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Claire Smith
Editor

Encyclopedia of Global Archaeology

Second Edition

Springer

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With 3841 Figures and 164 Tables

Springer

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Preface to the Second Edition

Archaeology – the study of human cultures through the analysis and interpretation of artifacts and material remains – continues to captivate and engage people on a local and global level. The significance of international heritage sites such as the pyramids – both Egyptian and Mayan – the Lascaux caves, the Taj Mahal, and Petra all provide insights into our ancestors and their actions and motivations. However, there is much more to archaeology than famous sites. When archaeologists are asked to elaborate about their job, they will touch on archaeological theory, chemistry, geology, history, classical studies, museum studies, ethical practice, and survey methods, along with the analysis and interpretation of their sites. Archaeology is a much broader subject than its public image and branches out to many other fields in the humanities and in the social and hard sciences.

The *Encyclopedia of Global Archaeology* provides a comprehensive and systematic coverage of archaeology that is unprecedented. It encompasses the breadth of the subject area along with those aspects that are tapped by other disciplines. In addition, it encompasses all time periods and regions of the world and all stages of human development. The entries range from succinct summaries of specific sites and the scientific aspects of archaeological enquiry, to detailed discussions of archaeological concepts, theories, and practice, the social and political dimensions of archaeology and archaeological ethics. The different forms of archaeology are explored, along with their respective techniques as well as the challenges, concerns, and issues that face archaeologists today.

This 18 volume *Encyclopedia of Global Archaeology* is available in both print and eReference versions. The print version of the second edition has 1964 contributions from 1630 authors and over 12729 cross-references. At the time of publication, many more entries have been commissioned for the eReference version. Through constant updating, the eReference version of the *Encyclopedia of Global Archaeology* will continue to access the best scholarship from around the world. Our aim is to ensure that this reference work will be as useful in 20 years as it is in two years.

An Encyclopedia for a Global World

The *Encyclopedia of Global Archaeology* was designed to be a definitive reference work for archaeologists, cultural heritage managers, and the general public. Its major aim is to disseminate global expertise in archaeology.

We have achieved this through four innovations: an unparalleled level of contributions from archaeologists who do not normally publish in English, the conscious inclusion of multiple perspectives on key topics, biographies of major archaeological figures from throughout the world, and the combination of print and continuously updated eReference publication.

The first major challenge for this encyclopedia was to access the best scholarship in the world. There was a fundamental problem, however: archaeological experts around the globe do not always write in English. For example, the problems of site conservation and preservation can be very different in different parts of the world – and the experts publish in their own languages. Some of the most advanced thinking on archaeological theory comes from South America, while the French and Spanish have the deepest knowledge of Upper Paleolithic rock art and the place to learn about large-scale urban excavations or historic reconstructions is Japan. The experts from these countries publish their research in their own language. While some also publish in English, many don't – and even scholars who speak English can be reluctant to publish in English, as they may not have the level of written competency to fully express the complexity of their ideas. Not all specialist knowledge is published in English.

The answer was to allow non-English-language speakers to contribute to the encyclopedia in their own language. This accessed a torrent of hitherto untapped expertise. Around 180 entries and more than 350,000 words in the *Encyclopedia of Global Archaeology* have been translated from French, Italian, Portuguese, Russian, German, and Spanish. In addition, many more entries were submitted by authors whose first language is Chinese, Japanese, or Turkish. Often, these entries involved significant editing, rewriting, and polishing in order to ensure academic standards and clear communication. This painstaking work was undertaken by me anthropologist Gary Jackson or by the editors of the relevant sections. The authors and translators often had to review several versions of the text, and did so without complaint. This cooperative and cosmopolitan approach has brought enormous strengths to the encyclopedia and produced something that is quite different to what has come before.

The second challenge was to maximize the value of the *Encyclopedia of Global Archaeology* as a teaching resource for schools, colleges, and universities. Some of the best learning is achieved through comparison and debate. Accordingly, we have included multiple and regional perspectives on key topics to facilitate comparisons, especially at a global level, and provided rich materials for classroom debates. The ethics of commercial archaeology, for example, has individual entries that provide perspectives from Australia, Brazil, Japan, Nigeria, Southern Africa, and the USA. While each entry provides an in-depth discussion of the issues that affect a particular region, taken together, these entries provide the materials required for students to undertake analyses of contrasts and comparisons at a global level.

The third challenge was to honor the work of archaeologists from across the world. The biographies, and occasional autobiographies, in the encyclopedia were commissioned by Section Editors or by myself as Editor on the basis of the contribution of particular archaeologists to specific disciplinary areas and also through recommendations from archaeologists in underrepresented countries. While we attempted to obtain some form of uniform global coverage in archaeological biographies, this was not possible as archaeology is at different stages of development in different parts of the world. The need to build archaeological capacity is greatest on the African continent. The small number of biographies of African archaeologists reflects the small number of archaeologists in the continent as a whole. While the vast majority of these archaeologists are located in South Africa, there are key nodes in countries such as Kenya and Nigeria. Sometimes these nodes are an outcome of capacity building that occurred as part of colonial processes, as with the life work of Charles Thurstan Shaw. Some biographies honor the work of archaeologists who spent their lives building capacity in a part of the world that is not their home country, as with the work of Betty Meggers in South America. All of the biographies provide insights into the life histories of archaeologists in various periods and in diverse parts of the world. Moreover, cultural attitudes are apparent in the profiles of biographies for each region. For example, while many Portuguese biographies are of mid-career archaeologists who are still alive, the majority of biographies of Japanese archaeologists are of people who shaped important aspects of the profession and have now passed away.

The final challenge was to harness the potential of an online environment not only to ensure global accessibility but also to enrich the encyclopedia's content. From the beginning, the *Encyclopedia of Global Archaeology* was conceived firstly as an online reference work, and then as a print reference. This interactive, online reference uses dynamic content to deepen discussions and to update material published in the print version, and to add information on new finds, or new ways of approaching the material. Hot links and extensive cross-references between keywords and related articles provide topics with greater depth and enable efficient searches in a user-friendly manner. The important innovation here is the continuous updating of entries and the ongoing addition of new entries to the eReference version. This will ensure that the encyclopedia maintains ongoing relevance.

So, what is different about the second edition of the *Encyclopedia of Global Archaeology*? Firstly, when we started the second edition, we knew it was built on a strong foundation. We gained confidence to experiment a little more as we came to appreciate that this flexible, international, interdisciplinary (sometimes postdisciplinary) approach to scholarship is successful. At the time of writing the encyclopedia has had nearly 400,000 downloads, according to Bookmetrics. Physical copies are in 348 WorldCat member libraries worldwide, and many more have access to the digital version. In 2019, the *Encyclopedia of Global Archaeology* was the third most cited and the fourth most downloaded of 804 books in Springer's 2014 Humanities, Law and Social Sciences collection. By early 2020, the first edition had been cited 635 times. We can be confident that people are using, and citing, this encyclopedia.

The first edition was well received. The highlight for me was a review essay by the editors of *Antiquity.* They stated that:

> The involvement of more than the usual English-language cohort of contributors definitely gives this encyclopedia a special character and strengthens its international credentials . . . it is easy to imagine recommending students to begin their research on almost any topic by consulting the entries in these volumes. As a starting point for research, the Encyclopedia—and especially its eReference version—would be a very welcome resource for any archaeology student. More broadly, as a snapshot of the discipline, it is unparalleled. (Chris Scarre and Robert Witcher, *Antiquity*, Vol. 89 (343), February, 2015)

The authors of chapters in this encyclopedia are distinguished senior and mid-career scholars, as well as early career researchers. Participation is by invitation only: each chapter was solicited from a scholar who is an expert in that particular field. Each chapter has been peer-reviewed by at least two referees. The chapters were rewritten taking into account the comments of referees. This enhances the quality of the work. Each chapter is a work of original scholarship. Even the review chapters include original scholarship in terms of the theoretical frameworks and interpretations that are taken to the material. With some 2,000 chapters the *Encyclopedia of Global Archaeology* encompasses a formidable body of original research.

For the second edition we consciously tried to fill gaps that exist in the first edition. At times, this has been difficult as we wanted to solicit the chapter from someone who is a specialist in that particular field of study. The glaring example for me is Hadrian's Wall. The first edition does not have a chapter on the archaeology of Hadrian's Wall. Neither does the print copy of the second edition – but the online version does. We needed to wait for Rob Collins of Newcastle University in the United Kingdom to fit writing the chapter on Hadrian's Wall into his schedule. So, rather than seeking this chapter from someone who is less expert on the subject matter, we waited. The success of this approach is apparent in the comments of one of the anonymous reviewers of this chapter:

> I have read through the submission on Hadrian's Wall and am very impressed. Rob is an established Wall expert and actively involved in both researching it, and teaching university students about it. As a result, the text is factually accurate, up-to-date with current thinking, and successfully distils a massive subject into a concise and original piece of text. I have never before written a review without any suggestions for improvements, but on this occasion I really don't think anything needs to be added (or taken away) or rethought. (Anonymous reviewer, 27 February 2020)

Hadrian's Wall is also the subject of an innovation of the second edition, the inclusion of experiential chapters in relation to major sites. Leslie Carlin has written an engaging, lyrical chapter, "Writing on the Wall," that significantly broadens our understanding of the experience of visiting Hadrian's Wall:

> The view is stunning. There is a wall, and there are the rolling green hills and heathered soil supporting – fertilizing – the wall. Nothing more, bar the stretching sky, blue and gray, over the narrow length of stone unspooling east and west . . . In a way, in the hold it has on the world's imagination, it circles the globe. The narrative of men from Rome and from its conquered lands, ranging from the eastern Mediterranean to northwest Africa, walking north and further north and building a wall for their emperor and homes and bathhouses and lives for themselves, is a small story about the bigger story of human migration. Those men left their graffiti and their genes behind. A rare African Y chromosome has been traced to a lineage in Leicester and may well have come from a soldier guarding Hadrian's Wall. (Carlin 2020, these volumes)

This expressive, experiential chapter by Leslie Carlin perfectly complements the deep archaeological knowledge of the chapter by Rob Collins, each adding depth to the other. I would be interested in developing this approach in future editions.

The second edition of the *Encyclopedia of Global Archaeology* is broader in concept than the original. It is informed by a definition of archaeology that I developed, partly through working on the encyclopedia, archaeology as "the study of human behaviour, past and present, through the analysis of material culture, both real and virtual, as situated within cultural landscapes" (Claire Smith, *Pyrenae*, Vol. 48 (1), April, 2017). In this edition of the encyclopedia, there is a greater emphasis on the virtual realm, evident in chapters such as Jordan Ralph and Tom Bowden's "Archaeology of internet memes," Dr. João Carlos Moreno de Sousa's "Internet use for archaeological education," and Paul Graves-Brown's "Archaeology of the internet." I imagine that more chapters in this vein will be published in the online editions of the encyclopedia.

I love the biographies, especially of those archaeologists from countries whose first language is not English. I have learnt a lot about the scholars who established archaeology in Japan, Argentina, Russia, India, and other parts of the world. I have learnt about their lives as well as their archaeological achievements. Many of us have exciting lives, even if we are not Indiana Jones, Lara Croft, or Nathan Drake. I was particularly taken with the biographies of Nancy Hatch Dupree and Louis Benjamin Dupree, written by the eminent scholar Charles C. Kolb. While traditional biographies of archaeologists tend to focus on the subject's archaeological career, we encourage authors to personalize their subjects. Professor Kolb delves into the backgrounds of the Duprees and really brings them to life. So, we learn that Nancy Hatch Dupree's first husband, Alan Wolfe, was assigned to Afghanistan in 1962 as a cultural attaché to the US Embassy but in reality he was the CIA station chief. This marriage ended when Nancy fell in love with Louis Dupree, in an unusual exchange of partners:

> Their extramarital love affair caused a scandal in Kabul, and by 1966 Nancy and Louis had divorced their respective spouses and married in February 1966 (Alan Wolfe and Ann Dupree also married each other). Nancy and Louis would stay in Afghanistan conducting research and writing until the Soviet invasion in 1978. (Kolb 2020, Nancy Hatch Dupree)

Given his association with Alan Wolfe, it is somehow not surprising that "Louis was arrested as a suspected spy by the pro-Soviet Afghan government in April 1978, cruelly interrogated, and ultimately expelled by the new Communist regime" (Kolb 2020, Louis B. Dupree). Regarding Louis Dupree's outstanding achievements in Afghan and Pakistani archaeology, readers are provided with the material to interpret these achievements in terms of his lifelong commitment to people in this region. We also learn that Louis Dupree was a US Army paratrooper in North Africa during the Second World War, and was awarded a Purple Heart and Bronze Star. In fact, his life seems quite like that of Indiana Jones to me:

> After being wounded during a jump, he went to the Philippines in the late 1944, parachuting behind Japanese lines to organize native guerrilla units – the

Hukbalahap – an experience that he later credited with having inspired his interest in ethnography . . .

> Following the Marxist coup d'etat in Afghanistan in April 1978, Louis Dupree was imprisoned and interrogated by Afghans and their Soviet KGB advisors before being released through the intervention of Afghan friends. (Kolb 2020, Louis B. Dupree)

The archaeological achievements of Nancy and Louis Dupree are presented within the wider context in which they lived:

> The Duprees had conceived and established a predecessor to the Afghanistan Centre at Kabul University (ACKU) in Peshawar. This activity was the Duprees' response to the looting or destruction of private, university, and public libraries in Kabul – much in the manner that the National Museum collections had been decimated ... By 1999 Nancy had amassed 7,739 titles written in Pashto, Dari, and several European languages. She returned to Kabul in 2005, smuggling in a unique collection of 35,000 documents in 300 plastic fertilizer sacks. Two years later, the Afghanistan Centre at Kabul University was physically established on the Kabul campus. (Kolb 2020, Nancy Hatch Dupree)

As with the Duprees, each biographical chapter in this encyclopedia allows the reader to obtain insights from other chapters. It is simple to find these links between people, and other subject matter, through the cross references. I enjoin you to read all the biographies – it seems to me that this is a shortcut to learning about world archaeology within the context of the time.

Welcome to the second edition of the *Encyclopedia of Global Archaeology.* I have read, and learnt from, every chapter. I hope that you, too, will enjoy and learn from the material you read in this encyclopedia. Finally, I return to the review in *Antiquity*:

> The city's panegyrists described it [Rome] as a cosmopolis, a place where the full diversity of the known world—its peoples, ideas, animals, plants and things of every kind—could be experienced in a single place. Such is the *Encyclopedia of Global Archaeology.* (Chris Scarre and Robert Witcher, *Antiquity*, Vol. 89 (343), February, 2015)

Professor Claire Smith

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15 July 2020

Preface to the First Edition

Archaeology – the study of human cultures through the analysis and interpretation of artifacts and material remains – continues to captivate and engage people on a local and global level. The significance of such international heritage sites such as the pyramids – both Egyptian and Mayan – the Lascaux caves, Stonehenge, and Petra all provide insights into our ancestors and their actions and motivations. However, there is much more to archaeology than famous sites. When archaeologists are asked to elaborate about their job, they will touch on archaeological theory, chemistry, geology, history, classical studies, museum studies, ethical practice, and survey methods, along with the analysis and interpretation of their sites. Archaeology is a much broader subject than its public image and branches out to many other fields in the social and hard sciences.

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This 11 volume *Encyclopedia of Global Archaeology* is available in both print and eReference versions. The print version has 1,625 contributions from 1,356 authors and over 11,634 cross-references. At the time of publication, another 200 entries have been commissioned for the eReference version. Through constant updating, the eReference version of the *Encyclopedia of Global Archaeology* will continue to access the best scholarship from around the world. Our aim is to ensure that this reference work will be as useful in twenty years as it is in two years.

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The first major challenge for this encyclopedia was to access the best scholarship in the world. However, there was a fundamental problem – archaeological experts around the globe do not always write in English. The best scholars from throughout the world write in a variety of languages. For example, the problems of site conservation and preservation can be very different in different parts of the world – and the experts publish in their own languages. Moreover, not all specialist knowledge is published in English. Some of the most advanced thinking on archaeological theory comes from South America, while the French and Spanish have the deepest knowledge of Upper Paleolithic rock art and the place to learn about largescale urban excavations or historic reconstructions is Japan. The experts from these countries publish their research in their own language. While some also publish in English, many don't – and even scholars who speak English can be reluctant to publish in English, as they may not have the level of written competency to fully express the complexity of their ideas.

The answer was to allow non-English-language speakers to contribute to the encyclopedia in their own language. This accessed a torrent of hitherto untapped expertise. Around 140 entries and more than 300,000 words in the *Encyclopedia of Global Archaeology* have been translated from French, Italian, Portuguese, Russian and Spanish. In addition, many more entries were submitted by authors whose first language is Chinese, German, Japanese, or Turkish. Often, these entries involved significant editing, re-writing, and polishing in order to ensure academic standards and clear communication. This painstaking work was undertaken by the editors of the relevant sections and by myself. The authors and translators often had to review several versions of the text, and they did this without complaint. This cooperative and cosmopolitan approach has brought enormous strengths to the encyclopedia and produced something that is quite different to what has come before.

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underrepresented countries. While we attempted to obtain some form of uniform global coverage in archaeological biographies, this was not possible as archaeology is at different stages of development in different parts of the world. The need to build archaeological capacity is greatest on the African continent. The small number of biographies of African archaeologists reflects the small number of archaeologists in the continent as a whole. While the vast majority of these archaeologists are located in South Africa, there are key nodes in countries such as Kenya and Nigeria. Sometimes these nodes are an outcome of capacity building that occurred as part of colonial processes, as with the life work of Charles Thurstan Shaw. Some biographies honor the work of archaeologists who spent their lives building capacity in a part of the world that is not their home country, as with the work of Betty Meggers in South America. All of the biographies provide insights into the life histories of archaeologists in various periods and in diverse parts of the world. Moreover, cultural attitudes are apparent in the profiles of biographies for each region. For example, while many Portuguese biographies are of mid-career archaeologists who are still alive, the majority of biographies of Japanese archaeologists are of people who established important facets of the profession and have now passed away.

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This interactive, online reference uses dynamic content to deepen discussions and to update material published in the print version, and to add information on new finds, or new ways of approaching the material. Hot links and extensive cross-references between keywords and related articles provide topics with greater depth and enable efficient searches in a user-friendly manner. The important innovation here is the continuous updating of entries and the addition of new entries to the eReference version. This will ensure that the encyclopedia maintains ongoing relevance.

Adelaide, Australia Professor Claire Smith
15 July 2013

Acknowledgments

My motivation to produce an encyclopedia originated in my childhood, when my mother, Annette Smith, used her hard-won wages to purchase weekly installments of the *Columbia Encyclopedia*, a one-volume encyclopedia produced by Columbia University Press. Each week, my sister, Jo, and I would take pleasure in discussing the newest entries with our mother. It was in these conversations that we learnt a love of scholarship. Decades later, in 2008, the genesis of the *Encyclopedia of Global Archaeology* arose out of a conversation between Teresa Krauss, a now very senior editor at Springer, and myself over lunch at a restaurant in Vancouver. Teresa drove much of the early conception of the encyclopedia. Later, I asked her "what is the best book you have commissioned?" She answered "Your encyclopedia." While this may seem as a complementary statement to make, it wasn't really. The *Encyclopedia of Global Archaeology* was Teresa Krauss' idea, not mine – so she was really congratulating herself! My first discussions with Teresa were followed by workshops and meetings in Atlanta, Dublin, Memphis, Hawaii, and, regularly, New York. It took five years to bring the first edition of this encyclopedia to fruition in 2014. In the six years since then, new chapters have been commissioned and existing chapters subject to continual updating. In the process, the *Encyclopedia of Global Archaeology* has become a much-loved constant in my daily workflow.

While this encyclopedia is much more than the sum of its parts, each of these parts have been essential to the final product. There are many people to thank. I am grateful to the individual authors, who have shared their knowledge and expertise. The vision and architecture of this encyclopedia has been steered by the International Advisory Board, while the untiring efforts of Section Editors have ensured that high quality and polished entries came in on time. In addition, I thank the members of our editing and production team, which includes all of the translators, but especially Lilén Malugani Guillet from Universidad Nacional de Catamarca in Argentina; administrative assistant for the first edition, Cristina Lanteri; in-house editors, Christine Hausmann for the first edition and Aparajita Basu for the second edition; my current editors at Springer, Michael Hermann, Andrew Spencer, and Christi Lue (Teresa Krauss, naturally, got promoted); and the managing editor for the first edition, Jo Smith. I am grateful especially to my husband, anthropologist Gary Jackson, who undertook the English language polish of many chapters. He encourages and guides me in all my projects, no matter how impossible they may seem when I start.

Those who seek insight into the role of the editor should look up the YouTube clipping "C is for Contrafibularity," from the BBC program Blackadder, in which the writer Samuel Johnson celebrates having completed his lifework of a dictionary with every word in the English language – only to be accosted by a host of new words. Like the English language, archaeology is constantly changing and growing. While this is the most globally comprehensive encyclopedia of archaeology produced to date, it is not possible to have an entry on every possible subject. People should use this encyclopedia as a first stop for obtaining information on a topic and as a directory to further specialist information. Those seeking greater knowledge on a specific topic should use the reading lists provided to identify specialist publications. Readers should be prepared for some of these readings to be in a language other than English.

The translated entries, which are a critical and definitive characteristic of this encyclopedia, have been made possible through support from Springer-Verlag and through two grants from Flinders University in South Australia, one from the Faculty of Education, Humanities and Law and one from the School of Humanity. This support has allowed the encyclopedia to contribute to the democratization of archaeology globally. By accessing the work of the finest scholars, no matter what language they write in, we have replaced English-language networks with multi-lingual, international networks and produced an encyclopedia that is truly global in scope.

Adelaide, Australia Professor Claire Smith
July 2020

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Section Editor: *Gary Jackson*

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Section Editors: *Jordan Ralph* and *Troy Lovata*

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Section Editors: *Geoff Bailey* and *Wendy van Duivenvoorde*

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Section Editor: *Vicky Kynourgiopoulou*

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Zimbabwe's World Heritage Sites

About the Editor

Claire Smith is an anthropological archaeologist. She decodes patterns in human behaviors to interpret the past, understand the present, and envisage the future. The materials she analyzes range from rock art, statues, and monuments to memorials, graves, and social media. She has produced 13 books and more than 160 publications in English, Spanish, Catalan, Arabic, Russian, Portuguese, and Japanese. She is committed to intellectually enriching academia by strengthening the global impact of research by scholars from low-income countries. She has worked with the Aboriginal community of Barunga, Northern Territory, Australia, since 1990 and with Ngadjuri people in South Australia since 1998. Her current research interests are focussed on heritage, health, and well-being. In 2018, the Royal Anthropological Institute awarded Claire Smith the Lucy Mair Medal and Marsh Award, for sustained research with Australian Aboriginal communities that has contributed to human dignity.

Section Editors

Editor's Choice Biographies

Claire Smith is an anthropological archaeologist. She decodes patterns in human behaviors to interpret the past, understand the present, and envisage the future. The materials she analyzes range from rock art, statues, and monuments to memorials, graves, and social media. She has produced 13 books and more than 160 publications in English, Spanish, Catalan, Arabic, Russian, Portuguese, and Japanese. She is committed to intellectually enriching academia by strengthening the global impact of research by scholars from low-income countries. She has worked with the Aboriginal community of Barunga, Northern Territory, Australia, since 1990 and with Ngadjuri people in South Australia since 1998. Her current research interests are focussed on heritage, health, and well-being. In 2018, the Royal Anthropological Institute awarded Claire Smith the Lucy Mair Medal and Marsh Award, for sustained research with Australian Aboriginal communities that has contributed to human dignity.

Agriculture and Domestication

Dorian Q. Fuller is Professor of Archaeobotany at the University College London. He has worked on plant assemblages from many regions, including South Asia, West Asia, sub-Saharan Africa, mainland Southeast Asia, China, and parts of Europe, with a particular focus on Neolithic Archaeobotany and documenting plant domestication. He is also "Thousand Talents" Visiting Professor at Northwest University, Xi'an, China.

Archaeological Science

E. Christian Wells is Professor of Anthropology and Director of the Center for Brownfields Research & Redevelopment at the University of South Florida, where he has served previously as the Founding Director of the Office of Sustainability and as Deputy Director of the School of Global Sustainability. Wells, a Fellow of the American Association for the Advancement of Science, is an environmental anthropologist with expertise in archaeological science, especially as it pertains to the chemistry soils, clays, and other earthen substances.

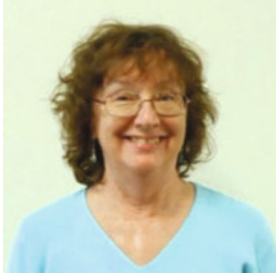

Arleyn W. Simon is Associate Research Professor Emeritus at Arizona State University, Tempe. She directed the Archaeological Research Institute at ASU for 20 years, now CASR, in the School of Human Evolution and Social Change. She taught classes in Southwest ceramic analysis and museum collection management for 30 years. Her specialties are Southwestern Archaeology, particularly central Arizona, materials analysis, 3D modeling, and quantitative methods.

Archaeology in the Modern World

Paul R. Mullins is Professor in the Department of Anthropology at Indiana University-Purdue University, Indianapolis (IUPUI), Docent in Historical Archaeology at the University of Oulu (Finland), and Past President of the Society for Historical Archaeology (2012–2013). He is the author of *Race and Affluence: An Archaeology of African America* and *Consumer Culture (1999).*

John Schofield is Director of Studies in Cultural Heritage Management at the University of York, UK. Prior to his appointment at York in 2010, John spent 21 years in heritage protection and policy at English Heritage where he developed specialisms in contemporary, conflict, and landscape archaeology.

Archaeology of Art

Inés Domingo Sanz is ICREA Research Professor at the University of Barcelona and Vice President of the World Archaeological Congress. Her research explores the archaeologies of art from a multidisciplinary and a multiscale approach and it is currently funded by an ERC CoG Grant: LArcHer Project.

Danae Fiore graduated from UBA (Universidad de Buenos Aires, Argentina) and received her MA and PhD degrees from the University College London. Danae is currently a Researcher at CONICET (National Council of Scientific and Technological Research, Argentina) and an Associate Professor at UBA. Her main research interests are the archaeology of art, archaeological theory and methods, visual archaeology, and cultural heritage studies. Her work has mainly focused in regional projects in Patagonia and Tierra del Fuego, where she combines archaeological and ethnographic lines of research. She has published numerous papers in academic journals and chapters in edited books. Danee has co-edited four books and co-authored one. She has also published three books for children, several articles for the general public, as well as book chapters in school textbooks.

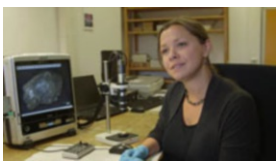

Ewa Dutkiewicz specializes in Paleolithic art studies. She is Curator of the Stone Age Department at Museum für Vor- und Frühgeschichte Staatliche Museen zu Berlin – Stiftung Preußischer Kulturbesitz in Berlin.

Bioarchaeology and Human Osteology

Soren Blau is the Manager of Human Identification and Senior Forensic Anthropologist at the Victorian Institute of Forensic Medicine. She is an Adjunct Professor in the Department of Forensic Medicine at Monash University; Founding Fellow of the Faculty of Science, The Royal College of Pathologists of Australasia; and recipient of a Churchill Fellowship (2013). Soren is also currently the Chair of the Forensic Anthropology Technical Working Group (National Institute of

Forensic Sciences, Australia) and a member of the INTERPOL Disaster Victim Identification Pathology and Anthropology Sub-Working Group.

Luis Fondebrider was born in Argentina, where he obtained his degree in Cs. Anthropological from the University of Buenos Aires (UBA). In 2014, he was distinguished by the UBA with the title of Doctor Honoris Causa. After the return of democracy to Argentina, in 1984, together with a group of students of archeology, anthropology, and medicine, and under the guidance of the American anthropologist Dr. Clyde Snow, he founded a non-governmental organization called the Argentine Team of Forensic Anthropology (EAAF) with the objective of scientifically documenting the human rights violations that had occurred in Argentina between 1976 and 1983. As a member of the EAAF, Dr. Fondebrider has participated as an expert before Argentine courts in more than 1,200 cases. EAAF has carried out investigative cases of political/ethnic violence in 50 countries around the world. Dr. Fondebrider, as a member of the EAAF, participated and/or co-led research and advisory missions in America, Africa, Europe, Middle East, and Asia-Pacific.

Douglas H. Ubelaker is a Curator and Senior Scientist at the Smithsonian Institution in Washington D.C. and served as the President of the American Academy of Forensic Sciences from 2011 to 2012. He has published extensively regarding his research interests in methods of extracting information from human skeletal remains and applications in forensic anthropology and bioarcheology.

Classical Archaeology

Jeffrey A. Becker is a Mediterranean archaeologist teaching at Binghamton University (State University of New York at Binghamton) in the USA. He also serves as an Editor for the Pleiades gazetteer and Smarthistory.org. His research centers on Roman architecture and urbanism.

Conservation and Preservation

Richard McClary completed his PhD at the University of Edinburgh in 2015, on Rum Seljuq Architecture, and then held a Leverhulme Trust Early Career Fellowship in Edinburgh, working on Qarakhanid architecture. Since 2019, he has been a Lecturer in Islamic Art and Architecture at the University of York. He has published two monographs and numerous articles and book chapters on medieval Islamic architecture and ceramics.

Douglas C. Comer has long experience in conducting research and developing management plans for protected areas, which he has done in every inhabited continent. He has published widely on archaeology, heritage and heritage management, as well as the use of aerial and satellite remote sensing technologies for the detection of heritage sites and environmental analysis and characterization. He is President of the United States National Committee of the International Council on Monuments and Sites (US/ICOMOS), Vice President of the ICOMOS Advisory Committee, Chair of the ICOMOS National Committee Council, and Immediate Past President of the ICOMOS Scientific Committee on Archaeological Heritage Management (ICAHM). He is also President of Cultural Site Research and Management, Inc., and President of the CSRM Foundation.

Cultural Heritage Management

Thanik Lertcharnrit is an Associate Professor of Archaeology and CRM Program Executive Board Member in the Department of Archaeology at Silpakorn University in Bangkok. He earned his BA with honors in Archaeology from the Department of Archaeology at Silpakorn University in Bangkok and MA and PhD degrees from the Department of Anthropology at Washington State University in Pullman, WA, USA.

Environmental Archaeology

Mike Morley is Associate Professor of Archaeological Science at Flinders University. He is a geoarchaeologist specializing in the reconstruction of past environments to contextualize archaeological narratives. Mike primarily works in Africa, Southeast Asia, and Australia, focusing primarily on the analysis of cave, rock-shelter, and fluvial sediments and what they can tell us about the habitats and environments that our Pleistocene ancestors interacted with. He is currently an Australian Research Council (ARC) Future Fellow, leading a project that aims to reconstruct the site and local environments that existed during periods of occupation and non-occupation of key archaeological and fossil sites in Pleistocene Southeast Asia and Australia. Mike uses a range of analytical techniques working at multiple scale, from micromorphology to geomorphology.

Ethics

Anna M. Kotarba-Morley is a Lecturer in Archaeology at Flinders University, Adelaide, South Australia. She is a Coastal and Maritime Archaeologist, Anthropologist, and Cultural heritage Expert with over a decade and a half experience in academia, museum, and consultancy sectors. Ania's extensive archaeological and heritage experience have been gained on sites in over 30 countries of the Near and Middle East, North and sub-Saharan Africa, South Asia, the Mediterranean, and the Black Sea, on numerous sites in the Northern and Western Europe, and recently in the Pacific Region, including in Australia and the Republic of Kiribati, Micronesia, and Remote Oceania. Ania is active in the field of teaching and research mostly connected with sustainability archaeology and risk preparedness and responses for cultural heritage sites and communities at risk of climate change and natural disaster.

Field Archaeology

Sandra Montón-Subías is an Archaeologist with broad interests in social and theoretical archaeology. She is currently an ICREA Research Professor at Universitat Pompeu Fabra (Barcelona, Spain), co-directs archaeological excavations in Guam, and investigates the intimate connection between material culture and gender in the making of the early modern colonial globalization. Sandra's recent publications include *Gender, Missions, and Maintenance Activities in the Early Modern Globalization: Guam 1668–98* (IJHA 2019), *Modern Colonialism, Eurocentrism and Historical Archaeology: Some Engendered Thoughts* (EJA 2018), *Archaeologies of Early Modern Spanish Colonialism* (Springer 2016), and *The Archaeology of Bronze Age Iberia: Argaric Societies* (Routledge 2014).

Bisserka Gaydarska is a specialist in Balkan and European prehistory with interests in archaeological method and theory, early urbanism, interdisciplinary studies, and identity.

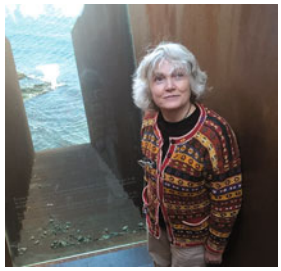

Extreme Environments

Vivian Scheinsohn is Full Professor at the University of Buenos Aires and Researcher at the CONICET (Scientific and Technical National Research Council). She is directing an archaeological project in Patagonia since 2009.

Geographical and Cultural Overview Essays

Marcel Otte is mostly involved in the study of Upper Paleolithic Civilizations in the whole of Eurasia and especially their aesthetic and mythological aspects. He has been excavating different places across this region, from Portugal to Siberia. He is also interested in the mechanical evolution processes that explain human evolution – from the cultural behavior to the anatomy – by epi-genetic factors.

Historical Archaeology

Patricia Fournier was born in Mexico City. She has a PhD in Anthropology from the Universidad Nacional Autónoma de México. She is a Senior Professor of Archaeology at the Escuela Nacional de Antropología e Historia, Mexico City. She is specializes in Historical Archaeology, Ethnoarchaeology, and Archaeometry. Her recent publications include "Indigenous Charcoal Production and Spanish Metal Mining Enterprises: Historical Archaeology of Extractive Activities and Ecological Degradation in Central and Northern Mexico" in *Historical Archaeology and Environment*, edited by Marcos André Torres de Souza and Diogo Menezes Costa, Springer (2018); "Material Culture, Status, and Identity in Postindependence Central Mexico: Urban and Rural Dimensions" in *Colonial and Postcolonial Change in Mesoamerica: Archaeology as Historical Anthropology*, ed. by Rani T. Alexander and Susan Kepecs, University of New Mexico Press (2018).

History of Archaeology

Anke Hein is Peter Moores Associate Professor in Chinese Archaeology at the University of Oxford and a Fellow of St Hugh's College. She is an Anthropological Archaeologist focusing on prehistoric and early historic China, and her main research interests lie with identity formation and human–environment interaction in general as well as culture contact and ceramic technology in particular. She is currently involved in field projects on the eastern rim of the Tibetan Plateau and in Northwest China, and she is working on heritage data from the earliest excavations in Northwest China held in the Museum of Far Eastern Antiquities in Stockholm.

Human Evolution/Peopling of the World

Chen Shen is a Senior Curator of Chinese Art and Culture, currently serving as Vice President and Head of the Department Art and Culture at Royal Ontario Museum, Toronto, Canada, and is cross-appointed as Professor in the Department East Asian Studies, University of Toronto.

Hunter-Gatherer and Mid-range Societies

Anna Marie Prentiss is Regents Professor of Anthropology at the University of Montana, Missoula. Her research interests include evolutionary process, lithic technology, and development of indigenous fisher-hunter-gatherer traditions in North America's Rocky Mountains, Pacific Northwest, and Arctic regions. She has published over 75 peer-reviewed books, journal articles, and book chapters.

Indigenous Archaeology

Ndukuyakhe Ndlovu is a Senior Lecturer in the Department of Anthropology and Archaeology at the University of Pretoria. He completed his PhD at Newcastle University, UK. Ndukuyakhe has 20 years' experience in heritage management, during which he was employed by provincial as well as national heritage authorities. He later served on the councils of two heritage authorities. Ndukuyakhe is currently the Editor-in-Chief of the South African Archaeological Bulletin, Secretary for the World Archaeological Congress, and a Member of Council for the Association for Southern African Professional Archaeologists (ASAPA) and the South African Archaeological Society (SAAS).

Legislation

Angela M. Labrador is an Anthropologist with a background in Archaeology, IT, and Cultural Policy. Angela is a Managing Partner of Coherit Associates LLC, an international cultural heritage–consulting firm based in the USA. She is a certified Project Archaeology Master Teacher and has taught university courses and professional development workshops on topics related to heritage legislation, national frameworks for heritage inventories, and engaging the public in the stewardship of heritage resources. She recently co-edited *The Oxford Handbook of Public Heritage Theory and Practice* (2018), published by Oxford University Press.

Medieval and Islamic Worlds

Tadhg O'Keeffe is Full Professor of Archaeology at the University College Dublin. He has written and lectured extensively on medieval architecture, landscape, and settlement. He also maintains an active research interest in Historical Archaeology, Heritage Studies, and Archaeological Theory.

Alison Gascoigne is Associate Professor of Archaeology at the University of Southampton, UK, which she joined in 2007 following a PhD and Postdoctoral Research at the University of Cambridge. Her primary research interests concern cultural change in the Islamic-era Middle East, with a particular focus on urbanism and ceramic assemblages. She has extensive field experience particularly in Egypt, where she has recently completed a major survey of Tell Tinnis in the north Nile Delta. She has also worked in Cairo, in the Nile Valley, and in the western desert as well as in Afghanistan and Uzbekistan.

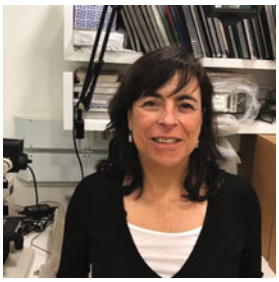

Museums

Sonia Archila obtained her PhD degree in 2000 from UCL, UK. At present, she is an Associate Professor in the Department of Anthropology, University of Los Andes, Colombia. Study of human–environmental interactions through time and social memory construction, particularly in relation to traditional knowledge of natural resource uses and archaeological heritage, are her main research interests.

Near East (Ancient, Pre-Achaemenid)

Laura Culbertson specializes in Ancient Near Eastern History Studies and Mesopotamian Studies in particular. She teaches in Middle Studies at American Public University.

Near East (Hellenistic and Roman)

Marta Żuchowska, Archaeologist and Sinologist, works as a Lecturer at the Institute of Archaeology, University of Warsaw. Between 1995 and 2010, she was a Member of the Polish Archaeological Mission at Palmyra, Syria. Her scientific work focuses on the issues of long-distance trade in Asia. She published many works concerning Palmyra and its special place in the trade of the Roman Empire.

Political and Social Archaeology

Uzma Z. Rizvi is Associate Professor of Anthropology and Urban Studies at the Pratt Institute, Brooklyn, NY, and a Visiting Professor at Shah Abdul Latif University, Khairpur, Pakistan. Rizvi's research interests include decolonizing archaeology, ancient urbanism, critical heritage studies, new materialism, and the postcolonial critique. A primary focus of her work contends with archaeological epistemologies and methodologies, and changed praxis based on decolonized principles and participatory ethics. Rizvi has intentionally interwoven archaeology with cultural criticism, philosophy, critical theory, art, and design.

Public Archaeology/Education

Marcia Bezerra is a Professor of Archaeology at the Universidade Federal do Pará in Brazil. Her research in the Amazon has covered themes like collecting, narratives of heritage, archaeology in popular culture, and teaching archaeology. She was the President of the Society of Brazilian Archaeology (SAB) and is a former WAC´s Southern America Junior Representative.

Mariana Petry Cabral is Professor of Archaeology at the Federal University of Minas Gerais (UFMG), Brazil. She has experience with indigenous archaeologies and collaborative projects, with extensive work in the Brazilian Amazon and indigenous history.

Religion and Sacred Spaces

Gary "Jacko" Jackson is a reluctant Anthropologist and Adventurer. He has worked with the Barunga Aboriginal community in the Northern Territory, Australia, since 1990. He also works with Ngadjuri people in South Australia. He is an Adjunct Senior Researcher at the College of Humanities, Arts and Social Sciences, Flinders University, South Australia.

Theory

Jordan Ralph is an Archaeologist who specializes in the archaeology of the contemporary past as well as Indigenous Australian archaeology. Jordan has worked in collaboration with people from Barunga, a remote Australian Aboriginal community, for a decade, where his research has focused on social justice and interrogating the material manifestations of government intervention.

Troy Lovata is a Professor in the interdisciplinary Honors College at the University of New Mexico in the USA, where much of his work has focused on the presentation of the past, the social role of material culture, and the cultural landscapes of the past and present. He earned a cum laude Bachelor of Arts in Anthropology from Colorado State University and both a Master of Arts and Doctorate in Anthropology, with a focus on Archaeology, from the University of Texas.

Underwater and Maritime Archaeology

Geoff Bailey is Anniversary Professor Emeritus of Archaeology at the University of York, UK, Visiting Professor at Flinders University, Australia, and Chairman of the EU COST Action "Submerged Prehistoric Archaeology and Landscapes of the Continental Shelf" (SPLASHCOS). His

research interests are in the archaeology of coastlines, submerged landscapes, and Quaternary landscape evolution, and he has led major projects in Australia, Greece, Saudi Arabia, and the UK. He is a Fellow of the Society of Antiquaries of London, Member of the Academia Europaea, and Corresponding Fellow of the Australian Academy of the Humanities.

Wendy van Duivenvoorde is an Associate Professor of Maritime Archaeology at the College of Humanities, Arts and Social Sciences, Flinders University, South Australia. She is an expert in late sixteenth- and early seventeenth-century Dutch shipbuilding. Her studies primarily focus on ships of exploration and Indiamen, and include the archaeological remains of Western Australia's Dutch East Indiamen shipwrecks. She has conducted research on the metal fasteners and anchors excavated from ancient Mediterranean merchantmen such as the Tektaş Burnu (±440–425 B.C.) and Kyrenia (third century B.C.) shipwrecks.

World Heritage

Vicky Kynourgiopoulou is Dean of Academic Affairs at Loyola University Chicago, Rome campus, and Professor of Cultural Heritage Studies. Since 2003, she is Chief Advisor at UNESCO and EU for the sustainable development of heritage sites, capacity building, and knowledge management in the Mediterranean and MENA region.

International Advisory Board

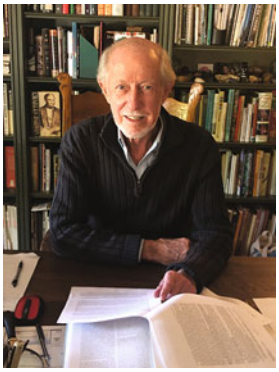

Neville Agnew has worked in the field of cultural heritage preservation in Australia and the USA for 40 years. He is a Principal Project Specialist with the Getty Conservation Institute in Los Angeles, California, where his projects deal with the conservation and management of archaeological sites, monuments, rock art, and outdoor sites in many parts of the world. He has a Ph.D. in chemistry.

Mitchell Allen is a Research Associate at the Archaeological Research Facility, UC Berkeley, and in the Department of Anthropology, Smithsonian Institution. He also runs Scholarly Roadside Service, a scholarly publishing consulting company, after founding and managing two independent archaeology-focused presses, AltaMira Press and Left Coast Press. Currently, he is writing up the results of a legacy survey project in Afghanistan, on which he was a field archaeologist in the 1970s.

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Kate Clark is an Industrial Archaeologist with a career in museums and heritage in Australia and the UK, including Ironbridge Gorge Museums, English Heritage, the Heritage Lottery Fund, Sydney Living Museums, and Cadw in Wales. She is Visiting Professor of Heritage Valuation at the University of Suffolk and writes about archaeology, heritage management, and the many different ways in which we value heritage. Her new book,

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Margaret Miller specializes in the archaeology and material culture of the ancient Mediterranean. She publishes widely on cultural relations between first millennium BC Greece, Anatolia, and the ancient Near East, especially relations within and with the Persian Empire. She has a long-standing interest in the exploitation of archaeology as a tool of social history, whether Greek drama or domestic life.

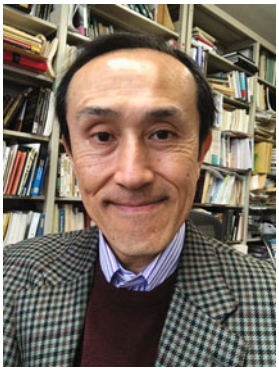

Koji Mizoguchi is Professor of Archaeology in the Faculty of Social and Cultural Studies, Kyushu University, Japan. He is the current President of the World Archaeological Congress. His research topics and areas cover social archaeology, archaeological theory, the Yayoi and Kofun periods of Japan, the Neolithic and the Bronze Age of Europe, and the Shang dynastic period of China.

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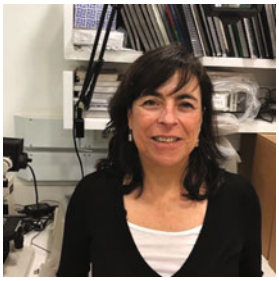

Sonia Archila Montañez obtained her Ph.D. degree in 2000 from UCL, UK. At present, she is an Associate Professor in the Department of Anthropology, University of Los Andes, Colombia. Study of human–environmental interactions through time and social memory construction, particularly in relation to traditional knowledge of natural resource uses and archaeological heritage, are her main research interests.

George P. Nicholas is Professor of Archaeology at Simon Fraser University and is Co-Principal Investigator on several international research projects. He is an Adjunct Faculty Member in Archaeology at Flinders University in Adelaide, South Australia, and Visiting Professor, Center for Ainu and Indigenous Studies, Hokkaido University, Japan. His current work investigates intangible heritage, indigenous archaeology, and traditional knowledge and archaeology and promotes heritage as a human right and archaeology as a tool of social justice.

Muiris O'Sullivan is Emeritus Professor of Archaeology at the University College Dublin where he formerly served as Head of the UCD School of Archaeology.

He has published extensively on passage tombs and prehistoric rock art and was the Lead Archaeological Consultant for the recently launched new visitor experience at Brú na Bóinne a UNESCO World Heritage Site incorporating the great passage tomb complexes at Newgrange, Knowth, and Dowth. He also serves on the Comité Scientifique for Paysages de Mégalithes de Carnac et du Sud Morbihan in France. He was appointed to the Irish Heritage Council in 2016.

Luiz Oosterbeek is Professor at the Polytechnic Institute of Tomar, Principal Investigator of the Quaternary and Human Adaptations Cluster of Geosciences Centre at Coimbra University, and Secretary General of the International Council for Philosophy and Human Sciences. His research interests include origins of farming, rock art, heritage, landscape management (in Portugal, Africa, Latin America). He is the Editor of over 300 papers and 50 books. He is also former SG of UISPP and UNESCO Chair Holder of "Humanities and Cultural Integrated Landscape Management."

Charles E. Orser Jr., is an Anthropological Historical Archaeologist who investigates the modern world as it was created after about 1492. He is the Editor of over 90 professional articles and several books, most recently *An Archaeology of the English Atlantic World, 1600–1700* (Cambridge University Press, 2018). He is the Founder and Editor of the *International Journal of Historical Archaeology*, and in 2019, he received the Society for Historical Archaeology's highest award, the J. C. Harrington Medal, for lifetime achievement in the discipline.

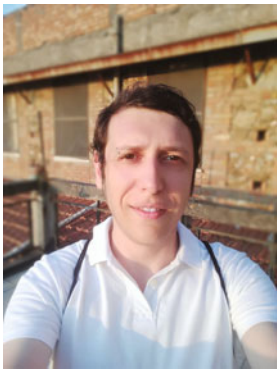

Dario Piombino-Mascali is a Research Professor at Vilnius University, Lithuania. He is a Bioarchaeologist who specializes in mummy studies. In 2007, he was awarded a Doctorate in Paleoanthropology and Pathocoenosis from Pisa University. In 2008, Dario was appointed as a Senior Researcher in Paleopathology at the European Academy of Bolzano. Two years later, he became the Scientific Curator of the Capuchin Catacombs of Palermo. He joined Vilnius University in 2013 as a Visiting Scholar in Anatomy, Histology, and Anthropology and was promoted to Research Professor in 2018. Dario has published extensively in the areas of biological and forensic anthropology as well as in bioarchaeology, and has investigated a wide

range of human remains, including the South Tyrolean Iceman, the mummies found in several European crypts and churches, Egyptian mummies, old anatomical specimens, and the so-called "fire mummies of the Philippines. Dario is a also specialist for the study and conservation of Catholic relics.

Gustavo G. Politis obtained his Ph.D. from Universidad Nacional de La Plata, Argentina, in 1984. He is currently Researcher at the Consejo Nacional de Investigaciones Científicas y Técnicas de Argentina (CONICET) and Professor at the Universidad Nacional del Centro de la Provincia de Buenos Aires and at the Universidad Nacional de La Plata, Argentina. He has published five books (including Nukak. Ethnoarchaeology of an Amazonian People, UCL Series, Left Coast Press 2007) and edited another six (including Archaeology in Latin America, Routledge 1999). Gustavo has also published more than a hundred and forty articles in peer-reviewed journals and book chapters. His main research interests are the archaeology of the Pampas of Argentina, the expansion of Homo sapiens in South Americas, and the ethnoarchaeology of South American hunter-gatherers. Gustavo is also interested in archaeological theory and in the sociopolitics of archaeology in Latin America.

Nathan Schlanger, Professor of Archaeology at Ecole Nationale des Chartes, Paris, is researching and publishing on material culture studies, on archaeological heritage management, and on the history and politics of archaeology.

Stephen Shennan is Professor of Theoretical Archaeology at the UCL Institute of Archaeology, where he was Director 2005–2014. His main interest is explaining stability and change in prehistory in the light of evolutionary ideas. He has published over 120 papers and books, including *Quantifying Archaeology* (2nd edition 1997), *Genes, Memes and Human History* (2002), and T*he First Farmers of Europe: An Evolutionary Perspective* (2018). He is a Fellow of the British Academy and a Member of the Academia Europaea. He received the Rivers Medal of the Royal Anthropological Institute in 2010 and a Shanghai Archaeological Forum Research Award for his EUROEVOL project in 2015.

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Sharon Sullivan is an Australian Archaeologist and Advocate of Indigenous Australian Rights. She has written five books on heritage management. Sharon is best known for her work in establishing protocols and programs for cultural heritage management in Australia, most notably through The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance.

Henry Tantaleán is Professor at the National University of San Marcos, Lima, Peru, and Co-Director of the Chincha Archaeological Program. His research interests include Andean archaeology, theoretical archaeology, origins of the prehistoric state, and relation between archaeology and politics.

Sandra L. Lopez Varela is a Professor at the Universidad Nacional Autónoma de México, holding a position in HeritagePpreservation and Management in the Faculty of Philosophy and Letters. As an Anthropological Archaeologist, her recent research adopts a critical approach to economic and development growth policies to combat poverty in Mexico, which has endowed her with the Friedrich Wilhelm Bessel-Forschungspreis Award of the Alexander von Humboldt Foundation. Her publications approach heritage in land-use plans, planning and development, public policies, indigenous populations, and business and marketing.

Karen D. Vitelli retired from the Anthropology Department at Indiana University, Bloomington, in 2005 and now lives in Mid-Coast Maine. She was on committees that wrote the professional codes of ethics for the SAA and AIA and edited several of the early books on archaeological ethics. She currently directs the Franchthi Cave, Greece project, overseeing final publications.

Sussane Voss studied Egyptology, Classical Archaeology, and Ancient Near Eastern Studies in Berlin and Heidelberg. Since 2006, she has been directing scientific projects about the "History of German Egyptology and Archaeology in Egypt."

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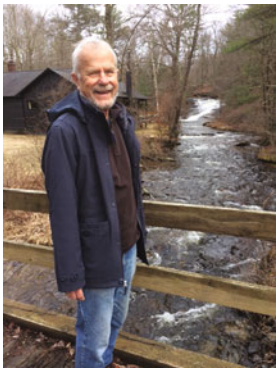

H. Martin Wobst is Professor Emeritus of Anthropology at the University of Massachusetts at Amherst, Massachusetts, USA, where he taught from 1971 to 2012. His work focused on theory and method in anthropology and anthropological archaeology and how they influence each other, and the people they are designed to explain, both in the past and present. He is interested in how material culture constructs and constrains individuals, communities, and societies, how the work of anthropologists has contributed to all aspects of the modern world, and how anthropologists can help to enlighten us on alternative material constructions of society to those in which they are embedded.

Thomas W. Wyrwoll is a German Archaeologist, Anthropologist and Zoologist. He heads the Institute for Mammalogy and Anthropology with its attached Laboratory for Archaeoiconological Biology and presides over the German Society for Rock Art Research. As an expert in prehistoric art, in particular rock art, he is known for his work on animal and human depictions. His research focuses on the Old World, chiefly Europe, the Eurasian Steppe Belt, and the Saharo-Arabian region.

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A

Abu Hureyra: Agriculture and Domestication

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Introduction

The prehistoric settlement of Abu Hureyra (35° 52′ N, 38° 24′ E) was located on the edge of the valley of the Euphrates River in northern Syria. It was a very large (11.5 ha) mound composed of two superimposed villages, Abu Hureyra 1 (c. 13,500–11,500 CalB.P.) and Abu Hureyra 2 (c. 10,600–7500 CalB.P.), linked by an intermediate episode of occupation (c. 11,500–10,600 CalB.P.) (Moore et al. 2000: Fig. 14.1). The site was thus continuously inhabited for 6000 years. Culturally, Abu Hureyra 1 had late Epipalaeolithic affinities, while the Intermediate Period and Abu Hureyra 2 fell within the Neolithic of Western Asia.

Key Issues

The site was excavated in 1972 and 1973 as part of an international salvage campaign that preceded the completion of a dam across the Euphrates (Fig. 1). The site was flooded in 1974. Seven trenches were dug across the site to establish the sequence of occupation. These demonstrated that the initial settlement of Abu Hureyra 1 was confined to the northwest sector of the mound. The bulk of the deposits was derived from the much more extensive settlement of Abu Hureyra 2.

All the soil was dry sieved to ensure near total recovery of artifacts and animal bones. Given the potential of the site to yield information about the formative stages of agriculture, the excavators systematically employed flotation to recover large samples of plant remains. The 2 t of animal bones and 500 l of plant remains retrieved by these methods provided important insights on changes in the economy and environment.

The initial settlement at Abu Hureyra in Period 1A consisted of multi-chambered pit dwellings dug into the subsoil that were covered with a timber framework and roofed with reeds (Fig. 2). This settlement was occupied year-round and lasted for 500 years. The form of the settlement changed abruptly in Periods 1B and 1C. The inhabitants built their huts on the surface of the ground with a frame of wooden posts and floors of trodden earth or clay. Finds of human bones suggested that some of the deceased were buried within the settlement.

The most numerous artifacts were made of chipped stone. Microliths, especially large lunates, and also scrapers and notched pieces, were conspicuous. A few fragments of obsidian were imported from Anatolia to the north. The bone artifacts included bipoints used as arrowheads, many awls, and some pins. Many of the

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other tools were made of basalt, among them grinding dishes, querns, rubbing stones, pestles, and mortars. These were used to prepare food and to grind pigments. Notched pebbles were probably used as sinkers for fishing lines and nets.

The inhabitants of Abu Hureyra 1A were hunters and gatherers who consumed a diverse range of foods. They collected over 100 species of edible plants (Moore et al. 2000: 369), of which wild cereal grains, feather grasses, club rush, knotgrass, millets, and chenopods were staples. Persian gazelles were the main source of meat. Herds of these animals were hunted using animal traps as they migrated past the site in the spring. The meat from these gazelles was probably dried for consumption later in the year (Legge and Rowley-Conwy 2000: 449, 450). The other main game animals were onagers, wild cattle, sheep, and hares.

Abu Hureyra: Agriculture and Domestication, Fig. 1 The prehistoric settlement mound of Abu Hureyra from the southwest

An abrupt change in economy took place in the transition from Period 1A to 1B, c. 12,900 CalB.P. The sudden onset of the Younger Dryas climatic phase caused a prolonged drop in temperature and increase in aridity that significantly altered the environment (Robinson et al. 2006: 1536). Many of the staple plant foods diminished in abundance. The villagers responded by adopting farming (Moore et al. 2000, 479; Hillman et al. 2001). Among their crops were domestic rye, einkorn, and lentils. Cultivation of crops provided increasing amounts of food thereafter, and the population of the settlement grew as a result. The inhabitants

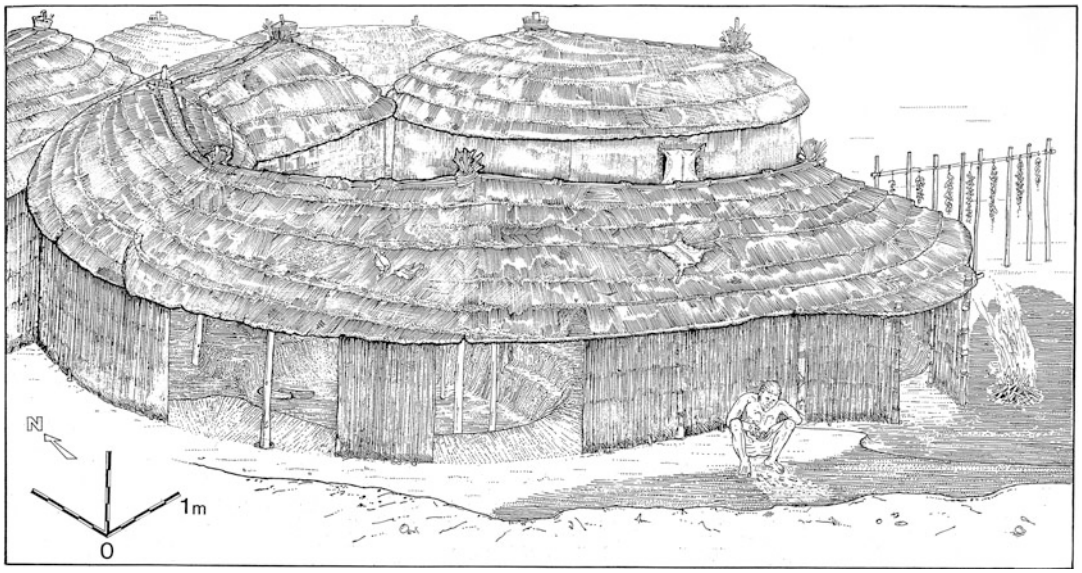

Abu Hureyra: Agriculture and Domestication, Fig. 2 A reconstruction drawing of a pit dwelling in the village of Abu Hureyra 1A

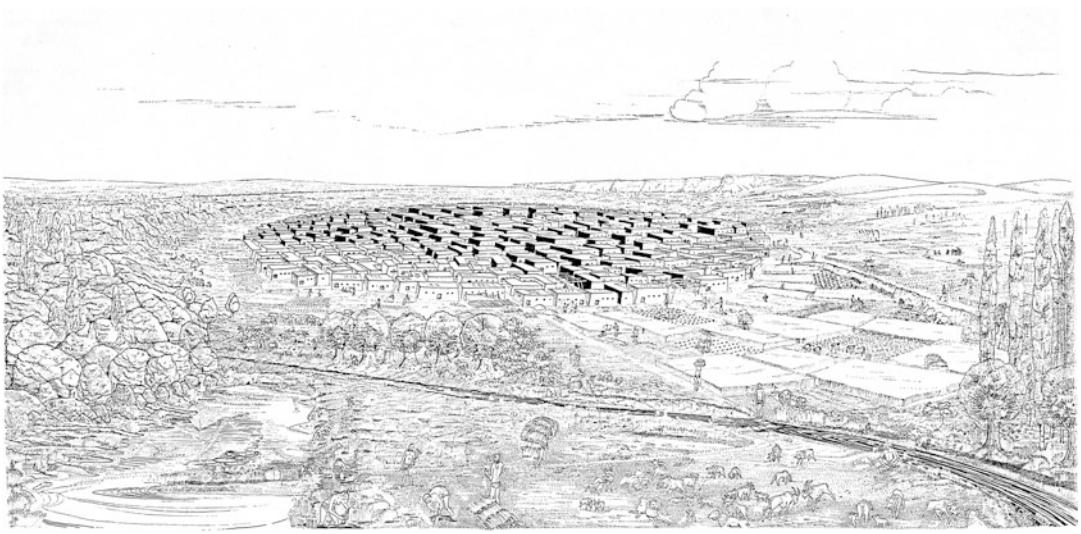

Abu Hureyra: Agriculture and Domestication, Fig. 3 The village of Abu Hureyra 2 as it would have looked c. 9000 CalB.P.

continued to hunt gazelle as before but they modified their pattern of plant gathering.

New evidence from across the northern hemisphere indicates that the Younger Dryas was precipitated suddenly by a cosmic event, likely caused by a comet or asteroid, which fragmented in the atmosphere (Bunch et al. 2012; Firestone et al. 2007; Wittke et al. 2013). This triggered a meltwater pulse into the North Atlantic that caused the onset of much cooler, drier conditions (Broecker 2006). This cosmic event is signalled by the widespread occurrence of platinum in terrestrial deposits dating to the beginning of the Younger Dryas (Moore et al. 2017). Evidence from Abu Hureyra indicates that an airburst from the asteroid or comet occurred within a kilometer or two of Abu Hureyra itself, causing the incineration of the Period 1A village c. 12,900 CalB.P. (Moore and Kennett 2014). The survivors of this catastrophe refounded the Abu Hureyra 1 village, this time with huts built above ground. It was they who, in a severely altered environment, took up farming.

During the Intermediate Period and Period 2, the nature of the settlement changed remarkably. The houses in this densely packed village were built of mudbrick, were rectilinear in plan, and contained several rooms. Following the development of farming, the settlement grew very large until in Period 2B its population numbered between 5000 and 6000 (Fig. 3). Its economy was based on an array of cultivated cereals, rye, several wheats and barley, and legumes, including lentils, peas, vetches, and chickpeas. The villagers also raised flocks of sheep and goat while continuing to hunt gazelle. Then, in the transition from Period 2A to 2B, c. 9300 CalB.P., hunting of gazelle sharply declined because of overexploitation. The inhabitants maintained the meat supply by rapidly expanding their flocks of sheep and goats and adding domestic cattle and pigs to the mix. By this time, hunting and gathering had ceased to contribute much to the diet.

The artifacts in Period 2 were significantly different from those of Period 1. The chipped stone industry was composed of large tools on blades, notably arrowheads, burins, and end scrapers, with a few sickle blades. Many of these artifacts were used to kill and butcher game. Small but regular amounts of obsidian attested to continued long-distance contacts with central and

eastern Anatolia. Bone tools, including awls, needles, and spatulae, were used in basketry, leather working, cooking, and as ornaments. There were relatively few ground stone tools in Period 2, so most agricultural and food-processing implements were presumably made of wood and other perishable materials.

Conspicuous among the remains from Period 2 were burials of humans. These were usually single inhumations or, occasionally, group burials in shallow graves under the floors of houses (Moore and Molleson 2000: 278). More women than men were buried in these locations, indicating a strong link between women and the home. Skulls were often buried separately from the rest of the corpse. The burials were the final stage in a lengthy series of rituals involving sequestering of the body while the flesh decayed. These elaborate burial rites reveal a rich ideology with reverence for ancestors and belief in an afterlife.

Many of the skeletons were sufficiently well preserved to yield vivid evidence of the lives these people had led. Most exhibited traits that indicated that they had worked extremely hard. The females, in particular, had developed a series of injuries caused by spending many hours of the day grinding grain on a saddle quern for food (Molleson 2000: Fig. 11.8).

Abu Hureyra is significant because it documents the transition from hunting and gathering through a continuous sequence of occupation at a single site. Year-round sedentary life based on specialized hunting and gathering preceded the transition to farming. The transition itself was precipitated by an abrupt climatic change, the onset of the Younger Dryas. The Younger Dryas was caused by a cosmic impact that devastated Abu Hureyra itself. The survivors among the inhabitants went on to develop farming. The subsequent expansion of agriculture was a lengthy step-by-step process that culminated 5000 years later in a mature mixed farming system. The inception of farming had extraordinary consequences at Abu Hureyra, from the massive growth in the population of the village to its impact on the people themselves.

References

Broecker, W.S. 2006. Was the Younger Dryas triggered by a flood? *Science* 312 (5777): 1146–1148.

Bunch, T.E., R.E. Hermes, A.M.T. Moore, D.J. Kennett, J.C. Weaver, J.H. Wittke, P.S. Decarli, J.L. Bischoff, G.C. Hillman, G.A. Howard, D.R. Kimbel, G. Kletetschka, C.P. Lipo, S. Sakai, Z. Revay, A. West, R.B. Firestone, and J.P. Kennett. 2012. Very high-temperature impact melt products as evidence for cosmic airbursts and impacts 12,900 years ago. *Proceedings of the National Academy of Sciences USA* 109 (28): E1903–E1912.

Firestone, R.B., A. West, J.P. Kennett, L. Becker, T.E. Bunch, Z.S. Revay, P.H. Schultz, T. Belgya, D.J. Kennett, J.M. Erlandson, O.J. Dickenson, A.C. Goodyear, R.S. Harris, G.A. Howard, J.B. Kloosterman, P. Lechler, P.A. Mayewski, J. Montgomery, R. Poreda, T. Darrah, S.S. Que Hee, A.R. Smith, A. Stich, W. Topping, J.H. Wittke, and W.S. Wolbach. 2007. Evidence for an extraterrestrial impact 12,900 years ago that contributed to the megafaunal extinctions and the Younger Dryas cooling. *Proceedings of the National Academy of Sciences USA* 104 (41): 16016–16021.

Hillman, G., R. Hedges, A. Moore, S. Colledge, and P. Pettit. 2001. New evidence of Lateglacial cereal cultivation at Abu Hureyra on the Euphrates. *The Holocene* 11 (4): 383–393.

Legge, A.J., and P.A. Rowley-Conwy. 2000. The exploitation of animals. In *Village on the Euphrates*, ed. A.M.T. Moore, G.C. Hillman, and A.J. Legge, 423–471. New York: Oxford University Press.

Molleson, T.I. 2000. The people of Abu Hureyra. In *Village on the Euphrates*, ed. A.M.T. Moore, G.C. Hillman, and A.J. Legge, 301–324. New York: Oxford University Press.

Moore, A.M.T., and D.J. Kennett. 2014. Cosmic impact, the Younger Dryas, Abu Hureyra, and the inception of agriculture in Western Asia. In *The Wenner-Gren workshop on island archaeology and the origins of seafaring in the Eastern Mediterranean*, ed. Albert J. Ammerman, and Thomas Davis. *Eurasian Prehistory* 10: 1–2, 57–66.

Moore, A.M.T., and T.I. Molleson. 2000. Disposal of the dead. In *Village on the Euphrates*, ed. A.M.T. Moore, G.C. Hillman, and A.J. Legge, 277–299. New York: Oxford University Press.

Moore, A.M.T., G.C. Hillman, and A.J. Legge. 2000. *Village on the Euphrates*. New York: Oxford University Press.

Moore, C.R., A. West, M.A. Lecompte, M.J. Brooks, I.R. Daniel Jr., A.C. Goodyear, T.A. Ferguson, A.H. Ivester, J.K. Feathers, J.P. Kennett, K.B. Tankersley, A.V. Adedeji, and T.E. Bunch. 2017. Widespread platinum anomaly documented at the Younger Dryas onset in North American sedimentary sequences. *Nature Scientific Reports* 7: 44031. https://doi.org/10.1038/srep44031.

Robinson, S.A., S. Black, B.W. Sellwood, and P.J. Valdes. 2006. A review of palaeoclimates and palaeoenvironments in the Levant and Eastern Mediterranean from 25,000 to 5000 years BP: Setting the environmental background for the evolution of human civilisation. *Quaternary Science Reviews* 25 (13–14): 1517–1541.

Wittke, J.H., J.C. Weaver, T.E. Bunch, J.P. Kennett, D.J. Kennett, A.M.T. Moore, G.C. Hillman, K.B. Tankersley, A.C. Goodyear, C.R. Moore, I.R. Daniel Jr., J.H. Ray, N.H. Lopinot, D. Ferraro, I. Israde-Alcántaram, J.L. Bischoff, P.S. Decarli, R.E. Hermes, J.B. Kloosterman, Z. Revay, G.A. Howard, D.R. Kimbel, G. Kletetschka, L. Nabelek, C.P. Lipo, S. Sakai, A. West, and R.B. Firestone. 2013. Evidence for deposition of 10 million tonnes of impact spherules across four continents 12,800 y ago. *Proceedings of the National Academy of Sciences USA* 110: E2088–E2097.

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Basic Biographical Information

George H. O. Abungu, a Kenyan, is among some of the well-known African archaeologists. He has had a tremendous academic career, establishing himself as one of the leading heritage professionals who have played a pivotal role in the management of Africa's rich past. His illustrious career should be an inspiration to the younger generation of African scholars who take up an interest in the discipline of archaeology and heritage management.

George trained as an archaeologist at the University of Nairobi Kenya between 1980 and 1984 with an Honors degree in archaeology and was subsequently employed as a Research Trainee with the National Museums of Kenya (NMK). A year later, in 1985, he got a scholarship to study at Cambridge University in England, United Kingdom, where he received an M.Phil. (1986) and a Ph.D. (1989) in archaeology. His Ph.D. research was titled *Communities on the River Tana: An Archaeological Study of Relations Between the Delta and River Basin, AD 700–1890*.

Dr. George Abungu went back to Kenya and continued working for the NMK as a Coastal Archaeologist. Between 1984 and 2002, he served in a number of positions beginning as a Research Trainee in 1984; a Senior Research Scientist 1987–1990; Head, Department of Coastal Archaeology 1990–1995; Head, Coastal Museums Programme 1992–1995; Deputy Director, NMK 1996–1997; and a Director, Regional Museums, Sites, and Monuments 1997–1999 and the Director General of the NMK, 1999–2002 when he left NMK.

Besides working for the NMK for almost two decades, Dr. Abungu has had many other professional responsibilities over the years, among them, Founding Chairman of Africa 2009 Program, and Founding Chairman for the Centre for Heritage Development in Africa (CHDA). He was a Research Associate (2001–2009) with the Field Museum of Natural History in Chicago, a Committee Member and African Representative on the ICOMOS International Committee on Underwater Cultural Heritage, and a Kenyan Representative on the UNESCO World Heritage Committee (2005–2009). Other positions of responsibilities he has held include World Archaeological Congress (WAC) Council Member from 1997, Chairman of the International Standing Committee on the Traffic of Illicit Antiquities (since 1999), Global Heritage Fund Advisory Board Member (from 2002), Member of the Executive International Council of Museums 2004–2010, and Vice-President of International Council of Museums (ICOM) from 2010.

In well over two decades, Dr. George Abungu has actively worked to ensure that the preservation of the rich African heritage and training of heritage professionals including heritage managers is not only enhanced but well established. His knowledge has been sought after, and he is often a key note speaker to many international conferences as well as guest lecturer to a number of universities, in Africa and beyond. Dr. Abungu's efforts have not gone unnoticed and most recently became the recipient of the

2012 Association for Research into Crimes Against Art (ARCA) Award for Lifetime Achievement in Defense of Art 2012 as well as the recipient of *Knight in the Order of Arts and Letters of the French Republic*. He is also a recipient of the *Life Prize in Museology* (2007), as well as *Passeur du Patrimone*, of Ecole du Patrimone Africa (2009).

The Kenyan authorities have also honored this high achiever as he is one of the three professionals whose contributions were celebrated by the NMK during its centenary celebration in 2011. In particular, Dr. Abungu was honored for the contribution he made to research and the development of Coastal Archaeology in Kenya.

Besides being a museum professional and training many aspiring heritage professionals, Dr. Abungu has been a scholar of note. He has published extensively and his publications have covered a wide range of subjects, from archaeology, heritage management, heritage legislation, to museology. He is currently undertaking research on one of the most significant challenges in this century, that of the relationship between heritage conservation and development. In the case of an African continent that lags behind in service delivery to its citizens, the conflict between managing Africa's rich past and encouraging development has become a big challenge. Additionally, Dr. Abungu is an Editorial Member for among other publications, *Public Archaeology* and *African Archaeological Review*.

He is a Founding Director of the Okello Abungu Heritage Consultants, a company, through which he offers specialized expertise to a number of heritage institutions in Africa and beyond, particularly in the areas of heritage management and planning, training, and policies relating to the management of World Heritage sites and heritage training programs in the field of world heritage in and out of Africa.

Major Accomplishments

As a trainer, mentor, and advisor, Dr. Abungu has been instrumental in efforts to improve the management of World Heritage and other sites in Africa. He is among the scholars who have pushed the African position at the World Heritage Committee (WHC) and other international forums to ensure that the rich heritage of the continent is adequately represented on the World Heritage List and supported. Among some of his accomplishments in this area has been the writing of Management Plans for Lalibela WHS (Ethiopia), Kilwa Kisiwani and Sogo Mnara WHS (Tanzania), Robben Island (SA), and nomination dossiers for Mijikenda Kaya (Kenya), the Kenya Rift Valley Lakes System (Kenya), and Le Mourne (Mauritius) among others. He is also the Founding Coordinator for the World Heritage Nomination Course in Africa 2008–2012 and the African Regional Coordinator for the UNESCO African Periodic Reporting 2010–2011. Both of these exercises have not only led to the increase of the number of African heritage sites on the UNESCO World Heritage List but also to the improvement in the conservation of the heritage in Africa.

An advocate against the illicit trade in African heritage, Dr. Abungu was recently recognized for his commitment to this through the 2012 ARCA award. He was instrumental in the return to Kenya of the looted vigango, which are the traditional grave markers. Many of these traditional grave markers were stolen from the Mijikenda Kayas, which are now on the World Heritage List. Their return followed a process of repatriation Dr. Abungu began with his American colleagues many years ago when he worked on Kenya's Coastal Archaeology and as the Director General of the National Museums of Kenya.

Cross-References

- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNESCO's World Heritage List Process

Further Reading

Abungu, G.H.O. 1994. Islam on the Kenyan coast: An overview of Kenyan coastal sacred sites. In *Sacred sites, sacred places*, ed. D. Carmichael et al., 152–162. London: Routledge.

Abungu, G.H.O. 1998. City states of the East African coast and their maritime contacts. In *Transformations in Africa*, ed. G. Connah, 204–218. Leicester: Leicester University Press.

Abungu, G.H.O. 2004. Democratising museums and heritage: Ten years on. *South African Museums Association Bulletin* 30.

Abungu, G.H.O. 2005a. Africa and its museums: Changing of pathways? In *Arts and cultural heritage law for the 21st century*, ed. B. Hoffman, 386–393. Cambridge: Cambridge University Press.

Abungu, G.H.O. 2005b. Rock art management in eastern and southern Africa: Whose responsibility? In *Of the past for the future: Integrating archaeology and conservation*, ed. N. Agnew et al. Los Angeles: The Getty Publications.

Abungu, G.H.O. 2008. Universal museums: New contestations, new controversies. In *Utimut: Past heritage – future partnerships: Discussions on repatriation in the 21st century*, ed. M. Gabriel and J. Dahl. International Work Group for Indigenous Affairs: Copenhagen.

Abungu, G.H.O. 2012. Africa's rich intangible heritage: Managing a continent's diverse heritage. In *Safeguarding intangible heritage*, ed. M.L. Stefano et al. Suffolk: Boydell & Brewer.

Abungu, G.H.O., and L. Abungu. 2009. *Lamu: Kenya's enchanted island*. New York: Rizolli.

Abungu, G.H.O., W. Ndoro, and A. Mumma, eds. 2009. *Conserving cultural heritage and law: Protecting immovable cultural heritage in English-speaking countries of sub-Saharan Africa*, ICCROM conservation studies. Vol. 8. Rome: ICCROM.

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Basic Information

The *Académie Internationale de la Pipe* is a learned society which, according to its statutes, was established "to advance the education of the public in the economic and social history of tobacco and pipe smoking worldwide." Specifically it attempts to promote a better awareness of the tobacco pipe as a cultural, artistic, and social phenomenon and to highlight the particular place the pipe holds in the history of people and civilizations. It supports and encourages the collecting of both artifacts and documentary information about pipe smoking and encourages serious research on pipes and related subjects.

The Academy came into being in 1984 on the initiative of a Frenchman, André-Paul Bastien. Initially based in Italy, it moved to France in 1992. Membership of the Academy consists of three distinct constituencies: serious collectors of pipes and tobacco-related artifacts, curators of national museum and specialists of museum collections, and academics involved in the study of the archaeology and socioeconomic history of tobacco and smoking. Originally, the Academy might be described as elitist in that only two academicians were permitted from any one country and applications were intensively vetted. There was a secondary layer of "corresponding" members as well as institutional and sponsor involvement.

In 2008 the Academy moved its head office to Liverpool where it is housed within the School of Archaeology, Classics and Egyptology at the University, under new charitable articles of association (UK Registered Charity Number 1126166). Its address is 12–14 Abercromby Square, University of Liverpool, L69 7WZ. Its website can be found at www.pipeacademy.org. Under its new articles, there is a single category of individual membership which is now open to any bona fide researcher and can include any number of people from the same country, including women.

Major Impact

The Academy has always tried to promote knowledge and research about tobacco pipes and their use in every era, in all parts of the world and from every angle, whether cultural, artistic, scientific, sociological, or ethnographic. It does this in three main ways: by organizing conferences at different centers at which members are able to discuss major themes, by the formation and activities of

working groups of members, and by a program of publication.

Since 2008 there have been conferences in Hungary (2009), France (2010 and 2014), Serbia (2011), Poland (2012), Germany (2013), Belgium (2015), Japan (2016), UK (2017) and The Netherlands (2017). The conferences are usually focused on regional pipe collections and are intended to promote research and local appreciation of them. For example, the Budapest conference resulted in a series of papers on the archaeology of the clay pipe in Hungary and eastern Europe which, together, have transformed understanding of the industry in that region (Ridovics and Davey 2010). At Grasse, the meeting focused on the outstanding pipe collection brought together by A Baroness Rothschild in the second half of the nineteenth century. The 2011 conference stimulated research into pipe collections throughout Serbia (Gačič 2011). In 2015 the meeting was based in the Nationaal Tabaksmuseum Wervik, Belgium, with the express purpose of focusing attention on the role of tobacco and smoking behavior during the First World War (Gallagher 2016). In 2016 the conference took place in the Tobacco and Salt Museum in Tokyo and considered the spread of tobacco and smoking habits to the Far East and their local manifestation in the context of one of the finest tobacco-related museum collections in the world.

Between 1996 and 2008, the Academy regularly published the *Livre de la Pipe* in French, English, and German. It also produced 19 issues of an annual newsletter the *Annales* from 1987 to 2006 and other occasional publications (e.g., Suzuki 1997).

Since the move to Liverpool in 2008, the Academy has launched a new A4, full-color, peer-reviewed annual journal that is now the main public platform for pipe research worldwide. So far 9 volumes with 116 separate articles totalling 1366 pages have been published. Contributions range from overviews of national and regional clay pipe production (e.g., Davey 2009), art historical studies (e.g., Burla et al. 2011), social and economic conditions of workers in the pipe industry (e.g., Stam 2015), and the analysis of archaeological groups from around the world (e.g., Leenen 2013; Gellichi and Sabbionesi 2015; Bekić 2016).

References

Bekić, L. 2016. Clay pipes from the waters of Veštar harbour near Rovinji in Croatia. *Journal of the Académie Internationale de la Pipe* 9: 99–108.

Burla, F., H. Kierulf, S. Peckus, and B. Rapaport. 2011. Iconography, morphology and meerschaum: Four essays illustrating their nexus. *Journal of the Académie Internationale de la Pipe* 4: 83–96.

Davey, P.J. 2009. National clay pipe summaries. *Journal of the Académie Internationale de la Pipe* 2: 1–148.

Gačič, D. 2011. *The pipes from museum collections of Serbia*. Novi Sad: City Museum of Novi Sad.

Gallagher, D. 2016. Pipes in peace and war. *Journal of the Académie Internationale de la Pipe* 9: 1–41.

Gellichi, S., and L. Sabbionesi. 2015. Turkish pipes from Stari Bar, Montenegro. *Journal of the Académie Internationale de la Pipe* 8: 21–50.

Leenen, S. 2013. Pfeifenfragmente aus der Hafengrabung in Stade. *Journal of the Académie Internationale de la Pipe* 6: 169–201.

Ridovics, A., and P.J. Davey. 2010. Papers about Hungarian pipe history and archaeological papers from neighbouring countries. *Journal of the Académie Internationale de la Pipe* 3: 1–170.

Stam, R. 2015. Some aspects of the social history of Dutch pipe makers in the seventeenth and eighteenth centuries. *Journal of the Académie Internationale de la Pipe* 8: 9–12.

Suzuki, B.T. 1997. *The first English pipe smoker in Japan: William Adams, the pilot and English trade house in Hirato (1600–1621)*. Paris: L'Académie Internationale de la Pipe.

Further Readings

Annales. n.d.1–19.

Journal of the Académie Internationale de la Pipe. n.d. 1–9.

Livre de la Pipe. n.d.

Acheulean Industrial Complex

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Introduction

For almost a million years in Africa during the first phase of human cultural development known as the Oldowan industrial complex, there appears to have been limited directional change in tool

technology. As sophisticated and variable as that technology had been, many archaeologists consider it a time of relative technological stasis, with differences across assemblages being relatively minor. Although the success of the simple core and flake adaptation was evident in its long endurance, by 1.7 Ma, innovations began with the appearance of the Acheulean. An adaptive and technological threshold was crossed with the knapping of large flakes (>10 cm in size) and the shaping of heavy-duty tools (handaxes, cleavers, and picks) for specific tasks. The Acheulean industrial complex, together with the Oldowan, is referred to as the Earlier Stone Age (ESA) and persisted until c. 0.3/0.25 Ma in Africa. Mary Leakey (1971) published the first detailed description of the Early Acheulean, using the EF-HR assemblage from Olduvai Gorge as her descriptive type series. Over the years, research has fleshed out a deeper understanding of the Acheulean complex across the African continent.

Although Leakey preferred the term *biface* to the functionally defined types of cleaver and handaxe, the best generic term today for these diagnostic types is the large cutting tool (LCT). This term is preferable because handaxes are not always bifacial and also because picks (which are sometimes trihedral) were not usually discussed as bifaces. Many LCTs are made on large flakes because such blanks are relatively thinner, with accessible edges, making it easier to shape the piece, but cobbles were also used for handaxes in some assemblages and very occasionally for cleavers. At some sites, there are preferences of particular raw materials for LCTs, such as large lava or quartzite cobbles and boulders, because they yield large flakes of better size and quality. Overall, the technology of many of the earliest Acheulean assemblages is relatively similar to the classic Oldowan or only slightly more advanced in core working strategies, with large flakes and LCTs largely an added component. However, there are some clear behavioral changes apparent in the size and distribution of sites from 1.7 Ma. A trend toward larger sites and greater densities of stone tools within a site reflects a more habitual dependence on lithics for daily subsistence, and there is a more sustained use of some venues as strategic locations or for seasonal resources. Sites also occur in a greater variety of environments and include the more consistent use of open habitats. Occasionally, some raw materials are transported further distances than is typical in the preceding Oldowan, reflecting the broader use of landscapes.

The controlled use of fire was a further innovation in the earlier Acheulean, especially as it provided a means of defense against carnivores in open habitats where hominids competed for game. However, the interpretation of early campfires is controversial due to poor preservation in open-air sites. A few East African sites c. 1.5 Ma contain burnt sediments accepted by many researchers as plausible evidence of campfires, as heat of a certain temperature must be sustained long enough to alter the ground. There is also patterning at some sites in the spatial distribution of lithics and bone around these burnt features, which strengthens the argument for the controlled use of fire in the Early Acheulean. However, in South Africa by 1 Ma, there is evidence for bones burnt in campfires at the surface and washed into an underground cave deposit at Swartkrans (Brain 2004). Also c. 1 Ma at Wonderwerk Cave, ashed plant remains, and fragments of burnt bone are documented within an Acheulean occupation layer about 30 m from the modern cave entrance (Berna et al. 2012). By c. 0.79 Ma, the open-air site of Gesher Benot Ya'aqov in Israel has burnt artifacts and charred botanical remains with a patterned distribution that suggests activities associated with hearths (Goren-Inbar et al. 2018).

Key Issues/Current Debates

The Earliest Acheulean

The appearance of a new African hominid, *Homo ergaster* (Fig. 1), is the most plausible explanation for the behavioral and technological changes that appear with the Acheulean. This species has more sapient-like traits than *Homo habilis*, including modern human body proportions which provided an advantage in open habitats. Many researchers group *H. ergaster* with *Homo erectus* or refer to it as African *Homo erectus*, while others restrict the

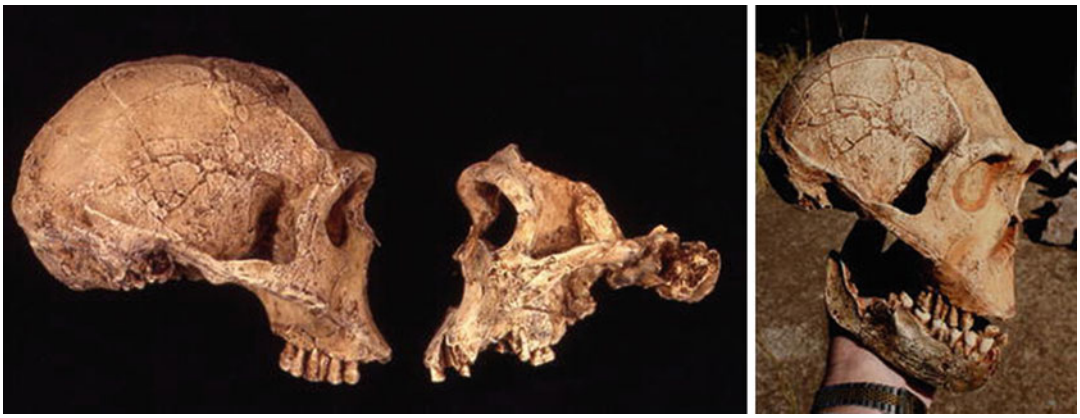

Acheulean Industrial Complex, Fig. 1 The earliest Acheulean is contemporary with a new hominid species, *Homo ergaster*, considered to be responsible for cultural innovations. KNM-ER 3733 from Kenya (*far left*) is the most complete cranial specimen and is shown facing SK 847 (*center*) from Swartkrans, which was the first discovery of this species. At right is the type specimen, the KNM-ER 992 mandible from Kenya, shown together with 3733. They are not the same individual. (All photos are of casts, courtesy of R. J. Clarke)

erectus species to Asia, which is the classification followed here. The earliest appearance of *H. ergaster* is dated to 1.78 Ma in Kenya (Lepre and Kent 2010) and to >1.7 Ma at Swartkrans in South Africa (Pickering et al. 2012). At Sterkfontein in South Africa, it is found in direct association with Early Acheulean artifacts (Kuman and Clarke 2000). The species persists until at least 1.4 Ma, and thus there is a good match with Early Acheulean chronology.

Many of the historically important debates concerning the Early Acheulean are today increasingly less relevant. For example, Leakey's (1971) classification system regarded many core-based forms as tools rather than cores, considering the sharp edges created by platform intersections to be working edges. She then used a quantitative analysis of these types (which included the "bifaces") to arrive at her formal definition for the Acheulean industry: an assemblage in which 40% or more of the "tools" consist of bifaces. Assemblages which did not meet this criterion were designated as Developed Oldowan. However, few researchers today use this term as the technical differences once considered important have other, better explanations. Today the range of variability in the Early Acheulean is clearer, and technological and behavioral traits that reflect the increasing complexity of the adaptation allow researchers to recognize such assemblages even when LCTs are absent due to activity differences or small sample sizes.

Kokiselei (West Lake Turkana, Kenya) is the earliest dated Acheulean site at 1.76 Ma (Lepre et al. 2011). Other dates for major East African sites are 1.7–1.4 Ma at Konso, Ethiopia; 1.7–1.4 at Gona, Ethiopia; 1.7–1.4 Ma at Olduvai, Tanzania; and c. 1.5–1.4 Ma at East Lake Turkana, Kenya (see de la Torre 2016). In South Africa, equally Early Acheulean assemblages are well established but less well-dated in the karst hominid sites of Sterkfontein and Swartkrans (Kuman 2007; Kuman and Clarke 2000), which have infills in underground contexts deposited from surface occupations. Faunal ages for cave breccias with Early Acheulean are c. 1.5 Ma and 1 Ma at Swartkrans and c. 1.6 Ma at Sterkfontein. While there have been claims for younger ages at Sterkfontein in a number of deposits, the dating methods employed have their own problems at these karst sites. Paleomagnetic and U-Pb dates for Sterkfontein have been argued based on speleothems, but these have formed post-depositionally after the collapse and settling of breccias created voids that later filled with flowstone. Also problematic are younger electronic spin resonance dates proposed for the Sterkfontein breccias, as the migration of groundwater through deposits compromises the closed system needed for ESR dating. Typologically and technologically, the

Sterkfontein LCTs are comparable to Early Acheulean examples from East Africa, and attempts to obtain cosmogenic dates are in progress. In interior South Africa, cosmogenic dating has documented Early Acheulean artifacts in alluvial deposits of the Vaal River basin (Fig. 2), with dated deposits ranging from 1.7 to 1.3 Ma (Gibbon et al. 2009; Kuman and Gibbon 2018; see Leader et al. 2018 for revised dating). Due to the limitations of geological preservation and dating in East and South Africa, the Early Acheulean industries in these two regions provide our best evidence for the widespread distribution in Africa of this complex by 1.7 Ma.

Descriptions of Early Acheulean technology and tool types have largely focused on the shaping of LCTs (Fig. 3), as more effort tends to be invested

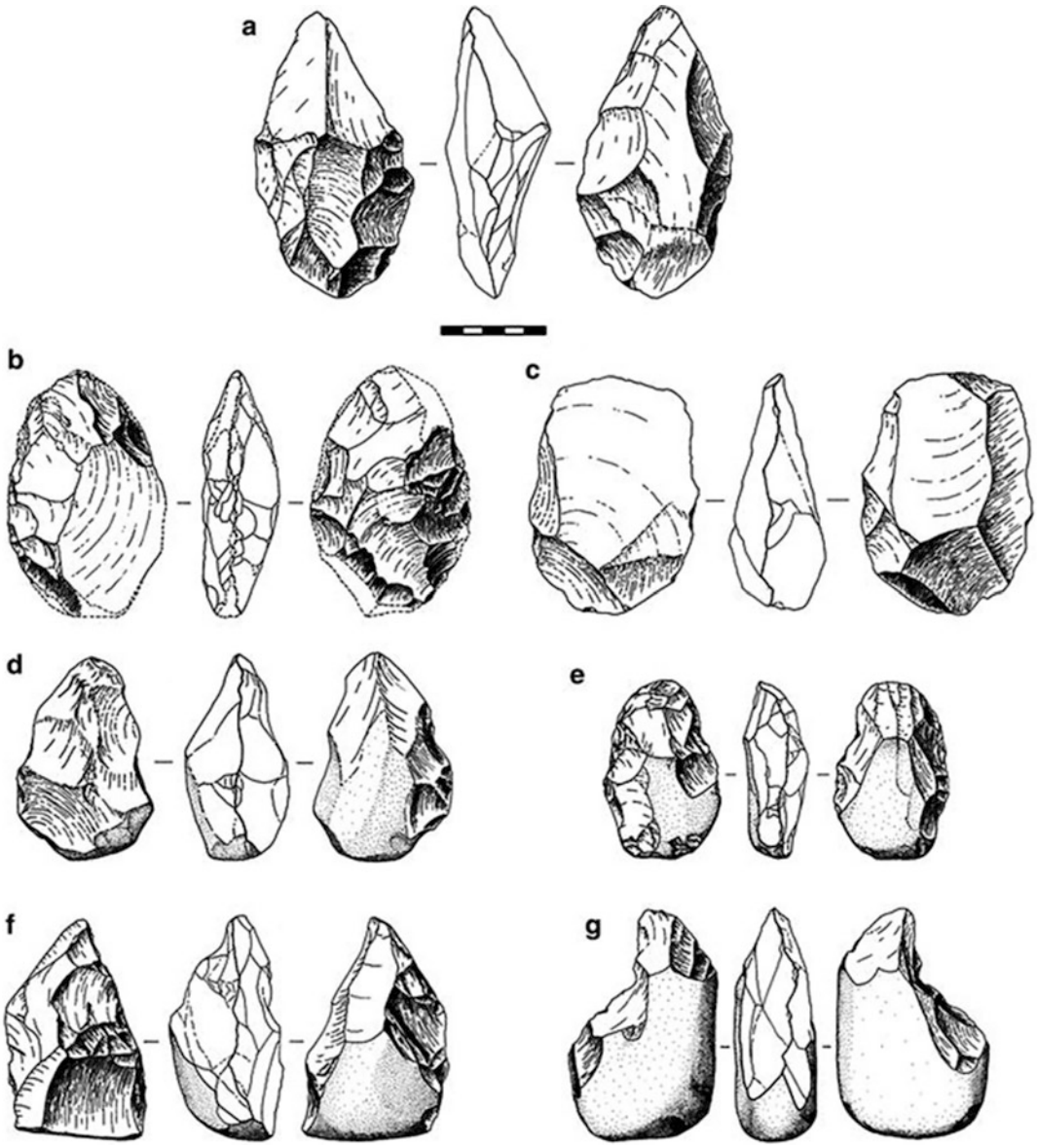

Acheulean Industrial Complex, Fig. 2 Early Acheulean LCTs from Rietputs 15, South Africa, where sites have been dated from 1.7 to 1.3 Ma. Handaxes (**a**, **b**) and a cleaver (**c**) on flakes; handaxes (**d**, **e**) and picks (**f**, **g**) on cobbles (From Gibbon et al. 2009)

Acheulean Industrial Complex, Fig. 3 Early Acheulean LCTs of East and South Africa are comparable. *Right* are from Mary Leakey's type series from EF-HR, Olduvai Gorge; *left* are from Member 5, Sterkfontein

Acheulean Industrial Complex, Fig. 4 Broken handaxes and handaxe tips from BK, Olduvai, most probably resulting from flaking to re-sharpen the pieces

in such tools. LCTs from Konso and Kokiselei have been described as large pick-like pieces or "pick-like handaxes." The heavy-duty function of these tools may have been for digging underground foods such as bulbs, roots, and tubers. However, such types do not dominate in all the early assemblages. Handaxes from EF-HR at Olduvai and Peninj in Tanzania have been described as largely unifacial pieces – like massive scrapers with robust convergent tips (De la Torre et al. 2008). The notched edges on some examples from Peninj, EF-HR, and Sterkfontein suggest woodworking was another important function. In some assemblages, pick-like handaxes and unifacial handaxes with robust tips and scraper edges are only a minor component of the LCTs, but early handaxes generally all possess strong distals converging to a more or less flat tip for some hacking or cutting function. The degree of trimming to shape a handaxe also ranges from largely unifacial to partly bifacial to fully bifacial. However, many assemblages tend to be dominated by one type of shaping within this range, which is often determined by the degree of re-sharpening. For example, the BK assemblage from Olduvai (Fig. 4) includes some classic bifacial handaxes, along with likely evidence for re-sharpening in the form of distals broken through end-shock during knapping, as well as some very small-sized bifaces. Although some early assemblages are dominated by pick-like handaxes, many researchers are able to distinguish picks as a separate type: an LCT in which the shaping is focused mostly on the distal end, with limited attention given to the body of the piece. Following the Early Acheulean, however, picks and handaxes are easier to separate as discrete types.

Another very characteristic type in the African Early Acheulean is the cleaver – an LCT made usually on a large flake, with a broad cutting edge at the distal end and/or along one lateral. The cutting edge is referred to as the "bit." It is usually formed by the naturally sharp portion of the large flake blank, but rare examples of bits shaped by removals do occur in the early assemblages, presumably to regularize the shape of the cutting edge. The making of a cleaver requires some planning for the large flake to be detached in order to produce a sizeable bit. The most classic cleaver type for both the early and younger Acheulean industries is one made on a large side-struck flake – a flake that is wider than it is long, with the bulb at the side of the flake's long axis. The thick platform area is then trimmed with some large removals, and the opposite lateral may also be trimmed (particularly in younger Acheulean assemblages). However, examples of cleavers on corner-struck and end-struck flakes also commonly occur. The cleaver bit implies that the tool was used for a cutting or hacking function requiring a sizeable sharp edge and a tool with weight. Experiments suggest that cleavers make good dismembering tools in butchery, but handaxes and plain flakes can also perform this function. A small number of pieces studied for use-wear traces, micropolish, or phytoliths also suggest that some cleavers may have been used for chopping and scraping wood.

The raw material and the blank's form have a strong influence on the regularity of shape for LCTs, and the Early Acheulean is characterized by both crude and relatively finer examples when made in better raw materials. However, it is essential to remember that LCTs were functional pieces and there was no need for early *Homo* to produce standardized forms, symmetrical handaxes, or elegant shapes. The iconic concept of the classic, symmetrically shaped handaxe or elegant cleaver, when it occurs, is most often found in Later Acheulean assemblages after 0.6 Ma (discussed below). However, it is during the earlier Acheulean that the first handaxe industries appeared beyond the African continent. Ubeidiya in Israel has a sequence of Early Acheulean deposits from 1.4 Ma, and the Early Acheulean has also been documented in India c. 1.5 Ma with cosmogenic burial dating. The earliest handaxes in China appear by at least 0.8 Ma (at Yunxian in central China and Bose in southwestern China). In Europe, the earliest Acheulean may be as old as ca 1.0 Ma in Spain, but it only becomes widespread after 0.5 Ma.

From 1 to 0.6 Ma: Developments Following the Early Acheulean

While sites dated between 1.7 and 1.4/1.3 Ma are consistently referred to as Early Acheulean in the literature, there is no consensus on terminology for the following phases of ESA development. This is certainly a result of the limited number of sites and especially dates for the period between 1.3 and 0.78 Ma. Terms such as Early, Middle, and Later Acheulean are also historical labels created at a time when few absolute dates were available. Consequently, some researchers prefer to lump Acheulean sites into only two phases: Lower and Upper Acheulean or Early and Later Acheulean. However, with today's better understanding of Acheulean developments c. 1 Ma, there is some justification to recognize a Middle Acheulean phase from approximately 1.0 to 0.6 Ma. East African sites at this time demonstrate improvements in LCT production, as outlined below, and some sites show increased numbers of handaxes. Changes in handaxe flaking are probably the result of more attention paid to creating sharp cutting edges, and picks are now easier to separate into a class of their own.

At Olduvai, the sequence following the Early Acheulean in middle and upper Bed II has been published in some detail (Leakey and Roe 1994). Although the preservation of these younger assemblages is poor relative to the Early Acheulean and dating of these beds is not so precise, Roe was able to characterize changes in technology following the Early Acheulean: the Bed IV handaxes (c. 0.95–0.78 Ma – Peters et al. 2008) show more regularity of shapes and thinner profiles over the Early Acheulean, and cleavers become more frequent and often more elegantly made. Advances in the shaping and thinness of the Bed IV LCTs have since been demonstrated quantitatively by Shipton (2018), and these

improvements support the notion of a Middle Acheulean technology. Following Bed IV are the Masek Beds (c. 0.78–0.5 Ma – Peters et al. 2008), in which handaxe manufacture shows even greater standardization of preferred shapes and a high degree of technological competence. In Kenya, Olorgesailie also has a lengthy sequence, now known to date from 1.2 to 0.5 Ma. Before such ages were achieved, Isaac (1977: 213) classified the site as Upper Acheulean because "reliable chronological distinctions… are not possible." However, he commented that the assemblages are not the most refined and that one might be tempted to designate them as Middle Acheulean. Similar improvements over time are also recorded for the long sequence of Acheulean sites in the Middle Awash of Ethiopia (de Heinzelin et al. 2000). Soft-hammer flaking made its first appearance in the Middle Acheulean, with the earliest date for this technique reported from Gesher Benot Ya'aqov, Israel, at c. 0.79 Ma (Goren-Inbar et al. 2018). Potential soft percussors could have been a softer stone (like sandstone), a hardwood billet, or in Eurasia deer antler. The method is useful for detaching thinner flakes that extend further across the surface of an LCT and for finer retouching along the edges. However, the technique is more typically seen used for LCTs in the Later Acheulean.

A handful of hominid fossils is found with industries that could be termed Middle Acheulean. Several specimens from Daka, Ethiopia, are dated to 1 Ma, including a remarkable cranium described as an evolving form of *Homo ergaster* (de Heinzelin et al. 2000). The illustrated LCTs show better technique and are more regular in form than Early Acheulean examples, but overall they are described as having bold flake scars and are larger and more irregular in plan view and profile than Later Acheulean examples. Also dating to 1 Ma is Buia in Eritrea which yielded a hominid cranium that, like Daka, possesses some progressive features. LCTs show variability across the Buia sites but are comparable in many respects to those of Daka, with bold scars and limited trimming that does not significantly modify the original blank's morphology (Abbate et al. 2004). Olorgesailie in Kenya has also yielded fragments of a hominid cranium at least 0.9 Ma, contemporary with Middle Acheulean elsewhere at the site. For South Africa, little detail is currently available for hominids in this time range as few dates are available for potential sites. An exception is Uitzhoek-Cornelia, but so far this site has only yielded one hominid tooth (Brink et al. 2012).

Most research on Acheulean sites today is focused on documenting the cultural and stratigraphic record of the relevant sites and obtaining reliable dates and paleoenvironmental information. From a theoretical perspective, however, the "variability selection hypothesis" for hominid and cultural evolution has received widespread acceptance (Potts 1998). It argues that the driving force behind human evolution in the Pleistocene has been climatic change and the periodic fluctuations between moister and wetter environments over hundreds of thousands of years. *Homo* rose to this challenge of variability in climate and subsistence resources and adapted both physically and culturally. Fauna has long been the primary means of reconstructing paleoenvironments when it is preserved. Isotopic studies (particularly on faunal teeth) are now a major means of analyzing diets, and hence the habitats of hominids and fauna, supplementing data that was previously limited to lists of taxa and their correlation with modern habitats. As the diets of some modern species differ somewhat relative to their past counterparts, isotopic analysis has become a valuable tool to discover those differences. Some researchers also focus on "taxon-free" analysis, studying the details of weight-bearing postcranial bones in relation to habitat substrates, particularly in bovids. And dental microwear analysis has shed further light on subsistence patterns of both fauna and hominids and hence habitat adaptations. Analysis of plant phytoliths and pollen, when preserved, along with stable carbon isotopes from sediments and geomorphological reconstruction, is another means of studying past environments. The varied regional habitats that existed across Africa during the Pleistocene add strength to the hypothesis of fluctuating climates as a driving force in hominid evolution.

Another area of focus in Middle Pleistocene research is the origins of prepared core technology

within the Acheulean. The earliest published date for this development is in Israel c. 0.79 Ma (Goren-Inbar et al. 2018). However, a cosmogenic burial date for the Victoria West industry from Canteen Kopje, South Africa (still to be published), is older, and although the prepared cores are not the most common, they are substantial in number. These two unrelated examples suggest that the ancestor of *Homo sapiens* had relatively sophisticated cognitive abilities which were, so to speak, "hardwired" in the brain. Many researchers believe that the shaping of handaxes gave rise to the concept of core preparation, and the Victoria West industry demonstrates this well (Figs. 5 and 6). These almond-shaped cores are flaked initially like a very large handaxe with bold scars. However, the profile is more asymmetrical, with a shallower upper surface and a deeper lower surface. A single large "preferential" flake is struck from the upper surface, perpendicular to the long axis of the core. Such side-struck flakes were particularly suitable blanks for LCT manufacture. Although the Victoria West core is a small component of the overall cores in excavated samples, it clearly shows the conceptual link with handaxe manufacture. "Giant cores" are also present at Gesher Benot Ya'aqov and appear to have been specially targeted for the making of LCT blanks. Hominid size and strength at this time must have enhanced human survival considerably, and this is reflected in the giant cores and the heavy-duty tools.

Acheulean Industrial Complex, Fig. 5 A handaxe in four views from Canteen Kopje's Victoria West prepared core industry, South Africa (image courtesy of Vincent Mourre)

Acheulean Industrial Complex, Fig. 6 Victoria West prepared core technology. At *left* are two prepared cores in profile view, showing the deeper undersurface and flatter upper surface used for the large flake removal. At *right* an LCT made on a large prepared flake is shown over the large flake scar on the upper core surface

From 0.6 Ma to 0.3–2 Ma: The Later Acheulean and Final ESA

From 0.6 Ma, the number of archaeological sites in Africa increases (Clark 2001a), not merely because younger sites are more likely to be preserved but because of the successful adaptations of evolving *Homo sapiens*. In particular, a slower rate of maturation for early *Homo sapiens* undoubtedly influenced the success of the species at this time. In contrast, even *Homo ergaster* matured relatively quickly. The specific age of an early *Homo* fossil may be difficult to know for certain, but it is today well documented that the rate at which an early *Homo ergaster* juvenile reached maturity was faster than in modern humans, and this fact undoubtedly influenced the character of earlier Acheulean industries. Hominids learned to make tools by observing and learning their group's tradition, but a shorter adolescence would have limited the time for individuals to experiment and innovate. Studies of nonhuman primates show that it is mainly the younger individuals who invent new cultural practices or adopt innovations from others in the group through observation.

While most variability in the Later Acheulean from c. 0.6 to 0.3 Ma can be explained by differences in raw materials and environment (Clark 2001a), there is nevertheless greater skill evident in the flaking of cores, in the acquisition of some better raw materials from distant sources, and in the shaping of the best LCT examples. The most logical explanation for these changes is not the appearance of a dramatically different, more advanced hominid but the increase of more sapient traits and cognitive abilities in the descendants of *H. ergaster*. Some researchers lump the hominids of this phase together as *Homo heidelbergensis*, but many specialists prefer to restrict this species to Europe and refer the fossils to early *Homo sapiens*. The relevant fossils are all associated with the Later Acheulean period and include the Bodo cranium from Ethiopia c. 0.6 Ma, the Elandsfontein skullcap from South Africa c. 0.6 Ma, and the Ndutu cranium from Tanzania >0.4 Ma. The Kabwe cranium (initially called Rhodesian Man or *Homo rhodesiensis*) was retrieved by miners at Broken Hill, Zambia. It is undated but similar to the Elandsfontein hominid. Middle Stone Age artifacts were also found in the cave deposits but in unknown relationship, while Acheulean and Sangoan assemblages (discussed later) were excavated in open-air deposits not far from the cave.

Although Wonderwerk Cave is argued on microstratigraphy to show occupations much earlier for both the Oldowan and earlier Acheulean levels, early humans only occupied caves more consistently during the Later Acheulean (e.g., at Cave of Hearths, Montagu Cave, and Wonderwerk in South Africa). For the earlier levels at Wonderwerk, it is likely that hominids sheltered or slept in the cave at times, as some rare baboon and chimpanzee troops have been recorded to do, and this could explain the smaller numbers of tools in these levels, as well as the signs of fire c. 1 Ma (see further reading suggestions).

Open-air sites of the Later Acheulean in Africa are much more numerous, although many remain poorly dated. Some of the most detailed descriptions of Later Acheulean industries are published for Olduvai, Tanzania (Leakey and Roe 1994), the Middle Awash Valley of Ethiopia (de Heinzelin et al. 2000), and Cave of Hearths in South Africa (see further reading: McNabb and Sinclair 2009). All Later Acheulean assemblages show considerable improvement in skill over earlier phases, even though there is very often a "least effort" approach, with just enough flaking to get the desired edge. The sequence at Kalambo Falls deserves special comment, as it is well described and includes both Later Acheulean and an overlying final ESA industry known as Sangoan (Clark 2001b). Experienced knappers have commented that the Kalambo LCTs show some of the finest proficiency in the African Acheulean, with refined technique evident in sharp cutting edges around all or most of the perimeter, intensive flaking, absence of step fractures, symmetrical plan forms and cross sections, careful removal of small flakes as a last series of removals to regularize edges, and use of soft-hammer flaking for the finer work (Clark 2001b, Chap. 11). Not all Later Acheulean LCTs are beautifully made, but when effort is invested in a good raw material or the maker is highly experienced, there is great skill evident, demonstrating what Glynn Isaac

Acheulean Industrial Complex, Fig. 7 Some of the more finely worked handaxes from the Later Acheulean at Cave of Hearths, South Africa, showing extensive flaking

referred to as the "upper limits" of the abilities manifested in an industry (Fig. 7).

The significance of blades in the Later Acheulean and the transition to the Middle Stone Age (MSA) are often noted, as blades require a purposeful flaking strategy to be made with any consistency. Three of the oldest regional industries with blades date back to c. 0.5–0.4 Ma (see Wilkins and Chazan 2012 for references). Along with blades, the Fauresmith industry at Kathu Pan and other South African Fauresmith sites (c. 0.5–0.29 Ma) include some LCTs, points, and prepared cores. Similarly, the Kapthurin industry in Kenya has core preparation and blades from c. 0.55 to 0.285 Ma. In Israel, a third blade technology is the Amudian, c. 0.42–0.32 Ma. These three technologies are unrelated as the techniques differ. In Africa, Acheulean blade tools tend to be associated with more open habitats (Clark 2001a). Another trait noted occasionally in some late assemblages is small-sized LCTs, some of which overlap in length with the larger early MSA points and unifaces. The most variable and skilled assemblages of the Later Acheulean occur in the late or final phase of the Acheulean, with retouched tools and technology presaging MSA features in some industries (Clark 2001a). Due to such similarities, many researchers recognize regional transitions from ESA to MSA but will label an assemblage Acheulean if it contains LCTs. However, the Kapthurin and Fauresmith industries both suggest a reduction in numbers of handaxes and a slow transition toward MSA technology in different parts of Africa.

Clark (2001a) always maintained that the late ESA was the first time that hominids coped with the challenges of more forested environments. The Sangoan was named as a central African industry found in regions that today are tropical. While the original collections were retrieved from disturbed geological contexts, subsequent research has documented the Sangoan in context, where it follows the Acheulean in time in sites where both phases are present as distinct industries. It is found mainly in central and south central Africa and western Kenya where woodlands were prominent at times. At Kalambo Falls, climates alternated between warmer/moister and colder/drier episodes, indicating that the Sangoan was not specifically a tropical or closed habitat adaptation. Rather it occurred in regions where woodland resources were an important component. Typical tools include small scrapers, picks,

and core axes, a type which seems to have functioned as a form of adze for woodworking and cutting toeholds for climbing in trees (Clark 2001b). Acheulean-style handaxes continue to occur in small numbers, and thus some researchers see the Sangoan industry as a variant of the Later Acheulean with the addition of some new types related to the prominence of woodland resources. In Zambia and western Kenya, there are some shared features between Sangoan and early MSA industries, such as the core axes at Kalambo Falls which continue in the early MSA but become increasingly adze-like. In western Kenya, the Sangoan and the Lupemban (an early MSA industry) share so many traits that at least one researcher refers to the Sangoan-Lupemban Complex. Precise dates are not available for Sangoan industries, but they are at least 0.1–0.2 Ma, and some may be considerably older.

International Perspectives

The most interesting theoretical aspect of Acheulean research is perhaps the "variable sameness" of the industries across time and space in Africa and Eurasia until the Later Acheulean. Even then, most variability is attributed to raw material differences, and one is left with an impression that the toolmakers were very clever people indeed, but still relatively archaic in mind and matter when compared to modern humans that appeared by 0.3 Ma with the early MSA. Industries then become considerably more variable, with many regional adaptations that include some stylistic differences, and the pace of change picks up even more during the course of the MSA. Various researchers have debated the meaning of Acheulean variability and the methods used to analyze it both regionally and globally. However, the most informative approach remains a thorough understanding of Acheulean assemblages in the context of experimental flaking with the specific raw materials that influenced their characters. Such hands-on experience always provides valuable insights, often more informative than detailed morphometric and statistical studies used today, as they help to interpret factors related to tool-making and tool functions. The Acheulean was undoubtedly a highly successful adaptation from 1.7 to 0.3–0.2 Ma ago, with an emphasis on open woodland and grassland subsistence until the appearance of the Sangoan variant. The final ESA, however, is unique, witnessing the transition from early *H. sapiens* to modern humans. The success of the Early Acheulean and *Homo ergaster* as a species clearly set the stage for these milestones in human development.

Cross-References

- ▶ African Stone Age
- ▶ *Homo ergaster*
- ▶ Human Evolution: Use of Fire
- ▶ Lithic Technology, Paleolithic
- ▶ Olduvai Gorge Archaeological Site

References

Abbate, E., B. Woldehaimanot, Y. Libsekal, T.M. Tecle, and L. Rook, eds. 2004. A step towards human origins: The Buia Homo one-million-years ago in the Eritrean Danakil depression (East Africa). *Rivista Italiana di Paleontologia e Stratigrafia* 110: 3–4. Supplement.

Berna, F., P. Goldberg, L.K. Horwitz, J. Brink, S. Holt, M. Bamford, and M. Chazan. 2012. Microstratigraphic evidence of in situ fire in the Acheulean strata of Wonderwerk cave, Northern Cape Province, South Africa. *Proceedings of the National Academy of Sciences of the United States of America* 9 (20): E1215–E1220.

Brain, C.K., ed. 2004. *Swartkrans, a Cave's chronicle of early man*. Transvaal Museum monograph no. 8. 2nd ed. Pretoria: Transvaal Museum.

Brink, J.S., A.I.R. Herries, J. Moggi-Cecchi, J.A.J. Gowlett, C.B. Bousman, J.P. Hancox, R. Grun, V. Eisenmann, J.W. Adams, and L. Roussouw. 2012. First hominine remains from a ~1.0 million year old bone bed at Cornelia-Uitzoek, Free State Province, South Africa. *Journal of Human Evolution* 63: 527–535.

Clark, J.D. 2001a. Variability in primary and secondary technologies of the later Acheulian in Africa. In *A very remote period indeed*, ed. S. Milliken and J. Cook, 1–18. Oxford: Oxbow Books.

Clark, J.D. 2001b. *Kalambo falls prehistoric site*. Vol. III. London: Cambridge University Press.

De Heinzelin, J., J.D. Clark, K.D. Schick, and W.H. Gilbert. 2000. *The Acheulean and the Plio-Pleistocene deposits of the Middle Awash Valley,*

Ethiopia. Belgique Annales-sciences Géologiques 104. Tervuren: Musée Royal de l'Afrique Central.
De la Torre, I. 2016. The origins of the Acheulean: Past and present perspectives on a major transition in human evolution. *Philosophical Transactions of the Royal Society B* 371: 20150245. https://doi.org/10.1098/rstb.2015.0245.
De la Torre, I., R. Mora, and J. Martinez-Moreno. 2008. The early Acheulean in Peninj (Lake Natron, Tanzania). *Journal of Anthropological Archaeology* 27: 244–264.
Gibbon, R.J., D.E. Granger, K. Kuman, and T.C. Partridge. 2009. Early Acheulean technology in the Vaal River gravels, South Africa, dated with cosmogenic nuclides. *Journal of Human Evolution* 56: 152–160.
Goren-Inbar, N., N. Alperson-Afil, G. Sharon, and G. Herzlinger. 2018. *The Acheulian site of Gesher Benot Ya'aqov*. Vol. IV. Dordrecht: Springer.
Isaac, G.L. 1977. *Olorgesailie*. Chicago: University of Chicago Press.
Kuman, K. 2007. The earlier stone age in South Africa: Site context and the influence of cave studies. In *Breathing life into fossils: Taphonomic studies in honor of C.K. (bob) Brain*, ed. T.R. Pickering, K. Schick, and N. Toth, 181–198. Bloomington: Stone Age Institute Press.
Kuman, K., and R.J. Clarke. 2000. Stratigraphy, artefact industries and hominid associations for Sterkfontein, member 5. *Journal of Human Evolution* 38: 827–847.
Kuman, K., and R.J. Gibbon. 2018. The Rietputs 15 site and early Acheulean in South Africa. *Quaternary International* 480: 4–15.
Leader, G.M., K. Kuman, R.J. Gibbon, and D.E. Granger. 2018. Early Acheulean organised core knapping strategies ca. 1.3 Ma at Rietputs 15, Northern Cape Province, South Africa. *Quaternary International* 480: 16–28.
Leakey, M.D. 1971. *Olduvai Gorge*. Vol. III. Cambridge: Cambridge University Press.
Leakey, M.D., and D.A. Roe. 1994. *Olduvai Gorge, volume 5: Excavations in beds III, IV and the Masek beds, 1968–1971*. Cambridge: Cambridge University Press.
Lepre, C.J., and D.V. Kent. 2010. New magnetostratigraphy for the Olduvai Subchron in the Koobi Fora formation, Northwest Kenya, with implications for early Homo. *Earth and Planetary Science Letters* 290: 362–374.
Lepre, C.J., H. Roche, D.V. Kent, S. Harmand, R.L. Quinn, J.-P. Brugal, P.-J. Texier, A. Lenoble, and C.S. Feibel. 2011. An earlier origin for the Acheulian. *Nature* 477: 82–85.
Peters, C.R., R.J. Blumenschine, R.L. Hay, D.A. Livingstone, C.W. Marean, T. Harrison, M. Armour-Chelu, P. Andrews, R. Bernor, R. Bonnefille, and L. Werdelin. 2008. Paleoecology of the Serengeti-Mara ecosystem. In *Serengeti III: Humans' impacts on ecosystem dynamics*, ed. A. Sinclair, C. Packer, S.A.R. Mduma, and J.M. Fryxell, 47–94. Chicago: University of Chicago Press.
Pickering, T.R., M.B. Sutton, J.L. Heaton, R.J. Clarke, C.K. Brain, and K. Kuman. 2012. New stratigraphic interpretations and hominid fossils from Swartkrans member 1 (South Africa). *Journal of Human Evolution* 62: 618–628.
Potts, R. 1998. Environmental hypotheses of hominin evolution. *Yearbook of Physical Anthropology* 41: 93–136.
Shipton, C. 2018. Biface knapping skill in the east African Acheulean: Progressive trends and random walks. *African Archaeological Review* 35: 107–131.
Wilkins, J., and M. Chazan. 2012. Blade production ~500 thousand years ago at Kathu Pan 1, South Africa: Support for a multiple origins hypothesis for early middle Pleistocene blade technologies. *Journal of Archaeological Science* 39: 1883–1900.

Further Reading

Barham, L., and P. Mitchell. 2008. *The first Africans*. Cambridge: Cambridge University Press.
Clark, J.D. 1970. *The prehistory of Africa*. London: Thames & Hudson.
Klein, R.G. 2000. The earlier stone age of southern Africa. *South African Archaeological Bulletin* 55: 107–122.
Klein, R.G. 2009. *The human career*. 3rd ed. Chicago/London: The University of Chicago Press.
McNabb, J., and A. Sinclair, eds. 2009. *The Cave of Hearths: Makapan middle Pleistocene research project*. B.A.R. international series, University of Southampton Archaeological series no. 1. Oxford: Archaeopress.
Wonderwerk Cave research. 2015. See: Special Issue: Archaeological and Palaeoenvironmental Perspectives on Wonderwerk Cave, South Africa. *African Archaeological Review* 4: 591–876.

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Basic Biographical Information

Lisa Ackerman served as Interim CEO of World Monuments Fund through September 2019, after 11 years as Executive Vice-President and Chief Operating Officer of World Monuments Fund. She serves on the boards of Historic House Trust of New York City, New York Preservation Archive Project, and American Schools of Oriental

Ackerman, Lisa, Fig. 1 Visitors enjoying the Lion of Babylon, one of Iraq's cultural heritage treasures. (© World Monuments Fund)

Research. Previously she served on the boards of US/ICOMOS and Partners for Sacred Places. She previously served as Executive Vice-President of the Samuel H. Kress Foundation. Ms. Ackerman is a Visiting Assistant Professor at Pratt Institute Graduate Center for Planning and the Environment.

Major Accomplishments

In 2007, Lisa Ackerman received the Historic District Council's Landmarks Lion Award. In 2008, she was named the first recipient of the US/ICOMOS Ann Webster Smith Award for International Heritage Achievement (Fig. 1).

Cross-References

- ► China: Domestic Archaeological Heritage Management Law
- ► Vandalism and Looting: Destruction, Preservation, and the Theft of the Past
- ► World Monuments Fund (WMF)

References

Di Giovine, M.A. 2009. *The heritage-scape: UNESCO, world heritage, and tourism*. Lanham: Lexington Books.

Serageldin, I., E. Shluger, and J. Martin-Brown, eds. 2001. *Historic cities and sacred sites. Cultural roots and urban futures*. Washington, DC: The World Bank.

Tung, A. 2001. *Preserving the world's great cities. The destruction and renewal of the historic metropolis*. New York: Clarkson Potter.

Activism and Archaeology

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Introduction

For most people, including many archaeologists, archaeology is about the more distant past.

Archaeology is more interesting and esoteric than actually being useful. After all, the "archaeo" part of the word means "ancient"! Thus, the past is over and done with, and while it may be intrinsically interesting or provide us with perspective on our lives and cultural changes through time, the past does not seem to be of much use in dealing with contemporary issues. Other archaeologists, however, have called on archaeology to become more action oriented and for archaeologists to explore more ways to use archaeology to address contemporary problems (Kleindienst and Watson 1956). They want archaeology to matter (Sabloff 2008) arguing that archaeologists "...have responsibilities towards the communities, individuals, and institutions directly implicated by archaeological work into the recent past in helping them come to terms with the obscured and often painful circumstances of contemporary life" (Buchli 2007: 14). To do this, archaeologists must first acknowledge that the past actually includes anything from the briefest moment ago into the depths of time (Patel 2007: 51).

Archaeology is really more about the study of material culture than about the past and can be applied to *any* period of time. Expressed simply, artifacts do not "lie"; they are present or they are not, which in either case may require explanation. Although archaeologists may err in their interpretations, their goal is to recover material remnants of past behaviors and their contexts in order to provide a narrative – a story – about the history of a people, their lifeways, their adaptations to changes in natural and social environment, and what things mean to them. This can be a powerful way of seeing the past, which makes archaeology potentially useful in understanding contemporary concerns. Archaeology's applicability to the present stems from three key elements: studying material culture, building accurate narratives about the past based on what is found, and using the narratives to suggest changes relating to social concerns. To realize this potential, however, requires activism.

Definition

Activism generally is the use of some kind of direct action either in support of or in opposition to a cause or issue. When linked to archaeology, this means that the tools of archaeology are applied in some way to support or oppose an issue in an effort to promote change. Activism requires that archaeologists make choices and then take some sort of political position, usually in collaboration with stakeholders to that issue, in an effort to effect the desired change.

Activism depends heavily on collaboration with non-archaeologists. Projects are sometimes low key exercises in public education about what archaeology does or uses archaeology to address relatively uncomplicated concerns. Several projects, for example, employ archaeology to demonstrate the historical basis and impacts of race in a community, and others use particular archaeological techniques to assist with mass disasters. On the other end of the continuum are projects in which archaeology is only one aspect of studying very complex social problems such as homelessness or global warming. Little and Zimmerman (2010) and Stottman (2010) provide numerous examples spanning the spectrum of activist archaeology projects.

Key Issues/Current Debates/Future Directions/Examples

Two key issues impede activism. The first is that activism requires archaeologists to be political, which many have been loath to do. The second is that even if they are willing to be activists, few archaeologists know how to translate the results of their work in ways useful to the formulation of public policy.

The former stems from archaeology's long struggle to become scientific, and as such, many archaeologists believe that archaeologists and their interpretations must be objective and unbiased. Some altogether reject studies of the contemporary past as even being archaeology, suggesting that they epistemologically reflect postmodernism. As a few activist archaeologists

have heard from colleagues, "you do politics, not archaeology!" In spite of the fact that there is disagreement with his assessments, McGuire (2008) has contended, however, that archaeology always has been and still is clearly political.

Accepting archaeology as inherently political, a growing number of archaeologists have moved toward making their research "translational". This means that they "generate knowledge and utilize evidence to develop meaningful practices that address problems or issues in everyday life and collaborate or form partnerships to successfully translate evidence into meaningful practices" in order to make a difference in people's lives (Zimmerman et al. 2010: 444–45). In other words, by working with others, they find ways to put archaeology to use. Doing so is not always easy and carries risks of alienating collaborators or other powerful stakeholders. Given the limited experience of most archaeologists with activism, most are relying on a case-by-case approach to projects and use a lot of experimentation. To say that the discipline has yet to develop an encompassing epistemology for activism and is nowhere close to a set of "best practices" would be a profound understatement.

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Critical Historical Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Stakeholders and Community Participation

References

Buchli, V. 2007. Opinion. *Conservation Bulletin* 56: 14.

Kleindienst, M.R., and P.J. Watson. 1956. Action archaeology: The archaeological inventory of a living community. *Anthropology Tomorrow* 5: 75–78.

Little, B., and L.J. Zimmerman. 2010. In the public interest: Creating a more activist, civically-engaged archaeology. In *Voices in American archaeology*, ed. W. Ashmore, D. Lippert, and B. Mills, 131–159. Washington, DC: Society for American Archaeology Press.

McGuire, R.H. 2008. *Archaeology as political action*. Berkeley: University of California Press.

Patel, S.S. 2007. Writing on the wall: The graffiti archaeology project challenges the discipline of archaeology. *Archaeology* 60 (4): 50–53.

Sabloff, J.A. 2008. *Archaeology matters: Action archaeology in the modern world*. Walnut Creek, CA: Left Coast Press.

Stottman, M.J., ed. 2010. *Archaeologists as activists: Can archaeology save the world?* Tuscaloosa: University of Alabama Press.

Zimmerman, L.J., C. Singleton, and J. Welch. 2010. Activism and creating a translational archaeology of homelessness. *World Archaeology* 42 (3): 443–454.

Further Reading

Dawdy, S.L. 2010. Clockpunk anthropology and the ruins of modernity. *Current Anthropology* 51 (6): 761–793.

Harrison, R., and J. Schofield. 2010. *After modernity: Archaeological approaches to the contemporary past*. Oxford: Oxford University Press.

Actor Network Theory (ANT)

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Introduction

Actor-Network Theory (ANT) is a framework for the study of sociology that emerged in the early 1980s with the work of Bruno Latour, Michel Callon, and John Law in the field of Science and Technology Studies (STS). Bruno Latour continued to develop ANT throughout the 1990s, where its application moved beyond the boundaries of STS and made its way into other disciplines outside sociology. The application of ANT within the archaeological discipline has predominantly occurred through the development of symmetrical archaeology, which seeks to apply the ANT concept of symmetry in order to develop more complex interpretations within the archaeological discipline. Beyond this, the application of ANT

by archaeologists exists within a number of isolated case studies in the subfields of maritime archaeology aviation archaeology, and ethnographies of archaeological practice.

Definition

ANT primarily emerged as a result of sociologies of scientific practice that developed in the early 1980s within the field of STS. These studies use participant observation to produce detailed ethnographic descriptions of scientific "data" and "fact" production, concluding scientific knowledge to be a socially constructed product of both laboratory cultural practices and the social connections that exist between scientists (Harman 2007:43). Despite being an early proponent in the social construction of scientific knowledge, sociologist and philosopher Bruno Latour was also the first to abandon social construction, claiming it to be the key weakness of early sociologies of science (Van Rebrouck and Jacobs 2006:36–37). Specifically, Latour (2005:7) argues there is an assumption within traditional sociology that the social is a distinct micro-context of reality separate from economic and/or political contexts. Latour maintains the entire notion of contexts, particularly social contexts, creates an unnecessary dichotomy that restricts ethnographic descriptions of knowledge production to social contexts and socially derived outcomes. In response to this, Latour took inspiration from French philosophers Giles Deleuze and Félix Guattari's (1980) assemblage theory in order to reconceptualize or "reassemble" (cf. Latour 2005) the nature of social contexts. In doing so, Latour (1999, 2005) developed ANT as an inductive method of ethnographic description to describe the production of knowledge outside a given context.

Despite the inclusion of the word "theory," ANT is a *method* of inquiry rather than a theory (Latour 1999:19). As John Law (2009:142) argues, "it is a toolkit for telling interesting stories. . .about how relations assemble." In other words, ANT is used as a method to describe the relationships or connections that comprise a particular network or assemblage; however, to fully comprehend ANT as a method, it needs to be described in relation to the specific case study in which it is being applied (see Latour 2005:141–156). In spite of this, ANT does emphasize the use of key concepts including symmetry, translation, and black boxing. These key concepts have been adopted by proponents of symmetrical archaeology and/or applied within a number isolated case studies in the subfields of maritime archaeology, aviation archaeology, and ethnographies of archaeological practice.

Key Issues/Current Debates/Future Directions/Examples

Within the archaeological discipline, the most predominant application of ANT has occurred through the development of symmetrical archaeology, which applies the ANT concept of symmetry in order to draw attention to the often marginalized or silenced agency of nonhumans. Latour (1999:190) argues the agency of nonhumans has resided in a "blind spot" in society, with their agency ignored socially, politically, and philosophically despite the fact humans depend on and care for nonhumans in our everyday lives; however, ANT maintains nonhumans are not passive, inert, or inanimate but are actors with the capacity to act alongside human actors (Harman 2007; Hodder 2012; Olsen et al. 2012). Thus, the concept of symmetry seeks to promote the equal agency of human and nonhuman actors in order to create a "flat ontology," which treats all humans and nonhumans democratically.

In applying this concept, symmetrical archaeology argues the archaeological discipline produces anthropocentric histories that emphasize the "Indian [sic] behind the artefact" (Braidwood 1958:734) but has failed to recognize the agency of nonhumans or things. In essence, things have been forgotten. For example, key practitioner of symmetrical archaeology Bjørnar Olsen (2007:580; 582) believes the archaeological discipline and the histories it produces have kept things at arm's length:

> (what) we see is basically a prolonged asymmetry, in which things continue to be treated as secondary or epiphenomenal to some cultural or social 'first

> instance'. . .[where] the material inhabitants were plastic and receptive, sitting in silence waiting to be embodied with cultural significance.

Alternatively, symmetrical archaeology can offer a distinct and reconceptualized focus on things, where the metaphor of an assemblage or network is used to better understand the agency of things. For example, things make a difference, not just because of their agency and ability act but because of the reciprocal mutually constitutive connection that exists between human and nonhuman actors as part of an assemblage or network (Latour 2005). In other words, agency is possessed in connections between actors rather than in actors themselves, with agency relative to and distributed via the assemblage within which they are situated (Lucas 2012:162). Therefore, proponents of symmetrical archaeology argue being sensitive to the connections that exist between humans and nonhumans can result in far more complex archaeological interpretations (Olsen et al. 2012:14).

Ian Hodder's (2012) *Entangled: An Archaeology of the Relationships Between Humans and Things* also draws upon the metaphor of an assemblage to explore the spatial and temporal relationships between humans and nonhumans. In doing so, Hodder (2012:91–94) initially explores the concept of ANT but soon rejects it on the basis of its symmetry and instead favors the concept of entanglement to convey the dependence that exists between human and nonhumans. Consequently, the concept symmetry and the creation of a "flat ontology" are the key criticisms of ANT. Critics claim this democratic approach does not account for or challenge pre-existing systems of asymmetrical power and authority or inequality (Amsterdamska 1990; Restivo 2005; Whittle and Spicer 2008). Utilizing ANT has the potential to obscure systems that marginalize particular groups or individuals, or their agency, in resisting this marginalization. Despite this, ANT understands hegemonic systems of power and authority as a product or effect of pre-existing assemblages and not a predetermined reality (Latour 2005:64). Therefore, despite not recognizing or challenging pre-existing hegemonic systems of power and authority, ANT can be used to describe the assemblages that create and maintain such systems, which becomes a useful tool in challenging such structures.

Beyond the development of symmetrical archaeology, the application of ANT by archaeologists has existed within a few case studies. In an early example, Whitridge (2004) considers the complex technical assemblage that resulted in stylistic variability in harpoon heads observed archaeologically, which in turn contributed to changes in whaling practices in the North American Artic around 1000 AD. In doing so, Whitridge's (2004) example is one of the few that demonstrates how ANT can be applied to develop more complex archaeological interpretations. Accordingly, many of the other archaeological case studies that exist under the ANT umbrella seek to describe the archaeological practice and/or the production of knowledge, aligning these case studies with the field of sociologies of scientific practice from which ANT emerged. In another early example, Jones' (2002) *Archaeological Theory and Scientific Practice* explicitly draws upon STS and ANT in his analysis of archaeological practice, arguing research questions, hypotheses, techniques, sampling strategies, and scales limit the production of archaeological knowledges. In addition to this, Jones draws upon the ANT concept of symmetry to explore the agency of archaeological traces in influencing the production of archaeological knowledge. Both Yarrow (2003) and Van Rebrouck and Jacobs (2006) apply the ANT concept of symmetry to explore the mutually constitutive nature of the connection between subject and object or archaeologists and archaeology that plays out during archaeological excavation, demonstrating neither archaeologist nor archaeology is self-evident but emerges simultaneously as a result of the connection that develops during archaeological practice. In other words, without the archaeology there can be no archaeologist. More recently, Deal et al. (2015) apply ANT to explore the social and technical actors that comprise and produce knowledge within the emerging field of aviation archaeology, whereas Van

Oyen (2015) explores how archaeological understandings of Roman pottery types became a constructed yet an imbedded form of categorization.

Lastly, research by Wiltshire (2017) uses ANT to reconceptualize archaeological practice as an assemblage, in order to describe the heterogeneous actors often marginalized in the production of archaeological knowledges. In doing so, this research moves beyond the ANT concept of symmetry, to include the concept of translation in order to identify and describe how connections between actors assemble, shift, and fell apart over the course of archaeological investigations. Specifically, the concept of translation is a process where one actor transforms another through connections that involve work, negotiation, and resistance between actors (Harman 2007:40–41). When translation has succeeded, one actor has worked upon another to translate it to become part of an assemblage (Latour 1999). Alternatively, when actors are not transformed by other actors, they do not form part of an assemblage. As a result of this process of translation, assemblages are continually being made, remade, shaped, and reshaped and are constantly shifting through the dynamic connections that exist between actors. In other words, assemblages are not static or permanent but are dynamic, and ANT allows for the study of numerous moments of translation by describing how the connections between actors assemble, shift, and fall apart (Latour 2005:132). For Wiltshire (2017), this concept is used to highlight how the agency of the Ngarrindjeri Nation resulted in a process of translation, ultimately influencing the development of the researcher's role as an archaeologist. In addition to this, successful and unsuccessful instances of translation are also described. Specifically, this research describes how the connection between the Ngarrindjeri Nation and the researcher allowed for the initiation of archaeological investigations, while the nature of this connection including the agency of gender contributed to the conclusion of archaeological investigations.

Following on from the concept of translation, Wiltshire (2017) also applies the concept of black boxing to identify and describe how successful and unsuccessful instances of translation became concealed. Once successful translation occurs, an assemblage appears static, stable, and self-evident, which conceals the heterogeneous actors that comprise it, and focus is directed toward one or few actants (Latour 1999). For example, the discovery of archaeological facts is attributed to the authoritative archaeologist, while other human and nonhuman actors that are part of the assemblage of archaeological practice and contribute to the production of these facts are marginalized and silenced.

Black boxing also allows for particular knowledges and/or practices to become accepted, rather than allowing them to be continually critiqued, refined, and reproduced to reflect the dynamic nature of the assemblage that produced them. In describing the concept of black boxing in relation to archaeological practice, Leighton (2015:68) explains:

> Black-boxing refers to the extent to which a scientific knowledge claim needs to be justified and explained within a specific scientific community. For instance, when radiocarbon dating was a new technology, its use was a matter of uncertainty and debate, but today an author writing in an archaeological journal does not need to explicitly convince his or her readers that C14 is an appropriate way to date an archaeological layer. Archaeologists no longer have to explain, justify and prove the concept of radioactive decay every time they want to make use of a C14 date in a paper, and in this sense C14 dating has become a black-boxed 'matter of fact' rather than an open problem one needs to think about, pay attention to and justify explicitly.

In applying the concept of black boxing, Wiltshire (2017) describes how successful and unsuccessful instances of translation became concealed, particularly during the production of written texts and reports that obscure emotion actors such as uncertainty and excitement.

Cross-References

- ▶ Assemblage Thinking
- ▶ Materiality in Archaeological Theory
- ▶ Reflexive Approaches in Archaeology, Development of
- ▶ Symmetrical Archaeology

References

Amsterdamska, O. 1990. Surely, you must be joking, monsieur Latour! *Science, Technology and Human Values* 15: 495–504.

Braidwood, R.J. 1958. Vere Gordon Childe 1892–1957. *American Anthropologist* 60: 733–736.

Deal, M., L.M. Daly, and C. Mathias. 2015. Actor-network theory and the practice of aviation archaeology. *Journal of Conflict Archaeology* 10 (1): 3–28.

Deleuze, G., and F. Guattari. 1980. *A thousand plateaus: Capitalism and schizophrenia*. Mineapolis: University of Minnesota Press.

Harman, G. 2007. The importance of Bruno Latour for philosophy. *Cultural Studies Review* 13 (1): 31–49.

Hodder, I. 2012. *Entangled: An archaeology of the relationships between humans and things*. Oxford: Wiley-Blackwell.

Jones, A. 2002. *Archaeological theory and scientific practice*. Cambridge: Cambridge University Press.

Latour, B. 1999. On recalling ANT. In *ANT theory and after*, ed. J. Law and J. Hassard, 15–25. Oxford: Blackwell.

Latour, B. 2005. *Reassembling the social: An introduction to actor-network-theory.* Oxford: Oxford University Press.

Law, J. 2009. Actor-network theory and material semiotics. In *The new Blackwell companion to social theory*, ed. B. Turner, 141–158. Oxford: Blackwell.

Leighton, M. 2015. Excavation methodologies and labour as epistemic concerns in the practice of archaeology: Comparing examples from British and Andean archaeology. *Archaeological Dialogues* 22 (1): 65–88.

Lucas, G. 2012. *Understanding the archaeological record*. Cambridge: Cambridge University Press.

Olsen, B. 2007. Keeping things at arm's length: A genealogy of asymmetry. *World Archaeology* 39 (4): 579–588.

Olsen, B., M. Shanks, T. Webmoor, and C. Witmore. 2012. *Archaeology: The discipline of things*. Berkeley: University of California Press.

Restivo, S. 2005. Politics of Latour. *Organization and Environment* 8 (1): 111–115.

Van Oyen, A. 2015. Actor-network theory's take on archaeological types: Becoming material agency and historical explanation. *Cambridge Archaeological Journal* 25 (1): 63–78.

Van Rebrouck, D., and D. Jacobs. 2006. The mutual constitution of natural and social identities during archaeological fieldwork. In *Ethnographies of archaeological practice: Cultural encounters, material transformations*, ed. M. Edgeworth, 33–44. Lanham: Altamira Press.

Whitridge, P. 2004. Whales, harpoons and other actors: Actor-network theory and hunter-gatherer archaeology. In *Hunters and gatherers in theory and archaeology*, ed. G.M. Crothers, 445–474. Carbondale: Southern Illinois University.

Whittle, A., and A. Spicer. 2008. Is actor network theory critique? *Organization Studies* 29 (4): 611–629.

Wiltshire, K.D. 2017. All things are connected: An autoethnography of archaeological practice with and for the Ngarrindjeri nation. Unpublished PhD dissertation, Flinders University.

Yarrow, T. 2003. Artefactual persons: The relational capacities of persons and things in the practice of excavation. *Norwegian Archaeological Review* 36 (1): 65–73.

Adandé, Alexis B. A.

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Basic Biographical Information

Dr. Alexis Bertrand Agunmaro Adandé is an archaeologist from the Republic of Benin, born April 7, 1949 in Dakar, Senegal. He completed his primary and secondary studies in Dakar (Senegal), and Porto-Novo (Republic of Benin), between 1954 and 1968. After obtaining his Baccalaureat in 1968, he entered the Institute of Higher Education of Benin in Lomé, Togo; in 1970, he left to continue his studies at the University of PARIS I – Panthéon – Sorbonne in France. There, he obtained a license of history in 1971 and a Master of Arts in 1972. He returned to Benin, where he taught history and geography in secondary schools (1972–1979), before returning to France in 1979 for his doctoral studies. At the University of PARIS I – Panthéon – Sorbonne, he successfully defended a Diploma of Advanced Studies in Archaeology in 1980, and a Ph.D. in 1984. Upon his return, he was sent to the National University of Benin, where he was already a lecturer in archaeology at the Department of History and Archaeology (1978–1986). He taught archaeology as Assistant Professor of Archaeology from 1986 to 1993. Since 1993, he has been a senior lecturer in archaeology. He was Deputy Head of the Department of History and Archaeology of the University of Benin from 1989 to 1995, and Head

Adandé, Alexis B. A., Fig. 1 During fieldwork

of the Archaeological Research Team of Benin (ERAB) from 2003 to 2007 (Fig. 1).

During his career, Dr. Adandé participated in several training courses at archaeological sites in Tunisia and France; in particular at the Pincevent school site, under the direction of Professor André Leroi-Gourhan, College of France (16 June–6 July, 1980) and the training school site of Ras ed. Drak-Kerkouane (Tunisia) under the auspices of the Institute of Art and Archaeology and under the joint direction of Professors A. Fantar and J. Leglay (September 1983).

He has directed several archaeological excavations in Benin. He was, among other things:

- responsible for research and excavations in the region of Allada (1981–1982);
- Co-leader of the Mixed team for the Benin–Togo Archaeological Rescue Project of Mono Valley (1990–1993);
- Co-director of the Archaeological Project in Ouidah (July–August 1991);
- Project Manager of Ouessè Archaeological Research (1992);
- Co-leader of Project Beninese—Danish archaeology (BDArch, 2002–2004).

Dr. Adandé is also interested in museums, where he led several exhibitions within the framework of the development of the archaeological results. This includes the first archaeological exhibition in the Republic of Benin during the commemoration of "Ten years of archaeological research in Benin" (campus of Abomey – Calavi and Honmè Museum – Royal Palace Porto Novo, 1988); and the installation of the exhibition "The Earth is also Our History Book," Alexandre Sènou Adande ethnographic museum, Porto-Novo (1994–1995). He was Executive Director of West African Museums Program (WAMP) from 1995 to 2001. Dr. Adandé has also participated in several seminars and scientific conferences and educational workshops on the national and international level (Fig. 2).

Major Accomplishments

Dr. Alexis Bertrand Agumaro Adandé was the first to have defended a doctoral thesis in archaeology in the Republic of Benin. He was the first archaeologist who conducted well-documented

Adandé, Alexis B. A., Fig. 2 Dr. Alexis Adandé during an exhibition

archaeological excavations at the site of Togoudo Awutè Allada, southern Republic of Benin (Adandé 1984). His work has contributed to the knowledge of the rich archaeological heritage of Benin and its protection. He has contributed to the creation of the Archaeological Research Team of Benin in 1978 under Father François de Medeiros, then Head of Department. This team developed the first national program of archaeological research, covering the territory of Benin and has enabled a precise inventory of archaeological sites in Benin.

Dr. Adandé has contributed to the opening of a regional perspective in archaeological research through the West African Archaeological Association. For him, the archaeological approach, to be meaningful, has to be global; that is to say, the work cannot be achieved without taking into account research sites located in neighboring countries (Adandé 1993). This methodological perspective of integrating the historiography of various countries within the sub-regional West Africa is fruitful, because it helps build hypotheses that are better reasoned and less narrow.

Dr. Adandé also contributed to the training of several generations of archaeologists in Benin and in the sub-region of West Africa. He has significantly contributed to the development of archaeology in Benin and West Africa.

Cross-References

- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ West Africa: Museums
- ▶ World Archaeological Congress (WAC)
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Adandé, A.B..A. 1984. Togudo—Awute, capitale de l'ancien royaume d'Allada étude d'une cité précoloniale d'après les sources orales, écrites et les données de l'archéologie. Unpublished Ph.D. dissertation, Université Paris I/Panthéon – Sorbonne.

Adandé, A.B..A. 1993. Origines lointaines des peuples de la République du Bénin: Problématique et perspectives de recherche, Revue annuelle d'histoire africaine, numéro spécial sur le Bénin, nouvelle série 1. Afrika Zamani, 65–92.

Further Reading

Adandé, A.B..A. 1990. Cultural heritage, archaeology and education. In *Cultural resource management: An African dimension (Forum at the conference in honour of Professor Thurstan Shaw)*, ed. B. Andah, 102–109. Ibadan/Owerri: Wisdom Publishers Limited.

Adandé, A.B..A. 1995. Plea for a traditional arts & crafts museum. In *Museums & the community in West Africa*, ed. C.D. Ardouin and E. Arinze, 68–79. Washington/London: Smithsonian Institution Press/James Currey on behalf of WAMP.

Adandé, A.B..A. 1997. Benin—training in archaeology: The beginning of an experiment. In *Museums & archaeology in West Africa*, ed. C.D. Ardouin, 44–51. Washington/Oxford: Smithsonian Institution Press/James Currey.

Adandé, A.B..A. 2000. Benin—buried heritage, surface heritage: The Portuguese fort of Sao Joao Baptista de Ajuda. In *Museums & history in West Africa*, ed. C.D. Ardouin and E. Arinze, 127–131. Washington/Oxford: Smithsonian Institution Press/James Currey.

Adandé, A.B..A. 2002. Introduction. In *Museums & urban culture in West Africa*, ed. A.B..A. Adandé and E. Arinze, 1–5. Oxford: James Currey on behalf of WAMP.

Adandé, A.B..A., and I. Zevounou. 1994. Education and heritage: An example of new work in schools in Benin. In *The presented past, heritage, museums and education*, One World Archaeology series, ed. P. Stone and B.L. Molineux, vol. 25, 315–325. London/New York: Routledge & English Heritage.

Adaptation in Archaeology

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Introduction

The theory of evolution is inherently attractive for archaeologists, who are concerned with the long-term history of humankind (Dunnell 1980). Changes through time during the long process of hominization are, by definition, adaptive. Adaptation is clearly one basic constituent of evolution. For that reason, the concept of adaptation – including the capacity for a cultural system to adjust to changes – is important in many approaches, particularly in ecologically oriented archaeology and, more recently, in evolutionary archaeology.

Definition

This variety of approaches using the concept of adaptation naturally leads to the existence of slightly different definitions (O'Brien and Holland 1992; Van Pool 2002).

Basically, adaptation refers to "the idea that organisms are fitted for the particular environments in which they live" (Alexander 1962: 826) or more directly to the "conformity between the organism and its environment" (Pianka 1983: 85).

It is accepted that an adaptation refers to both the state of being adapted and the process that produces the adaptation. However, even biologists have found it difficult to recognize adaptations, and the acceptance that natural selection is not the only mechanism behind evolutionary processes was one result of this difficulty (Vrba and Eldredge 1984).

Historical Background

The concept of adaptation used by many archaeologists was based on the work of classic evolutionary anthropologists like Leslie White (1949) and Julian Steward (1955). In these approaches, tools are seen basically as extrasomatic means of adaptation. The assignation of functions to archaeological tools and features is the key concept to understand and discuss adaptations, an activity that falls within the approach known as cultural evolution, which is extremely popular. Circularity is the main interpretative problem of this approach. Effectively, the role of adaptation as an ex post facto argument invoked as the cause of both the appearance and the persistence of archaeological traits was and is an impediment in most applications (O'Brien and Holland 1992).

On a slightly different vein, Patrick Kirch wrote about "the continuous modification of . . . behavioral patterns in response to changing environments, by means of selective retention of behavior" (Kirch 1980: 110). He explained that it is this selective retention which serves the adaptation of individuals. In a sense, in this approach, artifacts are the result of adaptations. One famous example provided by Kirch refers to the different types of fishhooks recovered at the different Pacific Islands (Kirch 1980). Using this approach to define tactics and strategies which involve tools and features, it is possible to discuss how large parts of past societies functioned in the past, and Kirch used it – in conjunction with historical linguistics – to explain the process of human colonization of the Pacific Islands (Kirch 2010).

One observation is that many times these approaches assumed that cultural systems were in equilibrium and adaptations were simply seen as including those behaviors "that seemed a reasonable way to maintain the status quo" (Kelly

1995: 47). In the end, it is true that the concept of adaptation is trapped in circular thinking.

Since the 1980s, adaptation is also a core concept of Darwinian or selectionist archaeology. In this approach, tools are seen as the hard parts of the human phenotype, and they are treated as adaptations resulting from the action of natural selection (O'Brien and Holland 1992). The problem is that showing that any given trait was under natural selection is a difficult task at best. Most published applications are restricted to highly specific aspects of past societies, like changes in the shape of projectile points or in the wall thickness of pottery (Neff 1992; O'Brien and Holland 1992). These are attractive and useful examples, but wider applications are still difficult to achieve.

Key Issues/Current Debates

In the twenty-first century, different approaches with a focus on the concept of adaptation are disputing their capacity to deal with the archaeological record. Among these approaches, human behavioral ecology (Bird and O'Connell 2006), selectionism (Dunnell 1980), and cultural macroevolution (Prentiss et al. 2009) are among the best known. Behavioral ecology is "the subset of evolutionary ecology that studies the fitness-related behavioral trade-offs that organisms face in particular environments" (Bird and O'Connell 2006: 144) and includes widely used subfields like costly signaling theory. Basic to these approaches is that natural selection provides the flexibility to adapt to a variety of situations. Extensive ethnoarchaeological and experimental research was done in order to understand the costs and benefits of different tools and strategies. These results are in turn used to discuss diverse aspects of the archaeological record that are not focused in adaptations but result from the process of decision-making allowed by natural selection. Ethnographic data is used not only to develop methodological tools but also to test some of the basic assumptions of behavioral ecology.

Selectionism, on the other hand, tries to explain the archaeological record in terms of the direct action of natural selection (Dunnell 1980; Neff 1992). Adherents to this approach believe that ethnoarchaeology is not useful, since recent societies should be the result of evolutionary forces. For that reason, they should not be adequate to provide good analogs for the past. However, there is a role for experiments, especially those designed to develop engineering principles that can be used to understand the performance of archaeological tools. Many of the most attractive discussions about adaptation produced by selectionists derive from this kind of studies.

Researchers working under the cultural macroevolution brand are concentrating in the study of higher-level cultural entities. This is their basis for the construction of an inclusive macroevolutionary approach to archaeology, which is used to study the evolution of whole cultural systems (Prentiss et al. 2009).

Examples of the identification of archaeological and ethnographic adaptations exist, but there are critiques, importantly that most of the so-called adaptations recorded by ethnographic research cannot be the result of natural selection, because they occurred within one human generation. The main example is the use of snowcats by the Cree that replaced snowshoes in a few years (Boone and Smith 1998). It is indeed difficult to implicate natural selection – a benefit in differential survival – to explain a process that occurred in less than one generation. As a result of all these disagreements, nothing close to an operative application of the concept of adaptation for archaeology emerged. Scheinsohn (2011) maintains that the published examples presented as adaptations are many times in fact either aptations or exaptations, that is, "features coopted for a current utility following an origin for a different function (or for no function at all)" (Gould 2002: 1246). In the end, it appears that it is not reproductive but replicative success that is useful in archaeological studies (Leonard and Jones 1987). Tools can be counted through space and time, and the results can be compared. The assumption is that replicative success derives from the better performance properties of tools, and this is something that we can study in a

number of ways. Studies of the resistance of materials, that is, the resistance of ceramics to thermal shock, or the shape of tools, that is, the distribution of cutting edges in lithic tools, can be used to understand the performance potential of different materials. Given the fact that the selective environment is constantly changing, when replication is successful, a number of exaptations are to be expected (Van Pool 2002). For example, most of the morphological transformations of lithic tools are expected to be exaptive. For that reason, it can be suggested that many lithic tools follow an inexorable trend of exaptive transformation. Functional studies, or residue analysis, are adequate ways to study and understand the scope of these variations.

Also, in order to study replicative success per se, engineering studies are useful. These studies are basic components within both the Darwinian or selectionist and behavioral approaches to archaeology. Behavioral archaeology is an approach based on human-artifact interactions that seek to understand cultural change in the long term. In part, this similarity and the idea that "nothing in Darwinian theory per se nor in modern evolutionary biology precludes framing theory and models in behavioral terms" (Schiffer 1996: 96) led Michael Schiffer to propose the existence of important overlaps between both research programs. The answer from the selectionist camp was that differences were still important, including the nomothetic interest which is manifested in the behavioral approach and the corresponding place for historical contingency in the selectionist approach (O'Brien et al. 1998). Beyond these discrepancies, it can be sustained that an understanding of the forces and tensions to which pottery, lithics, or bones are subjected surely helps in the construction of credible adaptive scenarios. These scenarios, in turn, should be able to capture the whole complexity of the cultural systems that produced them.

The study of human bones should be a basic component of any approach that is trying to tackle adaptations in the archaeological record. However, bioanthropology usually appears only through applications of the results of population genetics and molecular biology. This is particularly true in highly speculative scenarios of human colonization of the different regions of the planet. But human bones rarely appear in archaeological discussions of adaptation (but see O'Brien 1987). This is odd, since humans are the carriers of the supposedly adaptive tools and behaviors that we are studying.

Future Directions

One important conclusion is that tools are just means purposefully designed to perform functions. However, intentions can be considered proximate causes at best, and their main role is to generate variation (O'Brien and Holland 1992). Some of the tools recovered in the archaeological record can be seen as exaptations, cases in which the design is not necessarily related with the function but, instead, in the nomenclature of Gould (2002), with its effects. In other words, tools can be used in many unplanned contexts. In one way or the other, it may be true that exaptations can be seen as basic to the understanding of long-term human processes. More specifically, the explicit search for exaptive examples appears today as an archaeologically relevant task, since functions and effects can be understood and temporal changes can be evaluated (Scheinsohn 2011). In a more sophisticated level, exaptations can be invoked even to explain issues like the origins of social inequality or socioeconomic change (Prentiss et al. 2009).

Finally, it is only with the intensive use of bioanthropological information that archaeological discussions of adaptation will find the much desired depth. There is promise in a study that starts with the study of adaptations of the human individual – functional pathologies, stress indicators, stable isotope information, etc. – and then searches for related changes in the frequency of tools or designs. In doing this, we are dealing with conscious or unconscious modifications of behavior (Van Pool 2002: 16) that respond to changes in the social and natural environment. In other words, behaviors, technologies, and phenotypes can be related in complex and difficult to understand loops. Then, an exploration of

exaptations, which may be related or not with previous adaptations, appears to be an attractive and promising way to understand the dynamics of past societies.

Cross-References

- ▶ Cultural Ecology in Archaeology
- ▶ Darwin, Charles R.
- ▶ Evolutionary Anthropology: Issues, News, and Reviews
- ▶ Human Evolution: Theory and Progress

References

Alexander, G. 1962. *General biology*. New York: Thomas Y. Crowell.

Bird, D.W., and J.F. O'Connell. 2006. Behavioral ecology and archaeology. *Journal of Archaeological Research* 14: 143–188.

Boone, J., and E.A. Smith. 1998. Is it evolution yet? A critique of evolutionary archaeology. *Current Anthropology* 39: 141–173.

Dunnell, R.C. 1980. Evolutionary theory and archaeology. In *Advances in archaeological method and theory*, ed. M. Schiffer, vol. 3, 35–99. New York: Academic.

Gould, S.J. 2002. *The structure of evolutionary theory*. Cambridge, MA: The Belknap Press of Harvard University Press.

Kelly, R.L. 1995. *The foraging spectrum. Diversity in hunter-gatherer lifeways*. Washington, DC: Smithsonian Institution Press.

Kirch, P.V. 1980. The archaeological study of adaptation: Theoretical and methodological issues. In *Advances in archaeological method and theory*, ed. M. Schiffer, vol. 3, 101–156. New York: Academic.

Kirch, P.V. 2010. Peopling of the Pacific: A holistic anthropological perspective. *Annual Review of Anthropology* 39: 131–148.

Leonard, R.D., and G.T. Jones. 1987. Elements of an inclusive evolutionary model for archaeology. *Journal of Anthropological Archaeology* 6: 199–219.

Neff, H. 1992. Ceramics and evolution. In *Archaeological method and theory*, ed. M. Schiffer, vol. 4, 141–193. Tucson: University of Arizona Press.

O'Brien, M.J. 1987. Sedentism, population growth, and resource selection in the Woodland midwest: A review of coevolutionary developments. *Current Anthropology* 28: 177–197.

O'Brien, M.J., and T.D. Holland. 1992. The role of adaptation in archaeological explanation. *American Antiquity* 57: 36–59.

O'Brien, M.J., R.L. Lyman, and R.D. Leonard. 1998. Basic incompatibilities between evolutionary and behavioral archaeology. *American Antiquity* 63: 485–498.

Pianka, E.R. 1983. *Evolutionary ecology*. 3rd ed. New York: Harper & Row Publishers.

Prentiss, A.M., J.C. Chatters, and I. Kuijt. 2009. *Macroevolution in human prehistory*. New York: Springer.

Scheinsohn, V. 2011. Adeptos a la adaptación: tres propuestas clásicas para la arqueología y una evaluación. *Antipoda. Revista de Antropología Arqueológica* 13: 55–73.

Schiffer, M.B. 1996. Some relationships between behavioral and evolutionary archaeologies. *American Antiquity* 61: 643–662.

Steward, J. 1955. *Theory of culture change*. Urbana: University of Illinois Press.

Van Pool, T.L. 2002. Adaptation. In *Darwin and archaeology*, ed. J.P. Hart and J.E. Terrell, 15–28. Westport: Bergin & Garvey.

Vrba, E., and N. Eldredge. 1984. Individuals, hierarchies, and processes: Towards a more complete evolutionary theory. *Paleobiology* 10: 146–171.

White, L. 1949. *The science of culture: A study of man and civilization*. New York: Farrar, Straus and Giroux.

Adult Education in Archaeology

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Introduction

Archaeology as a discipline has had diverse beginnings and traditions, depending on where it developed and where it is currently practiced on the planet. For example, European archaeology is often (inextricably) entangled with History, Art History, or Classics, while what is called New World archaeology has traditionally been more affiliated with (social, biological, or other types of) anthropology. The demographics and motives of adults involved in archaeology, either professionally or not, are also different, depending on the era and area. As a consequence, the relationship between adult education and archaeology is varied in different parts of the world, but, I would

argue, is seemingly consistent with local preoccupations about heritage and the pasts that archaeology can help illuminate and reconstruct. It is therefore important to look into the relationship between adult education and archaeology, in order not only to understand more broadly the different motivations and pathways of people into archaeological practices and matters but also to consider how the relationship of such people with the past is shaped.

Definition

What is adult education, what is archaeology, and what is adult education in archaeology? For the purposes of this chapter, I take adult education (often interchangeably called Continuing Education or Lifelong Learning, even though they are not the same) to mean training and participation to educational activities by adults who are not (initially or even ultimately) pursuing a professional career in preestablished ways, such as doing a full-time BA. In other words, I take adult education to mean a part-time, ad hoc, non-conventional educational way in which an adult might pursue further knowledge on a specific subject. Such educational provision might be provided by a university, a local authority (e.g., a city council, a museum), a local society, a project, or an interest group. It may range from formalized lessons and assessment, which award certification points or paperwork of some sort, to regular public talks, project outreach (e.g., excavation tours), museum volunteering, etc. Adult education usually covers subjects not taught in school education or school subjects which adult education students did not have the opportunity to study at school initially (due to, e.g., age, academic or vocational orientation, family history, etc.).

I take archaeology to mean both the practice and the subject matter of investigating a past milieu through its material remains, whether this is recent (e.g., World War II archaeology) or chronologically remote (e.g., the Paleolithic). Official practitioners of archaeology are certified as professionals by authoritative bodies, such as university departments or local archaeological services. It is usually they who need to authorize and regulate volunteering in archaeological activities, such as excavations or museum studies, as well as teach archaeological topics in adult education.

Adult education in archaeology, therefore, can be taken to mean here the relationship between usually non-professional education on the one hand and archaeological topics and practice on the other. Consequently, this paper will look at what forms this relationship might take, whether it is reciprocal, what issues it raises, as well as what directions it may assume in the future.

Historical Background

Archaeology as a pursuit, first amateur, then progressively professional, began as the preserve of affluent social classes, especially men. Figures such as Heinrich Schliemann (1822–1890), for instance, exemplify the white affluent male, who, either through inherited or (in his case) acquired wealth, could afford not only the time but also the expense to travel, explore, excavate, and pay for wages and supplies, in order to produce a result with dubious financial but phenomenal publicity returns. This pursuit contributed instead more broadly to the humanistic backlash against the industrial dehumanization of the nineteenth and twentieth centuries CE. Archaeology, like art history, classics, anthropology and other humanities, sought to understand the past through a raft of techniques beyond and in addition to literary analysis, with the ultimate aim of making sense of people in the here and now (in the nineteenth and twentieth centuries) and of imbuing public life with ideas and aspirations about the past, its educational qualities, its nationalist, and even escapist and moralistic qualities (cf. Speight 2011).

By the end of the nineteenth and the beginning of the twentieth century, adult education was making its appearance in earnest. There were several drivers behind the development of this alternative to the traditional, and often elitist, types of education, especially for subjects taught after school (and usually confined to university undergraduates). One reason was the concept of adult education as a social service to educationally

disenfranchised people, e.g., workers, who were seen as both audiences willing to advance their educational background but also as a workforce to be invested in through non-conventional training (whether vocational or not; see, for example, the Workers' Educational Association in the UK, founded in 1903). Another social reason was the wider role that e.g. universities saw themselves as playing in the local communities: Adult education may have represented additional revenue for such institutions, but it also enhanced their reputation as social actors in a world where class boundaries were not as rigid as they had been in previous eras, especially when one takes into consideration the social upheavals afforded by the two World Wars (to variable effect, depending on the country).

The fusion of adult education and archaeology occurred for a number of reasons at the end of the nineteenth and especially the beginning of the twentieth century (see, e.g., Speight 2003). This also goes some way towards explaining the choices of today's students in pursuing adult education archaeology. Some reasons for adult education in archaeology were, from a European perspective, the Enlightenment, the Romanticist and Classicist movements of the eighteenth and nineteenth centuries (cf. Speight 2011), as well as the growing varieties of nationalism, leading up to the early twentieth-century conflicts and beyond. Elite understandings of the past, partly due to antiquarianism but also due to the emerging discipline of archaeology, had seeped into the public domain. This contributed to a climate of public curiosity and excitement about the past which, through "the Grand Tour," museum exhibitions, public lectures, the cinema, excavations, etc., could be more widely and readily accessed. It was therefore an almost natural leap for interested people to want to educate themselves, not just by visiting a museum but by also taking a course, studying how archaeology worked as a discipline, and assessing what it could reveal about past societies, and about students' own ancestors in particular. Another, "New World," reason for the uptake of such education was the sociopolitical circumstances of state formation in countries such as the USA and Australia. This created a wider public interest in anthropological and cultural evolution, often intertwined with claims of land or populace legitimization; but it also helped migrant (and eventually local) communities "connect" to what they perceived as their ancestors.

After the two World Wars, education for archaeology as a discipline, although still the preserve of certifying institutions, became progressively more "democratized" (but less so than other nonhumanities disciplines, such as engineering). So, this incentive, to attend adult education archaeology due to the frequent inaccessibility of university education, was no longer the case. Other reasons persisted or even emerged, such as the movement of feminism and the "need" to find its historical/archaeological antecedents. Recent developments in museological and excavational outreach have also blurred the boundaries between adult education in archaeology and (since at least the 1970s) public archaeology, boundaries once better defined.

Key Issues/Current Debates

So why have students continued to enroll to adult education archaeology courses, instead of, say, taking undergraduate university archaeology courses leading to professional certification? Time and expense are easy (and of course valid) answers. Instead, one way in which to answer this more fully is to look at the makeup of student cohorts and the reasons they give today (author's personal experience). Most adult education archaeology students, whether of a working (evening courses) or retired (day-time courses) background, are of mature age, either living on independent means or day-time jobs or having retired from a profession which was not related to archaeology. Although they can vary widely, most engage in assessment because of a personal passion (which is also why they enroll) rather than an interest in accreditation leading to a professional qualification, which is often an option offered by the providing institution. For many people, enrollment on and study for a course in archaeology are a lifelong aspiration and the

fulfillment of an unrequited parallel occupation with archaeology (i.e., as a recreational rather than a professional activity). Nevertheless, younger students and students systematically working towards accreditation do occur, although they are still the minority. For the non-accreditation students, the outcomes hoped for are varied. Some want to cultivate in themselves a better understanding of certain past societies/civilizations/circumstances (cf. Tennant 1998; Speight 2011: 154 calls it "enrichment learning"). Others want to (and do) volunteer in local communities and heritage activities (cf. discussion in Jack 1980), travel widely, and inform their own practice, if related (e.g., librarianism, museology, school teaching, etc.).

A number of issues can be (and have been, to a certain extent) raised regarding adult education in archaeology. Firstly, because of the complex history of each of the constituent parts, as well as the nature of the fusion between adult education and archaeology, this type of archaeological education might suffer in terms of authority and legitimacy. If this is education which does not produce professionals and which is taught by staff who may or may not have (full or part time) academic positions, it is often the case that courses are considered more simplistic, easier, or inferior to their "certified" equivalents, officially or unofficially (cf. discussion in cf. Speight 2003: 162; also author's personal experience); staff may also occasionally be discriminated against by tenured colleagues as a result.

Secondly, the question of cost and investment arises for adult education archaeology, as it does for all archaeology. Many academic quarters consider the humanities in general, and archaeology in particular, a luxury – and certainly not a wise financial investment. For example, the fees alone for a full time three-year undergraduate degree in archaeology in the UK currently are in the region of £27,000, while a starting salary for a new archaeology graduate is in the region of £17,000–19,000 p.a. (National Careers Service, UK Government 2018), if s/he is lucky enough to be employed. This long-term issue has prompted archaeology as a discipline to react in three ways:

(a) To divide between "hard-science" archaeology (incorporating chemistry, geophysics, palaeopathology, and the like) and "soft-science" (such as more theoretical, classicist, epigraphic, and art historical approaches)
(b) To market itself as providing transferrable job skills if an archaeological career is not pursued (but see discussion in Colley 2005 for the potential non-effectiveness of this)
(c) To use adult education archaeology as a way of sensitizing the public about the usefulness (and financial needs!) of archaeological investigation and as a way to redress the gap of staff unemployment, audience curiosities and aspirations, and outreach quota.

This, in turn, raises the question of who is driving the adult education archaeology agenda. Currently, it is almost always a top-down process, primarily determined by staff and institutions (who offer courses), then by student demand (who take or do not take the courses on offer, and can, on occasion, suggest topics to staff, but normally do not organize their own).

Ultimately, adult education in archaeology currently operates, as does much of the wider adult education sector in this author's opinion, as an add-on to mainstream institutional provision and to students' lives and careers, rather than as an essential type of training or set of skills needed in employment, cognitive development, and health or everyday activities. This is certainly not the design or intent of either the adult educational providers or the students who take the relevant courses. The source is likely to be found on an institutional, governmental, and museological level, as it is these actors who determine the societal and employability role of archaeology (cf. debate on instrumentalism in Hamilakis 2004), and therefore, in effect, regulate how the different pathways to archaeological knowledge are perceived, achieved, and (not) certified.

International Perspectives

The author has extensive knowledge and experience of the Higher Education and Adult

(Continuing) Education sector in the UK, principally through archaeology, Classics and art history. The view from this position is situated within the wider milieu described above. However, it is also complemented by the particularities of the UK educational provision, such as university and local authority Continuing Education Departments, UK organizations creating or promoting accessible archaeological knowledge, as well as the UK governments' changing attitude to archaeology specifically and to adult education more generally. For example, universities with substantial reputation in (traditional) archaeological training and practice, such as Oxford, Cambridge, and UCL, also, unsurprisingly, offer well-attended adult education archaeology, which recruits well and offers topics of both local and international archaeology. Local authorities and archaeological societies may offer a comparably wide range of topics, but students who attend these are more likely to enroll on courses which investigate their local archaeology (e.g., Roman Britain; cf. discussion on regionalism in Speight 2003: 154) rather than a completely new or geographically remote archaeology (e.g., Minoan Crete), although there are, of course, exceptions.

There is also variation in the organizational and financial aspect of adult education in archaeology. Larger, longer established, and well-funded education providers, such as universities, attract students not only because of the range of archaeological topics they make available but also because of their reputation (both as institutions and as staff), online provision (e.g., distance learning), location, and other attractive additions to their "package" (Fig. 1; e.g., the opportunity to spend time exploring the institution and surroundings during a weekend course or summer school; cf. Speight 2003 for a thorough, contextual overview of the UK residential sector).

Adult Education in Archaeology, Fig. 1 *Learning Environment*: (**a**) exterior of Dillington House, Ilminster, UK, host of one of the author's Continuing Education courses (in this case, Aegean Prehistory and Early Iron Age Greek Archaeology), May-June 2014; (**b**) typical adult learner classroom arrangement for another of the author's residential courses in archaeology (in this case, Aegean Prehistory), at the Institute of Continuing Education (ICE), Madingley Hall, University of Cambridge, Cambridge, UK, October 2016; (**c**) props (including replicas of vessels, tablets, seals and tools) and other materials towards the provision of a multimodal and tailored learning experience from the same occasion as **b**. Photography for (**a**) by and © of T. Grimshaw, 2014, reproduced here with permission; photography for (**b**) and (**c**) by and © of the author 2016

In addition, they operate on an economies-of-scale model. In other words, the overall revenue of a university Continuing Education department makes it possible to be flexible regarding recruitment numbers, which can vary substantially between courses. So, for example, the lowest viable number of students for an adult education course in archaeology to run at a university setting is 6, bearing in mind that there may be several other courses which recruit in the region of 20–25 students, and therefore even out the projected earnings of the department, the latter managed by professional academic staff. In addition, in these cases the premises need to be booked but not hired (i.e. paid for separately) and there is administrative and library support. The same is not the case for a course organized by proactive volunteers on the level of a local archaeological society, museum, or interest group. They have to manage all the administrative, financial, booking, and other practicalities on an ad hoc basis, hire venues at additional cost and effort, liaise with the teaching staff, sort out taxes etc. So, for these courses, which do not come under a larger university or departmental umbrella, a viable minimum number of students is about three times more, in the region of 18–20 at least, which, in turn, limits the range of courses on offer, and therefore, eliminates "tasters" of initially less popular but probably just as interesting and inspiring archaeological subjects.

One additional point should be made here regarding the financing of adult education in archaeology. Up until 2006, the UK government offered part-sponsorship of adult education / lifelong learning courses in general. This was done for various reasons. One of these was to help more people access educational provision and gain a variety of skills (academic, vocational, personal, social, etc.). Another reason, bearing in mind that many, if not the majority, of adult education students were and are pensioners, was to help elderly people keep an active mind as a strategy towards social interaction and as a prevention of conditions such as dementia (cf. Kingston 2006). In 2006, the UK found it appropriate to radically restructure such funding. This had a profound and immediate effect. Firstly, it led to a sharp drop in the number of students who could afford to pay for courses and to the axing of many courses which either the providing organizations or the enrolling students did not feel were a priority, now that there was more competition for money. Secondly, the change directly affected archaeological provision, such as in the case of the University of Bristol, which had to close down its archaeological programs for the wider public (these, up until then, were prominent in the local community). Thirdly, as a knock-on effect, departments as a whole found it difficult to continue not only with the breadth of courses that they once offered, but to continue at all. The Continuing Education Department of the University of Reading was one such fatality, and so the local adult education provision was eventually taken over by the Department for Continuing Education of Oxford University, which hired the spaces on Reading University's campus in order to run its courses. Archaeology, as part of this sector, felt these repercussions more acutely, as students now had to prioritize their sponsorship in a way that had more to do with instrumental gains (e.g., learning mainstream foreign languages) rather than non-practiced personal fulfillment (e.g., broadening their historical-archaeological knowledge). In effect, archaeology and its adult education provision almost reverted to the nineteenth century paradigm of an affluent, elitist pursuit.

Future Directions

The future of adult education in archaeology may be bright or bleak based on a number of factors. It could be bleak if funding for it and archaeology as a discipline continues to shrink. There is only so much effort and cost that educational organizations, societies, and individuals can invest in something which is considered as a luxury or add-on by some of the same organizations and the governments they operate under and are (not) sponsored by. It can also be bleak if the rift in archaeology itself widens further, with the "hard-science" branch, already largely inaccessible by

nonprofessionals, providing exclusive training to practitioners, and the "soft-science" part catering for more philosophical (and increasingly more detached from fieldwork) aspects of archaeology. Thirdly, it can be bleak depending on the demographics of the adult education archaeology students of the future. If in 20–30 years' time the cohorts continue to be made up of mature students, it is doubtful to what extent the social, professional, and personal interests of today's youth would be translated into fees paid, in their maturity, into archaeological knowledge for the wider public; or even if the nature of education sought would be the same. Conversely, if the demographic age of such students decreases, i.e., is brought down to working ages for a larger proportion of the students, it is likely that these people would be more interested in being instrumental by acquiring transferrable, practical, archaeological skills, rather than pursuing a more rounded, less quantifiable education. This, in turn, would kill off part of the discipline and theory of archaeology.

Conversely, the future of adult education in archaeology may be bright. At a time of great turmoil, migration, culture clashes, conflicting accounts of the present and the past, as well as a number of crises, students, and indeed adult educators, (should) seek to educate themselves regarding how past populations dealt with some challenges, in the hope of understanding their own positions and options in the here and now (cf. discussion in Guy 1999 about the cultural relevance of adult education; and in Colley 2005, esp. 62, and Simandiraki-Grimshaw 2017 about the current public relevance of archaeological education in the USA, Australia and Greece respectively). Another reason why organizations, associations, local authorities, and interest groups persist in pursuing archaeological knowledge, despite the effort and cost (and often travel) involved, is cultural capital. Understanding past civilizations, learning to be analytical and critical of sources, relics, and situations, and synthesizing narratives based on a variety of data (excavational, epigraphic, osteological, art historical, chemical, etc.), as well as understanding how local and global identities were and are constructed, should be seen as skills that current societies need (e.g., Tennant 1998). They should not be seen as luxuries or optional add-ons left to the discretion of organizations, adult education staff, or interested individuals. They ought to be funded, promoted, and supported through infrastructure, public debates and legislation. It is this author's wish and hope, therefore, that this will have been achieved by the next generation of adult education staff and students of archaeology.

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References

Colley, S. 2005. 'Consumer choice' and public archaeology in and beyond the academy. *Australian Archaeology* 61 (1): 56–63.

Guy, T.C. 1999. Culture as context for adult education: the need for culturally relevant adult education. *New Directions For Adult And Continuing Education* 82 (Summer): 5–18.

Hamilakis, Y. 2004. Archaeology and the politics of pedagogy. *World Archaeology* 36: 287–309.

Jack, R.I. 1980. Adult education and archaeology. *Australian Archaeology* 11 (Dec): 101–106.

Kingston, P. 2006. Adult education cuts are not a healthy option: a dramatic fall in learning among older people can only exacerbate the problems of age. *The Guardian*, 2 May 2006. https://www.theguardian.com/education/2006/may/02/furthereducation.longtermcare. Accessed 12 Nov 2018.

National Careers Service, UK Government. 2018. Archaeologist. https://nationalcareersservice.direct.gov.uk/job-profiles/archaeologist#. Accessed 12 Nov 2018

Simandiraki-Grimshaw, A. 2017. An archaeology of/for the disenfranchised in Greece. *Journal of Eastern Mediterranean Archaeology and Heritage Studies* 5 (3–4): 271–286.

Speight, S. 2003. Residential archaeology and local history in British university adult education c.1940–1980. *Journal of Adult and Continuing Education* 9 (2): 149–166.

Speight, S.J. 2011. A gentlemanly pastime: antiquarianism, adult education and the clergy in England, c.1750–1960. *History of Education* 40 (2): 143–155.

Tennant, M. 1998. Adult education as a technology of the self. *International Journal of Lifelong Education* 17 (6): 364–376.

Advertising and the Appropriation of Culture

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Introduction

The growth of cultural tourism and the spread of global information have both contributed to an increase in the commercialization of the past. Ancient cultures are used for marketing everything from vacation destinations to a wide range of products that draw upon stereotypes of the past as mysterious or idyllic. The pervasive use of ancient sites and artifacts by advertisers may simultaneously increase awareness of the past as well as put sites in danger as a result of overvisitation or mismanagement.

Definition

Certain sites such as Stonehenge and Chichen Itza have both iconic status within modern Western marketing and clear brand name recognition. Unfortunately, the field of advertising is largely unaware of the impact upon archaeological sites and descendant communities of a campaign designed around stereotypes of the past.

Key Issues/Current Debates/Future Directions/Examples

Advertising is ubiquitous in our world today. Given the seemingly endless opportunities to purchase goods and services in modern Western society, it is no wonder that archaeological cultures and sites are frequently used to attract consumer attention. Well-known archaeological sites achieve an iconic status within many cultures and become easy shorthand for specific values advertisers wish to associate with their products. The advertising industry is voracious and constantly on the lookout for new ideas and ways to market products. Archaeologists must be aware of the impact such media campaigns have on popular conceptualizations of cultural heritage and guard against a trivialization of archaeological resources due to overexposure or distortion in the media.

One of the risks of archaeological resources being utilized in advertising campaigns derives from the nature of this particular enterprise. "Advertizing is a rhetoric of persuasion, not a narrative of instruction," and while it is obvious that we do not turn to advertisements for educational purposes, nonetheless the messages conveyed about ancient cultures and archaeological sites via the medium of advertising influence our shared understanding of the past (Talalay 2004: 208). In many cases, an entire civilization is reduced to a single image and concept – when Stonehenge is used to convey a sense of a premodern, nonindustrial, and tribal identity missing from today's hectic world or when a jungle-covered Maya pyramid is used to convey an exotic and dangerous escape from modern routines, advertisers have selectively imagined the past in a way that essentializes the diversity and complexity of ancient cultures in order to connect quickly and easily with the consumer (McCarthy 2002). This reductive process in turn fosters the stereotypes that most Westerners have about the ancient past – that it was a simpler, easier time – and may even constrain how heritage resources are managed. The use of a single icon from ancient Egypt, such as the Sphinx, reinforces the stereotype that ancient Egypt was dominated by isolated monumental constructions that exist in a peopleless and pristine setting (Macdonald and Rice 2003). When such extraordinary and unusual artifacts come to define an ancient culture, we lose the richness of a landscape filled with ancient people performing an enormous range of activities in order to keep desert settlements functioning, and in turn we hamper our ability to preserve the less visible sites where the vast majority of the population lived, worked, and conducted the business of social reproduction.

Popular advertising that utilizes archaeological themes often overemphasizes the artificial

boundary erected today between past and present (Talalay 2004). The idea of a "past" that is not in some way tied to our modern lives is a falsehood encouraged by depictions of archaeological cultures as exotic, unchanging, or bizarre. Advertisements for adventure tourism or all-terrain vehicles often utilize this trope by situating the modern consumer within an alien landscape of ruined structures in a harsh environment. The message conveyed is that the past is stuck in the past and we may enter it for entertainment or diversion if we are brave enough. Advertisements for cosmetics and jewelry that draw selectively upon artifacts and iconography of the ancient Mediterranean, for example, are based in a different trope that argues the boundary between past and present is permeable – certain goods have always been valued by elites, and the purchase of a pearl necklace or timepiece will connect the consumer to a privileged set who unabashedly displayed their elite status when such behaviors were better tolerated (Duke 2007). The consumer is invited to share an essential understanding of the unchanging and timeless value of certain important luxuries. In both cases, whether the past is depicted as alien and threatening or as a source of legitimization, the past has an uncontested authority that advertisers use to promote their product. This inherent authority is set in opposition to our ever-changing present, full of diverse choices and ambiguity.

Archaeological tourism is one venue in which advertisers take full advantage of ancient cultures to sell a product. As cultural and heritage tourism have grown over the last 20 years, national tourism agencies have created marketing campaigns centered on the iconic image of archaeology as healthy escapism. Many of the most important archaeological sites around the world are state owned and state managed, with governmental control over how they are marketed. This arrangement has serious implications for the interpretation of archaeological cultures, as governmental control has often meant a small minority of power holders construct a past that is acceptable, marketable, and profitable. Descendant communities, especially indigenous populations, are very often excluded from this interpretive process and from decisions about how their heritage will be marketed or appropriated for national tourism campaigns (Ardren 2004). This is despite overwhelming evidence of the strong ties many modern indigenous people have to ancient sites or to an identity that rests in part within a historically charged landscape of places and events. In January 2006, indigenous people from all over the world met at the ancient center of Tiwanaku, Bolivia, to witness purification and blessing ceremonies of incoming President Evo Morales. President Morales is the first Bolivian president of indigenous heritage, and he chose Tiwanaku as his inauguration setting deliberately. His comments on that occasion referenced the archaeological site as evidence for the survival of indigenous culture and its successful resistance to colonial empires. Morales reclaimed the site as a reservoir of native art and culture as well as a source of tourism revenue. The distinctive art and architecture of Tiwanaku are frequently used in advertisements, and President Morales argued that the indigenous people of Ecuador should have a role in deciding how such images are commercialized and manipulated. Tiwanaku is by no means a unique example: the three most heavily visited UNESCO World Heritage sites in the New World – Chaco Canyon in New Mexico, Chichen Itza in Mexico, and Machu Picchu in Peru – have no formalized mechanisms for the involvement of the large descendant communities that surround them in decisions about how images from the sites will be commercialized and popularized.

The way archaeological resources are portrayed in the media also affects the public understanding of archaeology as a natural and cultural resource and, thus, site management strategies. If archaeological sites are trivialized, through their depiction as either the settings for escapism or entertainment activities only, the argument for sufficient resources for protection and maintenance becomes much harder for archaeologists and others committed to heritage preservation to make. Likewise, when archaeological sites are depicted as exotic locations full of unusual or mysterious objects, a message is conveyed that archaeological resources are only located in distant places and we are unlikely to

encounter them at home. When archaeological cultures are used as a passive backdrop for commercialized advertising, a dangerous impression is given that archaeological resources are unlimited and eternal and that they exist without the need for careful preservation and management (McCarthy 2002).

In sum, the archaeological past is generally appropriated by advertising in a way that furthers common stereotypes and does not encourage responsible use. Improvements are simple and would involve avoidance of these stereotypes, efforts to "people" the past, and consultation with descendent communities when images are being used. The common use of ancient cultures in modern advertising can have a very positive effect upon the public awareness of archaeology and archaeological resources. But there is tremendous room for improvement in how such images are utilized and in trying to understand the effect they have on all of us who consume them.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Gender
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Heritage Research and Visitor Planning
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage: History and Context
- ▶ Indigenous Archaeologies
- ▶ Intangible Cultural Heritage
- ▶ Marketing Heritage

References

Ardren, T. 2004. Where are the Maya in ancient Maya archaeological tourism? Advertising and the appropriation of culture. In *Marketing heritage: Archaeology and consumption of the past*, ed. Y. Rowan and U. Baram, 103–116. Walnut Creek: AltaMira Press.

Duke, P. 2007. *The tourists gaze, the Cretans glance: Archaeology and tourism on a Greek island*. Walnut Creek: Left Coast Press.

Macdonald, S., and M. Rice. 2003. *Consuming ancient Egypt*. London: Institute of Archaeology, University College London.

Mccarthy, S. 2002. 'Once upon a megalithic time. . .': The representation of archaeology in Irish tourism literature. *Papers from the Institute of Archaeology* 13: 34–50.

Talalay, L. 2004. The past as commodity: Archaeological images in modern advertising. *Public Archaeology* 3: 205–216.

Aerial and Satellite Remote Sensing in Archaeology

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Introduction

Aerial and satellite remote sensing technologies offer a noninvasive and nondestructive tool that can be used in many ways for the preservation and conservation of archaeological sites and landscapes. A synoptic, landscape perspective is inherent in the use of these technologies, which enriches the context that is essential to understanding the value of archaeological discoveries. The extent and nature of environmental changes that threaten sites can often be more quickly observed, characterized, and measured by observing the landscape from above, rather than exploring it on the ground. With training, archaeologists can use them to (1) directly detect archaeological sites, (2) model likely site locations, (3) assess the importance of sites based upon spatial relationships among sites themselves as well as relationships among sites and environmental features, (4) detect threats to sites and landscapes arising from natural processes or from development, and

(5) monitor such threats as they emerge, increase, or abate.

Recent years have seen enormous advances in sensor technologies and much greater access to a variety of aerial and satellite platforms that carry these sensors. During the same period, computing power measured in numerous ways has roughly doubled every two years ("Moore's Law"), data storage capacity has grown at the same pace and become much less expensive, and software for enhancement, analysis, and integration of images into geographical information systems has become more user friendly. Some of this software is open source or available at a reasonable price. The cost of using open source software is therefore only in acquiring the training necessary to use it. The result of these technological improvements means that little stands in the way of their use by archaeologists and conservationists.

Definition

Remote sensing includes a wide array of technologies that have in common the acquisition of data from platforms that are at a distance from objects, materials, and other phenomena of interest. These technologies use and analyze electromagnetic radiation or, in a few cases, sound waves or gravitational fields. Types of radiation frequently used include many bands of the electromagnetic spectrum, from ultraviolet through visible light to longer electromagnetic waves, such as near infrared, infrared, and radar. Sensors that collect data generated by the use of visible through infrared bands are termed *multispectral* if they utilize only a few, narrow, discreet bands or *hyperspectral* if they sense bands over a continuous range. Some electromagnetic bands can be transmitted and received in ways that greatly enhance the ability to collect data of particular interest. Light waves, for example, can be made highly coherent and focused. Transmitting and receiving a pinpoint of light created in this way can be used to precisely locate what reflected the light. Using many points of light, a surface can be extrapolated from multiple locations. Radar transmitted from a rapidly moving platform (aircraft or satellite) creates a synthetically large antenna; since resolution of images sensed by radar depends upon the size of the antenna, the faster the platform carrying radar moves, the greater the resolution of resulting images.

Synthetic aperture radar (SAR) waves can also be polarized vertically or horizontally at transmission and reception, providing data that can be used to discern shape and orientation and can be analyzed interferometrically to develop a surface model. Analysis of remotely sensed data is done with use of many different types of software that create and enhance images, and provide built-in algorithms for the analysis of images and a degree of capacity to develop custom algorithms. Images, which are enhanced, analyzed, or otherwise modified, are often further interpreted as a layer in a geographical information system project. Data obtained from sensors and images can also be analyzed with mathematical, statistical, and engineering software.

Key Issues/Current Debates/Future Directions/Examples

An important application of this technology is the detection of archaeological sites. Archaeologists have used aerial photos obtained from aircrafts and before that balloons and kites for more than 100 years (see, for example, Poidebard 1934). Photos obtained from small, private aircrafts are still being used in this way, especially in Europe and the Middle East. From 1960 to 1972, the United States operated the Cold War-era CORONA intelligence satellite program. In 1972, Corona images were declassified and now can be easily obtained by the public (http://earthexplorer.usgs.gov), as can those acquired by a companion satellite, GAMBIT. These black and white photos are of relatively high resolution, but were not georeferenced and contained the normal distortion associated with perspective. They require georeferencing or preferably orthorectification to be transformed into an image with a scale that is constant throughout. They have been of especially great utility in planning archaeological surveys in remote areas and in

determining the locations of sites that have been obscured or obliterated by development. Min (2013) has used CORONA photographs in this way to map features on the ancient landscape that have been removed by the recent rapid development in China.

New analytical techniques can render the analysis of images produced with older, strictly optical, technologies more useful. Jesse Casana and Jackson Cothren (2013) of CAST at the University of Arkansas have developed a means to streamline orthorectification of CORONA imagery. They have made more than 1000 CORONA tiles of the Middle East available for download (http://corona.cast.uark.edu/index) and have described their technique for replication by others. Ur (2012) provides an overview of how CORONA and GAMBIT have been used in the Middle East, describing how tells, roads and tracks, irrigation canals, and fields have been discerned with the eye by attention to shadow, lightness, and darkness. Ur and Menze have refined this approach by developing signatures for soils generated by human occupation (anthrosols) using bands from among the 14 collected by ASTER satellites (Menze and Ur 2013).

Newer sensing technologies expand possibilities for site detection. If archaeological remains are above ground, and exhibit a level of structural integrity, LiDAR can generate remarkably clear images of them. If dense clusters of LiDAR beams are used, the full array of archaeological features on a landscape can be imaged even when covered by forests, shrubs, or grassland. SAR can penetrate materials to a depth determined by wavelength and moisture content of materials encountered. Maximum penetration is of sand in hyperarid environments. SAR images are less easy to interpret with the naked eye than are images produced by LiDAR, because data to produce them are obtained from oblique angles, and so distortion can be more difficult to correct. SAR images are therefore generally more informative when data contained in them are analyzed by the use of statistical protocols that have been identified or developed for this purpose (Comer and Blom 2007; Chen et al. 2013). Similar statistical protocols can also detect sites using multispectral and hyperspectral imagery under certain conditions with greater or lesser success given the nature of sites to be detected and the environment in which they are located. Statistically based site detection, by definition, admits some degree of uncertainly until site locations are confirmed on the ground. Nonetheless, an inventory based upon statistically valid measures of productivity and reliability provides a valuable starting point for site protection, one that can also be used to more wisely allocate on-ground survey efforts. An alternate approach is the use of archaeological predictive modeling (APM), which identifies areas more or less likely to contain sites. While direct detection of archaeological sites can therefore be termed probabilistic, APMs are *possibilistic*, as discussed by Van Leusen and Kamermans (2005: 30).

Site evaluation is an essential step in the protection of archaeological heritage. Not all sites and landscapes are of equal importance. Given the dearth of resources available for site preservation, setting priorities is essential. The analysis of multispectral and hyperspectral imagery is particularly useful in characterizing the environments in which sites occur. It can therefore illuminate relationships among sites themselves and the environment in which they are found. These relationships have a tremendous bearing on the importance of each individual site. Environments can often be characterized sufficiently using data contained in inexpensive NASA satellite imagery. Landsat satellite images are now available at no cost, and the cost of ASTER imagery is minimal. Comer (2013), for example, has used Landsat imagery to explore the association between the distribution of sites on arable soils and the emergences of settled way of life among the Nabataeans.

NASA satellites also provide information not available from imagery collected by more recently developed, higher-resolution satellites operated by the private sector: they provide a record of environmental change over the past 30 years, since the first Landsat was launched. This records degradation that affects the value of sites, which can be halted or reversed if detected in time. For example, Barlindhaug et al. (2007) has analyzed Landsat imagery to monitor regrowth at

archaeological sites allocated in abandoned farms in Norway, which damages or destroys them.

Precise surface models (DSMs, DTMs, and DEMs) can be the key to an even deeper understanding of intra-site and environmental relationships. These are developed from dense point clouds, often obtained using LiDAR and SAR data collected from satellites and many common types of aircraft. As noted previously, data collected by LiDAR, if this is done in certain ways, can model the surface of the earth as it would appear if it were devoid of vegetation (usually termed a digital terrain model or DTM). Standard or custom algorithms can generate least-cost paths from DTMs. These provide the basis for developing and testing hypotheses about polity size, procurement zones, and social and political interactions. White and Surface-Evans (2012) offer many examples of how this has been done; surface models can also provide viewshed analyses, which are pertinent to suggesting similar social parameters (Fisher and Farrelly 1997; Bongers et al. 2011). Harrower (2010) and Harrower et al. (2011) has generated hydrological models from digital surface models that clarify the development of agriculture and the role of pastoralism in Yemen.

Surface models can also identify areas that would visually intrude upon ancient landscapes were they developed. They can also be used to model hydrological changes that threaten archaeological sites (Akasheh 2012). Point clouds can be generated by photogrammetric analysis of "stereo pairs" acquired from model airplanes and even kites. This can be done very inexpensively, but will not provide a DTM.

As the cost of such technologies continues to lessen, archaeologists, conservationists, and cultural management officials will increasingly use them to track and maintain cultural heritage throughout the world.

Cross-References

- ▶ Aerial Archaeology
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Landscape Archaeology
- ▶ Nondestructive Subsurface Mapping in Field Archaeology

References

Akasheh, T. 2012. The environmental and cultural heritage impact of tourism development in Petra, Jordan. In *Tourism and archaeological heritage management at Petra: Driver to development or destruction?* New York: Springer Press.

Barlindhaug, S., I.M. Holm-Olsen, and H. Tammervik. 2007. Monitoring archaeological sites in a changing landscape – using multitemporal satellite remote sensing as an 'early warning' method for detecting regrowth processes. *Archjaeological Prosepeection* 14: 231–244.

Bongers, J., E. Arkush, and M. Harrower. 2011. Landscapes of death: GIS-based analyses of chullpas in the western Lake Titicaca basin. *Journal of Archaeological Science* 39: 1687–1693.

Casana, J., and J. Cothren. 2013. The CORONA Atlas project: Orthorectification of CORONA satellite imagery and regional-scale archaeological exploration in the Near East. In *Mapping archaeological landscapes from space: In observance of the 40th anniversary of the World Heritage Convention*, ed. D.C. Comer and M.J. Harrower, 33–44. New York: Springer Press.

Chen, L., D.C. Comer, C.E. Priebe, D. Sussman, and J.C. Tilton. 2013. Refinement of a method for identifying probable archaeological sites from remotely sensed data. In *Mapping archaeological landscapes from space: In observance of the 40th anniversary of the World Heritage Convention*, ed. D.C. Comer and M.J. Harrower, 251–258. New York: Springer Press.

Comer, D.C. 2013. Petra and the paradox of a great city built by Nomads: An explanation suggested by satellite imagery. In *Mapping archaeological landscapes from space: In observance of the 40th anniversary of the World Heritage Convention*, ed. D.C. Comer and M.J. Harrower, 73–84. New York: Springer Press.

Comer, D.C., and R.G. Blom. 2007. Detection and identification of archaeological sites and features using synthetic aperture radar (SAR) data collected from airborne platforms. In *Remote sensing in archaeology*, ed. J.R. Wiseman and F. El-Baz, 103–136. New York: Springer Science + Business Media, LLC.

Fisher, P., and C. Farrelly. 1997. Spatial analysis of visible areas from the Bronze Age Cairns of Mull. *Journal of Archaeological Science* 24: 581–592.

Harrower, M. 2010. Geographic information systems (GIS) hydrological modeling in archaeology: An example from the origins of irrigation in Southwest Arabia (Yemen). *Journal of Archaeological Science* 37: 1447–1452.

Harrower, M., E.A. Oches, and J. McCorriston. 2011. Hydro-geospatial analysis of ancient pastoral/agro-pastoral landscapes along Wadi Sana (Yemen). *Journal of Archaeological Science* 86: 131–138.

Menze, B.H., and J.A. Ur. 2013. Mapping patterns of long-term settlement in the Near East at a large scale. *Proceedings of the National Academy of Sciences of the United States of America* 109: E778–E787.

Min, L. 2013. Archaeological landscapes of China and the application of corona images. In *Mapping archaeological landscapes from space: In observance of the 40th anniversary of the World Heritage Convention*, ed. D.C. Comer and M.J. Harrower. New York: Springer Press.

Poidebard, A. 1934. *La trace de Rome dans le désert de Syrie (Bibliothéque Archéologique et Historique 18)*. Paris: Librairie Orientaliste Paul Geuthner.

Ur, J. 2013. CORONA satellite imagery and ancient Near Eastern landscapes. In *Mapping archaeological landscapes from space: In observance of the 40th anniversary of the World Heritage Convention*, ed. D.C. Comer and M.J. Harrower. New York: Springer Press.

Van Leusen, M., and H. Kamermans, eds. 2005. *Predictive modeling for archaeological heritage management: A research agenda (Nederlandse Archeologische Rapporten 29)*. Amersfoort: Rijksdienst voor het Oudheidkundig Bodernonderzoek.

White, D., and S.L. Surface-Evans, eds. 2012. *Least-cost analysis of social landscapes*. Salt Lake City: University of Utah Press.

Further Readings

Beazeley, G.A. 1919. Air photography in archaeology. *The Geographical Journal* 53: 330–335.

Blom, R., N. Clapp, J. Zarins, and G.R. Hedges. 1997. Space technology and the discovery of the lost city of Ubar. *Aerospace Conference, Proceedings IIEE* 1: 19–28.

Campbell, J.B., and R.H. Wynne. 2011. *Introduction to remote sensing*. New York: Guilford Press.

Chase, A.F., D.Z. Chase, and J.F. Weishampel. 2013. The use of LiDAR at the Maya site of Caracol, Belize. In *Mapping archaeological landscapes from space: In observance of the 40th anniversary of the World Heritage Convention*, ed. D.C. Comer and M.J. Harrower. New York: Springer Press.

Comer, D.C. 2012. Hydrology, human occupation, and preservation on the landscape of Petra. In *Tourism and archaeological heritage management at Petra: Driver to development or destruction?* 16–18. New York: Springer Press.

Comer, D.C. 2008. Wide-area, planning level archaeological surveys using SAR and multispectral images. In *The proceedings of the 28th international geophysical and remote sensing symposium.* Boston: IEEE International 1: 1–45.

Comer, D., and M. Harrower, eds. 2013. *Mapping archaeological landscapes from space: In observance of the 40th anniversary of the World Heritage Convention*. New York: Springer Press.

Jenson, J.R. 2006. *Remote sensing of the environment: An earth resource perspective*. 2nd ed. Upper Saddle River: Prentice Hall.

Kennedy, D., and R. Bewley. 2004. *Ancient Jordan from the Air*. London: The Council for British Research in the Levant.

Lasaponara, R., and N. Masini. 2012. *Satellite remote sensing*. New York: Springer.

Lillesand, T.M., R.W. Kiefer, and J.W. Chipman. 2008. *Remote sensing and image interpretation*. New York: John Wiley.

Ricketson, O., and A.V. Kidder. 1930. An archaeological reconnaissance by air in Central America. *The Geographical Review* 20: 177–206.

Tilton, J.C., and D.C. Comer. 2013. Method for identifying probable archaeological sites from remotely sensed data. In *Mapping archaeological landscapes from space: In observance of the 40th anniversary of the World Heritage Convention*, ed. D.C. Comer and M.J. Harrower. New York: Springer Press.

Wilson, D.R. 1982. *Air photo interpretation for archaeologists*. London: Batsford.

Wiseman, J., and F. El-Baz, eds. 2007. *Remote sensing in archaeology*. New York: Springer Press.

Aerial Archaeology

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State of Knowledge and Current Debates

Aerial archaeology (AA) uses photographs, and other kinds of image acquisition, in archaeological field research. It involves taking photographs of the land from above, examining them for pertinent information, interpreting the images seen there and making the resulting data available in a variety of forms to develop archaeological knowledge about past people and the conservation of archaeological sites and landscapes (Bewley and Rączkowski 2002).

Why Can We See Variety Types of Sites?

Since people first learnt to fly, it has been appreciated that traces of early human activity can be observed from the air, recognized from their

Aerial Archaeology, Fig. 1 Bonikowo, Wielkopolska Region, Poland. Early Medieval stronghold clearly visible due to flooded bottom of valley (Photo: W. Rączkowski, March 1999)

curved or linear shapes. Humans have always exploited and adapted the environment to their own needs. The surface of the ground has been disturbed and altered by generations of previous occupants, who have dug into it to create foundations, ditches and pits, and raised structures upon it, in the form of stone buildings or earth ramparts and mounds. All this activity has caused "injury" to the land. Much of it has been subsequently covered over or levelled by later exploitation, particularly agriculture. Today, in the majority of such places, there is little sign of this past human activity on the surface, but the "scars" remain beneath and these may show up from the air (Wilson 1982).

Some ancient earth, stone, and timber structures are still just visible above ground level as *earthworks*. Most frequently encountered are the remains of barrows, ramparts, walls, banks, and ditches. These can be photographed by exploiting the contrast of the shadows by a sun low on the horizon. The way snow settles and melts may also reveal the presence of archaeological features, as can widespread flooding (mainly on low-lying ground) for it exposes all the topographic elements which are above water level (Fig. 1). The new technique of LiDAR (see below) now records low-lying earthworks by measuring their topography directly.

The remains of human activity beneath the topsoil determine growth conditions and cause difference in growth, causing *cropmarks* (Fig. 2). Subsurface hollows, foundation trenches, ditches, and pits retain water and nourishment, prompting the plants that grow immediately above them to be taller or greener for longer than others in the immediate vicinity (*positive cropmarks*). Plants growing over stones, bricks, or roads are deprived of moisture, so may be more stunted in growth and more pallid in color (*negative cropmarks*). Cropmarks can also be photographed thanks to the shadows thrown by taller plants, disclosing the archaeological features beneath. Not all plants are equally "sensitive" to variable soil conditions – some "display" what is beneath the topsoil, while others do not react to local conditions. Wheat and barley best show the presence of archaeological remains well, especially late in the growing

Aerial Archaeology, Fig. 2 Mutowo, Wielkopolska Region, Poland. Cropmarks show up archaeological remains of a medieval town (thirteenth century) of Szamotuły (Photo: W. Rączkowski, July 2006)

season, while potatoes, cabbage, or corn are less demonstrative of what lies beneath.

Plowing may disturb the uppermost layer of an archaeological feature and bring it to the surface as a *soilmark*, recognizable by its different color to the topsoil. Soilmarks can be most readily observed when there is no vegetation growing – from late autumn through to early spring (Fig. 3).

Development of Techniques: History

The first known aerial photographs of archaeological sites were taken between 1899 and 1911 (Forum Romanum, Tiber delta, Pompei, Ostia) and in 1906 (Stonehenge). The hot air balloons were used to take cameras into air. The First World War advanced the development of both aeroplanes and cameras. The number of pioneers using aerial photographs to search, identify, and document archaeological sites increased (T. Wiegand, L. Rey, G. Beazeley, A. Poidebard, C. Schuchhardt). O.G.S. Crawford (1923) made a significant contribution to the methodology and its application in research. In the 1920s and 1930s, photographs were taken of archaeological sites (e.g., hillforts) across Europe, excavation work in progress was documented from balloons and aircrafts (e.g., Biskupin in Poland), and aerial surveys led to the discovery of new sites (e.g., Woodhenge – UK, Ipf near Bopfingen – Germany). Similar surveys were also successful in the USA (C. A. Lindbergh, N. Judd), Mexico (A. V. Kidder, P. C. Madeira Jr.), and Peru (G. Johnson).

Developments in both technology and the interpretation of aerial photographs (e.g., the Allied Central Interpretation Unit) during the Second World War enhanced the technique and established it after the war as a primary research tool in archaeology. Although political regimes in some European countries severely restricted overflying, it developed without major interference in the UK (J.K. St Joseph, A. Baker, J. Pickering, D. Riley, D. Wilson), France (J. Baradez, R. Agache), West Germany (I. Scollar,

Aerial Archaeology, Fig. 3 Rębowo, Wielkopolska Region, Poland. Colour of soil differentiation show up the remains of a plowed rampart of an early medieval stronghold (Photo: W. Rączkowski, March 1999)

R. Christlein, P. Filtzinger, O. Braasch, K. Leidorf), Belgium (C. Leva, J. Semey), and Denmark (H. Stiesdal). The 1994 Klienmachnow conference (in Germany) was a key moment in raising awareness of AA among archaeologists from Central, Eastern, and Southern Europe.

Stereoscopy was a successful technology especially applied during WWII. Nowadays, it is frequently used in AA when working with vertical photographs to give an illusion of depth. A 3D effect can be achieved using two photographs offset by 60%. The stereoscope shows the left eye one photograph and the right eye the second, the brain then creates a 3D image of the area.

Since the late 1960s, AA has seen dramatic technical advances. In addition to the traditional platforms (e.g., kites, model planes, balloons, aircrafts, helicopters), remote sensing now makes use of multispectral imagery captured by *satellites* to explore past landscapes and features at a wide range of scales. Satellites (since 1960s) orbiting at 600–1200 km from the earth's surface have recorded a wealth of information.

The declassification by the USA in 1995 of an archive of images acquired by the first generation of US photo reconnaissance satellites (CORONA – 1960 and 1972) and the KH-7 GAMBIT and KH-9 mapping camera programs in 2002 was a milestone for archaeologists who quickly recognized the potential of these archives for extensive survey coverage of the Earth, including territories currently lying in no-fly zones (e.g., Turkey, Syria, Armenia) (Ur 2003). The ERTS satellite (later renamed LANDSAT) was launched in 1972 to continually photograph the Earth's surface. Many countries and organizations have sent satellites equipped with cameras and sensors into orbit to acquire information on surface events by using electromagnetic radiation across the spectrum (Parcak 2009; Lasaponara and Masini 2012).

Use of the wider spectrum of different bands of wavelengths of electromagnetic radiation (daylight, infrared, ultraviolet, thermal radiation) means that AA can be classed as a method of *remote sensing*. Radiation of different wavelengths detects different physical features. The majority of satellite survey work in archaeology

has focused on the band of *visible light* to detect archaeological features and past landscapes. However, visual data are only a small proportion of what cameras and other sensors can detect. A multispectral scanner registers a small number of bandwidths. By comparison, a hyperspectral scanner registers 100 or more bandwidths – including those which are beyond the visible spectrum, e.g., radar, ultraviolet, thermal radiation.

For assessing what can be detected, two parameters are especially important – spectral resolution and spatial resolution. *Spectral resolution* denotes the detection that is possible owed to the chosen wavelength. The range of visible light is from 0.380 to 0.780 μm (panchromatic image). If a sensor registers visible light, then it covers four channels (spectrum bands) – blue (0.45–0.52 μm), green (0.52–0.60 μm), red (0.63–0.69 μm), and infrared (0.76–0.90 μm). The spectral response pattern of soil is generally governed by the properties of the soils: color, texture, structure, mineralogy, organic matter, free carbonates, salinity, moisture, and the oxides/hydroxides of iron and manganese. Thus, analysis of results from parts of the spectrum provides information about the physical-chemical characteristics of any detected features. For example, analysis of green and red bands may give information on the contents of iron (Fe) in soil. *Normalized Difference Vegetation Index* (red and infrared bands) is a method for measuring vegetation vigor, which may indirectly infer the presence of archaeological features.

Ground (spatial) resolution measures the minimum size of a feature detectable on the ground. A feature larger than the spatial resolution will be visible on the image, while a feature appearing smaller than a pixel on the image will not be seen. High ground resolution therefore is extremely important. Images of 80 m resolution (Landsat series MSS 1, 2, and 3) or 30 m (Landsat TM 4 and 5) are sufficient to determine geological or geographical aspects but not to detect archaeological features. Current resolutions can be achieved down to 1 m, which enables individual features such as storage pits, barrows, or sunken houses to be identified. The IKONOS satellite's panchromatic imaging (the whole visible spectrum, which means more energy reaches the sensor) provides a surface resolution of 1 m, although multispectral imaging resolution falls to 4 m. Satellite images (mostly optical, high resolution) are currently used in prospection of archaeological features, study of their environmental contexts, spatial analysis, past landscape studies, 3D modeling, preservation assessments, protection, and management of archaeological heritage.

Airborne Laser Scanning (ALS) developed in the 1990s uses the LiDAR (**Li**ght **D**etection **a**nd **R**anging) system for rapid, high precision survey of the surface of the ground (including forested areas) (Crutchley and Crow 2009). In this method, laser range-finding beams are fired at the ground from an aircraft with exact position measured by GPS, creating clouds of points (with x, y, z coordinates), which are used to compute a digital terrain model (DTM) and digital elevation model (DEM) (Bewley et al. 2005). Digital graphic processing generates views of the surface in microrelief. The most spectacular discoveries made using this technique include medieval field systems, road courses, barrows, queries, etc., especially those hidden in forests (Devereux et al. 2005, Doneus and Briese 2011) (Fig. 4).

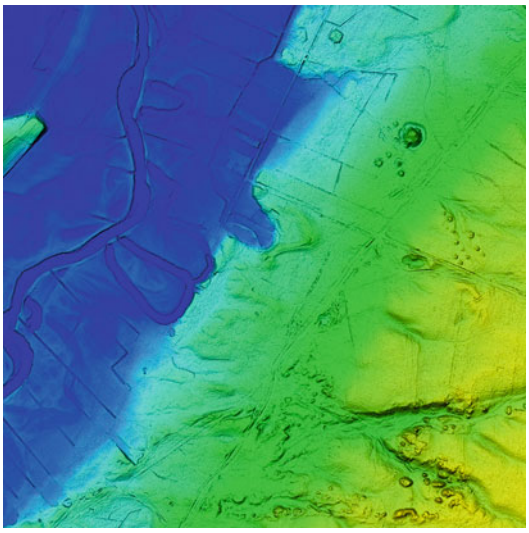

Aerial Archaeology, Fig. 4 Wrześnica, Pomerania Region, Poland. DTM derived from LiDAR of the forested area presenting detailed topography and showing up the presence of geomorphologic structures as well as clusters of early medieval burial mounds (By Ł. Banaszek & MGGP Areo, 2012)

LiDAR data also provide additional information on the intensity of the reflected light, as the emitted signal is usually in the near-infrared (NIR) spectrum. It is therefore possible to use it to analyze moisture, chlorophyll content, and other factors that characterizes cropmarks.

Theoretical Context

AA has been a key branch of *field archaeology* for more than a century. Its initial success was applied to generating *culture history*, featuring interpretations based on *evolution* and *diffusion*. This took the premise that a photograph is neutral and objective in its representation of the world. As image registration is "mechanical" in nature, photographs were seen as recording real anomalies devoid of a subjective human factor. These anomalies added to the world's stock of sites and monuments, from which the narratives of prehistory and history can be written. By the same token, repeat visits to certain landscapes led to the realization that the sites were disappearing. *A Matter of Time* (published in 1960 by the Royal Commission on Historical Monuments of England) established a role for AA in conservation practice in the UK, leading to *The National Mapping Programme* and the development of set standards.

Processual archaeology was a major factor in the technological "revolution" in AA. It emphasized the objectivity of the research process and the consequent importance of the precise measuring of cultural and natural features. This mission was aided by new analytical technologies, particularly computerized *data bases* (including mapping) and *Geographic Information Systems* (GIS). Gaps in the record raised questions about the visibility of sites, and prompted research into *formation processes* as applied to cropmarks and soilmarks. Results obtained from remote sensing influenced the classification and construction of models describing the relation between cultural systems and the natural environment and the application of technological innovation.

Postprocessual archaeology questioned the "realism" of aerial photographs and emphasized the role of perception and interpretation in the creation of the record. Interpretation issues are the subject of intense discussion on the way the cultural context affects aerial survey, the photo-reading process, and their role in forming how we imagine the past (Brophy and Cowley 2005).

Interpretation

Understanding that there is an interpretative process by which the information from aerial photograph becomes an archaeological record is crucial. The interpretation of archaeological features and landscapes is a skill built on experience and knowledge, where intuition and subjective judgment are acknowledged as major factors. The ability of the archaeologist to interpret and depict is as important as the technical processes of rectification and georeferencing.

As archaeological use of digitally recorded data has developed, it has become increasingly clear that it is not an "objective" dataset. Methods of primary data collection and processing parameters have a significant impact on output; the ability to "see" is heavily dependent on software for manipulation and visualization. These factors are a complex mix of objective parameters (e.g., point density) and subjective judgments that are inextricable from the pervasive issue of archaeological interpretation.

Archaeologists decide which platform to use (aerial, satellite, ALS) and which electromagnetic emission to record. Similarly, data-processing, the selection of suitable algorithms, and their mode of visualization are matters decided by researchers. The final image undergoes visual editing and interpretation according to knowledge and interpretation experience and is accepted when a result is deemed to be satisfactory. Thus, like all other forms of archaeological data, the corpus of aerial photographs is the result of reconciling observation and imagination, of matching what we want to know, what has survived, what we currently recognize, and the methods available for their detection and recording. These methods are improving all the time as fresh interpretations raise our expectations and ambitions further.

Current Trends

The enormous dynamics of modern technological changes in the field of acquisition of remote sensing data and their computer processing have

Aerial Archaeology, Fig. 5 Drone with camera over the archaeological site (Photo: W. Rączkowski, 2013)

influenced the shaping of new trends. On the one hand, these trends are very distant from the traditionally understood aerial photography, and, on the other hand, they do not question its basics, achievements, and identified problems.

Mass introduction of UAVs (Unmanned Aerial Vehicles) have significantly captured imagination of archaeologists. UAVs equipped with GPS devices are a technology which allows in a quick and a cost-efficient way raising a camera/sensor in the air and in a short time getting a picture of archaeological sites/features (Fig. 5). Thanks to the appropriate software from the Image Based Modelling group, a series of photos help to generate detailed 2D orthomosaics and 3D models. Therefore, this technology introduces new elements to the broad practice, which have until now been difficult and expensive although obtainable (photos from model planes, balloons, and kites have been known since the 1920s, and photogrammetry allowed to create orthomosaics). The indubitable advantage of UAVs usage in archeology is ease of use and the ability to reach even hard to reach places. However, generally available technology does not mean common ability to interpret the generated 2D orthomosaics and/or 3D models. This leads to the common situation which is present from the very beginning of the usage of a traditional aerial reconnaissance, when the main objectives were brought to discovering and documenting relics of past human activities (Cowley et al. 2018). Due to technological constraints, UAVs are usually used to document individual sites/features (including excavation works) and have limited capacities when it comes to studying past landscapes.

Traditional aerial reconnaissance is gradually losing its importance although it does not mean its elimination from the field of interest and reflection of archaeologists. Archaeologists conducting an aerial survey are currently equipped with GPS and also have access to the archaeological heritage database. This allows taking many more rational actions in the field of flight route planning and straight line recognition of selected regions, and as well, making decisions regarding the shooting of visible cropmarks/soilmarks/earthworks. Appropriate software allows quick geotagging of the taken photos and their cataloging. Also aerial photographs taken during a traditional reconnaissance can be used to create 2D orthomosaics and/or 3D models.

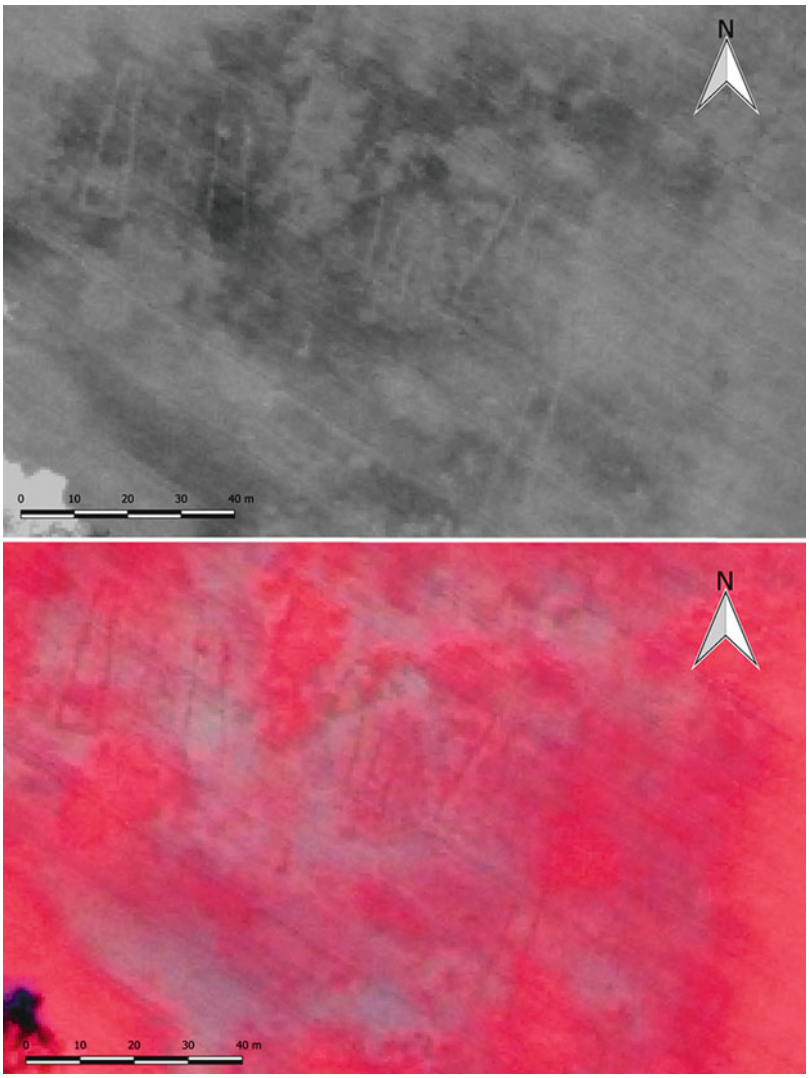

Aerial Archaeology, Fig. 6 Kaczkowo, Kujawy Region, Poland. The Early Neolithic trapezoidal long houses as seen on satellite imagery (QuickBird 2, 4.07.2005) – panchromatic channel (upper) and channels: NIR, G, B (bottom) (© 2005 DigitalGlobe, Inc. ALL RIGHTS RESERVED)

Satellite technologies are increasingly entering the AA. This involves assembling on satellites such sensors, which allow getting very high ground resolution. The extract of specific technologies of data acquiring is more and more apparent. Currently, optical high-resolution Earth Observation techniques (Lasaponara and Masini 2012) are dominating, but there are also attempts with the use of synthetic-aperture radar (SAR – Stewart 2017). Each of the aforementioned techniques requires different data processing procedures and its interpretation. Currently, optical satellite imageries techniques are more far-reaching due to available high ground resolution (currently even up to 30 cm). Previous experience has shown that the possibilities of archaeological structure identification on optical satellite imageries are related to the same phenomena, which lead to the presence of cropmarks and soilmarks recorded on aerial photographs (Fig. 6). Consequently, all problems associated with the interpretation of aerial photographs are also related to high-resolution optical satellite imageries.

Still, one of the most developed methods is ALS. In the applications, special attention is paid to the use of algorithms, which allow us to emphasize specific aspects ALS derived DTM (e.g., Sky

View Factor, Local Relief Model, Openness, Cumulative visibility) (Kokalj and Hesse 2017). Variety of ways to visualize data in a greater degree highlights the complexity of their interpretation process. The new challenge is to develop a method of generating DTM for coastal zones (hydrographic airborne laser scanning systems – Doneus et al. 2013) allowing identification of submerged archaeological relics.

Technological changes in many fields of aerial photography applications and remote sensing data open the possibilities and the need for systems which allow for creation of total coverage surveys with the usage of aerial photographs, ALS data, or satellite images. As a result, acquiring large amounts of data requires automated and semi-automated tools allowing image correction and their enhancement leading to management and interpretative mapping (e.g., Verhoeven and Sevara 2016).

Undoubtedly, technology opens new possibilities in recording traces of the past and allows constructing new narratives. However, it cannot be forgotten that in studies about the past, data visualization is something other than traditional, analogue aerial photography. Remote sensing users must be aware of the complexity of the process, including data acquisition → data processing → data visualization → interpretation. This is the subject discussed in the community, and it is essential for conscious and critical studies about the past.

Regardless of the interest in new technologies, the community of aerial archaeologists recognizes the value of historic aerial photographs. Historic aerial photographs, mostly from the World War I, but also taken later during World War II and by military spy missions, are an extremely important source of information about relics of past human activities as well as past landscapes. A great deal of interest about this potential can be attributed to numerous conferences devoted to this topic and publications (e.g., Cowley et al. 2010; Hanson and Oltean 2013; Stichelbaut and Cowley 2016). In addition, historical aerial photographs play an important role in the new currents of archaeology (e.g., archaeology of contemporary past, conflict archaeology).

In Europe, the Aerial Archaeology Research Group is a main platform for discussions on archaeological applications of aerial photographs as well as other airborne and satellite remote sensing data (http://www.univie.ac.at/aarg/).

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Landscape Archaeology
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Prospection Methods in Archaeology
- ▶ Site Formation Processes

References

Bewley, R., and W. Rączkowski, eds. 2002. *Aerial archaeology. Developing future practice*. Amsterdam: IOS Press.

Bewley, R.H., S.P. Crutchley, and C.A. Shell. 2005. New light on an ancient landscape: Lidar survey in the Stonehenge World Heritage Site. *Antiquity* 79: 636–647.

Brophy, K., and D. Cowley, eds. 2005. *From the air: Understanding aerial archaeology*. Stroud: Tempus.

Cowley, D.C., R.A. Standring, and M.J. Abicht, eds. 2010. *Landscapes through the lens. Aerial photographs and historic environment*. Oxford: Oxbow Books.

Cowley, D.C., C. Moriaty, G. Geddes, G.L. Brown, T. Wade, and C.J. Nichol. 2018. UAVs in context: Archaeological airborne recording in a national body of survey and record. *Drones*, (in press).

Crawford, O.G.S. 1923. Air survey and archaeology. *The Geographical Journal* 61 (5): 342–360.

Crutchley, S., and P. Crow. 2009. *The light fantastic: Using airborne laser scanning in archaeological survey*. Swindon: English Heritage.

Devereux, B.J., G.S. Amable, P. Crow, and A.D. Cliff. 2005. The potential of airborne lidar for detection of archaeological features under woodland canopies. *Antiquity* 79: 648–660.

Doneus, M., and C. Briese. 2011. Airborne laser scanning in forested areas – Potential and limitations of an archaeological prospection technique. In *Remote sensing for archaeological heritage management*, ed. D. Cowley, 59–76. Budapest: Archaeolingua.

Doneus, M., N. Doneus, C. Briese, M. Pregesbauer, G. Mandlburger, and G. Verhoeven. 2013. Airborne

laser bathymetry: Detecting and recording submerged archaeological sites from the air. *Journal of Archaeological Science* 40: 2136–2151.
Hanson, W.S., and I.A. Oltean, eds. 2013. *Archaeology from historical aerial and satellite archives*. New York/London: Springer.
Kokalj, Ž., and R. Hesse. 2017. *Airborne laser scanning raster data visualization: A guide to good practice*. Ljubljana: Založba ZRC.
Masini, N., and R. Lasaponara, eds. 2012. *Satellite remote sensing. A new tool for archaeology*. Dordrecht: Springer.
Parcak, S.H. 2009. *Satellite remote sensing for archaeology*. London: Routledge.
RCHME. 1960. *A matter of time: An archaeological survey*. London: HMSO.
Stewart, C. 2017. Detection of archaeological residues in vegetated areas using satellite synthetic aperture radar. *Remote Sensing* 9(2): 118, 1–45. https://doi.org/10.3390/rs9020118.
Stichelbaut, B., and D. Cowley, eds. 2016. *Conflict landscapes and archaeology from above*. Farnham: Routledge.
Ur, J.A. 2003. CORONA satellite photography and ancient road networks: A northern mesopotamian case study. *Antiquity* 77: 102–115.
Verhoeven, G., and C. Sevara. 2016. Trying to break new ground in aerial archaeology. *Remote Sensing* 8 (918): 1–29.
Wilson, D.R. 1982. *Air photo interpretation for archaeologists*. London: Batsford.

Aesthetics in Archaeology

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Introduction and Definition

The term "aesthetics" was coined in the eighteenth century by Alexander Baumgarten, who thought of it as "the science of sensible cognition" (Baumgarten 1961 [1750–1758]: §1, 107). As such, it concerns the study of how to think the sensible appearance (the look/sound/feel) of things when the focus is on their perceptual qualities. Immanuel Kant further added to this conception by proposing that aesthetic judgment involves a claim *not* based on an (objective) *coming to know* of the world but on a particular (subjective) *feeling* produced in the encounter with objects of perception. The feeling in question is produced when the faculties of imagination and understanding are in "free play" while provoked by various objects of perception (Kant 1790 trans. 1987: Pt. 1, Book 1, Section 9).

Accordingly, aesthetics is concerned with the claim that the *particular way* in which things are present in our awareness may lead to a certain kind of object-related but subjective feeling. Concretely, the feeling in question responds to *the particular disposition* of things, be it the composed *ordering* of sounds; the *layout* of material things in space; the choreographed *pattern* of movement of bodies through three-dimensional space; the *design* of two-dimensional surfaces; the meaningful *arrangement* of words; the determinate *sequencing* of the contents of the imagination based on some written, heard, or visual narration; or some other perceivable *structuring* of our perceptual world, including, for example, diverse forms of "skilled and knowledgeable forms of action" (Pollard 2001, 318).

While Baumgarten and Kant intended aesthetics to address itself to a *very wide* range of objects, later theoreticians tended to focus on *artistic* manifestations, as found in the Western world. This orientation has caused concern among archaeologists and anthropologists about the application of the aesthetic gaze to their objects of study, insofar as it would bring about ethnocentric and anachronistic conclusions, especially since many cultures seem not to distinguish between art and other spheres of life. The worry is that by using the categories of Western aesthetics and art in the study of the archaeological record, epistemological, methodological, as well as ethical problems seem to arise.

Key Issues/Current Debates/Future Directions/Examples

The situation would seem to pose an epistemological problem since, due to limited access in archaeological research to the context of the objects studied, it may be questioned whether we can know that the people, who made and used

these things, in fact had the intention of making them with the types of aesthetic qualities that we value in standard Western artworks of the modern period (Soffer and Conkey 1997). Furthermore, there is the problem of how the disposition or structuring of things may have been appreciated by their makers and users if we have reason to believe that their perceived world differed radically from ours. In other words, their different "perceptual sensibilities" would suggest that their appreciation of things would have been significantly different from ours and, consequently, it may be difficult to know whether anything counted as aesthetically valuable in the first place and, furthermore, in the case that there were such things, which of them and which qualities were actually aesthetically valued.

Methodologically, there is the problem that the focus on aesthetics and art seems to lead down the wrong path because oftentimes *universal validity* has been claimed for aesthetic and art-oriented categories that in fact import perspectives and values of *merely regional and historical validity*, as developed in the artworld of European peoples between the eighteenth and twenty-first centuries (Tomásková 1997; White 2003; Moro Abadía and González-Morales 2008). Ethically, moreover, the utilization of these categories entails the problem that, insofar as they are value-laden, their application to objects from other cultures may lead to inappropriate value judgments (often expressing ethnocentrism) about other peoples' cultural goods (Heyd 2003, 2007; Heyd and Clegg 2005).

However, these respectively epistemological, methodological, and ethical concerns actually arise because of the narrowing down of the object of aesthetics to a very limited, geographically local and historically conditioned, notion of "art." As it happens, aesthetic judgments are also issued in a great variety of *nonartistic* contexts, such as regarding human beings and natural landscapes or even concerning thought constructs such as mathematical formulae. *Anything* may become an object of aesthetic attention when it is considered as the trigger for a particular kind of feeling grounded in the reflexive appreciation of one's perceptual contents (Ziff 1997). Human beings everywhere sing, produce poetry, tell and enact stories, and draw or fashion three-dimensional objects in order to delight and engage their fellows and children. As such, aesthetic judgments are ubiquitous and, as evolutionary aesthetics argues, probably can be projected back to our species' deep past (Davies 2006, 1–25). This situation, in turn, invites closer consideration of aesthetic values in the archaeological record as a topic of research.

While anthropology may be said to have considered aesthetics as a research tool at least since the 1990s (Coote and Shelton 1992; Gell 1992, 1998), interest in theorizing its application in archaeology is more recent. Starting from the perspective that the aesthetic values perceived in things have socially relevant effects, it is argued, for example, that tracking the ways in which such effects are produced may open up an understanding of important aspects of the cultural systems under study (Gosden 2001). From this perspective, the plethora of possibilities for structuring physical objects two- and three-dimensionally, and even their arrangement in space in relation to other objects, may constitute valuable resources for cultural insight (as demonstrated by Pollard 2001, in his study of depositional practice).

One very general argument for the consideration of the aesthetic perspective in archaeology is that many cultural goods, be they material (such as pots, knives, or shoeing) or more notional (such as texts describing religious ideals or social hierarchies), even if produced for practical uses often evidently exhibit *more structuring than necessary* to realize a specific function or to get a particular message across (Dobres 2001). Relevantly, the perceptually accessible structuring of the carriers of information may be accessible to archaeologists as, for example, in the case of humanly made marks on rock commonly referred to as "rock art" (e.g., see Fig. 1).

Aesthetically relevant choices commonly are evident in the making of these markings on rock. Moreover, often it is clear that the sites are chosen among other sites available, that only certain surfaces on those sites are selected even if others could be used, that certain modes of image making (e.g., painting, engraving, stencils, or wax application) are utilized when other modes are

Aesthetics in Archaeology, Fig. 1 *Gwion Gwion*, Kimberleys, Northern Australia. (Taken by Heyd in 2000)

possible, and that motifs perceived may be represented in more or less dynamic, restrained, interactive, or striking ways. The multiple, perceptually significant choices realized in each site suggest empirically testable hypotheses with regard to the significance of the markings for their makers and users.

For example, large images in wide open areas may be understood as directed toward people at a distance, suggesting that they may have group representational functions, while small images only accessible by, or visible to, single individuals may be meant for more private, potentially spiritual, functions. Dazzling figures may be meant to impress friend, foe, or commercial exchange partner (Gell 1992, on the decoration of Trobriand canoe prows, and Morphy 1992, 2005, on Yolngu *bir'yun* brilliance), while hand stencils may be intended as referential to personal identities (Forge 1991, 40).

Insofar as the making of images requires attention to how the marks created appear to onlookers, aesthetic judgments and the application of skill and knowledge would have been required on the part of their makers. Furthermore, insofar as different aesthetic values are generated through the choice of particular formal qualities, the ability among viewers to "read" aesthetically relevant differences would have to be presupposed. Hence, *not* attending to the aesthetics of such images would be to overlook potentially important aspects of the forms of life of the human groups studied (also see Heyd 2012).

While concern regarding the importation of values and categories from the cultural context of the researcher into her or his objects of research certainly is relevant and legitimate, this danger and the ways in which it can be addressed are nothing new within the wider anthropological and archaeological context. Appropriate methodology in this respect would argue for the need to recognize cultural biases and the application of empirical techniques that allow specific cultural differences to *emerge*

from the archaeological text, instead of forcing the given into the procrustean bed of Western aesthetic categories. Certainly, recovering a sense of the aesthetic impact of any structuring of items found in the archaeological record on their makers and users will have to remain at the level of an educated guess. As Gosden (2001, 166) suggests, this requires "an unlearning" of our own sensorium to facilitate the appreciation of the sensory environment that may have existed for those who left material traces in former times. In sum, we may conclude that though aesthetic perspectives in archaeology undoubtedly have played a part throughout archaeological research in the past, its theoretical grounding and systematic exploration are still in development and likely will produce significant payoff in future research endeavors.

Cross-References

► Rock Art, Forms of

References

Baumgarten, A.G. 1961 [1750–1758]. *Aesthetica*. Hildesheim: G. Olms.

Coote, J., and A. Shelton, eds. 1992. *Anthropology, art and aesthetics*. Oxford: Clarendon Press.

Davies, S. 2006. *The philosophy of art*. Malden: Blackwell.

Dobres, M.-A. 2001. Meaning in the making: Agency and the social embodiment of technology and art. In *Anthropological perspectives on technology*, ed. M.B. Schiffer, 47–76. Albuquerque: University of New Mexico Press.

Forge, A. 1991. Hand stencils: Rock art or not? In *Rock art and prehistory*, ed. P. Bahn and A. Rosenfeld, 39–44. Oxford: Oxbow.

Gell, A. 1992. The technology of enchantment and the enchantment of technology. In *Anthropology, art and aesthetics*, ed. J. Coote and A. Shelton, 40–63. Oxford: Clarendon Press.

Gell, A. 1998. *Art and agency: Towards a new anthropological theory.* Oxford: Clarendon Press.

Gosden, C. 2001. Making sense: Archaeology and aesthetics. *World Archaeology* 33 (2): 163–167.

Heyd, T. 2003. Rock art aesthetics and cultural appropriation. *Journal of Aesthetics and Art Criticism* 61 (1): 37–46.

Heyd, T. 2007. Cross-cultural contact, etiquette and rock art. *Rock-art Research* 24 (2): 191–199.

Heyd, T. 2012. Thinking through aesthetics, art, and humanly made marks on rocks. In *Blackwell's companion to rock art*, ed. J. McDonald and P. Veth. Malden: Blackwell.

Heyd, T., and J. Clegg, eds. 2005. *Aesthetics and rock art*. Aldershot: Ashgate.

Kant, I. 1790 (1987) *Critique of judgment*. Trans. W.S. Pluhar. Indianapolis/Cambridge: Hackett Publishing.

Moro Abadía, O., and M.R. González-Morales. 2008. Paleolithic art studies at the beginning of the twenty-first century: A loss of innocence. *Journal of Anthropological Research* 64 (4): 529–552.

Morphy, H. 1992. From dull to brilliant: The aesthetics of spiritual power among the Yolngu. In *Anthropology, art, and aesthetics*, ed. J. Coote and A. Shelton, 51–60. Oxford: Clarendon Press.

Morphy, H. 2005. Aesthetics across time and place: An anthropological perspective on archaeology. In *Aesthetics and rock art*, ed. T. Heyd and J. Clegg, 51–60. Aldershot: Ashgate.

Pollard, J. 2001. The aesthetics of depositional practice. *World Archaeology* 33 (2): 315–333.

Soffer, O., and M.W. Conkey. 1997. Studying ancient visual cultures. In *Beyond art: Pleistocene image and symbol*, ed. M.W. Conkey, O. Soffer, D. Stratmann, and N.G. Jablonski, 1–16. San Francisco: California Academy of Sciences/University of California Press.

Tomásková, S. 1997. Places of art: Art and archaeology in context. In *Beyond art: Pleistocene image and symbol*, ed. M.W. Conkey, O. Soffer, D. Stratmann, and N.G. Jablonski, 265–287. San Francisco: California Academy of Sciences/University of California Press.

White, R. 2003. *Prehistoric art: The symbolic journey of humankind*. New York: Harry Abrams.

Ziff, P. 1997. Anything viewed. In *Aesthetics*, ed. S. Feagin and P. Maynard, 15–30. Oxford: Oxford University Press.

African Diaspora Archaeology

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Introduction and Definition

Archaeological investigations of African diasporas have expanded dramatically in number, diversity of research designs, and geographic

scales over the last several decades. The term "diaspora" is typically used to address the dispersion of people to new locations as a result of hostile circumstances in the areas from which they departed or were abducted. Analysts have pursued a diverse array of perspectives in this period of growth for African diaspora archaeology. Projects have explored questions in spatial scales spanning the household, local, regional, interregional, and global.

Historical Background

Researchers undertaking interdisciplinary studies of African diaspora sites and communities will benefit by familiarity with the analyses of scholars in Black studies, such as Frederick Douglass, St. Claire Drake, W. E. B. Du Bois, bell hooks, Zora Neale Hurston, Arturo Schomburg, Booker T. Washington, George Williams, Carter Woodson, and Malcolm X (e.g., Mullins 2008). The work of investigators of African diaspora communities is also aided by digital and internet-based databases. These include *The Trans-Atlantic Slave Trade: A Database on CD-ROM* (Eltis et al. 2000) and the expanded *Voyages* database available online (Eltis and Halbert 2013), which provides information on 34,948 slave vessel voyages and the people captured in those operations of bondage (e.g., Eltis and Richardson 2008). The *Digital Archaeological Archive of Comparative Slavery*, funded and maintained by the Thomas Jefferson Foundation (2017), presents archaeological data from numerous sites in North America and the Caribbean. Handler and Tuite (2015) and their colleagues maintain a substantial online database of historical images depicting details of the operations of the trans-Atlantic slave trade and its impact on past lives. The African Diaspora Archaeology Network (n.d.) consists of numerous collaborating researchers who promote publications such as a quarterly newsletter and the peer-reviewed *Journal of African Diaspora Archaeology and Heritage* (Taylor and Francis Press).

Key Issues/Current Debates

A remarkable variety of research questions have been addressed over the past several decades, often engaging with theoretical debates on subjects such as social group identity, agency, racism, power, class structures, ethnicity, and self-determination (Ogundiran 2008; Fennell 2011 provide overviews). In North America, the vast majority of archaeology projects related to African diaspora sites are conducted by archaeologists working in cultural resource management (CRM) settings. This tendency reflects the higher frequency with which sites of African diaspora heritage are impacted by disturbance due to new construction projects and resultant analysis through CRM procedures (e.g., Joseph 2004). These CRM archaeology projects contributed significantly to the development of African diaspora archaeology in the United States (e.g., Wheaton et al. 1983).

Some researchers advocate the compilation of detailed, contextual studies addressing dynamics at local and regional scales (e.g., Mullins 2006). Researchers also frequently implement investigative plans shaped in part by the interests of descendant communities (e.g., Agbe-Davies 2007 in Ogundiran and Falola 2007). Other analysts recommend a focus on the facets of racial ideologies and capitalist economies on a worldwide scale (e.g., Orser 1994; Mullins 2008).

This variety of research designs includes a focus on the operations of racial ideologies underlying economic structures (e.g., Orser 2007) and African descendants living and working in industrial settings (e.g., Shackel and Larsen 2000 in Delle et al. 2000). Researchers have also explored the ways in which facets of particular African cultures (such as the Asante, BaKongo, Igbo, and Yoruba) were related to continuing developments of cultural beliefs and practices at diaspora sites (e.g., Ferguson 1992). Many sites have yielded evidence of the material expressions of spirituality by African descendant people (e.g., Fennell 2003). The contours of ethnic group identities and new social networks (e.g., Wilkie 2000a; Ogundiran and Falola 2007 in Ogundiran and Falola 2007) as well as processes of ethnogenesis,

syncretism, and creolization (e.g., Fennell 2007) have been examined in extensive studies.

Our knowledge of African diaspora histories has also been greatly enhanced by studies of mortuary traditions (e.g., McCarthy 2006 in Haviser and MacDonald 2006) and health-care practices (e.g., Cabak et al. 1995). Bioarchaeological investigations similarly provide detailed evidence of past lifeways, individual health conditions, and the impacts of enslavement on the physiologies of Africans and African descendants trapped in bondage (e.g., Mack and Blakey 2004). Diverse studies of diets, culinary practices, and consumer choices provide evidence on multiple time periods and spatial scales (e.g., Wilkie 2000b). Investigators have explored the subject of gender dynamics within African diaspora communities and seek to implement feminist critiques of research designs (e.g., Battle-Baptiste 2011). Extensive studies have examined the degree of impacts of particular African pottery-making and ornament traditions on ceramic production at diaspora sites (e.g., Ferguson 1992; Deetz 1993; Singleton and Bograd 2000 in Delle et al. 2000; Hauser 2007 in Ogundiran and Falola 2007).

Other investigations have concentrated on instances of self-determination, resistance against subjugation, and the creation of "maroon" communities (e.g., Weik 2004; Agorsah 2006 in Haviser and MacDonald 2006). Archaeological studies have focused on such dynamics of communities founded by escaped bonds people called "palenques" in Cuba and "quilombos" in Brazil (e.g., Orser and Funari 2001; La Rosa Corzo 2003). The operations of escape networks combating slavery in North America, often referred to as facets of an "underground railroad," have received increasing attention by archaeologists and landscape analysts as well (e.g., Ginsburg 2007; Delle and Shellenhamer 2008). Studies of spatial distributions and the ways people shaped and perceived the surrounding landscape have traversed scales from the household and yard, to neighboring plantations, to community and region (e.g., Handler and Lange 1978; Delle 1998; Battle-Baptiste 2007 in Ogundiran and Falola 2007; Chan 2007 in Ogundiran and Falola 2007).

International Perspectives

Much of the work in African diaspora archaeology has focused on sites in the Americas and Caribbean. A growing body of work addresses diasporas throughout the Indian Ocean region, Middle East, and portions of Asia (Walz and Brandt 2006 in Haviser and MacDonald 2006; de Jayasuriya Silva and Angenot 2008). In addition, an increasing collection of historical archaeology studies of locations in Africa impacted by the trans-Atlantic slave trade presents excellent potentials for comparative analyses in the future (e.g., Hall 2000; Kelly 2004 in Reid and Lane 2004; Schmidt 2006; Ogundiran and Falola 2007).

Future Directions

This brief survey of research questions and methods in African diaspora archaeology illustrates the remarkable breadth and diversity of the field. Future work provides great promise for comparative and synthetic analyses of sites spanning the Americas, Africa, Europe, and Asia. Rapid advances in bioarchaeological methods, DNA studies, and stable isotope analyses have the potential to provide increasing data on direct connections between populations across space and time. Ongoing developments in spatial modeling, remote sensing, accessibility of aerial and satellite data, and complex mapping programs will also enhance landscape and spatial studies. Researchers in African diaspora archaeology pursue these state-of-the-art advances while also maintaining close ties with the interests and questions advanced by members of African descendant communities.

Cross-References

- ▶ African Diaspora Archaeology Network (ADAN)
- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Caribbean Historical Archaeology

▶ Ceramics: Colonoware
▶ Deetz, James (Historical Archaeology)
▶ East Africa: Historical Archaeology
▶ Funari, Pedro Paulo A. (Historical Archaeology)
▶ Hispanic South America: Historical Archaeology
▶ Historic St. Mary's City
▶ Mexico: Historical Archaeology
▶ Modern World: Historical Archaeology
▶ North Africa: Historical Archaeology
▶ Orser, Jr., Charles E.
▶ Plantation Archaeology
▶ Posnansky, Merrick
▶ Southern Africa: Historical Archaeology
▶ Trade Beads in Historical Archaeology
▶ West and Central Africa: Historical Archaeology

References

African Diaspora Archaeology Network. n.d.. Available at: http://www.diaspora.illinois.edu/ and http://scholarworks.umass.edu/adan/. Accessed 10 May 2017.

Battle-Baptiste, W.L. 2011. *Black feminist archaeology.* Walnut Creek: Left Coast Press.

Cabak, M.A., M.D. Groover, and S.J. Wagers. 1995. Health care and the Wayman A.M.E. Church. *Historical Archaeology* 29: 55–76.

De Jayasuriya Silva, S., and J. Angenot, eds. 2008. *Uncovering the history of Africans in Asia*. Leiden: Brill.

Deetz, J. 1993. *Flowerdew Hundred: The archaeology of a Virginia plantation, 1619–1864*. Charlottesville: University Press of Virginia.

Delle, J.A. 1998. *An archaeology of social space: Analyzing coffee plantations in Jamaica's Blue Mountains*. New York: Plenum Press.

Delle, J.A., and J. Shellenhamer. 2008. Archaeology at the Parvin Homestead: Searching for the material legacy of the underground railroad. *Historical Archaeology* 42: 38–62.

Delle, J.A., S.A. Mrozowski, and R. Paynter, eds. 2000. *Lines that divide: Historical archaeologies of race, class, and gender*. Knoxville: University of Tennessee Press.

Eltis, D., and M. Halbert, eds. 2013. Voyages: The trans-Atlantic slave trade database. Available at: http://www.slavevoyages.org/. Accessed 10 May 2017.

Eltis, D., S.D. Behrendt, D. Richardson, and H.S. Klein. 2000. *The trans-Atlantic slave trade: A database on CD-ROM*. Cambridge, UK: Cambridge University Press.

Fennell, C.C. 2003. Group identity, individual creativity and symbolic generation in a BaKongo diaspora. *International Journal of Historical Archaeology* 7: 1–31.

Fennell, C.C. 2007. *Crossroads and cosmologies: Diasporas and ethnogenesis in the new world*. Gainesville: University Press of Florida.

Fennell, C.C. 2011. Early African America: Archaeological studies of significance and diversity. *Journal of Archaeological Research* 19: 1–49.

Ferguson, L.G. 1992. *Uncommon ground: Archaeology and early African America*. Washington, DC: Smithsonian Institution Press.

Ginsburg, R. 2007. Freedom and the slave landscape. *Landscape Journal* 26: 36–44.

Hall, M. 2000. *Archaeology and the modern world: Colonial transcripts in South Africa and the Chesapeake*. London: Routledge.

Handler, J.S., and F.W. Lange. 1978. *Plantation slavery in Barbados: An archaeological and historical investigation*. Cambridge, MA: Harvard University Press.

Handler, J.S., and M.L. Tuite Jr. 2015. *The Atlantic slave trade and slave life in the Americas: A visual record*. Charlottesville: Virginia Foundation for the Humanities and the Digital Media Lab at the University of Virginia. Available at: http://www.slaveryimages.org. Accessed 10 May 2017.

Haviser, J.B., and K.C. MacDonald, eds. 2006. *African re-genesis: Confronting social issues in the diaspora*. New York: University College of London Press.

Joseph, J.W. 2004. Resistance and compliance: CRM and the archaeology of the African diaspora. *Historical Archaeology* 38: 18–31.

La Rosa Corzo, G. 2003. *Runaway slave settlement in Cuba: Resistance and repression*. Chapel Hill: University of North Carolina Press.

Mack, M.E., and M.L. Blakey. 2004. The New York African burial ground project: Past biases, current dilemmas, and future research opportunities. *Historical Archaeology* 38: 10–17.

Mullins, P.R. 2006. Racializing the commonplace landscape: An archaeology of urban renewal along the color line. *World Archaeology* 38: 60–71.

Mullins, P.R. 2008. Excavating America's metaphor: Race, diaspora, and vindicationist archaeologies. *Historical Archaeology* 42: 104–122.

Ogundiran, A. 2008. African Atlantic archaeology and Africana studies: A programmatic agenda. *African Diaspora Archaeology Newsletter*. June. Available at: http://www.diaspora.illinois.edu/news0608/news0608.html#1. Accessed 10 May 2017.

Ogundiran, A., and T. Falola, eds. 2007. *Archaeology of Atlantic Africa and the African diaspora*. Bloomington: Indiana University Press.

Orser, C.E., Jr. 1994. Toward a global historical archaeology: An example from Brazil. *Historical Archaeology* 28: 5–22.

Orser, C.E., Jr. 2007. *The archaeology of race and racialization in historic America*. Gainesville: University Press of Florida.

Orser, C.E., Jr., and P.P. Funari. 2001. The archaeology of slave resistance and rebellion. *World Archaeology* 33: 61–72.

Reid, A.M., and P.J. Lane, eds. 2004. *African historical archaeologies*. New York: Kluwer Academic/Plenum Press.

Schmidt, P.R. 2006. *Historical archaeology in Africa: Representation, social memory, and oral traditions*. Walnut Creek: AltaMira Press.

Thomas Jefferson Foundation. 2017. *Digital archaeological archive of comparative slavery*. Charlottesville: Thomas Jefferson Foundation. Available at: http://www.daacs.org/. Accessed 10 May 2017.

Weik, T. 2004. Archaeology of the African diaspora in Latin America. *Historical Archaeology* 38: 32–49.

Wheaton, T.R., A. Friedlander, and P. Garrow. 1983. *Yaughan and Curiboo Plantations: Studies in African American archaeology*. Marietta: Soil Systems.

Wilkie, L.A. 2000a. *Creating freedom: Material culture and African American identity at Oakley Plantation, Louisiana, 1840–1950*. Baton Rouge: Louisiana State University Press.

Wilkie, L.A. 2000b. Culture bought: Evidence of creolization in the consumer goods of an enslaved Bahamian family. *Historical Archaeology* 34: 10–26.

Further Readings

Agbe-Davies, A.S. 2007. Practicing African American archaeology in the Atlantic world. In *Archaeology of Atlantic Africa and the African diaspora*, ed. A. Ogundiran and T. Falola, 413–425. Bloomington: Indiana University Press.

Agorsah, E.K. 2006. The other side of freedom: The maroon trail in Suriname. In *African re-genesis: Confronting social issues in the diaspora*, ed. J.B. Haviser and K.C. MacDonald, 191–203. New York: University College London Press.

Allen, S.J. 1998. A 'cultural mosaic' at Palmares? Grappling with the historical archaeology of a seventeenth-century Brazilian quilombo. In *Cultura material e arquelogia histórica*, ed. P.P. Funari, 141–178. Campinas: UNICAMP.

Armstrong, D.V. 2003. *Creole transformations from slavery to freedom: Historical archaeology of the east end community, St. John, Virgin Islands*. Gainesville: University Press of Florida.

Armstrong, D.V. 2008. Excavating African American heritage: Towards a more nuanced understanding of the African diaspora. *Historical Archaeology* 42: 123–137.

Armstrong, D.V., and M. Fleischman. 2003. House-yard burials of enslaved laborers in eighteenth-century Jamaica. *International Journal of Historical Archaeology* 7: 33–65.

Ascher, R., and C.H. Fairbanks. 1971. Excavation of a slave cabin: Georgia, U.S.A. *Historical Archaeology* 5: 3–17.

Babson, D.W. 1990. The archaeology of racism and ethnicity on southern plantations. *Historical Archaeology* 24: 20–28.

Barile, K.S. 2004. Race, the National Register, and cultural resource management: Creating an historic context for postbellum sites. *Historical Archaeology* 38: 90–100.

Battle-Baptiste, W.L. 2007. "In this here place:" interpreting enslaved homeplaces. In *Archaeology of Atlantic Africa and the African diaspora*, ed. A. Ogundiran and T. Falola, 233–248. Bloomington: Indiana University Press.

Blakey, M.L. 2001. Bioarchaeology of the African diaspora in the Americas: Its origins and scope. *Annual Review of Anthropology* 30: 387–422.

Brown, K.L., and D.C. Cooper. 1990. Structural continuity in an African-American slave and tenant community. *Historical Archaeology* 24: 7–19.

Bullen, A.K., and R.P. Bullen. 1945. Black Lucy's garden. *Bulletin of the Massachusetts Archaeological Society* 6: 17–28.

Chan, A.A. 2007. Bringing the out kitchen in? The experiential landscapes of black and white New England. In *Archaeology of Atlantic Africa and the African diaspora*, ed. A. Ogundiran and T. Falola, 249–276. Bloomington: Indiana University Press.

Davidson, J.M. 2004. Rituals captured in context and time: Charm use in North Dallas Freedman's town (1869–1907), Dallas, Texas. *Historical Archaeology* 38: 22–54.

De Jayasuriya Silva, S. 2010. *The African diaspora in Asian trade routes and cultural memories*. Lewiston: Edwin Mellen Press.

DeCorse, C.R. 2001. *West Africa during the Atlantic slave trade: Archaeological perspectives*. New York: Leicester University Press.

DeCorse, C.R., and M.W. Hauser. 2003. Low-fired earthenwares in the African diaspora: Problems and prospects. *International Journal of Historical Archaeology* 7: 67–98.

Deetz, J. 1996. *In small things forgotten: An archaeology of early American life*. New York: Anchor Books.

Delle, J.A. 2008. A tale of two tunnels: Memory, archaeology, and the underground railroad. *Journal of Social Archaeology* 8: 63–93.

Eltis, D., and M. Halbert. 2013. Voyages: The trans-Atlantic slave trade database. Available at: http://www.slavevoyages.org/. Accessed 10 May 2017.

Eltis, D., and D. Richardson. 2008. A new assessment of the transatlantic slave trade. In *Extending the frontiers: Essays on the new transatlantic slave trade database*, ed. D. Eltis and D. Richardson, 1–60. New Haven: Yale University Press.

Farnsworth, P. 1996. The influence of trade on Bahamian slave culture. *Historical Archaeology* 30: 1–23.

Fennell, C.C. 2008. African diaspora archaeology in multiscalar and multivariate perspectives. In *Perspectives from historical archaeology: African diaspora archaeology*, ed. C.C. Fennell, 1–25. Tucson: Society for Historical Archaeology.

Ferguson, L.G. 2007. Early African-American pottery in South Carolina: A complicated plainware. *African Diaspora Archaeology Newsletter*. June. Available at

http://www.diaspora.illinois.edu/news0607/news0607.html#1. Accessed 10 May 2017.

Franklin, M. 1997. "Power to the people": Sociopolitics and the archaeology of black Americans. *Historical Archaeology* 31: 36–50.

Galle, J.E., and A.L. Young, eds. 2004. *Engendering African American archaeology: A southern perspective*. Knoxville: University of Tennessee Press.

General Service Administration (GSA). n.d.. GSA and the African Burial Ground. Available at: http://www.gsa.gov/africanburialground. Accessed 10 May 2017.

Gradwohl, D.M., and N.M. Osborn. 1984. *Exploring buried Buxton: Archaeology of an abandoned Iowa coal mining town with a large black population*. Ames: Iowa State University Press.

Handler, J.S. 1994. Determining African birth from skeletal remains: A note on tooth mutilation. *Historical Archaeology* 28: 113–119.

Hauser, M.W. 2007. Between urban and rural: Organization and distribution of local pottery in eighteenth-century Jamaica. In *Archaeology of Atlantic Africa and the African diaspora*, ed. A. Ogundiran and T. Falola, 292–310. Bloomington: Indiana University Press.

Heath, B.J., and A. Bennett. 2000. "The little spots allow'd them": The archaeological study of African-American yards. *Historical Archaeology* 34: 38–55.

Jamieson, R.W. 1995. Material culture and social death: African-American burial practices. *Historical Archaeology* 29: 39–58.

Joseph, J.W. 1993. White columns and black hands: Class and classification in the plantation ideology of the Georgia and South Carolina lowcountry. *Historical Archaeology* 27: 57–73.

Joseph, J.W. 2007. One more look into the water – Colonoware in South Carolina rivers and Charleston's market economy. *African Diaspora Archaeology Newsletter*. June. Available at http://www.diaspora.illinois.edu/news0607/news0607.html#2. Accessed 10 May 2017.

Journal of African Diaspora Archaeology and Heritage. n.d.. Available at: http://tandfonline.com/toc/yjaf20/current. Accessed 10 May 2017.

Kelly, K. 2004. The African diaspora starts here: Historical archaeology of coastal West Africa. In *African historical archaeologies*, ed. A. Reid and P. Lane, 219–241. New York: Kluwer Academic/Plenum Press.

LaRoche, C.J. 2004. On the edge of freedom: Free black communities, archaeology, and the underground railroad. Unpublished PhD dissertation, University of Maryland.

LaRoche, C.J. 2013. *Free black communities and the underground railroad: The geography of resistance*. Urbana: University of Illinois Press.

LaRoche, C.J., and M.L. Blakey. 1997. Seizing intellectual power: The dialogue at the New York African Burial Ground. *Historical Archaeology* 31: 84–106.

Leone, M.P., and G. Fry. 1999. Conjuring in the big house kitchen: An interpretation of African American belief systems based on the uses of archaeology and folklore sources. *Journal of American Folklore* 112: 372–403.

Markell, A., M. Hall, and C. Schrire. 1995. The historical archaeology of Vergelegen, an early farmstead at the Cape of Good Hope. *Historical Archaeology* 29: 10–34.

Marshall, L.W., ed. 2014. *The archaeology of slavery: A comparative approach to captivity and coercion*. Carbondale: Southern Illinois University Press.

McCarthy, J.P. 2006. African community identity at the cemetery. In *African re-genesis: Confronting social issues in the diaspora*, ed. J.B. Haviser and K.C. MacDonald, 176–183. New York: University College London Press.

McDavid, C. 1997. Descendants, decisions, and power: The public interpretation of the archaeology of the Levi Jordan plantation. *Historical Archaeology* 31: 114–131.

Mouer, L.D., M.E. Hodges, S.R. Potter, S.L. Renaud, I. Noël Hume, D.J. Pogue, M.W. McCartney, and T.E. Davidson. 1999. Colonoware pottery, Chesapeake pipes, and "uncritical assumptions". In *"I, too, am America:" archaeological studies of African-American life*, ed. T.A. Singleton, 83–115. Charlottesville: University Press of Virginia.

Mullins, P.R. 1999. Race and the genteel consumer: Class and African-American consumption, 1850–1930. *Historical Archaeology* 33: 22–38.

Ogundiran, A., and T. Falola. 2007. Pathways in the archaeology of transatlantic Africa. In *Archaeology of Atlantic Africa and the African diaspora*, ed. A. Ogundiran and T. Falola, 3–45. Bloomington: Indiana University Press.

Ogundiran, A., and P. Saunders, eds. 2014. *Materialities of ritual in the Black Atlantic*. Bloomington: Indiana University Press.

Orser, C.E., Jr. 1988. The archaeological analysis of plantation society: Replacing status and caste with economics and power. *American Antiquity* 53: 735–751.

Orser, C.E., Jr. 2003. *Race and practice in archaeological interpretation*. Philadelphia: University of Pennsylvania Press.

Philips, J.E., ed. 2000. *Writing African history*. Rochester: University of Rochester Press.

Posnansky, M., and C.R. DeCorse. 1986. Historical archaeology in Sub-Saharan Africa – a review. *Historical Archaeology* 20: 1–14.

Price, T.D., J.H. Burton, A. Cucina, P. Zabala, R. Frei, R.H. Tykot, and V. Tiesler. 2012. Isotopic studies of human skeletal remains from a sixteenth to seventeenth century AD churchyard in Campeche, Mexico: Diet, place of origin, and age. *Current Anthropology* 53: 396–433.

Reitz, E.J. 1994. Zooarchaeological analysis of a free African community: Gracia Real de Santa Teresa de Mose. *Historical Archaeology* 28: 23–40.

Richard, F.G., and K.C. MacDonald, eds. 2015. *Ethnic ambiguity and the African past*. Walnut Creek: Left Coast Press.

Ruppel, T., J. Neuwirth, M.P. Leone, and G. Fry. 2003. Hidden in view: African spiritual spaces in North American landscapes. *Antiquity* 77: 321–335.
Russell, A.E. 1997. Material culture and African-American spirituality at the Hermitage. *Historical Archaeology* 31: 63–80.
Samford, P.E. 2007. *Subfloor pits and the archaeology of slavery in colonial Virginia*. Tuscaloosa: University of Alabama Press.
Sayers, D.O. 2016. *A desolate place for a defiant people: The archaeology of maroons, indigenous Americans, and enslaved laborers in the Great Dismal Swamp*. Gainesville: University Press of Florida.
Sayers, D.O., P.B. Burke, and A.M. Henry. 2007. The political economy of exile in the Great Dismal Swamp. *International Journal of Historical Archaeology* 11: 60–97.
Shackel, P.A., and D.L. Larsen. 2000. Labor, racism, and the built environment in early industrial Harpers Ferry. In *Lines that divide: Historical archaeologies of race, class, and gender*, ed. J.A. Delle, S.A. Mrozowski, and R. Paynter, 22–39. Knoxville: University of Tennessee Press.
Singleton, T.A., and M. Bograd. 2000. Breaking typological barriers: Looking for the colono in colonoware. In *Lines that divide: Historical archaeologies of race, class, and gender*, ed. J.A. Delle, S.A. Mrozowski, and R. Paynter, 3–21. Knoxville: University of Tennessee Press.
Stahl, A.B.. 2004a. Making history in Banda: Reflections on the construction of Africa's past. *Historical Archaeology* 38: 50–65.
Stahl, A.B.. 2004b. Political economic mosaics: Archaeology of the last two millennia in tropical Sub-Saharan Africa. *Annual Review of Anthropology* 33: 145–172.
Symanski, L.C.P. 2006. Slaves and planters in western Brazil: Material culture, identity and power. Unpublished PhD dissertation, University of Florida.
Upton, D. 1985. White and black landscapes in eighteenth-century Virginia. *Places* 2: 59–72.
Walz, J.R., and S.A. Brandt. 2006. Towards an archaeology of the other African diaspora: The slave trade and dispersed Africans in the western Indian Ocean. In *African re-genesis: Confronting social issues in the diaspora*, ed. J.B. Haviser and K.C. MacDonald, 246–268. New York: University College of London Press.
Watters, D.R. 1994. Mortuary patterns at the Harney site slave cemetery, Montserrat, in Caribbean perspective. *Historical Archaeology* 28: 56–73.
Weik, T.M. 1997. The archaeology of maroon societies in the Americas: Resistance, cultural continuity, and transformation in the African Diaspora. *Historical Archaeology* 31: 81–92.
Weik, T.M. 2012. *The archaeology of antislavery resistance*. Gainesville: University Press of Florida.
Weik, T.M. 2014. The archaeology of ethnogenesis. *Annual Review of Anthropology* 43: 291–305.
Wilkie, L.A. 1997. Secret and sacred: Contextualizing the artifacts of African-American magic and religion. *Historical Archaeology* 31: 81–106.
Wilkie, L.A. 2003. *The archaeology of mothering: An African American midwife's tale*. New York: Routledge.

African Diaspora Archaeology Network (ADAN)

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Basic Information

The African Diaspora Archaeology Network (ADAN) consists of collaborating scholars, researchers, and interested parties with expertise in African diaspora studies, archaeology, material culture analysis, African histories, and studies of the many developments and changes over time in African diaspora communities. The term "diaspora" typically addresses the dispersion of people to new locations as a result of adverse and hostile circumstances in the areas from which they were abducted or departed. The ADAN (n.d.) describes its mission as connecting "an intellectual community that considers the historical processes of culture, economics, gender, power, and racialization operating within and upon African descendant" populations.

Major Impact

The ADAN includes a quarterly, open-access newsletter published through Internet distribution to thousands of readers worldwide. The network also presents extensive resources for community members and researchers through its Internet site (ADAN n.d.) and often convenes an annual forum at the conference of the Society for Historical Archaeology (SHA).

The ADAN and its quarterly newsletter are successors to the African-American Archaeology Network (AAAN) and newsletter. The AAAN was organized by Theresa Singleton in 1990, and its newsletter was edited and produced in succession by Singleton, Thomas Wheaton, and John McCarthy up through 2000. The ADAN was organized in 2005 by a group of collaborating scholars and adopted a new name to focus on the broader geographic scale of African diaspora communities worldwide.

The field of African diaspora archaeology has witnessed a remarkable expansion in the number of projects, scope of investigations, and variety of research questions pursued over the past several decades. This growth was illustrated in discussions at an ADAN forum entitled "Research Designs for Atlantic Africa and African Diaspora Archaeologies," convened in 2007 at the annual meeting of the SHA. Those forum discussions focused on interpretative frameworks and theoretical constructs utilized in African diaspora archaeology projects. Debates also addressed comparative historical archaeology investigations of sites in Africa impacted by the trans-Atlantic slave trade. The resulting assessments of the state of the field demonstrated that researchers are pursuing a breathtaking variety of research questions. Such analysts address relationships between people, material culture, and historical processes across spatial scales spanning local, regional, interregional, hemispheric, and global frameworks (Fennell 2011). Collaborators from the ADAN also launched the peer-reviewed *Journal of African Diaspora Archaeology and Heritage* (Taylor and Francis Press) in 2012. News, current events, and conference announcements are now disseminated through social media Internet sites (ADAN, News and Events n.d).

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

References

African Diaspora Archaeology Network. n.d.. Available at: http://www.diaspora.illinois.edu/ and http://scholarworks.umass.edu/adan/. Accessed 10 May 2017.

African Diaspora Archaeology Network, News and Events. Available at: https://www.facebook.com/AfricanDiasporaArchaeologyNetwork/. Accessed 11 May 2017.

Fennell, C.C. 2011. Early African America: Archaeological studies of significance and diversity. *Journal of Archaeological Research* 19: 1–49.

Journal of African Diaspora Archaeology and Heritage. Available at: http://tandfonline.com/toc/yjaf20/current. Accessed 10 May 2017.

African Stone Age

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Introduction

The African Stone Age spans the first 2.5 Ma of human prehistory, beginning with the world's earliest stone tool production and continuing through the historical period of European colonization. The African Stone Age includes a tremendous diversity in terms of the characteristics of its industries and the life ways engaged in by its makers. Archaeological research on African stone tool industries has had wide-ranging impacts on our understanding of processes of human evolution and the organization of past human societies.

Definition

The African Stone Age is conventionally divided into three phases, including the Early, Middle, and Later Stone Ages (ESA, MSA, and LSA). The ESA includes the Oldowan, Developed Oldowan, and Acheulean industries. Oldowan industry is thought to have begun with the world's oldest known stone tool technology at the site of Gona, Ethiopia, dating to around 2.5 Ma (Semaw 2000).

The Oldowan industry is characterized by the production of flakes using direct hard-hammer percussion, though bipolar flaking is also known Delagnes and Roche (2005). Common core forms include choppers, discoids, and polyhedrons. Retouched tools mainly include various types of scrapers and denticulates, though flake retouching is not common in most assemblages. The Oldowan gives way to the Acheulean industry between around 1.8 and 1.5 Ma, though this transition appears to have occurred gradually. Numerous securely dated Oldowan sites are known across eastern and southern Africa, and stone tool assemblages with Oldowan characteristics have also been identified in both the eastern and western Sahara (Plummer 2004). It is reasonable to conclude that the Oldowan industry was a pervasive phenomenon across Africa during the Lower Pleistocene.

The earliest known Acheulean assemblages occur at sites dating between around 1.8 and 1.5 Ma in the Konso Formation of Ethiopia (Asfaw et al. 1992), the West Turkana region of Kenya (Roche 2003), and at Olduvai Gorge in Tanzania (Leakey 1971). Acheulean assemblages include the same core and retouched tool forms as the Oldowan but are defined by the production of large bifacial hand axes, which are also referred to as "large cutting tools" (LCTs). Acheulean sites are known from all regions of the African continent. Hand axes at early Acheulean sites were produced through a process of alternate flaking using direct hard-hammer percussion, which resulted in large tools with bifacial edges. Middle Pleistocene Acheulean assemblages show more sophisticated flaking techniques for the purposes of bifacial thinning, including the use of soft-hammer percussion and the preparation of striking platforms (Ambrose 2001). Terminal Acheulean industries, such as the Fauresmith industry of southern Africa, are characterized by the production of much smaller hand axes and the increasing prevalence of other core reduction strategies. The Acheulean industry gives way to the Middle Stone Age between around 300 and 200 ka.

The Developed Oldowan industry is contemporaneous with the early period of the Acheulean industry, ranging in age between 1.8 and 1.0 Ma. It is mainly defined by the absence or scarcity of hand axes, though Developed Oldowan assemblages often include crude bifacial core forms, such as picks (Leakey 1976). Retouched tools also occur in somewhat higher frequencies and with more diversity than in the Oldowan industry. While there is some controversy in the definition and identification of Developed Oldowan sites (Semaw et al. 2009), a number of examples have been documented in eastern and southern Africa as well as in the Sahara.

The earliest known MSA sites are located in the Kapthurin Formation of the Kenyan Rift Valley and date to around 280 ka (Tryon and McBrearty 2002). Elsewhere in eastern and southern Africa, the transition from the Acheulean to the MSA appears to have occurred somewhat later, ending by around 200 ka. The Middle Stone Age is defined by the use of the Levallois technique, in addition to other varieties of centripetal core reduction strategies and the use of striking platform preparation. These core reduction strategies had their origins earlier in the later Acheulean industry, perhaps predating 500 ka (Rolland 1995). In the MSA, however, they comprise a more prevalent element of core reduction strategies and the production of hand axes largely ceases. Thus, the transition from the Acheulean to the MSA may again be described as a relatively gradual shift in the prevalence of various core reduction strategies at the boundary between the Middle and Upper Pleistocene (Tryon et al. 2005: 201).

The MSA is also the first period in which stone points were produced in significant frequencies using both the Levallois technique and through the marginal retouching of flakes. Such points are thought to have served as the tips of hand delivered spears. In addition, the MSA is characterized by low frequencies of other retouched tools, including various types of scrapers, notches, denticulates, and trimmed flakes. The latter MSA, after around 100 ka, is characterized by increasing regional diversity in terms of stone tool traditions. In southern Africa, the distinctive Still Bay and Howiesons Poort industries, respectively, defined by the production of thinned bifacial points and backed blades, appear between 80 and 55 ka

(Henshilwood et al. 2001; McCall 2007). In eastern Africa, the Mumba industry dates between 60 and 50 ka and is also defined by the production of backed blade technologies. In northern Africa, the Aterian industry appears between 80 and 40 ka and is defined by the production of stemmed points and bifacial points (Cremaschi et al. 1998). It is also important to note that these later regional MSA industries are associated with the appearance of the earliest symbolic objects, which have important implications for the origins of modern cognitive, linguistic, and social capabilities (Henshilwood and Marean 2003).

The LSA begins in eastern and southern Africa between 50 and 40 ka and is characterized by the production of small microlithic tools (Wadley 1993; McCall and Thomas 2009). The earliest uncontroversial LSA assemblages are known from the site of Enkapune Ya Muto in Kenya, though putative LSA artifacts predating 40 ka have also been found at the South African site of Border Cave. Elsewhere in southern Africa, MSA traditions have been documented dating to 25 ka or later, demonstrating that the transition from the MSA to the LSA was both a time-transgressive and geographically mosaic phenomenon. While most LSA industries are characterized by microlithic stone tool technologies, this is not universal. For example, the South African Oakhurst industry dates between around 12 and 7 ka and is defined by the production large flakes and the frequent retouching of these into informal scrapers.

In the eastern Sahara, terminal Pleistocene and Holocene microlithic stone tool industries share most formal qualities with the LSA of sub-Saharan Africa but are generally referred to as Neolithic using the Levantine nomenclature system (Wendorf et al. 1976). Across Africa, LSA stone tool industries are associated with origins of pastoralist and eventually allied small-scale agricultural economic systems, occurring first in the Sahara around 9 ka and spreading to sub-Saharan Africa subsequently. The use of stone tools comes to an end with appearance of iron technology, which becomes increasingly prevalent between 2 and 1 ka. In southern Africa, forager and pastoralist populations continued producing stone tools in the Wilton industry of the LSA through the historical period of colonial contact. Isolated cases of stone tools production, such as the manufacture of stone scrapers by hide workers in Ethiopia, have persisted into the twenty-first century.

Historical Background

Early research on the African Stone Age was associated with the expansion of European colonial territories in Africa during the late nineteenth and early twentieth centuries. The three-age Stone Age chronological system was first proposed seriously by the South African archaeologists John Goodwin and Clarence van Riet Lowe (1929), though Goodwin was heavily influenced by his training under Miles Burkitt at Cambridge University. Following from Burkitt (1925), Goodwin and van Riet Lowe (1929) eschewed the three-age system used to classify the European Paleolithic (Lower Paleolithic, Middle Paleolithic, and Upper Paleolithic) in favor of a chronology unique to the African continent. The reason for this revolved around the widely held Eurocentric view that while the African Stone Age sequence showed some similarities with that known from Europe, its industries occurred later in time and were inferior reflections of their European origins. In short, the various stone tool industries found in Africa were thought to have originated earlier in Europe and diffused into Africa, degrading in quality over space and time.

This view was seriously challenged beginning in the late 1950s by the research of Louis and Mary Leakey, who were the first to establish the deep antiquity of Stone Age artifacts in eastern Africa using newly developed isotopic dating methods (Leakey 1971, 1976). Their research showed that Oldowan artifacts dated to at least 1.8 Ma – much older than what had been supposed and also significantly older than any known stone tool technology in Europe. Subsequent research demonstrated that virtually every early stone tool industry known in Europe had its predecessors in Africa, reframing Africa as the location of the origins of both our earliest human ancestors and their technological traditions. Furthermore, the

increasingly synthetic reconstructions of African prehistory in the 1960s produced by archaeologists such as Desmond Clark and Glynn Isaac, as well as their students and colleagues, demonstrated that African Stone Age industries were as complex and sophisticated as any known from other regions of the world.

This trend continued with respect to research on the MSA and modern human origins, thanks in part to further advances in dating technology. While the MSA was once seen as static and underdeveloped relative to European Middle and Upper Paleolithic sequences, it is now known that the MSA was the source of many key behavioral changes among early modern human population. It is now widely acknowledged that many features of the so-called Upper Paleolithic Revolution in fact had their origins in African MSA (McBrearty and Brooks 2000; Henshilwood and Marean 2003). Furthermore, it is increasingly recognized that many important technological features of the Mesolithic and Neolithic microlithic industries of Eurasia originated much earlier in the Upper Pleistocene with the appearance of the LSA in Africa. Thus, the African Stone Age has become a major focus of research on a wide range of global Paleolithic phenomena in terms of the evolution of humans and their expansion across the Old and New Worlds.

Key Issues/Current Debates

The African Stone Age continues to be the subject of a wide range of active archaeological research and debate. Such debates involve issues of prehistory as well as archaeological method and theory. They primarily revolve around accurately reconstructing the life ways of past populations and the complexity of associated social structures, cognitive capabilities, and symbolic practices.

Current research on the ESA has focused on assessing the sophistication of knapping activities and putting these in the context of forms of archaeological information concerning economic and social behaviors. Making use of *chaîne opératoire* and allied methods of lithic analysis, this line of research has demonstrated that even the earliest hominin flintknappers associated with Oldowan lithic assemblages had a solid mechanical understanding of platform angles and other aspects of core geometry – something that even the most highly trained and sophisticated chimpanzee knappers lack (Toth and Schick 2009). Similarly, research on Middle Pleistocene Acheulean assemblages has shown that evident processes of bifacial thinning require a high degree of knapping skill, perhaps implying both sophisticated cognitive and social/linguistic structures for teaching (McPherron 2000). These insights stand in contrast with prior views of early hominin behavior and cognition, which have tended to see ESA archaeological assemblages as indicating much more apelike behavioral patterns.

Archaeological research on the MSA has exploded within the last two decades with profound implications for our understanding of modern human origins. New dating technologies and expanded programs of field research have radically overhauled our knowledge of MSA prehistory and the nature of early modern human cultural behavior. Such discoveries include the world's earliest symbolic objects, ground bone tools, blade-based lithic technology, as well as evidence for other complex knapping procedures and the exploitation of labor-intensive subsistence resources. These behavioral features have been used to define the European "Upper Paleolithic Revolution" and the broader concept of "behavioral modernity" (Mellars 1989; Shea 2011). In addition, research on MSA lithic technology has offered increasing clarity concerning the kinds of technologies, subsistence practices, and mobility systems employed by early humans. Combined, modern research on the MSA has provided important insights concerning the origins of modern humans, their shifting cultural behavior, and their spread to the rest of the world.

By virtue of finer-grained chronological information and historical associations with modern forager groups in the Kalahari and East Africa, research on the LSA has sought to investigate the nature of later prehistoric foraging forms of technology, economic practices, and social systems. Research on rock art, especially in southern Africa, has offered important information

concerning the nature of LSA social structures, religious practices, and cosmological constructs (Lewis-Williams 1983). Recent research has also focused on the transition from foraging to small-scale farming and pastoralist economic systems, as well as the complex forms of interaction between later LSA foragers and their agricultural neighbors. Finally, the transition from the MSA to the LSA is now receiving renewed attention in light of new excavations and improved dating techniques.

International Perspectives

The bulk of early archaeological research on the African Stone Age was conducted under the auspices of European colonial (especially British) academics and their associates in various African colonies. For example, John Goodwin, Louis Leakey, J. Desmond Clark, Glynn Isaac, and Brian Fagan all received graduate education in archaeology at Cambridge University in the early to middle twentieth century. Beginning in the 1960s, an initial generation of African professional archaeologists emerged and populated departments of archaeology at local universities, especially in South Africa. While this generation remained committed to the methodological and theoretical directions that originated in Europe, archaeological research on the African Stone Age began to take on a distinctive regional flavor.

The 1960s also saw the movement of many of the most important African Stone Age archaeologists to major research universities in the United States, such as the hiring of J. Desmond Clark and Glynn Isaac and the University of California Berkeley in 1961 and 1966, respectively. This trend had the effect of fostering the increasing involvement of American archaeologists on African Stone Age topics. Beginning in the 1970s, American archaeologists began to make important contributions on topics ranging from dynamics of lithic reduction, patterns of bone modification, site formation processes, ethnoarchaeology, and experimental archaeology. The increasing popularity of African Stone Age research topics also attracted the attention of powerful foreign scholars, such as Lewis Binford. Within the last two decades, archaeologists from other regions, such as various Western European countries and Australia, have made increasingly important contributions. For example, French Paleolithic scholars, such Anne Delagnes, Pierre-Jean Texier, and Jean-Philippe Rigaud, have offered new perspectives in terms of the application of *chaîne opératoire* approaches to lithic echnology in the ESA and MSA.

Perhaps the most important shift in terms of research on the African Stone Age has been the increasing involvement of indigenous scholars and African governments in the examination and preservation of Stone Age cultural resources. While this has been a continent-wide phenomenon associated with the gaining of independence from European colonial powers, it has been particularly salient in the Rift Valley nations of East Africa (especially Ethiopia, Kenya, and Tanzania) and South Africa. Across Africa, the record of human evolution and cultural diversity associated with the Stone Age has become increasingly recognized as a crucial element of cultural patrimony. With that said, indigenous involvement in research on African Stone Age topics remains regrettably rare (Shepard 2002).

Future Directions

Research on the African Stone Age is in the midst of a significant period of reorientation based on the development of new analytical methods and dating techniques as well as the expansion of available data sets through the proliferation of fieldwork projects.

Research on the Oldowan and Acheulean industries has recently focused on the evaluation of early hominin cognitive capabilities and the complexity of social organization. Future research is poised to make use of a wide range of evidence resulting from human and chimpanzee knapping experiments, further archaeological and ethological investigations of chimpanzee tool use and associated activity areas, and more detailed analysis of archaeological assemblages within a technological framework. In addition, various three-

dimensional scanning technologies now allow for the documentation of the shape of tools such as hand axes in much greater detail. Finally, the field is once again turning its attention to the examination of early hominin technological organization, mobility patterns, and broader dynamics of ecological adaptation.

Recent research on the MSA has offered a great deal of new knowledge concerning the design and function of tools and weapons as well as implications for subsistence activities and economic organization. Likewise, having established the presence of many precocious forms archaeological remains associated with early modern humans, recent research on the MSA has sought to evaluate the nature of novel forms of social organization and their potential causes. While some current scholarship has questioned the utility of the behavioral modernity concept (Shea 2011), a great deal of work continues to be focused on the nature of MSA early modern human cognitive and cultural sophistication (Wadley 2012). Future research will no doubt continue to add detail concerning the nature of MSA life ways while improving our understanding of the relationship between various regional phenomena and shifts over time. For example, while the later MSA sequences of South Africa are known in great detail, their relationship with contemporaneous industries in adjacent regions is not. Likewise, the MSA of East Africa remains a neglected topic relative to the study of ESA technologies in the interest of addressing debates concerning early hominin evolution.

Future research on the LSA seems poised to address a range of issues. While the technological and operational characteristics of MSA tools and weapons are increasingly known in great detail, such information remains lacking for the LSA in spite of links with modern forager groups in Africa. The application of a similar research program would seem to have much to offer. In addition, the transition between the MSA and LSA remains a poorly understood process, especially considering apparent differences between various African regions. New directions in research on the LSA might also choose to focus on the continued production of tools by historical and modern societies. Understanding changes in lithic technology associated with processes of colonization and modernization could offer valuable new perspectives on these profoundly important historical phenomena. Finally, future research on the LSA will continue to show the ways in which LSA life ways were specialized aspects of global processes of post-Pleistocene adaptation rather than being "timeless" elements of foraging societies as was assumed by earlier ethnographers and archaeologists.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Central and West African Middle Stone Age: Geography and Culture
- ▶ East and Southern African Neolithic: Geography and Overview
- ▶ North and Saharan Africa: Geography and Culture During the Lower Stone Age
- ▶ Oldowan Industrial Complex
- ▶ Olduvai Gorge Archaeological Site
- ▶ Out-of-Africa Origins
- ▶ Southern and East African Middle Stone Age: Geography and Culture
- ▶ West and Central African Neolithic: Geography and Overview

References

Ambrose, S.H. 2001. Paleolithic technology and human evolution. *Science* 291: 1748–1753.

Asfaw, B., Y. Beyene, G. Suwa, R. Walter, T. White, G. Woldegabriel, and T. Yemane. 1992. The earliest Acheulean from Konso-Gardula. *Nature* 360: 732–735.

Burkitt, M.K. 1925. *Prehistory: A study of early cultures in Europe and the Mediterranean Basin*. Ann Arbor: The University Press.

Cremaschi, M., S. Di Lernia, and E.A. Garcea. 1998. Some insights on the Aterian in the Libyan Sahara: Chronology, environment, and archaeology. *African Archaeological Review* 15: 261–286.

Delagnes, A., and H. Roche. 2005. Late Pliocene hominid knapping skills: The case of Lokalei 2C, West Turkana, Keyna. *Journal of Human Evolution* 48: 435–472.

Goodwin, A.J., and C. Van Riet Lowe. 1929. The stone age cultures of South Africa. *Annals of the South African Museum* 27: 1–289.

Henshilwood, C.S., and C.W. Marean. 2003. The origins of model human behavior. *Current Anthropology* 44: 627–651.

Henshilwood, C.S., F.E. D'Errico, C.W. Marean, R.G. Milo, and R. Yates. 2001. An early bone tool industry from the Middle Stone Age at Blombos Cave, South Africa: Implications for the origins of modern human behaviour, symbolism and language. *Journal of Human Evolution* 41: 631–678.

Leakey, M.D. 1971. *Olduvai Gorge, excavations in Beds I and III, 1960–1963, 3*. Cambridge: Cambridge University Press.

Leakey, M.D. 1976. The early stone industries of Olduvai Gorge. In *Colloquium V, IXth congress of the international union of prehistoric and protoizistoric sciences, Nice,* 24–41.

Lewis-Williams, J.D. 1983. *The rock art of southern Africa*. Cambridge: Cambridge University Press.

McBrearty, S., and A. Brooks. 2000. The revolution that wasn't: A new interpretation of the origin of modern human behavior. *Journal of Human Evolution* 39: 453–563.

McCall, G.S. 2007. Behavioral ecological models of lithic technological change during the later Middle Stone Age of South Africa. *Journal of Archaeological Science* 34: 1738–1751.

McCall, G.S., and J.T. Thomas. 2009. Re-examining the South African Middle-to-Later Stone Age transition: Multivariate analysis of the Umhlatuzana and Rose Cottage Cave stone tool assemblages. *Azania: Archaeological Research in Africa* 44: 311–330.

McPherron, S.P. 2000. Handaxes as a measure of the mental capabilities of early hominids. *Journal of Archaeological Science* 27: 655–663.

Mellars, P. 1989. Major issues in the emergence of modern humans. *Current Anthropology* 30: 349–385.

Plummer, T. 2004. Flakes stones and old bones: Biological and cultural evolution at the dawn of technology. *Yearbook of Physical Anthropology* 47: 118–164.

Roche, H. 2003. Les sites archéologiques plio-pléistocènes de la formation de Nachukui, Ouest-Turkana, Kenya: bilan synthétique 1997–2001. *Comptes Rendus Palevol* 2: 663–673.

Rolland, N. 1995. Levallois technique emergence: Single or multiple? A review of the Euro-African record. In *The definition and interpretation of Levallois technology*, ed. H.L. Dibble and O. Bar-Yosef, 333–359. Madison: Prehistory Press.

Semaw, S. 2000. The world's oldest stone artefacts from Gona, Ethiopia: Their implications for understanding stone technology and patterns of human evolution between 2·6–1·5 million years ago. *Journal of Archaeological Science* 27: 1197–1214.

Semaw, S., M. Rogers, and D. Stout. 2009. The Oldowan-Acheulian transition: Is there a "developed Oldowan" artifact tradition? In *Sourcebook of Paleolithic transitions: Methods, theories, and interpretations*, ed. M. Camps and P. Chauhan, 173–193. New York: Springer.

Shea, J.J. 2011. *Homo sapiens* is as *Homo sapiens* was. *Current Anthropology* 52: 1–35.

Shepard, N. 2002. The politics of archaeology in Africa. *Annual Review of Anthropology* 31: 189–209.

Toth, N., and K. Schick. 2009. The Oldowan: The tool making of early hominins and chimpanzees compared. *Annual Review of Anthropology* 38: 289–305.

Tryon, C.A., and S. McBrearty. 2002. Tephrostratigraphy and the Acheulian to Middle Stone Age transition in the Kapthurin Formation, Kenya. *Journal of Human Evolution* 42: 211–225.

Tryon, C.A., S. McBrearty, and P.-J. Texier. 2005. Levallois lithic technology from the Kapthurin Formation, Kenya: Acheulian origin and Middle Stone Age diversity. *African Archaeological Review* 22: 199–229.

Wadley, L. 2012. Two 'moments in time' during Middle Stone Age occupations of Sibudu, South Africa. *South African Humanities* 24: 79–97.

Wadley, L. 1993. The Pleistocene Later Stone Age south of the Limpopo River. *Journal of World Prehistory* 7: 243–296.

Wendorf, F., R. Schild, R. Said, C.V. Haynes, A. Gautier, and M. Kobusiewisc. 1976. The prehistory of the Egyptian Sahara. *Science* 193: 103–114.

Further Readings

Barham, L., and P. Mitchell. 2008. *The first Africans: African archaeology from the earliest toolmakers to most recent foragers*. Cambridge: Cambridge University Press.

Camps, M., and P. Chauhan, eds. 2009. *Sourcebook of Paleolithic transitions: Methods, theories, and interpretations*. New York: Springer.

Deacon, H.J., and J. Deacon. 1999. *Human beginnings in South Africa: Uncovering secrets of the Stone Age*. Walnut Creek: AltaMira Press.

Willoughby, P. 2007. *The evolution of modern humans in Africa: A comprehensive guide*. Lanham: AltaMira Press.

African World Heritage Fund (AWHF)

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Introduction

The African World Heritage Fund (AWHF) addresses a dire need to provide greater protection

for World Heritage sites in Africa. The mission of the African World Heritage Fund is to support the effective conservation and protection of natural and cultural heritage of outstanding universal value in Africa (Herbert n.d.). The fund was established in 2006 as an intergovernmental organization to support the protection of World Heritage sites by providing financial support for training, national inventories of cultural heritage sites, and the conservation and management of heritage properties in Africa (Patchett 2006). The aim is to target local populations of the African countries who have signed the United Nations Educational, Scientific and Cultural Organization (UNESCO) convention and support them to implement active approaches to protect World Heritage sites (Herbert n.d.). The major initial contribution to the Fund was a donation of 20 million rand, the equivalent of US$3.5 million, from South Africa (Patchett 2006).

Current Debates

The African World Heritage Fund addresses two issues that are critical to world heritage in Africa: the low number of sites in this region that is inscribed on UNESCO's World Heritage List and the high costs of maintaining the sites that are inscribed on the World Heritage List. The impact of the fund can be judged by an increase in the number of sites in Africa that are inscribed on the World Heritage List and in the number of countries from the region that have sites inscribed on the list or nominations in process.

According to Varissou (2010), the most important task of the African World Heritage Fund is to increase the number of African sites on the World Heritage List. There is a need to impress the importance of listing sites on the local population and to train authorities and site managers of heritage sites with knowledge on how to apply for inscription on the list. In the space of a year, from 2009 to 2010, the fund helped finance 30 sites to conform to the criteria needed to progress for enlistment. When the African World Heritage Fund was established in 2006, only 65 of the 812 sites inscribed on the World Heritage List were located in sub-Saharan Africa and only 24 of the 40 sub-Saharan African states that had ratified the World Heritage Convention had sites on the World Heritage List (Patchett 2006). By 2013, the World Heritage List had grown to 962 properties (UNESCO 2013). Notable sites from Africa that were inscribed during this period include the Sangha Trinational National Parks, situated in the northwestern Congo Basin, at the intersection of Cameroon, Central African Republic, and Congo; the Ounianga Lakes in Chad; Rabat in Morocco; and the Bassari, Fula, and Bedik cultural landscapes in Senegal (UNESCO 2013).

The African World Heritage Fund provides critical support for State Parties in their efforts to ensure that their World Heritage sites conform to the 1972 World Heritage Convention criteria. There is a significant financial burden involved in ensuring that sites inscribed on the World Heritage List continue to conform to the 1972 World Heritage Convention criteria. The maintenance of World Heritage sites is the responsibility of State Parties. In low-income countries, such as those in Africa and parts of Asia, the burden of maintaining sites on the World Heritage List is particularly onerous. In 2013, the critical nature of the situation was indicated by 16 of the 38 sites on the List of World Heritage in Danger being located in Africa (UNESCO 2013). While some of these sites are in danger due to conflict in the region, such as with the Democratic Republic of the Congo, other sites are in danger due to a lack of trained personnel to protect sites or financial resources to put protection measures in place. The African World Heritage Fund provides both forms of support. To achieve these objectives, the fund requires the implementation of a plan to ensure the sustainability and protection of heritage sites.

The capacity building program established by the African World Heritage Fund addressed a

critical need for trained local personnel. As Leitão (2012: 5) points out, Asia and North Africa were the last regions to experience capacity building programs as part of the World Heritage Capacity Building Project. A significant event in this process was a workshop for North Africa which took place in 2012, held in partnership with the Arab Regional Centre for World Heritage and the National Institute for Heritage in Tunisia. The International Centre for the Study of the Conservation and Restoration of Culture Property (ICCROM) and International Union for Conservation of Nature (IUCN) conduct specialized training on World Heritage and conduct assessments to deal with issues surrounding the topic (Leitão 2012: 6). The first two assessments were at the University College Dublin, Ireland, and at the Brandenburg University of Technology in Cottbus, Germany.

Though it was established only recently, African World Heritage Fund plays a critical role in protecting World Heritage sites in Africa.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Southern Africa: Cultural Heritage Tourism Development and Management
- ▶ UNESCO (1972) and Malta (1992) Conventions

References

Herbert, I. n.d. African World Heritage Fund. Available at: http://www.awhf.net/. Accessed 15 Apr 2013.

Leitão, L. 2012. Follow-up on the implementation of the World Heritage Capacity Building Project. *World Heritage Capacity Building*, July 2012, 5.

Patchett, L. 2006. Launch of African World Heritage Fund. Available at: http://whc.unesco.org/en/news/253/. Accessed 15 Apr 2013.

UNESCO. 2013. World Heritage list. Available at: http://wwc.unesco.org/en/list/.

Varissou, S. 2010. World Heritage in Africa. Available at: http://www.iucn.org/about/union/secretariat/offices/esaro/_news/?5752/World-Heritage-in-Africa. Accessed 15 Apr 2013.

Age Estimation

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Introduction

Age can be defined as a simple measure of how long a person or an object has existed. A reliable estimation of the age of a human requires there to be a well-defined and documented event to which the duration of a known passage of time can be ascribed. The thorny question then arises about "when" a human begins to exist. This temporal moment of definition between existence and non-existence can be difficult to fix in relation to the human and generally has three measurable options: the time since fertilization or intrauterine implantation (which have most value for embryological or fetal aging), or, most commonly, the time since birth for those who survive the uterine environment and a safe passage into the outside world.

Key Issues

Clinical practitioners, but especially pediatricians, wish to know the date of fertilization to permit them to calculate the age of an embryo or a fetus and to assess that development is progressing at the predicted and normal pace. However, unless there has been only one sexual event, then this timing is unlikely to be a certainty, and so clinicians often opt to calculate the age of the fetus from a more reliable event – the last menstrual period (LMP). The mother is more likely to recall or at least approximate this date but of course this can also be unreliable as she may genuinely not remember or may choose to falsify the information for personal reasons. Therefore, even in the earliest stages of human development, age estimation can be imprecise; a fact which is often little understood by the expectant mother who, when

given a due date for her baby, is disappointed when that date generally proves to be incorrect. Only some 4–5% of babies arrive on their predicted due date, with approximately 80% arriving in the 2 weeks to either side of that date.

To assign an age to a fetus in utero is generally achieved through ultrasound image measurements of the length of the fetus (crown-rump length), biparietal width of the skull, or length of the long bones, especially those in the lower limb. If the fetus has been miscarried or aborted, then additional measures of weight, head circumference, thorax dimensions, and crown-heel length can be measured. If, however, the remains are skeletonized, then age estimation is normally based on either bone lengths or maturation status of several of the skeletal elements (Cunningham et al. 2016). A fetus can be viable from 23 weeks gestation, but chances of survival are greatly enhanced if it is over 25 weeks. In some contexts, legal abortions of a fetus can be undertaken providing the fetus is less than a prescribed number of weeks of gestation (e.g., in the UK it is less than 24 weeks). Thus, there are two very important forensic questions that can be related to the age of the fetus – (a) was it viable and (b) was the termination legal.

Birth is an eminently definable event in relation to both a time and a specific calendar date. It is perhaps the most important human marker of existence and is celebrated by millions of people as an annual event throughout their entire life. In most western countries, birth is formally recorded through authenticated certification so that "proof" of the date does not rely solely on memory but is supported by verifiable documentation. Indeed, this formal record is so important and desirable that it can carry a high black-market price and may be acquired through fraudulent means. This therefore brings the authenticity of the documented information into some debate, and an understanding that forgeries exist is vital to the realistic acceptance that even documentation may not be relied upon. Many less-developed countries may not record birth dates and therefore have no documented basis upon which to develop a robust certification process. This leads to difficulties when the age of a person is required to be known and there is no formal paperwork to support the believed assumption. Under these circumstances, what is referred to as "chronological age" may be questioned and may require verification for the purposes of border crossings, access to services or legal rights. Government departments, banks, employers, law enforcement agencies, and other legislative authorities require confirmation of the age of the individual with whom they interact, and each can, and frequently does, seek legal recourse to resolve disputes over alleged age assignment (Black et al. 2010). Therefore, the estimation of the age of a person is undeniably of forensic relevance (i.e., pertinent to the courts) irrespective of whether the person is alive or dead. The methodologies and principles followed in both circumstances are very similar.

In the case of a deceased person, an assignment of the age at death is an important component of the biological profile of the individual which can ultimately assist with the identification of the remains in forensic and archaeological investigations. Investigation of a crime is exceptionally difficult in the absence of the identity of the deceased, and indeed investigation of the death is critical for the prosecution of a crime. The biological identity of the deceased is comprised of four principal characteristics – sex, age at death, ancestry, and stature. The personal identity of the deceased can be pursued once these primary characteristics have been attributed. Personal traits of identity may include matching for DNA, fingerprints, dental information, and other, what are deemed to be secondary, indicators of identity including facial appearance. The methods used to estimate age vary little, regardless of whether the deceased is of recent origin or of historical provenance.

Age estimation processes are based on the principle that as time passes (i.e., the further one progresses from the date of birth), then a series of biological maturational events will occur that can be mapped out and cross-referenced to the known occurrence and timing of such events. This requires there to be a strong relationship and correlation between two age-related continua: chronological and biological age. The closer biological age is to chronological age, then the

greater will be the accuracy of prediction of one from the other, but the more they diverge, then the more uncertain will be the estimation of chronological age and this will necessitate the provision of a range for the possible age of the individual. The methods utilized in this process tend to show a close and strong relationship between the two ages during childhood, and they start to diverge markedly as adulthood approaches and then move even further apart as middle age approaches and are most divergent into the later decades of human life expectancy. Therefore, the techniques available to forensic anthropologists and osteoarchaeologists permit high levels of accuracy at predicting the age of a child (living or dead), and they are reliable in the later teenage years, acceptable in the early adult years, and very poor in the middle to later years of adult life (Latham and Finnegan 2010).

Biological age has two components, skeletal age and dental age, and each can be established independently or considered in parallel. Skeletal age utilizes information on the timing of formation of bones, their growth, and the pattern of their ultimate fusion to form the final adult product. Almost all growth has ceased in the human skeleton by 30 years of age, and the changes thereafter are degenerative. These are less reliable markers of the passage of time as they are heavily influenced by many factors including genetics, environment, health, nutrition, and life-style. To visualize the skeleton in the living requires that the person usually be exposed to ionizing radiation for imaging purposes (X-ray or computed tomography (CT) scans) although magnetic resonance imaging (MRI) and ultrasound (US) do not carry the same health risks. In the deceased, exposure to radiation for imaging purposes is not as restrictive, and indeed to gain access to the skeleton, soft tissue can be removed through maceration, although of course this does not pose a problem if the remains are partially or completely skeletonized. Age can be estimated to some degree from almost every part of the human skeleton, but obviously in the living, the areas that can be targeted by clinical imaging are restricted and tend to focus on the wrist and, if possible, the medial ends of the clavicle. The radiographic image of the wrist and hand region provides access to at least 29 separate bones, and therefore age estimation can be considered from birth through to middle adolescence with some degree of reliability (Black et al. 2010). Imaging of the medial clavicle permits an indication of age from later teenage years through to early adulthood, but it does carry some health and safety risks in relation to exposure to radiation for imaging purposes. Textbooks exist on how to establish the age of an individual when living (Black et al. 2010), for forensic purposes (Latham and Finnegan 2010) and in the archaeological arena (White and Folkens 2005), but in reality, they all use similar methodologies.

Dental age is predicated on the pattern of known development, eruption, and shedding of teeth that occurs throughout the life of the child (Blenkin 2009). The first tooth to start to develop does so in early embryonic life and the last tooth to reach occlusion does so in early adult life – therefore, accurate age estimation from the teeth is valid from fetal age through to adulthood, but beyond the eruption of the third molars, teeth become less reliable indicators of age (Aka et al. 2016). In the living, teeth are the only hard structures of the body that are visible to the naked eye, and their ability to survive trauma makes them an ideal medium for age evaluation. There is also a largely unsubstantiated, but generally accepted, maxim that dental age is more closely related to chronological age than is skeletal age as the teeth tend to be more protected from environmental insult and so retain a closer parallel progression of the two continua. Therefore, combining estimations of age from the skeleton with those from the teeth will most likely result in an acceptably reliable indicator of age both for the living and the deceased that will be closer to the chronological age than if either were to be used in isolation.

Future Directions

Our modern society demands confirmation of how long we have existed, and the scientist does their best to oblige, but it is never, and can never be, a precise operation. This is the area of research that

is most likely to be prevalent in future years as our security-conscious world focuses on who we think we are, who we say we are, and how we can prove it.

Cross-References

- ▶ Ancestry Assessment
- ▶ Bioarchaeology: Definition
- ▶ Dental Anthropology
- ▶ Facial Approximation and Craniofacial Superimposition
- ▶ Imaging Techniques in Bone Analysis
- ▶ Osteology: Definition
- ▶ Sex Assessment

References

Aka, P.S., M. Yogan, N. Canturk, and R. Dagalp. 2016. *Primary tooth development in infancy: A text and atlas*. London: CRC Press.

Black, S.M., A. Aggrawal, and J. Payne-James. 2010. *Age estimation in the living: The practitioner's guide*. London: Wiley.

Blenkin, M. 2009. *Forensic odontology and age estimation: An introduction to concepts and methods*. Saarbrücken: VDM Verlag.

Cunningham, C.A., L. Scheuer, and S. Black. 2016. *Developmental juvenile osteology*. 2nd ed. London: Elsevier.

Latham, K.E., and J.M. Finnegan. 2010. *Age estimation of the human skeleton*. Springfield: CC Thomas.

White, T.D., and P.A. Folkens. 2005. *The human bone manual*. New York: Pearson.

Agency in Archaeological Theory

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Introduction

Agency is an explicitly humanistic perspective for understanding ancient people and social reproduction. It emphasizes the reciprocal relationship between people's conscious and unintended actions and their social, ideological, and material conditions. Agency is an attempt to bridge three long-standing paradigmatic divides: between theories focused on egocentric individuals "in" society, those concerned with the deterministic nature of normative culture, and theories emphasizing the influence of external (material) conditions on both individuals and society.

After more than three decades of experimentation and critical reflection, there is still little consensus across paradigmatic boundaries as to precisely what agency is (Dobres and Robb 2000, for attempts at a comprehensive definition, see Johnson 1989; Bell 1992; Pauketat 2001; Dornan 2002). Nonetheless, as a conceptual framework and an analytic tool, the utility of agency for making sense of the past is undisputed. And given the heterogeneous interests of twenty-first-century archaeology, perhaps resistance to being pigeonholed by a single set of tenets is part of its wide appeal and its efficacy. For example, recent agency research published across a wide spectrum of archaeological journals, books, dissertations, and edited compendia shows that how agency played out in particular ancient settings varied considerably (e.g., the agentive processes involved in early state formation in Ancient Mexico, Venezuela, and Crete did not unfold in the same manner).

Another aspect of its popularity in archaeology is that the dynamics of agency have shown themselves amenable to empirical investigation. Indeed, practically every kind of archaeological material has been the means to study agency, including post holes, stone tools, trash, monumental stelae, cave art, village layouts, burial mounds, and graves as well as classic material signifiers of technology, economics, prestige, culture contact, and state formation. Methodologically, this is important, because while archaeologists do not "dig up" agency (see below), they can study "it" in any time period, in any place in the world, from practically any paradigmatic standpoint, and using practically any categories of material culture.

The previous three points help explain the appeal of agency across the discipline: (1) lack

of definitional consensus allows the concept to be utilized creatively; (2) agency "looks" different in different cultural, historical, and material circumstances; and (3) research on agency is not limited to only certain times, places, processes, or categories of data.

Nonetheless, agency in archaeology has, at times, been employed far too uncritically (e.g., conflating agency with physical actions or all-knowing and self-strategizing individuals). Uncritical use of the concept remains an epistemological, interpretive, and methodological issue that this presentation cannot hope to resolve.

Definition

Agency is notorious for resisting a single clear-cut definition (Dobres and Robb 2000). Not only do archaeologists employ the concept in numerous and sometimes competing ways, but the "thing" itself is a slippery dynamic that plays out different in different settings. While an early and seminal definition of agency (in sociology) defined it as the capacity to make a difference through action (Giddens 1984; see below), this definition is too narrow to capture the many layers of what agency means in contemporary archaeology.

For example, depending on who you read agency in archaeology has been defined in terms of the rational individual, the conscious (or unconscious) negotiation of intersubjective personhood, free will and intentional (self- or group-serving) strategizing, the normative collective and its construction of reality, conscious or (unconscious) resistance to social norms, adept social practice, unintended goofs and their consequences, and the interplay of individuals, structures, events, and history.

At its core, agency in archaeology is concerned to understand the dynamic relationship between the knowledgeable routines of everyday practice and the ability of agents (both individuals and collectives) to act within and upon larger "structures." In this regard, one major tenet agreed upon by most is that although agents are necessarily conditioned by historical, social, and material circumstances, they are not wholly circumscribed by them.

More specifically, agency is about the unfolding and recursive process of social reproduction. It is about individual and collective agents acting in relation (1) to each other; (2) to their cultural norms; (3) to history; (4) to environmental, (5) material, (6) political, and (7) economic conditions; and (8) in relation to a host of local circumstances. Collectively, numbers 2–8 are called "structures." While structures are necessarily of their own making, agents do not fully control them.

In agency theory, the unintended consequences of habitual (largely unconscious) routines loom large in mediating the reciprocity between agents and their structures. For example, while socioeconomic, political, material, and ideological structures are the resources agents use (imperfectly) to make sense of and act in the world, such structures simultaneously shape how agents think and act. Thus, rather like the chicken and the egg dilemma, the question of agency is not about "which came first (agents or structures)?" but about how, in specific settings, they interacted with and shaped one other.

In sum, agency in archaeology is, at one and the same time, a cultural process, a theoretical concept, an interpretive paradigm, and an analytic tool for making sense of the past in terms of an inseparable suite of dynamics. For its advocates, agency is a corrective bridging the inadequacies and limitations of better-established (albeit more narrowly conceived) processual and post-processual approaches to the past. But to others, the acknowledged difficulty with providing a clear-cut definition acceptable to all makes agency a "platitude" more than a "paradigm" (Dobres and Robb 2000: 3).

Historical Background

The initial inspiration for agency in archaeology (and the social sciences more generally) stems from Marx's famous dictum that "men [sic] make their own history, but they do not make it just as they please; they do not make it under

circumstances chosen by themselves, but under circumstances directly encountered, given and transmitted from the past" (Marx 1969: 15 [orig. 1869]). The more immediate and palpable influence on archaeology begins in the 1980s, with Anthony Giddens' (1984) work on "structuration" and Pierre Bourdieu's (1977) emphasis on habitus and *praxis* (Ortner 1984). The key points of their ideas, as relevant to archaeology, are summarized below.

Giddens' theory, known as "structuration," seeks to understand how society, social rules, and large-scale structures (specifically, sociopolitical and economic institutions and class ideologies) come to exist outside of the agents who make them possible in the first place. Structuration wants to explain how society's structures are susceptible to change if the agents who create and sustain them have little awareness or control of what's going on. Giddens' "duality of structure," in particular, emphasizes how everyday actions create the normative rules and top-down conditions which recursively act back on their creators in a never-ending "dialectic." Structuration theory takes the question of social change seriously because agents and structures do not exist in a homeostatic feedback loop adapting to each other and the "real" world. Rather, agency and structures are processes of interaction, and their relationship is a dynamic dance in which "external" and objectified conditions (viz., structures) are both the architecture and the resources agents use to live in a world of both social perception and material realties. Importantly, it is in this unstable cauldron of agency and structures that change unfolds.

On the other hand, Bourdieu was particularly concerned to counter structuralist notions that agents are little more than robots unconsciously following deep-seated rules and a cultural logic of which they are unaware and impotent to change. Bourdieu's so-called "theory of practice" highlights habitus, which is defined as tacitly learned social practices and routines of action that serve as the resources with which agents cope with their social, ideological, and material conditions (no matter how imperfectly understood). Habitus and everyday practice (*praxis*) are not only normative strategies to get through the day. As an embodied and meaningful form of knowledge of how to get by in the world, habitus is susceptible to both conscious and unintended alteration. Thus, subtle changes in everyday routines, whether by mistake or by intention, can accumulate to change the structures (i.e., the culture) within which they take place.

Importantly, both Giddens and Bourdieu emphasize that the structures "within which" agency unfolds (i.e., institutions of power, history, social rules, traditional and innovative practices, as well as and knowledge) are neither rigid nor do they exist "out there" and in opposition to agents. But because structures are the means by which agents understand who they are and how the world should work, they are perceived as objective (external) entities.

To summarize, agency theory in the social sciences emphasizes habitus, *praxis*, and structures as different but inseparable aspects of social reproduction. Combined, they not only shape how agency unfolds but also serve as the raw material used to act in the world as agents see fit.

In archaeology, agency is thus premised on the idea that both the structuration process and the habitus of everyday practice are relational and recursive dynamics. Structuration and habitus highlight not only the interplay, or duality, of people and society but also their social, ideological, historical, and material conditions – none of which should be teased apart for heuristic (analytic) ease. In this web of life, past and present, neither structures nor agents can exist without the other, neither wholly determines nor is influenced by the other, and change is built in to the very essence of everyday routinized actions (rather than only through conscious political upheaval, culture contact, or change in the environment).

The question of agency entered archaeological discourse as part of the "post-processual" movement (e.g., Johnson 1989; Bell 1992; Barrett 1994) but is currently investigated by researchers of every paradigmatic stripe (not that they all define agency in the same way; see above). Agency was initially a balm to the impersonal and deterministic nature of the functionalist and

systemic (New Archaeology/Processual) paradigm, which gave more credit to the environment and "needs of the system" than to living breathing people. Thus, the attractiveness of agency was, at first, to "find people" (Robb 2010; but see below for new intellectual trends). A parallel interest in agency can be traced, at much the same time, to frustration with how mainstream paradigms discounted the role of gender, in particular, as (1) a form of everyday practice, (2) as a structure and set of rules shaping actions and perceptions, and (3) as a potential source of wholesale culture change (e.g., Dobres 1995).

For archaeologists, habitus and *praxis* are attractive concepts because we dig up palimpsests of everyday material activities and evidence of culture change at numerous analytic scales (Barrett 2001). Similarly, the structuration process is intuitively familiar because archaeological applications of systems theory have already made familiar the idea that archaeologists can excavate a "system" from the patterning of archaeological remains. But on these two points, there are substantive differences, explicated below (see also Dobres and Robb 2005).

Key Issues/Current Debates

Agency and Projects

While archaeologists dig up the material remains of past activities, those activities are not, conceptually, the same as "projects" (Robb 2010). Projects is a concept better suited to researching the dynamics of the agency/structuration dialectic because agency is about more than just doing something with material culture.

For example, the earliest writing projects were more than just activities. As scribal projects, they wove together the agencies of traders and accountants with scribal communities and elite patrons. Epigraphy on a gravestone or on the walls of a chiefly tomb intimately connected the agencies of dead and the living with the agency of the material being inscribed (see below). Accounting projects concerned not only the herds or cloth being counted and the containers of wine and grain being sealed. Each of these was, in turn, connected with the bone, ivory and clay being used for seals, with the chisels used on stelae, and with the technical recopies for ink and papyrus. Thus, more than activities leaving material traces, early writing projects were overlapping fields of social, symbolic, political, economic, and material agency contextualized within structures too numerous to elaborate here (but see papers in Englehardt 2013).

The Agency of Material Things

Extending the idea of agency beyond the original duality of agents and structures, archaeologists now study the agency of material things (Gosden and Marshall 1999; Gosden 2005). In this formulation the material world is not passive, waiting to be brought to life through the physical activities of people. Rather, the material world of objects and raw materials has its own kind(s) of agency that during the unfolding of agentive projects interacts with and thus in part shapes how agents understand the world and act in it.

But material things are not agentive simply because humans give them meanings, values, and functions. From an agency perspective, things are partners in social life and can contribute to or intervene in the best-laid plans of sentient agents. For example, in crafting and using Ice Age sewing needles, bone and stone (burins) collaborated with, but also occasionally resisted, the wishes, skillful gestures, and know-how of the technicians engaging in those projects. In this sense, the agency of bone and stone not only contributed to the "inalienable" value of bone sewing needles but also helped "make" their makers (Dobres 1995).

Agency and Personhood

As mentioned above, the initial focus on agency in archaeology was to humanize the past through explicit concern with human beings and their meaningful experiences in a material world of sociopolitical, economic, and historical structures. Many archaeologists remain focused on understanding how the mindfully, materially, and socially constituted bodies of agents worked in and through their world to give it meaning and shape. This research often appeals to

phenomenology and its attention to how the corporeal senses of embodied experience become both a locus of meaning making and a medium of agency.

As but one example of the (inter)agency of people, communities, structures, projects, and things, Dobres (2000) has explored how an embodied and corporeal sense of (gendered) personhood was negotiated, tacitly, during the most mundane and habitual projects of artifact manufacture, use, and repair during the Magdalenian (Late Ice Age) in the French Pyrénées. Asking about the agency of Magdalenian personhood led to an empirically grounded exploration of the interrelationship between gestural skill, esoteric and practical knowledge, and normative rules about the right and wrong ways to make and use objects in particular material settings. In turn, this concern with personhood led to an appreciation of the materiality and agency of antler, bone, and ivory as well as the artifacts made from them – as agents in their own right.

Agency and Social Reproduction

Clearly, the resources agents make use to act in the world, and the meanings attached to them come about through the routinized practice and physicality of everyday projects. At the same time, such routines are in a dialectical dance with larger-scale structures (such as tradition and history, politics, and ideologies and of course material conditions). Combined, local practice and large-scale structures constitute the "stuff" of social reproduction. But agents employ an imperfect understanding of their circumstances, and they do so with only partial success and with a host of unintended consequences. Thus, from an agency perspective, social reproduction unfolds through a series of relationships negotiated between (1) the agencies of individuals and communities, (2) the agency of material culture, and (3) between these myriad projects and larger-scale historical traditions and structures.

For example, at Umbro and Penitenzeria (Bova Marina, Calabria), Robb (2007, 2010) has used the lens of agency to consider prosaic projects as social and material forms of agency. Foodways, herding, clay and stone technologies, house construction, burials, and trade – these were overlapping projects (not activities) connecting people to their kin, to their ancestors, and to extrafamilial relationships. But more than the stuff of everyday life and habitus, these projects also reproduced the Italian Neolithic writ large. Robb shows how six items of everyday trash are more than traces of an "economic system." The projects in which they were caught up connected them to social actors, to other objects, to symbolic power, to the social landscape, to fields of memory, as well as and to household rites. Thus, social reproduction during the Italian Neolithic was a partnership interconnecting artifacts, agents, habitus, community, and the social landscape with the *longue durée* of history, memory, economic institutions, space, and the environment.

As well, the question of agency has led to new considerations of power and even the question of wholesale culture change. To generalize, the methodological individualism underwriting "rational actor" models holds that humans have a universal desire for prestige and power and will seize the opportunity, consciously, whenever possible. In stark contrast, from an agency perspective the development of sociopolitical and economic inequality is posed as a historically specific and local question of intersubjectivities and contingencies. While some archaeologists investigate how collective expressions of agency made use of older (normative) socioeconomic and political structures in order to reconfigure them in new and unequal ways, others research how traditional ideologies, habitus, and sociomaterial conditions served as a pool of (imperfectly understood) resources with which communities sometimes resisted and sometimes acquiesced to attempts at altering power relationships.

Agency and Scale

As can be seen above, still another way to think about agency in archaeology is in terms of scale. For some, agency is a way to highlight the local, the historical, and the situatedness of "individuals" or intimate collectivities within larger-scale structures beyond their ken. But for others, the interest is on those larger-scale structures. Importantly, when one shifts from the question of small

("micro")- to larger ("macro")- scale concerns, it does not mean that localized expressions of agency are no longer relevant. Because in the past agency unfolded at each and every scale one can identify, research focused on any particular scale must be concerned with the overlapping and possibly contested nature of agency at multiple scales.

Thus, the focus on understanding the agency of people and communities in relation to their social, material, and ideological conditions ranges from making sense of the projects and habitual practices of recognizable individuals to the more anthropological concept of "the individual," to communities of agents (who may or may not have been acting in concert), and all the way "up" to the scale of structures far beyond the control of anyone. Similarly, agency can be studied through the remains of a hearth, a single house floor, a village, a trade route, or an empire – because agency unfolded within and through them all.

International Perspectives

In a brief amount of time, agency has become a popular topic in archaeological research across the globe, and increasingly, such work is being pursued by non-Western trained archaeologists. For example, agency has been used to study the origins of writing in Greece, pottery manufacture in Cameroon, culture contact in Hawaii, lithic production in prehistoric Pakistan, identity in Ancient Egypt, and dynastic-period Chinese burials. As a result, expressions of agency are being identified that do not conform to Western notions, such as the agency of the "we" (rather than the "me"). Indeed, across the globe the current state of research on agency in the past may best be characterized as the study of agencies in archaeologies.

Perhaps the most difficult issue facing archaeologists interested in agency is to learn how to "see" and appreciate expressions that were different from those evident in the modern (capitalist) world (e.g., papers in Knappett and Malafouris 2008). It has been far too easy to succumb to the "me, myself, and I" notion of the egocentric individual and describe past expressions of agency in terms of all-knowing individuals (or agenda-driven groups) consciously manipulating the world to suit their fancy. In this regard, international perspectives on agency are a welcome challenge to Western and capitalist descriptions of the past. It is hoped that international perspectives, framed by non-Western theoretical perspectives, will enable us to ask if we can hope to understand, on their own terms, how differently constituted agentive projects unfolded in settings unlike anything known in the present.

These are among the vexing dilemmas research on agency is only beginning to grapple with, and they will be well-served by increasing input from non-Western trained archaeologists and those studying times and settings wholly unlike the present.

Future Directions

What is both vindicating, but at the same time problematic, is that agency has become a ubiquitous part of twenty-first-century archaeological discourse. It is currently employed by Darwinian, evolutionary, and behavioral archaeologists, by processualists and those favoring ecological perspectives, by feminist and Marxist archaeologists, and by post-processualists of every stripe. Nonetheless, there is still much room for analytical, interpretive, methodological, and epistemological introspection and growth. In archaeology, particularly, many issues still need to be explored and elaborated, among them:

- A phenomenological concern with how normative structures become internalized through the situated subjectivity of everyday practice should be leading us to ask: how did non-discursive and tacit forms of agency play out at collective and larger (macro) scales?
- In different times, places, and in cultural settings, archaeologists could be asking: what, precisely, was the nature of the relationship between embodied and mindful human agents

and their externalized social, political, and material conditions?

- For all the focus on the dialectic of agents and structures, archaeologists still tend to take for granted the question of "tradition" and cultural conservatism. Thus, perhaps it is time to ask: how did agency contribute to long-term social stability?
- On the flip side, more work needs to be done on understanding how microscalar forms of agency, played out in local arenas of materiality and meaning making, contributed to wholesale structural change. Among the topics we might explore from this perspective: how did local expressions of agency and habitus contribute to state formation or the development of agriculture?
- Archaeologists with even a passing familiarity with ethnography are well aware that Western notions of agency, "the individual," and personhood depend on a problematic definition inappropriate for much of the past. Though this does help explain why there is growing interest in the agency of material things, we need to keep asking: what other forms of personhood and agency existed in the past?
- More particularly, how can archaeologists conceptualize, much less study, the agency of class, power, gender, ethnicity, or race? Will a one-size-fit-all (Western-centric) theory and methodology work for all these dynamics? Surely not.

Conclusions

While archaeology is all the better for the inclusion of agency in the study of the past, major epistemological, analytical, and interpretive issues remain unresolved (Dobres and Robb 2005). But there is no doubt that as an explicitly humanistic perspective for understanding ancient people and social reproduction in terms of practice, projects, and materiality, agency is a theoretical concept, an interpretive paradigm, and an analytic tool amenable to studying any time, place, and circumstance of interest to archaeologists.

Cross-References

- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Material Culture and Education in Archaeology
- ▶ Phenomenology in Archaeology

References

Barrett, J. 2001. Agency: The duality of structure and the problem of the archaeological record. In *Archaeological theory today*, ed. I. Hodder, 140–164. Oxford: Polity Press.

Barrett, J.C. 1994. *Fragments from antiquity: An archaeology of social life in Britain, 2900–1200 BC*. Oxford: Blackwell.

Bell, J. 1992. On capturing agency in theories about prehistory. In *Representations in archaeology*, ed. J.-C. Gardin and C. Peebles, 30–55. Bloomington: Indiana University Press.

Bourdieu, P. 1977. *Outline of a theory of practice*. Cambridge: Cambridge University Press.

Dobres, M.-A. 1995. Gender and prehistoric technology: On the social agency of technical strategies. *World Archaeology* 27: 25–49.

Dobres, M.-A. 2000. *Technology and social agency: Outlining a practice framework for archaeology*. Oxford: Blackwell.

Dobres, M.-A., and J.E. Robb, eds. 2000. *Agency in archaeology*. London: Routledge.

Dobres, M.-A., and J.E. Robb. 2005. "Doing" agency: Introductory remarks on methodology. *Journal of Archaeological Method and Theory* 12 (3): 159–166.

Dornan, J.L. 2002. Agency and archaeology: Past, present and future directions. *Journal of Archaeological Method and Theory* 9: 303–329.

Englehardt, J., ed. 2013. *Early writing and agency in archaeology*. Boulder: University of Colorado Press.

Giddens, A. 1984. *The constitution of society: Outline of a theory of structuration*. Berkeley: University of California Press.

Gosden, C. 2005. What do objects want? *Journal of Archaeological Method and Theory* 12 (3): 193–211.

Gosden, C., and Y. Marshall. 1999. The cultural biography of objects. *World Archaeology* 31: 169–178.

Johnson, M. 1989. Conceptions of agency in archaeological interpretation. *Journal of Anthropological Archaeology* 8: 189–211.

Knappett, C.A., and L. Malafouris, eds. 2008. *Material agency: Towards a non-anthropocentric approach*. Berlin: Springer.

Marx, K. 1969 [orig. 1869]. *The eighteenth Brumaire of Louis Bonaparte*. New York: International Publishers.

Ortner, S.B. 1984. Theory in anthropology since the sixties. *Comparative Studies in Society and History* 26: 126–166.

Pauketat, T.R. 2001. Practice and history in archaeology: An emerging paradigm. *Anthropological Theory* 1: 73–98.
Robb, J.E. 2007. *The early Mediterranean village: Agency, material culture and social change in Neolithic Italy.* Cambridge: Cambridge University Press.
Robb, J.E. 2010. Beyond agency. *World Archaeology* 42 (4): 493–520.

Further Readings

Flannery, K.V. 1999. Process and agency in early state formation. *Cambridge Archaeological Journal* 9: 3–21.
Gardner, A., ed. 2004. *Agency uncovered: Archaeological perspectives on social agency, power and being human*. London: University College London Press.
Gell, A. 1998. *Art and agency: An anthropological theory.* Oxford: Clarendon Press.
Hodder, I. 2000. Agency and individuals in long-term processes. In *Agency in archaeology*, ed. M.-A. Dobres and J.E. Robb, 21–33. London: Routledge.
Hoskins, J. 2006. Agency, biography and objects. In *Handbook of material culture*, ed. C. Tilley, W. Keane, S. Küchler, and M. Rowlands, 74–84. London: Sage.
Robb, J.E. 2005. Agency. In *Archaeology: The key concepts*, ed. C. Renfrew and P. Bahn, 3–7. London: Routledge.
Silliman, S. 2001. Agency, practical politics and the archaeology of culture contact. *Journal of Social Archaeology* 1 (2): 190–209.
Smith, A.T. 2001. The limitations of doxa: Agency and subjectivity from an archaeological point of view. *Journal of Social Archaeology* 1: 155–171.
Varien, M.D., and J.M. Potter, eds. 2008. *The social construction of communities: Agency, structure, and identity in the prehispanic southwest*. Lanham: AltaMira.

Agnew, Neville

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Basic Biographical Information

Neville Agnew joined the Getty Conservation Institute (GCI) in Los Angeles in January 1988. He came to the Getty from the Queensland Museum, Australia, where he had headed the conservation department, which he was instrumental in establishing when he joined that institution in 1980. Prior to 1980, he had pursued a career in academic and research chemistry in South Africa and Australia. Educated in South Africa, he did graduate research in England and received a doctorate in chemistry in 1967. His conservation work in Australia was mainly on the preservation of outdoor sites, including fossil footprints (the Lark Quarry dinosaur stampede site), a maritime archaeological site (the British warship *Pandora* wrecked in 1791 on the Barrier Reef), and the ruins of a nineteenth-century settlement (the penal colony on the island of St. Helena in Moreton Bay). Among his research activities have been a joint Getty Conservation Institute/New Mexico State Monuments project on adobe preservation, development of techniques for preservation and protection of archaeological sites, and a collaborative project with the U.S. National Park Service at Chaco Canyon, New Mexico.

Dr. Agnew has led and participated in many of the international conservation projects of the institute, notably in China where he has worked continuously since 1989, under the Getty's agreement with China's State Administration of Cultural Heritage, at the Mogao ancient Buddhist grotto site and the Chengde Imperial Summer Resort; and among others, in Egypt on conservation of the wall paintings in Nefertari's tomb and the Great Sphinx at Giza; in Africa on the conservation of the bas-reliefs of the royal Palaces of Abomey and the Laetoli hominid trackway in Tanzania; South America in the Quito historic center; and in the city of Prague on the St. Vitus mosaic project. His long association with heritage conservation in China has resulted in a number of awards: the Friendship Award of the State Council in 2000, the International Scientific and Technological Cooperation Award of the PRC in 2005, and awards from Gansu Province and the Dunhuang Academy. He was instrumental in drawing up national guidelines for the conservation of heritage sites in China. Currently he leads the Getty's collaborative projects in Egypt for the conservation of the Valley of the Queens and Tutankhamen's tomb and the Southern African Rock Art Project.

Dr. Agnew has authored publications in research chemistry and conservation, including the book: *Cave Temples of Mogao* (with two coauthors), and is a member of several professional associations, including being on the editorial boards of the journals *Conservation and Management of Archaeological Sites* and *Historic Environment*. For 8 years, he was a board member of the National Center for Preservation Technology and Training (a program of the U.S. National Park Service) and served as chair. He has organized major international conferences and edited the proceedings. These include two conferences at the Mogao Grottoes of Dunhuang and the conservation theme at the 5th World Archaeological Congress held in Washington, D.C., in 2003.

Dr. Agnew is currently senior principal project specialist in the Field Projects department of the GCI.

Major Accomplishments

Neville Agnew has successfully sustained significant multiyear international heritage conservation projects in a wide range of cultures and climates. These collaborative projects, as part of the GCI's international outreach, are premised on identifying significant conservation needs or problems and developing partnerships and teams to address the issues. This has required both conceptual understanding and technical knowledge and the ability to lead. Examples of these projects have been the development of the *Principles for the Conservation of Heritage Sites in China* with the State Administration of Cultural Heritage and the Australian Heritage Commission, technical preservation interventions at the Mogao Grottoes, and completion of a decade-long project for conservation of the earth-based wall paintings at this World Heritage Site. Also at the Mogao Grottoes, the *China Principles* were used in drawing up a master plan which in turn led to the development of a systematic methodology for sustainable visitation to the site. In southern Africa, annual workshops have been mounted for conservation and management of rock art. These have been attended by participants from all 12 southern African countries, and linkages are now being forged with traditional owners of rock art sites in Australia.

In Tanzania, the 6-year project for the conservation of the 3.5-million-year-old Laetoli trackway was completed with educational outreach to local and international audiences. Currently in Egypt, in collaboration with the Supreme Council of Antiquities, a comprehensive plan for conservation and management of the Valley of the Queens with its 100 tombs has been completed, while research and study of the tomb of Tutankhamen is well advanced, in preparation for conservation of the wall paintings and presentation and interpretation of the tomb.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Archaeological Stewardship
- ▶ Archaeology and Anthropology
- ▶ Architectural Sites: Monitoring
- ▶ Art, Paleolithic
- ▶ Australia: Maritime Archaeology
- ▶ Australia's Archaeological Heritage
- ▶ Australopithecines
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Chaco Canyon, Archaeology of
- ▶ China: Cultural Heritage Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ China: Managing Cultural Heritage and the World Heritage List
- ▶ China: New Approaches to Heritage Administration
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Getty Foundation
- ▶ Kakadu National Park: Rock Art
- ▶ Kondoa Rock Paintings: Traditional Use
- ▶ Lake Mungo, Archaeology of
- ▶ Landscape Archaeology
- ▶ Nonstructural Sites: Monitoring
- ▶ Paleoart Studies: Scientific Methods
- ▶ Prehistoric Human Footprint Sites
- ▶ Pueblo Bonito
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art Sites: Management and Conservation
- ▶ Rock Art, Forms of
- ▶ Sierra de San Francisco: Great Mural Rock Paintings
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Site Formation Processes
- ▶ Site Stewardship Programs
- ▶ South Africa: Heritage Management
- ▶ Stakeholders and Community Participation
- ▶ Tanzania's History and Heritage
- ▶ Tells in Archaeology
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana
- ▶ Trackways in Archaeological Conservation and Preservation
- ▶ Underwater Sites in Archaeological Conservation and Preservation
- ▶ Urban Landscapes: Environmental Archaeology
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management
- ▶ World Archaeological Congress (WAC): First Code of Ethics

Further Readings

Agnew, N. 2001. Methodology, conservation criteria and performance evaluation for archaeological site shelters. *Conservation and Management of Archaeological Sites* 5: 7–18.

Agnew, N., ed. 1997. Conservation of ancient sites on the Silk Road.In *Proceedings of an international conference on the conservation of grotto sites,* Oct 1993. Los Angeles: Getty Publications.

Agnew, N. 2010. Conservation of ancient sites on the Silk Road. In *The second international conference on the conservation of grotto sites, Mogao Grottoes, Dunhuang, People's Republic of China, June 28–July 3, 2004*. Los Angeles: Getty Publications.

Agnew, N., and J. Bridgland., eds. 2006. Of the past, for the future: Integrating archaeology and conservation. In *Proceedings of the conservation theme at the 5th world archaeological congress*, Washington (DC), 22–26 June, 2003. Los Angeles: Getty Publications.

Agnew, N., and M. Demas. 1998. Preserving the Laetoli footprints. *Scientific American* 1998: 26–37.

Agnew, N., and M. Demas. 2004. Monitoring through replication: Design and evaluation of the monitoring reburial at the Laetoli trackway. *Conservation and Management of Archaeological Sites* 6: 295–304.

Agnew, N., and M. Demas, eds. 2002. *Principles for the conservation of heritage sites in China*. Los Angeles: Getty Publications.

Agnew, N., and J. Fan. 1997. Treasures at Dunhuang. *Scientific American* 1997: 29–33.

Agnew, N., and S. Maekawa. 1999. Preserving Nefertari's legacy. *Scientific American* 1999: 75–79.

Agnew, N., H. Griffin, M. Wade, T. Tebble, and W. Oxnam. 1989. Strategies and techniques for the preservation of fossil tracksites: An Australian example. In *Dinosaur tracks and trackways*, ed. D.D. Gillette and M.G. Lockley, 397–407. Cambridge: Cambridge University Press.

Agnew, N., S. Maekawa, R. Coffman, and J. Meyer. 1996. Evaluation of the performance of a lightweight modular site shelter. *Conservation and Management of Archaeological Sites* 1: 139–150.

Agnew, N., Po-Ming Lin, Li Zuixiong, and Xudong Wang. 1999. A lightweight composite panel for the repair of cave roofs at the Mogao Grottoes, China. *Conservation and Management of Archaeological Sites* 3: 135–144.

Agnew, N., M. Demas, S. Sullivan, and K. Altenburg. 2004. The begetting of charters: Genesis of the China principles. *Historic Environment* 18: 40–49.

Agnew, N., C. Selwitz, and M. Demas. 2004. Reburial research: Preliminary field experiments. *Conservation and Management of Archaeological Sites* 6: 333–345.

Agnew, N., K. Altenburg, M. Demas, and S. Sullivan. 2006. Tourism: A good servant, but a bad master: Strategies for visitor management at Chengde and Mogao, China. *Historic Environment* 19: 13–19.

Burch, R., and N. Agnew. 2004. Reburial research: A conceptual design for field testing for the reburial of wall plasters and mosaic pavements. *Conservation and Management of Archaeological Sites* 6: 347–361.

Guolong, Lai, M. Demas, and N. Agnew. 2004. Valuing the past in China: The seminal influence of Liang Sicheng on heritage conservation in China. *Orientations* 35: 82–89.

Whitfield, R., S. Whitfield, and N. Agnew. 2000. *Cave temples of Mogao: Art and history on the Silk Road*. Los Angeles: Getty Publications.

Agora in the Greek World

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Introduction

The word "agora" derives from the ancient Greek term ageirein, meaning "to gather together" and is attested as early as the eighth century BCE. It is commonly translated as "assembly," "assembly place," and "market place." The agora was a crucial component of all Greek villages and towns across the Mediterranean. According to Herodotus (1.153), the Persian king Cyrus II conceived of the agora as the single most defining characteristic of an urban settlement. For Homer (*Od*. 9.112-5), the agora was not only a constituent part of an urban environment but also signified a form of order and civilization, since he characterized a community without one, such as that of the Cyclopes, as lawless (*Od*. 9.106). The emergence of the agora has been linked with the birth of the Greek polis (city-state). Antonaccio (1997: 170–80) regards the agora, alongside other features including monumental temples and the council house, as an indicator for urbanization. Civic requirements – political, social, commercial, religious, and cultural – were fulfilled in this public place. It was also a place for public display, with honorific statues for good citizens and benefactors as well as political monuments that often functioned to define the collective identity of the polis. Some of these activities and functions were so closely linked to this space that they came to describe it as well as the term "agora," including *choros* (dance), *agon* (athletic contest), and *ekklesia* (popular assembly) (Kenzler 1999: 306). It was originally an open place, but it soon became home to buildings of civic and sacred importance, in line with the growing need to permanently reserve specific areas for specific activities. However, there was nothing that one might call an archetypical Greek agora. While most examples are attested in urban centers, there were also areas designated as agoras outside of settlements (Strab. 9.1.10) and temporary agoras outside of cities, especially in wartime (Thuc. 1.62.1).

Definition

The earliest references to the *agora* can be found in the *Iliad* and the *Odyssey*. While the exact date of the composition of the epics of Homer is debated, most scholars seem to agree that they were written down in the later eighth or early seventh centuries. For Homer and his audience, *agora* could refer to an actual gathering (*Il*. 7.345; *Od*. 9.112, see also Alcaeus F 130b.1-4; Campbell 2002) or an assembly place (*Il*. 18.497; *Od*. 7.44). Once the Greek polis and its rules for communal living were fully developed in the Archaic period, it came to denote a public space that served as the civic and commercial heart of the Greek city-state. This area was sacred in a similar manner to other elements of the urban infrastructure (Martin 1951: 164–201). It served as the locus of governmental proceedings, archives, religious rites, athletic and dramatic competitions, military activities, trading and shopping, philosophical discussions and chats, and eating and drinking.

Historical Background

Both textual and archaeological sources provide evidence for the ancient Greek agora. The earliest use of the word is attested in the Homeric epics, where the word is mostly employed in the sense of a gathering of people and a council assembly (*Il*. 2.143-4; *Od*. 2.26) but also as a topographical term (*Il*. 18.274; *Od*. 2.7). It is occasionally unclear whether Homer refers to the agora as an institution or a location (*Il*. 2.93; *Od*. 10.114). The agora plays a significant role in the world that he created in his poems, but it is much debated to what extent the *Iliad* and the *Odyssey* actually portray Greek society in the eighth century BCE; it is, therefore, better to discuss the Homeric world separately. People in the Homeric world come to the agora to attend court sessions, games, and

assemblies and to watch dances and athletic contests (Kenzler 1999: 304–6). The agora might also be associated with craftsmen, if indeed the shipyards beside the Phaeacian agora provided ship maintenance services (*Od*. 6.268-9). Especially in the *Iliad* (2.48-83), it is also a place where military matters are addressed. In Homeric Ithaca, the men congregate every morning at the agora to talk and gossip (*Od*. 17.52-72); political meetings usually seem to require the presence of their leader (*Od*. 2.26-7, but 2.6-7). In wartime, gatherings could take place close to ships or on the battlefield (*Il*. 1.305; 8.489-92). The agora is an open, sacred space with few structures, located at the temple of Poseidon in the harbor area on Scheria (*Od*. 6.263-7), or in the lower city, below the acropolis (Kolb 1981: 2–3); assemblies could also be held at other places, such as in the citadel of Troy (*Il*. 7.345). The single most important installation is the *hieros kyklos* (sacred circle); the circle of honorary seats (*thokoi*) marked this place permanently (Kenzler 1999: 53–9, 243–8). In the trial scene depicted on Achilles' shield (*Il*. 18.497-508), the elder noblemen sat on polished stones within this circle while the other men of the community gather around them in the open space. Heralds gave staves to the elders who wished to give judgment. Other authors had different names for this sacred circle, and it was called the "orchestra" in Athens (Plato *Ap*. 26d-e), implying that it served for theater performances and other religious activities. The Spartans termed it according to Pausanias (3.11.9) "choros" (dance), suggesting that it functioned as a dance floor.

The agora plays a crucial role in communal life both in the Homeric world and in ancient Greece. While community matters were openly debated in the epics of Homer, court sessions were held by a small number of representatives and followed by an audience that participated through verbal assent (Kenzler 1999: 304–5). In this sense, the agora was an important place for the strengthening of a community's sense of unity. This basic function was not restricted to the Homeric world. In fact, this never changed even if access to the agora and the relative roles of the worlds of the living and the dead within it were subject to change. It appears that access to this public place was unrestricted in Homeric society though not everybody seems to have had the right or power to decide matters of controversy. Many historical poleis, by contrast, clearly defined the space of the agora by boundary markers (*horoi*) and lustral basins (*perirrhanteria*) set up at its edges, and some excluded by law individuals accused of pollution, such as murderers (Dem. 20.158). Assemblies were occasionally held at hero tombs within Homeric society (*Il*. 10.414-5, cf. Kenzler 1999: 307). The relationship between the living and the dead became more permanent when the agora was placed next to burial grounds. For the Megarians, this was a conscious decision so that the dead could play an active role in communal affairs (Paus. 1.43.3). Other poleis only granted select individuals the right to be buried in the city center. The founder-leader (*oikistes*) was customarily buried and worshipped in the agora of new foundations, as in the case of Cyrene in North Africa (Malkin 2009: 374). The Athenians buried the remains of their local hero and model ephebe, Theseus, in their civic center; his adventures adorned a temple, the so-called Hephaisteion, that stood next to major civic buildings (Paus. 1.17.6).

The origin of the agora is much debated. Some scholars believe that the agora of the Early Iron Age was influenced by Minoan palace architecture (cf. Kenzler 1999: 323–6). Other scholars (e.g., Mazarakis Ainian 1997: 273) place more emphasis on the spatial configuration of Early Iron Age settlements and suggest that the open space in front of a ruler's house may have functioned as a "primitive agora." In any case, the earliest-known spatially defined agoras date to the eighth century BCE, a period that is characterized by the formation of cities and states. The earliest archaeologically attested agora was discovered in Megara Hyblaea in eastern Sicily, a settlement that was founded shortly after 750 BCE and covered a territory of about 600,000 m^2 (Mertens 2006: 64–72; cf. Hoepfner 2006: 3–4 for early settlements on Chios and Andros). The territory of the city of Megara Hyblaea was subdivided into five districts, each of which followed a slightly differently oriented

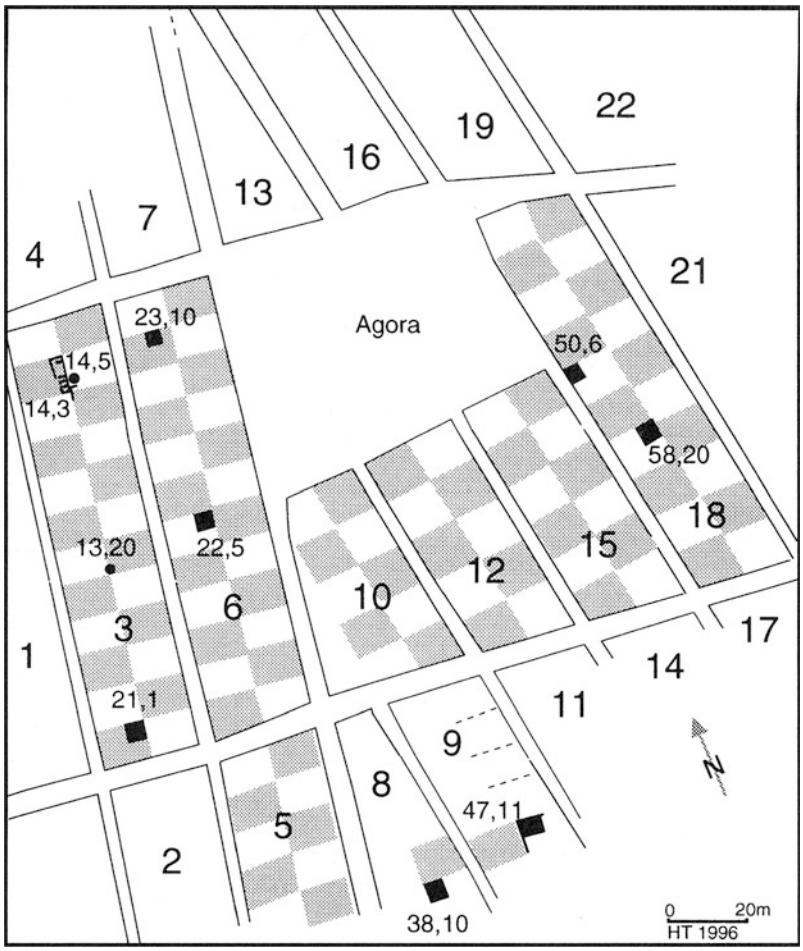

Agora in the Greek World, Fig. 1 Plan of the agora of Megara Hyblaea. (Courtesy: H. Tréziny)

grid system. The spatial planning reserved, among other spaces, an agora on the so-called Plateau Nord, an area of about 4200 m^2 that was located between two habitation districts, hence its unusual trapezoidal form (Fig. 1). This innovative urban planning solution was copied in Selinus, Miletus, and Piraeus, cities that were also laid out in converging grid-patterns. Another feature of urban planning, the main road connecting the agora with the main urban sanctuary, can be found in Megara Hyblaea's daughter colony, Selinus. At first, the agora of Megara Hyblaea consisted of an open, multifunctional space with altars, and it remains unclear whether its primary function was originally civic or sacred (Bergquist 1992: 134–5; de Polignac 1999). Monumental buildings, including temples, stoas, possibly a *bouleuterion* (council house), were constructed at the end of the seventh century BCE, while a heroon and a banquet house were added much later.

It is perhaps not surprising to find one of the earliest agoras in a colonial context, since "the phenomenon of colonization provided the overall rise of the polis with an enormous impetus" (Malkin 2009: 377). Although processes of urbanization were not uniform throughout the Mediterranean (van Dommelen 2005: 44), in most Greek settlements, they seem to have followed similar trends. Among other things, increasing importance was accorded to the community as a whole and to the public (*to koinon*, *to demion*) rather than the individual (*to idion*) or the household (*oikos*). If necessary, preexisting domestic structures and burials were cleared away for the creation of an agora. Designated spaces in the polis were assigned specific functions and later adorned

with purpose-built buildings. Once the civic center was established, it was seldom relocated, as can be seen in Argos (Pariente et al. 1998). This may also have been true for the agora of Corinth, which Donati (2010) recently posited beneath the Roman forum.

The evidence from the sixth and fifth centuries BCE is somewhat more plentiful, partly due to the construction of permanent administrative buildings and sanctuaries for polis deities. The agora of Metapontium in South Italy, for instance, not only housed a number of shrines and temples but also an impressive amphitheater-like installation that has been interpreted as an *ekklesiasterion* (building for popular assembly) with space for up to 8000 people. It is possible that the area was already used as an agora before 600 BCE, if the wooden remains discovered here can be interpreted as a stage (*ikria*) (Mertens 2006: 47). As in Selinus and possibly Syracuse (Mertens 2006: 76), it was an integral part of the planned settlement but it was not the focal point of its layout. The agora of Metapontium only became the heart of the city when the settlement expanded in the fourth century BCE. On the Greek mainland, the agoras tended to be less elaborate. The agora of Argos was adorned with two stoas and a temple for Apollo around the middle of the fifth century BCE.

The most famous agora is the agora of Athens, situated directly beneath the Acropolis in the district called the *Kerameikos*. It is also one of the best-published agoras (Camp 2010). This well-known agora is most likely the successor of an earlier agora. The location of the original agora and the date at which the later agora was monumentalized are much discussed. Papadopoulos (2003: 280–97; cf. Hoepfner 2006: 16, fig. 13) recently suggested that the earlier agora was located east of the Acropolis and relocated after 480 BCE. The chronology of the first major building phase in the western part of the new agora has been pushed back to the end of the sixth century BCE in recent scholarship; Papadopoulos (2003: 295) does not necessarily contradict this view, since he is mainly interested in determining when this place formally acquired its new function. By then, the principal public building of the Old Bouleuterion (Metroon) and perhaps the Royal Stoa had been erected in the northern part of the agora as well as altars and shrines, including the Altar of the Twelve Gods (Figs. 2 and 3). The Athenian agora also had its own fresh water supply; the public fountain house was part of a larger water management project that was celebrated on many black-figure vases. Some civic institutions such as the people's assembly were eventually established in the neighborhood of the agora, on the Pnyx or in the theater (McDonald 1943: 45, 47–51, 57–8). If many major buildings of the agora and the erection of boundary markers are associated with the Cleisthenic reforms in 508/7 BCE which resulted in "a united Attica" that was "a functional reality" (Anderson 2003: 5), it can be argued that this newly formed community, in turn, used the agora to strengthen its sense of community and collective identity. The Athenians measured the distances in Athens from the Altar of the Twelve Gods (Hdt. 2.7; *IG* II^2, 2640); the Panathenaic procession crossed the agora; monuments commemorating important people and milestones in the city's history, such as the end of tyranny and victories in the Graeco-Persian Wars, were erected in the agora. It is noteworthy that in addition to the meeting place in the city center, each Attic deme (small community of a citizen body that shared cults and festivals) had its own "agora" or "theatron," as they were called in inscriptions, in the fifth and fourth centuries BCE (Kolb 1981: 62–74).

Herodotus (5.101) is one of the first authors to refer to the agora as a marketplace but it soon became the quintessential function of this public place. Some Greek authors such as Herodotus (2.39) and Xenophon (*An*. 1.5.6) even used the term to denote market places in non-Greek societies. Specific products such as vegetables, meat, books, and perfumes were sold in designated spaces in the agora of Athens (e.g., Ar. *Lys*. 557-8), and these spaces were in turn named by the Attic orators after the goods sold there (Poll. 9.47; 10.19). Stoas often had rooms used as shops and workshops that were rented out by the polis authorities. The Attalos stoa on the east side of the agora of Athens consisted of 42 rooms (approximately 5 m by 5 m) on two floors.

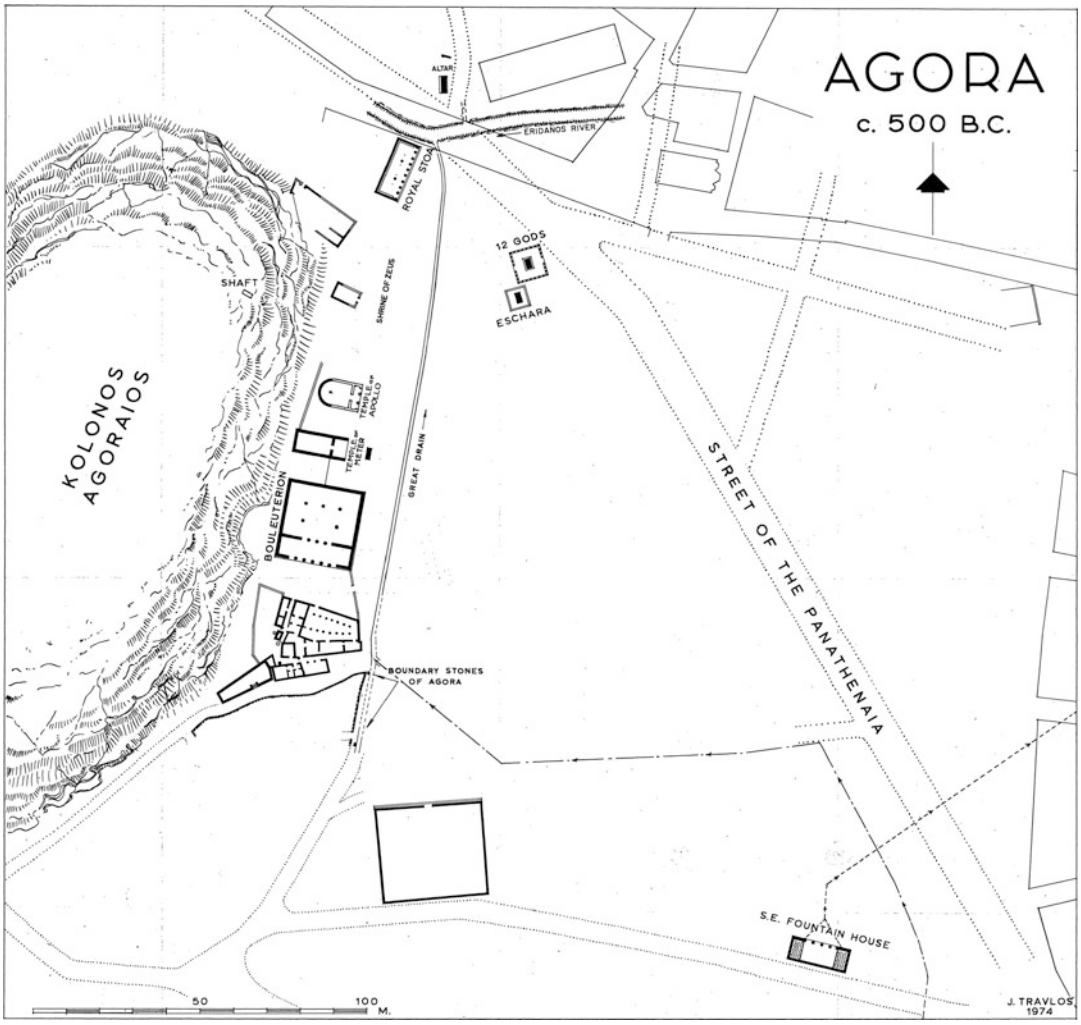

Agora in the Greek World, Fig. 2 Plan of the agora of Athens, c. 500 BCE. (Courtesy: Agora Excavations)

This additional function made the agora the perfect social meeting place, hence the term *agoraios* for someone who spends much time there (e.g., Hdt. 1.93). For Socrates, the agora was the ideal place to engage passers-by in philosophical discussions. Aristotle (*Pol*. 1331a-b) argued for a separate commercial agora. Two agoras were the norm for most Hellenistic cities. While the market place can be found near the harbor in Ephesus and Miletus, the civic and the commercial centers were placed next to each other in Kamarina and Morgantina. The two agoras of Priene were close to each other but of different sizes.

The agora was still a characteristic feature of Greek cities in the late Classical and Hellenistic periods even though their autonomy was often limited to self-government and depended on the approval of imperial powers, and while new institutions emerged and became characteristic features of Hellenistic cities. This was also true for later writers, including Dio Chrysostomus (*Or*. 48.9) and Pausanias (10.4.1). By the Hellenistic period, the agora was monumentally defined and quite often closed off from the surrounding area by monumental public buildings. Yet it was not standardized. One of the most characteristic

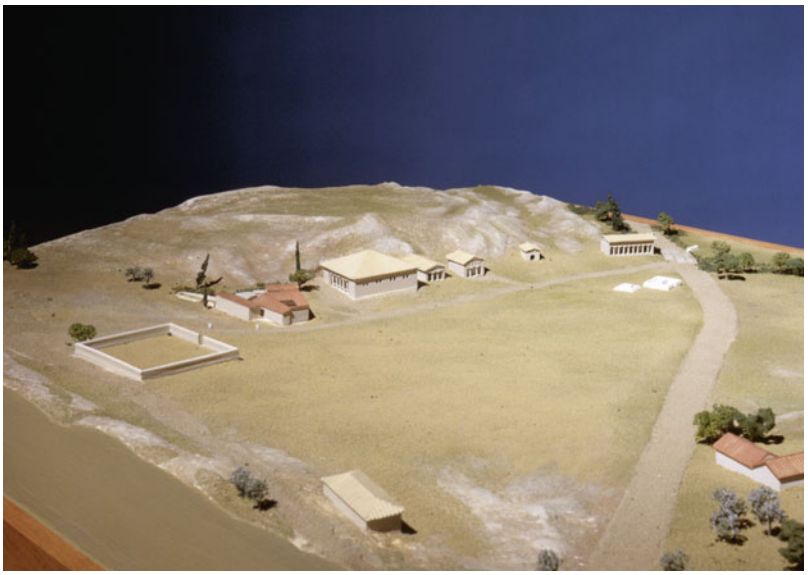

Agora in the Greek World, Fig. 3 Model of the agora of Athens, c. 500 BCE. (Courtesy: Agora Excavations)

building types of this period was the stoa defining the boundaries of a central area and housing commercial establishments, as on Delos, at Magnesia on the Maeander and Miletus. Two adjacent sides of the agorai of Kassope, Kolophon, Orchomenos in Arcadia, and Syracuse were closed off by porticos, while the agora of Morgantina in Sicily and that of Thelpousa in Arcadia were framed on three sides. The agora at Messene is a typical example of a completely closed agora. Other cities placed theaters on the edges of their agoras. In the cases of Akrai, Assos, Elis, Mantineia, Morgantina, and Metapontium, the theater served as an *ekklesiasterion* (Kolb 1981: 88), while the theater of Kassope has been interpreted as a *bouleuterion* (Hoepfner 2006: 23). In addition, wealthy benefactors (*euergetai*) sponsored individual buildings within the agora or completely new building complexes. Famous examples of the former include the Stoa of Attalos at Athens and the colonnades and exedrae of the so-called Agora des Italiens on Delos, the function of which is still debated. The most famous example of the latter is perhaps the Upper Agora of Pergamon on the edge of the acropolis (Figs. 4 and 5), which was part of the major building project of the Hellenistic King Eumenes II (197-160/59 BCE). As the administrative and religious center of the newly organized royal metropolis of the Attalids, it was adorned – like most Hellenistic agoras – with statues, dedications, and altars (Radt 2001: 48).

The Upper Agora of Pergamon moreover exemplifies characteristically Ionian features according to Pausanias' typology of agoras, namely, the colonnades that enclose large sections of the agora (but do not obstruct the view to the monumental altar; Fig. 5). Many newly founded, refounded, and even modernized late Classical and Hellenistic cities in Ionia used the so-called Hippodamian town plan, in which streets are laid out on a rectangular grid around central, often colonnaded public spaces. Another famous example is the agora of Priene, a city that was refounded in the fourth century BCE. When Pausanias, in the second century CE, visited the agora of Elis, he noted that the local agora with "porticoes separated from each other and with streets through them" was rather old-fashioned and stood in sharp contrast to the agoras of the cities of Ionia and of the Greek cities near Ionia (6.24.2; Jones 1933). The closed-off Ionian agora with few formal entrances may be seen as the predecessor of the forum, the open square, or market place of a Roman settlement or town, even if some of its characteristic features such as the podium temple and basilica were developed in Italy, and some aspects of its layout such as the new architectural concept of a grandiose approach to the forum, as

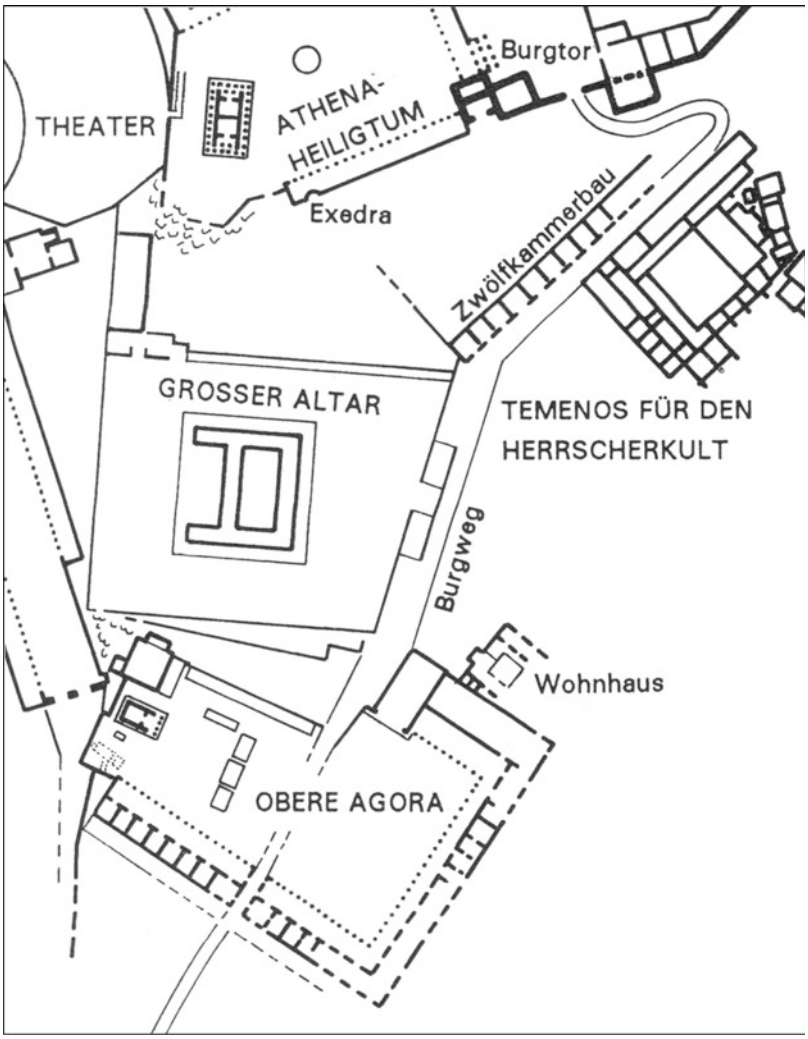

Agora in the Greek World, Fig. 4 Plan of the agora of Pergamon, second century BCE. (Courtesy: K. Rheidt)

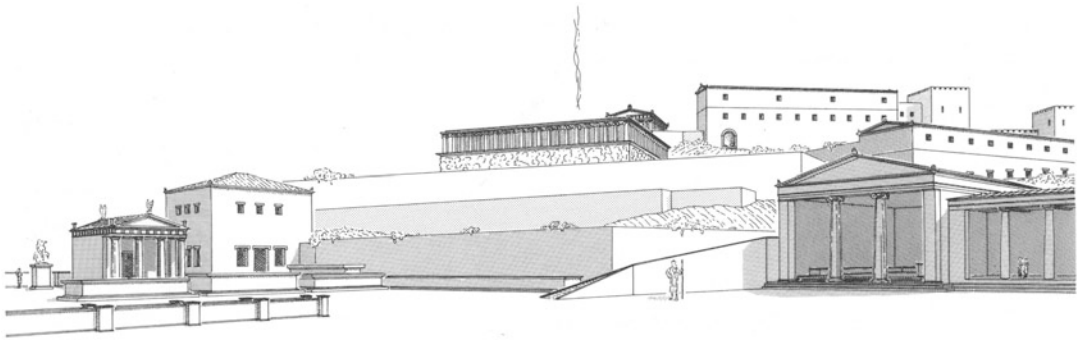

Agora in the Greek World, Fig. 5 Reconstruction of the Upper Agora of Eumenes II. The reconstruction of the north niche in the foreground is hypothetical. (Courtesy: K. Rheidt)

found at Ephesus, Pergamon, and Hierapolis, were introduced much later.

Key Issues/Current Debates

The archaeological evidence for the emergence of the agora is scarce. The location and appearance of the early agora is best documented in systematically planned poleis in southern Italy and Sicily. Here, agoras are centrally located, open places that serve the needs of the community. The earliest civic centers of cities which were never planned as a whole, such as Corinth and Athens, are often difficult to locate or can only be traced archaeologically when buildings were placed along their boundaries. Literary references to an earlier agora exist occasionally, as in the case of Athens, but no traces of this old agora that is mentioned in a note of the second century BCE writer Apollodoros (FGrH 244F 113 and preserved by Harpokration) have been discovered. Owing to the poor archaeological documentation of early poleis, the frequent references to the agora as a social institution and as a place of communication in the epics of Homer have received much scholarly attention. However, the Homeric poems cannot be used as a historical source even if the date at which they were written down can be determined. While it is generally accepted that the Homeric world cannot be mapped onto Bronze Age or Iron Age Greece, it is still debated how to best explain inconsistencies within the poems and how to conceptualize the sociopolitical configuration of Homeric society.

Future Directions

The main area for future research is the early agora. The exact relationship between the origin of the agora and the birth of the polis and urbanization processes needs to be explored in more detail. New discoveries will play a major role in this discussion, since many of the excavated sites have long occupation histories that make it difficult to detect open space with little to no architectural features. A further research area concerns the development of the agora in the Black Sea region.

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Forum
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Islands (excluding Crete), Archaeology of
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Polis
- ▶ Sicily and Magna Graecia, Archaeology of
- ▶ Stoa
- ▶ Urban Planning in the Greek World

References

Anderson, G. 2003. *The Athenian experiment: Building an imagined political community in ancient Attica, 508–490 BC*. Ann Arbor: University of Michigan Press.

Antonaccio, C. 1997. Urbanism at archaic Morgantina. In *Urbanization in the Mediterranean in the ninth to sixth centuries BC*, Acta hyperborea, vol. 7, ed. H.D. Andersen, H.W. Horsnaes, S. Houby-Nielson, and A. Rathje, 167–193. Copenhagen: Museum Tusculanum.

Bergquist, B. 1992. The archaic temenos in western Greece: A survey and two inquiries. In *Le sanctuaire Grec. Huit exposés suivis de discussions*, Entretiens sur l'Antiquité Classique, vol. 37, ed. A. Schachter, 109–158. Geneva: Fondation Hardt.

Camp, J.M.K. 2010. *The Athenian Agora: Site guide*. 5th ed. Princeton: American School of Classical Studies at Athens.

Campbell, D.A. 2002. *Greek lyric, volume 1: Sappho and Alcaeus*, The Loeb classical library, vol. 142. Cambridge/London: Harvard University Press.

de Polignac, F. 1999. L'installation des dieux et la genèse des cités en Grèce d'Occident. Une question résolue. Retour à Mégara Hyblaea. In *La colonisation grecque en Méditerranée occidentale. Actes de la rencontre scientifique en hommage à Georges Vallet*, 209–230. Rome: Ecole Française de Rome.

Donati, J. 2010. Marks of state ownership and the Greek agora at Corinth. *American Journal of Archaeology* 114: 3–26.

Hoepfner, W. 2006. Die griechische Agora im Überblick. In *Die griechische Agora. Bericht über ein Kolloquium am 16. März 2003 in Berlin*, ed. W. Hoepfner and L. Lehmann, 1–28. Mainz: Philipp von Zabern.

Jones, W.H.S. 1933. *Pausanias description of Greece, volume 3: Books VI-VIII.21*, The Loeb classical library, vol. 272. London: W. Heinemann Ltd.

Kenzler, U. 1999. *Studien zur Entwicklung und Struktur der griechischen Agora in archaischer und klassischer Zeit*, Europäische Hochschulschriften, vol. 38. Frankfurt: Peter Lang.

Kolb, F. 1981. *Agora und Theater, Volks- und Festversammlung*. Berlin: Gebrüder Mann.

Malkin, I. 2009. Foundations. In *A companion to archaic Greece*, ed. K.A. Raaflaub and H. van Wees, 373–394. Malden/Oxford: Wiley-Blackwell.

Martin, R. 1951. *Recherches sur l'agora grecque. Études d'histoire et d'architecture urbaines*. Paris: De Boccard.

Mazarakis Ainian, A. 1997. *From ruler's dwellings to temples. architecture, religion and society in early Iron Age Greece (1100–700 BC)*, Studies in Mediterranean archaeology, vol. 121. Jonsered: Paul Åstroms.

McDonald, W.A. 1943. *The political meeting places of the Greeks*. Baltimore: The Johns Hopkins University Press.

Mertens, D. 2006. *Städte und Bauten der Westgriechen. Von der Kolonisationszeit bis zur Krise um 400 vor Christus*. Munich: Hirmer.

Papadopoulos, J. 2003. *Ceramicus redivivus: the early Iron Age potters' field in the area of the classical Athenian Agora*, Hesperia Supplement, vol. 31. Athens: American School of Classical Studies at Athens.

Pariente, A., M. Piérart & J.-P. Thalmann. 1998. Les recherches sur l'agora d'Argos: résultats et perspectives. In *Argos et l'Argolide. Topographie et urbanism*, Recherches Franco-helléniques, vol. 3, ed. A. Pariente and G. Touchais, 211–231. Paris: De Boccard.

Radt, W. 2001. The urban development of Pergamon. In *Urbanism in western Asia Minor. new studies on Aphrodisias, Ephesos, Hierapolis, Pergamon, Perge and Xanthos*, Journal of Roman Archaeology Supplement, vol. 45, ed. D. Parrish, 43–57. Portsmouth: Journal of Roman Archaeology.

van Dommelen, P. 2005. Urban foundations? Colonial settlement and urbanization in the western Mediterranean. In *Mediterranean urbanization 800–600 BC*, Proceedings of the British Academy, vol. 126, 143–167. Oxford/New York: Oxford University Press.

Further Reading

Agora of Athens. n.d.. Available at http://www.agathe.gr/. Accessed 2 Oct 2010.

Ampolo, C. 2012. *Agora greca e agorai di Sicilia*. Pisa: Edizioni della Normale.

Arslan, N. 2012. L'agora d'Assos: le plan, la construction et les différentes phases de son utilisation. In *Basiliques et agoras de Grèce et d'Asie Mineure*, ed. L. Cavalier, R. Descat, and J. des Courti, 273–286. Bordeaux: Ausonius.

Bielfeldt, R. 2012. Polis made manifest: The physiognomy of the public in the Hellenistic city with a case study on the Agora in Priene. In *Politische Kommunikation und öffentliche Meinung in der antiken Welt*, ed. C. Kuhn, 87–122. Stuttgart: Steiner.

Camp, J.M.K. 2001. *The archaeology of Athens*, Bibliography on controversies concerning the date of the agora and specific buildings, 259–261. New Haven/London: Yale University Press.

Camp, J.M.K., and C.A. Mauzy, eds. 2009. *The Athenian Agora: New perspectives on an ancient site*. Mainz: Philipp von Zabern.

Courbin, P. 1998. Le temple d'Apollon Lycien à Argos: quelques suggestions. In *Argos et l'Argolide: topographie et urbanisme*, ed. A. Pariente and G. Touchais, 261–269. Paris: De Boccard.

Crielaard, J.P. 1995. Homer, history and archaeology. Some remarks on the date of the Homeric world. In *Homeric questions. Essays in philology, ancient history and archaeology, including the papers of a conference organized by the Netherlands Institute at Athens (15 May 1993)*, Publications of the Netherlands Institute at Athens 2, ed. J.P. Crielaard, 201–288. Amsterdam: J.C. Gieben.

De Angelis, F. 2003. *Megara Hyblaia and Selinous: The development of two Greek city-states in archaic Sicily*. Oxford: Oxford University, School of Archaeology.

Donati, J.C. 2010b. *Towards an agora: The spatial and archaeological development of Greek commercial and civic space in the Peloponnese*. New York University: Unpublished PhD dissertation.

Dubbini, R. 2010. Agones on the Greek agora between ritual and spectacle: Some examples from the Peloponnese. In *Ritual dynamics and the science of ritual. volume 2: Body, performance, agency, and experience*, ed. A. Chaniotis, 157–182. Wiesbaden: Otto Harrassowitz.

Dubbini, R. 2011. *Dei nello spazio degli uomini. I culti dell'agora e la costruzione di Corinto arcaica,* Supplementi e Monografie della Rivista "Archeologia Classica", vol. 7. Rome: L'Erma di Bretschneider.

Giannikoure, A., ed. 2011. *The Agora in the Mediterranean from Homeric to Roman times: International conference Kos, 14–17 Apr 2011*. Athens: Ministry of Culture and Tourism.

Hansen, M.H., and T. Fischer-Hansen. 1994. Monumental political architecture in archaic and classical Greek poleis: Evidence and historical significance. In *From political architecture to Stephanus Byzantius: Sources for the ancient Greek polis*, Paper from the Copenhagen Polis Center, vol. 1, ed. D. Whitehead, 29–90. Stuttgart: Franz Steiner.

Heiden, J. 2006. Die Agorai von Elis und Olympia. In *Die griechische Agora. Bericht über ein Kolloquium am 16. März 2003 in Berlin*, ed. W. Hoepfner and L. Lehmann, 53–58. Mainz: Philipp von Zabern.

Hölkeskamp, K.-J. 2002. Ptolis and agore. Homer and the archaeology of the city-state. In *Omero tremila anni dopo. Atti del congresso di Genova 6–8 luglio 2000, Storia e Letteratura*, ed. F. Montanari, vol. 210, 297–342. Rome: Storia e Letteratura.

Hölscher, T. 2007. Urban spaces and central places. In *Classical archaeology, Blackwell studies in global archaeology, vol. 10, S.E. Alcock, and R. Osborne*, 164–181. Malden/Oxford/Carlton: Blackwell.

Karvonis, P. 2010. The Athenian Agora as a commercial center: archaeological and literary evidence. In *Attika – Archäologie einer "zentralen" Kulturlandschaft. Akten der internationalen Tagung vom 18.–20. Mai 2007 in Marburg*, ed. H. Lohmann and T. Mattern, 137–150. Wiesbaden: Otto Harrassowitz.

Königs, W. 1993. Planung und Ausbau der Agora von Priene. *Istanbuler Mitteilungen* 43: 381–397.

Marchetti, P., and Y. Rizakis. 1995. Recherches sur les mythes et la topographie d'Argos 4. L'agora revisitée. *Bulletin de Correspondance Hellenique* 119: 437–472.

Osborne, R. 2004. Homer's society. In *The Cambridge companion to Homer*, ed. R. Fowler, 206–219. New York: Cambridge University Press.

Paga, J. 2010. Deme theaters in Attica and the trittys system. *Hesperia* 79: 351–384.

Rheidt, W. 1992. Die obere Agora. Zur Entwicklung des hellenistischen Stadtzentrums von Pergamon. *Istanbuler Mitteilungen* 42: 235–285.

Robertson, N. 1998. The city center of archaic Athens. *Hesperia* 67: 283–302.

Sherratt, E.S. 1990. "Reading the texts": Archaeology and the Homeric question. *Antiquity* 64: 807–824.

Themelis, P. 2010. Die Agora von Messene. In *Neue Forschungen zu griechischen Städten und Heiligtümern. Festschrift für Burkhardt Wesenberg zum 65. Geburtstag, Beiträge zur Archäologie Griechenlands*, ed. H. Frielinghaus and J. Stroszeck, vol. 1, 105–125. Möhnesee: Bibliopolis.

Treziny, H. 2009. De Mégara Hyblaea à Sélinonte, de Syracuse à Camarine: le paysage urbain des colonies et de leurs sous-colonies. In *Colonie di colonie: le fondazioni sub-coloniali greche tra colonizzazione e colonialismo. Atti del convegno internazionale, Lecce, 22–24 giugno 2006*, ed. M. Lombardo and F. Frisone, 161–181. Galatina: Congedo.

Trümper, M. 2008. *Die'Agora des Italiens' in Delos. Baugeschichte, Architektur, Ausstattung und Funktion einer späthellenistischen Porticus-Anlage*. Rahden: Leidorf.

Williams, C.K. 1970. Corinth, 1969: Forum area. *Hesperia* 39: 1–39.

Williams, C.K. 1978. *Pre-Roman cults in the area of the forum of ancient Corinth*. University of Pennsylvania: Unpublished PhD dissertation.

Williams, C.K. 1982. The early urbanization of Corinth. *Annuario della Scuola Archeologica di Atene* 60: 9–21.

Agrarian Landscapes of the Historic Period

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Introduction

Agrarian landscapes of the historic period have an often fragile archaeology. Most are still used to produce food, and the fences, walls, and hedges which form their principal remains, or the earthwork traces of earlier systems of farming and land division which survive within them, are thus vulnerable to destruction. Those living and working within what appear to be everyday, functional landscapes are often unaware of their antiquity or historical significance.

Definition and Historical Background

Across much of medieval Europe peasant communities exploited most uncultivated land in common. Grazed intensively for centuries, and cut for fodder, fuel, and much else, these areas developed as particular forms of habitat – with their own individual suites of flora and fauna – such as moorland, fens, or heaths. In addition, in many districts the arable land was farmed in "open fields," in which the properties of cultivators lay intermingled in the form of narrow, unenclosed strips (each usually less than 10 m wide and frequently less than 7 m), across which various communal routines were imposed. Usually, for example, the same crop was cultivated by all those holding land in a particular section of the fields, and large and often continuous sections of the arable lay "fallow," or uncropped, every second or third year, so that they could be dunged by livestock and recover fertility. Open-field strips were usually slightly sinuous in plan, having been distorted over the years. Many took the form of a shallow "reversed S," caused by the

way that the plowman moved to the left as he approached the end of the strip, in order to avoid too tight a turning circle.

Open fields took many forms. In Sweden, parts of Denmark, central England, northeastern France, southern Belgium, and central-southern Germany, extensive and highly communal systems existed. These were farmed from large villages and contained the intermixed holdings of substantial numbers of landholders. But more "irregular" field systems, containing the holdings of fewer farmers and normally associated with dispersed settlement patterns, could be found widely across northern Europe, from Cornwall and Brittany in the west to Hungary in the east. Other variants existed in some Mediterranean countries, including Italy and Spain. Open fields first developed in the early medieval period, in many districts before the tenth century, and possibly as early as the seventh. There has been much debate about their origins. The intermixed properties seem initially to have developed as a consequence of partible inheritance and piecemeal colonization (as new land was divided in an equitable fashion among those who had worked to reclaim it). But the emergence of more complex and corporate forms was probably the result of population pressure, technological change (especially the shared use of a large moldboard plow), and the need for elites to facilitate the extraction of rents and services. Their creation involved a measure of systematic planning and, in some cases, the reorganization of existing patterns of settlement.

Open fields disappeared from most of northern Europe between the fifteenth and the nineteenth centuries, but have left a number of archaeological traces. In some areas unhedged and intermixed parcels, larger than the original strips and no longer subject to communal regulation, still survive, as in parts of the Netherlands and France. Elsewhere their essential layout is preserved, in more simplified form, in the current pattern of walls and hedges. This is because in many districts open fields disappeared through "piecemeal" enclosure: that is, landowners gradually consolidated scattered holdings through purchase and exchange, surrounding groups of strips with walls or hedges which thus perpetuated the sinuous, parallel patterns of the former landscape. In addition, in areas of heavy soil individual strips were often plowed in ridges, to facilitate drainage. Because enclosure was often associated with a shift from arable farming to specialized livestock production or dairying, these can be preserved in grass fields as the earthworks known as "ridge and furrow" (Fig. 1), found in particular in parts of the English Midlands but also sporadically in northern France and Germany.

Agrarian Landscapes of the Historic Period, Fig. 1 Well-preserved ridge and furrow in western Northamptonshire. (Photo credit: T. Partida)

Key Issues

Not all areas of Europe were dominated by open-field agriculture. In the *bocage* of western and much of central France, for example, and in the "woodland" districts in both south eastern and western England, landscapes of enclosed and often irregularly shaped fields, or ones in which enclosed fields and small patches of open fields coexisted, could be found. Both the relative extents of open fields, and their particular character, were the consequence of the complex interplay of demographic, economic, environmental, and social factors, although archaeologists and historians continue to debate the relative importance that should be attributed to each.

The agriculture of much of northern and western Europe was transformed in the postmedieval period, with the development of greater regional specialization and major increases in productivity. These developments were the consequence of wider changes and pressures which included rapid population growth (especially from the eighteenth century), the emergence of developed market economies, and industrialization. Agricultural "improvement," to use the fashionable eighteenth-century English term, occurred at differing rates in different areas, depending on the wider character of social and economic relations. By the eighteenth century the agricultural primacy of England and the Netherlands was widely accepted, and the new practices which had been developed there widely emulated. New fodder crops – turnips and other "roots," and grasses like clover – were introduced into field rotations, reducing the need for land to lie fallow, and agropastoral areas and other commons and forests were brought into more intensive cultivation. These changes involved the end of communal forms of exploitation and a shift to more individualistic modes of farming. Many areas of common land were now allocated in hedged or walled parcels to particular owners; properties in open fields were either subject to gradual piecemeal consolidation or were reallocated in a planned fashion as private fields – in England, for example, by parliamentary enclosure and in Denmark through the process of *ensgifte*. Nevertheless, these developments were not universal, and open fields were still being reorganized, in Germany and the Netherlands, as late as the eighteenth century. In parts of central and eastern Europe, they survived into the twentieth century and in some cases up until the present.

The enclosure and "improvement" of marginal land in postmedieval Europe had major effects on biodiversity. This period saw, for example, the destruction of more than three quarters of the heaths in Denmark and even more in Brittany. In part, reclamation of such land was made possible by the substitution of organic materials for coal and iron, as Europe industrialized, for heaths, moors, and other rough ground had originally been cropped for fuel and fodder, just as many wetlands had been regularly dug for peat. Indeed, it was the drainage of wetlands which was one of the most striking features of the postmedieval period. Much coastal marsh had been reclaimed in medieval times, but the period from the sixteenth century saw an increase in drainage activity and its extension to the more problematic wetlands, especially those formed in peat rather than marine clays. The Netherlands had long experience of land drainage, carried out from the fifteenth century with the assistance of windmills, and it was largely Dutch engineers who directed postmedieval reclamation in the Fenlands of eastern England, in the Marais de Poitou and other French marshes, in Lammefjorden and elsewhere in coastal Denmark, and in Poland and north Germany.

Planned enclosures of commons and open fields were assisted by the development of more sophisticated systems of surveying and land measurement, and fields created from the seventeenth century were frequently straight-sided and geometrically shaped: land freed from communal control was now, more than ever, a commodity to be measured and exchanged. Such landscapes can be found across much of northern Europe, although they have survived modern agricultural developments best in the English Midlands, parts of the Netherlands, and southern Scandinavia. Some schemes of enclosure took particularly abstract geometric forms, such as the grid of roads and drainage ditches created when the

wetlands at Beemster in the Netherlands were drained in the seventeenth century – now a World Heritage site. Indeed, the new agrarian landscapes of the post-medieval centuries were not purely practical and agricultural in character. They represented the rational transformation of nature and the triumph of modernity over tradition, and it is noteworthy that in this period, in contrast to the Middle Ages, elites often consciously identified themselves with agricultural activities. This was especially true in England, where major eighteenth- and nineteenth-century landowners like Thomas Coke of Holkham in Norfolk were prominent "improvers," the landscapes of their estates often combining, in complex ways, aesthetic and agricultural elements. Many created "model farms" with buildings which were both practical and ornamental in character, often laid out in some whimsical "Gothic" form. Major landowners in other European countries did the same: notable examples include the Gothic farm complex created at Racconigi in Piedmont by Charles Albert, Prince of Carignano, in the early nineteenth century (Fig. 2).

Enclosed fields thus proliferated in the post-medieval period in Europe, and the ways in which they were bounded exhibited elements of both continuity and change with medieval practice. Boundaries in drained wetlands took, in all periods, the form of water-filled ditches. These served to drain the land but also – in areas where livestock farming was important – functioned as "watery fences" to restrain sheep or cattle and to provide them with drinking water (Fig. 3). Reclaimed wetlands are thus characterized by an absence of hedges, fences, or walls. In upland areas dry stone walls were generally employed to enclose land, and in the course of the post-medieval period, these often took increasingly regular forms. In lowland districts hedges were generally used (Fig. 4). In medieval and early postmedieval times these had normally been planted with a range of species, partly because of the difficulties of accessing large quantities of hedging material but also because – as well as functioning as stock-proof barriers – they also served as a source of fuel wood. By the eighteenth century the fashion for planting single-species thorn hedges was becoming established, especially in England, as the increasing availability of coal lessened the importance of hedges as a fuel source. Such hedges served to express the divorce of large, modern landowners from the archaic practices of a peasant economy.

Agrarian Landscapes of the Historic Period, Fig. 2 The ornamental farm erected in the grounds of Racconigi Castle, Piedmont, in the early nineteenth century by Charles Albert, Prince of Carignano. (Photo: T. Williamson)

Agrarian Landscapes of the Historic Period, Fig. 3 In areas of low-lying wetland, field boundaries took the form of water-filled ditches: Halvergate Marshes, Norfolk. (Photo: T. Williamson)

Agrarian Landscapes of the Historic Period, Fig. 4 Hedges were the most common form of medieval and postmedieval field boundary across large areas of Europe. (Photo: T. Williamson)

International Perspectives

The range of agricultural landscapes found elsewhere in the world, and which were encountered by Europeans during the great postmedieval diaspora, are too varied to be considered in detail here, but were again shaped both by practical agrarian considerations and by wider social, economic, and ideological contexts. In archaeological terms, the most striking features include the great systems of terraces which are found across much of the Far and Near East, and in the Americas, from the southwest of the United States as far south as northern Argentina. Terraces fulfilled a range of functions. They provided a level area of cultivatable ground in mountainous regions, helped control soil erosion, and assisted in water management. The latter concern looms large in agricultural systems on a global scale, from an early date: examples include the complex forms of perennial irrigation practiced in various parts of the Middle East and Mesoamerica, with water conducted to crops through complex systems of channels, and the systems of basin irrigation practiced in Egypt, where seasonal floods are constrained within embanked fields.

Archaeological remains of irrigation are often, in semiarid areas, one part of more complex agrarian strategies. Across much of central and southern America, and in some parts of the USA, "raised fields" – elevated planting areas separated by canals or ditches, often covering very extensive areas of ground – served both to provide drainage and irrigation, depending on the season. The canals also provided a microclimate, giving some protection from frosts, and served as a source of fertility, for their nutrient-rich mud was dredged and spread on the fields.

When European colonists encountered indigenous peoples, existing agricultural landscapes often continued with little change, especially in contexts of colonial dominance rather than large-scale immigration. The great rice terraces of the Ifugao in the Philippine Cordilleras have thus been continuously used and maintained through more than 2000 years. Where agrarian landscapes possessed relatively few structural elements or the economy was largely organized around hunting and gathering, in contrast, and where the immigrants were themselves numerous, they were more likely to impose elements of their own ways of organizing a countryside – although sometimes these were inappropriate and short-lived, like the attempts by early settlers in New England to lay out fields modeled on the open fields of their homelands. In the southern coastal states of North America, in particular, elements of the landscape of English eighteenth-century estates were often replicated, although here organized mainly around slave production rather than tenanted farms. The long European experience of reclaiming wetlands was also employed in the New World, to create drained marshes like those of the French Acadian settlement at Grande Pré in Nova Scotia, currently a candidate for World Heritage status. But much about the agrarian landscapes of North America was new. In the original thirteen states, field boundaries were normally fenced, or in parts of New England walled, rather than hedged, largely due to the local abundance of wood. Initially post-and-rail fences were created but in the southern states these were soon replaced by the split rail zigzag fences still characteristic of the area. As the colonists spread west, into the northwestern territories, highly rectangular field patterns were created through the organized subdivision of the great abstract grid imposed on the landscape under Thomas Jefferson's direction as an expression of the rational and egalitarian principals of the young republic. This was further extended into the territories purchased from the French in 1803. Here, in a landscape singularly lacking in wood and timber, the fields created as the grid was subdivided were bounded by various forms of wire fence, and especially by barbed wire (invented in the USA in the 1860s), rather than by fences of wood. Across the interior of Australia, too, parcels of land bounded by wire fences, currently the subject of archaeological research and classification, proliferated in the course of the nineteenth century, rendering redundant the practice of running mobile sheep flocks under the control of shepherds.

Viewed in global terms, agrarian landscapes display an almost limitless variety, born not only of agricultural and economic factors but also of wider social, economic, and ideological influences.

Cross-References

- ► Estate Landscapes in Historical Archaeology
- ► Farmsteads and Rural Life in the United States, Archaeology of
- ► Hedges in Historical Archaeology

Further Reading

Conzen, M. 1990. *The making of the American landscape*. London: Routledge.

Danner, H., ed. 2005. *Polder pioneers: The influence of Dutch engineers on water management in Europe 1600–2000*. Utrecht: Universiteit Utrecht, Faculteit Geowetenschappen - Koninklijk Nederlands Aardrijkskundig Genootschap.

Hall, D. 1992. *Medieval fields*. Aylesbury: Shire Archaeology.

Miller, N., and K. Gleason. 1994. *The archaeology of garden and field*. Philadelphia: University of Pennsylvania Press.

Paillet, A. 2005. *Archéologie de l'agriculture modern*. Paris: Editions Errance.

Pickard, J. 2010. Wire fences in colonial Australia: Technology transfer and adaptation, 1842–1900. *Rural History* 21: 27–58.
Rennes, H. 2010. Grainlands: The landscape of open fields in a European context. *Landscape History* 31: 37–70.
Williamson, T. 2002. *The transformation of rural England: Farming and the landscape 1700–1870*. Exeter: University of Exeter Press.
Williamson, T. 2012. *Environment, society and landscape in Early Medieval England: Time and topography.* Woodbridge: Boydell Press.

Agrarian Landscapes: Environmental Archaeological Studies

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Introduction and Definition

Environmental archaeology has grown to be a major subdiscipline of archaeology, which utilizes scientific approaches from many different backgrounds of academia, including geography, geology, biology, physics, and chemistry (Butzer 1982; Dincauze 2000; Bell and Walker 2004; O'Connor and Evans 2005). We can therefore define environmental archaeology in archaeology as "*the study of the environment and its relationship with people through time*"; this has in turn led with landscape and stratigraphic formation and modification processes and draws mainly on geological, sedimentological, and soil science analytical techniques. Both zooarchaeology and archaeobotany focus not only on human economies and subsistence (diet, health, and nutrition) of both wild and domesticated animals and plants (*paleoeconomy*) but also on broader environmental reconstruction (*paleoenvironment*), such as vegetation succession (Branch et al. 2005).

The reconstruction of agrarian practices, and their landscape and environmental context, is reliant therefore upon the application of scientific procedures utilized in *geoarchaeology*, *zooarchaeology*, *and archaeobotany.* Geoarchaeological procedures include sediment/soil classification, micromorphology, particle size analysis, magnetic susceptibility, and multielement geochemistry. The relevant archives investigated include not only archaeological features, such as ditches and pits, and ancient soils (paleosols), but also geological archives, such as floodplains (alluvium), slope wash in dry valleys (colluvium), aeolian deposits, volcanic and cave sediments, and organic and mineral sediments in bogs and lakes. In bioarchaeology (both *zooarchaeology and archaeobotany*), the key proxies (subfossils) that are recovered from these archaeological and geological archives include animal bones, terrestrial Mollusca, charred seeds and other plant parts, charcoal and phytoliths, and also pollen, fungal spores, and waterlogged seeds. Precise identification and recording of these proxies, and where applicable the utilization of data from ethnographical, ethnohistorical, and documentary sources, is key to the reconstruction of agrarian practices. Good preservation of charred plant remains on many West Asian and North African archaeological sites, for example, combined with well-established ethnographic models detailing traditional agricultural practices, has indicated the status of the arable fields (e.g., soil type, moisture content), the system of cultivation (e.g., intensive, extensive), manuring regimes, tillage practices, and sowing, harvesting (e.g., uprooting, plucking, or cutting with a sickle or scythe), and processing methods, especially for free-threshing cereals (durum wheat and naked barley), hulled barley, and glume wheat (emmer, spelt, and einkorn). Studies make frequent use therefore of both qualitative and quantitative approaches to evaluate the potential of proxies to provide robust reconstructions of agrarian practices and their wider environmental context. These approaches include the creation of taphonomic models to differentiate between "local" and "regional" signatures of human activity (e.g., pollen analysis) and to elucidate the role of diagenesis in the creation of the subfossil assemblages (e.g., animal bones, pollen). The application of "modern analogue" studies is especially important here, and this has been ably demonstrated with respect to West and Southeast Asian investigations of the history of wheat/barley and rice cultivation (respectively), which has involved gathering essential information on the environmental variables

for their growth within specific agricultural regimes (e.g., dry-farmed, irrigated fields, crop rotation).

The integrated study of these archives, both archaeological and geological, and their proxies permits environmental archaeologists to address a range of research themes that may be specific to a single site (e.g., Neolithic settlement), and an event of short duration (e.g., woodland clearance), or relevant at a regional to global scale, and spanning several millennia. Whatever the spatial and temporal scale, collectively they provide important information on the origins and spread of agricultural practices, the development of agricultural systems through time, the impact of agriculture on the landscape and environment, and the changing nature of human diet, health, and nutrition.

Key Issues/Current Debates

Environmental archaeological studies make a considerable, ongoing contribution therefore to improving understanding of the origins and spread of agriculture and the accompanying landscape and environmental changes. Western Asia (from present day Iran in the east to Turkey in the west), for example, is acknowledged as one of the geographical centers for plant and animal domestication ~12–10,000 years ago. In this area, many of the food staples that remain important today, such as wheat, barley, rye, lentils, peas, sheep, and cattle, were morphologically and genetically altered through the processes of domestication and then subsequently spread across Europe over ~6,000 years (Zeder 2008). In the Jordan Valley, an important region of intensive environmental archaeological research, investigations provide a complex picture of farming and its environmental context (Mithen and Black 2011). Charred plant remains and animal bone assemblages indicate mixed farming, with the cultivation of a broad range of key plant domesticates from the start of the Neolithic (~12–6,500 years ago) that included emmer and einkorn wheat, barley, as well as lentil, pea, chickpea, bitter vetch, and flax. The evidence suggests that significant landscape modification accompanied the transition to farming, with programs of water management to feed agricultural land enclosed within terrace walls, thereby enhancing the probability of a regular crop yield. According to the pollen data, the onset of the Chalcolithic (~6,500 years ago) was marked by the first clear signs of woodland clearance for farming, which became extensive ~2,000 years ago with significant deforestation associated with metallurgical activities. These studies have also suggested that periods of rapid climate change in the East Mediterranean significantly influenced the direction of agricultural activities, with periods of higher precipitation seemly favoring the intensification of cultivation at ~6.5–4,000 and ~2.5–1,300 years ago, with olive, grape, and walnut production at its maximum during the Roman-Byzantine period.

Similarly, in SW Turkey, extensive pollen-based land-use histories have revealed evidence for widespread Bronze Age clearance and farming ~3,200 years ago (Eastwood et al. 1998). These studies indicate that, depending upon elevation and local factors, olive, walnut, chestnut, pistachio, and vine were cultivated, alongside cereals, and managed in the woodland. In E Turkey, lake sediment records indicate pronounced human activities from ~3,800 years ago, which became more intensified in the last ~600 years, with evidence for walnut cultivation and the expansion of pastureland, while in central Turkey, there is outstanding evidence for the imprint of agrarian activities on the landscape from the late Roman period based on pollen analysis (England et al. 2008). The presence of walnut, olive, vine and chestnut, and rye, wheat, and barley cultivation suggests arboriculture, pastoralism, and cereal cultivation. At 670–950 CE, there was a marked decline in agrarian practices during the "Dark Age," which was succeeded at 950 CE by renewed cereal cultivation and pastoralism. The impact of Neolithic agricultural practices on the landscape in this region remains less well understood, however, despite the good archaeological evidence for settlement and farming. Indeed, the pollen evidence indicates a predominantly wooded landscape with seemingly low levels of human interference. An alternative interesting possibility is that this wooded landscape was

"managed" by deliberate burning to create suitable grazing land and to enhance conditions for cultivation (Roberts 2002; Wick et al. 2003).

In Southeast Asia, environmental archaeological studies of agrarian practices, and their landscape and environmental context, have arguably been less intensively investigated than in West Asia. Comprehensive studies in the Lower Yangtze region (China), however, have permitted an improved understanding of prehistoric farming and one of the key crops for this region: rice. Studies have shown that rice cultivation commenced here ~6.9–6,600 years ago and certainly as early as ~8,000 years ago in other parts of China. This systematic study using rice grains, phytoliths, and spikelet bases has also provided important evidence for the composition of weed species typically associated with rice cultivation, thereby providing a further important evidential base from which to infer cultivation (Fuller et al. 2009). The landscape context for the cultivation involved both water management and burning.

In Europe, environmental archaeological studies have revealed that the spread of agriculture had far-reaching consequences for the landscape and environment (Kaplan et al. 2009). The evidence from both archaeological and geological archives suggests that although the early stages were a mixture of permanent settlement and residential mobility, both cultivation and animal husbandry of the main domesticates from West Asia required the clearance of woodland, which was often associated with biomass burning ("slash and burn"). Although many records suggest that clearance was temporary ("shifting cultivation"), which permitted the woodland to recover, during prehistory, the evidence indicates progressive deforestation of mature coniferous (e.g., fir) and/or deciduous (e.g., elm, lime, oak) woodland and the introduction of field systems and, in some areas, agricultural terracing. This led to the creation of "plagioclimax communities" that were sustained by human interference, e.g., grasslands, heathlands, and moorlands of Northwest Europe and the scrubland of Mediterranean Europe (although regional climatic and edaphic factors were also important in their formation and maintenance).

Evidence for deforestation due to agricultural practices, namely, cereal cultivation and/or animal husbandry, from the Neolithic period onwards is widespread in upland and lowland parts of Europe. Indeed this key "anthropogenic signature" in subfossil records from lake sediments and bogs, combined with archaeological evidence for mixed farming (e.g., charred plant remains and animal bone), has enabled the development of complex regional models of human-environment interaction. For example, pollen data from Northwest Europe indicate two pronounced events, which have been strongly associated with human activities: Neolithic "elm woodland decline" (Parker et al. 2002) and Bronze Age "lime woodland decline" (Grant et al. 2011). These two trees formed important components of the natural forest cover. Debate over the cause, or causes, of the "primary" decline in elm woodland has continued for several decades, with evidence from Britain and Ireland indicating a very rapid decline in ~36 years (6,343–6,307 years ago). For this reason, woodland clearance for cultivation and grazing, as well as the harvesting of elm leaves, twigs, and branches for winter fodder and bedding, may be a secondary cause. Instead, the rapid spread of disease (caused by ascomycete fungus *Ophiostoma ulmi*), in conjunction with both human activities and climate change (increased continentality), may collectively have contributed to the decline. Whatever the precise cause, pollen analysis has shown that the decline of elm woodland is often associated with cereal cultivation and possibly animal husbandry (presence of dung beetles), which suggests that human groups, albeit at dispersed, low population levels during the Neolithic, were having some localized impact on elm woodland. This probably formed part of a system of forest farming involving residential mobility, short-term woodland clearance, burning, woodland management (pollarding/coppicing), and cultivation. In Ireland, the discovery of the Neolithic "céide fields" provides an exceptional example of a coordinated approach to landscape modification following the introduction of agriculture that provides unequivocal evidence for a marked

reduction in woodland cover (pine, oak, elm, hazel, and birch) and the establishment of grassland and finally heathland.

The lime woodland decline, which commenced in Britain ~5–3,000 years ago (Late Neolithic to Late Bronze Age), has also been strongly linked to clearance of the landscape for farming, as well as the provision of fodder for animals. Although, like elm, alternative explanations have been proposed, the overwhelming evidence for its association with contemporaneous cereal cultivation and settlement activities, together with the diachronous nature of the decline ("different times in different places"), provides strong support for a human cause. For example, in S England, the environmental archaeological evidence suggests widespread use of landscape units (valley bottom and side, and hilltop) with mixed farming of emmer wheat and six-row barley, as well as einkorn, bread, and spelt wheat, and pastoralism involving cattle, sheep, pig, and goat that were probably moved on a seasonal basis ("transhumance"). These practices caused not only a change in natural vegetation cover from the Bronze Age onwards (e.g., widespread heathland formation) but also soil status (e.g., podzol and rendzina formation), including a reduction in nutrient quality and pH (acidification), accelerated erosion (colluviation), and paludification (wetland or bog formation) due to impeded drainage. During later prehistory, and into the historic periods, environmental archaeological evidence for the wider landscape and environmental context of farming practices in NW Europe, especially Britain and Ireland, is less available due to the paucity of intensive studies and availability of suitable sites. Nevertheless, those studies conducted in Britain and Ireland suggest marked intra-regional differentiation in the agricultural landscape, with significant temporal variations in land use, e.g., afforestation, pastoralism, and cereal cultivation (Fyfe et al. 2004). Those studies that have benefitted from the combined use of geological, archaeological, and historical archives have provided valuable information on medieval and later agrarian landscapes. In Ireland, for example, studies have revealed that although cattle farming, and barley and oat cultivation, formed the basis of the medieval economy, a shift towards cereal cultivation occurred from 770 CE as a possible response to wetter climatic conditions, which worsened during the Little Ice Age (1350–1850 CE), and led to major changes in settlement patterns and agrarian practices. Indeed, the role of climate change in determining the direction of agrarian activities in Britain and Ireland, and throughout the world, has been a considerable point of debate. For example, pollen-based studies of later Bronze Age farming in Scotland indicate that ~2,900 years ago, a widespread period of climatic deterioration commenced across NW Europe and resulted in a change in land use, rather than abandonment, with the increased importance of grazing in upland areas, and the expansion of settlement and agricultural land in the lowlands (Tipping et al. 2008). In this example, the evidence indicates that adaptation, rather than collapse of the agricultural system, caused a change in farming activities, which implies a high degree of resilience to environmental stress caused by climate change by human populations living in "marginal" agricultural areas.

In the Mediterranean region, environmental archaeological studies of landscapes have debated the influences of human activities, especially farming, and climate change for many decades. Although the debate continues, there is now a substantial body of sedimentary evidence linked to the archaeological record for catastrophic erosion due to woodland clearance and land use, especially from the Bronze Age onwards (e.g., Greece) (Klinge and Fall 2010). The subsequent construction of agricultural terraces throughout the Mediterranean may therefore have been an important conservation measure to mitigate the risk of further erosion and to ensure the sustainable supply of food for an expanding population. Indeed, environmental archaeological data suggest that abandonment and/or neglect of the terraces caused renewed erosion, accelerated by unmanaged vegetation growth and grazing animals. Periods of erosion have been associated therefore with phases of expansion and contraction in agricultural activities. The modification of the morphology of the landscape, changes in

natural soil quality, and reduced susceptibility to erosion, through the Bronze Age development of terrace agriculture in the Mediterranean, was therefore a major innovation (~3,800 years ago). This provided a means of creating a more sustainable agricultural system and ultimately provided an ideal situation for the widespread management of important cultivars, such as olive.

In addition to terracing, an important aspect of Mediterranean agriculture has been transhumance involving the movement of livestock on a seasonal basis between lowland and upland areas, sometimes over considerable distances (Barker 1985). These practices were probably in place from the Early Neolithic, but the expansion of farming into mountainous regions of the Mediterranean from at least the Late Neolithic led to further development of the transhumance network. In Greece, for example, evidence for sheep/goat, cattle, and pigs provides a valuable insight into early agrarian practices, which included the cultivation of emmer and einkorn wheat, and two-row barley and lentil. These crops were initially cultivated in a forested landscape in localized clearings, but pollen records reveal a progressive reduction in woodland that coincided with the development of a broader subsistence economy. In Italy, a similar dependence on emmer, barley, and legumes, as well as sheep and goats, recorded in lowland open air and cave settlements, seemingly led to limited landscape modification until the Late Neolithic (~6,100 years ago). At this time, pollen records from mountainous areas indicate a gradual reduction in woodland cover (e.g., elm and lime) or the changing dominance of tree taxa (e.g., fir to beech), suggesting the increasing influence of human activities. The history of beech woodland in N Italy, in particular, has received considerable attention because of its ability to invade adventitiously mature woodland due to one or more causes, including disturbance and climate change to favorable conditions. The remarkable correlation at many sites between the expansion of beech woodland, increased biomass burning, evidence for pastoralism (archaeological and pollen stratigraphical), accelerated erosion, and the decline of other tree taxa strongly suggests that agrarian practices may have initiated changes in the conditions necessary for beech growth leading to its dominance in vegetation communities (Branch 2012).

Outside Asia and Europe, environmental archaeological studies have demonstrated the existence of multiple centers of plant and animal domestication around the world, with the timing of the transition to farming varying considerably. To highlight this global phenomenon, the broad timing of plant domestication in key centers is illustrated (all "years before present day"): Australasia (e.g., yam and banana) ~7,000; N Africa (e.g., millet and sorghum) ~4–3,000; N America (e.g., squash and sunflower) ~5,000; Mesoamerica (e.g., squash and maize) ~10–8,000; and S America (e.g., squash, arrowroot, yam, cotton, sweet potato, beans, peanut, manioc, chilli pepper, potato, and quinoa) ~10–5,000. Although the precise reason or reasons for the initiation and adoption of plant cultivation and animal husbandry in many parts of the world remain unclear, the key factors were undoubtedly geographically variable and included measures to mitigate the risk of failure of annual food supplies, population pressure, and climate change (Stahl 1994).

In S America, evidence for landscape modification based on pollen and phytolith data suggests that cultivation probably commenced at least ~7,000 years ago in northern countries, such as Panama, and involved maize, arrowroot, and economically important trees. Throughout S America, the development of raised field agriculture transformed the landscape and enabled the development of a sustainable system by creating a distinctive microclimate and by improving the soil status and nutrient cycling. Similarly, terracing throughout S America is extensive with an estimated ~1,000,000 ha in Peru alone. The importance of terrace agriculture in many parts of the Andes, like the Mediterranean region, cannot be overstated. Environmental archaeological studies indicate that the construction of terraces transformed the morphology of the landscape while also creating the basis for a highly innovative and sustainable agricultural system that primarily permitted the cultivation of maize and

quinoa, an interpretation verified by parallel studies of archaeological and geological archives using pollen and phytolith analyses. Archaeological studies have permitted detailed investigations of the terrace structural organization and development, especially their irrigation and drainage, and the physical properties and composition of the soil infilling the terraces using techniques such as micromorphology and geochemistry. Studies in central and southern Peru, for example, have revealed multiple phases of terrace construction during later prehistory, with evidence for possible soil enrichment through manuring and/or fallow periods, and localized landscape erosion triggered by the construction activities (Branch et al. 2007). Interestingly, there is evidence in several parts of Peru for the abandonment of terraces, such as those of the Wari civilization (500–1000 CE), and their subsequent reconstruction prior to the Colonial Period (1533 CE). While the persistence of terrace agriculture confirms the importance of terraces in the agricultural system, the precise reason for their occasional abandonment remains unclear. Correlation of archaeological and paleoecological studies with paleoclimatic records from ice cores in Peru and Bolivia indicates, however, that periods of rapid climate change, e.g., at ~1000 CE, may have been the cause. The onset of drought therefore may have led to the collapse of Wari irrigated terrace agriculture, an argument supported by the contemporaneous decline of the "Tiwanaku civilization" raised field agriculture on the shores of Lake Titicaca. The development of terrace agriculture and maize cultivation in the intermontane valleys of the Andes has been linked to the formation of complex social and economic systems, e.g., Wari. Maize growth formed part of a broadly defined agricultural model that saw the utilization of a wide range of ecosystems, and included the cultivation of bitter potatoes, and herding of llama and alpaca, above the maximum elevation of maize cultivation (3,700 m above sea level).

In Mesoamerica and N America, the history of maize has also been the primary focus of many environmental archaeological studies. The main sources of evidence have been phytoliths in pottery residues and dental calculus, as well as in soils, lakes and bogs, and macrofossil specimens, and associated archaeological artifacts indicating food production. Evidence has pointed to the conversion of the landscape and environment by shifting cultivation ("swidden"), terrace agriculture, and raised field systems. The collapse of these intensive practices due to nutrient depletion and soil erosion has been strongly associated with the demise of the Mayan civilization (Santley et al. 1986). Alternatively, the evidence for a well-developed system of environmental and crop management suggests that other external factors may have triggered the collapse. The evidence for extensive deforestation and hydrological changes, together with an over-reliance on maize cultivation, suggests, however, that the Maya did not facilitate the development of a long-term sustainable agricultural system.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Rice: Origins and Development

References

Barker, G. 1985. *Prehistoric farming in Europe*. Cambridge: Cambridge University Press.

Bell, M., and M.J.C. Walker. 2004. *Late Quaternary environmental change*. Harlow: Longman.

Branch, N.P. 2012. Early-Middle Holocene vegetation history, climate change and human activities at Lago Riane (Ligurian Apennines, NW Italy). *Vegetation History and Archaeobotany*. https://doi.org/10.1007/s00334-012-0384-9.

Branch, N.P., M.G. Canti, P. Clark, and C.S.M. Turney. 2005. *Environmental archaeology: Theoretical and practical approaches*. London: Edward Arnold.

Branch, N.P., R.A. Kemp, B. Silva, F.M. Meddens, A. Williams, A. Kendall, and C. Vivanco Pomacanchari. 2007. *Journal of Archaeological Science* 34: 1–9.

Butzer, K.W. 1982. *Archaeology as human ecology*. Cambridge: Cambridge University Press.
Dincauze, D.F. 2000. *Environmental archaeology: Principles and practice*. Cambridge: Cambridge University Press.
Eastwood, W.J., N. Roberts, and H.F. Lamb. 1998. Palaeoecological and archaeological evidence for human occupance in southwest Turkey: The Beyşehir occupation phase. *Anatolian Studies* 48: 69–86.
England, A., W.J. Eastwood, C.N. Roberts, R. Turner, and J.F. Haldon. 2008. Historical landscape change in Cappadocia (central Turkey): A palaeoecological investigation of annually laminated sediments from Nar Lake. *The Holocene* 18: 1229–1245.
Fuller, D.Q., L. Qin, Y. Zheng, Z. Zhao, X. Chen, L.A. Hosoya, and G.-P. Sun. 2009. The domestication process and domestication rate in rice: Spikelet bases from the Lower Yangtze. *Science* 323: 1607–1609.
Fyfe, R.M., A.G. Brown, and A.J. Rippon. 2004. Characterising the late prehistoric, 'Romano-British' and medieval landscape, and dating the emergence of a regionally distinct agricultural system in South West Britain. *Journal of Archaeological Science* 31: 1699–1714.
Grant, M.J., M.P. Waller, and J.A. Groves. 2011. The Tilia decline: Vegetation change in lowland Britain during the mid and late Holocene. *Quaternary Science Reviews* 30: 394–408.
Kaplan, J.O., K.M. Krumhardt, and N. Zimmermann. 2009. The prehistoric and preindustrial deforestation of Europe. *Quaternary Science Reviews* 28: 3016–3034.
Klinge, J., and P. Fall. 2010. Archaeobotanical inference of Bronze Age land use and land cover in the eastern Mediterranean. *Journal of Archaeological Science* 37: 2622–2629.
Mithen, S., and E. Black, eds. 2011. *Water, life and civilisation. Climate, environment and society in the Jordan Valley.* Cambridge: Cambridge University Press.
O'Connor, T., and J.G. Evans. 2005. *Environmental archaeology: Principles and methods*. Stroud: Sutton Publishing.
Parker, A.G., A.S. Goudie, D.E. Andersen, M.A. Robinson, and C. Bonsall. 2002. A review of the mid-Holocene elm decline in the British Isles. *Progress in Physical Geography* 26: 1–45.
Roberts, N. 2002. Did prehistoric landscape management retard the post-glacial spread of woodland in southwest Asia. *Antiquity* 76: 1002–1010.
Santley, R.S., T.W. Killon, and M.T. Lycett. 1986. On the Maya collapse. *Journal of Anthropological Research* 42: 123–159.
Stahl, P.W. 1994. The significance of anthropogenic landscapes in prehistoric South America to studies of biodiversity. In *Man, culture and biodiversity*, *Biology international special issue*, ed. G. Hauser, M. Little, and D.F. Roberts, vol. 32, 3–11.
Tipping, R., A. Davies, R. McCulloch, and E. Tisdall. 2008. Response to late Bronze Age climate change of farming communities in north east Scotland. *Journal of Archaeological Science* 37: 2379–2386.
Wick, L., G. Lemcke, and M. Sturm. 2003. Evidence of Late glacial and Holocene climatic change and human impact in eastern Anatolia: High-resolution pollen, charcoal, isotopic and geochemical records from the laminated sediments of Lake Van, Turkey. *The Holocene* 13: 665–675.
Zeder, M.A. 2008. Domestication and early agriculture in the Mediterranean Basin: Origins, diffusion, and impact. *Proceedings of the National Academy of Sciences* 105: 11597–11604.

Agricultural and Social Earthworks in the Guianas

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State of Knowledge and Current Debates

For few years, pre-Columbian agriculture in Amazonia begins to be better understood, thanks to more accurate studies, exempt of the classical, and too simple dichotomy between the poor interfluvial lands and the fertile floodplains. William Denevan (2001) published a useful synthesis on indigenous agriculture in South America outlining that farming patterns observed today are likely to be very different from those that existed before the European Conquest and the introduction of iron tools. In fact, many pre-Columbian agricultural techniques do not exist anymore today in the region. For that reason, ethnographical analogy is not very useful to understand them. Other data must be taken into consideration.

Pre-Columbian Amerindians transformed deeply the Amazon, whether the vegetal cover, the topsoil, the nature of the sediments, and even the modeling of soil. These changes, volunteers or not, were observed in the first place by geographers, anthropologists, or archaeologists some 30 years ago (Posey 1985). Rainforest covering the region is then less natural and less exuberant as thought. During millennia, the former inhabitants

weeded, planted, multiplied, crossed, associated, or improved species. For instance, William Balée (1987) estimated that about 12% of the Amazon basin was manipulated in its vegetation by the indigenous. A close observation of the Amazon vegetation leaves no doubt about the importance that had the ancient human intervention in its current state (Clement et al. 2015). Recently, it had been shown the long term and strong influence of pre-Columbian societies on Amazonian vegetation by revealing the relative abundance and richness of domesticated species near archaeological sites (Levis et al. 2017).

In a comparable way, scholars brought to light soils partially created by man. The *terras pretas* or "Amazonian dark earth" (ADE) are compounds, dark and fertile soils associated with remains of implementations and naturally enriched with debris of occupation, coal, and ash. Many have wondered if they are the result of long or successive occupations on a site and if they are the result of voluntary creative acts or not. In any case, it is clear that they are islands of surprising fertility among the tropical acid and poor soils. It is difficult to believe that this remarkable quality has been not noticed by the first inhabitants of Amazon, although it is still complicated to prove that these soils have been used for the agriculture by pre-Columbian Amerindians.

Finally, pre-Columbian inhabitants not only modified the topsoil and the nature of the soil but also the morphology of the surface in many places. Amerindians dug, turned around, transported, lifted, and built thousands of cubic meters of earth, transforming the modeling of its territory more or less in a radical way. A net of permanent dug routes, channels, and ditches crossed pre-Columbian Amazonia. Moreover, built causeways connected artificial mounds, and dikes delimited pools and reservoirs. Finally, various plants were cultivated on raised fields with a large variety of forms, dimensions, and arrangements (Rostain 2012).

Indeed, the discovery of immense archaeological settlements and the revelation of complex societies by the new generation of archaeologists working in the Amazon since the 1980s provoked radical revision of our assumptions about pre-Columbian peoples. We became aware of the size and density of the earthworks from the Llanos de Moxos of Mojos, Bolivia (Erickson 1993). Similarly, contemporaneous archaeological works at the Marajoara mounds of Marajó Island revealed that the existence of complex societies in the region was not the result of an ancient migration from the Andes (Meggers and Evans 1957) but rather the product of a long-term, local development (Roosevelt 1991). However, if recent investigations revealed the importance of landscape management by pre-Columbian societies, it must be stressed that such human impact has been heterogeneous and did not affect the entire Amazonia but only specific areas (Bush and Silman 2007; Barlow et al. 2012; Balée 2013).

Recently, Eduardo Neves and James Petersen discovered and studied several enormous sites along the Middle Amazon, which often contained settlement mounds (Lima et al. 2006; Neves and Petersen 2006).

At the same time, in the Upper Xingu of Brazil, Michael Heckenberger (2005; Heckenberger et al. 2008) excavated the site of Kuhikugu, which major development occurred around 1510 AD. With a surface area of 50 ha, it is the largest residential site of the region. Its organization is similar to that of the nearby modern Kayapó villages, consisting of a ring-shaped settlement oriented around an immense central plaza. In the archaeological site, the large communal houses were located on the periphery and were protected by two rows of ditches. Very wide roads originated from the village in a radial pattern to connect it with secondary sites. A variety of fairly large earthworks marked the landscape: docks, bridge foundations, etc. The territory as a whole was organized in a system of principal centers and secondary settlements, indicating the existence of a stratified society. Today, the indigenous populations of the Upper Xingu still live in this type of large, ring-shaped village, connected to one another by wide, straight roads.

Pre-Columbian earthworks are varied, but they share three principal functions. The first one is for settlement on artificial mounds, which includes funerary functions since burials have frequently

been discovered in these residential mounds, as well as ceremonial uses. Certain mounds were dedicated solely to funerary functions, such as the San Jorge basin of Colombia (Plazas and Falchetti de Saenz 1981). The second function is for defense, through ditches excavated on the periphery of settlements. The third function is agriculture on raised fields. Such pre-Columbian earthworks still can be observed in the Guianas (Rostain 2010), particularly along the coast.

The Context

The Guiana Shield forms an "island" of approximately 1,800,000 km^2 bordered on all its periphery by water: the Amazon and Negro rivers, the Casiquiare Canal, the Orinoco River, and the Atlantic Ocean (Fig. 1). Today, this region includes five coastal countries: Venezuelan Guiana, Guyana, Suriname, French Guiana, and Amapá in Brazil. As in the rest of Amazonian rainforest, many different natural environments can be distinguished. However, there are three main landscapes that had strong influence on the pre-Columbian peopling: the grassy savannas in the center, the inland rainforest covering most of the area, and the coastal swampy plain.

The pre-Columbian cultural evolution of the Guianas is divided into four main phases that represent different food procurement strategies: nomadic hunter-gatherers from ca. 11,000 years BP, semisedentary fisher-gatherers from 6,000 years BP, the first farmers employing slash-and-burn agriculture and agroforestry from 3,000 years BP, and raised-field farmers employing permanent agriculture from 1,700 years BP.

It is very probable that several human groups using these different strategies lived simultaneously. However, a clear boundary can be seen along the coast, marked by the Cayenne Island in modern French Guiana, few centuries after the beginning the Christian era. Southeastern communities, connected with cultural traditions of the Lower Amazon, continued the technique of slash-and-burn agriculture and small-scale food procurement strategies up to the arrival of the Europeans. At the same time, Western populations, derived from the Barrancoid and Arauquinoid traditions of the Orinoco Valley, intensified their agriculture using the raised-field technique and transforming enormous surfaces of flooding savannas and swamps. Most of these different agricultures disappeared from 1500 AD because of the effects of the European Conquest.

The human history of the Guianas began 13,000–10,000 years ago, during a dry and cold climatic phase. Paleolithic hunter-gatherers quickly began to experiment plants and to induce change in flora composition and distribution. However, major human impacts on the tropical rainforest occurred some millennia later when agriculturalists transformed soil composition and morphology of the surface of the ground creating coupled human environmental systems.

Process of domestication and incipient agriculture differ notably in the tropics than in temperate regions of the globe. While most of the Neolithic cradles of the northern hemisphere domesticated one major cereal crop and generally developed one single agricultural technique, Amazonia used tens of domesticated and semidomesticated different plants. At the same time, indigenous invented a wide variety of efficient agricultural systems, including agroforestry, slash and burn, alluvial culture, raised fields, etc. Moreover, certain plants were not domesticated but actively managed or cultivated, especially many species of palms. In various cases, such agricultural techniques were coupled with elaborated management of faunal exploitation, as ponds or parks. In fact, scientists agree today to recognize a large set of pre-Columbian strategies of animal, faunal, and habitat management that is considered as a true "domestication of landscape." Natives took advantage of each environmental quality of their biotope, and, when it was not sufficient, they created ingenious systems to improve them. One fascinating characteristic of these solutions is the systematic reconstitution of an equilibrated habitat after exploitation. They ran and transformed their surroundings without destroying it, but stimulating regeneration.

The agricultural intensification is dated of the beginning of the Christian era with the

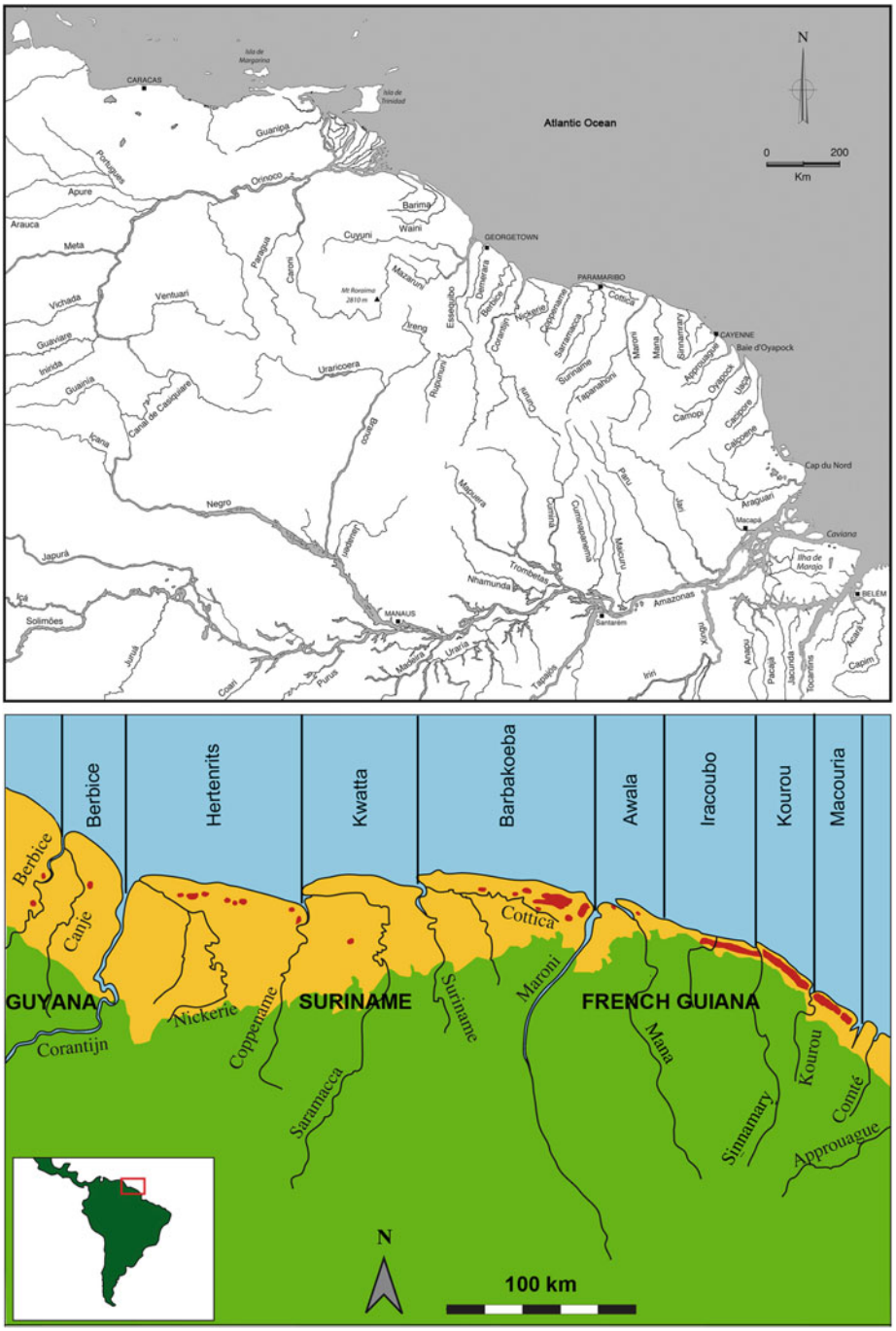
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increasing population and the multiplication of settlements all over the Guianas and, more generally, Amazonia. For instance, Amazonian dark earth (or *terra preta*) agriculture is a spectacular system that used fertility induced by the intense transformation of the earth provoked by long and important human occupation in the same place. Another spectacular agricultural system has been the raised fields in swamp or seasonally flooded areas that began to expanse along the Guianas coast and the Venezuelan Llanos from 500 AD. Still today, impressive extended monumental heritage of this pre-Columbian raised-field agriculture can be observed, especially from air, in the flooded savannas of the Guianas (Rostain 1991). The most prominent features of these pre-Columbian agricultural systems are, in first place, the durability of their effects and the permanence of their traces up to now and, in second place, that they resulted from a coupled action of culture and nature, proving the intimate marriage between indigenous intervention and environmental activity in Amazonia (McKey et al. 2010).

In the Guianas, like in other places in Amazonia, pre-Columbian populations greatly modified their landscapes, particularly those areas that were otherwise not well adapted to agriculture. The goal was to control excess water through drainage systems. In the Guianas, raised fields were elongated, square, or round, but the internal organization of these complexes can vary considerably. The principal difference among these systems is whether they articulate with rivers, standing water, or periodically flooded spaces.

Raised Fields

The most impressive pre-Columbian landscape modifications in the Guianas can be observed in the coastal plain that runs on 1,600 km from the Amazon Mouth up to the Orinoco Delta. Thousands of raised fields have been built by pre-Columbian inhabitants on a portion of 600 km long, between the Berbice River in Guyana and the Cayenne Island in French Guiana (Fig. 1). There is a great variability of shapes and distribution of these raised fields. Nevertheless, the diversity of agricultural structures does not appear random but is rather the result of careful strategies adapted to the local hydrology, chronology of construction, and the available technology. The form and size of raised fields would be thus influenced by cultural and technological criteria, which thereby justify the development of a general classification scheme. Four major types of raised fields can be proposed, based principally on size and to a lesser extent on morphology: elongated raised fields, large mounds, medium mounds, and small mounds:

1. Elongated raised fields vary in appearance from place to place, with dominant types apparent in different countries. In French Guiana and eastern Suriname, they can range from 1 to 7 m wide, 5 to 30 m long (although they are rarely longer than 10 m), and 50 cm to 1 m high. They are generally rectangular, although occasionally oval. While sometimes located in flooded depressions, they are more often located along the interface between flooded zones and sand bars. Their distribution, whether parallel or perpendicular to the slope, depends on their elevation. Raised fields at the foot of Quaternary sand bars follow the slope to facilitate drainage. Those located in the nonseasonally flooded zone on top of the sand bars are arranged perpendicular to the slope, to optimize water retention. In the year-round seasonally flooded zones, they are organized parallel to one another, forming a checkerboard that facilitates irrigation.

   In western Suriname, one finds regular and irregular complexes (Boomert 1976). The former exist in various forms: round, oval, square, and rectangular. They measure 3–4 m wide and 4–30 m long, while the canals between the mounds measure 50–100 cm wide. They are arranged around habitation mounds in the marshes of the recent coastal plain or close to the sand ridges to the east. Irregular complexes are rounded or oval rectangles measuring 4–5 m wide and anywhere from 8 to 140 m long, with 30 m being the average. The canals between the mounds

are narrower, 1–2 m wide, but erosion has partially destroyed them. They are distributed in compact groups of two to 15 mounds in marshy areas of the recent coastal plain or below the sand ridges. Raised fields are generally smaller and shorter on the sand ridges than on the coastal plain. On the western part of the coast of Suriname, raised fields can be differentiated chronologically based on their morphology and their association with Barrancoid or Arauquinoid habitation mounds (Boomert 1980). Regular (quadrangular) raised fields are associated with Wageningen-1 and 2, Buckleburg-1 and 2, and de Burnside habitation mounds. Irregular raised fields are generally near Hertenrits and Wageningen-1 mounds, indicating an Arauquinoid association (650–1200 AD).

Several complexes of elongated raised fields in eastern Guyana are visible in aerial view. Generally, these constructions are poorly documented, but those observed are most often distributed perpendicular to a river. Close to Fort Nassau, along the Berbice River, George Simon (cited in Plew 2005) recorded 787 rectangular raised fields that measure 1.7–6.9 m wide, 5–8.2 m long, and 50 cm to 1.7 m high. It is likely that other such complexes, associated with habitation mounds, exist along both sides of the Canje and Berbice Rivers.

2. Large mounds vary in diameter from 2 to 6 m and in height from 50 cm to 1 m (only rarely 2 m high). In French Guiana, they are generally rounded near Kourou and quadrangular (although eroded) around the Maillard Savanna to the east. Some are oval, rectangular, or even polygonal, such as in the Iracoubo sector. The largest mounds are generally located in the most inundated areas, their size diminishing progressively with their distance from the seasonally flooded zone. They tend to be arranged in a tight gridded pattern, except for in Guyana, where the large round mounds are widely spaced. They are clearly visible in aerial photographs.
3. Medium mounds are round or square (more rarely rectangular). They measure 1.5–2 m in diameter and 30–50 high. They are organized either in groups or distributed in a checkerboard pattern. They form tight groups when located in forested settings and are difficult to detect from aerial photographs alone. These mounds are often very eroded but likely are identical to the intact mounds that are located in marshy zones.
4. Small mounds are almost always round, only rarely square. They measure 30–150 cm in diameter and 20–30 cm high. They are found on the edges of sand bars or on savannas that are slightly seasonally flooded but are completely dry in August. They are barely visible on aerial photographs at 1:10000 scale and are detected though pedestrian survey.

Large and medium mounds are the most common types; small mounds are the rarest (or perhaps only the most difficult to detect). Elongated raised fields represent an adaptation to specific geomorphological conditions. In most cases, the complexes are made up of an assortment of different types of mounds. This mixing is not accidental. Stereoscopic interpretation of aerial views suggests an intricate engineering at work, addressing multiple factors and well adapted to local conditions.

Multiple survey methods (stereoscopic interpretation of aerial photographs and aerial reconnaissance combined with pedestrian survey) have been conducted by the author in 1989–1991 and 2004–2010 to produce a precise map of pre-Columbian structures on a 200 km stretch of coast in French Guiana. On the basis of this cartography, it has been calculated that raised field cover 2,856 ha in French Guiana. However, in view of multiple destructive factors, it is reasonable to assume that a portion of the pre-Columbian constructions of French Guiana has disappeared and that the extent of territory transformed by indigenous peoples was greater prior to the Conquest.

Similar mapping work was carried out at a larger scale from 2006 to 2008 by the Dutch forester Frans Bubberman along the coast of Suriname (Rostain 2012). Agricultural constructions are less frequently recorded over a great deal of this coast because they are hidden by colonial

polders. However, it is likely that raised fields were equally common as in French Guiana before the Conquest. Combining the ensemble of mapping data available across these regions, it is possible to locate the raised fields of Guiana, from Cayenne (French Guiana) up to the Corantijn River (Suriname), a territory that covers 586 km. The only portion that is currently without data is eastern Guyana, consisting of at least 40 km bordered by the Berbice River.

Form and organization of raised-field complexes vary through time and space. The variability of raised fields in the Guianas is tied to cultural, chronological, and technological differences. Differences in local hydrological and edaphic factors also play a role. In French Guiana and Suriname, raised fields are not distributed along rivers, unlike the elongated raised fields of Guyana and Venezuela. Rather, they are constructed in coastal savannas, where they are organized in groups or grids between the marshes and sand formations. Five principal organization schemas are defined for the Guianas, each reflecting the level and degree of flooding, as well as the local topography:

Agricultural and Social Earthworks in the Guianas, Fig. 2 Raised fields in a flooded area, Maillard Savanna, French Guiana. (Photo by S. Rostain)

1. Permanently flooded zones are frequently characterized by large constructions. These are elongated raised fields or large mounds, arranged in a grid pattern (Fig. 2). Such complexes have been recorded in permanently flooded depression in the Macouria and Awala sectors of French Guiana, as well as in eastern Suriname.
2. Seasonally flooded banks along rivers were cultivated in western Guyana. Parallel groups of elongated raised fields are arranged perpendicularly or in chevron patterns along rivers (Fig. 3). They appear to function more often for irrigation than drainage. These structures are the most common type in South America (the most spectacular examples are along the San Jorge River in Colombia) but can also be found in Guyana, although only in the Berbice and Canje basins.
3. Thalwegs are the preferred location for constructing raised fields because they provide highly concentrated fertile soils. They have been almost completely modified throughout the Guianas coast. Medium mounds are the type most commonly found on thalwegs (Fig. 4). These mounds follow the natural line of the thalweg and are distributed in sinuous formations across the landscape. They are abundant in French Guiana and the preferred location for building raised fields around artificial habitation mounds in western Suriname.
4. The edges of sand bars are another important location for raised field construction because the slope allows for adaptations to changing flood levels over the course of the year. These zones are marked by the most complex examples of agricultural distribution; each mound is individually adapted to local hydrologic conditions (Fig. 5). Thus, the shape and size of raised fields vary according to their location. This type of organization is common in French Guiana, particularly in the Kourou sector but also in eastern Suriname.

Agricultural and Social Earthworks in the Guianas, Fig. 3 Raised fields along a river, eastern Guyana. (Photo by G. Simon)

Agricultural and Social Earthworks in the Guianas, Fig. 4 Raised fields along a thalweg, Maillard Savanna, French Guiana. (Photo by S. Rostain)

5. The seasonally flooded savannas, completely dry in August, are the largest spaces cultivated by indigenous peoples. Almost the entire surface is modified; only the highest areas and the sandiest zones are left untouched (Fig. 6). It is also notable that the most seasonally flooded areas were not utilized. Across these vast, flat surfaces, raised fields are very similar and located closely together. Only in eastern Guyana are large, widely spaced mounds reported. But doubts regarding whether they are of anthropogenic origin remain unresolved. Elsewhere, the mounds are generally medium in size, although large and small mounds also may occur.

Thus, the morphology and the distribution of raised fields are linked to topography and water levels, with variability possible within a single complex. Furthermore, the mounds sometimes form homogeneous and independent groups extending on half hectare each. Along the coast of the Guianas, some sectors are dominated by specific types of mound complexes. From west to east, seven principal modes of organization have been distinguished (Fig. 1). Cultural or geographic reasons for these differences are not always apparent. Nevertheless, it seems that each sector corresponds to a specific archaeological culture, associated to a specific environment:

1. Berbice sector: along the eastern part of the coast of Guyana, the dominant pattern is a series of elongated raised fields oriented perpendicular to rivers. Also common are very large mounds, up to 2 m high, widely

Agricultural and Social Earthworks in the Guianas, Fig. 5 Raised fields along a slope, west of Kourou, French Guiana. (Photo by S. Rostain)

Agricultural and Social Earthworks in the Guianas, Fig. 6 Raised fields in a flooding savanna, Roche Blanche savanna, and French Guiana. (Photo by S. Rostain)

spaced across the seasonally flooded savannas. Perhaps, pertaining to the Barrancoid period, they would represent a different chronological phase.

2. Hertenrits sector: in the recent coastal plain of western Suriname, complexes of elongated raised fields of varying sizes follow the contour of the thalwegs. The raised fields are either arranged in small concentrations or distributed in a disordered manner.
3. Barbakoeba sector: in the east of the country, from the Suriname River to the Maroni, raised fields (large or medium) are principally distributed around Quaternary sand formations.
4. Awala sector: both banks of the Maroni and also the Lower Mana, these consist of flooded depressions that have been modified by humans by the construction of large mounds or elongated raised fields arranged in grids.
5. Iracoubo sector: between the Organabo and Sinnamary Rivers of French Guiana, these are principally seasonally flooded savannas covered by large and medium mounds. There are also raised fields on the southern thalwegs, south of the route nationale no. 1 (national road that runs east-west along the coast).
6. Kourou sector: from the Sinnamary to the Macouria, elongated raised fields and mounds

tend to be fairly randomly distributed along the contours of sand bars. South of the coastal plain, below route nationale no. 1, thalwegs are the preferred location and are generally associated with large and medium mounds.

7. Macouria sector: from the Macouria River to the Cayenne Island, although there is some preference for thalwegs, the savanna and flooded depressions are also used. The mounds are large and medium in size and tend to be square.

The coastal stretch between the Hertenrits and Barbakoeba sectors is named Kwatta, where few raised fields have been detected. It is assumed that indigenous peoples cultivated without using the raised field technique the region's sandy shell ridges that are supposed more fertile than the coastal savannas.

Structures are generally arranged geometrically in a well-defined grid (although less symmetrical examples are occasionally noted). Our knowledge of the distribution of pre-Columbian earthworks on the coast of Guiana is still incomplete but indicates that a great deal of the seasonally flooded zones to the west of Cayenne was transformed by pre-Columbian peoples.

The elevation of the fields permits successful farming of land that has low agricultural fertility and is subject to periodic, prolonged flooding. The ancient coastal plain of the Guianas is largely composed of marshes, unsuitable for cultivation without modification. The solution adopted by indigenous groups was to construct mounds that reached above the highest flood level. This technique combines two principal functions: drainage of the soil and the concentration of fertile material.

The removal of soil from the matrix for constructing the mounds also produced drainage canals between the raised fields. The canals, in addition to their primary function of drainage, permit the elimination of harmful gases that limit root growth. This practice considerably reduces the risk of rot for the crops, particularly tubers.

The construction of raised fields in the Guianas corresponded to a period of extremely humid climatic conditions. Between 1300 and 800 years BP, intense rains provoked flooding in the Amazonian lowlands (Colinvaux et al. 1985; Colinvaux 1989). Pollen analysis carried out on the artificial habitation mounds of western Suriname demonstrates that they were built during periods of freshwater flooding (Versteeg 1985). The elevation of the surface of habitation mounds well above the present day high flood stage for the region, and that of Marajó Island, may also be evidence that the flood level was higher during this past period. Drained land would therefore have been less available in the past. These conditions likely led to the development of raised field techniques, at least in Suriname.

The second function of elevating mounds is to improve the structure of the soil. The clay soils of the marshes on the coastal plain are not well-suited for farming, but the construction of mounds concentrates the highest quality earth for planting. This technique also aerates the soil, which improves plant growth due to deeper penetration of roots and tubers. Restoring eroded mounds with sediment from between the fields rejuvenates the cultivated soil. Nevertheless, the application of fertilizers is important for increasing productivity. In the eighteenth century, Father Juan Gumilla (1963) observed indigenous peoples constructing raised fields along the Middle Orinoco, in Venezuela. He noted that they included dried vegetal material in the mounds. This same method of fertilization is still practiced by modern Brazilian and Haitian farmers who cultivate on raised fields. It seems that this technique could have been also practiced by pre-Columbian farmers. Recovery of phytoliths characteristic of maize rachis, stems, and leaves in raised fields in the Grand Macoua savanna indicates that crop remains were incorporated in the mounds as fertilizer (McKey et al. 2010; Iriarte et al. 2010).

Pedologists and archaeobotanists carried out sampling and measurements on the Grand Macoua and Organabo savannas in French Guiana (McKey et al. 2010). A comparison of phytolith assemblages and variations in the levels of stable carbon isotopes provides insight into the history of the landscape. Samples were collected from a stratigraphic column to a depth of 70 cm below

surface. The phytolith spectrum at different depths provides an image of the dominant vegetal community at different points through time, with the deeper deposits older than the deposits closer to the surface. The analysis reveals two trends that evolved in a parallel manner. The first trend shows the increase of the relative proportion of grasses of the subfamily Panicoideae from the lower clay level to the upper, more organic level and the decrease of the proportion of sedges (Cyperaceae) and herbaceous dicotyledons moving from the lowest level to the surface. The second trend indicates fairly homogeneous vegetation in the lower levels transitioning to more differentiated vegetation between the mounds (grasses) and the matrix close to the surface (Cyperaceae). These results are confirmed by isotopic analysis of the organic material in the soil, which shows a transition from a homogeneous isotopic signature in the lower levels (indicating a higher proportion of C3 plants) to a heterogeneous signature near the surface, with the mounds displaying a strong signal of the contribution of C4 plants (the greatest contributor being the grasses of the Panicoideae subfamily) and the matrix dominated by C3 plants (i.e., herbaceous plants such as *Heliconia*, Marantaceae (arrow root family) and, a few grass species, along with most sedges (Cyperaceae). The modern vegetation at the site demonstrates the same pattern, with a stronger proportion of C4 plants on the mounds and C3 plants in the matrix. The change in the vegetation communities can be interpreted as the result of a change from naturally flat and flooded savanna to a savanna scattered with mounds, where heterogeneity was introduced by humans (Renard et al. 2011).

The principal physical constraint is access to water and control of its circulation. Indigenous people deliberately located their mound complexes between low-lying areas and sand bars. Nevertheless, this precaution did not always protect the mounds from flooding, and it was sometimes necessary to surround certain groups of fields with drainage canals. The distribution of elongated raised fields in grids also reflects a concern for water control. In several complexes, the fields follow the downhill slope of the sand bars, likely to facilitate drainage. Conversely, the upstream elongated raised fields (in a less humid environment) are distributed perpendicular to the slope to favor water retention.

The mounds serve a double function. First, they protect plants from flooding because they elevate the planting surface above the flood level, and they facilitate drainage because the soil cannot absorb all of the rainfall during the wet season. Second, they concentrate organic material (residues of harvests and weeds) for the more demanding crops, such as maize or yams. The mounds also permit aeration of the soil. Physical and chemical constraints could be easily overcome by minimal fertilization and efficient water control. In any case, locating raised fields on the edge of flooded, seasonally flooded, and dry zones reflects a conscious decision-making by indigenous peoples. Finally, compared with highland slash-and-burn cultivation, it seems that raised fields allow for better regeneration of soils and are more sustainable over the long term.

Dating raised fields directly is challenging because they are constructed from material transported from surrounding areas and thus contain little datable material. The anthropogenic remains that are sometimes recovered from the mounds are generally not useful because their presence does not necessarily correspond to the period of utilization. In addition, they may also consist of material that predates the mound but was brought there during its construction, or conversely, material abandoned on the mound more recently. While these possibilities may be unlikely because the seasonally flooded savannas were little exploited prior to the pre-Columbian earthworks and generally ignored by European colonists, they cannot be dismissed.

There are several indices for deductive dating. The young coastal plain of western Suriname was almost never used by Amerindians, Europeans, or Creoles from the Conquest until the 1950s. Therefore, the earthworks found there are most likely of pre-Columbian origin. Furthermore, the raised fields of this region have always been organized around artificial residential mounds that are clearly indigenous and associated with the Barrancoid or Arauquinoid periods (300–1250 AD).

The discovery of a wooden shovel in the peat of the Arauquinoid site Prins Bernhard Polder, dated to the thirteenth century AD, supports this chronological association. This tool, perfectly adapted for excavating clay to construct mounds, was no doubt abandoned during the period of construction and thus represents a useful chronological marker (Fig. 7). Elsewhere in the tropical lowlands of South America, mound complexes are also associated with constructions that are clearly pre-Columbian and located in areas recently taken over by colonists. Nevertheless, those circumstances represent only indirect evidence of the antiquity of the raised fields and are insufficient for secure dating.

Agricultural and Social Earthworks in the Guianas, Fig. 7 Wooden shovels: at left, archaeological specimen from western Suriname, dated 1240–1280 AD; at right, Ashuslay shovel from Paraguay, at the beginning of the twentieth century. (Photos by S. Rostain and E. Nordenskiöld 1929)

The only sure dates on Guianas raised fields have been obtained in French Guiana. Organic material extracted from the tops of the paleosols buried under the mound complexes of Bois Diable and K-VIII, west of Kourou, has been dated using ^{14}C. The ages obtained are, respectively, 760 ± 40 BP (calibrated 670–700 BP) and 1010 ± 40 BP (calibrated 920–950 BP) (McKey et al. 2010). Other ages are 1060 ± 30 BP (calibrated 898–1022 AD) in Bois Diable and 620 ± 30 BP (calibrated 1289–1404 AD) in Matiti savanna. These dates correspond to those obtained from the sites of Barbakoeba on the west coast of French Guiana and from the eastern coast of Suriname. It is therefore reasonable to attribute the construction of the raised fields to the Barbakoeba groups that inhabited the sand ridges bordering the mound complexes (Figs. 8 and 9).

Canals, Causeways, and Mounds

While raised fields constitute the principal landscape modification employed by indigenous peoples, other transformations to the environment are known. Canals were frequently associated with agricultural constructions in order to improve drainage. However, not all constructions served an agricultural function. Streams were diverted and canals excavated to facilitate their circulation. Roads were elevated to cross safely flooded areas. Finally, enormous clay mounds were constructed as foundations for villages.

Stereoscopic interpretation reveals a tremendous number of excavated features, both natural and anthropogenic. These consist of irregular lines created by water flow or rectilinear canals. It is sometimes difficult to determine which are anthropogenic in origin because these earthworks can be easily confused with features caused by natural runoff. Due to their horizontality, the seasonally flooded savannas are characterized by a dense and disordered hydrologic pattern. However, these natural networks are too random to aid with drainage of the raised fields. Thus, it was necessary for indigenous peoples to excavate ditches to redirect excess water, which they often accomplished by simply modifying segments of

Agricultural and Social Earthworks in the Guianas, Fig. 8 Artificial mound of Hertenrits in the 1950s, western Suriname. (Photo by D. Geijskes)

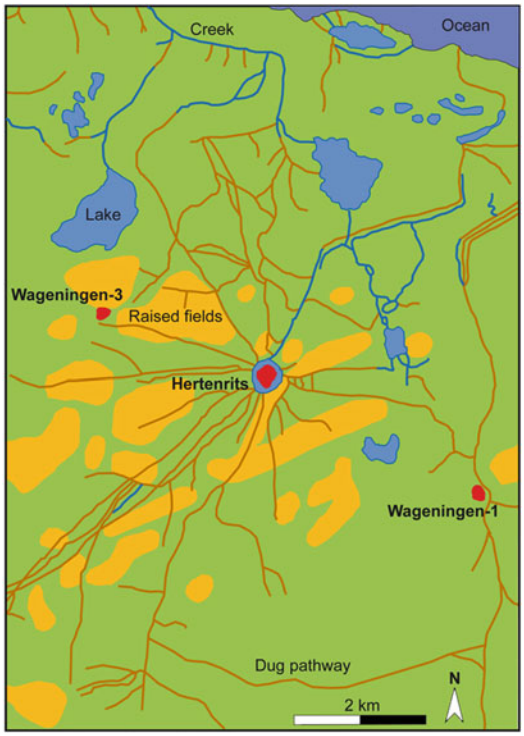

Agricultural and Social Earthworks in the Guianas, Fig. 9 Hertenrits territory in western Suriname: the red marks are artificial mounds, the yellow areas are raised fields, the brown lines are dug pathways, and the blue lines are small rivers, sometimes deviated by pre-Columbian inhabitants. (Drawing by S. Rostain)

the existing natural channels. In other cases, they excavated straight and wide drainage canals. This latter technique was also practiced by European colonists, who constructed long canals for the polders but also as routes for communication. Leroy Canal, which stretches for almost 11 km to the west of Kourou, is an example of these colonial constructions. It is therefore often difficult to identify with certainty the nature and origin of the drainage routes observed. Four types of hydraulic modifications are distinguished: enclosed ditches, canals, pools, and dug paths:

1. Enclosed ditches are linear features that follow an irregular course, perpendicular to the natural flow of water. They often connect two areas of high ground and enclose a group of raised fields. These small, artificial features measure from 1 to 2 m wide and several dozen meters long. They provide protection from flooding during the rainy season. They are relatively narrow and shallow at their extremities but often form a basin at the center point. These ditches therefore not only divert excess water in the rainy season, but they also provide a reservoir of water in the dry season.
2. Canals are rectilinear ditches, wider and deeper than enclosed ditches. They measure between

50 and 600 m long and between 2 and 5 m wide. They often enclose a seasonally flooded space and appear to control its drainage. Beyond their drainage function, the ditches and canals can also serve as reservoirs of water during the dry season and as permanent fishponds. Nevertheless, this type of canal is relatively rare. In French Guiana, in the Kourou sector, they are more frequent to the south of route nationale no.1 than to its north. This distribution is probably due to greater problems with drainage in the southern zone, which is elevated slightly higher than the northern plain. Canals are less common toward the marine shore, where they would be counterproductive because the clay soils become impermeable once they are saturated. Also, the construction of a dense drainage network could provoke a rise of brackish water, which would irreversibly render the soil uncultivable.

Raised fields are constructed and organized based on consideration of the seasonal levels and circulation of water. Ditches were constructed to control water flow.

3. Pools are excavated areas that function to conserve water and/or for pisciculture. They are not formally recorded in French Guiana but occur to the east of Suriname (Boomert 1976).
4. Dug paths and the channeling of streams are similar to canals, but they are much smaller in their dimensions, and their usage is radically different. Rather than being used for agriculture, they facilitate circulation. The most notable example is associated with the artificial settlement mounds of Hertenrits, where a network of these linear furrows forms a grid 10 km in diameter (Fig. 10). Indigenous people have drastically changed the course of small natural streams that cut across the plain. Most of the time, this involves altering the course of water flow to render it more rectilinear. In other cases, two existing creeks are linked by a passage. Completely human-made channels occur as well. The Hertenrits mound is surrounded by a large spider web pattern of dug paths. Some lengthen the course of natural streams, while others run parallel to creeks. Many extend out from residential mounds and link with raised field complexes or secondary domestic mounds. These sunken paths serve a double function. During the dry season, they mark paths to arrive at a specific location. These ancient networks resemble those associated with modern indigenous villages today. During the rainy season, when the plain is flooded, the same paths can be used as canals for pirogues. The flooding is not very deep across the plain and boats thus risk running aground. The sunken paths serve as canals that permit the navigator to direct his boat safely across the landscape.

Agricultural and Social Earthworks in the Guianas, Fig. 10 Burnt raised fields by modern fire, Maillard Savanna, French Guiana. (Photo by S. Rostain)

In eastern Suriname, the flow of creeks has also been modified to aid the circulation of boats. Across the Guianas, canal reaches are common on the bends of rivers. These are canals that pass through the forest to facilitate passage of pirogues and shorten the overall route by not requiring the craft to follow the longer, natural course of the river. In some cases, the shallow canals were constructed to connect two points of the river. Therefore, it is possible that some of the canals that connect higher parts of the coastal plain of Guiana served as routes for pirogues.

In French Guiana, two ancient human-constructed canals cross the road no. 22 linking Mana to Awala (Cornette 1987). They pass through the chenier on which the road is constructed and enter the marshes on both sides of the sand formation. The first canal cuts the road at 8.6 km east of the village. Its length is estimated at 2 km, but it is not perfectly straight because there are two slight changes of its orientation from 10° to 30° east. At its intersection with the road, it measures 21.4 m wide at the top of its walls (a slope of 25° to the northwest and 31° to the southeast). It is 4 m at its base and its maximum depth is 3.15 m. It has a concave section and a relatively flat base. When it enters the forest to the south, the width of the canal diminishes to an average of 8 m. The second canal, 12 m wide, crosses the road perpendicularly at 5.2 km from the first and is located several dozen meters east of raised fields. Another canal, 5 m wide and approximately 1 m deep, is noted close to the ancient Kali'na village of Coswine. According to the indigenous people of Awala, these canals were related to the site of *Nieku dupo* ("where the poison root for fishing is found"), which today no longer exists. (The *nivrée* is fishing with poison using macerated plant material having bioactive principles that paralyze the gills of fish, causing them to rise to the surface clumsily, from several vines in the Sapindaceae (soapberry) and Fabaceae (bean) families or from two cultivated shrubs, one in the Fabaceae family and the other in the Asteraceae (sunflower) family (William Balée, 2012, personal communication).)The myth of *Sibalalimbo* ("the man dressed in iron") tells that the Kali'na of this village had dug sunken paths to quickly assemble their warriors during conflicts with the English during the Colonial period.

The inverse of the dug paths is the raised paths or causeways. Stereoscopic interpretation has identified artificial earthen levees in several highly flooded areas of French Guiana, close to the modern shore. Some constructions of this type have been found in French Guiana. These levees cross the marshes, perpendicular to the shoreline. Three link together two cheniers, while the final departs from a chenier and ends in the mangroves along the shore. They measure 430 m long and 8 m wide, 330 m long and 5 m wide, and 450 m long and 3 m wide.

The most remarkable earthworks are the habitation mounds. There are almost no cheniers in the recent coastal plain of western Suriname and eastern Guyana. Thus, indigenous peoples had to adapt in order to build settlements. Due to the lack of sufficient dry land for their villages, they constructed immense, circular clay mounds above the flood level. Arauquinoid populations were accustomed to wetland environments and skilled in their modification. Several artificial mounds and other earthworks are found within the Arauquinoid sphere of influence in the Venezuelan *llanos* (Redmond and Spencer 2007). Versteeg's (1985) doctoral thesis at the University of Leiden in the Netherlands presented a study of mounds in western Suriname. In Suriname, of the 15 potentially anthropogenic mounds recorded by van der Heide (1973), seven are clearly ancient indigenous villages, two do not contain archaeological materials, two were circular mounds produced by the growth of *Avicennia* mangroves, and the remaining four were not visited (Versteeg 1985). The mounds in eastern Guyana are less well-known due to a lack of archaeological work, but the majority of them appear to belong to the Abary culture, a Barrancoid tradition, defined by Clifford Evans and Betty Meggers (1960).

The Barrancoid peoples were the first to construct settlement mounds in Guiana during the first few centuries of the Christian era. Analysis and dating of pollen from peat layers indicate that between 300 and 1000 AD, freshwater conditions prevailed on the western plain of Suriname (Versteeg 1985). It was at this time that

Barrancoid groups began mound construction. The mounds were constructed in stages, as is evidenced by the succession of light and dark layers in the stratigraphy. The former correspond to the foundational fill, while the latter represent the actual remains of the occupation.

- Buckleburg-1 is a circular mound that measures 139 × 137 m in diameter. Its mean altitude is 2.7 m asl or 1.5–1.9 m above the level of the surrounding marsh. Humans arrived in the area around 1835 BP, and construction began at 1735 BP. The mound was abandoned by the Barrancoid people shortly after 1315 ± 55 BP.
- Buckleburg-2 is slightly larger and taller than Buckleburg-1, located 2.1 km to the west/southwest. The two sites share similar ceramics. Furthermore, the two mounds are built along the same river.
- Wageningen-1 is a slightly oval mound that measures 130 × 100 m in diameter and has an altitude of 2.25 m asl or close to 1 m above the level of the marsh. Its construction began at 1315 ± 20 BP and its occupants left after 1130 ± 45 BP. The ceramic style is defined as Early Hertenrits, which corresponds to the Early Arauquinoid period.
- Wageningen-2 is a small oval mound located 1.6 km southeast of Hertenrits and is associated with this culture. It measures 60 × 40 m in diameter and is 40–50 cm high.
- Wageningen-3 is situated 2.8 km to the northwest of Hertenrits. It measures 80 × 60 m in diameter and 40 cm high. Like the two previous mounds, it is located in the territorial network of the Hertenrits culture.
- Burnside is the easternmost mound in the region. Oval in shape, it measures approximately 100 m in diameter and rises 50–75 cm above the level of the marsh. The ceramics collected from the mound are associated with the Hertenrits culture.
- Joanna, on the banks of the Canje River, is the only well-described mound in eastern Guyana (Goodland 1964). Surrounded by a ditch from which the construction material was derived, it measures 90 m in diameter and 2.5 m high.
- Hertenrits, 6 km south of the modern shoreline, is the largest of all the known residential mounds and has the longest occupation. It was named "sandy ridge of the deer" (*hert-en-rits* in Dutch) by the hunters who used it in the past. Oval in shape, it measures between 200 and 320 m in diameter and averages 2.9 m above the level of the marsh (Boomert 1980). The ceramic sherds recovered in the different levels are divided into two successive styles, Early and Late Hertenrits (Versteeg 1985). The mound was inhabited between 1265 BP and 935 ± 35 BP, but the stylistic change at the end of the sequence is interpreted as the result of the arrival of a new influx of population from the Orinoco around 1000–900 BP.

Besides the artificial mounds, often associated with paths and raised fields, as well as reservoirs and fishponds, the other notable earthworks found in the Amazon are the peripheral ditches. To date, they have been found in the east of Guiana and the Upper Amazon.

In French Guiana, east of Suriname and the eastern edges of Amapá, more than 40 sites with peripheral ditches have been reported, but it is probable that many more still are hidden by the forest. The Saramaka call them "crowned mountains." These are generally small hills, close to a river, ringed at the summit by a ditch 3–15 m wide and approximately 1 m deep, generally filled in one, two, or three places to allow crossing. They measure on average 100 m in diameter. Some reach up to 800 m long, 8 m wide, and 5 m deep. In one case, the ditch was carved directly into the rock (Éric Gassies, 2009, personal communication). Sometimes, particularly on the high banks of the river, the ditch only closes a hillfort. Little archaeological work has been carried out on these structures. These sites are particularly frequent in the interior of French Guiana and rare in Amapá and Suriname. They are dated from the beginning of the Christian era to the early Colonial period (sixteenth century).

To the northeast of Suriname, the peripheral ditch of Pondo Kreek-2 was excavated in 1980 (Versteeg 1981). The oval ditch has a diameter of

120 m by 95 m and measures on average 4.2 m wide, with an original depth of 3 m. Surface collections yielded 264 quartz tempered sherds (four of which were painted or 1.5% of the sample) and a quartz polishing stone for ceramics. Three test trenches cut across the ditch produced very little archaeological material (Aad Versteeg, 1994, personal communication). A piece of wood charcoal, collected at 175–180 cm below the base of the ditch, was dated to 1180 ± 70 BP (Versteeg 1981). The exact function of these sites is unknown, but it seems likely that they were fortified villages or ceremonial sites. The thinness of the anthropogenic level and the low percentage of phosphates recorded at Pondo Kreek-2 (Versteeg 1981), as well as the rarity of the archaeological material discovered, do not suggest a long occupation or a permanent settlement.

The ditched hill of Crique Yaou, on the Upper Maroni of French Guiana, excavated in 1992, revealed two archaeological levels and furnished a number of ceramic sherds. The two ^{14}C dates obtained on wood charcoal range between 200 BC and 130 AD. Dating carried out at other ditched hill sites throughout French Guiana have returned ages between the beginning of the Christian Era and the European Conquest (Mazière et al. 1997; Éric Gassies, 2009, personal communication).

The oral tradition of the Wayampi of Oyapock attributes these sites to the ancient Karane, who inhabited villages with defensive structures: "*throughout the region, there were many Kalana. They constructed villages that they protected with ditches two meters wide and one meter deep. Stakes were planted at the bottom. Those who did not know fell in and died. There are still remains of these ditches around the mountains close to Camopi and elsewhere*" (Captain Norbert cited by Grenand 1982: 270). Moreover, at the end of the eighteenth century, on the Inirida tributary of the upper Orinoco, the Puinave (warriors who practiced cannibalism) lived in fortified villages surrounded by ditches filled with poisoned stakes (Dreyfus 1992). At this time, the Wayana villages of French Guiana also presented elaborate defensive systems (Leblond 1813). However, these data are insufficient to prove the military use of pre-Columbian ditched sites. Thus, if the defensive function cannot be discarded, it is more probable that they had a ceremonial use.

Built Landscape

Stereoscopic interpretation, archaeological excavation, and the analysis of the natural and anthropogenic environments of the coast of Guiana have revealed significant impact by pre-Columbian populations on their landscape. These transformations were accompanied by rigorous management of the territory and the organization of many small parcels. Furthermore, the sociopolitical scope of different settlements seems to have varied, with some exercising more power than others.

One of the most significant criteria to determine the existence of chiefdoms is the hierarchization of sites based on their political importance. This aspect has been, to date, little studied in Amazonian archaeology. I have thus attempted to evaluate whether Arauquinoid sites fall into a hierarchical model.

In the floodplain of the Guianese coast, the cheniers offer ideal locations for villages, which are arranged along the length of these sand formations, extending parallel to the coast and connected to one another by paths. While each of these settlements was limited by the narrow width of the sand bars (less than 200 m), they spread over several hundreds of meters, at times, even over many kilometers.

The Barbakoeba site of Sable Blanc, on the western part of the coast of French Guiana, stands out because it combines three different functions: residential, funerary, and agricultural, this last one being located some hundreds of meters south of the settlement. The residential zone is located at the top of the sand bar, with the houses constructed at the highest and driest point. The settlement was arranged in a linear form, punctuated by open spaces, along the length of the chenier. The site is found on the left bank of the Iracoubo River, just south of its mouth. This location corresponds to a recurring model evident for the ancient coastal Arauquinoid villages. The largest sites were systematically located a short distance to the west of a large river and

close to the coast. This is the case for the sites of Bois Diable and Crique Jacques in French Guiana (Rostain 2012) and Kwatta-Tingiholo and Peruvia-2 in Suriname (Versteeg 1985). Access to the ocean was important because the farmers of raised fields also depended heavily on marine resources. The southern slope of the chenier was reserved for funerary activities, and the absence of domestic structures supports this interpretation. Two distinct groups of urns, of similar dimensions, appear in this sector, and it is likely that other such groups can be found in the rainforest farther to the west. These concentrations of urns, simple but with different associations of burials and offerings, could correspond to clans or families within the village. In this case, the cemetery would have been organized very precisely. The drainage canals that cross the necropolis indicate that it was necessary to manage an excess of water at certain times of the year. An artificial embankment 4 m wide and 1.5 m high surrounds the cemetery. It could have served to protect the necropolis from flooding, when the level of the southern marsh rose during the rainy season. In the lowest portions to the south and west, less than a kilometer from the site, there are raised-field complexes that cover the savannas. As in the other sites of Quaternary sand bars, the preferred placement of raised fields is in the marshes south of the settlement.

Thus, Arauquinoid sites of the cheniers demonstrate a specific organization of the settlement and its surroundings. The boundaries are well-defined, and the communities make the most advantage possible of their space. It is difficult to believe that these modifications to the territory resulted from small, independent groups. In addition, notable nonagricultural earthworks were sometimes created. These include embankments, causeways that cross the marshes, and canals or reservoirs (possible fisheries).

These findings are even more convincing for the artificial mound sites of the western part of the coast of Suriname. Pollen samples collected around these constructions show that they were located at the interface of freshwater and saltwater environments (Versteeg 1985). The areas around the mounds were flooded with freshwater at the end of the dry season. This permitted the inhabitants to exploit resources from marine, brackish, and freshwater environments, without going far from their village.

The two Barrancoid artificial mounds of Buckleburg-1 and 2 were constructed on the banks of the same river, about 2 km apart (Versteeg 1985). This likely represents a schema of settlements planned along a river where the principal site is found close to the coast, while the secondary site is established slightly more to the south. It is easy to access one mound from the other, either by boat or on foot.

Hertenrits, in western Suriname, is the most obvious example of carefully defined boundaries. Stereoscopic interpretation of this zone indicates precise management and organization of the territory. The Arauquinoid site of Hertenrits is the largest of the known mounds, covering close to 4 ha. Boomert (1980) estimates that its construction would have required the equivalent of 14,000 loads from a medium size truck. The mound is surrounded by a depression 20–100 m wide, created to extract the clay from which the mound was built. The perimeter is crossed by five canals with traces of moorings, indicating places used as docks. Several channels from water runoff were modified, some perhaps even created by indigenous peoples. The channels that cross the area have often been straightened or lengthened to connect one to another or with the canals. A complex network of straight, shallow canals crosses the landscape.

A number of connections were thus created among the different mounds, the raised-field complexes, and the streams. During the rainy season, the zone was crossed in canoes, while pedestrian paths prevailed in the dry season. Raised-field complexes, consisting of irregular groups of less than 20 elongated fields, occupied the surrounding thalwegs. Two smaller satellite mounds were constructed opposite to one another around Hertenrits. Wageningen-1 is 4 km to the southeast, and Wageningen-3 is 3 km to the northwest. Canals radiating from Hertenrits lead directly to these secondary settlements. The distribution and the connecting features demonstrate that the mounds were contemporaneous. They

were constructed around 650 AD and occupied for several centuries before their abandonment.

The inhabitants of Hertenrits, Wageningen-1, and Wageningen-3 constructed their settlement following a precise model. They carefully divided the territory to take advantage of the full range of resources their biotope offered.

Conclusion

Pre-Columbian populations in Amazonia dug and accumulated earth to build many structures and to adapt their environment to their necessities. Although they offer a biotope rich in various resources, the Amazonian marshy savannas were imperfectly adapted to the needs of their pre-Columbian occupants.

As in forested Amazonia, a late-Holocene expansion – and possibly an intensification – of farming also seems to have occurred in seasonally flooded savannas around the rim of Amazonia in Bolivia, Venezuela, and coastal Guianas (Rostain 2012). To respond to the constraints of these environments, farmers had to develop a monumental agriculture to take advantage of these spaces. This management strategy consisted of constructing mounds above the level of flooding. However, this increase was sometimes insufficient to protect the crops from submersion. Canals, ditches, and levees completed the system to overcome the variability of the water level.

Tens of thousands of hectares of floodplain lands have been developed for agricultural purposes in three major Amazonian regions: the Bolivian llanos to the west, the Venezuelan savannas to the north, and the Guianas marshy coast to the east. Raised fields affect a wide variety of shapes, sizes, and layouts. There is no universal model in elevated fields, each region, and even each site, showing particularities.

There is archaeobotanical evidence (phytoliths and pollen) for cultivation of maize and of squash on raised fields in French Guiana (Iriarte et al. 2010; Charconac and Rostain 2015). Microfossil remains of several other crop plants – yam (*Dioscorea* sp.), sweet potato (*Ipomoea batatas*), yuca (*Manihot esculenta*), and chili pepper (*Capsicum*) – have been found in villages associated with raised-field farmers and were probably also grown on raised fields. Based on the current diet of Amazonian groups, it has often been considered that the diet of pre-Columbian populations must also be based on cassava. Recent researches in the Amazon region, however, shows that this "civilization of manioc" was, in fact, perhaps less preponderant than it is today.

Other archaeobotanical data have been recently obtained in an older settlement in French Guiana based on starch grain analysis (Pagán-Jiménez et al. 2015). In a layer associated to the Late Archaic period, with dates that range from 6090–5740 cal. BP to 4150–3920 cal. BP, of the site of Eva 2, grindstones have been used for the processing of maize (*Zea mays*), sweet potato (*Ipomoea batatas*), chili pepper (*Capsicum* sp.), achira (*Canna* sp.), legumes (Fabaceae), and yams (Dioscoreaceae).

But the indefatigable of pre-Columbian earthmover farmers did not only build these magnificent agricultural chessboards. They also applied their skills to build a multitude of land monuments with various functions. For instance, they erected enormous mounds to settle their villages, to carry out their ceremonies, and to bury their deceased. They also built long roads and dykes, the latter sometimes serving as dams to trap fish. Elsewhere, they dug basins, reservoirs, peripheral ditches, roads, canals, and diverted streams using excavations. A whole hydraulic system therefore came in addition to a set of raised earthworks above the water.

Ceremonial life was also crucial in the pre-Columbian world. There may be too much tendency to see all these various earthworks as having a strict technological and practical purpose, whereas the Amerindian world had an extensive conception of the interaction of man with nature, associating the mythological universe with reality palpable. Some earthworks, for instance, the geoglyphs of Acre State in Brazil, could have served for rituals.

Slash-and-burn agriculture still is largely used in Amazonia by indigenous, so ethnological observations can be made to help to understand this technique. It is not the case with the

raised-field agriculture that has completely disappeared in Amazonia after the European Conquest. As other abandoned agricultural system, its understanding is completely dependent on inferences from the observation of the raised fields themselves and archaeological studies. Such partial data do not authorize to fully evaluate the complete diet of the ancient inhabitants because farming on raised fields was probably only one component of multi-activity subsistence systems (McKey and Rostain 2015). It is necessary to define a wider picture of the sustainability of this raised field, including intensity and productivity, to get a more accurate overview of the ancient indigenous economy.

Because of the absence of similar systems today in South America, a useful path can be to study modern raised-field farmers in other continent. For that reason, Doyle Mckey conducted ethno-ecological research in Africa where many groups still use a similar technic (McKey et al. 2014). Such approach suggested answers to contentious questions about pre-Columbian raised-field agriculture. For example, the integration of fallow periods appears to be a constant.

In sum, agricultural and social earthworks constitute a crucial aspect of the pre-Columbian period in the Guianas. Their study opens wide files of data and conclusions on the ancient inhabitants. Tropical soils can instruct us in many aspects.

Cross-References

- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Corsican Late Prehistory
- ▶ Earthworks of the Amazon
- ▶ Earthworks of the Llanos de Mojos
- ▶ Geometric Earthworks of Western Amazonia

References

Balée, W. 1987. Cultural forest of the Amazon. *Garden* 11 (6): 12–14.

Balée, W. 2013. *Cultural forests of the Amazon: A historical ecology of people and their landscapes*. Tuscaloosa: University of Alabama Press.

Barlow, J., T.A. Gardner, A.C. Lees, L. Parry, and C.A. Peres. 2012. How pristine are tropical forests? An ecological perspective on the pre-Columbian human footprint in Amazonia and implications for contemporary conservation. *Biological Conservation* 151 (1): 45–49.

Boomert, A. 1976. Pre-Columbian raised fields in coastal Surinam. In *Proceedings of the 6th international congress for the study of the Pre-Columbian cultures of the Lesser Antilles*, Gainesville, 134–144.

Boomert, A. 1980. Hertenrits: An Arauquinoid Complex in North West Suriname. *Journal of the Walter Roth Museum of Archaeology and Anthropology* 3 (2): 68–104. Georgetown.

Bush, M.B., and M.R. Silman. 2007. Amazonian exploitation revisited: Ecological asymmetry and the policy pendulum. *Frontiers in Ecology and the Environment* 5 (9): 457–465.

Chacornac, M., and S. Rostain. 2015. Les plantes cultivées sur les champs surélevés précolombiens. In *Archéologie de l'Amazonie. Les premiers habitants de la Guyane côtière*, BAR international series 2758, Paris monographs in American archaeology 44, ed. S. Rostain, 141–155. Oxford: Archaeopress.

Clement, C., W. Denevan, M. Heckenberger, A.B. Junqueira, E.G. Neves, W. Woods, and W. Teixeira (2015). The domestication of Amazonia before European conquest. *Proceedings of the Royal Society B* 282: 20150813. https://doi.org/10.1098/rspb.2015.0813

Colinvaux, P.A. 1989. The past and future Amazon. *Scientific American* 260: 102–108.

Colinvaux, P.A., M.C. Miller, L. Kam-Biu, M. Steinitz-Kannou, and I. Frost. 1985. Discovery of permanent Amazon lakes and hydraulic disturbance in the upper Amazon Basin. *Nature* 313: 42–45.

Cornette, A. 1987. Quelques Données sur l'Occupation Amérindienne dans la Région Basse Mana, Bas Maroni, d'après les Sources Ethno-archéologiques. *Equinoxe* 24: 70–99. Cayenne.

Denevan, W.M. 2001. *Cultivated landscapes of native Amazonia and the Andes*. Oxford: Oxford University Press.

Dreyfus, S. 1992. Les réseaux politiques indigènes en Guyane occidentale et leurs transformations aux XVIIe et XVIIIe siècles. *L'Homme* 32 (122–124): 75–98. Paris.

Erickson, C. 1993. The social organization of prehispanic raised field agriculture in the Lake Titicaca basin. In *Economic aspects of water management in the prehispanic new world*, Research in economic anthropology, Supplement 7, ed. V.L. Scarborough and B.L. Isaac, 7369–7426. Greenwich: JAI Press.

Evans, C., and B.J. Meggers. 1960. *Archeological investigations in British Guiana*, Bureau of American Ethnology, bulletin. Vol. 177. Washington, DC: Smithsonian Institution.

Goodland, E.A. 1964. The mound. *Journal of the British Guiana Museum and Zoo* 39: 9–17.

Grenand, P. 1982. *Ainsi parlaient nos ancêtres: essai d'ethnohistoire Wayapi*. Paris: ORSTOM.

Gumilla, J. 1963. *The Orinoco illustrated and defended*. Caracas: Biblioteca de la Academia Nacional de Historia. (original work published 1791).

Heckenberger, M.J. 2005. *The ecology of power: Culture, place and personhood in the Southern Amazon, AD 1000–2000*. New York: Routledge.

Heckenberger, M.J., J.C. Russell, C. Fausto, J.R. Toney, M.J. Schmidt, E. Pereira, B. Franchetto, and A. Kuikuro. 2008. Pre-Columbian urbanism, anthropogenic landscapes, and the future of the Amazon. *Science* 321: 1214–1217.

Iriarte, J., B. Glaser, J. Watling, A. Wainwright, J.J. Birk, D. Renard, S. Rostain, and D. McKey. 2010. Late Holocene Neotropical agricultural landscapes: phytolith and stable carbon isotope analysis of raised fields from French Guianan coastal savannas. *Journal of Archaeological Science* 37 (12): 2984–2994.

Leblond, J.-B. 1813. *Description abrégée de la Guyane française*. Paris.

Levis, C., et al. 2017. Persistent effects of pre-Columbian plant domestication on Amazonian forest composition. *Science* 355: 925–931.

Lima, H., E.G. Neves, and J.B. Petersen. 2006. La fase Açutuba: um novo complexo cerâmico na Amazônia Central. *Arqueología Suramericana* 2 (1): 26–52.

Mazière, G., et al. 1997. *L'archéologie en Guyane*. Cayenne: édition APPAAG.

McKey, D., and S. Rostain. 2015. Farming technology in Amazonia. In *Encyclopaedia of the history of science, technology, and medicine in non-Western cultures*, ed. H. Selin. Dordrecht: Springer/Business Media. https://doi.org/10.1007/978-94-007-3934-5_9893-1.

McKey, D., S. Rostain, J. Iriarte, B. Glaser, J.J. Birk, I. Holst, and D. Renard. 2010. Pre-Columbian agricultural landscapes, ecosystem engineers and self-organized patchiness in Amazonia. *PNAS* 107 (17): 7823–7828.

McKey, D., D. Renard, A. Zangerlé, J. Iriarte, K.L.A. Montoya, L.E.S. Jimenez, A. Solibiéda, M. Durécu, M. Comptour, S. Rostain, and C. Raimond. 2014. New approaches to pre-Columbian raised-field agriculture: Ecology of seasonally flooded savannas, and living raised fields in Africa, as windows on the past and the future. In *Amazonía. Memorias de las conferencias magistrales del 3er Encuentro Internacional de Arqueología Amazónica*, ed. S. Rostain, 91–136. Quito: MCCTH/SENESCYT/3EIAA.

Meggers, B.J., and C. Evans. 1957. *Archaeological investigations at the mouth of the Amazon*, Bureau of American ethnology, bulletin. Vol. 167. Washington, DC: Smithsonian Institution.

Neves, E., and J.B. Petersen. 2006. The political economy of pre-Columbian Amerindians: Landscape transformation in Central Amazonia. In *Time and complexity in historical ecology*, ed. W. Balée and C.L. Erickson, 279–309. New York: Columbia University Press.

Nordenskiöld, E. 1929. *Analyse ethno-géographique de la culture matérielle de deux tribus indiennes du Gran Chaco*. Paris: éditions Genet.

Pagán-Jiménez, J.R., R. Rodríguez-Ramos, B.A. Reid, M. van den Bel, and C.L. Hofman. 2015. Early dispersals of maize and other food plants into the Southern Caribbean and Northeastern, South America. *Quaternary Science Reviews* 123: 231–246.

Petitjean Roget, H. 1991. 50 sites de montagnes en Guyane française: contribution à l'inventaire archéologique d'Émile Abonnenc. In *Comptes rendus du XIIe Congrès de l'Association Internationale d'Archéologie des Caraïbes,* Martinique, 241–258.

Plazas, C., and A.M. Falchetti de Saenz. 1981. *Asentamientos prehispanicos en el Bajo Río San Jorge*. Bogotá: Fundación de Investigaciones Arqueológicas Nacionales, Banco de la República.

Plew, M.G. 2005. *The archaeology of Guyana*, Bar international series. Vol. 1400. Oxford: Archeopress.

Posey, D.A. 1985. Indigenous management of tropical forest ecosystems: The case of the Kayapo Indians of the Brazilian Amazon. *Agroforestry Systems* 3 (2): 139–158.

Redmond, E.M., and C.S. Spencer. 2007. *Archaeological survey in the High Llanos and Andean Piedmont of Barinas, Venezuela*, Anthropological papers of the American Museum of Natural History. Vol. 86. New York: American Museum of Natural History.

Renard, D., J. Iriarte, J.J. Birk, S. Rostain, B. Glaser, and D. McKey. 2011. Ecological engineers ahead of their time: The functioning of pre-Columbian raised-field agriculture and its potential contributions to sustainability today. *Ecological Engineering* 45: 30–44.

Roosevelt, A.C. 1991. *Moundbuilders of the Amazon: Geophysical archaeology on Marajó Island, Brazil*. New York: Academic.

Rostain, S. 1991. *Les champs surélevés amérindiens de la Guyane*, collection La Nature et l'Homme. Cayenne: ORSTOM.

Rostain, S. 2010. Pre-Columbian earthworks in coastal Amazonia. *Diversity* 2 (3): 353–369. Special issue long-term anthropic influences on the diversity of Amazonian landscapes and biota, edited by W. Balée.

Rostain, S. 2012. *Islands in the rainforest: Landscape management in pre-Columbian Amazonia*. Walnut Creek: Left Coast Press.

van der Heide, J. 1973. De Hertenrits: Een Bodemkunding/Archeologisch, *Rapport Dienst Bodemkartering*, 43, Paramaribo.

Versteeg, A.H. 1981. A fortified pre-columbian village in East Suriname? *Mededelingen Surinaams Museum* 32: 39–56. Paramaribo.

Versteeg, A.H. 1985. The prehistory of the young coastal plain of West Suriname. *Ber Rijksdienst Oudheidkundig Bodemonderzoek* 35: 653–750.

Agricultural Practice: Transformation Through Time

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Introduction

Agricultural production is a dynamic process that evolves out of interactions between plants, animals, the environment, and the food needs of human communities. Through time, agricultural practices changed as farmers developed new techniques to meet demands presented by both their physical and sociopolitical environments. The diversity of past agricultural practices and how they changed through time are reflected in a range of archaeological datasets, from large-scale landscape modifications such as irrigation and field systems to small-scale shifts in plant and animal ecologies. Archaeologists employ a range of methodologies to document the diversity of past agricultural practices and to understand the reasons for change.

A unifying topic in the archaeological study of transformations in agricultural practices through time is that of intensification. Intensification is the increase of agricultural output per unit of land per unit of time (Brookfield 1972). Two aspects of intensification that archaeologists study are (1) documenting the diverse range of intensification practices that past farmers employed and how they changed through time and (2) understanding the reasons why farmers needed to increase production. Both aspects of agricultural production relate to other important aspects of ancient human societies including population size, the environment, and sociopolitical dynamics.

Definition

Around the world, the adoption of agriculture as the primary means of obtaining food came after the initial domestication of plants and animals. In many places, there was a long period of time in which domesticated plants and animals supplemented foraging activities or "low-level food production" (Smith 2001). For a variety of reasons, ranging from climate change to social demands, most of these societies eventually became reliant upon agriculture and foraging became a supplemental practice.

Being a committed agriculturalist requires a fundamental shift in the relationship people have with their environment. In order to assure that a domesticated plant reproduces successfully and in sufficient quantities each year, farmers must learn to manage the dynamic environments in which the plants live and grow. Aside from the crops themselves, farmers must manage inclement weather (hail, frosts, drought), water, soil quality, and competitors (both plants and animals). Each region of the world presents unique characteristics, which have given rise to the diversity of agricultural strategies developed by people through time and space. Despite this diversity, there are common trends seen across the globe as societies became increasingly dependent on agricultural production.

Agricultural Practices

In his book, *Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture*, anthropologist Robert Netting (1993) provided a useful framework for categorizing the various practices nonindustrial farmers utilize to maintain productive agricultural systems: (1) soil moving and management, (2) water regulation, (3) restoring/increasing soil fertility, (4) diversification of production, and (5) protection of plants from growth-inhibiting competition. Each category is defined and discussed below with some specific examples and a general commentary of how these practices change through time. The types of archaeological evidence and the methods used to study each category are also described.

Soil Moving and Management

A variety of practices involve moving or manipulating the earth in order to support plant growth and control erosion. This can range from simple tilling to more permanent landscape modifications, such as terracing, elevating raised fields, and constructing paddy or pond fields.

In most regions, early agriculture occurred in areas with soils that were loose enough to till with simple tools, such as digging sticks or handheld hoes, including alluvial soils along river floodplains and loess deposits. As agriculture expanded, people often had to modify more difficult terrain in order to make it suitable for planting. For example, in mountainous regions with steep slopes such as the Andes, expansive systems of terraces were constructed. Another major innovation with reference to soil manipulation was the ox-drawn plow. While it initially helped farmers in the Near East farm more efficiently in river valleys, its introduction into Europe permitted expansion of farming into areas with deep, firm soils (Sherratt 1981).

Archaeologists have traditionally studied agricultural practices associated with soil moving and management using aerial and pedestrian survey, as well as analysis of stone, wood, and metal artifacts associated with tilling. Topographic maps and aerial photographs have long been used to document regional field systems. New technologies such as remote sensing with satellite photography and, most recently, airborne light detection and ranging (LiDAR) provide more expansive regional coverage, filters to highlight variations in soil and vegetation, filters to digitally remove obstructive features such as dense vegetation, and in some cases, provide higher resolution of features. For example, the use of LiDAR has revealed extensively terraced hillsides around the Classic Maya site of Caracol that had for centuries been obscured by tropical forest (Chase et al. 2011) (Fig. 1).

Soil manipulation can also be detected in geoarchaeological data sources such as soil profiles, sediment cores, and microstratigraphy (Lehmann et al. 2003). Finally, archaeobotanical datasets can reveal increased soil manipulation through the study of plant species associated with clearance such as a decline in forest species and increase in agricultural weeds.

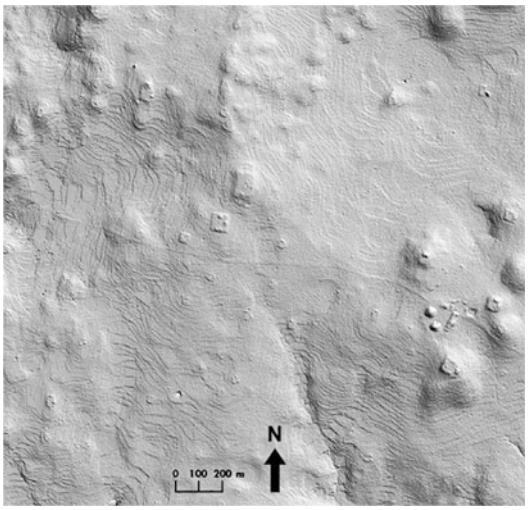

Agricultural Practice: Transformation Through Time, Fig. 1 LiDAR 2-D image of Ceiba Terminus at Caracol, Belize, showing hundreds of constructed terraces. (From Chase et al. 2011: 394, with permission)

Water Regulation

Farmers utilize a range of strategies to regulate water either to increase its supply or remove it. Water regulation systems that bring and retain water to fields include canal networks, check dams, and pond or paddy fields. Systems that help eliminate water include raised fields or mounded fields.

Early farmers used naturally well-watered areas such as receding floodplains or, in the case of rice, naturally flooded areas. As with soil manipulation, which is in part related to water regulation, when farmers wanted to expand their planting area, they needed to invent ways to transport water from the original source, maintain it, or, in some cases, remove it.

Extensive irrigation systems were developed in arid regions such as Egypt and coastal Peru. Elaborate wet farming systems that involve both canals and water-retaining fields developed throughout East and Southeast Asia and the

Pacific. Throughout the Americas, farmers developed raised-field systems in naturally inundated areas.

Archaeologists use the same range of survey and remote-sensing methods as discussed for soil manipulation and management. There are also innovative uses of archaeobotanical evidence to document the use of irrigation. For example, researchers observed an increase in the size of wheat and barley phytolith skeletons in periods associated with increased irrigation in the Near East and Egypt (Rosen 1994).

Restoring/Increasing Soil Fertility

An important process often associated with intensification is the reduction of the fallow period, or the time in which the field is allowed to rest. The fallow period is crucial for rejuvenating the nutrients in soils; however, if food needs require fields to be more continuously productive, humans can intervene to replenish nutrients and restore soil fertility.

Restoration of soil fertility has been accomplished through a variety of strategies such as crop rotation and adding fertilizer. Rotation involves planting different crops with different soil requirements over successive years. Legume crops are particularly crucial in these systems as they fix nitrogen and can improve soil quality. In Eurasia, legumes are often planted after cereals, and in Central and North America, indigenous farmers planted beans together with maize and squash.

Farmers also add nutrient-rich materials such as animal dung, kitchen or midden ashes, plant litter, and even animal parts to increase fertility. Fertilizing with dung is very common in regions with domesticated animals such as goats, sheep, and cows in Eurasia and camelids in the Andes. Muck from canals and ditches can be excavated and added to the planting field.

In tropical regions, soils tend to be thin and acidic, greatly limiting their natural productivity. These areas are most well known for the use of slash-and-burn or swidden agriculture, where plots of forest vegetation are cut and burned to create ashy, nutrient-rich planting surfaces. Such plots can be used for 4–5 years, but the nutrients are eventually depleted and the area is often overrun with weeds and pests. These plots are abandoned and new ones are cleared. Swidden farming is considered to be an extensive system of production and only able to support relatively small populations.

In the Amazon basin of South America, archaeologists have recently discovered that ancient farmers actually improved soils through a combination of slow burning forests, or creating what is known as a biochar, and possibly adding household waste. This increased the fertility of the soils and these "terra preta do indio" or Amazonian Dark Earths (ADE) are still sought after by modern-day food producers in Brazil. These deposits have been documented and studied by sedimentologists and micromorphologists to understand the practices that formed these unique soils (Lehmann et al. 2003).

When ancient cultivated areas are identified, several geochemical and geoarchaeological methods can help determine if they have been supplemented with fertilizer. There are also several indirect measures that together with other evidence may point to fertilization and soil restoration. These include the presence of manure-producing animals, nitrogen-fixing legumes, or nitrogen-loving (eutrophic) plant species in the archaeological record. Recently, researchers working in the Near East have argued that increased nitrogen levels in human isotopes throughout the Neolithic may reflect fertilization of fields rather than increased meat consumption (Bogaard et al. 2007).

Diversification of Production

Unlike our modern, industrial farming systems that focus on the mass production of a few crops, ancient and subsistence farming systems incorporated a wide range of crops and varieties that were often interplanted and rotated based on local environmental conditions and food needs. They also incorporated domesticated animals and pastoral activities.

The indigenous farming systems that developed and spread throughout the world involved a range of domesticated plant species including seed crops, legumes, tubers, fleshy fruits, and nuts for food and wood, fibers, and resins for industrial uses. For example, in the Andes of South America, ancient farmers grew many varieties of potatoes, as well as other tuber species such as *oca*. They also grew the grain crops quinoa and maize and in some areas leguminous crops such as tarwi and common bean. In more temperate climates, they managed food and spice-producing tree species such as huarango and molle. Additionally, they raised guinea pigs and two species of camelids, llamas and alpacas.

Through time farmers developed many varieties of individual crops and adopted and exchanged new crops for many purposes. Some varieties were selected for their ability to withstand local climatic variations and others were developed to meet diverse culinary tastes and traditions. While there were local developments of crop species and varieties, the spread of different domesticated plant species into new regions also played an important role in changing agricultural practices. In some cases, these new crops were simply integrated into existing cropping systems, such as maize in the Andes. In other cases, the introduced crops eventually replaced some of the indigenous ones, such as in eastern North America where the indigenous crop complex that included sunflower, maygrass, chenopod, and knotweed was eventually replaced by the Mesoamerican tripartite of maize, beans, and squash.

Archaeobotanical remains provide the primary means for studying the composition of past cropping systems. Carbonized, dessicated, or waterlogged macrobotanical remains have provided a great deal of insight into the role of seed crops, legumes, durable fruits, and woods. Tubers and fleshy fruits have been more difficult to study because they often do not preserve, but advances in microbotanical analyses of phytoliths and starch grains are improving our knowledge of these very important species. Finally, analysis of human isotope levels also contributes to the study of cropping regimes, particularly for the introduction and spread of C4 plants, such as maize in the Americas (Hastorf and DeNiro 1985).

Protection

Finally, all farmers must deal with the unwanted plants, animals, and insects that inhabit the fields and present competition or danger to the crops. Pests often increase as farmers intensify agriculture because some species, for example, members of the sunflower and mustard families and some rodents, are especially adapted to the highly disturbed environments in cultivated plots and fields. Additionally, as certain crops are cultivated more frequently for human consumption, they are more readily available to the insects that prefer them.

Several practices can help reduce the number of unwanted species such as plowing or planting toxic or pungent species that deter animals or birds. To remove unwanted plant species, often referred to as weeds, farmers intermittently enter the growing fields and manually remove them. Intercropping diverse crops and varieties, as well as maintaining a crop rotation system, can also serve to reduce pest populations or at least reduce the risk of complete destruction by them. Certain types of wet farming, such as pond and paddy fields, can help reduce the number of weeds and animals in fields. In his study of wet versus dry farming on Futuna Island in the Pacific, Patrick Kirch (1994) found that wet fields required much less work weeding than the dryland farming fields. Fences and earthen barriers also aid in keeping unwanted animals and even other humans away from the crops.

Detecting these types of practices in the archaeological record can be challenging. Fencerows or physical barriers may be encountered in surveyed or excavated field systems. Weedy species are common in archaeobotanical assemblages, particularly in areas where the dung of grazing animals is burned. These assemblages can provide insights into the types of species present in the fields but not necessarily if or how they were removed (Jones et al. 1999). Archaeobotanical studies of crop processing

stages may reveal the removal of weedy species during the grain cleaning process (Hillman 1973). Zooarchaeological studies also provide insight into the animal pests that may have inhabited fields. For example, in the American Southwest, the ubiquity of field and house rodents increased as farming became the primary form of subsistence (Dean 2005). Although farmers do not want these ruderal plant and animal species to destroy their crops, they are often useful resources in their own right. Some weedy plant species can be eaten as greens or used for medicine, while garden hunting can provide an important source of animal food.

These categories provide a general overview of the various strategies farmers employed, how they may have changed through time, and how archaeologists can document them. While understanding this diversity is important, it is also important to understand *why* such practices changed through time.

Historical Background

Theories of Agricultural Change

Archaeologists have long recognized that transformations in agricultural production were linked to other fundamental changes in human prehistory such as the development of complex societies and the founding of cities. V. Gordon Childe (1950) believed that the "Urban Revolution" could only occur once agricultural production was great enough to support non-farming specialists who could produce prestige goods and engage in trade. Julian Steward (1955) and Karl Wittfogel (1956) both argued that the first states emerged in arid regions that required irrigation to expand and intensify agriculture. They believed that a centralized and hierarchical system of governance was required to organize the construction, maintenance, and distribution of water in expansive irrigation systems.

Another factor that early thinkers associated with agricultural production was population. In 1798, Thomas Malthus (2004 [1798]) argued that agricultural production generally could not keep up with population growth. Unless a new technology could be introduced, overpopulation would be checked by famine or war. He did not consider, however, the political or social factors that may have caused such tragedies. This idea was challenged in 1965 by Danish economist Ester Boserup (1965), who, based on observations of nonindustrialized agriculturalists in Africa and Asia, argued that population growth is not limited by available agricultural technologies but that demographic pressure actually stimulates agricultural change. She found that as populations grew, farmers reduced the amount of time they left their fields in fallow and increased their work in the fields by weeding, fertilizing, and plowing in order to make them more productive. In cases where population size fell or pressure was reduced, they would shift back to more extensive land use.

Key Issues/Current Debates

Recent archaeological inquiries and debates have built upon these previous ideas and have attempted to determine which of these various factors, environment, population, and/or sociopolitical dynamics, may have brought about transformations in agricultural production. The main arguments are summarized below.

Population

Boserup's (1965) theory of population growth as the primary cause for agricultural intensification found much support among anthropologists and archaeologists. Such a pattern was documented among modern-day farmers in Africa and the Americas, and the definition was further refined (e.g., Brookfield 1984; Turner et al. 1993). Archaeologists argued that there was support for population causing agricultural intensification in areas such as Peru (Cohen 1977).

Boserup's theory has also received much critique. One set of critiques focuses on Boserup's unilinear evolutionary scheme of ever-decreasing fallow periods as the primary trajectory of intensification (Table 1). As described in the section on agricultural practices above, however, there are many ways to increase production such as

Agricultural Practice: Transformation Through Time, Table 1 Esther Boserup's (1965: 15–16) intensification scheme of decreasing fallow periods

Types of land use	Fallow period	Vegetation
Forest-fallow cultivation	>10 years	Forest regeneration
Bush-fallow cultivation	5–10 years	Some shrub, tree regeneration
Short-fallow cultivation	1–2 years	Grass regeneration
Annual cropping	Months	Cropped once a year
Mutli-cropping	None	Cropped two or more times a year

implementing innovative irrigation or cropping systems (Morrison 1994). Another critique focuses on her lack of consideration for the role of environmental or ecological variables. She saw the evolution of ever-decreasing fallow as independent of local environmental conditions, but new research shows this may not be the case. Finally, researchers have found other reasons as to why people may intensify agriculture aside from population growth. These ideas are discussed in more detail below.

Environmental Conditions

Boserup challenged environmentally deterministic models but to such an extent that she largely ignored how natural conditions shape the dynamics of agricultural systems. Boserup's scheme of forest fallow to multi-cropping is not applicable to more arid regions. As Wittfogel (1956) and Steward (1955) pointed out early on, the primary means of intensification in particularly arid regions is through irrigation.

In some cases, environmental conditions prohibit the possibility of intensification. In extremely arid regions, where rainfall is highly variable (seasonally and/or annually) and where irrigation is not possible, it is not worth increasing investment in fields that will likely fail due to drought. This seems to have been the case in the Wupatki region of New Mexico in the twelfth century CE (Stone and Downum 1999). Here, a volcanic eruption deposited fertile ash in a valley normally not suitable for agricultural production. Although the population did subsequently increase in the area, rather than intensify the production of individual fields, settlement patterns and territory markers indicate that farmers protected large areas of land in order to maintain a more extensive land-use strategy because intensification would have been too risky in this particularly arid region.

Finally, researchers argue that in some regions where rainfall is unpredictable, intensification practices, such as terracing or irrigation, are not implemented to meet the needs of population pressure but as a risk reduction strategy. For example, maize irrigation in parts of the Basin of Mexico did not increase yields compared to successful dryland farming but secured the production of the crop during years of low rainfall (Nichols 1987).

Social and Political Variables

Another important topic related to explaining agricultural transformations is the role of social and political variables. One theory is that agriculture is often intensified to meet political rather than population demands. For example, in New Guinea and the Pacific Islands, communities overproduce pigs and taro or yams for large feasts that will boost the social status of certain individuals. Although one result is the increased power and prestige of particular individuals, the community members also benefit by taking part in the feasts and ceremonies sponsored by this individual (Brookfield 1972). Shifts in political power can also drastically transform how and what types of food are produced. Expansive states and empires often reorganized food production in their new territories. For example, the Inca empire shifted highland potato farmers into lowland valleys and required them to produce more maize (Hastorf 1993).

The other issue that links social and political power to agricultural transformations is the "hydraulic hypothesis" proposed by Steward (1955) and Wittfogel (1956). They posited that complex irrigation or field systems require a more centralized form of governance. Much

like Boserup's intensification model, Steward and Wittfogel's ideas generated much enthusiasm. Archaeologists argued that the irrigated pondfield systems of the Hawaiian Islands were governed by complex chiefdoms (Earle 1980) and that the large-scale raised-field production in the Lake Titicaca Basin of Bolivia was directed by the Tiwanaku state (Kolata 1986). This model has been challenged, however, with ethnographic and archaeological cases showing how decentralized communities can operate large-scale irrigation and field systems such as on the north coast of Peru (Netherly 1984).

The theories summarized above focus primarily on single causes such as population, environment, or politics that bring about changes in an agricultural system. As archaeologists have learned more about the complexities of past and present agricultural systems, they have realized that no single factor or "prime mover" can explain how they developed and changed (Morrison 1996). For this reason, archaeologists now aim to understand the multivariable processes or courses of agricultural change by considering multiple archaeological datasets, such as those described above.

International Perspectives

From the examples provided above, the study of past agricultural strategies and transformations has been quite international and comparative in nature. Aside from teaching us about past dynamics in agricultural systems, archaeological studies of agricultural transformation have the potential to inform us about modern-day agricultural issues.

Rehabilitation of Ancient Farming Technologies

In some underdeveloped countries and regions, the study of lost, ancient agricultural techniques has led to rehabilitation projects aimed at improving local economies. For example, there have been several raised-field rehabilitation projects in highland and lowland Bolivia and Peru (Fig. 2). Ancient raised fields that were likely in use between 800 and 1200 CE were reconstructed in the Lake Titicaca basin of the Andean highlands (Erickson 1988; Kolata and Ortloff 1996), and the Llanos de Moxos of the Amazon basin (Erickson 1980). Initial experiments showed them to be highly productive. Several development projects aimed at helping these communities use this technology to improve food production were

Agricultural Practice: Transformation Through Time, Fig. 2 Ancient raised fields in the Pampa Koani, Bolivia

instituted but none of them lasted very long (Swartely 2002). Why these projects were unsuccessful has forced archaeologists to think more carefully about the differences in food production between today and the past and about our models of how these field systems originally functioned. Were raised fields used because they were more productive than dryland fields, or did they simply supplement dryland agriculture? Is the labor and effort needed to construct and maintain such field systems too great for small communities? Or has the economic structure of the modern, market and city-oriented labor force made rural, agricultural projects that require large, continuous labor inputs no longer viable or valuable? While such projects have the potential to help modern-day communities, they also help us refine our understanding of the past.

Future Directions

Archaeologists continue to pursue more information on the particular trajectories of agricultural transformation across the globe. The trend towards considering a broader range of reasons for and strategies of agricultural change will lead us to a better understanding of both differences and similarities among different world regions. Early studies of agricultural change tended to focus on landscape modifications such as field and irrigation systems. While we will continue to learn more about such systems with new technologies such as LiDAR, the greatest advancements will be made through analytical techniques in botanical and geochemical analyses that reflect other important agricultural practices such as fertilization, soil management, and pest control.

Cross-References

- ▶ Aerial Archaeology
- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Andes: Origins and Development of Agriculture
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Garden Hunting
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Paddy Soils: Environmental Analyses

References

Bogaard, A., T.H.E. Heaton, P. Poulton, and I. Merbach. 2007. The impact of manuring on nitrogen isotope ratios in cereals: Archaeological implications for reconstruction of diet and crop management practices. *Journal of Archaeological Science* 34: 335–343.

Boserup, E. 1965. *The conditions of agricultural growth: The economics of agrarian change under population pressure*. New York: Aldine Publishing Company.

Brookfield, H. 1972. Intensification and disintensification in Pacific agriculture. *Pacific Viewpoint* 13 (1): 30–48.

Brookfield, H. 1984. Intensification revisited. *Pacific Viewpoint* 25: 15–44.

Chase, A.F., D.Z. Chase, J.F. Weishampel, J.B. Drake, R.L. Shrestha, K.C. Slatton, J.J. Awe, and W.E. Carter. 2011. Airborne LiDAR, archaeology, and the ancient Maya landscape at Caracol, Belize. *Journal of Archaeological Science* 38 (2): 387–398.

Childe, V.G. 1950. The urban revolution. *The Town Planning Review* 21 (1): 3–17.

Cohen, M.N. 1977. *The food crisis in prehistory*. New Haven: Yale University Press.

Dean, R. 2005. Site-use intensity, cultural modification of the environment, and the development of agricultural communities in southern Arizona. *American Antiquity* 70 (3): 403–431.

Earle, T. 1980. Prehistoric irrigation in the Hawaiian islands: An evaluation of evolutionary significance. *Archaeology and Physical Anthropology in Oceania* 15: 1–28.

Erickson, C. 1980. Sistemas agrícolas prehispánicos en los Llanos de Mojos. *América Indígena* 40 (4): 731–755.

Erickson, C.L. 1988. Raised field agriculture in the Lake Titicaca Basin. *Expedition* 30 (3): 8–16.

Hastorf, C.A. 1993. *Agriculture and the onset of political inequality before the Inka*. Cambridge: Cambridge University Press.

Hastorf, C.A., and M.J. DeNiro. 1985. Reconstruction of prehistoric plant production and cooking practices by a new isotopic method. *Nature* 315: 489–491.

Hillman, G. 1973. Crop husbandry and food production: Modern basis for the interpretation of plant remains. *Anatolian Studies* 23: 241–244.

Jones, G., A. Bogaard, P. Halstead, M. Charles, and H. Smith. 1999. Identifying the intensity of crop

husbandry practices on the basis of weed floras. *Annual of the British School at Athens* 94: 167–189.
Kirch, P.V. 1994. *The wet and the dry: Irrigation and agricultural intensification in Polynesia*. Chicago: University of Chicago Press.
Kolata, A.L. 1986. The agricultural foundations of the Tiwanaku state: A view from the heartland. *American Antiquity* 51 (4): 748–762.
Kolata, A.L., and C. Ortloff. 1996. Tiwanaku raised-field agriculture in the Lake Titicaca Basin of Bolivia. In *Tiwanaku and its hinterland, archaeology, and paleoecology of an Andean civilization*, ed. A. Kolata, 109–152. Washington (DC): Smithsonian Institution Press.
Lehmann, J., D.C. Kern, B. Glaser, and W.I. Woods, eds. 2003. *Amazonian dark earths: Origin, properties, management*. Dordrecht: Kluwer Academic Publishers.
Malthus, T.R. 2004 [1798]. *An essay on the principle of population: Influences on Malthus selections, from Malthus' work, nineteenth-century comment, Malthus in the twenty-first century*. New York: Norton.
Morrison, K. 1994. Intensification of production: Archaeological approaches. *Journal of Archaeological Method and Theory* 1 (2): 111–159.
Morrison, K. 1996. Typological schemes and agricultural change: Beyond Boserup in south India. *Current Anthropology* 37 (4): 583–608.
Netherly, P. 1984. Management of late Andean irrigation systems on the north coast of Peru. *American Antiquity* 49 (2): 227–254.
Netting, R.M. 1993. *Smallholder, householders: Farm families and the ecology of intensive, sustainable agriculture*. Stanford: Stanford University Press.
Nichols, D. 1987. Risk and agricultural intensification during the Formative period in the northern Basin of Mexico. *American Anthropologist* 89: 596–616.
Rosen, A.M. 1994. Identifying ancient irrigation: A new method using opaline phytoliths from emmer wheat. *Journal of Archaeological Science* 21: 132–135.
Sherratt, A.G. 1981. Plough and pastoralism: Aspects of the secondary products revolution. In *Pattern of the past: Studies in honour of David Clarke*, ed. I. Hodder, G. Isaac, and N. Hammond, 261–305. Cambridge: Cambridge University Press.
Smith, B.D. 2001. Low-level food production. *Journal of Archaeological Research* 9 (1): 1–43.
Steward, J.H. 1955. *Irrigation civilizations: A comparative study*. Washington (DC): Pan American Union.
Stone, G.D., and C.E. Downum. 1999. Non-Boserupian ecology and agricultural risk: Ethnic politics and land control in the arid Southwest. *American Anthropologist* 101 (1): 113–128.
Swartely, L. 2002. *Inventing indigenous knowledge: Archaeology, rural development, and the raised field rehabilitation project in Bolivia*. New York: Routledge.
Turner, B.L., II, Goran Hyden, and R.W. Kates. 1993. *Population growth and agricultural change in Africa*. Gainsville: University of Florida Press.
Wittfogel, K. 1956. The hydraulic civilizations. In *Man's role in changing the face of the earth*, ed. W. Thomas, 152–164. Chicago: Wenner-Gren Foundation.

A

Further Reading

Denevan, W. 2002. *Cultivated landscapes of native Amazonia and the Andes*. Oxford: Oxford University Press.
Mabry, J. 1996. *Canals and communities: Small-scale irrigation systems*. Tuscon: University of Arizona Press.
Marcus, J., and C. Stanish, eds. 2006. *Agricultural strategies*. Los Angeles: Costen Institute of Archaeology, University of California, Los Angeles.
Miller, N., and K. Gleason. 1994. *The archaeology of garden and field*. Philadelphia: University of Pennsylvania Press.

Agricultural Practices: A Case Study from Papua New Guinea

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Introduction and Definition

A useful methodological tool to help unravel the complexities of how early agriculture emerged within a given locale is the concept of "practice" (following Bourdieu 1990; see Denham 2005, 2009, 2011; Denham and Haberle 2008; Bruno 2009; Jussuret 2010). In archaeology, practices represent human actions in the past, including habitual modes of behavior and dispositions, as well as individual idiosyncrasies (Barrett 1994). As such, the concept of practice has been proposed as a useful way to overcome various dualisms, or binary divisions, that permeate the study of human-environment interactions and social relations, whether in the past or present (Fig. 1; Denham and Haberle 2008; Denham 2009).

From one perspective, practices represent the nexus of human-environment relations because they mark the intersection of social life with the biosphere and geosphere (Fig. 1a); practices are

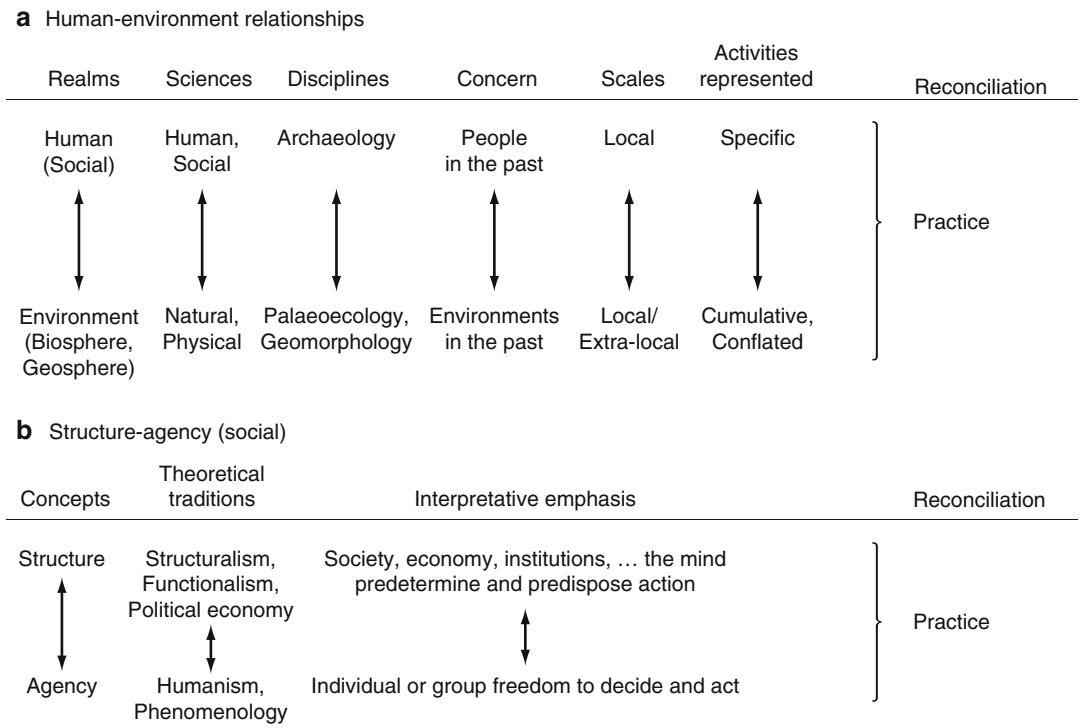

Agricultural Practices: A Case Study from Papua New Guinea, Fig. 1 Schematic diagram showing how the concept of practice reconciles various dichotomies inherent to the understanding of human-environment (*upper*) and human-human (social) relations (*lower*) in the past. (Amended version of Denham and Haberle 2008: Fig. 2)

structured by the environment, while simultaneously acting upon and changing that environment. Any practice represents the intersection between people and their world. From another perspective, practices are a manifestation of, and represent the nexus of, more abstract structure-agency dichotomies that pervade the social sciences and humanities (Fig. 1b). Practices focus upon what people did rather than upon seeking to unravel the degrees to which someone's actions are structurally determined (whether by social, economic, or mental structures) or represent their predispositions or are a product of individual improvisation. As such, practices subsume and encapsulate the inherent recursivity of human-environment interactions and social relations, respectively.

The concept of practice, though, does not address questions of ultimate causation, which remain open to variable speculation (Denham and Haberle 2008: 484–485):

> . . . in trying to explain why people did something in the past – whether in terms of what caused something to happen or in terms of what it meant to people in the past – we are continually drawing on our own frames of reference about how people behave and what governs that behaviour, ie, we continually fall back on patterns of thinking derived from our understanding of the world today. Consequently, we populate the past with *Homo economicus* and *H. ecologicus*, such as resource maximisers and optimal foragers . . ., or we try to distinguish conscious or unconscious patterns of behaviour from the evidence of past practices. . .. In attempting to address questions of 'why?' there is a continual interplay between what happened in the past and how that past is made meaningful in the present.

Having said this, a focus on practice draws our attention away from questions of "why," or from questions of ultimate causality, to the "what" and "how" something happened in the past. As a result, the concept has considerable utility for understanding the emergence of agriculture in a particular locale.

Key Issues

A Practice-Centered Method for Investigating Early Agriculture

A practice-centered approach is useful for archaeologists studying early agriculture because it focuses attention upon the multidisciplinary evidence of what people did in the past. Specific practices associated with cultivation may potentially include burning, forest clearance, gathering, plot preparation, transplantation, planting of seed, dibbling, staking of plants, tillage, construction of raised beds and mounds, and digging of drains or ditches. Some of these are relatively generic, constituent practices that are common to many forms of plant exploitation, including agriculture. As such, a practice-based framework provides common conceptual ground to understand and compare different forms of plant exploitation, such as agriculture and foraging, and to chart how these were transformed through time and across space (Denham 2008; Denham et al. 2009).

Within this conceptual framework, forms of plant exploitation represent higher-order categories associated with how various constituent practices co-occur, or are "bundled," within particular historico-geographical contexts. This bundling effectively reconstructs how constituent practices articulate and intersect within a locale at different times in order to determine which forms of plant exploitation plausibly occurred in the past and to show how these were transformed through time (following Hägerstrand 1970). This practice-centered method is designed to circumvent some of the laden "semantic" (Harris 1996) debates concerning the definition and attribution of monolithic categories such as "agriculture" or "foraging" to different forms of plant exploitation in the past.

Methodologically, a chronology of practices in the past can be reconstructed relatively directly from archaeological remains and indirectly through the interpretation of paleoenvironmental proxies, such as charcoal, phytoliths, pollen, and sediments. Using the Kuk Swamp evidence from the highlands of Papua New Guinea as an example, archaeological evidence of past plant exploitation and cultivation practices has grounded more equivocal paleoecological evidence of landscape transformation and archaeobotanical evidence for the presence and use of food plants (Denham and Haberle 2008). It is not just that multidisciplinary evidence for different practices co-occurs in time and place, but the archaeological evidence enables the different lines of evidence to be integrated and linked to specific practices, thereby enabling their "bundling" into forms of plant exploitation.

At Kuk Swamp, archaeological excavations documented artificially constructed mounds dating to 7000–6400 cal BP on the wetland margin. One of the fills between these mounds contained anomalously high *Musa* spp. banana phytoliths, while paleoecological evidence from several fills indicated a dramatic transformation of the landscape to grassland at this time (Denham et al. 2003). In the highland New Guinea context, these lines of evidence suggest mounded cultivation of crops, including bananas, as well as the exploitation of tuberous plants on the wetland margin within a landscape denuded and maintained as grassland.

The multidisciplinary evidence, the chronology of practices, and the interpretation of plant exploitation in the past should be reconstructed for a particular landscape or restricted region, rather on broader spatial (or chronological) scales. Today cultivation practices and major crop plants can vary considerably across Papua New Guinea, including from one valley to another (Bourke and Harwood 2009). Similarly, forms of plant exploitation are likely to have varied considerably across the island of New Guinea in the distant past (Denham 2005, 2011). In seeking to reconstruct plant exploitation in the distant past, particularly the emergence of agriculture, the conflation of records from geographically dispersed regions may provide a highly inaccurate portrayal of what actually happened at any given locale – the interpretative sum can be greater than the evidential parts (Denham 2009: 661).

These ideas are illustrated, and have been developed in order to understand, the long-term history of plant exploitation and the emergence and transformation of agriculture in the highlands of New Guinea.

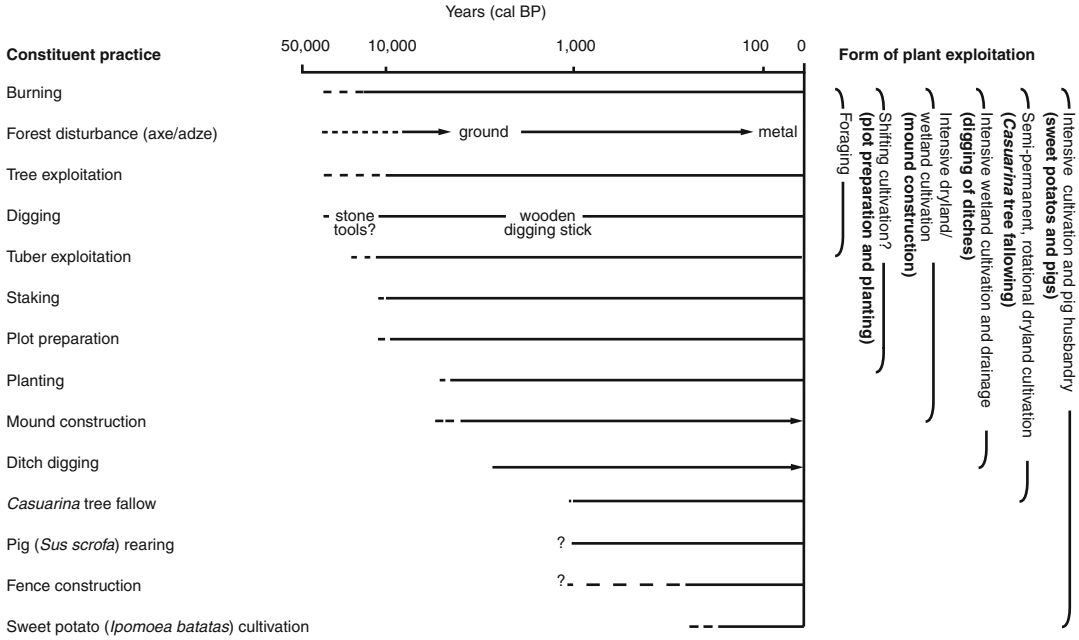

Agricultural Practices: A Case Study from Papua New Guinea, Fig. 2 Chronology of practices and associated forms of plant exploitation reconstructed for the Upper Wahgi Valley using multidisciplinary lines of evidence. (Amended version of Denham and Haberle 2008: Fig. 9)

Early Agriculture in the Upper Wahgi Valley, Papua New Guinea

Various lines of multidisciplinary evidence have been used to reconstruct a chronology of practices in the past for the Upper Wahgi Valley, Papua New Guinea (Fig. 2; following Denham and Haberle 2008). The chronology of practices has been cross-referenced with, and bundled into, forms of plant exploitation that have been documented ethnographically in the region. The chronology and resultant interpretations are secure because they are derived from archaeological, geomorphological, and paleoecological investigations at multiple sites (including wetlands, rockshelters, and open sites) within a confined region of one valley in the highlands.

The practice-centered method charts the emergence and transformation of agriculture through time in the Upper Wahgi Valley (Fig. 3). Continuities with earlier forms of plant exploitation, such as from foraging to shifting cultivation, are clearly demonstrated. To illustrate, multiple constituent practices are associated with traditional forms of foraging that occurred since the beginning of the Holocene, including burning, forest disturbance, tree exploitation, tuber exploitation, and digging. The additions of plot preparation, staking, and inferential evidence for planting to the practical repertoire are suggestive of some form of shifting cultivation on the floor of the Upper Wahgi Valley during the early Holocene. Additional definitive evidence for planting and mound construction indicates more intensive forms of cultivation on the wetland margin at Kuk Swamp at 7000–6400 cal BP. Subsequent innovations, introductions, and transformations of agriculture occurred following the inception of ditch digging from 4400 to 4000 years ago, the adoption of *Casuarina* tree fallowing from c. 1200 years ago, and intensive pig rearing and sweet potato cultivation within the last few hundred years.

Each transformation, or augmentation of the plant exploitation repertoire, results from the adoption of additional practices, whether of local innovation or extralocal introduction. Significantly, forms of plant exploitation need not be supplanted by successive transformations. In the Upper Wahgi Valley context, each reconstructed

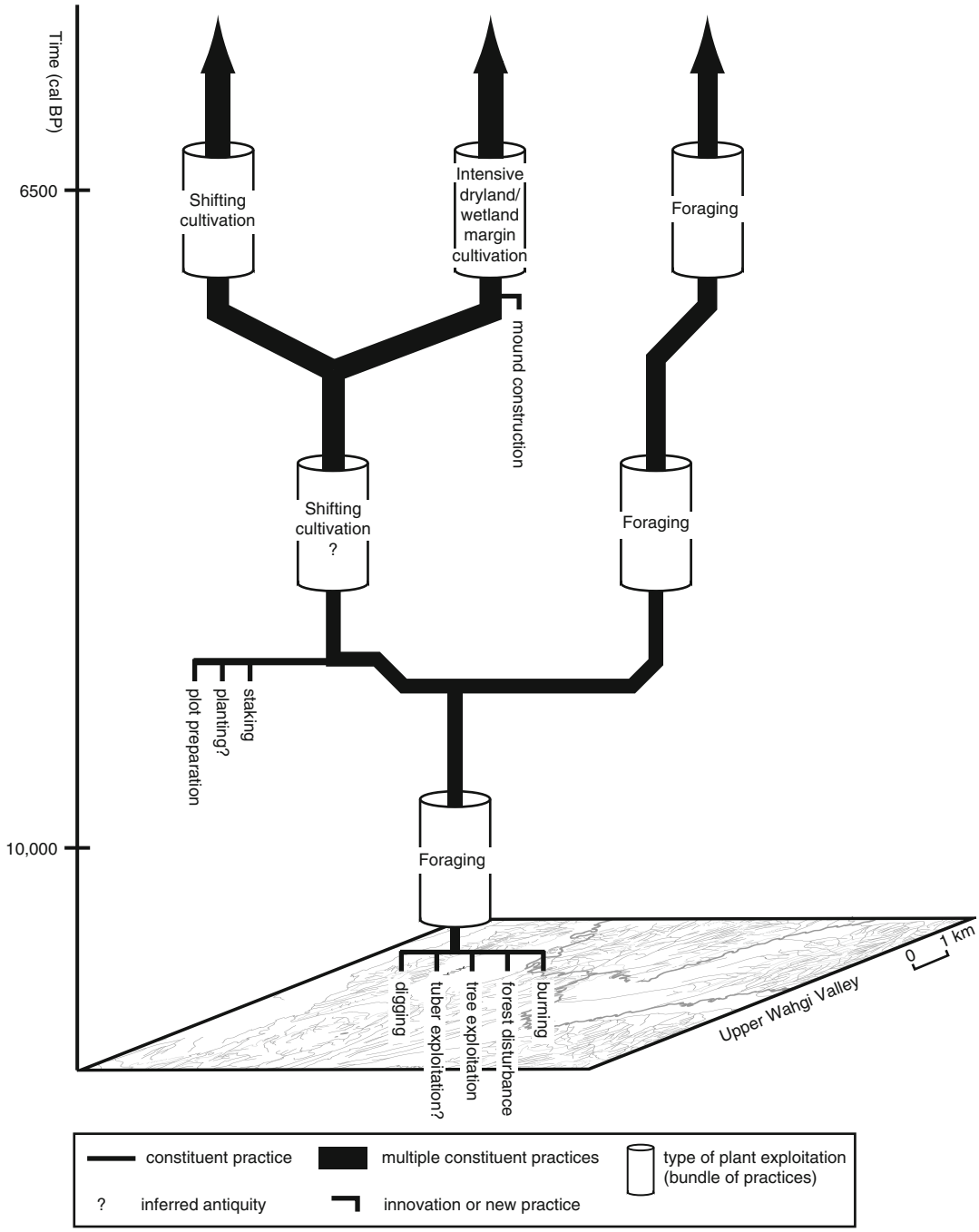

Agricultural Practices: A Case Study from Papua New Guinea, Fig. 3 Schematic representation of the bundling of practices into forms of plant exploitation reconstructed for the Upper Wahgi Valley during the early-to-mid Holocene. (Amended version of Denham 2009: Fig. 2)

form of plant exploitation broadens the repertoire that people draw upon simultaneously in different parts of the landscape. Consequently, the long-term history of agriculture is not unilinear; rather it becomes increasingly multilinear and adaptive to different parts of the landscape, as well as to

different landscapes, through time. The practice-centered method is designed to highlight the transformative aspects of plant exploitation, rather than viewing each form as a static, monolithic entity (Denham 2009).

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Bananas: Origins and Development
- ▶ Domestication: Definition and Overview
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Sugarcane: Origins and Development
- ▶ Taro: Origins and Development
- ▶ Yams: Origins and Development

References

Barrett, J. 1994. *Fragments from antiquity: An archaeology of social life 2900–1200 B.C.* Oxford: Blackwell.

Bourdieu, P. 1990. *The logic of practice*. Cambridge: Polity Press.

Bourke, R.M., and T. Harwood, eds. 2009. *Food and agriculture in Papua New Guinea*. Canberra: ANU E Press.

Bruno, M.C. 2009. Practice and history in the transition to food production. *Current Anthropology* 50: 703–706.

Denham, T.P. 2005. Envisaging early agriculture in the Highlands of New Guinea: Landscapes, plants and practices. *World Archaeology* 37: 290–306.

Denham, T.P. 2008. Traditional forms of plant exploitation in Australia and New Guinea: The search for common ground. *Vegetation History and Archaeobotany* 17: 245–248.

Denham, T.P. 2009. A practice-centred method for charting the emergence and transformation of agriculture. *Current Anthropology* 50: 661–667.

Denham, T.P. 2011. Early agriculture and plant domestication in New Guinea and Island Southeast Asia. *Current Anthropology* 52: S379–S395.

Denham, T.P., and S.G. Haberle. 2008. Agricultural emergence and transformation in the Upper Wahgi valley during the Holocene: Theory, method and practice. *The Holocene* 18: 499–514.

Denham, T.P., S.G. Haberle, C. Lentfer, R. Fullagar, J. Field, M. Therin, N. Porch, and B. Winsborough. 2003. Origins of agriculture at Kuk Swamp in the Highlands of New Guinea. *Science* 301: 189–193.

Denham, T.P., R. Fullagar, and L. Head. 2009. Plant exploitation on Sahul: From colonisation to the emergence of regional specialisation during the Holocene. *Quaternary International* 202: 29–40.

Hägerstrand, T. 1970. What about people in regional science? *Papers of the Regional Science Association* XXIV: 7–21.

Harris, D.R., ed. 1996. Introduction: Themes and concepts in the study of early agriculture. In *The origins and spread of agriculture and pastoralism in Eurasia*, 1–9. London: University College London Press.

Jussuret, S. 2010. Socializing geoarchaeology: Insights from Bourdieu's theory of practice applied to Neolithic and Bronze Age Crete. *Geoarchaeology* 25: 675–708.

Agriculture: Definition and Overview

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State of Knowledge and Current Debates

Introduction

Agriculture is the most comprehensive word used to denote the many ways in which crop plants and domestic animals sustain the global human population by providing food and other products. The English word agriculture derives from the Latin *ager* (field) and *colo* (cultivate) signifying, when combined, the Latin *agricultura*: field or land tillage. But the word has come to subsume a very wide spectrum of activities that are integral to agriculture and have their own descriptive terms, such as cultivation, domestication, horticulture, arboriculture, and vegeculture, as well as forms of livestock management such as mixed crop-livestock farming, pastoralism, and transhumance. Also agriculture is frequently qualified by words such as incipient, proto, shifting, extensive, and intensive, the precise meaning of which is not self-evident. Many different attributes are used too to define particular forms of agriculture, such as soil type, frequency of cultivation, and principal crops or animals. The term agriculture is occasionally restricted to crop cultivation excluding the raising of domestic animals, although it

usually implies both activities. The Oxford English Dictionary (1971) defines agriculture very broadly as "The science and art of cultivating the soil, including the allied pursuits of gathering in the crops and rearing live stock (*sic*); tillage, husbandry, farming (in the widest sense)." In this entry, we too use the term in its broadest, inclusive sense.

In the published literature on early agriculture, there is a tendency for the word agriculture and many of its subsidiary terms to be used vaguely without precise definition, and sometimes their connotations overlap, for example, proto/incipient and shifting/extensive. There is need to clarify much agricultural terminology to avoid confusion (Harris 2007: 17–26), particularly because the multidisciplinary nature of research on the subject leads to many concepts being used that derive from disparate disciplines; principally archaeology, anthropology, biogeography, genetics, linguistics, and taxonomy. In this entry, we cannot review comprehensively all the typological terms currently used in discussions of the origins and early development of agriculture. Instead we focus on the two most fundamental processes that led to agriculture, cultivation and domestication (of plants and animals), and then comment on some of the terms used to denote particular categories of agricultural production. In conclusion, we return to agriculture itself as a process of landscape-scale food production.

This approach, leading from consideration of cultivation through domestication to agriculture (Fig. 1), proposes that agriculture is a form of land use and economy that resulted from the combination of cultivation (a bundle of human actions focused on preparing soil and planting, tending, and harvesting plants) and domestication (a bundle of genetic and morphological changes that have increased the ability of plants to adapt to cultivation). Cultivation and domestication are related as cause and effect, a change in human strategy with consequences in genetic adaptations of another organism, which increased the interdependencies of both. In the next two sections, we explore the nature of and interaction between cultivation and domestication over time in light of mainly archaeological evidence together with some genetic data, including exploration of the concept of "pre-domestication cultivation."

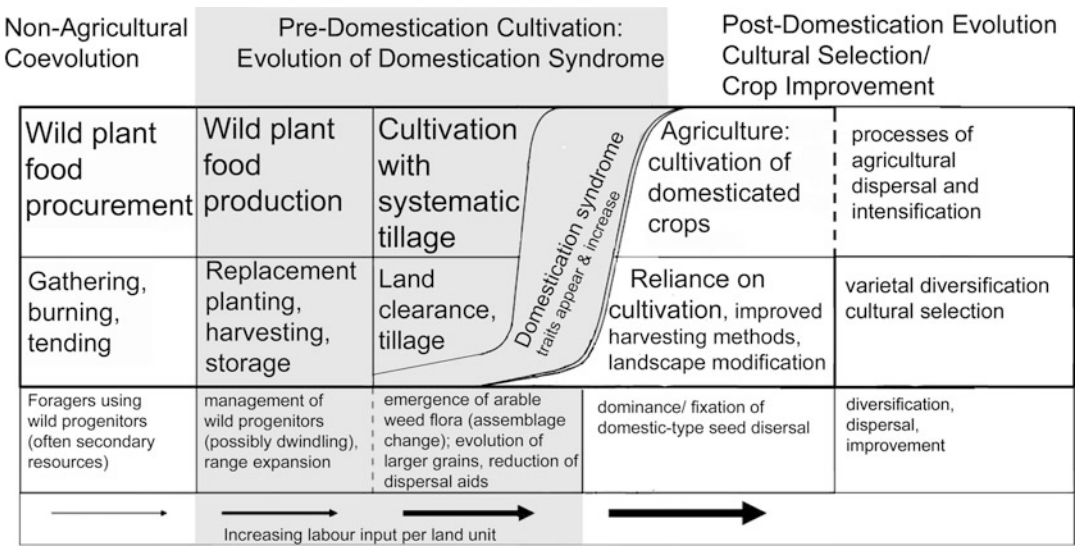

Agriculture: Definition and Overview, Fig. 1 An evolutionary model from foraging to agriculture, in which the transitions to cultivation, domestication, and agriculture are separated and potential archaeological indicators are suggested (Modified from Harris 1989 and Fuller 2007)

Cultivation

Cultivation is an activity through which humans become directly involved in the management of the lives and life cycles of certain plants. In abstract terms, this can be considered a change from a largely extractive approach to subsistence (collecting) towards a highly regulative one (Ellen 1994), with seasonal scheduling of labor for delayed returns and storable product. In practice, cultivation involves manipulation of soil, water, and other components of the plant environment. At its most basic, it involves sowing of seeds on soil which has been cleared of other vegetation. In low-intensity systems, this may come about through burning of vegetation (slash and burn) or by taking advantage of fresh deposits of silt by river floods (e.g., *décrue* agriculture; Harlan and Pasquereau 1969). It usually involves preparation of the soil by tillage. Tillage methods and tools vary from simple handheld devices (digging sticks, spades, hoes) to team-employed tools, such as the Andean "foot-plough," to animal-powered ards and true ploughs (Steensburg 1986). Other important variables include the addition of nutrients to the soil by such means as manuring, multiple cropping with nitrogen-fixing species (usually legumes of the family Fabaceae), or using crop rotations with legumes or fallow periods. This represents an important component of cultivation, i.e., scheduling the seasons of sowing and harvesting and interannual patterns in crop rotation and fallowing.

Water is a key input into any cultivation system, and in some regions it had a central role in the origins of agriculture. For example, control of water levels was essential in the development of early rice cultivation in China (Fuller and Qin 2009). Successful cultivation of the perennial ancestor of *japonica* rice involved extending shallow and wetland-margin habitats by clearing competing vegetation, as use of these slightly less-watered microenvironments would have increased grain production. The earliest preserved field systems for rice cultivation consist of small (1–2 m diameter) fields interconnected to each other and to frequent deep water pits that served to drain water from the growing rice.

Cultivation represents an important change in human strategy as people start to manipulate the soil and the composition of plant communities to enhance yields of particular plants later. This has led many researchers to infer that morphological domestication came about through unconscious selection. In other words, people did not set out to domesticate plants but to manipulate productivity through cultivation. The new environment created by cultivation can cause unintended domestication, as the cultivated species adapts to these new circumstances.

In recent years, archaeobotanical research has aimed to identify the practices of cultivation prior to the emergence of domesticated species. Such evidence for pre-domestication cultivation can be inferred from the presence of arable weed assemblages, which may be demonstrated by the statistical composition of wild-seed assemblages or by the modern ecological characteristics of species that recur archaeologically but have little or no known human uses (Willcox 2012). As is well known from later agricultural periods, archaeobotanical assemblages are made up predominately of crops and weeds, together with some gathered fruits and nuts, and this pattern begins to emerge by the earliest Pre-Pottery Neolithic in Southwest Asia and in the middle Neolithic in parts of China (Fuller and Qin 2010). This approach draws on the well-developed tradition in European archaeobotany of using weed-seed assemblages to infer the cultivation ecology of fields (Jones 1988).

Domestication

Domestication is most clearly defined as a biological phenomenon, that is, by traits in crops that result from adaptation to cultivation and by which they differ from close wild relatives. Several recurrent "domestication syndromes" can be recognized as sets of characters that define domesticated crops and characterize domestication as a form of convergent evolution under cultivation (Fuller 2007). The domestication syndrome differs for different kinds of crop plants, according primarily to how they are reproduced, by seed or by cuttings, and what plant organ is the target of selection (grain, fruit, tuber).

The best defined domestication syndrome is that for grain crops, including cereals, pulses, and oilseeds. While all of these traits are the product of cycles of harvesting and sowing from such harvests, the actual selection pressures seem to come from two different aspects of cultivation. First are some traits selected for by harvesting and the crops' growing reliance on humans for seed dispersal. Second are traits that relate to soil conditions, as tilled fields are essentially early successional communities on empty soil, which is generally loose and allows deeper burial of seeds. Although there are six essential syndrome traits in seed crops, only the first four have some chance of archaeobotanical preservation in some species.

First (1) is the elimination of natural seed dispersal, such as through non-shattering rachis in cereals and non-dehiscent pod in pulses and oilseeds. This is often regarded as the single most important domestication trait as it makes a species dependent upon the farmer for survival. It also means that human labor must be used to thresh crops and separate seeds, pods, or spikelets instead of natural dispersal occurring at maturity (Fuller et al. 2010). This trait can only evolve under conditions of harvesting, such as uprooting, use of sickles, or harvesting when crops are mature rather than green. This trait is readily identifiable in cereal rachis or spikelet-base remains, and has been studied in rice, wheats, barley, pearl millet, and maize, but is less evident in the preserved remains of many other crops. However, not all harvesting methods necessarily select for this, which means there are conceivable systems of "non-domestication cultivation" (Hillman and Davies 1990), or there may be weak selection leading to very protracted evolution of this trait within populations (Fuller 2007; Allaby 2010). It is worth noting that any individual plant, or archaeological specimen, either has wild-type or domesticated-type dispersal, but domestication is working on populations, and therefore domestication status should be determined for assemblages as representative of past populations. Recent archaeobotanical evidence tends to suggest relatively weak selection for this trait (Fuller et al. 2010).

A second connected trait (2) is reduction in aids to wild seed dispersal. Plants often have a range of structures that aid seed dispersal, including hairs, barbs, awns, and even the general shape of the spikelet in grasses. Thus domesticated wheat spikelets are less hairy, have shorter or no awns, and are plump, whereas in the wild they are heavily haired, barbed, and aerodynamic in shape. Varieties of wild rice are always awned and heavily barbed, while many cultivars are awnless and those with awns have fewer barbs. Rather than being positively selected by harvesting, this comes about by removal of natural selection for wild-type dispersal adaptations, and therefore under domestication, such traits require less metabolic expenditure. This trait may sometimes be visible in archaeobotanical material but is rare and non-diagnostic and does not provide a definitive means of identifying domestication archaeologically. Because this trait shifts gradually and non-diagnostically, it can be regarded as indicating "semidomestication."

Two additional traits of the domestication syndrome may be widespread, but they are not recoverable archaeologically: (3) synchronous tillering and ripening, sometimes including a shift from perennial to annual. Planting at one time and harvesting at one time will favor plants that grow in synchronization. Another trait (4) is a more compact growth habit with apical dominance, such as a reduction in side branching and denser spikes or seed heads. In some species, such as in several pulses, this involved a shift from a climbing habit to self-standing. Harvesting methods, like those that select for non-shattering types, can also favor plants with single and compact parts to be harvested.

Two more important traits are thought to relate primarily to an aspect of soil conditions, i.e., planting seeds into more deeply tilled soils. These are traits that relate to rapid germination and early growth. On the one hand (5) is the loss of germination inhibition. In the wild, many seeds will only germinate after certain conditions have passed – conditions of day length and temperature – or after the seed coat is physically damaged. In wild legumes, for example, this may mean that 90% of seeds will fail to germinate. By contrast,

crops tend to germinate as soon as they are wet and planted. This is simply selected by planting as those seeds that do not germinate will fail to contribute to the next harvest and subsequent crops planted from it. This is regarded as a key domestication trait, especially in pulses and pseudo-cereals (e.g., *Chenopodium* spp.) This change is often signalled by changes in the seed, such as thinner and less ornamented seed coats. On the other hand it is a trait, widely studied in archaeobotany, that can be regarded as a "semidomestication" trait. Trait 6 is increasing seed/fruit size. This is likely to be selected for by open environments and deep burial in disturbed soils. This has the added advantage of increased seed weight which tends to increase harvest yields from a given number of crop plants. Comparative studies, for example, between related species, show that larger seeds germinate more quickly and effectively than smaller seeds, and thus this should be selected for by tillage and cultivation generally. As seeds readily preserve, archaeological populations of them can be measured to track changes in average sizes and size ranges, to trace this trait over time. In the case of cereals, selection seems to be focused on seed thickness/breadth rather than length (Fuller et al. 2010).

While for seed crops, predominance of the above traits marks domestication, the end of a process of biological evolution, the determination of domestication sequences is much more difficult in vegetatively cultivated plants such as roots and tubers (Hildebrand 2003, and see the section below on Vegeculture). Because harvest of tubers focuses on a starchy storage organ rather than a reproductive organ, harvesting practices by humans are unlikely to pose strong selective pressures on the next generation. In addition, because tuber plants tend to be perennials, the harvested individual will tend to grow back, reducing the potential to select for improvements across generations. In many cases, cultivation practices may induce the useful part of the plant – the starchy organ – to exhibit phenotypic alteration without changes in its genotypic makeup, such as the improved tuber size produced by yams in loosened, prepared soil as opposed to harder unprepared soils (Chikwendu and Okezie 1989). Thus tuber crops can be cultivated for long periods and on an extensive field scale without undergoing morphological domestication. In addition, archaeologically recovered tuber fragments (parenchyma) tend to preserve few morphological attributes relevant to phenotypic or genotypic change. There is some research which suggests that micro-remains such as starch grains have increased in size with tuber domestication (Piperno 2012). As a result of these factors, the study of early vegecultural systems tends to focus on establishing the presence of potential crop species and inferring practices of landscape modification and management, such as soil mounding, ditch digging, and vegetation burning (see, e.g., Denham 2007).

Specialized Types of Livestock Management and Crop Production

In this section, we examine briefly several distinctive types of agriculture that developed over time into specialized systems focused on the production of food and often also secondary products such as hides, hair, wool, building materials, and many other useful items.

Mixed Crop-Livestock Farming

One of the most significant variables in the historical differentiation of agricultural systems is whether domestic livestock were fully integrated with the processes of crop cultivation as beasts of burden and agents of soil fertilization as well as producers of food. Such systems of "mixed farming" or "agropastoralism" developed early in only a few regions. They did so most comprehensively in Southwest Asia (and later in Europe) where domesticated herd animals – cattle, sheep, goats, and pigs – were raised in close conjunction with wheat, barley, and other cereal and pulse crops as producers of meat, milk, hides, hair, wool, and dung and as traction animals used for ploughing, load-bearing, and other purposes (Harris 2002). A comparable system of mixed farming evolved in East and Southeast Asia where water buffaloes became an integral component of the system of wet-rice (padi) cultivation (Hoffpauir 2000), although this may have been millennia after rice had spread

throughout China and much of Southeast Asia (Fuller et al. 2011).

In other regions of early agriculture where domestic herd animals were present, they were not fully integrated with crop cultivation as providers of food, fertilizer, and traction. Thus, in northern tropical Africa, cattle, camels, sheep, and goats, and in the Andean region of South America camelids (llama and alpaca), were not fully incorporated into indigenous systems of cereal, pulse, and root-crop cultivation.

Pastoralism

The full incorporation of domestic herd animals into systems of mixed farming requires permanent facilities such as barns, sheds, stalls, fenced fields, and other enclosures for confining the animals and controlling their movements. This contrasts with pastoral systems that are characterized by more mobile methods of management. The term pastoralism derives from the Latin *pastor*, meaning a herdsman or shepherd, and it applies to mobile systems in which the herd animals, principally sheep, goats, cattle, horses, donkeys, camels, llamas, alpacas, and reindeer, are raised to provide food and other products and as pack and riding animals. The essence of pastoralism is that people move with their animals. The spatial and temporal scales of their movements range from short daily movements of flocks and herds to and from pastures near their owners' settlements (diurnal grazing) to longer seasonal movements by part of the local community with their animals to higher and/or more distant pastures (transhumance), to the most fully mobile system in which families migrate from pasture to pasture with their herds throughout the year and from year to year (nomadic pastoralism). Nomadic pastoralists own and largely depend on their animals, although they have historically obtained some of their food and other supplies by trading with or raiding settled agricultural communities. In fact, all nomadic pastoralists depend to some degree on crop products for their food and often also for supplementary fodder for their animals.

Few if any fully nomadic pastoral groups still exist in the modern world, but in the historical and prehistoric past, this way of life was followed extensively in the deserts of northern and eastern Africa and southwestern and central Asia. The pastoralists' herds consisted mainly of sheep and goats, with the roles of horses and camels varying from region to region, and in the high latitudes of Eurasia a variant form of reindeer pastoralism became established (Ingold 1980).

Horticulture

Horticulture has two contrasted connotations in the literature on traditional agricultural systems and the origins of agriculture. The first relates directly to the origin of the word from the Latin *hortus*, meaning garden (juxtaposed to *ager*, field), and in this literal sense it refers to the cultivation of plots of land adjacent or quite close to the houses of the cultivators. Such gardens are normally smaller than fields, which are usually located farther from their associated settlements. A greater variety of plants, especially perennial shrubs and trees, tend to be cultivated in gardens than in fields, which are commonly devoted to one or only a few types of crop. Also, whereas most fields are cultivated in seasonal cycles, gardens are usually tended continuously, especially in the tropics where long growing periods favor year-round production. Another distinctive feature of house gardens is the presence in them of many adventitious wild and weedy plants. They add to the floristic and structural diversity of the plant community and enhance its ability to provide a great variety of edible, medicinal, and other products such as flowers, fibers, dyes, containers, and construction materials (see, e.g., Coomes and Ban 2004).

The contrasts in size and floristic diversity between gardens and fields are widely recognized in the literature on early agriculture, for example, in the terms "fixed-plot horticulture" and shifting or "swidden" cultivation and the German *gartenbau* and *ackerbau*. Small, continuously tended plots close to dwellings have been proposed as probable arenas of early plant domestication (Harris 1973: 398–401), but very little archaeobotanical research on past garden cultivation has as yet been undertaken.

Secondly, the terms horticulture and gardening have been used to denote agricultural systems that

combine field cultivation of annual root and/or seed crops with growing mainly perennial tree, shrub, and herbaceous plants in gardens – a mixed cropping system that, when trees are a major component, is sometimes alternatively described as agroforestry. This connotation of horticulture has been used particularly in descriptions of traditional, and by implication early, systems of cultivation in Melanesia and the Pacific Islands, but this usage tends to obscure the useful distinction between field and garden cultivation.

Arboriculture

The term arboriculture, from *arbor* the Latin for tree, is used to specify agricultural systems focused exclusively or largely on the cultivation of trees and shrubs for the production of fruits and seeds and, in some species, also for ancillary products such as wood for construction and leaves for thatch, fiber, etc. The term, which is sometimes equated with agroforestry (see above), refers mainly to the specialized cultivation of fruit- and nut-bearing trees and shrubs in single- or mixed-species orchards and plantations. It can refer also to plantations of trees for timber production, although this process is more usually described as forestry.

Arboriculture differs from horticulture in that the plants are grown in less floristically diverse communities on larger landholdings. Traditional systems of arboriculture include oil-palm plantations in tropical West Africa and olive, almond, and walnut orchards in the circum-Mediterranean region. Arboriculture has attracted much less attention in the literature on the beginnings and early development of agriculture than the cultivation of cereal, pulse, and root crops, and fruit- and nut-bearing trees are likely to have been a much more important source of food among many hunter-gatherer groups than among early farmers (Harris 2012: 37–9). It tends to be difficult to differentiate specialized arboriculture from more floristically mixed traditional systems of horticulture, and it is seldom possible to do so on the basis of archaeobotanical data alone (see, e.g., Gosden 1995 and Latinis 2000). At present, most of what can be inferred about arboriculture in premodern times comes from historical and ethnoecological evidence.

Vegeculture

The word vegeculture is used to describe agricultural systems that produce mainly root and tuber crops with underground storage organs consisting of starch-rich roots, root and stem tubers, corms, and rhizomes. The crops are reproduced asexually by planting pieces of a parent plant such as parts of tubers, stem cuttings, or sprouts, rather than being grown from seed. Vegetative reproduction made possible the domestication of tuberous plants by replicating the characteristics of parent clones and then selecting and multiplying useful phenotypic variations that arose in planted stock, such as unusually large or smooth-skinned tubers. The process did not involve directional genotypic change from wild progenitor to domesticate as occurred in seed-crop domestication. Root and tuber domestication has taken place within the limits of phenotypic variation determined by an unaltered genotype, but morphological changes under domestication have nevertheless been substantial, for example, decreased flowering and in tubers changes towards greater size and starch content and reduction in bitterness and in the numbers and length of thorns.

Although root and tuber and seed crops are often cultivated together, vegeculture is the traditional mode of agricultural production in many parts of the humid and seasonally dry tropics. Until recently, little macrobotanical evidence of vegeculture had been found because the soft tissues of root and tuber crops are seldom preserved (except in very dry or waterlogged archaeological contexts), but advances in microbotanical techniques for identifying remains of tuberous plants in the form of phytoliths (silicified particles of plant tissues), parenchyma (vegetative storage plant tissues), and starch grains preserved in sedimentary deposits are now beginning to illuminate the prehistory of vegeculture in several regions of the tropics (Hather 1994; Fullager et al. 2006; Piperno 2012).

Agriculture as Landscapes of Food Production

The beginnings of food production represent a strategic shift in human behavior, towards the manipulation of the soil environment and through an influence on the composition of plant populations grown in that soil, via preferential seeding and tending of one or a few species. While cultivation may involve a range of practices, and these will tend to select for morphological domestication, at least in seed crops, we can define agriculture in relation to the scale of cultivation, its prominence in local landscapes and in contributing a major component of human diet. In this sense, *agriculture* is the form of land use that represents a *change in the landscape*, as people regularly cultivate, raise, and focus more attention on domestic plants and/or animals. Agriculture creates fields for larger-scale production of crops and livestock. While small-scale cultivation may involve a few plants, agriculture involves the creation of substantial fields of sown vegetation on such a scale that it should, in principle, be recognizable in regional palaeovegetation datasets, recoverable from palaeosols, and a prominent part of the inferred source of archaeological plant remains. How one distinguishes agriculture from small-scale cultivation varies according to the parameters of particular geographical and cultural contexts.

Irrigation systems are one notable and widespread way in which distinctive landscapes of agriculture have been created. Control of water can be focused either on its removal (drainage) or by adding water to otherwise locally dry areas to allow cultivation where rainfall is insufficient to enhance productivity. In riverine agriculture, such as that associated with ancient Mesopotamia and Egypt (Butzer 1976), this took the form of canals and basins that helped to conserve floodwater and distribute it more evenly and widely. In some mountain environments, such as the Andes, canal systems, often closely associated with cultivated terraces, were also developed to bring steep slopes into agricultural production (Donkin 1979). Some irrigation systems incorporated manual water-lifting devices, such as the *shaduf* which was widespread in Egypt and Southwest Asia by c. 1500 BCE and allowed buckets of water to be raised above the level of canals and fed onto the fields. By the Classical era, cattle-driven water wheels (*saqia*) made lifting water more efficient and increased the extent of arable lands in river valleys. In regions that relied on rainfall for cultivation, deep wells to tap into groundwater, and surface reservoirs (tanks), were developed to store water. In some of the driest margins of cultivation around the Iranian plateau, in Central Asia, Arabia, and the Sahara, systems of underground tunnels or galleries (*qanats*, *karez*, *foggara*) began to be built several thousand years ago to collect subsurface water from piedmont slopes and direct it out to fields and palm groves in the adjacent plains (see, e.g., English 1968; Magee 2005).

Many other types of agricultural landscape, not referred to here, were developed in premodern times as an increasing proportion of the inhabited earth's surface was transformed by agriculture and as the human population became progressively more dependent through the Holocene, for its food and other needs, on a growing number of domesticated plant and animal species.

Cross-References

- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Landscape Domestication and Archaeology
- ▶ Vegeculture: General Principles
- ▶ Yams: Origins and Development

References

Allaby, R. 2010. Integrating the processes in the evolutionary system of domestication. *Journal of Experimental Botany* 61: 935–944.

Butzer, K.W. 1976. *Early hydraulic civilization in Egypt: A study in cultural ecology*. Chicago: Chicago University Press.

Chikwendu, V.E., and C.E.A. Okezie. 1989. Factors responsible for the ennoblement of African yams: Inferences from experiments in yam domestication. In *Foraging and farming. The evolution of plant exploitation*, ed. D.R. Harris and G.C. Hillman, 344–357. London: Unwin Hyman.

Coomes, O.T., and N. Ban. 2004. Cultivated plant species diversity in home gardens of an Amazonian peasant village in northeastern Peru. *Economic Botany* 58: 420–434.

Denham, T. 2007. Early to Mid-Holocene plant exploitation in New Guinea: towards a contingent interpretation of agriculture. In *Rethinking agriculture. Archaeological and ethnoarchaeological perspectives*, ed. T. Denham, J. Iriarte, and L. Vrydaghs, 78–108. Walnut Creek: Left Coast Press.

Donkin, R.A. 1979. *Agricultural terracing in the aboriginal New World*. Tucson: University of Arizona Press.

Ellen, R. 1994. Modes of subsistence: Hunting and gathering to agriculture and pastoralism. In *Companion encyclopedia of anthropology. Humanity, culture and social life*, ed. T. Ingold, 197–225. London: Routledge.

English, P.W. 1968. The origin and spread of qanats in the Old World. *Proceedings of the American Philosophical Society* 112 (3): 170–181.

Fullager, R., J. Field, T. Denham, and C. Lentfer. 2006. Early and mid-Holocene tool-use and processing of taro (*Colocasia esculenta*), yam (*Dioscorea* sp.) and other plants at Kuk Swamp in the highlands of Papua New Guinea. *Journal of Archaeological Science* 33: 595–614.

Fuller, D.Q. 2007. Contrasting patterns in crop domestication and domestication rates: Recent archaeobotanical insights from the Old World. *Annals of Botany* 100 (5): 903–924.

Fuller, D.Q., and L. Qin. 2009. Water management and labour in the origins and dispersal of Asian rice. *World Archaeology* 41 (1): 88–111.

Fuller, D.Q., and L. Qin. 2010. Declining oaks, increasing artistry, and cultivating rice: The environmental and social context of the emergence of farming in the Lower Yangtze region. *Environmental Archaeology* 15 (2): 139–159.

Fuller, D.Q., R.G. Allaby, and C. Stevens. 2010. Domestication as innovation: The entanglement of techniques, technology and chance in the domestication of cereal crops. *World Archaeology* 42 (1): 13–28.

Fuller, D.Q., J. van Etten, K. Manning, C. Castillo, E. Kingwell-Banham, A. Weisskopf, L. Qin, Y. Sato, and R. Hijmans. 2011. The contribution of rice agriculture and livestock pastoralism to prehistoric methane levels: An archaeological assessment. *The Holocene* 21: 743–759.

Gosden, C. 1995. Arboriculture and agriculture in coastal Papua New Guinea. *Antiquity* 69: 807–817.

Harlan, J.R., and J. Pasquereau. 1969. Décrue agriculture in Mali. *Economic Botany* 23: 70–74.

Harris, D.R. 1973. The prehistory of tropical agriculture: An ethnoecological model. In *The explanation of culture change*, ed. C. Renfrew, 391–417. London: Duckworth.

Harris, D.R. 1989. An evolutionary continuum of people-plant interaction. In *Foraging and farming. The evolution of plant exploitation*, ed. D.R. Harris and G.C. Hillman, 11–26. London: Unwin Hyman.

Harris, D.R. 2002. The expansion capacity of early agricultural systems: a comparative perspective on the spread of agriculture. In *Assessing the language/farming dispersal hypothesis*, ed. P. Bellwood and C. Renfrew, 31–39. Cambridge: McDonald Institute for Archaeological Research.

Harris, D.R. 2007. Agriculture, cultivation and domestication: exploring the conceptual framework of early food production. In *Rethinking agriculture. Archaeological and ethnoarchaeological perspectives*, ed. T. Denham, J. Iriarte, and L. Vrydaghs, 16–35. Walnut Creek: Left Coast Press.

Harris, D.R. 2012. Evolution of agroecosystems: Biodiversity, origins, and differential development. In *Biodiversity in agriculture. Domestication, evolution, and sustainability*, ed. P. Gepts, T.R. Famula, R.L. Bettinger, S.B. Brush, A.B.. Damania, P.E. McGuire, and C.O. Qualset, 21–56. Cambridge: Cambridge University Press.

Hather, J. 1994. The identification of charred root and tuber crops from archaeological sites in the Pacific. In *Tropical archaeobotany. Applications and new developments*, ed. J. Hather, 51–65. London: Routledge.

Hildebrand, E.A. 2003. Motives and opportunities for domestication: an ethnoarchaeological study in southwest Ethiopia. *Journal of Anthropological Archaeology* 22: 358–375.

Hillman, G.C., and M.S. Davies. 1990. Measured domestication rates in wild wheats and barley under primitive cultivation, and their archaeological implications. *Journal of World Prehistory* 4: 157–122.

Hoffpauir, R. 2000. Water buffalo. In *The Cambridge world history of food*, ed. K.F. Kiple and K.C. Ornelas, 583–607. Cambridge: Cambridge University Press.

Ingold, T. 1980. *Hunters, pastoralists and ranchers*. Cambridge: Cambridge University Press.

Jones, M.K. 1988. The arable field: a botanical battleground. In *Archaeology and the flora of the British Isles—human influence on the evolution of plant communities (Committee for Archaeology Monograph 14)*, ed. M.K. Jones, 86–92. Oxford: Oxford University Committee for Archaeology.

Latinis, D.K. 2000. The development of subsistence system models for Island Southeast Asia and near Oceania: The nature and role of arboriculture and arboreal-based economies. *World Archaeology* 32: 41–67.

Magee, P. 2005. The chronology and environmental background of Iron Age settlement in southeastern Iran and the question of the origin of the qanat irrigation system. *Iranica Antiqua* 40: 217–231.
Oxford English Dictionary. 1971. *The Oxford English dictionary*. Oxford: Oxford University Press.
Piperno, D.R. 2012. New archaeobotanical information on early cultivation and plant domestication involving microplant (phytolith and starch grain) remains. In *Biodiversity in agriculture. Domestication, evolution, and sustainability*, ed. P. Gepts, T.R. Famula, R.L. Bettinger, S.B. Brush, A.B.. Damania, P.E. McGuire, and C.O. Qualset, 136–159. Cambridge: Cambridge University Press.
Steensburg, A. 1986. *Man the manipulator*. Copenhagen: The National Museum of Denmark.
Willcox, G. 2012. Searching for the origins of arable weeds in the Near East. *Vegetation History and Archaeobotany* 21: 163–167.

Agroforestry: Environmental Archaeological Approaches

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Introduction

Agroforestry, the deliberate incorporation of trees in farming systems, is a very widespread practice with many variants, some of them presumably ancient. Archaeological investigation of these systems requires multidisciplinary research across disparate temporal and spatial scales, combining archaeobotanical, paleoecological, and ethnobotanical studies and focusing on agroecosystems rather than their individual constituents. The recent increase in such studies is part of a growing awareness of the intricacies of past human impacts on environments and of the diverse and complex histories of farming. Recognition of the biodiversity and variability of management practices in traditional agricultural systems has begun to stimulate revised models of the trajectories of peopled landscapes. New research questions in archaeology are supported by an expanding array of analytical techniques which draw on a wide range of sciences including molecular biology, genetics, chemistry, geophysics, information technology, and ecology.

The characteristics of trees, especially their slow maturation and long life, contrast with those of the annual and short-lived crops most often emphasized in archaeological studies of the origins and development of agriculture. Understanding the incorporation of trees in agroecosystems requires research at scales encompassing whole landscapes and long sequences of environmental change at fine resolution. Revised models of the effects of human manipulations of plant communities are developing as archaeobotanical, paleoecological, and associated research gradually expands the information base.

Definition

The Oxford English Dictionary lists "agroforestry (n.d.) as agriculture in which there is integrated management of trees or shrubs along with conventional crops or livestock" (http://www.oed.com/view/Entry/4197 [accessed June 26, 2012]) and cites the following earliest usage from Bene et al. (1977: 41): "One of the objectives of ∗agroforestry is to 'domesticate' and upgrade shifting agriculture to maximize sustained production on less well-endowed land."

Definitions of agroforestry that state similar objectives, and prescribe remediation of damage caused by unsound agricultural practices, are common in literature on rural development. Usage of the term agroforestry has extended to include many forms of polycultural farming in which trees are incorporated, practiced by independent small-scale farmers worldwide. In this broader usage, agroforestry may be synonymous with or include arboriculture, forest farming, orchard-gardens, silviculture, and similar terms. Clarke and Thaman (1993) distinguished the first, prescriptive definitions as constituting institutional agroforestry and the second broader usage as traditional or indigenous agroforestry. In the second sense, agroforestry is a useful collective

name for land-use systems in which woody perennials are deliberately grown on the same piece of land as agricultural crops and/or animals, either in some form of spatial arrangement or in sequence.

Historical Background

The word agroforestry came into common use with the establishment of the International Council for Research in Agroforestry (ICRAF), following the recommendation of Bene et al. (1977). This was a response to the perception that tropical forests were increasingly threatened by agricultural expansion. Agroforestry research became a topic of major interest among agricultural scientists, at first centered on Africa and restricted to a small range of practices aimed at soil improvement. The term agroforestry has gradually been adopted in other disciplines, especially anthropology and geography, to cover the wider range of traditional polycultural systems which include trees. The literature on agroforestry is now enormous.

Deforestation in the tropics was one among a number of environmental concerns that in the last decades of the twentieth century prompted wide-ranging research on causes and rates of environmental change. Cultural, ecological, and historical aspects of human agency have been an important part of this research, which has at times fueled political controversy over issues such as indigenous rights and conflicting claims to resource use.

The expansion of archaeological and related research over the last few decades has made clear that human-environmental interactions are complex and variable across time and space. Simplistic developmental trajectories, based on hypothetical sequences of the practices by which human groups have drawn food and other resources from their environments, have been superseded by more complex local and regional sequences. These are based on a wide range of evidence from many disciplines, derived from a profusion of new, analytically sophisticated research techniques and revised research questions.

Recent research on tropical forests has shown that these are mostly not primeval remnants of an ancient, unpeopled world and that human impacts on them are not restricted to relatively recent degradation, nor are they inevitably destructive (Brookfield 2001; Bhagwat et al. 2008). There has been an upsurge of interest in traditional small-scale tropical forest farming systems, many of which can be described as agroforestry, drawing together descriptions in older literature with newly identified variants. Ethnobotanical studies have shown that local systems of plant management often articulate elements that lie outside common analytical conceptions of agroecosystems, thus extending the boundaries of human influence on vegetation across space and over time (influential examples are Yen (1974) for Oceania and Alcorn (1981) for Mexico).

Traditional, subsistence-oriented agroforestry systems encompass fixed, rotational, and shifting fields and may include trees for food, fuel, medicine, forage and other uses, as well as for soil improvement and erosion control. While there is a strong association with tropical rainforest, there are tropical savanna and temperate examples as well.

Among the most familiar agroforestry systems (though not usually so-described) is the archetypical palm-fringed tropical South Pacific island. Its traditional components, apart from coconuts, include iconic ornamentals such as hibiscus and gardenia, breadfruit, and other tree crops, along with root and herbaceous food crops. These Pacific farming systems have often been characterized as arboriculture (Yen 1974), emphasizing the tree crop component, which is certainly distinctive but nevertheless an integral part of the larger system (Clarke and Thaman 1993). Another classic exemplar of an agroforestry system is the Guatemalan orchard-garden minutely described and mapped by Anderson (1952: 137–40). And in northern Luzon, in the Philippines, Conklin's (1980) detailed research over many years on the monumental rice terraces of the Ifugao showed how they are embedded as one component, albeit overwhelmingly picturesque, of an intricately

managed and flexible landscape architecture in which "woodlots" are essential. These carefully managed mini-forests provide food, medicine, firewood, and construction materials but most importantly, anchor the water and soil that maintain the terraces (Conklin 1980; Brookfield 2001: 18–20).

The literature describing traditional systems of tree management in the tropical New World expanded rapidly during the 1980s and in Southeast Asia, especially Indonesia, in the 1990s (summarized in Brookfield 2001: 140–56). Regional surveys of modern agroforestry practices often begin with thumbnail accounts of past practices for which high antiquity is asserted (e.g., for China, Hsiung et al. 1995; and Europe, Eichhorn et al. 2006). Although it is commonly accepted that the widespread and varied traditional forms of agroforestry systems have considerable time depth, evidence of this is often weak. In a few areas, the detailed ethnographic and ethnobotanical descriptions of extant traditional agroforestry systems have attracted the attention of archaeologists and provided the impetus for research on the origins and development of these tree-based agroecosystems, using archaeobotanical and paleoecological evidence. Such research contributes to wider debates among archaeologists and others on Pleistocene to Holocene environmental change, human-environmental interactions in general, and trajectories of plant-based human resource use in particular.

Key Issues/Current Debates

Tropical rainforests, under increasing threat from the encroachments of the modern world, have become the focus of increased attention from many disciplines: ecology, climatology, biogeography, and the politics of resource use prominent among them. Rates of change, at all scales and time periods, are a critical and highly contentious issue, as are the nature and timing of human impacts. The recent upsurge of multidisciplinary interest has largely rewritten tropical rainforest ecology and has opened new debates in archaeology and historical ecology.

Most archaeological research on agroforestry and related systems has so far been concentrated in the tropics, especially the New World, where establishing evidence for plant food production is problematic. Tropical agroecosystems are a poor fit for standard theoretical frameworks concerned with agricultural origins, in which the sharp contrasts of foraging/farming and wild/domestic are supported by relatively well-defined domestication syndromes of annual seed crops (Fairbairn 2005). Systems based on these crops do not furnish comprehensive models of the much greater range of practices which produce foods from plants managed in modified environments. Perennial crops, especially those propagated vegetatively, have been largely overlooked in synthetic models linking domestication processes and landscape management (McKey et al. 2012). Because of their long life spans and slow growth, tree crops are an especially difficult category (Kennedy 2012). Recent research has begun to increase the range of plants examined, as new techniques in archaeobotany are more often applied, and comparative collections expanded.

Understanding the development of crop assemblages and agroecosystems has tended to be sidelined by research, especially recent genetic research, on individual crops. Current archaeological research on local and regional trajectories of prehistoric human resource use ranges in scale from the isotopic signatures of dietary histories of single individuals to cultural and environmental transformations over millennia. The complexity of new data requires very specialized technical skills and more sophisticated models than ever. The challenge to develop interdisciplinary collaborations, based on shared understanding of complex laboratory methods matched with the flexibilities needed for field research, has never been greater.

International Perspectives

Although agroecosystems that might be described as agroforestry exist virtually throughout the cultivated world, archaeological research on these has been concentrated especially in the tropics.

In temperate areas of the Old World, where research on the prehistory of agriculture has concentrated especially on the cereals, other crops, including trees, have tended to be considered species by species, if at all. Their integration as part of agroecosystems has been less of an issue than their incidental presence in cultivated landscapes.

Recent archaeological work in the New World has focused directly on agroforestry. In tropical Central America and Amazonia, there is an emerging consensus of widespread modification and more or less intensive management of forest, including successional fallows (reviewed by Brookfield 2001: 141–6). However, debate continues about the origins of particular crops, the directions and rates of spread of these, and the sequence of practices associated with their management.

Landscape-focused, multidisciplinary research on agroforestry and management of water resources around the Mayan site Tikal has recently been renewed (see "Further Reading", below). In western Ecuador, in a valley-wide study, Stahl and Pearsall (2012) drew together macrobotanical, phytolith, and faunal data from archaeological contexts to infer that pre-Columbian agroforestry was practiced, producing a managed landscape mosaic in which domesticated annuals were combined with perennial tree crops and useful forest taxa. In the Peruvian Andes, Chepstow-Lusty and Winfield (2000) used historical and ethnographic data along with pollen cores and archaeologically provenanced charcoal from fuel wood, to examine Inca management of trees for firewood, construction, and tool making. Their data imply that this management would also have protected water resources.

In the Pacific, the relatively rich ethnohistorical and ethnobotanical records of traditional agroecosystems of the small, remote islands, especially those of Polynesia, form a particularly striking paradigm of landscape transformation under human management. Most of the plant food resources of these islands are human introductions. Archaeobotanical and paleoecological research on these islands is increasingly directed to resolving local sequences that span both prehuman and human phases of environmental change and to disentangling human action from other causes of environmental change. Human agency here includes construction of agricultural features such as terraces and ponded fields and extensive tree planting as well as erosion and deforestation. Athens et al. (1996) considered development of the traditional agroforestry system of Kosrae, a Micronesian high island, using pollen, sedimentological, and macro- and micro-charcoal evidence derived from cultural and noncultural contexts. They argued that this system, in which the trees and other crops are introduced cultigens, was established rapidly after the first colonization and persisted relatively unchanged for nearly two millennia. In contrast, developmental sequences have been proposed for other remote Pacific islands, starting with shifting cultivation which is then gradually transformed by intensification of land use and management of the introduced tree crops.

Further west, on larger islands of the southwest Pacific, the time span of human settlement extends back to the Pleistocene. The extended trajectories of human resource use are enmeshed with the effects of late Pleistocene climate change and include transition from hunter-gatherer to agricultural economies and domestication of local plants as well as extensive landscape modification. On these large islands, cultivated and wild populations of closely related tree species coexist, often without easily defined boundaries between them. Ethnobotanical and other descriptions provide incomplete coverage of the very diverse agroecosystems, many of which are tree based (Kennedy 2012). Archaeobotany in these islands confronts the pioneering challenges of poorly specified models and inadequate reference collections (Fairbairn 2005). Archaeobotanical and other evidence for sequences of resource use is scarce, especially in the lowland areas of tropical rainforest. In the densely populated intermontane valleys of

highland New Guinea, the striking diversity of extant intensive agricultural systems reflects a long and complex prehistory. Haberle (1998) collated chronological data from 16 archaeological and 23 paleoecological sites across the highlands, showing indirect evidence of changes associated with agriculture over the last 2000 years. These include most notably an increase in pollen of *Casuarina*, likely to represent a nitrogen-fixing species (*C. oligodon*) widely planted today for firewood and construction, and recognized as having sacred/aesthetic value and as a soil improver. There are also changes in palynological and sedimentological data indicative of landscape disturbance. Tephra chronology and sequences of archaeological features articulate with the other records to show an overall picture of dramatic and widespread change. Since these changes are not synchronous across the highlands, Haberle (1998) suggests that they reflect human activities, including adoption of new crops and new management practices such as agroforestry, as well as climatically driven environmental change.

In Southeast Asia, the large literature describing extant systems of agroforestry is mentioned above. This record raises questions for archaeobotanical and paleoecological research that are yet to be addressed in any detail. The region suffers from much the same challenges of pioneering research as the large islands of the southwest Pacific to the east (Fairbairn 2005). In some areas, including the islands of Java and Borneo, it is commonly assumed that systems such as fallow management and household orchards are historically recent developments, but evidence for this is lacking (Brookfield 2001: 146–7).

In Africa, the literature on modern agroforestry systems is enormous, and the remedial interventions that this literature documents were first developed there. There is nevertheless recognition in this literature of the existence of traditional forms of agroforestry, though without much evidence for their antiquity. Archaeological studies have begun to remedy this. For example, Neumann et al. (2012) point out the widespread importance in archaeological sites, all over West and Central Africa from the semi-arid Sahel to the humid rainforest, of intensively exploited trees, especially those with oil- and fat-containing seeds and fruit, over at least the last 2500 years. Archaeobotanical and other records elucidating how and when these trees have come to be integrated with other crops are so far very limited. Some of the trees, notably oil palm (*Elaeis guineensis*), are now important crops on the world market. Genetic research to improve this resource is very likely to provide useful insights relevant to its past. As elsewhere, archaeological evidence for the origins and development of African traditional agroforestry systems needs more research oriented to archaeobotanical and paleoecological questions.

Future Directions

Since the role of human agency in environmental change is currently a subject of great interest, the extended time scale contributed by archaeological studies is likely to be increasingly valuable. Archaeological research based on multidisciplinary collaborations enables the investigation of complex linkages between patterns of human resource use and environmental change, encouraging the development of more sophisticated models than before.

Human use of plant resources is undergoing reassessment, as new techniques allow more direct and detailed data bearing on previously difficult questions, such as the constitution of individual diets, rates of genetic change of plants under human management, and fine-grained environmental fluctuations. As a result, existing models of the ecological relationships that underpin human subsistence are subject to renewed critique (e.g., Zeder 2012).

Insights from the extensive new research on agroforestry and related practices in the New World are likely to be influential and to stimulate similar work in other areas.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Landscape Domestication and Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology

References

Alcorn, J. 1981. Huastec noncrop resource management: Implications for prehistoric rain forest management. *Human Ecology* 9: 395–417.

Anderson, E. 1952. *Plants, man and life*. Boston: Little, Brown and Company.

Athens, S.J., J.V. Ward, and G.M. Murakami. 1996. Development of an agroforest on a Micronesian high island: Prehistoric Kosraean agriculture. *Antiquity* 70: 834–846.

Bene, J.G., H.W. Beall, and A. Côté. 1977. *Trees, food and people: Land management in the tropics*. Ottawa: International Development Centre.

Bhagwat, S.A., K.J. Willis, H.J.B. Birks, and R.J. Whittaker. 2008. Agroforestry: A refuge for tropical biodiversity? *Trends in Ecology and Evolution* 23: 261–267.

Brookfield, H. 2001. *Exploring agrodiversity*. New York: Columbia University Press.

Chepstow-Lusty, A., and M. Winfield. 2000. Inca agroforestry: Lessons from the past. *Ambio* 29: 322–328.

Clarke, W.C., and R. Thaman, eds. 1993. *Agroforestry in the Pacific Islands*. Tokyo: United Nations University Press.

Conklin, H.C. 1980. *Ethnographic atlas of Ifugao: A study of environment, culture, and society in northern Luzon*. New Haven: Yale University Press.

Eichhorn, M.P., P. Paris, F. Herzog, L.D. Incoll, F. Liagre, K. Mantzanas, M. Mayus, G. Moreno, V.P. Papanastasis, D.J. Pilbeam, A. Pisanelli, and C. Dupraz. 2006. Silvoarable systems in Europe – Past, present and future prospects. *Agroforestry Systems* 67: 29–50.

Fairbairn, A. 2005. An archaeobotanical perspective on Holocene plant-use practices in lowland northern New Guinea. *World Archaeology* 37: 487–502.

Haberle, S.G. 1998. Dating the evidence for agricultural change in the highlands of New Guinea: The last 2000 years. *Australian Archaeology* 47: 1–19.

Hsiung, W., S. Yang, and Q. Tao. 1995. Historical development of agroforestry in China. *Agroforestry Systems* 30: 277–287.

Kennedy, J. 2012. Agricultural systems in the tropical forest: A critique framed by tree crops of Papua New Guinea. *Quaternary International* 249: 19–30.

McKey, D., M. Elias, B. Pujol, and A. Duputié. 2012. Ecological approaches to crop domestication. In *Biodiversity in agriculture: Domestication, evolution and sustainability*, ed. P. Gepts, R. Bettinger, S.B. Brush, T. Famula, P.E. McGuire, C.O. Qualset, and A.B.. Damania, 377–406. Cambridge: Cambridge University Press.

Neumann, K., K. Bostoen, A. Höhn, S. Kahlheber, A. Ngomanda, and B. Tchiengué. 2012. First farmers in the Central African rainforest: A view from southern Cameroon. *Quaternary International* 249: 53–62.

Oxford English Dictionary. n.d.. Available at: http://www.oed.com/view/Entry/4197. Accessed 26 June 2012.

Stahl, P.W., and D.M. Pearsall. 2012. Late pre-Columbian agroforestry in the tropical lowlands of western Ecuador. *Quaternary International* 249: 43–52.

Yen, D.E. 1974. Arboriculture in the subsistence of Santa Cruz, Solomon Islands. *Economic Botany* 28: 247–284.

Zeder, M. 2012. The Broad Spectrum Revolution at 40: Resource diversity, intensification, and an alternative to optimal foraging explanations. *Journal of Anthropological Archaeology* 31: 241–264.

Further Reading

Balée, W., and C.L. Erickson, eds. 2006. *Time and complexity in historical ecology: Studies in the neotropical lowlands*. New York: Columbia University Press.

Cairns, M., ed. 2007. *Voices from the forest: Integrating indigenous knowledge into sustainable upland farming*. Washington, DC: Resources for the Future Press.

Denevan, W.M., and C. Padoch, eds. 1987. *Swidden-fallow agroforestry in the Peruvian Amazon*. Advances in economic botany, vol. 5. Bronx: New York Botanical Garden.

Fairhead, J., and M. Leach. 1996. *Misreading the African landscape: Society and ecology in a forest-savanna mosaic*. Cambridge: Cambridge University Press.

Hviding, E., and T. Bayliss-Smith. 2000. *Islands of rainforest: agroforestry, logging and eco-tourism in Solomon Islands*. Aldershot: Ashgate.

Lentz, D., N. Dunning, and V. Scarborough. 2010. Ancient Maya agroforestry and water management systems at Tikal: 2010 field season, report to NSF. Available at: http://www.artsci.uc.edu/collegedepts/. . ./fac. . ./NSF %20Report%202010.pdf. Accessed 3 July 2012.

Michon, G. 2005. *Domesticating forests: How farmers manage forest resources*. Bogor: Institut de Recherche pour le Développment, Centre for International Forestry Research and The World Agroforestry Centre.

Nair, P.K.R., ed. 1989. *Agroforestry systems in the tropics*. Dordrecht: Kluwer Academic Press.

Posey, D.A. and W.L. Balée, eds. 1989. *Resource management in Amazonia: Indigenous and folk strategies*. Advances in economic botany, vol. 7. New York: New York Botanical Garden Press.

Aguigah, Angèle Dola

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Basic Biographical Information

Dr. Angèle Dola Akofa Aguigah (Fig. 1) is the first female archaeologist from Togo. She was born 4 December, 1955, in Lomé, Togo, where she grew up. Dr. Aguigah is the first female archaeologist in Togo and one of the only archaeologists in the region to defend two doctoral theses in archaeology. In 2007, Dr. Aguigah was admitted to the rank of Living Human Treasures of Togo.

Dr. Aguigah undertook her higher studies in France, where she obtained at the University of Paris I, Pantheon-Sorbonne, a License in Archaeology and general History of Art (1978–1979), a MA in African Archaeology (1980–1981), a Diploma of Advanced Studies (1981–1982), and a Ph.D. in African Archaeology (1982–1986) (Aguigah 1986). She also obtained a Certificate in Regional Planning and Urbanism from the National Arts Centre of Paris in 1992. In 1991, Dr. Aguigah started work on a second African Archaeology Ph.D. thesis, successfully defended in 1995 at the University of Paris I, Panthéon-Sorbonne, under the supervision of the late Professor Emeritus Jean Devisse (Aguigah 1995).

Aguigah, Angèle Dola, Fig. 1 Mrs. Angèle Aguigah

Dr. Aguigah is a Senior Lecturer at the Universities of Lomé and Kara (Togo) and also teaches art history at the School of African Architecture and Urbanism. She is the Head of the Archaeological Program of Togo and a consultant in cultural heritage. She has given courses in several universities in West Africa, France, and the United States of America. She has directed several archaeological excavations and her research on Notsé, Tado, Dapaong, Nook (Togo), and Bè sites is the subject of an exhibition at the National Museum of Lomé (Togo).

She has participated in several international conferences and scientific events and is a member of several associations and networks, including the UNESCO-Network Forum at the World Heritage Centre of UNESCO, the Council of African Museums, and the Board of Directors of the West Africa Museums Program. Dr. Aguigah's administrative duties include being Secretary-General of the Association of Heritage Friends, Lomé; Vice-President of Togolese ICOM (International Council of Museums), Lomé; President and member of the Togolese ICOMOS (International Council on Monuments and Sites), Lomé: and in 1999–2001 President of West African Archaeological Association (WAAA). She is still the current president of this Association (2013–2015). She is also President of the Network of African Women Ministers and Parliamentarians section of Togo.

Dr. Aguigah has received many decorations and awards during her career. Notable among these are the Order of Merit from the University of Lomé (1999); Knight of the French Order of Academic Palms (2002); Officer of the Order of Mono, Togo (2002); Award of Excellence at the University of Lomé (2005); and a Distinguished

Personality of the African Jubilee of Independence of Togo (2010).

Major Accomplishments

Dr. Aguigah's fieldwork across the Togolese territory has contributed to knowledge of the rich archaeological heritage of the country and to the protection and management of this heritage. One of her major accomplishments is rehabilitation of the archaeological sites of Notsé, Bassar, and Tcharè (Togo). As a consultant to UNESCO, she undertook an inventory of the intangible cultural heritage in Togo in 2008. She is currently coordinator of the ongoing study of the caves sites of Nook and Mamproug for their registration on World Heritage list of UNESCO.

Dr. Aguigah has occupied high positions in her country. She was Minister Delegate to the Prime Minister's Office in charge of Private Sector of Togo (2000–2003) and Minister of Culture of Togo (2003–2005). This last function enabled her to put her competences as an archaeologist to the service of her country. The concrete actions that she undertook included the presentation of the "Cultural Landscape of Koutammakou" and its registration in the World Heritage list of UNESCO, the first cultural landscape registered in Togo; realization of the first edition of "Heritage Month" in the Togo official launch of the site of Koutammakou; revaluation of endangered culinary heritage through the presentation of dishes in the maritime region, Aného; carrying out a study on the development of cultural industries and identifying opportunities for economic growth in Togo; creation of Regional Directions of Culture in the context of decentralization of culture in Togo; facilitation of an exhibition "Museum and Heritage Woman" at the artisanal center of Lomé for International Women's Day; meeting with tour operators and travel agencies on the socioeconomic management of heritage sites; and coordination of the cultural policy of Togo on an international level in the context of globalization, cultural diversity, and intercultural dialogue.

Dr. Aguigah has contributed to the training of several generations of archaeologists in West Africa. In addition, she has participated in important archaeological fieldwork particularly the excavations of the Loropéni ruins southwest of Burkina Faso, required for the registration of this site on the UNESCO World Heritage list in 2009.

Cross-References

- ▶ International Council of Museums (ICOM)
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Aguigah, D.A. 1986. Le site de Notsé: Contribution à l'archéologie du Togo. Objet archéologique africain et son deveni: Actes du colloque international Paris-CNRS, 4 au 6 novembre 1992: 35–48. Unpublished Ph.D. dissertation, Université de Paris I, Panthéon-Sorbonne.

Aguigah, D.A. 1995. Pavements et terres damées dans les régions du Golfe du Bénin: Enquête archéologique et historique: Unpublished Ph.D. dissertation, Université de Paris I, Panthéon-Sorbonne.

Further Reading

Aguigah, D.A. 1992. Les problèmes de conservation des pavements en tessons de poterie du Togo. In *Objet archéologique africain et son deveni: Actes du colloque international Paris-CNRS, 4 au 6 novembre 1992*, 35–48. Paris: CNRS.

Aguigah, D.A. 1994. Pavimentos de fragmentos ceramicos en las regiones del Golfo de Benin. *Boletín Antropológico* 31: 120–128.

Aguigah, D.A. 2002. *Environnement patrimonial et education au Togo*. 30è anniversaire du Centre du Patrimoine Mondial. Dakar: UNESCO.

Aguigah, D.A. 2004. Mosaïques, pavements et revêtements de sol en Afrique: Cas d'habitat éwé à Notsè (Togo). Séminaire Africalia d'aménagement du sol, chez les kabyè au Nord Togo. *Archeologia Africana*. Milan: Centro Studi Archeologia Africana.

Aguigah, D.A. 2007. Archéologie préventive: Une nécessité pour l'Afrique de l'ouest. In *Acte du colloque de l'IRAP et de l'IRM*. Nouakchott: SEPIA.

Aguigah, D.A. 2011. Archéologie au Togo: Les revetements de sol dans l'aire culturelle Aja Tado. Colloque en hommage au feu professeur Jean Devisse, à paraitre. Paris.

A

'Ain Difla Rockshelter

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Introduction

'Ain Difla (WHS 634) was discovered by Burton MacDonald's Wadi Hasa Survey in 1982 and was partially excavated by Geoffrey Clark in 1984, 1992, and 1993; by Clark and Gary Rollefson in 1986; and by Zeljko Rezek in 2010 and 2011 (Fig. 1). Located at c. 780 m above sea level in the Wadi Ali, a southern tributary of the Wadi Hasa in west-central Jordan, the site consists of a small wedge of sediment preserved under the overhang of a large rockshelter, the contents of which have mostly been emptied by fluctuations in the course of the wadi, now located some 12 m below it. Intact deposits cover about 35 m^2 and extend to a depth of c. 6–7 m in the talus slope in front of the rockshelter (Fig. 2). Preservation within the rockshelter is a function of its location, nestled within a recessed cavity that protected it from lateral erosion and slope retreat.

Definition

Field profiles record approximately 30 thin, moderately sloping (7–15°) to subhorizontal layers or lenses in Tests A and B, which reached a depth of 2.1 m below datum. Excavation proceeded by 10 cm arbitrary levels (spits) because the natural stratigraphy of the extremely dry sediments was very hard to follow clearly. Three primary sediment "packages" comprise (1) surface debris, roof

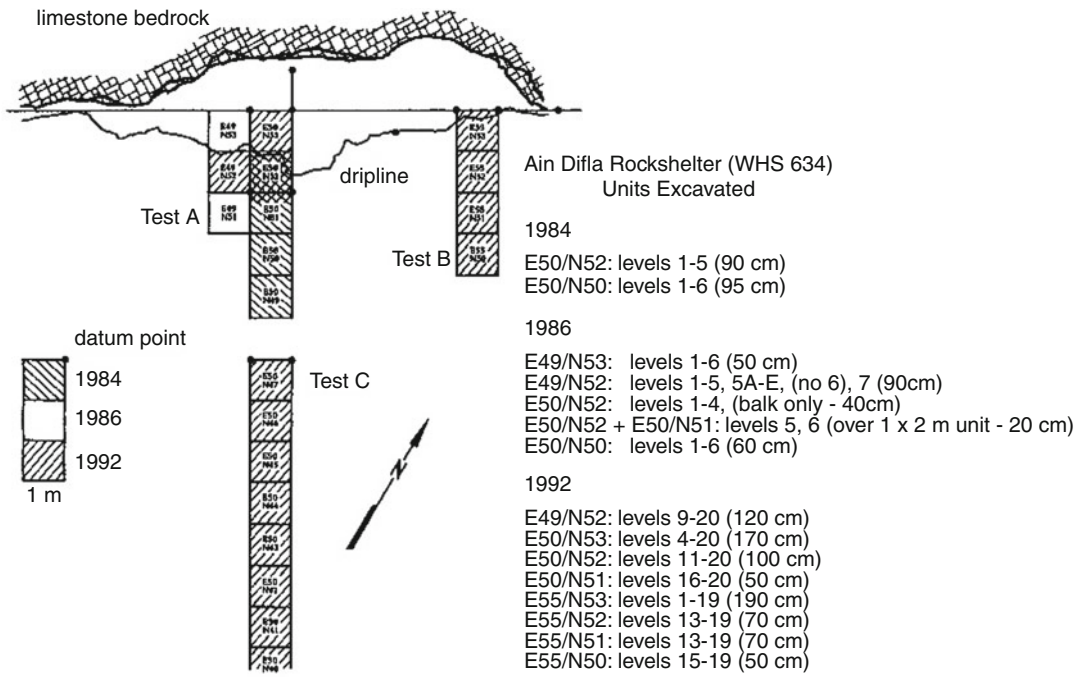

'Ain Difla Rockshelter, Fig. 1 A plan view of the 'Ain Difla rockshelter (WHS 634): units excavated during the 1984, 1986, and 1992 field seasons in Tests A, B, and C. (After Clark et al. 1997: 80)

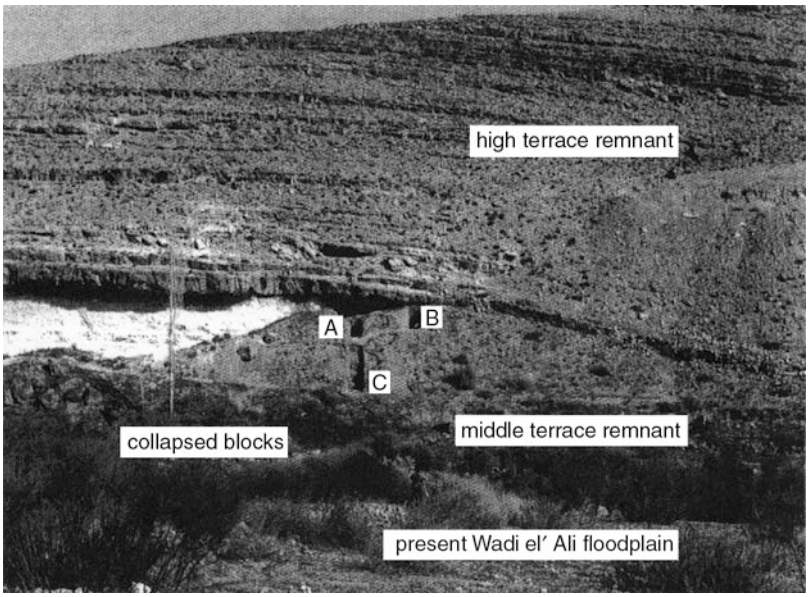

'Ain Difla Rockshelter, Fig. 2 View of 'Ain Difla from the south bank of the Wadi Ali showing the locations of Tests A–C, the high (12–30 m) and middle (3–7 m) terraces, and the present wadi floodplain (foreground). A linear pile of boulders from a major collapse of the shelter overhang can be seen to the left. The position of these rocks indicates that the shelter overhang extended at one time at least 10 m beyond its present location. (After Clark et al. 1997: 78)

spall, deflated silts, and pockets of calcreted organic residues (0.0–0.6 m); (2) organic silts and oxidized sands associated with weathering and water-laid (possibly seasonal) sedimentation (0.6–1.4 m); and (3) more consolidated flowstones and breccias interstratified with organic lenses that accumulated episodically and were subsequently calcified (>1.4 m).

A geological section, Test C, was excavated to a depth of 7 m below datum to determine the relationship of the rockshelter fill to the high (12–30 m) and middle (3–7 m) terraces of the wadi. It showed that, although scattered artifacts occurred in fragments of both terraces, relatively intact cultural deposits backed up against the shelter wall were confined to the talus slope fronting the site. Six primary depositional units were recognized, variously subdivided. The lowest part of the sequence rests on what appears to be a fragment of the middle terrace and consists of alluvial sands and silts, gravel stringers, and local slope wash (units 6–4A). Unit 3B records an episode of brecciation, and the upper part of the sequence consists of slope collapse, scree, mixed colluvium, rubble, and roof spall (units 1–3A).

Northwest of the rockshelter, three massive blocks of tufa (calcium carbonate precipitates) cover the mid-slopes of the Wadi Wanid, a tributary of the Ali. The base of the highest of these lies at approximately the same elevation as the upper third of the occupation levels in the rockshelter and is thought to be roughly contemporaneous with it. Dated to 141 ± 20 ka BP, it represents an ancient spring that could have recharged the aquifer that fed the active wadi systems during the Upper Pleistocene prior to the cut and fill sequences registered in the middle and low (0.5–1.5 m) terraces (Fig. 4).

'Ain Difla is a Middle Paleolithic (Mousterian) site dated by 10 thermoluminescence (TL), thorium/uranium (Th^{230}/U^{234}), and electron spin resonance (ESR) determinations to 180–90 ka BP. The site was assigned to the Middle Paleolithic based on the absence of any later materials in the initial surface collection (1982) and the presence of elongated Levallois points. The excavations produced an assemblage of 19,132 stone artifacts, one of the largest from the region. Statistical descriptions of the lithic assemblage using standard Bordesian indices and ratios, a use-wear study of a sample of the Levallois points, the stratigraphy, sedimentology, landscape geomorphology, paleontology, and palynology, have been published (Lindly and Clark 1987, 2000; Clark et al. 1987a, b, 1997; Schuldenrein and

Clark 1994, 2001, 2003; Mustafa and Clark 2007).

Although samples were taken from the entire sequence, pollen was recovered only from Levels 1 and 3. These layers are dominated by non-arboreal taxa indicating steppe vegetation (Chenopodiaceae, Tubuliflorae, Artemisia, Gramineae, Cruciferae), suggesting that the last phase of occupation took place during a cool, dry interval, perhaps MIS 6 (186–127 ka BP): or the early part of MIS 5 (121–27 ka BP). A TL determination from Level 5 (105 ± 10 ka BP) dates the latest possible occupation at 'Ain Difla because the pocket of sediment that constitutes the site extended up to within about 50 cm of the shelter overhang.

Faunal analyses are also consistent with a cool, dry, steppe environment. The sparse assemblage is largely confined to teeth and is dominated by equids (wild ass, horse, or possibly, zebra – *Equus hemionus/asinus*; *Equus* sp. indet.) and caprids (goat or ibex – *Capra* spp.) but gazelle (*Gazella* sp. indet.) are also present. Grassland grazers, gazelle and equids (three species) are indicators of steppe or steppe/desert conditions, consistent with the dry conditions indicated by the pollen.

Technological, typological, and metrical analyses of the 'Ain Difla lithics are consistent with previous studies that align 'Ain Difla with the Tabūn D-type Levantine Mousterian. First defined by Dorothy Garrod at Mugharet et-Tabūn, a cave on Mt. Carmel, Tabūn D-type assemblages are typically made on laminar blanks (blades, elongated points) derived from Levallois and non-Levallois unipolar convergent and bipolar cores (Fig. 3). Based on core reconstructions, Meignen (1994) notes a change in the volumetric concept of reduction that differs little from that of Upper Paleolithic blade industries. Tabūn D assemblages often contain a higher frequency of retouched pieces when compared with those assigned to Tabūn C and B. Bifaces are usually absent, and those reported by Garrod at Tabūn layer D could have resulted from mixture with uppermost Layer E, assigned to the Acheulo-Yabrudian (Bar-Yosef 1998). Tabūn D-type assemblages are reported from Tor Abu Sif and Sahba, in the Judean Desert; at Rosh Ein Mor and Nahal Aqev 3, in the central Negev highlands; in the Galilee at Hayonim lower layer E; at Jerf Ajla and Douara Cave layer IV, in the Palmyra Basin; the Hummalian sites at El Kowm, in Syria; and at the 'Ain Difla rockshelter, in west-central Jordan. TL and ESR dates from Tabūn and 'Ain Difla indicate temporal spans of 270–170 ka BP (Mercier et al. 1995) and 184–90 ka BP (Clark et al. 1997) respectively, suggesting that human use of the site falls in the latter half of the Levantine type D Mousterian chronology. No human fossils have so far been recovered from any D-type site, so the authors of this Mousterian facies remain unknown. Neanderthals have been found in association with Type B industries at Kebara and Amud and with Type C industries at Tabūn, whereas early modern humans are associated with Type C industries at Qafzeh and Skhūl. Although dated sites are few, there is general agreement that the D-type

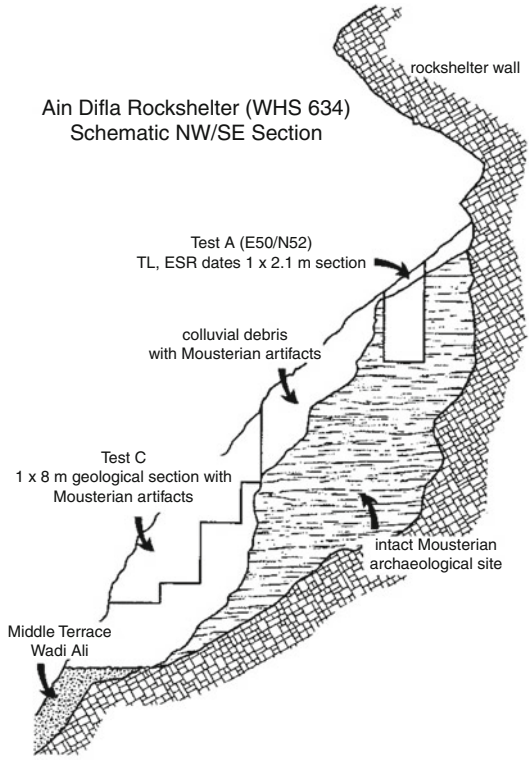

'Ain Difla Rockshelter, Fig. 3 A schematic NW/SE section through the 'Ain Difla rockshelter showing gross stratigraphy in relation to bedrock and to what is probably the middle terrace of the Wadi Ali – not drawn to scale. (After Clark et al. 1997: 79)

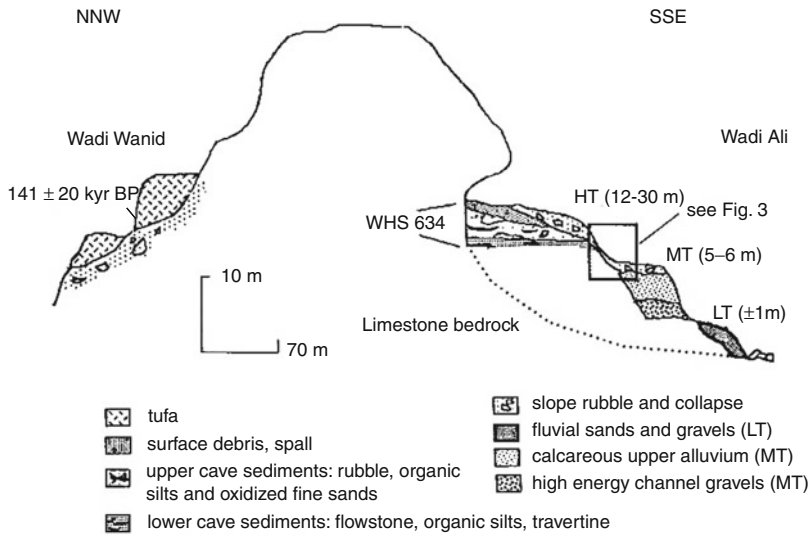

'Ain Difla Rockshelter, Fig. 4 A schematic NNW/SSE section through the cuesta ridge separating the drainages of the Wadi Ali and the Wadi Wanid – vertical scale exaggerated. (After Clark et al. 1997: 80)

industries mostly predate the last interglacial (MIS 5, 127–71 ka).

Although Middle Paleolithic sites are fairly common and well-published west of the Jordan Rift (see, e.g., Bar-Yosef 1998), stratified Middle Paleolithic sites in Jordan are confined to 'Ain Difla, and to Tor Sabiha, and Tor Faraj rockshelters in the Wadi Hisma below the Ras en'Naqb escarpment in southern Jordan (Henry 1995, 2003), and the open-air sites of Ar Rasfa on the eastern edge of the Jordan Rift in the northwest part of the country (Ahmad and Shea 2009) and WHS 621, at the eastern end of the Wadi Hasa (Clark et al. 1987).

Except for a very low incidence of retouched pieces (1.1%), 'Ain Difla is in good agreement with descriptions of the Levantine Type D Mousterian. Typological and technological comparisons with other Levantine Mousterian sites suggest that the evolution of the blade-rich Mousterian can be viewed as a continuum between the early (Tabūn) and late (Boker Tachtit) Mousterian, that (on any index) 'Ain Difla falls somewhere around the middle of that continuum, and that after about 47 ka BP, Mousterian laminar technologies develop more or less continually into the early Upper Paleolithic Ahmarian. It might also be the case that blade-dominated industries long predate the Mousterian itself, extending far back into the Lower Paleolithic (Monigal 2001).

Key Issues

'Ain Difla derives its importance from several aspects of modern human origin (MHO) research in the Levant and from an ongoing debate about the compositional integrity and behavioral implications of the basic analytical units used there, the Mousterian facies defined by Garrod at Tabūn.

MHO research in the Levant is guided by two conceptual frameworks that, in their extreme forms, are almost diametrically opposed to one another: (1) the multiregional continuity (MRC) model (e.g., Wolpoff et al. 2000) and (2) the recent African origin (RAO) or replacement model (e.g., Stringer 2007). MRC advocates emphasize strong evidence for continuity in adaptation based on fossils and on archaeology and supported by studies of symbolic and mortuary behavior. MRC holds that archaic *Homo sapiens* evolved independently into anatomically modern humans in the Levant and elsewhere, that gene flow through interactions between neighboring groups was sufficient to maintain species integrity over large areas, and that differences between archaic and modern *H. sapiens* are subspecific or populational, rather than specific. RAO emphasizes the results of genetic analyses of human mitochondrial DNA and "spread-and-replace" scenarios drawn from certain construals of pattern in the archaeological record. RAO maintains that

anatomical moderns arose as a speciation event in an isolated region of east Africa and that they migrated, radiated, or dispersed from Africa throughout Eurasia after c. 100 ka, eventually replacing all other archaic hominins over the range originally colonized by *Homo erectus*.

'Ain Difla is important in MHO research because evidence from the site supports Jelinek's arguments for local continuity in cultural development at Tabūn (e.g., Jelinek 1981). At neither site are there any indications of obviously intrusive elements, as would be expected under the RAO models proposed by Stringer (e.g., 2007) and others. The core tenet of the RAO model is that if anatomically modern African immigrants were moving into the Levant and replacing indigenous archaic populations there, that process should be evident in the appearance of a distinctive cultural repertoire, with an archaeological "signature" that differs from that of the indigenes and that it should be discernible in differences in adaptation between archaic and modern populations. While changes in technological continuity are not necessarily related to changes in human morphology, continuity in adaptation as monitored by the archaeology tips the balance in favor of multiregional continuity as the hypothesis best supported by the available evidence (Mustafa and Clark 2007).

The 'Ain Difla research is also noteworthy in an epistemological sense because work there has had important implications for pattern in the Levantine Mousterian and what it might mean in terms of human behavior. The large collection from the site has been compared to those from 19 other Levantine sites classified by reference to the 3-facies sequence at Tabūn (Culley et al. in press). Keeping in mind that 'Ain Difla is only a small part of a much larger site, now destroyed, the work showed that human occupations were ephemeral and episodic, of short duration, by small numbers of people and that there was little evidence for prolonged use of the locality. A dozen small circular or oval hearths attest to visits by perhaps three to six individuals, a pattern most consistent with an overnight hunting camp by a small party dispatched for some particular purpose from a larger residential base located elsewhere. There is little evidence for core preparation, primary and secondary reduction, and almost no retouched pieces, indicating the provisioning of mobile individuals with a limited number of tools they could carry with them, rather than the full repertoire of lithic processing activities expected at a long-term residential base.

Work at 'Ain Difla is ongoing, with current efforts directed toward refining the radiometric chronology of the upper sequence using optically stimulated luminescence (OSL) dating of sediments from Levels 1–5.

Cross-References

- ► Adaptation in Archaeology
- ► Hunter-Gatherers, Archaeology of
- ► Lithic Technology, Paleolithic

References

Ahmad, G.S., and J. Shea. 2009. *Reconstructing late Pleistocene human behavior in the Jordan Rift valley*, BAR International series. Vol. 2042. Oxford: Archaeopress.

Bar-Yosef, O. 1998. The chronology of the Middle Paleolithic in the Levant. In *Neandertals and modern humans in western Asia*, ed. T. Akazawa, K. Aoki, and O. Bar-Yosef, 39–56. New York: Plenum Press.

Clark, G.A., J.M. Lindly, and N.R. Coinman. 1987a. Middle Paleolithic sites in the Wadi al-Hasa. *Annual of the Department of Antiquities of Jordan* 31: 23–31.

Clark, G.A., J.M. Lindly, M. Donaldson, A. Garrard, N.R. Coinman, J. Schuldenrein, S. Fish, and D. Olszewski. 1987b. Paleolithic archaeology in southern Jordan: A preliminary report of excavations at Middle, Upper, and epipaleolithic sites in Wadi al-Hasa, west-central Jordan. *Annual of the Department of Antiquities of Jordan* 31: 19–78.

Clark, G.A., J. Schuldenrein, M. Donaldson, H.P. Schwarcz, W.J. Rink, and S.K. Fish. 1997. Chronostratigraphic contexts of Middle Paleolithic horizons at the 'Ain Difla rockshelter (WHS 634), west-central Jordan. In *The prehistory of Jordan II, perspectives from 1997*, Studies in early near eastern production, subsistence & environment, ed. H.-G. Gebel, Z. Kafafi, and G.O. Rollefson, vol. 4, 77–100. Berlin: Ex Oriente.

Culley, E.V., G.M. Popescu, and G.A. Clark. In press. An analysis of the compositional integrity of the Levantine Mousterian facies. *Quaternary International* 280. https://doi.org/10.1016/j.quaint.2012.11.030.

Henry, D.O. 1995. The middle paleolithic sites. In *Prehistoric cultural ecology and evolution: Insights from southern Jordan*, ed. D. Henry, 49–84. New York: Plenum.

Henry, D.O. 2003. *Neanderthals in the Levant: Behavioral organization and the beginnings of human modernity.* New York: Continuum.

Jelinek, A.J. 1981. The Tabūn cave and paleolithic man in the Levant. *Science* 216: 1369–1375.

Lindly, J.M., and G.A. Clark. 1987. A preliminary lithic analysis of the Mousterian site of 'Ain Difla (WHS site 634) in the Wadi Ali, west-central Jordan. *Proceedings of the Prehistoric Society* 53: 279–292.

Lindly, J.M., and G.A. Clark. 2000. The 'Ain Difla rockshelter and Middle Paleolithic systematics in the Levant. In *The archaeology of the Wadi al-Hasa, west-central Jordan, volume 2: Excavations at Middle, Upper and Epipaleolithic sites*, Arizona State University anthropological research papers, ed. N.R. Coinman, vol. 52, 111–121. Tempe: Arizona State University Press.

Meignen, L. 1994. Le Paléolithique moyen au Proche-Orient: Le phénomène laminaire. In *Les industries laminaires au Paléolithique Moyen*, ed. S. Révillon and A. Tuffreau, 125–159. Paris: Centre National de la Recherche Scientifique.

Mercier, N., H. Valladas, G. Valladas, J.L. Reyss, A.J. Jelinek, L. Meignen, and J.L. Joron. 1995. TL dates of burnt flints from Jelinek's excavations at Tabūn and their implications. *Journal of Archaeological Science* 22: 495–509.

Monigal, K. 2001. Lower and Middle Paleolithic blade industries at the dawn of the Upper Paleolithic in the Levant. *Archaeology, Anthropology & Ethnology of Eurasia* 1: 11–24.

Mustafa, M., and G.A. Clark. 2007. Quantifying diachronic variability: The 'Ain Difla rockshelter (Jordan) and the evolution of Levantine Mousterian technology. *Eurasian Prehistory* 5: 47–83.

Schuldenrein, J., and G.A. Clark. 1994. Landscape and prehistoric chronology of west-central Jordan. *Geoarchaeology* 9: 31–55.

Schuldenrein, J., and G.A. Clark. 2001. Prehistoric landscapes and settlement geography along the Wadi Hasa, west-central Jordan – Part 1: Geoarchaeology, human palaeoecology and ethnographic modeling. *Environmental Archaeology* 6: 23–38.

Schuldenrein, J., and G.A. Clark. 2003. Prehistoric landscapes and settlement geography along the Wadi Hasa, west-central Jordan – Part 2: Towards a model of palaeoecological settlement for the Wadi Hasa. *Environmental Archaeology* 8: 1–16.

Stringer, C.B. 2007. The origin and dispersal of *Homo sapiens*: Our current state of knowledge. In *Rethinking the human revolution: New behavioral and biological perspectives on the origin and dispersal of modern humans*, ed. P. Mellars and K. Gibson, 15–21. Cambridge: McDonald Institute for Archaeological Research.

Wolpoff, M., J. Hawks, and R. Caspari. 2000. Multiregional, not multiple origins. *American Journal of Physical Anthropology* 112: 129–136.

Aitken, Martin

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Basic Biographical Information

Following a B.A. in physics and a D.Phil. in high energy physics at the University of Oxford, Martin Aitken (1922–2017) was appointed in 1957 as the Deputy Director of the Oxford Research Laboratory for Archaeology and the History of Art which had been established 2 years earlier through the combined efforts of Lord Cherwell and Professor Christopher Hawkes under the directorship of Edward (Teddy) Hall. Martin Aitken then continued to work at the Oxford Research Laboratory until his retirement in 1989.

Major Accomplishments

In the early days, his two main research interests were magnetic dating and magnetic prospection, of which the former remained an ongoing interest throughout his career. Initially, magnetic dating involved the measurement of the past direction of the Earth's magnetic field using large samples extracted from in situ kilns and hearths, but later, the method was extended to the measurement of the past intensity of the magnetic field, an approach that did not require in situ samples but could be applied to pottery sherds. Although as a dating method, the technique never realized its initial expectations; the results have helped toward our understanding of the origin of the Earth's magnetic field and are thus an example of the contribution of archaeology to science rather than vice versa.

In 1958, he undertook the first successful magnetic survey on an archaeological site using a proton magnetometer which had been developed and built in the Oxford Research Laboratory. Originally developed to locate kilns for magnetic

dating, it was immediately found that the proton magnetometer could also be used to detect filled-in pits and ditches, as well as stone walls surrounded by topsoil. Thus, the very considerable potential of magnetic prospection for the investigation of archaeological sites prior to excavation was established, and as a result, magnetic prospection, using various types of magnetometer, is now extensively used on archaeological sites throughout the world.

One consequence of his involvement in magnetic prospection was the emergence of the International Symposium on Archaeometry. In 1962, he organized a course for archaeologists who had purchased proton gradiometers from the Oxford Research Laboratory. During subsequent years, regular reunions of these gradiometer users were held in Oxford, and gradually the scope of these reunions expanded to include other aspects of archaeometry until eventually they evolved into the annual (now biennial) International Symposium for Archaeometry, of which the 42nd symposium was held in 2018. From their inception, he was Chairman of the Standing Committee responsible for their organization, subsequently, from 1990 to 2008, taking on the role of president.

In 1960, he initiated the first detailed research into the use of thermoluminescence (TL) phenomena for the dating of archaeological ceramics. Subsequently, luminescence dating was his primary research interest through until his retirement and beyond. Thus, he was actively involved in all the wide-ranging developments that occurred from its beginnings as a method for dating and authenticating ceramics, through TL dating of burnt flint and calcite deposits in caves, to the development of optically stimulated luminescence (OSL) dating of sediments. Again, the first Specialist Seminar on Thermoluminescence Dating that he organized in Oxford in 1978 evolved into the current triennial International Conference on Luminescence and Electron Spin Resonance Dating, of which the 15th conference was held in 2017. As a result, he established the Oxford Research Laboratory as an internationally recognized center of excellence for luminescence dating.

In addition to more than 150 scientific papers, he published the first comprehensive textbook on archaeometry, entitled *Physics and Archaeology* (1961, Interscience Publishers, London). Subsequently, as well as a second edition of *Physics and Archaeology* (1984, Clarendon Press, Oxford), he published books entitled *Thermoluminescence Dating* (1985, Academic Press, London), *Science-Based Dating in Archaeology* (1990, Longman, London), and *An Introduction to Optical Dating* (1998, Oxford University Press, Oxford). In addition, until 1989, together with Professor Edward Hall, he edited the journal *Archaeometry* from its humble beginnings as the Bulletin of the Oxford Research Laboratory to its current status as one of the primary international journals for the subject. He has further contributed to the development of archaeometry through his supervision of a succession of research students, several of whom have continued to work in the field and become authorities in their own right.

Recognition of his contribution to the subject both nationally and internationally came: first, in 1983, with his election as a Fellow of the Royal Society and, second, in 1985, when he was given an ad hominem Chair in Archaeometry by the University of Oxford.

Thus, throughout his career, Martin Aitken has been at the forefront of research in archaeometry and has played a major role in ensuring the subject's national and international recognition within both the archaeological and scientific communities. Therefore, he can be truly seen as one of the "fathers" of archaeometry, even though, having confined his research to scientific dating and prospection methods, he has always regarded himself as being primarily a physicist rather than an archaeological scientist.

Cross-References

- ▶ Archaeometry: Definition
- ▶ Hall, Edward T.
- ▶ Research Laboratory for Archaeology and the History of Art (University of Oxford)

References

Aitken, M. 1961. *Physics and archaeology*. London: Interscience Publishers.
Aitken, M. 1984. *Physics and archaeology*. 2nd ed. Oxford: Clarendon Press.
Aitken, M. 1985. *Thermoluminescence dating*. London: Academic.
Aitken, M. 1990. *Science-based dating in archaeology*. London: Longman.
Aitken, M. 1998. *An introduction to optical dating*. Oxford: Oxford University Press.
Aitken, M., and E. Hall, eds. until 1989. Archaeometry. Available at: http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291475-4754/issues

Akrawi, Aysar

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Basic Biographical Information

Aysar Akrawi's educational background is in history and political science, and she has undergone extensive training in senior management. Previous positions have included setting up and managing The Queen Noor College for Civil Aviation and introducing and implementing entrepreneurial projects for women in rural areas of Jordan.

Major Accomplishments

Aysar Akrawi has occupied the position of executive director of the Petra National Trust (PNT) since 1994. In this capacity, her responsibilities are diverse. As it is the aim of the Trust to advocate for the preservation of the cultural and natural heritage as well as the integration of the local communities in the decision-making process of the PAP and the Petra region, she is responsible for the planning, implementation, and supervision of the Trust's projects; the local and international publications; and coordination with governments, other NGO's, international donors, and international preservation organizations and societies. Finally, she is also responsible for the correlation with the media, educational systems, and action groups with the purpose of increasing public awareness of the World Heritage Site of Petra.

One of PNT's major roles throughout Aysar Akrawi's tenure has been advocacy for protection of Petra and its associated Outstanding Universal Values.

PNT has called for maintaining a rational balance between the dictates of the site's fragile environment and the role of tourism in the region's economy. Community involvement in the development and protection of this important heritage remains a high priority for PNT.

A major mechanism for this inclusion is the Petra Junior Ranger Programme, in which youth from the communities surrounding Petra learn about the site and its significance to their heritage. This project raises awareness among future decision makers, arming them with important knowledge and skills. Additionally, PNT has implemented conservation projects with local, national, and international partners that save both monuments and lives. The PNT furthermore pivotally serves as the institutional memory of developments in the state of management and conservation of Petra.

Cross-References

► Living Communities: Local Communities in Site Management and Advocates for Site Preservation
► Petra National Trust and the Challenge of Site Management at Petra
► Petra, Archaeology of
► World Heritage List: Criteria, Inscription, and Representation
► World Heritage Objectives and Outcomes

Further Readings

Akrawi, A. 2003. NGO & government collaboration in archaeological site management, Jordan (Petra case). In *Of the past, for the future: Integrating archaeology*

and conversation, ed. M. Greenburg, 29–34. Los Angeles: The Getty Conservation Institute.
Akrawi, A. 2009. Issues at world heritage sites – Petra case study. In *Studies in the history and archaeology of Jordan*, ed. F. al-Khraysheh. Amman: Department of Antiquities.
Akrawi, A. 2012. Site management, history, and status. In *Tourism and archaeological heritage management at Petra: Driver to development or destruction*, ed. D. Comer, 30–77. New York: Springer.
Akrawi, A., and L. Shekede. 2010. Unique Nabataean wall painting in Petra: Conservation in situ. In *Conservation and the eastern Mediterranean: Contributions to the 2010 IIC Congress*, 214–219. *Istanbul*: International Institute for Conversation of Historic and Artistic Works.
Comer, D., ed. 2012. *Tourism and archaeological heritage management at Petra. Driver to development or destruction?* New York: Springer.

Aksum: Environmental Archaeology

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Introduction

Rising above the Sudanese lowlands to the north and the Red Sea coastal plains to the east, the highlands of northern Ethiopia and Eritrea have long been recognized as a center of plant domestication and host of some of the earliest complex societies of sub-Saharan Africa. The intensification of contacts with southern Arabia in the first millennium BCE favored the development of complex societies and, later, the emergence of the Kingdom of Aksum (c. BCE 140–CE 800). Aksum is located on a gentle plain at the heart of the Tigray highlands (Fig. 1) which provided excellent ground for the new kingdom to thrive for almost a 1000 years by engaging in long-distance trade and commerce, developing literacy and coinage. The adoption of Christianity in the early fourth century CE furthered Aksum's importance within and beyond northeast Africa. This historical significance has fostered intensive archaeological research in the region, but the history of its diverse environment has received little scholarly attention until recently. Today, Aksum (UNESCO World Heritage Site, 1981) is one of the most important archaeological sites of Africa and remains the leading religious center for the Ethiopian Orthodox Church. As environmental archaeology in Ethiopia and Eritrea grows, the historical contexts of landscape change are becoming increasingly prominent in current debates about land degradation and sustainable resource uses.

This essay presents an updated review of environmental archaeology at Aksum as appeared in the first edition of the *Encyclopedia of Global Archaeology* (2014). While the original framework offered then has not changed, the last couple of years have seen the publication of few important syntheses and studies that provide new stimuli to advance knowledge, and research, on human-environment interaction in the greater Aksum area in the coming years.

The essay first outlines the environmental aspects that have been explored by archaeological research at Aksum. The historical background traces the emergence of archaeological research through three main phases: the "discovery" (1900s–1940s), the "consolidation" (1970s–1980s), and the "diversification" since the early 1990s. A third section explores the emerging critique of environmental history models in the light of new research findings and changing perspectives. The review ends with a remark on the emphasis on the role of environmental archaeology and history to current debates on heritage management, land degradation, and sustainable resource use and some considerations on future research prospects.

Definition

Environmental archaeology in the northern highlands of Ethiopia has focused on three main topics: (1) the development of settlement and its impact on the landscape, (2) the availability and management of environmental resources such as

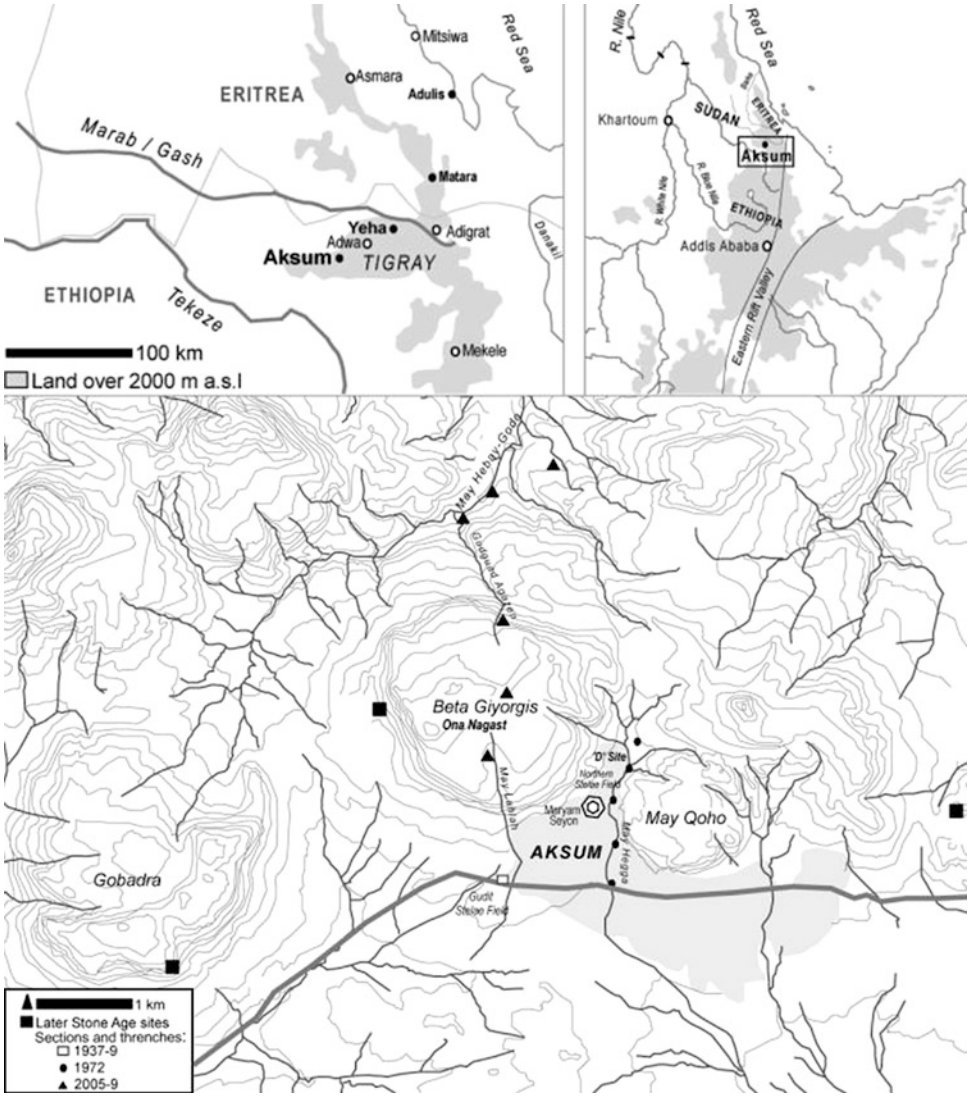

Aksum: Environmental Archaeology, Fig. 1 Map of Aksum: (*top row*) regional map and the location of Tigray; (*bottom row*) the Aksum area (contours are at 20 m interval)

land and water, and (3) the legacy of past land uses into present-day landscapes and societies. The emphasis on these topics is much the result of advances in archaeological methods and the sociopolitical transformations that have shaped modern Ethiopia and Eritrea. Intensive archaeological survey and reconnaissance records have elucidated the main patterns of settlement history in the Aksum plain. However, while the research focus on the development of the kingdom has produced well-defined settlement trajectories for the first millennium CE, the records for the periods before the emergence of Aksum and following its decline are patchy, and there are important gaps. For example, excavations at rock-shelter sites have detailed later prehistoric occupation sequences (c. ninth/eight millennia BCE) in the hills surrounding the Aksum plain (Phillipson 2000), but the landscape that hosted these early groups is poorly understood. In fact, no solid environmental record is available from Aksum for this period, though regional and continental

datasets of past climate are available. The regional record of significant climate amelioration at the beginning of the Holocene (c. 10,000 BCE) has been linked to the peopling of the area – though sporadic occurrences of Early Stone Age and Middle Stone Age material point to much earlier frequentation. Substantial environmental records are available only for the Aksumite periods, broadly encompassing the rise of social complexity and the demise of the kingdom (c. 900 BCE–CE 800). Studies of plant and animal remains and geoarchaeological investigations have contributed to illuminating aspects of the subsistence base of the kingdom and its impact on the landscape. Archaeobotanical and zooarchaeological studies have concentrated on settlement sites and funerary contexts, and geoarchaeological data come mainly from landscape sequences and buried soils (or paleosols). Regional climatic records provide further sources of information, but the physical diversity of the northern Ethiopian-Eritrean highlands together with patchy archaeological records makes it difficult to build solid correlations (see below). The cultural and environmental history following the decline of the Aksumite kingdom (c. 800 CE onward) is poorly understood, but there is now indication that Aksum's countryside was not abandoned (Fattovich 2008; Sernicola 2017). In addition, buried soil records, palaeobotanical data, and historical sources provide supporting evidence for prolonged settlement and arable land use throughout the second millennium CE.

Over the last decade or so, the implications of environmental reconstructions beyond archaeological research have begun to emerge. Geomorphological and land evaluation studies have often linked past land uses to present environmental degradation (e.g., Nyssen et al. 2004). The links between intensifying agriculture and the decline of the Aksumite kingdom feed into discussions about traditional land uses and their contribution to present environmental conditions. This remains a debated topic, which is unlikely to find consensus until a far more coherent and richer body of data is available. In fact, while Aksum is arguably the place where most archaeological research has taken place, environmental and land evaluation studies have targeted other areas of the Ethiopian-Eritrean highlands and beyond. Thus, correlations between local archaeological evidence and regional environmental proxies rely on questionable geographical, cultural, and temporal uniformities.

Historical Background

Discovery (1900s–1940s)

Archaeological investigation at Aksum begun in the early 1900s with the Deutsche Aksum-Expedition (hereinafter DAE) led by Enno Littmann. The German team comprehensively recorded ancient monuments at Aksum and other sites of Tigray and Eritrea. The detailed analysis of ancient architecture, inscriptions, and material culture was published in four volumes (Littmann et al. 1913) and laid the foundations of Aksumite archaeology. Although this team was not particularly concerned with environmental aspects, the expedition's photographic archive includes several panoramic views of Aksum's landscape in 1906 and, thus, before the occurrence of main reforestation programs, infrastructure building, and urban development, which later transformed significant parts of the Ethiopian highlands. This is a remarkable source of information that remains largely untapped. The DAE publication offered the first detailed description of the local archaeology, which Carlo Conti Rossini (1928) framed within a coherent historical context and linked to textual and oral sources. This includes, for example, reference to oral traditions linking the "fall" of Aksum to the destruction caused by the external invasions, droughts, and famines. However old some of these local traditions may be, they are preserved in manuscript texts, often compiled in much later periods than those to which they refer. That said, these sources offer remarkable information on Aksum's landscape, and some have long been referenced in support of archaeological interpretation (see Fattovich 2008).

In the 1930s and 1940s, systematic excavations at Aksum included the recording of landscape stratigraphy. In 1937, while in Aksum for the relocation of a stele to Rome, Ugo Monneret

Aksum: Environmental Archaeology, Fig. 2 View of Aksum's landscape, November 2007: taken from Beta Giyorgis hillside, near "D site," and looking northward. (Photo: F. Sulas)

de Villard (1938) conducted a topographic study and investigated the stratigraphic sequence of the Aksum plain. He identified two main phases of sediment depositions next to the Cathedral Maryam Seyon (Fig. 2): the earliest phase would have preceded the rise of Aksum, and, in particular, it would have occurred before the erection of the monoliths at the Northern Stele Park; a second phase would have taken place after the decline of the kingdom. Shortly afterward, further sedimentary data were collected by Salvatore Puglisi (1941), who led the *Missione Archeologica Italiana* at Aksum and sought to expand research beyond the then known archaeological area by surveying other sectors of the plain. Puglisi excavated a main residential building and conducted test excavations to the west and northeast of the old town where he recorded a stratigraphic sequence of cultural layers interspersed by alluvial deposits (Fig. 2). In the 1950s and 1960s, the newly established Ethiopian Institute of Archaeology (Addis Ababa 1952) sponsored further systematic research by French scholars who excavated important monumental structures and sites. The results of these studies provided new evidence for outlining the early cultural sequence of Aksum and its surroundings (e.g., de Contenson 2005).

Consolidation (1970s–1980s)

The early 1970s saw the beginning of large-scale excavations and surveys at Aksum and its surroundings by British, Italian, and American archaeologists. The new research programs were designed to examine the environmental factors and cultural processes involved in the development of the Aksumite kingdom (e.g., Munro-Hay 1989; Ricci 1990; Michels 2005). However, these were cut short by widespread sociopolitical unrest that culminated in the demise of the Ethiopian monarchy in 1974 and the establishment of the Derg regime (1974-1991). The new political setting halted field research for nearly two decades, but this interruption provided time for elaborating and publishing the results of the research conducted in the early 1970s. In particular, two main works laid the foundations for subsequent modeling of the environmental and settlement history of Aksum. In 1972, Butzer (1981) had conducted preliminary geoarchaeological

investigations in the Aksum plain, which included the application of soil micromorphology. The results were elaborated into an "archaeo-sedimentary" sequence that provided for the first time an integrated framework for linking cultural developments and environmental change. Although the chronological frame available in the 1970s was later revised, Butzer's sequence remains the main reference point for any environmental reconstruction of the Aksum area. The analysis of several sections in the core archaeological area (Fig. 1) led Butzer to conclude that four aggradation phases had occurred at Aksum. The first aggradation phase (c. BCE 150-CE 150) was associated with a period of increased precipitation and the growth of Aksum as a regional political center. The second aggradation phase was linked to the erosion of degraded agricultural lands upslope due to heavier rains coupled with settlement and demographic increase. The last two phases of aggradation occurred several centuries after the decline of the Aksumite kingdom.

Shortly after Butzer's work at Aksum, an American team led by Joseph W. Michels conducted a systematic survey of the region comprised between Aksum and Yeha (Fig. 1). During the 6 months of intense fieldwork, the survey documented over 250 ancient sites, and the resulting database not only included archaeological information but also a new classification of settlement types and records of modern land uses (Michels 2005). The results of this work (2005; an interim report was published in 1984) were fundamental in showing the intensity of ancient settlement over a diversified environment and the links between landscape characteristics and land uses.

Diversification (Since the Early 1990s)

Following the establishment of the Federal Democratic Republic of Ethiopia in the early 1990s, the country regained enough political stability for resuming archaeological fieldwork. New research programs began investigating the development of farming and livestock holding, the settlement system and subsistence base of the Aksumite kingdom, and the short- and long-term impact of land use practices on the environment. In 1993, two large-scale archaeological projects started at Aksum: David W. Phillipson (2000) led the British Institute in Eastern Africa's research in the plain, and the Italian-American expedition directed by Rodolfo Fattovich and Kathryn A. Bard resumed research on the adjacent hill of Beta Giyorgis (Fattovich et al. 2000). In addition to sharing a multidisciplinary approach, both projects combined large-scale excavations and systematic surveys for over a decade, and, thus, they ensured an unprecedented continuity of research. The British expedition excavated a number of sites to the north and west of the town. The excavations of rock-shelter sites clarified aspects of later prehistoric occupation, and research on later periods included the excavations at Aksumite sites and, significantly, the first rural settlement known as "D site" (domestic site). This low-status satellite farming settlement was located to the north of the old town (Figs. 1 and 2) and yielded evidence for two distinct occupations: an early farming-based settlement (c. 700–400 BCE) and, after a significant hiatus, a lower-status occupation in the sixth century CE. Botanical and faunal assemblages revealed a widening of the resource base from the early phase and included the first appearance of African cereals such as tef (Boardman 1999; Phillipson 2000). The records from "D site" and other sites nearby show that Near Eastern and African crops were grown from at least the mid-first millennium BCE and possibly earlier (Bard et al. 2000; D'Andrea 2008). Near Eastern plants (i.e., barley, emmer wheat, flax) were the most common groups and were most likely associated with dry farming. Since the mid-first millennium CE, there is evidence for an increase in food plants, cereals, pulses, oil, and fiber plants (Boardman 1999). With the exception of few species (grape, sorghum, finger millet), there is a remarkable continuity between the later Aksumite times and today (Phillipson 2000: 420). A similar scenario is illustrated by the results of exploratory pollen analyses on archaeological sediments from Beta Giyorgis hill, which point to the presence of an open grassland vegetation cover with tree patches from the mid-first millennium BCE (DiBlasi in Bard et al.

2000). While further palynological studies have yet to be undertaken, research on plant resources and vegetation history has gradually diversified. Recent developments include ethnobotanical approaches to reconstruct crop processing and taphonomic processes (D'Andrea 2008) and analyses of phytoliths and charred wood, from buried soils and sediments to acquire information on the vegetation history (French et al. 2009; Sulas 2016). As for zooarchaeological studies, the faunal assemblages from settlement sites at Beta Giyorgis and Aksum show a predominance of domesticated mammals (cattle, sheep, and goat), suggesting that animals were kept for meat, by-products, and labor (Bard et al. 2000; Phillipson 2000). These first studies showed the potential of zooarchaeology for investigating environmental and resource use aspects of the Aksumite culture. However, no further research in this direction has been conducted, and, in the absence of taphonomic studies, the role and use of animal resources remain poorly understood. Recent detailed analyses of lithic assemblages, instead, have added significant depth to understanding of the early peopling and resource management history of the Aksum area and the wider region in general (Phillipson 2009, 2017). Comparative studies of lithics by L. Phillipson (2017), in particular, have elucidated how rural population from the later prehistoric period has adapted to changing cultural and economic circumstances before and during the Aksumite period.

The last few years have witnessed the rise of the first Ethiopian archaeologists working at Aksum (Hagos 2001, 2010; Wurku Derara 2015) and the opening of the first archaeology department in the country (2006) at the newly established Axum University. New research projects were set up to investigate the local landscape history by combining geoarchaeological, palaeobotanical, and remote sensing techniques (Schmid et al. 2008; French et al. 2009). At the same time, Fattovich (2008), Sernicola (2017), and Phillipson (2009, 2017) resumed systematic surveying to complete the archaeological map of the greater Aksum area as well as conducting high-resolution studies of material culture (Fig. 3). Other recent studies also include geo-pedological research on past soil erosion (Ciampalini et al. 2008). As detailed in the following section, these new developments provide the basis for rethinking a series of aspects concerning the theories and methodologies of environmental archaeology in the region.

Key Issues/Current Debates

Recent research advances call now for a reconsideration of a series of long-established ideas about Aksum's past. First, new archaeological findings indicate the presence of agropastoralists in the Aksum area, and the northern Ethiopian highlands in general, since the mid-fourth millennium BCE at least (Phillipson 2017 and reference therein). It is also now apparent that a mosaic of cultures and subsistence strategies populated the region during the first millennium BCE (Phillipson 2012). This evidence calls for a rethinking of former cultural sequences emphasizing the importance of a single culture (viz., the pre-Aksumite culture) and farming. While these were part and parcel of Aksum's development as a kingdom, other cultures and ways of life played important roles in the broader region that was later under the control of the Aksumite kingdom. Second, there are substantial temporal and spatial discrepancies between the archaeological and landscape data at regional and local scale. A wide range of regional data about past environment and climate come from lake deposits and landscape sequences in areas and regions (see, e.g., Nyssen et al. 2004) for which archaeological evidence is very limited, if not absent altogether. On the other side, the remarkably rich cultural record from Aksum has been associated with limited local landscape data until recently; these were almost exclusively based on Butzer's "archaeo-sedimentary" sequence, linking the rise and demise of Aksumite cultures to increased rainfall, population growth, and intensified land use. Since the mid-1990s, the study of plant and animal remains and, more recently, geoarchaeological research have provided new local data that suggest a more complex scenario. Studies of plant macro- and microfossils

Aksum: Environmental Archaeology, Fig. 3 Archaeologists at Aksum, May 2006: top from left Charles French, Rodolfo Fattovich and Marco Madella; bottom Laurel Phillipson and Luisa Sernicola. (Photos: F. Sulas)

(seeds, charred wood, pollen, and phytoliths) indicate the presence of a woody savannah vegetation cover at Aksum before, during, and after the kingdom was in place, and there is no evidence for the occurrence of woodland and, subsequent, land clearance. This is further illustrated in the sedimentary record from the hilltop of Beta Giyorgis, hillsides, and river valleys north of the town (Fig. 1), reflecting prolonged landscape stability associated with permanent settlement and land uses from the mid-fourth millennium BCE until about 1600 CE (French et al. 2009). On hilltops and uplands, thick buried soil horizons were associated with settlement and farming, while buried soil records from hillside deposits may have been linked to pastures. The botanical remains (phytoliths and charred wood) from the buried soils reflect a substantially stable woody savannah

vegetation cover with tree patches nearby watercourses and settlements, of which palm trees were a significant component. However, the impact of the climatic fluctuations on the vegetation is still unclear, and the possibility of localized, intense, and climate-driven events, such as natural fires and the partial removal of vegetation by erratic rainfall, requires careful consideration. The buried landscape records have also prompted a revision of earlier models linking land productivity to irrigation at ancient Aksum. Yet, the buried soil record shows no evidence for irrigation, and the botanical indicators reflect the presence of crops and other plants that can grow under rain-fed farming (Boardman 1999; D'Andrea 2008; Sulas 2014).

Today, Ethiopia is undergoing major landscape transformations due to urban development and agricultural programs, and these changes are having a significant impact on the "traditional" lifestyles of the rural population. Modern Aksum is situated in a buffer position between international borders, a war-prone zone where rain/crop failure and political instability are actual rather than potential threats. A main theme of current research targets precisely the debate about present-day landscape conditions: Are they the results of mismanagement since people permanently settled down, started farming, and ultimately transformed Aksum's landscape? Or have both human and natural forces contributed to change? If so, what lesson can be learned from the past? These questions highlight the need for studies designed to understand the interrelated histories of land use and degradation not simply for writing Aksum's history but also for negotiating current challenges to heritage preservation and management (Wurku Derara 2015). As outlined above, archaeological research has long focused on the development of settlement and the emergence of social complexity, and only a limited number of studies have addressed the potential effects of agriculture and other land uses on the landscape. These are now emerging themes for understanding but also assessing and conserving Aksum's long-lasting environmental and cultural heritage.

International Perspectives

Since the early 1980s, the decline of the kingdom in the late first millennium CE has been linked to environmental degradation due to population pressure, arable land use intensification, and increased precipitation. This thesis has then been integrated with large-scale survey data on settlement patterns and applied for modeling a cultural history of Aksum, whereby human-induced factors inhibited landscape readjustments to climatic shifts. However, recent work has begun to question a number of assumptions based on earlier research. First, recent large-scale landscape investigations using a variety of archaeological science techniques are now regularly able to elucidate finer details from buried landscapes that indicate intrinsic linkages between human exploitation of landscapes, soil and vegetation change, and long-term climate change. The development of geoarchaeology has had a fundamental role in placing human activity in changing landscape settings by deciphering long-term trajectories of landscape change and by identifying the effects of human settlement on the sustainability of landscapes under human pressure. In Ethiopia, human activity as a factor of soil formation and development has rarely, if ever, been considered. Instead, an increasing number of studies, particularly pertinent to tropical environments, are showing how important the perception of local people is for addressing soil issues. In addition, recent archaeological survey has also indicated a greater time depth and gradual intensification of settlement development in the northern Aksum area over at least the last four millennia. As such, archaeology has moved beyond simple equations linking state formation, settlement expansion, agricultural intensification, and consequent deforestation, erosion, and soil degradation. Rather than raising new questions, these considerations refocus perspectives and viewpoints for old issues: Was intensification of agriculture a result of decreased land productivity, environmental/climatic worsening, increased population/market demands, or a combination of all of these?

Future Directions

Throughout the twentieth century, the understanding of the relationship between the development of subsistence systems and environmental changes at Aksum was based on a combination of multi-scale and multidisciplinary data. The interpolation of environmental data, which informs our wider research question of human settlement, was drawn from regional scale and context-specific archaeological records. The Aksumite urban development has long been linked to the idea of an agricultural substratum dependent on irrigation and responsible for land clearance. However, it is now clear that woods were not a common feature of the local landscape either before or during the Aksumite period and that agriculture relied on rainfall. Even if some aspects of ancient resource management have been investigated, site-specific studies and informed research are still very few. Furthermore, important issues such as terracing and field systems have yet to be addressed, albeit clearly priorities within the context of a changing landscape. A greater amount of environmental and archaeological records are needed particularly now that relevant comparable datasets have recently been acquired from elsewhere in Tigray (e.g., Gebru et al. 2009). The retrieval of landscape information is needed to contextualize non-environmental factors affecting societal decision-making over time. A greater amount of archaeological and historical data on the typology/typologies and distribution of rural settlements is necessary to address urban development and, subsequently, the decline of the Aksumite kingdom. The trajectories of settlement and land use diversification need to be addressed within their environmental and ecological contexts. Indeed, the paucity of buried landscape records implies that any attempt at modeling synchronous histories of forest expansion/clearance or the impact of changing rainfall, to mention just two important topics, has to rely on assumptions of environmental and cultural uniformity across vast regions.

Perhaps, the most compelling task currently facing archaeology and cognate disciplines concerns the development of multiple "applied approaches." In this respect, there are a number of opportunities and challenges for archaeological research at Aksum. The applied nature of archaeology has often been confined to the spheres of heritage creation and conservation, and tourism development. However, archaeology has much to offer to integrated, environmental research and can act as a bridge to link theories and methods from the humanities and earth sciences. Past societal responses to environmental stresses and opportunities were chosen from within a range of cultural and ecological constraints, and the understanding of these responses may well contribute to approaching and negotiating present and future environmental risks.

Cross-References

- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Butzer, Karl W.
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Oral Sources and Oral History
- ▶ Phytolith Studies in Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Taphonomy: Definition
- ▶ Zooarchaeology

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References

Bard, K.A., M. Coltorti, M.C. DiBlasi, F. Dramis, and R. Fattovich. 2000. The environmental history of Tigray (northern Ethiopia) in the middle and late Holocene: A preliminary outline. *African Archaeological Review* 17: 65–86.

Boardman, S. 1999. The agricultural foundations of the Aksumite empire, Ethiopia: An interim report. In *The exploitation of plant resources in ancient Africa*, ed. M. van der Veen, 137–147. New York: Plenum Publishing Corporation.

Butzer, K.W. 1981. Rise and fall of Axum, Ethiopia: A geo-archaeological interpretation. *American Antiquity* 46 (3): 471–495.

Ciampalini, R., P. Billi, G. Ferrari, and L. Borselli. 2008. Plough-marks as a tool to assess soil erosion rates – A case study in Axum (Ethiopia). *Catena* 75: 18–27.

Conti Rossini, C. 1928. *Storia d'Etiopia*. Bergamo: Istituto d'Arti Grafiche.

D'Andrea, A.C. 2008. T'ef (*Eragrostis tef*) in ancient agricultural systems of highland Ethiopia. *Economic Botany* 62 (4): 547–566.

Derara, W. 2015. Treats to the Aksum Archaeological Area. In *Ethiopian Studies at the Brink of Its 50th Anniversary* (Proceedings of the XVIIth International Conference of Ethiopian Studies, November 2–5, 2009, Addis Ababa), eds. Aklilu Yilma and Ahmed Hassen, 281–292. Addis Ababa: Institute of Ethiopian Studies, Addis Ababa University.

Fattovich, R. 2008. *Kings and farmers. The urban development of ancient Aksum (Tigray, Ethiopia), ca. 700 BC–AD 1500*, Working papers in African studies 4. Boston: African Studies Center/Boston University.

Fattovich, R., K.A. Bard, L. Petrassi, and V. Pisano. 2000. *The Aksum archaeological area: A preliminary assessment*. Naples: Istituto Universitario Orientale.

French, C., F. Sulas, and M. Madella. 2009. New geoarchaeological investigations of the valley systems in the Aksum area of northern Ethiopia. *Catena* 78 (3): 218–233.

Gebru, T., Z. Eshetu, Y. Huang, T. Woldemariam, N. Strong, M. Umer, M.C. DiBlasi, and V. Terwilliger. 2009. Holocene palaeovegetation of the Tigray Plateau in northern Ethiopia from charcoal and stable organic isotopic analyses of gully sediments. *Palaeogeography, Palaeoclimatology, Palaeoecology* 282: 67–80.

Hagos, T. 2001. New megalithic sites in the vicinity of Aksum, Ethiopia. *Annales d'Éthiopie* 17: 35–41.

Hagos, T. 2010. The choice of Aksum as a metropolis. *Annales d'Éthiopie* 25: 139–156.

Littmann, E., D. Krencker, and T. Von Lüpke. 1913. *Deutsche Aksum-Expedition*. Berlin: Reimer.

Michels, J.W. 2005. *Changing settlement patterns in the Aksum-Yeha region of Ethiopia: 700 NC–AD 850*, British archaeological reports international series 1446. Oxford: Archaeopress.

Monneret De Villard, U. 1938. *Aksum: Ricerche di topografia generale*. Rome: Pontificium Institutum Biblicum.

Munro-Hay, S.C., ed. 1989. *Excavations at Aksum: An account of research at the ancient Ethiopian capital directed in 1972–74 by the later Dr Neville Chittick*. London: British Institute in Eastern Africa.

Nyssen, J., J. Poesen, J. Moeyersons, J. Deckers, and A. Mitiku Haile Lang. 2004. Human impact on the environment in the Ethiopian and Eritrean highlands – A state of the art. *Earth-Science Review* 64: 273–320.

Phillipson, D.W. 2000. *Archaeology at Aksum, Ethiopia, 1993–7*. London: British Institute in Eastern Africa and Society of Antiquaries, London.

Phillipson, L. 2009. *Using stone tools: The evidence from Aksum, Ethiopia*, British archaeological reports, international series 1926. Oxford, UK: Archaeopress.

Phillipson, D.W. 2012. *Foundations of an African civilisation. Aksum and the northern horn, 1000BC-AD 1300*. Woodbridge: James Curry.

Phillipson, L. 2017. Lithic evidence for the peopling of northern Ethiopia. *African Archaeological Review* 34 (2): 177–191.

Puglisi, S. 1941. Primi risultati delle indagini compiute dalla Missione archeologica di Aksum. *Africa Italiana* 8: 95–153.

Ricci, L. 1990. Appunti archeologici. *Rassegna di Studi Etiopici* 32: 129–165.

Schmid, T., M. Kock, M.C. DiBlasi, and M. Hagos. 2008. Spatial and spectral analysis of soil surface properties for an archaeological area in Aksum, Ethiopia, applying high and medium resolution data. *Catena* 75: 93–101.

Sernicola, L. 2017. *Ancient settlement patterns in the area of Aksum (Tigray, northern Ethiopia) – ca. 900 BCE-800/850 CE*, BAR international series 2860. Oxford: Archaeopress.

Sulas, F. 2014. Aksum: Water and urbanization in northern Ethiopia. In *A history of water, series 3, Vol. 1. From Jericho to cities in the seas: A history of urbanization and water systems*, ed. T. Tvedt and T. Ostigaard, 171–195. London: I. B. Tauris.

Further Reading

Anfray, F. 1990. *Les anciens éthiopiennes*. Paris: Armand Colin.

Bard, K.A., ed. 1997. *The environmental history and human ecology of northern Ethiopia in the Late Holocene*. Naples: Istituto Universitario Orientale.

Cain, C.P. 1999. Results from zooarchaeological analysis at Axum, Ethiopia. *ArchaeoZoologia* 10 (1–2): 24–45.

de Contenson, H. 2005. *Antiquités éthiopiennes d'Axoum à Haoulti*. Éd. Sépia: Saint-Maur-des-Fosses.

Finneran, N. 2007. *The archaeology of Ethiopia*. Abingdon: Routledge.

French, C. 2010. People, societies, and landscapes. *Science* 328: 443–444.

Machado, M.J., A. Pérez – González, and G. Benito. 1998. Palaeoenvironmental changes during the last 4,000 years in the Tigray, northern Ethiopia. *Quaternary Research* 49: 312–321.

Sulas, F. 2016. Soils, plants and texts: An archaeologist's toolbox. In *Oxford handbook of historical ecology and applied archaeology*, ed. C. Isendahl and D. Stump. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199672691.013.18.

Akurgal, Ekrem

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Basic Biographical Information

Ekrem Akurgal was born on the family farm in the village of Haifa, near Tulkarem, Palestine, in 1911. At the age of two, his family returned to Turkey and he started his education at home. He graduated from Istanbul Males High School in 1932. As a requirement of the period of which the Turkish Republic was recently established, and due to new cultural and historical policies, he was sent to Germany as a scholarship student in 1932 and studied classical archaeology under Gerhart Rodenwaldt until 1940. In 1941 he was promoted to associate professor in Ankara University's Faculty of Languages, History and Geography and in 1949 became professor and professor emeritus in 1957. Akurgal served as the dean of the faculty from 1958 to 1959.

Major Accomplishments

Akurgal founded an archaeology library in the faculty that contains nearly 6000 books which are mostly published in foreign languages. This provides students and scholars with convenient access to an important reference resource. Akurgal excavated and revealed ancient sites such as Foça (Phokaia), Çandarlı (Pitane), and Çeşme – Ildırı (Erythrai) veBayraklı (old Smyrna). He has written numerous publications on ancient Greek, Hittite – Hatti, and ancient Anatolian civilizations in various languages. He was a member of seven academies in Europe and also an honorary member of many scientific institutions: the University of Bordeaux (1961), the University of Athens (1988), the University of Lecce (1990), and the Anatolian University (1990) where he was awarded the title of honorary doctor.

Ekrem Akurgal received the Order of Merit of the Federal Republic of Germany (1979), Goethe Medal (1979), Republic of Turkey Ministry of Culture Great Award (1981), Italian Commendatore Order (1987), and French Légion d'Honneur Officier (1990). He died in İzmir in 2002. His studies were continued by his wife, Meral Akurgal, who was an archaeologist and the closest assistant of Akurgal when he was alive.

Cross-References

▶ Architecture, Roman
▶ Hellenistic and Roman Anatolia, Archaeology of

Further Reading

Akurgal, E. 1942. *Griechische Reliefs aus Lykien*. Berlin: DAI.
Akurgal, E. 1945. *Remarques Stylistiques sur les reliefs*. Ankara: Hittite.
Akurgal, E. 1962. *The art of the Hittite*. London: Thames & Hudson.
Akurgal, E. 1966. *Treasures of Turkey*. New York. (In German, French, Italian and Spanish).
Akurgal, E. 1968. *Urartaische und Altiranische Kunstzentren*. Ankara: TürkTarihKurumu.
Akurgal, E. 1980. *The art and architecture of Turkey*. Oxford: Oxford University Press.
Akurgal, E. 1993. *Ancient civilizations and ruins of Turkey*. Istanbul: NET Yayınları.
Akurgal, E. 1993. *Eskiçağ'da Egeve İzmir*. İstanbul: YaşarHolding, Yayınları.
Akurgal, E. 1995. Hattive Hitit Uygarlıkları. İzmir.
Akurgal, E. 1998. *Türkiye'nin Kültür Sorunları*. Ankara: BilgiYayınev.
Akurgal, E. 1998. *Anadolu Kültür Tarihi (TÜBİTAK)*. Ankara: Yayınları.
Akurgal, E. 2000. *Ege Batı Uygarlığının Doğduğu Yer. Doğu Hellen KültürTarihi İ.Ö. 1050–333*. İzmir: İzmir BB KültürYayınları.

Alberto, Carlos

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Basic Biographical Information

Carlos Alberto Aschero was born in Buenos Aires, Argentina, in 1946. His professional career began in the field of visual arts. In 1969, he graduated as art school teacher of drawing and, in 1972, as teacher of drawing and engraving. At the same time that he was studying visual arts, he began to study anthropological sciences at the University of Buenos Aires (UBA) where he graduated as Bachelor in Anthropological Sciences who specialized in prehistory and archaeology in 1974.

Between 1973 and 1975, Carlos Alberto Aschero began his career at CONICET (National Council of Scientific and Technical Research) as an initiation scholarship researcher. In April 1977, he began a career as a scientific researcher. He was an independent researcher between 1977 and 1996, and later he became senior researcher. As a CONICET researcher, Aschero was a member of the Advisory Commission on History, Anthropology and Geography for several periods between 2000 and 2012. He was the coordinator of the Commission between 2004 and 2007 and a member of CONICET Qualification Board between 2003 and 2004.

Carlos Alberto Aschero is currently Principal researcher at the ISES Institute of Social Studies, CONICET-National University of Tucumán (UNT). He was interim director between 2010 and Vice Director until 2016. He was representative of CONICET monitoring the Archeometry Laboratory Project (LALAR-INDyA, MINCyT-CONICET) and is currently the chairman of the board of directors of that organization, which was recently created in Argentina.

In 1971, Carlos Alberto Aschero began his teaching career while still a student at the National University of Tucumán, where he worked as associate professor. He was assistant professor between 1983 and 1993 of the Ergology and Technology Chair. From 1991, he was temporary Associate Professor of the Faculty of Natural Sciences of the National University of Tucumán and the Institute of Archaeology and Museum (IAM) until 1996. He was Director of the Institute of Archaeology, from 1995 to 1996, and Director of the IAM, between 1995 and 2002. In 2005, he became Full Professor of the Theory and Methods Chair in Archaeology of the Archaeology Department of the same faculty at UNT. From 2008, he reduced his full-time commitment to the post to part-time. He eventually became Honorary Director of the Institute from 2006 to 2010. He was also Professor of Field Practice III.

Carlos Aschero continued to work after his official retirement from CONICET in 2010. In 2018, he teaches about the rock art and hunter gatherers of Puna and Patagonia, within the International MASTER PREFALC in South American Prehistory Theory, Methodology and Practice of the University of Rennes 1 (France) and the National University of Trujillo (Perú). He was President of the Argentine Society of Anthropology between 1990 and 1993, and he is now an honorary member.

Major Accomplishments

In 1996 Carlos Alberto Aschero received the KONEX Award for the Humanities, and in 2001 he received the Bunge and Born Foundation award for his scientific career. He is a highly regarded archaeologist in South America. He is a specialist in diverse archaeological subjects and initially was part of the Argentine cultural historical school within C. Gradin's team. His first works reveal a strong influence from the French school, particularly of M. Brezillon, A. Leroi Gourhan, and F. Bordes (Aschero 1973).

Aschero worked on human productions derived from the concept of ergology in technofactures (both things or objects and symbolic

representations), developing various research programs on the lifestyles of hunter-gatherer groups and rock art in Argentina. His work on lithic typology (1983) has been a reference to Argentine archaeologists and has had international impact, which is remarkable, since it was never been published in a widely available medium.

Carlos Alberto Aschero's research on hunter-gatherer societies in the Southern Patagonian Andean area (Cuenca del Río paintings, Casa de Piedra Mount, Pueyrredón Lake, Santa Cruz Province) (Aschero and Aguerre 1979) and in the Northwest of Argentina (Puna Salada in Antofagasta de la Sierra, Inca Cave, Azul Pampa, Susques) (Aschero 2014) laid the foundations for a regional archaeology for those two regions of Argentina. In the same way, his research in these regions influenced the study of the process of American settlement (Aschero 2000), revealing the antiquity of human settlement in this part of the continent from very early dates.

His regional projects on rock art combined aspects in which symbolics were integrated into the vision, strategies, and social organization of these groups in relation to their natural environment (Aschero 2007). He also contributed to the historical reconstitution of different artistic styles, working on a diachronic reading of mural representations based on study of their production techniques, the reading of their structures and associations, and their relationship to the archaeological remains related to their manufacture. In his courses and publications, he delved deeper into the relationship between style and function, contributing to an enriched reading of these productions and to generating different readings of both the structures underlying those productions and the objects themselves, their manufacturing modalities and use.

In terms of his contributions to archaeological theory, Aschero developed an integrated view of archaeology in its social context and of its participation in the process of identity construction. Here, the influence of the postmodern school through Ian Hodder or Tim Ingold can be perceived. This is clearly seen in his recent works where humanism, ecology, and landscape are articulated as methods to explain cultural processes and hunter-gatherers' ways of living (Aschero 2010). His influence on Argentine archaeology is very important because he formed a school for his research as well as for training professionals (in the UBA as well as in the UNT). These scholars now occupy important position in the archaeology of the country. The range in their theoretical orientations reflects the intellectual freedom with Aschero encouraged during his career as an educator. The audiovisual production created by CONICET between 2014 and 2016, *Indigenous Technologies*, reflects Aschero's theoretical approaches and his multiple interests. It comprehensively conveys the breadth of his vision of archaeology, dealing with different aspects of Argentine archaeology from the settlement of the continent to the appearance of metallurgy. After he retired, he continued to work as archaeologist at Cueva Cacao 1 site at the Puna Catamarca province in Argentina. In 2018, human hair from his excavations was dated by the Centre for Isotope Studies at the University of Georgia to more than 40,000 BP (UGAMS # 33465, Sample ID M33-D5), opening up new debate concerning the peopling of South America.

Cross-References

- ▶ Art, Paleolithic
- ▶ France: Field Method Origins
- ▶ Hodder, Ian (Theory)
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Hunting and Hunting Landscapes
- ▶ Leroi-Gourhan, André
- ▶ Peopling of the Americas
- ▶ Post-Processual Archaeology
- ▶ Rock Art, Forms of
- ▶ South American Archaeology: Postcolonial Perspectives
- ▶ South American Rock Art

References

Aschero, C.A. 1973. Secuencia arqueológica del alero de las manos pintadas, Las pulgas departamento de Rio Senguerr Chubut. *Relaciones* 7: 187–209.

Aschero, C.A. 1983. *Ensayo para una clasificación morfológica de artefactos líticos*. Buenos Aires: Instituto de Antropología. Revisión.

Aschero, C.A. 2000. *El poblamiento del Territorio in: Tarrago Myriam Comp. Nueva Historia Argentina TOMO I Argentina Prehispánica*, 17–57. Buenos Aires: Editorial Sud americana.

Aschero, C.A. 2007. Iconos, *Huancas* y Complejidad en la Puna sur argentina. In *Producción y circulación prehispánicas de bienes en el sur andino*. Colección Historia Social Precolombina, vol 2, 135–165. Compiladores: A.E. Nielsen, M.C. Rivolta, V. Seldes, M. Vázquez, P. Mercolli. Ed. Brujas, Córdoba. ISBN: 978-987-591-107-9.

Aschero, C. A. 2010. Arqueologías de Puna y Patagonia centro-meridional: comentarios generales y aporte al estudio de los cazadores-recolectores puneños en los proyectos dirigidos desde el IAM (1991–2009). Rastros en el camino. . .Trayectos e identidades de una Institución. Homenaje a los 80 años del IAM. Arenas, P., C.A. Aschero, C. Taboada EDUNT, San Miguel de Tucumán. 257–293. . ISBN 978-987-1366-72-9. Chapter 25

Aschero, C.A. 2014. Hunters-gatherers of the Puna in a temporal perspective (10.500–3500 BP) Hunter-gatherers from a high altitude desert. People of the Salt Puna Oxford. 2014. 25–42.

Aschero, C.A., and A.M. Aguerre. 1979. Arqueología del área Río Pinturas. *Relaciones* 13: 187–227.

Tecnologías Originarias

https://www.youtube.com/playlist?list=PLmZ4WP5IsCKGacPS45_AFJ5_tyJpg4owL.

Ali Kosh: Agriculture and Domestication

Frank Hole
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Introduction

Ali Kosh is a small mound on the Deh Luran plain of western Iran, close to the Iraqi border (32°33′26 18″ N and 47°19′30 11″ E). The site's prominence owes to its having revealed the first substantial evidence from charred plant remains of early stages of domestication in the Near East. Using the (at the time) new method of flotation, archaeologists recovered tens of thousands of seeds from Ali Kosh (Neolithic) and nearby Tepe Sabz (Chalcolithic), whose analysis by Hans Helbaek, a Danish paleobotanist (Helbaek 1969), showed an evolving competence in agriculture.

Key Issues

Excavated in 1961 and 1963 by Frank Hole and Kent Flannery, Ali Kosh is divided into three phases denoted by changes in plant and animal use, building types, burials, grinding stones, chipped lithics, and other artifacts (Hole et al. 1969; Hole 1977). The Bus Mordeh and Ali Kosh Phases are preceramic, while the Mohammad Jaffar Phase has some of the oldest ceramics in Iran. Radiocarbon dates show that the site was founded around 7500 cal. BCE and abandoned by 7000 cal. BCE (Zeder and Hesse 2000; Zeder 2000).

The Deh Luran plain, situated near the base of the Zagros Mountains had rich wild resources for the settlers to exploit and fertile soil in which to plant crops. The site was established near a marshy lake, which provided food resources, such as fish, water fowl, crabs, and turtles, as well as plants such as sea club rush whose seeds are edible. Local-hunted fauna included gazelle, onager, cattle, and pigs. The people also made extensive use of the wild-plant resources, including alfalfa, spiny milk vetch, *Trigonella* (a small plant of the pea family), various grasses, goosefoot, and fruit of the caper. While such plants were edible, because of their small seeds, they required considerable time to process. The people also imported and planted the larger-seeded emmer wheat and two-row hulled barley, neither native to the Deh Luran steppe. This basic picture of an important reliance on wild foods continued throughout the occupation of Ali Kosh, although their use diminished as domesticates increased, and the floral composition of the steppe gradually changed owing to cultivation, grazing by herds of

goats and sheep, and gradual burial of the marsh by geological processes.

Bus Mordeh Phase

Using red-clay slabs cut from the edge of the marsh, the first people at Ali Kosh built small rooms whose floors were covered with reed matting (Fig. 1). They planted emmer wheat and two-row hulled barley and kept a small herd of goats, but hunting and fishing provided a major part of their subsistence. It is probable that the people migrated into the mountains during the summers where cooler temperatures and fresh grass would be available for their herds. While they made thousands of small bladelets of flint, their inventory of grinding stones was limited. A small number of pieces of obsidian arrived from a source in Turkey, one indication of wide regional contacts. Although no burials were recovered, a number of beads and pendants made of boar tusk and shell are indications of personal decoration.

Ali Kosh Phase

A change in architecture is one of many differences with the Bus Mordeh Phase. By this time, red clay was no longer accessible, and walls were made of large slabs of clay cut directly from the land surface, and the houses were larger. Two such structures, with a narrow corridor between, lay next to an open courtyard with a brick-lined hearth. The courtyard was littered with stone tools for butchering animals, and the corridor between the buildings was filled with discarded bones (Fig. 2). In addition to using mats on the floor, they also made simple baskets, some of which may have been waterproofed with asphalt, taken from a seep near the site. Although there was no pottery, there were carefully made stone bowls and shallow trays of limestone, as well as clay figurines, mostly of goats and possibly humans, as well as other enigmatic clay objects. A copper bead hammered from a native source on the Iranian plateau attests to contacts, as does the increased amount of obsidian. This phase sees a proliferation of grinding stones in various new forms, implying a more sophisticated approach to the processing of wild plants and domestic crops.

There are burials beneath the houses, generally in small pits in which the bodies were tightly wrapped in matting and placed in a seated position. The skulls show annular cranial deformation,

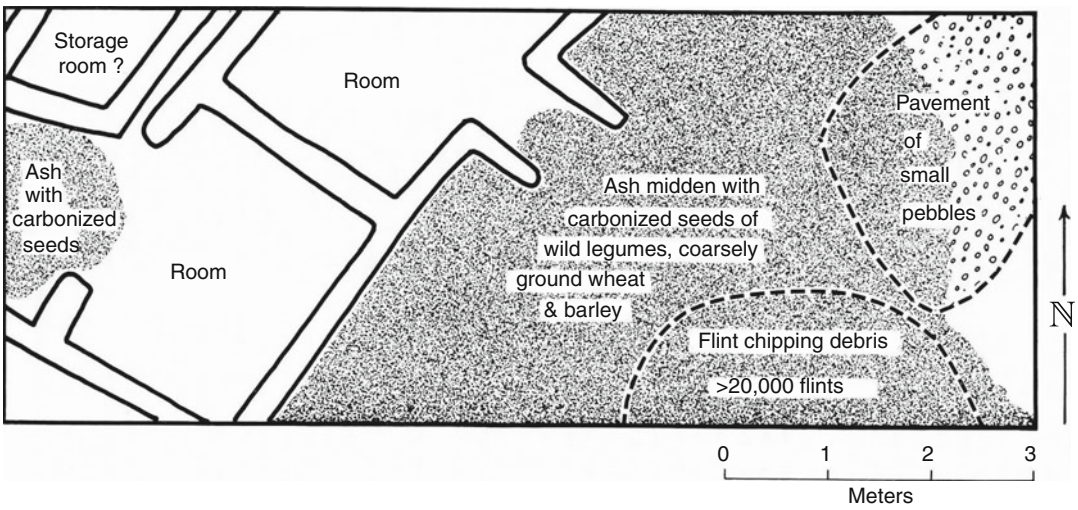

Ali Kosh: Agriculture and Domestication, Fig. 1 Plan of Zone C2 (Bus Mordeh Phase). Small rooms of *red*-clay bricks and lithic workshop covered with the *ash* midden

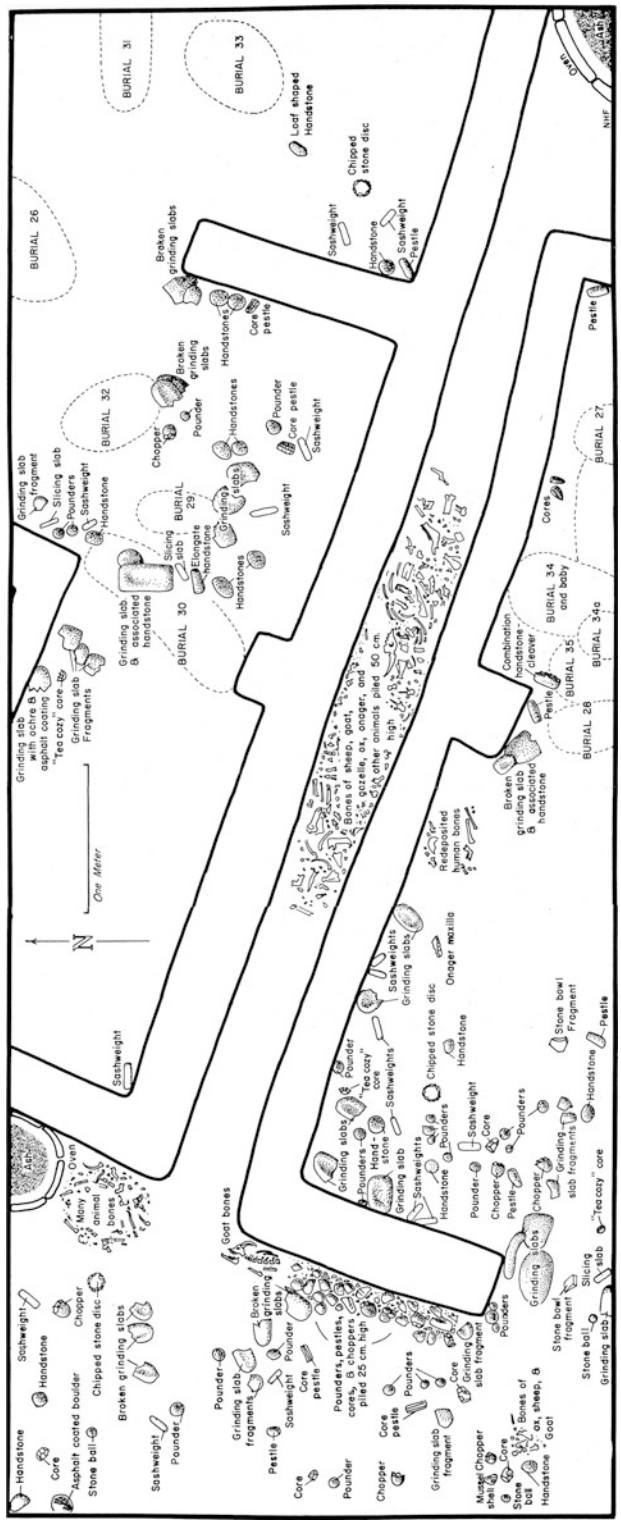

Ali Kosh: Agriculture and Domestication, Fig. 2 Plan of Zone B2 (Ali Kosh Phase). Parts of two houses and courtyard, with lithic and faunal remains in situ

which elongates the skull. Numerous beads and other ornaments were on the bodies, some of which had been coated with red ochre.

Mohammad Jaffar Phase

The presence of pottery, lightly fired, chaff-tempered wares in three types – plain unpainted bowls, painted vessels, and red burnished bowls – denotes this phase and provides excellent stylistic links with other excavated sites in western Iran and Iraq, such as Sarab, Guran, and Jarmo.

The herds, consisting of both goats and sheep, show the characteristics of full domestication, and they now comprised the majority of faunal remains, although hunting of the large ungulates continued. The steppe vegetation now had *Prosopis*, a woody perennial with edible pods which, with fumaria and goose grass, are indications of grazing and cultivation. The filling of the marsh is attested by the absence of water-loving plants. In other words, human use and geological processes over the centuries had degraded the local environment.

Many of the flint, clay, and stone objects made in the Ali Kosh Phase continued in use, but a further innovation was the combination of shallow-basin grinding slab and mortar.

Together with grinding implements carried over from earlier times, there never had been as varied an array of artifacts to deal with the processing of cereals, which still were not "free-threshing."

Houses in the Mohammad Jaffar Phase showed further evolution. Now the walls had stone bases to control soil moisture, and the walls were of straw-tempered mud bricks (Fig. 3). Outside the houses are a number of burials lying in fetal position on their sides. Gone is cranial deformation, but a new array of ornaments occurs: bell-shaped pendants of marble, as well as labrets (one found in place), and beads of turquoise. Obsidian from eastern Turkey, seashells from the Gulf, specular hematite from Fars (southern Iran), and turquoise (possibly from northeastern Iran) are all evidence of widespread contacts through some means of exchange or transmission.

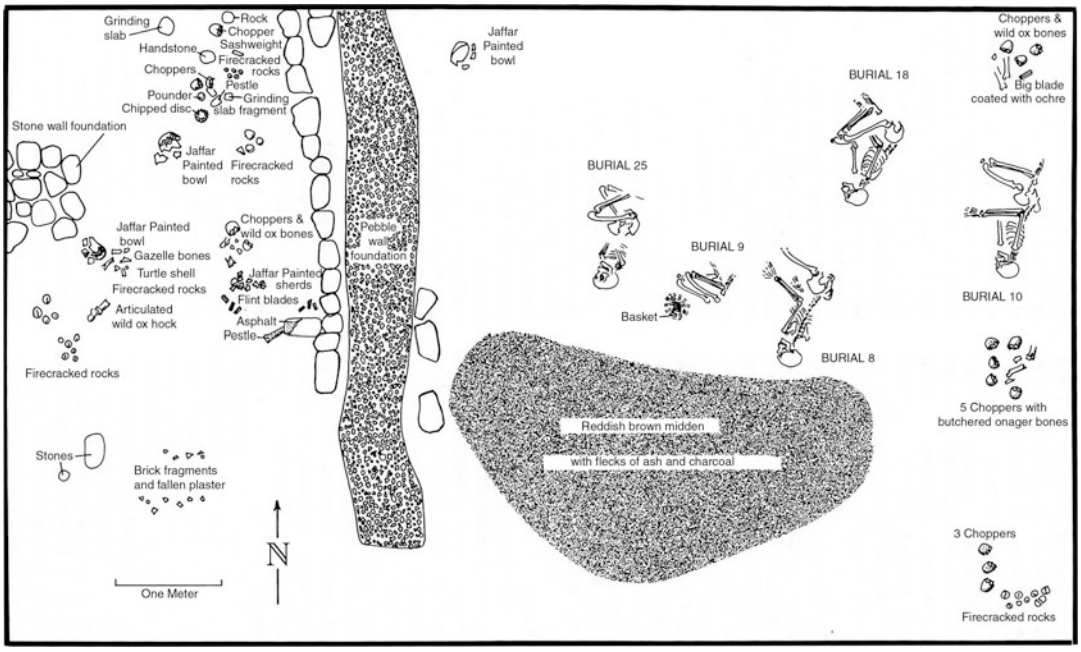

Ali Kosh: Agriculture and Domestication, Fig. 3 Plan of Zone A1 (Mohammad Jaffar Phase). To the *left*, a stone-founded wall of a house with tools and fauna. On the *right* are burials outside the structure

Because of its importance in the history of Deh Luran as well as to western Iran generally, the site has been designated as a protected reserve, off-limits to any non-archaeological activity.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Goat: Domestication
- ▶ Sheep: Domestication
- ▶ Wheats: Origins and Development

References

Helbaek, H. 1969. Plant collecting, dry-farming and irrigation agriculture in prehistoric Deh Luran. In *Prehistory and human ecology of the Deh Luran Plain: An early village sequence from Khuzistan*, Museum of Anthropology Memoir, ed. F. Hole, K.V. Flannery, and J.A. Neely, vol. 1, 383–426. Ann Arbor: University of Michigan.

Hole, F., ed. 1977. *Studies in the archaeological history of the Deh Luran Plain*, Museum of Anthropology Memoir. Vol. 9. Ann Arbor: University of Michigan.

Hole, F., K.V. Flannery, and J.A. Neely. 1969. *Prehistory and human ecology of the Deh Luran Plain*, Museum of Anthropology Memoir. Vol. 1. Ann Arbor: University of Michigan.

Zeder, M.A. 2000. The goats of Ganj Dareh: Identification of the earliest directly dated domestic animals. *Science* 287: 2254–2257.

Zeder, M., and B. Hesse. 2000. The initial domestication of goats (*Capra hircus*) in the Zagros Mountains 10,000 years ago. *Science* 287: 2254–2257.

Allen, Jim

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Basic Biographical Information

Frederick James (Jim) Allen was born in Gosford, NSW, Australia, in 1938. Graduating B.A. (Hons.) from Sydney University in 1965, Allen then undertook research for his doctorate in the Department of Prehistory at the Australian National University, being awarded the degree in 1969. From 1969 to 1972, he was a Lecturer in Prehistoric Archaeology in the Department of Anthropology at the University of Papua New Guinea. Following this, he took up an appointment as Research Fellow and then Fellow in the Department of Prehistory at the Australian University until 1985. During that time (in 1974), he was appointed Commonwealth Fellow, St John's College, Cambridge, UK. In 1985, he left the ANU to become foundation Professor of Archaeology at La Trobe University in Melbourne, Australia, retiring to become an Emeritus Professor in 1999. Allen's La Trobe years saw him take up Visiting Professorships in Auckland (1989) and Utah (1993). From 1993 to 1998, he was an Australian Research Council Senior Research Fellow. In retirement, he has also been a Member, Centre for Archaeological Research, Department of Archaeology and Natural History, Australian National University (1999–present), and a Research Professor, Department of Anthropology, University of Utah (2004–present).

Major Accomplishments

Allen has a unique position in the history of archaeology in Australia. Beginning at the University of Sydney with a training in Classical Archaeology, Allen moved to the Australian National University to undertake Ph.D. research on the historic site of Port Essington (1966–1969), completing the first ever dissertation on historical archaeology in Australia. Allen then moved to the University of Papua New Guinea (1969–1972) where he became a pioneer of prehistoric and protohistoric archaeology in that country.

Allen has contributed to a revolution in scientific knowledge about the prehistory of Melanesia and Tasmania. Returning to the Australian National University (1972–1984), Allen played a pivotal role in founding the field archaeology of

island Melanesia, through his leadership of the Lapita Homelands Project. In addition, Allen became involved in the prehistoric archaeology of Tasmania, which increased in intensity with his move to become foundation professor at La Trobe University (1985–1993), where he led the Southern Forests Archaeological Project. These major passages of fieldwork lay the groundwork for significant publications related to the archaeology of greater Australia. They also provided the framework for several major doctoral dissertations and other ancillary research. Allen has played a vital role in training several generations of Australian archaeologists and founded the Department of Archaeology at La Trobe University, Melbourne, in 1985.

Although he retired from academic archaeology in 1998, Allen has continued to conduct foundational research in Australian prehistoric archaeology and to draw together the threads of his diverse experience and knowledge of regional archaeology. Beginning with his work on developing models of prehistoric trade for egalitarian communities along the Papuan coast, which underscored the complexity of trade as a social act; then moving towards an exploration of colonization as a vector for increasing social complexity in Melanesia; and finally resting on a deep consideration of the prehistoric settlement of Australia and its consequences for the subsequent history of Aboriginal societies over the last 50,000 years, Allen continues to be vitally engaged in the research process. The importance of Allen's long connection with regional archaeology and its broader consequences was recognized by his election as Foreign Associate of the US National Academy of Sciences in 2012.

Cross-References

- ► Australasian Historical Archaeology
- ► Jones, Rhys Maengwyn
- ► Mulvaney, John
- ► Murray, Tim

Further Reading

Allen, J. 1973. The archaeology of nineteenth century British imperialism: An Australian case study. *World Archaeology* 5 (1): 44–60.

Allen, J. 1977. Fishing for wallabies: Trade as a mechanism for social interaction, integration and elaboration on the central Papua coast. In *The evolution of social systems*, ed. J. Friedman and M.J. Rowlands, 419–455. London: Duckworth.

Allen, J. 1984. Pots and poor princes: A multidimensional approach to the role of pottery trading in coastal Papua. In *The many dimensions of pottery*, ed. S. van der Leuuw and A.C. Pritchard, 409–463. Amsterdam: University van Amsterdam.

Allen, J. 1994. Radiocarbon determinations, luminescence dating and Australian archaeology. *Antiquity* 68: 339–343.

Allen, J. 2000. From beach to beach: The development of maritime economies in prehistoric Melanesia. In *East of Wallace's Line; studies of past and present maritime cultures of the Indo-Pacific region*, ed. S. O'Connor and P. Veth, 139–177. Published as *Modern Quaternary Research in SE Asia* 16. Rotterdam: A. A. Balkema.

Allen, J. 2008. *Port Essington. The historical archaeology of a North Australian nineteenth-century military outpost*, Studies in Australasian Historical Archaeology. Vol. 1. Sydney: Australasian Society for Historical Archaeology, Sydney University Press.

Allen, J., ed. 1996. *Report of the Southern Forests archaeological project, volume 1: Site descriptions, stratigraphies and chronologies*. Bundoora: School of Archaeology, La Trobe University, Archaeology Publications.

Allen, J., B. Blain, R. Fullagar, D. Ranson, S. Harris, R. Jones, E. Stadler, R. Cosgrove, and G. Middleton. 1983. The Australian National University Tasmanian National Parks and Wildlife Service archaeological expedition to the Franklin and Gordon Rivers, 1983: A summary of results. *Australian Archaeology* 16: 71–83.

Allen, J., R. Cosgrove, and B. Marshall. 1990. Palaeoecology and Pleistocene human occupation in south central Tasmania. *Antiquity* 64 (242): 59–78.

Anderson, A., and T. Murray, eds. 2000. *Australian archaeologist: Collected papers in honour of Jim Allen*. Canberra: Australian National University, Coombs Academic Publishing.

Hewitt, G., and J. Allen. 2010. Site disturbance and archaeological integrity: The case of Bend Road, an open site in Melbourne spanning pre-LGM Pleistocene to Late Holocene periods. *Australian Archaeology* 70: 1–16.

O'Connell, J.F., and J. Allen. 2012. The restaurant at the end of the universe: Modelling the colonisation of Sahul. *Australian Archaeology* 74: 5–17.

Allen, Mitchell

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Basic Biographical Information

Mitchell Allen is an archaeologist, publisher, and instructor. He obtained a Bachelor of Arts degree in Anthropology from the University of California, Santa Barbara; a Master's degree in Near East Studies from the University of Michigan; and, in 1997, a Ph.D. in Archaeology from the University of California, Los Angeles. His dissertation was concerned with Philistia, the Neo-Assyrians, and world systems theory (Allen 1997). Allen has taught at several universities in the United States, such as Mills College, the University of Maryland, Santa Clara University, and Diablo Valley College. Allen has taught and published on an eclectic mix of subjects, including the ancient Near East, archaeology, and scholarly publishing. The latter was borne out of 40 years of experience in the publishing industry. After retiring from Left Coast Press in 2015, Allen founded the Scholarly Roadside Service, a consulting company that specializes in academic publishing.

Major Accomplishments

Allen is best known for his career in publishing, during which he has overseen the publication of over 1500 books, journals, and software products. After working as an executive editor at Sage Publications, a social science publisher, Allen founded AltaMira Press in 1995 and directed its first 10 years. Under his supervision, AltaMira Press became a leading source of texts on cultural resource management, public history, and applied anthropology, among other topics. In 2005, Allen left AltaMira Press to establish Left Coast Press Inc., which he ran until it was sold to Routledge in 2015. There, he published books and journals in the humanities and social sciences, covering a broad range of topics such as anthropology, archaeology, sociology, ethnic studies, gender studies, heritage studies, public history, museum practice, qualitative research, and ethics. Allen's goal with both AltaMira Press and Left Coast Press was to create a space in which to produce progressive works (e.g., on indigenous and postcolonial archaeologies) and "find alternatives to traditional publishing" (Allen 2005). The latter can be demonstrated by the variety of unconventional textbooks Allen has published, including those that take the form of comic books and novels. Allen also encouraged the development of materials that would address gaps in scholarship, arguing that "our role is as much to shape scholarly output as to facilitate it" (Allen 2007a: 197). For example, at his urging, a textbook on archaeological ethics was written.

In addition to publishing the work of others, Allen has contributed several of his own publications, many of which are practical guides to navigating professional or academic life. He has advised on topics such as creative teaching methods (Allen 2007b), writing memorable and engaging works (Allen 2002), and the nature of

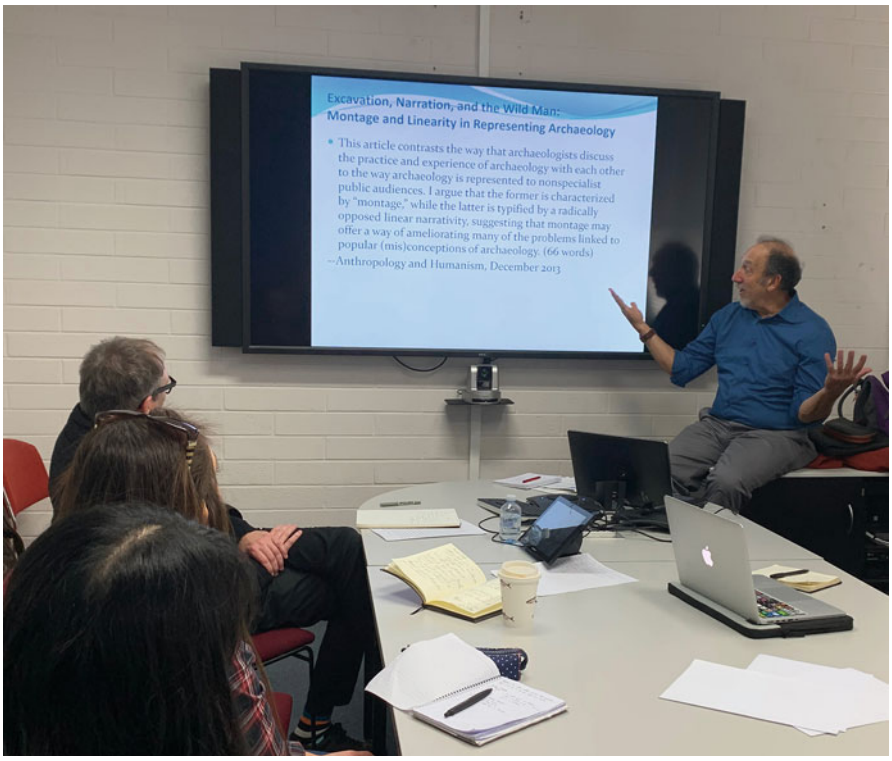

Allen, Mitchell, Fig. 1 Mitch Allen running a workshop on publishing. October, 2019, Flinders University, South Australia

academic publishing (Allen 2003; Allen and Joyce 2010).

In 2013, the World Archaeological Congress (WAC) gave Allen an International Achievement Award in recognition of his contributions to archaeological scholarship and publishing. Allen had collaborated with WAC to produce new publications such as the *WAC Research Handbooks in Archaeology*, the *Archaeology and Indigenous Peoples* series, and the journal *Archaeologies*.

Allen has returned to archaeology since retiring from publishing and is writing up a legacy project in which he participated, the Helmand Sistan Project, a joint US-Afghan survey and excavation expedition that worked in southwest Afghanistan from 1971–1979. He also conducts occasional workshops on writing and publishing in books and journals (Fig. 1). helping to build academic capacity and assisting universities to deal with the challenges of a changing world.

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Ethics in Archaeology
- ▶ Indigenous Archaeologies
- ▶ Postcolonial Archaeologies

References

Allen, M.J. 1997. *Contested peripheries: Philistia in the neo-Assyrian world-system*. PhD dissertation, University of California, Los Angeles. Ann Arbor: University Microfilms.

Allen, M.J. 2002. Reaching the hidden audience: Ten rules for the archaeological writer. In *Public benefits of archaeology*, ed. B. Little, 244–251. Gainesville: University Press of Florida.

Allen, M.J. 2003. Field guide to archaeological publishing. *SAA Archaeological Record* 3 (1): 5–6.

Allen, M.J. 2005. Charlie Brown in the classroom: Comics and other incendiary devices for teaching archaeology. *SAA Archaeological Record* 5 (5): 9–12.
Allen, M.J. 2007a. Think small. *Near Eastern Archaeology* 70 (4): 196–197.
Allen, M.J. 2007b. Scenarios for archaeologists: A teaching tool. In *Archaeology to delight and instruct: Active learning in the university classroom*, ed. H. Burke and C. Smith, 245–251. Walnut Creek: Left Coast Press.
Allen, M.J., and R. Joyce. 2010. Communicating archaeology in the 21st century. In *Voices in American archaeology*, ed. W. Ashmore, D. Lippert, and B.J. Mills. Washington, DC: Society for American Archaeology.

Alpaca and Llama: Domestication

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Basic Species Information

Four camelid species inhabit South America today: the vicuña (*Vicugna vicugna*) and its domesticated form alpaca (*Vicugna pacos*), and the guanaco (*Lama guanicoe*) and its domesticated form the llama (*Lama glama*) (Kadwell et al. 2001). Since their initial contact with humans in the late Pleistocene and early Holocene, camelids have been an important resource for the South American people. Initially camelids were a primary source of food, which ultimately led to their domestication in the mid-Holocene. Over the last several thousand years, domesticated camelids have become important in many aspects of human life, from textiles to religious practices. In the sixteenth century, the Spanish conquest had a devastating impact on camelid populations. Tax records of herd sizes registered a 90% decrease during the first 100 years of Spanish occupation (Wheeler 2012). Therefore, we do not have a clear understanding of the diversity of alpaca and llama that existed under pre-conquest husbandry practices.

The vicuña is the smaller of the two wild camelids (35–50 kg), with very fine fiber (~12.5 μm) (Wheeler 1995; Mengoni Goñalons 2008). Alpaca closely resemble their wild vicuña ancestor, *V.v. mensalis*, but are slightly larger (adult weight 55–65 kg) with coarser, white to brown, and black fiber (~32 μm). Studies of pre-Spanish, alpaca mummies indicate that intensive selection for phenotype and high quality fiber production was practiced (Wheeler 2012). Two recognizably different varieties exist today, although they do not breed true. Alpacas with the "suri" phenotype have long dreadlock fibers, while those with the "huacaya" phenotype have a crimped fleece. They are also an important source of meat in South America.

Guanaco are larger (85–140 kg) and have coarser fiber (16.5–24 μm). Llamas are very similar in size and morphology to their wild guanaco ancestor, *L. g. cacsilensis*, although fleece color, texture, and fiber diameter have changed as a result of selective breeding (Mengoni Goñalons 2008; Wheeler 2012). Due to their robust nature, llamas have traditionally been used as pack animals, making possible the Inca expansion from southern Columbia to central Chile. However, they were also bred for fine fiber production prior to Incan times. These latter varieties have largely disappeared today, and although llama have several distinct fleece phenotypes, only the woolly (ccara), non-woolly (chaku), and dreadlock (suri) varieties are generally recognized.

Archaeological evidence tracking the timing and location(s) of camelid domestication in South America includes direct evidence (tooth morphology, osteometry, bone, and fiber morphology), indirect evidence (change in abundances and age groups), and contextual evidence (corral structures, art, and other cultural artifacts) (Mengoni Goñalons 2008). Archaeological evidence suggests that alpaca and llama were used

by the native people for a variety of purposes, including fiber for textiles, bones for tools, dung for fuel and fertilizer, pack animals for transportation of goods, and in religious ceremonies. Other evidence suggests that the high-elevation, montane Puna (grassland) region, which extends from central Peru, through Bolivia to northern Chile and northwestern Argentina, was the area in which the domestication of both camelids occurred (reviewed in Wheeler 2012 and Mengoni Goñalons 2008).

Alpaca were likely first domesticated in the humid Puna region of Peru during the early to mid-Holocene. Archaeozoological evidence, primarily based on tooth enamel patterns unique to alpaca, from Telarmachay rockshelter suggests that alpaca were domesticated prior to 6,000 years ago. Faunal remains from other sites suggest that alpaca were brought to lower elevation mountain valley areas ~3,800 years ago and into coastal sites in the last 1,000 years (Wheeler 2012). Similar to its ancestor vicuña, alpaca had a more restricted range than guanaco and llama. The historical distribution of alpaca included the Puna of Peru, Bolivia, and northern Chile, as well as the inter-Andean and coastal valleys of Peru (Mengoni Goñalons 2008).

Archaeozoological evidence indicates that llama were likely domesticated ~5,000–3,800 years ago at multiple locations in the Puna of the central Andes (northwest Argentina and northern Chile) and possibly in the high Andes of Peru (Wheeler 2012 and Mengoni Goñalons 2008). Beginning ~1,400 years ago, llama were brought into areas previously uninhabited by their wild ancestors such as Ecuador and southern Columbia. Generally, archaeologists have considered llama domestication independent, but more research is needed to fully understand the relationship between alpaca and llama domestication.

Both llama and alpaca figured prominently in the economy of the pre-Incan cultures, as well as the Incan empire (1470–1532 CE). At the site of El Yaral in southern Peru, naturally mummified alpacas and llamas from the Chribaya period (850–1470 CE) document both religious sacrifice of these animals and selective breeding for fine fiber production in both domestic forms (Wheeler 1995). Under the Inca, alpaca and llama production was strictly controlled by herding specialists and emphasis was placed on breeding animals for sacrifice to specific deities, for fiber production for the state-controlled textile industry, and as pack llamas for the army.

Although it is possible that the extant varieties (e.g., suri and huacaya alpacas, ccara, chaku, and suri llamas) are in fact relicts of highly selected Inca or pre-Inca varieties, the vast majority of alpacas and llamas reared in the Andes today are not the object of selective breeding practices. Genetic analyses of contemporary llama and alpaca populations have confirmed that extensive bidirectional hybridization has occurred (Stanley et al. 1994; Kadwell et al. 2001), possibly as a result of the breakdown of traditional breeding practices during the chaos of the Spanish conquest. Although guanaco and vicuña can produce fertile offspring when forced, there is no evidence that hybridization occurs in areas where their ranges naturally overlap. Only 6–20% of alpacas are free of llama ancestry, making the preservation of alpacas an urgent necessity.

Morphological and osteometric studies and DNA analysis have revealed that the domestication of South American camelids played out against a complex recent evolutionary history, potentially involving yet incompletely understood additional camelid taxa. Along with data from stable isotopes, these methods will be key to developing a better understanding of the timing and locations of domestication for both llama and alpaca, as well as the role of hybridization in preconquest breeds.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Camels: Domestication
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

References

Goñalons, G.L.M. 2008. Camelids in ancient Andean societies: A review of the zooarchaeological evidence. *Quaternary International* 185: 59–68.

Kadwell, M., M. Fernandez, H. Stanley, R. Baldi, J.C. Wheeler, R. Rosadio, and M.W. Bruford. 2001. Genetic analysis reveals the wild ancestors of the llama and alpaca. *Proceedings of the Royal Society of London B Biological Sciences* 268: 2575–2584.

Stanley, H.F., M. Kadwell, and J.C. Wheeler. 1994. Molecular evolution of the family Camelidae: A mitochondrial DNA study. *Proceedings of the Royal Society of London B Biological Sciences* 256: 1–6.

Wheeler, J.C. 1995. Evolution and present situation of the South American Camelidae. *Biological Journal of the Linnean Society* 54: 271–295.

Wheeler, J. 2012. South American camelids – past, present and future. *Journal of Camelid Science* published by the International Society of Camelid Research and Development, ISOCARD.

AlSayyad, Nezar

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Basic Biographical Information

Dr. Nezar AlSayyad is an architect, planner, urban designer, and urban historian. He is a Professor of Architecture, Planning, and Urban History at the University of California at Berkeley where he currently serves as Chair of the University's Center for Middle Eastern Studies (CMES) and the Director of the International and Area Studies Graduate Program. AlSayyad holds a B.S. in Architectural Engineering and Diploma in Town Planning from Cairo University, an M.S. in Architecture from the Massachusetts Institute of Technology, and a Ph.D. in Architectural History from UC Berkeley.

Major Accomplishments

He is the recipient of many grants and awards for his research, books, films, and projects. In 1988, AlSayyad co-founded the International Association for the Study of Traditional Environments (IASTE). Today, he still serves as the Association's President and Editor of its highly acclaimed peer-reviewed journal *Traditional Dwellings and Settlements Review*. Professionally, AlSayyad has an active practice in the Middle East and the USA and is the Principal in XXA-Office of Xross-Cultural Architecture, an Architecture, Urban Design, and Planning firm with several award-winning credits. AlSayyad is the author, co-author, editor, or co-editor of many books. Additionally, he has written, co-produced, and co-directed two NEA-funded public television programs: "Virtual Cairo" and "At Home with Mother Earth."

Cross-References

► Authenticity and the Manufacture of Heritage
► Heritage Sites: Economic Incentives, Impacts, and Commercialization

Further Reading

AlSayyad, N. 1991. *Cities and caliphs: On the genesis of Arab Muslim urbanism*. New York: Greenwood Press.

AlSayyad, N. 2006. *Cinematic urbanism*. New York: Routledge.

AlSayyad, N. 2011. *Cairo: Histories of a city*. Cambridge, MA: Harvard University Press.

AlSayyad, N., ed. 1992. *Forms of dominance: On the architecture and urbanism of the colonial enterprise*. Avebury, UK: London and Aldershot.

AlSayyad, N., ed. 2001a. *Hybrid urbanism: On the identity discourse and the built environment*. Westport, CT: Praeger Publishers.

AlSayyad, N., ed. 2001b. *Consuming tradition, manufacturing heritage: Global norms and urban forms in the age of tourism*. New York: Routledge.

AlSayyad, N., ed. 2004. *The end of tradition*. New York: Routledge.

AlSayyad, N., and J.-P. Bourdier, eds. 1989. *Dwellings, settlements and tradition*. New York: University Press of America.

AlSayyad, N., and M. Castells, eds. 2002. *Muslim Europe or Euro-Islam*. Lanham, MD: Lexington Books.
AlSayyad, N., and M. Massoumi, eds. 2010. *The fundamentalist city? Religiosity and the remaking of urban space*. New York: Routledge.
AlSayyad, N.I., A. Bierman, and N. Rabbat, eds. 2005. *Making Cairo medieval*. Lanham, MD: Lexington Books.
Garcia Canclini, N. 1995. *Hybrid cultures. Strategies for entering and leaving modernity*. Minneapolis: University of Minnesota Press.

A

Alta (Norway), Rock Art of

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Introduction

The Alta rock art area is the largest concentration of Stone Age rock art in Northern Europe. This paper is a brief presentation of the rock art of Alta, Northern Norway. An overview of the sites with rock art in the Alta Fjord region can be found in Fig. 1. The find history of the rock art sets the historical background. Then the chronological framework for the rock art is presented, followed by a presentation of the rock art including the fascinating narrative hunting and fishing scenes and compositions where the interaction between rock art and natural features will be discussed. Some of the panels with rock art stand out as representations of miniature landscapes including references to landscape features such as lakes, rivers, and valleys where the rock art is deliberately placed in relation to these features.

Definition

The Alta rock art was discovered in 1973. It was inscribed on the UNESCO World Heritage list in 1985. New rock art is found every year adding to this large rock art record of the past. At present the Alta rock art area comprises numerous rock art sites with c. 6000 petroglyphs and five sites with rock paintings, in total about 100 figures. The rock art was made over 5000 years from about 5200 BC until about 0 AD. It is often referred to as hunters' rock art, also named northern tradition rock art of Scandinavia. Central to the rock art is large game; bear, elk, reindeer, but also halibut, seabirds, salmon, seals, and whales are depicted. Adding to this a large number of human representations are depicted in various activities. There are also boats and various artefacts such as bow and arrows and spears. The Alta rock art shows a unique narrative in scenes and compositions such as bear hunting, elk hunting, halibut fishing, reindeer hunting (see Fig. 2), sealing (see Fig. 3), and whaling. Some of the scenes cover more than 10 m of rock, where the figures and scenes are interacting in the storied rocks of the Stone Age. Returning to the same place for more than 5000 years makes Alta one of the nodes in prehistoric landscapes central to people inhabiting northern Norway and possibly beyond. Alta can be seen as a meeting place in the past central to people living in the area, likely used by inland and coastal groups (Fuglestvedt 2017; Gjerde 2010; Helskog 2014; Hood 1988).

Historical Background

The first rock art in Alta was discovered in 1926 by a Finnish ethnologist, Samuli Paulaharju, the rock paintings at Transfarelv (Transfarelvdalen) (see Fig. 4). However, it was not until 1966 that the archaeologists became aware of the rock paintings and documented them (Simonsen 1969). In the 1960s a small boulder with one human figure was discovered at Gjermunds by about 20 km from the main concentration of rock art later discovered at Hjemmeluft. It was named Isnestoften and later Isnestoften 1. Then in 1973 petroglyphs were discovered in Hjemmeluft at Ole Pedersen and at Storsteinen (Eng. the large boulder), defining Alta as a large rock art area. Since then rock art has continuously been discovered in Alta, the petroglyphs at Amtmannsnes in 1978, and the petroglyphs at

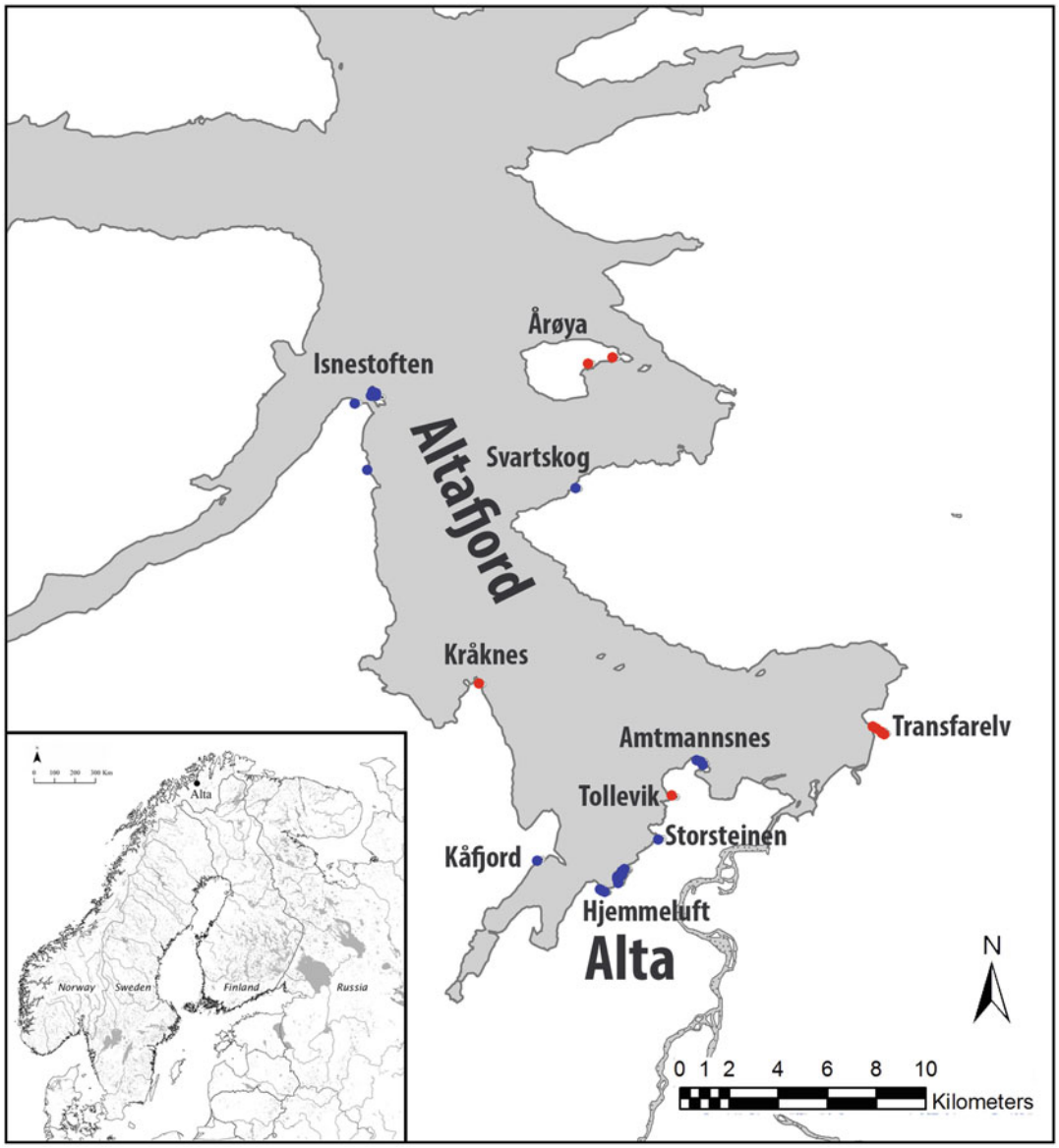

Alta (Norway), Rock Art of, Fig. 1 Map of the rock art in the Alta Fjord region. The sites with petroglyphs are marked in blue, while the paintings are marked in red. (Illustration by Jan Magne Gjerde)

Kåfjord in 1978. The second site with paintings at Transfarelv was found in the 1970s. Boulders with rock art at Isnestoften were discovered in 1998 and 2008 and paintings at Tollevik (Komsa) in 2000. Between 2002 and 2004, three new rock painting sites were found at Transfarelv. During the last years, five new sites have been found: petroglyphs at Svartskog 2016, rock paintings at the island Årøya (Årøya and Kongshus) in 2017 and 2018, and a boulder at Isnestoften in 2018. The rock art in Alta includes the five sites known by the World Heritage Listing, i.e., four sites with petroglyphs, Amtmannsnes, Hjemmeluft, Kåfjord, and Storsteinen, and the paintings at Transfarelv. Considering that several sites have been discovered in recent years, more rock art is

Alta (Norway), Rock Art of, Fig. 2 Narrative scene of a reindeer hunt with bow and arrow from the Bergbukten 4a panel at Hjemmeluft, Alta. The reindeer figure measures c. 10 cm. The panel is dated to c. 5000 BC–4000 BC. (Photo: Jan Magne Gjerde)

likely to be found in the Alta region in the future. An updated record of the Alta rock art can be found at the Alta Rock Art Archive at Alta Museum (www.altarockart.no/).

Key Issues/Current Debates/Future Directions/Examples

Dating of the Rock Art

A key issue to the dating of the Alta rock art is the notion that the rock art is made in the shore zone and that the land uplift has changed the elevation of the rock art in relation to the contemporary shoreline (Helskog 1983, 1999). The petroglyphs in Alta are located between 26.5 masl and 8.5 masl. The rock art at the same elevation holds the same or similar style in figures and selection of motifs (Helskog 2014). An example of this is the bear hunting scenes and the reindeer corrals that are all located between 22 masl and 26 masl. Another factor is that no scene or composition crosses the 2 m elevation. Even scenes of bears and bear tracks that can be followed for more than 8 m follow a horizontal orientation and do extend vertically the 2 m vertical limit. This also corresponds with the sea spray where the shore zone directly above the tidal zone is vegetation-free (from lichen and moss), hence making the figures more visible. The functional reasoning for placing the rock art in the shore zone has been further strengthened by Helskog (1999) in his study of rock art in relation to arctic hunter-gatherer cosmology where the rock art is placed in a three-tier cosmology in the middle world between the sky (upper world) and the sea (lower world). These factors as well as the extraordinary situation in Alta where the selection of motifs and composition follows the same elevation make shoreline dating a good method for dating the Alta rock art.

Alta (Norway), Rock Art of, Fig. 3 Narrative scene of a seal hunt at the Bergbukten 1 panel at Hjemmeluft, Alta. The boat figure measures c. 15 cm. The front of the seal figure where the head was is eroded. The panel is dated to c. 5000 BC–4000 BC. (Photo: Jan Magne Gjerde)

The studies by Helskog found the rock art to be made between 4200 BC and 0 AD (Helskog 1983, 1988, 2000). Excavations near the rock art area and a revision of the geological data made Gjerde suggest the initial rock art in Alta dates to c. 5200 BC (Gjerde 2010). This was later supported by Helskog (2012d, 2014) with minor modifications. This current record and dating shows rock art was made during a period of c. 5000 years between c. 5200 BC and 0 AD. A tentative chronological scheme of the rock art in Alta is found in Fig. 5.

Rock Art, Scenes, and Compositions

Between 26.5 masl and 22 masl, we find the earliest rock art in Alta, dated to between c. 5000 and 4000 BC. Some of these earliest panels with rock art in Alta are made up by several narrative scenes, and compositions stretching for more than 10 m in length include several hundred figures (see Fig. 6). The dominant motifs are large game with focus on elk and reindeer. The motifs include human representations, reindeer, elk, fish, bear, whale, seabirds, and geometrical patterns. What is prominent from the earliest rock art in Alta are the scenes and compositions depicting people in various activities, such as bear hunting, elk hunting, reindeer hunting (see Fig. 2), halibut fishing from boats, and what appears to be ritual activities (see Fig. 7). The boats have elk-head stems. The boats take part in various maritime hunting scenes, such as halibut fishing and sealing (Gjerde 2016). There are also many artefacts depicted as part of the activities, such as bow and arrows (see Fig. 2), spears, and elk-head staffs (see Fig. 7). The characteristic bear tracks are sometimes connected to bear dens where one at times can follow the bear tracks for about 8 m along the panel. We also see several reindeer enclosures and reindeer corrals, some of which hold drive fences guiding the reindeer (Helskog 2012a, b).

Alta (Norway), Rock Art of, Fig. 4 Section of the rock paintings at Transfarelv, Alta. One can see the human figure at the top, a reindeer, and a few geometrical figures. The human figure measures c. The panel is heavily eroded. The original photo to the left and DStretch color-enhanced photo to the right. (Photo and DStretch: Jan Magne Gjerde)

Between 21 masl and 17 masl, the rock art is dated to between c. 4000 BC and 3000 BC. The dominant motifs are still a large game with focus on elk and reindeer. In general, the motifs are similar to the earlier period. The seabirds are more frequent here, but there are still only a few figures. The large panels contain scenes and compositions such as bear hunting. The boats change in style, and the hull is more prominent, while the elk-head stem is still a feature. Some of the boats are involved in maritime hunting, such as sealing and possibly whaling small whales. The large narratives found in the earliest rock art are not that evident, and the large reindeer corrals and the numerous bear tracks are now missing from the record.

Between 16 masl and 14 masl, the rock art is dated to between c. 3000 BC and 2000 BC. We now see a change in the motifs. Most notable are the large human representations and the large animals (see Fig. 8). No boats have yet been documented from this period. Another notable feature is that it is not as easy to distinguish the species of some of the deer figures (elk or reindeer). While the rock art from between 5000 BC and 3000 BC included humans depicted in activities, the narrative scenes are no longer found in the record.

Between 13 masl and 10 masl, the rock art is dated to c. 2000 BC until c. 1000 BC. In this period, less rock art is made in Alta. The most notable change from the previous period is that the elk is missing from the record. The boats have a different style than the earlier boats from Alta. Boats of this period have been compared to the South Scandinavian Bronze Age boats and show similar traits (Gjerde 2017; Helskog 2012c; Kaul 2012). Another stylistic feature is the large "oversized" antlers of the reindeer. One of the scenes shows what is likely to be two human figures in a sword fight with swords and shields, similar to

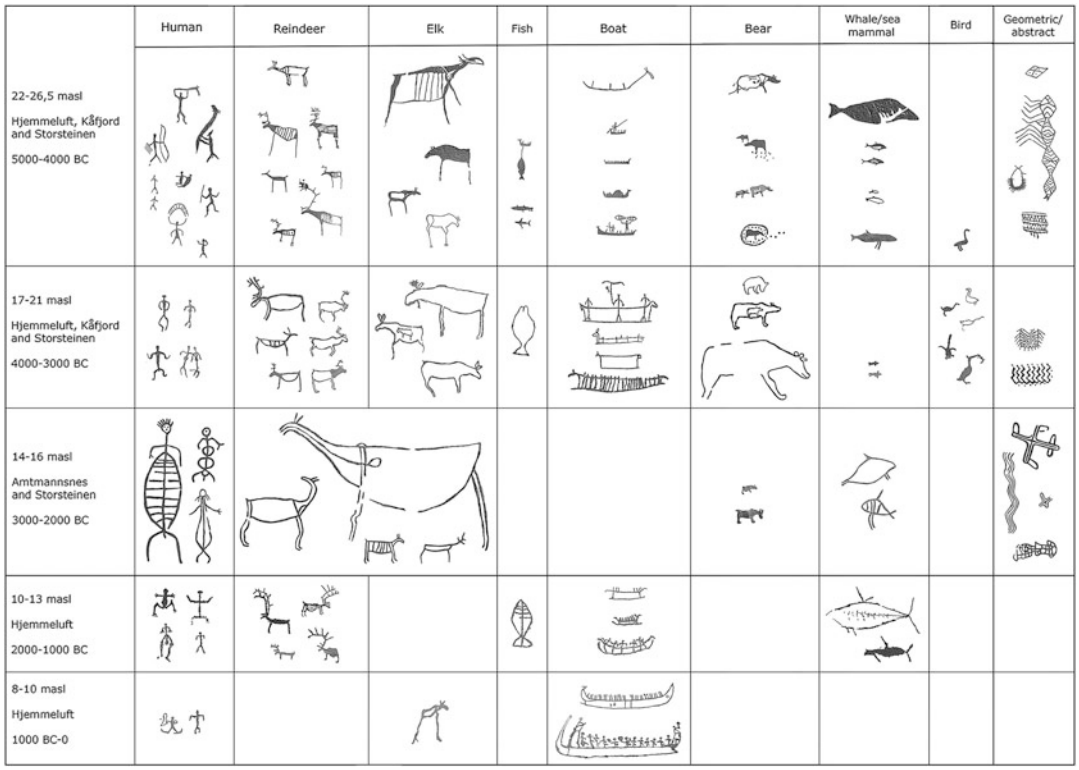

Alta (Norway), Rock Art of, Fig. 5 Chronological scheme of rock art in Alta. (With kind permission from Karin Tansem)

Alta (Norway), Rock Art of, Fig. 6 Section of the Bergbukten 1 panel at Hjemmeluft, Alta. The panel is dated to c. 5000 BC–4000 BC. The photo covers c. 8.5 m of the panel. The panel holds c. 300 figures. (Photos and photo compilation: Jan Magne Gjerde)

Alta (Norway), Rock Art of, Fig. 7 Section of the Ole Pedersen 9 panel. Central are the male persons with what appears to be headdresses and holding elk-head sticks interpreted as "shamanic" paraphernalia. The central human figures measure c. 30 cm. (Photo: Jan Magne Gjerde)

the "warrior scenes" in South Scandinavian Bronze Age rock art (e.g., Toreld 2015).

Between 10 masl and 8 masl, the rock art is dated to c. 1000 BC until c. 0 BC/AD. This period reflects the previous period, and only a few figures are found, including one elk, but no reindeer figures. We find several boat depictions comparable to the South Scandinavian Bronze Age and Iron Age boats (Gjerde 2017; Helskog 2012c; Kaul 2012) (see Fig. 9).

Natural Elements and Landscapes of Rock Art

The sites in Alta are some of the best examples of interaction between rock art and natural elements, the art and the canvas. This is especially true for the earliest rock art dated to between c. 5000 BC and 3000 BC. Some of the panels seem to be miniature landscapes where the figures are placed in relation to the topography of the rock, pools, cracks (see Figs. 6 and 10), and discoloration or other features in the rock. These natural elements may represent valleys, rivers, or lakes, and the rock art figures appear to interact with these features (Gjerde 2010; Helskog 2004; Helskog and Høgtun 2004). Bergbukten 1 at Hjemmeluft (see Figs. 6 and 10) contains more than 300 figures and is dated to c. 5000 BC–4000 BC. This panel holds several clues to seasons in rock art, such as the autumn reindeer corral and the bear dens and spring bear hunting (Helskog 2012b). Hence, it has been interpreted as a "panel of the year," representing seasonal activities (Helskog 1999, 2004). On some panels, the rock art interacts with the canvas or the natural features of the rock. At the Ole Pedersen 11A panel in Hjemmeluft, dated to c. 4000 BC–3000 BC, the canvas of the rock appears to be a representation of the aurora borealis, the northern lights (Tansem and Johansen 2008). The figures appear to interact with the natural elements taking part in the storied rocks (see Fig. 11).

Alta (Norway), Rock Art of, Fig. 8 Section of the large Amtmannsnes 2B panel. The panel holds large human figures. The central figure measures c. 85 cm. (Photo: Jan Magne Gjerde)

Alta (Norway), Rock Art of, Fig. 9 Boat representation at Apana Gård 12. The boat measures c. 1.10 m. (Night photo: Jan Magne Gjerde)

Alta (Norway), Rock Art of, Fig. 10 The "miniature landscape" at Bergbukten 1. Compare with Fig. 3 where one can see part of the reindeer corral at the left of this photo and the bear hunting scene. Here it is apparent how the figures relate to the natural elements such as miniature lakes, rivers, and valleys in the rock. (Photo: Jan Magne Gjerde)

Alta (Norway), Rock Art of, Fig. 11 The aurora borealis in the rock at Ole Pedersen 11A. Note how the figures interact with the rock surface in "black and green" bands similar to the northern lights. (Photo: Jan Magne Gjerde)

The rock art is related to the natural elements of the rock so that the panels appear to be miniature landscapes. In some cases, the rock art may also signify the place of the activity, such as the bear dens, the halibut fishing from boat, and the shore zone represented by people in boats driving reindeer onto the shore where a hunter is waiting for them. These may be clues to the physical landscape, geographical references included in the rock art (Gjerde 2010). Some rock art panels may represent "maps" including information on activities, seasonality, and places in the landscape.

Future Directions

The Alta region holds numerous Stone Age settlements. Within the same area, there are also Stone Age quarries. Few attempts have been made to integrate the rock art into the rest of the prehistoric remains in the Alta Fjord region. The main future direction is to see how the rock art relates to the settlements and other cultural remains in the area. An ongoing research project is currently focusing on these topics.

References

Alta Rock Art Archive. http://altarockart.no/

Fuglestvedt, Ingrid. 2017. *Rock art and the wild mind. Visual imagery in Mesolithic Northern Europe*. London/New York: Routledge.

Gjerde, Jan Magne. 2010. Rock art and landscape. Studies of Stone Age rock art from northern Fennoscandia. University of Tromsø.

Gjerde, Jan Magne. 2016. Marine Ventures in Stone Age rock art of Fennoscandia. In *Marine ventures symposium proceedings*, ed. Hein Bjartmann Bjerck and Silje Fretheim, 337–354. Sheffield: Equinox Publishing.

Gjerde, Jan Magne. 2017. A boat journey in rock art "from the Bronze Age to the Stone Age – Form the Stone Age to the Bronze Age" in northernmost Europe. In *North Meets South. Theoretical aspects on the northern and southern rock art traditions in Scandinavia*, ed. Peter Skoglund, Johan Ling, and Ulf Bertilsson, 113–143. Oxbow Books: Oxford.

Helskog, Knut. 1983. Helleristningene i Alta i et tidsperspektiv – en geologisk og multivariabel analyse. In *Folk og ressurser i nord. Foredrag fra Trondheimssymposiumet om midt- og nordskandinavisk kultur 1982*, ed Jørn Sandnes, Ivar Østerlie, and Arnfinn Kjelland, 47–60. Trondheim: Universitetsforlaget.

Helskog, Knut. 1988. *Helleristningene i Alta : spor etter ritualer og dagligliv i Finnmarks forhistorie*. Alta: K. Helskog; distributør: Alta museum.

Helskog, Knut. 1999. The shore connection. Cognitive landscape and communication with rock carvings in Northernmost Europe. *Norwegian Archaeological Review* 32 (2): 73–94.

Helskog, Knut. 2000. Changing rock carvings – Changing societies. A case from arctic Norway. *Adoranten*, Scandinavian Society for Prehistoric Art: 5–16.

Helskog, Knut. 2004. Landscapes in rock-art: Rock-carving and ritual in the old European North. In *The figured landscapes of rock-art. Looking at pictures in place*, ed. Christopher Chippindale and George Nash, 265–288. Cambridge: Cambridge University Press.

Helskog, Knut. 2012a. Ancient depictions of reindeer enclosures and their environment. *Fennoscandia Archaeologica, XXIX* (2012): 29–54.

Helskog, Knut. 2012b. Bears and meanings among hunter-fisher-gatherers in Northern Fennoscandia 9000-2500 BC. *Cambridge Archaeological Journal* 22: 209–236.

Helskog, Knut. 2012c. Helleristninger av båter og ressursutnyttelse i Europas nordlige ytterkant. In *Nordlige verdener. Agrarsamfundenes ekspansion i nord*, ed. Flemming Kaul and Lasse Sørensen, 221–232. København: Nationalmuseet.

Helskog, Knut. 2012d. *Samtaler med maktene : en historie om verdensarven i Alta, Tromsø museums skrifter*. Tromsø: Tromsø museum, Universitetsmuseet.

Helskog, Knut. 2014. *Communicating with the world of beings: The world heritage rock art sites in Alta, Arctic Norway*. Oxford: Oxbow Books.

Helskog, Knut, and Ernst Høgtun. 2004. Recording landscapes in rock carvings and the art of drawing. In *Prehistoric Pictures as Archaeological Source. Förhistoriska bilder som arkeologisk källa*, 23–31. Tanumshede: Tanums Hällristningsmuseum.

Hood, Bryan C. 1988. Sacred pictures, sacred rocks: Ideological and social space in the North Norwegian Stone Age. *Norwegian Archaeological Review* 21 (2): 65–84.

Kaul, Flemming. 2012. Fund, helleristninger og landskaber, Nordnorge. In *Nordlige verdener. Agrarsamfundenes ekspansion i nord*, ed. Flemming Kaul and Lasse Sørensen, 205–220. København: Nationalmuseet.

Simonsen, Povl. 1969. Ny bergkunst fra Finnmark. *Ottar. Populære småskrifter fra Tromsø Museum* 61 (3): 13–19.

Tansem, Karin, and Heidi Johansen. 2008. The world heritage rock art in Alta. *Adoranten* 2008: 65–84.

Toreld, Andreas. 2015. Sword-wielders and manslaughter. Recently discovered images on the rock carvings of Brastad, Western Sweden. In *Picturing the Bronze Age*, ed Johan Ling, Peter Skoglund, and Ulf Bertilsson, 165–174. Oxbowbooks: Oxford.

Altai: Paleolithic

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Introduction

The Altai range is located at the cross-roads between Central and Northeast Asia, between 49–52°N latitude and 32–88°E longitude. The Altai plain borders it in the north and the Ob River Basin opens to the west on the Siberian plain. On the northwest border stand the Salair and the Alatau ranges and in the southwest, the western Sayan range. In the south, the Mongolian Altai runs east to the Gobi Desert and joins the Kazakh steppe to the west. In the southwest, the Altai is separated from the Central Tian Shan by the plains of the eastern Balkash, by the Tarbaghatay range, and by the surrounding Zaisan. The plains reach the Xinjang and the Taklamakan desert via the Turpan-Ami depression and southern and Inner-Mongolia via the western edge of the Gobi desert.

The Altai Mountains are the result of a complex and contrasted history. Several periods of complete flattening (e.g., Early Mesozoic, Late Paleozoic) of the landscape have been recorded and the current setting was initiated during the Late Jurassic (Chlachula 2001). The Siberian Mountains are seen as the continuity of uplifting processes starting from the Baikal region, progressing from east to west and reaching the Altai-Sayan during the late Pliocene.

The Altai alpine ridges, such as the Chuya, Saylugem, Katun, and Kuray, include peaks with a maximum elevation of 4,506 m asl. The high plateaus of more than 2,000 m in elevation (e.g., Ukok, Chulyshman, Ulugan) represent a third of the Altai territory and intermediate mountain landscapes, ranging between 800 and 2,000 m asl, account for about half of it. These are mainly located in the northern and western regions and their relief is shaped by active hydrographic networks and by selective erosion. Intermediate mountain landscapes were formed by the erosion of the peneplains of large plateaus (Shahgedanova 2003). Two main lakes, the Markakol and the Teletskoe, are located respectively at the southern and northern edges of the Altai range. The current climate is continental with contrasting seasonal climatic inversions. The winters are generally cold with mean temperatures ranging from −16 °C in the foothills to −36 °C in the high mountains (Shahgedanova 2003). The minimum temperature is recorded in the Chuya depression, reaching −60 °C. Precipitation is stronger in the northwestern part of the Altai, as the southeast is more arid (Chlachula 2001).

The earliest sedimentary deposits in the Anuy river valley were first attributed to the last interglacial, c. 120–110 ka, when karsts were formed due to the exposure of carboniferous formations (Baryshnikov and Maloletko 1997). Such a chronological attribution is consistent with the tectonic activity recorded at the end of the Middle Pleistocene that would be responsible for a deepening of the valley system by about 100 m the Anuy River and about 200 m in the Katun River. This view, however, has been challenged on the basis of radio-thermoluminescence (RTL) measurements providing ages of c. 225 ka for the pebble and gravel layers at the base of the Anuy alluvial plain (Derevianko et al. 2003).

During the first half of the twentieth century, the interest for Paleolithic research in the Altai was stimulated by the collection of surface artifacts at the confluence of the Katun and the Biya rivers and with excavations in the Byisk area. In 1954, S.I. Rudenko reported evidence of Paleolithic occupation at Ust-Kanskaya Cave, along the Charysh River. Rudenko quickly noted some Mousterian typological features on the lithic assemblage, and eventually attributed the human occupation to the Last Glacial based on the fauna recovered. A.P. Okladnikov recognized affinities with the Mousterian from Western Europe and Central Asia and until the discovery of Ulalinka site in 1961, Ust-Kanskaya was considered the most ancient Paleolithic site in the Altai. Okladnikov discovered and excavated important

sites in the region, such as Strashnaya Cave, Denisova Cave, and Kara-Bom and remains a major figure in Altai Paleolithic archaeology. His work in Uzbekistan, the Baikal area, Mongolia, and the Far-East led him to consider the existence of a vast Sibero-Mongolian Levallois techno-complex (Fig. 1).

Among his students, A.P. Derevianko appears as the most influential contributor to Paleolithic research in the Altai region. He participated in the discovery of the Anuy I open-air site in 1983 and Okladnikov Cave in 1984. At about the same time, excavations started at Maloyalomanskaya Cave, in the Katun basin. Derevianko discovered the site of Ust-Karakol 1 at the confluence of the Karakol and Anuy Rivers. The latter was first excavated in 1986 (sector 1) and excavations at the nearby site of Anuy II started in 1989. Since the beginning of the 1990s, the sites of Karama, Anuy III, and more recently, the Mousterian site of Chagyrskaya were discovered and his team. Following Okladnikov's legacy, Derevianko undertook numerous international expeditions (e.g., Montenegro, Uzbekistan, Mongolia, Far-East) and developed many collaborations. This approach generated a rich data set upon which synthetic models of population dynamics could be built (Derevianko 2011) (Fig. 2).

Paleolithic sites are mostly located in the north-western and in the central part of Gorny-Altai, between the Alpine relief and the northern plain. They lie in intermediate mountain zones, generally between 300 and 1,200 m asl. In the north-west, Strashnaya Cave and Chagirskaya Cave are located in the Charysh Basin. Okladnikov Cave, Isrkra Cave, Karama, Anuy I-III, Denisova Cave, Ust-Karakol, and Kamminaya Cave are located in the Anuy basin and Ust-Kanskaya is located further south along the Charysh, in the Central Altai. Ulalinka was found near the city of Gorno-Altaisk, and the Biyka Cave complex and the site of Kara-Tenesh lie upstream along the Katun River. The Tiumechin complex and the Kara-Bom site are located near the Ursul river, and Maloyalomanskaya Cave can be found along the Mala Yaloman, a small tributary of the Katun. Only a few sites such as Barbughazy, Torgun, and Yustid are found in the southeast, and they are mainly attributed to the final stages of the Paleolithic.

Definition

Based on the Eurasian system of division, three main periods can be recognized during the Paleolithic of the Altai: the Lower, Middle, and Upper

Altai: Paleolithic, Fig. 1 A.P. Okladnikov (*left*) and A.P. Derevianko (*right*). (Photo credits: IHMC RAS St. Petersburg, IAE SBRAS Novosibirsk)

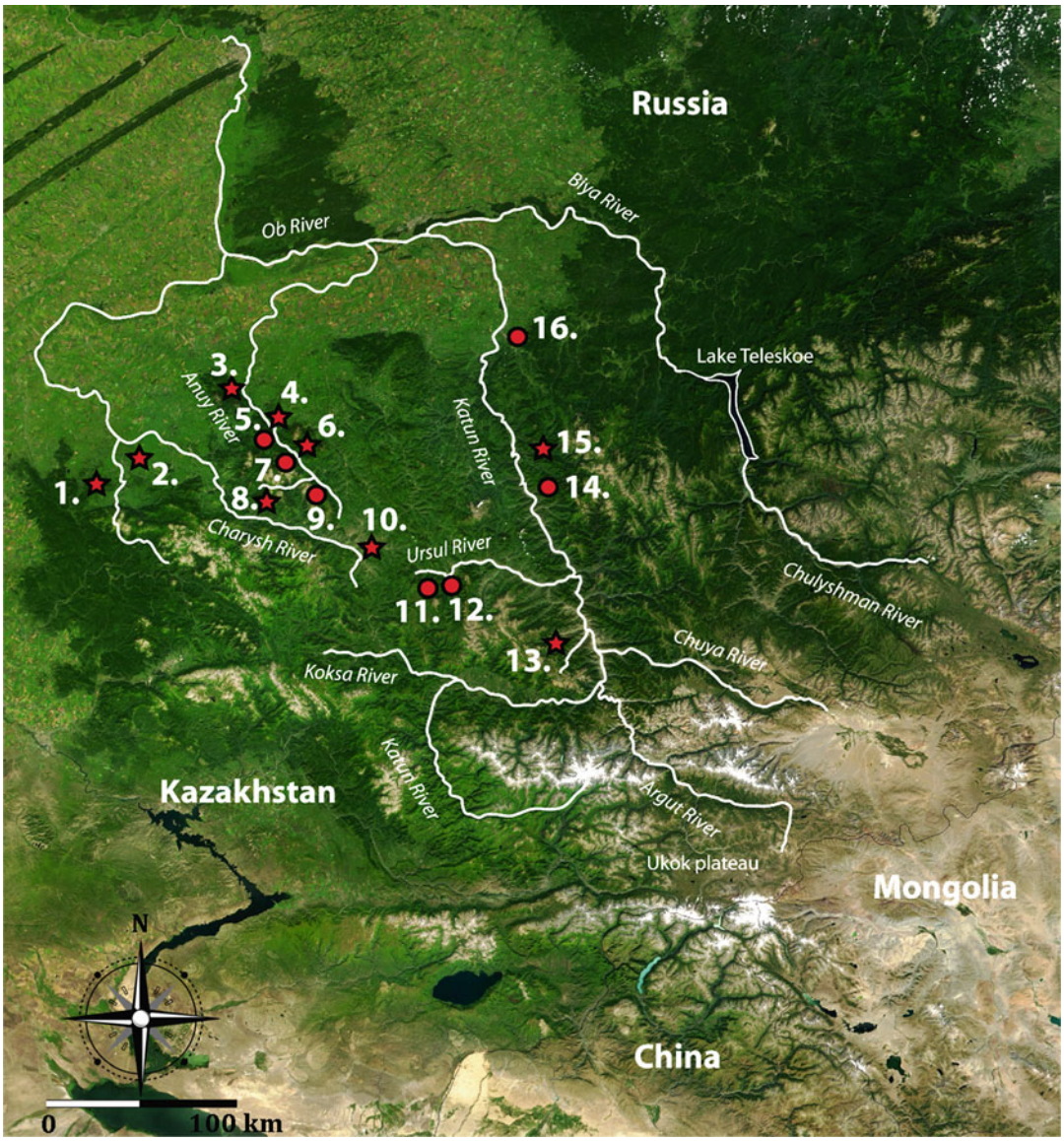

Altai: Paleolithic, Fig. 2 Location of the main Paleolithic cave (*stars*) and open-air (*circles*) sites in the Altai (Adapted from Nasa Visible Earth). *1* Strashnaya Cave – *2* Chagyrskaya Cave – *3* Okladnikov Cave – *4* Iskra Cave – *5* Karama – *6* Anuy I-III – *7* Denisova Cave – *8* Kamminaya Cave – *9* Ust-Karakol 1–*10* Ust-Kanskaya – *11* Kara-Bom – *12* Tiumechin 1–4 – *13* Maloyalomanskaya Cave – *14* Kara-Tenesh – *15* Biyka Caves – *16* Ulalinka

Paleolithic. The Lower Paleolithic corresponds to the first human occupation of the Altai that would start c. 800 ka. The Middle Paleolithic would start sometime at the end of the Middle Pleistocene and last until c. 50 ka. The Upper Paleolithic covers a time range from c. 50 ka to the end of the Pleistocene.

Key Issues/Current Debates

The Lower Paleolithic

According to Derevianko (2011), the Altai was first colonized by small populations of *Homo erectus*/*ergaster* starting from c. 800 ka, that subsequently disappeared from the region c. 500 ka.

The site that would best represent this first wave of human occupation is Karama, along the Anuy River (Derevianko and Shunkov 2009). The diversity of the exotic flora is said to fit with a Middle Pleistocene attribution and the RTL dates of 643 ± 130 ka and 542 ± 110 ka have been obtained on the lower portion of the sequence (layers 8–14). Although the identifiable artifacts do not include handaxes, Derevianko and Shunkov tend to emphasize elements that would fit with an Acheulean attribution. The technology is described as cores on pebble blanks and flakes with subparallel dorsal pattern. The tool-kit includes various kinds of scrapers (including naturally backed examples), Clactonian notches, and choppers. More surprising is the reported presence of core-like endscrapers with abrupt retouch. Derevianko acknowledged that the first Lower Paleolithic occupation of the Altai is elusive and likely represents a short-term event. Discovered in 1961, the site of Ulalinka was originally presented by Okladnikov as evidence of Lower Paleolithic human occupation. The chronological attribution beyond the Bruhnes-Matuyama reversal and the authenticity of the lithic artifacts became, however, quickly controversial. The period following the initial peopling of the Altai corresponds to a gap in the archaeological record followed by what is interpreted as a replacement of population (Derevianko 2011). Based on assemblages from the lowermost layers in the Denisova Cave main chamber, Derevianko suggested that a new population settled in the Altai during the Middle Pleistocene, around 300 ka (Fig. 3).

These newcomers bring the first evidence of Levallois and blade technology. Although first mentioned as Mousterian, the archaeological material is also seen as derived from a Late Acheuleo-Yabrudian (Derevianko and Postnov 2004).

The attribution of these assemblages to the Lower Paleolithic is mostly based on RTL dates. At one standard deviation, ages between 330 and 130 ka were obtained on the layer 22. Two inversions of magnetic polarity have been recorded and, following the dating of the layer, interpreted as Biwa I (220–176 ka) and Biwa II (330–266 ka). This contradicts estimations based on tectonic, geomorphology, and small mammals that suggest a formation of the karstic system too closer to the last Interglacial. Furthermore, some authors have warned that the RTL method follows different assumptions than the standard TL and that unbleached particles in cave sediments may be problematic for luminescence dating. In front of the cave, the lower part of the sequence is attributed to the last interglacial and the single magnetic inversion recorded is currently assigned to the Blake episode.

Altai: Paleolithic, Fig. 3 Denisova Cave. (Picture by N. Zwyns)

The Middle Paleolithic

The Altai Middle Paleolithic is described as belonging to two main variants. Based on Levallois indexes and on frequencies of Mousterian elements, Shunkov (2005) recognizes a Mousterian variant opposed to a Levallois-Mousterian variant. This variability was

interpreted as reflecting different settlement patterns of a single MP tradition. Mousterian assemblages, which are only represented in cave sites, would represent long-term occupations. On the contrary, the Levallois-Mousterian seasonal occupations are associated with open-air contexts. A behavioral ecology approach was further developed by P. Wrinn (2010). Based on the occurrence/absence of formal tools or chips that would testify to tool rejuvenation or raw material management, he classifies MP occupations into three main categories: ephemeral/task specific, ephemeral generalized, and intermittent generalized occupation. His analysis of the fauna and of the lithic frequencies suggests a low intensity of human occupation in the region. The Altai is then seen as a refugium for hominins during cold phases.

The *Levallois-Mousterian variant* is mainly represented by the assemblages from the middle part of the section at Denisova Cave (layers 20–12), the lower and middle part of the sequence at Ust-Karakol I sector 1 (layers 19–12), and the lowermost cultural layers at Kara-Bom. In addition, the variant possibly occurs at Ust-Kanskaya and Strashnaya Cave. Kara-Bom and Ust-Karakol assemblages show a technology characterized by the production of Levallois points from tabular cores. The reduction is mostly unidirectional but also includes bidirectional instances, with occasional removals of debordant blanks to reshape the convexities of the core. The reduction system includes the production of elongated spalls. Although it should be supported by additional chronometric data, the Levallois-Mousterian would appear during the OIS5e, c. 120 ka and eventually disappear from the region at the beginning of OIS3.

The *Mousterian variant* is defined based on the material from Okladnikov and Chagirsakaya Cave. Recently, Derevianko and Markin suggested that these two sites illustrate the existence of a distinct MP facies, relatively late, and intrusive, which they call the Sibiryachikha variant (Derevianko and Markin 2011). It is characterized by a lack of Levallois elements and by a good representation of Mousterian retouched tools, such as various types of sidescrapers and notches. These assemblages seemingly appear at the beginning of OIS3, around 55–50 ka, and last at least until the middle part of OIS3, c. 37 ka. The Sibiryachikha assemblages are said to represent Neandertal populations moving across Central Asia (e.g., Teshik-Tash) and subsequently penetrating in the Altai under the demographic pressure of the spreading Modern Human populations.

In sum, two variants can be distinguished among the MP assemblages from the Altai. The Levallois-Mousterian is better represented in the archaeological record and seems to predate the appearance of a more elusive, and apparently intrusive Mousterian. How much seasonal, functional, or cultural factors are responsible for such variability is not yet clear.

The Upper Paleolithic

The local Levallois-Mousterian is said to have gradually evolved into two main UP variants, the Ust-Karakol and the Kara-Bom variants. Derevianko (2011) sees both UP trends as the result of an incipient evolution from a local Middle Paleolithic background. In his model, the latter process is used to support a scenario of multiregional emergence of modern human anatomical and behavioral features. Other authors have underlined the role of site-formation processes to explain the apparent transitional character of some assemblages or the regional discontinuity of human occupation (Wrinn 2010; Zwyns 2012). Following these views, the Altai data set may support to models in which population movements more consistent with the Out-of-Africa hypothesis.

The Kara-Bom variant (or *Initial Upper Paleolithic*) is defined on the basis of levels OH5 and OH6 from the eponymous site, but is also described at Ust-Karakol 1 (sector 1, OH5.5 and OH5.4), Kara-Tenesh, Maloyalomanskaya Cave, and in the Byike complex. The defining technological features are clearly expressed in the production of laminar blanks (Fig. 4).

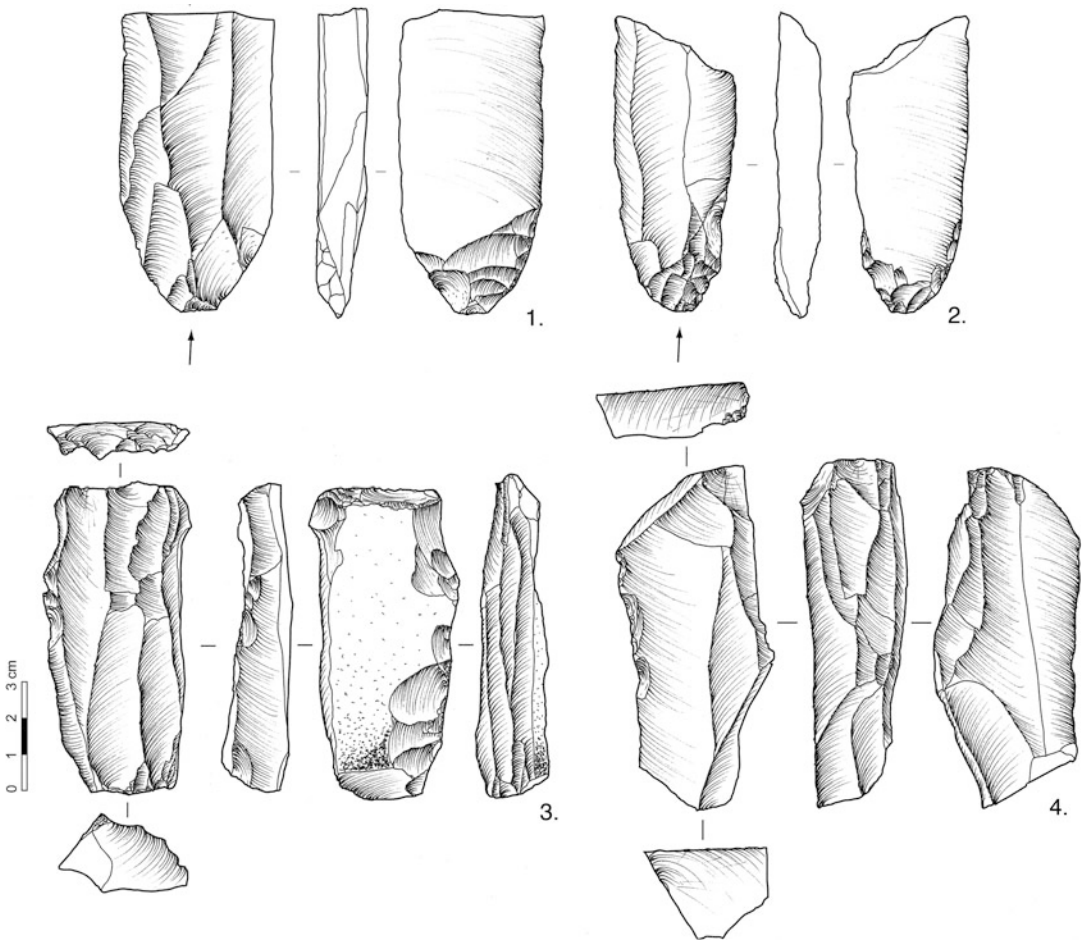

Altai: Paleolithic, Fig. 4 Initial Upper Paleolithic (the Kara-Bom variant) from Ust-Karakol 1 sector 1. 1, 2, blade with inverse proximal retouch; 3, bidirectional blade core; 4, burin-core. (Drawings by N. Zwyns)

Asymmetrical blade cores were reduced from two opposed platforms. The main flaking surface is usually located on the broad face of the core and one of the narrow faces is used to reshape lateral convexities. Large and robust blade blanks are produced and retouched whereas thick technical side blades were turned into burin-cores to detach small laminar blanks (Zwyns et al. 2012). This technology is seemingly associated with an early appearance of ornaments, starting from c. 42 ka. The Kara-Bom trend has been considered as an example of local and gradual transformation of the technology observed in the underlying Middle Paleolithic layers (Derevianko 2011).

The *Ust-Karakol variant* (or *Early Upper Paleolithic*) first occurs during the middle phase of OIS3. It is marked by the production of small laminar blanks from narrow-fronted and carinated cores reduced by direct percussion. It is associated with the generalization of bone tools and fully developed forms of ornaments. The defining assemblages are Ust-Karakol 1 (sector 2) layers 11–8, but other assemblages from Anuy I-III, Strashnaya upper levels, Tyumechin-4, and Ushlep 6 are considered analogous. It is said to have evolved from a Levallois background assigned to OIS5e at Ust-Karakol 1, sector 2, (layers 19–18). Originally described as non-

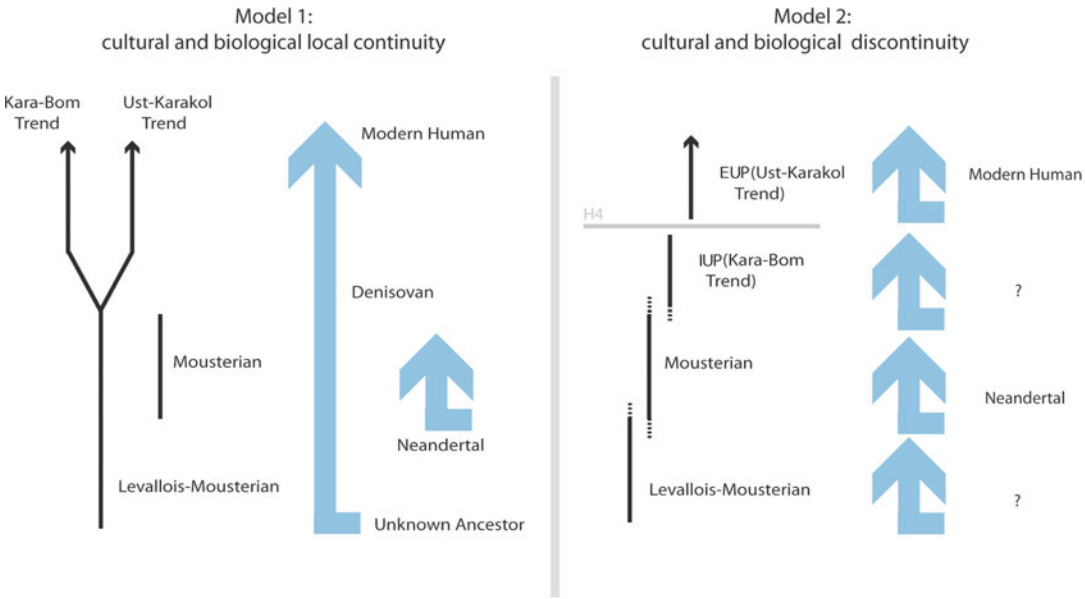

Altai: Paleolithic, Fig. 5 Main models of Upper Paleolithic emergence in the Altai: summary (see text for references)

Levallois, the central chamber of Denisova Cave was later said to illustrate the same gradual development, between 100 and 30 ka, toward genuine UP (layers 11 and 9). Although the Ust-Karakol trend is sometimes listed as a possible source for the spread of microblade technology in Northeast Asia, the early UP assemblages display no clear evidence supporting an early use of pressure flaking.

A recent study based of the laminar technology of Kara-Bom and Ust-Karakol variant supports the existence of two main technical traditions at the beginning of the Upper Paleolithic (Zwyns 2012). By comparison with Europe and the Levant, the Kara-Bom variant is assigned to the Initial Upper Paleolithic (IUP) to describe the presence of derived UP features without necessarily implying a local transition. The IUP definition reinforces analogies proposed by numerous authors (e.g., Derevianko 2011) with sites from the Cis-Baikal (e.g., Makarovo-4), Trans-Baikal (e.g., Tolbaga, Barun-Alan, Khotyk, Kamenka A and C, Varvarina Gora, Podzvonkaya), or Mongolia (Tolbor 4). The IUP is followed by an Early Upper Paleolithic (EUP) phase with a shift toward developed UP features (Ust-Karakol variant). The latter correspond to a series of behavioral changes in terms of economy (emancipation of the bladelet production) knapping techniques (shift to soft hammer), but also probably in terms of weaponry (composite spears). Although they are poorly dated, the two phases appear separated by a significant time span and by climatic events such as Heinrich 4 (Fig. 5).

According to the chronometric data, the Upper layers of Anui 2 document human presence during a time span that covers the end of OIS3 until the Late Glacial Maximum. It is not yet clear if human groups inhabited the lower valley of the Altai during the LGM or if the record illustrates a regional discontinuity in human occupation. It seems, however, that the occupational hiatus is more clearly marked than in the piedmonts. Starting from OIS 2, the blockage of river systems driven by the expansion of mountain glaciers led to the multiplication of lakes. Eventually, periodic drainage

events may have caused catastrophic floods that may represent a source of bias in the archaeological record for the period between 26 and 13 ka.

Human Remains

At Okladnikov Cave, dental remains occur in stratum 2 with a left lower molar, but also in stratum 3 with a left lower premolar, a left lower molar, and a right lower molar. Postcranial remains are found in stratum 2 with an adult humerus, and in stratum 3 with a subadult humerus and a hand phalanx. The good preservation of the collagen extracted from the phalanx, from the subadult humerus, the femur, and from the adult humerus has led to the reconstruction of the mtDNA sequence which has been identified as Neandertal (Krause et al. 2007). The archaeological assemblage is Mousterian but the dating of the human occupation is far from clear. Direct dates would indicate that the Neandertal presence in the area lasted until at least 37 ka 14C BP.

At Strashnaya Cave, eight deciduous teeth presumably belonging to a single individual come from an unclear stratigraphic context that can be attributed to the UP. The specimens could not be assigned to a clear taxon. At Maloyalomanskaya Cave, the discovery of a single human tooth has been reported, but no detailed description has been published.

At Denisova Cave, two teeth have been found in the 1984 collection from the central chamber. Denisova 1 is an upper central incisor found in layer 12. Although it has been previously published as a human tooth, Viola et al. (2011) assign it to a worn incisor from a large bovid. Denisova 2 is a deciduous molar (right first lower) found in layer 22.1 that would date to at least OIS 5e. In 2000, layer 11.1 of the south gallery yielded a tooth belonging to a young adult and identified as a third or second upper molar (Viola et al. 2011). Denisova 3 is the proximal epiphysis of a juvenile manual phalanx uncovered in layer 11.2 of square D2 of the east gallery. The phalanx belongs to a distinct individual with an age evaluated at around 6–7 years old. Both mtDNA and nuclear DNA were extracted from these remains, resulting in the identification of a hitherto unknown archaic hominin (Krause et al. 2010; Reich et al. 2010). The nuclear DNA indicates that these hominins, referred to as "Denisovans," belong to a lineage sharing a common origin with Neandertals that post-dates the split with MH ancestors. Initial morphological descriptions of the tooth noted a set of archaic features not seen in Neandertals or in early modern humans, further suggesting a distinct evolutionary history.

At the recently discovered Chagysrkaya Cave, Viola et al. (2011) described human fossils associated with layers 6b and 6c. Chargyrskaya 1 is a worn upper deciduous canine and Chagyrskaya 2 is an atlas fragment. Both fossils are associated with layer 6b. Chagyrskaya 3 is an upper premolar and Chagyrskaya 4 is a lower incisor. Both are worn and small and would fall outside the range of Neandertals. Nevertheless, the mtDNA is under reconstruction; although the results are not fully published, they seem to indicate an attribution to Neandertals (Viola et al. 2011). The rich lithic and fauna assemblage is assigned to the Mousterian and the excavation is still ongoing.

Future Directions

The recent identification of the Denisovans in the Altai opens up new perspectives for understanding the peopling of Asia. Genetic data suggest that, apart from some present-day populations from Melanesia and Australia, Denisovans did not contribute significantly to the genome of Eurasian populations (Reich et al. 2011). The current geographical distribution of the Denisovan genetic input lead to the hypothesis that the Altai might represent the northern edge of their territorial expansion. Where and when they did interbreed with MHs is still unclear and the current data do not rule out other sterile encounters.

The human fossils from Denisova Cave have not been directly dated. New radiocarbon dates

were produced on cut-marked bones and bone tools that belong to the same layers as the Denisovan fossils. The results indicate post-depositional admixtures from subsequent and underlying layers (Reich et al. 2010). The chronological and cultural attributions of the Denisova hominins remain, therefore, uncertain. Although it shows the first occurrence of modern behaviors, the IUP assemblages predate the earliest known MH fossil from Siberia. According to the data at hand, the latter appears contemporaneous of the EUP. The Altai Neandertals are, up to now, the only taxon clearly associated with an archaeologically defined unit, namely, the MP of Mousterian variant. The makers of the Levallois-Mousterian variant are still unknown and the identity the IUP populations is yet to be found.

Finally, the apparent complexity of the Altai Paleolithic human occupation likely reflects a lack of reliable and comparable chronological data. Recent steps taken toward the identification of human remains in clear archaeological, taphonomic, environmental, and chronological contexts have already proven to be highly valuable. Further efforts to acquire high-resolution datasets are, nevertheless, essential in order to test current models. There is a few doubt that it will provide new keys for the understanding of the peopling dynamics in a region that stands as a gate between Central and Northeast Asia.

Cross-References

- ▶ Fossil Records of Early Modern Humans
- ▶ Mongolia: Paleolithic
- ▶ Mousterian Industry Tradition
- ▶ Neanderthals and Their Contemporaries

References

Baryshnikov, G.F., and A. Maloletko. 1997. *Arkheologicheskye pamiatniki Altaya glazami geolog. Archeological sites through the eyes of a geologist 9, volume 1: Ulalinka, Ust'-Karakol, Anuy 1*. Dmitrievka, Tystesken: Tomsk University Press.

Chlachula, J. 2001. Pleistocene climate change, natural environments and palaeolithic occupation of the Altai area, west-central Siberia. *Quaternary International* 80: 131–167.

Derevianko, A.P. 2011. *The Upper Paleolithic in Africa and Eurasia and the origin of anatomically modern humans*. Novosibirsk.

Derevianko, A.P., and S.V. Markin. 2011. Sibiryachikhinsky version sites o the Altai Middle Paleolithic industries. In *Proceedings of the international symposium 'Characteristic features of the Middle to Upper Paleolithic transition in Eurasia: Development of culture and evolution of homo genus'*, ed. A.P. Derevianko and M.V. Shunkov, 40–50. Novosibirsk.

Derevianko, A., and A. Postnov. 2004. The Mousterian of Gorny Altai. *Actes Du XIV Congres UISPP, 2-8 Septembre 2001*, BAR 1239 international series, 105–16.

Derevianko, A., and M. Shunkov. 2009. Development of early human culture in northern Asia. *Paleontological Journal* 43: 881–889.

Derevianko, A.P., M.V. Shunkov, A.K. Agadjanian, G.F. Baryshnikov, E.M. Malaeva, V.A. Ulianov, N.A. Kulik, A.V. Postnov, and A.A. Anoikin. 2003. Paleoenvironment and paleolithic human occupation of Gorny Altai. Subsistence and adaptation in the vicinity of Denisova Cave. Russian Academy of Sciences.

Krause, J., L. Orlando, D. Serre, B. Viola, K. Prüfer, M.P. Richards, J.-J.J. Hublin, C. Hanni, A.P. Derevianko, and S. Paabo. 2007. Neanderthals in central Asia and Siberia. *Nature* 449: 902–904.

Krause, J., Q. Fu, J.M. Good, B. Viola, M.V. Shunkov, A.P. Derevianko, and S. Paabo. 2010. The complete mitochondrial DNA genome of an unknown hominin from southern Siberia. *Nature* 464: 894–897.

Reich, D., R.E. Green, M. Kircher, J. Krause, N. Patterson, E.Y. Durand, B. Viola, A.W. Briggs, U. Stenzel, P.L.F. Johnson, et al. 2010. Genetic history of an archaic hominin group from Denisova Cave in Siberia. *Nature* 468: 1053–1060.

Reich, D., N. Patterson, M. Kircher, F. Delfin, M.R. Nandineni, I. Pugach, A.M.S. Ko, Y.C. Ko, T.A. Jinam, M.E. Phipps, et al. 2011. Denisova admixture and the first modern human dispersals into southeast Asia and Oceania. *The American Journal of Human Genetics* 89 (4): 516–528.

Shahgedanova, M. 2003. *The physical geography of northern Eurasia*. Oxford: Oxford University Press.

Shunkov, M.V. 2005. The characteristics of the Altai (Russia) Middle Paleolithic in regional context. *Bulletin of the Indo-Pacific Prehistory Association* 25 (Taipei Papers vol. 3), 69–77.

Viola, B., S.V. Markin, A.N. Zenin, M.V. Shunkov, and A.P. Derevianko. 2011. Late Pleistocene hominins from the Altai mountains. In *Proceedings of the international symposium 'Characteristic features of the*

Middle to Upper Paleolithic transition in Eurasia: Development of culture and evolution of homo genus, ed. A.P. Derevianko and M.V. Shunkov, 207–213. Novosibirsk.

Wrinn, P.J. 2010. Middle Paleolithic settlement and land use in the Altai mountains, Siberia. In *Settlement dynamics of the middle Paleolithic and the middle stone age, volume III*, ed. N.J. Conard and A. Delagnes, 163–194. Tübingen: Kerns Verlag.

Zwyns, N. 2012. *Laminar technology and the onset of the Upper Paleolithic in the Altai, Siberia (studies in human evolution)*. Leiden: Leiden University Press.

Zwyns, N., E.P. Rybin, J.-J. Hublin, and A.P. Derevianko. 2012. Burin-core technology & laminar reduction sequence in the initial upper Paleolithic from Kara-Bom (Gorny-Altai, Siberia). *Quaternary International* 259: 33–47.

Further Reading

Agadjanian, A., and N. Serdyuk. 2005. The history of mammalian communities and paleogeography of the Altai mountains in the Paleolithic. *Paleontological Journal* 39 (Suppl 6): 645–821.

Baker, V.R., G. Benito, and A.N. Rudoy. 1993. Paleohydrology of late Pleistocene superflooding, Altay mountains, Siberia. *Science* 259: 348.

Baryshnikov, G.F., and A.M. Maloletko. 1997. *Arkheologicheskye pamiatniki Altaya glazami geolog. (Archeological sites through the eyes of a geologist), volume 1: Ulalinka, Ust'-Karakol, Anuy 1*. Dmitrievka, Tystesken: Tomsk University Press.

Brantingham, P.J., A.I. Krivoshapkin, L. Jinzeng, and Y. Tserendagva. 2001. The initial Upper Paleolithic in Northeast Asia. *Current Anthropology* 42: 735–746.

Derevianko, A., and S. Markin. 1992. *Mustie Gomogo Altaya (The Mousterian of the mountainous Altai)*. Novosibirsk.

Derevianko, A.P., and E.P. Rybin. 2003. The earliest representations of symbolic behaviour by Paleolithic humans in the Altai Mountains. *Archaeology, Ethnology and Anthropology of Eurasia* 4: 27–50.

Derevianko, A., and M. Shunkov. 2002. Middle Paleolithic industries with foliate bifaces in Gorny Altai. *Archaeology, Ethnology & Anthropology of Eurasia* 9: 16–42.

Derevianko, A., and M. Shunkov. 2004. Formation of the upper Paleolithic traditions in the Altai. *Archeology, Ethnology and Anthropology of Eurasia* 5 (3): 12–40.

Derevianko, A., and M. Shunkov. 2009. Development of early human culture in northern Asia. *Paleontological Journal* 43: 881–889.

Derevianko, A.P., I.V. Grichan, M. Dergacheva, A.N. Zenin, S.A. Laukhin, G.M. Levskoskaia, A.M. Maloletko, S.V. Markin, V.I. Molodin, I. Ovodov, V.T. Petrin, and M.V. Shunkov. 1990. *Arkheologiia i paleoekologiia Paleolita gornogo Altaia (Paleolithic archeology and paleo-ecology of Gorny Altai)*. Novosibirsk: ANSSSR.

Derevianko, A.P., D.B. Shimkin, and W. Roger Powers, eds. 1998. *The Paleolithic of the Altai*. The Paleolithic of Siberia: New discoveries and interpretations. Chicago.

Derevianko, A., A. Agadjanian, G. Baryshnikov, M. Dergacheva, T. Dupal, E. Malaeva, S. Markin, V. Molodin, S. Nikolaev, L. Orlova, et al. 1998. *Arkheologia, geologia i paleografia pleistotsena i golotsena Gornogo Altaya 8 archaeology, geology and paleogeography of the Pleistocene and Holocene of the mountainous Altai*. Novosibirsk: Izdatelstvo Instituta Arkheologii i Ethnografii Sibirskogo Otdelen.

Derevianko, A., V.T. Petrin, and E.P. Rybin. 2000. The Kara-Bom site and the characteristics of the Middle-Upper Paleolithic transition in the Altai. *Archaeology, Ethnology & Anthropology of Eurasia* 2 (2): 33–52.

Derevianko, A.P., A.V. Postnov, E.P. Rybin, Y.V. Kuzmin, and S.G. Keates. 2005. The Pleistocene peopling of Siberia: A review of environmental and behavioral aspects. *Bulletin of the Indo-Pacific Prehistory Association* 57: 69–77.

Goebel, T. 2004. The early Upper Paleolithic of Siberia. In *The early Upper Paleolithic beyond western Europe*, ed. P.J. Brantingham, S.L. Kuhn, and K.W. Kerry, 162–195. Berkeley: University of California Press.

Goebel, T., A.P. Derevianko, and V.T. Petrin. 1993. Dating the middle-to-upper-paleolithic transition at Kara-Bom. *Current Anthropology* 34: 452–458.

Kuzmin, Y. 2000. Geoarchaeology of the Lower, Middle, and early Upper Palaeolithic of Siberia: A review of current evidence. *The Review of Archaeology* 21: 32–40.

Kuzmin, Y.V. 2008. Siberia at the last glacial maximum: Environment and archaeology. *Journal of Archaeological Research* 16: 163–221.

Okladnikov, A. 1972. Ulalinka-drevnepaleoliticheskii pamiatnik Sibiri [Ulalinka, Siberian Lower Paleolithic site]. *Materialy i issledovaniia po arkheologii SSSR* 185: 7–19. (in Russian).

Okladnikov, A.P. 1961. Comment on "The Ust-kanskaya Paleolithic cave site, Siberia". *American Antiquity* 27: 203–215.

Okladnikov, A.P., and G.A. Pospelova. 1982. Ulalinka, the oldest Palaeolithic site in Siberia. *Current Anthropology* 23 (6): 710–712.

Otte, M., and J. Kozlowski. 2001. The transition from the Middle to Upper Paleolithic in North Eurasia. *Archaeology, Ethnology and Anthropology of Eurasia* 3: 51–62.

Postnov, A., A. Anoikin, and N. Kulik. 2000. Criteria for the selection of raw materials in Palaeolithic industries of the Anui River basin (Gorny Altai).

Archaeology, Ethnology & Anthropology of Eurasia 1: 18–30.
Rudenko, S.I. 1961. The Ust'-Kanskaia Paleolithic cave site, Siberia. *American Antiquity* 27: 203–215.
Rybin, E. 2004. *Middle Paleolithic "blade" industries and the Middle-to-Upper-Paleolithic transition in South Siberia: Migration or regional continuity?* BAR international series. Vol. 1239. Oxford: Archaeopress.
Slavinskiy, V.S. 2007. Industrii Ranneverhinepaleoliticheskii Ourovney Ovitanya Ctoyanki Ust-Karakol 1 [Early Upper Paleolithic industry from the occupation levels at Ust-Karakol 1. In *Severnaya Evrasia v Anthropologenie. ChelovekPaleolitechnologii, Geoecologia, Ethnografii i Anthropologi*.i, 197–214 (in Russian).
Slavinskiy, V.S., and E.P. Rybin. 2007. Vosstanovlenies Pomowyou Remontaja Variantov Skalivanya Kamnya v Industriyah Srednego Paleolita i Raneii Pory Vernehgo Paleolita Soyanki Kara-Bom [Reconstruction of the knapping variant through refits of stone flakes of the Middle Paleolithic and early Upper Paleolithic industry from the Kara-Bom site]. *Vestnik NGU* 6: 70–80. (in Russian).

Altamira and Paleolithic Cave Art of Northern Spain

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Introduction

There are more than 120 caves in the Cantabrian side of Northern Spain that preserve rock art produced during the Paleolithic. In 1985, one of them, Altamira, was declared World Heritage as it represents "a masterpiece of human creative genius" (Criterion I & III: http://whc.unesco.org/en/criteria/). In 2008, this same recognition was extended to another 17 caves in the region.

Some of the archaeological sites with Cantabrian Paleolithic cave art have also produced outstanding portable art pieces on bone, antler, or stone (Corchón 1986; Barandiaran 1989).

Definition

Cave art of Northern Spain extends along a 400-km coastal zone, from the Bidasoa's to the Nalón's river basin, coinciding with the distribution of the karstic lithology of the Cantabrian coast. Especially noteworthy are the concentrations associated with the mouth of the Sella and the Saja-Besaya river basins; the Nalón, the Pas, and the Asón middle basins; or the coastal areas of Llanes and Castro Urdiales (González Echegaray and González Sainz 1994).

This area is one of the classic regions of Paleolithic cave art (Balbín Behrmann 2004), together with the Pyrenees and the Dordogne, and other emerging regions such as Andalusia and Ardèche. New sites continue to be discovered, increasing the number of sites and gradually redefining the characteristics of this artistic tradition.

Altamira was not just the first recognized decorated cave, but one of the most outstanding because of its artistic quality and the quantity of motifs preserved. The cave was discovered in 1879 by the daughter of Marcelino Sanz de Sautuola who for years had studied the cave. The discovery generated a huge controversy about the finding's authenticity, which was only resolved in 1902, when the existence of Paleolithic art was accepted by the broader scientific community (Moro Abadía and González Morales 2004). The turn of the century brought the first systematic surveys that resulted in the discovery of other new and spectacular decorated caves (Alcalde del Rio et al. 1911) (Fig. 1).

After one and a half centuries of research, the wide variability and the specific features of each site are now well known (González Sainz 2004). Each of these is unique, and we have identified a number of graphic devices that were continuously reused throughout the Upper Paleolithic with art assemblages involving hundreds of figures such as Peña Candamo, Llonín, Tito Bustillo, Altamira, Castillo, or La Garma. Others, however, were only decorated at specific points in time but, in some cases, also in a very profuse manner (e.g., Ekain

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 1 Distribution map of decorated caves on the Cantabrian coast of the Iberian Peninsula (D. Garate)

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 2 Panel of the polychromes of the Altamira cave (P. Saura/ Museum of Altamira)

or Altxerri). In some cases (such as in Cullalvera), the artists penetrated the farthest depths inside the caves for their activities. But quite often (such as in La Lluera, Chufín, or Venta Laperra), the decorated panels are located near the entrances, even illuminated by natural light.

Most of the others have very modest assemblages with only a few images represented. This

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 3 Main panel of Tito Bustillo cave (R. de Balbin)

suggests that the artistic production was not probably the main activity practiced at these sites (Fig. 2).

Figurative subject matters are dominated by animals. From the beginning are horses, bison, aurochs, and goats, but during later periods, the horse and the bison dominate the iconography as is found in other regions (Pyrenees and Dordogne). The animals appear together with specific geometric signs such as rectangles divided internally, rectilinear forms with central bulges, and simpler shapes such as cupules in rows or clouds of dots. Although there are a few human figures, there are representations of vulvas and hands stencils are abundant.

The techniques used by the artists are basically painting and engraving. The color palette was limited: different hues of black, yellow, and red. The first was obtained from charcoal, burned bones, or manganese oxides, while the others were produced using different sorts of iron oxides. The color was applied directly as a crayon or as a processed paint. The application of the pigment with the fingers to produce dotted animals is a technical peculiarity specific to this region. Engravings made with flint tools or with the fingers on soft surfaces had different depths and were produced by one or repetitive strokes. In this case, multiple striping to indicate animal fur, especially on deer, is also specific to the region (Fig. 3).

Key Issues/Current Debates/Future Directions/Examples

Paleolithic art research presents a number of common problems in the various regions where it appears. It is difficult to interpret its original meaning, and the establishment of chronological sequences has been a priority, given the difficulties of directly dating the art. Even though the message originally transmitted by the Paleolithic images cannot be recovered, through their study we can explore the lifestyle and the way the artists understood the world and, by extension, to the societies that created them (Fig. 4).

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 4 Panel of the hands of the El Castillo cave (P. Saura/Council of Culture, Tourism and Sports, Government of Cantabria)

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 5 Zaldei panel with polychrome horses in Ekain cave (Basque Government/J. Wesbuer)

Chronological Distribution

The improvement of radiocarbon and other dating techniques has demonstrated that a highly developed art form existed from the beginning of the Upper Paleolithic.

The chronology of art production in caves along the Cantabrian coast requires further research. Radiocarbon dates remain controversial (Fortea Perez 2000–2001), and other techniques such as calcite formations dating, under or superimposed over the figures, provide a lower degree of resolution. Thus, the thermoluminescence dates from Venta Laperra and Pondra caves offer a minimum age for the decoration of these caves, and these are significantly older than expected (González Sainz 1999). Uranium series applied to calcifications at Altamira, Tito Bustillo, and Castillo (Pike et al. 2012) are surprisingly old, and the accuracy of this technique is still being debated.

In any case, it seems that artistic skills were not the result of a progressive learning throughout thousands of years of European Paleolithic art. Advances in dating techniques will allow us to reconstruct in a much more precise way the sequence of this first art of mankind.

Style, Territory, and Identity

The spatial settlement of hunter-gatherer groups in the territory is given by the combination of sedentary behaviors and a range of mobility. Within these parameters, social activities develop. In this sense, art is understood as a graphic code associated with a specific community and is an indispensable tool for the characterization of groups of Paleolithic hunter-gatherers.

In the Cantabrian coast, the graphic traditions of the Early and Upper Paleolithic were significant (Moure Romanillo 1994). This includes the open air rockshelters or sites decorated with deep engravings representing animal forming palimpsests and especially concentrated in the Nalón basin and the deep caves with red animal paintings composed of small digital dots arranged in pairs, whose main focus of which is found on the river Asón. The caves of the central part of the region have fine striated engravings which represent animal fur, which also present on pieces of portable art. In all cases the most common animal is the deer, accompanied by horses, aurochs, and bison. Traditionally these regional styles were interpreted as successive and independent but, in the light of the recent chronological findings, they could have overlapped in time, reflecting the presence in the territory of different human groups (Garate 2010).

By the end of the Upper Paleolithic, the Cantabrian regional particularities are replaced by some artistic interregional linkages encompassing also the Pyrenees and the Dordogne (Fig. 5).

Cross-References

- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Rock Art, Forms of
- ▶ Spain: Archaeological Heritage Management
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Alcalde del Rio, H., H. Breuil, and L. Sierra. 1911. *Les cavernes de la région cantabrique*. Monaco: Chêne.

Balbin Behrmann, R. 2004. Los cazadores de la Cantabria glacial y su expresión gráfica. In *La materia del lenguaje prehistórico. El arte mueble paleolítico de Cantabria en su contexto*, ed. P. Arias and R. Ontañón, 23–36. Santander: Consejería de Cultura, Turismo y Deporte, Gobierna de Cantabria.

Barandiaran, I. 1989. Constantes y variabilidad del arte portátil magdaleniense en la vertiente cantábrica. *Veleia* 5: 45–61.

Corchon, M.S. 1986. *El arte mueble paleolítico cantábrico; contexto y análisis interno*, Monografías, vol. 16. Madrid: Centro de Investigación y Museo de Altamira.

Fortea Pérez, J. 2000–2001. Los comienzos del arte paleolítico en Asturias: aportaciones desde una arqueología contextual no post-estilística. *Zephyrus* 53–54: 177–216.

Garate, D. 2010. *Las ciervas punteadas en las cuevas del Paleolítico. Una expresión pictórica propia de la cornisa cantábrica. Munibe*, Antropologia – Arkeologia suplemento, vol. 33. San Sebastián: Donostia.

Gonzalez Echegaray, J., and C. Gonzalez Sainz. 1994. Conjuntos rupestres paleolíticos de la cornisa cantábrica. *Complutum* 5: 21–43.

Gonzalez Sainz, C. 1999. Sobre la organización cronológica de las manifestaciones gráficas del Paleolítico superior. Perplejidades y algunos apuntes desde la región cantábrica. *Edades* 6 (2): 123–144.

Gonzalez Sainz, C. 2004. Arte parietal en la región cantábrica: centros y peculiaridades regionalese. In *Las sociedades del Paleolítico en la Región Cantábrica*, Kobie (Paleoantropología), vol. 8, ed. M.A. Fano, 403–424.

Moro Abadía, O., and M. González Morales. 2004. 1864–1902: el reconocimiento del arte paleolítico. *Zephyrus* 57: 119–135.

Moure Romanillo, A. 1994. Arte paleolítico y geografías sociales. Asentamiento, movilidad y agregación en el final del paleolítico cantábrico. *Complutum* 5: 313–330.

Pike, A.W.G., D.L. Hoffman, M. García-Diez, P.B. Pettitt, J. Alcolea, R. de Balbín, C. González-Sainz, C. de Las Heras, J.A. Lasheras, R. Montes, and J. Zilhao. 2012. U-series dating of Paleolithic art in 11 caves in Spain. *Science* 336: 1409–1413.

Further Reading

Altuna, J. 1997. *Ekain y Altxerri*. San Sebastián: Haranburu.

Asociación Cántabra Para La Defensa Del Patrimonio Subterráneo. 2002. *Las cuevas con arte paleolítico en Cantabria*. Santander: ACDPS – Cantabria en Imagen.

Breuil, H., and H. Obermaier. 1935. *La cueva de Altamira en Santillana del Mar*. Madrid: Tipografía de Archivos.

Fortea-Pérez, J., C. Fritz, M.A. Garcia, J.L. Sanchidrián Tortí, G. Sauvet, and G. Tosello. 2004. L'art pariétal paléolithique à l'épreuve du style et du carbone-14. In *La spiritualité*, ERAUL, vol. 106, ed. M. Otte, 163–175. Liège: Université de Liège.

Garate, D. 2008. The continuation of graphic traditions in Cantabrian pre-Magdalenian parietal art. *International Newsletter on Rock Art* 50: 18–25.

González Sainz, C. 2007. Dating Magdalenian art in North Spain: the current situation. In *Palaeolithic cave art at Creswell Crags in European context*, ed. P. Pettitt, P. Bahn, and S. Ripoll, 247–262. Oxford: Oxford University Press.

González Sainz, C., R. Cacho Toca, and T. Fukazawa. 2003. *Arte paleolítico en la región cantábrica. Base de datos multimedia Photo VR, DVD-ROM versión Windows*. Santander: Consejería de Cultura, Turismo y Deporte del Gobierno de Cantabria, Servicio de Publicaciones de la Universidad de Cantabria y Texnai Inc. (DVD).

Moure Romanillo, A. 1988. Composition et variabilité dans l'art pariétal paléolithique cantabrique. *l'Anthropologie* 92 (1): 73–86.

Moure Romanillo, A., and M. Gonzalez Morales. 1988. El contexto del arte parietal. La tecnología de los artistas en la cueva de Tito Bustillo (Asturias). *Trabajos de Prehistoria* 45: 19–49.

Moure Romanillo, A., and C. González Sainz. 2000. Cronología del arte paleolítico cantábrico: últimas aportaciones y estado actual de la cuestión. In *3° Congreso de Arqueología Peninsular*, *volume II*, 461–473.

Altitude Environments in Archaeology

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Introduction

Because humans have evolved as a low-elevation species, to live and thrive at high elevations, our species had to develop physiological, genetic, and cultural adaptations to this extreme environment. Although it is probable that humans made seasonal forays into high-elevation environments, perhaps beginning in the Lower Paleolithic in Africa, the permanent occupation of high-elevation environments occurred relatively late in prehistory. The adoption and spread of plant and animal cultigens, along with acquired genetic adaptations, allowed high-elevation inhabitants, particularly in the world's high plateaus, to create complex polities.

Definition

High-elevation (or altitude) environments are defined as those at and over 2500 masl (meters above mean sea level). It is at this elevation that native lowlanders first experience hypoxia, which is the reduced partial pressure of oxygen. At sea level, for example, arterial blood is 97% saturated with oxygen; at 3000 m, it is at 90%; and at elevations between 4000 and 5000 m, saturation decreases by almost 30% when compared to sea level (Beall 2001: 426–428). Hypoxia has both direct and indirect effects on health status, reproduction and growth, nutritional status, and work capacity. These effects on human biology are differentially expressed across time and can be characterized as being of short-or long-term consequence. Hypoxia is the terrestrial environmental stressor that is least amenable to intervention and amelioration via cultural adaptations. The establishment of permanent elevations above 2500 m depended of the appearance of acclimatizations (phenotypic plasticity), true adaptation (the appearance of genes capable of overcoming the selective pressure of hypoxia), or some combination of the two.

High-elevation ecology is determined by a complex interaction of climate, altitude, and topography and can be characterized by five primary features (Aldenderfer 1998: 2–4): (1) environmental heterogeneity, (2) extremeness, (3) low predictability, (4) low primary productivity, and (5) high instability and fragility. High-elevation environments tend to be patchy in both space and time, and consequently, there is significant variability in the location, size, and duration of resource patches. At high elevation, two aspects of extremeness are important: cold temperatures and hypoxia. Even in tropical mountains like the Andes, cold is a constant problem, and humans must cope with cold by cultural adaptations that have significant material and energy costs, thus diverting resources from the subsistence quest. Hypoxia affects plant morphology and metabolic processes, which in turn affects primary productivity. The combination of cold, hypoxia, and aridity in high -elevation environments creates a context of low primary productivity. Only the most extreme deserts and polar environments of the planet have lower primary productivity than those at high elevation. Finally, high-elevation environments are highly susceptible to wind and rain erosion and extreme colluvial processes which can modify terrain, change stream courses, and destroy resource patches, thus contributing to the overall patchiness of the high-elevation landscape.

The stressors of hypoxia and cold likely had significant effects on the range of human *cultural* adaptations and historical outcomes of cultural evolution and change at high altitude. Constraints on fertility or exceptionally high neonatal mortality rates, for example, which are known to affect migrants to high elevation, may well have led to lower growth rates of highland populations, especially in the generations immediately following their founding by lowlanders. And since high-elevation peoples tend to have higher basal metabolic rates, they would have required on average more calories than comparable low-elevation peoples. This may in turn have had important effects on cultural strategies when dealing with problems relating to environmental packing, diet choice under restricted mobility, resource intensification, and both short- and-long-term changes in resource availability. Mobility strategies themselves may have been substantially affected due to demands imposed by basic caloric requirements as well as the greater work effort required to traverse rugged mountain topography. Although it is important not to cast these stressors in an overly deterministic role, they did have tangible effects on a variety of aspects of human life at high elevation.

There are relatively few places on the planet that exceed 2500 m in elevation (Fig. 1). Most are the peaks and surrounding high terrain of the mountainous regions of North America (the Alaska Range and the Rocky Mountains), Central America (including the Basin of Mexico),

Altitude Environments in Archaeology, Fig. 1 Shaded areas are above 2500 masl. The elevation of Greenland is due to the presence of an ice sheet

South America (the Andean chain), Europe (the Alps and Caucasus), the Middle East (Zagros), the Asian mountain systems (Himalayas, Tien Shan, Kunlun Shan, and Altai ranges), and Africa (peaks in Ethiopia and Kenya). Aside from the Greenland and Antarctic plateaus, which owe their elevation to massive glaciers and icecaps, there are three major plateaus at high elevation: the Ethiopian plateau, the Andean altiplano, and the Tibetan plateau.

Historical Background

The study of high-elevation environments in archaeology has been significantly undertheorized. Although archaeological research has been done in all of the world's high plateaus and surrounding mountainous regions, virtually no serious consideration of how the stressors of hypoxia and cold affected the ways in which these environments were first entered then permanently occupied. Clive Gamble's *Timewalkers* (1993) recognized high-elevation environments as extreme and noted that they were among the last places on the planet to be occupied permanently. However, there was no discussion of the physiological factors that would have challenged early inhabitants, and instead the ruggedness and difficulty of the terrain were emphasized.

Key Issues/Current Debates

There are two major areas of emphasis in modern archaeological studies of high-elevation environments: evaluations of the evidence for the initial peopling of the world's high plateaus and mountainous regions and debates about the timing of their permanent occupation.

Evidence for Early Entries into the World's High Elevation Regions

Ethiopian Plateau

It is possible that some of our hominin ancestors may have entered elevation zones above 2500 m as early as 1.5 mya along the Rift Valley rims near the southern margin of the Ethiopian plateau. Sites such as Melka Kunture (2300–2400 m), which contains Olduwan, Acheulian, and Middle Stone Age materials, also include the fragmentary skeletal elements of *Homo ergaster* and *Homo erectus,* and the Gadeb locality (2400 m), which contains Developed Olduwan and Acheulian materials dated between 1.5 and 0.7 mya, suggests the possibility that higher-elevations regions on the nearby plateau could have been utilized on a seasonal or temporary basis (Aldenderfer 2006). Acheulian-style hand axes and Middle Stone age artifacts have been found in surface contexts on the plateau at elevations up to 2300 m (Phillipson 2005). Vogelsang et al. (2018) report on the discovery of a buried site with Late Acheulian materials, including hand axes, in the Mount Dendi region of the central Ethiopian plateau at an elevation of ca. 3000 m. Unfortunately, no chronometric dating of the site has proven possible, but the investigators suggest an age between 500,000 and 200,000 years ago based on stone tool morphology. If confirmed by subsequent analysis, this would represent the earliest hominin entry into a high-elevation environment in the world. A much more secure date of an early presence on the Ethiopian plateau is reported by Ossendorf et al. (2019). At the Fincha Habera rockshelter, found at an elevation of 3469 m in the Bale Mountains, they report the presence of an assemblage of stone tools said to be typical of the Ethiopian Middle Stone Age along with the burned remains of giant mole-rats. The date of the materials ranges from 31,000 to 47,000 BP. The authors describe the rockshelter as "…a long-term residential site" but this interpretation is open to question. Nevertheless, it is the earliest securely dated high elevation site.

Andean Altiplano

The antiquity of an initial human presence on the Andean altiplano is constrained by the antiquity of the human presence in the New World. The only reliable archaeological data for the earliest site in South America is from Monte Verde, located in lowland south-central Chile and which is dated to between 14,220 and 13,980 cal BP (Dillehay et al. 2008). Recent research has considerably expanded our understanding of the timing of an early human presence in the Andes. Two sites are the earliest: Rademaker et al. (2014) at Cuncaicha, a rockshelter located at 4480 m in the south-central Andes of Peru, and which is dated between 12,400 and 11,400 cal BP. A second rockshelter, Cueva Bautista, located in the highlands of southwestern Bolivia at an elevation 3933 m, has similarly early dates as well which range between 12,700 and 12,100 cal BP (Capriles et al. 2016b). The earliest levels of Asana (3435 m) in southern Peru range in date from 11,710 to 10,511 cal BP (Aldenderfer 1998); slightly further to the south in northern Chile, three sites have early dates: Hakenasa (4100 m), 11,600–10,190 cal BP; Las Cuevas (4485 m), 11,720–10,300 cal BP; and Pampa el Muerto 15 (3174 m), 11,070–10,570 cal BP (Osorio et al. 2017). There remains some controversy about the routes by which these sites were occupied; a traditional model suggests that coastal foragers who occupied the Pacific shorelines began to explore the nearby highlands and eventually, became permanent residents (Aldenderfer 1998). A second model sees the high elevation dry puna as a "megapatch" that was exploited systematically from the north of the continent to the south (Osorio et al. 2017).

Tibetan Plateau

The lack of systematic research on the plateau has not prevented speculation on the timing of the initial entry of humans onto the plateau. Dates from 50,000 to 35,000 years ago have been postulated and were generally based on limited evidence that has subsequently been shown to be

incorrect (Aldenderfer 2011: 142). However, recent research has not only confirmed an early presence of humans on the plateau by at least 30,000 years ago but has pushed a possible initial entry back to the Middle Pleistocene. These discoveries, however, are not without controversy. The most secure of these discoveries is from the Nywa Devu site (4600 m) on the central Tibetan plateau that is dated between 30,000 and 40,000 years ago (Zhang et al. 2018). The excavators describe the site as a quarry for the procurement of lithic material. Aside from these artifacts, no other cultural materials were identified. The location of the site invites speculation what role this site may have served in a settlement system, but the investigators do not advance a hypothesis on this. A more problematic discovery is from the extreme northeastern margins of the plateau at the Baishiya site (3280 m; Chen et al. 2019). The report on the site describes a mandible (labeled the Xiahe mandible by the authors) dated to 160,000 years ago and attributed to a Denisovan phylogenetic status on the basis of proteins recovered from it. Artifacts described as of "Paleolithic" style are said to be present but were not described. The investigators make a number of strong claims about the site. They state "Our results indicate that archaic hominins occupied the Tibetan Plateau in the Middle Pleistocene epoch and successfully adapted to high-altitude hypoxic environments long before the regional arrival of modern *Homo sapiens*" (Chen et al. 2019: 409). The data presented support neither claim. As noted above, the site is on the extreme margins of the plateau and is at a slightly higher elevation than the valley floor below. It is more plausible that this site reflects a temporary use of the plateau margins from lower elevation base camps, a pattern seen much later in time on the northeastern plateau at sites such as Heimahe 1 (3210 masl) and Jiangxigou 1 (3330 masl) which date between 15,000 and 13,000 BP (Madsen et al. 2006). The temporary use of the margins of high elevation regions does not require genetic adaptations, and the authors offer no evidence of these aside from the assignment of the mandible to the Denisovans. Terms like "occupied" imply permanent residence, and until the type of use of the site is determined by the composition of the archaeological assemblage, the larger significance of the Xiahe mandible in relationship to the peopling of the plateau remains to be seen. These observations do not diminish the importance of the find, but they do place it into a broader context.

Other Mountain Regions

Many of the world's highest mountains are in the Northern Hemisphere and are characterized by strongly seasonal climates which include intense winter cold and significant snowfall. During glacial epochs, many of these mountain ranges could not have been inhabited or traversed during the winter. Consequently, human or hominin entry into these high-mountain environments, such as the Alps, Caucasus, Zagros, Altai, or Rocky Mountains occurs relatively late in prehistory. Richter (2006) notes that Neanderthals seasonally used rockshelters in the Swiss and Austrian Alps at elevations ranging from 1400 to 2100 m during MIS 3 times (roughly 57,000–29,000 years ago); Roustaei (2010) reports on Middle Paleolithic tools (dated by typology) in the Zagros mountains at elevations ranging from 2450 to 2800 m; although the low-elevation Dmanisi site in the southern Caucasus shows the presence of hominins in the region in the Lower Paleolithic, higher elevations, and then only at 2150 m at the Tsona site, are not entered until MIS 7 (243,000–191,000 years ago; Doronichev 2008); although the lower-elevation zones of the Rocky Mountains were apparently used by Clovis peoples (11,200–10,900 BP), defined by surface finds of projectile points, no excavated Clovis-era site has been discovered. There is evidence, however, of a Folsom presence dated to 10,600 BP (Jodry et al. 1996; Pitblado 2017).

Debates over the Timing of the Permanent Occupation of High-Elevation Regions

Although the data are limited, it appears that permanent occupations of the Ethiopian plateau at least by the end of the Pleistocene or the onset of the Holocene (Finneran 2008).

Despite continued controversy, a permanent occupation of the Andean altiplano is far better understood. Rademaker et al. (2014) have argued that Cuncaicha rockshelter was a base for foragers who lived permanently in this region of the altiplano. However, Capriles et al. (2016a) challenge this and argue that the materials recovered from the site do not clearly support a permanent occupation and instead are more consistent with a seasonal use of the site. According to Aldenderfer (1998), the Asana site in southern Peru was first used as a short-term logistical site monitored from low-elevation base camps but became part of a permanent high elevation settlement system around 9500 cal BP. Lindo et al. (2018), using ancient DNA extracted from human remains recovered from the Titicaca basin, postulate a separation of lowland versus highland peoples in the Andes around 9000 BP. Haas et al. (2017) using isotope data obtained from burials in the Titicaca basin (3800 m) shows that humans have been living permanently on the altiplano at least since 7000 BP. These studies demonstrate convincingly that domesticated plants and animals were not required for permanent life at high elevation in the Andes.

Controversies over the timing of a permanent occupation of the Tibetan plateau remain very much unresolved. Until recently, most researchers did not believe that hunters and gatherers could have lived on the plateau permanently. Chen et al. (2015) claimed that agriculture facilitated the permanent occupation of the plateau only after 3600 BP, and that any archaeological evidence dated earlier than that reflected sporadic and seasonal use. Meyer et al. (2017) using data from the Chusang site in central Tibet (4270 m) challenged that interpretation and demonstrated the site, dated between 7400 and 12,000 BP, was part of a settlement system that reflected a permanent occupation of the plateau. Although the authors made no claims for the nature of occupation at Nywa Devu, its location suggests that it may well have been part of an earlier settlement system. These arguments that postulate permanent occupation of the plateau perhaps by 30,000 years ago are supported by analyses of the genomes of modern Tibetans (Lu et al. 2016).

As previously noted, the claims about a permanent occupation of the plateau at the Baishiya site are not credible.

Future Directions

As with many research questions in archaeology, more data will be required to begin to resolve many questions regarding the peopling of the world's high places and the timing of permanent occupation upon them. Research strategies that focus upon accessibility and the timing of possible openings onto plateaus from surrounding lowlands offer some real promise. So-called ice patch archaeology – the examination of areas once covered by permanent snow that have begun to melt as global warming intensifies – is beginning to provide new data into specific routes into mountainous terrain or the locations of possible foraging territories. The discovery of Ötzi, the frozen remains of a person who died in a high alpine setting (3210 m) around 5200 BP in what is now the Austrian-Italian border, is a dramatic example of what may be discovered as research intensifies.

Another line of evidence that may provide some insight into high-elevation genetic adaptations is ancient DNA (aDNA). If skeletal remains of sufficient antiquity and conditions of preservation can be located, it may be possible to examine these samples for the presence of genes and alleles thought to promote adaptation to hypoxia.

References

Aldenderfer, M. 1998. *Montane foragers: Asana and the south-central Andean archaic*. Iowa City: University of Iowa Press.

Aldenderfer, M. 2006. Modelling plateau peoples: The early human use of the world's high plateaux. *World Archaeology* 38 (3): 357–370.

Aldenderfer, M. 2011. Peopling the Tibetan Plateau: Insights from archaeology. *High Altitude Medicine & Biology* 12 (2): 141–147.

Beall, C. 2001. Adaptation to altitude: A current assessment. *Annual Review of Anthropology* 40: 432–456.

Capriles, J., C. Santoro, and T. Dillehay. 2016a. Harsh environments and the Terminal Pleistocene peopling of the Andean highlands. *Current Anthropology* 57: 99–100.

Capriles, J.J., U. Albarracin-Jordan, D. Lombardo, B. Osorio, S. Maley, K. Goldstein, M. Herrera, A. Glascock, H. Veit Domic, and C. Santoto. 2016b. High-elevation adaptation and late Pleistocene foraging in the Bolivian Andes. *Journal of Archaeological Science: Reports* 6: 463–474.

Chen, F., G. Dong, D. Zhang, X. Liu, X. Jia, C. An, M. Ma, Y. Xie, L. Barton, X. Ren, Z. Zhao, X. Wu, and M. Jones. 2015. Agriculture facilitated permanent human occupation of the Tibetan Plateau after 3600 BP. *Science* 349: 248–250.

Chen, F., F. Welker, C. Shen, E. Shara, I. Bergmann, S. Davis, H. Xia, H. Wang, R. Fischer, S. Freidline, T. Yu, M. Skinner, S. Steltzer, G. Dong, Q. Fu, G. Dong, J. Wang, D. Zhang, and J.-J. Hublin. 2019. A late Middle Pleistocene Denisovan mandible from the Tibetan Plateau. *Nature* 569: 409–412.

Dillehay, T., C. Ramirez, M. Pino, M. Collins, and J. Pino-Navarro. 2008. Monte Verde: Seaweed, food, medicine, and the peopling of South America. *Science* 320: 784–786.

Doronichev, V.B. 2008. The lower Paleolithic in Eastern Europe and the Caucasus: A reappraisal of the data and new approaches. *PaleoAnthropology* 2008: 107–157.

Finneran, N. 2008. *The archaeology of Ethiopia*. London: Routlege.

Gamble, C. 1993. *Timewalkers: The prehistory of global colonization*. Stroud: Alan Sutton.

Haas, R., I. Stefenescu, A. Garcia-Putnam, M. Aldenderfer, M. Clementz, M. Murphy, C. Viviano Llave, and J. Watson. 2017. Humans permanently occupied the Andean Highlands by at least 7ka. *Royal Society Open Science* 4: 170331.

Jodry, M.A., M.D. Turner, V. Spero, J.C. Turner, and D.J. Stanford. 1996. Folsom in the Colorado high country: The Black Mountain site. *Current Research in the Pleistocene* 13: 25–27.

Lindo, J., R. Haas, C. Hofman, M. Apata, M. Moraga, R. Verdugo, J. Watson, C. Viviano, D. Witonsky, C. Beall, C. Warinner, J. Novembre, M. Aldenderfer, and A. di Rienzo. 2018. The genetic prehistory of the Andean highlands 7000 years BP through European contact. *Science Advances* 4 (11): eaau4921.

Lu, D., H. Lou, K. Yuan, X. Wang, C. Zhao, Y. LU, X. Yang, L. Deng, Y. Zhou, Q. Feng, Y. HU, Q. Ding, Y. Yang, S. LI, L. Jin, Y. Guan, B. Su, L. Kang, and S. Xu. 2016. Ancestral origins and genetic history of Tibetan highlanders. *The American Journal of Human Genetics* 99: 580–594.

Madsen, D., M. Haizhou, P. Brantingham, G. Xing, D. Rhode, and Z. Haiying. 2006. The Late Upper Paleolithic occupation of the northern Tibetan Plateau margin. *Journal of Archaeological Science* 33: 1433–1444.

Meyer, M., M. Aldenderfer, Z. Wang, D. Hoffmann, J. Dahl, D. Degering, W. Haas, and F. Schlütz. 2017. Permanent human occupation of the central Tibetan Plateau in the early Holocene. *Science* 355: 64–67.

Osorio, D., J. Steele, M. Sepulveda, E. Gayo, J. Caprisles, K. Herrera, P. Ugalde, R. Pol-Hoz, C. Latorre, and C. Santoro. 2017. The dry puna as an ecological megapatch and the peopling of South America: Technology, mobility, and the development of a late Pleistocene/early Holocene hunter-gatherer tradition in northern Chile. *Quaternary International* 461: 41–53.

Ossendorf, G., A. Groos, T. Bromm, M. Tekelmariam, B. Glaser, J. Lesure, J. Schmidt, N. Akcar, T. Bekele, A. Beldados, S. Demisseew, T. Kahsay, B. Nash, T. Nauss, A. Negash, S. Nemoissa, H. Veit, R. Vogelsanf, Z. Woldu, W. Zech, L. Oppennoorth, and G. Miehe 2019. Living the high life: Middle Stone Age foragers in the glaciated Bale Mountains, Ethiopia. *Science* 365: 27–28.

Phillipson, D.W. 2005. *African archaeology.* 3rd ed. Cambridge: Cambridge University Press.

Pitblado, B. 2017. The role of the Rocky Mountains in the peopling of North America. *Quaternary International* 461: 54–79.

Rademaker, K., G. Hodgins, K. Moore, S. Arrillo, C. Miller, G. Bromley, P. Leach, D. Reid, W. Yepez, and D. Sandweiss. 2014. Paleoindian settlement of the high-altitude Peruvian Andes. *Science* 346 (6208): 466–469.

Richter, J. 2006 Neanderthals in their landscape. In *Neanderthals in Europe*, ed. B. Demarsin and M. Otte, 17–32. Proceedings of the international conference, held in the Gallo-Roman Museum in Tongeren, TVATVCA, Gallo-Roman Museum.

Roustaei, K., 2010. Discovery of Middle Palaeolithic occupation at high altitude in the Zagros Mountains, Iran. *Antiquity* 84 (325). Project Gallery.

Vogelsang, R., O. Bubenzer, M. Kehl, S. Meyer, J. Richter, and B. Zinaye. 2018. When hominins conquered highlands – An Acheulean site at 3000 m.a.s.l. on Mount Dendi/Ethiopia. *Journal of Paleolithic Archaeology* 1: 302–313.

Zhang, X., B. Ha, S. Wang, Z. Chen, J. Ge, H. Long, W. He, W. Da, X. Nian, M. Yi, A. Zhou, P. Zhang, Y. Jin, O. Bar-Yosef, J. Olsen, and X. Gao. 2018. The earliest human occupation of the high-altitude Tibetan Plateau 40 thousand to 230 thousand years ago. *Science* 362: 1049–1051.

Amazonian Dark Earths: Geoarchaeology

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Introduction

Amazonian Dark Earths (hereinafter ADEs) are expanses of anthropogenic soils that formed on generally nutrient-poor upland soils of the Amazon basin during pre-Columbian times. Expanses of ADEs range from <1–80 ha, and overall agricultural aptitude is higher than the vast majority of soils in the region. These soils are much sought after by local farmers who use them to grow specific crops. Most of the documented expanses of ADEs are found on Tertiary-age sediments located in riparian and interfluvial positions of the Amazon basin. However, instances are also reported on Quaternary alluvial sediments and on human-made earthworks, highlighting that the formation of these soils was an outcome of specific forms of pre-Columbian settlement. The discovery of ADEs alongside the main waterways of the region has been a crucial Rubicon for Amazonian archaeology: these soils record the effects of pre-Columbian indigenous societies' creative manipulation of environmental affordances. Thus, they highlight that human inhabitation of the Amazon basin was, and is, much more than efficient adaptation to environmental limitations. Their ubiquity provides strong evidence for the existence of more sedentary and demographically denser indigenous societies in the Amazon basin before European colonization. Moreover, examined from a strictly archaeological perspective, ADEs are one of the best archaeological signatures of sedentary occupations in a region with limited archaeological preservation potential. ADEs are *sui generis* archaeological artifacts of extraordinary relevance for present-day concerns: soil scientists are currently studying the properties and formation of ADEs in order to develop techniques of soil amelioration that permit recuperation and amendment of degraded and infertile soils.

A

Definition

ADEs collectively refer to circumscribed expanses of organically enriched mineral soils found mostly within the non-flooding terrain of the Amazon basin. Expanses of these soils vary in size, shape, and location: linear expanses have been reported as patches extending over hundreds to thousands of meters along *terra firme*(non-flooding) bluffs that overlook the major waterways of the basin. However, smaller patches, either oval in shape or draping the horizontal surface of the landform on which they are located, also exist on relict floodplain locations, on *terra firme* areas adjacent to alluvial lakes and flooding forest, on *terra firme* interfluvial terrain away from large rivers, and on alluvial sediments. Moreover, soil horizons with similar characteristics are reported on both shell middens and artificially constructed pre-Columbian mounds found in flooding landscapes of the Amazon basin and beyond.

The topsoil of ADEs (the A horizon) is generally darker (grey, brown, or ink black in color) and deeper (not infrequently reaching down to 60 cm) than the thin A horizons of regional soils. Studies distinguish between *terras pretas* (black earths), i.e., pottery-rich dark soils with a deep A horizon, and *terras mulatas* (brown earths), larger surrounding or adjacent expanses of darkened soils whose surface horizon lacks archaeological artifacts but whose nutrient status is intermediate between *terras pretas* and the broader soilscape (Sombroek 1966). Many scholars consider this contrast to reflect a distinction between sedentary pre-Columbian settlements and associated outfields. The vast majority of studies of ADEs concentrate on settlement-related *terras pretas*. These studies demonstrate that compared to the underlying B horizon or comparable adjacent soils, the A horizon of ADEs shows a higher cation exchange capacity, a more basic pH, and higher concentrations of, among others, organic carbon, calcium, phosphorus, manganese, potassium,

barium, copper, manganese, strontium, and zinc. Estimates of black carbon contents using molecular markers, such as benzenepolycarboxylic acids, suggest that the A horizon of settlement-related ADEs occludes up to 70 times more pyrogenic carbon (charred plant matter, i.e., charcoal) than adjacent Oxisols. This observation has been marshalled to suggest that high black carbon concentrations are key to the high organic matter retention of these soils (see Glaser and Birk 2011 for a recent review).

Historical Background

Amazonian Dark Earths were first described in nineteenth-century Brazil as "Terra Preta de Índio" (Indian's Black Earth) or simply as "terras pretas", the reference to "Indians" being a reflection of the fact that abundant pottery shards of evident pre-Columbian age could be seen on the surface. An anthropic origin for ADEs was advocated in these first descriptions: pioneering geologists like Smith and Hartt unhesitatingly related cultivated ADE patches to villages of former indigenous peoples (Myers et al. 2003). The results of the first soil chemistry analyses conducted on ADEs allowed Katzer (1903) to argue that their high fertility was the result of unusual concentrations of charcoal and decomposed organics in the fine earth fraction, properties which he argued had also made them attractive to farmers in the past. As early as the 1920s, ethnologist and archaeologist Nimuendajú (see Neves 2004) noted that their geographical distribution and associated archaeological remains (including artifacts, earthworks, and roads) suggested they had originated in densely populated, sedentary pre-Columbian settlements.

For the first part of the twentieth century, however, these opinions remained isolated. Nimuendajú's archaeological research went unpublished and, more significantly, was beyond the intellectual web of earth scientists until the mid-1960s. The size of farmed expanses in the Brazilian Amazon, the fact that many local farmers did not recognize their human-made origin, a lack of clear-cut evidence for their contemporary formation, and the scant attention accorded to them by important Amazonian archaeologists (see below) led some researchers to advocate a variety of "geogenic" models for their origins. In broad outline these models argued that ADEs are patches of fertile soils that formed from localized, non-anthropogenic accumulations of organic and/or mineral materials of fossil, volcanic, or peaty origin. However, Klinge (1962) argued that high total and soluble phosphoric acid concentrations of ADEs evidenced an anthropogenic origin. In parallel, Hilbert (1968) whose archaeological research documented the co-occurrence of dark earths and ceramic archaeological remains along the main rivers of the western half of the Brazilian Amazon, observed that ADEs formed on different types of Oxisols (Red and Yellow Latosols in the Brazilian soil classification). Like Nimuendajú, he suggested that ADEs resulted from long-lived settlement.

It was undoubtedly soil scientist Wim Sombroek's (1966) interpretation of the physicochemical characteristics measured in settlement-related ADEs located on the Belterra plateau (near Santarém, Brazil) that convincingly refuted geogenic models for their origin. Sombroek pointed out that the overall topography and drainage of the plateau were incompatible with suggestions that organic material had accumulated in small water bodies. He next noted that instead of the random spatial distribution to be expected from a natural phenomenon, the landscape position of ADE expanses suggested deliberate selection of areas suitable for the invigilation of navigable waterways. He then reported particle size and x-ray diffraction data that evidenced the same overall texture and kaolinitic parent material in *terras pretas* and neighboring soils, effectively overruling a source in volcanic debris. Finally, he enunciated the distinction between *terras pretas* and *terras mulatas*, i.e., between settlement-related anthrosols and settlement-peripheral anthrosols, and presented distributional evidence that expanses of the former were often associated with much larger surrounding or adjacent areas of the latter. It is fair to say that Sombroek settled the matter of anthropogenic *vis-à-vis* geogenic origins in the 1960s.

Although Sombroek's work inaugurated the modern era of studies of ADEs, discussions of Amazonian pre-Columbian history did not initially take stock of their presence or ultimate significance. This lack of attention was not trivial in the face of contrasting understandings of pre-Columbian societies advanced by leading scholars of the day: Betty Meggers (1971) militantly disregarded suggestions that Amazonian upland soils could be made fertile and thus envisioned a low ceiling for sedentism and demographic growth based on the retroduction of ethnographically observed slash-and-burn agriculture. Donald Lathrap (1970) placed his weight behind the suggestion that the crop base of large pre-Columbian populations would have relied on intensive cultivation of rich alluvial sediments. While some argued that the agricultural aptitude of upland soils was not *per se* low nor necessarily unchanging (Carneiro 1983), this lack of attention to Sombroek's findings all but blinded archaeologists to the possibility of creative manipulation of environmental affordances in the past until the 1980s (Herrera et al. 1980–1; Eden et al. 1984; Andrade 1986; Mora 1991), when pioneering pedo-archaeological investigations in the Colombian Amazon highlighted the part that ADEs could have played in permitting denser populations in pre-Columbian times. On the other hand, Sombroek's research was a crucial intellectual referent for the first systematic survey of ADEs in the Brazilian Amazon, led by geographer Nigel Smith (1980). Significantly, Smith presciently surmised that the dark color of these soils was a result of the deposition of comminuted charcoal and argued they were the correlates of the large settlements that had been sighted by European explorers in the sixteenth century. Recognition of their ubiquity, in turn, permitted links with studies of Amazonian resource management – specifically practices resulting in deliberate environmental alteration (Posey 1984) and/or the presence of biotic legacies in the landscape (Balée 1989). These inferences eventually prompted a reassessment of geographers' arguments about pre-Columbian settlement patterns and population density (Denevan 1992, 1996). It is accurate to say that since the late 1980s and 1990s, ADEs have become an increasingly more important component of archaeological arguments about pre-Columbian Amazonia (Heckenberger et al. 1999; Petersen et al. 2001; Arroyo-Kalin 2010a).

Key Issues

The Makeup of ADEs

Many of the concentrations of edible or useful fruit trees marshalled by Balée (1989) as evidence of anthropogenic disturbance grow on expanses of ADEs (see also Junqueira et al. 2011). Some researchers have considered ADEs as remains of pre-Columbian house gardens produced by the deliberate composting of settlement residues (Andrade 1986; Myers 2004), others perceive them as an outcome of the accumulation, perhaps also management, of waste associated with settlements (see review in Erickson 2003; WinklerPrins 2009; Schmidt 2013, in press), yet others postulate that alluvial inputs make these soils more productive (Herrera et al. 1992; Woods 1995), and still others emphasize the role that pottery production may play in understanding their makeup (Lima et al. 2002; Schaefer et al. 2004; Sergio et al. 2006). It is evident that these opinions do not necessarily exclude each other, especially because a single, Amazon basin-wide account of these soils' formation processes is unlikely to exist. This explains in part the appeal of the "kitchen midden" model (Sombroek et al. 2002), which suggests that a combination between the decomposition of excrements, household garbage, bone, and organic constructions, and the concentration, of ash and charcoal derived from ground-level fires are the most important inputs leading to the formation of settlement-related ADEs. A rise in soil pH associated with organic waste is argued to permit the formation of resistant organo-mineral complexes and thus augment the retention of a more stable pool of organic matter (Sombroek 1966); larger quantities of pyrogenic carbon are considered to provide more ubiquitous sorption sites for metals; a combination of illuviation and faunal mixing of comminuted and/or decomposed constituents is considered

responsible for homogenizing these inputs and for the strong melanization that characterizes these soils (Vacher et al. 1998; Kern et al. 2004; Topoliantz and Ponge 2005); both organic and inorganic inclusions are thought to become metabolized by soil microbes and stabilized through humification (Glaser and Birk 2011).

Micromorphological studies have been crucial to ascertain some of these processes as well as the ubiquitous presence of microscopic charcoal, bone, and pottery fragments in ADEs. Soil micromorphological methods were initially deployed by soil scientists (Lima et al. 2002; Schaefer et al. 2004) to compare *terras pretas* and nearby Oxisols. This study permitted linking the aforementioned anthropogenic inclusions and enhanced elemental concentrations. A geoarchaeological study using soil micromorphology (Arroyo-Kalin 2008b, 2010a, 2012; Arroyo-Kalin et al. 2008) expanded these results significantly. By comparing ADEs from within archaeological sites and contrasting observations between clayey- and sandy-textured ADEs from different archaeological sites, it showed that high levels of nutrient enhancement covary with the presence of microscopic inclusions (especially charcoal and bone), highlighted that high densities of microscopic pottery fragments and baked clay are reflected in high magnetic susceptibility values for these sediments, and presented empirical evidence to distinguish between settlement-related *terras pretas* and settlement-peripheral *terras mulatas*. *Terras mulatas* were found to contain a significant volume of microscopic charcoal (lower than *terras pretas*) but, despite high nutrient status, only negligible fragments of microscopic bone, pottery, or burnt clay. Magnetic enhancement of *terras mulatas* has been interpreted as evidence that soil microscopic charcoal did not originate *ex situ* but from repeated near-surface burning associated with past management. Coupled with micromorphological observations suggesting scraping, raking, and/or churning of the soil, this research provides important support for Denevan's (2004) suggestion that *terras mulatas* are the result of spatially concentrated, fire-intensive cultivation practices in pre-Columbian times. It also emphasizes that settlement-related ADEs bear the material signatures of midden material, house floors, and other activity areas.

From a geoarchaeological perspective, important questions arise about the buildup of settlement-related ADEs, which are anthropogenic cumulic soils that in many cases lack a clear source of sediments nearby. Micromorphological analysis accords a role to bulking-up of the sand- and silt-sized fractions by large quantities of microscopic inclusions of anthropic origin, to mixing by soil fauna, and, indirectly, to ash deposition (Arroyo-Kalin et al. 2008). These observations shed light on two conceptual models for ADE horizonation: Vacher et al. (1998) suggest that vegetation clearance associated with the implantation of settlements would lead to destruction of organic litter, after which inhabitation-related production of organic and mineral inputs and the modification of mineral surfaces through trampling, soil removal, and other activities would lead to the formation of a modal O-A-B soil profile with clearly established eluvial and illuvial subhorizons. The upper subhorizon would be directly affected by settlement activities and the lower one would accumulate inputs from the settlement surface. Visible differences between these subhorizons would be obliterated as the lower subhorizon becomes saturated with pigmenting soil constituents, effectively resulting in melanization. At site abandonment, a new mineral surface (A horizon) would be developed through upwards translocation of sediments by soil fauna, obliterating settlement-related sedimentary structures (e.g., compaction) and interring artifacts in the organically enriched sediment matrix. Woods (1995), in contrast, highlights that the accumulation of organic and mineral material would tend to bury the original surface, resulting in rising of habitation surfaces as subsequent occupations takes place. Given a modal O-A-E-B soil profile, he argues that organic inputs would result in an enhancement of the activity of soil fauna as well as strong melanization of the new A horizon, transforming the sediments of the original A-E-B sequence into a transitional AB horizon. Further sedimentation associated with continued habitation would tend to result in

repetition of the same process, i.e., buildup at the surface and down mixing as a result of increased activity of soil fauna. While Woods' model is particularly useful to explain the thick A horizons most commonly noticed by soils scientists, there are elements in both models that resonate with empirical observations: ADEs should not be understood exclusively as thick A horizons that have expanded downwards but as an outcome of the accumulation of settlement debris, the effects faunally induced burrowing, mixing, and/or churning of soil material; of the upwards or "conveyor" translocation of sediments from lower in the deposit; and of a higher overall deposition of organic matter (Arroyo-Kalin 2008b).

The Making-Off of ADEs

In his classic review of Amazonian pre-Columbian community patterns, Myers (1973) argued that the larger and more complex settlement layouts that could be derived from ethnographic and ethnohistorical sources – single-family house communities, multi-family rounded or circular houses, plaza-centered groups of houses (including cases of multiple malocas around a plaza), and linear groups of houses strung alongside rivers and lakes – were all characterized by scrupulous maintenance of the patios, plazas, or circular plazas within, behind, or around which dwellings were located. These maintenance practices resulted in debris accumulating as secondary refuse in either linear middens behind rectilinear rows of houses or in ring-shaped middens around other types of settlements (from single and multi-family house-based settlements to plaza-centered groups of houses). Erickson's (2003) recent survey of the ADE formation literature reexamines Myers's (1973) classic survey and suggests that ADE expanses could result from a combination between specifically shaped refuse accumulations, remobilization of enriched soils once they have formed, and overlapping occupations characterized by different settlement layouts. These suggestions are borne out by the compounded results of different ethnographic studies in Amazonia: Deboer and Lathrap's (1979) ethnoarchaeological study of San Francisco de Yarinacocha, in the Peruvian Amazon, shows that secondary refuse resulting from constant sweeping and raking of household and plazas/patios should, under ideal conditions, accumulate in settlement-peripheral middens and (to judge from the settlement plan they present) specific activity areas such as food preparation and pottery firing areas (see also Siegel and Roe 1986). Zeidler (1983) describes a 3-year-old Achuar dwelling as a thatch-roofed oval area of some 160 m^2 enclosed by walls formed by upstanding peach palm logs. He observes that the position of debris within the house reflects, first, gender-ordained, communal, and personal activity areas and, second, maintenance of clean spaces through sweeping. However, he also notes that the periodicity of sweeping opens up opportunities for artifacts to become interred as a result of trampling, a process that is assisted by sedimentation of ash, charcoal, and burnt soil produced by and accumulated adjacent to combustion features. In the upper Xingú region, research along the southern periphery of the Amazon basin has highlighted circular plaza-centered villages surrounded by rings of dwellings as contexts for the formation of ADEs (Heckenberger 2005; Schmidt 2013, in press). Chemical and physical analyses of a ringlike string of elevated rubbish middens behind house structures as well as house sediments and plaza sediments show the lowest values of pH, organic matter, phosphorus, calcium, potassium, manganese, magnesium, and sodium in the latter areas, intermediate values within abandoned houses, and high values within middens. Middens form distinctive patterns on the landscape consisting of linear mounds along backyard edges and trails. These are used for the cultivation of home garden crops but can also be levelled to place houses on them. Comparable data are presented by Hecht (2003) at the Kayapó settlement of Gorotire, which identifies different types of middens beyond plazas and houses and records comparatively higher concentrations of key elements as a result of planned waste management. Silva's (2003) study of an Asuriní village similarly shows how regular maintenance of public spaces produces large middens behind houses, some being deliberate pilings of large

amounts of debris and others more incidental accumulations. In northwest Amazonia, early-twentieth-century ethnographic descriptions show thatch-roofed longhouses enclosing spaces internally divided into communal areas used for meals and transit, compartments for nuclear families, and areas in which manioc processing takes place. Fireplaces of different kinds and purposes were frequently used in different parts of the longhouse, resulting in the production of charcoal and ash. Many accounts suggest that the interiors were swept regularly, sometimes accompanied by wetting of the otherwise dry floors (Koch-Grünberg 1995 (1909)). More recent observations (Arroyo-Kalin, field notes) suggest that floors of thatch-roofed structures are characterized by buildup of sediment in which significant amounts of organic debris, ash, and charcoal accumulate. Roofed precincts restrict the transportation of airborne sediments permitting, among other things, the accumulation of soot particles on the underside of roof thatching (in new houses, this is encouraged to increase water-proofing). A number of different researchers (Neves et al. 2003, 2004; WinklerPrins 2009) point to various forms of localized "dooryard" burning of organic debris that could result in localized, within-settlement concentrations of charcoal and other debris. Other activity areas of potential interest for the formation of ADEs are smoldering fires under racks used for smoking fish and, perhaps most intriguingly, areas in which pottery tempered with *caraipé* (obtained by ashing the bark of *Licania octandra*) was produced. The *caraipé* link deserves more focused research given that it could permit linking ADE formation to particular ceramic techno-sylistic traditions. All in all, it is clear that a variety of contexts for the formation of ADE must be considered.

ADEs in Space and Time

An up-to-date map of the spatial distribution of reported expanses of ADEs is being developed as a Google Earth map (WinklerPrins and Aldrich 2010). The overall distribution suggests ADEs are ubiquitous in the Amazon basin but, on the whole, less frequent or underreported as one approaches the westernmost lowlands of the Amazon basin. In terms of occupations, the oldest reported ADEs are associated with c. 3rd millennium BCE preceramic occupations of the Massangana phase, Jamari river, in the upper Madeira basin, Brazil (Miller 1992). However, the vast majority of occupations include ceramic remains and charcoal that date from around or after 0 CE and, in many instances, from around 500 CE. Most of these occupations peak around or after 1,000 CE (Arroyo-Kalin 2008a; Moraes and Neves 2012). Some controversy has existed about the extent to which *terra preta* sites reflect continued inhabitation as opposed to overlapping short-lived occupations (Meggers 2001; DeBoer et al. 2001; Heckenberger et al. 2001; Neves et al. 2003, 2004; Neves and Petersen 2006). A comparison between the 14C dates of soil-embedded microscopic charcoal and macroscopic charcoal associated with archaeological remains shows that the pyrogenic carbon pool of *terras pretas* is coherent with the most intense human occupations inferred from archaeological evidence (Arroyo-Kalin 2012). At the Manduquinha site, a relatively small ADE expanse occupied over a period of approximately 300 years prior to European contact, horizontal variability in elemental concentrations of the A horizon is interpreted as evidence for areas of transit, middens, dwellings, and shells heaps, effectively suggesting a relatively stable settlement layout persisted during occupation (Kern et al. 2004). Studies of multicomponent sites (e.g., Heckenberger et al. 1999, Neves 2003, Mora 2003, and Moraes 2006) support Woods' contention that ADEs are accreting deposits in which numerous occupations are recorded. Thick A horizons in ADE are generally associated to anthropogenic enrichment of multiple surfaces and subsequent mixing by soil fauna, sometimes appearing as subhorizons to other earth scientists (Arroyo-Kalin 2008b). Evidently this suggests that many of the best-known ADE exemplars are large sites with protracted and intensive occupation histories. However, less-evident, perhaps incipient anthropogenic horizons are found associated with occupations that reach back to the early to mid-Holocene (Arroyo-Kalin 2010a).

Future Directions

While much recent literature has emphasized the unique Amazonian character of these soils (Lehmann et al. 2003; Glaser and Woods 2004), archaeological investigations show that similar anthropogenic modifications are found beyond the Amazon basin, for instance, in the north of Colombia, in the Orinoco basin, in the Guianas, and in subtropical areas south of the Amazon basin proper. This has led some to propose the need to reconsider the distribution of anthropogenic dark soils of pre-Columbian origin within the broader geographical context of the Neotropics (Graham 2006). Even casual perusal of studies from further afield highlights that anthropogenic soils and sediments have been linked to a very broad variety of situations, i.e., underscores the need to examine ADE formation processes with attention to historical regional specificities. Notwithstanding, the significant appeal of their study in the Amazon basin ultimately resides in a heritage of archaeological interpretations that regards the Amazon basin as hostile to population growth and sedentism. ADEs lay to rest this suggestion and effectively tackle down the received truth that soil fertility was an insurmountable limit for pre-Columbian populations.

Amazonian Dark Earths are prized to this day by farmers because they achieve higher yields of staple lowlands cultivars such as manioc, permit the growth of acid-intolerant crops such as maize, and concentrate a high diversity of edible/useful fruit trees. The overall spatial distribution of ADEs might suggest co-occurrence between these soils and regions where bitter manioc is cultivated (Arroyo-Kalin 2010a; Fraser et al. 2011). However, more intensive archaeological survey is required to ascertain broad patterns of regional distribution as well as to determine any significant temporal gradients in their formation. Detailed consideration of their variability and associated plant and animal fossil assemblages is called for to answer a number of archaeological research questions: given the ubiquity of microscopic bone fragments and the fact that bone apatite is a source of P and Ca, can fertile ADEs be linked to the ability of past populations to tap into abundant faunal resources? If this is the case, then new and interesting questions arise regarding the feedback mechanism between fishing, the main source of protein in Amazonia, and the development of fertile agricultural soils (Arroyo-Kalin 2010b). A further question can be asked: to what extent have we grasped the full variability of the ADE phenomenon? Here it is crucial to take into consideration the little that we know about the variability of intra-settlement and, especially, settlement-peripheral soils (*terras mulatas*), which can be expected to vary according to broad precipitation patterns (Arroyo-Kalin 2012). One might also ask: were some of the well-developed expanses that we see today recycled for crop cultivation in the pre-Columbian past? Did they play a role in permitting the cultivation of certain crops? Were they dump heaps for the domestication of autochthonous Amazonian lowland crops? What does the spatial patterning of known occurrences indicate in terms of pre-Columbian population density and livelihoods (Arroyo-Kalin 2010b; cf. McMichael et al. 2012)? To what extent did increased soil fertility in ADEs lead to specific locales becoming more contested by pre-Columbian populations (Arroyo-Kalin 2008a)? Such questions can only be answered through interdisciplinary research that includes archaeological perspectives: it is otherwise impossible to establish basic spatiotemporal parameters that permit examining ADEs as historical outcomes of multiple processes. In conclusion, it can be stated that ADEs provide a paradigmatic example of a trans-generational and cumulative transformation of the landscape – one with incidental *and* deliberate components – in an environment long regarded as impenetrable. Consequently, the study of ADEs ultimately angles on the increasingly more significant role that human niche construction (Laland et al. 2000) – as a long-term process associated with cultivation, husbandry, and sedentism – is set to play in archaeological thinking in coming decades.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeological Soil Micromorphology
- ▶ Chemical Survey of Archaeological Sites
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Urban Dark Earth

References

Andrade, Á. 1986. Investigación arqueológica de los antrosolos de Araracuara (Amazonas). *Arqueología Colombiana* 31: 1–101.

Arroyo-Kalin, M. 2008a. Steps towards an ecology of landscape: A geoarchaeological approach to the study of anthropogenic dark earths in the Central Amazon region. Unpublished Ph.D. dissertation, University of Cambridge.

Arroyo-Kalin, M. 2008b. Steps towards an ecology of landscape: The pedo-stratigraphy of anthropogenic dark earths. In *Amazonian dark earths: Wim Sombroek's vision*, ed. W. Woods, W. Teixeira, J. Lehmann, C. Steiner, A. Winklerprins, and L. Rebellato, 33–83. Dordrecht: Kluwer.

Arroyo-Kalin, M. 2010a. The Amazonian Formative: Crop domestication and anthropogenic soils. *Diversity* 2: 473–504.

Arroyo-Kalin, M. 2010b. A domesticação na paissagem: Os solos antropogênicos e o Formativo na Amazônia. In *Primeiro Encontro Internacional de Arqueologia Amazônica*, ed. E. Pereira and V. Guapindaia. Museu Goeldi: Belém.

Arroyo-Kalin, M. 2012. Slash-burn-and-churn: Landscape history and crop cultivation in pre-Columbian Amazonia. *Quaternary International* 249: 4–18.

Arroyo-Kalin, M., E.G. Neves, and W.I. Woods. 2008. Anthropogenic dark earths of the Central Amazon region: Remarks on their evolution and polygenetic composition. In *Amazonian dark earths: Wim Sombroek's vision*, ed. W. Woods, W. Teixeira, J. Lehmann, C. Steiner, A. Winklerprins, and L. Rebellato, 99–125. Dordrecht: Kluwer.

Balée, W. 1989. The culture of Amazonian forests. In *Resource management in Amazonia: Indigenous and folk strategies*, ed. D. Posey and W. Balée, 1–21. Bronx: New York Botanical Garden.

Carneiro, R.L. 1983. The cultivation of manioc among the Kuikuru of the upper Xingú. In *Adaptive responses of Native Amazonians*, ed. R.B. Hames and W.T. Vickers, 65–112. New York: Academic.

Deboer, W.R., and D.W. Lathrap. 1979. The making and breaking of Shipibo Conibo ceramics. In *Ethnoarchaeology: Implications of ethnography for archaeology*, ed. C. Kramer, 102–138. New York: Columbia University Press.

Deboer, W.R., K. Kintigh, and A.G. Rostoker. 2001. In quest of prehistoric Amazonia. *Latin American Antiquity* 12: 326–327.

Denevan, W.M. 1992. The aboriginal population of Amazonia. In *The Native population of the Americas in 1492*, ed. W.M. Denevan, 2nd ed., 205–234. Madison: University of Wisconsin Press.

Denevan, W.M. 1996. A bluff model of riverine settlement in prehistoric Amazonia. *Annals of the Association of American Geographers* 86: 654–681.

Denevan, W.M. 2004. Semi-intensive pre-European cultivation and the origins of anthropogenic dark earths in Amazonia. In *Amazonian dark earths: Explorations in space and time*, ed. B. Glaser and W.I. Woods, 135–143. Berlin/London: Springer.

Eden, M.J., W. Bray, L. Herrera, and C. McEwan. 1984. *Terra preta* soils and their archaeological context in the Caquetá basin of southeast Colombia. *American Antiquity* 49: 125–140.

Erickson, C.L. 2003. Historical ecology and future explorations. In *Amazonian dark earths: Origins, properties and management*, ed. J. Lehmann, D. Kern, B. Glaser, and W. Woods, 455–500. Dordrecht: Kluwer Press.

Fraser, J.A., A.B.. Junqueira, N.C. Kawa, C.P. Moraes, and C.R. Clement. 2011. Crop diversity on anthropogenic soils in Central Amazonia. *Human Ecology* 39: 395–406.

Glaser, B., and J.J. Birk. 2011. State of the scientific knowledge on properties and genesis of anthropogenic dark earths in Central Amazonia. *Geochimica et Cosmochimica Acta* 82: 39–51.

Glaser, B., and W.I. Woods, eds. 2004. *Amazonian dark earths: Explorations in space and time*. Berlin/London: Springer.

Graham, E. 2006. A neotropical framework for *terra preta*. In *Time and complexity in historical ecology: Studies in the neotropical lowlands*, ed. W. Balée and C.L. Erickson, 57–86. New York: Columbia University Press.

Hecht, S.B. 2003. Indigenous soil management and the creation of Amazonian dark earths: Implications of Kayapó practices. In *Amazonian dark earths: Origin, properties, management*, ed. J. Lehmann, D.C. Kern, B. Glaser, and W. Woods, 355–372. Dordrecht: Kluwer Academic Publishers.

Heckenberger, M.J. 2005. *The ecology of power: Culture, place and personhood in the southern Amazon AD 1000–2000*. London: Routledge.

Heckenberger, M.J., J.B. Petersen, and E.G. Neves. 1999. Village size and permanence in Amazonia: Two archaeological examples from Brazil. *Latin American Antiquity* 10: 353–376.

Heckenberger, M.J., J.B. Petersen, and E.G. Neves. 2001. Of lost civilizations and primitive tribes, Amazonia: Reply to Meggers. *Latin American Antiquity* 12: 328–333.

Herrera, L., W. Bray & C. McEwan 1980–1. Datos sobre la arqueología de Araracuara (comisaría del Amazonas, Colombia). *Revista Colombiana de Antropología* 23: 183–251.

Herrera, L.F., I. Cavelier, C. Rodríguez, and S. Mora. 1992. The technical transformation of an agricultural system in the Colombian Amazon. *World Archaeology* 24: 98–113.

Hilbert, P.P. 1968. *Archäologische Untersuchungen am mittleren Amazonas: Beiträge zur Vorgeschichte des südamerikanischen Tieflandes*. Berlin: Reimer.

Junqueira, A., G. Shepard, and C. Clement. 2011. Secondary forests on anthropogenic soils of the Middle Madeira River: Valuation, local knowledge, and landscape domestication in Brazilian Amazonia. *Economic Botany* 65: 85–99.

Katzer, F. 1903. *Grundzüge der Geologie des unteren Amazonasgebietes (des Staates Para in Brasilien)*. Leipzig: Von Max Weg.

Kern, D.C., M.L.D. Costa, and F.J.L. Frazão. 2004. Evolution of the scientific knowledge regarding archaeological black earths of Amazonia. In *Amazonian dark earths: Explorations in space and time*, ed. B. Glaser and W.I. Woods, 19–28. Berlin/London: Springer.

Klinge, H. 1962. Beiträge zur Kenntnis tropischer Böden V. über Gesamtkohlenstoff und Stickstoff in Böden des brasilianischen Amazonasgebietes. *Zeitschrift für Pflanzenernährung Düngung und Bodenkunde* 97: 106–118.

Koch-Grünberg, T. 1995 (1909). *Dos Años entre los Indios*. Bogotá: Editorial Universitaria Nacional.

Laland, K.N., J. Odling-Smee, and M.W. Feldman. 2000. Niche construction, biological evolution and cultural change. *Behavioral and Brain Sciences* 23: 131–146.

Lathrap, D.W. 1970. Review of Peter Paul Hilbert's "Archäologische Untersuchungen am mittleren Amazonas: Beiträge zur Vorgeschichte des südamerikanischen Tieflandes". *American Antiquity* 35: 499–501.

Lehmann, J., D. Kern, B. Glaser, and W. Woods. 2003. *Amazonian dark earths. Origins, properties and management*. Dordrecht: Kluwer Press.

Lima, H.N., C.E.R. Schaefer, J.W.V. Mello, R.J. Gilkes, and J.C. Ker. C. 2002. Pedogenesis and pre-Colombian land use of "terra preta anthrosols" ("Indian black earth") of western Amazonia. *Geoderma* 110: 1–17.

McMichael, C.H., D.R. Piperno, M.B. Bush, M.R. Silman, A.R. Zimmerman, M.F. Raczka, and L.C. Lobat. 2012. Sparse pre-Columbian human habitation in western Amazonia. *Science* 336: 1429–1431.

Meggers, B.J. 1971. *Amazonia: Man and culture in a counterfeit paradise*. Washington: Smithsonian Institution Press.

Meggers, B.J. 2001. The continuing quest for El Dorado: Part two. *Latin American Antiquity* 12: 304–325.

Miller, E.T. 1992. *Archaeology in the hydrolectric projects of Eletronorte*. Brasília: Eletronorte.

Mora, S. 1991. *Cultivars, anthropic soils, and stability: A preliminary report of archaeological research in Araracuara, Colombian Amazonia*. Pittsburgh: University of Pittsburgh.

Mora, S. 2003. *Early inhabitants of the Amazonian tropical rain forest: A study of humans and environmental dynamics*. Pittsburg: University of Pittsburg.

Moraes, C.D.P. 2006. *Arqueologia na Amazônia Central Vista de uma Perspectiva da Região do Lago do Limão*. Masters Masters: Universidade de São Paulo.

Moraes, C.D.P., and E.G. Neves. 2012. O ano 1000: Adensamento populacional, interação e conflito na Amazônia Central. *Amazônica* 4: 122–148.

Myers, T.P. 1973. Towards the reconstruction of prehistoric community patterns in the Amazon basin. In *Variation in anthropology: Essays in honor of John C. McGregor*, ed. D.W. Lathrap and J. Douglas, 235–252. Urbana: Illinois Archaeological Survey.

Myers, T.P. 2004. Dark earth in the upper Amazon. In *Amazonian dark earths: Explorations in space and time*, ed. B. Glaser and W.I. Woods, 67–94. Berlin/London: Springer.

Myers, T.P., W.M. Denevan, A. Winklerprins, and A. Porro. 2003. Historical perspectives on Amazonian dark earths. In *Amazonian dark earths: Origins, properties and management*, ed. L. Lehmann, D. Kern, B. Glaser, and W. Woods. Dordrecht: Kluwer Press.

Neves, E.G. 2003. *Levantamento Arqueológico da Área de Confluência dos rios Negro e Solimões, Estado do Amazonas: Continuidade das Escavações, Análise da Composição Química e Montagem de um Sistema de Informações Geográficas*. São Paulo: FAPESP.

Neves, E.G. 2004. The relevance of Curt Nimuendajú's archaeological work. In *In pursuit of a past Amazon. Archaeological researches in the Brazilian Guyana and in the Amazon region*, ed. P. Stenborg, vol. 45, 2–8. Gothenburg: Världskulturmuseet i Göteborg.

Neves, E.G., and J.B. Petersen. 2006. The political economy of pre-Columbian Amerindians: Landscape transformations in central Amazonia. In *Time and complexity in historical ecology: Studies in the neotropical lowlands*, ed. W. Balée and C.L. Erickson, 279–310. New York: Columbia University Press.

Neves, E.G., J.B. Petersen, R. Bartone, and C.A. Da Silva. 2003. Historical and socio-cultural origins of Amazonian dark earths. In *Amazonian dark earths: Origin, properties, management*, ed. J. Lehmann, D.C. Kern, B. Glaser, and W. Woods, 29–50. Dordrecht: Kluwer Academic Publishers.

A

Neves, E.G., J.B. Petersen, R.N. Bartone, and M.J. Heckenberger. 2004. The timing of *terra preta* formation in the central Amazon: Archaeological data from three sites. In *Amazonian dark earths: Explorations in space and time*, ed. B. Glaser and W.I. Woods, 125–134. Berlin/London: Springer.

Petersen, J.B., E.G. Neves, and M.J. Heckenberger. 2001. Gift from the past: Terra preta and prehistoric occupation in Amazonia. In *Unknown Amazon. Culture in nature in ancient Brazil*, ed. C. McEwan, C. Barreto, and E.G. Neves, 86–107. London: The British Museum Press.

Posey, D. 1984. Keepers of the *campo*. *Garden* 8 (8–12): 32.

Schaefer, C., H.N. Lima, R.J. Gilkes, and J.W.V. Mello. 2004. Micromorphology and electron microprobe analysis of phosphorus and potassium forms of an Indian black earth (IBE) anthrosol from western Amazonia. *Australian Journal of Soil Research* 42: 401–409.

Schmidt, M.J. 2013, in press. Amazonian dark earths: Pathways to sustainable development in tropical rainforests? *Boletim do Museu Paraense Emílio Goeldi*

Sergio, C.S., G.P. Santana, G.M. Da Costa, and A.M.C. Horbe. 2006. Identification and characterization of maghemite in ceramic artifacts and archaeological black earth of Amazon region. *Soil Science* 171: 59–64.

Siegel, P.E., and P.G. Roe. 1986. Shipibo archaeoethnography: Site formation processes and archaeological interpretation. *World Archaeology* 18: 96–115.

Silva, F.A. 2003. Cultural behaviors of indigenous populations and the formation of the archaeological record in Amazonian dark earths: The Asurini do Xingú case study. In *Amazonian dark earths: Origin, properties, management*, ed. J. Lehmann, D.C. Kern, B. Glaser, and W.I. Woods, 373–385. Dordrecht: Kluwer Press.

Smith, N.K.H. 1980. Anthrosols and human carrying capacity in Amazonia. *Annals of the Association of American Geographers* 70: 553–566.

Sombroek, W.G. 1966. *Amazon soils: A reconnaissance of the soils of the Brazilian Amazon region*. Wageningen: Centre for Agricultural Publications and Documentation.

Sombroek, W.G., D. Kern, T. Rodriguez, M.D.S. Cravo, T.J. Cunha, W. Woods, and B. Glaser. 2002. Terra preta and terra mulata: Pre-Columbian Amazon kitchen middens and agricultural fields, their sustainability and their replication. In *Paper presented at the 17th world congress of soil science*. Bangkok: Thailand.

Topoliantz, S., and J.F. Ponge. 2005. Charcoal consumption and casting activity by Pontoscolex corethrurus (Glossoscolecidae). *Applied Soil Ecology* 28: 217–224.

Vacher, S., S. Jérémie, and J. Briand. 1998. *Amérindiens du Sinnamary (Guyane): Archéologie en forêt équatoriale*. Paris: Éditions de la Maison des Sciences de l'Homme.

Winklerprins, A.M.G.A. 2009. Sweep and char and the creation of Amazonian dark earths in homegardens. In *Amazonian dark earths: Wim Sombroek's vision*, ed. W. Woods, W. Teixeira, J. Lehmann, C. Steiner, A. Winklerprins, and L. Rebellato, 205–211. New York: Springer.

Winklerprins, A.M.G.A., and S.P. Aldrich. 2010. Locating Amazon dark earths: Creating an interactive GIS of known locations. *Journal of Latin American Geography* 9: 33–50.

Woods, W.I. 1995. Comments on the black earths of Amazonia. *Papers and Proceedings of the Applied Geography Conferences* 18: 159–165.

Zeidler, J.A. 1983. La etnoarqueología de una vivienda Achuar y sus implicaciones arqueológicas. *Miscelánea Antropológica Ecuatoriana* 3: 155–193.

What do Amazonian Shellmounds Tell Us About the Long-Term Indigenous History of South America?

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> Entre les temps différents de l'histoire, la longue durée se présente ainsi comme un personnage encombrant, compliqué, souvent inédit. L'admettre au coeur de notre métier ne sera pas un simple jeu, l'habituel élargissement d'études et de curiosités. Il ne s'agira pas, non plus, d'un choix dont il serait le seul bénéficiaire. Pour l'historien, l'accepter c'est se prêter à un changement de style, d'attitude, à un renversement de pensée, à une nouvelle conception du social.
> Braudel (1958)

Introduction

Shellmounds (also known in Brazilian archaeology as sambaquis), understood as archaeological sites whose stratigraphic matrices are composed predominantly by shells, are found in fluvial and coastal contexts throughout the planet. They can

be understood as meaningful places (Zedeño and Bowser 2009) where human occupation has persisted for millennia (Schlanger 1992). The convergence of factors which led to the emergence and countless waves of reoccupation of these sites has been studied since the origins of archaeology (Steinen 1886, 1894). In the Amazon basin, the earliest shellmounds date at least to the eighth millennium BP and occur in three contexts: in the Lower Amazon (LA), along the Estuary and Coastal Areas (ECA), and in Southwest Amazonia (SWA), along the tributaries of the upper Madeira River (Fig. 1). In common, these sites share some of the earliest ceramics produced in the New World. Outside of the Amazon, there is also a correlation between early ceramic production and shellmound construction in places such as northern Colombia (Reichel-Domaltoff 1985) and Southeastern United States (Sassaman 1993, 2004a, b). The reason why such a pattern developed is one of the most interesting questions of New World archaeology.

The Long History of Shellmounds in the Amazon

The distance between the areas with known occurrences of shellmounds in the Amazon is considerable, and one could surmise that they represent distinct processes of occupation. However, their common traits in terms of chronology, settlement patterns, and technological histories of their ceramics are becoming increasingly more evident with the development of archaeological research in these sites.

Early evidence of ceramics in Amazonian shellmounds is reported in the literature (Evans and Meggers 1960; Simões 1981; Williams 1981, 1997; Meggers 1987, 1997; Roosevelt et al. 1991;

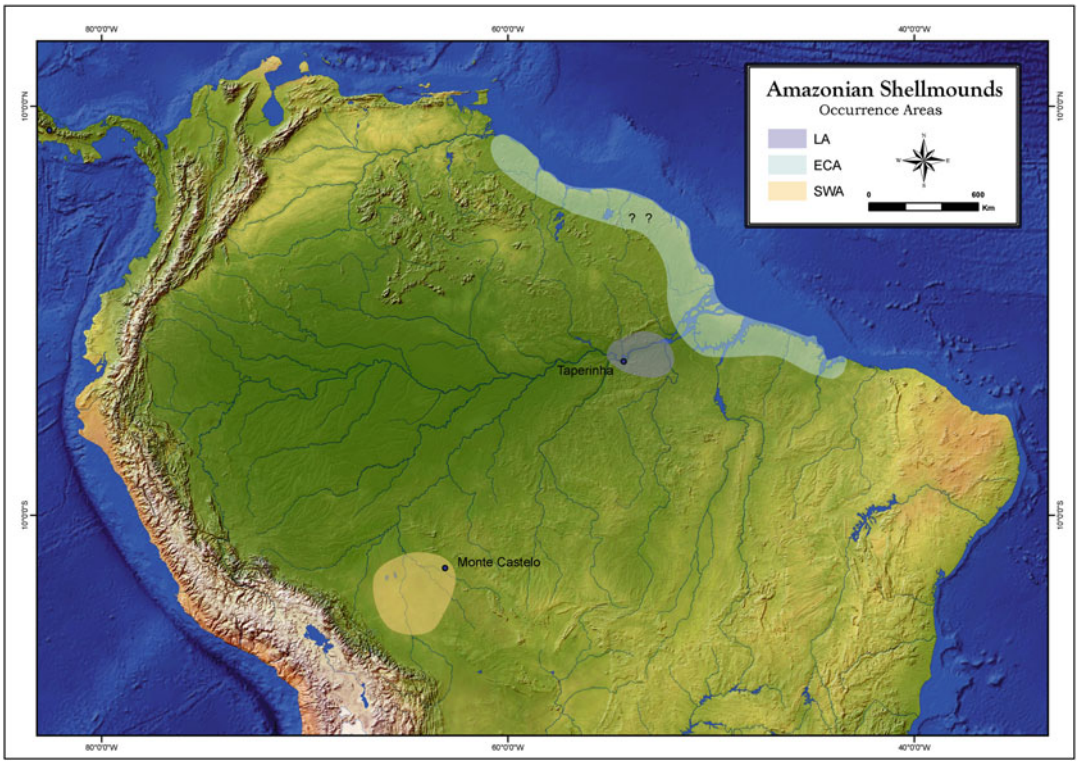

What do Amazonian Shellmounds Tell Us About the Long-Term Indigenous History of South America?, Fig. 1 Sites with ceramics dating back to 8000 cal BP and the shellmounds' occurrence areas estimated by the known sites in Amazon

Roosevelt 1992, 1997; Hoopes 1994), and it is noteworthy that early ceramics are consistently found in the basal strata of Amazonian shellmounds. As will be seen below, these early ceramics always appear as vestiges of simple industries which started to incorporate technological innovations at some point in the Middle Holocene, including the adoption of specific attributes shared among distant contexts: this occurs in Taperinha, Monte Castelo, in the Xingu sites, the coastal sites in Pará and the Guyanas, as well as in the ancient ceramics of the Colombian and Ecuadorian coasts and even in Panama (Meggers et al. 1965; Reichel-Domaltoff 1985; Hoopes 1994; Oyuela-Caycedo 1996).

Roosevelt (1995) was the first to show that there are no preceramic strata in Amazonian shellmounds. These sites are always built on topographically salient areas, which gradually received low amounts of sediments until people started to erect an earth mound, after which constructive layers were added with shells. Ceramic remains are present throughout the whole stratigraphic matrix. The scant available data shows that ceramics are present at the basal strata of the mounds, even if in very simple form or in low density. An eventual preceramic component in this type of site would, therefore, be an exception (but see Williams 1997 for another interpretation). This suggests that contexts for early mound building were correlated with the clay experimentation from the beginning.

Amazonian shellmounds are located in environments where high diversity of resources is available along permanently or seasonally flooded areas such as floodplains and swamps. Shared characteristics are also seen in changes observed in the uppermost stratigraphic layers, where variations in settlement patterns are associated with differences in ceramic technology, mound-building activities, and, consequently, changes in the use of these places throughout the Middle Holocene. There are also recurring occupations from the Late Holocene, sometimes after chronological gaps in the sequences. Finally, indigenous people have seasonally occupied some of these places until the present. Thus, shellmounds can be seen as persistent places where archaeology provides data about continuity and change in the long-term indigenous history (LIH) of the Amazon since at least the Early Holocene.

Exploring the Similarities Among Amazonian Shellmounds

The area definitions proposed here are based on different criteria: LA and ECA for the diverse geoenvironmental contexts where they are localized, whereas SWA is a more isolated from other regions where fluvial shellmounds occur. A divergence in the malacological building materials used in each region exists, since bivalve mollusk shells are predominant in LA and ECA, but gastropod shells are more prominent in SWA. Distance and material differences group these three areas of occurrence into two isolated sets of sites, those in the west and those in the east. Despite this, the attributes shared by known Amazonian shellmounds permit exploring them as a single set of sites under formation throughout the Middle Holocene, allowing an understanding about the history of Amazonian landscape management from then until the present day (Fig. 2).

The Taperinha and Lower Xingu Sites (LA)

Taperinha is located adjacent to the floodplain of the Amazon River, downstream from the city of Santarém. The site was initially researched by Canadian geologist Charles Hartt in 1870–1871. Hartt recognized that the place was an archaeological site and suggested its old age due to its location next to an abandoned channel of the Amazon (Hartt 1885). More than 100 years later, Anna Roosevelt continued the research started by Hartt, seeking to test the hypothesis that contexts dating back to the Early Holocene could be excavated in the site (Roosevelt 2009). Taperinha is located on a ledge of dry land adjacent to the river's floodplain, with ready access to lakes, swamps, and natural channels. The site is 50,000 m^2 and over 6 m high, built on a beach (Roosevelt 1999), and, like Hartt had already noticed, ceramic fragments were found all the way to the basal layers. These were later dated to

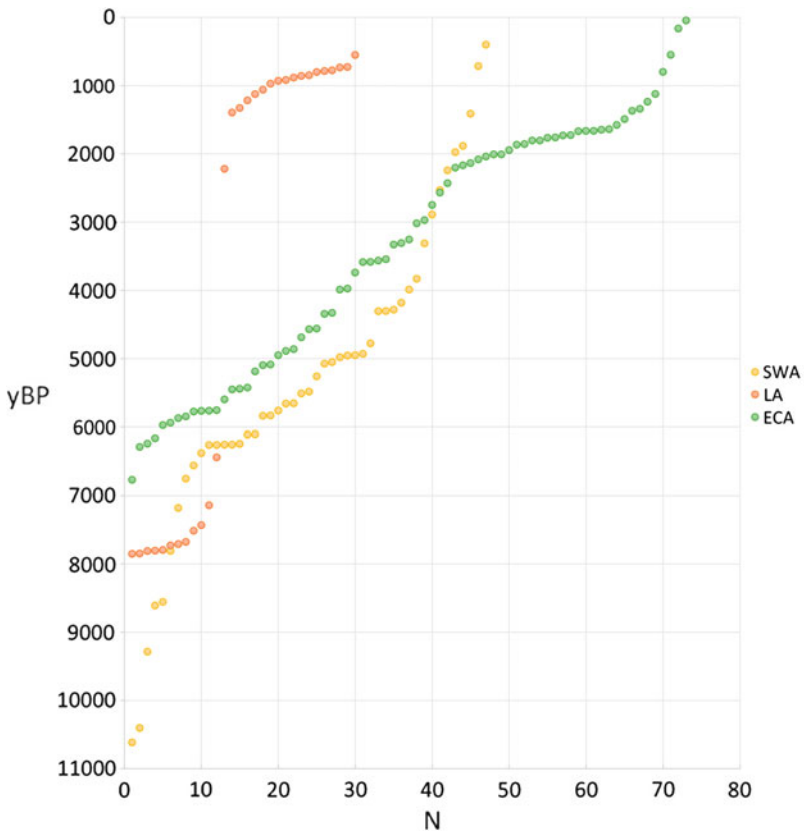

What do Amazonian Shellmounds Tell Us About the Long-Term Indigenous History of South America?, Fig. 2 Chronology of Amazonian shellmounds from the 150 available radiocarbon ages (Simões 1981; Williams 1981; Roosevelt et al. 1991; Perota 1992; Perota and Botelho 1992; Hoopes 1994; Roosevelt 1995; Gaspar and Silveira 2000; Bandeira 2008, 2012; Miller 2009; Lombardo et al. 2013; Canto Lopes 2016), calibrated (Hogg et al. 2013) and quantified by occurrence areas

around 8000 cal yBP (all ages mentioned below are calibrated. From here on just BP), providing the earliest dates for ceramics in the Americas (Roosevelt et al. 1991; Roosevelt 1995, 1999, 2009). The site was occupied by relatively large and stable groups who carried out intensive fishing of fish and shellfish in the river, lakes, and streams of the region. The technology of early Taperinha ceramics (Fig. 3) was described based on 383 fragments identified in 48 different strata, composed by shells, charcoal, seeds, bones, and lithics (Roosevelt et al. 1991; Roosevelt 1999).

The ancient presence of ceramics in the Taperinha region is also supported by similar data from the Caverna da Pedra Pintada rockshelter (Roosevelt 1995), which would indicate the presence of early ceramics in other kinds of archaeological sites besides sambaquis, although other sites with ceramics dated to the transition from Early to Middle Holocene have yet to be found.

Ceramics of the basal strata are tempered with grit, sand, and, in a few cases, shell (Roosevelt et al. 1991; Roosevelt 1999). Vessel shapes are gourd-like and simple open bowls. Vessel shape and the presence of carbon soot in some sherds may imply the preparation and consumption of food (Oliver 2008). Eleven fragments evidenced incised or punctuated decoration (Roosevelt 1992, 1999). Lithic instruments in the same strata include hammerstones, flakes, grinders, and fire-cracked rocks. Other artifacts, such as scrapers of turtle bone and shell, are also reported (Roosevelt et al. 1991). Other than ceramic chronology and some stratigraphic details, there is little further information about the site. From the profile drawings, it can be seen that the basal strata shows the record of an earth mound upon which the shellmound was built. The switch from earth to shellmounding marks also a change in habitation and funerary patterns (Roosevelt et al. 1991; Roosevelt 1992, 1995, 1999, 2009).

What do Amazonian Shellmounds Tell Us About the Long-Term Indigenous History of South America?, Fig. 3 Taperinha ceramics from (**a**) Hartt (both sides) and (**b**) Roosevelt excavations. Collection of the Technical Reserve of Archaeology Mario Ferreira Simões, Museu Paraense Emílio Goeldi/MCTIC. (Photos: Elisângela Oliveira)

Taperinha's occupation persisted for a long period after early ceramic production. Overlaying early ceramic strata related to the earth matrix, there is a thick accumulation of shells composed of multiple strata dated to the Middle Holocene and, above it, a later stratum of Santarém ceramics associated with anthropic dark earths, or *Terras Pretas de Índio*, the latter dated to the early second millennium AD (Roosevelt 2009). Hartt had already recorded that the shellmound was covered by a stratum of dark soils with ceramics similar to ones found on other sites in the area.

Following earlier hints by Bates (1863) and Agassiz (1868), Hartt (1885) also mentioned the presence of other shellmounds in the LA region. Hilbert (1959, 1968), following Protasio Frikel, published data on Ponta do Jauari, also a shellmound located in the Santarem region, where Zone-Hachured ceramics were found overlapping Mina tradition layers. In the 1970s, excavations took place in Guará I and II sites in the lower Xingu River (Perota and Botelho 1992, 1994), and the available data indicates that around 3000 years BP ceramic materials related to the Mina tradition can be found in these shellmounds. They are broad-based sites, formed by the interdigitation of clay and sandy layers. Mina ceramics persist on the intermediate layers, where bivalve shells abound. The chronology also points to a more recent Mina tradition in the region. In fact, the most recent Mina tradition dates were recorded at the Guará I (Perota and Botelho 1992, 1994) and Uruá sites and are situated around 550 years BP (Silveira et al. 2008). The data reported seems to indicate that the old pattern of reoccupations verified at the base of other sites also occurred there. These sites, therefore, are also palimpsests that document the regional extent and persistence of the Mina tradition in the Lower Amazon.

The Mina Tradition Sites (ECA)

Shellmounds with Mina tradition ceramics were first cited (Baena 1839; Barbosa Rodrigues 1876) and described (Ferreira Penna 1876, 1877) in the nineteenth-century literature, from the lower Tocantins River to the mouth of the Amazon River. Further work done in Guyana in the 1950s identified similar sites as well with ceramics denominated as Alaka (Evans and Meggers 1960; Williams 1997). In the 1960s and 1970s, dozens of shellmounds and open-air sites with Mina ceramics were mapped and excavated at the Atlantic coast east of the mouth of the Amazon (Simões 1981), where ceramics were classified in

five phases (Mina, Uruá, Areão, Castália, and Macapá), mainly differentiated by geographical location and by settlement patterns, rather than technological variability (Simões 1981; Oliveira and Silveira 2016).

Today, shellmounds from the Mina tradition are known to be found in a large region that extends from the archipelago of Marajó to almost the Parnaiba River delta, as well in the Guyana (Evans and Meggers 1960; Simões 1981; Silveira and Schann 2005; Bandeira 2016), maybe reaching Venezuela (Meggers, *apud* Simões 1981: 78) and Caribe (Bel 2012). Such distribution, however, is not continuous and there are no records in Amapá or French Guiana. The sites occur in estuarine areas, along rivers and bays, as well as on islands, and are often surrounded by mangrove forests. Their dimensions vary: Porto da Mina site has 40 × 30 m at the base and reaches 4 m of height, while the Ponta das Pedras is 145 × 70 m at the base and stands 9 m tall. Mina ceramics are also starting to be found in other types of open-air sites, such as Jabuti, located further inland and where they are associated with anthropic dark earths (Silveira et al. 2011), and possibly Eva 2, a San Jacinto-like (Oyuela-Caycedo and Bonzani 2005) site located near the forested border of the coastal savannas of French Guiana (Bel 2012; Pagán-Jiménez et al. 2015).

The chronology of the Mina tradition extends from 5570 to 1245 BP, making it one of the longest and persistent cultural complexes (Fig. 2) in the continent (Simões 1981; Bandeira 2012). A common technological trait spanning the millennia is the constant presence of shell tempering, albeit with varying proportions. Firing appears to have been low temperature. Vessel surface is smooth and red slipping is frequently applied. Shapes are simple and open, with flat or slightly rounded bases and flat or round rims. Plastic decoration includes incision, coiling, and brushing (Simões 1981; Bandeira 2008).

The Mina tradition is recognized due to its antiquity and the huge spread of its technological characteristics on ceramics from Mid- to Late Holocene assemblages, such as the Alaka phase in Guyana and the Guará phase in the lower Xingu River. Taken together with the ceramics from Maranhão shellmounds, this makes it not only very ancient and long-lasting, but also wide-reaching in Eastern Amazonia, encompassing an area ranging from the Lower Amazon to the coast several hundred kilometers southeast and northwest of the mouth of the Amazon. However, the excessive attention given to the early age of Mina ceramics outshined the long-term history recorded in these contexts, which have only recently been approached by regional ceramic variability analyses (Bandeira 2009, 2016) and in the variation of settlement patterns (Silveira et al. 2011).

Bandeira (2008) presents the best description of a Mina tradition shellmound. The author divides its history in different cultural periods, stressing that ceramics of this kind are found in all of them. In the Bacanga shellmound, east of the mouth of the Amazon, Mina tradition may be found even before the beginning of shellmound construction, between 6600 and 5800 BP. This event is revealed by combustion structures composed by blocks of laterite disposed in a circular fashion, associated with charcoal, food remains, and ceramics that share few technological and morphological attributes with the Mina tradition, as they are thin and well fired and don't feature Mina's characteristic shell-tempered paste. The analysis of the vestiges collected in these basal layers points to a scenario in which the diet was not very dependent on aquatic resources and in which the presence of ceramic material is less dense than in relation to overlying strata (Bandeira 2009).

After that period, strata dated between 4800 and 1830 BP show significant technological changes marked by the start of the construction of the shellmound and contexts pointing to a wider utilization of resources, based on fishing and shellfish gathering, as well as significative increase in the quantity of ceramics, lithics, and bone remains. Vessel form becomes predominantly globular, with mouth diameters around 30 cm and some surface treatment, including smooth, brushed, simple, and parallel incised lines. Occupational strata are composed by lenses of shells of different species, associated with soils of varying colors. Besides ceramics, remains of

terrestrial and aquatic vertebrate bones, charcoal, laterite blocks, lithics, and ornaments are also found.

Mina tradition shellmounds also feature human burials with individuals in flexed position in right lateral decubitus, frequently accompanied by shells and ornaments. Just as in the pre-shellmound period, combustion structures and evidence of postholes are found (Simões 1981; Bandeira 2012).

Around 5000 years ago, various shellmounds were already occupied throughout the ECA: Bacanga (Maranhão), Porto da Mina, Ponta das Pedras and Uruá (Pará), and Barambina (Guyana) (Simões 1981; Williams 1981; Hoopes 1994; Bandeira 2012). Between 5000 and 2500 BP, after this initial phase of coastal occupation, different Mina tradition sites are formed both on the coast and further inland, while the ancient shellmounds of initial sequence were still being occupied (Bandeira 2009).

Mina phase ceramics are also associated with open-air non-mounded sites located further inland, such as Jabuti, who is found on high ground on an island at the west bank of the Caeté River, 36 km from the coast. Jabuti has anthropic dark earths with deposits ranging from 40 to 100 cm without signs of accumulation of shells, fishbones, or soil as in other Mina sites. There is a single date of 2900 BP for the early formation of this site (Silveira et al. 2011).

Above Mina phase occupations, ceramic fragments tempered with different materials are found on the surface of various shellmounds. These are associated with different occupations, including colonial Afro-Brazilian sites, but unfortunately not much is known about them (Simões 1981:14) Likewise, in Maranhão, two cultural assemblages were chronologically situated after the end of the Mina tradition at Bacanga site, the first associated with anthropic dark earths contexts and the most recent related to ceramics of the Tupinambá subtradition (Bandeira 2008, 2012) (Fig. 4).

Anthropic dark earth contexts associated with occupations above shellmound strata are common in all shellmounds studied in Maranhão. Such upper strata are 30–50 cm thick showing abundant ceramics, lithics, fish remains, human burials, and no shells and dating from 900 BP at Bacanga and Paço do Lumiar to 760 BP at Panaquatira (Bandeira 2012). These later ceramics are totally distinct from earlier Mina phase vessels, being similar to other Amazonian complexes such as the incised rim and Tupinambá traditions (Bandeira 2008, 2012). Such occupations persisted until the 1700s, after initial European settlement, and is associated with the Tupinambá Indians described historically (Bandeira 2016).

Shellmounds from Southwestern Amazonia (SWA)

The Monte Castelo shellmound is located on the floodplain of the Branco River (Fig. 5), next to the border of Bolivia and Brazil, and is currently 120 × 100 m long and 6.5 m tall. It had been previously excavated in the 1980s, and such previous research revealed that the shellmound is a monument built and occupied since the Early Holocene (Miller 2009, 2013).

Research at the site was restarted in July 2013 (Pugliese 2018). Excavations at MC have shown the presence of ceramics from the deepest strata to the surface of the site. The first samples of this technology were found in association with faunal and charcoal remains in occupational strata lacking shells as building material. There, an impressive volume of fragments of ceramic blocks and slabs were found, perhaps comparable to the clay balls found in Terminal Classic Maya sites in Central America or in the end of the Archaic period in the United States (Ford and Webb 1956; Gibson 2001). However, a few samples show walls or other attributes characteristic of pottery. The predominant temper is composed of quartz grains, which may have been added to the paste or might originate from a selection of a locally available sandy clay matrix for the production of these artifacts. Only a few diagnostic sherds were detected. Evidence of carbon soot on these pieces is rare and their use is still under investigation.

The strata that cover these initial occupations contain a larger investment in pottery making (Fig. 6). Likewise, the context in which these later ceramic materials are found differs notably

What do Amazonian Shellmounds Tell Us About the Long-Term Indigenous History of South America?, Fig. 4 Ceramics from coastal shellmounds in the state of Maranhão (Bandeira 2012): (**a**) Tupinambá, (**b**) associated with TPI, (**c**) Mina tradition, (**d**) pre-shellmound culture

from earlier strata. What before was composed by a matrix similar to an earthwork, in which structured features are not common, turns into a context in which intense domestic activities were recorded in firepits and other remains of food production and consumption. These horizontally overlaid strata, each about 10 cm thick, record a series of occupational contexts covering the initial occupation of the site. Stratum L is composed of a "floor" cut by negative features such as stake and postholes which seem to mirror the malacological contexts of strata K and M; the excavation of a

What do Amazonian Shellmounds Tell Us About the Long-Term Indigenous History of South America?, Fig. 5 Aerial view of Monte Castelo shellmound (photo by Carlos Zimpel), in front of the Branco River and the Guaporé wetlands

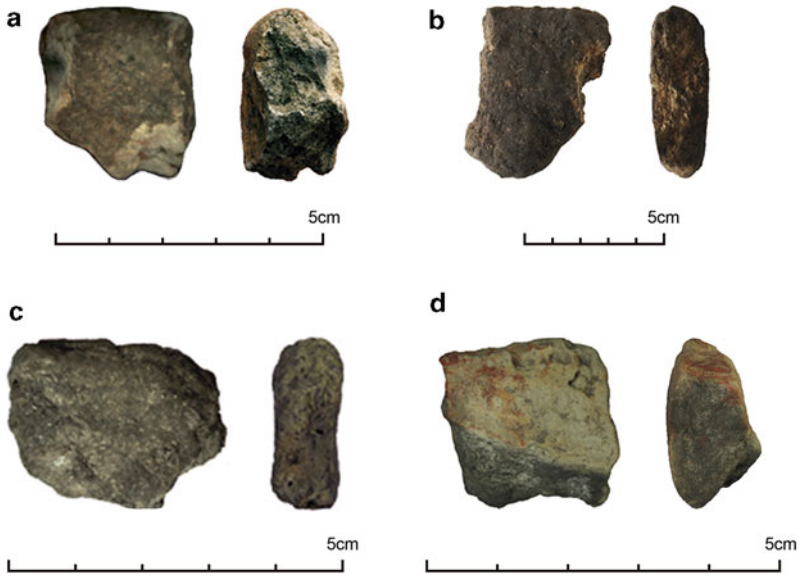

What do Amazonian Shellmounds Tell Us About the Long-Term Indigenous History of South America?, Fig. 6 First pottery (>5200 BP) in Monte Castelo (depth): (**a**) Layer J (461 cm), (**b**) Layer K (473 cm), (**c**) Layer N (507 cm), (**d**) Layer T (610 cm). (Photos Francisco Pugliese)

large hearth reached through several of these strata, and the material which were found suggests that a combustion area used for processing food existed on top of the shellmound for a long period. The use of *cauixi* (freshwater sponge spicules) tempering on clay found in these intermediary layers of the oldest strata (>5200 BP), together with a change in the structure of ceramic sherds,

shows that firing was better controlled, reaching higher temperatures. Besides the inclusion of *cauixi* and quartz, some shell temper is also found.

After ceramics had been present at the site for a period that may reach 3000 years, the Bacabal phase (Miller 2009, 2013) shows several technological innovations at Monte Castelo shellmound. These ceramics, which are deposited over the last strata associated with the massive accumulation of gastropod shells (Stratum F), are found in high density and in association with lithics and different kinds of botanical remains. Strata A–D, where Bacabal materials are found, also contain a significant amount of zooarchaeological remains, with a prominence not only of whole and fragmented gastropod shells but also turtle, cervid, rodent, reptile, and fish bones and some bivalve mollusk shells as well. These evidences not only suggest the consumption of these animals but also the use of skeleton parts for the preparation of utensils such as ornaments, points, needles, and hooks. There are also recurring burials marked with contours or agglomerations of shells and contain associated funerary paraphernalia.

Analyses of the ceramic material have revealed that these vessels were produced with a paste tempered primordially with spicules, mixed with fine sands. Some fragments in the older strata also present shells as temper. The homogeneous structure and hardness of the ceramics shows that high temperatures were achieved at firing. Pots were manufactured by coiling with the addition of modeled apliqués. Surfaces were smoothed with several different techniques that can be identified by the traces of soft (such as bamboo and gourd) or hard (such as pebbles, seeds, and shells) utensils. Polished samples are also found, but the most recurring types of surface treatment are slips and red slip.

Excision and incision were the most recurring types of plastic decoration used. Painted motifs are not to be found. On the other hand, plastic decorations are plentiful, with the most frequent type featuring motifs formed by zigzagging excisions, creating triangular areas filled by thin parallel incisions. This same motif is also found in decorations which are based on incise lines, in which the created areas are filled with dotted lines. Large, parallel, and straight excisions abound, as do different types of incision and dotted lines, as well as two kinds of brushed decoration (by corncob or corn ear). This surface treatment confirms the presence of maize (*Zea mays*) in this context dating about 4000 BP. Applied handles are commonly found, from the simplest varieties to the most stylized, including zoomorphic and anthropomorphic pieces. The pot shapes are simple, with plane to concave bases and rims with simple contours. Mouth diameter and the thickness of the walls indicate that the pots had a wide range of dimensions, from small serving pots to large cooking pots (Fig. 7).

This is an archaeological culture with dates reaching back more than four millennia, sharing elements with the first known ceramic complexes, notably in relation to settlement patterns that relate to the exploration of aquatic resources described in the Mina phase, the lower Xingu sites, and the Taperinha site. The zoned-hachured pattern of the decorative elements has been used by Miller (2009, 2013) to link these ceramics to processes of diffusion starting with Valdívia phase sites from coastal Ecuador, whose early dates go back to ca. 6400 BP (Zeidler 2003).

In Bolivia, shellmounds are a part of the earthwork landscapes of the Llanos de Mojos (Denevan 1964, 1966; Erickson 2006; Prümers 2012; Lombardo et al. 2013), but little specific information has so far been published. Recently, three sites located south of the flooded savannahs, near the municipality of Trinidad in the Beni River, were excavated. These sites are similar to Monte Castelo in terms of their implementation and stratigraphic matrix. However, they have much smaller dimensions, currently reaching only less than 2 m of height. Initial mound building seems to have started 10,000 years ago, as small mounds were built at the edge of the savannahs bordering the Mamoré River.

Just as in Monte Castelo, since the Middle Holocene, these sites witnessed a greater investment in construction and accumulation of shells as well as other technological novelties, such as ceramics (Fig. 8). Ceramics were found there with dates starting ca. 6000 BP, bearing similarities to the intermediary layers in Monte Castelo.

What do Amazonian Shellmounds Tell Us About the Long-Term Indigenous History of South America?, Fig. 7 Bacabal phase ceramics from the Monte Castelo shellmound: (**a**) zoomorphic and anthropomorphic representations; (**b**) excise and incise motifs; (**c**) brushed with corncobs and ears. (Photos Carlos Zimpel)

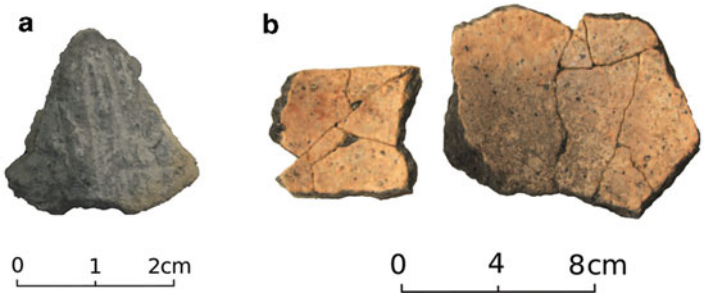

What do Amazonian Shellmounds Tell Us About the Long-Term Indigenous History of South America?, Fig. 8 Pottery from Isla del Tesoro, Llanos de Mojos, Bolivia (Lombardo et al. 2013): (**a**) Incised ceramic sherd, layer dates (6235 ± 62 BP); (**b**) ceramics from Late Holocene earthworkers

Occupations relating to the constructive period of the site extend to ca. 4000 BP, which begins the chronological hiatus which extends until 400 BP. These recent reoccupations also coincide with the reappearance of ceramics and faunistic remains, which were associated with the well-known Late Holocene Earthmover societies (Lombardo et al. 2013). There are also reports of sambaquis in the

northwestern Llanos, near the Rogoaguado lagoon (Echevarría 2008). Considered beside the (little) information available about those sites, paleoecological data (Brugger et al. 2016) indicates that they may also corroborate the pattern of association between ancient pottery and malacological material accumulation that is beginning to be recognized in the region's early settlements.

Shellmounds Landscape Formation

The monumental character of shellmounds is still unexplored in Amazonian archaeology, differently from what happens with this type of site in the southern and southeastern coasts of Brazil (Fish et al. 2013). The smooth topography of the areas where these sites were built in the Amazon highlights the constructed sites – which can surpass 6 m of height and have dozens of thousands of square meters in area – as imposing features of the local landscape. In the floodable savannahs of SWA, during some seasons, the shellmounds are the only features rising above the water in a radius of kilometers. The significance and persistence of these places must be considered under this perspective.

In the three areas of occurrence of known *sambaquis* in the Amazon, the same general structure in the stratigraphic composition (Fig. 9) – in simpler or more complex versions – seems to be visible from the available data, indicating parallels in their histories. The first settlements featured earth mounds dating to the Early Holocene that reach a maximum height of around 2 m, such as in the case of Monte Castelo. Subsequently, throughout the Middle Holocene, the sites undergo changes in their pattern of occupation, marked

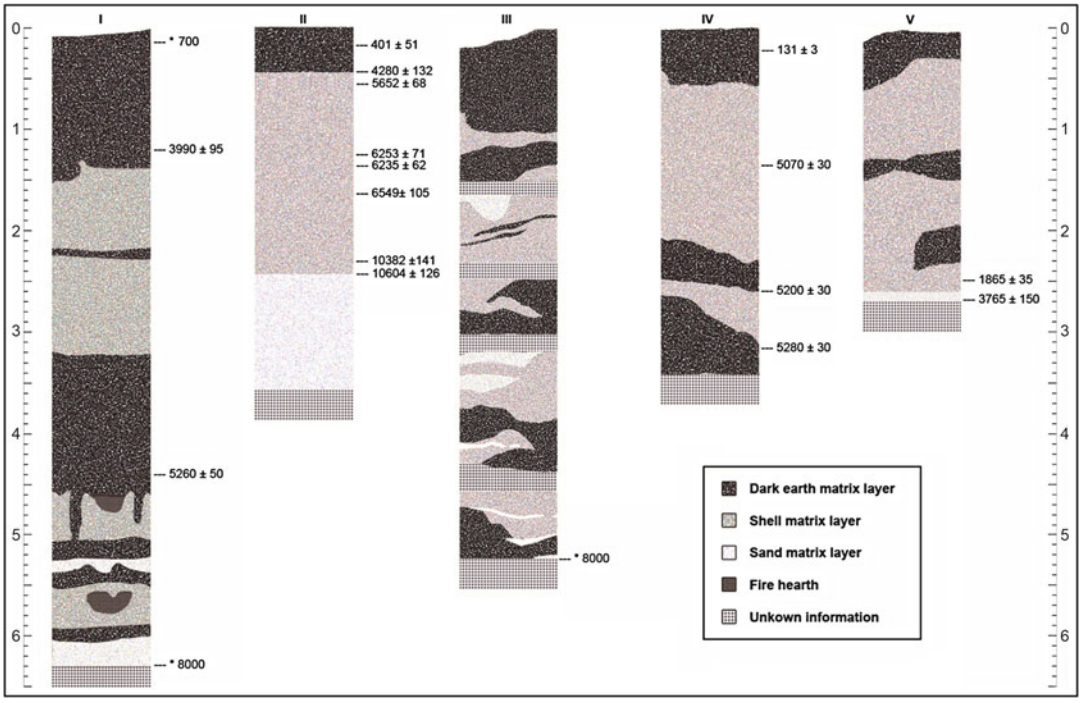

What do Amazonian Shellmounds Tell Us About the Long-Term Indigenous History of South America?, Fig. 9 Synthetic stratigraphy from Amazonian shellmound profiles with available chronological information from calibrated radiocarbon dates (BP). I, Monte Castelo (Beta408413, Beta408414); II, Isla del Tesoro (Lombardo et al. 2013: Poz-34228, Poz-34229, Poz34230, Poz22902, Poz34232, Poz36136, Poz34301, Poz36135); III, Taperinha (Roosevelt 1995); IV, Porto da Mina (Canto Lopes 2016: Beta439361, Beta439362, Beta439363, Beta439364); V, Panaquatira (Bandeira 2012). * Estimated layer ages after Miller (2009, 2013), Roosevelt et al. (1991), and Roosevelt (1995)

by the use of massive accumulations of shells as a constructive material, forming thick layers that intercalate occupational structures and mounds, where the variability of vestiges is much more expressive. It can be considered that from this period on the sambaquis acquire a truly monumental character, standing out in the landscapes with proportions like no other sites in the basin.

During this period, an expressive increase in the species undergoing management occurs. This was archaeologically recorded mainly by the presence of new botanical remains on the sites, often carbonized and associated with combustion contexts. These changes are followed by a long period of continuity in this type of constructive activity, and the populations which carried it out also produced ceramics with more sophisticated technologies than those used by their predecessors. These contexts also present a wider variability of types of lithic and bone instruments. In fact, between 5000 and 4000 BP, the sambaquis are practically the only sites in the Amazon and in much of the continent where the production of ceramics is so systematically and expressively confirmed.

Taken together, these three facts (the construction of monuments, the appearance of new plants, and the development of more sophisticated technologies) seem to indicate that the changes observed in Amazonian shellmounds along the Middle Holocene are related to the transition from low-density landscape management to the beginning of a new indigenous history, which would culminate in the high-density landscape management which was later dispersed throughout the basin (Neves and Petersen 2006). When searching for historical meaning in the continuities and variations in settlement patterns recorded in structural changes in the shellmounds layers, we can also take into account a series of occurrences taking place further south in the continent, such as the construction and occupation of earthworks with malacological materials in the Paraguay River (Schmitz et al. 1998; Eremites De Oliveira 2003; Migliacio 2006; Schmitz et al. 2009). The construction of small shellmounds in the Ribeira do Iguape river valley since the Pleistocene transition is also noteworthy. Starting in the Middle Holocene, burials related to the known burial patterns of coastal shellmounds start appearing in these sites, followed by reoccupations of the region during the Late Holocene (Figuti et al. 2013). The explosive increase in dates for coastal shellmounds related to the period between 4000 and 2000 BP, 4ky after the first occurrences of this type of site (Gaspar et al. 2008), coincides with the construction of shell strata in Amazon sites, also founded in the Early Holocene and occupied until the present or the recent past. Other than the well-known Tupinambá reoccupations of the coastal sites, which may have been extinguished by the advancement of European colonization, dates in superior layers of shellmounds surpassing the first millennium of this era are common.

If we expand the limits of this approach, one could observe congruences between the contexts of emergence and development of shellmounds in the Amazon and in Colombia (Reichel-Domaltoff 1985), Venezuela (Cruxent and Rouse 1961), Panamá (Hoopes 1995), Southeastern United States (Sassaman 1993, 2004a, b), and in the Lower Mississippi Valley (Russo 1996; Sassaman 2004c), or even in various parts of the Pacific coast, where these sites occur from Chile to the United States. This is an enormous history contained in a long period of construction of shellmounds and associated landscapes in the continent.

Why Long-Term Indigenous History?

> L'intérêt de ces enquêtes pour l'enquête, c'est, au plus, d'accumuler des renseignements; encore ne seront-ils pas tous valables ipso facto pour des travaux futurs. Méfions-nous de l'art pour l'art.
> Braudel (1958)

The construction of a long-term history of the indigenous populations of the South American lowlands has been the object of archaeological research throughout the Amazon. Historical ecology approaches in particular have changed our understanding of the variability in the relation between mankind and the environment, adding to the understanding of how this took place in the long-term occupation of the continent. A lot

of this research has revolved around investigating the periods in which the most intense changes in the landscape are perceived archaeologically, proposing interpretations for the emergence and maintenance of cultural traits (Heckenberger 2005; Ballé and Erickson 2006; Thompson and Waggoner 2013).

The long-term indigenous history proposed here consists in the analysis of similarities and differences, continuities and changes in order to interpret the way in which the dialectic between the structures and events took place in the past, seeking to contribute to the understanding of the historical contexts in which they were produced and have been signified. To this end, the evaluation of whether an event is relevant in relation to long duration structures partially depends on the analysis of similarities and differences in the artifactual variability and on the archaeologist's ability to provide a plausible theory based on their internal perceptions, motivations, and cultural standards (Hodder 1987).

Archaeologically speaking, we can state that much of what can be observed in present-day cultures is the result of long-term history, which is represented in the present by the continuation of traits that appeared in remote times. In the Amazon, the persistence of certain cultural traits in artifactual assemblages and settlement patterns may represent the continuation of well-adapted lifestyles which were developed by the pioneer populations that colonized the region between the Late Pleistocene and the Middle Holocene (Neves and Petersen 2006) – not to be confused with a stagnation in time and place. In this sense, archaeological investigation of persistent places does not reject contemporary indigenous history. Rather, these studies should integrate themselves with it so that the places where long-term indigenous occupation can be archaeologically accessed may be researched ethically (Meskell 2005) and so that their results reach expected representativeness in the problematic political and social contexts in which they are carried out (e.g., Pugliese and Valle 2015). This stems from the recognition of the immeasurable worth of these sites for the construction of LIH and that the rights of indigenous people of these places must prevail over the territorial rights imposed by national states.

In relation to this, it is relevant to recall the potential archaeology has to change paradigms in contemporary communities. Archaeology must address the construction of scientific knowledge about the past, which aids our understanding of the present and which may substantiate the construction of a future in which human occupations not only contribute to the maintenance of biodiversity but also sustain a fairer and more diverse society. There is growing consensus among researchers that archaeology must take a central role in the investigations of the relationship between humans and the environment, building insights into wider issues, related, for instance, with the management of tropical forests (Ballé and Erickson 2006; Iriarte et al. 2016; Watling et al. 2015, 2017).

Furthermore, the absence of socially useful approaches to archaeology may lead to the disengagement of talented researchers, and maybe the very survival of the discipline is conditioned by its intellectual engagement with great challenges faced by present-day communities (Van der Leeuw and Redman 2002). In this sense, exploring the connections between the ethnographic present and the archaeological past in the search for a new ontology of the archaeological present (Hicks 2016) of the ancient occupations of the Americas allows knowledge to be used so that remaining meaningful places are respected and territories are kept in existence.

In fact, many of the most important archaeological sites in the Amazon are located in areas occupied and reoccupied throughout the millennia, which now house contemporary occupations, be they villages, towns, or even large cities. Unfortunately, it is still common to find the descendants of ancient inhabitants residing in the periphery of urban agglomerations, in situations of social risk, used as cheap labor to sustain local economies. In all such places, archaeology has the potential to create a foundation for the insubordination of traditional populations to the destructive drive of nation-states, if it can overcome its traditional colonial role to be

appropriated as an instrument in these peoples' struggle for sovereignty (McGuire 2004).

The Indigenous History of Middle Guaporé River Basin

Shared between Brazil and Bolivia, the basins of the Guaporé and Mamoré rivers are known as one of the regions with the highest linguistic variability in the planet. Over 50 indigenous languages have been found here, belonging to 7 families (Arawak, Chapacura, Jabuti, Nambikwara, Pano, Tacana, and Tupi), as well as 11 isolated languages (Aikanã, Canichana, Cayubaba, Iranxe, Itonama, Kanoê, Kwazá, Leko, Mosetén/Chimané, Movina, Yurakaré), sharing various lexical elements among them. For historical linguistics, this complex patchwork of oftentimes genetically distant languages in the present is probably a result of a number of waves of settlement in the region, whose descendants have been living together in the area for millennia (Crevels and van der Voort 2008).

The first pieces of written information referring to the occupation of the Guaporé were produced in the eighteenth century, in a context of dispute of this region between the Spanish and Portuguese empires. In the colonial period, the Guaporé was the fluvial connection between Villa Bella, in Mato Grosso, and Belém, in Pará, a route which gained importance at that time through commerce and capture of Indians. Portuguese and Spanish both claimed the river, trying to control the dense indigenous populations that inhabited the region concentrated in religious missions (Lucidio 2013). Next to the Branco River, missions and old colonial settlements were installed, and the information available about these places help us identify some of the indigenous occupations of the region in the eighteenth century (Fonseca 1874, 1881).

The first mission in the region, Santa Rosa, was founded by Spanish Jesuits in 1743 in an area on the right margin of the Guaporé where the Aricoroni, speakers of Chapacura, lived. In 1744, over 4000 members of the Moré indians, also Chapacura speakers, were subjugated in San Miguel, located on the river of the same name. San Simón was founded in 1746, in the Branco River, and around 700 people lived there between Morés and Mekéns, a part of the Tupari branch of the Tupi language family. The Mekéns are also mentioned as part of the population of the Portuguese settlements of Ilha Comprida (1742), located in the mouth of the River Mequéns, and Casa Redonda (1752), in the mouth of the Corumbiara River (cf. Fonseca 1749; Amado and Anzai 2006).

The decline in mining, the discovery of more efficient commercial routes, and the end of the territorial dispute between Portugal and Spain resulted in a diminished imperial interest in the Guaporé region. The people who inhabited its margins, who had been enslaved, killed, or concentrated in missions, could finally go back to living in relative freedom, and many of them headed up the river toward the head of the tributaries on the right margin, since following those on the left could mean encountering Jesuits in Bolivia (Lucidio 2013).

The Tupari linguistic family was rediscovered by Brazilian civil servants and ethnologists in the twentieth century (Snethlage 1937; Caspar 1953, 1957). It has four languages: (1) *Makurap*, centered around the head of the Branco River; (2) *Ayuru*, around the Colorado River; (3) *Mekéns*, around the Mequéns River; (4) and *Tupari*, in the heads of Machado River tributaries (Moore and Galucio 1994). When found in the twentieth century, speakers of Tupari shared a tragic history of contact with capitalism due to the rubber boom that spread throughout the entire Amazon, ravaging entire populations.

The first rubber plantations in the region were installed near the Branco River circa 1910, at a place known as Laranjal, where a Bolivian owner concentrated 600 individuals for rubber work (Snethlage 1937). Their exact identity is unclear, but in 1924, Aluízio Ferreira, who would become the governor of Rondônia in later years, took refuge in this area and described the presence of Makuraps there. He attests the same for the Paulo Saldanha plantation, near the head of the Branco River, founded by the Guaporé Rubber Co., which soon after would install the São Luiz plantation downstream.

These plantations were responsible for incorporating the Makurap, Ayuru, Jabuti, Arikapú, and Aruá into rubber exploitation work, as well as *poaia (Psychotria ipecacuanha)* and Brazil nut (*Bertholletia excelsa*) gathering. In 1927, a plantation employee accompanied by a retinue of Makurap visited the Tupari malocas (T.N.: indigenous Amazonian long house) in the headwaters of the Branco River, convincing these groups to work at Paulo Saldanha (Caspar 1953). The Tupari had heard of this new non-indigenous presence in the area due to reports by neighboring Makurap, who had acquired tools that the Tupari greatly valued after the contact. Soon, the plantations become a local hub, consequently spreading disease (Tupari 2013).

Caspar (1953) estimates that in the late 1920s, at least 3000 people inhabited the headwaters of the Branco River, due to a 1948 report by an elder relating the existence of at least 30 *malocas* in the area before contact with the rubber trade. In 1934, Emil Heinrich Snethlage was in the Branco, and before reaching the Tupari *malocas*, he visits the São Luis, reporting a complete absorption of indigenous labor in the plantation as well as cases of physical punishment suffered by the Tupari. Upon reaching the *malocas*, he only finds three of them, therefore estimating a population of 250 inhabitants (Snethlage 1937).

In 1948, Caspar lived among the Tupari where he notes the existence of temporary relations with the rubber trade when men moved temporarily to the São Luís plantation to work in exchange for manufactured products. At this time, they lived in two malocas, around 200 under the leadership of Waitó and Kuarumé, Caspar's interlocutors. According to a report by Konkwat Tupari, a daughter of Waitó Tupari, the Tupari people were forced by the plantation owner to leave their malocas and move indefinitely to the São Luiz in 1953. He also moved other families to the Laranjal plantation, preventing them from returning to their homes after working in the plantation (Fonseca 2008). Amnin Tupari describes Laranjal as a small town, formed by families, both Tupari and non-indigenous, involved in the production of foodstuffs to supply the great huts of the rubber plantation (Tupari 2013).

This moment of intense contact with the São Luis is crucial to the history of the Tupari. In 1954, a measles epidemic would irradiate from here, leaving the Tupari on the brink of extinction. In 1955, Franz Caspar visits the Branco River again and meets a group of refugees from this group, amounting to no more than 66 people living in a single *maloca,* probably in Laranjal (Caspar 1957).

Up until 1980, the plantations are sold between owners, many of whom kept Indians working in conditions tantamount to slavery. That year, the Branco River Indigenous Station is created in the old headquarters of the São Luis. Ethnologist Apoena Meireles works on freeing many people from this regime of slavery (Meireles 1983). Finally, in 1983, the Rio Branco Indigenous Reservation is demarcated. However, a few settlements were left outside its limits, including three of them, inhabited mostly by Tupari, inside the Guaporé Biological Reserve, demarcated the year before.

The Contemporary Indigenous History of Monte Castelo Shellmound

The migratory movement of the Tupari from northern Mato Grosso to the Rio Branco basin and the reoccupation of ancestral areas in the Guaporé River are known in the literature since the publication of Franz Caspar's ethnography in 1953. According to the Tupari, their ancestors reoccupied archaeological sites when they arrived in that region, a common practice when human settlements move. This is due to privileged characteristics of these places in their environment, such as the topographical advantages of wetlands "islands" or the fertile and fish-rich areas adjacent to fluvial terraces.

However, over the last two decades of the twentieth century, the populations that traditionally occupied the middle Guaporé underwent a moment of their history in which new displacements were needed due to the creation of various conservation units in the region. The demarcation of indigenous lands and establishment of federal and state reservations restricted their mobility and precluded their access from wide areas.

In the specific case of the Rio Branco Indigenous Land (RBIL), the demarcation process left

out central components in the history of occupation of that indigenous territory out of its limits. Like the Laranjal "island," the Palhal village, situated downstream of the RBIL, a very old settlement recognized for the worth of its fishing and agricultural lands, was left outside of the RBIL and inside the Guaporé Biological Reserve (Rebio Guaporé). The same fate befell the Monte Castelo shellmound, which was often used as a seasonal settlement, mainly for hunting and gathering activities in the wetlands during the dry season and for fishing and gathering during the wet season, and a strategic place in the route to Versailles, an Indigenous village in the Bolivian margin of Guaporé river, where the Tupari trade boats and forest resources. During the dry season, the site converts into a privileged spot for big game hunting, especially the cervids which populate the fields and the tapirs which inhabit the Branco's swamps at that time of the year. In addition, the site is part of a settlement system which encompasses literally all areas above the waterline during the wet season (locally called "islands"), places used as seasonal logistical camps, but also as cemeteries.

The current resistance to expropriation of the lower Branco River settlements, explicit in the continuing occupation of sites outside the RBIL, creates a case in which archaeological heritage can act on people's present, supporting a relationship of belonging not to be overwhelmed by Western territorial rights. Going beyond this case, this notion of archaeological heritage geared toward what these sites represent to the people who make use of it may be the most combative to the destruction caused by the advancement of national societies on traditionally occupied territories in the Amazon, if approached as an effective form of protection of places that hold significance to the present occupants of this area. Understood in its present subjectivity, this idea of archaeological heritage can contribute to the construction of a LIH that can be a tool for the transformation of the social relations which took hold with the advancement of capitalist society, helping to reclaim places with meaningful roles in the formation of past and present indigenous territories.

In this sense, the contemporary occupation of the Monte Castelo site constitutes an emblematic case for the construction of the long-term history of the indigenous populations of the Amazon based on shellmound archaeology. Right when we first took up research at the site, in 2013, we noticed the presence of recent remains, indicating that although the site was located inside a federal reserve, prohibiting the development of activities by local populations, it still received regular visits by hunters. Sometime later, when our presence was intensified with new excavations in 2014, signs which intentionally warned us about the ownership of this place started cropping up. Name of persons and villages started to be carved on trees, and there was an increase in the area of activity of the current occupation, previously centered on small clearings in the northern and southeastern summits of the site. During the 2016 excavations, besides new dates carved on trees, we found true signatures, with name and ethnic affiliation. These signs seemed to be strong acts of demarcation, a reaction to the invasion of a meaningful place (Fig. 10).

However, our attempts to enter into direct contact with the Indians, heading toward their villages by land and water, had come to no fruition. Nowadays, after the shellmound was isolated by the demarcation of the reserve and their traditional occupations were restricted to ILs and maroon areas, access between the site and the upper Branco River is practically impossible during most of the year. The drastic reduction in circulation of boats allowed hydrophilic vegetation to take over the area between the shellmound and the nearest village, Palhal, and the herds of buffalo which multiplied with the extinction of nearby farms have made the overland route truly deadly. Despite this, the inhabitants of the Rio Branco IL, who never truly abandoned their settlements outside the IL, continue to use the shellmound, but mainly in periods of extreme flood, when it is possible to overtake the vegetation coverage, which becomes a little less dense during this period, allowing fluvial paths to be made.

Paradoxically, the indigenous population has been growing over the past few years due to the protection granted by the demarcation, but

What do Amazonian Shellmounds Tell Us About the Long-Term Indigenous History of South America?, Fig. 10 Site's current occupation signs (**b**–**d**) and activity areas (**a**, **e**). (Photos by Francisco Pugliese)

productive areas inside the RBIL are not plentiful. The exhaustion of resources in the most explored parts of the IL have forced an intensification of use of external areas and a growing movement to reclaim places inside the ReBio Guaporé which were traditionally occupied. Furthermore, isolated populations from the Massaco IL, located on the left margin of the Branco River, have been approaching the southern villages of the Rio Branco IL, and they were even seen by inhabitants in some recent cases, increasing the pressure on them and making exploration of the surroundings of some villages very dangerous.

Contact with the inhabitants of the RBIL was finally established in October 2016 when we sailed downstream from nearby villages into the IL and met the people who communicated with us in the shellmound's trees. At that time, we were introduced to the territorial claims of the various communities we visited, and collaborative projects were proposed to us, mainly aiming to reclaim Monte Castelo and others sites in lower

Branco River for their land. The archaeological project in the shellmound and other sites, all places of ancestral indigenous occupations, is producing data that must be used to repatriate these places to modern indigenous people. In relation to this, even if linguistics and the relatively recent character of the current occupation of the villages of the Rio Branco IL may allow for questioning the phylogenetic relation between its inhabitants and the people who produced the archaeological packets of the shellmound, the return to the region of middle Guaporé River is described by the local elders as a return to a land that had already been occupied by ancestors, and that was the reason why they chose the Branco River in their last migration. Currently, these populations consistently occupy this place in a similar manner to how their predecessor occupied it (even producing analogous contexts of activity). The indigenous history of the region, associated with the meanings held by that place, makes the shellmound landscape a fundamental component of their territoriality.

It is important to remember that the search for correlations between the history of occupation of the archaeological sites and current indigenous occupations must consider the multiethnic and multilinguistic pattern that became predominant in various parts of the Amazon from, at least, the tenth century on. If on the one hand this pattern complicates the establishment of strict correlations between the past of an ethnicity and the material culture of the sites, because the degree of resolution which can be obtained from the archaeological record only allows for direct correspondences to be observed in specific contexts (Neves 2011), on the other, the case of Monte Castelo demonstrates that for the archaeology of persistent places, this search for strict correlations is not the way to understand its territorial characters. What we propose here, based on the case of the indigenous occupation of the Guaporé wetlands, is that shellmounds are fundamental for the long-term history of occupation of the region where they are implemented, and, in this way, they are a part of the formation of all indigenous territories who have embraced them, independently of the identity which might be conferred to the archaeological record (Meskell 2001).

The Long-Term Indigenous History of Shellmounds in the Amazon

For millennia, monumental sites all over the world have shaped landscapes which reflect histories of colonization, diffusion, and migration which connect communities in faraway regions and through countless generations. Long continuities are frequent in these places, and some characteristics of these occupations persist, transcending the hiatuses which commonly exist in these sites' chronologies, denoting the permanence of structural traits in its history (Sassaman 2005).

In the Amazon, the advance of shellmound research has demonstrated covariations between chronology (Fig. 2), ceramic technology, and settlement patterns which are related to the history of occupation of a very wide region, which encompasses three known areas of occurrence. In these places, characteristics which can be considered structural in the human occupations which produced the sites present shared elements, and related events can be accessed through the archaeological record (e.g., changes between constructive and occupational layers), pointing to a common history. The structure of this history appears in the sequence of periods of occupation of the sites, which was shaped by recurrences in relation to the emergence and complexification of ceramic technology, to the morphology of stratigraphic layers, and to the distribution of remains in the sites in the Middle Holocene, as well as by the reoccupations of these places during the Late Holocene.

Some elements shared by the pottery, such as the use of sand and shell tempers in older technologies, seem to indicate that the relative synchronic appearance of ceramic assemblages in several sites was derived from a process of cultural diffusion; nevertheless, the change in the artifacts from modeled to coiled technologies marks a scenario of intense cultural change starting in the Middle Holocene. The contexts where these changes are

recorded, with high variability in plant and animal use remains, may be related to the development of a productive model based on agroecological diversity, a pattern dispersed throughout the Amazon in very ancient times and that can still be found today (Neves 2011).

In the search of a LIH of the Amazon based on shellmound archaeology, the Monte Castelo site constitutes a privileged chronological record for the recognition of persistence and innovations, notably in relation to the presence of dates distributed from the end of the Early Holocene to the thirteenth century (Miller 2009, 2013). The site is inserted in the southwestern Amazonian regional context, in which the exceptional language dispersion patterns of the past may be associated with patterns found in archaeological sites (Neves 2011). The recognition of these patterns may contribute to construct a new perspective on the archaeology of Amazonian shellmounds and about the appropriation of these places by present-day communities.

It is important to highlight that in other parts of the globe, shellmounds are archaeologically identified as aboriginal ancestral sites (Australia, Ulm 2013), monuments from ancient indigenous complex societies (Southeastern North America, Sassaman 2004c), or even as historical references for the construction of modern national identities (Japan, Mizoguchi 2004). In California, the indigenous history of shellmounds of the San Francisco bay area has been investigated by archaeology since the very beginning of the twentieth century (Uhle 1907; Nelson 1909). Today, they are considered sacred places with a history charged with meanings in mythology, and the indigenous movements are using archaeology to support the reclaim of these sites as part of their ancestral territories. On the other hand, in the Amazon, shellmounds were never approached by archaeology in a similar vein. Paradoxically, if on the one hand the region hosts one of the largest extensions of officially recognized indigenous territories in the world, on the other, the debate about the antiquity of its chronology has hindered attempts to approach ancient sites as persistent and meaningful places for current communities. Together with sites along the margins of rapids, big waterfalls, and the meeting of the main tributaries of the basin, Amazonian shellmounds are part of landscapes which have been built and reoccupied for millennia, and they must be explored in relation to the true spatial and temporal reach of their archaeology.

This is of special relevance for this chapter's objectives, since the three areas of shellmound occurrence in the Amazon are located in old indigenous territories, now severely changed by recent colonization processes in the Amazon. In the EAC, extractivist mining of malacological lime deposits has partially or completely destroyed many shellmounds, and the advance of urban perimeters has intensified the modification of the landscapes to which these sites belonged, to the point that today many of them have completely disappeared. In the SWA, true massacres of indigenous peoples occurred in the second-half of the twentieth century, and the expansion of the agricultural frontier still is, without a doubt, the current biggest problem for the conservation of the sites. If the creation of various conservation units in the middle Guaporé River basin insulated important areas from this process, they also restricted local communities from accessing various features of their territories, leading to an unnecessary and harmful opposition between conservation and traditional occupation of these places. In the LA, the Taperinha site has been partially destroyed by shell mining, and many sites recorded in the nineteenth century may never be found again for the same reason. However, the most extreme deterioration of indigenous territories in the region can be found is the lower Xingu River. The construction of the Belo Monte dam and other associated developments have set loose a true cataclysm in the region. The local shellmounds are located only a few kilometers downriver from the Xingu's "Big Turn," where the dam's axis was dramatically erected. In some of these areas, initiatives for the protection and recovery of these places have been put into place by indigenous people and other traditional communities, similarly to how the inhabitants of the Rio Branco Indigenous Land currently relate to Monte Castelo. The results of archaeological research should be used to support the recovery

of meaningful components of the deep indigenous history of the continent.

Final Remarks: Shellmounds and Ceramics in Amazon

Recently obtained dates from Monte Castelo shellmound confirm that ceramic remains found on its basal layers are related to occupations dating before 5200 BP, an assertion which is also supported by Miller's (2009) dates for these layers, reaching 8000 BP. This implies that the ceramic assemblages found in these layers have the same age of the earlier ceramics of the Americas, resulting in a new interpretation about these ancient contexts. However, differently from what has been observed in sites like San Jacinto 1 (Oyuela-Caycedo and Bonzani 2005), for instance, ancient ceramics from Amazonian shellmounds present evident stratigraphic correlation with contexts of food processing, being artifacts used for the ordinary preparation and consumption of food. The analysis of residues and other types of microremains will assess this hypothesis, but early Amazonian ceramics are also distinct from the typically highly decorated ancient ceramics found elsewhere in South America. In Amazonian shellmounds, ceramics characterized by intense decoration normally appear in more recent contexts (Betancourt 2013; Zimpel and Pugliese 2016), from the Middle Holocene on, and, in some cases, in layers covering older occupations, which present a simpler ceramic technology coupled, like in Monte Castelo, with a high density of remains.

Despite the lack of a correlation between the emergence of ceramics and the advent of agriculture in the lowlands of South America (Neves 2016), data about the first vestiges of this technology in the continent reveal an association with food processing and consumption. Roosevelt (1992) reports proposed a culinary use in the oldest ceramics in Taperinha, but she relates its use to a diet specialized in fish and mollusks, where there is no use of plants such as corn (1999). What Monte Castelo has demonstrated is that, moving beyond the debate about whether societies specialized in fishing, hunting, and gathering adopted agriculture or not, dietary patterns among early ceramists already leaned toward generalism. As has been observed in a series of Early-to-Middle Holocene sites in various parts of South America (Dillehay 2008), diet diversification was also the choice of most Amazonian settlers (Roosevelt et al. 1996), even with the precocious presence of various plants which would become important for the emergence of agriculture elsewhere in the continent. Such generalist strategies are also characteristic of early ceramic technologies associated with food-processing remains.

The chronological correlation (Figs. 2 and 9) between innovations observed in the ceramic assemblages of the Middle Holocene suggests that their emergence is related to structural changes in LIH (sensu Sassaman 2004b, c, 2005), which seem to be a good alternative hypothesis to explain artifactual variability without relating it exclusively to processes connected to the emergence and diffusion of early ceramic technologies. This is because that assumption is invalidated by the chronology verified in Amazonian sites where the most ancient ceramics were actually found, like Taperinha and Monte Castelo. A deeper understanding of historical contexts of the tropical lowlands around 8000 BP is fundamental to appropriately pose better questions about the advent of ceramic technologies and to test the origin hypotheses. Hypotheses relating to the emergence of ceramic technology should focus on the same chronological framework, be they based on diffusionist or multiple origin hypotheses and novelties in artifactual variability in Middle Holocene assemblages addressed by more specific regional investigations, such as those involving ethnogenetic processes.

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References

Agassiz, L. 1868. *A journey in Brazil*. Cambridge, UK: University Press: Welch, Bigelow, & Co., 540 p.

Amado, J., and L.C. Anzai. 2006. *Anais de Vila Bela 1734–1789*. Cuiabá: EdUFMT.

Baena, A.L.M. 1839. *Ensaio Corográfico sobre a Província do Pará*, Edições do Senado Federal. Vol. 30. Belém: Typ. de Santos & Menor.

Ballé, W., and C. Erickson. 2006. *Time and complexity in historical ecology: Studies in the neotropical lowlands*. New York: Columbia University Press.

Bandeira, A.M. 2008. Ocupações humanas pré-históricas no litoral maranhense: um estudo arqueológico sobre o sambaqui do Bacanga na Ilha de São Luís-Maranhão. Unpublished Master's thesis, Museu de Arqueologia e Etnologia, Universidade de São Paulo, São Paulo.

Bandeira, A.M. 2009. Arqueologia no sambaqui do Bacanga, São Luís, Maranhão: Reflexões sobre a ocorrência de cerâmica em sambaquis do litoral equatorial amazônico. *Revista Amazônica* 1 (2): 484–511.

Bandeira, A.M. 2012. Ocupações humanas pré-coloniais na Ilha de São Luís-MA: inserção dos sítios arqueológicos na paisagem, cronologia e cultura material cerâmica. Unpublished PhD thesis, Museu de Arqueologia e Etnologia, Universidade de São Paulo, São Paulo.

Bandeira, A.M. 2016. A cerâmica Mina do Maranhão. In *Cerâmicas arqueológicas da Amazônia: rumo a uma nova síntese*, ed. C. Barreto, H.P. Lima, and C.J. Betancourt, 147–157. Belém: IPHAN: Ministério da Cultura.

Barbosa Rodrigues, J. 1876. Antiguidades do Amazonas. Sernambys. *Ensaios de Sciencia*, Rio de Janeiro 4: 23–34.

Bates, H.W. 1863. *The naturalist on the river Amazon*. London: Murray.

van den Bel, M. 2012. Archaeological investigations at the Saint-Louis on the lower Maroni river: The Early Ceramic series. *Archaeology and Anthropology, Journal of the Walter Roth Museum of Anthropology* 17 (2): 1–52.

Betancourt, C. 2013. Diversidad cultural en los Llanos de Mojos. In *Arqueología Amazónica. Las civilizaciones ocultas del bosque tropical*, ed. F. Valdez. Quito: Instituto Francés de Estudios Andinos; Institut de Recherche pour le Développement; Abya-Yala.

Braudel, F. 1958. Histoire et Sciences sociales: La longue durée. *Annales Économies, Sociétés, Civilisations* 13 (4): 725–753.

Brugger, S.O., E. Gobet, J.F. van Leeuwen, M.-P. Ledru, D. Colombaroli, W. van der Knaap, U. Lombardo, K. Escobar-Torrez, W. Finsinger, and L. Rodrigues. 2016. Long-term man-environment interactions in the Bolivian Amazon: 8000 years of vegetation dynamics. *Quaternary Science Reviews* 132: 114–128. https://doi.org/10.1016/j.quascirev.2015.11.001.

Canto Lopes, P.R. 2016. Caracterização do Modo de Vida dos Sambaquieiros que Ocuparam o Litoral Paraense: Quatipuru, Pará, Brasil. Unpublished PhD thesis, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro.

Caspar, F. 1953. *Tupari: entre os índios, nas florestas brasileiras*. São Paulo: Melhoramentos.

Caspar, F. 1957. A aculturação da tribo Tupari. *Revista de Antropologia* 5 (2): 145–171. Universidade de São Paulo.

Crevels, M., and H. Van Der Voort. 2008. The Guaporé-Mamoré region as a linguistic area. In *From linguistic areas to areal linguistics*, ed. P. Muysken, 151–179. Amsterdam/Philadelphia: J. Benjamins.

Cruxent, J.M., and I. Rouse. 1961. *Arqueología cronológica de Venezuela*. Washington, DC: Unión Panamericana.

Denevan, W.M. 1964. Pre-Spanish earthworks in the Llanos de Mojos of north-eastern Bolivia. *Revista Geografica* 34 (60): 17–25.

Denevan, W.M. 1966. *The aboriginal cultural geography of the Llanos de Mojos of Bolivia*. Berkeley: University of California Press.

Dillehay, T.D. 2008. *The settlement of the Americas: A new prehistory*. New York: Basic Books, 352 p.

Echevarría, G.T. 2008. Excavaciones arqueológicas en la cuenca del Lago Rogoaguado, provincia de Yacuna (Beni, Bolivia). *Estudios Amazónicos* 5 (7): 87–150.

Eremites De Oliveira, J. 2003. Da pré-história à história indígena: (re) pensando a arqueologia e os povos canoeiros do Pantanal. *Revista de Arqueologia* (Sociedade de Arqueologia Brasileira. Impresso), São Paulo 16: 71–86.

Erickson, C. 2006. The domesticated landscapes of the Bolivian Amazon. In *Time and complexity in historical ecology: Studies in the neotropical lowlands*, ed. W. Ballé and C. Erickson, 235–278. New York: Columbia University Press.

Evans, C., and B.J. Meggers. 1960. *Archeological investigations in British Guiana*, Smithsonian Institution

Bureau of American Ethnology Bulletin, 177. Washington, DC: U.S. Govt. Print. Off.

Ferreira Penna, D.S. 1876. Breve notícia sobre os sambaquis do Pará. *Archivos do Museu Nacional do Rio de Janeiro* 1: 85–99.

Ferreira Penna, D.S. 1877. Apontamentos sobre os Cerâmios do Pará. *Archivos do Museu Nacional do Rio de Janeiro* 2: 47–67.

Figuti, L., C.R. Plens, and P.A.D. Deblasis. 2013. Small sambaquis and big chronologies: Shellmound building and hunter-gatherers in neotropical highlands. *Radiocarbon* 55: 1215–1221.

Fish, P.R., S.K. Fish, P.A.D. Deblasis, and M.D. Gaspar. 2013. Monumental shell mounds as persistent places in southern coastal Brazil. In *The archaeology and historical ecology of small scale economies*, ed. V.-D. Thompson and J.C. Waggoner Jr., 120–140. Gainesville: University Press of Florida.

Fonseca, J.G. 1748 [1874]. Primeira Exploração dos Rios Madeira e Guaporé feita por José Gonçalves da Fonseca em 1749 por Ordem do Governo. In *Memorias para a historia do extincto estado do Maranhão cujo territorio comprehende hoje as províncias do Maranhão, Piauhy, Grão-Pará e Amazonas, Tomo Segundo,* ed. C.M. de Almeida. Rio de Janeiro: Nova Typographia de J. Paulo Hildebrand.

da Fonseca, J.S. 1881. *Viagem ao Redor do Brasil (1875–1878)*. Rio de Janeiro: Typographia de Pinheiro & Co.

Fonseca, M.G. 2008. Casa de escrever no papeo: a escola Tuparí da terra indígena Rio Branco. Unpublished Master's dissertation. Universidade Federal de Rondônia, Porto Velho, 103 p.

Ford, J. A, and C. H. Webb. 1956. *Poverty point, a late archaic site in Louisiana*, Anthropological Papers, Vol. 46, Pt. 1. New York: American Museum of Natural History.

Gaspar, M.D., and M.I. Silveira. 2000. Os pescadores-coletores-caçadores do litoral Norte brasileiro. In *Pré--história da Terra Brasilis*, ed. M.C. Tenório, 247–260. Rio de Janeiro: UFRJ.

Gaspar, M.D., P.A.D. Deblasis, S.K. Fish, and P.R. Fish. 2008. Sambaqui (shell mound) societies of coastal Brazil. In *Handbook of South América archaeology*, ed. H. Silverman and W.I. Isbel, 319–335. Lisboa: Springer.

Gibson, J.L. 2001. *The ancient mounds of poverty point: Place of rings*. Gainesville: University Press of Florida.

Hartt, C.F. 1885. Contribuições para a ethnologia do Valle do Amazonas. *Archivos do Museu Nacional* 6: 1–174.

Heckenberger, M.J. 2005. *The ecology of power: Culture, place and personhood in the Southern Amazon, A.D. 1000–2000*. New York: Routledge.

Hicks, D. 2016. The temporality of the landscape revisited. *Norwegian Archaeological Review* 49 (1): 5–22. https://doi.org/10.1080/00293652.2016.1151458.

Hilbert, P. P. 1959. Achados arqueológicos num sambaqui do baixo Amazonas. *Publicação do Instituto de Antropologia e Etnologia do Pará*, Belém 10: 1–22.

Hilbert, P.P. 1968. *Archäologische Untersuchungen am mittleren Amazonas: Beiträge zur Vorgeschichte des südamerikanischen Tieflandes*. Berlin: Reimer.

Hodder, I. 1987. *Archaeology as long-term history*. Cambridge, UK: Cambridge University Press.

Hogg, A.G., Q. Hua, P.G. Blackwell, M. Niu, C.E. Buck, T.P. Guilderson, T.J. Heaton, J.G. Palmer, P.J. Reimer, R.W. Reimer, C.S.M. Turney, and S.R.H. Zimmerman. 2013. SHCal13 Southern Hemisphere calibration, 0–50,000 years cal BP. *Radiocarbon* 55 (4): 1889–1903. https://doi.org/10.2458/azu_js_rc.55.16783.

Hoopes, J.W. 1994. Ford revisited: A critical review of the chronology and relationships of the earliest ceramic complexes in the New World, 6000–1500 B. C. *Journal of World Prehistory* 1 (8): 1–49.

Hoopes, J.W. 1995. Interaction in hunting and gathering societies as a context for the emergence of pottery in the Central American Isthmus. In *The emergence of pottery. Technology and innovation in ancient societies*, ed. W.K. Barnett and J. Hoopes, 185–198. Washington, DC: Smithsonian Institution Press.

Iriarte, J., P.A.D. Deblasis, J.G. Souza, and R. Corteletti. 2016. Emergent complexity, changing landscapes, and spheres of interaction in southeastern South America during the Middle and Late Holocene. *Journal of Archaeological Research* 24: 1–63. https://doi.org/10.1007/s10814-016-9100-0.

Lombardo, U., K. Szabo, J.M. Capriles, J. May, W. Amelung, R. Hutterer, E. Lehndorff, A. Plotzki, and H. Veit. 2013. Early and middle holocene hunter-gatherer occupations in western Amazonia: The hidden shell middens. *PLoS One* 8 (8): e72746. https://doi.org/10.1371/journal.pone.0072746.

Lucídio, J. 2013. A Ocidente do Imenso Brasil: as conquistas dos rios Paraguai e Guaporé (1680–1750). Unpublished PhD dissertation. Universidade Nova de Lisboa, Lisboa.

McGuire, R. 2004. Contested pasts: Archaeology and Native Americans. In *A companion to social archaeology*, ed. Lynn Meskell and Robert W. Preucel, 374–395. Oxford: Blackwell.

Meggers, B. 1987. El origen transpacífico de la cerámica Valdivia: una reevaluación. *Boletín del Museo Chileno de Arte Precolombino* 2: 9–31.

Meggers, B. J. 1997. La cerámica temprana en América del Sur: ¿invención independiente o difusión? *Revista de Arqueología Americana*, México 13: 7–40.

Meggers, B.J, C. Evans, and E. Estrada. 1965. Early formative period of coastal Ecuador: The Valdivia and Machalilla phases. In *Smithsonian contributions to anthropology*, 1–234. https://doi.org/10.5479/si.00810223.1.1.

Meireles, D.M. 1983. Populações Indígenas e a Ocupação Histórica de Rondônia. Unpublished monography. Universidade Federal de Mato Grosso, Cuiabá.

Meskell, L. 2001. Archaeologies of identity. In *Archaeological theory today*, ed. Ian Hodder, 187–213. Cambridge, UK: Polity Press.

Meskell, L. 2005. Sites of violence: Terrorism, tourism and heritage in the archaeological present. In *Embedding ethics*, ed. L.M. Meskell and P. Pels, 123–146. Oxford: Berg.

Migliacio, M.C. 2006. O doméstico e o ritual: cotidiano Xaray no Alto Paraguai até o século XVI. Unpublished PhD dissertation. Museu de Arqueologia e Etnologia, Universidade de São Paulo, São Paulo.

Miller, E.T. 2009. Pesquisas arqueológicas no Pantanal do Guaporé-RO, Brasil: a sequência seriada da cerâmica da Fase Bacabal. In *Arqueologia interpretativa. O método quantitativo para estabelecimento de sequências cerâmicas: estudos de caso*, ed. B. Meggers, 103–117. Porto Nacional: Unitins.

Miller, E.T. 2013. Algumas culturas ceramistas, do noroeste do Pantanal do Guaporé à Encosta e Altiplano Sudoeste do Chapadão dos Parecis. Origem, Difusão/Migração e Adaptação – do Noroeste da América do Sul ao Brasil. *Revista Brasileira de Linguística Antropológica* 5 (2): 335–386.

Mizoguchi, K. 2004. Identity, modernity, and archaeology: The case of Japan. In *A companion to social archaeology*, ed. Lynn Meskell and Robert W. Preucel, 396–414. Oxford: Blackwell.

Moore, D., and A.V. Galucio 1994. Reconstruction of Proto-Tupari consonants and vowels. In *Proceedings of the meeting of the society for the study of the indigenous languages of the Americas July 2–4, 1993 and the Hokan-Penutian Workshop July 3, 1993*, 119–137.

Nelson, N. 1909. Shellmounds of the San Francisco Bay region. *University of California Publications in American Archaeology and Ethnology* 7 (4): 310–356.

Neves, E.G. 2011. Archaeological cultures and past identities in Precolonial Central Amazon. In *Ethnicity in ancient Amazonia: Reconstructing past identities from archaeology, linguistics, and ethnohistory*, ed. A. Hornborg and J. Hill, 31–56. Boulder: University of Colorado Press.

Neves, E.G. 2016. Não Existe Neolítico ao Sul do Equador: as Primeiras Cerâmicas Amazônicas e Sua Falta de Relação com a Agricultura. In *Cerâmicas arqueológicas da Amazônia: rumo a uma nova síntese*, ed. C. Barreto, H.P. Lima, and C.J. Betancourt, 32–39. Belém: IPHAN: Ministério da Cultura.

Neves, E.G., and J.B. Petersen. 2006. Political economy and pre-Columbian landscape transformations in Central Amazonia. In *Time and complexity in historical ecology: Studies in the neotropical lowlands*, ed. W. Ballé and C. Erickson, 279–310. New York: Columbia University Press.

Oliveira, E., and M.I. Silveira. 2016. A Cerâmica Mina no Estado do Pará: Oleiras das Águas Salobras da Amazônia. In *Cerâmicas arqueológicas da Amazônia: rumo a uma nova síntese*, ed. M.C. Barreto, H. Lima, and C.J. Betancort, 125–146. IPHAN/MPEG.

Oliver, J.R. 2008. The archaeology of agriculture in ancient Amazonia. In *The handbook of South American archaeology*, ed. H. Silverman and W. Isbell, 185–216. New York: Springer. https://doi.org/10.1007/978-0-387-74907-5_12.

Oyuela-Caycedo, A. 1996. The study of collector variability in the transition to sedentary food producers in northern Colombia. *Journal of World Prehistory* 10: 49–93. https://doi.org/10.1007/bf02226071.

Oyuela-Caycedo, A., and M. Bonzani. 2005. *San Jacinto I a historical ecological approach to an archaic site in Colombia*. Tuscaloosa: University of Alabama Press. https://doi.org/10.1017/s0003598x0009428x.

Pagán-Jiménez, J.R., R. Rodríguez-Ramos, B.A. Reid, M. van den Bel, and C.L. Hofman. 2015. Early dispersals of maize and other food plants into the Southern Caribbean and Northeastern South America. *Quaternary Science Reviews* 123: 231–246. https://doi.org/10.1016/j.quascirev.2015.07.005.

Perota, C. 1992. Adaptação Agrícola no baixo Xingu. In *Prehistória Sudamericana: nuevas perspectivas*, ed. B.-J. Meggers, 221–218. Santiago: Taraxacum.

Perota, C., and W.C. Botelho. 1992. Les "Sambaquis" de Guara et des variations climatiques pendant l'Holocène. In *Evolution des littoraux de Guyane et de la zone caraïbe méridionale pendant le quaternaire*, ed. M.-T. Prost, 379–395. Paris: ORSTOM.

Perota, C., and W.C. Botelho. 1994. Os sambaquis do Guará e as variações climáticas no Holoceno. *Revista do Departamento de Geografia* 7 (1): 49–59. São Paulo: Universidade de São Paulo.

Prümers, H. 2012. El Proyecto Lomas de Casarabe: investigaciones arqueológicas en los Llanos de Moxos, Bolivia. In *The past ahead. Language, culture, and identity in the neotropics*, Studies in Global Archaeology 18, ed. C. Isendahl, 139–159. Uppsala: Acta Universitatis Upsaliensis.

Pugliese Jr., F.A. 2018. A História Indígena Profunda do Sambaqui Monte Castelo um ensaio sobre a longa duração da cerâmica e das paisagens no sudoeste amazônico. Unpublished PhD Thesis, Museu de Arqueologia e Etnologia da Universidade de São Paulo, 389 p.

Pugliese, F.A., Jr., and R.B.M. Valle. 2015. A Gestão do Patrimônio Arqueológico em Territórios Indígenas: a resistência Munduruku e a preservação do patrimônio cultural frente ao licenciamento ambiental de empreendimentos em territórios tradicionais. *Revista de Arqueologia* 28: 30–51.

Reichell-Domaltoff, G. 1985. *Monsú, un sitio arqueológico*. Bogotá: Biblioteca Banco Popular.

Roosevelt, A.C. 1992. Arqueologia amazônica. In *História dos índios no Brasil*, ed. M. Carneiro Da Cunha, 53–86. São Paulo: Companhia das Letras; Secretaria Municipal de Cultura; FAPESP.

Roosevelt, A.C. 1995. Early pottery in the Amazon: Twenty years of scholarly obscurity. In *The emergence of pottery. Technology and innovation in ancient societies*, ed. W.K. Barnett and J. Hoopes, 115–131. Washington, DC: Smithsonian Institution Press.

A

Roosevelt, A. 1997. *Amazonian Indians from prehistory to the present*. Tucson/London: University of Arizona Press, 441 p.

Roosevelt, A.C. 1999. The Maritime, highland, Forest dynamic and the origins of complex culture. In *The Cambridge history of the native peoples of the Americas*, ed. F. Salomon and S.B. Schwartz, 264–349. Cambridge, UK: Cambridge University Press.

Roosevelt, A.C. 2009. A historical memoir of archaeological research in Brazil (1981–2007). *Boletim do Museu Paraense Emílio Goeldi Ciências Humanas* 4 (1): 155–170. https://doi.org/10.1590/s1981-81222009000100013.

Roosevelt, A.C., R.A. Housley, M.I. Silveira, S. Maranca, and R. Johnson. 1991. Eighth millennium pottery from a prehistoric Shell Midden in the Brazilian Amazon. *Science* 254 (5038): 1621–1624.

Russo, M. 1996. Southeastern Archaic mounds. In *Archaeology of the mid-Holocene southeast*, ed. K.E. Sassaman and D.G. Anderson, 259–287. Gainesville: University Press of Florida.

Sassaman, K.E. 1993. *Early pottery in the Southeast: Tradition and innovation in cooking technology*. Tuscaloosa: The University of Alabama Press, 305 p.

Sassaman, K.E. 2004a. Structure and practice in the Archaic Southeast. In *North American archaeology*, ed. T.K. Pauketat and D.D. Loren, 79–107. Oxford: Blackwell.

Sassaman, K.E. 2004b. Common origins and divergent histories in the early pottery traditions of the American Southeast. In *Early pottery: Technology, style, and interaction in the lower Southeast*, ed. Rebecca Saunders and Christopher Hays. Tuscaloosa: University of Alabama Press.

Sassaman, K.E. 2004c. Complex hunter–gatherers in evolution and history: A North American perspective. *Journal of Archaeological Research* 12 (3): 227–280.

Sassaman, K.E. 2005. Poverty point as structure, event, process. *Journal of Archaeological Method and Theory* 12: 335–364.

Schlanger, S. 1992. Recognizing persistent places in Anasazi settlement systems. In *Space, time, and archaeological landscapes*, ed. J. Rossignol and L. Wandsnider, 91–112. New York: Plenum Press.

Schmitz, P.I., J.H. Rogge, A.O. Rosa, and M.V. Beber. 1998. Aterros Indígenas no Pantanal do Mato Grosso do Sul. *Pesquisas Antropologia* 54: 1–271.

Schmitz, P.I., J.H. Rogge, A.O. Rosa, M.V. Beber, and E.A.V. Freitas. 2009. Aterros da Tradição Pantanal nas fazendas Sagrado Coração de Jesus e Bodoquena, Corumbá, MS. *Pesquisas Antropologia* 8 (1): 321–374.

Silveira, M. I., and D. P. Schann. 2005. Onde a Amazônia encontra o mar: estudando os sambaquis do Pará. *Revista de Arqueologia*, São Paulo 18: 67–79.

Silveira, M.I., M.C.L. Rodrigues, E. Oliveira, and L.M. Losier. 2008. Sequência cronológica de ocupação na área do Salobo (Pará). *Revista de Arqueologia, Belém* 21 (1): 61–84.

Silveira, M.I., E. Oliveira, D.C. Kern, M. Costa, and S. Rodrigues. 2011. O sítio Jabuti, em Bragança, Pará, no cenário arqueológico do litoral amazônico. Boletim do Museu Paraense Emílio Goeldi. *Ciências Humanas* 6 (2): 335–345.

Simões, M. F. 1981. Coletores-pescadores ceramistas do litoral do Salgado (Pará). *Boletim do Museu Paraense Emílio Goeldi*, Nova Série: Antropologia, Belém 78: 1–26.

Snethlage, E.H. 1937. *Atiko y: meine Erlebnisse bei den Indianern des Guaporé*. Berlin: Klinkhardt & Biermann.

von den Steinen, K. 1886. *Durch Central-Brasilien: Expedition zur Erforschung des Schingú im J. 1884*. Leipzig: Brockhaus, 372 p.

von den Steinen, K. 1894. *Unter den Naturvölkern Zentral-Brasiliens. Reiseschilderungen und Ergebnisse der zweiten Schingú-Expedition 1887–1888*. Berlin: Geographische Verlagsbuchhandlung von Dietrich Reimer, 648 p.

Thompson, V.D., and J.C. Waggoner. 2013. *The archaeology and historical ecology of small scale economies*. Gainesville: University Press of Florida.

Tupari, I. 2013. Puop'orop Toap, Um Estudo Sobre A Educação Indígena Tupari. Unpublished monography. Fundação Universidade Federal de Rondônia, Ji-paraná.

Uhle, M. 1907. The Emeryville shellmound. *University of California Publications American, Archaeology and Ethnology* 7 (1): 107.

Ulm, S. 2013. 'Complexity' and the Australian continental narrative: Themes in the archaeology of Holocene Australia. *Quaternary International* 285: 182–192. https://doi.org/10.1016/j.quaint.2012.03.046.

Van der Leeuw, S., and C.L. Redman. 2002. Placing archaeology at the center of socio-natural studies. *American Antiquity* 67 (4): 597–605.

Watling, J., J. Iriarte, B.S. Whitney, E. Consuelo, F. Mayle, W. Castro, D. Schaan, and Ted R. Feldpausch. 2015. Differentiation of neotropical ecosystems by modern soil phytolith assemblages and its implications for palaeoenvironmental and archaeological reconstructions II: Southwestern Amazonian forests. *Review of Palaeobotany and Palynology*. https://doi.org/10.1016/j.revpalbo.2015.12.002.

Watling, J., J. Iriarte, F. Mayle, D. Schaan, L.C.R. Pessenda, N.J.F. Loader, A. Street-Perrott, R.E. Dickau, A. Damasceno, and A. Ranzi. 2017. Impact of pre-Columbian "geoglyph" builders on Amazonian forests. *PNAS*. https://doi.org/10.1073/pnas.1614359114.

Williams, D. 1981. Excavation of the Barambina shell mound northwest district: An interim report. *Archaeology and Anthropology*, Georgetown 4(1–2): 13–38.

Williams, D. 1997. Early pottery in the Amazon: A correction. *American Antiquity* 62 (2): 342–352.

Zedeño, M.N., and B.J. Bowser. 2009. The archaeology of meaningful places. In *The archaeology of meaningful places*, ed. M.N. Zedeño and B.J. Bowser, 1–14. Salt Lake City: The University of Utah Press.

Zeidler, J.A. 2003. Settlement process and historical contingency in the western Ecuadorian formative. In *Archaeology of formative Ecuador*, ed. J.S. Raymond and R.L. Burger, 69–123. Washington, DC: Dumbarton Oaks.

Zimpel Nt, C.A., and F.A. Pugliese Jr. 2016. A fase bacabal e suas implicações para a Interpretação do Registro Arqueológico no Médio Rio Guaporé, Rondônia. In *Cerâmicas arqueológicas da Amazônia: rumo a uma nova síntese*, ed. M.C. Barreto, H. Lima, and C.J. Betancort, 420–434. IPHAN/MPEG.

Ambrosetti, Juan Bautista

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Basic Biographical Information

Considered the "father" of Argentine archeology, Ambrosetti was born in 1865 in Gualeguay, Entre Rios Province, but lived most of his life in Buenos Aires. He initially became interested in natural sciences, interacting very young with eminent naturalists Eduardo Holmberg, Florentino Ameghino, and Pedro B. Scalabrini. At the age of 20, he visited indigenous reductions in Santa Fe Province and overturned this experience in a first book entitled *Viaje de un maturrango*, published in 1893 and signed with the pseudonym Tomas Bathata. There he expressed a strong criticism about progress and modern society, in line with the relativistic thinking of his teacher Scalabrini.

Between 1885 and 1891, he lived in the city of Paraná, where he held the positions of Head at the Section of Zoology at Natural Sciences Museum, President of the Library, and Secretary of the Police Department. Once he moved back to Buenos Aires, he undertook expeditions to Misiones Province and the Pampa, supported by La Plata Museum and the Argentine Geographic Institute. From the moment he was commissioned to explore the Argentine Northwest in 1895, archeology became his main interest (Cáceres Freyre 1967).

In 1903 he became the substitute professor of American Archaeology in the Faculty of Arts at the University of Buenos Aires, where he founded the following year the Ethnographic Museum that bears his name today. He remained as director until his death in 1917. During his last years of life, Ambrosetti was also an active participant at international conferences, especially the Congress of Americanists (Cáceres Freyre 1967). Some colleagues used to refer to him as "our national archeologist" given the active role played along these instances.

Major Achievements

Ambrosetti's contributions on Carahuasi rock art cave, the ruins of Quilmes, and Tafi menhirs are remarkable. He was, along with Adan Quiroga, the initiator of the research field called "Calchaquí studies." His *Notes on Calchaquí Archaeology* (Ambrosetti 1899) are a good example of the so-called philological-historical approach to archeological matters (Haber 1995). Focused on symbolic interpretation, it bears traits in common with contemporary developments in American anthropological archeology. In fact Ambrosetti was highly interested on similarities among the Pueblo Indians and Calchaquí populations, as pointed out earlier by the Dutch anthropologist Ten Kate, participant of Cushing's expeditions to the American Southwest.

To this first stage in Ambrosetti's production belongs *The Ancient City of Quilmes* (Fig. 1) (Ambrosetti 1897), his most accomplished work of interpretation that was not devoted to symbolism but to the functionality of the stone buildings of one of the most visited sites in Argentina today. Ambrosetti described the ruins with an unprecedented level of detail in Argentine archeology – counting with the support of the illustrations by Federico Voltmer – and was able to successfully define the shape of the calchaquí house, now known for this reason as "Ambrosetti house" (Fig. 2). He used historical data from the time of the Spanish conquest to provide a plausible working model of the bigger and most complex

Ambrosetti, Juan Bautista, Fig. 1 Rock art at Quebrada del Chuzudo, studied by Ambrosetti in his work "The Ancient City of Quilmes". (Photo by Javier Nastri)

Ambrosetti, Juan Bautista, Fig. 2 Interior courtyard of an "Ambrosetti-type house" at Quilmes site, Tucumán province. (Photo by Javier Nastri)

Ambrosetti, Juan Bautista, Fig. 3 Ambrosetti (in the center) and local workers at Pampa Grande, Salta Province, 1906. (Photo courtesy Historical Archive of the Ethnographic Museum "J.B. Ambrosetti", University of Buenos Aires)

Calchaquí settlement, located at the center of Santa María Valley, Tucumán Province.

In the early twentieth century, his work shifted to a more descriptive approach, probably along with the lines spread by Flinders Petrie and Max Uhle (Nastri 2010). In this vein, he published a rigorous study of pre-Columbian metallurgy (Ambrosetti 1904) and the first extensive monograph of an archeological excavation in northwestern Argentina (Fig. 3), in which contexts and findings were presented in detail (Ambrosetti 1906). The analysis of the materials recovered from this site allowed him to build the second chronological statement based on contextual data in the Argentine medium, identifying a *Calchaquí* component superimposed on the remains of a culture which he called "inferior" at the site of Pampa Grande (Salta Province).

Ambrosetti's masterpiece is the monumental *Archaeological Explorations at the Prehistoric City of La Paya* (Ambrosetti 1907), where he presented the contents of hundreds of burials from Inca and earlier times. This detailed evidence soon allowed Max Uhle to establish a first relative chronology of aboriginal times in northwestern Argentina (Nastri 2010).

On the whole, Ambrosetti's work at the Ethnographic Museum of the University of Buenos Aires contributed to position archeology in the field of humanities, while its innovative actions on archeological sites laid the foundation for the vigorous Argentinean tradition of field research to this day.

Cross-References

- ▶ Petrie, William Matthew Flinders
- ▶ Santa María, Geography and Culture of
- ▶ Uhle, Friedrich Max

References

Ambrosetti, J.B. 1897. La antigua ciudad de Quilmes (Valle calchaquí). *Boletín del Instituto Geográfico Argentino* 18: 33–70.

Ambrosetti, J.B. 1899. *Notas de arqueología calchaquí*. Buenos Aires: Imprenta La Buenos Aires.

Ambrosetti, J.B. 1904. El bronce en la región calchaquí. *Anales del Museo Nacional de Buenos Aires* 11: 163–314.

Ambrosetti, J.B. 1906. *Exploraciones arqueológicas en la Pampa Grande*. Buenos Aires: Universidad de Buenos Aires.

Ambrosetti, J.B. 1907. *Exploraciones arqueológicas en la ciudad prehistórica de La Paya (Valle calchaquí, Prov. de Salta)*. Buenos Aires: Universidad de Buenos Aires.

Cáceres Freyre, J. 1967. *Juan B. Ambrosetti*. Buenos Aires: Ediciones Culturales Argentinas.

Haber, A. 1995. Supuestos teórico-metodológicos de la etapa formativa de la arqueología de Catamarca (1875–1900), Cuadernos de Investigación de la Facultad de Filosofía y Humanidades 47(Publicaciones arqueología) 1994, 31–54.

Nastri, J. 2010. Una cuestión de estilo. Cronología cultural en la arqueología americanista de la primera mitad del siglo XX. In *Historias de arqueología sudamericana*, ed. J. Nastri and L. Menezes Ferreira, 95–121. Buenos Aires: Fundación Azara.

Further Readings

Debenedetti, S. 1917. Ambrosetti y su obra científica. *Revista de Filosofía* 5: 211–259.

Fernández, J. 1982. Historia de la arqueología argentina. *Anales de Arqueología y Etnología* 34-35: 1–100.

Podgorny, I. 2008. La prueba asesinada. El trabajo de campo y los métodos de registro en la arqueología de los inicios del siglo XX. In *Saberes locales. Ensayos sobre historia de la ciencia en América Latina*, ed. Gorbach, F., and C. López Beltrán, 169–205. México: El colegio de Michoacán.

American Academy in Rome

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Basic Information

The American Academy in Rome, founded in 1894 and chartered by the US Congress in 1905 and 1912, is an independent center for the development of US artists and scholars. Its present institutional form dates to 1914, when the American Academy, newly consolidated with the American School of Classical Studies in Rome (founded in 1895 under the auspices of the Archaeological Institute of America), took up a joint campus on the Janiculum Hill, encompassing 11 acres.

The Academy still operates under its 1912 charter as "an institution for the study and practice of the fine arts and for the study and investigation of the archaeology, literature, and history of the Classical and later periods." The Academy appoints its "Rome Prize" Fellows through a juried competition (with now typically four out of an annual total of c. 30 fellowships reserved for ancient studies). In addition to a small staff (which includes a Professor-in-Charge for the humanities), a complement of residents (appointed by the Academy's Director), affiliated fellows, and visiting scholars and artists presently fill out the Academy community each year.

Major Impact

The Academy's most significant contribution to archaeology is the five decades (1947–1999) of excavation it organized at the site of the Latin colony of Cosa in southwestern Tuscany, tracing developments in the town and its territory from the important era of growth in the second century BCE through the early and later imperial and then Medieval periods. More generally, the Academy can be credited for the field training of many American archaeologists at Cosa and other more loosely sponsored digs in Rome and Italy, as well as through various summer programs it has offered.

By the time of the physical merger of the American Academy and American School on Rome's Janiculum in 1914, the School had a substantial library, an archaeological museum (principally assembled by Richard Norton, its Director from 1899 to 1907) and cast collection, a $100,000 endowment, and continuing

subscriptions from a number of foundations and colleges. It also had admitted women members since the turn of the century. However, the consolidated American Academy, now organized into two schools ("Fine Arts" and "Classical Studies"), would see women as full Fellows only in the Classics and Archaeology fields until the post-World War II period.

The pivotal year 1914 opened with Albert William Van Buren (American School Fellow in 1906) as Professor of Archaeology and in charge of the library. In that same year, the death of Thomas Spencer Jerome (US Consul on Capri) brought an important endowment jointly to the Academy and University of Michigan for a lecture series on Roman topics that bears his name. A journal, *Memoirs of the American Academy in Rome*, began in 1915, with a *Papers and Monographs* series soon to follow in 1919. In the period between the two Wars, Van Buren closely supervised an archaeologically based course of study for the Classical Fellows and shorter-term visiting students that included intensive explorations in Rome and travel in Latium, Campania, and Greece. (Links between the new Rome Academy and the American School of Classical Studies at Athens, which date to 1881, were close from the start.) A Classical Summer School was founded in 1923 that condensed the curriculum for Rome and environs for the benefit of American teachers of classics.

The disruptions caused by World War II led to the shutting of the Academy from 1940 to 1945. By that time, the institution had firmly established itself as a premier archaeological training ground for future American academics and museum curators. The Academy's impact here can perhaps best be seen in the significant number of both its scholars and artists who played a prominent role in forming and serving in the military Monuments, Fine Arts, and Archives (MFA&A) section that proved highly effective in preserving cultural properties in Europe during and immediately following the Second World War. The Academy also opened its properties in 1945 and 1946 for "leave courses" in archaeology and other subjects to military personnel and members of the US Embassy in Rome.

During the war years, the Academy's Trustees decided that it would henceforth broaden the institution's humanistic fields to encompass Medieval and Renaissance studies and (apparently with a view toward reducing overhead) discontinue the system of courses in both the Schools of Fine Arts and Classical Studies. These were significant choices that proved decisive for the Academy's present identity as a center for independent study and advanced research. Other measures included a revitalization of the Jerome Lectures and energetic participation in the new (1946) International Union of the Academies in Rome and International Association of Classical Archaeology (AIAC). The creation of the Fulbright Program in 1946 soon enabled the Academy to introduce two Italian scholars per year into the community, many of them archaeologists. One of the most important dividends of the "internationalization" of the postwar Academy was German photographer Ernest Nash's establishment there in 1957 of the Fototeca Unione archive, which remains a vital center of visual documentation on Roman architecture and topography.

Already in 1944, the Academy's Trustees had started discussions about finding a working excavation site once peace was restored in Italy. In 1947, former Fellow (and Yale University faculty member) Frank E. Brown returned to the freshly reopened Academy as Professor-in-Charge and Director of Excavations. Brown moved quickly to systematize and prune the Academy's museum holdings and to identify Cosa as the most promising site for an institutional dig. Excavations started at Cosa in 1948, and work continued (under Brown for almost three decades, followed by Russell T. Scott, and then Elizabeth Fentress) at regular intervals until 1999 with a series of publications that is still ongoing. The Academy also constructed a small museum on the site (1964–1968), which it turned over to the Italian government in 1981 when it was fully furnished. The research methods and results from especially the early years of work at Cosa have done much to stimulate work in Republican urban archaeology elsewhere in Italy, most directly Fregellae, and provided valuable comparanda for other sites,

including the situation of Republican Rome itself. Excavations that followed up the Academy's work resumed at Cosa under Russell T. Scott in 2013.

The postwar years saw the Academy make repeated attempts to expand its public acceptance in the United States and to increase revenues for its ambitious programs, including the Cosa excavations. Financial pressures led to the creation of a full-time paid Executive President based in New York starting in 1969. But one of many welcome developments was the decision in 1973 by the Andrew W. Mellon Foundation to endow the position of Professor-in-Charge, with Frank Brown as the first incumbent (1974–1976).

Though the central organization of the sustained work at Cosa as a multiyear institutional project has so far proved unique, the Academy has sponsored numerous other excavations at varying levels. These range from work in Rome by Frank Brown on the Regia (1964–1966), Russell T. Scott in the Area Sacra of Vesta (1987–1996), and Eric Hostetter on the northeast slope of the Palatine hill (1989–1995) to formal patronage of a large-scale University of Michigan excavation at Gabii in Italy conducted by Nicola Terrenato (2008–present), the Porta Stabia excavations at Pompeii (Steven Ellis, University of Cincinnati) and the Contrada Agnese at Morgantina (Alex Walthall, University of Texas). The American Academy also has established a series of summer programs on the analogy of its long-standing Classical Summer School, ranging from immersive experiences in general archaeology (annually from 1991 to 2012) and Roman pottery (first in 2006) to a series of rotating skills courses including epigraphy, ancient building documentation, and digital finds analysis. An effort of some 25 years to reorganize and properly catalogue the Academy's museum holdings has resulted in the creation of a new (2008) archaeological repository and seminar room dedicated to Richard Norton and A. W. Van Buren and a new archive for its excavation documentation, including the Cosa and Regia excavations, much of which is also available online at the Academy's website (aarome.org).

Notable past Fellows of the American Academy and its predecessor the American School who have made significant contributions in Mediterranean archaeology include Charles Rufus Morey (completing his Fellowship in 1903), Esther Boise Van Deman (1909), Charles Densmore Curtis (1915), Lily Ross Taylor (1920), Charles Alexander Robinson (1926), Howard Comfort (1929), James Henry Oliver (1930), Frank E. Brown (1933), Lucy Shoe Merritt (1937), Lawrence Richardson, Jr. (1950), Emeline H. Richardson (1952), William L. MacDonald (1956), Michael Jameson (1959), R. Ross Holloway (1960), Maria Teresa Moevs (1964), James Packer (1964), Susan Downey (1965), Russell T. Scott (1966), Malcolm Bell III (1970), Joseph Carter (1971), Eric Hostetter (1983), Ingrid Edlund-Berry (1984), and C. Brian Rose (1992), among many others. Archaeologists have often filled the rotating post of Professor-in-Charge, most recently Elizabeth Fentress (1996–1999), Archer Martin (1999–2001), and 2006 Fellow Kimberly Bowes (2012–2014, then serving as Academy Director into 2017).

Cross-References

▶ Archaeological Institute of America (AIA)
▶ Latium Vetus, Latium Adjectum

Further Reading

Bonfante, L., and H. Nagy, eds. 2016. *The collection of antiquities of the American Academy in Rome*. Ann Arbor: University of Michigan Press.

Goldman, N.W., ed. 2001. *New light from ancient Cosa: Classical Mediterranean studies in honor of Cleo Rickman Fitch*. New York: Peter Lang.

Kohl, B.G., et al. 1995. *The centennial directory of the American Academy in Rome*. New York/Rome: American Academy in Rome.

Scott, R.T. 1995. The academy and the school of classical studies. In *American Academy in Rome: Celebrating a century*, 84–88. New York: American Academy in Rome.

Valentine, A., and L.N. Valentine. 1973. *The American Academy in Rome, 1894–1969*. Charlottesville: University Press of Virginia.

American Anthropological Association (AAA) and Ethics

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Introduction

The American Anthropological Association (AAA), established in 1902 and currently with over 10,000 members, has a long and conflicted history of professional ethics. Originally comprised mainly of academic anthropologists, the organization now features members with employment both inside and outside of the academy. Anthropologists today can be found in the classroom, the boardroom examining organizational behavior, in a hospital room observing practitioners, or at a construction site assessing the significance of archaeology. Anthropologists undertake a particularly wide array of research methods, from physical measurements and blood draws by biological anthropologists to ethnographic interviewing and participant observation by cultural anthropologists, to the collection of artifacts and oral histories by archaeologists, and more. As a result, anthropologists encounter wide-ranging instances of ethical dilemmas and debates.

Key Issues

Since its founding, the AAA has grappled with what it means to be an ethical anthropologist, with significant debates on the subject continuing (Fluehr-Lobban 2003). In the AAA Code of Ethics (2009), the emphasis was on a "primary ethical obligation" to the "people, species, and materials they study and to the people with whom they work." This statement was congruent with the description of an anthropologist's primary obligation going back to the first comprehensive statement about ethics established by the AAA in 1971. Other responsibilities are to colleagues, students, employers, and to scholarship itself. The Principles of Professional Responsibility (PPR) established in 2012 state: "A primary ethical obligation shared by anthropologists is to do no harm" (available in AAA 2017). At the same time, the 2012 version emphasizes the complexity, fluidity, and potential internal conflicts of competing ethical considerations to be found in anthropological work. Because of the multiple ethical mandates with which anthropologists must engage, the AAA Code of Ethics attempts to provide suggested guidelines for best practice but rarely provides easy answers. The most recent version utilizes the capacities of the Internet to provide ongoing commentary, debate, and examples through lively blog exchanges and other means.

Development of the AAA Code of Ethics was not an immediate priority for the organization. In fact, the first formal code of ethics passed by an anthropological group was enacted in 1948 by the Society for Applied Anthropology. The concept of applied anthropology itself has engendered its own set of debates. In 1971 the AAA issued the Principles of Professional Responsibility, and in 1998, after much contentious discussion, a formal AAA Code of Ethics replaced this. That document was revised in 2009, resulting in a more nuanced version that is purposefully ambiguous on questions of classified research, leaving it up to the individual anthropologist to interpret. Intense deliberation over the AAA Code of Ethics continued for several years – this ongoing debate was prompted in part by highly publicized programs, like the Human Terrain System (HTS) in which some anthropologists have worked for the US military in Afghanistan and Iraq. At the same time, there are growing numbers of scholars who have started doing proprietary research for public and private companies and institutions, another contentious ethical topic for the AAA. Central issues for anthropologists engaging in these types of action are those of transparency, consent, conflicting obligations (toward funders, employers, the AAA, etc.), and the dissemination of the research outcomes. The most current code,

the 2012 Principles of Professional Responsibility, focuses on these issues.

Historically, conversations surrounding ethical issues within the AAA have been reactive rather than proactive, generated by moments of crisis like Vietnam, Cambodia, Project Camelot (the 1964–1965 US Army project to assess the sources of insurgency in Latin America using knowledge gained from anthropologists and other social scientists), and, most recently, the US Army's Human Terrain System and the potential destruction of the archaeological record during uprisings in Egypt, Libya, Qatar, Syria, and the Yemen. Changes to the code in the 1990s were intended to address earlier failings, but events in Iraq and Afghanistan in the mid-2000s renewed calls for a more active policy on ethics. Throughout the AAA's debate on ethics, critics have charged that the association has been too slow to respond to critical issues and that it has been unwilling to maintain a process for repudiating actions judged unethical. While a sanctioning process was established in 1971, it proved unworkable and was ended in the mid-1990s (Levy 2009).

Former chair of the AAA Committee on Ethics, Janet Levy, has suggested that earlier iterations of the ethical code provided no real guidance or direction for archaeologists and/or biological anthropologists to deal with issues such as the destruction of archaeological resources, the international trade in antiquities, or the bushmeat trade in nonhuman primates. For many years, ethics work by the AAA focused entirely on issues of cultural/linguistic anthropologists; the four-field nature of anthropology was not captured in ethics debates (Levy 1994). Since 1998, there have been limited attempts to speak to the issues encountered by archaeologists and biological anthropologists in the AAA's ethical statements.

Anthropological archaeologists have duties to systematically excavate, analyze, and report on the archaeological record while collaborating with the local communities and governments where they work. There are overarching issues of control over the production of archaeological knowledge, custodianship of cultural heritage, the legacy of colonialism, and ongoing requests for the repatriation of artifacts and remains (Bruchac et al. 2010). The Native American Graves Protection and Repatriation Act of 1990 (and its recent amendments) was passed to address the rights of lineal descendants, Indian tribes, and Native Hawaiian organizations to Native American cultural items, including human remains, funerary objects, sacred objects, and objects of cultural patrimony. This has encouraged both archaeologists and museums to reevaluate their practices in relation to Native American materials.

The relationship of archaeologists with the military also raises difficult issues. In 1919, Franz Boas, one of the founding members of the AAA, was censured by the organization for his critique in *The Nation* of anthropologists (including archaeologists) who acted as informants (spies) during WWI. Recently archaeologists who work with the military to protect archaeological sites in Iraq, Afghanistan, and Syria have faced condemnation by some anthropological colleagues for collusion and for implied support for military intervention. As it currently states, the AAA's Principles of Professional Responsibility (2012) are intended to provide anthropologists with the tools needed to engage in the development and maintenance of an ethical framework, especially when faced with conflicting ethical obligations. Critics find the wording overly vague and not appropriately prescriptive.

The current PPR, while briefly incorporating mention of specifically archaeological issues (such as site protection), retains the historic AAA focus on relationships among people. However, this remains useful for archaeologists, especially as archaeological practice turns toward more collaborative and community-oriented projects, which involve the same complex human relationships as cultural anthropology (e.g., Little and Shackel 2007; Silliman 2008). Recognizing that issues related to cultural heritage are a persistent and an increasingly important element of anthropology, in 2013 the AAA empaneled the Task Force on Cultural Heritage to produce a series of recommendations, which would allow the organization to take a more proactive rather than reactive stance on

threats to cultural heritage (broadly defined to include tangible and intangible aspects). The task force's goal was to increase appreciation of cultural heritage issues in anthropological discourse and to assist the AAA Executive Board in developing effective positions and practices on cultural heritage issues in the USA and internationally. In response to the recommendations made by the Task Force in July 2016, the AAA Executive Board released a statement on *Cultural Heritage Principles and Values* (American Anthropological Association 2016), which includes some guiding principles and best practices for AAA members related to cultural heritage.

At best ethics in anthropology are situational and often contradictory. Arriving at a code of ethics for the practice of anthropology is a long, negotiated, ongoing process, which is greatly enhanced by education and the recognition that there are complex conversations involving the various scenarios that anthropologists from all areas of the discipline face. Just as there are often no truly right and wrong answers, anthropologists can in no way consider codes of ethics the last word on ethical practice. All ethical debates are ongoing projects.

Cross-References

- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Forensic Anthropology: Definition
- ▶ Repatriation: Overview
- ▶ Stakeholders and Community Participation

References

American Anthropological Association (AAA) 2016. AAA *executive board: Cultural heritage principles and values*, July 25, 2016. http://www.americananthro.org/ParticipateAndAdvocate/AdvocacyDetail.aspx?ItemNumber=20528&navItemNumber=592. Accessed 13 Aug 2017.

American Anthropological Association (AAA). 2017. *Ethics resources*. http://www.americananthro.org/ParticipateAndAdvocate/Content.aspx?ItemNumber=1895&RDtoken=9542&userID=6944. Accessed 5 Aug 2017.

Bruchac, M.M., S.M. Hart, and H.M. Wobst. 2010. *Indigenous archaeologies: A reader on decolonization*. Walnut Creek: Left Coast Press.

Fluehr-Lobban, C. 2003. *Ethics and the profession of anthropology. Dialogue for ethically conscious practice*. Walnut Creek: AltaMira Press.

Levy, J. 1994. Anthropological ethics, the PPR and the COE: Thoughts from the front line. *Anthropology Newsletter* 35 (2): 1–5.

Levy, J. 2009. Life is full of hard choices: A grievance process for the AAA? *Anthropology Newsletter* 50 (6): 7–8.

Little, B., and P. Shackel. 2007. *Archaeology as a tool of civic engagement*. Lanham: AltaMira Press.

Silliman, S. 2008. *Collaborating at the Trowel's edge: Teaching and learning in indigenous archaeology*. Tucson: University of Arizona Press.

American Association of Physical Anthropologists (AAPA)

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Basic Information

The American Association of Physical Anthropologists (AAPA) was founded in 1930 after being proposed to and supported by Section H (Anthropology) of the American Association for the Advancement of Science (AAAS) in 1928. Aleš Hrdlička was the principle driving force behind the founding of the AAPA, also having launched the *American Journal of Physical Anthropology* (*AJPA*) in 1918. Hrdlička served as the first editor of the journal (1918–1942) and the first President of the AAPA (1930–1931). An early history of the AAPA in Spanish can be found in Comas (1969) with an English translation by Alfonso and Little (2005). Today, the AAPA (http://www.physanth.org/) has grown from its charter membership of 83 in 1930 to a

membership of nearly 2000 physical or, as often called, biological anthropologists. The early members were drawn from anatomical, medical, and anthropological professions, whereas contemporary membership is broadly represented by the biological, medical, and social sciences. It is the largest professional society in physical/biological anthropology in the world. Annual meetings often draw 1000 or more professional, associate, and student members and other attendees.

Major Impact

The professional goals of the Association are to promote and advance the development of research, education, and public outreach within the science of physical (biological) anthropology. Theoretical perspectives and the content of research in biological anthropology are derived from a number of sources. Of primary importance is *human evolution*, including past processes, as represented by human fossil remains and artifacts reflecting past human cultures. Human evolution is also studied as ongoing evolution, that is, the diversification of humans by microevolutionary and hereditary processes. Another theoretical focus is on the uncovering of patterns of *human variation* and its sources – evolutionary, developmental, and historical. A third theoretical focus derives from its anthropological roots: this is the search for *interactive biological and cultural/behavioral processes* that define us as human. Current subfields of biological anthropology include skeletal biology, bioarchaeology, forensic anthropology, human population genetics and molecular anthropology, human population biology, reproduction and child growth, paleoanthropology, and primatology. Each of these subfields is represented by members of the AAPA, and substantial cross-disciplinary research is conducted by these members and others from the biological, health, and anthropological sciences.

The AAPA officers include a President, either Past President or President-Elect, Vice President, and Secretary-Treasurer. The Executive Committee is constituted of these four officers, the two editors of the *AJPA* and the *Yearbook*, and four additional elected members. A new nonvoting member of the Executive Committee is a graduate student liaison. There are a number of specific subcommittees charged with issues of career development, education, history, awards, and the like. A Code of Ethics was prepared in 2003, and "Position Statements" cover a variety of topics that are germane to the profession. Some of these include positions on "Biological Aspects of Race," "Native American Graves Protection and Repatriation Act (NAGPRA)," "Teaching 'Scientific Creationism' in Public Schools," and "Disposition of Culturally Identifiable Human Remains."

There are two publications associated with the AAPA: *American Journal of Physical Anthropology* and the *Yearbook of Anthropology*. The journal, which began as a quarterly, is now published 12 times each year, with an additional issue devoted to the annual meeting program and abstracts. The *Yearbook* was founded in 1946 by Sherwood L. Washburn and Gabriel W. Lasker as an annual that originally published reprints of important articles that were not easily available to North American anthropologists, as well as reports of the Wenner-Gren Foundation summer workshops in the 1940s and early 1950s. During the 1970s, the Yearbook was reorganized to publish solicited and unsolicited reviews of important topics to the profession. The annual meeting, usually held in the spring, and which at its inauguration included 30 papers, now constitutes a program with more than 400 posters and 400 podium presentations. The AAPA annual meeting ordinarily meets for 3 days. However, there are a number of smaller sister societies that meet in conjunction with the AAPA which lengthens the meeting to 5 or 6 days. These societies are American Dermatoglyphics Association, American Association of Anthropological Genetics, Dental Anthropology Association, Human Biology Association, Paleoanthropology Society, and Paleopathology Association.

Numerous awards and sponsorships are provided by the AAPA for professional members and for student members. The Charles R. Darwin Lifetime Achievement Award (est. 1992) and the Gabriel W. Lasker Service Award (est. 2006) are

given annually. There is an Early Career Executive Committee Mentoring Opportunity that carries with it travel funding, and several Professional Development Grants for early-career, nontenured faculty or postdocs. The William S. Pollitzer Student Travel Awards to attend the annual meeting were given to more than 40 students in 2012. Finally, there are cash awards for Student Presentation Prizes given for outstanding poster or podium presentations. Five prizes are named after distinguished past members of the AAPA: Juan Comas, Earnest A. Hooton, Aleš Hrdlička, Mildred Trotter, and Sherwood L. Washburn. These awards and prizes recognize the achievements of senior and junior members of the AAPA, and they support the next generation of biological anthropologists as developing scientists.

The American Association of Physical Anthropologists is an active professional society that has been growing in membership since its beginning in 1930. With the exception of the WW II years, there have been annual meetings each year, and the journal will have its 100th anniversary in less than a decade (2018). Fiftieth anniversary (Boaz and Spencer 1981; Spencer 1982) and 75th anniversary (Little and Kennedy 2010) reviews of physical anthropology and the AAPA provide overviews at these time junctures.

Cross-References

- ▶ Darwin, Charles R.
- ▶ Forensic Anthropology: Definition
- ▶ Hrdlička, Aleš
- ▶ Paleoanthropology Society
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice

References

Alfonso, M.P., and M.A. Little. (trans. & ed.). 2005. Juan Comas's summary history of the American Association of Physical Anthropologists (1928–1968). *Yearbook of Physical Anthropology* 48:163–195.

Boaz, N.T., and F. Spencer, eds. 1981. 1930–1980: Jubilee Issue. *American Journal of Physical Anthropology* 56 (4): 327–535.

Comas, J. 1969. *Historia Sumaria de la Asociación Americana de Antropólogos Físicos (1928–1968)*. Mexico: Instituto Nacional de Antropologia e Historia.

Little, M.A., and K.A.R. Kennedy, eds. 2010. *Histories of American physical anthropology in the twentieth century*. Lanham: Rowman & Littlefield.

Spencer, F. 1982. *A history of American physical anthropology: 1930–1980*. New York: Academic Press.

Further Readings

Brace, C.L. 2005. *"Race" is a four-letter word: The genesis of the concept*. New York: Oxford University Press.

Spencer, F., ed. 1997. *History of physical anthropology: An encyclopedia*. New York: Garland.

American Institute for Conservation of Historic and Artistic Works (AIC)

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Basic Information

The American Institute for Conservation of Historic and Artistic Works (AIC; http://www.conservation-us.org) is the national membership organization supporting conservation professionals in preserving cultural heritage by:

Establishing and upholding professional standards

Promoting research and publications

Providing educational opportunities

Fostering the exchange of knowledge among conservators, allied professionals, and the public

Incorporated as a nonprofit organization under article 501(c)(6) of the US tax code in 1972, its membership of over 3400 includes archaeological conservators who are active around the world.

AIC holds annual meetings in venues across the United States. General session themes range from the theoretical to the practical, while specialty group sessions focus on topics of particular interest to those practicing in fields ranging from architecture, books and paper, electronic media, paintings, photographic materials, textiles, and objects, including wooden artifacts and archaeological materials.

In addition to supporting the production and dissemination of a variety of online and print conservation publications, AIC publishes a peer-reviewed journal, the *Journal of the American Institute for Conservation*, which is available as a benefit of membership and on Conservation Online (http://cool.conservation-us.org/), on JSTOR (www.jstor.org), and, as of 2015, through Taylor & Francis (http://www.tandfonline.com/).

Major Impact

As the national body that represents archaeological conservators in the United States, the AIC provides professional standards and guidelines that directly pertain to the conservation and preservation of historical and archaeological resources. These include legal and ethical considerations for treating artifacts, professional conduct and respect toward various cultures and societies, educational and training guidelines, and guidelines for the examination and scientific investigation of artifacts which are applied to field excavations, in situ preservation, and conservation treatments used for archaeological materials. The AIC also encourages collaboration with allied professionals to ensure the best possible understanding and outcome in preserving our collective cultural heritage.

Within the AIC, the Archaeology Discussion Group (ADG) is a network of professional conservators who work with, or are interested in, the conservation of archaeological objects, structures, and sites. The ADG is a working group of AIC's Objects Specialty Group. Their members work in many different areas including for museums and other cultural institutions and organizations, in private practice, for archaeological or historical sites, as well as for teaching in academic programs. Many ADG members are also affiliated with national and international archaeological, scientific, and cultural heritage organizations. These include the American Association of Museums, the International Council of Museums and the Committee for Conservation, the International Institute for Conservation of Historic and Artistic Works, the Archaeological Institute of America, the Society for Historical Archaeology, the Society for American Archaeology, the American Schools for Oriental Research, and the Materials Research Society, which help to further promote conservation, and specifically archaeological conservation, worldwide.

One of the central goals of the ADG is to facilitate communication and collaboration between AIC and professional archaeological organizations in the United States. The AIC and individual members promote interdisciplinary relations with various professional archaeological organizations, including the Archaeological Institute of America, the Society of Historical Archaeology, the Society for American Archaeology, and the American Schools for Oriental Research through the presentation of papers and posters at annual meetings, through organizing and moderating specific sessions and workshops dedicated to conservation, and through AIC-sponsored exhibit booths at these conferences.

The AIC also provides scholarships and grants to aid in the professional development of members through workshops, publications, and outreach efforts and provides grant funding for specific conservation projects. In addition to these opportunities, the organization promotes safe practices through resources provided by the Health and Safety Committee. Disaster response and recovery can also be provided to archaeological sites and collections that have experienced damage through natural or man-made disasters.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Museums
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Outreach
- ▶ Field Stabilization of Movable Heritage
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

Conservation Online. Available at http://cool.conservation-us.org/

Journal of the American Institute for Conservation. 1962–current. Available at http://www.tandfonline.com/loi/yjac20. Accessed 1 Sept 2017.

Further Reading

American Institute for Conservation Archaeological Conservation Brochure. 2012. Available at http://www.conservation-us.org/docs/default-source/resource-guides/aic-adg-brochure-2012-web. Accessed 1 Sept 2017.

American Institute for Conservation Archaeological Fieldwork Checklist. 2011. Available at http://www.conservation-us.org/docs/default-source/resource-guides/adg-checklist. Accessed 1 Sept 2017.

American Institute for Conservation of Historic and Artistic Works website. n.d. Available at http://www.conservation-us.org/. Accessed 1 Sept 2017.

Brady, C., M. Gleeson, M. Myers, C. Peachey, B. Seifert, H. Wellman, E. Williams, and L. Young. 2006. *Conservation FAQ's and facts*. Available at https://sha.org/conservation-facts/. Accessed 1 Sept 2017.

Caring for your treasures. n.d. Available at http://www.conservation-us.org/about-conservation/caring-for-your-treasures. Accessed 1 Sept 2017.

Conservation training in the US. n.d. Available at http://www.conservation-us.org/jobs/become-a-conservator. Accessed 1 Sept 2017.

Conservation Wiki. n.d. Available at http://www.conservation-wiki.com/. Accessed 1 Sept 2017.

Find a conservator. n.d. Available at http://www.conservation-us.org/findaconservator. Accessed 1 Sept 2017.

Heritage Emergency Programs. n.d. Available at http://www.conservation-us.org/emergencies. Accessed 1 Sept 2017.

Warda, J., ed. 2017. *The AIC guide to digital photography and conservation documentation*. 3rd ed. American Institute for Conservation of Historic and Artistic Works.

American Pioneers and Traditions

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Introduction

The Americanist tradition of archaeology is defined by cross-cultural comparative research that draws heavily on an innovative tradition of regional-scale fieldwork (Willey and Phillips 2001[1958]; Willey and Sabloff 1980). Many early pioneers worked in multiple culture areas of the Americas, seeking direct connections between the archaeological record and living or historical indigenous peoples, and fostering close ties with anthropology as a result. This brief overview covers seminal developments in stratigraphic excavation, regional survey, and other field methods within their historical and geographic context.

Definition

Pioneering archaeological efforts across the globe are often lauded for their early attention to stratigraphy and the association of geological or cultural strata with change in human societies over time. In the Americas, as in other parts of the globe, such attention was often the result of nonsystematic excavations into mounds of anthropomorphic origin. This was the case along Peru's arid coast, where immediately following the conquest Spaniards began excavating in adobe temples (known as *huacas*) in search of gold left by pre-Inca cultures such as the Moche and Chimú. A couple centuries later, a few early naturalists and proto-archaeologists began defining construction layers within such structures. A notable effort is part of a nine-volume record of the natural and cultural history of the region surrounding Trujillo, Peru, by its bishop, Baltasar Jaime Martínez Compañón, compiled in the mid to late eighteenth

century (Pillsbury and Trever 2008). Among remarkable watercolors and line illustrations of site maps, structures, and artifacts is a rendering of a labeled stratigraphic cut through Huaca Tantalluc, located near Cajamarca. It was made in 1765 by one of Martínez Compañón's predecessors, the magistrate Miguel Feyjoo, following a Spanish Bourbon dynasty mandate to explore and document its provinces. It may represent the first stratigraphic archaeological illustration in the Americas, before Thomas Jefferson's more widely known efforts in the US. Jefferson's excavation was undertaken in the 1770s or 1780s, with 1783–1784 being likely, and involved trenching through a burial mound near Monticello to understand its composition and correctly attribute its builders to the ancestors of the native peoples of the region (Milner 2004). Yet it took the systematic works of nineteenth-century scholars such as E. G. Squier, Edwin Davis, and Cyrus Thomas to completely dispel the "myth of the moundbuilders," which through prejudice and ignorance held that mounds of the eastern USA were built by peoples other than Native Americans.

Though pioneering, the attention to stratigraphy of a Feyjoo or Jefferson would not match our contemporary understanding of stratigraphic excavation. This began in the Americas in the early twentieth century, some two decades after its initial development in Europe, but then quickly became part of standard archaeological practice. The stratigraphy of the Emeryville shellmound, near San Francisco, was explored by the German archaeologist Max Uhle in 1902 and by the American Nels Nelson in 1906 (Nelson 1909; Uhle 1907). The Mexican archaeologist Manuel Gamio was a foundational figure in Mesoamerican archaeology and may be seen as the first person to link stratigraphic levels to cultural materials in developing a regional chronological sequence. Together with Franz Boas, his graduate advisor at Columbia University, Gamio developed a chronological sequence for Central Mexico in 1911 (Gamio et al. 1921). This work involved ceramic collections at six sites surrounding Mexico City and Gamio's excavation of nearly six meters of superimposed cultural layers at Azcapotzalco. Two years later, Nelson participated in stratigraphic excavations at the Palaeolithic cave site Cueva de El Castillo, Spain, and returned to New Mexico convinced of the importance of the methodologies he learned there, which he then applied to Southwestern archaeology through his work in the Galisteo Basin (Nelson 1914). The pace of stratigraphic work in these culture areas accelerated rapidly and spread elsewhere. Direct successors within these two regions include George Vaillant's excavations of nine Central Mexican sites, while a curator at the American Museum of Natural History, and Alfred Kidder's 15 years of investigations at Pecos Pueblo, sponsored by the Peabody Museums of Harvard University and of Phillips Academy (e.g., Kidder 1924; Vaillant 1937). Both projects were critical for establishing cultural sequences and served as benchmarks for future excavations in Mesoamerica and the Southwest.

Part of Franklin D. Roosevelt's New Deal put Americans back to work during the Great Depression by offering jobs as laborers on archaeological survey and excavation crews led by trained professionals (Fagette 2008; Lyon 1996). This boon to US archaeological research resulted in investigations in 36 states and included the widespread adoption of methods such as excavation by horizontal stripping, spraying sediments for better visibility of features and strata, plotting the post molds and pit features of perishable structures (Fig. 1), and the circulation of manuals on field and lab methods. New Deal archaeology also saw the professionalization of historical archaeology in the USA. Whereas earlier excavations had focused primarily on architectural restoration, J. C. Harrington's 1934–1941 investigations at Jamestown, Virginia, included excavations targeted especially at areas lacking architecture in order to document the ditches and fence lines that defined property boundaries, and the collection of all artifacts with special attention to context (e.g., Harrington 1955). Several pioneering women in archaeology also began their careers around this time (see Claassen 1994), including Elizabeth W. Crozer Campbell, who studied California desert cultures while at the Southwest Museum; Hannah Marie Wormington, who

American Pioneers and Traditions, Fig. 1 WPA trowelmen at work, Thompson Village Site, Tennessee. Image courtesy of the Frank H. McClung Museum, University of Tennessee (62HY5[B])

American Pioneers and Traditions, Fig. 2 Gordon Willey at Tula, Mexico. Gordon Willey Slide Archive, courtesy of William L. Fash

made significant contributions to Paleoindian research and was the first woman elected president of the Society for American Archaeology; and Betty Meggers, whose research in South America ranged widely during a long career at the Smithsonian Institution.

Gordon Willey (Fig. 2) launched the field of regional archaeology (aka landscape archaeology) with his 1946 survey of Peru's Virú Valley while working for the Smithsonian Institutions' Bureau of American Ethnology (Willey 1953), followed by over two decades of settlement research in Central America and Mesoamerica. His work transformed global archaeology by demonstrating that sites cannot be understood in isolation, nor should archaeologists focus exclusively on large or architecturally conspicuous sites; rather sites must be viewed holistically, as parts of ecological and cultural landscapes. Field methods in the Virú Valley included the production of site maps from

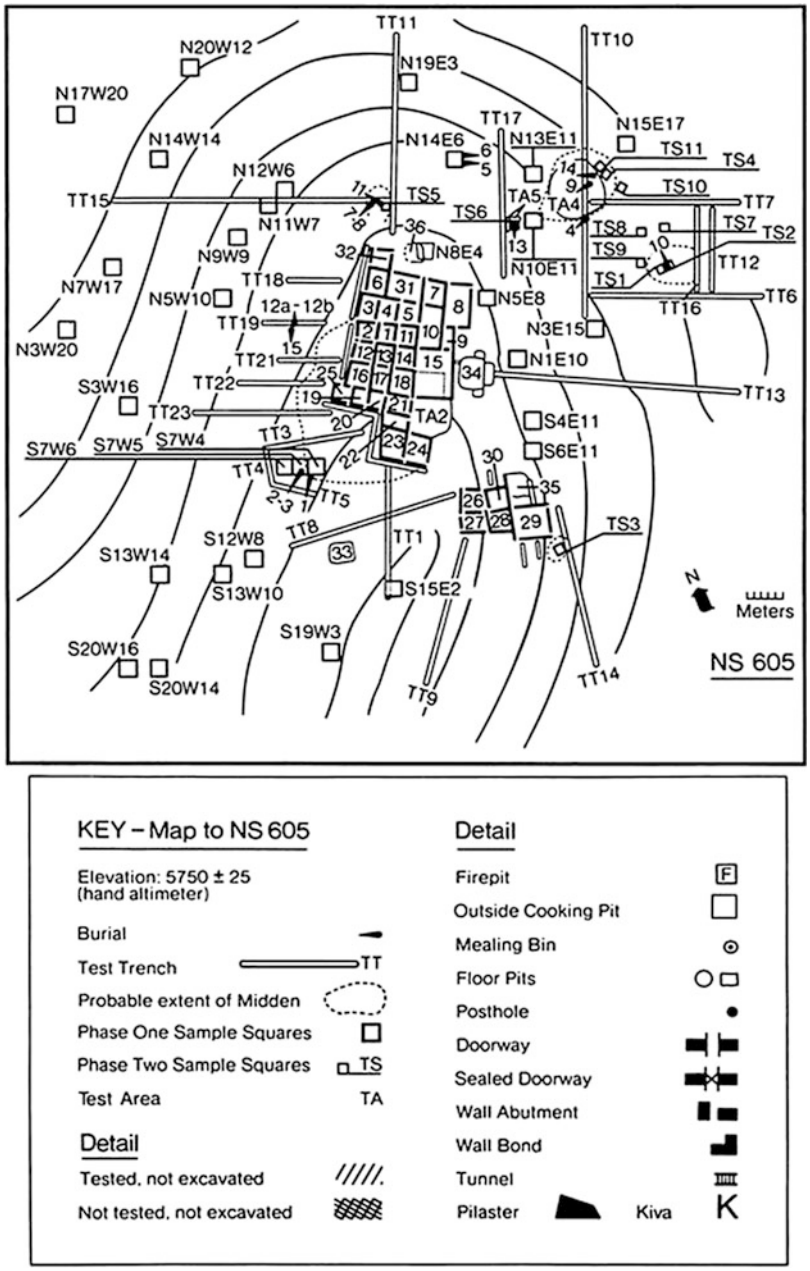

American Pioneers and Traditions, Fig. 3 Site sampling by squares and trenches at the Joint Site Pueblo, Arizona (Hanson and Schiffer 1975: Fig. 5). Image courtesy of the Field Museum

aerial photos, "ground-truthing" these maps in the field using a compass and measuring chains, recording details of site setting and architecture, and plotting all sites on a valley map made by the geographer F. W. McBryde. In North America, Willey's long-time collaborator Philip Phillips developed a similar approach during his 1940–1947 survey of the Lower Mississippi Valley, undertaken with James Griffin and James Ford, the latter of whom worked with Willey in Virú (Phillips et al. 1951). The greater use of test pits in the Mississippi Valley reflects the differences in surface cover and visibility between the arid coast of Peru and temperate woodlands of the

eastern USA, and full test pits or shovel test pits are much more common in surveys of densely vegetated regions of the Americas such as the Eastern Woodlands, Maya Lowlands, and Amazon Basin, compared to drier regions of western North America, and the highlands of Mesoamerica and the Andes.

The regionally oriented and stratigraphically deep research of Stuart Struever in the Lower Illinois Valley during the 1960s was highly influential for its use of multiscalar sampling strategies (within sites, ecozones, and regions) and of flotation as a means of recovering small ecofacts and artifacts (e.g., Struever 1968, 1971). Field sampling methods were further developed by projects such as the Chevelon Archaeological Research Project, directed by Fred Plog (1974), the New Survey of the Southwest Archaeological Expedition of the Field Museum (e.g., Hanson and Schiffer 1975), and the Prehistory and Human Ecology in the Valley of Oaxaca Project, directed by Kent Flannery (1976) and later codirected with Joyce Marcus. These projects emphasized the importance of some element of randomness in the placement of test units in order to minimize biases based on initial assumptions of the patterning of subsurface remains and to derive statistically significant samples upon which to build social interpretations. The choice of squares or trenches as sample units might be determined by the depth of deposits – as was done by Flannery and colleagues, who found trenches to be more efficient for deep sites in Oaxaca, thereby avoiding "telephone booth" style pits – or the strategies could be integrated at the same site, as was done by Hanson and Schiffer at the Joint Site Pueblo (Fig. 3).

Key Issues/Current Debates/Future Directions/Examples

The Americanist tradition of cross-cultural comparison drawing on regional archaeological datasets is exemplified by work such as Flannery's and by Robert McC. Adams's (1966) comparative study of urbanization in Mesopotamia and Mesoamerica. Building on this base of pioneering researchers, methods in American archaeology continue to develop, today increasingly incorporating new geospatial technologies and material sciences in the field. This is not only true of archaeology sponsored by universities and museums but also of Cultural-Resource Management (CRM), which is currently the public face of archaeology and the largest employer of archaeologists in the USA.

Cross-References

- ▶ Archaeology in the Enlightenment
- ▶ Binford, Lewis R. (Theory)
- ▶ Cultural Heritage Management and Native Americans
- ▶ Early Excavations Around the Globe
- ▶ Excavation Methods in Archaeology
- ▶ Flannery, Kent Vaughn
- ▶ Gamio Martínez, Manuel
- ▶ Historic Jamestowne
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Mesoamerica: Strengths and Weaknesses of the Current Classification
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Schiffer, Michael Brian (Theory)
- ▶ Society for American Archaeology (SAA)
- ▶ Stratigraphy in Archaeology: A Brief History
- ▶ Surface Survey: Method and Strategies
- ▶ US National Park Service and World Heritage
- ▶ Uhle, Friedrich Max
- ▶ Willey, Gordon Randolph

References

Adams, R.M. 1966. *The evolution of urban society: Early Mesopotamia and prehispanic Mexico*. Chicago: Aldine.

Claassen, C., ed. 1994. *Women in archaeology*. Philadelphia: University of Pennsylvania Press.

Fagette, P. 2008. *Digging for dollars: American archaeology and the new deal*. Albuquerque: University of New Mexico Press.

Flannery, K.V., ed. 1976. *The early Mesoamerican village*. New York: Academic.

Gamio, M., A. Best, and F. Boas. 1921. *Álbum de colecciones arqueológicas*. Mexico City: Museo Nacional de Arqueología, Historia y Etnografía.
Hanson, J.A., and M.B. Schiffer. 1975. The joint site – A preliminary report. In *Fieldiana.* Anthropology, Vol. 65, Chapters in the prehistory of Eastern Arizona, IV, 47–91. Chicago: The Field Museum.
Harrington, J.C. 1955. Archeology as an auxiliary science to American history. *American Anthropologist* 57 (6): 1121–1130.
Kidder, A.V. 1924. *An introduction to the study of Southwestern archaeology with a preliminary account of the excavations at Pecos and a summary of Southwestern archaeology today.* New Haven/Andover: Yale University Press/Phillips Academy.
Lyon, E.A. 1996. *A new deal for Southeastern archaeology.* Tuscaloosa: University of Alabama Press.
Milner, G.R. 2004. *The moundbuilders: Ancient peoples of eastern North America*. New York: Thames and Hudson.
Nelson, N.C. 1909. Shellmounds of the San Francisco Bay region. *University of California Publications in American Archaeology and Ethnology* 7 (4): 319–348.
Nelson, N.C. 1914. *Pueblo ruins of the Galisteo Basin, New Mexico*, Anthropological papers 15. Vol. 1. New York: American Museum of Natural History.
Phillips, P., J.A. Ford, and J.B. Griffin. 1951. *Archaeological survey in the lower Mississippi alluvial valley, 1940–47*, Papers of the Peabody Museum. Vol. 25. Cambridge, MA: Peabody Museum.
Pillsbury, J., and L. Trever. 2008. The king, the bishop, and the creation of an American antiquity. *Ñawpa Pacha: Journal of Andean Archaeology* 29: 191–219.
Plog, F.T. 1974. *The study of prehistoric change*. New York: Academic.
Struever, S. 1968. Flotation techniques for the recovery of small-scale archaeological remains. *American Antiquity* 33 (3): 353–362.
Struever, S. 1971. Comments on archaeological data requirements and research strategy. *American Antiquity* 36 (1): 9–19.
Uhle, M. 1907. The Emeryville shellmound. *University of California Publications in American Archaeology and Ethnography* 7 (1): 1–106.
Vaillant, G.C. 1937. History and stratigraphy in the valley of Mexico. *Scientific Monthly* 44: 307–324.
Willey, G.R. 1953. *Prehistoric settlement patterns in the Virú Valley, Peru*, Bureau of American Ethnology. Bulletin 155. Washington, DC: Smithsonian Institution.
Willey, G.R., and P. Phillips. 2001[1958]. Introduction. In *Method and theory in American archaeology*, ed. R.-L. Lyman and M.J. O'Brien. Tuscaloosa: University of Alabama Press.
Willey, G.R., and J.A. Sabloff. 1980. *A history of American archaeology.* 2nd ed. San Francisco: W.H. Freeman.

American School of Classical Studies at Athens (ASCSA)

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Basic Information

The American School of Classical Studies at Athens (ASCSA) is America's first overseas research center and is still the largest in terms of assets, programs, and constituencies. It is a nonprofit organization based in the United States; its Trustees were incorporated in 1881 in Massachusetts for the purpose of founding the ASCSA in Greece. ASCSA's website is at http://www.ascsa.edu.gr.

Major Impact

Since its beginnings, ASCSA has provided American graduate students and scholars a base in Greece for pursuing studies in the history and civilization of the Greek world (Lord 1947; Meritt 1984). ASCSA remains today a teaching institution, providing through its academic programs, opportunities for graduate students, undergraduates, secondary school and college teachers, as well as other scholars to study at first hand the sites and monuments of Greece. ASCSA is also a major research center for postdoctoral scholars pursuing independent research in a broad range of fields in the humanities, archaeological science, and social sciences from antiquity to modern times.

ASCSA operates two internationally renowned libraries, the Blegen Library with approximately 110,000 volumes dedicated to Greece and related regions and cultures from prehistory to the end of antiquity and the Gennadius Library with over 120,000 volumes concentrating on the Greek world and Balkans after the end of antiquity to

the modern day, two archival repositories, and the Malcolm H. Wiener Laboratory for Archaeological Science. ASCSA sponsors two major excavations and related research centers at Corinth and in the Athenian Agora, administers other American excavations and research activities in Greece, and supports a major publications program, publishing up to ten titles per year and an award-winning, quarterly journal, *Hesperia* (ISSN: 0018-098X; E-ISSN: 1553-5622).

Many scholars of classical antiquity consider the Blegen Library to contain research collections in their field comparable to those at major research universities, while the Gennadius Library holds a diverse collection of books and rare bindings, manuscripts, works of art, and archival collections that pertain to Medieval and modern Greece. Important among the collections of the latter are first editions of Homer, rare Bibles, diaries of early travelers to Greece, unique maps of Greece and the Mediterranean, the diaries and letters of Heinrich Schliemann, and the papers of many of Greece's most important political and cultural figures, including Greece's two Nobel Prize-winning poets, George Seferis and Odysseas Elytis. The archives of the Blegen Library contain records of many important archaeological projects, as well as photographs and the personal papers of renowned archaeologists who have conducted work under its auspices (Vogeikoff-Brogan and Davis 2013; Vogeikoff-Brogan). Recent remodeling of both the east and west wings of the Gennadius Library has added an exhibition space and expanded facilities that will permit consolidation of all archival holdings of ASCSA. Founded in 1992, the Wiener Laboratory is one of the leading laboratories of its kind in Greece, especially in the fields of biological anthropology, zooarchaeology, geoarchaeology, and environmental studies (including the study of organic residues and botanical remains). An expanded state-of-the-art laboratory building was inaugurated in 2016.

ASCSA presents lectures, workshops, and conferences on topics related to Greece and neighboring regions in all periods. Lectures in the 200-seat auditorium, Cotsen Hall, are videotaped and made available on the ASCSA website. In addition, ASCSA's digital library, also available through the website, offers wide access to archaeological records from the excavations at Corinth and the Athenian Agora and research materials from the libraries and archives (http://www.ascsa.edu.gr/index.php/digital-library).

From its founding, ASCSA has sponsored excavations at major sites in Greece. Its excavations at Corinth began in 1896 and are one of the world's longest continuous projects, as well as serving as a training ground for generations of young archaeologists. Located on a hill above the strategic Gulf of Corinth, the ancient site is vast, encompassing over 6 km^2 within its walls; the more than 60 acres of the site that have been explored thus far include the acropolis of Acrocorinth, the city center, and its two ports on the Corinthian and Saronic Gulfs: Lechaion and Kenchreai. Excavations by ASCSA have documented Corinth's history and its territory from the Early Neolithic period (6500–5750 BCE) to the modern day (http://www.ascsa.edu.gr/index.php/excavationcorinth/). Some 45 volumes in ASCSA's Corinth series have been published, while other monographs and numerous articles in *Hesperia* also record the results of investigations.

The second long-term excavation of ASCSA is in the civic, political, and commercial center of ancient Athens, the Athenian Agora. Since 1931 ASCSA has excavated this large archaeological site in the heart of the city, documenting its 5,000-year history (http://www.ascsa.edu.gr/index.php/excavationagora/). Excavations have yielded finds ranging in date and character from pottery of the late Neolithic period (c. 3000 BCE) to the contents of nineteenth and twentieth century basements. The Agora of the fifth and fourth centuries BCE, however, has been the main focus of attention, and its exploration has revealed primary evidence for the functioning of the ancient Athenian governmental institutions that played a formative role in the foundations of western democracies. There are few ancient sites more

important in Greece, and none for which the excavation records are more critical for documenting the unparalleled achievements of Classical Athens. ASCSA has published some 40 volumes in a series on the Athenian Agora, as well as numerous other monographs, booklets and guidebooks for the general public, and scholarly articles in *Hesperia* and elsewhere.

Since its founding ASCSA has overseen numerous other excavations and surface surveys in many parts of Greece, though often with particular focus on the Peloponnese and Crete. Recent projects are at Gournia in eastern Crete, Thebes in Boeotia, the Sanctuary of Zeus at Nemea, the Sanctuary of Zeus on Mt. Lykaion, Arcadia, at Molyvoti in Thrace, and at the Palace of Nestor in Pylos (for a list of and links to other projects affiliated with ASCSA in recent years, see http://www.ascsa.edu.gr/index.php/fieldwork/Affiliated-North-American-Field-Projects).

Cross-References

- ▶ Agora in the Greek World
- ▶ Bioarchaeology: Definition
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Crete, Archaeology of
- ▶ Geoarchaeology
- ▶ Organic Residue Analysis in Archaeology
- ▶ Schliemann, Heinrich
- ▶ Zooarchaeology

References

Lord, L.E. 1947. *A history of the American School of Classical Studies at Athens, 1882–1942*. Cambridge, MA: Harvard University Press.

Meritt, L.T.S. 1984. *History of the American School of Classical Studies at Athens, 1939–1980*. American School of Classical Studies at Athens: Princeton.

Vogeikoff-Brogan, N. and J.L. Davis (eds.). 2013. Philhellenism, philanthropy, or political convenience? American archaeology in Greece. *Hesperia* (Special Issue) 82: 1.

Vogeikoff-Brogan, N. The archivist's notebook: Essays inspired by Archival Research in Greece. www.nataliavogeikoff.com

Amheida, Archaeology of

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Introduction

Amheida is a substantial ancient settlement located in the northwest extent of Egypt's Dakhleh Oasis (Fig. 1). Amheida is a multiphase site that reached its greatest expanse under Roman rule (first C AD–fourth C AD). Its pharaonic name was Set-wah ("resting place") and it was known as Trimithis during the Roman Period. This site is the largest surviving ancient settlement within the oasis.

Amheida was one of the most important towns in the Dakhleh Oasis during the Roman and Byzantine centuries. Documentary sources indicate that it became a city by the fourth century and was regarded on the same level as other significant cities in the Oasis Magna, which consisted of Dakhleh and the Khargeh Oasis to the east (Wagner 1987). The diversity and extent of archaeological remains at Amheida attest to this significance. The substantial aboveground remains and surface pottery scattered across the urban center, and cemeteries extend from at least 2.5 kms north-south and 2 kms east-west. These remains represent dates ranging from Pharaonic to Late Antique periods, and the surrounding environs contain evidence of prehistoric lithic scatters, Old Kingdom ceramics, and several cemeteries. Despite a long occupational history, Late Antique ruins dominate the visible site surface today. The historical trajectory of Amheida complements that of the greater Dakhleh Oasis in that it reached its apex during the Roman Period.

Definition

Amheida, known as Trimithis during the Roman Period, was a significant urban site located in

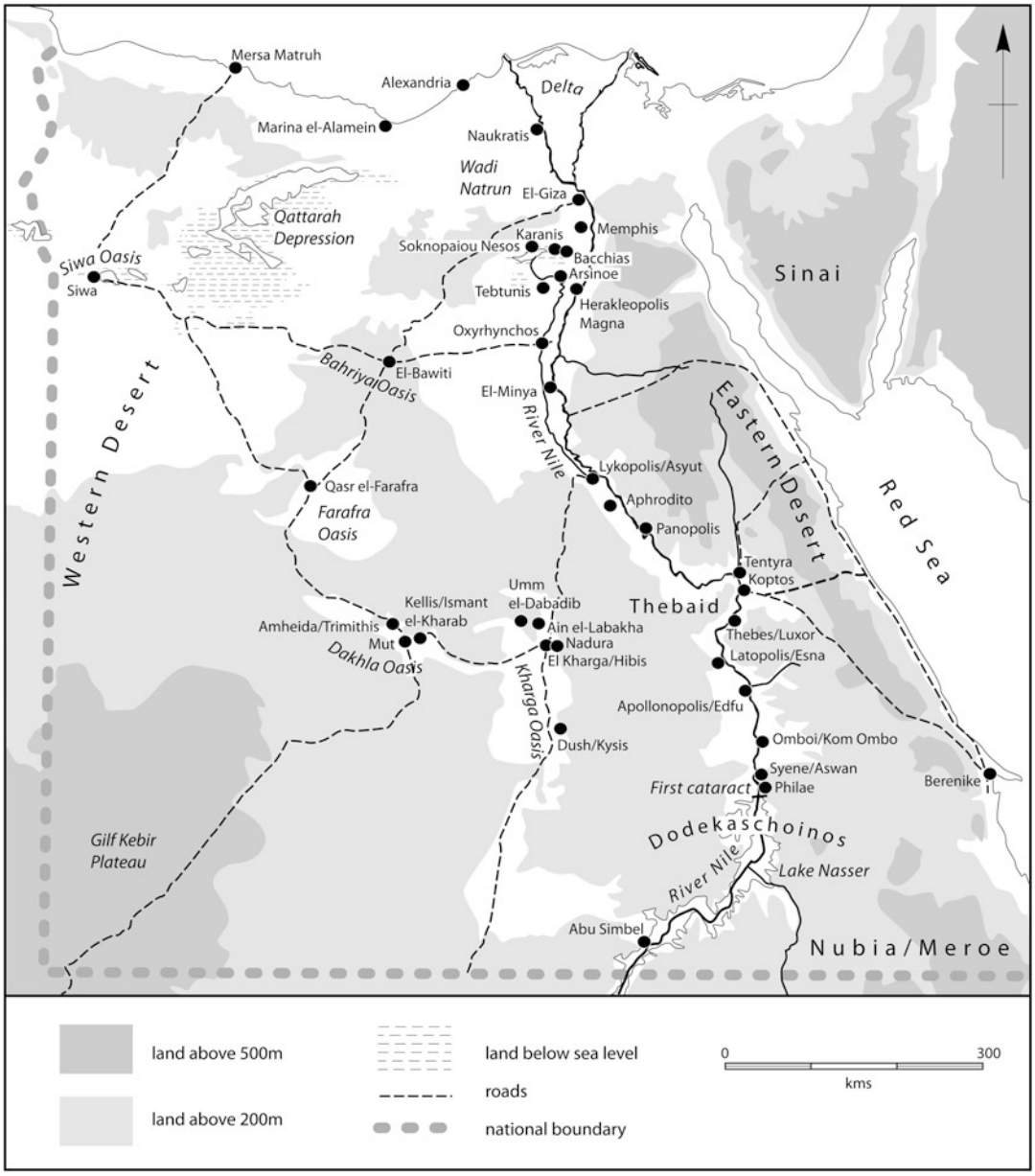

Amheida, Archaeology of, Fig. 1 Map of Egypt. (Illustration: M. Mathews)

Egypt's Dakhleh Oasis. Despite this peripheral location, inhabitants sustained an existence that entangled Roman Mediterranean, Greek, Egyptian, and local traditions into their everyday lives.

Historical Background

History of Research and Excavation

Outsiders have known about Amheida since European explorers first ventured to Egypt's

Western Desert. Sir Archibald Edmonstone, a British explorer, became the first European to visit the oasis and Amheida in 1819. Renowned explorers, Bernardino Drovetti and Frédéric Cailliaud, visited the oasis shortly thereafter. Since its European discovery, both specialists and nonspecialists visited Amheida (Boozer 2013). The site came into prominence in 1979 when the Dakhleh Oasis Project (DOP) discovered classical wall paintings on the site during its survey of the entire Dakhleh Oasis (Leahy 1980).

Modern archaeological fieldwork began in 2000, directed by Roger Bagnall. It was first under sponsorship from Columbia University and then by New York University. Anna Lucille Boozer leads excavations in Area 1, initially as part of the University of Reading (2012, 2013) and currently as part of the City University of New York. Research has experienced delays due to external causes: in 2009 there was a delay in issuing security clearances; and in 2011 the team was evacuated after only a few days of excavation because of the Egyptian revolution. Since the revolution the approval of security clearances has not been as dependable as they were in prior years, and security restrictions on the entire Western Desert have been in place since 2015. These external causes have slowed the pace of excavation as well as the final analysis of excavated material for publication.

The chief areas of excavation include Area 1 in the northeastern part of the site, a fully excavated house (B2), a courtyard (C2) and its unexcavated house (B9), and the widest street (S1) at Amheida; Area 2 which is the current center of the archaeological site, a fully excavated house (B1), a *thermae* (bathhouse) under B1 and B4 (B3), a complex consisting of stables and post-abandonment rubbish disposal area located north of house B1 (B4), a school (B5), the Byzantine update of the earlier bathhouse (B6), a church (B7), a partially excavated house (B8), and a covered street (S2); Area 4, an elevated mound upon which the precinct of the Temple of Thoth was located; and Area 8, an urban area north of Area 2 and a house (B10). The project has also conserved a pyramid and a monumental mudbrick tomb in Area 3 in the southern part of the site (Fig. 2).

Key Issues/Current Debates

Town Planning

Survey continues to define the extent and form of Amheida's layout, although preliminary conjectures regarding the layout can be made at this time (Fig. 2). Amheida manifests a diversity of structure types, as can be expected for a major regional center. The houses seem to be single – or, in some cases, possibly two – story mudbrick structures with mainly barrel-vaulted roofs and some palm reed and mud flat roofs. Industrial areas can be found distributed among the domestic structures, but primarily along what we currently understand to be the edges of the city. A temple mound on the west side, around which the Roman settlement curves, and mortuary structures along the southern side are also clearly evident among the surface remains. Agricultural fields occupied the low-lying surrounding landscape. Governmental, administrative, or so-called public buildings, aside from bathhouses, have not been identified securely yet. Even so, it seems that the area just east of the temple mound may have been a focal point on the site as surface remains indicate a number of large, elaborate structures that may have served civic functions. The excavated houses and public baths closest to this area appear to be high status. The first church discovered at Amheida also is located here.

There are two major streets currently identifiable at Amheida. First, a broad east-west oriented road (S1) provided access into the city from the east. It leads from the industrial and domestic area on the northeastern extent of the site toward an area north of the temple mound, but it turns sharply off axis and then stops abruptly before reaching the temple mound itself. It is the widest identified road at Amheida at nearly seven meters wide. It appears that the road and the structures along its easternmost extent may have been built during a single phase of construction (Boozer 2014).

The second major street is a north-south oriented road (S2) that extends from the mortuary area in the southeastern portion of the city to the north. This road appears to have had structures built into it over time, which made it less effective

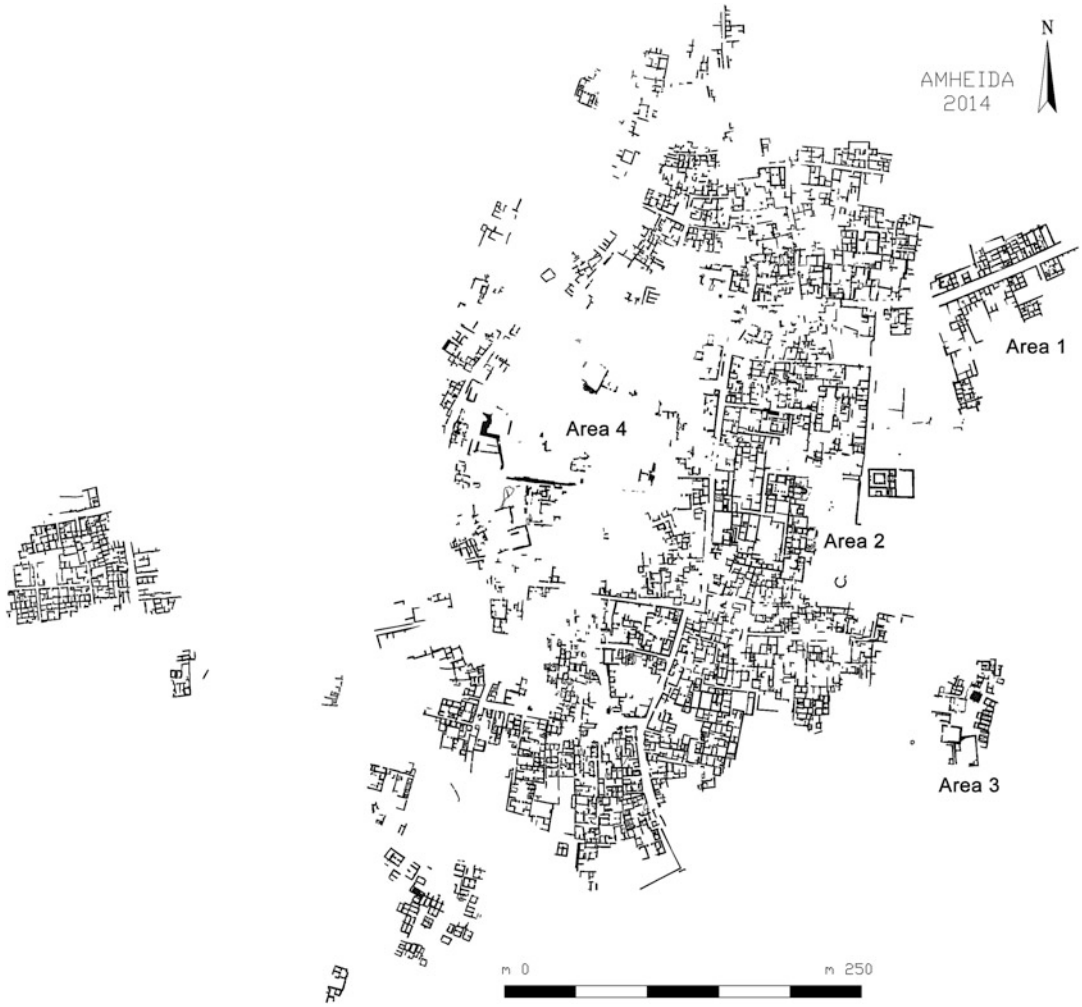

Amheida, Archaeology of, Fig. 2 Plan of Amheida. (Courtesy of the Amheida Project)

as a major conduit across the city. In addition to these major roads, there are some less-fully traced out streets and alleys. One runs roughly parallel to the major north-south road and is located between this road and the temple mound. Some additional east-west aligned streets also occur. Curiously, the project has not yet identified any streets connecting the eastern settlement area with the temple mound, nor has any trace of the temple dromos been found. There are several areas that indicate localized planning. For example, the northeastern part of the site appears to have been laid out in a single phase, and the structures in this area share similar plans. An area located in what appears to be the center of the Roman site also contains houses that, from the surface, appear to share similar layouts. Likewise, in an area just south of the temple, a series of roads delineate the eastern boundary of a housing block where at least one significant, decorated house is identifiable on the basis of surface architecture (Bagnall et al. 2016; Boozer 2014).

Domestic Structures

Domestic structures have been a key focus of this project since its inception, and this project has made a major contribution to our understanding of Romano-Egyptian domestic life. There are

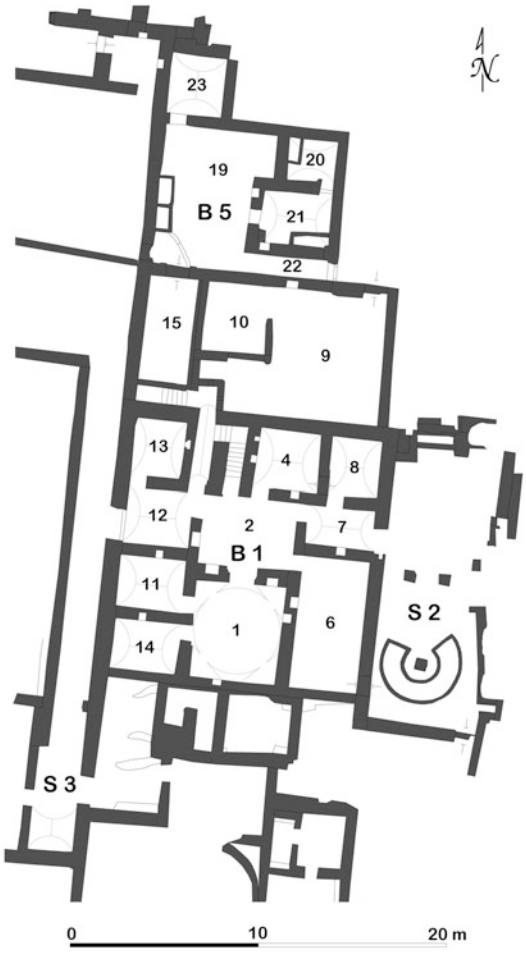

Amheida, Archaeology of, Fig. 3 Plan of House B1 and School B5 in Area 2. (Courtesy of the Amheida Project)

Amheida, Archaeology of, Fig. 4 *Polis* from House B1, Room 1 in Area 2. (Courtesy of the Amheida Project)

three main houses: B1 and B2, which have been excavated fully, and B10, which has been excavated partially. Two other houses have undergone preliminary investigation only: B8, south of B1, and B9, east of B2.

A fourth-century house (B1) is a lavish dwelling that contained Greek mythological wall paintings in a central, domed room and wallpaper motif wall paintings in a number of side rooms (Figs. 3 and 4). The figural scenes are the only ones of their kind so far discovered in Roman Egypt. They inform us that occupants of the oasis were engaged with Roman Mediterranean cultural norms (Boozer 2010). A 2015 survey of wall paintings at Amheida corroborates this conjecture and further emphasizes that this site will make a major contribution to our understanding of wall paintings in the Roman World (Bagnall et al. 2015b).

Measuring approximately 15 × 15 m, this house was essentially square in plan view and had a clustered plan of access between rooms. It was constructed out of mudbrick with selective use of baked brick, which appears to have been reused from the dismantling of an earlier bathhouse, which this house partially covers. Most of the rooms in this house were covered in barrel vaults, although one room contained a dome, potentially with an oculus, and there were flat roofs constructed out of palm reeds and beams with a mud plastering over at least two rooms. The stratified objects recovered from this structure suggest that it was built around 330 AD, was renovated in two subsequent phases, and then definitively abandoned in approximately 365 AD (Bagnall et al. 2016).

Damp conditions did not preserve soft organic materials as well as at other sites within the oasis,

particularly Kellis (Ismant el-Kharab), or at other areas at Amheida (namely, area 3). Among the material that survives is a substantive corpus of *ostraka* (potsherds with writing), which provide information about the owners of this structure, dependency relationships within the region, small-scale economic data, and also political information because one of the owners was a city councilor (Serenos) (Bagnall and Ruffini 2004; Bagnall and Ruffini 2012). Among the few objects recovered during excavation were bronze rings, one gold ring, bone hairpins, glass bracelets and beads, and a few bronze coins. Ceramics are of a generally high quality with respect to the local assemblage, and there are other artifacts that point toward higher status occupants. Preliminary analyses of faunal remains suggest that the occupants consumed foods common within the broader Roman Empire, such as chicken and pork. As an assemblage, this evidence suggests that the inhabitants sustained an existence looking more toward the Mediterranean than one might have expected, given the peripheral location of the site. In the last occupational phase of the house, some floors were replastered and others replaced. Bands of whitewash were added around the niches, doors, and walls of some rooms. Storage bins were built inside one room and a small cooking hearth was added in another room. Together, this renovation evidence suggests that the house was redesigned to be more functional than decorative. The reasons for the redesign are not clear at this time (Bagnall et al. 2016; Boozer 2007, 2010, 2012).

The vicinity around House B1 has also been explored. South of House B1 lies another, partially excavated house (B8) with an identical overall footprint and a similar layout within. The stratigraphy and object assemblage recovered from the only excavated room suggest that it may have had a somewhat different occupational history from that of B1: there was a higher density of objects, and most of them appear to be goods used by women. The street (S2) in front of an informal entrance to B1 was covered with a flat roof made out of palm beams, a common feature of medieval settlements in the Dakhleh Oasis. There was an open space in front of the entrance to the house where a dining area (*stibadium*) was constructed (Fig. 3). Based upon the stratigraphy of the street, this dining area appears to have been short-lived. It was demolished and paved over during the occupational history of the house. The opening in front of the house entrance created a natural updraft which creates a cooling effect; this feature is also found in local medieval settlements. Although S2 once connected Houses B1 and B8, it was later blocked off, suggesting that there may have been a change in the relationship between the two households (Bagnall et al. 2016).

A mid-late third- to early fourth-century AD house (B2) was also excavated in its entirety (Fig. 5). This house is located in the northeastern part of the site in an industrial and domestic quarter. The house measures approximately 11 × 11 m. Like the larger house (B1), this structure is constructed out of mudbrick, demonstrates a clustered plan of access over its square plan, and employed barrel-vaulted roofs over most rooms and a flat palm-and-mud roof over one room. No evidence of roofing was recovered from the central room, which also had a bread oven, which suggests that it may have been uncovered. Cooking facilities are present within two different rooms in the house, suggesting potential changes in food preparation practices or different facilities used for different types of cookery. The other room with cooking equipment was located in the corner of the house and was covered with a flat roof (Boozer 2015a, b).

The material culture from House B2 was preserved in great densities and included a small percentage of organic remains. The animal bones include chicken, goat, donkey, cattle, and even wild gazelle, which suggest traditional Egyptian influences upon an otherwise standard diet for the time. Archaeobotanical evidence indicates that occupants consumed emmer wheat, a traditional Egyptian grain nearly unattested in documentary sources of this period. Additional objects and texts suggest a range of activities including linen weaving, trade, and low-level water management. This evidence indicates that the inhabitants of this house, or at least people living in its vicinity, may have participated in the small-scale management of production and transportation activities. Future

Amheida, Archaeology of, Fig. 5 Plan of House B2 in Area 1. (Courtesy of the Amheida Project)

research in this neighborhood may provide useful avenues of research into mid-level economic relationships. It is notable that the density of written evidence was substantially lower in this house than in House B1 and that one inscribed object, a clay tablet, conforms to a unique local oasite practice (Fig. 6). During the Roman Period, inscribed clay tablets have only been found at Amheida and Kellis. Two others come from Balat and date to the Old Kingdom. This object therefore appears to represent some sort of local practice of writing on unbaked clay (Ruffini 2015). As a whole, the domestic assemblage shows a combination of oasite, pan-Egyptian, Greek, and Roman influences. This range may indicate that the inhabitants had mixed ethnicities, that social status linked with ethnic material goods, or that the inhabitants did not have a vested interest in ethnic identity (Boozer 2007, 2011, 2015a, b).

The vicinity around this house has also been explored (Boozer 2016). A courtyard exterior to the house (C2), but belonging to the house east of B2 (B9), contained a bread oven with a platform and appeared also to have served as a stable for animals such as donkeys. Small dumps of material found above floor level suggest that it was reused for rubbish depositions after its abandonment. Numerous objects relating to domestic life were found in this courtyard, including figurines, a palm reed broom, a broach, cloth fragments, a bracelet, and so on (Fig. 7). While these objects cannot be connected directly to the occupational history of the courtyard in most cases, they likely connect to habitation in the vicinity.

The street adjacent to the house (S1) was also excavated, revealing multiple street levels as well as foundation trenches in common between the houses (B2 and B9) and the street. This suggests that this part of Area 1 was laid out in a single phase of construction (Boozer 2015a). House B9 has not been excavated yet although from the surface its layout appears to be similar to that of

House B2. The Dakhleh Oasis Project cleaned and mapped the surface of a structure across the street from House B2 in 1979, revealing a house that was subsequently provided with kilns for small-scale ceramics production (Hope 1980). These two houses will be the focus of future excavation seasons.

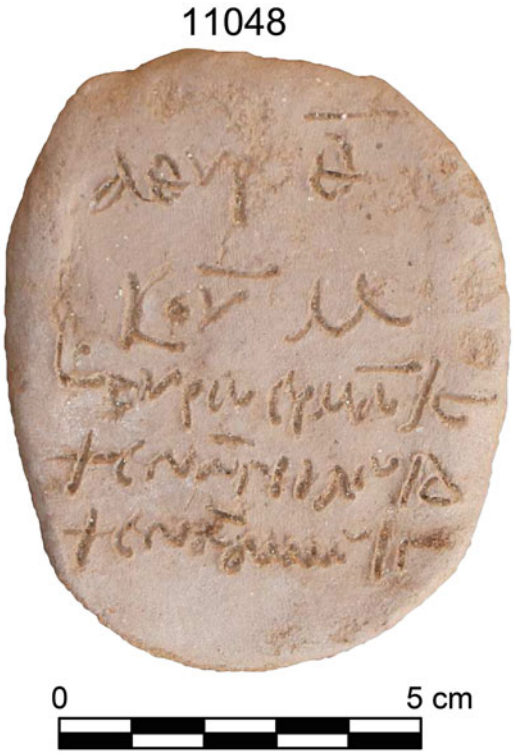

Amheida, Archaeology of, Fig. 6 Clay tablet inscribed in Greek (Inv. 11,048) from House B2, Room 7 in Area 1. (Courtesy of the Amheida Project)

During the 2015 field season, new excavations commenced on House B10, located in Area 8.1, which is north of Area 2 and west of Area 1. On the basis of the finds recovered, chiefly ceramics and *ostraka*, the excavators suggest that this house dates to the fourth-century CE. House B10, measuring approximately 30 × 26 m, has an irregular plan consisting of a northern and southern part. The main entrance to the house appears to have been from the north: an alleyway leads to an entrance room followed by a grand hallway, which was plastered in lime and decorated with geometric motifs on its lower elevations. This grand hallway appears to have been covered in a flat roof and to have had molded decorations rendered in gypsum. Additional rooms in the northern portion of this house were explored, and evidence of white and black painted plaster were identified in one. The southern portion of the house, measuring approximately 9 × 7 m, is architecturally more elaborate than the northern portion of the house. One room, with four columns supporting a flat roof, gave access to additional rooms. One of these rooms was covered with a vault. Excavations in this same room revealed numerous pots (complete and broken), 81 well tag *ostraka* written in Greek, and a bronze ring. Well tag *ostraka* are tags that were once

Amheida, Archaeology of, Fig. 7 Unfired clay figurine wearing a bracelet from Courtyard C2 in Area 1. (Drawing: S. Lambert-Gates, Courtesy of the Amheida Project)

attached to jars, giving a personal name, a date, and a place. The place name corresponds to a typical formula: "*pmoun* (well) + place name." The abundance of such tags found across Amheida indicate the importance of wells within this desiccated landscape. From the documentary evidence, we know that it was possible to own partial shares in wells as well as the land around the well but not the water itself. These complicated economic arrangements for water persist in the oases to this day (Boozer 2015).

School and Thermae

In the course of excavating the environs of House B2 in Area 1, the project uncovered evidence of bathhouses as well as a school.

B5, a building consisting of three rooms located along the north end of House B1, appears to have been used to educate children and youths (Figs. 3 and 8). Red dipinti on the walls indicate that these pupils were educated in Classical Greek traditions and particularly rhetorical verse composition (Cribiore et al. 2008; Davoli and Cribiore 2010). This school is the first of its kind to be located anywhere within the Roman Empire. Subsequent to its use for education, one room was reused as a storage magazine connected to House B1 and others as a workshop and stable (Bagnall et al. 2016).

Multiple phases of *thermae* (public bathhouses) have been discovered at Amheida (Fig. 9). Bathhouse B3, which is located underneath House B1 and the functional area north of it (B4), appears to date to the third century AD or perhaps even earlier. It was constructed out of mud and baked brick and measures approximately 41 × 34 m. Only a fraction of this structure has been excavated thus far, due to the overlying domestic structures and additional standing walls. On the basis of the current evidence, Paola Davoli has suggested that there were two major building phases; the initial phase sometime during the first centuries AD followed after a period of abandonment by a full remodeling (Bagnall et al. 2016; Davoli 2017).

B6 appears to be a public bath constructed after what Davoli estimates as a 40- to 60-year period of abandonment during which the earlier bathhouse (B3) was reused for rubbish depositions. The later bath structure is rectangular in plan view, measuring approximately 18.5 × 31.5 m, and is distinguished by a central, columned room. Some 23 rooms and pools have been identified, but their precise functions are not understood at this time and may never be understood due to their poor level of preservation. Water for the bath probably derived from a well southeast of the bath. A *sakia* (paddle-driven water-lifting wheels) would have brought the well water into the underground water

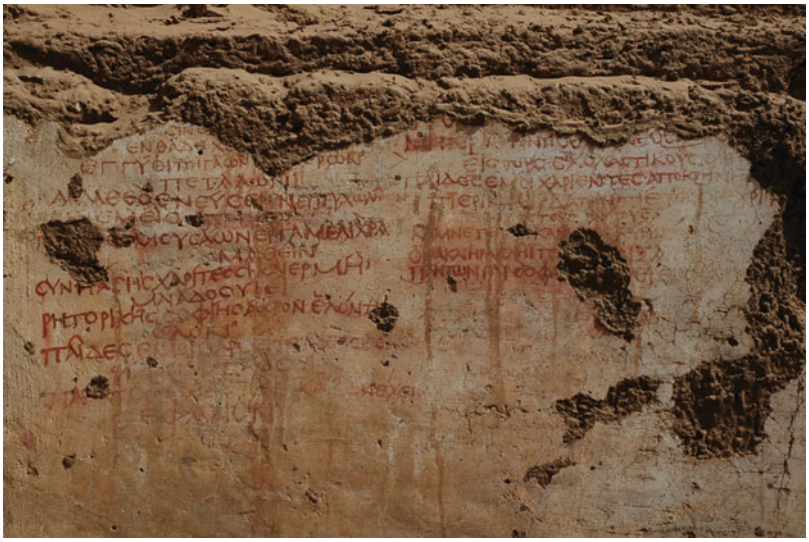

Amheida, Archaeology of, Fig. 8 A wall showing a poetic *dipinto* in a schoolroom, Room 15 in Area 2. (Courtesy of the Amheida Project)

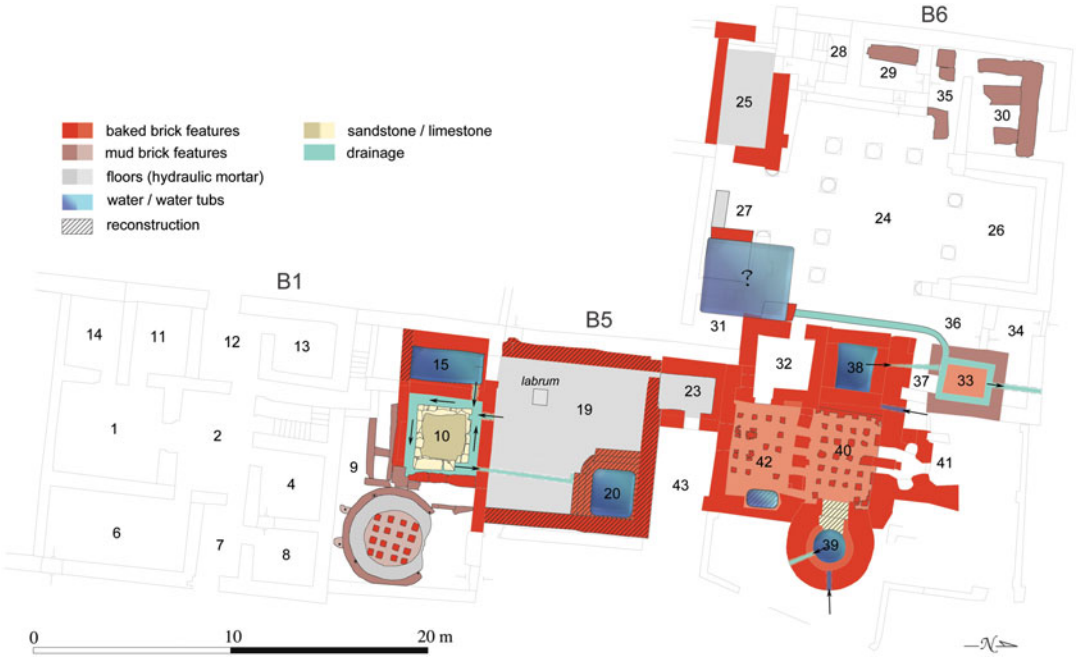

Amheida, Archaeology of, Fig. 9 Plan of the *thermae* in Area 2. (Courtesy of the Amheida Project)

distribution system, which then conveyed it to the baths. Wastewater appears to have been deposited north of the baths using a sewer system (Bagnall et al. 2016; Davoli 2016).

Davoli has identified two renovation phases within this structure, during which some rooms were demolished and rebuilt and new ones added. She has also described two main parts to the bath: to the west was the cold and dry bath, as is suggested by the presence of mud-plastered floors and walls, and to the east was the hot and wet bath, as is indicated by the use of waterproof baked brick and hydraulic mortar. Presumably the cold area (*frigidarium*) was used for socializing, as is indicated by the benches which lined the west and south-west walls of the pillared central room. This area also possessed a communal toilet (*latrina*). The hot area (*calderia*) was used for typical bathing activities as indicated by the presence of two pools, one square and one round. A dry heat room designed for sweating (*laconium*) was round and constructed out of mudbrick. It had a suspended floor composed of thin tiles and white plaster. The floor was later relaid with wooden planks nailed into crossbeams. So far, this *laconium* is unique in Egypt. The hot area was accessed by crossing what was presumably a warm area (*tepidarium*) from the cold area. Although the excavation and analysis of the structure are not yet complete, Davoli believes that it represents a typical Late Antique bathhouse from this region. The bath was abandoned abruptly; a mosaic floor was left incomplete along with the *tesserae* that were being cut for it. After its abandonment, at the end of the fourth century, it appears to have been reused for various functional activities and for depositing rubbish. Even later, perhaps during the Mamluk Period, some of the building materials appear to have been robbed (Ast and Bagnall 2017; Bagnall et al. 2016; Davoli 2017).

Temple

Amheida's temple was dedicated to the Egyptian god Thoth, god of writing and wisdom. The temple itself, although looted in antiquity and again in more recent times, has provided substantive information on the occupational history and religious life within the Dakhleh Oasis. Excavations of the

numerous Ottoman looter pits that dot the temple mound have indicated that the site was occupied since at least the Old Kingdom, and the material recovered from these excavations suggests that there may have been a settlement located on what became the temple mound in later years. Paola Davoli has estimated two main periods of activity during the dynastic era: the end of the Old Kingdom to early First Intermediate Period and the 13th Dynasty to the Second Intermediate Period. Textual and decorative evidence, such as an *ostrakon* with a *Kemyt* text (apprentice writing), then suggests a return to activity in the 19th Dynasty when there appears to have been a school attached to the New Kingdom temple (Kaper 2010). The discovery of a large stela of King Seti II from the 19th Dynasty confirms the presence of a school and depicts the king making offerings to Thoth and Horus, among other gods (Bagnall et al. 2016) (Fig. 10).

The epigraphic material from the temple, which has been studied primarily by Olaf Kaper, has provided a particularly important collection of cartouches with pharaonic and imperial names that indicate governmental investment in this region. The recovered cartouches provide us with some of the construction history of the temple and associated chapels, although interpretations may change as they are based on a highly fragmentary data set. Under Takelot III (r. 774–759 BC), a stela was erected recording a land donation to the temple. Minor building took place under the Theban 23rd Dynasty (King Pedubast circa. 800 BC) and the early 26th Dynasty (Nekau II (610–595 BC) and Psamtik II (595–589 BC)). Major construction seems to have started under Amasis/Ahmose II (569–526 BC) and the Persian ruler Darius I (522–486 BC), both of whom contributed a new chapel with vaulted ceiling. The Roman Emperor Titus (79–81 AD) built a new Roman Period temple on the site, and Domitian (AD 81–96) both demolished older structures and contributed a new larger sanctuary, which was extended under later emperors, as yet anonymous (Kaper 2009; Kaper and Davoli 2006).

Amheida, Archaeology of, Fig. 10 Stela showing Seti II making offerings to Thoth and Horus (Inv. 16,309) from the Area 4 temple mound. (Courtesy of the Amheida Project)

The epigraphic material also provides us with some intriguing clues about local oasite traditions. In the Third Intermediate Period, Dakhleh was ruled by an Egyptianized Libyan tribe, called the Shamain (Kaper 2009; Kaper and Demarée 2006). This epigraphic material suggests that these late dynasties incorporated the oasis much more thoroughly into their regional ruling than had been attested previously. Moreover, the Persian Period finds have provided some of the most substantial indications of a Persian presence in this distant oasis.

The material culture recovered from the temple mound includes fragmentary glimpses into local cultic practices and the occupational history of Amheida. For example, ceramic coffins containing un-mummified animals were recovered from the temple mound. Such deposits were common from the Late Period through the Roman Period and served as votive offerings. The remains included a range of birds (raptors, ibis) as well as other animal fragments. The ibis was long associated with Thoth, while the raptors should be associated with other gods venerated in the oasis such as Horus or Re-Horakhte.

Offerings to Osiris were also found in the form of 45 bronze statuettes, fragments, and pendants of the god. In addition to these finds, ceramics dating back to the Old Kingdom have been recovered, including large quantities of bread molds. *Ostraka* in hieratic, demotic, and Greek further attest to the long and complex occupational history in this area of the site (Bagnall et al. 2016).

Christianity

Documentary evidence found primarily where the temple of Thoth was once located (Area 4) suggested the existence of a Christian community at Amheida before it was attested archaeologically. This written evidence consisted of titles of clergy members and personal names written on *ostraka* (Bagnall and Cribiore 2012). Additional graffiti, also found on the temple mound (Bagnall et al. 2016), signify a Christian presence.

In 2012 Nicola Aravecchia began excavation on a structure in Area 2 that he subsequently identified as a fourth-century church (B7). This building consists of a central nave with side aisles that were defined by two rows of mudbrick columns. These colonnades were oriented east-west and seem to have been joined together with a return aisle. Together these features created an interior ambulatory, which is a feature commonly found in other fourth-century Upper Egyptian churches. The foundations of what may have been a pulpit have also been identified at the east end of the north colonnade. A *mastaba* (bench) was found against the inner face of the south wall of this room. The east wall has a stepped rectangular platform, which may have stood at the location of the building's apse, which is now lost. Additional decorative features were found amid collapse depositions, namely, a fragment of wall plaster with the inscription *ho theos* (Greek: "God") and painted plaster fragments from the flat roof that once covered this room. These fragments represented a geometric motif may have been intended to imitate a coffered ceiling. While additional research remains to be done in order to understand the life history of this structure, the 3-m deep foundations make it clear that a considerable labor effort went into constructing this monumental building (Bagnall et al. 2016).

To date, eight human burials have been found inside of the church. Each of the bodies was oriented with their heads to the west, as was standard for Christian burials in the Dakhleh Oasis, and lacked grave goods. Preliminary results from osteological analysis by Tosha Dupras and Lana Williams indicate that these bodies were male and female and belonged to a wide range of ages. Three of the eight bodies are derived from a funerary crypt which was located underneath what may once have been the sacristy (*pastophorion*) but is now destroyed. There may be more to this crypt and to the church more broadly as excavation in this area has not been completed yet (Bagnall et al. 2016).

International Perspectives

Amheida offers a well-preserved archaeological site that was incorporated to greater and lesser degrees into larger imperial structures. The high state of preservation and diversity of structures at this site ensures that the entanglements between episodic imperial formations – Egyptian, Persian, Greek, Roman, and Arab – and local life can be investigated from a variety of vantages.

Future Directions

Topographic survey will continue to expand and fill in detail to the urban and cemetery layout of Amheida, and excavations will continue in the areas previously investigated in order to deepen our understandings of the environs surrounding excavated structures. For example, excavations in House B10 in the north of the site have only just begun. These excavations will continue to refine our understanding of the distinctions between public and private architecture in this site, since this and other domestic structures in Dakhleh are much larger and more opulent than previously suspected. Excavations will continue in the vicinity of the third-fourth-century house (B2) in order to understand neighborhood affiliations, small-scale production, and ethnic affinities in Roman Egypt. Likewise, additional research will take

place on the temple mound in order to recover additional information about the construction history of this temple, the occupational history of Amheida, and the history of the oasis in general. Geological and geomorphological surveys will continue in the future to understand the landscape of the city and of its surroundings. The project also intends to build upon the mortuary and physical anthropological component begun with the church excavations in the near future.

Cross-References

► Hellenistic and Roman Egypt, Archaeology of

References

Ast, R., and R.S. Bagnall. 2017. *Amheida III. Ostraka from Trimithis, volume 2: Greek texts from the 2008–2013 Seasons*. New York: NYU Press & ISAW.

Bagnall, R.S., and R. Cribiore. 2012. Christianity on Thoth's Hill. In *The oasis papers 6: Proceedings of the sixth international conference of the Dakhleh oasis*, ed. R.S. Bagnall, P. Davoli, and C.A. Hope, 409–415. Oxford: Oxbow.

Bagnall, R.S., and G.R. Ruffini. 2004. Civic life in fourth-century Trimithis: Two ostraka from the 2004 excavations. *Zeitschrift für Papyrologie und Epigraphik* 149: 143–152.

Bagnall, R.S., and G.R. Ruffini. 2012. *Amheida. Ostraka from Trimithis volume 1: Texts from the 2004–2007 Seasons*. Vol. 1. New York: Institute for the Study of the Ancient World and New York University Press.

Bagnall, R.S., N. Aravecchia, R. Cribiore, P. Davoli, O. E. Kaper, and S. McFadden. 2016a. *An Oasis City*. New York: ISAW & NYU Press.

Bagnall, R.S., Susanna McFadden, and Elizabeth S. Bolman. 2016b. Wall paintings in the late Roman City of Trimithis (Amheida), Dakhla Oasis: A tantalizing preliminary survey. *Bulletin of the American Research Center in Egypt* 208: 1–8.

Boozer, A.L. 2007. Housing empire: The archaeology of daily life in Roman Amheida, Egypt. Unpublished PhD dissertation, Columbia University.

Boozer, A.L. 2010. Memory and microhistory of an empire: Domestic contexts in Roman Amheida, Egypt. In *Archaeology and memory*, ed. D. Borić, 138–157. Oxford: Oxbow Books.

Boozer, A.L. 2011. Forgetting to remember in the Dakhleh oasis, Egypt. In *Cultural memory and identity in ancient societies*, ed. M. Bommas, 109–126. London/New York: Cultural Memory and History in Antiquity. Continuum.

Boozer, A.L. 2012. Globalizing Mediterranean identities: The overlapping spheres of Egyptian, Greek and Roman Worlds at Trimithis. *Journal of Mediterranean Archaeology* 25: 93–116.

Boozer AL (2013) Archaeology on Egypt's edge: Archaeological research in the Dakhleh Oasis, 1819–1977. Ancient West & East 12:117–156.

Boozer, A.L. 2014. Adapting urban space in late Roman Trimithis (Dakhleh oasis, Egypt). In *Egypt in the first millennium AD: Perspectives from new fieldwork. Orientalia Lovaniensia Analecta*, ed. E. O'Connell, 23–42. Leuven: Peeters, plates 21–23.

Ruffini, Giovanni Roberto. 2015. Transport and trade in Trimithis: The texts from area 1. In *A late Romano-Egyptian house in the Dakhleh Oasis: Amheida House B2*, ed. Anna Lucille Boozer, 353–367. New York: New York University Press.

Boozer, A.L. 2015a. *Amheida II. A late Romano-Egyptian house in the Dakhla Oasis: Amheida house B2*. New York: New York University Press & The Institute for the Study of the Ancient World.

Boozer, A.L. 2015b. The tyranny of typologies in Romano-Egyptian domestic archaeology. In *Material evidence: Learning from archaeological practice*, ed. A. Wylie and R. Chapman, 92–109. Malden: Blackwell.

Boozer, A.L. 2016. Inside and out: Romano-Egyptian housing from the Fayyum and the Dakhleh oasis. In *Housing and habitat in the ancient Mediterranean: Cultural and environmental responses*, ed. A.A. Di Castro, C.A. Hope, and B.E. Parr, 185–197. Leuven: Peeters.

Cribiore, R., P. Davoli, and D.M. Ratzan. 2008. A Teacher's Dipinto from Trimithis (Dakhleh oasis). *Journal of Roman Archaeology* 21: 170–191.

Davoli, P. 2016. The baths of Trimithis. In *An Oasis City*, ed. R.S. Bagnall, N. Aravecchia, R. Cribiore, P. Davoli, O.E. Kaper, and S. McFadden, 76–86. New York: ISAW and NYU Press.

Davoli, P. 2017. A new public Bath in Trimithis (Amheida, Dakhla Oasis). In *Collective baths in Egypt 2. Recent discoveries and perspectives*, ed. B. Redon, 193–220. Cairo: IFAO-Etudes urbaines 10.

Davoli, P., and Cribiore, R. 2010. Una scuola di greco del IV secolo d.C. a Trimithis (oasi di Dakhla, Egitto). In *Leggere greco e latino fuori dai confini nel mondo antico: atti del I Congresso nazionale dell'Associazione italiana di cultura classica*, ed. M. Capasso, 73–87. Quaderni di Atene e Roma, 1. Lecce: Pense multimedia. Lecce, 10–11 maggio 2008.

Hope, C.A. 1980. Dakhla Oasis project: Report on the study of the pottery and. *Kilns Journal of the Society for the Study of Egyptian Antiquities* 10: 303–307.

Kaper, O.E. 2009. Epigraphic evidence from the Dakhleh oasis in the Libyan period. In: *The Libyan period in Egypt, historical and cultural studies into the 21st*

–24th dynasties: Proceedings of a conference at Leiden University, vol. 23, eds. G.P.F. Broekman, R.J. Demarée, O.E. Kaper, 25–27 October 2007, vol Egyptologische Uitgaven. Leiden: Netherlands Institute for the Near East
Kaper, O.E. 2010. A Kemyt Ostracon from Amheida, Dakhleh Oasis Bulletin de l'Institut Français d. *Archéologie Orientale du Caire* 110: 115–126.
Kaper, O.E., and P. Davoli. 2006. A new temple for Thoth in the. *Dakhleh Oasis Egyptian Archaeology* 28: 12–14.
Kaper, O.E., and R.J. Demarée. 2006. A donation stela in the name of Takeloth III from Amheida. *Dakhleh Oasis Jaarbericht Ex Oriente Lux* 39: 19–37.
Leahy, L.M. 1980. Dakhleh Oasis Project: The Roman Wall-Paintings from Amheida. *Journal for the Society for the Study of Egyptian Antiquities* 10: 331–378, plates XXI–XXXVI.
Wagner, G. 1987. Les Oasis d'Égypte à l'époque grecque, romaine et byzantine d'après les documents grecs. Bibliothèque d'étude, t. 100. Cairo: Institut Français d'Archéologie Orientale du Caire.

Further Reading

For a popular account of Amheida, see, R.S. Bagnall, N. Aravecchia, R. Cribiore, P. Davoli, O.E. Kaper, and S. McFadden. 2016. *An Oasis City*. New York: ISAW & NYU Press.
For field reports, database access, and a full bibliography on Amheida, see www.Amheida.org

Amphitheater

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Introduction

The amphitheater is one of several classes of building that were developed to accommodate a range of entertainments and spectacles in the Roman world. It was an exclusively Roman architectural development and was traditionally associated with gladiatorial display, although it came to accommodate animal displays and executions as well. As a building type, it was relatively late in reaching its canonical form and acquiring the associated facilities. Debates about the origins of both the structures and the types of display have monopolized scholarly attention, although recent research has clarified many points (Futrell 1997; Welch 2007). Partly as a result of senatorial opposition as well as cultural conservatism, permanent amphitheaters were not constructed in the city of Rome until the very late first century BCE, despite the fact that they were being provided earlier for other cities in Italy (e.g., at Pompeii). In the provinces, most amphitheaters were constructed in the first to early third centuries CE corresponding to the chronology of epigraphic evidence for arena displays, though it should be noted that not every city had one, nor were they always constructed on a monumental scale (Dodge 2014a, b). In the Eastern Mediterranean, a more complex situation prevailed which involved the limited provision of purpose-built amphitheaters and the much wider modification of preexisting entertainment venues for arena displays (Dodge 2009).

Definition

The permanent amphitheater is recognizable by its elliptical plan, with an oval arena completely surrounded by seating (Golvin 1988; Welch 2007; Dodge 2014a, b). This is the literal meaning of the Greek word *amphitheatron*, which from the time of Augustus gradually came to be used for this structure (Vitruvius, *de Arch* 1.7.1; *Res Gestae* 24; see also Dio 43.22). The earliest, datable permanent amphitheater is at Pompeii (Italy), and in the dedicatory inscription (*CIL* 10.852, 70–65 BCE), it is termed as *spectacula*, a word usually used for the entertainments themselves, and one clearly employed here because such buildings had yet to acquire a specific terminology.

Gladiatorial displays (*munera*) had their origins in aristocratic funerary rites at Rome and as such played an important role in elite display and competition in the Republic. They were staged in the Forum Romanum, the traditional location for aristocratic funerals, and the temporary spectator facilities required for the displays became increasingly elaborate. These facilities may have provided a model for the ovoid plan of early

permanent amphitheaters elsewhere in Italy (Golvin 1988: 56–58; Welch 2007: 30–71; Dodge 2014a). Investigations during the mid-twentieth century under the paving of the Forum Romanum located a central corridor, with four lateral arms bisecting it at regular distances 15 m apart, which excavators dated to the mid-first century BCE. Twelve shaft openings grafted access up into the open piazza. Traces of installations in these galleries are reminiscent of the system of cages and pulleys for winching performers and animals up into the arena that would later be installed beneath the arena floor in some developed amphitheaters of the imperial period (Coleman 2000: 227–228; Dodge 2014a, b). The amphitheater at Pompeii was dedicated by C. Quinctius Valgus and Marcus Porcius, *duoviri* of the new colony established at Pompeii in 80 BCE; they paid for the structure with their own money and in accordance with their magistracies (Golvin 1988: 33–37; Welch 2007: 74–77). The building was located just within the eastern city walls and measures 135 by 105 m. In common with other early amphitheaters, it was not provided with the extensive vaulted substructures, and the main support for the seating was formed by upcast from digging out the sunken arena. The exterior retaining wall at the upper level was built of *opus caementicium* faced with *opus incertum*, strengthened by buttresses, and with staircases that provided spectator access to the top of the *cavea*. At the north and south ends were broad, sloping corridors leading down into the arena. It was not until 29 BCE that Rome received its first permanent amphitheater, built by T. Statilius Taurus. It stood in the southern Campus Martius and was financed by the *manubiae* (a general's share of the booty) he received from his successful campaigns in Africa (Dio 51.23.1; Suetonius, *Augustus* 30.8; Golvin 1988: 52–53; Welch 2007). Little is known about it except that it was small and built of stone and wood; Dio referred to it as a "hunting theater" (*theatron kunegetikon*) and probably it was never used as a fully public venue. It was destroyed in the fire of 64 CE.

Key Issues/Current Debates/Future Directions/Examples

Key Example: The Colosseum

The most famous, largest, and most influential of all amphitheaters in the Roman world was the Flavian Amphitheater in Rome, better known today as the Colosseum (Gabucci 2001; Lancaster 2005; Welch 2007; Dodge 2019) (Fig. 1). It was begun by Vespasian on the site of the drained lake of Nero's Domus Aurea and dedicated in 80 CE by Titus after his father's death (Alföldy 1995). This was a grand and monumental building of four stories, 52-m high, standing on elliptical concrete foundations 12 m deep. It was an astonishing feat of planning and engineering on an unprecedented scale. With outer dimensions of 188 by 156 m and an arena measuring 80 by 54 m, an estimated 100,000 m^3 of travertine was used for the façade with 300 t of iron needed to clamp the blocks together. A combination of construction materials was used: concrete, travertine, and tuff, which allowed architects to address the specific structural challenges inherent in its design. The vaulted substructures beneath the *cavea* comprised a series of passages, corridors, and staircases. The three outer arcades formed two outer, annular corridors 7-m high covered by concrete barrel vaults. One further ring corridor closer to the arena was constructed of brick-faced concrete with a veneer of marble; this particularly grand passageway was used by those accessing the ringside seats set aside for the elite. These annular passages were intersected by the radial passages that accommodated staircases, superbly organized for ease and control of access. Although the access system had been used in both the theaters of Marcellus and of Pompey in Rome, here it was perfected so that the building perfectly incorporated the functional demands of a segregated society into its fabric (Edmondson 2002).

The design of the façade, broken up by arches, was framed by traditional orders (Tuscan, Ionic, and Corinthian) and helped to relieve the visual heaviness of the building. A similar treatment had already been employed for the exterior of the Theater of Marcellus (ded. 13 BCE). The topmost

Amphitheater, Fig. 1 Colosseum, view of the arena

level of the Colosseum facade, possibly not completed until the reign of Domitian, was a plain wall with windows alternating with Corinthian pilasters. It is at this level that the corbels for the awnings (*vela* or *velaria*) are preserved. Beneath the now lost wooden floor of the arena is an elaborate system of subterranean passages and chambers where animals and gladiators were held in readiness and winched up to the arena level or let up along ramps (Connolly 2003; Lancaster 2005). These had a very simple arrangement in wood at the time of the inauguration, such that scholars have suggested that the arena could have been flooded for full-scale aquatic displays, as implied by the literary sources (Dio 66.25.2-4; Coleman 2000; Gabucci 2001; Connolly 2003). There is still much debate about the logistics of such an enterprise, made more difficult by the fact that the arena substructures (*hypogeum*) have been much refurbished and rebuilt over time (Dodge 2019). However, such substructures and their access points can be better appreciated in the amphitheaters at Capua and Pozzuoli in Campania. Here the arena floors of concrete are still in place, and the trap-doors for hauling up animal cages can still be clearly seen (Golvin 1988; Dodge 2014a).

Welch has demonstrated that the provision of amphitheaters in Italy and the western provinces during the late republican and early imperial periods was linked to army training, and to veteran settlement and entertainment, as at Pompeii and Capua (Welch 2007: 88–91). These first permanent amphitheaters came to represent an important display of Rome's power and culture in Italy, and late first century BCE colonies also provided the context for the earliest amphitheaters in the provinces, as at Carmona (Spain), Corinth (Greece), and Antioch-on-the-Orontes (Turkey) (Golvin 1988: 41–42; Welch 2007: 255–259; Dodge 2009, 2014a). In the early imperial period, this colonial association continued within Italy, for example, at Aosta and Verona. Both colonies and provincial capitals provided important contexts for amphitheatrical building projects in the western provinces, as at Lyon (France), Mérida (Spain), and Carthage (Tunisia) (Golvin 1988: 82–83, 109–110, 122–123; Bomgardner 2000: 128–141). However, this is a pattern found with less frequency in the provinces of the Roman East (Dodge 2014a, b).

Amphitheaters in the Provinces

Amphitheaters survive in large numbers in Italy, North Africa, the Danube region, and the Western provinces, although with much variation in size and design, for example, at Capua (170 m by 139 m), second in size only to the Colosseum; Nîmes and Lyon (France); Carthage, El Djem (Tunisia); and Lepcis Magna (Libya). Extramural amphitheaters were also built and survive at some *civitas* capitals in Britain, as at Silchester and Cirencester (Wilmott 2008). Legionary bases around the empire were routinely provided with an extramural amphitheater, for example, at Vetera (Germany), Caerleon and Chester (Britain), Carnuntum (Austria), and Lambaesis (Algeria) (Golvin 1988: 80, 88; Futrell 1997: 147–152). All are relatively small, both in overall size and scale of construction.

In the British and Gallic provinces a hybrid structure, built to function as both theater and amphitheater, was often constructed, for example, Les Arènes in Paris (France). It is unclear if these "theater-amphitheaters" (also, confusingly, referred to as "semi-amphitheaters" by some modern commentators) were more amphitheater than theater, and it is uncertain what kind of performances took place in them (Golvin 1988; Dodge 2009). They were generally not elaborately constructed, utilizing earth banks retained by masonry walls as supports for the seating (*cavea*). Similar theater-amphitheaters were also associated with rural shrines in Gaul, as at Sanxay, and these perhaps should be interpreted as a continuation of the classical connection between temple and festival games as seen in the Greek sanctuaries at Delphi and Epidauros, and continued in Italy, for example, at Pietrabbondante. The only example of this type of hybrid theater-amphitheater outside the Northwestern Provinces is at Lixus in Morocco (Golvin 1988). There may also have been an economic element in this design, maximizing the facilities available in a single building (Dodge 2014a).

By comparison with the West, there are far fewer purpose-built amphitheaters known in the eastern Roman provinces (Dodge 2014a, b). This has been traditionally explained by the idea that the Greek East was more "civilized" than Italy and the Western Provinces and therefore would not have indulged in the kind of blood sports these structures accommodated. However, at least 22 purpose-built amphitheaters have already been identified in the East (Dodge 2009). The earliest example was constructed at Antioch-on-the-Orontes in the later first century BCE (Malalas 216.21-217.4; Libanius *Orations*, 2.219). Malalas referred to it as "a place of single combat" (*monomachikon*). The simple form of this building, partly rock-cut with no arena substructures, was probably similar to other contemporary amphitheaters known in Italy and the West, for example, at Paestum (Italy) and at Carmona. None of the amphitheaters in the Roman East have the monumentality and arena substructures seen in the West, as Nimes, Mérida, or El Djem, except perhaps Pergamum and Cyzicus (Turkey) (Golvin 1988; Dodge 2009) (Fig. 2).

Problems of Definition

There are many venues that do not fit simple modern characterizations, both in terms of ancient terminology and the range of events staged within them. This is particularly true of the eastern empire that had an already existing building stock of theaters and stadia. What has become clear in recent years is the extent to which venues were modified and remodeled to maximize the flexibility for staging a range of entertainments. This was achieved in a number of different ways. In theaters, the most common method was the construction of a wall around the orchestra, often with the removal of the lower rows of seats and the reduction of the stage-building to create an arena-like space, as at Corinth (Dodge 2009); the removal of the seats created a high podium wall providing both protection and better viewing for the spectators. These modifications are mainly second century CE in date, or later, but some occurred as early as the first century CE, as at the Theatre of Dionysus in Athens. Stadia were adapted in a similar way at the curved end of the structure to create a mini-arena, for example, at Perge (Welch 1998, 1999; Dodge 2009).

Very few entertainment buildings have been fully excavated and properly published, making their dating and structural history

Amphitheater, Fig. 2 Pergamum. Amphitheater

problematic. Despite the massive scale of construction and public investment, some have been completely lost. Thus, new discoveries in recent decades have been particularly important, advancing knowledge in the provision of these buildings and the engagement of the local populations in typically "Roman" cultural pursuits. For example, an amphitheater was identified and excavated in the late 1980s and 1990s in London, the provincial capital of Britannia (Bateman 2008). The identification in 2006 of an amphitheater at Sofia (Bulgaria) has made another addition to the lengthening list of amphitheaters in the Eastern part of the Empire, further emphasizing that Roman spectacles were enjoyed as much in the Greek East as in the Latin West (Welch 1998, 1999; Dodge 2009; Velichkov 2009).

The most northerly amphitheater occurs in a military context in Scotland associated with the Antonine fort of Inveresk (Wilmott 2008); the most easterly examples have been identified at Palmyra in the Syrian desert and Dura-Europos on the Euphrates (Rostovtzeff et al. 1936: 72–77; Golvin 1988: 139; Hammad 2008; Dodge 2009, 2014a, b). Interestingly, the latest amphitheaters were constructed in the third and early fourth centuries CE, for example, at Beth Guvrin (Israel) (Dodge 2009), at a time when the gladiatorial games themselves were becoming far less frequent, and indeed late evidence does not survive in the West outside Italy. As combat displays declined, arenas continued to provide a venue for the other types of display with which they had long been associated – animal displays, acrobatics, and dancing. This continuity is very evident in the early sixth century CE writings of Cassiodorus and the contemporary diptychs of Constantinople (Cassiodorus *Variae* 5.42.6-10; Dodge 2009, 2011: 73–76; Dodge 2014a, b).

Cross-References

- ▶ Architecture, Roman
- ▶ Romanization
- ▶ Urban Planning, Roman

References

Alföldy, G. 1995. Eine Bauinschrift aus dem Colosseum. *Zeitschrift fur Papyrologie und Epigraphik* 109: 195–226.

Bateman, N. 2008. *London's Roman amphitheatre: Excavations at the Guildhall*. London: Museum of London Archaeology Service.

Bomgardner, D. 2000. *The story of the Roman amphitheater*. London: Routledge.

Coleman, K. 2000. Entertaining Rome. In *Ancient Rome. The archaeology of the Eternal City*, ed. J. Coulston

and H. Dodge, 210–258. Oxford: Oxford University Committee for Archaeology.
Connolly, P. 2003. *Colosseum. Rome's arena of death*. London: BBC.
Dodge, H. 2009. Amphitheaters in the Roman East. In *Roman amphitheaters and spectacula: A 21st century perspective. Papers from the Chester conference, February 2007, Chester, UK*, ed. T. Wilmott, 29–46. Oxford: Archeopress.
Dodge, H. 2011. *Spectacle in the Roman world*. London: Bristol Classical Press.
Dodge, H. 2014a. Building for an audience: The architecture of Roman spectacle. In *Blackwell companion to Roman architecture*, ed. R. Ulrich and C. Quenemoen, 281–298. Oxford: Blackwell.
Dodge, H. 2014b. Amphitheatres. In *Blackwell companion to sport and spectacle*, ed. P. Christesen and D. Kyle, 545–560. Oxford: Blackwell.
Dodge, H. 2019. The Colosseum. In *The Oxford handbook of sport and spectacle in the ancient world*, ed. A. Futrell and T. Scanlon. Oxford: Oxford University Press.
Edmondson, J. 2002. Public spectacles and Roman social relations. In *Ludi Romani: espectáculos en Hispania Romana*, ed. T. Nogales Basarrate and A. Castellanos, 21–43. Madrid: Museo Nacional de Arte Romano.
Futrell, A. 1997. *Blood in the arena. The spectacle of Roman power*. Austin: University of Texas Press.
Gabucci, A. 2001. *The Colosseum*. Los Angeles: J. Paul Getty Museum.
Golvin, J.-C. 1988. *L'amphithéâtre romain. Essai sur la théorisation de sa forme et ses fonctions*, 2 vols. Paris: Boccard.
Hammad, M. 2008. Un amphitheatre à Palmyre? *Syria* 85: 339–345.
Lancaster, L. 2005. The process of building the Colosseum: The site, the materials and the construction techniques. *Journal of Roman Archaeology* 18: 57–82.
Rostovtzeff, M.I., A.R. Bellinger, C. Hopkins, and C.B. Welles. 1936. *The excavations at Dura-Europos. Preliminary report of the sixth season of work, October 1932–March 1933*. New Haven: Yale University Press.
Velichkov, Z. 2009. The amphitheater of *Serdica*, Sofia, Bulgaria. In *Roman amphitheaters and spectacula: A 21st century perspective. Papers from the Chester conference, February 2007, Chester, UK*, ed. T. Wilmott, 119–125. Oxford: Archaeopress.
Welch, K. 1998. Greek stadia and Roman spectacles: Asia, Athens, and the tomb of Herodes Atticus. *Journal of Roman Archaeology* 11: 117–145.
Welch, K. 1999. Negotiating Roman spectacle architecture in the Greek world: Athens and Corinth. In *The art of ancient spectacle*, ed. B. Bergmann and C. Kondoleon, 124–145. Washington, DC: National Gallery of Art.
Welch, K. 2007. *The Roman amphitheater from its origins to the Colosseum*. Cambridge: Cambridge University Press.
Wilmott, T. 2008. *Amphitheatres in Roman Britain*. London: Tempus.

An Zhimin

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An Zhimin (1924–2005) was a successful Chinese archaeologist, who worked for the Institute of Archaeology, Chinese Academy of Sciences (known as "Chinese Academy of Social Sciences" after 1977), since the 1950s. His explorations into China's prehistoric cultures attracted much attention and made a major contribution toward creating a framework for the prehistoric archaeology of China (Gu 2014).

Biographical Information

An Zhimin was born in Yantai, Shandong Province, in 1924. He spent most of his childhood in Shandong and then went to Peking (known as "Beijing" from 1979) for high school study. At Yiwen High School 藝文中學 (known as "Beijing No.28 High School 北京第二十八中學" from 1952), an article by Liang Qichao 梁啟超 – *The Past and Future of Chinese Archaeology* 中國考古學的過去及將來 (Liang 1936) – awakened his interest in the field of archaeology.

During his undergraduate studies at the University of China 中國大學, An was able to study archaeology under the tutelage of a number of renowned scholars, such as Pei Wenzhong 裴文中 (1904–1982) and Torii Ryuzo 鳥居龍藏 (1870–1953). In 1949, he became a graduate student at Yenching University 燕京大學. After that he joined the Institute of Archaeology, Chinese Academy of Sciences, under Liang Siyong's 梁思永 (1904–1954) supervision, from where he began a career as an archaeologist that would endure for the next 50 years or so (An and An 2014).

Since then, a number of archaeological projects have been carried out under An Zhimin's management. During the 1950s and 1960s, he left his footprint in Hebei, Henan, Hunan, Qinghai, Inner Mongolia, and the three provinces in the

northeast of China. In 1978, he was appointed as the chief editor of the journal *Archaeology* (*Kaogu* 考古) and then as the director of the Neolithic Department of the Institute of Archaeology. In the following couple of years, he became first the deputy director of his Institute and then the chairman of the Department of Archaeology, at the Graduate School of Chinese Academy of Social Sciences. In 1986, An was conferred the title of correspondent academician by the German Archaeological Institute, and 5 years later, he was invited to be a visiting professor at the Institute for Research in Humanities, Kyoto University, Japan.

An Zhimin had expressed interest in China's Neolithic period from the beginning of his career, and he achieved great accomplishments in fields related to this. By defining the "Second Phase of the Miaodigou Culture 廟底溝文化," which lines up with the earlier Yangshao Culture 仰韶文化 in the west and the later Longshan Culture 龍山文化in the east, he argued that "the Yellow River region was undoubtedly the only origin of Chinese civilisation" (An 1987). This theory is also known as the model of "Central Plains diffusion." During the 1980s and 1990s, many scholars, such as Su Bingqi 蘇秉琦 (1909–1997), Zou Heng 鄒恆 (1927–2005), K. C. Chang 張光直 (1931–2001), Yan Wenming 嚴文明, Li Shaolian 李紹連, and others, were heavily involved in debate concerning the origin of Chinese civilisation. Their contributions have greatly enriched and deepened our understandings of the context of China's prehistoric cultures.

Cross-References

► Periodization in Japanese Prehistoric Archaeology

References

An, Z. 安志敏 1987. Shilun wenming de qiyuan 試論文明的起源. *Kaogu* 考古 1987(5):453–457.

An, J. 安家瑤 and An, J. 安家瑗 2014. Kaogu rensheng – mianhuai fuqin An Zhimin xiansheng 考古人生——緬懷父親安志敏先生. *Dazhong Kaogu* 大眾考古 2014(7):47–54.

Gu, C. 谷叢 2014. An Zhimin 安志敏. In *Zhongguo Kaoguxue Dacidian* 中國考古學大辭典, ed. W. Wang, 87. Shanghai: Shanghai cishu chubanshe 上海辭書出版社.

Liang, Q. 梁啟超 1936. Zhongguo kaoguxue zhi guoqu ji jianglai 中國考古學之過去及將來. In *Yinbingshi Zhuanji zhi Yibaiyi* 飲冰室專集之一百一, 1–15. Shanghai: Zhonghua shuju 中華書局.

Further Readings

Li, S. 李紹連 1987. Zhongguo wenming qiyuan de kaogu xiansuo jiqi qishi 中國文明起源的考古線索及其啟示. *Zhongzhou Xuekan* 中州學刊 1987(1):101–107.

Yan, W. 嚴文明 1987. Zhongguo shiqian wenhua de tongyixing yu duoyangxing 中國史前文化的統一性與多樣性. *Wenwu* 文物 1987(4):38–50.

Zou, H. 鄒衡 1987. Zhongguo wenming de dansheng 中國文明的誕生. *Wenwu* 文物 1987(2):69–85.

Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation

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Introduction

Archaeological artifacts which have been lost, abandoned, or deliberately deposited in the ground will become included in the natural cycles of decay and the return to nature. This normally results in the survival of only the more robust materials such as stone, shell, and ceramics and the partial survival of metals, glass, bone, and other inorganic materials. The most abundant materials used by mankind are of organic origin such as wood and plant materials, skins, and other animal products. These will normally all be destroyed through microbial activity and biodeterioration, leaving barely a trace. But occasionally these materials do survive, albeit in a greatly altered state, through becoming included in anaerobic waterlogged deposits. Where such conditions pertain, not only do a greater range of artifact materials survive but also environmental

macrofossil remains such as small bones, insect parts, plant remains, seeds, and pollen resulting from the interaction between humans and their immediate surroundings. Waterlogged archaeological deposits therefore represent a particularly valuable source of information about past cultures and environments, requiring special management and protection.

Definition

Anaerobic, or anoxic, conditions are formed by the exclusion of air from the burial medium through water saturation. This denies the microorganisms (mainly fungi and bacteria) responsible for biological decay the oxygen which their metabolism requires. These oxygen-free or "reducing" conditions can also provide excellent protection against corrosion for metals such as copper, lead, and iron whose normal corrosion is as a result of oxidation processes (Selwyn 2004).

Artifacts composed of organic materials (wood, leather, and animal and plant fibers) can survive burial in anaerobic deposits for many hundreds or thousands of years, but only if the artifacts become well sealed within anaerobic deposits and with their chemical equilibrium undisturbed and at a depth that does not permit exchange of oxygenated water from the deposit/air interface. Anaerobic waterlogged conditions most commonly exist in the sediments at the bottoms of rivers and lakes; in fenlands, marshes, and peat bogs; and in urban contexts where the natural water table is raised artificially through centuries of deliberate dumping of organic debris.

Key Issues/Current Debates/Future Directions/Examples

Wetlands have always been a focus of human activity and settlement, offering means for defense, transport, and trade or the ready availability of natural resources. Where anaerobic conditions persist into modern times, preserved cultural materials of many different types and sizes may be anticipated. Discoveries are almost always made due to modern exploitation, such as gravel extraction, peat digging, land drainage for agriculture, the dredging of rivers, and construction. Among the largest waterlogged wooden structures discovered in recent years are ships and large boats, normally discovered in silted-up river harbors and on riverbeds or incorporated into riverbanks. In the UK prehistoric dugout canoes are regularly found during gravel extraction in the floodplains of rivers or in the digging of drainage channels and artificial lakes. The remains of prehistoric settlements and associated trackways, constructed entirely out of wood, are often found accidentally or as a result of rescue excavations on sites threatened with the dewatering and shrinkage of overlying protective peat layers. Wetlands, especially bogs, can also contain remarkable assemblages of well-preserved artifacts of many material types, taken to be votive or sacrificial deposits. Bogs can also be the last resting places of human sacrifices, as in the case of the Danish bog bodies and Lindow Man (Stead et al. 1986), found during the commercial digging of peat. Culturally rich waterlogged deposits also exist in many ancient cities, such as London and York in the UK and the major ancient towns in Scandinavia. These highly organic contexts, sometimes referred to as "black earth," contain domestic, craft, and industrial waste, timber foundations, and environmental remains – all of which, when properly excavated and researched, can provide a highly detailed picture of the life and activities on that particular site and its surroundings, sometimes over many centuries.

Artifacts of organic origin can often be preserved sufficiently well that the surfaces still bear an extraordinary level of detail. Wood artifacts and structural timbers often bear the clear signs of the tools used in their shaping, allowing the type and size of the cutting tool to be identified. Even the "tool signature," the minute signs of damage and wear to the blade edge, can be recognized, allowing the use of the same tool to be identified over several timbers or within the same structure (Brunning 2010, 16). Non-artifactual wood from prehistoric contexts has occasionally been found still bearing the chew marks of ancient beavers (Coles 2006). The study of wood technology and biology often

provides valuable information relating to resource use and procurement, woodland management, and dating through dendrochronology. But despite appearances, waterlogged organics are usually to be found in a highly altered state upon excavation, having become denatured by their long period of burial. The more susceptible portions of the material's structural and chemical makeup will have been removed through processes such as hydrolysis, the breaking down of chemical bonds through the addition of water. This is partly driven by low levels of bacterial activity that is able to tolerate the toxic anaerobic conditions. Wood will lose its cellulose component leaving only the lignin skeleton, but enough of the macrofossil structure will often remain to permit identification (Kenward et al. 2008). Leather survives only because the tanning process has rendered the collagen fibers resistant to hydrolysis. Only textiles of animal fiber origin (hair, wool) are normally found, since keratin is similarly resistant. Other chemical factors in the burial medium may also have an effect on survival. Peat bogs can be strongly acidic, causing some materials, such as bone, to be destroyed. But peat bogs are also extremely tannin-rich meaning that skin products other than pre-tanned leather will become preserved. This accounts for the survival of "bog burials" where the human skin and some internal organs are well preserved, but the skeletal material has all but disappeared (Stead et al. 1986).

Such denatured organic materials are often structurally very weak and their surfaces in particular extremely soft and fragile, their shape only being maintained by the water that they contain. They are therefore very susceptible to drying from the moment of exposure onward, any loss of water content causing irreparable damage to both surface detail and whole objects due to shrinkage and structural collapse. Controlled archaeological excavations of waterlogged sites require special management and resourcing as the working conditions and anticipated results will be so different from a normal dry site. Special techniques and procedures will be required for uncovering waterlogged structures and artifacts, with specialist skills and knowledge available to undertake recording, sampling, and field stabilization and conservation (Brunning 2010). Advance plans need to be made for the safe packaging and temporary storage of recovered materials and arrangements made with suitable laboratories for longer-term storage and treatment. Advice on "best practice" on excavating fragile waterlogged organic materials is now available through European Standards (BS EN 16873:2016). The preservation treatment of waterlogged materials can be costly and complex, especially for larger items, and the decision to excavate and lift waterlogged structures and assemblages can only be presaged on the ability to undertake such preservation (Hoffman 2013). The possibility of reburial or "preservation in situ" has, it seems, only become a viable alternative in exceptional cases (Coles 1987; Spriggs 1987). Current research into these topics is reported to the triennial international meetings of the Waterlogged Organic Archaeological Materials (WOAM) Group of the ICOM Conservation Committee (e.g., Williams 2017).

The main threat to wetlands and other types of waterlogged deposits is from lowering of the water table, with consequent drying out, wastage, ingress of air, and the rapid onset of the normal processes of biodeterioration. In cities such as York and Bergen, evidence for dewatering can be linked directly to the construction of buildings with underground basement levels which serve as sumps for water from the surrounding cultural levels which start to dry out as a consequence. Rural wetland sites are under continual threat from activities such as sand and gravel quarrying, peat extraction, and field drainage for agriculture (e.g., French 2017). Recent research at the Mesolithic site of Star Carr, North Yorkshire, UK, has demonstrated just how damaging these threats can be when loss of waterlogging leads to changes in the site geochemistry (High et al. 2016). Waterlogged structures are seldom anticipated or detectable in advance of these activities, and major finds are not uncommon and have to be recovered by archaeologists under "rescue" conditions. Efforts at site protection are often most likely to succeed when in concert with other organizations with common interests such as nature conservation bodies and wildlife agencies. Legal protection is sometimes possible where cultural significance

can be established, and interest from other stakeholders, such as tourism and education, can also be valuable. But in most cases, some form of physical intervention will also be necessary to maintain or elevate the local water table. Where extensive structures, such as prehistoric trackways and lakeshore villages, are known to exist, various forms of environmental intervention to protect surviving portions have been used by, for example, constructing clay bunds around the area to be protected, which is then backfilled and artificially flooded (Coles 1987). These attempts at protection are usually costly and require continuous monitoring and long-term regular maintenance, if they are to be successful.

Research into new methods and strategies for site protection techniques is reported at regular intervals at the Preservation of Archaeological Remains In Situ (PARIS) International Conferences (e.g., Leuzinger et al. 2016). Important here is the development of techniques and equipment for inground monitoring to measure the rate of change in waterlogged soils and the effectiveness of remedial action taken (Smit et al. 2006). A number of site-specific projects are ongoing to find ways to slow down the deterioration of important waterlogged archaeological and historic structures and sites, such as at the Neolithic Sweet Track, Somerset, UK (Brunning 2000); Medieval Bryggen, Bergen, Norway (Mathieson et al. 2008), and in Medieval and later Amsterdam, The Netherlands (Klaassen 2005). These projects have led to an increasing awareness of the potentially catastrophic effects that could be caused by ongoing climate change.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Dating Techniques in Archaeological Science
- ▶ Deep-Water Archaeology
- ▶ Field Stabilization of Immovable Heritage
- ▶ Glass: Conservation and Preservation
- ▶ International Council of Museums (ICOM)
- ▶ Leather, Archaeological: Conservation and Preservation
- ▶ Metals: Preservation and Conservation
- ▶ Paleoentomology: Insects and Other Arthropods in Environmental Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation
- ▶ Waterlogged Finds: Conservation
- ▶ Wood: Conservation and Preservation

References

Brunning, R. 2010. *Waterlogged wood: Guidelines on the recording, sampling, conservation and curation of waterlogged wood*. 3rd ed. London: English Heritage.

Brunning, R., D. Hogan, J. Jones, M. Jones, E. Maltby, M. Robinson, and V. Straker. 2000. Saving the Sweet Track: The in situ preservation of a Neolithic wooden trackway, Somerset, UK. *Conservation and Management of Archaeological Sites* 4 (1): 3–20.

BS EN 16873:2016. *Conservation of cultural heritage. Guidelines for the management of waterlogged wood on archaeological terrestrial sites*. British Standards Institution.

Coles, J.M. 1987. The preservation of archaeological sites by environmental intervention. In *In situ archaeological conservation*, ed. H.M.W. Hodges, 32–55. México: Instituto Nacional de Antropología e Historia and J Paul Getty Trust.

Coles, B.J. 2006. *Beavers in Britain's past*. Oxford: Oxbow Books.

French, C. 2017. Some thoughts on the monitoring and preservation of waterlogged archeological sites in eastern England. *Wiley Interdisciplinary Reviews: Water*, 4 (3.e1204). https://doi.org/10.1002/wat2.1204.

High, K., N. Milner, I. Panter, B. Demarchi, and K.E. Penkman. 2016. Lessons from Star Carr on the vulnerability of organic archaeological remains to environmental change. *Proceedings of the National Academy of Sciences*: 12957–12962.

Hoffman, P. 2013. *Conservation of archaeological ships and boats*. London: Archetype Publishing.

Kenward, H., A. Hall, and H. Mathieson. 2008. Patterns of early-stage taphonomy in plant and insect macrofossils: Testing hypotheses in relation to post-depositional mass-decay of organo-rich archaeological deposits. In *Preserving archaeological remains in situ (PARIS): Proceedings of the 3rd Conference 7–9 th Dec. 2006 (Geoarchaeological & Bioarchaeological Studies)*, ed. H. Kaas and R.M. Van Heeringen, vol. 10, 29–36. Amsterdam: Univ. of Amsterdam.

Klaassen, R. 2005. Preserving cultural heritage by preventing bacterial decay of wood in foundation piles and archaeological sites (BACPOLES). Wageningen: EU Report EVK4-CT-2001-00043.

Leuzinger, U., J. Sidell, and T. Williams (eds.). 2016. The 5th International Conference on Preserving Archaeological Remains in situ (PARIS5): 12–17 April 2015, Kreuzlingen, (Switzerland). *Conservation and Management of Archaeological Sites* 18: 1–3.

Matthiesen, H., R. Dunlop, J.A. Jensen, H. de Beer, and A. Christensson. 2008. *Monitoring of preservation conditions and evaluation of decay rates of urban deposits – Results from the first five years of monitoring at Bryggen in Bergen (Geoarchaeological & Bioarchaeological Studies 10)*, 163–174. Amsterdam: University of Amsterdam.

Selwyn, L. 2004. *Metals and corrosion: A handbook for the conservation professional*. Ottawa: Canadian Conservation Institute.

Smit, A., R.M. Van Heeringen, and E.M. Theunissen. 2006. *Archaeological monitoring standard: Guidelines for the non-destructive recording and monitoring of the physical quality of archaeological sites and monuments (Nederlandse Archeologische Rapporten 33)*. Amersfoort: NAR.

Spriggs, J.A. 1987. Wood, with an emphasis on the preservation of in situ structures. In *In situ archaeological conservation*, ed. H.M.W. Hodges, 106–113. México: Instituto Nacional de Antropología e Historia and J Paul Getty Trust.

Stead, I.M., J. Bourke, and D. Brothwell. 1986. *Lindow man: The body in the bog*. Ithaca: Cornell University Press.

Williams, E., ed. 2017. *Proceedings of the 13th ICOM/CC group on wet organic archaeological materials conference, Florence 2016*. Italy: ICOM/WOAM.

Further Readings

Caple, C. 2001. Degradation. In *Handbook of archaeological sciences*, ed. D.R. Brothwell and A.M. Pollard, 587–594. Chichester: Wiley.

Corfield, M. 2007. Wetland science. In *Wetland archaeology and environments: Regional issues, global perspectives*, ed. M. Lillie and C. Ellis, 144–155. Oxford: Oxbow Books.

Gregory, D., and H. Matthiesen. 2006. In situ preservation of waterlogged archaeological sites. In *Conservation science: Heritage materials*, ed. E. May and M. Jones, 309–329. Cambridge, UK: Royal Society of Chemistry.

Analogy in Archaeological Theory

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Introduction and Definition

An analogy is a cognitive process by which new phenomena are comprehended from known experiences, using the latter heuristically in building explanatory models and in directing future research. Analogies perform an important role in theory building and in suggesting new lines of research. An orthodox position in the philosophy of science posits that analogies are not indispensable in systematic scientific explanations (deductive-nomological model) and thus are not part of the process of theoretical justification (hypothetic-deductive model), that is, analogies are significant in the process of discovery but not when scientific justification is at stake because they function in the inductive confirmation of a given theoretical proposition. However, analogical reasoning can perform a clue role in the justification of hypothesis and theories, especially if we accept that scientific practice ultimately rests on analogical extensions of paradigmatic models. An analogical argument allows setting forth conclusions based on similarities between two or more entities that share relevant structural properties (analogues). Yet, an analogical argument is not exclusively based on similarities and coherences between analogues but on ideas, generalizations, and principles that make the analogical movement feasible and open to epistemic consideration (Shaw and Ashley 1983).

Key Issues/Current Debates

In the history of archaeological thinking, the epistemological role of analogical inferences, in general, and of ethnographic analogies, in particular, has been central in the ontological debate that has taken place in the last decades about the status of archaeological theory in the social sciences field. In epistemological terms, archaeological knowledge has always used analogies drawn from other fields, such as history (analogies about changes over long periods), paleontology (materialist analogies about the classification of evidences), biology (analogies about the interconnectedness of different types of natural phenomena), and, in particular, anthropology (analogies about cultural behavior) (Murray and Walker 1988).

Ethnographic analogies were foundational in prehistoric archaeology since the sixteenth century, when the contact with "contemporary savages" made possible in Europe widening

interpretative perspectives about ancient human artifacts, traditionally understood from a mythical or magical standpoint (Wylie 1985). The interpretations of antiquarians were configured as primitive analogies, that is, they were based on simple identifications and projections of certain empirical properties between two or more analogues, without even considering a relevant structural connection (Shaw and Ashley 1983).

The use of ethnographic analogies increased in the nineteenth century as attention was given to theoretical explanations of cultural development. If until the eighteenth century the antiquarian's perspective established a direct equivalence between "prehistoric primitives and moderns," for classical evolutionism, contemporary cultures were composed of different degrees of cultural complexity that were projected into the past as stages of a determined course of historical development. This first systematic use of analogies in archaeological interpretation posited that the most primitive contemporary cultures were presumably comparable to most ancient forms of prehistoric savagery. Such an idea took for granted an evolutionary starting point in a developmental sequence of technological, economic, and political stages leading to industrial civilization (Wylie 1985). Ethnographic analogies in classic evolutionary thinking were a direct reading of the past from the present. They were standard analogies in that the identification and projection of certain empirical properties between two or more analogues were constituted from conditions of relevance established by the very principles and theoretical structure that set them forth in the first place (Shaw and Ashley 1983). This kind of analogical inference is based on uniformitarian premises, making it impossible to prove its truth. Besides, they are prone to error and are a part of an ethnocentric, biased vision of the past (Wylie 1985; Trigger 1992).

A first reaction against the abuses of classical evolutionism stemmed from the rejection by culture-historical archaeology of ethnographic analogies as interpretative inferences about past human behavior. At the beginning of the twentieth century, the emphasis on establishing cultural typologies and chronologies championed by culture history led to a renewed appraisal of analogies based on the direct historical approach. In American archaeology, the proximity with anthropology made it possible to trace direct relationships between the prehistoric past and historical events documented in written sources. This was achieved by archaeological investigations in sites with contemporary occupations. As a result, archaeological contexts and styles from a given area were identified with groups that were recognizable in ethnohistorical sources. The analogical argument involved was based on continuous models of interpretation which imply that the sources of analogies presuppose a genetic connection between ascendant and descendant, in clear opposition with the purely functional connections so cherished by evolutionism. The direct historical analogies of the 1930s and 1940s implied archaeological tests that could correct or confirm hypotheses derived from ethnographic or ethnohistorical data. Archaeological tests helped to control analogies, and ethnographic data helped to stimulate and direct archaeological research (Wylie 1985; Trigger 1992; Willey and Sabloff 1996).

Given that most prehistoric phenomena do not have likely evolutionary descendants and that many documented ethnographic phenomena do not have any obvious archaeological ancestor, in the 1950s American archaeology began to search for new parameters for establishing general analogies based on discontinuous models of interpretation. Comparisons between the present and the past were filtered out by theoretical inferences derived from cultural ecology and multilinear evolutionism. Important in that regard was the notion that functional convergences between past and present cultures are mediated by similar environmental characteristics and similar levels of technological sophistication (Wylie 1985; O'Brien et al. 2005). They were, inferentially speaking, analogies with presumed structure, that is, analogies in which the connection between analogues is established by relevance, linking structure, and properties (Shaw and Ashley 1983).

At that time, it was held that the problem with ethnographic analogies was mostly related to the limitations of the sources. In order to overcome

such limitations, archaeologists should pursue their own ethnographic projects about continuous cultural change, by which living communities create, use, recycle, and discard the material culture that will eventually form the archaeological record (Wylie 1985). Although there was no methodological consensus about the role of analogies in archaeological interpretations, the term ethnoarchaeology began to be used from then on to define the research procedures of this "new analogy," placing emphasis on the study of subsistence and settlement patterns, production and use of material culture, and formation of the archaeological record. Experimental studies can also be included in this perspective because they were developed to document contemporary patterns of tool manufacture and the effects of natural processes in the formation of the archaeological record (David and Kramer 2001).

In the last three decades, the debate between processualism and postprocessualism regarding the role of analogies in archaeological interpretations reflects a wider epistemological discussion. The New Archaeology of the 1970s adopted a radical posture regarding ethnographic analogies. Such a posture stemmed from its explicit adoption of neopositivism, which rejects analogies as explanatory components of hypothetic-deductive methods. The New Archaeology strove to eliminate the dependence in analogies or any other form of inductive inferences leading to uncertain conclusions in hypotheses testing. They were treated as tautological inferences doomed to the fallacy of affirming the consequent. Such an objection was premised upon the limitations of amplitude and quality attributed to the empirical data used as referents of contemporary analogues, incapable of accounting for the diversity of past human behavior. The idea was that interpretative hypotheses must be deducted from nomothetic propositions based on well-established uniformitarian principles, such as those derived from natural sciences, projecting into the past human behavior regularities, limited to their biological and physical dimensions (Gould 1980; Gould and Watson 1982; Wylie 1985; David and Kramer 2001; O'Brien et al. 2005).

In the 1980s, the critique of the "safe yet limited" interpretations championed by processualism and of the role of analogies in archaeological practice led to the reassessment of the relationship between inductive methodologies and archaeological theory. If analogies are inductive but also ampliative, the conclusions they allow have more information than premises and initial data. The relevance of an analogy is assessed by analyzing the connecting principles between analogues that posit the simple presence or absence of given properties (formal analogies), emphasizing the importance of structural relationships between them (relational analogies). Relational analogies imply that causal mechanisms are behind similarities between analogues, determining the presence and interrelationship between properties. It is from this kind of analogical reasoning that established theories can expand to new analytical realms, given that such a reasoning is explanatory: the projection of new properties not only implies structural connections between the properties of the analogues but also explains their coherence (Hodder 1982; Shaw and Ashley 1983; Wylie 1985; O'Brien et al. 2005).

The analysis of the relational character of analogies between the present and the past in building archaeological theory is linked to the processualist revision of the guiding ontological principles of the discipline through middle-range theory and behavioral archaeology. Middle-range theory posited relationships between the static and the dynamic through inductive methodologies, while general theories would be devoted, instead, to understanding those processes involved in changes and diversifications of the organizational principles of living systems. For middle-range theory, all interpretative principles about past dynamics cannot be tested in the archaeological record, for it is static and contemporary. Inferences about the past can only be tested in actualistic studies, in which the formation of the archaeological record can be examined experientially and directly. Such an approach is also based on uniformitarian principles: the causes of current events leading to the formation of the static archaeological record are the same obtained in the past. An analogy allows setting forth

propositions about the past to be tested in the archaeological record. Consequently, ethnoarchaeology became a source for formulating and testing hypotheses about the relationship between cultural and material phenomena, making it possible to offer models of past societies based on contextual studies of the archaeological record (Binford 1977, 1981). To this analogical equation, behavioral archaeology adds noncultural processes that contribute to the formation of the archaeological record. It is argued that the understanding of the depositional and postdepositional processes responsible for the formation of the archaeological record is a means for refining analogical arguments linking past and present behaviors, as they are reflected in archaeological contexts (Schiffer 1995, 1996).

To the discussion on the limits of a neopositivist approach in archaeology, in the 1980s, postprocessual archaeology added a wider openness toward social sciences. The paradigmatic tensions between processual and postprocessual approaches at the end of the twentieth century are a part of a wider debate in human sciences about universalistic and particularistic perspectives, opposing materialist and symbolic visions of cultural phenomena. Postprocessualism, drawing from eclectic theoretical approaches, emphasizes the symbolic nature of material culture and its active role in the relationship among human beings and between them and the environment. It champions the importance of linking social practices to history, and by doing so, it aims to capture the gradual and cumulative processes of cultural maintenance and transformation. While processual analogies between the past and the present would entail external, nonparticipant visions in the study of human behavior (etic perspective), postprocessualism, by positing culture as a fabric of historically constituted meanings, seeks to understand the meanings of material culture by contextualizing it in particular symbolic environments (emic perspective). This led to a renewed discussion about the role of analogies in building continuous and discontinuous interpretative models about the past (Hodder 1986).

Future Directions

In current archaeological theory, these dichotomies have been relativized by understanding that the knowledge about the past is contingent to a network of dialectical relationships between the whole and the parts, the universal and the particular, the structure and the event, and the material and the symbolic. The role of analogies in processual and postprocessual ethnoarchaeological approaches shares the common goal of building, from ethnographic experiences directed by an "archaeological gaze," interpretative models about the relationship between practice and symbolism in the action of human beings upon the material world. Likewise, relational analogical thinking keeps feeding the development of ethnoarchaeological approaches strongly aligned with processualist premises, such as those arising from performance theory, and it also contributes to a dialogue with natural sciences through behavioral ecology and Darwinian archaeology (David and Kramer 2001; O'Brien et al. 2005).

Cross-References

- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Hypothesis Testing in Archaeological Theory
- ▶ Middle-Range Theory in Archaeology
- ▶ New Archaeology, Development of
- ▶ Post-Processualism, Development of
- ▶ Processualism in Archaeological Theory

References

Binford, L. 1977. General introduction. In *For theory building in archaeology: Essays on faunal remains, aquatic resources, spatial analysis and systemic modeling*, ed. L. Binford, 1–13. New York: Academic.

Binford, L. 1981. Middle-range research and the role of actualistic studies. In *Bones: Ancient man and modern myths*, ed. L. Binford, 21–30. New York: Academic.

David, N., and C. Kramer. 2001. *Ethnoarchaeology in action*. Cambridge, UK: Cambridge University Press.

Gould, R. 1980. *Living archaeology*. New York: Cambridge University Press.

Gould, R., and P.J. Watson. 1982. A dialogue on the meaning and use of analogy in ethnoarchaeological reasoning. *Journal of Anthropological Archaeology* 1: 355–381.
Hodder, I. 1982. *Symbols in action: Ethnoarchaeological studies of material culture*. New York: Academic.
Hodder, I. 1986. *Reading the past*. Cambridge, UK: Cambridge University Press.
Murray, T., and M. Walker. 1988. Like what? A practical question of analogical inference and archaeological meaningfulness. *Journal of Anthropological Archaeology* 7: 248–287.
O'Brien, M., R.L. Lyman, and M. Schiffer. 2005. *Archaeology as a process: Processualism and its progeny*. Salt Lake City: The University of Utah Press.
Schiffer, M. 1995. *Behavioral archaeology: First principles*. Salt Lake City: The University of Utah Press.
Schiffer, M. 1996. *Formation process of the archaeological record*. Salt Lake City: The University of Utah Press.
Shaw, W., and L. Ashley. 1983. Analogy and inference. *Dialogue* 22: 415–432.
Trigger, B. 1992. *A history of an archaeological thought*. Cambridge, UK: Cambridge University Press.
Willey, G., and J. Sabloff. 1996. *A history of American archaeology*. New York: W. H. Freeman and Company.
Wylie, A. 1985. The reaction against analogy. In *Advances in archaeology method and theory*, ed. M. Schiffer, vol. 8, 63–110. New York: Academic.

Further Readings

Asher, R. 1961. Analogy in archaeological interpretation. *Southwestern Journal of Anthropology* 17: 317–325.
Binford, L. 1983. *Working at archaeology*. New York: Academic.
Binford, L. 1989. *Debating archaeology*. New York: Academic.
Gould, R. 1990. *Recovering the past*. Albuquerque: University of New Mexico Press.
Hodder, I. 1989. *The meanings of things: Material culture and symbolic expression*. London: HarperCollins Academic.
Hodder, I., ed. 2012. *Archaeological theory today*. Cambridge, MA: Polity Press.
Kleindienst, M.R., and P.J. Watson. 1956. Action archaeology: The archaeological inventory of a living community. *Anthropology Tomorrow* 5 (1): 75–78.
O'Connel, J. 1995. Ethnoarchaeology needs a general theory of human behavior. *Journal of Archaeological Research* 3: 205–255.
Preucel, R., and I. Hodder, eds. 1996. *Contemporary archaeology in theory: A reader*. Oxford: Blackwell Publishers.
Skibo, J., and M. Schiffer. 2009. *People and things: A behavioral approach to material culture*. New York: Springer.
Wobst, H. 1978. The archaeo-ethnography of hunter-gatherers or the tyranny of the ethnographic record in archaeology. *American Antiquity* 43: 303–309.
Wylie, A. 1982. An analogy by any another name is just as analogical: A commentary on Gould-Watson dialogue. *Journal of Anthropological Archaeology* 1: 382–401.
Wylie, A. 2002. *Thinking from things: Essays in the philosophy of archaeology*. Berkeley: University of California Press.

A

Anarchist Theory and Archaeology

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Introduction

The theory of anarchism primarily concerns the organization of society in a way that fosters egalitarian or equitable forms of association and cooperation and resists all forms of domination. An anarchist perspective involves an awareness of, and critique of, how power is implemented through social relations, whether positively as in collaborative acts of mutual aid to common goals or negatively as in assertions of authoritarian power contrary to the interests of the community as a whole. As a theory concerning power and social relations, archaeologists apply anarchism for analyses of past societies, to interpret and evaluate forms of egalitarian or hierarchical relations, modes of domination or resistance, and expressions of control or autonomy. Moreover, it is not just for considering the past, but the theory can be applied to contemporary social arrangements concerning archaeology in multiple ways: how archaeologists organize themselves for research teams and field crews, involve local or descendant communities, or relate to the various publics concerning heritage. Anarchism has had an increasing influence upon archaeology in recent years, just as the theory has influenced other

disciplines throughout the social sciences and humanities.

Anarchism originated in the mid-nineteenth century, advocated by such individuals as William Godwin and Pierre-Joseph Proudhon. Anarchism concerns principles for the organization of societies without recourse to formal governments or centralized institutions. For this reason, the name of the theory translates as "no rulers": *an-* (without) + *arche* (ruler). However, a better translation of it is perhaps "without domination" or framed in active form as "against domination." Anarchism is a theory explicitly about human relationships without coercive forms of authority, hierarchy, or exploitation of other humans; many anarchists extend these prohibitions against domination even further to include human relations with nonhuman beings or entities, meaning other species and the environment.

This formulation, notably, is in contrast to popular notions about anarchy used in the sense of chaos. Rather, for its advocates, anarchism provides principles for social order among any group of people, even in contexts without centralized leadership. This notion provides a significant contrast to Hobbes' notion in 1651 concerning the need for a "Leviathan" to govern people that otherwise chaos would reign without a monarch or other dominant ruler and their enforcers. Instead, as the long history of human social and political organization indicates, peoples have generally organized their lives without the need for a king, monarch, or other leviathan to maintain order. Anarchists presume a degree of willingness to cooperate among consenting parties. Rather than chaos, anarchism is a theory about community-organized forms of social order.

To implement such social relations, anarchist theorists did not provide a blueprint for how societies should be organized, as they recognized that all peoples need to adapt their societies to meet their local historical situations and environmental circumstances. Anarchist theory instead consists of several values or principles for organizing people in egalitarian, equitable, and noncoercive ways, whether as small groups, local communities, extended networks, or societies as a whole. Common principles include individual and local group freedom or autonomy, voluntary forms of association and federation, mutual aid, decentralized and networked forms of organization, communal decision-making (direct democracy), temporary or situated forms of authority, direct actions, and resistance to all forms of domination or exploitation.

Shared among these principles is the emphasis on liberty and autonomy, freedom of thought and expression, both for individuals and groups. While there is a libertarian strain to this emphasis, they do not advocate for social atomism, where each person is left to care for oneself. Instead, there is a strong push for community relationships, although those should be engaged and pursued through voluntary forms of association and community agreement. Self-organization refers to the ability of individuals to organize cooperatively into groups at various scales for productive tasks or shared goals. According to anarchist notions, no central authority is necessary to accomplish any endeavor, no matter the scale. Mutual aid and cooperative endeavors are seen by anarchists as the core dynamic for the self-organization of groups and for the linking of those local corporate groups into larger community and regional networks of interaction. It's the practical needs of individuals within local groups that are the medium for organization. These repeated acts and engagements of mutual aid form networks that link individuals and groups in multifaceted manners that are nonhierarchical or decentralized in structure. Furthermore, these networks have a temporary quality, generally lasting for the duration of utility for those involved; there is a general opposition to arrangements becoming fixed or entrenched, which are limitations upon the freedom of individuals and groups.

While building connections – mutual aid and alliances – are something anarchists support, concentrated authority is something they oppose. Historically, much of anarchist discourse has been directed foremost at the state, as a political formation that is hierarchical and uses state power to enforce and maintain hierarchical relations. However, archaeologists are concerned with the application of power within all types of societies, whether states or non-states. To apply to all

societies and settings, the emphasis therefore is upon assertions of domination in any social setting. Various forms of absolutism can occur at multiple scales of human social interaction.

Central to anarchist thinking is that it is a theory about power. For this reason, anarchists have shaped thinking about social power in the social sciences and philosophy, influencing Nietzsche and Foucault. This is founded on the basic point made by Bertrand Russell (2004 [1938]) that the natural sciences are about the physical dynamics of energy, while the social sciences are about the dynamics of human social power. As archaeology increasingly uses the language and reasoning of the natural sciences (as it should), archaeologists need to also deploy theoretical frameworks about social power, and early anarchist theorists have been at the source of that.

Anarchist approaches have much relevance for archaeologies, especially for social or political perspectives that must understand the dynamics of power relations. Since the vast majority of societies in the *longue durée* of human history have been anarchies, or societies without formal governments or centralized institutions, the theory of anarchism has relevance for understanding the self-organization of communities.

The theory has more than application toward interpreting the archaeological record, however. Due to its basis as an analysis and critique of power, the theory also applies as well to the contemporary context of archaeology and its practices. Power pervades all forms of social relations that lead to coordinated forms of action. For this reason, anarchism can be applied to the contexts of archaeological work as field crews, as researchers collaborating with communities, as workers in Cultural Resource Management firms or cooperatives, as educators in the classroom, as stakeholders regarding heritage, and so on across the many arenas in which archaeologists relate to others.

Historical Background

Anarchism has a long history in Western discourse, extending back to the mid-1800s. Yet, anarchist principles for social organization associated with the theory have found expression in numerous societies and groups that extend back millennia. Some historians connect such principles with the Taoists, Gnostic groups, and even early Christianity. In this way, anarchistic societies, if not anarchist (meaning derived from the discourse of anarchist thinkers), have been expressed throughout human history. In several respects, anarchist elements form a part of any society, non-states or states, since all societies contend with issues of centralization and decentralization, hierarchy and egalitarianism, and control and autonomy.

One of the earliest formalizations of anarchist thought derives from William Godwin, who in 1793 published *Enquiry Concerning Political Justice, and its Influence on General Virtue and Happiness*, offering how an anarchist society might be organized. Shortly thereafter, in 1798, Immanuel Kant defined anarchy as a form of government entailing law and freedom without force in *Anthropology from a Pragmatic Point of View*. The term became most prominent decades later with Pierre Joseph Proudhon's 1840 publication of *What Is Property? An Enquiry into the Principle of Right and of Government*. Significant subsequent thinkers included Peter Kropotkin and Mikael Bakunin in Europe and Emma Goldman in the USA. Unlike Marxism, which can be distilled, as its name implies, to Marx, anarchists rely upon a plurality of thinkers, each of whom provides a unique vantage point to think through human sociopolitical dynamics. Not one of those thinkers could be pointed to as central, as Marx is to Marxism.

These two traditions share a history. Both are traditions of the political left. Both aim for an egalitarian society and profess interest in an ultimate society of communism without a domineering state. Both joined in efforts of uniting laborers beyond countries in the workers' internationals. Advocates and thinkers of both Marxism and anarchism engaged in vigorous discussions and debates, with Marx enthusiastically meeting Proudhon and Bakunin at various times, even if he later turned against them theoretically. Despite the closeness of being both political allies to the left

of Liberalism, the two also differed on how best to transform society. For Marxism, revolution proceeds in stages, and the workers need to take over state authority in order to enable the eventual transformation into communism. Anarchism, on the other hand, requires that liberation proceeds in a manner that reflects the end goal. Anarchists rejected centralization of the state-level authority from the outset. This grew from the anarchist idea that societies are prefigured, which is to say they emerge from the practices that create them. Instead of the ends justifying the means, anarchists believe that the means create the ends or that the means are the ends – the two are simultaneous. Therefore, while they were close politically, the issue of centralization of power in their methods caused a fissure between the groups. Marx's ideas gained stronger adherents, in the decades following the fissure, both in state and academic positions. This is also reflected in the predominance of Marxism in academic discourse since. However, in recent years, anarchism has seen a resurgence of application.

In the late nineteenth and early twentieth century, interest in anarchism would increase with theorists such as Elisée Reclus, Gustav Landauer, Errico Malatesta, and Voltairine de Cleyre, among others. In many quarters, other major thinkers are regarded within the scope of anarchism, such as Max Stirner or Leo Tolstoy. Into the later twentieth century, the theory of anarchism further developed through Rudolph Rocker, Colin Ward, Noam Chomsky, and Murray Bookchin, among others. Recently, theorists have also adapted anarchism in light of its affinity or relevance to postmodern and poststructuralist thinkers such as Foucault, Derrida, and Lacan (e.g., Newman 2001).

In anthropology, there have been several scholars that have used anarchism to assess cultures throughout the world. Most notably, Pierre Clastres (1987), in *Society Against the State*, has argued that anarchistic societies have not developed a political centralized state but rather that they explicitly do not aim to concentrate power in their societies, preferring the autonomy of groups. Harold Barclay (1982) has provided a survey of anarchic societies with *People without Governments*. Brian Morris (2014) has emphasized the affinity of anarchism and the discipline of anthropology overall, as both emphasize local cultural and historical contexts and relay the diverse possibilities for arranging human societies. While there have been important precursors, it is with the work of James C. Scott and David Graeber that anthropologists have increasingly begun to apply anarchist theory. James Scott (2009) has provided a historical ethnography of societies that oppose the state in Southeast Asia, and his overall works have often been about "arts of resistance" to domination across numerous cultures. The work of David Graeber (2004) has influenced anthropologists and other social scientists toward the breadth and scope of anarchist perspectives, whether upon exchange, debt, democracy, and much more.

Anarchist archaeologists have become more prominent in recent years, including Severin Fowles' (2010) study of a "People's History of the American Southwest," Angelbeck and Grier's (2012) analysis of the archaeological history of the "inverted pear"-shaped social structure of the Coast Salish of the Pacific Northwest Coast, and James Flexner's (2014) treatment of the archaeology of states and non-states in Hawai'i and Vanuatu. Three doctoral dissertations concern anarchist analyses, including our own work (see further readings). Colleen Morgan (2015) has published an overview of anarchist analyses in archaeology. Others have dealt with anarchist analyses implicitly or tangentially, such as Wengrow and Graeber's (2015) discussion of the shifting modes of sociopolitical orders from hierarchy to heterarchy prior to the development of states or Gonzalez-Ruibal's (2014) archaeology of resistance in the borderlands of Ethiopia and Sudan. The basic premises of an anarchist archaeology have been outlined in "Foundations of an Anarchist Archaeology: A Community Manifesto" (Black Trowel Collective 2016).

Anarchist archaeologists often recognize that other scholars tread similar ground, emphasizing order without governments or centralization, recognizing shifting or temporary forms of authority, or acts of resistance in response to forms of domination. These could be called anarchistic studies

in that they parallel anarchist interests without explicitly naming or drawing upon anarchist theory. For instance, McGuire and Saitta (1996), while generally using a Marxist dialectical perspective, emphasized how groups in the Pueblo Southwest can arrange and exhibit both egalitarian and hierarchical sociopolitical formations (i.e., it is not a simple either/or dichotomy). This parallels anarchist views on the complexity of egalitarian forms of social organization and aspects of resisting domination. Barbara Mills (2004), in "The Establishment and Defeat of Hierarchy," argued that forms of hierarchy were contested through the destruction of the material signatures of ritual expressions of inequalities. Finally, Robert L. Bettinger's (2015) *Orderly Anarchy* presented a study of indigenous California cultures that concerned their general social order in the absence of government that also parallels anarchist themes without drawing upon anarchist discourse. A close association also exists with works in heterarchy, whereby Carole Crumley (1995) and others have emphasized the presence of complex nonhierarchical societies. The theory of heterarchy reveals the possibilities for numerous authorities in a society or nodes in a network, allowing for more complex and dynamic interactions and information flows. Many societies, formerly viewed as simply egalitarian, are more accurately heterarchical with their authorities, revealing the diverse ways that cultures can arrange their social relations.

Key Issues/Current Debates

> The epic poems, the inscriptions on monuments, the treaties of peace – nearly all historical documents bear the same character; they deal with the breaches of peace, not with peace itself. So that the best-intentioned historian unconsciously draws a distorted picture of the times he endeavors to depict; and, to restore the real proportion between conflict and union, we are now bound to enter into a minute analysis of the thousands of small facts and faint indications accidentally preserved in the relics of the past; to interpret them with the aid of comparative ethnology; and, after having heard so much about what used to divide men, to reconstruct stone by stone the institutions which used to unite them. (Kropotkin 1955 [1902]: 117)

Over a century ago, Peter Kropotkin (1955 [1902]) outlined an important role for archaeology in providing a counter-ballast to the historian's emphasis on conflicts and changes in the chronology of the past and instead highlighted that the great bulk of time consists of the alliance of people in constructive relationships and that archaeologists can help "reconstruct stone by stone the institutions which used to unite them." Archaeological chronologies, too, are flush with terms that emphasize not only periods of change but also periods in which domination was at its peak: "classical," "formative," or "climax" periods are typically identified as cultural "fluorescences." Through such language, other periods are seen as lesser in cultural achievement, with periods of "cultural decline," "dissolution," "de-evolution," or "collapse." Anarchist theory, with its focus on power and a critique of political structures, can offer alternate insights into these periods. Instead, these may represent popular assertions of local sovereignty or actions to achieve less hierarchical social arrangements, for instance. Traditional archaeological chronologies are turned on their heads when reframed using anarchist theory and its consideration of power relations.

Anarchists view all human social relations as mediated by or influenced by power relations. Anarchist approaches also entail an understanding of the dual role of power, as a force for domination as well as a force for voluntary alliances. Power relations, instead of necessarily dominating or hierarchical, can also be built on mutual cooperation, equity, and egalitarianism. The former power represents "power over" another person, which anarchists refer to as "vertical power." This is top-down form of power, as a boss to an employee, a general to a soldier, and a king to its subjects. The second form of power anarchists recognize is "horizontal power." This is the power to organize in alliances. It is a bottom-up form of power, as with marches, unions, and many grassroots social movements.

Anarchists argue that an emphasis in our language usage upon vertical forms of power can be disenfranchising and marginalizing. Horizontal forms of power must be considered as a power that can oppose vertical forms of power.

Therefore, archaeologists aim to assess not only "traditional" forms of power that are hegemonically used to dominate others but also the multiple forms that engender voluntary alliances between people.

The following key issues for anarchist archaeologies involve an assessment of power in past or contemporary social relations or within modern disciplinary practices. Whether vertical or horizontal, power often is distributed through authorities. Bakunin (1953 [1871]: 239) referred to this distinction as between natural and artificial authority. The former is justified as an expression of natural human relationships, whereas artificial authorities are imposed through institutional structures. Saul Newman (2001: 38–41) considered this distinction significantly important in political philosophy. No longer could one critique the anarchists for an oversimplified focus upon the state, since an anarchist conception of power is not tied solely to the state or the "social contract," but instead concerns the power dynamics of any human social relationship (Newman 2001: 40).

While anarchists oppose authoritarian power, they do not reject authority in itself. Bakunin (1953 [1871]: 253–254) stated "I bow before the authority of special men because it is imposed upon me by my own reason. Therefore there is no fixed and constant authority, but a continual exchange of mutual, temporary, and, above all, voluntary authority and subordination." Therefore, any authority must be situationally justified. This notion of justification also applies to any social arrangement as well, such as an alliance, exchange relation, or network. Once the need for an alliance accomplishes its goal or outlives its need, a union might soon dissipate to return greater autonomy to local groups. These distinctions provide archaeologists a way to consider expressions of authority, alliances, or other social arrangements in the past as either imposed or consensus-based. Historical processes in any society's culture history may reveal tensions regarding the centralization and contestation of power, either diachronically or synchronically. The changing nature of these community relationships can reveal themselves in settlement patterns, community arrangements, or households, exhibiting decentralized or centralized characteristics. For instance, in many anarchic societies, authority is not centralized. Rather, it consists of numerous authorities that provide balance to each other and a multivocal, diverse environment of thought and practice. This type of heterarchical structure is very resilient (Crumley 1995).

These distinctions between natural authority and artificial authority also apply to contemporary practices since archaeologists represent ourselves as authorities to others concerning the narratives of the past or the management of heritage. Archaeologists should aim to be natural authorities concerning the past, as people knowledgeable of our conceptions of past cultures and events, or as individuals trained in archaeological methods as a craft. Yet, archaeologists should not become artificial authorities, those imposing their authority over stories of the past, as there can be multiple narratives, particularly those of indigenous oral traditions. As well, this applies to stances regarding heritage of sites and artifacts, where the need of scientific study of heritage is claimed over the interests of other publics, especially descendant groups with non-research interests at stake. The anarchist division of types of authority enables and promotes a multivocality regarding heritage while simultaneously allowing for our expertise regarding our craft. Indeed, this may provide solid footing for engaging other publics and communities regarding archaeology.

Anarchist theory supports that we can engage these publics, both descendant and non-descendant communities, as natural authorities regarding our craft and specialization and yet recognize the multitude of other authorities regarding the heritage and narratives of the past. This contributes to a more inclusive and collaborative archaeology, resulting in changes in field methods, publication practices, and interpretive stances. An anarchist archaeology offers support to such archaeologies with its emphasis in the decentralization of authorities, the formation of alliances of mutual interest, and an equality of representation among numerous publics.

Anarchist critiques of power and authority bring many ethical implications for implementing anti-authoritarian practices. These stances, concerning authority and assessments of power relations, extend to anarchist approaches in education concerning archaeology. Pedagogy, accordingly, is not a place for hierarchical forms of knowledge dispersal but a setting for engaging others in a shared process of learning, whether in the classroom, at a site with a field school, or in public talks.

An anarchist assessment can also be brought to bear on other forms of social arrangements in archaeological practices, such as research teams, field crews, or archaeological firms. These allow for considering the justification of certain hierarchies or their appropriateness for the tasks at hand. They may ask whether certain interpretations are dominant regarding publication of results or reports or whether recommendations for heritage management adequately reflect the consensus of interests involved.

The interests of anarchist archaeologies share much with other strains of archaeology. These affinities include those emphases on activist archaeology that aims to transform existing practices for the betterment of communities. In the critique of dominant structures, there are shared emphases with archaeologies of resistance (e.g., Ruibal-Gonzalez 2014). This certainly extends to parallel aims of decolonizing archaeologies that aim to critique and remove colonial structures of domination over indigenous peoples and their heritage. To address such structures and pursue alternate forms of social relations with indigenous or descendant groups is a primary method to address such goals. This is supported by anarchist emphases on equitable relationships and direct actions to prefigure the associations that will enable a better community. In this way, anarchist archaeologies also buttress the aims of subaltern archaeologies to redress structures of dominance, including both feminist and indigenous archaeologies. A final example of concurrent aims is with Marxist archaeologies. While there has been a long history of debate between advocates of both approaches, the shared aims of a more equitable society and a critique of power structures in society is present in both. The end goals are similar as well. In many ways, anarchist and Marxist archaeologies are sisters that have been too long separated. Indeed, the many parallel and contradictory perspectives provided by these two perspectives only enhance both archaeologies in their efforts.

In summation, anarchist theory, based in over a century of debate and refinement, both among anarchists and in dialogues with Marxists and others of the left and right, has developed a critique of hierarchical power relations as well as proposals for enacting more equitable relations. In this way, anarchists offer varieties of social and political archaeology that center on the dynamics of power relationships, and these can be applied to the societies of the past and to relationships in the present.

Cross-References

► Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives

References

Angelbeck, Bill, and Colin Grier. 2012. Anarchism and the archaeology of anarchic societies: Resistance to centralization in the coast Salish region of the Pacific northwest coast. *Current Anthropology* 53 (5): 547–587.

Barclay, Harold B. 1982. *People without government*. London: Kahn & Averill with Cienfuegos Press.

Bettinger, Robert L. 2015. *Orderly anarchy: Sociopolitical evolution in aboriginal California*. Berkeley: University of California Press.

Black Trowel Collective. 2016. Foundations for an anarchist archaeology: A community manifesto. *Savage Minds*. October 31. https://savageminds.org/2016/10/31/foundations-of-an-anarchist-archaeology-a-community-manifesto/

Clastres, Pierre. 1987. *Society against the state: Essays in political anthropology*. New York: Zone Books.

Crumley, Carole L. 1995. Heterarchy and the analysis of complex societies. *Archeological Papers of the American Anthropological Association* 6 (1): 1–5.

Flexner, James L. 2014. The historical archaeology of states and non-states: Anarchist perspectives from

Hawai'i and Vanuatu. *Journal of Pacific Archaeology* 5 (2): 81–97.

Fowles, Severin. 2010. A People's history of the American southwest. In *Ancient complexities: New perspectives in Pre-Columbian North America*, ed. Susan Alt, 183–204. Provo: University of Utah Press.

González-Ruibal, Alfredo. 2014. *An archaeology of resistance: Materiality and time in an African borderland*. New York: Rowman & Littlefield.

Graeber, David. 2004. *Fragments of an anarchist anthropology*. Chicago: Prickly Paradigm Press.

Kropotkin, Peter. 1955 [1902]. *Mutual aid: A factor of evolution*. Boston: Extending Horizons Books.

McGuire, Randall H, and Dean J. Saitta. 1996. Although they have petty captains, they obey them badly: the dialectics of prehispanicWestern Pueblo social organization. *American Antiquity* 61 (2): 197–216.

Morris, Brian. 2014. *Anthropology, ecology, and anarchism*. Oakland: PM Press.

Newman, Saul. 2001. *From Bakunin to Lacan: anti-authoritarianism and the dislocation of power*. Lexington Books, Lanham, Maryland.

Russell, Bertrand. 2004. *Power: A new social analysis*. 2nd ed. Psychology Press, London.

Scott, James C. 2009. *The art of not being governed: An anarchist history of upland Southeast Asia*. Cambridge, UK: Cambridge University Press.

Wengrow, David, and David Graeber. 2015. Farewell to the "childhood of man": Ritual, seasonality, and the origins of inequality. *Journal of the Royal Anthropological Institute* 21 (3): 597–619.

Further Readings

Angelbeck, B. 2009. They recognize no superior chief: Power, practice, anarchism and warfare in the Coast Salish past. Unpublished PhD dissertation. University of British Columbia, Vancouver.

Angelbeck, Bill. 2016. The balance of autonomy and alliance in anarchic societies: The organization of defences in the coast Salish past. *World Archaeology* 48 (1): 51–69.

Bakunin, Mikhail. 1953. In *The political philosophy of Bakunin: Scientific anarchism*, ed. G.P. Maximoff. New York: Free Press.

Bookchin, Murray. 1991. *The ecology of freedom: The emergence and dissolution of hierarchy*. Montreal: Black Rose Books.

Borck, Lewis 2016. Lost voices found: An archaeology of contentious politics in the Greater Southwest, A.D. 1100–1450. Unpublished Ph.D. Dissertation, University of Arizona, Tucson.

Borck, Lewis. 2018. Sophisticated rebels: Meaning maps and settlement structure as evidence for a social movement in the Gallina region of the North American Southwest. In *Life beyond the boundaries: Constructing identity in edge regions of the North American Southwest*, ed. Karen G. Harry and Sarah Herr, 88–121. Boulder: University of Colorado.

Borck, Lewis, and Matthew C. Sanger. 2017. An introduction to anarchism in archaeology. *The SAA Archaeological Record* 17 (1): 9–16.

Borck, Lewis, and Erik Simpson. 2017. Identity is an infinite now: Being instead of becoming Gallina. *Kiva* 83 (4): 471–493.

Call, Lewis. 2002. *Postmodern anarchism*. Lanham: Lexington Books.

de Cleyre, Voltairine. 2010. In *Exquisite rebel: The essays of Voltairine de Cleyre – feminist, anarchist, genius*, ed. Sharon Presley and Crispin Sartwell. Albany: State University of New York Press.

Del Castillo Müller, Cristian, Leonardo Faryluk, Juan Carlos Mejías, Camilo Araya Fuentes, Alma Lerma Guijarro, and Diego Mellado 2017. *Palimpsestos: Revista de Arqueología y Antropología Anarquista* 1(0). Retrieved from http://palimpsestoanarqui.wixsite.com/palimpsestos/blank. 12 July 2018.

Crumley, Carole. 2017. Assembling conceptual tools to examine the moral and political structures of the past. *The SAA Archaeological Record* 1 (17): 22–27.

Goldman, Emma. 1910. *Anarchism and other essays*. New York: Mother Earth Publishing Association.

Henry, Edward R., Bill Angelbeck, and Uzma Z. Rizvi. 2017. Against typology: A critical approach to archaeological order. *The SAA Archaeological Record* 1 (17): 28–32.

Landauer, Gustav. 2010. In *Revolution and other writings: A political reader*, ed. Gabriel Kuhn. Oakland: PM Press.

Marshall, Peter. 1993. *Demanding the impossible: A history of anarchism*. London: Fontana Press.

Morgan, Colleen. 2015. Punk, DIY, and anarchy in archaeological thought and practice. *Online Journal in Public Archaeology* 5: 123–146.

Proudhon, Pierre Joseph 1876 *What is property? An enquiry into the principle of right and of government*. John Wilson & Son, Cambridge, Massachusetts.

Reclus, Elisée. 2013. In *Anarchy, geography, modernity: Selected writings of Elisée reclus*, ed. John Clark and Camille Martin. Oakland: PM Press.

Sanger, Matthew C. 2015. Life in the round: Shell rings of the Georgia Bight. Unpublished Ph.D. Dissertation, Columbia University, New York.

Sanger, Matthew C. 2017. Anarchic theory and the study of hunter-gatherers. *The SAA Archaeological Record* 1 (17): 39–44.

Scott, James C. 1990. *Domination and the arts of resistance: Hidden transcripts*. New Haven: Yale University Press.

Ward, Colin. 1973. *Anarchy in action*. New York: Harper & Row.

Welch, John R. 2017. Cycles of resistance. *The SAA Archaeological Record* 1 (17): 17–20.

Woodcock, George. 1962. *Anarchism: A history of libertarian ideas and movements*. New York: Meridian Books.

Anatolian Historic City Centers: Urban Archaeology in Multilayered Context

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State of Knowledge and Current Debates

Anatolia (Asia Minor) as a cradle of first settlements is a land bridge between east and west, but not a single geographical corridor (Sagona and Zimansky 2009, 1). Varying materials and latter agricultural production caused the emergence of first settlements in especially central and southeastern Anatolia. Although there was a complex culture, making pottery and stone workmanship at Göbeklitepe as a cult centre (?) dated nearly 10.000 BC (Schmidt 2012, 87), which could not be defined as a settlement or city. However, there are first examples of round houses in the southeastern Anatolia settlements as Hallan Çemi dated approximately 11,000 BC (Rosenberg 1999, 359). In central Anatolia, Çatalhöyük (Hodder 1996, 43–46) and Aşıklı Höyük (Esin 1996, 31) are the first examples of flat-roofed and adjacent houses let to cultural interaction and daily-life production together. These were first examples of settlements with a communal life instead of a division of labor or social stratification. But, by the time, transformation of houses and changes in structure would be followed in unique settlements like Çayönü, where rounded houses had been turned into rectangular units (not only houses but also other specific uses like cult centers and open spaces) in a 3000 years from 8000 BC to 5000 BC (Özdoğan 1999, 317 and 1996, 21). Then, Anatolia let to settlements with its own resources and a junction for various trading materials from surrounding area including Mesopotamia, Mediterranean, Aegean and Black Sea and Thrace (Europe). Therefore, there have been always varying size settlements in different context and characteristics or even the capitals of different cultures and civilizations in Anatolia. The first one is Hattusa, the capital of Hittites that were first Anatolia centered Civilization on the arc of Halys River in 2750 BC (McEvedy 2004, 24), and the last capital is Ankara that is a multilayered city has been continuously occupied since Phrygians around 750 BC. In sum, there are different settlement patterns and cities, not only by geographical or natural conditions but also by cultural interaction, trade, war, or mass migrations. The cultural and historical accumulations of various cultures and their socio-spatial development throughout history have pioneered numerous archaeological sites in contemporary Anatolia. Some of them like Troy or Miletus were abandoned by natural causes such as earthquakes or alluvial accumulation or man-made influences like wars. On the other hand, most of the settlements-cities have been permanently settled since early ages and still inhabited ones are defined as multilayered settlements (Bilgin Altınöz 2002). In other words, most of the historical cities have multilayered features with archaeological stratification behind modern life. In fact, not only physical archaeological stratification but also cultures, memories, traditions, rituals, and sometimes functions have accumulated in historic urban centers. In fact, each contemporary settlement or archaeological site has different layers or periods of settlements since its inception but multilayered settlements contain subsoil archaeological strata embedded in everyday life as vertical and horizontal layers. In this entry, multilayered historic city centers in Anatolia are presented with key features and interesting spatial context, then a method to evaluate archaeological potential of multilayered settlements as subzones is underlined.

Multilayered Historic City Centers in Anatolia

According to the recent official record, there are registered 16,706 archaeological, 288 urban conservation, 170 historical, 33 urban archaeological, and 88 mixed conservation sites in Turkey. In addition, 359 conservation areas overlaid with natural conservation areas (http://www.kulturvarliklari.gov.tr/TR,44973/turkiye-geneli-sit-alanlari-istatistikleri.html, accessed in September

2018). In addition to national official records, 16 cultural and two mixed sites, recently Göbeklitepe (2018) are listed in UNESCO, World Heritage List (http://whc.unesco.org/en/statesparties/tr, accessed in September 2018). Four of cultural sites, İstanbul, Bursa, Pergamon, and Diyarbakır Fortress-Citadel, which are still inhabited as modern cities, include multilayered features referring their cultural accumulation. In addition to sites in World Heritage List, there are 77 sites in varying contexts in the tentative list of UNESCO (http://whc.unesco.org/en/tentativelists/state=tr, accessed in September 2018). From that list, Alanya, Çanakkale (Dardanelles), Hacı Bayram Mosque and its surrounding area in Ankara, İznik (Nicaea), Konya (Iconium), St. Paul Church, St. Paul's Well and surrounding historic quarters in Tarsus, The Bodrum Castle in Halikarnassos, Tushpa/Van Fortress-the Mound and the Old City of Van, Yivli Minaret Mosque in the old fortress of Antalya and Zeynel Abidin Mosque Complex and Mor Yakup (Saint Jacob) Church-Mardin in tentative list include some references for multilayered context.

However, the multilayered potential of Anatolia is not limited with UNESCO's lists. In an alphabetical order according to modern names, Adana (Tepebağ tumulus – Antiochia on the Sarus), Ankara (Ankyra), Antakya (Antioch on the Orontes), Antalya (the Citadel), Bergama (Pergamon), Bodrum (Halicarnassus), Bursa, Çanakkale (Dardanelles), Diyarbakır (Amida), Edirne (Hadrianopolis), Foça (Phokaia), Gaziantep (Antiochia ad Taurum?), İstanbul (Constantinople-Byzantium), İzmir (Smyrna), İzmit (Nicomedia), İznik (Nicaea), Kayseri (Caesarea in Cappadocia), Konya (Iconium), Manisa (Magnesia ad Sipylum), Mardin, Milas (Mylasa), Side, Silifke (Seleucia on the Calycadnus), Sinop (Sinope), Şanlıurfa (Edessa), Tarsus (Antiochia on the Cydnus), Trabzon (Trebizond), Urla (Klazomenai), and Van (Tuspa) are well-known multilayered settlements of Anatolia, which have been continuously inhabited since early ages. In other words, multilayered historic city centers of Anatolia include cosmopolitan cities or capitals, forgotten centers of antiquity and small towns together with ongoing modern life. Detailed data and updated reports about those multilayered settlements, where there are ongoing or recently completed archaeological researches, would be found at the official website of the General Directorate of Cultural Assets and Museums as annual e-books of Symposiums (in Turkish) (http://www.kulturvarliklari.gov.tr/TR,44758/e-kitap.html accessed in September, 2018). In any case, discussing whole of them in same detail is a hard issue for a single paper. However, for selected multilayered historic city centers in different context, brief history, known monumental or conserved archaeological remains, physical traces of multilayered structure and socio-spatial continuity of life are concise to describe the term of multilayered in the following text.

İstanbul: The Capital of Three Empires

İstanbul has a strategic geographical location between Europe and Anatolia and has a perpetual role as the capital of Eastern Roman Empire (later Byzantine) and the Ottoman Empire. The Archaeological Park including monumental and administrative buildings of Romans and Ottomans at the horn of the Historical Peninsula with the Suleymaniye quarter, the Zeyrek area of settlement and the Theodosian land walls were listed in UNESCO World Heritage List in 1985. In fact, not only listed sites, the Historical Peninsula includes accumulation of archaeological layers merged with modern life. Özdoğan (2013, 4) underlines that the depth of archaeological deposits might reach 32 meters in the Historical Peninsula. Salvage excavations at the Yenikapı Project for Metro and Light Rail Systems (Marmaray Excavations) indicate an Early Neolithic settlement dated between 6400 BC and 4800 BC below the sand deposits of the Port of Theodosius, which was the largest commercial centre of Constantinople (Özdoğan 2013, 4). Tuna (2003, 89) said that there are various archaeological remains and ad hoc findings indicating subsoil archaeological potential in whole peninsula and the boundaries of old ports are known. In addition to archaeological findings, as a multilayered socio-spatial continuity, the ancient route of Mese (Middle Route) starting from the Milion

(mile stone) between the Hippodrome and the Hagia Sophia to the Golden Gate through Constantine's Forum, Forum Tauri, Forum Bovis, and Forum of Arcadius is still observable in contemporary İstanbul. The spine of Divan Yolu (the route to governmental structure of Ottoman Empire) from the square of Sultanahmet to Çemberlitaş, then the Square of Beyazıt lay on the ancient route of Mese. Brief information and related documents are available in İstanbul at UNESCO website (http://whc.unesco.org/en/list/356 (accessed in September 2018)). In fact, as a multilayered historic city centre of Istanbul with a population of approximately 15 million, the Historical Peninsula endangered with urban development pressure and infrastructure needs. Therefore, unfortunately, archaeological potential of the Peninsula could not be integrated to modern life and presented to public for increasing feeling of multilayeredness.

Ankara, Ankyra: An Ancient and a Modern Capital

Ankara, capital of the Republic of Turkey, had been centers of different civilizations because of core location in Anatolia. Surveys (Kadıoğlu and Görkay 2007) indicate that Ankara established near to Hacı Bayram Hill by the Phrygians because of defense advantages. The hill was probably used the temple for Cybele, the chief goddess of Anatolia. In Roman period, Ankara as the capital of Galatia was embellished with many monuments, and the Temple of Augustus, Roman Baths, Theatre, colonnaded roads, and the Column of Julianus. Furthermore, inscriptions indicate other monumental structures like Stadion, Nymphaeum, and Palatium (Kadıoğlu and Görkay 2007, 21). Ankara had conserved its central role during the Ottoman Period with commercial activities (Çağlayan 1999, 38). After the Ottoman Empire, Ankara was planned as the capital and the characteristics of the old city was carefully conserved until the mid of twentieth century (Tankut 1993, 79). However, the historic core has numerous development operations especially along main routes since 1950s. Todays, just monumental structures are observable in low conditions. The Palestra and Roman Bath are conserved as open-air archaeological museum, but the level of conservation and site-presentation features have to be revised. In fact, according to socio-spatial continuity of Ankara, two sites have to be discussed to get multilayered context. At the hill, where the city was established, the Temple of Augustus (Monumentum Ancyranum) dated first century AD and Hacı Bayram Mosque dated fifteenth century are conserved together those indicating multilayered continuity of site as a holy place. According to archeological studies, there are known traces of Phrygian Temple or earlier sanctuary at the same area (Fig. 1). The second one is probable location of Roman Forum, according to main routes, junctions, and columns (Fig. 2), has been still sustained its role as administrative core of modern capital, where the Governorship of Ankara has been located in the same square.

İzmir, Smyrna: The Western Gate of Anatolia

The multilayered historic centre of İzmir, Smyrna, was founded between the Mount Pagus (Kadifekale in Turkish) and the coast in the Hellenistic Period (Cadoux 1938, 10–11). In ancient times, Roman Period was the most brilliant times of Smyrna. There are writings indicating Smyrna's beauty like Strabo's, the geographer, says of it *"…And now is the most beautiful of all the cities"* (Cadoux 1938, 171). Smyrna's history in Byzantine Period is not known very well but the fortification might be a priority for city like other Anatolian Cities. The city had an important role in Christian World by becoming one of the metropolite centers in 692 (Kuban 2001, 61). In the Ottoman Period, İzmir become a crucial commercial centre in Mediterranean. At the beginning of twentieth century, there were political and economic problems and in 1914, the First World War stopped commercial activities of İzmir with European countries. In Early Republican Period, the rehabilitation and reconstruction of city was the most important problem for historic city centre (Belge 2012, 338). Agora, the Mount Pagus (Acropolis) and Theatre, where there are ongoing archaeological researches (http://www.antiksmyrna.com/Default.aspx accessed in September 2018) are monumental and seen

Anatolian Historic City Centers: Urban Archaeology in Multilayered Context, Fig. 1 The Temple of Augustus (25 BC) and Hacı Bayram Mosque (fifteenth century). (Personal archive of the author)

Anatolian Historic City Centers: Urban Archaeology in Multilayered Context, Fig. 2 The Column of Julien at the square of Governorship of Ankara. Original location of the column was the southwest corner of the square. (Personal archive of the author)

Anatolian Historic City Centers: Urban Archaeology in Multilayered Context, Fig. 3 Open bazaar on Roman Road in İzmir (Smyrna). (Personal archive of the author)

archaeological remains of the city, which indicate significant archaeological potential of Roman times. In addition to them, a well-conserved Roman Road is still used as an open bazaar (Fig. 3). In any case, main characteristics of multilayered structure of İzmir would be followed through recent urban pattern. Especially the zone between State Agora, the Mount Pagus (Acropolis), and Theatre has been continuously occupation since at least 324 BC should be evaluated another type of multilayered heritage, pattern, and axes. Although the zone was seen as low occupation area in the Byzantine Period, there had been Turkish quarters in the zone until the beginning of Early Republican Period. The Eşrefpaşa and Anafartalar Avenues defined the western and northern boundaries of the zone. The probable route of the ancient fortification wall defined the eastern boundary of zone. There are some conserved pieces of fortification walls in Altınpark Street. In that area, there is no complete destruction by modern developments, because there are traditional and 1–2 floored buildings, which probably do not have basement (Belge 2005, 136). Gridiron axes that was a symbol of Hellenistic era in Anatolia will be still observable by aerial photographs or base maps (Fig. 4). Therefore, urban archaeological potential of İzmir is not limited with just archaeological remains, streets, and historic axes have to be conserved as archaeological heritage, especially against large-scale urban regeneration projects. In a similar context, another historic ax defines the arc of the ancient inner port, Anafartalar Street, known as Kemeraltı Arc. The zone has been settled continuously since alluvial floods filled the ancient port completely in the beginning of the eighteenth century. Kemeraltı Arc has been the centre of traditional commercial activities (Belge 2005, 143). In the present, traditional buildings lay on conserved traditional pattern of the nineteenth century. Todays, the zone

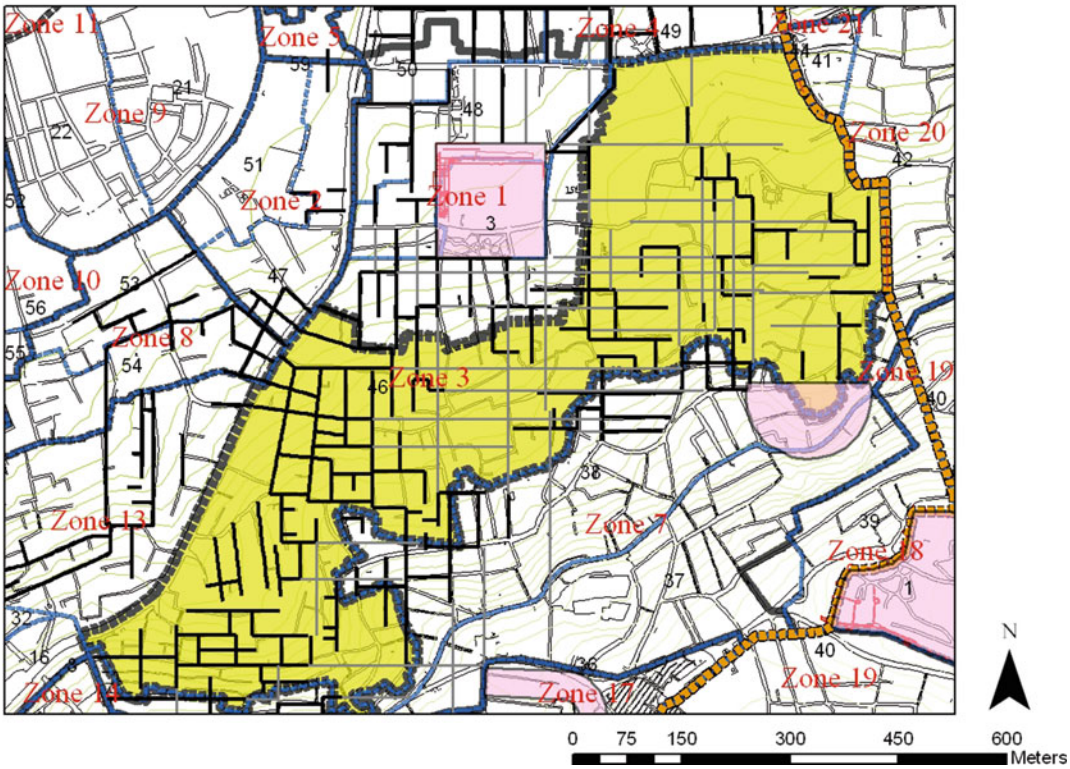

Anatolian Historic City Centers: Urban Archaeology in Multilayered Context, Fig. 4 Grid-iron axes (observed from base map or estimated) in the zone between Agora (indicated as Zone 1), the Mount Pagus (Acropolis), and Theatre (Belge 2005, 136)

conserves vitality and variety of an ancient port with functions, goods, ethnicities, and contemporary life together (Fig. 5).

Antakya, Antioch on the Orontes: *"Orientis Apicem Pulcrum"* (The Queen of the East)

Similar to İzmir (Smyrna), multilayered features of Antakya are observable through recent urban pattern as streets and axes following Hellenistic gridiron plan of the city. Morey (1936, 651) points out that Antakya is one of the four metropoles of the Later Empire with Rome, Constantinople, and Alexandria. The city was established at the junction of Anatolia, the Levant and northern Mesopotamia and the fertility of Amik Valley and Orontes flourished it. In the Hellenistic Period, there is a well-known grid-iron plan between the Mount Silpius and Orontes let probably new residential areas for increasing population, which had increased from 25,000 to 400,000 (Downey 1963, 30–33 and 1958, 87). Antioch history is marked by a series of catastrophes particularly earthquakes and streams overflowing, which led various damage by raising the ground level. Since third century BC, the ground has risen 11 m in the axis of the city; the stratum representing the second Byzantine conquest of the tenth century AD is on the average 4 m below the present ground level, that of the reconstruction under Justinian 7 m, and that of the Monumental Roman Street 8.5 m (Tuna and Belge 2011). However, aerial photographs and basemaps have revealed the Hellenistic gridiron plan traced in the modern street layout hidden under the traditional urban pattern. Colonnaded main route (Cardo Maximus) is still observable as the main street of historic city centre of Antakya, as Kurtuluş Street (A at Fig. 6), Hippodrome, Theatre, and Baths (B-C-D at Fig. 6) had been documented by archaeological researches in 1930s (Morey 1936, 638).

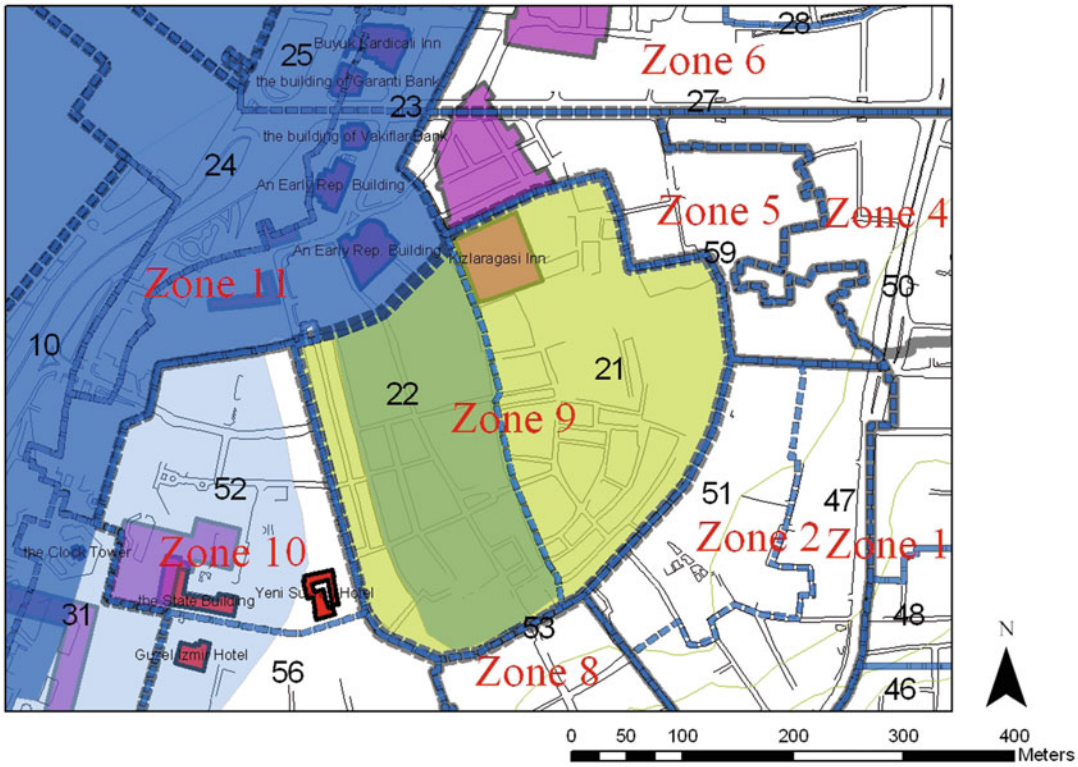

Anatolian Historic City Centers: Urban Archaeology in Multilayered Context, Fig. 5 The arc of the ancient inner port, Anafartalar Street, known as Kemeraltı Arc and infilling area (Belge 2005, 143)

Furthermore, recent researches (Leblanc and Poccardi 1999; Uggeri 1998) indicate correlation between Hellenistic gridiron patterns with recent street pattern. Especially, if Uggeri's (1998) map is georeferenced with current base-map and aerial view, the multilayered characteristic of Antakya could be followed in contemporary city (Fig. 7).

Pergamon and Its Multilayered Cultural Landscape

As another example of glorious Hellenistic art and planning, Bergama (Pergamon) is listed as a special site with the term of "multilayered" in whole UNESCO World Heritage List. The characteristics of Bergama (Pergamon) is emphasized as the achievements of the civilizations from Hellenistic, Roman, Byzantine, and Ottoman Periods and so reflecting different cultural features together (http://whc.unesco.org/en/list/1457 accessed in October, 2017). The multilayered development of Pergamon was comprehensively studied and published (Bilgin 2002; Bilgin et al. 2016). As another multilayered feature, cultural rituals related with sacred springs at Asklepion still sustaining by local groups. In Turkey, "Henna Night" is a ritual at the beginning of wedding like other eastern countries and local people of Bergama have been still used holy waters of the springs at Asklepion to clean-wash bride's hands after "Henna Night." Although the Asklepion has been conserved as an open-air Archaeological Museum entered by ticket, the families of bride and groom have forced the guards of the Ministry of Culture and Tourism to let them to enter the site to complete their rituals (Fig. 8).

Tarsus, the City of Cleopatra, and Mark Antony

Tarsus, where it is possible to mention about an ongoing settlement and multilayered stratigraphy from Neolithic Ages to recent town. Archaeological researches (Belge 2016; Gök and Belge 2016) indicate a settlement pattern starts from Gözlükule

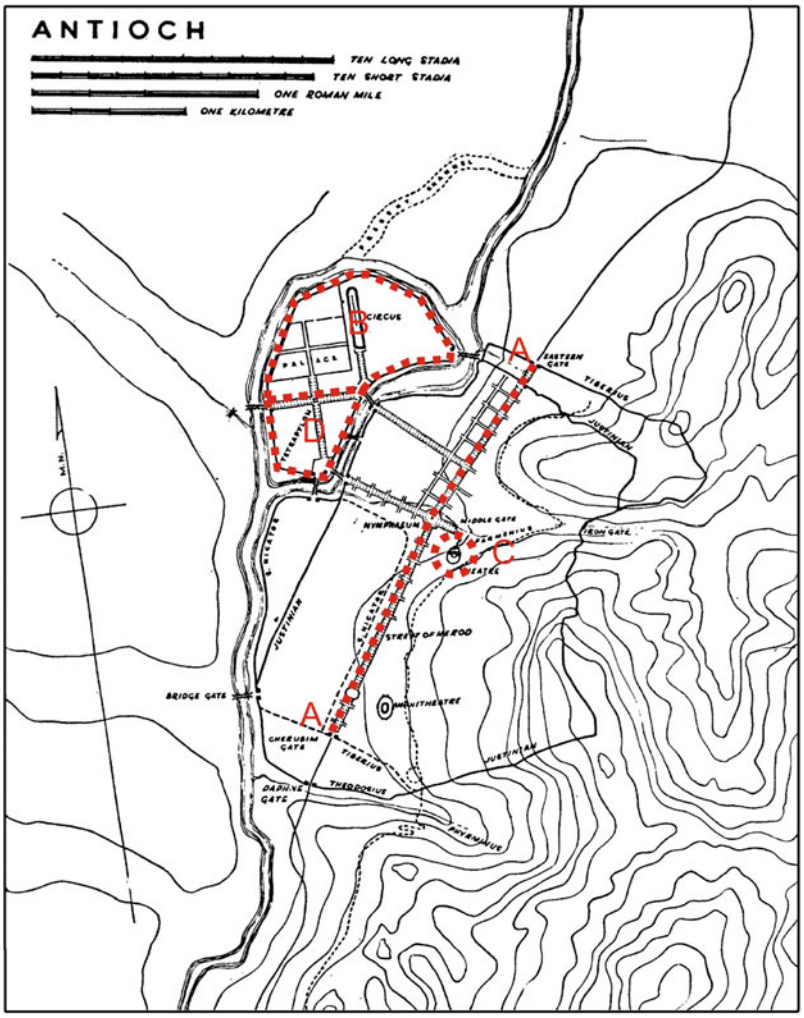

Anatolian Historic City Centers: Urban Archaeology in Multilayered Context, Fig. 6 The location of main features of Antioch on map of Morey (1936, 638). (Prepared by the author)

(a prehistoric mound at the south of centre) and enlarging to northern area and the eastern bound of Kydnos River. Similar to aforementioned ones, in Tarsus, there are monumental structures and seen archaeological remains around historic city centre. Roman Road in the core of Tarsus that is seen as a crucial problem waiting for a clever site management solution to avoid obstructing the vehicular and pedestrian circulation system for nearly two decades and to create an archaeological focus. Another monumental archaeological remain is Donuktaş, which is a Roman Temple (approx. 43 × 100 m), dated to the Late Roman Period and one of the biggest temple in its time. The Cleopatra Gate and rock-cut Necropolis around it, Roman Bath (known as "Altından Geçme" in Turkish) and Gözlükule Mound, where earlier settlement layers were found are other seen-known archaeological sites suffering from lack of maintenance and challenges for site management. Only one site, Makam Mosque and Roman Bridge is presented with religious rituals because of a tomb known as Daniel's tomb (Hz. Danyal). In addition to seen conserved archaeological remains, there are registered urban conservation zones where traditional and registered buildings that have made minimum destruction to urban archaeological layers and probable archaeologically sensitive areas. In 2013, these areas were registered as Grade III

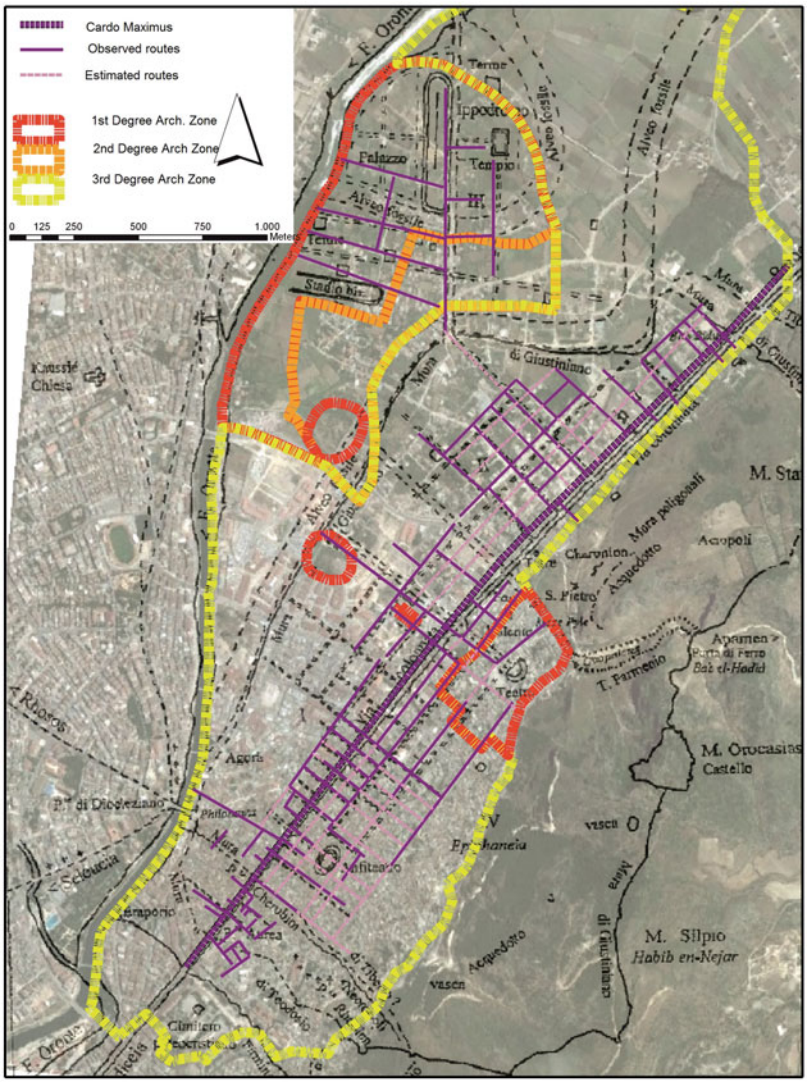

Anatolian Historic City Centers: Urban Archaeology in Multilayered Context, Fig. 7 Main traces and axes on georeferenced map of Uggeri (1998). (Prepared by the author)

archaeological sites means Museum controlled development. Therefore, the number of archaeological findings is gradually increased. In addition to archaeological findings, unknown-probable archaeological layers that are mostly subsoil resources and archaeological traces like axis, open areas, or topographical foci that will be followed in recent settlement pattern. Main axes (probable Cardo Maximus – Decumanus Maximus) and traces of gridiron pattern could be followed by current pattern of historic city centre and archaeological findings (Fig. 9).

At the junction of Cardo and Decumanus, probable location of Forum is recently used as traditional city centre or bazaar of Tarsus, or civic centre of the settlement that indicates not only a physical multilayered structure but also functional and social continuity through history.

Consequently, Anatolian historic city centers have the potentials of variety and continuity of urban life at the same location. Unfortunately, the most of citizens are not aware of archaeological layers beneath their feet, because archaeological resources – not only subsoil resources, even monumental sites – could not be integrated into urban daily. Therefore, the context of Anatolian historic city centers and multilayered structure is a primary topic of interest for not only archaeologist

Anatolian Historic City Centers: Urban Archaeology in Multilayered Context, Fig. 8 A photograph of bride and groom using sacred water to clean their hands. (Personal archive of the author)

or historians but also professions like city planners, and architects or administrative units like local authorities or conservation councils.

Reading Multilayered Context and Diachronic Documentation

Multilayered context is related with not only physical or morphological continuity and archaeological traces but also socio-economic or socio-spatial urban continuum. There are seen archaeological traces as monumental structures or conserved sites and invisible subsoil urban archaeological potential beneath modern cities. Moreover, urban pattern, streets, axes, or open-spaces could follow physical traces of multilayered settlements. In addition to physical traces, multilayered historic city centers include a socio-spatial continuity defined by land-use, holiness, or rituals. An Anatolian historic city centre would have physical, functional, and economical traces from an Ottoman bazaar that had been settled on a Byzantine market above a Roman forum above an Agora. Similarly, a mosque would has been conserved the holiness of the hill including probably remains of a church, a temple or a sanctuary. Settlement, as a socio-spatial term include tangible and intangible heritage together. Therefore, reading and understanding multilayered context is a complex issue for single disciplines. A methodology to estimate and rank the archaeological potential of different zones of multilayered settlements is needed for proper planning and conservation strategies.

Sommella (1987, 3) defines utilizable documentation of multilayered cities as an interdisciplinary study with the assistance of specialists in the fields of ancient history, archaeology, city planning, topography, history, epigraphy, numismatics, etc. and cooperation between them to achieve a comprehensive understanding of an urban environment by means of horizontal and vertical cross-sectional analyses. Similarly,

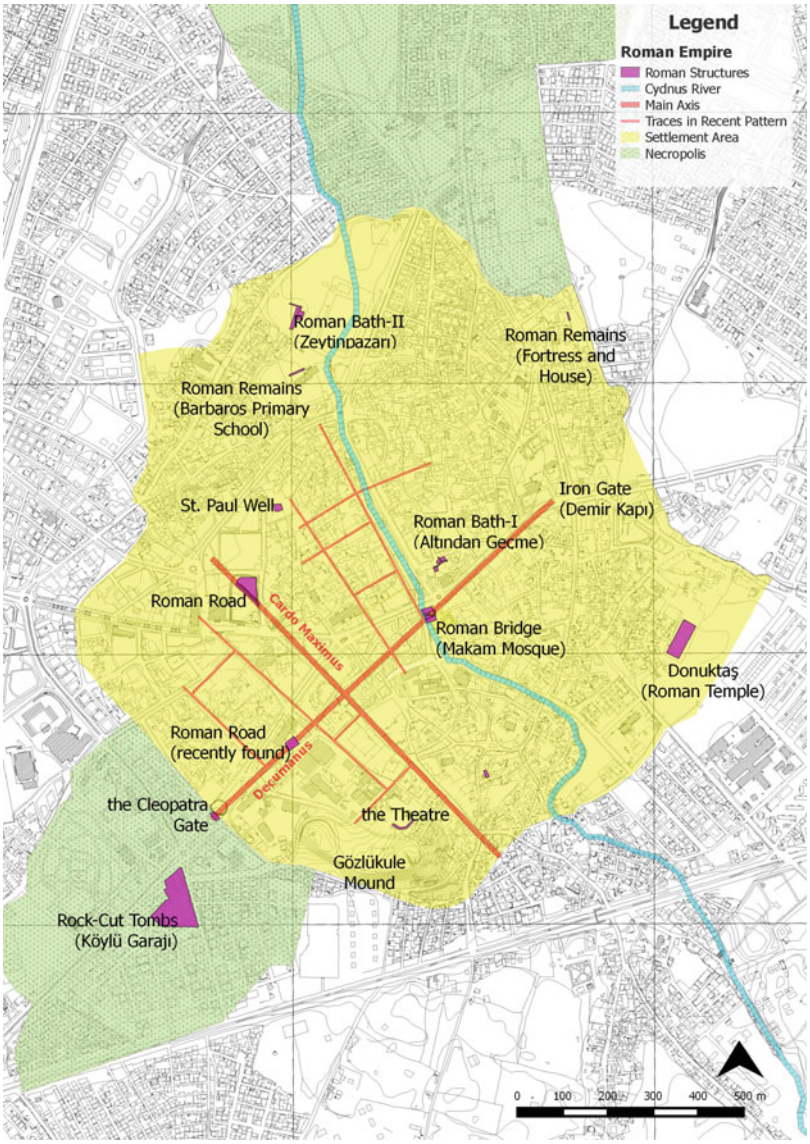

Anatolian Historic City Centers: Urban Archaeology in Multilayered Context, Fig. 9 Conserved and estimated archaeological remains in Tarsus (base map indicates contemporary Tarsus). (Prepared by the author)

Cohen (2001, 36–37) indicates needs to broken down city into most basic components to understand in-depth defines. In defined context, diachronic documentation and mapping could be defined as the evaluation of successive occupations of the settlement layer by layer including occupation area, boundaries, gates, main uses, and urban division with vertical and horizontal links. Moreover, monumental and main buildings, traces of urban pattern, and open areas are the elements of diachronic documentation indicating inner layout of cities (Belge 2012, 335).

There are different approaches to manage urban archaeological heritage in multilayered historic city centers. Some of researches have focused on just single period of the settlements. Garmy (1999, 94–96) uses the "urban continuum" to define chronological components of urban archaeological resources instead of just focusing monumental remains or single periods. In defined

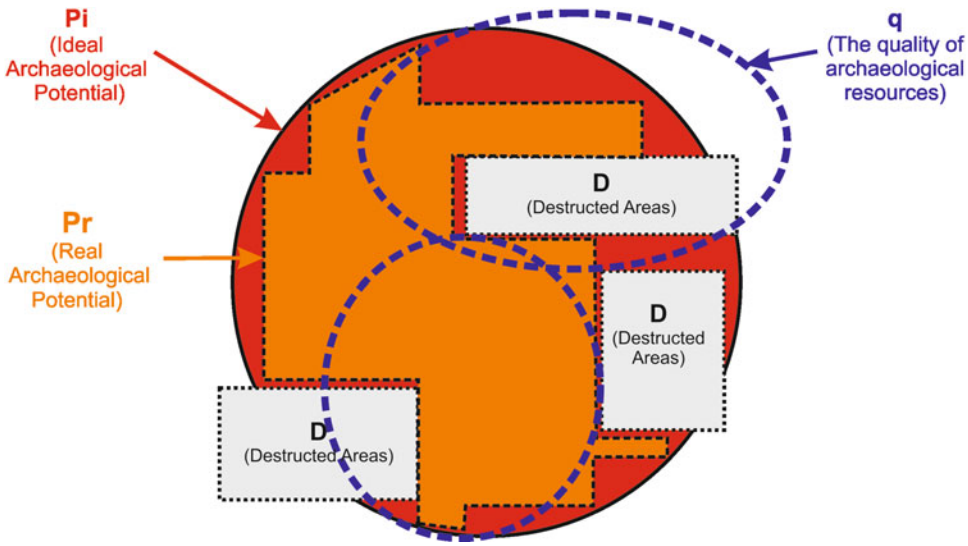

Anatolian Historic City Centers: Urban Archaeology in Multilayered Context, Fig. 10 The evaluation of the Real Urban Archaeological Potential in terms of Garmy's (1999) equation (Belge 2012, 332)

context, the formula $Pr = (Pi\text{-}D)^q$ is suggested to determine real urban archaeological potential. In the formula, "Pi" is theoretically the successive occupation of the city and its historical development. "D" means destruction of archaeological heritage by natural or man-made factors "q," the quality of archaeological deposit, is related with topographic factors and archaeological sites' capacity to preserve archaeological deposits (Garmy 1999: 94). The formula is not a mathematical process, instead spatial evaluation of factors let to understand historical development of cities by emerged periods instead of level-by-level (Fig. 10). By means of basic method, real urban archaeological potential in historic city centers will be determined as an outcome of the superimposition of archaeological potential with destruction and the quality of archaeological deposit. Then, urban archaeological potential can be evaluated as urban archaeological character zone according to similar characteristics. While some part of archaeological deposit have been preserved well and some part may be lost its wholeness. Consequently, appropriate conservation strategies and comprehensive planning policies may be developed by referring unique aspects of each character zone, like restricted development, high urban archaeological potential and conservation, controlled, limited development, or reserve areas.

Cross-References

- ▶ Göbekli Tepe: Agriculture and Domestication
- ▶ Hellenistic and Roman Anatolia, Archaeology Of
- ▶ Late Antique Anatolia, Archaeology Of
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Urban Archaeology
- ▶ Urban Archaeology in Twenty-First Century Perspective

References

Belge, B. 2005. *Urban archaeological issues and resources in İzmir historic city centre: An exploratory case study* [online]. Master Thesis, Middle East Technical University, Ankara. Accessed 15 July 2015. Available at: http://etd.lib.metu.edu.tr/upload/12606886/index.pdf

Belge, B. 2012. Handling sub-soil urban archaeological resources in urban planning, issues in İzmir historic city Centre. *METU-JFA* 29 (2): 331–350.

Belge, B. 2016. Development of a methodological framework for handling urban archaeological resources:

Tarsus historic city centre, Turkey. *Conservation and Management of Archaeological Sites* 18 (4): 422–448. https://doi.org/10.1080/13505033.2016.1290478.

Bilgin (Altınöz), G. 2002. *Assessment of historical stratification in multi-layered Towns as a support for conservation decision-making process; A Geographic Information Systems (GIS) based approach case study: Bergama*. Unpublished PhD Thesis, Middle East Technical University, Ankara.

Bilgin (Altınöz), G., D.U. Binan, and F. Pirson. 2016. Pergamon and its multi-layered cultural landscape. In *UNESCO world heritage in Turkey*, ed. Ertürk and Karakul, 342–377. Ankara: Turkish National Commission for UNESCO.

Cadoux, C.J. 1938. *Ancient Smyrna; a history of the City from the earliest times to 324 A.D*. Oxford: Basil Blackwell.

Çağlayan, D. 1999. *An assessment of Urban archaeology and archaeological heritage: A case study in Ulus Ankara*. Unpublished Master Thesis, Middle East Technical University, Ankara.

Cohen, N. 2001. *Urban planning conservation and preservation*. New York: McGraw-Hill.

Downey, G. 1958. The size of the population of Antioch. *Transactions and Proceedings of the American Philological Association* 89: 84–91.

Downey, G. 1963. *Ancient Antioch*. Princeton: Princeton University Press.

Esin, U. 1996. On Bin Yıl Öncesinde Aşıklı: İç Anadolu'da Bir Yerleşim Modeli. In *Tarihten Günümüze Anadolu'da Konut ve Yerleşme*, ed. Y. Sey, 31–42. Habitat II, İstanbul: Tarih Vakfı.

Garmy, P. 1999. France. In *Report on the situation of urban archaeology in Europe*, 91–102. Strasbourg: Council of Europe Publishing.

Gök, T., and B. Belge. 2016. Tarsus city: Conservation issues of a multi-layered cultural heritage. In *Conservation of cultural heritage in Turkey*, ed. Z. Ahunbay, D. Mazlum, and Z. Eres, 325–348. İstanbul: ICOMOS-TURKEY.

Hodder, I. 1996. Çatalhöyük: Orta Anadolu'da 9000 Yıllık Konut ve Yerleşme. In *Tarihten Günümüze Anadolu'da Konut ve Yerleşme*, ed. Y. Sey, 42–48. Habitat II, İstanbul: Tarih Vakfı.

Kadıoğlu, M., and K. Görkay. 2007. *Yeni arkeolojik araştırmalar ışığında μητρόπολιςτῆςΓαλατίας: Ankyra*, Anadolu/Anatolia 32. http://dergiler.ankara.edu.tr/dergiler/14/722/9120.pdf. Accessed in October 2017.

Kuban, D. 2001. İzmir'in Tarihsel Yapısının Özellikleri ve Koruması ile İlgili Rapor. In *Türkiye'de Kentsel Koruma; Kent Tarihleri ve Koruma Yöntemleri*, 49–105. İstanbul: Tarih Vakfı.

Leblanc, J., and G. Poccardi. 1999. Etude de la permanence des tracés urbains et ruraux antiques à Antioche-sur-l'Oronte. *Syria* 76 (1): 91–126.

McEvedy, C. 2004. *İlkçağ Tarih Atlası*. İstanbul: Sabancı Üniversitesi.

Morey, C.R. 1936. The excavation of Antioch-on-the-Orontes. *Proceedings of the American Philosophical Society* 76 (5): 637–651.

Özdoğan, M. 1996. Kulübeden Konuta: Mimarlıkta İlkler. In *Tarihten Günümüze Anadolu'da Konut ve Yerleşme*, ed. Y. Sey, 19–30. Habitat II, İstanbul: Tarih Vakfı.

Özdoğan, M. 1999. The transition from sedentary hunters gatherers to agricultural villages in Anatolia – some considerations. In *Çağlar Boyunca Anadolu'da Yerleşim ve Konut Uluslararası Sempozyumu Bildiriler Kitabı-1996*, 311–320. İstanbul: Ege Yayınları.

Özdoğan, M. 2013. Dilemma in the archaeology of large scale development projects: A view from Turkey. *Papers from the Institute of Archaeology* 23 (1): 25, 1–8. https://doi.org/10.5334/pia.444.

Rosenberg, M. 1999. Hallan Çemi and the beginnings of Settled Village life in eastern Anatolia, section: Settlement types and settlement patterns. In *Çağlar Boyunca Anadolu'da Yerleşim ve Konut Uluslararası Sempozyumu Bildiriler Kitabı-1996*, 359–372. İstanbul: Ege Yayınları.

Sagona, A., and P. Zimansky. 2009. *Ancient Turkey*. Oxon: Routledge.

Schmidt, K. 2012. *Göbeklitepe A Stone Age Sanctaury in South-Eastern Anatolia*. V. Berlin: Ex Oriente e.V.

Sommella, P. 1987. Methodology of archaeological research in urban areas. In *Archaeology and planning, architectural heritage reports and studies, no: 5*. Strasbourg: the Council of Europe Publishing.

Tankut, G. 1993. *Bir Başkentin İmarı: Ankara (1929–1939)*. İstanbul: Anahtar Kitaplar.

Tuna, N. 2003. İstanbul Suriçi'nde kentsel arkeolojik kültür mirası. *İstanbul Dergisi, Tarih Vakfi* 46: 88–93.

Tuna, N., and B. Belge. 2011. Antakya Tarihi Kenti nin Kentsel Arkeolojik Kaynakları için Öntespit Çalısmaları ve Degerlendirme. In *The proceedings of the fourth Colluquim of Mersin in history*, Mediterranean Cities. Mersin.

Uggeri, G. 1998. The town planning of Antioch on the Orontes. *Journal of Ancient Topography* VIII: 179–222.

Ancestry Assessment

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Introduction

The assessment of ancestry forms part of the suite of analyses undertaken by forensic anthropologists and bioarchaeologists to develop a biological profile. Regardless of the methods used, it is not an easy task to assess a person's biological

ancestry. It is usually not possible to be confident about an assessment unless a person's ancestry lies within one of the four major geographical regions of the Euro-Mediterranean, sub-Saharan Africa, eastern Asia, or Australia/Melanesia. The reason for lack of confidence is that areas between these four regions contain people whose biological properties tend to be blended.

Definition

Ancestry in this context means where a person's ancestors originated before the mass voluntary and forced migrations of peoples that started around the world in the fifteenth century CE.

Key Issues

Why Assess Ancestry?

There are various reasons for wanting to assess ancestry from skeletal remains. These may include answering archaeological questions, such as the identification of persons of African ancestry in Romano British York (Leach et al. 2009). A major question in archaeology is whether the spread of agriculture into Europe was caused by the migration of farming people from Southwest Asia or by the diffusion of cultural practices (Pinhasi and Von Cramon-Taubadel 2009). More remote in time, there are questions such as whether the late Pleistocene Upper Cave skull 110 from Zhoukoudian, in China, is a morphological candidate for being an ancestor of modern people in eastern Asia (Wright 1995).

The process of repatriation raises questions about whether particular skeletal remains are biologically related to the groups to which they are to be repatriated, or whether there has been some confusion of labeling over the decades since they were collected.

In the forensic field, an assessment of an individual's ancestry from analysis of the skeletal remains may help in the search for missing persons. If ancestry has been assessed from skeletal remains, then information about an individual's soft tissue, and the hair color and form, will be more accurate. So assessment of ancestry, when no soft tissue is available, may help in facial reconstruction.

In summary, anthropological evaluation of ancestry offers a quick estimation, which may later be backed up or refuted by analysis of DNA. However, the ability to use DNA cannot be taken for granted. In many non-forensic cases, there are no funds to use DNA to compare results with anthropological assessment of ancestry. There may also be no viable DNA recoverable from archaeological bones. So a need persists for the anthropological analysis of ancestry, using the appearance of the bones themselves.

Assumptions Underlying Assessment of Ancestry

Most assessments of ancestry depend on the skull, because of its high information content available for both observation and measurement. All anthropological methods for determining ancestry are based on the critical assumption that there is systematic geographical patterning of cranial variation (Howells 1989). This assumption of patterning is justified on a worldwide scale (Fig. 1). This scattergram is derived from a metrical analysis of 29 measurements on each of 3163 skulls in the CRANID database (Wright 2008). Though the provenance of each skull is known, the analytical program that produced the chart contained no information about geographical origin. Analysis considered merely likeness and unlikeness, in size and shape, of the skulls. The results are consolidated for plotting as points on the chart, which represents samples in the space of what are known as the first two canonical variates.

If geographical origins are then superimposed onto the purely craniometric chart, it is possible to see that there is a high correlation between cranial form and world geography. The craniometric results produce an approximate map of the world. Therefore, placing an unknown skull on such a map, using its measurements, helps in an assessment of ancestry. An additional working hypothesis is that this patterning is very much due to inherited variation, though there is likely

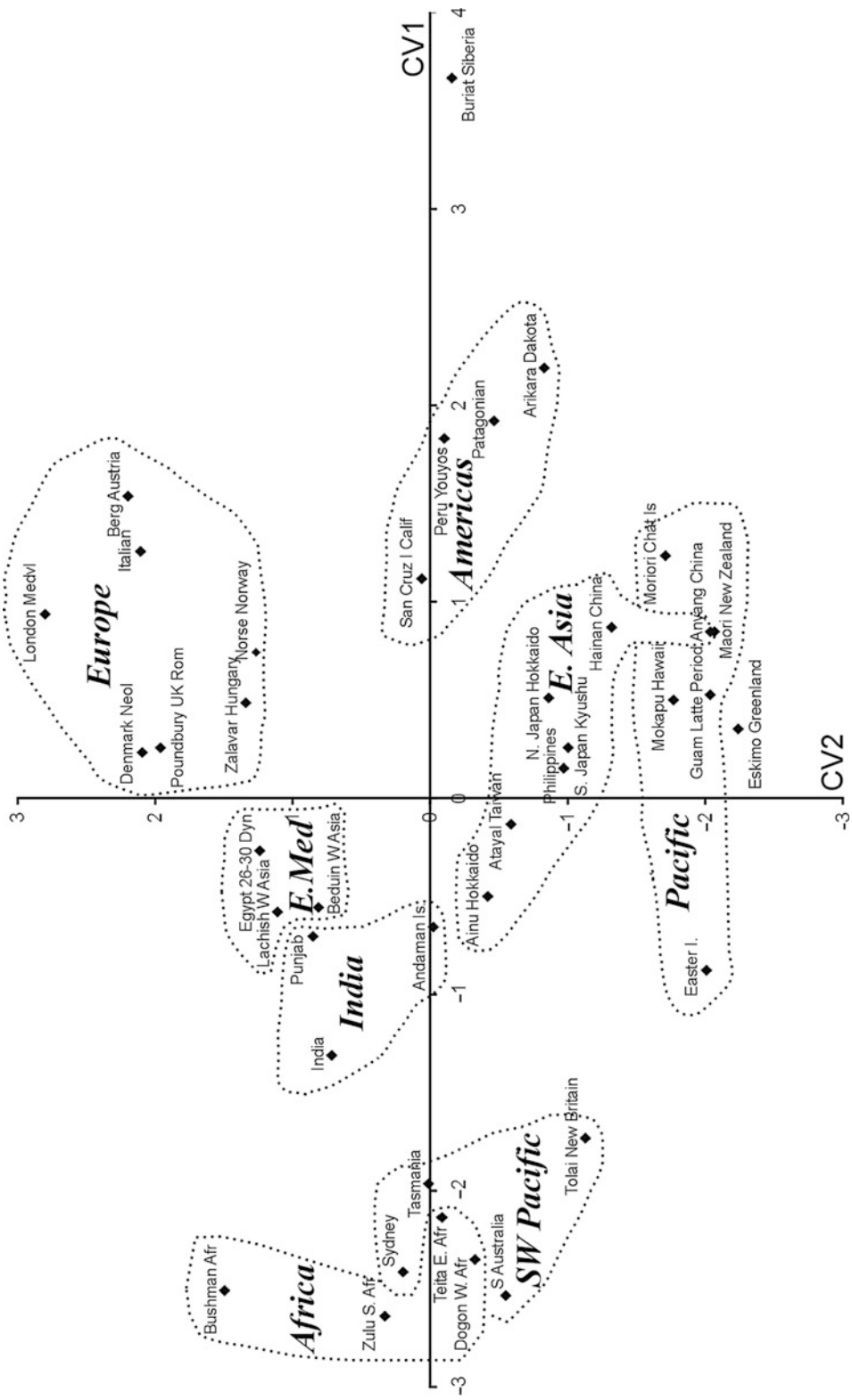

Ancestry Assessment, Fig. 1 Samples of skulls analyzed by CRANID and plotted in the space of the first two canonical variates following multivariate analysis. No geographical information was available to the program, only cranial measurements. Nevertheless, there is a clear geographical patterning of samples, showing that there is good correlation between geography and cranial form. This correlation is the assumption that underlies methods of assessing ancestry

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to be some interference from such environmental factors as diet and climate.

How Is Ancestry Assessed?

Early attempts to determine ancestry were hampered by lack of computers. For many decades anthropologists used the two variables of cranial length and breadth, from which they calculated, by hand, the so-called cranial index. Results for this index ranged from dolichocephalic (long headed) to brachycephalic (short headed).

Though much effort was published in this field, the results had fundamental flaws when applied worldwide to an understanding of ancestry. For example, in their cranial index medieval Norwegian skulls are more like Tasmanian Aboriginal skulls than they are like medieval skulls from European Austria – an ancestral implication that is negated by all other indications of ancestry and history.

More durable in their usefulness have been various illustrations of skulls that characterize the properties of skulls from various geographical regions. Use of these illustrations depends on the undoubted ability of the human mind to visually evaluate similarities and dissimilarities between images. Widely used illustrations are those of Rhine (1993). These illustrations have been reproduced elsewhere, and are presented with full annotations in Klepinger (2006). While such illustrations are easy to use by workers with no prior knowledge of worldwide cranial variation, they tend to be limited by being caricatures of geographical extremes. In other words, they do not take account of variation within groups and overlap between groups.

Furthermore, it happens that determination of geographical origin is easiest in the case of adult males, who best manifest the extremes seen in the illustrations. The skulls of females and subadults tend toward the undifferentiated general human form of cranial appearance and, because of much overlap in morphology, their ancestry is more difficult to assess by whatever method is used.

One advantage of such illustrations, compared with the craniometric approach, is that they can readily illustrate such simple but important discriminating properties such as the shape of the anterior margin of the base of the nasal aperture (Fig. 2). Although not a universal panacea for assessing ancestry, this tiny area of the face shows a sharp transverse ridge in people of European and eastern Asian ancestry. This ridge is not seen in people of sub-Saharan African or Australian Aboriginal and Melanesian ancestry where the sill appears smooth.

Multivariate Methods

The development of computers led to multivariate methods of assessing ancestry. Most of these efforts have used measurements of crania, though some have applied multivariate methods to the worldwide distribution of epigenetic traits (Hanihara et al. 2003). An early multivariate aid was supplied by Giles and Elliot (1962). Giles used linear discriminant analysis of eight measurements on American Whites, American Blacks, and Indigenous Americans. To take

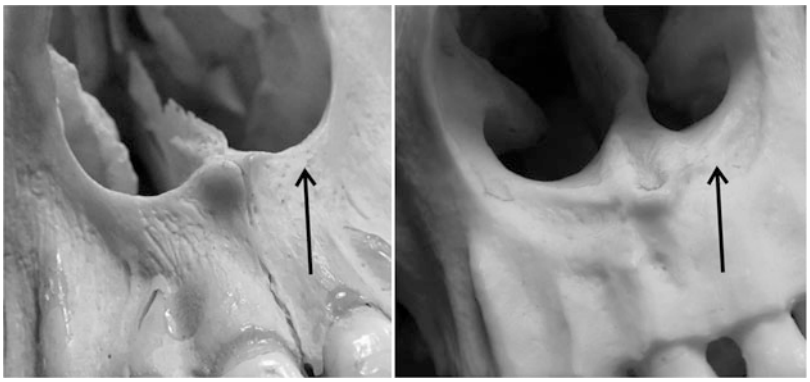

Ancestry Assessment, Fig. 2 Two extreme forms of the anterior margin of the base of the nasal aperture. The sharp sill on the left is characteristic of people with European and east Asian ancestry. The smooth form on the right is characteristic of people with sub-Saharan African and Australian/Melanesian ancestry

advantage of this work, the user substitutes measurements from an unknown skull into equations and thereby determines which of the three groups the unknown skull is most alike (Wright 1995).

The method of Giles and colleagues was helpful, but restricted in terms of its worldwide coverage. In 1973, the anthropologist W.W. Howells made available the results of his lifetime study of cranial variation in the human species around the world (Howells 1973). This work was followed up by the general release of the actual measurements on the skulls (Howells 1996). His work is distinguished by a worldwide approach, and the notion of geographical mapping of cranial variation rather than the sterile, and to some provocative, attempt to define the concept of race and races.

The release of Howells's database led to the development of "turnkey" computerized packages for the determination of ancestry, such as Fordisc (Jantz and Ousley 2005) and CRANID (Wright 2008). Both packages use multivariate methods of discriminant analysis. Fordisc has additional forensic samples from America, and CRANID has additional samples from parts of the world not covered by Howells, for example, the Indian subcontinent and Patagonia.

Compared with the simplicity of comparing a skull with illustrations, the multivariate approach means that the user must first get thoroughly competent in taking a series of defined measurements. An advantage of the multivariate approach is that it offers numerical results. These reflect the differing probabilities of an unknown skull coming from particular samples from around the world.

Future Directions

Possible Advances

It seems unlikely that there will be significant advances in multivariate method and theory for use on craniometric data. The algorithms for discriminant analysis were developed in the 1930s. They have advanced little since then, though their use is now widespread with the availability of computer packages. A useful advance, aiming to improve the accuracy of determining ancestry, would undoubtedly come from increasing the worldwide coverage of samples of skulls that can be incorporated into discriminant analysis.

New techniques to take measures have been developed, for example, 3D landmark geometric approaches (Ross et al. 1999) as opposed to measurements by calipers. However, it is difficult to see such methods eclipsing the traditional approaches to worldwide assessment of ancestry, used in Fordisc and CRANID. This doubt exists because there seems little prospect of anybody building up a new worldwide reference collection that matches the comprehensiveness of Fordisc and CRANID. Skeletal collections from many parts of the world are now off limits when it comes to research.

Cross-References

- ▶ Age Estimation
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Children in Bioarchaeology and Forensic Anthropology
- ▶ Demographic Transitions
- ▶ Dental Anthropology
- ▶ Osteology: Definition
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition

References

Giles, E., and O. Elliot. 1962. Race identification from cranial measurements. *Journal of Forensic Sciences* 7: 147–157.

Hanihara, T., H. Ishida, and Y. Dodo. 2003. Characterization of biological diversity through analysis of discrete cranial traits. *American Journal of Physical Anthropology* 121: 241–251.

Howells, W.W. 1973. *Cranial variation in man: A study by multivariate analysis of patterns of difference among recent human populations (Papers of the Peabody Museum of Archaeology and Ethnology 67)*. Cambridge: Harvard University Press.

Howells, W.W. 1989. *Skull shapes and the map*. (Papers of the Peabody Museum of Archaeology and Ethnology 79). Cambridge: Harvard University Press.

Howells, W.W. 1996. Howells' craniometric data on the internet. *American Journal of Physical Anthropology* 101: 441–442.

Jantz, R.L., and S.D. Ousley. 2005. *FORDISC 3: Computerized forensic discriminant functions. Version 3.0*. Knoxville: University of Tennessee.

Klepinger, L.L. 2006. *Fundamentals of forensic anthropology*. Hoboken: Wiley-Liss.

Leach, S., M. Lewis, C. Chenery, G. Müldner, and H. Eckardt. 2009. Migration and diversity in Roman Britain: A multidisciplinary approach to the identification of immigrants in Roman York, England. *American Journal of Physical Anthropology* 140: 546–561.

Pinhasi, R., and N. Von Cramon-Taubadel. 2009. Craniometric data supports demic diffusion model for the spread of agriculture into Europe. *PLoS One* 4: e6747. https://doi.org/10.1371/journal.pone.0006747.

Rhine, S. 1993. Skeletal criteria for racial attribution. In *Race, ethnicity, and applied bioanthropology (NAPA Bulletin 13)*, ed. C.C. Gordon, 54–67. Arlington: American Anthropological Association.

Ross, A.H., A.H. McKeown, and I.W. Konigsberg. 1999. Allocation of crania to groups via the "new morphometry". *Journal of Forensic Sciences* 44: 584–587.

Wright, R.V.S. 1995. The Zhoukoudian Upper Cave skull 101 and multiregionalism. *Journal of Human Evolution* 29: 181–183.

Wright, R.V.S. 2008. Detection of likely ancestry using CRANID. In *Forensic approaches to death, disaster and abuse*, ed. M. Oxenham, 111–122. Brisbane: Australian Academic Press.

Andah, Bassey Wai

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Basic Biographical Information

An outstanding scholar and teacher, Bassey Wai Andah was born on January 6, 1942. He had his first degree in history at the University College, Ibadan and graduated in 1964. Bassey Andah's keen interest in archaeology was fired by a series of open lectures delivered then by Professor Thurstan Shaw. By that time, he was a final year history student and a member of the audience.

Shortly after graduation, Andah rejected a job offer by the Nigerian Department of Antiquities to take up a postgraduate program at the Institute of Archaeology, London, through a Nigerian Federal Government scholarship. He completed his M. Phil. degree in July 1967 at the institute and thereafter proceeded to the University of California for a Ph.D. under the renowned Professor Desmond Clark.

Bassey Wai Andah gained his Ph.D. in 1973 with his thesis on archaeological reconnaissance in Upper Volta, 1970–1972. He became a faculty member of the Department of Archaeology at the University of Ibadan almost immediately after a successful defense of his work.

In 1978, Bassey Andah was promoted to the rank of a professor at the relatively young age of 36 and was also appointed as head of the Department of Archaeology.

Professor Andah who played a very active role in the formation and stability of the World Archaeological Congress (WAC) became the first African/third president of the world archaeological body having been elected in Delhi, India, in 1994. He had earlier served as the senior representative for the West African region.

Professor Bassey Wai Andah was the president of WAC till his last breath on December 22, 1997. Few months before then, precisely March 1997, he was elected as deputy vice-chancellor (Administration), University of Ibadan.

Major Accomplishments

Professor Bassey Wai Eteyen Andah's distinguished career in African archaeology was hinged on a proper channeling of "expert" curiosity, energy, and experience into the effective analysis of West African cultural patterns. Andah believed that many of the early scholars in West Africa were too uncritical especially in the approaches adopted for the story of man's broad cultural history in the region. Consequently, concepts and mis-concepts coined from other places were utilized wholesale and indiscriminately in the analyses and interpretations of cultural life patterns in West Africa.

Andah's canonical writings reflected in several of his articles published as editor of the *West*

African Journal of Archaeology. Examples of such include Introduction to the Sociology of Settlement History, the Earliest Human Occupation and Settlement in West Africa, and Early Urban Societies and Settlements of the Guinea and Savanna Regions of West Africa – all in the Epistemology of West African Settlements, Special Issue of *West African Journal of Archaeology* volume 25. Others are as follows: The Quaternary of the Guinea Region of West Africa: An Assessment of the Geomorphic Evidence, Iron Age Beginnings in West Africa: Reflections and Suggestions, and The Early Paleolithic in West Africa: The case of Asokrochona Coastal Region of Accra, Ghana – all in the *West African Journal of Archaeology* volume 9.

He promoted the development of cultural resources management which he regarded as a means of linking the past with the present.

Andah carried out extensive fieldwork in various parts of West Africa and lectured in Ghana, the United States, Sweden, and Nigeria.

Professor Andah was prolific as a teacher and a scholar. He wrote over 70 journal articles, authored 4 books, and co-authored 6 books on African archaeology. Having succeeded Professor Thurstan Shaw as the editor of *West African Journal of Archaeology* in 1978, Andah edited the journal till his death on the 22nd of December 1997. He was a teacher of teachers. Professor Andah had little or no patience for non-rigorous archaeological work, always instilling on students that archaeology is neither for the intellectually lazy nor for those without thorough analytical skills. His passion for hard-work and thoroughness showed clearly in the pool of those nurtured academically by him. Many of the current academics in the Department of Archaeology and Anthropology, University of Ibadan, were his students. In fact most of the Archaeology lecturers in other Nigerian universities were also his students, while many of his former students are today archeologists, ethnographers, cultural officers, and museum professionals in different parts of Nigeria.

Bassey Andah was the longest-serving head of the Department of Archaeology and Anthropology, University of Ibadan, having been head from 1978 to 1985 and from 1989 to 1991. It was at his initiative that courses in cultural anthropology were introduced and the first set of graduates in cultural anthropology graduated during the 1986/1987 academic session; the name of the department was changed to reflect the introduction of degree courses in anthropology.

The first Nigerian professor of archaeology laid the foundation for the active participations of Nigerians in the activities of the World Archaeological Congress. Today, Nigeria has an enviable record of service in the global body, while the country has the highest number of WAC members in the West African region.

During his lifetime, Professor Andah received a plethora of academic awards including the Fulbright Senior Scholars Fellowship Award in 1984 and the CODESRIA/Rockefeller Senior Scholars Fellowship Award in 1991/1992. In 1993, he received the Distinguished Historian Award for APEX Museum, Atlanta, Georgia, USA, and secured the Australian University's Merit Award in 1995.

In recognition of his academic brilliance and numerous contributions to African archaeology, a memorial lecture was instituted in his honor, while the library of the Department of Archaeology and Anthropology, University of Ibadan, was named after him.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ World Archaeological Congress (WAC)

References

Andah, B.W. 1979. Introduction to perspectives on West Africa's past. *West Africa Journal of Archaeology* 9: 135–150.

Andah, B.W. 1987. Introduction to foundations of civilizations in tropical Africa. *West Africa Journal of Archaeology* 17.

Andah, B.W. 1992. *African paleo-anthropological stories: Which way forward? Imprints of West Africa's past*. Ibadan: Wisdom Publishers.
Andah, B.W. 1995a. Introduction to the sociology of settlement history. *West African Journal of Archaeology* 25.
Andah, B.W. 1995b. Early urban societies and settlements of the Guinea and Savannah Regions of West Africa. *West African Journal of Archaeology* 25.
Andah, B.W 1995c. The earliest human occupation and settlement in West Africa. *West African Journal of Archaeology* 25.
Andah, B.W., and A.I. Okpoko. 1979. Oral traditions and west African culture history: A new direction. *West Africa Journal of Archaeology* 9: 201–224.
Folorunso, C.A. 1997. Obituary and tributes; Late Bassey Wai Eteyen Andah. *West Africa Journal of Archaeology* 27(2).
Shaw, T.P., Ucko, and MacDonald. 1999. *A tribute to the life and work of Professor Bassey Wai Andah*. Ibadan: Textflow Limited.

Andarayan: Agriculture

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Introduction

The archaeological site of Andarayan is located close to the Cagayan River, in the Cagayan Valley, just east of the modern town of Solana, northern Luzon, Philippines. Richard Shutler Jr. conducted limited test excavations at the site in 1978 (Snow et al. 1986). Within the alluvial deposits, Shutler recovered a large assemblage of red-slipped pottery, clay earrings and spindle whorls, and fragments of ground stone tools. Some of the pottery had been produced using an organic temper of rice chaff and broken stem segments to aid in the bonding of the clay during firing. The general shape of the glume imprints identified in the pottery indicated that the impressions were from rice *Oryza* and intermediate between the common cultigen *O. sativa* and its wild progenitors. A single AMS date of 3400 ± 125 years BP or 4000–3350 cal. BP (no code) confirmed that the pottery was produced during the early–mid second millennium BCE. From this evidence Snow et al. (1986) argued that this represented the earliest evidence for the cultivation of rice in the Philippines and across most of Island Southeast Asia (The earliest known rice temper in Island Southeast Asia is from the cave site of Gua Sireh, Sarawak, Malaysian Borneo, and is dated to c. 4,200 years ago. Rice has also been identified to the north of the Philippines at late Dabenkeng sites such as Nanguanli in Taiwan dated to c. 4,700–4,200 years ago).

Key Issues

Andarayan is by no means a unique archaeological site for northern Luzon but rather one of many such sites found within the Cagayan River Valley that have produced a similar suite of material culture. These include Magapit, Nagsabaran, Conciso, and Irigayan, and there are sites of a similar date to the north in the Batanes Islands (Mijares 2007). But the lower Cagayan Valley sites are unique in that many of them are very large shell middens, dating from Neolithic and Iron Age times and possibly even pre-Neolithic as well (more research is needed on chronology). The earliest occurrence of many of these Neolithic artifact types and technologies in the Philippines, like pottery and ground stone tools, is at these sites in the Cagayan Valley. Many such artifacts have strong similarities to the types of material culture identified in Taiwanese Neolithic sites dating to a similar period. For example, the red-slipped pottery found in southeastern Taiwan and northeastern Luzon has great affinities in form, surface finish, and decoration. The spindle whorls are very similar in morphology to those found at sites such as Fengpitou in southwestern Taiwan.

Although it has been argued that these Neolithic peoples were sedentary agriculturalists who brought rice agriculture with them, the evidence for intensive cultivation has yet to be identified, and Andarayan remains the only site of this date to have produced any evidence for the presence of

rice in the region (Andarayan is unusual in that it is the only site in the Cagayan Valley to have produced red-slipped pottery with an organic temper. The pottery from all other sites in the region has either fine- or coarse-grained inorganic tempers). There is, however, evidence to suggest that, along with new types of material culture, domestic pigs were introduced to the Philippines by c. 4,000 cal. BP.

Collectively, Andarayan and these Cagayan River Valley sites are considered to reflect one of the earliest arrivals of the Austronesian-speaking peoples from Taiwan into Luzon around 4,000 years ago. The settlement of the northern Philippines from Taiwan represented the initial step in a process of migration and colonization by the Austronesian-speaking populations that would eventually encompass two thirds of the globe from Madagascar in the west to New Zealand and Easter Island in the east and is considered the most extensive movement of human populations recorded in prehistory (Bellwood 1997).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Farming-Language Dispersals (1): Principles
- ▶ Farming-Language Dispersals (2): Worldwide Survey
- ▶ Island Southeast Asia: Neolithic
- ▶ Pig: Domestication
- ▶ Rice: Origins and Development

References

Bellwood, P. 1997. *Prehistory of the Indo-Malaysian Archipelago*. 3rd ed. Canberra: ANU E Press.

Mijares, A.S.B. 2007. *Unearthing prehistory: The archaeology of northeastern Luzon, Philippine Islands*, BAR International series. Vol. 1613. Oxford: John and Erica Hedges Ltd.

Snow, B.E., R. Shutler Jr., D.E. Nelson, J.S. Vogel, and J.R. Southon. 1986. Evidence of early rice cultivation in the Philippines. *Philippine Quarterly of Culture and Society* 14: 3–11.

Andean Petroglyphs

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Introduction

The archaeology of the Andes is recognized worldwide for the complexity of the sociohistorical developments that have occurred in the region and for the wealth and monumental nature of its archaeological record. This has led researchers to pay great attention to study of the great architectural complexes of the Andes and to a series of elements of material culture which can be catalogued as art, such as ceramics and metalworking. Although petroglyphs are a recurrent material record in the Andes, they have not been studied in the same depth as other material evidence from the pre-Hispanic era. An overview of Andean petroglyphs is realized in this entry.

Definition

Petroglyphs are a particular type of rock art, characterized by the production of images on rock supports through extraction of the surface material of the rock by engraving, scraping, and/or incision. These extractions create lines or areas to depict specific images which make up the motifs of Andean petroglyphs. In some cases, the lines or the areas between them may be filled with paint. Petroglyphs are part of a broader corpus of Andean rock art which also includes paintings, geoglyphs, and carved outcrops.

Description

The practice of creating petroglyphs was recurrent in the different regions of the Andes and throughout a large part of their historical sequence. This wide spatial and temporal distribution implies great heterogeneity in the visual representations.

In spatial terms, although petroglyphs are found on the different altitude floors of the Andes, their presence diminishes notably in coastal spaces. In temporal terms, although further studies are still needed to define the chronology of these manifestations in various regions, their production can be clearly recognized since at least 6000 years ago (Berenguer 2000; Guffroy 1999; Tumi 2011). Nevertheless, it may be noted that in some sectors such as northwestern Argentina, the presence of rock art in the form of paintings goes back to the start of the Early Holocene. Manufacture of petroglyphs continued in different sectors of the region after colonization by the Spanish, but at a lower intensity than in earlier moments, consistent with the inquisitorial practices of the crown (Hernández Llosas 2006; Hostnig 2007; Martínez 2009).

Despite the spatial, temporal, and visual variety of Andean petroglyphs, some very general characterizations can be proposed about their iconography to introduce the reader to the visual richness of these manifestations. The most recurrent motifs in Andean petroglyphs are nonfigurative (Fig. 1). They may be simple geometric units like circles, squares, or lines, represented either in isolation or containing interior elements such as other geometrical figures (e.g., concentric circles, inscribed squares, squares with internal lines) or else combined with other geometric units to form motifs like agglutinated circles, circles connected by lines, interwoven inscribed squares, etc. Some of these nonfigurative representations are similar between the different spaces of the Andean region, but it is not known whether this is a result of shared visual codes or of convergences within independent iconographic processes. Indeed, some of these motifs are shared with other regions of the planet due to their simplicity, or to the finite character of the geometric units of which they are composed.

Figurative motifs are varied across the region, although some common trends may be observed. There is a rich corpus of zoomorphic representations, reflecting part of the local ecologies, but also animals which were important for local imaginaries and practices. A symptom of this is the scarce representation of marine fauna, consistent with the low frequency of petroglyphs in coastal spaces. One exception is the Las Lizas style from northern Chile, which depicts sharks, dolphins, tuna fish, etc. (Niemeyer 1985). In contrast, Andean camelids (Llamas, Alpacas, Guanacos, and Vicuñas) are perhaps the most popular animals in the repertoire of Andean petroglyphs. They may be represented in isolation, in herds, or in scenes where they interact with humans (Fig. 2). The latter include hunting, rodeos, herding/grazing, and caravan transport (Berenguer 2000; Guffroy 1999). Their recurrence is consistent with the high economic, social, and symbolic value of camelids in the Andes.

Andean Petroglyphs, Fig. 1 Petroglyph with nonfigurative motifs, anthropomorphs, and camelids, northern Chile. (Photo courtesy of Mauricio Uribe & Flora Vilches)

Human figures are also recurrent in the various spaces and times, with no clear trends observed in their distribution. Despite their great heterogeneity, the predominant representation seems to be of simple anthropomorphs with lines for the body and a circle for the head. In other cases the bodies may have volume, either square or circular, and in some the trunk is decorated as if with clothing. Considering the high symbolic and identity value of textiles in the Andes, some works have examined these representations of clothing to identify the affiliation of the anthropomorphs carved in rocks (Lopez Campeny and Martel 2014). A similar situation appears to occur with headdresses, which are recurrent in the region and are related with aspects of identity of the pre-Hispanic Andean populations.

Andean Petroglyphs, Fig. 2 Pastoral scene (humans and camelids), northern Chile. (Photo courtesy Pablo Larach)

Andean Petroglyphs, Fig. 3 Human head with feline features from Central Peru. (Photo courtesy of Tomi Guri Echeverria)

Andean Petroglyphs, Fig. 4 Human head with headdress, central northern Chile

Andean Petroglyphs, Fig. 5 Therianthropic figure of the Aguada culture, northwestern Argentina. (Photo courtesy Norma Ratto)

Heads in particular are a recurrent motif (Fig. 3). They may be naturalistic representations or transformed following at least two basic principles: *schematizations*, which include a series of nonfigurative elements in the face, "distorting" its naturalness, and *combinations* which integrate human and animal elements in the composition of the face, especially attributes of felines such as spots or teeth. Some of them may also include headdresses (Fig. 4). Although the spatial distribution of the different facial expressions of the heads has not been much studied, the fact remains that they are a body part which was highly valued in the Andean world, being associated with notions like ancestors, fertility, and power. The best-known cases to date suggest that heads are distributed from formative to state contexts; however, they appear not to be continued after contact with the Spanish Empire, possibly due to the importance of this motif in the imaginaries of the indigenous populations.

The combination of multiple beings in a single representation is not very frequent in Andean petroglyphs; however, therianthropy is found, as noted above, when human and feline attributes are combined. In some cases it has been postulated that human-camelid combinations are represented. By the same token, combinations between animals are even scarcer; one well-known case is that of the Aguada petroglyphs in northwestern Argentina, where snakes are combined with felines, and even human elements may be included (Fig. 5).

Andean Petroglyphs, Fig. 6 Scene with mounted figure in a petroglyph of the colonial period, northwestern Argentina. (Photo courtesy of Mercedes Podestá)

Andean Petroglyphs, Fig. 7 Petroglyphs known as cattle marks (nineteenth–twentieth centuries) associated with creole communities, central western Argentina. (Photography from the files of the National Institute of Latin American Anthropology and Thought – Argentina)

The known iconographic corpus of petroglyphs post-contact with the Spanish Empire is less varied than the pre-Hispanic and may be divided into two large groups. One set consists of the petroglyphs associated with the colonial era (sixteenth to early nineteenth centuries), which have been studied intensely in recent decades. In general, they present similar themes in the different regions of the Andes with representations of Christian crosses, scenes of people mounted on horseback, churches, and priests (Fig. 6). Nonfigurative representations like chessboards have also been recognized, as well as writing with indications of calendar dates (Hostnig 2007; Martínez 2009; Strecker 2016).

The other set are petroglyphs created in the nineteenth to twentieth centuries, associated with creole communities rather than necessarily indigenous populations. They have been little studied and consist mainly of inscriptions with dates, names, and nonfigurative motifs like circles or lines. In central western Argentina and central northern Chile, these representations are known as "cattle marks" and were supposedly made by cattle herders who took their cattle across the Andes; the marks would have served to delineate territorial borders and for communication (Podestá et al. 2011) (Fig. 7).

Further to this brief characterization of the iconography of Andean petroglyphs, we do not presently know of any spatial or temporal trends in the distribution of the motifs adopted. Although petroglyphs created by hunter-gatherer groups have been recognized, they were created for the most part by agricultural and state societies.

Historical Background

The historical development of research into Andean petroglyphs varies among the different countries and sectors of the region. Although in general an early interest in this material record is observed among the first scholars to study the Andes, the intensity, depth, and orientation of investigation over the course of time have generated different research traditions in different countries. For example, in Argentina and Chile, we find a great accumulation of investigations and works oriented toward the problems raised by petroglyphs among the multiple social, political, and economic dynamics of pre-Hispanic communities. In recent years, especially in Argentina, collaborative investigations with communities have become very frequent. In Bolivia on the other hand, thanks to the work of the Bolivian Rock Art Research Society (SIARB), a tremendous effort has been made in recent decades to record, catalogue, conserve, and appreciate the country's rock art, together with an emphasis on regional studies and the characterization of colonial rock art. A similar

orientation can be seen in Colombia, thanks to the actions of a series of bodies, among them the Rock Art Research Investigation Group (GIPRI), with great emphasis on conservation, cataloguing, and appreciation of the petroglyphs. In Peru, studies on rock art have intensified over the last decade, oriented more toward systematizing the sets of petroglyphs, with discussion of their chronology and relation with the landscape.

These examples of the different paths followed by research reflect how complex it is to take a historical approach to the study of Andean petroglyphs, since at bottom it is a story of highly fragmented investigation in the different sectors of the Andes, and has not yet been defined by common research topics. Nevertheless, some general points can be noted.

First, despite the rich documentary corpus left by the conquest and the imposition of Spanish power in the region, there are few documentary sources which refer to petroglyphs and rock art. Martínez (2009) suggests that this may be due to multiple factors, one of which is that Europeans may have seen the petroglyphs as indecipherable texts from the past.

Second, although some descriptions exist, recorded by travelers and military personnel as early as the eighteenth century, no tradition of investigation was formed until late in the nineteenth century and early in the twentieth century, after the creation of the Andean states on their independence from Spain. In general, these studies were mainly descriptive, and on occasions focused on deciphering the meanings of the representations in terms of ritual practices, mythologies, or even maps. Of course, these first approaches formed the basis on which the researchers of the mid-twentieth century would work, continuing to address areas like classification and systematization into sets and chronology and combining rock art information with that of other archaeological contexts. Important figures in this story are Juan Bautista Ambrosetti and Eric Boman (Argentina), Jorge Iribarren and Hans Niemeyer (Chile), Eloy Linares Málaga (Peru), José Pérez Barradas and Miguel Triana (Colombia), among others.

Third, researchers have tried to incorporate understanding of Andean petroglyphs into the archaeological problems of the region. To do this, theoretical-conceptual and methodological frameworks have been drawn up which in some degree dialogue with general changes in worldwide theoretical frameworks, and those particular to the Andes, without however being remitted and reduced to the simple opposition between processual and post-processual archaeology. Nevertheless, it also occurs that these cases coexist with approaches which were more descriptivist or based on aesthetic or art history perspectives. These variations are associated with the particularities and tradition of research in the different Andean countries.

Fourth, despite the scarce documentary evidence associated with the production of petroglyphs, rock art information has been combined with archaeological, ethnographic, and ethnohistorical data in different parts of the Andes to attempt interpretations of the symbolic, mythological, and landscape aspects related with Andean petroglyphs. This research tradition is proper to the Andes, and contains history going back to before the proposals of post-processual Anglo-Saxon archaeology.

Fifth, today we are witnessing huge growth in investigation into rock art, and petroglyphs in particular, in the Andes. This is shown by the large number of publications on this subject (e.g., Boletín SIARB and Rupestreweb), the organization of national and Latin American conferences, the emergence of multiple theoretical-methodological discussions, and regional studies, all of which position the Andes as a vibrant space in world rock art archaeology. These processes are accompanied by important collaborative work with local communities, as well as cataloguing, recording, and appreciation of this delicate cultural heritage.

Key Issues/Current Debates

As in many parts of the world, one of the key issues in the study of Andean petroglyphs is determining their chronology and cultural

affiliations. Although progress has been made over recent decades, identifying zones with clear, well-established historical sequences of petroglyph production, further studies in this field are required in other spaces. This interest in defining visual sets with historical value has been accompanied by theoretical-methodological discussion on what constitutes a style, how styles are defined and their implications in terms of identity or information flows.

One aspect that is widely discussed in the Andes is the relation between petroglyphs and landscape. Although a number of approaches exist, they can be grouped around three basic perspectives: (i) the relation between petroglyphs and mobility, in that they serve to mark both routes and territorialities; (ii) the relation between petroglyphs and landscape construction in terms of endowing a specific space with meaning by carving rocks; and (iii) the ways in which these petroglyphs create historically constituted memory and experiences. These approaches have combined the information obtained from rock art with data collected from other archaeological material records, as well as Andean ethnohistory and ethnography (Castro and Gallardo 1995–96; Martel et al. 2012). However we know of no specific studies investigating or comparing the forms of landscape construction implemented by petroglyphs in relation with other forms of rock art such as paintings or geoglyphs, although a landscape archaeology approach is common to investigations into the different rock art manifestations in the Andes. As may be expected, many of these studies are based on intensive regional orientation programs (e.g., Strecker 2016).

One aspect which is only now being discussed in some parts of the region refers to the technological dynamics of petroglyphs. Theoretical-methodological proposals have been offered which take up notions of the anthropology of technology and/or craft production, with a strong emphasis on replicative studies. These proposals have given rise to attempts to understand not only the instruments used in creating petroglyphs, but also the operative chains associated with their production, the investment of time, and energy as they relate to intervention in these spaces, the types of design, and the social dynamics of production (Alvarez and Fiore 1995; Valenzuela 2007; Vergara and Troncoso 2015; Vergara et al. 2016).

Such technological and spatial studies coexist with other, more iconographic approaches focused on study of the visual nature of petroglyphs in order to discuss many aspects of social life, such as social differentiation, dynamics of identity and territory, and the domestication of camelids; the latter is a key moment in the pre-Hispanic history of the Andean peoples (Aschero 2000; Bray 2002; Guffroy 1999; Gallardo and Yacobaccio 2005). Through these multiple perspectives, the study of Andean petroglyphs has become integrated with archaeological studies of the pre-Hispanic period in order to understand past sociohistorical processes in the Andes and the role played by this type of rock art in these dynamics.

Recognition of petroglyphs specific to the Inca state, or Tawantinsuyu, has opened up a series of debates in the last decade. A group of works has focused on recognizing the presence of this material expression in different spaces of the Tawantinsuyu, especially its southern provinces. These approaches have discussed the authorship of these representations and whether they are a product of the incorporation of Inca visual elements by local populations or were manufactured by agents of the state; in the latter case, they would be part of the material resources deployed by the state in its annexation processes in the region. There are interesting theoretical aspects to this discussion, as it establishes an analytical separation between the manufacture of petroglyphs and the circulation of motifs on rock supports.

Although the presence of rock paintings attributable to the state is recognized in the Inca heartland, the situation is not conclusive for petroglyphs. However it is known that state agents of the Tawantinsuyu sculpted rocks with geometric forms and zoomorphs in Cusco and its surroundings (Joyce 2015). This group contains the so-called models which represent fields of crops with canals; these have been recognized

Andean Petroglyphs, Fig. 8 Inca models from northern Chile. (Photo courtesy of Mariela Pino)

both in the Inca heartland and in provincial sites (Berenguer 2000; Meddens 2006). As these models tend to be sculptures and engravings, they have not traditionally been considered as petroglyphs, since their production implies a different way of working stone (Fig. 8).

Finally, the recognition and systematization of a set of petroglyphs from the colonial and republican periods has been a vibrant and important line of investigation in Andean archaeology. It has served to evaluate on the one hand the common elements associated with the discourses and imaginaries of the indigenous communities with respect to the Spanish conquest; and on the other the expressive possibilities and limitations imposed by the Spanish Empire on the traditional practices of indigenous communities. Some lines of work compare colonial petroglyphs with other contemporary media in order to discuss the different freedoms, expressivities, and values which could be deployed on different material supports under Spanish domination.

International Perspectives

In general terms, Andean petroglyphs are little known and discussed globally. The same is true of the rock art of the Andes, with the exception of the Nasca geoglyphs. Nevertheless, study of these petroglyphs has gradually become internationalized through the organization of local rock art federations associated with IFRAO and the organization of international conferences, in particular the two IFRAO Conferences held in Bolivia and Brazil. Regional researchers are publishing their works in the principal world journals with increasing frequency, thus publicizing the study of Andean petroglyphs and incorporating it into world archaeology.

As we shall see in the following section, we believe that there are at least two lines of work which are proper to the Andes and can contribute to world rock art archaeology. On the one hand, the existence of different types of societies which manufactured petroglyphs (from hunter-gatherers to states) makes the Andes a suitable space for comparative and intercultural studies and theoretical orientation about petroglyphs. On the other, the rich corpus of ethnographic knowledge about technology and creation processes also contributes to technological and interpretative study of these petroglyphs, but from an Andean ontology; this proposes other points of view that differ from the most frequently cited cases in global rock art archaeology, which refer to Australia and South Africa.

Future Directions

There is no doubt that the study of petroglyphs in the Andes has been a fertile and popular field in recent decades. However a series of tasks and subjects for further work can be glimpsed for the future. As we have indicated, although in some regions of the Andes, good systematization work and chronological definitions have been carried out for petroglyphs, this is not the case throughout the whole region. In many places work is needed to continue with the systematization of the sets of petroglyphs and to refine the chronologies using a combination of lines of evidence which together can give them solidity. It is quite feasible to achieve this object in the short to medium term given the great intensity of systematic and theoretically oriented investigations on Andean petroglyphs. Exploring ways of dating petroglyphs directly is a task which must be undertaken jointly with the efforts being made worldwide.

In addition, there is a series of other important aspects that need to be addressed. One subject that has been little explored is to determine whether something exists that we can describe as "Andean" rock art or petroglyphs. In other words, interregional, diachronic comparative studies are needed to try to recognize codes and patterns reflecting similar principles which would allow us to define a set of basic elements recognizable as those of Andean petroglyphs. These principles must be thought of not only in iconographic terms but also in terms of the composition of sets and landscapes, and articulation with pre-Hispanic social life. If an entity can be recognized which is definable as "Andean petroglyphs," we must try to understand when it came into being, under what conditions, and its temporal and spatial extent. This evaluation appears important not only because it implies comparative views and collaborative work between researchers from different countries but also because traditions of rock art production covering wide temporal and spatial ranges have been recognized in other regions like South Africa and North America.

There is a line of work that can be carried out in the Andes region which is impossible in other regions; it should therefore be a priority in our local agenda. We refer to comparative study of Andean petroglyphs in relation with the different sociocultural formations particular to the region. The petroglyphs of the Andes were produced by groups with different degrees of social complexity, ranging from hunter-gatherers to state societies; moreover, the latter included different types of states (e.g., Chavin and Inca). This privileged situation allows comparative and intercultural exploration as to whether trends exist in the sociopolitical, economic, and productive aspects of petroglyph production in relation with the level of social complexity or the politico-economic nature of the human groups that manufactured them. From an archaeology of colonialism, the presence of petroglyphs from both the Inca and Spanish periods allows us to discuss the articulations between the materiality and practice of rock art and the colonialist dynamics deployed by two states founded on very different imperial expansionist ontologies and practices. This type of perspective on Andean petroglyphs would certainly be an important contribution to world rock art archaeology, and would position the Andes as an important space for this discipline, both for its research potential and for the richness of the petroglyph record.

Although in South American archaeology in general, and Andean archaeology in particular, the technological aspects of petroglyphs have been studied with a fair degree of intensity in recent years, deeper approaches are needed to go beyond identification of the instruments used and the formal delineation of the operative chain. We believe, therefore, that we can recognize two possible paths to follow. On the one hand, we need to go more deeply into the study and comprehension of Andean petroglyphs from the logic of the economic and political aspects of craft production. This approach will enable us to continue to integrate petroglyphs into discussions established on the pre-Hispanic production dynamics of a series of other material records, assessing how the different media are inserted and articulated in the sociopolitical processes of the past.

On the other, although the ethnohistorical record contains scarce references to the production of petroglyphs in the past, anthropological works have addressed what we might call an Andean understanding of the technology (Allen 2015; Van Kessel and Condori 1992). Starting from a study of ethnohistorical records and current ethnography, it has been recognized that the technology of the Andes is imbued with a series of active ontological relationships with nonhuman others, as well as with values and symbols which differ drastically from those of the Western world. These relations and principles not only define operative chains specific to the objects but also endow the act of production with a social density, and the objects produced with capacities of animation, which make them unique in the world. Petroglyph production may not have been exempt from these particularities, although there are no

particular studies which address this aspect. Future works are needed to follow this line, not only in search of a more spatially and historically located understanding of Andean petroglyphs but also as a contribution to world rock art archaeology by suggesting models and interpretative proposals arising from different ontological horizons. These can be discussed and compared with those recognized in other parts of the world to try to understand the human phenomenon of petroglyph production.

Last but not least, the whole rich corpus of Andean petroglyphs forms part of the social landscape in which today's local communities live their social lives, some aspects of which maintain a set of practical, discursive, and symbolic relations with this material record. This in turn leads to two lines of work which are relevant to archaeology. First, collaborative work oriented toward recovering the knowledge and practices of local communities in relation to petroglyphs. This process does not necessarily seek to essentialize indigenous knowledge into something ahistorical in order to use it as a pathway to interpretation. Rather it allows us to understand how today's communities weave a series of relations with materialities of the past; how these are integrated into today's landscapes by these groups, and so to discuss the values and meanings of the petroglyphs for those groups who live in the region today. A critical historical view of this process also allows us to deploy these interpretations as narratives through which to understand the pre-Hispanic past.

Second, to accompany and collaborate in the processes deployed by these communities for the recovery, recognition, and appreciation of their traditional knowledge, practices, and landscapes. Above any economic value, we believe that the central element of this process is to restore the dignity of the local communities and to recover and recognize the value of other viewpoints and discourses on a practice and a material record which by its visual nature invites interpretation. It may be noted that this process has already begun in several parts of the Andes, and will probably intensify in future years.

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Andes: Prehistoric Art
- ▶ Andes: Prehistoric Period
- ▶ Geoglyphs
- ▶ Nasca and Pampa Jumana Lines and Geoglyphs
- ▶ Niemeyer, Hans
- ▶ South American Rock Art

A

References

Allen, C. 2015. The whole world is watching: New perspective on andean animism. In *The archaeology of wak'as: Explorations of the sacred in the pre-Columbian Andes*, ed. T. Bray, 23–43. Boulder: University of Colorado Press.

Alvarez, M., and D. Fiore. 1995. Recreando imágenes: diseño de experimentación acerca de las técnicas y los artefactos para realizar grabados de arte rupestre. *Cuadernos del Instituto Nacional de Antropología* 16: 215–240.

Aschero, C. 2000. Figuras humanas, camélidos y espacios en la interacción Circumpuneña. In *Arte en las rocas. Arte rupestre, menhires y piedras de colores en Argentina*, ed. M. Podestá and M. de Hoyos, 15–44. Buenos Aires: Sociedad Argentina de Antropología y Asociación Amigos del INAPL.

Berenguer, J., ed. 2000. *Arte rupestre en los Andes de Capricornio*. Santiago: Museo Chileno de Arte Precolombino.

Bray, T. 2002. Rock art, historical memory, and ethic boundaries: A study from the northern Andean highlands. In *Andean archaeology II: Art, landscape and society*, ed. H. Silverman and W. Isbell, 333–354. New York: Kluwer/Plenum Publishers.

Castro, V. and F. Gallardo. 1995–96. El poder de los Gentiles. Arte rupestre en el río Salado. *Revista Chilena de Antropología* 13: 79–98.

Gallardo, F., and H. Yacobaccio. 2005. Wild or domesticated? Camelids in early formative rock art of the Atacama Desert (Northern Chile). *Latin American Antiquity* 16 (2): 115–130.

Guffroy, J. 1999. *El arte rupestre del antiguo Perú*. Lima: IFEA.

Hernández Llosas, M.I. 2006. Inkas y españoles a la conquista simbólica del territorio Humahuaca: sitios, motivos rupestres y apropiación cultural del paisaje. *Boletín del Museo Chileno de Arte Precolombino* 11 (2): 9–34.

Hostnig, R. 2007. Arte rupestre indígena y religioso de épocas postcolombinas en la provincia del Espinar (Cusco). In *Actas del 1er Simposio nacional de Arte*

Rupestre, ed. Rainer Hostnig, Matthias Strecker, and Jean Guffroy, 189–236. Lima: IFEA.

Joyce, J. 2015. *Memory landscapes of the Inka carved outcrops*. New York: Lexington Books.

Lopez Campeny, S., and A. Martel. 2014. La vestimenta del poder: Comparando los registros textiles y rupestres en el Noroeste de Argentina. *Relaciones de la Sociedad Argentina de Antropología* XXXIX (1): 21–55.

Martel, A., S. Rodríguez, and E. Del Bel. 2012. Arte rupestre y espacios de memoria: Las representaciones del sitio Confluencia. *Revista Chilena de Antropología* 25: 121–162.

Martínez, J.L. 2009. Registros andinos al margen de la escritura: El arte rupestre Colonial. *Boletín del Museo Chileno de Arte Precolombino* 14 (1): 9–35.

Meddens, F. 2006. Rocks in the landscape: Managing the agricultural cycle. *The Antiquaries Journal* 86: 36–65.

Niemeyer, H. 1985. El yacimiento de petroglifos Las Lizas (Región de Atacama, Provincia de Copiapó, Chile). In *Estudios en arte rupestre*, ed. C. Aldunate, J. Berenguer, and V. Castro, 131–171. Santiago: Museo Chileno de Arte Precolombino.

Podestá, M., A. Re, and G. Romero. 2011. Visibilizando lo invisible. Grabados históricos como marcadores idiosincráticos. In *En Ruta: Arqueología, Historia y Etnografía del Tráfico Surandino*, ed. Lautaro Núñez and Axel Nielsen, 341–372. Córdoba: Encuentro Grupo Editor.

Strecker, M., ed. 2016. *Arte rupestre de la región del Lago Titicaca (Perú y Bolivia)*. La Paz: SIARB.

Tumi, G. 2011. A tentative sequence and chronology for Checta, Peru. *Rock Art Research* 28 (2): 211–224.

Valenzuela, D. 2007. *Arte, tecnología y estilo: propuesta teórico metodológica para el estudio de la producción en grabados rupestres*. Unpublished MA thesis, Universidad de Tarapacá, Arica.

Van Kessel, J., and D. Condori. 1992. *Criar La Vida. Trabajo Y Tecnología En El Mundo Andino*. Vivarium: Santiago.

Vergara, F., and A. Troncoso. 2015. Rock art, technique and technology: An exploratory study of hunter gatherer and agrarian communities in prehispanic Chile (500 to 1450 CE). *Rock Art Research* 32 (1): 31–45.

Vergara, F., A. Troncoso, and F. Ivanovic. 2016. Time and rock art production: Explorations on the material side of petroglyphs in the semiarid north of Chile. In *Paleoart and materiality: The scientific study of rock art*, ed. R. Bednarick, D. Fiore, M. Basile, G. Kumar, and T. Huisheng, 147–160. Oxford: Archaeopress.

Further Reading

Argüello, P. 2008. Tendencias recientes en la investigación de arte rupestre en sudamérica: Una síntesis crítica. *Arqueología Suramericana* 4 (1): 53–75.

Astete, F., J. Bastante, and G. Tumi. 2016. Quilcas en el santuario histórico de Machupicchu-Parque Arqueológico Nacional de Machupicchu: análisis y perspectivas arqueológicas. *Revista Haucaypata* 11: 62–86.

Berenguer, J. 2004. Cinco milenios de arte rupestre en los Andes atacameños: imágenes para lo humano, imágenes para lo divino. *Boletín del Museo Chileno de Arte Precolombino* 9: 75–108.

Dubelaar, C. 1986. *South American and Caribbean petroglyphs*, Caribbean series. Vol. 3. Dordrecht/Riverton: Foris.

Fiore, D., and M.I. Hernández Llosas. 2007. Miradas rupestres. Tendencias en la investigación del arte parietal en Argentina. *Relaciones de la Sociedad Argentina de Antropología* XXXII: 217–242.

Fiore, D., and M. Podestá. 2006. *Tramas en la piedra: producción y usos del arte rupestre*. Buenos Aires: Sociedad Argentina de Antropología y Asociación Amigos del INAPL.

Guffroy, J. 2011. Las tradiciones centro-andinas de rocas grabadas (Perú): Evoluciones y Continuidades. *Chungara, Revista de Antropología Chilena* 43 (1): 73–88.

Hostnig, R., M. Strecker, and J. Guffroy. 2007. *Actas del 1er Simposio nacional de Arte Rupestre*. Lima: IFEA.

Linares, E. 1974. *Arte Rupestre: El Arte Rupestre en el Sur del Perú. Introducción al Estudio de los Petroglifos de Toro Muerto*. PhD Thesis, Universidad San Agustín, Arequipa.

Mostny, G., and H. Niemeyer. 1985. *Arte Rupestre Chileno*. Santiago: Ministerio de Educación.

Podestá, M., and M. de Hoyos, eds. 2000. *Arte en las rocas. Arte rupestre, menhires y piedras de colores en Argentina*. Buenos Aires: Sociedad Argentina de Antropología y Asociación Amigos del INAPL.

Podestá, M., D. Rolandi, and M. Sánchez. 2006. *El arte rupestre de Argentina Indígena, Noroeste*. Buenos Aires: Academia Nacional de la Historia.

Schobinger, J., and M. Strecker. 2001. Andean South America. In *Handbook of rock art research*, ed. David Whitley, 707–759. Walnut Creek: Altamira Press.

Troncoso, A., F. Armstrong, and M. Basile. 2018. Rock art in central and South America: Social settings and regional diversity. In *The Oxford handbook of archaeology and anthropology of rock art*, ed. B. David and I. Davidson, 273–314. New York: Oxford University Press.

Troncoso, A., F. Armstrong, and G. Nash. 2018. *Archaeologies of rock art: South American perspectives*. London: Routledge.

See Also

Boletín APAR journal: https://sites.google.com/site/aparperu/home/boletin-apar

Boletín del Museo Chileno de Arte Precolombino: http://boletinmuseoprecolombino.cl/

Rupestreweb journal: http://www.rupestreweb.info

Andernach-Martinsberg (Magdalenian): Geography and Culture

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Introduction

Andernach-Martinsberg is, together with the site of Gönnersdorf, one of two major Magdalenian settlements in the German Central Rhineland. Burial under Late Glacial ash deposits of the Laacher See volcano protected the site from destruction, making possible detailed insights into many aspects of human life during the Magdalenian. A broad range of analyses informs on technology and subsistence strategies, spatial organization of living space, mobility of people in the landscape, and sociocultural behavior represented by ornament and artistic expression.

Definition

Much knowledge of certain periods of the Paleolithic is defined by a few exceptional sites, which for reasons of function or duration of occupation, but crucially also due to favorable conditions for their survival, preserve a range of information rarely available in the case of most archaeological sites of this age. In the case of the late Paleolithic, Andernach-Martinsberg is such a rare site.

Key Issues/Current Debates/Future Directions/Examples

Research History

The Andernach Paleolithic site lies on the Martinsberg, a middle Pleistocene lava flow which forms a slope extending toward but not reaching the River Rhine, a few hundred meters to the north. The site is secure from flooding and sheltered by the local topography and close to where the river flows northwestwards from the low-lying Neuwied Basin into the narrow channel of the Rhine Gorge. The comparable Magdalenian site of Gönnersdorf lies only 2 km away, to the north of the Rhine in view of the Martinsberg.

The Martinsberg site was originally discovered in 1883 and excavated and subsequently published by Hermann Schaaffhausen (1888). The anatomist and antiquary from Bonn, an advocate for the presence of "Diluvial Man" in the Rhineland, saw the site as a vindication of his views.

A reanalysis of the 1883 Andernach lithic and faunal assemblages was carried out following the discovery of the neighboring Gönnersdorf Magdalenian site in 1968 (Bosinski and Hahn 1972). The location of the Martinsberg site was then rediscovered during earthmoving in 1978. Excavations between 1979 and 1983 (Veil 1982; Street 1995) and from 1992 to 1994 (Holzkämper 2006) showed the presence not just of the expected Magdalenian horizon but also a younger late Paleolithic horizon assigned to the "Federmessergruppen" (Penknife Point groups).

The excavations from 1979 to 1983 investigated something over 100 m^2, uncovering three distinct concentrations of Magdalenian lithic and faunal material (C 1, C 2, and C 3). The investigation of a similar area from 1994 to 1996 discovered a fourth Magdalenian concentration (C 4) 15 m to the south.

Chronology and Environment

The age of the Magdalenian settlement of the Martinsberg is known quite accurately due to series of radiocarbon dates on the bones of hunted animals, which fall around 13,000 BP, equating to approximately 13,800 calibrated years BCE. This was near the end of a cold and very dry climatic event and some 1,000 years before the onset of the Late Glacial Greenland interstadial (Street et al. 2006). The species hunted during the Magdalenian occupation at Andernach are typical for steppe-tundra conditions – horse, reindeer, arctic fox, and varying hare – whereas woodland species are absent.

Settlement Features

That concentrations C 1 and C 3 had been dug into by the 1883 excavation is shown by conjoined lithic material recovered a century apart, and C 1 is also truncated by the foundations of a house built later. C 4 was also truncated by recent disturbances. After the deposition of the Magdalenian archaeological horizon, some areas of C 2 and C 3 were heavily disturbed by erosion into fissures in the underlying basalt. This clearly took place before burial by Laacher See volcanic ash. Before this happened some material from both the Magdalenian and Federmessergruppen phases was vertically displaced and mixed by frost heaving and/or bioturbation.

Features C 1, C 3, and C 4 are characterized by areas of denser (C 1, C 3) to diffuse (C 4) paving formed of sometimes very large slabs of slate, quartzite, and other types of rock, sometimes stained by red ochre and by concentrations of lithic artifacts, faunal remains, and other items. The concentrations are associated with complexes of pits and are interpreted as stable, enclosed dwelling structures. They clearly represent complex and dynamic settlement activities over an appreciable length of time, perhaps during repeated occupations over several years.

C 2 is defined by a discrete scatter of blanks, tools, and waste of flint and numerous ivory fragments around and within a natural fissure open to a depth of perhaps 2 m at the time of the settlement. The surrounding material was subsequently eroded into the fissure, truncating the higher-lying archaeological horizon and redepositing finds at various depths. Shallow patches of red ochre-stained sediment on the truncated surface suggest that any pits originally present were largely destroyed. Patches of red stained sediment in the fissure fill may represent the fills of these pits or merely sediment blocks transported by erosion. Activities at C 2 included the production and repeated sharpening of flint burins and probably the working of ivory. Refitted artifacts show a connection to C 4, and it is possible that C 2 was a specialized satellite activity area linked to the dwelling structure.

Indications for the use of fire are limited to traces of thermal reddening of slabs and cobbles of schist and quartzite and quantities of fire-cracked quartz cobbles (pot boilers). Bones from the Magdalenian horizon show almost no traces of burning and very few burnt lithic artifacts are present. Rocks with concave surfaces (geodes, conglomerate) are found and would have been suitable for use as lamps fueled with animal fat, which may have provided light and some heat within the dwelling structures. However, since the many fire-reddened slabs and fire-cracked cobbles suggest that fires were lit in contact with the paved surface, it is possible that contents of hearths (ash, charcoal, and burnt objects) were methodically cleared away and possibly dumped outside the excavated area.

Artifacts

Analyses of the lithic artifact assemblage (Floss and Terberger 2002; Holzkämper 2006) include studies of raw materials, technology and typology, conjoining and plotting knapping sequences, and examination of assemblage variability. Samples were also studied for trace wear.

It is difficult to quantify the lithic material from the 1883 excavation, now divided between a number of museums, but almost 1,000 finds can still be located and seem to be representative of the better analyzed samples from the more recent excavations. Between them, C 1–C 3 produced more than 23,000 Magdalenian artifacts of which >5,300 were larger cores, flakes, blades, or bladelets. The most recently recovered Magdalenian assemblage (C 4) yielded almost 20,000 artifacts, over 600 of which were blades and bladelets.

Artifacts recovered from C 1 and C 3 are predominantly made of limnic quartzite and show a balanced mix of tool forms typical of the Magdalenian. C 2 is characterized by the manufacture and re-sharpening of burins associated with waste from ivory working. In C 4 the importance of activities involving burins is shown by 129 of these forms, almost 50% of the tool inventory, and more than 700 recovered burin spalls.

A wide range of non-cryptocrystalline rocks brought to the site were modified as artifacts in several ways (Eickhoff 1995). Various types of

pebbles obtained from river gravels, some of them quite standardized, were used as hammer stones or retouchers for the manufacture of lithic artifacts, while larger cobbles were probably used for processing a range of other inorganic or organic materials.

Many of the rocks used as constructional material show complex patterns of modification, such as splitting and notching of the edges of blocks and slabs. Some of the notches may have been created to accommodate perishable wooden posts or stakes.

Numerous artifacts of bone, reindeer antler, and mammoth ivory typical for the later Magdalenian include eyed needles of bone, spalls and projectile points of antler and ivory, antler batons percés, and baguettes demi-rondes (Tinnes 1994). Waste debitage shows the manufacture of such items at the site.

Subsistence

The fauna comprises mainly larger and smaller mammal species, with some evidence for birds and fishes (Poplin 1972; Street 1993). In terms of food value, the most important species is the horse. Together C 1, C 2, and C 3 yielded the remains of at least 12 horses, and at least three individuals are present in C 4. Analysis of the age patterning of the animals killed suggests prey selection, with Magdalenian hunters targeting family groups of mares and young animals. Since almost all parts of the horse skeleton are present, albeit in varying proportions, at least some kill sites must have been close enough to the Martinsberg to enable utilization of entire horse carcasses, probably after dismembering into transportable portions. Standardized butchering processes, such as disarticulation and filleting of the carcass, are revealed by regular patterns of cut marks on bones. Intensive fracturing of bones for the extraction of marrow and grease is also well documented.

Other species play a far less significant role in the diet. Reindeer is represented in C 1, C 2, and C 3 by no more than three individuals interpreted as food remains and is also present in C 4 where it was not possible to calculate the number of individuals. By contrast, antler is very common in the form of modified tools or waste from their manufacture and in some cases demonstrably comes from collected shed antlers.

Of the smaller taxa, arctic fox is mainly found in the large paved structure C 1, with appreciably less material from C 2 and C 3. At least five or seven individuals are represented, calculated on the postcranial skeleton and dentition, respectively. Only a single tooth fragment was recovered from a pit in C 4. Only 24 specimens from the 1979–1983 excavation are identified as varying hare, most of them from C 2, with at least two individuals represented. Several vertebrae from a pit in C 4 probably deposited in articulation may underline the connection between this area and C 2.

Bird species found in C 1 and C 3 include ptarmigan (single bones), swan, and goose. The avifauna from C 2 comprises only ptarmigan and raven, each represented by at least two individuals. Bird wing and foot bones may primarily derive from use of ornamental feathers and claws and not represent food remains. The few fish remains recovered from the paved structures C 1 and C 3 include salmon or sea trout, while C 2 has these species and a single find identified as grayling.

Mammoth is represented only by ivory. C 1 contained three female figurines, some ivory projectile points, and a unique core on a tusk segment, and the small area of C 3 also produced some ivory. C 2 has been mentioned as an area perhaps specialized in ivory working and several figurines were recovered here, while a single female figurine and three ivory fragments are all that was found in C 4.

Season and Duration of Occupation

Seasonal information from the analysis of faunal remains suggests that Andernach was occupied over an extended period of the year.

Tooth eruption data for horse and reindeer suggest an autumn/winter occupation for Andernach C 1 and C 3, and the importance of arctic fox in C 1 can perhaps be interpreted as an indication of winter trapping of animals for pelts (which might also apply to varying hare). The presence of migratory birds (geese and swan) could equally

suggest autumn/winter occupation if these species had similar patterns of migration to that of today.

Vertebrae of large adult salmonids (up to 1-m length and more) at Andernach clearly represent anadromous fish and could be from individuals caught in spring/summer when ascending the river to spawn. The majority of specimens are from C 2, but two vertebrae of a very large salmonid were found in a pit of C 1 which also contains horse teeth of a young horse killed in autumn. It is therefore probable that site history is complex, with settlement probably extending over longer periods of time and at different and/or overlapping seasons.

Mobility and Social Networks?

A range of exogenous lithic raw materials were imported to the Central Rhineland by Magdalenian people (Floss 1994). They are seen as proxies for the mobility of groups within the landscape, providing information on their movements over middle- and long-range distances and contacts to other regions. Several varieties of fine-grained Tertiary limnic quartzite available at distances of up to 30 km are generally of very high quality and suitable for the production of large blade blanks.

Lithic resources located much further (>90 km) from the Central Rhineland include high-quality Cretaceous flint from primary outcrops in chalk formations some 120–130 km to the northwest, in the region of the German-Dutch-Belgian border, which possibly indicates contact or identity with Magdalenian groups at the northern edge of the loess belt. Cretaceous flint was also collected from glacial moraines some 100 km north and northeast of the Central Rhineland. A small number of artifacts made of chalcedony were probably obtained from the lower Main Valley some 80–100 km to the southeast.

The exact relationship between the different regions represented by these raw materials of disparate origin is unknown. Possibly distinct Magdalenian groups exploiting the different regions met at Andernach, which would then have the character of an "aggregation camp." Alternatively, a single larger group occupying the Central Rhineland for much of the year may have dispersed into the different regions during specific seasons.

Other categories of finds at Andernach show the movement of objects and, thus in some manner, of people, over much greater distances. Marine mollusk shells (*Homalopoma sanguineum, Dentalium*) show contact between the Central Rhineland and the southern French Atlantic or even Mediterranean coast, a distance of some 800–1,000 km. Possibly contact was along the axis provided by the Rhine-Rhône river systems; alternatively, movement could have been along the northern edge of the upland zone, traversing the region of origin of some of the Cretaceous flint. A few specimens of *Tympanotonos* and *Pirenella plicata* from C 1 and C 4 identified as fossils from Lower Miocene deposits in the Mainz Basin suggest contact between both these concentrations and the south.

Apart from the modified marine shells, the teeth of several mammal species transformed into ornament were found at Andernach. Reindeer incisor teeth from C 1, C 2, and C 3 were cut as articulated series from the mandible by removal of their roots for use as adornment. They must have come from at least eight individuals; more than are demonstrated by material believed to derive from hunting episodes during the occupation of the site; however, the presence of removed roots shows that some specimens were certainly modified at the site. C 3 yielded three similarly modified incisor teeth of a large bovine, a taxon not otherwise present in the area of the 1979–1983 excavation, although postcranial bones of a large bovine found in C 4 suggest that these animals were sometimes hunted locally. Two perforated canine teeth (*Hirschgrandeln*) of red deer stags from C 1 may not have been produced at the site but imported from elsewhere. By contrast, many or perhaps most of the perforated canine, incisor, and premolar teeth of arctic fox were certainly manufactured at Andernach.

Whether the very long-range transport of some of the marine shell ornament reflects mobility of individual persons/human groups or exchange systems between groups is unknown.

Clearer evidence for the mobility of individual persons is provided by a detailed engraving on a slate plaque which shows that the artists were as familiar with these animals as with species hunted in the Central Rhineland. It is unlikely that seals migrated up the Rhine as far as the Neuwied Basin in view of the far greater distance from the Late Glacial coast to the Central Rhineland since no seal remains are known from the faunal assemblage. It is more probable that the animals were observed at the coast, which implies that at least some people present in the Neuwied Basin must have previously spent time there. Engravings of seals are very uncommon in the Rhineland Magdalenian and the most commonly depicted animal species are horse and mammoth, with several of the other hunted species also represented by engravings (Bosinski 1996). Rare representations of woolly rhinoceros show that both mammoth and rhinoceros were well known to the artists, but, as in the case of seals, they may have encountered or observed these megafaunal species not in the Central Rhineland, but elsewhere.

In contrast to the realistic representations of animals, the many depictions of women are executed in a very schematic fashion (Bosinski 1992; Höck 1995). The figures, without head and feet and with pronounced buttocks, are often arranged as pairs or in groups to form scenes interpreted as dancing. Female figurines, normally carved of ivory, are fashioned in the same style. In addition to the representations of animals and women are many engravings of abstract symbols, and together this rich corpus of art forms an open-site equivalent to body of artistic expression from western European Magdalenian cave sites and reflects the complex social activities which occurred at Andernach.

Conclusions

The site of Andernach must be seen as forming only one location in the extensively oriented land-use occupation strategy of highly mobile Magdalenian people. That they were in a position to occupy specific localities intensively is shown by the large amounts of diverse materials accumulated at favored locations in the landscape. The intensity of settlement probably represents a palimpsest of occupations over an appreciable length of time (several weeks to several months) due to repeated visits separated by periods of absence lasting a season or even longer.

It is possible that northern Magdalenian groups spent the shortest days and coldest part of the year in sheltered locations, such as the Central Rhine valley, with a period centered around winter the time when the "temporary sedentism" seen at Andernach would be the most appropriate survival strategy. Conversely, the probable time of their absence from the site perhaps involving social contact with other groups by traveling to other regions (as suggested by a range of exogenous materials at the site) would have been the warmest season with the longest hours of daylight, the summer. This scenario can be broadly suggested for Andernach and is supported by better seasonal evidence at the neighboring and similar site of Gönnersdorf. An alternative interpretation of the role of Andernach would see distinct groups of people inhabiting different regions traveling to the Central Rhineland, giving the site the character of an "aggregation camp." With no clear indications for the social identity of the people occupying the different Magdalenian concentrations, it may be impossible to decide which model is more plausible.

Cross-References

- ▶ Art, Paleolithic
- ▶ Bone Tools, Paleolithic
- ▶ Gönnersdorf (Magdalenian): Geography and Culture
- ▶ Lithic Technology, Paleolithic

References

Bosinski, G. 1992. The representation of female figures in the Rhineland Magdalenian. *Proceedings of the Prehistoric Society* 57: 51–64.

Bosinski, G. 1996. Die Gravierungen des Magdalénien-Fundplatzes Andernach-Martinsberg. *Jahrbuch des*

Römisch-Germanischen Zentralmuseums Mainz 41: 19–58.
Bosinski, G., and J. Hahn. 1972. Der Magdalénien-Fundplatz Andernach (Martinsberg). *Rheinische Ausgrabungen* 11: 81–257.
Eickhoff, S. 1995. Wohnplatzstrukturen: Strukturierung eines Wohnplatzes. Zur Besiedlungsgeschichte des Magdalénien-Fundplatzes Andernach. Unpublished Ph.D. dissertation, University of Cologne (1992), Potsdam (1995).
Floss, H. 1994. *Rohmaterialversorgung im Paläolithikum des Mittelrheingebietes*, Monographien des Römisch-Germanischen Zentralmuseums Mainz. Vol. 21. Mainz/Bonn: Dr. R. Habelt.
Floss, H., and T. Terberger. 2002. *Die Steinartefakte des Magdalénien von Andernach (Mittelrhein). Die Grabungen 1979–1983*, Tübinger Arbeiten zur Urgeschichte. Vol. 1. Rahden (Westfalen): Verlag Marie Leidorf.
Höck, C. 1995. Die Frauenstatuetten des Magdalénien von Gönnersdorf und Andernach. *Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz* 40: 253–316.
Holzkämper, J. 2006. Die Konzentration IV des Magdalénien von Andernach-Martinsberg, Grabung 1994–1996. Unpublished Ph.D. dissertation, Cologne University.
Poplin, F. 1972. Die Großfauna. In *Der Magdalénien-Fundplatz Andernach (Martinsberg)*, Rheinische Ausgrabungen, ed. G. Bosinski and J. Hahn, vol. 11, 175–191. Bonn: Rheinland-Verlag.
Schaaffhausen, H. 1888. Die vorgeschichtliche Ansiedelung in Andernach. *Bonner Jahrbücher* 86: 1–41.
Street, M. 1993. Analysis of Late Palaeolithic and Mesolithic faunal assemblages in the Northern Rhineland, Germany. Unpublished Ph.D. dissertation, Birmingham University.
Street, M. 1995. Andernach-Martinsberg. In *The Palaeolithic and Mesolithic of the Rhineland*, ed. G. Bosinski, M. Street, and M. Baales. In Quaternary field trips in central Europe, volume 2: Field trips on special topics (14. International INQUA congress, 3–10 Aug 1995, Berlin), ed. W. Schirmer, 910–918. Munich: Dr. Friedrich Pfeil.
Street, M., F. Gelhausen, S. Grimm, F. Moseler, L. Niven, M. Sensburg, E. Turner, S. Wenzel, and O. Jöris. 2006. L'occupation du bassin de Neuwied (Rhénanie centrale, Allemagne) par les Magdaléniens et les groupes à Federmesser (aziliens). *Bulletin de la Société Préhistorique Française* 103: 1–28.
Tinnes, J. 1994. Die Geweih-, Elfenbein- und Knochenartefakte der Magdalénienfundplätze Gönnersdorf und Andernach. Unpublished Ph.D. dissertation, Cologne University.
Veil, S. 1982. Der späteiszeitliche Fundplatz Andernach, Martinsberg. *Germania* 60: 391–424.

Andersson, Johan Gunnar

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Basic Biographical Information

Johan Gunnar Andersson (1874–1960) is an archaeologist, paleontologist, and geologist, a pioneer in Neolithic Chinese archaeology, and also famous for his involvement in the discovery of Peking man. He was born in rural Sweden and in several riveting autobiographical books (*1932*, most famously) tells the story of how he became interested in science and nature already as a young boy. He later read geology and paleontology at Uppsala University and received a doctoral degree in 1901 for his dissertation on the geology of Bear Island in the North Atlantic. Andersson participated in several other Arctic and Antarctic expeditions. In 1906 he became director of Sweden's Geological Survey and hosted the International Geological Congress in Stockholm in 1910. In 1914 he accepted an invitation to work at China's newly organized National Geological Survey (NGS) as a "mining adviser to the Chinese Government" of the young Chinese Republic founded in 1911 (Fig. 1).

From 1914 to 1925, Andersson was based in Beijing (Peking). There, he trained geologists, surveyed mining ores, and helped modernize Chinese mining. He also engaged in paleontological investigations across Northern China. Then, beginning in 1920–1921 with his sensational archaeological discoveries of China's previously unknown Neolithic, Andersson shifted decisively to archaeological field research during his last 4 years in China.

He dedicated the rest of his life to publishing the results of his Chinese research and also to the new Museum of Far Eastern Antiquities, in Stockholm, Sweden, which he opened in 1929 based on the first collections from Chinese Neolithic archaeology, which had been partaged between Sweden and China. He served as the museum's

Andersson, Johan Gunnar, Fig. 1 Johan Gunnar Andersson in the field in China, 1918 (Andersson's photographic collection, Museum of Far Eastern Antiquities, Stockholm)

first director and continued his work there after retiring in 1938. He kept writing and publishing into the 1950s, ultimately returning to his native rural home area.

Major Accomplishments

In 1920, following on years of geological and paleontological survey work, Andersson and his Chinese co-workers came across painted ceramics protruding from gulleys at Yangshao, Henan Province. Based on his knowledge of geology and stratigraphy, Andersson confirmed that they were Neolithic. Excavations were carried out the next year, with Yuan Fuli (1893–1987), another pioneer geologist-turned-archaeologist, and others (Andersson 1923). This was a sensational breakthrough, since Neolithic materials had not previously been systematically studied in a stratigraphic context in China. Yangshao later gave name to an entire period of prehistoric archaeology and sparked debate over the relationship between the previously unknown people who had created these materials and later Chinese civilizations.

Until recently, it was widely believed that the breakthrough was accidental, but recent archival research (Chen and Fiskesjö 2014) has shown that Andersson knew the time was ripe for the archaeological discovery of Chinese prehistory. He had been encouraged to pursue it by the famous archaeologist Oscar Montelius (1843–1921), who argued that China's unknown prehistory was obscured by the burden of known history, just like that of Egypt or Greece had once been.

In light of the then-current theories concerning transcontinental linkages between prehistoric cultures in eastern and central or western Eurasia and bolstered by the apparent similarities of Yangshao to Anau, Tripolje, and other comparable Eurasian sites further west, Andersson developed a major NGS-supported and Swedish-financed campaign of more excavations further west (Fiskesjö 2016). His closest Chinese colleague and superior, the British-trained geologist, polymath, and politician Ding Wenjiang (1887–1936) who was founder-director of the National Geological Survey, strongly encouraged this research and was as enthusiastic about it as "An Tesheng" (Andersson's Chinese name) himself.

His work in the provinces of Gansu and Qinghai was carried out during 1923–1924; the resulting wealth of ceramics and other prehistoric materials found forced Andersson to focus on their recovery and care. Hundreds of painted vessels and other artifacts were shipped on rafts down the Yellow River. In 1925, a Swedish-Chinese partaging agreement was made between the NGS and the China Committee now chaired by Sweden's Crown Prince (later King Gustaf VI Adolf; reigned 1950–1973), himself an archaeologist and scholar. Andersson would ship everything to Sweden, describe it, and return half to China (which he did, in seven shipments, 1927–1936). Andersson was appointed Professor

of East Asian archaeology and used the Swedish half to find the Museum of Far Eastern Antiquities, which opened in Stockholm in 1929 (see Fiskesjö and Chen 2004; Fiskesjö 2014).

Because of his museum commitments, as well as the Japanese invasion of China, Andersson could not continue his field research program in China as he had hoped. On his last trip to Asia, in 1936–1938, he conducted surveys and excavations in Sichuan, Western China; Hong Kong; and Vietnam (Andersson 1938, 1939). In retirement, Andersson focused on writing up his research, in large part published in the *Bulletin of the Museum of Far Eastern Antiquities BMFEA* since 1929 (Andersson 1943; also *BMFEA* volumes 17, 18, 19, and more) and with parts of this work delegated to others (e.g., Palmgren 1934; Sommarström 1956).

Later, the returned Chinese materials were lost, probably in the war (including priceless human ceramic figures that remain unparalleled despite the phenomenal development of Chinese archaeology since Andersson's time) – as were the Peking man (*Homo erectus*) fossils excavated from 1921 onward at the Zhoukoudian site, near Beijing, the potential value of which had been pinpointed by Andersson. Strangely, the disappearance of the Peking man fossils has attracted much more attention than the loss of the first Neolithic treasures (Fiskesjö 2010) even if, of course, a whole Neolithic archaeology has developed since Andersson's breakthrough.

Today, the Museum of Far Eastern Antiquities still contains vast unstudied materials. While Andersson originally envisioned it as an international center for East Asian archaeology, the prehistoric materials were increasingly marginalized in favor of later-period arts. Even Andersson, who had lamented the destructive effect of looting for artifacts in the wake of his own field research, became increasingly entangled with collectors and dealers (Johansson 2012; Fiskesjö 2014). The reasons for this shift include China's isolation under Mao and also an absence of disciples to pursue Andersson's path. Most notably, Andersson recommended the talented Folke Bergman (1902–1946) as a field archaeologist to the expeditions of the Swedish geographer and explorer Sven Hedin (1865–1952), but Bergman died prematurely, and Hedin's expeditions were also interrupted by war and other factors.

Johan Gunnar Andersson's pioneer role in Chinese archaeology was made possible by his insights and skills from geology and paleontology, just as archaeology itself once emerged on this same trajectory. Andersson's genius and main accomplishments were in the spirited and creative application of these insights to the trailblazing discoveries of the prehistory of East Asia, accomplished in collaboration with his Chinese colleagues. Andersson is famous above all as a key pioneer of (Neolithic) Chinese archaeology, as the founder of Sweden's Museum of Far Eastern Antiquities, and also as a prominent geologist, paleontologist, polar explorer, and writer. Less well known is the fact that apart from his numerous scientific papers and books in all these fields, this polymath also, in his last years, published a 1,200-page history of exploration, denouncing the harm done to indigenous peoples through European colonialism and conquest (Andersson 1953).

Cross-References

- ▶ East Asia: Early *Homo* Fossil Records
- ▶ East Asia: Paleolithic
- ▶ Peking Man

References

Andersson, J.G. 1923. An early Chinese culture. *Bulletin of the Geological Survey of China* 5: 1–68.

Andersson, J.G. 1932. *Den gula jordens barn: Studier över det förhistoriska Kina*. Stockholm: Bonniers. (Trans. as *Children of the yellow earth: Studies in prehistoric China*. London: Kegan Paul, 1934).

Andersson, J.G. 1938. *Under brinnande krig*. Stockholm: Saxon & Lindström. (Trans. as *China fights for the world*, London: Paul, Trench & Trubner, 1939).

Andersson, J.G. 1939. Topographical and archaeological studies in the Far East. *Bulletin of the Museum of Far Eastern Antiquities* 11: 1–111.
Andersson, J.G. 1943. Researches into the prehistory of the Chinese. *Bulletin of the Museum of Far Eastern Antiquities* 15: 7–304. 200 plates.
Andersson, J.G. 1953. *Hur vi erövrade jorden: De geografiska upptäckterna genom tidsåldrarna [How we conquered the earth: Geographical discoveries through the ages]*. Vols. I–II. Stockholm: Saxon & Lindström (In Swedish).
Chen, X. & M. Fiskesjö. 2014. "Oscar Montelius and Chinese archaeology." Co-authored with Chen Xingcan. Bulletin of the History of Archaeology [Melbourne, Australia] 24:10. archaeologybulletin.org/article/view/bha.2410/608.
Palmgren, N. 1934. Kansu mortuary urns of the Pan Shan and Ma Chang groups. Palaeontologia Sinica series D, Vol. 3, Fascicle 1.
Sommarström, B. 1956. The site of Ma-Kia-Yao. *Bulletin of the Museum of Far Eastern Antiquities* 28: 55–138.

Further Reading

Chen, X. 1997. *Zhongguo shiqian kaoguxue yanjiu [Studies in the history of Chinese prehistoric archaeology, 1895–1949]*. Beijing: Sanlian. (in Chinese).
Fiskesjö, M. 2007. Science across borders: Johan Gunnar Andersson & Ding Wenjiang. In *Explorers and scientists in China's borderlands, 1880–1950*, ed. D. Glover et al., 240–266. Seattle: University of Washington Press.
Fiskesjö, M. 2010. The reappearance of Yangshao? Reflections on unmourned artifacts. *China Heritage Quarterly* 23 http://www.chinaheritagequarterly.org/scholarship.php?searchterm=023_yangshao.inc&issue=023
Fiskesjö, M. 2014. Art and science as competing values in the formation of the museum of far Eastern antiquities. In *Collectors, collections, and collecting the arts of China: Histories and challenges*, ed. G. Lai and J. Steuber, 67–98. Gainesville: University of Florida Press.
Fiskesjö, M. 2016. Chinese autochthony and the Eurasian context: Archaeology, mythmaking and Johan Gunnar Andersson's "Western origins". In *Fitful histories and unruly publics: Rethinking temporality and community in Eurasian archaeology*, ed. K. Weber et al., 303–320. Leiden: Brill.
Fiskesjö, M., and X. Chen. 2004. *China before China: Johan Gunnar Andersson, Ding Wenjiang, and the discovery of China's prehistory/ Zhongguo zhi qian de Zhongguo: Antesheng, Ding Wenjiang, he Zhongguo shiqianshi de faxian*. Stockholm: Museum of Far Eastern Antiquities. (Bilingual, in English and Chinese).
Johansson, P. 2012. *Saluting the yellow emperor: A Swedish case of sinography*. Leiden: Brill.
Liu, L. 2004. *The Chinese neolithic: Trajectories to early states*. Cambridge: Cambridge University Press.

Andes: High-Altitude Archaeological Sites as Cultural Heritage

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Introduction

Archaeological remains, predating the Spanish conquest of 1532 CE, have been found on numerous mountain summits in the Andes, including more than 100 sites above 5,200 m, with some ranging as high as 6,700 m. This is only one of the many achievements associated with the culture of the Incas – but it is unique (D'Atroy 2002). In less than a 100 years (c. 1470–1532 CE), they constructed well-built stone structures in mountains over a vast area of the Andes, encompassing the countries of Chile, Argentina, Bolivia, and Peru (Beorchia 1985, 2001) (Fig. 1). Nowhere else on earth have archaeological remains been found at such altitudes. Indeed, the heights of some structures were not even *reached* again for four centuries, and taken together, this constitutes one of the most awesome accomplishments known to us from ancient times.

The sites generally consist of stone buildings with low walls, artificial raised platforms, and simple structures that served for protection from the elements. At the base of some mountains, fairly large complexes – some with hundreds of structures – have been found that provided storage and housing facilities for participants in ceremonies carried out on the summits. The summit structures are often not impressive in size, and it is the ritual offerings, such as statues, precious textiles, foodstuffs, and in rare cases human sacrifices, which have been found in the structures that make them of such value to us today.

Extraordinarily preserved in the cold environment of the high Andes, the mummified remains of the sacrificial victims and their associated funerary offerings provide invaluable evidence for the study of the ceremonial life of the Inca

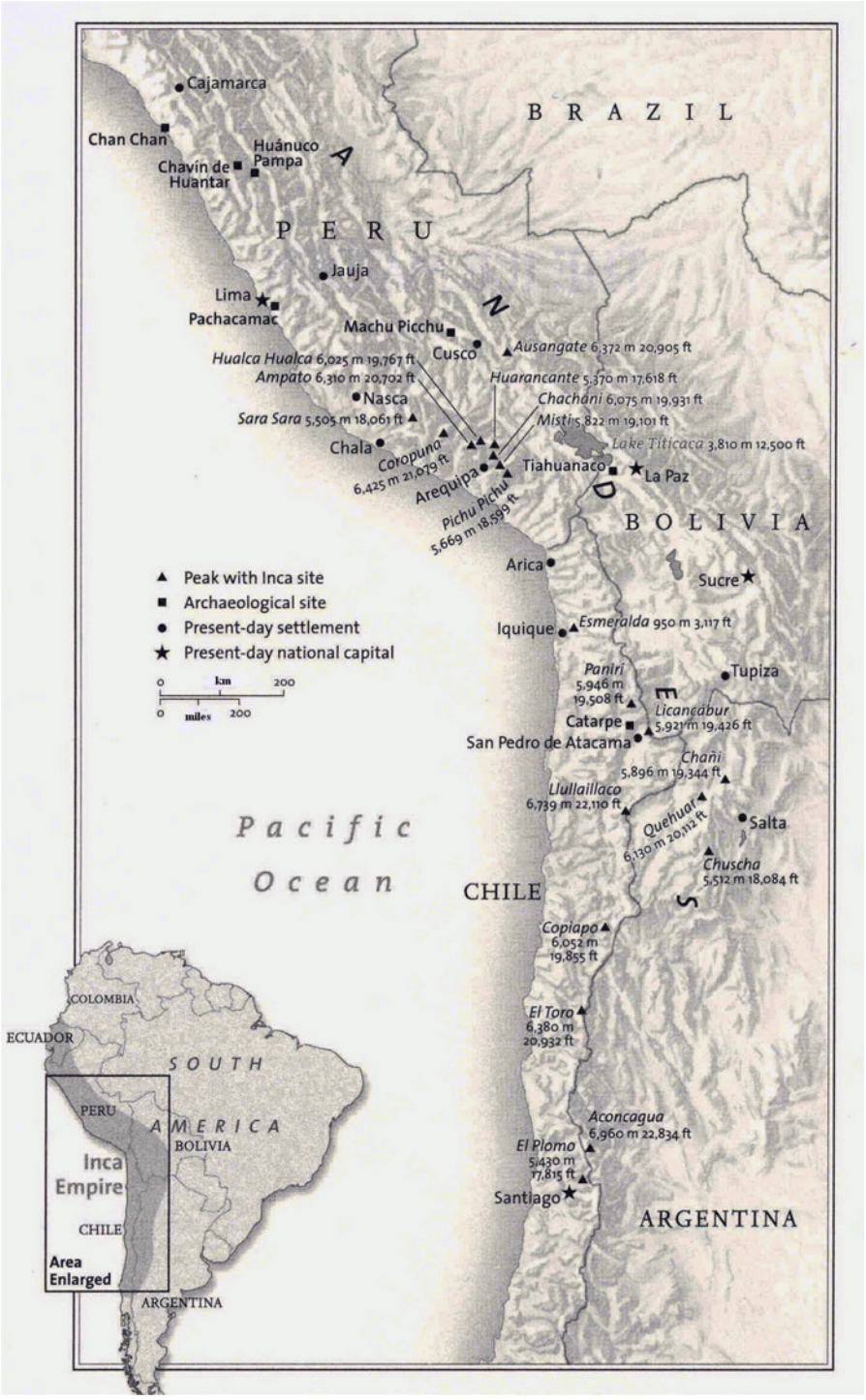

Andes: High-Altitude Archaeological Sites as Cultural Heritage, Fig. 1 Map of the central Andes with selected Inca high-altitude archaeological sites marked. (Courtesy of the National Geographic Society)

civilization. They are among the few pieces of material evidence of Inca religion that have survived the Spanish conquest and have been found in their original contexts. Unfortunately, during the last 100 years, many of the mountain-top shrines of the Incas have been destroyed by looters, and the scientific study of these sites only began in the past few decades.

Definition

The term "high altitude" has often been used by archaeologists to refer to sites found above 5,200 m. This has been a convenient way to distinguish them from lower-lying ruins with which they may, nonetheless, share many characteristics. It is also understood that ruins on a mountain only 2,000 m in altitude could still be considered "high" relative to people living over 1,000 m below.

Nonetheless, it is the high altitude of so many ruins that has captured attention, not least of all because of the great amount of energy, organization, and in some cases specialized techniques necessary for constructing and maintaining structures at such heights. Commonly, even people who have lived all their lives at c. 4,000 m (the highest that permanent villages are normally found) have difficulty in reaching, let alone working at, altitudes over 5,200 m.

A mummy can be defined as a human corpse that has had its skin preserved over its skeleton, either through natural or artificial processes. One of the things that makes Andean frozen mummies unique is their *natural* preservation. Egyptian mummies are renowned and some date back over three millennia before the Incas. However, these are usually desiccated bodies that have had their intestinal organs removed and embalming techniques utilized to help the mummification process. As rare as these ancient mummies may be, those mummies that have been naturally frozen are far more so. Thanks to their better-preserved body tissues and organs, they provide a wealth of human biological information otherwise unobtainable and enable scientists to undertake far more comprehensive studies.

Historical Background

The Spanish chroniclers described Inca offerings to the gods as including statues made of precious metals, finely woven textiles, and ceramics of distinctive Inca style, along with coca leaves, incense, food items, and alcoholic beverages. Although they also noted that offerings could involve human sacrifices, it was not until 1954 that scientists began paying serious attention to such sacrifices having taken place on mountains. That year, looters in Chile discovered the body of an Inca boy on the summit of El Plomo at c. 5,200 m. After it was recovered by archaeologists, the study of the mummy and its associated artifacts led to a collection of articles by specialists from several scientific disciplines (Mostny 1957). In 1964, the frozen body of an adult male was found by mountain climbers at 6,000 m on Mount El Toro, and in 1985, the frozen body of a seven-year-old boy was recovered from an Inca site at 5,300 m on the slopes of Aconcagua in Argentina (Schobinger 1966, 2001). The resulting studies of these mummies laid the foundation for the development of longer-term scientific excavations to be undertaken on the summits themselves during the 1990s, and this resulted in the discovery of four exceptionally preserved Inca mummies on the mountains of Ampato and Llullaillaco in Peru and Argentina, respectively (Reinhard 2005; Reinhard and Ceruti 2010) (Fig. 2).

Key Issues/Current Debates

The Andean mountain-top mummies are unusual even among the world's few "ice mummies." This is because the human sacrificial victims often would have become frozen at the time of their deaths – not after time had passed and the bodies begun undergoing decomposition. Indeed, several chroniclers described many of them as having been buried while they were still alive. On snow-laden mountains, this has allowed for an unprecedented scientific treasure – a body could be frozen with little decomposition having occurred even after the passage of five centuries (Fig. 3).

Andes: High-Altitude Archaeological Sites as Cultural Heritage, Fig. 2 An overview of the Inca ceremonial site on Mt. Llullaillaco's summit at 6,700 m. (Photo: Johan Reinhard)

There are several reasons for their excellent preservation, but the main one would have been the continuity of below-freezing temperatures at the high altitudes of Andean peaks. Scientists have noted that some humidity is necessary because the absolute absence of water causes shrinkage and embrittlement of organic materials by water loss. As Cronyn (1990: 24) noted, "the best condition for preservation is that of extreme cold – for here, since all water is turned to ice, it is inactivated without being lost and so both inorganic and organic materials are unaffected."

If volcanic ash surrounds the mummies, such as has occurred in some cases in the Andes, this also helps to inhibit the growth of bacteria, while maintaining moisture. And the rapid burial and freezing of the soil can result in a vapor barrier being created, further impeding decomposition. This unique combination of factors makes the high Andean summits excellent places for the preservation or organic material. Frozen mummies have even been recovered with their DNA perfectly intact.

At present, these high Andean sites cannot be protected and they will – sooner or later – be looted. That is a fact, one underlined by the looting that already has taken place at many of them, not to mention at thousands of tombs throughout the coastal region and highlands of western South America (Atwood 2004). Of the several dozen high-altitude sites I have seen, only a few have not been at least partially looted *already* – in the sense of items having been taken from the surface and holes dug. It is impossible to post guards on the summits or even around the mountains, which are, after all, several miles in circumference. Furthermore, mountains can be climbed from many sides, and, if situated on a border between countries, they are even harder to protect.

Several factors have combined in recent years to increase the likelihood of the sites being looted. Access has become easier as roads have penetrated throughout the Andes, in large part due to mining. Poverty and the displacement of people has increased, while at the same time the amount of money being paid on the black market for artifacts has multiplied. The number of mountain climbers has increased, gear (and its availability) has improved, and guidebooks now provide descriptions of routes up most of the mountains. It is not a matter of *if* the mountain sites will be looted, but *when*. As for the ease of destroying one of them, a single person with a stick of dynamite could be on and off the summit in less than an hour.

All of this is also taking place within the larger context of climate change. Throughout the Andes, the permanent snowline is receding, exposing ruins previously hidden from sight. This not only makes the organic materials more susceptible to decomposition, it also makes them more likely to be discovered and looted.

Andes: High-Altitude Archaeological Sites as Cultural Heritage, Fig. 3 An Inca female frozen mummy recovered from the summit of Mt. Llullaillaco. (Photo: Johan Reinhard)

International Perspectives and Future Directions

Whether in a museum, in a laboratory, or in the field, research on the ritual offerings made on mountain summits continues to add to scientific knowledge while at the same time helping protect the cultural patrimony of Andean peoples. Mummies and their associated artifacts also serve as means to help the economies of local communities through avenues such as arts and crafts, museum exhibitions, and focusing government attention on their needs.

Mummies provide information that can be used to educate the world about the unique history of a remarkable ancient civilization – and point the way to others. In the imaginations of many children, mummies are second in interest only to dinosaurs, and their educational potential appears to be unlimited. A mummy is a magnet and can be used as a teaching tool on many subjects, including archaeology, geography, human biology, conservation, and the environment.

True time capsules, these frozen bodies allow a view into the past that cannot be obtained through any other means, including that of the best-preserved mummies found in other climates, such as in the deserts of Egypt (Bahn 2003). Due to their excellent preservation, finds made at high altitudes enable unique opportunities for studies ranging from the biological to the archaeological (extremely rare artifacts and among the few remaining Inca ceremonial sites which have offerings in situ). Because of the Incas' practice of making human sacrifices at sites on high mountains, the Andes region is the only one in the world with a good chance of finding frozen mummies – assuming systematic work is conducted before they are destroyed and lost to mankind forever.

In recent years, it has become clear that a frozen mummy is one of the most valuable objects to reach us from the distant past. Such mummies

will *never* stop adding to our knowledge, since technology is constantly evolving and they contain information that cuts across a wide variety of scientific disciplines, including ones as diverse as ornithology, pollen analysis, parasitology, DNA analysis, microbiology, paleopathology, odontology, prehistoric diet, and textile and pottery analysis. New information will be obtained years from now and likely to continue to be so for as long as mankind exists. Thanks to extraordinary cell preservation and advances in technology that have resulted in the reanimation of frozen cells, one day frozen mummies may no longer just be like time machines, they may *become* time machines, enabling us to recover living information from the past. It is difficult to imagine anything, however rare, that can compare with the uniqueness, complexity, and the unlimited knowledge provided by a frozen mummy.

The documentation of the mountain-top shrines and the finds made at them has combined with the development of interdisciplinary studies on frozen mummies and other organic materials to add insights into fundamental aspects of Inca ceremonial life. They have therefore not only helped deepen our knowledge of Inca civilization, but contributed to the preservation of an invaluable heritage for future generations.

References

Atwood, R. 2004. *Stealing history: Tomb raiders, smugglers, and the looting of the ancient world*. New York: St. Martin's Press.

Bahn, P. 2003. Introduction. In *Written in bones: How human remains unlock the secrets of the dead*, ed. P. Bahn, 6–8. Buffalo: Firefly Books.

Beorchia, A., ed. 1985. *El enigma de los santuarios indígenas de Alta Montaña, volume 5*. San Juan: Centro de Investigaciones Arqueológicas de Alta Montaña.

Beorchia, A., ed. 2001. *Revista del Centro de Investigaciones Arqueológicas de Alta Montaña, volume 6*. San Juan: Centro de Investigaciones Arqueológicas de Alta Montaña.

Cronyn, J. 1990. *The elements of archaeological conservation*. London: Routledge.

D'Atroy, T. 2002. *The Incas*. Oxford: Blackwell Publishers.

Mostny, G., ed. 1957. La momia del Cerro El Plomo. *Boletín del Museo Nacional de Historia Natural* 27: 1–119.

Reinhard, J. 2005. *The Ice Maiden: Inca mummies, mountain gods, and sacred sites in the Andes*. Washington, DC: National Geographic Society.

Reinhard, J., and C. Ceruti. 2010. *Inca rituals and sacred mountains: A study of the world's highest archaeological sites*. Los Angeles: Cotsen Institute of Archaeology, University of California.

Schobinger, J., ed. 1966. *La "momia" del Cerro El Toro: Investigaciones arqueológicas en la Cordillera de la Provincia de San Juan*. Mendoza: Universidad Nacional de Cuyo.

Schobinger, J., ed. 2001. *El santuario Incaico del Cerro Aconcagua*. Mendoza: Universidad Nacional de Cuyo.

Cross-References

- ▶ Altitude Environments in Archaeology
- ▶ Andes: Prehistoric Period
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Heritage Museums and the Public
- ▶ Human Remains in Museums
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Inca State and Empire Formation
- ▶ Landscape Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Permafrost Digging
- ▶ Sacred Site Conservation and Preservation

Andes: Origins and Development of Agriculture

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Introduction

Terminal Pleistocene horticultural societies such as the Natufian complex of the Near East that domesticated wheat at c. 14,000 BCE were not alone in the world at that time. Recent interdisciplinary research show that past tropical Andean societies began to experiment with cultigens

approximately 12,000 BCE, i.e., somewhat coeval with other pristine cultures around the world.

Two main effects resulted from this early plant manipulation process. The first one was the in-crescendo guarantee of stocking staples, which ensured quasi-permanent food among ancient Andean societies. The second effect was the resulting decrease in mobility of plant manipulators, who learned to plant seeds near camps and dwelling structures, thus providing food in one place, and therefore the preference of establishing in the same place.

Andean civilizations learned not only to domesticate plants since the Terminal Pleistocene/Early Holocene but completed domestication prior to the emergence of complex societies in the third millennia BCE; so from that time, only a few "new" plants were incorporated into the Andean diet. Once the principal Andean cultigens were controlled, they were improved in quality, increased in size, and massively produced, not only during the Preceramic but also CE times, even until the Incas, who cultivated maize in impressive quantities and made this plant together with potatoes and quinoa the main staples of the Imperium.

Definition

Agriculture in the Andes is a common denominator among all cultural developments throughout this territory, from the Pacific Ocean to the humid eastern Amazonian boundary including the Upper Amazonas. From the earliest times, hunter-gatherers in the Andes learned to adapt to the complex Andean region, not only by hunting, gathering, and fishing strategies but also by experimenting with plants, i.e., horticultural assays. The in-crescendo agriculture techniques during Andean cultural developments led to Andean societies to great achievements, where plant economies were crucial for the sustenance of whole cultures and even to the Imperium of the Incas.

Among the pre-Columbian Andean plants are lowland roots and tubers such as achira (*Canna edulis*), manioc (*Manihot esculenta*), and sweet potato (*Ipomoea batatas*). These provide huge proportions of carbohydrates. Further root and tubers were also domesticated in the Andes, such as for instance, oca (*Oxalis tuberosa*), mashwa (*Tropaelum tuberosum*), and ullucu (*Ullucus tuberosus*), including probably the most popular: potato (*Solanum tuberosum*). These four high altitude plants were domesticated in southern Peru and Bolivia and display exceptionally rich values in proteins and minerals. In the Andes, pseudocereals such as quinoa (*Chenopodium quinoa*) and maize (*Zea mays*), and also legumes such as peanut (*Arachis hypogaea*), common bean (*Phaseolus vulgaris*), and lima bean (*Phaseolus lunatus*) were domesticated and became important sources of proteins, carbohydrates, and vitamins. Additional important native plants were chili-peppers (*Capsicum* sp.) and coca (*Erythroxylon coca, E. novogranatense*) (Pearsall 2008).

Ancient Andean agriculture restricts its evidence mostly to macro-remains. These are found in places where organic preservation occurs. For instance, ideal organic preservation conditions on both the Peruvian and Chilean Coast (south of 4°S) allow for detailed examination of ancient Andean plants, in order to determine both taxonomy and state of specimens (wild or domesticate). Other research avenues such as phytoliths and biochemical traces in bones help to recover data on paleodiet based on plants (Piperno and Pearsall 1998).

The world of pre-Columbian agriculture should also cover derivative evidence, such as the native knowledge of conservation techniques to generate permanent staples and improve biochemical properties (as in the case of dried maize or chuño–dried potatoes), or even the development of artificial irrigation techniques dating to 5600 BCE, such as those irrigation channels found in the valley of Zaña, which could be considered the oldest probable evidence of agricultural irrigation systems (Dillehay 2011).

When they realized that some cultivars yield higher productive resources when planted in combination, this aboriginal knowledge allowed ancient Andean people to profit from agricultural resources. This was the case for maize, common beans, and squashes, when these three plants were

cultivated together. While maize grows upwards in the middle of the field, common beans profit from the wet and shady environment, and squashes flank both plants as a protection wall. Such combination was already mentioned by Vavilov and was used in the Andes from the very beginnings of the agriculture. Apparently, there are other combinations with positive effects among other plants, such as high altitude tubers and rhizomes.

The very early peopling of the Andes seems to be almost coeval with the discovery of plant manipulation and horticultural practices that finally led to agriculture in the Andes. Calibrated radiocarbon dates of Ecuadorian phytoliths of both domesticated squashes (*Cucurbita* sp.) and gourds (*Lagenaria* sp.) push back them to approximately 10,000 BCE (Piperno and Stothert 2003). In Peru, pristine cultivars are found in the cave of El Guitarrero, a site located in the Callejon de Huaylas, an interandean and mesothermic valley at 2850 masl in the Central Andes. At that site, Tom Lynch (1980) reported a layer containing macro-remains of the already domesticated common bean (*Phaseolus vulgaris*), oca (*Oxalis tuberosum*), and chili pepper (*Capsicum* sp.) dating c. 9600 BCE. All of these finds imply that plant manipulation began around 10,000 or even 11,000 BCE, i.e., within the Younger Dryas, virtually the last ice age.

Recent archaeological research conducted by Tom Dillehay on the Northern Coast of Peru (Zaña valley) shed light onto very early agriculture in the Central Andes. By using interdisciplinary analysis, wild peanut (*Arachis* sp.) macro-remains and starch were discovered in situ and dated to approximately 7000 BCE. Sweet potato (*Ipomoea batatas*), also an important tuber among the ancient Andean people, was domesticated around 8000 BCE, but was introduced to the Andes and later became one of the most important food sources. A wild ancestor (*Manihot flavelifolia*) of the sweet potato (*Manihot esculenta*) was likely domesticated in the Cerrado region (Southern Brasil), and then imported into the Andean area (Piperno and Pearsall 1998).

However, two plants are most representative of the Andes: potatoes and maize. The earliest potato remains were found in a site called Huaynuna, located on the Central Coast of Peru and dated to approximately 2800 BCE (Ugent et al. 1983). Don Ugent, the botanist who examined the specimens, was able to find out based on starch analysis that the domestication of potatoes likely began two (or more) millennia before, i.e., around 5000 BCE. According to experts, the domestication centers could have been located principally in Northern Bolivia, Southern Peru, and Chile.

Maize was also a key domesticated plant in the Andes. Conversely to what was believed for a long time, maize of the Andes does not come from Mesoamerica or Mexico, but rather from the same Andean region. Indeed, once wild maize seeds landed in the Andes (probably by means of birds migration), people learned to manipulate and then domesticate this plant. Independent lines of evidence support the thesis of an Andean domestication that seems to be approximately coeval with its domestication in Central America (e.g., Oaxaca, Guila Naquitz). Indeed, calibrated radiocarbon dates of archaeological sites such as Cerro Julia, Cerro Negro (Casma Valley), Rosamachay (Ayacucho), the (abovementioned) Guitarrero cave, and the recently excavated Huaca Prieta on the North Coast yield approximately 5600–4000 BCE. In this last mentioned site, Grobman et al. (2012) discovered native maize races than belong exclusively to the Central Andes. In general terms, the existence of three Preceramic races of maize, older dates, the difference among the chromosomal knots, the absence of hybridization with teosinte, and the high variety of Andean maize are the basis to affirm that there was a native Andean domesticated maize.

Some high altitude plants, such as quinoa (*Chenopodium quinoa*), an important crop found at the site of Jiskaurimoko in the southern Andean plateau (Lake Titicaca environment), were already domesticated and dated to c. 2000 BCE. However, wild *Chenopodium* has been found in excavations in some caves of the Central Andean plateau dating back to approximately 7000 BCE.

Historical Background

The scientific interest in pre-Columbian agriculture in the Andes goes back at least to the end of the nineteenth and beginning of the twentieth century, with the pioneer ethnobotanical research of W. Safford, who was able to examine some botanical remains from the early archaeological field research in Peru. Also, John Harschberger analyzed botanical remains from sites like Pachacamac and proposed, based on both starch and plant morphologies that the evolution and domestication process took place within the Andean region.

In the first half of the twentieth century, works like those of Eugenio Yacovleff and Fortunato Herrera were veritable efforts in capturing all available data related to plant remains and agriculture from ancient Peru.

Richard MacNeish took another step with his ethnobotanical project in the Ayacucho basin. He intended to record all possible plant remains from Preceramic times, from a series of caves and sites in the central Andes. From that time on, in-crescendo interests in recording this kind of data have been present, and therefore projects usually incorporate this type of approach in order to document plant occurrences and development of ancient Andean agriculture. Extensive reports, such as that on "Los Gavilanes," a Preceramic site where huge maize storage holes were found by Duccio Bonavia (1982), are clear efforts towards a reconstruction of ancient plant management in the Central Andes.

On the other hand, archaeologists and other researchers discovered some key technologies that contributed to provide stable and regular food resources to the past Andean societies from the earliest times. From the Middle Holocene to the Inca time, people built, for example, complex systems of irrigation, aqueducts, and raised fields, especially in Ecuador, Peru, and Bolivia (Farrington 1980; Denevan et al. 1987; Donkin 1979; Erickson 2000; Lane 2009). High complex civilizations such as Chimu or Tiahuanaco were able to develop practical and efficient artificial systems to improve water sourcing and management. Puquios (holes to extract water from the underground) even made it possible to live in the desert, as did the Nazca some 1500 years ago (Schreiber and Lancho 2006). Recent approaches towards an integral understanding of ancient agriculture in the Andes involve, for instance, genetic analysis (Zeder et al. 2006) that uses phyto tracers to track plant origins. This and other approaches promise increasing data, leading to a better understanding of Pre-Columbian Andean agriculture.

Key Issues/Current Debates

Key issues and debates around Andean domestication are quite rich and numerous. There is discussion about the character and particularity of the plant domestication process in the Andes, the link between paleoclimatology and pre-Columbian agriculture, the timing of the Early Holocene gardening, the human manipulation of plants since the very begin of the Holocene, the phytogenetic relations among Andean plants, the biochemical properties of Andean plants, and the characterization of the agriculture technology (including channels, dams, artificial irrigation, raised fields, etc).

International Perspectives

Ancient Andean agriculture is relevant because of its exclusivity. In fact, potatoes, maize, quinoa, and other important food plants were domesticated and cultivated in the Andes once early people settled this territory, with no other contacts such as in Eurasia. These plants were therefore exclusive to the Andes, and once this area was conquered, they were exported to the world. Therefore, research is to be conducted on some key topics that will contribute to the study of worldwide parallel plant domestication processes, genetic markers (phytogenetic), and biochemical properties of the principal plants of the Andes.

Also, the precocious character of Andean domestication of plants should be radiometrically updated in order to assess the actual time depth in comparison to other worldwide histories. This implicates not only overseas interests but also

the Andean community, as the Andes are shared by six countries.

Future Directions

There are many number of difficulties regarding the destiny of ancient agriculture in the Andes, especially in moving towards a holistic view and incorporating them into current life. Probably the most important is the role of plant diversity in the Andes as a potential bioresource, not only for the Andes but also for the whole world. Ancient Andean people were able to domesticate and profit from the high potential botanical diversity. Hence, it could be a matter of research to learn about opportunities from the past and use them in the present. High protein-content tubers and grains once cultivated in the high Andes are virtually the feed reserve for the future. Another issue for future direction is the recovery of ancient efficient agricultural technologies that were developed in the Andes in the past. There are a number of studies showing the outstanding productivity and harmless effects in applying this native technology to agricultural issues. Finally, plants played a key role from the earliest time in the Central Andes, within the early process of the rise of the Andean civilization in the Middle Holocene some seven millennia before. Plants were not only food but also became a crucial part of ancient beliefs, myths, and legends. People of today who taste Andean food should realize that this ample assortment of plants has a very ancient history that belongs to the national identity; this is especially important during this time when gastronomy is experiencing a "boom." The correct link will fuse both issues, benefitting both the Andean past and current nations.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Beans: Origins and Development
- ▶ Capsicums/Chiles: Origins and Development
- ▶ Paleoethnobotany
- ▶ Phytolith Studies in Archaeology
- ▶ Potato: Origins and Development
- ▶ Quinoa: Origins and Development
- ▶ Squash: Origins and Development
- ▶ Sweet Potato: Origins and Development
- ▶ Waynuna: Agriculture and Domestication

References

Bonavia, D. 1982. *Los Gavilanes. Mar, desierto y oasis en la historia del hombre precerámico peruano*. Lima: Cofide and Kommission für Allgemeine und Vergleichende Archäologie des Deutschen Archäologischen Instituts.

Denevan, W., K. Mathewson, and G. Knapp. 1987. *Pre-Hispanic agricultural fields in the Andean region*. Vol. 359, *British Archaeological Reports International series*. Oxford: Archaeopress.

Dillehay, T.D., ed. 2011. *From foraging to farming in the Andes. New perspectives on food production and social organization*. Cambridge: Cambridge University Press.

Farrington, I.S. 1980. The archaeology of irrigation canals with special reference to Peru. *World Archaeology (London)* 11 (3): 287–305.

Grobman, A., D. Bonavia, T.D. Dillehay, D.R. Piperno, J. Iriarte, and I. Holst. 2012. Preceramic maize from Paredones and Huaca Prieta, Peru. *PNAS* 109 (5): 1755–1759.

Lane, K. 2009. Engineered highlands: The social organization of water in the ancient north-central Andes (AD 1000–1480). *World Archaeology* 41 (1): 169–190.

Lynch, T.F. 1980. *Guitarrero Cave. Early cave in the Andes*. New York: Academic.

Pearsall, D.M. 2008. Plant domestication and the shift to agriculture in the Andes. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 105–120. New York: Springer.

Piperno, D.R., and D.M. Pearsall. 1998. *The origins of agriculture in the lowland neotropics*. San Diego: Academic.

Piperno, D., and K. Stothert. 2003. Phytolith evidence for early Holocene *Cucurbita* domestication in South West Ecuador. *Science* 299 (5609): 1054–1057.

Schreiber, K., and J. Lancho. 2006. *Aguas en el desierto. Los puquios de Nasca*. Lima: pucp.

Ugent, D., S. Pozorski, and T. Pozorski. 1983. Restos arqueológicos de tubérculos de papas y camotes de Casma en el Perú. *Boletín de Lima* 25: 28–44.

Zeder, M.A., E. Emshwiller, B.D. Smith, and D.G. Bradley. 2006. Documenting domestication: The intersection of genetics and archaeology. *Trends in Genetics* 22 (3): 139–155.

Further Reading

Dillehay, T., H. Eling, and J. Rossen. 2005. Preceramic irrigation canals in the Peruvian Andes. *Proceedings of the National Academy of Science* 102 (47): 17241–17244.

Donkin, R. 1979. *Agricultural terracing in the Aboriginal New World*. Tucson: Wenner-Gren Foundation for Anthropological Research Inc.

Erickson, C. 2000. The Lake Titicaca basin. A pre-Columbian built landscape. In *Imperfect balance: Landscape transformations in the pre-Columbian Americas*, ed. D. Lentz, 311–356. New York: Columbia University Press.

MacNeish, R.S. 1969. *First annual report of the Ayacucho archaeological-botanical project*. Andover: Robert S. Peabody Foundation on Archaeology.

Pozorski, T., S. Pozorski, C.J. Mackey, and A. Klymyshyn. 1983. Pre-Hispanic ridged fields of the Casma Valley, Peru. *Geographical Review* 73: 407–416.

Reichel Dolmatoff, G., and A. Reichel-Dolmatof. 1974. Un sistema de agricultura prehistórico en los Llanos Orientales. *Revista Colombiana de Antropología* 17: 191–194.

Troll, C. 1931. Die geographischen Grundlagen der andinen Kulturen und des Incareiches. *Ibero Amerikanisches Archiv* (III) 5 (3): 257–294.

Yacovleff, E., and F. Herrera. 1934. Elmundo vegetal de los antiguos peruanos. *Revista del Museo Nacional* 3: 240–322.

Andes: Prehistoric Art

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Introduction

Worldviews among Andean people go back to the very first inhabitants that once entered this vast and complex territory. Early on, people figured out a way to capture the inaccessible by means of material representations. From the Andean hunters, i.e., artists representing a dancing shaman and running camelids in caves, invoking natural powers, to the Inca "tokapus" (textiles containing different signs and colors) exhibited by the elite, sacred art was a link to power and control of human and natural resources.

Early in time, Andean artists were able to find a variety of raw materials to accomplish these handcrafts. Clay, metal, wood, textiles, bones, and even stone were employed and transformed into art. With a few exceptions, almost all objects of nature were represented, both without modification and modified into unreal subjects. Therefore, it is usual to find, for example, plants or animals transformed into humans and also human beings with bird attributes, etc. From the universal worldview, pre-Columbian ritual art is a common denominator of the Andean region from Colombia to Argentina, and from the early hunter gatherers to the arrival of the Spaniards, and even thereafter.

Definition

The prehistoric art of the Andes could be defined as all artistic expressions made of materials such as stone, clay, metals, textiles, wood, and bones, among others, with the purpose of capturing an image from the outside environment or even from the mind-self of the creator. Hence, there is a transfer of the subject from reality to a "captured" image contained in a space or even in an object. "Captured" or represented images played a number of roles in pre-Columbian times, from the animist goal (no complex societies) to power and propaganda issues (complex and aggregated societies).

Archaeologists usually divided pre-Columbian art objects into two categories, namely: non-portable art and portable art. While the first one involves murals, for example, cave paintings and even rock art, the second comprises portable objects made of a number of raw materials, in most cases little (to medium) in size and weighing less than the non-portable art pieces.

Although there are some particularities among pre-Columbian Andean art expressions, especially in regard to the multiple microenvironmental conditions of the whole Andean region, one can perceive some common traits, such as the constant intention of representing animals typical of the Andes (e.g., pumas, condors, snakes, frogs)

and also plants (Andean crops and tubers), human beings, and even scenes of life, such as the very famous Mochica iconography found in pottery or Colombian metal art.

From a chronological point of view, the wealth of artistic representations of pre-Columbian art in the Andes can be divided into two main groups. The first one was an early art that displayed images that reflect both the elements of the surrounding environments and individual-common internal "imagination." This kind of art usually belonged to the times of the hunter-gatherer-fisher, i.e., "non-complex" societies. However, it does not imply that "realistic" art occurs later in pre-Columbian times. In fact, human beings associated with animals are usually represented in caves and interpreted as hunting scenes. But, in some similar cases, the same image is accompanied by points and symbols that are part of the composition and complicated to interpret. That means non-complex and complex representations are associated from the earliest times.

As time went by, artistic expressions underwent complex transformations in response to their sources and intentions, usually within a state and civic frame as established components and official propaganda. Thus, archaeologists see the birth of complex scenes and symbols that became local and/or regional recurrences throughout the Andes, implying consensus and territorial domains. Indeed, it was the time of the second "later" art in the Andes. Examples for such an art could be the Inca human figurines found in some fertility rites, such as the "capacocha" in the high mountains of the Andes, and also textile flags of banners representing jaguar-snake-human being gods of the Chavin culture some 2,500 years ago.

Once the Europeans landed in the Andes, pre-Columbian art persisted, despite the occidental rules against all native artistic expressions as a part of the conquerors' domination plan. A very interesting example is the continuity in rock art paintings of Lachay (Near Lima, Peru), where one can see pre-Columbian designs in association with images of Jesus Christ on the same wall cave (Bonavia 1999).

Historical Background

Let us now mention some relevant passages of pre-Columbian art of the Andes. Once they arrived in the Andes, non-complex civilizations began to paint and engrave rocks and caves. In fact, the need to create art goes back to the earliest times, i.e., the Paleoindian period. Parenti (1996), for instance, found two red parallel lines in association with a hearth in Boqueirao da Pedra Furada (Piaui, Brazil) dated to 17 kyr BP. Later, Jean Guffroy (1999), in a synthesis of the Central Andean rock paintings and engravings, proposed that indeed this is a particular Andean tradition than belongs to the Central Andean region, including southern Peru and probably northern Chile and NW Argentina.

Early rock art usually displays hunting scenes, but there are also some other "common denominators," such as the "negative hands," a tradition shared by a number of regions as Peru, Argentina, Bolivia, and Chile. These are quite similar to those made in Europe by Solutreans some 20 kyr ago. The "negative hands" are prints of hand silhouettes, usually in red or black colors, possibly representing children initiation rituals. Later, rupestrian art was also practiced by cultures as the Cupisnique (100 BCE–1 CE) or even the Recuay (100–700 CE) in Central Peru.

Cave paintings were made throughout the Andes. In northern Chile, for example, research around this art has been recently updated and summarized by Sepúlveda et al. (2010). They point out that most of the representations in an initial time span, c. 2000 BCE–1 CE, address themes related to hunter-gatherer activities and, in a second time span, caravans of camelids, a typical symbol of the Southern Andes that implies commerce and trade.

As explained above, Andean people such as the Chinchorro from the northern Chilean desert manufactured grave goods, shell and bone necklaces, and pendants dating back 5,000 years. Among these remains, archaeologists were able to find colored pigments and small vegetable brushes that were probably used to paint their

bodies (Arriaza et al. 2008). Grave goods representing ornaments destined to be a companion of the death person are typical, even from the Middle Holocene.

One of the mobile arts typical of the Andean cultures is the decorated pottery. From the very beginning, Andean people learned to paint, engrave, and model clay. Very early decorated bowls (c. 3800 BCE) were manufactured by the Valdivia culture, which was located in the southwest of Ecuador. These vessels were usually finished with a burnished red slip and decorated on their exterior surfaces with incised geometric motifs. The Valdivia potters also made figurines representing male and female individuals for ritualistic purposes (Raymond 2008). In Peru, for example, in some very early archaeological sites such as Caral, Chupacigarro, and Áspero, dating from c. 3500 BCE, archaeologists found miniature idols made of clay that are believed to have relationships with rituals.

Metal handcrafts also occurred relatively early in the Andes. At Jiskairumoko on the southern Altiplano, a necklace composed of gold beads has been found in a context dating to c. 2200 BCE (Aldenderfer 2008). Later in time, gold ornaments, such as from the Kuntur Wasi, were made exclusively to accompany priests and elite persons. But later cultures, mostly from the beginning of our era, achieved quite impressive metal pieces, not only from Peru but especially from Colombia, among such cultures as Nariño, Tairona, Muiscas, etc. pre-Columbian metal workers learned to work mostly gold, silver, and copper. They were not able to discover iron.

Textiles and fabrics are also one of the most impressive and finest manifestations of Andean pre-Columbian art. This type of organic remains is almost perfectly preserved along the coastal desert because of the dry climatic conditions. Textile handcrafts have their origins in Early Holocene basketry; techniques learned from that time later applied to weaving. For example, on the northern coast of Peru in a site called Huaca Prieta, a c. 3000 BCE, cotton textile was found. As with other materials, textiles were conceived not only for practical and dressing purposes but also for beliefs and religion. Textiles of Huaca Prieta display, for example, a design of a condor and a snake within its belt, two of the most represented animals among the Andean iconography. Because of their sophisticated techniques and bright colors, the Paracas have some of the most impressive textile art. Thousands of mantles, dresses, and embroideries are wonderfully preserved within the Desert of Ica, immediately south of Lima. These "masterpieces" are believed to cover and wrap mummies in a way that bundles and contains these human remains and offerings of various types and raw materials. Archaeologists interpret the "excessive time" invested in their elaboration as the result of ancestor worship in the past.

Another important raw material is stone, so, for example, lithic sculptures are also a particularly developed art by Ancient Andean people. From north to south, we can mention some outstanding examples, such as the stellae made by the San Agustin culture in Colombia (representing priests or shamans and dating CE 1–1200), the Chavin (1000–100 BCE) stone sculptures (representing zoomorphic and phytomorphic beings, including anthropomorphic human beings), the Recuay (100–800 CE) mourning lapidae, and the impressive Pucara (1000–100 BCE) and Tiahuanaco (100 BCE–1200 CE) monoliths undoubtedly associated with ancient gods and beliefs. Among these, we can mention the Bennett's monolith, currently a symbol of the Tiahuanaco culture. Not considered art but no less impressive are the sculpted wall stones of Inca buildings, e.g., Sacsayhuaman (Cuzco). The perfect fit of their outlines, used as "block puzzles" to erect walls, led archaeologists to think Incas were aware of masonry techniques and used sophisticated procedures to transform stone forms to some degree.

Finally, idols and other modeled artistic items of wood and bone were also created by a number of cultures of the Andes. This is the case for the figurines of the Peruvian north coast cultures, or the beautiful Inca beakers of wood called "Kero," which were decorated with rhombic designs and flowers that were actually Inca patterns, indicating regional domination.

Key Issues/Current Debates

Among the most fascinating debates on pre-Columbian art in the Andes, there is discussion on the exclusively "unique" character of some selected pieces. Indeed, all Andean pieces share common traits, such as modular bodies of anthropomorphic representations or shamanic personages, but in some cases there are distinctive pieces that distinguish themselves from the others. Stone sculptures such as the "Estela Raimondi" (Chavin Culture, c. 400 BCE) or the Bennett monolith (c. 200–500 CE) are unique pre-Columbian legacies to Peru and Bolivia, respectively. Hence, pre-Columbian art could also be considered national symbols in Andean countries.

Another key issue in pre-Columbian Andean art is the techniques that were employed. Tiny metal filigrees, helicoidally made wooden sticks, highly elaborated textiles, or stones that seem to have been "smelted" still remain enigmatic from the technical point of view. Archaeologists, aided by other colleagues from a variety of research fields, try to reconstruct some *chaine operatoires* that lead to this kind of superb technical-artistic results.

We know that in the Andes, there were no writing systems, and yet there were accounting devices and possible ideograms. So, are we able to recognize one artist or a family/group of them when assessing an artistic work? Chris Donnan proposed that among the Mochica potters, there were actual artists who were painters and exclusively devoted their time to the fine painting of ritual pottery. However, we lack further data and studies of other cultures to test if this was a regular trait of ancient Cultures of the Andes.

Pre-Columbian Andean art of complex civilizations is usually conceived to enhance power and legitimacy of some cultures "above" others. Yet the conceptual relationship of "art-power" in the Andes as an establishment is in some cases a matter of debate when chemical-physical sciences are applied, so that, for instance, some highly decorated Nasca vessels (CE 1–650) from Ica (south of Lima) were also used for food purposes and not only as grave goods.

But were archaeologists able to find the ancient artistic workshops that were agglomerated by these creative minds? The answer is "unfortunately no." Most research addresses graves, simply because the luxurious contents attract media and people, which helps to maintain and improve research budgets. As seen, archaeologists need to apply a rather holistic approach in order to get a more complete overview from the past art in the Andes.

International Perspectives

Indeed, there is great potential in ancient Andean art, because of its uniqueness, palette-rich expressions, high technical quality, outstanding manufacture, and combined colors. Its abstract and lineal modulation, in contrast to other world ancient arts such as the Roman Empire or even Attica, are typical of the Andes. Furthermore, the nature and special combination of structure and colors, for instance, gold-cinnabar-turquoise, make such a visual impact, surely in ancient and even in modern times. However, technical and contextual data are still lacking.

Future Directions

A post-processual perspective is needed within this fascinating issue of pre-Columbian Andean art in order to improve our knowledge on this issue. Round tables with interdisciplinary participation would highly benefit our understanding of the how, reasons why, and role of ancient Andean art among not only elite but also common populations.

Cross-References

► Andes: Prehistoric Art
► Archaeology of Art: Theoretical Frameworks
► Cueva de las Manos, Río Pinturas Cave Art
► South American Rock Art

References

Aldenderfer, M. 2008. High elevation foraging societies. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 131–143. New York: Springer.

Arriaza, B., V.G. Standen, V. Cassman, and C.M. Santero. 2008. Chinchorro culture: pioneers of the coast of the Atacama Desert. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 45–58. New York: Springer.

Bonavia, D. 1999. Prefacio. *El arte rupestre del antiguo Perú*. Lima: IFEA & Institute de recherché pour le dévelopment.

Guffroy, J. 1999. *El arte rupestre del antiguo Perú*. Lima: IFEA & Institute de recherché pour le dévelopment.

Parenti, F. 1996. Questions about the Upper Pleistocene prehistory in northeastern Brazil: Pedra Furada rock shelter in its regional context. Proceedings of the International Meeting on the Peopling of the Americas. São Raimundo Nonato, *Fumdhamentos* 1(1): 15–53.

Raymond, J.S. 2008. The process of sedentism in northwestern South America. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 78–90. New York: Springer.

Sepúlveda, R., A. Marcela, T. Saintenoy, and W. Faundes. 2010. Rock paintings of the Precordillera region of northern Chile. *Rock Art Research: The Journal of Australian Rock Art Association* 27 (2): 161–175.

Andes: Prehistoric Period

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Introduction

After the Last Glacial Maximum (LGM), immigrants from Asia and probably other parts of the world entered the American continent. Once established in this ample territory, some settled in North America, while others peopled the Pacific shore, intra-mountain areas, and Amazonia of South America. Some people remained on the western side of South America, a territory whose common denominator is the Andean chain. Although it is difficult to say why Ice Age people decided to stay in the Andes, one possible reason is (and was) its extremely diverse and rich ecological environment (Lavallée 1999). From west to east, the tropical warm waters in the north, cold currents in the south, temperate and microthermal Interandean chain, the cold southern Altiplano, and the evergreen Amazonia certainly provided a number of resources for food and raw materials, depending on seasonal productivity. Besides, a combination of natural rivers resulted in a cool and extremely rich ocean stream (the Peruvian or Humboldt stream). Upwelling waters have made a huge number of fishes and mollusks constantly available to humans living along the Peruvian and Chilean coast, especially from about 5,000 BP. Some archaeologists believe these were the basis of the Andean civilization (Dillehay 2000).

From a global perspective, Andean prehistory seems to have some constants, such as extreme internal cohesion among ethnic groups, strong interchange links, reciprocity, communal labor and sense, authority and vertical power, fixed traditions, deep beliefs, and a special commotion in front of natural events. These are key in assessing material culture in response to ancient Andean behaviors.

Definition

By convention, the prehistory of the Andes lasted from the very early peopling of this region at about 16,000 BP, until the arrival of the Spaniards at the beginning of the sixteenth century. From the start, early human settlers who entered the Andes inhabited a number of ecotones, from the Pacific Ocean shores of South America's western flank to above 4,000 m above sea level (masl), high in the Andes Mountains. Archaeologists believe that by that time, the Amazonian region bordering the Andes was also inhabited.

The development of different cultural complexes within the Andean region occurred under a scenario of changing environmental conditions. The initial population was coeval with the time span after the LGM that is marked by glacial advances and inversions, until the Younger Dryas (YD) event approximately 13,000 BP (León 2007). People were hunters, gatherers,

fishers, and scavengers and lived in both camps and caves. From that time, some locations of the Central Andean region experienced a socioeconomic boom due to two key events. The first event was the premature invention of horticulture, especially based on squashes and likely a short time after the YD. Next, among other important plants, chilies (*Capsicum* sp.), peanuts (*Arachis hypogaea*), and beans (*P. vulgaris*, *P. lunatus*) were domesticated from the time of the glacial-Holocene transition at 12,000 BP. The second key event (as a consequence) is that some groups became less mobile after the Early Holocene, and thus the sedentary process that finally led to the rise of Andean civilization was triggered (Bonavia 1991; Lavallée 1999; Dillehay 2000).

Socioeconomic developments within the Andes were not coeval. The rise of complex societies within this broad area seems to have occurred earlier, and originated in the Central region, especially from the coast of Ecuador and Northern–Central Peru.

The whole Central Andean development, founded on very early agriculture, camelid domestication, and quasi-permanent seafood resources, probably lead to internal social aggregation, differentiation, and discrete hierarchies at around 6,000 BP. Emergent complex societies generated ritual paraphernalia and a "sacred world" that commanded a series of socioeconomic developments. Therefore, ornaments decorated with a typical Andean iconography were manufactured in response to the different gods that were worshipped.

The reorganization and establishment of the cool sea of the Peruvian stream region resulted in both a quasi-permanent and invariable climate and richness in seafood resources (including fish and mollusks) that complemented the horticulture already being practiced. This time span corresponds to the Maximum Holocene, when climate was warm and wet. Soon after 6,000 BP, people were able to build monuments devoted to ritual activities, probably linked to economic endeavors. Whereas pottery occurred in Peru around 4,600 BP, it dates to 7,000 BP in Ecuador. Monumental architecture experienced a singular emergence after that time. Archaeologists were able to identify at least three architectonical traditions. The first consisted of truncated platforms, stairways, and ramps; the second displayed courtyards, rooms, and a subterranean ventilation duct for fire offerings; and the last one was composed of a u-shaped building typical for the Central Coast of the Peruvian Andes.

"Periphery" regions to the Central Andean Region underwent cultural changes to become complex societies somewhat later. However, the premature techniques discovered in some circumstances appear to be extremely early. For example, this is the case for the mummies of the Chinchorro culture located on the coast of Northern Chile and Southern Peru and dating to approximately 7,000 BP. Even within the Middle Holocene, people of this culture were able to recognize that organic remains were perfectly preserved when exposed to very dry conditions of the Atacama Desert. Noncentral Andean societies also contributed with some key food resources, such as the potatoes, sweet potatoes, or peanuts that, once introduced among complex civilizations, became a key factor in their development. These are undoubtedly plants that were domesticated in the Oriental Andes or even in the Amazonian region and then introduced to the Andes.

Central Andean prehistory is one of the most attractive research issues, both to national and international archaeologists. This is not due to the former occurrence of the greatest empire of the southern hemisphere, by the Incas, but to the outstanding preservation of organic remains from the very earliest human presence in this region.

Some 3,500 years ago, the Andean landscape witnessed the rise of the first civilization known as Chavin; this name was chosen from the Chavin de Huantar site in the Central Highland of Peru. Some archaeologists consider this cultural occurrence as the very first horizon, based on the spread of icons such as jaguars, condors, and snakes, always altered and mixed with traits of human beings. This iconography is found from Northern to Southern Peru, covering more than 500 km, thus implying all regions within this radius were part of the Chavin culture, i.e., first horizon of the Central Andes. However, it must be kept in mind that almost all "Chavin traits" are not local but

rather imported. The Archaic or Late Preceramic public buildings addressed above came from both the Coast and Highland and are present in Chavin de Huantar. Also, some Amazonian animals such as caimans are key icons within the Chavin iconography. The probable pilgrimage into the cult center included paraphernalia and even inhalation of hallucinogens by priests. This time was based on religious beliefs in Chavin, and thus archaeologists propose that people were differentiated between the elite, composed of administrators and priests, and common people and servants.

The CE opening time span is coeval with the dissolution of the Chavin cult and occurrence of a series of regional cultures on both the Coast and Highland regions of the Central Andes. At that time, experts consider that states were established and an "essor" of development of complex societies took place. It was also the time of magnificent development of art in a number of raw materials, from pottery to textiles to metals such as gold, silver, and copper. In general terms, ornaments were conceived as representations of the ritualistic worship of the Andean god. Cultures of the Vicus, Mochica, Nazca, Recuay, and Cajamarca are representative of the time from 100 BCE to 600 CE. Sites display a series of forms from simple dwelling structures to ritual temples. One interesting difference is that northern buildings are usually huge and monumental, in contrast with the Southern Coast structures that are smaller.

The next period lasting from CE 600 to 1,000 witnessed a new cultural fusion, again by means of a belief in a god. This god seems to be a human being, holding a trophy head in one hand and a (sacrificial) knife in the other. Its representation spread throughout the Central Andean region, similar to the Chavin cult. Archaeologists have labeled this time span as the Middle Horizon or (by most experts) the Huari Empire. There are discrete differences when comparing the Huari god with the one of the Tiahuanaco culture (Bolivia), so there might have been some interaction between these two coeval cultures. The Huari Empire developed a complex road system that covered key places from the highest Andean mountains to the coastal shores facing the Pacific Ocean. These were further improved by the Inca Empire some millennium later. The Huari were also able to plan and construct actual orthogonal "cities," organized by administrative centers, public buildings, fortifications, ceremonial temples, and even domestic villages. Lama caravans were also a dynamic means of communication and wares interchange with other populations across the Andes.

The internal atomization of the Huari Empire leads again to a regional independence and the reactivation of local societies, not only where former ones existed, but in a number of other localities. For instance, the Chimu Kingdom ruled over the Northern Coast of Peru and was able to build the Americas' biggest "city" of mud and also the most delicate and wonderful metal handcrafts of the Central Andes. At the same time, the Huanca culture inhabited the highest mountains in Central Peru at over 4,000 masl, dominating Andean resources and the side effects of high-altitude living. Other cultures from that time achieved high quality in the manufacture of different wares and arts that in most cases were related to sacred purposes.

Finally, the Incas represent the crown of c. 14,000 Andean prehistoric development. According to historical sources, Imperial Inca development lasted only about 70 years. However, radiocarbon data seems to indicate that the Inca origins date back to at least the fourteenth-century CE. Spreading from Cuzco, they reached quite far, from Colombia to Chile and Argentina along the Pacific Ocean shore, wherever the Andean mountain chain was present. The Incas based their culture on principles such as the royal panaca (elite family ties) and a dual system of conceptualizing the world. Their paraphernalia were simply expressions of an impressive power. They conquered a series of cultures inhabiting the Andes not only by means of force but usually also by reciprocity and a smart system of interrelations. They also profited and improved the already implemented connection web throughout the Andes built by the Huari Empire, and introduced some Inca logos, such as the cross-like shape

(Chacana) and the trapezoid window typical of the Inca occurrence.

Periphery history is somewhat dissimilar, but important to include here to complete a broad intercontinental panorama on the archaeologies of the Andes. In Northwest Argentina, for example, most cultures are recognized by a dependence on agricultural crops such as maize and other tubers and grains, as well as household residential dwellings where people devoted time to economic activities such as agriculture and, at times, ritual ceremonies (Leoni and Acuto 2008). Also, in western Ecuador, permanent settlements were established by 3,500–3,000 BCE with antecedents being low, mobile people from the Las Vegas culture from 8,500 to 4,600 BCE (Raymond 2008). From the same country, phytoliths of squashes are dated to 10,000 BCE and maize to 6,000 BCE. These, together with the Peruvian botanical remains, are very early evidence of Early to Middle Holocene plant domestication of the Central Andes. Further north in Colombia, a number of cultures also developed, but they are known in some cases by their stonework (e.g., the San Agustin culture with its lithic stelae), and mostly by their wonderful metal art, as in the Muisca, Calima, Tairona, or Tumaco cultures.

The southern Altiplano area around the Titicaca Lake deserves special mention. After approximately 3,000 BCE, people settled this high-altitude region. Pukara and Kaluyu cultures are representatives of the first millennium BCE. Archaeologists recognize the importance of the Tiahuanaco culture at the end of that time span; it was actually a former state, based on religious beliefs that centered on a human-looking god who held a trophy head and a ceremonial knife in his hands. The Tiahuanaco people were recognized by their stone art and monuments. The Tiahuanaco center is an impressive center with massive stonework in the form of remarkable pyramids and platforms. Lama caravans for transporting goods are also uniquely typical for this culture. Multiproxy studies show that by that time, pilgrimage and immigration into and out of the center were quite frequent (Silverman and Isbell 2008).

Historical Background

The history of archaeological research in the Andes shares four similar and almost coeval periods (Politis and Alberti 2005). The first period goes back to the time after the Spanish arrival, when priests, administrators, and other Spaniards gave accounts of the newly conquered territories and ancient heritage. The second period includes reports of the voyagers of the seventeenth and eighteenth centuries, within the context of both the illustration and romantic years ending with the new rising Andean nations. There is a third period when scientific research begins, approximately by the middle of the nineteenth century. In Colombia, for instance, the German anthropologist Adolf Bastian made an exhaustive list of Colombian archaeological sites published in 1878; this was continued by Vicente Restrepo in 1898. In Ecuador, pioneers such as Jacinto Jijón Caamaño, Federico Gonzáles, and Otto von Buchwald also reported the first archaeological studies at the end of the nineteenth century. In Peru, Mariano Eduardo de Rivero was able to make the first archaeological collection and thus founded the national museum. Later, Wilhelm Reiss and Adolph Stuebel conducted the first scientific excavations in Ancón by the late nineteenth century. A fourth and final period started around the start of the twentieth century, with scientific research in both field and labor. In Ecuador, for example, George Dorsell, Marshall Saville, and Paul Rivet were remarkable during the first decades. One scholar who made a series of seminal contributions not only in Ecuador but also in Peru and Chile was a German, Max Uhle. This is why some consider him as the father of Peruvian archaeology. Uhle excavated in the Pachacamac Sanctuary, near Lima, Peru, and proposed the very first archaeological sequence for Peruvian archaeology based on the stratigraphy of this sanctuary. Another relevant scholar was Julio Tello, who excavated a number of archaeological sites throughout Peru, thus providing quite important collections that now comprise the national museum. Other scientific expeditions, especially from the United States, conducted a research in

Peru, laying the groundwork for the next generations. A pivotal sequence was proposed, based on the team of the famous Viru project in Northern Peru. The 1960s witnessed the emergence of interdisciplinary research that opened a new age, allowing important issues, from botanical to paleoenvironmental in nature, to be addressed. Up to 2012, there are regular projects that include this type of approach and invite not only Andean but also international archaeologists to contribute to our knowledge of Andean archaeology.

Key Issues/Current Debates

The Andean archaeology of the twenty-first century especially incorporates international debates on inclusive archaeology, gender anthropology, expedient/complex technologies, paleoenvironment (i.e., past climate change impact on ancient Andean civilizations), effects of archaeometrical contributions, radiocarbon calibrations, Andean household archaeology, *chaine operatoire* approaches, and external problems such as public archaeology. All these topics are debated and included in Andean archaeology to improve our knowledge of this subject.

International Perspectives

Andean archaeology contains issues attractive to international research teams. One such issue is the wonderful and almost perfect conservation of organic remains in the Atacama Desert that make possible high-resolution reconstructions in different perspectives. Good tissue preservations are also ideal for mummy conservation. The sea as a food provider for ancient people is also quite an interesting issue, especially because of the richness of its waters.

Future Directions

Research on Andean archaeology is a suitable and promising issue in every nation of the Andes, and national and international archaeologists have conducted it (Lane 2012). It provides not only a partial portion of the history of almost half of the countries in South America but also a sense of integration, because of the general homogeneity of ancient cultures of the Andes. A good example is the Inca road that links literally the whole Andes. The Inca road system was conceived and constructed over the whole Andean territory for the purpose of communication and ware transport and is being seen as the main link among modern Andean countries.

On the other side, governments also see the history of the ancient cultures of the Andes as a common denominator for integration. Andean countries share a similar past and so have an experience of permanent interchange from the earliest times.

Andean archaeology should also see an opening for applying new theoretical frames by relating, for example, the past roles of women, minorities, domestic activities, and landscape archaeology. Every nation has its challenges in this task.

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Caral: The Sacred City
- ▶ Guinea Pig: Domestication
- ▶ Inca State and Empire Formation
- ▶ Machu Picchu: Geography and Culture
- ▶ Maize: Origins and Development
- ▶ Nasca and Pampa Jumana Lines and Geoglyphs
- ▶ Paleoindians
- ▶ Peopling of the Americas
- ▶ South America: Lithic Industries

References

Bonavia, D. 1991. *Perú: Hombre e historia*. Lima: Edubanco.

Dillehay, T. 2000. *The settlement of the Americas. A new prehistory*. New York: Basic Books.

Lane, K. 2012. Prospects: Archaeological research and practice in Peru. *Antiquity* 86: 221–227.

Lavallée, D. 1999. *The first South Americans. The peopling of a continent from the earliest evidence to high culture*. Salt Lake City: University of Utah Press.
León, E. 2007. *Orígenes humanos en los Andes del Perú*. Lima: USMP.
Leoni, J., and F.A. Acuto. 2008. Social landscapes in Pre-Inka Northwestern Argentina. In *Handbook of South American archaeology*, ed. H. Silverman and W. Isbell, 587–603. New York: Springer.
Politis, G., and B. Alberti, eds. 2005. *Archaeology in Latin America*. London: Routledge.
Raymond, S. 2008. The process of sedentism in northwestern South America. In *Handbook of South American archaeology*, ed. H. Silverman and W. Isbell, 79–90. New York: Springer.
Silverman, H., and W. Isbell, eds. 2008. *Handbook of South American archaeology*. New York: Springer.

Andron

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Introduction

Andron (plural, *andrones*) is the name given by modern scholars to rooms excavated at sites from ancient Greece that combine a number of distinctive architectural features. These include a near-square layout with walls approximately 4.5 or 6.5 m in length; an offset doorway; a raised border platform; a central depression floored with plain or colored cement or plaster, or inlaid with pebbles or tiled mosaic; channels or guttering for drainage; and colored plastered walls (Nevett 2010: 47). Archaeological analyses place basic forms of these rooms at sanctuaries during the Archaic period, for example, at Perachora's Heraion and the sanctuary of Apollo Delios on Paros (Bergquist 1990: 38). Later, while continuing to appear at ritual-civic sites, the increasingly elaborate *andron* became commonplace, if not standard, in Classical and Hellenistic houses. Olynthus provides the majority of evidence for the domestic *andron* in the late fifth and fourth centuries BCE, where it has been identified in a third of the excavated houses (see Cahill 2002: 74–146). While the record for smaller domestic units at Delos and in the rural demes of Attica further emphasizes that the *andron* was non-pervasive and was possibly absent from the majority of households (Trümper 2005: 119; Nevett 2005: 88, 93), the room does appear at Greek settlements across the Mediterranean (Nevett 1999: 80–126, 127, 138, 142, 153). However, sometimes the designation "*andron*" may be debatable. Thus, at the Hellenistic House of the Ptolemaic Coins in New Halos, the raised platform can be indicative of a storage area in the absence of other markers (Haagsma 2003: 68). Then again, distinctive architectural features were dispensable. While a number of houses at Delos contain ornate rooms with mosaic floors and elevated platforms, few of these "*andrones*" are quadrangular and none possess an offset door (Trümper 2007: 330).

Definition

The word *andron* means literally a space belonging to men. Earliest literary attestations from the fifth century BCE make it a generic "men's quarters" and a place for hospitality, including convivial gatherings that display features of the *symposion* (e.g., Aeschylus, *Agamemnon* 244; *Libations Bearers* 712). Of the architecturally distinctive room, the elaborate furnishing, extravagant decoration, and raised platform to accommodate couches, along with the provision of stepped floors and gullies to facilitate cleaning, correspond to this specific usage. However, domestic space was flexible. The *andron*, like other rooms in the Greek house, may have been occupied differently during the day, across seasons, and between owners. Daytime activity is implied, for example, by additional architectural elements. At House II in Eretria (c.400 BCE), upper columns break up an interior *andron* wall. Like external windows, this feature would maximize light and encourage circulation of air (Reber 2007: 284). As drinking was ideally staged in the evening (and those like the younger Alcibiades who reputedly reveled by day were censured for it: Lysias 14.25), this setup would most benefit

daytime users engaged in other household occupations. More broadly, the *andron* may have provided a general living area when winter weather made the courtyard uninhabitable, as suggested by Rider (1965: 249) for Hellenistic Delos. Specific finds can also suggest changing usage over time. Thus, the presence of terracotta statues and the selection of tableware in the *andron* of the House of the Comedian at Olynthus leads Cahill (2002: 140-1) to propose that the sympotic room acquired ritual functions during its lifetime, although dual usage is another possibility.

Unfortunately, finds from *andrones* are frequently sparse and inconclusive, with the result that it is often difficult to establish what activities may have taken place on the basis of artifactual evidence. At Olynthus, even sympotic furniture and paraphernalia are rare. However, the best bet for an *andron* in the House of Zoilos did yield a loom weight, an item prevalent in other parts of the house (Cahill 2002: 135). The whole ground floor may have been appropriated for household industry (cf. Nevett 1999: 71). Then again, in the front room of House AII.6 at Leucas in Acarnania, a large room decorated with painted plaster and boasting a window, a wide range of material was excavated. The presence of cooking ware, storage vessels, and fine pottery suggests that this likely *andron* space was harnessed for the production and storage of food and drink, as well as their consumption. Worktools – chisels, fishhooks, flint instruments, and an axe – were also kept in the room (Fiedler 2005: 107–10). Certainly, to return to hospitality, opportunities for dining beyond the symposion *sensu stricto* might also arise during festivals and on a daily basis. So, when Theban rebels arrive at the home of the governor they plan to assassinate, in Xenophon's *Hellenica* (5.4.7), they find him reclining on a couch with his wife seated by his side after dinner. Presumably, on the basis of this detail, they are in the *andron* (cf. Kelly Blazeby 2011: 89 for other convivial occasions involving female family members at home). Wider usage of the *andron* by other members of the household, and not just its menfolk at the symposion, is plausible.

Key Issues and Current Debates

As the place where visitors were accommodated within the house, and as space defined by its male occupants, the domestic *andron* offers special insights into the relationships between *oikos* and *polis* and between the genders. Nevett's (1999) careful study of the Olynthian record shows that here the *andron* was frequently situated near the entrance to the house, approached through the court, and sometimes through an antechamber (the pattern is replicated at some near-contemporary sites, e.g., at Athens, 1999: 90–1; Thasos, 1999: 93–4; and Halieis, 1999: 98–101). These areas might also be decorated with "coloured plaster walls, terracottas and metal ornaments" (Nevett 1999: 70), effectively marking them as a suite and setting them apart from the remainder of the house. Through their adornment, the *andron* and the areas by which it was accessed made a statement to invited guests of the householder's "social prestige" (Jameson 1990: 189), or such decoration might be a marker of "social distinction" (see Westgate 1997–98: 106). The domestic *andron* may be an indicator of broadening sympotic activity from élite circles to the moderately wealthy, but it still conveys the affluence of the household to visitors. The addition of windows on the exterior walls, however high up, might have carried this message out into the city, at every noise- and scent-filled celebration (Tsakirgis 2010: 576).

If the *andron* communicated ideas about the wealth and prestige of the household to guests, it also provided a separate and enclosed space which kept those visitors focused inwards and away from the rest of the house. For the *symposion*, this enhanced the psychological effects of being together, hot-housing the sensory pleasures of drinking wine, inhaling incense, listening to and making music, conversing and laughing, and sexual desire. For the men who gathered together in the *andron*, relationships might be negotiated through shared endeavor and consolidated via a heightened atmosphere of merriment (*euphrosyne*) and fellow-feeling (*philophrosyne*), the qualities envisaged by sympotic poets Solon of Athens (26 W) and Ion of Chios (27 W) and

manifest in parties painted on pottery like the red-figure bell-krater now at Port Sunlight (Lady Lever Art Gallery 5037: see Robertson 1987: 37–8, 96). Produced at Athens in the early fourth century, at the very time *androne*s were becoming visible in the domestic record, this mixing vessel depicts tightly packed, garlanded young men reclining on couches, their heads thrown back in song, as a young boy beats the tympanum and a woman dances (or plays an *aulos*: the instrument is visible below the paint but omitted from the final composition). Presented within the confines of the body of the krater, the scene encapsulates the spirit of camaraderie and shared pleasures encountered within the enclosed space of the *andron*.

Because the men joining in the symposion might be friends or relatives or associates or co-members of a religious organization, the *andron* offers a bridge between the "private" *oikos* and the "public" sphere, as "insiders" and "outsiders" mix within its walls. Furthermore, drinking companions might be fellow citizens or political sympathizers. Connecting the rise in domestic *androne*s in particular to democratic practice and ideology, Ault (2000: 486-8) even suggests that "the domestic *andron* brought the political sphere into the domestic realm and provided a space for small groups of citizens to gather for discussion outside the public assembly, lawcourt, or *agora*" (see also Nevett 2010: 62). For *androne*s outside the domestic record, in civic-ritual sanctuaries from the Archaic period onwards, the dynamic might be reversed, as individuals confirm their social and political relationships and continue their conversations under the rubric of public celebration (Schmitt Pantel 1992). The *andron* thus not only bridges but muddies the relationship between "public" and "private" and in the process sheds light on the dynamics of the Greek city. Social bonds established there between friends might be simultaneously between colleagues in political enterprise, whether symposiasts are citizens dedicated to democratic endeavor or orchestrators of dissent.

While fostering unity among participants in the symposion, the *andron* also articulates a gender divide. This divide was both physical and ideological. Certainly, the room may have been used by different members of the household for a variety of purposes, possibly including weaving by women in the House of Zoilos (see above). Figured pottery like the Port Sunlight krater also shows women present at the *symposion*. However, such women were hired musicians or dancers, or they were *hetairai*, "female companions" who were sexually available (the two groups need not be mutually exclusive). As the fourth-century lawcourt case involving Neaera shows, a woman attending a drinking party could be branded a *hetaira* and find her status as a wife attacked ([Demosthenes] 59). In Athenian public discourse, female relatives should not be present in the *andron* during the *symposion*. By closing off the space to women in the family at certain moments, their contact with male incomers was controlled and gender relations were prescribed. To Antonaccio (2000: 532), the *gunaikonitis* "was a space where women could retreat when male visitors were present." By default, its male equivalent, the *andron* – or *andronitis* – becomes an exclusively male preserve, a space for men to occupy in the absence of women from the house. This was not a permanent segregation of the sexes, however, but a temporary impermeable division arising from social convention. The *andron* was both a space and an idea.

Cross-References

- ▶ Agora in the Greek World
- ▶ Polis
- ▶ Religion, Greek, Archaeology of
- ▶ Symposion

References

Antonaccio, C.M. 2000. Architecture and behavior: Building gender into Greek houses. *Classical World* 93: 517–533.

Ault, B.A. 2000. Living in the polis: The Greek house as microcosm. *Classical World* 93: 483–496.

Bergquist, B. 1990. Sympotic space: A functional aspect of Greek dining-rooms. In *Sympotica: A symposium on*

the symposion, ed. O. Murray, 37–65. Oxford: Oxford University Press.
Cahill, N. 2002. *Household and city organization at Olynthus*. Yale: Yale University Press.
Fiedler, M. 2005. Houses at Leucas in Acarnania: A case study in ancient household organization. In *Ancient Greek houses and households: Chronological, regional, and social diversity*, ed. B.A. Ault and L.C. Nevett, 99–118. Philadelphia: University of Pennsylvania Press.
Haagsma, M.J. 2003. The houses of New Halos. In *Housing in New Halos: A Hellenistic town in Thessaly, Greece*, ed. H. Reinder Reinders and W. Prummel, 37–80. Rotterdam: Balkema.
Jameson, M. 1990. Private space and the Greek city. In *The Greek city: From Homer to Alexander*, ed. O. Murray and S. Price, 171–195. Oxford: Clarendon.
Kelly Blazeby, C. 2011. Women + wine = prostitute in classical Athens? In *Greek prostitutes in the ancient Mediterranean, 800 BCE – 200 CE*, ed. A. Glazebrook and M.M. Henry, 86–105. Madison: University of Wisconsin.
Nevett, L.C. 1999. *House and society in the ancient Greek world*. Cambridge: Cambridge University Press.
Nevett, L.C. 2005. Between urban and rural: house-form and social relations in Attic villages and *deme* centres. In *Ancient Greek houses and households: Chronological, regional, and social diversity*, ed. B.A. Ault and L.C. Nevett, 83–98. Philadelphia: University of Pennsylvania Press.
Nevett, L.C. 2010. *Domestic space in classical antiquity.* Cambridge: Cambridge University Press.
Reber, K. 2007. Living and housing in Classical and Hellenistic Eretria. In *Building communities: House, settlement and society in the Aegean and beyond. Proceedings of a conference held at Cardiff University, 17–21 Apr 2001*, ed. R. Westgate, N. Fisher, and J. Whitley, 281–288. London: British School at Athens.
Rider, B.C. 1965. *The Greek house: Its history and development from the Neolithic period to the Hellenistic Age*. Cambridge: Cambridge University Press.
Robertson, M. 1987. *Greek, Etruscan and Roman vases in the Lady Lever art gallery, Port Sunlight*. Liverpool: Liverpool University Press.
Schmitt Pantel, P. 1992. *La cité au banquet: histoire des repas dans les cités grecques*. Rome: École française de Rome.
TrÜmper, M. 2005. Modest living in late Hellenistic Delos. In *Ancient Greek houses and households: Chronological, regional, and social diversity*, ed. B.A. Ault and L.C. Nevett, 119–139. Philadelphia: University of Pennsylvania Press.
TrÜmper, M. 2007. Differentiation in the Hellenistic houses of Delos: The question of functional areas. In *Building communities: House, settlement and society in the Aegean and beyond. Proceedings of a conference held at Cardiff University, 17–21 Apr 2001*, ed. R. Westgate, N. Fisher, and J. Whitley, 323–334. London: British School at Athens.
Tsakirgis, B. 2010. Lighting the way: Windows on behavioral patterns in the Greek house. In *Städtisches Wohnen im östlichen Mittelmeerraum 4. Jh. v. Chr. – 1 Jh. n. Chr. Akten des internationalen Kolloquiums vom 24.–27. Oktober and der Österreichischen Akademie der Wissenschaften*, ed. S. Ladstätter and V. Scheibelreiter, 569–582. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.
Westgate, R. 1997–1998. Greek mosaics in their architectural and social contexts. *Bulletin of the Institute of Classical Studies* 42: 93–115.

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Angel, John Lawrence

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Basic Biographical Information

J. Lawrence Angel was born on March 21, 1915, in London, England. His father, John W. Angel, was a British sculptor and his mother, Elizabeth Day Seymour, was an American classicist originating from Connecticut, USA. Angel moved to the United States with his family at the age of 13 and enrolled in the Choate School in Wallingford, Connecticut. In 1932, he entered Harvard where he obtained his A.B.. (Artium Baccalaureautus) in 1936 and his Ph.D. in anthropology in 1942. In 1937, Angel married Margaret (Peggy) Seymour Richardson, his wife of 49 years and an invaluable professional as well as personal partner.

His most influential mentors at Harvard were Clyde Kluckhohn (social anthropologist), Carleton S. Coon (physical anthropologist), and Earnest A. Hooton (physical anthropologist). As an undergraduate student, he participated in archaeological fieldwork in New Mexico, Arizona, and Georgia. His first data collection and fieldwork trip to Greece and the Eastern Mediterranean occurred between 1937 and 1939, mainly under the auspices of the American School of Classical Studies at Athens and Harvard University,

followed by ten more field trips in the Near East, focusing on Greece, Cyprus, and Turkey (1949, 1954, 1957, 1965, 1967, 1969, 1972, 1975, 1977, 1978).

Angel taught at the University of California at Berkeley (1941–1942), at the University of Minnesota (1942–1943), and at the Daniel Baugh Institute of Anatomy of the Jefferson Medical College in Philadelphia (1943–1962). He was a research associate at the University Museum of the University of Pennsylvania (1946–1962) and a civil consultant in surgical anatomy at the U.-S. Naval Hospital in Philadelphia (1957–1962). In 1962, Angel succeeded T. Dale Stewart as the Curator of Physical Anthropology at the Smithsonian Institution, National Museum of Natural History, in Washington D.C., a position he held until his death. Additionally, he was an adjunct professor at George Washington University (1962–1986) and a visiting professor of anatomy at Howard University Medical School (1965–1970).

After joining the Smithsonian, Angel also became actively involved in forensic anthropology and served as a consultant for the Federal Bureau of Investigation (FBI), the US Armed forces, and other law enforcement agencies. He joined the American Academy of Forensic Sciences (AAFS) in 1975; he became a Diplomate of the American Board of Forensic Anthropology in 1978 and served as president (1980–1985). He also taught forensic pathology at John Hopkins School of Public Health (1963–1986).

He served as secretary-treasurer (1952–1956) and as vice president (1959–1960) of the American Association of Physical Anthropologists (AAPA). He was president of the Philadelphia Anthropological Society (1946–1948), the Philadelphia Society of the Archaeological Institute of America (1949–1950), and the Anthropological Society of Washington (1974–1975). He also performed associate editor roles for the *American Anthropologist* (1946–1948), the *American Journal of Physical Anthropology* (1951–1954, 1960–1963), and *Clinical Orthopaedics* (1954–1970).

Angel died at the age of 71 at the George Washington University Hospital on November 3, 1986.

Major Accomplishments

Angel's work shows a remarkable scholarly breadth encompassing human anatomy and osteology, dental anthropology, paleopathology, paleodemography, paleoecology, longevity and biological aging, obesity, stress indicators, behavioral reconstruction, biological distance and genetic mixture, and forensic anthropology. Among these, health and disease as selective micro-evolutionary processes held a central place in his research. His enduring research interest in Greece and the Eastern Mediterranean developed early on in his career, where he literally founded the fields of physical anthropology and paleopathology.

His early work, influenced by Hooton, was typological and emphasized craniometry, as represented in his dissertation aimed at reconstructing the complex interplay of biology, culture, and the environment in the Greek world. In doing so, Angel introduced a highly contextualized approach that he termed *social biology* (Angel 1946). Throughout his career, he promoted problem-oriented, interdisciplinary anthropological research, methodological and theoretical rigor, and new methodologies, thus setting the stage for the more recently developed field of bioarchaeology.

Angel's research on hemolytic anemias and particularly on the history of thalassemia in the Eastern Mediterranean has been a landmark in paleopathology. He coined the term *porotic hyperostosis* (Angel 1966a, 1967), now widely accepted. Angel attributed *porotic* hyperostosis to thalassemia or sicklemia in the Eastern Mediterranean favoring the former due to its endemicity in that part of the world. Based on the classification of these two genetic anemias as balanced polymorphisms maintained by the heterozygote advantage against malaria, he linked the

occurrence of porotic hyperostosis in the Eastern Mediterranean to malaria, particularly *falciparum* malaria. In this regard, he developed a thoroughly ecological and regional approach to population health and disease (Angel 1971, 1975), culminated in his monograph on *The People of Lerna*.

Angel was particularly interested in paleodemographic parameters such as longevity, fecundity, and differential fertility. One of his major contributions has been his influential critique of the use of life tables from archaeological skeletal samples, emphasizing the difference between cemetery samples and living populations (Angel 1969). Angel was also a pioneer in the reconstruction of past human behavior and lifestyle through skeletal markers. The identification of the commonly observed elbow osteoarthritis in the Pre-Columbian human remains from Tranquillity (California) with spear-throwing described as "atlatl elbow" was highly influential, especially in linking osteoarthritis to a specific activity (Angel 1966b). His contextualized approach to behavioral reconstruction was further established in his work on the life stresses of slavery for the African American ironworkers at the Catoctin Furnace Cemetery with J. O. Kelley during the last decade of his life.

Angel received the Pomerance Medal of the Archaeological Institute of America (1983), the Physical Anthropology Section award of the AAFS (1984, 1986), and the Distinguished Service Medal of the American Anthropological Association (AAA) (1986). The AAPA organized and published a symposium in his honor (1979). Posthumously (1987), a memorial session was held at the AAA annual meeting, followed by an edited volume (Buikstra 1990). Since 1992, the Wiener Laboratory of the American School of Classical Studies at Athens has regularly awarded the J. Lawrence Angel Fellowship in human skeletal studies.

Cross-References

- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Bone, Trauma in
- ▶ Dental Anthropology
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition

References

Angel, J.L. 1946. Social biology of Greek culture growth. *American Anthropologist* 48: 493–553.

Angel, J.L. 1966a. Porotic hyperostosis, anemias, malarias, and marshes in the prehistoric Eastern Mediterranean. *Science* 153: 760–763.

Angel, J.L. 1966b. *Early skeletons from Tranquillity, California (Smithsonian Contributions to Anthropology 2.1)*. Washington (DC): Smithsonian Press.

Angel, J.L. 1967. Porotic hyperostosis or osteoporosis symmetrica. In *Diseases in antiquity: A survey of the diseases, injuries and surgery of early populations*, ed. A.T. Sandison and D. Brothwell, 378–389. Springfield: C.C. Thomas.

Angel, J.L. 1969. The bases of paleodemography. *American Journal of Physical Anthropology* 30: 427–437.

Angel, J.L. 1971. *The people of Lerna: Analysis of a prehistoric Aegean population*. Princeton: American School of Classical Studies at Athens and Washington (DC): Smithsonian Press.

Angel, J.L. 1975. Paleoecology, paleodemography and health. In *Population, ecology and social evolution*, ed. S. Polgar, 167–190. The Hague: Mouton.

Buikstra, J.E., ed. 1990. *A life in science: Papers in honor of J. Lawrence Angel*. Kampsville: Center for American Archaeology.

Further Readings

Buikstra, J.E., and L.A. Beck, eds. 2006. *Bioarchaeology: The contextual analysis of human remains*. New York: Academic Press.

Buikstra, J.E., and E. Prevedorou. 2012. John Lawrence Angel. In *The global history of paleopathology: Pioneers and prospects*, ed. J.E. Buikstra and C. Roberts, 3–13. Oxford: Oxford University Press.

Harper, N.K. 2008. Short skulls, long skulls, and thalassemia: J. Lawrence Angel and the development of Cypriot anthropology. *Near Eastern Archaeology* 71: 111–119.

J.L. Angel Papers. National Anthropological Archives, Smithsonian Institution, Washington (DC). 20560. Available at: www.nmnh.si.edu/naa/fa/angel.pdf.

Stewart, T.D. 1979. J. Lawrence Angel. *American Journal of Physical Anthropology* 51: 507–516.

Animal Domestication and Pastoralism: Socio-environmental Contexts

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Introduction

The domestication of herding animals and the development of pastoralist societies have played a key role in human economic, ecological, and social history (Dyson-Hudson and Dyson-Hudson 1980). Pastoralism supports substantial human populations in Eurasia, Africa, and South America, and both pastoralists and other farmers still rely predominantly on the few animal species that were domesticated in the early to mid-Holocene. Understanding changing human-animal relations with domestication and the development of pastoralism provides insights into the biodiversity of the animals on which contemporary pastoralists rely, the history of milk-drinking, and the coevolution of humans and domestic animals. Archaeology provides broad perspectives on pastoral societies as complex and flexible social constructs, as forms of risk management, and as resilient systems evolved over millennia to help people to cope with aridity, climatic changes, and environmental extremes.

Definition

Conceptual Framework

Collaboration among archaeologists, ecologists, and molecular biologists has resulted in the development of a new conceptual framework for understanding the emergence and multiple dimensions of pastoralism. Pastoralism is defined here as a social and economic system in which people move domestic animals to pasture and rely on spatial mobility for survival (Dyson-Hudson and Dyson-Hudson 1980; Wendrich and Barnard 2008). Pastoralists also emphasize the social and symbolic role of domestic animals (Marshall and Weissbrod 2011). They thrive in environments where climate and topography constrain agricultural production such as deserts, semiarid plains, mountains, and tundras. Although pastoralists often complement their livestock-based economy with other productive tasks such as cultivation, exchange, trade, fishing, hunting, and gathering, the needs of their herds override other considerations. People's roles as herders and pastoralists are also fundamental to the construction of individual and group identities in pastoral societies. Pastoralism in this sense is more than an economic activity and includes ecological, social, political, and ideological dimensions.

Pastoralists depend on a range of herd animals including sheep (*Ovis aries*), goats (*Capra hircus*), taurine cattle (*Bos taurus*), humped cattle (*Bos indicus*), horses (*Equus caballus*), donkeys (*Equus asinus*), llamas (*Lama glama*), alpacas (*Vicugna pacos*), dromedaries (*Camelus dromedarius*), Bactrian camels (*Camelus bactrianus*), yaks (*Bos grunniens*), or reindeer (*Rangifer tarandus*) that were domesticated between 12,000 and 4000 years ago. Many of them were domesticated multiple times, and the circumstances in which different taxa were domesticated vary widely. Animal domestication is seen here as a microevolutionary process resulting from long-term coevolutionary relations between people and animals in humanly modified habitats (Zeder 2011). Microevolution in anthropogenic habitats and management of animals lead to selection away from wild genotypes and phenotypes. The degree to which people and animals depended on each other varied greatly. Animal domestication was a slow process, and long-term gene flow often continued between wild and domestic populations (Marshall et al. 2014).

Animals provide food including meat, milk, and blood and raw materials such as dung, hides, or wool and can also be used for transport and traction. Pastoral families generally employ

herding animals with diverse feeding strategies and uses. Pastoral herd sizes range from a few animals to many thousands depending on factors such as wealth, access to labor and land, climate, and disease, as well as political conditions. Herders move animals to grazing, water, and salt, guard them from predators and rustlers, and monitor their health. Settlements are sited in locations well suited for the needs of domestic stock and revisited over time. Landscape management and cycles of mobility facilitate access to pasture and water but depend on factors such as seasonality, climate, and local flora, as well as enforcement of institutionalized property rights to pastures. Individuals or whole households move with herds at time scales that range from a few days to seasonal, yearly, decadal, and even centennial intervals, depending on environmental and social factors (Wendrich and Barnard 2008).

Most pastoral societies are characterized by social systems that emphasize rights to diverse terrain, through kin relationships and lineages, clans, or age sets. Families make their own herding decisions, however, and often have considerable autonomy. It has been argued, therefore, that mobility and pastoral subsistence systems lend themselves to the development of complex but relatively egalitarian social systems. However, polygamy is common in pastoral societies in Africa and Asia, and in many regions today, older men wield much of the power. Furthermore, highly stratified pastoral societies have existed in most continents through time. Central Asia is especially well known for ancient pastoral empires (Frachetti 2012), and raiding and warfare have been commonly associated with pastoral societies.

Historical Background

There have been long-term debates in anthropology over the role of mobility in society, domestication, and timing of the development of pastoral societies. One of the big questions has been whether hunter-gatherers domesticated animals or whether pastoral societies developed after settled plant-cultivating communities. In the nineteenth century, it was thought that nomadism preceded settled agricultural villages, but as a result of Darwin's evolutionary research, he and other scholars began to focus on the role of genetic isolation in domestication and to argue that animals were more likely to have been domesticated by settled village-based cultivators than mobile foragers. Despite the long-term success and resilience of pastoralism, Western popular culture retains biases against mobile herding ways of life, which can be traced to the difficulty that ancient states faced in controlling mobile peoples, nineteenth-century cultural evolutionism, and historical notions of mobile hunter-gatherers or pastoralists as "primitive." Current anthropological perspectives strongly refute this argument and see the sustainability of pastoral ways of life as one of the long-term success stories of the ancient and modern worlds.

In a different historical twist, scholars studying early cities in Mesopotamia argued that pastoralism developed relatively late as a specialized economic system in response to the establishment of settled urban communities, irrigation systems, and exchange networks in the region. It was proposed that pastoral mobility developed as farmers occupied the best soils and relegated pastoralists to the margins of agricultural areas (Lees and Bates 1974). In the Zagros, however, there has always been an argument for early independent development of pastoral systems (Abdi 2003). The nature of pastoral subsistence has also been much discussed. There are ongoing debates regarding the Secondary Products Revolution or the idea that people's use of animals for milk, hair, and traction was not part of the initial motivation for domestication but led, instead, to the elaboration of herding systems and the spread of pastoralists into Europe (Sherratt 1983). There are also discussions regarding independent incidences of animal domestication and development of pastoral ways of life vis-à-vis demic diffusion from discrete points of origin.

Key Issues/Current Debates

Identifying Domestication

Archaeological research on animal domestication relies on information from animal bones discarded

at archaeological sites and contextual analyses of faunal remains, spatial organization, architecture, and artifacts found on sites. Size decrease has long been the most widely used marker of animal domestication, but it has become increasingly clear that there is a significant time lag after management before size changes are manifested (Marshall and Weissbrod 2011; Zeder 2011). More sensitive indicators include the change in species frequencies, animal age and sex profiles, and pathologies indicating animal use or penning, as well as distribution of animals outside their wild range. Lenses of animal dung resulting from corralling or organic residues indicating milking are also increasingly used to identify early phases of domestication (Outram et al. 2009; Dunne et al. 2012). Genetic studies of extant species and ancient bones are playing a major role in helping to codify the phylogenetic relationships of purported ancestors and domesticates as well as helping to ascertain the location, timing, and number of domestication processes involved.

Domestication and Pastoralism: Regional Variability

The histories of domestication reviewed here and incorporation of sheep, goat, and taurine cattle into pastoral societies around the world provide important insights into the development of diverse pastoral trajectories and their relationships with domestication processes.

The Near East

Sheep and Goats Archaeological and genetic data suggest that sheep and goats were domesticated multiple times by hunter-gatherers living in settled village communities in the higher-elevation headwaters of the Tigris and Euphrates rivers (Zeder 2011). The wild bezoar (*Capra aegagrus*) was the earliest of the herd animals to be domesticated. Goat herds were managed 11,000–10,000 years ago during drier conditions. By 9500 years they were herded at lower elevations outside of their wild range. Genetic data also document at least six maternal lineages of domestic goats and suggest that herders moved them around the Fertile Crescent. Attempts to manage wild herds of Asiatic mouflon (*Ovis orientalis*) also occurred 11,000 years ago. Culling of young male sheep suggests herd management and domestication in Eastern Anatolia and the northwestern Zagros 10,300–9500 years ago.

Herders relied for a long period on a combination of free-living, managed, and fully domesticated sheep and goats. As a result of long-term gene flow among these populations and variable levels of animal management and herding success, domestication was slow and erratic. Scholars have argued that pastoralism developed out of specialized hunting in mountainous regions (Abdi 2003). However, most excavations have explored settled village sites. The extent to which sheep or goat herding was seasonally specialized or undertaken by pastoral subgroups has not been fully examined. This may be remedied by new isotopic approaches to detecting mobility. The high mountains of Iran and Iraq remain relatively little explored from a pastoral perspective, and smaller open sites that might have been created by early pastoralists have not been systematically investigated. The earliest well-documented evidence for nomadic pastoralism in the Zagros Mountains dates to 9000–4000 BP.

Cattle Domestication of taurine cattle (*Bos taurus*) added a key third animal species to the caprine duo relied on by early herders. Aurochs (*Bos primigenius*) are now extinct but were domesticated 10,500–10,000 years ago by settled farmers in the middle Euphrates and high Tigris valleys of the Near East (Zeder 2011). Unlike caprines, taurine cattle were domesticated only once. Recent genetic research suggests that relatively few female cattle were ever domesticated and that people from just a few villages might have been involved (Bollongino et al. 2012). Cattle herding spread into western Turkey and southeastern Europe. Lipid residues in ceramic pots date as early as 9000–6000 years ago, and the genetics of human lactase persistence suggest that milk had an important impact on survival (Gallego Romero et al. 2012).

Development and Spread A mosaic of farming, hunter-gatherer, and pastoral communities lived in the Levant during the PPNB. Pastoral nomadism, it is argued, originated in the Syrian Desert and diffused south (Arikan 2012). In the Negev herders also hunted. In a different pattern, pastoralists living in the increasingly arid environment of Chalcolithic Jordan adopted extensive nomadic pastoral strategies with seasonal cultivation. Land use models suggest this was the most sustainable way to minimize impacts and increase biodiversity in this low-rainfall area.

To the west, domesticated cattle, sheep, and goats and annual crops were progressively incorporated into the European Neolithic beginning 8000 years ago. Mixed farming, herding, and milking are strongly associated with demic diffusion. Specialized pastoralism such as that practiced in the Alps and other mountainous regions of Central Europe probably began as recently as 4000 years ago during the Bronze Age. The specialized management and domestication of reindeer occurred approximately 2000 years ago and independently in northern Scandinavia and central northern Russia.

South Asia

Cattle, Goats, and Sheep In South Asia there is a different trajectory toward pastoralism than in Western Asia, with domestication of wild South Asian cattle (*Bos namadicus*) in the Indo-Iranian borderlands (Meadow 1996). Just as in Western Asia, little is known about smaller sites, and the bulk of the evidence comes from settled villages. Genetic data suggest that humped zebu cattle (*Bos indicus*) were domesticated in the Indus and perhaps northern India. During the eighth millennium BCE, farmers in Baluchistan cultivated wheat and barley, kept goats, and hunted wild cattle and sheep (Meadow 1996; Fuller 2006). Cattle domestication is documented 7000 years ago by age profiles and size decreases indicative of management. Herders subsequently spread zebu cattle west across the Iranian plateau. In South India, ash-mound sites document the development of specialized pastoralism between 6000 and 4500 years ago and possibly preceding cultivation in the region. Four thousand years ago, pastoral systems of the Indian subcontinent incorporated transport animals from other regions including donkeys, horses, and Bactrian camels to create resilient pastoral systems in arid portions of South Asia. Lactase persistence in parts of South Asia attests to the significance of the history of milk-drinking among herding populations (Gallego Romero et al. 2012).

Central Asia

Horses, Bactrian camels, and yaks were domesticated in Central Asia, and these transport and multipurpose animals provided the basis for pastoral systems variously adapted to steppes, deserts, mountains, and high-altitude plateau regions from the Black Sea to China.

Horses Domestication of horses influenced the development of pastoral systems of the Central Asian Bronze Age and transformed scales of mobility and flows of information across Central Asia. Evidence from settlements in northern Kazakhstan, especially the site of Botai, suggests that settled hunters used domestic horses 5500 years ago to hunt wild horses (*Equus ferus*). Geoarchaeological evidence of corals, bit wear on horse teeth, milk residues, and size decrease demonstrate domestication (Outram et al. 2009). Initial domestication likely took place elsewhere. Genetic data document multiple maternal horse lineages across Central Asia and suggest gene flow over the long term among wild and domestic populations.

The introduction of domesticates from Western Asia enhanced horse-based pastoralism and triggered later Middle Bronze Age (4500–3500 years ago) forms of nomadic pastoralism that incorporated Western Asian cattle and sheep. Horses were used for meat, skins, milk, and transport, associated with the sun god, and used in ritual sacrifice. A recent hypothesis suggests that pastoralism and herding animals could have spread from west to east through the Inner Asian mountain corridor instead of the steppes (Frachetti 2012). Nomadic pastoralists in Mongolia, 2500 years ago, relied on diverse subsistence strategies including horses, domestic caprines, cattle, hunting, and cultivation

(Wright et al. 2009). Furthermore, organized landscapes reflect long-term revisiting of sites best suited for pastoral settlement. In areas such as Northern Mongolia, there is also evidence for trade, hierarchy, and semipermanent pastoral habitation.

Bactrian Camels The domestication of two-humped Bactrian camels transformed people's ability to live in the cold deserts of Central Asia and opened up desert trade routes. Bactrian camels are thought to have been first domesticated between China and Mongolia. There is little osteological information, however, on the social context, place, and timing of domestication. Ancient DNA from Iron Age sites and the lack of geographic variability among modern domestic camels from China and Mongolia have led scholars to suggest a single center of domestication. Genetic research has demonstrated, though, that endangered wild Bactrian camel populations are not the ancestor of the domestic two-humped camel. On the basis of early distribution outside their wild range, archaeologists suggest that Bactrian camels were domesticated 6000–4000 years ago (Peters and von den Driesch 1997). After domestication the range of domestic Bactrians expanded west to Turkmenistan where clay figures of Bactrian camels pulling carts date to the early third millennium BCE (Meadow 1996). In South Asia two-humped Bactrian camels appear in the late third millennium BC, probably through northern Afghanistan, whereas in Northwest China, camel bones date to about 3000 years ago.

Yaks Yaks were domesticated by hunters of the Tibetan borderlands (Rhode et al. 2007). Genetic studies document the presence of two maternal lineages of domestic yaks suggesting two domestication events or gene flow. Yak dung has played an important role as fuel on the Tibetan plateau, and it has been argued that this may have been a motivating factor in domestication. Yaks were used for milk, hair, and meat and as pack animals. They are also spiritually important in the region. Yak-based pastoralism has played an important role in the settlement of the high-altitude regions of Central Asia and the development of trade and interconnections among valleys, plateaus, and mountain ranges of the region. Yaks were adopted by both herders and mixed farmers from the Himalayas to the Kunlun Mountains and through the Gobi to Mongolia and Siberia.

Arabian Peninsula

Domestication of dromedaries allowed people to survive over the long term as pastoralists and traders in the arid deserts of the Arabian Peninsula and Africa. Recent research indicates that the extinct giant camel (*Camelus thomasi*) was the wild ancestor of the dromedary or Arabian camel. Large numbers of camel hunting sites on the eastern coast of the Arabian Peninsula suggest that dromedaries were domesticated there 6000–4000 years ago (von den Driesch and Obermaier 2007). Pastoralists of this region came to rely heavily on camels for milk and as a result have high frequencies of lactase persistence today. With domestication the ancient range of the dromedary expanded along trade routes to Iran and South Asia. Camels date to 2000 years ago in Africa and became an increasingly important part of subsistence and trade as deserts expanded. Pastoral societies of the Horn have been shaped by their reliance on camels for milk, meat, and blood. Saharan camel trains are depicted in rock art and associated with the development of specialized gold and salt trade routes. In the Arabian Peninsula and Sahara, camel-based pastoral groups played a role in the development of complex polities.

Africa

Pastoralism was the earliest form of food production on the continent and allowed Africans to cope with the mid-Holocene expansion of the Sahara (Gifford-Gonzalez and Hanotte 2011). Microsatellite and paternal genetic data, and the timing of the appearance of cattle before sheep and goats, suggest that settled hunter-gatherers may have domesticated African cattle in the eastern Sahara (Marshall and Weissbrod 2011). It is also likely that incoming taurine cattle from Asia were interbred with local wild cattle. A thousand years later, Near Eastern domestic sheep and goats were

integrated into mobile herding, hunting, and gathering systems that spread across Saharan grasslands. These herders also domesticated a desert-adapted animal, the African wild ass (*Equus africanus*). Genetic data documents high diversity in African donkeys and two maternal haplogroups suggesting two African populations played a role in domestication. Cattle, donkeys, sheep, and goat complement each other, increasing resilience by providing herders with animals that have dissimilar life cycles, feeding habits, and disease susceptibilities. Lipid residues in ancient pots from Southern Libya demonstrate that herders were relying on cattle for milk as they moved west from the central Sahara by 7000 years ago. Milk fats from a range of plants also indicate a seasonal pastoral system in the Acacus, with herders moving between the mountains and the plains (Dunne et al. 2012). As the African humid phase ended, hyperarid conditions developed in the Sahara 6000 years ago. Herders moved more frequently and relied more on sheep and goats. Monumental cattle burials appear at this time, and abundant pastoral rock art testifies to ritualization of cattle.

Pastoralists ultimately abandoned the Sahara, migrating to the Nile Valley and Sahel. Herders with generalized domestic and wild subsistence bases also moved as far south as East Africa 5000 years ago. In Southwest Kenya, specialized pastoralists relied on domestic stock without hunting abundant large mammals approximately 3500 years ago. It has been argued that this subsistence choice reflected pastoral identity as people who eat cattle, rather than wild meat (Marshall and Weissbrod 2011). Pearl millet was domesticated 4000 years ago in West Africa by pastoralists who settled in the Sahel. After this time, seasonal cultivation became part of the repertoire of many pastoralists. Disease threats affected the spread of pastoralism in Africa, but trypanosomiasis-resistant cattle breeds attest to the adaptation of African cattle to the wetter tsetse belt of West Africa (Gifford-Gonzalez and Hanotte 2011).

South America

Pastoralism developed in the Andes between 6000 and 4000 years ago with the domestication of llamas and alpacas and the development of distinctive pastoralist societies (Mengoni-Goñalons 2008). Genetic research has demonstrated that the guanaco (*Lama guanicoe*) is the wild ancestor of the llama and the vicuña (*Vicugna vicugna*) the wild ancestor of the alpaca. Considerable hybridization has also been documented (Wheeler et al. 2006). Recent research suggests that camelid pastoralism developed to buffer against the climatic and environmental unpredictability that characterized the Andean highlands throughout the Holocene. Domestication of Andean camelids now appears a more diverse and dynamic process than previously thought. Growing evidence from southern Peru, Northern Chile, northwestern Argentina, and western Bolivia suggests multiple simultaneous instances of domestication outside the Peruvian central highlands. Long archaeological sequences from widespread highland sites document specialized hunting of wild camelids between 10,000 and 6000 years ago, followed by a period of intensive management and the eventual formation of distinctive herding communities 5000–3500 years ago. There is evidence for long-term herding in the highlands and the introduction of domestic camelids to the coastal, eastern, and northern Andes as early as 4500 years ago.

In the Andes, pastoralism was complemented by other subsistence strategies as it developed, and these varied with environmental and social settings. In the Bolivian central Altiplano, Wankarani pastoralists employed camelids in a diverse subsistence strategy that included fishing, cultivating, and use of a range of wild resources. Domestication of llama's secured access to meat, transport, and dung for fuel, but the motivation behind herding alpacas was to produce fine wool with which to make textiles. Pastoralist specialization in some areas resulted in herders depending on specialized wool-producing breeds. Highland farming societies also incorporated domesticated camelids from early on to complement agricultural production. Meat-, wool-, and pack-based pastoralism allowed denser settlement in high-altitude regions of the Andes and has proven a resilient way of life.

Emerging Patterns

New data and increasing research in Central Asia, Africa, and South America are providing fresh perspectives on domestication and contexts for the development of pastoralism. Two common assertions regarding the timing of the appearance of pastoral systems are that plants were domesticated before animals and that pastoralism developed late and out of settled villages and towns of early states. Thinking about these processes was initially framed in Southwest Asian contexts. Sheep and goat were the earliest herd animals to be domesticated worldwide, and recent syntheses show that they were domesticated in the Fertile Crescent at about the same time as the earliest plants. Similarly, in South America, hunter-gatherers domesticated camelids at the same time as many Andean cultigens. In Africa, however, domestication of donkeys and incorporation of introduced animals and the development of mobile early pastoral societies preceded domestication of African plants by several thousand years. In Central Asia pastoral systems are variable, but there is no indication that cultivation occurred as early as herding. In Baluchistan, however, there are complex patterns of cultivation of introduced wheat and barley prior to the domestication of zebu cattle. However, in South India, early cattle pastoralism preceded cultivation. Current data suggest that domestication of South Asian plants occurred after the earliest pastoralism and in regions where pastoralism was never common.

Answers to the related question of whether pastoralism developed late and out of the settled villages and towns of early states are straightforward in some regions and less so in others. There are strong indications that domestication resulted from specialized hunting and widespread modification of the environment starting 12,000 years ago (Zeder 2011). But whether goats and sheep were also incorporated into residentially or seasonally mobile pastoral systems in the Fertile Crescent or whether they were largely integrated into systems of village-based agriculture is unclear. The timing of the earliest pastoralism in Southwest Asia is, therefore, unknown. By contrast, in Africa and the Andes, hunter-gatherers or early herders domesticated a range of animals and pastoral sociopolitical systems developed well prior to the appearance of settled polities. Similarly, the first evidence for reliance on domestic horses is among hunter-gatherers. It is possible, however, that horses were domesticated by people further to the west who kept cattle and cultivated crops. It is clear, however, that the development of pastoralism in Central Asia stimulated the development of complex nomadic societies and states, rather than the other way around. Settled towns and polities played no role in the development of horse pastoralism in Central Asia. Simple statements about the relative timing and spread of farming and pastoral systems obscure complex climatic shifts and subsistence histories and sociopolitical contacts that made one system or the other more likely to flourish at any given time. But it is clear that plants were not domesticated earlier than animals as a general rule and that in many cases pastoralism developed before ancient states.

Research carried out during the last 20 years shows that animals were domesticated and pastoralism was developed in widely dispersed areas of Eurasia, Africa, and the Andes. However, there is still tension between the ideas of independent origins and diffusion, and with the exception of relations between Southwest Asia and Western Europe, relatively little is known about the nature and timing of regional contacts. Recent research suggests passage of people, animals, and ideas across Iran from the Near East to South Asia. Similarly, it has been argued that horse-based pastoralism spread through long-distance movements from west to east across the Central Asian steppe and the Inner Asian mountain corridor. Current discussions of Central Asia focus less on migrations as mechanisms for social change and more on relatively small-scale pastoral movements, repeated revisiting of the same locales, and extensive interactions among mobile pastoralists during seasonal rounds (Frachetti 2012).

The question of whether herders started to milk animals early or whether milking and use of animals for hair, and traction, was part of later pastoral development and spread is another issue that has been much discussed (Sherratt 1983). Recent

research demonstrates, though, that in Turkey, milk residues on pots date to as early as 9000 years ago (Dunne et al. 2012). Pastoralists moving into southeastern Europe 8000 years ago also relied on milk (Gallego Romero et al. 2012). The same is true of the earliest cattle pastoralists moving west across the central Sahara 7000 years ago. Horses were also milked in the earliest phases of domestication by herder-hunters in northern Kazakhstan about 6000–4500 years ago (Outram et al. 2009). As a result, scholars now suggest that secondary products may have been part of the early motivation for people to manage herd animals. Drinking milk conferred such a survival advantage on pastoralists that different genetic pathways for lactase persistence developed in Europe and Africa. Lactase persistence is a pastoral legacy and geographically concentrated at high frequencies today in northwestern Europe, parts of Africa, Southwest Asia, the Arabian Peninsula, and Mongolia.

Future Directions

Well-known pastoral regions of the world such as the Andes, Africa, and Central Asia have seen far less research than areas that have long been under intensive cultivation such as Western Asia, Western Europe, Eastern China, or North America. Ongoing research is addressing these imbalances. Furthermore, pastoral sites are by definition ephemeral, and there is a need for more highly trained pastoral archaeologists. Global geopolitics as well as applied issues such as the need for sustainable food production and mobile responses to climate change are, however, expanding the scope and relevance of pastoral research. New methods of detection of pastoral sites and early stages of animal management such as micromorphology and soil chemistry, as well as breakthroughs in the study of isotopes and ancient and modern biomolecules, are also making it possible to conduct much more systematic and fine-grained archaeological research on domestication and mobile pastoral societies.

Future research is needed on regional variability in pathways to pastoralism at a range of scales. There is evidence for different pathways to pastoralism in South America, Africa, and Central Asia, for example. There is much less information, however, on smaller-scale variability in patterns of camelid domestication or breed development within regions – such as the Peruvian or Bolivian Andes. Similarly, little is known about differences in the way that Bactrian camels and dromedaries were domesticated. It has also been suggested that there are resemblances between the development of cattle-based pastoralism and late cultivation of crops by early herders in northeast Africa and South India, but multisited research projects have not attempted systematic data collection and comparison between continents.

Ethnohistoric research in Africa and the archaeology of Cyprus also make it clear that small groups of people and their animals suffered periodic reverses with pastoralists becoming hunter-gatherers, animals becoming feral, or local populations of cattle or other livestock being decimated. Research on these and other small-scale processes that are critical to domestication and breed formation will be greatly enhanced by long-term regional archaeological studies that integrate fine-grained research on zooarchaeology, paleogenomics, geoarchaeology, paleoecology, and human behavior.

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Asses/Donkeys: Domestication
- ▶ Camels: Domestication
- ▶ Cattle: Domestication and Development
- ▶ Domestication: Definition and Overview
- ▶ Goat: Domestication
- ▶ Horses: Domestication
- ▶ Sheep: Domestication
- ▶ Yak: Domestication

References

Abdi, K. 2003. The early development of pastoralism in the Central Zagros Mountains. *Journal of World Prehistory* 17: 395–448.

Arikan, B. 2012. Don't abhor our neighbor for he is a pastoralist: The GIS-based modeling of the past human-environment interactions and landscape changes in the Wadi el-Hasa, west-central Jordan. *Journal of Archaeological Science* 39: 2908–2920.

Bollongino, R., J. Burger, A. Powell, M. Mashkour, J.D. Vigne, and M.G. Thomas. 2012. Modern taurine cattle descended from small number of near eastern founders. *Molecular Biology and Evolution* 29: 2101–2104.

Dunne, J., R.P. Evershed, M. Salque, L. Cramp, S. Bruni, K. Ryan, S. Biagetti, and S. Di Lernia. 2012. First dairying in green Saharan Africa in the fifth millennium BC. *Nature* 486: 390–394.

Dyson-Hudson, R., and N. Dyson-Hudson. 1980. Nomadic pastoralism. *Annual Review of Anthropology* 9: 15–61.

Frachetti, M.D. 2012. Multiregional emergence of mobile pastoralism and nonuniform institutional complexity. *Current Anthropology* 53: 2–38.

Fuller, D.Q. 2006. Agricultural origins and frontiers in South Asia: A working synthesis. *Journal of World Prehistory* 20: 1–86.

Gallego Romero, I., C. Basu Mallick, A. Liebert, F. Crivellargo, G. Chaubey, Y. Itan, M. Metspalu, M. Eaaswarkhanth, R. Pitchappan, R. Villems, D. Reich, L. Singh, K. Thangaraj, M.G. Thomas, D.-M. Swallow, M. Mirazán Lahr, and T. Kivisild. 2012. Herders of Indian and European cattle share their predominant allele for lactase persistence. *Molecular Biology and Evolution* 29: 249–260.

Gifford-Gonzalez, D., and O. Hanotte. 2011. Domesticating animals in Africa: Implications of genetic and archaeological findings. *Journal of World Prehistory* 24: 1–23.

Lees, S.H., and D.G. Bates. 1974. The origins of specialized nomadic pastoralism: A systemic model. *American Antiquity* 39: 187–193.

Marshall, F., and L. Weissbrod. 2011. Domestication processes and morphological change through the lens of the donkey and African pastoralism. *Current Anthropology* 52: S397–S407.

Marshall, F.B., K. Dobney, T. Denham, and J.M. Capriles. 2014. Evaluating the roles of directed breeding and gene flow in animal domestication. *Proceedings of the National Academy of Sciences* 111: 6153–6158.

Meadow, R.H. 1996. The origins and spread of agriculture and pastoralism in northwestern South Asia. In *The origins and spread of agriculture and pastoralism in Eurasia*, ed. D.R. Harris, 390–412. London: UCL Press.

Mengoni-Goñalons, G.L. 2008. Camelids in ancient Andean societies: A review of the zooarchaeological evidence. *Quaternary International* 185: 59–68.

Outram, A.K., N.A. Stear, R. Bendrey, S. Olsen, A. Kasparov, V. Zaibert, N. Thorpe, and R.P. Evershed. 2009. The earliest horse harnessing and milking. *Science* 323: 1332–1335.

Peters, J., and A. Von Den Driesch. 1997. The two-humped camel (*Camelus bactrianus*): New light on its distribution, management and medical treatment in the past. *Journal of Zoology* 242: 651–679.

Rhode, D., D.B. Madsen, P.J. Brantingham, and T. Dargye. 2007. Yaks, yak dung, and prehistoric human habitation of the Tibetan Plateau. *Developments in Quaternary Sciences* 9: 205–224.

Sherratt, A. 1983. The secondary exploitation of animals in the Old World. *World Archaeology* 15: 90–114.

Von Den Driesch, A., and H. Obermaier. 2007. The hunt for wild dromedaries during the 3rd and 2nd millennia BC on the United Arab Emirate coast. Camel bone finds from the excavations at Al Sufouh 2, Dubai, UAE. In *Skeletal series and their socioeconomic context (Documenta Archaeobiologiae 5)*, ed. G. Grupe and J. Peters, 133–167. Rahden: M. Leidorf.

Wendrich, W., and H. Barnard. 2008. The archaeology of mobility: Definitions and research approaches. In *The archaeology of mobility: Old world and new world nomadism*, ed. H. Barnard and W. Wendrich, 1–21. Los Angeles: Cotsen Institute of Archaeology, University of California.

Wheeler, J.C., L. Chikhi, and M.W. Bruford. 2006. Genetic analysis of the origins of domestic South American camelids. In *Documenting domestication: New genetic and archaeological paradigms*, ed. M.A. Zeder, D.G. Bradley, E. Emshwiller, and B.D. Smith, 329–341. Berkeley: University of California Press.

Wright, J., W. Honeychurch, and C. Amartuvshin. 2009. The Xiongnu settlements of Egiin Gol, Mongolia. *Antiquity* 83: 372–387.

Zeder, M.A. 2011. The origins of agriculture in the near east. *Current Anthropology* 52: S221–S235.

Animal Exploitation on Neolithic Sites in Central Germany

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Introduction

More than ten millennia ago, people invented agricultural practices and domesticated various species of plants and animals in the Near East, as well as in other regions of the world. This Neolithic Revolution, as it was called by V. Gordon

Childe, involved mankind changing from a predation to a production economy. Observed from a technical point of view, this phenomenon caused another, called by A. Sherratt "Secondary Products Revolution." The causes of this transition were of environmental, demographical, and/or ideological nature. The time of onset varies for new activities like animal traction, milk, and wool production. Later during the Neolithization Process, in the seventh millennium BC, Near Eastern settlers brought their know-how and their agropastoral equipment into Europe. This primary Neolithization came to an end during the fourth millennium BC, a threshold epoch in which also climate change occurred and fundamental transformations led to the emergence of less egalitarian societies in Central Europe. Revealing in which way Neolithic animals were exploited in a particular time and place contributes to this broad debate about timing and diffusion of the so-called secondary products and their consequences. This is the aim of our study of Neolithic sites in the Elbe-Saale region.

Definition

The study of animal bones from archaeological sites provides information about man–animal relationships. All these relations form a pastoral subsystem, which depends on natural constraints and varies according to cultural choices. This technical subsystem based on animal resources is illustrated here by insisting on the animal's status: alive or dead (Fig. 1). Animal behavior, maintenance, and recycling are also incorporated. Transforming a natural element into a final product is made by a succession of operations, starting with acquisition and maintenance. Then, depending on their needs, men choose either to keep the animal alive to obtain lifetime products or to kill it for final products. These raw materials can be used or transformed into more sophisticated products, like cheese or leather. A particular case exists: the inhumation of an animal in a burial or accompanying a man. Related to its use, this animal is granted a preferential status compared to other animals. The technical subsystem based on animal resources is in direct interaction with other technical subsystems, and this technical system as a whole is linked to social, symbolic, physiological, etc. systems, which together inform us about the life of past society.

Key Issues/Current Debates/Future Directions/Examples

Before exposing the major results of animal exploitation on Neolithic sites in Central Germany, it is useful to present the geographical and chronocultural context, to overview the key issues under debate and to point out the limits of the documentation.

An Environment Conductive to Agropastoral Practices for More than 3000 Years

The Elbe-Saale region is a territory of about 40,000 km^2 covering the *Länder* Saxe-Anhalt, Saxe, and Thuringe. The landscape is characterized by the last glacial period and several watercourses pass through it, like the Elbe and Saale. Vegetation is varied because different soil types exist, as, for example, the fertile Chernozem which is one of the most profitable European lands. The subcontinental climate, with hot summers, harsh winters, and low annual precipitations, imposes a husbandry adapted to these conditions. Around 3700 BC, the passage from Atlantic to Subboreal induced a cooler and dryer climate and important forest clearances made by Neolithic settlers let to the elm and linden decline.

This region was densely inhabited between 5500 and 2200 BC. Based on established chronologies (Lüning 1996; Müller et al. 2012), Fig. 2 presents the sequence of cultural groups observed in the Elbe-Saale region (MES). Since the Early Neolithic, people from the Linear Pottery Culture settled there. During the Middle Neolithic appeared the Stroked Pottery Culture, Rössen and Gatersleben, the last cultural group continuing in the Younger Neolithic. During this period occurred also the Jordansmühl. At the end of the Younger Neolithic, a local group of the Michelsberg Culture existed: the Hutberg, which

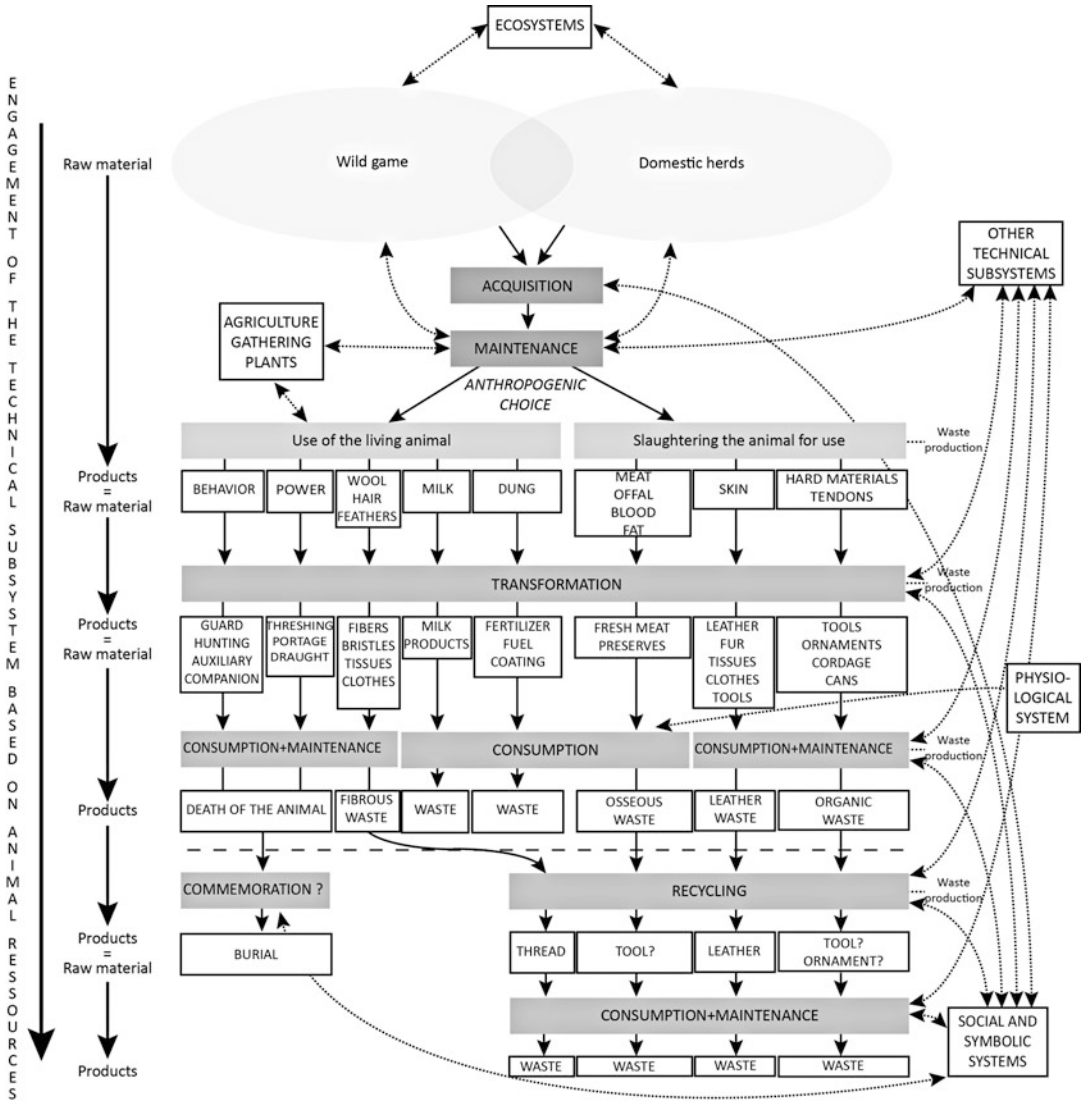

Animal Exploitation on Neolithic Sites in Central Germany, Fig. 1 Technical subsystem based on animal resources (Modified after Tresset 1996: Fig. 3; Vigne 1998: Fig. 1) integrating behavior, maintenance, and recycling

was partly contemporaneous with the Baalberge. From the Late Neolithic on, various cultural groups cohabited in this area, some occupied the same territory (Salzmünde, Walternienburg, Bernburg, Globular Amphora Culture – KAK), others avoided each other (Salzmünde and Tiefstich). These groups, except the KAK, were regional groups of the large Funnel Beaker Culture complex (TRB). The Final Neolithic is marked by the Schönfeld, the Corded Ware, and the Bell Beaker Cultures.

A Special Framework to Understand Social Change and Man–Animal Relationships

The Elbe-Saale region is an archaeo(zoo)logical well-documented area. In the last decades, the fauna from Early Neolithic sites was analyzed in detail (Müller 1964a; Döhle 1994) and several faunal studies exist for the Younger and Late Neolithic (consult the inventories in Döhle 1997; Höltkemeier 2016: 258). The first archaeozoological syntheses are devoted to the state of research (Döhle 1997; Benecke 2006)

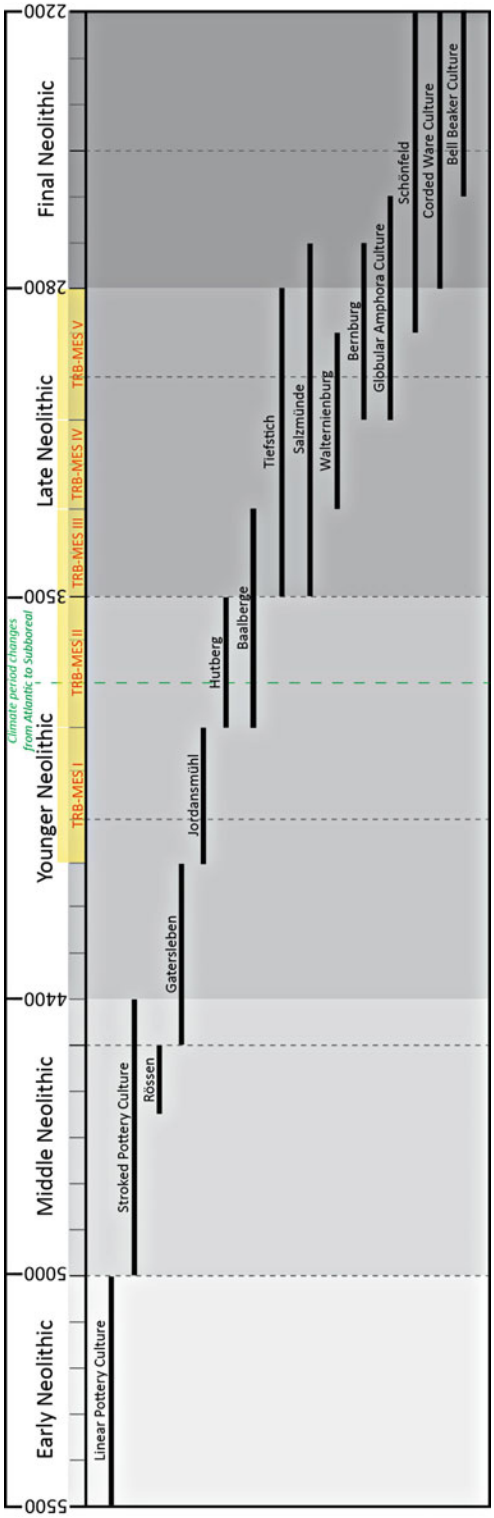

Animal Exploitation on Neolithic Sites in Central Germany, Fig. 2 Chronology for the Elbe-Saale region (MES) between 5500 and 2200 BC. Some cultural groups belong to the Funnel Beaker Culture complex (TRB)

and some supra-regional syntheses are concerned with specific issues, such as horse domestication (Uerpmann 1990; Benecke 2006). Recently, the fauna of two eponymous enclosures, Wallendorf "Hutberg" and Salzmünde "Schiepzig," were examined and placed in their regional context (Höltkemeier 2016). Moreover, DNA analyses revealed that the mare from Salzmünde is a domestic horse (Benecke et al. 2013).

Key issues currently debated are rather classical, as the characterization of subsistence economy, which can be based on hunting, gathering, or farming. More specifically, it is pointed out which animal species were used and why – for meat/milk/hair/draught or mixed exploitation. Not only used for economic purposes, animals can also have a particular social status and this can be reflected in the symbolic system. Other research topics are animal size and health, which provide information about the agropastoral practices and their conditions. An old theme still relevant is the differentiation of wild and domestic animals. Thanks to recent increases in data, these debates can be refined and research can be undertaken in the study area on specific practices, such as castration or traction, and their evolution during the Neolithic.

The Documentation and Its Limits

Fifteen archaeozoological studies for Neolithic settlements are considered and almost 40,000 identified bones are used for the analysis (Fig. 3). Sites with an uncertain chronological attribution are excluded from this inventory. The sites are mainly located in Saxony-Anhalt, in or near the Saale valley. Data disparities exist between them and also between chronological periods. Indeed, Krautheim is the site where most of the bones were discovered and the Late Neolithic is the best documented period in the current state of research. The data published by H.-H. Müller (1964a) are chronologically differentiated, but the faunal remains of each site are insufficient for comparisons between sites. Therefore, we have only an overview for the Early and Middle Neolithic sites. Eight cultural groups are represented: Linear and Stroked Pottery, Hutberg, Tiefstich, Salzmünde, Bernburg, Schönfeld, and Corded Ware. Unfortunately, only few data for the Younger Neolithic exist, resulting in a gap in data between Rössen and Jordansmühl. Faunal spectra, logarithm size index (LSI), gender distinction, paleopathology, age at death estimations based on teeth eruption and wear are used to compare the data. The detail of the applied methodology can be consulted in a PhD thesis chapter dedicated to this topic (Höltkemeier 2016: 70–116).

Animal Supply and Evolution of Subsistence Practices

In the Neolithic, animal food economy is based in the study area on farming and proportion of domestic animals is over 90% (Fig. 3). On the majority of sites, cattle are with over 50% the best represented species. At Niedergörne, fishing and mussel gathering are so significant that one might suggest that the site is specialized in these activities. At Eilsleben and Magdeburg Neue Neustadt, breeding is below the threshold of 90%. More specifically, at Eilsleben, Halle Dölauer Heide, and Quenstedt, cattle represent less than 50%. Sheep are much more prevalent than goats for all sites and this could reflect a special exploitation mode. In general, pigs are less important than sheep and goats. While caprines become economically less important at the end of the period, the proportion of pigs remains relatively stable.

Evolution of Size and Morphological Variability for Cattle, Sheep, and Pig

To apprehend the consequences of human intervention on animals and their size evolution, histograms and box plots based on LSI values are established. The values are obtained by species with osteometrical data from archaeological sites compared to measurements of a standard individual and are clustered by chronological period. The box plots are detailed by age class and anatomical part (limb, bone). The first version can reveal size changes during growth; the second version can indicate differences in skeletal proportions between the ancient population and the standard individual.

Cattle have the smallest size during the Younger Neolithic, with a LSI mean of −0.11 (Fig. 4). Between the Early and Middle Neolithic, their size increases slightly because the LSI mean

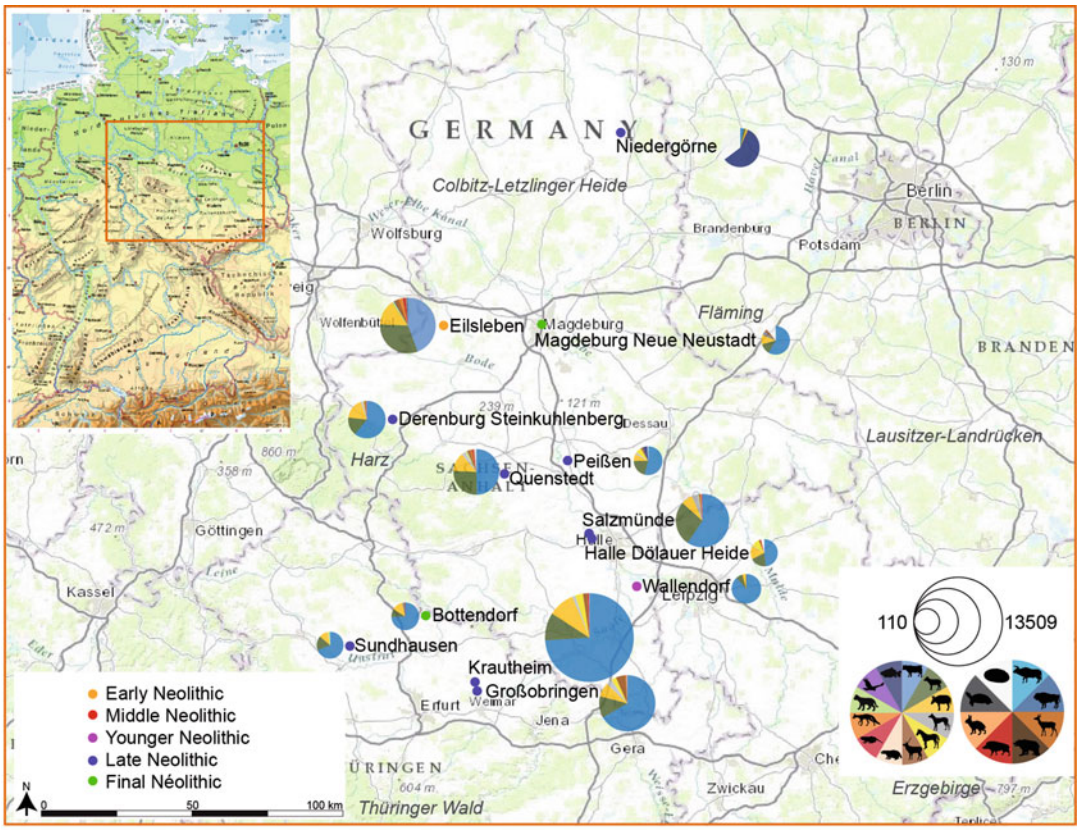

Site	Region	Chronology	NRd	% Dom.	% Wild	Author
Eilsleben	Saxony-Anhalt	Linear Pottery	4443	89,6	9,7	Döhle 1994
Several		Linear Pottery	3708	95,4	4,6	Müller H.-H. 1964a
Several		Stroked Pottery	1004	92,8	7,2	Müller H.-H. 1964a
Wallendorf	Saxony-Anhalt	Hutberg	544	99,6	0,4	Höltkemeier 2016
Salzmünde	Saxony-Anhalt	Salzmünde	4189	97,7	2,3	Höltkemeier 2016
Peißen	Saxony-Anhalt	Salzmünde	413	91,5	8,5	Becker 1999
Niedergörne	Saxony-Anhalt	Tiefstich	1986	6,4	93,6	Stolle et al. 1988
Halle Dölauer Heide	Saxony-Anhalt	Bernburg	214	93,5	6,5	Müller H.-H. 1978
Quenstedt	Saxony-Anhalt	Bernburg	3037	93,2	6,8	Müller H.-H. 1985
Derenburg-Steinkuhlenberg	Saxony-Anhalt	Bernburg	1762	97,4	2,6	Müller H.-H. 1964b
Großobringen	Thuringe	Bernburg	4596	93,45	6,55	Barthel 1985
Sundhausen	Thuringe	Bernburg	110	99,1	0,9	Walter 1990
Krautheim	Thuringe	Bernburg	13509	97,7	2,3	Benecke unpublished
Magdeburg Neue Neustadt	Saxony-Anhalt	Schönfeld	255	86,3	13,7	Teichert 1976
Bottendorf	Thuringe	Corded Ware	166	98,8	1,2	Clason 1971

Animal Exploitation on Neolithic Sites in Central Germany, Fig. 3 Studied sites of the Elbe-Saale region and proportions of their animal species

changes from −0.05 to −0.04. This could be related to a change of livestock compositions, with a higher number of bulls or even oxen, or could be due to an introduction of freshly domesticated individuals. In the Late Neolithic, few individuals reach the proportions of a female aurochs and those concerned are oxen. The data for the Final Neolithic are scarce; all of them are inferior to the standard individual. By comparing the data of cattle with them of Neolithic aurochs from the Elbe-Saale region, it appears that the LSI values around zero overlap, but that generally the aurochs is in terms of proportions higher than cattle, and this is value since the Early Neolithic. Moreover, changes are perceptible during growth. At the first age class (individuals aged less than 1 year), cattle grow up a little slower. Generally, bovine growth is rather homogenous

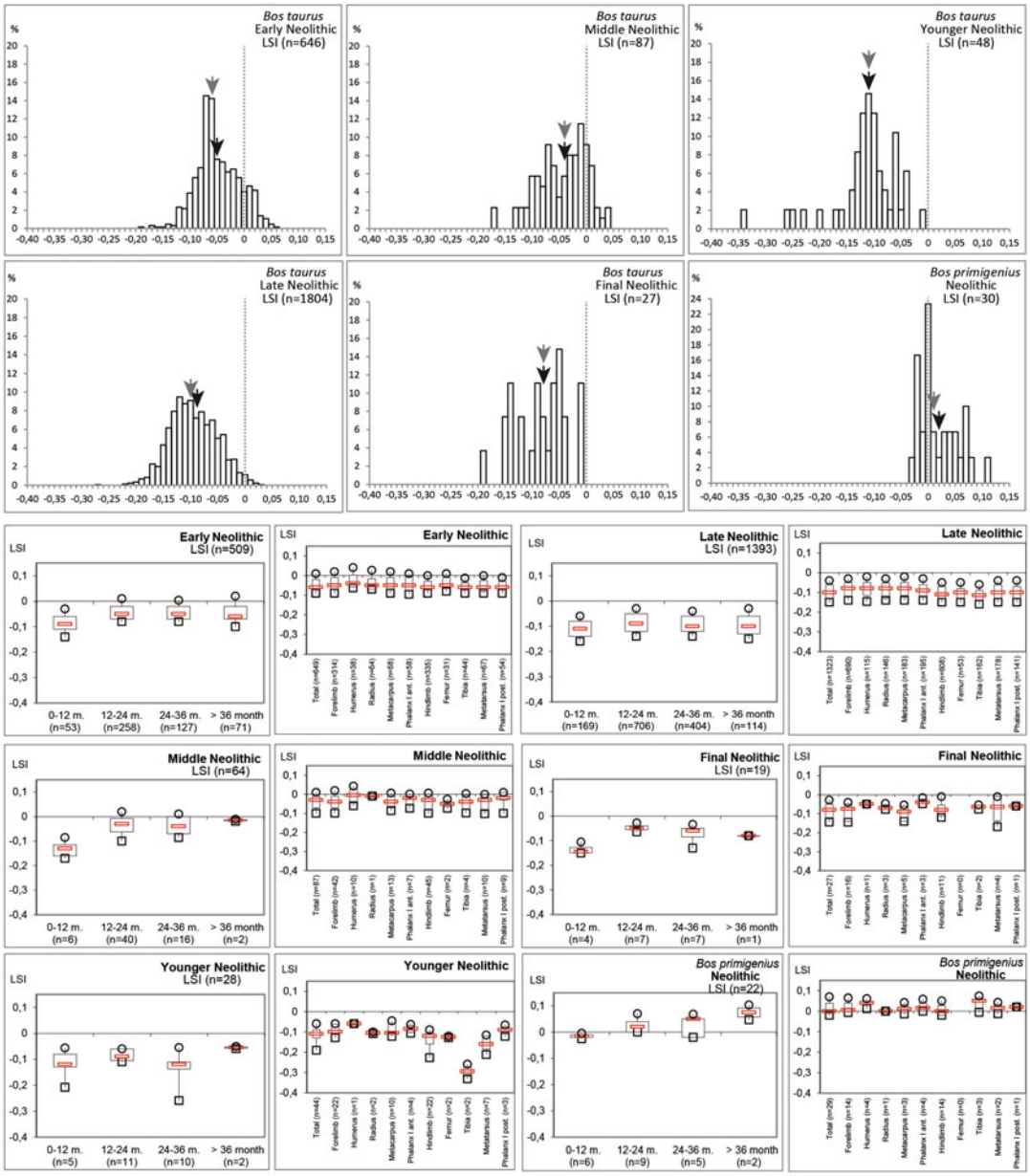

Animal Exploitation on Neolithic Sites in Central Germany, Fig. 4 Logarithm size index (LSI) distribution for cattle (*Bos taurus*) by chronological period and for Neolithic aurochs (*Bos primigenius*) from the studied sites. Indication of mean (black arrow) and median (gray arrow)

during the Early and Late Neolithic. During the Younger Neolithic, some low values exist for the age class 2–3 years. This could be a more pronounced proportional change caused by particular agropastoral practices.

Sheep are smaller in the Early Neolithic than in the Late Neolithic, because the LSI mean increases from −0.09 to −0.05 (Fig. 5). At the end of the period, large sheep are more abundant – the question is if this is due to an increase of males

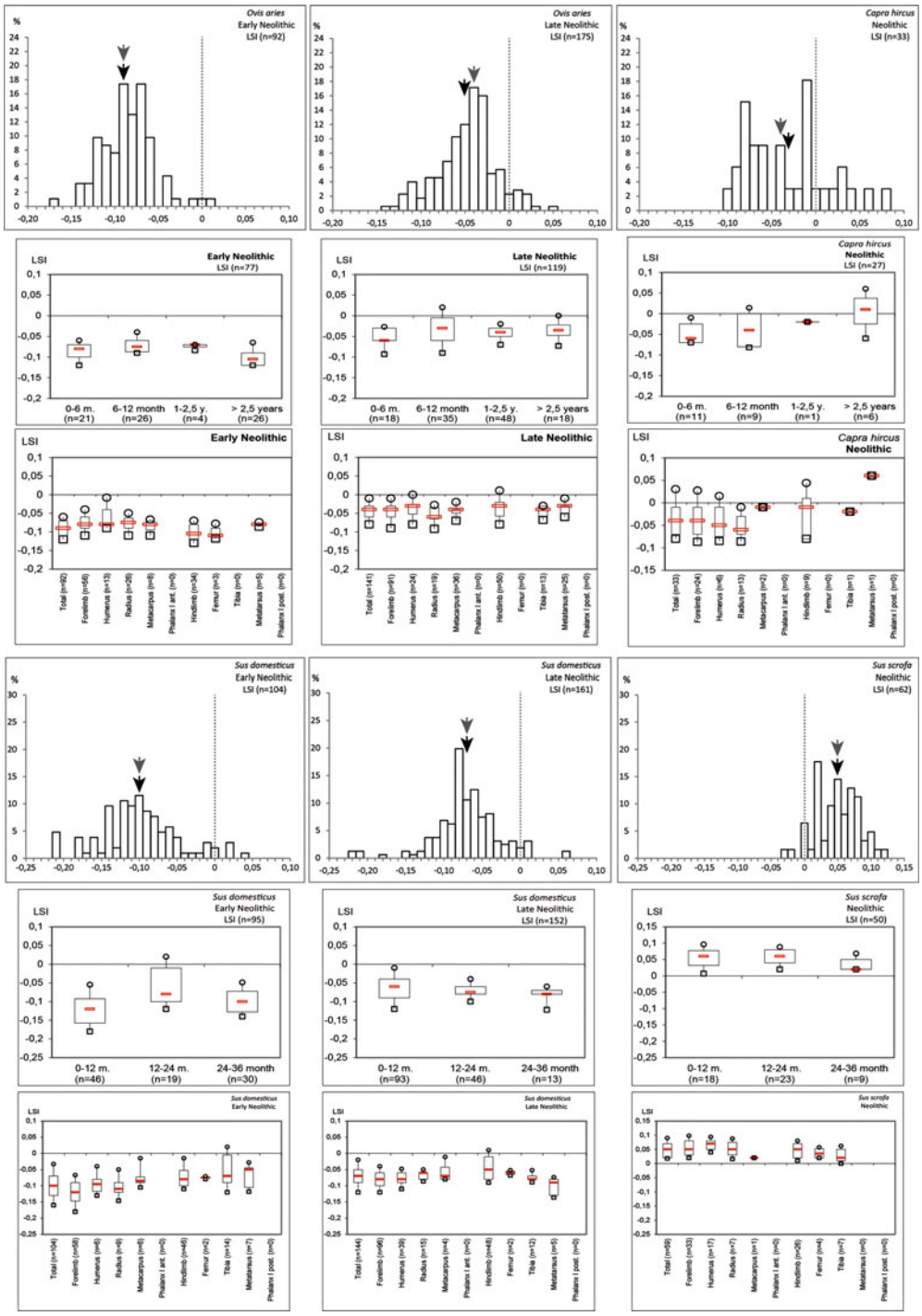

Animal Exploitation on Neolithic Sites in Central Germany, Fig. 5 Logarithm size index (LSI) distribution for sheep (*Ovis aries*) and pig (*Sus domesticus*) by chronological period and for Neolithic goat (*Capra hircus*) and wild boar (*Sus scrofa*) from the studied sites. Indication of mean (black arrow) and median (gray arrow)

within the herds or because of an introduction of new, larger sheep, which could be wool breeds? Even if the size of goats is overlapping with that one of sheep from the studied area, confusion between these two species can be excluded because the LSI values are based on specifically identified bones.

The data are sufficient to illustrate the morphological variability of pigs for the Early and Late Neolithic (Fig. 5). Their mean size increases from −0.10 to −0.07 and Linear Pottery pigs aged between 1 and 2 years grow up a little faster. Compared to a male boar, the hindlimbs are slightly larger than the forelimbs, which could be related to a selection of individuals with well-developed posteriors. The pigs are proportionally similar but are taller than Neolithic local wild boars. Thus, these data do not argue in favor of hybridization between pigs and local wild boars.

The Herd Management Reveal a Varied Animal Exploitation

To find out how Neolithic settlers handle their livestock in this region and to know for what purposes the different species are raised, slaughter ages, gender distinction, and animal health were analyzed.

It turns out that animal husbandry practices are relatively well developed. The castration of bulls is possible for the Younger Neolithic, at Wallendorf, and is certain for several Late Neolithic sites (Fig. 6). This activity is even proposed for Early Neolithic cattle, as, for example, at Hohlstedt (Müller 1964a: 16–17). Bulls are castrated to provide a large supply of tender meat, as at Quenstedt, and to get docile individuals for traction, as at Salzmünde. On this enclosure, cattle are primarily raised for their meat and their draught power and secondarily for their milk. Slaughtering peaks for calves aged less than 1 year are observed for one Younger Neolithic site and some Late Neolithic sites. These peaks reflect the practice of post-lactation, which means the slaughtering of calves at the time of their weaning (Tresset 1996: 80–83). Milk exploitation is also demonstrated by a high slaughtering of cows aged between 4 and 6 years, whose milk production decreases. This is well illustrated at Krautheim. The herd composition is variable with one bull for one cow (Quenstedt) to one bull for three cows (Wallendorf, Salzmünde). At Krautheim, the sex ratio is almost in equilibrium if the oxen are considered but stands at one male for ten females if the castrated individuals are excluded.

At least during the Bernburg period, rams are castrated for meat and/or textile exploitation, as at the enclosures of Krautheim, Quenstedt, and Großobringen (Fig. 6). The exploitation can be "type A" or "B" for milk or meat, with a preference for quality in the first case and for quantity in the second case. For example, a "type B milk exploitation" is coupled to a "type A meat exploitation" at Salzmünde and Krautheim. Moreover, sheep are raised for their hair at Salzmünde and Großobringen. The herd is composed of three males for one female at Salzmünde and by one ram for five eves at Großobringen.

Cattle and sheep are raised for mixed exploitation, although some sites are apparently more specialized, especially during the Late Neolithic. For example, meat exploitation predominates at Quenstedt, Krautheim is more involved in dairy products, and at Salzmünde, cattle are used for traction and sheep for textiles.

Pigs are the choice suppliers of meat, because their gross return on slaughter is higher than cattle or caprines. Yet this species seems to be less important on most sites, supporting the hypothesis that the need for other products is essential in this region. Providing tender meat is the main objective of pig breeding, and this is valuable since the Early Neolithic. For example, at Eilsleben, half of the herd is slaughtered under the age of one year (Döhle 1994: 72). This is comparable with Wallendorf and Quenstedt, where the herds are sharply reduced before the sexual maturity of females (Fig. 7). On other Late Neolithic sites, some older sows are kept for reproduction. Gender distribution is balanced on almost all sites. Occasionally, males can even be more abundant than females, as during the Younger Neolithic.

Skeletal alterations on bovine bones are known since the Early Neolithic. Indeed, an acetabulum with a polished surface (in German "*Schliffusur*") in the pubis part comes from the enclosure Eilsleben (Döhle 1994: 53) and enlarged bones are also mentioned (Müller 1964a). For the

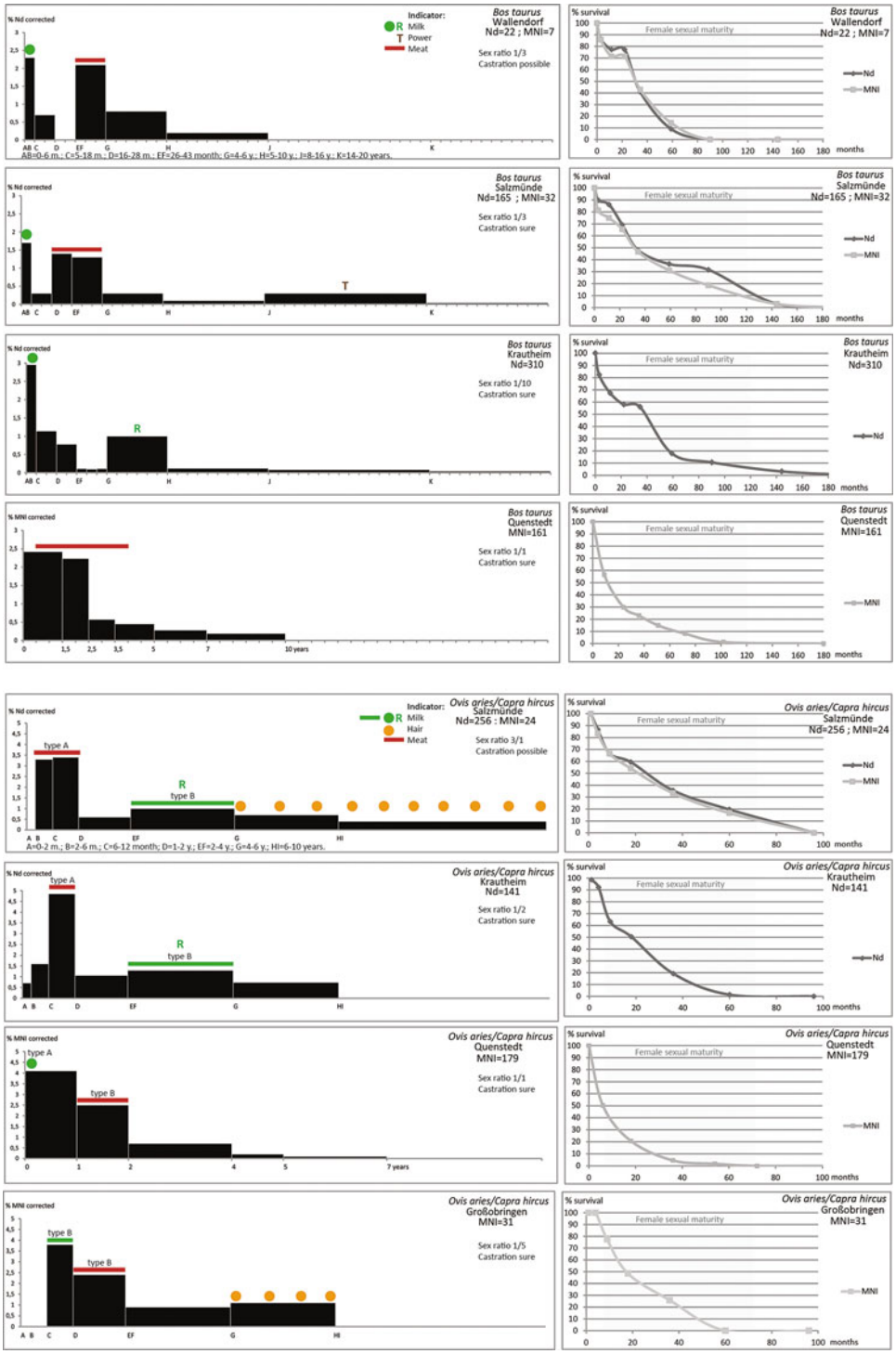

Animal Exploitation on Neolithic Sites in Central Germany, Fig. 6 Slaughter profiles (at left) and survival curves (at right) based on teeth (Nd) or minimum number of individual animals (MNI) for cattle (*Bos taurus*) and caprines (*Ovis aries/Capra hircus*)

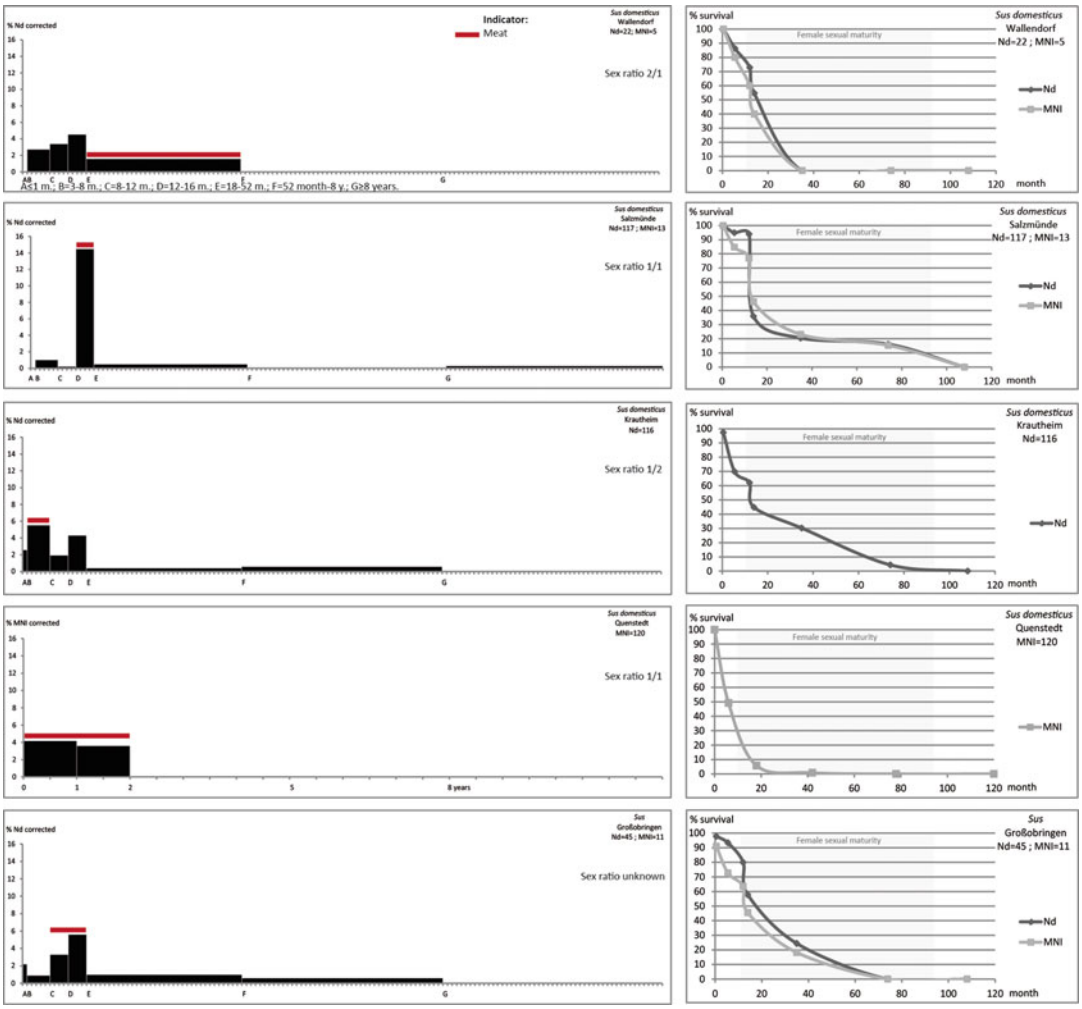

Animal Exploitation on Neolithic Sites in Central Germany, Fig. 7 Slaughter profiles (at left) and survival curves (at right) based on teeth (Nd) or minimum number of individual animals (MNI) for pigs (*Sus domesticus*)

Younger Neolithic, cattle phalanxes from Wallendorf are enlarged and have exostoses (Fig. 8). However, these anomalies become really frequent during the Late Neolithic, because many cases exist on a number of sites. For example, 28 bones from Salzmünde are affected by pathological deformations reflecting skeletal stress. Concerned are the scapula, coxal, femur, metapodials, and phalanxes. Figure 8 shows among other bones a femoral head with a little *Schliffusur*. At Peißen, a metatarsal condyle is enlarged (Becker 1999), at Großobringen, eight Phalanx I have exostoses (Barthel 1985), and at Quenstedt, six acetabula are affected by a coxarthrosis (Müller 1985). Calculating the pathological index is a rather recent method and could only be applied for Wallendorf and Salzmünde; their respective mean values are 0.23 and 0.36 (Höltkemeier 2016). Otherwise, the three main domestic species (cattle, sheep, pigs) show some dental anomalies, and bone fractures are observed since the Early Neolithic for cattle and caprines and since the Late Neolithic for cattle, caprines, pigs, and dogs.

Animals Used in the Symbolic Sphere

More than a mere supplier of raw materials, an animal can be perceived differently by men. It is

Animal Exploitation on Neolithic Sites in Central Germany, Fig. 8 Cattle bones from Wallendorf "Hutberg" (at left) and Salzmünde "Schiepzig" (at right) with anomalies due to skeletal stress (Photo: S. Höltkemeier)

not only part of the technical system but also of the symbolic system and both are linked (Fig. 1). The symbolic system can inform us about mental representations which humans had for animals and about the social value that they gave to them.

In the Elbe-Saale region, a new activity has particularly affected the Neolithic people – animal traction. This is reflected by cattle depositions, which occur since the Salzmünde cultural group. Often, these are buried pairs of adult cattle, placed side by side or face to face, and which can be cows, bulls, or oxen. In some cases, they are associated with human graves. In the current state of research, this practice is most recurrent in the study area during the Amphora Globular Culture, but it persists during the Corded Ware Culture and the Schönfeld cultural group. Other more classical depositions exist also, like animal parts, especially animal skulls. Cattle are the most common species, but there are also dog, sheep, pig, horse, and some wild animals, such as red deer and fox. Depositions of animal parts are often intentional deposits in a funerary context, fire and destruction can play a role in funerary rites, as at Salzmünde (Höltkemeier 2016: 299–302).

Future Directions

In order to contribute to the wide-ranging debate about dating and diffusion of new agropastoral activities, it is fundamental to adopt a holistic approach. This is carried out with a fine characterization of the technical subsystem based on animal resources. Using effective methods enables us to understand several aspects of man–animal relationships. Consideration of other archaeological data related to this subject, such as iconographic elements (as harness representations of animals) or artefacts linked to a specific exploitation (such as cheese vessels, yokes) can support the archaeozoological results and replace them in a larger context, in order to apprehend the connections between people and their environment.

The obtained regional synthesis shows aspects of animal exploitation in the Elbe-Saale region and its development through the period between 5500 and 2200 BC. However, the study requires further refinement and extension. Therefore, more archaeozoological data for the poorly documented periods (Younger and Final Neolithic) must be acquired, which implies future excavations. Moreover, it would be interesting to examine the

role of cattle in Neolithic landscape transformation, with interdisciplinary research. Future work with DNA and stable isotopes will be necessary to confirm the presence of sheep wool breeds and milk exploitation on some specialized sites.

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Animal Paleopathology
- ▶ Archaeology of Animal Burials
- ▶ Secondary Products and the "Secondary Products Revolution"
- ▶ Social Zooarchaeology
- ▶ Zooarchaeology

References

Barthel, H.-J. 1985. Die Tierreste aus einer "Grabenanlage" der neolithischen Bernburger Kultur. In *Beitrage zur Archäozoologie III (Weimarer Monographien zur Ur- und Frühgeschichte 13)*, ed. H.-J. Barthel and M. Teichert, 59–101. Weimar: Museum für Ur- und Frühgeschichte Thüringens.

Becker, C. 1999. Neue Tierknochenanalysen zum Spätneolithikum des Mittelelbe-Saale-Gebietes. In *Radiokarbonchronologie, Keramiktechnologie, Osteologie, Anthropologie, Raumanalysen. Beiträge zum Neolithikum und zur Frühbronzezeit im Mittelelbe-Saale-Gebiet (Bericht der Römisch-Germanischen Kommission 80)*, ed. J. Müller, 91–121. Mainz: Von Zabern.

Benecke, N. 2006. Late prehistoric exploitation of horses in Central Germany and neighboring areas: The archaeozoological record. In *Horses and humans: The evolution of the human-equine relationships (BAR International series 1560)*, ed. S.L. Olsen, S. Grant, A.M. Choyke, and L. Bartosiewicz, 195–208. Oxford: Archaeopress.

Benecke, N., H.-J. Döhle, A. Ludwig, M. Reißmann, and S. Wutke. 2013. Zu den Anfängen der Pferdehaltung in Mitteldeutschland. In *3300 BC. Mysteriöse Steinzeittote und ihre Welt*, ed. H. Meller, 95–97. Mainz: Nünnerich-Asmus.

Clason, A.T. 1971. Die Jagd- und Haustiere der mitteldeutschen Schnurkeramik. *Jahresschrift für mitteldeutsche Vorgeschichte* 55: 105–112.

Döhle, H.-J. 1994. Die linienbandkeramischen Tierknochen von Eilsleben, Bördekreis. In *Ein Beitrag zur neolithischen Haustierhaltung und Jagd in Mitteleuropa (Veröffentlichungen des Landesamtes für Archäologische Denkmalpflege Sachsen-Anhalt 47)*. Halle: Landesmuseum für Vorgeschichte.

Döhle, H.-J. 1997. Zum Stand der Untersuchungen an neolithischen Tierknochen aus Mitteldeutschland. *Jahresschrift für mitteldeutsche Vorgeschichte* 79: 111–147.

Höltkemeier, S. 2016. L'exploitation animale au IVe millénaire avant notre ère en Allemagne centrale : les sites de Wallendorf et Salzmünde dans leur contexte régional. Unpublished PhD dissertation, Paris 1 – Panthéon-Sorbonne University.

Lüning, J. 1996. Erneute Gedanken zur Benennung der neolithischen Perioden. *Germania* 74: 233–237.

Müller, H.-H. 1964a. *Die Haustiere der mitteldeutschen Bandkeramiker (Schriften der Sektion für Vor- und Frühgeschichte 17)*. Berlin: Akademie Verlag.

Müller, H.-H. 1964b. Vorläufiger Bericht über die Untersuchung des Knochenmaterials von Derenburg-Steinkuhlenberg. Report prepared for Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt, Halle.

Müller, H.-H. 1978. Tierreste aus einer Siedlung der Bernburger Gruppe bei Halle (Saale). *Jahresschrift für mitteldeutsche Vorgeschichte* 62: 203–220.

Müller, H.-H. 1985. Tierreste aus Siedlungsgruben der Bernburger Kultur von der Schalkenburg bei Quenstedt, Kr. Hettstedt. *Jahresschrift für mitteldeutsche Vorgeschichte* 68: 179–220.

Müller, J., J.-P. Brozio, D. Demnick, H. Dibbern, B. Fritsch, M. Furholt, F. Hage, M. Hinz, L. Lorenz, D. Mischka, and C. Rinne. 2012. Periodisierung der Trichterbecher-Gesellschaften. Ein Arbeitsentwurf. In *Siedlung, Grabenwerk, Großsteingrab. Studien zur Gesellschaft, Wirtschaft und Umwelt der Trichterbechergruppen im nördlichen Mitteleuropa (Frühe Monumentalität und soziale Differenzierung 2)*, ed. M. Hinz and J. Müller, 29–33. Bonn: R. Habelt.

Stolle, T., N. Benecke, and J. Beran. 1988. Zwei Siedlungsgruben der altmärkischen Gruppe der Tiefstichkeramik mit zahlreichen Tierresten von Niedergörne, Kr. Stendal. *Jahresschrift für mitteldeutsche Vorgeschichte* 71: 37–55.

Teichert, L. 1976. Haus- und Wildtierknochenreste aus Siedlungen und Gräberfeldern der Schönfelder Gruppe. *Jahresschrift für mitteldeutsche Vorgeschichte* 60: 432–455.

Tresset, A. 1996. Le rôle des relations homme/animal dans l'évolution économique et culturelle des sociétés des Ve et IVe millénaires en Bassin parisien: approche ethnozootechnique fondée sur les ossements animaux. Unpublished PhD dissertation, Paris 1 – Panthéon-Sorbonne University.

Uerpmann, H.-P. 1990. Die Domestikation des Pferdes im Chalkolithikum West- und Mitteleuropas. *Madrider Mitteilungen* 31: 109–153.

Vigne, J.-D. 1998. Faciès culturels et sous-systèmes techniques de l'acquisition des ressources animales. Application au Néolithique ancien méditerranéen. In *Production et identité culturelle: actualité de la recherche*, ed. A. D'Anna and D. Binder, 27–45. Antibes: Éditions APDCA.

Walter, D. 1990. Eine befestigte Siedlung der Bernburger Kultur mit Brunnen bei Sundhausen, Kr. Nordhausen. *Ausgrabungen und Funde* 35 (5): 223–233.

Further Reading

Bartosiewicz, L., W. Van Neer, and A. Lentacker. 1997. *Draught cattle: their osteological identification and history (Annalen Zoologische Wetenschappen 281)*. Tervuren: Koninklijk Museum voor Midden-Afrika.

Behrens, H. 1964. *Die neolithisch-frühmetallzeitlichen Tierskelettfunde der Alten Welt*. In *Studien zu ihrer Wesensdeutung und historischer Problematik (Veröffentlichungen des Landesmuseums für Vorgeschichte in Halle 19)*. Berlin: Deutscher Verlag der Wissenschaften.

Behrens, H. 1973. *Die Jungsteinzeit im Mittelelbe-Saale-Gebiet (Veröffentlichungen des Landesmuseums für Vorgeschichte in Halle 27)*. Berlin: Deutscher Verlag der Wissenschaften.

Benecke, N. 1994. *Archäozoologische Studien zur Entwicklung der Haustierhaltung in Mitteleuropa und Südskandinavien von den Anfängen bis zum ausgehenden Mittelalter (Schriften zur Ur- und Frühgeschichte 46)*. Berlin: Akademie Verlag.

Childe, V. Gordon. 1936. *Man makes himself*. London: Watts.

Demoule, J.-P., ed. 2009. *La révolution néolithique dans le monde*. Paris: CNRS éditions.

Gronenborn, D., and J. Petrasch, eds. 2010. *Die Neolithisierung Mitteleuropas. The spread of the Neolithic to central Europe (RGZM-Tagungen 4)*. Mainz: Verlag des Römisch-Germanischen Zentralmuseums.

Guilaine, J., and P.-L. Van Berg, eds. 2006. *The Neolithisation Process (BAR International series 1520)*. Oxford: Archaeopress.

Hinz, M., and J. Müller, eds. 2012. *Siedlung Grabenwerk Großsteingrab. Studien zu Gesellschaft, Wirtschaft und Umwelt der Trichterbechergruppen im nördlichen Mitteleuropa (Frühe Monumentalität und soziale Differenzierung 2)*. Bonn: R. Habelt.

Lichardus, J., M. Lichardus-Itten, G. Bailloud, and C. Cauvin. 1985. *La Protohistoire de l'Europe: Le Néolithique et le Chalcolithique entre la Méditerranée et la mer Baltique (Nouvelle Clio 1 bis)*. Paris: Presses universitaires de France.

Midgley, M.S. 1992. *TRB culture. The first farmers of the North European Plain*. Edinburgh: University Press.

Müller, J. 2001. *Soziochronologische Studien zum Jung- und Spätneolithikum im Mittelelbe-Saale-Gebiet (4100-2700 v. Chr.). Eine sozialhistorische Interpretation prähistorischer Quellen (Vorgeschichtliche Forschungen 21)*. Rahden: M. Leidorf.

Russel, N. 2012. *Social Zooarchaeology: humans and animals in Prehistory*. Cambridge: University Press.

Sherratt, A. 1981. Plough and pastoralism: Aspects of the secondary products revolution. In *Pattern of the past*, ed. I. Hodder, G. Isaac, and N. Hammond, 261–305. Cambridge: University Press.

Vigne, J.-D., J. Peters, and D. Helmer, eds. 2005. *The first steps of animal domestication. New archaeological approaches*. Oxford: Oxbow Books.

Vigne, J.-D., and D. Helmer. 2007. Was milk a "secondary product" in the Old World Neolithisation process? Its role in the domestication of cattle, sheep and goats. *Anthropozoologica* 42 (2): 9–40.

A

Animal Paleopathology

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Introduction

A relationship is a two-way entity. The different partners within it influence each other to a greater or lesser extent. So it is true for the long history of human-animal relationships (Fig. 1): each has affected the individual lives, and also the historical trajectories of whole populations, of the other. It is these stories that animal paleopathology can elucidate. The domestication of animals, for example, changed the course of development of human society and economy and in doing so affected human health and disease. Bringing animals together in larger, denser herds, in close association with human communities, would have changed the ecology of infectious diseases for both parties.

Definition

Animal paleopathology is the study of health, disease, and injury in past animal populations from the analysis of preserved hard and soft tissues. It is concerned primarily with the bones and teeth routinely recovered from archaeological sites but can also include studies of soft tissues

Animal Paleopathology, Fig. 1 Example of a human-animal relationship: a man travelling by donkey (modern Greece). (Photo: author)

(mummified remains; bog bodies) and articulates with a range of related research areas, such as paleoparasitology, paleodiets, molecular biology, veterinary medicine, and human paleopathology. Through studies of skeletal abnormalities and alterations related to disease and injury, a range of interpretations can be formed and forwarded relating to past economies and societies, environments and living conditions, animal husbandry techniques, and disease ecology.

Key Issues/Current Debates/Future Directions/Examples

The current state of the discipline of animal paleopathology and several of the key issues under debate (in particular those relating to methodology) are perhaps best viewed and understood through a brief retrospective on the discipline.

Methodological Problems and Biases

In considerations of the state of the discipline, parallels are often drawn with its close relative, human paleopathology (O'Connor 2000: 98; Thomas and Mainland 2005). Human paleopathology is a discipline reaching back into the nineteenth century. It is a mature subject, with well-established and consistently applied protocols and methodologies. Animals were included in paleopathological reviews in the earlier twentieth century, but it was only from the 1960s, with the work of such specialists as R.A. Harcourt and D.R. Brothwell, that the foundations of animal paleopathology really began to take off. The publication in 1980 of a general textbook on the subject by Baker and Brothwell (1980) is widely recognized as a seminal moment for animal paleopathology. This volume, a collaborative work between a veterinary pathologist and a zooarchaeologist, reviewed the potentials of the discipline and the abnormalities that might be identifiable within zooarchaeological assemblages. In the subsequent decades, animal paleopathology has developed slowly and rather erratically, and in comparison to human paleopathology, methodologies have unfortunately not been applied consistently to studied material (Thomas and Mainland 2005; Upex and Dobney 2012).

The discipline developed into a situation where common practice was to publish "interesting specimens" (Upex and Dobney 2012). On the one hand, these publications can be useful as

they raise the profile of certain recognizable disorders to the wider zooarchaeological community, hopefully encouraging their future recognition; on the other hand, the absence of proper articulation with their full context, and other forms of archaeological evidence, limits their broader importance. This general approach has been linked with relatively limited publication of prevalence rates (the number of cases of disease or infection in relation to the unit of population in which they occur). It is important to synthesize and compare data to understand geographical and chronological variability. To this end, prevalence rates should be routinely calculated and published. The lack of standardization has led to a situation where studies are not often comparable; even more problematic is the fact that pathology is not always recorded or reported.

This lack of methodological refinement and systematic application has been attributed to several factors (Thomas and Mainland 2005). Most zooarchaeological assemblages consist of disarticulated and fragmented skeletal elements, and complex taphonomic processes (differential destructive processes associated with slaughter, butchery, cooking, consumption, and discard behaviors) further bias the recoverable data (Bartosiewicz 2008). These factors, often resulting in pathological bones being separated from the context of the whole individual, mean that there are often multiple etiologies for a single pathological lesion type. Linked to taphonomy, it is the case that some pathologies are more likely to survive than others.

Full understanding of pathologies is not supported by control studies in modern populations. There are further methodological problems related to the identification, recording, and interpretation of pathologies. One key problem, for instance, is determining what should be considered "normal" (O'Connor 2000: 107). As the premise of paleopathology rests upon identifying, quantifying, and interpreting abnormal alteration from a healthy state, we need to understand the full range of normal variation that might occur. Modern comparative studies of known life history populations will help in the assessment of what is "normal" and what is pathological and will be able to improve knowledge on conditions that remain poorly understood (O'Connor 2000; Thomas and Mainland 2005).

The inconsistent application of paleopathological research may perhaps be viewed in the context of the variability in methodologies applied in zooarchaeological research more generally (due to differing research agendas, project aims, personal research interests, publication space, and financial/time constraints). Pathologies tend to be an infrequent occurrence in zooarchaeological assemblages and may not be prioritized for research. Problems may also stem from a lack of familiarity with veterinary medicine research and also with the archaeological relevance of the diversity of pathological lesions. In many senses the discipline has been a story of unrealized potential to date, and studies have been somewhat sidelined, although they can contribute key information in relation to the human past (discussed below).

The discipline, however, has seen significant advances in the last 20 years or so, in the development and application of methodology, occurring alongside a number of developments promoting animal paleopathological research and publication. Established in 1999, the *Animal Palaeopathology Working Group* of the *International Council for Archaeozoology* was founded to address the problems discussed above, especially the integration of paleopathological data with other forms of evidence; improvement in recording practices and their systematic application; and improvement in the knowledge of the underlying biological processes and consequences of disease and injury. Further, 2011 saw the launch of the *International Journal of Paleopathology*, a journal dedicated to the publication of both human and animal disease.

The Functioning of Economies and Societies

Animals have been, and are, a central part of human existence: they are part of our economies, providing dietary staples and physical work; we form emotional attachments to them; and through our close associations, we share diseases with them. Animal paleopathological research can inform on all of these broad themes.

Until the mechanization of wheeled vehicles, animal power played an essential role in land transport, agricultural production, and warfare. Their use thus had major repercussions on human society and economy with cattle plowing, for example, allowing the intensification of agriculture, and horse riding bringing into human use an animal that revolutionized how people could travel, communicate, and fight each other. Pathological changes occurring in the skeletons of animals used for transport and work can provide evidence of these past uses.

Bone skeletal elements undergo adaptive remodeling in response to increased functional strain – essentially bone deposition is stimulated by extra forces acting on the skeletons (Fig. 1). This can produce joint arthropathies in animals used for work (Fig. 2), although it is the case that such morphological changes also develop as a function of other factors, such as age, sex, body weight, work undertaken, living conditions, and genetic predisposition (Bartosiewicz et al. 1997; O'Connor 2000: 99–101). It is only through the study of collections of modern skeletons with known life history that it will be possible to understand the different influences of the separate factors. Study of such comparative, control populations has contributed to the development of criteria usable to explore the identification of the human use of animals for work in the past, such as the use of cattle for traction (e.g., Bartosiewicz et al. 1997) and the horse for transportation (e.g., Bendrey 2007; Fig. 3). These criteria need to be robustly tested and revisited with reference to new and more diverse control collections to assess their validity, for example, current debates over the reliability of different methods for identifying bitting damage in horses (Bendrey 2007) will hopefully continue as methods are improved and refined.

Again, a further complicating problem with such studies is that as most zooarchaeological material recovered is both disarticulated and fragmentary, it is difficult to assign specific ages or sexes to pathologies in such material, making it harder to assess the separate possible factors influencing individual cases. Complete skeletons can often give more detailed, nuanced assessments.

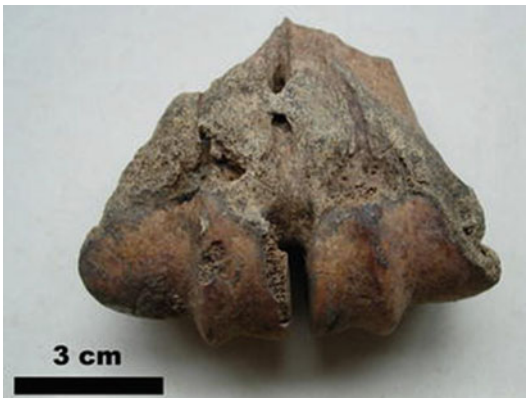

Animal Paleopathology, Fig. 2 Cattle metacarpal from Roman Canterbury (England) displaying degenerative changes to the distal epiphysis, with splayed distal condyles and peripheral exostoses. (Photo: author)

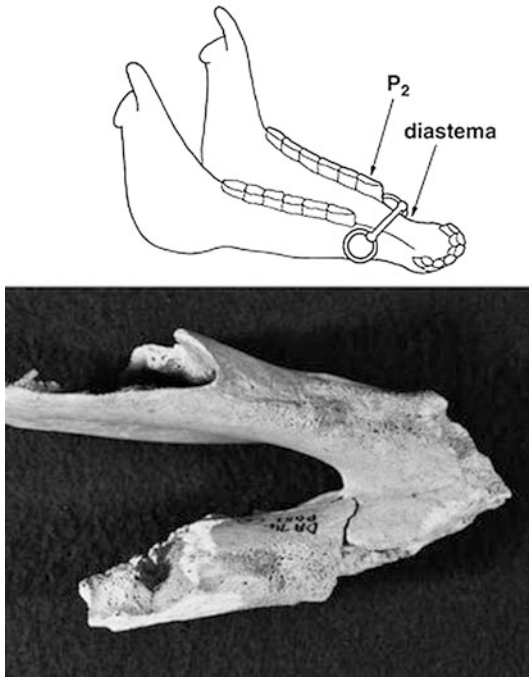

Animal Paleopathology, Fig. 3 Identifying horses used for transport: above – the position of the bit relative to the mandible in the horse's mouth; below – both reactive new bone deposition and bone destruction on left and right mandibular diastemata of a horse from Iron Age Danebury (England) interpreted as a bit-induced pathology. (Photo: author)

Cultural attitudes towards animals can also be revealed through the study of pathologies (MacKinnon 2010). Traumatic injuries, for example, can give insights into possible cases of accident, abuse, "occupational" injury, care, and treatment of "pets." Dogs, for example, may be susceptible to both abusive injury by humans and "occupational" injuries received during hunting or herding (Fig. 4). In such studies, recorded fracture prevalence rates will be an underestimate of the true prevalence, and it is also difficult to distinguish between accidental and deliberate injuries (which is most reliably assessed through cases where traumata distributions are studied in complete skeletons) (Groot 2008). Again, to interpret archaeological data, it would be useful to have modern control data for known populations, such as the prevalence of fracture rates in working populations of dogs (Thomas and Mainland 2005).

Environments and Living Conditions

Knowledge of past animal health and disease articulates with, and informs on, that of broader ecology and environment. This can encompass the broader regional environmental context of the animals (e.g., climate and ecology) and also "local" context (e.g., housing, penning, etc.). Diet, a key aspect of animal ecology, directly affects skeletal development.

In recent years, a considerable research focus has been directed at recording and interpreting finds of enamel hypoplasia – an interruption or disturbance in the formation of enamel (Fig. 5). This developmental defect is associated with physiological stress during the growth of the tooth crown. Research has shown that it can be due to a range of factors causing stress on the animal, especially developmental (e.g., weaning), nutritional (e.g., seasonal malnutrition), and disease (e.g., parasite load). In zooarchaeology, most work has been undertaken on the low-crowned

Animal Paleopathology, Fig. 4 Photograph (left) and X-ray (right) of a healed double fracture of a Roman right dog radius and ulna from Tiel-Passewaaij (the Netherlands). (Photo: courtesy of Dr. Maaike Groot)

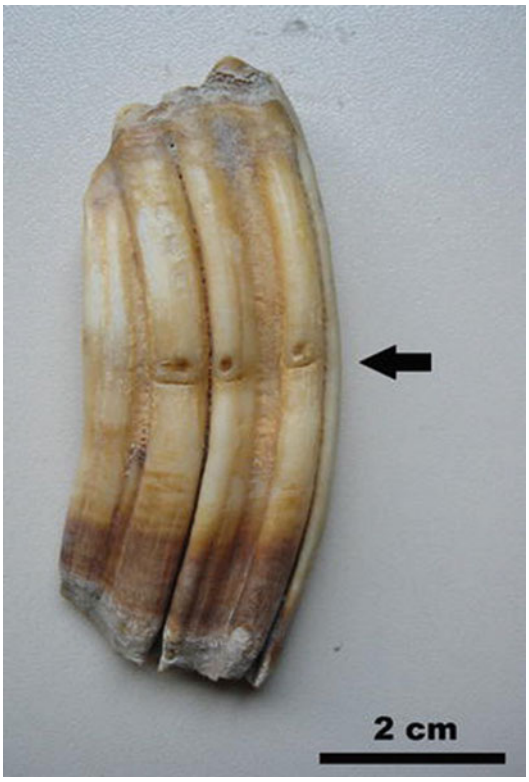

Animal Paleopathology, Fig. 5 Linear and pitlike enamel hypoplasia on an Iron Age horse lower third molar (M_3) from Tsengel Khairkhan (Mongolian Altai). (Photo: author)

teeth of pigs; however recent work has begun to address the study of enamel hypoplasia on high-crowned species, such as caprines (sheep and goats) (Upex and Dobney 2012). The prevalence of enamel hypoplasia, for example, has been shown to vary according to climatic and ecological factors in a study comparing modern caprine teeth between a semiarid and a (moister) mesic environment in Kenya (Balasse et al. 2010).

Studies of enamel hypoplasia can also inform on animal husbandry. In the study of pig remains covering some two millennia at Neolithic Çayönü Tepesi, in south-east Turkey, Ervynck et al. (2002) identified a gradual increase in enamel hypoplasia through time, along with a trend towards younger animals at death and smaller body size. They interpreted this as a gradual increase in physiological stress in pig populations due to the domestication process and animal husbandry pressures.

Markers indicative of the animals' physical environment may be preserved on the bones. The condition known as "penning elbow" – consisting of new bone (osteophyte) deposition on the lateral side of sheep humero-radial joints – is so-called as it is often considered to be a result of trauma to the outside of the joint from husbandry practices such as penning or handling (Baker and Brothwell 1980: 127; Upex and Dobney 2012; 202–203). However, recent work on comparative modern sheep populations from North Ronaldsay (Scotland) indicates that the incidence of these lesions may not be related exclusively to husbandry practices but also to environment, joint morphology, and possibly age (Clark 2009). This study of sheep from two contrasting environments on the island indicated that the lesion may also be related to the environment and that repeated minor shocks, as might be expected from movements over rocky ground, may produce the lesion.

Animal Breeding and Husbandry

Animal management and husbandry techniques lie at the intersection of economic and cultural decisions, domestic animal physiology and behavior, and local (and wider) environmental contexts. Evidence for these practices, as discussed above, can leave various traces in animal skeletons linked to both individual lifetime events (e.g., weaning) and habitual lifestyle and behavior (e.g., grazing terrain). Other conditions may potentially contribute to understanding of the housing and feeding of animals, such as evidence for rickets or malnutrition (Baker and Brothwell 1980: 43–52). At the population level, selective breeding for certain desired traits can have detrimental effects by the unconscious concomitant selection of other detrimental congenital traits which can be identifiable in skeletal remains (Baker and Brothwell 1980: 40–42; Upex and Dobney 2012: 204–205).

Infectious Diseases and Disease Ecology

Changes in disease ecology and the incidence of infectious diseases affecting humans and animals will have been important consequences of changing human-animal relationships through time. A range of cultural, social, biological, and environmental variables will have impacted upon the epidemiology of infectious diseases in the past. Examples of the significant effects of the transmission of infectious organisms between contiguous animal and human communities are well known, as in the medieval plague epidemics in Europe caused by the bacterium *Yersinia pestis*.

Animals are, and have been, an important vector for the transmission of infectious diseases to humans, and the study of animal paleopathology can therefore inform our understanding of the disease ecology of past human communities. Domestication events can be seen as pivotal moments in these stories, for example, the number of shared diseases between humans and domestic animals increases in relation to the length of time since domestication (Horwitz and Smith 2000). The intensification of human-animal relationships through the domestication processes provided the routes for disease transmissions. The health implications of infectious diseases for past animals may also potentially provide valuable insights into past economies (e.g., losses associated with illness and death among domestic animal populations) and environments and living conditions (e.g., contact among and between various domestic and wild animal species).

Our ability to explore these relationships is limited by what is identifiable from the archaeological record. For example, a case of tuberculosis (caused by infection by one of the members of the mycobacterial tuberculosis complex) may cause bony changes to the skeleton of an animal, whereas one of anthrax (caused by the organism *Bacillus anthracis*) would not. Further, only a small proportion of animals infected by an infectious organism might show evidence of bony changes (when these do occur – as in the case of tuberculosis), suggesting that what is visible in the archaeological record underrepresents the true prevalence rate (Upex and Dobney 2012: 196). As mentioned above, the taphonomic histories of most animal bone assemblages mitigate against the identification of diseases (Bartosiewicz 2008). However, in some cases, we have complete, well-preserved animal skeletons with lesions preserved suggestive of infectious disease. Even then it is often the case that gross morphological analysis can often only indicate nonspecific infections, as identifying the causative agent based on structural changes within bone alone is problematic given the lack of specificity of these changes for the various pathogens (Bendrey et al. 2008). Beyond this it may only be with the application of DNA analyses that a specific agent may be positively identified (Spigelman et al. 2012), although epidemiological models can be used to generate hypotheses about factors promoting the potential circulation and maintenance of pathogens within past populations (Fournié et al. 2017).

Future Directions

Although still a relatively young discipline, animal paleopathology is capable of delivering valuable and unique insights into a range of past human-animal-environment interactions. Studies are most powerful and effective when linked into the broader archaeological context and integrated with other methods. The foundation for the future of animal paleopathology will be built on a few key practices: an emphasis on the description of lesions (not just diagnoses) in publications, in a quantifiable manner, and the routine calculation of prevalence rates. Ideally, recorded conditions should be analyzed within the background of the normal elements and in relation to the other recognized osteological anomalies in that species in the analyzed assemblage (Clark 2009).

It is the identification of variation in gross morphology of bones and teeth that is the core method in the study of animal paleopathology, but increasingly the application of multiple techniques to specimens will help to produce robust differential diagnoses including radiology, microscopy, histology, and genetic analyses. Microscopic study of bone microarchitecture can contribute important perspectives on the nature and timescale of pathological manifestations. Undoubtedly, recent and future advances in ancient DNA research will contribute significant results to the study of ancient diseases and their ecology, although there is continued debate over both methods and results (Spigelman et al. 2012). Further understanding of skeletal abnormalities must be based on the distribution and expression of such conditions in modern control populations (e.g., Bartosiewicz et al. 1997; Bendrey 2007), otherwise interpretations of lesions in the archaeological record risks being nothing more than speculation. The discipline must continue to test and refine methodologies and assess and compare the expression of abnormalities in different archaeological as well as modern populations.

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone, Trauma in
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Social Zooarchaeology
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Zooarchaeology

References

Baker, J., and D.R. Brothwell. 1980. *Animal diseases in archaeology*. London: Academic.

Balasse, M., B. Upex, and S. Ambrose. 2010. The influence of environmental factors on enamel hypoplasia in domestic sheep and goats in southern Kenya, Maasailand. In *Tracking down the past: ethnohistory meets archaeozoology*, eds. G. Grupe, G. McGlynn, J. Peters. *Documenta Archaeobiologiae* 7: 3–13.

Bartosiewicz, L. 2008. Taphonomy and palaeopathology in archaeozoology. *Geobios* 41: 69–77.

Bartosiewicz, L., W. Van Neer, and A. Lentacker. 1997. *Draught cattle: their osteological identification and history*. Koninklijk Museum voor Midden-Afrika, Annalen Zoölogische Wetenschappen 281.

Bendrey, R. 2007. New methods for the identification of evidence for bitting on horse remains from archaeological sites. *Journal of Archaeological Science* 34: 1036–1050.

Bendrey, R., G.M. Taylor, A.S. Bouwman, and J.P. Cassidy. 2008. Suspected bacterial disease in two archaeological horse skeletons from southern England: Palaeopathological and biomolecular studies. *Journal of Archaeological Science* 35: 1581–1590.

Clark, K. 2009. Pathologies of the sheep. In *Food, craft and status in medieval Winchester*, ed. D. Serjeantson and H. Rees, 158–166. Winchester Museums & English Heritage.

Ervynck, A., K. Dobney, H. Hongo, and R. Meadow. 2002. Born free!: New evidence for the status of pigs from Çayönü Tepesi, Eastern Anatolia. *Paléorient* 27: 47–73.

Fournié, G., D.U. Pfeiffer, and R. Bendrey. 2017. Early animal farming and zoonotic disease dynamics: Modelling brucellosis transmission in Neolithic goat populations. *Royal Society Open Science* 4 (2): 160943. https://doi.org/10.1098/rsos.160943.

Groot, M. 2008. Understanding past human-animal relationships through the analysis of fractures: A case study from a Roman site in the Netherlands. In *Current research in animal palaeopathology: Proceedings of the second ICAZ animal Palaeopathology working group conference*, ed. Z. Miklikova and R. Thomas, 40–50. Oxford: Archaeopress. (BAR International Series 1844).

Horwitz, L.K., and P. Smith. 2000. The contribution of animal domestication to the spread of zoonoses: A case study from the southern Levant. *Anthropozoologica* 31: 77–84.

MaCkinnon, M. 2010. 'Sick as a dog': Zooarchaeological evidence for pet dog health and welfare in the Roman world. *World Archaeology* 42: 290–309.

O'Connor, T.P. 2000. *The archaeology of animal bones*. Stroud: Sutton.

Spigelman, M., D.H. Shin, and K.B.G. Gila. 2012. The promise, the problems and the future of DNA analysis in paleopathology studies. In *A companion to paleopathology*, ed. A.L. Grauer, 133–151. Chichester: Blackwell.

Thomas, R., and I. Mainland. 2005. Introduction: Animal diet and health – current perspectives and future directions. In *Diet and health in past animal populations: Current research and future directions*, ed. J. Davies, M. Fabiš, I. Mainland, M. Richards, and R. Thomas, 1–7. Oxford: Oxbow.

Upex, B., and K. Dobney. 2012. More than just mad cows: Exploring human-animal relationships through animal palaeopathology. In *A companion to paleopathology*, ed. A.L. Grauer, 191–213. Chichester: Blackwell.

Further Reading

Brothwell, D.R. 2008. Paleoradiology in the service of zoopaleopathology. In *Paleoradiology: imaging mummies and fossils*, ed. R.K. Chhem and D.R. Brothwell, 119–145. Berlin: Springer.

Davies, J., M. Fabiš, I. Mainland, M. Richards, and R. Thomas, eds. 2005. *Diet and health in past animal populations: Current research and future directions*. Oxford: Oxbow.

Donoghue, H.D., I. Hershkovitz, D.E. Minnikin, G.S. Besra, O.Y.-C. Lee, E. Galili, C.L. Greenblatt, E. Lemma, M. Spigelman, and G.K. Bar-Gal. 2009. Biomolecular archaeology of ancient tuberculosis: Response to "deficiencies and challenges in the study of ancient tuberculosis DNA" by Wilbur et al. (2009). *Journal of Archaeological Science* 36: 2797–2804.

Grauer, A.L., ed. 2012. *A companion to paleopathology*. Chichester: Blackwell.

Lawler, D.F. 2017. Differential diagnosis in archaeology. *International Journal of Paleopathology* 19: 119–123.

Levine, M.A., K.E. Whitwell, and L.B. Jeffcott. 2005. Abnormal thoracic vertebrae and the evolution of horse husbandry. *Archaeofauna* 14: 93–109.

MaCgavin, M.D., and J.F. Zachary, eds. 2007. *Pathologic basis of veterinary disease*. 4th ed. St. Louis: Elsevier.

Miklikova, Z., and R. Thomas, eds. 2008. *Current research in animal palaeopathology: Proceedings of the second ICAZ animal palaeopathology working group conference*. Oxford: Archaeopress. (BAR International Series 1844).

Miles, A.E.W., and C. Grigson. 1990. *Colyer's variations and diseases of the teeth of animals*. Cambridge, UK: Cambridge University Press.

Thomas, R. 2019. Non-human animal paleopathology – are we so different? In *Identification of pathological conditions in human skeletal remains*, ed. J. Buikstra and D. Ortner, 3rd ed., 809–822. London: Academic.

Vann, S., and R. Thomas. 2006. Humans, other animals and disease: a comparative approach towards the development of a standardised recording protocol for animal palaeopathology. *Internet Archaeology* 20. http://intarch.ac.uk/journal/issue20/vannthomas_toc.html

Von Hunnius, T. 2009. Using microscopy to improve a diagnosis: An isolated case of tuberculosis-induced hypertrophic osteopathy in archaeological dog remains. *International Journal of Osteoarchaeology* 19: 397–405.

Annapolis: Historical Archaeology

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Brief Definition of the Topic

Annapolis, first settled in 1649, is located on the Chesapeake Bay and is the current capital of the state of Maryland. Initially centered on the Chesapeake tobacco economy, Annapolis is known today for its maritime and heritage tourism industries. The city served as the short-lived capital of the United States from 1783 to 1784 and has been the home of the US Naval Academy since 1845. Annapolis has become a tourist destination due to its seventeenth-century town plan and surviving impressive eighteenth-century and vernacular nineteenth-century buildings. A formal archaeological program, Archaeology in Annapolis, began in 1981 through collaboration between the University of Maryland, College Park, Historic Annapolis Foundation, and City of Annapolis. Since that time, Archaeology in Annapolis has excavated sites ranging from elite colonial houses and gardens to early twentieth-century houses of middle- and working-class people from different racial backgrounds. Through archaeological interpretation, the history of enslaved and free African-American life became a more publicly understood part of the city's official histories.

Archaeology in Annapolis seeks to understand the city as a whole, interpreting its history and class structure. Early work focused on the ability of archaeology to understand the development of the culture of capitalism. This work is exemplified by Mark Leone's study of the William Paca Garden, Leone and Paul Shackel's examination of individuation and standardization of material culture, and Barbara Little's study of the Jonas and Anne Catherine Green Print Shop. As the early goals were to democratize archaeology and challenge a world created by capitalism, through the work of Parker Potter, Archaeology in Annapolis also became an experiment in public archaeology. Using open excavations, museum exhibits, newspapers, local television, and community education, the project sought to integrate critical theory with the aim of politicizing and making change in the present.

During the early 1990s, the project began to excavate the homes of the city's free African-American community and those of middle- and working-class residents of European descent. Guided by community-based anthropology, much research was carried out in consultation with minority communities. Working especially with politically or socially disfranchised groups, the hope was to present alternatives to official historical narratives. This work is exemplified by Paul Mullins' and Mark Warner's studies of the 1847 Maynard-Burgess house, the home of a free, middle-class African-American family, where they examined the effects of racist experiences, labor structure, and class through material consumption. In a comparative study, Kathryn Deeley continued exploring these intersections at the James Holliday house, examining the connections between table settings, women's occupations, and class within the African-American community in Annapolis. Jocelyn Knauf wrote about the ways that normative ideas about domestic etiquettes and management, public health behaviors, and appropriate use of urban space were negotiated by residents of a diverse area of the city. Hannah Jopling describes how African American families tenaciously struggled to gain their equal rights at the same time they enriched their own community in 20th century Jim Crow Annapolis.

Also illuminating a history of Annapolis made for class purposes, Parker Potter Jr. and Christopher Matthews have shown how the city's current look is tied to the nineteenth and twentieth centuries through the making of and use of landscapes and the reconstruction of them. They offered a critique of the uses of archaeology and historic preservation. These landscapes extend to include the infrastructure of the city's utilities. Matthew

Palus's dissertation articulates how infrastructure changes in the early twentieth century reflected racial and class inequalities throughout the city. His dissertation is a particularly full exemplification of these aims of the members of Archaeology in Annapolis.

Overall, archaeology has sought to understand how material culture is tied to power relations, the creation of class, and identity construction within the context of a single city. This has included the study of the transition to a capitalist economy, the techniques of racism, and examination of the city's historic preservation industry.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Critical Historical Archaeology
- ▶ Historic Jamestowne
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Modern World: Historical Archaeology

References

Deeley, Kathryn Hubsch. 2015. Double "double consciousness": An archaeology of African American class and identity in Annapolis, Maryland, 1850 to 1930. UMI dissertation services.

Jopling, Hannah. 2015. *Black Community: Striving for Equal Citizenship in Annapolis, Maryland, 1902–1952*. Lanham: Lexington Books.

Knauf, Jocelyn. 2013. *Brought up carefully: the archaeology of women, race relations, domesticity, and modernization in Annapolis, Maryland, 1865–1930*. UMI dissertation services.

Leone, M.P. 2005. *Archaeology of liberty in an American capital: Excavations in Annapolis*. Berkeley: University of California Press.

Little, B.J. 1994. "She was. . .an example to her sex": Possibilities for a feminist historical archaeology. In *The historical archaeology of the Chesapeake*, ed. P.-A. Shackel and B.J. Little, 189–204. Washington, DC: Smithsonian Institution Press.

Matthews, C. 2002. *An archaeology of history and tradition: Moments of danger in the Annapolis landscape*. New York: Plenum.

Mullins, P.R. 1999. *Race and affluence: An archaeology of African American consumer culture*. New York: Kluwer Academic/Plenum Press.

Palus, Matthew. 2010. *Materialities of government: A historical archaeology of infrastructure in Annapolis and Eastport, 1865–1961*. New York: Columbia University.

Potter, P.B., Jr. 1994. *Public archaeology in Annapolis: A critical approach to history in Maryland's ancient city*. Washington, DC: Smithsonian Institution Press.

Shackel, P.A. 1993. *Personal discipline and material culture: An archaeology of Annapolis, Maryland, 1695–1870*. Knoxville: University of Tennessee Press.

Anozie, Fred

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Basic Biographical Information

Information on Prof. Fred A. Anozie is extremely scarce. Prof. Anozie, as he was popularly called, was an astute Nigerian archaeologist whose name rang (still rings) bells within the archaeology space in and outside Nigeria. There is, as yet, virtually no information about his early years. But it is known that as early as 1977, Anozie had published a preliminary report of excavations in Aguleri, a village in Southeastern Nigeria (Nzewunwa 1983).

Between 1978 and the 1980s, Prof. Anozie conducted extension research in Igboland and quickly became recognized as a notable archaeology scholar in Nigeria and West Africa. Most of his research sites were based in eastern Nigeria with some of the most popular being the Ezi-Ukwu rockshelter near Afikpo, the iron-smelting sites of Umundu and Lejja, and Ugwuele in Uturu Okigwe local government area in Imo State, Nigeria (Nzewunwa 1983).

Major Accomplishments

Like Dr. N. Nzewunwa, the fact that he worked with Prof E.J. Alagoa for many years and coauthored the book: *The early history of the Niger delta* is a testimony of his competence in

the field. In addition, he and Prof. Chikwendu V.E. took over the mantle of leadership for the direction of archaeological research in Eastern Nigeria with the exit of Prof. D.D. Hartle who worked extensively in Igboland in the mid-twentieth century.

He was a prominent member of the Archaeological Association of Nigeria (AAN) until his unfortunate death in 2006.

Cross-References

► West and Central Africa: Historical Archaeology

References

Nzewunwa, N. 1983. *A sourcebook for Nigerian archaeology*. Lagos: Standard Printing and Publishing Co, Ltd.

Anquandah, James

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Basic Biographical Information

Professor James Kwesi Anquandah (Fig. 1) was one of the earliest and longest serving Ghanaian archaeologists. He was born on April 10, 1938 and obtained his Cambridge School Certificate from the Achimota School in Accra, Ghana, in 1957 and Cambridge Higher School Certificate in 1959. Prior to obtaining his diploma certificate in Archaeology from the University of Ghana, Legon, in 1965, professor Anquandah had studied for his Bachelor of Arts (B.A.) degree in history at the same university from 1960 to 1963. In 1967, he received his Master of Letters (M.Litt.) from the University of Oxford, UK, and worked as a research assistant at the Pitt-Rivers Museum, University of Oxford, between 1966 and 1967.

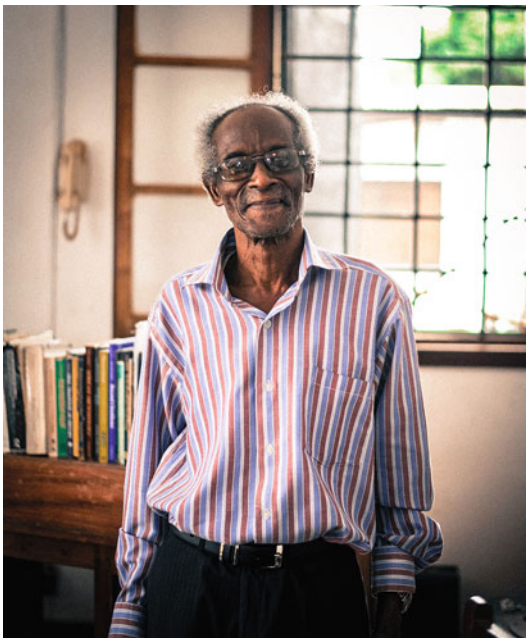

Anquandah, James, Fig. 1 James Anquandah

Before joining the academia, Professor Anquandah worked at the state-owned Ghana Broadcasting Service (GBC) as Programmes Officer (1959–1960) and later as Senior Producer (1972–1973) of content pertaining to the history, culture, and heritage of Ghana. He began his career at the University of Ghana as a research fellow in African Studies and Archaeology (1973–1975) and then as lecturer at the Department of Archaeology (1975–1978) and rose through the ranks. He was promoted to senior lecturer (1978), associate professor (1988), and professor in 1994. Professor Anquandah had a wide array of experience in teaching and researching African Archaeology and has about 50 publications. His areas of specialization include Archaeology of Ghana/West Africa, Archaeology of the Nile Valley, Historical Archaeology, Art History of Ghana, and Palaeo-Historical Demography.

At the University of Ghana, Professor Anquandah held several positions, including Head of Department of Archaeology (1976–1977; 1981–1993) and Dean, Faculty of

Social Studies (1991–1997). He also acted briefly as pro-vice chancellor of the University from January 1996 to February 1996. He served on various boards and committees of the university including Academic Board, Faculty Board, and Executive Committee. He was the curator of the Archaeology Museum, University of Ghana, Legon, from 1974 to 1998 and served as member of Ghana Museums and Monuments Board (GMMB) from 1995 to 1999 and 2010 to 2012.

He was a visiting professor at the University of Pisa, Italy in 2002 and visiting professor at the New York University (Ghana Campus) in Art History (2008–2017) and served as external examiner doctoral theses from the College of Art, Kwame Nkrumah University of Science and Technology, Kumasi-Ghana, from 2006 to 2017. After serving 10 years (1998–2008) post-retirement contract at the Department of Archaeology and Heritage Studies, University of Ghana, James Anquandah continued to teach on part time until he passed away in September 2017.

Major Accomplishments

Professor Anquandah was instrumental in the training of most of the current generation of Ghanaian archaeologists at the University of Ghana and elsewhere. He played a vital role in the survival of the Department of Archaeology by resisting attempts by university authorities to scrap the department in the 1990s following some restructuring exercises embarked on by the University. His contribution to the now vibrant Department of Archaeology and Heritage Studies, University of Ghana (the only such department in Ghana and one of the earliest established in Sub-Saharan Africa), cannot be overemphasized.

As one of the earliest Ghanaian archaeologists, Professor Anquandah became the first Head of Department of Archaeology at the University of Ghana, after apprenticing under, and later working with, expatriates such as Peter Shinnie, Oliver Davies, and Merrick Posnansky. His commitment to research and publication aimed at deepening knowledge about the prehistory, historical archaeology, and arts history of Ghana remains one of his greatest achievements. His pioneering works as an indigenous archaeologist (Anquandah 1981, 1987, 1998, 1999, 2003, 2012, 2013, 2014) are good insider's contribution to Ghanaian Archaeology and African Archaeology at large. He won the Ghana Book Development Council award in 1983 for the publication of his book (Anquandah 1982) titled *Rediscovering Ghana's Past*. In 1987, he successfully mounted an exhibition on Ghana's Arts at Porte de Versailles in Paris.

Between 1994 and 2001, Professor Anquandah served as the coordinator of the management committee of the Ministry of Education Secretariat Universities of Ghana Research Fund. As the Chairman of the Scientific Committee, National Commission on Culture (2004–2008), he among other things ensured the creation and maintenance of a vibrant website for the commission which serves as a good reference point for the understanding of certain aspects of Ghana's culture and cultural institutions.

He worked tirelessly as chairman of the research unit of Ghana's National Slave Route Project at the Ministry of Tourism from 1999 to 2017. The unit's efforts culminated in the publication of one of the most comprehensive books (Anquandah 2007) on the trans-Atlantic slave trade in Ghana.

Cross-References

- ▶ Historical Archaeology
- ▶ West Africa: Museums
- ▶ West and Central Africa: Historical Archaeology

References

Anquandah, J. 1981. Excavations at the Smith's quarter of Begho, Ghana. *West African Journal of Archaeology* 11: 131–144.

Anquandah, J. 1982. *Rediscovering Ghana's past*. Essex: Longman.

Anquandah, J. 1987. The stone circle sites of Komaland, northern Ghana in west African archaeology. *African Archaeological Review* 5 (1): 171–180.

Anquandah, J. 1998. *Koma-Bulsa: Its arts and archaeology*. Rome: IsIAO – Istituto Italiano per l'Africa e l'Oriente.
Anquandah, J. 1999. *Castles and forts of Ghana*. Paris: Atalante.
Anquandah, J. 2003. The arts of Koma-Bulsa. In *Ghana yesterday and today*, ed. C. Falgayrettes-Leveau and C. Owusu-Sarpong, 135–148. Paris: Musee-Dapper.
Anquandah, J. 2007. *The transatlantic slave trade: Landmarks, legacies, expectation*. Accra: Sub-Saharan Publishers.
Anquandah, J. 2012. *A panorama of Ghana's heritage*. Accra: UNESCO: Sub-Saharan Publishers.
Anquandah, J. 2013. The people of Ghana: Their origins and cultures. *Transactions of the Historical Society of Ghana,* New Series 15: 1–25.
Anquandah, J. 2014. *Current perspectives on the archeology of Ghana*. Accra: Sub-Saharan Publishers.

Antarctica: Historical Archaeology

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Introduction

Historical archaeology in Antarctica has been largely driven by the needs of heritage resource management. Polar heritage sites can be defined by, or have their significance enhanced by, archaeological remains, and the archaeological study of aboveground evidence and buried deposits has long been used in researching and conserving such sites in Antarctica.

In Antarctica, archaeological sites are rare commodities. Human presence on the continent and its surrounding islands has been relatively recent, brief, infrequent, and widely scattered. The range of human activities – exploration, sealing, whaling, and scientific research – has been very limited, and sites often relate to a single use at a single point in time. These sites have immense archaeological potential and, at the same time, are unique elements of the world's cultural heritage. They are also very expensive to study, given their isolated location and difficult access, severe climatic conditions, and the difficulties in excavating frozen deposits. These considerations dictate that the benefits of archaeological programs in Antarctica have to be clearly demonstrated in order to gain support, and to date, most funding has been associated with broader heritage conservation or environmental remediation efforts.

Professional historical archaeology has been practiced in Antarctica and the sub-Antarctic islands since the late 1970s. Archaeologists from Argentina, Australia, Brazil, Chile, France, New Zealand, South Africa, the United Kingdom, and the United States of America have participated in archaeological programs of survey, recording, or excavation. The objective of this work in the past has primarily been the identification and conservation of historic sites and in particular historic buildings, but in recent decades, substantial work has been done on sealing-era sites in the South Shetland Islands, with more academic research-driven objectives (for a short history of archaeology in Antarctica, see Pearson 2011a).

Definition

"Antarctica" is defined as being the area south of 60° south latitude (the area encompassed by the Antarctic Treaty), and for the purposes of archaeological research, the isolated peri- and sub-Antarctic islands of the Southern Ocean are included. All archaeology on the Antarctica continent and immediate peri-Antarctic islands is historical archaeology, as there is no evidence of any prehistoric contact with the continent. There is, however, recent evidence of prehistoric Polynesian visitation or settlement on the sub-Antarctic Auckland Island, south of New Zealand, and Campbell Island in the same region remains to be investigated (Dingwall et al. 2009).

Key Issues/Current Debates/Future Directions/Examples

The vast bulk of the archaeological work in Antarctica has been undertaken in relation to the removal of ice from inside and around historic huts and the excavation, often through ice, of accumulated material inside huts and of stores boxes and caches outside huts. Despite being targeted at practical conservation works, this research has produced an accumulated record of the activities and material culture of, particularly, Heroic Era exploration parties (1897–1922).

In the case of sealing and whaling sites on the sub-Antarctic islands and the peri-Antarctic South Shetland Islands, the focus has been on establishing the presence and form of shelters and work areas, again largely related to the long-term conservation of this heritage resource, but also providing information about sealer's and whaler's domestic subsistence and work activities not available in the usually scant documentary sources (Figs. 1 and 2). The work of Senatore and Zarankin in the South Shetland Islands has moved archaeology into more theory-driven research questions (e.g., Senatore and Zarankin 1999; Zarankin and Senatore 2005, 2007; Zarankin et al. 2007).

The range of conservation-related archaeological work has included:

The retrieval of artifacts related to known historical parties

The direct understanding of the construction of buildings and sites, their historical sequencing, and use

The understanding of sites in the context of other, like, sites

Ascertaining the survival and research value of artifacts in the light of Antarctic risks such as "wallowing" by elephant seals (e.g., Townrow

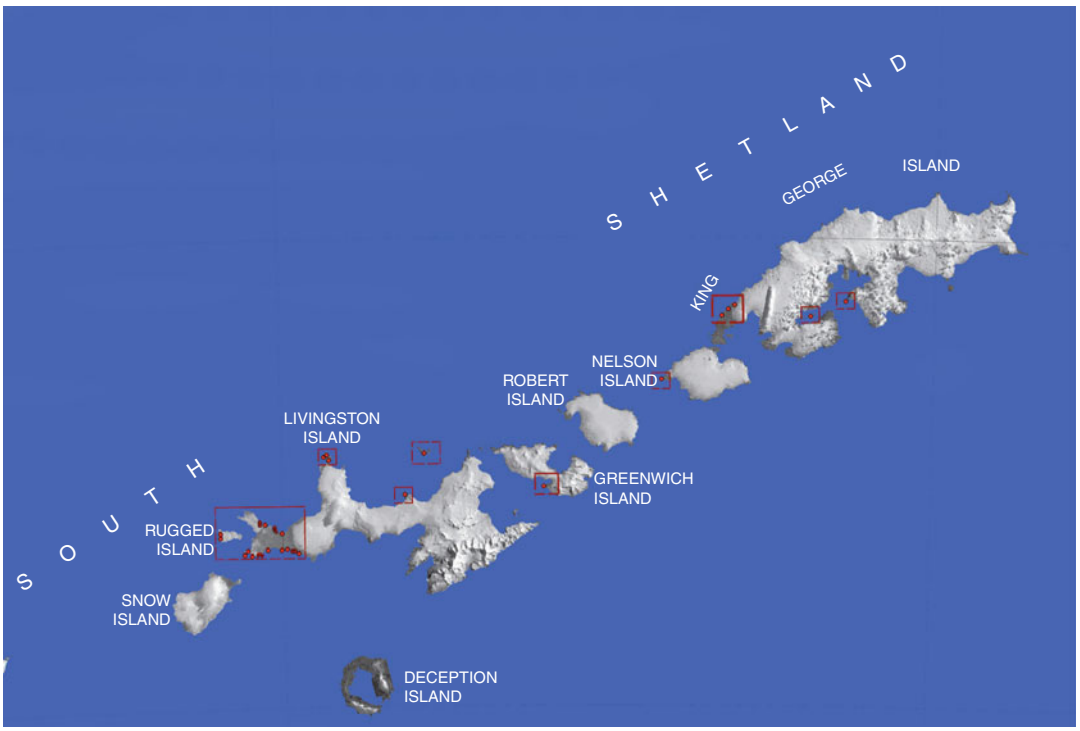

Antarctica: Historical Archaeology, Fig. 1 Map of South Shetland Islands showing the location of archaeological sites of sealers and whalers occupation in the nineteenth century

Antarctica: Historical Archaeology, Fig. 2 Sealer/whaler archaeological site in Livingston Island, South Shetland

1989) and erosion caused by penguin rookeries and extreme weather events (Pearson et al. 2008.

For nonstructural sites, such as sealing sites, better understanding of their characteristics so other sites can be identified (e.g., determining if artifact types differ from inside and outside now-collapsed shelters, so former shelter locations can be identified from artifact scatter patterns)

Isolating the factors influencing the deterioration of archaeological sites over time

Work asking broader research questions has included:

Determining if the archaeological remains provide substantive evidence of heritage significance not available from other sources (such as the lifestyle and experiences of nineteenth-century sealers, e.g., Lazer and McGowan 1990: 15)

Determining the ethnic origin of sealers (e.g., McGowan 2000: 69)

Using evidence to see if sites found in different locations originated from the same sealers (e.g., Hughes and Lazer 2000: 73)

The relationship of sealing to global industrial developments and economic networks (Senatore and Zarankin 1999; Zarankin and Senatore 2005, 2007)

In the Antarctic regions, the documentary evidence of human activities is sometimes far less helpful in understanding the past than it can be in more temperate climates. The Heroic Era exploration sites are usually well supported by journals, diaries, inventories of gear, and even photographs. There are, however, few surviving sealing logs and journals, and there are few detailed inventories of sealer's gear and stores, nor are there many instances where a specific site can be related to a specific historically documented party. The life experience of individual sealers is little recorded. The interpretation of the aboveground sites and excavated finds and data can provide "physical history" to augment a scant documentary history of this important period of human interaction with the continent, quite apart from archaeology's potential to address broader research questions.

Archaeological excavation destroys, at least in part, the sites it studies, and human occupation sites in Antarctica are rare. They are of high research value and of high heritage value, are vulnerable to human (including archaeological) and natural disturbance, and are very difficult and expensive to study. It is therefore imperative that archaeologists understand the multiple values of the sites they wish to study and formulate research strategies that maximize the benefits of their work in the unusual Antarctic context.

Cross-References

▶ Heritage and Archaeology
▶ Polar Exploration Archaeology (South)

References

Dingwall, P.R., K.L. Jones, and R. Egkerton, eds. 2009. *In the care of the southern ocean; an archaeological and historical survey of the Auckland Islands*. Auckland: New Zealand Archaeological Association.

Hughes, J., and E. Lazer. 2000. Importance of "historic sites" on heard island for protection of scientific resources and environmental management of a world heritage site. in Heard island paper: Papers presented to the heard island workshop, Hobart, 29 June–1 July, 1998. *Papers and Proceedings of the Royal Society of Tasmania* 133(2): 71–77.

Lazer, E., and A. Mcgowan. 1990. *Heard island archaeological survey (1986–1987)*. 2nd ed. Sydney: Department of Architectural and Design Science, University of Sydney.

Mcgowan, A. 2000. On their own: Towards an analysis of sealer's sites at Heard Island, in Heard Island Paper: Papers presented to the Heard Island workshop, Hobart, 29 June–1 July, 1998. *Papers and Proceedings of the Royal Society of Tasmania* 133: 61–70.

Pearson, M. 2011a. Polar heritage conservation and archaeology. In *Polar settlements – location, techniques and conservation*, ed. S. Barr and P. Chaplin, 24–34. Norway: International Polar Heritage Committee, International Council on Monuments and Sites.

Pearson, M. 2011b. Antarctica. In *The Routledge handbook of archaeological human remains and legislation: An international guide to laws and practice in the excavation, study and treatment of archaeological human remains*, ed. N. Marquez-Grant and L. Fibiger, 673–690. London: Routledge Press.

Pearson, M., and R. Stehberg. 2006. Nineteenth century sealing sites on Rugged Island, South Shetland Islands. *Polar Record* 42: 1–13.

Pearson, M., R. Stehberg, A. Zarankin, M.X. Senatore, and C. Gatica. 2008. Sealer's sledge excavated on Livingston Island, South Shetland Islands. *Polar Record* 44: 362–364.

Senatore, M.X., and A. Zarankin. 1999. Arqueología histórica y expansión capitalista. Prácticas cotidianas y grupos operarios en Peninsula Byers, Isla Livingston de las Shatleand del Sur. In *Sed non sataita. Teoría social en la Arqueología Latinoamericana Contemporánea*, ed. A. Zarankin and F. Acuto, 171–188. Buenos Aires: Ediciones del Tridente.

Stehberg, R.L. 2003. *Arqueología histórica antártica: Aborígenes sudamericanos en los mares subantárticos en el siglo XIX*. Chile: Centro de Investigaciones Diego Barros Arana.

Townrow, K. 1989. *Survey and excavation of historic sites on Macquarie Island*. Tasmania: Department of Lands, Parks and Wildlife.

Zarankin, A., and M.X. Senatore. 2005. Archaeology in Antarctica: Nineteenth-century capitalism expansion strategies. *International Journal of Historical Archaeology* 9: 43–56.

Zarankin, A., and M.X. Senatore. 2007. *Historias de un pasado en blanco: arqueología histórica antártica*. Belo Horizonte: Argumentum.

Zarankin, A., R. Stehberg, M. Pearson, C. Gatica, and M.X. Senatore. 2007. Campaña multinacional de arqueología antártica. *Vestígios-Revista Latino-Americana de Arqueología Histórica* 1: 119–120.

Further Reading

Harrowfield, D.L. 2005. Archaeology on ice: A review of historical archaeology in Antarctica. *New Zealand Journal of Archaeology* 26: 5–28.

Senatore, M.X., and A. Zarankin. 2011. Widening the scope of the Antarctic heritage archaeology and the "The ugly, the dirty and the evil" in Antarctic history. In *Polar settlements – Location, techniques and conservation*, ed. S. Barr and P. Chaplin, 51–59. Norway: International Polar Heritage Committee, International Council on Monuments and Sites.

Wood, P. 2011. Whiteout: An examination of the material culture of remembrance and identity generated between New Zealand and Antarctica. *Memory Connection* 1: 183–195.

Anthracology: Charcoal Analysis

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Introduction

Anthracology is a transdisciplinary field of knowledge that applies to the study of ancient or extant charcoal macroremains. This discipline was developed in close association with Archaeology, but contributes to different fields such as Palaeoecology, Palaeobotany, Botany, Forestry, and Geology.

In Quaternary and pre-Quaternary sedimentary deposits, charcoal allows reconstruction of the palaeovegetation and palaeoclimate.

In archaeological sites, it provides palaeoecological data while also testifying the usages that past populations made of woody plants. This discipline sheds light on several issues of

importance to Archaeology, such as the past landscape, dwelling space, site catchment area, fuel economy, use of wood in domestic and ritual contexts, among others. By these means, it allows a better understanding of ancient ways of life.

Extant charcoal is studied in a taxonomic approach (charcoal anatomy), or in association with foresters as a means of reducing illegal wood extraction from native biomes.

This young field of study has ongoing theoretical and methodological developments in all of its lines of research. It is particularly dynamic in its archaeological strand.

Definition

Anthracology is the analysis and identification of charcoal based on wood anatomy.

This term is employed both in a broader sense (all branches of the discipline) and to denote studies in archaeological context in general. Some authors, however, will refer to the latter as "Archaeoanthracology."

Other branches of this discipline are specifically designated as:

- "Pedoanthracology" or "Geoanthracology," denoting the analysis and identification of charcoal of sedimentary origin (soils, palaeosoils, sedimentary deposits)
- "Pre-Quaternary Anthracology," reserved for studies of pre-Quaternary charcoal remains
- "Dendroanthracology," indicating the application of dendrological techniques to charred fragments, especially wood diameter estimates

Although some English speakers favor the term "Charcoal analysis" to encompass all of these approaches, "Anthracology" is more precise and already widespread in the international literature (e.g., Scheel-Ybert 2000; Théry-Parisot et al. 2010; Damblon 2013; Dotte-Sarout et al. 2015). We should therefore distinguish "Anthracology," the analysis of macrocharcoal based on wood anatomy, from "Charcoal analysis," which is largely employed to designate the analysis of microcharcoal in sedimentary context. While the first aims for archaeobotanical and palaeoecological studies through taxonomic identification, the second aims for the identification of past fire events or periods of fire activity through quantification of microremains.

Historical Background

The identification of plant species from the analysis of charred remains is quite ancient. The first known studies dealt with archaeological charcoals and date from the second half of the nineteenth century, in Europe (e.g., Heer 1866). The twentieth century witnessed a growing interest of archaeologists, especially from the Mediterranean basin, for charcoal identification and the ensuing possibility of landscape reconstructions. But the first study presenting explicitly paleoecological interpretations based on archaeological charcoal was carried out in Britain (Salisbury and Jane 1940). It was harshly criticized on the grounds that cultural factors (species selection) and differential preservation preclude adequate representation of the natural vegetation in archaeological context.

It was only from the 1960s that a stronger interest of botanists and wood anatomists in archaeological charcoal and their palaeoecological interpretation, particularly in France, laid the foundations for an important advance of the discipline. In this context, Couvert (1968) was the first to recognize that anthracological analysis offered palaeoecological data which would be even more accurate than those obtained from pollen analysis (actually, these disciplines are complementary. Palynology offers information on different plant seres – trees, herbs, epyphites etc. – in a regional scale, while anthracology provides data on woody plants only, but at a local level. Confrontation with phytosociological data is more straightforward for the latter. Taxonomic determination, often at the species or genus level in charcoal, is also generally more accurate than in palynological studies).

In these early studies, sampling was essentially restricted to hearths charcoal. The methods of analysis (wax, resins, or paraffin embedment,

microtome cutting, thin sections mounting) were extremely time-consuming, and often produced poor and few sections. Consequently, very few charcoal pieces were analyzed and the results rarely allowed more than small floristic lists.

The multiplication of analyzes and the emergence of Anthracology as a proper discipline was made possible through the establishment of an original methodology: manually fracturing charcoal fragments to expose fresh anatomical sections, followed by observation under incident light using reflected light microscopes. This method allowed the identification of a large number of specimens in a much shorter time (e.g., Western 1971; Vernet 1977) and led to the possibility of quantitative studies and to the adoption of meaningful palaeoecological perspectives.

The French Jean-Louis Vernet was responsible for a significant improvement in the development of Anthracology. In a major research center founded at the University of Montpellier, he encouraged the first systematic studies of archaeological charcoal and contributed to establishing the theoretical and methodological bases of the discipline. Under his influence, significant research was carried out in the Mediterranean, particularly in France and the Iberian Peninsula, and anthracological research advanced to several countries in Europe and later to other continents.

From the 1980s, the discipline was marked by an increasing concern about the recognition of the palaeoecological significance of archaeological charcoals, the establishment of appropriate sampling strategies and analytical methods, and the need for statistically reliable analysis and for experimentations aiming to understand carbonization and postdepositional processes. Based on these studies, many anthracological analyses proved the validity of palaeoecological reconstructions based on archaeological charcoals, despite the cultural factors and differential preservation issues that might influence the samples.

At the same time, another line of research (Pedoanthracology) was also developed in France, under the guidance of Michel Thinon, from University of Marseille. Later, charcoal analysis in Quaternary and pre-Quaternary sediments spread throughout Europe and North America, aiming essentially at the reconstruction of palaeoenvironmental and palaeoclimatic changes.

From the 1990s, concurrently in France and Germany, a branch of anthracological research was directed towards the estimation of wood diameters. Dendroanthracology, based on the premise that the election of wood diameters is probably as relevant as that of wood species, provides interpretations concerning the availability and choice of wood in different contexts, as well as on vegetation structure (e.g., Marguerie and Hunot 2007; Ludemann 2010).

Currently, a great number of publications in many parts of the world attest of the vigor and advancement of the discipline in its different approaches. Important compilations of works developed by anthracologists over the years have been published in the actes of five of already six international conferences (Vernet 1992; Thiébault 2002; Fiorentino and Magri 2008; Badal et al. 2012; Damblon et al. 2013). More extensive references and more detailed accounts on the history of Anthracology may be found elsewhere (e.g., Asouti 2006; Théry-Parisot et al. 2010; Dotte-Sarout et al. 2015; Scheel-Ybert and Gonçalves 2017).

Key Issues/Current Debates

Anthracology is a young discipline and as such its theoretical and methodological bases are still under construction. Some key issues under debate in the present and past few years, particularly those related to studies in archaeological context, are discussed below.

Significance of Charcoal Deposits in Archaeological Sites

Anthracological interpretations are based on two kinds of charcoal deposits, which must be distinguished during the archaeological excavations and carefully collected.

Concentrated charcoals are related to specific activities (domestic or specialized hearths, kilns, charred artifacts, etc.). Features containing concentrated charcoal normally have had a brief

utilization in time or bear the remains of only the last charring event. Thus, they imply in a short-term deposition – and therefore a sample that is not representative of the plant environment as a whole (Chabal 1997). Analysis of such deposits usually reveals species-poor assemblages and provides only palaeoethnobotanical information. They may allow identification of firewood acquisition practices (distinction of intentional wood selection from random wood gathering), but only through the analysis of a large number of features.

Dispersed charcoals derive from the scattering of charcoal pieces originated from the many different burning activities performed in a site or from the periodical cleaning of fireplaces – thus representing a long-term deposition (Chabal 1997). These are the remnants of numerous wood gathering events over time, probably with multiple objectives. These samples usually contain species-rich assemblages and as such provide good representations of the plant environment.

Palaeoecological Reliability of Archaeological Charcoal

Palaeoethnobotanical reliability of archaeological charcoal is never questioned. However, a common criticism anthracologists still meet is that archaeological samples could not possibly provide palaeoecological reconstructions due to cultural wood selection and to postdepositional differential preservation.

The reliability of these studies, however, has already been amply demonstrated. Diligent methodological and statistical studies largely fostered by the French Lucie Chabal were essential in establishing the validity of this approach (e.g., Chabal 1997; Théry-Parisot et al. 2010).

The first main argument to be advanced was the low species selectivity of domestic firewood gathering (Vernet 1977; Shackleton and Prins 1992; Chabal 1997). Indeed, many authors agree that domestic firewood, most usually, is randomly gathered around the settlement. The corollary is that all the species present in the surrounding vegetation would be collected as fuelwood in (approximatively) direct proportion to their abundance in the environment. Since the site occupation length is directly correlated to firewood gathering and to the surface of the site catchment area, long-term deposition of domestic charcoal is a good proxy to the surrounding vegetation.

More recently, cultural aspects related to fire function also came to be considered. Fire, in traditional societies, had several different functions (such as heating, cooking, lighting, drying, smoking, transforming raw materials, keeping animals away, taking part in ceremonies or ritual practices). For each one of these functions, different woods might be chosen. Théry-Parisot et al. (2010) argue that the notion of "good fuel" is closely related to the usage intended for each particular fire, i.e., if the goal is to get flames, embers, smoke, heat, etc. Since the essences have different properties, one good fuel would not exist, but different fuels were needed for different purposes. In addition, one must consider that wood properties can change according to the essence, but also according to log diameter and wood state (dried, fresh, rotten, etc.). The corollary is that there is a wide range of wood choices (or non-choices) that might be associated to each fire function in a human settlement. Once again, on the condition of analyzing the remains of an occupation that has lasted for a sufficiently long time, it is likely that all the species in the different vegetation types around the settlement will have, sooner or later, a chance to be collected, charred, and therefore preserved as charcoal.

The arguments presented above are not mutually exclusive. Hence, one can conceive that people in the past gathered and concentrated wood samples in the archaeological site, on the same measure that the wind concentrates pollen grains in lakes sediments. In both cases, under-representation or over-representation of some taxa is expected. Still, the most frequent species in the environment tend to be better represented in the sediments than rarer ones.

Notice that different vegetation communities may be recognized in an anthracological assemblage, as the plants associated with each vegetation type can be identified by ecological criteria. Similarly, ecological criteria may help identifying over-representation of taxa due to positive selection. Conversely, under-representation due to negative selection (avoidance of firewood because of

undesirable fuel properties or cultural taboo) may be much harder to recognize.

Currently, most authors agree that reliable palaeoecological information should be based on the analysis of "synthetic" deposits, which combine remains of the different vegetation types existing around the settlement during the occupation (Théry-Parisot et al. 2010). Those are the dispersed charcoals, but also specific concentrated charcoal features. The latter include hearths or kilns associated with long-term activities, that is to say, that have been repeatedly supplied with wood fuel. These deposits may be identified by archaeological criteria and by their high species diversity. However, in most circumstances, analysis of the dispersed charcoal might be necessary to validate the interpretations proposed.

Charcoal kilns, although representing short-term activities, are also high diversity synthetic deposits. They are related to the cutting of entire forest parcels (cf. Ludemann 2010) and may therefore be interpreted in an ecological approach.

Palaeoecological reliability of archaeological charcoal analyses is supported by arguments largely demonstrated both in temperate (Vernet 1977; Chabal 1997) and in tropical sites (Scheel-Ybert 2000): (1) the high taxonomic richness/diversity of samples, (2) the strong correlation between different analysis, i.e., the similarity of anthracological results in contemporary neighboring sites and between different layers/samples of the same site, (3) the strong correlation between different proxies (e.g., charcoal, pollen grains, phytoliths), (4) the strong correlation of anthracological spectra with extant vegetation types.

Taphonomy/Postdepositional Issues

In a strict sense, "taphonomy" refers to the study of the processes by which biological remains become fossilized – in the present case, the processes through which charcoal of human or natural origin become incorporated to the sediments after the extinction of fire. Anthracologists dealing with archaeological charcoal, however, have proposed a broader definition of this term, in order to take into account the many human activities and natural processes affecting this ecofact, from wood gathering to the charcoal analysis (Théry-Parisot et al. 2010).

In this sense, "taphonomy" comprises a series of processes influencing the reconstruction of the original vegetation from the analyzed charcoal assemblage: (1) cultural practices (firewood gathering, fuel management, wood selection, taboos, fire functions, fireplaces management), (2) combustion (carbonization, mass loss, anatomical changes, differential fragmentation, charcoal preservation), (3) depositional and post-depositional processes (anthropogenic factors, sedimentation, bioturbation), and (4) archaeological/anthracological procedures (excavation, sampling, identification, quantification methods).

The first three levels of processes lie beyond any concrete action of the anthracologist, but can be better understood through experimental tools, and ethnographical and theoretical models (Dotte-Sarout et al. 2015). The fourth level can be controlled by an effective sampling methodology, rigorous laboratory practices, and adequate statistical treatment.

Nevertheless, despite all the processes affecting charcoal from firewood collection to its analysis (human transport, physical transformations of carbonized wood, postdepositional processes, fragmentation, etc.), many results show that anthracology allows reliable reconstructions of local woody vegetation.

Sampling Procedures

Two sets of practices must be considered for anthracological sampling: field sampling and laboratory analysis.

In the field, the archaeologist/anthracologist must consider the different existing charcoal deposits. Concentrated charcoals in archaeological features are much more conspicuous during the excavation and have historically been preferentially collected. But the choice, by the excavator, of the larger, more concentrated or more easily recognizable charcoal in the field, is a bias that would unavoidably lead to interpretation errors. Hence, systematic sampling of the dispersed charcoal from archaeological sediments is paramount. Although they frequently go unnoticed by the untrained eye, dispersed

charcoals are the basis of palaeoecological reconstruction and stand as a control for palaeoethnobotanical interpretations.

Anthracological field sampling must be planned in order to guarantee the reliability of palaeoecological and palaeoethnobotanical interpretations and the reproducibility of the results. The site surface should be extensively sampled. Under the best of circumstances, sediment samples from one-fourth to the entirety of each square meter, in each decapage, are collected (Chabal 1997) (Fig. 1). But the sampling estrategy may vary depending on the possibilities of the field and the layers' richness in charcoal. For instance, one might collect a bucket of sediment in alternating quadricules in each decapage or archaeological layer, if that guarantees a sufficient number of charcoal fragments for analysis, or else collect all the excavation sediments, exhaustively, when preservation is low or when the area of intervention is small.

When large surface excavations are not possible, sampling in trenches or profiles might allow acquiring important data, provided that the sediments are collected in natural/cultural levels.

Features containing concentrated charcoal (e.g., hearths and associated deposits, charred objects) should always be carefully collected, whenever possible with exhaustive sampling of the sediment.

In all circumstances, hand-picking must be avoided. Charcoal should be separated from the sediments by controlled sieving with mesh sizes down to 2 mm (4 mm being recommended by most authors). Flotation is by far the preferably recovering method, since it implies in greater efficiency, lesser effort, and is less aggressive for the material.

In the laboratory, subsampling will generally take place. Most authors agree that reliable interpretations must be based on samples of at least 200–400 fragments per archaeological layer or feature.

Some authors still argue that taphonomic bias in archaeological charcoal is too important to allow for quantitative analysis. They recommend that only qualitative analysis methods, such as ubiquity, should be employed.

Most anthracologists, however, agree that quantitative analyses are well founded. Yet a disagreement still subsists whether the mass or the number of charcoal fragments best represents the original proportion of the used firewood. But demonstrations and statistical analyses indicate that the relative proportions of taxa are much the same in weighing or counting of charcoal pieces (e.g., Chabal 1997). Counting remains, to these days, the most widespread method, for it is methodologically easier and more reproducible.

Once again, it is essential that all charcoal fragments from the sieve or flotation are collected and that fragments of all size classes are analyzed. The choice, by the analyst, of the larger or better conserved charcoal pieces would again introduce biases and interpretation errors, for it underestimates the sample diversity. Indeed, the outcome of fragmentation patterns statistically demonstrated is that larger fragment classes contain only the most frequent species, whereas most species, and all rare species, will be represented only in the smallest fragments (Chabal 1997).

Of course, "larger" and "smaller" are relative concepts and depend on the sample and the preservation conditions of each site. Gymnosperms of only 0.5 mm in side can be identified, but in general, the smaller the fragment, the harder the determination. Identification is usually possible down to 2-mm pieces, but the ideal minimum size of charcoal fragments to be determined is 4 mm. Smaller fragments usually lack a sufficiently large array of diagnostic features, resulting in difficult and time-consuming identifications, usually restricted to higher taxonomic levels.

Charcoal Identification/Carbonization and Structural Changes in Wood

Charcoal identification is based on the wood anatomy. Species-level identifications are quite common in temperate regions and low-diversity environments. In the tropics and areas of high biodiversity, genus-level identifications are expectable. In certain cases (for both contexts), determined by wood anatomy, only higher identification levels are possible.

The analysis of charcoal pieces is presently made under reflected light optical microscopes

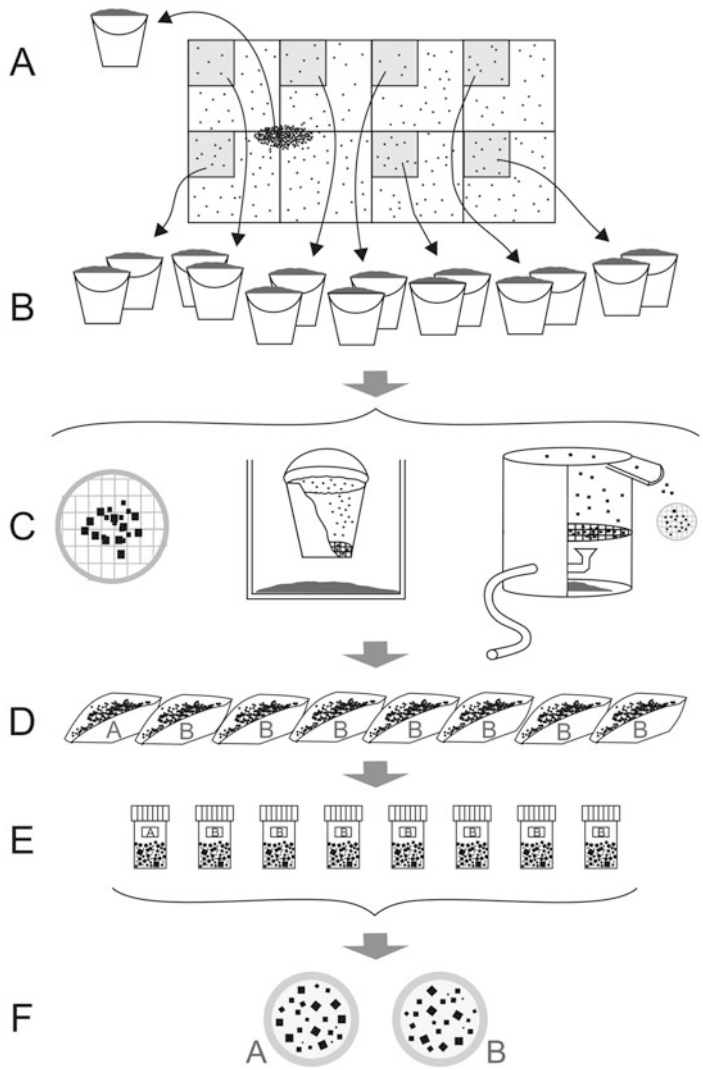

Anthracology: Charcoal Analysis, Fig. 1 Schematic representation of the several steps of anthracological sampling (Adapted from Chabal et al. 2004). A. Concentrated charcoal shall be exhaustively sampled, independently of dispersed charcoal; B. Dispersed charcoal shall be systematically sampled, for instance, collecting all the sediments in a quarter of square meter at each decapage; C. The separation of charcoal from the sediments may be done by dry sieving, tank-sieving, or flotation, with meshes of 2–4 mm; wet sieving is to be avoided to prevent damage to charcoal pieces; D. Tank-sieving and flotation samples shall be allowed to dry naturally (no artificial heat source used), in order to preserve the anatomical integrity of charcoal; E. Charcoal samples may be stored in well-referenced plastic bags or hard containers; F. Concentrated and dispersed charcoal shall be analyzed separately; subsamples of 200–400 charcoal pieces of each feature or archaeological layer must comprise charcoals of all size classes

with brightfield and darkfield. Charcoal pieces are manually split according to the three wood structural sections: transverse, longitudinal tangential, and longitudinal radial (Fig. 2). Taxonomic determination of charcoal is done by comparing the anatomical structure with that of extant known wood species – consulting both descriptions and/or photographs from the literature or online databases, and samples from comparative collections.

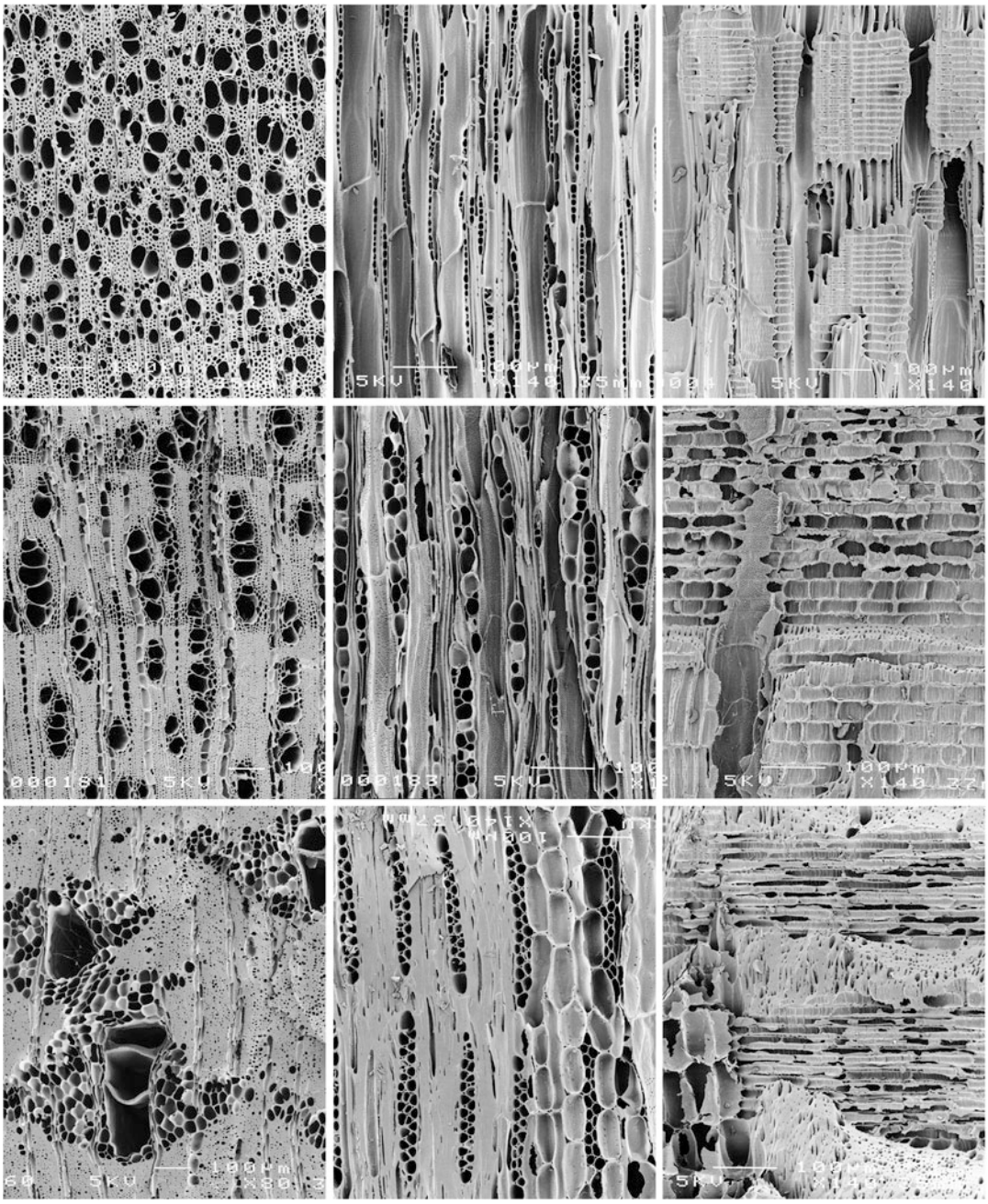

Anthracology: Charcoal Analysis, Fig. 2 Charcoal anatomy of some tropical species; SEM images from the three wood structural sections (transverse, longitudinal tangential, longitudinal radial). A. *Aspidosperma olivaceum* (Apocynaceae). B. *Eremanthus goyazensis* (Asteraceae). C. *Bowdichia virgilioides* (Fabaceae Faboideae)

Charcoal anatomical characterization follows the standards of the International Association of Wood Anatomists, with very few discrepancies (Scheel-Ybert and Gonçalves 2017). This is possible because charcoal carries nearly all diagnostic wood characters.

However, charring/carbonization causes substantial mass loss and anisotropic shrinkage to wood – and many researchers expect that these changes induce significant structural changes in charcoal.

Thus, several studies have tried to assess these structural changes, through the analysis of charcoal obtained at different temperatures (e.g., Prior and Gasson 1993). All of them point in the same direction and demonstrate that (1) carbonization only causes minor quantitative changes in the original wood structure, and (2) the cellular organization is perfectly maintained on charcoal. These minor structural changes do not affect species identification, for their scale is similar to that which occurs between individuals of the same species for reasons intrinsic to the individual (e.g., trunk/branch thickness) or ecological factors (e.g., specimens collected at different plant formations, at the edge of a forest fragment or favored by higher water availability, etc.).

Dendroanthracology/Dendroanthracometry

Dendroanthracology consists essentially at estimating the minimum diameter of the charred wood. It aims at addressing issues such as wood gathering practices, wood choices, vegetation management, and evolution of forest structure under anthropogenic or climatic driving.

Different models were developed with this intent, mainly in France and Germany. There are qualitative (Marguerie and Hunot 2007) and quantitative models, the later using diameter stencils (Ludemann 2010) or image-analysis calculations (Dufraisse 2006). All are based on cross-section wood anatomy features: the curvature of annual growth rings and divergence of rays.

In the present, there is a large investment in the development of more precise protocols, in the establishment of models aiming at restituting the "real" diameter of the wood used and in the validation of coherent theoretical/methodological frameworks to these studies.

International Perspectives

Anthracological studies were initially developed in Europe and other temperate/Mediterranean regions. In consequence, most theoretical and methodological precepts were related to species-poor environments (e.g., Vernet 1977; Chabal 1997; Théry-Parisot et al. 2010).

The development of tropical anthracology began in the 1990s and was accompanied by diligent efforts to establish appropriate theoretical background and methodological protocols to species-rich biomes. The pioneer research, developed mostly in Brazil and later in the Australia/Pacific region, is marked by a strict concern with samples validity, statistical reliability, and the association of both palaeoecological and cultural interpretations (e.g., Scheel-Ybert 2000; Dotte-Sarout et al. 2015).

Contrary to the historical false antagonism that there seems to have existed between European "anthracology" (particularly focused in palaeoenvironmental reconstructions) and North-American "charcoal analysis" (of a more palaeoethnobotanical aim), tropical anthracology studies have been demonstrating that these two interpretative lines can be based on the same material. The human transport of wood from natural vegetation to the dwelling working, or ceremonial areas does not invalidate reconstructions of the past vegetation based on analysis of archaeological charcoal, for it can be assumed that past populations "sampled" the vegetation surrounding the site, leaving a record of the existing species as charcoal preserved in archaeological sediments. Likewise, the use of anthracology to reconstruct past environments should not overshadow the cultural information contained in the same sample.

While most of the theoretical/methodological principles developed for temperate and arid environments were proven to be valid in tropical biomes, a major distinction stands: Biodiversity.

In nontropical regions, of lower plant diversity – especially in Europe – wood anatomy is better known. Comprehensive wood anatomy references render the identification process much easier, and species-level determinations are frequent. In the tropics, determination accuracy is significantly lower. The two reasons for that are the high biodiversity (as the wood anatomy of several plants are similar to each other), and

the fact that the anatomy of tropical timbers is as yet poorly known, especially regarding non-commercial species. In consequence, species identification is harder and taxonomic precision is lower (frequently at genus level).

The precision of determination possible in regions of lower floristic diversity will probably never be achieved in the tropics. However, a decrease in uncertainty can be obtained by systematically taking into account a large number of anatomical features in each sample. This imposes a minimum size for the fragments studied (usually 4 mm), as well as the use of good comparative collections and databases as complete as possible.

Nevertheless, the results already obtained show that anthracological studies are perfectly applicable to the tropics. Palaeoenvironmental and landscape reconstructions can be satisfactory even with taxonomic determination limited to genus. Likewise, a large scope of archaeobotanical data can be obtained, especially related to wood use in domestic and ritual contexts, but also to other aspects such as site formation processes and indicators of people's mobility in the landscape (e.g., Scheel-Ybert 2014; Dotte-Sarout et al. 2015).

Future Directions

Since the 2000s, a great increase has been observed in the number of both anthracological publications and existing charcoal collections, as well as in their geographical spread. Even if anthracological research still remains much more widespread in Europe/Mediterranean and in temperate regions, it has firmly advanced in South America, Australia and the Pacific region, and Africa. Conversely, few studies have been developed in North and Central America and in Asia. A larger dissemination of anthracological studies, in both tropical and nontropical regions, is an important endeavor of the discipline.

The improvement and expansion of charcoal collections and online databases is an important step to fostering the development of the discipline and encouraging its new applications. Wood anatomical studies are extremely useful in helping charcoal identification, but the identification process is more straightforward when charcoal is directly compared to extant charred samples. Thus, charcoal comparative collections are essential to reliable charcoal identifications – especially in the tropics.

One of these possible new applications of anthracology has recently come to light in Brazil. Forest scientists have been committed to the development of extant charcoal identification. This approach seeks the recognition of species from fires of natural and anthropogenic origin and the controlling of charcoal production in order to reduce the illegal wood extraction from native biomes.

Dendroanthracology is another line of research that has experienced much growth. The multiplication of these studies and the establishment of stronger theoretical and methodological frames are under way. So is the application of dendroanthracometrical techniques to tropical regions, which is a great challenge. On the one hand, the huge biodiversity prevents the establishment of specific models. On the other hand, the rarity of growth rings compels to the development of protocols exclusively based in other anatomical features – such as rays or fibers. Yet this development will be a major contribution in view of the understanding of vegetation structure and cultural practices.

In general, the theoretical and methodological bases of Anthracology, as a discipline, have been largely established. Still many issues remain yet to be addressed. Key subjects are a better understanding of cultural practices and of taphonomic processes that might have engendered different charcoal assemblages. While the first topic depends on the development of ethnobotanical/ethnoanthracological/ethnoarchaeological studies, the second one calls for more experimental research.

Those are critical research challenges both in nontropical and in tropical areas. Still a larger investment in establishing theoretical and methodological premises specifically adapted to tropical regions is also key to the future of the discipline.

Cross-References

- ▶ Archaeobotany
- ▶ Charcoal: Preservation and Conservation
- ▶ Excavation Methods in Archaeology
- ▶ Paleoethnobotany
- ▶ Phytolith Studies in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Taphonomy of Plant Micro-remains in Environmental Archaeology

References

Asouti, E. 2006. Charcoal analysis – A short history. http://pcwww.liv.ac.uk/~easouti/History%20of%20charcoal%20analysis.htm.

Badal, E., Y. Carrión, M. Macías, and M. Ntinou, eds. 2012. Wood and charcoal: Evidence for human and natural history. *Sagvntvm Extra* 13:1–299.

Chabal, L. 1997. Forêts et Sociétés en Languedoc (Néolithique Final, Antiquité Tardive). L'Anthracologie, Méthode et Paleoécologie. *Documents d'archéologie française* 63. 188 p.

Couvert, M. 1968. Étude des charbons préhistoriques. Méthodes de préparation et d'identification. *Libyca* 16: 249–256.

Damblon, F. (ed.) 2013. *Proceedings of the fourth international meeting of Anthracology*, British Archaeological Records International Series, Vol. 2486, 1–251.

Dotte-Sarout, E., X. Carah, and C. Byrne. 2015. Not just carbon: Assessment and prospects for the application of anthracology in Oceania. *Archaeology in Oceania* 50 (1): 1–51.

Dufraisse, A. 2006. Charcoal anatomy potential, wood diameter and radial growth. In *Charcoal analysis: New analytical tools and methods for archaeology*, British archaeological reports international series, ed. A. Dufraisse, 47–60. Oxford: Archaeopress.

Fiorentino, G., and D. Magri. (eds.) 2008. *Charcoals from the past: Cultural and Palaeoenvironmental implications*, British archaeological reports international series, Vol. 1807, 1–318.

Heer, O. 1866. Pflanzen der Pfanhlbauten. Neujahrsblatt der Naturforschunden Gesellschaft Neujbl, 1–54.

Ludemann, T. 2010. Past fuel wood exploitation and natural forest vegetation in the Black Forest, the Vosges and neighbouring regions in western Central Europe. *Palaeogeography, Palaeoclimatology, Palaeoecology* 291 (1–2): 154–165.

Marguerie, D., and J.-Y. Hunot. 2007. Charcoal analysis and dendrology: Data from archaeological sites in north-western France. *Journal of Archaeological Science* 34: 1417–1433.

Prior, J., and P. Gasson. 1993. Anatomical changes on six African hardwoods. *IAWA Journal* 14 (1): 77–86.

Salisbury, K.J., and F.W. Jane. 1940. Charcoals from Maiden Castle and their significance in relation to the vegetation and climatic conditions in prehistoric times. *Journal of Ecology* 28: 310–325.

Scheel-Ybert, R. 2000. Vegetation stability in the Southeastern Brazilian coastal area from 5500 to 1400 14C yr BP deduced from charcoal analysis. *Review of Palaeobotany and Palynology* 110 (2): 111–138.

Scheel-Ybert, R., and T.A.P. Gonçalves. 2017. First anthracological atlas of Brazilian species. Rio de Janeiro: Museu Nacional. Série Livros Digital, 10. 234 pp.

Shackleton, C., and F. Prins. 1992. Charcoal analysis and the "Principle of least effort": A conceptual model. *Journal of Archaeological Science* 19: 631–637.

Théry-Parisot, I., L. Chabal, and J. Chrzavzez. 2010. Anthracology and taphonomy, from wood gathering to charcoal analysis: A review of the taphonomic processes modifying charcoal assemblages, in archaeological contexts. *Palaeogeography, Palaeoclimatology, Palaeoecology* 291: 142–153.

Thiébault, S. (ed.) 2002. *Charcoal analysis: Methodological approaches, palaeoecological results and wood uses*, British archaeological reports international series, Vol. 1063, 1–284.

Vernet, J.-L. 1977. Les Macrofossiles Végétaux et la Paléoécologie du Pléistocène. *Bulletin de l'Association Française pour l'étude du Quaternaire, Suppl.* 47: 53–55.

Vernet, J.-L. (org.) 1992. Les charbons de bois, les anciens écosystèmes et le rôle de l'homme. *Actes du Colloque*. Bulletin de la Société Botanique de France, Actual. bot., Vol. 139, no. (2/3/4), 1–725.

Western, C.A. 1971. The ecological interpretation of ancient charcoals from Jericho. *Levant* 3: 31–40.

Anthropogenic Environments, Archaeology of

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Introduction

The term "anthropogenic environment" suggests, in its etymology, an environment that is created by humans, but the archaeological study of anthropogenic environments is primarily concerned

with the coevolution of human communities and their landscapes, the dialectic between ecology and society.

As the intersection between culture and ecology, anthropogenic environments provide a critical record of past human impacts on the environment, an aspect of archaeology that is critical for contextualizing current environmental problems. From an ecological perspective, human modifications to the environment can be both positive and negative, leading to increases in biodiversity as well as decreases. The archaeology and anthropology of anthropogenic environments have led to the recognition of traditional landscape management practices as important to the development and maintenance of ecological diversity in many regions worldwide. Anthropogenic environments also preserve records of past societies; diet, subsistence practices, labor organization, social organization, settlement patterns, and beliefs are all part of the relationship between people and their environments and therefore leave some archaeological trace on the landscape.

Zooarchaeology, archaeobotany, and geoarchaeology are the methodological subfields most commonly used in the study of anthropogenic environments. These are the fields best suited to the study of human/environmental interactions as seen through the impacts human communities have had on animals, plants, and soils or landforms.

Definition

Anthropogenic environments are also called culturally modified environments or human-modified landscapes. Modifications of the environment, whether minor or profound, are ubiquitous wherever human communities are found. In the modern world, therefore, essentially all environments are anthropogenic, to the extent that they have been altered by human occupation. In practice, however, archaeologists usually define anthropogenic environments as those that show measurable changes in ecological dimensions, such as plant and animal diversity or soil fertility, that can be attributed to human modifications.

The tendency of Western societies to see the environment and human societies as categorically separate (the nature/culture dichotomy) makes anthropogenic environments difficult to define. The English language and Western philosophy define humans as distinct from their ecological context, but the study of anthropogenic environments demands a recognition of humans as part of the environment, one important component within the ecosystem. Anthropogenic environments are the result of the dialectic between human communities and their context, a physical manifestation of the enveloping web of relationships between humans, their landscape, and other animal and plant species.

The archaeological study of anthropogenic environments focuses on three common types of human interactions with the environment: impacts on plants, impacts on nonhuman animals, and the modification of soils or landforms.

The modification of soils or landforms can take many forms, often (and most spectacularly) related to agriculture, but certainly not limited to agricultural societies (Fig. 1). Terracing, irrigation, soil amelioration (including the creation of dark earth), damming, and other modifications of the landscape are frequently associated with the cultivation of domestic or wild plants but can have a strong effect on the composition and growth of all members of the local plant community, including weedy annuals and tree growth. The creation of roads, paths, fields, houses, burial mounds, or villages can also affect plant and animal species by changing water runoff patterns and soil compaction and creating edge effects that increase diversity. These deliberate modifications of the landscape have both intentional and unintended effects on species composition. Additionally, use of the landscape can have disastrous effects on soils and productivity, through salinization or erosion.

Human impacts on plant species and communities include domestication, transplantation, the extension of normal range (for either domestic or wild plants), cultivation of wild or semidomesticated plants, clear-cutting of forests, burning of forests or grasslands, and the preferential destruction or encouragement of certain species. Less

Anthropogenic Environments, Archaeology of, Fig. 1 A terraced agricultural landscape, along the Douro River, Portugal

direct, but often just as significant, are human-caused changes to habitats or growing conditions, whether or not such changes were intended to impact plant species. These include most of the modifications of soil and landforms mentioned above. For example, irrigation, soil amelioration, and terracing have a profound effect on plant growth, as can clearing vegetation for a field or trampling soil for a path. These effects can be wide-reaching and impact not just the specific species that may have been targeted (if any) but also weedy annuals that may take advantage of these anthropogenic niches. Agricultural systems, such as monocropping or multicropping, can also impact the diversity and density of regional plant communities (Fig. 2).

Anthropogenic Environments, Archaeology of, Fig. 2 Agave growing in rock mulch gathered from the desert floor, Arizona, USA

Similarly, human societies and communities impact animal species through domestication, transplantation (of wild or domestic animals), range extension, overhunting, and the targeting of particular age/sex classes of prey. Human impacts on plant species, like those discussed above, can also have a profound effect on animal communities, through changes to habitat and food supply. Burning is commonly used to increase the range and abundance of grazing animals, for example, but irrigation, terracing, and other modifications that lead to denser or more diverse plant cover can also increase the abundance and diversity of animal communities. Clear-cutting of forests, damming of rivers, and wide-scale pollution can also lead to the local extinction of some species. Livestock can also impact landforms and

plant communities through over-grazing, a common cause of erosion and changes in seed distribution and plant survivorship.

While anthropogenic environments are, in a sense, human "created," the relationship between people and their environments is more complex and nuanced than this implies. Anthropogenic environments are, in essence, contingent landscapes; landscapes reflect past histories of use and modification, and current uses and modifications are dependent on the choices made in previous generations. A fundamental recognition that all people live in contingent landscapes is fundamental for an understanding of modern environmental problems.

Historical Background

The history of the archaeological study of anthropogenic environments mirrors changes in popular conceptions of the environment and how it relates to human societies and also to the development of theoretical perspectives on the environment in the fields of ecology, anthropology, and geography, which have strongly influenced, and been influenced by, archaeology.

The Western concept of nature/culture dichotomy has roots as deep as ancient Greek philosophy and continues to be enshrined in popular and scholarly culture. The tendency for Western scientists and philosophers to see non-Western people as part of nature – a tendency fueled by the unwillingness of colonial powers to recognize the accomplishments of indigenous people and the land claims that went with them – initially made it difficult for Western archaeologists to recognize the extent of anthropogenic landscapes around the world.

Early understandings of human/environmental interactions in the social sciences often took the form of extreme determinism. As a backlash against these simplistic views, environmental arguments were avoided during the early development of archaeological theory. A culture's environmental setting was considered little more than an enabler or (more frequently) limiter of human behavior. After World War II, however, popular recognition of the environmental effects of human population growth, pollution, and consumption increased. Archaeologists working with ancient states were some of the first to apply this recognition to the past, with the documentation of human-created environmental disasters that led to abandonment of settlements or collapse of civilizations (e.g., Jacobsen and Adams 1958). While large-scale societies were considered to have significantly depleted their environments, the ecological impact of small-scale societies, whether positive or negative, was not widely studied (but see Day 1953).

The first ecologically inspired theoretical perspective to gain wide purchase within anthropology was Julian Steward's. His 1955 *Theory of Culture Change* was the foundation for the school of Cultural Ecology, which saw social and subsistence organizations as adaptations to the environment. Steward's work focused heavily on subsistence and the technological adaptations adopted to implement a particular subsistence regime within a particular environmental context. Although Steward's approach was far better suited to the study of small-scale societies than earlier approaches to human/environmental interactions, his primary focus was on the impact that the environment had on people, rather than on a recognition of the diversity of impacts people could have on the environment.

Popular and scientific understanding of the environment, and particularly environmental problems, was revolutionized by the 1962 publication of Rachel Carson's classic *Silent Spring*. Carson documented the degree to which the catastrophic effects of human actions could be both widespread and subtle. Overtly destructive actions, such as logging or strip-mining, were not the only environmental threats, nor could protecting national parks and wilderness from development solve the problems of invisible poisons in the air, soil, and water. Carson showed that urban, agricultural, and rural landscapes, as well as our own health, had to be protected from the effects of pollution. Population pressure, and the threat of population growth to the environment, was another important scientific and popular theme of the 1960s, with the publication of Paul

Ehrlich's (1968) best seller, *The Population Bomb*.

Although the focus of public discourse was on the destructive impacts of human actions on the environment, within anthropology and archaeology there was increasing recognition of the coevolutionary aspects of human/environment interactions. Anthropologists of the 1960s were strongly influenced by equilibrium models of ecosystems. In these models, disturbance – including positive and negative feedback from cultural or non-cultural sources – was thought to pull the ecosystem away from a "natural" vegetation regime. When disturbance ended or was minimized, the ecosystem would return to this "baseline environment." Under these models, small-scale communities could be seen as inherent environmentalists, living within the equilibrium of their environment. This was an idea supported by the work of Roy Rappaport (1968) who argued that complex cultural adaptations maintained ecological balance. Similarly, while Ehrlich (1968) had warned of the negative consequences of unchecked population growth, within archaeology, the late 1960s saw the emergence of models suggesting that population pressure drove social and technological change in human societies. The shift to Mesolithic/Archaic ways of life, the development of agriculture, and the rise of urbanization were all attributed, at least in part, to population growth (Boserup 1965; Binford 1968; Flannery 1969; Athens 1977).

Anthropological awareness of human impacts on the environment broadened as the issue gained increased public recognition. Vayda and Rappaport's (1968) seminal paper "Ecology, Cultural and Non-Cultural" became a critical theoretical underpinning of the study of human/environmental interactions and particularly anthropogenic environments. This interest moved beyond a focus on complex societies, as a growing interest in the origins and effects of agriculture and agricultural intensification led to a focus on the impact of small-scale farming societies on ecosystems (e.g., Netting 1968). Foraging societies were also recognized as having a significant impact on their environments at this time, with Martin and Wright's (1967) publication of *Pleistocene Extinctions: The Search for a Cause*, one of the first attempts to systematically explore the possibility that small-scale hunting and gathering societies may have caused wide-scale prey extinctions.

While Cultural Ecology remained the dominant theoretical perspective on human/environmental interactions through the 1970s, the 1970s and 1980s saw the diversification of theoretical approaches, particularly the development of Human Behavioral Ecology, which focuses on the use of optimality models for explaining human behavior (Winterhalder and Smith 2000). Optimality models have their base in ecology, particularly Charnov's (1976) "Optimal Foraging: The Marginal Value Theorem," but are also developed from rational choice models popular in economics. While classic works of Cultural Ecology sought to explain human behaviors as adaptations to maintain ecosystem balance, Human Behavioral Ecologists argued for short-term and self-serving behavior by individuals seeking to maximize individual fitness. Although the behaviors best suited to survival might involve conservation of local landscapes, Human Behavioral Ecology did not assume that such conservation was necessary or desirable to the actors involved. From the perspective of evolutionary theory, Human Behavioral Ecology is more defensible in its focus on individual fitness than Cultural Ecology, since the latter's theoretical approach can rely on an assumption of group selection. Human Behavioral Ecology, however, did not significantly improve archaeological understanding of anthropogenic environments, since the focus on individual actions meant that Human Behavioral Ecologists tended to see human impacts on the environment as inherently negative (or absent) rather than part of a feedback loop (as with Cultural Ecology) or as a dialectic with the local landscape that could be both positive and negative for environmental health.

The 1980s brought a better understanding of the dynamic relationship between human communities and their landscapes, as equilibrium models of ecosystem dynamics were abandoned in favor of non-equilibrium models that rejected the idea of "natural" baseline environment that was

maintained through a series of feedback loops. Instead, ecosystems were seen as highly dynamic, influx, and contingent, with disturbance part of the system, rather than inherently negative. Non-equilibrium models challenged the view of humans as either destroying the "natural" vegetation regime or adapting to an existing ecological balance. Rather, people were situated squarely within the ecosystem, as just one more source of dynamic and historical change.

The use of non-equilibrium models is most strongly associated with the development of Historical Ecology, which emerged in the last decade of the twentieth century (Balée 2006). Historical Ecology's focus on non-equilibrium models, and particularly the recognition of contingent landscape development, makes this the natural theoretical perspective for fully exploring the role that humans have played in shaping environments over millennia. Historical Ecology is particularly suited for the study of small-scale agricultural societies and the many subtle and profound ways that such societies manipulated their environment, creating whole landscapes shaped by human actions. Early works on the landscape management of small-scale agricultural societies, such as Posey's (1985) "Indigenous Management of Tropical Forest Ecosystems: The Case of the Kayapó Indians of the Brazilian Amazon," were instrumental in recognizing the scope of anthropogenic environments.

Throughout the 1990s, anthropological research continued to refute the idea that the indigenous people of any continent had failed to change their local and even regional landscapes. Influential articles, such as Redford's (1991) "The Ecologically Noble Savage" and Denevan's (1992) "The Pristine Myth," were published just before the UN Conference on the Environment and Development in Rio, which brought to the forefront the environmental problems of traditional and developing nations. The rejection of the view of small-scale societies as inherent conservationists was founded on strong ethnographic and archaeological data. Some of this data, however, had been present since the 1950s or earlier. The increasing acceptance of this perspective had as much to do with changing paradigms as with new data. The growth of postcolonial and indigenous archaeologies helped to refute older theoretical perspectives on small-scale societies that had deep roots in archaeology's colonial past.

Key Issues/Current Debates

The study of anthropogenic environments is tied to the increasing importance of applied archaeology as it relates to modern environmental policy and conservation efforts. An understanding of how people have changed their environments in the past can be used to improve modern environmental policy. This includes the use of archaeological and historical data to guide the reconstruction of damaged ecosystems as well as the use of archaeological knowledge of past technology (e.g., agricultural technology) to improve modern landscape modification practices.

The concept of environmental reconstruction assumes a "baseline environment" that can be reconstructed. As discussed above, however, current theoretical perspectives recognize the inherent dynamism of ecosystems. The focus on anthropogenic landscapes allows for a better understanding of the complexity of environmental reconstruction, a process that does not necessarily involve minimizing disturbance and human impact. If all environments are anthropogenic – and in fact many degraded modern environments are degraded from a healthy diversity that was created through human manipulation – then the purpose of reconstruction must be something other than to return the environment to a pre-manipulation state. Specific goals, such as increasing diversity or decreasing erosion, must be identified, and the recognition made that such goals may be best gained through active cultural manipulation of vegetation and landforms.

The archaeology of anthropogenic environments can provide data on the species of plants and animals present in past environments, the past landscape manipulations that created the environment, and the cultural behaviors that improved environmental health. Archaeologists are also increasingly applying lessons from past societies to help local communities improve quality of

human life as well as improve or protect environmental diversity. For example, archaeological studies of Amazonian dark earth (terra preta soils) may help protect the Amazon rainforest by reviving prehistoric soil amelioration practices that allow farmers to use the same plot of land for longer, rather than expanding into nearby forested regions when fields lose fertility (Lehmann et al. 2004).

International Perspectives

The understanding of anthropogenic environments has a peculiar history within the Americas, which makes their importance (politically, economically, and socially) far different from Eurasia or Africa. Concepts of the "ecologically noble savage," which only recognized European-style agriculture, architecture, and landscape modification as "cultural," were the result of blindness to the accomplishments of indigenous people and were also part of the colonial justification for land acquisition. When native land transformations, and the indigenous people themselves, were seen as "natural," then their land could be considered "unimproved." This was used as justification for European appropriation.

Although there is now a much greater understanding of the impact indigenous people had on the landscapes of the Americas, the colonial history of this topic, as well as the colonial history of archaeology itself in the Americas, continues to impact scientific and popular understanding of environmental transformations. The modern landscapes of the Americas are a part of the cultural patrimony of groups of people who were historically only a peripheral part of archaeological discussions.

Future Directions

Archaeologists interested in anthropogenic environments are increasingly engaged in applied research, both through engagement with environmental policy makers and through the application of archaeological knowledge to change or modify present behaviors that could harm the environment or human health. As the destruction of ecosystems intensifies and greater interest is paid to environmental problems, an understanding of past human/environment interactions will become more critical for understanding how environmental problems can be solved and predicted.

Cross-References

- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Cultural Ecology in Archaeology
- ▶ Environmental Archaeology and Conservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ Human Impacts on Ancient Marine Ecosystems
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Sustainability and Cultural Heritage
- ▶ Urban Landscapes: Environmental Archaeology

References

Athens, J.S. 1977. Theory building and the study of evolutionary process in complex societies. In *For theory building in archaeology*, ed. L.S. Binford, 353–384. New York: Academic Press.

Balée, W. 2006. The research program of historical ecology. *Annual Review of Anthropology* 35: 75–98.

Binford, L.S. 1968. Post-Pleistocene adaptations. In *New perspectives in archaeology*, ed. L.S. Binford and S. Binford, 313–341. Chicago: Aldine.

Boserup, E. 1965. *The conditions of agricultural growth: The economics of agrarian change under population pressure*. Chicago: Aldine.

Carson, R. 1962. *Silent spring*. New York: Houghton Mifflin.

Charnov, E.L. 1976. Optimal foraging: Attack strategy of a mantid. *The American Naturalist* 110: 141–151.
Day, G.M. 1953. The Indian as an ecological factor in the northeastern forest. *Ecology* 24: 329–346.
Denevan, W.M. 1992. The pristine myth: The landscape of the Americas in 1492. *Annals of the Association of American Geographers* 82: 369–385.
Ehrlich, P. 1968. *The population bomb*. New York: Ballantine.
Flannery, K.V. 1969. Origins and ecological effects of early domestication in Iran and the Near East. In *The domestication and exploitation of plants and animals*, ed. P.J. Ucko and G.W. Dimbleby, 73–100. London: Duckworth.
Jacobsen, T., and R.M. Adams. 1958. Salt and silt in ancient Mesopotamian agriculture. *Science* 128 (3334): 1251–1258.
Lehmann, J., D.C. Kern, B. Glaser, and W.I. Woods, eds. 2004. *Amazonian dark earths: Origin, properties, management*. New York: Springer.
Martin, P.S., and H.E. Wright, eds. 1967. *Pleistocene extinctions: The search for a cause*. New Haven: Yale University Press.
Netting, R.M. 1968. *Hill farmers of Nigeria: Cultural ecology of the Kofyar of the Jos Plateau*. Seattle: University of Washington Press.
Posey, D.A. 1985. Indigenous management of tropical forest ecosystems: The case of the Kayapó Indians of the Brazilian Amazon. *Agroforestry Systems* 3: 139–158.
Rappaport, R.A. 1968. *Pigs for the ancestors: Ritual in the ecology of a New Guinea people*. New Haven: Yale University Press.
Redford, K.H. 1991. The ecologically noble savage. *Cultural Survival Quarterly* 15: 46–48.
Steward, J.H. 1955. *Theory of culture change: The methodology of multilinear evolution*. Urbana: University of Illinois Press.
Winterhalder, B., and E.A. Smith. 2000. Analyzing adaptive strategies: Human behavioral ecology at twenty-five. *Evolutionary Anthropology* 9: 51–71.

Further Reading

Dean, R., ed. 2010. *The archaeology of anthropogenic environments*. Occasional papers, vol. 37. Carbondale: Center for Archaeological Investigations, Southern Illinois University.
Denevan, W.M. 2001. *Cultivated landscapes of Native Amazonia and the Andes*. Oxford: Oxford University Press.
Doolittle, W.E. 2002. *Cultivated landscapes of Native North America*. Oxford: Oxford University Press.
Lyman, R.L. 2006. Paleozoology in the service of conservation biology. *Evolutionary Anthropology* 15: 11–19.
Lyman, R.L., and K.P. Cannon, eds. 2004. *Zooarchaeology and conservation biology*. Salt Lake City: University of Utah Press.
Vayda, A.P., and R.A. Rappaport. 1967. Ecology, cultural and noncultural. In *Introduction to cultural anthropology*, ed. J.A. Clifton, 477–497. Boston: Houghton Mifflin.
Whitmore, T.M., and B.L. Turner. 2001. *Cultivated landscapes of Middle America on the eve of conquest*. Oxford: Oxford University Press.
Wolverton, S., and R.L. Lyman, eds. 2012. *Conservation biology and applied zooarchaeology*. Tucson: University of Arizona Press.

A

Anthropogenic Sediments and Soils: Geoarchaeology

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Introduction

Archaeology has gradually but consistently increased its interest in the study of soils and sediments over the last decades. As a result of this emphasis, the discipline has not only sought to characterize the terrigenous matrix within which the great majority of archaeological materials are found but, increasingly, to also understand soils and sediments in their double dimension: as archives of archaeological and environmental data and as *sui generis* artifacts (Butzer 1982; Waters 1992; French 2003; Holliday 2004; Goldberg and Macphail 2006; Walkington 2010). This salience notwithstanding, a tendency to conflate the meaning of sediments and soils continues to exist within the discipline. In some cases, this owes much to the nature of archaeological findings and their context; artifacts are found in sediment deposits that have stratigraphy and which, generally speaking, are sufficiently close to the surface to be affected by soil-forming processes. Be that as it may, it is useful to draw a contrast between "anthropogenic sediments" and "anthropogenic soils" (and indeed between sediments and soils) because the distinction highlights different earthly processes that can affect the formation of this type of archaeological evidence. Put another way, both anthropogenic sediments and anthropogenic soils imply

terrigenous material with distinctive characteristics resulting from the strong and enduring influence of past human activity. However, each concept emphasizes a different aspect of the life history of the landscape, that demands the separate attention of archaeological research, especially the subdiscipline of geoarchaeology.

Definition

Sediment is non-lithified material made up, most of the time, of mineral particles of different composition, shape, and size. Sediment is subject to alteration through weathering and can be transported by different agents, which can select different particle sizes as a function of overall energy. Sediment is generally studied by archaeology in deposits that have stratigraphy: the composition of particles, their distribution in terms of size classes, and the sedimentary structures at various scales of observation both inform about the history of a deposit and provide crucial information about preservation factors (Goldberg and Berna 2010). Anthropogenic sediments are those sediments whose distinctive characteristics are a result of the strong and enduring influence of past human activity. Their geoarchaeological study focuses on their composition, history of deposition, and post-deposition alteration, taking into account the significant material effects of human agency. A more intuitive starting point is that most human activity takes place on land surfaces and that land surfaces are subjected to different actions that modify their characteristics over time. Modifications resulting from the activity of people produce a specific range of changes and inputs that lead to detectable differences when preserved: even fairly simple human activities can produce a variety of debris, e.g., charcoal, ash, bones, pottery, plaster, lithics, phytoliths, and slag; one might also consider here other human activities such as excavating, heaping, and winnowing of sediments for different purposes. The archaeological correlates of these inputs and activities are detected through specific material signatures that endure over time and alter the measurable properties of sediments. It is important to underscore that anthropogenic sediments do not only include sediments enriched by anthropic debris or depleted by associated chemical alteration. Unaltered sediments that have been relocated by humans (for instance, those used in platforms, agricultural raised fields, as well as sand or clay mined from quarries and transported to other locales), and sediments that have been modified by humans as raw materials for the manufacture of objects (e.g., clay deposits for making pottery, adobe, and mudbrick), among others, also deserve to be considered as anthropogenic sediments. Human impact on the stability of sedimentary deposits (for instance, through vegetation clearance and burning) are also known to contribute to higher mobility of sediments (e.g., via erosion), but the concept of anthropogenic sediments is probably best reserved for those sediments so mobilized that show the enduring and telltale material signatures of human activity, e.g., re-deposited anthropogenic sediments and soils.

A measure of the importance of distinguishing between anthropogenic sediments and anthropogenic soils is gained by examining what the notion of soil embodies and, consequently, how we can understand the notion of anthropogenic soils. Soil constitutes a complex and open system, a material continuum that drapes the entire planet. It is an assortment of organic and mineral material resulting from the interaction between geomorphological and biotic processes as they affect, and modify the properties of, surface sediments. Collectively, these processes are known as soil-forming or pedogenetic processes and lead to the formation of distinctively patterned layers known as soil horizons (Phillips and Lorz 2008). While key characteristics of soil horizons are determined by the parent material of soil, in other words by the actual composition of the sediments upon which soils have formed, the differences that can be observed between horizons are often the result of the decay, mixing, and depositional action of soil, the mobilization of non-consolidated or dissolved mineral and organic material through the existing pore structure (much of which results from the action of soil biota), and other forms of chemical modification. Horizontal variation in soil characteristics along a land form – a soil

catena – subsumes contrasts in parent material as well as variation in slope, drainage, vegetation cover, etc. Anthropogenic soils, in turn, are those whose formation and characteristics have been enduringly influenced by the material effects of human action. Their geoarchaeological study emphasizes an interpretation of the properties of soil horizons as a partial outcome of past human modification. Examples are as varied as they are intriguing: they include soils which were deliberately enhanced through the addition of materials in the past (often to increase fertility, including here compost heaps, home gardens, and agricultural fields) inasmuch as the mineral and even organic components are resistant to degradation; they also include soil horizons formed on human-transported or human-manufactured anthropogenic sediments (e.g., landforms created or altered by humans, including raised fields, soils formed on disturbed materials associated with mining); soils formed in situ on abandoned habitation areas; and soils whose surface horizon has been modified by topsoil disturbance and/or irrigation associated with different types of agriculture (e.g., slash and burn soils, paddy soils), among others (Limbrey 1975; Woods 2003; Dudal 2005).

Anthropogenic sediments and soils exist at variable spatial and temporal scales, from sand piles, pit fills, and compost heaps ephemerally accumulated in the vicinity of houses to entire landscapes blanketed by sediments dislodged by clearance and modified through millennia of continued agriculture. The foci of geoarchaeological studies of anthropogenic sediments involves, among others, establishing which sediments have been transported by humans deliberately (and wherefrom), which in situ sediments have been modified due to human activity (and how), and which sediments have been chosen to craft particular materials (wherefrom and how). The study of anthropogenic soils, on the other hand, includes how soil horizons' properties record the enduring influences of past populations (and to what extent the soil archive can be used to examine past land use), how these material signatures can be used to infer past human activity, and whether soils formed on old occupation deposits have been subsequently employed for cultivation, among others.

Historical Background and Current Debates

Archaeological research focused on anthropogenic inputs on soils and sediments trace their lineage back to Arrhenius' studies of phosphate enrichment in Sweden (Arrehenius 1929) and include geochemical prospection in a wide array of different contexts. The interpretation of modified properties as evidence of anthropogenic enrichment rests on the conceptual premise that humans concentrate metals and nonmetals, and develop other signatures in the sediment record (for instance, enhanced magnetism as a result of burning, changes in pH, etc.). Ethnographic and actualistic situations, in turn, document enrichment with phosphorus, carbon, calcium, potassium, magnesium, manganese, zinc, copper, and other elements associated with different settlement practices or activity areas (Woods 2003). These studies constitute a powerful tool to infer patterns in the use of space, especially when chemical properties are interpreted with the aid of micromorphological observations (Milek 2012). In this connection, compared to some pioneering research of the 1970s and 1980s (Eidt 1984, 1985), the application of micromorphological observations (Courty et al. 1989) has both greatly expanded the overall scope of this research and illustrated the remarkable heterogeneity that characterizes occupation deposits as archives of past human activity (Brochier 2002; Goldberg and Macphail 2006).

Approaches to the study of anthropogenic soils as archaeological entities owe much to studies of *plaggen* soils, the latter being deliberately enhanced farming soils resulting from applications of manured animal bedding made of heather, grasses, and peat by medieval farmers of the sandy lowlands of North-West Europe (Blume and Leinweber 2004). Examples are studies documenting the impact of *plaggen* cultivation on the landscape and research focused on determining new recipes for *plaggen* production (Simpson et al. 2005). Other examples of anthropogenic soils modified for agricultural purposes include soils modified by liming (Conry 1971) and *terra mulata* soils of the Amazon basin, modified by intensive in-field burning (Arroyo-Kalin

2012). In parallel, studies emphasizing the deliberate "making" of anthropogenic sediments include the construction of ash mounds of South India (Paddayya 2002), the making of Tell mudbrick (Rosen 1985) and New World adobe bricks (Goodman-Elgar 2008). Also important are studies devoted to the construction of mounds from more incidental materials, including earth and shells (Roosevelt 1991; Gaspar 1998; Villagran et al. 2011; Rostain 2012).

Worthy of note are examples of anthropogenic soils developed on abandoned archaeological sites, such as Amazonian Dark Earths (Arroyo-Kalin et al. 2009) and European Urban Dark Earth (Macphail 1983; Cammas 2004). Some of the more sophisticated geoarchaeological studies of these deposits focus on ascertaining the properties, mode of formation, spatial extent, and variability of anthropogenic soils, with a particular emphasis on how pedogenetic processes have been affected by past human action (Cremasci and Nicosia 2010). Further areas of research include the actual timing of anthropogenic soil formation (Arroyo-Kalin 2012) and the extent to which these soils, enriched with human occupation debris, can be said to have been used for cultivation (Devos et al. 2009). The latter is an important avenue for research in light of ethnoarchaeological and actualistic studies documenting within-settlement soil improvement (Schmidt 2013, in press), as well as sophisticated, experimentally-based, studies of the material signatures of past cultivation (Lewis 2012). A related line of enquiry focuses on the use of refuse and/or manure in broad areas around settlements, which has prompted important discussion in the archaeology of North-West Europe, the Mediterranean region, and Middle East (Wilkinson 1989; Bintliff et al. 1990; Guttmann 2005).

Techniques employed in the study of anthropogenic sediments and soils are, for the most part, those deployed in other environmental archaeology investigations (Rapp and Hill 1998; O'Connor and Evans 1999; Goldberg and Macphail 2006): a combination between quantifying inclusions and fossil remains, measuring physical and chemical properties of terrigenous material, and studying undisturbed samples microscopically – all within an understanding of processes of landscape evolution. A key methodological issue, however, is the need to establish adequate baselines to assess anthropogenic modification. While human activity can be linked to higher phosphorous, calcium carbonate, carbon, as well as changing particle size classes and enhanced magnetism, it is not straightforward to successfully establish the extent of enrichment or depletion of soils and sediments in absolute terms. One approach is to use maps to compare relative abundance of selected parameters. Another is to employ a "background" for comparison. The extent to which this "background" is equivalent to "natural" conditions depends on the particular features of different regions: in some areas of the world agricultural modification of large expanses makes it next to impossible to detect parts of the landscape that are comparable to archaeological situations and which have not seen major impact by humans (Sanders in Turner and Sanders 1992). In other parts of the world, "backgrounds" can and should be sought because their study permits understanding local processes and situating anthropogenic modification in the specific context of local sediment dynamics and soil forming processes (Arroyo-Kalin et al. 2009). In this connection, some crucial considerations are to study "background profiles" rather than simply "background topsoil samples" (in order to compare to the profiles, rather than surface samples, of archaeological interest); ideally, to locate study profiles on the same landform as archaeological exemplars; and, importantly, to take into consideration the position in the soil catena or palaeocatena (French 2003).

Future Directions

The fundamental common ground between the study of anthropogenic sediments and soils is that both bear distinctive characteristics which can be traced back to human action. These characteristics are enduring, such that, on the one hand, they can be studied as material signatures of past human activity and landscape transformation and, on the other, they can affect the

properties of anthropogenic sediments or anthropogenic soils, rendering substrates that have become enriched, depleted, polluted, or otherwise transformed as a result of human agency. Given the ubiquity of human modification of the landscape throughout the Holocene – in many cases an integral consequence of the widespread adoption of agricultural livelihoods over millennia – geoarchaeological studies of anthropogenic soils and sediments constitute a developing and ever more important research program. It is increasingly realized that questions such as "What was the human impact on past environment?" can in many contexts oversimplify the issues at stake, namely, that the legacy effects of past human inhabitation constitute an important source of landscape variability which subsequent inhabitants had to both confront and creatively engage with (Stahl 1996). Put another way, in many cases, and via the enduring effects of manipulating environmental affordances, human populations have played the role of a keystone-species (Balée 2006), both in the flux of ecological interactions and as part of long-term processes of change that have modified the actual properties of the landscape.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Aksum: Environmental Archaeology
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeological Soil Micromorphology
- ▶ Chemical Survey of Archaeological Sites
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ Paddy Soils: Environmental Analyses
- ▶ People as Agents of Environmental Change
- ▶ Urban Dark Earth

References

Arrehenius, O. 1929. Die Phosphatfrage. *Zeitschrift für Pflanzenernährung, Düngung und Bodenkunde* 10: 185–194.

Arroyo-Kalin, M. 2012. Slash-burn-and-churn: Landscape history and crop cultivation in pre-Columbian Amazonia. *Quaternary International* 249: 4–18.

Arroyo-Kalin, M., E.G. Neves, and W.I. Woods. 2009. Anthropogenic dark earths of the Central Amazon region: Remarks on their evolution and polygenetic composition. In *Amazonian dark earths: Wim Sombroek's vision*, ed. W. Woods, W. Teixera, J. Lehmann, C. Steiner, A. Winklerprins, and L. Rebellato, 99–125. Dordrecht: Springer.

Balée, W. 2006. The research program of historical ecology. *Annual Review of Anthropology* 35: 75–98.

Bintliff, J., C. Gaffne, A. Waters, B. Davies, and A. Snodgrass. 1990. Trace metal accumulation in soils on and around ancient settlements in Greece. In *Man's role in the shaping of the Eastern Mediterranean landscape*, ed. S. Bottema, G. Entjes-Nieborg, and W.V. Zeist, 159–172. London: Taylor & Francis.

Blume, H.-P., and P. Leinweber. 2004. Plaggen soils: Landscape history, properties, and classification. *Journal of Plant Nutrition and Soil Science* 167: 319–327.

Brochier, J.E. 2002. Les sédiments anthropiques. Méthodes d'étude et perspectives. In *Géologie de la préhistoire: Méthodes, techniques, applications*, ed. J.-C. Miskovsky, 451–477. Paris: Géopré Editions.

Butzer, K.W. 1982. *Archaeology as human ecology*. Cambridge: Cambridge University Press.

Cammas, C. 2004. Les "terre noires" urbaines du Nord de la France: Première typologie pédo-sédimentaire. In *Terres noires. Dark earths*, ed. L. Verslype and R. Brulet, 43–55. Louvain-la-Neuve: Centre de Recherches d'Archéologie Nationale. Université Catholique de Louvain.

Conry, M.J. 1971. Irish plaggen soils – Their distribution, origin and properties. *Journal of Soil Science* 22: 401–416.

Courty, M.-A., R. Macphail, and P. Goldberg. 1989. *Soils and micromorphology in archaeology*. Cambridge: Cambridge University Press.

Cremasci, M., and C. Nicosia. 2010. Corso Porta Reno, Ferrara (northern Italy): A study in the formation processes of urban deposits. *Il Quaternario – Italian Journal of Quaternary Sciences* 23: 373–386.

Devos, Y., L. Vrydaghs, A. Degraeve, and K. Fechner. 2009. An archaeopedological and phytolitarian study of the "dark earth" on the site of Rue de Dinant (Brussels, Belgium). *Catena* 78: 270–284.

Dudal, R. 2005. The sixth factor of soil formation. *Eurasian Soil Science* 38: S60–S65.

Eidt, R.C. 1984. *Advances in abandoned settlement analysis. Application to prehistoric anthrosols in Colombia, South America*. Milwaukee: The Center for Latin America, University of Wisconsin-Milwaukee.

Eidt, R.C. 1985. Theoretical and practical considerations in the analysis of anthrosols. In *Archaeological geology*, ed. J.G. Rapp, 155–190. New Haven (CT): Yale University Press.
French, C.A.I. 2003. *Geoarchaeology in action: Studies in soil micromorphology and landscape evolution*. London: Routledge.
Gaspar, M.D. 1998. Considerations of the sambaquis of the Brazilian coast. *Antiquity* 72: 592–615.
Goldberg, P., and F. Berna. 2010. Micromorphology and context. *Quaternary International* 214: 56–62.
Goldberg, P., and R. Macphail. 2006. *Practical and theoretical geoarchaeology.* Oxford: Blackwell.
Goodman-Elgar, M. 2008. The devolution of mudbrick: Ethnoarchaeology of abandoned earthen dwellings in the Bolivian Andes. *Journal of Archaeological Science* 35: 3057–3071.
Guttmann, E. 2005. Midden cultivation in prehistoric Britain: Arable crops in gardens. *World Archaeology* 37: 224–239.
Holliday, V.T. 2004. *Soils in archaeological research*. New York: Oxford University Press.
Lewis, H.A. 2012. *Investigating ancient tillage. An experimental and soil micromorphological study.* British archaeological reports. Oxford: Archaeopress.
Limbrey, S. 1975. *Soil science and archaeology.* New York: Academic Press.
Macphail, R.I. 1983. The micromorphology of Dark Earth from Gloucester, London and Norwich: An analysis of urban anthropogenic deposits from the late Roman to early medieval periods in England. In *Soil micromorphology*, ed. P. Bullock and C.P. Murphy, 245–253. Berkamsted: AB Academic Publishers.
Milek, K.B. 2012. Floor formation processes and the interpretation of site activity areas: An ethnoarchaeological study of turf buildings at Thverá, northeast Iceland. *Journal of Anthropological Archaeology* 31: 119–137.
O'Connor, T., and J.G. Evans. 1999. *Environmental archaeology: Principles and methods*. Stroud: Sutton Publishing.
Paddayya, K. 2002. The problem of ashmounds of Southern Deccan in light of recent research. In *Recent studies in Indian archaeology*, ed. K. Paddayya, 81–111. New Dehi: Munshiram Manoharlal.
Phillips, J.D., and C. Lorz. 2008. Origins and implications of soil layering. *Earth-Science Reviews* 89: 144–155.
Rapp, G., and C.L. Hill. 1998. *Geoarchaeology: The earth-science approach to archaeological interpretation*. New Haven: Yale University Press.
Roosevelt, A.C. 1991. *Moundbuilders of the Amazon. Geophysical archaeology on Marajo Island, Brazil*. New York: Academic Press.
Rosen, A.M. 1985. *Cities of clay: The geoarchaeology of tells*. Chicago: University of Chicago Press.
Rostain, S. 2012. Between Sierra and Selva: Landscape transformations in upper Ecuadorian Amazonia. *Quaternary International* 249: 31–42.
Schmidt, M.J. 2013, in press. Amazonian dark earths: Pathways to sustainable development in tropical rainforests? *Boletim do Museu Paraense Emílio Goeldi*.
Simpson, I., J. Barrett, and K.B. Milek. 2005. Interpreting the Viking Age to medieval period transition in Norse Orkney through cultural soil and sediment analyses. *Geoarchaeology* 20: 355–377.
Stahl, P.W. 1996. Holocene biodiversity: An archaeological perspective from the Americas. *Annual Review of Anthropology* 25: 105–126.
Turner, B.L., and W.T. Sanders. 1992. Summary and critique. In *Gardens of prehistory. The archaeology of settlement agriculture in Greater Mesoamerica*, ed. T.-W. Killion, 263–284. Tuscaloosa: University of Alabama Press.
Villagran, X.S., A.L. Balbo, M. Madella, A. Vila, and J. Estevez. 2011. Stratigraphic and spatial variability in shell middens: Microfacies identification at the ethnohistoric site Tunel VII (Tierra del Fuego, Argentina). *Archaeological and Anthropological Sciences* 3: 357–378.
Walkington, H. 2010. Soil science applications in archaeological contexts: A review of key challenges. *Earth-Science Reviews* 103: 122–134.
Waters, M.R. 1992. *Principles of geoarchaeology: A North American perspective*. Tucson: University of Arizona Press.
Wilkinson, T. 1989. Extensive sherd scatters and land-use intensity: Some recent results. *Journal of Field Archaeology* 16: 31–46.
Woods, W.I. 2003. Development of anthrosol research. In *Amazonian dark earths: Origins, properties and management*, ed. J. Lehmann, D. Kern, B. Glaser, and W. Woods, 3–14. Dordrecht: Kluwer Academic Publishers.

Anthropological Genetics

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Introduction and Historical Background

Anthropological genetics is a study of the history of human genetic variation in the past and present. It applies methods and theory of evolutionary biology and population genetics on genetic data from human populations to address questions drawn from biological (physical) anthropology. In the broadest sense, anthropological genetic research covers a wide range of questions:

"What is it in our genes that makes us human?" "How does human genetic variation relate to that of other animals and great apes in particular?" "What is the genetic basis of normal (non-disease related) variation of phenotypic traits?" "When and how did regional differences in allele frequencies arise among populations?" "How to obtain and interpret evidence for natural selection in human evolutionary history?" "What inferences about demographic histories, spread of languages, and material culture can we make from genetic data?" Anthropological genetics overlaps with other research fields interested in variation among humans at molecular level, such as the following:

> "Molecular anthropology": In which any molecular evidence, including DNA, lipids, and proteins, is used to understand the extent and nature of human variation.
>
> "Forensic Anthropology": Its overlap with genetic anthropology lies in individual and population level identities as well as the study of phenotype/genotype relationships.
>
> "Archaeogenetics": More restricted to the study of human past (than present) with methods of molecular genetics.
>
> "Gene geography": Perhaps the least widely used of these parallel terms to characterize more specifically the study of spatial variation of allelic variants of genes.

Historically, anthropological genetics can trace back its roots to the serological studies of the early twentieth century which were the first to explore the distribution of the now "classical" genetic markers in human blood samples collected from across the world. The work of Dungern and Hirszfeld in 1910–11 on families of the academic staff of Heidelberg University showed that simple Mendelian rules of inheritance apply also on human ABO blood group data. During World War I, Ludwik and Hanka Herszfeld collected ABO blood group and hair color data from soldiers of different ethnic backgrounds. Their work provided the first insights into patterns of geographic variation of human genetic diversity. It should be kept in mind when reading papers from that time, however, that in the anthropological genetic studies published before World War II, the geographic patterns in human serological data were largely interpreted within the framework of racial categories. These early genetic studies tried but failed to find conclusive support to typological concepts of human variation as each marker system produced a different set of "races." After World War II, more blood group systems were described and the work on the characterization of their frequencies in human populations continued. The global frequency distributions of hundreds of classical markers were summarized and systematically analyzed in the works of Luigi Luca Cavalli-Sforza and Arthur Mourant. *The History and Geography of Human Genes* (Cavalli-Sforza et al. 1994) presented the analyses of synthetic maps of variation of many classical markers becoming a standard reference on human genetic variation. These synthetic maps, based on principal component analyses (PCA), have been for many later studies the starting blocks for hypothesis testing and interpretations of the correlation between genetic maps and distribution of languages and archaeological sites.

Implementation of polymerase chain reaction (PCR) technology in population genetic studies in the 1980s started a new era in anthropological genetics as it became easier and affordable to study the sequences of short targeted regions of DNA in large numbers of human samples. PCR requires only small quantities of starting DNA per sample, and therefore noninvasive biological source material, such as hair and buccal swabs, became accessible methods for collecting samples in anthropological fieldwork. This democratization of anthropological genetics meant that many labs started to carry out genetic work on humans leading to increasing volumes of data published on increasingly larger number of human populations. This, in turn, created the need for new analytical tools to interpret the variations observed in these short stretches of targeted sequence among human groups. Wider sampling of human populations brought up new questions about research ethics that needed to be resolved: questions about ethical use of DNA information with individual consent and questions about ethical use and interpretation of genetic data sampled from minority ethnic groups.

Dating Human Genetic Variation: Interpretations of Coalescent Trees of Individual Loci

PCR-based analysis of sequence variation in mtDNA and non-recombining regions of Y chromosome became particularly popular foci in anthropological genetic research in the 1990s given the sex-specific inheritance of these loci and lack of recombination. These features rendered mtDNA and Y chromosome suitable for drawing phylogenetic trees to describe relationships among multiple individual sequences. Phylogenetic trees drawn from these two uniparentally inherited loci provided the opportunity to explore genealogical relationships among individuals drawn from a range of geographic locations via an approach called phylogeography by John Avise. By knowing the rate at which mutations occur, one can estimate time to the most recent common ancestors (TMRCAs) of mtDNA or Y chromosome sequence types (haplotypes), study the time depth of local and interregional scales of variation in the groups of haplotypes (haplogroups) related by common descent, and make phylogeographic inferences about the source areas and dispersal times of the carriers of the haplogroups.

The most recent common ancestors of all mtDNA and Y chromosome lineages alive today have been labelled as "mitochondrial Eve" and "Y chromosomal Adam," respectively. Although technically these terms refer to mathematical reconstructions of sequences that were likely to exist in real human bodies at some point in the past, they do not suggest that Adam and Eve were, in Biblical sense, the only human beings living at that time. Because of the stochasticity of lineage survival and extinction in finite-size populations, the age of TMRCAs of different loci can be vastly different, and indeed mitochondrial Eve and Y chromosomal Adam have been estimated to have lived thousands of generations apart (Fig. 1). Because the time to TMRCA is primarily determined by the effective population size of the locus – which can vary due to uniparental versus biparental inheritance, sex-specific processes, and natural selection – the time estimates of Eve and Adam do not necessarily reflect anything unusual happening to human populations at the time when they lived. The TMRCA dates of individual loci cannot, for example, be interpreted as genetic estimates of a speciation event, i.e., when a non-human mother (or a father) gave birth to (fathered) a human child, neither do they necessarily mean that human populations had unusually low number (a bottleneck) of females or males at the time when mitochondrial and Y chromosomal trees coalesce, respectively. The fact, however, that genetic variation in mtDNA, Y chromosome, and, in fact, most autosomal loci follows consistently a pattern whereby variation in non-African populations is a subset of genetic variation observed in Africa suggests that humans originated in Africa and from there colonized the world only recently.

Population Histories and Admixture Events Inferred from Whole-Genome Sequences of Modern and Ancient Populations

High-throughput sequencing methods revolutionized the study of ancient DNA in the first two decades of the twenty-first century. Anthropological genetics has become a more model-based and genome-scale study of variation in human populations. The shift from analyses of single-locus systems, such as mtDNA and Y chromosome, to whole genomes has allowed anthropological genetics to make interpretations about the history of populations with more vigor and power. An example of a paradigmatic change in our interpretation of human evolutionary history concerns the debate over archaic introgression. Studies of mtDNA and Y chromosome variation, relying on tens of thousands of individuals, were unable to detect Neanderthal admixture that we now know exists in the genomes of all non-African populations at the level of ~1–2% (Green et al. 2010; Reich et al. 2010). The ancient genomes of Neanderthals and Denisovans have allowed us to reconstruct the human population histories in the last half million years and to detect a number of introgression events (Kuhlwilm et al. 2016; Posth et al. 2017; Prufer et al. 2017) between the "archaic" and "modern" humans

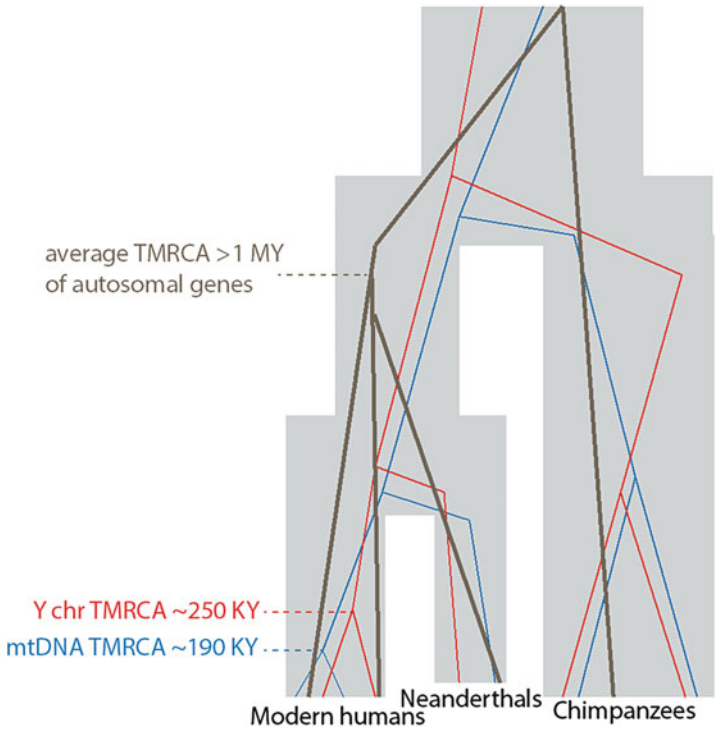

Anthropological Genetics, Fig. 1 The most recent common ancestor (TMRCA) dates of autosomal genes are (about four times) older than Y chromosome and mtDNA TMRCAs because (four times) more autosomal gene copies are passed on by parents to offspring each generation. Because of the large effective population size (indicated by the width of the grey "population" background at the top of the graph) of their ancestral species, human and chimpanzee autosomal genes coalesce way earlier (at 13 MY on average (Prufer et al. 2017)) than the estimated species split (~7 MYA (Scally et al. 2012)). MY, million years; KY, thousands of years

(Fig. 2). Not all chromosomes and genes carry equal load of Neanderthal-related ancestry, and populations vary also qualitatively by the content of haplotypes that are ascribable to archaic introgression. Therefore it is not surprising that some individual loci do not show any evidence of introgression. Most Neanderthal- and Denisovan-derived haplotypes that are found in human populations occur at low frequency, while in some rare cases, called adaptive introgression, the archaic haplotype may have reached high frequency in some human populations as a result of positive selection. One such example is the *EPAS1* haplotype in high-altitude adapted Tibetans (Huerta-Sanchez et al. 2014).

Another illustration of how genome-scale ancient DNA evidence has changed the interpretations of the genetic history of human populations is the debate about the extent of genetic continuity and contribution of hunter-gatherers and Neolithic farmers to present-day populations of Europe. Two basic models had been at the core of this historic debate: one emphasizing the cultural diffusion of ideas of farming (Fig. 3d) and the other demic diffusion of the farmers themselves across Europe (Fig. 3a). Cultural diffusion model assumed substantial continuity of the genes of Mesolithic populations, while demic diffusion model proposed that present-day genetic variation in Europe reflects primarily that of the Anatolian farmers with some minor contributions from local hunter-gatherer populations. The map of the first PC of classical genetic markers in Europe (Fig. 3b) was interpreted as the primary genetic evidence in support of the demic diffusion model. The southeast/northwest orientation of the first component has been explained as the reflection of the "wave of advance" of Europe's first farmer dispersal starting from Anatolia. According to this view, the farmers with their advanced economy were able to reproduce more than hunter-gatherer populations, and as their population sizes grew, their territories expanded. As they expanded they mixed on their way with hunter-gatherer populations of smaller group sizes which eventually left behind a pattern of decreasing farmer contributions on the southeast to northwest axis. However, clines can also be generated under models, such as isolation by distance (Fig. 3c),

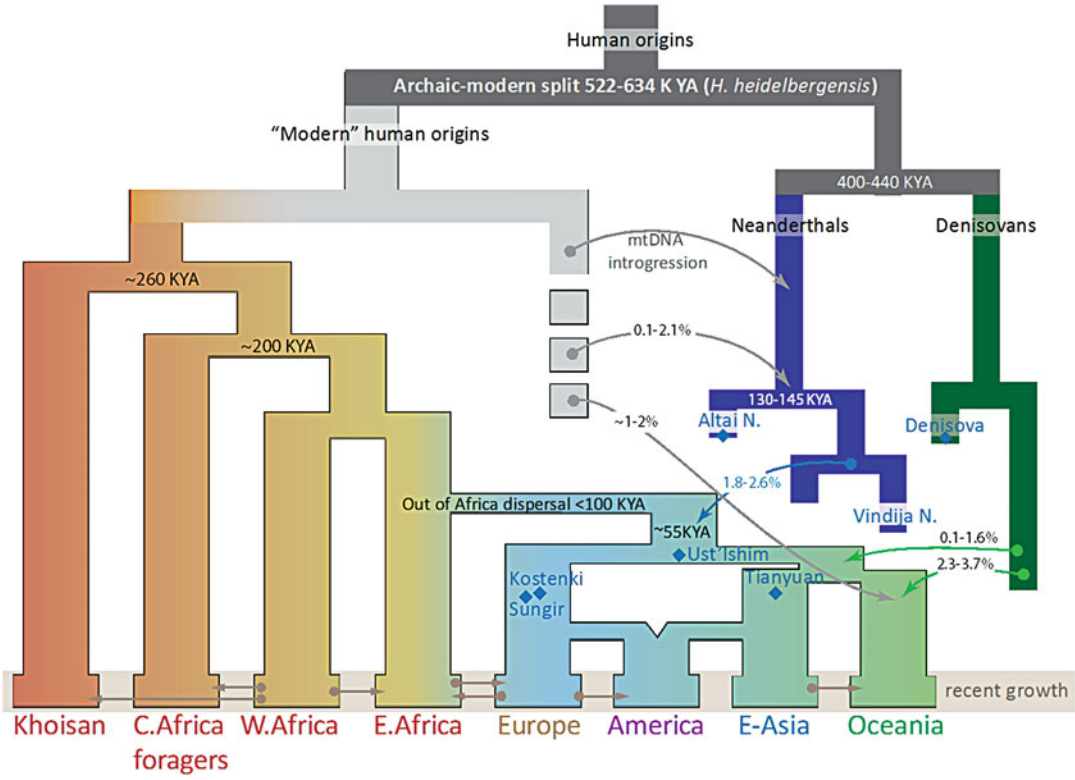

Anthropological Genetics, Fig. 2 Simplified model of human origins and archaic introgression

that do not assume differences in population densities or dispersal of one group into the territory of another.

Phylogeographic studies based on mtDNA and Y chromosome variation in the late 1990s argued for a substantial degree of continuity of European hunter-gatherer haplotypes and suggested that the southeast to northwest cline in the first two principal components of classical markers as well as the frequency distribution of some mtDNA and Y chromosome haplogroups reflected a sum over several gene flow episodes from the Late Pleistocene to the Neolithic. More than 80% of modern European genetic variation was estimated to reflect continuity since Mesolithic. Ancient DNA studies have now revealed that a number of major population turnovers occurred in the Late Pleistocene and Early Holocene Europe (Posth et al. 2016) and that major changes in genetic composition of European populations continued to occur not only at the start of the Neolithic but also later at the end of the Neolithic and Early Bronze Age (Fig. 3e) (Brandt et al. 2013; Haak et al. 2015). Although a large proportion of present-day genetic variation in Europe derives from the Anatolian farmers, their genetic contribution to modern populations follows a south to north gradient (Fig. 3f) which is orthogonal to the southeast to northwest pattern (Fig. 3b) revealed by the classical markers (Lazaridis et al. 2014). The highest prevalence of genetic ancestry of the early farmers has been maintained in Greeks, Sardinians, and Basques even though the latter speak a non-Indo-European language that has been long considered to reflect the continuity of Europe's hunter-gatherers. These analyses of ancient genomes have shown that genetic landscape has changed repeatedly and to a substantial degree in

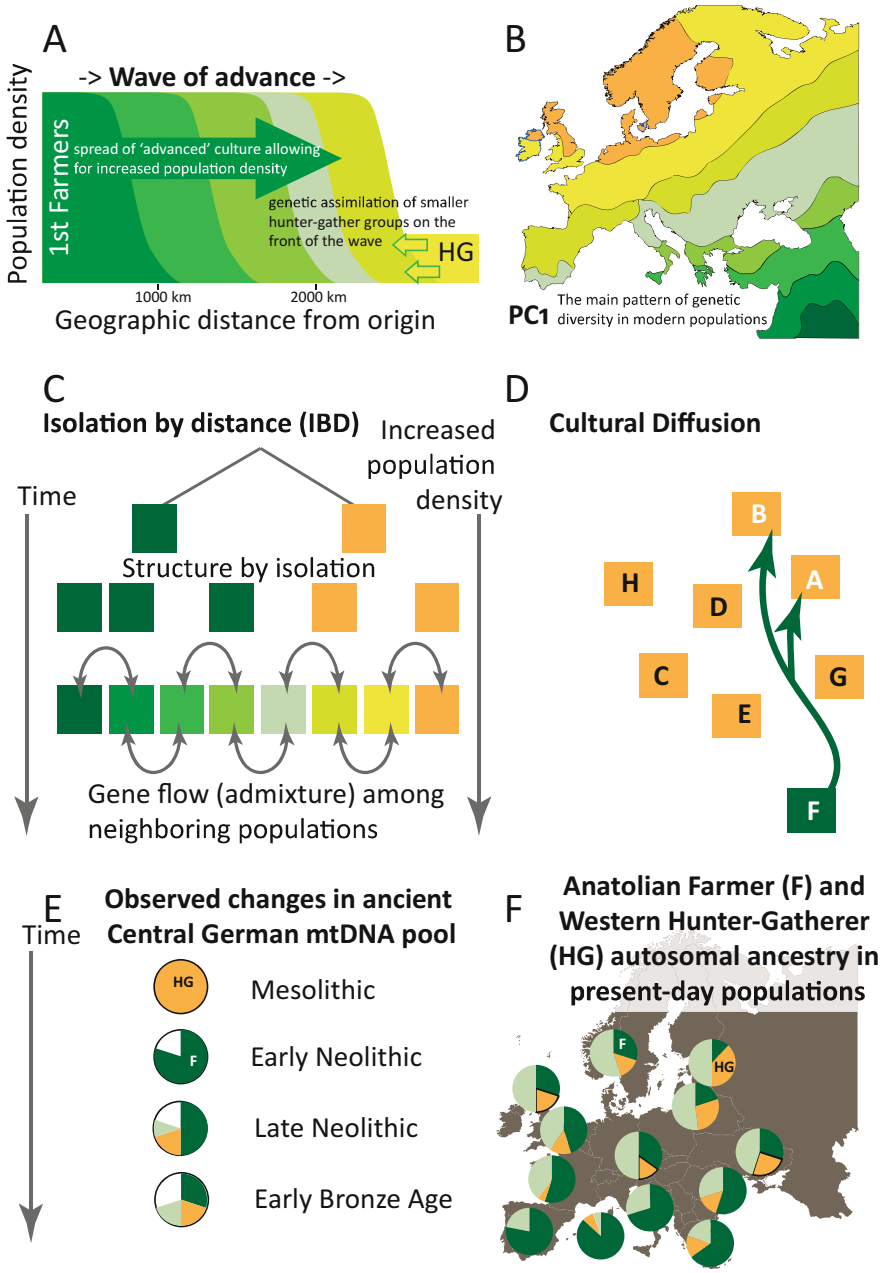

Anthropological Genetics, Fig. 3 Models explaining genetic structure in Europe. (**a**) The model of demic diffusion by means of wave of advance (Cavalli-Sforza et al. 1994). (**b**) The first principal component (PC1) map displaying the main pattern of genetics in Europe. PC1 explains 30% of the total genetic variation in a set of 91 classical markers (Cavalli-Sforza and Minch 1997) and only 0.30% when using >500,000 SNPs across the genome (Novembre et al. 2008). (**c**) Isolation by distance model. (**d**) Cultural diffusion model. (**e**) Changes in mtDNA haplogroup composition in ancient Central German samples (Brandt et al. 2013). (**f**) Estimates of the three major autosomal ancestry components in European populations based on ancient DNA analyses (Haak et al. 2015) https://www.eupedia.com/europe/autosomal_maps_dodecad.shtml#Neolithic_farmers

the population history of Europe, more so than portrayed by the dichotomy of wave of advance and cultural diffusion models. When considering the changes in patterns of genetic diversity over time, they "mirror migrations and culture" (Gunther and Jakobsson 2016) rather than just geography (Novembre et al. 2008), and therefore accurate reconstructions of the demographic history of past populations just from the patterns of genetic variation observed in modern populations may not be feasible.

Human Origins and Uniqueness

Comparisons of genetic data between species can inform us how different they are, how many changes, and in which genes have occurred over the course of millions of years since their common ancestor. Leaving aside structural differences, insertions, and deletions, human and chimpanzee genomes differ on average in 12 per every 1,000 base pairs, with a total of about 40 million differences spread across the genomes. While anthropological genetic studies have resolved the debate about which nonhuman primate is the closest relative to humans conclusively in favor of chimpanzee, they have also revealed that in 15% of the genes, humans are more closely related to gorilla because of the process called incomplete lineage sorting (ILS) (Scally and Durbin 2012). The time it takes for two species to become completely "sorted" so that all individual gene trees would match the species tree depends on the effective population size of the species during and after the split. It has been estimated that the effective population size of our ancestral great ape species may have been an order of magnitude as high as the long-term effective population size of human populations in the last couple of million years (Fig. 4).

Humans differ from great apes in more than a few hundred morphological, physiological, and behavioral characters (Varki and Altheide 2005), such as bipedality, the ability to run long distances, loss of body hair, language, as well as millions of genetic differences in our genome. Although both phenotypic and genetic differences have been increasingly well identified and catalogued in recent anthropological genetic research, we still have relatively little knowledge about which particular genetic changes map to which phenotypic traits and which evolved under strong influence of natural selection in making our ancestors behave and look like human. Using more distant outgroups, such as the orangutan or macaque genomes, it is possible to distinguish between the mutations that occurred on human lineage from those that occurred in the ancestors of modern chimpanzees. However, it

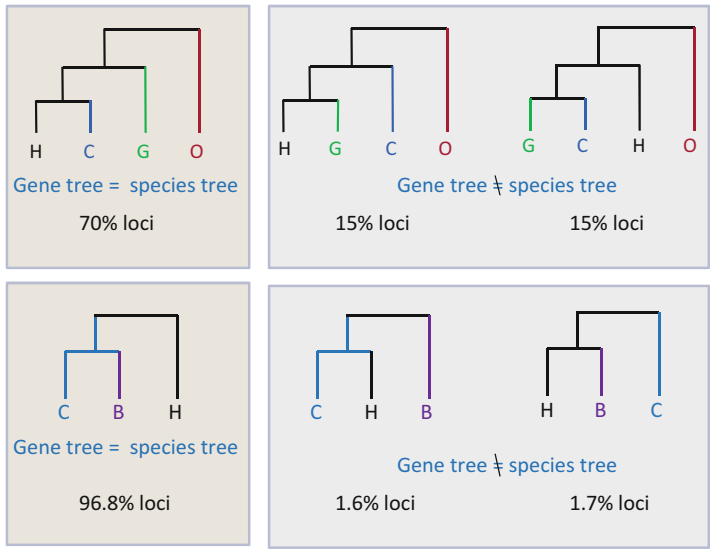

Anthropological Genetics, Fig. 4 Incomplete lineage sorting in great apes. *H* Human, *B* Bonobo, *C* Chimpanzee, *G* Gorilla, *O* Orangutan

has been notoriously challenging to define which of the 20 million or so changes that have occurred in the hominin lineage, i.e., between present-day humans and the common ancestor of humans and chimpanzees, are the ones which have caused the key differences in human brain development, cognitive abilities, locomotion, and appearances. Multispecies comparisons, experiments on human cell lines, scans of protein coding and regulatory regions for the level of their phylogenetic conservation, comparative analyses of tissue-specific expression, and disease association of individual variants have been used as methods to reveal genomic regions where changes are most likely to cause functional and phenotypically detectable differences between the species. Approximately 3,000 human genes have been shown to be intolerant to the loss of one of the two alleles (Bartha et al. 2018). Many of these essential genes are highly conserved and define components of basic cellular processes that if modified will almost certainly lead to fatality or reduced fitness and therefore are unlikely to include changes that converted ancestral apelike phenotypes to human. Only a relatively small number of candidate loci of human uniqueness have been thoroughly characterized for their biological effect on the development of cells and tissues in model organisms so far. Significant progress has been made, for example, in revealing the developmental mechanisms through which mutations in the human lineage have changed cellular and molecular reorganization of neural circuits of our brains (Fig. 5).

For the anthropological study of genetic changes that make us human, only a small number of DNA samples, at the extreme case only one individual sample per species, can be used to reveal most of the species-level differences with other great apes. Any set of human samples would equally well serve this purpose as we expect the genetic changes that define us as a species to be fixed in all human populations. Even if we were to include Neanderthals to our sampling, we would get highly similar list of genetic differences with chimpanzee and gorilla given the shortness of the list of fixed genetic and phenotypic differences between modern humans and Neanderthals (Green et al. 2010). However, when examining this list of genetic changes that are fixed in modern humans, but in ancestral state in archaic humans, sample size becomes an important factor as the split between the "archaic" and "modern" populations (whether we can call it "speciation" is debatable) happened very recently and variation in majority of genes has not been sorted yet. Neanderthal and Denisovan introgression into non-African populations (Fig. 2) is another complicating factor that reduces the number of sorted differences between the groups. However, even when considering just Africans, only a very small proportion of genetic loci, only 87 protein coding genes out of ~20,000 (Prufer et al. 2014), in our genome include sites where all Africans are fixed for the derived allele, while Neanderthals and Denisovans carry the ancestral allele.

One of the central debates in anthropological genetics has concerned the dates of speciation events. How do hominin fossils relate to species split and gene divergence dates estimated from the genetic data? The date estimates assigned to splits on any gene or species tree depend on the mutation rate being used. Fossils with known dates and well-understood relationship with hominins and living great ape species are often used for mutation rate calibration. However, applying such phylogenetic rate estimates on taxa that separated millions of years ago can, however, be problematic as it relies on assumption that mutation rates and generation times have not changed significantly over time. Alternatively, one can estimate the mutation rate directly from human pedigrees. Phylogenetic rate calibrations yield ~2x faster rate estimates than the pedigree method, suggesting that rate variation across taxa cannot be ignored and when considering phylogenetic splits in the last 1 million years, slower pedigree rate appears to be more suitable for dating splits of archaic and modern human populations and relevant gene divergence dates (Scally and Durbin 2012).

In cases of large ancestral effective population sizes and/or permeability of species barriers to gene flow (introgressions), ILS can be the norm rather than exception, and the split dates of individual genes can substantially predate the date of

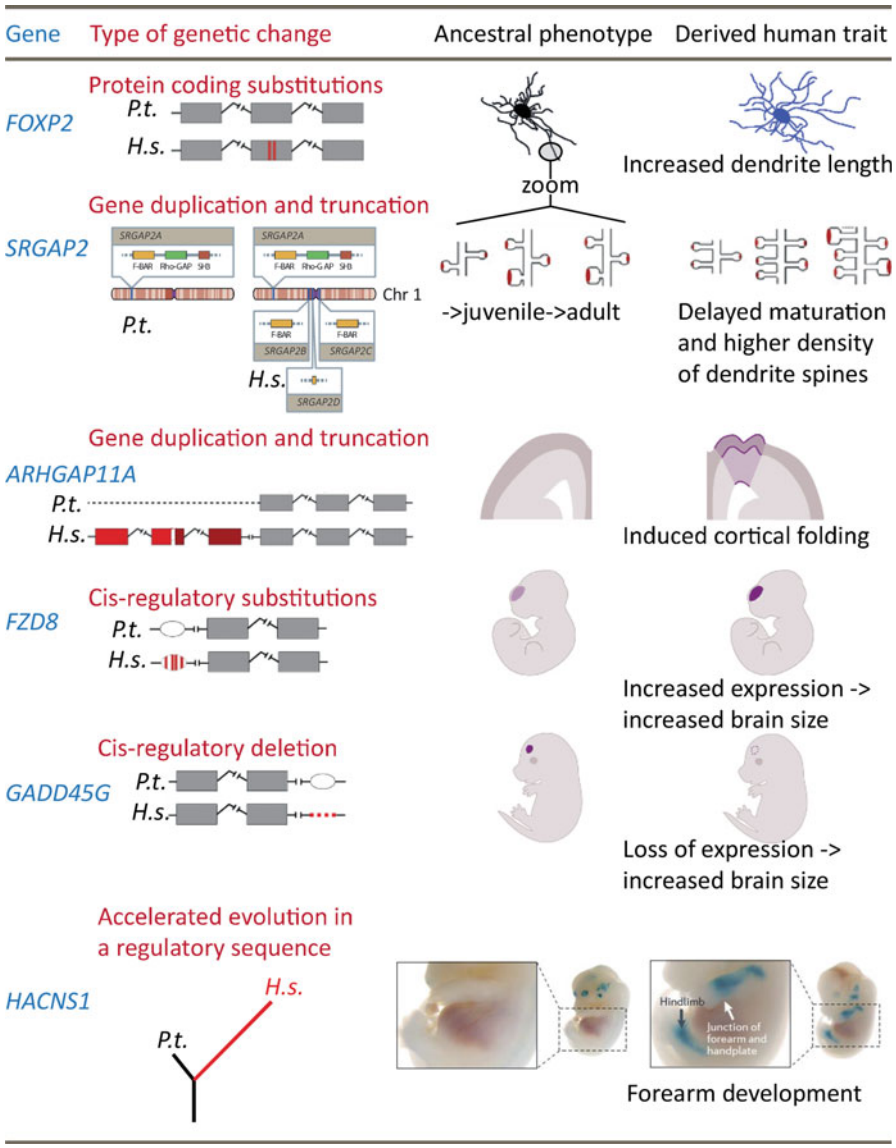

Anthropological Genetics, Fig. 5 Examples of genetic changes associated with human uniqueness that have been studied in mouse model. (Adapted from (Jobling et al. 2013; Sousa et al. 2017)). *H.s.* human, *P. t.* chimpanzee

the separation of the species under neutral model. But the differences between gene trees and species trees can be furthermore made more emphatic by natural selection. For example, haplotypes that define A and B alleles of the ABO blood system and haplotypes in the HLA locus on chromosome 6 responsible for immune response have local coalescent times in humans older than 10 million years. Variation in these loci has been maintained by balancing selection. In contrast, variation in genes that have been subject to directional positive selection can be significantly reduced in comparison with the genome average. While some of the genetic changes defining human unique traits may have evolved neutrally and become fixed in hominin lineage by random genetic drift, those that were subject to positive selection may be recognizable by their "extended lineage sorting" (Peyregne et al. 2017) and young coalescent times.

The oldest remains of anatomically fully modern humans uncovered so far come from East Africa and date to ~200 kya, while some of the anatomically modern features of the cranium appear already in a 315 kya Jebel Irhoud fossil from Morocco (Hublin et al. 2017). As the evidence for long distance trade, art, and symbolic thinking is more recent, it has been argued that behavioral modernity may have appeared later (Klein 2002) being driven by genetic switch which allowed our ancestors to go through a categorical behavioral change. It has been argued that this genetic change may have enabled spoken language, art, and symbolic thinking which allowed human populations successfully to expand out of Africa and colonize the world. Anthropological genetic studies have searched thousands of whole genome sequences for indication of such genetic change that would have left behind a signal of a selective sweep and have found no support for the model that would reduce the complexity of human behavior to one or few genetic changes. On average human genes have a coalescent date older than 1MYA (Fig. 6), and none of the genes in our genome has the most recent common ancestor younger than 100 kya to fit the predictions of Klein's model (Mallick et al. 2016). In fact, the coalescent dates of overwhelming majority of human genes are older than the split date of human and Neanderthal lineages which means that most genetic changes that make us humans (in comparison to other great apes) were indeed shared with archaic humans. The coalescent dates of only a fraction of 0.28% of short 50-kb windows in our genome postdate the separation of archaic and modern humans which makes the case of complete sorting and separation of "modern" versus "archaic" haplotypes a rare exception rather than a rule. Interestingly, amylase gene cluster represents one of such exceptional cases of an early selective sweep after the split of humans from Neanderthals which led to the fixation of multiple copies of salivary amylase genes in place of a single copy in the ancestral population of modern humans (Inchley et al. 2016; Lazaridis et al. 2014).

Anthropological Concept of Race and Genetic Ancestry

Anthropological genetic studies often use the term "genetic ancestry" to refer to patterns of genetic variation observed within and among populations. At the surface, given that the frequency distribution of individual ancestry components tends to be correlated with geography, it would be tempting to associate the genetic ancestry with the nineteenth century anthropological concept of race. And some authors have indeed tried to use genetic evidence in support of claims for the existence of discrete races within our species. However, there are several reasons why genetic evidence does not support the concept of race and why a clear distinction should be made between "genetic ancestry" and "race."

While we share remarkably high levels of sequence identity with our closest relatives,

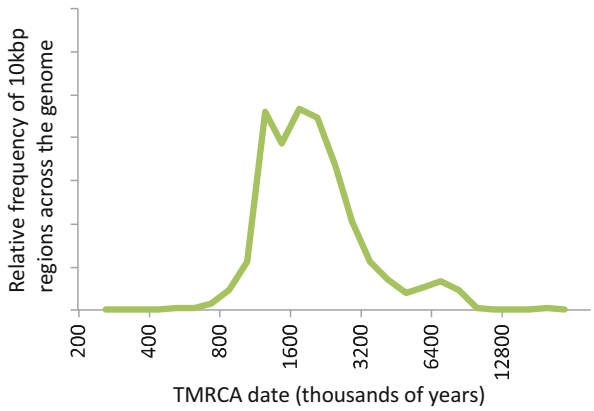

Anthropological Genetics, Fig. 6 Distribution of autosomal TMRCA dates in humans. The plot shows the frequency distribution of dates estimated for 10kbp regions as TMRCAs at which all (100%) chromosome pairs in a sample of 24 African and 8 non-African genomes have coalesced. (Adapted from Extended data Fig. 7b (Mallick et al. 2016))

chimpanzees and gorillas, the tens of millions of differences that are sparsely spread across the genomes as fixed differences at the species level guarantee that species identification can be achieved unambiguously. Beyond that comfort zone, it is far more challenging to interpret the precise meaning of subgroups, particularly within human species, that can be identified with the use of DNA evidence. Individual genetic markers, as revealed already by the blood group studies of the first half of the twentieth century, can give rise to different frequency patterns across the geographic space that human populations inhabit today. In the absence of obvious barriers, such as oceans or mountain ranges, genetic differences tend to increase gradually over geographic space following the pattern predicted by the "isolation-by-distance" model (Fig. 3c) according to which most individuals mate and leave offspring near to their birthplace. If human populations were or had once been structured by anthropological races, the genetic patterns of individual genetic markers would be expected to converge toward the same underlying distribution. However, only a minor part of genetic variation, less than 15%, can be attributed to differences among geographically distinct groups, while the greater part of the variation is within populations.

On average, individual genomes determined from a wide range of human populations carry less than one difference of substitutional type per 1,000 base pairs. Such a low level of differentiation is compatible with a model of recent common origins of all human populations. A large proportion of these differences occur at sites that are called common variants. These are SNPs with minor allele frequency higher than 5%. Majority of common SNPs are shared not only among local neighboring populations but also globally among continental population groups. Because anthropological concept of race emphasized the existence, in the past, of pure racial populations, it also would have predicted that a large proportion of common variants should be continent specific. Available empirical evidence from thousands of genomes has shown that this is not the case. Most variants that are specific to a local population or continental region are rare, while most common variants are shared. There are indeed only a small number of variants that are at the same time common and highly differentiated to the extent that one allele is nearly fixed at 100% frequency in one continental area and the other allele near to fixation in another, e.g., in *SLC24A5* and *EDAR* genes. Apart from these exceptional cases where the knowledge of individual's continent of origin allows us to predict their genotype in the given genetic locus, overwhelming majority of variants in our genome do not follow this pattern.

The accuracy of identification depends on the number of genetic markers being used. Only a few tens of unlinked, randomly chosen common SNP markers would be needed to yield random match probabilities that are low enough for individual identification. However small the allele frequency differences are between human continental or regional groups, these differences can be employed in the calculation of probabilities of group membership, or in other words, for estimating genetic ancestry of individuals. Few thousands of common SNPs are required to confidently assign individual's genetic ancestry to a continent, while hundreds of thousands of SNPs are needed to discern patterns within genetically homogenous continental regions such as Europe. Predictions of individual's birthplace from genetic data via methods such as principal components analysis (PCA) yield meaningful results with precision up to a few hundred kilometers only when all parents and grandparents of the individual come from the same geographic region. However, not all our great-great-ancestors were necessarily born in the same place, and therefore the ancestry prediction provided by the analyses of thousands of common SNPs will necessarily inform us about the average of many ancestors.

Although methods for identification and quantification of admixture at the level of individual genomes have been developed, these, again, estimate the average contribution of multiple ancestors derived from a similar "ancestry" background rather than enabling us to be quite specific about any of our genealogical or distant ancestors at individual level. Many such algorithms are

designed to identify genetic structure in populations in the form of discrete ancestry components which does not mean that at any given time such unadmixed populations ever existed (Weiss and Long 2009). Because of the exponentially increasing number of genealogical ancestors we have when looking back to the past, the smaller and smaller the genetic contribution of each one of them becomes and hence the more and more "shared" our ancestry becomes rather than stemming from a single or a few clearly identifiable "genetic homelands" (Jobling et al. 2016).

Most common genetic markers are "old" and shared by a wide range of populations. In contrast, rare variants, i.e., those that occur in a population at frequency below 1%, are typically "young" and specific to one or few neighboring populations. Genome-wide analysis of a large number of rare variants can serve as population-barcoding for detection of regional substructure of populations at finer level (Genomes Project et al. 2015). In sum, both common and rare variants can be effectively used for predicting average birthplace of the group of genetic ancestors one has, yet the opposite, predicting genotype from birthplace cannot be achieved as variants that are common are shared, while with any rare variant, there is a very small chance that any individual carries the derived genotype. This means that no single gene or genetic variant conveys sufficient information about an individual ancestry for meaningful prediction of the allelic states of other SNPs or phenotypes. This type of distribution of information embedded within rare and common variants supports the recent out-of-Africa model and is not consistent with the long-term separation of human races under the anthropological concept of race which ascribed specific phenotypic, behavioral, and cultural differences to fixed genetic differences among the original, pure, races.

Phenotypic differences among human populations are often said to be skin-deep, and there is some truth in this claim in more than one sense. Firstly, most genetic variations are shared among populations, and there are only a few examples of functional genes that show high levels of allele frequency differentiation among populations. But, secondly, the few genes that show high levels of differentiation include those determining pigmentation of skin, hair, and eye color, and some other skin-expressed traits, such as hair thickness and curliness. Besides very small genetic differentiation and virtual lack of fixed genetic differences, most phenotypic variations seen among human populations are polygenic and based on a large number of shared common variants, each with small effect size.

Ethical Aspects of the Study of Indigenous Populations

Anthropological studies by the very definition have been interested in variation within and among human populations. Introduction of methods of genetics to anthropology has helped to resolve many questions about the extent and nature of relatedness between human populations, but it has also brought on the table new questions of ethical nature related to the ownership and patent rights of research outcomes and vulnerability for discrimination of populations whose DNA is examined. Ethnic minority groups are called "vulnerable" in situations where genetic research can have a potential of causing individuals from these groups, whether they have been directly sampled for the study or not, any economic and/or political disadvantage. Although overwhelming majority of genetic studies has clearly rejected the anthropological concept of human races, we cannot deny that racism nevertheless has continued to exist as a social construct in human societies. If a genetic study would reveal, for example, high incidence of a disease-associated mutation in a vulnerable group, such findings, if mishandled, could potentially lead to discrimination, e.g., by employers or insurance companies, against individuals from such communities, and therefore special care has to be taken when studying and interpreting genetic data from indigenous populations or minor ethnic groups.

One of the key issues with any genetic study is the sampling strategy – which groups and which

individuals should be included in a study. Major criticisms have been made from the grounds of ethics against projects sampling indigenous populations, such as the human genome diversity project (HGDP). The criticisms made have been about the controversies in the attempts of such projects to define and sample "pure" ethnic groups by avoiding sampling of populations with large degree of recent admixture. Ethical issues have also been raised against "biological imperialism" which refers, for example, to a case of patenting a cell line generated from the blood sample of a Papua New Guinea highlander from the Hagahai ethnic group by HGDP; potential use of genetic data in discrimination against the vulnerable groups; and the issues surrounding the cross-cultural concept of consent in cases where DNA of indigenous people can be used to undermine their own narratives of their origins and identity (Marks 2012).

While research on topics of anthropological genetics that are related to human origins and uniqueness does not necessarily require sampling of all populations of the world, there are some important areas of anthropological research where the inclusion of a wide range of indigenous populations has been essential for characterizing genetic diversity in our species in an unbiased way. These are questions about peopling of continental regions, including but not restricted to Americas and Australia, inferences of human dispersals, demographic bottlenecks and founder events in the past, and study of adaptational processes within our species.

References

Bartha, I., J. di Iulio, J.C. Venter, and A. Telenti. 2018. Human gene essentiality. *Nature Reviews Genetics* 19: 51–62. https://doi.org/10.1038/nrg.2017.75.

Brandt, G., W. Haak, C.J. Adler, C. Roth, A. Szecsenyi-Nagy, S. Karimnia, S. Moller-Rieker, H. Meller, R. Ganslmeier, S. Friederich, V. Dresely, N. Nicklisch, J.K. Pickrell, F. Sirocko, D. Reich, A. Cooper, K.W. Alt, and C. Genographic. 2013. Ancient DNA reveals key stages in the formation of central European mitochondrial genetic diversity. *Science* 342: 257–261. https://doi.org/10.1126/science.1241844.

Cavalli-Sforza, L.L., and E. Minch. 1997. Paleolithic and neolithic lineages in the European mitochondrial gene pool. *American Journal of Human Genetics* 61: 247–254. https://doi.org/10.1016/S0002-9297(07)64303-1.

Cavalli-Sforza, L.L., P. Menozzi, and A. Piazza. 1994. *The history and geography of human genes*. Princeton: Princeton University Press.

Genomes Project C, A. Auton, L.D. Brooks, R.M. Durbin, E.P. Garrison, H.M. Kang, J.O. Korbel, J.L. Marchini, S. McCarthy, G.A. McVean, and G.R. Abecasis. 2015. A global reference for human genetic variation. *Nature* 526: 68–74. https://doi.org/10.1038/nature15393.

Green, R.E., J. Krause, A.W. Briggs, T. Maricic, U. Stenzel, M. Kircher, N. Patterson, H. Li, W. Zhai, M.H. Fritz, N.F. Hansen, E.Y. Durand, A.S. Malaspinas, J.D. Jensen, T. Marques-Bonet, C. Alkan, K. Prufer, M. Meyer, H.A. Burbano, J.M. Good, R. Schultz, A. Aximu-Petri, A. Butthof, B. Hober, B. Hoffner, M. Siegemund, A. Weihmann, C. Nusbaum, E.S. Lander, C. Russ, N. Novod, J. Affourtit, M. Egholm, C. Verna, P. Rudan, D. Brajkovic, Z. Kucan, I. Gusic, V.B. Doronichev, L.V. Golovanova, C. Lalueza-Fox, M. de la Rasilla, J. Fortea, A. Rosas, R.W. Schmitz, P.L.F. Johnson, E.E. Eichler, D. Falush, E. Birney, J.C. Mullikin, M. Slatkin, R. Nielsen, J. Kelso, M. Lachmann, D. Reich, and S. Paabo. 2010. A draft sequence of the Neandertal genome. *Science* 328: 710–722. https://doi.org/10.1126/science.1188021.

Gunther, T., and M. Jakobsson. 2016. Genes mirror migrations and cultures in prehistoric Europe-a population genomic perspective. *Current Opinion in Genetics & Development* 41: 115–123. https://doi.org/10.1016/j.gde.2016.09.004.

Haak, W., I. Lazaridis, N. Patterson, N. Rohland, S. Mallick, B. Llamas, G. Brandt, S. Nordenfelt, E. Harney, K. Stewardson, Q. Fu, A. Mittnik, E. Banffy, C. Economou, M. Francken, S. Friederich, R.G. Pena, F. Hallgren, V. Khartanovich, A. Khokhlov, M. Kunst, P. Kuznetsov, H. Meller, O. Mochalov, V. Moiseyev, N. Nicklisch, S.L. Pichler, R. Risch, M.A. Rojo Guerra, C. Roth, A. Szecsenyi-Nagy, J. Wahl, M. Meyer, J. Krause, D. Brown, D. Anthony, A. Cooper, K.W. Alt, and D. Reich. 2015. Massive migration from the steppe was a source for Indo-European languages in Europe. *Nature* 522: 207–211. https://doi.org/10.1038/nature14317.

Hublin, J.J., A. Ben-Ncer, S.E. Bailey, S.E. Freidline, S. Neubauer, M.M. Skinner, I. Bergmann, A. Le Cabec, S. Benazzi, K. Harvati, and P. Gunz. 2017. New fossils from Jebel Irhoud, Morocco and the pan-African origin of *Homo sapiens*. *Nature* 546: 289–292. https://doi.org/10.1038/nature22336.

Huerta-Sanchez, E., X. Jin, Bianba Z. Asan, B.M. Peter, N. Vinckenbosch, Y. Liang, X. Yi, M. He, M. Somel, P. Ni, B. Wang, X. Ou, Luosang J. Huasang, Z.X. Cuo, K. Li, G. Gao, Y. Yin, W. Wang, X. Zhang, X. Xu,

H. Yang, Y. Li, J. Wang, J. Wang, and R. Nielsen. 2014. Altitude adaptation in Tibetans caused by introgression of Denisovan-like DNA. *Nature* 512: 194–197. https://doi.org/10.1038/nature13408.

Inchley, C.E., C.D. Larbey, N.A. Shwan, L. Pagani, L. Saag, T. Antao, G. Jacobs, G. Hudjashov, E. Metspalu, M. Mitt, C.A. Eichstaedt, B. Malyarchuk, M. Derenko, J. Wee, S. Abdullah, F.X. Ricaut, M. Mormina, R. Magi, R. Villems, M. Metspalu, M.K. Jones, J.A. Armour, and T. Kivisild. 2016. Selective sweep on human amylase genes postdates the split with Neanderthals. *Scientific Reports* 6: 37198. https://doi.org/10.1038/srep37198.

Jobling, M.A., E. Hollox, T. Kivisild, and C. Tyler-Smith. 2013. *Human evolutionary genetics*. New York: Garland Science.

Jobling, M., R. Rasteiro, and J.H. Wetton. 2016. In the blood: The myth and reality of genetic markers of identity. *Ethnic and Racial Studies* 39: 142–161.

Klein, R. 2002. *The dawn of human culture*. New York: Wiley.

Lazaridis, I., N. Patterson, A. Mittnik, G. Renaud, S. Mallick, K. Kirsanow, P.H. Sudmant, J.G. Schraiber, S. Castellano, M. Lipson, B. Berger, C. Economou, R. Bollongino, Q. Fu, K.I. Bos, S. Nordenfelt, H. Li, C. de Filippo, K. Prufer, S. Sawyer, C. Posth, W. Haak, F. Hallgren, E. Fornander, N. Rohland, D. Delsate, M. Francken, J.M. Guinet, J. Wahl, G. Ayodo, H.A. Babiker, G. Bailliet, E. Balanovska, O. Balanovsky, R. Barrantes, G. Bedoya, H. Ben-Ami, J. Bene, F. Berrada, C.M. Bravi, F. Brisighelli, G.B. Busby, F. Cali, M. Churnosov, D.E. Cole, D. Corach, L. Damba, G. van Driem, S. Dryomov, J.M. Dugoujon, S.A. Fedorova, I. Gallego Romero, M. Gubina, M. Hammer, B.M. Henn, T. Hervig, U. Hodoglugil, A.R. Jha, S. Karachanak-Yankova, R. Khusainova, E. Khusnutdinova, R. Kittles, T. Kivisild, W. Klitz, V. Kucinskas, A. Kushniarevich, L. Laredj, S. Litvinov, T. Loukidis, R.W. Mahley, B. Melegh, E. Metspalu, J. Molina, J. Mountain, K. Nakkalajarvi, D. Nesheva, T. Nyambo, L. Osipova, J. Parik, F. Platonov, O. Posukh, V. Romano, F. Rothhammer, I. Rudan, R. Ruizbakiev, H. Sahakyan, A. Sajantila, A. Salas, E.B. Starikovskaya, A. Tarekegn, D. Toncheva, S. Turdikulova, I. Uktveryte, O. Utevska, R. Vasquez, M. Villena, M. Voevoda, C.A. Winkler, L. Yepiskoposyan, P. Zalloua, et al. 2014. Ancient human genomes suggest three ancestral populations for present-day Europeans. *Nature* 513: 409–413. https://doi.org/10.1038/nature13673.

Mallick, S., H. Li, M. Lipson, I. Mathieson, M. Gymrek, F. Racimo, M. Zhao, N. Chennagiri, S. Nordenfelt, A. Tandon, P. Skoglund, I. Lazaridis, S. Sankararaman, Q. Fu, N. Rohland, G. Renaud, Y. Erlich, T. Willems, C. Gallo, J.P. Spence, Y.S. Song, G. Poletti, F. Balloux, G. van Driem, P. de Knijff, I.G. Romero, A.R. Jha, D.M. Behar, C.M. Bravi, C. Capelli, T. Hervig, A. Moreno-Estrada, O.L. Posukh, E. Balanovska, O. Balanovsky, S. Karachanak-Yankova, H. Sahakyan, D. Toncheva, L. Yepiskoposyan, C. Tyler-Smith, Y. Xue, M.S. Abdullah, A. Ruiz-Linares, C.M. Beall, A. Di Rienzo, C. Jeong, E.B. Starikovskaya, E. Metspalu, J. Parik, R. Villems, B.M. Henn, U. Hodoglugil, R. Mahley, A. Sajantila, G. Stamatoyannopoulos, J.T. Wee, R. Khusainova, E. Khusnutdinova, S. Litvinov, G. Ayodo, D. Comas, M.F. Hammer, T. Kivisild, W. Klitz, C.A. Winkler, D. Labuda, M. Bamshad, L.B. Jorde, S.A. Tishkoff, W.S. Watkins, M. Metspalu, S. Dryomov, R. Sukernik, L. Singh, K. Thangaraj, S. Paabo, J. Kelso, N. Patterson, and D. Reich. 2016. The Simons genome diversity project: 300 genomes from 142 diverse populations. *Nature* 538: 201–206. https://doi.org/10.1038/nature18964.

Marks, J. 2012. The origins of anthropological genetics. *Current Anthropology* 53: S161–S172.

Novembre, J., T. Johnson, K. Bryc, Z. Kutalik, A.R. Boyko, A. Auton, A. Indap, K.S. King, S. Bergmann, M.R. Nelson, M. Stephens, and C.D. Bustamante. 2008. Genes mirror geography within Europe. *Nature* 456: 98–101. https://doi.org/10.1038/nature07331.

Peyregne, S., M.J. Boyle, M. Dannemann, and K. Prufer. 2017. Detecting ancient positive selection in humans using extended lineage sorting. *Genome Research* 27: 1563. https://doi.org/10.1101/gr.219493.116.

Posth, C., G. Renaud, A. Mittnik, D.G. Drucker, H. Rougier, C. Cupillard, F. Valentin, C. Thevenet, A. Furtwangler, C. Wissing, M. Francken, M. Malina, M. Bolus, M. Lari, E. Gigli, G. Capecchi, I. Crevecoeur, C. Beauval, D. Flas, M. Germonpre, J. van der Plicht, R. Cottiaux, B. Gely, A. Ronchitelli, K. Wehrberger, D. Grigorescu, J. Svoboda, P. Semal, D. Caramelli, H. Bocherens, K. Harvati, N.J. Conard, W. Haak, A. Powell, and J. Krause. 2016. Pleistocene mitochondrial genomes suggest a single major dispersal of non-Africans and a late glacial population turnover in Europe. *Current Biology* 26: 827–833. https://doi.org/10.1016/j.cub.2016.01.037.

Prufer, K., F. Racimo, N. Patterson, F. Jay, S. Sankararaman, S. Sawyer, A. Heinze, G. Renaud, P.H. Sudmant, C. de Filippo, H. Li, S. Mallick, M. Dannemann, Q. Fu, M. Kircher, M. Kuhlwilm, M. Lachmann, M. Meyer, M. Ongyerth, M. Siebauer, C. Theunert, A. Tandon, P. Moorjani, J. Pickrell, J.C. Mullikin, S.H. Vohr, R.E. Green, I. Hellmann, P.L. Johnson, H. Blanche, H. Cann, J.O. Kitzman, J. Shendure, E.E. Eichler, E.S. Lein, T.E. Bakken, L.V. Golovanova, V.B. Doronichev, M.V. Shunkov, A.P. Derevianko, B. Viola, M. Slatkin, D. Reich, J. Kelso, and S. Paabo. 2014. The complete genome sequence of a Neanderthal from the Altai Mountains. *Nature* 505: 43–49. https://doi.org/10.1038/nature12886.

Prufer, K., C. de Filippo, S. Grote, F. Mafessoni, P. Korlevic, M. Hajdinjak, B. Vernot, L. Skov,

P. Hsieh, S. Peyregne, D. Reher, C. Hopfe, S. Nagel, T. Maricic, Q. Fu, C. Theunert, R. Rogers, P. Skoglund, M. Chintalapati, M. Dannemann, B.J. Nelson, F.M. Key, P. Rudan, Z. Kucan, I. Gusic, L.V. Golovanova, V.B. Doronichev, N. Patterson, D. Reich, E.E. Eichler, M. Slatkin, M.H. Schierup, A.-M. Andres, J. Kelso, M. Meyer, and S. Paabo. 2017. A high-coverage Neanderthal genome from Vindija Cave in Croatia. *Science* 358: 655–658. https://doi.org/10.1126/science.aao1887.

Reich, D., R.E. Green, M. Kircher, J. Krause, N. Patterson, E.Y. Durand, B. Viola, A.W. Briggs, U. Stenzel, P.L. Johnson, T. Maricic, J.M. Good, T. Marques-Bonet, C. Alkan, Q. Fu, S. Mallick, H. Li, M. Meyer, E.E. Eichler, M. Stoneking, M. Richards, S. Talamo, M.V. Shunkov, A.P. Derevianko, J.J. Hublin, J. Kelso, M. Slatkin, and S. Paabo. 2010. Genetic history of an archaic hominin group from Denisova Cave in Siberia. *Nature* 468: 1053–1060. https://doi.org/10.1038/nature09710.

Scally, A., and R. Durbin. 2012. Revising the human mutation rate: Implications for understanding human evolution. *Nature Reviews. Genetics* 13: 745–753. https://doi.org/10.1038/nrg3295.

Scally, A., J.Y. Dutheil, L.W. Hillier, G.E. Jordan, I. Goodhead, J. Herrero, A. Hobolth, T. Lappalainen, T. Mailund, T. Marques-Bonet, S. McCarthy, S.H. Montgomery, P.C. Schwalie, Y.A. Tang, M.C. Ward, Y. Xue, B. Yngvadottir, C. Alkan, L.N. Andersen, Q. Ayub, E.V. Ball, K. Beal, B.J. Bradley, Y. Chen, C.M. Clee, S. Fitzgerald, T.A. Graves, Y. Gu, P. Heath, A. Heger, E. Karakoc, A. Kolb-Kokocinski, G.K. Laird, G. Lunter, S. Meader, M. Mort, J.C. Mullikin, K. Munch, T.D. O'Connor, A.D. Phillips, J. Prado-Martinez, A.S. Rogers, S. Sajjadian, D. Schmidt, K. Shaw, J.T. Simpson, P.D. Stenson, D.J. Turner, L. Vigilant, A.J. Vilella, W. Whitener, B. Zhu, D.N. Cooper, P. de Jong, E.T. Dermitzakis, E.E. Eichler, P. Flicek, N. Goldman, N.I. Mundy, Z. Ning, D.T. Odom, C.P. Ponting, M.A. Quail, O.A. Ryder, S.M. Searle, W.C. Warren, R.K. Wilson, M.H. Schierup, J. Rogers, C. Tyler-Smith, and R. Durbin. 2012. Insights into hominid evolution from the gorilla genome sequence. *Nature* 483: 169–175. https://doi.org/10.1038/nature10842.

Sousa, A.M.M., K.A. Meyer, G. Santpere, F.O. Gulden, and N. Sestan. 2017. Evolution of the human nervous system function, structure, and development. *Cell* 170: 226–247. https://doi.org/10.1016/j.cell.2017.06.036.

Varki, A., and T.K. Altheide. 2005. Comparing the human and chimpanzee genomes: Searching for needles in a haystack. *Genome Research* 15: 1746–1758. https://doi.org/10.1101/gr.3737405.

Weiss, K.M., and J.C. Long. 2009. Non-Darwinian estimation: My ancestors, my genes' ancestors. *Genome Research* 19: 703–710. https://doi.org/10.1101/gr.076539.108.

Antioch, Apamea, and the Tetrapolis, Archaeology of

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Introduction/Definition

Seleukos Nikator is traditionally referred to as the founder of a constellation of colonies in the Syrian region and in particular of the *Tetrapolis*, a consortium of four sister cities that occupied first millennium BCE settlements: two inland foci (Antioch and Apamea) and two seaports (Laodikeia and Seleukeia in Pieria). Altogether, these foundations were essential in stamping Seleucid hegemony over Syria in light of the overall peaceful settlement with Ptolemy Soter, who in turn seized most of Phoenicia after the fall of Antigonos Monophthalmos. By this rationale, the *Tetrapoleis* created a web of urban foci that firmly secured the Orontes Valley and the coastline in Seleucid hands, thereby curbing expansion ambitions of the Ptolemies. We can safely infer that this ambitious plan of geopolitics was brought to completion in fairly rapid terms during the last years of the fourth century BCE, following the foundation of the new capital at Seleukeia on the Tigris, Seleukos' assumption of kingship, and Antigonos' defeat at Ipsos. As regards the agencies behind these foundations, the Macedonians, Athenians, Argives, and Syrians who figured so prominent in the ranks of the Seleucid legions in the campaigns between 306 and 300 BCE may have served in the initial construction of the *Tetrapolis* as well as in a series of equally ambitious urban achievements, many of which carried dynastic denominations.

Key Issues/Current Debates

In chronological order, Seleukeia in Pieria (Samandağ, Turkey) deserves primacy. It was the first foundation among the *Tetrapolis*, and

what is more, in Seleukos' plans, it was to become the next capital as well as his final resting place. Hence, in the aftermath of his key victory against Antigonos in 301 BCE, he offered sacrifices to Zeus on Mt. Kassios and shortly thereafter founded the city at a site seven miles north of the Orontes' delta, near modern Samandağ. Bearing witness to the ebb and flow between Seleucid and Ptolemaic rule in the region, Seleukeia throve as a hub of commerce, in particular, during the days of Pompey the Great. Later, under the mandate of the Flavian emperors, the city was inserted in the grand scheme of militarization of the Orontes basin. A new harbor was built, and along with it came a vast program of canals and diversion of waters to ease the navigability of the Orontes and prevent the silting of the harbor itself. Furthermore, Seleukeia became home of the *Classis Syriaca* and of detachments from the fleets at Misenum and Ravenna, as attested by a rich corpus of funerary inscriptions. All in all, the eastern campaigns of the second and third centuries CE fully harnessed the resources of Seleukeia's harbor. With the tetrarchic era, however, the harbor's role began to dwindle, a process accelerated by the rise of new hubs at Tyre and Antarados further south along the Syrian coast. That the city's abandonment may have started at this time is a cogent hypothesis. All the same Isaurian raids, the early sixth century's catastrophic earthquakes, and finally the Sasanian king Khusro's invasion brought city life to a halt; aside from the names of its bishops, Seleukeia was heard of no more.

As for the archaeology, very little is known about Seleukeia. Cursory investigations were conducted by a Princeton team in the 1930s but limited to a handful of houses and their mosaic pavements, namely, a Hellenistic peripteral temple, the so-called Market Gate, and finally the late-fifth-century-CE remarkable martyrion near the latter. Yet, it is plain that Seleukeia's city plan negotiated the steep slope through systems of terraces; strewn over an upper and lower city, its configuration is arguably reminiscent of that of Pergamon, albeit on a smaller scale. The city walls are of interest: while stretches of polygonal masonry survive on the eastern flank of the acropolis, the rest of the perimeter uses an isodomic technique that seemingly harks back to the early days of the Seleucid foundation. Measuring approximately five km of length, these walls were punctuated by potent rectangular and semicircular towers. Outside of them, along the road leading to Apamea, are a hippodrome (now covered by maquis and shrubs) and the necropolis at Mağaracık. Seleukeia's main attraction, however, is the so-called Titus Tüneli, the spectacular tunnel that diverted torrential waters and thus avoided the inundation and silting of the bay. Several inscriptions around the harbor, referring to Vespasian and Titus, leave no doubts about the agency involved in these works and underscore the size of this undertaking as without par.

The fortunes and the decline of Seleukeia in Pieria, it seems, cannot be divorced from those of its twin-sister city Antioch on the Orontes (Antakya, Turkey). Poised on the southwesternmost tip of the Amuq Valley, Antioch sits on a highly dynamic ecosystem. Three rivers demarcate this landscape: the Orontes, the Afrin, and the Kara Su. While the former follows its erratic course from south to north, the other two originally emptied their waters in the Amik Gölü, that is, the Lake of Antioch, now dry, after a vast 1960s reclamation plan.

Antakya is Antioch's modern reincarnation. Its features are typical of many modern Turkish towns: large boulevards, squares dedicated to the leaders of the modern Republic, and the chaotic allure of the bazaar. Antakya's gradual, almost tangible urban sprawling is ridding the city of old and ancient buildings by the day, and the modern cityscape bears no memory of what lies beneath.

Replete with great expectations, the 1930s excavations of Antioch were the first attempt to investigate archaeologically a city that had played a key role in the political landscape of Classical and Late Antiquity and had always attracted innumerable researchers thanks to the mediating powers of the textual sources. Financial cutbacks, strategy shortcomings, and ultimately pressures from the sponsoring institutions, however, greatly impaired the operations of the *Committee for the Excavation of Antioch and Its Vicinity*, thereby

hindering the effectiveness of this short-lived enterprise.

The mosaics, frescoes, and sculpture recovered – enthusiastically hailed as markers of Antioch's elites – have reduced the city's complexity to a mere constellation of luxurious suburbs with vistas on springs and idyllic landscapes. What is more, the city's topographical and social configurations remain by and large conjectural. Ironically, what was the Seleucid metropolis, the Roman provincial capital, the seat of the first Christian community, the virtual capital of the Near East in the fourth and fifth centuries CE, and the seat of the Count of the east – to name but a few titles – remains an uncanny, almost abstract entity. Simply put, Antioch and its vicinity are still unknown.

Today, only a handful of heavily battered monuments survive and conjure up the glorious past of the capital: the aqueduct of Trajan, the late antique fortifications, the stadium's piers, a pagan temple, and finally the church of St. Peter. The rich textual sources, however, compensate for the dearth of visible ruins. The texts of Josephus, Libanius, John Chrysostom, and Malalas plus a vast array of early Christian and Byzantine sources are key in tracing the building programs that shaped the capital city time and again. The inconsistencies, discrepancies, and vagaries that these texts present, however, hamper the realization of a more precise picture. For instance, the location of most sacred areas is speculative at best; while we know very little of the several sanctuaries that existed in Antioch and in its suburban extension Daphne, the picture for 31 churches reported by several authors is even more perplexing, as none of them can be situated in space.

Nevertheless, some general narratives of settlement and of building programs can be presented here. Antioch was apparently founded only a month after Seleukeia in Pieria. Honoring the memory of Seleukos' deceased father Antiochos, the city was built on a site where there had been favorable omens. In addition, the entire population of nearby Antigonia was forcibly relocated to Antioch; the former, founded by Antigonos in 306 BCE, may have ceased to exist shortly afterward.

The growth of Antioch began under Antiochos Soter and Antiochos III, when the island on the Orontes and the slopes of Mt. Silpius were incorporated within the urban grid, likely in response to the number of new settlers and veteran soldiers that the city continued to receive. Under Antiochos IV Epiphanes, however, some decisive changes occurred. The quarter of Epiphaneia was added to the city, thus modifying the overall urban layout that, however, would remain basically unchanged for the rest of antiquity. A new square was also added, which might correspond to the "Tetragonal" agora that was later to become the stage for the disorder of 69 CE. Furthermore, an aqueduct was added at this time, providing Antioch a continuous supply of fresh water. On a different note, Antiochos IV also commissioned the construction of the *Charonion* bust, an apotropaic monumental group defending the city from a plague's explosion. Though heavily weathered, it is still visible today and it is Hellenistic Antioch's only visible monument.

This Hellenistic city plan defined Antioch for ages to come; despite the many overhauls that the walls in particular underwent in the following centuries, the layout of the city remained unchanged. A solid grid-regulated space, punctuated as it were by two possible agoras and their correlated sanctuaries, followed the tradition of the great cities of Asia. The gradual addition of new urban quarters and the building of the royal headquarters on the island coalesced with the armature of the city, which at that point was structured around the main north to south thoroughfare. This road connected the various boroughs and also linked the city to south and northern Syria. Its modern reincarnation, Kurtuluş Caddesi, follows exactly the same trajectory.

More notably, however, this road was the locus for various manifestations of popular mobility: riots, acclamations, food distributions, and funeral parades, among others. Here, on this pivotal axis, Antioch's many historical layers converge. The grand military parade of Antiochos IV Epiphanes in 166 BCE, the mourning of the great general

Germanicus' body plausibly poisoned by Piso in the year 19 CE, and the solemn entrance of St. Symeon's coffin in 459 CE bring into focus the centrality of this axis within the constant reshaping of Antioch's urban and social fabrics. A unique commingling of emotions, political anxieties, and religious tensions unfolded along this boulevard, and demarcated some of Antioch's most momentous events.

Punctuated as it were by agoras and sanctuaries, the thoroughfare underwent major overhauls at the time of Herod the Great, when Syria and Antioch were firmly in Roman hands. Half a display of loyalty toward Augustus and half an act of *euergetism* toward a city that tallied a sizable Jewish community, newly designated as cardo, now embellished by porticoes and colonnades, it inspired the appearance of similar colonnaded streets in most cities of the Greek East.

This new addition to the urban matrix, however, was germane to the insertion of buildings and venues that advertised the spirit of the Augustan Peace. The theater of Caesar and a sequence of baths along the slope of Mt. Silpius contributed to redesigning the map of amenities in Antioch while conveying the essence of *Romanitas*. In more practical terms, however, Agrippa and Augustus promoted the wholesale implementation of new quarters at the end of the first century BCE, in a way that reminisced and perhaps deliberately replicated what the Seleucid kings had accomplished in the previous centuries.

Be that as it may, the city at the time of Tiberius may have been girded by new, larger, and more potent walls. Caution is in order on this point, however, as Tiberius of all the Julio-Claudian emperors went down in history for not having promoted major building programs in Rome, let alone in the provinces. Otherwise, as a token to Antioch's splendor, prestige, and remarkable pedigree, the city became the capital of Roman Syria enjoying a series of grants and tax immunities. The largesse with which these gifts were accorded must be questioned. Antioch had many assets; as early as the Julio-Claudian period, the city became instrumental in keeping the recalcitrant South Syria and Judea districts in check. Moreover, from there, the Euphrates region and the Parthian border could be reached with ease thanks to a network of roads that was promptly enhanced by Augustus in the first decades of his mandate. In practical terms, Antioch had to accommodate the governor and his substantial entourage, plus the entire military infrastructure of the east. It retained civic independence, but it came with a price.

In spite of vast building programs that included aqueducts, baths, stadiums, and other amenities, Antioch's armature remained substantially unvaried through the Islamic era. The Theodosian and Justinianic fortifications, though conspicuous, replicated earlier perimeters; new quarters and building programs allowed grandees from Agrippa to the bishop Ephraem in the early sixth century CE to declare their ambition onto the local cityscape. But by early Late Antiquity, Antiochene urbanites must have felt cramped in a city that was getting too crowded and too constructed. Urban chaos, noise, and confusion resonate in Theodoret of Cyrrhus' descriptions of the city. Antioch's built environment and its experience, however, constantly changed. The city never stayed a museum to its own self, far from it. The traditional agora which had marked the center of public space was replaced by the courtyards of great churches, *sermons in stone* as Peter Brown comments. Their wide open plazas became ideal venues for social and religious aggregation as well as proselytism; the daily routines of Paul of Samosata's parading through the agora in 260 CE while reading aloud to his clients from his official correspondence are well known. By contrast, the thoroughfare became the new heart of the city's economy after having been framed by porticoes and stoas as well as punctuated by shops. Earthquakes, fire, and floods had, however, their own share of responsibility in the reshaping of this community and in forcing continuous rebuilding and maintenance in Antioch.

Further upstream from Antioch lies the city of Apamea (Qalaat al-Moudiq, Syria), the best known among the *Tetrapolis*. According to Strabo, this city served as arsenal for the Seleucid kings as it accommodated thousands of mares and elephants as well as training facilities for the

soldiers. Outshined by its neighbor and Syrian capital Antioch in the Roman period, Apamea acquired visibility in the third century when it was base of the Legion II Parthica. It suffered greatly from Sapur's raids in 252 CE and from the sequence of earthquakes that shattered most urban foci in the sixth century. In the census of the year 6/7 CE, Apamea apparently tallied 117,000 citizens.

Thanks to the extensive Belgian excavations, Apamea is now well documented and attracts visitors by throngs. The site's well-preserved ruins, which in the main predate the earthquake of 115 CE, open vistas onto the planning solutions adopted by the Seleucid planners for the *Tetrapolis*.

Framed by a mountain called al-Saheliyeh and dominating the middle course of the Orontes and the Ghab Valley, Apamea was laid out on a conspicuous plateau accessible solely from its north side. A grid consisting of 105 × 53 m blocks created the basic armature, framed as it were by a 7-km-long system of fortifications that date to the third/second centuries BCE – the tumultuous days of the Syrian wars – but underwent numerous overhauls during the Roman and Byzantine periods. Well known are the third-century-CE repairs that employed a cache of funerary stones from nearby necropoleis. Overall, Apamea's built environment encompassed 250 ha of space, seized by domestic and public areas. The backbone is the colonnaded street, by far one of the best preserved in the Greek East. At 1850 m of length and almost 40 m of width and beautifully embellished by second-century-CE porticoes, it illustrates an architectural feature that was the signature of Greek cities in the east. At Apamea, this avenue linked the southern quarters to the Tycheion, the Agora, and the Great Baths, while also connecting suburbs to the city. Of importance is also the formerly prominent temple of Zeus Bêlos situated west of the colonnaded street, where emperors with the stature of Hadrian and Septimius Severus sought the response of the oracle, and the second-century-CE theater, one of the largest in Syria with its 140-m diameter. Also, it should be borne in mind that numerous houses have been excavated; by and large they date to the fifth and sixth centuries, and many showcase architectural and decorative solutions similar to the houses excavated in the 1930s near Antioch, Daphne, and Seleukeia in Pieria.

Finally, Laodikeia (Latakiyah, Syria) bore the lofty name of Seleukos' mother. Its population may have consisted in the main of Macedonian settlers, as attested by the 175 BCE decree that mentions the city's *peliganes*, a Macedonian term for city councilors. As with Apamea, Laodikeia was greatly affected by the political fluctuations of the Syrian wars, and it acquired independence as late as 83 BCE under Tigranes of Armenia. During the Roman era, it owed its reputation as hub for the shipment of its celebrated wine and to the famous incident that led to the downgrading of Antioch as kome (village) under Laodikeia's jurisdiction (so much for not siding with the just during the civil war of 193 CE). In the sixth century, Laodikeia was not exempt from suffering the blows of earthquakes, just as most of its Syrian counterparts.

Although obscured by the modern city, Laodikeia's urban configuration is fairly well known thanks to an early study by Jean Sauvaget. Built around its harbor, Laodikeia's design mirrors that adopted by the planners at Apamea, thus reinforcing the possibility that the same agencies were behind these foundations. A northern access, a colonnaded street, and *insulae* measuring 112 × 57 m are the features that legitimize this hypothesis. All the same, not much has survived among the temenoi and sanctuaries that allegedly punctuated Laodikeia's cityscape. A tetrapylon of the Severan period is the sole reminder of Laodikeia's heyday in the Roman era. Finally, it should be noted that Sauvaget's reconstruction of classical Laodikeia was long upheld to illustrate the transition from the classical colonnaded street to the enclosed and covered market, the suq of the Islamic period. As it stands, this model is based on a notion of cultural decline and degeneration from an age of order to one of political chaos; its

overall colonial posture is now called into question.

Cross-References

- ▶ Domestic Architecture, Roman
- ▶ Dura-Europos, Archaeology of
- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Greater Syria: Islamic Archaeology
- ▶ Late Antique Anatolia, Archaeology of

Further Reading

Balty, J., and J.-C. Balty. 1977. *Apamée de Syrie, archéologie at histoire*, Aufstieg und Niedergang der Römischen Welt 2.8, 103–44. Berlin: Walter de Gruyter.

Bowersock, G.W. 1994. The search for Antioch. In *Studies on the Eastern Roman empire*, ed. G.W. Bowersock, 411–427. Goldbach: Bibliotheca Eruditorum.

Cohen, G.M. 2006. *The Hellenistic settlements in Syria, the Red Sea basin, and North Africa*. Berkeley: University of California Press.

Downey, G. 1961. *A history of Antioch in Syria. From Seleucus to the Arab Conquest*. Princeton: Princeton University Press.

Grainger, J.D. 1990. *The cities of Seleucid Syria*. Oxford: Clarendon Press.

Jones, A.H.M. 1971. *The cities of the Eastern Roman Provinces*. Oxford: Clarendon Press.

Kondoleon, C. 2000. *Antioch. The lost ancient city.* Princeton: Princeton University Press.

Lassus, J. 1972. *Les portiques d'Antioche*. Princeton: Princeton University Press.

Levi, D. 1947. *Antioch mosaic pavements*. Princeton: Princeton University Press.

Millar, F. 1993. *The Roman Near East, 31 B.C.-A.D. 337*. Cambridge: Harvard University Press.

Poccardi, G. 1994. Antioche de Syrie. Pour un nouveau plan urban de l'île de l'Oronte (Ville Neuve) du III au V siècle. Mélanges de l'Ecole française de Rome. *Antiquité* 106: 993–1023.

Sartre, M. 2001. *D'Alexandre a' Zenobie. Histoire du Levant antique IVesiècle av. J. C. – IIIesiècle ap. J.-C*. Poitiers: Fayard.

Sauvaget, J. 1934. Le plan de Laodicée-sur-Mer. *Bulletin d'études orientales* 4: 81–114.

Tate, G. 1992. *Les campagnes de la Syrie du Nord du II au VII siècle*. Paris: P. Geuthner.

Van Berchem, D. 1985. Le Port de Séleucie de Pièrie et l'infrastructure logistique des Guerres Parthiques. *Bonner Jahrbücher* 185: 47–87.

Aphrodisias, Archaeology of

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Introduction

Aphrodisias is located on a plain south of the fertile Meander River valley, about 200 km southeast of Izmir in modern Turkey. The city was part of the region of Caria and the capital of the Roman province of Caria-Phrygia starting from the 250s CE. The city was well-known in antiquity for its cult of Aphrodite, sculpture production, and sculptors, who are known to have worked for domestic as well as Italian patrons.

Definition

Previous Excavations

The site was visited by several travelers in the eighteenth and nineteenth centuries such as William Sherard, Charles Texier, Sir Charles Fellows, Philippe Le Bas, and William Waddington, who mostly focused on recording the inscriptions of the site. Excavations were first conducted in 1904 by Paul Gaudin and later in 1937–1938 by Giulio Jacopi. Systematic excavations and research were begun in 1961 by Kenan T. Erim on behalf of New York University, until his death in 1990. After 1991, NYU excavations have continued under the directorship of R.R.R. Smith from Oxford University.

History of the Site

The site, with its buildings and monuments, is exceptionally well preserved, owing to its secluded location. The site's surviving monuments and material culture, the latter of which is predominantly in the form of marble sculpture, are mostly from the Roman and late antique periods and provide information on the history of the site

from the Republican period to the fifth century CE. Some 2000 inscriptions preserved on the site, on the other hand, illuminate the social history of the site and life in Roman Asia Minor in general.

According to Greek tradition and a legend recorded by Stephanus of Byzantium, the city was founded by Ninos, who was the mythical founder of the Assyro-Babylonian Empire and the husband of Semiramis. There are substantial remains from the prehistoric and Bronze Age periods of the city, which were excavated from the two prehistoric mounds, the Theater Hill (Acropolis) and the Pekmez mound (Joukowsky 1986). There are fewer remains excavated so far from the archaic and classical periods. From the second century BCE onward, the city grew around the sanctuary of Aphrodite, and witnessed major urban development in the first century BCE onward. By this period, as evident from coins, Aphrodisias was in a "sympolity," or close political or religious union, with Plarasa, a nearby city, which may have been the present-day village of Bingeç (Reynolds 1982: Doc. 2, 11–16).

One of the major sources for the history of the site, the north parodos wall of the theater, the so-called archive wall, provides information about the early urban development of the site. In 39 BCE, after the city's loyalty to Rome against Labienus, who plundered both the sanctuary and private property, the city was granted freedom, nontaxable status, and increased asylum rights in the sanctuary of Aphrodite. The granting of these privileges was without doubt a major influence of Octavian/Augustus.

In the imperial period, the city kept its "free" status until 250s CE when it became the capital of the province of Phrygia and Caria. The first and second century CE saw major construction of marble monuments and urban development at the site (Ratté 2000). This construction stopped in the second half of the third century, but the city kept its vital culture under the influence of Roman governors. The rise of Christianity eventually put an end to the cult of Aphrodite. In the fourth century CE, the city had a bishop. In the fifth century, however, it was still home to a leading school of pagan Neoplatonic philosophy. The site gradually depopulated and turned into a village starting from the seventh century and became home to a Turkish population beginning in the fourteenth century.

Key Issues/Current Debates

Major Monuments and Urbanism

The North and South Agora

There are two agoras at Aphrodisias, but the older and true civic center is the North Agora, which lies in the area immediately to the south of the Bouleuterion and to the west of the Hadrianic Baths (Smith and Ratté 1998). The space was surrounded by colonnades on all four sides. Excavations have shown that only the northern and southern colonnades had a double row of colonnades, whereas the eastern and western ones each had a single row (Smith and Ratté 1997). The northern colonnade of the North Agora was dedicated in the first century BCE by C. Julius Zoilos, an Aphrodisian, who was also the freedman of Octavian/Augustus. The southern colonnade of the Agora is adjacent to the Portico of Tiberius, a colonnade that carried a mask and garland frieze.

The South Agora is a rectangular porticoed enclosure to the south of the North Agora and is bordered on the north side by the Portico of Tiberius, on the south by a portico and the Theater Hill, and on the west by the Hadrianic Baths. The South Agora seems to have been laid out as a consequence of second century CE urban development, and an earlier possible formulation of the area is ambiguous. In the second century, a columnar two-storey gate, known as the "Agora Gate" or the "East Gate" was added to the east end. Around the same time, an extraordinarily large (c. 175 × 25 m) rectangular pool with rounded ends was built in the center of the Agora (Wilson 2016: 109). As evident from two reused inscribed blocks, the space between the Agora Gate and the pool, as well as the unpaved area all around the pool – between the porticoes and the marble pavement surrounding the pool – was likely to be a palm grove (Reynolds et al. 2007: Doc. 12.204 = Calder and Cormack 1962: Doc. 448; Reynolds et al. 2007: Doc. 4.202.i = Roueché 2004:

Doc. 38; Wilson 2016: 129). The South Agora, therefore, would have been a shady park, rather than a traditional agora, surrounded by porticoes and planted with palms, which provided leisure space to Aphrodisians.

The South Agora was heavily renovated and repaired in Late Antiquity. The west portico was rebuilt in the fifth or sixth century CE (Roueché 2004: Doc. 83), and the south portico was renovated in Late Antiquity (Reynolds et al. 2007: Doc. 4.19 = Roueché 2004: Doc. 66; Wilson 2016: 107). Ancient cracks and repairs on the columns and clamps suggest that the north portico was also repaired later. A major renovation activity took place to rebuild and restore the Agora Gate, undertaken by the governors Dulcitius and Ampelius in the late fifth or early sixth century CE (Roueché 2004: Doc. 38–40 = Reynolds et al. 2007: Doc. 4.202.i–iii). This is evident from the three inscription blocks built on the Agora Gate to honor those responsible for the extensive renovation. Around the same time, but probably slightly later, a large water basin fed by pipes was added in front (west) of the gate. The basin is too deep to be a collecting basin; rather it probably served as a supply tank for the pool (Wilson 2016: 130–134).

The Temple of Aphrodite

The first marble temple of Aphrodite was a prostyle building of the late first century BCE, which was turned into a pseudodipteros in the first century CE (Smith and Ratté 1995). Two features were added to the sanctuary in the second century: the temenos surrounding it and the monumental gateway of the temenos courtyard in the east ("Tetrapylon"). In Late Antiquity, probably around 500 CE, the temple was converted into a Christian church and remained in use until the Middle Byzantine period (Smith and Ratté 1995: 46). Major restructuring was necessary for the conversion (Cormack 1990: 75–88; Hebert 2000: 13–14). The 8 × 13 m cella was dismantled to build the walls of the church, and the columns on the (short) east and west sides were repositioned to align with the long sides on the north and south. The main entrance was moved to the west, and an apse was added to the east. Narthexes and an atrium were built on the west, and the north and south sides of the temenos were modified: while the south portico remained standing, the colonnade of the north portico was stripped away.

Even though with the conversion of the temple, the Tetrapylon, and the courtyard it gave access to lost their function, the Tetrapylon was left standing by Christian builders probably because it was an iconic monument that represented the city's identity and the past. It was even re-erected in the late fourth or early fifth century after its probable destruction in an earthquake, datable by two coins presumably used as shims, found in the 1980s under one of the column pedestals (Paul 1996: 208).

The Sebasteion

The Sebasteion, discovered in 1979, is a large temple and sanctuary complex dedicated to Aphrodite and the Julio-Claudian emperors. Construction of the complex was undertaken by two local families and began in the reign of the emperor Tiberius, c. 20 CE, having brought to an end early in the reign of Nero, c. 60 CE. The structure was a long and narrow street with a three-storey building on the north and south sides, a propylon on the west end that opens onto the main north-south avenue of the city, and a temple dedicated to Aphrodite and Roman emperors on the opposite east end of the complex. The building complex presents an unusual combination of well-preserved architecture, relief sculpture, and inscriptions. There are about 80 surviving panels of relief sculpture from the facades of the south and north buildings, which are either mythological or allegorical/imperial in content (Smith 1987). The mythological reliefs are unusual in that they provide us with the surviving visual vocabulary of ancient mythology in the Roman period. The allegorical/imperial reliefs, on the other hand, present a glimpse of the reception of Roman emperors in this eastern city. Excavations have shown that almost nothing beyond the façade remains of the temple, which was replaced in antiquity by domestic structures. The propylon, however, continued to be used until it entirely lost its function in Late Antiquity. It was an unusual two-story columnar structure in the form of a double-sided screen – rather than a columnar

facade with a back wall. The columnar screen displayed several statues of the imperial family on their bases at least on its first storey.

The Theater

The Theater, a semicircular structure leaning over the hill of the Bronze Age occupation, was built in two major stages. The earliest phase was the construction of the stage building, dedicated in 28 BCE by C. Julius Zoilos, the same freedman who dedicated the north colonnade of the Agora. The second phase was the building of the auditorium out of marble, which was a Julio-Claudian undertaking and was perhaps still under construction in the Flavian period. The seats above the diazoma are lost today. Excavations in the 1960s and 1970s have unearthed the auditorium, the blocks of the stage building, which was restored on the first storey, and the so-called archive wall to the north of the *logeion* that records the communications between the city and Rome. Recent studies have reconstructed the stage facade (De Chaisemartin and Theodorescu 2017). The fourth-century CE colonnaded square to the west of the Theater, called the "tetrastoon," was also cleared of blocks. Recent efforts have focused on studying the architecture of the tetrastoon as a whole, together with its inscriptions and statues and its contribution to the late antique urban plan of the site.

The Hadrianic Baths

The baths were built in the early second century CE and dedicated to Emperor Hadrian. The building, located at the west end of the South Agora, consists of three parts: a series of barrel-vaulted rooms, a forecourt with marble architecture in the east, and a late antique court (the "tetrastyle" court) with a central pool in the north. Excavations in 1904–1905 and then in the 1960 revealed the walls of the main bathing block; its floors, including the well-preserved hypocaust system; the marble court; and the tetrastyle court and its sculpture. Recent studies have focused on the Baths once again, with the aim of conserving the monument, explaining its architecture and historical phases, and opening it to the visitors (McDavid 2016; Öztürk 2016).

The Bouleuterion

The building was the seat of the *boulē* and is a small semicircular auditorium on the north edge of the Agora, with a shallow stage building. The marble seating of the lower cavea survives intact, but the section above the diazoma has collapsed. The stage building was a two-storey structure with niches decorated with honorific statues and statues of deities. One of the major questions surrounding the structure is its exact chronology. The main structure dates to the second century CE with distinct Antonine and Severan phases. It remains elusive, however, whether there was an earlier first-century structure on the site (Smith and Ratté 1996). The Bouleuterion was used through Late Antiquity. Several changes to the architecture were made to enlarge the orchestra for performances in the fifth century CE, when the cornice molding of the stage front (or *pulpitum*) was incised with an inscription identifying the patron (whose name is missing) of the *palaestra*. The word *palaestra*, originally meaning wrestling place, could have been used metaphorically to refer to various competitions taking place in the building (Roueché 2004: 79).

The Civil Basilica

The Civil Basilica – as opposed to a Christian basilica – is a long hall extending southward from the South Agora (Stinson 2008; Stinson 2016). Excavations since 1962 have documented the architecture and relief decoration of the building. The building, with a central hall flanked by two side aisles and a hall in the south opened to the main nave by arches, combined a Roman basilica with a Hellenistic stoa and meeting hall. The two-storied structure had an Ionic order on the lower storey and a Corinthian order on the upper one, with engaged half-columns and balustrade-like reliefs at the bottom of the columns. Built in the Flavian period, the building probably had a multipurpose public function, including banking, money changing, and engaging in scribal activities and legal contracts. The building also served as a site to display important relief sculpture and inscriptions. There were reliefs and niches for statuary along the side walls of the long hall.

The South Hall may also have served as an honorific hall for Flavian emperors and other dignitaries. In the fourth century CE, the north façade of the building became a surface to display Diocletian's Price Edict. Recent excavations have revealed the pillar capitals from the South Hall that were decorated with bull and lion protomes (Stinson 2016).

The Stadium

The 270-m-long building, entirely built of marble, is the best preserved example of its type. It has an unusual double-ended design with the auditorium running in semicircle on both ends. The structure has a seating capacity of 30,000 people, which is above the entire population of the city itself, showing that it was designed to host games for guests. The east end of the structure was converted into a small amphitheater in Late Antiquity (Welch 1998).

Domestic Architecture

Three major house complexes were excavated beginning in the 1980s and shed light on a portion of the domestic life of the city in Late Antiquity. One of the most significant domestic complexes on the site is the "Bishop's Palace," which was named so based on its proximity to the cathedral, but is now known as the "Triconch House" after its most prominent architectural feature (Berenfeld 2009). The house conveys the architecture and layout of a late antique house in the city and its relationship with the wider urban environment.

A second major house complex is the "Atrium House," which is adjacent to the back wall of the northern portico of the Sebasteion and consists of two complexes: an atrium complex to the north and an apsidal building to the south. The archaeology of the building and its peculiar sculpture, which includes a series of late Roman philosopher portraits, has been well examined (Lockey 2016).

A third housing complex of late antique date is the "North Temenos House," which is adjacent to the Temple of Aphrodite (Smith and Ratté 1998). A building with a large apsidal hall, the structure provided a mosaic floor and a series of late antique pilaster capitals with bucolic scenes.

Regional Survey

An archaeological survey of the surrounding areas was conducted between 2005 and 2009. The survey has documented several Hellenistic-Roman or pre-Hellenistic settlements, fortifications, Byzantine churches, inscriptions, aqueducts, marble quarries, tumuli, tombs, and sarcophagi, which were catalogued and published in a volume (Ratté and De Staebler 2012).

Sculpture Studies

Marble workshops and sculptors from the city provided for both domestic and Italian patrons. For example, some sculptures from Hadrian's Villa at Tivoli and the Esquiline statues in Rome are signed by Aphrodisian sculptors. Due to the massive amount of Roman marble sculpture, both free-standing and in relief, sculpture studies have been one of the main focal points of the current excavation project. Several studies have dealt with Roman and late Roman portrait sculpture, relief sculpture from the Zoilos monument (Smith 1993), Sebasteion (Smith 2013) and the Civil Basilica (Yıldırım 2008), the Aphrodite of Aphrodisias (Brody 2007), mythological reliefs from the Agora Gate (De Bellefonds 2009), sarcophagi (Öğüş 2014; Ogus 2018), and other pieces of sculpture material.

Epigraphy Studies

The epigraphic documents from the city, which survive in unusual numbers and provide tremendous information on the history of the site, have been studied since the eighteenth century by various scholars including Sir Charles Fellows, William Waddington, William Paton, and Louis Robert. NYU's systematic excavations carried out in the years 1961–1995 had Joyce Reynolds and Charlotte Roueché as epigraphers, who created the invaluable online database known as "Inscriptions of Aphrodisias" (Roueché 2004; Reynolds et al. 2007). From 1995 onward, the epigraphy of the site has been studied and published by Angelos Chaniotis (2004, 2016).

Future Directions

Current research and planned future research at Aphrodisias can be reviewed under two separate headings: (1) the excavation and conservation of monuments and (2) the publication of major monuments and sculpture. In terms of the excavation of the site, there are two main focus areas: the north-south avenue of the city and the South Agora pool. The main north-south avenue connects the monumental gateway of the Temple of Aphrodite to the propylon of the Sebasteion and the theater. This avenue, renovated in Late Antiquity, has been excavated and conserved along its length since 2008 to answer questions regarding the Roman and late antique urban layout of the city and to enhance the visitor's experience of the site (Öğüş 2016; Sokolicek 2016; Yıldırım 2016).

Other recent excavation efforts focus on the South Agora pool (Wilson et al. 2016). The east and west ends of the pool were partially dug out in the excavations in 1988–1989, under the directorship of late Kenan T. Erim. A new initiative that began in 2012 aims to expose the entire pool area and conserve the pool and the surrounding porticoes in its ancient appearance as an urban park.

The conservation and restoration of the existing monuments have been a major part of seasonal activity at Aphrodisias, and one of the most significant of these efforts is the anastylosis of the east corner of the south building of the Sebasteion. For this project, plaster casts of several reliefs were made and installed on the facade of the structure, whose architectural blocks have mostly survived. Following the completion of this project, another anastylosis project was undertaken, that of the propylon of the Sebasteion. The first storey of the propylon, including columns and architrave blocks, was re-erected mainly using original architectural pieces. When original pieces do not survive, plaster casts of architectural blocks were made. This project provided several clues about the overall appearance of the propylon and its spatial relationship with the avenue that ran in the front, as well as the original setup of the statues on the propylon.

Another major conservation project has focused on the Hadrianic Baths and includes wall capping and re-bedding of the tile floors. The aim of the project is to protect the walls and floors of the rooms of the Baths from further damage and secure them well enough to open the complex to visitors.

Several site monographs have been published. The first two by the excavation director R.R.R. Smith deal with the funerary monument of C. Julius Zoilos (Smith 1993) and the Roman portrait statuary from the site (Smith et al. 2006). The third volume is on the Aphrodite of Aphrodisias (Brody 2007), and the fourth monograph is about the mythological reliefs from the Agora Gate (de Bellefonds 2009). More recent site monographs have dealt with the Aphrodisias regional survey (Ratté and De Staebler 2012), Sebasteion reliefs (Smith 2013), Civil Basilica (Stinson 2016), the theater stage building (De Chaisemartin and Theodorescu 2017). A forthcoming volume is on the Sculptor's Workshop (van Voorhis forthcoming), and another one is on the columnar sarcophagi from the site, exploring the relationship of social history with local burial culture (Ogus 2018).

Cross-References

- ▶ Domestic Architecture, Roman
- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Epigraphy, Greek
- ▶ Erim, Kenan
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Urban Planning, Roman

References

Berenfeld, M. 2009. The Triconch house and the predecessors of the Bishop's palace at Aphrodisias. *American Journal of Archaeology* 113: 203–229.

Brody, L. 2007. *The Aphrodite of Aphrodisias*, Aphrodisias 3. Mainz am Rhein: Philipp von Zabern.

Calder, W.M., and J.M.R. Cormack. 1962. *Monumenta Asiae Minoris Antiqua 8: Monuments from Lycaonia,*

the Pisido-phrygian Borderland, Aphrodisias. Manchester: Manchester University Press.
Chaniotis, A. 2004. New inscriptions from Aphrodisias (1995–2001). *American Journal of Archaeology* 108: 377–416.
Chaniotis, A. 2016. New epigraphic finds, 2006–9. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 5) 103: 333–340.
Cormack, R. 1990. The temple as the cathedral. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers) 1: 75–88.
De Bellefonds, L. 2009. *The mythological reliefs from the Agora Gate*, Aphrodisias 4. Mainz am Rhein: Philipp von Zabern.
De Chaisemartin, N., and D. Theodorescu. 2017. *Le Theater d'Aphrodisias: les structures sceniques*, Aphrodisias 8. Wiesbaden: Reichert.
Hebert, L. 2000. The temple-church at Aphrodisias. Unpublished PhD dissertation, Institute of Fine Arts, New York University.
Joukowsky, M. S. 1986. *Prehistoric Aphrodisias: An account of the excavations and artifact studies*. 2 vols. Providence: Brown University, Center for Old World Archaeology and Art; Louvain-la-Neuve, Belgique: Institut supérieur d'archéologie et d'histoire de l'art, Collège Erasme.
Lockey, I. 2016. The Atrium House: The archaeology of a late-antique residence. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 5) 103: 243–254.
McDavid, A. 2016. Renovation of the Hadrianic Baths in late antiquity. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 5) 103: 209–224.
Öğüş, E. 2014. Columnar sarcophagi from Aphrodisias: Elite emulation in the Greek East. *American Journal of Archaeology* 118: 113–136.
Öğüş, E. 2016. Excavations on the Tetrapylon Street, 2010–22. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 5) 103: 48–57.
Ogus, E. 2018. *The columnar sarcophagi from Aphrodisias*. Aphrodisias 9. Wiesbaden: Reichert.
Öztürk, A. 2016. The architecture of the Hadrianic Baths in their original phase. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 5) 103: 195–208.
Paul, G. 1996. Die Anastylose des Tetrapylons. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 3) 20: 201–213.
Ratté, C. 2000. The urban development of Aphrodisias in the late Hellenistic and early imperial periods. In *Patris und Imperium: kulturelle und politische Identität in den Städten der römischen Provinzen Kleinasiens in der frühen Kaiserzeit*, ed. C. Berns et al., 5–32. Leiden/Dudley: Peeters.
Ratté, C., and P.D. De Staebler. 2012. *Aphrodisias V: The Aphrodisias regional survey*. Darmstadt: Philipp von Zabern.
Reynolds, J. 1982. *Aphrodisias and Rome. Documents from the excavation of the theatre at Aphrodisias conducted by Professor Kenan T. Erim, together with some related texts*. London: Society for the Promotion of Roman Studies.
Reynolds, J., C. Roueché, and G. Bodard. 2007. *Inscriptions of Aphrodisias*. Available at: http://insaph.kcl.ac.uk/iaph2007.
Roueché, C. 2004. *Aphrodisias in late antiquity: The late Roman and Byzantine inscriptions,* rev 2nd ed. Available at: http://insaph.kcl.ac.uk/ala. 2004.
Smith, R.R.R. 1987. The imperial reliefs from the Sebasteion at Aphrodisias. *The Journal of Roman Studies* 77: 88–138.
Smith, R.R.R. 1993. *The monument of C. Julius Zoilos*, Aphrodisias 1. Mainz am Rhein: Philipp von Zabern.
Smith, R.R.R. 2013. *The Marble reliefs from the Julio-Claudian Sebasteion*, Aphrodisias 6. Mainz am Rhein: Philipp von Zabern.
Smith, R.R.R., and C. Ratté. 1995. Archaeological research at Aphrodisias in Caria, 1993. *American Journal of Archaeology* 99: 33–58.
Smith, R.R.R., and C. Ratté. 1996. Archaeological research at Aphrodisias in Caria, 1994. *American Journal of Archaeology* 100: 5–33.
Smith, R.R.R., and C. Ratté. 1997. Archaeological research at Aphrodisias in Caria, 1995. *American Journal of Archaeology* 101: 1–22.
Smith, R.R.R., and C. Ratté. 1998. Archaeological research at Aphrodisias in Caria, 1996. *American Journal of Archaeology* 102: 225–250.
Smith, R.R.R., S. Dillon, C. Hallett, J. Lenaghan, and J. van Voorhis. 2006. *Roman portrait sculpture from Aphrodisias*, Aphrodisias 2. Mainz am Rhein: Philipp von Zabern.
Sokolicek, A. 2016. Excavations on the Tetrapylon Street, 2012–14. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 5) 103: 58–76.
Stinson, P. 2008. The civil basilica: urban context, design, and significance. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 4) 70: 79–106.
Stinson, P. 2016. *The civil basilica*. Aphrodisias 7. Wiesbaden: Reichert.
van Voorhis, J. forthcoming. *The sculptor's workshop*, Aphrodisias 10. Wiesbaden: Reichert.
Welch, K. 1998. The stadium at Aphrodisias. *American Journal of Archaeology* 102: 547–569.
Wilson, A. 2016. Water, nymphs, and a palm grove: Monumental water display at Aphrodisias. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 5) 103: 100–135.
Wilson, A., B. Russell, and A. Ward. 2016. Excavations in an urban park ("South Agora"), 2012. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 5) 103: 77–90.

Yıldırım, B. 2008. The date of the reliefs from the colonnades of the civil basilica. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 4) 70: 107–130.
Yıldırım, B. 2016. Excavations on the Tetrapylon Street, 2008–9. *Journal of Roman Archaeology* (Supplementary series: Aphrodisias Papers 5)103: 36–47.

Applied Archaeology (Including Activist Archaeology)

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Introduction

All archaeology is inherently applied in some way. As the study of the material remains of past cultures, it has been primarily applied as a means to learn about the past. It, however, has also been applied to a wide variety of uses that extend beyond research of the past. Despite this fact, applied archaeology is a label that has, throughout its history, seen sporadic use among archaeologists and has had a history of ambiguous meanings. Consequently, the term applied archaeology has been used to refer to many types of archaeology often interchangeably. More recently it has been used to refer to archaeology that takes an activist perspective and has concern for contemporary communities. In this entry, I will examine the various iterations of applied archaeology and the history of its development.

Definition

Defining applied archaeology seems like a rather simple thing to do, one that can be assumed to have been done many times; however there are few archaeologists that have offered definitions. Perhaps it is apparent that applied archaeology is a self-explanatory term that means any application of archaeological research and methods. It, however, has most often been referred to as applications of archaeology outside of traditional academic research, meaning that applied archaeology has a more practical and public purpose (Gunn 1978). This definition is indeed very broad encompassing most of the archaeology conducted around the world. Downum and Price (1999) made the most extensive effort to examine this definition and applied archaeology's potential. I have distilled more recent concepts of applied archaeology into this simplified definition: the application of archaeological research, methods, and theory to assist the public in addressing societal problems and issues. This definition by no means is the result of some consensuses among archaeologists, but it is a culmination of the evolution of applied work in archaeology that is presented below.

Historical Background

The Beginnings of Applied Archaeology

Since the initial beginnings of a formalized archaeological practice in the nineteenth century, archaeologists have occasionally stepped beyond traditional research into the politics, culture, and motivations of their societal contexts. Unfortunately most of these forays into contemporary society were often misguided, having dire consequences for contemporary peoples. Evolutionary approaches to archaeology during the late nineteenth century helped foster racist justifications for the rampant colonialism of the time. The use of unilineal concepts of cultural evolution helped to establish perceptions that less complex cultures were inferior and less evolved, which were used to justify the colonization of Africa, displacement of aborigines in Australia, and removal of Native Americans in North America (Trigger 1989).

As the direct historical or cultural-historical approach began to replace evolutionary thought

at the beginning of the twentieth century, archaeologists became more focused on understanding the history and development of contemporary cultures, tracing their origins back to prehistory. This approach emphasized the prehistory of specific historic and contemporary cultures in specific areas, which were exploited by nationalist and racist agendas of the time (Trigger 1989). Politically astute archaeologists knew the danger of an intersection of cultural history and contemporary politics, leading to a rejection of racist explanations for cultural variation (Dawdy 2009; Trigger 1989).

Some archaeologists, such as Gustaf Kossinna, were motivated by politics in their archaeological work. Kossinna employed archaeology to search for the prehistoric German homeland, which served to feed the national patriotism and imperialism sweeping through Germany just before World War I (Trigger 1989). Although Kossinna died in 1931, his propagandistic research caught the attention of the Nazis who used it to build their racist national identity from the ashes of the war and as the backbone of their ambition to conquer Europe and eradicate inferior cultures. It can be argued that archaeology used in this way aided the waging of the most destructive war in world history and helped justify the Holocaust (Dawdy 2009).

Although it was not called applied archaeology, this example demonstrates early uses of archaeology beyond traditional research, spilling out into the politics of contemporary society with disastrous consequences. With such an inauspicious beginning, it is no wonder that an applied archaeology failed to fully develop, and practical applications of archaeology would be limited in the years immediately after World War II.

CRM as Applied Archaeology

Not all nationalistic archaeology was used for nefarious purposes. The focus on national identity in many countries led to the development of historic preservation and heritage management of which archaeology was an integral part (Neumann et al. 2010). For example, buildings and sites important to the history of the United States became protected through several laws starting in the early 1900s. For many countries national archaeology became intertwined with the government for the purpose of protecting history and heritage for the public good. It is within this context that the term applied archaeology is first used to describe applications of archaeology outside of academia. Perhaps fearful of its colonial and nationalistic past, academia seemed content to avoid such an applied archaeology, setting up an academic and applied dichotomy that would persist for decades. The hesitancy of academia to embrace applied archaeology gave rise to cultural heritage management, also known as archaeological resource management (ARM) or in North America cultural resource management (CRM), and its dominance of the term applied archaeology (Gunn 1978). I will use CRM here to refer to this specific type of applied archaeology.

The management of historic, cultural, heritage, or archaeological resources, such as historic sites, buildings, monuments, landscapes, archaeological sites, etc., was born out of national and salvage archaeology programs. Because of rampant development and the desire for national identity after World War II, the management of these resources has been focused on the protection and interpretation of heritage sites. Most of this management is conducted under the auspices and authority of governments in the public's interest (Neumann et al. 2010). Archaeology became an integral part of the CRM process, which occurred around the time that a major paradigm shift in archaeological theory was taking place. The processual theoretical movement in archaeology was partly focused on understanding broader cultural processes, which was conducive to CRM's archaeological focus of inventorying resources and collecting data. Thus, the CRM movement spurred the development of an archaeology industry known as contract or private sector archaeology, which has grown to employ most archaeologists working around the world today.

As such, it has come to epitomize and is synonymous with applied archaeology, so much so that the term became rarely used.

Applied Archaeology Beyond CRM

Archaeologists have used the methods of archaeology to address contemporary issues outside of the CRM context before, for example, the William Rathje's Garbage Project in the 1970s and 1980s. Although this and other similar projects were largely motivated by testing archaeological methods within positivistic theoretical frameworks, this research produced valuable information regarding the nature of contemporary garbage disposal practices that have been applied to better understanding problem of dwindling landfill space in more recent times (Little and Zimmerman 2010).

The reactions to processual theoretical perspectives in the late 1970s and early 1980s spurred the post-processual movement to inject more contextual and humanistic thinking into archaeological theory. In particular Marxist and critical theoretical approaches brought self-reflexivity and a sense of political engagement in archaeology that would help revive the use of the term applied archaeology and begin to expand it beyond the shadow of CRM. During this period, archaeologists were becoming more interested in applying archaeology outside of CRM, and its public interest mandates to more practical benefits for the public at large (Gunn 1978). Thus, archaeologists were becoming more aware of the social and political environments in which their research was conducted and presented. Some saw archaeological research as having the ability to empower and change present-day people with knowledge of the past. This type of thinking was more like what was happening in the burgeoning field of applied anthropology than it was in CRM (Downum and Price 1999; Gunn 1978). It was a logical next step that archaeologists began to look toward applied anthropology in order to reconceptualize applied archaeology.

Archaeology as Applied Anthropology

Although applied anthropology had a similar beginning to applied archaeology, it developed differently and thus had been well established by the time that CRM was developed. Applied anthropology has had a number of definitions throughout its history; however a definition which provides a basic concept of the field is "the application of anthropological knowledge, methodology, and theoretical approaches to address societal problems and issues" (Kedia and van Willigen 2005). Within this concept anthropology is applied in a great number and diversity of domains. Cultural resource management is considered to be one of many domains of application that anthropologists, through archaeology, work (Kedia and van Willigen 2005). Given the above definition of applied anthropology, it is clear that CRM is certainly an application of archaeology and anthropology; however it is also clear that this application of archaeology is limited and that it has the potential to be applied within many of the other domains in which applied anthropologists work. Anthropologists have long worked in agriculture, economic development, education, environment, health, politics, media, the military, and human rights just to name a few (Kedia and van Willigen 2005). Nearly all of these domains have some relationship or connection with the public. Similarly an expanded applied archaeology also had to be engaged with the public in many ways.

Applied Archaeology and the Public

All concepts of applied archaeology are inherently public, meaning that applied archaeology has some connection or relationship to the general public. In part, it is this relationship with the public that allowed CRM to not only become synonymous with applied archaeology but also public archaeology. This concept of CRM is predicated on doing archaeology for the public or in the public's interest (Little and Zimmerman 2010). Thus, CRM was an application of archaeology to preserve and protect cultural resources in

the public interest through government regulation. This form of public archaeology was more public trust than public interest, as it placed the archaeologist in a position of power as a gatekeeper to place cultural resources in trust for the public, often out view of the public. However, the very government institutions that created the cultural resource power structure later forced CRM to interface with the public in a different way as pressure mounted to consider descendant groups as stakeholders in decisions about cultural resources and to justify the expenditures made in the name of culture resource management. CRM archaeologists found themselves on the front line of interaction with the public and as the public face of archaeology.

Although there have been many forms of public outreach and interaction outside of CRM throughout the history of archaeology, public archaeology did not take significant steps to expand beyond CRM until the 1980s. Through post-processual concerns for self-reflexivity and the desire to apply archaeology to contemporary issues, public archaeology programs, such as those conducted in Annapolis, Maryland sought to inform the public with knowledge produced by archaeological research and show them how that information was produced. It was the intention of the archaeologists to use the past discovered through archaeology to enlighten people in the present about their condition within capitalistic societies and act to change it (Potter 1994).

This concept of public archaeology led to a concern among archaeologists for how they and their research interacted and interfaced with the public. Archaeologists took more interest in how their research was being used at public heritage sites and museums and in developing more ways to disseminate their research to the general public (Smith 2006). They designed publications and programs specifically for public consumption, and they invited the public to see and even participate in the process of archaeology. Some archaeologists worked with local schools to develop school-based archaeology programs and educational materials featuring archaeological research and processes (Little 2002). These type of public interactions with archaeology helped expand and redefine public archaeology into a much more diverse and dynamic concept. It was this attention to the public that connects archaeology with the present and helped open up applied archaeology to the multitude of domains that anthropologists have typically explored (Shackel and Chambers 2004).

Recent Applications of Archaeology

By the 2000s, archaeologists became more actively engaged in and had goals aimed at contemporary communities not just past ones. This concern for contemporary communities has thrust archaeologists into some unfamiliar territory as they have had to extend their work into the world of living people, which requires a different set of skills than archaeologists traditionally use. They had to learn how to collaborate with contemporary communities beyond interactions with stakeholders within the CRM context. They had to learn how to engage people and better understand the needs and desires of contemporary communities so that they could better develop projects to address them (Derry and Malloy 2003; Shackel and Chambers 2004; Stottman 2010). These goals were much more in line with what applied anthropologists had been doing, and archaeologists began to look to applied anthropology for the skills and methods necessary to work with contemporary communities. Along with this concern for contemporary communities and affinity with applied anthropology, the term applied archaeology was being used more frequently and outside of the CRM context. Applied archaeology was being used to refer to archaeology that resembled more applied anthropology than CRM (Brighton 2011; Derry and Malloy 2003; Downum and Price 1999; Stottman 2010).

The ways in which archaeology has been applied recently include a variety of domains most of which are focused on contemporary communities and their problems and issues.

Archaeology is used as a form of civic engagement, political action, social justice, activism, environmental justice, tourism, and collaboration with communities and has been used to address issues of climate change, genocide, agriculture, gender equality, racism, homelessness, poverty, hunger, and disasters just to name a few (Little and Zimmerman 2010). Many of these more recent applications of archaeology have come from academic-based researchers and programs challenging the academic and applied dichotomy that developed as a result of CRM. Based on these recent applications of archaeology, it is clear that at this point in time, archaeology has seen more applications than ever before. These applications push the notion of archaeology from just being useful to the public to being instrumental in many issues that contemporary communities face.

Key Issues/Current Debates

What Is Applied Archaeology?

Although I have posed a working, if not simple, definition of applied archaeology and constructed a somewhat limited history of its development, the key issue for applied archaeology and what has been debated for some time is determining what it is. Despite the fact that archaeology has been and is applied in many different ways, the term applied archaeology is problematic for many archaeologists. Although I have clearly shown that many archaeologists currently that the applied archaeological work that they do is closely aligned with applied anthropology in goals and practice, some archaeologists do not have the same affinity with applied anthropology. Also born out of critical and Marxist perspectives, praxis has been seen as a way to provide the methodological basis for connecting their research with contemporary communities by becoming politically engaged in their causes. This perspective has been most exemplified by Randall McGuire (2008) and others who have become politically engaged with communities in an activist way. Although applied anthropology has greatly influenced recent applications of archaeology, there are other ways that archaeologists have applied their work with similar goals. It also suggests that perhaps applied archaeology is an inadequate and problematic term to encompass all applied work. Thus, there has been debate about what to call these more recent applications of archaeology.

Clearly some saw the use of the term applied archaeology as an obvious description for what it is that they do and that it is related to applied anthropology. Archaeologists who have sought to expand the applications of archaeology have struggled with the semantics of this type of archaeology. Because applied archaeology is most commonly associated with CRM, many archaeologists felt that it did not adequately describe what they do. Some sought simply to redefine applied archaeology to include archaeologist's focus on contemporary communities and lessen CRM's dominance of the term, while others felt that more specific labels were necessary to adequately describe their work (Brighton 2011; Stottman 2010).

In order to distinguish more recent applications of archaeology from the traditional concept of CRM applied archaeology, a variety of labels have been used to describe them, such as action archaeology, activist archaeology, community archaeology, and collaborative archaeology just to name a few. It has been argued that such archaeologies amount to "an activist niche in archaeology" and that what is needed is a label that can focus on what archaeologists are trying to do with this work rather than just a niche (Atalay et al. 2014: 8). It has been suggested that what archaeologists want to do with activist-type work is more than an application of archaeology they want it to be transformative not just for communities but also for archaeology itself (Atalay et al. 2014).

The definition of applied archaeology that I posed in this entry is an attempt to redefine the term so as to more broadly encompass applied work, using the model of applied anthropology (Kedia and van Willigen 2005; Shackel and

Chambers 2004). Although this definition generally describes the breadth of applied work that is being done, it does not however capture the essence of activism and transformation that some seek. The debate over terms and labels may seem like a superficial semantic discussion, but it is important for charting the future of applied work. Will applied archaeology be formalized like applied anthropology? Will applied work be splintered into individual niches? Or will it be transformative? These are questions that will be debated as applied work in archaeology moves forward.

The Relevancy of Archaeology

Underlying much of the applied archaeological work conducted around the world is the relevancy of archaeology. Is archaeology useful and relevant and to whom? These are questions that archaeologists debate and applied archaeology is central to this debate (Gunn 1978). The relevancy of archaeology was largely unquestioned in the context of CRM with the full weight of government mandates behind it; however as archaeologists increased their interactions with the public and were compelled to justify their work to the public, they began to question archaeology's relevancy beyond CRM. Archaeologists began to reflect on the relevancy of their field and document the contributions that archaeology has made to societies around the world (Little 2002; Sabloff 2008). Most of these contributions were conducted within applied contexts, and it is clear that more recent applications of archaeology that focus on addressing the issues and needs of communities expand archaeology's relevancy to the public (Rockman and Flatman 2012).

Archaeologists have recognized that not only do they need to better inform the world of archaeology's contributions to society, they also need to think about their research and their projects in ways that also prioritize the benefits that such work can and should have to the public. Whether archaeology is and how it can be useful to society has been the subject of discussion and debate, being a topic at conferences and forums for some time (Dawdy 2009). Similar discussions and debates have taken place regarding archaeologist's stature within public media. For example, a recent discussion forum examined the role of archaeologists as public intellectuals (Tarlow and Stutz 2016). An important aspect of that discussion was not just about applied archaeological work but also about how that work is applied to media and the way the public consumes information. Certainly the work that archaeologists do has something to contribute to solving society's problems and issues, but if archaeologists cannot serve the role as a public intellectual, being called on to provide a perspective on non-heritage issues such as climate change, then archaeology's relevancy is substantially diminished. This is but just one example of discussions involving relevancy. The issue of archaeological relevancy will always be discussed and debated among archaeologists, and applications of archaeology will be at the center of it.

The Challenges for Applied Archaeology

Some of the challenges for applied archaeology mirror those that plagued its colonial inception. One of the reasons that archaeologists became wary of using archaeology to affect communities was the unintended consequences that such applications could have for those communities (Dawdy 2009). As archaeologists have recently become more engaged with contemporary communities and applying archaeology to address societal problems and issues, a major risk with this type of work is unintended consequences. This type of work also places archaeologists in unfamiliar situations often without the skills needed to negotiate them. With new opportunities for the application of archaeology comes the need for developing the skills, methods, and ethics to work with contemporary people (Derry and Malloy 2003; Stottman 2010). It risks changing what archaeology is and what archaeologists do to accommodate the goals of benefiting contemporary communities with archaeology.

As archaeologists work with contemporary communities through their research and projects, there may be unintended consequences for those communities and archaeology. Working with these communities can create unequal power relationships and sometimes force archaeologists to take sides in political battles (McGuire 2008). Although the intent is to benefit communities with archaeology, it is possible that some can be harmed by good intentions (Atalay et al. 2014; Stottman 2010). It will be a challenge for archaeologists doing applied activist work to collaborate fully with communities in order minimize the possible negative consequences of their work.

Another major challenge for applied archaeology is to continue to find ways to make and keep archaeology relevant to the public at large and retain its identity. The push for relevancy and to find more uses and applications of archaeology threatens to lead the field away from its core identity focused on excavation, material culture, and heritage. Is it still archaeology if there is no excavation involved or research results are not focused on understanding the past? Can we conceive of an archaeology that applies only archaeological thinking or method to address contemporary societal problems and issues? Applied archaeology may well redefine what it means to be an archaeologist, and thus, as we move forward, we must constantly reflect back on who we are and what archaeology is.

International Perspectives

Like all archaeology, applied archaeology is contextual. Clearly my perspective is North American centric, which represents the context of the applied work that I do and with which I am most familiar. Regardless of this fact, I think that the history of and issues facing applied archaeology that I have discussed will be recognizable to those doing applied work around the world. Archaeologists doing applied work share in the discussion above but with the nuances of their own context. Some aspects of the discussion may be more accentuated, while others are less relevant. Below I will attempt to highlight some of the ways that archaeology is applied which are perhaps more global in perspective.

Most developed countries around the world have some form of government-regulated cultural heritage resources process that is similar to CRM. Much of my discussion about CRM as applied archaeology applies to similar processes in other countries, such as that it represents much of the applied archaeological work being done there. One area of difference is that nationalistic archaeology gets a great deal of attention internationally, where government-supported archaeology is applied toward building national identities or establishing links to disputed regions, which can sometimes harken back to archaeology's colonial legacy. However, such archaeology has also been applied to build cooperation in disputed regions such as the work that Israeli and Palestinian archaeologists have done (Little and Zimmerman 2010).

Applied archaeology has a much larger role in heritage studies internationally than in the United States. Archaeology has been employed to identify and interpret important heritage sites not only as part of nationalistic archaeology but also to serve the heritage tourism industry. For many countries around the world, heritage tourism is a major industry that is integral to economies. This industry has spurred academic and applied archaeological and anthropological research through heritage studies programs (Little and Zimmerman 2010; Smith 2006). Such research is used to help develop heritage sites and museums for tourism but also to study the effects of heritage tourism on local cultures and economies. Activist components to heritage research seek to collaborate with local communities through archaeology so that they also have a stake in the decisions being made about their archaeological resources and the positive and negative effects that heritage tourism can have for them (Atalay et al. 2014; Little and Zimmerman 2010).

Also of concern globally are issues such as hunger, climate change, and genocide, for which archaeology has been employed. Archaeologists have used their work in understanding the development of agriculture to help find solutions to hunger in parts of the world where modern agriculture is failing (Little and Zimmerman 2010). They have also used their studies of human and environmental interaction to better understand the effects that culture has had on the world's environments and how it can be applied to help understand climate change (Rockman and Flatman 2012). Furthermore, archaeologists have been employed to help investigate genocide to bring attention to such atrocities and build cases against groups that have perpetrated the crimes.

Future Directions

What does the current trajectory of applied archaeology mean for CRM? Although more recent applications of archaeology tend to be derived from academia, CRM is still applied archaeology and should not be left out of the current concern for contemporary communities and their problems and issues. I and others see great potential for CRM archaeology to be more cognizant of and applicable to address societal problems and issues (Atalay et al. 2014; McGhee and McDavid 2009). CRM has the ability to provide the field of archaeology the most consistent access to people and communities on a daily basis. Some parts of the CRM system have already begun to embrace a concern for how the process and products of CRM articulate with communities. There is more community collaboration within the CRM process, and community projects have been the focus of alternative mitigation strategies. For example, educational materials have been developed for local school children using the results of CRM projects and as a way to provide tangible returns to fill the needs of affected communities. The future of applied archaeology requires the removal of academic vs. CRM dichotomies and fostering activist approaches within CRM.

It is likely that applications of archaeology will continue to grow and develop as the use of archaeological knowledge is limitless, since society's problems and issues are immense. The benefits and uses of archaeology for contemporary communities are not restricted to traditional concepts of heritage and the past. Archaeologists are also extending the uses of the field beyond the traditional knowledge we gain to using the process of how we do archaeology. Archaeologists are seeking uses for archaeology in many aspects of society that may seemingly have very little relation to heritage. More recently, archaeological methods and techniques have been used to locate victims of 911 and the aforementioned work in climate change, agriculture, and justice for victims of genocide (Little and Zimmerman 2010). Public archaeologists have found that using the process of doing archaeology has far greater potential in education than the products of that process (Atalay et al. 2014). The future of applied archaeology is only limited by our concept of archaeology and for what it can be used. In order to expand the uses of archaeology, we have to first think about archaeology as not just about the past. It is about how the field articulates with the present and what we can learn, not just about people in the past but also about people in the present.

Given the current trajectory of applied work, the future of applied archaeology could mean the end of applied archaeology as a term or label. As more recent applications of archaeology have become mainstream within archaeology, there may be a point in the future where all archaeological work has some applied component or goal, making applied archaeology, as a term, irrelevant.

Cross-References

- ▶ Activism and Archaeology
- ▶ Archaeological Resource Management: The Changing Role of the State
- ▶ Archaeology and Anthropology

▶ Community Archaeology
▶ Constructivism in Archaeology Education
▶ Critical Theory in Archaeology
▶ Environmental Archaeology and Conservation
▶ History of Archaeology in Japan
▶ Media and Archaeology
▶ Public Archaeology and Education: Present Relevance to the Past
▶ Society for Historical Archaeology (SHA) (Modern World Archaeology)

References

Atalay, Sonya, Lee Rains Clauss, Randall McGuire, and John R. Welch, eds. 2014. *Transforming archaeology: Activists practices and prospects*. Walnut Creek: Left Coast Press.

Brighton, Stephen A. 2011. Applied archaeology and community collaboration: Uncovering the past and empowering the present. *Human Organization* 70 (4): 344–354.

Dawdy, Shannon Lee. 2009. Millennial archaeology. Locating the discipline in the age of insecurity. *Archaeological Dialogues* 16 (2): 131–142.

Derry, Linda, and Maureen Malloy, eds. 2003. *Archaeologists and local communities: Partners in exploring the past*. Washington, DC: Society for American Archaeology.

Downum, Christian E., and Laurie J. Price. 1999. Applied archaeology. *Human Organization* 58 (3): 226–239.

Gunn, Joel, ed. 1978. *Papers in applied archaeology*. San Antonio: Center for Archaeological Research, The University of Texas.

Kedia, Satish, and John van Willigen. 2005. *Applied anthropology: Domains of application*. Westport: Paeger Publishers.

Little, Barbara J., ed. 2002. *Public benefits of archaeology*. Gainesville: University Press of Florida.

Little, Barbara J., and Larry J. Zimmerman. 2010. In the public interest: Creating a more activist, civically engaged archaeology. In *Voices in American archaeology*, ed. Wendy Ashmore, Dorothy T. Lippert, and Barbara J. Mills, 131–159. Washington, DC: The Society for American Archaeology.

McGhee, Fred L., and Carol McDavid. 2009. Strategies of practice: Implementing postcolonial critique, CRM, public archaeology and advocacy. In *World archaeological congress (WAC) handbook on postcolonialism and archaeology*, ed. Uzam Rizvi and Jane Lydon, 481–494. Walnut Creek: Left Coast Press.

McGuire, Randall H. 2008. *Archaeology as political action*. Berkeley: University of California Press.

Neumann, Thomas W., Robert M. Sanford, and Karen G. Harry. 2010. *Cultural resources archaeology*. New York: Alta Mira Press.

Potter, Parker B., Jr. 1994. *Public archaeology in Annapolis*. Washington, DC: Smithsonian Institution Press.

Rockman, Marcy, and Joe Flatman, eds. 2012. *Archaeology in society: Its relevance in the modern world. 2012*. New York: Springer.

Sabloff, Jeremy A. 2008. *Archaeology matters: Action archaeology in the modern world*. Walnut Creek: Left Coast Press.

Shackel, Paul A., and Erve J. Chambers, eds. 2004. *Places in mind: Public archaeology as applied anthropology*. New York: Routledge.

Smith, Laurajane. 2006. *Uses of heritage*. London: Routledge.

Stottman, M. Jay, ed. 2010. *Archaeologists as activists: Can archaeologists change the world?* Tuscaloosa: The University of Alabama Press.

Tarlow, Sarah, and Liv Nilsson Stutz. 2016. Can an archaeologist be a public intellectual? *Archaeological Dialogues* 20 (1): 1–5.

Trigger, Bruce G. 1989. *A history of archaeological thought*. New York: Cambridge University Press.

Apricot: Origins and Development

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Basic Species Information

Apricot, sometimes known as Armenian plum (derived from a mistaken belief of an Armenian origin), is the common name of *Prunus armeniaca* L./*Armeniaca vulgaris* L. The name apricot derives from the Arabic *al-birquq* through Byzantine Greek *berikokkia* from Latin *malum praecoquum* – early ripening fruit. The Latin *Prunus armeniacum* is a reference to an early believed origin in Armenia, which is one of the places where these trees are wild.

Apricot is a deciduous tree up to 10 m with broad ovate leaves, self-fertile white – rarely pink – flowers produced singly or in pairs before the leaves in spring. Some cultivars are self-compatible while are others are self-incompatible. Wild forms are fully interfertile with cultivated populations. Apricots are grown for their large

fleshy fruit, a drupe with glabrous or pubescent yellow to orange exocarp and a soft mesocarp. The endocarp is lignified and slightly grainy on the outer surface. There is a pronounced ridge along the ventral suture. The seeds or kernels produce laetrile (cyanide) in wild forms, and some cultivars are bitter to avoid predation (Zohary et al. 2012). In other cultivars, apricot kernels can be eaten in substitution for almonds, especially in China where they are commonly roasted to make them palatable (Simoons 1991). Apricot kernels are also used to flavor Amaretto liqueur and biscuits (van Wyk 2005).

Apricots are cultivated in temperate, subtropical and continental regions. They require cool weather for dormancy, and the trees can survive winter temperatures down to −30 °C, but the buds and flowers are not frost resistant. The fruit needs dry weather for maturation. Trees usually bear fruit the 4th or 5th year after planting.

Major Domestication Traits

Wild apricots have a disjunct distribution in the Caucasus region and in eastern Asia. These wild forms are characterized by smaller fruits and leaves and spiny branches (Lu and Bartholomew 2003; Gabrielian and Zohary 2004). In China, free-growing and possibly wild populations of a number of varieties are reported from hilly areas around much of northern and western China (Ningxia, Qinghai, Shaanxi, Shanxi, Nei Mongol, Liaoning, Jiangsu, Shandong, and Sichuan). *A. vulgaris* var. *vulgaris* is reported to occur in pure stands in the Illi prefecture of Xinjiang. While in China, these occur between 600 and 3000 m elevation; in Armenia, they are found at 1200–2100 m only. Modern genetic diversity is suggested to have three centers of diversity (Yilmaz and Gurcan 1977; Maghuly et al. 2005), including one focused on the Caucasus, one on northwestern South Asia, Central Asia, and Xinjiang, and one on China. This strongly suggests that wild populations in Xinjiang and Armenia have contributed to cultivar diversity, although the origins of early cultivars may only have taken place in China.

Timing and Tracking Domestication

Archaeobotanically, apricots may be recognized from endocarp remains that differ from related tax (e.g., Fig. 1). Based around the Caucasus center of wild apricots are a number of early finds. These include archaeological evidence from the Eneolithic at Garni and Shengavit in Armenia (Arakelyan 1968), Eneolithic sites in the Ukraine ca 4000–2800 cal BCE (Zohary et al. 2012), and sixth and fourth millennia cal BCE sites in the Carpathian-Dniester region (Monah 2007). It is unclear if this indicates a formerly more widespread wild distribution or early translocation of cultivated trees.

In the East, archaeobotanical evidence points to origins of cultivars in Central China. It is difficult at this stage to separate stone remains of wild versus domesticated apricots in early assemblages. The earliest finds probably represent gathering, such as from Kuahuqao (6000–5400 BCE) in the Lower Yangtze region, alongside many wild nuts and fruits, including the related *Armeniaca mume*. Later in the Longshan period (after 2500 BCE) and Bronze Age (second millennium

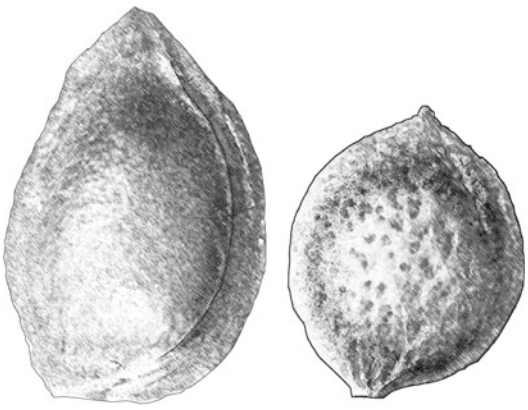

Apricot: Origins and Development, Fig. 1 Illustration of endocarps (stones) of apricot (*Armeniaca vulgaris*), *left*, compared to the Japanese apricot (*Armeniaca mume*), *right*

BCE), there are several sites with apricot from Central China (Hosoya et al. 2010). The early history of apricot in China is intertwined with the mume apricot, or Japanese apricot, *A. mume* Siebold (syn *Prunus mume*), which today goes by the Chinese name *mei* distinct from *xing* used for true apricot. However, it is thought that *mei* might have originally referred to true apricots. *A. mume* is an important cultivar, especially in South China, Japan, Korea, northern Laos, and Vietnam. It is native to the slopes below 3100 m in western Sichuan and western Yunnan (Lu and Bartholomew 2003). Disjunct wild populations are also reported from northern Taiwan. This species has sour fruits which are normally made edible through drying, salting, or pickling (Simoons 1991). True apricots may have been used in similar fashion, with sweet forms developing later (or even outside of China). The first finds of apricot beyond its Chinese wild distribution is in Neolithic Kashmir by or shortly after 2000 BCE (Lone et al. 1993). Much later finds include late First Millennium BCE in Nepal (Knorzer 2000) and in the Sampula Cemetery in Xinjiang (Jiang et al. 2009).

Apricots reached the Mediterranean region late, probably as introductions from Iran and Armenia around the third century BCE. Within a few hundred years apricots were well established in Spain, Turkey, Greece, and Italy (Zohary et al. 2012). They were taken to the Americas by the Spanish in the fifteenth century (Yilmaz and Gurcan 1977).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Peach: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Arakelyan, B. 1968. Excavations at Garni, 1949–50. In *Contributions to the archaeology of Armenia*, ed. H. Field (tran: A. Kromgold). Cambridge: Peabody Museum.

Gabrielian, E., and D. Zohary. 2004. Wild relatives of food crops native to Armenia and Nakhichevan. *Flora Mediterranea* 14: 5–77.

Hosoya, L.A., M. Wollstonecroft, D. Fuller, and L. Qin. 2010. Experimental pilot study of peach/ apricot kernel detoxification: For reconstruction of Chinese early rice farmers broad spectrum subsistence strategy. In *Studies of landscape history of East Asian inland seas*, ed. K. Makibayayashi and M. Uchikado, 457–464. Kyoto: Neomap Project, Research Institute for Humanity and Nature (RHIN).

Knorzer, K.H. 2000. 3000 years of agriculture in a valley of the High Himalayas. *Vegetation History and Archaeobotany* 9: 219–222.

Jiang, H.-E., Y.-B. Zhang, X. Li, Y.-F. Yao, D.K. Ferguson, E.-G. Lu, and C.-S. Li. 2009. Evidence for early viticulture in China; proof of a grapevine (Vitis vinifera L., Vitaceae) in the Yanghai Tombs, Xinjiang. *Journal of Archaeological Science* 36 (7): 1458–1465.

Lone, F.A., M. Khan, and G.M. Buth. 1993. *Palaeoethnobotany: Plants and ancient man in Kashmir*. Rotterdam: A.A. Balkema.

Lu, L.T., and B. Bartholomew. 2003. Armeniaca Scopoli. Meth. Pl. 15. 1754. In *Flora of China*, vol. 9, 396–401. St. Louis: Missouri Botanical Garden Press.

Maghuly, F., E. Borroto Fernandez, S. Ruthner, A. Pedryc, and M. Laimer. 2005. Microsatellite variability in apricots (Prunus Armeniaca L.) reflects their geographic origin and breeding history. *Tree Genetics and Genomes* 1: 151–165.

Monah, F. 2007. The spread of cultivated plants in the region between the Carpathians and Dniester, 6th–4th millennia cal BC. In *The origins and spread of domestic plants in southwest Asia and Europe*, ed. S. Colledge and J. Connolly, 111–124. Walnut Creek: Left Coast Press.

Simoons, F.J. 1991. *Food in China: A cultural and historical inquiry*. Ann Arbor/Boca Raton/Boston: CRC Press.

van Wyk, B.E. 2005. *Food plants of the world: An illustrated guide*. Portland: Timberland Press Inc.

Yilmaz, K.U., and K. Gurcan. 1977. Genetic diversity in apricot. In *Genetic diversity in plants*, ed. A.R. Muhammed and R.C. von Borstel, 270–249. London: Plenum Press. CAB direct.

Zohary, D., M. Hopf, and E. Weiss. 2012. *Domestication of plants in the Old World*. Oxford: Oxford University Press.

Further Reading

Online Etymology Dictionary. n.d.. Available at: http://www.etymonline.com.

Arabian Peninsula: Islamic Archaeology

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Introduction

As the birthplace of Islam, the Arabian Peninsula holds a special place within the Muslim religion and culture. Despite this the archaeology of the region has not been investigated to the same extent as many other parts of the Middle East, and there are still major sites and themes which are yet to be explored. The reasons for this situation are largely historical, and currently our understanding of the archaeology of the region is being transformed through new international and national projects throughout most of the Peninsula.

Definition

The Arabian Peninsula is a huge area covering more than one million square miles with a considerable diversity of climate, topography, and culture. It is located between Africa and Asia and with its own tectonic plate may be considered a subcontinent although conventionally it is regarded as part of Asia. Seven countries are located entirely within the Peninsula (Saudi Arabia, Kuwait, Bahrain, Qatar, United Arab Emirates (UAE), Oman, and Yemen), while large parts of Jordan and Iraq may also be considered part of the region. Saudi Arabia is overwhelming the largest country in Arabia and shares a common border with all of the other states. The regional significance of Saudi Arabia is further reenforced by the fact that it contains the two holiest sites in Islam, the sacred cities of Mecca and Medina. Despite being home to ancient civilizations, the modern states of Arabia are mostly fairly recent, and with the notable exceptions of Oman and Yemen, all are less than 200 years old.

Historical Background

Prior to the development of European interest in Arabia, inhabitants of the region had shown some interest in the antiquities of their homeland. For example, as early as the seventh century, the authorities in Mecca had investigated the antiquity of the Ka‘ba and the earlier foundations buried beneath. Similarly the early tenth-century author Hasan ibn Ahmad al-Hamdani considered the antiquities of Southern Arabia in his book *Kitab al-Iklil* (Faris 1938). However, systematic investigation of ancient remains recognizable as modern archaeological practice was largely the result of European interests in the region. The archaeological investigation of Arabia began in different areas at different times although the earliest scientific exploration of the Peninsula was carried out by the Danish Expedition of 1761–1767 of which Carsten Niebhur was the only survivor. Although the expedition mostly retrieved information about the coast of Arabia with little information from the interior, it was unique because it was the first attempt to systematically document the region (Niebhur 1792). In the nineteenth century there were many expeditions to Arabia which included documentation of antiquities; the majority of these focused on northwest Arabia though Yemen was also an area of considerable interest. Although many of these early explorations collected information relevant to Islamic archaeology, most were concerned primarily with pre-Islamic remains and in particular the ancient Arabian civilizations. Interest in Islamic civilization was generally restricted to ethnographic studies although there was some interest in Islam as a religion with a fascination for the holy cities of Mecca and Medina. Early explorers who offered descriptions of antiquities include the Swiss explorer Burckhardt famous for rediscovering Petra in 1812. In addition Burckhardt made a trip to Mecca in 1814 where in the guise of a Muslim, he made a detailed study of the holy sites of Mecca including the Ka‘ba

(Burckhardt 1829). Nearly forty years later in 1853, Sir Richard Burton disguised himself as an Afghan Muslim and visited Mecca and Medina making detailed notes and measurements of all he saw within the holy cities (Burton 1893).

Against the background of increasing European interest in the antiquities and culture of Arabia, the political configuration of the Peninsula in the nineteenth century was gradually evolving. While the Hejaz (western region), Yemen, and al-Hasa were under Ottoman Turkish control, the interior Najd was the home to a growing fundamentalist Islam which was the seed of the modern Saudi state. In the Arabian/Persian Gulf on the east coast of Arabia, Oman and a number of tribal territories along the coast were brought under British influence in order to protect the security of the sea route to British India. Despite the British presence in the Gulf, there was little interest in the antiquities of the area although records made by British officials have subsequently become indispensable for the study of archaeology in the area. Following the collapse of the Ottoman Empire in 1918, there was political turmoil in the region, and little archaeological research was carried out until after World War II.

From the 1950s onward there was increasing interest in the archaeology of Arabia partly funded by the quest for oil in the region. Important work was carried out in Bahrain and the Eastern Province of Saudi Arabia (formerly al-Hasa province) revealing a complex early society with links to Mesopotamia and India. Although the focus of this archaeology was on the pre-Islamic period, the presence of Islamic-period remains often overlying those of earlier periods could not be ignored. In general however Islamic archaeology was not regarded as something of interest in its own right. This is reflected in the works of Creswell who was famously dismissive of the Arabian contribution to Islamic architecture (King 1993). Even within the highly religious Kingdom of Saudi Arabia, the interest in antiquities in general and Islamic antiquities in particular was muted, and on occasions there seemed to be a hostility to archaeological research. The suspicion of archaeology was partly a wariness that archaeological sites could become shrines and as such used as a focus for unorthodox worship. There was also a sensitivity to interpretations of archaeological material which might conflict with accepted historical narratives. Examples of studies which have challenged Muslim historiography include Patricia Crone's work which suggested that Mecca was not a major trading center (Crone 1987) and Nevo and Koren's assertion that Muhammad was not fundamental in the establishment of Islam in Arabia (Nevo and Koren 2003). Although both these studies have largely been disproved by archaeological and historical research, they are both sensitive issues for the Saudi religious authorities.

The granting of full independence to the Gulf States and growing urban and industrial infrastructure during the 1970s led to a growing interest in protecting and investigating the antiquities of Arabia. For example, the government of Qatar commissioned the *Qatar Archaeological Report* which was the first detailed archaeological survey of the country and is still an important source of information for the Islamic and pre-Islamic archaeology of the country (De Cardi 1978). Also during this period the Saudi government began a comprehensive survey of archaeological sites throughout the kingdom and initiated a major project recording the Darb Zubayda (Muslim pilgrimage route from Baghdad to Mecca). The 1970s also saw the first publication of the *Proceedings of the Seminar for Arabian Studies* under the initiative of John Dayton. The Seminar provided a forum for the discussion and publication of issues related to the archaeology and culture of Arabia which is still continuing today. This period also saw the first excavations at Qaryat al-Fau by King Saud University under the direction of Abd al-Rahman al-Ansary. This major pre-Islamic settlement in central Arabia (first century BCE and fourth century CE) is important for understanding the Islamic archaeology of Arabia because it indicates the indigenous roots of Arabian civilization (al-Ansary 1982). However, the most important project for Islamic archaeology was the excavation of the early Abbasid site of al-Rabadha by Saad al-Rashid in the late 1970s and early 1980s (al-Rashid 1986). Although the site had been inhabited prior to the eighth century, the construction of the pilgrimage route from Baghdad to

Mecca led to the development of the settlement as a major stopping place. The architecture and finds from the site indicate a sophisticated urban settlement with extensive trade connections.

Since 1980 the number of archaeological projects in Arabia has multiplied with both research projects and developer-funded excavations transforming our understanding of the archaeology of the region.

Key Issues

The archaeology of the Islamic period in Arabia is a subject which is developing very quickly, and it is likely that many of the current questions and theories will be modified or replaced as new data becomes available. For the present a number of areas of research dominate our understanding of this period which relate to urbanism, maritime/coastal archaeology, water management and agriculture, and trade and pilgrimage routes.

Urbanism

The birth of Islam in Arabia is intimately associated with urban life in Mecca and Medina, while the spread of Islam outside Arabia is also associated with cities and towns. Before the 1980s archaeologists working further north in Syria, Palestine, and Jordan tended to ignore this Arabian urban heritage looking instead at Islamic cities simply as developments of earlier Roman and Byzantine urban settlements. The discovery of both pre-Islamic and early Islamic cities within Arabia has led to a reassessment of this cultural bias. New research based on excavations at sites such as ‘Aqaba in Jordan has suggested that the pattern for Islamic settlement may in fact originate in Arabian forms of urban development (Fig. 1; Whitcomb 1996). In addition to an interest in the contribution of Arabia to early Islamic urbanism, there is also a growing interest in towns of the late Islamic period (Petersen 2009). In part this is connected with an interest in the origins of the modern Gulf cities such as Dubai, Abu Dhabi, Ras al-Khaimah, Doha, and Muscat (Peterson 2007). There is also a growing interest in traditional urban architecture which is seen as environmentally and socially more suitable than modern energy-intensive structures.

Maritime/Coastal Archaeology

Although typical images of Arabia are largely dominated by arid mountains and sand deserts, it also has coasts on three seas (the Red Sea, the Indian Ocean, and the Persian/Arabian Gulf). The majority of settlement in Arabia is located near the coast with traditional occupations including fishing, pearl diving, and maritime trade. A number of port cities have been excavated (e.g., ‘Aqaba,

Arabian Peninsula: Islamic Archaeology, Fig. 1 The Mamluk and Ottoman fortress at ‘Aqaba, Jordan, excavated between 2000 and 2003. Originally founded in the thirteenth or fourteenth century, the majority of the standing building dates to the 1500s and later. The site of early Islamic ‘Aqaba excavated by Donald Whitcomb in the 1980s is approximately one kilometer to the west

Qalhat, Bahrain, Ras al-Khaimah, Sohar, Jumeirah, Ras al-Hadd) with finds which indicate wide-ranging long-distance trade with sub-Saharan Africa (Kenya and Tanzania), the Far East (China, Vietnam, and Philippines), and India (Gujerat). Recently there has been considerable interest in the pearl industry in the Gulf with major excavations at Zubarah and Ruwayda in Qatar revealing much about the organization and material culture of a nineteenth-century pearling center (Petersen and Grey 2010; Richter et al. 2011). Fishing has also attracted attention with the mapping and excavation of fish traps demonstrating considerable continuity from the pre-Islamic period to the present day.

Water Management and Agriculture

One of the distinguishing features of the Arabian Peninsula is the scarcity of water, and over the centuries the inhabitants have developed sophisticated means of water catchment and retention. Some areas such as Yemen and southern Oman benefit from seasonal monsoon rains and have developed complex irrigation and agricultural systems which maximize the available water. In other areas such as Oman and the UAE, water is brought from the mountains into urban agricultural areas by means of underground water channels (*qanat*s). However, in most of Arabia water is derived from wells or springs and is extremely scarce. Nomadic Bedouin are generally dependant on wells both for their herds and for themselves, and complex arrangements have developed to enable the water to be shared between different tribes. One of the key issues in the study of water management is the origin and the development of the *qanat* system which investigators have traditionally attributed to pre-Islamic Persian occupation. While some *qanat*s certainly predate the advent of Islam, it also appears that many of the *qanat*s in Arabia were built during the Islamic period (Lightfoot 2000).

Trade and Pilgrimage Routes

While Arabia had extensive connections through maritime trade in the Indian Ocean and the Gulf, there were also caravan routes which connected the towns and cities of the coast with the interior and the more settled regions of further north. The most famous caravan route is undoubtedly the incense road which connected south Arabia with Syria via the caravan cities of Medain Saleh and Petra. Although the incense trade seems to have declined before the advent of Islam, the route continued to be of importance during the Islamic period as the Syrian *hajj* route. During the Ottoman period this route became particularly significant as the link between the Constantinople and Mecca increasing the legitimacy of the Sultan's title of Protector of the Two Shrines (al-Rashid 1979, 1980; Petersen 2012). The network of pilgrimage routes which cover Arabia not only provided access to the holy cities of Mecca and Medina but also stimulated trade and the local economies of the towns, villages, and nomadic territories through which they passed. Other important caravan routes linked the settlements on the Gulf coast with those of Oman via the Wadi Jizzi. The advent of Islam increased the traffic on all the existing routes as well as creating new roads such as the Darb Zubayda.

Current Debates

The large number of archaeological investigations in Arabia as well as the increasing interest in the history and culture of the area has raised a number of difficult methodological problems which need to be addressed. These may be summarized as (1) how to incorporate churches and Christianity into the Islamic archaeology of the region; (2) how to deal with the archaeology of Mecca and Medina in the face of rapid development; (3) how to investigate the archaeology of slavery within the region; and (4) how to deal with the archaeology of different religious sects.

Churches and Christianity

Both historical sources and archaeological excavations point to a significant Christian population in Arabia before the advent of Islam. In eastern Arabia excavations have revealed churches and monasteries at a number of sites including Failaka in Kuwait and Sir Bani Yas in

the emirate of Abu Dhabi. There is also significant anecdotal evidence of the discovery of churches in Saudi Arabia although these are generally unpublished (see, e.g., Langfeldt 1994). The general assumption is that all the churches are of pre-Islamic date and ceased to function soon after the time of Muhammad; however, it is probable that at least some of these communities continued well into the Islamic period. The challenges include recognizing the archaeological evidence of continued Christian presence into the Islamic period and incorporating this into "Islamic archaeology" (see also Insoll 2005: 198–9).

Archaeology in Mecca and Medina

Like many religious sites around the world, Mecca and Medina have both a spiritual and an archaeological significance. The spiritual dimension of the cities includes both practical considerations related to the accommodation of ever-increasing numbers of pilgrims and also philosophical questions related to the embodiment of the faith in structures and locations. The archaeological dimension relates to the fabric of buildings as well as stratigraphic deposits and features which may be found within the cities. Massive building works in recent times have meant the destruction of much archaeological material, and it has been estimated that up to 90% of the historic fabric of the cities has been destroyed. Reconciling the needs for accommodating vast and increasing numbers of pilgrims with the historic remains is undoubtedly a challenge and will involve some difficult decisions; however, archaeological documentation can still be carried out whatever the ultimate fate of particular historic structures.

The Archaeology of Slavery

The archaeology of slavery in the New World, in Africa, Europe, and elsewhere is an area of research which has seen growing interest in recent years. Within the Islamic world there have been a few attempts to investigate slavery through archaeology, but much more needs to be done. In Arabia there is considerable scope for investigating the phenomenon both because it survived much longer than elsewhere and also because there is potential for considerable material to have survived.

The Archaeology of Religious Sects

Although Muslims generally see themselves as part of a single community (*ummah*), there are many different sects and divisions, the most prominent of which is between Shia and Sunni Muslims. Within Arabia the majority of the current population is Sunni (specifically *Wahidun*, *Salafist*, or *Wahabbi*) although there are also significant numbers of Shia in the Eastern Province of Saudi Arabia, Bahrain, and Yemen. In addition Oman has a sizeable Ibadi population, and there are Sufi orders which although rare in present-day Arabia were a significant feature in Ottoman times. The recognition of these sects within archaeology is important to inform modern perceptions of heritage and to gain a full understanding of the past cultures.

International Perspectives

Archaeology in Arabia has always had international dimensions because of both the religious significance of the region and international strategic and economic interests in the area. For example, Russian archaeological expeditions were carried out in south Yemen during the period when the country was allied to the Soviet Union (1969–1992), while many of the early archaeological discoveries in Saudi Arabia were linked to the work of Americans working for the Aramco oil company. Other countries involved in Arabian archaeology include Denmark (with Danish teams carrying out excavations in Qatar, Bahrain, Kuwait, and the UAE), Japan, and Britain.

Future Directions

The rapid development of much of Arabia combined with a growing appreciation of the value of traditional heritage and culture means that archaeology is of growing importance for the region.

Islamic archaeology is particularly significant due to its connection with the modern population of the area and because it is so well represented in the material record. Aspects of archaeology likely to develop our understanding of the Islamic period in Arabia include aerial survey, environmental studies, and heritage development, as well as some theoretical approaches adopted from historical archaeology.

Aerial Survey

The large and often inhospitable interior of Arabia lends itself to aerial survey, which has been used in the region since the early twentieth century. Although security concerns and territorial disputes have restricted the use of aerial survey in archaeology, the development of new techniques has opened up new possibilities. These include the use of declassified and open-source satellite imagery which together with increased accessibility to historical imagery have enabled significant discoveries of archaeological sites (Kennedy and Bishop 2011). In addition the development of unmanned aerial vehicles (UAVs) has given archaeologists the opportunity to selectively survey areas both as a means of site prospection and in order to monitor known archaeological sites.

Environmental Studies

Although environmental studies have long been part of prehistoric archaeology in the Middle East, their application to historic-period sites is infrequent. However, as the number of sites investigated increases, it is likely that it will be possible to investigate long-term patterns of production and consumption throughout the Islamic period. Of particular interest is the range and quantity of agricultural produce used on different sites, with associated implications for cultural adaptation and climate change.

Heritage Development

The growing importance of archaeology and historic buildings in Arabia is reflected in the increased attention being given to the presentation of sites and monuments as well as the development of museums. The Islamic period is particularly well presented in museums, while a number of specifically Islamic sites have been added to the UNESCO World Heritage list; these include the al-Turaif district in Saudi Arabia, Zubarah in Qatar, Zabid and San‘a in Yemen, and Bahla Fort in Oman. In the future it is likely that the number of World Heritage sites in the region will increase, as will local engagement with archaeology and heritage (Figs. 2, 3, and 4).

Arabian Peninsula: Islamic Archaeology, Fig. 2 Corner tower of al-Jahili Fort in al-Ain, UAE. The fort dates mostly from the nineteenth to twentieth century and is one of nine forts in the al-Ain Buraimi Oasis. It was excavated in 2008 as part of a comprehensive restoration program

Arabian Peninsula: Islamic Archaeology, Fig. 3 Zubarah fort during National Day 2008. The site has national significance and is used as a location for heritage reenactments. To the south of the fort are extensive ruins of the city of Zubarah which are currently being excavated and restored

Arabian Peninsula: Islamic Archaeology, Fig. 4 Julfar ware jar in al-Khaimah museum. Julfar ware was produced from the medieval period until recent times and was widely used in the region of the Gulf

Theoretical Approaches

As a branch of archaeology which focuses on a historical period, Islamic archaeology can benefit from many of the theoretical and practical perspectives of historical archaeology as it has developed in Europe and the Americas. Particular importance can be attached to issues of globalization in which Arabia, as the bridge between the Mediterranean and the Indian Ocean worlds, was a key component. Also of interest is the diffusion of crops such as coffee from Arabia to the Americas as well as the importation of tobacco (see, e.g., Bouzigard and Saidel 2012). In the future it is likely that these approaches will demonstrate that Arabia was already a major component of world trade systems before the discovery and exploitation of oil.

Cross-References

- ▶ Historical Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Islamic Archaeology
- ▶ Ottoman Empire: Historical Archaeology

▶ Religion in Islamic Archaeology
▶ Rural Life in Islamic Archaeology

References

Al-Ansary, A.R. 1982. *Qaryat al-Faw: A portrait of pre-Islamic civilisation in Saudi Arabia*. Riyadh: Riyadh University Press.

Al-Rashid, S.A. 1979. Ancient water tanks on the Hajj route from Iraq to Mecca and their parallels in other Arab countries. *Atlal* 3: 55–62.

Al-Rashid, S.A. 1980. *Darb Zubayda. The pilgrim road from Kufa to Mecca*. Riyadh: Riyadh University Press.

Al-Rashid, S.A. 1986. *Al-Rabadah: A portrait of early Islamic civilization in Saudi Arabia*. Riyadh: King Saud University.

Bouzigard, A.C., and B. Saidel. 2012. A note on the dating of the clay smoking pipes collected in the course of two archaeological surveys conducted in Saudi Arabia: The Comprehensive Survey of Saudi Arabia (1976–1981) and Michael Gilmore's survey of the Darb al-Hajj. *Arabian Archaeology and Epigraphy* 23: 116–124.

Burckhardt, J.L. 1829. *Travels in Arabia*. London: Henry Colburn.

Burton, R. 1893. *A personal narrative of a pilgrimage to al-Madinah and Mecca (1855)*. London and New York: Dover Books.

Crone, P. 1987. *Meccan trade and the rise of Islam*. Princeton (NJ): Princeton University Press.

De Cardi, B. 1978. *Qatar archaeological report*. Oxford: State of Qatar/Oxford University Press.

Faris, N.A. 1938. *The antiquities of South Arabia (Princeton Oriental Texts)*. Princeton/Oxford: Princeton University Press.

Insoll, T. 2005. Changing identities in the Arabian Gulf: Archaeology, religion and ethnicity in context. In *The archaeology of plural and changing identities*, ed. E. Conlin Casella and C. Fowler, 191–209. New York: Kluwer/Plenum.

Kennedy, D.L., and M.C. Bishop. 2011. Google Earth and the archaeology of Saudi Arabia. A case study from the Jeddah area. *Journal of Archaeological Science* 38: 1284–1293.

King, G.R.D. 1993. Creswell's appreciation of Arabian architecture. *Muqarnas* 8: 94–102.

Langfeldt, J.A. 1994. Recently discovered early Christian monuments in northeastern Arabia. *Arabian Archaeology and Epigraphy* 5: 32–60.

Lightfoot, D.R. 2000. The origin and diffusion of qanats in Arabia; new evidence from the northern and southern Peninsula. *Geographical Journal* 166: 215–266.

Nevo, Y., and J. Koren. 2003. *Crossroads to Islam: The origins of the Arab religion and the Arab state*. Amherst: *Prometheus Books*.

Niebhur, C. 1792. *Travels through Arabia and other countries in the East*. Translated by R. Heron. Edinburgh, Perth and London: Morrison Mudie and Vernor.

Petersen, A.D. 2009. Islamic urbanism in Eastern Arabia, the case of the al-'Ain/Buraimi Oasis. *Proceedings of the Seminar for Arabian Studies* 39: 307–320.

Petersen, A.D. 2012. *The medieval and Ottoman Hajj route in Jordan: An archaeological and historical study*. Oxford: British Academy/Oxbow.

Petersen, A.D., and A.D. Grey. 2010. Excavations and survey at Qal'at Ruwaydha in Qatar. *Proceedings of the Seminar for Arabian Studies* 40: 35–48.

Peterson, J. 2007. *Historical Muscat*. Leiden: E.J. Brill.

Richter, T., P. Wordsworth, and A. Walmsley. 2011. Pearlfishers, townsfolk, Bedouin and shaykhs: Economic and social relations in Islamic al-Zubarah. *Proceedings of the Seminar for Arabian Studies* 41: 1–16.

Whitcomb, D. 1996. Urbanism in Arabia. *Arabian Archaeology and Epigraphy* 7: 38–51.

Further Readings

Al-Thenayian, M.A.R. 1999/2000. *An archaeological study of the Yemeni Highland pilgrim route between Sana and Mecca*. Riyadh: Deputy Ministry of Antiquities and Museums.

Doughty, C.M. 1979 [1888]. *Travels in Arabia Deserta*. Cambridge: Clarendon Press/Dover Books.

Groom, N. 1981. *Frankincense and myrrh*. London: Longman.

Hogarth, D. 1905. *The penetration of Arabia; a record of western knowledge concerning the Arabian Peninsula*. London: Alston Rivers.

Huber, C. 1891. *Journal d'un voyage en Arabie (1883-4)*. Paris: Société Asiatique et la Société de Géographie/Imprimerie Nationale.

Jaussen, R.R., and P.P. Savignac. 1922 [1997]. *Mission Archéologique en Arabie (Mars-Mai 1907) de Jérusalem au Hedjaz Médain-Saleh*. Paris: Ernst Leroux/Institut Français d'Archéologie Orientale du Caire.

Kennet, D., and D. Connolly. 1995. *The towers of Ras al-Khaimah (BAR International series 601)*. Oxford: Archaeopress.

King, G. 1998. *The traditional architecture of Saudi Arabia*. London: I.B. Taurus.

McCorriston, J. 2011. *Pilgrimage and household in the ancient Near East*. Cambridge: Cambridge University Press.

Musil, A. 1926. *The northern Heǧâz (Oriental Explorations and Studies 1)*. New York: American Geographical Society.

Musil, A. 1927. *Arabia Deserta: A topographical itinerary (Oriental Explorations and Studies 2)*. New York: American Geographical Society.

Peeters, F.E. 1994. *The Hajj: The Muslim pilgrimage to Mecca and the holy places*. Princeton: Princeton University Press.

Ward, C. 2000. The Sadana Island shipwreck: A mid-eighteenth century treasure trove. In *A historical archaeology of the Ottoman Empire: Breaking new ground*, ed. U. Baram and L. Carroll, 185–202. New York: Kluwer Academic/Plenum Publishers.

Ward, C., and U. Baram. 2006. Global markets, local practice: Ottoman-period clay pipes and smoking paraphernalia from the Red Sea shipwreck at Sadana Island, Egypt. *International Journal of Historical Archaeology* 10 (2): 135–158.
Whitcomb, D. 1988. Islamic archaeology in Aden and the Hadhramaut. In *Araby the blest*, ed. D.T. Potts, 176–263. Copenhagen: Museum Tusculanum Press.

Archaeobotany

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Introduction and Definition

Archaeobotany is a composite discipline, combining botanical knowledge with archaeological materials. Archaeobotany is also known as *palaeoethnobotany* (or *paleoethnobotany*). It focuses on the study of preserved plant evidence from archaeological sites and the reconstruction and interpretation of past human-plant relationships. The term "archaeobotany" emphasizes the archaeological nature of the evidence, with its recognition of site formation processes and sampling issues. The term *paleoethnobotany*, especially prominent in North America, recognizes the importance of modern ethnobotanical studies in contributing to interpretations of the past. This needs to be kept distinct from the term *palaeobotany*, which is the study of past plants, their adaptations, evolutionary relationships, and communities, from the fragmented remains that are preserved in old sediments. While palaeobotany takes in the whole history of plant life on land (approximately 415 Ma), archaeobotany focuses on the plant evidence relating to past human environments of the Pleistocene and Holocene.

Like many other specialist subdisciplines of archaeology, archaeobotany has evolved from a side-line pursuit of scientists outside of archaeology to something that is very much a part of archaeological research (for histories, see Hastorf 1999, Pearsall 2000, and Fuller 2008). The origins of this field of research can be traced back to the nineteenth century, especially to a prominent expert on fossil plants, Oswald Heer, who carried out the first studies of archaeological plant remains recovered from waterlogged Swiss Neolithic and Bronze Age lake-side sites. His detailed monograph on these, in 1865, had a major impact on the discipline of archaeology and the early development of evolutionary biology; see by extension, summaries in Charles Darwin's *Variation in Animals and Plants under Domestication* (1868) and John Lubbock's *Prehistoric Times* (1872), which introduced to archaeology the term "Neolithic." For much of the subsequent century, recovered plant remains were sent by archaeologists to botanists for study, for instance, specialists working at natural history museums. However, specialist archaeobotanists taking part in archaeological fieldwork only began to be staples of archaeological research from the 1960s onward. Particularly important for this trend was the advent of improved systematic sampling of plant remains through the flotation method, first carried out in the USA and the Middle East in the 1960s. Flotation, a key method in archaeobotanical research, uses water to separate light organic remains (especially charcoal and carbonized seeds) from heavier archaeological material and the sand component of sediment (details of various systems in Pearsall 2000).

Key Issues/Current Debates

Research Themes

In general terms, archaeobotanical research questions relate to both past food-related practices/foodways, and past landscapes. A central concern of archaeobotany is the recovery of evidence for food plants exploited by past populations, where these plants came from, and how they were processed. In the study of hunter-gatherer societies, there are often challenges of preservation; yet, research on plant subsistence is crucial to examining issues of seasonal scheduling of activities, intensification of plant use and processing, storage, and niche construction (e.g., Mason and

Hather 2002 and Wollstonecroft 2011). Another major focus of archaeobotany is the transition to, and spread of, agriculture, including research on cultivation systems, arable weeds, and plant domestication traits (e.g., Fuller 2007 and Piperno 2011). In contexts where agriculture existed, archaeobotanical research focuses on issues of diversification and intensification of agricultural systems and the organization of production and consumption of crops in relation to social hierarchy (e.g., Gumerman 1997 and Fuller and Stevens 2009). When it comes to landscapes, archaeobotany has contributed to the reconstruction of past environments as well as to studies of environmental change due to climate change and/or human impact. In this area, wood charcoal, on-site and off-site palynology, and phytolith studies are especially prominent.

Archaeobotanical Datasets and Subfields

Given that the various datasets define subfields of the discipline, few archaeobotanists practice research on all lines of plant evidence. Macroremains analyses tend to focus on the study of seeds only, whereas wood charcoal and the analyses of phytoliths and starches are specializations in their own right. Still these various datasets are largely complementary and gain strength from integration. The sections below, and Table 1, summarize the main lines of archaeobotanical evidence and their respective potentials. The study of Palaeofaeces, i.e., the analysis of exceptionally preserved human coprolites and gut contents, is

Archaeobotany, Table 1 Archaeobotanical datasets, preservation environments, and typical spatial resolution

Data sets:	Preservation	Spatial resolution (typically)
Macros: remains of seeds and other fruit fragments	Charred	Local, biased by human procurement
	Waterlogged	
	Desiccated	
	Mineralized	
Macros: wood charcoal	Charred	Local, biased by human procurement
	Desiccated	
	Waterlogged	
Macros: parenchyma fragments	Charred	Local, biased by human procurement
	(Potentially desiccated)	
Plant impressions in pottery/ mud-brick	In pottery or hardened clay, therefore all environments where pottery or mud-brick is used	Local or nonlocal (traded), biased by human procurement and tempering preferences
Pollen	Fine sediments, especially acidic (alkaline and oxidizing conditions destroy pollen)	Regional
Phytoliths	Fine sediments, minimal bioturbation (of most pH levels except very high alkalinity (>9) and high temperatures).	Local plant use activities (on-site)
		Regional vegetation (when part of off-site studies, as with pollen)
Starch Grains	Preserved in dental calculus	Components of human/ animal diet
	From artifact surfaces (groundstone, ceramics)	Plant parts and taxa processed on these tools or vessels
Palaeofaeces (i.e., preserved feces or coprolites, and gut contents from mummies or bog bodies)	Mineralized	Local diet, but may contain regional pollen
	Waterlogged	
Diatoms are sometimes examined in archaeobotanical research		Regional aquatic environment

another source of archaeobotanical data that may combine several lines of evidence (Hillman 1986).

Macro-Remains: Crops, Chaff, and Weeds

Macro-remains refers to plant remains that are visible to the naked eye (larger than 0.25 mm), but which still require microscopy to identify. Seeds, which are the most common evidence studied by archaeobotanists, can be preserved by numerous means, including mineralization, waterlogging, metal oxide preservation (sometimes called pseudomorphs), or as impressions in pottery. The most common means of seed preservation encountered, however, are charred seed remains. Generally, charred macro-remains can be identified by examination of their external morphology through a low powered binocular microscope (i.e., 6x–40x). It has now become possible to extract fragmentary ancient genetic information (i.e., aDNA) from ancient seeds, and the prospects of this technique are immense (Palmer et al. 2012).

In general, charred assemblages sample only a very limited range of the floristic diversity of local flora. This came to be recognized in Europe in the 1970s. It was observed that most archaeobotanical samples consisted of a similar range of taxa that are dominated by grain crops (seeds and chaff) and wild species known from modern field studies as weeds of cultivation or weeds of habitats that are disturbed by humans (Jones 1985). However, by far, the best represented remains were those of cereals, in part due to the good preservation of grain and chaff. Thus, aside from the remains of a few wild fruits likely collected for food, most of this fossil evidence can be interpreted as deriving from arable plant communities rather than the environment at large. Therefore, the associations of grains, chaff, and weed seeds can be used to infer aspects of crop-processing (Hillman 1984; Jones 1987; Fuller and Stevens 2009). After crops are harvested, they must be processed in predictable ways, to remove inedible husk (and weeds) and to separate the grain products. Through ethnographic studies, archaeobotanists have developed predictive models about sample composition, which allow the stages of crop-processing represented to be inferred. Most studies have been on the crop-processing of Mediterranean wheat and barley (e.g., Fuller and Stevens 2009), but one can also find studies of millets (e.g., Reddy 1997; D'Andrea and Wadge 2011), rice (Thompson 1996), and some new world crops (e.g. Lopez et al. 2011). These ethnoarchaeological models have made it possible to interpret crop-processing, which can be divided into two basic sets of activities: those that break apart the crop-plant and those that separate out the various freed components. The first activity includes threshing to break apart cereal ears, or separate the pods of some pulses. Another later stage, for hulled crops, is de-husking, which removes the hulls and glumes that are still attached to the grain. In simplified terms, the early stages produce waste that is rich in chaff (especially of free-threshing cereals, like bread wheat and barley) and weed seeds, especially smaller, lighter weed seeds that are removed by winnowing. Later stages will have a higher proportion of grains, fewer weeds that are generally larger and heavier, and will only have chaff from hulled cereals (like the glumes of emmer or einkorn wheat).

Parenchyma, the starchy storage tissue of plants, which predominates in tubers and other underground storage organs, can also be preserved by charring. Such material has not traditionally been searched for in archaeobotanical samples, but studies from a number of regions have found it to be fairly common among seeds and charcoal (Hather 2000), and this line of evidence has the potential for identification of wild or cultivated roots and tubers. This approach should be an important part of research on the origins and development of Vegeculture. Identifications of this material requires the high magnifications and depth of field provided by scanning electron microscopy (SEM).

Macro-Remains: Impressions

Another source of evidence of seeds and chaff is preserved impressions of plants. Plant impressions, often preserved in pottery, are one of the traditional sources of archaeobotanical information. However, today, the study of impressions is

often eschewed when charred remains recovered through flotation are available from a site. Impressions can be studied at lower magnifications and often latex casts are prepared from the molds, which can then be analyzed by SEM. Most cereal parts, such as chaff, are preserved in pottery since these readily available by-products of grain production were often used for tempering pottery. In some cases, this provides early evidence for crop domestication, such as in West Africa (e.g. Manning et al. 2011).

Macro-Remains Wood Charcoal

Wood charcoal is the most abundant component of archaeobotanical flotation samples. Given the centrality of fire in human cultures, wood charcoal is among the most abundant of cultural by-products. In contrast to seed remains, which represent chance/incidental burning, wood is generally considered to be the product of intentional burning. Wood can also be preserved under other circumstances, such as waterlogging. It is identified by looking at anatomical characters in transverse, tangential, and radial sections. This kind of study requires higher magnifications, generally 50x–150x, but sometimes as high as 400x, and beyond, which is aided by SEM. Since most fuel is likely to come from the vicinity of the site, it should provide some reflection of the surrounding vegetation. Numerous studies have utilized changes in the composition of wood taxa to examine changes in the landscape, but fuel choice may also reflect social and political concerns (Asouti and Austin 2005; Marston 2009).

Micro-Remains: Phytoliths, Starch, and Pollen

There are a number of lines of archaeobotanical evidence that are beyond the range of human vision and must be extracted from sediment samples, mounted on slides, and examined under high magnification. These lines of evidence are micro-remains, and include phytoliths, pollen, and starch grains. The most widely studied micro-remains in archaeology are phytoliths (sometimes called "plant opals," silica skeletons, or spodograms), which are the silica casts of plant cells formed by the evaporation of silica-laden water through plant transpiration (Pearsall 2000). Being an inorganic glass, these have a high potential for preservation in many sedimentary environments, although they are likely to be destroyed by mechanical processes. The study of these remains requires magnifications from 200x to 1,000x. Phytoliths are invisible in cross-polarized light. Phytolith identification is complicated by the fact that any given plant produces numerous different forms of phytoliths and similar phytoliths forms may be produced by unrelated species. Nevertheless, some phytolith forms are diagnostic. Because of the high preservation potential of phytoliths, they have proved particularly important for examining plant exploitation prior to agriculture in the Palaeolithic (Madella and Jones 2002), and for tracking crops in tropical environments with poor on-site preservation of macro-remains (e.g., Piperno 2011).

A more recently expanding line of research are starch grains; the intracellular storage of starch by plants. The form of starch grains appears to be taxonomically determined, allowing separation of families, and sometimes genera and species (Torrence and Barton 2006). There also seems to be some indication of domestication in some taxa (e.g., Piperno 2011). Most often starch grains are extracted from the surfaces or residues of artifacts, such as groundstone, but they also become trapped in dental calculus and, as such, reflect human diet. Starch grains have been central to the archaeological study of past Chimpanzee archaeology (Mercader et al. 2007). Some traditional archaeobotanists still regard starch grains with suspicion and there is on-going research and debate on issues of taphonomy, preservation, and identification, as there is with other lines of archaeobotanical evidence.

Pollen is usually collected from off-site geological sediments (palynology) for examining palaeoecology, which is often of relevance for archaeological interpretations. Of particular interest are approaches to identifying the introduction or intensification of agriculture through pollen. In addition, pollen is sometimes preserved in archaeological sediments (archaeological palynology), which can help fill-out reconstructions of past

vegetation (e.g., Dimbleby 1985 and Pearsall 2000). Pollen is studied at similar high magnifications as phytoliths.

International Perspectives and Future Directions

The growth of archaeobotany has been uneven internationally. As reviewed in Fuller (2008), several regions of the Old World have seen different chronologies for the development of this field. It was earliest in Europe, quite early but small-scale in India, and early in the Near East. Development in Africa has been slow, and the majority of sub-Saharan countries have had no archaeobotanical research. The USA has a long tradition of archaeobotanical research, but for much of the Neotropics, developments have been more recent and are spatially uneven (cf. Piperno 2011). Japan has had a longer tradition of studying waterlogged macro-remains, using flotation, and undertaking phytolith research, whereas such developments are quite recent in China or Korea. Most of Southeast Asia is un-sampled and understudied (Castillo and Fuller 2010). Thus, while archaeobotany has potential application anywhere – all human societies have used and consumed plants – its adoption has been uneven, partly biased toward countries with better funded research institutions and partly focused on regions deemed to be centers of origins of agriculture and civilization (e.g., Mesoamerica or Southwest Asia). Archaeobotany has greatly expanded internationally and across a range of subfields. It is set to continue to do so in the future.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agriculture: Definition and Overview
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Landscape Domestication and Archaeology
- ▶ Maize: Origins and Development
- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Phytolith Studies in Archaeology
- ▶ Vegeculture: General Principles

References

Asouti, E., and P. Austin. 2005. Reconstructing woodland vegetation and its relation to human societies, based on analysis and interpretation of archaeological wood charcoal macro-remains. *Environmental Archaeology* 10: 1–18.

Castillo, C., and D.Q. Fuller. 2010. Still too fragmentary and dependent upon chance? Advances in the study of early Southeast Asian archaeobotany. In *50 years of archaeology in Southeast Asia: Essays in honour of Ian Glover*, ed. B. Bellina, E.A. Bacus, O. Pryce, and C.J. Weissman, 91–111. Bangkok/London: River Books.

D'Andrea, A.C., and P. Wadge. 2011. T'ef (*Eragrostis tef*): A legacy of pastoralism? In *Windows on the African past. Current approaches to African archaeobotany*, ed. A.G. Fahmy, S. Kahlheber, and A.C. D'Andrea, 225–241. Frankfurt: Africa Magna Verlag.

Dimbleby, G.W. 1985. *The palynology of archaeological sites*. London: Academic.

Fuller, D.Q. 2007. Contrasting patterns in crop domestication and domestication rates: Recent archaeobotanical insights from the old World. *Annals of Botany* 100 (5): 903–924.

Fuller, D.Q. 2008. Archaeological science in field training. In *From concepts of the past to practical strategies: The teaching of archaeological field techniques*, ed. P.-J. Ucko, L. Qing, and J. Hubert, 183–205. London: Saffron Press.

Fuller, D.Q., and C.J. Stevens. 2009. Agriculture and the development of complex societies. In *From foragers to farmers. Papers in honour of Gordon C. Hillman*, ed. A. Fairbairn and E. Weiss, 37–57. Oxford: Oxbow Books.

Gumerman, G. 1997. Food and complex societies. *Journal of Archaeological Method and Theory* 4 (2): 105–139.

Hastorf, C. 1999. Recent research in paleoethnobotany. *Journal of Archaeological Research* 7: 55–103.

Hather, J.G. 2000. *Archaeological parenchyma*. London: Archetype Press.

Hillman, G.C. 1984. Traditional husbandry and processing of archaic cereals in recent times: The operations, products and equipment which might feature in Sumerian texts, part I. the glume wheats. *Bulletin of Sumarian Agriculture* 1: 114–152.

Hillman, G.C. 1986. Plant foods in ancient diet: The archaeological role of palaeofaeces in general and Lindow Man's gut contents in particular. In *Lindow Man: The body in the bog*, ed. I.M. Stead, J.B. Bourke, and D.R. Borthwell, 99–115. London: British Museum Press.

Jones, M.K. 1985. Archaeobotany beyond subsistence reconstruction. In *Beyond domestication in prehistoric Europe*, ed. G.W. Barker and C. Gamble, 107–128. New York: Academic.

Jones, G. 1987. A statistical approach to the archaeological identification of crop-processing. *Journal of Archaeological Science* 14: 311–323.

Lopez, L.M., A. Capparelli, and A.E. Nielsen. 2011. Traditional post-harvest processing to make quinoa grains (Chenopodium quinoa var. quinoa) apt for consumption in Northern Lipez (Potosí, Bolivia): Ethnoarchaeological and archaeobotanical analyses. *Archaeological and Anthropological Sciences* 3: 49–70.

Madella, M., and M.K. Jones. 2002. The exploitation of plant resources by Neanderthals in Amud Cave (Israel): The evidence from phytolith studies. *Journal of Archaeological Science* 29: 703–719.

Manning, K., R. Pelling, T. Higham, J.-L. Schwenniger, and D.Q. Fuller. 2011. 4500-year old domesticated pearl millet (Pennisetum glaucum) from the Tilemsi Valley, Mali: New insights into an alternative cereal domestication pathway. *Journal of Archaeological Science* 38 (2): 312–322.

Marston, J.M. 2009. Modeling wood acquisition strategies from archaeological charcoal remains. *Journal of Archaeological Science* 36: 2192–2200.

Mason, S.L.R., and J.G. Hather, eds. 2002. *Hunter-gatherer archaeobotany. Perspectives from the northern temperate zone*. London: Institute of Archaeology, UCL.

Mercader, J., H. Barton, J. Gillespie, J. Harris, S. Kuhn, R. Tyler, and C. Boesch. 2007. 4300-year-old chimpanzee sites and the origins of percussive stone technology. *Proceedings for the National Academy of Sciences* 104 (9): 3043–3048.

Palmer, S.A., O. Smith, and R.G. Allaby. 2012. The blossoming of plant archaeogenetics. *Annals of Anatomy* 194: 146–156.

Pearsall, D.M. 2000. *Paleoethnobotany.* 2nd ed. New York: Academic.

Piperno, D.R. 2011. The origins of plant cultivation and domestication in the New World tropics. *Current Anthropology* 52 (S4): S453–S470.

Reddy, S.N. 1997. If the threshing floor could talk: Integration of agriculture and pastoralism during the late Harappan in Gujarat, India. *Journal of Anthropological Archaeology* 16: 162–187.

Thompson, G.B. 1996. *The excavation of Khok Phanom Di: A prehistoric site in Central Thailand, volume 4: Subsistence and environment: The botanical evidence*, The Botanical Remains. Vol. 53. London: Society of Antiquaries of London.

Torrence, R., and H. Barton, eds. 2006. *Ancient starch research*. Walnut Creek: Left Coast Press Inc.

Wollstonecroft, M.M. 2011. Investigating the role of food processing in human evolution: A niche construction approach. *Archaeological and Anthropological Sciences* 3: 141–150.

Archaeobotany of Agricultural Intensification

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Introduction

Although agriculture was introduced into Europe at the beginning of the Neolithic period, archaeological studies often suggest that intensive systems of agricultural production were not practiced until the Bronze Age. In the case of Ireland and Britain, for example, the increased appearance of archaeologically identifiable fields and farmsteads during the Bronze Age is often understood to represent agricultural intensification (see Brück 2000: 275). The intensification of agriculture in Bronze Age Europe is of enormous significance, as it is considered to be a precursor to increasing social stratification, with the creation of a strong agricultural economic base enabling the development of hierarchies that controlled the means of production and distribution of produce. This model of increasing intensity over time will be challenged here through detailed consideration of agricultural terminology and archaeological evidence for intensification, with a focus on archaeobotany and Ireland. It will be shown that intensification represents just one of many agricultural strategies available to prehistoric farmers in Europe and cautions against an

overfocus by archaeologists on this mode of production.

Definition

The definition of intensification used by many archaeologists worldwide is derived from the seminal work of a Danish economist, Ester Boserup, who published a revolutionary study in 1965 entitled *The Conditions of Agricultural Growth*. Boserup's study proposed a model for the development of intensification in non-industrial farming societies. Since the publication of her work, the validity of Boserup's model has been much debated, mainly among ethnographers, but also in other disciplines such as agronomy, history, and, to some extent, archaeology. It appears, however, that many archaeologists have not followed these subsequent debates, while others are misinterpreting the basic meaning of intensification.

There is a need for more precision in terminology used to describe agricultural systems. In archaeological studies, the term "intensification" is sometimes used to refer to an increase in production or increased detection of remains (Morrison 1994, 1996: 587). The definition of intensification will be taken as follows: intensification is an increase in labor and/or capital inputs to a fixed area of land in order to increase or maintain production (after Brookfield 1972: 31). Intensification aims to achieve not simply an increase in overall production; instead it aims to increase productivity per unit of land.

Land capital remains the same in this process, in that the area of land being farmed does not increase; the increase is in labor and/or capital inputs with the aim of increasing or maintaining production. While labor inputs can be applied at a specific point in time, capital inputs – including the construction of terracing, irrigation, and field systems – may have to be created before they can be used, perhaps over a long period and then enduring for a substantial period of time (Brookfield 1972: 32).

If the goal is to increase productivity through the cultivation of a greater area of land than previously farmed, then this process is known as "extensification" rather than intensification. Extensification can take place when people move out over the landscape – thereby extending the area of land being farmed – rather than increasing inputs into a fixed area. Extensive farming is often characterized by a lower level of input and lower output per unit area, but a higher output per capita (van der Veen 2005: 158).

Historical Background

Boserup's model of agricultural intensification, *The Conditions of Agricultural Growth* (1965), is one of the most influential formulations of this issue from the last century. Based on ethnographic work, Boserup argued that an increase in population density was responsible for an increase in the intensity of cultivation. Boserup proposed that in preindustrial societies, as farmers intensify agricultural production, cultivation systems pass through a universal and linear sequence of evolutionary stages. According to this model, a clear trajectory of agricultural development can therefore be identified.

Boserup suggested that extensive forms of shifting cultivation gradually become more intensive by a reduction of the fallow length. According to this model, shifting cultivation might take place in order to minimize the possibility of soil exhaustion – land is cultivated and then abandoned in order to leave it fallow and allow the soil to regenerate, whereupon the land can be farmed again at a later time. With more intensive strategies, Boserup suggested that communities reduce the length of time that the ground is left fallow. Communities are able to reduce the fallow length by introducing more labor and/or capital until they eventually reach the stage of annual cropping or even multicropping. Increased labor will allow more tillage and seedbed preparation, as well as more weeding, all of which can encourage reduced fallow periods. Capital inputs can include the use of superior tools and increased diversity in crops. Boserup also refers to inputs such as manuring and the enclosing of land in the progression toward intensification.

Many of Boserup's stages can be identified archaeologically, for example, in the form of

innovative tools, soil modifications, and field boundaries. It is likely that the ability to identify these stages has influenced the popularity of Boserup's model in archaeological studies. The model appears to be straightforward – people start out by farming extensively with low inputs, progressing toward more intensive farming by adding in more labor, tools, and various other methods to increase or maintain productivity in an area of land. Boserup's assertion that population pressure was a causal factor in encouraging intensity of agricultural production has also found favor among archaeologists, as it has often been suggested that population pressure was a causal factor leading to societal and economic changes in Bronze Age Europe (Sherratt 1981).

Since the publication of *The Conditions of Agricultural Growth*, there have been many criticisms of this model of agricultural intensification and also of its application uncritically by archaeologists (Brookfield 1984, 2001; Kirch 1994; Morrison 1994, 1996; van der Veen 2005). Boserup did, however, provide a very useful framework for highlighting some of the many variables in the process of agricultural change, and this seminal study resulted in much discussion and development of these complex issues as they pertain to different societies and environments throughout the world.

Key Issues/Current Debates

Does Agriculture Evolve from Extensive to Intensive Systems?

One of the main debates in agricultural intensification relates to the concept of unilinear progression, whereby agriculture is considered to start out as extensive and then becomes increasingly intensive as time progresses. Boserup (1965) proposed an evolutionary continuum toward fixed field-intensive agriculture, which argued for a clear trajectory from extensive to intensive farming. Diversity and variability are, however, critical aspects of both the structure of agricultural production and the process of agricultural intensification. Extensive and intensive forms of cultivation are different options, rather than stages of an evolutionary sequence. They represent strategies available to farmers to choose from, depending on local, social, and economic circumstances and to use alongside other strategies such as innovation, specialization, and diversification (van der Veen 2005: 158). Intensification should therefore be viewed as consisting of one of multiple potential strategies, rather than a single process.

A consequence of this view is that there may be multiple paths or courses toward intensification rather than a single route from shifting to fixed agriculture, from extensive to intensive production, and from long to short fallows (Morrison 1994: 115). The direction, as well as the rate, of change may have varied, depending on economic and cultural circumstances at different times and places, with the possibility of reversals occurring, whereby agriculture became more or less intensive. Boserup's model suggested that early farmers would have made use of shifting agriculture, eventually moving toward fixed plot, more intensive agriculture. This model was applied by archaeologists to Neolithic societies in Europe, where it was assumed that extensive agricultural practice eventually gave way to more intensive systems in the Bronze Age. The archaeobotanical evidence from Neolithic Europe does not, however, support this application of Boserup's model.

Bogaard's (2002) study of early crop husbandry in Central Europe investigated management of agricultural plots through analysis of ecological characteristics of potential arable weeds. Ecological characteristics relevant to the permanence of cultivation plots were previously determined during the "Hambach Forest experiment" in Germany, where experimental plots on loess soils, cleared of long-lived deciduous woodland, were cultivated over a 6-year period and surveyed immediately prior to harvest time in order to document the weed flora. It emerged that arable weed flora associated with recently cleared plots managed with little or no tillage and weeding (as in a shifting cultivation regime) is likely to be dominated by perennial taxa, particularly woodland perennials. Dominance by annual taxa is more likely to be indicative of long-established cultivation plots on regularly

disturbed soils (representing a more intensive regime). Bogaard's analysis of archaeobotanical weed data from sites in the western loess belt and Alpine foreland demonstrated that many Neolithic cultivation plots in these regions tended to be long established, rather than temporary, plots, suggesting that shifting agriculture was not taking place. Bogaard, together with Jones, also applied this approach to weed assemblages from Neolithic Britain, where they found further evidence for weeds associated with more intensive and long-term cultivation strategies in archaeological deposits associated with the earliest farmers (Bogaard and Jones 2007).

The difficulties in directly applying Boserup's model, which is based upon tropical agricultural systems, to temperate agricultural systems, such as Europe, have been highlighted (e.g., Sherratt 1981: 290). It could be argued that shifting cultivation is an agricultural system adapted to a specific set of ecological circumstances – found primarily in the humid inner tropics – to ensure maintenance of soil fertility. The application of such a system to Europe may be inappropriate, because different soil types and the presence of domestic animals enabled different forms of soil nutrient restoration in this region (Sherratt 1981; van der Veen 2005: 157).

Population Change and Intensification

Potential relationships between agricultural intensification and population change represent another issue that has been much debated. Population pressure has often been regarded as a causal factor leading to societal and economic change in Bronze Age Europe (Sherratt 1981). Boserup (1965) argued that population pressure was the primary causal factor of intensification – more intensive agricultural strategies can support increasing populations, with intensification in turn requiring increased labor per unit of food produced.

Boserup suggested that intensification in food production originated as a response to factors beyond human control, in that humans were unable to prevent population increase. Anthropological studies have, however, revealed numerous examples of birth-spacing practices, abortion, and infanticide, suggesting that population increase has been subject to human intervention throughout prehistory (Kirch 1994: 310). More importantly, population growth and resultant land shortages are not in all cases the primary inducements for intensification. Demographic factors can be of variable importance in different cases, and intensification is not the only response to land shortage (Stone 1994: 317; Stone and Downum 1999: 115). Other responses could include migration, conflict, and changes to nonagricultural enterprises, while coercive social relations, such as chiefdoms, may also influence intensification. There is also the issue of which came first – was population increase followed by changes in agricultural practice or could populations have expanded *following* "favorable" circumstances, for example, where there was a stable agricultural base to support more people?

It has been argued that the disadvantages associated with intensive agriculture ensure that such modes of production will be adopted only when necessary, citing disadvantages such as increased labor inputs and declining efficiency of that labor over time (Boserup 1965). Diminishing returns on labor are assumed, which results in declining efficiency as intensification increases. Efficiency considerations can, however, be overridden, and an increase in production does not always correspond to a decline in efficiency (Stone and Downum 1999). Efficiency can vary according to the types of crops grown – e.g., hulled versus naked crops and spring-sown versus autumn-sown crops – and methods of cultivation. As well as technical innovations – such as new tools – social innovations can be hugely significant, including mobilization of labor, increases in productivity of labor, and improvements in the management of resources. Efficiency in time management, for example, rather than basic labor input, can be of significant importance – there can be major differences in productivity between adjacent farms that are similar in workforce endowment (Brookfield 2001: 184).

It has also been argued that agricultural producers exerted the minimum effort required to meet their needs – the Law of Least Effort (Boserup 1965). In this way, people and societies

make rational, informed choices in order to maximize the outcome of agricultural activities in the local landscape. But were agricultural strategies in Bronze Age Europe focused on maximization of production? As well as providing calorific value, crops can also be grown for social returns, being used, for example, in ceremonial and "ritual" activities. Ethnographic evidence indicates that inputs may appear uneconomic when measured against calorific returns yet reasonable when measured against social returns (Brookfield 1972: 38). Intensive production should not, therefore, automatically be assumed to be an objective in Bronze Age Europe.

International Perspectives

Were the Earliest Farmers in Ireland Engaged in Intensive Agriculture?

Arable agriculture was introduced into Ireland in the centuries after 4000 cal BCE, and it has often been suggested that the earliest farming was extensive, with intensive practices becoming more widespread during the Bronze Age (2500–600 cal BCE). This assumption is based presumably on the Boserupian model, which suggests that agricultural production would have started out in an extensive manner, eventually becoming more intensive. The relatively large quantity of cultivated archaeobotanical remains from Bronze Age sites in Ireland, when compared with Neolithic sites, is also likely to have been of influence. This evidence does not, however, necessarily mean that more intensive practices were being undertaken during the later period – increased production does not automatically mean intensification. It has been shown above that the evolutionary model of agricultural production – whereby systems progress from extensive to intensive – is not appropriate in many cases. A better method of assessing the intensity of farming practices in Neolithic Ireland is through ecological analysis of potential arable weeds.

The contribution of arable weed analysis in detecting intensity of agricultural production has already been discussed above, with reference to archaeobotanical studies from Central Europe and Britain. Previous studies have established the types of arable weeds characteristic of a shifting cultivation regime versus arable weeds more associated with long-established cultivation, representing a more intensive regime. Analyses of arable weeds from Neolithic sites in Central Europe and Britain have indicated that cultivation plots in these regions tended to be long established, rather than temporary, suggesting that shifting agriculture was not taking place (Bogaard 2002; Bogaard and Jones 2007). This approach has recently been applied to archaeobotanical data from Ireland for the first time, and a similar picture is emerging (McClatchie et al. 2014). Although the Irish Neolithic dataset is smaller than that from Britain or Central Europe, it appears to follow a similar trend, in that disturbed weed taxa are dominant and woodland taxa are rare, while annual species are more commonly recorded than perennial species. In common with Neolithic Britain and Central Europe, the evidence from Ireland does not resemble the picture expected for newly cleared plots managed under a shifting cultivation regime. The earliest farmers in Ireland instead appear to be engaged in more intensive practices than previously acknowledged. More detailed investigations into functional weed ecology can shed further light on cultivation intensity, distinguishing between arable weeds growing on intensive "garden" plots and extensive "field" cultivation (Bogaard et al. 2016).

Do Prehistoric Field Systems in Ireland Represent Intensification?

It has been noted above that an increased appearance of archaeologically identifiable fields has been interpreted as representing agricultural intensification in prehistoric Europe. The construction of field systems creates both enclosures and boundaries. The enclosing of land can be effective in the prevention of further soil erosion, particularly on sloping ground, because it can help decelerate soil creep and encourage drainage. Boundaries can protect animals and crops by preventing wind chill and providing shelter. As well as enclosing and bounding areas of land, the

construction of field systems is also a form of *landesque* – investing in the land beyond the life of the current crop (Brookfield 1984).

One of the earliest, and indeed largest, examples of field systems from prehistoric Europe can be found at the Céide Fields, County Mayo, on the northwest coast of Ireland. Here, well-defined rectangular field systems, consisting of stone walls, were erected over an area of approximately 12 km^2 around the middle of the fourth millennium BCE and then covered by peat growth, thus enabling their preservation (Caulfield 1978; Figs. 1 and 2). The fields appear to be large in size and are often thought to have enclosed animals, although it should be noted that organic hedge boundaries, which would have left little trace, could also have been used to subdivide fields for arable use. While this early evidence from the Céide Fields is certainly significant, prehistoric field systems in Northwest Europe more often date to the Bronze Age, as is the case in Ireland. Some field systems appear to have an orderly layout – for example, at the Céide Fields – while others tend not to be laid out in a coaxial manner, instead being less regular in their arrangement, perhaps indicating more gradual and incremental growth.

The erection of agricultural walls, dams, irrigation features, and terraces can require a substantial labor input in their construction and maintenance, which is sometimes interpreted as evidence for intensification. Although it is clear that the increase in field systems during the Bronze Age represents a change in the organization of production, this does not necessarily imply any enhancement in productivity. Studies of field systems often focus on morphology of the fields as well as economic and technological aspects of their construction and use. The increased appearance of field systems may also reflect changing

Archaeobotany of Agricultural Intensification, Fig. 1 Aerial view of a section of the Céide Fields, County Mayo, Ireland – prehistoric stone walls. (Courtesy of Photographic Unit, National Monuments Service, Department of Culture, Heritage and the Gaeltacht)

Archaeobotany of Agricultural Intensification, Fig. 2 Section of the Céide Fields, County Mayo, Ireland – prehistoric stone walls

social relationships between people and landscapes, rather than being explained solely in economic or technological terms. Field boundaries can be established for reasons other than increasing productivity of the land (Stone 1994; Brück 2000). Field boundaries can be constructed to mark boundaries – to transmit information – and also to protect boundaries or control access. Field boundaries will therefore not *necessarily* occur where cultivation is intensive. It is also worth noting that landscapes can be demarcated conceptually and their natural features can convey symbolic meanings, without the land itself being altered in any way by field boundaries, ditches, lines, or posts (Bayliss-Smith and Golson 1999: 209). So while field boundaries may well be part of an intensive system, their presence does not automatically imply intensification. Field boundaries may even be part of an extensive strategy, whereby people are moving out over the landscape. It seems, therefore, that a variety of economic and social strategies might have prompted the increased construction of field systems in Bronze Age Ireland. This may be better understood as a *transformation* in the way that agriculture was being carried out.

An alternative means of determining the intensity or otherwise of agricultural production is through geoarchaeological analysis of the sediments themselves. Manures can be important indicators for the intensification of arable production, because they are an example of applying increased inputs to a fixed area to increase/maintain production. Such soil amendment strategies have been detected at the Bronze Age field system in Belderg Beg, County Mayo, through geoarchaeological analyses (Verrill and Tipping 2010). Another recently developed technique is the investigation of manuring through analysis of stable isotope values in cereal remains, specifically $\sigma^{15}N$ values. Investigations of modern crops have shown that manuring with animal dung has a clear effect on stable nitrogen isotope ratios in cereals, and this can be measured to reveal distinct local or regional strategies in the use of manures (Bogaard et al. 2013). Furthermore, combining crop stable isotope ratios with functional weed ecology can be very effective in identifying cultivation intensity (Bogaard et al. 2016). A variety of methods can therefore be employed to explore intensity of cultivation at an individual site.

Future Directions

It is clear that the causes and paths of agricultural change can be complex – variability and diversity are often evident in the archaeological record. Intensification is not caused by any single factor, such as population pressure. It may instead be influenced by a variety of demographic, social, and economic factors. There is not an evolutionary trajectory in all agricultural systems, whereby they go from extensive to intensive farming. Similarly, certain landscape features do not automatically imply any individual agricultural strategy – it has been demonstrated above that the construction of field systems is not always indicative of intensive agricultural production. The term "intensification" and its implications have, unfortunately, been misused and misunderstood in some archaeological studies. Future studies should aim to pay more attention to the use of proper terminology and to be more critical when exploring evidence for agricultural change – in the case of prehistoric Europe, it could be argued that the problem with Boserup's model is not so much the model itself, rather the way it has been applied and oversimplified by others. While the identification of true intensification in the archaeological record can certainly be challenging, a variety of useful environmental analyses are now available, including geoarchaeological and isotope studies. Investigation of archaeobotanical evidence – such as arable weeds – can also provide new insights into the intensity or otherwise of land use. More frequent use of such methods is recommended. Archaeologists should, however, be careful not to overfocus on trying to identify intensification in the archaeological record. Depending on local circumstances, different agricultural strategies may have been deployed at different times and in different places, with the possibility of co-occurrence. It may be more worthwhile to explore the potential for a variety of different

strategies, which may include intensification but also includes other options such as innovation, specialization, and diversification.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Agriculture: Definition and Overview
- ▶ Andes: Origins and Development of Agriculture
- ▶ Archaeobotany
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Sherratt, Andrew
- ▶ Southern Africa: Origins and Development of Agriculture

References

Bayliss-Smith, T., and J. Golson. 1999. The meaning of ditches: Deconstructing the social landscapes of New Guinea, Kuk, phase 4. In *The prehistory of food: Appetites for change*, ed. C. Gosden and J. Hather, 199–231. London: Routledge.

Bogaard, A. 2002. Questioning the relevance of shifting cultivation to Neolithic farming in the loess belt of Europe: Evidence from the Hambach Forest experiment. *Vegetation History and Archaeobotany* 11: 155–168.

Bogaard, A., and G. Jones. 2007. Neolithic farming in Britain and central Europe: Contrast or continuity? *Proceedings of the British Academy* 144: 357–375.

Bogaard, A., R. Fraser, T.H.E. Heaton, M. Wallace, P. Vaiglova, M. Charles, G. Jones, R.P. Evershed, A.K. Styring, N.H. Andersen, R.-M. Arbogast, L. Bartosiewicz, A. Gardeisen, M. Kanstrup, U. Maier, E. Marinova, L. Ninov, M. Schäfer, and E. Stephan. 2013. Crop manuring and intensive land management by Europe's first farmers. *Proceedings of the National Academy of Sciences of the United States of America* 110 (31): 12589–12594.

Bogaard, A., J. Hodgson, E. Nitsch, G. Jones, A. Styring, C. Diffey, J. Pouncett, C. Herbig, M. Charles, F. Ertuğ, O. Tugay, D. Filipovic, and R. Fraser. 2016. Combining functional weed ecology and crop stable isotope ratios to identify cultivation intensity: A comparison of cereal production regimes in Haute Provence, France and Asturias, Spain. *Vegetation History and Archaeobotany* 25: 57–73.

Boserup, E. 1965. *The conditions of agricultural growth: The economics of agrarian change under population pressure*. London: George Allen & Unwin.

Brookfield, H.C. 1972. Intensification and disintensification in Pacific agriculture: A theoretical approach. *Pacific Viewpoint* 13: 30–48.

Brookfield, H.C. 1984. Intensification revisited. *Pacific Viewpoint* 25 (1): 15–44.

Brookfield, H.C. 2001. Intensification, and alternative approaches to agricultural change. *Asia Pacific Viewpoint* 42 (2/3): 181–192.

Brück, J. 2000. Settlement, landscape and social identity: The Early–Middle Bronze Age transition in Wessex, Sussex and the Thames Valley. *Oxford Journal of Archaeology* 19 (3): 273–300.

Caulfield, S. 1978. Neolithic fields: The Irish evidence. In *Early land allotment in the British Isles – A survey of recent work*, British Archaeological Reports 48, ed. H.C. Bowen and P.J. Fowler, 137–143. Oxford: Archaeopress.

Kirch, P.V. 1994. *The wet and the dry: Irrigation and agricultural intensification in Polynesia*. London: The University of Chicago Press.

McClatchie, M., A. Bogaard, S. Colledge, N.J. Whitehouse, R.J. Schulting, P. Barratt, and R. McLaughlin. 2014. Neolithic farming in northwestern Europe: Archaeobotanical evidence from Ireland. *Journal of Archaeological Science* 51: 206–215.

Morrison, K.D. 1994. The intensification of production: Archaeological approaches. *Journal of Archaeological Method and Theory* 1 (2): 111–159.

Morrison, K.D. 1996. Typological schemes and agricultural change: Beyond Boserup in precolonial South India. *Current Anthropology* 37 (4): 583–608.

Sherratt, A. 1981. Plough and pastoralism: Aspects of the secondary products revolution. In *Pattern of the past: Studies in honour of David Clarke*, ed. I. Hodder, G. Isaac, and N. Hammond, 261–305. Cambridge, UK: Cambridge University Press.

Stone, G.D. 1994. Agricultural intensification and perimetrics: Ethnoarchaeological evidence from Nigeria. *Current Anthropology* 35 (3): 317–324.

Stone, G.D., and C.E. Downum. 1999. Non-Boserupian ecology and agricultural risk: Ethnic politics and land control in the arid southwest. *American Anthropologist* 101 (1): 113–128.

Van Der Veen, M. 2005. Gardens and fields: The intensity and scale of food production. *World Archaeology* 37 (2): 157–163.

Verrill, L., and R. Tipping. 2010. A palynological and geoarchaeological investigation into Bronze Age farming at Belderg Beg, Co. Mayo, Ireland. *Journal of Archaeological Science* 37: 1214–1225.

Further Readings

Bogaard, A. 2004. *Neolithic farming in central Europe: An archaeobotanical study of crop husbandry practices*. London: Routledge.

Bogaard, A. 2005. 'Garden agriculture' and the nature of early farming in Europe and the Near East. *World Archaeology* 37 (2): 177–196.

Charles, M., A. Bogaard, G. Jones, J. Hodgson, and P. Halstead. 2002. Towards the archaeobotanical identification of intensive cereal cultivation: Present day ecological investigation in the mountains of Asturias, northern Spain. *Vegetation History and Archaeobotany* 11: 133–142.

Geertz, C. 1963. *Agricultural involution: The process of ecological change in Indonesia*. Berkeley: University of California Press.

Johnston, R. 2000. Field systems and the Atlantic Bronze Age: Thoughts on a regional perspective. In *The prehistory and early history of Atlantic Europe*, British Archaeological Reports, International series 861, ed. J.C. Henderson, 47–55. Oxford: Archaeopress.

Leach, H.M. 1999. Intensification in the Pacific: A critique of the archaeological criteria and their application. *Current Anthropology* 40 (3): 311–339.

Netting, R.M. 1993. *Smallholders, householders: Farm families and the ecology of intensive, sustainable agriculture*. Stanford: Stanford University Press.

Stone, G.D. 2001. Theory of the square chicken: Advances in agricultural intensification theory. *Asia Pacific Viewpoint* 42 (2/3): 163–180.

Archaeobotany of Early Agriculture: Macrobotany

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Introduction

Analysis of archaeological macrobotanical remains continues to be a primary source of direct evidence for the development of agriculture in many parts of the world. Macrobotanical remains are small in size, often fragile, and require special conditions for preservation, making interpretation of archaeobotanical assemblages a complex process. There are multiple ways that macrobotanical remains can be used to explore early agriculture and plant domestication, from techniques examining morphological changes in seeds to statistical analysis of changes in archaeobotanical assemblages. Recently, archaeobotanical evidence in multiple parts of the world has been used to argue for extended periods of "predomestication cultivation" in early agricultural systems.

Definition

Macrobotanical remains are archaeological plant remains that are large enough to be seen with the naked eye. These remains usually range in size from several centimeters (e.g., wood charcoal and tubers) down to 250 μm (e.g., very small seeds). Using stereomicroscopes, archaeobotanists examine these remains for diagnostic features that can be used to identify the plant to the lowest taxonomic level possible (e.g., genus or species). Morphological and morphometric studies are also often carried out on macrobotanical remains from early agricultural sites to examine changes resulting from plant domestication. Although macrobotanical remains can include items such as wood charcoal, herbaceous plant material, and parenchyma, in the context of early agriculture the focus of research is usually on the seeds of cultivated or domesticated plants.

Key Issues

The Nature of Macrobotanical Research in the Context of Early Agriculture

Although microbotanical remains such as silica phytoliths and starch grains have recently demonstrated some of the earliest evidence for agriculture in some parts of the world (e.g., in the New World Neotropics and Southeast Asia), macrobotanical remains continue to be the primary source of evidence for most archaeobotanists who study the development of plant cultivation and agriculture worldwide. Macrobotanical research, though often challenging, is particularly

valuable because it allows researchers to directly investigate relationships between people and plants (Pearsall 2010: 247). By using strict methodological controls and statistical measures recording changes in seed morphology, taxon abundance, and assemblage diversity through time, archaeologists can use macrobotanical remains to detect shifts in plant use practices that are not discernable through the analysis of any other type of archaeological remains.

Unlike mineralized artifacts such as ceramics and bone, macrobotanical remains require special conditions for preservation and special techniques for recovery. Carbonization transforms botanical matter into compounds that cannot be broken down and consumed by living organisms, such as insects and microbes. With the exception of dry, waterlogged (anaerobic), or frozen conditions, carbonization is usually required for botanical preservation at archaeological sites. The majority of botanical evidence for early agriculture comes from such charred macrobotanical remains, with some exceptions. For example, Grobman et al. (2012) recovered numerous partially charred and uncharred remains of maize (*Zea mays*) from a desert site on the north coast of Peru from layers dated c. 6700–5000 BP, and some of the earliest evidence for rice agriculture in central China comes from waterlogged levels at the Hemudu site, dated c. 7000–5800 BP (Zhao 2011).

Although macrobotanical remains can include relatively large materials such as charcoal and tubers, most macrobotanical remains are small and thus unlikely to be recovered through typical dry screening. The development and spread of the flotation recovery method in the 1960s allowed the recovery of representative archaeobotanical assemblages and were responsible in large part for the development of archaeobotany as an archaeological subdiscipline (Pearsall 2010). In flotation, archaeological sediments are disaggretated in a water-filled tank, allowing charred botanical remains to float to the surface of the water for collection in fine mesh sieves.

The requirement of carbonization acts as a preservation filter for macrobotanical remains, with important implications for the interpretation of archaeobotanical assemblages. Plants that are processed, consumed, and discarded in the absence of fire (e.g., many fruits) are unlikely to be preserved in the archaeological record, while those that are exposed to fire are more likely to dominate archaeobotanical assemblages. In the context of early agriculture, this can lead to ambiguities in the interpretation of wild and domesticated plant use, particularly in cases where dung may have been an important source of fuel. For example, Miller (1996) argued that the archaeobotanical assemblage at early Abu Hureyra (c. 11,000 BP), which contained a broad range of seed taxa, including seeds which are inedible to humans without processing, was not just the result of crop processing but also of dung fuel use, however, Hillman et al. (1997) suggested that the assemblage of wild plant taxa was instead a reflection of the broad-based seed collection strategy practiced by site inhabitants.

In any agricultural site, the sequence and location of crop processing activities shapes the archaeobotanical assemblage. Heuristic models of pathways to botanical preservation (i.e., formation processes), often based on ethnoarchaeological studies, are required to accurately reconstruct past practices (Fuller and Weber 2005). These models should integrate how and where crops are harvested, threshed, winnowed, stored, ground, cooked, consumed, and discarded, as well as how taphonomic processes affect the distribution and preservation of remains after deposition (Fuller and Weber 2005). Variations in crop processing sequences between sites and time periods preclude simple comparisons of macrobotanical assemblages across time and space. The proportion of agricultural weeds may be much higher at one site than another, but this pattern could result from increased exposure of winnowed botanical materials to fire or the use of dung as fuel rather than co-consumption of arable weeds with agricultural crops.

The process of carbonization also affects the morphology of plant seeds. Seeds with hard testas or fruits with stony endocarps tend to retain their shapes during carbonization, while seeds and fruits lacking hard testas and containing large quantities of starch (e.g., grass caryopses) or oils

(e.g., flax seeds) often exhibit dramatic changes in morphology and appearance after carbonization. Märkle and Rösch (2008) documented significant differences in the environmental requirements (temperature, duration, and oxygen availability) for preservation through carbonization between cereals and oily seeds, showing that oily seeds are much less likely to be preserved than cereals in oxidizing conditions. Thus, interpretation of archaeobotanical assemblages must also take into account the different conditions necessary for preservation. The absence of a taxon in an archaeobotanical assemblage does not necessarily imply that it was not present or in use at a site.

Macrobotanical Remains as Evidence for Cultivation and Domestication

Evidence for early agriculture is drawn from multiple lines of evidence, including the development of novel tilling/harvesting/processing technologies, increased sedentism, changes in isotopic indicators of dietary composition, and many others. However, often the most direct form of evidence for early agriculture has come from the detection of domesticated characteristics in the morphology of plant seeds. Fuller (2007: 904–5) identified six phenotypic traits that comprise the "domestication syndrome" for field crops: elimination of natural seed dispersal, reduction in seed dispersal aids, increasing seed/fruit size, loss of germination inhibition, synchronous tillering and ripening, and more compact growth habits. Of these, the first four can be examined using archaeobotanical remains. One additional characteristic, parthenocarpy (fruit maturity in the absence of seed fertility), may be useful in identifying vegetatively propagated plants.

In addition to morphological attributes of seeds and fruits, characteristics in the composition and structure of archaeobotanical assemblages can also indicate plant cultivation. Examples include botanical remains found outside of their natural ranges, unexpectedly high densities of botanical remains within natural plant ranges, and changes in the maturity of seeds in assemblages.

Elimination of Natural Seed Dispersal/Reduction in Dispersal Aids

In the overwhelming majority of wild cereals, grains are connected to the rachis by a brittle attachment that shatters when the grain is mature. A small proportion of wild cereal plants exhibit nonshattering ears, a genetic mutation in which the attachments between the rachis segments are too strong to naturally dehisce. In these cereals, grains must be separated by threshing, leaving a distinct jagged attachment scar on the rachis or spikelet base (Fuller and Allaby 2009). A large proportion of nonshattering rachis fragments in an archaeobotanical assemblage provides strong evidence for domestication since seed dispersal and germination is dependent on human intervention in these contexts. Domestication also removes selection pressures maintaining plant anatomical structures that aid in seed dispersal (e.g., cereal spikelet hair cells and elongated awns), sometimes reducing or eliminating these structures (Fuller 2007).

Changes in Seed Size and Morphology

The process of domestication often results in enlarged seeds or fruits and sometimes in changes in the overall shape of these. In Near Eastern domesticated cereals, increases in seed size take the form of greater breadth and thickness in caryopses. At the site of Jerf el Ahmar in Syria, Fuller (2007) showed that the maximum breadth and thickness of both barley (*Hordeum vulgare*) and einkorn wheat (*Triticum monococcum*) caryopses increased dramatically between early (c. 11,500–10,800 BP) and late (c. 10,500 BP) occupation levels. Unlike barley and wheat, increase in rice (*Oryza sativa*) caryopsis size in central China took the form of significantly increased *length* and breadth after c. 6000 BP (Fuller 2007). Bruno (2006) argued that seed size is not sufficient to distinguish wild and domesticated forms of quinoa (*Chenopodium* spp.) taxa. Rather, morphological features such as seed coat texture, pericarp patterning, and margin configuration are required to differentiate wild from domesticated forms.

Loss of Germination Inhibition

Many wild plants produce seeds that have physical or chemical characteristics which inhibit immediate germination. Harvesting of crops in a single age cohort tends to select for seeds which germinate as soon as they are planted, reducing the incidence of germination inhibition in plant populations. This characteristic has been used primarily to identify domesticated quinoa taxa, which tend to have thinner testas than wild varieties. Bruno (2006) found that domesticated quinoa have testas 1.25–7.50 μm in thickness, while the testas of wild varieties are 11–55 μm in thickness. However, Bruno cautioned that the potential overlap between testa thicknesses between some wild and domesticated taxa makes this characteristic nondiagnostic on its own.

Parthenocarpy

Some fruit tree taxa occasionally produce parthenocarpic mutants in which fruits mature without fertile seeds. Parthenocarpic fruits can have larger quantities of sugars and carbohydrates than their fertile counterparts, making them more desirable for human consumption. Kislev et al. (2006) recovered nine apparently parthenocarpic fig fruits from the site of Gilgal I in the Jordan Valley, dated to 11,400–11,200 BP. While Kislev et al. (2006) interpreted the remains as early evidence for the horticultural propagation of fig trees, Denham (2007) argued that the parthenocarpic figs represented a small sample of specimens that may have been preferentially harvested from wild stands.

Archaeobotanical Evidence for Plants Outside Natural Ranges

The identification of domesticated or non-domesticated food plants outside of natural plant ranges can be evidence for local cultivation or for trade. Multiple lines of evidence, such as from the development of cultivation-related technologies or increased sedentism, can clarify which explanation is most likely. Weiss et al. (2006) suggested that the presence of morphologically wild lentil (*Lens orientalis*) at the site of Netiv Hagdud in the Jordan Valley around 11,000 BP indicates that soon after initial loss of seed dormancy, lentil quickly spread southward from its genetic origin in northern Syria or southeastern Turkey.

High Densities of Archaeobotanical Remains Within Natural Plant Ranges

In cases where plants used as food occur in the wild only sporadically, large quantities of the taxon on archaeological sites may indicate cultivation. Weiss et al. (2006) argued that this is the explanation for hundreds of morphologically wild lentil remains at the site of Jerf el Ahmar in Syria, dated 11,000 BP. The authors reasoned that wild lentils are unlikely to have been harvested in significant quantities due to their low abundance on the natural landscape and low seed production. They suggested that the lentil remains in the archaeobotanical assemblage represented cultigens that had lost seed dormancy, but had not yet begun to exhibit domestication-related morphological changes.

Changes in Maturity of Crop Seeds

The caryopses of wild grasses often do not mature in synchrony, but rather over a period of days to weeks. Fuller (2007), drawing on expectations of optimal foraging theory and ethnographic data, proposed that early rice harvesters could maximize wild rice (*Oryza* spp.) yields by harvesting several days after the first grains on inflorescences began to mature. At this time, many rice grains would be harvested in an immature state, creating a distinct pattern of high proportions of immature grains in archaeobotanical assemblages. Fuller (2007) argued that this pattern is evident in assemblages of early cultivated rice in central China and proposed that changes in rice morphology toward larger and plumper grains after c. 6000 BP reflect a shift toward harvesting larger proportions of mature grains.

Predomestication Cultivation and Multiple Domestication Origins

A longstanding model of domestication in the Near East proposed that founder crops were domesticated (a) relatively quickly, (b) as a package, and (c) in a single location or "core area" from which they subsequently spread (Fuller et al. 2011). This model has been called into question

through recent research. By tracking changes in the proportion of nonshattering ears and in grain sizes at early agricultural sites in the Near East, Fuller (2007) found that the period of transition from archaeobotanical assemblages comprised of wild wheats (*Triticum* spp.) and barley to those dominated by grains with domesticated characteristics was protracted, lasting up to 2000 years. Cultivation during this period, in which archaeobotanical assemblages contain both morphologically wild cultigens along with arable weeds, is termed "predomestication cultivation" and produces archaeobotanical assemblages with "semidomesticated" characteristics (Fuller 2007). Fuller et al. (2011) compared the archaeobotanical assemblages of early (c. 11,000–9000 BP) cultivation sites across the Fertile Crescent. The authors found that the suite of domesticated Near Eastern founder crops was not present at one or a few early sites in a core area. Rather, they describe domestication as occurring in a mosaic or piecemeal fashion across the region, with particular zones focusing on a limited number of early domesticates. They argue that the putative "core area" of domestication is not the origin of the Near Eastern founder crops, but rather the location of later agricultural integration of crops domesticated in multiple locations.

This pattern of multiple origins of domesticates within a region likely applies to other parts of the world as well. Smith and Yarnell (2009) reviewed evidence for the earliest domesticates in eastern North America. At each of three widely separated sites dated from c. 5000–4500 BP, only a single domesticated crop was present; evidence for an incipient "crop complex" of multiple domesticates at a single site does not appear until c. 3700 BP.

Zhao (2011) reports clear independent centers of domestication for rice and millet in central and northern China, respectively. As in the Near East, archaeobotanical data suggests a protracted period of predomestication cultivation for both crops. Zhao (2011) proposed that rice cultivation may have begun around 10,000 BP, with morphologically domesticated rice first appearing between 9000 and 7800 BP at the Jiahu site in central China. Zhao suggested that rice cultivation played a supplemental role in subsistence practices for an extended period, with full rice agriculture only beginning c. 6500 BP. Alternatively, Fuller (2011) argued that the evidence for domesticated rice at Jiahu was unclear, as archaeobotanical research at the site did not include spikelet base analysis or present clear evidence of morphological changes. Although Fuller (2011) traced the beginnings of cultivation in China to as early as c. 10,000 BP, he proposed that the earliest evidence for morphologically domesticated rice comes from the Baligang site in interior central China, dated to c. 8000 BP.

Although preliminary evidence suggests extended periods of predomestication cultivation in multiple areas of the world, the number of proto-agricultural sites examined archaeobotanically is still relatively low in many regions (with the exception of the Near East). Additional research in the coming years will be needed to clarify this important issue.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Andes: Origins and Development of Agriculture
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Australia and the Origins of Agriculture
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Southern Africa: Origins and Development of Agriculture

References

Bruno, M. 2006. A morphological approach to documenting the domestication of *Chenopodium* in the Andes. In *Documenting domestication: new genetic and archaeological paradigms*, ed. M. Zeder, D. Bradley, E. Emshwiller, and B. Smith, 32–45. Berkeley: University of California Press.

Denham, T. 2007. Early fig domestication, or gathering of wild parthenocarpic figs? *Antiquity* 81: 457–461.

Fuller, D. 2007. Contrasting patterns in crop domestication and domestication rates: Recent archaeobotanical insights from the Old World. *Annals of Botany* 100: 903–924.

Fuller, D. 2011. Pathways to Asian civilizations: tracing the origins and spread of rice and rice cultures. *Rice* 4: 78–92.

Fuller, D., and R. Allaby. 2009. Seed dispersal and crop domestication: shattering, germination and seasonality in evolution under cultivation. *Annual Plant Reviews* 38: 238–295.

Fuller, D., and S. Weber. 2005. Formation processes and paleoethnobotanical interpretation in South Asia. *Journal of Interdisciplinary Studies in History and Archaeology* 2: 93–115.

Fuller, D., G. Willcox, and R. Allaby. 2011. Cultivation and domestication had multiple origins: Arguments against the core area hypothesis for the origins of agriculture in the Near East. *World Archaeology* 43: 628–652.

Grobman, A., D. Bonavia, T. Dillehay, D. Piperno, J. Iriarte, and I. Holst. 2012. Preceramic maize from Paredones and Huaca Prieta, Peru. *Proceedings of the National Academy of Sciences of the United States of America* 109: 1755–1759.

Hillman, G., A. Legge, and P. Rowley-Conwy. 1997. On the charred seeds from Epipaleolithic Abu Hureyra: Food or fuel? *Current Anthropology* 38: 651–655.

Kislev, M., A. Hartmann, and O. Bar-Yosef. 2006. Early domesticated fig in the Jordan Valley. *Science* 312: 1372–1374.

Märkle, T., and M. Rösch. 2008. Experiments on the effects of carbonization on some cultivated plant seeds. *Vegetation History and Archaeobotany* 17 (Suppl 1): S257–S263.

Miller, N. 1996. Seed eaters of the ancient Near East: Human or herbivore? *Current Anthropology* 37: 521–528.

Pearsall, D. 2010. *Paleoethnobotany: A handbook of procedures*. 2nd ed. Walnut Creek: Left Coast Press.

Smith, B., and R. Yarnell. 2009. Initial formation of an indigenous crop complex in eastern North America at 3800 BP. *Proceedings of the National Academy of Sciences of the United States of America* 106: 6561–6566.

Weiss, E., M. Kislev, and A. Hartmann. 2006. Autonomous cultivation before domestication. *Science* 312: 1608–1610.

Zhao, Z. 2011. New archaeobotanic data for the study of the origins of agriculture in China. *Current Anthropology* 52 (Suppl 4): S295–S306.

Further Readings

Piperno, D., and D. Pearsall. 1998. *The origins of agriculture in the lowland Neotropics*. San Diego: Academic Press.

Zeder, M., D. Bradley, E. Emshwiller, and B. Smith, eds. 2006. *Documenting domestication: New genetic and archaeological paradigms*. Berkeley: University of California Press.

Zohary, D., M. Hopf, and E. Weiss. 2012. *Domestication of plants in the Old World*. 4th ed. Oxford: Oxford University Press.

Archaeobotany of Early Agriculture: Microbotanical Analysis

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Introduction

Archaeobotanical research is conducted to gain an understanding of the relationships between ancient human populations and their surrounding botanical biosphere. To reach this goal, archaeobotanical researchers recover plant remains from archaeobotanical contexts, identify the botanical taxa present in the samples, and interpret the data within the cultural framework of the peoples who used the plants for various purposes including food, construction, and crafts such as basketry. Microremains are also used as tools to understand human impact on the surrounding landscape. It is the aim of archaeobotanical research both to gain a complete understanding of ancient plant use and to obtain the most solid, reliable evidence possible.

Perhaps the most common area of research is plant use and economy, a broad field of study that includes basic subsistence categories such as diet and construction materials, as well as more specific topics such as medicines or fish poisons. Because plants were often important economically, their remains can also be used to study migration and trade among human populations as seeds and other propagules moved from hand to hand across the landscape.

Another important archaeobotanical research subject is environmental reconstruction, which typically involves the coring of sediments in wetlands and subsequent analysis of the botanical microremains within. These cores and other samples from living and activity areas can also help us understand human adaptation to the environment including the introduction of plants into a new area, as well as their tending, cultivation, and domestication.

Finally, but no less importantly, archaeobotanical remains can be used to understand ancient human cultural activities including ideology and religion. Examples include plants in symbolic contexts; in art, as incense; and as hallucinogens for spirit journeys.

There are two major categories of archaeobotanical remains that are studied: macroremains, or large fragments of plants or their tissues, and microremains, the subject of this discussion, which are much smaller in size and, therefore, typically require more specialized equipment for both extraction and identification. Most microbotanical remains are of such small size that they must be viewed using instruments that allow for both high magnification and resolution. These instruments include the compound light microscope and the scanning electron microscope. Microremains are also, however, more durable than macroremains in harsh environmental contexts as well as at great depths where the heavy, overlying sediments can crush fragile charred specimens. Thus, microremains can be studied by archaeobotanists working in contexts that did not allow for the preservation and recovery of macroremains.

Key Issues/Current Debates/Future Directions/Examples

Microbotanical analysis is the study of ancient fragments or structures of plant tissues that are not visible to the naked eye, with the aim of understanding interrelationships between human populations and the plant world.

The three most commonly studied categories of microbotanical remains are pollen, phytoliths, and starch grains. All three types of microremains form in the tissues of plants and, just like the larger-scale flowers or fruits, differ in morphology between different groups or even species of plants. They are deposited in archaeological contexts via various methods, and archaeobotanists are able to extract them from sediments or artifacts, concentrate the extracts, and examine the assemblages of microfossils via microscopy. Microfossils can often be identified as being derived from specific plant taxa, and, thus, they are important indicators of plant presence and/or use in an archaeological context.

There are many similarities between the types of microfossils and how they are used by archaeobotanists, but there are also some key differences. This entry presents basic summaries of the three types of microfossils and how their analysis is carried out and then used as an interpretive tool in archaeobotany.

Pollen grains (Fig. 1) are microsporangiate reproductive structures that form in the anthers of flowers. If pollen grains are recovered from archaeological contexts, they can be used as markers to identify the remains of plants in archaeobotanical samples.

The extraction of pollen grains from archaeobotanical samples can also recover other microfossils that are made of very durable materials (Traverse 1988). The exine, or outer envelope of a pollen grain or spore, contains the material sporopollenin, and structures made by protozoa, fungi, or algae can consist of chitin, tectin, or other similar substances (Traverse 1988). These substances are resistant to degradation by the acids that are used by archaeobotanists to extract the microfossils from sediment samples, and, when considered as a group, these types of

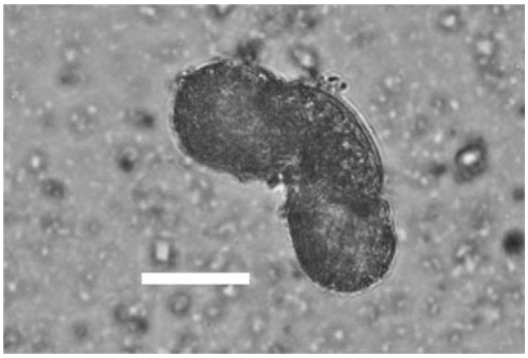

Archaeobotany of Early Agriculture: Microbotanical Analysis, Fig. 1 A pollen grain from *Pinus* sp. showing the distinctive bisaccate form. Archaeologists sample for ancient pollen using methods that eliminate the possibility of contamination from modern pollen rain. This pollen grain was extracted from a starch sample. The *scale bar* is 20 μm in length

microscopic structures that occur in an assemblage are called palynomorphs (Traverse 1988).

The study of palynomorphs is called *palynology*. Archaeologists typically use palynology to provide evidence for three main purposes: environmental reconstruction, understanding human environmental impact, and documentation of the economic use of plants.

Environmental reconstruction involves the documentation of the species and diversity of plants that occur or move in and out of a system over time. Knowledge of the specific environmental requirements of each type of plant, such as rainfall, temperature, or soil conditions, then allows for an understanding of changes and/or stability in the studied environment.

The impact of human activities on the immediate environment is typically documented using specific changes in the plant community as well as other markers that may appear in the samples. Loss of timber species and the appearance of weedy taxa, for example, are good indicators that humans are clearing forest, perhaps for agricultural activities. If the landscape is altered, samples can show an increase in sedimentation rates as soil is exposed, and charcoal fragments indicative of burning activities may also occur.

The economic use of plants can be documented using pollen that may occur in specific contexts. Burials, for example, may include the ritual use of flowers that can then be identified. Identification will lead to a seasonal date of the burial due to the restricted time period in which the flowers bloom each year. Pollen can also be extracted from human coprolites. Typically, if the recovered pollen is from an insect-pollinated plant and is quite abundant, it can be interpreted as ingested. In contrast, pollen from wind-pollinated plants could have entered the system as "rain."

Pollen is identified using a one-on-one comparison with modern palynomorphs, and micromorphological features like shape and size as well as surface details such as pores and decorations are taken into consideration (Traverse 1988). Diagnostic forms occur in many plant groups but not in others (Traverse 1988). A three-dimensional viewing of pollen grains is usually required for identification, and taxonomic identification may be to the family, tribe, genus, or species level depending upon many factors including the types of pollen recovered and the quality of preservation.

When analyzing an assemblage of pollen remains, the archaeologist and paleoecologist must take several factors into consideration when making interpretations (Traverse 1988). First, the type of pollination system that the plant used is determined. Wind-pollinated plants make very large numbers of pollen grains that travel over distances. In contrast, insect-pollinated plants produce relatively few grains of pollen, and these grains will be dispersed only as far as the pollinator takes them. Some plants are pollinated by the movements of water, and these pollen grains tend to be very fragile and decay rapidly after deposition, while pollen grains from self-pollinated plants often germinate prior to the opening of the flower. Each type of pollination system will create a different signature, and, with the exception of wind-pollinated plants, most types of pollen are likely to be "underrepresented" in an assemblage or not represented at all.

Taphonomic processes can also affect a pollen assemblage. Degradation can occur due to the mechanical abrasion of sediment particles on pollen grains, the chemical destruction of the

structure by alkalinity, and biological activity of decomposers like fungi and bacteria can digest pollen grains.

Pollen samples can be collected in different ways that are dependent upon the questions the investigators wish to address. The main goals are to collect samples so that naturally occurring pollen rain can be distinguished from cultural deposits and to minimize modern pollen rain and cross-contamination within the samples.

Samples for pollen analysis, and for microbotanical studies in general, can include stratigraphic sequences, feature sediments, washes from artifacts, cores from lake beds or other sources, and control and/or comparative samples. Modern comparative collections are typically assembled from locally occurring flora. Pollen grains are stored on slides or in vials for the purposes of one-on-one comparisons with archaeological pollen grains.

Phytoliths (Fig. 2) are silica "bodies" that occur within and between plant cells. Plants produce phytoliths using soluble silica that is absorbed from the soil, and they are believed to occur in plant tissues for various reasons including the structural support of the plant, to aid as a detoxifying agent against damage from heavy metals that occur in soils, and for defense against small herbivores such as insects (Piperno 2006). Unlike pollen and starch grains, phytoliths consist of inorganic silica and, thus, are the most resistant to degradation in sediments. The relative stability of a phytolith in a sediment is dependent upon several factors including the comparative fragility of the phytolith in its native state, concentrations of various substances in sediments like iron and aluminum oxides that protect phytoliths, or extremely alkaline conditions that can degrade them (Piperno 2006).

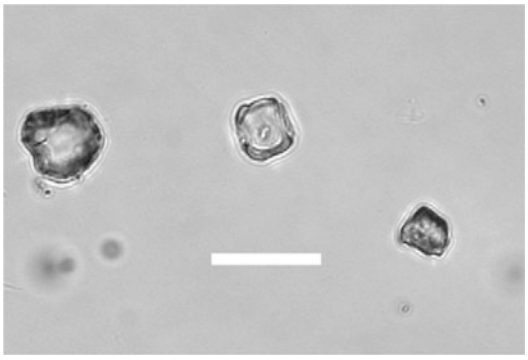

Archaeobotany of Early Agriculture: Microbotanical Analysis, Fig. 2 A saddle phytolith (*center*) typical of those from grasses in the Chloridoideae. The presence of this type of phytolith in an assemblage is an indicator of the occurrence of chloridoid grasses in the sampled context. The scale bar is 20 μm in length

Phytoliths are extracted from sediments by chemical processing followed by a heavy liquid flotation (Piperno 2006). Notably, the processing techniques that are used to free phytoliths from sediment particles destroy pollen grains, and vice versa. Starch grains, in turn, are destroyed during the processing for both pollen and phytoliths. Thus, enough sediment must be collected from each relevant context if all analyses are to be employed. Phytoliths can also be brushed or washed from artifact surfaces. A sonic cleaner or sonic toothbrush can prove indispensable in extracting microfossils from artifacts, even in the field, and assemblages of phytoliths can reveal the function of the artifact in question.

As is the case with pollen, diagnostic phytoliths occur in some plant groups but not in others (Piperno 2006). Some plants produce commonly occurring or less-distinctive morphologies, while other plant groups do not make phytoliths at all. Two general approaches to the study of systematics within phytoliths are commonly employed within the discipline. The botanical approach studies phytoliths in situ, within the modern plant tissues themselves. The morphological approach studies disarticulated phytoliths that have been extracted from plant tissues. The goal of each approach is the same: to determine the typology for a particular plant or group of plants so that the remains can then be identified in the archaeological record.

To successfully identify phytoliths, a one-on-one comparison with modern specimens is used, and the microremains are viewed in three dimensions. The archaeobotanist must understand the local flora, both modern and at the time of interest, and must also have a grasp of which plants in the area may produce similar types of phytoliths. With this approach, the specific characteristics

necessary to separate groups can be determined, and secure identifications can be more reliably made. Like in palynology, the study of phytoliths is employed by archaeobotanists who are interested in studying environmental reconstruction, the impact of humans on their environment, and the economic uses of plants by ancient peoples.

Phytoliths are deposited in archaeological contexts via several mechanisms. Plant tissues can decay in situ, leaving behind the durable silica. Plants can also be burned, and phytoliths can bear the scars of fire with black markings or heat distortion. Digested plant materials, such as coprolites, will also contain intact, indigestible silica phytoliths. Via the careful analysis of context, archaeobotanists can collect phytolith samples from these cultural contexts and use them as tools to reconstruct ancient human activities. Phytoliths are also continuously deposited in non-anthropogenic contexts via the decomposition of plant tissues in "natural" systems.

As with pollen, sampling strategies for phytolith studies are typically dependent upon the research questions of the archaeobotanists. Cultural contexts, both sediments and artifacts, can be sampled, as can "natural" contexts like lake cores. Again, control samples can be key in determining the background "noise" and determining which deposits are culturally derived.

Starch grain (Fig. 3) analysis is the most recently applied method in the analysis of archaeobotanical microremains; however, due to the significance of starch in other fields including botany, food science, and industrial chemistry, it has been very broadly studied, and descriptions of both native and modified starches are common in various literatures (e.g., Reichert 1913 and BeMiller and Whistler 2009). Starch grains are the eventual product of photosynthesis in many plants, and they are formed in amyloplasts within the plant cell. Storage starches in particular are studied by archaeobotanists because they are both used for food and are diagnostic in morphology, while other transient starches that occur in plant tissues are not.

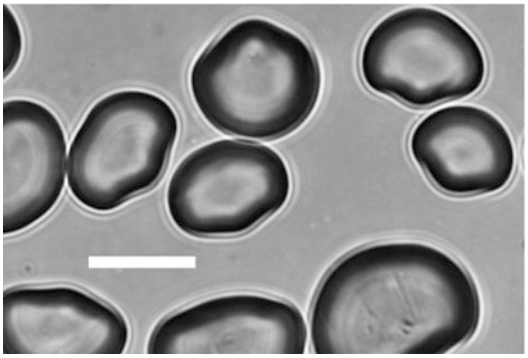

Archaeobotany of Early Agriculture: Microbotanical Analysis, Fig. 3 Starch grains from a modern comparative specimen of *Nothoscordum bivalve*, or "crow poison." Modern specimens are key in identification of ancient microfossils. The *scale bar* is 20 μm in length

Starch analysis has been used to document the origins of agriculture, the domestication of plants, and economic uses of plants. Because starches are much more likely to represent ancient foodstuffs than items such as construction materials and surrounding vegetation, studies of starch grains are typically, though not necessarily, diet focused. Just as is the case with pollen grains and phytoliths, diagnostic starch grains occur in many plant taxa but not in others.

Starch grains are identified very much like pollen grains and phytoliths are, via a one-on-one comparison with modern specimens and a three-dimensional examination of the morphological features of the grain. The archaeobotanist must have a grasp of the local plant communities, both modern and at the time of interest, and must also understand which related taxa in the area may produce similar types of starch grains. With this approach, the specific characteristics necessary to separate groups can be determined, and secure identifications can be more reliably made.

Starch grains can be deposited in archaeological contexts via various processes including the decay of discarded starchy plant tissues and through the processing of plant foods with, for example, cutting or grinding tools or cooking vessels. Thus, as with other microfossils, starch grains can occur both in sediments and on artifacts, and they can be extracted from both contexts. Extraction from sediments involves a chemical deflocculation followed by a heavy liquid flotation, while artifacts can be washed or treated with a sonic cleaner or toothbrush. Starch

analysis can be used in the study of dental calculus (Henry et al. 2011), and starch grains have also been extracted from human coprolites (Vinton et al. 2009). Both of these contexts document the actual ingestion of plant food resources.

The processing of starchy foods in laboratory settings allows archaeobotanists to compare damaged starches to those found in archaeological contexts (e.g., Perry and Quigg 2011). Both mechanical processing and heating, as would be applied in cooking, have been studied and documented archaeologically. These analyses allow for a more detailed understanding of the uses of ancient starchy food plants and a more comprehensive interpretation of ancient food-related activities.

Sampling for starch grains in the field, like in palynology and phytolith analysis, is dependent upon the research questions. Stepwise sampling of artifacts in the laboratory can include a dry brushing of the tool, followed by a wet brushing and a final sonic cleaning. This stepwise analysis can solidify the interpretation that the starch grains are directly associated with the artifact's function (Piperno et al. 2000), although, thus far, there has been no evidence that artifacts can be contaminated by decaying plant tissues in surrounding sediments.

Studies

Pollen studies, combined with phytoliths and particulate charcoal, have documented the sequence of farming practices in the tropical forests of Panama (Piperno et al. 1990) and helped document ancient cultivation of bananas in New Guinea at Kuk Swamp (Denham et al. 2003). Starch grain research has revealed the ancient use of millets in North China (Yang et al. 2012), ancient root crop agriculture in Panama (Piperno et al. 2000), the use of chili peppers throughout the tropics of the Americas (Perry et al. 2007), and the domestication of maize in the Balsas region of Mexico (Piperno et al. 2009). Multiproxy analyses using combinations of microremains are becoming more common. As an example, the integration of both phytoliths and starch grains revealed the early use of maize in highland Peru (Perry et al. 2006).

These are but a few examples of the many studies using microremains as tools for increasing our understanding of ancient agriculture throughout the world. These studies make a larger suite of economically significant ancient plants visible than can be recovered using macrobotanical analysis alone. As more archaeobotanists embrace these methods, ancient relationships between people and plants will be better understood.

Cross-References

- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ Phytolith Studies in Archaeology
- ▶ Phytoliths in Islamic Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology

References

BeMiller, J., and R. Whistler, eds. 2009. *Starch: Chemistry and technology*. 3rd ed. Amsterdam: Academic.

Denham, T., S. Haberle, C. Lentfer, R. Fullagar, J. Field, M. Therin, N. Porch, and B. Winsborough. 2003. Origins of agriculture at Kuk Swamp in the highlands of New Guinea. *Science* 301: 189–193.

Henry, A., A. Brooks, and D. Piperno. 2011. Microfossils in calculus demonstrate consumption of plants and cooked foods in Neanderthal diets (Shanidar II, Iraq; Spy I and II, Belgium). *Proceedings of the National Academy of Sciences USA* 108: 486–491.

Perry, L., and J. Quigg. 2011. Starch remains and stone boiling in the Texas Panhandle Part II: Identifying wildrye (*Elymus* spp.). *Plains Anthropologist* 56: 109–119.

Perry, L., D. Sandweiss, D. Piperno, K. Rademaker, M. Malpass, A. Umire, and P. de la Vera. 2006. Early maize agriculture and interzonal interaction in southern Peru. *Nature* 440: 76–79.

Perry, L., R. Dickau, S. Zarrillo, I. Holst, D. Pearsall, D. Piperno, M. Berman, R. Cooke, K. Rademaker, A. Ranere, J. Raymond, D. Sandweiss, F. Scaramelli, K. Tarble, and J. Zeidler. 2007. Starch fossils and the domestication and dispersal of chili peppers (*Capsicum* spp. L.) in the Americas. *Science* 315: 986–988.

Piperno, D. 2006. *Phytoliths: A comprehensive guide for archaeologists and paleoecologists*. Lanham: AltaMira Press.

Piperno, D., M. Bush, and P. Colinvaux. 1990. Paleoenvironments and human occupation in Late-Glacial Panama. *Quarternary Research* 33: 108–116.
Piperno, D., A. Ranere, I. Holst, and P. Hansell. 2000. Starch grains reveal early root crop horticulture in the Panamanian tropical forest. *Nature* 407: 894–897.
Piperno, D., A. Ranere, I. Holst, J. Iriarte, and R. Dickau. 2009. Starch grain and phytolith evidence for early ninth millennium B.P. maize from the Central Balsas River Valley, Mexico. *Proceedings of the National Academy of Sciences* 106: 5019–5024.
Reichert, E. 1913. *The differentiation and specificity of starches in relation to genera, species, etc.* Washington, DC: Carnegie Institute.
Traverse, A. 1988. *Paleopalynology.* Boston: Unwin Hyman.
Vinton, S., L. Perry, K. Reinhard, C. Santoro, and I. Teixeira-Santos. 2009. Impact of empire expansion on household diet: The Inka in northern Chile's Atacama Desert. *PLoS One* 4 (11): e8069. https://doi.org/10.1371/journal.pone.0008069.
Yang, X., Z. Wan, L. Perry, H. Lu, Q. Wang, C. Zhao, J. Li, F. Xie, J. Yu, T. Cui, T. Wang, M. Li, and Q. Ge. 2012. Early millet use in northern China. *Proceedings of the National Academy of Sciences* 109: 3726–3730.

Archaeological Archives

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Introduction

Archaeologists seek to reconstruct the past through the material record. In doing so, they produce a body of data of their own – the archaeological archive. Without these associated materials that document the fine details of an excavation, the artifacts themselves, however impressive, run the risk of losing much of their intrinsic value as tools for understanding past human experience.

Definition

Archaeologists document an excavation thoroughly, beginning well before the ground is broken with background research and development of a research design. During fieldwork, excavators create detailed maps and drawings, take photographs, and make extensive and detailed field notes. Once the excavation is complete, artifacts and specimens may be conserved and analyzed and the archaeological site interpreted in the form of a final report, scholarly work, or publication. Together, these supporting components make up archaeological archives.

Key Issues/Current Debates/Future Directions/Examples

Archaeology is by its very nature an act of destruction. As cultural features and artifacts are removed from their original physical contexts, embodied information risks being lost without careful attention to documentation at each step of the way. Maintaining this documentation is an ethical obligation for archaeologists and institutions that house archaeological collections and records. Stewardship of archaeological records is a component of the statements of ethics for the Society for American Archaeology, the Society for Historical Archaeology, and other professional organizations (Society for American Archaeology 1996; Society for Historical Archaeology 2003).

Archaeological record curation facilities are as varying as the sites themselves. Some record repositories are unique to one site or area. Others are affiliated with universities or cultural institutions, and yet more are divisions of government agencies. In some instances, collections of artifacts are stored alongside related documentation, and in others, different types of archaeological materials and records are housed in separate facilities determined by medium. Many artifact curation facilities have collection policies that specifically spell out requirements for non-artifact records associated with an archaeological collection in order to ensure that they are housed in a safe manner and that they may be useful tools for future research (Parks Canada 2009).

Good archaeological supporting documentation begins in the field. It is imperative that field notes are written legibly and all paperwork

properly labeled and organized before being sent off to a permanent repository for curation. The variety of media present within archaeological records can create a challenge for long-term preservation and storage. Large-format maps and field drawings, delicate photographs, scribbled and dirty field notes, computerized artifact catalogs, and other materials each require different accommodations and handling to ensure their survival over the decades and centuries. Environmental factors such as temperature, humidity, vulnerability to insects and other pest, and threats of damage by flood, fire, or intentional human effects like theft and destruction must all be considered when developing strategies and policies for managing collections of archaeological records.

The loss of provenience data is another major risk for archaeological archives (as well as recovered artifacts and specimens). Great care should be taken to clearly mark each document with appropriate reference numbers and dates in case individual pieces of documentation become separated from a larger collection. An important photograph of an archaeological feature or excavation unit may appear unremarkable and indistinguishable from any other when viewed out of context. Field records written on or with archivally unstable materials (Kraft paper bags, napkins, water-soluble ink, etc.) may be photocopied onto acid-free archival paper to ensure long-term survival. Photographs should be printed to archival standards in order to ensure that the chemistry is stable over time.

Many record curation facilities employ the use of relational databases to serve as an index to these diverse materials, often organized by site and/or provenance. This level of organization is key to maintaining the usability of all the collected information. A fundamental value of archaeological archives lies in their ability to make existing collections valuable tools for current research. When supporting documents become lost or damaged, the research value of the collection as a whole is greatly diminished. In order for archaeological collections to be a vital source of data for scholarly research, the associated records must be diligently maintained. A well-documented excavation and collection can produce data repeatedly, data that can be analyzed in a myriad of ways beyond what may have been envisioned by the original researcher without any additional destruction to the archaeological site (Nelson and Shears 1996).

The digitization of archaeological archives has had a major impact on data from a global perspective. As more and more countries move into the digital era, it is becoming possible to easily relate data between sites located across the globe. With an eye on interoperability of archaeological records and databases, researchers have developed projects like the Archaeological Records of Europe – Networked Access (ADS 2012), the Digital Archaeological Record (Digital Antiquity 2012), and the Digital Archaeological Archive of Comparative Slavery (Thomas Jefferson Foundation 2012). Although standards for data collection may vary from site to site depending on the excavator, government requirements, site type, and other factors, modern relational databases allow for information to be parsed in a way that enables broader inter-site analysis.

The nature of archaeological archives has changed at an astonishing rate over past decades with the increased ubiquity of digital data for information capture and storage. Instead of 35-mm film, many archaeologists only take digital photographs. Site mapping may be done entirely in Geographic Information System (GIS) or Computer-Aided Design (CAD) software, using GPS coordinates obtained from sophisticated units in the field (or even mobile phones). Artifact catalogs may be part of large databases, and final reports may exist in the form of interactive websites or as a single digital file. While these technologies introduce endless new opportunities for ways to process and disseminate archaeological data, they also prove to be a challenge for managers of archaeological archives. Technology is not always sustainable. If a digital record is created using a technology that becomes obsolete, the data may be lost forever.

Sophisticated analytical methods such as geospatial modeling and 3-D scanning may produce large volumes of digital data. Many contemporary facilities holding digital materials as part of archaeological archives are currently struggling with ways to manage an ever-increasing volume

of bits and bytes while keeping the data accessible. A disorganized box of paper site records is just as difficult to use as digital data that is not well maintained and indexed. Without a way to connect the information to the excavation and artifacts, knowledge is lost.

Because of the fragile and irreplaceable nature of many archaeological sites, access to information held as part of archaeological archives is often restricted to professional archaeologists and other approved researchers. In the United States, the Archaeological Resources Protection Act of 1979 allows government agencies to withhold any information from public access that may make the site vulnerable to looting or destruction. Great care should be taken to protect the physical location of archaeological sites while still allowing for an open flow of information.

Cross-References

- ▶ Archaeological Record
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation
- ▶ Paper: Preservation and Conservation
- ▶ Recording in Archaeology

References

ADS. 2012. Archaeological records of Europe – networked access. Available at: http://ads.ahds.ac.uk/arena/index.html. Accessed 10 Aug 2012.

Childs, S.T., and E. Corcoran. 2000. Managing archeological collections: Technical assistance. Available at: http://www.cr.nps.gov/archeology/collections/. Accessed 3 Aug 2012.

Digital Antiquity. 2012. tDAR: About. Available at: http://www.tdar.org/about/. Accessed 1 Sept 2012.

Nelson, M.C., and B. Shears. 1996. From the field to the files: Curation and the future of academic archaeology. *Common Ground* 1: 35–37.

Parks Canada. 2009. Parks Canada archaeological recording manual: Excavations and surveys. Available at: http://www.pc.gc.ca/docs/pc/guide/fp-es/8.aspx. Accessed 10 Aug 2012.

Society For American Archaeology. 1996. Principles of archaeological ethics. Available at: http://www.saa.org/AbouttheSociety/PrinciplesofArchaeologicalEthics/tabid/203/Default.aspx. Accessed 3 Aug 2012.

Society For Historical Archaeology. 2003. Statement of ethics. Available at: http://www.sha.org/about/ethics.cfm. Accessed 3 Aug 2012.

Thomas Jefferson Foundation. 2012. DAACS: Digital archaeological archive of comparative slavery. Available at: http://www.daacs.org/. Accessed 10 Aug 2012.

Archaeological Chemistry: Definition

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Brief Definition of the Topic

Archaeological chemistry, a subfield of archaeometry, is the application of techniques and approaches from chemistry and the chemical sciences to the analysis of the material record of past societies. Research in this field of study examines a wide range of human behaviors and formation processes including dating, provenance, technology, organic and inorganic residues, diet, migration, and human-environment interactions, among other topics. Early approaches are reviewed by Caley (1948, 1951, 1967) and more recently by Pollard and Heron (2008), who describe the most common applications today: obsidian characterization, clay and ceramic provenance, chemistry of archaeological glass and metals, composition of resinous substances, amino acid stereochemistry, lead isotope geochemistry, human bone (diet, nutrition, health, mobility), and biomolecules (e.g., DNA, dairy products). A number of important textbooks have emerged recently, including those by Pollard et al. (2007) and by Price and Burton (2012). These and related works, including a series of eight volumes from the American Chemical Society (from 1974 to 2013), emphasize the use of physicochemical instrumentation in solving archaeological problems, including (but not limited to) optical emission spectroscopy, atomic

absorption spectrometry, inductively coupled plasma emission spectrometry, mass spectroscopy, X-ray fluorescence spectrometry, analytical electron microscopy, proton-induced X-ray emission spectroscopy, neutron activation analysis, infrared and Raman spectroscopy, and various chromatographic techniques.

Cross-References

- ▶ Archaeometry: Definition
- ▶ Biomolecular Archaeology: Definition
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone: Chemical Analysis
- ▶ Isotope Geochemistry in Archaeology
- ▶ Laboratory for Archaeological Chemistry (University of Wisconsin)

References

Caley, E.R. 1948. On the application of chemistry to archaeology. *The Ohio Journal of Science* 48: 1–14.

Caley, E.R. 1951. Early history and literature of archaeological chemistry. *Journal of Chemical Education* 28: 64–66.

Caley, E.R. 1967. The early history of chemistry in the service of archaeology. *Journal of Chemical Education* 44: 120–123.

Pollard, A.M., C.M. Batt, B. Stern, and S.M.M. Young. 2007. *Analytical chemistry in archaeology*. Cambridge: Cambridge University Press.

Pollard, A.M., and C. Heron. 2008. *Archaeological chemistry*. 2nd ed. Cambridge: The Royal Society of Chemistry.

Price, T.D., and J.H. Burton. 2012. *An introduction to archaeological chemistry*. New York: Springer.

Further Reading

Allen, R.O., ed. 1988. *Archaeological chemistry IV*, Advances in chemistry series no. 220. Washington, DC: American Chemical Society.

Armitage, R.A., and J.H. Burton, eds. 2013. *Archaeological chemistry VIII*, ACS symposium series no. 1147. Washington, DC: American Chemical Society.

Beck, C.W., ed. 1974. *Archaeological chemistry*, Advances in chemistry series no. 138. Washington, DC: American Chemical Society.

Carter, G.F., ed. 1978. *Archaeological chemistry II*, Advances in chemistry series no. 171. Washington, DC: American Chemical Society.

Glascock, M.D., R.J. Speakman, and R.S. Popelka-Filcoff, eds. 2007. *Archaelogical chemistry: Analytical techniques and archaeological interpretation*, ACS symposium series no. 968. Washington, DC: American Chemical Society.

Goffer, Z. 2007. *Archaeological chemistry*. 2nd ed. New York: Wiley-Interscience.

Jakes, K.A., ed. 2002. *Archaeological chemistry: Materials, methods and meaning*, ACS symposium series no. 831. Washington, DC: American Chemical Society.

Lambert, J.B., ed. 1984. *Archaeological chemistry III*, Advances in chemistry series no. 205. Washington, DC: American Chemical Society.

Lambert, J.B. 1997. *Traces of the past: Unraveling the secrets of archaeology through chemistry*. Reading: Addison-Wesley.

Orna, M.V., ed. 1996. *Archaeological chemistry: Organic, inorganic and biochemical analysis*, ACS symposium series no. 625. Washington, DC: American Chemical Society.

Archaeological Fieldwork

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Introduction

Archaeologists are guided in their fieldwork through a variety of instruments that collectively may be called codes of ethics. Such instruments are variously known as codes, principles, standards, statements, and guidelines.

These codes of ethics are often comprehensive, establishing guidance in all matters pertaining to archaeology, including but not restricted to fieldwork.

Many associations of archaeologists have such instruments, including the World Archaeology Congress, the European Association of Archaeologists, the Chartered Institute of Field Archaeologists, the Register of Professional Archaeologists, the Society for American Archaeology, and the Canadian Archaeological Association. Many other associations at national, regional, and local levels also have codes of ethics, as do subdisciplines of archaeology, such as the Society for Historical Archaeology.

Definition

All matters of archaeological fieldwork have ethical implications. This includes determining whether archaeological fieldwork should be undertaken, the methods of fieldwork employed, who should be able to do fieldwork, and how members of fieldwork projects should behave in both social and professional contexts at field locations.

In most situations, governments regulate the parameters in which archaeological fieldwork may be done, but it is codes of ethics that guide archaeologists working within those parameters, of how archaeology should be done.

Key Issues/Current Debates/Future Directions/Examples

Key issues and debates about ethics in archaeological fieldwork revolve around professional responsibility, archaeological privilege, and the culture of fieldwork.

It is a basic archaeological ethic to do good fieldwork, which is often embedded in the mindset of archaeologists through education and experience and codified in statements by archaeological associations. Codes of ethics are generally silent or vague on precisely what constitutes good fieldwork although it may generally be considered to include having a good research design, keeping accurate records, using appropriate methods, and, after excavations, leaving the site as close to its pre-excavation state as possible.

Although the precise meaning of doing good fieldwork is broad and vague, there are some emerging trends. This includes using noninvasive or nondestructive field methods where feasible. Rather than excavating, for example, this may mean using remote sensing techniques to collect data on subsurface deposits. Another trend which some see as an ethic related to good fieldwork is to do more of what may be called sustainable archaeology, reducing the ecological footprint of archaeological field projects. This includes more digital recording.

Archaeological fieldwork associated with human skeletal remains is a topic of considerable ethical concern and debate. Some archaeologists view the excavation and analysis of human skeletal remains for science as trumping the concerns of others, including those with cultural and/or biological affiliation to those being excavated. Many archaeologists, however, believe that the potential contributions to science do not outweigh the wishes of peoples with affiliations to the skeletal remains.

The ethics of working with the skeletal remains of Indigenous peoples has become an important part of the relationship between archaeologists and Indigenous communities in recent decades. As outlined by Allen and Phillips (2010), the World Archaeology Congress has been instrumental in advancing the rights and concerns of Indigenous peoples. Indigenous peoples generally prefer that ancestral remains are not excavated or otherwise disturbed, and when they are, then the remains should be turned over or repatriated to the group for reburial or another form of disposition such as cremation. Some codes of ethics explicitly prioritize the wishes of Indigenous groups in archaeological fieldwork.

Another issue concerns whether it is appropriate to do fieldwork at all. Fieldwork has long been a key component of archaeology, with archaeologists often preferring to collect their own data, whether searching for sites or excavating them. Doing fieldwork is often considered a rite of passage in archaeology, and designing and implementing a field project is often desired at the graduate level of studies for those pursuing advanced degrees to pursue archaeology as a career. This need or desire to do fieldwork is now being questioned by some archaeologists, especially those excavations undertaken for pure research or academic purposes, who believe that in many cases it would be more prudent to use existing collections of materials rather than undertaken new excavations and by so doing destroy part of the archaeological record.

Some archaeologists also suggest that recording previously undocumented sites and excavating sites in advance of development projects serves the interests of developers and government

rather than Indigenous peoples. In effect this practice may be seen to legitimize the destruction of the archaeological record, which is at odds with the ethic of stewardship. Hutchings and La Salle (2017: 72, 73), for example, suggest that CRM archaeology "has been largely ineffective at protecting heritage sites" and that "CRM can be seen as facilitating development by clearing heritage from the landscape."

Archaeological privilege is an issue that receives considerable debate, mostly concerning who are the rightful stewards of archaeological record. This includes such things as who controls access to field locations and issues permits to conduct archaeological excavations. A common theme in codes of ethics is that archaeologists should be stewards of the past, meaning that they should work toward preserving and protecting the archaeological record. This becomes an issue when other stakeholders in the archaeological record, such as Indigenous peoples whose ancestors created the archaeological record, view themselves as the stewards of their own heritage. In some regions of North America, for example, it is common for Indigenous groups to have their own permitting system, meaning in addition to receiving permits for fieldwork from government, archaeologists may be in a dilemma when Indigenous groups will not issue a permit or give permission in other ways. Doing fieldwork in some areas where there are overlapping claims of traditional territory may mean that archaeologists are faced with prioritizing the wishes of one Indigenous group over another.

Gaining permission from Indigenous groups to undertake fieldwork in their territory may be particularly difficult when archaeologists wish to do fieldwork on behalf of developers and governments to which the Indigenous group is opposed.

This dilemma is created, in part, by some codes that include responsibilities to both Indigenous groups and funding agencies without establishing priority.

Many codes of ethics indicate that fieldwork should only be undertaken by qualified archaeologists, with proper levels of training, education, and resources. Where this ethic becomes most contentious is when it comes to subsistence looting, defined by Hollowell (2006: 72) as "where people dig to find archaeological goods to sell and use the proceeds to support a subsistence lifestyle." Subsistence looting often occurs when traditional subsistence and economic systems have been irreparably harmed by natural or cultural forces, including conflict and invasions. This kind of subsistence looting has been widespread in the early twenty-first century in Afghanistan, Iraq, and Syria, for example, where local people subjected to years of conflict have looted archaeological sites in order to survive. It is not restricted to these areas or circumstances, however, with notable occurrences of subsistence looting being common in other regions and, in some cases, as part of the regular economic practices of local people.

While some archaeologists see all forms of looting, including subsistence looting, as wrong, others think subsistence looting is an exception. Those who see subsistence looting as wrong tend to privilege archaeology, following notions that archaeologists are the stewards of the past and that only qualified people should undertake fieldwork. Those who do not agree tend to privilege people over things, recognizing that when other subsistence and economic systems fail, many people are left with little choice but to loot sites. Some archaeologists also think looting of sites by local Indigenous people with cultural and biological affiliations to the sites being looted is acceptable. In this case, they may be following an ethic prioritizing Indigenous peoples' rights to their own heritage.

Archaeologists also may find themselves in an ethical dilemma when working with treasure hunters. Beaudry (2009), for example, notes dilemmas may occur when archaeologists are hired to work with commercial treasure hunters. Some associations deem such work unethical. For many, working with commercial treasure hunters goes against an ethic of not becoming involved in the commercialization of artifacts.

Providing safe working environments is another common ethic in field archaeology. Archaeologists are tasked with providing safe work environments and taking appropriate

measures to reduce risk, including a wide range of situations ranging from using appropriate stabilizing equipment or shoring of walls during excavation to reducing the danger of encounters with wild animals. Providing a safe working environment also includes providing an environment free from harassment and abuse. Despite this basic ethic, sexual harassment and abuse in field locations have been well-documented in recent years (e.g., Clancy et al. 2014; Meyers et al. 2015), and some associations are modifying their codes to address this.

Statements of ethical concerns, whether framed as codes, statements, principles, or guidelines, are now common among archaeological associations. They can usually be found on the websites of the associations.

Cross-References

- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Ethics of the Archaeological Record
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Human Remains: Ethical Issues and Historical Perspectives
- ▶ Recording in Archaeology
- ▶ Vandalism and Looting (Ethics)

References

Allen, Harry, and Caroline Phillips. 2010. Maintaining the dialogue: Archaeology, cultural heritage and indigenous communities. In *Bridging the divide: Indigenous communities and archaeology into the 21st century*, ed. Caroline Phillips and Harry Allen, 17–48. Walnut Creek: Left Coast Press.

Beaudry, Mary C. 2009. Ethical issues in historical archaeology. In *International handbook of historical archaeology*, ed. Teresa Majewski and David Gaimser, 17–29. New York: Springer.

Clancy, Kathryn B.H., Robing Nelson, Julienne N. Rutherford, and Katie Hinde. 2014. Survey of academic field experiences (SAFE): Trainees report harassment and assault. *PLoS One* 9 (7): e102172.

Hollowell, Julie. 2006. Moral arguments on subsistence digging. In *The ethics of archaeology: Philosophical perspectives on the practice of archaeology*, ed. Christopher Scarre and Geoffrey Scarre, 69–93. Cambridge: Cambridge University Press.

Hutchings, Richard M., and Marina La Salle. 2017. Archaeology as state heritage crime. *Archaeologies: Journal of the World Archaeology Congress* 13 (1): 66–87.

Meyers, Maureen, Tony Boudreax, Stephen Carmody, Victoria Dekle, Elizabeth Horton, and Alice Wright. 2015. Preliminary results of the SEAC sexual harassment survey. *Horizon and Tradition* 57: 19–33.

Further Reading

Scarre, Christopher, and Geoffrey Scarre, eds. 2006. *The ethics of archaeology: Philosophical perspectives in archaeological practice*. Cambridge: Cambridge University Press.

Vitelli, Karen D., and Chip Colwell-Chanthaphunh. 2006. *Archaeological ethics*. 2nd ed. Lanham, MD: Altamira.

Zimmerman, Larry J., Karen D. Vitelli, and Julie Hollowell-Zimmer, eds. 2003. *Ethical issues in archaeology*. Lanham: AltaMira Press.

Archaeological Informatics

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Brief Definition of the Topic

Archaeological Informatics is the practice of analyzing, managing, and preserving archaeological information. This can include information relating to tangible and intangible heritage, and the term generally adheres to both information and data, created or held in digital formats. Such data might be held in databases, geographical information systems, as digital documents (such as text, spreadsheets, images, audio, video), as well as more complex digital objects such as CAD, remote sensing formats, and 3D datasets. It also refers to both the dissemination and the collection of information via digital media, such as the World Wide Web.

Just as digital technology has had an incalculable impact on multiple spheres of human

experience, Archaeological Informatics has revolutionized archaeological practice in a number of ways, most noticeably in the near universal use of databases to store, manipulate, analyze, and ultimately disseminate archaeological information. It has also challenged traditional models of paper-based archaeological publication, particularly through broadening access to underlying datasets and to other traditionally unpublished material, such as gray literature, via the Internet. It is also true that Archaeological Informatics does not fundamentally remedy issues of representation, partiality, categorization, and interpretation that are inherent in the data themselves irrespective of the media in which they are held. The potency of digital media itself, particularly in terms of its association with modernity, precision, accuracy, and scientific approaches, may even add additional complexity to the task of critically assessing data for interpretative purposes. This is especially true where data are being consumed by nonexpert audiences where, for example, data presented as a three-dimensional model might appear inherently more trustworthy than the same data presented as a hand-drawn image.

Breaking down barriers between isolated archaeological datasets remains a constant challenge in Archaeological Informatics because the adoption of archaeological information systems and digital recording techniques has generally taken place in advance of formats and systems that allow sharing of the data out with the project or organization in which it was created. Recent developments have begun with regard to data standards, that is, shared categories, definitions, and data schema, which facilitate meaningful comparison between cultural heritage records and the aggregation of these records nationally and internationally. This will have a significant impact on both how the heritage is curated and how it is presented to the public. The most obvious benefit to curation has been that digital sources, such as national and local monument inventories and digital repositories containing significant resources, need no longer be hermetic entities relating to a specific geographical period or subject boundaries but can make their content available as part of a larger aggregated dataset. Thus, researchers and cultural heritage managers are much more likely to be able to retrieve data on their area of interest from a single point of access without being constrained by arbitrary, technical, political, or regional boundaries.

Two important points which arise with regard to data standards are, firstly, they should be reactive to how data is gathered rather than proscriptive and the role of arbitrary classification should be balanced against the creative process of interpretation. Secondly, the level of their adoption is far from universal even in countries where such standards exist, recasting legacy datasets as compliant to data standards can be time-consuming and costly even using data-mining and natural language processing techniques. As well as local or national standards, the CIDOC Conceptual Reference Model provides an international standard with definitions and formal structures for describing the implicit and explicit concepts and relationships used in cultural heritage documentation. A number of countries also have national and or regional policies explicitly intended to create cultural heritage data infrastructures and/or aggregation services for cultural heritage resources or participate in projects with this aim, such as the NSF "Cyberinfrastructure" program in the USA, the EU-funded Europeana project, and the multi-European-government-funded Digital Research Infrastructure for the Arts and Humanities (DARIAH).

At the same time as standards development extends the interconnectedness and utility of archaeological datasets, a broader shift in Internet technology toward the "Semantic Web" has prompted a change in the publication of datasets online to linked data format (i.e., expressed as a series of dereferencable URIs linked together in subject-predicate-object triples). This acts to extend the linkages between archaeological and cultural heritage datasets to any other appropriate dataset, or data point expressed as linked data. In some countries, the driver for the adoption of this approach to structuring data is being explicitly driven by government policy (e.g., the UK data.gov.uk program). The impact that this change will

have over time in widening access to cultural heritage information and embedding it in a broader "semantic Web" could potentially be on a scale of significance similar to that of the original World Wide Web.

A further significant focus for Archaeological Informatics is the representation of uncertainty. This is still considered a challenge more generally in informatics, but has particular implications for systems holding cultural heritage information. Many aspects of cultural heritage defy precise definition, geographically, temporally, and culturally, and even where the subject matter is amenable to some form of precise definition, there is often a lack of certainty due to incomplete evidence or competing interpretations. For example, for in-building or development control purposes, precise boundaries for archaeology may be desirable, but some indication or representation of the "fuzzy" or contested nature of the data from which the boundary is derived is necessary to make the boundary actually meaningful when making decisions.

Perhaps the most significant issue facing archaeological informatics is the growing realization that digital data is extremely prone to corruption, loss, and software and hardware obsolescence. This is a particularly important point as virtually all archaeological data, from primary data to synthetic analysis, is now "born-digital," that is, it is originally created in digital form whether that be a simple word processing document or a three-dimensional laser scan. Much of this data, if lost, cannot be recreated. The need for all sectors of archaeology to have access to reliable and (preferably publically) accessible repositories with expertise in digital preservation and cultural heritage content remains a key concern in Archaeological Informatics. There are still few organizations able to offer viable preservation and access services specifically focused on the cultural heritage domain although good examples are the Archaeology Data Service in the UK (ADS), Data Archiving and Networked Services (DANS) in the Netherlands, and Digital Antiquity's data archive (tDAR) in the USA.

In tandem with the challenges relating to digital preservation, there has been a rapid expansion of opportunities for public dissemination and engagement provided by new media, particularly Web-based technologies such as social networking, public participatory GIS, (PPGIS), and other forms of user-generated content. These have to a certain extent blurred traditional boundaries between "expert" and "mediated" material and content, including interpretation, memories, opinions, and records of the cultural heritage generated by the broader community. This process can raise challenges for cultural heritage managers, such as understanding conflicting or contradictory viewpoints, as well as significant opportunities such as expanding the knowledge base and tapping into the many alternative perceptions of what actually constitutes the heritage.

Cross-References

- ▶ Archaeology Data Service (ADS)
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Heritage: History and Context
- ▶ Intangible Cultural Heritage

Further Reading

Archaeology Data Service/Digital Antiquity, Guides to good practice. Available at: http://guides.archaeologydataservice.ac.uk/.

Chambers, R. 2006. Participatory mapping and geographic information systems: Whose map? Who is empowered and who disempowered? Who gains and who loses? *The Electronic Journal on Information Systems in Developing Countries* 25: 1–11 Available at: http://www.ejisdc.org/ojs/include/getdoc.php?id=247&article=264&mode=pdf.

Doerr, M. 2003. The CIDOC conceptual reference module: An ontological approach to semantic interoperability of metadata. *AI Magazine* 2493: 75–92.

Huggett, J., and S. Ross, eds. Archaeological informatics – Beyond technology. *Internet Archaeology* 15. Available at: http://intarch.ac.uk/journal/issue15/.

Jeffrey, S., J. Richards, F. Ciravegna, S. Waller, S. Chapman, and Z. Zhang. 2009. The Archaeotools

Project: Faceted classification and natural language processing in an archaeological context. *Philosophical Transactions of the Royal Society of London A* 367: 2507–2519. https://doi.org/10.1098/rsta.2009.0038.

Lock, G., and K. Brown, eds. 2000. *On the theory and practice of archaeological computing*, Oxford University Committee for Archaeology monograph, vol. 51. Oxford: Oxbow.

Martinez, K., and L. Isaksen. 2010. The semantic web approach to increasing access to cultural heritage. In *Re-visualising visual culture*, AHRC ICT methods network, ed. H. Gardner and C. Bailey, 29–44. London: Ashgate.

Richards, J.D., and C. Hardman. 2008. Stepping back from the trench edge: An archaeological perspective on the development of standards for recording and publication. In *The virtual representation of the past*, ed. M. Greengrass and L. Hughes, AHRC ICT methods network, 101–112. London: Ashgate.

Winters, J. (ed.) 1999. Digital publication theme. Internet Archaeology 6. Available at: http://intarch.ac.uk/journal/issue6/.

Wise, A.L., and J.D. Richards. 1999. Digital preservation in archaeology. In *Archaeology in the age of the internet: CAA 97 computer applications and quantitative methods in archaeology*, British archaeological reports international series, vol. 750, ed. L. Dingwall, S. Exon, V. Gaffney, S. Laflin, and M. Van Leusen, 137–142. Oxford: Tempus Reparatum.

Archaeological Institute of America (AIA)

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Basic Information

The Archaeological Institute of America (AIA), located at 44 Beacon Street, Boston, Massachusetts, 02108 USA, http://www.archaeological.org, is the oldest learned society in North America devoted to archaeology. It is also the largest with over 200,000 members. The AIA was founded in Boston in 1879 under the leadership of Charles Eliot Norton of Harvard University (Sheftel 1979: 3). It has a unique structure based on local societies, now numbering over 100 across the United States, Canada, and overseas. The AIA counts among its members professional archaeologists, most of whom work in the Old World, and members of the general public with a deep interest in archaeology. The coexistence of these two groups has shaped the AIA throughout its history and continues to be a fundamental element of its character.

The AIA promotes archaeological research and disseminates its findings, notably in a scholarly journal, the American Journal of Archaeology; in a popular magazine, Archaeology; and in professional monographs. Endowments enable the AIA to fund grants for field surveys, excavations, and laboratory research. The Institute holds an annual meeting at which archaeologists present their latest results to colleagues and interested members. Through its local societies the AIA supports a nationwide program of public lectures and other programs designed to inform the wider public about archaeology and significant recent discoveries. It has also developed educational programs for children. In recent years the AIA has initiated a program to preserve prominent archaeological sites worldwide and to promote best practices in site conservation. News about archaeology and the activities of the Institute is communicated to members and the public through a newsletter and, increasingly, the worldwide web. The AIA provides a fellowship program for its younger academic members and also funds students who wish to gain some experience of fieldwork. Several awards recognize archaeologists and others who have made outstanding contributions to the field and to heritage preservation. The most significant of these is the Gold Medal for Distinguished Archaeological Achievement. This has been given to such distinguished archaeologists as George Bass, Robert Braidwood, Hetty Goldman, and Gordon Willey. Additional awards honor scientific contributions, books of special note, and excellence in undergraduate teaching.

The AIA has long campaigned to end the international traffic in antiquities, arguing that this destroys our shared heritage from the past. Recently, the Institute has spoken out against the large-scale destruction of archaeological and historic sites in the Middle East and elsewhere. It has joined with other organizations to support efforts to mitigate such damage.

In the beginning the members of the Institute were mostly Harvard faculty and leading figures in the Boston business and social communities. Within a decade of its founding the AIA could claim to be national in scope as local societies were founded in New York, Baltimore, and across the Midwest (Allen 2002: 12). Early in the twentieth century the number of societies grew still farther across the western states, including California. In 1906, the United States Congress approved a Charter for the AIA (Sheftel 1979: 14), an indication of the organization's growing national prominence. That document set out a mission for the Institute that continues to inspire its activities today. The Charter states that the AIA was founded

> . . . for the purpose of promoting archaeological studies by investigation and research in the United States and foreign countries by sending out expeditions . . ., by aiding the efforts of the independent explorers, by publication of archaeological papers, and reports of the results of the expeditions which the Institute may undertake or promote . . .

In its early years the AIA sponsored excavations at the Pecos Pueblos in New Mexico, at Assos in Turkey, in Crete, at Cyrene in Libya, and also in Guatemala, Mexico, and at Nippur in Iraq. The Institute considerably expanded its reach through the establishment of schools of archaeology around the Mediterranean and in the Southwestern United States (Sheftel 1979). Among the most prominent were the American School of Classical Studies at Athens, the American School of Classical Studies in Rome (now the American Academy in Rome – School of Classical Studies), the American School for Oriental Study and Research in Jerusalem (now the American Schools of Oriental Research), and the School of American Archaeology in Santa Fe, New Mexico (now the School for Advanced Research on the Human Experience). Later, schools of archaeology in Baghdad, Cairo, and Tehran were added to this list.

From the beginning the Institute developed a special interest in the archaeology of the ancient civilizations of Greece and Rome, together with the high cultures of the ancient Near East. This continues to be the focus of many of its professional members today and is reflected in the contents of theAmerican Journal of Archaeology. Thus, for some of its members, the archaeology of the lands surrounding the Mediterranean has been of primary importance (Renfrew 1980). Others associated with the Institute, however, have had more diverse interests within archaeology, extending widely across the Old World and into the New World as well. Indeed, this dichotomy has been part of the Institute's character from its founding as its early exploration of sites in the Southwestern United States demonstrates. Currently, that wider array of interests finds expression in the pages of the magazineArchaeologyand in the lecture program, both of which embrace the exploration of the entire human past across the globe. Through these means, and also in the site preservation program, another global initiative, the Institute has a global reach.

Major Impact

Today the Archaeological Institute of America can claim to be the leading organization devoted to international archaeology in North America. It continues to provide significant support for professional archaeologists and their research while expanding its outreach to members of the public, including children. The AIA has become a leader in the worldwide heritage preservation movement. Its role as an advocate for the safeguarding of the record of the human past has become one of its defining characteristics. The AIA's rich array of activities is captured concisely in its motto "Excavate, educate, advocate."

References

Allen, S.H. 2002. The archaeology of the AIA: An introduction. In *Excavating our past*, ed. S.H. Allen, 1–28. Boston: Archaeological Institute of America.

Renfrew, C. 1980. The great tradition versus the great divide: Archaeology as anthropology? *American Journal of Archaeology* 84: 287–298.

Sheftel, P.S. 1979. The archaeological institute of America, 1879–1979: A centennial review. *American Journal of Archaeology* 83: 3–17.

Archaeological Licenses

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Introduction

The licensing of archaeologists is one part of a system of quality control of archaeological heritage management (AHM), sometimes known as archaeological resource management (ARM), cultural resource management (CRM), contract archaeology, rescue archaeology, and preventive archaeology. The other two parts of quality control are: oversight of an ongoing project by the appropriate government agencies; and review and approval of the final product or report by the proper authorities. Licensing often involves requiring registration of qualified archaeologists at the national or provincial or even local level, and it can also involve review of a candidate's qualifications on a project-by-project basis. Such a review can include personal interviews and submission of prior work upon which to base a certification of the archaeologist's ability to complete a project in an acceptable manner.

Definition

While quality control in archaeology has always been an issue, it did not really come to the forefront of consideration until in the mid-twentieth century; archaeology moved out of the academy and government and into the private or contracting sector. Prior to that time, only archaeologists knew or cared enough about the quality of archaeology to make it an issue, and the quality of archaeologists and the work they did was thus generally controlled by peer pressure and academic ethics and organizations. As the public and non-archaeologists became more involved in archaeology through taxpayer and polluter-paid funding and by projects that were of more immediate local public concern, there arose a need for non-archaeologists to judge the qualifications of archaeologists, about which the average citizen, politician, and government bureaucrat knew virtually nothing.

Taxpayers and clients hiring archaeologists needed to know that their money was being spent in the most efficient and effective manner possible to protect the public's common archaeological heritage and to get approval and permits for development projects. The inherent conflict of interest involved in academic archaeologists or government agencies accrediting their own work also argues for the application of some kind of independent certification or licensing of such archaeologists so to protect the public's interests when public funding is involved. Despite this, however, licensing is generally only accepted by, and applied to, private-sector or contract archaeologists.

Qualifying archaeologists prior to commencement of a project, or in other words licensing, can be thought of as a "front-end" approach to quality control, and in some countries this is the full extent of attempts to control the quality of the work done. If you pick a well-qualified archaeologist, the thinking goes, the work done and the final product must be acceptable. This is a common system in countries with legal systems based on the Napoleonic code and in the Latin tradition.

Peer review of the final report of a project attempts to control quality by reviewing what the archaeologist has done to see if the completed work meets certain standards. This is usually accompanied by inspection of the project in progress and can be considered the "back-end" approach to quality control. This is a common system in countries based on Saxon or British common law.

Both the "front-end" and the "back-end" approaches have their advantages and disadvantages, and in most countries both approaches are used, with one or the other receiving most of the emphasis. Even in "back-end" countries like the United States, the United Kingdom, and Australia, where the government is not involved in prequalifying or certifying archaeologists beforehand, the qualifications of archaeologists are taken into consideration before awarding a contract. And conversely, in "front-end" countries

such as Namibia, Portugal, and Ireland, there is some review of the final product at the completion of the project. In countries, such as France and Mexico, where there is no licensing, since archaeology is a monopoly of the state, the final product is subjected to at least a cursory review, and it is assumed that the archaeologists hired by the state are qualified at some level. In some countries, for example, the Netherlands where there is a recently instituted private sector, AHM is controlled by a complete system of "front-end" licensing, in progress inspection, and "back-end" review. But such a complete system of quality control, if not unique, is unusual at the beginning of the twenty-first century.

Key Issues

What is considered adequate work depends on the country and the laws and customs where the work is conducted. Neither the "front-end" nor the "back-end" approach by itself is sufficient to ensure that the work conducted is adequate in any country. The major drawbacks for the "front-end" approach are that the work may be poorly executed and a final report never submitted, which has often been a major problem of academic archaeology. For the "back-end" approach, the work conducted may turn out to have been inadequate, but once an excavation is completed the site and data it contained have been destroyed, cannot be replicated, and are irretrievably lost. Clearly, both approaches accompanied by ongoing project review, as in the Netherlands, are necessary to assure that the public's money has been spent wisely and that the archaeological data has been collected to protect the public's common heritage.

It was mentioned above that even in "back-end" countries, where the government does not require a formally recognized register of qualified archaeologists, there are often informal qualifications standards, if for no other reason than that the client, such as a local government requiring national government review or a private developer needing an adequate level of investigation to obtain a building permit, must be assured that the work that will be done is sufficient to pass review prior to spending their money. In many of the "back-end" countries, NGOs have been instituted whose main purpose is to certify the qualifications of archaeologists and archaeological contracting companies. Two prime examples are the Register of Professional Archaeologists (RPA) in the United States and the Institute for Archaeologists (IFA) in the United Kingdom.

In the USA, there is no licensing at the federal, state, or local level, although federal agencies who oversee the implementation of the major AHM legislation suggest and sometimes require that archaeologists have a minimum level of education and experience. However, there is a private, nonprofit NGO, the Register of Professional Archaeologists (RPA), which certifies the educational and experiential qualifications of its members who join the organization voluntarily. RPA members who break the rules can be, and have been, expelled from the organization. Hiring an RPA member provides some assurance to the client that the work will be adequate and will pass review, but there is no requirement at any level of government in the USA that archaeologists be RPA certified, and few clients even know of the existence of the RPA. In the UK, the Institute for Archaeologists (IFA) has improved on the RPA by certifying not only individual archaeologists but archaeological contracting companies, including periodic inspections by the IFA of a company's financial and personnel records. The British government does not require that contractors be IFA certified, but clients hiring IFA-certified companies are assured that the individuals in the companies and the companies themselves are qualified. In addition, British clients are learning of the IFA and are increasingly requiring IFA certification of their contractors.

One of the major benefits of certifying companies rather than individual archaeologists is that companies, because of their varied work force, have expertise in various subspecialties that an individual archaeologist could not have, including such things as business management and meeting contract requirements, bio-archaeology, regional and temporal specialties, rock art, physical anthropology, and other specialties often necessary for the successful completion of a project. Even in countries that have no private sector, it is often the case that a government agency might have a

particular type of expert, but scheduling may prevent that expert from being available in a timely manner to complete a project. Thus, the private-sector contracting system is often more flexible and able to address a variety of situations than single-source, centralized, governmental agencies. If one company is not available, another qualified company usually is.

Perhaps the main reason for the development and thus licensing of a private sector is the lack of sufficient personnel in government agencies and academia. This is often for a lack of financial resources even in developed countries. As an example, in the United States the main AHM legislation was passed in 1966. Over the next few years, clients doing work for or requiring permits from the federal government began looking for archaeologists to meet the new requirements. There were few if any governmental archaeologists available to do the work so developers seeking archaeologists looked toward the universities. At first, the universities met the need by using student labor, often managed by university graduate students. This was inexpensive and provided experience to students, but the quality and timeliness of the work varied greatly. By the mid-1970s, the demand outstripped the ability of universities to respond appropriately and within limited time frames. Some universities tried to set up separate contracting arms within the university, but these were generally poorly managed, underfunded, and unable to meet schedules and budgets. As a result, the private sector was instituted, often with a graduate student or professor setting up a company on his/her own. By the early 1980s, there were so many of these extra-academic archaeologists and companies that developer clients could not determine if their contractors were qualified, since they were not clearly associated with a recognized university program. A need for some kind of certification was born, but, in the USA at least, it was not adequately met. The RPA which had been started in the early 1970s has never really caught on as a certification group by clients or government agencies, and as a result, the USA is still today without a system generally recognized by clients and government review agencies. Thus, the USA still has primarily a "back-end" system.

Examples

A perusal of the IFA, RPA, and the Dutch Archaeology Quality Standards gives a set of standards that could serve as a framework for certification in countries presently operating without such standards and who wish to develop a more well-rounded quality control system to meet the needs of their taxpaying publics, of developers requiring such work, and of their archaeological resources. Such standards might also be worth reviewing by those countries who already have a "front-end" system and even for those with a closed governmental monopoly.

Some of the major points in these standards state that a professional archaeologist should:

- Insure that any work conducted is replicable, management and results are open and transparent, and that methods are clearly stated and adequate to the job
- Provide for publishing the data in a timely manner and as completely as possible for use by other archaeologists and the public, and that the data is preserved for the future whether the work is paid for by the government or by the polluter-pays principal
- Abstain from dishonesty, fraud, and misrepresentation in dealings with others
- Deal fairly, responsibly, and ethically with colleagues, employees, and clients
- Cooperate with other archaeologists and the public and descendant groups
- Insure that the archaeologist has the necessary expertise to do a competent job
- Abide by laws protecting the resource and employees
- Protect client's privacy and interests if not in conflict with archaeological ethics
- Assure the timely completion of an adequate project
- Be aware of safety for employees and the public
- Avoid conflicts of interest
- Support and promote conservation of the resource base and the interests of descendant communities
- Not knowingly recover artifacts for commercial exploitation

- Give credit where credit is due
- Keep up with developments in the field
- Not commit plagiarism or falsely attack the reputation of another archaeologist
- Not take bribes
- Ensure that the research results will justify the destruction of the resource
- Avoid exaggerated and sensationalist statements about archaeological remains
- Be informed about the research at hand and before dealing with the public or giving legal testimony
- Report violations of the code of conduct to the proper authorities in a timely manner
- Insure that archaeologists and agencies put the archaeological resource first, and not their political agenda

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Management: Project Management
- ▶ Ethics in Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Institute for Archaeologists (IfA)
- ▶ Netherlands: Cultural Heritage Management
- ▶ Stakeholders and Community Participation
- ▶ United States: Cultural Heritage Management

Further Reading

Ciuchini, P. 2010. Archaeological policies and practices across Europe: National developments and international trends. Unpublished manuscript for a course entitled Postgraduate module archaeology in the EU at the University College of Dublin. (A summary of several European countries attempts at quality control and laws).

Dutch archaeology quality standard. n.d. Available at: www.sikb.nl/upload/documents/archeo/knauk.pdf. (Very specific and detailed standards of research performance for conducting archaeological projects in the Netherlands).

Institute for Archaeologists (IfA) code of conduct. n.d. Available at: http://www.archaeologists.net/sites/default/files/node-files/code_conduct.pdf. (A general code of ethics and qualification maintenance for professional archaeologists).

Institute for Archaeologists (IfA) introduction to standards and guidance. n.d. Available at: http://www.archaeologists.net/sites/default/files/node-files/ifa_standards_intro.pdf. (A very detailed set of standards for conducting various types of archaeological projects in the UK).

King, T.F. 2008. *Cultural resource laws and practice*. Walnut Creek: AltaMira Press (An overview of cultural resource management in the United States including quality control issues).

Register of Professional Archaeologists' (RPA) code of conduct. n.d. Available at: http://www.rpanet.org/displaycommon.cfm?an=1&subarticlenbr=3. (General ethics and an archaeologist's obligations towards the obligations towards colleagues, clients and the public).

Register of Professional Archaeologists' (RPA) standards of research performance. n.d. Available at: http://www.rpanet.org/displaycommon.cfm?an=1&subarticlenbr=4. (General standards on how an archaeologist should prepare and conduct research).

Willems, W., and M. van den Dries. 2007. *Quality management in archaeology*. Oxford: Oxbow Books (This is a series of articles on how countries approach archaeological quality management, mainly in Europe).

Archaeological Prospection Laboratory (National Autonomous University of Mexico)

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Basic Information

In the same way that the development of medical technology has contributed to make surgical interventions less intrusive, by using images generated by X-rays, ultrasounds, and nuclear magnetic

resonances and complementing them with biopsies, clinical analyses, etc., so, in the last few years, archaeological prospection has made available a variety of images from the subsoil that contribute to optimizing excavation strategies and accurately defining the areas and depths at which one can recover the information that is relevant to the objectives of an archaeological project.

Unfortunately, exploratory studies prior to excavation are well behind and a long way from being a generalized archaeological practice, unlike medicine, where you would not conceive of carrying out any surgery without applying all of those tests. Nonetheless, the international trend is, more and more, to make use of the information provided by techniques that can give details about the conditions of the subsoil, and so reduce to a minimum any disturbance of the archaeological context caused by excavating, and at the same time recovering as much information as possible. This is where the activities of the Archaeological Prospection Laboratory come in, which, during the last 30 years, has developed procedures, technologies, and tools for the study of archaeological sites in Mesoamerica.

Background of the Laboratory

The Archaeological Prospection Laboratory was created in early 1983, with a proposal to incorporate, develop, and adapt instruments, techniques, and methods that permit to obtain data and interpret archaeological sites from the ground surface.

After training at the Lerici Foundation in Italy in 1981, Luis Barba outlined a plan to gradually incorporate various techniques into the laboratory, in the same coordinated way that the Italians have come to use so successfully. After further training at the University of Georgia getting his Masters Degree, Barba returned in 1983 to establish the laboratory. In that year, a mobile laboratory was designed and built to facilitate the acquisition of geophysical data and perform chemical analysis in the field. With this infrastructure, the laboratory began to take part in archaeological projects, with the purpose of carrying out exploration studies prior to any excavation work.

In 1985, Barba defended a Master's thesis at the University of Georgia that proposed a methodology for the surface study of archaeological sites that is still being applied by the laboratory. In this way, the Prospection Laboratory established a process that includes the application of remote sensing, geophysics, geochemistry, and archaeological techniques. This has been called the methodology for studying sites from the ground surface, and it provides information about the characteristics of the context and the buried structures, which permits decision-making about whether to excavate or not, and then where to excavate, based on scientific data.

In favorable conditions, it has been possible to obtain data about the function of a site before its excavation. This presents unquestionable advantages in the quantity and quality of the information that can be retrieved as well as the time and cost that the archaeological investigation will require.

The methodology mentioned incorporates a variety of archaeological exploratory techniques, organized in such a way that their application is as efficient as possible. Essentially, it makes use of a wide range of techniques such as satellite imagery and aerial photography to locate and delimit the sites. It records the conditions of the surface using the topography and the distribution of scattered material. The geophysical techniques are located at an intermediate level as regards the area of land that they cover, which shows the limits of the sites and the localization of the structures that form it.

At the last stage of this procedure, the samples taken from the site are chemically analyzed. In this way, at each stage of the process, the data obtained in the previous stage is detailed and verified. In every case, the variations detected for each indicator are represented by way of computer-generated maps and immediately after the acquisition of data to provide a constant feedback (Barba 1994).

In this way, it is possible to cover several hectares in a few weeks of work, but at the same time, the results offer a sufficient level of detail in the areas of interest to guide subsequent excavation work. Recently, the quality of

surface data has allowed us to visualize and understand complete archaeological sites without the need for any excavation.

Prospection Techniques

The laboratory has experimented with a variety of tools. One of the most successful has been the use of balloons to lift photographic cameras, triggered by remote control, to acquire aerial images for archaeology. That, complemented by the processing of images to produce digital mosaics of the site and combined with topographic surveys, has permitted a comprehensive recording of the surface using digital terrain models (DTM).

As one part of the technology used in archaeological exploration, geophysical techniques are utilized to identify what is below the surface and, by way of indirect observation, what materials have different physical properties. The most common techniques include measuring magnetic properties, currents and electric potentials, and the reflection of electromagnetic waves in the terrain that is being studied.

In archaeology, the techniques of geophysical prospection offer the advantage of being able to investigate areas in less time and with less cost than the use of traditional methods. As with other research techniques, they also have their limitations, as there always exists some uncertainty in the interpretation of the data. Generally, one has to decide between the penetration (depth of investigation), the required resolution, and the speed of accomplishing the fieldwork. It is very difficult to achieve rapid and inexpensive measurements that will reveal in detail the deep structures, by using only one technique; because of that, our work includes many of the currently available techniques, applied in a systematic and coordinated manner. Despite the undoubted contribution of geophysical techniques, our laboratory has never abandoned the use of chemical techniques, and the expected arrival of new elemental analytical techniques with portable XRF promises to revitalize the role of chemical techniques in archaeological prospection.

Major Impact

Main Contributions of the Laboratory to Archaeological Investigation

Throughout the 30 years of its operation, the laboratory has developed many analytical techniques and applied them in over 100 archaeological sites in which it has worked in various parts of the world. One of the most significant achievements is the establishment of the integrated methodology that has permitted, through the application of remote sensing, geophysical exploration techniques, and chemical techniques, enormous detail in the study of archaeological sites before initiating excavation. As is shown in Fig. 1, each technique collects data that are converted into images, producing layers of information, each time more accurate, of the archaeological site that is still buried.

As a consequence of applying chemistry to prospection, another significant contribution was made to the study of occupation surfaces: it was in this laboratory that, at the end of the 1970s, a research project was designed to reconstruct human activities by analyzing the chemical residues on floors of the excavated sites. In the early 1980s, the laboratory gradually incorporated geophysical tools in its fieldwork, at the same time reducing the role of chemistry in prospection but promoting the study of chemical residues, first on floors of occupied houses (Barba and Bello 1978), later on floors of archaeological houses, and finally on ceramic vessels.

The chemical study of floors has provided evidence of the activities carried out on them, allowing us to understand the use to which the spaces were destined. Such is the case in the identification of areas for food preparation, consumption of food, ritual zones, transit zones, storage, etc. Recently, the efforts of several laboratories have made ICP, XRF, GC-MS, and other analytical techniques available to detect those residues on floors (Middleton et al. 2010).

It has been also incorporated the study of residues impregnated in the pores of ceramic vessels in order to infer what liquid substances they once

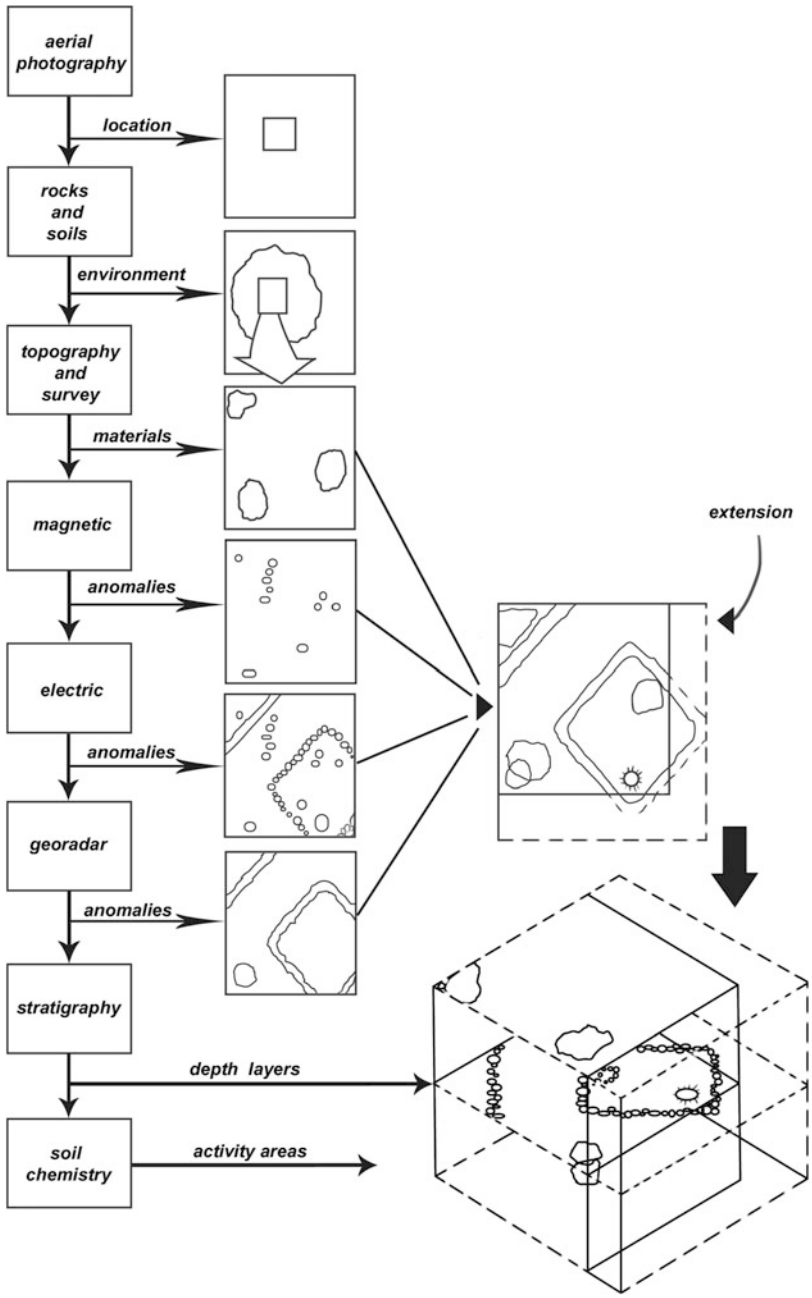

Archaeological Prospection Laboratory (National Autonomous University of Mexico), Fig. 1 Diagram showing the application sequence of analytical techniques used in the Archaeological Prospection Laboratory. (After Barba 1994)

contained. The analyses applied as much to the floors as to the ceramic vessels include tests for phosphates, carbonates, pH, protein residues, fatty acids, carbohydrates, and sometimes the determination of color (Barba 2007). On occasion, additional tests to detect iron, nitrates, chlorides, and calcium have been applied to resolve specific problems. Nowadays, XRF has been incorporated to also identify some elements with cultural importance.

Cross-References

- ▶ Archaeological Soil Micromorphology
- ▶ Chemical Survey of Archaeological Sites
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Prospection Methods in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Barba, L. 1994. A methodology for the study of buried archaeological sites. In *Archaeometry for pre-Columbian sites and artifacts: Proceedings of a symposium organized by the UCLA Institute of Archaeology and the Getty Conservation Institute, Los Angeles, California, March 23–27, 1992*, ed. D.A. Scott and P. Meyers, 353–366. Los Angeles: The Getty Conservation Institute.

Barba, L. 2007. Chemical residues in lime plastered archaeological floors. *Geoarchaeology* 22 (3): 439–453.

Barba, L., and G. Bello. 1978. Análisis de fosfato en el piso de una casa habitación actual. *Notas Antropológicas* 24 (1): 188–193.

Middleton, W., L. Barba, A. Pecci, J. Burton, A. Ortiz, L. Salvini, and R. Rodriguez. 2010. The study of archaeological floors. Methodological proposal for the analysis of anthropogenic residues by spot test, ICP-OES and GC-MS. *Journal of Archaeological Method and Theory* 17: 183–208.

Archaeological Record

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Introduction

Read history if you wish to learn the past? Well, yes and no. Read history, by all means. But the human past – hundreds of thousands to millions of years – vastly exceeds the 5000 years of written records which, in any event, are highly uneven in time-space coverage even during that comparatively brief span. For most of the human past in most corners of the world, the archaeological record is our sole or chief source of evidence. The historical record is texts of various kinds. But what exactly is the archaeological record?

Definition

Everyone knows, or at least think they do, that the archaeological record consists of the material remains left behind by past societies. In the narrowest sense, this much certainly is true. An ancient hunter discarding a butchered animal bone, an ancient cook discarding the broken shards of a pot, and an ancient despot raising a monument to his or her glory that, like the statue of Ozymandias, at length falls to abandonment and disrepair all contributed to the archaeological record. The record, therefore, consists of all things that ancient people made, used, or otherwise transformed from their natural state and place. It is indeed material things that range in size and makeup from old bones and stones, dusty bricks, and shards of pottery vessels to palaces and pyramids. But archaeologists and even students in their introductory classes know that the record is not just material things but also abstract or intangible *context*. It is not just the old bones, broken shards, etc., but where they are found, associated with what else, and in what depositional matrix. The archaeological record is old things and contextual information about them.

Artifacts and other material things in the record possess intrinsic properties like their composition, size, and form, which characterize them whatever the nature of the record. Extrinsic properties include objects' abundance or number, their distribution, and their patterns of association. Extrinsic properties of things in turn comprise intrinsic properties of the archaeological record. The theory that explains how the record formed says nothing directly about objects' intrinsic properties but a great deal about their extrinsic ones, in the sense of what and how much is deposited, where, and with what.

Whatever its nature, the archaeological record is not entirely a thing of the past. It may have

originated in "Thens" beyond number, but it is accessed in painfully finite "Nows." Archaeologists often emphasize the record's status as a contemporaneous thing to distinguish what we do from ethnography, the study of contemporaneous cultures by direct observation, not indirect inference from material remains in context. But the record is contemporaneous in another sense because "Nows" of different times involve different methods by which to recover the record. Fifty years ago, for instance, tiny and nearly invisible fragments of plants and animals that ancient people ate were overlooked in archaeological deposits, too small to detect and systematically to collect. With the development of flotation methods, representative samples of those abundant and important parts of the record became commonplace, in the process altering our understanding of the past. Physical science methods allow us to identify trace elements in archaeological materials from pottery to stone and beyond in ways that earlier generations of archaeologists could not imagine. What parts of the archaeological record are accessible, and how, are themselves historical artifacts. Whatever he had in mind, so far as it concerned the archaeological record, Faulkner was righter than he knew in saying "The past is. . .not even past."

Historical Background

For most of archaeology's own past, however, there was precious little self-conscious reflection about what the archaeological record was. It was there, and it clearly was meant to be dug and documented. Archaeologists simply got on with the task.

At a particularly influential moment in its history, though, a prominent American archaeologist argued that the material record and context "present a systematic and understandable picture of the total extinct cultural system" (Binford 1962: 220; original emphasis). Salutary against the then-prevailing belief that the record revealed comparatively little about the past (e.g., Hawkes 1954), this optimistic view excited enthusiasm for ambitious attempts not just to learn the chronological order of things or to engage in sterile exercises in object classification but to determine how the record registered, if obliquely, the structure and organization of the past cultures that left it behind. Initial enthusiasm may have overreached, less so than some believe today, but had the virtue of rescuing archaeology from its traditional preoccupations with time order and taxonomy. In the process, archaeologists were prompted not only to think about what the record revealed of the past but also to appreciate that learning how the record formed was essential to revealing that meaning.

Besides its promise, this appreciation naturally led archaeologists to contemplate limitations of the record. Obviously, limitations include the natural processes like organic decomposition that reduce or alter the record after its deposition and those like disturbance by animals – "bioturbation" – that alter its context. Perhaps less obviously until archaeologists began to think about it, another limitation is that the record as deposited is neither time capsule nor preserved Pompeii. Instead, it is a confusing scramble of things used in different ways at different times for different purposes, all thrown together at the point of abandonment or discard with (as it seems to some of us at weaker moments) no regard whatsoever for the inferential challenges confronting future archaeologists. (Schiffer (1976) termed these "natural-" and "cultural formation processes," respectively.) Confusing this scramble of things may be, but arbitrary it is not. Yet until the systematic properties of the scrambling process are, well, unscrambled, archaeologists cannot understand the record or, by extension, the past that it reveals. Failing to understand the complex, secondary patterns of association that dominate the archaeological record, for instance, anyone troubling to examine a family's trash when it contains food scraps, rosary beads, broken tools, and fragments of shingles might mistakenly conclude that it dined on the roof using screwdrivers while adorned in curious jewelry.

Thus arose formation theory which, broadly speaking explains how the record formed and why it formed as it did (Schiffer 1976, 1987; Binford 1981; Shott 2006). It is one thing to know that how the record formed is critical to its

grounded interpretation. It is quite another thing to accomplish this task in practice. Doing so requires knowing the record both for its promise and the limitations only briefly noted above. If, as David Clarke (1973: 17) once said, the archaeological record was "indirect traces in bad samples" of what ancient people did and how their societies were organized to do it, this rueful characterization merely underscores the challenge confronting archaeologists who wish to learn from the past from its material remains. No one promised that it would be easy; fortunately, some have thought seriously about the problem in ways that might help us meet the challenge.

For instance, Cowgill (1970) described the archaeological record as the transformed, progressively diminished remnant first of what was deposited, then of what preserved among the deposits, and then of what could be found and recovered of those deposits. However mundane the argument may seem to outsiders, it focused archaeologists' minds on the steps in the process that separate living cultures of the past from the material record that we study now and led eventually to serious theorizing about how the record formed and the systematic transformation that structure it at each stage. Archaeologists called this "middle-range theory," "formation processes," "accumulations research," or "formation theory" (Shott 2006). In the 1970s, prominent American archaeologists debated what the record was. If to Schiffer (e.g., 1976) it was transformed ethnographic tableaux, Binford (e.g., 1981) saw all records as fundamentally different categories of evidence to ethnography's. To Schiffer, if we systematically account for transformations between ethnographic and archaeological contexts and more finely resolve past time, then we approximate the ethnographic record. Binford argued instead that not merely transformation and timescale separate the two records and that how they formed and what they revealed differed immensely. Like many debates this one gave off light but also much heat that sometimes obscured the good points that antagonists made. But at least it served to contrast archaeological and ethnographic data, a difference that, even now, archaeologists have assimilated imperfectly (Perreault 2019). In the process, it gave renewed emphasis to ethnoarchaeology, the study of living peoples and cultures for how they form their archaeological records. As a result, Binford but also many others documented how cultures of many places and characters generated their own archaeological records.

Briefly around 1980, ethnoarchaeology was popular, and it has continued since as a secondary but vital branch of archaeological theory and method (David and Kramer 2001). Just as ethnoarchaeology and formation theory began to gain traction in the 1970s and 1980s, however, their development was complicated by other intellectual trends. For reasons that had as much to do with contemporary sociopolitics and European, particularly British, intellectual reactions to American thought (Shott 2005) as with the past, a strain of postmodernism gripped archaeology in the 1980s. Somewhat subsided today, it nevertheless questioned legitimate archaeological concerns. For instance, postmodernists cited by David and Kramer (2001: 419) airily dismissed ethnoarchaeology as an immoral effort to deny peoples' or cultures' splendid isolation by subjugating them beneath general principles residing within bodies of thought like formation theory. In this view, there are different cultures, but no general patterns or causes of the undeniably immense variation among them. Instead, each culture must be contemplated only in its irreducible uniqueness. This is academic nihilism unworthy of serious regard and a brief for archaeology as glorified butterfly collecting.

Postmodernism also created the trope of record as text to be read to reveal its many voices and messages. In the process, many nouns became verbs, and words like "multi-vocality" grew popular among archaeologists who regarded the effort to learn about and from the past as a futile bourgeois pastime. In its place, reading the record reduced to exercises in cleverness or inscribing a blank canvas with one's intellectual predilections. In this climate, how the record formed either was irrelevant, or its systematic characterization was hopelessly confounded by ineffable systems of meaning accessible only to the living mind and therefore beyond the reach of any theory of a

material record whose producers do not survive to explain it. The latter is, at best, a clever counsel of despair. Record as text identifies archaeology's material record with written texts. In the process, it rests on a conflation of very different purposes and origins. All writers write for an audience; even diarists write for themselves. In contrast, only vanishingly small fragments of the archaeological record were deposited with the self-conscious purpose of interpretation by those expected to encounter them later.

Whatever the sources and origin of historical data, archaeology's is a record chiefly of what ancient people lost, abandoned, or discarded. The archaeological record, then, was not written for audiences; it accumulated as the by-product of actions, ordinary and extraordinary, and with no future readers in mind. As our only source of grounded knowledge about the remote past, archaeologists must properly recognize the material record as it is, not as their conceits may wish it to be: unintended consequence, not constructed text.

Despite such distractions, formation theory as a way to explain the record has made modest progress. One example of its contribution to understanding the archaeological record is formation theory's explanation of "discard behavior," where trash was placed, how, and with what other trash. This could be regarded either as trivial or impossible to know, but instead it was shown to pattern systematically with culture type, land use, and other factors (e.g., Murray 1980), whatever unethical subjugating of ineffable uniqueness entailed. And, far from being trivial, it matters a great deal to how we interpret the record in ways that range from the existence of "toolkits" (tools thought to be used together in performance of certain tasks and therefore to reveal the nature and frequency of ancient peoples' actions) to parsing the occupational history of complex sites (e.g., Varien and Ortman 2005; Chapman and Gaydarska 2007) with all its implications for population trends, political organization, and social process.

Another example concerns how we understand the abundance of things in the archaeological record. In an innocent past, the more abundant an artifact type was in the record, the more important was its role or frequent was its use in the past. Following such logic, future archaeologists might conclude that people today smoke cigarettes much more often than we wear expensive jewelry because butts are far more abundant than are diamond rings in the material record that we are accumulating. Correcting such misapprehensions draws our attention to an intervening factor – how long different things last in use or "use life" (Schiffer 1976: 60; Shott 2018) – and to systematic variation in this factor that must be understood as we interpret the record.

Current Debates and Future Directions

Would that there were many more examples and that formation theory and systematic study of the archaeological record qua evidence were actively debated today. Instead, in an archaeology that continues to lurch from fad to intellectual fad in its immature disciplinary state, formation theory and its critical role in explaining the record were left to languish somewhere between indifference and oblivion. Case studies cited above and others show that some archaeologists continue to study it seriously, but it no longer is a central concern of the field. One of our most urgent tasks is to establish the serious study of formation theory at what it pleases British academics to call the "high table." That is, archaeologists must regard formation theory not as an esoteric infatuation of the few but as an essential tool in every archaeologist's quest to learn about the past. If formation theory were vigorously debated today, topics might include the connection, if any, it implies between archaeology and anthropology and the relevance of the record and formation theory to the full range of general theories. In North America, archaeology is subsumed beneath anthropology in ways not duplicated elsewhere. Whatever purpose its encapsulated status may have served historically, today archaeology is poorly placed within an anthropology whose chief preoccupations are vastly different from ours. Formation theory and the nature of the archaeological record, as complex, time-averaged accumulations rather than simple ethnographic tableaux (Perreault 2019), sharply distinguish archaeology from an anthropology that requires neither. Archaeology also applies a range of general theory that differs in

character and epistemological status from the interpretive traditions that most anthropologists practice. Perhaps if and when archaeology achieves in North America the disciplinary independence that it has deserved for at least decades, formation theory will rise in importance and stature.

Whatever the complexities of its formation and the obliqueness of the prehistoric action that it registers, the archaeological record is our sole evidence of the cultural past. Of course how we interpret the record depends crucially upon how we understand its formation. But how we understand the past depends also on how we explain the action, structure, and process that the record preserves; formation theory and general theory are equally essential to archaeological research (Shott 2006). Accordingly, the understanding of how the record formed is not confined to theoretical traditions like materialism in its various guises. Rather, formation theory is equally vital to all theoretical traditions, including those that favor agency, symbol, or structure over material conditions. In its most radical programmatic statements, the postmodernism noted above denied the possibility of knowing the past and, by extension, the need to ground inference in evidence. Such views neatly reduce archaeology to the "irresponsible art form" that Clarke (1973:16) feared it might become. But the excesses of postmodernism at least inspired the belief that the past might be understood in structural and symbolic terms, not just in the material terms of what people ate or did. At length postmodernism yielded to more constructive cultural and structural theories that provide balance to the materialism that undeniably dominated archaeological, particularly American, thought in processualism's heyday (Roux 2007).

Today, nonmaterial theory is both more diverse and, in significant degree, committed to grounded inference (e.g., Chapman and Gaydarska 2007). Warts and all, such theory considers not just material conditions and individuals or groups as strategizing agents but also intrinsic cultural context which, admitting only the possibility of systematic properties to cultural variation, therefore is accessible to both general and formation theories. To date, however, there has been more development of general cultural theory than the "middle-range (i.e., formation) theory of mind" (Cowgill 1993), of structure, and of organization that is as conceivable and essential as it currently is neglected. Sources like Hill (1995) and Chapman and Gaydarska (2007) are exceptions that prove the rule; cultural theory awaits the formation theory that can make its inferences reasoned, not a priori.

A start has been made using ethnoarchaeological study to illuminate social, political, and symbolic dimensions of cultures. The Colombian Nukak, for instance, deliberately break artifacts during dispute resolution (Politis 2000). Awá men of the Brazilian Amazon make arrows out of proportion to their utilitarian value; details of fletching, construction, and use are signifiers of maleness, not mere functional attributes, and "use" sometimes amounts to little more than carrying arrows (González-Ruibal et al. 2011). Applied mechanically to archaeological interpretation, these observations are mere cautionary tales (e.g., that the abundance of arrows in material records may not directly measure the frequency or importance of hunting) that underscore the often particular cultural contextualization of the record's formation. But compiled into a larger body of evidence itself synthesized as Cowgill's "middle-range theory of mind," they can reveal symbolic dimensions in the use of material objects and their discard into the record. In this way, formation theory is not narrowly material or utilitarian but broadly cultural in its scope.

Yet concerning formation theory, there is room for improvement in all varieties of archaeology's general theory. We have no shortage of general theoretical stances and predilections, most of which are inadequately grounded in evidence by a sincere effort to develop necessary formation theory. Varieties of evolutionary theory, for instance, have resurged since the 1990s (e.g., O'brien and Lyman 2000). Context in the record does not figure prominently in their usage; also, they sometimes dismiss formation theory as an effort to reconstruct ancient behavior, which they reject on principle as unobservable. Yet every evolutionary invocation of transmission, style, drift, and function invokes behavior, at least implicitly; more broadly, formation theory and the

understanding of the record's meaning that it provides are as essential to evolutionism as to any other general theory in archaeology. Similarly, intellectual traditions in classical and prehistoric archaeology are quite distinct, yet formation theory was central to Peña's (2007) study of Roman pottery.

Conclusions

Even in archaeology's present underdeveloped state of intellectual development, it is futile to debate what the record is; at least broadly, we agree on that score. Nor should we wonder if it preserves all relevant detail and content of all past cultures. Of course it does not. Yet it is equally futile to suppose that the record is so limited and biased as to deny the possibility of systematic, fairly far-reaching inference to those past cultures or to free archaeological thought from any grounding in relevant evidence. The archaeological record is neither our best friend nor worst enemy. The archaeological record simply is. It is for us to determine what can be made of it.

Case Studies

Despite halting advances and sometimes bitter debate, archaeologists of various theoretical casts have used formation theory intelligently to improve their inferences from general theory and their understanding of the past generally, encouraging signs that serious study of how the record formed is regaining traction. Hill (1995) interpreted patterns and sequences of discard at British Iron Age settlements in symbolic terms, as ritual or "structured deposition" that revealed elements of world view. Careful analysis of deposits and building sequences at a Cypriot Bronze-Age village allowed Frankel and Webb (2001) to estimate population size and occupation span and gave insight into household size and structure and social reproduction otherwise obscured from view. Gallivan (2002) examined joint variation in population and sociopolitical complexity in the late prehistory of the American mid-Atlantic coast. Varien and Ortman (2005) used formation theory to determine occupation span and sequence of Puebloan villages in the American Southwest, which they then linked to land tenure, economic intensification, and sociopolitical trends. Lamenting neglect of "how and when different kinds of pottery came to be incorporated in different amounts and in different conditions into different kinds of archaeological deposits" (2007: 1), Peña demonstrated the relevance of formation theory in Roman archaeology. Shott (2018) compiled a large dataset on Mexican Purépecha pottery uselife, some derived from near-monthly household censuses, and fitted it to Weibull models. Results showed not only differences in mean uselife by vessel type and size class, but graded variation in Weibull attrition coefficients. Purépecha data also patterned with a global sample of census-derived pottery uselife data, revealing robust patterns that allow analysts to predict uselife from easily observed measures of vessel size in any cultural context. Surovell (2009) both integrated formation theory with a general theory, behavioral ecology, and applied it systematically to stone tools and debris, among archaeology's most abundant and widely distributed materials.

Cross-References

- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Middle-Range Theory in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Site Formation Processes

References

Binford, L.R. 1962. Archaeology as anthropology. *American Antiquity* 28: 217–225.

Binford, L.R. 1981. Behavioral archaeology and the 'Pompeii premise. *Journal of Anthropological Research* 37: 195–208.

Chapman, J., and B. Gaydarska. 2007. *Parts and wholes: Fragmentation in prehistoric context*. Oxford: Oxbow.

Clarke, D. 1973. Archaeology: The loss of innocence. *Antiquity* 47: 6–18.
Cowgill, G.L. 1970. Some sampling and reliability problems in archaeology. In *Archéologie et calculateurs: Problémes sémiologiques et mathématiques*, 161–172. Paris: Editions du Centre National de la Recherche Scientifique.
Cowgill, G.L. 1993. Beyond criticizing new archeology. *American Anthropologist* 95: 551–573.
David, N., and C. Kramer. 2001. *Ethnoarchaeology in action*. Cambridge: Cambridge University Press.
Frankel, D., and J.M. Webb. 2001. Population, households, and ceramic consumption in a prehistoric Cypriot village. *Journal of Field Archaeology* 28: 115–129.
Gallivan, M.D. 2002. Measuring sedentariness and settlement population: Accumulations research in the middle Atlantic region. *American Antiquity* 67: 535–557.
GonzÁlez-Ruibal, A., A. Hernando, and G. Politis. 2011. Ontology of the self and material culture: Arrowmaking among the Awá hunter-gatherers (Brazil). *Journal of Anthropological Archaeology* 30: 1–16.
Hawkes, C. 1954. Archeological theory and method: Some suggestions from the Old World. *American Anthropologist* 56: 155–168.
Hill, J.D. 1995. *Ritual and rubbish in the Iron age of Wessex: A study on the formation of a specific archaeological record*, British archaeological reports British series. Vol. 242. Oxford: Tempus Reparatum.
O'brien, M.J., and R.L. Lyman. 2000. *Applying evolutionary archaeology: A systematic approach*. New York: Kluwer.
Peña, J.T. 2007. *Roman pottery in the archaeological record*. Cambridge: Cambridge University Press.
Politis, G. 2000. Patrones de descarte de los Nukak: Implicaciones para la arqueología de los cazadores-recolectores. *Arqueología del Área Intermedia* 2: 99–124.
Perreault, C. 2019. *The quality of the archaeological record*. Chicago: University of Chicago.
Roux, V. 2007. Ethnoarchaeology: A non-historical science of reference necessary for interpreting the past. *Journal of Archaeological Method and Theory* 14: 153–178.
Schiffer, M.B. 1976. *Behavioral archeology*. New York: Academic.
Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico.
Shott, M.J. 2005. Two cultures: Thought and practice in British and North American archaeology. *World Archaeology* 37: 1–10.
Shott, M.J. 2006. Formation theory's past and future: Introduction to the volume. In *Formation theory in archaeology: Readings from American antiquity and Latin American antiquity*, ed. M. Shott, 1–16. Washington, DC: Society for American Archaeology Press.
Shott, M.J. 2018. *Pottery ethnoarchaeology in the Michoacán sierra*. Salt Lake City: University of Utah.
Surovell, T.A. 2009. *Toward a behavioral ecology of lithic technology: Cases from Paleoindian archaeology*. Tucson: University of Arizona.
Varien, M.D., and S.G. Ortman. 2005. Accumulations research in the southwestern United States: Middle-range theory for big-picture problems. *World Archaeology* 37: 132–155.

A

Further Reading

Ammerman, A.J., and M.C. Feldman. 1974. On the 'making' of an assemblage of stone tools. *American Antiquity* 39: 610–616.
Ascher, R. 1968. Time's arrow and the archaeology of a contemporary community. In *Settlement archaeology*, ed. K.C. Chang, 43–52. Palo Alto: National Press Books.
Bedaux, R. 1986. Recherches ethno-archéologiques sur la poterie des Dogon (Mali). In *Op zoek naar mens en materie¨le.cultuur*, ed. H. Fokkens, P. Banga, and M. Bierma, 117–146. Groningen: Universiteitsdrukkerij RUG.
Binford, L.R. 1977. General introduction. In *For theory-building in archaeology: Essays on faunal remains, aquatic resources, spatial analysis, and systemic modeling*, ed. L. Binford, 1–10. New York: Academic.
Chapman, J. 2000. *Fragmentation in archaeology: People, places and broken objects in the prehistory of South Eastern Europe*. London: Routledge.
Claassen, C. 1977. Estimating occupation span from artifacts: A trial run at Selevac, Yugoslavia. *Paper presented at the 42d Annual Meeting of the Society for American Archaeology*, New Orleans, Apr 1977.
David, N. 1972. On the life span of pottery: Type frequencies and archaeological inference. *American Antiquity* 37: 141–142.
Deal, M. 1998. *Pottery ethnoarchaeology in the Central Maya highlands*. Salt Lake City: University of Utah.
Deboer, W.R. 1974. Ceramic longevity and archaeological interpretation: An example from the upper Ucayali, Peru. *American Antiquity* 39: 335–343.
Deboer, W.R. 1983. The archaeological record as preserved death assemblage. In *Archaeological hammers and theories*, ed. J.A. Moore and A.S. Keene, 19–36. New York: Academic.
Engelhardt, R.A., and P.R. Rogers. 1998. The ethnoarchaeology of Southeast Asian coastal sites: A model for the deposition and recovery of archaeological material. *Journal of the Siam Society* 86: 131–159.
Espenshade, C.T. 2000. Reconstructing household vessel assemblages and site duration at an early Ostionoid site from South-Central Puerto Rico. *Journal of Caribbean Archaeology* 1: 1–22.
Gorecki, P. 1985. Ethnoarchaeology: The need for a post-mortem enquiry. *World Archaeology* 17: 175–191.
Hayden, B., and A. Cannon. 1983. Where the garbage goes: Refuse disposal in the Maya highlands. *Journal of Anthropological Archaeology* 2: 117–163.
Hayden, B., and A. Cannon. 1984. *The structure of material systems: Ethnoarchaeology in the Maya highlands.*

Society for American Archaeology, SAA papers 3. Washington, DC: Society for American Archaeology.
Hildebrand, J.A. 1978. Pathways revisited: A quantitative model of discard. *American Antiquity* 43: 274–279.
Hildebrand, J.A., and M.B. Hagstrum. 1999. New approaches to ceramic use and discard: Cooking pottery from the Peruvian Andes in ethnoarchaeological perspective. *Latin American Antiquity* 10: 25–46.
Lange, F.W., and C.R. Rydberg. 1972. Abandonment and post-abandonment behavior at a rural central American house-site. *American Antiquity* 37: 419–432.
Mayor, A. 1991–1992. La durée de vie des céramiques Africaines: Un essai de comprénsion des mécanismes. *Bulletin du Centre Genevois d'L'Anthropologie* 3: 47–70.
Murray, P. 1980. Discard location: The ethnographic data. *American Antiquity* 45: 490–502.
Needham, S. 1996. Pottery evidence for formation process in the late bronze age deposits. In *Refuse and disposal at area 16 East Runnymede: Runnymede bridge research excavations*, ed. S. Needham and A. Spence, vol. 2, 61–77. London: British Museum.
Nelson, B.A., T.A. Kohler, and K.W. Kintigh. 1994. Demographic alternatives: consequences for current models of southwestern prehistory. In *Understanding complexity in the prehistoric Southwest*, ed. G. Gumerman and M. Gell-Mann, 113–146. Reading: Addison-Wesley.
O'connell, J.F. 1987. Alyawara site structure and its archaeological implications. *American Antiquity* 52: 74–108.
Schiffer, M.B. 1972. Archaeological context and systemic context. *American Antiquity* 37: 156–165.
Schiffer, M.B. 1975. The effects of occupation span on site content. In *The Cache River archeological project: An experiment in contract archeology*, Arkansas archeological survey, research series, ed. M.B. Schiffer and J.H. House, vol. 8, 265–269. Fayetteville: Arkansas Archeological Survey.
Schlanger, S.H. 1991. On manos, metates, and the history of site occupations. *American Antiquity* 56: 460–473.
Shott, M.J. 1989. On tool class use lives and the formation of archaeological assemblages. *American Antiquity* 54: 9–30.
Shott, M.J. 1996. Mortal pots: On use life and vessel size in the formation of ceramic assemblages. *American Antiquity* 61: 463–482.
Shott, M.J. 1998. Status and role of formation theory in contemporary archaeological practice. *Journal of Archaeological Research* 6: 299–329.
Stevenson, M.G. 1985. The formation of artifact assemblages at workshop/habitation sites: Models from peace point in northern Alberta. *American Antiquity* 50: 63–81.
Varien, M.D., and J.M. Potter. 1997. Unpacking the discard equation: Simulating the accumulation of artifacts in the archaeological record. *American Antiquity* 62: 194–213.

Archaeological Research in Colonial Angola

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Introduction

The development of archaeology in colonial Angola can be divided into two moments. The first moment relates to the work conducted by foreign and Portuguese archaeologists involved with the diamond exploration company Diamang in the Lunda region. Also in this period, there was work conducted by colonial agents, especially in the Angolan Anthropological Missions which took place in the 1940s and 1950s. It is worth mentioning that both of these efforts were aligned with the colonial project, be it in a indirect or direct form. The second moment is marked by a change in the line of research, seeking a distancing from colonial ideology, incorporating the matter of teaching and professionalization of archaeology in the colony, while still trying to incorporate African narratives in the interpretation of the material analyzed.

Key Issues

The inaugural works on the prehistory of Angola date back to the year of 1890, with the publications of Servero and Nery Delgado. Afterwards, the explorers Serpa Pinto, together with his assistant Santos Júnior, conducted some surface collecting and interpretations in the 1930s. Santos Júnior, when returning to Portugal, organized a synthesis of the explorer's works on the prehistoric past of Angola, presenting it in the 1934 *Congresso Nacional de Antropologia Colonial do Porto*. The presentations reinforced the connection of the studied pieces with the Tumba culture, existent in what was at the time the

Belgian Congo. Up until the 1940s, studies consisted mainly in describing isolated pieces, found on the surface, seeking more to establish a classification and chronology of an object regarding cultures at the time than an analysis per se.

The first substantial works of archaeological research in Angola begun based on the initiative of the DIAMANG company (*Companhia de Diamantes de Angola*), in mid 1930s. The company was given concession by the colonial government of an area of over 30,000 km^2 in the Lunda region, for the exploration of diamonds. With the expansion of profits, the company began making cultural investments that led to the hiring of researchers and scientists, culminating in the founding of the first museum of Angola in 1936, the *Museu do Dundo* (Porto 1999). The purpose of the creation of the museum was to preserve the traditions, which were "lost in contact with civilization."

A sagacious collecting of material was therefore initiated in the region, with a leap from 496 objects in the collection in 1936 to 5500 in 1942. Under the curatorship of José Redinha, the museum expanded, creating new departments; among these is the archaeology and prehistory department which was idealized by the technicians employed by the company, namely, the archaeologists and geologists – J. Redinha, Fernando Mouta, Jean Janmart, H. Breuil, L. Leakey, J. Camarate França, and Desmond Clark (Porto 1999). This group was favored by the profile of the Diamang and the museum which, even though aligned with colonialism, had the autonomy to conduct research with the presence of foreigners, resulting in an assemblage of objects obtained in different ways: surface collecting, collecting through mining activity (both in the extraction as well as in the washing and separation), and archaeological excavations (Domingos 2009).

Numerous efforts were made in the region, culminating in a series of published articles in the *Publicações Culturais do Museu do Dundo*, which became an important instrument in the establishing of international partnerships with renowned academic institutions. Thanks to the work of these specialists, the northeast region of Angola is one of the most well-known in the Zaire River basin region (Ervedosa 1980).

The main efforts were the ones developed at first by Janmart and later continued by Desmond Clark. During his stay, Clark undertook important studies for the understanding of the prehistory of the region, also being a critic of nomenclatures and chronologies attributed to the Angolan territory (Clark 1971). The author's reference works are those that he proposes a synthesis of his activities and the confectioning of an archaeological letter (Clark 1963, 1966; Clark and Langeheim 1968).

Parallel to the activity of researchers connected to Diamang, the Portuguese State also sought to obtain more information on the past of the native inhabitants of their domains. Ever since their origins, these investigations already possessed a character notably centered on physical anthropology. The connection of physical anthropology to archaeology is understood regarding evolutionistic aspects existent at the time and consolidated in what was called the *Escola do Porto*.

This school of thought, according to Pereira (2005), guided the course of Portuguese anthropological thought, especially in the first half of the twentieth century, and one name would mark an entire generation of studies involving anthropology and archaeology: Antônio Augusto Mendes Corrêia (1888–1960). His career began in medicine, followed by a doctorate in physical anthropology in 1921, already assuming an important role in the University of Porto (*Universidade do Porto*), as professor and cathedratic of anthropology of the *Faculdade de Ciências Naturais*.

In the first half of the twentieth century, Portugal lived a situation not only of economic hardship but also of a violent political repression, where freedom of thought was persecuted and condemned and the incentive for research was reduced. This situation would change from the 1940s onward with the consolidation of the *Junta de Investigação do Ultramar* (JIU).

The emergence of the JIU happened in the mid-1930s, in the heart of a debate on the precarious situation in which studies regarding the Portuguese colonies were found at the time. The vision on the role of science was directly related

as a form of guaranteeing success of the colonization and the exploration of colonial resources (Castelo 2012). In this initial moment, archaeology appeared as one of the branches of anthropology, following the notion of anthropology by the *Escola do Porto*. The concept incorporated at the same time racial theories and aspects from physical anthropology, in this case the prehistory of populations, being absent of social or cultural perspectives (Pereira 2005).

In the anthropology and archaeology area, Mendes Corrêa elaborated in 1940 a study plan for colonial anthropology. In this plan, according to Poloni (2011), Corrêa established a hierarchy of research priorities, with a privilege toward physical anthropology, as a way to measure and evaluate the physical conditions of the Africans relating to work force. Archaeology would occupy a smaller space, losing importance, maintaining the interest solely in the scholarly part, so as Portugal would not distance itself from the international debates.

For Poloni (2011), archaeology only maintained itself in the anthropological missions due to four reasons:

1. The need for interaction with the international scientific panorama.
2. Exchanges with important figures from national and international archaeology.
3. Archaeology is used as a way to evaluate the potential of each native community based on knowledge of their past.
4. Through anthropobiological fieldwork, the same resources are used in order to conduct archaeological reflections according to the time and space available.

The anthropological missions were carried out in the period between 1945 and 1975, with a total of 21 incursions, comprising the colonies of Moçambique, Angola, Guiné, and Timor. To Angola, four campaigns were undertaken in the years of 1948, 1950, 1952, and 1955. The chief of the missions was the physician Antônio de Almeida (1900–1984). In his campaigns in Angola, he travelled over 45,000 km, registering aspects such as behavior, dressings, material culture, kinship relations, religion, and demography among the country's different ethnic groups.

It was exactly in the missions to Angola that the paths of the Diamang archaeologists and that of Almeida crossed. Since the first mission in 1948, Almeida counted with the support and collaboration of Diamang members in order to conduct his studies on the prehistory of Angola. In an initial moment, he worked with Camarate França in various sites, until his death in 1962, being replaced with Henri Breuil.

All efforts related to archaeology were published in the periodical *Memórias da Junta de Investigação do Ultramar*, between the years of 1950 and 1964. The missions' efforts were, as oriented, directed toward anthropobiological questions, giving little attention to activities related to archaeology (França 1960). This critic was reflected not only toward the preponderant character of physical anthropology but also its obsession by the ideologists of the *Estado Novo* and Mendes Corrêa. According to the research program of the anthropobiological missions, the studies on physical anthropology occupied around 75% of the fieldwork activities undertaken, leaving activities related to the research and gathering of data and spoils in the domains of ethnography, of prehistory and archaeology to use only around 25% of the determined time for each campaign (Rodrigues 1999).

Despite the relative little interest toward archaeology, we can see some very positive and controversial results from some of the missions. Among the many studies published, analyses on archaeological vestiges were presented, such as those which seeked to create typologies for the lithic industry of Angola and attempted to create chronologies, trying to insert artifacts in a regional and international perspective. Almeida sought in some of his analyses to reinforce notions already rejected at the time, such as that of European diffusionism, attributing a European origin to structures considered as of high complexity, located in the interior of Angola, such as the walled enclosures existent in the south of Angola, in Huila region.

As a summary of this phase of Portuguese archaeology in Angola, we have the participation

of Almeida and the French archaeologist Henri Breuil, at the *Congresso Pan-africano de Pré-história e Estudo do Quaternário* (Leopoldville 1959). The two authors seek to resume the state of Angolan archaeology and contextualize it regarding work done in the continent (Almeida and Breuil 1964).

The controversial positions of the colonial authors were a symptom of the state of Portuguese archaeology and its primordial involvement with the political cause, to the detriment of technical and scientific questions. By privileging anthropobiological studies, colonial archaeology in Angola up to that point skidded over elementary questions with the intention of sustaining a colonial regime in decadence and which was losing its references for existence. In the Portuguese, colony studies resumed themselves to prehistory with a racialized and evolutionistic inspiration. The obsessively biological dominance of anthropology and also of archaeology, according to Pereira (2005), blocked an analysis directed toward social and cultural questions in the anthropological missions, contributing to a classification of the colonized people as inferior races. The major objective of these "scientific" incursions was to provide the Salazar regime with arguments which would justify the maintenance of the status quo and the empire, based essentially on the decadent concept of "inferior races" and on the contrast between "barbarian and civilized."

With the death of Mendes Corrêa, the *Junta de Investigação do Ultramar* underwent significant changes, putting aside the perspective of physical anthropology in exchange for a more ethnological bias. In the case of Angola, it is important to point out the arrival of the anthropologist Santos Júnior – chief of the anthropobiological missions of Mozambique – to the University of Angola, located in Luanda and the founding of its department of anthropology in 1970. Archaeological teaching and research began on that same year, ministered not only by Santos Júnior but also by the writer Carlos Ervedosa, a great enthusiast of the Angolan past. His involvement with archaeology began in 1967 with the work conducted in the paleolithical sites of Baia Farta, in Benguela. After the arrival of Santos Júnior, a partnership was initiated between him and Ervedosa, resulting in work conducted in Benfica I Cobolombo, in the outskirts of Luanda, and on the rock paintings of Caninguri, in Mungo (Domingos 2009).

The archaeology classes at the *Universidade de Angola* produced very interesting results, as demonstrated by the article published by Jorge in 1974, where there can be found listed a great amount of sites discovered in the southwest of Angola on that same year. Vitor Oliveira Jorge, who was at the time professor of archaeology, discovered in 1973 during fieldwork an area with a large amount of objects, including a cemetery. The place went on from a simple archaeological site to being an object for teaching, something unprecedented in the colony.

This union between research and teaching was something innovative among the students of the colony. Despite the delay in the establishment of universities in the colonies, this was an important step for the development of archaeology on the territory, since the purely ideological and political interest of anthropology was withdrawn, bringing a perspective with a more scientific and cultural rigor. The reality altered itself, now problematizing more on scientific colonial practice, incorporating new points of view not necessarily connected to the state.

In this new phase of Portuguese colonial science, the research of Jorge and others was also innovative in two other aspects: it presented a critical reflection about the work previously carried out in Angola as well as the incorporation of historical and ethnological reports in his analyses. Jorge and others, even though inserted in the colonial structure, were able to establish some critics regarding work conducted in previous studies. His work on Angola can be found summarized in the text *Breve Introdução a Pré-História de Angola* (1975). Santos Júnior also contributed in an important way by conducting a wide research on the rock paintings in Angola, which resulted in an article in which he comments on his findings and possibilities for research (Santos Júnior 1974).

When studying the vestiges on earring cast molds found in an ancient city in the north of Angola and Quibaxe village, Rui de Sousa

Martins took advantage of the involvement with the traditional chief of the locality and gathered information on the use of earrings by the people of the region and what were the meanings attributed to them. Furthermore, he registered with detail the entire procedure used in the making of earrings, from the objects used up to the techniques and forms of preparation (Martins 1982).

Analyzing the methodology used by Martins, we can observe a change in Angolan archaeological practices when compared to the previous period. The registering and adoption of the local chief's knowledge regarding the artifact were not only an act of consideration but also a break in hierarchy, where the importance of the chief's wisdom was recognized and given the opportunity to him of interpreting and contributing to the archaeological interpretation. It also showed an interest, before absent, on the recent past of the people of Angola, the so-called people of the Iron Age. His work, together with those of Ervedosa, Oliveira Jorge, and Santos Júnior, marked the end of studies characterized by colonialist ideology in Angola, with the effective rupture in political terms occurring in 1975 with the declaration of independence.

Cross-References

- ▶ African Stone Age
- ▶ Central and West African Middle Stone Age: Geography and Culture
- ▶ Clark, John Desmond
- ▶ Jorge, Vítor Oliveira
- ▶ Race in Archaeology
- ▶ West and Central African Neolithic: Geography and Overview

References

Almeida, Antônio de, and Henri Breuil. 1964. Introdução à Pré-História de Angola. *Memórias da Junta de Investigação do Ultramar*. 2ª Série, Nº 50.

Castelo, Cláudia. 2012. Investigação científica e política colonial portuguesa: evolução e articulações, 1936–1974. *História, Ciências, Saúde – Manguinhos* 19 (2): 391. Rio de Janeiro.

Clark, J.D. 1963. *Prehistoric cultures of northeast Angola and their significance in tropical Africa*, Publicaçôes culturais. Vol. 62. Lisboa: Diamang.

Clark, J. 1966. *The distribution of prehistoric culture in Angola*, Publicaçôes culturais. Vol. 73, 15–102. Lisboa: Diamang.

Clark, J. 1971. Problems of archaeological nomenclature and definition in the Congo Basin. *The South African Archaeological Bulletin.* 26 (101/102): 67.

Clark, J.D., and J.H. Langeheim. 1968. *Further palaeo-anthropological studies in Northern Lunda*, Publicaçôes culturais. Vol. 78. Lisboa: Diamang.

Domingos, Sônia Ludmila da Silva. 2009. *Les Series Ceramiques des Amas Coquilliers de la* region *de Luanda (Angola): Contribution à l'étude de la Préhistoire recente angolaise.* Tese de Doutorado em Antropologia Social e História da Europa, Université de Toulouse II Le Mirail.

Ervedosa, Carlos. 1980. *Arqueologia Angolana*. Lisboa: Edições 70.

França, J. Camarate. 1960. Primeira nota sobre a Jazida Magosiense de Vila de Serpa Pinto (Angola). *Memórias da Junta de Investigação do Ultramar*. 2ª Série, Nº 16.

Jorge, Vítor. 1975. *Breve introdução à pré-história de Angola*. Guimarães: Revista de Guimarães.

Martins, Rui de Sousa. 1982. Um molde para fundição de brincos da antiga "Mbanza Kibashi" – Angola. Separata de: *Revista da Universidade dos Açores*, Série Ciências Humanas IV. pp. 437–458

Pereira, Rui Mateus. 2005. Raça, sangue e robustez: os paradigmas da antropologia física colonial portuguesa. *Cadernos de Estudos Africanos* Vol. (7–8), 209–242. Lisboa.

Poloni, Rita. 2011. A ciência vivida: a arqueologia e as missões antropológicas do oficial à prática. In Vitor R. Marques, Ana Cristina Roque & Ricardo Roque (ed.). *Atas do Colóquio Timor: missões científicas e antropologia colonial*. Lisboa: IICT.

Porto, Nuno. 1999. Manageable past: Time and native culture at the Dundo Museum in colonial Angola (Le passé manipulé. Le temps et la culture locale au musée du Dundo en Angola coloniale). *Cahiers d'Études Africaines* 39, Cahier 155/156.

Rodrigues, Maria Conceição. 1999. Os primórdios da investigação arqueológica em Moçambique e o Prof. Santos Júnior. Um reconhecimento arqueológico. *Portugalia* XIX–XX. Nova Série. pp. 265–279.

Santos Júnior, Joaquim dos. 1974. *Arte rupestre em Angola*. Porto: Instituto de Antropologia.

Further Reading

Bibliographical listing related to archaeology of Angola: http://www.african-archaeology.net/biblio/biblioang.html

Coelho, Ana Godinho, and Inês Pinto. 2015. Redescobrindo estações arqueológicas à guarda do IICT. *Africana Studia*. n° 24, 1° semestre.

Conde, P., A.C. Martins, and J.C. Senna-Martinez. 2016. Arqueologia em contexto colonial. Moçambique

e Angola entre a indiferença e a internacionalização. In *Perspetivas sobre Construir Ciência – Construir o Mundo*, ed. I. Malaquias, A. Andrade, V. Bonifácio, and E.H. Malonek. Aveiro: Universidade de Aveiro.

De Maret, Pierre. 1990. Phases & facies in the archeology of central Africa. In *A history of African archeology*, ed. Peter Robertshaw. London: James Currey.

Gutierrez, Manuel. 2008. *Recherches archéologiques en Angola: préhistoire, art rupestre, archéologie funéraire*. Paris: L'Harmattan.

Martins, Ana Cristina. 2015. Arqueologia portuguesa em solo africano durante o Estado Novo atores, espaços e projetos – o caso de Moçambique. *Africana Studia*. n° 24, 1° semestre.

Máximo, Bruno. 2017. *Um lugar entre dois mundos: paisagens de Mbanza Kongo.* Dissertação (Mestrado), Museu de Arqueologia e Etnologia da Universidade de São Paulo, São Paulo.

Archaeological Resource Management: The Changing Role of the State

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Introduction

In the United Kingdom (as in many other countries) the state, from the end of the Second World War onwards, played a dominant role in investigating, protecting, and presenting the nation's archaeological heritage. Now, in very many areas of life, the role of the state, and the relationship between citizen and state, is changing. Archaeology, and also heritage protection more generally, are affected by this in a variety of ways. The way in which state archaeological organizations operate in the future may be rather different than it has been in the past.

Key Issues/Current Debates/Future Directions/Examples

In 1945, immediately following the end of the Second World War, the Labour Party came into government in the United Kingdom, following a "landslide" victory in a general election. This marked the beginning of a phase of history in which, under the so-called "welfare state" philosophy, central government played an increasingly dominant role in many different areas of the life of the nation. The same trend was seen, in varying degrees, in many other liberal democracies in western Europe and beyond.

The investigation and protection of the archaeological heritage, and the presentation of this heritage to the public, was just one among many areas of activity in which the role of the United Kingdom state expanded greatly in the decades after 1945. Central government and its agencies undertook extensive archaeological surveys; new legislation was introduced to provide better protection for archaeological sites and monuments; officials selected more sites for such protection; greatly increased finance was made available for excavating sites threatened with destruction by development; important monuments were excavated, conserved, and displayed for the benefit of the members of the general public who wished to visit them; and guide books, produced and sold by the state at the monuments, gave authoritative accounts of the remains and their interpretation. One result of all this activity and expenditure was the development of a substantial archaeological profession. Another was the establishment of a particular kind of relationship, in the area of archaeology and archaeological protection, between the state and the archaeological profession on the one hand and interested members of the public on the other. The state was a major provider of interpretation and narrative (in a broad sense, and not least in the kinds of monuments and remains which it chose to investigate and protect), and the public was cast largely in the role of passive consumer of messages devised by officials of the state and archaeological professionals dependent on the state (Thomas 2004: 192–3).

Today, the situation is very different. The role of the state has changed quite significantly in recent years and is continuing to change. There is every indication that the rate of such change may, if anything, accelerate in the coming years.

There are many reasons for this. Globalization, the Internet, and the emphasis on "consumer choice" have made people much less ready to accept single, "official" versions of the nation's past. Increased leisure and mobility (for some, at least) have prompted people to find new ways to spend time. The digital social media are leading people to expect to contribute their own views (and to have these listened to) rather than simply being passive consumers of information and decisions emanating from the state and other large corporate bodies (Thomas 2004: 193–5). Most recently, the economic crisis which has engulfed large parts of Europe since about 2008 has left many governments struggling financially. Many states are cutting their expenditure drastically; in the future, they will not be able to provide all the things which they have been providing in the recent past.

This, then, is the broad background to this entry. Two main forces for change can be identified. First, people are much less ready and willing today to simply accept the authority of the state without question; people wish to decide for themselves what they believe, and they also want their voices to be heard by authority. Second, the state is less able to provide services (of many different kinds) than it was previously. The archaeological functions of the state are no exception to this; indeed, they may be among the more vulnerable because these functions can easily be seen as less necessary than, say, health or education. It is easy to see how these two trends can reinforce each other.

How, then, are these trends being manifested in archaeology and heritage protection in the United Kingdom today? And how are state archaeological organizations and their officials reacting to them?

The rejection of "official" views of the archaeological past can perhaps be seen most clearly in the way in which prehistoric archaeology and prehistoric monuments have been taken up by "New Age" and "pagan" believers. The conflicts over access to Stonehenge are well known (e.g., Bender 1998), but there are other examples of contest over the rights to, and interpretations of, prehistoric monuments. A particularly telling episode occurred when a prehistoric timber circle was exposed by storms on a beach in Norfolk in the east of England. The monument was quickly labeled "Seahenge." English Heritage (the principal state agency for archaeology and heritage in England) believed the monument to be at risk of destruction. It decided that the best course of action would be to investigate the monument scientifically (in the course of which some physical damage would be caused) and to remove the timbers from their context in the hope of preserving them elsewhere. The state was seeing the monument primarily as a resource for scientific inquiry by dissection. Other groups, however, had different ideas. Pagans of various kinds believed that the monument was a sacred place and should be left in peace. The conflict was acute and generated a huge amount of media coverage (Champion 2000).

Seahenge was an example in which the beliefs and perspective of a particular group clashed with those of the state. In other cases, a group may simply develop its engagement to the past with little or no reference to what the state thinks (if anything) of that group's perspective. "Pagan" or "alternative" uses and interpretations of ancient monuments (particularly prehistoric ones) are an example of this (Cope 1998).

Thus, in some instances the authority of the state may be challenged; in others the state is simply ignored because it is not seen as relevant.

Shifting power relations can be seen very clearly in the relationship between the media and the state. The television archaeology series "Time Team" has been immensely popular in England (and more widely) (Taylor 1998). It portrays archaeological investigation as a rather breathless pursuit, carried out by people who some might regard as slightly eccentric. In some cases, Time Team has wished to work on protected monuments, meaning that English Heritage's agreement has been needed. The relationship has not always been an easy one. Sometimes English Heritage has had reservations about what was proposed and has ended up being made to look slightly officious in the broadcast program. However, the public popularity of Time Team and its impressive viewing figures (routinely in the millions) have meant that English Heritage has not

wished to be uncooperative towards the program and its makers.

Overall, certain wider social trends – a readiness to reject "official" versions of the past in favor of alternative ones, to challenge state authority, and to pursue different agendas from those advocated by the state – are reflected in the public's approach to archaeology and heritage. There is no doubt that responding to these trends poses considerable challenges for state archaeological and heritage organizations, accustomed as they are to "top-down" ways of seeing the world and of operating. How have such organizations tried to respond?

"Designation" (protecting buildings, monuments, and areas by giving them specific legal protection) has long been a key state function. Traditionally, decisions about which monuments to select for designation were made by officials, using criteria which reflected a particular outlook and set of priorities (Thomas 2004: 192–3). In recent years, a number of things have happened. First, English Heritage has encouraged members of the public to propose sites for designation and has provided a means of doing this online. Second, the idea of "local listing" – that is, designation at a local level, by local authorities, using locally developed criteria – has been promoted. This is seen as a more locally responsive system than one operated entirely by central agencies. In theory, "local lists" are meant to supplement national designation, allowing things which would not meet the stringent national selection criteria to be given some formal recognition, but it is possible that some locally listed items will be ones which are of national importance, but which central government has not yet had the resources to designate at national level. Third, English Heritage has undertaken a number of programs to assess the material legacies of "underrepresented" groups in England (English Heritage n.d. a, b, c).

Another interesting development has been the Portable Antiquities Scheme, in which public funding supports professional archaeological staff who record objects found by metal-detector users and other members of the public (Portable Antiquities Scheme n.d.). In England, there is no obligation on finders to report archaeological discoveries (other than those which fall into the restricted category of objects which are legally defined as "treasure"), so the scheme is very much about professional archaeologists reaching out to the public and working with them. Relations between professional archaeologists and metal detectorists have sometimes been uneasy in the past. When metal detecting first became widespread, some archaeologists wished to see it made illegal. That was never likely to happen (and certainly will not happen now), so engaging with metal detectorists has been the only viable option. In fact, many detectorists are deeply interested in the past and have a strong desire to be involved in its discovery but have chosen metal detecting, rather than (say) going on organized excavations, as their way of doing this.

Another recent growth area has been community archaeology (Council for British Archaeology n.d.). This is a large topic, but the broad thrust is clear – it is about nonprofessionals engaging actively in archaeology themselves and about some professionals acting as trainers and enablers, helping nonprofessionals to carry out archaeological projects which are of direct interest to them. One of the sources of funding for community archaeology is the Heritage Lottery Fund (which distributes fund raised by the National Lottery, established by the state in 1994). Of particular interest is the Community Archaeology Bursaries Scheme, under which the Heritage Lottery Fund and the state archaeological bodies for England, Wales, and Scotland support training placements "to equip would-be community archaeologists with the skills, experience and confidence to work with voluntary groups and communities." The message is clear – rather than the state doing archaeology on behalf of the citizen, it is helping the citizen to do archaeology on behalf of himself or herself.

All of the forms of activity described above are reflections of a changing relationship between state and citizen in the area of archaeology and of changes in the way the state operates, made in response to this changing relationship. Citizens are no longer so willing to be the passive consumers of messages generated by state-employed professionals, and the Internet and social media provide new and larger opportunities for the

citizen to make his or her voice heard and to exchange views and information directly with other citizens. At the same time, the state's ability to do everything itself is declining, which makes it difficult for professionals to argue (even if they wanted to) that archaeology is best left to the state and the professional to do.

In many ways, what is happening in archaeology in the United Kingdom today is a microcosm of what is happening in society more widely: a public which expects to have its views listened to by the state, a state which cannot afford to do everything which it might like to do or which it used to do, and a voluntary sector which is starting to show signs of filling some of the gaps left by the state. The activities described above are all examples of new kinds of relationships being negotiated between the state and the citizen, in a world which is changing rapidly and which is already markedly different from that of the "welfare state" which emerged after 1945.

There is no doubt, of course, that the state will continue to play a very important role in archaeology in the future. Not least, the imposition of legal controls on private property is something which can only be done by, or with the full backing of, the state. Nonetheless, it is clear that the role of the state in archaeology, and the relationship between citizen and state in this area, has changed substantially over the past 20 or so years. It seems beyond doubt that it will continue to do so in the years and decades ahead.

Cross-References

- ► Community Archaeology
- ► Heritage and Archaeology
- ► Heritage and Public Policy
- ► Metal Detecting in Archaeology

References

Bender, B. 1998. *Stonehenge. Making space*. Oxford: Berg.

Champion, M. 2000. *Seahenge: A contemporary chronicle*. Barnewell: Timescape Publishing.

Cope, J. 1998. *The modern antiquarian: A pre-millennial odyssey through megalithic Britain*. London: Thorsons.

Council for British Archaeology. n.d.. Available at: http://www.archaeologyuk.org/community/. Accessed 27 Feb 2013.

English Heritage. n.d.-a. Available at: http://www.english-heritage.org.uk/caring/listing/listed-buildings/. Accessed 27 Feb 2013.

English Heritage. n.d.-b. Available at: http://www.english-heritage.org.uk/caring/listing/local/local-designations/. Accessed 27 Feb 2013.

English Heritage. n.d.-c. Available at: http://www.english-heritage.org.uk/discover/people-and-places/disability-history/. Accessed 27 Feb 2013.

Portable Antiquities Scheme. n.d.. Available at: http://finds.org.uk/. Accessed 27 Feb 2013.

Taylor, T. 1998. Behind the scenes at Time Team. London: Channel 4.

Thomas, R.M. 2004. Archaeology and authority in the twenty-first century. In *Public archaeology*, ed. N. Merriman, 191–201. London: Routledge.

Archaeological Review from Cambridge

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Brief Definition of the Topic

The Archaeological Review from Cambridge (ARC), first published in July 1981, is a biannual academic journal of archaeology, with calls for papers released approximately 18 months before its two publication dates (April and November) (Fig. 1). It is run on a nonprofit, voluntary basis by postgraduate students at the University of Cambridge. The present Committee is comprised of members working on such diverse research projects as Croatian Epigravettian subsistence strategies and Etruscan identities.

Rooted primarily in archaeological theory and practice, publication in ARC is open to all, and it increasingly invites a wider range of perspectives

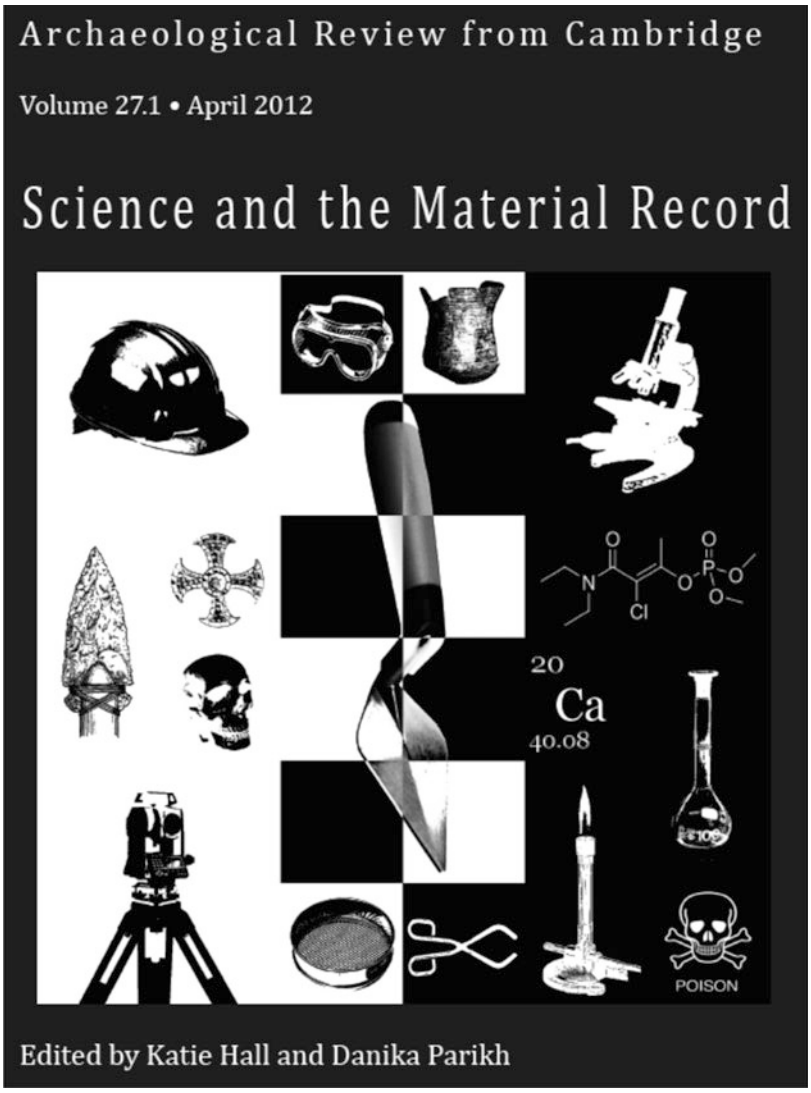

Archaeological Review from Cambridge, Fig. 1 Cover of the April 2012 issue of the Archaeological Review from Cambridge

with the aim of establishing a strong, interdisciplinary journal which will be of interest in a range of fields. Recent issues have focused on such topics as violence in the material record, boundaries and archaeology, and economic crises:

- volume 26.1 (April 2011): *Archaeology and Economic Crises*. Edited by Suzanee E. Pilaar Birch and Rosalind Wallduck
- volume 25.2 (Nov. 2010): *Boundaries and Archaeology*. Edited by Mark Sapwell and Victoria Pía Spry-Marqués
- volume 25.1 (April 2010): *Violence and Conflict in the Material Record*. Edited by Skylar Neil and Belinda Crerar

Current issues under production include Katie Hall and Danika Parikh's (eds) *Science in the Material Record* (27.1 – April 2012), which looks at how advances in archaeological science have opened up new vistas when it comes to the interrogation of archaeological material in the twenty-first century, and Dominic Walker's (ed.) volume on *Collaborative Archaeology*,

due to be published in November 2011 (issue 26.2).

Cross-References

- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Landscape Archaeology
- ▶ Modern Material Culture, Archaeology of
- ▶ Zoning: Boundary Areas and Buffer Zones

Further Reading

Archaeological Review from Cambridge. n.d. Available at: http://www.societies.cam.ac.uk/arc/.

Archaeological Soil Micromorphology

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Introduction

Archaeological soil micromorphology, which has become increasingly developed as a technique over the last 70 years, is now a major global component of geoarchaeological investigations. This is because it not only provides information for landscape studies but is best able to identify site formation processes, land use such as numerous types of cultivation, and use of space within houses and settlements (Lee et al. 2014). Key to this is the recognition that soils and sediments are not only worthy of contextual study but also that being artifacts they are a fundamental part of the archaeological record.

Definition

Archaeological soil micromorphology is adapted from soil science and geology using thin sections and the polarizing microscope, where undisturbed soils and sediment samples are stabilized by resin impregnation before thin sectioning. This method has now become developed specifically in order to investigate soils and sediments affected or produced by humans; the latter includes a wide variety of archaeological materials. The technique employs the use of standard optical (plane polarized light [PPL], crossed polarized light [XPL], and oblique incident light [OIL]) and fluorescence (e.g., ultraviolet light [UVL], blue light [BL]) microscopy, as well as instrumental studies on thin sections, such as scanning electron microscopy (SEM), energy dispersive X-ray spectrometry (EDS), microprobe, micro Fourier transform infrared spectroscopy (micro-FTIR), and micro X-ray fluorescence (micro-XRF). Methods and applications have developed especially over the last 30 years with standardized descriptive and various numerical methods and the employment of such geological concepts as "microfacies" and a hugely enlarged reference base (Bullock et al. 1985; Courty et al. 1989; Courty 2001; Goldberg and Macphail 2006; Macphail and Goldberg 2018a; Nicosia and Stoops 2017; Stoops et al. 2018).

Historical Background

Ian Cornwall, Institute of Archaeology, University College London, UK, was the first person to apply the new technique of soil micromorphology as developed by Kubiena (1938) when working with Frederick Zeuner, the first ever professor of Environmental Archaeology. Cornwall contributed numerous analytical reports on British and foreign archaeological sites during the 1950s and 1960s (11 are cited in a review of soil science in English archaeology; Macphail 1987). For example, Cornwall provided a barrow-buried thin section study on the classic Neolithic cultivated site of Kilham, North Yorkshire, when working with major environmentalist archaeologists (Dimbleby and Evans 1974). These first investigations were followed up by the Scottish soil scientists Romans and Robertson (Macaulay Institute, Aberdeen), who when providing analytical data on Scottish soils managed to investigate a number of

monument-buried soils dating to the Neolithic and Roman periods, with special focus on environmental change and ancient cultivation (Romans and Robertson 1983).

The next major advance came in an international collaboration, which considered that the current understanding of soil science and geology could be applied to the soil micromorphological study of archaeological soils worldwide; this was done through a series of thematic chapters and case studies in "Soils and Micromorphology in Archaeology" (Courty et al. 1989). The authors had the great benefit of the advice of internationally famous soil scientist Nicholas Fedoroff (Institut National de la Recherche Agronomique – INRA; Paris-Grignon, France). Subsequently this methodology has continued to advance through experiments, the increased employment of associated instrumentation and closer collaborations with other scientists (e.g., soil chemistry, macro- and microfossils) studying the same soils and sediments (Cruise et al. 2009; Viklund et al. 2013; Linderholm et al. 2019). As archaeology has now often come to rely on the data that thin section studies can provide, the number of workers in this field has expanded exponentially, while the number of soil micromorphologists working in agronomy has shrunk dramatically. High standards have in part been encouraged by the establishment of the Working Group on Archaeological Soil Micromorphology in the early 1990s. Important advances have also been made by taking part in long-term archaeological experiments such as the Experimental Earthworks Project and Butser Ancient Farm in the UK and at Umeå University, North Sweden, and by extemporizing experiments and employing ethnographic analogue sites to examine specific questions across Europe and Africa (see Banerjea et al. 2016; Goldberg and Macphail 2006; Mallol et al. 2017; Shahack-Gross 2011).

Current Themes of Study

The number of ways that soil micromorphology contributes to archaeological investigations is ever-increasing. In the first instance, these relate to attempts to match pedological and/or sedimentological formation processes with human occupation, whether in open air sites or in caves, for example. In many cases, these formation processes are simply contemporary and not influenced by human activity. Such studies can only be carried out if there is a very clear understanding of the processes that effect *buried soils* and *sediments*. It also has to be remembered that during the Pleistocene and at sites affected by human-induced colluviation, surfaces may be ephemeral and pedological development is likely to be very weak. Here, we are dealing with *soil sediments*. In some cases, sites have been preserved by sediments associated with alluviation and/or marine inundation, and here not only are these events required to be recognized, but also their effects on buried surfaces need to be understood. Thus, *inundated sites* necessitate comprehension if microfeatures now present in buried landscapes are to be interpreted properly.

Another key area is the study of *archaeological materials*, and these include everything from human latrine waste and animal coprolites to constructional and industrial materials. In terms of major human impact on the landscape, *clearance* and *cultivation* are often of primary importance and require accurate identification. Closer analysis of complex societies however also warrants a clear idea of how *occupation surfaces* reflect use of space by humans and stock, but this is only one part of how *settlement morphology* can be elucidated. There will also be water holes and wells, graveyards, and middening areas, for example. Lastly, *site transformation* studies show how once recognizable occupation layers and farmed soils, for instance, became reworked after abandonment or through a land use change. This is a key aspect of investigation on any archaeological site. In fact, there has been a major focus on these kinds of studies on some of the most challenging archaeological deposits worldwide, such as European Dark Earth and Amazonian Dark Earths (e.g., *terra preta*; Arroyo-Kalin 2017). These eight themes which are discussed in detail elsewhere (Macphail and Goldberg 2018a) are now briefly presented.

Issues concerning how *buried soils* and *sediments* could be accurately interpreted were first

addressed by soil micromorphological components in the Experimental Earthworks Project, UK, both on base-rich chalk soils (Overton Down, Wiltshire) and on acid soils (Wareham, Hampshire) (Macphail and Goldberg 2018a, 100–109). The chief result was the recognition that changes and compaction occurred rapidly after burial, especially at Overton Down, where an open, rooted, and earthworm-worked Mull horizon was transformed into a compact soil. In places, earthworms had migrated upward blurring the buried soil boundary. Compaction was in part due to a loss of organic matter (roots had disappeared or been finely fragmented) – as also shown by soil chemistry. The nature of soil burial is thus very important, and conditions of burial vary according to pH, degree, or absence of waterlogging and/or periodic anaerobism, extant soil fauna, weight of overburden, migrating solutions, etc. Neolithic chalk soil examples include the Rendzinas below Neolithic Easton Down and soil dump which formed the Neolithic bank barrow at Maiden Castle, Dorset, which encouraged earthworms to burrow downward into the buried soil; chalky soil burrow fills were in stark contrast to the original decalcified buried soil (Macphail and Goldberg 2018a, 109–113). In the case of the Gokstad ship burial mound, Vestfold, Norway, the anaerobic conditions which preserved the wooden long ship also encouraged the migration of phosphate within the turf mound. Vivianite became concentrated along some plant litter layers within the turf stack (Figs. 1 and 2) (Macphail et al. 2013).

Although an aspect of European prehistoric and historic colluvia is an outcome of clearance and/or cultivation, *soil sediments* are more often encountered in Pleistocene sequences, where these deposits can bury palaeosols or form palaeosols. Investigations of palaeosols with associated artifacts should always pay attention to the provenance of bones and stone tools, as concentrations of such materials can simply be the result of geological processes rather than cultural activity. Accurate interpretation is even more crucial at early hominid sites. The micromorphology of soil sediments and associated palaeosol formation, in relationship to the erosion of unstable soils, for example, has been investigated for a long time (Fedoroff et al. 2018). Climatic conditions, especially those involving cycles of freezing and thawing, have come under special scrutiny, especially in North West Europe and North America.

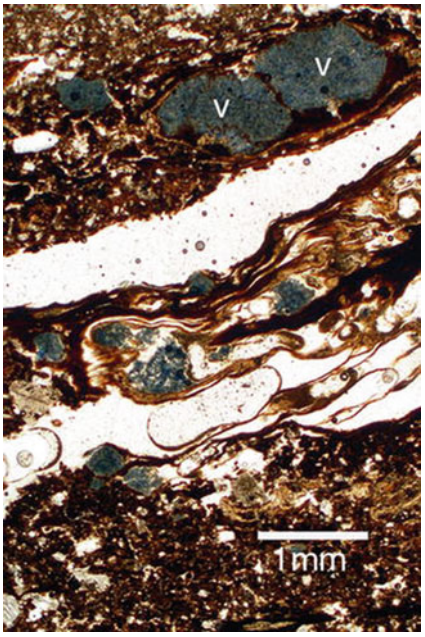

Archaeological Soil Micromorphology, Fig. 1 Late Roman Leicester, UK (Freeschool Lane, dark earth deposits); photomicrograph of lead (Pb) droplet embedded in calcitic ash, recording an earlier period of artisan activity – perhaps lead pipe soldering. This Context 6450 is generally strongly enriched in lead (2560 μg g^{-1}), a common metal on Roman sites (analysis by John Crowther, University of Wales Trinity St David) (Macphail and Goldberg 2018a). Plane polarized light (PPL)

Cave sedimentology has also improved our understanding of natural geological and faunal processes and its ability to differentiate sedimentary layers that are strongly influenced by human activity (Karkanas and Goldberg 2018). For example, mudflows occur beneath sink holes in caves, bird and bat guano strongly affect phosphatization, while large animal scavengers might burrow into "middens" and deposit coprolites. Diffuse hearth deposits are often termed combustion zones because of fragmentation by wind, water, and human and animal activity (Mallol et al. 2017). Recent micromorphological work on caves has been applied to site formation studies

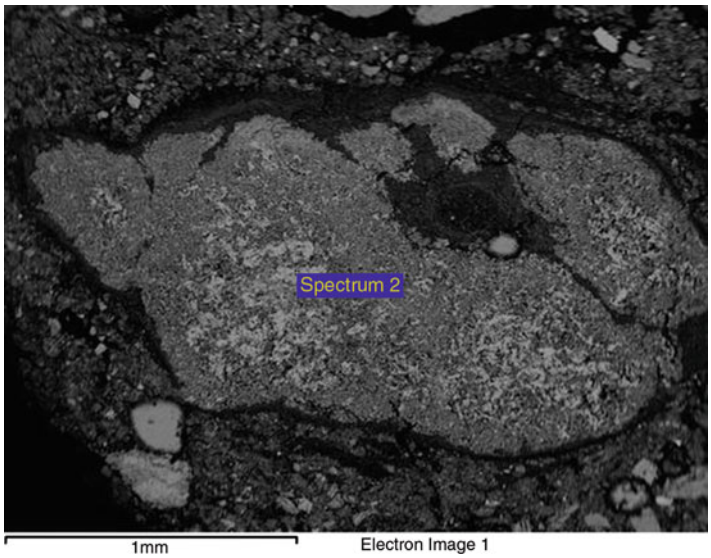

Archaeological Soil Micromorphology, Fig. 2 As Fig. 1, under oblique incident light (OIL). Thilo Rehren, University College London (employing a metallurgical microscope), tentatively identified pure lead (1), with corrosion haloes of red lead oxide (2) and lead carbonate (3) within this ashy aggregate. SEM/EDS analysis on this and other examples confirmed this: red lead oxide, 92.8% Pb (100% PbO); lead carbonate, 86.3% Pb, 5.67% Ca, 7.23% P; surrounding ashes, 43.0% Pb; 10.6%; Ca, 7.83% P (Macphail and Goldberg 2018a)

a number of cave sites, Contrebandiers in Morocco, Roc de Marsal and Pech de l'Azé IV in France, Wonderwerk in South Africa, and Liang Bua in Indonesia, providing significant information about the human and natural environments during occupation (e.g., Goldberg et al. 2018 and Morley et al. 2017).

Open-air occupations are much more prone to reworking compared to caves, but there are some exceptions, for example, and *inundated sites* can show good preservation, although these have to be interpreted with caution. Soil micromorphology has shown that some low-lying terrestrial areas, which were a focus of occupation by hunters and gatherers, for example, were affected by rises in sea level and/or freshwater inundation caused by a similar rise in base level. Together with faunal and artifact refitting analyses, sediment micromorphology showed that butchery and Acheulian hand axe manufacture occurred on mudflats within the intertidal zone at Boxgrove, West Sussex, UK, where a chipping floor was studied within marine alluvium (Macphail and Goldberg 2018a, 186–206). The full 20 km extent of the palaeo-coastline was found through borehole cores and sediment micromorphology analysis of these (Roberts and Pope 2018).

In the case of complex societies, there is the ever-increasing need to identify *archaeological materials*, whether these are of simple constructional origin, such as earth-based daub/adobe, or sophisticated manufactures – for example, lime-based plaster, iron slag, nonferrous metals, alloys, etc. Artisan activity such as soldering lead pipes in Roman and medieval constructions can lead to lead droplets being preserved in occupation sediments (Figs. 3 and 4). In addition, there are other background deposits in the form of fuel and kitchen wastes (charcoal, charred peat, calcitic ashes, bone, burned bone, eggshell) and animal dung and various forms of latrine deposits (Macphail and Goldberg 2018b; Brönnimann et al. 2017a, b). Moreover, the interpretation of *occupation surfaces* within archaeological deposits has been crucial in determining use of space within structures (Gé et al. 1993; Rentzel et al. 2017); this has been further elucidated by experiments (Goldberg and Macphail 2006, 258–263). Such studies have also included ethnoarchaeological investigations as a way of

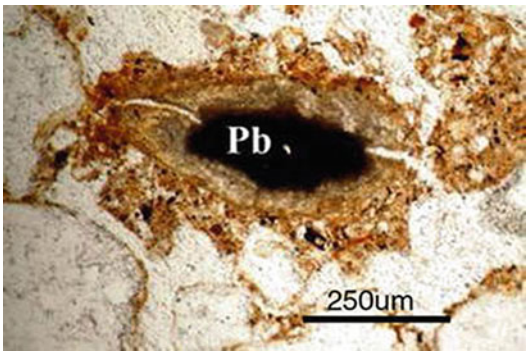

Archaeological Soil Micromorphology, Fig. 3 Viking Gokstad ship burial mound, Vestfold, Norway; photomicrograph of turf layers ("laminated mull humus"), with vivianite (crystalline iron phosphate [e.g., $Fe_3(PO_4)_2$ H_2O] formed under reduced conditions) associated with humified plant litter layers, and recording migration of phosphate from pasture soil turf within the mound. PPL (Macphail and Goldberg 2018a)

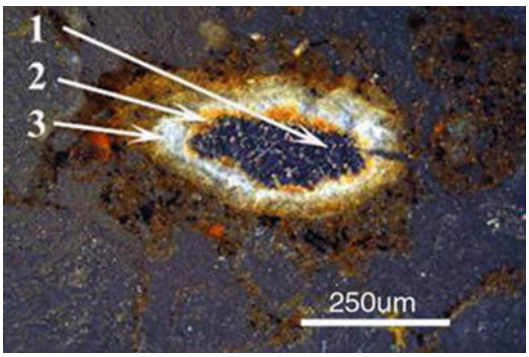

Archaeological Soil Micromorphology, Fig. 4 As Fig. 4, SEM/EDS X-Ray backscatter image of vivianite within laminated mull horizon characterized by layered plant litter and amorphous (humified) organic matter. EDS spectrum found 45.6% Fe (58.7% FeO) and 16.7% P (38.2% P_2O_5). Scale = 1 mm (Macphail and Goldberg 2018a)

understanding *settlement morphology* better (Macphail et al. 2017).

One example is the multi-method geoarchaeological investigation of dung, which included its preservation and spatial distribution associated with cattle management in abandoned Maasai settlements in East Africa (Shahack-Gross 2003). Some Neolithic cave deposits might be totally anthropogenic in origin, as many meter-thick ashed dung and stabling remains were formed by the overwintering of stabled ovicaprids in the Mediterranean region. In the study of settlements and local land use, local building material sources, paths, trackways, cesspits, waterholes and wells, and even cremation, excarnation, and inhumation features require investigation alongside ubiquitous waste disposal midden deposits (Goldberg and Pérez-Juez 2018). For example, at a truncated Viking grave mound at Hesby, Vestfold, Norway, body stains, tentatively identified in the field and subsequently mapped by phosphate analysis (Figs. 5 and 6), were found to be amorphous iron-phosphate-calcium compounds; in the Viking boat grave at Heimdalsjordet wood, iron nails and calcium phosphate-replaced human remains were found (Viklund et al. 2013; Macphail et al. 2013). At both sites standard excavation, geochemical mapping, and soil micromorphology, complemented by EDS, fully characterized this Viking grave mound.

Settlements are often associated with farming communities, and local areas would likely have undergone *clearance* and *cultivation*. One of the earliest contributions of soil micromorphology was its ability to identify cultivation. The microfeatures found in arable soils by Dutch soil scientists allowed workers to tentatively suggest that similar features in disturbed surface soils found under monuments, for example, could record a cultivation history (Romans and Robertson 1983). This suggestion was followed up by experiments in the use of cultivation tools, including replica ards, in France, Germany, and the UK, and the subsequent analysis of the resulting soil microfabrics (see Deák et al. 2017); rice cultivation has also been tackled (Lee et al. 2014). It has always been important, however, to be able to broadly differentiate between the soil disturbance and resulting colluviation caused by cultivation and that caused by woodland clearance (Deák et al. 2017; Macphail and Goldberg 2018a, 290–303). While cultivation tends to homogenize soil, clearance soils, in contrast, might display heterogeneity, with fragments of mixed soil horizon materials being represented. Burned soil might also be present, if fire was involved. Arable soils which are not manured may lose structure

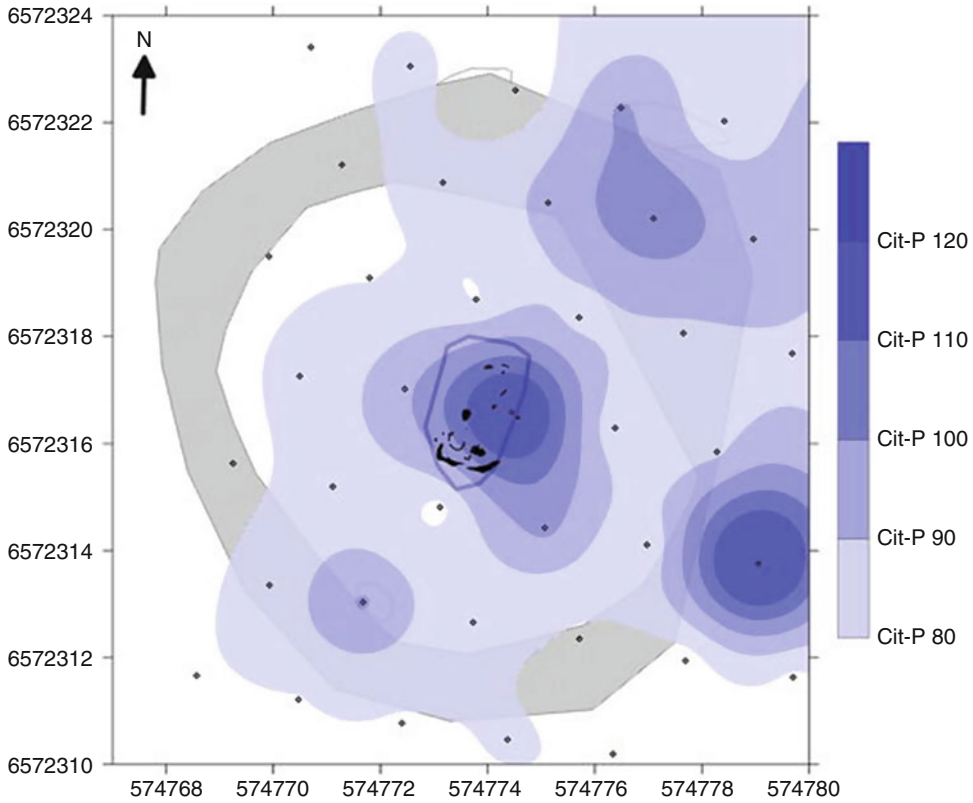

Archaeological Soil Micromorphology, Fig. 5 Map of truncated Viking grave mound (Hesby, Vestfold, Norway); map shows phosphate distribution (dark blue equals highest concentrations – see Fig. 6) (analysis by Johan Linderholm, MAL, University of Umeå, Sweden) (Viklund et al. 2013)

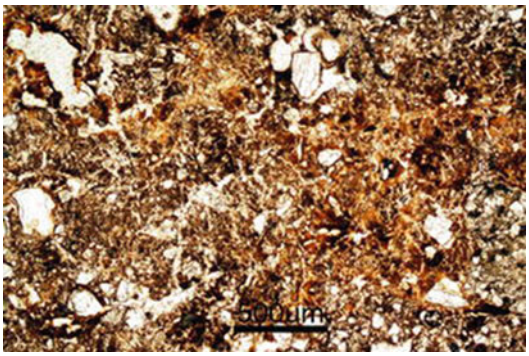

Archaeological Soil Micromorphology, Fig. 6 As Fig. 5, photomicrograph of phosphate-rich area; "body stain" fine silty clay fill inside grave, composed of very abundant iron staining and void hypocoating. Note fibrous secondary iron in voids. Iron also impregnates a relict organic content. EDS found mean 33.8% Fe, max 48.1% Fe; mean 9.34% P, max 14.4% P; mean 2.26% Ca, max 3.77% Ca as mineralized human body residues. PPL (Viklund et al. 2013)

and suffer reduced fertility, and so manuring practices developed. Soil chemistry and field walking may indicate manuring with animal dung and settlement waste. In thin section, the residues from manuring may also be evident. These can be in the form of pottery fragments and burned flint and daub, while coprolitic bone and amorphous phosphate – sometimes embedding calcitic ash – from night soiling, i.e., the use of household latrine waste, may additionally be found.

"Mixed farming" involved both cultivation and animal management, and in some circumstances dung traces can be recognized in ancient arable soils, which are high in organic phosphate of dung origin. In the settlements themselves, use of space investigations can show areas of a long house or a specific roundhouse, for example, which was used to stable animals. In more urban environments, not all animal waste could be used

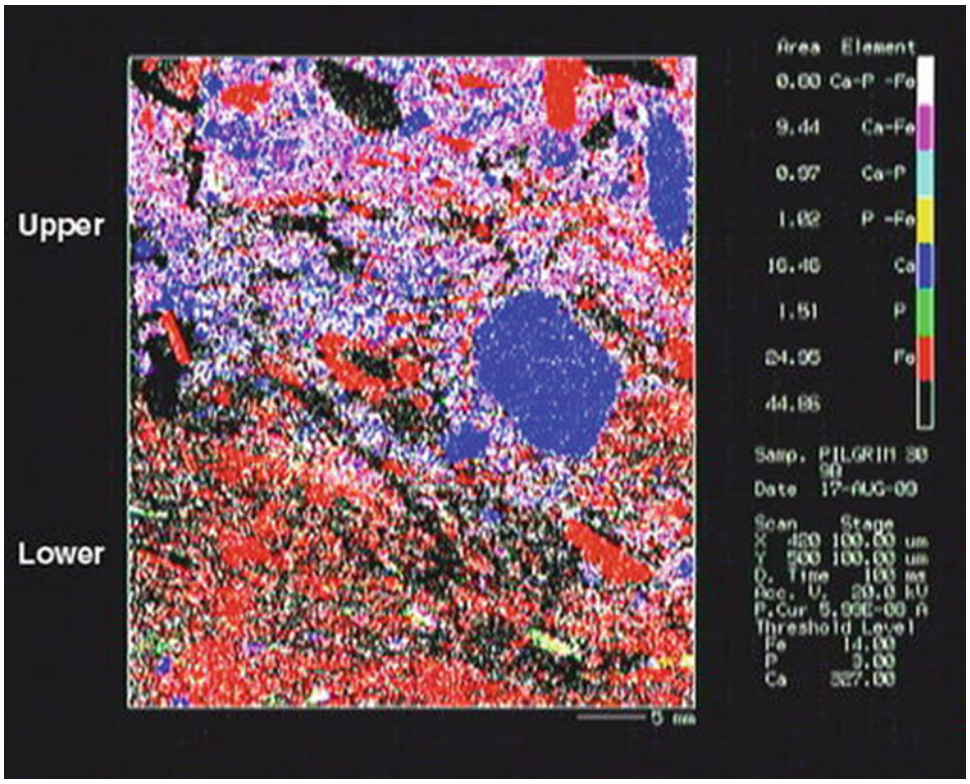

Archaeological Soil Micromorphology, Fig. 7 Fourteenth-century dumped occupation floor deposits (Pilgrims School, by Winchester Cathedral, Winchester, UK); microprobe map of Context 309B; 309B upper is composed of mixed calcareous (ashy) floor and kitchen waste (Pb [0.06%] enriched); 309B lower is an Fe-stained layered stabling waste dump – which also shows some P enrichment; 1.12% mean Fe, max. 7.12 Fe; 0.162% mean P, max. 1.39% P; 0.394% mean S, max. 1.20% S (see Fig. 8). (Microprobe map of Ca-P-Fe; scale = 5 mm) (Macphail and Goldberg 2018a)

on the fields and was often dumped by roadsides and in open area middens. Interdisciplinary analysis of layered, humified plant-rich stabling waste, employing soil micromorphology, microprobe, macrofossil, and pollen analysis (e.g., at Butser Ancient Farm, Hampshire, UK), has found them to have specific characteristics (Figs. 7 and 8) compared to generally more minerogenic earth floors formed in domestic space (Macphail and Goldberg 2018, 342–377; Rentzel et al. 2017). The latter is likely to include much more kitchen and burned waste and as a consequence often has an enhanced magnetic susceptibility.

Lastly, soil micromorphology has the ability to reveal *site transformation*, when postdepositional processes (Courty et al. 1989, 138–189; Stoops et al. 2018) affect what may once have been recognizable as archaeological stratigraphy. These processes include mechanical working by plants and animals, as well as pedological ones, such as leaching and horizonation. The effect of marine inundation on ancient land surfaces, as noted above, is one example where information on past land use may still be relatively easy to discern. There are other more extreme examples of the transformation of archaeological layers, and these are the Urban Dark Earth of Europe and Amazonian Dark Earths (Arroyo-Kalin 2017; Macphail and Goldberg 2018, 490–515; Nicosia et al. 2017). In the case of northwest Europe, there has been a focus on seeking information on urban land use from dark earth that dates to the late Roman (late Antique) to medieval periods, where homogeneous deposits occur between stratified Roman and Medieval layers. Work in England, France, Belgium, and Italy has shown

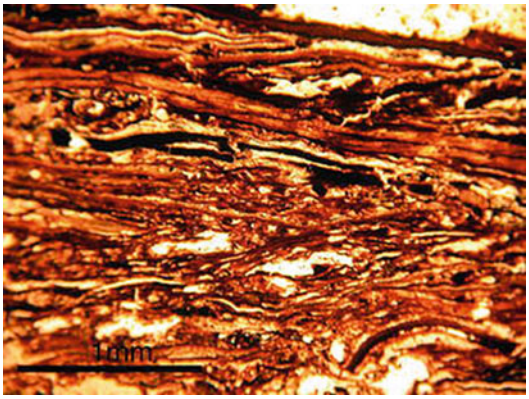

Archaeological Soil Micromorphology, Fig. 8 As Fig. 7; stabling waste in Context 309B lower: Overall Context 309 bulk analysis: 34.4% LOI, 3.92 mg g^{-1} phosphate-P, 10.5 × 10^{-8} SI χ, 4.13% χ_{conv}, 736 μg g^{-1} Pb, 84.5 μg g^{-1} Zn, 47.4 μg g^{-1} Cu; Pollen from 309B lower: cereal types (19%) and grasses (57%) and range of herbaceous taxa (21%) are consistent with presence of dung/stabling waste composed of straw/chaff and grass hay; long, horizontally oriented humified monocotyledonous plant fragments, with long articulated phytoliths and intercalated silt. PPL. (Chemical analysis by John Crowther, University of Wales Trinity St David; pollen data from G. M. Cruise, freelance) (Macphail and Goldberg 2018a)

that soil micromorphology is one of the best tools for this kind of investigation, especially when backed up by associated and carefully analyzed small artifact and bulk soil studies that include macro- and microfossil identifications (e.g., pollen and phytoliths) (Devos et al. 2017). Firstly, the decay of earth-based buildings and weathering of lime plasters and mortar, dating to a supposed decrease in urban populations, provide much of the "soil" in dark earth. Secondly, abandoned and robbed-out house plots often became favored areas for ash middening by the remaining town dwellers. Latrine and butchery residue dumping and inhumations in newly formed waste ground within some Roman cities likely reflect a breakdown in municipal regulations. These deposits became almost totally homogenized and weathered into brown soils, ~~for example~~ during second- to third-century AD. Other dark earth layers on the other hand can record a renewed and different use of "urban" space in the late Roman and early medieval periods. Middening and animal dung-rich deposits indicate stock management in a form of rural suburban lifestyle. There is compelling soil evidence that urban space was never totally abandoned in general and that early medieval urban life, recorded by dark earth and the micro-artifacts it contains, was possibly enjoyed by larger populations than during Roman times in some European cities. Numerous case studies in Brussels have allowed the reconstruction of how the settlement developed and changed from early medieval times, for example (Devos et al. 2017).

International Perspectives

It is remarkable to note that the technique of soil micromorphology, first employed across North America and Europe to study questions concerning agronomy and palaeosols, which was first a mainly "European" technique when applied to archaeology, has now gone global. Research and teaching in archaeological soil micromorphology in the North America were almost exclusively carried out by Paul Goldberg at Boston University and his past students. It is surprising that this application has yet to properly catch on in the USA. In Europe, in stark contrast, the subject has gone from strength to strength with major centers of expertise in the UK (Cambridge, London, Reading, Stirling, York), Belgium (e.g., Brussels), France (e.g., INRAP), Germany (Frankfurt and Tübingen), Greece (Athens), Italy (e.g., Milan, Pisa, Padova), Spain (e.g., Barcelona, Lleida, and Tenerife) and Switzerland (e.g., Basel), with other key workers in Czech Republic, Greece, Holland, Romania, etc. Encouragingly, new students of the subject are now emerging from Asia (Seoul, Korea) and North and South America.

Since the 1980s archaeological soil micromorphology has been an integral part of workshops and conferences, within organizations such as the International Union of Soil Science International Working Meetings in Soil Micromorphology (e.g., London 1981, Paris 1985, Austin, USA 1988, Ghent 2001; Lleida, Spain 2012; Mexico City 2016). In addition, since the 1990s, specific archaeological soil micromorphology workshops have been held annually/biannually, to aid training and promulgation of the discipline. In recent

years workshops have also been organized as part of Developing International Geoarchaeology (DIG) meetings, and during 2008–2018 an annual weeklong intensive training course in archaeological soil micromorphology has been organized at the Institute of Archaeology, University College London, where it had all started some six decades previously. Lastly, six workshops and training sessions are taking place across the world in 2019.

Future Directions

Future directions include (1) technical advances and (2) more integrated approaches to site reconstruction. In the first case, interdisciplinary analyses allied to soil micromorphology are correlated bulk analyses for chemistry, magnetic susceptibility, and micro- and macrofossil recovery, paralleled by phytolith, SEM/EDS, micro-FTIR, and microXRF analyses directly on the thin section. The integration of all this data has expanded from use of studies, for example, in houses or caves, to attempts to reconstruct how whole settlements function through time. Such advances permit both the first use of fire and salt working practices to be identified and further allow the modelling of the interconnectivity of activities inside, around, and between settlements – and this also incorporates a landscape functioning as fields, pastures, and routeways for trade.

Cross-References

- ▶ Aksum: Environmental Archaeology
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Soil Micromorphology Working Group
- ▶ Chemical Survey of Archaeological Sites
- ▶ Geoarchaeology
- ▶ Paddy Soils: Environmental Analyses
- ▶ Urban Dark Earth

References

Arroyo-Kalin, M. 2017. Amazonian dark earths. In *Archaeological soil and sediment micromorphology*, ed. C. Nicosia and G. Stoops, 345–358. Chichester: Wiley Blackwell.

Banerjea, R.Y., M. Badura, U. Kalējs, A. Cerina, K. Gos, S. Hamilton-Dyer, E. Maltby, K. Seetah, and A. Pluskowski. 2016. A multi-proxy, diachronic and spatial perspective on the urban activities within an indigenous community in medieval Riga, Latvia. *Quaternary International* 460: 3–21.

Brönnimann, D., C. Pümpin, K. Ismail-Meyer, P. Rentzel, and N. Égüez. 2017a. Excrements of omnivores and carnivores. In *Archaeological soil and sediment micromorphology*, ed. C. Nicosia and G. Stoops, 67–81. Chichester: Wiley Blackwell.

Brönnimann, D., K. Ismail-Meyer, P. Rentzel, C. Pümpin, and L. Lisá. 2017b. Excrements of herbivores. In *Archaeological soil and sediment micromorphology*, ed. C. Nicosia and G. Stoops, 55–65. Chichester: Wiley Blackwell.

Bullock, P., N. Fedoroff, A. Jongerius, G. Stoops, and T. Tursina. 1985. *Handbook for soil thin section description*. Wolverhampton: Waine Research Publications.

Courty, M.A. 2001. Microfacies analysis assisting archaeological stratigraphy. In *Earth sciences and archaeology*, ed. P. Goldberg, V.T. Holliday, and C.R. Ferring, 205–239. New York: Kluwer.

Courty, M.A., P. Goldberg, and R.I. Macphail. 1989. *Soils and micromorphology in archaeology*, Cambridge Manuals in Archaeology. Cambridge: Cambridge University Press.

Cruise, G.M., R.I. Macphail, J. Linderholm, R. Maggi, and P.D. Marshall. 2009. Lago di Bargone, Liguria, N. Italy: A reconstruction of Holocene environmental and land-use history. *The Holocene* 19 (7): 987–1003.

Deák, J., A. Gebhardt, H.A. Lewis, M.R. Usai, and H. Lee. 2017. Soils disturbed by vegetation clearance and tillage. In *Archaeological soil and sediment micromorphology*, ed. C. Nicosia and G. Stoops, 233–264. Chichester: Wiley Blackwell.

Devos, Y., C. Nicosia, L. Vrydaghs, L. Speleers, J. Van Der Valk, E. Marinova, B. Claes, R.M. Albert, I. Esteban, T.B. Ball, M. Court-Picon, and A. Degraeve. 2017. An integrated study of dark earth from the alluvial valley of the Senne river (Brussels, Belgium). *Quaternary International* 460: 175–197.

Dimbleby, G.W., and J.G. Evans. 1974. Pollen and land snail analysis of calcareous soils. *Journal of Archaeological Science* 1: 117–133.

Fedoroff, N., M.A. Courty, and Z. Guo. 2018. Palaeosols and relict soils. In *Interpretation of micromorphological features of soils and Regoliths*, ed. G. Stoops, V. Marcelino, and F. Mees, 821–662. Amsterdam: Elsevier.

Gé, T., M.A. Courty, W. Matthews, and J. Wattez. 1993. Sedimentary formation processes of occupation surfaces.

In *Formation processes in archaeological contexts*, Monographs in world archaeology, ed. P. Goldberg, D.T. Nash, and M.D. Petraglia, vol. 17, 49–163. Madison/Wisconsin: Prehistory Press.

Goldberg, P., and R.I. Macphail. 2006. *Practical and theoretical Geoarchaeology*. Oxford: Blackwell Publishing.

Goldberg, P., and A. Pérez-Juez. 2018. The hidden record at Torre d'en Galmés, Menorca. Accounts from soil micromorphological analysis. *Pyrenae* 47: 1–27.

Goldberg, P., S.J. Mcpherron, H.L. Dibble, and D.-M. Sandgathe. 2018. Stratigraphy, deposits, and site formation. In *The middle Paleolithic Site of Pech de l'Azé IV*, ed. H.L. Dibble, S.J. McPherron, P. Goldberg, and D.M. Sandgathe, 21–74. Cham: Springer.

Karkanas, K., and P. And Goldberg. 2018. *Reconstructing archaeological sites. Understanding the geoarchaeological matrix*. Chichester: Wiley Blackwell.

Kubiena, W.L. 1938. *Micropedology*. Ames: Collegiate Press.

Lee, H., C. French, and R.I. Macphail. 2014. Microscopic examination of ancient and modern irrigated Paddy soils in South Korea, with special reference to the formation of silty clay concentration features. *Geoarchaeology* 29: 326–348.

Linderholm, J., R. Macphail, and P. Buckland. 2019. Ørlandet Iron age settlement pattern development: Geoarchaeology (geochemistry and soil micromorphology) and plant macrofossils. In *Human – environment Interaction during the Iron age and early medieval period in Vik. Archaeology at Ørland air base*, ed. I. Ystgaard. Oslo: Cappelen Damm Akademisk.

Macphail, R.I. 1987. A review of soil science in archaeology in England. In *Environmental archaeology: A regional review*, Occasional paper no. 1, ed. H.C.M. Keeley, vol. II, 332–379. London: Historic Buildings & Monuments Commission for England.

Macphail, R.I., and P. Goldberg. 2018a. *Applied soils and micromorphology in archaeology*. Cambridge: Cambridge University Press.

Macphail, R.I., and P. Goldberg. 2018b. Archaeological materials. In *Interpretation of micromorphological features of soils and Regoliths*, ed. G. Stoops, V. Marcelino, and F. Mees, 2nd ed., 779–819. Amsterdam: Elsevier.

Macphail, R.I., J. Bill, R. Cannell, J. Linderholm, and C.L. RØdsrud. 2013. Integrated microstratigraphic investigations of coastal archaeological soils and sediments in Norway: The Gokstad ship burial mound and its environs including the Viking harbour settlement of Heimdaljordet, Vestfold. *Quaternary International* 315: 131–146.

Macphail, R.I., J. Bill, J. Crowther, C. HaitĂ, J. Linderholm, D. Popovici, and C.L. Rødsrud. 2017. European ancient settlements – A guide to their composition and morphology based on soil micromorphology and associated geoarchaeological techniques; introducing the contrasting sites of chalcolithic Borduşani-Popină, Borcea River, Romania and the Viking age Heimdaljordet, Vestfold, Norway. *Quaternary International* 460: 30–47.

Mallol, C., S.M. Mentzer, and C.E. Miller. 2017. Combustion features. In *Archaeological soil and sediment micromorphology*, ed. C. Nicosia and G. Stoops, 299–330. Chichester: Wiley Blackwell.

Morley, M.W., P. Goldberg, T. Sutikna, M.W. Tocheri, L.C. Prinsloo, E.W. Jatmiko Saptomo, S. Wasisto, and R.G. Roberts. 2017. Initial micromorphological results from Liang Bua, Flores (Indonesia): Site formation processes and hominin activities at the type locality of Homo floresiensis. *Journal of Archaeological Science* 77: 125–142.

Nicosia, C., and G. Stoops. 2017. *Archaeological soil and sediment micromorphology*. Vol. 476. Chichester: Wiley Blackwell.

Nicosia, C., Y. Devos, and R.I. Macphail. 2017. European 'Dark Earth'. In *Archaeological soil and sediment micromorphology*, ed. C. Nicosia and G. Stoops, 331–344. Chichester: Wiley Blackwell.

Rentzel, P., C. Nicosia, A. Gebhardt, D. Brönnimann, C. Pümpin, and K. Ismail-Meyer. 2017. Trampling, poaching and the effects of traffic. In *Archaeological soil and sediment micromorphology*, ed. C. Nicosia and G. Stoops, 281–298. Chichester: Wiley Blackwell.

Roberts, M.B., and M.I. Pope. 2018. *The Boxgrove wider area project: Mapping the early middle Pleistocene deposits of the Slindon formation across the coastal plain of West Sussex and eastern Hampshire*. Brighton: Spoilheap Press.

Romans, J.C.C., and L. Robertson. 1983. The general effects of early agriculture on soil. In *The Impact of aerial reconnaissance on archaeology*, Research report no. 49, ed. G.S. Maxwell, 136–141. London: Council for British Archaeology.

Shahack-Gross, R., F. Marshall, and S. Weiner. 2003. Geo-ethnoarchaeology of pastoral sites: the identification of livestock enclosures in abandoned Maasai settlements. *Journal of Archaeological Science 30*, 439–459.

Shahack-Gross, R. 2011. Herbivorous livestock dung: Formation, Taphonomy, methods for identification, and archaeological significance. *Journal of Archaeological Science 38*, 205–218.

Stoops, G., V. Marcelino, and F. Mees, eds. 2018. *Interpretation of micromorphological features of soils and Regoliths*. 2nd ed. Amsterdam: Elsevier.

Viklund, K., J. Linderholm, and R.I. Macphail. 2013. Integrated palaeoenvironmental study: Micro- and macrofossil analysis and geoarchaeology (soil chemistry, magnetic susceptibility and micromorphology). In *E18-prosjektet Gulli-Langåker. Oppsummering og arkeometriske analyser Bind 3*, ed. L.-E. Gerpe, 25–83. Bergen: Fagbokforlaget.

A

Archaeological Soil Micromorphology Working Group

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This working group was initiated in 1990 by Richard Macphail at the Institute of Archaeology, University College London (UCL), and with the encouragement of co-workers Marie-Agnès Courty (CNRS, France) and Paul Goldberg (Hebrew University of Jerusalem, Israel; now Emeritus professor at Boston University, USA) (Courty et al. 1989). The first full workshop was organized at Birmingham University (with Susan Limbrey). A pattern developed comprising approximately alternating UK and European venues and organized at Cambridge (C. French, x2), Sheffield (C. de Rouffignac), Stirling (D. Davidson), and UCL (R. Macphail, x3), for example, along with Amersfoort, Netherlands (D. Huisman); Basel, Switzerland (P. Rentzel, x2); Brno, Czech Republic (L. Lisa); Dijon (D. Sordoillet) and Rennes (A. Gebhardt), France; Frankfurt, Germany (H. Thiemeyer); and Poviglio (C. Nicosia and M. Cremaschi), Pisa (G. Boschian, x3), and Milan (L. Trombino), Italy, e.g., Pisa 1998 (Arpin et al. 1998). Since 2014 ad hoc workshops have also been run at UCL in order to coincide with the training course on archaeological soil micromorphology held there. Only one meeting took place in the USA and held at the Boston University field school in New Hampshire (P. Goldberg). This year, 2019, there are workshops in Basel, Brussels, Nancy, and Vancouver.

The meetings are designed specifically to aid students in archaeological soil micromorphology; hence prices are kept low, and the emphasis is on practical help and study. Short presentations are mainly given to introduce material for the workshop and sometimes to improve a study ahead of publication, by getting feedback. In a number of cases, however, workshops have produced publications (electronic Bulletin 1, 1995–1997, Greenwich University web publication edited by Acott, T. and Macphail, R. I.) or have been associated with conference publications, e.g., soils and archaeology (Boschian 2007) and DIG (Developing International Geoarchaeology – Cambridge, 2007) (French 2009). There has also been a close relationship with the International Union of Soil Sciences Commission 1.1 "Soil Morphology and Micromorphology." A joint workshop and conference was held, for instance, at Ghent, Belgium (J. Mikkelsen, R. Langohr and G. Stoops 2001) (Stoops 2003). In 2012, a workshop was held in Spain at Barcelona University (R. Macphail and M. Bergada) in association with the IUSS Soil Micromorphology conference, which was held at Lleida, and where there was a venue for posters and presentations by attendees of the workshop; these were published in Quaternary International (Macphail 2013). In order to test the general competence of students and workers, a few people undertook a self-evaluation test, which showed that an earth science background was generally useful and that a knowledge of background context was essential (Shahack-Gross 2015).

It can also be noted that there have been themed workshops. For example, the link was established between soil micromorphology and (1) soil chemistry (e.g., phosphate and magnetic susceptibility; London 1997), (2) the field (the early human cave site of Tautavel, France 2006; M-A Courty and C. Perrenoud), and (3) phytolith studies in general (e.g., Brussels; Y. Devos and L. Vrydaghs). As training has always been the chief aim of the working group, a short intensive course in archaeological soil micromorphology has also been developed for this need at UCL since 2005. In order to improve identifications and link natural and anthropogenic processes to microfabric and microfacies types, three new textbooks have been published (Karkanas and Goldberg 2018; Macphail and Goldberg 2018; Nicosia and Stoops 2017).

References

Arpin, T., R.I. Macphail, and G. Boschian. 1998. Summary of the spring 1998 meeting of the working group on archaeological soil micromorphology, February 27–March 1, 1998. *Geoarchaeology* 13 (6): 645–647.

Boschian, G. 2007. *Proceedings of the Second International Conference on Soils and Archaeology*: Volume CXII, Società Toscana di Scienze Naturali, 43–197.

Courty, M.A., P. Goldberg, and R.I. Macphail. 1989. *Soils and micromorphology in archaeology*. Cambridge: Cambridge University Press.

French, C. 2009. Developments in International Geoarchaeology. *Catena*, Catena Special Issue 78, 3: Amsterdam, Catena, p. 322.

Karkanas, K., and P. Goldberg. 2018. *Reconstructing archaeological sites. Understanding the geoarchaeological matrix*. Chichester: Wiley Blackwell.

Macphail, R.I. 2013. Site formation processes in archaeology: Soil and sediment micromorphology. Proceedings of the 14th IWMSM session 5, Lleida, Spain, July 2012 (Guest Editorial). *Quaternary International* 315: 1–2.

Macphail, R.I., and P. Goldberg. 2018. *Applied soils and micromorphology in archaeology*. Cambridge: Cambridge University Press.

Nicosia, C., and G. Stoops, eds. 2017. *Archaeological soil and sediment micromorphology*. Chichester: Wiley Blackwell.

Shahack-Gross, R. 2015. Archaeological micromorphology self-evaluation exercise. *Geoarchaeology* 31: 49–57.

Stoops, G. (ed.) 2003. Achievements in Micromorphology. *Catena*, Catena Special Issue, 54, 3: Amsterdam, p. 681.

Archaeological Stewardship

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Introduction

Stewardship is a term and concept often invoked in some archaeological circles and entirely absent from others. Archaeologists, anthropologists, museum curators, collectors, government officials, and members of descendent populations have all been considered stewards. Exploring questions about stewardship "for whom?" "of what?" and "to what ends?" reveals that the meanings and applications of archaeological stewardship, though entrenched and bureaucratized in some contexts, are neither universal nor unchanging. In fact, conceptions of stewardship seem to be shifting away from standardized interpretations of management, preservation, and conservation toward more collaborative, inclusive discourses and practices that recognize the special relationships many people have with the past. Collaborative approaches to stewardship sometimes result in restrictions on the activities of archaeologists as they begin to share "the past" on terms other than just their own.

Definition

"Stewardship," as defined by the Oxford English Dictionary (OED Online), refers to the office or duties of a steward (from the Old English, for "house" and "keeper"), which may include caretaking, administration, planning, control, or use of property or resources owned by another. Stewardship is also defined as an ethic, exemplified by responsible planning and management of resources.

In archaeology, stewardship has been closely associated with conservation, curation, anti-looting sentiments, resource management, and the nonrenewable nature of archaeological resources. In *Teaching Archaeology in the 21st Century*, Bender and Smith (2000: 34) present a narrow definition of stewardship as "the wise use of resources [that] can include stabilizing an archaeological site, preserving it in place, excavation, or promoting public understanding of the information content of the resources through site development and interpretation." More generally, and particularly in the context of North American archaeology, the term has come to mean the act of conserving and preserving the nonrenewable archaeological record for future generations, with the aim of promoting knowledge about the past.

Implicit in all of these definitions are assumptions that stewardship is a relationship that denotes responsibility for taking care of something for someone else. Stewardship implies

choosing service over self-interest and, instead, acting in the interest of another. Thus, underlying the discourse of stewardship are various legal, cultural, economic, moral, and political interests, all of which raise fundamental questions of privilege and legitimacy. Who claims to be a steward? For whom? Whose interests does the steward actually serve?

For whom do archaeologists serve as stewards? The concept is fuzzy in this regard. Is it for a universal "everyone" – all of humanity, "the public"– or for "no one" because the archaeological record cannot be "owned?" Or do archaeologists serve the nation-state, which, in many cases, claims legal ownership of archaeological sites and objects? In arguing that archaeological stewardship is performed for "the public," archaeologists remove themselves from the problematic arenas of ownership or culture-based rights and instead purport to act as stewards of, and advocates for, cultural heritage that belongs either to no one, to everyone, or to the state (see Warren 1999).

Historical Background

Historically, at least in western contexts, "stewardship" has never been necessarily egalitarian or altruistic; in fact, the term has often carried an exclusive and elitist connotation. Originally, the term was primarily found in relation to the governance and management of elite wealth and property or as a title for an officer of the state, such as the "Great Steward of England." Later, stewardship was used in commerce to indicate a manager and also as a synonym for servant or aide. The term has long been employed in ecclesiastical contexts, both to refer to the manager of a church's property and the duty to use God's teachings and gifts wisely.

But the concept of stewardship has a much deeper history than the term itself or its co-option by state-based governance systems would suggest. It is deeply rooted in the ethics and practices of land-based peoples throughout time and place. For example, in New Zealand/Aotearoa, the Maori concept of "kaitiakitanga" is closely analogous to "stewardship" but translates more specifically as "guardianship" that is undertaken on behalf of a particular community or *whenua* (J. Coster, e-mail, 23 August 2012).

In recent decades, stewardship has often appeared in reference to the environment and natural resource use. "Earth stewardship" has come to connote one's duties not on behalf of an entity such as god, king, or nation-state but on behalf of the earth and its resilience (see Chapin et al. 2011). Indeed, archaeology should have a great deal to contribute to these discussions (see Hudson et al. 2012).

According to Shawn Malley (2012: 23), the concept of archaeological stewardship emerged in conjunction with excavations of Near Eastern sites by British archaeologists in the mid-1800s, along with the rabid collecting of ancient material culture by western museums. Malley (2008: 623) notes that "the paternalistic ideology of Western stewardship" that pervaded British archaeology at the time served to rationalize less benevolent, imperialistic interests. By the late 1880s, western museums promoted themselves as stewards of the past for the public, responsible for educating the masses and promoting national identity. These deliberate policies reinforced particular ideologies and public imaginings about archaeology that later coalesced under the heading of "stewardship" (see Smith 2004: 85).

In the early 1900s in the United States, just as natural resource conservation movements were on the rise and the discipline of archaeology was beginning to embrace more systematic methods of research and training, massive commercial excavations of noteworthy sites by private entities prompted government action. The 1906 Antiquities Act essentially appointed archaeologists as protectors and stewards of sites on public lands, acting in the national interest. In the decades that followed, the US government funded many large excavations – whether to salvage the remains of earlier cultures, to investigate the "Mound builder" myth, or to bolster the American economy. Other nations also recognized the power of archaeology to reinforce nationalist narratives and developed similar programs. This use of government funds for archaeology endowed the notion

of stewardship with a sense of public accountability that remains prominent today.

Laurajane Smith (2004: 84–92) associates the development of the concept of archaeological stewardship with the growth of liberalism – the idea that governments think they know what is best for others. She points out that long before the term actually came into use, archaeologists had assumed stewardship of the histories and prehistories of others. This presumption was nurtured by early twentieth century ideas that cultural objects embodied past identities in ways that revealed themselves through scholarly study. Subsequent ideological positions within archaeology, including the claim of processual archaeology to be a science of human behavior, the development of heritage as a public education issue, the establishment of CRM archaeology as a profession accountable to public and private interests, and the articulation of a "conservation ethic," all lent support to a notion of archaeological stewardship.

In the 1960s and 1970s, the United States, Great Britain, and Australia were among nations that enacted archaeological resource management legislation. This was in part a reaction to increased development, land use changes, and other threats to archaeological sites. Many of these acts defined the proper care and management of heritage objects and sites in terms of "preservation" or "stewardship." In many instances, sacred sites or other places of heritage value and their contents were reinscribed as "archaeological resources," in need of protection by trained professionals. The implementation of these top-down policies quickly fell to university-trained archaeologists, creating a cadre of professional managers that assumed both a legal right and a moral responsibility to serve as guardians of sites and objects.

By the mid-1990s, "stewardship" had been adopted as the primary principle of ethics by the Society for American Archaeology (SAA) (Lynott and Wylie 1995). This signaled an expanded responsibility for archaeologists, far beyond merely doing "good science." The concept of stewardship spoke to many pressing issues of the time, such as the growing reluctance to excavate except at threatened sites, the "curation crisis," threats posed by looting and the antiquities market, the need to preserve archaeological records, and a mandate for public outreach. Most of the other Principles of Archaeological Ethics set forth by the SAA evolved to address what stewardship meant in various contexts. Clearly, stewarding the archaeological record "in the public trust" entailed serving many different – and sometimes conflicting – interests.

During the 1980s and 1990s, archaeologists faced ardent criticism from Aboriginal peoples, especially in regard to assumptions about the right to study Aboriginal pasts and claims of ownership by nation-states over heritage sites and objects. Reframing these potentially messy issues in terms of stewardship, instead of rights or ownership, could be called a strategic move on the part of state-based agencies, since it "require[d] all sides to accept their responsibilities as stewards and to put aside professional and political interests in order to act in the best interest of the property and the cultural heritage that property represents" (Hanna 1993).

But is it possible to put aside professional and political interests? What does it mean to act in the best interest of the archaeological record or the heritage it represents? Could the use of the term stewardship in such contexts – intentionally or unintentionally – serve to depoliticize archaeology and neatly smooth over or mask more contentious issues of rights and sovereignty? (see Smith 2004, Chap. 5).

Current Contexts

How is the term "stewardship" being used in various heritage- and archaeology-related contexts today? The brief discussion below incorporates responses to a query posted on the World Archaeological Congress listserv.

Government

The normative force of the concept of stewardship is clear from how pervasive and embedded the term has become in "official" discourses, where it puts a benevolent spin on who has the authority and expert knowledge to make decisions about how to manage, for whom, and to what ends. Federal programs typically follow standardized legal definitions that equate archaeological

stewardship with cultural resource protection, preservation, management, and public outreach, performed under the direction of trained professionals. In many government contexts, "heritage stewardship" has become synonymous with "heritage management." Stewardship is also a central tenet of numerous government-sponsored public education programs, which impart particular values to citizens through participatory archaeology projects and "site steward" programs.

Sometimes codified definitions of stewardship embedded in agency policies and regulations conflict with ideas about good stewardship in practice. For example, US regulations legally mandate indefinite or perpetual curation of federally accessioned archaeological collections (see 36 CFR 79). This severely limits what actions can be taken, even when repatriation, reburial, or disposal is more appropriate.

Private Sector

Today the majority of archaeological work is conducted by private sector cultural resource management firms (CRM; also known as archaeological heritage management or AHM). In this context, stewardship typically refers to practices and decisions that protect or increase the significance and value of heritage resources. Here, preservation and conservation often compete with economic development, and stewardship may involve calculated destruction or mitigation that attempts to balance economic, private, and state interests. Some heritage management companies invoke "stewardship" as an advertising strategy, to express their moral superiority in contrast to other firms that practice "mere compliance."

The recent growth of private sector involvement in historic preservation has spawned a drove of "heritage stewardship" consultants who seek to bridge private interests and government mandates. Many of these consultants talk about heritage as an asset or form of capital and good stewardship as the means of protecting and growing these investments.

Professional Contexts

"Stewardship" appears in the codes of ethics and professional statements of many archaeological societies and not at all in others. For example, the Archaeological Institute of America's Code of Professional Standards describes archaeologists as "primary stewards of the archaeological record," while the professional statements of the Council for British Archaeology mention stewardship only briefly, in connection with local sites, and the Australian Archaeological Association makes no reference to "stewardship." The SAA Principles of Archaeological Ethics, which declare "stewardship" as the primary principle, are widely cited in archaeological literature and training and have been adapted or adopted by a number of other national archaeological organizations, including the Society of Philippine Archaeologists and New Zealand Archaeological Association.

A refreshing approach is found in the Canadian Archaeological Association's (CAA) Principles of Ethical Conduct, ratified in 1996. As in the USA and New Zealand, the CAA lists "stewardship" as its primary principle but defines it as "respect for archaeological remains and for those who share an interest in these irreplaceable and nonrenewable resources now and in the future." This is notable for its openly stated inclusion of other interested persons. The CAA also has a Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples, which essentially recognizes Aboriginal stewardship as a right.

Using examples of high-profile repatriations in the USA (Kennewick Man) and Australia (Lady Mungo), Claire Smith and Heather Burke (2003) have illustrated how differing interpretations of stewardship deeply affect the professional practices and outcomes of archaeology. They point out that a code of ethics which cites stewardship of the archaeological record as its primary ethical principle invokes a very different epistemological standpoint and set of practices compared to a code that foregrounds people and relationships (as do the CAA and the World Archaeological Congress).

Museums also take their professional role as stewards very seriously. During the twentieth century, most museum professionals came to see themselves as stewards not simply for the

nation-state but with a mandate to serve the public. In yet another transformation of their stewardship role, a growing number of museums today act as caretakers of objects for particular descendant and source communities. This has opened up the concept of archaeological stewardship to new relationships and practices. It can also mean that archaeologists and other researchers may encounter restrictions on access to particular objects or cultural information, unless appropriate permissions are obtained.

University Contexts

The term "stewardship" is noticeably absent from most introductory archaeology texts. When it does appear, it generally occurs within discussions of CRM or Public Archaeology. As Sonya Atalay advocates (2008: 139), archaeology courses should be studying the social, political, and historical conditions that have led archaeologists to claim to be stewards of the archaeological record in the first place. University-level archaeology programs with a focus on stewardship have tended to be located in North America, and they are typically geared toward training in heritage management. This is changing, however gradually (see "Future Directions" below).

Indigenous Uses of Stewardship

When Indigenous peoples – who have their own potent relationships, values, and forms of knowledge associated with ancestral sites and objects – talk about stewardship, it can mean something quite different from what most archaeologists take the term to mean. According to Navajo archaeologist Rena Martin (1997), all members of the Navajo community consider themselves stewards of the land and what it offers, and archaeologists are often viewed as interlopers who disturb the dead and their belongings.

Many descendant or source communities recognize stewardship as describing the relationship that Indigenous populations had with their lands and cultural resources prior to European colonization, a relationship that many are seeking to recover (Atalay 2008: 123). They are concerned that their heritage continues to be appropriated without their involvement or consent, and they see this as a serious violation of their own principles and responsibilities as stewards.

Some First Nations and other Indigenous peoples utilize the term in governance to express their rights and responsibilities to protect and nurture cultural resources. For example, in 1988 the Navajo Nation passed a Cultural Resources Protection Act (CMY 19–88, 1988) based on the concept of stewardship. The Act suggests the same end goal described by archaeologists (to benefit present and future generations) but goes further in advocating collaboration among all parties who play a part in administering Navajo cultural resources. As a result of amendments to the US National Historic Preservation Act in 1992, over 100 federally recognized tribes have established Historic Preservation Offices to administer duties that would otherwise fall under state supervision. Meanwhile, Indigenous archaeology, which integrates tribal-based teachings with principles of "cultural heritage stewardship," has become a vibrant subfield within archaeology (see the entry on "▶ Indigenous Archaeologies in Archaeological Theory" by George Nicholas and Joe Watkins).

Key Issues

In many ways, the concept of stewardship has acted to promote the idea that archaeologists have a special, or even primary, relationship to "the past," one that overrides the interests and relationships of others. What rationales have been used to justify this presumption of privilege?

- The training archaeologists receive does indeed give them a special relationship to "the archaeological record" (a term that claims the past as the domain of archaeologists) and implies that this domain is best cared for or managed by trained professionals (see Hamilakis 2003).
- Government-mandated policies that designate archaeologists as managers and protectors of heritage resources.
- The discourse of professionalism and expertise, which distances archaeologists from the

public and at the same time creates a sense that experts are needed to help people understand and care for the past (see Zimmerman 2000).
- The "implicit presumption of scientific privilege," justified by intellectual and scientific authority (see Wylie 1996).
- The "fiction of universalism" that supposes a transcendent, panhuman interest in scientific knowledge about the past (Wylie 2005: 61–2).
- Related to this, the notion that archaeologists, in their role as stewards, are acting as "impartial caretakers of a common heritage" (Bendremer and Thomas 2008: 62).

Over the past 30 years, each of these presumptions has been deeply criticized and challenged by archaeologists, Native peoples, and others (see McGuire 1992; Wylie 1996, 2005; Zimmerman 2000; Groarcke and Warrick 2006; Bendremer and Thomas 2008).

At the turn of the century, David Lowenthal (2000: 19) declared that heritage stewardship had become an "enterprise of technical expertise, while the general public, devoid of professional competence, stands aside." He repeatedly warned against this kind of exclusivity, insisting that effective stewardship requires engagement with the complications of everyday life. Alison Wylie (1996, 2005) has long argued that archaeological expertise should not override other interests or ways of connecting with the past. Leo Groarcke and Gary Warrick (2006) find the claim that archaeologists are acting for "all of humanity" problematic and impossible in practice, as if "the public" were a homogenous entity with interests synonymous with those of the state. Cornelius Holtorf has pointed out that, insofar as stewardship claims to preserve or protect on behalf of future generations, there has been no substantive discussion about what future that should be or why we should assume that the heritage being preserved now will be valued then.

John Carman (2005: 75–6) has gone so far as to call the concept of stewardship a justification employed to legitimate state claims of cultural property ownership. Laurajane Smith (2004) has exposed stewardship as a strategy for government control and authority that positions archaeology to mediate between the record of humanity's past and interest groups in the present. She argues that archaeological stewardship is often an appropriation of someone else's history in disguise, used to justify "pastoral care" and legitimate archaeological intervention (Smith 2004: 100). Nick Shepherd and Alejandro Haber (2011: 13) have discussed how the concept of archaeological stewardship acts to devalue and transform local knowledge and ways of interacting with sites and objects into a global, professionalized discourse of "heritage" and "resources" in ways that enable nationalistic interventions or re-inscriptions of local histories.

In spite of their robust nature, these and other critiques have not led to a reenvisioning of stewardship among the majority of practicing archaeologists. Nevertheless, there are archaeologists and Indigenous community members alike who are giving serious thought to what it means to be a good, active steward and to identifying qualities that characterize leadership in heritage stewardship (see, e.g., Welch et al. 2011). All in all, although some people advocate doing away with the term altogether, there are also important ways that the concept of archaeological stewardship is being redefined, expanded upon, and recast.

International Perspectives

The term "stewardship" may be an entrenched part of the discourse of heritage in North America, but in global heritage contexts and in many places around the world, its use is much more uneven, though the underlying rhetoric of preservation, protection, or conservation "in the public trust" is usually present. With a few exceptions, stewardship is noticeably absent from international discourses on heritage. UNESCO's mandate includes "promot[ing] the stewardship of the world's cultural resources, including the built heritage, which constitutes our collective cultural memory," but with no discussion of what this means. The International Council of Museums (ICOM) defines stewardship in its code of ethics

in relation to a museum's duty to hold collections "in the public trust":

> Collections are a significant public inheritance. . .inherent in this public trust is the notion of stewardship that includes rightful ownership, permanence, documentation, accessibility, and responsible disposal. (ICOM 2004)

Responses to a query posted on the World Archaeological Congress listserv indicate that stewardship is not a term commonly employed in archaeology outside of North America. In fact, many felt that it had negative connotations, related to an imbalance of power over decisions about the care and management of heritage, in favor of national governments and archaeologists.

In South America, the term "stewardship" is also not commonly used. A word that sometimes takes its place is "fideicomiso," which refers to holding property in trust but also connotes a process of appropriation and disenfranchisement that is tacitly normalized by the state (Herrera in press).

A notable exception is the ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value, which recognizes the Maori concept of "kaitiakitanga" as an obligation that extends beyond legal ownership (ICOMOS New Zealand 2010: §3). Although the text of the Charter does not mention stewardship, the glossary defines "kaitiakitanga" as ". . .the duty of customary trusteeship, *stewardship*, guardianship, and protection of land, resources, or taonga [cultural treasures]."

A few international colleagues saw value in using the term – not, however, to define an archaeologist's rights or responsibilities but rather when characterizing a community's right to manage resources on local terms. Several respondents noted that, in many international and intercultural contexts, and outside of North American governance circles, stewardship was more commonly associated with land and landscapes instead of sites and objects, and as an alternative to ownership. In this sense, the responsibilities of archaeologists may actually fall under the broader duties of land stewardship.

Future Directions

A number of significant changes in archaeology in recent years have challenged normative conceptions of stewardship and have brought about shifts in its meaning and uses. These include:

- Acknowledgment that living people(s) have potent interests in and intimate relationships with the past and may be strongly affected by the actions and interpretations of archaeologists
- Shifts in authority – in who is working for whom and who sets the agenda
- Respect for alternative, culturally appropriate ways of conserving, curating, and caring for sites, objects, and cultural knowledge
- Realization that the imagined divide between cultural knowledge and "science" is false as well as disrespectful of the diverse ways that people value the past
- Greater degrees of collaboration among those who have special relationships with "the archaeological record" or who are otherwise affected by archaeology
- In particular, the inclusion of non-archaeological voices and values in planning, interpretation, and decision-making

These changes have helped generate new conceptions of "stewardship" that begin to move beyond privileging archaeological knowledge or expertise.

Below are some examples of how "stewardship" is taking on new meaning in archaeology and heritage-related research and practice.

Shared Stewardship

Shared stewardship has become an important concept in international negotiations regarding ownership of antiquities and cultural property, where questions of valid title are so difficult to resolve (see Lyons 2002: 133). In another context, the US National Park Service now references "shared stewardship" as one of its "core values," purportedly as a way to signal a commitment to collaborating with members of the global preservation community. Shared stewardship is also occurring

with greater frequency on small, local scales, where it means sharing control, authority, management, and/or decision-making. Examples include repatriations to source communities, the co-management of heritage sites, development of memoranda of understanding between museums and cultural descendants, and the use of culturally appropriate curation practices.

Collaborative Stewardship

Collaborative stewardship moves even further toward inclusiveness, honoring and supporting the obligations, values, and alternative approaches of others, and thus directly challenging archaeological privilege. For many archaeologists, incorporating alternative conceptions of stewardship, worked out in collaboration with others, is an important way to decolonize archaeology (see Nicholas 2005; Atalay 2008, 2010).

Community-Based Stewardship

Community-based stewardship – which is essentially collaborative stewardship guided by community-identified needs – is becoming an important aspect of twenty-first century archaeological practice. In community-based projects, archaeologists may act as facilitators, promoters, educators, or benefactors, while local people are full partners and beneficiaries. Frequently the role of steward, over time, is "devolved" from archaeologists or the state to those living and working in the area. The museum at Agua Blanca, Ecuador, is one example where, after years of collaborating with archaeologists, the stewardship of local sites and management of the local cultural center/museum is today in the hands of local townspeople (see McEwan et al. 2006).

Community-based stewardship presents archaeologists with considerable challenges, since community needs may have more to do with securing economic opportunities, jobs, or funding for local projects than with conventional archaeological goals. Swedish archaeologist Eva Svensson (e-mail, 28 October 2011) suggests that since heritage has become such an important asset for development, a community-based conception of stewardship could lend weight to citizen and community voices and thus help balance development decisions (often made by outsiders) with ideas about heritage and its significance held by local people.

Knowledge Stewardship

For archaeologists, knowledge stewardship has long been an important aspect of their own professional practice, but today it also refers to respect for how others have their own, sometimes very different, methods of caring for, nurturing, and sharing knowledge and other intangible aspects of culture. Atalay (2010: 65) notes that "[i]n many cases, caring for knowledge and place simultaneously was often interwoven in traditional forms of stewardship." For example, the Ojibwe concept of *gikinawaabi* encompasses the responsibility of elders to protect and pass on knowledge. In this and many other instances, archaeologists are also learning that good stewardship sometimes means respecting restrictions on access to or circulation of cultural information or knowledge.

Indigenous Heritage Stewardship

Indigenous heritage stewardship is a term being used to describe approaches developed by, for, and with Indigenous communities, which place archaeology in the service of Indigenous goals and principles and have social justice as an underlying core value.

For example, for the White Mountain Apache, archaeology and heritage stewardship are playing an important role in ongoing efforts to strengthen tribal sovereignty (Welch et al. 2006). The tribe has created heritage policies founded on Apache principles of stewardship, which extend to caring for sites and objects that, due to historical circumstances, lie outside current tribal boundaries and ownership. These policies in turn inform tribal law, governance, and economic development decisions. Similarly, the Hul'qumi'num Treaty Group of Vancouver Island (Canada) has articulated protocols based on their own conceptions of heritage law to guide decisions about land and resource development (see McLay et al. 2008).

Today, several universities, including Northern Arizona University (USA) and University of

Victoria (BC) Canada, offer programs in Indigenous Heritage Management (see Hunter 2008). John Welch, who teaches Indigenous Heritage Stewardship at Simon Fraser University in British Columbia, believes that this is the direction that the concept of stewardship is heading within archaeology.

Deliberative Democracy

When the participants of a 2008 conference session on "The Ethics of Archaeological Stewardship" shared their experiences, they discovered that "stewardship" had a different meaning in each and every situation (Shoup and Monteiro 2008). What seemed to matter most was the attitude of the archaeologist – in particular, an attitude of respect, the ability to listen, and a willingness to integrate local needs and interests into the research agenda. The concept of "deliberative democracy" emerged as a term that encompassed the kinds of practices that archaeological stewardship should nurture, both in daily interactions, dialogues, and decisions with local people and in broader heritage contexts (Shoup and Monteiro 2008: 331).

These are just a few examples of ways the concept of stewardship is being revisioned in archaeology.

Conclusions

The idea that stewardship is the purview and privilege of archaeologists and other heritage specialists is still very entrenched – especially in government agencies, international bodies, and private sector heritage industry. In some places, use of the term in relation to archaeology is virtually nonexistent. In others, it marks deliberate movements toward self-determination and more equitable practice, signaling empowerment of local people and descendant communities to manage, protect, and make decisions about heritage and its uses.

In general, the meaning of stewardship in archaeology has shifted over the past generation from being almost exclusively object-centered to becoming more relationship-centered and from being defined by state-based policies or universalisms to recognizing pluralisms and particularisms that embrace more collaborative and inclusive approaches. Archaeologists may find that these new approaches and relationships mean additional restrictions on current disciplinary practices as they find ways to share their sense of duty to the archaeological record with others. Whatever the case, as part of understanding and confronting the foundation of their discipline and its practices, archaeologists must continue to revisit the questions: stewardship – of what? for whom? on what terms? and to what ends?

Cross-References

- ▶ Archaeological Record
- ▶ Community Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and Communities
- ▶ Ethics in Archaeology
- ▶ Repatriation: Overview
- ▶ Sacred Sites in Indigenous Archaeology

References

Atalay, S. 2008. Pedagogy of decolonization: Advancing archaeological practice through education. In *Collaborating at the trowel's edge: Teaching and learning in indigenous archaeology*, ed. S.W. Silliman, 123–144. Tucson: University of Arizona Press.

Atalay, S. 2010. *"Diba jimooyung"*- telling our story: Colonization and decolonization of archaeological practice from an Anishinabe perspective. In *Handbook of postcolonial archaeology*, ed. J. Lydon and U. Rizvi, 61–72. Walnut Creek: Left Coast Press.

Bender, S.J., and G.S. Smith. 2000. *Teaching archaeology in the 21st century*. Washington, DC: Society for American Archaeology.

Bendremer, J.C., and E.L. Thomas. 2008. The tribe and the trowel: An indigenous archaeology and the Mohegan Archaeological Field School. In *Collaborating at the trowel's edge: Teaching and learning in indigenous archaeology*, ed. S.W. Silliman, 50–66. Tucson: University of Arizona Press.

Carman, J. 2005. *Against cultural property: Archaeology, heritage, and ownership*. London: Duckworth.

Chapin, F.S., III, S.T.A. Pickett, M.E. Power, R.B. Jackson, D.M. Carter, and C. Duke. 2011. Earth stewardship: A strategy for social-ecological transformation to reverse planetary degradation. *Journal of Environmental Studies and Sciences* 1 (1): 44–53.

Groarke, L., and G. Warrick. 2006. Stewardship gone astray? Ethics and the SAA. In *The ethics of archaeology: Philosophical perspectives on archaeological practice*, ed. C. Scarre and G. Scarre, 163–177. Cambridge: Cambridge University Press.

Hamilakis, Y. 2003. Iraq, stewardship and 'the record': An ethical crisis for archaeology. *Public Archaeology* 3: 104–111.

Hanna, M. 1993. *Doing the right thing: Archaeology as stewardship*. Paper presented at the Canadian Archaeological Association meeting, Montreal, 5–7 May 1993.

Herrera, A. in press. De la práctica a la teoría en la arqueología latinamericana. In *Arqueología y desarrollo en América del Sur*, ed. A. Herrera. Lima/Bogotá: Universidad de los Andes & Instituto de Estudios Peruanos.

Hudson, M.J., M. Aoyama, K.C. Hoover, and J. Uchiyama. 2012. Prospects and challenges for an archaeology of global climate change. *WIREs Climate Change* 3: 313–328.

Hunter, A. 2008. A critical change in pedagogy: Indigenous cultural resource management. In *Collaborating at the trowel's edge: Teaching and learning in indigenous archaeology*, ed. S.W. Silliman, 165–187. Tucson: University of Arizona Press.

ICOMOS New Zealand. 2010. ICOMOS New Zealand charter for the conservation of places of cultural heritage value. Available at: http://www.icomos.org.nz/docs/NZ_Charter.pdf. Accessed 20 Sept 2012.

International Council on Museums (ICOM). 2004. Code of ethics. Available at: http://icom.museum/the-vision/code-of-ethics/. Accessed 28 July 2012.

Lowenthal, D. 2000. Stewarding the past in a perplexing present. In *Values and heritage conservation*, ed. E. Avrami, R. Mason, and M. de la Torre, 18–25. Los Angeles: Getty Conservation Institute.

Lynott, M.J., and A. Wylie, eds. 1995. *Ethics in American Archaeology: Challenges for the 1990s*. Washington, DC: Society for American Archaeology.

Lyons, C.L. 2002. Objects and identities: Claiming and reclaiming the past. In *Claiming the stones; naming the bones – Cultural property and the negotiation of national and ethnic identity*, ed. E. Barkan and R. Bush, 116–137. Los Angeles: Getty Research Institute.

Malley, S. 2008. Layard enterprise: Victorian archaeology and informal imperialism in Mesopotamia. *International Journal of Middle Eastern Studies* 40 (4): 623–646.

Malley, S. 2012. *From archaeology to spectacle in Victorian Britain: The case of Assyria*. London: Ashgate.

Martin, R. 1997. How traditional Navajos view historic preservation: A question of interpretation. In *Native Americans and archaeologists: Stepping stones to common ground*, ed. N. Swidler, K.E. Dongoske, R. Anyon, and A.S. Downer, 128–134. Walnut Creek: AltaMira Press.

McEwan, C., M.-I. Silva, and C. Hudson. 2006. Using the past to forge the future: The genesis of the community site museum at Agua Blanca, Ecuador. In *Archaeological site museums in Latin America*, ed. H. Silverman, 187–216. Gainesville: University Press of Florida.

McGuire, R. 1992. Archaeology and the first Americans. *American Anthropologist* 94 (4): 816–836.

McLay, E., K. Bannister, L. Joe, B. Thom, and G.P. Nicholas. 2008. *A'lhut tu tet Sul'hweentst* "respecting the ancestors": Understanding Hul'qumi'num heritage laws and concerns for protection of archaeological heritage. In *First Nations cultural heritage and law: Case studies, voices and perspectives*, ed. C. Bell and V. Napoleon, 158–202. Vancouver: The University of British Columbia Press.

Nicholas, G. 2005. *Archaeological stewardship as negotiated practice*. Paper presented at the Society for American Archaeology conference, Salt Lake City, 30 Mar–3 Apr 2005.

Shepherd, N., and A. Haber. 2011. What's up with WAC? Archaeology and 'engagement' in a globalized world. *Public Archaeology* 10: 96–115.

Shoup, D., and L. Monteiro. 2008. When past and present collide: The ethics of archaeological stewardship. *Current Anthropology* 49 (2): 328–333.

Smith, L. 2004. *Archaeological theory and the politics of cultural heritage*. London: Routledge.

Smith, C., and H. Burke. 2003. In the spirit of the code. In *Ethical issues in archaeology*, ed. L.J. Zimmerman, K.D. Vitelli, and J. Hollowell-Zimmer, 117–200. Walnut Creek: AltaMira Press.

Warren, K.J. 1999. A philosophical perspective on the ethics and resolution of cultural property issues. In *The ethics of collecting cultural property: Whose culture? Whose property*, ed. P.M. Messenger, 1–38. Albuquerque: University of New Mexico.

Welch, J.R., M. Altaha, D. Gatewood, K.A. Hoerig, and R. Riley. 2006. Archaeology, stewardship and sovereignty. *The SAA Archaeological Record* 6 (4): 17–20. 57.

Welch, J.R., D. Lepofsky, M. Caldwell, G. Combes, and C. Rust. 2011. Treasure bearers: Personal foundations for effective leadership in Northwest Coast Salish heritage stewardship. *Heritage and Society* 4 (1): 83–114.

Wylie, A. 1996. Ethical dilemmas in archaeological practice: Looting, repatriation, stewardship, and the (trans) formation of disciplinary identity. *Perspectives on Science* 4 (2): 154–194.

Wylie, A. 2005. The promise and perils of an ethic of stewardship. In *Embedding ethics: Shifting boundaries of the anthropological profession*, ed. L. Meskell and P. Pels, 47–68. New York: Berg.

Zimmerman, L.J. 2000. Regaining our nerve: Ethics, values, and the transformation of archaeology. In *Ethics in American archaeology: Challenges for the 1990s*, ed. M. Lynott and A. Wylie, 64–67. Washington, DC: Society for American Archaeology.

Further Reading

Hollowell, J. 2009. Standpoints on stewardship in a global market for the material past. In *Ethnographies and archaeologies: Iterations of the past*, ed. L. Mortensen and J. Hollowell, 218–239. Gainesville: University Press of Florida.

Joyce, R. 2002. Academic freedom, stewardship, and cultural heritage: Weighing the interests of stakeholders in crafting repatriation approaches. In *The dead and their possessions: Repatriation in principle, policy, and practice*, ed. C. Fforde, J. Hubert, and P. Turnbull, 99–107. London: Routledge.

Pantazatos, A. 2010. Does diaspora test the limits of stewardship? Stewardship and the ethics of care. *Museum International* 62 (1–2): 96–99.

Zimmerman, L.J., K.D. Vitelli, and J. Hollowell-Zimmer, eds. 2003. *Ethical issues in archaeology*. Walnut Creek: AltaMira Press.

Archaeological Theory: Paradigm Shift

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The humanities and social sciences have undergone major changes in the past two decades as a result of (1) the critique of anthropocentrism, Eurocentrism, and secularism; (2) the development of new connections between the humanities and the natural sciences, especially the life and Earth sciences; (3) the conventionalization of the interpretivist-constructivist paradigm which has prevailed in the humanities since the 1970s; (4) the emergence of various, often conflicting, trends related to new materialism, new empiricism, new animism, and new vitalism that share a turn away from the text and a return to materiality that is present and accessible in the "here and now"; (5) the digital turn and technological developments that transform the tools and methods available to researchers; and (6) the opposition to the prevailing "fast" mode of academic work with the rise of "slow science." This shift has been prefigured by the development of global capitalism, post-capitalism, or neo-capitalism, the crisis of liberal democracy, migrations, terrorism, new cases of mass killings, climate change, the ecological crisis, natural disasters, and broadly understood technological progress (biotechnology, computer sciences, robotics, artificial intelligence) – phenomena which the humanities and social sciences have attempted to describe and comprehend. The alternative trends proposed by scholars who represent cutting-edge research perspectives and lead the way in disciplinary debates suggest a need to thoroughly rethink our notions of life, what it means to be human, and the relations between the human and the nonhuman, and humans and technology, while also finding ways to break away from the Western tradition of anthropocentrism with its reductionist concept of matter as empty, lifeless, and lacking agency.

The variety of research tendencies and approaches constituting the contemporary human and social sciences cannot be subsumed under homogeneous paradigms (understood here after Thomas Kuhn as research models or as a disciplinary matrix). Nevertheless, in order to present a simplified model of the paradigm shift which has arisen in the humanities and social sciences in recent decades, two dominant models might be identified: (1) the interpretivist-constructivist (postmodernist) and (2) the non- or post-anthropocentric, which is associated with other aspects of the shift toward non- or post-Western, post-global (planetary/cosmic), and post-secular approaches (ecological, the posthumanist). This shift can be observed, for example, in the recent interest in animals, plants, and things. However, while they are treated as interesting research topics and examined by means of known theories, quite often researchers hesitate to address the relationship between humans and nonhumans in the context of the radical avant-garde tendencies represented by such scholars as Karen Barad, Jane Bennett, Rosi Braidotti, Dipesh Chakrabarty, Donna Haraway, N. Katherine Hayles, Tim Ingold, Bruno Latour, Anna Tsing, Eduardo Viveiros de Castro, and Cary Wolfe, as well as artists including Eduardo Kac or Stelarc, even though artists often anticipate the appearance of new facts.

From the perspectives of these avant-garde tendencies, the concept of a global world appears increasingly reductive, while planetary identification backed by the ideas of transculturalism looks to be of growing interest (Spivak 2003; Keller 2018). Explorations of human subjects deprived of personhood (dehumanized prisoners of camps, the stateless, those enmeshed in extreme poverty), those who have transcended humanity thanks to biotechnological progress (disabled persons given special abilities thanks to prostheses and transplants) and the non-dead (the corpses and, in popular culture, zombies and vampires), offer particularly interesting perspectives. The non-human has become the paradigmatic figure of the contemporary and a guidepost to the future.

Scholars are increasingly interested in "disobedient" subjects, who often require complementary approaches combining the human, social, and natural sciences, such as environmental studies, animal studies, plant studies, as well as elements drawn from "art and science" and from science and technology studies (STS). A major shortcoming of today's human and social sciences is that the theories used lead to research findings that are incommensurable with rapidly changing realities and social expectations. That is to say that although scholars observe ongoing changes and write about them, creating new research areas in the process, they ultimately lack the tools to conceptualize these changes.

The interpretivist-constructivist paradigm was never a homogeneous whole but a set of various research approaches and perspectives which have evolved in time and space. This paradigm might be regarded as characteristic of the so-called new humanities, which includes a variety of interdisciplinary trends such as gender and queer studies, postcolonial studies, ethnic studies, and disability studies, among others (Fuery and Mansfield 1997). The interpretivist-constructivist paradigm has played an interventionist, emancipatory, and even insurrectionary role, actively participating in social change. Throughout its dominant period in the humanities, scholarship has become a form of political activism that has focused its interest on such key concepts as identity, power, and others. The characteristics of this paradigm include a pragmatic approach to research, its politicization, emphasis on the relations between knowledge and power, the ideological engagement of the researcher who wants to participate in social change, and the struggle for justice, unmasking the practices of power, belief in the construction of social reality, and focus on reclaiming forgotten and/or excluded pasts. In terms of epistemology, the interpretivist-constructivist paradigm has promoted interdisciplinary approaches and epistemological eclecticism, the theory of the situated subject of knowledge (i.e., its subjectivity), and reflexivity, thus emphasizing the pertinence of interpretation over an interest in truth.

After the long period of dominance of postmodern "weak science," together with its politicization and ideologization, the scholarship which is at the avant-garde of the paradigm shift is beginning to look for ways to reestablish its authority, for new goals and standards, and for solid knowledge based on evidence and affording a sense of security in the world. It begins to readdress such classic worldly issues as good and evil, truth, values and virtues, universals, human nature, religion, and the sacred while looking for practical wisdom that would help answer the question of how to live together in conflicts.

The limitations of the interpretivist-constructivist paradigm are evident in relation to the process that sociologist of science Andrew Pickering described as the "posthumanist displacement of our interpretative frameworks" (Pickering 1999: 561). One manifestation of this process is the emergence of the posthumanities (Badmington 2007), defined as a set of tendencies and research trends related to the intellectual movement and ethical stance known as posthumanism (Badmington 2000; Wolfe 2010; Braidotti 2013). They construct knowledge that critiques and/or rejects the human's central position in the world, hence their preference for non-, anti-, or post-anthropocentric approaches (ideas related to a non-anthropocentric paradigm appeared as early as the 1990s). In a sense, the posthumanities can be thought of as non-anthropocentric humanities, although this definition is too paradoxical to be embraced without

reservations. The primary research interests of the posthumanities include the boundaries of species identity, relations between the human and the nonhuman (the human's relations with technology, the environment, animals, things), questions of biopower, biopolitics, and biotechnology, and technology's impact on the contemporary world. The point is not to exclude the human from scholarship but to critique the view that presents the human as the master and center of the universe.

Environmental history scholars have long criticized cultural and social determinism and the Euro- and anthropocentric character of knowledge. Richard C. Foltz has emphasized the need to depart from fragmented knowledge and instead replace it with an integrated vision of the relations between humans and nonhumans and to reframe the concept of agency as the historical (non-intentional) agency of nonhuman actors. He observes that "the environmental crisis is the playing field on which all other issues meet," while "climate change may well turn out to be the historical event of our times, which future historians may see as the matrix within which all other historical events of our era unfold" (Foltz 2003: 20).

This kind of thinking has inspired the ideas popularized by Fritjof Capra in the late 1990s. Capra argued that we were witnessing a paradigm turn in science away from physics and toward biological sciences accompanied by a change of values as researchers embraced the principles of ecological thinking (Capra 1997). During recent decades, there has been an observable shift from the interpretivist-constructivist paradigm toward the posthumanist paradigm (working label) that includes various pro-environmental approaches. Richard McNeil Douglas argues that "Environmentalism itself is not the paradigm, rather its antithesis, erupting from the growing contradiction between progress and reality, which tells us that a new paradigm is needed" (Douglas 2010: 214). However, posthumanities and ecological or environmental humanities, with their non-anthropocentric approach (seeing the world in terms of collectives of humans and nonhumans, companion species, and kincentricity with the natural world) and interest in traditional ecological knowledges, are already indicators of a growing fundamental change in scholars' consciousness. Recently, Bruno Latour and Timothy M. Lenton announced that we are witnessing not only a paradigm shift in various fields of knowledge but "a shift in worldview," meaning a major change in the "distribution of traits affecting science as well as politics, morality, and the arts" (Latour and Lenton 2019: 661).

Processes of "indigenizing the academy" – as Devon Milhesuah and Angela Wilson have called it (Milhesuah and Wilson 2004) or further processes of decolonization (Rizvi 2006) – are worth mentioning here; they argue – as do postcolonial scholars – that the academy needs an alternative to the European tradition of thinking since this tradition does not offer a worldview that will provide a successful survival tool. In a sense, the paradigm shift discussed here marks a return to the evolutionary understanding of scholarship as adjusting to a changing reality and a resumption of the debates about whether scholarship (the humanities and social sciences) has any survival value for the human species and for life in general (Hodder 2018). This shift is interesting and important because it adopts new points of reference and new goals for the production of knowledge. One of its reference points is life itself or *zoe*.

The changes described above provide a context for the growth of "thing studies" (part of the so-called new material culture studies) which is also associated with an interest in the new materialism that manifests a departure from the traditional (Cartesian) concept of matter as passive and lifeless (Cole and Frost 2010). Characterized by focus on technological progress and humans' growing dependence on things, validation of indigenous cultures' view of the relations between humans and things, and reliance on quantum physics, new materialism proposes a thorough rethinking of the concepts of matter, vitalism, and animism in the completely new context of today's world (Lury et al. 2006; Harvey 2006). Matter and things become active, unpredictable forms of constant becoming with non-intentional agency (Knappett and Malafouris 2008; Bennett 2010; Lury et al. 2006).

While observing a growing interest in thing studies as well as in animal studies and plant studies, it seems that the reference point for human and social sciences is increasingly shifting from the human being and the humanist, anthropocentric view of its dominant position in the world to the human being as a species (Chakrabarty 2015), considered in the context of the so-called deep or big history of life on earth (Christian 2004; Smail 2008) and understood as one life form among many. Paradoxically, in the current geological epoch referred to as the Anthropocene (Solli et al. 2011; Edgeworth et al. 2014), which is characterized by the massive human impact on the environment and the climate, today's human and social sciences are defined by debates involving a critique of anthropocentrism, posthumanism, species identity, and interspecies relations (Edgeworth et al. 2014).

One sign of the major reconfigurations in the theory of the human and social sciences is the shift of research perspective from the vertical to the horizontal. Generally speaking, the vertical model of knowledge is being replaced by the horizontal model as the so-called flat alternatives and/or relational approaches grow in importance. Indeed, it is legitimate to say that contemporary human and social sciences are all about relations and interconnectedness. Among the many factors stimulating this shift are quantum physics, genetics and technology studies, as well as traditional ecological knowledge (Descola 2013), which all share the conviction that all things are connected (cf. Hodder 2018). However, Raymond Pierotti and Daniel Wildcat indicate, as suggested above, that connectivity "is not simply a homily and a romanticized cliche, but instead is a realization that no single organism can exist without the web of other life forms that surround it and make its existence possible" (Pierotti and Wildcat 2000: 1336). The pyramidal metaphor of viewing reality has given way to the metaphor of entangled relations, with webs, nets, and networks, as well as assemblages, collectives, kinships, companions, and communities, crucial (Hodder 2012; Watts 2013).

Thus, this shift is a result, firstly, of ecological thinking, which endorses an ontology of connectivity between humans and nonhumans and humans and the environment, and, secondly, of science and technology studies, which examine the relations between humans and things (Hodder 2018). It has resulted in a widespread use of flat ontologies and relational approaches. Flat alternatives operate in terms of horizontal relations, associations, assemblages, symbiotic communities, emergence, and entanglement. Examples of such flat ontologies are Bruno Latour's actor-network theory (Latour 2005), Manuel DeLanda's assemblage theory (DeLanda 2006), Ian Hodder's concept of entanglement (Hodder 2012, 2018), and Christopher Watts' relational archaeology (Watts 2013). They share a critical approach to traditional social constructivism, whose idea of society as socially constructed establishes a certain social determinism (sociocentrism) focused on human subjects. Many scholars agree with Latour, who argues that society is not constructed exclusively by humans but emerges as a result of human-nonhuman interactions. In such approaches, the idea of hierarchy is being replaced by that of symmetry.

The idea of symmetry has become so widespread in the human and social sciences that avant-garde archaeologists, following in Latour's footsteps, have formulated the project of "symmetrical archaeology" (Witmore 2007). In his *In Defense of Things*, Bjørnar Olsen presents an egalitarian approach and a more symmetrical view of reality. He assumes that things, and material culture in general, are beings that coexist with other beings like humans, animals, or plants. They all have material properties and share the world they inhabit. Symmetry in this context does not mean that all these beings are equal or the same; they are seen as different and diversified forms of being, but the differences among them should not be framed as ontological dualisms or negations. Rather, they are nonoppositional, relative differences that foster collaboration, transmission, and exchange (Olsen 2010; cf. Watts 2013). Olsen's project encouraged researchers to refer to a variety of new materialisms (Bennett 2010), speculative realism (Bryant et al. 2011) or agential realism (Barad 2007), which is particularly visible in the theoretical discussions (Witmore 2014; Hodder

2018). Material culture studies, the "material turn" and the "(re)turn to things," and object-oriented approaches together with new materialisms mark the broad horizon of the materialistic paradigm shaping archaeology today.

Another paradigm that relates to humanities and social sciences' recent interest in natural sciences is the "scientific turn," which also features in discussions as Processualism 2.0. It is evident in a growing body of scholarship on archaeometry, also termed archaeological science. Its progress is strongly influenced by research on ancient DNA and epigenetics (Templeton 2019), stable isotope analyses, lipid analyses, chemometrics, and thermal analyses. Results of physical and chemical analyses provide more holistic insight into relations between humans, nonhumans, and past environments.

The "scientific turn" benefits also from the "digital turn." The popularity of big data, the development of databases, and the variety of digital, virtual, and cyber methods have deeply transformed archaeological research (i.e., Forte 2010). A growing body of literature reveals the polarization surrounding digital, virtual, and cyber tools, often emphasizing its undertheorization (Huvila and Huggett 2018) while on the other hand pointing to the epistemic possibilities enabled by databases and big data (Kintigh et al. 2014).

The "scientific turn" and the "digital turn" allow archaeology to address the Grand Challenges (Kintigh et al. 2014) and draw big pictures. Those ambitions are currently criticized as embodiments of "fast science" relating to neo-capitalist modes of scientific production (Cunningham and MacEachern 2016). Clear opposition to "big science" is now articulated by proponents of "slow science" or "slow archaeology" (Rizvi 2006; Cunningham and MacEachern 2016). "Slow archaeology" is often supported by a variety of public archaeologies, including community or indigenous archaeology. This branch of archaeology is mostly concerned with social well-being and the significance of archaeology for global and local communities.

Archaeology likewise addresses the needs of the contemporary society by engaging with the more recent past (Buchli et al. 2006; Harrison and Schofield 2010; Sturdy Colls 2016; González-Ruibal 2019), complementing research conducted within the fields of history, cultural anthropology, human geography, and cultural and social studies. Future-oriented perspectives might be found in archaeology's recent interest in the Anthropocene. Matthew Edgeworth represents archaeologists within the Anthropocene Working Group. Archaeologists discuss the golden spike (the date when the Anthropocene started), heritage in the Anthropocene, and future-oriented practices (Solli et al. 2011; Edgeworth et al. 2014; Bauer and Bhan 2018).

The future of the humanities and social sciences is inseparably connected with reflection on the future of the Earth, the human species, trans-speciation, and life itself. Thus, knowledge about the past increasingly becomes a future-oriented knowledge that facilitates adaptation and is relevant insofar as it supports the continuation of the life of various species (in both social and biological contexts). As such, it also becomes part of the planetary (or even cosmic) project where emerging knowledge opens the way for the humanities and social sciences to think about the multi-species world of future communities that attempts to answer the question of how to live together in conflicts.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Archaeobotany
- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Cyber-archaeology
- ▶ Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation
- ▶ Environmental Archaeology and Conservation
- ▶ Hodder, Ian (Theory)
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Interdisciplinarity and Archaeology
- ▶ Material Culture and Education in Archaeology
- ▶ Materiality in Archaeological Theory
- ▶ Zooarchaeology

References

Badmington, N., ed. 2000. *Posthumanism*. Basingstoke: Palgrave.

Badmington, N. 2007. Cultural studies and the post-humanities. In *New cultural studies: Adventures in theory*, ed. G. Halland and C. Birchall, 260–272. Edinburgh: Edinburgh University Press.

Barad, K. 2007. *Meeting the universe halfway. Quantum Physics and the Entanglement of Matter and Meaning*. Durham-London: Duke University Press.

Bauer, A., and M. Bhan. 2018. *Climate without nature: A critical anthropology of the Anthropocene*. Cambridge/New York: Cambridge University Press.

Bennett, J. 2010. *Vibrant matter: A political ecology of things*. Durham/London: Duke University Press.

Braidotti, R. 2013. *The posthuman*. Cambridge/Malden: Polity Press.

Bryant, L., G. Harman, and N. Srnicek. 2011. *The speculative turn: Continental materialism and realism*. Melbourne: re.press.

Buchli, V., G. Lucas, and M. Cox, eds. 2006. *Archaeologies of the contemporary past*. London: Routledge.

Capra, F. 1997. *The web of life*. London: Harper Collins.

Chakrabarty, D. 2015. Decentering the human? Or what remains of Gaia. In *The human condition in the Anthropocene*. The Tanner Lectures in human values delivered at Yale University, 18–19 February, 165–188. https://tannerlectures.utah.edu/Chakrabarty%20manuscript.pdf. Accessed 23 Sept 2019.

Christian, D. 2004. *Maps of time. An introduction to big history*. Berkeley/Los Angeles: University of California Press.

Cole, D., and S. Frost. 2010. *New materialisms. Ontology, agency, and politics*. Durham/London: Duke University Press.

Cunningham, J.J., S. MacEachern. 2016. *Ethnoarchaeology as slow science*, World Archaeology 48(5): 628–641, https://doi.org/10.1080/00438243.2016.1260046

DeLanda, M. 2006. *A new philosophy of society. Assemblage theory and social complexity*. London: Continuum.

Descola, P. 2013. *Beyond nature and culture*. Trans. J. Lloyd. Chicago/London: University of Chicago Press.

Douglas, R.M. 2010. The ultimate paradigm shift: Environmentalism as antithesis to the modern paradigm of progress. In *Future ethics. Climate change and apocalyptic imagination*, ed. S. Skrimshire, 197–215. New York/London: Continuum.

Edgeworth, M., J. Benjamin, B. Clarke, Z. Crossland, E. Domańska, A.C. Gorman, P. Graves-Brown, E.C. Harris, M.J. Hudson, J.M. Kelly, V.J. Paz, M.A. Salerno, Ch. Witmore, and A. Zarankin. 2014. Archaeology of the Anthropocene. *Journal of Contemporary Archaeology* 1 (1): 73–132.

Foltz, R.C. 2003. Does nature have historical agency? World history, environmental history, and how historians can help save the planet. *The History Teacher* 37 (1): 9–28.

Forte, M. 2010. Introduction to cyber-archaeology. In *Cyber-archaeology*, ed. M. Forte, 9–14. Oxford: Archaeopress.

Fuery, P., and N. Mansfield, eds. 1997. *Cultural studies and the new humanities: Concepts and controversies*. Melbourne: Oxford University Press.

González-Ruibal, A. 2019. *An archaeology of the contemporary era.* Abingdon: Routledge.

Harrison, R., and J. Schofield. 2010. *After modernity. Archaeological approaches to the contemporary past*. Oxford: Oxford University Press.

Harvey, G. 2006. *Animism: Respecting the living world*. New York: Columbia University Press.

Hodder, I. 2012. *Entangled. An archaeology of the relationships between humans and things*. Oxford: Wiley-Blackwell.

Hodder, I. 2018. *Where are we heading? The evolution of humans and things*. New Haven: Yale University Press.

Huvila, I., and J. Huggett. 2018. Archaeological practices, knowledge work and digitalisation. *Journal of Computer Applications in Archaeology* 1 (1): 88–100.

Keller, C. 2018. *Political theology of the Earth. Our planetary emergency and the struggle for a new public*. New York: Columbia University Press.

Kintigh, K.W., J.H. Altschul, M.C. Beaudry, R.D. Drennan, A.P. Kinzig, T.A. Kohler, W.F. Limp, H.D.G. Maschner, W.K. Michener, et al. 2014. Grand challenges for archaeology. *American Antiquity* 79 (1): 5–24.

Knappett, C., and L. Malafouris, eds. 2008. *Material agency: Towards a non-anthropocentric approach*. Berlin: Springer.

Latour, B. 2005. *Reassembling the social. An introduction to actor-network-theory*. Oxford: Oxford University Press.

Latour, B., and T.M. Lenton. 2019. Extending the domain of freedom, or why Gaia is so hard to understand. *Critical Inquiry* 45 (3): 659–680.

Lury, C., S. Kembers, and S. Fraser. 2006. *Inventive life: Approaches to the new vitalism*. London: SAGE.

Milhesuah, D.A., and A.C. Wilson. 2004. *Indigenizing the academy: Transforming scholarship and empowering scholarship*. Lincoln: University of Nebraska Press.

Olsen, B. 2010. *In defense of things. Archaeology and the ontology of objects*. Lanham: AltaMira Press.

Pickering, A. 1999. The mangle of practice: Agency and emergence in the sociology of science. *The American Journal of Sociology* 99 (3): 559–589.

Pierotti, R., and D. Wildcat. 2000. Traditional ecological knowledge: The third alternative (commentary). *Ecological Applications* 10 (5): 1333–1340.

Rizvi, U. 2006. Accounting for multiple desires: Decolonizing methodologies, archaeology, and the public interest. *India Review* 5 (3–4): 1–12.

Smail, D.L. 2008. *Deep history and the brain*. Berkeley: University of California Press.

Solli, B., M. Burström, E. Domanska, M. Edgeworth, A. González-Ruibal, C. Holtorf, G. Lucas, T. Oestigaard, L. Smith, and Ch. Witmore. 2011. Some reflections on heritage and archaeology in the Anthropocene. *Norwegian Archaeological Review* 44 (1): 40–88.
Spivak, G.Ch. 2003. Planetarity. In *Death of a discipline*, G.Ch. Spivak, ed. 71–102. New York: Columbia University Press.
Sturdy Colls, C. 2016. *Archaeologies of Holocaust: Approaches and future directions*. Cham: Springer.
Templeton, A.R. 2019. *Human population genetics and genomics*. London: Academic. https://doi.org/10.1016/C2010-0-66258-4. E-book.
Watts, Ch., ed. 2013. *Relational archaeologies. Humans, animals, things*. London/New York: Taylor and Francis.
Witmore, C. 2007. Symmetrical archaeology: Excerpts of a manifesto. *World Archaeology* 39 (4): 546–562.
Witmore, C. 2014. Archaeology and new materialism. *Journal of Contemporary Archaeology* 1 (2): 1–44.
Wolfe, C. 2010. *What is posthumanism?* Minneapolis: University of Minnesota Press.

Archaeology and Anthropology

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Introduction and Definition

This entry addresses the practice of modern world archaeology in relationship to its sister discipline of anthropology. My discussion explores two particular issues. First, I briefly describe a history of some of the shared interests that establish the relationship between archaeology and anthropology. Based in the analysis of material culture and spatial relations, archaeology has long drawn insight and inspiration from the anthropological study of cultural interactions, processes, and systems. I also consider the application of anthropology in the actual practice of modern world archaeology. This work is presented in two frames. The first is the use of anthropological data and approaches in the recovery and interpretation of past people and ways of life through surviving material remains. I focus specifically on cross-cultural studies, whose anthropological perspectives enhance the capacity of archaeology to contribute to the study of colonialism. A second frame is the use of anthropology as a method for developing a reflexive critique of archaeological practice. In recent years especially, a great deal of work has aimed to better understand archaeology as a distinctly modern practice. In one guise, this work looks explicitly to connect archaeology with modern interests in heritage and cultural identity and establishing a record that recognizes diversity within modernity. Another expression is found in work that employs an anthropological perspective to establish archaeology itself as a worthy subject of study. In this work, archaeologists and others examine archaeologists and archaeological projects as cultural practices. The use of anthropology here is a realization of one of the discipline's most basic goals: to critique the "home" cultures and communities that conceived of anthropology and archaeology in the first place and to enhance the capacity of this work to cultivate greater understanding and democratic participation in modern life.

Historical Background

A logical place to start is Lewis Binford's classic and controversial 1963 *American Antiquity* article, "Archaeology as Anthropology." This essay is regarded as a seminal work for "new" or "processual" archaeologists, especially in the United States. While the essay has been critiqued, it still represents one prominent perspective on the practice of archaeology as a branch of anthropology. Binford (1963: 217) states his understanding of anthropology in this way:

Initially, it must be asked, "What are the aims of anthropology?" Most will agree that the integrated field is striving to *explicate* and *explain* the total range of physical and cultural similarities and differences characteristic of the entire spatial-temporal span of man's existence. Archaeology has certainly made major contributions as far as *explication* is concerned. Our current knowledge of the diversity which characterizes the range of extinct cultural systems is far superior to the

limited knowledge available 50 years ago. Although this contribution is "admirable" and necessary, it has been noted that archaeology has made essentially no contribution in the realm of explanation.

For Binford, the purpose of anthropology is to explain "cultural systems," and, as anthropologists, archaeologists should aspire to not only recover, describe, and classify material culture but to employ it as evidence to explain the causes of past activities. Binford sought to reinvent archaeology as a more rigorous scientific pursuit that produced causal explanations based on hypotheses tested against the archaeological record itself. Binford's career as well as that of many of his American peers and acolytes was defined by a scientific struggle to connect the archaeological record to the activities that produced it so that what happened in the past could be known, tested, and ultimately predicted (Schiffer 1976).

Processual archaeologists largely deployed cultural ecology as "anthropology" so that people and their social and cultural contexts were defined by the resources and limitations of their environment. Cultural ecology also places great value on (eco)systemic stability and the importance of adaptation to explanations of human activity. An excessive focus on human-environmental relationships and the concurrent dehumanization of archaeology's subjects fostered a number of powerful critiques of cultural ecology (e.g., Shanks and Tilley 1987; Trigger 1989; Gero and Conkey 1991; Hodder and Hutson 2004). Nevertheless, a kernel of Binford's hope for an anthropological archaeology remains in general circulation. This is the idea that archaeology shares a basic common goal with anthropology: that expressions of humanity, including in and through material objects, are patterned and can be read to reveal influential practices and perhaps underlying rules that produced and reproduced meaning and action. While the cultural ecological approach of processual archaeology situated meaning in the adaptation of societies to their surroundings, the diverse post-processual archaeologies that followed it engendered a more broadly conceived approach to meaning-making in archaeology.

Couched in Marxism, feminism, hermeneutics, and other frameworks, post-processual archaeologies embrace a general notion that understanding agency and subjectivity is essential to the making and interpretation of the archaeological record. In fact, most post-processualists embrace subjectivity, arguing that the intersubjective spaces and activities people work through every day form the basis of active meaning-making in social and cultural life. Post-processual archaeology draws on the anthropological framework that succeeded cultural ecology. This approach has come to be termed "interpretive anthropology," a framework described famously by Clifford Geertz (1973: 5) in this way: "Believing, with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law but an interpretive one in search of meaning." Interpretive anthropology moves from explanation toward understanding such that even as we live now in our own situated and culturally structured worlds, we may still acquire a perspective on others, both past and present, in which they may be appreciated and understood on their own terms. The focus of interpretative anthropology is less the struggle for resources than the struggles for identity, power, change, and significance.

As interpretive anthropology matured, a significant interest emerged in the situated standpoint of all persons and institutions, including those of the disciplines and researchers working to document and represent diverse cultural worlds. Eventually a reflexive anthropology formed, especially following a set of powerful critiques of the discipline during the 1970s and 1980s. One critique showed the complicity of anthropology within the oppressive and racist colonial regimes where anthropological fieldwork traditionally took place (Asad 1973). A second critique, initially voiced by feminist anthropologists, rejected the capacity for anthropology to produce objective knowledge, insisting that all knowledge is situated and partial, especially knowledge constructed cross-culturally (Moore 1989). A third critique focused on the translation of experience into text and argued for the radical deconstruction of the research position

as not only socially situated but also the result of distinct and under-theorized actions of writing and representation in and about the world (Clifford and Marcus 1986).

Reflexive anthropology fostered new approaches to writing and to the representation of cultural subjects. It also established that the practice of anthropology is itself more than description and interpretation but also is an active way to create meaning in and about the modern world. However, the most powerful transformation to anthropology achieved by reflexive approaches was an acceptance that not only are interpreters (i.e., anthropologists) viable anthropological subjects but subject persons and groups themselves are necessarily valid interpreters of anthropology. Seeking broader inclusion in the discipline and a deeper dialogue about the meaning of anthropology in the modern world, indigenous anthropologies illustrate some of the most basic goals of reflexive research (Smith 1999; Kirch 2006).

In large part modern world archaeology is a post-processual, interpretive, and reflexive field. With access to historical and cultural documents, the textual silence associated with the creators of the prehistoric archaeological record disappears and in fact defines a new rationale for archaeology that aligns it with interpretive anthropology. Given the presence and authority of documents and oral testimony in modern life, archaeology and material culture provide complimentary data that reveal significant contradictions and uncertainties that lie in the spaces between the written and wrought and between the consciously recorded and the simply done (Potter and Leone 1988). Very much informed by interpretive anthropology, modern subjects are considered active social beings whose lives are marked by a rich negotiation with competing regimes of power and identity, such as nation, race, class, capitalism, and modernity. Moreover, with a complex array of documentary and material data at hand, the reconstruction of the interpreting subject is well within the reach of modern world archaeologists. At its best, modern world archaeology brings the world as subjectively conceived by it subjects into view and then deepens it as the statements recorded in documents are articulated with the practical consciousness of actions and artifacts.

Modern world archaeologists are also quite aware that they study the origins of the world as most people know and experience it today. Modern world archaeology thus contains a number of studies cast in the mold of reflexive anthropology. Some of these studies work to bring awareness and significance to what may be termed "minority histories." This sort of research takes as a starting point the fact that the making of modern world has involved the creation of the white western heterosexual male standpoint as the "normal" historical subjectivity. The perspectives and experiences of the modern world of women and nonwhites, as people without history, must therefore be excavated from the spaces where they were confined as secondary and abject and reintroduced as fully participating characters in the narratives of modern life.

A second branch of reflexivity in modern world archaeology researches what may be called "subaltern pasts" (these terms derive from Chakrabarty 2000). In these instances, a reflexive critique of archaeology works to challenge not only the absence of a historical presence for the majority of actors but the inherent biases that lie latent in the archaeological methods and practices we deploy to recover them. As with reflexive anthropology, an indigenous archaeology movement was forged alongside a great deal of productive research and analysis in the field of critical, community, and public archaeology. The remainder of this essay explores varied examples of the use of interpretive and reflexive anthropology in modern world archaeology.

Key Issues/Current Debates

Archaeologies of Colonialism

In most conceptions, anthropology is the study of cross-cultural interactions and subjectivities to provide a relativistic understanding of cultural experiences in different cultural milieus. Anthropology in this vein introduces an important layer of meaning and interpretation that transforms

behaviors that may appear quite strange to outsiders into appropriate, culturally situated responses and actions. For example, Marshall Sahlins' (1985) study of the killing of Capt. James Cook by native Hawaiians in 1779 explains that the event, which lived up to the western conception of indigenous people as dangerous and wild, was rather a playing out of a native Hawaiian conceptual scheme that constructed Cook and his crew as representation of the deity Lono. Similarly, Michael Taussig's (1983) study of Columbian and Bolivian peasants shows that irrational practices like making deals with the devil and baptizing money are rather astute interpretative critiques of the transformations wrought by the capitalist planting and mining industries that came to dominate their communities. Many modern world archaeologists work in comparable cross-cultural contexts that help reveal the contours and constructions of the modern world. While this sort of work may be found in varied contexts, I highlight here the studies that examine the emergence and entanglement of cultures in colonial settings.

One of the most prevalent markers of the modern world is the thousands of intercultural relations that developed with European expansion and colonialism. Most research in this area begins with a conception of colonialism as the interaction of two or more distinct cultural worlds. The result has been an overwhelming majority of studies documenting the impact of colonialism on presumably stable "preexisting" indigenous cultures that underwent substantial change as they became modern. This sense of colonial cultures has undergone serious critique. In a nutshell, this critique illustrates Eric Wolf's (1982) concern with "people without history" such that before contact the worlds of the colonizer and especially the colonized followed secure and essentially timeless traditions that changed only after impact. It is misguided and self-important to think that colonialism instituted changes so substantial that colonized people were irreparably changed by their encounter with Europeans. For one, anthropology explains that all groups face changes and are culturally poised to respond, understand, and control their circumstances. This is the basis of Sahlins' interpretation of culture contact in Hawaii. Second, anthropology also shows that culture does not function outside of the social and historical circumstances in people's lives but is simultaneous and integral to the way history is made. This is what we learn from Taussig's research in South America. As such, we need to take care to recognize that colonialism is more than a context or a set of relations that situates people and groups in certain conceptual cultural worlds; colonialism is also a means of actual cultural production that creates and is created by the specific conditions that enable and control actions and social power through time.

An excellent approach to understanding the dynamics of colonial culture is Kurt Jordan's (2008) study of *The Seneca Restoration* in the early 1700s in New York State. Jordan urges the adoption of two critical standpoints. The first is a rejection of the dominant trope of "cultural decline" attached to the study of indigenous communities in the colonial era. In most instances, researchers posit a "precontact" indigenous people defined by the modern dream of the noble savage, a dream eviscerated as the unprepared native succumbs to modern desires, falters, and ends up destitute if not eliminated altogether. Regarding his study of the Seneca Iroquois, Jordan (2008: 18) points out the principal implication of the trope: "it declares that the only way for the Iroquois to remain Indians was to stay the same." In contrast, Jordan contends that the fact that we call people Iroquois (or another identifier) does not necessarily mean that they need to act in any particularly "Iroquois" way to leave behind important stories about the Iroquois people. Rather, how they struggled to remain a relatively autonomous and empowered community of Iroquois people is what we need to understand.

Jordan also calls for researchers to consider the "local political economy" in the interpretation of colonial lives. Referring to the places and relationships that make up the contexts of their daily activities, such as acquiring, cooking, and preserving food and tools and the maintenance of external relationships (through trade and conflict), he argues that understanding and operating in local contexts made up most of the consciousness

of colonial subjects. A focus on local political economy does not replace a concern for broader-reaching contexts of colonialism or capitalism that are the general interest of modern world archaeologists. Rather, inasmuch as these broader concerns can be understood culturally, it will be in how they emerge in the actual daily practice in localities.

Jordan's study of the Seneca Iroquois in west-central New York State illustrates these standpoints masterfully. Most research argues that the Iroquois' encounter with British and French colonials is a story of decline defined by their participation in the international fur trade interspersed with periodic warfare, which left them decimated by disease and death and unable to reproduce vital cultural practices and remain Iroquois. The consensus is that by the early 1700s, the Iroquois were fully colonized and in this eroded state adopted what they could of European ways of life to survive. By the time they were subject to one of the earliest modern anthropological studies in the 1840s, Lewis Henry Morgan concluded they had become passive and lost the capacity for innovation, i.e., they were no longer Iroquois. Among the most visible effects of Iroquois acculturation were a change in housing and settlement patterns. Pre-contact Iroquois sites are associated with a matrilineal, multifamily house structure known as the "longhouse," built in clustered and often palisaded villages. By the 1700s clustered longhouse villages were replaced with dispersed settlements made up of smaller, sometimes nuclear-family, houses built with European materials. So, when "the people of the longhouse" (Jordan 2008: 13) stopped building longhouses, scholars took this as evidence of their decline.

Jordan counters this interpretation explaining that "many factors previously taken as evidence for acculturation or social disintegration in fact were innovations *beneficial* to Iroquois people" (Jordan 2008: 23). His focus is the Townley-Read site, a component of the dispersed New Ganechstage Complex, located near the western shore of Seneca Lake. The site was established around 1715 in the years after a formal declaration of peace between Britain and France and occupied until the start of new international hostilities in 1754. Over several previous generations, international conflicts created a "landscape of fear" forcing Senecas to negotiate alliances with their Indian neighbors and colonial settlers and armies and, with a constant threat of war, be prepared to protect and/or uproot their settlements. However, after a peace treaty in 1713, palisaded villages were abandoned, and the Seneca moved to the dispersed New Ganechstage Complex consisting mostly of smaller "short longhouses" (Fig. 1).

Jordan argues that the 1713 peace treaty brought about the best conditions the Iroquois had experienced in decades. The shift to a dispersed settlement therefore was a strategic development that allowed established Iroquois cultural practices to be put to use given the current conditions. Dispersed settlements supported greater household autonomy and better integration into the regional political economy. Households avoided a pattern of overusing key resources like firewood and cropland. Seneca women were also closer to water sources and their fields, giving them more time to devote to other productive activities. For example, the archaeological record suggests a greater emphasis on local deer hunting in this era. Deer meat was useful, but given more free time, women also extracted the maximum amount of value from a given animal. Marrow from long bones was collected for storable bone grease. Deerskins were also useful both in the household and as a valuable good in the international fur trade that still operated in the region.

Participation in the deerskin trade is paired with a documented shift in the source of beaver pelts to the Ohio territory and points west. Many scholars assert that this factor also evidences Iroquois decline. Jordan (2008: 341) shows that the western fur trade instead established a very useful "geographic middleman position" for the Seneca, in which good relations with the Iroquois were required for safe passage through their territory to the European trading forts. Iroquois are documented to have encouraged western groups to trade with Europeans in their region, most likely because this would have preserved and enhanced their role in the evolving trade network. Archaeologically this process is visible in a marked increase in the number of red pipestone

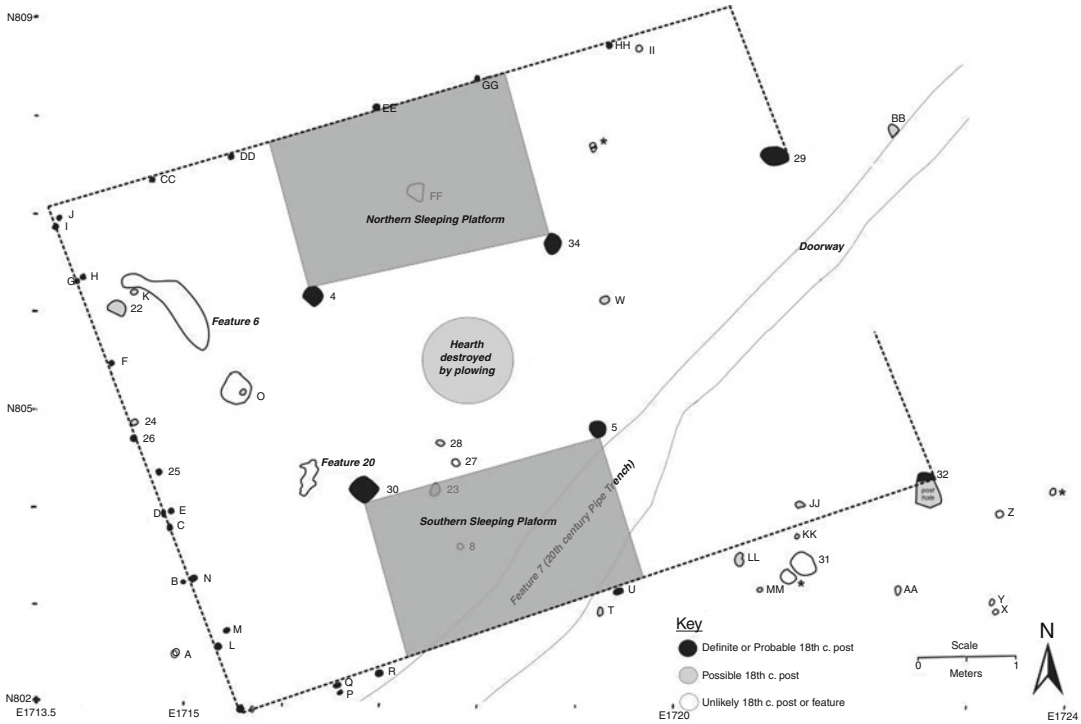

Archaeology and Anthropology, Fig. 1 Plan view of a Seneca short longhouse, Structure 1, DRC 1, Area D, Townley-Read site (Courtesy: Kurt A. Jordan)

artifacts which originate from the upper Midwest. More than exotic goods, these artifacts were part of an assemblage that also included glass beads and beaver pelts paid to the Seneca for safe passage through their territory. Notably, red pipestone was not valuable to Europeans at the trading forts so its value was restricted to Native American relations. Moreover, a 1730 document shows that western Indians went out of their way to visit Seneca villages, a record suggesting this was part of an established process of securing an alliance.

In sum, Jordan shows in these data and many others that the early eighteenth-century Senecas were not in decline but strategically situated to take advantage of the opportunities and limitations presented in their cultural world. Their selection of a dispersed settlement pattern suited the conditions of the era and allowed them to employ and adjust key "Iroquois" cultural practices in household management and trade relations. In effect, the evidence of being Iroquois in this case indicates the process of Iroquois people continuously transitioning to become modern within and against colonialism.

A second compelling archaeological study of modern colonialism is Akinwumi Ogundiran's (2002) study of trade beads and cowrie shells in Nigeria and Benin during the era of the African slave trade. Ogundiran works with multiple data sets including myths and legends as well as archaeological material culture to weave a brilliant interpretation of the uses and meanings of cowrie shells. Ogundiran (2002: 431) argues that "material culture, myth, and legends constitute a "cognitive constellation" that shapes the perception of reality and provides insights about the world and about new experiences. In this regard, objects (whether locally or externally derived) are critical to generating, transforming, and

transmitting ideas and values into physical reality. The conversion of ideas into objects and of objects into ideas, however, is a two-way process by which culture is created, codified, and contained." In this approach cultural expressions (both material and ideal) are practical statements seeking to provide stability to the dynamic and unsettled meanings that can emerge in colonial settings.

This study begins with the fact the Bight of Benin/Slave Coast region consumed almost half of the cowrie shells (more than 10 billion) imported through all West African entrepôts. Cowries are an Indian Ocean shellfish species first imported by Portuguese traders to serve as a trade item in Africa. Soon after their introduction, cowries were adopted as a form of currency and thus elevated from a bauble to a foundation of local economies. Ogundiran contrasts the use of cowries with that of glass trade beads that had long served as sumptuary goods deployed by elites to display prestige, cement alliances, and fund attached specialists. Moreover, beads came to stand for preciousness, auspiciousness, good fortune, and spiritual health. Ogundiran offers the following translation of a Yoruba panegyric to illustrate:

Child of one who wakes to thread, one who threads *segi* beads
My father, one who rises at the crack of dawn to thread "groundnut" coral
Child of Owara Aremu, who scatters *segi* beads in the forest
He said it's because of the pluckers of leaves (leaf sellers)
He said it's because of the breakers of sticks (firewoods sellers)
He said it's because of the destitute who traverse the bush far and wide

Beads were the result of hard work and the use of one's wealth to care for those at the margins of society. While self-aggrandizing, elites were praised for their charity and support of the whole community.

The introduction of cowries and their use as currency supported an intensification of commercial activities among an ever-larger proportion of the population that ultimately undermined such reciprocal cross-class relations. Cowries were used for most payments including tribute and bride-price as well as accepted as payments for captives sent to the slave trade. It was the connection between cowries and captive people more than anything else that fractured earlier social relations. One key social factor of cowrie currency was their tie to the emergence of more centralized state power largely supported by elite control of the slave trade. With centralization, the value of cowries stabilized, and their use more became widespread such that while most African commoners rarely owned other Atlantic trade goods by the 1700s, almost everyone in Yorubaland had cowries.

Notably, cowries also became an "embodiment of transformative/ritual potency" (Ogundiran 2002: 440). One story tells of the origins of cowrie money as the result of the peace made between a Benin king, Oba Eresoyen, and the great deity of the seas, Olokun, who "as a reward . . . heaped up cowries to the sky for Eresoyen and they were packed to the palace" (Ogundiran 2002: 441). This myth worked because the connection between the use of cowries and the transshipment of captives represented the basis of a new way of life for people tied to the generation of wealth and power from the ocean. Commoners also told stories that connected enslavement, cowries, and the sea:

In the beginning of the world we had the forge and we forged things, we had weaving-looms and we wove our clothes. . .. we had boats from which we caught fish. We had no guns. We had no cowrie-money (akwa). If you went to the market you took beans in order to exchange them for sweet potatoes. You exchanged something for something else. Then the king brought the cowrie-money. What did the king do in order to bring the cowrie-money? He caught people and broke their legs and their arms. Then he built a hut in a banana plantation, put the people in it, and fed them bananas until they became big and fat. The king killed the people and he gave orders to his servants to attach strings to their bodies and to throw them into the sea where the cowrie-shells (akwa) lived. When the cowrie-shells started to

eat the corpses, they pulled them in, collected the shells, and put the live cowries in hot water to kill them. That is how cowrie-money came to exist (Ogundiran 2002: 443).

Here we see how common people, those most vulnerable to capture, construed a direct human-cowrie conversion. Yet, this myth also captures the rising significance of commercial activity in coastal West African society during this era. With cowries, as with all money, the value of goods shifted from their use in barter to their use in the creation of wealth at the expense of those traded away.

Slave Coast West Africans also found ways to rationalize the transformation of their society toward the global system and an associated shift in the meaning of humanity from lineage and region to the commercial value of persons, enslaved or free, in the market. Ogundiran explains this change through the use of cowries in rituals of self-realization. Just as "Oba Eresoyen is remembered in the oral traditions of Benin as the king who "built a house of money" because he "decorated the walls and palace of his palace with cowries"" (Ogundiran 2002: 445), so did others, including both noble and common people. A significant expression is the proliferation of *Ibori* shrines and *ile orí* or individualized deities constructed with cowries as the main decoration (Fig. 2). The *ile orí* was "the house of the inner head" used to protect individuals from harm by nature or the evil eye, secure their privacy, and ensure their self-respect. The key reference is how cowries supported the individual as the basis of social life and the distinctions between individuals as the result of their autonomous actions: "The centrality of cowries to the making of *Ibori* and its *Ile- Orí* is evidence that cowries became the value register for harnessing the spiritual and temporal powers of successful men and women after the sixteenth century" (Ogundiran 2002: 448). Cowries helped West Africans to conceptualize and enable the transformations wrought to their society by the impact of the slave trade both in the taking of persons and in the commercialization and individualization of everyday experience.

Archaeology and Anthropology, Fig. 2 House of the head shrine (ile ori), dimensions: H. 13 3/4 × diam. 10 in. (35 × 25.4 cm). (The Michael C. Rockefeller Memorial Collection, Gift of the William W. Brill Foundation, 1962. Accession number: 1978.412.459a-c)

Minority Histories: Archaeology, Heritage, and Identity

A very active interest in modern world archaeology lies at the intersection of archaeological research and heritage interests. Heritage is a shared interest among anthropology and archaeology, especially in the field of applied anthropology (Shackel and Chambers 2004). Based on the promise that archaeology can recover new data and build interpretations that compliment as well as challenge dominant narratives of modern history, many archaeologists see their work being about the meaning of past actions to people living now. As applied anthropology, archaeology is used to provide tangible histories and material touchstones in support of the creation and recognition of minority identities in modern life and the construction of paths to the recognition of diverse heritages. Some archaeologists see their work as a form of civic engagement and adopt a distinctly political edge. These approaches deploy archaeological resources to work with minority communities in order to capture their interests in the past

and to present their findings to the broader public with the aim of fostering recognition and social change.

Very good examples of this work come from research connected to the struggle to preserve "unrecognized" indigenous identities in post-colonial modern life. In United States as well as other modern settler nations, the legitimacy of indigeneity is a serious discourse that crosscuts questions about national and tribal identities, race, as well as propertied interests and claims. The basis of recognition in the eastern United States is especially difficult since federal recognition of tribal status demands a continuous and documented official tribal record over four centuries. Being poor, racially outcast, and largely dispossessed of their material and cultural property and heritage, many eastern tribal communities cannot produce the records required for official recognition. Archaeological research on the history of these communities in the modern world, therefore, enters a dialogue on heritage and identity with powerful meanings and results.

The Werowocomoco project (Gallivan et al. 2011) in tidewater Virginia provides a good illustration of this sort of work. Werowocomoco was the capital of the Powhatan confederacy when the English settlement at Jamestown was constructed in 1607. Werowocomoco was also the likely site where Pocahontas saved the life of John Smith, establishing a key origin story about colonial intercultural encounters that most Americans know and embrace. The archaeological discovery of the site in recent years, especially as it was concurrent with the 400th anniversary of the Jamestown settlement, positioned Werowocomoco as a potent symbol to a wide number of groups, including both Native American descendants and non-Indian American patriots.

Gallivan et al. (2011) point to a contradiction that surfaced around the Werowocomoco project between the expectations of indigenous historical and cultural continuity and current trends in anthropological scholarship that challenge essentialist cultural claims. Anthropology in this vein draws attention to the fluid social networks and strategic adaptations groups adopt to preserve autonomy and power during stressful times. The problem for unrecognized tribes such as the Pamunkey and the Mattaponi is that, while this sort of research may produce a more accurate, decolonized depiction of their history as people who equally contributed to the making of the modern world, it undermines the requirements for recognition that they exist still as "fixed, bounded and historically continuous entities" (Gallivan et al. 2011: 12). As such, Native American collaborators in the Werowocomoco project "publically represented themselves and their communities in terms of tightly bounded, internally homogenous tribal identities" (Gallivan et al. 2011: 12).

Despite this context, the research team still found useful insights and approaches that helped to construct a novel understanding of an indigenous life during the early colonial era. Challenging preconceptions that the Powhatan confederacy was a regionally organized, hierarchical chiefdom, archaeologists now believe that the network of Indian communities was framed in more local terms with groups forming alliances and other "foreign relations" without the overarching authority of a centralized chief. With this perspective in mind, Gallivan et al. (2011: 19) consider the community at Werowocomoco and their descendants have long practiced "creatively incorporating cultural elements including colonists, Christianity, and (most recently) archaeology, while retaining meaningful connections to place as well as kinship ties that stretch across diverse communities." While the results of this project and the collaborations and political actions with which it is engaged are not yet fully realized, a view of how modern world archaeology intersects with the complexities of intersecting and diverse heritages is very evident.

A second approach to heritage-driven research in modern world archaeology draws from a more explicit and political engagement with the process of building community collaborations as social action. Through the negotiation of a shared authority over research and presentation, collaborations with descendant and local communities often serve to empower not only their recognition but novel forms of knowledge useful to

understanding modern lives both past and present. The Hampden Community Archaeology Project (HCAP) in Baltimore, Maryland, is a wonderful example of this work in the context of industrial working-class heritage (Gadsby and Chidester 2011). The Hampden section of Baltimore is a former industrial zone and working-class district that thrived in the late nineteenth and early twentieth centuries. After the 1920s most factories closed and residents had to look elsewhere for work. By the late twentieth century, Hampden's industrial history became noteworthy, though this was based in stories of the district's industrial and technological achievements and not stories about its working-class residents. As is common in post-industrial districts, this history was closely tied to the renovation of mill buildings into high-end studios and offices and the opening of new restaurants and trendy shops as Hampden was gentrified for use by the middle class. While the working-class history of the neighborhood is largely neglected, it does make an appearance at "HonFest" an annual event that "lampoons an imaginary blue-collar experience by disseminating inaccurate and cartoonlike images of working class men and women" (Gadsby and Chidester 2011: 106) (Fig. 3). The HCAP seeks to redress this slighting of the heritage of the working-class residents, who have always formed the core of the Hampden community.

Gadsby and Chidester (2011: 107) distinguish between public heritage, that which is marketable and often the focus of heritage and urban development professionals, and private heritage "in which the past is dynamically linked to the present, with heritage values interpreted and identified by community members rather than outsiders." Focused on landscapes, housing, and fixed historical associations, public heritage encourages forgetting as it separates people and places. Private heritage, however, promotes remembering as it is based on the people and relations that connect past and present and thus give historical contexts to places as they are actually lived.

In addition to excavations at sites associated with the historic working class of Hampden, the HCAP also developed a number of noteworthy outreach programs to illustrate and promote an appreciation of the private heritage in Hampden. These included a series of public history workshops, a project blog, an oral history project run with high school students, and a program that paid city youth to work on the project. These resources provided community members with a chance to participate, publicly share their interest in

Archaeology and Anthropology, Fig. 3 HonFest 2004. Hamden, Baltimore (Photograph courtesy David A. Gadsby)

Hampden's working-class heritage, and criticize how this heritage is ignored by outsiders. These useful critiques enhance the capacity of the archaeological project to engage in informed social action. One example of this was the creation of an exhibit on working-class women's history in Hampden to be mounted during HonFest, which provided a counter-narrative to the disparaging public heritage otherwise represented at this event.

Subaltern Pasts: Diverse Meanings of Archaeology in the Modern World

There is one additional anthropological method used to engage the cultural complexity of the modern world in archaeology. This involves understanding the contemporary landscape of knowledge production that enmeshes archaeology in modernity (Thomas 2004). Taking a cue from reflexive approaches in anthropology, some modern world archaeologists have conceived projects that consider archaeology itself as a subject of study. While some have engaged in ethnographic research of archaeologists at work (Edgeworth 2006), others pursue ethnographic research on the contexts that construct archaeology as a discipline and practice as well as the activity of specific persons in the modern world. From the latter especially, important insights on the intersection of archaeology and modern life have emerged that very well may change the discipline's future.

This line of research may be couched under Lynn Meskell's (2005) term "archaeological ethnography." For Meskell, there are two critical elements that define this approach. The first is an interrogation of the relations between archaeology and "the locals." Long associated with archaeology as laborers, constituencies, sources of "traditional" knowledge, descendants, and stakeholders, archaeological ethnography seeks to broaden the scope of "local" relations as they are defined by the global and local scales of the modern world. At the global scale, "locals" are defined by diverse and specific geopolitical positions that situate them in ethnic, racial, and class histories of place and locality. According to Meskell (2005: 82), "locals" are not passively engaged with their conditions but "directly enmeshed in their own critical reformulations, political negotiations, and constitutions of theory and interpretation." In addition, local communities engaged with archaeology are typically internally diverse, crosscut by gender, age, and class dynamics that will necessarily affect relations with archaeologists and other outsiders. Archaeological ethnography works through these dynamics to establish the proper cultural fields in which archaeology participates.

One result of this approach for Meskell was the clear pictures of archaeology that "locals" had in mind when she approached them about her project at Kruger National Park in South Africa. Meskell's interest was in developing a proper picture of the cultural meanings and interests that neighboring communities, many of whom had been displaced by the colonial and apartheid regimes to create the park, held for archaeological sites within the park. Intending to discuss this project with residents of a Malatji village, she was directed to a courtyard where women were preparing a plaster courtyard floor. Meskell realized they were showing her traditional Malatji construction techniques or what they thought an archaeologist would be interested in seeing in their village. A similar example of cross-cultural confusion arose when her team reached an impasse while interviewing Malatji elders. The new chief expressed reservations about sharing the elders' stories because of a history of their cultural knowledge being used against them, especially in regard to land claims. Meskell (2005: 92) puts it this way: "in most contexts the taxonomy of "homeland" would be a positive one inflected with concepts of tradition, ancestry, and indigeneity, whereas in South Africa it is steeped in a dystopian history of dislocation and disenfranchisement."

A second critical element for Meskell is the interrogation of the discursive field archaeology occupies. In archaeological ethnography, researchers shift their attention from an interest in past dynamics to the notions and uses of "archaeology" and "the past" in contemporary culture. While the past is a vital resource for building heritage in the present, the structure of the past and even what constitutes being "past" are

regularly debated. The structure of the past is defined in the conflicts between unified and fractured tellings of history: whose history is privileged? How and why are others left out? Does the acceptance of diversity in history require multiple histories or can a broader inclusive history be built? The question of what is actually past versus what is still present is one with especially great relevance in modern world archaeology. In fact, a defining characteristic of modern world archaeology is that the issues and topics driving research have direct relevance to the present. Topics such as capitalism, colonialism, industrialization, racism, gender and sexual bias, class formation, and oppression can all be situated in both past and present, often with clear ties between what happened before and why and how things are the way they are now (Hamilakis and Duke 2007; Matthews 2010; Voss and Casella 2012).

More pointed than expressions of cultural continuities, the question of what makes the past is especially significant when the problem is whether a people still exist and therefore whether the claims of those living now need to be addressed. Similar to the question of recognition in the Werowocomoco project discussed above, Meskell found a sharp divide between natural and cultural history in Kruger National Park that removed responsibility from park managers for the maintenance of archaeological sites or from having a working understanding of the relevance of archaeological sites to nearby local communities. The additional complexity here comes from basic questions that emerge about what counts as archaeology and who is responsible (and how) for establishing its relevance in the contemporary world.

My own work with the descendant mixed-heritage Native and African American community in Setauket, New York, explores some dimensions of archaeology as a public discourse alongside its role as a method for recovering histories lost to modernity (Matthews 2011). This project began as a collaboration between a community-based historic preservation group, Higher Ground Intercultural and Heritage Association, Inc., and the Center for Public Archaeology at Hofstra University (the collaboration is now with the Center for Heritage and Archaeological Studies at Montclair State University). From the start the project was community-driven, in that Higher Ground sought to create an independent story of their community that captured what its leaders felt was a disappearing resource. Since the 1960s, the mixed-heritage minority community in Setauket has seen a great deal of change as their population dropped from more than 40 families to fewer than 15. The problem is that during this time the Setauket area became suburbanized, a process that introduced more people and commercial development in the local area. New people and resources in turn led to an increased demand for housing and municipal services that in turn drove up property taxes. The Native and African American community were not prepared for these changes, and many have since left the area for less expensive places to live. While the process of gentrification is common on the American landscape, in this case, the community being removed is one that has distinctly deep local roots, having been present in the area since colonial settlement in the 1660s, if not long before, given their Native American ancestry.

This community's story is also connected to another local effort to control suburbanization: the creation of a series of historic districts in the area that have protected historic sections of Setauket from demolition. These districts have preserved a wide range of structures dating to the colonial and postcolonial eras of the area that help to give Setauket an aura of the past that it uses to distinguish itself within the larger region. It is notable that the sections excluded from these historic districts were those areas where the minority community, who have always been there, lived. In one case the neighborhood was already torn down and replaced with a strip mall; in another case, the community was already removed in order to create an all-white elite enclave; and in the third, the area known as east Christian Avenue, where those who remain still live, was excluded because of its lack of properly "historic" structures. In the end, the historic minority community was surrounded on all sides by an official historical landscape that made virtually no mention of them.

In response, Higher Ground petitioned for the creation of the Bethel-Christian Avenue-Laurel Hill historic district in 2005 so that the last stronghold of the historic Native and African American community could be preserved. This act not only added a minority component to the local historical landscape, it created a social context for creating and telling a separate story about the past in Setauket. This is how the collaboration between Higher Ground and Hofstra University came about. Higher Ground deliberately sought an outside institutional partner with which to create an independent and critical story of Setauket as a historical place. The partnership therefore was formed not only to recover archaeological and historic data but to create a new perspective on minority history within a space where the official history is routinely and genuinely celebrated by the majority community. Moreover, the purpose of our project does more than challenge the mainstream story about the past in Setauket but also makes plain that neglecting the minority community in local history is akin to neglecting their well-being and survival in the present.

In words of Mr. Robert Lewis, President of Higher Ground, archaeology provides an opportunity to do something "unconventional." For his whole life, Mr. Lewis lived in a Setauket that relied on a simple historical thread tied to its colonial and rural history, its association with actions during the American Revolution, and a long process of slow capitalist development that had always found a place for his people, although at the bottom end of the socioeconomic scale. When he heard this same story from white preservationists as he sought their help, he realized that the story itself was very much part of the problem because it was not the same resource in his community than it was for his white neighbors. He needed a story of his own that could excite his community and inspire them to protect their heritage despite the obvious challenges.

Regarding archaeology Mr. Lewis said, "because it is unconventional opportunities for exciting discoveries exist" (Matthews 2011: 50). So, in this project we not only share our findings and include community members in the process of creating knowledge about the past but seek explicitly to engage them in the association between archaeology and discovery that Mr. Lewis keyed into. Archaeology emerges through a different process and from a different archive than the traditional stories circulating in Setauket, and the sites and artifacts we discover are directly connected to members of their community. These sources and connections support a place for an indigenous knowledge not predicated on the survival of ancient traditions alone. Rather, it is based on the same process of discovery that has fueled mainstream knowledge and fascinations with the past but practiced in this case by subalterns who have traditionally been excluded from making discoveries and contributing to the making of modern places of heritage. Thus, in this case, archaeology is both discursively and practically in the hands of the community and therefore provides them with a tool to do more than represent diversity but also to create it.

Future Directions

This entry has considered the relationship between anthropology and modern world archaeology, and the studies reviewed were selected to provide a view on where the use of anthropology by modern world archaeologists is heading. The several examples show how the use of the interpretative and reflexive anthropological approaches creates potent frameworks for creating knowledge about and understanding of modern lives. One specific use of anthropology is in the cross-cultural analysis of modern colonialism where archaeology provides insight on local political economies and reveals strategic indigenous cultural practices that complicate master colonial narratives of decline and acculturation. A second anthropological approach lies in the development of heritage diversity in modern life. Considering examples of Native American and working-class struggles for proper cultural recognition, archaeology is shown to function as a tool for both research and social action and to provide a useful means for supporting cultural claims that complicate the histories of minorities that dominate modern life. Also discussed was the possibility of

modern world archaeology to address the cultural realities that situate archaeology and archaeologists. These realities include miscommunications of the role of archaeology in the new South Africa and the capacity of subaltern people in New York to appropriate the idea of "archaeological discovery" to create an independent and politically useful indigenous history.

Anthropology serves modern world archaeology by providing frameworks that situate modern people, practices, disciplines, objects, and ideas in specific and productive material and cultural relations. In turn, archaeology activates a new archive of data that brings into view actual and possible counter-narratives that complicate our understanding of the experiences of modern life and the ability of archaeologists to act as modern people coeval with the people and pasts that constitute their research and lives.

Cross-References

- ▶ Activism and Archaeology
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Colonial Encounters, Archaeology of
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Contemporary Past, Archaeology of the
- ▶ Critical Historical Archaeology
- ▶ Cultural Heritage and the Public
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- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Modern World: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ South Africa: Heritage Management

References

Asad, T. 1973. *Anthropology and the colonial encounter*. New York: Ithaca Press.

Binford, L.R. 1963. Archaeology as anthropology. *American Antiquity* 28 (2): 217–225.

Chakrabarty, D. 2000. *Provincializing Europe: Postcolonial thought and historical difference*. Princeton: Princeton University Press.

Clifford, J., and G.E. Marcus, eds. 1986. *Writing culture: The poetics and politics of ethnography*. Berkeley: University of California Press.

Edgeworth, M., ed. 2006. *Ethnographies of archaeological practice: Cultural encounters, material transformations*. Walnut Creek: AltaMira Press.

Gadsby, D.A., and R.C. Chidester. 2011. Heritage and "those people": Representing working class interests through Hampden's archaeology. *Historical Archaeology* 45 (1): 101–113.

Gallivan, M., D. Moretti-Langholtz, and B. Woodward. 2011. Collaborative archaeology and strategic essentialism: Native empowerment in tidewater Virginia. *Historical Archaeology* 45 (1): 10–23.

Geertz, C. 1973. *The interpretation of cultures*. New York: Basic Books.

Gero, J.M., and M.W. Conkey, eds. 1991. *Engendering archaeology: Women and prehistory*. New York: Blackwell.

Hamilakis, Y., and P. Duke, eds. 2007. *Archaeology and capitalism: From ethics to politics*. Walnut Creek: Left Coast Press.

Hodder, I., and S. Hutson. 2004. *Reading the past: Current approaches to interpretation in archaeology*. 3rd ed. New York: Cambridge University Press.

Jordan, K.A. 2008. *The Seneca restoration, 1715–1754: An Iroquois local political economy*. Gainesville: University Press of Florida.

Kirch, S. 2006. *Reverse anthropology: Indigenous analysis of social and environmental relations in New Guinea*. Palo Alto: Stanford University Press.

Matthews, C.N. 2010. *The archaeology of American capitalism*. Gainesville: University Press of Florida.

Matthews, C.N. 2011. Lonely islands: Culture, community, and poverty in archaeology perspective. *Historical Archaeology* 45 (3): 41–54.

Meskell, L. 2005. Archaeological ethnography: Conversations around Kruger National Park. *Archaeologies* 1 (1): 81–100.

Moore, H. 1989. *Feminism and anthropology*. Minneapolis: University of Minnesota Press.

Ogundiran, A. 2002. Of small things remembered: Beads, cowries, and cultural translations of the Atlantic experience in Yorubaland. *International Journal of African Historical Studies* 35 (2–3): 427–457.

Potter, P.B., Jr., and M.P. Leone. 1988. Issues in historical archaeology. In *The recovery of meaning: Historical archaeology in the eastern United States*, ed. M.P. Leone and P.B. Potter, 1–24. Washington, DC: Smithsonian Institution Press.

Sahlins, M. 1985. *Islands of history*. Chicago: University of Chicago Press.

Schiffer, M.B. 1976. *Behavioral archeology*. New York: Academic Press.

Shackel, P.A., and E.J. Chambers, eds. 2004. *Places in mind: Public archaeology as applied anthropology*. New York: Routledge.
Shanks, M., and C. Tilley. 1987. *Re-constructing archaeology: Theory and practice*. New York: Routledge.
Smith, L.T. 1999. *Decolonizing methodologies: Research and indigenous peoples*. New York: Zed Books.
Taussig, M. 1983. *The devil and commodity fetishism in South America*. Chapel Hill: University of North Carolina Press.
Thomas, J. 2004. *Archaeology and modernity*. New York: Routledge.
Trigger, B.G. 1989. *A history of archaeological thought*. New York: Cambridge University Press.
Voss, B., and E. Casella, eds. 2012. *The archaeology of colonialism: Intimate encounters and sexual effects*. New York: Cambridge University Press.
Wolf, E.R. 1982. *Europe and the people with history*. Berkeley: University of California Press.

Archaeology and Antiquarianism in China

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Introduction

Antiquarianism has long been intertwined with historical and historiographical narratives in China and can be understood as an attempt to bridge the divide between the present and the past through written and material sources. Harking back to the primal stages of dynastic rule in China, history and historiography played a vital role in political and philosophical thought and speculation. Thus, a concern for ancient artifacts and the material residues of the past to undergird historical scholarship has formed an integral part of Chinese historical thought.

Although we can find traces of collecting and proto-antiquarian pursuits from as early as the Han 漢 dynasty (206 BCE-220) – with a first apogee during the years of the Wang Mang 王莽 (r. 9–23) interregnum (Falkenhausen 2013) and another crucial period during the Tang dynasty (618–906) in which the preoccupation with the material remains of the past facilitated the development of an interest in antiquarian studies that laid the foundations for later antiquarian and proto-archaeological research – it was not until the Song 宋 dynasty (960–1276) that antiquarianism became both a fathomable concept as well as a past-time of the elite. Collecting and studying ancient objects became associated with the idea of comprehending and retracing the Way (*dao* 道), the natural order of the universe, and maintaining the order of the world and the cosmos. By collecting and studying antique objects, which were regarded as embodiments of political and moral authority, the antiquarian collector could bridge the divide between him and the idealized past. By virtue of this appropriation, he therefore gained moral gravitas, demonstrating a firm and historically recurrent belief in the moral and educative capacity of ancient artifacts (Grimberg 2019). Collectables were perceived as documents, as cultural legacy and material evidence of the past rather than objects of art. Therefore, books, but also ritual bronzes, jade objects, and other artifacts, were regarded as being the same type of objects. Their main function was not to please the senses or to inspire awe and admiration in those who looked at them, but to record events and deeds of the past. By collecting ancient objects, the antiquarian aligns himself with the (idealized) past and the (virtuous) people that owned the objects before him. Consequentially, the antiquarian collector is eager to preserve and pass on the objects he collects. Antiquarian studies and collecting thus correlate with maintaining and emulating the order of the world and the cosmos, as the cosmos is reflected in the objects collected. By collecting and studying ancient objects, the antiquarian symbolically protects the world from chaos (*luan* 亂).

Not only, however, were ancient objects regarded as material evidence of the past and exemplifications of cosmic forces, but also as instruments for education. Hence, antiquarian

collecting was seen as a means of fostering talent and disseminating knowledge, thereby promoting learning and virtuousness which were considered to be among the guiding principles in becoming a Confucian Gentlemen (*junzi* 君子).

While in later centuries, especially during the Yuan 元 (1276–1368) and Ming 明 dynasties (1368–1644), the majority of scholars showed little interest in antiquarian studies per se, it was during the Qing 清 dynasty (1644–1911) that antiquarianism flourished, reaching the apex of activity in the eighteenth century. Whereas the best part of the nineteenth century witnessed a more textually and linguistically oriented approach to history and historical texts, it was during the first decades of the twentieth century that modern field archaeology was introduced to China for the first time.

Definition

Antiquarianism can be defined as the study of history through objects such as antiquities, ancient artifacts, and manuscripts, while the term *archaeology* describes the scientific study and excavation of material and environmental remains of past human life and activities.

In China antiquarianism or *jinshixue* 金石學, literally the "study of bronze and stone," is first used to describe the activity of studying historical artifacts, mostly bronze inscriptions and inscriptions on stone stelae – hence the term, in texts of the late Tang and early Song dynasty. The modern Chinese term for archaeology, *kaoguxue* 考古學 or "investigating antiquity," on the other hand, is an old term borrowed from the title of a catalogue of collectibles by Song scholar Lü Dalin 呂大臨 (1046–1092) that was only reintroduced to Chinese scholarly discourse from Japan in the second half of the nineteenth century where it had been adopted for the phenomenon of western field archaeology. Until the beginning of the twentieth century both terms have been used interchangeably (Visconti 2015).

Historical Background

The Tang Dynasty

Although collections of historical and/or precious objects, of so-called ecofacts, and curios as well as accidental discoveries of relics and artifacts by peasant-farmers, well-sinkers, or builders, antedating (proto)archaeological scholarship of later dynasties, have been documented in China since the 1st millennium BC, antiquarian interests only started to form during the Tang dynasty. With Confucianism gradually substituting Buddhism as the philosophical and social common denominator after a period of predominantly Buddhist leanings of the Chinese court, collecting ancient artifacts and *objects d'art* became a pastime of the elite (Demattè 2011).

The discovery of a set of drum-shaped stones engraved with archaic characters describing the hunts of the dukes of Qin dating from the late Spring and Autumn (Chunqiu 春秋, 771/770 to 481/453 BCE) or early Warring States (Zhanguo 戰國, 481/475/453-221 BCE) period, which were unearthed during the founding years of the Tang dynasty, furthered a new interest in antiquarian studies and ancient history. The so-called "Stone drum inscriptions" (Shigu wen 石鼓文) count among the earliest known stone inscriptions in China. They boast a number of poems in four-syllable verses with some 700 characters in large seal script (dazhuan 大篆). During the middle and late Tang historians commented on the stones and copies of the inscriptions were widely circulated among scholars (Mattos 1988), fuelling debates about history and historiography.

An example of what might be regarded as the earliest documented evidence of antiquarian interest during the Tang dynasty is a collection of coins unearthed from a hoard in Xi'an, dating to the year 755. It contained, among other things, coins from the Eastern Zhou to the Northern and Southern Dynasties period (Nanbei chao 南北朝, 420–589) as well as specimen from Turfan, Japan, and even Byzantium. Although Falkenhausen (2013) rightly argues that we cannot know the collector's intention in putting together his collection we can, however, infer that it is the result of a systematic, (proto-)antiquarian approach to collecting rather

than a mere bricolage of random, unrelated objects.

In the wake of the so-called *guwen* (old text 古文) movement initiated by the prominent Tang scholar and poet Han Yu 韓愈 (768–824) that promoted the use of pre-Han writing styles in literature and the strengthening of the Confucian orthodoxy, studies of ancient texts and antiquities alike became the nucleus of a new scholarship that evolved around ancient history, palaeography, and object studies, eventually leading to the development of antiquarian learning that unfolded during the Song dynasty.

The Song Dynasty

Antiquarian pursuits of scholar-officials and members of the social elite during the Song dynasty were based on the studies and collections of their Tang progenitors. An increase in building and engineering endeavors that was due to economic growth and a high-impact level of prosperity at the beginning of the dynasty led to more and more archaeological discoveries of ancient relics, sparking an ever growing interest in the material legacy of the past (Rudolph 1963).

While during the centuries following the Qin 秦 (221-206 BCE) and Han-Empires up until the end of the Tang dynasty the court has been the driving force of collecting ancient artifacts and predominantly shaped the tastes of the elite, it was during the first century of the Song dynasty that the court gradually lost its status as the center of gravity for antiquarian studies and collecting, and affluent private scholars came to dominate the scene instead. Although the founding Emperors of the Song had seized the collections of conquered local dynasties of the Five Dynasties and Ten Kingdoms (Wudai shiguo 五代十國, 906–960), uniting their treasures and incorporating them into the Imperial collection in order to demonstrate the new dynasty's cultural hegemony, it was only during Emperor Huizong's 徽宗 (1101–1125) reign that the court regained its former significance in collecting antique objects while at the same time reclaiming the prerogative of cultural sovereignty (Buckley-Ebrey 2014; Hsu 2013; Buckley-Ebrey 2008). Simultaneously, scholar-officials like Ouyang Xiu 歐陽修 (1007–1072) and Su Shi 蘇軾 (1037–1101) revived the *guwen* movement of the Tang and advocated the strengthening of the Confucian orthodoxy and classicizing learning.

The systematic documentation of collected objects and antiquarian catalogues both private and Imperial also emerged during the Northern Song for the first time. Among the earliest catalogues of this kind are the *Jigulu* 集古錄 by Ouyang Xiu, dating from 1061; the *Xian Qin guqitu* 先秦古器圖 by Liu Chang 劉敞 (1019–1068), dating from some time before 1068; the *Kaogutu* 考古圖 by Lü Dalin, which was posthumously published in 1092; Zeng Gong's 曾鞏 (1019–1083) *Yuanfeng leigao jinshilu* 元豐類稿金石錄 from sometime between 1078 and 1085; Zhao Mingcheng's 趙明誠 (1081–1129) *Jinshi lu* 金石錄 from 1104; as well as Xue Shanggong's 薛尚功slightly later *Lidai zhongding yiqi kuanshi fatie* 歷代鐘鼎彝器款識法帖 from 1144 and Zheng Qiao's鄭樵 (1104–1162) *Tongzhi jinshi lue*通志金石略 from 1157 (Visconti 2015).

One of the most important precursors and patrons of antiquarian studies, collecting, and (proto-)archaeology among Chinese antiquarians, however, was Emperor Huizong, the penultimate Emperor of the Northern Song (960–1127). As one of the first collectors in Chinese history, he commissioned and published extensive catalogues of his collections. Huizong started collecting when he still was only a prince, influenced by his maternal uncle Wang Shen 王詵 (1048- c. 1103) who assembled a premier collection of books, ceramics, bronzes, and jades himself (Buckley-Ebrey 2008).

Among Huizong's catalogues the most prominent are the *Illustrated Catalogue of Antiquities of the* Xuanhe-*Era* (Xuanhe bogutu 宣和博古圖), the *Catalogue of Paintings from the* Xuanhe-*Era* (Xuanhe huapu (宣和畫譜), the *Catalogue of Calligraphies from the* Xuanhe-*Era* (Xuanhe shupu 宣和書譜), and the *Catalogue of Rocks from the* Xuanhe-*Era* (Xuanhe shipu 宣和石譜).

The first of these catalogues, the *Illustrated Catalogue of Antiquities of the* Xuanhe-*Era*, edited by scholar-official Wang Fu 王黼 (1079–1126), was published in 1123 during the

Xuanhe reign period of the Emperor (1119–1125), as were all of the other aforementioned catalogues; hence their respective titles. The *Illustrated Catalogue of Antiquities of the* Xuanhe-*Era*, however, describes some 55 categories of objects from the imperial collection, including bronzes of such types as *zun* 尊, *yan* 甗, *pu* 鋪, *ge* 鬲, *ying* 罌, *qing* 磬, *jian* 鑒, and *ding* 鼎 etc., totaling 840 objects. They date from between the Shang/Zhou dynasties through the Tang. Besides categorizations of the objects and their respective approximated chronologies and age estimates, the catalogue offers skillfully illustrated descriptions and comments on provenance and measures such as height, diameter, volume, and weight, as well as information concerning the material used and the decorations applied. Furthermore, it provides transcriptions and comments on the ancient inscriptions. It is, indeed, the very first catalogue of this kind, being a thoroughly executed scholarly assessment of the objects it lists and a demonstration of the Emperor's keen interest in his collections and the objects he collected. In order to enlarge and enhance his collections Emperor Huizong deployed professional agents who searched the country for the most outstanding pieces and brought them back to court. Some artifacts were dug up in imperially commissioned archaeological excavations, others were given as presents to the Emperor by local dignitaries and aspiring officials. In some cases, recasts and copies of artifacts of outstanding beauty, rarity or value were made and incorporated into the Imperial collection (Buckley-Ebrey 2010).

The *Catalogue of Paintings from the* Xuanhe-*Era* describes 6396 paintings by 230 masters in the Imperial collection, dating from the Wei-Jin 魏晉 periods to the Northern Song. The catalogue specifies genres and categories by which paintings and masters are listed chronologically according to their rank, merit and quality, which were measured in descending order by the categories of "divine" (shen 神), "wonderful" (miao 妙), and "able" (neng 能).

The *Catalogue of Calligraphies from the* Xuanhe-*Era* is the catalogue of the Imperial calligraphy collection and contains chronologically arranged entries on calligraphies executed in the seal script (zhuanshu 篆書), clerical script (lishu 隸書), standard script (kaishu楷書), cursive script (xingshu 行書), grass script (caoshu 草書), and the bafen 八分-style of the standard script as well as biographies of calligraphers and masters from the Wei-Jin period up to the Northern Song, which are discussed due to their rank, merit and overall quality. In total the catalogue contains 1220 works by 247 calligraphers.

Lastly, the *Catalogue of Rocks from the* Xuanhe-*Era*, the shortest of all of Huizong's catalogues, contains 61 entries on ancient rocks and rockeries of various origins, shapes, and sizes that were to decorate and adorn the Imperial parks and gardens. It lists the rocks' measurements, their visual nature and qualities, their provenance, their site of installation, and, if they happened to have one, the inscriptions they bore (Buckley-Ebrey 2014).

Most catalogues of the time combine visual representations like textual transcriptions, rubbings, and printed images of the objects with a systematic, typological approach of classification that is backed by philological and historical scholarship.

During the Northern Song dynasty antiquarian approaches towards antique objects generally changed from classifying them as treasured relics or artifacts to material evidence of the past that seconded the traditional text-based historical inquiries of classical learning, while at the same time fusing notions of historicity and aesthetic concern deeply ingrained in Northern Song antiquarian scholarship with the (re-)awakening of a Chinese identity in a time of geopolitical uncertainty with foreign dynasties at the Empire's doorstep.

While after the abduction of the Imperial court to Manchuria following the plight of the Jurchen's siege and sacking of Kaifeng in 1127 and the reestablishment of the court in the southern capital of Lin'an (Hangzhou) shortly afterwards, collecting and antiquarian pursuits in general wavered, Northern Song catalogues were continuously reprinted and widely circulated among members of the elite. However, during the Southern Song intellectual concerns shifted from the object-driven antiquarian interests of their

forebears to more metaphysically inclined philosophical debates that led to a gradual decline in the prestige of collecting and antiquarianism. Thus, antique objects, formerly venerated for their moral authority and educative capacities, were relegated to the status of aesthetic props, valued for their entertaining qualities and artistic merits only. Accordingly, archaic forms and ornaments in decorative objects were to define the taste and aesthetics in the arts and crafts for the remainder of the Southern Song, affixing the visual signatures of the past to the tastes of antiquarians and collectors alike.

The Yuan and Ming Dynasties

After the end of the Southern Song dynasty in 1276, the majority of former court officials, scholars, and Song loyalists refused to take up office under the new Mongol regime and thus retreated to retirement – some even committed suicide. In light of the dynasty's fate, antiquarian pursuits were largely discarded in favor of more serious political and philosophical speculation about the future prospects of the realm under foreign rule. The Mongols on the other hand, while generally being rather indifferent towards Chinese cultural traditions, boasted three prominent members of the Imperial clan that fashioned antiquarian studies during the Yuan dynasty. The first, Princess Sengge Ragi 祥哥剌吉 (1283–1331), was the great-granddaughter of Kublai Khan 忽必烈 (1215–1294) and an avid collector of ancient objects of Imperial provenance. Thus, the Princess eagerly retrieved objects that formerly were part of the collections of the Song court and, specifically, personally belonged to Emperor Huizong of the Northern Song (or allegedly did so). After his demise the bulk of his collections was either destroyed by the Jurchen invaders or dispersed and sold off. Some 200 years later Princess Sengge Ragi managed to locate and retrieve a great many of objects of Imperial Song provenance and incorporated them into the collections of the Yuan court, which were later to become the foundation of the Ming and ultimately Qing Imperial collections. The second, her son-in-law, Tugh Temür (1304–1332), who became Jayaatu Khan or Emperor Wenzong 文宗 in 1328, was an accomplished poet and a dedicated antiquarian himself who established the so called Kuizhang Pavilion (Kuizhang ge 奎章閣), an academy and treasury in the palace grounds in the Mongol capital of Dadu 大都 where he kept and studied his collections of bronzes, jades, ceramics, and books. The third member of the Mongol Imperial clan who showed an interest in antiquarianism and collecting was Toghon Temür or Emperor Huizong 惠宗 (1333–1370), the last of the Yuan Emperors. Much like his predecessor Emperor Wenzong, Toghon Temür instituted an Imperial academy called Xuanwen Pavilion (Xuanwen ge 宣文閣) where he conversed with scholars and fellow antiquarians and kept his collections of antique objects, calligraphies, and paintings (Shambaugh Elliot and Shambaugh 2005).

Admittedly, his successors of the Imperial house of Zhu 朱 did not show much interest in antiquarian studies, archaeology or collecting altogether. However, the Ming dynasty in general witnessed a phase of rapid and profound socio-economic change including a considerable growth of population, an overall increase in wealth, and the emergence of a new affluent "middle class" of merchants with access to education and the time and money for leisurely pursuits. Thus, antiquarian studies and collecting became more and more common among tiers of Chinese society that were formerly barred from the exclusive circles of elite pastimes. While during the first century of Ming rule only very few antiquarian manuals were published – like Cao Zhaos 曹昭 (fl. 1370–1400) *Gegu Yaolun* 格古要論, a comprehensive collection of bronzes, paintings, calligraphies, stone rubbings, jades, ink stones, metalwork, ceramics, lacquer ware, textiles, and musical instruments that became very influential among fellow antiquarians and collectors of the day – it was only during the second half of the Ming dynasty that private collectors issued antiquarian catalogues and manuals of their collections in larger numbers. Among these was Gao Lian's 高联 (1573–1620) treatise *Zunsheng bajian* 遵生八笺, published in 1591 as well as Zhang Yingwen's 張應文 (1530–1600) *Qingbi zang* 清閟藏, published in 1595. Others, like

critic and Confucian reformer of the Ming-Qing transition Huang Zongxi 黃宗羲 (1610–1695), published his collections of rubbings of tomb inscriptions in his *Jinshi yaolie* 金石要例 in 1658, some 14 years after the demise of the Ming, while philologist and geographer Gu Yanwu 顧炎武 (1613–1682) published two compendia of epigraphic texts on bronze vessels and stone stelae, the *Qiugulu* 求古錄, containing rubbings and transcriptions of texts from fifty-six stone stelae from the Han to the Ming dynasty, and the *Jinshi wenzi ji* 金石文字記, dealing with bronze vessels from the Shang and Zhou dynasties as well as stone inscriptions from the Han to the Tang dynasty.

Whereas during the Late Ming the elite's interest in bronzes and antique objects generally wavered in favor of a more linguistically driven concern for the textual transmission of what was considered the original teachings of the Confucian orthodoxy of Han and pre-Han times unspoiled by Buddhist and Neo-Confucian additions – artifacts were no longer considered historical sources in their own right, rather, they were seen as "superfluous things" (zhangwu 長物) (Clunas 2004) and "ancient playthings" (wangu 玩古) that yielded no value beyond aesthetic pleasantry – reprints of Song catalogues of antiques became collectibles themselves. Rather than perpetuating antiquarian pursuits or sparking an interest in archaeological research, catalogues found their way into book collections of the Late Ming where they were grouped with other connoisseurial manuals of the time like the *Pinghua Pu* 瓶花譜 by Zhang Chou 張丑 (1577–1643), published in 1595, or Yuan Hongdao's 袁宏道 (1568–1610) *Pingshi* 瓶史, published in 1599.

Although antiquarian and archaeological studies remained in a stalemate during most of the Ming, the more evidence-oriented approach of the philological reform movement of the Ming-Qing transition (Elman 1984) and the shift in paradigm from philosophical and metaphysical speculation to practical research and "evidential scholarship" (kaozhengxue 考證學 or kaojuxue 考據學) of the time (Hammond 2012; Elman 1984) was to prompt an increasing concern for archaeological studies and scholarly antiquarianism that first emerged during the early Qing dynasty, reaching its apogee in the eighteenth century.

The Qing Dynasty

Early precursors of Qing textual criticism like aforementioned scholar Gu Yanwu, founder of the so-called "School of Han Learning" (Hanxue 漢學), as well as Huang Zongxi, Yan Ruoqu 閻若璩 (1636–1704), Hu Wei 胡渭 (1633–1714), Mao Qiling 毛奇齡 (1623–1716), Wan Sida 萬斯大 (1633–1683), or his brother Wan Sitong 萬斯同 (1638–1702) and others advocated the use of an inductive method of textual criticism, including the use of material evidence and archaeological finds in order to adjust and re-evaluate canonical interpretations of history and to gain a firmer, more evidence-based grip on the lore of the Classics and their inherent meanings. This tide of textual criticism, ultimately aimed at improving the ruler's capacities to govern properly through a thorough and unswerving grasp of the past, simultaneously led to an increase in antiquarian and archaeological research that was to replace traditional notions of historical scholarship as a means for comprehensively and systematically reconstructing the past (Guy 1987).

While the first two Emperors of the new dynasty, Shunzhi 順治 (1644–1661) and his son Kangxi 康熙 (1662–1722), who otherwise was rightfully considered a wise, learned ruler, did not pay much attention to antiquarianism or archaeological research, the third Emperor of the Qing, Yongzheng 雍正 (1723–1735), on the other hand, showed a keen interest in collecting and antiquarianism and was the first of the Manchu rulers to have his decorative curios and antique objects studied and portrayed in detail. In so-called "Illustrations of Ancient Playthings" (Guwantu 古玩圖) Emperor Yongzheng and his fellow antiquarians documented their collections in pictorial inventories that depict a wide variety of objects ranging from books and handscrolls to ceramics, jade and bronzes as well as exotic items such as coral, shells or rocks and other ecofacts.

It was, however, his son, Qianlong 乾隆 (1736–1796), who became the most prolific and avid collector of ancient artifacts among Qing

Emperors and a knowledgeable and keen antiquarian, setting the stage for a lifelong political and artistic program that was to encompass both his roles as an absolute ruler over the at the time richest country in the world and that as an aesthete, a scholar, and a collector who dedicated part of his time and wealth to antiquarian studies and collecting (Grimberg 2019; Holtzwarth 2005; Rawson 2005). The Emperor was a major patron and important preserver and furtherer of the arts and culture of the time. For the first time in the history of antiquarianism in China Qianlong aimed at putting together a "universal" collection, including objects from Japan, India, South East Asia, the Ottoman Empire, and Europe such as furniture, clocks, automatons, technical and optical instruments, carpets, mirrors, paintings, tapestries, musical instruments, weapons, books, etc., as opposed to earlier collections that predominantly focused on particularly *Chinese* objects. Most "foreign" objects in his collections came as presents from missionaries or envoys or were specially commissioned for the court and shipped to the Emperors' palaces.

The objects he collected identify the Emperor as supreme scholar as well as the guardian and preserver of China's historical and cultural heritage and demonstrate his patronage over the cultural production of his country. Gaining the cultural prerogative and sovereignty of interpretation over the arts and culture in general was of great importance for the Manchu rulers, although none of the other nine Emperors of the Qing dynasty that ruled over China invested as much and paid as much attention to accomplish this goal like Qianlong (Wang 2018).

Much like Emperor Huizong of the Song dynasty Qianlong commissioned catalogues of his collections, among which the *Midian zhulin* 秘殿珠林 and the *Shiqu baoji* 石渠寶笈, a series of catalogues of the Imperial collection of religious and nonreligious paintings, manuscripts, and calligraphies, counted for the most prodigious of his catalogues. Moreover, we find inventories of mechanical clocks, telescopes, astrolabes, European artworks of enamel and glass, as well as jewels, sacrificial objects, and jades.

As was the case with the Song Imperial collections, ancient bronzes from the Shang and Zhou dynasties all the way to the Tang dynasty were of paramount importance with regard to Qianlong's collecting and cataloguing practices. The *Xiqing gujian* 西清古鑑, published in 1749, was the first of a series of four catalogues, followed by the *Ningshou jiangu* 寧壽鑑古, published in 1779, and the two sequel catalogues *Xiqing xujian jiabian* 西清續鑑甲編 and *Xiqing xujian yibian* 西清續鑑乙編, published in 1794, describing, illustrating, and categorizing more than 4,000 bronzes ranging from wine and food vessels, musical instruments and bells, to coins and mirrors (Yu 2007). Yet in comparison to the catalogues Emperor Huizong had issued some 600 years earlier, Qianlong's catalogues are much larger in scope, but limited to measures and numbers and rather demure descriptions of the objects listed than engaging in extensive descriptions, interpretations, and age determination efforts as can be found in Huizong's catalogues, demonstrating a somewhat lesser extend of antiquarian acumen and devotion to the objects collected.

Although we see a rapid decline in Imperial collecting and antiquarianism from the reign of Qianlong's son Emperor Jiaqing (1796–1820) onwards several private antiquarians and scholars of the time published catalogues of their collections (Bai 2013). Among them were Qian Dian 錢坫 (1744–1806) and his catalogue of bronze objects, the *Shiliu Changletang guqi kuanzhikao* 十六長樂堂古器款識考, published in 1796, and his catalogue of mirrors, the *Huanhua baishi xuanjing ming jilu* 浣花拜石軒鏡銘集錄, published in 1797, as well as Wang Chang 王昶 (1725–1806) and his *Jinshi cuibian* 金石翠編, a catalogue containing 1500 inscriptions from stone stelae and bronzes from the Xia to the Jin dynasty, complete with transcriptions and discussions of the texts. Another expert collector and antiquarian of the day was Ruan Yuan 阮元 (1764–1849), who published his vast study collections of bronze inscriptions in his *Jiguzhai zhongding yiqi kuanzhi* 積古齋鐘鼎彝器款識 in 1804 together with a comprehensive preface. In his catalogue Ruan Yuan gives an account of the history of

bronze collecting and research and provides illustrations of the objects and their respective inscriptions, all in chronological order and grouped according to a classification system based on object typologies. Moreover, he edited and published the *Huang Qing jingjie* 皇清经解 (1829), an anthology of Imperial erudition in "evidential" (kaozheng) learning and scholarship.

Likewise, Cao Zaikui 曹載奎 (1810–1839), a young and enthusiastic *kaozheng* scholar, antiquarian, and collector published his private collection of bronzes in the *Huaimi Shanfang jijintu* 懷米山房吉金圖 in 1839, together with measures, drawings of the objects, and transcriptions of texts.

One of the last and most prolific antiquarian scholars of Imperial China was artist, scholar-official, and collector Wu Dacheng 吴大澂 (1835–1902). His catalogue of bronzes, the *Kezhai jigu lu* 愙齋集古錄 with inscriptions, typology, and interpretative essays as well as his catalogue of jades, the *Guyu tukao* 古玉圖考 are set at the intersection of traditional antiquarian studies and a more modern approach to artifacts and material culture in general (Demattè 2011).

Overall, scholarly publications on antiquarian studies soared during the last decades of the nineteenth century, paving the way for the rise of western field archaeology and art history at the beginning of the twentieth century (Su 2004).

Key Issues/Current Debates

While antiquarianism and early forms of archaeology during the Song and Qing dynasties have been extensively researched over the last decades, Tang and pre-Tang antiquarianism remains almost completely unstudied. Contrary to the common notion that antiquarian scholarship in China only developed during the Song dynasty (e.g., cf. Visconti 2015), we find literary and historical traces as well as material vestiges of (proto-) antiquarian interests and archaism possibly dating back as early as the Late Shang dynasty (Falkenhausen 2013). Whether the documented preoccupation with and the concern for material relics from the past attests to early forms of antiquarianism, however, remains a desideratum for further study.

References

Bai, Qianshen. 2013. Antiquarianism in a time of crisis: On the collecting practices of late-Qing government officials, 1861–1911. In *World antiquarianism. Comparative perspectives*, ed. Alain Schnapp, 386–403. Los Angeles: The Getty Research Institute Publications Program.

Buckley-Ebrey, Patricia. 2008. *Accumulating culture: The collections of Emperor Huizong*. Seattle: University of Washington Press.

Buckley-Ebrey, Patricia. 2010. Replicating Zhou bells at the Northern Song court. In *Reinventing the past: Archaism and antiquarianism in Chinese art and visual culture*, ed. Wu Hung, 179–199. Chicago: The University of Chicago Press.

Buckley-Ebrey, Patricia. 2014. *Emperor Huizong*. Cambridge: Harvard University Press.

Clunas, Craig. 2004. *Superfluous things: Material culture and social status in early modern China*. Honolulu: University of Hawai'i Press.

Demattè, Paola. 2011. Emperors and scholars: Collecting culture and late imperial antiquarianism. In *Collecting China: The world, China, and a history of collecting*, ed. V. Rujivacharakul, 165–175. Newark: University of Delaware Press.

Elman, Benjamin. 1984. *From philosophy to philology: Intellectual and social aspects of change in late imperial China*. Cambridge, UK: Harvard University Press.

Grimberg, Phillip. 2019. Collecting for power and pleasure – A comparative study of the imperial collections of Emperors Huizong and Qianlong. In 歐洲漢學 1/2019 (in press).

Guy, R. Kent. 1987. *The Emperor's four treasuries. Scholars and the state in the late Ch'ien-lung era*. Cambridge, MA: Harvard University Press.

Hammond, Kenneth J. 2012. Wang Shizhen and Li Shizhen: Archaism and early scientific thought in sixteenth-century China. In *Antiquarianism and intellectual life in Europe and China, 1500–1800*, ed. Peter N. Miller and François Louis, 234–249. Ann Arbor: The University of Michigan Press.

Holtzwarth, Gerald. 2005. The Qianlong Emperor as art patron and the formation of the collections of the Palace Museum, Beijing. In *China: The three Emperors, 1662–1795*, ed. E.S. Rawski and J. Rawson, 41–53. London: Royal Academy of Arts.

Hsu, Ya-Hwei. 2013. Antiquaries and politics: Antiquarian culture of the northern song, 960–1127. In *World antiquarianism. Comparative perspectives*, ed. Alain Schnapp, 230–248. Los Angeles: The Getty Research Institute Publications Program.

Mattos, Gilbert L. 1988. *The stone drums of Ch'in*. Monumenta Serica monograph series, 19. Nettetal: Steyler.
Rawson, Jessica. 2005. The Qianlong Emperor: Virtue and the possession of antiquity. In *China: The three Emperors, 1662–1795*, ed. E.S. Rawski and J. Rawson, 270–305. London: Royal Academy of Arts.
Rudolph, Richard C. 1963. Preliminary notes on Sung archaeology. *The Journal of Asian Studies* 22.2 (1963): 169–177.
Shambaugh Elliot, Jeanatte, and David Shambaugh. 2005. *The Odyssey of China's imperial art treasures*. Seattle/London: The University of Washington Press.
Su, Rongyu. 2004. The reception of 'archaeology' and 'prehistory' and the founding of archaeology in late imperial China. In *Mapping meanings: The field of new learning in late Qing China*, ed. M. Lackner and N. Vittinghoff, 423–449. Leiden: Brill.
Visconti, Chiara. 2015. The influence of Song and Qing antiquarianism on modern archaeology. *Ming Qing Yanjiu* 19: 59–86.
von Falkenhausen, Lothar. 2013. Antiquarianism in East Asia. A preliminary overview. In *World antiquarianism. Comparative perspectives*, ed. Alain Schnapp, 35–66. Los Angeles: The Getty Research Institute Publications Program.
Wang, Tao. 2018. Mirroring the past: Emperor Qianlong and his bronzes. In *Mirroring China's past: Emperors, scholars, and their bronzes*, ed. Tao Wang, 127–139. Chicago/New Haven: The Art Institute of Chicago/Yale University Press.
Yu, Hui-chun. 2007. *The intersection of past and present: The Qianlong Emperor and his ancient bronzes*. PhD dissertation, Princeton.

Archaeology and Art

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Introduction

Archaeology has a long history of parallel development with art, and within that relationship, we see a huge range of different nuances. Here, I will focus on evolving connections between the theory and practice of art and that of archaeology. I will, largely, confine discussion to manifestations of "archaeology and art" that have arisen from within archaeology itself. Many artists have taken inspiration from archaeology, its practitioners, and its methods, and although the works produced by these artists are a very important part of the symbiosis of the two fields, there is simply not space for a full review. So, there will be very little discussion here of "art about archaeology," although its existence and volume must be remembered as an essential element of the background to what follows (the term "creative archaeology" encompasses a wider set of practice and theory). It is, of course, not easy to enact such a split. In some cases, specific art works referencing archaeology have inspired archaeological thinking. Here, such works will be discussed. In others, archaeologists have developed creative practices that closely resemble or are intentionally described as art works and these too will be included. Lastly, and perhaps most worthy of fore mention here, outside of the Western scholarly tradition, the relationship between archaeology and art is rather different because archaeology and art themselves can be conceived in different ways. I have opted here to discuss this in the International Perspectives section below, while the main discussion will focus on what "archaeology and art" looks like to me, close up, as a European archaeologist, and its manifestations within the discipline of archaeology.

Suffice it to say that although a particular direction has been taken here, there is a wider world of "archaeology and art" in which the definitions and divisions used here do not matter, and recognizing that openness is essential to creative thinking. The following attempt at ordering recent thought may provide a way in, but is really only an attempt to highlight the wide range of interests and approaches that will and do find a home in "archaeology and art." Ultimately, the idea of "archaeology and art" is a global discussion open to all.

Definition

"Archaeology and art" describes a wide-ranging body of theory and practice addressing the ways in which different engagements with art – principally with artistic practice – can help to create new

ways of thinking archaeologically about the world, its histories, and its futures. It is, at its best, an open-ended field bringing together a wide variety of scholars and practitioners who place collaboration, creativity, and experimentation centrally in their work. Many key "archaeology and art" projects feature artists and archaeologists working together to combine, or to contrast, their approaches to understanding the contemporary world. For clarity here, a distinction is drawn between "archaeology and art" and "archaeology of art," although the two will necessarily overlap, for instance, in the excavation of Francis Bacon's Dublin studio in 1998 (O'Connor 2014) which has gone on to make substantial contributions to both. Where the "archaeology of art" may be more ordinarily taken to mean the occurrence of art objects as a subject of archaeological analysis, "archaeology and art," as the "and" suggests, is usually an effort to suspend objective archaeological analysis and examine the results of collaborative engagement, whether explicitly working with artists or seeking to use artistic histories, theory, and practice in ways that go beyond simple appropriation. As such, "archaeology and art" finds itself more readily engaged with contemporary art (or perhaps, more specifically, with art post-dating the advent of Surrealism), although the two disciplines enjoy a long-shared trajectory of interrelation. From antiquarian representations of their contemporary archaeological worlds, through the interrelation of artists, ethnography, and museums and their role in the development of archaeology as a social science from the late nineteenth into the mid-twentieth century, to the almost identical funding structures imposed on (certain parts of) the two in the public realm of the late twentieth century, archaeology and art have rarely been easily separable.

Historical Background

Early antiquarian depictions of historical and archaeological sites in more artistic than scientific ways will be well known. From William Camden onward, the investigation and description of ancient sites and landscapes went alongside visual representations that sought often to depict those archaeological remains, their investigation, and their landscape context. This tradition perhaps reached its apotheosis in *Our Ancient Monuments*, an outcome of work to establish the first national heritage list in England by Pitt-Rivers in the 1880s. Here, photographs and scientific archaeological drawings of sites are joined by watercolor depictions by W.S. Tomkin, some in a broadly Arts and Crafts style that works to connect not just archaeology and art but developing archaeological theory and practice with a (then) contemporary artistic movement.

In the early twentieth century, notably in Europe, a particular interrelation developed between art, ethnography, and museums that gives us, perhaps, the origin of archaeology as a social science in the contemporary sense and the beginnings of the relationship between archaeology and art that exists today. With new forms of art developing through the late nineteenth and early twentieth centuries, including but not limited to Surrealism, that put greater emphasis on the daily lives of people, ideas of psychoanalysis began to influence art and ideas of "inner minds" and "the subconscious" became an accepted and regular artistic subject. Many artists undertook early ethnographic excursions, a coincidence of their quests to discover the nature and manifestations of "primitive" or "savage" minds and their (for many at least) ability to self-fund expeditions. The result, combined with contemporary developing theory in anthropology, was ideas connecting the subconscious mind, human society, and material culture in such a way as to have a direct impact on early ethnographic museum displays (Kelly 2007). Although archaeology has a longer history than this, it is perhaps at this point that we see the emergence of that part of archaeology that is an academic social science.

In much of the Western world at least, neoliberal politics in the second half of the twentieth century has led to private sector concerns dictating much of the development of the built environment. In the United Kingdom, this combined with a particular kind of cultural aspiration promoted by Margaret Thatcher's Conservative government

in the 1980s (but echoed elsewhere in the world) to create a situation wherein private finance led development directed in part by a body of guidance known as the PPGs (Planning Policy Guidance). These were influential in the development in the United Kingdom of private-sector archaeology, but also promoted green space, playgrounds, art and more, to be created alongside development. Thus we see, and are still very much within, a world where archaeology and art both exist politically and in legislation as aspirations for responsible, sustainable development, both as mitigation and as tangible narratives for changing landscapes.

The three key aspects of the history of archaeology and art briefly presented here do not necessarily run into each other as a chronology might but instead give three different trajectories of that relationship to bear in mind. They all manifest in different ways in the contemporary world and in academic thinking. However, those trajectories – visualization, theorization, legislation – are worth keeping in mind.

Key Issues/Current Debates

At their best, archaeology and art come together in a spirit of collaboration and experimentation. The full range of expressions of that relationship at one level work together to provide a body of work that enables creativity within archaeology, whether in practice or in theory. There are, however, a few themes worth highlighting for their specific contributions to the wider field.

Archaeological Theory and Art

Perhaps the strongest central theme in archaeology and art is the bringing together of aspects of the two disciplines to drive archaeological theory and practice forward. Colin Renfrew, in 2003, wrote of the potential for archaeological engagement with contemporary art to change the way we understand the past. In *Figuring It Out: The Parallel Visions of Archaeologist and Artists*, Renfrew highlights a similarity in how practitioners of the two disciplines think about the connections between people, things, and landscapes, going further to draw an analogy between the visitor to an art gallery, or viewer of a sculpture, and an archaeologist uncovering an artifact for the first time. But this is more than an analogy, he writes, their tasks, coming to understanding of the world through a primary encounter with the result of a creative moment, are the same. Renfrew takes his discussion beyond representation and visualization to encouraging an understanding of artistic process as a means to better understanding human creativity in the archaeological past.

"Archaeology and art" features prominently in *After Modernity*, Rodney Harrison and John Schofield's 2010 work on archaeological approaches to the contemporary past. As part of a wider chapter on working between disciplines, they highlight three relationships between archaeology and art: "art as an archaeological record (or the archaeology of art), archaeological investigation as performance (or archaeology as art), and art as interpretation, narrative and characterization (or art as archaeology)." Their outline works well and has proven influential in much recent writing and presentation on archaeology and art. It does not necessarily describe an equal relationship between the two disciplines, with art perhaps being elevated to a position of understanding to which archaeology should aspire or attempt to emulate (rather than a true collaboration as equals). Despite this minor quibble, *After Modernity* remains the most useful widely available work that discusses archaeology and art within the body of a wider discipline of archaeological thought.

Ian Russell and Andrew Cochrane's *Art and Archaeology: Collaborations, Conversations, Criticisms* (Russell and Cochrane 2014) focuses on archaeology and art coming together in practice and primary research, bringing together a number of practitioners for whom direct engagement with art is central to their thinking. The book, and the essays it contains, stresses the importance of creative collaboration, "archaeology and art" through doing. The work is notable for its inclusion of a number of "creative archaeologists," archaeologists (of different kinds) who regularly build creative expression into their archaeological practice. As such, it stands as

something of a call to action for archaeologists to let themselves be inspired by art and to let that inspiration take their archaeology to new places without necessarily worrying about where those places are or how that might be critiqued.

In 2010, the exhibition *Unearthed* at the Sainsbury Centre for the Study of Japanese Arts and Cultures saw a collaboration between archaeologists and artists use Japanese Jōmon dogū to investigate thematically the potential for archaeology and art to influence each other at the level of interpretation (Bailey et al. 2010).

Archaeologies of Art/Art About Archaeology

Although, as stated above, archaeology *of* art is a different thing to "archaeology and art" as presented here, and although I have restricted myself to discussion of that relationship as it appears within archaeology, it is worth making mention of a few key projects that have worked between the two disciplines. The following stand out for both their innovative approaches to material, whether the impetus comes from archaeology or art, and for their regular occurrence in archaeological writing on art.

Tate Thames Dig by Mark Dion saw the artist, with volunteers, collect material from the Thames Foreshore adjacent to the two London Tate sites. Material was then sorted and classified. The work was first shown as part of the *Art Now* series at Tate Modern between 1999 and 2000 and thereafter entered Tate's collection. Objects collected as part of the project sit in a large mahogany cabinet sorted into various categories, but with no further interpretation. The work avoids chronological ordering of the objects which are presented grouped by broad types (pottery, metal). The viewer is invited to create their own interpretation of the objects seen and their interrelation. Cole and Dion's 1999 book *Archaeology* focuses on the work and other of his works that address similarly archaeological themes. The book includes an essay by Colin Renfrew covering themes later revisited in *Figuring It Out*.

In 1998, a team of archaeologists and conservators excavated Francis Bacon's studio at 7 Reece Mews in London in advance of its being dismantled and installed in Dublin City Gallery The Hugh Lane between 1998 and 2001. As well as the archaeological understanding of the space and its contents created by the project, the work also sought to investigate the connections between artistic and archaeological practices. It inspired a number of written pieces and a plenary session at the World Archaeological Congress in Dublin in 2008.

Journalist, artist, and archaeologist Christine Finn has created a number of projects that work between archaeology and art, but of particular interest is the series *Leave-Home-Stay* in which she addressed, through both archaeology and art (and reportage), the process of dealing with the house she inherited from her parents. The series has involved an excavation, open days, exhibitions of artifacts, and writing on the subject and brings together a wide spread of approaches to the space, from the architectural-historical to the intimate and difficult personal attachment to the house as a home (Finn 2014, 2017).

Performance

It is worth making particular mention of the relationship between archaeology and performance. The archaeological interest in art has most often been interested in sculpture, photography, and film. We see a clear concern with performativity although this is often when, as discussed by Harrison and Schofield, an art work has included a conscious recording and presentation of a process of investigation; archaeological investigation as performance. Performance itself has seen less engagement from archaeologists. Mike Pearson and Michael Shanks' *Theatre/Archaeology* (Pearson and Shanks 2001) discussed this issue, seeking to take the connection between archaeology and performance "beyond the theatrical paradigm," an aspiration roughly equivalent to the move past performativity mentioned above. Mike Pearson has produced further work in this area, and *In Comes I* (Pearson 2007) and *Marking Time* (Pearson 2013) are both exemplary "archaeology and art" although published as part of a Performance Studies list.

Performance differs from other visual media in its ephemerality and temporary nature. It is, perhaps, harder to engage with for archaeologists because it relies on presence at the time of performance (although performances are recorded and "performance re-enactments" take place). Despite this, working with live performance is essential for understanding space and duration, not least for thinking about archaeology; not casting it as a performance, but understanding it as a durational act in the present moment.

Art-Archaeology

Lastly here, we can step away from the "monolith" approach to archaeology and art, the way I have presented here as start points a number of key texts and works taken from a vast body of available work, and acknowledge a messier world of archaeology and art that is going on on a daily basis around the world. Here, "archaeology and art" (or art-archaeology, or art/archaeology, or artaeology, or creative archaeology) exists more as ongoing practical experimentation between archaeology and art. The results may be presented or published, or they may equally validly not be, but connecting everyone working in this area, which includes all of the authors already mentioned, is the desire to allow archaeological practice to be affected and changed by experimentation with art, whether this happens at the level of general creative inspiration or through specific collaboration.

In Europe, much of this kind of experimentation takes place under the umbrella of contemporary archaeology and much has been presented at the various conferences of the *Contemporary and Historical Archaeology in Theory* (CHAT) group since its inception in 2003. Common at CHAT conferences are approaches to archaeology that are intentionally experimental and the extension of this to artistically inspired experimentation (or collaboration) has proven to be an easy one. Art is now regularly recognized among the conference's sub-themes. The result is a kind of archaeology that while not quite fully anti-disciplinary does intentionally blur the boundaries of what archaeology can be and do.

Projects that demonstrate this aspect of "archaeology and art" include the *Papay Gyro Nights* art festival in 2013. This saw archaeologists Antonia Thomas and Daniel Lee undertake an archaeological residency at the festival, bringing creative archaeological practice to Papa Westray in Orkney (Thomas and Lee 2017). Also of interest is the new creative engagement journal *Epoiesen* edited by Shawn Graham, which is beginning to showcase interesting artistically inspired contemporary archaeology including *en-counter-maps* by Gísli Pálsson and Oscar Aldred (Pálsson and Aldred 2017). Between 2007 and 2009, the group Artists in Archaeology (later Art + Archaeology), led by Helen Wickstead, produced a series of artistic residencies alongside the *Stonehenge Riverside Project*, primarily to investigate the archaeological process through art, but also inspiring a number of other creative archaeological outcomes for individual participants (Wickstead 2008, 2014). Archaeologist Carolyn White's ongoing collaboration with photographer and philosopher Steven Seidenberg, including *The Archaeology of Artists' Studios*, has focused on the potential for interdisciplinarity to change how archaeology and art can think differently about space (Seidenberg and White (n.d.); White and Seidenberg 2017). James Dixon has produced a series of projects using artistically inspired practices in public archaeology to differently understand how we might approach local places and sites, and live in or develop them accordingly (Dixon 2017). Ursula Frederick brings her artistic background to contemporary archaeology, both in expanding the range of types of site that might be of archaeological interest and understanding them in ways that need an expanded, refined archaeology, but also in creative experimentation with archaeological recording to produce an allied archaeological-artistic record of sites (Frederick 2014).

I have presented a rather unequal relationship between archaeology and art. This is intentional. The bringing together of archaeology and art, whether through collaboration, or to produce art works, or to produce archaeological products, happens in more ways than can be covered here.

It happens in more complicated ways than will benefit from the simple explanations I have provided. I have chosen to focus on manifestations of the close relationship between archaeology and art within archaeological discourse and publishing and as such have intentionally ignored more than half of what the wider archaeology and art world might be reasonably considered to be.

But, I repeat, if "archaeology and art" is a thing, it is a thing about openness and experimentation, and will mean a different thing to every person who engages, if they are thinking creatively beyond the referencing of texts.

International Perspectives

Archaeology and art exist, of course, across the world. The relationship between the two is highly variable although outside Europe and the USA one seems more likely to encounter archaeologies of art or art about archaeology than the kind of collaborative, experimental work presented here, although it does exist. There are many reasons for this, not least that the relationship between art and the daily lives of people is equally variable wherever we go, and different art forms dominate different places.

We should recognize that the blurring of disciplinary boundaries is an aspiration that principally arises from positions of security. The freedom to self-ascribe permission to disregard established practices should not be taken for granted. Of course, in most cases, this kind of experimentation is undertaken from a position of respect for the disciplines involved where proper knowledge of the two is recognized as a necessary precursor to pushing at the edges. Elsewhere, the same respect and knowledge may result in intentionally not-experimenting.

Global "archaeology and art" has benefitted in recent years from prominent placement at international conferences, notably the World Archaeological Congress (WAC). At WAC 6 in Dublin, a strong archaeology and art theme ran through the conference, inspired by the tenth anniversary of the excavation of the Francis Bacon studio. The aforementioned volume edited by Ian Russell and Andrew Cochrane (Russell and Cochrane 2014) arose partly from this conference, as well as their earlier collaborations around archaeology, art, and visualization, for instance, as presented at the CHAT conference in Bristol in 2006.

Archaeology and art was again a central theme at WAC 8 in Kyoto in 2016. Here, a number of sessions in the area, including art-archaeology and archaeology of art, ran alongside two exhibitions, *Art and Archaeology: The Silent Voices of Materials and Soil* (cur. Sahoko Aki, Masakage Murano, Oki Nakamura, and Toshio Matsui) (Museum of Kyoto 2016) at Museum of Kyoto, and *Garden of Fragments* (cur. Sahoko Aki and Peter Matthews) at Ryosokuin temple. There were also a number of other events bringing archaeology and art together. The particular Japanese perspective on archaeology and art presented at WAC 8, and through the preceding 2 years of work by the Kyoto Art and Archaeology Forum, has shown a relationship between the two much more centered on aesthetics. The Japanese context however leans toward a role of aesthetic thinking in daily life that may not, perhaps, exist so explicitly elsewhere and which will provide a rich source of inspiration for non-Japanese archaeologists in the future.

Future Directions

The key future direction for "archaeology and art" is to do more of the same. As has been stated throughout here, "archaeology and art" as a subfield of archaeology is intentionally open, collaborative, creative, and experimental. It benefits from not having an overt agenda. More creative archaeologists from around the world should meet and work together. Ultimately, "archaeology and art" should aim toward ways of doing archaeology and thinking archaeologically that create better understanding of people, places, and things, and that will happen best if it works to become more inclusive of all takes on what "archaeology" and "art" (and "and") can mean.

References

Bailey, D., A. Cochrane, and J. Zambelli. 2010. *Unearthed: A comparative study of Jōmon dogū and Neolithic figurines*. Norwich: Sainsbury Centre for Visual Arts.

Coles, A., and M. Dion. 1999. *Archaeology*. London: Black Dog Publishing.

Dixon, J. 2017. Buildings archaeology without recording. *Journal of Contemporary Archaeology* 4(2): 213–220.

Finn, C. 2014. Home: An installation for living in, 115–127. Russell & Cochrane.

Finn, C. *Leave-Home-Stay*. http://www.leavehomestay.com/. Accessed 03 Sept 2017.

Frederick, U.K. 2014. Shake well midden: An archaeology of contemporary graffiti production. *Australian Archaeology* 78: 93–99.

Harrison, R., and J. Schofield. 2010. *After modernity: Archaeological approaches to the contemporary past*. Oxford: Oxford University Press.

Kelly, J. 2007. *Art, ethnography and the life of objects: Paris c.1925–35*. Manchester: Manchester University Press.

McAtackney, L. & Ryzewski, K. 2017. *Contemporary Archaeology and the City: Creativity, Ruination and Political Action*. Oxford: OUP.

Museum of Kyoto. 2016. *Exhibition catalogue, art and archaeology: Silent voices from material and soil*. Kyoto: Museum of Kyoto.

O'Connor, B. 2014. Dust and debitage: An archaeology of Francis Bacon's studio, 131–140. Russell and Cochrane.

Pálsson, G., and O. Aldred. 2017. en-counter-maps. *Epoiesen*. https://doi.org/10.22215/epoiesen/2017.1.

Pearson, M. 2007. *In comes I: Performance, memory and landscape*. Exeter: University of Exeter Press.

Pearson, M. 2013. *Marking time: Performance, archaeology and the city*. Exeter: University of Exeter Press.

Pearson, M., and M. Shanks. 2001. *Theatre/Archaeology*. London: Routledge.

Renfrew, C. 2003. *Figuring it out: What are we? Where do we come from? The parallel visions of artists and archaeologists*. London: Thames and Hudson.

Russell, I.A., and A. Cochrane. 2014. *Archaeology and art: Collaborations, conversations, criticisms*. New York: Springer.

Seidenberg S., and C. White. (n.d.) *The archaeology of artists studios*. http://www.stevenseidenberg.com/archaeology-of-artists-studios.html. Accessed 03 Sept 2017.

Thomas, A., and D. Lee. *Archaeology meets art at Papay Gyro Nights*. http://www.papaygyronights.papawestray.org/html/gyro2013/artists/archaeology.html. Accessed 03 Sept 2017.

White, C.L., and S. Seidenberg 2017. Artist spaces in Berlin: Defining and redefining a city through contemporary archaeology, 31–50. McAtackney & Ryzewski.

Wickstead, H. 2008. Drawing time. *British Archaeology* 101: 44–49.

Wickstead, H. 2014. Another proof of the preceding theory: Film, materialities and stonehenge, 99–114. Russell & Cochrane.

Archaeology and Colonialism

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Introduction

Colonialism and culture contact have become hot topics in archaeology. Colonialism has been implicated frequently as one of the most significant forces in world history, and the current global situation is, to a large extent, the product of a long and complex history of colonial encounters. Indeed, according to Frank and Gills (2000) or Chris Gosden (2004), one could claim with some justification that the past 5000 years of human history have witnessed an unending series of colonial encounters and attempts at imperial expansion. At the same time, archaeology can trace the material dimensions of colonialism, and, therefore, archaeology and material culture studies let us understand the range of forms in which colonialism is manifest in both modern and ancient human societies (Given and Knapp 2003; Gosden 2004; Farrujia 2014).

It has been estimated (Frank and Gills 2000; Stein 2005) that, by the early decades of the twentieth century, one half of the surface of the earth's continents was under some form of colonial domination and about two fifths of the population of the world (more than 600 million people) were living under colonial rule. Other regions (such as Latin America) had suffered long periods of transformative colonial domination in previous centuries. Moreover, despite the dramatic collapse of the major European colonial empires in the face of widespread popular resistance movements during the last half of the twentieth century – giving rise to the recent popularity of the term "postcolonial" to describe the current world situation – colonialism is still alive and well. Moreover, several current states that are dominated by populations resulting from earlier episodes of settler colonialism (e.g., the United States, Canada, Australia, New Zealand, or the Canary Islands) are hardly

postcolonial from the standpoint of the descendents of the indigenous inhabitants.

The development and regional manifestations of the modern capitalist "world system," in both its colonial and "postcolonial" guises, have become an increasingly central focus of research by historians, sociocultural anthropologists, and archaeologists during the past few decades.

Definition

Colonialism is a concept tied to the last 5000 years and not just a post-Columbian concept. According to Gosden (2004: 153), colonialism is not many things, but just one. Colonialism is a process by which things shape people rather than the reverse. Colonialism exists where material culture moves people, both culturally and physically, leading them to expand geographically, to accept new material forms and to set up power structures around a desire for material culture. There are different types of colonialism:

- A colonialism that is ruled from a center (metropole) that exploits other's resources through economic and military power and establishes colonies or administrative, indirect rule (the British Empire, Roman Empire, etc.).
- Other colonial activities are tied to migrations and settlement that are not regular colonies but have to do with the power balance among various cultural groups which can result in hybridizations but can also result in that one group take over the recourses on the expense of the other group.
- A third group of colonialism is when one group tries to eradicate or marginalize indigenous people (North America, Australia, New Zealand, the Canary Islands, etc.).

Historical Background

The above classification is broad in scope and takes into consideration the work of world system theorists, in particular Wallerstein (1974, 1980) and Frank and Gills (2000). "Colonialism within a shared cultural milieu" would be the term used by Gosden (2004) to describe the earliest (and perhaps most controversial in terms of their acceptance as colonial contexts) colonial forms, such as those that existed from Mesopotamia to the Greeks and among the Aztecs, Incas, Chinese, and Tongans. This form of colonialism is characterized by colonial relations between state and nonstate polities, where power is manifest in forms that operate within norms of social behavior and where the limits of colonization are controlled not by military power but by the area over which a particular culture is shared or spread. Colonial "middle grounds" are exemplified by the peripheries of the Greek colonies and the Roman Empire and early modern contacts with indigenous peoples in North America, Africa, India, and the Pacific. These forms of colonialism are characterized by experimentation and creativity and consist of accommodation on the part of both indigenes and colonists and the development of regularized social relations. *Terra nullius* colonialism, as evidenced by the major settler societies of Australia, New Zealand, North America, and Russia from the mid-eighteenth century but also by the Mongols and Spanish in Peru and Mexico and in the Canary Islands too, is characterized by extreme violence, mass appropriation of land, and the spread of disease which enables the destruction of existing forms of social relations. Active resistance to colonial forms which allow indigenous cultural continuity often exists in such circumstances. *Terra nullius* colonialism is differentiated from the other forms by the existence of relatively fixed categories of difference, whereas in middle-ground colonialism, new categories of difference are often created by cross-cultural encounters, and in the case of colonialism in a shared cultural milieu, no such categories of difference may exist.

Key Issues/Current Debates

There are several approaches that have contributed to a renewed interest on the archaeology of colonialism from within archaeology on issues of contemporary relevance to both indigenous and

nonindigenous peoples in settler societies and to the development of a truly global perspective on world history (Lyons and Papadopoulos 2002), culture contact (Fagan 1998; Torrence and Clarke 2000; Murray 2004; Silliman 2005; Farrujia 2014), or the historical archaeology of indigenous peoples (Murray 1996; Harrison and Williamson 2002; Paterson 2003; Byrne 2003).

The current debates about archaeology and colonialism are influenced by postcolonial theory. This is the case, for example, of one of the most influential approaches, Gosden's work (2004), particularly in terms of understanding the intellectual traditions that underlie the concept of colonialism and how nineteenth-century views of colonialism influence strongly the way in which it has been studied by academics. But there are several other archaeologists that have currently worked in the field of culture contact (Torrence and Clarke 2000; Gosden and Knowles 2001; Farrujia 2014), strongly influenced by the work of Edward Said (1979) and Nicholas Thomas (1991, 1994).

Other authors, such as Given (2004), are interested in the lived experience of colonialism for those on the receiving end of colonial regimes, a "bottom-up" approach to understanding the materiality of the colonial project. Given's focus is narrower than Gosden, both geographically and in terms of the forms of colonialism with which he deals. Most examples are drawn from Turkey and Cyprus, although he also cites material from the Old Kingdom of Egypt, Nazi Germany, and nineteenth-century Scotland. He is most interested in those particular forms of colonialism which express themselves through taxation and the material manifestations of empire.

Regarding postcolonial archaeology, studies have indisputably produced a richer, more complex, and nuanced vision of colonial processes (Gosden 2004; Lyons and Papadopoulos 2002; Stein 2005). However, despite that cultural hegemony and economic exploitation are not two different or even opposed interpretations of colonial power but they should rather be seen as two sides of the same coin, the truth is that the political side of colonialism tends to be ignored in current studies of the phenomenon (Gosden and Knowles 2001; González-Ruibal 2010). This might be dangerous; by stressing fluid encounters, negotiation, hybridity, consumption, agency, and creative appropriation (Dietler 2010), we neglect the crudest side of colonialism – politics, including political economy, asymmetrical power relations, massacres, looting, disease, impoverishment, unequal wars, heavy taxes, and genocide. Surely, these are not always relevant, especially in ancient examples (e.g., Dietler 2010). Yet by overlooking politics, we run the risk of depriving the people without history of the history that hurts, the experience of daily humiliation and abuse by foreign masters (Given 2004: 163).

This means that postcolonialism is not just about attempting to reveal, recognize, and heal the problems of the past, but it is also about trying to move toward a new future in which emotions of belonging can be strongly and proudly felt at a local level but also effectively mobilized at a more global level to gain recognition and the resources necessary for local cultural forms to thrive. It can, for example, comprise of an archaeology where indigenous people use archaeology to tell their own stories and in relations to land rights. In some areas the complex current political situation can make archaeology and archaeological remains political, and the one or the other cultural, political, or religious group, for example, tries to destroy or degrade the other group's iconic monuments. According to Gosden (2012: 263), we know we are not yet postcolonial but carry the hope that we can become so.

International Perspectives

In the specific case of Europe, modern European colonialism has affected the whole world, and its legacy is overwhelming today. It would be enough to review the works and thoughts of European archaeologists on other continents. However, since Said's *Orientalism* (1979), we know that colonial categories not only constructed an image of the other but were also fundamental in shaping European identity, science, and politics. Thus, there is a particular relationship between colonialism and European archaeology that has

already been explored (González-Ruibal 2010; Farrujia 2014).

In the Canary Islands, an archipelago located on the Atlantic Ocean, just 100 km (62 miles) off the southern coast of Morocco, the colonial past has had a clear influence on the development and evolution of Canarian archaeology, also shaping archaeological heritage management in the islands. Consequently, the study of the interrelations between the colonial past and Canarian archaeological studies may be considered relevant to the subject of archaeology in an international context for three reasons. First of all, it provides an almost unique opportunity for uncovering the history of archaeology within the margins of Europe (in fact, in an African region) and exploring colonial and foreign influences. In many ways it is a mirror of archaeological mainstreams and an exercise in (re)thinking the aim and status of present-day archaeology.

Second, it is an exceptional opportunity for revealing the "weight of tradition" by presenting a form of archaeological heritage management that has interesting oppositions, namely, the European/monumental heritage (Castilian monuments and buildings) versus the African/nonmonumental heritage (Amazigh or ancient Canarian sites). In this sense, given the monumental, lavish, and artistic nature of the antiquities of mainland Spain (Iberian, Roman, Visigoth, and Arab, to give just a few examples), the archaeology of the Canary Islands is very different. The material culture of the indigenous settlements in the archipelago is characterized by greater simplicity and sobriety, handmade ceramic vessels, which are sparsely decorated, lithic tools made essentially from obsidian or basalt, the bone industry, very few metal objects, the predominance of cave dwellings, etc.

The third important reason is that the situation in the Canary Islands provides an opportunity to study the role played by colonialism in archaeological heritage management. Many books have appeared recently on European archaeological heritage management (Cleere 1984, 2000; Willems 2007; Smith and Waterton 2009; Mauch and Smith 2010) and several on colonialism and archaeology (Lyons and Papadopoulos 2002; Gosden 2004; Dietler 2010; Burchac et al. 2010; Carlson and McHalsie 2010; Lydon and Rizvi 2010), but the possibility of researching both within Europe, in the Canary Islands, is certainly an extraordinary phenomenon, even taking the following fact into account: in the Canary Islands, there is no indigenous archaeology – i.e., archaeology produced by and for indigenous people – since the conquest and colonization of the Canarian archipelago led to the gradual disappearance of the precolonial societies (Farrujia 2014). However, the European colonial discourse that influenced archaeology in other indigenous contexts (Australia, Africa, etc.) is also evident in the Canary Islands. As Ireland (2010) has pointed out, indigenous and nonindigenous communities are all engaged in the active "use" of the colonial archaeological heritage as much as any other forms of tangible or intangible heritage.

Future Directions

Archaeologists have a good deal to gain from theoretical insights generated by other disciplines, but they also have much to contribute to the field as a whole by virtue of both their privileged access to a comparative perspective on the deep history of precapitalist colonial encounters and the complementary kinds of evidence they can bring to bear on the study of the historical process of modern colonialism. In fact, the study of colonial encounters is a field with unusually rich potential for mutually beneficial collaboration between archaeologists and historical anthropologists. As Gosden notes (2004: 6), "colonialism is the major cultural fact of the last 500 years, and to some extent of the last 5000 years, although it is said we now live in a postcolonial world... we are still wrestling with the economic, intellectual and social consequences... by looking at the varying forms power can take we can learn much about the past and unlearn much about the present." In this sense, the future directions of the studies on archaeology and colonialism should deal with the general understanding of the highly variable

nature, structure, and effects of colonialism. Also, the distinctive potential contributions and methodological strategies of archaeological research on this issue should be examined, and, of course, a comparative perspective (in both spatial and temporal terms) on processes of social and cultural transformation associated with colonialism should be furnished.

Regarding postcolonialism, historians of archaeology do not need a postcolonial viewpoint to recognize the continuing effects of colonialism and imperialism over the practice of archaeology. Indeed, the recognition that most archaeological agendas have been affected to some degree by Western imperialism has been carried out without reference to postcolonial theory. During the last two decades, historians have traced the effects of Western imperialism over archaeology, have depicted how colonialism determined which questions were and were not investigated, and have demonstrated that some archaeological evidence has been systematically misinterpreted to offer a historical justification for colonialist interests. These investigations have been undertaken without reference to postcolonial studies. However, postcolonial studies offer a wide variety of theoretical positions, ideas, and categories that can be useful to elucidate the nature and impact of colonial powers and their effects on archaeological practice. The field provides a set of critical terms that are helpful in unraveling the complex nature of relationships between colonialism and science. Terms such as "colonial discourse," "appropriation," "hegemony," and "authenticity," for instance, have generated extensive discussions in parallel fields such as anthropology and history and can be similarly used both in archaeology and in the history of archaeology. The use of elaborate theoretical frameworks such as postcolonial studies can assist historians to overcome a central problem in the new history of archaeology: if archaeology is to be understood in terms of its social and political context, then historians of archaeology must define "context" more precisely, and they have to specify in which ways the social, political, and cultural environment has marked archaeological agendas, as it has been argued by Moro (2006) or González-Ruibal (2010). To do this, the history of archaeology should be informed by debates and discussions developed in other fields, like postcolonial studies. This interdisciplinary approach can provide historians with critical tools to better understand the assumptions within the discipline.

Cross-References

- ▶ Activism and Archaeology
- ▶ Advertising and the Appropriation of Culture
- ▶ Archaeology and Politics
- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canarian Indigenous People
- ▶ Chile, Archaeology and Indigenous Communities of
- ▶ Cold War
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Ethics in Archaeology
- ▶ French Guiana: Archaeology and Indigenous Peoples
- ▶ Heritage and Archaeology
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Postcolonial Archaeologies
- ▶ South American Archaeology: Postcolonial Perspectives

References

Burchac, M.M., S.M. Hart, and H.M. Wobst, eds. 2010. *Indigenous archaeologies: A reader on decolonization*. Walnut Creek: Left Coast Press.

Byrne, D. 2003. Nervous landscapes: Race and space in Australia. *Journal of Social Archaeology* 3 (2): 169–193.

Carlson, K., and A.J. McHalsie. 2010. *The power of place, the problem of time: Aboriginal identity and historical consciousness in the cauldron of colonialism*. Toronto: University of Toronto Press.

Cleere, H., ed. 1984. *Approaches to the archaeological heritage*. Cambridge, UK: Cambridge University Press.

Cleere, H., ed. 2000. *Archaeological heritage management in the modern world*, One World Archaeology. Vol. 9. New York: Routledge.

Dietler, M. 2010. *Archæologies of colonialism: Consumption, entanglement, and violence in ancient Mediterranean France*. Berkeley: University of California Press.

Fagan, B.M. 1998. *Clash of cultures*. New Delhi: SAGE Publications.

Farrujia de la Rosa, A.J. 2014. *An archaeology of the margins. Colonialism, amazighity and heritage management in the Canary Islands*, Springer Briefs in Archaeology. New York: Springer.

Frank, A.G., and B.K. Gills. 2000. The five thousand year world system in theory and praxis. In *World system history: The social science of long-term change*, ed. R.A. Denemark, J. Friedman, B.K. Gills, and G. Modelski, 3–23. London: Routledge.

Given, M. 2004. *The archaeology of the colonised*. London/New York: Routledge.

Given, M., and A.B.. Knapp, eds. 2003. *The Sydney Cyprus survey project: Social approaches to regional archaeological survey*, Monumenta Archaeologica. Vol. 21. Los Angeles: University of California Cotsen Institute of Archaeology.

González-Ruibal, A. 2010. Colonialism and European archaeology. In *Handbook of postcolonial archaeology*, ed. Jane Lydon and Uzma Rizvi, 37–47. Walnut Creek: Left Coast Press.

Gosden, C. 2004. *Archaeology and colonialism: Cultural contact from 5000 BC to the present*. Cambridge, UK: Cambridge University Press.

Gosden, C. 2012. Post-Colonial Archaeology: in "Hodder, I. (ed.) *Archaeological Theory Today* (2nd edition)", pp 251–66, Cambridge: Polity Press.

Gosden, C., and C. Knowles. 2001. *Collecting colonialism: Material culture and colonial change*. Oxford: Berg.

Harrison, R., and C. Williamson, eds. 2002. *After captain cook: The archaeology of the recent indigenous past in Australia*, Sydney University Archaeology Methods Series. Vol. 8. Sydney: Archaeological Computing Laboratory, University of Sydney.

Ireland, T. 2010. *Excavating globalization from the ruins of colonialism: Archaeological heritage management responses to cultural change*. ICOMOS Scientific symposium changing world, changing views of heritage: The impact of global change on cultural heritage. Retrieved January 15, 2013 from http://www.international.icomos.org/adcom/dublin2010/Paper_2.pdf.

Lydon, J., and U. Rizvi, eds. 2010. *Handbook of postcolonial archaeology*. Walnut Creek: Left Coast Press.

Lyons, C.L., and J.K. Papadopoulos, eds. 2002. *The archaeology of colonialism*. Los Angeles: Getty Research Institute.

Mauch Messenger, Ph., and G. Smith. 2010. *Cultural heritage management. A global perspective*. Gainesville: University Press of Florida.

Moro-Abadía, O. 2006. The history of archaeology as a 'colonial discourse'. *Bulletin of the History of Archaeology* 16 (2): 4–17. https://doi.org/10.5334/bha.16202.

Murray, T. 1996. Contact archaeology: Shared histories? Shared identities? In *SITES. nailing the debate: Interpretation in museums*, ed. S. Hunt and J. Lydon, 199–213. Sydney: Historic Houses Trust of New South Wales.

Murray, T., ed. 2004. *The archaeology of contact in settler societies*. Cambridge, UK: Cambridge University Press.

Paterson, A. 2003. The texture of agency: An example of culture contact in central Australia. *Archaeology in Oceania* 38 (2): 52–65.

Said, E.W. 1997 [1979]. *Orientalismo (Orientalism)*. Barcelona: Editorial De Bolsillo.

Silliman, S.W. 2005. Culture contact or colonialism? Challenges in the archaeology of native North America. *American Antiquity* 70 (1): 36–49.

Smith, L., and E. Waterton. 2009. *Heritage, communities and archaeology*. London: Duckworth Academic and Bristol Classical Press.

Stein, Gil J., ed. 2005. *The archaeology of colonial encounters: Comparative perspectives*. Santa Fe: School of American Research Press.

Thomas, N. 1991. *Entangled objects: Exchange, material culture and colonialism in the Pacific*. Cambridge, MA: Harvard University Press.

Thomas, N. 1994. *Colonialism's culture: Anthropology, travel and government*. Cambridge, UK: Polity Press.

Torrence, R., and A. Clarke, eds. 2000. *The archaeology of difference: Negotiating cross-cultural engagements in Oceania*. London: Routledge.

Wallerstein, I. 1974. *The modern world system, I*. New York: Academic.

Wallerstein, I. 1980. *The modern world system, II*. New York: Academic.

Willems, J.H.W., ed. 2007. *Quality management in archaeology*. Oxford: Oxbow Books Limited.

Further Reading

Atalay, S. 2006. Indigenous archaeology as decolonizing practice. *American Indian Quarterly* 30(3/4.): Special Issue: Decolonizing Archaeology (Summer – Autumn), 280–310.

Carlson, K., and A.J. McHalsie. 2010. *The power of place, the problem of time: Aboriginal identity and historical consciousness in the cauldron of colonialism*. Toronto: University of Toronto Press.

Chatterjee, P. 1993. *The nation and its fragments: Colonial and postcolonial histories*. Princeton: Princeton University Press.

Farrujia de la Rosa, A.J. 2003. The Canary Islands under Franco's dictatorship: Archaeology, national unity and African aspirations. *Journal of Iberian Archaeology* 5: 209–222.

Farrujia de la Rosa, A.J. 2008. Archaeology, politics and identity: The case of the Canary Islands in the 19th century. In *Archives, ancestors, practices. Archaeology in the light of its history*, ed. N. Schlanger and J. Nordbladh, 247–259. New York/Oxford: AREA. INHA. Berghahn Books.

Farrujia de la Rosa, A.J. 2009. A history of research into Canarian rock art: Opening up new thoughts. *Oxford Journal of Archaeology* 28 (3): 211–226.

Farrujia de la Rosa, A.J. 2011. Waiving the ancestors voices? In *IV Congreso de Arqueología Peninsular. Universidad de Algarbe*, Faro, 14–19 de septiembre de 2004, ed. N. Bicho, 251–260. Lisbon: Ed. Universidade Do Algarbe.

Gosden, C. 2001. Postcolonial archaeology: Issues of culture, identity and knowledge. In *Archaeological theory today*, ed. I. Hodder, 241–261. Cambridge, UK: Polity Press.

Harrison, R. 2012. *Heritage. Critical approaches*. London: Routledge.

Ireland, T. 2002. Giving value to the Australian historic past: Archaeology, heritage and nationalism. *Australasian Historical Archaeology* 20: 15–25.

Jay Stottman, M. 2010. *Archaeologists as activists. Can archaeology change the world?* Alabama: University of Alabama Press Tuscaloosa.

Maddy-Weitzman, B. 2006. Ethno-politics and globalisation in North Africa: The Berber culture movement. *The Journal of North African Studies* 11: 71–83.

Mulvaney, K., and W. Hicks. 2012. Murujuga madness: World heritage values disregarded. In *Actas del Primer Congreso Internacional de Buenas Prácticas en Patrimonio Mundial: Arqueología*, Menorca, 9–13 de abril de 2012, ed. A. Castillo, 187–201. Madrid: Editora Complutense. Retrieved January, 29, 2013 from https://portal.ucm.es/web/publicaciones/congresos.

Pagán Jiménez, J.R. 2004. Is all archaeology at present a postcolonial one? Constructive answers from an eccentric point of view. *Journal of Social Archaeology* 4 (2): 200–213 www.sagepublications.com.

Trigger, B. 2006. *A history of archaeological thought*. 2nd ed. Cambridge, UK: Cambridge University Press.

Watkins, J. 2005. Through wary eyes: Indigenous perspectives on archaeology. *The Annual Review of Anthropology* 34: 429–449 www.anthro.annualreviews.org.

A

Archaeology and Cultural Heritage in Kiribati

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Introduction

The Republic of Kiribati [pronounced: Ki-ri-bass] consists of a group of 32 low lying atolls and reef islands and one raised coral island, Banaba (Ocean Island), situated at the interface of Micronesian and Polynesian cultures in Remote Oceania and part of the Fiji-Tuvalu-Kiribati chain (Fischer 2013: 28). With 3.5 million km^2 of marine jurisdiction and only 800 km^2 of land, this generally dry equatorial country represents one of the most isolated and infertile parts of the world. The name Kiribati is an appropriation of the colonial name Gilbert Islands, with the local name for the archipelago being *Tungaru* and their inhabitants referred to as *I-Tungaru* (or *I-Kiribati*). Kiribati, also previously known as the Kingsmill Islands, straddles the equator and extends over 400 miles north to south. The 112,000-strong island nation of *I-Kiribati* is divided administratively into three main groups of islands (Fig. 1): the Gilbert Islands, currently the most populated, with half of the nation's population inhabiting the capital of South Tarawa alone; the Phoenix Islands (the first UNESCO World Heritage site in the country in 2010, and remains the second largest designated Marine Protected Area in the world, whc.unesco.org), which are largely uninhabited; and the Line Islands, situated on the dateline border, and – similar to the Phoenix group – were found to be uninhabited by the first Europeans (the "mystery islands"; Thomas 2003: 4) (see Fig. 1). The *I-Kiribati* are relatively homogenous linguistically and their

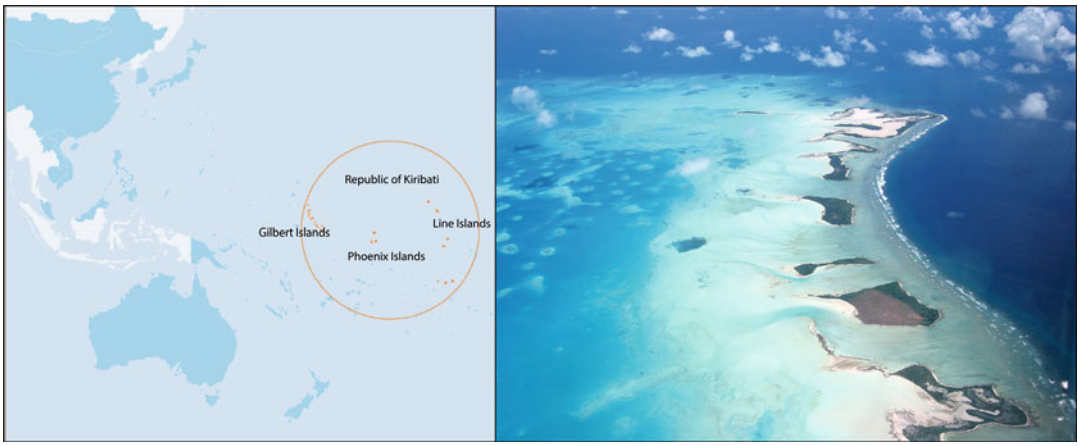

Archaeology and Cultural Heritage in Kiribati, Fig. 1 Left: Map of the location of Republic of Kiribati with three main archipelagoes. Right: Aerial photo of the North Tarawa atoll and islets. (Photo: AM Kotarba-Morley)

language, also known as Gilbertese, is a Micronesian tongue with some Polynesian borrowings. The language is distinct from neighboring Tuvalu and Marshall Islands, all of which belong to the Austronesian language family.

Cultural links between Micronesian and Polynesian cultures, especially with Samoa, are strong, with creation myths referring to ancient back-and-forth migrations between the two nations (MacDonald 2001: 3), and a recent migration from Samoa to Kiribati some 500 years ago, around fourteenth century CE, often explained as a "return of Kiribati Islanders" (Kirion and Karaiti 1979: 10). It is believed that the Samoans introduced the use of *manaeba* (e.g., communal meeting house), initially on the island of Beru, influencing the development of specific sociocultural norms (Petersen 2009: 216; Fischer 2013: 62–63, after Gheuens 2017). Southern islands of the Gilbert chain were influenced by the Samoans with the northern islands remaining independent up until their colonization by the south in the seventeenth century. This led to two centuries of struggle and resistance by traditional chiefs and powerful landowners who opposed the new, southern, sociopolitical system run by the council of elders.

Early contact with Europeans was usually brief due to the scarcity of resources that Kiribati could offer, although Darwin notably visited the Phoenix islands between 1831 and 1836 to study the creation of low lying atolls (Onorio 1979: 29). Longer-term interaction, often initially fractious, started in the early nineteenth century, with whalers visiting the islands regularly from the 1830s and initiating early trade in iron hoops and tobacco in exchange for food and women. In these early days, *I-Kiribati* men were often employed on whaling ships but since the 1860s labor trade was introduced in Kiribati with "recruitment" (early on as kidnapping and evolving eventually to volunteering) to work on plantations in Fiji (Onorio 1979: 34–37). No archaeological investigations to date have focused on this period (fourteenth to nineteenth century). Kiribati gained independence in 1979 after being a British protectorate from 1892 and a British colony from 1916.

The archaeology of Kiribati can be written into a methodological framework of Islands Archaeology (e.g., Rainbird 2007), although different aspects of archaeological and cultural heritage in these archipelagoes can be studied using diverse archaeological methods and techniques. A long history of anthropological research in Micronesia and Polynesia – going back to the times of first contact with missionaries, traders, whalers, and travelers – enabled the development of a so-called social archaeology (Rainbird 2004).

Because of their small size, limited and fluctuating resources, and relative isolation, low-lying

atolls are often depicted as marginal habitats for human settlement. While some communities did not endure (Anderson et al. 2000; Di Piazza and Pearthree 2001a), a remarkable number of atolls (and other small islands) continued to support human populations for centuries, indicating a long history of resilience to environmental variability. Stratified cultural deposits tend to be concentrated where people live today (i.e., on the larger islets), although later settlements expanded from the center toward the lagoon, which was facilitated by land progradation (Thomas 2014; Weisler 1999, 2001).

Historical Background: Archaeology

Early research on the only raised coral island of Kiribati – Banaba – confirmed the dating of an interior village to the late prehistoric or an early historic period (Lampert 1968, see also Grimble 1989 for other sites and Thomas 1999: 58–62 for a review). Pioneering archaeological research on atolls in Kiribati was conducted by Richard Shutler who in 1969 visited Tarawa, Abemama, Butaritari, and Makin and collected a few shell adzes (Di Piazza 1998). The first archaeological excavations followed in 1983, undertaken by a Japanese team (who collaborated with Shutler on the Caroline Islands in the 1970s) at the Utiroa Site on Makin, and later on North Tarawa. Oral traditions from Makin propose that there used to be settlements located on both sides adjacent to an island passage that was subsequently filled by heavy sedimentation and the wave action. Utiroa was dated (although not without contention) to 1400 BP (Takayama and Takasugi 1985) and resulted in the discovery of a deeply stratified cultural deposit of approximately 3.5 m (Takayama and Takasugi 1987, 1988). Later excavations by the team at the site of Nukantekainga on North Tarawa were limited in depth, but artifacts confirmed parallels with Polynesia especially through the findings of dog and porpoise tooth pendants (Takayama et al. 1990). This early research specifically focused on establishing a chronology for the first occupation of the atolls and the establishment of external connections with other parts of Micronesia and Polynesia.

The French archaeologist, Anne Di Piazza (1998, 1999a, b), carried out research on Nikunau in the southern Gilberts, which yielded the earliest reliably-dated deposits for the initial occupation of Kiribati. These dates are consistent with some of the earliest dates in Eastern Micronesia, including the Marshall Islands to the north, at about 2000 years B.P.

Since the mid-1990s, ethnographic and ethnoarchaeological research, supplemented by archaeological excavations and historical ecological data collection, was undertaken by Thomas on selected atolls in the Gilbert Islands (2001, 2007a, b, 2009). Radiocarbon dates on wood charcoal derived from swamp taro pit mounds on North Tarawa showed evidence of human activity at about 1800 BP. Other radiocarbon dates, some associated with buried A horizons, suggested land clearance between the third and seventh centuries CE.

Using a regional approach to understand island settlement and abandonment, Di Piazza and Pearthree (2001a) proposed the concepts of "mother communities," "satellites," and "isolates" and concluded that resource scarcity and/or isolation resulting in abandonment were likely explanations for those islands that were relatively inaccessible, small, and/or dry. Some islands appeared never to have been inhabited, perhaps because they were too marginal in terms of water availability or because their fringing reefs prevented effective fishing. "Mother communities" with high rainfall, such as Tabuaeran (Fanning Island), once supported relatively large resident populations supported by a rich agricultural base. These communities periodically exploited nearby satellites (e.g., Kiritimati – Christmas Island) which, despite their drier appearance, were located within an overnight voyage of a richer land and offered attractive faunal resources, especially seabirds and turtles. While the demise of "mother communities" remains problematic, settlement extinction need not be explained solely in terms of environmental crunches. The occurrence of exotic basalt (Di Piazza and Pearthree 2001b, c), together with the abundance of timber for

canoe building, should serve as a reminder that populations were capable at any time of migrating to other archipelagoes.

The "Mystery islands" (Bellwood 1978) of the Phoenix and Line chains, of Polynesian origin, have been studied since the 1920s and 1930s, with archaeological coverage largely limited to describing surface features (Emory 1934). All of these low coral islands were uninhabited when first discovered by Europeans. While building up local chronologies, archaeologists have more recently considered the probable causes for the abandonment of these islands (Anderson 2002; Anderson et al. 2000).

Historical archaeology in Kiribati has not been a particularly popular research avenue to date. The site of the first mission in Kiribati – established on Abaiang Island in 1857 by Reverend Dr Hiram Bingham II – is well known, with one of the later versions of the church in Koinawa (Fig. 2) and a commemorative marker – often mistaken for his tomb – remaining fairly well-preserved and maintained. To our knowledge neither has been recorded archaeologically.

Due to the recent history of archaeological research in Kiribati, the focus continues to be on culture history, especially the establishment of settlement chronologies with maritime, shoreline, and historical archaeology only recently becoming research objectives, including the documentation of submerged and half-submerged World War II features related to the Battle of Tarawa on the islet of Betio (pronounced: Be-soo) and Battle of Makin fought on the island of Butaritari. The mass graves of both soldiers and workers, including Japanese, Korean, and Americans, rusting artillery, ships, tanks, guns, bunkers, and other relicts are still visible on the island of Betio where the battle took place (Fig. 3). A number of groups have been involved in documenting this cultural heritage and some

Archaeology and Cultural Heritage in Kiribati, Fig. 2 Koinawa church on Abaiang in early second decade of 2000 (left) and 2018 (right). Note the deterioration of painted decoration over a short period of time that has been sustained in the tropical area. (Photos: left – F Thomas; right – AM Kotarba-Morley)

Archaeology and Cultural Heritage in Kiribati, Fig. 3 Top: Archival photos from Battle of Tarawa on the islet of Betio. (Source: AP Photo). Bottom: remains of military equipment from World War II on the islet of Betio. (Photos: AM Kotarba-Morley)

historians have collected oral memories of the battle (Thomas from 2007). No coherent archaeological research has been published about World War II relics on Betio to date.

The atoll of Nikumaroro (Gardner Islands) has been the focus of attempts at finding the plane-wreck of the Lockheed L10 Electra that was piloted by the world-famous aviator, Amelia Earhart, who disappeared over the Pacific during her attempt to circumnavigate the globe in July 1937 (King et al. 2004). Survey attempts in the 1940s by Gerald Gallagher, first officer-in-charge of the Phoenix Islands Settlement Scheme – the last colonial expansion of the British Empire – identified a camp, now known as the Seven Site, and a skeleton with an old sextant amongst a few other items. These were shipped to Fiji for an assessment by a colonial doctor, who determined them to be of a European male, but have since been lost.

During the 1940s surveys, a photograph – known as "Bevington Image" – has been taken revealing, what some interpret, as an object similar to landing gear from Electra. Significant research efforts have been expanded to locate the wreck including almost 30 years of research over 12 expeditions carried out on Nikumaroro by The Historic Group for Historic Aircraft Recovery (TIGHAR) as well as a very recent (August 2019) 2-weeks long, multimillion dollars unsuccessful attempt by the Titanic discoverer Robert Ballard (Cohn 2019). The New York Times reported that Ballard's team on Nautilus used multibeam sonar, and deployed a floating autonomous surface vehicle to map shallower areas off the island's shore, as well as four aerial drones for additional inspections of the surrounding reef. During this search they discovered old, 'yet unidentified', shipwreck two hats in the depths, debris from an old shipwreck, and even spotted a

soda can, yet they were unable to locate a single piece of Lockheed Electra that supposedly sunk there in 1937 (Cohn 2019).

TIGHAR team are now entering a new phase of research after locating the notes of the Fiji doctor and having them re-examined by Richard Jantz, director emeritus of the Forensic Anthropology Center at the University of Tennessee, who determined that they belonged in fact to a woman of a statute in 99 percentile probability similar to that of Earthart. No bones have been found at the site of a castaway camp since the 1940s however, but researchers hope that new analyses of 22 soil samples and a female skull from the Museum in Tarawa collected by the team of DNA scientists Hiebert and Kimmerle will shed new light on the possibility of Earthart's existence as a survivor on Nikumaroro .

In general, apart from Ballard's recent search, to date there have been no serious attempts at undertaking underwater archaeological investigations in Kiribati due to the lack of equipment and diving facilities on most of the islands.

Cultural Heritage of Kiribati

The typologization of Cultural Heritage is always an onerous task, yet one that is of importance to future generations of researchers setting out to document the often rapidly vanishing heritage of small islands and Pacific atolls, Kiribati included. Local preservation initiatives have shown what is important to local communities (Thomas and Teaero 2010), and although not exhaustive the list below records a number of cases where heritage assets have been perpetually conserved and maintained by generations of *I-Kiribati.*

Below we propose a typological scheme that takes into consideration (Table 1) archaeological, built and tangible heritage although we do acknowledge that in the Pacific in general, Kiribati included, people do not usually make a strong distinction between tangible and intangible cultural heritage, or even cultural and natural heritage. For the purposes of this chapter we omit intangible aspects of heritage (the "living heritage"), which include traditional knowledge, tools, and crafts connected with seafaring, shipbuilding, ocean fishing, and near-shore trapping, as well as objects such as hair and shell necklaces, tattooing implements, shell ornaments, combs, rope, baskets, and traditional weapons such as famous porcupine fish helmets, pandanus leaves back shields and chestplates, and shark-teeth ritual daggers/swords and wooden clubs. Collected over 130 years, many of these objects are located in the museums around the world with the unique coconut fiber armor found in 'other parts' of Europe 23 museums in the UK, in addition to those in Europe and Oceania. We also exclude from this entry food preservation and preparation technologies as well as oral histories and beliefs, folklore, and arts including myths and cosmologies, indigenous epistemologies, performance arts, especially dancing of which *I-Kiribati* are especially proud, as well as the art of tattooing with its elaborate and unique patterns. While we recognize that these aspects of heritage are of great importance to *I-Kiribati*, these will be discussed in a separate entry.

Key Issues and Current Debates

Culture is a vital link between past, present, and future and on Kiribati encompasses both places and people. However, local residents do not generally regard landscapes as heritage and remain ambivalent about preserving places and sites per se – in a Western sense – rather favoring areas in which particular traditional activities are practiced. On the islands, culture is still firmly rooted in kin and community obligations and therefore the traditional definition of "cultural heritage" in Remote Oceania should ideally be expanded to include traditional forms of knowledge and intangible connection with land, shoreline, and ocean.

I-Kiribati were originally entirely dependent on their maritime resources which also formed the basis for their social identity. However,

Archaeology and Cultural Heritage in Kiribati, Table 1 Types and Elements of Archaeological and Cultural Heritage Sites in Kiribati

Type	Element	Notes
Maritime and coastal cultural landscapes	**Cultural and "transported" landscapes**	The "transported" landscapes (Anderson 1952; Kirch 2017) were a byproduct of colonization events connected with seafaring migration that brought cultivable plants and domestic animals, as well as weeds and commensal animals (such as rats) to the islands. These transported landscapes did not – as some would posit – arrive as a single package, but rather differed significantly across different geographic and cultural regions. Agriculture was often focused upon a single crop of high and rapid carbohydrate production, such as taro (Fitzpatrick 2008), due to the overabundance of dietary protein (e.g., shellfish) (Fig. 4, top left). Giant swamp taro pits are present in most of the inhabited islands and according to radiocarbon dates were already excavated by around 1800 BP (Thomas 2019, personal communication). Although many of these pits are not maintained today, they still represent a living part of the cultural landscapes providing important dietary supplement if not, on some islands, remaining a staple. Local residents do not perceive "landscape" as "heritage" although they recognize the importance of the traditional activities that are performed within the seascape, coastscape, and landscapes, such as fishing, fish trapping, seafaring, and the cultivation of various plants and trees (Fig. 4).
	Aquaculture	These represent a unique type of "land use" in Kiribati and other Pacific islands, developed as a part of risk aversion strategies where placing the larger species of giant clams close to the shoreline may be considered a risk reduction strategy (Fig. 5). It represents a unique and ingenious form of live storage of animal meat and can be seen as one of the hallmarks of the maritime cultural landscape of Kiribati.
	Agroarboreal production, atoll agroforestry	In response to the most severe environmental constraints and greatest population pressures, atoll-dwellers have created the most intensive agroforestry in the entire Pacific, with the greatest relative dominance of trees over non-trees (Latinis 2000). Apart from widespread copra plantations, other cultivated fruit-trees include *papaya*, banana and plantain *cultivars*, the native fig, or te bero (*Ficus tinctoria*), the common fig, or te biku (*Ficus carica*), and the lime (*Citrus aurantiifolia*). More archaeobotanical studies are needed to establish the relative presence of these different species in various periods of the past and to establish the reliance of people upon their crops.

(continued)

Archaeology and Cultural Heritage in Kiribati, Table 1 (continued)

Type	Element	Notes
Pre-European archaeological sites	**Occupation sites, cultivation sites, and shell middens**	Pre-European archaeological sites have been documented on Makin (Takayama 1988; Takayama and Tagasugi 1985, 1987), Abaiang (Thomas 2014), North Tarawa (Takayama et al. 1990; Thomas 2014), Tamana (Takayama et al. 1989), and Nikunau (Di Piazza 1998, 1999a, b) in the Gilberts Group (some artifacts with midden materials, and in other cases, charcoal from giant swamp taro pit mounds, see Fig. 6) (Thomas 1999).
	Ceremonial sites	There have been a small number of sites recorded in the Phoenix Islands mostly associated with *marae* or ceremonial sites of Polynesian origin (Di Piazza and Pearthree 2004) and a study was conducted in Line Islands on Kiritimati and Tabuareran (Di Piazza and Pearthree 2001a).
	Burials (terrestrial and submerged)	We believe that no archaeological excavations of precolonial burials have been carried out thus far on land. However, according to a UNESCO report (Guérin et al. 2010: 53), a number of ancient submerged burial sites have been documented at Bike in Abemama and Kuma in Butaritari. Bike, located 4 h away by sailing canoe from Abemama, is partially inundated and according to legend used to serve as a cemetery. Additionally, a small mound enclosed in mangroves with the burial site of a woman known as Nei Teinaieta said to be located at sea close to Kuma on the island of Butaritari (Guérin et al. 2010: 53).
	Underwater, coastal and maritime sites	*I-Kiribati*, as all Micronesians and Polynesians, are inextricably connected with the ocean. Numerous underwater cultural heritage sites are known from oral histories and legends including, now submerged, traditional settlements, meeting places, burial sites, and ancient fish weirs and traps. Some of the sites are well-known and even documented, while others remain in the domain of local legends (Guérin et al. 2010: 53). One example of such sites is a submerged *mwanaeba* identified based on a number of submerged coral block pillars recorded on Temotu, one of the villages at the end of Nonouti Island. Local divers confirmed seeing pillars arranged as the *mwanaeba* would be with one of the elders of the village confirming that the structure would have once stood on dry land (Guérin et al. 2010: 53).
Colonial and postcolonial archaeological sites and structures	**Colonial buildings**	The first permanent traders who established themselves in the Gilberts were Rendell and Durant who, in 1846, started coconut oil and turtle shell manufacture on the northern – wet – island of Butaritari and then Durant moved south to Makin. There are no visible remains of any of their trading posts today. It is important to note that not all agents were foreigners; a local man Kaiea of Abaiang was also trading with coconut oil – again

(continued)

Archaeology and Cultural Heritage in Kiribati, Table 1 (continued)

Type	Element	Notes
		no archaeological evidence for this trade has been documented to date. The mid 1850s followed with the introduction of Protestant missionaries – some of the buildings and monuments from this time are still visible including Bingham's church on Abaiang. The maintenance of such colonial architecture in the tropics is very challenging (see Fig. 2: the photos from 2014 and 2018) notwithstanding the fact that studying colonial heritage in Oceania always has to be set against ongoing struggles over land, resources, and identity in the region today, encapsulated by the tension between the global and the local (Flexner 2014).
	WWII remains and sites (terrestrial, nearshore and some underwater)	The Islet of Betio was the scene of one of the largest battles of the Pacific Theatre of World War II. Fought in November 1943 as part of Operation *Galvanic* – the US invasion of the Gilberts – this battle witnessed nearly 6400 Japanese, Korean, and American soldiers perish in just 76 h of intense fighting. The American invasion force consisted of 17 aircraft carriers (6 CVs, 5 CVLs, and 6 CVEs), 12 battleships, 8 heavy cruisers, 4 light cruisers, 66 destroyers, and 36 transport ships and a total of about 35,000 troops and was the largest yet assembled in the Pacific. The sheer quantity of monuments and objects left behind by both sides and their current location on beaches of the most densely populated neighborhood in South Tarawa – Betio – make conservation and documental efforts very challenging. Every few years, bodies or a mass grave are identified somewhere in Betio with the most recent 22 Marines repatriated on July 17 2019. While there have been some ad hoc preservation efforts and campaigns by WWII enthusiasts and army veterans, no large-scale coordinated documentation and preservation efforts have been carried out to date. Operations *Galvanic* and *Kourbash* were the code names for the Gilberts campaign – part of "Gilbert and Marshall Islands Campaign." This campaign included the seizure of Tarawa and Butaritari, which was known by US forces as Makin Atoll, and was the site of the Battle of Makin fought from 20 to 23 November 1943 (CMH 1990). A total of six shipwrecks are known to be located in the waters of Kiribati, including a US escort carrier, *Liscome Bay* on Butaritari and two Japanese submarines (Guérin et al. 2010). Due to recent Chinese enterprises exporting metal from Tarawa many local sites are being seriously damaged and looted as source of income (Guérin et al. 2010).

(continued)

Archaeology and Cultural Heritage in Kiribati, Table 1 (continued)

Type	Element	Notes
Traditional and modern architecture and buildings	**Living vernacular architecture – rural setting**	The majority of buildings on Kiribati, both rural and urban, are "*kia kia*" houses with thatched roofs and open sides, built from local material, the roofs from pandanus leaf thatch (Fig. 7). Of both traditional and nontraditional (wooden or concrete walled) houses, the majority still have a thatched roof. On the outer islands, almost all "habitable" buildings are built in the "traditional" style, and almost all cinder block buildings are quickly abandoned. Unfortunately, many village dwellings on the outer islands lie abandoned and dilapidated because of the mass exodus to South Tarawa; however, people retain their ancestral "outer islands" land as potential areas of refuge to which one can return from the capital. The move "back" to the outer islands is specifically supported by the policies of the new government.
	City village – vernacular architecture of "urban" capital on South Tarawa	With regard to architecture, the only urban center in Kiribati, South Tarawa, remains mostly traditional and vernacular with rural character and structure of the households and their surroundings. The high population density caused by constant in-migration pressures from outer islands is achieved by the large household sizes and close proximity of the huts to each other (Royle 1999). The growing population of the capital island is largely accommodated in moderately traditional vernacular styles, but often using "new" materials – mostly due to depletion of traditional resources (Royle 1999). The "rural" character (a majority of the population still participating in traditional primary production) of the capital is mostly connected with poverty and affordability of "modern" materials.
	Ceremonial buildings – *mwaneabas*	*Mwaneaba* is a community meeting house for villagers or any recognized group of people where social or ceremonial occasions are held and public affairs discussed (Geddes 1982). The public *mwaneaba* are of similar design to the residential huts, but on a larger scale and built to a set form: they have a steeply pitched roof which comes quite close to the ground and is supported on pillars. The sides are open to allow the passage of air. The flaring-out of the roof line at the gable is the most characteristic feature of *I-Kiribati* architecture and can be observed in both thatched pandanus leaves and aluminum-roofed *mwanaebas*. The roofs of these structures descend very low to provide protection from rain and increase floor area as well as, more significantly, to provide maximum shade (Royle 1999).

climate change and other environmental pressures are taking their toll not only on the population but also on heritage preservation strategies. Human adaptations to the environments (although *not without environmental consequences* in themselves) can be seen all over Kiribati, in the ubiquity of "transported landscapes (see Table 1)." Throughout Remote Oceania, initial emphasis was

Archaeology and Cultural Heritage in Kiribati, Fig. 4 Cultural Landscapes of Gilbert Islands. Top left: Giant swamp taro pit on Abaiang; Bottom left: crossing on an outrigger from South to North Tarawa; Right: Fish trap on the ocean side of Abaiang. (Photos: AM Kotarba-Morley)

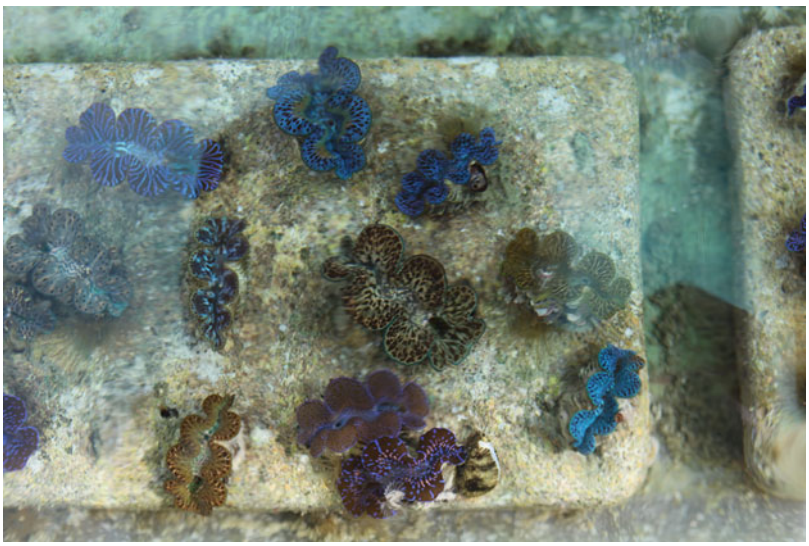

Archaeology and Cultural Heritage in Kiribati, Fig. 5 Giant clam aquaculture on North Tarawa. (Photo: AM Kotarba-Morley)

upon fragile but highly accessible resources of high food value (protein – especially shellfish), sometimes to the virtual exclusion of agriculture, and agricultural activity elsewhere was probably subordinate to foraging in most early colonizing phases (for the case of Yap see Fitzpatrick 2008). It is, however, important to stress that some resources were more resilient than others, for example, shellfish compared to flightless birds. We propose here that the cultural heritage of

Archaeology and Cultural Heritage in Kiribati, Fig. 6 Archaeological finds from surface survey on Abaiang. (Photo: F Thomas)

Archaeology and Cultural Heritage in Kiribati, Fig. 7 Abandoned vernacular household on Abaiang. (Photo: AM Kotarba-Morley)

Kiribati should include maritime and coastal cultural landscapes, aquaculture, vernacular architecture, agroforestry (i.e., transported landscape), and other forms of traditional knowledge (e.g., Fig. 8) with oral history and folklore tackled separately.

Compared to other island groups in the Pacific, including the atolls of the Marshall Islands, Kiribati is in urgent need of systematic survey, site mapping, and systematic archaeological excavation to better document the sequence of island settlements, the impact on resources, and cultural transformation over time. Radiocarbon dates are few and far between, and in some cases, inadequately described, including problems associated with dating charcoal of plant species that have not been properly identified. At a regional scale, the position of the Gilbert Islands Group at the crossroads of Micronesia and Polynesia could provide the opportunities for finding additional evidence for long-distance migrations and trade extending to more distant islands and archipelagos, to complement the atolls' rich oral tradition of population movements. The discovery of pre-European

Archaeology and Cultural Heritage in Kiribati, Fig. 8 Traditional fish trap for catching eels. North Tarawa. (Photo: AM Kotarba-Morley)

contact human burials might also yield aDNA to better understand genetic affiliations with other Pacific populations, although aDNA and other important biomarkers are not readily preserved in tropical environments (Morley 2017).

Cultural Heritage Protection and Tourism

Many cultural monuments and historical buildings are in disrepair, both on South Tarawa and on the outer islands. Ad hoc conservation is inadequate and continuous management practices and plans for the future with allocated resources need to be developed. This is also extremely important in light of the growing (although still very small-scale) tourist industry.

As part of UN Small Island Developing States (SIDS), a group of countries spread across the Atlantic, Pacific, and Indian Oceans, as well as the Caribbean and South China Seas and recognized as among the most vulnerable states in the world, Kiribati is working with the United Nation's Sustainable Development Goals. Plenary Panel on The Role of Culture in the Sustainable Development of SIDS held in Mauritius emphasized the issues of: (i) cultural identity and diversity; (ii) protection of tangible and intangible heritage; (iii) incorporation of local languages and traditional knowledge in formal education; and (iv) the economic opportunities provided by culture, in particular through cultural industries. It also "expressed strong and enthusiastic support for the recognition of culture as an indispensable and all-pervading component of human living and development. Mention was also made of 'Culture' as a fourth pillar of sustainable development" (Ikhlef 2014). Upholding these values and agendas, the consultation draft of the Kiribati 20-year Vision 2016–2036 (KV20 2016) states that "the nexus between tourism and culture is one of the priority areas for the KV20. It is in this context, that Government will strive to safeguard, revive and promote tangible and intangible cultural and historical heritages evident across the chants, music, dance and craft heritage sectors as well as the significant remnants from World War II" (KV20 2016: 44).

On a national scale, the local museum and Cultural Centre (Te Umwanibong) has a regional mission catering mostly to local primary and secondary schools, documenting the oral traditions of the outer islands and forming a great foundation for future development. Currently, considerable effort is being expended promoting heritage to outsiders; however, this has been taken over by, in lieu of government funded initiatives, tourism agencies such as *Tobaraoi*.

Future Directions

In terms of future directions, we argue that international conservation standards need to be adapted to suit regional purposes using scientific knowledge, for example, concerning climate change-driven shore erosion and sea-level rise. We strongly believe that the development of management plans and strategies should be undertaken on-the-ground, in cooperation with relevant stakeholders, and by local institutions, rather than by fly-in fly-out consultants. This is crucial, and while extremely challenging to achieve, the top-down approach in designing, championing, and implementing cultural and heritage sensitive agendas, policies and education curricula is the first step in which the foundations for capacity building and future bottom-up initiatives might best be achieved.

Archaeologists, historians, documentalists, archivists, and cultural heritage professionals

often find it difficult to "compete" for funding, permissions, and attention of governmental employees, diplomats, and dignitaries with "real life solutions" projects such as those preventing diabetes, dealing with water resources management or sustainable fisheries. Although it is much easier to sell the benefits of such projects to the general public, culture should be treated as one of the key pillars of sustainable development and should be imbedded in the core of educational curricula to expand public awareness of its importance. By becoming increasingly sensitive to heritage issues, engineering companies and NGOs could work in unison with researchers to achieve better opportunities for archaeological and heritage data acquisition and sharing, especially in such a vulnerable environment that might disappear within our lifetime.

There is a startling lack of comprehensive heritage legislation across many countries in Remote Oceania, especially those that do not follow American models, with issues of land ownership (land belongs to the clan and not to the country) making it difficult to "formulate or implement appropriate legislation for this purpose" (Thomas and Teaero 2010). In 2017, Kiribati adopted "An Act to regulate shipping, to update and modernise law relating to shipping to give effect to certain international maritime conventions and for related purposes" called in short "Maritime Act," 2017. Although word heritage is not mentioned in the document, the act has powers that could be used to protect Underwater Cultural Heritage including that of Wreck and Salvage Ordinance 1966 that is a similar regime to that in the UK, such as Receiver of Wrecks, Salvage, and Receiver of Wreck fees.

Additionally, the Environmental Act of 1999 has objectives "to protect, conserve and promote heritage" and Heritage is defined as including "a place, feature, structure or object that has aesthetic, archaeological, historic, cultural, natural, scientific or social significance or other special value for the present community and for future generations." Section 20 on the Contents of environmental impact statement prescribes that proposed and existing developments shall: (t) include a site survey report concerning National Heritage items or traditional artifacts as specified by the Minister acting in accordance with the advice of the Cabinet (Environment Act 1999, §20). Inclusion of heritage protection (including that of cultural heritage) under Environmental Act seems to follow the Australian federal model of "Environment Protection and Biodiversity Conservation Act of 1999," which also automatically provides for World Heritage Properties. In a similar vein, the Environment Act 1999 provides for regulation of the Phoenix Island Protected Area, which is the only WH site in the country.

Attempts have been made to incorporate specific issues of land ownership in the Pacific into legislation (e.g., Spennemann 1992; Thomas and Teaero 2010) but some archaeologists advocate that it should be through education rather than legislation that cultural heritage management practices are changed (Williamson 2001; Thomas and Teaero 2010). It is widely recognized that capacity building and training are key, but this can only be successful if interest is raised at an early stage of education. Job security, status, and pay are important considerations for young graduates so training and funding should be directed at selected individuals who are to be provided a pathway towards respectable and secure jobs and who would use the knowledge to promote further cultural education in the future.

Cross-References

- ▶ Atoll Archaeology in the Pacific
- ▶ Central Pacific Islands: Sea-Level Change and Sites
- ▶ Pacific Islands: Finding the Earliest Sites

Disclaimer Dr Thomas has been carrying out research on Kiribati since 1990s whilst Dr Kotarba visited in 2018 with Global Challenges funding but was unable to undertake any field research.

References

Anderson, E. 1952. *Plants, man and life*. Boston: Little, Brown & Company.

Anderson, A. 2002. Faunal collapse, landscape change and settlement history in Remote Oceania. *World Archaeology* 33: 375–390.

Anderson, A., P. Wallin, H. Martinson-Wallin, B. Fankhauser, and H. Hope. 2000. Toward a first prehistory of Kiritimati (Christmas) Island, Republic of Kiribati. *Journal of the Polynesian Society* 109: 273–293.

Bellwood, P. 1978. *Man's conquest of the Pacific*. London: Collins.

CMH (Center Of Military History, United States Army). 1990. *The capture of Makin, 20–24 November 1943*. Reprint from Historical Division, War Department, for the American Forces in Action series, 1946. Washington, DC: U.S. Government Printing Office.

Cohn, J. 2019. The Amelia Earhart mystery stays down in the deep. *The New York Times*, Oct 14, 2019. https://www.nytimes.com/2019/10/14/science/amelia-earhart-robert-ballard.html?smid=nytcore-ios-share. Accessed 21 Oct 2019

Di Piazza, A. 1998. Archaeobotanical investigations of an earth oven in Kiribati, Gilbert Islands. *Vegetation History and Archaeobotany* 7 (3): 149–154.

Di Piazza, A. 1999a. Te bakoa. Two old earth ovens from Nikunau Island (Republic of Kiribati). *Archaeology in Oceania* 34: 40–42.

Di Piazza, A. 1999b. Migration d'une plante et migration de ses représentations. Le taro de marécage (*Cyrtosperma chamissonis*) sur Nikunau et Tabuaeran (République de Kiribati). *Journal d'agriculture traditionnelle et de botanique appliquée. Systèmes de culture traditionnels et pratiques paysannes nouvelles en Océanie* 41 (1): 93–108.

Di Piazza, A., and E. Pearthree. 2001a. An island for gardens, and island for boards and voyaging: A settlement pattern for Kiritimati and Tabuaeran, two 'mystery islands' in the northern Lines, Republic of Kiribati. *Journal of the Polynesian Society* 110: 149–170.

Di Piazza, A., and E. Pearthree. 2001b. L'art d'être pirogues de voyage en Océanie insulaire. *Journal de la Société des Océanistes* 112: 61–72.

Di Piazza, A., and E. Pearthree. 2001c. Voyaging and basalt exchange in the Phoenix and Line archipelagoes: The viewpoint from three mystery islands. *Archaeology in Oceania* 36: 146–152.

Di Piazza, A. and E. Pearthree. 2004. *Sailing routes of old Polynesia: The prehistoric discovery, settlement and abandonment of the Phoenix Islands*. Honolulu: Bishop Museum Press.

Emory, K.P. 1934. *Archaeology of the Pacific Equatorial Islands*, Bulletin 123. Honolulu: B.P. Bishop Museum.

Environmental Act. 1999. An Act to provide for the protection improvement and conservation of the environment of the Republic of Kiribati and for connected purposes. MADE by the Maneaba ni Maungatabu and assented to by the Beretitenti. http://www.paclii.org/ki/legis/num_act/ea1999159/

Fischer, S. 2013. *A history of the Pacific Islands*. 2nd ed. New York: Palgrave.

Fitzpatrick, S.M. 2008. Maritime interregional interaction in Micronesia: Deciphering multi-group contacts and exchange systems through time. *Journal of Anthropological Archaeology* 27 (1): 131–147.

Flexner, J.L. 2014. Historical archaeology, contact, and colonialism in Oceania. *Journal of Archaeological Research* 22 (1): 43–87.

Geddes, W.H. 1982. *Atoll economy: Social change in Kiribati and Tuvalu. Islands on the Line*, Team report no. l, Development Studies Centre. Canberra: Australian National University.

Gheuens, J. 2017. *Landscape and identity in Kiribati*. Unpublished Masters thesis, Uppsala University.

Grimble, A.F. 1989. In *Tungaru traditions: Writings on the atoll culture of the Gilbert Islands*, ed. H.E. Maude. Honolulu: University of Hawaii Press.

Guérin, U., B. Egger, and V. Penalva. 2010. *Underwater cultural heritage in Oceania*, 53. Paris: UNESCO.

Ikhlef, K. 2014. UNESCO's SIDS agenda: from Barbados via Mauritius to Samoa. *World Heritage Papers* 38: 8–17.

King, T.F., R.S. Jacobson, K.R. Burns, and K. Spading. 2004. *Amelia Earhart's shoes*. Walnut Creek: Altamira Press.

Kirch, P.V. 2017. *On the road of the winds: An archaeological history of the Pacific islands before European contact*. Revised and expanded edition. Berkeley: University of California Press.

Kirion, M., and B. Karaiti. 1979. Migration: From Samoa and beyond. In *Kiribati: Aspects of history*, ed. A. Talu, 1st ed., 7–11. Suva: University of the South Pacific: Institute of Pacific Studies and Extension Services; Ministry of Education, Training and Culture, Kiribati Government.

KV20. 2016. Kiribati 20-year vision 2016–2036. Consultation draft. http://www.mfed.gov.ki/sites/default/files/KV20%20VISION.pdf

Lampert, R.J. 1968. An archaeological investigation on Ocean Island, Central Pacific. *Archaeology and Physical Anthropology in Oceania* 3: 1–18.

Latinis, D.K. 2000. The development of subsistence system models for island Southeast Asia and near Oceania: The nature and role of arboriculture and arboreal-based economies. *World Archaeology* 32 (1): 41–67.

Macdonald, B. 2001 (reprint from 1982 edition). *Cinderellas of the Empire: Toward a history of Kiribati and Tuvalu*. Suva: Institute of Pacific Studies, University of the South Pacific Press.

Maritime Act. 2017. An Act to regulate shipping, to update and modernise law relating to shipping to give effect to certain international maritime conventions and for related purposes. Made by the Maneaba ni Maungatabu and assented to by Te Beretitenti. http://extwprlegs1.fao.org/docs/pdf/kir177488.pdf

Morley, M.W. 2017. The geoarchaeology of hominin dispersals to and from tropical Southeast Asia: A review and prognosis for the future. *Journal of Archaeological Science* 77: 78–93.

Onorio, A. 1979. I-Matang: Early European contacts. In *Kiribati: Aspects of history*, ed. A. Talu, 1st ed., 29–37. Suva: University of the South Pacific: Institute of Pacific Studies and Extension Services; Ministry of Education, Training and Culture, Kiribati Government.

Petersen, G. 2009. *Traditional Micronesian societies: Adaptation, integration, and political organization in the Central Pacific*. 1st ed. Honolulu: University of Hawai'i Press.

Rainbird, P. 2004. *The archaeology of Micronesia*. New York: Cambridge University Press.

Rainbird, P. 2007. *The archaeology of Islands*. New York: Cambridge University Press.

Royle, S. 1999. Conservation and heritage in the face of insular urbanization: The Marshall Islands and Kiribati. *Built Environment* 25 (3): 211–221.

Spennemann, D. 1992. *Republic of the Marshall Islands historic preservation legislation*. Majuro: Archaeology Unit, Alele Museum.

Takayama, J. 1988. A pandanus fruit scraper from Makin Island, Kiribati, Central Pacific. *Bulletin of the Indo-Pacific Prehistory Association* 8: 162–166.

Takayama, J., and H. Takasugi. 1985. Preliminary report of archaeological excavation on Makin Island in the Gilberts, Central Pacific. In *The 1983–84 cultural anthropological expedition to Micronesia: An interim report*, ed. E. Ishikawa, 85–101. Tokyo Metropolitan University: Tokyo.

Takayama, J., and H. Takasugi. 1987. The significance of lure shanks excavated in the Utiroa Site of Makin Island in the Gilberts. *Senri Ethnological Studies* 21: 29–41.

Takayama, J., and H. Takasugi. 1988. *Archaeology on Makin, Kiribati, Central Pacific*. Tarawa. Submitted to Ministry of Home Affairs and Decentralisation. Copies available from Department of Ethnology, Tezukayama University, Nara-shi.

Takayama, J., H. Takasugi, and K. Kaiyama. 1989. The 1988 archaeological expedition to Kiribati: A preliminary report of Tamana. *Tezukayama University Review* 63: 1–14.

Takayama, J., H. Takasugi, and K. Kaiyama. 1990. Test excavation of the Nukantekainga Site on Tarawa, Kiribati, Central Pacific. In *Archaeological research on the atoll cultures of Micronesia, 1988*, ed. I. Ushijima, 1–19. Tsukuba-shi: Committee for Micronesian Research, University of Tsukuba.

Thomas, F.R. 1999. *Optimal foraging and conservation: The anthropology of mollusk gathering strategies in the Gilbert Islands Group, Kiribati*. Doctoral dissertation. Honolulu: Department of Anthropology, University of Hawai'i. Available from ProQuest Dissertations and Theses database (UMI No. 9940631).

Thomas, F.R. 2001. Remodeling marine tenure on the atolls: A case study from western Kiribati, Micronesia. *Human Ecology* 29: 399–422.

Thomas, F.R. 2003. Kiribati: "Some aspects of human ecology". Forty years later. *Atoll Research Bulletin* 501: 1–40.

Thomas, F.R. 2007a. The behavioral ecology of shellfish gathering in western Kiribati, Micronesia 1: Prey choice. *Human Ecology* 35: 179–194.

Thomas, F.R. 2007b. The behavioral ecology in western Kiribati, Micronesia 2: Patch choice, patch sampling, and risk. *Human Ecology* 35: 515–526.

Thomas, F.R. 2009. Historical ecology in Kiribati: Linking past with present. *Pacific Science* 63: 567–600.

Thomas, F.R. 2014. Shellfish gathering and conservation on low coral islands: Kiribati perspectives. *Journal of Island and Coastal Archaeology* 9: 203–218.

Thomas, F.R., and T.F. Teaero. 2010. Learning about the past today to map future routes: Historic preservation and education in Kiribati. In *Education for sustainable development: Continuity and survival*, ed. U. Nabobo-Baba, C.F. Koya, and T. Teaero, vol. 1, 26–45. Suva: School of Education, University of the South Pacific & Asia/Pacific Cultural Centre for UNESCO.

Weisler, M.I. 1999. Atolls as settlement landscapes: Ujae, Marshall Islands. *Atoll Research Bulletin* 460: 1–51.

Weisler, M.I. 2001. Archaeological excavations at site MLMI-3, Kapen Islet, Maloelap Atoll, Marshall Islands, report prepared for the historic preservation office, Republic of the Marshall Islands. Available from the author.

Williamson, D.V. 2001. The challenges of survey and site preservation in the Republic of the Marshall Islands. *Cultural Resource Management* 24(1): 44–45.

Further Reading

Carson, M. 2018. *Archaeology of Pacific Oceania: inhabiting a sea of islands*. Abingdon: Routledge.

Kirch, P.V. 2017. *On the road of the winds: An archaeological history of the Pacific Islands before European contact*. Oakland: University of California Press.

Mason, L., ed. 1985. *Kiribati: A changing atoll culture*. Suva: Institute of Pacific Studies of University of the South Pacific.

Rainbird, P. 2004. *The archaeology of Micronesia*. New York: Cambridge University Press.

Van Trease, H., ed. 1993. *Atoll politics: The Republic of Kiribati*. Christchurch/Suva: Macmillan Brown Centre for Pacific Studies, University of Canterbury/Institute of Pacific Studies, University of the South Pacific.

Archaeology and Geography

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Introduction

Scientific field archaeology has always relied on the methods, tools, and techniques of geography, geology, and other earth sciences. In the specific case of geography, with its core interest in the study of natural and human features across space, its contributions to archaeology have been multiple, transformative, and enduring. This is not surprising in light of the empirical nature of most archaeological inquiries and the need to record the location of remains. Although geography and archaeology are close parents and enjoy a mutually beneficial synergy, archaeologists have historically benefited more from geography – especially from major technical developments in mapping sciences, paleoclimatology, and geomorphology – than the other way around.

At the most basic level, archaeological surveys and excavations are anchored in mapping and surveying techniques. At a broader conceptual level, both archaeology and geography are concerned with the relationships between humans and their environments and their analysis through time and space. Indeed, beyond field methods, site formation processes, and spatial analyses, archaeology and geography share common research interests including the origins of agriculture, human-environmental relations, and the ways through which humans perceive, organize, modify, and engage with places including buildings, public symbols, and landscapes.

This essay offers an overview of the technical, methodological, and theoretical engagements between archaeology and geography. Building upon a review of the epistemological foundations of both disciplines, as well as their historical contours and interactions, four main areas are explored: (1) the applications of geospatial methods; (2) the contributions of Quaternary science, paleogeography, and paleoclimatology; (3) the intellectual cross-pollination between human geography, integrated geography, and the study of human-environmental interactions through time and space; and (4) the input of the geography of space and place in the development of landscape archaeology, phenomenology, and the study of ancient anthropogenic settings.

Definition

From its etymology couched in the "description of the earth," geography's traditional objects of study are varied and include things, peoples, and natural features. Indeed, as pointed out by William Hughes (1818–1876), geography is more than learning the names of places. Geographers study the distribution of humans, processes, and phenomena across the surface and subsurface of the planet. Because space and place affect a variety of topics, geography has the potential to be interdisciplinary. While early approaches emphasized the mapping and spatial distribution of natural and human phenomena, chronology and the study of time have gradually gained more weight, and longitudinal and historical perspectives have complemented synchronic ones. For instance, and with respect to the physical features of the earth and their changes through time, field archaeologists have gained significantly from advances in geomorphology and the recording and understanding of site formation processes.

Geography is a vast discipline that studies both natural and cultural phenomena. Hence, it has historically been polarized into two broad fields interested in the processes and patterns of natural environments (i.e., atmosphere, hydrosphere, biosphere, geosphere) at one end and in humans and their interactions with different types of variables (e.g., environmental, economic spatial, natural, social, political, religious) at the other. Several different iterations of geography integrate physical and human geography in various shapes and forms (e.g., environmental geography).

Historically, the tools and methods of geography have clustered into four major foci including spatial analyses, area studies, human-environmental relations, and geosciences. In relation to archaeology, most input, transfusion, and cross-pollination can be found at the level of survey and mapping techniques (including recent innovations in remote sensing); geospatial analyses (including recent advances in computer-aided mapping); human-environmental interactions (including human-plant interactions, human-animal interactions, and landscapes); the study of space, place, and settlements (including Walter Christaller [1893–1969] Central Place Theory); and Quaternary science, especially paleoclimate reconstructions (including the seminal work of Wladimir Köppen [1846–1940]).

Historical Background

By the eighteenth century, geography as a discrete discipline was part of most academic curricula in Europe. An early holistic view of geography was formulated by Alexander von Humboldt (1769–1859) in his *Cosmos: A Sketch of a Physical Description of the Universe* originally published in German in 1845 (Humboldt et al. 1849). A few decades later, Thomas Henry Huxley (1825–1895) – in his *Physiography: An Introduction to the Study of Nature* published in 1877 – presented a new form of geography and emphasized the empirical collecting of data over sole theoretical debates.

Exploration in the eighteenth and nineteenth century was a significant stimulus to both archaeology and geography as field disciplines. Fieldwork by Humboldt, Thomas Jefferson (1773–1826), John Lloyd Stephens (1805–1852), Frederick Catherwood (1799–1854), Ephraim George Squier (1821–1888), Ernst W. Middendorf (1830–1908), Clarence Bloomfield Moore (1852–1936), and Max Uhle (1856–1944) offered pioneering models. Napoléon Bonaparte's expedition to Egypt (1798–1801) had laid prior foundations for empirical and material collecting for both disciplines.

Epistemologically, geography and archaeology share many central tenets, most traceable to the Enlightenment and the birth of modern geosciences. The work of paramount figures in geology, paleontology, biostratigraphy, and prehistory such as Nicola Steno (1638–1685), James Hutton (1726–1797), George Cuvier (1769–1832), Carl Ritter (1779–1859), Charles Lyell (1797–1875), and Arnold Henry Guyot (1807–1884) was formative. In sum, the past is different from the present and is knowable through empirical observations. Natural processes are uniform, and their study can inform on similar processes in the past and their role in geological transformations (i.e., concept of uniformitarianism). Material remains survive, accumulate, and can be recovered. Younger geological strata typically sit atop older deposits (i.e., law of superposition), and their stratigraphic study can shed light on sequences of occupation, chronologies, and biological and cultural transformations. Advances in geosciences impacted archaeological methods, in particular excavations techniques as exemplified in the pioneering stratigraphic recording of Jacques de Boucher de Perthes (1788–1868), Eugène Dubois (1858–1940), Tessa Wheeler (1893–1936), and Mortimer Wheeler (1890–1992). The principles of geology, stratigraphy, and superposition also influenced the classification efforts of early antiquarians, collectors, and prehistorians including Christian Thomsen (1788–1865), Jens Jacob Asmussen Worsaae (1821–1885), and Gabriel de Mortillet (1821–1998).

Archaeology and geography, in particular biogeography, cultural ecology, and environmentally inclined studies, also owe to developments in naturalism, evolutionary theory, biology, adaptation, and social evolution and the key works of Humboldt, Charles Darwin (1809–1882), Huxley, Herbert Spencer (1820–1903), Alfred Russell Wallace (1823–1913), and Edward Burnett Tylor (1832–1917). The publication of Huxley's *Physiography* in 1877 was particular influential. From that standpoint, evolutionary archaeologists and geographers recognize that the concept of adaptation can be applied, albeit in different ways, to both cultural and biological studies. Cultural adaptations can be material, linguistic, behavioral, and so on, and the concept of social evolution

must not be conflated with the culturally constructed idea of "progress," as well as teleological and unilinear evolutionary models (e.g., Lewis Henry Morgan [1818–1881] *Ancient Society* published in 1877).

Although archaeology and geography share many epistemological, methodological, and theoretical tenets, very limited formal interactions and explicit conceptual discussions are documented before the second half of the twentieth century. Some overlap can be found in the writings of Friedrich Ratzel (1844–1904), Ellen Churchill Semple (1863–1932), Ellsworth Huntington (1876–1947), and Griffith Taylor (1880–1963) and the development of the concept of anthropogeography and subsequent models of so-called environmental determinism. Nevertheless, the historical contours of both disciplines align well.

The rejection and criticism of unilinear evolutionary ideas and models of the nineteenth century paved the way to the development of the concept of culture area and subsequently culture core. The idea that human cultures could be delimited in space based on linguistic, material production, and other cultural traits was key to the formalization of the cultural historical methods. Franz Boas (1858–1942), Robert Lowie (1883–1957), and Ruth Benedict (1887–1948), among others, promoted the idea of geographically distinct culture areas or culture blocks recognizable by their shared combination of traits. Through that normative view, human cultures are bound together through common and distinct norms. In that "aquatic" view of culture, time and space flow like water (so-called "ripple effect"). Culture contacts are constant and a function of time and space. More similar assemblages will be closer in time and space than less similar assemblages. Hence, by mapping trait distribution, one could establish the boundaries of a culture and its historical particularities. In geography, this era of research was characterized by regional area research and the collecting of descriptive information on places. Key figures in regional geography include Paul Vidal de la Blache (1845–1918), Alfred Hettner (1859–1941), and Richard Hartshorne (1899–1992). In American archaeology, culture history is perhaps best represented in the work of Alfred V. Kidder (1885–1963), William Duncan Strong (1899–1962), James A. Ford (1911–1968), Irving Rouse (1913–2006), and Will Carleton McKern (1892–?) (i.e., Midwestern Taxonomic Method).

Professionally, the Royal Geographical Society was founded in England in 1830, while in the United States, the National Geographic Society was formed in 1888. Both have been active in supporting archaeological fieldwork and exploration. A few decades later, the American Association of Geographers (formerly the Association of American Geographers [AAG]) was organized in 1904 in Philadelphia, the hometown of AAG's founder William Morris Davis (1850–1934). This boom in geography was closely tied to colonial enterprises, the extraction of resources, and the need of colonial authorities and companies for maps. From that standpoint, the emergence of archaeology is somewhat analogous, yet perhaps more complicated and multifaceted. Indeed, archaeology emerged as a discipline through multiple and fragmented fields including prehistory (anchored in geology), antiquarianism (based in collecting and the emergence of nation-states), classical archaeology (linked to art, esthetics, and architecture), and ethnography and sociocultural anthropology (grounded in the study of indigenous peoples).

Following the revival of ecological concerns under the banner of neo-evolutionary movements, archaeologists regained interests in the environment. This was not without input from cultural anthropologists and geographers including Leslie A. White (1900–1975), Carl O. Sauer (1889–1975), and Julian H. Steward (1902–1972). As such, environmental functionalism and processualism integrated paleoclimatological tools to the reconstruction of ancient environments and their impact on human adaptations. The pioneering work of geologist Gerard de Geer (1858–1943) on dating ice retreat in Scandinavia using varve deposits and E. J. Lennart von Post (1884–1951) on pollen grains to study postglacial floral change paved the way for the more systematic consideration of paleoenvironmental studies. The later study of Mesolithic Star Carr by Grahame Clark (1907–1995) is exemplary of

the importance of studying paleoenvironments and human adaptations.

Interest in the influence of ecological conditions on settlement patterns was further investigated by Steward and associated with the development of the cultural ecological approach to settlement archaeology. While recognized as the first American anthropologist to adopt an explicit materialist approach and focus on ecological factors, Steward's work influenced several archaeologists studying the origins of agriculture including Robert Braidwood (1907–2003) in Iraq, Richard S. MacNeish (1918–2001) in highland Mexico and South America, Robert C. West and Pedro Armillas on the Mexican *chinampas* ("floating gardens"), Donald D. Brand (1905–1984) in Mesoamerica, Joseph R. Caldwell (1916–1973) on interaction spheres in Eastern United States, and Gordon R. Willey (1913–2002) in the Virú Valley in Peru.

Cultural ecological influences in archaeology also came through the work of Sauer, Karl W. Butzer (1934–2016), David R. Harris (1930–2013), William M. Denevan (1931–), Kent Mathewson (1946–), Billie Lee Turner II (1945–), and others. Of those key figures in environmental and historical geography, the work of Sauer – in particular his *Agricultural Origins and Dispersals* published in 1952 – has been of significant impact in archaeology and paleoethnobotany. Influences can be seen in the work of Deborah Pearsall (1950–), Dolores Piperno (1949–), James A. Zeidler (1949–), and others.

Methodologically, the first application of remote sensing in mapping and imaging goes back to 1891, when a camera was attached to a blimp. Yet, scientists had to wait for the commercialization and militarization of airplanes for aerial imagery to become systematically relied upon. This was pioneered by Charles Lindbergh (1902–1974) and Anne Lindbergh (1906–2001) in Central America in 1929. A new era of remote sensing imaging was launched. Two years later, Robert Shippee (1910–1989) and George R. Johnson (1900–?) were leading an aerial photography expedition to Peru, and a decade later, Paul Kosok (1896–1959) and Richard Schaedel (1920–2005) were using aerial photographs to investigate the Nasca lines, irrigation systems, and ancient settlements in coastal Peru.

The quantitative revolution in geography coincided with the rise of processualism in archaeology and interests in systems theory, statistics, and the myriad applications of computers. This laid the bases for later innovations in Geographic Information Systems (GIS). Well-known geographers of this era include Fred K. Schaefer (1904–1953), Waldo Tobler (1930–), William Garrison (1924–2015), Peter Haggett (1933–), Richard J. Chorley (1927–2002), William Bunge (1928–2003), Edward Augustus Ackerman (1911–1973), and Torsten Hägerstrand (1916–2004).

The quantitative revolution and developments in spatial analyses, computing, and remote sensing contributed in major ways to the transformation of field archaeology. These innovations can be grouped under the banner of geomatics and include tools and techniques used in land surveying, remote sensing, cartography, GIS, global positioning satellite systems (GPS), photogrammetry, geophysics, geography, and other forms of earth mapping.

Critical geography, which arose as a critique of positivism in an analogous manner to post-processual and contextual archaeology, contributed significantly to bringing to the forefront existentialism and phenomenology to the archaeological study of ancient monuments and landscapes. The work of Yi-Fu Tuan (1930–) is perhaps most influential in geography and archaeology as seen in countless landscape studies.

In sum, the intellectual history of archaeology and geography shares many parallels, from their nineteenth-century reliance on evolutionary theory as applied to social formations to shifts toward area studies and culture history from the 1920s and the turn to positivism, spatial analysis, and processual approaches in archaeology in the 1960s. By the early 1980s, both archaeology and geography were undergoing reactions to the strictures of positivism, leading to pluralistic and more humanistic theoretical approaches.

Key Issues/Current Debates

Beyond regional geographies, archaeologists have borrowed and continue to be influenced by developments in geography, including tools, techniques, methods, and theories. While most geographical applications have been at the low-range, field-level archaeological research, higher range engagements with human-environmental relations and the concepts of space and place can also be recognized.

Geospatial Methods

Geomatics, also known as geospatial technology, is the utilization of computers in cartography and topography. Rapid progress in geospatial technologies is linked to advances in computer hardware, computer science, and software engineering, as well as airborne and satellite remote sensing. Geomatics methods are varied and include digital theodolites, distance meter total stations, spatial analysis, GIS, Geographic Information Science (GIScience), remote sensing, and GPS.

Remote sensing in archaeology allows to collect data beyond traditional excavations and survey methods. As such, any techniques used to acquire information through indirect means can be considered remote sensing. Data are obtained about the earth from measurements made at a distance and can come from many sources including satellite imagery, aerial photography, and handheld sensors (e.g., magnetometers, electrical sensitivity detectors, GPS units, ground-penetrating radar [GPR]). Results are obtained by contrasting archaeological features with the natural background. These contrasts are referred to as anomalies.

The development of remote sensing owes to rapid advances in technology, as well as the changing needs in the discipline. Demographic explosions on the planet have contributed to the increased need for cost-effective methods to locate, map, and acquire information from sites before they disappear. Considering that pedestrian surveys are becoming increasingly expensive, remote sensing allows to investigate large regions at low costs.

Broadly, methods in remote sensing archaeology can be aerial or terrestrial and rely on photogrammetry, radar technologies, light detection, geophysics, and more. Aerial methods include photography, multispectral, hyperspectral sensors, thermal infrared multispectral scanners, color infrared film, microwave radar, and satellite imaging (e.g., LiDAR [Light Detection and Ranging], SAR [Synthetic Aperture Radar]).

LiDAR measures the distance to a target by illuminating that target with a pulsed laser light and measuring the reflected pulses with a sensor. Laser return times and wavelengths are used to make digital 3D representations of the target. LiDAR can be airborne or terrestrial. Its applications in archaeology range from planning field operations to mapping features beneath forest canopy and providing data on features otherwise invisible from the ground. LiDAR also allows for the creation of high-resolution digital elevations models (DEMs) that can reveal micro-topography otherwise hidden by vegetation. LiDAR-derived products can be integrated into GIS.

The field of satellite archaeology has proven useful in detecting potential archaeological features as well as monitoring the state of preservation and destruction of visible ones. High-resolution satellites with thermal and infrared capabilities can be used to identify and locate sites of potential archaeological interest. Such technology typically works for features around one or two meters in depth and is based on the processing of images with the objective of defining anomalies at the surface of the earth. Landscape features such as soil, vegetation, geology, and human-made structures can be identified. Noninvasive methods are also significant to monitor sites that face encroachment from human and natural activities. Recent work by Daniel A. Contreras, Neil Brodie (1954–), and others on site inventories and evaluations of looting and destruction based on satellite images is particularly significant.

With respect to site inventory and reconnaissance, remote sensing archaeology has been particularly productive in regions covered with thick vegetation including the Petén region of northern

Guatemala. Remote sensing is also useful to gather data on deforestation and anthropogenic landscape alteration. Canals and irrigation systems have been successfully delineated and mapped using SAR, a type of radar that is sensitive to linear and geometric features on the ground.

Terrestrial or ground-based geophysical methods employ instruments on or near the surface of the earth including magnetometry, electrical resistivity, electromagnetic conductivity, GPR, and terrestrial LiDAR. Magnetometry is usually the most productive technique and provides fast results over broad areas on the formation of magnetic anomalies including firing the soil, the accumulation of fired artifacts, variations in soils and sediments, surface soil layers magnetically enhanced, the removal of magnetically enriched topsoil (e.g., ditch), and the accumulation of topsoil (e.g., mound), imported stone, and iron-bearing artifacts. Electrical resistivity measures soil resistivity to electrical current and depends on material type, moisture, dissolved ion content, density, and pore space. Electromagnetic conductivity is based on the inverse principle and the fact that a highly resistant material is a poor conductor (e.g., floors, walls). GPR sends rapid pulses of microwave energy which pulses can reflect on buried features (e.g., walls, floors, pits, rubble).

Recently, remote sensing techniques have been complemented by 3D scanning which has multiple applications in archaeology and the recording, study, and reproduction of objects. The purpose of 3D scanning is to create a point cloud of geometric samples on the surface of an object. Overall, two types of 3D scanning technology exist: (1) contact and (2) noncontact (active or passive). Contact 3D scanners probe the subject through physical touch (e.g., coordinate measuring machine), while noncontact methods utilize different types of emissions including light, ultrasound, or x-ray. LiDAR scanners, handheld laser scanners, structured-light 3D scanners, and volumetric techniques (e.g., computed tomography, magnetic resonance) all have archaeological applications.

The quantitative revolution in geography and the development of GIS have impacted in significant and enduring ways field archaeology and the analysis of spatial data. Indeed, much if not all the information collected in archaeology is wholly or partially spatial. Following its introduction in archaeology in the mid-1980s, its tools, techniques, and softwares became standard by the mid-1990s. GIS can be defined as computer systems which main purpose is to store, manipulate, analyze, and present information about geographic space. GIS is not a single computer software; rather it is a spatial toolbox with various softwares. It is often compared to AutoCAD, because both allow one to draw a map, but GIS is different and more powerful since it can be manipulated by its database and provides predictive power. Four main subsystems can be identified including data entry, spatial database, manipulation and analysis, and visualization and reporting. The central component of any GIS is its database. It must store locational component (i.e., position in geographic space), topological component (i.e., logical relationships between objects), and attribute component (i.e., characteristics).

GIS has various and useful applications in archaeology. Elevation modeling, or the representations of surface of terrain, is useful since it can produce derivatives valuable to understand human occupation (e.g., slope, ridge-drainage index). Related analytic methods include visualization of topography, cost-distance and least-cost pathway analyses, the analysis of visibility and intervisibility, simulations of natural processes (e.g., flooding, erosion), virtual reality and visual reconstruction, spatial interpolation (i.e., the use of spatial characteristics of a variable and the observed values of that variable to guess the values of that variable at unobserved locations), and predictive modeling. The latter, although widespread in archaeology, is also the most controversial. Its main goal is to generate spatial models that have predictive implications for future observations. Geospatial technologies as well as geophysical methods are a central part of the growing field of landscape archaeology.

Quaternary Science, Geomorphology, and Paleoclimatology

In the realm of physical geography, archaeologists have interfaced most with the disciplines of biogeography, oceanography, paleoclimatology, landscape ecology, geomorphology, pedology, hydrology, hydrography, paleogeography, and Quaternary science. Paleoclimatology encompasses a broad array of studies and datasets that can be of great use to archaeologists in reconstructing paleoenvironmental conditions and their role in the development of human societies. Paleoclimatologists typically rely on proxy evidence, especially for periods predating the twentieth century.

Popular proxies in reconstructing past climatic conditions include dendrochronology, sclerochronology, palynology (pollen), and glaciology. Since annual tree rings depend on water, solar energy, and temperatures, dendrochronology, or the study of tree rings, can bring insights into patterns of precipitation and droughts. Sclerochronology, or the study of growth rings in calcium carbonate skeletal material (e.g., mollusk shells, fish otoliths, corals) and in particular their geochemical composition (stable isotope analysis, elemental ratios), can help reconstruct ancient sea surface temperature and other oceanic conditions. For instance, the ratios of different types of oxygen isotopes in water are dependent on temperature and salinity and are incorporated into the calcium carbonate. This field of study is part of the broader discipline of paleoceanography. While this is true in corals, shells, and otoliths, in glacial ice cores, paleoclimatologists usually reconstruct air temperature, rather than sea surface conditions. Glaciologists study the various inclusions found within ice cores including gas like CO_2, ash, pollen, and dust, with the objective of reconstructing ancient climatic conditions, especially air temperatures and things such as land use change, pollution, and precipitation.

The study of pollen, or palynology, can shed light on the presence of plant species and help in estimating ancient natural ranges of certain ecosystems and biotopes as well as artificial changes in land use. Changes in the relative frequencies of different types of pollen can provide longitudinal perspectives on changing patterns of vegetation cover.

Geosciences, in particular geomorphology, have been influential in the study of site formation processes in archaeology. Michael B. Schiffer's *Behavioral Archaeology* published in 1976 exposed the basic difference between natural (N-transforms) and cultural processes (C-transforms), which has since then been refined and integrated into more complex models.

Human-Environmental Relations

In reaction to the static, classificatory approach to environmental variables, a branch of archaeology promotes a more active perspective on geography. Such a contextual approach favors the integration of zooarchaeology, paleoethnobotany, geoarchaeology, and cultural ecology into archaeological studies. The movement was also a reaction to environmental determinism and favored historical particularist approaches to understand the interactions between humans and their environments. The work of Sauer and his disciples – as part of the Berkeley School of Latin American Geography – was particularly influential and helped shape more contextual and environmental iterations of archaeological research.

Debates in geography, cultural ecology, and historical particularism were seminal in the adoption of cultural ecological – and later political ecological – frameworks in anthropological and environmental archaeology. Steward, with the publication of *Theory of Culture Change: The Methodology of Multilinear Evolution* in 1955, was instrumental in the popularization of cultural ecology approaches and their instrumentalization in archaeology, in particular settlement pattern studies. In order to reconstruct the ways in which the environment influences human adaptations, one needs to consider its particular historical trajectories and developments through time.

In geography, Butzer developed the concept of contextual archaeology in *Archaeology as Human Ecology: Method and Theory for a Contextual Approach* published in 1982. He advocates for the study of archaeological sites as part of broader ecosystems and their various environmental

subsystems. While this is reminiscent of Lewis R. Binford's (1931–2011) technomic, sociotechnic, and ideotechnic subsystems, Butzer contextual and human ecological approach to archaeology recognizes five main themes including space, scale, complexity, interaction, and stability. These concepts, while geographical and biological, have significant potential in archaeology. It is different from anthropological archaeology and suggests to move human ecosystems and geography from the background to the foreground in a more dynamic perspective.

Cultural ecology was also central to studies of the origins of agriculture and their ecological and economic roots, especially as seen in the work of Alexander Chayanov (1888–1937) and Ester Boserup (1910–1999). The latter's publication in 1965 of *The Conditions of Agricultural Growth* was significant and impacted archaeological research, including the work of Billie Lee Turner II on ancient agricultural systems and environmental transformations of Maya groups in the Yucatán. In South America, the publication of *Cultivated Landscapes of Native Amazonia and the Andes* by William Denevan in 2001 represents an important contribution from the field of human geography and archaeology. Recent research by John H. Walker, Manuel Arroyo-Kalin, Daniel A. Contreras, José Iriarte, David Beresford-Jones, Volker Sossna, and others on South American historical and prehistoric ecologies, paleoenvironments, and anthropogenic landscapes continues this tradition.

Space, Place, and Landscape

A major contribution of geography to archaeological studies has been to shift the fundamental units of analysis from the "site" or "settlement" to broader spatial categories including the region, area, and landscape. At the same time, scholars have realized the importance of considering the natural features of the landscape in the formation of world views and cultural realities. Landscape history and archaeology investigate the engagement of people in the past with their environments, including the ways those are constructed, modified, and perceived. This field of study emerged through interdisciplinary interactions between historical geography, archaeology, architecture, and phenomenology. *The Morphology of Landscape* published by Sauer in 1925 and *The Making of the English Landscape* by William George Hoskins (1908–1992) in 1956 were key in developing the concept of cultural landscapes.

Landscape archaeologists place emphasis on the relationships between material culture, anthropogenic modifications, and nature. Although some landscapes can be considered natural and devoid of human modifications, landscape archaeologists focus on cultural landscapes, those spaces modified by humans, sometimes over long period of time. Modifications can be small or large, from garden patches to monumental earthworks and agrarian infrastructures. Places and spaces – as well as natural features – are seen as dynamic agents that helped shape human actions through time.

The archaeological study of space and place owes to the work of geographer Yi-Fu Tuan, in particular his *Space and Place: The Perspective of Experience* published in 1977. From the standpoint of architecture, the work of Amos Rapoport (1929–), especially his *House Form and Culture* published in 1969, is fundamental and contributed to the establishment of environment-behavior studies. The contributions of Edward T. Hall (1914–2009) on proxemics and Erving Goffman (1922–1982) on performance and symbolic interaction have also helped shape archaeological approaches to human-space interactions. Concepts from environment-behavior studies have been widely applied in the anthropology, ethnohistory, history, and archaeology of the built environment, especially in urban, ceremonial, and monumental settings as seen in the work of Jerry D. Moore, Stephen H. Lekson, Michael E. Smith, Setha M. Low, and Denise Lawrence.

Concepts from phenomenology and the writings of Maurice Merleau-Ponty (1908–1961), Edmund Husserl (1859–1938), and Martin Heidegger (1889–1976) also contributed a great deal to advances in the archaeology of landscapes and monuments, as exemplified in the prolific literature on architecture, material culture, interpretive

archaeology, and the phenomenology of landscape. The writings of Ian Hodder (1948–), Julian Thomas (1959–), Michael Shanks (1959–), Michael Parker Pearson (1957–), and Christopher Tilley feature prominently as examples of the archaeological study of past experiences and perceptions. Other landscape archaeologists include Sam Turner, Tony James Wilkinson (1948–2014), Bruno David, Adam T. Smith, Stephen J. Lansing, Clark L. Erickson, Nicole Branton, Steven A. Wernke, James A. Delle, and Barbara Voss. Landscape archaeology has explored cultural identities, political hegemonies, religious movements, and their manifestations in space, among other things.

More recently, archaeologists have further drawn from developments in the social theorization of space and place as materialized in the increased importance of the concept of social memory, persistent place, and sacred geographies. The archaeology of memory has been particularly productive as exemplified in the work of Ruth M. Van Dyke and Susan E. Alcock, among others.

Future Directions

Future directions in the cross-fertilization of archaeology and geography are multiple and have the potential to open exciting and innovative avenues for research. While most contributions have typically flowed from geography into archaeology, historical and environmental geographers are increasingly cognizant of the value of longitudinal and archaeological perspectives.

One can expect that continued advances in remote sensing, computer-aided mapping, and other geospatial technologies will lead to new and fruitful applications in archaeology. As such, the now systematic training of archaeologists in GIS is a testimony to its enduring status. The implementation and greater accessibility of drones should also help aerial photogrammetry becoming a staple in field archaeology. At the same time, the widespread and public accessibility of satellite imagery raises issues and concerns regarding the protection of archaeological sites. With respect to the conservation, promotion, and appreciation of cultural heritage, advances in imaging technologies, 3D scanning, and virtual realities are paving the way to new forms of museological experiences and appreciation of ancient cultural, spatial, geographic, and material realities. Beyond terrestrial applications, geography and archaeology also have a future in space archaeology, or the study of human-made objects and traces found in space.

The training of archaeologists and geographers is increasingly done hand in and hand. In North America, this is done under the banner of geography and anthropology departments (e.g., Louisiana State University, Colorado State University), while in the United Kingdom, several undergraduate and graduate programs in geography and archaeology exist in geosciences and earth sciences departments (e.g., University of Cork, University of Edinburgh, University of Southampton). A more sustained and ubiquitous combining and integrating of geography and archaeology in both undergraduate and graduate curricula would contribute to their synergy and applications to the study of the past and present human phenomena.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Aerial Archaeology
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeobotany
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeometry: Definition
- ▶ Architectural Sites: Monitoring
- ▶ Butzer, Karl W.
- ▶ Cultural Ecology in Archaeology
- ▶ Dating Techniques in Archaeological Science

- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Geoarchaeology
- ▶ Glacial Landscapes: Environmental Archaeology
- ▶ Google Earth Afghan Surveys
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Human Impacts on Ancient Marine Ecosystems
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Nasca and Pampa Jumana Lines and Geoglyphs
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Nonstructural Sites: Monitoring
- ▶ People as Agents of Environmental Change
- ▶ Phenomenology in Archaeology
- ▶ Prospection Methods in Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Spatial Analysis in Field Archaeology
- ▶ Surface Survey: Method and Strategies

References

Boserup, Esther. 1965. *The conditions of agricultural growth*. London: George Allen & Unwin.

Butzer, Karl W. 1982. *Archaeology as human ecology: Method and theory for a contextual approach*. Cambridge, UK: Cambridge University Press.

Denevan, William M. 2001. *Cultivated landscapes of native Amazonia and the Andes*. Oxford: Oxford University Press.

Hoskins, William George. 1956. *The making of the English landscape*. London: Hodder and Soughton.

Huxley, Thomas Henry. 1877. *Physiography: An introduction to the study of nature*. London: MacMillan & Company.

Morgan, Lewis H. 1877. *Ancient society or researches in the lines of human progress from savagery trough barbarism to civilization*. London: MacMillan & Company.

Rapoport, Amos. 1969. *House form and culture*. Englewood Cliffs: Prentice-Hall.

Sauer, Carl O. 1925. The morphology of landscape. *University of California Publications in Geography* 2 (2): 19–54.

Sauer, Carl O. 1952. *Agricultural origins and dispersals: The domestication of animals and foodstuffs*. Cambridge, MA: The Massachusetts Institute of Technology Press.

Schiffer, Michael B. 1976. *Behavioral archaeology*. New York: Academic.

Steward, Julian H. 1955. *Theory of cultural change: The Methodology of multilinear evolution*. Urbana: University of Illinois Press.

Tuan, Yi-Fu. 1977. *Space and place: The perspective of experience*. Minneapolis: University of Minnesota Press.

von Humboldt, Alexander, E.C. Otté, B.H. Paul, and W.S. Dallas. 1849. *Cosmos: A sketch of a physical description of the universe*. London: H. G. Bohn.

Archaeology and Politics

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Introduction

This entry considers the institutionalization of the archaeological discipline in the context of modern Western science and puts forward the idea of "archaeology as politics." The analysis takes place from a South American perspective and takes a different stance from the widespread treatment on the subject which is based on the presumption of a division between science and politics as exclusive domains (although recognizing some influence of the latter). That is, it is not the intention of this entry to differentiate between archaeology and politics as separate spheres, which would imply the acceptance of the possibility of being able to "manage" at will the political side of archaeological practice in time and space. On the contrary, it is considered that archaeology is politics and its disciplinary practice inscribes power-knowledge relations both at the micro- and macro-political levels.

The dual anchorage of archaeology in modernity and in the unfinished transmodern reconfigurations predefines the political origin of absolutely all actions and choices involved with

the production process, reproduction, and management of scientific knowledge. This is related to the geopolitical conditions implicated in the generation of knowledge and which preestablishes the preeminence of science over other forms of knowing. Geopolitical contexts refer not only to the physical space but also to the sociopolitical, historical, epistemological, academic, and editorial (among others) scenarios, through which certain forms of knowledge are generated and installed over others (Walsh 2007). To account for this, some historical trends will be discussed that have occurred in South America in general and in Argentina in particular, regarding the interrelationships between archaeological practices, theoretical frameworks, and political contexts. The geopolitics of knowledge impact not only the forms and conditions of producing and reproducing knowledge (i.e., science, academia, publishing companies) but also the definition and management of places of interest (e.g., historic sites, protected areas) and materiality (e.g., memorials, monuments, heritage, artifacts, museums) promoted by different sectors and actors with commemorative, recreational, educational, and cultural purposes. In this context, archaeology as discipline provides discourses, narratives, lifestyles, places, and objects located in time and space, thereby becoming a contemporary device in the classification of stories, landscapes, people, and their relationships from an Anglo-Saxon, colonial, and modern knowledge perspective.

Historical Background

Archaeology from a Political Perspective

Anthropology and archaeology as disciplines have a modern origin and are associated with the centers of political and economic power of liberal industrial countries (e.g., England, France, Germany, and the United States). Since its beginnings in the mid-nineteenth century, social sciences in general and archaeology in particular developed in relation to these power centers and became institutionalized as a knowledge-producing enterprise. In this historical constitution of disciplines in Western thought, there are two foundational assumptions that characterize modern social sciences (Lander 2003). On one hand, the existence of a universal metanarrative from which all peoples and world experiences are classified and ranked, with European industrial society considered the most advanced expression of this development. In this context, the first "articulations of cultural differences in chronological hierarchies" appear, activating classifications of premodern, traditional, and/or primitive. From this perspective the forms of knowledge that were developed to understand the "other" societies came to be the only valid, objective, and universal ways of understanding the world. Through this Eurocentric view which organizes time and space, a mechanism of colonial and imperial knowledge was installed and naturalized that preestablished the superiority of the product of science over other forms of knowing (Restrepo 2007). The ideal of knowledge in modernity, besides being characterized by its objectivity and universality, is predefined as disembodied and ahistorical, that is, by its possibilities of transcending and disregarding persons, times, and places. This is connected with the ontological rupture between body and mind, an initial separation in the modern Western tradition, which places human beings in an external position and instrumental to their environment (Lander 2003). This reinforces abstraction and distancing as main heuristic elements in the construction of knowledge.

According to the Porto Rican philosopher Maldonado-Torres, if scientific knowledge is recognized as the only valid way of knowledge, cognitive faculties in racialized subjects (the "other" colonized) are denied, which provides the basis for the ontological denial and epistemic disqualification of the latter (Maldonado-Torres 2007). Descartes' cogito ergo sum gives primordial importance to the epistemological and expresses the sense of coloniality of knowledge, "others do not think, thus they are not." So, "not thinking becomes a not being signal in modernity" (Maldonado-Torres 2007: 145), and thereby exclusion, subalternation, and/or denial mechanisms are generated for all that is different from the way of thinking of the modern, Western, and

white "us." The epistemic disqualification referred to by Maldonado-Torres can be linked to the concept of "epistemicide" proposed by Santos (2006), to refer to the death of alternative knowledge caused by the installation of the idea of scientific knowledge as the only valid and rigorous way of understanding the world. Consequently, this monoculture of knowledge, as it discredits and disqualifies "others," shrinks and reduces the present by eliminating different contemporary conceptions that do not fit within modern canons and scientific principles (Santos 2006).

Moreover, there is no doubt that the relationship between politics and archaeological practice has begun with the emergence and development of the discipline in the nineteenth century (Trigger 1989). However, discussions about the political implications of archaeology or on the uses and abuses of the past emerged only in the last decades of the twentieth century. Archaeologists' late treatment of these discussions can be seen as a result of disciplinary institutionalization which sought to cover archaeology with scientific status guaranteeing objectivity and neutrality. Simultaneously, the development of the firm belief that archaeology is synonymous with the past helps to install the view of the professional's role as being free from the vicissitudes and particularities of its own time. In that sense, the practice of archaeology, under the precepts of modern scientific thought, is inscribed and mediated by the denial of its contemporaneity reflected mostly in political, Eurocentric, and racist terms. Some academic theories, such as diffusionism and evolutionism, were the conceptual frameworks for the construction of national identities in different countries of South America and which white Europeans used to legitimate their treatment of indigenous peoples. At the same time, different archaeological investigations sought to demonstrate the historical discontinuities between high pre-Hispanic cultures and contemporary native groups. The cultural historical synthesis of large regions and areas was one of the main objectives of the South American archaeology in the early decades of the twentieth century. In this context, diffusionism and racial studies were one of the main mechanisms to explain the migration patterns of human groups through space and time (Politis 1995).

It was not until the 1970s and 1980s that scientists began to reflect deeply on the close relationship between the archaeological work and nationalist practices, as well as the sociopolitical contexts in general. The emergence of Latin-American social archaeology in Mexico and Peru, with its theoretical orientations in historical materialism and neopositivism, saw attempts to explain social phenomena scientifically. This movement sought to link the past to the present and aimed to be a weapon of liberation for the people. Issues relating to their origin and status as exploited or the transience of social classes, institutions, and behavioral patterns were explored (Lumbreras 1974). Latin-American social archaeology was therefore characterized by the development of an original theoretical approach which sought to provide the basis for generating emancipatory political positions rather than academic positions. The most significant contributions were made in Mexico, Peru, Venezuela, Dominican Republic, and Cuba; however, the influences of this approach were restricted to those countries during the 1970s and early 1980s. In this regard, it has been suggested that social archaeology was associated with temporal contexts where the political model of the nation state tended towards a Marxist ideology (Oyuela-Caycedo et al. 1997).

Moreover, not all Marxist archaeologists ascribed to the tenets of the Latin-American social archaeology. Among them, some American archaeologists close to Marxism began to explore the political implications of the discipline and archaeological praxis and to discuss issues relating to the procedures and uses of the past such as ownership of archaeological materials, authenticity, ethnicity, restitution, and cultural resource management (Trigger 1989; Kohl and Fawcett 1995; McGuire et al. 2005). The emergence of post-processual archaeology in the Anglo-Saxon context also contributed to a deeper analysis of the relationship between archaeology and politics and broadened the discussion about the implications of professional practice and the role of the archaeologist (Shanks and Tilley 1987). The organization of the first World Archaeological Congress

(WAC) in 1986 promoted the analysis and discussion of politics in archaeology and especially its inclusion in the research agenda (Ucko 1987). The founding objectives of the WAC, which among other things sought to promote indigenous peoples and defend their rights, were to activate relationships with and the participation of archaeologists from peripheral countries and engage in their sociopolitical issues. These were novel proposals that challenged the idea of a neutral archaeology and promoted other ways of considering professional practice.

In the 1990s, the vision that archaeology had consolidated, due to its origin, an inescapable political dimension and that nationalism is just one of many possible manifestations of this nature can be expressed both in its political and scientific activities (Silberman 1995). Some observations may be made in relation to this idea of archaeology and also in reference to the excision of political and scientific domains. Regarding the former, this assumption is still accepted without much discussion, and it appears that the political domain in archaeology is *one* dimension (Kohl and Fawcett 1995). This idea implies that the discipline must inevitably have other dimensions that are not political and that there is some possibility of disaggregating its components. Moreover, considering scientific and political activities as independent areas, besides representing the possibilities of disaggregation of archaeological dimensions, is part of the neoliberal agenda which is sustained by ideas of neutrality, detachment, and objectivism. As mentioned at the beginning of this entry, by its origin, scope, implications, overt and hidden actions, and omissions, archaeological practice is always inherently political. In this decade, and in some South American countries, constitutional reforms have recognized the preexistence of indigenous peoples and have consecrated certain fundamental rights such as the communal ownership of land as well as rights to health care, to education, and to practice their culture. These rights, established by the nation state, will become in the future significantly relevant for the indigenous peoples in their relationship with archaeologists.

The beginning of the twenty-first century heralded the deepening and multiplicity of voices associated with the politics of knowledge in archaeology. This development gave rise to changes in the ways archaeologists began to consider archaeological practice through an understanding of the plurality of agents involved. In recent years there have been, in different contexts of world archaeology, diverse theoretical and methodological approaches in the light of decolonizing thought that have tried to account for the involvement, participation, and coproduction in archaeological research projects of actors and historically marginalized sectors (McNiven and Russell 2005; Smith and Wobst 2005; Gnecco and Ayala 2010).

In its disciplinary history, much of South American archaeology has developed behind closed doors privileging knowledge construction from a Western and white perspective. One could argue that this way of looking at archaeological practice in much of South America is a result of the theoretical and methodological influences from the historical cultural school and the processual archaeology that predominated and still influences this part of the Americas. Moreover, in Argentina in particular as well as in some other South American countries, democratic governments have alternated with coups d'état and military governments that have significantly influenced the development of archaeology in these regions through the promotion of national archaeologies (Politis 1995). In general and in brief, it can be said that in Argentina during democratic times, science advanced and academic activity progressed in many directions. During these moments, archaeological research consolidated, systematic financing research projects began, important national and international scientific events occurred, and new undergraduate and graduate careers were created. Conversely, during military periods, there were setbacks in research, some universities and anthropology careers were closed, and there was ideological persecution and discrimination (Politis and Curtoni 2011).

In recent years, especially since 2003, the Argentine government of President Néstor Kirchner promoted a progressive national and popular

model, with a clearly defined foreign policy and South American connection, which meant a change in style and conception of international integration of the country. In the twenty-first century, this has been favored by the surging conditions in the South American scenario, generally characterized by a neoliberal exhaustion – through policies of market liberation; the emergence of social and political movements that put forward alternatives of production and management; the revaluation of the State versus the market, shown in the regulation and promotion of social equality; debt reduction and the proposal of autonomous relations with the United States; and, finally, the search and strengthening of processes of regional integration represented by the Mercosur and Unasur (Ayerbe 2011). This economic, political, social, and cultural repositioning, which has occurred in several countries in South America, has affected and still are affecting, to varying degrees and depth depending on national contexts, the ways to consider archaeological practice as well as its own theoretical elaboration. In Argentina, in recent years, discussions about the ethical dimensions of archaeological work and heritage management have been activated, and the participation and involvement of indigenous peoples in archaeological research projects has seen the emergence of new issues and problems of inquiry. For example, issues relating to local situations have been considered and claims and disputes raised by local groups (e.g., indigenous peoples, peasants) have been addressed in archaeological congresses (e.g., relating to territorial dispossessions, the destruction of sacred places, repatriation of human remains and associated materiales, and the destruction of sites).

Key Issues

Archaeology, Knowledge, Politics, Power

Since its conception, production, reproduction, distribution, and consumption, knowledges generated within academic institutional frameworks bear their geopolitical, geo-historical, and geocultural imprints ("knowledge" is used in plural in this entry with the intention of presenting the idea that knowledge in singular refers to the Eurocentric view while the plural makes reference to the Latin-American conception of the possibility of multiple knowledges). Referred to as the body politics of knowledge (Castro Gomez and Grosfoguel 2007), knowledges possess a place, context, body, color, and gender in their origin (Castro Gomez and Grosfoguel 2007). Thus, they are contingent, situated, and traversed by relations of space and power. These conditions may also express the senses of coloniality of power, knowledge, and being, which characterized ways of knowing developed and imposed in colonial modernity (Lander 2003). The concept of the coloniality of power refers to strategies of modern exploitation and domination that had their origins in the naturalization of racial hierarchies and the ordering and classification of "otherness." The coloniality of knowledge is related to the central role of epistemology in the process of elaborating knowledge, which can allow reproducing colonial schemes of thinking and controlling all forms of subjectivity, of culture, and of production and reproduction of knowledges (Quijano 2003). Finally, the coloniality of being refers to the colonized subjects' lived experiences and histories and their impact on language forms (Maldonado-Torres 2007). Under these conditions, Western science's epistemic colonialism is imposed from the definition of the "zero" point as the main model of knowledge through which the world can be observed from a neutral, objective, and absolute locus (Castro Gomez and Grosfoguel 2007).

In Argentina, the thinker Arturo Jauretche reflected on the reality of the country in the 1950s in terms similar to those involved in the concept of the coloniality of power, by considering the geopolitical and chronopolitical dimensions of knowledge. In his essay on "pedagogical colonization," he said that under the appearance of universal values, "only relative values corresponding to a certain time or geographical location, whose appearance of universality arises solely from the power of universal expansion given by the centers that originate them" are still being introduced (Jauretche [1957] 2004: 99). Also, through national projects,

the intellectual elites or "intelligentsia," according to Jauretche ([1957] 2004), identified the universal values of "culture" enshrined by the centers of power, thereby excluding all preexisting understandings. The ideal promoted by the "intelligentsia" was to create Europe in America through the destruction of indigenous peoples who were seen to be an obstacle and through the denial of all local values and possibilities of regional creations. Thus, the process of "Europeanization that was practiced did not consist in the incorporation of European values to the existing culture, but in its outright derogation" (Jauretche [1957] 2004: 102).

Hegemonic narratives are furthermore added that imposed some axiomatic formulations, discursively constructed, posing the lack of continuity between the pre-Hispanic past and contemporary indigenous peoples. In his book, *The Prophets of Hate and Yapa* (*Yapa* is Quechua word meaning gift that the seller gives to the buyer), Jauretche ([1957] 2004: 102) expressed, "The misunderstanding of our pre-existing as a cultural, or rather, understand it as anti-cultural, contributed to the fact that the pre-existing were deprived of all means of expression. It was not enough with the massive replacement of the native population by immigration flow. Intelligence became 'intelligentsia' and assuming that culture was exclusively imported it became one of the most effective tools to uproot the local elements of pre-existing culture." The idea of progress in America could materialize if both the past and the present were denied, "hence the insistence of American denial and anxiety about being European. This historical pattern caused a method that later became norm. Reality was replaced by abstraction" (Jauretche [1968] 2002: 30).

The effects of the coloniality of power and relationships with knowledge management have been criticized and denounced by various Argentine thinkers such as Ortiz Pereira, Manuel Ugarte, Scalabrini Ortiz, Jauretche, and Fermín Chávez, who sought to think of reality both from their own and from concrete needs. It was a way of seeing things "from here" because "the inability to see the world from ourselves has been systematically cultivated in our country" (Jauretche [1957] 2004: 108). Pre-Hispanic past denial and the denial of contemporary indigenous peoples became part of the essence of the modern cosmovision and modus operandi established from colonial order. For example, in the search for defining the identity of the pampas promoted by state authorities and based in the multicultural synthesis, "the indigenous" fluctuates in a complex way, being at times present as a figure of recognition and reparation and at other times absent ignoring their current claims and concessions. This is a consequence of the action of two simultaneous processes called the "specific invisibility" and "generic visibility" (Curtoni and Chaparro 2008). Specific invisibility refers to the strategies of concealing, silencing, and denying that operate on the "indigenous being," on the concrete needs of the communities, their rights, and claims, as well as on political activism and its representatives. Different narratives have been attempting both to enunciate the absence of indigenous people in the region and to challenge the legitimacy of existing identities. In parallel, generic visibility mechanisms are generated, generally staged by state power, and associated with reparation, recovery, and revaluation of "the indigenous" actions. The preferred forms of expression of this process are the materialization or the monumentalization of "something" referred to as the indigenous world, without any discussion and consensus with local communities about what and how and with the intention of visibilizing actions and demonstrating political awareness. These constructions objectify indigenous agency and relationships. The official authorities' discourses are also activated which promote multicultural integration as a way of overcoming historical controversies (such as indigenous and white Creoles). In this search for Pampa identity, the "indigenous" fluctuates unanchored in different forms, being at times synonymous with the past, in the best case, in miscegenation, and in others and expressed as patrimonialized and/or monumentalized figures (Curtoni and Chaparro 2008).

These strategies, together with racist and ethnocentric elaborations, formed the basis of nation-constitution projects in different countries of South America in general and Argentina in

particular (Politis and Curtoni 2011). Social science and archaeological practice taking place in these spaces of power were not free of ideological-political influences promoted by the colonial modern imaginary. Thus, the criticism of the colonial construction of knowledges requires an epistemological-political positioning that attempts to "decolonize" disciplinary foundations. This dual dimension is expressed in terms of methodology with the statement that there are no definitive and unique rules which guide research (see Haber 2011), together with the acceptance of other views and extra-academic elements in the construction of knowledges and at the political level with the critique of science's hegemonic, globalizing, and exclusive stance. The premise of the decolonization of knowledge is to make clear the place and relationships from which knowledges are produced and to analyze the institutions that produce and/or are managers of it and point out its power effects. It also entails transcending the senses involved in the "zero point" challenging detachment and neutrality and recognizing contamination and agreement in the generation of knowledge (Castro Gomez and Grosfoguel 2007).

Future Directions

In this sense, what is necessary is not just alternative knowledge, but new ways of producing and reproducing them (Santos 2006). These could rise from an intertopic criticism about the global imposition of knowledge, leading to the promotion of different and multiple places of enunciation though interrelated, coproduced, and pluriversal. The practice of archaeology "from here" (Jauretche's) results in a rupture with the academic-scientific privilege and status as the legitimate producer of universal knowledge construction, and on the other hand, it activates decolonizing procedures of instituted knowledge (pedagogical decolonization), thereby promoting new ways of knowing. What is sought with these statements is that the construction of knowledge is historically situated, i.e., not Eurocentric or based on the scientific rationalism of liberal modernity. Overcoming Eurocentrism implies, among other things, an anchorage of space in terms of the spatial, social, bodily, linguistic, epistemic, and political sense so as to activate our incorporation in concrete spheres of pluriversality where other bodies, languages, concepts, other knowledges, and epistemologies coexist. These "other spaces," where different knowledges are organized together with other epistemologies, cosmovisions, and rationalities, are prior to the interests and motivations of the academic field. Therefore, neither do peoples and groups forming these spaces and knowledges, as well as the places themselves, need to be empowered (paternalist attitude quite common in some postcolonial and postmodern discourses) nor do they need the academic concourse or the "expert" wink to manage a position of credibility, legitimacy, and existence. On the contrary, it is essential to establish decolonizing processes at the subject's level in terms of its "pedagogical colonization," its scientific language and disciplinary practices, and its disincorporation, in order to overcome academic arrogance and the exclusion caused by epistemic hierarchies of the global coloniality and its incorporation – in the sense of embodiment – to local situations.

Throughout history and even in some current contexts, archaeology has developed and been installed as a hegemonic biopolitical device whose narratives construct and control stories, places, subjects, and their relations from a Anglo-Western, scientific, modern, and colonial production standpoint. Thus, archaeological practice is always inherently political, and it reflects in different ways and intensities the complex and dynamic interrelationships between interest groups, archaeologists, and sociopolitical contexts. The analysis of the relationship between archaeology and policy exhibits complicity between modernity and coloniality and the generation of knowledge as an ideological/political product. The subversion of this mode of production, which has been institutionalized and naturalized, involves at least the effort to place the constructions of knowledges together with and from local pluriversality and from geo-chrono-political

stances so as to invert the relationship and thus retrace the itineraries of the archaeological politics in the light of other interests and other ways of knowledge production.

Cross-References

- ▶ Decolonization in Archaeological Theory
- ▶ Indigenous Archaeologies
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Social Archaeology
- ▶ South American Archaeology: Postcolonial Perspectives

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References

Ayerbe, L. 2011. La Argentina de Néstor Kirchner en un contexto regional de irrupción de nuevos liderazgos populares y menor presencia estadounidense. In *La Inserción Internacional de Argentina durante la Presidencia de Néstor Kirchner*, ed. S. Colombo, 15–37. Argentina: Universidad Nacional del Centro de la provincia de Buenos Aires.

Castro Gómez, S., and R. Grosfoguel, eds. 2007. *El giro decolonial. Reflexiones para una diversidad epistémica más allá del capitalismo global*. Bogotá: Iesco-Pensar-Siglo del Hombre Editores.

Curtoni, R., and M.G. Chaparro. 2008. El re-entierro del cacique José Gregorio Yancamil. Patrimonio, política y memoria de piedra en la pampa Argentina. *Revista Chilena de Antropología* 19: 9–36.

Gnecco, C., and P. Ayala Rocabado. 2010. *Pueblos Indígenas y arqueología en América Latina*. Colombia: Universidad de los Andes.

Haber, A. 2011. Nometodología Payanesa: Notas de Metodología Indisciplinada. *Revista Chilena de Antropología* 23: 9–49.

Jauretche, A. [1968] 2002. Manual de Zonceras Argentinas. Buenos Aires: Ediciones Corregidor.

Jauretche, A. [1957] 2004. *Los profetas del odio y la yapa*, Obras completas. Vol. 4. Buenos Aires: Editorial Pena Lillo.

Kohl, P., and C. Fawcett, eds. 1995. *Nationalism, politics, and the practice of archaeology*. Cambridge: Cambridge University Press.

Lander, E., ed. 2003. *La colonialidad del saber: Eurocentrismo y ciencias sociales. Perspectivas latinoamericanas*. Buenos Aires: CLACSO.

Lumbreras, L. 1974. *La arqueología como ciencia social*. La Habana: Casa de las Américas ed.

Maldonado Torres, N. 2007. Sobre la colonialidad del ser: Contribuciones al desarrollo de un concepto. In *El giro decolonial. Reflexiones para una diversidad epistémica más allá del capitalismo global*, ed. S. Castro Gómez and R. Grosfoguel, 127–167. Bogotá: Siglo del Hombre Editores, Universidad Central, Instituto de Estudios Sociales Contemporáneos y Pontificia Universidad Javeriana, Instituto Pensar.

McGuire, R., M. O'Donovan, and L.A. Wurst. 2005. Probing praxis in archaeology: The last eighty years. *Rethinking Marxism* 17: 355–372.

McNiven, I., and L. Russell. 2005. *Appropriated pasts. Indigenous peoples and the colonial culture of archaeology*. Oxford: Rowman and Littlefield Publishers, Inc.

Oyuedal-Caycedo, A., A. Anaya, C. Elerea, and L. Valdez. 1997. Social archaeology in Latin America? Comments to T.C. Patterson. *American Antiquity* 62 (2): 365–374.

Politis, G. 1995. The socio-politics of the development of archaeology in Hispanic South America. In *Theory in archaeology: A world perspective*, ed. P. Ucko, 197–235. London: Routledge.

Politis, G., and R. Curtoni. 2011. Archaeology and politics in Argentina during the last 50 years. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 495–525. New York: Springer Science and Business Media.

Quijano, A. 2003. Colonialidad del poder, eurocentrismo y América Latina. In *La colonialidad del saber: Eurocentrismo y ciencias sociales. Perspectivas latinoamericanas*, ed. E. Lander, 201–246. Buenos Aires: CLACSO.

Restrepo, E. 2007. Antropología y colonialidad. In *El giro decolonial. Reflexiones para una diversidad epistémica más allá del capitalismo global*, ed. S. Castro Gómez and R. Grosfoguel, 289–304. Bogotá: Siglo del Hombre Editores, Universidad Central, Instituto de Estudios Sociales Contemporáneos y Pontificia Universidad Javeriana, Instituto Pensar.

Santos, B. 2006. *Renovar la teoría crítica y reinventar la emancipación social (encuentros en Buenos Aires)*. Buenos Aires: CLACSO.

Shanks, M., and C. Tilley. 1987. *Social theory and archaeology*. Cambridge: Polity Press.

Silberman, N. 1995. Promised land and chosen peoples: The politics and poetics of archaeological narrative. In *Nationalism, politics, and the practice of archaeology*, ed. P. Kohl and C. Fawcett, 249–262. Cambridge: Cambridge University Press.

Smith, C., and H.M. Wobst, eds. 2005. *Indigenous archaeologies: Decolonizing theory and practice*. London: Routledge.

Trigger, B. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.

A

Ucko, P. 1987. *Academic freedom and apartheid: The story of the World Archaeological Congress*. London: Duckworth.

Walsh, C. 2007. Interculturalidad y colonialidad del poder. Un pensamiento y posicionamiento 'otro' desde la diferencia colonial. In *El giro decolonial. Reflexiones para una diversidad epistémica más allá del capitalismo global*, ed. S. Castro-Gómez and R. Grosfoguel, 47–62. Bogotá: Iesco-Pensar-Siglo del Hombre Editores.

Archaeology and the Emergence of Fields: Environmental

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Introduction

Environmental archaeology is both an extension of general archaeological principles and an area of study in its own right. Formally acknowledged in the 1950s, it has grown significantly since then – so much so as to give rise to the fear of ever-increasing "silos" in the discipline of archaeology. Environmental archaeology uses proxies to investigate site context and forensically pursues artifacts and ecofacts to elicit data. Rigorous taphonomic investigations are intrinsic to methods used in environmental archaeology.

Definition

Environmental archaeology investigates the site environment at the time of human activity. The principal aim is to determine the link between changing patterns of human activity and local, regional, or even global environmental change. In this way, the environmental record can be used to make causal inferences about changes in the archaeological record.

Humans continually respond to their environment and any change to their familiar surroundings invokes changes in their response. This change is discovered in the archaeological evidence through the use of a number of subdisciplines. For example, paleoethnobotany (study of fossil plant remains), zooarchaeology (the study of vertebrate remains), geomorphology (study of landscape formation), palynology (study of past pollen regimes), geophysics (study of dynamic landscapes), landscape archaeology (the cultural landscape of the site), human biology (human remains), and human ecology (living in the landscape) are some of the subdisciplines in environmental archaeology. Each subdiscipline offers a particular analytical methodology to investigate the past environment and its record over time. Change is scalar and can be anywhere from micro to macro. Smaller changes are generally harder to recognize in the archaeological record. Through the use of subdisciplines, a greater level of sensitivity can be applied, thus increasing the chance of successfully recognizing local, small-scale change. Identifying change on any level enables inter- and intrasite comparison and comparative archaeological analysis is the core of most archaeological research.

Historical Background

Environmental archaeology has been recognized as a serious component of archaeological investigation since the 1950s. The appointment of Frederich Zeuner as Professor of Environmental Archaeology at the Institute of Archaeology in London in 1952 allowed formal recognition of environmental archaeology as a substantial and significant subdiscipline of archaeology. Initially, the place of the natural sciences in archaeology was almost exclusively through the application of stratigraphy. Stratigraphy emerged through the efforts of geology to provide time lines for fossil finds and in so doing allowed a means of chronology to be applied to human occupation. Stratigraphy was also able to identify catastrophic environmental events such as sudden onset of aridity, floods, or lava flows. Such singular and dramatic, large-scale environmental events were readily recognized and their subsequent impact on

humans could be investigated as an individual focus in archaeological investigations. Matching stratigraphic change to a chronological phase has allowed changes in human response to be recognized and environmental interpretations to emerge. However, the nineteenth century saw archaeological endeavor subsumed to some extent by evolutionary theory and it was not until the early twentieth century that a broadening of the discipline really came about.

A key turning point in the approach to archaeology had already begun with Eric Higgs paleoeconomics and an equivalent impact was delivered by Graham Clarke through his work at Starr Carr. Starr Carr is a Mesolithic site located in Yorkshire, England, and is arguably one of the most significant sites studied in the mid-twentieth century. This site is considered to have truly set environmental archaeology on its path by providing a momentous leap from simply looking at stone tools in isolation to applying other lines of scientific investigation. Indeed, Clarke was able to inter-relate human behavior and their artifacts with the environment. In this way, changes in the artifacts became signatures of changes in human behavior over time. From here on, archaeologists were able to seek the causal effects of changing environments on human behavior over time. It also allowed the reverse to be investigated – human environmental impact causing landscape, ecological, and even meteorological change over time.

Key Issues/Current Debates

Two schools of thought have arisen in environmental archaeology which can be simplified into a regional versus single site approach (Evans 2003). Some archaeologists concentrate on single sites while others adopt a regional approach by investigating a series of sites usually linked chronologically and/or culturally. A region is generally geologically defined such as a valley or mountain range. It is possible to consider sites as a single entity within a broader cultural landscape and both schools of thought offer advantages and disadvantages. Regional approaches allow greater scope for identifying large-scale environmental change and its impact on a region. Regional approaches also enable intersite comparison and broaden the investigation by including, for example, exchange and transport routes. However, the disadvantage can be the lack of intense investigation at any one site, as offered in the single site approach. Perhaps a combination of both is ideal if not always practical.

The rise of environmental archaeology has also been expressed differently on different continents. O'Connor (1998) identifies a key difference existing in the 1980s between the United States of America and Britain. According to O'Connor, Britain was primarily focused on the "organic" content of a site while North Americans were primarily geologically focused. This could be an inevitable outcome considering the marked differences between these two continents in not only dimension, but also in geology, culture, and chronology.

Environmental archaeology does allow a site investigation to be reduced into many fields of enquiry. This fact has caused some concern, as expressed initially by Thomas (1990) and then considered by others (Wilkinson and Stevens 2003) in that environmental archaeologists operate outside of the mainstream of archaeology. Fear lies in the sublimation, or worse elimination, of archaeological aims and methods in the pursuit of identifying environmental change. The fact that environmental archaeology is independent of routine archaeological methods has been viewed as problematic and even threatening. For this reason, it is reliant on the archaeologist to synthesize the many streams of enquiry into a coherent interpretation that acknowledges the discipline for which it is written.

Others feel that the term "environmental archaeology" is redundant and all scientific pursuits relevant to archaeology are either bioarchaeological (zoology and biology) or geoarchaeological (sedimentology and pedology). This allows the archaeologist to maintain a clearer approach; however, if both are selected, then the whole reverts back to environmental archaeology! In the end, archaeology must remain focused on human response to localized change.

Environmental archaeology is investigated via key areas of exploration – geology (earth systems), zoology (animal systems), sedimentology (layering of soils and rocks), biology (ecosystems), botany (plants and floral systems), pedology (origin and change of soils), and taphonomy (site formation processes). These subdivisions fall into one of two key areas of investigation: via the organic or the physical. Bioarchaeology covers the former and geoarchaeology covers the latter.

Archaeological artifacts are composed of raw materials. These raw materials are termed proxies and it these proxies that are available for specific analysis. Proxies are more sensitive as environmental indicators compared to their "whole body" counterparts. A modern Australian kangaroo, for example, is a poor environmental indicator as its geographic distribution is continent wide and it has been on the same continent for many thousands of years. By comparison, pollen is a more sensitive indicator of the local environment. Preferred proxies are those with narrower geographic distributions or habitats and are themselves very sensitive to localized environmental change.

Proxies exist on macro- or microscales. Bioarchaeological macroproxies are mostly floral and faunal remains such as seeds, shells, bones, teeth, and insect carapaces and casings. Geoarchaeological macroproxies include sediments, soils, and rocks. Microscopic bioarchaeological remains include pollen, phytoliths (silica skeletons), diatoms (single celled algae), ostracods (bivalve crustaceans), and foraminifera (singled celled shelled animal). Microscopic geoarchaeology proxies include the chemical elements that make up soil and rocks. Most proxies are "ecofacts" as unlike artifacts, they are not directly attributable to human endeavor such as a wooden or stone implement. Ecofacts are not fashioned or manufactured for human purpose but provide an important opportunity for investigating the paleoenvironment. For example, meal discards such as shells found in Aboriginal middens are ecofacts. Midden shell is used extensively in archaeology to identify environmental change (through spectrum analysis, for example) and cultural change (through radiometric analysis).

Some proxies can be even further reduced into smaller elements and characterized to extract a finer level of information. However, all environmental archaeology effort is constrained and challenged by the degree of preservation operating across a site or region and the method employed. Sampling for microproxies relies on a high degree of structural preservation. Taphonomy investigates site formation processes and offers a means of determining and assessing degrees of site and artifact or ecofact disturbance and preservation. In using proxies, it is critical to be able to identify when a proxy is an unreliable agent due to significant bioturbation or other impact on the site.

Charles (1998), for example, investigated the use of dung-derived plant material in archaeological sites in Northern Iraq. In areas where animal dung is used as a fuel source, dung cakes offer a means of identifying local plants by identifying seeds passed out in the dung. As Charles (1998) points out, critical taphonomic issues are that the plants can be a mix of grazed, crop residue or wild plant fodder sources. Dung is also likely to be sourced from a range of animals and the variable impact of digestion on seeds needs to be understood. A further key point is that dung cakes are burned and only those that partially or completely survive this process are useful for analysis. Some of the dung cakes also contained dung pellets, offering a means of identifying which animals produced the dung. Dung pellets may also contain seeds or pollen. Charles (1998) was able to consider the taphonomic aspects effecting plant remains in dung cakes and then compare the interpretative data from the dung cakes and pellets with ethnographic information on animal husbandry and seasonal cycles of cereal cultivation. Importantly, these two interpretative frameworks were not in unison and Charles (1998) suggests that critical changes within husbandry at these sites can be linked to local environmental change.

By way of another example, Church et al. (2005) have provided results from the first archaeological investigation of Norse settlement on the Faroe Islands. This archaeological investigation makes use of the results of prior

paleoenvironmental investigations to assess the impact of early human economic practices. The archaeology explored reliance on and timing of animal husbandry, cereal production, integration of wild species, and sourcing different fuel supplies. Church et al. (2005) utilized animal and plant remains as vital proxies, integrated against the multiproxy approach employed previously in the paleoenvironmental investigations. By examining the animal bones in the excavations, it was recognized that Norse settlers commenced with a heavy reliance on puffins as a vital food source and the collection of driftwood, peat, and turf as fuel sources. This reliance on both food and fuel that was gathered from the natural environment altered the understanding of the beginnings of human settlement in this region. The eventual shift to the production of crops, husbandry, and managed fuel sources was matched against the environmental data to provide the contextual framework of Norse settlement on the Faroe Islands.

With multiple lines of investigation, the archaeologist is more likely to find at least one proxy from primary (humans bringing in materials), secondary (by-products of the processing), or tertiary (dumped rubbish) agents. Locating proxies also requires the application of purposeful sampling methods and it is here that the environmental archaeologist may seek the expertise of non-archaeological specialists.

Spectral analysis is a field of investigation used across the physical sciences. It offers significant potential for archaeology by identifying the elemental composition of proxies, a process known as "characterization." Characterization allocates the raw material of a proxy a unique signature or "fingerprint." The characterization of raw geological materials such as sedimentary rock (e.g., dolomite, basalt, and flint), sand or hematite or goetite rich clay pigments (e.g., ocher) is a key focus for geochemical investigation. Rock or clay from a quarry will have a different signature or "fingerprint" to rock or clay from another quarry. This uniqueness enables the distribution of objects to be mapped away from their quarry source. In turn, distribution routes of the raw material can be spatially located, thus connecting humans across different cultural and geographic landscapes. Characterizing ocher to its own quarry source is proving both successful and challenging as ocher is found to differ geochemically within as well as between sources (Popelka-Filcoff et al. 2008). Exchanged objects have also benefited such as ground edge axes manufactured from dolomite rock in southeastern Australia. Dolomite was sourced from very few quarries and traded out from those centers. By characterizing the dolomite, exchange routes across southeastern Australia have been established (McBryde 1984).

Trade and exchange routes originally identified through more traditional archaeological methods are now able to be refined by use of highly sensitive analytical instruments that rely on infrared spectroscopy. Finds, such as the 100,000 years old ocher grinding tools from Blombos Cave in South Africa, provide a range of samples capable of providing detailed environmental data. These tools include abalone shell, ocher, bone, and stone which are all significant for geochemical investigation.

Environmental archaeology commenced with an awareness of the value of data gathered directly from the site context. Looking back, the gathering of environmental data was comparatively coarse, relying largely on macroproxies and rarely on microproxies. The introduction of highly sensitive instruments offering a range of spectrum analysis has shifted the balance to microproxies. It has also, as a result of that shift, placed increasing emphasis on ecofacts whereby artifacts and ecofacts can hold similar weight in interpreting the site. Environmental archaeology has fine-tuned its approach in response to the increasing availability of highly sensitive analytical instruments as a valuable methodological tool.

Other preferred proxies are those that are keyed to a single level of water quality – fresh or saline. Proxies that can withstand brackish environments are poorer indicators than those that are associated only with either fresh or saline hydrological regimes. Declining levels of fresh water are often identified in archaeological landscapes as the primary cause of a shift in technology, economy, and even geographic with groups moving elsewhere. In this case, diatoms, foraminifera, or ostracods are sought out in aquatic sediments,

particularly lakes. These proxies are highly sensitive indicators of fresh or saline regimes and have proved successful in detecting varying water quality over long time scales (e.g., Gell et al. 2005).

The investigation of dune-fields is another key focus area for environmental archaeology. The occurrence and abeyance of dune-fields has long preoccupied human groups. Dune-fields are a natural feature but can be mobilized by deforestation. A major trigger for deforestation has resulted globally from humans seeking fuel and also fodder for domestic animals. Numerous settlements over time have been swallowed up by mobile dune-fields and the timing and consequences of this on human activity can be investigated through the characterization and aging of dune-fields (Hesp 2001).

Environmental archaeology through its reliance on proxies also requires a range or reliable datasets and reference materials. Diagnosis of animal and plant remains relies entirely on a comparative reference set. As found by numerous archaeologists, establishing such sets can be extremely problematic as it is also necessary to include as much demographic or seasonal variation as possible. Ideally each animal will be represented by male and female examples of juveniles, subadults, and adults. Such a plea was made by LeFebre (2007) during an investigation of the maritime economy on the coral reefs of the West Indies. Inevitably LeFebre was confronted with numerous fish bones and limited reference material. This is hardly an unusual situation and one that will continue to confront emerging environmental archaeologists. Fish are particularly sensitive environmental indicators. The need to identify to species level is critical if a robust environmental framework is to be established. Fish otoliths (earbones of fish) are an even more sensitive proxy than the fish itself, are species specific, and also offer data on the size and age of fish at death. Otoliths are structurally robust and preserve better than fragile fish bones, offering an almost perfect archaeological proxy. However, establishing adequate banks of otolith reference material requires high resource commitment and a skilled researcher to match archaeologically derived otoliths.

International Perspectives

The pursuit of environmental archaeology in Australia has progressed similarly to other continents after having commenced in a recognizable format since the 1960s. Australian archaeologists at that time were particularly aware of Higg's paleoeconomic models and Clarke's paleoenvironmental approach at Starr Carr. Australian archaeology has also demonstrated a bold approach to integrating science into the discipline. In the 1930s, for example, Norman B. Tindale was collecting raw sediment samples, charcoal, and ocher in the belief that future technology could provide analytical tools for dating and deciphering the elements there in. Over the last 20 years, there has been considerable effort made to find an increasingly diverse array of proxies analyzed by increasingly more sensitive and sophisticated instruments. As a result, proxies become ever smaller and more diverse, offering multiple possibilities for highly sensitive signatures of environmental change. Australia's greatest challenge is the size of its land mass and the relatively few well-described sites and even fewer fully analyzed excavation assemblages. The ratio of open to deep deposit (rockshelter/cave) sites is also significantly in favor of open sites. Preservation of bioarchaeological proxies in particular is poor for open sites, leaving the vast majority of sites reliant on geoarchaeological proxies for determining environmental change. The limitations incurred under such conditions can be alleviated to some extent by a regional approach in the hope that at least some rockshelter/cave sites will be recorded along with the numerous open sites. However, this in turn can be problematic in view of the size of the continent and the scarcity of well-described sites. This can lead to valiant but statistically challenged attempts to identify regional and chronological trends drawn from a few sites spread over vast distances. Aboriginal occupation of Australia is well over 45,000 years and this only compounds the problem of too few well-described sites.

Although Australian archaeology has been unhesitating in its incorporation of scientific principles into the discipline, it too is hampered by

minimal comparative reference sets of proxies and datasets. A hiatus in the 1980s saw numerous small research projects devoted to establishing proxy collections, but the more recent trend away from such core research has created a significant gap in valid reference material. A similar history exists with taphonomic reference material due to the demise of actualistic studies. Understanding growth rates and species diversity is also an under researched area and yet it is vital to making interpretations from elements such as bone and shell. Australia's unique environment with its consequent unique range of environmental agents needs to establish its own comprehensive data set rather than assume that data derived from other continental contexts is comparable. Happily, however, it is precisely Australia's unique situation with such a long era of hunter-gatherer occupation followed by the current and very brief era of colonial and pastoral settlement that offers enormous potential for environmental archaeology. Australia's way of life leads us to automatically look to the natural landscape to explain patterns of human occupation. The contribution from contemporary Aboriginal people has also enabled an inspiring approach in interpreting the relationship between humans and their environment.

A key difference between the Australian continent and other land masses is its hydrology. It is the driest continent on earth but capable of dramatic, short-lived floods and has very slow rates of soil deposition. All of this has great bearing on the preservation of archaeological deposits and proxies which in turn makes environmental archaeology in Australia unique. It also points out the urgency in generating our own data sets from a range of comprehensive biological, geological, and hydrological studies.

Future Directions

O'Connor (1998) and others (e.g., Evans 2003; Wilkinson and Stevens 2003) have pointed out that environmental archaeology is capable of reducing itself into innumerable pockets of research (soil, coins, trees, phytoliths, etc.). Although there is the potential for a "silo" effect as it is often known, it is rare that any one site offers an overwhelming range of proxies suitable for intense analysis. Most sites offer only a few well-preserved proxies. In addition, it is reliant on the archaeological team to ensure that clearly stated archaeological aims are established and the driving and unifying force for the environmental investigations. The strength of environmental archaeology lies in offering a holistic view of the relationship between past ecosystems and changing human response. Data collection and building reference collections needs to be more robust, geographically wider, diverse in species and genus, and longitudinal. There has been a step away from experimental (simulation) archaeology, due to recognized inherent problems of replicating human and/or animal behavior in controlled conditions. Environmental archaeology is only as valid and robust as its datasets and reference material. Fine scale data, such as growth rates (e.g., Langlet et al. 2006) and species identification, is demanded globally. There is also an urgent need for complex and longitudinal taphonomic studies. The vagaries of site preservation have been long accepted but the understanding of factors affecting the preservation of a site and its objects is still poorly understood in most instances. If proxies are to be selected for specialist analysis, archaeology needs to ensure that they are relevant to the site and that they have structural integrity. To make environmental archaeology more rigorous, taphonomic investigations also need to offer more concise identifications of the numerous agents of change operating across a site and identify the implications of this for the use of proxies.

The opposing side of field work is the pressing issue of making archaeological collections sustainable. Archaeological collections are notorious in collecting institutions for their high-end need for space compared to other collections. Spectrum analysis is able to investigate the matrix of any element, thus urging archaeology to retain almost the entire site rather than just the objects and modest samples of excavation sediment. The need for space will escalate exponentially if

collecting institutions allow archaeology to retain bulk samples and increasing amounts of ecofacts. This renewed interest in existing collections is extremely beneficial for research outcomes and for securing existing collections into the future; however, it is hoped that this is not at the cost of housing new collections.

The final challenge for environmental archaeology (as it is for archaeology generally) is to publish results more often and more widely. Too often it is only the environmental results that make it into the public domain rather than a broader and comprehensive contribution to the discipline of archaeology. Field activities such as excavation and surface collection continue to far outweigh the more laborious and in-house task of producing professional reports and peer-reviewed papers. It is vital that archaeologists offer the latter as some recompense for disturbing, or even destroying, cultural heritage sites.

Cross-References

- ▶ Aksum: Environmental Archaeology
- ▶ Biometry in Zooarchaeology
- ▶ Bone Chemistry and Ancient Diet
- ▶ Cultural Ecology in Archaeology
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Submerged Prehistoric Landscapes
- ▶ Urban Landscapes: Environmental Archaeology

References

Charles, M. 1998. Fodder from dung: The recognition and interpretation of dung derived plant material from archaeological sites. *Environmental Archaeology* 1: 111–122.

Church, M.J., S.V. Arge, S. Brewington, T.H. McGovern, J.M. Woolett, S. Perdekaris, I.T. Lawson, G.T. Cook, C. Amundsen, R. Harrison, Y. Krivogorskaya, and E. Dunbar. 2005. Puffins, pigs, cods and barley: Palaeoeconomy at Undir Junkarins fløtti, Sandoy, Faroe Islands. *Environmental Archaeology* 10: 179–197.

Evans, J.G. 2003. *Environmental archaeology and the social order*. London: Routledge.

Gell, P., J. Tibby, J. Fluin, P. Leahy, M. Reid, K. Adamson, S. Bulpin, A. MacGregor, P. Wall Brink, G. Hancock, and B. Walsh. 2005. Accessing liminological change and variability using fossil diatom assemblages, South East Australia. *River Research and Applications* 21: 257–269.

Hesp, P. 2001. The Manawatu Dunefield: Environmental change and human impacts. *NZ Geographer* 57: 33.

Langlet, D., M. Alunno-Bruschia, M. Rafelis, M. Renard, M. Roux, E. Schein, and D. Buestel. 2006. Experimental and natural cathodoluminescence in the shell of Crassostrea gigas from Thau Lagoon (France): Ecological and environmental implications. *Marine Ecology Progress Series* 317: 143–156.

Lefebre, M. 2007. Zooarchaeological analysis of prehistoric vertebrate exploitation at Grand Bay Site, Carriacou, West Indies. *Coral Reefs* 26: 931–944.

McBryde, I. 1984. Kulin greenstone quarries: the social contexts of production and distribution for the Mount William site. *World Archaeology* 16: 267–285.

O'Connor, T.P. 1998. Environmental archaeology: A matter of definition. *Environmental Archaeology* 2: 1–6.

Popelka-Filcoff, R., J. Elizabeth, J. Miksa, J. David-Robertson, M.D. Glascock, and H. Wallace. 2008. Elemental analysis and characterization of ochre sources from southern Arizona. *Journal of Archaeological Science* 35: 752–762.

Thomas, J. 1990. Silent running: The ills of environmental archaeology. *Scottish Archaeological Review* 7: 2–6.

Wilkinson, K., and C. Stevens. 2003. *Environmental archaeology: Approaches, techniques and applications*. London: Tempus.

Further Reading

Branch, N., M. Canti, P. Clark, and C. Turney. 2005. *Environmental archaeology: Theoretical and practical approaches*. London: Hodder Arnold.

Chambers, F.M. 1994. *Climate change and human impact on the landscape: Studies in palaeoecology and environmental archaeology*. London: Chapman and Hall.

Dincauze, D.F. 2000. *Environmental archaeology: Principles and practice*. Cambridge: Cambridge University Press.

Dugmore, A., A. Newton, G. Larsen, and G. Cook. 2000. Tephrochronology, environmental change and the Norse settlement of Iceland. *Environmental Archaeology* 5: 21–34.

Matteson, M. 1960. Reconstruction of prehistoric environments through the analysis of molluscan collections from shell middens. *American Antiquity* 26: 117–120.

Mudie, P.J., A. Rochon, and E. Levac. 2005. Decadel-scale sea ice changes in the Canadian Arctic and their

impacts on humans during the past 4,000 years. *Environmental Archaeology* 10: 113–126.
Reitz, E.J., C.M. Scarry, and S.J. Scudder, eds. 2008. *Case studies in environmental archaeology*. 2nd ed. New York: Springer.

A

Archaeology and the Emergence of Fields: Historical and Classical

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Introduction

In this entry two closely linked archaeological fields are discussed: classical archaeology and historical archaeology. We share Thomas Patterson's (2001) externalist approach to the history of science, considering the discipline not only through changes in ideas and concepts but also as a result of intellectual moves linked to social changes. This theoretical stand pays attention to social and cultural issues affecting scholarly production in general and particularly archaeology.

Historical Background

The relationship between classical and historical archaeology is not a given fact but a chosen way of understanding the archaeology of societies with written records and concerned with Western tradition. It is thus a theoretical stand, informed by a redefinition of the field from the 1990s (Funari et al. 1999). Classical archaeology arose very early, at the beginning of the nineteenth century, as part of the imperial project of Western powers, being military in character, a conservative and male endeavor (Funari 2002). It started as an ancillary to history and classics, mostly as art history illustrating classical references to peoples and places. In epistemological terms, classical archaeology was established as a philological discipline, concerned with cataloguing and typology, and dependent on the mastering of Greek and Latin. First and foremost, a classical archaeologist was a military male with a good command of classical languages and literature as well as an historian. Until last quarter of the twentieth century, the field continued a conservative course, but since then classical archaeology gained a lot of traction from social theory and theoretical discussion in general, even if continuing in line with traditions of the field, such as having a good command of classical languages (Shanks 1996).

Historical archaeology developed in a completely different historical and intellectual context. It started in the United States in the 1960s, as an anthropological field interested in the material culture of Anglo-Americans. Although it departed from a completely different place in comparison to classical archaeology, the American discipline was also reactionary, focusing on the study of the White Protestant Anglo-Saxons (WASP) and praising the founding fathers (Orser 2001).

In the following decade, as a result of substantial social and academic changes in the United States, in the wake of the civil rights, antiwar, and feminist movements, new issues were included in historical archaeology, such as the study of subordinate groups, African-Americans, the Irish, and women. Years later, new concerns from outside the USA led to the inclusion of global issues, and the discipline started to discuss all historical periods with written documents, much beyond the original fifteenth century onwards thrust as was prevalent in the USA (Funari et al. 1999). From the late 1990s, there have been a growing number of people putting together the archaeology of Greece and Rome (classical archaeology) and the archaeology of

other historical periods, including the historical archaeology of the modern period.

Key Issues/Current Debates

Historical Archaeology

Historical archaeology as the study of societies with written records comprises such diverse subjects as ancient Egypt, Greece, and Rome, medieval societies, and modern settlements but also sites in China and Vietnam, thus including all the continents. This broad perspective is now widely accepted, even if historical archaeology is still mostly a term used to refer to late medieval and modern material culture as attests a leading journal in the field, *International Journal of Historical Archaeology*.

Disciplinary boundaries are always a thorny issue (Burke 2006: 13–4), as it concerns not only an epistemological question (what is and what is not within the field) but an administrative one, related to power in academia and society at large, as stressed by Pierre Bourdieu (1988). Any study of the discipline is thus embedded in power relations and politics (Meskell 1998), and our own stand here is to contextualize the field and our own stand, as we are archaeologists from the periphery. We thus reject any essentialist standpoint, as if a specific definition should be correct, for we acknowledge the diversity of the field and different approaches. In this entry we will deal with two different traditions in the field: European and North American historical archaeology.

European and North American Traditions

The epistemological differences between European and North American traditions are rooted in the different historical and academic contexts. Archaeology started in Europe in the nineteenth century as a counterpoint to classical philology and history. Archaeology was the material study of ancient civilizations considered as the intellectual ancestors of the Western powers, Egypt, Greece, Rome, and later on Mesopotamia and Palestine. Different civilizations flourished in those areas in ancient times due to the mastering of writing, a key feature of civilized life. History itself was thus defined by writing, and due to an evolutionary approach, there was a perception that there was ever-growing progress from the most ancient civilizations to the apex of industrial capitalism (Nitecki and Nitecki 1992).

Archaeology was thus historical archaeology, in so far as it dealt with civilizations using writing to store knowledge. Prehistory and prehistoric archaeology developed later to study material remains from much earlier people who lived before writing was invented.

Until the 1930s at least, archaeologists working in Europe were using philological and historical tenets in archaeological interpretations, particularly in historical or protohistorical contexts, such as Flinders Petrie, Gustaf Kossinna, and Gordon Childe. However, the role of writing has been challenged from different quarters, from the early twentieth century. First and foremost, the influx of social theory revealed the relevance of other sources of knowledge and questioned the well-established pivotal role of writing (Burke 2006).

This move affected archaeology by emphasizing identity issues (Kristiansen 2009). Archaeology has moved to pay attention not only to distant civilizations but turned also to more direct national roots, turning to the Anglo-Saxon in Britain, to Germans in Germany, to Vikings in Scandinavia, or to the Celts and Iberians in Spain. It is thus possible to conclude that in the European tradition historical archaeology emerged from a number of epistemological and political issues: the pivotal role of writing and the role of a historical framework in interpretation. In this tradition, historical archaeology studies us, the civilized people, producers of learned culture as expressed in writing, and it is thus linked to nationalist and imperialist contemporary interests and concerns. The conflict of different nation states in Europe led also to interpretive conflicts, such as the different identification and interpretation of Celtic, Germanic, and Slavic remains. Historical archaeology in the European tradition has been rooted in modern identity issues and to national pride and prejudice.

Historical Archaeology in the American Tradition

In the United States, archaeology started in two different ways. First, as in Europe, it was established as the study of civilization. The American Archaeological Institute was set up in 1879, and soon afterwards America was digging in the Old World, as attests the American School at Athens (1880) and the American School in Rome (1895) and in Jerusalem (1899). Classical and oriental archaeology were thus in the same European style and it still is a most active tradition in the USA. It was and in a way still is concerned with studying the Western tradition, rooted in the both the Middle East through Judaism and Christianity and in the Greek and Roman classical heritage.

Prehistoric archaeology though was from the start concerned with the other (Hartog 1998), native inhabitants of the continent, taken as completely foreign to the civilized American cultural milieu. It was thus only too natural that archaeology in this vein was taken as part of the discipline concerned with the other, anthropology. While linguistics studied Indian languages, biological anthropology studied bodies, social anthropology studied living Indians, and archaeology was to explore dead Indians through their remains. The American Anthropological Association was established in 1902.

It is thus clear that the archaeological study of colonial and national sites in the USA developed only lately. It started as the archaeology of historical sites still very much concerned with some national iconic sites. It was only in the 1960s, thanks not least to the influx of Roman archaeology as practiced in Britain, that historical archaeology took root in the country, searching for the equivalent of Romans, that is, the first introducers of writing and civilization to the land: the early Anglo-Saxon settlers of America. The Society for Historical Archaeology was established in 1967 and in 1989 the AIA, the American Schools of Oriental Research, and the Society for Historical Archaeology held the first Joint Archaeological Congress, further strengthening the link of historical archaeology concerned with modern roots and the other archaeological institutions equally in search of American and Western civilizations.

Changes in European and American Historical Archaeology (1970s Onwards)

Since the 1970s, historical archaeology in the USA gained traction and increasingly broadened its scope, as attests the seminal publication of James Deetz (1977). The original focus on WASP material culture shifted gradually to include other groups, such as African-Americans (Orser 1988), and then a plethora of excluded subjects, including women, Chinese, and more. The publication of Eric Wolf's classic in 1982 signaled this trend towards the excluded and beyond the traditional emphasis on written evidence for interpreting material culture. Colonialism has thus also been put at the heart of the discipline (Hicks and Beaudry 2006; Kristiansen 2009).

Historical Archaeology and Capitalism

According to Hicks and Beaudry (2006), Charles E. Orser, and Mark Leone, among other pioneering Marxist historical archaeologists, such as Randall McGuire, managed to define historical archaeology as the study of capitalism and the resulting modernity and globalization. The Annapolis Project (1981) is a clear case of successful interpretation of material evidence as part of the capitalist order of things. The project was also responsible for the study of the subaltern, as with the case of the remains of African slaves, workers, and exploited people.

Orser (1996) produced a most convincing argument for historical archaeology as the study of capitalism, spreading from Europe and uniting the whole globe. Capitalism was not only the economic driving force, but it redefined the whole set of social relations (Leone 1999). Power relations, domination and resistance, and identity processes were among the subjects dealt with through the identification of historical archaeology and the study of capitalism. In recent decades, under the influx of other interpretive frameworks, most notably those criticizing normative schemes, several scholars have refined or even contradicted the overwhelming and

totalizing power of capitalism. Some stressed symbolic issues (Hodder 1995), class conflict (McGuire 2008), and the role of writing (Little 2007; Johnson 2010). However, it should be noted that some of those scholars were not American and this leads us to the role of peripheral outlooks.

Historical Archaeology in Latin America

Archaeology in Latin America started very early as it did in the United States, first as a search for Old World roots in the nineteenth century (Ferreira 2010) and then prehistoric archaeology developed for nationalist purposes in countries such as Mexico and Peru, but also in countries with less impressive prehistoric monuments. This was the case in Argentina with its quest for the earliest human remains worldwide. The study of Iberian settlements though developed late, as this was mostly as a result of the influence of the United States newly established field of historical archaeology. However, while the USA was always a democratic country with a wide variety of social movements, Latin America faced the contradictions of the Cold War (1947–1989), including dictatorships. Historical archaeology developed late and at first as an empirical endeavor, in tune with the times. The waning of authoritarian rule led to a freer and more diversified study of historical archaeology. The inclusion of the subaltern, such as maroons, slaves, and women, led to a growing social commitment of the discipline, culminating in the study of repression and the struggle for freedom (Funari 2001; Funari et al. 2009). Two different theoretical trends developed. Under the influence of the USA, historical archaeology has mostly been interpreted as the study of capitalism after the arrival of the Europeans in the Americas. Others though were keen to explore how the historical experience in Latin American has been also patriarchal, hierarchical, and prone to personal and patronage relations, as such the importation of the concept of historical archaeology as the study of capitalism was not always useful. On the contrary, the specificities of non-capitalist features in Latin America necessitated the study of material culture through different, local lenses (Funari et al. 1999). The diversity of approaches has fostered the interest of people outside to understand it, discussing such theoretical concepts as transculturation, patronage, and métissage among others.

Classical Archaeology

Classical archaeology was only recently affected by theoretical discussions in the discipline. At the conference celebrating the centenary of the Archaeological Institute of America, the leading classical archaeologist Colin Renfrew (1980) pondered the three the most relevant achievements of the institute: the extension of the field of American archaeology in other areas and seasons, including the "ancient world"; the promotion of academic criteria for the discipline through its publications; and the creation of a discussion forum in this institutional space.

Renfrew interpreted classical archaeology as part of the so-called great tradition of the Western canon: the reading of classical literature in the original and a philological approach to the world. We can add that this tradition was grounded on repetition, memorization, and description. The past was always better than the present, as in other traditional cultures stressing past models rather than aiming for innovation, such as is also the case with the traditional Chinese worldview. This led to classical archaeology being from the start mostly descriptive and lacking interest in theoretical issues. It was only through the push of Anglo-Saxon anthropological moves, first new archaeology in the 1960s and 1970s and then post-processual archaeology, from the 1980s, that it reacted in a creative way. Let us turn to the main traditions of classical archaeology.

Traditions of Classical Archaeology

Over the last few decades, classical archaeologists from various parts of the world reacted to the challenge, rethinking their epistemological frames. We will study four main perspectives here: the German, English, Italian, and French. We start with the German, for it is the earliest and in a way the most traditional and probably also the most impervious to social theory issues,

as the term is interpreted in the Anglo-Saxon world.

German Tradition

German classical archaeology predates the country and refers not to Germany but to German-speaking people. This is a key aspect of classics and classical archaeology in the German style: it is a culture area (*Kulturkreis*). Classics played a unique role in German-speaking areas such as Prussia but also elsewhere. It was a romantic way of fostering nationalism and identity in different contexts. The *Gymnasium* (grammar school) was the basket of the intelligentsia. Classical archaeology started as a search for material evidence relating to classical literature in the German-speaking principalities, municipalities, and even empires (such as the Austro-Hungarian), Greece and Italy, geographical concepts in search of a nationality. It is no coincidence that the 21st of April (date of the foundation of ancient Rome) 1829, a number of scholars, artists, and diplomats founded in Rome the *Istituto di Corrispondenza Archeologica*, aiming at studying monuments of ancient art, inscriptions, topography, and beyond. It was transferred to Berlin, in Prussia, in 1832, becoming imperial after the unification of Germany in 1874. Several branches were established and classical excavations spread throughout the Mediterranean.

German classical archaeology followed strict procedures in terms of publications paying attention first and foremost to complete catalogues with the largest possible cross-references. It was also subjected to nationalist and racist trends from society and academia, such as the search for superior Aryans and Indo-Germans: racist interpretations were widespread everywhere as attested to, for example, in books by Vere Gordon Childe, not to mention more imperialist archaeologists such as Mortimer Wheeler, both founders of the Institute of Archaeology, University College London. In recent decades, classical archaeology in German-speaking countries, even if still keeping most of the array of learned descriptions of sites and artifacts, is ever more open to social theory, German style, meaning the consideration of theories relating to religion, to economics, to iconography, and so on. This acceptance of a specialized theoretical discussion is thus usually concerned not with social theory in epistemological terms but with specific interpretive tools considered as useful for understanding specific sets of material culture.

The English Tradition

Classical archaeology started early in Britain, and as with classics in general, it was mostly influenced by German scholarship. It was, however, from the start less obsessed with cross-referencing *ad nauseam* and was open to social theory, as attested to by two of the leading icons of the discipline of archaeology, Gordon Childe and Roger Collinwood. From those early-twentieth-century days dates also the preoccupation with interpreting material culture per se, not as mere parts of a narrative established by ancient literature. This led to a late-twentieth-century emphasis on the interpretation of material culture outside the framework of classical literature (Snodgrass 1987) and expanded the interpretation of periods before the use of writing, such as the Iron Age in several parts of Europe. Later on, issues such as colonialism, imperialism, and nationalism were used to study different classical subjects, such as obscure periods of Greek history (Morris 2000), so much so that for Morris (2000: 3) "archaeology is cultural history or it is nothing." The entangled relationship between past and present and reception and interpretation has also been stressed by such classical archaeologists as Richard Hingley and David Mattingly, using medium range theory, German style, and epistemological discussions about the discipline.

The Italian Tradition

Italian classical archaeology has been similar to the German tradition, since the early-nineteenth-century days. Filippo Coarelli (1994) explored the subject and concluded that historical problems and narratives guided classical archaeology on the one hand and on the other stressed cross-referencing and description. Even Marxist-inspired classical archaeology (e.g., Ranuccio

Bianchi Bandinelli, Mario Torelli, Andrea Carandini, and Daniele Manacorda) upheld both tenets. Today, classical archaeology in Italy has been subjected to social theory via Anglo-Saxon influences, but mostly it is the German style of medium range theory of religion studies, economics, or even law studies which are most relevant.

The French Tradition

Classical archaeology in France was established in the nineteenth century as a reaction to German movements. The French established archaeological schools in the Mediterranean in the wake of the German ones, and the main German tenets were also adopted, but the French style came with a reversion of roles. While the Germans searched for Aryans, the French looked for colonizers and civilizers, as if the ancient Greeks were the only early bearers of civilization standards (*la mission civilisatrice*).

Renewal came from the 1960s due to several reasons, most notably French colonial setbacks. The discipline was also concerned with the importation of field techniques, such as the Wheeler grid. Most relevant has been the recent redefinition of the discipline as historical archaeology, as proposed by Étienne et al. (2000). The use of middle range theories from semiotics, religion studies, economics, and others is now much more common, and anthropological issues are also apparent. Again, this move is close to what happened in German-speaking countries and Italy, while a social theory of wider scope is still usually sidelined.

Future Directions

Historical archaeology and classical archaeology developed in completely autonomous, independent, and even contradictory ways. However, they share some major concerns with the role of writing and literary narratives in shaping the understanding of material culture. They also share issues relating to roots, identity, national, and imperial power, as well as how to deal with the other, opposing civilization and barbarism. In recent decades, several scholars have been stressing the usefulness of a closer relationship between all the archaeologies in general and particularly those studying societies using writing, from the Mayas to Egypt, China, and the contemporary USA (Gosden 2004). Even more related are historical and classical archaeologies, for they share a common classical canon but also the criticism of this canon in recent decades. The cross-fertilization of both fields has been going on for a while and promises to grow in the future for the benefit of an informed archaeological approach to ancient and modern societies.

Cross-References

► Archaeological Theory: Paradigm Shift
► Capitalism: Historical Archaeology
► Classical (Greek) Archaeology
► Historical Archaeology

References

Bourdieu, P. 1988. Homo academicus. Translated by P. Collier. Stanford: Stanford University Press.

Burke, P. 2006. *Variedades de história cultural*. Rio de Janeiro: Civilização brasileira.

Coarelli, F. 1994. L'archéologie classique dans la culture européenne d'aujourd'hui. *Revue Archéologique* 2: 294–302.

Deetz, J. 1977. *In small things forgotten: The archaeology of early American life*. New York: Doubleday.

Étienne, R., C. Müller, and F. Prost. 2000. *Archéologie historique de la Grèce antique*. Paris: Ellipses.

Ferreira, L.M. 2010. *Território primitivo: A Institucionalização da Arqueologia no Brasil (1870–1917)*. Porto Alegre: EDIPUCSRS.

Funari, P.P.A. 2001. Public archaeology from a Latin American perspective. *Public Archaeology* 1 (4): 239–242.

Funari, P.P.A. 2002. Classical archaeology. In *Encyclopedia of historical archaeology*, ed. C.E. Orser Jr., 108–111. London: Routledge.

Funari, P.P.A. 2005. Teoria e Métodos na Arqueologia. *Mneme (Caicó. Online)* 5 (13).

Funari, P.P.A., M. Hall, and S. Jones, eds. 1999. *Historical archaeology, back from the edge*. London: Routledge.

Funari, P.P.A., A. Zarankin, and M. Salerno. 2009. *Memories from darkness*. New York: Springer.

Gosden, C. 2004. *Archaeology and colonialism*. Cambridge: Cambridge University Press.

Hartog, F. 1998. *The mirror of Herodotus*. Berkeley: University of California Press.
Hicks, D., and M.C. Beaudry. 2006. Introduction: The place of historical archaeology. In *The Cambridge companion to historical archaeology*, ed. D. Hicks and M.C. Beaudry, 1–9. Cambridge: Cambridge University Press.
Kristiansen, K. 2009. The discipline of archaeology. In *The Oxford handbook of archaeology*, ed. B. Cunliffe, C. Gosden, and R. Joyce, 3–46. Oxford: Oxford University Press.
Leone, M.P. 1999. Setting some terms for historical archaeologies of capitalism. In *Historical archaeologies of capitalism*, ed. M.P. Leone and P.B. Potter Jr. New York: Kluwer Academic and Plenun Publishers.
Lightfoot, K.G. 2006. Mission, gold, furs, and Manifest Destiny. In *Historical archaeology*, ed. M. Hall and S.W. Silliman, 272–292. Oxford: Blackwell Publishing.
Little, B. 2007. *Historical archaeology: Why the past matters*. Walnut Creek: Left Coast Press.
Meskell, L. 1998. Introduction: Archaeology matters. In *Archaeology under fire*, ed. L. Meskell, 1–12. London: Routledge Press.
Morris, I. 2000. *Archaeology as cultural history: Words and things in Iron Age Greece*. Oxford: Blackwell.
Nitecki, M., and D. Nitecki. 1992. *History and evolution*. New York: State University of New York Press.
Orser, C.E. 1988. *The material basis of the Postbellum Tenant Plantation: Historical archaeology in the South Carolina Piedmont*. Athens: University of Georgia Press.
Orser, C.E. 2001. *A historical archaeology of the modern world*. New York: Plenum Press.
Patterson, T. 2001. *A social history of anthropology in the United States*. New York/Oxford: International Publishers.
Renfrew, C. 1980. The great tradition versus great divide: Archaeology as anthropology? *American Journal of Archaeology* 84: 287–298.
Shanks, M. 1996. *Classical archaeology of Greece: Experiences of the discipline*. London: Routledge.
Snodgrass, A.M. 1987. *An archaeology of Greece: The present state and future scope of a discipline*. Berkeley: University of California Press.
Wolf, E. 1982. *Europe and the people without history*. Los Angeles: University of California Press.

Further Reading

Alcook, S.E., and R. Osborne, eds. 2007. *Classical archaeology*. Oxford: Blackwell Publishing.
Cunliffe, B., C. Gosden, and R. Joyce, eds. 2009. *The Oxford handbook of archaeology*. Oxford: London.
Hicks, D., and M.C. Beaudry, eds. 2006. *The Cambridge companion to historical archaeology*. Cambridge: Cambridge University Press.
Whitley, J. 2001. *The archaeology of ancient Greece*. Cambridge: Cambridge University Press.

Archaeology and the Emergence of Fields: Maritime

A

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Introduction and Definition

Maritime archaeology in its most basic form is the study of material culture related to human interaction with the sea. It involves the study of ships and shipwrecks, maritime infrastructure, maritime exploitation, maritime identities and landscapes, seascapes, and other types of heritage, tangible or intangible, associated with the sea. Related to maritime archaeology is the study of nautical archaeology which primarily focuses on "the ship" and all technical and social aspects of the ship, whether it is on land, underwater, or extant in a museum. Also related to maritime archaeology is underwater archaeology, which is concerned with the archaeology of sites located underwater, regardless of their connection to the sea; it includes not only shipwreck sites but also aircraft wrecks, sunken cities, submerged indigenous habitation sites and refuse sites. Thus, maritime archaeology differs from underwater archaeology in that its focus can be on wet or dry sites including shipwrecks, ship burials, shipwrecks buried in reclaimed land, maritime infrastructure sites (such as jetties and lighthouses), or shipwreck survivor camps. To further complicate matters, there are more related and overlapping study areas including lacustrine archaeology (archaeology in and of lakes), riverine archaeology (archaeology in and of rivers), marine archaeology (archaeology that occurs in the marine environment), and the list goes on. The development of maritime archaeology is intimately connected with each of these associated study areas through overlapping subjects, methodologies, and theoretical developments and can be difficult to separate when

reviewing its history. Nevertheless, this entry will only cover the development of maritime archaeology as a subdiscipline, and as such, sites and studies not related to human use of the sea will be omitted.

Historical Background

The emergence of maritime, underwater, or nautical archaeology as a field or subdiscipline within archaeology has been primarily linked to the works of George Bass in the Mediterranean in the late 1960s (Bass 1967). His research project was the first underwater excavation of a shipwreck directed by a diving archaeologist. Nevertheless, as stated in the above definition, maritime archaeology is not strictly conducted on sites underwater. Lesser known, or less associated, are the earlier works and publications of a number of individuals and projects that set the pace for conducting maritime archaeology, albeit on land. Beginning in the late nineteenth and twentieth centuries, discoveries of watercraft in tombs and on dry land were investigated by antiquarians and archaeologists alike. Examples of such work include Jean-Jacques de Morgan's (1895) discovery and excavation of Egyptian boats in tombs at Dahshur and Basil Brown and Charles Phillips' team excavation of the Anglo-Saxon ship burial at Sutton Hoo in 1938–1939. While these research projects were not conducted underwater, the site types and subject matter can be considered well within the purview of maritime archaeological studies. The individuals who undertook this early work held university degrees and were trained in archaeological excavation techniques. Further, the archaeological questions asked were consistent with contemporary thought and revolved around the assembly of culture types and culture-histories.

Underwater efforts to recover objects and investigate sites by amateur archaeologists and salvors were also attempted through breath-hold diving, surface-supplied air sources, and diving bells. While these projects are interesting from a historical diving perspective, they contributed little to the development of the discipline other than fine-tuning some of the underwater exploration and recovery techniques which eventually would be used by archaeologists. In contrast, a project that is considered to be the earliest and first state-sponsored underwater archaeological survey took place in Greece at the naval warfare site of the Battle of Salamis by the Archaeological Society of Athens in 1885 (Lolos 2003; Catsambis 2006). Although trained archaeologists directed divers from the surface, this project represents perhaps the very first maritime archaeological survey underwater. The field reports of this survey were only recently found and translated, which leads one to believe that there could be several more of these surprising examples waiting to be discovered.

The development in the 1940s of the Aqua-Lung, a self-contained underwater breathing apparatus (SCUBA), allowed humans to reliably explore the underwater environment. SCUBA provided a vehicle for explorers, antiquarians, and, indeed, later archaeologists to begin freely examining material culture located underwater. For example, in the 1950s and 1960s, French and Italian SCUBA divers worked under the direction of archaeologists on wrecks at Grande Congloué, Cape Dramont, Île du Levant, Mahdia, Spargi, and Albenga (Atti del II Congresso 1961; du Plat Taylor 1965; Roghi 1965; Bass 2011). These surveys may not have included full-scale archaeological excavation or even diving archaeologists, but they certainly fulfill the criteria considered appropriate for conducting modern "deepwater archaeology" projects in which archaeologists on the surface direct activities underwater.

Arguably, one of the largest recovery projects to take place in the history of maritime archaeology was the raising of the Swedish warship *Vasa* in 1959 (Cederlund and Hocker 2006). This project set the pace for large-scale excavation and recovery projects, and for the next few decades, a number of large shipwrecks were recovered such as the warship *Mary Rose* in England and Dutch East India Company vessel *Batavia* in Australia. Alongside these projects being conducted underwater, equally significant

maritime archaeological work was being undertaken in Scandinavia. By employing a cofferdam to allow submerged shipwrecks to be excavated as terrestrial sites, the Skudelev project involved the excavation of six Viking ships by Ole Crumlin-Pedersen and Olaf Olsen in 1962 (Crumlin-Pedersen and Olsen 1978).

What began with the untethered exploration of the underwater environment using SCUBA quickly developed into full-scale treasure hunting. Sites around the world were being destroyed in search of elusive treasure contained within shipwrecks. By the 1960s, legislation to protect underwater cultural heritage was being developed to prevent looters from destroying early shipwrecks. In fact, the Western Australian Government passed one of the earliest pieces of heritage legislation in the world in 1964 (Nash 2007: 3), which would ultimately become the model for Australia's *Historic Shipwrecks Act 1976*. By the late 1960s and early 1970s, several large-scale maritime archaeological projects were under way including excavations of the seventeenth- and eighteenth-century Dutch East Indiamen wrecked off of Western Australia, the fourth-century BCE Kyrenia ship in the Mediterranean, sixteenth-century Basque whaleships in Red Bay (Canada), and Spanish Armada wrecks in the USA and Caribbean. However, by this time, fewer were being directed from the surface as more archaeologists were conducting their own research on the seabed. John Goggin (1959–1960: 350), considered a pioneer in underwater archaeology for his work in freshwater springs in Florida (USA), was never more true when he stated, "it is far easier to teach diving to an archaeologist than archaeology to a diver!"

Another major step forward was the 1972 introduction of the *Journal of Nautical Archaeology and Underwater Exploration*, the first journal specifically devoted to the subdiscipline. Soon after, academic departments at universities in various parts of the world established programs dedicated to maritime archaeology; some of the early examples include those at Texas A&M University, University of Haifa, St. Andrews University, and East Carolina University. This was the beginning of what would become a proliferation of specialty degrees and would produce most of the first round of heritage managers and academics focusing on the subject.

Once maritime archaeology was a named degree or specialization within university archaeology and anthropology departments, it earned the status of a subdiscipline. While some speculate that this was a potential negative impact in the development of the discipline as a whole and that maritime archaeology should be taught alongside and in conjunction with the broader field of archaeology (Flatman 2008), others reveled in its acceptance and even benefitted from the newly developed specialty programs. As of 2011, there are no fewer than 15 academic departments around the world that teach maritime archaeology, and in nearly every country that borders on water, there is a maritime archaeologist working. Indicators of the success of the subdiscipline include the 2006 introduction of a second journal dedicated to the field of maritime archaeology (*Journal of Maritime Archaeology*) and a steady increase in the number of jobs in maritime archaeology.

Today, the field is so broadly focused and diverse, if it were not for the definition of "human and sea," it would be difficult to describe it adequately. No longer is it necessary to be a diver to specialize in maritime archaeology because there are an equal amount of maritime-related sites being investigated on land as there are underwater. From lighthouses to shipwreck survivor camps, maritime archaeology is just as at home on the dry edges of the sea as it once was underwater.

Key Issues/Current Debates

Perhaps one of the most pervasive issues within the field of maritime archaeology is the need to protect underwater cultural heritage from those who wish to profit by selling, bartering, or trading associated material culture. Treasure hunting and looting of all forms is an offense maritime archaeology has battled from its inception. Even with the 2009 ratification of the UNESCO Convention on the Protection of the Underwater Cultural

Heritage, the security of underwater heritage remains unstable in many countries around the world, and permits are issued regularly for treasure hunting endeavors. Public education and pressure to change laws at the State party and international levels are two areas where maritime archaeologists may contribute to correcting this problem. As Bass has so rightly pointed out, "[t]he distinction between archaeology and treasure hunting is misunderstood by far too large a part of the population" (Bass 2011: 14). Thus, education and engagement of the general public in maritime archaeology is critical. The media, from magazines to newspapers and television, is a powerful tool that has yet to be capitalized fully by maritime archaeologists and is a substantial key to educating the public about the difference. Treasure hunting is not profitable based on its "finds"; rather, it profits from selling a dream to unsuspecting investors. If there are no investors, there is no treasure hunting. Further, pressure to enact or change laws from individual and collective groups of maritime archaeologists, such as the Advisory Council on Underwater Archaeology and the Australasian Institute for Maritime Archaeology, can also provide protection to underwater cultural heritage. Through writing letters, lobbying governments, and providing technical assistance to developing countries that are often preyed upon by treasure hunting ventures, such groups are winning small battles. The enforcement of the UNESCO Convention on the Protection of the Underwater Cultural Heritage will be a huge leap forward in terms of managing and protecting underwater cultural heritage, but there is still much work to do on the local front.

Another related and key issue within the field is that of managing underwater cultural heritage. As more threats arise and budgets are restricted, maritime heritage managers are forced to find new ways of managing and protecting sites through survey (to locate sites), investigation (to identify sites and threats to them), and long-term monitoring (to ensure they are protected and to record changes over time). Over the last 10 years, large-scale excavation and recovery projects have waned. These projects are being replaced by in situ surveys, investigations, and monitoring, which involve leaving sites as they are rather than disturbing or recovering material culture. The current buzz word in the field is in situ preservation and conservation, and while most authors have pointed out that UNESCO defines in situ as a "preferred" method of management rather than the "only" method, it still weighs heavy on the minds of maritime archaeologists. Part of the issue with the concept in situ revolves around a lack of definition and principles for conducting in situ conservation and preservation. Because the field of in situ research is largely driven by conservation scientists and the results disseminated in conservation journals and conferences, there appears to be a lack of communication between the researchers (conservation scientists) and end users (maritime archaeologists and managers). A study conducted in 2009 of practitioners revealed that many were unaware of what constitutes in situ preservation and conservation techniques and were therefore unwilling to consider in situ as part of their management practices (Ortmann et al. 2010). Thus, an area of research and discussion for the future of maritime archaeology will undoubtedly be focused in the coming years on in situ methods and their use. Closer collaboration, scientific investigation, and on-site application, as well as wider dissemination of results, may contribute to a better understanding of in situ practices.

The management and investigation of archaeological sites beyond the reach of divers, such as deepwater or remote shipwrecks, is an area of growing interest. Advances in technology are facilitating access for not only the archaeologist but also the novice and in some cases the treasure hunter. Deepwater sites often fall under the jurisdiction of State bodies, and practitioners are charged with managing sites that they cannot in fact view or visit. Additionally, deepwater wrecks require sophisticated and expensive equipment, large platforms for operating that equipment, and in some cases lengthy cruises to access the sites. Finally, because these sites are further out to sea, they are not protected under State legislation. Thus, they are unprotected from disturbance and

treasure hunting. So how are these issues negotiated? The answers to accessing and investigating these sites may lie in the cooperation with large organizations, such as marine institutes that conduct geophysical, biological, or oceanographic research. However, partnering with groups who possess the technology and ability to access such sites will only allow the archaeologist to arrive at the site; the next issue is how to conduct archaeological investigations on deepwater sites. The same concern that others raised about archaeologists conducting archaeology from the surface in the 1960s, again, rears its head. Can proper archaeological work be conducted on sites that can only be accessed remotely? And perhaps more importantly, what types of research questions can be adequately addressed? Can questions that count be asked of sites where little ability exists other than to collect samples for identification of site type, function, and possibly cultural affiliation? Are basic archaeological site plans reconstructed though remote photography and video contributing to our knowledge about the people and culture behind the sites? Answers to these questions are currently being debated among academics and practitioners (Adams 2007). There are no easy answers to these questions; however, the issue exists and is not one that will disappear or even decrease in complexity.

A final key issue that has rippled beneath the surface and is occasionally communicated relates to interaction of indigenous peoples with the sea and the investigation of archaeological sites closely associated with these activities. Until relatively recent times, maritime archaeology has primarily focused on classical and historic period sites. Ships, lighthouses, boatyards, jetties, and harbors were typically constructed by historic culture groups. Thus, maritime archaeologists have given relatively little attention to sites and regions of the world where an indigenous population had/has an intimate connection with and use of the sea. These sites are overlooked primarily because they fall within the realm of terrestrial archaeologists who focus on indigenous sites. However, maritime archaeologists can contribute greatly to this area; the key lies in collaboration. Maritime archaeologists are trained to look at the specific "maritimity" of a site or object (Tuddenham 2010). When viewing coastal and inland sites, our first questions involve the location of the nearest port or how far inland a river is navigable. Answers to questions about access to goods and trade networks often involve waterborne travel rather than overland travel. Maritime archaeologists understand seasonality, maritime subsistence, and boat-building technologies. Some researchers have begun to collaborate on projects related to indigenous knowledge and use of the marine environment and the importance of watercraft in migration, but the work is slow to develop. This area of research could contribute not only information about past and present use of the sea but also indigenous claims of tenure and sea rights. Maritime archaeologists and their research have the potential to contribute to relevant modern social issues in the areas of indigenous maritime tenure in the coming years.

Future Directions

From its inception, an overwhelming obsession with shipwrecks, method, and technology has left the subdiscipline of maritime archaeology unbalanced. Just as developing methods for finding and recording shipwreck sites underwater were a necessity for the field to grow, so was the need to align research with current intellectual and theoretical discourse within the broader field of archaeology and anthropology. Unfortunately, the field's practitioners failed to accomplish this second phase, and a period dominated by historical particularism characterizes most of the early work. However, all is not lost; in recent years, the battle to overcome the historical-particularist approach is well under way. A perusal through journal articles, books, and websites demonstrates that maritime archaeologists are actively engaging in greater intellectual and theoretical debates with the disciplines of archaeology and anthropology. The investigation of more terrestrial maritime sites including landscape and seascape studies

and shipboard material culture are areas in which theoretical discussions are occurring.

Another future direction that is vital to the field of maritime archaeology is that of public engagement. This has never been more important than now when the world's economy is flailing and budget cuts are severely impacting State bodies, granting organizations, and education funding. The public write letters to those who make the laws, vote for the laws, and, ultimately, are for whom maritime archaeology is practiced. Engaging people in all levels through consultation, volunteerism, and eventually to the final product of publication and dissemination of results is an area in which maritime archaeology can expand. And it appears to be making progress; with successful organizations and programs such as the Nautical Archaeology Society in the UK, the Florida Public Archaeology Network in the USA, and the Museum of Underwater Archaeology online, the public is being brought into the fold. There remains, however, room for improvement such as involving and interpreting sites for the non-diver and producing stimulating media products to rival exploration and treasure hunting ventures. In an age of video games, simulation technology, and mobile applications, maritime archaeology offers a veritable and endless source of public entertainment and education.

Cross-References

- ▶ Australasian Institute for Maritime Archaeology Inc. (AIMA)
- ▶ Bass, George Fletcher
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Goggin, John M.
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Maritime Archaeological Organizations
- ▶ Underwater Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

Adams, J. 2007. Alchemy or science? Compromising archaeology in the deep sea. *International Journal of Nautical Archaeology* 2: 48–56.

Atti del II Congresso Internazionale di Archaeologia Sottomarina, Albenga 1958. 1961. Bordighera: Instituto Internazionale di Studi Luguri.

Bass, G.F. 1967. Cape Gelidonya: A Bronze Age shipwreck. *Transactions of the American Philosophical Society* 57: 8.

Bass, G.F. 2011. The development of maritime archaeology. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D. Hamilton, 3–22. Oxford: Oxford University Press.

Catsambis, A. 2006. Before Antikythera: The first underwater archaeological survey in Greece. *International Journal of Nautical Archaeology* 35: 104–107.

Cederlund, C.O., and F. Hocker. 2006. *Vasa I. The archaeology of a Swedish warship of 1628*. Sweden: National Maritime Museums of Sweden.

Crumlin-Pedersen, O., and O. Olsen. 1978. Five Viking ships from the Roskilde Fjord. Roskilde.

de Morgan, J. 1895. *Fouilles ì Dahchour: Mars-Juin 1894*. Vienna: Adolphe Holzhausen.

du Plat Taylor, J. 1965. *Marine archaeology*. London: Hutchinson.

Flatman, J. 2008. What 'maritime archaeology' are we teaching? A comment on 'context' and 'setting'. *Journal of Maritime Archaeology* 3: 121–122.

Goggin, J.M. 1959-1960. Underwater archaeology: Its nature and limitations. *American Antiquity* 25: 348–354.

Lolos, Y.G. 2003. Christos Tsountas in the Straits of Salamis, 1884: The first underwater archaeological exploration in modern times. *ENALIA. The Journal of the Hellenic Institute of Marine Archaeology* VII: 13–27.

Nash, M. 2007. *Shipwreck archaeology in Australia*. Crawley: University of Western Australia Press.

Ortmann, N., J. McKinnon, and V. Richards. 2010. In situ preservation and storage: Practitioner attitudes and behaviors. *Bulletin of the Australasian Institute for Maritime Archaeology* 34: 27–44.

Roghi, G. 1965. Spargi. In *Marine archaeology*, ed. J. du Plat Taylor, 103–118. London: Hutchinson.

Tuddenham, D.B. 2010. Maritime cultural landscapes, maritimity and quasi objects. *Journal of Maritime Archaeology* 5: 5–16.

Further Reading

Cederlund, C.O. 2002. Archaeology in the marine environment in Sweden. In *The international handbook of underwater archaeology*, ed. C.V. Ruppe and J.F. Barstad, 333–346. New York: Kluwer Academic.

Westerdahl, C. 1992. The maritime cultural landscape. *The International Journal of Nautical Archaeology* 21: 5–14.

Archaeology and the Future

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The Future as a Research Subject in Archaeology

The future has seldom been an object of archaeological study even though there are some very profound and deep-reaching links between past, present, and future (Holtorf and Högberg 2015; Högberg et al. 2017). In particular, archaeologists and others dealing with the archaeological past are negotiating the future in two ways. On the one hand, they are studying long-term change. Patrick V. Kirch, for example, suggested once that an archaeology of prehistoric global change investigating the effects of uncontrolled human population growth on environmental degradation ultimately leading to sociopolitical crises can make a contribution "to the future of this planet" (Kirch 2004: 23). The historian Daniel Lord Smail used a long-term perspective of prehistoric human evolution to discuss the deep history of the human brain and its past, present, and future in order to discern what is fundamentally human today and how this understanding might be constituted in the future (Smail 2008). In environmental studies, models of prehistoric climate change and long-term human impact on the environment have been used to discuss past climate variation and possible future trends (Rockström et al. 2009). And recently, by investigating economic history drawing on archaeobotanical and ethnoarchaeological data, Amanda Logen discussed how food insecurity in Ghana emerged as late as the nineteenth century in connection with the introduction of market economies and colonial rule, revealing the future potential in certain areas "to maintain a high level of food security even during severe, prolonged drought" (Logen 2016: 11). Some archaeologists, such as Ian Morris (2010), have even been making explicit attempts at forecasting future developments based on historical analysis and reasoning.

On the other hand, archaeologists are managing human legacies as heritage. Archaeologists work to preserve places, environments, and associated values and knowledge for future generations. But although it is not far-fetched to claim that the future will differ from what we are used to in the present, in managing archaeological heritage, most assumptions about the future do not build on an understanding of how the future will be different from today. Instead, planning processes imply that key aspects of heritage and contemporary society will not change greatly in the future. This tendency to assume a likeness of present and future corresponds to the way people, as individuals, "expect to change little in the future, despite the fact that they have changed a lot in the past" which in turn "bedevils their decision-making" (Quoidbach et al. 2013: 96).

A recent study (Högberg et al. 2017) investigated how professionals within the heritage sector conceptualize the future in their daily work. Based on interviews with professionals working in the heritage sector in Sweden, England, and internationally, it emerged that very few in the heritage sector have professionally thought deeply about the future. A few heritage professionals do not see a need to consider a longer future in their work at all. Most heritage professionals see the need but cannot easily express what they think about the future they work for other than that it will be the time of our children and grandchildren. Hence, there is a paradox in large parts of the heritage sector. Professional heritage practice focuses on the future as a fundamental premise of the work, as acknowledged in many heritage policy documents (Högberg et al. 2017). Yet this future remains implicit in daily heritage practice which operates in a continuing present. It is expected that future generations will look back gratefully at the work done by the heritage sector today.

Based on these results, it is easy to agree with Spennemann (2007a, b) that the future is often little more than a popular "catch phrase" in relation to heritage, while present practice remains firmly focused on the past and the present. But

we cannot be certain that archaeological heritage will always be valued as a source of historic information or as a symbol of a collective past nor that the various heritage objects and landscapes we preserve will be appreciated by future generations for the stories they can tell about the past. We cannot know for certain how or if future generations will perceive, use, and receive benefits from heritage. Many, if not all, heritage objects have been reinterpreted regularly during the time of their existence. Indeed, the very notion of a heritage worth preserving in systematic fashion for the benefit of future generations has only existed for a few 100 years. Like archaeology, contemporary conservation ethics do not stand outside history but are firmly situated within it (Holtorf 2015).

From Historical Consciousness to Future Consciousness

For the reasons given, the future is an important research subject for archaeology. But archaeology is also itself firmly embedded in time. The discipline as such is part of history; it emerged about two centuries ago in a specific social and cultural context (Thomas 2004) and is in a constant process of change and development (Mizoguchi 2015; Pikirayi 2015). Archaeology is a particular way of creating information, knowledge, and meaning of specific objects and spaces in the present, and it will not exist forever. We cannot assume that current archaeological ways of making sense of the past will persist. By the same token, the notion of (archaeological) heritage is undoubtedly part of our history and, thus, part of the future human heritage in itself (Holtorf 2012).

It is by understanding change over time and in particular by understanding changing perceptions of past and future that archaeology can contribute to contemporary decision-making processes. In particular, the way humans make sense of pasts and futures in the present is important for how they situate themselves in the present. Arguably, the ability to understand the present as a consequence of change over time and the way we plan for the future separate us from other species. These issues have often been discussed in relation to the notion of historical consciousness (e.g., Rüsen 2001).

The concept of historical consciousness refers to the meaningful relations between past, present, and future that govern – and are established and reproduced – in uses of the past. Historical consciousness is thus a concept that refers to the underlying thought structures that generate meaning when a particular historical perspective is actualized and given significance in the present, implying certain consequences for the future (Rüsen 2001). Similar thought structures can also be actualized and given significance by particular perspectives on the future, with certain consequences for how we see the past. Therefore, historical consciousness could equally well be called future consciousness. The concept of future consciousness is in line with so-called critical future studies which are framed by a constructivist and self-reflexive approach (Miller 2011; Poli 2015). Just as it is possible to analyze historical consciousness from the way it manifests itself in uses of the past, future consciousness can be analyzed from the way it manifests itself in perceptions and uses of the future.

A graphic (Fig. 1) illustrates how processing of the past and the future in the present can be understood. Society exists in the present, in its *Now*. Assumptions about different futures create various perceptions of the future in the present. The *preferred future* is what different stakeholders would like to happen and therefore varies between individuals and communities. The *probable futures* are what will likely happen. Since the probable futures are not one but many futures, it is likely that several stakeholders can agree on them. *Plausible* and *possible futures* are what could happen, respectively, of what might happen. These are not specific futures but rather theoretical possibilities deriving from certain detectable trends and movements in the present.

In analogy with the future, various interpretations about the past create different perceptions of the past in the present. Within the wide and almost infinite spectra of things which have taken place in the long-term history of *possible pasts*, i.e., what today can be interpreted out of all events having

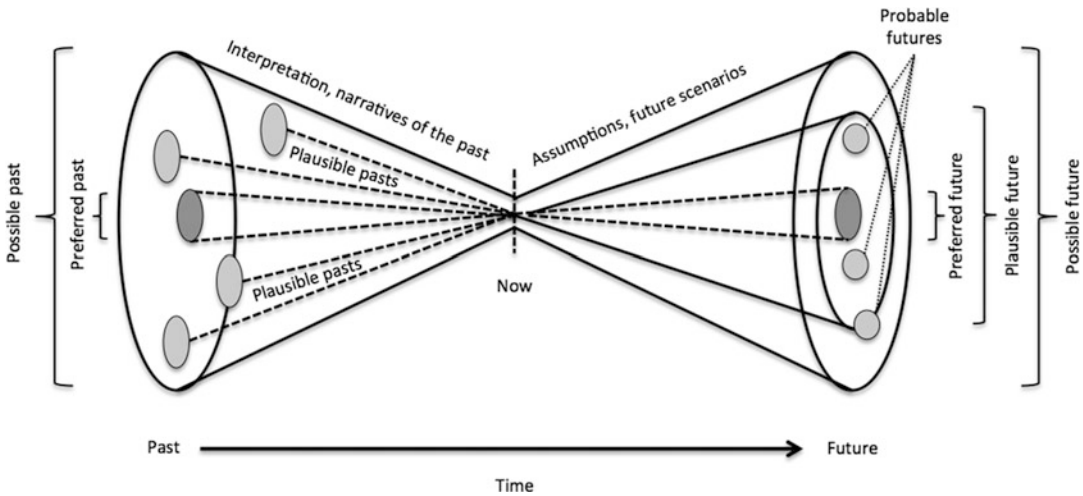

Archaeology and the Future, Fig. 1 Future consciousness: schematic illustration of how interpretations of the past are transformed through the needle's eye of *Now* into assumptions of the future. Crucially, this is a "rolling now" constantly moving along the axis of time as the future becomes present and the present becomes past. Figure by Anders Högberg, inspired by graphics of Stephan Magnus (https://adventurefuture.wordpress.com/2012/04/16/six-rules-of-forecasting/) and Anthony Dunne and Fiona Raby (2013: 5)

taken place as well as what we imagine having taken place over time, a selection is made of *plausible pasts* and a *preferred past*.

These pasts all have to be processed in our present, the *Now* in Fig. 1. As sand in an hourglass has to flow from one container to another through a narrow passage, time is constantly flowing through an ever-changing present. By passing through that narrow passage, the needle's eye comprising our present, the past is transformed into various assumptions about the future, i.e., future scenarios.

As we move the needle's eye of the *Now* along the timeline in Fig. 1 back into the past or forward into the future, the shape of the figure will always stay the same. Every past and future present has specific limits and possibilities on how people understand their specific *Now* in relation to their interpretations of the past and their assumptions about the future.

Future societies will have their own perceptions of past and future resulting in their own preferences in a future *Now* and will, therefore, need to make their own decisions. We need to recognize that future societies will have their own views not only of the past but also of the future.

Reinterpretation and indeed change of information, knowledge, and meaning over time is not a problem to be eliminated but a basic condition of human development over time which we need to understand and take on board. We have to allow for future *Nows* to create their own knowledge to act upon and for future human beings to act as creative and innovative creatures able to generate information, knowledge, and meaning that we cannot even imagine today.

These issues have been explored in relation to specific cases. In 2007, visitors to the Swedish History Museum in Stockholm were invited to select contemporary objects as "future memories." Together with attached labels containing stories about their perceived significance in the present, the objects were first formally recorded and registered in the museum's database and then permanently "incavated" inside the museum courtyard in holes that had previously been excavated by other visitors. The intention was to inspire reflections in the present on objects from the past and in the future, how we remember previous times, and how future generations will remember us. But the project was also meant as a provocation for the museum and heritage sector to reflect on their current practices, not least

concerning the benefits they will offer to people in the future (Wahlgren and Svanberg 2008).

In relation to "nuclear semiotics," i.e., the challenge of long-term communication about final repositories of nuclear waste over thousands of years, a recent project concluded that it is by understanding changing perceptions of past and future, and indeed of change over time more generally, that archaeology allows us to make better decisions concerning the sustainable preservation of information, knowledge, and meaning in a long-term perspective (Holtorf and Högberg 2014a, b, c). Here archaeology contributed to nuclear semiotics by showing that we cannot be certain that nuclear waste will always be seen predominantly as hazardous waste posing a threat to humanity nor that its radioactivity or other physical properties will always be its most significant property. For example, results from research on life histories of north European megaliths show that meaning and uses of these have changed significantly over time (Holtorf 1998). Similarly, the meaning of nuclear waste and its final repositories is likely to change over time. Although radioactive substances can be very dangerous, for example, when they enter the food chain or are used in dirty bombs, the locations of their storage or disposal do not have to be seen forever as areas of deadly threats but may, given time, be transformed into altogether different things. This is not to deny or ignore real dangers posed by radioactive material to future generations but more to look at these dangers in the present from a different perspective on their possible future context. Arguably, the best chance to transmit knowledge and information in the long-term is thus to keep knowledge alive in the short and medium terms, inviting future generations to interpret and use these sites in their own way.

Futures Unimagined: Future Thinking for Archaeology

Future thinking in archaeology can also be described in terms that relate future consciousness and different perceptions of possible, plausible, preferred, and probable futures to specific strategies of action in the present. The future in our actions may be optimized, unpredictable, or unimagined (Miller 2011; Miller et al. 2013; Poli 2015).

The notion of an *optimized future* is commonly applied in heritage management, especially in relation to the current conservation ethos. All planning builds on what happened in the past and what that implies as to what will happen in the future. The basic idea is that in a system with fixed rules and resources, it is possible, through planning and calculation, to steer certain parameters in order to reach a desired outcome. Many in society are engaged in optimizing futures in this way. They create futures through assessments, predictions, visionary perspectives, planning, explicit goals, strategic thinking, risk analysis, implementation, optimization of results, evaluation, analysis, and impact realization (see, e.g., Tonnquist 2012). However, methods that focus on cause and effect as a basis of predictions lead to a projection of recognizable trends and patterns of the past onto the future. In this way, the future is effectively colonized by extrapolating contemporary assumptions drawn from analyses of the past. As a consequence, the future comes to represent our image of the past. This is especially evident when the selection process in the present that governs which heritage should be conserved for the benefit of future generations depends on how well this heritage can represent our understandings of the past.

The *unpredictable future* is a result of external circumstances which cannot be foreseen in detail. This kind of future is often managed with the help of probability analysis. The notion of an unpredictable future encourages planning as a way of improving our ability to respond to those events that we cannot predict. A good example is current discussions on exactly how climate change will affect the preservation of heritage sites (e.g., Barthel-Bouchier 2013).

In contrast, the notion of an *unimagined future* comprises what we cannot even imagine today: futures that have not been discovered yet, i.e., aspects of our present that need to be investigated much more before we will be able to express futures that have not been thought before. Following this strategy, we need to improve our ability to

create futures that are not a mere mirror image of the past but that challenge current patterns and trends and thus help us create a better society. Key terms here are innovation and discontinuity. In practice this future is difficult to realize because it is about "futures unimagined and hence a present that does not *yet* make sense" (Miller 2011: 25). The challenge for archaeology and heritage management lies in finding ways in which an unimagined future can successfully inform specific strategies of action in the present.

The optimized future draws on the past to make predictions. The unpredictable future anticipates known risks based on what might occur but cannot be foreseen in detail. Both strategies of action are thus based on society's collected knowledge – what is known or expected to happen, extending the present into the future. They determine the limits of what people anticipate to change in the future. But these limits are not themselves expected to change; they are locked in present-day historical consciousness.

The unimagined future differs from these two strategies. It is also based on society's collected knowledge, but instead of projecting the present onto the future, it investigates what we need to know, imagine, and change in order to create futures which would be desirable but which we cannot think at the moment. Drawing on the notion of an unimagined future means finding new ways of understanding the present in order to strengthen our capacity of innovative thinking. Such thinking aims at taking advantage of an unknown future rather than becoming its victim. It helps us to question dominant perceptions in the present of what is right and proper. This strategy, then, is not about predicting the future but about creating capacity in order to be able to deal with a continuously changing world, by allowing us to use the unimagined as a resource in the work that we conduct to bring about the future.

Conclusions

Archaeologists and other professionals working in the heritage sector as well as their institutions should start thinking in more depth about the future (see also Högberg et al. 2017). Which future(s) are we working for? What are our aims concerning those futures? How can we be confident that our work will make a difference for the better? In order to understand how archaeological heritage can be part of that response, we need to go beyond, for example, bemoaning the fact that some sites will be negatively affected by rising water levels. Instead, we need a thorough discussion of how archaeology can develop theoretical thinking about the future. We also need to discuss how archaeology, heritage, and the past may be useful resources in making a positive impact on humans inhabiting that future.

Archaeologists should not only promote historical consciousness but also future consciousness: both forms of consciousness are essential for the ability to appreciate the interconnections between past, present, and future. The continuing discussions about long-term communication strategies concerning final repositories of nuclear waste can provide archaeologists with inspiration. The lack of substantial engagement with future issues in heritage management and heritage studies contrasts sharply with the commitment that we have come across among professionals in the nuclear waste sector addressing concerns that lie in the long-term future. There are a number of comprehensive studies (e.g., Trauth et al. 1993; Buser 2013) discussing how to communicate with our descendants, or indeed other forms of intelligent life that may exist in many thousands of years ahead, so as to prevent that they inadvertently expose themselves to radiation. In these works, consideration is given to the likelihood that no single language or alphabet of the present, including symbolic codes, will be easily understood and that even ways of interpreting and engaging with material markers or other media we may leave behind may not match our own customs and expectations.

Besides occasionally offering risky forecasts, archaeologists should give similarly detailed attention to the long-term effects of their own practice: How do specific perceptions of the future inform contemporary practices? Which impact on the future can, and indeed should, archaeology and archaeological heritage have? Can we

reasonably expect certain things of future generations? Which futures are we talking about anyway? Asking questions such as these will build capacities for archaeology to be more creatively and effectively connected with the pressing social, economic, political, and ecological issues of our time.

References

Barthel-Bouchier, D. 2013. *Culture heritage and the challenge of sustainability*. Walnut Creek: Left Coast Press.

Buser, M. 2013. *A literature survey on markers and memory preservation for deep geological repositories* (Preservation of records, knowledge and memory across generations (RK&M). Report NEA/RWM/R 2013,5). Issy-les-Moulineaux: OECD Nuclear Energy Agency.

Dunne, A., and F. Raby. 2013. *Speculative everything. Design, fiction, and social dreaming*. Cambridge, MA/London: MIT Press.

Högberg, A., C. Holtorf, S. May, and G. Wollentz. (2017) No future in archaeological heritage management? _World Archaeology_ 49 (5), available in open access at https://doi.org/10.1080/00438243.2017.1406398.

Holtorf, C. 1998. The life-history of megaliths in Mecklenburg-Vorpommern (Germany). *World Archaeology* 30: 23–38.

Holtorf, C. 2012. The heritage of heritage. *Heritage & Society* 5 (2): 153–173.

Holtorf, C. 2015. Averting loss aversion in cultural heritage. *International Journal of Heritage Studies* 21 (4): 405–421.

Holtorf, C., and A. Högberg. 2014a. Nuclear waste as cultural heritage of the future. In *WM2014 conference proceedings*, www.xcdsystem.com/wmsym/member/2014_proceedings.cfm.

Holtorf, C., and A. Högberg. 2014b. Communicating with future generations: What are the benefits of preserving for future generations? Nuclear power and beyond. *European Journal of Post-Classical Archaeologies* 4: 315–330.

Holtorf, C., and A. Högberg. 2014c. Zukunftsbilder in Erhaltungsstrategien. In *Diachrone Zugänglichkeit als Prozess. Kulturelle Überlieferung in systematischer Sicht*, ed. M. Hollmann and A. Schüller-Zwierlein, 197–214. Berlin: de Gruyter.

Holtorf, C., and A. Högberg. 2015. Contemporary heritage and the future. In *The Palgrave handbook of contemporary heritage research*, ed. E. Waterton and S. Watson, 509–523. Basingstoke/New York: Palgrave Macmillan.

Kirch, P.V. 2004. Oceanic Islands: Microcosms of "global change". In *The archaeology of global change*, ed. C.L. Redman, S.R. James, P.R. Fish, and J.D. Rogers, 13–27. Washington, DC: Smithsonian Books.

Logen, A.L. 2016. Why can't people feed themselves?: Archaeology as alternative archive of food security in Banda, Ghana. *American Anthropologist*. Early view available at http://onlinelibrary.wiley.com/wol1/doi/10.1111/aman.12603/full. Accessed 19 Aug 2016.

Miller, R. 2011. Opinion: Futures literacy – Embracing complexity and using the future. *Ethos* 10: 23–38 Available at: https://www.cscollege.gov.sg/knowledge/ethos/issue%2010%20oct%202011/pages/Opinion%20Futures%20Literacy.aspx. Accessed 18 Aug 2016.

Miller, R., R. Poli, and P. Rossel. 2013. The discipline of anticipation: Exploring key issues. Scoping global/local anticipatory capacities, working paper #1. Unesco Foresight. Available at: https://www.academia.edu/3523348/The_Discipline_of_Anticipation_Miller_Poli_Rossel_-_DRAFT. Accessed 19 Aug 2016.

Mizoguchi, K. 2015. A future of archaeology. *Antiquity* 89: 12–22.

Morris, I. 2010. *Why the west rules – For now. The patterns of history and what they reveal about the future*. New York: Farrar, Straus and Giroux.

Pikirayi, I. 2015. The future of archaeology in Africa. *Antiquity* 89: 531–541.

Poli, R. 2015. The implicit future orientation of the capability approach. *Futures* 71: 105–113.

Quoidbach, J.G., T. Daniel, and T.D. Wilson. 2013. The end of history illusion. *Science* 339: 96–98.

Rockström, J., W. Steffen, K. Noone, A. Persson, F.S. Chapin, E.F. Lambin, T.M. Lenton, M. Scheffer, C. Folke, H.J. Schellnhuber, B. Nykvist, C.A. de Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sörlin, P.K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R.W. Corell, V.J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J.A. Foley. 2009. A safe operating space for humanity. *Nature* 461: 472–475.

Rüsen, J. 2001. What is historical consciousness? A theoretical approach to empirical evidence. In *Paper presented at Canadian historical consciousness in an international context: Theoretical frameworks.* Vancouver: University of British Columbia.

Smail, L.D. 2008. *On deep history and the brain*. Berkeley: University of California Press.

Spennemann, D.H.R. 2007a. The futurist stance of historical societies: An analysis of position statements. *International Journal of Arts Management* 9 (2): 4–15.

Spennemann, D.H.R. 2007b. Futurist rhetoric in US historic preservation: A review of current practice. *International Review on Public and Non Profit Marketing* 4 (1/2): 91–99.

Thomas, J. 2004. *Archaeology and modernity.* London/New York: Routledge.

Tonnquist, B. 2012. *Project management. A guide to the theory and practice of project, program and portfolio management and organization change*. Stockholm: Sanoma Utbildning.

Trauth, K.M., S.C. Hora, and R.V. Guzowski. 1993. *Expert judgement on markers to deter inadvertent human*

intrusion into the waste isolation pilot plant. Sandia report SAND92–1282, UC-721. New Mexico: Albuquerque.
Wahlgren, K.H., and F. Svanberg. 2008. Public archaeology as renewer of the historical museum. *Public Archaeology* 7 (4): 241–258.

A

Archaeology and Time Travel

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Bringing the Past Back to Life in the Present

Time travel can be defined as an embodied experience and social practice in the present that brings to life a past or future reality. What is most characteristic of time travel is therefore the possibility in contemporary society to experience the presence of another time period (Fig. 1).

Time travel to the past has become a widespread practice and desire among many age groups, with present society increasingly offering relevant opportunities. Prominent examples of popular forms of time travel in contemporary society and popular culture are living history, historical role play, reenactment, and first-person interpretation, often associated with cultural institutions of various kinds. But time travel also occurs, among others, in literary fiction, movies, TV docusoaps, advertising, themed environments, and, last but not least, the rapidly improving virtual realities and computer games. Time travel is thus linked to a wide range of contemporary phenomena. It occurs not only within and through people's minds and bodies but is equally the result of specific social practices that support and indeed allow time travel experiences, especially a range of leisure activities, cultural tourism, and the heritage industry as well as shopping, reading, watching movies and TV, playing games, and more and more the use of augmented and entirely virtual realities.

Over the past few decades, all these different forms of time travel have become increasingly significant in tourism, entertainment, and education, especially museum and heritage pedagogy (see, e.g., Hjemdahl 2002; Hunt 2004; Thompson 2004; Hart 2007; McCalman and Pickering 2010; Kalshoven 2012; Hochbruck 2013; Samida 2013;

Archaeology and Time Travel, Fig. 1 Lejre, Land of Legends. A modern family temporarily living in the Iron Age. (From the photo archive of Holtorf: 2011)

Kruse and Warring 2015; Willner et al. 2016; Holtorf and Petersson 2017).

People have of course long been fascinated by imagining other periods and bringing them to life in some form, as reflected, for instance, in people taking part in historical processions, consuming historical novels, strolling through open-air museums, or interpreting historic sites. Certainly there have been staged performances of historic events in the Roman period and during the Middle Ages. Sites like Pompeii and finds like bog bodies and ice mummies, in particular, have long been seen as "frozen in time," material objects in which you can meet the past face-to-face as it were. For certain, a desire for time travelling, retrieving the past, or envisioning the future is a cultural theme that goes back some two centuries and has occupied authors and scholars alike, among them H. G. Wells and Arthur C. Clarke who inspired many (see Lowenthal 2015: chapter 2).

The academic study of time travel goes back at least to the 1980s. Important starting points for the existing academic appreciation of the phenomenon of bringing the past back to life in the present are Jay Anderson's (1984) discussion of *Time Machines: The World of Living History*, the classic account of *The Past is a Foreign Country* by David Lowenthal (recently revised, 2015) and the first volume of Raphael Samuel's (1994) study of present-day *Theatres of Memory*. Since then a fair amount of relevant work has been published, as indicated not the least by the references given earlier. Concerning the history of historic open-air museums, Sten Rentzhog (2007) provided a comprehensive discussion from their beginnings with Skansen in 1891 up until the introduction of virtual time travels. Particularly interesting in this context is Bodil Petersson's (2003) research about archaeological reconstructions and their attempts at recreating different periods of the past. She found that in the reconstructed Stone Age, travellers find harmony with nature, simple technology, and social equality; the reconstructed Bronze Age holds social hierarchies, fertility rituals, and some ecological thinking; the reconstructed Iron Age appeals to some with homemade food, clothes, and small-scale village life; the reconstructed Viking Age offers seafaring, long-distance trade and warfare, and even world peace; and the reconstructed medieval period, finally, presents the time traveller from the present with markets and cultural festivals, clear social roles, and knights' tournaments.

The Significance of Time Travel

In our age, mainly thanks to new technologies and increased demand, time travel has acquired a new level of popularity and societal significance. Time travel does not only represent a new tool for research, but it also manifests the changed role of material culture in archaeology generally. In experiences through which the past comes back to life, we can observe that bodily sensations and evocative narratives substitute for the study and analysis of material evidence in understanding the past, so that archaeology may no longer be self-evident as the discipline par excellence of things (Holtorf 2014). Now things may merely take the role of props facilitating larger stories and experiences.

Time travel arguably represents an alternative way to approach the past in current society in general. Whereas the most common approaches to the past have been foregrounding either knowledge and insight or critique and politics, now credible experience and sensual immersion feature large. Time travelling is directly linked to the lives and bodies of individuals in the present. It may begin at 8 p.m. on a particular TV channel. We are living in the present, but we are free to enter the past now! This perspective is neither about knowledge of human history and evolution nor about a critical assessment of those who write history, but about our imagination and embodied experience. Key notions for the way in which the past becomes meaningful through time travel include credibility and engagement. The past does not have to be genuine in the sense that it once "really" happened, but it needs to be credible as an authentic experience about a past that *could* have happened. Credible pasts are largely reliant on trust. We trust pasts either when they correspond closely to the past we already know, that is, our expectations, or when they are vetted by

experts whom we trust. Time travel does not demand a particular intellectual attitude toward either past or present but instead a readiness for an embodied engagement with different realities, involving both body and soul. Time travel is about getting immersed in another world, assuming the perspective of somebody actually living in that world, involving all the senses.

The dynamic of time travel lies in a constant oscillation between life now and then. On the one hand, the time traveller never leaves the present and remains the person she is, with all the associated baggage in the form of world views, preconceptions, and personal life histories. On the other hand, the time traveller is leaving that present and being transported to another reality governed by different norms and open to all sorts of fantasies and behaviors that may not be associated with our lived present.

Some of the most significant aspects of time travel are based on knowledge that is next to impossible to ever be (re-)gained in a scientific way. Sensual perceptions, embodied experiences, habitual behaviors, emotions, dreams, and not knowing what historically "came next" have been crucial to life in any period, but archaeologists and others cannot easily reconstruct these dimensions from the evidence available today. It is hard to avoid imposing our own responses to these issues on other periods and thus constructing the past as an extension of the present. But arguably an extension of the present is precisely what is desired as, ironically, many time travellers ultimately seek to find themselves in the past (Fig. 2; Petersson 2009)!

Archaeology and Time Travel, Fig. 2 A knight from the present in Salvestaden, a reconstructed medieval town in Kalmar, Sweden. (Photograph: Jes Wienberg 2002. Reproduced by permission)

Is Time Travel Actually Possible?

But how can another period, whether past or future, become "present" and a subject of embodied human "experience"? Is time travel merely a clever metaphor, or can it be said to describe a social and cultural reality? Initially, it seems obvious that a discussion of time travel carried out while being firmly based in the present can only be either pure magic or a product of the imagination, thus being unreal and contra-factual. No one can *actually* travel either into the past or into the future, in the same way you can travel to another country.

However, it is essential to ask what is meant by travelling in time "in reality." The statement that actual time travel, leaving present-day reality, is impossible employs a commonsense definition of reality: empirical, physical reality. According to this definition, *real* is everything physical, large or small, which we can empirically investigate, whether that may be an atom, a brain, or an ancient sword. Within contemporary physics as we know it, there is no time travel allowing us to leave our own empirical reality – although there certainly are some other anomalies regarding time such as the fact that it slows down when travelling at high enough speed. Physical reality is however not the only way to understand reality, and it may not even be the one that is most significant to

human beings. Reality might also be defined as the combination of human experiences and social practices. Reality, in this alternative view, is whatever humans experience during their lives and practices as social beings. This definition of reality is particularly pertinent here as it implies that all reality is partly virtual and all experienced and practiced time travel is real. According to this view, past and future are not physical realities distinct in time from our own but themes that contribute to shaping specific human experiences and social practices in the present (Fig. 3).

Time travel has a lot to do with the presence of *pastness* (and indeed futureness – but our discussion will in the following be restricted to pastness). Pastness is the contemporary quality of an object to be "of the past." This quality comes with the perception of something to be of the past and has thus little to do with actual age (Holtorf 2010, 2013, 2017).

The concept of presence has in recent years attracted a considerable amount of research within a range of academic disciplines, including IT science, psychology, performance studies, communication science, and media studies (Hofer 2016; Lombard et al. 2015). The defining notion of presence is a perception of non-mediation or immediacy, that is, a perception of "being there," even though the experience may actually be mediated to a considerable extent. For example, a sophisticated virtual environment provides a sense of presence when it convincingly suggests that you are visiting an actual place or meeting other people rather than looking at one or more digital screens, which is what you actually do. As with encountering such virtual places or people, whether or not pastness in time travel is perceived as non-mediated will depend on the extent to which:

(a) The past reality presented is consistent and coherent.
(b) The audience is familiar with the medium and willing to suspend any disbelief.
(c) The audience's senses are persuaded through rich and vivid impressions, i.e., the underlying technical sophistication creating a sense of immersion.
(d) Pre-understandings and expectations of the audience are matched.
(e) The audience is involved and engaged in a meaningful way (inspired by Lombard and Ditton 1997).

Provided these conditions are satisfactorily met, a perceived presence of pastness and time travel that brings the past to life becomes entirely possible. At its best, the time traveller experiences what is known as "period rush" or "magic moments" when another period suddenly comes to life. It is emerging realities such as these that have now begun to be taken seriously and investigated in a variety of social sciences and humanities, especially in the historical disciplines.

Archaeology and Time Travel, Fig. 3 The presence of futureness in a heritage context. (Copyright: Dave Askwith and Alex Normanton. Reproduced by permission)

Understanding Time Travel

Time travel can be conceptualized and different dimensions of time travel distinguished along the two axes representing the degree of lived experience and degree of collectivity, respectively (Fig. 4). The past may be played and performed or lived and experienced, collectively through

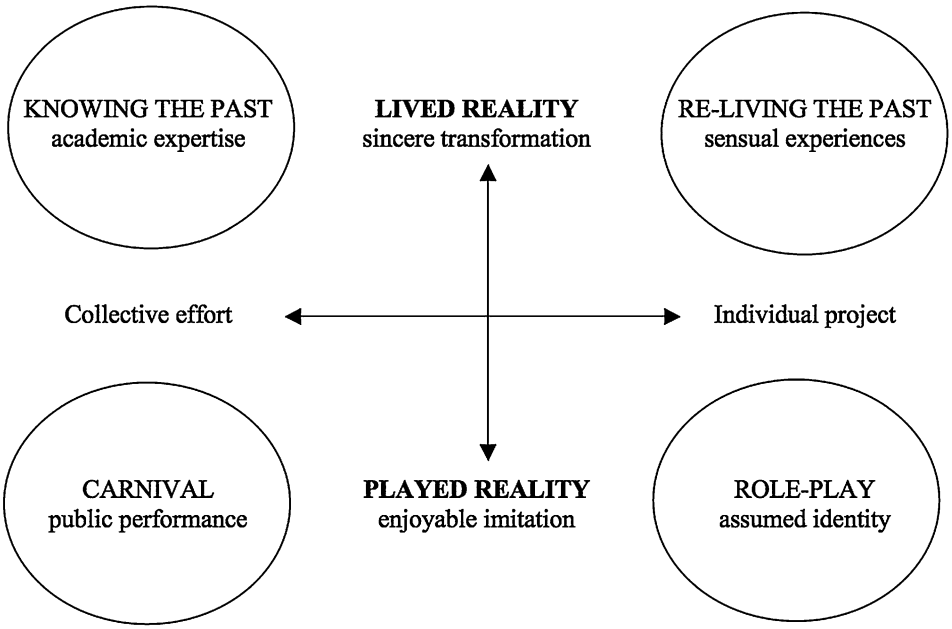

Archaeology and Time Travel, Fig. 4 A framework for understanding contemporary time travel and its various dimensions. (Based on Holtorf 2012)

group effort or separately in individual projects. Many forms of time travel combine playful and sincere aspects and have individual as well as collective dimensions.

In some time travel, the past is a kind of game, a playful and sometimes superficial entertainment drawing on well-known imagery and behavior commonly associated with the past. Playing the past can be as amusing and enjoyable for the individual participant assuming a historic role as for audiences of public performances that may be offered in a spirit reminding of carnival. Under the sign of "PLAY," the past is being staged somewhat tongue-in-cheek, and concessions to the present are willingly made for the sake of added fun.

In other time travel, the past is a lived reality, a heartfelt and sincere attempt at effectively representing the past in the present. Recreating past life may be achieved as a personal life project by effectively choosing to embody another person or collectively through the systematic acquisition of expertise and academic insight. Under the sign of "LIFE," the past is serious and given a new authenticity in lived experiences or accumulated knowledge of the present.

Rehabilitating Anachronism

It is generally accepted that living history, historical reenactment, and virtual reality cannot bring the past back to life *as it really was*. The significance of this truism to present-day time travel is however a matter of some discussion, even among those participating (Hart 2007; Hochbruck 2013; Samida 2013). Some commentators dispute that any time travel could ever be entirely genuine and authentic; however, much attention is given to getting the historical facts right. Time travel, therefore, always remains flawed and problematic as anachronistic ("against time") and inauthentic, to some extent misleading audiences about past realities, effectively representing stereotypes or fantasy and appropriating the past for some contemporary purposes. But others contend that all representations of the past originate in the present and are constructed for a specific purpose and in a particular context; historical research appropriates the past too and does not depict the past *as it really was* either. So why not use embodied experiences and the imagination to satisfy our historical curiosity?

Among archaeologists and historians, anachronism is usually conceived of as something genuinely inappropriate because it falsifies the representation of a particular period of the past by mixing different time periods in historically impossible ways. Two areas of practice with a special concern of avoiding anachronism in the name of authenticity are historical music and the use of language in literature, film, and theatre (Haynes 2007; Lowenthal 2006). The ambition here is usually to try to avoid more recent soundscapes or words/languages/expressions in favor of ancient and thereby "authentic" ways of using sound and language. It might be very disturbing for an audience to hear modern language spoken within a setting supposed to be Roman or Viking. In this genre, the efforts are more related to those within archaeology and history, in which the goal is to avoid "inauthentic" interpretations that are too dependent on present circumstances.

The charge of anachronism can also apply to a modern person seemingly entering the past and "living" the past. Impressions gained by our own senses may deceive the critical minds of historians and archaeologists (although sight is usually excluded). There is a real danger that arranging seemingly historical settings with contemporary traits makes the present integrated in the past so much that it really feels familiar and understandable. This is deceptive and takes away from the past the possibility to represent an alternative to the present. But according to another perspective, the deliberate use of anachronism shows that however we interpret the past – or the future – it is formed in the present. In the early twenty-first century, we have often been looking for evidence of female power, queer perspectives, diversity, sustainability, and the role of children and healthcare in the past. All these aspects were highly relevant and/or debated at the time, and their discussion in relation to the past could therefore make the past relevant, too. This is well established in art and literature and can equally apply to history and archaeology too.

The lessons possible to learn from actual time travel to the past do not necessarily provide actual benefits to historical scholarship. This will be especially true in cases where time travels lead to destinations that in any case are partly or entirely fictional and thus lack a solid factual basis. Should time travels to the lost worlds of Atlantis or Valhalla enjoy the same exposure in society as those to Classical Athens or Ancient Rome? Is it worrisome or encouraging when several thousands are visiting the Swedish region of Västergötland in the "footsteps" of the fictional historical character Arn derived from Jan Guillou's best-selling novels and subsequent movies (Mattsson and Praesto 2005)? Should the state provide public-service time travels to carefully vetted destinations with particularly desirable learning outcomes? Can time travel actually lead to inappropriate destinations? Fictional or semi-fictional pasts may be inappropriate destinations – but are not all pasts brought to life to some extent fictional and dependent on partly fictional assumptions?

Even plain and methodical anachronism can be a very rewarding and illuminating tool helping us to understand the past in the present. Places where methodical anachronism may occur are traditional museums, open-air museums, museum centers, and the so-called educational centers as well as at archaeological and historical sites sometimes named heritage sites. Methodical anachronism might also appear in books and other scientific or popular publications, or in the practice of ancient handicrafts using old-fashioned tools and techniques. Historically inspired anachronistic events may include markets, theatres, games, and tournaments. They can be arranged by, for example, schools, universities, nonprofit organizations, societies, gaming communities, and web communities.

Anachronism has deep roots in human practice, both conscious and unconscious. It can be interpreted as a human practice of translating between times and thereby an effect of human awareness of time. Artists have long made active use of anachronistic references, crossing periods at different levels of awareness of this practice:

Archaeology and Time Travel, Fig. 5 Medieval church painting from Härkeberga in mid-Sweden. (Photograph: Bodil Petersson 2010)

unconscious, semiconscious, and fully conscious use of anachronisms. In church paintings from the medieval period in Scandinavia (*c*. 1050 onward) and throughout the Middle Ages, people depicted are dressed in clothes contemporary with the painter for recognition by the audience, in this case visitors to church ceremonies (Fig. 5).

Two genres that make active and conscious use of anachronism are theatre and literature. Plays are often transformed into contemporary settings. For example, Greek dramas or Shakespearian plays are remodeled into the twenty-first-century society of Western Europe, or opera plays such as Mozart's *The Magic Flute* (*Die Zauberflöte* in German) are reshaped for more recent, present, or even future settings. The stories are constantly being reinterpreted and modernized. This can give renewed actuality and credibility to important thoughts and actions in plays and texts from the past, even if they were created and performed many hundreds, or even thousands, of years ago. As archaeologists and historians, we should, instead of fearing anachronism, do more like theatre and literature by using anachronism as a tool for creating actuality through time (Petersson and Narmo 2011; Petersson 2017).

Discussing Time Travel

An important question about both storytelling and time travel in contemporary society is about the criteria that should be used to evaluate different stories and time travel experiences. The answer will in part depend on which specific example we are talking about, but are there certain qualities that are inherently more valuable than others (see Fig. 6)? Are stories and time travels good or bad depending on the degree to which they are generally most persuasive? Academically true? Emotionally touching? Aesthetically pleasing? Commercially viable? Ethically acceptable? Or politically correct?

Another important question is who determines, and on which grounds, which pasts are historically well grounded and appropriate to be accessed by time travel and which are not. There are different reasons why dark and troubled pasts may be inappropriate for time travel. For example, should people travel in time to experience Nazi extermination camps such as Auschwitz-Birkenau and bring the early 1940s back to life there? Should such a trip be encouraged to remember the victims and keep the memory of the Holocaust

Archaeology and Time Travel, Fig. 6 The annual munch-ball match, refereed by the Pope, during the Medieval Week in Visby: genuine engagement with medieval heritage, good storytelling played out, luring tourists to Gotland, or nonsense in bad taste. (Photograph: Cornelius Holtorf 2003)

alive? Or should it rather be discouraged or even prohibited out of respect for the victims' families and their legitimate expectation of respect? How realistic and educational could it be anyway and what sort of people would be attracted to embody the German perpetrators? How appropriate is time travel as a medium for bringing to life such dark periods? Arguably, even the negative sides of history have to be brought back to life. Indeed, many time periods are littered with mass murder and all sorts of terrible things that ought to be witnessed but at the same time must not be trivialized or left out. Perhaps we have a particular duty to travel to unpleasant destinations as we may in that way take important lessons and emotions back to present reality. The problem is what lines you have to draw, and how to enforce them, over and above the obvious need to prevent time travellers from committing actual crimes.

Another important issue is whether there are any risks or dangers in time travel, or in other words what a critical perspective on time travel may have to contribute. Time travel makes for embodied experiences that are potentially very persuasive and memorable as well as enjoyable and even delightful. Arguably, American Civil War reenactments constitute a proliferation of reactionary politics glorifying White American resistance and sacrifice while failing to express sufficient distance to racism and slavery. Another issue of concern is that many forms of reenactment, especially those relating to conflicts and battles, are dominated by heterosexual men. Much reenactment builds on traditional gender roles that contradict present-day ideals to achieve gender equality and ensure equal opportunities.

In 2013, on the 200th anniversary of the Battle of the Nations at Leipzig in Germany, a particularly elaborate reenactment of the battle was staged. In response to the widespread glorification of wartime and soldier life, a group of injured and demoralized soldiers was supposed to disturb the picturesque image of the battle (Haude 2015). These defeated soldiers and their behavior throughout the area of reenactment reminded the audience of those events associated with the Battle of the Nations not otherwise remembered in reenactments: illnesses and injuries, the forced quartering of troops, plundering, raping, widespread destruction, and general misery among the population. Indeed, what is the message of playing war in battle reenactments of various

periods from antiquity to the twentieth century when this occurs at the same time that many thousands of refugees seek asylum from the nightmares of currently ongoing wars and the resulting chaos and human suffering in contemporary wars?

Another interesting and important question is whether or not time travelling should in fact be seen as a form of escape from the present: dressing in period clothes, a changing of daily routines, and adopting a different identity and value system while reenacting historical scenes, or closely observing all of that, make participants and audiences temporarily suspend and forget their ordinary lives (Hunt 2004: 399). Arguably, time travels are spaces of sensual and embodied action and adventure where the alienated modern city dwellers can release some of their frustrations. Tourists travelling in time can experience a heightened feeling of being present "here and now" that many are longing for. In these ways, time travel may compensate for the deficiencies of present society rather than contribute to social improvements, thus rendering it inherently conservative in society. However, it could also be argued that time travel is not an escape from present society at all, but rather its fulfillment. According to the logic of the Experience or Dream Society, in which we may be living, the proliferation of experiences and dreams, for example, in the form of time travelling, corresponds to its true character. The critical task at hand would then lie in correcting any possible negative outcomes of time travels, not their abolishment. Indeed, time travel experiences of other realities may also popularize social utopias and instill in people very concrete models of alternatives to present society, so that their social impact might be rather revolutionary. All these issues warrant further discussion in the future.

Conclusions

Time travel experiences and associated social practices have become ubiquitous and popular, in some cases replacing more academic and less anachronistic ways of packaging the past for popular consumption. Knowledge-oriented and critical approaches to the past are still around, but embodied engagements in time travel have gained a lot of ground in many contexts.

If reality is defined as the sum of human experiences and social practices, all reality is partly virtual, and all experienced and practiced time travel is real. In that sense, time travel experiences are not necessarily purely imaginary. Time travel facilitates the presence of pastness (or futureness) in people's lives, emerging from contemporary human experiences and associated social practices and making a direct contribution to human lives and social practice in the present.

Our discussion brought some of the implications and problems associated with the ubiquity and popularity of time travelling into view. They include the question by which criteria, and certainly by which institutions, time travels and anachronism should be assessed and evaluated for the benefit of society. Are there time travel destinations that we should be warned of or prevented from reaching because of ethical concerns? Does time travel invariably promote the original dominant values (e.g., concerning race, sexuality, and gender roles) of the periods of destination? And precisely what are we to make of the often-commercial overtones of some time travel opportunities? Finally, there is a continuing debate on whether time travel is inherently conservative because of its escapist tendencies, whether it might instead be considered as a fulfillment of the contemporary Experience or Dream Society or whether time travel might even popularize utopian visions that could make people want to work actively for a different society.

For all these reasons and ongoing considerations, time travel is a legitimate and timely object of study and critique involving scholars associated with any discipline investigating the past or with heritage studies, tourism studies, social anthropology, sociology, cultural economics, or film and media studies, among other fields. Time travel needs to be placed into the larger societal

context it deserves as a particularly significant way of bringing the past back to life in the present.

References

Anderson, Jay. 1984. *Time machines. The world of living history*. The American Association of State and Living History: Nashville.

Hart, Lain. 2007. Authentic recreation: Living history and leisure. *Museum and Society* 5 (2): 103–124.

Haude, Bertram. 2015. Krieg als Hobby? Das Leipziger Völkerschlacht-Reenactment und der Versuch einer Entgegnung. *Forum Kritische Archäologie* 4: 1–12. Available at http://www.kritischearchaeologie.de/repositorium/fka/2015_4_1_Haude.pdf. Accessed 5 July 2016.

Haynes, Bruce. 2007. *The end of early music: A period performer's history of music for the twenty-first century*. Oxford: Oxford University Press.

Hjemdahl, Kirsti M. 2002. History as a cultural playground. *Ethnologia Europaea* 32 (2): 105–124.

Hochbruck, Wolfgang. 2013. *Geschichtstheater. Formen der "Living History". Eine Typologie*. Bielefeld: Transcript.

Hofer, Matthias. 2016. *Presence und involvement*. Baden-Baden: Nomos.

Holtorf, Cornelius. 2007a. What does not move any hearts – Why should it be saved? The *Denkmalpflegediskussion* in Germany. *International Journal of Cultural Property* 14 (1): 33–55.

Holtorf, Cornelius. 2007b. Time travel: A new perspective on the distant past. In *On the road. Studies in Honour of Lars Larsson*, ed. B. Hårdh, K. Jennbert, and D. Olausson, 127–132. Stockholm: Almqvist & Wiksell.

Holtorf, Cornelius. 2010. The presence of pastness: Themed environments and beyond. In *Staging the past. Themed environments in transcultural perspective*, ed. Judith Schlehe, Michiko Uike-Bormann, Carolyn Oesterle, and Wolfgang Hochbruck, 23–40. Bielefeld: Transcript.

Holtorf, Cornelius. 2012. Review article: The past as carnival (Review of A. Dreschke, dir., *Die Stämme von Köln*, 2010). *Time and Mind* 5 (2): 195–202.

Holtorf, Cornelius. 2013. On pastness: A reconsideration of materiality in archaeological object authenticity. *Anthropological Quarterly* 86: 427–444.

Holtorf, Cornelius. 2014. The time travellers' tools of the trade: Some trends at Lejre. *International Journal of Heritage Studies* 20 (7–8): 782–797.

Holtorf, Cornelius. 2017. Changing concepts of temporality in cultural heritage and themed environments. In *Time and temporality in theme parks*, ed. Filippo Carlà, Florian Freitag, Sabrina Mittermeier, and Ariane Schwarz, 115–130. Hannover: Wehrhahn.

Holtorf, Cornelius, and Bodil Petersson, eds. 2017. *The archaeology of time travel–experiencing the past in the 21st century*. Oxford: Archaeopress.

Hunt, Stephen. 2004. Acting the part: 'Living history' as a serious leisure pursuit. *Leisure Studies* 23 (4): 387–403.

Kalshoven, Petra T. 2012. *Crafting the Indian. Knowledge, desire and play in Indianist reenactment*. New York: Berghahn.

Kruse, Tove, and Anette Warring, eds. 2015. *Fortider tur/retur. Reenactment og historiebrug*. Frederiksberg: Samfundslitteratur.

Lombard, Matthew, and Theresa, Ditton. 1997. At the heart of it all. The concept of presence. *Journal of Computer-Mediated Communication* 3(2). Available at http://onlinelibrary.wiley.com/doi/10.1111/j.1083-6101.1997.tb00072.x/full. Accessed 5 July 2016.

Lombard, Matthew, Frank Biocca, Jonathan Freeman, Wijnand IJsselsteijn, and Rachel J. Schaevitz, eds. 2015. *Immersed in media: Telepresence theory, measurement & technology*. Heidelberg: Springer.

Lowenthal, David. 2006. From harmony of the spheres to national anthem. Reflections on musical heritage. *GeoJournal* 65: 3–15. https://doi.org/10.1007/s10708-006-0008-y.

Lowenthal, David. 2015 [1985]. *The past is a foreign country – revisited*. Rev. 2nd ed. Cambridge: Cambridge University Press.

Mattsson, Jan, and Anja Praesto. 2005. The creation of a Swedish heritage destination: An insider's view of entrepreneurial marketing. *Scandinavian Journal of Hospitality and Tourism* 5 (2): 152–166.

McCalman, Iain, and Paul A. Pickering. 2010. From realism to the affective turn: An agenda. In *Historical reenactment from realism to the affective turn*, ed. I. McCalman and P.A. Pickering. Basingstoke/New York: Palgrave Macmillan.

Petersson, Bodil. 2003. *Föreställningar om det förflutna. Arkeologi och rekonstruktion*. Lund: Nordic Academic Press.

Petersson, Bodil. 2009. Travels to identity. Viking rune carvers of today. *Lund Archaeological Review* 15: 71–86.

Petersson, Bodil. 2017. Anachronism and time travel. In *The archaeology of time travel – Experiencing the past in the 21st century*, ed. C. Holtorf and B. Petersson, 281–297. Oxford: Archaeopress.

Petersson, Bodil, and Lars Erik Narmo. 2011. A journey in time. In *Experimental archaeology – Between enlightenment and experience*, Acta Archaeologica Lundensia Series in 8, ed. Bodil Petersson and Lars Erik Narmo, vol. 62. Lund: Lund University, Dpt of Archaeology and Ancient History.

Rentzhog, Sten. 2007. *Open air museums: The history and future of a visionary idea*. Stockholm: Carlsson.

Samida, Stefanie. 2013. Aneignung von Vergangenheit durch körperliches Erleben. *Literatur in Wissenschaft und Unterricht* 46: 105–121.

Samuel, Raphael. 1994. *Theatres of memory. Past and present in contemporary culture*. London: Verso.

Thompson, Jenny. 2004. War games. In *Inside the world of 20th century war reenactors*. Washington, DC: Smithsonian.

Willner, Sarah, Georg Koch, and Stefanie Samida, eds. 2016. *Doing history. Performative Praktiken in der Geschichtskultur*. Münster: Waxmann.

Archaeology as Anthropology

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Introduction and Definition

Archaeology, it has been said, is one of the four subdisciplines of a larger discipline – anthropology – the other three being bioanthropology (formerly known as physical anthropology), linguistics, and social/cultural anthropology (a double adjective that honors both the British and American traditions). This account, however, largely only reflects the American context. In most other parts of the world – notably in Europe, where the "disciplines (or subdisciplines)" were born – the two have been separated thematically, pedagogically, and administratively. But even in the Americas, where the linking of archaeology to anthropology is rarely disputed, their explicit relationship is strained, and it could be argued that the stated relationship does not really exist; further, it has been utterly distant for the most part, so much so that in spite of an avowed nearness and their contributions to the same thematic field, they successfully ignore each other. Their closeness or distance is a direct function of their relationships, separated or in tandem, with colonialism, nation-building, and, nowadays, with post-national multiculturalism. Yet, what anthropology means to archaeology and vice versa is important to their destinies in postmodern times.

In considering the relationship between archaeology and anthropology, however, more commentary is required to clarify the discussion that follows. Archaeological interpretations have *always* used cultural data – especially as professionally produced by anthropologists – in order to give meaning (functional and symbolical, for the most part) to "things" and "sites" through cross-cultural analogies; although the latter were used intuitively and in a very relaxed way for decades, archaeologists have spent much effort to refine and control their use. In this regard, the intimate, unidirectional relationship of archaeology with anthropology is quite evident and needs no further development. Other stories can be told in terms of their mutual or separate articulation to wider agendas and purposes, political and otherwise; the following is the story I chose to tell.

Historical Background

The origin of anthropology is tied to the European colonial expansion of the nineteenth century. Baffled by the weird behavior of the very peoples they sought to colonize and exploit, colonial governments rapidly understood that the best way to an efficient government was the understanding of the locals. The anthropological understanding of the "savages" thus emerged as a condition for better governments. Archaeology is older. It was born in the eighteenth century to feed the historical imagination of a recently created modern entity: the national society. Anthropology appeared to normalize the "other" of modernity (the "savages" located in an ontological exteriority), while archaeology tamed an undisciplined time vector built upon objectification, universality, and progressive temporality – modern time, that is. Their common European birth was thus not coterminous and arose in different contexts: while the latter provided the teleological and monoethnic temporality the recent nation-states needed, the former was geared to the administration of colonized peoples in Asia and Africa. Although canonical definitions have it that both were meant to deal with "men" as a cultural being (one in the past, the other in the present), in Europe and elsewhere they performed quite disparate functions. The story is different in the Americas, where archaeology was part and parcel of a larger field called anthropology.

The relationship between the two varies with place and time. In Europe and most of the world, it hardly exists or is merely formal. In the Americas – and, to a lesser extent, also in Australia and New Zealand (Harry Allen, personal communication) – it may be argued that they share a common genealogy. While archaeology in Europe wrote about the "savages" as proto-

selves – in evolutionary terms, the primitive that eventually evolved into the civilized Westerner – in the Americas and elsewhere "savages" were written about as the "other" external to modernity. In European countries, the denegation of coevalness to their own pre-civilized "savages" was a function of teleology: they were not part of modernity because they truly belonged to past times; their rhetorical existence (their presence in archaeological narratives built upon "true" relics) and their eventuating into modern selves (their presence in national histories) were proofs of the elapsing of progressive time. In the Americas the "savages" as "other" (the paradigmatic Indians) were not part of that story: they did not evolve into the civilized self. As if that were not enough, in Latin America the appropriation of some indigenous achievements – carefully selected as to mimic European civilization (gold work, domestication of crops, monumental architecture, religious life, centralized governments, even writing-like systems) – by national storytellers, all members of elites that despised the Indians and considered themselves "white," was a brutal paradox. Archaeology became the notary public of the passing of pre-European societies; it legitimized the disappearance of the Indians (something of the past), and it paved the road to *mestizo* national ideologies.

Such was the basic difference between the colonial centers of power and the colonized areas in terms of storytelling. Indeed, in Europe, anthropologists were producing information from and about the "savages" while archaeologists were mere citizens proudly elevating their own heritage; in their colonies of Africa and Asia, European archaeologists were delving in the pleasures of antique hunting. In the Americas, Australia, and New Zealand, archaeologists and anthropologists worked toward a similar goal, nation-building. For these reasons, archaeology in Europe and its colonies was not part of anthropology. In contrast, archaeology played a different role in the Americas where it took part in the normalization of contemporary "savagery." Archaeology and anthropology in the Americas were one and the same; their relationship was a pure brand of the apparently odd complicity between modernity and colonialism. While anthropology set to normalize the "savages" through indigenism, archaeology normalized them by imposing a new temporality (that of civilization) and by using their chosen civilized traits as national symbols – the latter was especially true in Latin America. In short, both were modern disciplines designed to modernize "savagery" through the production of national imaginations.

While in most parts of the world archaeology and anthropology have silently traveled along different paths, it is not surprising that in the Americas their relationship has preoccupied archaeologists – anthropologists, aware of their theoretical sophistication and the nuances of ethnographic renderings, have despised the rude empiricism of their disciplinary colleagues to whom they pay little attention. Archaeologists felt – and, to a large extent, still feel – that their subdiscipline was there to serve a higher anthropological purpose, the holistic understanding of humankind, through a painstaking spatial and temporal ordering of ancient things left in the ground. They did so, basically, by providing the long-term data that evolutionary typologies about society needed to fill temporal gaps. Yet, afraid that the relationship was drifting toward a mere departmental cohabitation with no epistemological articulations and seeing in anthropology a model to be followed, Philip Phillips (1955: 247) wrote what became a famous dictum, with lasting consequences: "American archaeology is anthropology or it is nothing." The anthropology Phillips was referring to was one of a kind – objective and disciplined by scientific protocols. The mirror archaeologists were looking at was that of a nomothetic and universalist science. Later on, Lewis Binford (1962) outlined even clearer relations through the use of the key term *explanation* ("the demonstration of a constant articulation of variables within a system"), the hinge that would articulate the disciplines dealing with "men" as cultural beings amenable to scientific scrutiny.

Anthropology was chosen as a model for archaeology due to an unreflective legacy that stressed a common origin, but it soon became a burden. A subservient dependence of archaeology

to anthropology was resented by many, especially in terms of theory, so much so that a strong appeal grew for archaeology to develop its own conceptual machinery. The scientific program widely adopted since the end of the 1960s found necessary to maintain genealogical ties with the mother discipline but building its own theoretical and methodological apparatus (understanding that the technical attire was already at hand) as a way to elevate archaeology to full maturity. An iconic paper in this regard was written by David Clarke (1973) – a British scholar, to be sure – celebrating the loss of innocence of archaeology at the expense of almost ignoring anthropology. Confident that even its own "general theory" was reachable, archaeology decided to follow its own path. The decision was not surprising; although heralded by British scholars who came from a non-relational tradition, it rapidly took roots and sealed the abandonment of the last traces of its functional relationship with the nation – and of its relationship with anthropology! Archaeology locked itself in a scientific, meta-real world, away from contemporary preoccupations such as collective history and identity – the very stuff anthropologists were dealing with. For scientific archaeologists, the field that still linked them to anthropology, although by sheer instrumentality, was ethnoarchaeology, widely promoted as a contact with *living peoples* but which was simply devoted to producing information for the translation of statics (the archaeological record) into dynamics (the operation of cultures).

The wave of reflection and criticism that beset anthropology after the 1970s (which occurred due to the mounting accusations of its complicity with colonialism) eventually impacted archaeology. Although never as agonizing as in anthropology, the critical move took the form of meta-disciplinary inquiries: the complex relationships with imperialism, nation-building, "othering," and capitalism came to the fore, in many cases, for the first time. The disentanglement of such relationships brought archaeology close to anthropology because it touched the nerves of the contemporary world. It also showed that archaeological products were constructed in social milieus and were thus social facts, inherently political. Politics are thus a recent archaeological preoccupation that has been engaged in several ways. Most archaeologists practice politics the multicultural way: politically correct while going public, they celebrate their proximity to "otherness" (still an academic object) but are careful not to mingle excessively and to safeguard their epistemic privileges – repatriation being the best example because it does not compromise the integrity of the discipline but allows archaeologists to get closer to the "other." A growing minority genuinely strives to reconcile knowledge and power, surgically separated since the end of the nineteenth century by positivism, and has made archaeological interventions politically conscious at all levels; in doing so, it follows anthropology's estrangement from colonialism by siding with and giving voice to the very people it used to study for governmental purposes; it became anticolonial and even antimodern. Discontent with a discipline that was a favorite proxy of modernity *qua* colonialism, a sector of anthropology started to think and act critically and independently, so did many archaeologists who refused to be functional to the rhetoric of multiculturalism.

Yet, most anthropologists work within the current social and political order, providing the epistemic means through which "otherness" is administered by the rhetoric of diversity, not least through the ongoing promotion of development. A more academic approach has seen the adoption of a constructivist agenda that portrays culture (and its weaving of the social fabric through identity) as situational, fluid, conjunctural, and strategic, thus castigating cultural primordialisms, especially ethnic. Alternative anthropologies have emerged, though, building upon previous political commitments. They stress collaboration in research (establishing research priorities from the local up) and account for non-Western cosmologies; the latter are not any longer seen as exotics awaiting cultural translation but as meaningful renderings of life on their own. Further, the widespread academic anti-essentialism is countered by a critical, at times sympathetic, understanding of the politics of identity. Archaeology is also plural in contemporary contexts. Two or three decades of

multiculturalism have altered its face. If archaeology had a clear relation with nationalism during its modern phase, in its house now reign disorder and confusion; if it formerly administered discourses partly designed to deal with others located outside of modernity, it now ignores what kind of discourses it administers when those others are no longer the exteriority of modernity but a constitutive interiority of multicultural societies. Many archaeologists, especially those in countries suffering aggressive capitalist expansions, satisfy market needs through cultural resource management (CRM) or cultural heritage management (CHM), becoming commodities themselves and undertaking their work according to a legalistic and vertical conception of heritage. Scientific archaeologists often fustigate CRM/CHM practitioners, arguing that their scholarly standards are piecemeal, if not unaccounted for; committed to an increasingly cumbersome liaison with science, they are unlikely birds in multicultural lands – decontextualized fellows who insist on courting a narrative monopoly already lost to other interested parties. Before that fact, a growing number of archaeologists have forged a curious approach that mixes a bit of old positivism with a pinch of new constructivism; they label it *public archaeology*, a fine multicultural product that accommodates the old tenets of archaeological practice to the changing multicultural contexts. Still others have embarked on different paths, seeking to forge alternative archaeologies – this is the case for disciplinary practitioners working through collaborative research agendas with local constituencies and/or via indigenous activism. Alternative archaeologies, though, still retain a metaphysical and ontological disciplinary core. For that reason, alternatives to archaeology are being casted world round with the aim of engaging non-Western conceptions of time, space, matter, and relations.

Key Issues/Current Debates

Several books (Gosden 1999; Gillespie and Nichols 2003; Garrow and Yarrow 2010; Shankland 2012) and a wave of professional symposia over the last few years show that the relationship between anthropology and archaeology is a matter of renewed interest. The main meeting points, sometimes intertwined, are ethnography and materiality; Ingold (1993) would add time and landscape to the list, but I will not explore them here given that they have received much less attention. Nor will I discuss the still widely held idea that archaeology is uniquely positioned to provide long-term data for the anthropological understanding of cultural practices or, as in the case of *applied archaeology*, for the implementation of successful past technologies in current contexts – such as pre-Hispanic raised field agriculture in tropical places in South America. The archaeological access to the long-term (also called the *distant past*) would account for variations and changes (but also continuities) not available to the theoretical and methodological machinery of other social disciplines. The understanding of adaptations and extinctions (their causes, consequences, and advantages) has been usually mentioned as the basic field to which the privileged archaeological gaze can contribute. However, such a contribution is hampered by a widespread rejection of uniformitarianism and by a simple tautology: archaeological models based in anthropological data are used to inform anthropological interpretations.

Ethnography

The theoretical, metadisciplinary lookouts that archaeologists build to have a better view of their own work (and, many times, to elude their responsibility) are usually removed from practice, as if their reflection about general, past concerns protect and isolate them from the very processes to which they contribute, intentionally or not. The genealogies of particular archaeological trajectories – such as the relationship between the discipline and nation-building – have proven their utility to uncover its social/contextual character. Yet, they lack an essential ingredient: the ethnographic present in which we are all trapped and which forces us to confront our work in real time

more than as the unavoidable legacy of faraway forebears. Such a limitation appears to be being overcome in recent times. Ethnography now appears as a common ground for archaeology and anthropology, so much so that a recent review paper (Hamilakis 2011) calls it "a multitemporal meeting ground" for them both.

New relational approaches, variously called "ethnographies of archaeology" (Edgeworth 2010), "archaeological ethnographies" (Hamilakis 2011), or "ethnographic archaeology" (Castañeda and Matthews 2008), "use ethnographic methods to try to understand the *cultural practices of archaeology* itself" (Edgeworth 2010: 54); their philosophical core is constituted by relations and meanings between beings, not things. They share a concern with the effects of archaeological activities (excavation, exhibition, curation, dissemination) upon local publics and, conversely, with how local publics engage archaeology and its diverse discursive objects. To use a time-honored archaeological expression, they document their own activities in situ: the archaeological *site* is thus elevated to a constructed place where the very materiality of the social and the political unfolds (the long-lasting effects of archaeological discourses – their articulation with national, regional, or subaltern agendas, for instance – are not the focus of their inquiry). Through reflexivity and self-criticism, they seek to understand (a) how archaeologists produce knowledge as situated and positional subjects, (b) how different publics relate to it (ironically, selectively, opposingly), and (c) how archaeological representations are deployed (and many times countered).

Archaeology may find in the ethnographic gaze a bountiful source of reflexivity about the observer/observed dichotomy. For decades, archaeologists disdained ethnography (that weird activity performed by anthropologists, uncomfortable bed partners to whom they didn't talk, with whom they didn't share) only to consider it now a novel way to connect past and present. Archaeological ethnographies are not akin to the ethnoarchaeological activities scientific archaeologists were so accustomed to. In spite of optimistic and condescending appraisals that posit it as a forebear of archaeological ethnographies, more often than not ethnoarchaeology reinforces the logocentric gaze, avoids intersubjectivity, and subdues multiplicity; its almost exclusive purpose is to produce dynamic cultural data for interpreting static archaeological information, bypassing or ignoring the lives of the peoples they judiciously study, those *mobile objects* whose sole role is providing information useful for archaeological interpretations; the people thus studied are just unveiled objects, measured, disciplined. But away from ethnoarchaeology, archaeologists and local communities can engage in new kinds of relations, meaningfully built around interactions of lives and beings and intersubjective understanding – the very meaning of ethnography, anthropologists notwithstanding (Fabian 1990).

Materiality

A widespread and shared idea is that archaeology's specificity, more than anything else, lies in its expertise about artifacts, especially if they are ancient. For most of archaeology's history, artifacts were inert, exterior, and silent things geared to mediate between culture and nature; although resulting from human interaction, they were utterly reified. Yet, due to the holistic approach to culture championed by the scientific program, artifacts began to be considered more widely and interactively as an important part of *material culture*; the use of *material* as an adjective of *culture* (but not vice versa) signaled an important change whereby social relations entered the otherwise sealed and autonomous realm of artifacts. An important consequence of this move was that archaeology engaged in related discussions with other fields (philosophy, economy, history) and pitched its tent in time slices and topics formerly banished; such is the origin, for instance, of historical archaeology and its more recent offspring, archaeology of the recent past. Joining forces around material culture with other disciplines, archaeology began to speak about commodities,

consumerism, and the constitution of social personas. Such an interdisciplinary endeavor is behind the creation of material culture studies (e.g., Buchli 2002). Part of the same move, the so-called anthropology of technology (Lemonnier 1992) brings archaeology and anthropology together by deploying ethnographic observations upon cultural practices around *techné*. Those observations downplay economic reductionism as a means to understand human choices regarding technical and technological options; instead, they show that such choices are often dictated by powerful drives that cannot be explained by functional criteria. The ethnographic, non-reductionist approach adopted by the anthropology of technology has humanized the mechanism inherent in studies designed to understand technological organizations, the Anglo rendering of the French *chaîne opératoire*. A related field of inquiry, from which archaeologists have largely profited, aims to reconstruct the social life of material objects (Appadurai 1988), mostly through the lens of political economy – the very reason that explains why things are thus considered in their mercantile phase as commodities. Another notable area of research along these lines put museums in the forefront because they are the iconic places for direct, bodily interactions between the public and archaeologically produced objects.

Not long ago, archaeologists brought theories of agency to bear on material culture, thus showing how humans position themselves actively toward "things" and how the latter participate in the production and reproduction of social life; the participation of things, however, does not occur as beings (as relational accounts would have it) but still as fetishicized and reified objects. Agency is accorded to humans, not to things. This fact underscores that most material culture studies are undergirded by modern ontological precepts whereby "things" and humans remain rigorously separated as much as mind and matter. For that reason, the term *materiality* is now preferred by those who favor processes and events and, perhaps more importantly, who think that objects can be disentangled from their modern ontological cradle. An exciting alternative has thus emerged, one that engages other ontologies in which life and the world are conceived and acted upon relationally, understanding materiality through its embeddedness in a web of living entities (Haber 2009). It is linked to the work of several individuals and traditions, basically in the social studies of science (e.g., Isabelle Stengers' *cosmopolitics* and Bruno Latour's *symmetrical anthropology*) and anthropology (e.g., Marisol de la Cadena's *multiontologies* and Eduardo Viveiros de Castro's *multinaturalism* and *perspectivism*).

Future Directions

Optimism is mounting among many archaeologists about the rapprochement with anthropology through ethnography, so much so that the editors of a recent volume devoted to the issue stated that "we foresee a time when ethnographies of archaeology such as these (which describe the social context, local reverberations, or political economies of archaeological ideas or objects) are considered just as significant to the field of archaeology as is excavation or artifact analysis" (Hollowell and Mortensen 2009: 8). However, there are powerful reasons why we should not celebrate so soon. Two contemporary conditions further the cleavage between archaeology and anthropology by solidifying the self-isolation of the former and by hampering its political edge: (a) its accommodated relationship with multicultural policies, especially those dictating political correctness and the commoditization of otherness, and (b) by embracing CRM/CHM projects, whereby disciplinary practice is geared to the needs of development.

The multicultural face of archaeology is pitiful. A "reformed" establishment is happy to share what it cherishes most with previously marginalized parties: disciplinary epistemic coherence. The gains are numerous: it keeps practicing archaeology as it was laid out by modern standards (it changes nothing of its metaphysical fabric); it does so in public (generously); it feels more

democratic (by sharing); it gets closer to what it used to call the "savage," appeasing her/his demands while convincing itself that disciplinary nearness is tantamount to spatial, temporal, and cultural coalescence. All in all, however, archaeology keeps spreading the fruits of enlightenment and gets other (local) actors to participate in institutional spaces created to control the definition and management of disciplinary principles.

The intimate relationship of archaeology with capitalism – as expressed in its provision of empirical data for supporting progressive temporality – has been augmented by the expansion of CRM/CHM worldwide. Its impact is so pervasive that a significant number of archaeologists work for that growing market – in Brazil, for instance, where the situation is distressing, that number may be as large as 90%. In doing so, they have abandoned any possible intervention in contemporary issues in order to dance to the rhythm of money. CRM/CHM is even producing profound curricular transformations (something achieved by no other event in the history of the discipline): new undergraduate programs – characterized by their short length (normally no more than 3 years) and their technical emphasis – are being created to mass-produce archaeologists to fulfill the contractual needs arising from aggressive capitalist expansions (transport infrastructure and mining are the most salient). In the process, the already weak ties with anthropology have been severed. The result is an utmost estrangement of archaeology from anthropology by severely abating the struggle for social justice, including engaging alternative social/historical cosmologies, and curtailing a critical stance toward the global order; by fueling the conversion of heritage and the past into commodities, long ago denounced; and by an overt complicity with market mandates, effectively diminishing the possibility for the discipline to rebuild its metaphysical and ontological apparatus, already clearly hierarchical and neocolonial. What archaeologists dreamed for decades (their independence from anthropology) seems to have been finally achieved by the most gruesome of means: their ultimate surrender to capitalism and the multicultural order. Although this complex stage would demand an attentive introspection, it seems that just the opposite is happening: most archaeologists are now more impervious to critique and self-reflection than ever before. They feel fine with their multicultural concessions; besides, the CRM/CHM money that flows through the inner circuits of the discipline is of such magnitude that they don't want anything or anyone disturbing their comfort. For these two main reasons (multiculturalism and CRM/CHM), most archaeologists are happy to preserve their privileges – cognitive and otherwise. This perverse situation has produced complacency and silence.

The future relationship between archaeology and anthropology is thus subjected to different forces. One is centrifugal and pulls them apart: it does so by accommodating to multicultural and capitalist needs. Another force is centripetal and brings them closer, sharing concerns in a convergent, alternative platform where modern metaphysics and ontology are at stake. In this regard, archaeological ethnographies can produce the collapse of disciplinary self-referentiality, the demise of its closure. They can also offer intersubjective experiences as the loci of knowing, which cease to be a function of a methodological prescription, as the canon of modernity established, to be the result of relationships between subjects who strive to bring closer different worlds; such proximity can open up alternatives of life and action that truly are alternatives to a Western cosmology. The intersubjective space facilitated by the ethnographic encounter entails the dismissal of objectivism in archaeological and anthropological discourses. In the ethnographic encounter, but also in the establishment of horizontal and participative relationships that seek to eliminate distance (between observer and observed, researcher and object of study, the West and the rest), archaeology meets anthropology anew. This encounter, not accidental or bureaucratic any longer but deliberate and militant, is the stage for a new morality that cannot be found solely within disciplinary borders (stubbornly patrolled to

preserve epistemic privileges) but which will more likely arise from an engagement, simple and non-hierarchical, with lives built and being built outside Western mandates.

Archaeologists are keen to talk about the past – well, that is what they basically do. They are not so keen to talk about the future, a temporal horizon far removed from their trade. It is not surprising, then, that it has been precisely an anthropologist who has ventured into the shifting grounds of prediction to imagine what archaeology and anthropology are going to look like four decades from now. For Tim Ingold, a concern with relatedness (instead of anthropocentrism) and the persistence of life (instead of preservation) will define a common agenda:

> Between Archaeology and Social Anthropology, then, there is no longer any difference of principle. They have, in effect, converged upon a science of life whose overriding concern is to *follow what is going on*, within dynamic fields of relationships wherein the forms of beings and things are generated and held in place... [Thus] the *archaeo-* of archaeology and the *anthropo-* of anthropology have lost their former appeal... [and archaeology] has become an anachronism for the subject that still goes by that name has long since lost its association with antiquity. It is not that archaeologists have ceased to dig down for evidence of past lives, any more than ethnographers have ceased to participate in the lives that are going on around them, in what we call the present. But they have dropped the pretense that what is past is any older, or more ancient, than the present, recognizing that the occurrences of the past are not deposited at successive moments while time moves on, but are themselves constitutive of that very moment. (Ingold 2010: 160)

Cross-References

- ▶ Ethnoarchaeology
- ▶ Interpretation in Archaeological Theory
- ▶ Materiality in Archaeological Theory
- ▶ Multicultural Archaeology
- ▶ Nationalism and Archaeology
- ▶ Nationalism and Archaeology: Overview
- ▶ Supermodernity and Archaeology

References

Appadurai, A. 1988. *The social life of things: Commodities in cultural perspective*. Cambridge: Cambridge University Press.

Binford, L. 1962. Archaeology as anthropology. *American Antiquity* 28: 217–225.

Buchli, V., ed. 2002. *The material culture reader*. Oxford: Berg.

Castañeda, Q., and C. Matthews, eds. 2008. *Ethnographic archaeologies: Reflection on stakeholders and archaeological practices*. Lanham: AltaMira.

Clarke, D. 1973. Archaeology: The loss of innocence. *Antiquity* 47: 6–18.

Edgeworth, M. 2010. On the boundary: New perspectives from ethnography of archaeology. In *Archaeology and anthropology: Understanding similarity, exploring difference*, ed. D. Garrow and T. Yarrow, 53–68. Oxford: Oxbow.

Fabian, J. 1990. Presence and representation: The other and anthropological writing. *Critical Inquiry* 16: 753–772.

Garrow, D., and T. Yarrow, eds. 2010. *Archaeology and anthropology: Understanding similarity, exploring difference*. Oxford: Oxbow.

Gillespie, S., and D. Nichols, eds. 2003. *Archaeology is anthropology*. Arlington: American Anthropological Association.

Gosden, C. 1999. *Anthropology & archaeology. A changing relationship*. London: Routledge.

Haber, A. 2009. Animism, relatedness, life: Post-western perspectives. *Cambridge Archaeological Journal* 19: 418–430.

Hamilakis, Y. 2011. Archaeological ethnography: A multitemporal meeting ground for archaeology and anthropology. *Annual Review of Anthropology* 40: 399–414.

Hollowell, J., and L. Mortensen. 2009. Introduction. Ethnographies and archaeologies. In *Ethnographies & archaeologies. Iterations of the past*, ed. L. Mortensen and J. Hollowell, 1–17. Gainesville: University Press of Florida.

Ingold, T. 1993. The temporality of the landscape. *World Archaeology* 25: 152–175.

Ingold, T. 2010. No more ancient; no more human: The future past of archaeology and anthropology. In *Archaeology and anthropology: Understanding similarity, exploring difference*, ed. D. Garrow and T. Yarrow, 160–170. Oxford: Oxbow.

Lemonnier, P. 1992. *Elements for an anthropology of technology*. Ann Arbor: University of Michigan.

Phillips, P. 1955. American archaeology and general anthropological theory. *Southwestern Journal of Anthropology* 11: 246–250.

Shankland, D. 2012. *Archaeology and anthropology. Past, present and future*. London: Berg.

Archaeology Data Service (ADS)

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Basic Information

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The Archaeology Data Service (ADS) was established on October 1, 1996, with the mission to preserve, catalog, and describe digital data generated in the course of archaeological research and to facilitate its reuse (Richards and Moore 2015; Richards 2017). These activities are mutually supportive as unless digital data are actively curated, they will not be available to future scholars and unless researchers are going to reuse the data, there is little point in expending effort attempting to preserve them. Preservation is therefore inseparable from dissemination and publication (Fig. 1).

The ADS was set up as one of five disciplinary-defined services within the Arts and Humanities Data Service (AHDS) (Burnard and Short 1994). It developed from a successful proposal from a consortium of university departments of archaeology and the Council for British Archaeology, led by the University of York where it is hosted within the Department of Archaeology. Initial funding came from the Joint Information Systems Committee (JISC) and the Arts and Humanities Research Council (AHRC). From an early stage, the ADS also received external funding from a variety of other UK organizations, such as Historic England, and via commercial archaeology projects, reflecting the diverse nature of the archaeological sector. The ADS provides ongoing support for digital preservation and reuse, for research, learning, and teaching for archaeology and the historic environment sector. Depositors are required to pay a one-off fee, at the point of deposition, based upon the ADS charging policy (Richards et al. 2010). Access to data, however, is free to all. The source of the data must be acknowledged, and copyright is maintained by the data depositor. The ADS takes a non-exclusive right to distribute the data and to take steps to preserve it. All data archives are given a permanent digital object identifier (DOI) under the auspices of DataCite (http://datacite.org/). The ADS is a member of the Digital Preservation Coalition (http://www.dpconline.org/) and follows the Open Archival Information System (OAIS) model for the preservation of digital data (ISO 14721: 2003). In 2010 it was awarded the Data Seal of Approval (https://www.datasealofapproval.org/), and in 2012 it received the DPC's Decennial Award for the most outstanding contribution to digital preservation in the last decade.

Major Impact

Archaeology and the historic environment sector are in a special position in that much data creation results from the destruction of primary evidence, making access to data all the more critical in order to test, assess, and subsequently reanalyze and reinterpret both data and the hypotheses arising from them. Over the years, archaeologists have amassed a vast collection of fieldwork data archives, a significant proportion of which remain unpublished. Access to data, even those which are published, is often difficult or inconvenient at best. The ADS works with national and local archaeological agencies and those research councils involved in the funding of archaeological research to negotiate deposition of project data. This includes data derived from fieldwork as well as desk-based studies. The types of data involved include text reports, databases (e.g., related to excavated contexts or artifacts), images (including aerial photographs, remote sensing imagery, photographs of sites,

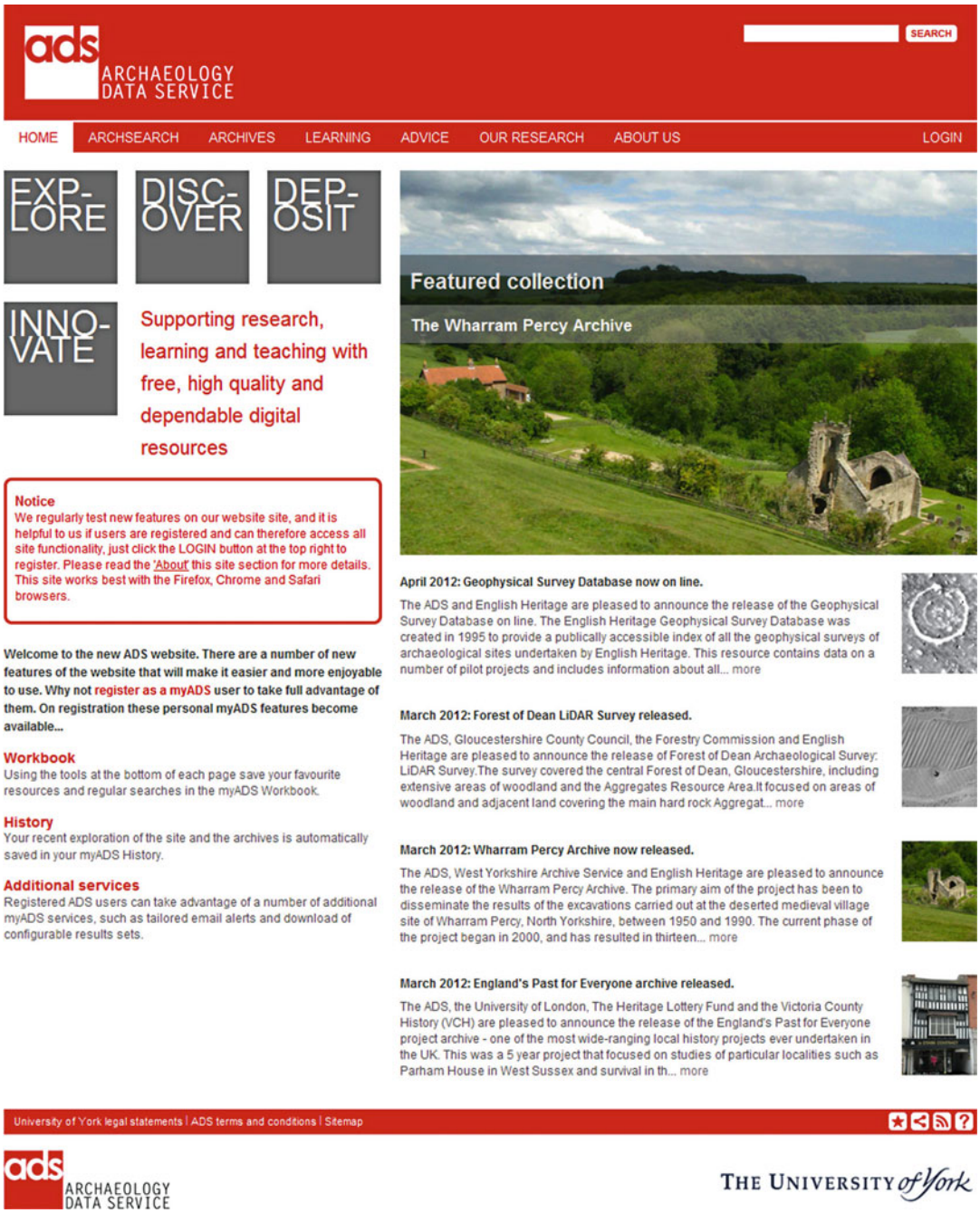

Archaeology Data Service (ADS), Fig. 1 The Archaeology Data Service homepage, April 2012

features, and artifacts), digitized maps and plans, numerical datasets related to topographical and subsurface surveys and other locational data, as well as reconstruction drawings. By 2017, the ADS provides access to over 1.3 million metadata records for the archaeology of the British Isles, over 40,000 unpublished fieldwork reports (the so-called gray literature), and over 1100 individual project

archives. The economic impact of the ADS has been the subject of an independent assessment (Beagrie and Houghton 2013). The ADS is also working with European and other international bodies to develop a worldwide e-infrastructure for archaeological research (Aloia et al. 2017).

Cross-References

- ▶ Archaeological Informatics
- ▶ Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data
- ▶ Strategic Environmental Archaeology Database (SEAD)

References

Aloia, N., C. Binding, S. Cuy, M. Doerr, B. Fanini, A. Felicetti, J. Fihn, D. Gavrilis, G. Geser, H. Hollander, C. Meghini, F. Niccolucci, F. Nurra, C. Papatheodorou, J. Richards, P. Ronzino, R. Scopigno, M. Theodoridou, D. Tudhope, A. Vlachidis, and H. Wright. 2017. Enabling European archaeological research: The ARIADNE E-Infrastructure. *Internet Archaeology* 43. https://doi.org/10.11141/ia.43.11.

Beagrie, N., and J. Houghton. 2013. *The value and impact of the archaeology data service. A study and methods for enhancing sustainability.* http://repository.jisc.ac.uk/id/eprint/5509.

Burnard, L., and H. Short. 1994. *An arts and humanities data service*. Report of a feasibility study commissioned by the Information Systems Sub-Committee of the Joint Information Systems Committee of the Higher Education Funding Councils.

Richards, J.D. 2017. Twenty years preserving data: A view from the UK. *Advances in Archaeological Practice*: 5(3):1–11. https://doi.org/10.1017/aap.2017.11.

Richards, J.D., and R. Moore. 2015. Here today, gone tomorrow: Open access, open data and digital preservation. In *Open source archaeology: Ethics and practice*, ed. A.T. Wilson and B. Edwards, 30–43. Berlin: De Gruyter Open.

Richards, J.D., A.F. Austin, and C. Hardman. 2010. Covering the costs of digital curation. *Heritage Management* 3: 255–263.

Further Reading

Archaeology Data Service/Digital Antiquity. 2017. Guides to good practice. Available at: http://guides.archaeologydataservice.ac.uk/.

Galeazzi, F., M. Callieri, M. Dellepiane, M. Charno, J.D. Richards, and R. Scopigno. 2016. Web-based visualization for 3D data in archaeology: The ADS 3D viewer. *Journal of Archaeological Science: Reports* 9: 1–11. https://doi.org/10.1016/j.jasrep.2016.06.045.

Richards, J.D. 2015. Ahead of the curve: Adventures in e-publishing in Internet Archaeology. *Archäologische Informationen* 38: 63–71.

Richards, J.D., S. Jeffrey, W. Waller, F. Ciravegna, S. Chapman, and Z. Zhang. 2011. The archaeology data service and the archaeotools project: Faceted classification and natural language processing. In *Archaeology 2.0 and beyond: New tools for collaboration and communication*, ed. S. Witcher-Kansa, E.C. Kansa, and E. Watrall, 31–56. Los Angeles: Cotsen Institute of Archaeology Press.

Archaeology in the Enlightenment

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Introduction

The late seventeenth century and much of the eighteenth witnessed the birth of an intense curiosity among Europeans in the ancient lives and products of peoples occupying the territories of modern western European nations. At this time one saw a continuation of the Renaissance obsession with the art and values of the classical world. In a few, exceptional cases, this curiosity was molded into something approaching a systematic form by Enlightenment-informed projects of cataloging a country's or colony's cultural and natural resources. Sadly, the activities subsurface that resulted from this curiosity was more often little more than unsystematic plunder. It would be fair to say that virtually no archaeological research, in the sense we today understand archaeology (i.e., the total and fully documented recovery of all artifacts, features and human modifications to the landscape, and the critical interpretation thereof), was conducted during the period (1690–1789) that was embroiled in the intellectual ferment known as the Enlightenment.

Yet three key concepts of the Enlightenment still frame debates about archaeological theory in the present. The learned of Europe and the English colonies earned liberation from a servile obeisance to the established political and clerical order by the universalizing canons of science – empiricism, trust in sense perception, and the freeing of human consciousness from ignorance and received doctrine. History was conceived as a predictive science that was fully an equal to the natural sciences because of an abiding faith that all humanity was borne of a common ancestor, with implications for present prehistorians who ask by what methods and authority we can comprehend unrecorded motivations in the past. Lastly, the Enlightenment's signature publication, the *Encyclopédie*, elevated the humblest tool to a probe for comprehending the intellectual status of its craftsman maker, however remote in the past. One of the enduring legacies of the Enlightenment is the general acceptance that archaeology is the study of the remains of past people's actions upon a world as socially constructed and perceived – understanding of which can be empirically derived and is not obscured to the outsider by an inner logic (manual of translation for the meaning of behavior) forever hidden.

Definition

The Enlightenment celebrated scientific society as the highest moral end of history, with the promise that the historical sciences (eventually including archaeology) could reveal moral laws and practical means to increase human happiness.

Key Issues

There is some irony in writing about archaeology in the Enlightenment. Arguably, there was no archaeology practiced (with one or two informative exceptions). Yet, it is also fair to say that three currents of Enlightenment thought converged to give us the fundamental questions we ask of all prehistoric data. It is a commonplace to say that all archaeologists can do is to use fragmentary and ambiguous material evidence to make statements about how peoples in the past acted upon the world as they perceived it. Put another way, the intellectual history of archaeology has been the search to comprehend unrecorded motivations. Were the actors upon the ancient stage much like us, such that we can recreate their motivations in our mind? Or were they playing to a script that is untranslatable to an audience from another time, another society?

These questions would have had no meaning to those who thought about past peoples during the previous medieval or even early modern periods. Post-Enlightenment, these same questions became core to archaeologists' understanding of the world (and continue to split philosophers of the social sciences into partisan camps).

In order for archaeology to be something other than an academic vanity, there must be a basis for cross-cultural and deep temporal understanding of what motivates people, in the past and present. How that cross-cultural understanding is derived may be a matter of strident dissent (e.g., witness the ongoing debates between processualists and post-processualists). The fact is that this question – how can we, at a remove in time and often of an alien culture, comprehend unrecorded motivations in the past? – is central to the archaeologist's enterprise and means that we are all children of the Enlightenment. But here we have to separate the intellectual task of archaeology from the data retrieval and processing task. To the vast majority of those who dug into ancient monuments and remains during the roughly 100 years of the Enlightenment, little knowledge was gained. So let's deal with this issue first.

Thomas Jefferson's 1784 excavations of Virginia burial mounds (arguably the only systematic, if "unintended" archaeological excavation conducted as part of the Enlightenment project) were undertaken to gather data to counter the argument of degeneration of North American animals, indigenous peoples, and their institutions. The nitty-gritty of the excavations techniques could hardly be called up to modern standards; however, the description and recording of what was found and in which stratigraphic context were surprisingly good. If we can agree that modern

systematic data collection starts with a question, a question that generates implications about patterning of the material remains, patterns that are, in turn, observable or non-verifiable in the field (falsifiability), and that the observation protocol (excavation, survey, etc.) must be fully described along with the ultimate conclusions so they can be assessed independently by others, then Jefferson did it all. His data recovery was in response to a European questionnaire that had at its heart an assumption (the question) that animals and humans removed from the Old World to the New would inevitably degenerate (becoming smaller and less complex) because of some presumed environmental deficit. Jefferson reasoned that Native American remains stratigraphically below others in burial mounds would be older than those above; hence (according to the questionnaire's assumptions) the artifacts in those lower strata should be more developed (and the makers physically larger). Dug stratigraphically and compared layer by layer, the material remains did not show any differences – Jefferson uses the new Enlightenment canon of sense perception, empirical knowledge derived from experience to falsify the initial "hypothesis."

The absence of a falsifiable hypothesis complicated the efforts recently to rehabilitate the reputation of Rocque Joaquin de Alcubierre, the Spanish military engineer in the employ of Charles of Bourbon, King of Naples, and to name him the Father of Classical Archaeology for his 1738 excavation of Herculaneum. Usually vilified as a plunderer and foe of his more systematic successor, Karl Weber (excavated from 1749), he is now acknowledged for at least making lists of the antiquities coming up from his shafts into the Vesuvian detritus and some note of where these treasures were found. As for his research question (or hypothesis) and his plan of attack (or protocol) – there were none of these. The same can be said for scores of other plunderers and curiosity seekers devastating the countless barrows, mounds, ruined cities and tells of Europe and, increasingly, the new territories of European expansion during the years of the Enlightenment.

Post-Enlightenment it is difficult to comprehend just how liberatingly radical (and recent, only with Locke's 1690 *Essay Concerning Human Understanding*) and dangerous to the established order was this experiment with how we comprehend the world from the material evidence around us. If, however, Jefferson can be called the sole "accidental" archaeologist of the Enlightenment, he was nonetheless attacking his problem in a quite current archaeological manner. By the Enlightenment period's close, the problem of comprehending the motivations of peoples distant in customs or in time was turned on its head compared to how pre-Enlightenment scholars would have proceeded: They may be us as we once were, but they are us, nonetheless.

Intellectual Liberation: The Enlightenment

Europe's world expansion would not have sufficed to challenge medieval ecclesiastical doctrine that all but the Christian chosen were lesser approximations of God's image. There was far too much need for justification of conquest and genocide, such as Fray Ginés de Sepúlveda's (c. 1560) assertion that the so-called savages of the Americas were not even human. All that began to change with the realization that the rude stones and bones being unearthed in increasing numbers from the ancestral soil of Europe looked undeniably like those made by so-called barbarous tribes far away. The best Enlightenment minds asked the archetypal archaeological question that rests the basis for all current assertions of universal human rights: Are they what we were once – or are now still? Beginning in the mid-seventeenth century, new inquiring minds of Europe began to invent a new authority to interpret distant savages and their own distant ancestors. The *philosophes* looked upon the face of modern savages and ancient brutes and saw there none of the revealed certainties of the senescent medieval order.

Intellectually, that medieval order, God's Order, was starting to crumble. The Enlightenment was not conceived in a vacuum: since the sixteenth century, curios from voyages of discovery and amateur diggings, together with natural science samples, found their way into

Wunderkammern or Cabinets of Curiosities. These were far more than proto-museums. They were the mirror of the universe, where Divine purpose was exposed to scrutiny of reason. Scholars scrutinized their *Wunderkammern* for universal, mechanical laws championed by Descarte, Kant, Buffon, and Newton. Dangerously, humans, too, were forged into God's Great Chain of Being and so belonged with all things measurable – animate and inanimate and present and ancient (as brilliantly presented in Arthur Lovejoy's *The Great Chain of Being*). Now, if God made the Great Chain, then He must have made it according to immutable principles. It was a given of the established order, that authoritarian cabal of clerics, princes and pre-Enlightenment scholars, that each link in the Great Chain was a unique, well-differentiated "natural species." Each link was present since the creation, each unchanging – each so different from its neighbors on the Chain that one could talk of an organic barrier to the understanding of the mental processes of one from the next just as unassailable as the genetic barrier between species. This was particularly the case in the matter of the "micro-" Great Chain of Being on which each people of the globe stood arrayed, a reflection in small of the "macro-" Great Chain of all organic life forged by God.

Linnaeus was ranking species, not just classifying them, when he invented, *Homo troglodytes*, the link to the great apes immediately below the rudest of living primitives. So too, as late as 1790, Soame Jenyns produced a seriation of humanity from the "brutal Hottentot" to Newton. However, as early as 1636, Peter Heylyn's *Microcosmos* makes a direct comparison of North American Aboriginals to Europeans 300 years after Noah's flood. While the members of the Scottish Enlightenment (Ferguson, Stewart, Adam Smith, Millar) and their French counterparts (Turgot, de Concorcet, Buffon, Montesquieu, Voltaire) were to make God an irrelevancy to the discovery of the principles of causation, they transformed how one uses the evidence of ancient times to know the workings of the minds of people very different than themselves. First, they championed the abandonment of the idea of a radical divide between the European and the rest of humanity. Secondly, there evolved an equation of ethnographic distance from Europe with the historical distance ancestors. This, in and of itself, was not particularly revolutionary. Certainly, it would not have been considered a remarkable insight when, in 1750, Turgot stated that all stages of development leading to the European nations were represented somewhere in the world. What was pioneering were the methods of analysis and the initial presumption of a transcendent, constant human nature.

If we take 1690 (publication of Locke's radical exposition of empiricism and the implicit challenge to the established order by denying the monopoly of a God-given warrant of Truth and Authority) as the beginning of the Enlightenment (and the 1789 beginning of the French Revolution as a somewhat arbitrary end), then what were the particular threads of thought in the multicolored weave of Enlightenment thought that made a modern archaeology possible?

Paired with the persistent anti-clericism of the period was a faith in science. Science, not in the sense of a protocol of skeptical testing and analysis that it has recently come popularly to mean, but as a liberation of the mind, of human consciousness from ignorance and immature (read: received) doctrine. Each an authority unto him or her self, each demanded by Locke to understand the world by the testimony of her or his own sense perceptions, each person had within the soul of a scientist and student of natural laws of the universe and of humanity. In the case of moral (human) laws, the goal of these studies was to isolate causation of human history by pragmatic observation, classification, and experiment. The laws thus revealed were to possess the same structure as natural science laws and, because they were lessons to reduce humanity's pain, were of even higher moral status. The means were open mindedness and unfettered empirical inquiry; the results would be democracy, equality, and progress! Laws were predictive. Infinite perfectibility was the law of nature. Societies develop along universal, linear stages, each developing out of the preceding. Scientific society was the highest moral end of history. As Kant wrote in his 1784

Was ist Aufklärung?, "Enlightenment is man's release from his self-inflicted immaturity. Immaturity here means man's inability to make use of his intelligence without direction from another."

History could only be treated as an equal to natural science because of an abiding faith that all humanity was borne of a common ancestor. This (monogenist) faith in global innate equality of intelligence, articulated by Buffon (1749) and Ferguson (1767), is passed on to the next generation by Prichard (1813, 1841) as the "psychic unity" of the social evolutionists. However, the idea of progress (that science, or a society directed by a committee of scientists, would inevitably lead to a higher quotient of happiness or lessening of pain, or of enlightenment in the world) was not so highly regarded by all *philosophes*. Rousseau, with his 1755 *Discourse on the Origins of Inequality*, challenged the abiding faith of luminaries, from Voltaire to Adam Smith, that (empirical) discovery of laws of human history would ineluctably lead to a better humanity. Rousseau's prescription was that the material gain that was science's harvest, especially private property and luxury, would lead to greater inequality, to the degeneration of society. Lost, perhaps, in most discussion of Rousseau is the shared assumption, his and his adversaries, that all humanity, all races, and all social classes partake of a universal psyche. By the mid-eighteenth century, at least in the rarified world of Enlightenment discourse, the revolutionary idea of a common human mind was unremarkable.

Eventually, the expression of this idea of a global innate equality of intelligence with greatest impact (albeit indirect) on archaeology was by the tragic Marquis de Condorcet, in his ten-stage, unilinear history *Esquisse d'un Tableau Historique des Progrès de l'Esprit Humain* (1793). This is the most revolutionary thesis of the Enlightenment in his use of antiquity to develop, empirically, not just a history of civilization but a "law" of the role of science in the grand schema of moral progress, justice, and human rights. Importantly, modern hunters and gatherers are survivals from the original human condition. They may still be steeped in ignorance because of environment or historical accident, but not because of biological (racial) barriers to progress or because they degenerated from an earlier condition. Stage by stage, the now familiar Enlightenment concepts of a comprehendible, universal, and law-driven humanity are expressed. Progress comes as ignorance is stripped away and as science increasingly drives rational society. Progress in the natural sciences will be followed by that of the moral or philosophical sciences, the latter with equal or more import for humanity. Expanding knowledge in all sciences leads inevitably to individual freedom and to more justice. And (as a methodology), study of the past reveals a causal order (laws, if you will) that can be rationally understood and that apply to all of humanity. Thus, the problem of comprehending the motivations of peoples distant in customs or in time was really a non-problem: They may be us as we once were, but they are us, nonetheless.

The third Enlightenment "Big Idea," no less foundational to archaeology than liberating science and global innate equality of intelligence, is one that rarely gets mention. Denis Diderot and Jean le Rond d'Alembert edited the Enlightenment's signature publication, the 28 volume *Encyclopédie* from 1751 to 1771. The spiritual importance to archaeology is in its full title, *Encyclopedia*, or *Analytical Dictionary of the Sciences, Arts, and Crafts*. Radical! In the last word of the title, *Crafts* or better in the French *Métier*, the once despised (or at least neglected) "mechanical" techniques and tools of everyday craftsmen were elevated to equal significance with the more cerebral sciences and (fine) arts. Hundreds of articles on the everyday craft of working with material things and hundreds of pages of engravings of tools, all for the purpose of showing how human experience and understand, are embedded in the mastery of mechanical things. If all that archaeologists can and have ever done is to read in the fragmentary material evidence the story of how peoples in the past acted upon the world as they perceived it, how better to try to comprehend the intentions and motivations of those peoples than through examination of the tools by which they acted upon the world? Ancient tools are not, of course, the be all and end all of archaeology. But arguably Diderot (himself the son of a master

cutler) sped us on the way from an exclusive celebration of fine arts (as in Johannes Winckelmann) to the omnivorous purview of archaeology today. (Junior archaeologists forced to create their first lithic or ceramic typology curse Diderot still!)

Reactions to the Enlightenment

The Enlightenment remained in its armchair. Real, systematic excavation as we recognize it today would have to wait until the late nineteenth century (with Pitt Rivers at Cranborne Chase (1887–1898) and as a profession, much later). More troubling as the nineteenth-century reaction against revolutionary ideas of universalism and Egalité and against the horrors of the French Revolution and the Napoleonic betrayal set in, speculation about the past fell increasingly into the hands of nationalists and mystical Romantics. There were Enlightenment-like carry-overs, to be sure. Saint-Simon (1813–1825) and, especially, August Comte greedily consumed classical antiquity and comparative prehistory as they carried the sputtering torch of progress and unity of method with the natural sciences. In his *Système de Politique Positive* (1824) and *Cours de Philosophie Positive* (1830–1842), Comte articulates a grand hierarchy of all the sciences. Social physics (history) will be the last to mature but will boast the profoundest laws. In the end, however, Comte's grandiose plans for history simply became irrelevant to the growing numbers of advocational field archaeologists. For them, the living prehistory represented by the diverse peoples of the new colonies overseas served as a quite adequate and uncomplicated illustration of how ancient peoples lived. The larger Enlightenment project of divining laws of moral progress by which all of humanity could be lifted up was largely abandoned. If those savages had had a history, it was irrelevant. The hand axes of Australian Aboriginals were just hand axes, with no innate lesson to teach about causation of history or about progress. These nationalists and mystics (e.g., Hegel. Herder, Schiller, and Fichte) held that each people had their own particularistic history, determined by geographical accident or race. Nationalism melded with the conceit that natural selection produced some races superior in intelligence and capacity for complex social institutions, while others – argued Lubbock in his *Prehistoric Times* (1865) – were destined only for cultural stasis.

Still, Enlightenment concepts lived on. Social evolutionists held as unremarkable the belief that variability in the ethnographic record mirrors humanity's past – so argued Lubbock in 1865. So Sollas still maintained in his 1911 *Ancient Hunters*, where he equates Tasmanians with the European Lower Paleolithic society, the Middle Paleolithic with Australian Aboriginals, and the Upper Paleolithic with the Eskimo and Kalahari San. The social evolutionists reinvented bastardized versions of "psychic unity": Within the same stage, ethnographic and archaeological peoples share the same emotions and same intellectual capacities. We see this in Sir James George Frazer's (1890, 1906–1915) belief in cross-cultural survivals of primitive totems and religion (eventually to give way to scientific thought).

One would be forgiven for seeing in more recent theoretical "stances" of archaeology (as anthropological archaeology) a pendulum swing toward and against fundamental Enlightenment contributions. We see a swing against in Boas' rejection of cross-cultural unilinearism and his and his immediate archaeologist students' writings against all forms of speculative, comparative laws of evolution, race, or progress. The field swings toward Enlightenment ideas with those optimisms of the new archaeology's first flush that archaeology becomes a science would transform the discipline into a true anthropology of the past. More recently, we have witnessed the post-processual recoil against renouncing all attempts to make archaeology into an anthropology aping the natural sciences. These theoretical swings and debates and even in the language in which those debates we see revealed the Enlightenment's deep legacy.

From mid-twentieth-century European and North American skepticism that the motivations of the long-dead could ever be known and W. W.

Taylor's argument that the archaeologist can never be a part of the past, so it is impossible for him or her to reconstruct a civilization, to Louis Binford's late career repudiation of an earlier position on the question of whether ancient beliefs and intentions could ever be reconstructed and then the post-processualists' astonishing reinvention of an empathetic source of real knowledge of the past (Hegel and Herder would have been proud) – the Enlightenment belief that the mind (intentions and motivations) of past peoples might be comprehended by the living is alive and well (and hotly debated).

At the end of the day, one of the enduring legacies of the Enlightenment (and of debates post-Enlightenment) is the general acceptance that archaeology is the study of the remains of past people's actions upon a world as socially constructed and perceived. Few archaeologists would go so far as to say that the process of social construction is mystical and, hence, utterly unknowable empirically. Behavior does not depend upon an inner logic (manual of translation) that is forever hidden from outsiders to the community. There is an emerging optimism that past motivations can be at least partially revealed through the investigation of how symbols and objects function as devices or insignia communicating peoples' view of themselves. That would be a novel way of putting the issue, one that would make the *philosophes* scratch their chins (scratch beneath their wigs?). But it is a concept that would not be completely alien.

Further Readings

Gay, P. 1966. *Enlightenment: An interpretation; the rise of modern paganism*. New York: Knopf.

Hankins, T.L. 1985. *Science in the enlightenment*. Cambridge: Cambridge University Press.

Lovejoy, Authur O. 1936. *The great chain of being: A study of the history of an idea*. Cambridge, MA: Harvard University Press.

Manuel, F. E. 1965 (1962). *Prophets of Paris: Turgot, Condorcet, Saint-Simon, Fouier, and Comte*. New York: Harper & Row.

Porter, R. 1990. *The enlightenment*. Houndmills, Basingstoke: Macmillan.

Spencer, L., and A. Krauze. 1997. *Introducing the enlightenment*. New York: Totem Books.

Stiebing, W.H. 1993. *Uncovering the past. A history of archaeology*. Oxford: Oxford University Press.

Trevor-Roper, H. 2010. *History and the enlightenment*, ed. John Robertson. New Haven: Yale University Press.

Trigger, B.G. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.

A

Archaeology in Transylvania

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State of Knowledge and Current Debates

Although there is no such modern political entity as Transylvania (today part of Romania), the theoretical archaeological currents and practices used in this historical region since the beginning of the nineteenth century make it a well-defined entity in archaeological research. In the following, the notion of Transylvania is used to describe the part of Romania located inside the Carpathian Basin, including the regions once referred to as Partium and Banat, as historical-cultural regions.

From Antiquarianism to Modern Archaeology (1458–1859)

The history of antiquarianism in Transylvania has its roots in the medieval urbanization of the region when the prehistoric, Roman, and early-medieval monuments were looted and reused in the first monumentalized building projects of the Saxon and Hungarian cities (Szabó 2014). During the age of János Hunyadi and Mathias Corvinus (1458–1490), the first collections of Roman monuments were established at the royal court of Mathias Corvinus, followed by numerous Renaissance collections of bishops and the high elite of the local aristocracy (Balogh 1943). The first documented excavations and archaeological discoveries were made in the eighteenth century when the Habsburg administration changed the urban landscape of the medieval towns radically. Due to the large construction sites, such as the Vauban forts of Alba Iulia or the military

buildings in Cluj and several other towns in Transylvania, many of the Roman and medieval sites were severely damaged. The territorial expansion of the urban areas and the agricultural reforms of the eighteenth and nineteenth centuries accelerated the increase in the number of excavations. Important discoveries were made in this period, for instance, at Várhely, the Roman Colonia Sarmizegetusa, Alba Iulia, the Roman Apulum (Szabó 2013), Szilágysomlyó (Stark 2000), and Nagyszentmiklós (Bálint 2004). Numerous Roman and prehistoric sites were discovered at the end of the eighteenth century. Some of them – such as the Roman baths of Herkulesfürdő (today Băile Herculane) and the wax tablets of Verespatak (Alburnus Maior) – were discussed widely in European academia. The capital of the Dacian Kingdom, Sarmizegetusa Regia, was discovered in 1804 also by the Habsburgic administrative and military staff of the region. Antiquarianism changed during that time from a privilege of royal and clerical (aristocratic) activity into a widespread fashion of scholars, travellers, and treasure hunters (Bărbulescu 2012). Important studies on the archaeological heritage and visible ruins of Transylvania were written in the first decades of the nineteenth century. First systematic excavations were conducted by Károly Torma at various sites of the Roman Limes. Due to the political status of Transylvania as part of the Habsburg Empire, most of the remarkable finds were transported to Vienna from the eighteenth century till 1867. Likewise at the end of the eighteenth century, the first systematic collections of antiquities emerged, e.g., the private museum of Count Batthyány Igánc from Karlsburg (Alba Iulia, Gyulafehérvár) and Samuel Brukenthal from Hermannstadt (Sibiu, Nagyszeben).

As a result of the Enlightenment and the so-called Hungarian Reform Period, the elite of Transylvania began to embrace the idea of collecting, promoting, and protecting the cultural and archaeological heritage of Transylvania; however nationalism plays a minor role in this period, which will be more powerful after 1867. As a result of this almost 50-year-long process, in 1859, Imre Mikó founded the Transylvanian Museum Society. This institute – formed and organized after the model of the Hungarian Academy founded in 1825 and the Hungarian National Museum in 1802 – was meant to be the supreme academic forum for scholars in this region. With the foundation of the Transylvanian Museum Society, the period of private collectors and sporadic excavations slowly ended, and a period of systematization and organized heritage protection began.

Transylvanian Archaeology in the Belle Époque (1859–1918)

The second half of the nineteenth century is marked by several political and legal changes. After 1867, when the Austro-Hungarian Empire was established, Transylvania became a part of the Hungarian academic environment again. This meant also a legal shift in the protection of the archaeological heritage. As a consequence of the foundation of the Transylvanian Museum Society in Cluj (Kolozsvár), in the 1870s and 1880s, numerous local museums and institutions were established. Their role was to enter in the systematic network of museums from the Hungarian Kingdom, organized and monopolized by Budapest and the National Inspectorate of Museums (Szabó 2016: 152–154). Archaeological excavations in urban and rural environments were organized by scholars (usually teachers financed by local politicians) from these local associations from Fehér (Alba), Hunyad (Hunedoara), Szilágy (Sălaj), Temes (Timiș), and several other counties (Szabó 2016: 154–160). Their impact was enormous, and it still defines the museum-related and archaeological heritage policies of this region.

The associations and some of the leading personalities of this period played an important role in the foundation of several museums; they also edited and published the first comprehensive monographs on the history and archaeology of Transylvania and promoted the protection of archaeological heritage for the greater public. The systematic excavations carried out especially by Gábor Téglás and his team in Colonia Sarmizegetusa (Boda 2014), by Zsófia Torma in Tordos (Coltofean 2014), and by Béla Cserni, the "father" of urban archaeology in Transylvania, in Alba Iulia (Szabó 2016), represent not only important contributions to local archaeological heritage research and preservation, but they also

introduced new methods to the archaeological process such as photography, site journals, highly accurate reports, documentation, and multilingual publications. Cserni was a pioneer not only in urban and rescue excavations but also in public archaeology. His work is essential to understand the topography and history of numerous sites in the region even today. The first department of archaeology in this region was founded at the new university of Kolozsvár (Cluj) at the end of the nineteenth century. The strong personality of Béla Pósta (Vincze 2014) created an archaeological school, which dominated all the excavations and the actions in the protection of archaeological heritage in Transylvania and Hungary between 1899 and 1916. His most important contribution to the field was the systematization of museology and university education of archaeology, which became an official discipline in Transylvanian research and higher education after 1874. His was also the very first attempt to create a real "Transylvanian" school of archaeology within the Austro-Hungarian academic environment, which communicated with the center (Budapest) and the international community but focused on local particularities and problems.

The downside to his school and dominant personality was the monopolization and centralization of the archaeological heritage and the excavations, which marginalized local museums and scholars. This period marks also a change in the archaeological narratives in Hungarian historiography. While publications from the early nineteenth century were much less ideologically influenced, publications from the end of the century are part of the larger European trend of nationalistic tendencies in archaeological thought (Diaz-Andreu 2007; Anghelinu 2014). While till the mid-nineteenth century, Roman and prehistoric archaeology was favored, after 1867 and especially after 1896 (i.e., the year of the Hungarian millennial celebration), early-medieval and Hungarian archaeology was emphasized. This tendency also reflects the imperialistic ideology of contemporary Hungarian academia and research. The relationship between Budapest and Kolozsvár (Cluj) reflected the same, central-periphery relationship as it was attested between Kolozsvár and the provincial museums of Transylvania (Szabó 2016). While some of the regionally important finds were transported to Sibiu and later Cluj, the most remarkable objects were sent to Budapest. Most of them are still in museums in these locales.

Parallel Discussions: Archaeology in Transylvania in the Interwar Period (1918–1939)

After 1918, Transylvania became part of the Romanian Kingdom. Beside the political changes, the archaeological narratives suffered also an ideological shift of paradigms in numerous fields. The Hungarian academic environment – which had dominated the local research until that point – was marginalized or left the country, being replaced on the institutional and educational level by a new Romanian group of scholars (Anghelinu 2014: 113–134). This affected not only the archaeological narratives but also the administration and infrastructure of the historical and archaeological monuments. Although a Commission of Historical Monuments for Transylvania was established, the looting of the archaeological heritage in the 1920s and 1930s increased significantly, especially in urban environments (for Alba Iulia as case study, see Szabó 2014). The number of systematic and rescue excavations decreased significantly. Both theoretical discussions and archaeological research came to emphasize Dacian history and the continuity of Latinized populations in Transylvania after 271 A.D. Most of the sites chosen for excavations and for preservation by the Commission and the leading archaeologists were related to Dacian history (Grădiștea Muncelui/Sarmizegetusa Regia) and the Roman period (Colonia Sarmizegetusa). Transylvanian archaeology as such ended and became integrated into the leading archaeological schools from Bucuresti. The most emblematic figure of this period was Vasile Pârvan, often referred to as the father of modern Romanian archaeology. His school from Bucuresti was influential also in Transylvania, dominating the major research policy of the new Romanian academic elite from Cluj. However, the charismatic personality of Constantin Daicoviciu created a new school of ancient studies and archaeology in Cluj in the 1930s which was to dominate the field till the

mid-twentieth century and creates a certain provincialization of the Romanian archaeology. His influence marked not only the higher education in history and archaeology, but as the president of the Commission of Historical Monuments, he also decided the major currents in field archaeology. His publications on the ancient history of Transylvania provoked a severe reaction from Hungarian academia, creating a long-lasting debate on continuity and the ethnogenesis of the Romanians (Visy 2015).

From Marx to Ceaușescu: Archaeology During the Communist Regime (1945–1989)

Although the political ideology of Great Romania and the dominance of Bucuresti in local archaeological narratives were observable in the 1930s, the so-called Transylvanian archaeological school retained a certain autonomy until 1945. The rise of the communist regime, however, imposed a much stronger and centralized ideology in classical education and field archaeology (Matei-Popescu 2007; Anghelinu 2014: 155–239). In the 1950s, Marxist ideology influenced the archaeological narratives on the ethnogenesis of Romanians. Instead of emphasizing the "imperialist" and Western (Roman and Latin) origins of the Romanians, new studies were focusing on the Slavonic elements and the history of Romanians. Excavations at early Slavonic sites in Transylvania played a crucial role in the creation of these new narratives (Horedt 1958). Transylvanian archaeology in this period played a crucial role in the establishment of a strong Marxist, united country. In the emerging narrative, the history and materiality of this region was used to legitimize the new political regime. Roman sites and history were ignored or played a less important role till the 1960s when another shift in ideology occurred. With the rise of Ceausescu in 1968, Romanian archaeological narratives started to combine nationalism with Marxism. Dacian and Roman history were used to legitimize the personal cult of the new dictator. Excavations in the Orastiei Mountains and other Dacian forts in Transylvania were in focus again, as were the Dacian ethnical elements in the ethnogenesis discussions. Constantin Daicoviciu, as the leading scholar of antiquity and archaeology in Cluj, changed his political affiliation several times to save the position of Cluj as the center of ancient studies. This effort created a conflict with the political elite from Bucuresti and marked his carrier and, indirectly, his personal life too.

Due to the large urbanization projects of N. Ceausescu in the 1970s, urban archaeology gained unprecedented dimensions in Alba Iulia, Cluj-Napoca, Drobeta-Turnu Severin, Turda, and other cities. Large reconstruction projects were initiated at various Roman sites, favoring especially the military archaeology and the *Limesforschung* in Romania (Gudea 1997). Transylvanian archaeologists and classicists, such as Constantin Daicoviciu, Hadrian Daicoviciu, Ioan Glodariu, Nicolae Gudea, and Ioan Piso, ensured the position of Cluj as leading archaeological school of the region, while others, such as Ion Berciu or Doina Benea, established regional centers of archaeological investigations in Alba Iulia and Timisoara. Some of these charismatic personalities (especially Hadrian Daicoviciu) became celebrities of their time. Hungarian archaeologists and the once well-known Béla Pósta School became less and less important in the formation and maintenance of a specific Transylvanian archaeological narrative. Gyula László and István Ferenczi as archaeologists and András Bodor as the only Hungarian classicist in Transylvania created a bridge between the new school of Daicoviciu and the old, Béla Pósta period.

A more obvious clash and academic debate existed between Hungarian archaeological narratives from Hungary on ethnogenesis and early-medieval archaeology and the Romanian one. The publication of a new Hungarian companion on the history of Transylvania (Köpeczi 1986) had a scandalous impact on the narratives of the Ceausescu regime.

A particularity of this period is the slow internationalization of Romanian archaeology. Although the mobility of the scholars in this period was extremely limited, some of them were able to participate in international conferences at least in the 1970s. Romania also signed almost all international cartas and agreements on the protection of archaeological heritage and patrimony rectified in this time. Few foreign

Archaeology in Transylvania, Fig. 1 Transylvania in 1910. (Source: *Nemzeti Internetfigyelő*)

exhibitions on the famous Roman and Dacian treasures and the archaeological heritage of Romania were presented outside the country (Condurachi 1963; Condurachi and Daicoviciu 1972). Numerous local museums were newly established and organized after the ideology of Ceausescu. Most of these interiors still exist, as a historical memento for Communist narratives of archaeology.

New Tendencies and Perspectives in Archaeology and the Case of Transylvania (1989–2016)

Since the fall of the Communist regime, archaeological narratives and practices have changed numerous times in Romania. Archaeological legislation suffered many changes over the last quarter of a century (Borș 2014). Although Romania became a member of the European Union and rectified most of the international treaties, the increased number of rescue and urban excavations is rarely documented or published properly. International projects and collaborations create new possibilities to attest, document, and present the archaeological heritage of the country, although modern museology and interactive methods still need to be improved. Archaeological databases and online catalogues were already established in the last decade, although the national register of archaeological sites is far from being satisfactory or complete. The number of centers of archaeological education increased significantly, deconstructing

the Cluj-Bucuresti dichotomy, although the dominance of these two schools and their archaeological institutes are still attestable in publications and field archaeology too. Transylvanian archaeology as such at present is experiencing a revival as well. The heritage and the school of Béla Pósta were newly established in Cluj by the Béla Pósta Association and the Transylvanian Museum Society, who for many years has been organizing annual archaeological conferences and also created a by now well-established archaeological school for Hungarian students focusing mostly on local sites. Important schools and excavations were organized emphasizing the medieval history of Transylvania and establishing a first generation of medieval archaeologists in the region.

The Archaeological Institute and the National History Museum of Transylvania from Cluj represent also an important factor in the overall evolution of Romanian archaeology. The most visited archaeological museum of the country is still in Transylvania, Alba Iulia, while most of the publications and rescue excavations and major international projects are focusing on this region. From the 16,000 archaeological sites registered in Romania, 6000 are from Transylvania. In the last decade, collaboration between Cluj and Bucuresti has become much friendlier and ideologically less charged which many of the recently established committees and national commissions being formed by mixed groups from Transylvania and beyond (Fig. 1).

Cross-References

- ► Béla Pósta
- ► Central–Eastern Europe: Historical Archaeology
- ► Ethnic Identity and Archaeology
- ► Europe Incastellated: Medieval Archaeology

References

Anghelinu, Mihai. 2014. *Evoluția gândirii teoretice în arheologia din România. Concepte și modele aplicate în preistorie*. Târgoviște: Editura Cetatea de Scaun.

Bálint, Csanád. 2004. *A nagyszentmiklósi kincs*. Budapest: Corvina Kiadó.

Balogh, Jolán. 1943. *Az erdélyi renaissance*. Kolozsvár: Egyetemi Nyomda.

Bărbulescu, Mihai. 2012. *Inscripții din castrul legionar de la Potaissa*. București: Editura Academiei Romane.

Boda, I. 2014. Ulpia Traiana Sarmizegetusa and the archaelogical research carried out between 1881 and 1893, *Studia Antiqua et Archaeologica* 20: 307–351.

Borș, Corina. 2014. *Protejarea patrimoniului arheologic din România. Despre situri și monumente arheologice din perspectiva evoluției cadrului legislativ în contextul european*. Cluj-Napoca: Editura Mega.

Coltofean, Laura. 2014. Unveiling Zsófia Torma. The diary of a woman, an archaeologist and a visionary. In *Fifty years of Tărtăria Excavations. Festschrift in Honor of Gheorghe Lazarovici on the occasion of his 73rd Birthday*, ed. John Marler, 258–273. Suceava: Editura Lidana.

Condurachi, Emil. 1963. *L'archéologie roumaine au XXe siècle*. București: Editura Academiei Romane.

Condurachi, Emil, and Constantin Daicoviciu. 1972. *Archaeologia Mundi Roumanie*. Geneve: Nagel Press.

Diaz-Andreu, Maria. 2007. *A world history of nineteenth-century archaeology. Nationalism, colonialism and the past*. Oxford: Oxford University Press.

Gudea, Nicolae. 1997. *Der Dakishe Limes. Materialien zu seiner Geschichte*, 1–113. Mainz: RGZM Verlag.

Horedt, Kurt. 1958. *Untersuchungen zur Frühgeschite Siebenbürgens*. Bucuresti: Editura Academica.

Köpeczi, Béla. 1986. *Erdély története I-III*. Budapest: Akadémiai Kiadó.

Matei-Popescu, Florian. 2007. Imaginea Daciei Romane în istoriografia românească între 1945 şi 1960. *Studii si Cercetaru de Istoria Veche si Arhologie* 58 (3/4): 265–288.

Stark, Robert. 2000. *Studien zu den Schatzfunden von Szilágysomlyó. Beiträge zum edelsteinverzierten Goldschmuck in der Selbstdarstellung von Eliten spätantiker Gesellschaften*. München: Ludwig Maximillians University Press.

Szabó, Csaba. 2013. The Mithraic statue of Secundinus from Apulum. *Revista Doctoranzilor de Istoria Veche și Arheologie* 1: 45–65.

Szabó, Csaba. 2014. Discovering the gods in Apulum. Historiography and new perspectives. *Revista Doctoranzilor de Istoria Veche și Arheologie* 2: 53–82.

Szabó, Csaba. 2016. *Béla Cserni and the beginnings of urban archaeology in Alba Iulia*. Cluj Napoca: Mega Publishing House.

Vincze, Z. 2014. A kolozsvári régészeti iskola a Pósta Béla korszakban (1899–1919). Kolozsvár, 2014.

Visy, Zsolt. 2015. Dacia . . . diuturno bello Decibali viris fuerat exhausta: András Alföldi and the continuity of Dacia. In *Andreas Alföldi in the twenty-first century*, ed. John R. Richardson and Federico Santangelo, 269–291. Stutgart: Franz Steiner.

Archaeology of Affection

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Introduction: Butterflies in My Stomach

Two years ago, I was surfing the internet when I was struck by news that made me shake from head to toe. The Brazilian Federal Senate had just accepted the request to initiate the impeachment case against President-elect Dilma Roussef. A coup d'etat was beginning to unfold in Brazil. For a few seconds, I was unsure about what to say, how to feel, or what to think. I felt like I had butterflies in my stomach. I had the impression that, as I was reading the news, light fled, emptying the space around me. The atmosphere became heavy, dark, and very dense. Another feeling that was hard to explain. A set of intensities which I also found difficult to express and put into words. An overall feeling of discouragement washed over me. Over the next few days I tried to rationalize these feelings, to think positive, but this was not an easy task. These intensities seemed to haunt me. The problem was that everyone around me seemed equally drowned in this hopelessness. Obviously, those who supported the coup d'etat against President Dilma were visibly pleased, but the rest of people, over 70% of the population, were feeling just like me. I do not know if it was the uncertainty, the fear, or the anguish about an uncertain future that generated these sensations. All I can say is that I myself could not express what I was feeling. Everything was blue.

But what are these intensities that sometimes take over our body and that we struggle to put into words? What are these visceral intensities that sometimes invite us to activity and other times prevent us from even moving? Some would call them affections or affect, others would say they are emotions. What is the difference between emotion and affect? Is there a difference at all?

Far from being a new issue, such questions as these have been among the focal points of the so-called affective turn. Influenced by feminist thinking, queer theories, and the work of philosophers such as Deleuze, Spinoza, and Bergson, the affective turn emerged in the 1990s. The affective turn sprang up as an alternative that might overcome the dichotomies and dualisms of constructivism and theories of representation, especially those involving mind and body, action and emotion, human and nonhuman. However, the first problem we encounter when approaching the literature about affect is that there is no consensus about what affect is or what it actually means to affect and be affected. While some researchers use affect as a synonym for emotion, others prefer to differentiate between emotion, affect, feelings, and sensations. Among the latter, emotion is conceived in close association with judgment processes, while affect is conceptualized as an unconscious and bodily intensity. Emotion would be a socially constructed and culturally variable element whereas affect would be an asocial phenomenon. Therefore, while norms, values, and social structures determine both the emergence of emotions and their appreciation (Von Scheve 2016), affect is not subject to influences of an ideological character.

Re-reading of Deleuze's works, Brian Massumi – considered one of today's most influential proponents of the affective turn – has attempted to organize the differences between affection and emotion, feeling and sensations to put forth that feelings are personal and biographical phenomena, that is, that they are intensities originating from our life experiences as individuals. It is only when these intensities are socially categorized that they become emotions. Emotion would thus be the social representation of a feeling, the linguistic extroversion of a felt intensity. Affection, on the other hand, would be a pre-cognitive and pre-linguistic intensity which prepares our body for an action in a certain situation, i.e., it is a body's capacity to affect and be affected by something.

Background: Four Great Traditions

Thrift (2007) lists four major currents of thought about affection. The first theoretical approach is linked to phenomenology, mainly to the work of Sarah Ahmed. The second trend is associated to psychology, neuroscience, and the works of Sylvian Tomkins and Eve Sedgewick. A third line of thought would be associated with neo-Darwinian thinkers. Finally, the fourth way of envisioning affect is associated with the works of such philosophers as Gilles Deleuze and Baruch Spinoza. These different currents of thought are not exclusive or closed but intertwine and share some theoretical tenets, concepts, and structures of analysis. As a result, a deep and healthy theoretical diversity emerges with the benefit of encouraging a constant actualization on the part of these different approaches. At the same time, such diversity can become problematic when it is perceived as an overall incongruous use of concepts.

Among those theorists of affect associated with phenomenological thought, affect is conceived as a group of bodily practices that produce defined and visible gestures and a specific bodily conduct. To proponents of this approach, being affected by something is to evaluate and judge that something. In Ahmed's view, for example, before we are affected by something or someone, this something or someone must have a place that determines whether we will be affected in one way or another. Such a place involves psychic and social dispositions and dimensions, which means that this place is always in transformation (2004). For Ahmed, emotions are not just feelings that someone or something has, but feelings that cause bodies to open up to each other. According to Ahmed, "It is not just collective bodies that are shaped by emotion, it is through experiences like pain that we come to understand the surfaces of our own bodies, to understand where they collide with objects and others to set ourselves apart" (2004, 26). In this way even the most solitary of emotions is social. In Ahmed's view, since emotions are relational elements, we should not ask ourselves what emotions are but what they do.

Critics of phenomenological positions have pointed out that, whether or not they are grounded in affective theory phenomenological approaches rely on the idea of empathy, that is, that as humans we may experience things in similar ways (Harris and Sørensen 2010). This idea is directly grounded in the notion that sensations are universal and trans-historical. At the same time, in phenomenology, intentions remain trapped in repetition preventing the emergence of the new. According to Massumi (2002), phenomenology envisions the personal as prefigured or pre-reflected in the world, in a closed circle of intentionality. The act of perception or cognition is a reflection of what is already pre-embodied in the world, in an endless repetition of the same structures.

The second theoretical approach within affect studies is rooted in psychoanalysis and the Freudian conception of drive, that is, those psycho-physiological processes that are the basis for the development of human identity and motivation. Among the best-known drives are sexuality, libido, and desire. Within this framework, emotions are both manifestations and consequences of a drive. An early proponent of this approach, Tomkins (1962–63) considered affection an inherently psycho-physiological process and argued for the separation of drive systems from affective systems. Tomkins considered the drive system to be very restrictive, directed to specific objects, and temporally limited. In contrast, he suggested that such affects as anger, pleasure, sadness, happiness, etc. are more open, less directed to specific objects, and more temporally flexible. Tomkins proposed that affects could be bound up with things, people, ideas, sensations, relationships, activities, ambitions, institutions, and anything else, including other affects. At the same time, Tomkins advocated the existence of what he called "basic affective programs," that is, a stable evolutionary set of eight orchestrated responses that evolved to signal urgency and allow action to be initiated (Tomkins and Mccarter 1964, 120). The framework is called the paradigm of basic emotions and posits that basic emotions – also called affective programs – do not involve any

kind of cognition or belief about the objects in the world, since emotions constitute a fast, automatic, and evolutionary response meant to guarantee an organism's survival. The speed at which the affective system operates prevents affections from being appreciated by the cognitive system, thus creating a kind of lagging between both systems. In this sense, affects would be unintentional body responses operating below the threshold of cognition. Leys has thus shown that (2011, 440), "as Tomkins has put it, there is a gap or radical dichotomy between the real causes of affect and the individual's own interpretation of these causes. The result of Tomkins's approach is to suggest that affects are only contingently related to objects in the world."

Tomkins' work paved the way for cultural studies on affect, especially those that view affect as a phenomenon closer to feeling and emotion, and hence to human bodies (Thrift 2007, 34). For example, Eve Sedgwick's work *Touching Feeling* re-reads Tomkins' works from a feminist and queer standpoint, and turns to questions of affect and the topic of affectivity in search of new critical vocabulary for investigating and conceptualizing the subject of feminism as embodied, located, worldly, contextualized, and relational (Liljestrom 2016). *Among those thinkers who follow this current, less attention is granted to the categorization of affection as a general and universal phenomenon, and more emphasis is given to the relations between the body and the social.*

The third definition of affect is based on Darwinian thought, being largely associated with the basic emotions paradigm. For Darwin, emotions were universal and evolutionary processes which were not exclusive to humans. Darwinists argue that at all cultures share at least five emotions: anger, fear, sadness, disgust, and pleasure, and that each one of these emotions manifests itself in ordinary facial expressions. These expressions would be the result of internal physiological changes and not of linguistic or communicative processes. In this way for the Darwinists culture has little influence on innate emotions.

Finally, the fourth definition of affection is inspired by the works of such philosophers as Baruch Spinoza, Henri Bergson, Alfred North Whitehead, Gilles Deleuze, and Fellix Guattari and conceives affect as the ability of bodies to affect and be affected. For Spinoza, for example, affect is nothing more than an increase or decrease in one's ability to affect and be affected by another body. An increase in affective capacity causes positive affect and a decrease in this capacity causes negative affect. According to Spinoza affect is a relational process, where bodies present in a relationship are understood not as stable entities, but from their relational effectiveness (Slaby 2016). Extending Spinoza's concept of affect, Deleuze explains that affect is the movement from one state to another in the affected body and affection is the bodily trait, the state of the affected body (Deleuze 1987).

Starting from these ideas, Massumi (2002) defines affect as a visceral impact on the body, an incomprehensible sensory event that escapes intellection. When this event is actualized, it turns into emotion. Within this paradigm, affection is defined as an autonomous force between bodies that best expresses itself not in terms of emotions or experiences, but of intensities that increase or decrease a body's potential for action. Affect, therefore, refers primarily to the reciprocal capacities of bodies to affect and be affected (Clough 2008, 2). The bodies referred to here are not just human, but include all kinds of bodies that can affect and be affected, such as an animal's, a table's, a book, or a tree's (Von Scheve 2016). Affection is not a characteristic that pertains to an individual body but is a quality of the different kinds of relationships through which interrelated bodies are constituted, actualized, and constantly transformed. As Shabbar (2016) shows us, for Deleuze, an affective event is a meeting between the virtual and the real, a meeting of incorporeal concepts with the world's materiality. Virtual duration is, in Deleuze's most basic definition, real duration, but it is not tangible, whereas the real is what has been actualized from the virtual to form a subject or an object. Memory, for example, operates in the virtual. Whenever someone remembers something and transforms the mnemonic narrative into a story, a book, or a painting,

their recollections are updated and become an object (Shabbar 2016).

To think affection as a relational process, unconscious and pre-linguistic, forces us to think of agency as the efficacy that is distributed between human and nonhuman assemblages, and not as an intentional action. According to the authors: "As such, the assemblage is the engine of all social production – whether of bodies, subjectivities, thoughts, feelings, social forms and institutions, or political and economic orders" (Deleuze and Guattari 1983, 7). Consider for example the archaeologist-and-archaeological-site assemblage. At first glance this set would be formed by two entities, the archaeologist on one side and the archaeological site on the other. But both the archaeologist and the archaeological site only exist within this relation archaeologist-archaeological site. At the same time the archaeologist and the site are already assemblages of themselves. The archaeologist is an assemblage of bones, organs, veins, bacteria, memories, experiences, training, in the same way as the archaeological site is an assemblage including layers of sediment, vegetation, atmospheres, architectural structures, and the narratives that arise from it. Thus, the archaeologist-archaeological site assemblage includes all the archaeologist's knowledge, their friends, relatives, the educational policies that allowed them to graduate, the people responsible for these policies, the financial conditions that allowed them to research, the patrimonial policies that determine what constitutes an archaeological site, the communities involved in the evaluation of the place as an archaeological site, local cultural policies, communities, etc. The assemblage will also include past experiences, stories of the relationship between the archaeologist and the archaeological site, social norms, models of what it means to be an archaeologist, what an archaeological site is supposed to look like, how people should behave, and so on. The way in which all these elements affect each other will determine the type of assemblage that will arise – whether it is an academic, a community, a tourist, a mystical, a religious, or a power assemblage.

Imagine this archaeologist-archaeological site assemblage in a specific situation. For example, let us imagine that our archaeologist discovers their institution has cut research funding just as they are about to go on the field. The lack of money can generate anxieties and uncertainties, which will in turn affect their ability to act. Suppose they seek other sources of funding. In this process a new subjectivity arises, that of the entrepreneurial researcher. The archaeologist will have to go to meetings to meet new sponsors and thus devote more time to bureaucracy than to research, which in turn can generate frustration. Frustration can once again influence how they act and relate to funding institutions. At a meeting to get money, affectionate or angry behavior will affect the other party, possibly determining whether or not they will finally manage to get the financial resources. In this process, several other subjectivities are created, that of the entrepreneur, the manager, the technician who analyzes the contract, the bank that releases the money. When they finally get the money for the fieldwork, our – by then happy – archaeologist will gather his/her team, who will in turn also be happy and excited at the opportunity to embark on the fieldwork and conduct their own research. Such joys can generate the desire to buy new equipment, new technologies, to develop new field methodologies, etc. But at the same time, the archaeologist and their team will have to meet the needs, schedules, desires, and policies of the funding agencies, which might generate new anxieties and frustrations, triggering new and endless affective flows. These will also affect the archaeological site, which will be actualized in the form of an archaeological site, tourist space, or anything else depending on the affective flows present in these relations. All these interrelated affects, which generate new and endless affects, have practical effects on the assemblage. Affects will enable the body to feel emotions like love, sadness, envy, or desire. All these capacities are themselves affects representing the body's potential to act. Emotions are affects within the assemblage, they can alter, increase, or reduce the ability to act, they can amplify desires or not, influencing the ability of these bodies to generate

other affects and affect other relationships within the assemblage, contributing to the flow of affection (Fox 2015). Archaeologists become archaeologists not only through their training and specific knowledge but because they affect and are affected by students, archaeological sites, heritage laws, the materialities they study, etc. In the same way a place becomes an archaeological site through its relationship with archaeologists, with research institutions, with preservation laws, with local communities, with specific narratives and discourses, etc. In this way, all the affections present in the relation archaeologist-archaeological site are essential for the subjectivation and the formation of the different identities involved in the relation. These affections constitute concrete bonds as well as relational positions, based on a series of elements that together make up an assemblage (Von Scheve 2016).

Since affects produce capabilities in the assemblage, these capabilities will result in single or multiple attachments that will create new affects, generating an affective flow in the assemblage. Thus, watching a film about injustice can generate anger, desire for social changes, or the desire to donate money to a campaign, which in turn generates the image of a donor, thus producing other affections ad infinitum (Fox 2015). At the same time, discourses, narratives, statements, etc. are formed from the assembly, because as Deleuze and Gattari teach, each assembly is "simultaneously and inseparably a mechanical assembly and an assembly of enunciation" (Deleuze and Guattari 1983, 555).

Assemblages comprise the human and non-human relationships that occur as a consequence of the affective flows between parts of a relationship. Territorialization and de-territorialization also emerge from these flows. While some flows may aggregate, territorializing bodies and assemblages into relatively stable forms, other affective flows may de-territorialize the elements of an assemblage generating new and unique capabilities that resist this territorialization and disassemble the assemblage. Clough (2008, 15) calls this whole process an economy of affect. According to this author, affective capacities sew bodies in terms of attention, arousal, interest, stimulation, action, reaction, and inaction. Here, assemblages of bodies, subjectivities, and experiences flow together with social movements, organizations, political doctrines, and geo-economy.

Debate and Critics. Life Is Not a Bed of Roses

As has been presented so far, affect seems to rely on at least two major theoretical references. On the one hand, it is used to denote a force or intensity of relationships or something that circulates between different types of bodies. On the other hand, it denotes modes or states of the human body and the feelings and capacities that accompany those modes (2011). In both cases affection is thought of as relational, that is, it is not limited to individual bodies but is part of the intensities of relations or resonances between bodies.

Another shared characteristic of both approaches is the idea that affection is independent of meaning and cognition. Much of the idea of unintentionality is anchored in an alleged separation between the affective system and the cognitive system. For Leys (2011), both cultural theorists and neuroscientists see affect as a question of autonomous responses occurring below the threshold of consciousness and cognition. This proposal arises from the idea that there is a time lag between the decision to act and the action itself.

Massumi (2002) makes use of a well-known experiment on consciousness and the body to substantiate his proposition that affection is pre-cognitive. The experiment concerns the relationship between conscious intention and brain activity conducted by Benjamin Libet in the 1970s. In the experiment briefly described by Massumi, people with their hands on a table were invited to flex a finger and inform when they were aware of their decision or intention to perform this movement by observing the spatial position of a rotating point in a large clock that measures the fractions of a second. Libet found that the actual

finger flexions occurred 0.2 s after the subject recorded his decision. But the apparatus used to monitor brain activity recorded a significant activity 0.3 s before the subject could record their awareness of his decision. In other words, there seemed to be a half-second delay between the beginning of the body-brain event and its completion in the form of finger movement. Libet concluded that unconscious brain processes initiate actions before conscious intent appears. So according to him the brain deceives us in creating the illusion that we consciously decide matters and that our actions are personal events.

Gallagher (2006) criticizes Libet's work showing that it is only when the normal mechanisms of motor system control fail that people are placed in the experimental position of Libet. Based on phenomenology, the author puts forth a distinction between intentional, usually but not always conscious, and motor movements, which are generally unconscious, suggesting that Libet's experiments apply not to intentional actions but to motor movements, whose control we normally expect to be unconscious.

In the end, as Leys points out (2011), the problem is not the idea that many bodily processes occur below the threshold of consciousness. The problem concerns the implications that Massumi seems to derive from this idea, which, Leys proposes, led Massumi to accept the idea that the mind is pure consciousness. According to Leys, Massumi entertains the false dichotomy between mind and matter by reinforcing the idea that in order for something to be fully conscious the only alternative is to regard it as corporeal or material. In this view, affects would be a set of innate behaviors and expressions of a brain and body that are triggered automatically and that operate out of the domain of consciousness and intentional action.

Affect, Discourses, and Relationality

In attempting to overcome the problems of unintentionality involved in the Theory of Affect, Lisa Blackmam, Joonas Lahtinen, Anne Rutherford, Andie Shabbar, Jessica Ringrose, Emma Renold, José Roberto Pellini, and others have attempted to ground a discussion of the idea of affect on Karen Barad's posthumanist theory and her concept of intra-action. According to Barad (2007), all phenomena, including affect, discourse, and felt experience, are always involved in processes of intra-action. The concept of intra-action "signifies the mutual constitution of entangled agencies. That is, in contrast to the usual 'interaction,' which assumes that there are separate individual agencies that precede their interaction, the notion of intra-action recognizes that distinct agencies do not precede their interaction, but rather emerge through their intra-action" (Barad 2007, 33).

Taking this idea as a starting point, Lahtinen (2015) proposes that human perception is an intra-action process, where sensory effects are automatically brought into language and transformed into the experiences of a self-conscious "self," inevitably rendering human perception both material and discursive. This means that whenever we perceive something, we are immediately signifying this something, so perception is the simultaneously action of feeling intensities and of signifying them. According to Slaby (2016), what determines whether a perceptual-affective process is an instance of fear, sadness, anger, or some other type of sensation is the general pattern in which these feelings are systematically articulated (Ahmed 2004). To Slaby (2016), whether my negative feeling about something constitutes fear will depend on that particular feeling's relative position within a systematically extended pattern of properly related assessments. None of these elements has priority over others; they operate through intra-actions, where each element constitutionally depends on the others. This understanding of material-discursive practice determines that agency is not a product of human will, intentionality or subjectivity, but the result of an ongoing process of becoming. Discursive practices and material phenomena are not established in an external relation to one another, since the material and the discursive are mutually involved in the dynamics of an in-action. Thus, the relation between the material and the discursive is one of mutual entanglement. Neither discourse nor matter are ontologically preexisting and prior to the relation. If for Deleuze (1987),

the virtual and the real are mutually exclusive elements, for Barad (2012) there are no mutually exclusive aspects to matter.

The idea that discourses and affections are mutually constituted from intra-actions can be exemplified by the concept of distribution of the sensible proposed by Jacques Rancière (2004). This author uses the phrase "the distribution of the sensible" to refer to the implicit laws regulating the sensible order, a self-evident perceptual system based on the modalities of what is visible, audible, and sensible, as well as what can be said, thought, or done. The distribution of the sensible includes both forms of inclusion and the exclusion of the sensible. The sensible does not refer to any kind of judgment but to that which can be apprehended by the senses. Bodies constantly record information from the world through their perceptual systems and therefore constantly change their affective mode through processes of intra-action. Most of the time this happens subtly, with many changes taking place without the subject being aware. However, depending on intensity, context, or relational position, we can become aware of these changes and ascribe certain causes to them. Affect has effects mainly insofar as it alters the body's ability to act. This can happen in many ways, through changes in cognitive and perceptual processing, changes in the endocrine and hormonal system, or changes in the autonomic or peripheral nervous system (Von Scheve 2016).

Archaeology and Affect

Affection is still a relatively new subject in archaeology, mainly because archaeologists think of affect and emotion as topics which are too abstract to be approached scientifically.

To Hamilakis (2017), for example, affect is a productive force that articulates different elements in an assembly. The author points out that this productive force is necessarily set in motion through sensoriality, which he perceives as incarnate action. For Hamilakis, affection cannot be separated from the senses or the sensory, since the role he ascribes to the senses is not to allow the organic body to operate but to allow affectivity to establish affective connections with other bodies.

Pellini (2018), along the same lines, argues that affection, senses, memories, and narratives are all formed relationally through processes of intra-actions. For this author, affection cannot be thought of as prior to the process of signification, since feeling and meaning are part of the same relation that arises through the intra-action of different elements. In this approach, affection does not pertain exclusively to humans, since the very constitution of the human is defined by the agentic cuts within an intra-active relationship (Barad 2012).

Harris and Sorensen (2010) have proposed a complementarity between affection and emotion. They have therefore developed a vocabulary that attempts to provide a parameter of analysis for past affects and emotions. The author suggests working with the terms: emotion, affective fields, attunement, and atmosphere. Emotion is the incarnate act of being affected and affecting, of moving and being moved; affective fields are networks of people and things through which emotions are generated; attunement is the practice of meeting the material world and its emotional qualities; and atmosphere is the emotional experience engendered by being in a certain place and situation.

The Future: Affecting and Being Affected?

There is still no consensus as to what affect is, whether it is a noncognitive intensity, a culturally determined emotion, an evolutionary or a social and phenomenological force. Neither is there a unanimous position about whether it is intentional or not, whether it is social or asocial. However, there is no denying that discussions about affect have opened up avenues of research within the human sciences, especially those focused on understanding the body, agency, relationality, post-humanism, and post-phenomenology.

While it remains unexplored in archaeology, affect has a great potential to change the discipline, especially when considered from the point of view of relationality. Understanding how

affect, senses, memory, narratives, body, and the social intertwine is fundamental to understanding both the past and the present. The idea of affect shows us that it is impossible to conceive body and mind, passion and reason, as separate phenomena. To think of affection is to think not of what a thing is, but of what it can do, of how different entities are captured within a relationship.

To think of affection is to think of politics, since power and control, cannot be understood as a production of the subject, as an expression or representation of norms, but as a "never-ending modulation of moods, capacities, affects and potentialities, assembled ... in bodies of data and information" (Clough 2008, 19). As Thrift (2007) reminds us, affection has always been a key element of politics and the subject of powerful technologies of massification. Let us remember how the media still exploit trauma and violence to create such figures as the terrorist, the crook, and the immigrant. Let us remember how hegemonic institutions exploit the idea of disgust, to create the figure of the civilized and the uncivilized.

At the same time, discussions about affection bring us to a broader discussion about ethics. Affect as the result of an active relationship, of an intra-action, points out that we are always partially responsible. Affecting and being affected remind us that we affect the world we live in, that we affect the assemblages in which we are present, and that we affect and are affected by affections, by things, people, humans, and nonhumans. We affect and are affected by the apparatus of our discipline, we affect and are affected by the knowledge we generate in an active way. As Barad would say, "Ethics is not concerned with the questions of matter, but rather the very nature of what it means to matter" (2012, 70).

References

Ahmed, S. 2004. *The cultural politics of emotion*. London: Routledge.

Barad, K. 2007. *Meeting the universe halfway. Quantum physics and the entanglement of matter and meaning*. Durham: Duke University Press.

Barad, K. 2012. *What is the measure of nothingness? Infinity, virtuality, justice*. Ostfildern: Hatje Cantz Verlag.

Clough, P. 2008. The affective turn: Political economy and the biomediated body. *Theory, Culture & Society* 25 (1): 1–24.

Deleuze, G. 1987. *A thousand plateaus: Capitalism and schizophrenia*. Minneapolis: University of Minnesota Press.

Deleuze, G., and F. Guattari. 1983. *Anti-oedipus: Capitalism and schizophrenia*. Minneapolis: University of Minnesota Press.

Fox, N. 2015. Emotions, affects and the production of social life. *The British Journal of Sociology* 66 (2): 301–318.

Gallagher, S. 2006. Where's the action? Epiphenomenalism and the problem of free will. In *Does consciousness cause behavior? An investigation of the nature of volition*, ed. S. Pockett, W. Banks, and S. Gallagher, 109–124. Cambridge, MA: MIT Press.

Hamilakis, Y. 2017. Sensorial assemblages: Affect, memory and temporality in assemblage thinking. *Cambridge Archaeological Journal* 27 (1): 169–182.

Harris, O., and T. Sørensen. 2010. Rethinking emotion and material culture. *Archaeological Dialogues* 17 (2): 145–163.

Lahtinen, J. 2015. How to address politics of the body in participatory performance? On the possibilities of sensory fields and collective body techniques as analytical tools. *Nordic Theatre Studies* 27 (2): 36–46.

Leys, R. 2011. The turn to affect: A critique. *Critical Inquiry* 37 (3): 434–472.

Liljestrom, M. 2016. Affect. In *The Oxford handbook of feminist theory*, ed. L. Disch and M. Hawkesworth, 16–38. Oxford: Oxford University Press.

Massumi, B. 2002. *Parables for the virtual: Movement, affect, sensation*. Durham: Duke University Press.

Pellini, J. 2018. Senses, affects and archaeology. In *Changing the minds, the hearth and the pants*. London: Cambridge Schoolar.

Rancière, J. 2004. *The politics of aesthetics: The distribution of the sensible.* Trans. G. Rockhill. London: Continuum.

Sedgwick, E. 2003. *Touching feeling: Affect, pedagogy, performativity*. Durham: Duke University Press.

Shabbar, A. 2016. Queer bathroom graffiti matters: Agential realism and affective temporalities. *Rhizomes: Cultural Studies in Emerging Knowledge Issue* 30 (2016). https://doi.org/10.20415/rhiz/030.e06.

Slaby, J. 2016. *Relational affect*. Working paper SFB 1171 affective societies 02/16. http://edocs.fu-berlin.de/docs/receive/FUDOCS_series_000000000562

Thrift, N. 2007. *Non-representational theory: Space, politics, affect*. London: Routledge.

Tomkins, S. 1962–63. *Affect imagery consciousness*. Vol. 2. New York: Springer.

Tomkins, S., and R. Mccarter. 1964. What and where are the primary affects? Some evidence for a theory. *Perceptual and Motor Skills* 18 (1): 119–158.

Von Scheve, C. 2016. *A social relational account of affect*. Working paper SFB 1171 affective societies 03/16.

Archaeology of Ancient Egypt

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State of Knowledge and Current Debates

Introduction

The Egyptian civilization developed along the banks of the Nile River from the south, from the cataracts, and from the border with present-day Sudan to the delta, from which the river flows into the Mediterranean Sea for a total extension of about 1,000 km. The history of this civilization covers a total of about 4,000 years, though the identification of a specific historical period and agreed dates is still source of debate, especially concerning its temporal location in prehistoric times and the many vicissitudes and dominations that accompanied the history of Ancient Egypt in its final part.

Many cultures followed one another in the Nile Valley since the Predynastic Period, in c. 3,900–3,500 BC. An embryonic stage of the State emerges in the Archaic Period with the First Dynasty (c. 3,200–3,100 BC) and with the unification of Upper and Lower Egypt. These two macro-areas will always remain distinct; in fact Egyptian rulers had among their titles that of *nsw-bjty* "King of Upper and Lower Egypt (see Appia 1996)."

Despite the great extension of the territory, which also included much of the Libyan-Nubian Desert, the ancient settlements developed in the narrow greenbelt near the riverbanks only. Traces of settlement dating back to 3.500 BC, in fact, have been found mostly along the banks of the Nile and, as far as the desert areas are concerned, only near the oases. Thanks to the annual floods and the fertile silt that the river carried, agriculture was prosperous, in particular the cultivation of wheat, barley, and flax. In order to guarantee a regular supply of crops, it was necessary to have control over the waters, to channel and preserve them since ancient times. The annual floods, in fact, allowed to harvest several times a year.

It is precisely this urge to deal with the needs connected with the management of agriculture and nilotic waters that favored the formation of the first communities at some time prior to 3,500 BC. These entities were allocated to partial but well-differentiated territories, politically and geographically identifiable with the Greek term of nomoi (*νόμοι*) that soon evolved into two distinct more complex geopolitical entities (see Grimal 1998; Wilkinson 2010).

The history of Ancient Egypt has been divided into 30 ruling dynasties by Manetho (Egyptian priest and historian under the reigns of Ptolemy I and Ptolemy II, c. 305–285 BC) in his *Aegyptiaca*, in which he also indicated the duration of the kingdom of each king. This subdivision is still used today, albeit with the appropriate modifications given by recent archaeological discoveries. To these 30 dynasties must be added those non-native governments raised from invasions and from the attainment of power by foreign rulers: XXXI Dynasty of Persian sovereigns; XXXII Dynasty of the Macedonian sovereign Alexander the Great; and XXXIII Dynasty, known as the Ptolemaic dynasty, born from the fall of Alexander's Macedonian empire. In addition to the Macedonians, also many Roman emperors who occupied Egypt would call themselves "pharaohs" also assuming the hieroglyphic title (see Cimmino 2003; Dodson and Hilton 2004).

The Ancient Egypt was home of a thriving civilization that through the construction of pyramids, temples, and statues tried to get in touch with the gods and the beings that inhabited the afterlife. Despite the millennial history of Ancient Egypt, after the Arab conquest in the seventh century, the culture, customs, and traditions of pharaonic Egypt were gradually overshadowed by Arab culture. Since the knowledge of the hieroglyphic language was progressively forgotten, and therefore the ancient Egyptian texts could in no way be translated, during the Middle Ages and until the seventeenth century, the Western world had a vision of Egypt totally different from reality.

The interest of the West toward Egypt began with Napoleon Bonaparte's campaign in Egypt and Syria (1798–1801); from this moment on, Egypt assumed a certain charm and mystery. In over a century or so, Egyptologists discovered most of the treasures buried along the banks of the Nile, from the entrances to the pyramids, such as those of the Giza Plateau, to tombs and sarcophagi, such as Tutankhamun's. Jean-François Champollion is responsible for deciphering hieroglyphic writing, thanks to the discovery, during Napoleon's campaign in Egypt, of the Rosetta Stone containing a trilingual text: hieroglyphic, demotic, and Greek. This event marked the birth of Egyptology (see Clauss 2001).

Archaeologies of Egypt

Since ancient times some authors have been interested in Egypt and its customs, developing writings and reports related to them. We have already mentioned Manetho and his contribution to modern Egyptology, but among the other authors, we must first of all remember Herodotus (484–430 BC) who, in the second book of his *Histories*, spoke in detail about the Egyptians and their customs, describing minutely some religious and funerary practices such as mummification. Diodorus Siculus (90–27 BC) in the first book of his *Bibliotheca historica* described the history and geography of Egypt.

Strabo (60 BC–21/24 AD) likewise treated the history and geography of Egypt in his works. Also Pliny the Elder (23–79 AD) in his *Naturalis Historia* dealt with Egypt, although in a less detailed manner than the abovementioned authors. This undoubtedly demonstrates that the fame and charm of Egypt have strongly influenced other ancient cultures, first of all the Greek and Roman cultures, reaching the point of capturing the attention and curiosity of most scholars and historians up until the modern era.

During the Middle Ages, Egypt was not taken into great consideration, returning instead to arouse interest during the Renaissance. The presence of some obelisks found in Rome generated a growing interest in hieroglyphic writing, which at the time was still incomprehensible. Starting from the fascination that Egypt and its monuments aroused, an increasingly scientific interest in Egyptology was gradually formed. Emblematic is the case of the famous *Bembine Table of Isis* (or *Mensa Isiaca* or *Isiac Tablet*) that arrived in Turin around the year 1630 after being bought in Rome by Cardinal Bembo after the sack of the Landsknechte of 1527. It is a bronze table damascened in silver, copper, and niello with images of various deities within a frame in hieroglyphics, now preserved at the Egyptian Museum of Turin. It was probably built in Rome in the first century AD for an Isiac sanctuary; therefore it is an Egyptizing artifact whose hieroglyphics have been engraved without any intrinsic meaning, only as decoration. The *Bembine Table* was carefully studied first by Lorenzo Pignoria and later by other scholars, including the Jesuit Athanasius Kircher, a great scholar and theologian.

The first real step that led from what we can call Egyptomania to the real Egyptology was the Napoleonic expedition that started toward the end of the eighteenth century. The publication in 1809 of the *Description de l'Égypte* (written in 25 volumes) constitutes the first real scientific report; in fact it cataloged and described the monuments and artifacts found during the expedition, including the very famous Rosetta Stone. The study and research conducted on Rosetta Stone by Jean-François Champollion (decipherer of hieroglyphic writing) and Ippolito Rosellini crown the birth of Egyptology as a proper science. They also conducted an important Franco-Tuscan Expedition between 1828 and 1829, followed by that of the German Karl Richard Lepsius between 1842 and 1845.

Of great importance is the contribution of the Italian Giovanni Battista Belzoni, who led a trip to Egypt between 1815 and 1819 visiting and exploring numerous sites. He was the first to enter the Great Temple of Ramses II at Abu Simbel; he discovered six tombs in the Valley of the Kings and opened the entrance to the Pyramid of Chephren in Giza. Many of the finds he found are now kept at the British Museum in London.

In France, important contributions came from the archaeologists Auguste Mariette, founder of the *Service des Antiquités* and the Egyptian Museum in Cairo, and Gaston Maspero who was

his pupil and continued his work. On the British front, we must remember the archaeologist Flinders Petrie, who devised his own technique of serialization of the finds establishing the chronological succession of about 2,200 graves in the necropolis of Naqada (Upper Egypt). The *Egypt Exploration Fund,* today known as the *Egypt Exploration Society*, was brought to life in the United Kingdom in 1882. This organization is responsible for numerous and important expeditions to many archaeological sites in Egypt, including Deir el-Bahari (or Dayr al-Bahri), Tell el-Amarna, Saqqara, and recently Deir el-Medina.

Among the most important discoveries of the twentieth century, we must certainly remember that of the Tomb of Tutankhamun (KV62) by Howard Carter and Lord Carnarvon in 1922.

The contributions of the abovementioned scholars and archaeologists and of many others have turned Egyptology into a science and have allowed the circulation of Egyptological finds throughout the world, leading the foundation of the most important museum collections and university faculties.

Physical Geography

Egypt, with an extension of 1,001,450 km^2, is located in Northeastern Africa. It overlooks the Mediterranean Sea at north and the Red Sea at east for a total coastal extension of about 2,450 km. The Mediterranean Sea and the Red Sea have been connected to each other by the Suez Canal since 1869. The Sinai Peninsula, a region in the east of the country, overlooks the Red Sea and forms the two narrow gulfs of Aqaba and Suez. At the mouth of these gulfs are the Egyptian marine islands of Tiran (80 km^2) and Shadwan (42.5 km^2), in addition to numerous river-type islands present in the Nile Delta.

The Egyptian territory is almost totally desert (about 95%) and can be divided into four geographic regions: in the north, the Nile Valley and its Delta (which covers 4% of the surface), an area with the most favorable environmental conditions for the development of human settlements; to the west, the Western Desert (over $2/3$ of the territory), mostly flat except the more mountainous southwestern part; to the east, the Eastern Desert, between the course of the Nile and the Red Sea, more mountainous than the Western and with heights reaching almost 2,000 m in height; and to the northeast, the Sinai Peninsula, which consists into a small extent of flat areas (which overlook the Mediterranean) and for the most part of hills and mountain ranges that constitute the highest places in the country, including Mount Catherine, which with its 2.641 m height turns out to be the highest peak.

The Nile, the second longest river in the world (6,853 km), crosses Egypt for c. 1,532 km and constitutes, together with the oases, the only fertile area of the country. It enters Egypt from Sudan, just north of the Sudanese city of Wadi Halfa (22nd parallel) and expands to form Lake Nasser. Starting from the south, after the Aswan Dam, the river sums up its natural course by drawing an elongated S that winds from Aswan to Cairo. Along its course (about 850 km), we progressively encounter some of the most important sites in Egypt including Kom Ombo, where the valley widens for about 20 km to then shrinks again, Edfu, El Kab, Hierakonpolis (Nekhen), and finally, Esna where the valley widens again between 8 and 15 km. North of Esna the river curves northeast across Gebelein, Hermontis, Luxor, Karnak, Naqada, Coptos, and Dendera. Here a limestone cliff of about 300 m high forces the river to change direction toward southwest for c. 60 km then continue northwest. The river continues for about 160 km up to Asyut meeting the sites of Kom el-Ahmar, Nag Hammâdi, Abydos, Thinis, and El Badari. After Asyut, the escarpments on both sides of the river decrease in height, the valley widens by about 22 km, and the river heads northward meeting Meir, Amarna, Hermopolis, Tunah el-Gebel, and Beni Hasan up to Beni Suef. The Nile then continues its course through the sites of Herakleopolis, Gurob, Medinet el-Fayyum, Meidum, Gerzeh, Lisht, Iti-tawy, Dahshur, Memphis, Saqqara, Abusir, Abu Gorab, Zawiyet el-Ariyan, Giza, Abu Roash, Cairo, and Heliopolis. From here on, it comes across the sites of Herakleopolis, Gurob, Medinet el-Fayyum, Meidum, Gerzeh, Lisht, Iti-tawy, Dahshur, Menfi, Saqqara, Abusir, Abu Gurob, Zawiyet el-Ariyan, Giza, Abu Roash, Cairo, and

Heliopolis. Near Cairo, the river is divided into various sections, thus giving rise to a large delta whose two main branches are to the east the Damietta (c. 240 km) and to the west the Rosetta (c. 235 km). Among the most important sites of the Delta, we should mention Tanis, Bubastis, Mendes, Iseum, Busiris, Leontopolis, Buto, Sais, Naukratis, Rosetta, Canopus, and Alexandria.

The desert climate presents very high average temperatures and low rainfall. In desert areas, there are frequent strong temperature changes ranging between 0° in winter and 50° in summer.

The Western Desert occupies the part of Egyptian territory that goes from the Nile Valley to the border with Libya and from the Mediterranean to the border with Sudan for an area of about 700.000 km^2. The territory is generally flat and sandy, consisting of desert plains that rise gradually from north to south and reach their maximum height in the southwestern area on the border with Libya and Sudan. What constitutes an important variation of the geophysical conformation of the desert are depressions in the ground, in which the oases develop. The most extensive depression is that of Qattâra, which reaches 133 m below sea level, flanked by the smaller one of Siwa. The Oasis of the Fayyum is much closer to the Nile, from which it receives the waters by means of an ancient artificial canal that allows the development of agricultural crops. Other, less deep depressions are found further south: el-Bahariya, el-Farafra, el-Dakhla, and el-Kharga. North of the depression of Qattâra, the desert degrades on the Mediterranean with low rocky slopes that leave room for a narrow coastal plain. Dates, cereals, and legumes are cultivated in the oases, while along the Mediterranean coast, where in winter, there is also precipitation, and the rare nomadic populations raise camels, sheep, and goats.

The Eastern Desert extends from the eastern band of the Nile Delta to the northeastern Sudan and to the east up to the Gulf of Suez and the Red Sea, with an area of about 222,000 km^2, equal to almost ¼ of the surface of Egypt. The territory consists of a sandy plateau that rises abruptly from the Nile Valley and extends eastward for a width ranging from 80 to 170 km to the so-called Red Sea Hills, a chain of mountains that develop northward south from Suez to the border with Sudan and reach the maximum height of 2.187 m with Mount Shaiyb al-Banat. The Eastern Desert, due to its location, receives more rainfall than the Western Desert.

The Sinai Peninsula, although politically belonging to Egypt, is geographically part of the Asian continent. It is bordered to the east by the Israeli desert of the Negev and the Gulf of Aqaba, to the north by the Mediterranean Sea, to the west by the gulf and the Suez Canal, and to the south by the Red Sea. The peninsula has a length from north to south of about 380 km and a width from west to east of about 210 km, for a total area of 61,000 km^2 approx. The eastern part of the peninsula is known as the Great Rift Valley, and it is a geological pit that extends from the valley of the Jordan River southward through the Red Sea into Africa into Kenya.

Chronology

As already stated above, the chronological scheme still used today to divide Egyptian history is based on the one provided by Manetho, who around 300 BC divided the succession of Egyptian kings into a series of 30 "dynasties," so recognized as belonging each to the same house. Manetho's dynastic succession is substantially in line with our knowledge of the changes in the ruling family, although in some cases, the reason for a dynastic change is not clear. Modern scholars have redefined the chronological structure by grouping the dynasties into "kingdoms" and "periods" during which constant sociopolitical themes can be identified. In ancient times, dating was recorded for years of reign and not as it is today due to the distinction of "epochs" or "periods."

Despite the great difficulty of giving substance to the periods dating back to prehistoric times, the Egyptian chronology is based on a few fixed data from which dates could be obtained. One of these refers to the heliacal rising of Sothis (Sirius), called Sopedet by the Egyptians (*Spdt*). Sothis rises about 30 min before dawn around the summer solstice. Thanks to another well-known event, that is, the rise in Heliopolis on July 21, 139 AD (as indicated by the Roman grammarian Censorinus), it was possible to date the heliacal rising of Sothis:

- In the year 7 of the reign of the Pharaoh Sesostris III of the XII Dynasty: about 1879 BC
- In the year 9 of the reign of the Pharaoh Amenhotep I of the XVIII Dynasty: about 1547 BC
- In the year 20 of the Pharaoh Thutmose III of the XVIII Dynasty: about 1471 BC

From these dates, together with the King Lists (Abydos King List, Saqqara King List, Turin Royal Canon) and other writings of ancient historians such as Sextus Julius Africanus and Eusebius of Caesarea, it was possible to construct a chronology that gave a solid foundation to the studies of many Egyptologists who otherwise would have continued to rely on dating with no absolute value. In recent times, more scientific dating systems, such as C^{14} or radiocarbon, have allowed specific analyses to be carried out on certain findings, allowing scholars to formulate more certain hypotheses regarding the Egyptian chronology. Despite all this, numerous uncertainties regarding the chronology still remain today, in particular as regard the Predynastic Period and the periods for which the sources are more scarce. The chronology provided therein is based on that of Ikram and Dodson (1998) and Shaw (2005).

Archaeology of Ancient Egypt Through Its History

Drawing a complete picture of the archaeology of Ancient Egypt is not a simple work, and an exhaustive treatment of it requires the drafting of one or more monographs. The extraordinary length of its history alone represents a difficulty for the authors who treat it, but even more complex is the close relationship that exists between it and the history of art, archaeology, and the whole complex of religious beliefs and costumes of Egypt. These aspects are effectively inseparable. Therefore, we cannot speak of a "history" of Ancient Egypt without implying the history of its monuments, its culture, and the evolution they have had over a period of more than 40 centuries. On the other hand, however, scholars must make choices and see themselves forced to separate the different Egyptological subjects. The reader must therefore necessarily summarize this work with other texts and essays, which deal with the other numerous aspects of this complex world which is Ancient Egypt. From this derives the title of this paragraph: our intent is to deal primarily with the material culture of Ancient Egypt, giving it a general overview of its main aspects and its evolution through history (Fig. 1).

From Palaeolithic to Predynastic Period (c. 700.000 BP–3.000 BC)

The Nile River was certainly the main fulcrum for the birth and prosperity of Egyptian civilization, and the geographical position of the country favored the first human migrations from East Africa to what we today call "Old World." There are still no reliable data to establish the time when the Nile Valley was occupied by the first human groups (see Schulz and Seidel 1997).

Dating from the *Lower Palaeolithic Period* (c. 700/500.000–250.000 BC) are many artifacts including numerous Acheulean handaxes. These artifacts are not connected to human remains. However, they could have belonged to the groups of Homo erectus allocated there and date back to the period between 400.000 and 300.000 BC. The main places of discovery of these findings are the hilly area between Deir el-Medina and the Kings Valley, Nag Ahmed el-Khalifa (near Abydos), and the region of Qena, where the concentration of handaxes is found on the first deposits of clay that indicate a connection with its sources in Ethiopia. In the Western Desert, the best-known Acheulean sites are the oases of Kharga and Dakhla, Bir Sahari, and Bir Tarfawi. The climatic conditions of these sites, where the humidity was higher, favored the establishment of groups of hunter-gatherers. The poor state of conservation of these sites, as well as the lack of detailed archaeological investigations, makes it impossible to provide an exhaustive documentation. Also in Nubia, a conspicuous quantity of handaxes and Acheulean lithic artifacts has been found, but their dating is uncertain and is based only on typological data.

The *Middle Palaeolithic Period* (c. 250.000–70.000 BC) presents some elements of continuity with the Acheulean (like the presence of handaxes) but also the introduction of important innovations in the production of lithic artifacts, such as the Levallois technique. Numerous sites

Archaeology of Ancient Egypt, Fig. 1 Prehistory and Predynastic Period chronology

Period	Phase or Culture	Dates
Palaeolithic Period	Lower Palaeolithic	c. 700.000 – 250.000 BC
	Middle Palaeolithic	c. 250.000 – 70.000 BC
	Upper Palaeolithic	c. 70.000 – 24.000 BC
	Late Palaeolithic	c. 24.000 – 10.000 BC
	Epipalaeolithic	c. 10.000 – 8.800 BC
Saharan Neolithic Period	Early Neolithic	c. 8.800 – 6.800 BC
	Middle Neolithic	c. 6.600 – 5.100 BC
	Late Neolithic	c. 5.100 – 4.700 BC
Predynastic Period	*Lower Egypt*	
	Neolithic	c. 5.300 – 4.000 BC
	Maadi Cultural Complex	c. 4.000 – 3.200 BC
	Upper Egypt	
	Badarian Culture	c. 4.400 – 4.000 BC
	Naqada I Culture or Amratian Period	c. 4.000 – 3.500 BC
	Naqada II Culture or Gerzean Period	c. 3.500 – 3.200 BC
	Whole Egypt	
	Naqada III Culture or Dynasty 0	c. 3.200 – 3.000 BC

dating back to the Mousterian period have been identified as excavated near Bir Sahari and Bir Tarfawi in the Western Desert. The alternation of warmer periods in summer and colder periods in winter leads us to suppose that the occupation of these sites was mostly seasonal, and their location was certainly chosen based on the proximity to the places of extraction of raw material, used for the manufacture of instruments. Even in the Nile Valley, there were sites of this type, and undoubtedly many of the artifacts produced at the same mining sites also circulated elsewhere, arriving at other more distant settlements. At least two different processing techniques have been recognized, one of classical Levallois type and the other of Nubian Levallois type. The period defined Aterian (c. 70.000–50.000 BC) follows the Mousterian and is characterized by the use of the bow.

The sites of the *Upper Palaeolithic Period* (c. 50.000–24.000 BC) are rare in Egypt. The oldest is Nazlet Khater, where skeletal remains of an individual were found between 1980 and 1982. This site is also one of the oldest examples of underground mining activity in the world. The lithic industry shows no traces of Levallois technique, and the instruments are mainly scrapers, chisels, denticulates, double-sided slats, and double-sided axes. The next phase is that of the Shuwikhatian industry, attested in several sites near Qena and Esna. It is characterized by the presence of sturdy blades, toothed blades, and scrapers.

Unlike the previous period, many sites of the *Late Palaeolithic Period* (c. 24.000–10.000 BC) have been discovered in the Upper Egypt. During this period, the climate became more arid, and the Nile River began to contain less water and more clay, especially in its springs. The oldest sites are the Fakhurian (c. 21.000–19.500 BC) and the Kubbaniyan (c. 19.000–17.000 BC). The latter

was located not only near Wadi Kubbaniya (near Aswan), from which it takes its name but also near Esna and Edfu. The occupation of these sites was not continuous but seasonal and was due to the nature of the food supply. The Fakhurian group presents four main classes of instruments: backed bladelets (which constitute the largest percentage), end scrapers, burins, and truncations. Of great interest at this stage are the first attestations of rock art in the Nile Valley, especially Abka (near the second cataract) in the "site XXXII," and in el-Hôsh, south of Edfu, whose depictions represent fishing. Between 16,000 and 12,000 BC take turns different industries: Ballanan-Silsilian (16.000–15.000 BC) characterized by the microburin technique; Afian (12,900–12,300 BC) of which the Nilotic site of Makhadma presents important traces of fishing techniques; Isnan (12,300 BC) characterized by the rough knapping technique; Qadan (12,000 BC) associated with three necropolises (the most notable being that of Gebel Sahaba, from which 59 skeletons originate) with pit tombs covered with sandstone slabs; and Sebilian, from the uncertain chronology, whose lithic technology (with prevalent use of quartzite or volcanic rocks) is different from other cultures of the period, perhaps an indication of intrusive groups coming from the south.

The following period, *Epipalaeolithic period* (c. 10.000–8.000 BP), is characterized by a chronological hiatus in the occupation of the Nile Valley. There is indeed no evidence of human presence between 11,000 and 9,000 BC, except for some small Arkinian sites in the region of the second cataract, datable to 9,400 BC. This is perhaps due to a drying up of the entire Nile Valley. However, the climatic conditions were not so dry as to make the fertile Nile Valley inhospitable. Following a climatic overheating and a consequent increase in humidity, there were numerous floods and frequent precipitations that favored the development of new settlements in the oases rich in water between the VIII and VII millennium BC, in full *Neolithic Period* (c. 8.800–4.700 BC). In this period, the lifestyle of human groups changed considerably, attracted by the fertile areas and began to abandon the nomadic life, passing to a semisedentary lifestyle. These groups hunted and harvested seeds and grasses; they even started taming cattle. It seems that the influences deriving from the Near East, in particular from the Syro-Palestinian area, played a fundamental role in the introduction of the first agricultural techniques toward the middle of the VI millennium BC.

The period that separates the Epipalaeolithic from the Neolithic is little known. We know that a new sub-pluvial period favored breeding and agriculture on the edge of the Nile Valley and in the area of western oases. We are witnessing the progress of weaving techniques and the production of ceramics. From the middle of the VII millennium BC to the middle of the V millennium BC, we witness the birth of all those cultural elements that will remain unchanged until the end despite the appearance of metals.

In any case, in this period, we distinguish two distinct phases in the Nile Valley which intersect chronologically. These phases correspond to the cultures that developed during the *Predynastic Period* (c. 5,300–3,000 BC) in the Lower and Upper Egypt.

As far as Lower Egypt is concerned, the oldest Neolithic culture is that of *Merimda* (Beni Salama) whose site, located in the western area of the Delta, has at least five settlement phases ranging from 5,200 BC to around 4,500 BC. Among the most important attestations, there are plates, bowls, and cups made of the finest ceramic with herringbone decorations. There are also arrowheads, bone harpoons, and nubian stone axes that demonstrate contact with the south. It is precisely with Merimda that the progressive changes that led from the Palaeolithic to the Neolithic are affirmed. Among them, we have the transition to a sedentary lifestyle, with the development of settlements mainly devoted to agriculture and breeding and characterized by ceramic innovations and, therefore, to the progressive formation of a new class of artisans. Moreover, in this period, the first contacts and commercial exchanges with the Syro-Palestinian area are recorded. Numerous pit graves were also found in Merimda where the deceased were placed in a fetal position. Only in some cases have the materials supplied been found, but from them, no social distinction emerges between individuals.

However, from the excavations, it emerged that in the long period of site settlement, the later inhabited areas overlapped the areas previously used for burials.

The most recent phase of the Neolithic cultures of Lower Egypt is represented by the site of *Maadi*, southeast of Cairo, corresponding to the first two thirds of the IV millennium BC. The urban settlement is annexed to two necropolises, and the material culture includes ceramics, tools in copper (needles, blades, and axes) that have replaced those in bone, and traces of copper ore probably used as a dye for cosmetics. The discovery of high Egyptian ceramics and other materials from the Syro-Palestinian area shows that Maadi must have been an important crossroads for trade and commerce between the Asian area, the Nile Valley, and Upper Egypt. The necropolises of Maadi testify to rather summary funeral rites: the dead were placed in shallow oval pits, covered with mats, accompanied by a few items of furniture (clay pots and sometimes shells).

As far as Upper Egypt is concerned, the oldest Neolithic culture was that of El Badari (hence the definition of *Badarian culture*), which probably originated in the Western Desert. According to Jean Vercoutter, the Badarian culture arose between 4,400 and 4,000 BC, but it would be likely to assume that it had arisen around 5,000 BC. It was known in particular for the high quality of its ceramics, its stone tools, and the use of copper. Among the most noteworthy aspects are the numerous burials and the rich funerary objects found in them, as they not only demonstrate a remarkable artisan quality but allow for the first time to determine the social status of the dead. While the ceramics of daily use were mainly large vessels, those present in the burials were much finer. Plates and bowls often had a red and brown color whose most characteristic element was the type of decoration with a rippled surface as it was "combed" in order to give a wavy and shiny appearance. The typology of the Badarian burials constitutes the first manifestation of the development of the funerary practices that will be affirmed in the following epochs in Upper Egypt. The dead were buried lined up in oval tombs, in a fetal position on the left side and looking west. They were usually wrapped in mats with rich funerary furnishings alongside; in the tombs besides the ceramics, there were jewels, furnishings for personal care, ivory and bone carvings, and objects with figurative decorations. Several other objects also appear, such as the stone palettes for the blasters, carved wooden spoons for the ointments, brooches, bracelets in bone and ivory, necklaces with turquoise beads, precious combs, enamelled soapstone, shells, different types of stones, and, rarely, also needles and pearls made of copper.

Immediately after the Badarian culture is the *Naqada culture* which takes its name directly from the Naqada site, conventionally divided into three periods: *Naqada I* (c. 4,000–3,500 BC), or *Amratian Period* from the site of El-Amra (first site where this cultural group was discovered), characterized by the production of black-topped vases and the introduction of ceramics decorated with white parallel lines and by the first attestations of the import of obsidian from Ethiopia for the manufacture of blades; *Naqada II* (c. 3,500–3,200 BC), or *Gerzean Period* from the site of El-Gerzeh, in which are recorded the first attestations of contacts with the Near East, in particular with Canaan and the coast of Biblo; and *Naqada III* (c. 3,200–3,000 BC), or *Dynasty 0*, a period that sees the formation of the Egyptian state taking place. This period is called Dynasty 0 since we have only the names of some sovereigns at the head of independent kingdoms who were fighting to dominate the region. This is a period of technological, social, and political innovations.

The *Naqada I* culture, about 120 km south of El Badari, developed at the beginning of the IV millennium BC (ca. 4,000 BC) parallel to the Badarian culture, the two merged, and then the Naqada culture replaced the Badarian culture. The places of origin and diffusion are located further south than the Badarian ones: in the area between Luxor and Abydos, an area where the main communication routes intersected with the East, the Red Sea, and the oases. Also from an environmental and technological point of view, the Badarian and Naqada I cultures are similar, even if the latter presents some peculiarities. Among the ceramics, the black-topped vases predominate, characterized by red walls and a black-colored

rim, and red ceramic with cream-colored decorations that had geometric motifs at first and figurative later on. Among the latter are the representations of the fauna of the Nile Valley, especially crocodiles and hippopotamuses, and depictions of hunting scenes or even war scenes. Of great importance are the depictions of boats that will be characteristic even in the full Pharaonic era. Alongside the ceramics, there are more figurative subjects such as feminine idols, pendants depicting male individuals with beards, and ivory sticks, all objects belonging to the symbolic sphere. Other typical objects of the Naqada I culture are the shale palettes in rhomboid shape and the mace-heads, recurrent objects in the high-born male burials. Predominant feature of the populations of this period is the territorial expansion from the area of Qena northward to the area between Asyut and the Fayyum and southward beyond the first cataract (Fig. 2).

The *Naqada II* culture began to be recognized toward the middle of the IV millennium BC. In this period, the production of black-topped ceramics ended in favor of new techniques: production of clay pots from the Nile mixed with straw and the use of a new type of clay, the marl, coming from the calcareous formations of the hills bordering the valley. The clay from the Nile is first used for the production of rudimentary shapes, tubs, and silos and then for the production of a wide range of better quality ceramic shapes. From the marl, more difficult to process, a hard and thick quality ceramic was produced for the production of containers for long-term storage of food. Furthermore, marl was used for the production of new types of objects: small- and medium-sized vases, pot-bellied, or conical, often with handles. The decoration has purely geometric motifs but also dots or spirals. It was done with a brush with a dark red or brown paint on a cream-colored background. There are also decorations depicting, although in a stylized manner, local flora and fauna. The main feature of distinction between the Naqada I and Naqada II periods is the greater quantity of decorations present on the Naqada II ceramic, as well as a higher quality of the ceramic productions. It is interesting to note that some typical symbols of Naqada II ceramics resemble some signs of traditional hieroglyphic writing and are contemporaries of pre-cuneiform Sumerian writing. A distinctive characteristic of this period is the type of settlement patterns that developed: in fact, alongside the rural areas, the first urban agglomerations were formed, the first "cities." The presence of fences of temples and fortifications is also documented, and in the inhabited centers appear traces of a specialized handicraft. The burials became larger and rectangular with walls in masonry or with wooden reinforcements, and the first side chambers appeared for the storage of the trousseau that became ever richer. Not all the tombs contained a rich collection, and this certainly proves the social gaps of that period (see Dodson and Ikram 2008). Certainly, the remarkable artisanal development of this culture went hand in hand with an improvement in agricultural techniques, which also allowed the production of a surplus that was accumulated and kept in an increasingly systematic way. Thus, we witness the establishment of the first social elite and the establishment of an institutional authority that can be considered the basis of Egyptian royalty. The Naqada II period ends with the formation of the first kingdoms in Upper and Lower Egypt.

Archaeology of Ancient Egypt, Fig. 2 Example of black-topped ceramic vase

The period of the *Naqada III* culture corresponds to the phase in which Egypt was for the first time unified in a larger territorial state. The

consolidation of a central power is found, in fact, in what is called *Dynasty 0*, immediately preceding the first two dynasties defined as "Thinite." But we must keep in mind that in this period, we cannot yet speak of a true unified State, since well-defined political-territorial entities were emerging but only at the local level. From the evidence of elite burials in the three major predynastic centers of the Upper Egypt, namely, Naqada, Abydos, and Hierakonpolis, one can highlight a first unification of Upper Egypt as a result of a series of alliances or conquests of war or perhaps both. It is interesting to note that in the larger elite pre-dynastic cemetery of Naqada III, there is an evident impoverishment of burials compared to the previous Naqada II period, probably caused by the political changes that occurred during the transition between the two phases. On the other hand in the region of Umm el-Qa'ab, near Abydos, burials seem to have evolved from the Naqada II period, becoming a veritable elite cemetery. According to Günter Dreyer, a burial there was supposed to belong to the famous King Scorpion II, whose name is known to us from some finds and who ruled between about 3,100 and 3,000 BC. The head of the Scorpion King's club was found in Hierakonpolis, the same place from which the palette and mace-head of King Narmer come. These three objects could be identified as royal donations to the temple of Hierakonpolis, and this suggests that this center had a particular importance during the Naqada III period. Although doubts remain, it seems likely that the site of Naqada gradually lost its importance in favor of the centers of Abydos and Hierakonpolis from which, through military alliances or conquests, there was a first reunification of Upper Egypt and due to Narmer (conventionally considered the first ruler of the I Dynasty) was completed the first unification of Upper and Lower Egypt. It is from this moment that the rulers of Egypt used the royal titles: the Name of Horus (*serekh*), the Name of the Two Ladies (*nebty*), and the Name of the Ruler of the Two Lands (*Nesu-bity*) (Fig. 3).

From the Early Dynastic Period to the First Intermediate Period (c. 3.000–2.055 BC)

The first dynasties defined by Manetho Thinite from the city of **Thinis** near Abydos date back to the *Early Dynastic Period* (c. 3,000–2,686 BC). With the birth of the I Dynasty (3,000–2,890 BC), those customs and values that characterized the Egyptian civilization for many of the centuries to come begin to assert themselves, first of all the adoption of the hieroglyphic writing, whose first prototypes are found in the recovered finds of the royal necropolis of Abydos. In fact, most of the kings of the Thinite Dynasties can be found in Abydos but also around Memphis. The documentation in our possession for this period is mainly based on these necropolises, the Royal Tomb of Saqqara and on some other documents such as the Palermo Stone and the Canon of Turin (see Schulz and Seidel 1997).

Archaeology of Ancient Egypt, Fig. 3 Early Dynastic, Old Kingdom, and First Intermediate Period chronology

Period	Phase or Culture	Dates
Early Dynastic Period	I Dynasty	c. 3.000 – 2.890 BC
	II Dynasty	2.890 – 2.686 BC
Old Kingdom	III Dynasty	2.686 – 2.613 BC
	IV Dynasty	2.613 – 2.494 BC
	V Dynasty	2.494 – 2.345 BC
	VI Dynasty	2.345 – 2.181 BC
First Intermediate Period	VII/VIII Dynasty	2.181 – 2.160 BC
	IX/X Dynasty	2.160 – 2.025 BC
	XI Dynasty (Thebes)	2.125 – 2.055 BC

Some of the most significant finds of this period are the makeup palettes, ivory knife handles, and, above all, the mace-heads of which the most famous is certainly the Narmer Palette (see Stevenon Smith 1998). This document summarizes in itself the unification of Egypt bearing the name of the king Narmer, represented on one side wearing the white crown of Lower Egypt and in the act of demolishing an enemy and on the other side visibly larger than the characters in the register wearing the red crown of Upper Egypt, in the act of inspecting the decapitated bodies of the enemies (Fig. 4).

One of the greatest expressions of Egyptian royalty is found in the development of a new funerary architecture. The necropolis of Abydos rises about 1.5 km from the fertile areas and consists of oblong chambers carved into the depths of the desert soil whose walls are reinforced with brick walls. The first phase belongs to the time of the Horus Aha (which some Egyptologists believe to be the same as Narmer) whose burial, unlike the previous ones, consisting of two chambers, consists of three much larger funerary chambers. It also begins the custom of burying the entourage of the king (whose members seem to have been killed during the funeral ceremony of the king) in nearby burial chambers whose use, however, lasts until the end of the I Dynasty. The funerary complex of his successor Djer presents structural innovations at the base of which there are later developments. In particular, to the numerous burial chambers, it is preferred a single larger chamber. Some traces reveal that the king must have been deposed in a wooden coffin. In any case, these are real mounds whose external features, however, remain unknown, perhaps because they were no external superstructures. Only a few steles remain, bearing the names of the kings, who were probably to be placed in places of worship before the burial. King Den introduced the use of an access ladder (usually southwest) to the burial chamber, sealed by boulders, and a chapel with his statue, the living could address their prayers to the statue from which the king could symbolically come out.

Archaeology of Ancient Egypt, Fig. 4 Narmer Palette. On the left the king wears the red crown; on the right he wears the white crown

In addition to the funerary complexes, the remains of imposing rectangular complexes located about 1,5 km away from the necropolis of Abydos have been found. The imponent funerary complex of Djer presents an architectural style that undoubtedly refers to the subsequent pyramidal complex of Djoser (III Dynasty) in Saqqara (see Lehner 1997).

Some sovereigns of the First Dynasty had funeral temples also dedicated to Memphis, as this center gradually acquired great importance until it became the new capital of the kingdom, as well as a royal residence. From archaeological evidence, we can confirm that its founder was Menes.

A major turning point in Egyptian funerary architecture came with the construction of the so-called mastaba tombs. Those found at Saqqara are certainly more impressive than the burials found in Abydos, but it is still not clear where they originated from. Although the remains of the imposing Djer's ruler structures could constitute a prototype, the structures of the mastabas seem to have more points in common with the architecture of the Near East. The niche facades of the Saqqara tombs, in fact, refer to a nearby eastern architectural model and have a low base where there were placed clay heads modeled in clay. At one of the niches in the eastern part of a mastaba, a stele was found which shows the seated sovereign with his title inscribed: it would be a forerunner of the Old Kingdom false-door stele. The Saqqara niche mastabas and the Abydos necropolis still have

common elements: the formal development of the substructure (burial chamber) and of the superstructure (chapel), the presence of external steps, and the presence of secondary tombs surrounding the main one. From this last element, we can recognize the existence of a ruling class that supported the sovereigns and that represents one of the main differences with the Predynastic Period. Among the funerary objects, stand out furniture and everyday objects in ivory and precious wood finely carved next to stone vases of various shapes.

The tombs of the first kings of the II Dynasty (2,890–2,686 BC) are located in Saqqara. The necropolis of Hotepsekhemwy is particularly impressive, but only the underground part of it remains. It has a different structure than the previous ones, as it is used to contain a vast set of furnishings, including furniture, dishes, and food that would have served the deceased in the afterlife. A consolidation of the idea of the tomb as a dwelling for the afterlife can therefore be seen. Subsequent kings of the dynasty (except Peribsen and Khasekhemuy who rejoined the ancient tradition) abandoned the necropolis of Abydos, perhaps because they intended to approach the seat of central power.

The dynasties from the III to the VI date from the *Old Kingdom* (2,686–2,181 BC). The most characteristic element that is introduced in this period, as well as perhaps the main symbol of the entire Egyptian civilization, is the birth of the pyramids.

The first great pyramid is that of the king of the III Dynasty Djoser, in Saqqara, whose stepped structure makes it immediately recognizable. In fact, however, the entire complex represents a great novelty compared to the past, as it combines in itself both the structural form of the mastaba and the new pyramidal structure of which it constitutes the prototype. The pyramid appears to be surrounded by ceremonial structures and decorative structures made here for the first time as the pavilions, the arcades, the fluted columns, the aedicules, the propylaea, the pilasters, and the capitals with pendulous leaves (which will no longer be used in the successive complexes). For the construction of the complex, limestone was used, and the boundary wall, which protected it as a fortress, was the simplified replica of the White Wall of Narmer. The most obvious innovation is the north-south orientation of the complex with respect to the four cardinal points. Below the stepped pyramid there is a labyrinth of corridors, chambers, and galleries connected to a central shaft with the burial chamber which is located between these spaces sealed by a stone as in the burial chambers of the rulers of the Thinite dynasties. Some shafts in the eastern part of the pyramid were used as cenotaphs for the kings of the I and II Dynasties which contained parts of the trousseau including vases and bowls made from precious stones bearing the names of the sovereigns (Fig. 5).

The pyramid of Djoser, rich in numerous symbologies, is the prototype for the subsequent

Archaeology of Ancient Egypt, Fig. 5 Step pyramid of Djoser, Saqqara

funerary complexes to the point that many kings will have one erected. Emblematic was the case of Sneferu (first ruler of the IV Dynasty) who even had three of them built. A first pyramid was that of Meidum, which followed the tiered model of Saqqara. Subsequently, Snefru had it reworked making it pyramidal, but in Roman times, the covering was removed to produce plaster, making its construction phases visible. The other two are in Dahshur. One of these is called the "Rhomboid Pyramid" as it presents a different inclination of the faces in the middle of the height; this change is of extreme importance for the architectural evolution of the pyramids as it marks the transition from the ancient stepped to those of canonical structure that can also be found in the Giza complex. The other pyramid, called the "Red Pyramid" (for the limestone bricks containing iron), was used by Sneferu as his burial and represents the first pyramid of perfect shape. The remarkable technique used to build it makes it one of the most successful examples of the Old Kingdom. Moreover, with Snefru, the orientation of the funeral complex changed from north-south to east-west, due to the identification of the sovereign with the cycle of the sun.

Another very important monumental complex, that of Giza, belongs to Snefru's successors: Khufu, Khafra, and Menkaure. The Pyramid of Khufu is the oldest and largest of the three main pyramids of the Giza necropolis and is by far the most perfect specimen that was never reached by any other pyramid. The pyramid has been extensively studied: it consists of a base of 230 m and is about 146 m high, but originally it must have been higher, as it was surmounted by a pyramidion perhaps in granite. The site of Giza was chosen because the terrain was much better than in Dahshur. Its construction took over 20 years, and it has several rooms inside. The upper sepulchral chamber, covered in dark red granite, must have been the site of Khufu's eternal rest. Inside the pyramid there are ascending and descending corridors, a chamber called "of the Queen" and another called "of the King." Then there are rooms with numerous graffiti bearing the name of Khufu. There are also fake corridors that lead upward, assumed to be ventilation ducts, or perhaps telescopes pointing to the sky.

Khafra's next pyramid faithfully reflects the model of Khufu but is slightly smaller as the one of Menkaure, whose dimensions are about half that of Cheops. Far more characteristic of Menkaure is the sphinx that portrays him in the Giza complex, whose figure has aroused interest and curiosity in all those who have seen it over the centuries (see Bard 2015).

The pyramids of the V and VI Dynasty maintain the Giza model but without managing to reach its grandeur. The choice of the king Shepseskaf, who decided not to build a pyramid but a massive mastaba in Saqqara, is an exception. This return to the past could be seen as an indicator of the difficult political passage that led from the IV to the V Dynasty. Although considerably smaller, there are also numerous pyramids dedicated to the queens. The pyramids that are found along the course of the Nile are very many indeed since they were built systematically during the Old and the Middle Kingdom, but many of them are today almost completely destroyed. We must necessarily mention the pyramid of Unas, the last ruler of the V Dynasty, as it is the first that presents the interior walls covered with funerary texts, the so-called Pyramid Texts.

Another structure of great importance during the Old Kingdom is that of the solar temple. In terms of monumentality, it approaches the pyramid, but it is not a sepulcher but a cultic structure. All solar temples are located between Abusirand Abu Gorab. The solar temple of Heliopolis is the most famous; unfortunately there are no remains to be observed. To get an idea of its features, we can look at the solar temple of Nyuserre in Abu Gorab, which had the same structure. Solar temples are generally composed of the same elements as the pyramid complexes. People could access to the temple of the valley, located lower down, through an uphill ramp. The walls were covered by the decrees that defined the offers. The ramp conducted to an elevated structure which represented a solar boat. At the center of this open-air court, there was an altar placed in front of the image of the *benben* that in Heliopolitan theology symbolizes the incarnation of the creator sun: a trunk obelisk placed on a wide podium. Among the wall reliefs, there are often scenes from the *sed* party.

Archaeology of Ancient Egypt, Fig. 6 Middle Kingdom, Second Intermediate, New Kingdom, and Third Intermediate period chronology

Period	Phase or Culture	Dates
Middle Kingdom	XI Dynasty (whole Egypt)	2.055 – 1.650 BC
	XII Dynasty	1.985 – 1.773 BC
Second Intermediate Period	XIII Dynasty	1.773 – after 1.650 BC
	XIV Dynasty	1.773 – 1.650 BC
	XV Dynasty	1.650 – 1.550 BC
	XVI Dynasty	1.650 – 1.580 BC
	XVII Dynasty	c. 1.580 – 1.550 BC
New Kingdom	XVIII Dynasty	1.550 – 1.069 BC
	Ramessid Period	
	XIX Dynasty	1.295 – 1.186 BC
	XX Dynasty	1.186 – 1.069 BC
Third Intermediate Period	XXI Dynasty	1.069 – 945 BC
	XXII Dynasty	945 – 715 BC
	XXIII Dynasty	818 – 715 BC
	XXIV Dynasty	727 – 715 BC
	XXV Dynasty	747 – 656 BC

The most imposing monuments certainly belonged to the kings, but even the dignitaries of the court and the rich private could enjoy sumptuous burials. However, the main form of the graves of these characters was the mastaba.

The *First Intermediate Period* (2,181–2,055 BC) is characterized by numerous disorders that led to a disintegration of the central power that was restored only after more than a century. Beyond the historical vicissitudes, we can say that the same figurative canons of the previous periods still remained, and the handicraft productions certainly did not stop. A situation of greater difficulty led to the use of poorer materials, so instead of stone it used wood only. In the necropolis of the princes of Asyut, abundant wooden materials have been found including a statuette of Chancellor Nakhti, considered a very fine specimen. This shows that the technical skills, although penalized by a lack of materials, continued to evolve (Fig. 6).

From the Middle Kingdom to the Third Intermediate Period (2.055–656 BC)

The XI and XII Dynasties date back to the *Middle Kingdom* (2,055–1,773 BC) and correspond to a period of recovery of the State. Probably the greatest expression of the architectural monumentality of this period can be seen in the complex of temples erected by Montuhotep II in Deir el-Bahari. It partly takes up the structure of the Old Kingdom funerary complexes, as it has a pyramid inside, but it is included in the complex. It could be defined as a combination of the templar specimens of the past and those that followed it. The peculiar aspects of this temple are represented by the colonnades placed at the limits of the terraces, which are inspired by the saff tombs (hypogeum characterized by a pillared facade with one or more entrances that allowed access to numerous rooms reserved for the sovereigns and their family) of the XI Dynasty, and the presence of

Archaeology of Ancient Egypt, Fig. 7 Coffin of the Middle Kingdom

the first hypostyle hall built in stone. The reliefs found on the walls of the terraced temple contain familiar themes: these are propaganda scenes designed to enhance the figure of the king, such as the pharaoh in the form of a sphinx who defeats his enemies or hunts (see Robins 1997) (Fig. 7).

Among the monumental works dating back to the XII Dynasty, we can remember the pyramids that Amenemhet I and Sesostris I had built at Lisht. The first takes up the prototypes of the VI Dynasty using stone blocks from the Abusir and Giza quarries; the second was built within a stone wall reinforced by a second brick wall and larger than the previous one, although made with a less expensive construction technique. Amenemhet II also had a pyramid built at Dahshur, and his successor Sesostris III did the same. Amenemhet III, on the other hand, had a simple cenotaph built at Dahshur.

During the Middle Kingdom some of the main features of the Egyptian statuary were consolidated, which in part resumed the characteristics of the Old Kingdom, but in a more evolved and diversified manner. Also the use and the shapes of the sarcophagi went through an evolutionary phase which however in this period still presents a remarkable simplicity compared to the much more elaborated and finely decorated models of the New Kingdom and the Third Intermediate Period.

The Middle Kingdom is considered the *classic period* par excellence of Ancient Egypt, although it is neither the longest nor the best documented (see James 2005). Certainly, the hieroglyphic language of this period is an example of it, since many of the most well-known literary texts were composed in this language, which was systematically used for many centuries to come even in monumental inscriptions. Another important feature of this period is the appearance of *ushabti*, mummiform figurines in stone, wood, or faïence. These were "responding statuettes" destined to obey the deceased's orders in the afterlife and to take care of his tasks on his behalf. The presence of some inscriptions bearing the name and genealogical information of the deceased allows us to associate some of these objects to a specific client.

From the XII Dynasty, these statuettes also offer formulas appear. Another group of objects that is found in the funerary objects of this period is one of the statuettes of the servants depicted performing a specific activity. Unlike the ushabti, which replaced the deceased, these served the same function as the funerary paintings: to ensure the life of their lord in the afterlife, his supply and to guarantee him, by serving and entertaining him, an existence worthy of his social class.

The *Second Intermediate Period* (1,773–1,550 BC) is much more documented than the First Intermediate Period and is characterized by the rise of the two dynasties of the Hyksos (XV and XVI Dynasties) which progressively conquered Egypt and became the new kings. Although this is a period conventionally considered as a succession of disorders and strong political changes, there is no lack of attestations of the activity of monumental works. Some kings of the XII Dynasty had already built buildings: Sekhemra-Khutaui in Deir el-Bahari and in Medamud; Sobekemsaf I a Medamud, Abydos, Karnak, Tod, and Elefantine; Sobekhotep III built a colonnade and doors in the temple of Montu in Medamud. Several graves of them and other kings have also been found.

The Hyksos dynasties, contrary to popular belief, favored the construction of other temple complexes, statues, and reliefs, and maintained

commercial contacts with their native homeland, the Levant, but also with various populations of the eastern Mediterranean. Many scarabs have been found of them that carry very special motifs, but perhaps one of the elements that most characterize their cultural identity are the so-called Hyksos fortresses (one of the most important was located outside Egypt in Sharuen, in Palestine). They also introduced the horse, the war chariot, the curved sword, helmets, and breastplates, and their material culture seems closely related to that of the Middle Bronze Age II of Palestine.

Of the XVII Theban Dynasty, partly contemporary to that of Hyksos, we know that it did not have access to great economic resources; however Sobekemsaf II had significant structures erected in Karnak and Abydos, and his tomb, mentioned in the papyrus Abbot, Ambras, and Amherst-Leopoldo II, had to contain a rich funeral kit. There are also numerous seals and burials of this dynasty.

The *New Kingdom* (1,550–1,069 BC), which corresponds to the XVIII, XIX, and XX Dynasty, is the period that can be defined as the most florid and significant of all Egyptian history. Handicraft productions gradually reached an increasingly high artistic and technological level, not only found in ceramics and everyday objects but also and above all in the evolution of coffins and sarcophagi, whose typologies changed hand in hand with the cultic and religious ideology. Thus, we are witnessing changes both in the forms (from a rectangular box to an anthropoid case) and in the ever more elaborate decorations and materials of great value such as gold and Egyptian blue. In the same way, the monumentality and grandeur of the templar complexes reached peaks that are not reflected by any in later periods, just think of the temples of Karnak, Luxor (see Bongioanni 2009), and Deir el-Bahari.

The high Egyptian city of Waset (Thebes) became, in this period, the main center of worship in Egypt. This is where the New Kingdom rulers build their tombs and temples. Karnak developed as a true temple city, consisting of numerous places of worship and sacred streets with small ports for boat stops, palaces, administrative complexes, and warehouses. The area of Karnak included three large complexes: in the center, the enclosure dedicated to Amon-Ra, to the south, the enclosure dedicated to Mut, and to the north, the enclosure dedicated to Montu. The sovereigns of the New Kingdom systematically pledged to expand and embellish the Temple, which is why they are unable to reconstruct the first stages of the interventions (Fig. 8).

The temple complex of Luxor was considered the residence of the god Amon-Ra and the place of regeneration of the divine forces. Even here, it is difficult to date the oldest buildings, but it is certain that the Thutmosid kings erected a large temple. Of great interest is the discovery of a tripartite boat station in the large courtyard of Ramses II that was to serve to house the boats of the divine triad of Karnak: Amon, Mut, and Khonsu. The papyriform red granite columns of Hatshepsut were reused by Ramses II who also affixed his name to it. Amenhotep III replaced the Thutmosid temple with a grandiose sanctuary consisting of a colonnade that allowed access to a south-facing courtyard from which a slightly elevated hypostyle hall opened. Here were the colossal statues of Amenophis III, which Ramses II later moved to his own courtyard. The most sensational find there is a statue of Amenhotep III standing on a sled. From the era of Ramses II, only one obelisk remains (the second was brought to Paris in 1836 and still today is located at Place de la Concorde), three statues and fragments of other statues scattered on the ground (Fig. 9).

In the XVIII Dynasty, the conception of the funerary temples changed; in fact, they were not built near the tomb anymore but on the edge of the desert of the Theban necropolis. These buildings became not only funerary buildings but also places of worship in which to venerate Amon-Ra and the seat of the cult of the king. The first funerary temples were built in Deir el-Bahari, where the funerary temple of Hatshepsut stands out, next to that of Mentuhotep II. Characteristic of this temple are the architecture and the iconographic program whose themes were to ensure worship, divine assistance, designation and legitimation, the aspiration to regeneration in the beyond, and the perpetuation of creation. Another important temple was that of Medinet Habu,

Archaeology of Ancient Egypt, Fig. 8 Papyriform pillars of Karnak

identified with the primordial hill, where the god Amon-Ra-Kamutef was worshiped and whose form allowed the god to continually regenerate (Fig. 10).

A special moment during the XVIII Dynasty was the foundation of Tell el-Amarna. This city was founded by the king Amenhotep IV (Akhenaten) who favored a religion based only on the cult of the god Aton. German and English Egyptologists during their investigations on the site found exceptional works of art. Although the temples and palaces are almost completely destroyed and the figures reduced to fragments, parts of the painted floors, fragments of paintings, reliefs, majolica, and statues have been preserved. In the residential quarters, real works of art were discovered as domestic altars with images of the royal family illuminated by the rays of the sun, sculptural models, and unfinished statues coming from the laboratories of the artisans.

In Qurna, west Thebes, Seti I (XIX Dynasty) had a sandstone temple built which served as a model for all subsequent funerary temples. The temple is surrounded by a high wall of white bricks with protruding quadrangular towers that recall the architectural construction of the Djoser era. A new element of the complex is the addition, in the facade of the temple, of a portico of papyrus-shaped columns that makes Seti I stand out from the previous dynastic tradition. But the most important complex of the XIX Dynasty is undoubtedly the Ramesseum, built by Ramses II, while, at the XX Dynasty, the Temple of Medinet Habu of Ramses III. The peculiarity of these

Archaeology of Ancient Egypt, Fig. 9 Coffin of the New Kingdom

temples lies in the iconography of the decorations: scenes of war in which the king stands victorious over defeated enemies.

The kings built their tombs in the Kings Valley. Near this necropolis, there was also a village of artisans: Deir el-Medina. Of great importance is the decorative program that first involved only the walls and pillars of the burial chamber, the antechamber of the shaft, and later, in the Ramesside period, the entire complex is decorated with representations and inscriptions. From the simple painting of the XVIII Dynasty, they passed to the bas relief and to the engraving of the XIX and XX Dynasty. Among the depictions stand out those of the Book of Amduat, the oldest of the guides for the afterlife, and the famous spell of the Weighing of the Heart (or "psychostasia") of the Chapter 125 from the Book of the Dead.

The following period, the *Third Intermediate Period* (1,069–656 BC), saw the coexistence of two centers of power: Tanis and Thebes. The rulers of Tanis erected their stone funeral buildings within the walls of the Temple of Amon, while those of Thebes opened the tombs and profaned mummies. Only a few tombs from this period have been discovered or brought to light; however, thanks to classical authors like Herodotus, we can reconstruct quite comprehensively how they could be. At the beginning of the period, a completely new burial appeared in which the funerary chapel was built inside the temple enclosure. The royal tombs, due to their position and construction technique, moved away from the model of the Old and Middle Kingdom burials and those of the Kings Valley, which was abandoned perhaps because of the continuous looting. The burials of the kings of the XXI and XXII Dynasties arise in the southwestern side of the necropolis of Tanis. Here, in fact, inviolate tombs that still hid the treasure rooms were found. Most of the sarcophagi were usurped to be redeployed by the successors of those who were buried there. Priests and officials of the period favored common and family burials and did not hesitate to occupy the most ancient tombs. The decorations mainly included mythological scenes made directly on the sarcophagi, which were made of wood or *cartonnage*.

The few examples of statues of sovereigns dating back to the period refer to the New Kingdom tradition. Statues that belonged to the rulers of the New Kingdom were reused, and minor modifications were made, or the inscription was changed. In those of new production, instead, following the decrease in iconographic variety and the tendency to simplification, the cube statue with smooth surfaces covered with inscriptions appears. Even the kings of the XXV Dynasty, of Nubian origin, were portrayed according to the canons of the Egyptian tradition by introducing Kushite stylistic elements with a round face with African features on a stocky neck and an athletic build. Iconographic innovations include the double *uraeus* on the forehead, tight-fitting headdress, and amulet shaped like a ram's head as a neck ornament (Fig. 11).

With the end of the Third Intermediate Period, Egypt was dominated by dynasties of foreign origin, Ethiopian, and Saitic, which still

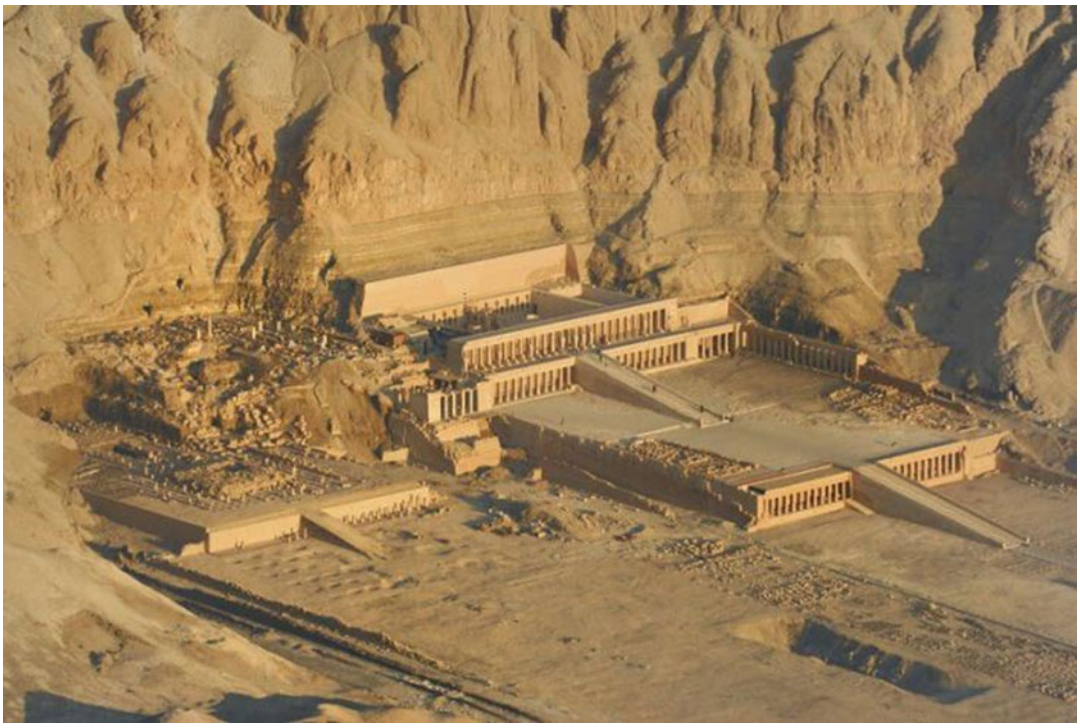

Archaeology of Ancient Egypt, Fig. 10 Funerary complex of Deir el-Bahari: the largest temple is the one erected by Queen Hatshepsut

maintained a policy corresponding to the Egyptian canons, but which soon began to fall apart after the Assyrian conquest. Although the history of Egyptian civilization is generally considered concluded with the Arab conquest, in the seventh century AD, actually already in the Late Period and in the following periods, it will no longer be an Egypt as it was in the past but with values now profoundly modified that will not come never reestablished.

Key Issues and Current Debates

The diversification of the research approach and the improvement of methodologies and technical procedures have changed the goals of Egyptologists. The current interest is no longer the description of individual phenomena but rather to insert them in a precise context of historical, sociological, and anthropological analysis. The DAI has promoted an initiative in which it has undertaken to examine the graves of the pharaohs of the I and II Dynasty of the necropolis of Abydos. The excavations conducted there have brought to light a large quantity of materials, including ceramic vessels bearing brief inscriptions and the names of previously unknown pharaohs. It was thanks to these researches that the so-called Dynasty 0 was identified. The joint activity of the DAI and the University of California of Los Angeles at Dra ‘Abu el-Naga (northern part of the Theban necropolis) has brought to light a rich necropolis dating back to the Second Intermediate Period and the beginning of the New Kingdom. These excavations led to the discovery of a new type of funerary architecture and to the knowledge of burial and cult practices typical of the lower-middle class. The aim of the Egyptologist is also to preserve the artifacts and monuments in a way that does not alter their original state. This is what the archaeologists of the French Institute of

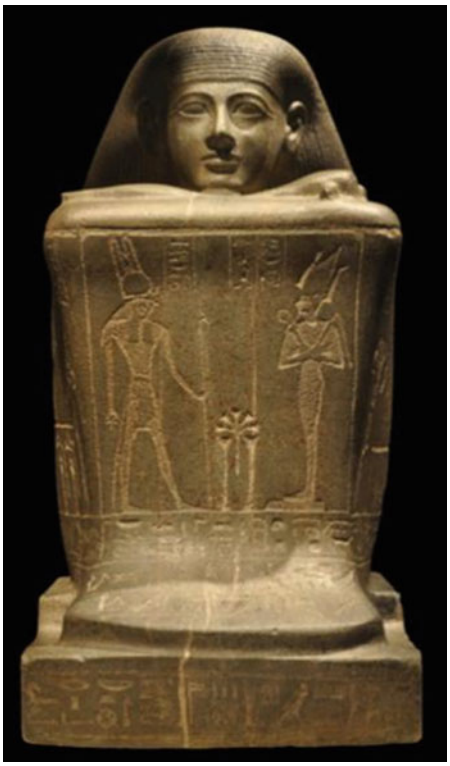

Archaeology of Ancient Egypt, Fig. 11 Example of cube statue

Eastern Archaeology (IFAO) are doing at the Deir el-Medina site. This site, contrary to what one might have expected, thanks to the introduction of new technologies, has returned findings and clues that help us understand the role of this village and its inhabitants, their cult, and their beliefs. In addition to this, the restoration of a part of the village was also carried out which allowed new and interesting results to be obtained, for example, the layout of the domestic environments, and some corrections could be made to the layout of the village designed by the Egyptologists who investigated on the site between the end of the nineteenth century and the first half of the twentieth century.

In 2015, several animal mummies were found in a system of catacombs near the temple of Anubis in Saqqara. According to the researchers, it must have been votive gifts to the gods or idols. The necropolis of Saqqara, not far from the pyramid complex of Giza, was discovered in the nineteenth century, but still today, the researchers continue to dig and to find a lot of information in this site.

Finally, modern Egyptology is not a stagnant science. On the contrary, it continues to evolve along with the new technologies of study. The greatest task of archaeologists is to preserve monuments from the collapse of time and to document those findings which, although already studied, deserve to be reviewed more carefully than has been possible in the past.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Carter, Howard
- ▶ Champollion, Jean-François
- ▶ Ippolito Rosellini
- ▶ Levallois Technology: Overview of Middle Paleolithic Technologies
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture

References

Appia, M.D. 1996. *Dizionario Enciclopedico dell'antico Egitto e delle civiltà nubiane*. Mondadori. Milan.

Bard, K.A. 2015. *An introduction to the archaeology of ancient Egypt*. Wiley Blackwell. Chicester.

Bongioanni, A. 2009. *Luxor e la Valle dei Re*. Mondadori. Milan.

Cimmino, F. 2003. *Dizionario delle dinastie faraoniche*. Bompiani. Milan.

Clauss, M. 2001. *Das Alte Ägypten*. Alexander Fest Verlag. Berlin.

Dodson, A. and Hilton, I. 2004. *The complete Royal Families of ancient Egypt*, Thames & Hudson. New York.

Dodson, A. and Ikram, S. 2008. *The Tomb in ancient Egypt: Royal Tombs and private Sepulchres from the early dynastic period to the romans*. Thames & Hudson. New York.

Grimal, N. 1998. *Historie de l'Egypte Ancienne*. Librairie Arthème Fayard. Paris.

Ikram, S. and Dodson, A. 1998. *Mummy in ancient Egypt: Equipping the dead for eternity.* Thames & Hudson. New York.

James, T.G.H. 2005. *The British museum concise introduction to ancient Egypt*. University of Michigan Press. Ann Harbor.
Lehner, M. 1997. *The complete pyramids*. Thames & Hudson. New York.
Robins, G. 1997. The art of ancient Egypt. Harvard University Press. London.
Schulz, R. and Seidel, M. 1997. *Ägypten. Die Welt der Pharaonen*. Könemann. Köln.
Shaw, I. 2005. *The Oxford history of ancient Egypt*. Oxford University Press. Oxford.
Stevenon Smith, W. 1998. *The art and architecture of ancient Egypt*. Third Edition. Revised with additions by W.K. Simpson. Yale University Press. New Haven. London.
Wilkinson, T.A.H. 2010. *The rise and fall of ancient Egypt: the history of a civilisation from 3000 BC to Cleopatra*. Bloomsbury. London. Berlin. New York.

Archaeology of Animal Burials

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Introduction

Animal burials are features identified at archaeological sites worldwide. Dogs are the most common taxon encountered in excavation; however, archaeologists have discovered the intentional interments of large carnivores, birds, reptiles, amphibians, fish, and even invertebrates, such as molluscs. The earliest animal interments date to the Late Pleistocene in Eurasia. While Pleistocene and Holocene hunter-gatherers tended to bury canids (e.g., Losey et al. 2011), many interments in complex societies are distinguished by scale, elaboration, and species diversity.

Definition

Animal burials or, more generally, animal interments are archaeological features in which a complete or nearly complete nonhuman animal was placed in a prepared pit or otherwise intentionally cached, installed, or deposited. Nonhuman animal burials are distinguished from other types of deposits, such as food or butchery debris, by archaeological context and the extent of skeletal articulation. Remains recovered in proper anatomical order have been termed "articulated" or "associated bone groups," or ABGs, and described as comprising "special" or "structured" deposits (Morris 2011). Many of these ABGs are intentional animal burials.

Key Issues/Current Debates/Future Directions/Examples

Entire animals from all vertebrate taxonomic classes, as well as invertebrates, have been intentionally interred by humans for at least 16,500 years. Animals were buried alone, with artifacts, with conspecifics (members of the same species), and with other species – most commonly humans. Some species were interred in cemeteries or catacombs; others have been found beneath structures, within tombs and pyramid mounds, in caves, and in isolated pits. When buried with humans, animals may represent companions, guides, guards, or mediators. In the absence of humans, animal interments may be sacrificial offerings and foundation deposits or represent the expedient disposal of a carcass or ceremonial "trash."

Documentary and archaeological evidence exist for the burial of beloved pets, mounts, and hunting companions, especially dogs, by the ancient Egyptians, Greeks, Romans, and medieval and post-medieval Europeans. Monkeys, squirrels, parrots, and ravens were also considered pets; some were memorialized with stele, cenotaphs, or place names, such as the faithful hunting dog of the Athenian general Xanthippus. However, in societies without written records, the status of buried animals as "pets" is debatable (see Russell 2012 for a thorough discussion of pets in the past).

Canids (members of the dog family, including foxes, wolves, dingoes, and jackals) have been buried in human graves and by themselves more frequently than any other animal taxon; canid burials have been reported from every continent

except Antarctica and are frequently interpreted as those of pets or companions. One of the earliest examples in the world is the interment of a red fox with a human at an Epipaleolithic site in Jordan. The fox has been interpreted as a companion to the deceased human, sharing a bond significant enough to be memorialized in death (Maher et al. 2011). In the succeeding Natufian period, the number of deceased humans accompanied by animals increases, establishing a global pattern of human-animal burial. Early proposed "pet" burials include that of a puppy with an elderly woman at Eynan, Israel, and a cat in association with a human grave on Cyprus about 9500 years ago.

Evidence from some human burials suggests that the deceased was buried with an animal who embodied membership in a specific clan, kin, or ethnic group. Such practices are associated with societies that recognize human descent from animal ancestors, identified as totems. The totem animal – as an ancestor – may have facilitated transition into the world of the dead by the deceased while simultaneously signaling group membership. Animal interments interpreted as totems, ancestors, or markers of descent include examples from Neolithic Orkney (eagles), Latvia (jay), the Natufian of Israel, and the Ohio Hopewell.

Similar in function to animal ancestors, dogs, horses, and geese may have been placed in human graves to serve as guides or guards after death. In Iceland, the burial of horses with both men and women highlighted their roles in mediation and transport (Loumand 2006). Like the mythic Norse steed Sleipnir, who was able to travel to Hel, these horses ensured safe passage of their human companions into the afterlife. In Iron Age Denmark, the richly furnished graves of warriors sometimes contained entire geese (Gotfredsen 2013). Being noisy and aggressive and with excellent vision, geese were considered superb guards by the Romans, who associated them with the god Mars. Burying geese commemorated the vocation of the deceased while protecting him on his postmortem journey.

Not all animals buried with humans were companions, pets, or guides, however. Some animals were interred in ceramic vessels, placed on plates, or found in association with food and drink. These animals appear to be grave gifts or food offerings intended for the deceased. In agricultural societies, domesticates were commonly interred with the dead as food for the afterlife. While entire animals were sometimes deposited this way, more frequently, only animal parts, such as the head or a joint of meat, were included in inhumations. The remainder of the animal was likely consumed by mourners at funerary feasts.

Interpretations of animal interments independent of human remains include votive or foundation deposits, expedient discard of a carcass, and disposal as ceremonial "trash." In contrast to food offerings for the deceased, these burials were often sacrificial, intended to give thanks, commemorate or memorialize a person or event, or obtain blessings or benefits from spirits, ancestors, or deities. For example, deposits of millions of mummified cats, dogs, and ibises in the Egyptian Late Period likely represent votive offerings made by pilgrims. Each animal was associated with a specific deity in the Egyptian pantheon. The purchase and interment of an animal mummy thus honored the god and conveyed the human worshipper's request for a blessing or good fortune (Ikram 2005). Among the ancient Maya of Mesoamerica, offerings may have functioned in a similar way; votive animals may have been selected to appeal to specific deities or mythic figures. Catfish offerings placed in graves, for example, may have garnered favor from the Hero Twins, who had once taken the form of catfish.

Foundation deposits are a specific kind of votive feature found in association with architecture, including temples, pyramids, bridges, walls, dams, and granaries. These interments mark the initiation of a construction and are intended to consecrate it and protect its contents or human inhabitants. Entire horses, cattle, sheep, and deer have been recovered from beneath medieval structures throughout Europe. Even more common was the deposit of skulls or jawbones of domesticated animals. The ritual use of such animal parts has considerable time depth.

Among the best known examples are the bucrania of bulls and rams from the site of Çatalhöyük. Beginning some 8000 years ago, inhabitants of this Anatolian site installed the skulls and horns of bovids in rows on benches and walls. The use of domesticates, especially bovids (sheep, goats, cattle), signals a major change in human-animal relations, as people in many parts of the world shifted from a foraging economy to one dependent upon animal husbandry and agriculture.

Analogous to foundation deposits, animal burials may also mark the ritual closure of buildings. Such features occur within existing architecture, rather than beneath its foundations, thereby ending the use-life of the structure. One example is the interment of dogs in the center of kivas, circular ritual structures common at sites in the Southwestern United States. In the Bronze Age Near East, donkeys served a similar function; they have been found in fill atop temple complexes.

Some animal burials represent "ceremonial trash" or the expedient disposal of carcasses. One of many interpretations of the 1000+ dogs interred at the site of Ashkelon in the Levant is that they were respectfully discarded after their use in healing rites (Edrey 2008). A similar explanation has been proposed for the mummified guinea pigs buried at the site of Lo Demás, Peru. Some of these "ritual rodents" may have been used for divinatory purposes, as well as in healing rites (Sandweiss and Wing 1997). Such animals could not be discarded like household trash; instead, they were deliberately interred at sites that resemble animal cemeteries. Social proscriptions also structured Roman disposal of horses and dogs at frontier military sites. Considered animal "comrades," neither horses nor dogs could be eaten. Their bodies may have been deposited expediently and fully articulated but without deliberate burial or grave goods.

Other possible interpretations of animal interments without accompanying human remains include burial of the animal as a person, an intentional social agent, rather than as a votive object or offering. Like some humans, some animals appear to have been the focus of mortuary ritual, meriting special treatment that distinguished them from conspecifics and paralleled the treatment of human dead. For example, in 2300 BCE, an Egyptian hound named Abutiyuw was buried at Giza with an inscription reading: "His Majesty ordered that he [the dog named Abutiyuw] be buried [ceremonially], that he be given a coffin from the royal treasury, fine linen in great quantity and incense. His Majesty also gave perfumed ointment and ordered that a tomb be built for him. . .. His Majesty did this for him that he [the dog] might be honoured before the great god Anubis" (Reisner 1936: 97).

The inscription about Abutiyuw focuses attention on a particular animal's experience of life and death, inviting a biographical approach to animal burial. Notable examples include Losey et al.'s (2011) osteobiographies of two canids interred in a Siberian cemetery and Argent's (2010) study of horse burial at the Iron Age site of Pazyryk. These studies suggest that humans recognized the unique characteristics and personalities of specific animals and commemorated those features in burial. A similar approach was taken by Campbell (2014), who sought to reconstruct the experiences of particular animals in his exploration of the social entanglements and life histories of a chariot horse, a dog, and a deer at the site of Anyang, China. He traced the "pathways" of each animal through training, hunting, sacrificing, consuming, and interment.

The innovative works of Losey, Argent, and Campbell recognize the subjectivity of animals, highlighting the fact that, like humans, animals are agents who experience their own lives and are capable of deliberate action. Certain animals, like certain humans, were persons. An even smaller fraction, however, were set apart as the incarnations of gods or ancestors. Catacombs at the site of Saqqara, Egypt, contained massive sarcophagi and mummified remains of Apis bulls, each of whom was believed to embody the god Ptah. The bodies of these animals were interred in ways that paralleled Egyptian treatment of elite humans, suggesting that the personhood and divinity of each bull was recognized and memorialized in death. Perri et al. (2015) have suggested a similar interpretation for the burial of a bobcat from a Hopewell site in Illinois; the animal wore a

collar of shell beads and bear teeth and was interred in a mound near several humans.

In contrast to the biographical or life history approach to animal interments, archaeologists in Mesoamerica have recently suggested that elites and ritual specialists used animal bodies in public ceremonies and as demonstrations of power. Display and burial of exotic, nonnative animals could be spectacular and performative, intended to showcase territorial conquest, as at the Aztec Templo Mayor at Tenochtitlan (López Luján et al. 2014). Animal burial could also make powerful statements about social hierarchies and inequalities. At Teotihuacan, powerful carnivores such as eagles and jaguars were captured, caged, and buried. Like human sacrifice, the ritual interment of these animals demonstrated the control of the state over inhabitants both human and nonhuman (Sugiyama et al. 2014). Royal menageries – for example, at the Tower of London – fulfilled similar roles by showcasing the power of a ruler through the physical restraint and subordination of exotic animals such as lions and elephants. The burial or disposal of their bodies therefore provides archaeological evidence of the use of animals as symbols and spectacles.

This essay has outlined some of the archaeological patterns in animal burial, focusing on deposits in which entire, or almost entire, articulated animals are found in intentional features. When animals are identified in burial contexts with humans, they tend to be interpreted as companions, pets, or guides to the afterlife. Some may embody descent group membership as totems or ancestors. However, when only animal parts are found, archaeologists generally assume they are food offerings or otherwise meant to serve or assist humans in the world after death.

Nonhuman animals were also interred without humans, with artifacts, members of their own species, and with other species. These interments are generally interpreted as foundation deposits and votive offerings to a deity, or they represent ceremonial "trash" or expedient disposal of a carcass. Recently, some archaeologists have suggested that certain animals were recognized and treated as agential persons. A life history approach to animal burial prioritizes the acts and experiences of animals as individuals, challenging anthropocentric reconstructions of the past.

To understand animal interments, archaeologists must situate them within the broader context of a society's foodways, beliefs, and rituals. Mythological or religious associations of animals with deities, culture heroes, or ancestors have been productive avenues of research. Archaeological context of the burial or deposit is also critical, including extent of articulation, disposition of the skeleton, and evidence of trauma. Like humans, animals had complex social roles in past societies as companions, guides, guards, sacrifices, offerings, the embodiments of gods and ancestors, and persons in their own right. They interacted not only with their human cohabitants and conspecifics but also with members of other species. Context-sensitive approaches to animal interment that consider such factors promise to yield more nuanced (pre)histories of the human-animal past.

Cross-References

► Social Zooarchaeology
► Zooarchaeology

References

Argent, G. 2010. Do the clothes make the horse? Relationality, roles and statuses in Iron Age inner Asia. *World Archaeology* 42: 157–174.

Campbell, R. 2014. Animal, human, god: Pathways of Shang animality and divinity. In *Animals and inequality in the ancient world*, ed. B.S. Arbuckle and S.A. Mccarty, 251–273. Boulder: University Press of Colorado.

Edrey, M. 2008. The dog burials at Achaemenid Ashkelon revisited. *Tel Aviv: Journal of the Institute of Archaeology of Tel Aviv University* 35: 267–282.

Gotfredsen, A.B.. 2013. The role of birds as grave gifts in richly furnished Roman Iron Age inhumation graves c. 1–375 AD, Eastern Denmark. *Anthropozoologica* 48: 355–370.

Ikram, S., ed. 2005. *Divine creatures: Animal mummies in ancient Egypt*. Cairo: American University in Cairo Press.

López Luján, L., X. Chávez Balderas, B. Zúñiga-Arellano, A. Aguirre Molina, and N. Valentín Maldonado. 2014. Entering the underworld: Animal offerings at the foot of the Great Temple of Tenochtitlan. In *Animals and inequality in the ancient world*, ed. B.S. Arbuckle and S.A. Mccarty, 33–61. Boulder: University Press of Colorado.

Losey, R.J., V.I. Bazaliiskii, S. Garvie-Lok, M. Germonpré, J.A. Leonard, A.L. Allen, M.A. Katzenberg, and M.V. Sablin. 2011. Canids as persons: Early Neolithic dog and wolf burials, cis-Baikal, Siberia. *Journal of Anthropological Archaeology* 30: 174–189.

Loumand, U. 2006. The horse and its role in Icelandic burial practices, mythology, and society. In *Old Norse religion in long-term perspectives: Origins, changes and interactions*, ed. K. Jennbert, A. Andrén, and C. Raudvere, 130–134. Lund: Nordic Academic Press.

Maher, L.A., J.A. Stock, S. Finney, J.J.N. Heywood, P.T. Miracle, and E.B. Banning. 2011. A unique human-fox burial from a pre-Natufian cemetery in the Levant (Jordan). *PLoS One* 6: e15815.

Morris, J. 2011. *Investigating animal burials: Ritual, mundane and beyond*, BAR British series no. 535. Oxford: BAR Publishing.

Perri, A.R., T.J. Martin, and K.B. Farnsworth. 2015. A bobcat burial and other reported intentional animal burials from Illinois Hopewell mounds. *Midcontinental Journal of Archaeology* 40: 282–301.

Reisner, G.A. 1936. The dog which was honored by the king of upper and lower Egypt. *Bulletin of the Museum of Fine Arts* XXXIV: 96–99.

Russell, N. 2012. *Social Zooarchaeology: Humans and animals in prehistory*. Cambridge: Cambridge University Press.

Sandweiss, D.H., and E.S. Wing. 1997. Ritual rodents: The guinea pigs of Chincha, Peru. *Journal of Field Archaeology* 24: 47–58.

Sugiyama, N., G. Pérez, B. Rodríguez, F. Torres, and R. Valadez. 2014. Animals and the state: The role of animals in state-level rituals in Mesoamerica. In *Animals and inequality in the ancient world*, ed. B.-S. Arbuckle and S.A. Mccarty, 11–31. Boulder: University Press of Colorado.

Further Reading

Green, M. 1992. *Animals in Celtic life and myth*. London: Routledge.

Hill, E. 2013. Archaeology and animal persons: Towards a prehistory of human–animal relations. *Environment and Society: Advances in Research* 4: 117–136.

Jennbert, K. 2014. Certain humans, certain animals: Attitudes in the long term. In *Exploring the animal turn: Human–animal relations in science, society and culture*, ed. E.A. Cederholm, A. Björck, K. Jennbert, and A.-S. Lönngren, 183–192. Lund: Pufendorfinstitutet.

Jones, A. 1998. Where eagles dare: Landscape, animals and the Neolithic of Orkney. *Journal of Material Culture* 3: 301–324.

Morey, D.F. 2010. *Dogs: Domestication and the development of a social bond*. Cambridge: Cambridge University Press.

Pluskowski, A., ed. 2012. *The ritual killing and burial of animals: European perspectives*. Oxford: Oxbow Books.

Sykes, N. 2015. *Beastly questions: Animal answers to archaeological issues*. London: Bloomsbury.

Archaeology of Art: Theoretical Frameworks

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Introduction and Definition

This entry provides an overview of the main *theoretical frameworks* used in the *archaeology of art* and outlines their main contributions and limitations. These frameworks can be defined as sets of *concepts* used by researchers to approach the *analysis and interpretation* of *visual imagery* in the *archaeological record*, which includes *materials* such as rock art (petroglyphs, paintings, and geoglyphs), portable art (decorated tools and artifacts with no practical-mechanical function), sculptures, friezes, body ornaments (beads, pendants, etc.), and pottery decoration. These theoretical frameworks have varied along the history of archaeology according to factors such as the following: (a) *ontology*, the way "art" is defined and conceived from each specific theoretical perspective; (b) *epistemology*, the way art analysis and/or interpretation is carried out, that is, whether it uses induction and/or deduction, whether it focuses on qualitative descriptions and/or searches for quantitative patterns, and whether it uses one or more lines of independent evidence (e.g., image data, technical data, spatial data, archaeofaunal data, and ethnographic data); (c) the *topics* which are central to each framework and which are reflected by the *questions* asked about the materials under study and by the *concepts* used to describe, explain, and interpret them; and (d) *methodology*, the practical ways in which *data* are collected and *variables* are measured in the field, analyzed in the laboratory, and presented within the academic community (theoretical frameworks have also varied according to their historical and sociocultural contexts, but these will not be addressed here due to space limitations).

Some theoretical approaches to art stem from wider archaeological theoretical frameworks (e.g., culture-history, processual, post-processual, and evolutionary-ecological; see below), and thus, their concepts are mainly applications of their particular conceptions about past human cultures to the analysis and interpretation of artistic materials in the archaeological record. Other approaches derive from the application of theoretical frameworks generated in other disciplines than archaeology, such as anthropology, linguistics, or sociology (e.g., structuralism, semiotics, and historical materialism; see below). Finally, others focus particularly on the development of hypotheses about art's functions (e.g., shamanism and art as landmarks along caravan routes; see below) which have been developed to tackle specific cases-studies (Fig. 1).

Historical Background

Foundational Approaches: The Pioneer Interpretations

In the late nineteenth century, researchers followed evolutionist ideas that viewed prehistoric hunter-gatherers as "savages" with a minimal cultural development; hence, they did not conceive that they could have the creativity potential to produce art. This was reversed by series of archaeological discoveries, firstly of portable art in Paleolithic contexts (e.g., Lartet and Christy 1865 in Ucko and Rosenfeld 1967; Bahn and Vertut 1988; White 2003) and later of rock art of Paleolithic origin (see De Sautuola-Carthailhac debate in idem). Interestingly, by that time similar findings and inferences about art's antiquity were also being made in other continents: in South

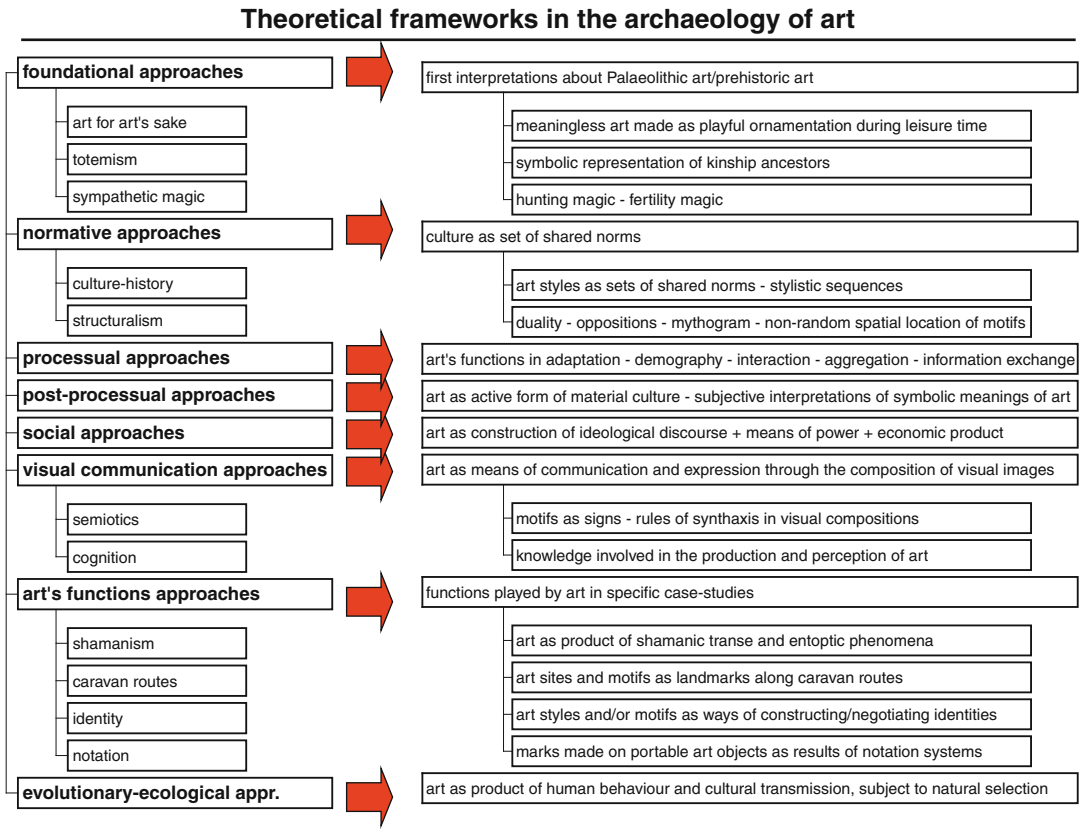

Archaeology of Art: Theoretical Frameworks, Fig. 1 Theoretical frameworks in the archaeology of art

America, some of the first rock art discoveries were made as early as 1876 in Patagonia (Argentina; Moreno 1876) and in 1877 in Northwest Argentina (Liberani and Hernández 1950), and in both cases, they were attributed to native peoples of pre-Hispanic times (which are obviously not comparable to Paleolithic antiquity but are conceptually comparable insofar as they are both prehistoric contexts).

As part of the realization that art had prehistoric origins, the first interpretations about its origins and purposes were proposed. Given that by that time archaeology was still not a formal academic discipline, these hypotheses were not developed within an explicit archaeological theoretical framework but rather were ideas that stemmed from the contemporary conceptions about Paleolithic life, about Western art, as well as from ethnographic analogies with hunter-gatherer societies living in several territories colonized by European countries.

An early interpretation, known as "*art for art's sake*," proposed that *portable art* had *no meaning*, pursued only an *ornamental* purpose, and was produced due to plentiful Paleolithic environmental conditions which enabled hunter-gatherers to dedicate to these activities during their spare time (Lartet and Christy 1864 in Ucko and Rosenfeld). Interestingly, this idea is detectable in contemporary authors of South America: for example, when referring to rock art from Patagonia (Argentina), Burmeister (1892) inferred that these images had been made by the native inhabitants during "leisure times." This hypothesis is difficult to test insofar as meaning is the most evasive aspect of prehistoric art. However, the fact that visual patterns are sometimes repeated within individual items and among assemblages indicates an intentional reproduction of certain decorative motifs which can be interpreted as socially significant, that is, responding to cultural norms of material culture design, presentation, and use, regardless of their potential symbolic meaning. Moreover, it is also interesting to note that the *emphasis* placed by Lartet and Christy on *environmental conditions* entails that already this early hypothesis was taking into account a *production context*, which, in turn, was positively valued in spite of the dominant negative ideas about hunter-gatherer life.

A second pioneering interpretation was that of *totemism*, which originated in *ethnographic analogies* and asserted that some Paleolithic *rock art motifs* could be conceived as *symbolic representations* of *kinship ancestors* (Reinach 1903). Such hypothesis, which had relatively little academic impact, only took into account few animal representations and disregarded other motifs and was clearly very hard to test. However, it did bring into attention the fact that prehistoric art could have had a social function, in this case related to identity and ritual use.

A third interpretation was that Paleolithic art had been produced as part of *sympathetic magic* rituals carried out in order to increase success in *hunting prey* and/or in its *fertility* and thus in its availability for further hunting (Reinach 1903; Breuil 1952; see details in Ucko and Rosenfeld 1967; Bahn and Vertut 1988; White 2003). This interpretation was based on the fact that *species* represented in rock art were also *consumed* by Paleolithic people, as well as the fact that the images' *location* was often hidden in *dark panels* of caves, a context that was assumed as likely for *ritual practices* and not general domestic use. Superimposed motifs were interpreted as ritual reiterations, while marks made on rock art and clay-modeled animal representations were interpreted as symbolic wounds. In turn, rock art depictions of animals with swollen abdomens were seen as pregnant individuals, while the portable "Venus" figurines were considered as fertility symbols given the exaggeration of the reproductive portions of the human female body in some of these figurines.

The number of images interpreted via this approach was later expanded by Breuil (1952) to account for other motifs: for example, predators which were not part of the diet were depicted to control them symbolically; geometric signs were representations of traps or weapons; incomplete animals were represented as deprived of their senses or body parts in order to symbolically prevent them from escaping; human hands

superimposed or near to animal figures represented their appropriation.

Criticisms to the sympathetic magic hypothesis have been many, including the following: (a) hunting scenes are infrequent, (b) some animals with swollen abdomens are male, (c) most represented animals are not "wounded," and (d) there are discrepancies between the represented taxa in the archaeofaunal and artistic records (a point that would later be approached by other frameworks; see below). Moreover, the exclusively inductive epistemology underlying these interpretations also weakens their explanatory power. However, one of its core contributions is the combination of an idealist ontology with some materialist underpinnings: the symbolic aspects of art are combined with its core practical functions in a hunter-gatherer world where prey availability seems crucial. Furthermore, both Reinach and Begouen (in Ucko and Rosenfeld 1967) stressed the fact that the *act of making* these images was essential to the *performance* of the sympathetic magic rites, a detail which points to an early – though implicit – interest in what later would be the concepts of praxis and engagement through art production.

Normative Approaches: Culture-History and Structuralism

Normative approaches to the study of art in archaeology share in common the fact that they consider *culture* as a *set of shared norms*; hence, art materials would reflect such norms in their design and technique.

Culture-history was the first formal theoretical framework developed in academic archaeology by authors such as Willey and Phillips. It operated within a normative conception of culture, and its main aim was to identify "*archaeological cultures*" or "*industries*" defined by spatial-temporal distributions of artifact *types*. Each type was defined by one or more trait/s that allowed the *typological classification* of artifacts found in the archaeological record. In turn, archaeological cultures involved specific artistic *styles*, defined by similarities in the types of motifs (their form, color, etc.), their layout on the artifacts, the themes represented in the figurative images, the techniques with which they were created, etc. Culture-history analyses tended to create *periods* which organized the archaeological cultures in a diachronic succession: thus, when approaching art, this theoretical framework created *stylistic sequences*. With portable art, these were mainly based on the stratigraphic position of decorated artifacts in successive layers of sites. In rock art these were based on (a) the superimposition of images, which were used as indicators of their relative dates, and (b) the indirect association of rock art images located in the walls of a site with pigment residues in sequential archaeological layers, dated sediments sealing the walls, or fallen wall fragments with imagery buried by the sediments.

These stylistic sequences were related by the authors to the periods not only as a way of providing a context to the former but also as a way of defining the latter. Yet it is interesting to note that in several cases there was no univocal correspondence between one style and one archaeological culture, implying that despite of the "shared cultural norms" premise, archaeologists did not assume that industries and artistic styles changed necessarily in a coordinated manner. For example, in Western European Paleolithic art, Breuil (1952) defined two "cycles," Aurignacian-Perigordian and Solutrean-Magdalenian, while similar – though more complex – stylistic sequences were proposed by Laming-Emperaire and Leroi-Gourhan. This kind of stylistic scheme was applied to the study of portable art and rock art in many other regions of the planet (e.g., Gradin et al. 1979 in Patagonia, Argentina).

Due to its emphasis on culture as a set of shared norms, this framework focused mostly on the types of artifacts and of motifs which could be used as "fossil guides" due to their high frequencies and/or visual distinctiveness, to construct cultural periods and stylistic sequences, thus disregarding cultural variability. Its idealist ontology – entailed by the notion that culture was a "projection" from mind to practice – and its highly inductive epistemology also limited its explanatory power insofar as little room was left to move

beyond descriptive and empiricist accounts of the past. However, the creation of art periods and stylistic sequences is still used by most archaeologists as a means of organizing archaeological data, although it has now become clear that this is only a means, and not an end, in the archaeology of art.

A second and entirely different normative approach to art was *structuralism*. In accordance with the core ideas of Levi Strauss about culture being structured by associations and oppositions as a reflection of the human mental structure, and following early suggestions by Raphael in 1946 about the fact that in European Paleolithic rock art animal representations were spatially displayed with a nonrandom structure, Leroi-Gourhan (1964) and Laming-Emperaire developed systematic analyses in search for spatial patterning of motifs in European cave art. Such analyses were carried out by (a) *classifying motifs* in *groups* (e.g., A = horses, B = bovines, P = fish, a = lines and dots signs, b = ovals and triangles), (b) partitioning the *topographic zones* of the caves (e.g., entrance; central zone; passageway; etc.), and (c) *quantifying* the motif groups in order to search for their *combination patterns* and their *links* to the *topographic zones* (Leroi-Gourhan 1964). The emerging patterns were then interpreted as *mythograms*, that is, the graphic symbolization of shared myths whose structure was projected from the mind to the cave walls. Such structure emerged from *dual associations and oppositions* such as light-darkness and life-death. Also, certain *animal motif types* were also associated to certain *geometric signs* and attributed a *sexual meaning*.

Although these authors also developed stylistic sequences in the normative fashion with an essentialist and idealist ontology, the differences of structuralism compared with the former framework are profound: (a) its emphasis on a synchronic view of art, (b) its partially inductive and partially deductive epistemology, (c) its use of quantitative data, and (d) its highly interpretive approach to the emerging patterns. Criticism did focus precisely on these issues: for example, the synchronic view collapsed images made centuries apart into one single data corpus and the mythogram interpretations were untestable. However, this framework did develop for the first time the systematic recording and quantification of art data (motif types, their combinations, and their spatial location) and proposed a testable hypothesis regarding the nonrandom layout of images, which are still of relevance in the archaeology of art.

Processual Approaches: Variability, Adaptation, and Information Exchange

A revolutionary breakthrough from normative theories was achieved by a group of archaeologists in the 1960s (e.g., Binford, Flannery, Schiffer, Redman, Renfrew, Watson, Wobst, etc.) who, following ecological concepts applied to the study of human behavior, proposed a definition of *culture* as an *extrasomatic means of adaptation* of *people* to the *environment*. This meant that culture could be seen as a *system* integrated by several *subsystems* (subsistence, technology, etc.), each of which complied with a specific *function* in the adaptation of a human group via the deployment of *adaptive strategies*. Thus, breaking away from finding cultural norms and creating periods which focused on the average items of the archaeological record, these "new archaeologists" focused instead on the study of cultural *variability* and on the circulation of *materials*, *energy, and information* along wide spatial scales. This materialist ontology was combined with a hypothetico-deductive epistemology: both were foundational in one of the most innovative and pervasive archaeological frameworks (though with obvious shortcomings; see below).

Although its main concern was with subsistence and technology, this theoretical framework had a clear impact on art analyses. Archaeologists following this perspective stressed the need to (a) study variability *within* broad periods such as "Paleolithic art" which covered thousands of years and often masked actual variations in human behavior, (b) consider that terms such as "parietal art" or "portable art" were also labels that often masked variability in spite of their

usefulness in academic communication, (c) go beyond inductive typological descriptions of periods and stylistic sequences and offer explanations proposed by explicit hypotheses tested against systematically analyzed data, and (d) focus not just on the potential symbolic meanings of art (which are often unattainable) but also on art's functions within the human groups that produced it (e.g., Conkey 1985).

These ideas were applied to several Paleolithic case studies, in which authors – following Wobst's demographic simulations and analyses about hunter-gatherer populations – focused on portable art and/or rock art similarities to identify inter-site links viewed as evidence of regional interaction. Art was a key evidence through which networks, alliances, and aggregation sites were identified by (a) qualitative comparisons between *designs* (Bahn 1982; Gamble 1982), (b) inter-site comparisons of relative *frequencies* of *decorated artifacts* (Conkey 1980; Bahn 1982; White 1992), (c) detailed analyses of *element repertoire* and *structural principles frequencies and diversity* (Conkey 1980), and (d) *number* of rock art *sites versus* stylistic *regionalization or homogeneity* (Jochim 1983). These data were contextualized by their environmental setting (e.g., paleotemperature, sites' geographic location, vegetation distribution, faunal diversity, carrying capacity, exploitation and intensification strategies, and their relation to the relative population densities they could afford) to characterize the natural and social context in which these "adaptive strategies" were operating.

In accordance with the processual agenda, these studies tended to see art production and use as a means of overcoming environmental stress and potential competition for resources triggered by environmental changes and/or demographic pressure by creating and reinforcing social bonds. This functionalist view of the adaptive purposes of art has been subsequently criticized by several authors (including self-criticism by some pioneers of this framework; e.g., Conkey 1984) for its environmental reductionism and for its teleological reasoning. While taphonomy/conservation, sampling, identification, and publication were explicitly considered as biasing factors of the artistic materials within the archaeological record (e.g., Bahn 1982; Conkey 1985), these analyses have been criticized because of their sampling strategies and statistical methods, which have subsequently been refined.

Following the adaptive approaches to culture, *style* and *function* were dichotomically conceived by some authors, the latter being considered as adaptive while the former being considered as nonadaptive (e.g., Dunnell). However, other authors argued that style did have specific adaptive functions as *systems of information exchange* (e.g., Wobst). This, in turn, led to a whole debate on the active and passive functions of style which are applicable to art analyses (see the entry on "► Style: Its Role in the Archaeology of Art" in this encyclopedia).

Another crucial development within this framework was the flow model presented by Schiffer in 1972 "to view the" life history "or processes of *systemic context* of any material element" which included "procurement, manufacture, use, maintenance, and discard," in order to account "for the production of a substantial portion of the *archaeological record*." This model, similar to the *chaîne opératoire* concept, was adapted to the analysis of rock art production by Aschero (1988) and applied to the study of production sequences of portable art by White (1992); clearly, both models supercede the processual agenda and are useful for the study of art materials from other theoretical perspectives.

The main criticisms to this theoretical framework were (a) its ecological reductionism and determinism, which often is not enough to explain art's creation, uses, and changes; (b) its teleological conception of culture, and art within it, as exclusively a means of adaptation, which leaves aside other potentially "nonadaptive" uses of art; and (c) its functionalist view of culture, and art within it, as a homeostatic system which paid little attention to its potential internal contradictions, which are often core factors leading to change. Although the search for variability was a key contribution of processualism, which is part of the research agenda nowadays, paradoxically its deterministic view sometimes gave little room to

the study of the diversity of human actions, that is, human agency, social divisions, and inequalities. Other theoretical frameworks took up these challenges.

Post-processual Approaches: Symbolism and Interpretation

One of the strongest reactions to the processual framework in the 1980s can be found in publications by, among others, Bender, Conkey, Hodder, Shanks, and Tilley who criticized it as positivist, reductionist, functionalist, and deterministic. Following post-modern concepts, they proposed instead that archaeologists cannot reach an objective truth about the past because the *past* is a *construct* made from the *present*, and as such it is a *situated* and *subjective* construction – that is, biased by the socioeconomic status of the researcher, his/her cultural and ideological background, and his/her gender, values, intentions, etc. Thus, the key means to approaching the archaeological record was via its *interpretation*, metaphorically reading it as a text, and offering as a result not necessarily just one but several subjective and *multivocal* insights to the past. Against the processual view of human behavior as a passive response to environmental conditions, post-processual archaeologists saw *human agency* as an active construction of *subjective relationships* between *persons*, *objects*, and *landscapes*. Thus, *material culture*, including art, was conceived both as *active* (bearing traces of its producers' actions but in turn having further effects on its users' actions) and *meaningful* (bearing multiple – sometimes ambiguous – senses and intentions). This was partly derived from ethnoarchaeological observations such as those made by Hodder, who studied the *decoration* of calabashes in the Ilchamus society of Kenya and inferred that, in this male-dominated society, these objects were decorated by women with designs that had several meanings, some of which were *gender*-related and *symbolized* female resistance.

A foundational example of the application of this framework to rock art interpretation is that of Tilley (1991), whom in his study of the engraved "*de*signs" of Nämforsen (Sweden) developed the following themes:

(a) An initial question about "What is their meaning, significance, and value**today**? . . . Or can we hope to mediate them productively, reinscribe them into the present, and open out the carvings to subjective experience once more?" (Tilley 1991: 8).
(b) Several interpretations of the carvings' meanings, including the use of the petroglyphs as totemic symbols (expressed through nature/culture dual oppositions), as ideological reinforcements of social control between the hunter-fisher-gatherer groups and as intragroup symbols operating in terms of age and gender distinctions (idem: 99, 167, etc.).
(c) An open dialogue with the reader in which he portrays the critical questions he thinks the reader will ask of his book, for example, that the discourse includes an open-ended array of possibilities, that the author has evaded his responsibility to tell the reader what the carvings in fact mean, and that the author's relativism destroys any productive links between past and present. To this, he replies that a "totalizing framework" or "totalitarian solution" that tries to box in many interpretations will anyway leave a surplus of meaning/s that cannot be captured in one single discourse (Tilley 1991: 173). Through such final deconstruction of his own work, the author actively engages the reader in the realization that unique conclusions are neither feasible nor desirable in the human sciences.

Other post-processual conceptions and analyses of art have been less relativist and skeptical and have focused on applying concepts related to art's spatial distribution, such as the notion of social geometry, with lattices of people and objects deployed in space to *construct socially meaningful landscapes* (Conkey 1984). This includes the knowledge to navigate in these landscapes, which is not just verbal but also expressed through material culture (e.g., movable, as in portable art, and fixed in space, as in rock art). Thus, following Bourdieu's notion of habitus, Conkey proposed that human practices and knowledges structure space and in turn such structured space structures humans: the reproduction of such

trends can be identified in the archaeological record (idem). This kind of approach to the ways in which people have engaged themselves in the construction of a visually marked landscape via rock art placement at significant locations has been fruitful and is still used nowadays (Bradley et al. 1994).

Finally, the interpretation of art from the *aesthetics* point of view – defined as the particular way in which a person experiences an object and through such process generates a subjective feeling – can also be included within the broad spectrum of post-processual approaches to past visual imagery (see the entry on "▶ Aesthetics in Archaeology" in this encyclopedia).

This framework has pinpointed a crucial issue in terms of the *self-awareness* and *self-criticism* that archaeologists need to develop by acknowledging the *biases* of their *situated knowledge-construction process*. However, in spite of such contextual approach, the idealist ontology and the hermeneutical epistemology of post-processual framework can be criticized for their extreme relativism, which leads to the notion that any interpretation is valid. Moreover, post-processual discourse can end up being more self-referential (about the researcher) than analytical and informative about the persons who lived in the past: if multi-vocality is truly advocated, then those *past voices* and *agencies*, which are inscribed in the *materiality* of archaeological *artefacts-images*, should also be listened to, without of course claiming that they can be accessed objectively. Thus, it is useful to draw a distinction between the *past events* and the *knowledge about the past*: present researchers have had no intervention in the creation of the former but do have total intervention – and responsibility – in the construction of the latter.

Social Approaches: Ideology, Power, and Economy

Partly independently and partly as a response to processualism, a relatively small group of archaeologists started applying *materialist* and *neo-Marxist* concepts to archaeological analysis (e.g., see publications by Bate, Earle, Gándara, Lumbreras, McGuire, Patterson, Vargas Arenas, etc., which in some cases follow the much earlier and foundational work of Childe). Challenging processualism, this framework pointed out the fact that culture is not always a means of adaptation due to several reasons, including that *societies* are often *not homogenous*, hence not all members of a group have the same chances of accessing *resources* and *information* vital for their social reproduction: culture can adapt some people at the expense of not adapting others. From this point of view, the basis of a society is its *economic structure* (briefly defined as the division of labor entailed in the process of extraction-production-circulation-consumption of raw materials, finished goods and services, the property of production means and of their profits). This determines the existence of a *political and ideological superstructure* developed to sustain and *reproduce* such structure, particularly when it entails situations of *social inequality* and *labor exploitation*. Within this framework, *art* has mainly been considered as part of *political strategies* manipulated to maintain control and enforce *power*, as well as part of *ideological discourses* to *mask* and/or *justify inequalities* (Earle 1989; Lumbreras 1998; Pérez Gollán 2000).

Such *political functions* to create and reproduce intragroup differences can be identified by studying art styles and luxury items, which are a means of conferring and sustaining *status* and *power* due to the fact that they operate visually, catching people's attentions and generating aesthetic reactions – which are sometimes difficult to manage rationally, hence their high effectiveness (Earle 1989). Moreover, the power emanating from durable objects tends to feel more permanent, hence unquestionable, thus conferring solidity also to the social position of their owners (Earle 1989). In turn, *ideological functions* of art have been often studied by analyzing the images' motifs/topics and the ways in which these are represented: for example, in the case of Aguada style (found in the pottery, metal objects, wooden artifacts and textiles from Northwest Argentina), the images of a sacrificer holding a human head and, particularly, of a feline are pervasive throughout these materials and have been interpreted as a means of *legitimizing* power and hereditary social

inequality, by linking the governants with sacred beings and, through such iconographic manipulation, represent the elites with divine attributes (Pérez Gollán 2000).

These analyses of the political and ideological functions of art have focused heavily on art's capacity to express ideas and thus on the *mental dimension* underlying its creation and use, while the *material conditions* in which it was produced and displayed have mainly been considered as an *external context* which determined art creation, but have often not been thoroughly analyzed as an *internal component of art's production*. However, some authors have indeed noted that art can also be conceived not just as a *representation* but as a *presentation* of a material object and, as such, as a "*productive work*" (Lumbreras 1998). Thus, the artistic *work process* can be reconstructed via the analysis of the *production sequence* (Aschero 1988; White 1992). Also, conceiving *art* as an *economic product* entails that it is a material artifact made through the combination of *productive forces* (raw materials, tools, techniques, human labor) and *social relations of production* (the engagement of persons and materials and knowledge in such work process) in order to create an image-artifact. In turn, art production entails a certain *labor investment*, which can be assessed via multiple variables, for example, (a) media on which to produce the images, their abundance/scarcity, accessibility/inaccessibility, hardness, and texture; (b) raw material availability to make tools and prepare paint; (c) expedient/curated nature of engraving and painting tools; and (d) simplicity/complexity of image-making techniques and of visual designs produced with them. The study of such variables allows one to transcend a descriptive approach to the *materiality of art* and is relevant to characterizing the amount and quality of labor invested in its production, thus revealing economic aspects underlying its creation, which in turn shed light on some of the ways people *engaged* themselves – through practical manipulation and visual perception – with the *material features* of these images.

The orthodoxy of these approaches has been rightly criticized for its reductionist economic determinism and for its mechanistic and teleological approaches to art's functions as mere reproductive reflections of the economic structure. Moreover, on many occasions, the potential political and/or ideological functions of art are not well grounded, hence reducing the explanatory power of these concepts. For this reason, materialist and neo-Marxist approaches need to not just assert but demonstrate in each case why and how a certain art form has complied (or not) with such functions. Yet, breaking away from the Cartesian mind-body split, which originally led to art being associated with ideology and not with economy, and recognizing that art is *intrinsically* and *simultaneously* ideological-political-economic, strengthens the viewpoints proposed by this framework. Moreover, its materialist ontology – which allows to focus on contextual *and* internal material aspects of art production and display – and its dialectical epistemology, combining deduction and induction, have great potential within the archaeology of art.

Approaches to Art as Visual Communication: Semiotics, Cognition, and Expressive Symbolism

Most frameworks do involve the notion that art has a communicative aspect, but two frameworks have focused on this feature as their core concept. On the one hand, following the work of linguists and semioticians such as Saussure, Peirce, and Barthes and also having clear influences from the structuralist framework presented above, the *semiotics* approach has put forward the notion that visual art is the product of an act of *communication*, which includes a *source* who produces a *message* containing information, a *code* in which it is formulated, a *channel* through which it is transmitted, and *receiver*(s) who decodes it (if they share a common code with the source) and who may respond or *feedback* to it. Three sets of rules function in the code in order for the information contained in the message to be transmitted: *syntactic*, *pragmatic*, and *semantic*. The first two have clearly a greater chance of archaeological visibility in art designs, since the *types* of motifs and their *spatial relations* in terms of association, juxtaposition, direction, distribution, etc. (e.g., Llamazares 1992) can help identify

aspects of the rules underlying the syntactic composition and pragmatic use of the images.

Also having developed partly from structuralism, approaches oriented to the study of *cognition* in the archaeology of art have focused on analyzing the steps taken by past artists in the creation of images with specific features (symmetry, size, etc.) and how their *visual perception* has participated in such process. To do so, special attention has been given to how *forms* (a) are *selected* and filtered among a wider array of possibilities, through the emphasis of some details and the omission of others, in order to facilitate and *economize* their visual perception and interpretation; (b) are *categorized* within each cultural context; and (c) are contained within a *cultural memory* which allows the *organization* of image perception, makes images *recognizable* and *significative*, and influences the *elaboration of future forms* (Washburn 1983). Finally, following Parsons' work, the *expressive symbolism* approach has proposed that an art object functions as an expressive symbol when it operates as a token of the *feelings* or the *attitude* of an "ego" toward an "alter," thus mediating the *affective component* in such *interaction* (Tanner 1992).

The complete application of these approaches seems to require other sources of information rather than just the archaeological materials, thus being more fully applicable to historic than to prehistoric cases. Yet many approaches developed by these frameworks can be found in diverse case studies.

Approaches to Art's Functions: Case-Oriented Hypotheses

A number of art analyses are based not on wide theoretical frameworks but rather on specific hypotheses which are oriented and applicable to specific case studies. Such is the case with *Shamanism*, which proposes that many rock art motifs are representations of images seen during *altered states of consciousness*, induced through *trance* and/or through the consumption of *hallucinogenic substances* which generate *entopic phenomena* (Lewis Williams and Dowson 1988). The application of this hypothesis, originally developed for South African cases, requires the use of ethnographic information as an independent source of data to corroborate it when applying it to other case studies in order to avoid equifinality problems: otherwise, similar motifs could be ascribed to shamanism when in fact they may well be the product of rather different causes.

Another function attributed to rock art is that of marking significant points and roads along *caravan routes*. This hypothesis has been tested by plotting the distribution of rock art sites and motifs depicting llama herds along wide spatial ranges in Northern Chile and checking their correspondence with trails followed by llama shepherds on their travels across long-scale distances and with sites containing evidence of these faunal resources (Nuñez Atencio 1976).

Rock art has also been related to *identity* in two different and complementary manners: (a) as an *archaeological indicator* of social groups and their boundaries and (b) as an *intentional* construction of *self-expression* of social identity (Domingo et al. 2008). What they share in common is that identity is a twofold phenomenon, which requires simultaneously the construction of *similarities* to produce a *sense of belonging* to a group and of *differences* to *distance* such group from other surrounding groups. Thus, identity may have archaeological visibility, although it is sometimes difficult to distinguish whether such identity is mainly a construction by the archaeologist derived from a set of visual designs attached to material culture or whether such designs were intentionally produced as an identity expression. In turn, this notion is very much related to that of style (see above and also the entry on "► Style: Its Role in the Archaeology of Art" in this encyclopedia).

Finally, the sets of marks such as dots and notches found on the surface of many Paleolithic portable art items have been interpreted as *notation systems* (e.g., lunar calendars and event tallies). This hypothesis was originally proposed by Marshack (1972) who used *microscopic observations* of *archaeological materials* to provide evidence to support it. However, such interpretations and methods were challenged by D'Errico

(1995) who pinpointed the need to use *independent criteria* derived from microscopic observations of *experimental marks* as *parameters* to assess the observations of the archaeological materials and to recognize whether the sets of marks had been made with a single tool or with several tools and in turn whether it had been made in a single event or along different events (D'Errico 1995; see also White 1992). Heated debate led to the refinement of these methods and to the conclusion that indeed several Paleolithic materials functioned as notation systems, but not all marked artifacts can be interpreted as such.

Evolutionary-Ecological Approaches: Human Behavior, Cultural Transmission, and Natural Selection

Following neoevolutionary concepts but breaking away from the processualist teleological and functionalist explanations about culture, the *evolutionary-ecological* approaches in archaeology led by authors such as Dunnell, Gamble, Lyman, Mithen, O'Brien, Shennan, etc., focused not just on adaptation but on the broader process of how *human behavior* is developed and reproduced within an *ecological context*, thus including *mechanisms* of *variability production*, *cultural transmission*, and their *natural selection* under specific *environmental conditions*. Its materialist ontology and positivist epistemology are also shared with processualism, but the evolutionary framework has entailed a broader spectrum of behavioral possibilities that range from *adaptive* to *nonadaptive* outcomes, thus allowing for a conception of *culture* which is *not always homeostatic*.

Although the core lines of research followed by this theoretical framework do not include art, when applied to the study of such materials, this approach has proposed, for example, that *Paleolithic art* has been regarded as "an emergent property of the interactions between individuals as they pursue their own social and economic strategies" (Mithen 1991: 105) and thus as a method of *information storage and retrieval* which would help hunter-gatherers to take *decisions* that would help "increase their *chances* of *survival* and *reproduction"* (Mithen 1991: 105). Thus, patterns in faunal assemblages have been related to patterns in art representations: the risk and uncertainty generated by changing ecological conditions that affected species availability would have been partially coped with via the information gathered through their visual depiction. This would also account for the discrepancies between archaeofaunal and artistic taxa representations insofar as the latter included informative cues for two different strategies – mass-hunting and stalking of individual animals – which would leave different quantitative traces in the archaeofaunal assemblages (Mithen 1991: 105).

Within this framework, the *diachronic frequency distributions* of *decorated pottery* from early Neolithic Central Europe have been quantitatively analyzed in order to find out whether their *variations* responded to a "*neutral model*," in which variation is regarded as the result of *random drift* of stylistic traits, or to a "*selection model*," in which variation is regarded as the result of *biased selection* of functional traits (Shennan and Wilkinson 2001). The authors conclude that the case-study data coincide with the model involving selection, that is, bias in favor of novelty toward the recent phases of the analyzed period, and stress that "this does *not mean* that there is a *radical separation* in the real world between" *style*, "in the sense of neutral variation, and *function*, in the sense of variation under selection. In the present study it is clear that *both drift and selection are operating*" (Shennan and Wilkinson 2001). Also, analysis of the *tempos* in portable art production can show the *pace* at which *variability* increases or decreases diachronically and thus unveil the *rates of change* of a decorative repertoire and their links to underlying social, technical, and/or economic factors (Fiore 2011).

Another approach based on ecological-evolutionary ideas is the *ethological* conception of art, which focuses on the *behavioral* aspects of making art, or "*artifying*," and their adaptive underpinnings: for example, their capacity as *pleasure sources* and their occurrence under

crucial life concerns are seen as reasons for the reproductive success of this behavior within the human species and of the human species along its evolution history (Dissanayake 2008).

Some of these concepts have been criticized for their naturalization of human actions, which entails a passive conception of people as entities behaving only according to biological conditions. However, people not only create cultural variability but also have a certain influence in the selection conditions of such variability: this conception allows for researching human agency underneath art production, continuity and change, at long-time scales characteristic of the evolutionary framework.

Key Issues/Current Debates

Several debates are currently developing within the archaeology of art arena, of which three are outlined here. One regards the reasons *why* such production occurred, which have mostly been related to human *cognitive capabilities* (including rational, perceptual, emotional, manual-skill, mnemonic, and neurological factors) and to the *potential symbolic functions* of visual images and their *adaptive and social implications* (Davis 1986; Chase and Dibble 1987; Davidson and Noble 1989; Mithen 1996; Conkey et al. 1997; Bednarik 2003; Hogdson 2006). Another revolves around whether art has been created exclusively by *Homo sapiens sapiens* (Mellars 2005) or whether it has also been created by *Homo sapiens neanderthalensis* (D'Errico et al. 1998), the latter possibility being slowly strengthened by early finds not attributable to the former species.

Finally, due to their strong aesthetic appeal and social implications, art materials often tend to be considered as valuable *cultural heritage* by *researchers, local communities*, and the *general public* (Loubser 2001). This situation sometimes entails conflicts of interest but also bears the potential of enriching the conservation, uses, and knowledge of this heritage if proper and mutually respectful dialogues among all the concerned agents are developed.

International Perspectives and Future Directions

The current theoretical panorama in the archaeology of art is quite heterogeneous, given that several of the above-mentioned frameworks are currently being used by researchers. It is clear that some of these frameworks have similar ontological and epistemological roots, making them complementary, while others are incompatible due to the fact that their perspectives contradict each other in the way they define and conceive art and/or in the way they have devised its analysis and interpretation. Moreover, different perspectives do sometimes approach the same topic from different points of view – for example, information transmission through art has been tackled from processual, post-processual, social, semiotic, and evolutionary-ecological approaches – and these approaches to such topic may or may not be complementary according to the ontological and epistemological similarities or differences discussed above. A combination of different frameworks can often be viable and relevant where they are not mutually contradictory in their core concepts and methods. Through this critical panorama, the reader can follow those approaches of his/her interest and explore, pursue, and link their paths in order to shed new light on ancient art.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Art Studies: Normative Approaches
- ▶ Mobiliary Art, Paleolithic
- ▶ Post-processual Archaeology
- ▶ Post-processualism, Development of
- ▶ Statues and Monumental Art in Archaeology
- ▶ Style: Its Role in the Archaeology of Art

References

Aschero, C. 1988. Pinturas rupestres, actividades y recursos naturales, un encuadre arqueológico. In *Arqueología contemporánea Argentina*, ed. H. Yacobaccio, 51–69. Buenos Aires: Ed. Búsqueda.

Bahn, P. 1982. Inter-site links during the Upper Palaeolithic. *Oxford Journal of Archaeology* 1 (3): 247–268.

Bahn, P., and J. Vertut. 1988. *Images of the ice age*. London: Windward.

Bednarik, R. 2003. The earliest evidence of palaeoart. *Rock Art Research* 20: 89–135.

Breuil, H. 1952. *400 Siécles d'art pariétal*. Paris: Editions Max Fourny.

Conkey, M. 1980. The identification of prehistoric hunter-gatherer aggregation sites: The case of Altamira. *Current Anthropology* 21 (5): 609–630.

Conkey, M. 1985. Ritual communication, social elaboration and the variable trajectories of Paleolithic material culture. In *Prehistoric hunter-gatherers. The emergence of cultural complexity*, ed. D. Price and J. Brown, 299–323. New York: Academic.

Conkey, M., O. Soffer, D. Stratmann, and N. Jablonski, eds. 1997. *Beyond art: Pleistocene image and symbol*, Memoirs of the California Academy of Sciences, vol. 23. San Francisco: California Academy of Sciences.

Davis, W. 1986. The origins of image making. *Current Anthropology* 27 (3): 193–215.

Earle, T. 1989. Style and iconography as legitimation in complex chiefdoms. In *The uses of style in archaeology*, ed. M. Conkey and C. Hastorf, 73–81. Cambridge: Cambridge University Press.

Gamble, C. 1982. Interaction and alliance in Palaeolithic society. *Man* 17: 92–107.

Jochim, M. 1983. Palaeolithic cave art in ecological perspective. In *Hunter-gatherer economy in prehistory. New directions in archaeology*, ed. G. Bailey, 212–219. Cambridge: Cambridge University Press.

Leroi-Gourhan, A. 1964. *Les religions de la préhistoire (Paléolithique)*. Paris: Presses Universitaires de France.

Lewis Williams, J.D., and T.A. Dowson. 1988. The signs of all times. *Current Anthropology* 29 (2): 201–245.

Lumbreras, L.G. 1998. The social context of art in pre-Columbian America. In *Art in pre-Columbian America*, ed. L.G. Lumbreras and C. Aldunate, 11–64. Santiago: Museo Chileno de Arte Precolombino.

Mellars, P. 2005. The impossible coincidence. A single-species model for the origins of the modern human behaviour in Europe. *Evolutionary Anthropology* 14: 12–27.

Mithen, S. 1991. Ecological interpretations of Palaeolithic art. *Proceedings of the Prehistoric Society* 57: 103–114.

Tilley, C. 1991. *Material culture and text. The art of ambiguity*. London: Routledge.

Ucko, P., and A. Rosenfeld. 1967. *Paleolithic cave art*. London: World University Library.

Washburn, D. 1983. Toward a theory of structural style in art. In *Structure and cognition in art*, ed. D. Washburn, 1–7. Cambridge: Cambridge University Press.

White, R. 1992. Beyond art: Toward an understanding of the origins of material representation in Europe. *Annual Review of Anthropology* 21: 537–564.

Further Reading

Bednarik, R. 2001. *Rock art science. The scientific study of palaeoart*. Turnhout: Brepols.

Bradley, R., F. Criado Boado, and R. Fabregas Valcarce. 1994. Rock art research as landscape archaeology: A pilot study in Galicia, north-west Spain. *World Archaeology* 25 (3): 374–390.

Burmeister, C. 1892. Nuevos datos sobre el territorio de Santa Cruz. *Revista del Museo de La Plata* 4: 227–256 & 337–352.

Chase, P., and H. Dibble. 1987. Middle Palaeolithic symbolism: A review of current evidence and interpretations. *Journal of Anthropological Archaeology* 6: 263–296.

Conkey, M. 1984. To find ourselves: Art and social geography of prehistoric hunter-gatherers. In *Past and present in hunter-gatherer studies*, ed. C. Shire, 253–276. New York: Academic.

Davidson, I., and W. Noble. 1989. The archaeology of perception: Traces of depiction and language. *Current Anthropology* 30: 125–155.

D'Errico, F. 1995. New model and its implications for the origin of writing: La Marche antler revisited. *Cambridge Archaeological Journal* 5 (1): 3–46.

D'Errico, F., J. Zilhao, M. Julien, D. Baffier, and J. Pelegrin. 1998. Neandertal acculturation in western Europe. *Current Anthropology* 39: 1–44.

Dissanayake, E. 2008. The arts after Darwin: Does art have an origin and adaptive functions? In *World art studies*, ed. K. Zijlmans and W. VanDamme, 241–263. Amsterdam: Valiz.

Domingo, I., D. Fiore, and S. May, eds. 2008. *Archaeologies of art. Time, place and identity*. Los Angeles: Left Coast Press.

Fiore, D. 2007. The economic side of rock art. *Rock Art Research* 24 (2): 149–160.

Fiore, D. 2011. Art in time. Diachronic rates of change in the decoration of bone artefacts from the Beagle Channel region (Tierra del Fuego, southern South America). *Journal of Anthropological Archaeology* 30: 484–501.

Gradin, C., C. Aschero, and A. Aguerre. 1979. Arqueología del área río Pinturas. *Relaciones de la Sociedad Argentina de Antropología* XIII: 183–227.

Hogdson, E. 2006. Understanding the origins of paleoart. *PaleoAnthropology* 56: 54–67.

Liberani, I., and R. Hernández. 1950. *Excursión arqueológica en los valles de Santa María, Catamarca, 1877*. Tucumán Instituto de Antropología-UNT.

Llamazares, A.M. 1992. A semiotic approach in rock-art analysis. The meanings of things. Material culture and symbolic expression. In *One world archaeology*, ed. I. Hodder, 242–248. London: Routledge.

Loubser, J. 2001. Management planning for conservation. In *Handbook of rock art research*, ed. D. Whitley, 80–115. Oxford: AltaMira Press.

Marshack, A. 1972. Upper Paleolithic notation and symbol. *Science* 178: 817–828.

Mithen, S. 1996. *The prehistory of the mind*. London: Thames and Hudson.

A

Moreno, F. 1876. Viaje a la Patagonia Septentrional. *Anales de la Sociedad Científica Argentina* I: 182–197.
Nuñez Atencio, L. 1976. Geoglifos y tráfico de caravanas en el desierto chileno. In *Tomo deHomenaje al R.P.G. Le Paige*, ed. L. Núñez, 147–201. Antofagasta: Universidad del Norte.
Pérez Gollán, J.A. 2000. *Caminos Sagrados. Arte precolombino argentino*. Buenos Aires: Banco Velox.
Reinach, S. 1903. L'art et la magie. *l'Anthropologie* 14: 257–266.
Shennan, S., and J. Wilkinson. 2001. Ceramic style change and neutral evolution: A case study from Neolithic Europe. *American Antiquity* 66 (4): 577–593.
Tanner, J. 1992. Art as expressive symbolism: Civic portraits in classical Athens. *Cambridge Archaeological Journal* 2: 167–190.
White, R. 2003. *Prehistoric art. The symbolic journey of humankind*. New York: H.B. Abrams Inc.

Archaeology of Childhood

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Introduction

Archaeologists always have been aware of the presence of children in past societies, particularly through their skeletal remains in mortuary populations. Traditional archaeological interpretations, however, have overlooked children's contributions to the archaeological record and as members of past societies. The archaeology of childhood is an area of inquiry that has grown significantly over the past 25 years to redress the absence of children in archaeological interpretation. This area of scholarship encompasses the study of childhood as a culturally defined stage of the human life cycle and research on children as cultural actors.

Definition

Viewed cross-culturally, childhood is a period in the human life cycle defined differently in each culture. Sources show that individuals embodying that category of personhood, children, make significant contributions to their families, communities, and societies in social, economic, and symbolic capacities. The archaeology of childhood embraces these views of children and childhood and works to develop method and theory that enables an understanding of children in their own right and also to investigate how the study of children can provide unique perspectives on life in the past more generally.

Key Issues/Current Debates/Future Directions/Examples

The archaeology of childhood has a singular history in terms of timing, but in reality many different areas of archaeology have developed a sensibility toward the study of children through unique disciplinary trajectories (Lillehammer 2015). In anthropological archaeology, studies of childhood emerged as an extension of feminist critiques in the 1980s and 1990s that exposed the neglect of women in archaeological analyses. Interpretations of the past that excluded women were considered inaccurate and incomplete, and the same argument was later made for children (Baxter 2008). Classical archaeology's interest in children and childhood developed from that discipline's enduring interest in Greco-Roman families, family structures, and family life (Bradley 2013). The remarkable fluorescence of work on the bioarchaeology of childhood builds on the long-standing inclusion of immature or "subadult" human skeletal remains in mortuary analyses and addresses intersections of social identity and meaning with biological development (Lewis 2007). Research on children and childhood in historical archaeology has been integrated into broader research topics including education, households, and parenting, as well as site-specific studies at orphanages, schools, brothels, and socializing institutions, but a reliance on readily identified child-specific material culture in the documentary record has limited many such studies (Wilkie 2000). Integrating children into archaeological interpretations has required two main developments; the first applies to the value of childhood as a subject of study and the second to the visibility of children in the archaeological record.

First, archaeologists have had to question their own assumptions about the nature of childhood and the physical, social, and cognitive capacities of children (Sofaer Derevenski 2000). Limitations on archaeological thinking about children and childhood stem from individual experiences of childhood and the dominant cultures around child-rearing experienced by archaeologists themselves. Many contemporary constructions of childhood emphasize the preparatory nature of childhood, particularly on how play and formal and informal education are not about constructing experiences during childhood as much as socializing and instructing children for their futures as adults (Baxter 2016). This type of thinking traditionally has led to the assumption that adults were important social actors in the past, while children were relatively insignificant and not worthy of archaeological study (Sofaer Derevenski 2000; Baxter 2008). The archaeology of childhood questions this fundamental assumption.

One of the ways archaeologists have challenged this assumption is by turning to the ethnographic and historical records to find cross-cultural examples of childhood that illuminate the diversity of childhood experiences and the possible roles and opportunities for children in the past. These sources have revealed significant variability in how cultures define childhood and stages of childhood, as well as the important and unique contributions children make to the economic, ritual, and social lives of their communities (Kamp 2002). Ethnoarchaeological work focused on children has further demonstrated their contributions to the economic activities and social lives of communities. Bird and Bliege Bird (2000) studied the foraging behavior of children and adults among the Meriam of the Eastern Torres Straits. They found that children used their small body size and particular agility to access different types of prey in coastal gathering events than adults who foraged in open spaces and deeper waters. The shell middens that were the archaeological signatures of these foraging events included distinct patterns of adult and child foraging, both in terms of prey choice and processing strategies. This work illustrated the impact children's behaviors can have on a group's overall economic strategy and also on the archaeological record. Ethnoarchaeological work on children's play in Northern Ghana demonstrated that children used material culture and space in unique and innovative ways that were often at odds with adult expectations and strictures (Casey and Burruss 2010). Children in this study created play spaces and accumulated found objects for imaginary game play focused on food preparation that reflected an awareness of and willingness to challenge the social structures present in their culture as a whole. Play in this context was not only preparatory, but also innovative and agentive, as well as archaeologically visible through the creation of distinct spaces devoted to play.

Second, archaeologists have expanded theoretical and methodological approaches to identify the presence of children in the archaeological record. Many of the earliest attempts to locate children in the archaeological record focused on miniature objects assumed to be toys or playthings, and archaeologists still tend to equate the, visibility of children archaeologically with the presence of artifacts identified as toys. This view has been critiqued as oversimplifying children's engagement with the material record, artificially separating objects into separate spheres of adult/child, and transplanting contemporary ideas of children's activities into the past (Crawford 2009; Baxter 2016; Wilkie 2000). While toys and play are still considered important aspects of children's lives, more recent approaches combine ethnographic and historical evidence for the types of roles and behaviors that might have been available to or expected of children in a particular culture and research on the cognitive, behavioral, and psychological development of children more generally.

For example, many studies have focused on children as learners, apprentices, and innovators in craft production and have found evidence for novice craft production in ceramic and lithic manufacturing assemblages (Crown 2010; Finlay 2015). One aspect of this type of study emphasizes how novice crafters engage in the process of manufacturing and working with materials. Differences in raw material use, precision and dexterity in manipulating materials, and

consistency in process and output are roughly identifiable by age and can be used archaeologically to distinguish between those learning to make handcrafted items and those who are expert crafters. These studies also present ideas about how children can participate in crafting communities when not directly working in their apprenticeship. Helping to gather raw materials, cleaning workspaces, and spending play and leisure time among crafters are all ways children are recorded ethnographically and historically as being a part of crafting communities and offer ways to integrate children into interpretations of work and workspaces encountered in the archaeological record.

Interpreting archaeological sites without relying specifically on toys and playthings to identify children has involved relational approaches that explore how landscape and architecture offer affordances and barriers to children's engagement in social spaces. At the Mayan site of Chunchucmil, Hutson (2006) used relational approaches to the landscape to illustrate the places where children likely would have spent time in work and play. Baxter (2010) looked at the placement of nineteenth-century graffiti in large tableaus of such art created by emancipated Afro-Bahamians at former plantation sites. By measuring the height of the images from the ground surface, she was able to determine that much of the art was either created by children or deliberately placed low to the ground to facilitate their engagement with the images. Dozier's (2016) study of a cache of odd objects in a pit at the margins of a farm site in Shabonna Grove, Illinois, suggested that the assemblage was the result of children deliberately selecting interesting objects for play in remote areas away from adult activities. All of these studies are examples of how archaeologists are moving beyond toys to identify children in the archaeological record, thus expanding the possibilities of interpreting their contributions to life in the past.

A final type of research has focused on understanding childhood as a category of identity and stage in the human life cycle. This type of work asks questions about how different cultural groups defined the category of child, its potential subcategories (e.g., infant, toddler, teen, etc.), and its intersections with other categories of identity such as class or gender. For example, archaeologists working in areas with well-preserved artistic traditions such as Ancient Egypt, the Greco-Roman World, and pre-Columbian Mesoamerica have studied iconographic and artistic images of young people to identity different life stages of children and the objects and activities associated with each (e.g., Beaumont 2012). While artistic renderings of people and activities often speak to cultural ideals rather than lived realities, they also create relationships between objects, spaces, and people that can be investigated through the archaeological record.

Bioarchaeological studies are another area of scholarship that has been particularly fruitful in defining categories of childhood, particularly through problematizing the relationship between biological maturation as seen in skeletal remains and socially defined age as reflected in mortuary treatment (Halcrow and Tayles 2008; Lewis 2007). A recent example of such work is Lewis's (2016) study that begins with the question, "What was it like to be a teenager in medieval England?" This study problematized the category of teenager/adolescent and explored what skeletal evidence can tell us about the health, working life, and social circumstances of young male and female adolescents before and after the Black Death of AD 1348–1349. The literature is filled with many such rich examples of how analyzing skeletal remains, burial treatments, burial placement, grave goods, and commemorative markers can be used to evaluate age-based categories of identity and the human lives being lived across the spectrum of age (e.g., Thompson et al. 2014).

Cross-References

- ▶ Children in Bioarchaeology and Forensic Anthropology
- ▶ Children in the Central and Western Mediterranean, Archaeology of
- ▶ Engendered Archaeologies
- ▶ Social Identity in Historical Archaeology

References

Baxter, J.E. 2008. The archaeology of childhood. *Annual Review of Anthropology* 37: 159–175.

Baxter, J.E. 2010. A different way of seeing: Casting children as cultural actors in archaeological interpretations (Los niños como agentes culturales en las interpretaciones arqueológicas. Los grafitis del XIX en San Salvador, Bahamas). *Complutum* 21 (2): 181–196.

Baxter, J.E. 2016. Adult nostalgia and children's toys past and present. *International Journal of Play* 5 (3): 230–243.

Beaumont, L.A. 2012. *Childhood in ancient Athens: Iconography and social history.* New York: Routledge.

Bird, D., and R. Bliege Bird. 2000. The ethnoarchaeology of juvenile foragers: Shellfishing strategies among Meriam children. *Journal of Anthropological Archaeology* 19 (4): 461–476.

Bradley, K. 2013. Envoi. In *The Oxford handbook of childhood and education in the classical world*, ed. J. Evans Grubbs and T. Parkin, 644. Oxford: Oxford University Press.

Casey, J., and R. Burruss. 2010. Social expectations and children's play places in Northern Ghana. *Ethnoarchaeology* 2 (1): 49–72.

Crawford, S. 2009. The archaeology of play things: Theorising a toy stage in the biography of objects. *Childhood in the Past* 2: 56–71.

Crown, P. 2010. Learning in and from the past. In *The anthropology of learning in childhood*, ed. D. Lancy, 397–418. Landham: Alta Mira Press.

Dozier, C.A. 2016. Finding children without toys: The archaeology of children at Shabbona Grove, Illinois. *Childhood in the Past* 9 (1): 58–74.

Finlay, N. 2015. Kid-knapped knowledge: Changing perspectives on the child in lithic studies. *Childhood in the Past* 8 (2): 104–112.

Halcrow, S.E., and N. Tayles. 2008. The bioarchaeological investigation of childhood and social age: Problems and prospects. *Journal of Archaeological Method and Theory* 15 (2): 190–215.

Hutson, S.R. 2006. Children not at Chunchucmil: A relational approach to young subjects. In *The social experience of childhood in ancient Mesoamerican worlds*, ed. T. Ardren and S.R. Hutson, 103–133. Boulder: University Press of Colorado.

Kamp, K.A. 2002. Working for a living: Childhood in the prehistoric Southwestern pueblos. In *Children in the prehistoric Puebloan Southwest*, ed. K.A. Kamp, 71–90. Salt Lake City: University of Utah Press.

Lewis, M.E. 2007. *The bioarchaeology of children: Perspectives from biological and forensic anthropology.* Cambridge, UK: Cambridge University Press.

Lewis, M.E. 2016. Work and the adolescent in medieval England (AD 900–1500): The osteological evidence. *Medieval Archaeology* 60 (1): 138–171.

Lillehammer, G. 2015. 25 years with the 'child' and the archaeology of childhood. *Childhood in the Past* 8 (2): 78–86.

Sofaer Derevenski, J. 2000. Material culture shock: Confronting expectations in the material culture of children. In *Children and material culture*, ed. J. Sofaer Derevenski, 3–16. London: Routledge.

Thompson, J., M.P. Alfonso-Durruty, and J. Crandall, eds. 2014. *Tracing childhood: Bioarchaeological investigations of early lives in antiquity.* Gainesville: University Press of Florida.

Wilkie, L.A. 2000. Not merely child's play: Creating a historical archaeology of children and childhood. In *Children and material culture*, ed. J. Sofaier-Derevenski, 100–114. London/New York: Routledge.

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The Archaeology of Forced Migration

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Definition

In early September 2015, a photo went viral. It showed a little boy in a red t-shirt, lying face down on a Mediterranean beach. He was later identified as Aylan Kurdi, a 3-year-old Syrian boy of Kurdish origin. In June 2019, another photo went viral. It showed an adult man and a child in red trousers, lying face down in the Rio Grande. They were later identified as Óscar Alberto Martínez Ramírez and his 2-year-old daughter, Valeria. Between the death of Aylan Kurdi and those of Óscar Alberto and Valeria Martínez Ramírez, it is estimated that 17,992 people lost their lives attempting to cross a border somewhere in the world (Missing Migrants Project 2019). (It is however important to note that the number of deaths has likely been underestimated (IOM press release).) In 2014, the UNHCR reported that the number of displaced people was the highest it had been since the Second World War, and everything indicates that the number keeps

growing with 70.8 million reported displaced people in June 2019 (UNCHR 2015, 2019).

The "right to seek and to enjoy in other countries asylum from persecution" is enshrined in the 1948 United Nation Universal Declaration of Human Rights (UDHR 1948), which recently celebrated its 70th birthday which much pump. Yet, the political response to the mass displacement of people around the world has always been fraught with attempts to evade the obligation to offer asylum (Mayblin 2017). This hostile attitude to refugees is particularly visible in – but not limited to – the Global North and has had a distinct material impact on the world. The erection of walls, fences, and checkpoints on the world's visible and invisible borders, the proliferation of refugee camps, and the complex transnational flow of materials between refugees, humanitarian and/or state actors, border guards, and "vigilantes" are all events shaping our landscapes and our response to it.

Like the study of traditional heritage, the materiality of forced displacement is a window into the temporal and spatial processes at play. Investigating forced migration through the practices and methods of archaeology differs to other methodological approaches by allowing a focus on the "physical manifestation of politics" (Herz 2013, 12). Herz (2013, 12) points out that the principal ways of investigating refugee camps are "as spaces of humanitarianism or a state of exception," but his focus is on "understanding the camp as they are used by the population" by simply asking the question: "How do people live in camps?" Similarly, archaeology asks how people lived in any given space and time, and extending the focus beyond the camp, archaeology can be an important tool to investigate the "physical manifestation of [the] politics" of forced migration.

I suggest that an archaeological approach focuses on (1) a global *longue durée* examination of how past contexts still resonate today; (2) the material entanglements between people, landscape, and objects in the context of forced displacement; (3) the unique ability of archaeology to engage an audience and "illuminate" the reality of forced migration (Gokee and De León 2014, 135). By creating an archaeological record and an archive of these materials, we can bring the experience of border crossing and displacement into our collective human heritage and ultimately can shift the perception of displaced people "as producers of valued materiality, worthy of attention, collection, and study" (Hamilakis 2016).

A note on terminology is necessary here. In recent years, the distinction between "refugees" and "migrants" has dominated political debates (Edwards 2015). The argument is as follows: refugees, fleeing war and persecution, are entitled to asylum and state protection, as outlined in the 1951 United Nations Refugee Convention; while migrants are "merely" seeking to better their economic prospects (Edwards 2015). The distinction between "refugees" and "migrants" is often an attempt at defending xenophobia and anti-immigrant sentiment: the refugee is deserving of help, the migrant is not (Edwards 2015; Hamilakis 2016). The issue of how to call people forced out of their countries has long been problematic: in 1943, Hannah Arendt opened her "We Refugees" essay with "In the first place, we don't like to be called 'refugees.' We ourselves call each other 'newcomers' or 'immigrants.'" (Arendt 1943). The term "refugee" has also been criticized for its passiveness: it implies that people *were forced* from their home and that they had no agency in their decision to leave (Greussing and Boomgaarden 2017; Brettell 2000). The term "migrant" suggests a more active decision process, albeit one that borders on criminality (Hamilakis 2016). However, taking into account that so-called economic migrants often want to escape low-level warfare, extreme poverty, political instability, unrest or dictatorship that curtail life options, and climate catastrophe, it is debatable whether the distinction between "refugee" and "migrant" is relevant, or even appropriate. However, the distinction should nonetheless not be erased: it remains significant in the Global North and shapes the political, cultural, and social discourse around forced migrations (Ong 2003). Maybe a case could be made to call them "expatriated" or "expats" in the manner in which wealthier (and often whiter) migrants from the Global North are referred to.

Here, I will use both "refugee" for people whose refugee status has been legally recognized and "migrant" for people whose status is unsettled. I will also use "forced migrant" and "displaced population" while recognizing that the terms are problematic as they suggest a lack of agency in the decision to leave one's homeland.

Background

The notion of "refugee" is fairly recent, with an oft-cited argument that French Huguenots escaping religious persecution may have been the first modern refugees (Hintermaier 2000). Refugees became ubiquitous in the twentieth century, leading George Steiner to talk of an "Age of Refugee" (Said 2013), and it looks like it will continue into the twenty-first century, as the number of displaced people keep growing (UNCHR 2019). While it is interesting to understand the history of the figure of the refugee, it is beyond the remits of this entry, and what is of interest here are the recent events leading up to the So-called 'refugee crisis' of 2015–2016.

While media interest peaked in the summer of 2015, and turned the plight of people fleeing war and persecution into a spectacle, the beginning of the so-called crisis had indeed started a year earlier when UNHCR reported 59.2 million forcibly displaced people, the highest number since the end of the Second World War in 2014 (UNHCR 2015), which is also when the *Missing Migrant* Project started recording migrant deaths. Migratory pressures were particularly visible in the Mediterranean and at borders of the Schengen Area. Elsewhere in the world, the Rohingya refugees fled Myanmar in large numbers in early 2015 and 2017, and the number of death on the US-Mexico border also increased (Sánchez Dionis and Dearden 2019, 6, 25, 28). The question of migration dominated political debates in 2015 and 2016 both in Europe and the United States, with the United Kingdom referendum to leave the European Union and with the presidential campaign of Donald Trump.

The reasons – the push and pulls – for the displacement of people are varied and complex and beyond the scope of this analysis (see, e.g., Van Hear et al. 2018). What the archaeology of forced migration focuses on instead are the material entanglements between displaced people and the world and how these entanglements echo long-term interactions between humans and their surroundings.

Key Issues

While contemporary archaeology might seem like an oxymoron, archaeological approaches have increasingly been applied to the studies of modern issues, including forced migration. Work has focused on camps (Dreyer 2001; Myers 2008; Burström 2009; Ramadan 2012, Hicks and Mallet 2019), shelters (Kiddey 2019; Fredriksen 2014); or objects (Bergqvist Rydėn 2018). The Undocumented Migrants Project (De Léon 2015), which has investigated how the landscape is used by and against those who attempt to cross it, has also been particularly influential. Here, the focus will be on four specific aspects of the materiality of forced migration: (1) landscape, (2) boundaries, (3) camps, and (4) objects. There are many more avenues for an archaeology of forced migration, but I contend that these four strands are a good starting point.

What is immediately striking when considering landscape in relation to forced migration is that the landscape plays two distinct and complementary roles: it is simultaneously used as a weapon against displaced people but can also be a space that needs to be protected from outsiders. The first aspect might be the most obvious one. Whether it is the Sonoran Desert in the Southern United States, the Sahara, the Mediterranean, or more recently the English Channel, features of the landscape have been used to deter people from reaching their destinations (De Léon 2015, 3; Hicks and Mallet 2019, 13, 30; Hamilakis 2016). Unsurprisingly, these policies have resulted in a very high mortality rate (Sánchez Dionis and Dearden 2019). While these numbers are only estimates, it is believed that 10,000

people have died in along the US-Mexico border since 1994, while 34,361 deaths have been recorded in the Mediterranean between 1993 and May 2018 (Sánchez Dionis and Dearden 2019, 6–52). There have been 78 deaths at the UK border in Calais, mostly traffic accidents, but 4 people have died in the Channel in the summer and autumn of 2019, making it a concern that the number could rise as many more people attempt to cross (Sánchez Dionis and Dearden 2019, 78; Sanderson 2019, Oberti 2019, AFP 2019). It is unknown how many people die each year in the Sahara: the only estimation is that of 1,703 deaths since 1996 but no official record is kept (Sánchez Dionis and Dearden 2019, 36). The local population of Agadez in Niger talk of the desert as an immense cemetery (Tervonen 2018).

That these obstacles to reach a destination are natural barriers have allowed the states to take a passive role in the consequences of their border policies, as "the environment obscures culpability" (McGuire 2013). This has been particularly visible in the United States, where the death of children was blamed on the dangers of the landscape, rather than on the policies that forced families across these dangerous places in the first place. Speaking of the death of Jakelin Amei Rosmery Caal Maquin, a little girl who died in US custody in late 2018, the then Secretary of the Department of Homeland Security Kirstjen Nielsen commented that "this is just a sad example of the dangers of this journey" (Varela 2018).

Archaeology has shown how natural boundaries have had a structuring role in the organization of the landscape (Bradley 2000, 150; McGuire 2013; Ten Harkel in prep). These barriers have participated in the construction of identity linked to territory, by seemingly making it *natural* that the landscape, and therefore its people, should be separated. In the words of McGuire, "borders inscribes sovereignty on the land" (McGuire 2013). Turning natural features into "killing machine[s]" (De Léon 2015, 3) is the most recent event in "the enduring record of -and testimony to- the lives and work of past generations" that is the landscape (Ingold 1993). The cognitive processes behind boundaries have developed from lines in the landscape to a concept of land-based identity, which mobilize the land to defend the identity (Løvschal 2014). While recent scholarship has also noted that natural boundaries and/or human-made borders were not only land divisions but also zones of communication and "fluid spaces of crossing" (Parker 2006; Loveluck and Tys 2006; McGuire 2013), the ability to "cross" or to "use" the sea as a "highway" is dependent on resources and maybe status, and not accessible to everyone (Ten Harkel in prep): this is still true today when crossing the English Channel, the Mediterranean, or the Rio Grande is fairly cheap and safe for one with a passport, but dangerous and deadly for one without.

The role the landscape plays in defending land-based identity is, however, not only active. It also plays a passive but no less important role. Indeed, the landscape is not solely used as a dangerous weapon: it is, at the same time, a fragile space in need of protection. This is particularly visible in Calais (France) where the site of the former "Jungle" camp, where 10,000 refugees lived between 2015 and 2016, has been reinvented as a nature reserve for migratory birds (Hagan 2019). It is not new that environmental concerns should be used to control migration and that nature is used to others and excludes certain groups (Doshi 2019; Ramutsindela 2015; Hultgren 2015, 36–52; Hagan 2019). The links between environmentalism and migration controls go back to postcolonial concerns of scarcity of resources due to overpopulation (Cagle 2019). As with most postcolonial legacies, racism is evident: the populations needing to be controlled are always perceived to be non-white (Cagle 2019). The idea that nature must be protected against outsiders has been a driving force of nature conservation. For example, the first national park in the United States was created with just this idea in mind. In his report to the President, Ferdinand Hayden, one of the main advocates for the creation of Yellowstone National Park, explicitly stated that "the vandals who are now waiting to enter into this wonderland, will in a single season despoil, beyond recovery, these remarkable

curiosities" (Chittenden 1915, 77). Today, this perception that foreigners are dangerous to the natural landscape is still very common (Cagle 2019) and sometimes used against migrants as an argument why they should not be let in. Tucker Carlson, a right-wing US media pundit, lost many advertisers after saying: "The truth is that unregulated mass immigration has badly hurt this country's natural landscape [. . .] Huge swaths of the region are covered with garbage and waste that degrade the soil and kill wildlife" (Bort 2018). Lynn Meskell writes of this tension between land conservation and local populations in Kruger Park in South Africa caused by colonial concept of natural parks (Meskell 2005).

Creating boundaries in prehistory was an attempt at mapping control of the landscape and protecting some of its parts from other groups (Løvschal 2014). These landscape divisions, much like natural barriers, invest people with a sense of identity with a place and separate groups between those who belong and want to *protect* it and those who do not belong and seek only to *destroy* it. These processes of landscape and identity creation are dynamic and constantly reinvented: one's identity can be articulated in relation to a street, a city, a region, a nation-state, a supranational territory, and even the entire planet, at any given time and/or simultaneously. I argue that the relationship between displaced and settled populations is articulated in and around notions of the landscape and the identities that flow from it and that archaeological investigations give both a diachronic and spatial perspectives of these people-landscape networks.

However, this mobilization of the landscape against displaced people does not mean they are without agency over it. In Calais, the creation of the "Jungle" camp was a reorganization of the landscape which happened with no oversight from the traditional state humanitarian actors (Alaux 2015). The makeshift camp grew into an urban space, with restaurants, bars, churches, and mosques (PEROU 2016; Agier et al. 2018). It existed on French soil, but outside of France. In a way, it even competed with French institutions: Calais locals would comment that bread and beer were cheaper in the camp due to the lack of taxes (PEROU 2016, 23). Outside the camp, new place names became an important tool to navigate this foreign place. "Car Park Belgium" was thus named after many people thought they were boarding trucks for the United Kingdom in a particular car park and found themselves in Belgium (Mann in prep). The name was intended to avoid future mistakes; "Car Park Sheitan" was a place teeming with police and dogs, the name here giving a clue to the danger of the place (Mann in prep). This ability to live and make use of the landscape was not deterred by the dismantlement of the camp in October 2016, with the establishment of a new network of places to find Wi-Fi, food distribution, or where to sleep and hide. A city park was even used as an "invisible church" for people to worship and conduct mass (Hagan 2019). All of these have created a geography unknown and hidden to most "legal" citizens, similar to what Kiddey (2017) described in her pioneering study of homelessness. State apparatuses are attempting to make this new geography invisible, but archaeology can render the invisible and the unrecorded visible. By investigating these landscapes through archaeological methods, we resist the injunction to look away and are forced to recognize the lives of the people who are constantly pushed into the margin of our societies (De León 2015, 3; Hicks and Mallet 2019, 31).

These new engagements between landscape and the "legal citizens" on the one hand and displaced populations on the other are only the most recent development of long-term interactions between humans and the world. The natural world played a part in structuring the human world, with natural features becoming markers of organization and identity, on which human-made borders have been superimposed. The physical existence of borders is the logical conclusion of a long-term cognitive process, which frames the ways in which people perceive spatial phenomena and social relations as being coherent separate material (Schaffer et al. 2010; Løvschal 2014). However, as argued by Barth, creating a boundary "lay(s) down some premises but does not determine all the social forms that will eventuate" (Barth 2012, 30). We can investigate

these premises through an archaeology of borders, which will allow us to take a longer view of frontier and boundaries and to focus on "subsistence strategies, social identity, colonialism, the growth of the nation-state and defence" (McCarthy 2008, 202; Lightfoot and Martinez 1995) and will also investigate borders as the material embodiment of nation-state and the physical separation between legal and illegal presence on any given territories (McGuire 2013).

Brown (2014, 25) argues that border walls "function theatrically," a conclusion that it is hard to disagree with considering the hysterical rhetoric of Donald Trump's promises to build a wall at the US-Mexico border during his presidential campaign (and his insistence that construction is underway despite evidence to the contrary). Less talked about than "Trump's wall" but no less significant – or less theatrical – are the dozens of current and proposed construction projects for national border barriers from the Mexico-US border to borders between Norway and Russia, India and Bangladesh, Afghanistan and Pakistan, and Turkey and Syria or the "berms" built by Morocco in the Western Sahara (Hicks and Mallet 2019, 25; Garfi 2014). This global wall-building moment is unprecedented: 30 years after the fall of the Berlin Wall, after the de-bordering of the Schengen Area but also of parts of Africa with the Economic Community of West African States, it now seems impossible to argue that the post-Cold War world is increasingly borderless. On the contrary, small pockets of border-free territories are gradually encircled with more and more barbed wire. Even Schengen is not the border-free zone than it once was, with controls reinstated [in some countries] thus limiting freedom of movement.

One of the main arguments for the rise of all these walls, put forward by Brown (2014, 24), is that this is the reaction from nation-states who are losing their sovereignty. This is particularly convincing since, while walls are the physical embodiment of nation-states, they are actually often dematerialized to "buffer zones" (Amnesty 2014), demonstrating how their purpose is not to protect the nation-states from other state actors but rather an attempt to control transnational flows that are not state-sponsored (Brown 2014, 21). It is indeed fascinating that modern borders do not necessarily map on to modern nation-states. For example, the physical border in Calais is an "an intra-European laboratory for an EU external border regime" (Hicks and Mallet 2019, 25), and in effect Europe has outsourced its border management and control to "buffer zones" such as Niger, Libya, or Turkey (Amnesty 2014). While Berlusconi was widely condemned for commenting that his 2007 deal with Libya (still under Gaddafi's regime) would mean "more oil and less migrants," most of European border deals actually follow the same model by giving money to third countries to let them handle the migratory flows (Andersson 2014, Hamilakis 2016).

However, the dematerialization of borders outside of the nation-state that they physically represent is not the only change to modern border regimes. There is an emerging tendency for borders to take on a range of different forms and even locations (Jones 2012). While this might be tempting to see this as a recent development brought on by the War on Terror launched by the United States after the attacks on the World Trade Center in September 2001, it was already changing before as noted by French philosopher Etienne Balibar who wrote "No longer simply located at the edges of territories; they are distributed all over the place, wherever the movement of information, people and things takes place, where is controlled, for example in cosmopolitan cities" (Balibar 2001 [1999], 15; Translation Hicks and Mallet). An archaeological approach focused on landscape and materiality is an attempt to map on to this new kind of borderwork, which goes beyond natural and human-made barriers but also exists in less monumental forms, such as paper. For example, the lack of specific pieces of paper has created the status of the *undocumented*, revealing of the developing importance of paperwork, a border materialized through the physicality of a different material (Hamilakis 2016).

It is argued here that the terminology used to discuss the "*undocumented*" *or* "*illegal*" *migrant* is revealing of the postcolonial legacies

of the border systems in the Global North. "Undocumented" immigrants are considered to be without documentation because postcolonial bureaucracies have often made the documentation of their country of birth worthless. It is true, however, the recent toughening of immigration politics in Europe has led some displaced people to burn all identity papers to avoid deportation back to the country they come from (Andersson 2014; Hamilakis 2016), but even in these cases, it is unlikely that we will ever see a class of truly undocumented citizens: as the steel border has been reinforced by the paperwork, paperwork has been reinforced by our own bodies, and we carry the border within us in our biometric world (Ramutsindela 2015). Fingerprinting and DNA used for testing family reunification are tools to control migratory flows that rely solely on the materiality of our bodies, when desert, steel, and papers have failed to contain displaced people "outside." This development, of course, is recent. But like the lines in the landscape of the Bronze Age, it is part of the same cognitive process of ordering the world between "us" and "them." The use of DNA in archaeology is fraught with theoretical issues, especially regarding its link to identity. This was illustrated when a paper by Feldman et al. (2019) was taken as conclusive proof by Israeli Prime Minister Netanyahu that Palestinian populations had not originated from Israel (Jaffe-Hoffman 2019). The relationship between land, identity, and bodies is a complex, ongoing process, which archaeology can contextualize and help clarify notion on population homogeneity and the origins of nation-states. The use of archaeological data in the political discourse of exclusion, racism, and xenophobia is evidence that archaeologists are needed to reframe the conversation on the relationship between the materiality of the body and identity.

Another important focus of the archaeology of forced migration is the archaeology of camps. Many studies (Dreyer 2001; Myers 2008; Burström 2009; Ramadan 2012, Hicks and Mallet 2019) have investigated how an archaeological approach can shed light on the materiality of the camp. Archaeology allows us to consider the space of the camp beyond that of a state of exception and to investigate the *longue durée* processes that have led to the creation of a camp in the first place as well as the complex spatial ties between the camp and the landscape it inhabits. An archaeology of refugee camps can start from the simple question of what survives once a camp is dismantled to the more complex ones of the social organization of a camp through its materiality: who controls resources, how are the shelters built, and how does the flow of materials between the different agents are organized. Camps are designed as temporary space, and this impermanence becomes a form of control, justifying destruction, dismantlement, and destitution, thus generating an ultra-short-term history (Hicks and Mallet 2019, 50). Archaeology allows to record and to give values to these temporary places. As Burström (2009) argues, "it brings the question of remembrance to the fore." Indeed, because camps are meant to be temporary, then they are not meant to be remembered. This is part of the process of invisibilization mentioned above – but by contextualizing them in an archaeological framework, we can inscribe them in the wider context of human heritage.

Finally, beyond the materiality of landscapes and borders and camps, it is also imperative to consider objects, who can speak of lives and event not otherwise recorded. At the UK border in France, instances of violence are regularly denounced but denied by both states (Refugee Info Bus 2018; E. Macron, *Discours à Calais* 16th January 2018), but the material evidence of this violence is overwhelming. Tear gas canisters were scattered all over the camp site and were picked by volunteers and refugees in very large numbers after the camp dismantlement. These canisters – as well as the rubber bullets also present on site – are direct evidence to the force used by the French police, as well as the tactics of using out-of-date tear gas, since the canisters range from 1993 to 2016. Much higher batch numbers in 2015 and 2016 suggest a significant increase in production at that time by the two different French manufacturers (Nobel Sport and SAE Alsetex). Further investigations are currently under way to correlate this

increase to the situation in Calais (Mallet and Fowler in prep).

But objects are at their most powerful when they act not as testimony of violence but as witness to humanity, when they are used to rehumanize refugees by giving back them their name, and their identity, even after death. One of the largest operations to identify the bodies of migrants. The Italian Prime Minister at the time decided that the bodies should be identified (Bromwich 2019). This mammoth task has been undertaken by the team of Christina Cattaneo in Milan, attempting to give back their identities to people who would otherwise be forgotten. Through their work, encounters with objects have allowed for the rehumanization of refugees, when the landscape, the borders, and political discourse only attempt to dehumanize them. I argue that the materiality of forced migration forces us to face the humanity of those we leave to die at the borders of our nation-states. When it is reported that a 14-year-old boy from Mali kept his school report sown inside his jacket, fragments of his identity – that of an excellent student, probably hoping to resume his education once he was safe in Europe – shine through and remind us that his death in the Mediterranean in April 2015 is not a statistic but a tragedy.

Conclusion and Future Work

This is only a brief overview of how archaeology practices and methodologies can further the study of forced migration. Archaeology is a powerful political tool with which to bring the stories of migrations and refugees into our lives and to further tolerance and acceptance with society. It also allows to place migrations into the *longue durée* context of human movements and reminds us that the present moment is not exceptional, but a part of a wider, global, and continuous pattern of movement. Focusing on landscape, borders, camps, and objects, we can investigate how the political discourse in the Global North has a material impact on the world. It also allows us to understand and contextualize this material impact and how it affects lives and causes death across the globe. By giving a framework into which one can examine the entanglement between people, landscapes, and materials, archaeology is particularly powerful to address the question of forced migration.

References

AFP. 2019. Two migrants found dead on Northern French Beach. *Agence France Presse*, 15th October 2019.

Agier, M., Y. Bouagga, M. Galisson, C. Hanappe, M. Pette, and P. Wannesson. 2018. *La Jungle de Calais*. Paris: Presses Universitaires de France.

Alaux, J.P. 2015. Calais vaut bien quelques requiem. *Plein droit* 104 (1): 3–8.

Amnesty International. 2014. *The human cost of Fortress Europe: Human rights violations against migrants and refugees at Europe's borders*. London: Amnesty International.

Andersson, R. 2014. *Illegality, Inc.: Clandestine migration and the business of bordering Europe*. Berkeley: University of California Press.

Arendt, H. 1943. We, Refugees. In *The Jewish writings*, 264–274. New York: Shocken Books.

Balibar, E. 1999. Ouverture: Aux frontières de l'Europe. In *Nous, citoyen d'Europe? Les frontières, l'état, le people*, 15–26. Paris: La Découverte.

Barth, F. 2012. Boundaries and connections. In *Signifying identities*, 25–44. New York: Routledge.

Bergqvist Rydén, J. 2018. When bereaved of everything: Objects from the concentration camp of Ravensbrück as expressions of resistance, memory, and identity. *International Journal of Historical Archaeology* 22: 511–530.

Bort, R. 2018. Tucker Carlson Juxtaposes migrants with Piles of Garbages as Advertisers Flee. *Rolling Stone*, 18th December 2018.

Bradley, R. 2000. *An archaeology of natural places*. London: Routledge.

Brettell, B.C. 2000. Theorising migration in anthropology: The social construction of networks, identities, communities in migration theory talking across disciplines. In *Migration theory: Talking across disciplines*, ed. C. Brettel and J. Hollifield, 3rd ed., 148–198. New York/London: Routledge.

Bromwich, K. 2019. We should be ashamed: Bearing witness to migrant deaths at sea. *The Guardian*, 8th June 2019.

Brown, W. 2014. (2nd Edition) *Walled states, waning sovereignty.* Mit Press.

Burström, M. 2009. Selective remembrance: Memories of a Second World War refugee camp in Sweden. *Norwegian Archaeological Review* 42 (2): 159–172.

Cagle, S. 2019. "Bees, not refugees": The environmentalist roots of anti-immigrant bigotry. *The Guardian*, 16th August 2019.

Chittenden, H.M. 1915. *The Yellowstone national park – Historical and descriptive*. Cincinnati: Stewart and Kidd Co.

De León, J. 2015. *The Land of Open Graves: Living and dying on the migrant trail*. Oakland: University of California Press.

Doshi, S. 2019. Greening displacements, displacing green: Environmental subjectivity, slum clearance, and the embodied political ecologies of dispossession in Mumbai. *International Journal of Urban and Regional Research* 43 (1): 112–132.

Dreyer, J. 2001. Archaeology and the Anglo-Boer War (1899–1902): A report on the discovery of the Black refugee camp and cemetery at Brandfort, Free State. *South African Journal of Ethnology* 24 (4): 131–137.

Edwards, A. 2015. *Refugee or migrant – Word choice matters.* Available at: http://www.unhcr.org/uk/news/latest/2016/7/55df0e556/unhcr-viewpoint-refugee-migrant-right.html

Feldman, M., D.M. Master, R.A. Bianco, M. Burri, P.W. Stockhammer, A. Mittnik, A.J. Aja, C. Jeong, and J. Krause. 2019. Ancient DNA sheds light on the genetic origins of early Iron Age Philistines. *Science Advances* 5 (7): eaax0061.

Fredriksen, A. 2014. Emergency shelter topologies: Locating humanitarian space in mobile and material practice. *Environment and Planning D: Society and Space* 31: 147–162.

Garfi, S. (2014). *An archaeology of colonialism, conflict, and exclusion: Conflict landscapes of Western Sahara: In two volumes: Volume one* (Doctoral dissertation, University of East Anglia).

Gokee, C., and J. De León. 2014. Sites of contention: Archaeological classification and political discourse in the US-Mexico borderlands. *Journal of Contemporary Archaeology* 1 (1): 133–163.

Greussing, E., and H.G. Boomgaarden. 2017. Shifting the refugee narrative? An automated frame analysis of Europe's 2015 refugee crisis. *Journal of Ethnic and Migration Studies* 43 (11): 1749–1774.

Hagan, M. 2019. Inhabiting a hostile environment: The sanitary politics of life at the post-camp Calais border. Available at: http://societyandspace.org/2019/05/13/inhabiting-a-hostile-environment-the-sanitary-politics-of-life-at-the-post-camp-calais-border/

Hamilakis, Y. 2016. Archaeologies of forced and undocumented migration. *Journal of Contemporary Archaelogy* 3 (2): 121–139.

Herz, M. 2013. *From camp to city: Refugee camps of the western Sahara*. Baden: Lars Müller Publishers.

Hicks, D., and S. Mallet. 2019. *Lande: The Calais 'jungle' and beyond*. Bristol: Bristol University Press.

Hintermaier, J.M. 2000. The first modern refugees? Charity, entitlement, and persuasion in the Huguenot immigration of the 1680s. *Albion* 32 (3): 429–449.

Hultgren, John. 2015. *Border Walls Gone Green: Nature and Anti-immigrant politics in America*. Minneapolis/London: University of Minnesota Press. Ebook Central. Web.

Ingold, Tim. 1993. The temporality of the landscape. *World Archaeology* 25 (2): 152–174.

Jaffe-Hoffman, M. 2019. Netanyahu: Archaeology, DNA prove Palestinians not Native to the Land of Israel. *The Jerusalem Post,* 7th July 2019.

Jones, R. 2012. *Border walls: Security and the war on terror in the United States, India and Israel*. London: Zed Books.

Kiddey, R. 2017. *Homeless heritage: Social archaeology as therapeutic practice*. Oxford: Oxford University Press.

Kiddey, R. 2019. Reluctant Refuge: An activist archaeological approach to sites of alternative refugee shelter in Athens, Greece. *Journal of Refugee Studies.*

Lightfoot, K., and A. Martinez. 1995. Frontiers and boundaries in archaeological perspective. *Annual Review of Anthropology* 24: 471–492.

Loveluck, C.P., and D. Tys. 2006. Coastal societies, exchange and identity along the channel and southern North Sea Shores of Europe, AD 600–1000. *Journal of Maritime Archaeology* 1: 140–169.

Løvschal, M. 2014. Emerging boundaries: Social embedment of landscape and settlement divisions in northwestern Europe during the first millennium BC. *Current Anthropology* 55 (6): 725–750.

Macron, E. 2018. *Discours à Calais,* 16th January 2018. Available at: https://www.elysee.fr/emmanuel-macron/2018/01/16/discours-devant-les-forces-de-securite-a-calais

Mallet and Folwler (in prep). Dzanghal and Lande: Two archaeological Approaches for the study of Forced Migration. To be published as the proceedings of the Materialising the Transient conference.

Mann, B. in prep. *Mother of the Jungle*. BBC4 film.

Mayblin, L. 2017. *Asylum after empire: Colonial legacies in the politics of asylum seeking*. Lanham: Roman & Littlefield International.

McCarthy, M. 2008. Boundaries and the archaeology of frontier zones. In *Handbook of landscape archaeology*, ed. B. David and J. Thomas, 202–209. Walnut Creek: Left Coast Press.

McGuire, R.H. 2013. Steel walls and picket fences: Rematerializing the US–Mexican border in ambos Nogales. *American Anthropologist* 115 (3): 466–480.

Meskell, L. 2005. Archaeological ethnography: Conversations around Kruger national park. *Archaeologies* 1 (1): 81–100.

Missing Migrants Project. 2019. Available at https://missingmigrants.iom.it

Myers, A. 2008. Between memory and materiality: An archaeological approach to studying the Nazi concentration camps. *Journal of Conflict Archaeology* 4 (1–2): 231–245.

Oberti, C. 2019. Iranian woman becomes first migrant to officially disappear in the channel trying to reach England. *Info Migrants*, 16th August 2019.

Ong, A. 2003. *Buddha is hiding: Refugees, citizenship, the New America*. Berkeley: University of California Press.

Parker, B.J. 2006. Toward an understanding of borderland processes. *American Antiquity* 71 (1): 77–100.

PEROU. 2016. *Atlas d'une cité potentielle.* Available at: http://www.urbanisme-puca.gouv.fr/IMG/pdf/CALAIS_16_PEROU_PUCA_INTRO_3.pdf

Ramadan, A. 2012. Spatialising the refugee camp. *Transactions of the Institute of British Geographers* 38: 65–77.

A

Ramutsindela, M. 2015. Natured borders. *Geoforum* 61: 135–137.
Refugee Info Bus. 2018. *Police violence in Calais: Abusive and illegal practices by law enforcement officers. Observations and testimonies: 1 November 2017–1 November 2018*.
Said, E.W. 2013. *Reflections on exile: And other literary and cultural essays*. London: Granta Books.
Sánchez Dionis, M., and K. Dearden. 2019. Missing migrants project data: A global overview. In *Fatal journeys, volume 4: Missing migrants children*, ed. F. Lazcko, J. Black, and A. Singleton. Geneva: IOM.
Sanderson, S. 2019. Migrant Drowned trying to swim to U.K. *Info Migrants*. 29th August 2019.
Schaffter, M., J.J. Fall, and B. Debarbieux. 2010. Unbounded boundary studies and collapsed categories: Rethinking spatial objects. *Progress in Human Geography* 34 (2): 254–262.
Ten Harkel, L. (in Prep). 'Enclosing Space' in English Landscapes and Identities: Investigating Landscape Change from 1500 BC to AD 1086, in preparation with OUP.
Tervonen, T. 2018. Les noyés du désert. *Les Jours*, 16th April 2018.
UDHR. 1948. Universal Declaration of Human Rights 1948.
UNCHR. 2019. *Global trends in forced displacement in 2018*. Geneva: United Nation High Commissioner for Refugees.
UNHCR. 2015. *Global trends in forced displacement in 2014*. Geneva: United Nation High Commissioner for Refugees.
Van Hear, N., O. Bakewell, and K. Long. 2018. Push-pull plus: Reconsidering the drivers of migration. *Journal of Ethnic and Migration Studies* 44 (6): 927–944.
Varela, J. 2018. Jakelin Amei Rosmery Caal Maquin's death at the border in Mexico is our fault, not her father's. *NBC News*, 15th December 2018.

Archaeology of Kalkriese

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Introduction

Kalkriese is the name of a community in the northwest of Germany, circa 20 km north of Osnabrück. Today, this name also stands for an extensive battle area, dating from the time around Christ's birth. Most likely, the Varian Disaster was taking place here in 9 A.D.

Archaeologists began to focus on Kalkriese in 1987 when field surveys with metal detectors helped to discover a hoard of 170 Roman denarii and soon thereafter Roman military equipment. The latter suggested that a place of military conflict had been discovered, while the denarii pointed to 9 A.D. Thereby earlier finds of Roman coins were also validated, which had been found by local farmers working their fields as early as the seventeenth century, and held at Barenaue Castle, home to a noble family in the region. Even the historian and Nobel Prize winner, Theodor Mommsen, concluded from these coin findings that the Varian Battle occurred in this spot (Mommsen 1885).

Definition

With the systematic archaeological research that took place in Kalkriese since 1987, it was the first time that an ancient battlefield and the wider context of the conflict landscape was investigated. The site helped in the development of modern archaeological techniques and methodologies for the archaeology of battlefields. As a case study, Kalkriese is particularly suitable because the military equipment of the Roman troops found here is rich in metal and rather unique, especially the weaponry of the legionaries, which allow for identification despite fragmented record.

Historical Background

The Varian Disaster is known due to written records of ancient writers such as Tacitus (Publius Cornelius Tacitus, Annales I, 59–62 = Ab excessu divi Augusti), Cassius Dio (Lucius Cassius Dio Cocceianus, ΡΩΜΑΙΚΗ ΙΣΤΟΡΙΑ 56, 18, 1–24), Florus (Publius Annius Florus, Epitomae de Tito Livio bellorum omnium annorum DCC 2, 30, 29–39), and Velleius Paterculus (Velleius Paterculus, Historia Romana 2, 117–119). In line with Emperor Augustus' policies of expansion, Germanic territories to the right of the Rhine were

meant to be taken under Roman control, starting with the Drusus campaigns 12–9 B.C. As of 7 A.D., this was the task of P.Q. Varus, the governor of *Germania*. In 9 A.D., an army of three legions was at the order of Varus in *Germania* east of the Rhine, in a summer camp close to the river Weser, in the territory of supposedly friendly Germanic tribes. On their way back to the main Roman camps at Rhine and Lippe, the legions of Varus were fatally beaten by an alliance of Germanic tribes. The Germanic allies were under the command of Arminius, a Germanic nobleman, who had served in the auxiliary troops of the Roman army. Despite this severe defeat, attempts at military expansion in *Germania* did not cease. It was not until the military campaigns of Germanicus in the years 14–16 A.D. that Emperor Tiberius put an end to these military quests.

At the beginning of the sixteenth century, the annals of Tacitus were rediscovered at Corvey Abbey. In this work, the defeat of Varus was referred to as the Battle of the Teutoburg Forest, and Arminius was named the liberator of *Germania*. Consequently, this event has for centuries been deemed to be of national significance, and there were many attempts to establish its location.

Key Issues/Current Debates

The History of Research

Systematic metal detecting was yielding further coins and military equipment at various locations in Kalkriese and the surrounding area (Fig. 1) soon after the discovery of the initial hoard of denarii. In 1989, first excavations took place at the Oberesch site, where successful prospections had been taking place that resulted in various finds. Even the first trial sections showed that Roman artifacts were present in their original positions underneath the layers of soil that were being used agriculturally. Once the excavations were extended, another significant discovery was made alongside the military equipment that was

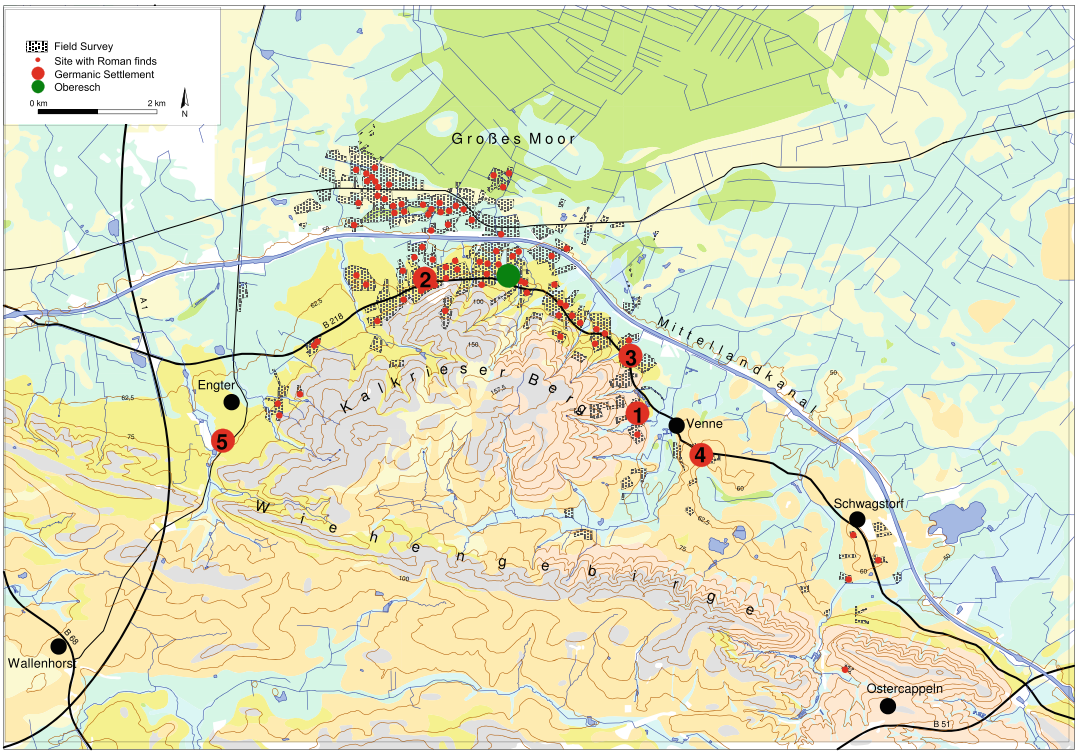

Archaeology of Kalkriese, Fig. 1 The area of investigation at Kalkriese and the topography; No. 1–5: indigenous settlements around the time of Christ's birth. (Copyright: Klaus Fehrs (Museum und Park Kalkriese), Achim Rost, Susanne Wilbers-Rost)

found, a rampart. Due to the dispersal of the artifacts, this was soon interpreted as an ambush by the Germanic tribes. The coins and military equipment that were found were deemed to be remains of military conflict between Romans and Germanic tribes in the Augustan period. It was supposed that these finds were relics of the Varian Disaster, especially since more and more sites with Roman finds were localized in the vicinity, indicating an extended battle area.

Traces of military conflict were found in an area of circa 30 km^2 on terrain that bridges low mountain ranges and the plains of northern Germany. The area in question is characterized by a natural strait between the Great Bog (Großes Moor) in the north and the Kalkriese Hill (Kalkrieser Berg; up to 160 m above sea level in height), a foothill of the Wiehen Mountains (Wiehengebirge), in the south. Between these terrains that are not easily passable, there is a topographic depression of 1.5 km in breadth. It was highly wet in large parts, which suggests that a passage about 2000 years ago was merely possible at the lowest part of the mountain's slope, and on a sand ridge at the southern edge of the bog. At the most narrow point of the natural strait and at the lowest part of the mountain slope (circa 60 m above sea level), the Oberesch site can be located as the main site for the archaeological finds pertaining to the vast battleground.

Excavations at the Oberesch Site

Features

At the Oberesch site, a field of circa 400 × 100 m across, the features that are directly related to military conflict in the area of Kalkriese were located: the rampart and several pits with skeletal remains of humans and animals (Fig. 2; Wilbers-Rost et al. 2007; Rost and Wilbers-Rost 2012).

The Rampart The rampart presents as a zigzagging structure of circa 400 m in length from east to west, between two creeks. It is no longer visible above ground level due to layers of soil, the so-called Plaggenesch. The practice of

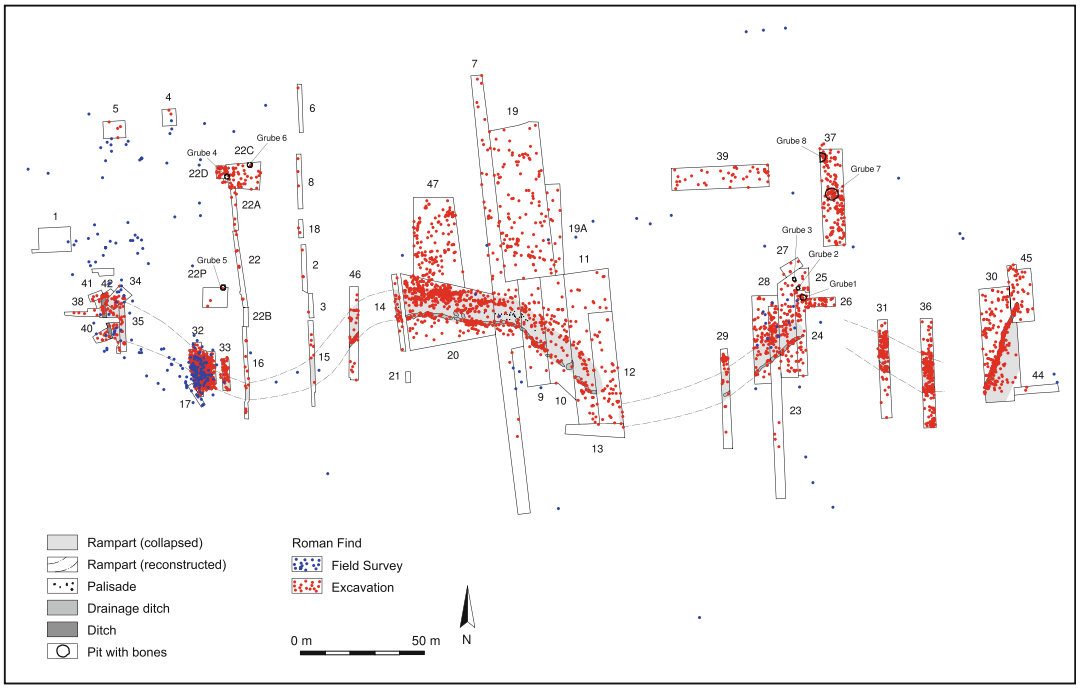

Archaeology of Kalkriese, Fig. 2 Kalkriese-Oberesch: Sections (No. 1–47), rampart, pits with bones (Grube = pit No. 1–8) and Roman finds. (Copyright: Klaus Fehrs (Museum und Park Kalkriese), Achim Rost, Susanne Wilbers-Rost)

Plaggenesch was common in northwest Germany since medieval times and ongoing until the twentieth century. Sod (called Plaggen in German) were used as a bedding in stables and blended with the excrements of farm animals. Then they were utilized to ameliorate areas of agricultural soil that had lacked nutrients. Layers of soil with a thickness beyond 1 m were therefore created and often prevented archaeological finds from being discovered.

Excavation work showed that the wall was erected using sod, sand, and in parts limestone. Initially, the wall measured circa 3 m in width and almost 2 m in height. Today, the remaining structure is 0.3 m in height due to the levelling of the rampart and erosion, and a slight 15 m wide rising can be detected. At least parts of the wall were bolstered by a wooden parapet. On the southside of the rampart, there were in some sections a row of short ditches and pits of various depths but not a continuous trench. Since the wall was partly erected above consolidated rock covered with water resistant silt, the pits and ditches were meant to facilitate drainage of rainwater from above that could have otherwise flooded the structure. In places where the ground is sandy, there was no such drain. The structure of the rampart also displays discontinuations in the form of several passages, one of which is constructed as a gate. The ends of the wall which are pointing northeast resp. northwest towards the aforementioned creeks had trenches at their northsides. There is a zone without any Roman finds below the wall material, which is interpreted as the original base of the rampart; this indicates that the wall was erected before the arrival of the Roman troops and the beginning of combats. Its relatively instable construction suggests that it was built only for temporary rather than long term use.

The unusual construction on the Oberesch site does not display the characteristics of Roman military camps and is therefore being interpreted as an entrenchment of Germanic origin. It served as a means of strengthening the preexisting environmental and topographical conditions of the bottleneck between hill and bog that facilitated a military ambush. Its function was offensive rather than defensive as it allowed attacks on Roman troops that were passing by. The passages in the rampart's structure allowed northward sorties, and quick retreats into the safety of the entrenchment, if Romans attacked. The zigzagging line of the wall also allowed to encircle the Romans from the rampart when the enemies organized counterattacks.

Since there have been questions concerning the interpretation of the rampart as being a Germanic construction, there have been trial sections at the Oberesch site since 2016 to investigate, if there are further wall-like structures that may point to a Roman construction. However, this theory could not be substantiated by evidence.

Pits with Bones Alongside several bones in the former occupation layer, including skeletal remains of mules and horses, eight pits containing human and animal bones were discovered at the Oberesch site. In those pits, there were no full skeletons but single bones and skeletal fragments (Fig. 3).

Osteological investigations concluded that the human bones in question, with the exception of a female pelvic fragment, belong to males age circa 20–40. The animal bones belonged to horses and mules. The bones had lain on the surface for 2–10 years before they ended up in the pits. The bad condition of the bones does not allow for DNA-analysis, where the human bones are concerned, which prevents conclusions about the origin of the deceased. Specific injuries, however, caused by traumatic blows point to soldiers fallen in battle. The mule bones can be ascribed to mules belonging to a Roman baggage train. Isotopic

Archaeology of Kalkriese, Fig. 3 Kalkriese-Oberesch: Bone-pit No. 5; in the center, there is a human skull. (Photo: Museum und Park Kalkriese, Dept. of Archaeology)

analyses suggest that some of the animals had been living in Mediterranean areas only few months prior to their death.

The bone pits can be associated with Tacitus' account (Annales 1, 62) of a burial ceremony in the year 15 A.D. according to which Germanicus visited the battle site with his troops to bury the fallen soldiers of the Varian Disaster. Tacitus refers to a burial mound that has not yet been discovered. Specifically placed burial or sacrificial objects have not been observed in the pits. However, by depositing the skeletal remains in the pits and covering them with earth 6 years after the battle, due diligence was done towards the deceased (Rost and Wilbers-Rost 2017a, b, 2018).

Finds

At the Oberesch site, more than 5000 Roman objects were discovered (compare Fig. 2), which is the biggest volume of all Roman finds of the Kalkriese area. Not only was there military equipment and weaponry of an army ready for battle among these finds but also evidence of a baggage train with wagons and their contents as well as draught and pack animals (Harnecker 2008, 2011). What is obvious is that mostly smaller fragments were found, whereas larger objects such as pioneer axes, remnants of a chest or the harness of a mule are exceptions. Fragments of helmets (Fig. 4), body armor such as chain mail and *lorica segmentata* (Fig. 5), belts, sandals, swords, daggers, spears (*pila*), and shields can be attributed to the weaponry of Roman legionaries.

Auxiliary units have been evidenced by iron arrowheads, the cavalry by spurs, horse harnesses, and most likely some lances. Medical equipment suggests the presence of medical personnel, numerous plummets the presence of teams of surveyors, and seal-boxes and styli the possibility of scriptoria. Fragments of balances and balancing weights also point to the logistics of this Roman military campaign. Entrenching tools such as pioneer axes, tools for the purpose of wood work and leather work such as chisels and scissors, in addition to tent stakes, milling stones, and personal items such as finger rings, coins, gaming pieces, brooches, knives, and spoons complete this image of a multifaceted Roman army on the move. Small

Archaeology of Kalkriese, Fig. 4 Face mask of a Roman helmet (iron with copper and silver remnants; height 17.1 cm); it was initially covered with silver foil. (Photo: Christian Grovermann for Museum und Park Kalkriese)

Archaeology of Kalkriese, Fig. 5 Hooks of chain mail (bronze), belt buckle (bronze), plate of body armor *lorica segmentata* with buckle and hinge (iron and bronze; height 18.7 cm). (Photo: Hermann Pentermann for Museum und Park Kalkriese)

fragments of transport chests, little chests, silverware and bronze vessels as well as of furniture, and ritual objects (*litui*) demonstrate that the Kalkriese finds, despite their fragmented nature, portray the diversity of the Roman troops' equipment that was in use at the time. A few brooches and a hairpin suggest the presence of women in

this military context. Two extraordinary features with skeletal remains of mules and fragments of their harnesses visualize the pack and draught animals of the baggage train. However, it needs to be stated that the largest majority of finds at the Oberesch site are small fragments of silver and bronze sheets some of which were gold-plated or displaying ornamental designs, and hundreds of iron nails whose purpose has not yet been established.

In comparison to the large number of fragments that were identified as Roman, there is only a limited number of Germanic finds, such as a bridle, a spur, and perhaps some spearheads and metal fragments of a shield. This contrast must be due to the fact that Arminius' soldiers were originally part of the Roman auxiliary troops and equipped just like Roman troops in the Varian Battle. It can thus not be determined who fought with this Roman equipment. Moreover, one should note that Germanic warriors usually possessed military equipment that was less likely to contain metal and is therefore harder to trace archaeologically. Another factor that has an essential impact on the archaeological record on a battleground is the treatment of the deceased. The Germanic troops were victorious in their own territory and hence able to recover their wounded and deceased including their equipment and bury the dead according to the rules. Such a practice reduces the corpus of finds on the very battlefield. The fallen Roman soldiers, however, were left to the arbitrariness of the enemy which also meant body-stripping. Such a brutal looting process was more likely to produce small fragments of military equipment and personal items to be lost and left on the battlefield than the acts of combat. Thus, the number of archaeological fragments that can be found is considerably high.

Dating

The Roman militaria found at Kalkriese match the corpus of finds of other Roman places from late-Augustan times. Nearly 2000 Roman coins were found in the area and allowed for a more precise dating (Berger 1996, 2009). With the exception of a few coins from the late first to the fourth centuries, which originate in the later phases of Germanic settlement, *denarii* and *aurei* of the Gaius/Lucius type (produced ca. 2 B.C.–4 A.D.) are the latest ones. Where copper coins are concerned, the asses of the first altar series from Lugdunum (7–3 B.C.) are the youngest ones to be found. Several copper coins display countermarks, many with the VAR countermark, which points to Varus (Fig. 6).

These countermarks were most likely produced when Varus had become governor, and they define a dating of the Kalkriese finds as of 7 A.D. Younger coins like the 9/10–14 A.D. asses of the second altar series from Lugdunum were not found at Kalkriese. The coins found are therefore likely to originate in total from 7–9 A.D. which makes it highly probable that Kalkriese was the site of the Varian Battle. At present, there is discussion pertaining to the question of whether a direct connection with the military campaigns of Germanicus (14–16 A.D.) can be ruled out. In line with this, the datings of the coins are being questioned. It is being argued in this instance, that coins produced in 9/10 A.D. had simply not made it to the Rhine region, which means that there is no way of distinguishing the coins of the armies of Germanicus from those of Varus' troops. Extensive analyses of the countermarks are ongoing and may eventually bring the desired clarity in this matter

Archaeology of Kalkriese, Fig. 6 Roman copper coin (As) of Augustus, produced 7–3 B.C., with countermark VAR. (Photo: Christian Grovermann for Museum und Park Kalkriese)

(Werz 2018; Wigg-Wolf 2018; Wolters 2018). Additionally, investigations relating to the metal objects found at Kalkriese and other Roman military sites of that time hope to establish the origin of the troops that perished at Kalkriese.

What is special about the finds at Kalkriese is that they relate to a particular event. In contrast to finds from military camps that were used in the long term the artifacts at the battlefield in Kalkriese show rather comprehensively which equipment the Roman army utilized at the beginning of the first century A.D. The location of the battle area, far from Roman settlements and military camps, ensures the character of the assemblage of Roman artifacts at Kalkriese as a "closed find." This makes for chronological relevance where the dating of Roman militaria is concerned.

The Spatial Distribution of Finds at the Oberesch Site

The extensive number and versatile nature of Roman finds at the Oberesch site serve as a foundation for a detailed analysis of the finds' distribution. This resulted in insights pertaining to the events at the battleground which had led to the dispersal of the finds (Rost and Wilbers-Rost 2012, 2015).

The various kinds of military equipment are dispersed in different ways, and the likelihood of encountering a particular artifact does not correlate with the frequency of its appearance in the equipment of the Roman soldiers. For example, there is only one fragment of a sword blade, although, these weapons were an integral part of the military equipment of each Roman legionary. In contrast, fragments of scabbards, shields, and *pila* (spears) were far more commonly found. It is important to bear in mind, however, that today's dispersal of finds was a result not only of the acts of combat during the battle but also of post-battle processes such as looting. Therefore, as far as the analysis of the finds' distribution is concerned, it is not merely the original purpose of a Roman military artifact in the army or during the fighting that is significant but rather the manner in which it had been transported and how it presented itself to the looters after the battle.

Dispersed relatively equally across the investigated area were nails of the legionaries' sandals, coins, and brooches, which point to the movement of the Roman soldiers in combat. Equally widely dispersed are fragments of equipment fixed to the body such as chain mail, *lorica segmentata*, belts (Fig. 7), and scabbards. These could be discovered close to the rampart and across the whole field as well. They indicate spots where wounded soldiers were looted and dead bodies were stripped after the battle. However, the remarkable concentration of shield fragments, especially metal edgings, near the rampart (Fig. 8) cannot be related back to the events and losses of the very fighting and body-stripping.

It is likely that processes following the combat had an impact on this distribution pattern. Since the large shields of the Roman legionaries did not suit the Germanic soldiers' weaponry, they were not reusable for the victors and hence taken apart. The looters would leave the wooden parts and take the metal pieces to transport the scrap metal more easily and recycle it. The rampart as a central place at the battlefield was suitable to serve as a workspace for taking metal fittings apart. Concentrations of small fragments of silver and bronze sheets as well as nails suggest that various types of objects were scrapped there, too.

Likewise fragments of helmets were most often discovered in close proximity to the rampart. Helmets, however, consisted mainly of metal and it would not have been necessary to take them apart for easier transport. This suggests another move by the Germanic victors, namely a display of enemy weapons close to the rampart. Similar to a Roman victory monument (*tropaeum*), the Germanic victors may have collected and displayed enemy weapons to mark their victory. Depictions on the Trajan's Column suggest that shields and helmets would have played an important role in the concept of such a *tropaeum*. Arminius and his auxiliary troops might have been familiar with Roman victory rites, and may have adapted them for their own purpose, before the booty was dispersed amongst the winners. Tacitus reports on Arminius' speech following his victory and the mockery of the Roman standards by his Germanic followers. This

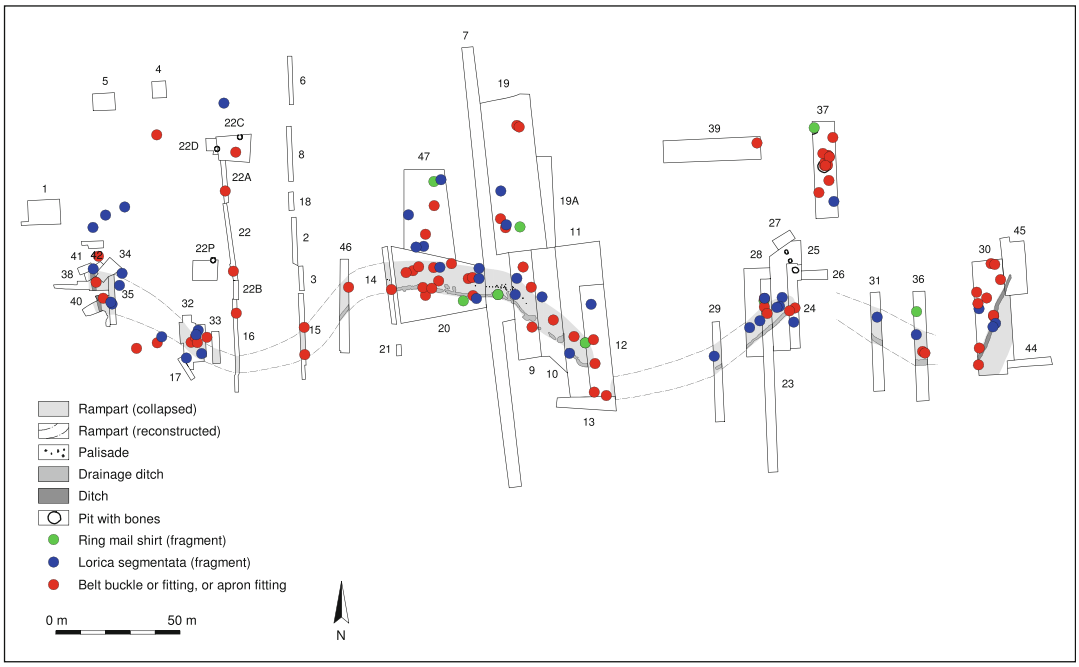

Archaeology of Kalkriese, Fig. 7 Kalkriese-Oberesch: Distribution of fragments of *lorica segmentata*, chain mail, and belts. (Copyright: Klaus Fehrs (Museum und Park Kalkriese), Achim Rost, Susanne Wilbers-Rost)

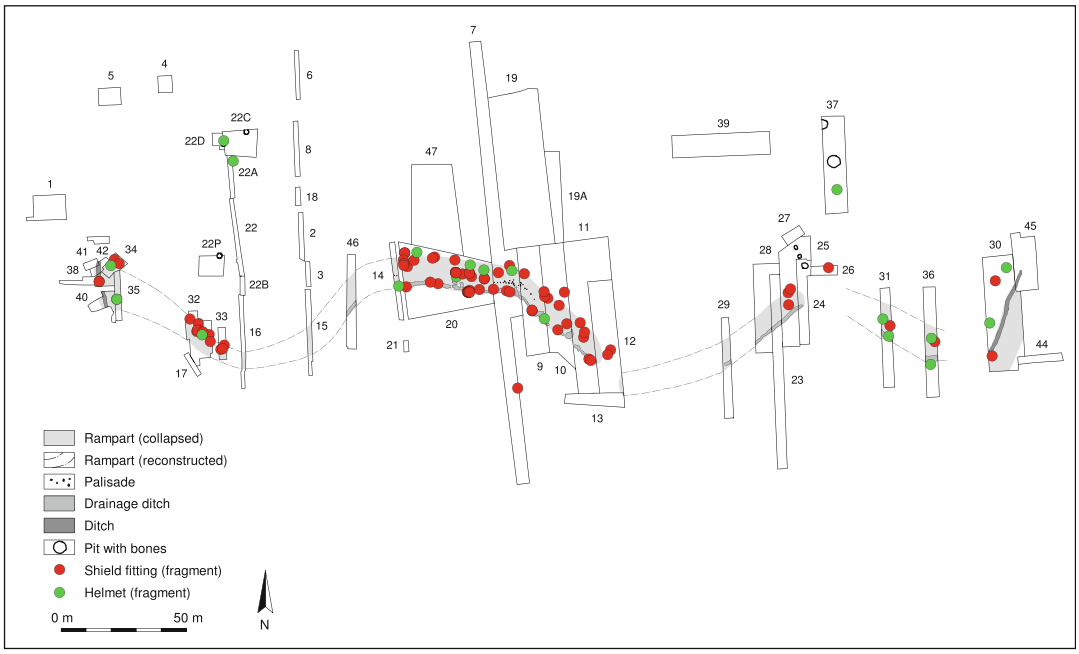

Archaeology of Kalkriese, Fig. 8 Kalkriese-Oberesch: Distribution of fragments of Roman shields and helmets. (Copyright: Klaus Fehrs (Museum und Park Kalkriese), Achim Rost, Susanne Wilbers-Rost)

may be interpreted as a part of the aforementioned victory celebration.

Although the indicators suggesting the presence of a Roman baggage train at the Oberesch site are diverse, there are very few remains of wagons and their load. This is likely the case because wagons and pack animals could be confiscated with their load by the victorious party and transported from the battleground. Small parts of harnesses, which were discovered at the Oberesch site, were most likely to be lost, when dead or wounded mules had to be exchanged.

A Conflict Landscape

The centrally located Oberesch with its unique features and finds can be deemed the main site in the battle area of Kalkriese, but should not be viewed in isolation, since military conflict was not solely taking place in this particular spot. Roman coins and military equipment were detected in an area of about 10 km from east to west in the narrow passage between hill and bog. However, nowhere else has a rampart such as the one at the Oberesch site yet been found. Nevertheless, excavations revealed remnants of Germanic settlements from the time around Christ's birth underneath layers of sod (Harnecker and Tolksdorf-Lienemann 2004). Since there were Roman finds unearthed on Germanic settlement sites, the question arose whether these can be deemed booty that had been transported from the battleground to indigenous settlements or whether military conflict took place at these sites. In order to evaluate the relationship between the Roman artifacts and the Germanic settlements, as well as the structure of the indigenous settlement at the time of the battle, further investigations began in 2011 (compare Fig. 1, especially No. 1 & 2). They were also intended to establish how the cultural landscape and the local infrastructure affected the course of the battle in question (Rost and Wilbers-Rost 2017b, 2019. A detailed publication is in progress).

In the area of investigation, five settlements have already been discovered, which existed around the time when the battle took place. A relatively concise dating can be made thanks to pottery with striking, thickened and facetted rims which were in use during the transition period between the Pre-Roman Iron Age and the Roman Iron Age, ca. 40 B.C.–20 A.D. The settlement sites were discovered on the lowest slopes of the Kalkriese Hill where sandy ground lent itself to agricultural use (compare Fig. 1). The slope facilitated the drainage of surface water, creeks and wells secured the fresh water supply, and the wet depression in the north, just like the Kalkriese Hill, served as a place for cattle herding and a source for timber. As was common in the northwest of Germany at this time, the settlements were single farms or small groups of farms rather than villages. On the sand ridge at the edge of the Great Bog and on top of the Kalkriese Hill, there were no indicators of settlements from around the time of Christ's birth. The settlements found in the eastern zone of the research area show a distance of circa 1.5 km to one another. Thus, the settlement clusters, that means the settlements and their agriculturally utilized areas, were closely interconnected. At all settlements in question, not only ceramics from the transition period but also from the later first century were found, which makes it likely that they were not vacated as a result of military conflict.

The events surrounding the Varian Disaster were unlikely to have been highly consequential for the civilians of the Germanic settlements. Since the attacks had been strategically planned by the Germanic military leadership, the civilians would have had the time to wait out the conflict at a spot, such as the Kalkriese Hill, that was further away from the battleground. They would have been able to take movable belongings such as personal items, stocks, cattle, and seeds.

Paths and roads can be presumed as connections between the indigenous settlements, but they cannot be detected archaeologically. Hence, the Roman army for their move westwards through the bottleneck between hill and bog would take a route along the sandy zone at the lower slope of the Kalkriese Hill. There, settlements and areas under cultivation had created forestless terrain. In times of peace and accompanied by indigenous allies, it would have been possible for the Roman troops to pass this terrain. But in the case of enemy attacks, this situation was very inconvenient for marching units since there was no alternative

route through the narrow terrain. The Germanic attackers, however, benefitted from this terrain. The edges of the forest, which surrounded the settlement clusters, provided cover in the case of partisan attacks on the Roman troops even without further entrenchments. The population density was, however, unlikely to have sufficed to withstand a Roman army, which is why the alliance between the Germanic tribes was essential to their military success.

The Course of the Battle

Unlike a siege, a pitched battle will not reveal many features, and the reconstruction of the events mainly depends on the archaeological artifacts. When paired with evidence about the settlement structures, the spatial distribution of Roman finds unearthed between Kalkriese Hill and the Great Bog allow for conclusions on the course of the battle. At Kalkriese, there is evidence of repeated attacks on marching Roman troops. To reconstruct the development of a military crisis is easier in such a battle in a defile rather than in a case of static warfare.

East of the Oberesch site various sites with Roman artifacts were discovered. The site that is furthest in the eastern direction is located about 6 km from Oberesch. However, in principle, the number of Roman artifacts found in the eastern zone of the battle area is low. This might not necessarily point to subordinate military combat. As long as the Roman units could care for the wounded and dead soldiers and could take them along in the baggage train with their equipment, there might have simply been hardly anything left on the battleground. In the east, the zone of the Romans' approach, there were few finds, mostly coins and brooches. Those were presumably part of the legionaries' field packs, which were sometimes left behind when units had to prepare for fighting and to counter sudden Germanic attacks. When the Germanic warriors looted the field packs of their Roman enemies, then small objects such as brooches and coins were more likely to fall out of the leather bags. The spatial distribution of finds at the lower slope of the Kalkriese Hill suggests that the Roman troops kept mainly to the route along the Germanic settlement area.

At the Oberesch site, the situation presents completely different from that in the east. The large number of Roman finds at this site, which is partly due to body-stripping, and the bone pits indicate that this was the section of the battle area where considerable parts of the Roman army were totally defeated. Roman soldiers who had been wounded in battle and transported with the baggage train would finally be killed here and their bodies would also be stripped by the enemy. This, too, may have enlarged the amount of archaeological finds at this site.

Most of the Roman finds west and northwest of the Oberesch site can be interpreted as the result of escape, subsequent skirmishes, and capture. The distribution of the remains stretches to the northwest about 3 km across the wet depression to the sandy ridge at the southern edge of the bog and westwards along the sandy slope of the hill as well. But in these areas, the finds are less numerous than at the Oberesch site. In the northwest, especially in the wet area, some striking valuable finds have been discovered, such as hoards of silver coins and silver fittings of a sword scabbard. Probably Roman soldiers hid their valuable belongings prior to being taken prisoner to prevent them from being taken by the enemies. Thus isolated, even larger wallets could be more easily overlooked than at the Oberesch site, where immediately after the battle many such finds would be lying. But there, leather purses with coins, for example, were still linked to the bodies and therefore more obvious to the looters.

At many sites west of the Oberesch site, at the slope of the mountain, there is further evidence that Roman soldiers aimed to escape and became involved in succeeding skirmishes. Even the 150 Roman coins and pieces of military equipment found in the area of a Germanic settlement circa 2 km west of the Oberesch site (Kalkriese-Dröge, Fig. 1, No. 2), point to combats and post-battle looting, not to booty transported to the settlement from another place in the battle area. The finds were dispersed across the settlement and beyond. Similar to the Oberesch site, the objects were small or fragmentary, and not selected items as can be expected, when booty was stored, for example, in a craftsman's or merchant's depot.

The notion of post-battle loot that was transported to the settlement at Kalkriese-Dröge can likely be refuted by the observation that there are very few Roman finds in nearby settlements, though any booty would presumably have been distributed evenly amongst the local population. However, the contrasting numbers of Roman finds east versus west of the Oberesch site, including those from the indigenous settlements, can be better explained with the development of the battle. The losses of the Roman army were less severe in the east than in the west, where the disorder among the troops would have been much bigger.

The complexity of the processes influencing the spatial distribution of archaeological artifacts on the battlefield can also be deduced from further observations. The numerous brooches and coins at Kalkriese-Dröge suggest that not only last combats took place here but also that soldiers managed to get to this area with their field packs intact. This may point to the strategy of the Germanic tribes of having some Roman units pass the bottleneck in an early phase of the fightings, before starting first attacks at different places at the same time. Perhaps the finds from the Dröge site indicate the overlay of two phases of the battle. Moreover, at Dröge, there were only a few finds of military equipment necessary for fighting. Fragments of shields, for example, are lacking completely. This might suggest that the Germanic warriors made more Roman war prisoners towards the end of the battle, once they felt more secure in their likelihood of being victorious. These prisoners of war who were valuable booty, too, might then be taken to the Oberesch site to be gathered in one place, and would have had to carry parts of their equipment there.

Naturally, some objects were lost even when the Germanic victors transported the booty to their tribal territories, and this is shown via fragments of silver sheets in the northwest of the battle ground that may have been scrapped before at other places such as the Oberesch site. The various observations concerning the spatial distribution of archaeological finds at Kalkriese demonstrate that the number of finds in one section of the conflict landscape does not necessarily allow to draw conclusions on the intensity of the fightings in this zone.

International Perspectives

The evaluation of the find distribution at Kalkriese has shown the extent to which the post-battle processes, especially the lootings and the handling of the booty and the fallen soldiers, affect the archaeological records of historical battlefields. Although it is not always possible to decide to what extent the various types of behavior took effect, the latest source-critical approach enables the development of methodological foundations for the comparatively novel discipline of battlefield archaeology.

One should bear in mind, however, that it was the cultural and historical framework that had a significant impact on the archaeological record on the battleground of Kalkriese. On one hand, an extensive army that was heavily equipped with metal and accompanied by a large baggage train was largely annihilated, on the other hand, the victors were not interested in the original function and purpose of all of the acquired loot. The resulting scrapping at the battleground in favor of acquiring metal as raw material has substantially enlarged the archaeological material at the battlefield. Oftentimes, however, the remains found on sites of military combat consist mainly of ammunition that is too small and worthless to be collected during the looting. Therefore, the research results of the battlefield at Kalkriese are not automatically transferable to other battlegrounds.

Future Directions

Similar phenomena of transmission that are like Kalkriese are primarily to be expected for both ancient and more recent sites of military conflict if they display patterns of asymmetrical warfare and particular interest towards military equipment as spoils. Future investigations not only at ancient battle sites but also, for example, at sites of

American-Indian Wars dating from the seventeenth to the nineteenth century may deliver insights which will help to successfully develop the investigation of landscapes of conflict as a field of research within the discipline of archaeology.

Cross-References

- ▶ Battlefield Archaeology
- ▶ Metal Detecting in Archaeology
- ▶ Roman Army, Archaeology of

References

Berger, F. 1996. *Kalkriese 1. Die römischen Fundmünzen*, Römisch-Germanische Forschungen 55. Mainz: Philipp von Zabern.

Berger, F. 2009. Die römischen Münzen von Kalkriese. In *Varusschlacht im Osnabrücker Land. Museum und Park Kalkriese*, ed. Varusschlacht im Osnabrücker Land, 140–151. Mainz: Philipp von Zabern.

Harnecker, J. 2008. *Kalkriese 4. Katalog der römischen Funde vom Oberesch. Die Schnitte 1 bis 22*, Römisch-Germanische Forschungen 66. Mainz: Philipp von Zabern.

Harnecker, J. 2011. *Kalkriese 5. Die römischen Funde vom Oberesch. Die Schnitte 23 bis 39*, Römisch-Germanische Forschungen 69. Darmstadt/Mainz: Philipp von Zabern.

Harnecker, J., and E. Tolksdorf-Lienemann. 2004. *Kalkriese 2. Sondierungen in der Kalkrieser-Niewedder Senke. Archäologie und Bodenkunde*, Römisch-Germanische Forschungen 62. Mainz: Philipp von Zabern.

Mommsen, Th. 1885. *Die Örtlichkeit der Varusschlacht*. Berlin: Weidmann.

Rost, A., and S. Wilbers-Rost. 2012. *Kalkriese 6. Die Verteilung der Kleinfunde auf dem Oberesch in Kalkriese. Kartierung und Interpretation der römischen Militaria unter Einbeziehung der Befunde*, Römisch-Germanische Forschungen 70. Darmstadt/Mainz: Philipp von Zabern.

Rost, A., and S. Wilbers-Rost. 2015. Looting and scrapping at the ancient battlefield of Kalkriese (9 A.D.). In *La Segunda Guerra Púnica en la peninsula ibérica. Baecula: arqueologia de una batalla*, ed. J.P. Bellón Ruiz, A. Ruiz Rodríguez, M. Molinos Molinos, C. Rueda Galán, and F. Gómez Cabeza, 639–650. Jáen: Servicio de Publicaciones, Universidad de Jaén.

Rost, A., and S. Wilbers-Rost. 2017a. They fought and died – But were covered with earth only years later: "Mass graves" on the ancient battlefield of Kalkriese. In *Death as a process. Funerals in the Roman world*, ed. J. Pearce and J. Weekes, 155–173. Oxford: Oxbow Books.

Rost, A., and S. Wilbers-Rost. 2017b. The 'conflict landscape' of Kalkriese (Varus battle AD 9) – Archaeological finds and ancient written sources. *Journal of Roman Military Equipment Studies* 18: 75–82. England: Mixam.

Rost, A., and S. Wilbers-Rost. 2018. Die Knochengruben auf dem Oberesch in Kalkriese – zum Spannungsverhältnis zwischen archäologischem Befund und antiken Schriftquellen. In *Phantom Germanicus. Spurensuche zwischen historischer Überlieferung und archäologischem Befund*, Materialhefte zur Ur- und Frühgeschichte Niedersachsens 53, ed. St. Burmeister and S. Ortisi, 147–158. Rahden/Westf.: Marie Leidorf.

Rost, A., and S. Wilbers-Rost. 2019. The ancient conflict landscape of Kalkriese (Varian Disaster 9 CE): New insights into the course of the battle and the post-battle processes. In *Proceedings of the 10th Biennial International Fields of Conflict Conference, Mashantucket Pequot Museum & Research Center, Sept 2018*. https://pequotwar.org/education/fields-of-conflict-conference-2018/. Conference proceedings, Vol. 4, 40–49; accessed 18 Dec 2019.

Werz, U. 2018. Gibt es einen "Germanicus-Horizont" im Fundmünzaufkommen? In *Phantom Germanicus. Spurensuche zwischen historischer Überlieferung und archäologischem Befund*, Materialhefte zur Ur- und Frühgeschichte Niedersachsens 53, ed. St. Burmeister and S. Ortisi, 221–236. Rahden/Westf.: Marie Leidorf.

Wigg-Wolf, D. 2018. 9 or not 9? New thoughts on Waldgirmes, Haltern, Kalkriese and co. In *Phantom Germanicus. Spurensuche zwischen historischer Überlieferung und archäologischem Befund*, Materialhefte zur Ur- und Frühgeschichte Niedersachsens 53, ed. St. Burmeister and S. Ortisi, 237–252. Rahden/Westf.: Marie Leidorf.

Wilbers-Rost, S., H.-P. Uerpmann, M. Uerpmann, B. Grosskopf, and E. Tolksdorf-Lienemann. 2007. *Kalkriese 3. Interdisziplinäre Untersuchungen auf dem Oberesch in Kalkriese – Archäologische Befunde und naturwissenschaftliche Begleituntersuchungen*, Römisch-Germanische Forschungen 65. Mainz: Philipp von Zabern.

Wolters, R. 2018. Zwischen VAR(us) und Germanicus: Die spätesten Kontermarken auf den Buntmetallmünzen von Kalkriese. In *Phantom Germanicus. Spurensuche zwischen historischer Überlieferung und archäologischem Befund*, Materialhefte zur Ur- und Frühgeschichte Niedersachsens 53, ed. St. Burmeister and S. Ortisi, 273–318. Rahden/Westf.: Marie Leidorf.

Further Reading

Grosskopf, B., A. Rost, and S. Wilbers-Rost. 2012. The ancient battlefield at Kalkriese. In *Sickness, hunger, war, and religion: Multidisciplinary perspectives*, RCC

perspectives 2012/3, ed. M. Harbeck, K.v. Heyking, and H. Schwarzberg, 91–111. http://www.environmentandsociety.org/perspectives/2012/3/sickness-hunger-war-and-religion-multidisciplinary-perspectives. Accessed 22 Jan 2019.

Moosbauer, G. 2009. *Die Varusschlacht*. München: C.H. Beck.

Rost, A., and S. Wilbers-Rost. 2010. Weapons at the battlefield of Kalkriese. *Gladius* 30: 117–135.

Rost, A., and S. Wilbers-Rost. 2016. The extensive battlefield at Kalkriese (Varus Battle 9 AD): A challenge for archaeological research and monument preservation. In *Preserving fields of conflict: Papers from the 2014 Fields of Conflict Conference and Preservation Workshop (Columbia, SC)*, ed. St. D. Smith, 25–30. Columbia: University of South Carolina.

Wiegels, R., ed. 2007. *Die Varusschlacht. Wendepunkt der Geschichte?* Stuttgart: Konrad Theiss.

Archaeology of Mining

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Introduction

The extraction and processing of metals and other minerals have played a significant role in economic, political, and social developments across the globe from early in prehistory to the present day. Processes of mining and metallurgy have left a number of material traces in the archaeological record, from mines themselves, to metallurgical slag and other waste, to finished metal objects, and to traces of environmental pollution. Likewise, mining landscapes often preserve other features related to mining labor and the economy, including settlements for housing laborers as well as roads and railroads for shipping. As such, mining has been examined from a variety of different archaeological perspectives and methods. The archaeology of mining, while in no way a cohesive subdiscipline, plays an important role in industrial archaeology and archaeometallurgy; in period-specific subfields including historical archaeology, prehistory, and classical archaeology; as well as in various area studies fields. It shares much in common with studies of other extractive industries such as quarrying stone or drilling for oil. Studies of mining technologies, landscapes, and communities have also contributed to wider conversations in archaeology about labor history, the history of technology, human-environment interaction, economic history, imperialism and colonialism, and conservation and preservation, among other varied topics. This entry provides a broad overview of the archaeology of mining. It begins by outlining the historical trajectory of studies of mining and metallurgy in archaeology from the pre-modern period to the present. It then discusses current trends and debates in the archaeology of mining relating to scientific methods, social approaches, as well as the conservation and preservation of mining heritage. Finally, it discusses international trends and future directions in research on mining. Given the disparate and diverse scholarship that intersects with and contributes to the archaeology of mining, selected examples provided are intended to be illustrative rather than comprehensive.

Definition

The archaeology of mining is a diverse topic studied from a number of different theoretical and methodological perspectives within archaeology. It involves the study of the material remains of mining from prehistory to the present, both before and after the Industrial Revolution. Such material remains include a wide variety of landscape features, artifacts, buildings, and infrastructure associated with mining. Most archaeological studies of mining in both ancient and contemporary contexts until relatively recently focused on uncovering evidence for the technologies surrounding the extraction and processing of ores: mines, tools, and equipment. The structure of mines themselves varies by period, geography, geology, type of ores extracted, and techniques used to extract them. Mines generally fall into two basic categories: underground mines and

Archaeology of Mining, Fig. 1 Remains of stairs leading between two galleries in Três Minas (Vila Pouca de Aguiar), Portugal, a large Roman gold mining complex. Red paint indicates places where modern prospecting has been carried out. (Photo by author)

opencast mines. Underground or deep-vein mines consist of subterranean tunnels including vertical shafts, horizontal galleries, and horizontal adits (horizontal passages that can be used for accessing an ore body or for drainage) that penetrate below the surface of the ground (Fig. 1). Underground mines are normally opened to either extract hard minerals containing metal ores or to extract soft minerals such as coal or salt. Opencast, open-pit, or opencut mines are created when large a quantity of material is extracted from the surface, thereby creating a pit, depression, or large hole. Contemporary open-pit mines can be recognized for their distinctive benches or stepped platforms that are cut to create access to lower levels (Fig. 2), while ancient examples are typically less regular and smaller in size. Opencast mines are used when ores are found relatively close to the surface and/or when the earth is not stable enough for underground mining. These methods have sometimes been used simultaneously, or one after another in different phases of mining in the same area. The development of contemporary opencast mining, which involves the removal of all the material inside the pit and more efficient processing techniques, has allowed the extraction of low-grade ores to become profitable. It is for this reason that ancient underground mines are sometimes reopened to exploit low-grade ores using opencast mining techniques. Aside from evidence for these various techniques of extraction, mining landscapes often contain evidence of sorting, processing, and refining ores. These include crushing platforms and stones, smelting furnaces, and slag heaps. A wide range of tools and other materials are often found in association with mines, especially in abandoned underground mines where anaerobic environments favor the preservation of organic materials such as clothing, baskets, and wooden equipment. The preservation of many components of mining landscapes varies widely across time and space. Because mining is an inherently destructive activity, older evidence of exploitation is often obliterated in the process of later mining activity. The conservation of mining heritage has received increasing attention with the spread of amateur and academic interest in industrial archaeology and as topics such as rural landscapes and labor history have become more prominent in archaeology.

As research questions in the archaeology of mining have expanded to address more than the technologies of mining, the range of material evidence employed for study has also expanded. Mines are now more often contextualized in their wider landscapes through the study of infrastructure such as railroads, roads, and ports. A desire to understand the organization of labor, the lived experience of miners, and topics such as community formation and identity at mining sites has also led archaeologists to study mining settlements, including houses, cemeteries, churches, stores, and other common spaces. Finally, increased interest in pollution and human health has also incited archaeologists to employ scientific techniques to study the environmental impacts of mining in the past and present.

Archaeology of Mining, Fig. 2 Corta Atalaya mine in Riotinto, Spain. The mine shows the distinctive benches of opencast mining, which was carried out at the site to extract copper, zinc, lead, gold, and silver beginning in 1907. (Photo by author)

Historical Background

Pre-modern Interest in Mining

There has long been an interest in exploring human engagement with metal-rich landscapes and a range of material and written sources from across the ancient world document mining technologies, mining landscapes, and labor practices. In ancient Egypt, for instance, a map of an ancient mining landscape in the Eastern Desert is depicted on a papyrus dating to the mid-twelfth century BCE (Fig. 3). This topographical map was produced during the reign of Ramesses IV in the 20th dynasty, apparently to map the locations of gold mines and sandstone quarries in Wadi Hammamat for royal mining expeditions (Shaw 1994: 111). Depictions of metallurgy are also known from Egypt, for instance, in the 18th dynasty (c. 1550–1292 BCE) tomb of vizier Rekhmire in Thebes (TT100) (Ogden 2000: 150).

Observations about mining and metallurgy also abound in Greek and Roman written sources (for a compilation, see Humphrey et al. 1998: 173–233). Of particular significance is Pliny the Elder's first century CE encyclopedic compendium, *Historia Naturalis*, which includes two full books about the history of metals, where the author details the state of Roman knowledge about gold, silver, copper, mercury, lead, tin, iron, and a number of alloys (*Natural History* 33–34). Pliny's elaborate description of gold mining in northwest Spain (*Natural History* 33.66–78) closely matches archaeological evidence for gold mining at the UNESCO World Heritage Site of Las Médulas (El Bierzo, León, Spain) (Fig. 4). Both Greek and Roman authors described the difficulties of laboring in mines (e.g., Diodorus, *History* 3.12-13.1, 5.36–38; Xenophon, *Ways and Means* 4.14–17), but archaeological investigations relating to mining

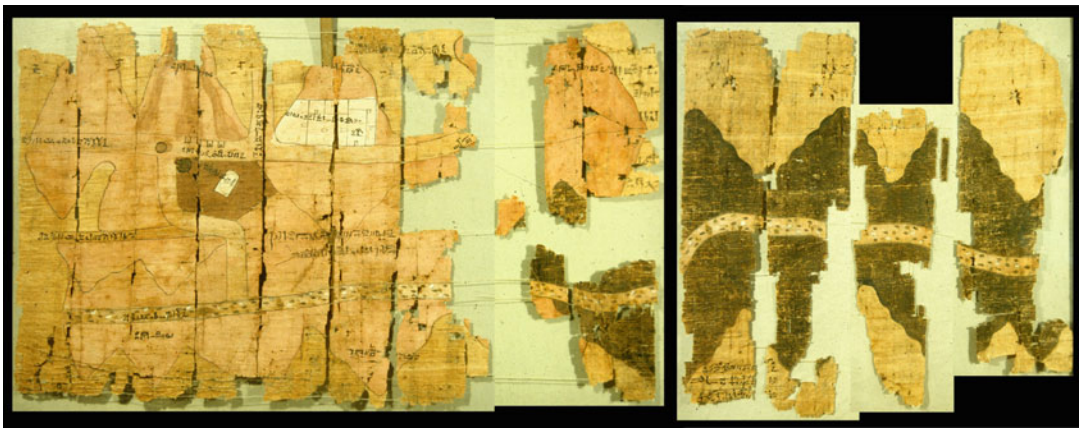

Archaeology of Mining, Fig. 3 Photograph of the Turin Papyrus, the earliest known topographical map, which depicts an ancient Egyptian gold mining and quarrying district in Wadi Hammamat in the Eastern Desert. (Photograph at the Turin Museum courtesy of J. Harrell)

Archaeology of Mining, Fig. 4 View of the remains of hydraulic gold mining at the UNESCO World Heritage Site of Las Médulas (Bierzo, León, Spain). (Photo by author)

labor have not become widespread until more recently. While visual and textual evidence certainly appear in other ancient cultural traditions, classical texts are emphasized here for the role they came to play in later mining history.

Mining is also recorded in maps and handbooks from more recent history, many of which were used by mining engineers and distributed widely thanks to the invention of printing. Perhaps most significant to the history of mining is Georgius Agricola's *De Re Metallica*, published in 1556 (Fig. 5). This is a twelve-book treatise illustrated with woodcuts that outlines in great detail the methods for mining, refining, and smelting metals. Printed in Latin as well as in German and Italian translations, the book was influential throughout Europe as a source for understanding mining technologies of the era. It also served to keep the memory of ancient mining alive with frequent references to classical authors and their descriptions of mining. In 1912, former US president Herbert Hoover and his wife Lou Henry Hoover produced an English translation with annotations that has been reprinted multiple times and is still well-regarded today (Hoover and Hoover 1950).

While these are but a few examples of extant visual and written sources from before 1600, they attest to the long-standing human interest in mining landscapes and technologies across various pre-modern cultures and time periods. While these sources certainly predate a contemporary "archaeology of mining," they are useful in interpreting the archaeological evidence for mining that has survived from the ancient and more recent past as well as in understanding engagements of people with mining landscapes over the *longue durée*.

Mining Scholarship in the Nineteenth and Twentieth Centuries

Modern scholarship on the archaeology of mining has, until recent decades, focused primarily on the technologies surrounding the processes of extracting, refining, and smelting metals. Many of the earliest scholars writing on what might be classified anachronistically as the "archaeology of mining" were themselves mining engineers rather

Archaeology of Mining, Fig. 5 Woodcut from Georgius Agricola's *De Re Metallica* (1556) depicting miners at work. (Public Domain, https://commons.wikimedia.org/w/index.php?curid=400140)

than trained archaeologists. Through their occupations, they had access to mining sites with deep histories of exploitation. Mining landscapes were rarely of major interest to archaeologists in the nineteenth and twentieth centuries, who instead were focused primarily on urban places and elite spaces. Significantly, mining engineers also had the technical expertise necessary to undertake rigorous analysis of the ancient archaeological evidence that they encountered in the course of contemporary mining operations. Often, these were people educated in the classical tradition according to the standards of their day (Dietler 2010: 27–42), so they could read the work of Agricola and Pliny the Elder. Herbert Hoover, for instance, was trained as a mining engineer, while his wife was a geologist and scholar of Latin. They had the ideal combined skillsets to produce a clear translation of *De Re Metallica* from the Latin, complete with footnotes referencing and describing relevant Latin and Greek authors to whom Agricola frequently referred.

Anglophone scholarship on mining from the nineteenth and twentieth centuries often focused on the history of the development of mining technology in specific locales or on the place of mining in world history. In the former category, for instance, is Nash's history of the Riotinto mines in southwest Spain (1904). In the latter is the work of Thomas Arthur Rickard (1864–1953). Born in Italy, Rickard came from a family of English mining engineers and worked in the industry for most of his career in the United States. Although he was a prolific scholar, he is most famous for his seminal two-volume work, *Man: and Metals: A History of Mining in Relation to the Development of Civilization* (1932). The book focused on the deep history of mining in the Old World and its relationship with the development of human culture. In this and other publications, his attention to both classical written sources and archaeological findings from mines is notable. Scholarship from the nineteenth and the early twentieth centuries, as well as the history of amateur collection in and around modern mines, ensured the survival of material evidence for mining at a time when there was not a great deal of interest in the subject on the part of archaeologists.

Archaeological interest in ancient mining, at least in Europe, began to arise after Rickard's initial work. The first major synthesis of mining sites in the Roman Empire was Englishman Oliver Davies' *Roman Mines in Europe* (1935). He produced maps and wrote descriptions of mines based on personal visits to mining sites. He lamented: "the evidence for ancient mines is in all cases poor, and archaeologists must not demand so strict a standard as in other branches" (1935: preface), a quote which aptly demonstrates the negative archaeological perspective on mining sites at the time. Later volumes contributed to deeper understanding of mines in antiquity, especially during the classical period. John F. Healy's *Mining and Metallurgy in the Greek and Roman World* (1978), for instance, has remained an important resource on mining itself as well as issues surrounding the administration and labor of mining in the classical Mediterranean. Likewise, Robert Shepherd's *Ancient Mining* (1993) traces developments in mining from prehistory to the later Roman Empire and includes information about labor and administration.

Studies of the archaeology of mining in prehistory also began to proliferate in the mid-twentieth century, many of which maintained a focus on the technologies surrounding mining and metallurgy. Significant volumes with a primarily technological focus include R.F. Tylecote's *A History of Metallurgy* (1976) and *The Early History of Metallurgy in Europe* (1987) as well as Paul T. Craddock's *Early Metal Mining and Production* (1995). Writing more specifically about the United Kingdom, Tylecote also published *Metallurgy in Archaeology: A Prehistory of Metallurgy in the British Isles* (1962) and, later, *The Prehistory of Metallurgy in the British Isles* (1986). Aside from these studies focused primarily on European mining history, other archaeological investigations have also been heavily focused on the technologies of mining and metallurgy. Beginning around the 1970s, a strong tradition of scholarship emerged that made use of scientific methods and techniques to study mining technologies. This was influenced both by the

predominant processual paradigm as well as advancements in the application and use of archaeometric techniques.

In addition to work on the archaeology of mining in ancient times, the field of industrial archaeology began to take shape from the 1950s as interest increased in preserving industrial heritage, inventorying industrial sites, and studying industrial technologies from an academic perspective. This field, which traces its origin to the United Kingdom, includes the study of mines dating to after the Industrial Revolution, as well as a variety of other sites with industrial buildings and structures such as mills and factories (Palmer and Neaverson 1998). Because industrialization took place earlier in some places than others, material remains considered industrial heritage can be as early as the sixteenth century but are often much more recent. Early work in industrial archaeology has been criticized for its focus on technology and conservation at the expense of other relevant topics, but more recent work has begun to contextualize industrial heritage in the wider discipline of historical archaeology. Mining heritage is not considered alone and solely for its technological value but as part of the wider industrial landscape, including towns, settlements, and supporting infrastructure (e.g., trains, railroad tracks, roads, and power plants).

Key Issues/Current Debates

The scope of the archaeology of mining began to change and grow from the early 1980s in step with theoretical shifts in archaeology – especially the post-processual turn. While previous investigation had been primarily concerned with understanding the technologies and processes surrounding mining itself, archaeologists began to realize increasingly that mining could be used to study a number of social and economic topics. Further, evidence from mining sites could be used to address questions of larger interest in the archaeology about gender, indigenous archaeology, and postcolonial archaeology, among others. Historical archaeologists, perhaps because of the wider range of material and written evidence available to them, were among the first to publish more interpretive, analytical, and holistic investigations of mining landscapes and communities (see especially Hardesty 1988). The conference and subsequent publication of *Social Approaches to an Industrial Past: The Archaeology and Anthropology of Mining* (1998) can be seen as an important turning point for research in the archaeology of mining. The volume brought together archaeologists, ethnohistorians, and anthropologists working in disparate geographical locations and from varied disciplinary backgrounds to discuss the social context of mining from prehistory to the recent past. Significantly, while mining sites from before and after the Industrial Revolution had traditionally been studied separately, the editors made a case for the broad comparison of mining landscapes across time periods and locations. While the "archaeology of mining" will never be a cohesive subdiscipline, the volume has prompted increased interdisciplinary work and cross-regional discussion over the past two decades.

Today, the archaeology of mining is studied under the purview of many divergent disciplines and subdisciplines in the humanities, social sciences, and hard sciences. Mining is also studied unevenly and from varied perspectives in different regions of the world. As in previous centuries, the study of mining as a part of the history of technology continues to play an important role in new research, but discussions about technology are increasingly being enhanced by new methods of inquiry as well as through their incorporation into wider questions about the social and economic significance of mining. Much of the most innovative and/or debated work of the past several decades can be grouped into the following three categories: methodological advancements in archaeometallurgy and geospatial technologies, social approaches, and conservation and preservation.

Methodological Advancements

Advances in archaeometry, geospatial, and digital technologies have enhanced the archaeology of mining and led to new discoveries as well as to changing methods for mapping, documenting,

and conserving mining landscapes and metal artifacts. The increase in the use of scientific techniques in archaeology from the 1970s onward has catalyzed a number of advances in metal provenience studies, in documenting the impacts of mining pollution on a variety of scales, and in better understanding the origins and development of technologies in mining and metallurgy. Geospatial and other digital technologies have, on the other hand, helped with the mapping and recording of mining landscapes, buildings, and other features.

Archaeometallurgy

Archaeometallurgy, the study of the use and production of metals in both prehistoric and historic periods, is a subdiscipline of archaeometry or archaeological science. Key areas of research in archaeometallurgy include the origins and dispersal of metallurgical technology, the reconstruction of metallurgical technologies that have fallen out of use, and the identification of the provenience of objects and ores to their geological origins through chemical and isotopic fingerprinting (Killick and Fenn 2012: 560–561). Some of the commonly used methods for the analysis of ores, metals, and slag include optical microscopy, electron microscopy, X-ray diffraction (XRD), Raman microscopy, portable X-ray fluorescence (p-XRF), energy-dispersive X-ray analysis (EDX), wavelength-dispersive X-ray analysis (WDX), and inductively coupled plasma spectroscopy/spectrometry, among a variety of others (Roberts and Thornton 2014). A multitude of archaeometric and archaeometallurgical studies related to mining technology can be found in the *Journal of Archaeological Science*, the *Journal of Archaeological Science: Reports*, and *Archaeometry*, among others.

For prehistorians, there has been long-standing debate concerning when and where the mining and extractive metallurgy of different ores originated. There have long been questions about the origins and spread of smelting technologies in the Old World and whether smelting was invented on multiple occasions in disparate locales or just once. In the 1960s, for instance, Colin Renfrew argued – against V. Gordon Childe's previous arguments for a single invention of metallurgy – that copper metallurgy was invented on multiple occasions in the ancient Near East, in the Balkans, and in Iberia. The past decades have seen a great deal of local research and global debate on these issues as new archaeological evidence has been found and archaeometric techniques have become more widely used. For instance, in 2009, the *Journal of World Prehistory* produced two special issues on the topic "Modelling Early Metallurgy" (Vols. 3 and 4). These volumes provide outlines of the state of this debate in various places including West, East, and Southern Africa, Thailand, South India, Western Europe, the Eurasian Steppe, Eastern Asia, Iran, the Southern Levant, the Indus Valley, the Eastern Woodlands of North America, and West Mexico. Concerning copper, most scholars now contend that copper metallurgy in Europe spread from east to west, beginning in Southeast Europe in the late 6th millennium BCE and culminating in Britain and Ireland by the mid-3rd millennium BCE. Further, the "virtually synchronous appearance of copper smelting throughout Southwest Asia and Southeast Europe, [shows that] a single central region of invention is far more probable than many parallel independent discoveries" (Roberts et al. 2009: 1012–1014).

Chemical and isotopic fingerprinting – including isotopic analysis of lead, copper, and copper-based alloys – are also major areas of research in archaeometallurgy. In particular, the application of lead isotope analysis to metal objects and ores has increasingly been carried out as a way to pinpoint the provenience of objects and characterize isotopic signatures for various mining districts. Identification of the origin of objects can help not only in the reconstruction of trade networks but also in better understanding the organization of production and its connection to economic systems in past societies. These methods can also be used to reconstruct processes of recycling, mixture, and reuse of metals of diverse origins. In the past decades, lead isotope analysis has shed light on topics such as the production of copper oxhide ingots in Late Bronze Age Cyprus, the origins and distribution of Roman lead ingots in the Mediterranean, and the

mixing of metals in coins, pipes, and archaeological objects from many times and places. Isotopic analyses have allowed researchers to trace the impacts of mining pollution and environmental degradation on local, regional, and even global scales. Most famously, Sungmin Hong and colleagues traced hemispheric lead pollution on a global scale by conducting lead isotope analysis on ice cores from Greenland. In doing so, they showed how mining in the classical Mediterranean contributed to levels of hemispheric pollution not observed again until after the Industrial Revolution (Hong et al. 1994). This research inspired a number of subsequent studies that helped pinpoint the geographic origins of pollution, the impacts of pollution on local plants and animals in mining districts, and the consequences of pollution for human health past and present. It has recently been reproduced with greater accuracy, allowing scholars to pinpoint fluctuations in pollution levels to specific economic and historical events (McConnell et al. 2018).

Geospatial and Digital Technologies

Advances in geospatial technologies have also expanded the ways in which mining landscapes can be documented and studied. Increasingly, archaeologists are using laser scanning, digital photogrammetry, geographic information systems (GIS), and other digital tools to map mining landscapes and features within them. These technologies have applications for making and documenting new discoveries. In addition, they are useful in monitoring changes in landscapes or the deterioration of archaeological sites for the purposes of environmental and heritage conservation and preservation. In one recent study of the Eria Valley in northwest Spain, archaeologists employed airborne LiDAR and aerial photography to create high-resolution digital terrain models of a Roman-era gold mining landscape. LiDAR, or Light Detection and Ranging, is remote sensing method that produces high-resolution digital surface models and topographic maps. Because of dense vegetation across the region, it had previously been difficult to determine the extent of hydraulic gold mining features such as trenches, canals, and mining deposits. The application of these technologies, and especially of LiDAR, brought to light these features and helped to document the extent of ancient gold mining in the region using GIS (Fig. 6; Fernández-Lozano et al. 2015). This technique is increasingly used to study ancient mining landscapes elsewhere. New technology is also employed for recording buildings and features of particular mining sites. A recent study of the nineteenth and twentieth century Our Lady of Montserrat mine in Cartagena-La Unión, Andalucía (Spain) employed laser scanning on a smaller scale. Using terrestrial laser scanning and airborne LiDAR textured with photographs, archaeologists created a textured digital model of the boiler room and chimney associated with the mine (García-León et al. 2017). The images produced serve to record the state of preservation of the building for the purposes of monitoring heritage preservation, and they can be used as accurate and realistic models of the site for both specialized and public uses. Outside of archaeology, LiDAR and other technologies are also sometimes employed in active mining projects for recording changes to landscapes and coastlines in order to monitor environmental impact and legal compliance, among other things (e.g., Kerfoot et al. 2014).

Social Approaches

While most archaeological studies of mining and metallurgy before the 1980s focused primarily on the locations of mines and the technologies used to extract and process metals, the rise of post-processual approaches in archaeology has led archaeologists to expand the range of research in the archaeology of mining to address debates about a broad range of social, economic, and ideological questions. Some of this has been the result of the increased integration of the archaeology of mining into other subdisciplines within archaeology such as historical archaeology and classical archaeology. Questions have also evolved with the increased integration of archaeological approaches to mining and ethnographic or ethnoarchaeological studies of contemporary mining landscapes and communities. It is

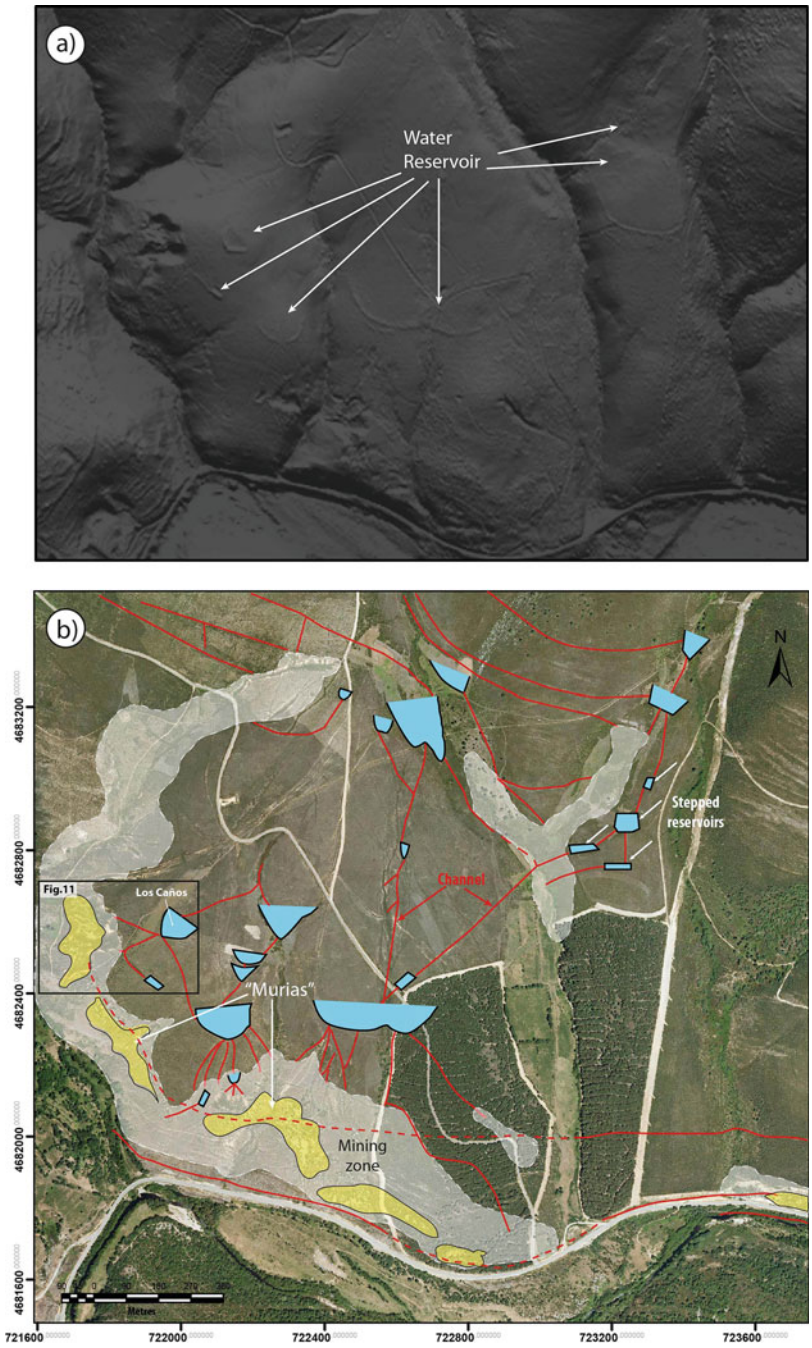

Archaeology of Mining, Fig. 6 (**a**) Digital elevation model of gold mining features, including canals and reservoirs, in the Eria Valley obtained from LiDAR data and (**b**) archaeologists, interpretation of the same landscape from aerial orthoimage and LiDAR data. (Fernández-Lozano et al. 2015, used with permission from Elsevier)

impossible to cover the breadth of this research, but I will highlight several interesting directions that mining research has taken both in and outside of archaeology.

Importantly, scholarship about mining technology itself has taken a more social turn, as archaeologists have increasingly recognized the social aspects of technological practice. Bryan Pfaffenberger, for instance, has advocated using the concept of the *chaîne operatoire* to study mining. This concept emphasizes the role of learned practices and social interactions in the

execution of technical processes and has often been applied to case studies in the production of lithics and ceramics (Pfaffenberger 1998). Thus, even when studies of mining remain technologically focused, there is increased discussion about the transmission of knowledge and the organization of labor in technical processes.

The broad topics of mining labor, work, and community have also become more prominent in recent decades. In 1985, Ricardo Godoy commented, "Despite his antiquity, the miner, like Geertz's peasant, was recently discovered by anthropologists. . .If interest in mining came late, systematic studies of mining have yet to arrive" (1985: 199). Since the publication of this article in the *Annual Review of Anthropology*, which was one of the first articles to present the potential contributions of mining to studies about labor history to a wide audience of anthropologists, studies about the social and economic organization of mining labor have proliferated in anthropological archaeology and cultural anthropology. Overlapping with research in the archaeology of women and gender, archaeologists have examined the roles that women and children have played in mining labor, household production, and subsidiary industries in mining communities. Research has also examined the role of other overlooked groups in mining, including slave laborers, corvée laborers, immigrants, itinerant laborers, and indigenous groups. Increasingly, archaeologists are interested not just in the organization of labor and the identification of laborers but in the lived experiences of those who formed mining communities.

This diverse research on labor has taken a wide variety of theoretical and methodological approaches in different regions and periods, especially because of disparities in the kinds of material available to study these topics. In historical archaeology in the United States, for instance, scholars have often adopted Marxist approaches to conceptualize mining labor practices. Historical archaeology has also benefitted from the existence of company records (financial, administrative, and medical), newspapers, personal journals, as well as photographs and oral histories that record details about life in mining communities not available for earlier periods. At the twentieth-century American coal mine of Ludlow, Colorado, for instance, a labor strike in 1914 resulted in the brutal massacre of miners and their families as well as the destruction of the town by the Colorado National Guard (Fig. 7). The "Archaeology of the Colorado Coalfield War Project," directed by Randall McGuire, Dean Saitta, and Phillip Duke, has been able to study the vivid photographs and other documentary records alongside the burned remains of the town, revealing more about life at the mine and how the massacre unfolded (McGuire 2004).

The role of the extractive industries, and especially mining, in imperial and colonial encounters has also become a topic of increasing interest to archaeologists, anthropologists, and historians. As Killick and Fenn note, "Because rich deposits of the scarcer metals are rare, and rarely coincide in space and time with the regions of greatest demand for them, the quest for metals has been a major driver of exploration, long-distance trade, colonization, and imperialism" (2012: 560). Research on the relationship between mining and colonialism has been carried out in various Mediterranean regions that were once provinces of the Roman Empire (especially Spain and Romania) as well as in more contemporary colonial mining landscapes including Australia and New Zealand. Archaeologists working in colonial Latin America have produced some of the most notable scholarship in this vein. Nicholas Robins, for instance, examined the relationship between Spanish colonialism and mining in the Andes in his book, *Mercury, Mining, and Empire: The Human and Ecological Cost of Colonial Silver Mining in the Andes* (2011). In his interdisciplinary study, Robins combined historical archival research with environmental data to study the use of mercury in the amalgamation process for silver after it was introduced by the Spanish in the late 1500s, revealing the adverse impacts that mercury pollution had on human health and the environment.

Drawing on phenomenological approaches to landscapes and materials, scholars have also become increasingly interested in the ritual and symbolic significance of mines, minerals, and

Archaeology of Mining, Fig. 7 Historic photograph of the aftermath of the Ludlow massacre showing the burned ruins of the mining houses at Ludlow Colony in 1914. (George Grantham Bain Collection of the Library of Congress, Public Domain)

mining landscapes. Notable studies that comment on these topics include a recent edited volume on mining and quarrying in the ancient Andes (Tripcevich and Vaughn 2013), Knapp's discussion of ideational mining landscapes in prehistoric Cyprus (Knapp 1999), and Boivin and Owoc's edited volume on cultural perceptions of the mineral world (2004).

Finally, modern global debates concerning the economics and politics of mining, local environments, and indigenous communities can also be seen reflected back in studies of mining and in the profile of mining in scholarly publications both in and outside of archaeology. Following on Godoy's influential work, Chris Ballard and Glenn Banks wrote an article about the role of the anthropologist in engaging with local communities and large corporations in post-1980s large-scale hard-rock mining in the Asia-Pacific region (2003). Their work showed the critical role that anthropology and ethnography can play in understanding conflicts over natural resources. It also outlined practices for ethical engagement with the various stakeholders in contemporary mining ventures. More recently, Routledge initiated a publication series called "Routledge Studies in the Extractive Industries and Sustainable Development" in 2016, which already has eight volumes related to mining. A new journal, *The Extractive Industries and Society*, was formed in 2014 for the dissemination of "in depth analysis of the socio-economic and environmental impacts of mining and oil and gas production on societies, both past and present" (https://www.journals.elsevier.com/the-extractive-industries-and-society). The presence of such publications demonstrates that mining studies are no longer confined only to specialized engineering journals but have become more integrated into other research in anthropology and sustainability, among other disciplines.

Conservation and Preservation of Mining Heritage

The conservation and preservation of metal artifacts – including coins, jewelry, and vessels –

have long been important activities on archaeological excavations and in museums around the world. The conservation and preservation of mining heritage sites across the world, on the other hand, are more recent developments in archaeological practice and ones that are implemented in a variety of different ways by region and by country. Some places still have few or no legal protections in place for mining heritage. Nevertheless, worldwide attention to the preservation of mining sites has grown as a result of two primary factors. The first are the changing research foci of archaeologists within academia. Increasingly, archaeologists are studying the everyday lives of non-elites, as well as nonurban landscapes, recognizing the significance of people and places outside of upper-class, urban environments. The archaeology of mines – including research on industrial landscapes, mining labor, and mining settlements – has gained momentum with these shifting research agendas. Efforts to preserve mining heritage have increased with the elevated scholarly interest in mining. Secondly, the preservation of mining sites can also be attributed to changing societal attitudes toward industrial heritage in many countries: mines and mining towns are now often considered places of historical interest, deserving of legal protections and preservation. This can be observed in recent legislation in many countries that has given mining landscapes additional legal protections as well as the emergence of national and international societies and interest groups dedicated to the study and conservation of industrial heritage. Mines and their settlements, further, are more often being preserved, conserved, and repurposed for tourism or other secondary, adaptive reuses.

The International Committee for the Conservation of the Industrial Heritage (TICCIH) is the worldwide organization for the promotion, conservation, documentation, and investigation of industrial heritage. While both individuals and institutions can become members of TICCIH, its activities are primarily carried out through national organizations in 40 member countries. These include, for instance, the Society for Industrial Archaeology (United States), the Association for Industrial Archaeology (United Kingdom), Associazione Italiana per il Patrimonio Archeologico Industriale (Italy), and the Associação Portuguesa para o Património Industrial (Portugal). TICCIH is the consultant to the International Council on Monuments and Sites (ICOMOS), which in turn advises UNESCO on industrial heritage sites to be added to the World Heritage List (TICCIH 2017). Many industrial mining sites or complexes have indeed been designated as World Heritage such as Sewell Mining Town (Chile), the Cornwall and West Devon Mining Landscape (United Kingdom) (Fig. 8), Zollverein Coal Mine Industrial Complex in Essen (Germany), Nord-Pas de Calais Mining Basin (France), and Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining, among others (UNESCO 2017a).

TICCIH has a specific focus on heritage dating to periods during and after the Industrial Revolution. There is no similar international organization centered around ancient or preindustrial mining heritage sites, though interest groups and societies do exist in some countries. In the United States, for instance, the Prehistoric Quarries and Early Mines Interest Group is a subgroup of the Society for American Archaeology. In the United Kingdom, the Historical Metallurgical Society Ltd. advocates the study of metals and conservation of metallurgical sites from prehistory to the present. Various ancient mining sites do have designations as UNESCO World Heritage Sites, such as Las Médulas in northwest Spain (Fig. 4) and the Neolithic flint mines at Spiennes in Belgium. Other preindustrial sites from later periods include the Spanish colonial mining towns in South America, including the city of Potosí in Bolivia and the historic town of Ouro Preto in Brazil. Certainly, many World Heritage mining sites have evidence of exploitation from ancient to more recent times, spanning the pre-/post-Industrial Revolution divide. The Mining Area of the Great Copper Mountain in Falun (Sweden), Iwami Ginzan Silver Mine and its Cultural Landscape (Japan), Heritage of Mercury: Almadén (Spain) and Idrija (Slovenia), and the city of Potosí are just a few examples (UNESCO 2017a).

Archaeology of Mining, Fig. 8 The remains of a Cornish engine house at the tin mines in the St. Just Mining District, part of the "Cornwall and West Devon Mining Landscape," a UNESCO World Heritage Site. (Photo by Will Wallis, Public Domain)

The issues of modern exploitation of earlier mining landscapes are also one with which lawmakers and cultural heritage specialists must contend. Beginning in 1998, UNESCO has reiterated on a number of occasions that mineral, oil, and gas exploration and exploitation should not be undertaken at World Heritage Sites (UNESCO 2017b). This serves as an additional protection for both ancient and contemporary World Heritage mining sites where mining could be reinitiated. Its impact on contemporary mining can be observed in the ongoing debate about whether to reinitiate mining at the site of Roşia Montană (Romania), the site of well-preserved subterranean Roman gold mines of the second and third centuries CE. A Canadian company, Gabriel Enterprises, together with the Romanian state-owned company Minvest Deva hoped to open Europe's largest gold mines in the area using cyanide-based open-pit mining. After years of protests by environmentalists and heritage specialists both locally and internationally, Roşia Montană was placed on the tentative list for consideration for World Heritage in February 2016 (Fig. 9). This will effectively halt plans to reopen mines in the area if and when the proposal is accepted (Rosia Montana 2016).

While it is impossible to cover issues and policies surrounding mining heritage from all national perspectives, I will provide a few examples that illustrate shifting attitudes toward mining heritage and the variety of solutions for its preservation at the national level. In the United States, the number of mining sites being recorded as cultural heritage sites increased as a result of the inventories produced following the Historic Preservation Act of 1966 and its subsequent amendment in 1980, enacted to preserve historical and archaeological sites broadly defined. This law provides a legal mandate to preserve mining areas classified as archaeological sites. However, the application of the law has historically been complicated by the General Mining Law of 1872, which allows all US citizens over 18 years old to locate and make claim to valuable minerals on public lands. Nevertheless, this legislation has provided legal protection for both mines and their associated settlements in many parts of the United States, as well as incentive for local communities to develop tourism dedicated to these places (Bakken 2008; Hardesty 1988: 105–107).

Bisbee, Arizona, a mining town that grew up to support the Copper Queen Mine in southern Arizona's Cochise County, illustrates these phenomena well. There, copper, gold, silver, and turquoise were mined beginning in 1880. Mining activity began to wane across southern Arizona by

Archaeology of Mining, Fig. 9 Protests against the reopening of gold mines at Roșia Montană in Timisoara, Romania, on September 22, 2013. The banner bears the logo of the grassroots Save Roșia Montană campaign and reads "Now or Never" in Romanian. (Photo by Ady777, CC-BY-SA-3.0)

the 1950s, and mining operations in Bisbee itself were officially halted in 1975. At that time, the city began its transformation into both a center for tourism related to its mining heritage and a quirky refuge for artists. Guided tours of the abandoned Copper Queen Mine began in 1976, with support of Mayor Chuck Eads and a federal grant from the Economic Development Administration. Multiple sites in the town have been classified on the National Register of Historic Places beginning with the Bisbee Historic District in 1980. Some of these are used for mining tourism, such as the Phelps Dodge General Office Building (classified in 1983), which was formerly the headquarters of the Phelps Dodge mining company and now serves as the Bisbee Mining & Historical Museum. The exodus of mining labor from the town also provided affordable real estate, which has been slowly purchased by artists and hippies, who have likewise contributed to the gentrification of Bisbee's historic districts and the preservation of the town in general (Fig. 10; Copper Queen Mine 2017).

Similar phenomena can be observed in Europe, where industrial heritage has been increasingly recognized as an economic resource in the development of tourism and to promote economic growth in towns where industrial centers have been abandoned. In Spain, for instance, the Plan Nacional de Patrimonio Industrial (PNPI) of 2001, took inspiration from legislative trends in Germany, the United Kingdom, Belgium, and elsewhere in Europe (Álvarez Areces 2010). Significantly, the law's definition of industrial heritage is inextricably linked to the Industrial Revolution and the mechanization of industrial technologies, and, as a result, the only mining sites that are included for protection date to the mid-eighteenth century and later. This definition has created a conceptual, and indeed practical, separation between ancient and contemporary mining sites. When preindustrial mining sites are protected, it is under a different designation: they are categorized as "Bienes de Interés Cultural" (goods of cultural interest).

While situations such as this complicate the business of protecting and presenting multilayered, diachronic landscapes with long histories of mining, some specific sites have come up with local solutions. For instance, the Riotinto mines in the Iberian Pyrite Belt (Huelva, Andalucía, Spain) have a history of mining dating back at least 5000 years. As a result, the area is replete with both ancient archaeological traces of mining as well as large-scale opencast contemporary mines. The area is categorized as both a Bien de Interés Cultural (since 2012) and is on the PNPI list of industrial heritage. It has been mobilized for tourism as the Parque Minero de Riotinto, where tourists can visit various parts of the nineteenth century British mining town, its historic railroad, and the opencast copper mines.

Archaeology of Mining, Fig. 10 Historic mining town of Bisbee, Arizona, in February 2010. (Photo by Alan Stark)

Many of the early archaeological traces of mining were destroyed in the processes of later mining operations and cannot be visited. However, the long history of mining is presented in the museum, which is located in the building that formerly served as the hospital for the Río Tinto Company Limited in the early 1900s. There, visitors can view prehistoric and Roman artifacts recovered both by archaeologists in recent excavations and by miners in the course of contemporary opencast mining operations.

International Perspectives

As the previous section on mining heritage suggests, attention to the study and preservation of mining heritage varies widely from region to region and period to period. Industrial archaeology, including the archaeology of mining from after the Industrial Revolution as a subset of this subdiscipline, is a more cohesive and prominent field of study on an international scale than the archaeology of mining from earlier periods. While industrial archaeology originated in Britain in the 1950s, it has since become a robust field in many parts of the world, especially in Western Europe and the United States. The journal *World Archaeology* devoted an issue to the topic in 1983 (Vol. 15, No. 2), indicating that it was growing in significance enough to be the focus of a major journal with international scope. The participation of local societies from across the globe in the International Committee for the Conservation of Industrial Heritage is a further attestation of the international significance of industrial archaeology and attention to the preservation of mining heritage. Excellent regional analyses of historical mining archaeology exist for varied regions (e.g., White 2017 on the United States), and there appears to be healthy communication across regions among scholars engaging with mining in contemporary periods.

The study of mining in earlier periods is not nearly as unified, owing to the broad geographic and chronological scope of ancient mining and the distribution of scholars interested in such evidence across various disciplines and academic departments. Some significant centers include the Institute for Archaeo-Metallurgical Studies at University College London and the Deutsches Bergbau-Museum in Bochum, Germany. Studies

of preindustrial mining are often buried in the pages of local or regional journals that are not distributed widely on an international level. Aside from the limited distribution of such publications, language barriers also restrict international readership, communication, and collaboration. This entry has focused more heavily on the Mediterranean, Middle East, United States, and Spanish-speaking regions than it has on Central or East Asia or Africa because of my own language training, American nationality, and research experience. While it is not possible to review the literature on ancient mining from all regions, many parts of the world have benefitted from prolonged studies of mining at the local, reginal, or national level. Regions for which scholarship is more widely available in Europe and the Middle East include the Iberian Peninsula (especially Spain), the Eastern Desert in Egypt and Sudan, and Wadi Faynan in Jordan, among others. In Latin America, mining has often been studied as a part of wider research about Spanish and Portuguese colonialism, including in Mexico, Peru, Bolivia, and Brazil (Brown 2012). I direct the reader to scholarship in the bibliography and further reading sections for more international perspectives.

Future Directions

The archaeology of mining will continue to expand and evolve in the twenty-first century. This can be attributed to increased interest in the topic from a variety of academic perspectives (both theoretical and methodological) and to the growing involvement of archaeologists in cultural heritage preservation and environmental advocacy. Ever-evolving scientific methods for studying topics ranging from pollution, to metal object provenience, to human health will continue to aid in new research in the archaeology of mining. Further, research into the aspects of past mining beyond technology will continue to expand, increasing intersections between the archaeology of mining and broad areas of interest in archaeology such as religion, migration, empire, and gender, among others. Finally, conflicts between modern mining projects, cultural heritage, and environmental sustainability interests, such as that described at Roşia Montană, will continue to arise as nations and corporations expand into new territories in search of mineral resources or seek to use more destructive methods of mining. Archaeologists knowledgeable about mining are well poised to play a central role in the study and preservation of ancient and industrial mining landscapes as well as of archaeological sites located in areas of interest for contemporary mining prospection. Increasing archaeological collaboration with indigenous groups and environmental advocates will also pave the way for future work in these areas.

These trends indicate that the archaeology of mining will continue to be a topic studied from a diverse range of theoretical, geographical, chronological, and methodological perspectives. Books such as *Social Approaches to an Industrial Past: The Archaeology and Anthropology of Mining* (1998) paved the way for more interdisciplinary collaboration in the archaeology and anthropology of mining and research on shared thematic interests. There has indeed been more of this type of research in the past 20 years, as indicated, for instance, by the founding of the journal *The Extractive Industries and Society* in 2014 and the inclusion of several sessions dedicated to mining in the 2018 International Congress of Classical Archaeology. Nevertheless, the archaeology of mining is not likely to become a more coherent field as a result of the vast differences in the scale, organization, and technologies employed in various times and places across the globe. Instead, it will continue to be a topic studied under the purview of a multitude of other topics and specialties in archaeology.

Cross-References

- ► Aerial and Satellite Remote Sensing in Archaeology
- ► Anthropogenic Environments, Archaeology of
- ► Archaeometry: Definition
- ► Arqueologia Industrial

▶ Association for Industrial Archaeology (AIA)
▶ Cultural Heritage Management: International Practice and Regional Applications
▶ Economy, Roman
▶ Historical Archaeology
▶ Historical Metallurgy Society Ltd.
▶ Industrial Archaeology
▶ Industrial Heritage in Archaeology
▶ Labor Archaeology
▶ Landscape Archaeology
▶ Technological Studies in Archaeological Science
▶ World Heritage Objectives and Outcomes

References

Álvarez Areces, Miguel Ángel. 2010. Patrimonio Industrial, Paisaje y Desarrollo. *AREAS. Revista Internacional de Ciencias Sociales* 29: 21–29.

Bakken, Gordon Morris. 2008. *The Mining Law of 1872: Past, politics, prospects*. Albuquerque: University of New Mexico Press.

Ballard, Chris, and Glenn Banks. 2003. Resource wars: The anthropology of mining. *Annual Review of Anthropology* 32: 287–313.

Boivin, Nicole, and Mary Ann Owoc. 2004. *Soils, stones and symbols: Cultural perceptions of the mineral world*. London/New York: Routledge.

Brown, Kendall W. 2012. *A history of mining in Latin America: From the colonial era to the present*. Albuquerque: University of New Mexico Press.

Copper Queen Mine. n.d. History. http://www.queenminetour.com/History. Accessed 1 Oct 2017.

Craddock, Paul T. 1995. *Early metal mining and production*. Washington, DC: Smithsonian Institution Press.

Davies, Oliver. 1935. *Roman mines in Europe*. Oxford: Clarendon Press.

Dietler, Michael. 2010. *Archaeologies of colonialism: Consumption, entanglement, and violence in ancient Mediterranean France*. Berkeley: University of California Press.

Fernández-Lozano, Javier, Gabriel Gutiérrez-Alonso, and Miguel Fernández-Morán. 2015. Using airborne LiDAR sensing technology and aerial orthoimages to unravel Roman water supply systems and gold works in NW Spain (Eria Valley, León). *Journal of Archaeological Science* 53: 356–373.

García-León, J., A. García Martín, M. Torres Picazo, and J. Fernández. 2017. 3D recording and modelling of mining heritage: The Monserrat Mine, Sierra Minera of Cartagena-La Unión, Southeast of Spain. *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* 42: 325–330.

Godoy, Ricardo. 1985. Mining: Anthropological perspectives. *Annual Review of Anthropology* 14: 199–217.

Hardesty, Donald L. 1988. *The archaeology of mining and miners: A view from the Silver State*. Ann Arbor: The Society for Historical Archaeology.

Healy, John F. 1978. *Mining and metallurgy in the Greek and Roman world*. London: Thames and Hudson.

Hong, Sungmin, Jean-Pierre Candelone, Clair C. Patterson, and Claude F. Boutron. 1994. Greenland ice evidence of hemispheric lead pollution two millennia ago by Greek and Roman civilizations. *Science* 265 (5180): 1841–1843.

Hoover, Herbert Clark, and Lou Henry Hoover. 1950. *Translation and Annotation of De Re Metallica (Georgius Agricola)*. New York: Dover Publications.

Humphrey, John W., John P. Oleson, and Andrew N. Sherwood. 1998. *Greek and Roman technology: A sourcebook*. New York: Routledge.

Kerfoot, W., Martin Hobmeier, Foad Yousef, Sarah Green, Robert Regis, Colin Brooks, Robert Shuchman, Jamey Anderson, and Molly Reif. 2014. Light detection and ranging (LiDAR) and multispectral scanner (MSS) studies examine coastal environments influenced by mining. *ISPRS International Journal of Geo-Information* 3 (1): 66–95.

Killick, David, and Thomas Fenn. 2012. Archaeometallurgy: The study of preindustrial mining and metallurgy. *Annual Review of Anthropology* 41: 559–575.

Knapp, A. Bernard. 1999. Ideational and industrial landscape on prehistoric Cyprus. In *Archaeologies of landscape*, ed. Wendy Ashmore and A. Bernard Knapp, 229–252. Malden: Blackwell Publishing.

Knapp, A. Bernard, Vincent C. Piggott, and Eugenia W. Herbert, eds. 1998. *Social approaches to an industrial past: The archaeology and anthropology of mining*. London: Routledge.

McConnell, Joseph R., Andrew I. Wilson, Andreas Stohl, Monica M. Arienzo, Nathan J. Chellman, Sabine Eckhardt, Elisabeth M. Thompson, A. Mark Pollard, and Jørgen Peder Steffensen. 2018. Lead pollution recorded in Greenland Ice indicates European emissions tracked plagues, wars, and imperial expansion during antiquity. *Proceedings of the National Academy of Sciences* 115 (22): 5726–5731.

McGuire, Randall. 2004. Colorado coalfield massacre. *Archaeology* 57 (6): 62–70.

Nash, William Giles. 1904. *The Rio Tinto Mine: Its history and romance*. London: Simpkin Marshall Hamilton Kent and Co., Ltd.

Ogden, Jack. 2000. Metals. In *Ancient Egyptian materials and technology*, ed. Paul T. Nicholson and Ian Shaw, 148–176. Cambridge: Cambridge University Press.

Palmer, Marilyn, and Peter Neaverson. 1998. *Industrial archaeology: Principles and practice*. London/New York: Routledge.

Pfaffenberger, Bryan. 1998. Mining communities, Chaînes Opératoires and sociotechnical systems. In *Social approaches to an industrial past: The archaeology*

and anthropology of mining, ed. A. Bernard Knapp, Vincent C. Piggott, and Eugenia W. Herbert, 291–300. London/New York: Routledge.
Rickard, T.A. 1932. *Man and metals: A history of mining in relation to the development of civilization*. New York/London: McGraw Hill.
Roberts, Benjamin W., and Christopher P. Thornton, eds. 2014. *Archaeometallurgy in global perspective: Methods and syntheses*. London: Springer.
Roberts, Benjamin W., Christopher P. Thornton, and Vincent C. Pigott. 2009. Development of metallurgy in Eurasia. *Antiquity* 83: 1012–1022.
Robins, Nicholas A. 2011. *Mercury, mining, and empire: The human and ecological cost of colonial silver mining in the Andes*. Bloomington: Indiana University Press.
Rosia Montana. 2016. Roşia Montană listed as UNESCO World Heritage candidate. https://www.rosiamontana.org/content/ro-ia-montan-listed-unesco-world-heritage-candidate?language=en. Accessed 1 Oct 2017.
Shaw, Ian. 1994. Pharaonic quarrying and mining: Settlement and procurement in Egypt's marginal regions. *Antiquity* 68: 108–119.
Shepherd, Robert. 1993. *Ancient mining*. London/New York: Institution of Mining and Metallurgy.
The International Committee for the Conservation of Industrial Heritage (TICCIH). n.d. http://www.ticcih.org/. Accessed 1 Oct 2017.
Tripcevich, Nicholas, and Kevin J. Vaughn. 2013. *Mining and quarrying in the ancient Andes: Sociopolitical, economic, and symbolic dimensions*. New York: Springer.
Tylecote, R.F. 1962. *Metallurgy in archaeology: A prehistory of metallurgy in the British Isles*. London: Edward Arnold (Publishers) Ltd.
Tylecote, R.F. 1976. *A history of metallurgy*. London: Metals Society.
Tylecote, R.F. 1986. *The prehistory of metallurgy in the British Isles*. London: The Institute of Metals.
Tylecote, R.F. 1987. *The early history of metallurgy in Europe*. London/New York: Longman.
UNESCO. n.d., 2017a. World heritage list. http://whc.unesco.org/en/list/. Accessed 1 Oct 2017.
UNESCO. n.d., 2017b. World heritage and extractive industries. http://whc.unesco.org/en/extractive-industries. Accessed 1 Oct 2017.
White, Paul J. 2017. *The archaeology of American mining*. Gainesville: University Press of Florida.

Further Reading

Conlin Casella, Eleanor, and James Sumonds, eds. 2005. *Industrial archaeology: Future directions*. New York: Springer.
Knapp, A. Bernard, Vincent C. Piggott, and Eugenia W. Herbert, eds. 1998. *Social approaches to an industrial past: The archaeology and anthropology of mining*. London: Routledge.
Roberts, Benjamin W., and Christopher P. Thornton, eds. 2014. *Archaeometallurgy in global perspective: Methods and syntheses*. London: Springer.
White, Paul J. 2016. The archaeology of underground mining landscapes. *Historical Archaeology* 50 (1): 154–168.
White, Paul J. 2017. *The archaeology of American mining*. Gainesville: University Press of Florida.

Archaeology of Northwestern Argentinean Puna

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State of Knowledge and Current Debates

Introduction

This essay addresses the archaeology of a section of the South American highlands, known in Spanish as *Puna* or *Altiplano*, which extends from Peru to Northwest Argentina. Here we will focus in the portion that encompasses part of Northwestern Argentina (see Fig. 1). This sectioning is partly based on the history of ethnohistorical and archaeological research, as well as on traditional geographical divisions. Although the northern part of the Argentine Puna had deep connections with the Bolivian Altiplano and the limits that now divide the national territories were only established in the nineteenth century, there are differences in the periodification and chronological frameworks currently used in both sides of the border. Nonetheless, there is always a subjective judgment in making a geographic cut of such a vast area.

Although it is impossible to be exhaustive in the synthesis of the archaeology developed and

Archaeology of Northwestern Argentinean Puna, Fig. 1 Map of the areas mentioned in the text. Each red circle gives the approximate location of the center of each area

currently at work in such a large area and in a such long period of time (archaeological research initiated in the beginnings of the twentieth century), we try here to give a brief account of the past and ongoing research carried out by Argentine scholars, mentioning the main sites, material evidence, and social processes under investigation. For those interested in deepening the knowledge of a particular subject, they can refer to the cited authors and their vast production. It must be highlighted that most of the papers on the archaeology of this area are available in Spanish, although currently more papers are being published in English.

Puna is defined as a highland in the Andean range, with an altitude above 3.200 m.a.s.l. and a desert environment, with a cold and arid climate. The topography is complex, including basins, valleys and ravines, which give origin to different microenvironments (see Fig. 2). In the Argentine Puna, most of the basins are endorheic, except for the San Juan Mayo River, which is part of the exorheic Pilcomayo river system. Vegetation is sparse and composed by xerophytic communities and the climate is harsh, with a wide thermic amplitude during day and high sun radiation. Traditionally, the Puna in Northwest Argentina has been divided into two sections: the northeastern sector, or the Jujuy Puna, with higher humidity and less cold (*Puna Seca*) and with a topographic continuity with the south of the Bolivian Altiplano, and the southwestern sector, encompassing the southwest of the province of Jujuy, west of Salta and northwest of Catamarca, which has a higher aridity and colder temperatures (*Puna Salada*). These sections are, as well, differentiated from the Peruvian and Bolivian highlands, which are characterized by a higher humidity (*Puna Húmeda*). The resources available in the region under analysis are also diverse and have permitted the development of agriculture, the grazing of camelids, and the use of other vegetable and animal resources, minerals of different types, and salt, among others (Ottonello and Krapovickas 1973; Haber 2000; Albeck 2000, 2001).

The archaeological history of South America has traditionally been divided in several periods (see "▶ South American Geography and Chronology"), which vary from author to author, depending on their theoretical viewpoint, the region of interest, and the local processes, among other criteria. Under the understanding that chronological periods are useful tools to

Archaeology of Northwestern Argentinean Puna, Fig. 2 Different microenvironments from the Puna of Jujuy. (Photographs taken by the authors)

order and expose the archaeological knowledge of the area, and not as rigid compartments or packages of traits, here we will follow the periodification used by most Argentine archaeologists, although the limits among periods vary from region to region.

The first inhabitants were hunter-gatherers and we can find them since at least 10,000 BP, although new research is pushing this date considerably earlier. They continued to hunt and gather to around 3000 BP. This period is usually called Archaic or it can be divided into Paleoindian and Archaic. Around 3000 BP the populations in our area of interest started growing their own crops and herding llamas and alpacas. This period is called Formative or Early Period (Raffino 1999; Aschero 2000; Olivera 2001). Although many archaeologists identify a Middle Period, characterized by the influence of what is known as Tiwanaku culture or style (from the Titicaca basin in Bolivia), there is no conclusive evidence in our area of interest of this influence or of a change in the pre-Hispanic populations that justifies separating such a period. Around 900–1000 AD starts the Late Period or Period of Regional Developments, which was a time of apparently more complex societies and of regional conflict, which made populations inhabit settlements in high places, called *pukaras*, or in large conglomerates. Sometimes this period is divided into two, Period of Regional Developments I (900–1200 AD) and II (1200–1450 AD). This period ended with the incorporation of the territory to the Inka empire, approximately around 1450 AD, which was later followed by the Spanish conquest, with the first Europeans entering our region in 1536 AD (Raffino 1999; Nielsen et al. 2015).

The First Inhabitants

Since at least 10,000 AP, our area of interest was inhabited by small groups of hunter-gatherers, which moved through the whole area to harness different available resources. They hunted camelids, rodents, and birds, gathered an array of plants, and lived in camps. They used weapons with lithic points and painted rock art. Probably the weather was not as the one present in the area today. Glaciations, volcanic eruptions, and variations in humidity and temperature were processes that modeled the environment in those times affecting the resources available for these populations. Studies carried out in the Argentina Puna and the Bolivian Altiplano have shown that the conditions toward the end of the Pleistocene were more humid and cold, becoming drier and warmer around 8500–7500 BP (Aschero 2000).

The earliest known sites include caves such as Huachichocana and Inca Cueva, in small valleys east of the Jujuy Puna, tributary to the Quebrada de Humahuaca. These sites have exceptional preservation, and their excavations have shown that these early populations lived in these caves, made fires in them and pits to store food and different objects, made clothes from leather and some textiles from vegetable fibers, and gathered a huge variety of plants. These populations also produced rock art, mostly consistent in different abstract geometrical motifs painted in the caves they inhabited or in other caves and shelters (Aschero 2000; Raffino 1999). Other sites in the Puna dated between 10,000 and 9000 years BP include La Cueva de Yavi and Hornillos 2 in Jujuy and Quebrada Seca 3 in the Catamarca Puna of Antofagasta (Aschero 2000; Yacobaccio et al. 2014).

These populations were highly mobile, with large exploitation areas and a seasonal pattern of mobility and circulation of information across long distances. Probably many of the sites from this period were part of nomadic circuits to which they returned periodically, to hunt, collect vegetables, and gather other resources. These populations made triangular projectile points without stem, in different rocks. They also had complex secondary funerary practices, like those documented in Huachichocana III, dated in 9600 BP, with parts of a young male skeleton wrapped and deposited near a fire pit and protected with stones (Aschero 2000; Yacobaccio et al. 2014). In the area of Antofagasta, it is frequent to register burial sites with evidence of reopening of graves or transportation of body parts, which has been interpreted as part of the high mobility of this populations and as a cult to ancestors and a continuity of their social participation among the living (López Campeny et al. 2015).

There is also evidence of the use of resources from other areas outside of the Puna, such as feathers, solid canes (*Chusquea* sp.), and earth snails (*Strophocheilus* sp.), all from the lowlands to the east, among others (Aschero 2000).

After 8000 years BP, with the increasing aridity of the environment, the groups of hunter-gatherers would have concentrated in certain places, with permanent availability of water and other resources. In this period, there is a strong increase in the use of camelids (mainly guanaco, *Lama guanicoe*, and vicuña, *Vicugna vicugna*), which would lead to the domestication of llamas (*Lama glama*) after 4500 BP or even earlier (see "▶ Alpaca and Llama: Domestication"). The concentration or reduction in mobility would also lead to the use of local raw materials for lithic technology (Aschero 2000; López 2013; Yacobaccio et al. 2014). These changes in the use of resources are linked to changes in the lithic technology as well in sites of the Puna of Jujuy and Salta, around 5000 BP, with fabrication of lithic artifacts made on blades (López 2013). The deep knowledge of the environment also included plants and their cycles, which led to different mechanisms to manage and use them (Babot 2016).

In the Puna of Catamarca, the sites of Quebrada Seca 3, Punta de la Peña 4, and Peñas Chicas 1 have been dated in this period. In the Puna of Salta, the sites of Alero Cuevas and Abrigo Pozo Cavado also present evidence of these processes. In Jujuy, Inca Cueva 4 continues to be inhabited, with burials that include elements from other areas. There is also evidence from this period in Inca Cueva 7 and in Alero Unquillar in the southern portion of the Jujuy Puna (Aschero 2000; López 2013).

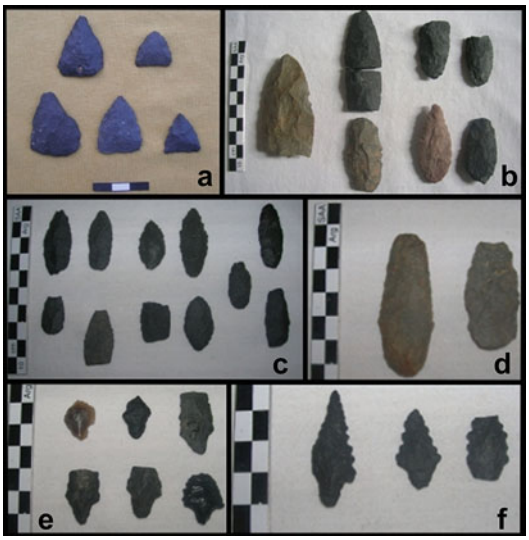

Archaeology of Northwestern Argentinean Puna, Fig. 3 Projectile points from Archaic and Formative times from south of Pozuelos basin. References: (**a**) triangular with straight base and thin section; (**b**) large lanceolated (longer than 5 cm); (**c**) small lanceolated (shorter than 5 cm); (**d**) lanceolated with shoulder; (**e**) triangular stemmed with convex edge; (**f**) triangular stemmed with straight and straight serrated edge. (Extracted from Angiorama 2011)

In the southern Pozuelos basin, the evidence from this period consists in superficial evidence of projectile points distributed over all the different microenvironments (see Fig. 3) and rock art that is comparable to the art of this period dated in other sites. One of these sites is a cave with paintings and a shelter besides it, where a diffuse combustion structure was identified and dated around 10,000 BP (Angiorama 2011).

Early or Formative Period

This period is characterized by sedentary populations that produced their own food and lived in small villages. They grew vegetables that were domesticated in the Andean region, through a long process that continues in time, and probably with local practices of flexible management and production of local varieties. These vegetables included potatoes and many other tubers, quinoa, beans, and also species domesticated in other areas, such as maize, gourds, peanuts, etc. Agricultural practices involved the preparation of different extensions of land for cultivation, including sometimes the use of structures, and complex rituals related to these activities (Raffino 1999; Albeck 2000; Korstanje et al. 2015). Despite the fact that the Puna has been traditionally portrayed as a marginal and hostile space, with human populations "adapting" to it through a strong emphasis in animal production, recent research is showing the importance that plants had in the life of past societies, including gathering, agriculture, and other practices in between (Haber 2000; Babot 2016).

They also herded llamas, which had a very important role in the economy from this period and the subsequent ones, as they provided not only meat but also wool and means of transportation for goods (Raffino 1999; Albeck 2000; Olivera 2001). However, probably, they also continued hunting and gathering other resources seasonally, involving mobility of the groups and a diversification of the resources exploited in order to confront a difficult environment. The zooarchaeological record shows that wild camelids continued to be an important resource for these populations and that both domesticated and wild camelids were the most represented species in dumps while other species scarcely appear (Olivera 2001).

They also started to produce their own pottery, for cooking, eating, drinking, and for ceremonial uses, in different styles, characteristic of each particular area, but that had a large distribution, probably by commerce or interchange. There is also evidence of networks of traffic and interchange between these societies and other regions with other products, even of long distance interchange, from the Pacific coast to the forests east of the Andes range. They were probably the continuation of those from previous times (Raffino 1999; Albeck 2000; Olivera 2001).

This period is better known in the southwestern Puna, in the province of Catamarca, where there is evidence of agro-pastoralist systems since at least 2400 years before present in the area of Antofagasta de la Sierra. The early pottery in this region (400 BC–100 AD) apparently indicates strong links with the north of Chile. However, later there is a stronger connection

with the valleys of Catamarca, evidenced by gray and well-made pottery, with incised decoration, or red with polychrome paint (Olivera 2001). Besides vessels, it is also frequent to find ceramic pipes. There is also a wide variety of other materials, including lithic technology, valve and stone beads, basketry, and bone instruments, among others. The rock art related to this period includes animal figures and other geometric motifs (Albeck 2000; Olivera 2001).

The sites in this portion of the Puna include permanent settlements in the bottom of river basins, like Casa Chavez Montículos, which had round houses built with stone foundations and walls made probably of mud or *adobes*, now seen as mounds. There were other permanent settlements at the lateral gorges of the basin, like Punta de la Peña 9 or Corral Grande 1, where the domestic spaces were used for multiple activities and continued to be occupied even after the Spanish conquest. These sites were integrated to other temporary posts in higher gorges, used sometimes during the year for hunting and herding, like Real Grande. A similar settlement pattern can be inferred for other parts of the Puna, where resources availability vary seasonally (Albeck 2000; Olivera 2001; Olivera and Vigliani 2000–2002).

The burials in this region were made either separate from the big settlements, in structures were several individuals were buried, in groups of burials with round or elliptical structures, or near the habitation and production spaces, with frequent opening and transportation of the bodies or parts of them, in a similar way to the previous period (Olivera and Vigliani 2000–2002; López Campeny et al. 2015).

Another formative village in the Puna of Catamarca is Tebenquiche Chico, near the salt flat of Antofalla. It has circular dwellings made of stone associated to the agricultural areas, which also have structures for water supply. The pottery is diverse, with local types, others related to the valleys of Catamarca and others to the area of Atacama in the North of Chile. Nearby there are also sites that have been used repeatedly over a long period of time for complementary activities, like hunting or gathering of lithic resources, among others (Albeck 2000; Haber 2007).

Also in Catamarca, to the south of Antofagasta, the basin of Laguna Blanca was the settlement of a series of villages from this period, with circular stone structures around a patio, and also other residences isolated and dispersed in the landscape. The isolated ones and those grouped in villages share a common architecture and material culture, which allows the researchers to infer that there was no functional difference among them. All these habitation structures are located near the agricultural areas, like in most of the Puna, and their material culture shows evidence of diverse productive activities. The pottery types present are similar to those described in the Antofagasta Region, which are related to those in the valleys to the east. As well, there is a continuity in the modes of construction and habitation that is only modified with the arrival of the Inka Empire, which has led to propose that the Formative or Early Period continues way after the end that has been conventionally identified for it in the Argentine Archaeology. Even more, the productive activities and the configuration of the landscape probably would have had strong continuities until very recent times (Delfino et al. 2015).

In a similar way, in the same province of Catamarca, but to the south, in the area of Chaschuil, the research being developed allows to suggest that the Formative or Early Period and its social strategies or ways of life do not end like conventional chronology postulates in the area. It has been shown that the populations in this area lived with similar settlement patterns, economies, and materiality from the first to the thirteen centuries of the era. The transitional Puna has shown an important role in the circulation between different neighbor environments. Several small sites with one or a few associated subcircular structures have been identified, probably related to activities such as the use of lithic resources, hunting of camelids, and probably gathering of other resources (Ratto et al. 2015).

There is not much information about this period for the northeastern Puna. In Jujuy, near the frontier with Bolivia, in Cerro Colorado, and La Quiaca Vieja, occupations from this period have been identified. They consist in small villages of farmers that settled in small valleys where

they grew their crops and built their houses with dried mud bricks (*adobes*) and which results in sites with mounds after their disintegration. The pottery from these settlements is technologically similar to the one that was produced in the area in the following period, but there are shapes present that do not appear after 1000 AD, like ceramic pipes (Albeck 2000).

There are also occupations in caves and shelters, which might have been integrated with other sites. Some of these have the earliest dates for pottery in Northwest Argentina, together with those of the Antofagasta Region. These include Inca Cueva 1, Tomayoc, Cueva Cristobal, and Pintoscayoc. Moreover, in Huachichocana, there is early evidence of domesticated vegetables dated around the 600 B.C. and 300 AD, although it has been suggested that these probably came from the lowlands. The rock art identified for this period is present in Inca Cueva, which includes motifs of human figures in groups or lines, sometimes with radiating lines over their heads. This style has also been identified in other parts of the Puna of Jujuy (Albeck 2000; Olivera 2001; García et al. 2015).

In the locality of Alto Sapagua, there are agricultural fields associated to a settlement with the same name, which has habitation structures with ceramic fragments that have been assigned to this period, together to other materials such as projectile points, and beads made on different resources, among others. Several burials with abundant material have been excavated in the vicinity of the structures and have radiocarbonic dates of the end of our period of interest (around 1000 AD). There is also rock art with representations of camelids in the area (García et al. 2015).

In the southern portion of the Miraflores-Guayatayoc basin, the site Torre can also be included in this period. It consists of a group of disperse circular structures that would have been used for habitation (Albeck and Zaburlín 2008). In the same region, in the site of Santa Ana de Abralaite, it was possible to identify an occupation from the end of this period, related to ceramic types characteristic of the Quebrada de Humahuaca, but with petrographic evidence of being locally produced (Zaburlín 2014). In a similar way, in a rubbish mound in the site of Moreta, in the basin of Pozuelos, the lower levels have yielded ceramic fragments, some with decoration comparable to types from Humahuaca, but with petrographical composition comparable to the local pottery. These are associated to dates around 700 and 800 AD (Pérez Pieroni and Angiorama in press).

In the northwest area of Jujuy, in the frontier between Bolivia, Argentina, and Chile, archaeological surveys allowed the identification of several archaeological sites with evidence from these moments irregularly distributed. They are small groups of round habitation structures and some isolated round structures for daily activities. The pottery associated in some of the sites is ordinary, polished, and sometimes incised, related to the types defined in the oriental portion of Jujuy. Other sites to the west of the region have polished pottery, similar to the types defined in the Atacama region in Chile. The lithic tools are abundant and diverse and made on several types of rocks. It has been proposed that the occupations would have been temporary but persistent, probably related to other settlements in lower areas and oriented to activities such as seasonal grazing of animals, hunting, gathering eggs, fabrication of lithic artifacts, and the working of copper minerals (Nielsen 2004).

Between the Puna of Jujuy and Catamarca, in the Puna of the Salta Province, the archaeological work carried out in recent years in the Quebrada de Matancillas has shown that also here the human populations had an agricultural economy, with pottery similar to the early ceramic tradition identified for the lowlands of Jujuy. There is evidence of diversity of vegetable species cultivated and/or manipulated and of domestic and wild camelids. The occupation of the sites was not long, as the radiocarbon dates obtained only encompass 400 years. There is also evidence of networks of interaction, probably related to trade, such as nonlocal lithic raw materials and the signaling of mobility circuits with rock art (Muscio 2007).

Late Period or Regional Developments

This period has been characterized in South America as one of diversification of ethnic groups (or Regional Developments) and as a period of

conflict between these groups, which would have led to the development of settlements in high defensive places, with visibility and strategic localization, known as *pukaras*; or to the concentration of population in large conglomerate settlements. Nonetheless, in the area of the Puna, the archaeological record does not support a vision of endemic conflict, as most of the large conglomerates that emerge in this region are not located in defensive places but on the bottom of river valleys or other areas, more related to the availability of farmable lands. Many of these groups have been identified with those that the Spanish *conquistadores* found when they entered our region of interest.

It has been proposed, as well, a change in productive systems, such as a supra domestic organization of agricultural activities, with a more intensive use of the land and separation from the habitation spaces, although in some places the organization of the previous period continues through time (Korstanje et al. 2015).

The northeastern Puna in Jujuy shows a concentration in large settlements in this period, probably with a considerable increase in the size of the populations. These settlements are usually closely related to areas prepared for agriculture. Mostly, they have rectangular habitation structures, but there are also some with round ones. Moreover, there is evidence of smaller sites, consisting of a couple of structures in between agricultural fields, or in places apt for farming animals, which were probably temporal posts for herders (Ottonello and Krapovickas 1973; Albeck 2001).

For this portion of the Puna, archaeologists have traditionally identified two material culture styles or traditions, which have later been correlated to the ethnic groups found by the Spanish *conquistadores* (Krapovickas 1983). One of them was called Yavi or Yavi-Chicha, and it was distributed in the Yavi-La Quiaca basin and the north of the Pozuelos basin in Argentina, in the valleys of the south of Bolivia and part of its highlands, and in the basin of the river Grande de San Juan in Bolivia and Argentina, where it is called San Juan Mayo River. It was first recognized through fieldwork in the Yavi Chico site, but it includes important conglomerate sites both in Argentina and in Bolivia (Krapovickas and Aleksandrowicz 1986–1987).

These conglomerate sites consist of rectangular structures around a patio, constructed most frequently in stone. The pottery is the aspect of the material culture most commonly used to identify this tradition, especially through the properties of the ceramic pastes, which characteristically exhibit white inclusions of pellitic sedimentary rocks. This pottery also has characteristic shapes (some are shown in Fig. 4), is frequently slipped and polished, and is very well made and cooked. Sometimes, different motifs are painted in a thin black paint over the color of the surface or of the slip (Ottonello and Krapovickas 1973; Ávila 2009; Cremonte 2014).

The other tradition was called Casabindo or Agua Caliente, and its territory included the Miraflores-Guayatayoc basin and the south of Pozuelos basin. Large sites as Doncellas (or Aguas Calientes) and the Pukará of Rinconada were included in its area of distribution (Ottonello and Krapovickas 1973; Albeck 2001). The early archaeological research made in some of these sites involved the excavation of a large quantity of tombs made in small caves or shelters, which allowed the recovery of a huge number of artifacts, including an important quantity of wooden tools, gourds, textiles, etc. The findings also included pottery that shows characteristic shapes and sometimes a very simple painted decoration (some examples are shown in Fig. 5) (Krapovickas 1983).

The use of lithic instruments was also important in this period. It is common to find shovels made of slabs, which exhibit the same shapes all over the Jujuy Puna. In addition, small triangular projectile points with stem or without stem and a concave base were made on different rocks. Moreover, some of the sites that have pottery of the Casabindo style have stone menhirs, such as the Pukará of Rinconada, Doncellas, and Pueblo Viejo de Tucute (Ottonello and Krapovickas 1973; Albeck 2001).

Some of the main sites in this period include the Pukará of Rinconada, in the Pozuelos basin, which is a defensive conglomerate, located in a

Archaeology of Northwestern Argentinean Puna, Fig. 4 Ceramic vessels with shapes and decoration characteristic of the Yavi-Chicha style from museum collections. Sources: A: object 71.1908.23.2140, Mission Sénéchal de la Grange-Crequi Montfort, Musée du Quai Branly; B: object 1800 (43-1125 ME), Doncellas Collection, Instituto Interdisciplinario Tilcara (FFyL, UBA); C: object 1965 (44-1533 ME), Queta Collection, Instituto Interdisciplinario Tilcara (FFyL, UBA)

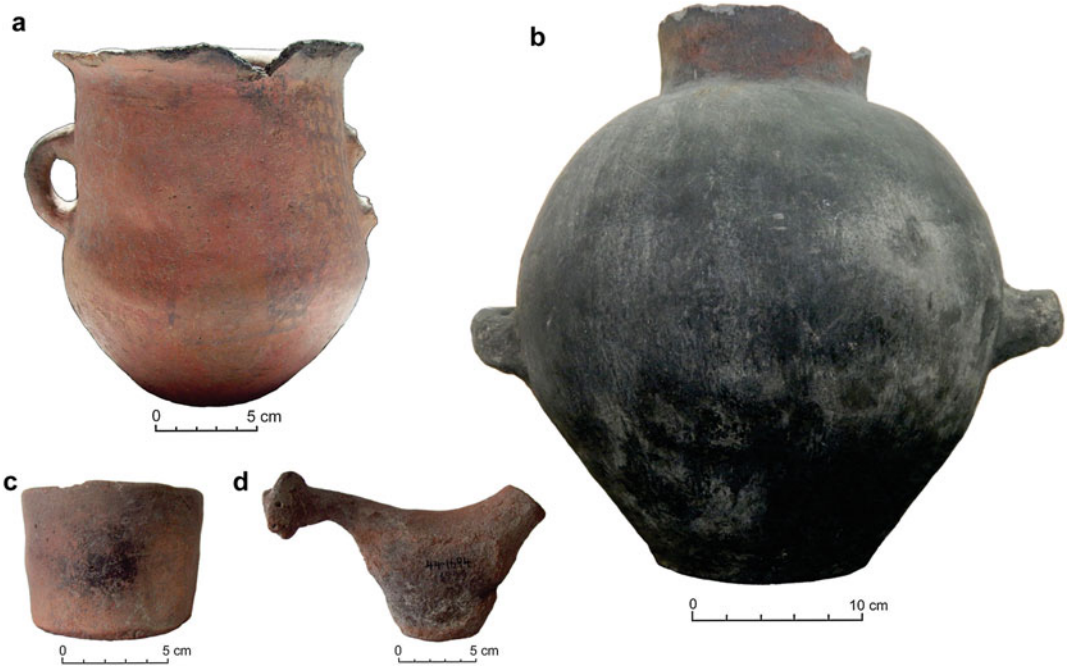

Archaeology of Northwestern Argentinean Puna, Fig. 5 Ceramic vessels with shapes characteristic of the Casabindo style. Sources: A: object 1447 (42-2675 ME), Doncellas Collection, Instituto Interdisciplinario Tilcara (FFyL, UBA); B: object 71.1908.23.2478, Mission Sénéchal de la Grange-Crequi Montfort, Musée du Quai Branly; C: object 1994 (44-1491 ME), Queta Collection, Instituto Interdisciplinario Tilcara (FFyL, UBA); D: object 1999 (44-1694 ME), Queta Collection, Instituto Interdisciplinario Tilcara (FFyl, UBA)

plateau that has a unique access and has an excellent and strategic view of the basin. In the neighboring plateaus, the local populations buried their dead in small caves and painted a high diversity of motifs in rock art panels (Albeck 2001). This was the only defensive site known until recently, when

new surveys in the Pozuelos basin have located the already mentioned site of Moreta. But as it was referred, this Inka facility was settled over an earlier village and associated to areas prepared for agriculture and to corrals for livestock. In a low hill next to the settlement, there is a defensive site, previously unknown, with a strategic view of the bottom of the basin, which probably was contemporary with the main settlement (Pérez Pieroni and Angiorama in press).

To the south of Pozuelos, in the basin of Miraflores-Guayatayoc, there are a number of large conglomerates but located in the bottom of valleys and in association with agricultural fields. One of these is Doncellas or Agua Caliente de Rachaite, which is a conglomerate distributed on both sides of a temporary stream, with mostly rectangular habitation structures and agricultural fields in its vicinity. There is also a structure with steps in the settlement, which has been interpreted as a ritual structure. It also includes a large quantity of tombs in caves, which were excavated by the early archaeologists of the area (Albeck 2001). Pueblo Viejo de Tucute is another large conglomerate, which has a defensive site in its vicinity, with only one access, limited by defensive walls, although the relation among the two sites is not yet clear. The settlement is also particular because it has round structures instead of the more common rectangular pattern. Other settlements in this area include Pueblo Viejo de Potrero, Tabladitas, Ojo de Agua, and Calaverioj, among others (Albeck 2001).

A particular type of sites includes mounds that are probably the result of structures built with mud bricks and that are located to the north and east of the Pozuelos basin. Two large ones are Yoscaba and Pozuelos, which have pottery that corresponds to the Yavi or Yavi-Chicha style. The excavations did not allow to identify the original shape and size of the structures (Albeck 2001; Albeck and Zaburlín 2008).

The northern part of the Argentine Puna also has important sites, like Yavi Chico, which is a settlement in a terrace by a river with the same name. The lowest part of the terrace was used for agricultural fields and the highest one for habitation structures. The burials in these sites were not made on caves, like the previous ones, but inside the dwellings. Another site is Cerro Colorado 1, near the town of La Quiaca, which is located over a hill, with an excellent view of the surroundings. It is a semi-conglomerate with rectangular structures (Albeck 2001).

Besides these large conglomerates, there is evidence of smaller sites related to productive areas, as we mentioned before. In the area of the southern basin of Pozuelos, it is common to find isolated structures or small groups of them, mostly round, in between areas prepared for agriculture, frequently also with a corral in its vicinity, and sometimes also with rock art. The excavation of many of these sites showed that all correspond to this period, especially after 1200 AD. There is rock art painted in different rock formations and caves, which becomes widely distributed. Most representations are of camelids or anthropomorphs. The resources in higher areas were also used in activities such as hunting and recollection of minerals, rocks, and others, in small sites of temporary use (Angiorama 2011).

Some of the large settlement and other small ones have structures called *chullpas* associated, built next to rock walls or in small shelters. Although they are smaller and constructively different than their homonyms in the Bolivian highlands, it has been postulated for both types that their functions could be more diverse than to be sites for burial but that anyway they represented the ancestors, real or imaginary, of the societies in these areas (Nielsen 2002; Rivet 2015).

In the Argentine portion of the San Juan Mayo River, which is closely related to the Puna to the east, recent studies on settlements of this period show that, like in the Puna, there was a concentration of the population in the large settlements around 1200 AD. These sites include a variability of sizes, from a few associated structures to large conglomerates (like Finispatriae, Cabrería, San Isidro, and Bilcapara). They are located in gorges tributary to the river, where there is permanent availability of water, and consist in groups of square or rectangular constructions of stones and earth (mud bricks). Besides the habitation structures, there are agricultural fields, corrals for animals, inhumations inside or outside the houses,

and other remains of activities. There are also structures with evidence of temporary occupation located in different microenvironments, probably linked to other activities, like seasonal grazing of animals, circulation, etc., and chambers in shelters or *chullpas* (Nielsen et al. 2015).

There is evidence that the traffic routes from previous periods continued to be used in this one. This can be seen through the products traded, in the presence of routes and sites associated to them, including offerings of minerals, and in the rock art, which frequently shows lines of llamas with their load (Albeck 2001; Angiorama 2011).

In the southwestern Argentine Puna, in the area of Antofagasta, apparently in this period, the populations abandoned the settlements in the bottom of the basin, like Casa Chavez Montículos, and moved to the piedmont to sites like Bajo del Coypar, which was a complex system of agricultural production, with artificial canals for water and with a settlement associated to it. Other big conglomerates emerge in this period, like the site of La Alumbrera, where there was a process of concentration of the population. This site has a wall surrounding most of it, and the structures of habitation are mostly rectangular with wall stones, but there are also other shapes present (Olivera and Vigliani 2000–2002).

However, an important part of the population continued to live in small sites related to the productive spaces, especially to those dedicated to herding, like Punta de la Peña 2. These settlements had a pattern similar to the ones of previous times, pattern that would remain even after the Spanish conquest. Another site belonging to this period is Peña Colorada 3, a defensive site, located on a high point with high visibility and a surrounding wall. This site is close to routes of circulation and a concentration of rock art. The decorated pottery in these sites is closely related to the ceramic styles identified in the lower valleys but have been made locally (Olivera and Vigliani 2000–2002; Cohen 2014).

In the rock art, some of the themes from the previous periods continued to be painted, like llamas and masks, among others, in panels located near small sites that would have belonged to small groups of herders. Other motifs, like those interpreted to represent *uncus* (the shirts that were used as main garments for men) and shield-like motifs, are located closer to the sites where population was concentrated. Some of these motifs are painted over motifs of the first group, what has been interpreted as an iconographic imposition that took place in the final centuries of the Late Period (Cohen 2014).

Inka Empire

This portion of the South American Highlands became part of the Kollasuyu during the Inka Empire, which was the largest empire constituted in pre-Hispanic South America (see "► Inca State and Empire Formation") and which extended over a diversity of environments. There are many hypotheses on the motifs for the Inka expansion to these regions, including the interest for mineral resources and the necessity of lands and resources for the rulers' extensive families or *panacas*, prestige, among others. It has been proposed that the Inka conquest in Northwest Argentina might have been driven by the interest in the exploitation of mineral ores (Raffino 1999), especially in the Puna where metalliferous minerals such as silver, copper, and gold are present, as well as other nonmetallic minerals (e.g., salt and turquoise). Nonetheless, many of these mining activities might have been obscured by later exploitations in the same mines, in colonial and republican times. Currently, different research projects are focused on studying the evidences of past mining activities and their development during Inka times.

As many authors have shown, the influence of this empire was not homogenous throughout the territories that they incorporated. Some factors that influenced these variations include distance to the core, the resources locally available, and the response of local populations, among others. Some spaces were highly controlled, with a large investment in infrastructure (administrative, defensive, agricultural, etc.), while other areas were controlled indirectly, with less integration and investment in infrastructure, including all the intermediate possibilities between these two (Alconini 2007). Depending on the interests of the empire on each of these regions, the Inkas applied

a diversity of strategies to incorporate them, as diplomacy and negotiations with local elites, incorporating them to the bureaucracies, asymmetrical redistribution of different resources and goods, military occupation, destroying of previous sites and/or structures, forced transportation of labor forces, etc. On the other hand, the answers of local populations were different and included resistance, cooperation, and negotiation, among others.

Material evidence left by this diversity of practices is varied and unevenly distributed. It includes architecture (military installations, agricultural infrastructure, administrative centers, an extensive road network, storage facilities, temples, etc.) and different kinds of objects (either imported or locally made with Inka influence): pottery, metal objects, and textiles, among others. Some of the most diagnostic materials of Inka presence are the pottery vessels that include new shapes, such as plates with an ornitomorph appendix (*platos pato*) (Fig. 6b), big bottles with a pointed base and a restricted neck with flaring rim known as *aríbalos* (Fig. 6d), and vessels with a very restricted neck and a lateral handle, called *aisanas* (Fig. 6a), among others. Mostly, these shapes are related to the storage and serving of drinks and foods (Raffino 1999). In the Puna, these vessels were most commonly not imported but locally made in the styles from the previous periods (the examples shown in Fig. 6 are made in styles of northeastern Puna of Jujuy). Specially, the Yavi-Chicha style was used to make a large quantity of these types of vessels, with the same pastes and surface finishes, incorporating some new decorative motifs on occasions (Ávila 2009). This provincial pottery was imported to many distant regions and sometimes even made in far places with local raw materials, interpreted as the result of *mitmakunas*, which were labor forces that were transported to different areas of the empire for different reasons (Williams and Cremonte 1997).

Archaeological sites from this time include portions of the Inka road, *tampus* (posts in trails), rock art, defensive sites or *pukaras*, shrines in mountains, agricultural complexes, etc. (Raffino 1999), reorganizing the conquest territory and the previous regional traffic of goods according to imperial interests. However, in most of Puna region, the Inka presence and investment in agricultural and possible mining activities do not appear to have had a dramatic impact in other dimensions of Puna herders and farmers' daily

Archaeology of Northwestern Argentinean Puna, Fig. 6 Some examples of Provincial Inka vessels from the Puna of Jujuy. A: object 2061 (44-1413 ME), Queta Collection, Instituto Interdisciplinario Tilcara (FFyL, UBA); B: object 1662 (43-1129 ME), Doncellas Collection, Instituto Interdisciplinario Tilcara (FFyL, UBA); C: object 1851 (44-1862 ME), Queta Collection, Instituto Interdisciplinario Tilcara; D: object MLP-Ar-(v)8177/(r) 111, Marquez Miranda Collection, División Arqueología, Museo Nacional de La Plata (Facultad de Ciencias Naturales y Museo, UNLP)

life (see Angiorama 2011). Some of these sites were constructed over previous ones from the preceding period. Many *tampus* are mentioned in the written sources of the European conquest, like the letter that the Spanish *Oidor* Juan de Matienzo wrote to the king in 1566 describing a possible road to link colonial Charcas jurisdiction (present-day Bolivia) with the Buenos Aires port (Krapovickas 1983).

In the Puna of Jujuy, there are many of these *tampus*, usually in proximity to different portions of the Inka trail, some of which are mentioned in Matienzo's letter. These include Toroara, Ojo de Agua de Cangrejillos, Rincón de las Salinas, Queta Viejo, Pozuelos, Yoscaba, and Calahoyo; many associated to previous settlements and with evidence of Inka architecture and provincial Inka pottery (Raffino et al. 1986). In recent years, studies have been undertaken in the small *tampu* of Santa Catalina, near the frontier with Bolivia, and Moreta, which is associated with the settlement mentioned before, occupied in the Late Period (Nielsen et al. 2015; Pérez Pieroni and Angiorama in press).

The Inkas were also present in the area of Antofagasta de la Sierra, in the settlement of La Alumbrera, where there is a sector built apparently during this period and pottery of provincial Inka styles. It has also been postulated that this empire expanded the agricultural area and improved the structures in the fields of Bajo del Coypar, where there is also evidence of Inka architecture (Olivera and Vigliani 2000–2002).

The Impact of the Spanish Conquest

The Spanish conquest involved a series of profound changes in the pre-Hispanic populations. Besides the well-known impact in indigenous demography, due to the conquest violence and the introduction of new diseases and of extreme forced labor system, during colonial times, individuals or entire indigenous communities were moved in order to ensure colonial control, evangelization, or the development of European economic enterprises, especially mining activities. Communities dispersed in different settlements were moved, for example, to *pueblos de reducción*, villages founded by colonial authorities or Spanish *encomenderos* (Spaniards who had the right to collect tribute from the indigenous population), or to developing mining centers. Therefore, many of the conglomerate settlements described above were complete or partially abandoned.

Nonetheless, indigenous populations showed a diversity of strategies to adapt to the colonial system. The archaeology of this period has begun to be systematically studied very recently, as part of historical archaeology, uncovering some of these strategies and complementing and sometimes defying the information available from historical studies of written sources.

As previously referred, mining activity had a very important role in the distribution of the population and the organization of the territory during colonial times (Becerra 2014). In the Puna of Jujuy, in the southern Pozuelos basin, archaeological work has led to the identification of different sites that emerged in this period around the mining and/or processing of gold and silver. There is a wide variety of such sites, from small sheltering structures with evidence of low investment extraction places to large settlements, which became very important, like the present-day towns of Santa Catalina and Rinconada, or became abandoned, like Antiguyoc (Fig. 7) or Ajedrez (Angiorama et al. 2017). Other interesting sites, related to the processing of minerals rich in silver, include reverberatory furnaces, which are frequently found in other areas of the Southern Andes (Becerra 2014). Most of these sites do not have other material evidence of colonial times, except for the large abandoned settlements, where it is frequent to find local pottery, with some new types from this period, imported earthenware, metal objects, and animal bones, among others (Becerra 2014; Angiorama et al. 2017).

Besides the mentioned villages in the Puna of Jujuy, other large settlements include Incahuasi in the Puna of Catamarca, where the extraction of gold led to its rapid growth in the eighteenth

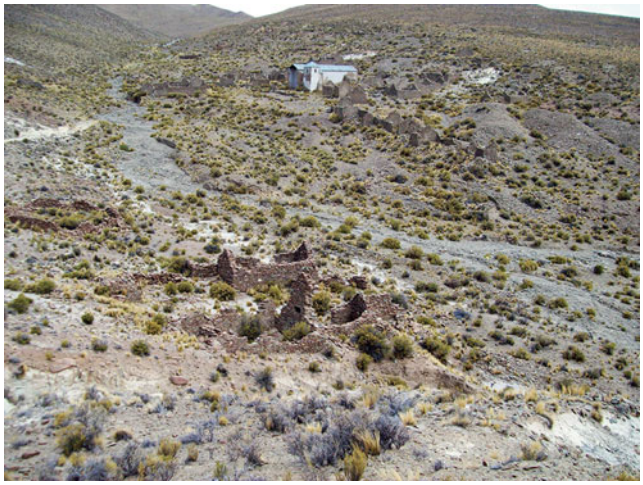

Archaeology of Northwestern Argentinean Puna, Fig. 7 View of the gold mining site of Antiguyoc, in Jujuy. The white building is the church, which continues to be used in present times. (Photograph taken by the authors)

century. The architecture is very similar to the one recorded in the Puna of Jujuy, and the technology for the extraction of gold was of low investment (Lema 2012).

Despite the importance of mining activities, the spaces related to agriculture and pastoralism were not abandoned, as it is shown by the continue occupation or reoccupation of pre-Hispanic structures. In the southern Pozuelos basin, some of such structures have been identified, showing a deep continuity in the architecture and material culture, in large sites like Moreta, or in structures related to agricultural fields, like Río Herrana and Chajarahuaico. Only radiocarbon dates, some ceramic types and the eventual finding of bones of European animals allow to identify their colonial occupations. There are other isolated findings of the continuity in the use of pre-Hispanic settlements or of rock art made in this period in the Puna of Jujuy (Angiorama et al. 2017).

Nearby, in the upper basin of the San Juan Mayo River, excavations in a habitation structure in the site of Casas Quemadas identified evidence of occupation from colonial times, posterior to the Inka occupation, which would have no longer been related to agricultural activities, like in the previous period, but to the traffic with cattle that became a very important economic activity in the colonial system (Vaquer 2016). Similar evidence has been documented in the excavation of a structure in the San Lorenzo site, on the upper course of the same river, where a colonial occupation is evidenced only by the presence of bones of European cattle, while the architecture and the rest of the material culture have a marked continuity with the Late Period occupations (Nielsen et al. 2015).

To the southern extreme of the Puna of Jujuy, in the area of Coranzulí (Susques), there is evidence of the construction and reutilization of *chullpas* or chambers in shelters during colonial times, some of which were possible to date through radiocarbon in this period. There are also engravings in the walls that are clearly from these times, including crosses (Rivet 2015).

For the Puna of Catamarca, there is evidence of occupations during colonial times in sites like Tebenquiche, where some of the Formative or Early habitation structures were reused in this period, with pottery made following indigenous traditions, but with European influence, and glass beads. In the Antofagasta region, in Punta de la Peña, it was possible to identify and date occupations from early colonial period, with evidence of European fauna and fruits. There are similar evidences of colonial occupations in Peñas Coloradas. All of these contexts evidence a deep temporal continuity in the use of habitation spaces

and the early use of European resources and materials by native populations (Quiroga 2014).

Final Comments and Future Perspectives

Populations in the Puna have followed a complex historic path, similar sometimes to those of other areas of the Andes, but also with local particularities. The region and time period encompassed in this essay is large; so much of the variability probably has been understated. Besides, the development of the research and the information available for each of the sectors of the area and for the periods encompassed are not homogeneous, as there are profound differences in the knowledge of different regions. Nonetheless, we have seen that there is evidence of a deep history, with groups of highly mobile hunter-gatherers exploiting different resources and showing a deep knowledge of their environment. This knowledge led to the domestication of camelids, to the incorporation of agriculture, and to more permanent settlements in the Early or Formative period, which are issues that are in the center of archaeological debate (see "▶ Alpaca and Llama: Domestication" and "▶ Andes: Origins and Development of Agriculture"). The settlements are articulated in complex networks where the populations developed different complementary activities.

Some of the cited authors have emphasized that the modes of habitation, the productive activities, and material culture show a strong continuity from Early or Formative periods to very recent times, challenging the traditional chronology and the understanding of periods as packages of traits or of certain social processes (Delfino et al. 2015; Ratto et al. 2015).

On the other hand, some of the areas analyzed went through deep changes in the Late or Regional Development Period, particularly after 1200 AD, where population concentrated in conglomerates, sometimes in defensive places. It has been emphasized that in the Puna, in contrast to other neighboring regions like the north of Chile or the Quebrada de Humahuaca, there are very few defensive settlements in high places or *pukaras* (Albeck 2001). This could be the result of differences in the local social processes, which are not yet fully understood.

The incorporation of this territory to the Inka Empire is a very interesting topic being studied with dissimilar depth in each region but is showing that this incorporation was not homogeneous and that the Inkas used a diversity of strategies, which produced a variable influence and diverse materials results in each area.

Throughout its history, this area was not isolated. Archaeology shows constant connections with neighboring areas such as the north of Chile, the Southern Bolivian *Altiplano*, and the valleys to the east, among others. These relationships are complex and involved not only resources but also people and knowledge. We refer to the cited and further references for more information in this respect.

The archaeology of colonial times is just beginning to be undertaken, but it is showing that while in some places the conquest and the incorporation to the colonial system had deep impact in the configuration of the territory and its population, particularly through mining activities, in many sites, it is possible to observe a deep continuity in the use of the land, the architecture, and material culture. This shows that the conquest did not have uniform consequences for all the inhabitants of the Puna (Angiorama et al. 2017), and the archaeology of this period of time will certainly deepen our knowledge of the diversity of practices involved, being a rich area for interdisciplinary studies, particularly with historians and ethnohistorians.

Many of the populations incorporated to the colonial system have continued their historic paths, not without changes, to the present day. They are undergoing complex processes of acknowledgment and/or reconstruction of their identities. The current challenge for the archaeological discipline in this part of Argentina is to articulate and engage on these processes and to collaborate to elaborate a historical discourse that is useful in terms of present social relationships (Haber 2007; Delfino et al. 2015).

To sum up, it must be highlighted that, despite the extended vision that regards the highlands as difficult and inhospitable environments, as places of circulation or of extraction of resources (see discussions in Ottonello and Krapovickas 1973 and Haber 2000), the Puna is a space of a complex history and of diverse and rich social processes. The archaeology of this area is generating much valuable information to understand the social dynamics in the Andes for pre-Hispanic and colonial times and will probably continue to do so as more research is undertaken.

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Andes: Origins and Development of Agriculture
- ▶ Inca State and Empire Formation
- ▶ South American Geography and Chronology

References

Albeck, M.E. 2000. La vida agraria en los Andes del sur. In *Nueva Historia Argentina. Los Pueblos Originarios y la Conquista*, dir. M. Tarragó, 187–228. Buenos Aires: Editorial Sudamericana.

Albeck, M. 2001. La Puna Argentina en los Períodos Medio y Tardío. In *Historia Argentina Prehispánica, Tome 1*, ed. E. Berberián and A. Nielsen, 347–388. Córdoba: Editorial Brujas.

Albeck, M.E., and M.A. Zaburlín. 2008. Aportes a la cronología de los asentamientos agropastoriles de la Puna de Jujuy. *Relaciones de la Sociedad Argentina de Antropología* XXXIII: 155–180.

Alconini, S. 2007. Dis-embedded centers and architecture of power in the fringes of the Inka empire: New perspectives on territorial and hegemonic strategies of domination. *Journal of Anthropological Archaeology* 27: 63–81. https://doi.org/10.1016/j.jaa.2007.08.002.

Angiorama, C.I. 2011. La ocupación del espacio en el sur de Pozuelos (Jujuy, Argentina) durante tiempos prehispánicos y coloniales. *Estudios Sociales del NOA* 11: 125–142.

Angiorama, C.I., M.J. Pérez Pieroni, M.F. Becerra, and M. Giusta. 2017. La Puna de Jujuy (Argentina) durante el período colonial: una mirada sobre los cambios y continuidades desde las prácticas y la cultura material. *Población & Sociedad* 25 (1): 5–43. https://doi.org/10.19137/pys-2018-250101.

Aschero, C.A. 2000. El poblamiento del territorio. In *Nueva Historia Argentina. Los Pueblos Originarios y la Conquista*, dir. M. Tarragó, 17–59. Buenos Aires: Editorial Sudamericana.

Ávila, M.F. 2009. Interactuando desde el estilo. Variaciones en la circulación espacial y temporal del estilo alfarero yavi. *Estudios Atacameños* 37: 29–50.

Babot, M.P. 2016. Notas sobre la arqueología de las plantas en un desierto de altura. *Cadernos do Lepaarq. Textos de Antropologia, Arqueologia e Patrimônio* 13: 333–365.

Becerra, M.F. 2014. Para que "creciera el pueblo como Potosí": la minería en la puna de Jujuy durante el período colonial. *Estudios Atacameños* 48: 55–70.

Cohen, M.L. 2014. Miradas desde y hacia los lugares de poder. Antofagasta de la Sierra entre 1000 y 1500 años d.C. *Arqueología* 20 (1): 47–72.

Cremonte, M.B. 2014. El estilo ceramico yavi-Chicha en instalaciones inkaicas del noroeste Argentino. In *Las pastas como posible marcador identitario. Ocupación Inka y dinámicas regionales en los Andes (Siglos XV–XVII)*, ed. C. Rivera Casanova, 223–245. Lima: Instituto Francés de Estudios Andinos.

Delfino, D.D., V.E. Espiro, and R.A. Diaz. 2015. Prácticas sociales en el pasado y presente de Laguna Blanca (Dpto. Belen, Catamarca): reflexiones en torno al modo de vida comunitario agrocentrico. In *Crónicas materiales precolombinas. Arqueología de los primeros poblados del Noroeste Argentino*, ed. M.A. Korstanje, M. Lazzari, M. Basile, F. Bugliani, V. Lema, L. Pereyra Domingorena, and M. Quesada, 385–426. Buenos Aires: Sociedad Argentina de Antropología.

García, L.C., E.I. Baffi, and P.S. Higa. 2015. Hacia los primeros poblados en Azul Pampa, Jujuy. In *Crónicas materiales precolombinas. Arqueología de los primeros poblados del Noroeste Argentino*, ed. M.A. Korstanje, M. Lazzari, M. Basile, F. Bugliani, V. Lema, L. Pereyra Domingorena, and M. Quesada, 183–214. Buenos Aires: Sociedad Argentina de Antropología.

Haber, A.F. 2000. La mula y la imaginación en la arqueología de la puna de Atacama: Una mirada indiscreta al paisaje. In *Paisajes Culturales Sudamericanos: De las Prácticas Sociales a las Representaciones*, TAPA, coord. C. Gianotti García, vol. 19, 7–34. Santiago de Compostela: Laboratorio de Arqueoloxía e Formas Culturais, Universidade de Santiago de Compostela.

Haber, A.F. 2007. Arqueología de *Uywaña*: Un ensayo rizomático. In *Producción y Circulación Prehispánica de Bienes en el Sur Andino*, comps. A.E. Nielsen, M.C. Rivolta, V. Seldes, M.M. Vázquez, and P.H. Mercolli, 13–34. Córdoba: Editorial Brujas.

Korstanje, A., M. Quesada, V. Franco Salvi, V. Lema, and M. Maloberti. 2015. Gente, tierra, agua y cultivos: los primeros paisajes agrarios del Noroeste Argentino. In *Crónicas materiales precolombinas. Arqueología*

de los primeros poblados del Noroeste Argentino, ed. M.A. Korstanje, M. Lazzari, M. Basile, F. Bugliani, V. Lema, L. Pereyra Domingorena, and M. Quesada, 721–749. Buenos Aires: Sociedad Argentina de Antropología.

Krapovickas, P. 1983. Las poblaciones indígenas históricas del sector oriental de la Puna (un intento de correlación entre la información arqueológica y etnográfica). *Relaciones de la Sociedad Argentina de Antropología* XV: 7–24.

Krapovickas, P., and S. Aleksandrowicz. 1986–1987. Breve visión de la cultura Yavi. *Anales de Arqueología y Etnología* 41–42: 83–127.

Lema, C. 2012. Paisaje minero y producción aurífera colonial en el Mineral de Incahuasi (Catamarca, Argentina). In *Actas del V° Congreso Nacional de Arqueología Histórica, Tome 1*, ed. E.M. Rodríguez Leirado and D. Schávelzon, 261–279. Saarbrücken: Editorial Académica Española.

López, G.E.J. 2013. Ocupaciones humanas y cambio a lo largo del holoceno en abrigos rocosos de la Puna de Salta, Argentina: una perspectiva regional. *Chungara, Revista de Antropología Chilena* 45 (3): 411–426.

López Campeny, S.M.L., A.S. Romano, and C.A. Aschero. 2015. Remodelando el Formativo. Aportes para una discusión de los procesos locales en las comunidades agropastoriles tempranas de Antofagasta de la Sierra (Catamarca, Argentina). In *Crónicas materiales precolombinas. Arqueología de los primeros poblados del Noroeste Argentino*, ed. M.A. Korstanje, M. Lazzari, M. Basile, F. Bugliani, V. Lema, L. Pereyra Domingorena, and M. Quesada, 313–353. Buenos Aires: Sociedad Argentina de Antropología.

Muscio, H.J. 2007. Sociabilidad y mutualismo durante las expansiones agrícolas en entornos fluctuantes: un modelo de teoría evolutiva de juegos aplicado al poblamiento del período temprano de la Puna de Salta, Argentina. In *Producción y Circulación Prehispánica de Bienes en el Sur Andino*, ed. A.E. Nielsen, M.C. Rivolta, V. Seldes, M.M. Vázquez, and P.H. Mercolli, 105–133. Córdoba: Editorial Brujas.

Nielsen, A.E. 2002. Asentamientos, conflicto y cambio social en el altiplano de Lípez (Potosí). *Revista Española de Antropología Americana* 32: 179–205.

Nielsen, A.E. 2004. Aproximación a la arqueología de la frontera tripartita Bolivia-Chile-Argentina. *Chungara, Revista de Antropología Chilena* 36 (vol. esp. 2): 861–878.

Nielsen, A.E., C.I. Angiorama, J. Maryañski, F. Ávila, and M.L. López. 2015. Paisajes prehispánicos Tardíos en San Juan Mayo (frontera Argentina – Bolivia). *Revista Arqueología* 21 *Dossier*: 33–65.

Olivera, D.E. 2001. Sociedades agropastoriles tempranas: el Formativo inferior del Noroeste Argentino. In *Historia Argentina Prehispánica*, ed. E. Berberián and A. Nielsen, 83–125. Córdoba: Brujas Editorial.

Olivera, D.E., and S. Vigliani. 2000–2002. Proceso cultural, uso del espacio y producción agrícola en la Puna meridional argentina. *Cuadernos del Instituto Nacional de Antropología y Pensamiento Latinoamericano* 19: 459–481.

Ottonello, M., and P. Krapovickas. 1973. Ecología y arqueología de cuencas en el sector oriental de la Puna, República Argentina. *Publicaciones de la Dirección de Antropología e Historia* 1: 3–21. Jujuy.

Pérez Pieroni, M.J., and C.I. Angiorama. in press. Evidencias arqueológicas de los siglos VII a XII AD en el asentamiento de Moreta (Puna de Jujuy, Argentina). *Comechingonia*.

Quiroga, L. 2014. Paisajes de rebeldía: Reproducción, identidades y resistencia en la serranía de Londres (Gobernación del Tucumán) Siglos XVI y XVII. *Revista de Arqueologia Americana* 32: 151–175.

Raffino, R. 1999. Las tierras altas del Noroeste. In *Nueva Historia de la Nación Argentina, T. 1 La Argentina Aborigen. Conquista y Colonización*, 83–108. Buenos Aires: Academia Nacional de la Historia, Editorial Planeta.

Raffino, R.A., R.J. Alvis, D.E. Olivera, and J.R. Palma. 1986. La instalación Inka en la sección andina meridional de Bolivia y extremo boreal de Argentina. In *El Imperio Inka. Actualización y perspectivas por registros arqueológicos y etnohistóricos*, Comechingonia, special issue, ed. R.A. Raffino, 63–130. Córdoba: CEH Prof. Carlos Segretti.

Ratto, N., M. Basile, A. Feely, I. Lantos, L. Coll, D. Carniglia, and J.P. Miyano. 2015. La gente y sus prácticas en las tierras bajas y altas del oeste tinogasteno en los siglos I a XIII D.C. (Catamarca, Argentina). In *Crónicas materiales precolombinas. Arqueología de los primeros poblados del Noroeste Argentino*, ed. M.A. Korstanje, M. Lazzari, M. Basile, F. Bugliani, V. Lema, L. Pereyra Domingorena, and M. Quesada, 215–245. Buenos Aires: Sociedad Argentina de Antropología.

Rivet, M.C. 2015. Espacialidades chullparias. Aproximación a los ancestros desde la materialidad (Coranzulí, Jujuy, Argentina). *Estudios Atacameños* 1 (50): 105–129.

Vaquer, J.M. 2016. La ocupación colonial temprana (S. XVIy XVII) en Casas Quemadas (Cusi Cusi, Rinconada, Jujuy): primeras aproximaciones a las relaciones entre lo global y lo local. *Revista de Arqueología Histórica Argentina y Latinoamericana* 10 (2): 1–26.

Williams, V., and M.B. Cremonte. 1997. Mitmaqkuna o circulación de bienes? Indicadores de la producción cerámica como indicadores étnicos. Un caso de estudio en el Noroeste argentino. In *El Tucumán Colonial y Charcas*, comp. A.M. Lorandi, 75–86. Buenos Aires: Facultad de Filosofía y Letras, Universidad Nacional de Buenos Aires.

Yacobaccio, H.D., M.P. Catá, M.R. Morales, D. Joly, P. Solá, M. Cáceres, B.I. Oxman, and C.T. Samec. 2014. Ocupaciones humanas tempranasen la Puna de Atacama: el alero Hornillos 2,

Susques (Jujuy). In *Artefactos Líticos, Movilidad y Funcionalidad de Sitios: Problemas y Perspectivas*, British archaeologicar reports international series, ed. P.S. Escola and S. Hocsman, vol. 2628. Oxford: Archaeopress.

Zaburlín, M.A. 2014. Participación de los pueblos de la Cuenca Guayatayoc-Miraflores (Puna de Jujuy) en redes de interacción de los Andes Centro Sur entre los siglos III y XVI. In *Desarrollos Regionales (1000–1500 DC) en el Sur de Bolicia y el Noroeste Argentino. Avances de investigación arqueológica*, ed. M. Beierlein de Gutiérrez and D.J. Gutierrez Osinaga, 81–98. Tarija: Editorial La Pluma del Escribano.

Further Reading

Berberián, E., and A.E. Nielsen, eds. 2001. *Historia Argentina Prehispánica*. Córdoba: Editorial Brujas.

Korstanje, M.A., M. Lazzari, M. Basile, F. Bugliani, V. Lema, L. Pereyra Domingorena, and M. Quesada, eds. 2015. *Crónicas materiales precolombinas. Arqueología de los primeros poblados del Noroeste Argentino*. Buenos Aires: Sociedad Argentina de Antropología.

Tarragó, M. (director). 2000. *Nueva Historia Argentina. Los Pueblos Originarios y la Conquista*. Buenos Aires: Editorial Sudamericana.

Archaeology of Salt in China

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Introduction

In the vast territory current within the borders of China, there are many sources of brine that are widely distributed. Among the sources, Xinjiang, Qinghai, Tibet, and Inner Mongolia contain large lakes that naturally produce salt, whereas the rich brine in the southwest and the Three Gorges region of the Yangzi River are deeply buried and referred to as "well salt" in historical discussions. In contrast, Yunnan and Jiangxi produce rock salt while coastal regions in the southeast and elsewhere produce sea salt. Salt archaeology has only been a research focus since the 1990s in China, but in that time, a strong foundation for future work has been laid by intensive work in both inland and coastal contexts of ancient salt production.

Definition

Salts are crucial to human and animal diets because they enable a variety of regulatory functions of the body and in human communities serve crucial cultural roles as well (Adshead and Adrian 1992). Salt production has been important throughout history (Kurlansky 2002), and archaeological research on salt has been an important source of information about the role of salt in many historical and prehistoric contexts. Salt archaeology in China concerns a variety of issues, from the technology associated with the manufacture of salt to the various economic and social practices in which salt manufacture, trade, and consumption played important roles that can be investigated through the lens of archaeological data.

Historical Background

There was early recognition in China that "nature produces brine while people produce salt". Tradition holds that about 4000 years ago salt producing tribe was situated on the eastern coast of China with a leader called "Susha 夙沙" who later evolved into a salt deity. On the earliest writing in China, known as "Oracle Bone Inscriptions", found in association with sites of the late Shang Dynasty (ca. 1250–1050 BC), we already find characters related to salt. The earliest salt-related characters are pictographic combinations of a number of other graphs including "official" (*chen* 臣), "person" (*ren* 人), "brine" (*lü shui* 卤水) and "vessel" (*rong qi* 容器) (Fig. 1). This combination suggests that already at this time salt was a resource that was placed under state

Archaeology of Salt in China, Fig. 1 Oracle bone inscription character related to salt combining "official" (chen臣), "person" (ren人), "brine" (lü shui卤水) and "vessel" (rong qi容器)

control. In a number of early textual sources, records related to the control of salt are common, including the Warring States period *Guanzi*管子 (475–221 BC), the Han era *Yantielun* 盐铁论, the Yuan Dynasty *Aobotu* 熬波图, and the Ming Dynasty *Tiangong kaiwu* 天工开物, among others.

There is a long tradition of research into the history of salt in China (e.g., Vogel 1990; Yoshida 1993), but archaeological research started relatively late. In the 1990s, the discovery in the Three Gorges of a site with thick homogeneous deposits was associated with the long history of salt production in the region and naturally they were connected to the origins of this salt production. From 1993 to 2003, a collaborative project involving archaeologists from Peking University, University of California, Los Angeles, and the Sichuan Provincial Institute of Archaeology investigated this site and the broader context of prehistoric salt production in the Sichuan Basin (Li and Falkenhausen 2006).

Over the last couple decades there has been considerable development of salt archaeology in China, and significant sites related to the production of salt have been found in many locations, while at the same time, broader research programs have also developed in multiple regions. The two most important salt manufacturing sites that have already been excavated are the site of Zhongba in the Three Gorges region of Chongqing along a tributary to the Yangzi River and the site of Shuangwangcheng on the southern shore of the Bohai Bay of the lower Yellow River region in Shandong (Fig. 2). These two sites represent the brine-based well salt production of inland areas and the coastal production of sea salt in southeast China, respectively.

The Three Gorges region was among the regions where the earliest salt manufacture developed in China. According to historical records, the "Ba" people of the region were responsible for developing salt technology. By the Western Zhou (1046–771 BC), the Ba were using salt as tribute to offer to the Western Zhou king.

Zhongba stands as the origin point for salt archaeology in China (Flad 2011; Li and Falkenhausen 2013). The site is located on the Ganjing River, a tributary to the Yanzi, 6 km from the river mouth. Zhongba rises 12.5 m above the river channel and is composed of a midden of pottery and other archaeological debris dating from the Neolithic period through the Ming-Qing period (Fig. 3) – an activity span of more than 4000 years essentially encompassing the entire historical period of Chinese history.

In the late Neolithic (ca. 2500–1750 BC), the ceramic vessels used for salt production at the site were large, pointed-bottom vats with decorated rims and corrugated marks on the exterior (Fig. 4a). These vats were approximately 40 cm high and had large mouths and pointed or small, flat bases. They comprise over 70% of the ceramics at the site. Contemporary with these vats were a large number of pits with rounded bases. The mouths of these pits were approximately 1–2 m, and they are around 1 m deep. Some pits were lined with an yellow clay that was created to prevent liquid from seeping out of the pit. Some of the pits contained a number of rocks at the bottom, and some contained fragmented pottery. The nature of these facilities were similar in many ways to the salt production location of Pwaga in Uvinza, Tanzania known from ethnographic and ethnoarchaeological work (Connah 1996) and were probably related to efforts to make brine more concentrated in advance of evaporation or for filtering out impurities during the salt manufacturing process. The heating facilities used in salt production during the Neolithic were long and rectangular: 9.2 m long, 1.4–1.7 m wide, and 40 cm or so deep, but

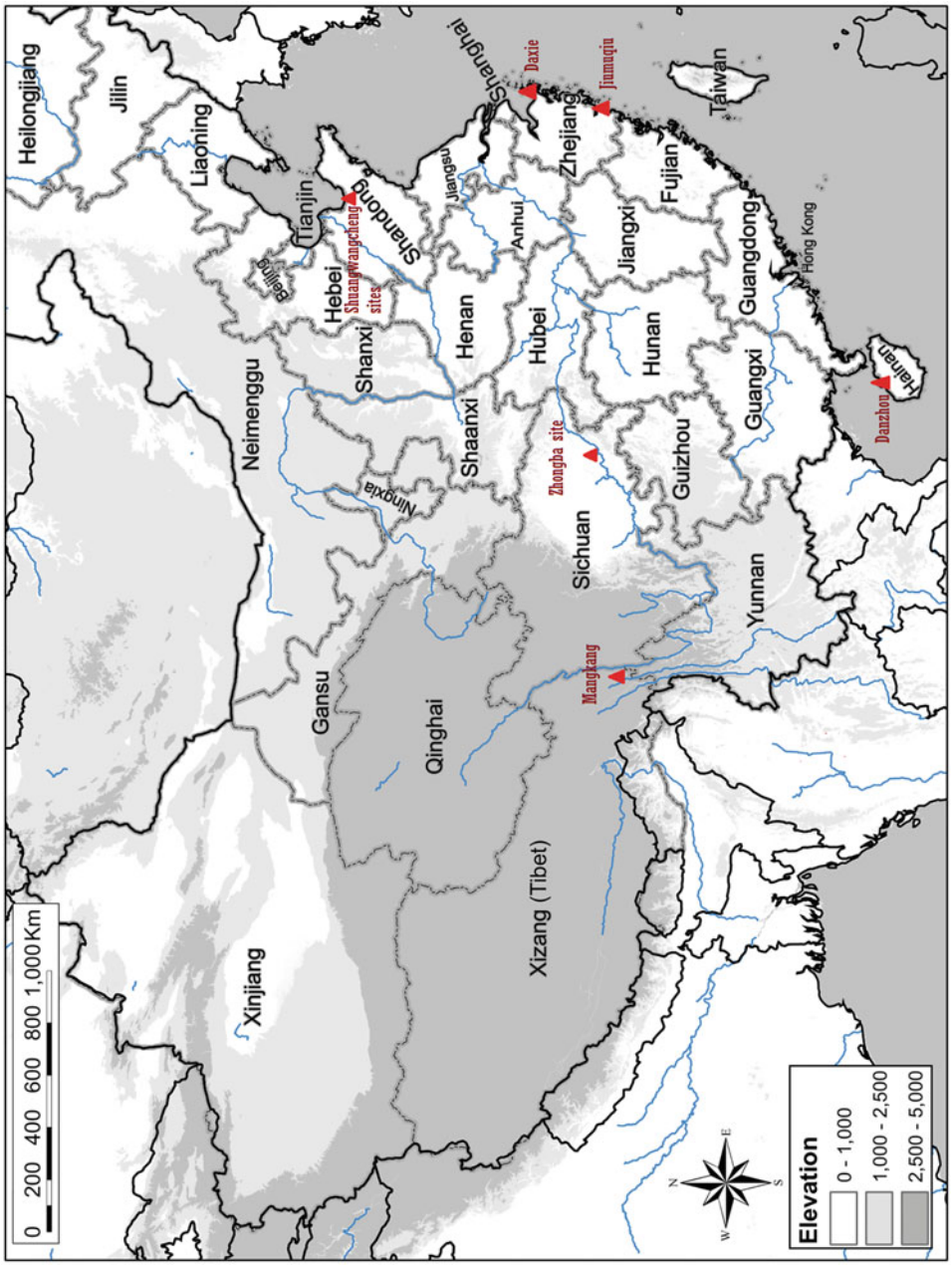

Archaeology of Salt in China, Fig. 2 Map of China showing locations of salt production discussed in the chapter

Archaeology of Salt in China, Fig. 3 The site of Zhongba, in Zhong County, Chongqing

determining whether or not these features were used in conjunction with the aforementioned vats requires further research.

During the Bronze Age at Zhongba (ca. 1750–1000 BC), there was a relatively sudden change in the nature of the pottery associated with salt production with the appearance of small pointed-bottom cups (Fig. 4b). The earlier version of these cups took the form of a spinning top and had mouths around 6–7 cm wide and were about 6 cm tall. Later cups were longer and more horn shaped, with 5–6 cm wide mouths but heights between 10 and 14 cm. These cups peak at about 90% of the ceramic assemblage in the levels in which they are found. The process in which they were used within the salt production process is still a matter of debate among scholars. Some have determined that many of the upper parts of the cups are red whereas the lower parts are darker and greyer, with a fairly clear dividing line between the parts. This trait has been used as a line of evidence to suggest that the cups may have been placed into a layer of hot ashes to bake once filled with brine in order to create salt cakes. Because the capacities of these vessels are all very uniform, the resulting products would also have been similar in size suggesting a degree of standardization that may have been related to trade. There are many sites in the region from around this time period where small numbers of pointed bottom cups have been found and we can see that the trade network involving salt was already quite expansive.

During the Late Bronze Age to Iron Age period at Zhongba (ca. 1000–200 BC), there was yet another change in the ceramic vessels involved in the salt production process. At this time, the ceramic assemblage came to be dominated by rounded-bottom jars that were 15–20 cm tall, with a mouth diameter of about 10 cm, and

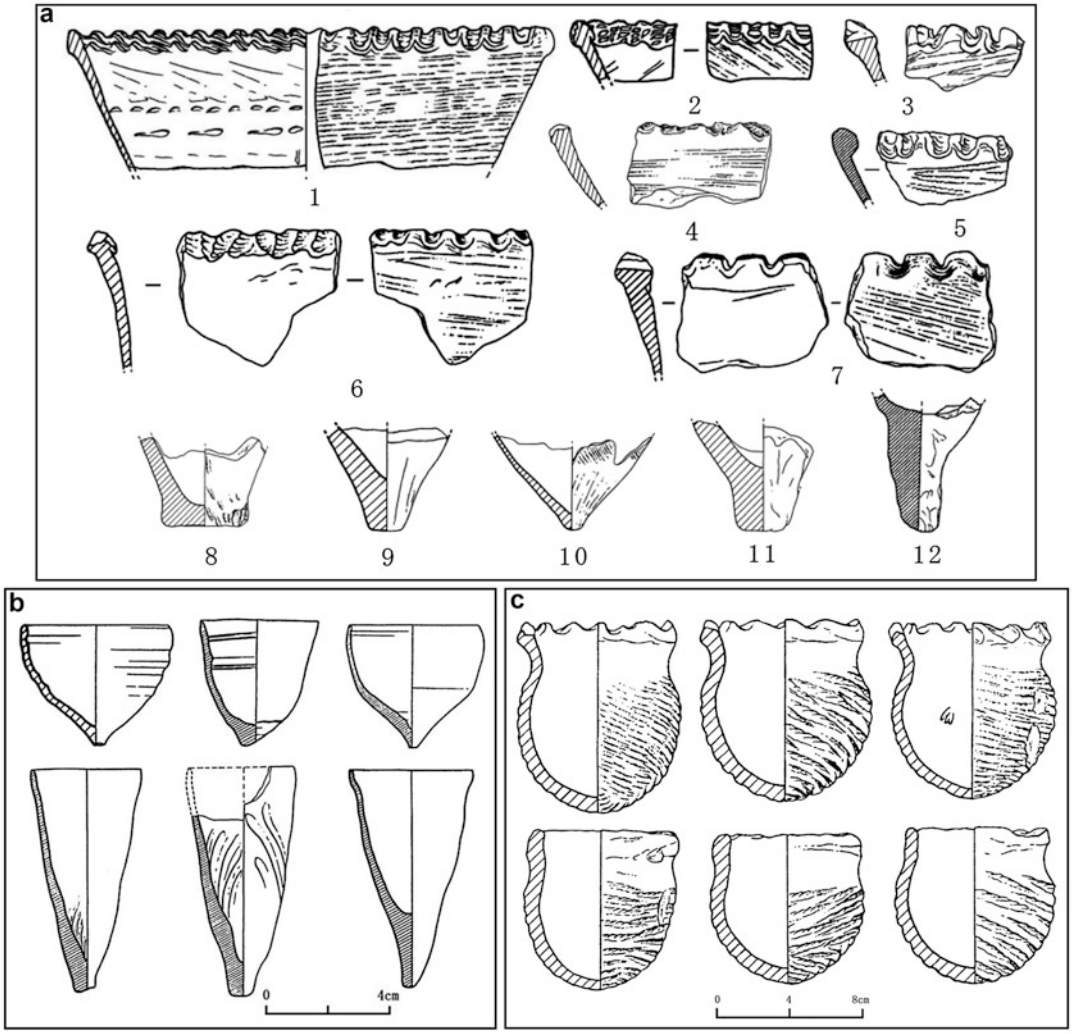

Archaeology of Salt in China, Fig. 4 (**a**) Pointed-bottom vats with decorated rims and corrugated marks on the exterior employed in salt production at Zhongba during the late Neolithic. (**b**) Pointed-bottom cups using at the site for salt production during the Bronze Age. (**c**) Late Bronze Age to Iron Age rounded-bottom jars used in salt manufacture

cord-marking on the exterior surface (Fig. 4c). These ceramics made up as much as 95–98% of the total ceramic assemblage from the associated layers and were found in abundance in association with workshop floors or nearby pits, including some that were associated with a level full of hole. Over time, these vessels became increasingly standardized in their shape and size. Accordingly, we can see the change in the degree to which the entire process of salt production at the site was becoming increasingly standardized as well. The organization of production became more centralized and the scale of salt manufacture also increased significantly as firm trade mechanisms were put into place. To date, the features involved in the heating of the brine during most of this period have not been identified, and so the precise way in which these vessels were used in the salt production process remains unclear.

Archaeological excavations have uncovered many examples of wattle and daub house foundations from this period that have remnants of a calcium carbonate sediment on their surface, probably left behind during the salt manufacturing

process. Nearby some of these foundations, several pits have also been found. The earlier pits during this phase are all round, similar to those from the Neolithic levels at the site. Later pits are rectangular. The longest exceed 4 m long and are 20–40 cm deep. The edges of some pits have a layer of yellow clay and some have pottery sherds embedded in the walls. Many examples have a white calcified crust on the surface as well. Inside these pits, excavators found numerous rounded-bottom jars and fragments of wood ash, and some also included rocks, which probably served a similar function to those in the round pits.

The heating facilities used for salt production at Zhongba during the Han Dynasty (202 BC–AD 220) were long and rectangular – more than 10 m long and 1–4 m wide (Fig. 5). Some had walls that were strengthened with stones, around which the sediment was pounded hard using a *hangtu* technique. These features would have been used together with iron pans in which the brine would have been boiled to produce salt. Eastern Han (AD 25–220) era decorated terracotta bricks from the Chengdu Plain area of central Sichuan depict salt wells, bamboo tube systems used to transport brine, salt production areas, and associated furnaces, all of which together comprised the system of facilities involved in the salt production process during the Han Dynasty.

Archaeology of Salt in China, Fig. 5 Long, rectangular facilities for heating brine and making salt dating to the Han Dynasty at Zhongba

The salt production furnaces used in the Tang Dynasty (AD 618–907) were round and arranged in an orderly set of rows, which established the subsequent organized structure of salt technology in the region. At another site in Yun'an Township of Yunmeng County, also in Chongqing, large scale Song (AD 960–1279), Ming (AD 1368–1644) and Qing (AD 1644–1911) Dynasty salt production workshops have been identified. At this site, brine wells, brine transportation troughs, brine storage pits, furnaces, and a jetty for facilitating boat transport of the finished salt have all been discovered.

The southern shore of the Bohai Sea has been an important location for the production of salt from antiquity to the present. Starting in the 1950s, archaeologists working on sites distributed in this region recognized that so-called "helmet-shaped vessels" (*kuixingqi* 盔形器), found in large quantities in this region, might have had an association with early salt production, but no evidence supporting this interpretation was forthcoming. Starting in 2002, archaeological survey in the region between the mouth of the Yellow River and the south shore of the Bohai sea discovered more than ten large clusters of archaeological remains related to the production of salt (Li et al. 2003, 2009). Each cluster of related material included numerous salt manufacturing facilities, between dozens and more than 100 in each case. After subsequent archaeological excavation, we now know these sites to date as early as the late Shang Dynasty, with some examples from Western Zhou, the Eastern Zhou, the Song Dynasty, and the Yuan Dynasty periods (Wei 2016).

Among these remains, remains from the terminal Shang and beginning of the Western Zhou (ca. 1000 BC) are the most completely preserved. One workshop covers an area of 660 × 900 m^2

with a central zone that contains an over 10 m long salt furnace that has a work space built behind it and two separate fireboxes (a front and a rear), along with two or three channels for smoke in the front (Fig. 6). Surrounding the salt furnace on four sides are a number of other related features including a brine well, evaporation pits, channels for the brine (Fig. 7), circular filtration pits, and flat areas for salt evaporation and collection. *Kuixingqi* vessels comprise over 95% of the ceramics collected in association with these features. These vessels are very similar to the rounded-bottom jars with decorated rims associated with Late Bronze Age salt production at Zhongba in the Three Gorges region. They average 20–22 cm in height, 16–18 cm in diameter at the rim, and have fairly standardized volumes (Fig. 8).

During the Springs and Autumns and Warring States periods (771–221 BC), it is clear that the size of salt furnaces in the region diminished and became more triangular in shape. These are around 4 m long and 85–100 cm wide. Their structures consisted of a fire door, fire chamber, and flues for the smoke. Inside the fire chamber, large numbers of jars with round bottoms were found. These vessels were similar to the *kuixingqi* of the Shang and Western Zhou period, but they are much larger in volume, with an average height

Archaeology of Salt in China, Fig. 6 Shang / Zhou period salt furnace 014B at Shuangwangcheng in Shouguang, Shandong with intact firebox and channels for heat and smoke and associated brine-storage pits

Archaeology of Salt in China, Fig. 7 Clay-lined brine storage pit with intact kuixingqi 盔形器 ceramic vessels from workshop 014B at Shuangwangcheng

Archaeology of Salt in China, Fig. 8 Shang / Zhou period kuixingqi 盔形器 "helment-shaped vessels" used in salt production from the site of Shuangwangcheng

between 60 and 70 cm and mouth diameter between 29 and 38 cm, reflecting a tremendous increase in the output of salt production at this time relative to the earlier period.

There is considerable order to the arrangement of salt production workshops during the Song and Yuan periods (10–14 centuries AD). They contain brine wells, salt furnaces, brine channels, and so forth. Furnaces are found lined up next to each other and range from 3 to 10 m in length. These include a work space, fire chamber, flues, storage rooms, and refuse pits. The nature of the kilns demonstrate that the objects involved in the evaporation of brine were rectangular or oval iron pans. There are some examples of small rectangular or oval stove props on top of the furnace flues which probably served as places to preheat the brine during the evaporation process. This type of feature was a technology that increased the efficiency of fuel use and continued to be employed in recent traditional salt production workshops such as those found in Sichuan into the twentieth century (see Vogel 1990; Flad 2011).

Key Issues/Current Debates

Based on the two examples discussed here, which are the only two examples that have been extensively excavated and published of the many examples of salt production locales known from across China, we have developed a much fuller understanding of some of the characteristics of early salt production sites in China in both the inland regions and the coastal areas. This work has revealed aspects of the technology of salt manufacture, the associated organization of production, the scale of output during different phases of operation, the nature of administration and control, and the relationship of production and exchange. These data are very valuable for addressing these and related issues and have established a strong foundation for our understanding of salt archaeology in China generally. Based on this foundation, during the past few years, additional work has started in many other locations including Gansu, Tibet, Yunnan, Hainan, Zhejian, Hebei, Jilin, Qinghai, Jiangxi, and Sichuan. This work has started a continuous stream of new information filling gaps in our knowledge and will form the body of research that fills out salt archaeology in China.

International Perspectives

Salt archaeology in China relates to a much broader field of the archaeology of salt production

globally. Salt has been an interest of archaeologists for more than a century, and after a couple of influential meetings about the topic in the 1970s (de Brisay and Evans 1975), the field of comparative salt archaeology has continued to grow lately with multiple recent conferences dedicated to the topic (e.g., Castello Huerta 2008; Weller et al. 2008; Li and Falkenhausen 2010) and field projects primarily focused on the major themes in the archaeology of salt in many regions of the world (e.g., McKillop 2002; Kern et al. 2009; Brown 2013; Harding and Kavruk 2013).

Future Directions

In addition to the broader historical and anthropological themes addressed by the research in China and globally, some recent work has attempted to develop scientific methodologies for convincingly identifying salt residue in prehistoric contexts, especially where ceramics are used in the evaporation process (Flad et al. 2005; Raad et al. 2014; Stoner et al. 2014; Tencariu et al. 2015). These techniques still have not produced convincing, universally applicable procedures, and more work is necessary on this subject.

Furthermore, in recent years, there has been an effort to begin ethnographic research at sites in inland China where traditional salt production techniques continue to be practiced. Examples include salt production localities in Tibet at the Mangkang 芒康 (Fig. 9) salt terraces, at the Yangpu 洋浦 and Eman 峨蔓 salt fields in Danzhou 儋州 on Hainan Island (Fig. 10), at the Duolunduo 多伦多 salt fields in Nangqian 囊谦, Qinghai, where the difficult processes of collecting relevant data have commenced (Xizang Zizhiqu Wenwu Baohu Yanjiusuo et al. 2010; Cui and Li 2013; Jia et al. 2015). This valuable work confirms that the ingenuity and vitality of technologies that have developed for thousands of years. The work also is an example that explores significant aspects of traditional culture, land, and resource use. If these traditions can be sufficiently well recorded and preserved such that we retain this important historical knowledge, it will help us maintain an understanding of the

Archaeology of Salt in China, Fig. 9 The Mangkang 芒康 salt terraces in Tibet

Archaeology of Salt in China, Fig. 10 The Yangpu 洋浦 and Eman 峨蔓 salt fields in Danzhou 儋州 on Hainan Island

diversity of human practices and thus serves as an important focus of both archaeological and heritage work more broadly in relation to salt production in China.

References

Adshead, Samuel, and M. Adrian. 1992. *Salt and civilization*. New York: St. Martins Press.

Brown, Ian W. 2013. *The red hills of Essex: Studying salt in England*. Tuscaloosa: Borgo Publishing.

Castellón Huerta, Blas Roman, ed. 2008. *The Diania – Sal y salinas: Un gusto ancestral*. Mexico: Instituto Nacional de Antropologia e Historia.

Connah, Graham. 1996. *Kibiro: The salt of Bunyoro, past and present*. London: The British Institute in East Africa.

Cui Jianfeng, and Li Shuicheng 崔剑锋, 李水城. 2013. 海南儋州洋浦古盐田玄武岩晒盐工艺的初步调查 Hainan Danzhou Yangpu Gu Yantian Xuanwuyan Shaiyan Gongyi de Chubu Diaocha (The preliminary investigation of the salt technology in Yangpu Ancient Salt Pan, Danzhou City, Hainan Province), *Nanfang Wenwu,*南方文物 [*Cultural Relics in Southern China*] 2013(1): 88–91.

de Brisay, Kay W., and K.A. Evans. 1975. *Salt: The study of an ancient industry. Report on the Salt Weekend held at the University of Essex, 20, 21, 22 September, 1974*. Colchester: Colchester Archaeological Group.

Flad, Rowan K. 2011. *Salt production and social hierarchy in ancient China: An archaeological investigation of specialization in China's Three Gorges*. Cambridge: Cambridge University Press.

Flad, Rowan K., Jiping Zhu, Changsui Wang, Pochan Chen, Lothar von Falkenhausen, Zhibin Sun, and Shuicheng Li. 2005. Archaeological and chemical evidence for early salt production in China. *Proceedings of the National Academy of Sciences* 102 (34): 12618–12622.

Harding, Anthony, and Valerii Kavruk. 2013. *Explorations in salt archaeology in the Carpathian zone*. Budapest: Archaeolingua.

Jia Hongjian, and Suonan Danzhou 贾鸿键, 索南旦周. 2015. Qinghai Yushu Nangqian Liangchu Yanchang Diaocha Gaikuang 青海玉树囊谦县两处盐场调查概况 (Investigation summary of two salt works in Nangqian Country, Yushu, Qinghai Province), *Nanfang Wenwu,* 南方文物 [*Cultural Relics in Southern China*] 2015(1): 123–124.

Kern, Anton, Kerstin Kowarik, Andreas W. Rausch, and Hans Reschreiter, eds. 2009. *Kingdom of Salt: 7000 years of Hallstatt*. Vienna: Natural History Museum.

Kurlansky, Mark. 2002. *Salt: A world history*. New York: Walker and Co.

Li Shuicheng 李水城, Lan Yufu 兰玉富, Wang Hui 王辉, and Hu Mingming 胡明明. 2003. Laizhouwan Diqu Gudai Yanye Kaogu Diaocha 莱州湾地区古代盐业考古调查 (The archaeological surveys of ancient salt in Laizhou Bay region), *Yanye shi Yanjiu*, 盐业史研究 [*Salt Industry History Research*] 2003(1): 82–91.

Li Shuicheng 李水城, Lan Yufu 兰玉富, and Wang Hui 王辉. 2009. Lu bei – Jiaodong Yanye Kaogu Diaochaji 鲁北–胶东盐业考古调查记 (Report on the archaeological surveys of salt production in Northern Shandong to the Jiaodong Peninsula). *Huaxia kaogu* 华夏考古 [*Huaxia Archaeology*] 2009(1): 11–25.

Li Shuicheng 李水城 and Lothar von Falkenhausen罗泰, eds. 2006. *Zhongguo yanye kaogu: Changjiang shangyou gudai yanye yu jingguan kaogu de chubu yanjiu (Di yi ji)* 中国盐业考古: 长江上游古代盐业与景观考古的初步研究 (第一集) [*Salt archaeology in China: Ancient salt production and landscape archaeology in the Upper Yangzi Basin: preliminary studies*]. Beijing 北京: Kexue cubanshe 科学出版社.

Li Shuicheng 李水城, and Lothar von Falkenhausen罗泰, eds. 2010. *Zhongguo yanye kaogu: Guoji yanye kaogu yanjiu (Di er ji)* 中国盐业考古: 国际盐业考古研究 (第二集) [*Salt* archaeology *in China: International research on salt archaeology (Vol. 2)*]. Beijing 北京: Kexue cubanshe 科学出版社.

Li Shuicheng 李水城, and Lothar von Falkenhausen罗泰, eds. 2013. *Zhongguo yanye kaogu: Changjiang shangyou gudai yanye yu Zhongba yizhi de kaogu yanjiu (Di san ji)* 中国盐业考古: 长江上游古代盐业与中坝遗址的考古研究 (第三集) [*Salt* archaeology *in China: Archaeological research on ancient salt production in the Upper Yangzi River* region *and at the site of Zhongba (Vol.* 3*)*]. Beijing 北京: Kexue cubanshe 科学出版社.

McKillop, Heather. 2002. *Salt: White gold of the ancient Maya*. Gainsville: University Press of Florida.

Raad, Danielle R., Shuicheng Li, and Rowan K. Flad. 2014. Testing a novel method to identify salt production pottery via release and detection of chloride ions. *Journal of Archaeological Science* 43: 186–191.

Stoner, Wesley D., John K. Millhauser, Enrique Rodríguez-Alegría, Lisa Overholtzer, and Michael D. Glascock. 2014. Taken with a grain of salt: Experimentation and the chemistry of archaeological ceramics from Xaltocan, Mexico. *Journal of Archaeological Method and Theory* 21 (4): 862–898.

Tencariu, Felix-Adrian, Marius Alexianu, Vasile Cotiugă, Viorica Vasilache, and Ion Sandu. 2015. Briquetage and salt cakes: An experimental approach of a prehistoric technique. *Journal of Archaeological Science* 59: 118–131.

Xizang Zizhiqu Wenwu Baohu Yanjiusuo, Shaanxi Sheng Archaeological Institute, and Sichuan Archaeological Institute 西藏自治区文物保护研究所,陕西省考古研究院,四川省考古研究院. 2010. Xizang Zizhiqu Changdu Diqu Mangkang Xian Yanjing Yantian Diaocha Baogao 西藏自治区昌都地区芒康县盐井盐田调查报告 (The investigatory report of salt well and salt pan in Mangkang Country, Changdu Territory, Tibet Autonomous Region), *Nanfang Wenwu,* 南方文物 [*Cultural Relics in Southern China*] 2010(1): 84–97.

Vogel, Hans Ulrich. 1990. *Untersuchungen uber die Salzgeschichte von Sichuan (311 v. Chr. – 1911): Strukturen des Monopols und der Produktion*. Stuttgart: Franz Steiner Verlag Stuttgart.

Wei Qiaowei. 2016. Ceramic management at salt production sites during the Early Bronze Age in Northern Shangdong, China. *Asian Archaeology* 4: 33–46.

Weller, Olivier, Alexa Dufraisse, and Pierre Pétrequin. 2008. Sel, eau et forêt D'hier à aujourd'hui, edited. Paris: Presses universitaires de Franche-Comté.

Yoshida, Tora. 1993. *Salt production techniques in ancient China: The Aobo Tu*. Leiden: E.J. Brill.

A

Archaeology of Salt in Japan

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Introduction and Definition

Seawater has been the primary resource for producing salt in Japan because of the absence of rock salt, salt lake, and salty soil (Kondō 1975). The only exception is salt springs which usually contain much less salt than seawater. Few places are known to have produced salt by salt springs in the early modern to the modern period. Salt production in Japan has developed along the seacoast which had suitable climatic conditions for producing salt. The first evidence of salt production was salt-producing pottery which had appeared in the Late Jōmon (ca. 1,500BC) (Kondō 1962; Kawashima 2012b, 2015). Salt pottery was distributed along the Pacific coast in eastern Japan (Fig. 1). While the tradition of the Jōmon salt production existed till the Middle Yayoi period in the northern region, in the same period, salt pottery appeared in the Inland Sea area which has been the most crucial salt production area in Japan till the contemporary period (Fig. 2). Salinity of seawater in Inland Sea is approximately 30–34‰ through the year. The area around Inland Sea has high fine weather rate, which is crucial for salt production. The reason that salt production occurred in the Inland Sea area in the Yayoi period is still unknown. Kondō (1984, 1994) suggested three possible scenarios of salt production in this

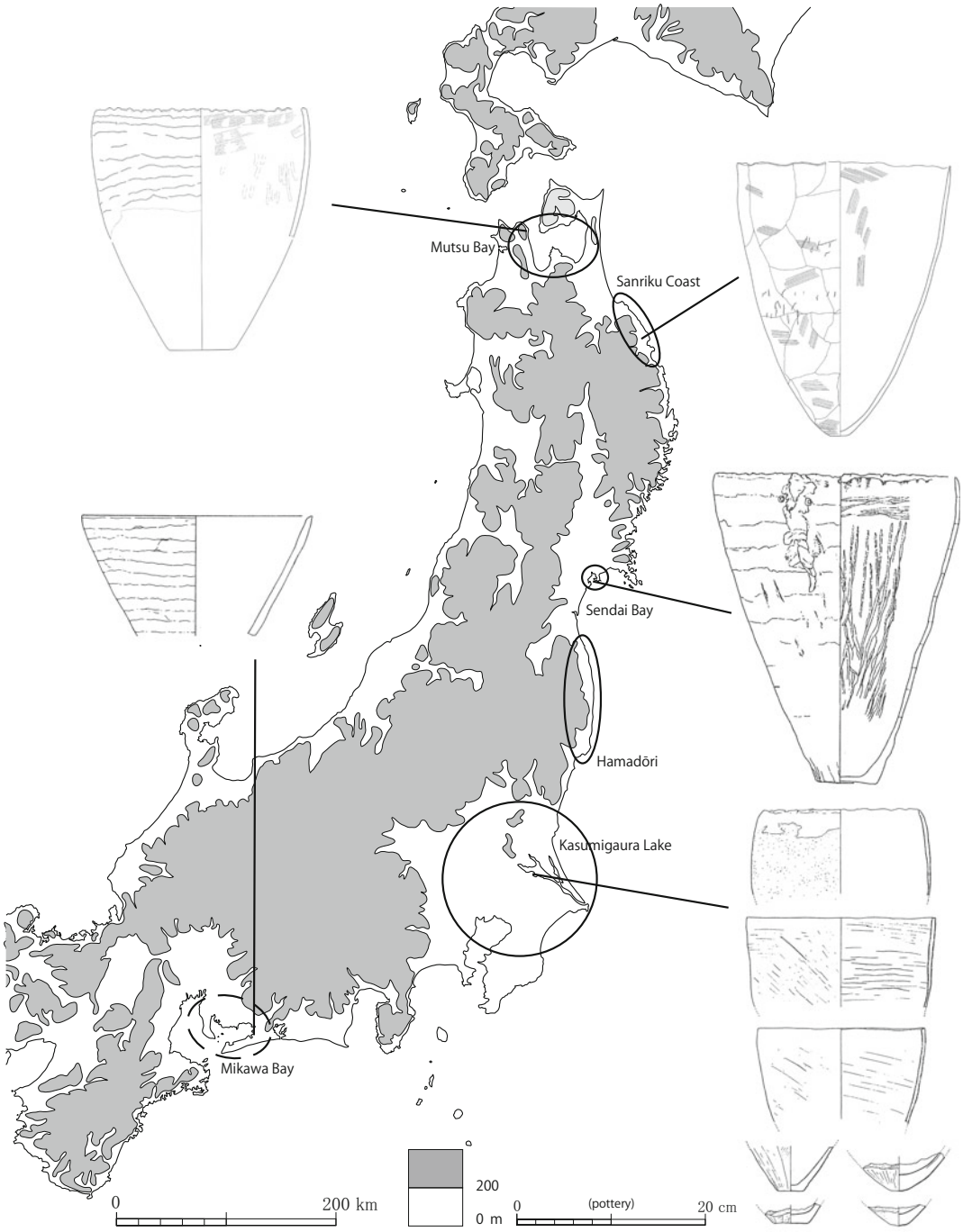

Archaeology of Salt in Japan, Fig. 1 Distribution of salt pottery in the Jōmon

area: diffusion of the salt production technique from the northern region, the invention of salt production in the Inland Sea area, and diffusion of the salt production technique from the Korean Peninsula. As there is no direct evidence of the scenarios suggested by Kondō, most researchers

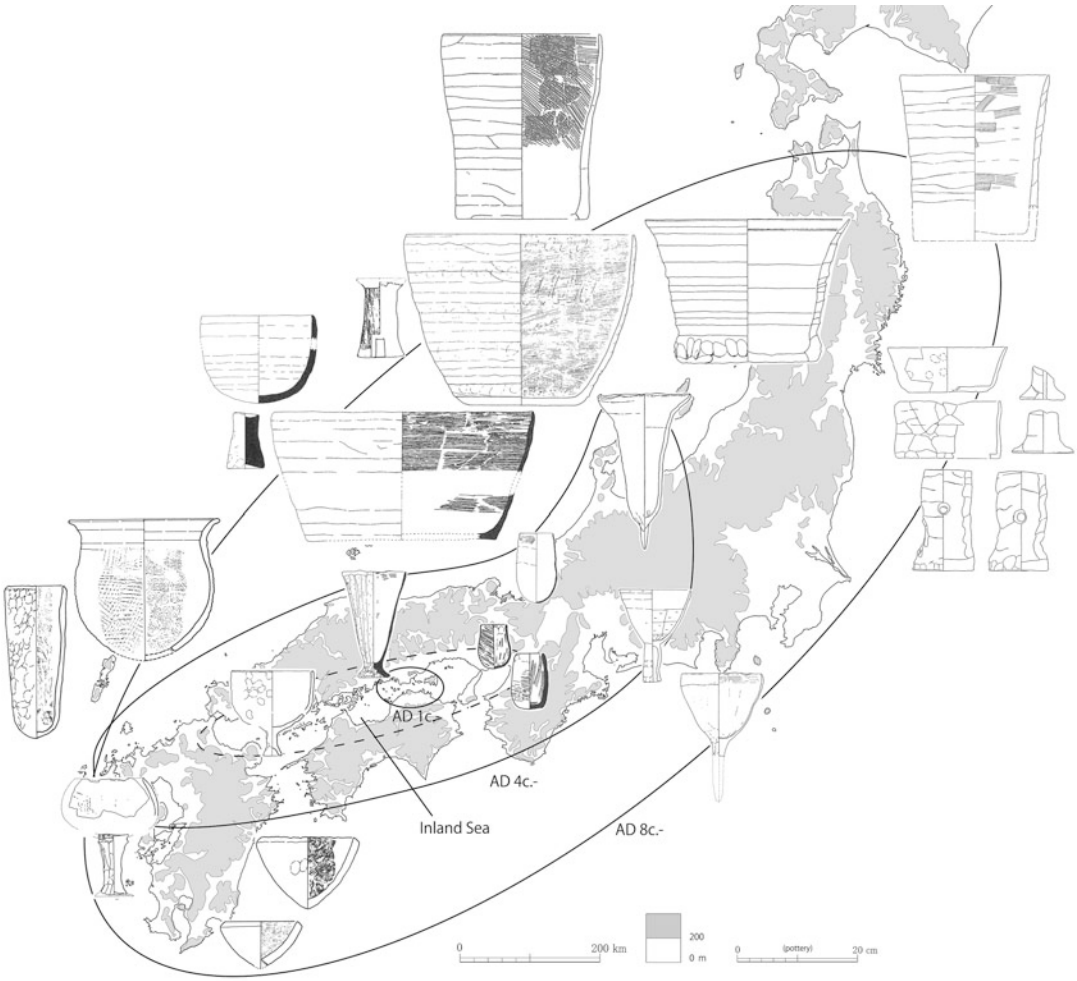

Archaeology of Salt in Japan, Fig. 2 Chronological and regional distribution of salt pottery after the Yayoi period

have assumed that salt production techniques with pottery were invented in the Jōmon and the Yayoi periods independently, and after the Yayoi, the technique was gradually diffused and adopted on the coasts of Japanese Archipelago.

Key Issues/Current Debates/Future Directions/Examples

For the ancient salt production, Japanese archaeologists have constructed the chronological order and regional variation of salt pottery (Kondō 1984, 1994). These were based on salt pottery found distributed from Kyūshū, a southern island to Tōhoku region, and the northernmost Honshū. In order to concentrate seawater, seagrass was thought to have been used for pottery salt production. Ancient literature such as *Man'yōshū* and *Hitachi no kuni hudoki* describes the word "*Moshio*," which literally means seagrass (*mo*) and salt (*shio*). There is a famous shrine near Sendai, which keeps the possible ancient way of brine concentration. In their annual ceremony, they harvest seagrass and pour seawater on it. Then they boil the collected brine. This method could be just a ceremonial practice and not an efficient way to obtain dense brine. According to archaeologists testing this method, however, seawater could actually be concentrated by

seagrass (Hiroyama 1993; Watanabe 1991). Another evidence that seagrass was used for concentrating seawater are burned micro shells on the seagrass found in ash layers at the salt production sites (Watanabe 1991). This technique, possibly dating back to the Jōmon period (Abe et al. 2013), could have lasted at least until the appearance of salt terrace system.

After the establishment of the *ritsuryō* political system in the eighth century, tax was paid in kind, mostly by rice and in some areas by salt. In Nara, the ancient capital of Japan, archaeologists excavated many wooden tablets with letters indicating the kind of tax, name and place of the taxpayer, and so on. Numerous wooden tablets containing the word "salt" were found in the Nara area, as the result of collecting tax (Kishimoto 1998; Nara National Research Institute for Cultural Properties 2013). In addition to wooden tablets, salt pottery shards possibly used for making salt cakes were found at Jikidoin, a dining hall, of Saidaiji Buddhist temple (Oobayashi et al. 2007). These pots from various areas were containers of salt, although other perishable materials could be used for salt package. In the temple, over 80 ceramic vessels as the storage facilities were installed in the ground in lines, suggesting a possibility of salted food. During the eighth and the ninth centuries, there were some areas recorded as salt production places and on wooden tablets but where salt pottery gradually declined (Kondō 1994; Nara National Research Institute for Cultural Properties 2013). Some researchers claim that iron pan partly replaced salt pottery as indicated in some documents from the eighth to the ninth century. However, the mentions of iron pans in texts were so few that it is hard to assume that all the salt was produced by iron pan. The issue of introduction and function of an iron pan needs further archaeological investigation in areas where salt pottery was absent in this period.

In spite of the difficulty to prove the connection, introduction of iron pan and salt terrace might be combined as suggested by the possible hearth for an iron pan at the Taki Shibagaki site located in Noto peninsula (Toyama daigaku jinbungakubu kōkogakukenkyūshitsu and Ishikawa kōkogaku kenkyūkai 1991). While the salt terrace was found in the eighth century at Taki Shibagaki, in other regions salt terrace was scarce until around the twelfth century. Salt terraces were widely constructed in the medieval period. Salt terrace was constructed above sea level, so seawater was sprayed on sand terrace paved by clay, then after the drying of wet sand, salty sand on the ground surface was gathered to leach it with seawater. This type of salt terrace is called "*Agehama.*" In the medieval period, furnaces were constructed by various materials, such as shell powder, stone, and wickerwork. Typical small-scale salt production survived on the Japan Sea coast until the modern period, as the scale of sandy beach is small. Another type of small-scale salt production existed on the small beaches in northern region, but there iron pan was used to boil seawater directly because of the cold weather.

On the other hand, in the Inland Sea area, another type of salt terrace called "*Irihama*" was developed in the seventeenth century. The size of the terrace became larger and complex (Hiroyama 1993). In this salt terrace system, seawater supplied through the channels goes up to the ground surface by capillary phenomenon, and the surface sand accumulates high salinity which is leached by seawater to dense brine. However, since this system needed a larger tidal range and flat sandy beach, the distribution of this kind of terrace was limited to some areas. Owing to the increasing amount of salt production in the early modern period and transportation by ship, salt became more easily available. As the salt consumption increased, high-quality salt hardened in a small ceramic pot appeared (Ogawa 2008). Such potshards were mostly found in residential areas for high-ranked people living in large cities. While in the history of salt in Japan it is no doubt that the Inland Sea area was the most important place for the early modern salt production in terms of the amount of produced salt, small-scale salt production mentioned above was also vital for regional history.

After the modernization, even the relatively large-scale salt producers in the Inland Sea area faced the difficulty of competing with low-cost imported salt. The government had to reform the salt production system by the Salt Monopoly Law

(1905–1997), in order to protect domestic salt industry and to earn by increasing tax. During the period of the Salt Monopoly Law, Japanese society experienced high economic growth, and people got used to buying processed foods, such as soy sauce, soy paste, pickles, etc., which were previously homemade in rural area. The traditional customs concerning salt in the modern period were also collected by ethnologists in Japan (Shibusawa 1939). They recognized a regional variation as well as some common practices and beliefs in a wide area. Ethnological studies also reveal a kind of salt production or a way to obtain salt. For example, some inland groups floated the timber down the river to the coast, then boiled seawater with the timber or sold it to buy salt (Miyamoto 2007). In addition to ethnological examples in Japan, the ethnoarchaeological approach using examples from overseas proved to be useful in archaeology, especially for understanding customs and beliefs relating to salt and the use of salt in the past (Kawashima 2012a).

Although in Japan a large number of archaeological sites were investigated, the lack of adequately obtained information on salt production prevented a full understanding of salt production. Owing to the industrialization along the coast, the most important beaches suitable for salt production became reclaimed land (Fig. 3). Also, many important salt production sites could have been destroyed before they were adequately excavated. On the other hand, as the knowledge of salt pottery became more widely shared among archaeologists, the number of recognized salt pottery shards increased suggesting not only the daily use of salt but a strong connection between salt production and other industries such as horse breeding as well as the military organization. For further understanding of salt production and

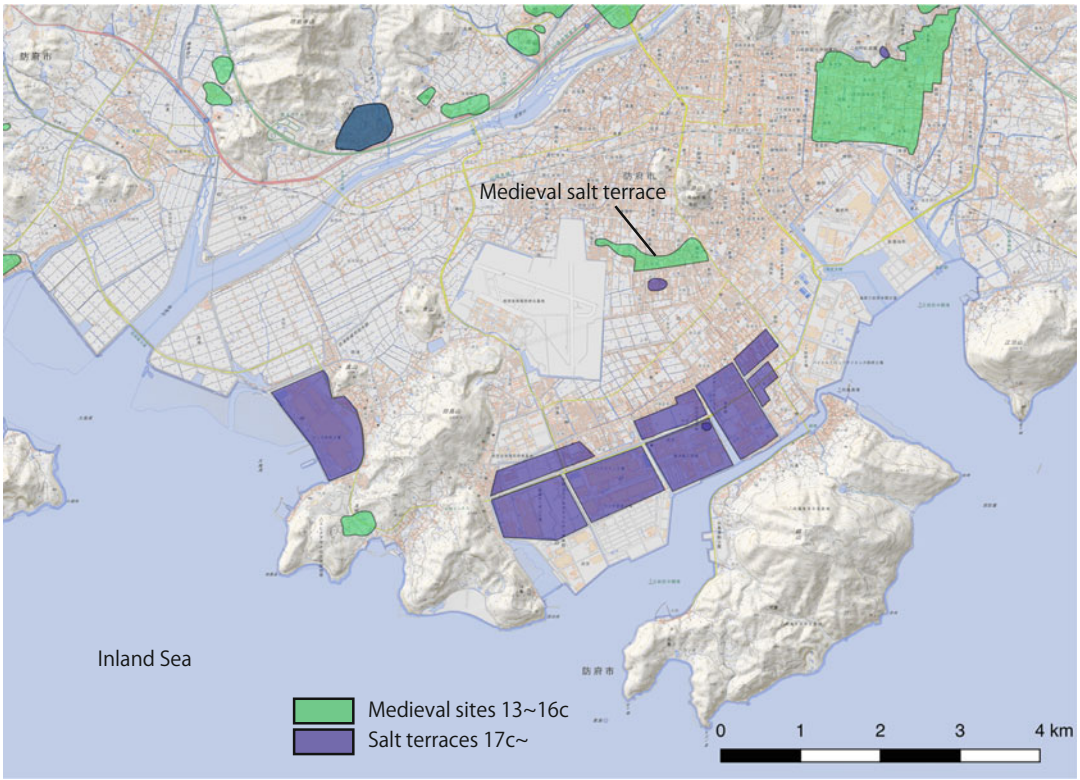

Archaeology of Salt in Japan, Fig. 3 Salt terrace and reclaimed land in Yamaguchi prefecture. (Map was made using GSI Tiles by Geospatial Information Authority of Japan, https://www.gsi.go.jp/kiban/, and site distribution map by Yamaguchi prefecture)

transportation of salt, the reexamination of excavated sites could be useful. New methods in chemical analysis (e.g., Horiuchi et al. 2011) and component analysis of salt pottery could enhance possibility of clarifying the trading system, tracing the movement of pottery from the coast to the inland areas. The latest approaches could provide us with valuable data to carefully reconstruct the (pre)history of salt production.

Cross-References

- ▶ Kondo, Yoshiro
- ▶ Periodization in Japanese Prehistoric Archaeology

References

Abe, Y., M. Kawanishi, T. Kurozumi, and K. Yoshida. 2013. Jōmon jidai ni okeru seien kōi no hukugen: ibarakiken hirohata kaizuka saishū no hakushoku kekkakutai no seisei katei to dokiseien [Reconstruction of salt production process in prehistoric Jomon period Japan]. *Sundaisigaku* [Sundai Historical Review: The Journal of the Historico-Geographical Association of Meiji University] 149: 137–159.

Hiroyama, G. 1993. *Nihon seien gijutsushi no kenkyū* [The history of salt producing techniques in Japan]. Tokyo: Yūzankaku.

Horiuchi, A., N. Ochiai, H. Kurozumi, and Y. Miyata. 2011. Detection of chloride from pottery as a marker for salt: A new analytical method validated using simulated salt-making pottery and applied to Japanese ceramics. *Journal of Archaeological Science* 38: 2949–2956.

Kawashima, T. 2012a. Reconsideration of the use of salt in the Jōmon period. *Inter faculty* 3: 25–37.

Kawashima, T. 2012b. Emerging craft production and local identity: A case of the Late Jōmon period. *Documenta praehistorica* 39: 263–268.

Kawashima, T. 2015. Prehistoric salt production in Japan. In *Archaeology of salt: Approaching an invisible past*, ed. R. Brigand and O. Weller, 125–138. Leiden: Sidestone Press.

Kishimoto, M. 1998. Kodai kokka to shio no ryūtsū [A circulation of salt in the ancient Japanese state]. In *Toshi to kōgyō to ryūtsū*, vol. 3, Kodaishi no ronten, ed. M. Tanaka and H. Kanaseki, 241–279. Tokyo: Shogakukan; Chinese and English translation in L. Shuicheng and L. Falkenhausen, eds. 2010. *Salt archaeology in China*, vol. 2, Global comparative perspectives, The circulation of salt in the ancient Japanese State, 67–135. Beijing: Science Press.

Kondō, Y. 1962. Jōmon jidai ni okeru doki seien no kenkyū [The study of the Jōmon salt production]. *Okayama daigaku hōbungakubu gakujutu kiyō* [Bulletin of Okayama University Faculty of Law and Letters] 15: 1–28.

Kondō, Y. 1975. The salt industry in ancient Japan. In *Salt: The study of an ancient industry*, ed. K.W. de Brisay and K. Evans, 61–65. Colchester: Colchester Archaeological Group.

Kondō, Y. 1984. *Dokiseien no kenkyū* [Study of pottery salt production]. Tokyo: Aokishoten.

Kondō, Y., ed. 1994. *Nihon dokiseien kenkyū* [Study of pottery salt production in Japan]. Tokyo: Aokishoten.

Miyamoto, T. 2007. *Shio no minzoku to seikatsu* [Folklore of salt and life]. Tokyo: Miraisha.

Nara National Research Institute For Cultural Properties. ed. 2013. *Shio no seisan ryūtsū to kanga shūraku* [Production and circulation of salt and ancient government offices and settlements]. Nara: Nara National Research Institute for Cultural Properties.

Ogawa, N. 2008. *Yakishiotsubo to kinsei no kōkogaku* [Pot for roasted salt and archaeology of the early modern period]. Tokyo: Dōseisha.

Oobayashi, J., A. Watanabe, K. Imai, M. Jinno, and N. Koike. 2007. Excavation of Jikidoin at Saidaiji temple. *Nihon Kokogaku* [Journal of the Japanese Archaeological Association] 14 (24): 123–134.

Shibusawa, K. 1939. *Enzokumondōshū* [Collection of dialogues of salt custom], Bulletin of attic museum. Vol. 34. Tokyo: Attic Museum.

Toyama Daigaku Jinbungakubu Kōkogakukenkyūshitsu and Ishikawa Kōkogaku Kenkyūkai. 1991. *Noto taki shibagaki seien isekigun* [Taki shibagaki site in Noto peninsula]. Toyama: Toyama daigaku jinbungakubu kōkogakukenkyūshitsu.

Watanabe, M. 1991. Matsuzaki iseki ni okeru burokku sanpuringu no chōsahōkoku [The report on the block sampling at the Matsuzaki site]. In *Matsuzaki iseki* [Matsuzaki site], ed. A. Fukuoka, T. Endō, Y. Mori, and S. Abe, 67–76. Yatomi: Aichi Prefectural Archaeological Center.

Archaeology of Shamanism

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Introduction

An *archaeology* of shamanism could be written in a few paragraphs: shamans work in northeastern Asia and the North American arctic, and claims to

evidence of shamans rest upon objects strongly associated with ethnographically observed shamans in those regions. Only a very few archaeological projects have met these criteria.

Definition

At the outset, we confront the question, is there such a "thing" as "shamanism?" There historically were and continue to be Siberian persons designated as shamans, a Tungusic (Evenki) word. But shaman*ism*? It is an academic term popularized during the 1960s through Mircea Eliade's 1964 book and then by the former academic anthropologist Michael Harner. "Shamans" are conventionally described as persons able to make contact with, or enter, the dimension in which spirits reside, popularly assumed to require an altered state of consciousness, that is, "trance." This popular notion stems from Western stereotyping of "primitive religion," attributed to non-Western peoples under Western colonial regimes.

Key Issues

Contrasted with the paucity of empirically well-supported inferences of discoveries of shamans through archaeology, claims for recognizing shamans in archaeological data are multitudinous. The editor of the book *Archaeology of Shamanism* cites Mircea Eliade's 1964 *Shamanism: Archaic Techniques of Ecstasy* as that "into the orbit of which most subsequent works have been drawn" (Price in Price 2001: 5). With this unsound, pseudo-scholarly book rife with errors and fraudulent citations (Balzer 1990: 47–48) serving to frame most works seeking archaeology of shamanism, careful critiques are warranted.

This entry will describe archaeology that seems justified in interpreting data to represent shamans and then explain the weaknesses in work framed by Eliade's seminal book. Fundamental issues are involved, of empirically grounded inferences to the best explanation (IBE) versus conclusions deductively derived from unexamined assumptions. To put it simply, the issue is ground-truthing with directly associated data, contrasted with proceeding from an asserted but untested general premise, that "shamanism" is ancient, universal among hunter-gatherer societies, and tied to altered states of consciousness. Each of these postulates must be examined.

What Is "Shamanism?"

Michael Harner moved from New York to an affluent San Francisco Bay community to build his Foundation for Shamanic Studies. Harner proselytized "core shamanism," "the universal, near-universal, or common principles and practices of shamanism not bound to any specific cultural groups or perspective" (quoted in Alberts 2015: 148). Anyone, he taught, can practice shamanism by entering an altered state of consciousness experienced as a passage into an alternate reality. Harner insisted, at the 1998 meeting of the American Anthropological Association, that the experience is empirically true, that he and his followers observed an alternate reality and therefore *scientifically* validated it (Kehoe 2000: 82–83). Although Harner was sincere, what is seen by a person in trance while their body lies inert is not accepted as scientific observation of the natural world.

Eliade's "shamanism" is mystical. He asserted that "All history is in some measure a fall of the sacred. . .but the sacred does not cease to manifest itself, and with each new manifestation it resumes its original tendency to reveal itself wholly" (Eliade 1964: xix). Thus in the premise that "shamanism" is primordial (Fig. 1) and eternal, "the sacred" manifests *itself* through human consciousness. From an Eliade standpoint, an archaeology of shamanism would seek evidence of "the sacred," a singular entity forever repetitiously manifesting. This would not be evidence of human actions in science's natural world. Significantly, Eliade did not do fieldwork with non-Western communities, refusing invitations to visit Australian Aborigines or even American First Nations near his home in Chicago.

"Shaman*ism*" contrasts with "shamans" as actual persons in socially constructed roles. Like

Archaeology of Shamanism, Fig. 1 Painting within Lascaux Cave, France, Upper Paleolithic, c. 14,500 B.C.E. Popularly called "The Sorcerer," the human figure is imagined to be a shaman in trance. A scientific interpretation using Ockham's Razor suggests the man has been killed by the bison bull he attempted to hunt: that is, the most *parsimonious* explanation is based on known fatal attacks of bison bulls upon men. Nothing in the picture links it to historic shamans. The bird on a pole or tree may represent a named place or the man's name (Ockham's Razor: William of Ockham, English scholar, fourteenth century, stated that interpretations should use the fewest assumptions needed – the "law of parsimony"). (Credit line: Lascaux #12, La scène du Puits, Cliché N. Aujoulat, Centre National de Préhistoire, MCC)

all *-isms*, "shamanism" is an abstraction. Unlike pottery or lithics, it does not exist tangibly in material form. It is an academic construct based on a literally imperial categorization – by Catherine, Empress of Russia – borrowed by a poet, her friend Johann Wolfgang Goethe, later popularized within 1960s counterculture proclivities toward spiritual fulfillment and altered states of consciousness and, most recently, linked to political movements for indigenous peoples' rights: for a detailed, thoroughly footnoted, extensive overview, see Alberts 2015. Within this mushrooming growth is the particular interpretation of rock art proffered by David Lewis-Williams in a 1988 *Current Anthropology* article. In line with Eliade's focus on altered states of consciousness, Lewis-Williams interpreted paintings of elands to be representations, not of the hunted animals but of shamans' feeling themselves transformed into elands. Rock art also includes simple geometric forms; these, Lewis-Williams suggests, are "entoptic," seen within closed eyes. Arising from human neurophysiology, seeing them would be universal. Western science insists that all rock art has been produced by humans, contrary to some non-Western societies' belief that some is made by nonhuman beings. A thesis that explained rock art in universalistic terms appealed to many researchers.

Archaeological Evidence for Shamans in Territories Historically Host to Shamans

It is reasonable to interpret items as evidence of shamans in the archaeological records of Siberia, where Evenki and other small nations do provide the social role "shaman" (*šaman*). Rock art figures of humans with a hand drum, particularly if the figure seems to be wearing regalia with fringes or appendages, are plausibly recognized there as shamans (Devlet in Price 2001: 43–55; Martynov 1991) (Fig. 2). On the other hand, in *The Archaeology of Shamanism*, ethnographer Peter Jordan shows only perishable items (cloth, animal skins) and bones as material components of, in this case, Khanty *elta-ku* (the equivalent of *šaman*) (Jordan in Price 2001: 86–104). Absent the metal or carved bone or ivory appendages of shamans' regalia, there would be no strong archaeological

Archaeology of Shamanism, Fig. 2 Regalia of a Tungus (Evenki) shaman, collected 1788 for a German museum: reindeer skin coat sewn with sinew, red and black painted geometric patterns outlined in fine white sinew, attached colored cotton and silk bands and long fringes, and 70 metal appendages of iron, copper, and bronze representing tree of life, birds, sun, moon, humans, and metal bells. A leather, fringed cap, fringed leather apron to which were attached metal images of wading birds and eagles, leather boots representing light (left boot with copper discs) and darkness (right boot, red paint), and a copper plate mask complete the dress. A long painted leather scarf resembling a snake, a handsome leather belt, a leather pouch with dried plants, and a leather strap fastened to the back of the coat's shoulders complete the ensemble, with additional painted leather snakes, doll-like spirit helpers, tobacco pipe and pouch, and mirrors and pieces of copper and iron. As the shamans danced, the long fringes flared out around them, the bells tinkled, and the metal pieces jangled (Hauser-Schäublin and Krüger 2007). (Note: this photo shows the dress before restoration by the Göttingen Museum). (The credit line is Fig. 2 (before restoration). © Ethnologische Sammlung der Universität Göttingen (As 957). Photographer: Harry Haase)

evidence for shamans – and not all Siberian shamans wore such regalia.

Perhaps the best archaeological example of a probable shaman is a middle-aged woman buried nearly 2000 years ago in Chukotka on the western side of Bering Strait. Excavated by Sergei A. Arutiunov and D. A. Sergeev in the early 1960s, Ekven Burial 154, well preserved in permafrost, was filled with tools and ornaments including a mask and carved ivory objects

resembling metal appendages hung on Siberian shamans' coats (Smithsonian Institution ekven1.#tomb). Its location and affiliation to archaeologists' Old Bering Sea culture support Patricia Sutherland's argument that Paleo-Eskimo art developed from Siberian and East Asian Maritime hunting antecedents (Sutherland in Price 2001: 135–145).

Reviewing the data advanced by archaeologists and art historians for archaeological evidence of shamans in Inner Asia and Siberia, Francfort (Francfort in Francfort and Hamayon 2001:260) first distinguishes between Indo-Iranian cultural elements seen in artifacts and rock art and those better associated with forebears of historic societies with shamans. Then he assesses these, concluding that not until the second half of the first millennium CE does rock art show elements characteristic of shamans in the Turkic-speaking regions of northern Asia (Francfort and Hamayon 2001: 260; Martynov 1991: 180, Fig. 52, a *historic* Yakut painting of a shaman bedecked with fringes).

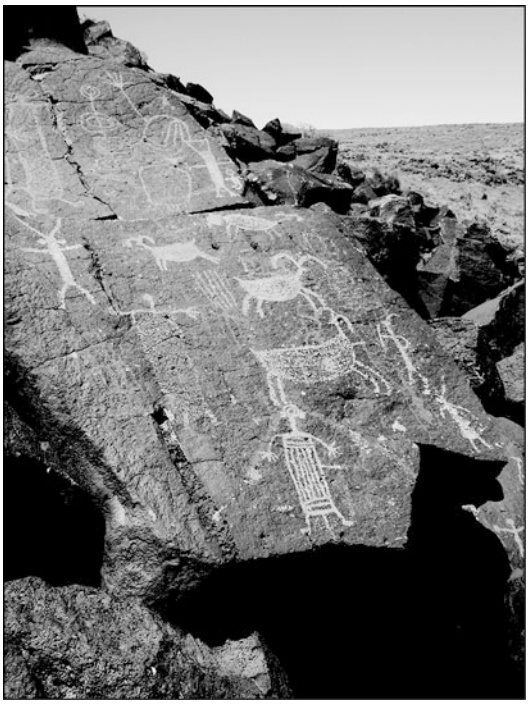

Archaeology of Shamanism, Fig. 3 Rock outcrop in Coso Range, southeastern California, with petroglyphs of bighorn sheep and anthropomorphs, likely hunters of the sheep. (Credit line: From Gilreath and Hildebrandt 2008, Fig. 5)

"Archaeology of Shamanism" Outside Historical Northern Shamans Territories

Lewis-Williams and Dowson state, in their abstract to their 1988 paper, that they were

> constructing a neuropsychological model of the apprehension of entoptic phenomena in three stages of altered states of consciousness. The utility of the model is assessed by applying it to two known shamanistic rock arts, San and Shoshonean Coso. It is then applied to Upper Palaeolithic mobile and parietal art to show that this art was also associated with altered states of consciousness. (Lewis-Williams and Dowson 1988: 201)

Problems with their model are:

- Their "entoptic" forms are simple, including parallel lines, circles, zigzags, waves, and dendritic branching. There is no a priori reason to interpret them as entoptic.
- The "three stages of altered states of consciousness" is a model not supported by most researchers (Helvenston and Bahn 2003).
- Neither the San of South Africa nor the Coso area Shoshone (western Great Basin, USA; Fig. 3) has or had shamans: they have ritual practitioners and healers. When these trained practitioners intently focus on their task, they are in control of their actions. Lewis-Williams' student David Whitley himself flatly acknowledges "ethnographic informants consistently and unanimously referred to rock art as made by shamans' spirit helpers" (Whitley 1988); the practitioners he calls "shamans" are *pohakanti*, "one who possesses or uses power" (Thomas et al. 1986: 271). Quinlan (in Francfort 2001: 189–205) critiques Whitley's claims, finding them poorly supported.
- To impute "altered states of consciousness" to Upper Paleolithic artists fails to take into account the esthetics and choices of their art (Francfort 2001: 252; Hodgson 2014), not to mention lack of evidence of altered states.

Twenty years on, Christine VanPool proposed increasing the "rigor" of archaeological analyses by using "a robust body of scholarly research" on "shamanism" (VanPool 2009: 177). She takes as premises (1) that "shamanism" equates with "religious practitioners. . .[who] initiate trance states, generally called altered states of consciousness (ASC), for the purpose of communing with spirits," and (2) "shamanism has been documented around the world" (ibid.). In other words, VanPool remains within Eliade's orbit. She asserts that "rock art researchers find that unmasked anthropomorphic figures are commonly associated with shamanism" (VanPool 2009: 182), which allows almost any figurative art to be interpreted as "shamanic" and concludes with invoking colonialist cultural evolutionism: "an older shamanic substrate might be reorganized or included into a newer religious system" of priests (VanPool 2009: 188). Paraphernalia may not differentiate between shaman and priest; the difference lies in "how they access the supernatural" (VanPool 2009: 183). If associated material does not mark shamans from priests and accessing the supernatural is ephemeral, what in the archaeological record could be determinative?

VanPool's bibliography does not include Price's edited volume *The Archaeology of Shamanism* nor the critical papers in Francfort and Hamayon's volume (both published 8 years earlier), although she does cite my critique, Kehoe 2000, to reject it. As with Lewis-Williams and Dowson, VanPool does not delve into the wide and varied pool of neurophysiologists and brain research, considering the popularized publications of Ronald K. Siegel to be sufficient authority, in spite of, as she footnotes, "Siegel and West (1975) found that it was critical to train their subjects in their clinical test when taking hallucinogenic drugs" (VanPool 2009: 180). Standing within Eliade's orbit, she takes this manipulation of clinical subjects to be similar to non-Western religious practitioners training apprentices. From the same standpoint, she uses data from Casas Grandes (Paquimé) and Pottery Mound, two late precontact Puebloan towns, to illustrate her method of recognizing shamans in nonliterate societies. Casas Grandes is on the intersection of major trade routes linking the American Southwest with Mexico and the Pacific coast with inland towns. That late in history, in towns Puebloan in many respects, a reader would presume anthropomorphic figures painted on pots and walls to represent priests and ceremonial dancers, but VanPool sees "entopic (sic) imagery" and transforming shamans.

Summary

The idea of "shamans," as primitive religious leaders universally in ancient societies and non-Western indigenous small nations, is accepted uncritically by many archaeologists. The foundational text by Mircea Eliade has been denounced by scholars conversant with his alleged sources, and a careful reading reveals his mystical concept of an undying "sacred" contacted by "shamans." An "archaeology of shamanism" was stimulated by a 1988 paper by South African anthropologist David Lewis-Williams, proposing that anthropomorphic and animal forms, and simple lines, in rock art represented shamans' visions while in trance. Premising cultural evolution from primitive shaman-led communities to later states employing priests is part of Western colonial legitimation, obvious in the attribution of "shamans" to colonized peoples in contrast to imperial powers' priests. The term "shaman" should be restricted to the Arctic-Subarctic societies with religious practitioners such as the Evenki *šaman*, archaeologically inferred from rock art anthromorphs showing shamans' attributes and from the very few burials with material objects associated with shamans in these regions. Because religions are dynamic constructs arising from historical situations, none can have persisted from Paleolithic times, nor can there have been a universal substrate religion or practice superseded in "civilized" nations by priests.

Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative

▶ North American Classification Schemes: Overview
▶ Olmec: Geography and Culture
▶ Pälsi, Sakari
▶ Tupi-Guarani Archaeology in Brazil

References

Alberts, Thomas Karl. 2015. *Shamanism, discourse, modernity*. Burlington: Ashgate.
Balzer, Marjorie Mandelstam. 1990. *Shamanism: Soviet studies of traditional religion in Siberia and Central Asia*. Armonk: M. E. Sharp.
Eliade, Mircea. 1964. Shamanism: Archaic techniques of ecstasy. Trans. W.R. Trask. Princeton: Princeton University Press. Original, Chamanisme et les techniques archaïques de l'extase. Paris: Librairie Payot, 1951.
Francfort, Henri-Paul, and Roberte N. Hamayon, eds. 2001. *The concept of shamanism: Uses and abuses*. Budapest: Akadémai Kiadó.
Hauser-Schäublin, Brigitta, and Gundolf Krüger. 2007. *Siberia and Russian America: Culture and art from the 1700s; the Asch collection, Göttingen*. Munich: Prestel.
Hodgson, D. 2014. The Significance of the Pech Merle Spotted Horses. Arts 3:207–212. https://doi.org/10.3390/arts3020207
Helvenston, Patricia A., and Paul G. Bahn. 2003. Testing the Three Stages of Trance Model with Comments by J. L. Bradshaw & C. Chippindale. *Cambridge Archaeological Journal* 13 (2): 213-24.
Kehoe, Alice Beck. 2000. *Shamans and religion: An anthropological exploration in critical thinking*. Long Grove: Waveland.
Lewis-Williams, J. David and Thomas A. Dowson. 1988. The Signs of All Times: Entoptic Phenomena in Upper Palaeolithic Art. *Current Anthropology* 29(2):201–245.
Martynov, Anatoly I. 1991 The ancient art of northern Asia. Trans. and edited by Demitri B. Shimkin and Edith M. Shimkin. Urbana: University of Illinois Press.
Price, Neil S., ed. 2001 *The archaeology of shamanism*, London: Routledge.
Smithsonian Institution. https://naturalhistory.si.edu/arctic/features/croads/ekven1.html#tomb. Accessed 22 Jan 2018.
Thomas, David Hurst, Lorann S.A. Pendleton, and Stephen C. Cappannari. 1986. *Western Shoshone*. In: *Handbook of North American Indians*, ed. Warren L. d'Azevedo, vol. 11, 262–283. Washington, DC: Smithsonian Institution.
VanPool, Christine S. 2009. The signs of the sacred: Identifying shamans using archaeological evidence. *Journal of Anthropological Archaeology* 28: 177–190.
Whitley, David S. 1988. Comment to Lewis-Williams and Dowson. *Current Anthropology* 29 (2): 238.

Further Reading

Sidky, Homayun. 2008. *Haunted by the archaic shaman: Himalayan Jhākris and the discourse on shamanism*. Lanham: Lexington.
Thomas, Nicholas, and Caroline Humphrey, eds. 1994. *Shamanism, history, and the state*. Ann Arbor: University of Michigan Press.
Tomášková, Silvia. 2013. *Wayward shamans: The prehistory of an idea*. Berkeley: University of California Press.
Znamenski, Andrei A. 2007. *The beauty of the primitive: Shamanism and western imagination*. New York: Oxford University Press.

Archaeology of Syria-Palestine

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Introduction

The archaeology of Syria-Palestine (Fig. 1) reveals a complex mosaic of interconnecting cultures with close relations to the ancient civilizations of Egypt and Mesopotamia, as well as with the surrounding cultures of the East Mediterranean, during the Bronze and Iron Ages (mid-fourth/third-mid first millennium BCE). As such Syria-Palestine was the ultimate contact situation, a place where individuals from very different social and material worlds interacted closely, sharing ideas and knowledge. The region was home to some of the earliest known fortified towns and cities; in the north these were literate from the mid-3 millennium BC, and texts from sites such as Ebla and Mari provide us with a unique insight into international politics, local religious practices, and social organization. Given the strategic position of Syria-Palestine, it was inevitably witness to countless military campaigns and successive empires between the late fourth and first millennium BC, indeed continuing down to the present day. Detailed and increasingly sophisticated archaeological exploration and

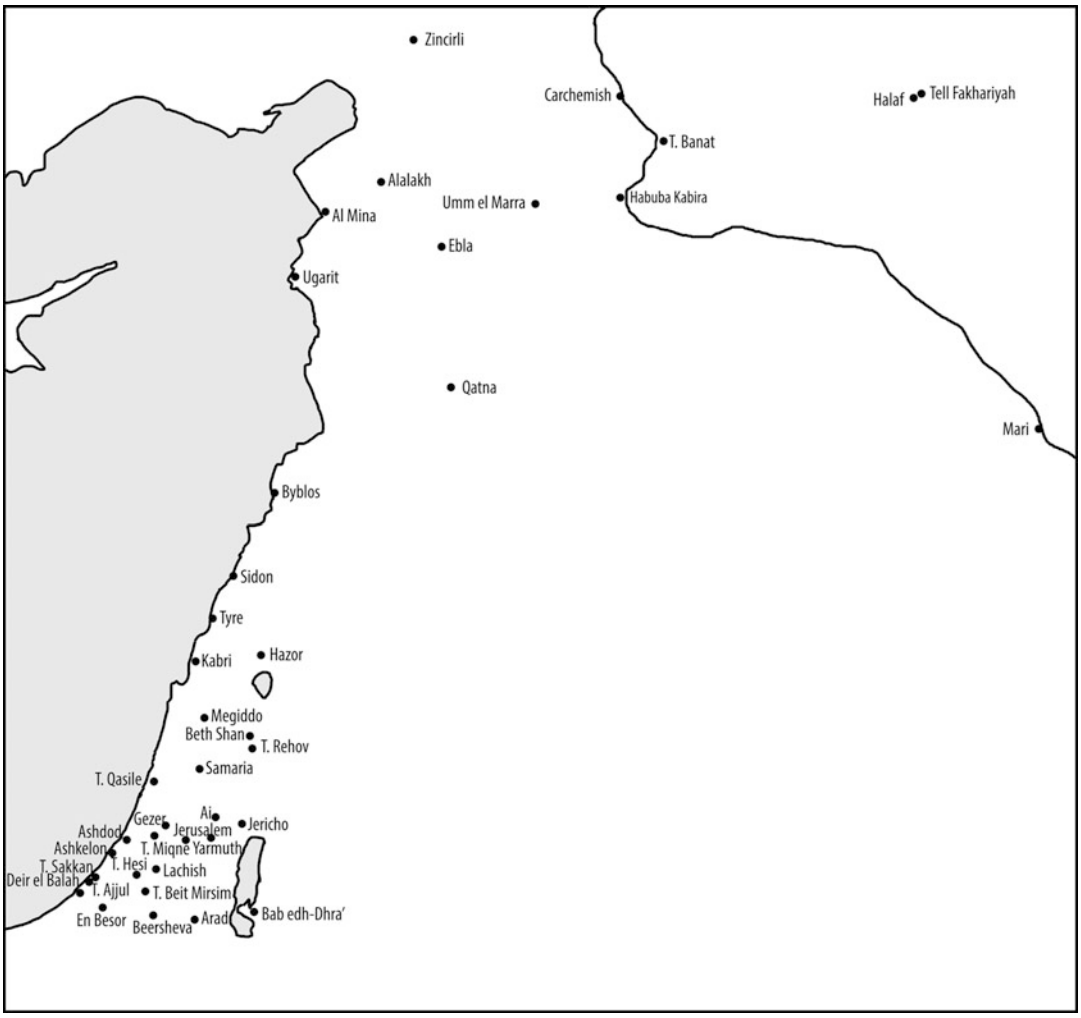

Archaeology of Syria-Palestine, Fig. 1 Map of Syria-Palestine showing sites mentioned in text

interpretation continues to shed light on Bronze and Iron Age settlement allowing a more nuanced understanding of the lives of the ancient communities in the region.

Definition

Syria-Palestine (also commonly referred to as the Levant) comprises the region of southwest Asia bounded by the Mediterranean Sea to the west, the Amuq plain to the north, the Sinai desert to the south, and the upper reaches of the Euphrates river to the east. It can be subdivided into a number of smaller regional entities according to geography and external influences. The two main areas of the northern Levant comprise coastal Syria, lying between the Mediterranean Basin and the Orontes River, and the uplands of inland Syria, between the Orontes and the Euphrates. The Barada river rising in the Anti-Lebanon Mountains watered the Damascus Oasis (al-Ghūṭah) – a large and fertile tract of land supporting settlement from at least the second millennium BC. To the south of the oasis is the basaltic region of Hawran, separating Syria from Transjordan. In antiquity the northern

Levant (Syria) fell within the cultural and political orbit of Mesopotamia. The central area of the Levant (modern-day Lebanon) is a narrow coastal strip, the homeland of the Phoenicians; this is bounded to the east by the Lebanon mountains, the Beqaa valley, and further east by the Anti-Lebanon mountains. The southern Levant is similarly divided into two zones by the River Jordan and Dead Sea. The western zone, Cisjordan, comprises a wide coastal plain and the highlands of mount Carmel, the Judean Hills, and the hilly region of Galilee. The Jezreel Valley in the northern part of this region provides an important route east-west. This area was the homeland to the ancient Canaanites, Philistines, and Israelites and was heavily influenced culturally and politically by ancient Egypt. To the east of the River Jordan lies an area of uplands and plateaus, known as Transjordan.

The chronology of pre-Achaemenid Syria-Palestine (Sharon 2014) is defined by ceramic seriation – significant changes in pottery styles over time. Absolute dates traditionally derive from cross-dating, using named Egyptian or Mesopotamian artefacts found in sealed contexts, but increasingly radiometric dating is being used to construct a more secure chronological framework (Toffolo et al. 2014). The late fourth-third millennium BCE covers the Early Bronze Age, the Middle and Late Bronze Ages equate to the second millennium BCE, Iron Age I covers 1200–1000 BCE, and Iron II (down to the Babylonian/Achaemenid Empire) largely correlates with the first 500 years of the first millennium BCE. These chronological phases largely correspond to significant developments in the social organization of the region: urbanization and the development of states through to the emergence of large regional empires.

Historical Background

The earliest archaeological activity in the southern Levant, in the nineteenth century, was largely inspired by an interest in the Bible (Davies 2004). The pioneer of biblical archaeology was the American clergyman Edward Robinson, who developed an historical/biblical geography of Palestine by matching modern Arabic names to biblical Hebrew names, albeit not always accurately. In 1865 the Palestine Exploration Fund was established with the express aim of surveying Palestine to provide a geographical background to the Bible. Some of their earliest work included the survey of the ancient water system of Jerusalem by Charles Warren, and in 1914 T.E. Lawrence and Sir Leonard Woolley (2003) completed a more detailed archaeological survey of the southern Levant, the so-called wilderness of Zin. Woolley and Lawrence also excavated the (Neo-)Hittite site of Carchemish on the Euphrates for the British Museum between 1912 and 1914.

The archaeological landscape of Syria-Palestine is characterized by tell sites – mounds formed by the detritus of continuous occupation over many centuries. These dominate archaeological narratives, being the focus of excavations over the past 150 years or so, while the rural hinterland is less well researched. While these tells proved challenging for the nineteenth and early twentieth century archaeologists, they also aided the development of archaeological techniques as demonstrated by Sir Flinders Petrie's excavations at Tell el-Hesi in 1890. Here, Petrie not only introduced the principles of stratigraphic excavations to Palestine but was also able to demonstrate the validity of his ceramic sequence dating by correlating his typological sequence against the stratigraphy of the tell. Important sites such as Megiddo, Gezer, and Ugarit (Minet el Beida and Ras Shamra) were excavated in the early years of the twentieth century, but archaeologists Gottlieb Schumacher, Robert Macalister, and Claude Schaeffer struggled with the complexities of the multiple layers of occupation and the sheer quantities of artefacts uncovered. At Byblos French archaeologists Pierre Montet and Maurice Dunand excavated the site in arbitrary 20 cm levels, creating an artificial stratigraphy, obscuring details of site formation. Instead, it was Reisner's excavations at Samaria where we see the first real understanding of tell formation and the necessity for meticulous recording, including architectural plans and photography. This was taken forward by William Albright at Tell Beit

Mirsim, albeit with a primary focus on pottery context rather than stratigraphy to interpret the results. Kenyon's excavations at Jericho further established the importance of stratigraphy and the use of the Wheeler-style grid system as standard. These approaches to tell archaeology have formed the basis of ongoing excavation in Syria-Palestine throughout the twentieth century up to the present, although regional surveys are increasingly helping to supplement our understanding of human interactions with the landscape (e.g., Wilkinson 2003), alongside some excavation of small, rural sites (e.g., Fall et al. 1998).

Over the past 70 years, modern political events have severely impacted upon archaeological research throughout much of Syria-Palestine. While dam construction in the late twentieth century has obliterated many sites in the area of the Syrian Euphrates, it likewise served as the impetus for systematic archaeological exploration of the region (Cooper 2006, 5–6). More destructive still have been the civil wars in Lebanon and Syria and the intifada in the Palestinian territories. Nonetheless, modern technologies have increasingly been employed to help record, preserve, and protect archaeological remains; for example, satellite imagery has been used to document the damage and destruction of archaeological sites in the Syrian civil war (Casana and Laugier 2017).

Key Issues/Current Debates

Initial interpretations of the archaeology of the southern Levant were informed by biblical sources. For example, the destructions at the end of EB III and appearance of new pottery and metal styles in MB I were equated with the Amorite incursions recounted in the Bible (Kenyon 1979, 145–6); similarly the Iron II sites at Samaria, Megiddo, and Beersheva were equated with the kingdoms of Israel and Judah (Kenyon 1979, 258–85). More detailed knowledge and understanding of the intricacies of the material record and the application of cultural-historical approaches have resulted in the archaeological narratives being placed within trajectories of social complexity, namely, the emergence, floruit, and decline of civilization. Also significant are more nuanced understandings of the relationship between material culture and cultural identity. The key metanarratives currently used to interpret Syria-Palestinian archaeology are urbanization, secondary state formation, empire, interconnections, and migrations/population movements. There has also been considerable debate over significant material changes in the archaeological record and the decline and collapse of urban centers and state systems, both at the end of the EBA (Kennedy 2016) and at the Bronze-Iron Age transition (Ward et al. 1992).

The EBA in the southern Levant is typically characterized as a period of increasing social complexity, culminating in the appearance of towns in EB II–III (Joffe 1993; Miroschedji 1989). Around 50 fortified EBA centers have been identified in Cisjordan, including Jericho, Ai, and Arad. These range in size between 3 and 25 hectares. The fortified walls had stone bases and mudbrick superstructures built on earthen ramparts and were protected by semicircular or rectilinear towers. The gateways were protected by flanking square towers. Inside the walls there were blocks of houses with courtyards and a network of paved streets. Public buildings are attested in EB III, most notably at Megiddo (Building 3177) and Tel Yarmuth (B1 and B2). These were substantial multi-roomed structures with inner courtyards. Recently, Chesson (2015) has questioned whether these settlements should in fact be identified as urban centers, noting a lack of distinction between the material habitus of rural and non-rural settlements and no evidence for the development of surplus redistribution economies. Instead she interprets these sites as egalitarian walled communities.

Urbanization is a later phenomenon in the northern Levant (Cooper 2006), dating to EB III–IV (the latter half of the second millennium BCE). Unlike the southern Levant, here there is clear evidence for settlement hierarchy, with large central places surrounded by smaller satellite settlements in the hinterland. The urban centers, or citadel cities, are characterized by a walled upper town, the location of the palace and temples, and a lower town fortified by walls built on a rampart.

A number of these cities have been excavated, most notably Ebla (Matthiae 1981). There is also clear evidence that these towns functioned within an early state system, as is evidenced by Palace G at Ebla and its important archives (some 17,000 documents written in the cuneiform script), which document a redistribution economy, treaties, and trade with other towns, and also literary texts. There is some evidence for gift exchange between Ebla and Old Kingdom Egypt in the form of a Pepi I inscribed stone vase fragment. Mari on the Euphrates (Margueron 2014), which lies at the interface between Mesopotamia and the Levant, was an important mediator of cultural and economic influence in Syria and in particular was in close contact (not always peaceful) with Ebla. Culturally, Mari was situated within the Mesopotamian sphere of influence, as is indicated by the lapis lazuli bead inscribed with the name of Mes-ana-pada, ruler of Ur, found in palace P1, and the fine stone sculptures dedicated in the Temple of Ishtar. There is also evidence for attached craft specialists in the palaces, who produced luxurious goods from traded commodities (lapis lazuli, gold, and silver). These might be placed in elite burials, such as the royal tombs located on top of the acropolis of Umm el-Marra. Here finds included silver drinking equipment and jewelry made from gold and semi-precious stones (Schwartz et al. 2006).

There is an apparent break between the urbanized communities of the EBA and MBA-LBA. Many EBA towns were abandoned – this has been variously attributed to climate change (Kennedy 2016) or military activity, such as the sack of Ebla by the Akkadian rulers – but by the second millennium BC, urban centers flourished along the coast of the Levant and in the region of the Syrian Euphrates, characterized by a new material habitus (architecture, metal objects, and pottery). These changes are commonly associated with the Amorites (Amurru of Akkadian texts and Martu in Sumerian) – a population group identified from Mesopotamia to Syria-Palestine (Burke 2018). In the north we see the development of cities controlling substantial territories, such as Ugarit (Yon 2006) and Alalakh (Woolley 1955); these typically comprised a fortified acropolis and a walled lower town. Fortified urban centers, chief among them Hazor, Lachish, and Megiddo, flourished in the south in the MBA (Burke 2018, 265–71, 287–8, 290–6). Burke's recent study (2018) of MBA fortifications from around the region demonstrates the interconnectedness of the urban centers throughout Syria-Palestine and the communication of ideas and practices over a wide area. Solid mudbrick walls 3–4 m wide with stone foundations were built on large freestanding earthen ramparts, or a glacis (an artificial slope created of earth on existing mound or hill, the outer slope covered with lime). There is clear evolution of the massive gateways from the four-pier bent axis structures of MBIIA gate to the standard four- and six-pier gate in MB IIB. Also common throughout the region in the MBA and LBA was the migdol (tower) temple.

The fortified towns of the MBA and LBA were dominated by monumental impressive palaces, located on the upper citadel in Syria. The east Syrian palaces, most famously that of Zimri-Lin at Mari with its many courtyards, demonstrate Mesopotamian influence. In western Syria, including Ebla and Alalakh, a different architectural tradition develops asymmetrical palaces, with hypostyle halls, royal burial vaults (hypogaea), and the widespread use of basalt orthostats and cedarwood columns. Several MB palaces, Qatna and Alalakh in the north and Kabri in the south, were decorated with Aegeanizing wall paintings (Brysbaert 2008). At Alalakh there is a prototype of the bit hilani type palace, comprising a wooden-pillared portico at the entrance to reception room approached by a broad but low flight of steps. The LBA palace at Ugarit combined the traditions of east and west Syria; covering an area of around 1 ha and protected by a sloping glacis, it comprised some 100 rooms, courtyards, a garden, and intramural dressed royal tombs. The palaces identified in the south in the MB-LB, for example, at Hazor and Megiddo, tend to be smaller than their Syrian counterparts, but similar in overall design. Patrician houses, large structures with open courtyard, a pillared hall, storage rooms, and an upper floor are common in LBA sites in the southern Levant, such as at Tell Beit Mirsim.

Interpretations of urbanization and state formation are closely intertwined within narratives of external (imperial) influences from the pristine states of Egypt and Mesopotamia. The earliest evidence for colonial activity dates to the late fourth millennium BCE and is usually attributed to trading endeavors for raw materials. Egyptian Dynasty 0 colonies have been identified in the southern Levant in EB I, at sites such as En Besor, Arad, and Tell Sakan, apparently established to control trading activities (Van den Brink and Braun 2003). These are characterized by Egyptian style architecture, locally made Egyptian pottery, and sherds marked with a serekh (one of the Egyptian king's royal names written inside a palace façade), including several Narmer serekhs (Braun 2009). Several fortified Late Chalcolithic sites on the Syrian Euphrates have been identified as Uruk colonies on the basis of their southern Mesopotamian architecture, material culture (including the characteristic bevel-rimmed bowl), and bureaucratic paraphernalia (numerical tablets, bullae, and seal impressions) (Stein 2014). The best known of these is Habuba Kabira. These "colonies" represent the earliest documented territorial expansion by the Egyptians and the city states of ancient Mesopotamia into the Levant; while both examples provide evidence for administrative activity and a need for protection, in the form of fortifications, it is not possible to demonstrate imperial governance over the wider hinterland.

The LBA (c.1600/1550–1200) can be characterized as an age of Empire, with three great powers competing over the territory of Syria-Palestine: Egypt, Mittani, and the Hittites. A destruction horizon separating MBA and LBA strata at several sites in the southern Levant has commonly been attributed to 18th Dynasty Egyptian military activity following the expulsion of the Hyksos (Toffolo et al. 2014, 240–1). There was an apparent urban decline in the southern Levant in the LBA, and the region is characterized by smaller city-states, a change that has been attributed to Egyptian imperial activity. The main phase of Egyptian expansion was in the Thutmosid period in LB I. Both Thutmosis I and III reached the Euphrates in their military campaigns, but for the most part, Egyptian military and imperial activity centered on the southern and central Levant. Here a number of Egyptian residencies and military establishments have been identified dating to LB II (19th Dynasty), including Beth Shan, Tel Rehov, and Deir el-Balah. These are characterized by distinctive Egyptian architecture and locally made Egyptian pottery. There are also numerous examples of Egyptianizing clay coffins at sites such as Beth Shan, Deir el-Balah, and Lachish, which have been attributed to burials of Egyptian officials (Steel 2018, 21–2). Although Egyptian officials were undoubtedly active in the southern Levant, for the most part, imperial rule was mediated via the local petty rulers, many of whom are recorded in the Amarna letters (Moran 2000).

The kingdom of Mittani was a significant power in the northern Levant during the earlier LBA (fifteenth to mid-fourteenth centuries). Their power base was the upper Khabur plains, and their capital of Washukanni has been identified with Tell Fakhariyah. Archaeologically, Mittani remains elusive, their only clear cultural markers being the distinctive Nuzi ware and Mittani-style cylinder seals (Akkermans and Schwartz 2003, 329). They were superseded in the late fourteenth century by the Hittites, under the reign of Šuppiluliuma I (c.1350 BCE), whose power base was Hattusas (modern-day Boğazköy) in the central Anatolian plateau. The Hittites controlled the region through local vassal kings; materially, they have left little mark in the archaeological record and physical evidence for their domination primarily comes from textual sources, as, for example, the Hittite seals, bullae, and cuneiform texts from the archives Ugarit (Yon 2006).

Empire continued to shape the Levant during the Iron Age, although this has not received the same attention in the archaeological literature. The geopolitical landscape of the Early Iron Age was greatly transformed following the collapse of the LBA centers c.1200 BCE (Ward et al. 1992; Yener 2013). Other than Sheshonq I's attack on the southern Levant, c. 925 BCE, recorded on a stele fragment from Megiddo and on the Karnak Temple List (Kitchen 1986: 432–47), Egypt had ceased to be a major power in the region. The

major imperial power that emerged in the region in the first millennium was Assyria. Between the reigns of Tiglath-Pileser III (745–727 BCE) and Ashurbanipal (668–627 BCE), the Assyrian rulers launched successive attacks on the major cities of the Levant, taking prisoners and tribute, which they recorded on the walls of their palaces. State formation continues to be a theme in the Iron Age, as, for example, Moab in Transjordan in Iron II (Routledge 2004).

The key debates shaping Iron Age research in the southern Levant have been migrations and ethnicity or identity (Yasur-Landau 2014; Finkelstein 1988). These narratives are embedded in archaeological interpretations of the relationship between material culture and cultural identity and also in more nuanced understanding of social praxis and lifeways. A key example of this is the identification of the characteristic bichrome Philistine pottery in Iron I strata with a migrant Aegean population (Dothan 1982; Yasur-Landau 2014). This debate is now increasingly underpinned by understandings of trans-culturalism (Hitchcock 2011) or cultural hybridity and how this resulted in the reinvention of Aegean architecture, especially hearth buildings at Tel Qasile and Tel Miqne (ancient Ekron), religious practices, and diet, in particular the consumption or otherwise of pig. Finkelstein (1988) has explored the formation of early Israelite identity (or ethnicity). He opposes the traditional view, strongly influenced by biblical narratives, that the rise of early Israel in the first millennium BCE resulted from a population shift from the Canaanite lowlands into the highlands during Iron I. Instead, drawing upon a detailed examination of the archaeological record (architecture, pottery, and foodways) in the highlands both east and west of the River Jordan – which he situates within a longue durée understanding of fluctuations in settlement patterns in the wider region – Finkelstein argues for population and cultural continuity in the highlands between LBA and Iron I, suggesting that the Israelites were settled pastoral nomads. Iron I is poorly known in Syria, but by Iron II, new political groupings have emerged in the region, chief among them the Neo-Hittites in the north and the Phoenicians in the central Levant. Examples of the bit hilani palaces are attested at Zincirli, Alalakh, Carchemish, and Tell Halaf (Akkermans and Schwartz 2003, 368–73); monumental architecture at these sites is adorned with sculptures of lions and sphinxes and relief carvings demonstrating a strong Hittite influence.

Despite the perceived focus on impressive monumental structures (fortifications, palaces, and temples) and as a corollary emphasis on social complexity in the literature (as discussed above), there are numerous examples of well-excavated domestic structures throughout the region. Accordingly, there is a growing interest in social archaeologies informed by theoretical perspectives to explore daily life and the activities of the ancient populations of the regions. This has resulted in nuanced discussions of household archaeology, which focus on how people created and negotiated domestic spaces, looking in particular at the material residues of behavioral patterns (Yasur-Landau et al. 2011; Foster and Parker 2012). Equally, there has been greater interest in gender, with an emphasis on the social and economic roles of women within and beyond the household (Meyers 2003; Budin and Turfa 2016). Issues of memory, identity, and ancestor cult have been explored at several EBA sites, including Bab edh-Dhra in Transjordan (Chesson 2007) and Umm el-Marra (Schwartz 2007) and Tell Banat (Porter 2002) in Syria.

International Perspectives

A key theme in recent scholarship has been interconnections within and beyond Syria-Palestine (e.g., Aruz et al. 2013), in particular as a result of flourishing trade routes connecting the region not only to Egypt and Mesopotamia but equally to the Mediterranean world. Access to the exotic shaped and defined the material culture and identities of the communities of the region. Particularly close were the social and economic ties binding Byblos and Egypt, a relationship which stretches back to the EBA. These are perhaps best

illustrated by the eight rock cut shaft tombs identified as royal tombs, contemporary with the Egyptian 12th Dynasty. There was selective adoption of certain Egyptian features in these tombs, including personal adornment, faience fragments from an Egyptian-style coffin, and the use of Egyptian hieroglyphs and titles, suggesting detailed knowledge of Egyptian practices.

Large quantities of imported Cypriot and Aegean pottery found at sites along the Levantine coast, between Ugarit in the north and Tell el-'Ajjul in the south and inland as far as Transjordan, attest to the importance of maritime trading connections during the LBA. This was apparently available to the mercantile classes and was readily incorporated in social practices within settlement and funerary contexts throughout the region (Steel 2012). These vessels were exchanged in mercantile trade (also evidenced by several shipwrecks in the Mediterranean). High status gift exchange between rulers in the LBA is illustrated by the so-called International Style (Feldman 2008). This refers to portable luxury objects found in elite contexts, which were made of valued materials such as ivory, alabaster, gold, silver, and faience and characterized by a mix of forms and motifs from the Aegean, Egypt, and the Levant so that their places of origin are unclear. Examples from the Levant include faience animal cups (bibru) from Ugarit and Hazor and the Megiddo ivories found in the twelfth-century palace.

Traditionally, it was accepted that following the collapse at the end of the Bronze Age, there was a breakdown in maritime trade until the eighth century, a period that has been described as a Dark Age. Today there is clear evidence that the Levant and Cyprus continued to be involved in exchanges throughout this period. The adoption of iron has been demonstrated to be the result of the close cultural and economic relations between Cyprus and the southern Levant (Philistia) in the twelfth century (Sherratt 1994). A more detailed knowledge of the Phoenician ceramic typology, based on soundings at Tyre, clearly demonstrates that the earliest phase of Phoenician expansion west to Cyprus dates to the eleventh century (Bikai 1987), which is reiterated by evidence for Phoenician activity in the Aegean as early as the tenth–ninth centuries. By the eighth century, the cities of Sidon, Tyre, and Byblos were establishing colonies in the west Mediterranean in their search for metals to supply the Assyrian empire. Evidence for Greek trading, and possibly even colonial, activity in the northern Levant is more controversial. Woolley famously identified the port site of Al Mina (Luke 2003) as a Greek (Euboean) colony, based on the large quantities of Greek pottery (primarily decorated drinking equipment) found there from the late eighth century. The material habitus of the site (architecture, burials), however, does not support resident Greeks, and current opinion is that the pottery represents imports brought by enterprising Phoenician (?) traders.

Future Directions

To date our understanding of the archaeology of Syria-Palestine has been based on meticulous recovery and analysis of the material remains. Ceramic typologies, architectural studies, stratigraphic sequences, and faunal analyses, to name but a few, form the bedrock of the debates and narratives outlined above. Interdisciplinary research, drawing on developments in biological and chemical sciences, is increasingly playing a significant role in archaeological research, enhancing our understanding of the Bronze and Iron Ages in the region. Harvey Weiss' (2015) ongoing exploration of the dramatic climatic events at the end of the third millennium BC is particularly relevant to current concerns about climate change in the Anthropocene. Archaeological survey is being enhanced by the application of online satellite imagery, which facilitates the mapping of environmental features for a more nuanced understanding of settlement patterns. This has been used for example to explore pastoral herding patterns in southern Syria (Ansart et al. 2016). DNA analysis is providing more information about ancient populations. Most recently, a study of ten skeletons from the Philistine site of Ashkelon has helped to resolve the issue of

population movements at the end of the Bronze Age (Feldman et al. 2019). Results indicate that the DNA of twelfth-century skeletons had similarities with ancient Cretan DNA. There was, however, limited genetic impact on the Iron Age population at the site, and there is virtually no trace of the European DNA in skeletons dating to the tenth–ninth centuries. These are just a few of the scientific developments transforming Syrian-Palestinian archaeology in the early twenty-first century.

Cross-References

- ▶ Archaeology of Ancient Egypt
- ▶ Cape Gelidonya Shipwreck Excavation
- ▶ Cyprus, Archaeology of
- ▶ Empire in the Ancient Near East, Archaeology of
- ▶ Households in the Ancient Near East, Archaeology of
- ▶ Jericho Archaeological Site
- ▶ Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of
- ▶ Megiddo and the Megiddo Expedition
- ▶ Petrie, William Matthew Flinders
- ▶ Seleucid, Parthian Mesopotamia, and Iran, Archaeology of
- ▶ Stratigraphy in Archaeology: A Brief History
- ▶ Urbanism in the Ancient Near East

References

Akkermans, P.M.M.G., and G.M. Schwartz. 2003. *The archaeology of Syria from complex hunter-gatherers to early urban societies*. Cambridge: Cambridge University Press.

Ansart, A., F. Braemer, and G. Davtian. 2016. Preparing an archaeological field survey: Remote sensing interpretation for herding structures in the Southern Levant. *Journal of Field Archaeology* 41 (6): 1–14.

Aruz, J., S.B. Graff, and Y. Rakic, eds. 2013. *Cultures in contact: From Mesopotamia to the Mediterranean in the second Millennium B.C*. New York: Metropolitan Museum of Art.

Bikai, P. 1987. *The Phoenician pottery of Cyprus*. Nicosia: Leventis Foundaiton.

Braun, E. 2009. South Levantine Early Bronze Age chronological correlations with Egypt in light of the Narmer Serekhs from Tel Erani and Arad: New interpretations. *British Museum Studies in Ancient Egypt and Sudan* 13: 25–48.

Brysbaert, A. 2008. *The power of technology in the Bronze Age Eastern Mediterranean: The case of the painted plaster*. London/Oakville: Equinox.

Budin, S.L., and J.M. Turfa, eds. 2016. *Women in antiquity: Real women across the ancient world*. Abingdon/New York: Routledge.

Burke, A. 2018. *Walled up to heaven: The evolution of Middle Bronze Age fortification strategies in the Levant*. Leiden: Brill.

Casana, J., and E.J. Laugier. 2017. Satellite imagery-based monitoring of archaeological site damage in the Syrian civil war. *PLoS One*. https://doi.org/10.1371/journal.pone.0188589.

Chesson, M.S. 2007. Remembering and forgetting in Early Bronze Age mortuary practices on the Southeastern Dead Sea plain, Jordan. In *Performing death: Social analyses of funerary traditions in the ancient near east and Mediterranean*, ed. N. Lanieri, 109–139. Chicago: Oriental Institute.

Chesson, M.S. 2015. Reconceptualizing the Early Bronze Age southern Levant without cities: Local histories and walled communities of EB II—III Society. *Journal of Mediterranean Society* 28 (1): 51–79.

Cooper, L. 2006. *Early urbanism on the Syrian Euphrates*. London/New York: Routledge.

Davies, T.W. 2004. *Shifting sands: The rise and fall of biblical archaeology*. Oxford: Oxford University Press.

de Miroschedji, P., ed. 1989. *L'urbanisation de la Palestine a l'Âge du Bronze ancien. Bilan et perspectives des recherches actuelles*, BAR International Series. Vol. 527(i). Oxford: B.A.R.

Dothan, T.K. 1982. *The Philistines and their material culture*. Harvard: Yale University Press.

Fall, P.L., L. Lines, and S.E. Falconer. 1998. Seeds of civilization: Bronze Age rural economy and ecology in the Southern Levant. *Annals of the Association of American Geographers* 88 (1): 107–125.

Feldman, M.H. 2008. *Diplomacy by design: Luxury arts and an "International Style" in the ancient near East, 1400–1200 BCE*. Chicago: University of Chicago Press.

Feldman, M., D.M. Master, R.A. Bianco, M. Burri, P.W. Stockhammer, A. Mittnik, A.J. Aja, C. Jeong, and J. Krause. 2019. Ancient DNA sheds light on the genetic origins of Early Iron Age Philistines. *Science Advances* 5 (7). https://doi.org/10.1126/sciadv.aax0061.

Finkelstein, I. 1988. *The archaeology of Israelite settlement*. Jerusalem: Israel Exploration Society.

Foster, C.P., and B.J. Parker, eds. 2012. *New perspectives on household archaeology*. Winona Lake Indiana: Eisenbrauns.

Hitchcock, L. 2011. 'Transculturalism' as a model for examining migration to Cyprus and Philistia at the end of the Bronze age. *Ancient West and East* 10: 267–280.

Joffe, A.H. 1993. *Settlement and society in the early bronze I & II Southern Levant: Complementarity and contradiction in a small-scale complex society.* Sheffield: Sheffield Academic Press.

Kennedy, M.A. 2016. The end of the 3rd Millennium BC in the Levant: New perspectives and old ideas. *Levant* 48: 1–32.

Kenyon, K.M. 1979. *Archaeology in the Holy Land*. 4th ed. London: Methuen & Co.

Kitchen, K.A. 1986. *The Third Intermediate Period , 1100–650 B.C.* 2nd ed. Warminster: Aris and Phillips.

Luke, J. 2003. *Ports of trade, Al Mina, and Geometric Greek pottery in the Levant*. Oxford: Archaeopress.

Margueron, J.-C. 2014. *Mari: Capital of Northern Mesopotamia in the third Millennium. The archaeology of Tell Hariri on the Euphrates*. Oxford: Oxbow Books.

Matthiae, P. 1981. *Ebla: An empire rediscovered*. Trans. C. Holme. Garden City: Doubleday.

Meyers, C. 2003. Women's culture in agrarian households of the Iron age. In *Symbiosis, symbolism, and the power of the past: Canaan, ancient Israel, and their neighbors from the Late Bronze Age through Roman Palaestina*, ed. W.G. Dever and S. Gitin, 425–444. Winona Lake Indiana: Eisenbrauns.

Moran, W.L. 2000. *The Amarna letters*. Baltimore: John Hopkins University.

Porter, A. 2002. The dynamics of death: Ancestors, pastoralism, and the origins of a third-millennium city in Syria. *Bulletin of the American Schools of Oriental Research* 325: 1–36.

Routledge, B. 2004. *Moab in the Iron Age: Hegemony, polity, archaeology.* Philadelphia: University of Pennsylvania Press.

Schwartz, G.M. 2007. Status, ideology and memory in third-millennium Syria: Royal tombs at Umm el-Marra. In *Performing death: Social analyses of funerary traditions in the ancient near East and Mediterranean*, ed. N. Laneri, 39–68. Chicago: Oriental Institute.

Schwartz, G.M., H.H. Curvers, S. Dunham, B. Stuart, and J.A. Weber. 2006. A third-Millennium B.C. elite mortuary complex at Umm el-Marra, Syria. 2002 and 2004 excavations. *American Journal of Archaeology* 110 (4): 603–641.

Sharon, I. 2014. Levantine chronology. In *The Oxford handbook of the archaeology of the Levant c. 8000–332 BCE*, ed. M. Steiner and A. Killebrew, 44–65. Oxford: Oxford University Press.

Sherratt, E.S. 1994. Commerce, iron and ideology: Metallurgical innovation in 12th – 11th century Cyprus. In *Cyprus in the 11th century B.C.*, ed. V. Karageorghis, 59–106. Nicosia: Leventis Foundation.

Steel, L. 2012. *Materiality and consumption in the Bronze Age Mediterranean*. Abingdon/New York: Routledge.

Steel, L. 2018. Shifting relations in Bronze Age Gaza: An investigation into Egyptianizing practices and cultural hybridity in the southern Levant during the Late Bronze Age. *Journal of Ancient Egyptian Interconnections* 20: 15–30.

Stein, G. 2014. Economic dominance, conquest, or interaction amongst equals? Theoretical models for understanding culture contact in early Near Eastern complex societies. In *Proceedings of the 4th Iranian archaeologists conference*, ed. H. Azizi, M. Khanipoor, and R. Naseri, 55–67. Tehran: University of Tehran Press.

Toffolo, M.B., E. Arie, M.A.S. Martin, E. Boaretto, and I. Finkelstein. 2014. Absolute chronology of Megiddo, Israel, in the Late Bronze and Iron Ages: High-resolution radiocarbon dating. *Radiocarbon* 56 (1): 221–244.

Van Den Brink, E.M.C., and E. Braun. 2003. Egyptian elements and influence on the Early Bronze Age I of the Southern Levant. Recent excavations, research and publication. *Archeo-Nil* 13: 77–91.

Ward, W.A., M.A. Joukowsky, and P. Åström, eds. 1992. *The crisis years: The 12th century B.C.: From beyond the Danube to the Tigris*. Dubuque: Kendall/Hunt Pub.

Weiss, H. 2015. Megadrought, collapse, and resilience in late third millennium BC Mesopotamia. In *2200 BC – A climatic breakdown as a cause for the collapse of the Old World?* ed. H. Meller, H.W. Artz, R. Jung, and R. Risch, 35–52. Halle: Landesmuseum für Vorgeschichte.

Wilkinson, T.J. 2003. *Archaeological landscapes of the Near East*. Tucson: University of Arizona Press.

Woolley, C.L. 1955. *Alalakh: An account of the excavations at Tell Atchana in the Hatay, 1937–1949*, Reports of the research committee of the society of antiquaries of London 18. London: Society of Antiquaries.

Woolley, C.L., and T.E. Lawrence. 2003. *The wilderness of Zin. PEF annual* III (Revised 3rd ed.). London: Stacey International.

Yasur-Landau, A. 2014. *The Philistines and Aegean migration at the end of the late bronze age*. Cambridge: Cambridge University Press.

Yasur-Landau, A., J.R. Ebeling, and L.B. Mazow. 2011. *Household archaeology in ancient Israel and beyond*. Leiden/Boston: Brill.

Yener, K.A. (ed.) 2013. *Across the border: Late bronze-Iron age relations between Syria and Anatolia: Proceedings of a symposium held at the research center of Anatolian Studies*, Koc University, Istanbul, 31 May –1 June 2010. Leuven: Peeters Publishers.

Yon, M. 2006. *The City of Ugarit at Tell Ras Shamra*. Winona Lake: Eisenbrauns.

Further Reading

Aruz, J., K. Benzal, and J. Evans, eds. 2008. *Beyond Babylon: Art, trade, and diplomacy in the second millennium B.C*. New York: Metropolitan Museum of Art.

Doumet-Serhal, C., ed. 2008. *Networking patterns of the bronze age and Iron age Levant. The Lebanon and its Mediterranean connections*. Beirut: Lebanese British Friends of the National Museum.

Fischer, P.M., and T. Bürge. 2017. *"Sea Peoples" up-to-date: New research on transformations in the Eastern Mediterranean in the 13th–11th centuries BCE*. Vienna: Austrian Academy of Sciences Press.

Gonen, R. 1984. Urban Canaan in the Late Bronze period. *Bulletin of the American Schools of Oriental Research* 253: 61–73.
Joffe, A.H. 2002. The rise of secondary states in the Iron age Levant. *Journal of the Economic and Social History of the Orient* 45 (4): 425–467.
Kempinki, A., and R. Reich, eds. 1992. *The architecture of ancient Israel from the Prehistoric to the Persian periods*. Jerusalem: The Biblical Society.
Killebrew, A.E. 2005. *Biblical peoples and ethnicity: An archaeological study of Egyptians, Canaanites, Philistines and early Israel, 1300–1100 BCE*. Leiden: Brill.
Levy, T.E. 1998. *Archaeology of society in the Holy Land*. London/New York: Continuum.
Meyers, C. 1998. *Discovering Eve: Ancient Israelite women in context*. New York: Oxford University Press.
Morandi Bonacossi, D., M. Da Ros, G. Garna, M. Iamoni, and M. Merlino. 2009. The 'Eastern Palace' and the residential architecture of Area T at Mishrifeh/Qatna: Preliminary report on the 2006–2008 excavation campaigns of the Syro-Italian archaeological project. Mesopotamia 44: 61–112.
Peltenburg, E.J., ed. 2015. *Tell Jerablus Tahtani, Syria, I. Mortuary practices at an Early Bronze Age fort on the Euphrates River*. Oxford/Havertown: Oxbow Books.
Podany, A.H. 2012. *Brotherhood of kings: How international relations shaped the ancient Near East*. Oxford: Oxford University Press.
Richards, S. 2003. *Near Eastern archaeology: A reader*. Winona Lake: Eisenbrauns.
Steiner, M.L., and A.E. Killebrew. 2014. *The Oxford handbook of the archaeology of the Levant c. 8000–332 BCE*. Oxford: Oxford University Press.
Tubb, J.N. 1998. *Canaanites*. Norman: University of Oklahoma Press.

The Archaeology of the ʻOpunohu Valley, Society Islands, Eastern Polynesia

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State of Knowledge and Current Debates

The ʻOpunohu Valley, located on the north shore of Moʻorea (Fig. 1), in the Windward Society Islands, Eastern Polynesia offers a number of advantages for archaeological research. The valley has a long and intensive history of archaeological field research, offering detailed data on settlement patterns in the Society Islands and within the broader regional context of Central Eastern Polynesia. The valley has well-documented and well-preserved surface architectural remains dating to the prehistoric-protohistoric period. A robust radiocarbon and U-Th chronology illustrates that most surface structural components date to c. AD 1350–1800, permitting diachronic analyses of change through time. Finally, oral traditions, ethnohistoric texts, and archaeological data demonstrate the central importance of the ʻOpunohu as a highly productive "core" with extensive evidence for residential, ceremonial, and agricultural use, making it an ideal location for multiscalar analysis of social complexity in chiefdom level societies. After discussing the geographic context of the valley and the history of archaeological research, I will turn to a synthesis of ʻOpunohu Valley settlement patterns, agricultural intensification and human-environmental landscape change, household arhaeology and inequality at the microscale, monumental architecture and macroscale patterns of social complexity, and demography.

Geographic Context and Natural Resources

The ʻOpunohu Valley is the largest valley on Moʻorea, c. 1500 ha in area (Figs. 1 and 2). The valley has three broad physiographic units: the valley bottom, the upper valley, and the mountain slopes and ridges which form the edge of the valley. The lower valley includes c. 800 ha of flat floodplain with rich soils suitable for cultivation. The upper valley begins roughly 1200 m inland and extends to the base of the mountains which reach over 700 m. The upper valley is characterized by a series of hills and water-fed valleys; much of this terrain has high-quality soils amenable to dryland and wetland cultivation. In terms of socioeconomic organization, the upper valley is divided into the Amehiti and Tupauruuru sections which formed traditional Māʻohi sociopolitical districts at the time of European contact in 1767. Tupauruuru has less pronounced relief than Amehiti or the Middle sector (Fig. 1), and

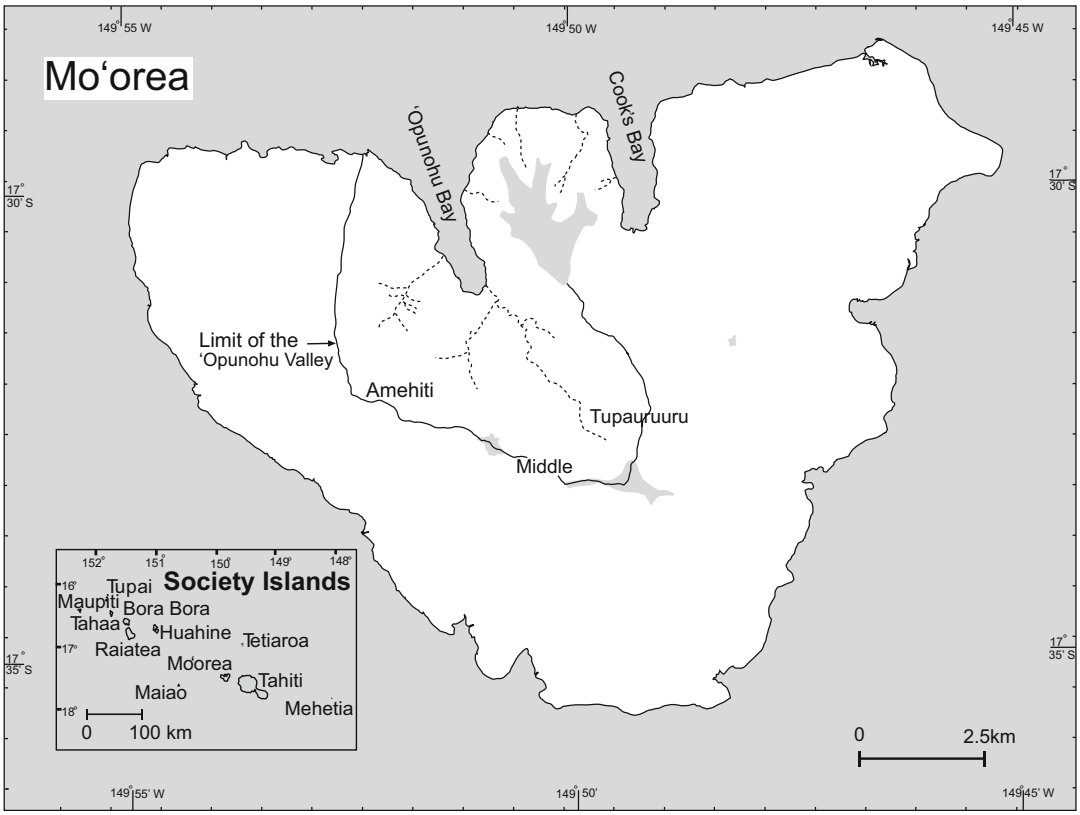

The Archaeology of the ‘Opunohu Valley, Society Islands, Eastern Polynesia, Fig. 1 Map of Mo‘orea, Society Island and location of the ‘Opunohu Valley

The Archaeology of the ‘Opunohu Valley, Society Islands, Eastern Polynesia, Fig. 2 Photo of the Tupauruuru District, ‘Opunohu Valley

these topographic differences resulted in somewhat divergent precontact settlement patterns.

In the ‘Opunohu Valley, permanent rivers and streams and high rainfall offered rich natural resources for the development of highly productive agricultural systems. The upper valley has branching rivers that flow into a single channel in the lower valley before discharging into ‘Opunohu Bay. Rainfall is abundant but varies with elevation. While there are no figures for rainfall at the valley bottom, comparisons with other nearby valleys (Lafforgue and Robin 1989) suggest c. 2500 mm of rain per year (Lepofsky 1994). The upper valley receives over 3200 mm per year, with two thirds of precipitation falling during the wet season. The foot of the mountains receives between 3500 and 4000 mm of rain per year (Lafforgue and Robin 1989; Météo-France 2004).

Traditional History

Traditional accounts suggest shifting sociopolitical configurations in the ‘Opunohu Valley through time. In early prehistory, no single district chief had authority over the others on the island of Mo‘orea; at this time at least one district within the ‘Opunohu Valley was under control of the Atiro‘o clan (Adams 1976: 163–165). A century or so prior to European contact, the then dominant Atiro‘o clan in the ‘Opunohu were overthrown by the powerful Marama lineage from Ha‘apiti (Adams 1976). The Marama line split the valley into two sociopolitical districts, Tupauruuru to the east and Amehiti to the west (Fig. 1). By the time of Cook’s voyages, the valley was the seat of a prominent Marama chief named Mahine (Green et al. 1967: 220–221; Oliver 1974: 1204–1205). Between 1774 and 1777 increasing conflicts developed between the paramount chiefs of Tahiti and Mo‘orea, after Mahine opposed leaving his title to an heir of the ruling Pomare line from Tahiti. Thereafter during the protohistoric period, the unified districts on the north shore of Mo‘orea, including the ‘Opunohu Valley, formed a chiefdom made up of seven large districts under the control of the Pomare clan (Handy 1930: 80–82). A chant recorded by Murau refers to the Amehiti and Tupauruuru districts during the Marama rule:

Come, oh come to your districts Tupauruuru and Amehiti,
To see the big canoe without an outrigger.
Its rowers are fair as the white clouds!
But Marama, the arii, *replied:*
No my children, no, I will not come. Take from me good counsel:
Curiosity has ever a bad temper,
Fair clouds and dark clouds can never long agree.
We have no better teacher than the storm. (Handy 1930: 82)

History of Archaeological Research

Kenneth P. Emory of the Bernice P. Bishop Museum arrived in the Society Islands in January 1925 and began a surface survey, primarily of large temple sites (*marae*). In his monograph, *Stone Remains in the Society Islands* (1933) Emory describes over 240 structures throughout the archipelago, but to a large extent his survey focused on coastal contexts. In the ‘Opunohu Valley, Emory recorded only three temples, a few house sites with pavements, and a smaller unnamed structure (Emory 1933: 106–107, Figs. 70 and 71).

Green’s pioneering settlement pattern research in the ‘Opunohu (Green 1961; Green et al. 1967) resulted in the mapping and description of over 63 dwelling structures, 111 probable habitation terraces, 145 religious structures (*marae* and shrines), and 77 agricultural complexes (Fig. 3; see Green and Descantes 1989); the latter often incorporated large clusters (>10–30 in number) of stone faced terraces. Green developed a culture historical sequence and understanding of site function with limited excavations at five site

Site Type	Count
Dwelling Structures with Curbstone Outline	63
Probable “Living Flats” or Habitation Terraces	111
Specialized- Council Meeting Platforms	5
Specialized- Archery Platforms	3
Religious Structures (Temples and Shrines)	145
God Figures (*ti‘i*)	18
Agricultural Complexes	77

The Archaeology of the ‘Opunohu Valley, Society Islands, Eastern Polynesia, Fig. 3 Roger Green Site Survey Data, ‘Opunohu Valley

complexes, including work at five temples and six house sites (Green et al. 1967). Reanalysis of Green's original data (Cochrane 2002; Descantes 1990, 1993; Eddowes 1991) has emphasized ritual sites (*marae*), seriation, and the potential social dimensions of ceremonial architecture and the function of precontact house sites (Orliac 2000), while Green (1996) continued to document aspects of valley-wide settlement patterns.

Dana Lepofsky (1994), Lepofsky et al. (1996) augmented Green's survey by extensively recording the spatial contexts of irrigated and dryland agricultural terrace complexes in the ʻOpunohu Valley. In her expert analysis of Māʻohi ethnohistoric documents, she outlined 6 major cultivation subsystems (1994) and the economic uses of 47 major cultigens (2003). Her archaeological work in the upper ʻOpunohu Valley documented terraced agricultural complexes adjacent to the main rivers and stream branches in Tupauruuru (Lepofsky et al. 1992, 1996), while some limited survey, mapping, and excavation were completed in the Middle and Amehiti sectors. Lepofsky completed test excavations at eight agricultural complexes, seven in Tupauruuru and one in Amehiti. She also developed a radiocarbon sequence to refine the valley's settlement chronology and to delineate a sequence of agricultural intensification (Lepofsky 1995).

In order to parse out geochronological sequences of landscape formation and human use/modification, Lepofsky completed considerable archaeological and geomorphological work in the lower ʻOpunohu Valley (Lepofsky 1994). Twenty-one back hoe trenches on the lower valley floor and 6 stream profiles in the upper valley were stratigraphically analyzed. Laboratory analyses included grain size analysis and X-ray diffraction of sediments, as well as wood charcoal identifications, to investigate long-term human-environmental interactions and their relationship to landscape use and agricultural intensification. Lepofsky's work continues to serve as the only detailed analysis of Māʻohi agricultural practices in the precontact period.

Finally, the author has completed multi-scalar archaeological analysis in the ʻOpunohu Valley since 1999. This work has included continued survey, mapping, and settlement pattern analysis in the Tupauruuru, Middle, and Amehiti sectors (Kahn 2005a, 2009, 2016a). A major program of household archaeology and landscape scale analysis saw the excavation of 13 precontact house sites, 19 terraces (including terraces fronting temples and probably habitation flats), three *paepae* (upraised stone platforms), 2 council platforms, 11 temple sites (*marae*), and 3 shrines (Kahn 2003, 2007, 2009, 2013, 2016b; Kahn and Kirch 2013, 2014). Dedicated radiocarbon dating of newly excavated sites and archived samples from Green's original excavations has predominately focused on short-lived species lacking inbuilt age to develop a robust settlement chronology (Kahn 2006, 2010, 2011). The use of both radiocarbon dating and more precise U-Th dating of corals incorporated into temple architecture has resulted in a refined chronology for temple construction sequences (Kahn 2011; Kahn and Kirch 2011, 2014; Sharp et al. 2010). Finally, newly excavated agricultural sites (Fig. 4) microfossil and wood charcoal identifications, and landscape scale analyses, including additional geomorphological work in the valley bottom, have advanced our understanding of Māʻohi agricultural practices and human-induced landscape change (Kahn et al. 2014, 2015; Kahn and Ragone 2013).

Settlement Pattern Analysis

Based on his original survey data, Green argued that an average to low density of surface remains were found in the Amehiti sector (Green 1996: 211), in contrast to the dense patterning of settlements found in Tupauruuru. Following this, Green posited that a dense population of ritual and social elites occupied the dominant ritual and residential sector of Tupauruuru. Low-, moderate-, and high-status residences are interspersed throughout this district, along with major agricultural complexes. Green found more temples (*marae)* and particularly larger and more elaborate *marae* in Tupauruuru sector. This sector also and more "specialized high-ranking structures," including large round-ended assembly houses, large raised assembly platforms (council platforms), and archery platforms, the latter were

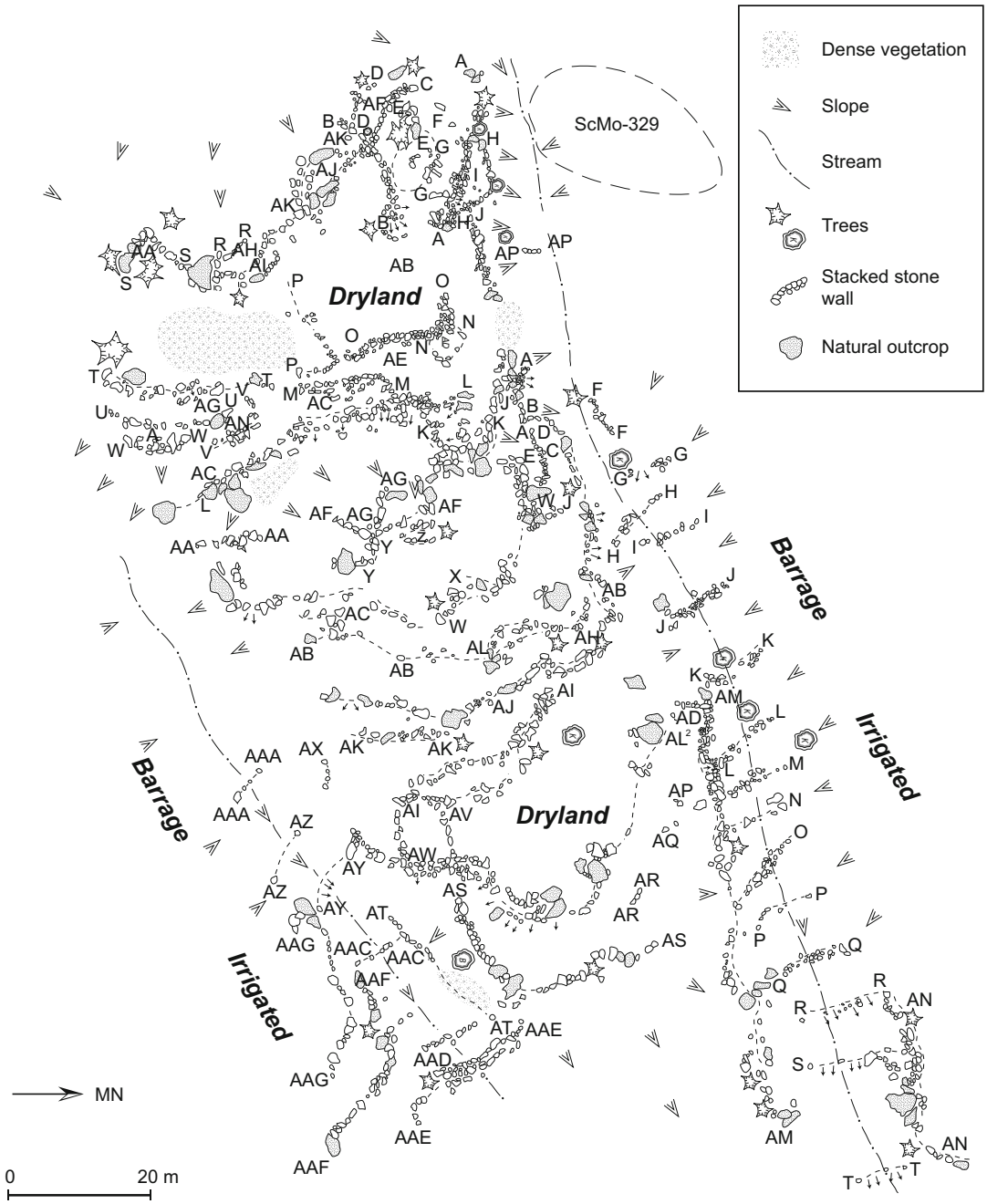

The Archaeology of the ‘Opunohu Valley, Society Islands, Eastern Polynesia, Fig. 4 Plan View of Agricultural Complex ScMo-330 with Barrage Terraces, Dryland Terraces, and Wetland (Irrigated) Terraces. Note that ScMo-330 is an inset in the larger landscape map found in Fig. 6

used for elite sport (Green 1961; Green et al. 1967: 224–225). Green (1996) interpreted the settlement pattern data as representing a more complex social hierarchy in Tupauruuru than Amehiti, as site density and site types varied considerably between the two sectors.

While the ‘Opunohu Valley has a long history of archaeological survey, site inventory has

largely focused on the eastern Tupauruuru sector, with survey data lacking for the Middle sector and quite limited for the Amehiti sector. Green's original Amehiti survey was brief, overall less intensive than that carried out in Tupauruuru, and focused largely on the lower valley flat. Lepofsky argued that Green's survey adequately recorded all site types within Amehiti (see Green 1996: 213–214; Lepofsky 1994: 144–145), yet this must be qualified as referencing lower Amehiti, as neither Green nor Lepofsky worked substantially in the upper sector. Subsequent limited archaeological survey in the upper Amehiti and upper Middle sector has documented that there are indeed fewer *marae* in these parts of the valley, yet six new *marae* complexes were located along two ridges in upper Amehiti (Kahn 2005b). It seems likely that additional survey will uncover more *temple* complexes in these understudied portions of the valley.

Preliminary analysis of the Amehiti survey data illustrates that certain areas have a moderately high density of habitation sites, somewhat higher than previously noted (Kahn 2005a; contra Descantes 1990; Green 1996; Lepofsky 1994). The Amethi district has relatively dense clusters of low-status habitation zones and some presence of moderate-status houses of oval-ended form, including sites that were used for specialized activities (Kahn and Kirch 2013). Amehiti *marae* tend to be small and have varied architectural plans. Some Amehiti temples cluster with important agricultural complexes or important water sources (springs), a pattern not previously recorded for the valley (Green 1996: 220, after Descantes 1990: 124), nor examined in other *marae* studies in the archipelago (Cochrane 1998, 2002). These data suggest that at least some Amehiti *marae* were likely used in agricultural rites or fertility ceremonies. Amehiti house sites also tend to be situated in different locales than Tupauruuru house sites. Finally, while Amehiti house terraces can reach the size of Tupauruuru habitation terraces, they often lack high-quality architectural construction or other signs of high status.

While the Middle sector has seen the most modern development and the least archaeological survey, agricultural sites are found here in continuous association alongside all usable areas of the main river (Kahn 2009; Lepofsky 1994: 143) suggesting a substantial precontact population. A reconnaissance survey of three ridges flanking the major river and its tributaries recorded a moderate density of agricultural complexes and residential sites, ranging from dispersed to nucleated settlements (Kahn 2009). The majority of recorded sites include agricultural complexes or water control features (55%), while aggregated residential and agricultural sites comprise 27% of the total sites surveyed. Of note, temples and shrines are lacking in this sector, and only a small percentage of surveyed sites have a probable ceremonial function (4.3%). Residential features were small and lacked elaborate architecture, even in contrast to Amehiti where most residential architecture was of moderate elaboration.

Taken as a whole, the ʻOpunohu Valley settlement pattern data suggest significant differences in the three major zones of the valley, some of which are likely related to topography, others of which are related to social organization. All sectors have high densities of precontact agricultural sites, suggesting substantial labor inputs to modify the landscape and increase agricultural productivity. Tupauruuru has the highest number of house sites, with a range of sizes and elaboration. Of the three sectors, Tupauruuru has the clearest evidence for an elite, high-status population, with substantial numbers of large, elaborate house sites and aggregated ceremonial complexes. In contrast, Amehiti has a moderate amount of residential sites and temple sites, both of which tend to be of moderate size and elaboration, while the Middle sector tends to have smaller low-status house sites and lacks ceremonial architecture.

Current ʻOpunohu Valley settlement pattern data suggest significant status differences among the three sectors, with Tupauruuru serving as a mixed elite to low-status sector with substantial evidence for residential, agricultural, and religious activities; Amehiti serving as a moderate- to low-status sector, with substantial evidence for residential, agricultural, and religious activities; and the Middle region serving as a low-status sector with substantial evidence for agricultural

and, to a lesser extent, residential activities. These data are supported by the spatial distribution of aggregate site complexes, defined as clusters of two or more elaborate temple sites, often in association with shrines, specialized-use house sites, and other high-status specialized structures, including archery platforms and council meeting platforms. Extensive aggregate clusters with elaborate house sites, specialized community structures, and monumental temples have been identified as ritual-political centers, and their spatial locations can be used as a proxy for status hierarchies (Green 1961) and the development of a ruling class of high-status elites (Kahn 2005b, 2010, 2011; Kahn and Kirch 2014). That four of the five currently identified ritual centers are found in Tupauruuru, with only one in Amehiti and none in the Middle sector, supports the interpretation that high-status elites largely censtered their settlement and religious practices in the Tupauruuru sociopolitical district. In fact, three of the five ritual centers are found in close association to one another at mid-elevations in the Tupauruuru sector (Fig. 5), highly suggestive of ritual ceremonies, competitive feasting, and other events hosted by high-status chiefs.

Agricultural Intensification and Human-Environmental Landscape Change

Archaeological survey has documented three main forms of cultivation systems in the ʻOpunohu Valley: rare wetland irrigated complexes with stone faced terraces along river and stream banks; and the more common barrage pondfields located in slow-moving or intermittent streams in addition to rain-fed dryland complexes with stone faced terracing (Lepofsky 1994; Lepofsky and Kahn 2011; Kahn 2005a). Geomorphological data from the lower valley indicate that soon after island colonization c. AD 1000, the Māʻohi cultivated coconuts and probably other crops on the ʻOpunohu Valley bottom (Fig. 7; Lepofsky et al. 1992, 1996). At the same time, slash and burn practices in the upper valley resulted in massive erosion of sediments into the valley bottom.

The Māʻohi began to construct terraced agricultural complexes in the valley c. AD 1250 (Lepofsky 1994; Lepofsky and Kahn 2011). This represents the first period of agricultural intensification, where significant labor inputs went into constructing permanent agricultural infrastructure, also known as landesque capital intensification (Brookfield 1972, 1984). Excavation data and wood charcoal analysis indicate that that the wetland terraces, rain-fed terraces, and barrage pondfields were likely used to cultivate taro and other root crops. Dryland terraces supported tree crops (breadfruit, Tahitian chestnut), root crops (yams, taro), and other economically important crops such as banana. By AD 1350–1450 many inland terrace complexes had been constructed in the ʻOpunohu Valley, consonant with an intensive period of house and temple construction. Some dryland terraces for tree cropping extended into more marginal lands at high elevations, suggestive of both elite demands for surplus and commoner desires for daily autonomy (Lepofsky and Kahn 2011). A second period of agricultural intensification occurred c. AD 1600, where new upland agricultural complexes were constructed astride large ritual-political centers, all of which were likely under elite control (Kahn 2017; Kahn and Kirch 2014; Lepofsky and Kahn 2011).

Household Archaeology and Inequality at the Microscale

Prehistoric habitation sites in the ʻOpunohu Valley are ubiquitous, with 132 rectangular and round-ended house sites outlined by curbing stones in addition to c. 300 pavements and "living flats" lacking curbstone outlines (Green et al. 1967; Green and Descantes 1989; Kahn 2003, 2005a, b, 2007, 2016c; Kahn and Kirch 2003, 2013; Oakes 1994). Excavations have now been completed at seven residential/ritual complexes, with 24 probable house sites excavated. The majority of ʻOpunohu household archaeology projects have included large block excavations or extensive horizontal excavations, facilitating recovery of subsurface features and artifacts and allowing for precise interpretations of household status and house function (Kahn 2017, 2018).

Data from the corpus of excavated ʻOpunohu Valley house sites indicate change through time at the community level in terms of household rank and

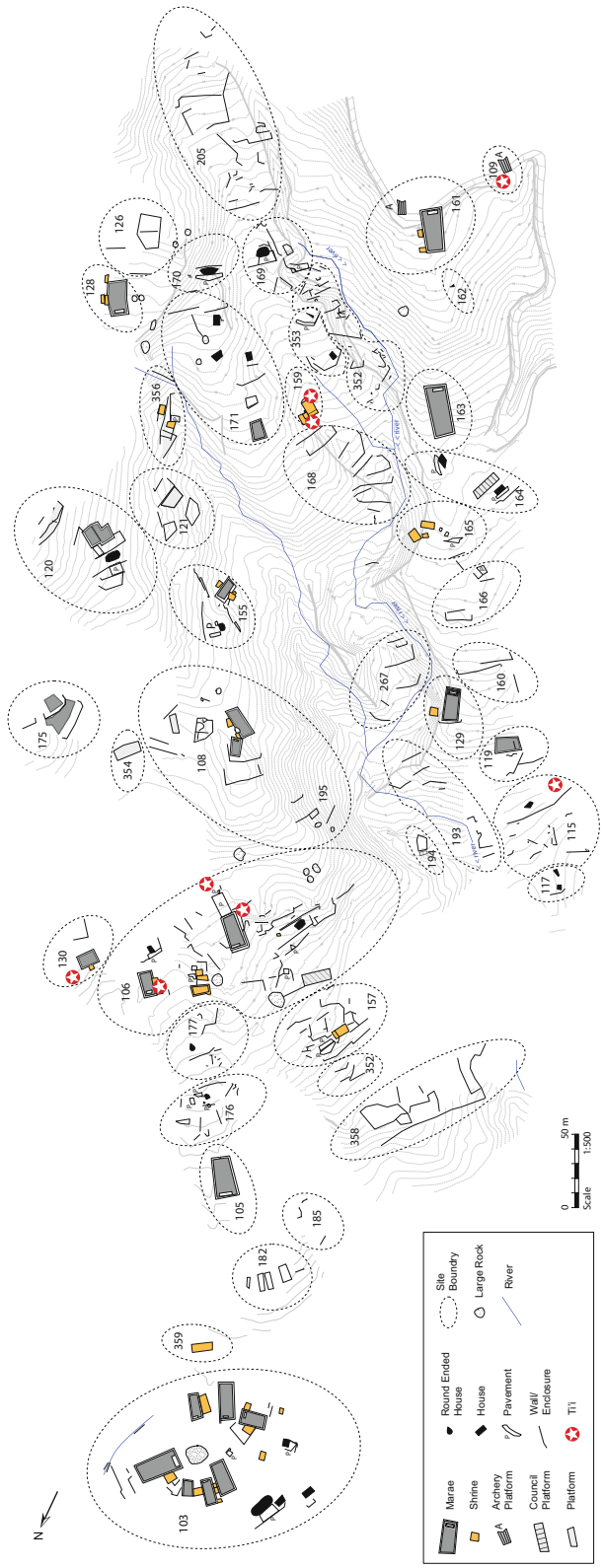

The Archaeology of the ‘Opunohu Valley, Society Islands, Eastern Polynesia, Fig. 5 Settlement Pattern Base Map, Segment of Tupaurauru District, ‘Opunohu Valley

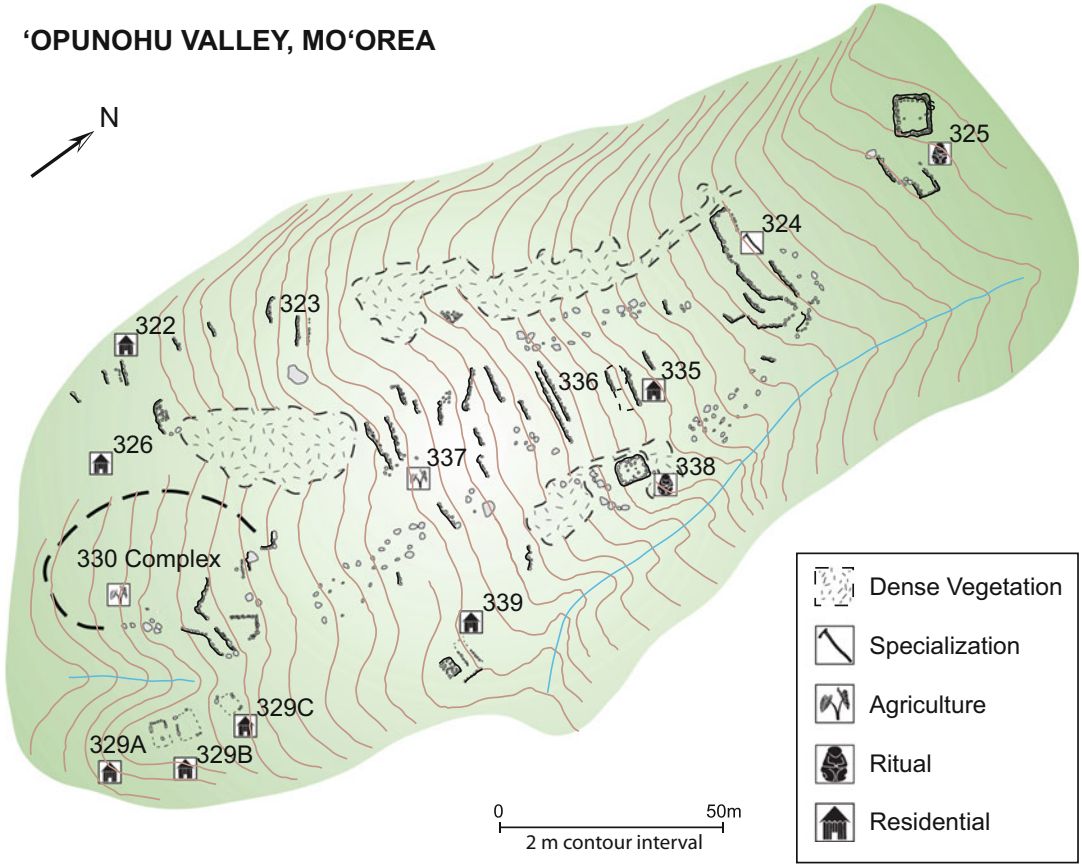

The Archaeology of the ‘Opunohu Valley, Society Islands, Eastern Polynesia, Fig. 6 Example of Amehiti district surface architecture including a Ridge with House Sites, Ceremonial Sites, and Agricultural Complexes

status and occupational specialization. The construction of the first ‘Opunohu Valley house sites begins c. AD 1350, about 100 years after the construction of the first major formalized agricultural complexes. At this time, house sites already exhibit a diversity of sizes, types, and architectural elaboration, signaling that status differences between elites and commoners were materialized at the local level by the fourteenth century AD (Fig. 6; Green 1996; Kahn 2005a, 2007, 2016c).

An ongoing concern lies in differentiating residential house sites (sleeping houses) from specialized-use house sites that were associated with craft production, communal activities, and occupational specialists (Orliac 2000). ‘Opunohu Valley studies have found that the number and type of ancillary buildings around house sites, and the placement and timing of houses on the landscape, are indicators of house site function (Kahn 2005b). House size and form (round-ended or rectangular) alone are not sufficient to determine house status or site function (Kahn and Kirch 2011, 2013). Elaborated architectural elements and certain architectural features, including basalt uprights, well-constructed paved areas adjacent to the house structure, and placement of the house on an elevated and raised terrace, are good indicators of house rank or specialized-use sites. Evidence for daily activities, such as cooking, food storage, and stone tool production and use (Kahn 2005a, 2007, 2016c; Kahn and Kirch 2013; Oakes 1994), are equally important for identifying house function or status.

In the ‘Opunohu Valley a pronounced shift in settlement patterns and house use are signaled by the construction and use of large and elaborate

The Archaeology of the ‘Opunohu Valley, Society Islands, Eastern Polynesia, Fig. 7 View of a specialized-use house, e.g., a large round-ended meeting house. “Capt. Samuel Wallis of HMS Dolphin being received by the Queen of Otaheite, July 1767” engraving from Account of voyage round world in years between 1766 and 1768 by Samuel Wallis

specialized house structures c. AD 1550–1650 (Fig. 7). Notable architectural differences and spatial patterning emerge, differentiating residential houses, or those houses used as sleeping houses, from communal houses used for public meetings and other types of activities and from specialized-use houses used for diverse activities, most notably ritualized production (Kahn 2003, 2005a, 2016c; Kahn and Kirch 2013; Lepofsky and Kahn 2011). Communal and specialized house sites are often associated with the highly sacralized ritual-political centers, illustrating how rank and hierarchy were materialized on the Mā‘ohi landscape (Fig. 8). Communal house structures and specialized house structures served as residences and craft locales for high-status occupational specialists and ritual practitioners (Kahn 2015). Ultimately, the construction and use of such house sites not only played into existing sociopolitical hierarchies but created new avenues for the expansion of elite power (Kahn 2005a, 2007, 2015).

Finally, studies of household material culture and their relationship to household status in the ‘Opunohu Valley have highlighted that both artifact assemblages and subsurface feature constellations differ between elite and commoner house sites. There is substantial variation in production and consumption activities between house sites of differing rank. Such patterns are expressed in the presence of adze production versus adze consumption activities; the size, layout, and form of cooking features; the frequency of food storage pits and other signs of surplus production; and the use of sacred and economically important woods in house post construction (Kahn 2016c; Kahn and Coil 2006; Oakes 1994). Specialized-use house sites have greater numbers of stone tools produced from off-island sources than residential house sites (Kahn et al. 2013), suggesting socio-ritual elites utilized long-distance trade networks as one of many strategies for consolidating their power and authority.

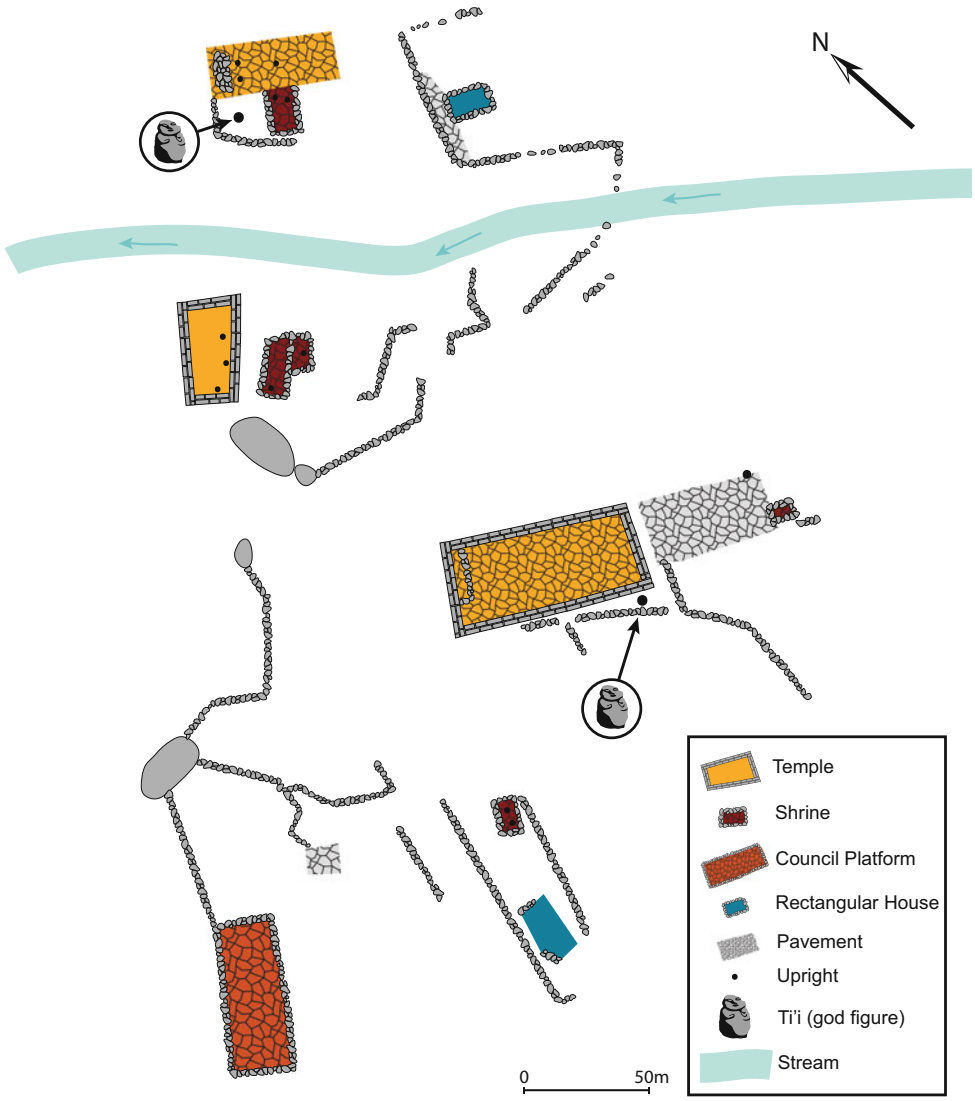

The Archaeology of the ‘Opunohu Valley, Society Islands, Eastern Polynesia, Fig. 8 Map of ScMo-106, an Aggregate *Marae* Ritual-political Center

Monumental Architecture and Macroscale Patterns of Social Complexity

There are two forms of religious architecture in the Society Islands. Shrines or small pavements with uprights and god figures (*ti‘i*) were contexts for individualized religious rites (Kahn 2016d). Temples (*marae*) or stone enclosures elaborated with rows of uprights, backrests stones, and altars were contexts for larger familial and community rites (Fig. 8; Kahn and Kirch 2014). Two hundred and twenty-five temples and shrines have been recorded in ‘Opunohu Valley archaeological surveys; 26 of these temples and shrines have been test excavated or dated via 14C or U-Th (Green et al. 1967; Kahn 2010, 2011; Kahn and Kirch 2013, 2014).

Archaeological studies have documented that Mā‘ohi temples became elaborated through time, both in terms of size and form. The first ‘Opunohu Valley temples were constructed c. AD 1350

The Archaeology of the ʻOpunohu Valley, Society Islands, Eastern Polynesia, Fig. 9 *Marae* Mahine, ʻOpunohu Valley. This war cult *marae* has worked stones used in the wall and altar construction. The *ahu* (altar) has a stepped construction

(Kahn and Kirch 2013), at the same time that house sites of a range of sizes and elaboration were also constructed for the first time. These simple *marae* include elevated pavements with rows of uprights, but lack upraised stone altars like the later, more elaborate forms. This first stage of temple construction is associated with the major inland expansion when residences and major agricultural complexes are also constructed. Interestingly, the first temple sites often are constructed at the same time as house sites of moderate status and agricultural complexes along major rivers and springs. In effect, temple construction appears to serve as a physical marker for claims to land and important resources.

Around AD 1450 temple forms become more elaborate (Kahn 2011; Kahn and Kirch 2014; Sharp et al. 2010). Not only are *marae* larger in size, but they are constructed with fancier architectural features. These include prismatic basalt capping stones, formal entryways, paved courts, and upraised stone altars at one end. A second stage of *marae* elaboration commences c. AD 1600, when coral facings were placed on stone altars and clusters of temples were arranged into aggregate *marae* clusters that were used as socio-ritual centers (Fig. 8; Kahn 2011; Kahn and Kirch 2014; Sharp et al. 2010). Following this, c. AD 1700 altars are considerably elaborated with the use of cut and faced coral blocks in a stepped fashion. The final stage of temple elaboration comes with the construction of multitiered altars (stepped *ahu*) and the use of pecked rounded stones in the enclosure walls or the altar (Fig. 9; Kahn 2010).

The ʻOpunohu Valley has a robust temple chronology clearly indicating the amplification of temple architecture and temple size through time, particularly an increase in the size of enclosures and the height and decorative treatment of altars. Truly monumental *marae* with elaborate stepped *ahu* and sculpted stones are used in the final period of elaboration just prior to European contact. The ʻOpunohu Valley monumental architecture sequence illustrates the ever-increasing role that ideology and religious rituals played in supporting the socioeconomic and political power of Māʻohi ruling chiefs at the community level. Data from ʻOpunohu Valley house sites and ceremonial complexes, namely, highly sacred, isolated ritual-political centers, replete with large temples and specialized houses for craft specialists and other occupational specialists such as priests, become ubiquitous c. AD 1600 onward, and serve as physical signs of increasing political centralization at the community and regional level (Fig. 10; Kahn 2016a, c; Kahn and Kirch 2014).

Date	ʻOpunohu: Agricultural Complexes	ʻOpunohu: House Sites	ʻOpunohu: Monumental Architecture	Archipelago-Wide Sequence
AD 1650-1750	Expansion and intensification of agricultural systems, often near ritual-political centers	Increased feasting, increased ritual production at specialized meeting houses; Round-ended (elite) houses, rectangular (commoner) houses	ʻOro style *marae* with worked stones, stepped *ahu* (coral blocks)	Classic Phase
AD 1600	Expansion and intensification of agricultural systems, often near ritual-political centers	Specialized meeting houses and ritual houses, often in association with ritual centers; Round-ended (elite) houses, rectangular (commoner) houses	Aggregate *marae* clusters in ritual-political centers, Megalithic *marae* with elaborate *ahu* (coral facing)	Classic Phase
AD 1450	Extensive agricultural complexes and mixed swidden in upper valley	Round-ended (elite) houses, rectangular (commoner) houses	Larger, more elaborate community level *marae* (*ahu*, entry way)	Late Expansion/ Development Phase
AD 1350	Extensive agricultural complexes and mixed swidden in upper valley	Round-ended (elite) houses, rectangular (commoner) houses	Simple family *marae* (no *ahu*), shrines	Early Expansion/ Development Phase
AD 1250	Slash and burn on hillslopes, erosion onto valley floor	---	---	Colonization Phase
AD 900-1000	Cultivation of valley floor (coconuts)?	---	---	Colonization Phase

The Archaeology of the ʻOpunohu Valley, Society Islands, Eastern Polynesia, Fig. 10 ʻOpunohu Valley and Archipelago-wide Chronology, Society Islands

Demography

The ʻOpunohu Valley is the only locale in the Society Islands where archaeologists have used archaeological data to develop precontact estimates for human population. Like other contexts in Polynesia and Oceania, precontact human population estimates are difficult to ascertain. European contact brought a mass of introduced diseases and sexually transmitted diseases previously unknown to Pacific Islanders who lacked immunities to Old World diseases. The first historic censuses were commonly completed 40 years or more after contact, after periods of devastating population loss. Thus, archaeological data provide a key dataset for estimating precontact populations, as do early European estimates prior to the devastating population losses in the later post-contact period.

For the island of Tahiti, where most European ships had the longest stays, early estimates range from 100,000 to 140,000 (Hamilton and Kahn 2007). Moʻorea estimates range from 20,000 to 40,000. Hamilton and Kahn utilized two approaches to develop precontact human population estimates for the ʻOpunohu Valley based on archaeological datasets. The first relied on two versions of the "house count" approach, where the number of house sites in the valley were counted, while house size and chronology were also taken into account. House count approaches provided population estimates of c. 1252, inhabitants for the valley. The second approach relied on estimating agricultural productivity in the valley and maximum carrying capacity, providing an estimate of c. 9750 persons. For various reasons, Hamilton and Kahn felt that the c. 10,000 population estimate for the ʻOpunohu Valley was the more likely estimate. Puelston and Tuljapurkar's population modeling (2008) took into account population age distributions, behavior, and technology and environmental constraints. Their analysis suggested that ʻOpunohu Valley agricultural yields could have been considerably higher (40%) than the Hamilton and Kahn carrying capacity estimate. This might suggest that late in prehistory, a considerable amount of agricultural produce was being converted into social production, notably foodstuffs used as gifts, offerings, exchange, and feasts that were then funneled into the chiefly political economy.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Early Regional Centers: Evolution and Organization
- ▶ Households in the Ancient Near East, Archaeology of
- ▶ Landscape Archaeology
- ▶ Woodland and Mississippian Cultures of the North American Heartland

References

Adams, H. 1976. *Memoirs of Arii Taimai*. Reprint of the Clements Library Copy [1901].

Brookfield, H.C. 1972. Intensification and disintensification in Pacific agriculture: A theoretical approach. *Pacific Viewpoint* 13: 30–48.

Brookfield, H.C. 1984. Intensification revisited. *Pacific Viewpoint* 25: 15–44.

Cochrane, E.C. 1998. Recent research and future advances in the analysis of Polynesian ceremonial architecture: A review essay. *Asian Perspectives* 37 (2): 279–300.

Cochrane, E.E. 2002. Separating time and space in archaeological landscapes: An example from Windward Society Islands ceremonial architecture. In *Pacific landscapes: Archaeological approaches. Easter Island Foundation Press, Los Osos, CA*, ed. T.N. Ladefoged and M.W. Graves, 189–209. Los Osos: Bearsville Press.

Descantes, C. 1990. *Symbolic stone structures: Protohistoric and early historic spatial patterns of the ʻOpunohu Valley, Moʻorea, French Polynesia*. MA thesis, University of Auckland.

Descantes, C. 1993. Simple Marae of the ʻOpunohu Valley, Moʻorea, Society Islands, French Polynesia. *Journal of the Polynesian Society* 102 (2): 187–216.

Eddowes, M. 1991. *Ethnohistorical perspectives on the Marae of the Society Islands: The sociology of use*. MA thesis, University of Auckland.

Emory, K.P. 1933. *Stone remains in the Society Islands*. Bernice P. Bishop Museum Bulletin 119. Honolulu.

Green, R.C. 1961. Moorean archaeology: A preliminary report. *Man* 61: 169–173.

Green, R.C. 1996. Settlement patterns and complex Society in the Windward Society Islands: Retrospective commentary from the ʻOpunohu Valley, Moʻorea. In *Memoire de Pierre, Memoire d'Homme: Tradition et Archeologie en Oceanie*, ed. M. Julien, M. Orliac, and C. Orliac, 209–228. Paris: Publications de la Sorbonne.

Green, R.C., and C. Descantes. 1989. *Site records of the ʻOpunohu Valley, Moʻorea*. Limited edition. Auckland: The Green Foundation for Polynesian Research.

Green, R.C., K. Green, R.A. Rappaport, A. Rappaport, and J. Davidson. 1967. Archeology on the Island of Moʻorea, French Polynesia. *Anthropological Papers of the American Museum of Natural History* 51 (2): 111–230.

Hamilton, B., and J. Kahn. 2007. Pre-contact population in the ʻOpunohu Valley, Moʻorea: An integrated archaeological and ethnohistorical approach. In *The growth and collapse of Pacific Island societies: Archaeological and demographic perspectives*, ed. P.V. Kirch and J.-L. Rallu, 129–159. Honolulu: University of Hawaii Press.

Handy, E.S.C. 1930. *History and culture in the Society Islands*. Bernice P. Bishop Museum occasional papers 79. Honolulu.

Kahn, J.G. 2003. Maohi social organization at the microscale: Household archaeology in the ʻOpunohu Valley, Moʻorea, Society Islands French Polynesia. In *Pacific Archaeology: Assessments and Prospects (Proceedings of the International Conference for the 50th Anniversary of the First Lapita Excavation, Kone-Nouméa 2002)*, ed. C. Sand, 353–367. Nouméa: Services des Musées et du Patrimoine.

Kahn, J.G. 2005a. Household and community organization in the late prehistoric Society Island chiefdoms (French Polynesia). PhD dissertation, University of California, Berkeley.

Kahn, J.G. 2005b. Annual report of archaeological research activities carried out in the ʻOpunohu Valley, Moʻorea, July 1-August 14, 2004. Ministry of Culture, Territorial Government, French Polynesia.

Kahn, J.G. 2005c. An Archaeological Survey of the Upper Amehiti Sector, ʻOpunohu Valley, Moʻorea, Society Islands. In *Bilan de la recherche archéologique en Polynésie française 2003–2004*, ed. H. Marchesi, 33–40. Dossier d'Archeologie polynésienne 4. Punaauia: Service de la Culture et du Patrimoine.

Kahn, J.G. 2006. Society Islands (Central Eastern Polynesia) chronology: 11 radiocarbon dates for the late prehistoric expansion and proto-historic periods in the ʻOpunohu Valley, Moʻorea. *Radiocarbon* 48 (3): 409–419.

Kahn, J.G. 2007. Power and precedence in ancient house societies: A case study from the Society Island chiefdoms (French Polynesia). In *The Durable House: House Society Models in Archaeology*, ed. R. Beck, 198–223. Center for archaeological investigations occasional paper no. 35. Carbondale: Southern Illinois University.

Kahn, J.G. 2009. Annual report of archaeological research activities between May 21–August 8, 2008. Punaauia: Service de la Culture et du Patrimoine.

Kahn, J.G. 2010. A spatio-temporal analysis of ʻOro Cult *Marae* in the ʻOpunohu Valley, Moʻorea, Society Islands. *Archaeology in Oceania* 45: 103–110.

Kahn, J.G. 2011. Multi-phase construction sequences and aggregate site complexes of the prehistoric Windward Society Islands (French Polynesia). *The Journal of Island and Coastal Archaeology* 6 (1): 24–50.

Kahn, J.G. 2013. Temple renovations, aggregate *Marae,* and ritual centers: The ScMo-15 complex, ʻOpunohu Valley, Moʻorea (Society Islands). *Rapa Nui Journal* 27 (2): 33–49.

Kahn, J.G. 2015. Identifying residences of ritual practitioners in the archaeological record as a proxy for social complexity. *Journal of Anthropological Archaeology* 40: 59–81.

Kahn, J.G. 2016a. *Stage 1 of archaeological activities related to INTEGRE, ʻOpunohu Valley, Moʻorea Island, French Polynesia 2015–2016*. Punaauia: Service de la Culture et du Patrimoine.

Kahn, J.G. 2016b. *Annual report of archaeological research activities between November 28–Decembver 12, 2016 Moʻorea Island, French Polynesia*. Punaauia: Service de la Culture et du Patrimoine.

Kahn, J.G. 2016c. Household archaeology in Polynesia: Historical context and new directions. *Journal of Archaeological Research* 4 (4): 325–372.

Kahn, J.G. 2016d. Public versus corporate ritual in the prehistoric Society Islands (French Polynesia): A multi-scalar analysis of religious practices. *Séances de la Société Préhistorique Française* 7: 141–161.

Kahn, J.G. 2017. *Annual report of archaeological research activities, Moʻorea, French Polynesia*. Punaauia: Service de la Culture et du Patrimoine.

Kahn, J.G. 2018. Household Archaeology at the Community Scale? Refining Research Design in a Complex Polynesian Chiefdom. In *Engaging Archaeology: 25 Case Studies in Research Practice*, (S.W. Silliman, ed.), pp. 89–97. Wiley-Blackwell.

Kahn, J.G., and J. Coil. 2006. What house posts tell us about status difference in prehistoric Tahitian society: An interpretation of charcoal analysis, sacred woods and inter-site variability. *The Journal of the Polynesian Society* 115 (4): 319–352.

Kahn, J., and P.V. Kirch. 2003. The Ancient ʻHouse Societyʼ of the ʻOpunohu Valley, Moʻorea: Overview of an Archaeological Project, 2000–2002. In *Bilan de la recherche archéologique en Polynésie française 2001-2002*, (H. Marchesi, ed.), pp. 21–36. Punaauia, Service de la Culture et du Patrimoine: Dossier d'Archeologie polynésienne 2.

Kahn, J.G., and P.V. Kirch. 2011. Monumentality and the materialization of ideology in Central Eastern Polynesia. *Archaeology in Oceania* 46: 93–104.

Kahn, J.G., and P.V. Kirch. 2013. Residential landscapes and house societies of the late prehistoric Society Islands. *Journal of Pacific Archaeology* 4 (1): 50–72.

Kahn, J.G., and P.V. Kirch. 2014. Monumentality and ritual materialization in the Society Islands. Bishop Museum bulletin in anthropology 13. Honolulu: Bishop Museum Press.

Kahn, J.G., and D. Ragone. 2013. Identification of carbonized breadfruit (*Artocarpus altilis*) skin: Refining site function and site specialization in the Society Islands, East Polynesia. *Journal of Ethnobiology* 33 (2): 237–258.

Kahn, J.G., J. Sinton, P.R. Mills, and S.P. Lundblad. 2013. X-ray fluorescence analysis and intra-island exchange in the Society Island archipelago (Central Eastern Polynesia). *Journal of Archaeological Science* 40 (2): 1194–1202.

Kahn, J.G., M. Horrocks, and M.K. Nieuwoudt. 2014. Agriculture, domestic production, and site function: Microfossil analyses and late prehistoric landscapes of the Society Islands. *Economic Botany* 68 (3): 246–263.

Kahn, J.G., C. Nickelsen, J. Stephenson, N. Porch, E. Dotte, C.C. Christensen, J.S. Athens, L. May, and P.V. Kirch. 2015. Mid- to Late Holocene landscape change and anthropogenic transformation on Moʻorea, Society Islands: A multi-proxy approach. *The Holocene* 25 (2): 333–347.

Lafforgue, A., and J. Robin. 1989. *Etudes hydrologiques sur les Ties de Raiatea et Tahaa de 1980 a 1989*. Papeete: Centre ORSTOM de Tahiti.

Lepofsky, D. 1994. Prehistoric agricultural intensification in Society Islands, French Polynesia. PhD dissertation, University of California, Berkeley.

Lepofsky, D. 1995. A radiocarbon chronology for prehistoric agriculture in the Society Islands, French Polynesia. *Radiocarbon* 37 (3): 917–930.

Lepofsky, D. 2003. The ethnobotany of cultivated plants of the Maohi of the Society Islands. *Economic Botany* 57 (1): 73–92.

Lepofsky, D., and J. Kahn. 2011. Cultivating an ecological and social balance: Elite demands and commoner knowledge in ancient Maʻohi agriculture, Society Islands. *American Anthropologist* 113 (2): 319–335.

Lepofsky, D., H. Harries, and M. Kellum. 1992. Early coconuts on Moʻorea Island, French Polynesia. *The Journal of the Polynesian Society* 101: 299–308.

Lepofsky, D., P.V. Kirch, and K.P. Lertzman. 1996. Stratigraphic and Paleobotanical evidence for prehistoric human-induced environmental disturbance on Moʻorea, French Polynesia. *Pacific Science* 50: 253–273.

Metéo-France. 2004. *Atlas Climatologique de la Polynésie française*. French Polynesia: STP.

Oakes, N.R. 1994. The late prehistoric Maohi fare haupape: An examination of household organization in Moʻorea, French Polynesia. MA thesis, Simon Fraser University.

Oliver, D.L. 1974. Ancient Tahitian society. Honolulu: University of Hawaii Press.

Orliac, C. 2000. *Fare et Habitat a Tahiti*. Marseille: Editions Parentheses.

Puleston, C.O., and S. Tuljapurkar. 2008. Population and prehistory II: Space-limited human populations in constant environments. *Theoretical Population Biology* 74 (2): 147–160.

Sharp, W.D., J.G. Kahn, C.M. Polita, and P.V. Kirch. 2010. Rapid evolution of ritual architecture in Central Polynesia indicated by precise 230Th/U coral dating. *Proceedings of the National Academy of Science* 107 (30): 13234–13239.

Archaeology of the Alps

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Introduction

The Alps are the most iconic mountain region of Europe, and archaeological research plays an important role in explaining how human communities have adapted to and transformed mountain landscapes and environments. Archaeological research in the Alps has a long tradition, which has been revived by recent exceptional discoveries, novel analytical approaches, and new research questions. Today the archaeology of the Alps includes a broad range of research themes, and it spans from the valley bottoms up to the highest summits. Archaeological data from the Alps contribute to understanding the prehistory and history of Europe and the Mediterranean, and they also have the potential to influence future development policies in the Alpine region.

Definition

The Alps are one of the most important mountainous regions of Europe (Fig. 1). They host some of the tallest summits of the continent (e.g., Mount

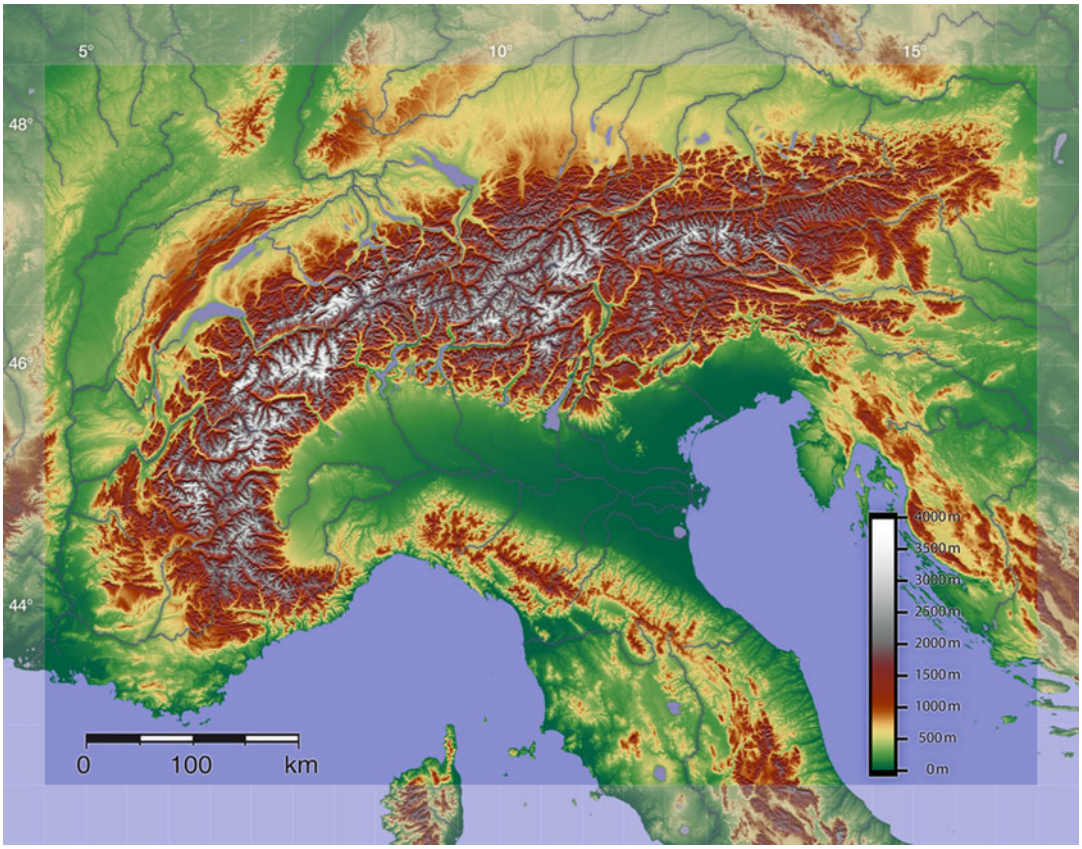

Archaeology of the Alps, Fig. 1 Relief map of the Alps. (By User: Perconte – Based on SRTM-Data, CC BY-SA 2.5, https://commons.wikimedia.org/w/index.php?curid=602322)

Blanc, 4810 m asl), they are bearers of unique heritage assets (e.g., the Dolomites and the prehistoric lake-dwellings, both part of the UNESCO World Heritage Site list), and they represent strategic reservoirs of freshwater and biodiversity. The Alps are a 1000 km mountainous arc, shared by eight countries (Austria, France, Germany, Italy, Liechtenstein, Principality of Monaco, Slovenia, and Switzerland), and they represent the second largest ecosystem in Europe. The size of this mountain region, its central position, and the fact that it's one of the most densely inhabited mountain areas in Europe (14 million people and almost 6000 different communities) explain its remarkable linguistic, cultural, and socioeconomic diversity. The Alps represent the geographical interface between Mediterranean and Central Europe, and it is widely acknowledged that they have played a key role in the history of the continent (Mathieu 2009). Therefore, the contribution of archaeological research in the Alps goes beyond the physical border of this mountain region and is critical for understanding the processes that influenced the evolution of European cultures and societies.

Socioeconomical aspects that characterize Alpine communities have been identified quite early by historians and geographers and led to the investigation of the adaptive processes behind their development. The starting point was the recognition of the ecological and accessibility constraints associated with mountain environments, which contributed to shaping the lifeways of Alpine peoples (Netting 1981). Although medium-size cities (>100,000 inhabitants) are not rare in the Alps (e.g., Grenoble, Trento, Innsbruck, etc.), the majority of people still live in small rural villages, which represent one of the most noticeable landscape characters in every Alpine valley. Until the second half of the twentieth century, the primary economic strategy associated with these villages was small-scale farming. Traditional Alpine farming is defined by the complementary exploitation of different ecotones at different elevations. Crop cultivation prevails at lower elevation, where the longer vegetative period and the better insolation make this farming activity cost-effective. Higher elevations are frequently associated with seasonal pastoralism, which exploits the open pastures above the timberline. The elevation of the timberline depends on climatic and microclimatic factors and is modified by human actions through different management activities (including slash-and-burn). Additional farming activities take place in the forested areas spanning between the permanently inhabited villages and the seasonally exploited upland pastures. These activities exploit the forest for different and non-mutually exclusive purposes: fuel, building material (timber), foraging, animal grazing, specialized cultivations (e.g., chestnut), haymaking, etc. Although all the aforementioned ecological zones are used by local rural communities, forests and pastures are less intensively exploited than the arable fields. Since forests and pastures cover over the 60% of the territory, game hunting represents an important complementary food provision strategy for local communities.

This quick overlook might suggest that pre-modern Alpine communities were isolated entities relying on adaptive farming strategies for their subsistence. This cannot be further from the truth. Members of the Alpine communities were actively engaged in various commercial enterprises, and small-scale workshops were commonplace in Alpine villages until the recent industrialization. Mobility has also been an important cultural trait of these communities, and seasonal emigration toward the plain was a vital risk mitigation strategy. Mining and metalworking have also been relevant productive activities for specific areas within the Alps, until very recently. All this shows that mountain communities are not isolated entities; they are instead nodes of complex regional and international networks, associated with craft production and trading, which significantly contributed to their socioeconomic development.

Pre-modern Alpine communities had a recognizable and unique character, which is the product of adaptation to the environment and nonlinear socioeconomic developments. This character is not only an essential component of current Alpine identity but corresponds to some of the most critical intangible heritage assets of Alpine

communities. The traditional practices mentioned above are currently promoted to foster tourism and sustainable landscape management in many sectors of the region. Investments and subsidies enable the surviving or revival of some of these traditions, hindered by globalization and depopulation. Within this unique framework, the archaeology of the Alps focuses on the identification of the historical or prehistoric roots of Alpine traditional practices and knowledge (Della Casa 2009). When did traditional farming start? When were the uplands first occupied by human groups? What is the history of Alpine mining? What is the evolution of Alpine mobility? Archaeology tackles all these questions and tries to provide chronological depth and solid temporal setting to the often misused concepts of "Alpine tradition" and "Alpine culture." Archaeology in the Alpine region is not only aimed at documenting the past but identifies continuities and discontinuities between the past and the present. This provides important information for development planning in the Alps: from sustainable tourism to rural development and from environmental protection to social cohesion.

Historical Background

Prehistoric studies in the Alpine regions date back to the very beginning of modern archaeology. The investigation of Neolithic lake-dwellings in Switzerland during the mid-nineteenth century can be reasonably considered a milestone in the early modern archaeology of continental Europe (Menotti 2001). The remarkable preservation of perishable materials in these lacustrine contexts contributed to shedding new light on prehistoric economy in Central and Southern Europe (Fig. 2). These earlier excavations, in turn, stimulated further archaeological investigations in the region, providing a better understanding of the prehistoric and early historic development of Alpine societies.

Archaeology of the Alps, Fig. 2 Bronze Age lake-dwellings in the Lake Ledro (Trentino, Italy). (Courtesy of Alessandro Fedrigotti)

One of the main site types investigated by archaeologists since the early twentieth century was the fortified strongholds. Often located in inaccessible positions, overlooking valleys or passes, they represent a key feature in the historic landscapes of the Alps. From prehistoric hillforts to medieval castles, these sites cover a long time span, and often the most recent ones reoccupy locations already fortified in earlier phases (Dal Ri et al. 2010). Representative examples of this site type are *Friaga/Bartholomäberg* (940 m asl) in Montafon (Austria), occupied in the Early to the Middle Bronze Age and again during the late Iron Age (Krause et al. 2004), and *Monte Barro* (650 m asl) near Lake Como (Italy), established in the Early Middle Ages (Brogiolo and Castelletti 1991). The interest of archaeologists for these sites is generally related to their architecture and connection with elites but also to their role as territorial markers and mobility/trading control points. It is worth pointing out, though, that the archaeology of hillforts and castles is not limited to the Alps, but characterizes every mountain region in Europe.

Caves and rock-shelters have also attracted the interest of Alpine archaeologists for decades. The main attribute of these contexts is the protracted occupation, often starting in early prehistory and continuing up to historical periods. Used as domestic, stabling, productive, ritual, funerary spaces, or a combination of these, caves and rock-shelters had a central role in the archaeology of the Alps. Some of these sites have provided crucial evidence to understand the long-term transformation of Alpine societies, economies, and cultures. One of the most interesting examples is *Riparo Gaban*, in the Trentino region (Italy). Occupied between the Mesolithic and the Medieval period (with various gaps), and investigated since the 1960s, it provided the first evidence of the eastern-Alpine Early Neolithic culture, today known as *Gaban facies* (Pedrotti 2002). Again, the use of rock-shelters and caves in different chronologies is not distinctive of the Alps, but is quite common in various mountainous contexts in Europe and beyond.

The archaeology of the Alps has remained confined to the valley bottoms and the mid-altitudes until quite recently. In the 1970s some pioneers have started investigating the recolonization of the subalpine and alpine zones of mountain ecosystems (1800–2500 m asl) at the end of the last Ice Age. Archaeological evidence of Late-Paleolithic and Mesolithic hunter-gatherers at high altitude was found in the Southern Alps and stimulated the emergence of related projects in other sectors of the region (Bagolini et al. 1994). But the real turning point in the archaeological exploration of the Alpine uplands is the discovery of the Iceman (aka Ötzi or Similaun man), a 5000-year-old mummy found at the Tisenjoch glacier (3213 m asl) in September 1991 (Egg and Spindler 2009). The information provided by this mummy (and by the equipment associated to it) revolutionized our understanding of the Alpine Neolithic and led to an increasing archaeological interest for the high mountains, previously considered marginal (Fig. 3).

Many other archaeological contexts have been investigated in the Alps during the last 170 years, besides the ones mentioned above. The increasing amount of data provided by archaeologists, complemented by archive sources for the most recent periods, shows that Alpine traditions have developed over time and are the product of complex processes. Recent collaborations between archaeologists and paleoecologist (who used to work in relative isolation until 20 years ago) have unravelled the long-term effects of human activities on mountain environments. This new knowledge contributes to strengthen the importance of Alpine traditions for the present and the future of Alpine societies, landscapes, and ecosystems.

Key Issues/Current Debates

As pointed out above, the interest of archaeologists for the Alps is multifaceted. And within this varied and dynamic framework, there are some research strands that have become particularly popular among Alpine archaeologists in the last decade. Novel methodological approaches, recent advances in archaeological science, and new research questions had an important role in the

Archaeology of the Alps, Fig. 3 Reconstruction of Ötzi the Iceman, by Kennis © Museo Archeologico dell'Alto Adige/foto-dpi.com

rising or strengthening of these strands. The outcomes of this new research fill some of the knowledge gaps related to human-environment interaction, socioeconomic evolution, and cultural change in the Alpine region (and beyond).

Pastoralism and Upland Occupation

Since the discovery of the Iceman (see above), the exploration of the uplands has progressively become one of the most intriguing branches of archaeological research in the Alps. The majority of the projects developed during the 1990s and the 2000s are diachronic and focus primarily on the analysis of pastoral occupation of mountain pasturelands: its origin, its development over time, and its role in shaping upland landscapes. One of the earliest research programs that addressed specifically these issues in a high mountain context is Kevin Walsh's and Florence Mocci's project in the Parc National des Ecrins (Southern French Alps) (Walsh et al. 2014). Extensive survey campaigns, archaeological excavations, and paleoecological analysis have revealed the complex history of human-environment interaction in this sector of the Western Alps, characterized by phases of "waxing and waning" associated with different drivers: from climatic fluctuations to socioeconomic upheavals (Fig. 4). During the last decade, new archaeological projects started in different parts of the Alps (like Silvretta Historica in Switzerland or ANISA in Austria), incrementing the amount of data available, as well as their geographical uniformity. These new data have been complemented by new analysis of the pastoral use of caves and rock-shelters during the Neolithic, often indicated by burnt dung layers called *fumiers* (Angelucci et al. 2009). These new projects have significantly improved our understanding of the evolution of pastoral practices, including the early phases of development of mobile pastoralism (Della Casa 2009; Walsh et al. 2014), the late prehistoric origin of summer dairy or *Alpwirtschaft* (Carrer et al. 2016), and the evolution of long-distance transhumance during the Roman period (Segard 2009). New archaeological data are challenging our perception of pastoral mobility and the origin of seasonal farming practices in the Alps.

The Exploitation of Mountain Resources

Many areas of the region provide rare and/or useful mineral resources, exploited since

Archaeology of the Alps, Fig. 4 Archaeological structures associated with pastoral activities in the Faravel Plateau (Parc des Ecrins, France). (Photo: Francesco Carrer)

prehistoric periods. Until the end of the Bronze Age, prehistoric communities largely relied on stone tools, and the raw material used to produce these tools (flint, chert, or rock crystal) was largely available in mountain areas. Human occupation of specific sectors of the Alpine arc was therefore motivated by the exploitation of lithic resources and not simply by subsistence needs. An interesting example of this is the Mesolithic rock crystal quarry identified at 2880 m asl in the Fuorcla da Strem (Grisons, Switzerland) (Reitmaier et al. 2016). The remote location of this procurement area provides an indirect evidence of the territorial knowledge and understanding of resource distribution of Alpine groups since prehistoric times. Green rocks were also exploited since the Neolithic for producing axe blades and ornaments (Della Casa 2005), many of which were probably attributed a symbolic value. Their large diffusion, beyond the extraction areas, suggests routes of exchange that confirm the mobility of Alpine population since these early prehistoric phases (see below).

Besides lithic resources, metal ore has been the primary raw material extracted in the Alps until modern times. Dedicated research projects have enabled the identification of numerous mines in different sectors of the Alps (Stöllner and Oeggl 2015), exploited in prehistoric or historical periods (Fig. 5). Smelting and roasting sites associated with these mines have also been identified, thus enabling a better understanding of metalworking *chaine operatoire*. Furthermore, new chemical methods are increasingly employed to track the origin of metal objects and to understand their distribution. This has contributed to the identification, for example, of an interesting E/W division between metallurgy traditions in the Alpine region, which defines most of the prehistoric periods and

Archaeology of the Alps, Fig. 5 Glance (galena) mine in the Col Piombin (Dolomites, Italy), exploited until the 1750s. (Photo: Fabio Cavulli)

might mirror underlying sociocultural factors that we still know very little about (Perucchetti et al. 2015).

Another important mineral was exploited in the Alps: salt. The earliest exploitation of the salt mines of Hallstatt (Austria) starts in the Bronze Age, and it leads to the development of a rich and socially complex mountain community, at the center of large-scale networks of exchange. This important development is mirrored by the necropolis of Hallstatt, one of the richest late prehistoric cemeteries of Europe, which gave the name to the central European EIA culture. Recent research in the mines yielded an incredible amount of archaeological material culture, including numerous artifacts made of organic material (leather, wood, etc.) perfectly preserved. These remarkable finds have shed new light on the organization of mining in prehistoric times, on the lifeways of miners, and in general on the character of a prehistoric community in the Eastern Alps (Reschreiter and Kowarik 2019).

Transalpine Connections

The difficult accessibility of the mountains has contributed to picturing mountainous regions as barriers and as natural border zones. Indeed, they have been perceived like that in many historical periods. Roman literature provides a description of the Alpine region as remote and impervious, and large defensive infrastructures were built in the Eastern Alps during the fourth and fifth century AD, to protect the Po plain and the Italian peninsula from the raids of "barbarian" armed groups. The "Alps as frontier" narrative recurred also during the Great War (World War I), as many Alpine summits and passes were battlefields for the armies of the Austrian Empire and the

Kingdom of Italy: defending the Alps was equivalent to defending the motherland.

However, this has not always been the case. In different historical periods, the Alps were a diaphragm, a connection between the great plains of central Europe and the Mediterranean coasts. The Alps have developed distinctive cultures and facilitated the movement of people, goods, and innovative ideas. Archaeology has played a prominent role in challenging the stereotypical perception of the Alps. Since the Paleolithic, tools produced with flint collected in the Southern Alps are regularly found beyond the Alpine watershed. This shows the large mobility of prehistoric hunter-gatherers, within and across the Alpine region (Visentin et al. 2016). As mentioned before, the large diffusion of stone axe blades and ornaments suggests the existence of prehistoric routes of exchange that crossed the mountains and connected communities within and beyond the Alpine region (Della Casa 2005). It is difficult to assess whether the movements of these artifacts imply movements of people or more sophisticated exchange networks; nevertheless, it can be argued that the roughness of the Alpine landscapes was not an impediment. Recent remarkable archaeological discoveries in ice patches and retreating glaciers (Fig. 6) confirm that high mountain passes were crossed in different prehistoric and historical periods, providing a glimpse of the variability of mobility strategies in mountain environments (Hafner 2012).

All these data suggest that the Alps, including their uplands, have been an interface of critical importance for the development of connections between Southern and Central Europe. By constraining mobility through privileged crossing points, the Alps have selectively linked the north and the south of the region more closely than the east and the west, thus influencing their socioeconomic and cultural development. Archaeology is highlighting the long-lasting role of the Alps as

Archaeology of the Alps, Fig. 6 Archaeologists recording and collecting finds in the area uncovered by a retreating glacier (South Tyrol, Italy). (Courtesy of Arc-Team (http://www.arc-team.com/))

source, corridor, and destination of important routes, which was assumed but largely unknown only few decades ago.

The Symbolic and Ritual Value of the Mountains

Many mountainous areas are considered sacred spaces by different cultures around the world, and the Alps are no different from this point of view. The symbolic or ritual significance of summits and caves is extensively investigated in the ethnographic and historical literature. Sanctuaries are very typical landscape features in the Alps, as much as in many other mountain regions. Some of these sacred places had a long and complex historical development and survived till nowadays. For example, Early Christian hermitages often developed into churches or abbeys, influencing landscape perception in the area for centuries or millennia.

The most significant Alpine sanctuaries are well-known from literature. For periods lacking written sources, archaeological evidence provides a crucial contribution. Late prehistoric examples of ritual sites are the so-called *Brandopferplätze*. This category, in fact, includes different types of contexts, particularly common in the Northern Alps during the Bronze and the Iron Age. Their locational pattern is not uniform, as they have been found near the valley bottoms or in remote upland areas. They also show diverse internal organizations: some are complex and well-structured sites with different sectors used for different activities, and others are much simpler and with more ephemeral architectures. However, they are all characterized by large bonfires used for ritual offering. Offerings are primarily animal parts, but they also include domestic and wild plants, pottery, prestige goods like metal objects (comprising coins in later periods), and even amber beads (Steiner 2010). The chronology of these contexts is quite varied, and some are occupied until the end of the Roman period. Scientific methods and the expansion of research are providing new exciting information and shedding new light on this interesting phenomenon. Recent research in South Tyrol, for instance, suggests that *Brandopferplätze* were a key feature of high-altitude landscapes during the Bronze Age (Putzer et al. 2016).

Rock art represents interesting evidence associated to the symbolic and ritual role of mountain landscapes. Figurative and schematic representations engraved in boulders and rock outcrops are widespread all over the Alpine arc and cover a broad chronological range, from prehistory to the modern period. It is worth mentioning two context among the most relevant in the Alps and in Europe: the *Vallée des Merveilles* ("the valley of marvels") and *Vallée de Fontanalba* of Mount Bego in France (de Lumley and Echassoux 2011) and the *Valcamonica*, UNESCO Heritage Site of Italy since 1979 (Anati 2015). The rock art of Monte Bego is primarily located at high altitude and is often associated to the pastoral occupation of mountain pastures, as well as to mobility routes through the uplands. In Valcamonica, rock engravings are not only clustered in ritual places (Fig. 7),

Archaeology of the Alps, Fig. 7 Cemmo's boulder (Valcamonica, Italy) displaying numerous prehistoric engravings. (Courtesy of Ausilio Priuli)

but they are also scattered in many other locations: they were associated not only with rituality but also with everyday activities. The oldest reliably dated rock engravings in these two areas belong to late Neolithic, but an earlier date has been suggested for some of them. Digital technologies and new interpretative models are contributing to changing our perspective toward Alpine rock art. Much more attention is paid today on the location of the engravings, on the geology of the support, on the tools used to produce them, and on their preservation. Many iconographic motives have been reinterpreted in the last years, and the growth of mountain research has provided new parallels from the Alps and other mountain regions. The study of rock art today is an integral part of landscape archaeology projects in the Alps and provides a much more detailed understanding of human interaction with their territory.

International Perspectives

For long time, archaeological research in the Alps has been connected to national archaeological traditions. Research themes and strategies were different in France, Italy, Austria, Switzerland, Germany, and Slovenia. It has become clear quite early on that Alpine cultures crossed current national borders and that archaeologists had to be aware of what their colleagues were finding in neighboring countries. Today the archaeology of the Alps overcomes the different national traditions, and data are regularly shared among the different research groups. A potential limitation to the development of a real collaborative research environment is the linguistic difference within the Alps. Many publications and reports of crucial importance are still written in Italian, German, or French, and this makes it more difficult for scholars to keep up to date. Increasing number of journal articles and volumes in English and the development of Web-GIS projects including the Alps (like ArkeoGIS.org or the Archaeological Information System in apsat.mpasol.it) are improving this situation and contributing to a real integration of Alpine archaeological research.

Future Directions

The archaeology of the Alps is changing fast, incorporating new methodological approaches, and reshaping its goals and theoretical framework. Four key themes that have been emerging in the last decade deserve further attention. It is worth pointing out that these are not the only themes that archaeology of the Alps is expected to focus on in the near future. These are just the themes that, based on my personal research experience and expertise, seem more challenging and at the same time more promising.

Spread of Farming in the Alps

Research on the spread of plant and animal farming in Europe during the Neolithic has increased in the last years, thanks to new scientific techniques and new interpretative approaches that changed the way we look at this phenomenon. However, the Alpine region is still underinvestigated from this point of view. Agriculture and pastoralism penetrated in the Alpine valleys much later than in the surrounding plains (Pedrotti 2002), but the mechanisms of diffusion and assimilation of these strategies are still largely speculative. Pioneering research on this topic is taking place in other mountain regions (Pyrenees, Balkans), and it is likely to be one of the most interesting research questions in the Alps during the next decade.

The Impact of Bioarchaeology

The rapid development of bioarchaeology is opening new perspectives for archaeology, by answering long-standing questions and replacing them with new ones. The archaeology of the Alps is already strongly influenced by scientific methods (e.g., the innumerable analysis undertaken on the Iceman mummy; Egg and Spindler 2009), and this influence will grow exponentially in the next decade. Isotope analysis will be increasingly used to understand cuisine and mobility of past mountain communities and to explore climatic fluctuations at local scale. Proteomics will enable a reliable identification of the animal and plant species used to produce artifacts.

The analysis of dental calculus will provide detailed information about individual diet. Ancient DNA will disclose migrations and lineage relationships between Alpine groups and will track the origin of domesticated Alpine fauna. As these techniques develop and become more established, their use increases in the Alps. As more Alpine projects include bioarchaeology, the inferences produced become more generalizable.

Glacial Archaeology

It is widely known that climate change will have dramatic consequences for mountain environments, as previously pointed out. Among these consequences there is also the loss of important cultural heritage. Glacier retreat is exposing traces of human presence at high altitude (Hafner 2012), and most of these are made of organic material (leather, wood, etc.) and might be lost if not recovered in time. This new awareness is stimulating a series of "rescue archaeology" projects in glaciers and ice patches, as well as the production of heritage risk maps for the high mountains. The protection and promotion of cultural heritage in the Alps are reaching the remote glacial landscapes at 3000 m of elevation, and global warming will increase the urgency and the extent of archaeological interventions in the nival zone of montane ecosystems.

Land Management and Sustainability

Promoting sustainable management of the landscape is one of the key priorities of policymakers engaged with the Alpine region. Landscape and environmental archaeology projects in the Alps will contribute to inform development and planning, providing a solid understanding of long-term socio-ecological dynamics. This ecological and societal role of archaeology is increasingly popular in some of the most endangered ecosystems in the world (e.g., the Amazon, the Sahara desert, etc.), but has long been overlooked in the European mountains. Today there is growing awareness that understanding the history of mountain landscapes is crucial to predict and manage their future. In order to influence decision-making, the archaeology of the Alps needs to expand its collaborations with other scientific fields (ecology, ethnography, economy) and adapt its research questions to the new challenges of our times.

Cross-References

- ▶ Altitude Environments in Archaeology
- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Ethnoarchaeology of Pastoral Societies
- ▶ Europe: Prehistoric Rock Art
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

References

Anati, E. 2015. *The rock art of Valcamonica*. Capo di Ponte: Atelier.

Angelucci, D.E., G. Boschian, M. Fontanals, A. Pedrotti, and J.M. Vergès. 2009. Shepherds and karst: The use of caves and rock-shelters in the Mediterranean region during the Neolithic. *World Archaeology* 41 (2): 191–214.

Bagolini, B., P. Biagi, A. Broglio, J. Kozlowski, S.K. Kozlowski, and M. Lanzinger, eds. 1994. *Human adaptations to the mountain environment in the Upper Palaeolithic and Mesolithic*. Preistoria Alpina 28(1–2). Trento: Museo Tridentino di Scienze Naturali.

Brogiolo, G.P., and L. Castelletti. 1991. *Archeologia a Monte Barro*. Vol. II. Lecco: Consorzio Parco di Monte Barro.

Carrer, F., A.C. Colonese, A. Lucquin, E. Petersen Guedes, A. Thompson, K. Walsh, T. Reitmaier, and O.E. Craig. 2016. Chemical analysis of pottery demonstrates prehistoric origin for high-altitude alpine dairying. *PLoS One* 11 (4): e0151442. https://doi.org/10.1371/journal.pone.0151442.

Dal Ri, L., P. Gamper, and H. Steiner, eds. 2010. *Höhensiedlung der Bronze und Eisenzeit, Kontrolle der Verbindungswege über die Alpen; Abitati dell'Età del Bronzo e del Ferro, controllo delle vie di comunicazione attraverso le Alpi*. Trento/Bozen: Temi.

Della Casa, P. 2005. Lithic resources in the early prehistory of the Alps. *Archaeometry* 47 (2): 221–234.

Della Casa, P. 2009. La Prehistoire des Alpes: Enjeux Scientifiques, Methodes et Perspectives de la Recherche. *Le Globe* 149: 7–28.

de Lumley, H., and A. Echassoux. 2011. *La montagne sacré du Bégo*. Paris: CNRS Editions.

Egg, M., and K. Spindler. 2009. *Kleidung und Ausrüstung der kupferzeitlichen Gletschermumie aus den Ötztaler Alpen*. Mainz: RGZM.

Hafner, A. 2012. Archaeological discoveries on Schnidejoch and at other ice sites in the European Alps. *Arctic* 65 (1): 189–202.

Krause, R., K. Oeggl, and E. Pernicka. 2004. Eine befestigte Burgsiedlung der Bronzezeit im Montafon, Voralberg – Interdisziplinäre Siedlungsforschungen und Montanarchäologie in Bartholomäberg und im Silbertal. *Archäologie Österreichs* 15: 4–21.

Mathieu, J. 2009. *History of the Alps 1500–1900. Environment, development, and society.* Morgantown: West Virginia University Press.

Menotti, F. 2001. The *Pfahlbauproblem* and the history of Lake-dwelling research in the Alps. *Oxford Journal of Archaeology* 20 (4): 319–328.

Netting, R.M. 1981. *Balancing on an Alp: Ecological change and continuity in a Swiss Mountain community.* Cambridge: Cambridge University Press.

Pedrotti, A. 2002. The Neolithic age in Trentino Alto Adige. *Preistoria Alpina* 34: 19–25.

Perucchetti, L., P. Bray, A. Dolfini, and M.A. Pollard. 2015. Physical barriers, cultural connections: Prehistoric metallurgy across the alpine region. *European Journal of Archaeology* 18 (4): 599–632.

Putzer, A., D. Festi, and K. Oeggl. 2016. Was the Iceman really a herdsman? The development of a prehistoric pastoral economy in the Schnals Valley. *Antiquity* 90 (350): 319–336.

Reitmaier, T., C. Auf der Maur, L. Reitmaier-Naef, M. Seifert, and C. Walser. 2016. Spätmesolithischer Bergkristallabau auf 2880 m. Höhe Nahe der Fuorcla da Strem Sut (Kt. Uri / Gaubünden / CH). *Archäologisches Korrespondezblatt* 46 (2): 133–148.

Reschreiter, H., and K. Kowarik. 2019. Bronze age mining in Hallstatt. A new picture of everyday life in the salt mines and beyond. *Archaeologia Austriaca* 103: 99–136.

Segard, M. 2009. Pastoralism, rural economy and landscape evolution in the western Alps. *Journal of Roman Archaeology* 22: 171–182.

Steiner, H. ed. 2010. *Brandopferplätze. Archäologische und naturwissenschaftliche Untersuchungen / Roghi Votivi Alpini. Archeologia e scienze naturali*. Forshungen zur Denkmalpflege in Südtirol – Band V / Beni Culturali in Alto Adige – Studi e Ricerche – Volume V.

Stöllner, T., and K. Oeggl, eds. 2015. *Bergauf Bergab. Eine Zeitreise durch 10.000 Jahre Bergbau in den Ostalpen. Wissenschaftlicher Beiband zur Ausstellung im Deutschen Bergbau – Museum Bochum von 31.10.2015–24.04.2016. Im Voralberg Museum Bregenz vom 11.06.2016–26.10.2016*. Rahden: Verlag Marie Leidorf GmbH.

Visentin, D., S. Bertola, S. Ziggiotti, and M. Peresani. 2016. Going off the beaten path? The Casera Lissandri 17 site and the role of the Cansiglio plateau on human ecology during the early Sauveterrian in North-Eastern Italy. *Quaternary International* 423: 213–229.

Walsh, K., M. Court-Picon, J.-L. de Baulieu, F. Guiter, F. Mocci, S. Richer, R. Sinet, B. Talon, and S. Tzortzis. 2014. A historical ecology of the Ecrins (southern French Alps): Archaeology and palaeoecology of the Mesolithic to the medieval period. *Quaternary International* 353: 52–73.

Further Readings

Broglio, A. 2016. The discovery of the Mesolithic in the Adige Valley and the Dolomites (North-Eastern Italy): A history of research. *Quaternary International* 423: 5–8.

Curdy, P. 2007. Prehistoric settlement in middle and high altitudes in the Upper Rhone Valley (Valais-Vaud, Switzerland): A summary of twenty years of research. *Preistoria Alpina* 42: 99–108.

Della Casa, P. ed. 2018. *The Leventina prehistoric landscape (Alpine Ticino Valley, Switzerland).* Zurich Studies in Archaeology (ISSN 2571–5712), Band 12. Chronos, Zurich

Dixon, E.J., M. Callanan, A. Hafner, and P.G. Hare. 2014. The emergence of glacial archaeology. *Journal of Glacial Archaeology* 1 (1): 1–9.

Horvat, J. 2019. Inhabiting the high-mountains of the south-eastern Alps. Forschungsberichte der ANISA für das Internet 1, 4–29.

Walsh, K., and C. Giguet-Covex. 2019. A history of human exploitation of alpine regions. *Encyclopedia of the World's Biomes*. https://doi.org/10.1016/B978-0-12-409548-9.11908-6.

Archaeology of the Jesuit Missions of Ethiopia

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Introduction

Catholic Jesuit missionaries, from Portugal, Spain, and Italy, were active in the Christian kingdom of Ethiopia, known then in Europe as the kingdom of Prester John, since 1557 until their expulsion in 1632–1633. They erected their first churches and buildings early during the mission, using local techniques with dry stone, stone and mud, and perishable materials. After 1622, when king Susenyos was converted to the Catholic faith, they began a vast program of architectonic constructions, which reached its apex after the introduction, in 1624, of the lime mortar technique. The many structures made thereafter, with

stone and mortar, though most of them heavily ruined, have remained until today.

According to the missionary record, the Jesuits established 19 residences in Ethiopia, although only 14 of them were inhabited for a consistent period of time. In at least ten residences, with the help of foreign and local masons and within a short span of time (1624–1632), they erected or started to build sophisticated structures that included stone and mortar churches, residences, schools, water conductions, large cisterns, bulwarks, and towers.

State of Knowledge

From 2006 to 2014, a Spanish archaeological team from Complutense University of Madrid, with the assistance of members of other institutions, carried out a program of research on the missions whose location is known, all of them around the lake Tana in central historical Ethiopia, as well as on the mission of Feremona in the northern region of Tigray. Special attention and extensive excavations were undertaken in the sites of Azezo-Gennete Iyesus near Gonder and Gorgora Nova on the northern shore of lake Tana, and, to a lesser extent, on the mission of Serka to the south of lake Tana. Archaeological surface survey was made on all the known sites, including GPR survey in Azezo, high-definition topographic survey was made on the best preserved sites (with the exception of Mertule Maryam, for technical impediments), and 3D Scanning was applied to the four main sites north of lake Tana (Azezo, Gorgora Nova, Denqez and Debsan). The complete results of the project were published in Fernández et al. (2017) and the 3D videos are available in Youtube. Previous archaeological work on the sites was published by Francis Anfray (1980–1981, 1988) and Tsega Michael (1998), and recent general studies on the Jesuit period in Ethiopia are Pennec (2003), Ramos and Boavida (2004), Cohen (2009), and Martínez d'Alòs-Moner (2015). The greater part of the reports and books written by the Jesuits during the time of the mission and immediately thereafter were compiled by Camilo Beccari in RASO (1903–1917).

The history of the mission can be divided into two clearly distinguished periods. The first period extended some 40 years, from the arrival of the first missionaries at the hand of the Spanish bishop Andrés de Oviedo until the end of the sixteenth century. This phase was characterized by stagnation and estrangement from the Ethiopian court. The second and most successful missionary phase began in 1603 and continued up to 1632. During this period, the missionaries befriended influential members of the Ethiopian court, first and foremost the Christian Ethiopian ruler, *negus* Susenyos, and his half-brother Seʿela Krestos. Under the leadership of men like the Spaniard Pedro Páez, the Portuguese António Fernandes and Manoel de Almeida, and later the Portuguese Afonso Mendes, appointed Patriarch of Ethiopia in 1625, the missionaries could intensify its activities. In the early 1620s, Susenyos declared Catholicism the state religion but the success of the mission was, however, short-lived for in 1632, amidst a civil war and a dynastic succession crisis, the missionaries were expulsed from the country.

The areas of activity and settlement of the missionaries were, broadly speaking, those of the royal monarchy and its court. Fourteen residences were located in the area surrounding Lake Ṭana and near the royal and provincial capitals, particularly to the North, East, and South of the lake, in the regions of Dembiya, Begemder, and Gojjam, respectively. Since the missionaries depended on the protection and patronage of the monarch and powerful lords, it is also in those areas where they erected their most ambitious constructions.

The exact location of ten Jesuit residences in the area surrounding Lake Ṭana is for the most part known: Azezo (also known as Gennete Iyesus), Gorgora "Nova," and Gorgora "Velha" (the location of the latter is not yet sure) in Dembiya; Debsan (Enfraz) and Denqez in Begemder; Serka, Hadasha, Qwellela, Merṭule Maryam (Ennebesse), and Lejje Negus in Gojjam. The location of the first and most enduring mission, Feremona in Tigray near the Eritrean border, is also known. A further eight sites, the "lost missions," have not been located yet (Anfray 1980–1981, 1988; Fernández et al. 2017: 35–438) (Fig. 1).

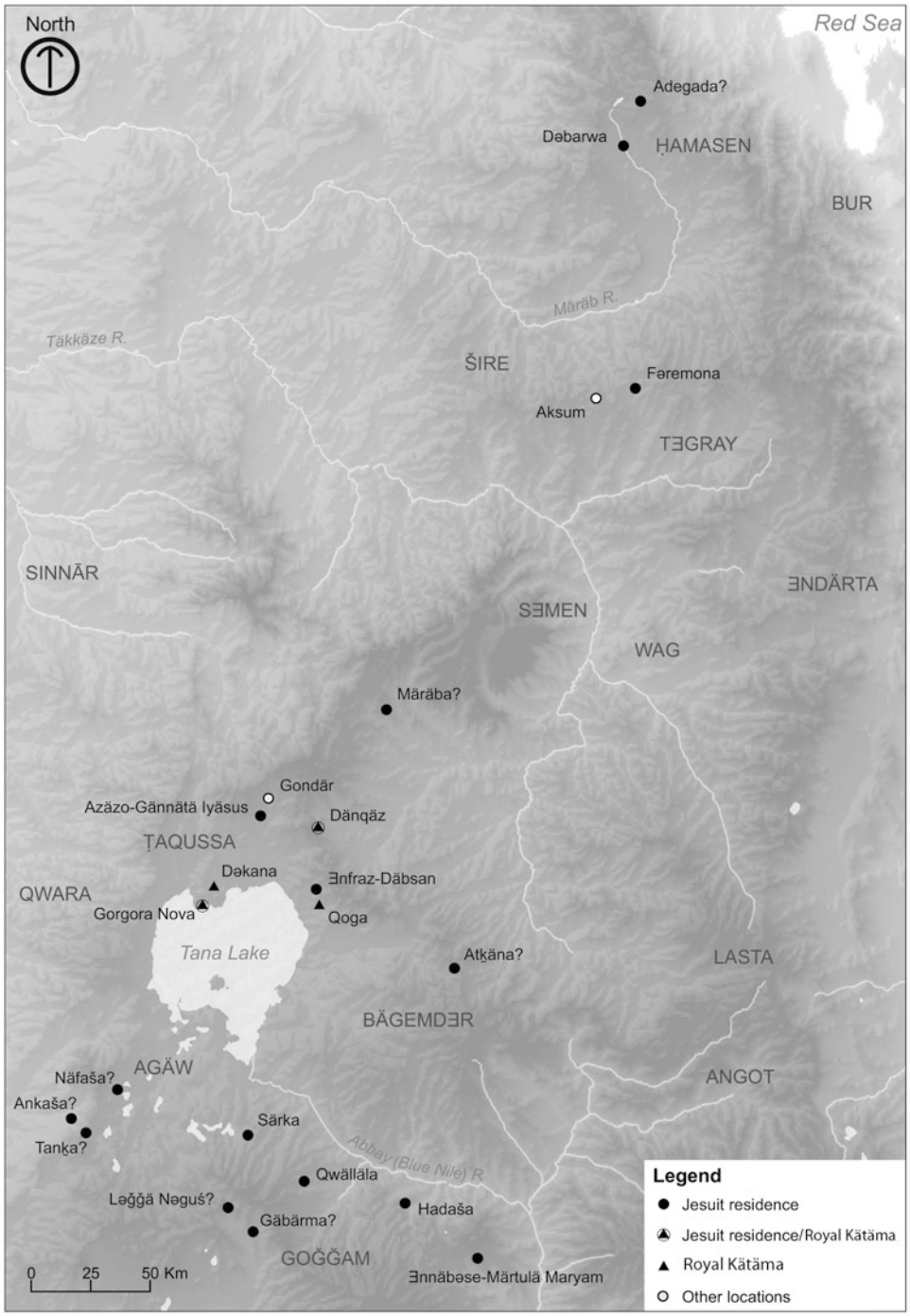

Archaeology of the Jesuit Missions of Ethiopia, Fig. 1 The Jesuit missionary network in Ethiopia and the royal courts (*ketema*). The spelling of the site names in the map follow the guidelines of the Encyclopaedia Aethiopica (Harrassowitz, 2003–2014)

The intention of missionary architecture in Ethiopia was multiple. Firstly, the missionaries were looking for structures suitable to the development of their proselytizing and intellectual activities. Secondly, they were eager to impress their patrons and the local people with sophisticated and technically improved constructions. Last but not least, the Ethiopian patrons, in particular Susenyos and Seʿela Krestos, used the building skills of the Jesuits and the masons who came with them from India to produce an architecture symbolizing their power and ideals for renewal and cultured life-style.

One of the most important missions was located in Azezo, 10 km south of Gonder, receiving the name of Gennete Iyesus, the Garden of Jesus. In 1624 the Jesuits built a small residence or palace for King Susenyos using stone and mortar, with a round tower that probably served as a model for the later Gonderine towers (Fig. 2). In one of the rooms of the palace, there was a water system that was probably a latrine or bathroom and besides the entrance stairs three individual latrines were built that drained through an underground channel to a nearby stream. Shortly after, the missionaries reformed with mortar a rectangular, single-nave church that Pedro Páez had erected with dry stone before the introduction of the mortar. The church was surrounded with a rectangular fortification endowed with round towers in the corners and in the middle of the long sections. Around the same time, they built for the king a large pool of water with a rectangular pavilion in the middle, following the pattern of the royal Indian pools and pavilions (*talao*) of the Mughal culture (Fernández et al. 2017: 59–189).

Equally important was the mission of Gorgora, on the north coast of Lake Tana. Pedro Páez created there a first settlement of buildings still without mortar (the "old" Gorgora, Gorgora Velha), whose location can, for the time being, only be guessed. Nearby, on a small peninsula on Lake Tana, Páez erected a two-story palace for the king, which Susenyos used between 1614 and 1618. Later, on the same site of the palace, the Jesuits began to build a large church around 1626, with a single nave and a recessed apse, endowed with an extraordinary decoration in carved stone both in its walls with circular, blind windows as in the vault (Fig. 3). Attached to the church was

Archaeology of the Jesuit Missions of Ethiopia, Fig. 2 Excavations at the royal palace of Azezo-Gennete Iyesus with the standing ruins of the round tower in the middle

Archaeology of the Jesuit Missions of Ethiopia, Fig. 3 The remains of the apse vault in the Gorgora Nova church. (Photo 2006)

Archaeology of the Jesuit Missions of Ethiopia, Fig. 4 The western tower and cells of the Gorgora Nova residence

a large courtyard-cloister and a residence for priests and students, with nine cells and two square towers at the corners, of two stories each (Fig. 4); the ruins are known locally as "Susenyos palace." In the eastern tower, there was a bathroom with a stone floor that drained the water into a deep well from which an underground conduit flowed into the lake. At present, part of the apse vault and the walls of the residence are conserved (Fernández et al. 2017: 189–303).

In 1618, King Susenyos moved his court to Denqez, at a point of greater height and better

sanitary conditions than the coast of Lake Tana, where malaria was endemic. There the missionaries, with the help of Indian, Egyptian, and local technicians, built a large palace of several floors for him, whose walls are still preserved today, with floral drawings of various colours over the walls' internal plaster. At a short distance, the Jesuits built a church, destined to be the Catholic cathedral of the country, shaped as a Latin cross plan with a transversal transept, from which the walls and arches are also preserved. Farther south, in Debsan on the top of a hill overlooking Lake Tana, the missionaries built a long rectangular building that served as Patriarch Mendes' residence until the expulsion (Fernández et al. 2017: 303–354).

South of Lake Tana, the most important missionary residence was that of Merṭule Maryam, where before there had been an orthodox monastery built around one century before by Queen Eleni. Although it was not finished, the high walls of the head of a church with three naves are still well preserved including very rich sculpted decorations (Fig. 5). Also in the region of Gojjam, in Serka, a mission was built next to the residence of the *Ras* (local governor) Seʿela Krestos, with a church of a single nave that still retains the walls and a beautiful arch of reddish stone. Of the other three missions known in Gojjam, Abba Gish Fasil (probably the mission of Lejje Negus), Qwellela, and Hadasha, only the first preserves some remains of a building, of unknown function, and a wall with defensive embrasures and a water deposit, on top of a high hill. In the mission of Qwellela there are only the scarce remains of a high wall, and in Hadasha we have only registered a defensive earth embankment, cited in the Jesuit texts (Fernández et al. 2017: 411–434).

In the northern region of Tigray, of the residence of Feremona, the first built and the last to be abandoned, no remains of any building have been preserved (with the exception of a few square blocks of the church that had begun to be built). The fortification erected around the mission hill, with flat stones bound only with mud because lime for mortar was difficult to find in the area,

Archaeology of the Jesuit Missions of Ethiopia, Fig. 5 Decorated blocks from the central nave arch in the Mertule Maryam church. See in the middle the graffito with his name written in 1842 by the English traveller, Charles T. Beke

is largely well preserved, including two of its round bastions (Fernández et al. 2017: 42–59).

When the Jesuits were expulsed from the kingdom in 1632, some of the structures were abandoned and some were reutilized for other purposes. Most of the buildings were ruined through the centuries but a few, like Gorgora Nova, Denqez, Debsan, and Serka, managed to preserve part of their structures remarkably intact.

A curious fact recorded by the archaeological project is that the Orthodox changed the significance of the Catholic churches to convert them to the traditional faith of the country. Thus, in several buildings (Debsan, Serka), new walls were built to divide the Jesuit open space into a new triple division as is usual in the eastern churches, or a new Orthodox church was built on top (Azezo) or in the middle of the Catholic buildings (Gorgora Nova, Merṭule Maryam). The

latter three buildings were not made immediately after the missionaries' expulsion as they were constructed with stone and mud, and the mortar technique seems to have been lost at the end of the Gonderine period around the mid-eighteenth century. In the two constructions that had underground conduits for bathrooms or latrines (Gorgora Nova, Azezo), these were destroyed or the wells were intentionally blocked, as if the new technologies were identified with the Roman heresy.

Current Debates

The traditional historiography on the Jesuit period in Ethiopia is divided into two main currents, favorable and critical. As expected, Jesuit historians and Catholics in general pay attention to the modernizing work that the missionaries carried out, introducing European ideas and techniques in a still very backward region, in addition to conducting and publishing very advanced studies for their time on that unknown part of Africa, long before the first European explorers arrived during the nineteenth century (e.g., Caraman 1985). In contrast, most Anglophone authors, together with contemporary Ethiopian historians, have presented almost to this day a rather negative view based on the division and wars that the intruders provoked in the country (e.g., Pankhurst 1998; Merid 1998), which unfortunately seems to have influenced the general neglected state of the Jesuit ruins.

There is general agreement about the Jesuit influence in the reinforcement of the Abyssinian monarchy. Before the missions, the kings changed residence frequently (it was a peripatetic monarchy) erecting large camps with perishable materials, but as soon as the missionaries left the country, the new king Fasiledes chose Gonder as a fixed capital. He also built an impressive four-story palace of square plan with circular towers in its corners, the Fasil Ghimb (one of the main visual symbols of the country and a tourist icon). These structures undoubtedly sought to reinforce the ruler's image of authority before its subjects and above all in the face of the rebellious regional nobility. The origin and models of that architecture, which was later completed by his successors while Gonder remained the capital until the mid-eighteenth century, has been much discussed, with most "post-colonial" local and Anglophone historians favoring an oriental origin (India, Ottoman Empire), rather than a European influence. However, the great resemblance between these buildings and the palace and fortifications erected very close by the missionaries (in Azezo, only a few kilometres from Gonder) makes it difficult not to think that their inspiration (together with the permanence in the country of the Indian technicians who had accompanied the missionaries from Goa and Diu) was crucial in the formation of Gonderine architecture.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Buildings Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ East Africa: Historical Archaeology
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Historical Archaeology
- ▶ India: Historical Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Mission Archaeology in North America
- ▶ South and Southeast Asia: Historical Archaeology

References

Anfray, F. 1980–1981. Vestiges gondariens. *Rassegna di Studi Etiopici* 28: 5–22.

Anfray, F. 1988. Les monuments gondariens des XVIIe et XVIIIe siècles: Une vue d'ensemble. In *Proceedings of the eighth international conference of Ethiopian Studies, Addis Ababa 1984*, ed. Taddese Beyene, 9–45. Addis Ababa: Institute of Ethiopian Studies.

Caraman, P. 1985. *The lost empire. The story of the Jesuits in Ethiopia 1555–1634*. London: Sidgwick & Jackson.

Cohen, L. 2009. *The missionary strategies of the Jesuits in Ethiopia (1555–1632)*. Wiesbaden: Harrassowitz.

Fernández, V.M., J. de Torres, A. Martínez d'Alòs-Moner, and C. Cañete. 2017. *The archaeology of the Jesuit missions in Ethiopia (1557–1632)*. Leiden: Brill.
Martínez d'Alòs-Moner, A. 2015. *Envoys of a human God. The Jesuit mission to Christian Ethiopia*. Leiden: Brill.
Merid Wolde Aregay. 1998. The legacy of Jesuit missionary activities in Ethiopia from 1555 to 1632. In *The missionary factor in Ethiopia. Papers from a symposium on the impact of European missions on Ethiopian society. Lund University, August 1996*, ed. Getatchew Hayle, Aasuly Lande, and Samuel Robeson, 31–56. Frankfurt-an-Main: Peter Lang.
Pankhurst, R. 1998. *The Ethiopians. A history*. Oxford: Blackwell.
Pennec, H. 2003. *Des Jésuites au Royaume du Prêtre Jean (Éthiopie). Stratégies, rencontres et tentatives d'implantation (1495–1633)*. Paris: Fundação Calouste Gulbenkian.
Ramos, M.J., Boavida, I. (Eds.). 2004. *The indigenous and the foreign in Christian Ethiopian art*. On Portuguese-Ethiopian contacts in the 16th–17th centuries. *Papers from the fifth international conference on the History of Ethiopian Art (Arrábida, 26–30 Nov 1999)*. Burlington: Ashgate.
RASO. 1903–1917. *Rerum Aethiopicarum Scriptores Occidentales Inediti a saeculo XVI ad XIX*, ed. Camilo Beccari, 15 vols. Roma: D. de Luigi.
Tsega Michael, Gessesse. 1998. *Rapport du travail archéologique sur le site d'Azezo dans la région de Gondar, mai–juin 1998*. Addis Abeba: Manuscript at the Centre Français d'études Ethiopiennes. (ref. AO-TSEG-0020et, 15pp., photos, and map).

Archaeology of the Majimaji War

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Introduction

The Majimaji war, which occurred in 1905–1907, was a resistance against German colonial domination in southern Tanzania. The war spread to over 260,000 km^2 of southern Tanzania covering seven regions, namely, Lindi, Mtwara, Ruvuma, Pwani, Njombe, Morogoro, and Dar es Salaam. More than 20 ethnic groups participated including the Mwera, Makonde, Makua, Yao, Ngindo, Matumbi, Bena, Zaramo, Ndengereko, Matengo Ndendeule, and Ngoni. Some of the prominent Majimaji warriors from these ethnic groups include Songea Mbano of the Ngoni, Selemani Mamba of the Mwera, Abdalah Mchimai of the Ngindo, Mpangile of the Bena, Lindimyo of the Matumbi, and Kibasila of the Zaramo. The numbers of people who participated in the war, those who died and the survivors, are uncertain. This is because there was no deliberate enumeration of the whole population in Tanzania before 1948 (Thomas 1968); available before this date are estimates rather than census. The German financial year report of 1906/1907 presented in 1908/1909 had estimated the figure of Majimaji causalities at 75,000 (Gwassa 2005). The Tanzanian historian Gilbert Gwassa estimated in 1973 that between 100,000 and 120,000 people died of the war. Altogether, depopulation is one of the legendry aftermaths of the Majimaji war.

Definition

The term Majimaji emerged out of the instructions of the ritualistic war leader named Kinjekitile Ngwale who instructed the words *Maji Maji* to be uttered whenever the Germans shot Tanzanian soldiers. Kinjekitile instructed that, when fighting, the soldiers should all look forward and pronounce the words M*aji! Maji!* It is from these words that Majimaji acquired its name. *Maji* is a Swahili term which means water. Kinjekitile prepared *Maji* – which was a liquid concoction used as the war medicine. *Maji* medicine is intended to immunize, cure, or protect the Majimaji fighters, their families, and properties during the war. It was believed that the use of *Maji* would turn the German bullets into water and bullets would fall off like water on an oiled body (Gwassa 1973). However, the medicine was ineffective and the Tanzanians were defeated. The term Majimaji was publicized by the colonial era publications (Sunseri 1999). This partly accounts for the English orthography that has been used in writing of term either as two separate entities, "Maji Maji" or with an intervening hyphen "Maji-Maji." The use of the term as two different entities Maji Maji has also been attributed to the retaining of the original cry that the Majimaji fighters uttered

during the war. Nevertheless, the original cry that Majimaji fighters uttered was according to the ethnic groups. For instance, the Matumbi used the words Mase Mase, while the Ngoni used Manji Manji, all translated to mean water. Scholars such as Sunseri (1999) have used the term Majimaji inconsistently either following the Swahili grammar or English but without explaining why they incline into that orthography. Majimaji as a term retains Swahili identity whereby Swahili grammatical conventions specify that compounds should be written as one word, thus Majimaji.

In Africa, the archaeology of resistance is nearly absent. Although much excellent work has been done on symbolic resistance, hybridity, and cultural negotiation by postcolonial archaeologists such as Hall (1993), issues of overt violence have seldom been addressed. The little available literature has shortcomings either evincing western bias or delving into military details, forgetting the larger historical and social picture (Gonzalez-Ruibal et al. 2011). The term archaeology of resistance on the other hand can be a misnomer as African resistances range from slavery to colonialism and post colonialism all existing in multiple forms of both passive and active resistance. Slaves' resistance, for instance, includes behaviors such as sabotage, feigned sickness, intentional tool damage, strikes, slowdowns, poisoning, and arson (Weik 1997:84), whereas resistance to colonialism involved armed struggle and active militarism. In the broadest sense, approach to the archaeology of African resistance has been conducted as historical archaeologies of ancient colonialism and imperialism or historical archaeology of modernity and expansion (Gonzalez-Ruibal et al. 2011). Nevertheless, historical archaeology in Africa is informed by diverse sources and multiple histories; as a result there is no single but rather multiple historical archaeologies on the continent (Pikirayi 2006). Archaeology of African resistance is thus a discipline of its own right. By looking at guerrilla bases, colonial military camps, and burnt-down indigenous villages, the archaeology of African resistance can offer a counterpoint to visions of cultural contact and colonialism from Roman times to nineteenth-century colonialism. The archaeology of resistance can also employ social accounts whereby different actors are brought into play, especially those that have been doubly ignored, women, children, and the elderly. Thus, approach to the archaeology of resistance in Africa is an essential tool to elucidate the role of different agencies, participants of the resistance, the landscape of resistance, and the nature of resistance as these were not uniform throughout the continent. The archaeology of resistance can also yield memories and the use of the same by the contemporary African communities.

Historical Background

The initial battlefield of the Majimaji war was Nandete in Lindi region and among the Matumbi people. To initiate the war, two patriotic warriors, namely, Ngulumbalyo Mandai and Lindimyo Machela, after they have used the war medicine – *Maji* – uprooted cotton plants from the German colonial plantation located at Sikwaku hill, 10°54′0"S/38°47′60″E. This ignited the war in Umatumbi in mid-July 1905. From its first battle, the Majimaji war spread rapidly to other parts of southern Tanzania. For example, the war broke out in Liwale on 13 August 1905 (Libaba 1968), on 16 August 1905 among the Pogoro (Iliffe 1979a), by the end of August among the Zaramo (Sunseri 1999), and 3 September among the Ngoni. This happened 3 years after the establishment of the cotton plantation. The cotton plantation economy was not beneficial to the southern Tanzanian people because of the harsh and inefficient way in which the scheme was handled. Hardship and suffering were caused, and the scheme did not benefit the local people (Giblin and Monson 2010). As mentioned above, the war was initiated by the Matumbi, but more than 20 ethnic groups joined the resistance with the interest to fight the Germans.

The Majimaji warriors were bounded together by rituals and traditions spearheaded by Kinjekitile Ngwale, a medicine man who lived at Ngarambi, west of Kipatimu. Kinjekitile declared that by sprinkling, bathing, or rubbing people with

medicinal water (*Maji*), he could provide them with immunity against the Germans bullets. Both the *Maji* medicine and the message of the war outbreak were spread by the Majimaji messengers. It is thus believed that *Maji* was an important organizational device (Gwassa 1973: 11). However, the acceptance and utilization of *Maji* created considerable ethnic confusion and variations, and receipt of the same varied widely. For instance, while *Maji* spread in some areas prior to the war, other battle sites received *Maji* long after the war had begun in their areas. Thus, the beginning of the Majimaji war differed in time from one battle site to the other. The Ngoni received *Maji* and the Majimaji at the same time, the Matumbi received *Maji* first and began the Majimaji, and the Yao received Majimaji before *Maji.*

The spread of the Majimaji war from one ethnic group to another forms a pattern in historical narratives. This is because the Majimaji situation stimulated different modes of reactions among southern Tanzanian ethnic groups. The majority of the ethnic groups in southern Tanzania joined the war, although sometimes they did so without support of their rulers. A number of headmen who were their rulers were forced to join the war only after a threat of being killed as enemies. Other ethnic groups such as most of the coastal peoples, the Matengo and the Yao, remained militarily passive. Individual African agents were also recruited as mercenaries for the Germany army. Therefore, ethnic groups and sometimes people of the same ethnic group reacted differently to the Majimaji war movement.

Key Issues

Archaeological survey, excavations, document analysis, and ethnographic enquiries that have been conducted in southern Tanzania have yielded a trail of sites, landscape, and memories attributed to different episodes of the Majimaji war. They include the cotton plantation source of the war, battle sites, battle landscape, refuge caves, execution trees, mass graves, numerous German administrative posts (*boma*) from which the war commands emanated from, and ritual sites as a spiritual panacea to the hardship of the war. These add on to memories, memorials, and memorialization activities that have been adopted by the contemporary communities to remember the havoc of the Majimaji war. As material past, the Majimaji war remains have been interpreted to elucidate the Majimaji peoples, warriors, landscape, and weapons (Rushohora 2015). The Majimaji people, for instance, are the people whose antecedents participated in the Majimaji war. These people are geographically living in the aforementioned seven regions of mainland Tanzania renowned in oral and written sources to have been involved in the warfare. In addition, material traces of the past, features, landscape, and memories attest to their being. The Mwera, Matumbi, and Ngindo in Lindi region, the Ngoni and Ndendeule in Ruvuma region, and the Makua of Mtwara region (just to mention a few) are the Majimaji peoples. The Majimaji warriors on the other hand were men of younger and middle age. The warriors were identified during the war with bottles of *Maji*; white, blue, or black *kaniki* cloth; and a headband threaded with stalks of millet or maize tied on their forehead (Gwassa 1973). Then, the Majimaji victims were both women and men. During the Majimaji war, women were used as spies and offered a constant supply of food to the warriors. For this reason, colonial troops detained both men and women as hostages in order to establish whether they were Majimaji supporters or loyalists. The same technique was used to force surrender by preventing supplies reaching the warrior bands (Schmidt 2010: 206).

The Majimaji war's paramount weapon was *Maji* (Becker 2004: 20). *Maji*, as a medicine, was a carrier of a multitude of social meanings. Prophet diviners of *Maji* played the role of military guidance although they were not combatants in the war itself (Monson 2010: 35). Military leaders used medicines as the war strategy to ensure or coerce loyalty and commitment among their soldiers (Monson 2010: 46). Rituals and medicine were perceived as instruments of invulnerability in time of war (Monson 2010: 36) and Maji as medicine of immortality (Gwassa 1973). Other weapons of the Majimaji war included

stones, spears, sticks, knives, shields, bows, and poisonous arrows. Although the southern Tanzania region and people were diverse, the weapons used for fighting throughout the Majimaji region were of the same nature (Monson 2010: 35). However, the Ngoni used cowhide shields, clubs, and stabbing spears in addition to other weapons (Becker 2004: 4), while some Africans throughout the region used guns (Makweta 1968: 2). The Germans' weapons were solely guns.

Another prominent legacy of the Majimaji war is memory. The Majimaji memories can be assigned to three levels of agents: the individual, the small group, and the collective. The individual Majimaji memories are those formed by remnants of families of the leaders of the war, the known warriors, and *Maji* (Majimaji medicine) agents. The small group's memories involve villages, districts, and the de facto regional scale. Collective memory involves the teachings of Majimaji as part of the national history project and creation of commemoration days, activities, and rituals. On individual memory, for example, some families of the Majimaji warriors forget or ignore the war memories, while others are keen to remember them. Ignoring the Majimaji warriors or at least disassociation with them mostly appear when the Majimaji warriors committed murder of German solders or their associates like the German missionaries and happened to be identified as the murderer. These Majimaji warriors are like Seleman Mamba and Abdallah Mchimaye. On the other hand, Majimaji warriors that made a pivotal contribution either in leading the battalion or prolonging the war until their arrest are memorialized by their individual families. Examples of such warriors include Songea Mbano Lwafu, the sub-chief and war general of the Ngoni. The family of this warrior performs rituals at his refuge cave and participates in the Songea commemoration events every year to keep his memories alive. The small group's memories include the celebration of individual warrior or warriors related to a particular village or region. Kinjekitile Ngwale memories, for example, are kept by the people of his village. One hamlet in the village is named after him, and until 1997, primary school graduations were held in ruins of his residential house and ritual site source of *Maji*. The collective memory of the Majimaji war in Tanzania as a country has seen the Majimaji war integrated in history syllabi from primary schools to the college level. The Majimaji heroes are celebrated on the heroes' day, and the war is regarded as a cornerstone of the countries' liberation against colonial domination.

International Perspectives

Different countries and communities choose different paths of recovery from colonial wars, trauma, and atrocities ranging from heritage therapy, human rights activism, juridical proceedings, apology, and truth revealing. In South Africa, for example, Lynn Meskell and Colette Scheermeyer point that production of objects, memorials, museums, heritage sites, and public spaces of commemoration has provided a therapeutic arena underpinning amnesty and the desire to move forward as a nation (Meskell and Scheermeyer 2008). In Rwanda and Uganda, John Giblin attempts to use international, national, and subnational post-conflict policies of healing heritage to conceptualize cultural process, cultural trauma, and symbolic healing, respectively. This led him to conclude that heritage is neither an essentially positive nor negative post-conflict remedy to select or avoid (Giblin 2014). Remedy especially after the Majimaji war is conceptualized as a procedure by which relief is obtained for individual or a community that suffered physical, mental, or emotional injury and economic loss. It is over a century since the Majimaji war occurred, and the contemporary communities desire for remedy. Remedy from the Majimaji war is very important given the fact that the trauma neither allowed appropriate mourning nor burial. The Majimaji war victims passed through different phases of a forceful total silence, nationalization, and community ownership. A forceful total silence was a safe option during the colonial period because the war was categorized as a revolt/rebellion; calling it a war was a punishable offense (Lawi 2009). Silence period was immediately after the war which saw the demarcation of southern Tanzania as a "rebel

area," (Jamaliddini 2006) and the hardest punishment that this region received was developmental backwater which has been difficult to recover up to date (Koponen 2010). Remedying strategy that was used during this period was migration from the Majimaji war zone to other parts of the country living the area with population denudation which took very long to recover (Gwassa 1973). The second phase was the nationalization and national commemoration period which commenced in the 1960s when the war was nationalized and identified as an independence movement attempt (Sunseri 1999; Ranger 1968). Tanzanians historical scholarship of the war began during this period hand in hand with entry into the history pedagogy from primary to college level emphasizing the Majimaji as a heroic independence movement. Even in the history of the Tanzanian army (Tanzania People's Defense Force – TPDF), the Majimaji war military techniques such as the guerilla wars and the use of shield and spears are mentioned as the indigenous forms of defense in Tanzania and origin of the military evolution in the country. The nationalization phase considered not the communities that were affected by the Majimaji war but the entire country as being built on the ashes of heroes and heroines of colonial resistance. Communities therefore required healing.

Reparation is one form of healing that the Majimaji war peoples demand from the Germans. The Majimaji commemoration events in Songea have always been the venue for the local voices about reparation. Demand for reparation does not mean that memory of trauma can be erased, but transformed in positive ways, and new narratives can make sense of past trauma. The Germans may have paid symbolic reparation through scholarships and aid to the government of Tanzania. In 2006, for example, the German Ambassador to Tanzania, Honorable Wolfgang Ringe, announced that the German Foreign Ministry had pledged 8.5 million Tanzania shillings to renovate the Maji Maji Memorial Museum (Chachage 2006). Given the fact that these are not given with a formal apology and acknowledgment of the crime and not paid directly to affected families, nothing is considered to have been done by the German government to the victims of the Majimaji war.

A

Future Directions

The Majimaji war is one of the catastrophes that fall within the realm of intergenerational historical trauma. It was a genocide, but obviously some genocides are prominently remembered, while others are ignored, hidden, or denied (Heerten and Moses 2014). The notion that local communities experienced genocide at the hands of their white conquerors is not only dismissed but openly derided by scholars because colonial and imperial wars are not usually considered genocidal (Dedering 1993). Nevertheless, the Majimaji war was meant to be destructive and genocidal because civilian population was systematically targeted: the entire villages, fields, and granaries were burnt, and hunger was used as a weapon to bring the guerrilla fighters to their knees. The Germans also committed cultural genocide by depriving the right to perform burial rite. In Tanzania, politics around the Majimaji genocide sprung in the parliament as awake to emulate the Kenya Mau Mau veterans and the Nama-Herero genocide. However, to delve into matters of the Majimaji as genocide, more research ought to be done: foremost to establish the exact number of people who died of the war, to document and bring to the fore all the genocidal acts committed during the war, and to repatriate human body parts which plausibly ought to have been taken from Tanzania.

References

Becker, F. 2004. Traders, big men and prophets: Political continuity and crisis in the Maji Maji rebellion in Southeast Tanzania. *The Journal of African History* 45 (1): 1–22.

Chachage, C. S. 2006. A patriot's response to Hon. Wolfgang Ringe, German Ambassador to Tanzania'. Tanzania Network, 20. Available at http://www.tanzania-network.de/upload/PDF/MajiMaji/Songea/2006_03_20_Chachage_response.pdf.

Dedering, T. 1993. The German-Herero war of 1904: Revisionism of genocide or imaginary historiography? *Journal of Southern African Studies* 19 (1): 80–88.

Giblin, J.D. 2014. Post-conflict heritage: Symbolic healing and cultural renewal. *International Journal of Heritage Studies* 20 (5): 500–518.
Giblin, J., and J. Monson, eds. 2010. *Maji Maji: Lifting the fog of war*. Boston: Brill.
González-Ruibal, A., Y. Sahle, and X. Ayan Vila. 2011. A social archaeology of colonial war in Ethiopia. *World Archaeology* 43 (1): 40–65.
Gwassa, G.C.K. 1973. The outbreak and development of the Maji Maji War, 1905–1907. Ph.D. Thesis, University of Dar es Salaam.
Gwassa, G.K. 2005. *The outbreak and development of the Maji Maji War 1905–1907*. Berlin: InterCultura-Missions- und kulturgeschichtliche Forschungen.
Hall, M. 1993. The archaeology of colonial settlement in southern Africa. *Annual Review of Anthropology* 22: 177–200.
Heerten, L., and A.D. Moses. 2014. The Nigeria–Biafra war: Postcolonial conflict and the question of genocide. *Journal of Genocide Research* 16 (2–3): 169–203.
Iliffe, J. 1979. *A modern history of Tanganyika*. Cambridge, UK: Cambridge University Press.
Jamaliddini, A.K.B. 2006. *Utenzi wa Vita vya Maji Maji*. Dar es Salaam: Taasisi ya Uchunguzi wa Kiswahili.
Koponen, J. 2010. Majimaji in the making of the south. *Tanzania Zamani* 7 (1): 1–58.
Lawi, Y. 2009. Pros and cons of patriotism in the teaching of the Maji Maji war in Tanzania schools. *Journal of Historical Association of Tanzania* 6 (2): 66–90.
Libaba, P.M. 1968. *The Maji Maji rising in Lindi district*, Maji Maji Research Project Collected Papers. Dar es Salaam: Dar es Salaam University.
Makweta, J. 1968. *Majimaji in Ubena*, Maji Maji Research Project Collected Papers. Dar es Salaam: Dar es Salaam University.
Meskell, L., and C. Scheermeyer. 2008. Heritage as therapy set pieces from the New South Africa. *Journal of Material Culture* 13 (2): 153–173.
Monson, J. 2010. War of words: The narrative efficacy of medicine in the Maji Maji war. In *Maji Maji lifting the fog of war*, ed. J. Giblin and J. Monson, 33–69. Boston: Brill.
Pikirayi, I. 2006. Gold, black ivory and houses of stones: Historical archaeology in Africa. In *Historical archaeology,* ed. M. Hall and S. Silliman. Blackwell Publishers, USA.
Ranger, T.O. 1968. Connexions between primary resistance movements and modern mass nationalism in East and Central Africa, part I. *The Journal of African History* 9 (3): 437–453.
Rushohora, N.A. 2015. An Archaeological Identity of the Majimaji: Toward an Historical Archaeology of Resistance to German Colonization in Southern Tanzania. Ph.D. thesis, University of Pretoria.
Schmidt, H.I. 2010. Deadly silence predominates in this district: The Majimaji war and its aftermath in Ungoni. In *Maji Maji lifting the fog of war*, ed. J. Giblin and J. Monson, 183–219. Boston: Brill.
Sunseri, T. 1999. Majimaji and the millennium: Abrahamic sources and the creation of a Tanzanian resistance tradition. *History in Africa* 26: 365–378.
Thomas, Ian. 1968. Geographical aspects of the Tanzania population census 1967. *East African Geographical Review* 6: 1–12.
Weik, T. 1997. The archaeology of maroon societies in the Americas: Resistance, cultural continuity, and transformation in the African diaspora. *Historical Archaeology* 31 (2): 81–92.

Archaeology of the Massim Island Region, Papua New Guinea

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Introduction

Modern humans colonized New Guinea and Australia at least 50,000 years ago, which at this time formed a single continent known as Sahul. In the millennia that followed, descendants of these early inhabitants spread across this large mosaic landscape and eventually reached the eastern tip of New Guinea (northern Sahul) and the very edge of the continental world. Scattered off the eastern shores were groups of islands collectively known today as the "Massim region" (Fig. 1). The Massim islands have an ecological diversity substantially diminished compared to the continental landscape of New Guinea, and they have undergone considerable changes in size as global sea levels fluctuated throughout the Late Pleistocene (>12kya) and Early-Middle Holocene (12–4kya). Further to the east is the vast expanse of the Pacific Ocean, with the remote islands of the Pacific some of the last landmasses on earth to be colonized by humans. The Massim is therefore well positioned to inform on (1) how our species adapted to living in changing island ecosystems throughout the Late Pleistocene and (2) the long-term emergence of island cultures, prior to, during, and

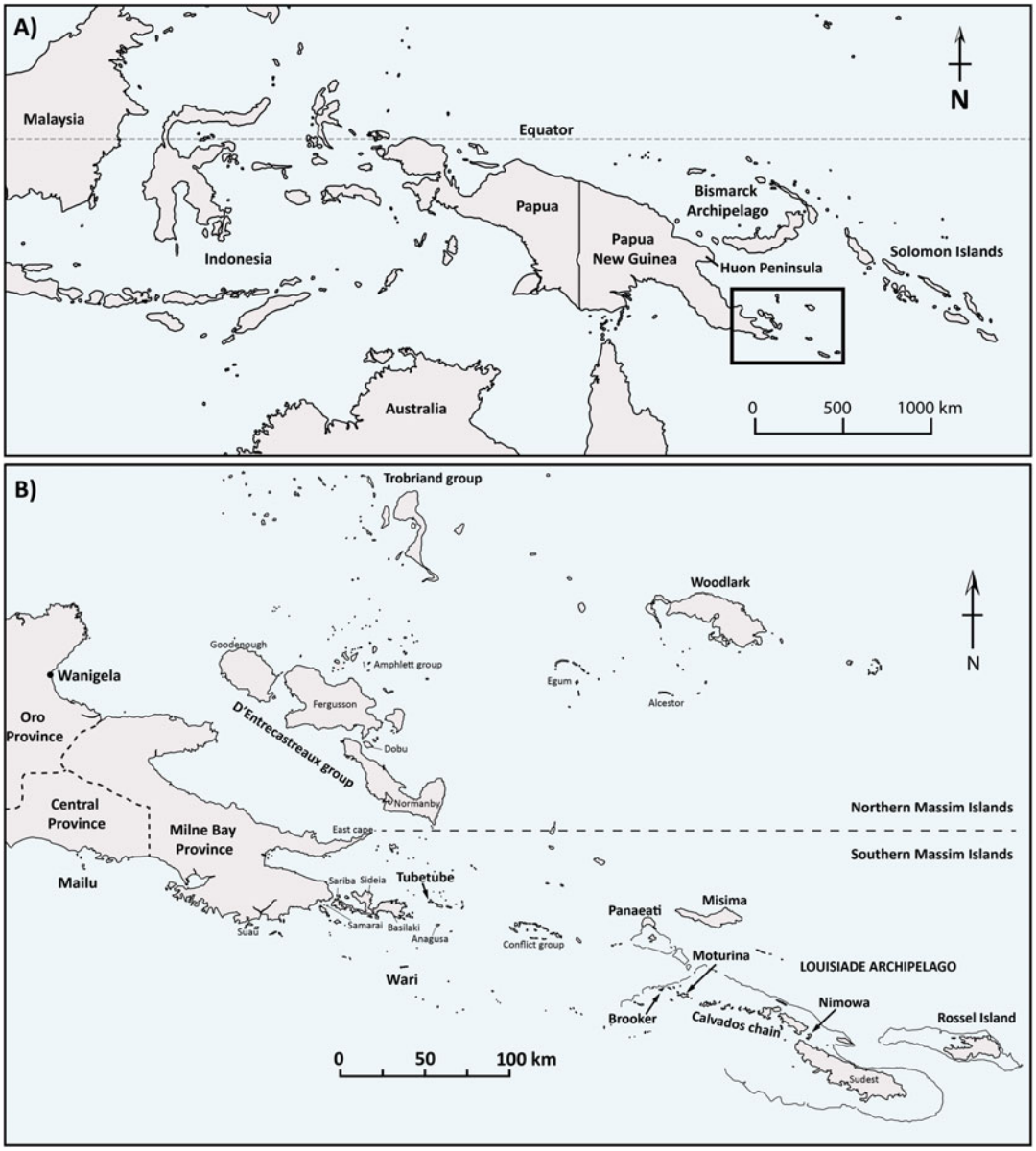

Archaeology of the Massim Island Region, Papua New Guinea, Fig. 1 Map of (**a**) the Asia-Pacific region showing the location of the Massim in Papua New Guinea, and (**b**) the Massim islands, with those mentioned in the text labelled

after the colonization of the Pacific Islands ~3000 years ago.

The region is best known for the plethora of anthropological accounts describing indigenous island populations and the diverse aspects of their cultural systems, including Bronislaw Malinowski's famed 1922 ethnography on *Kula* exchange and Trobriand Island culture. Massim archaeology, however, is still emerging. Coverage of the islands is patchy, although temporal resolution of cultural sequences has greatly improved over the last decade. Archaeological research in

the Massim has been heavily influenced by anthropological cultural accounts which have provided a historical framework for understanding the deeper past. Because of this, research has predominantly contributed to our understanding of when, how, and why regionally distinct maritime-focused cultural identities developed, including the origins of ethnographically recorded trade networks and social systems.

Definition

The Massim Region: Geography, Climate, and Ecology

The Massim region defines the eastern tip of New Guinea and the adjacent offshore islands (Fig. 1). The islands are spread over 140,000km^2 of ocean, are situated 8–12° south of the equator, and range in area up to 1370 km^2 (Fergusson Island) and in elevation up to 2536 m (Goodenough Island). The islands are encompassed by the modern political province of Milne Bay, with the mainland including parts of the Central and Oro provinces. The modern population is ~300,000, although in the late nineteenth century, it was well below 100,000 and was likely lower throughout prehistory. Over 30 languages are spoken in the Massim, all of which belong to the Papuan Tip Austronesian subgroup, except that spoken on Rossel Island which is a non-Austronesian outlier not related to any known language (Ross 1988).

The islands can be divided geographically into northern and southern groups, which are separated by a deep-sea basin. Historical differences in human social practices further underpin this division (Seligmann 1910). Most of the islands are volcanic, with those in the southern Massim forming a discontinuous extension of the central mountain range which runs the length of New Guinea. Many low-lying coral limestone islands have uplifted on the shallow continental plate (e.g., Trobriand group) and in large barrier reef systems (e.g., Panaeati). The largest reef system (~8000km^2) encompasses many of the islands of the Louisiade Archipelago and is one of the most biodiverse marine systems in the world (Allen et al. 2003).

The Massim has a monsoonal climate comprising a marked wet (November–April) and dry (May–October) season. Prevailing winds blow from the southeast for most of the year, with northwest winds and cyclones prevalent during the wet season. Massim island communities rely on annual wind cycles to coordinate the planting and harvesting of garden crops, as well as long-distance sailing expeditions. The islands are near the equator with no major difference in temperature throughout the year, having an annual average of 26–27 °C. Rainfall varies considerably by topography as higher mountain peaks trap cloud more frequently, which has influenced the distribution of past and present populations. Low-lying (<200 m asl) islands receive 1500–2000 mm annually and high islands 3000–4000 mm. Despite having a relatively depauperate fauna compared to New Guinea, the Massim islands have a high proportion of endemic species, comprised mostly of birds, amphibians, and reptiles. Four ecozones broadly characterize the islands: Littoral foothills (>50 m), tropical lowland forest (50–1000 m), lower montane forest (1000–2000 m), and upper montane (2000–2536 m) forest. The majority of modern villages are situated within the lowest ecozone, though many late prehistoric and historic villages have been identified at higher elevations (Irwin et al. 2019).

Historical Background

European Contact

The earliest recorded account of external (European) contact with the Massim Islanders was by Spanish sailor Luis Vaez de Torres and his crew over 400 years ago, in 1606 (Shaw 2015). French sailors Louis Antoine de Bougainville and Antoine Bruni D'Entrecasteaux sailed through the region in 1768 and 1793, respectively, and named several of the islands. Extensive reef systems prevented European sailing ships from making landfall on most islands in the Louisiade Archipelago until the nineteenth century. The use of stone tools across the region declined throughout the nineteenth century as access to iron from shipwrecks and European trade became more commonplace (Bickler 1998). Europeans first settled on the islands in 1847 when Marist

Archaeology of the Massim Island Region, Papua New Guinea, Fig. 2 Massim wood carvings with regionally distinctive decorative styles. From left to right: Canoe splashboard, spatula with two opposed seated figure, canoe wave splitter (top), canoe mast pulley (bottom), ceremonial presentation axe handle. (Original photos from Hamson and Aldridge (2009))

Missionaries established a station on Woodlark Island. Sustained European settlement was later established on Samarai Island in 1878 as a mission station and from 1888 as the district administration center following annexation of the region as a British protectorate. European cultural influences increased in the Massim after this time with a short-lived gold mining boom, the establishment of coconut plantations, and commissioning of several more mission stations.

Origins and Meaning of the Term "Massim"

The "Massim" is an anthropologically defined cultural construct with no explicit recognition of the term among local inhabitants, and it does not infer a common biological origin for the populations. The term was first used in 1856 by Italian Catholic priest, Father Carlo Salerio, to define a language spoken on Woodlark and other island, and is probably a phonetic mispronunciation of a local word, perhaps referring to the "Misima" language (Shaw 2015). Pioneering anthropologist Alfred Haddon (1894) adopted the term to collectively describe similarities between decorative designs observed on wood, shell, and bone carvings manufactured and widely traded in the region (Fig. 2). Charles Seligmann (1910) subsequently used "Massim" as a broader cultural nomenclature when he recognized a number of shared social aspects between the island populations, including matrilineal descent, the use of totems, and the organization of houses by clan affiliations. The term became firmly planted in anthropological literature following the publication of Malinowski's (1922) account of *Kula* exchange and is now used synonymously with "Milne Bay" when referring to the island groups off the eastern tip of Papua New Guinea.

The Kula Exchange Ring

No island group in the Massim region has received more attention from anthropologists than the Trobriand Island group, which was the geographic focus of the *Kula* exchange network (Fig. 3). The *Kula* is a vast institution involving the maritime exchange of shell valuables (*Mwali*

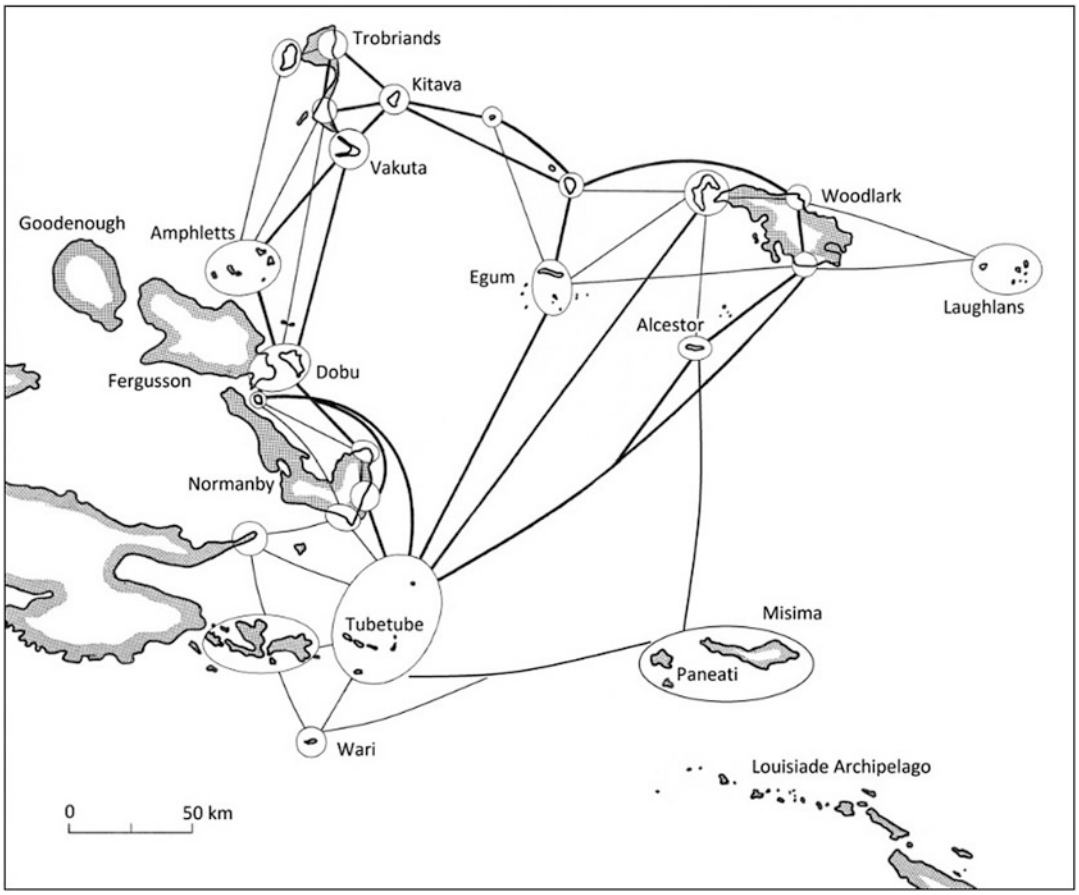

Archaeology of the Massim Island Region, Papua New Guinea, Fig. 3 The Kula Ring in the Massim. Major Kula communities are indicated by circles

armshells and *Soulava* necklaces) which circulate against each other clockwise and counterclockwise between exchange partners on different islands (Irwin et al. 2019). Participants who have the social standing to become involved in *Kula* gain prestige from successful exchanges through a process of delayed reciprocity, with a clear hierarchy both in the status of the valuables and between individuals involved. Although shell valuables are the primary items exchanged, food and other utilitarian goods moved through this network as the *Kula* also served to keep economic supply lines open between distant island communities during periods of drought and famine. Determining the prehistoric origins of the *Kula* network was the focus of early archaeological research in the Massim, discussed below in the Late Holocene section.

Late Pleistocene Settlement (17–12,000 Years Ago)

The Massim islands were colonized by modern humans at least 17,000 years ago, shortly after the Last Glacial Maximum (LGM) when sea levels were 110–120 m lower and islands were significantly larger. Air temperatures were only ~1–3 °C cooler than today due to the proximity of these islands to the equator and likely did not have any major impact on the diversity of vegetation on the islands (Rehfeld et al. 2018). Excavations at Kelebwanagum cave on the uplifted limestone island of Panaeati (30km^2) in 2018 revealed

burnt hard shore marine shell and small bird bone in the lowest layer associated with this age, indicating the inhabitants were primarily exploiting resources available in close proximity to the cave (Shaw et al. Forthcoming-a) (Figs. 4). During the LGM, Panaeati would have been almost ten times larger (~288km^2), providing a more substantial vegetation base and a larger shoreline with shellfish beds for pre-agricultural inhabitants to exploit. Obsidian (volcanic glass), also recovered from this context, has been attributed to the west Fergusson Island source, indicating people took lithics of known practical value with them as they dispersed into the more remote islands with an uncertain resource base.

Panaeati and the other islands of the Louisiade Archipelago had never been connected to New Guinea (Sahul), so watercraft and some degree of seafaring skill were needed to make the ≤17 km sea crossings. It is probable that people had also reached the easternmost Massim islands during the LGM as several robust "waisted" stone axe-adze blades were discovered on Rossel Island (Shaw 2017) (Fig. 5a). Although these blades were found in undated surface contexts, waisted tools are generally characteristic of Late Pleistocene sites across Sahul and are argued to have been used in early forms of plant management by ringbarking and felling soft trees, such as sago (*Metroxylon* sp.). A pre-LGM human presence in the Massim region is possible as waisted blades of similar dimensions had been recovered from excavations on the uplifted coral limestone terraces at the Bobongara site (Huon Peninsula) and date to >40kya (Summerhayes et al. 2017) (Fig. 1).

Early Holocene (12–8000 Years Ago)

There are no Early Holocene cultural sequences in the Massim, so little can be said about human activity during this time, although it was a period of marked environmental instability. Between 17kya and 8kya, postglacial warming rose sea levels ~100 m, which flooded coastal areas, reduced the size of shellfish beds, and drowned any established coral reef systems. The cessation of human use at Kelebwanagum cave by 12,600 years ago indicates people changed their settlement patterns and likely abandoned low-lying islands as they shrunk in size and ecological carrying capacity. Whether all of the islands were abandoned is not known, but only a handful of high islands would have remained large enough to sustain continual settlement of pre-agricultural populations. The increasing distances between islands would have limited the frequency of inter-island movement and promoted isolation, which may explain the genetic, linguistic, and cultural distinction of Rossel islanders from other Massim populations (van Oven et al. 2014).

Middle Holocene (8–4,000 Years Ago)

Evidence for Middle Holocene human settlement of the region is also scarce. The use of Kelebwanagum cave resumed by 4700 years ago, after a ~8000 year hiatus in human activity (Shaw et al. Forthcoming-a). The movement of people back into these islands during the Middle Holocene, as reflected by reuse of the cave, coincided with the stabilization of sea levels and the formation of large lagoon systems which are known in the region today. Exploitation of soft shore shellfish indicates that sandy beaches had formed on Panaeati Island, and the presence of small pieces of west Fergusson obsidian from this time onward suggests people were moving back into these more remote islands via the larger islands closer to the mainland.

The discovery of elaborately manufactured stone mortars, pestles, and tools (n= > 40) in the Massim suggests many islands were occupied in the Middle Holocene (Swadling 2016) (Fig. 5c–e). Although these stone tools all come from undated contexts, stone pestles and mortars are known in highland New Guinea archaeological sites and are putatively dated between 8000 and 3300 years ago. Their wide distribution, spanning the New Guinea Highlands, lowlands, and islands, is thought to have been part of an expansive trade network connecting communities across many language and cultural boundaries. A stemmed obsidian blade had also been found in the Massim (Fig. 5b), and these artifacts are known in the Bismarck Archipelago from contexts dating to 6000–3500 years ago (Fig. 6).

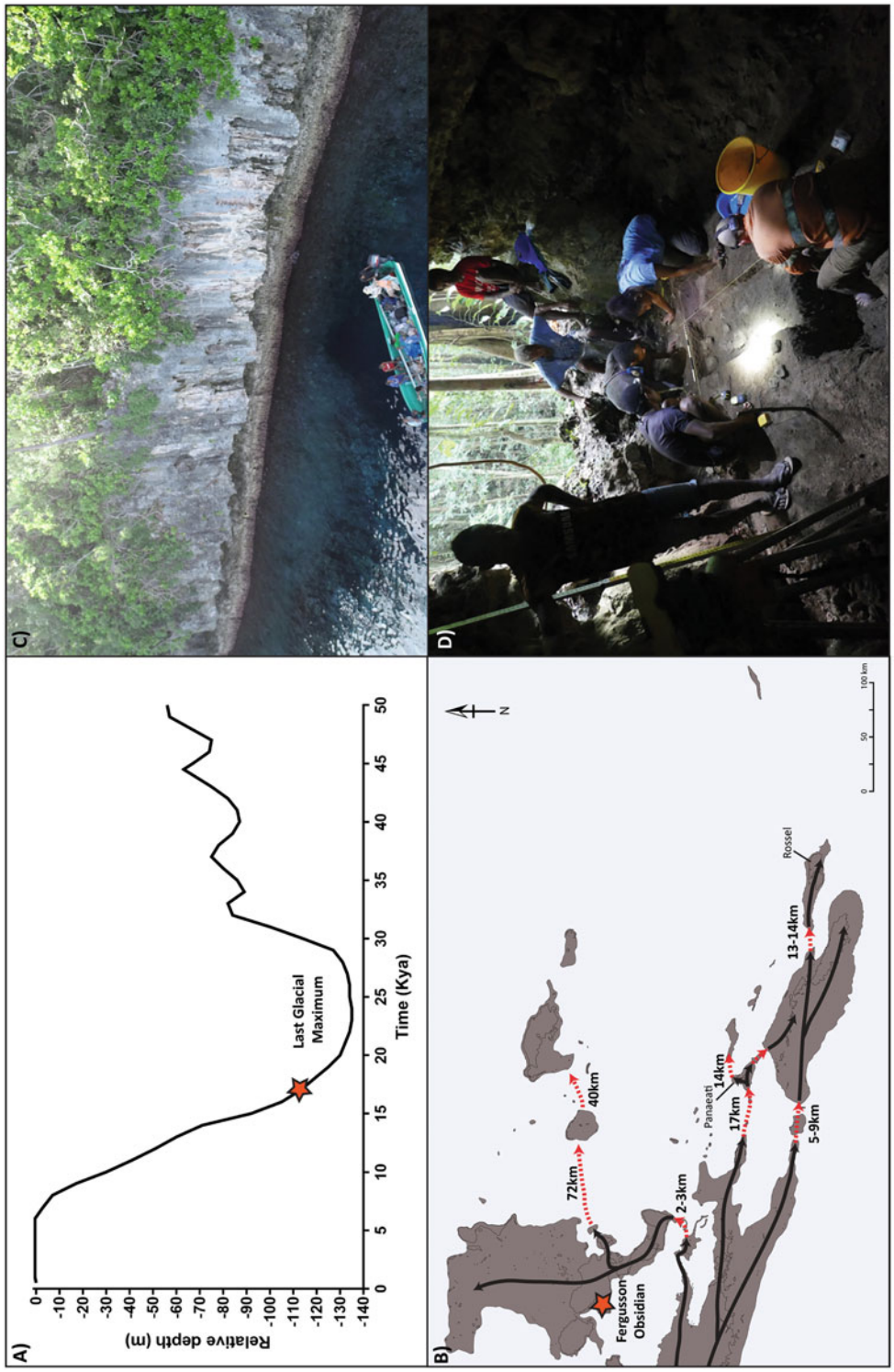

Archaeology of the Massim Island Region, Papua New Guinea, Fig. 4 Late Pleistocene settlement of the Massim. (**a**) Sea level curve over last 50kya, with red star indicating the earliest human settlement. (**b**) Size of landmasses in the Massim during the LGM, with location of west Fergusson obsidian source/s marked. (**c**) Uplifted limestone cliff on north coast of Panaeati Island near Kelebwanagum cave. (**d**) Kelebwanagum cave excavation in progress

Archaeology of the Massim Island Region, Papua New Guinea, Fig. 5 Possible Late Pleistocene and Early-Middle Holocene artifacts found in undated contexts on the Massim islands. (**a**) Waisted stone blade, Rossel Island. (**b**) Stemmed obsidian blade, Misima Island. (**c**) Stemmed stone blade, Trobriand Islands. (**d**) Stone pestle, Woodlark Island. (**e**) Stone mortar, Normandy Island

Most of these elaborate artifacts had been found on the larger islands of Kiriwina, Woodlark, and Misima, as well as the adjacent mainland. Swadling (2016) has argued their distribution may be related to the higher agricultural potential of these islands, which were likely important economic centers during the Middle Holocene. Currently, however, it is not known when agriculture was first practiced in the Massim islands. In the New Guinea Highlands, wetland cultivation of root and fruit crops was established by 7000 years ago, but in lowland and island areas, there is no clear evidence for agriculture prior to the arrival of the Lapita Cultural Complex into New Guinea from Southeast Asia around 3300 years ago (Summerhayes et al. 2017). A lack of earlier evidence for agriculture in the islands is due to the difficulty in finding sites where gardening evidence will have survived. It is possible that agriculture was established in the Massim islands during the Middle Holocene, as it was in the highlands, though confirmation is needed through archaeobotanical research.

Late Holocene (Last 4000 Years)

With the exception of Kelebwanagum cave, all archaeological sites in the Massim date to the Late Holocene.

Lapita Settlement (3050–2400 Years Ago)

Intensive settlement and the introduction of pottery to the Massim islands occurred by 3050 years ago and are attributed to the Lapita Cultural Complex. Lapita is an archaeologically recognized culture which introduced a number of significant new technologies, including pottery, developed island horticulture, several socially important animal domesticates (pigs, dogs, and chickens), and a more diverse range of shell ornaments and stone tools indicative of a well-defined hierarchical social organization. The earliest known Lapita sites are in the Bismarck Archipelago (Fig. 1). It is now clear that the Lapita settlement of the Massim islands was part of a large-scale diaspora of people out of the Bismarcks into the remote Pacific Islands and along the southern coast of Papua New Guinea around three millennia ago.

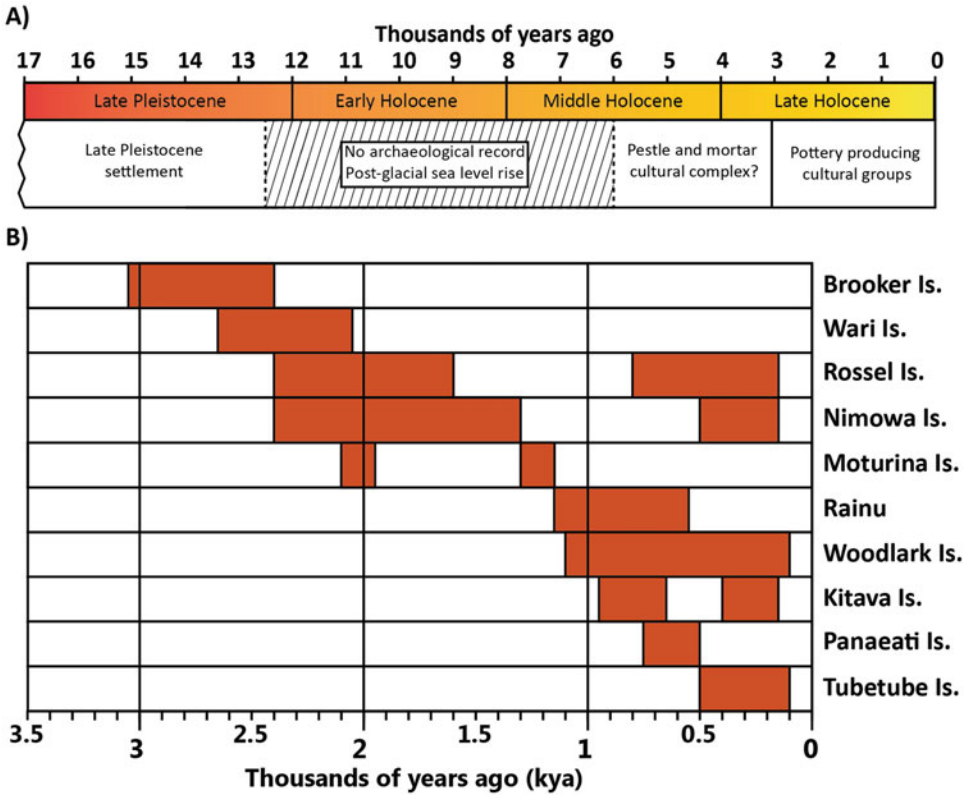

Archaeology of the Massim Island Region, Papua New Guinea, Fig. 6 Summary of Massim archaeology. (**a**) Major cultural phases since the Late Pleistocene. (**b**) Summary of Late Holocene island sequences since the apparent breakdown of the stone mortar, pestle, and stemmed blade cultural complex

Lapita settlement has been identified on three Massim islands: Brooker, Wari, and Nimowa. The Guntuka site on Brooker Island has yielded the earliest evidence and was occupied by Lapita communities from 3050 through to 2400 years ago (Figs. 6 and 7) (Shaw et al. Forthcoming-c). Shortly after the arrival of Lapita people on Brooker Island, a large volume of sediment was deposited on the beach from the adjacent hillside. The erosion derived from vegetation clearance as gardens were established on the hill. In addition to a presumably plant-based diet, the Lapita population on Brooker predominantly exploited reef fish (Scaridae) and sea turtle (Chelonioidea). Substantial quantities of obsidian were recovered, including retouched point and blade technology, indicating the Brooker population was in regular contact with those on or near Fergusson Island, from where the obsidian was sourced.

Lapita settlement on Wari Island (Kasasinabwana site) commenced from 2700 to 2450 cal. BP and on Nimowa Island (Malakai site) from 2400 cal. BP (Negishi and Ono 2009; Shaw et al. Under Review). The low density of material culture in the Lapita layers on both these islands suggests stilt houses had initially been built over a shallow lagoon, as only narrow beachfronts were present at this time. No obsidian was recovered from Lapita contexts at these sites, and it is possible they were "outposts" on the periphery of communication networks connecting major

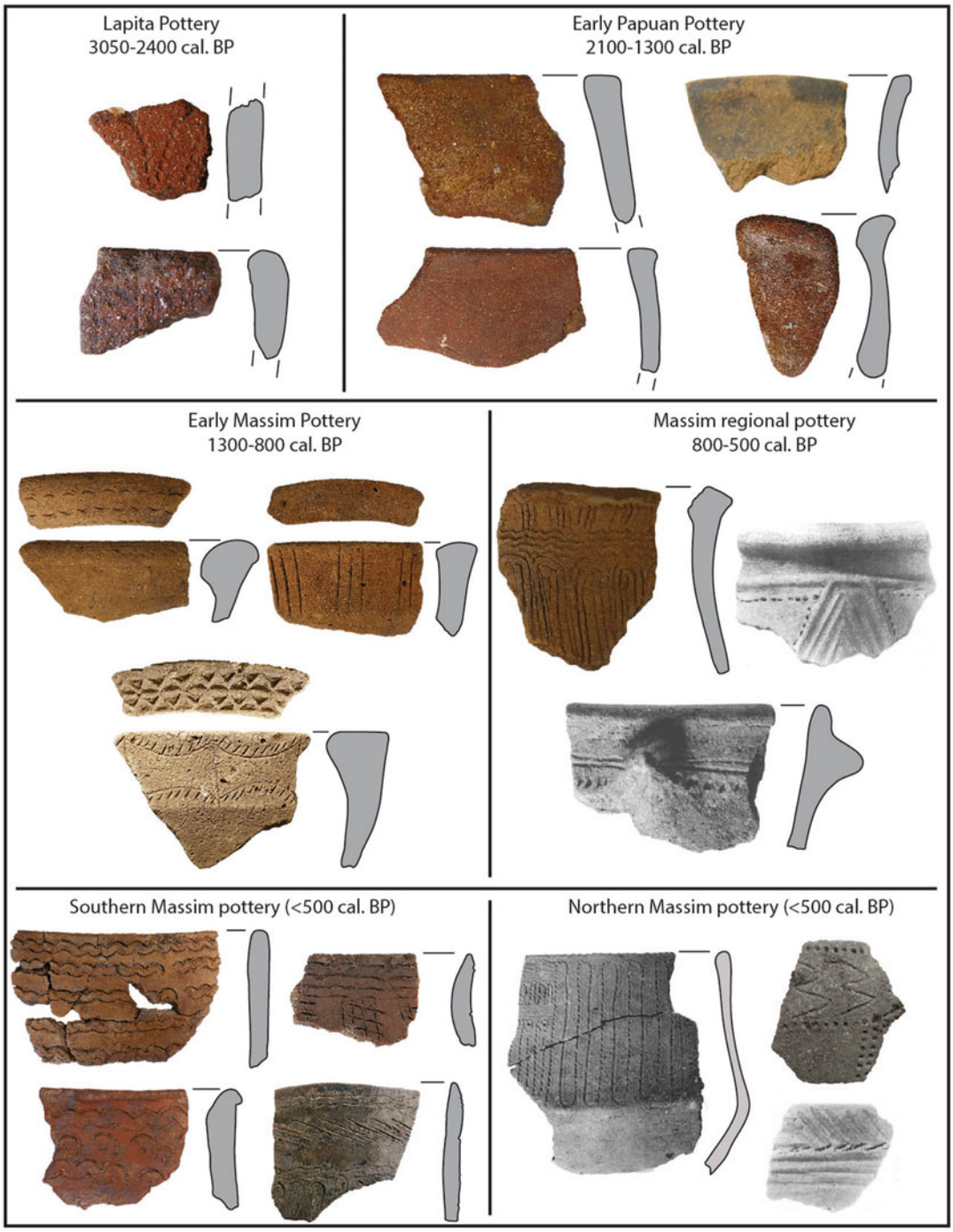

Archaeology of the Massim Island Region, Papua New Guinea, Fig. 7 Pottery development in the Massim region over the last 3000 years

settlements on Brooker Island and elsewhere along the Papuan south coast.

Early Papuan/Massim Settlement (2400–1300 Years Ago)

Low-density settlement of the Massim islands continued after the Lapita period, although it is currently unclear if there was a decline in pottery production and use in the few centuries that followed. On Rossel Island, excavations at Mt. Yeme cave defined a cultural sequence spanning 2400–1600 years ago. While no pottery was recovered, its absence likely reflects use of the cave as a short-term shelter rather than a village settlement. Settlement associated with plainware pottery has otherwise been documented on Nimowa and Wari from 2100 cal. BP (Fig. 7). A richly decorated pottery assemblage has been excavated on Motorina Island, dating sometime between 2100 and 1200 years ago. Details of this excavation are not yet available, but on current evidence, the pottery is likely to be associated with the later end of this age range (Irwin et al. 2019).

The apparent loss of decorative motifs on Massim pottery suggests the symbolic social system once connecting Lapita settlements over several thousand kilometers had broken down, from which regional systems of social expression had begun to emerge. There is a marked similarity in the shape of pottery vessels in the Massim and on the south Papuan coast from 2100 to 1300 cal. BP which derives from having a shared ancestral history of pottery production since Lapita. However, pottery from several sites on the south coast spanning several hundred kilometers is intricately decorated with shell-impressed motifs, indicating close connections were maintained between these communities but not with those in the Massim islands. Pottery production and the social motivations influencing motif design were therefore likely to have been local to each region by this time.

Obsidian exploitation also supports this pattern. Fergusson Island obsidian was imported to Nimowa Island from 2100 to 1700 cal. BP and along the south coast until 1900 cal. BP (Shaw et al. Under Review). Very small quantities of obsidian moved over large distances from the source, likely reflecting down-the-line exchange between multiple communities. It was unlikely people were moving frequently over such large distances. Obsidian import to Nimowa did not resume again until 500 BP, suggesting that increased isolation of these remote islands contributed to the divergence of cultural development within the Massim and with the south coast.

Emerging Regional Social Landscapes (1300–500 Years Ago)

It is apparent that regular contact between island populations over the last millennia or so had facilitated the development of social systems unique to the Massim. One of the most remarkable aspects of this cultural landscape was the construction of large stone (megalithic) structures in the northern islands which spanned up to 800m^2 in area and are at least 1300–1100 years old (Fig. 8) (Bickler 1998). Their construction and use are broadly contemporary with the earliest forms of "Massim" art, as recognized by motifs on pottery and on intricately carved conus shell valuables (Ambrose et al. 2012). Equivalent megaliths are not known in the southern islands, and it can be inferred that there were fewer social connections between the northern and southern islands at this time than were noted in the nineteenth century. These structures were predominantly orientated to the cardinal directions, built in close proximity to major prehistoric settlements, and likely marked clan territories as part of a social landscape which spanned multiple islands. The construction of megaliths clearly required coordination of a large labor force and perhaps also reflects the emergence of a hierarchical social structure in the northern Massim.

The presence of deliberately interred human skeletal remains indicates the megalithic structures had a funerary function. They were used as a place for primary and secondary pot burials until 650–400 cal. BP, after which time the structural complexes fell into apparent disuse (Fig. 8). Within the last 400 years, caves and rock niches became more commonly used for the curation of

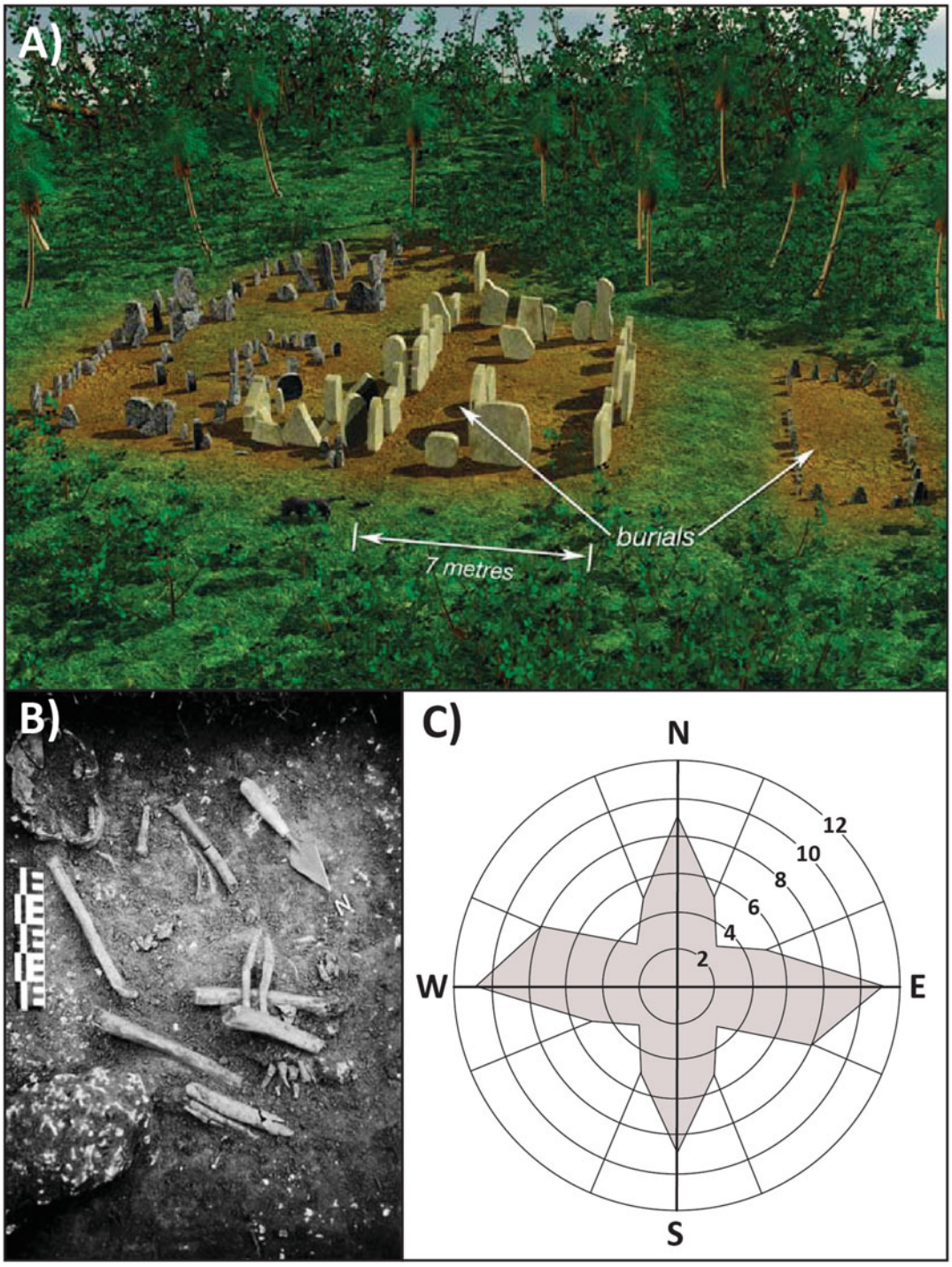

Archaeology of the Massim Island Region, Papua New Guinea, Fig. 8 Megalithic funerary structures on Woodlark Island. (**a**) 3D reconstruction of surveyed enclosures. (**b**) Primary burial of adult excavated within the enclosure. (**c**) Orientation of megalithic structures on Woodlark Island. (Images from Bickler (1998))

disarticulated skeletal remains, indicating that a major shift had occurred in how Massim communities viewed death and the deceased. Excavations on the Trobriand Island of Kitava revealed a cemetery with at least 17 individuals in primary burial contexts dated to 950–650 cal. BP. Although these skeletons were not interred within a megalithic enclosure, a similar shift to secondary cave burials had also occurred by 400 cal. BP (Burenhult 2002). After this time, the symbolic language connecting islands had broken down. A realignment of social systems is likely the cause, driven by rising population densities, competition over lands with high agricultural yield, and control over marine trade (Irwin et al. 2019).

Origins of the Kula Exchange Network (500 Years Ago)

At the Rainu mission station (Wanigela region, Collingwood Bay), several earth mounds were excavated, first by Rudolf Pöch in 1905 and by Brian Egloff in 1967–1969. The mounds contained substantial quantities of village refuse built up between 1100 and 500 cal. BP (Egloff 1979). Two broad cultural phases were identified based primarily on the stylistic analysis and chemical sourcing of the pottery. The Expansion Phase (1100–500 cal. BP) defined a period when villages in the Wanigela region on the New Guinea coast were supplying the D'Entrecasteaux-Trobriand Island groups with pottery. The Refuge Phase (<500 cal. BP) defined a subsequent refocus on inter-island trade, by which time the Rainu village had been abandoned and the Amphlett Islanders had completely replaced Wanigela as the primary pottery-producing center. It was argued by Egloff that by 500 years ago, the configuration of island connections reflected the ethnographically known *Kula* exchange network, thus providing a time depth to this historically important social system.

Key Issues/Current Debates

Timing, Nature, and Extent of Human Colonization

It remains unclear when humans colonized the Massim. The islands of the Bismarck Archipelago and the interior of New Guinea were colonized by modern humans from at least 44,000 cal. BP (Summerhayes et al. 2017). The Bobongara site on the eastern New Guinea coast was also occupied by 40,000 years ago. There is therefore a possibility that the Massim too was colonized as early as 40,000 years ago. Evidence of this antiquity would place these islands into global discussions about the adaptive processes of modern humans living in coastal and island environments. A current lack of clarity into Late Pleistocene Massim settlement is largely due to two reasons. The first is that the vast majority of archaeological sites earlier than 8,000 years are now underwater due to relatively rapid and substantial postglacial rises in sea level. Coastal areas will only have been preserved on islands with steep shoreline profiles or uplifted coastlines, such as was the case for Kelebwanagum cave on Panaeati Island. The second reason is that most archaeological investigations in the Massim have been aimed at identifying the prehistoric characteristics of ethnographically known social systems. As such, identifying Late Pleistocene settlement has not, until recently, been a priority of most field surveys.

Early and Middle Holocene Responses to Changing Island Environments

Archaeological sequences in the New Guinea Highlands have demonstrated an increased formality in stone tool technology sometime between 8,000 and 4,000 years ago, which includes the stone pestle and mortars found in the Massim. It is currently unclear if major changes in technology and settlement patterns occurred in these islands or if formally manufactured tools were transported to the islands from highland production centers. It has been argued, although not yet demonstrated archaeologically, that Lapita cultural groups arriving into the Massim utilized already established Middle Holocene coastal and inter-island networks (Swadling 2016). Sites found which date to this critical time period would yield significant new information on human adaptions to coastlines and islands which were undergoing significant changes and will provide insight into what social systems looked like prior to the arrival of Lapita cultural groups.

Lapita Settlement and Cultural Relationships with New Guinea, Australia, and the Wider Pacific

Over the last 50 years, archaeological research on the Lapita Cultural Complex has moved forward in leaps and bounds. Lapita sites are now known from New Guinea in the west to Samoa in the east, a distance of almost 5000 km. Advanced maritime technology was needed to cross these vast distance of open ocean, so the relatively small distances between the Massim islands would have been well within their technological and navigational capabilities. In New Guinea and the Massim, debate now surrounds (1) how Lapita communities interacted with already established populations that lived in these areas and (2) the extent of interaction between Lapita communities in neighboring regions. There is currently no clarity in the Massim on the former issue as no cultural sequences cover the period immediately prior to the arrival of Lapita. On the latter, there is some evidence for the interaction between Massim Lapita communities and with those further east in the Pacific. Fergusson Island obsidian has been found in 3000-year-old contexts in the Reef Santa Cruz and Vanuatu Lapita sites, and Lapita pottery in the Solomons has been tentatively sourced to Woodlark Island (Tochilin et al. 2012). It is therefore possible Massim Lapita communities played some part, directly or indirectly, in the colonization of the remote Pacific Islands.

International Perspectives

The Massim region is well-known internationally for the many anthropological accounts on island cultures. Comparatively, archaeology in the region has received far less attention, with the better known cultural sequences of mainland New Guinea having often been used as a proxy for prehistoric human settlement in the islands. The lack of longer-term archaeological records had prevented the regions involvement in broader discussions about the emergence of island cultures and on language and genetic diversity. This situation is beginning to change with an emerging Late Pleistocene archaeological record, but many chronological gaps remain to be filled.

Future Directions

As the resolution and time depth of archaeological records in the Massim continue to increase, more detailed questions can be asked about the role of these islands in the development of Pacific culture. Answering such questions will require multidisciplinary approaches to identifying change in language, material culture, biology, and the environment. Paleoenvironmental records are currently lacking for these islands. Coring of long-standing swamp and lake deposits will be crucial to understanding how sea level and climatic changes have impacted island environments and people's response to these changes. With an increased likelihood that many of the islands were abandoned and resettled since the Late Pleistocene, questions of population admixture and the effects of geographic isolation on population structure are becoming more pertinent. Genetic sequencing of prehistoric, historic, and modern islanders will be informative, but this must be done ethically and in consultation with local communities and governing institutions.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Agricultural Practices: A case study from Papua New Guinea
- ▶ Central Pacific Islands: Sea-level Change and Sites
- ▶ Human Impacts on Ancient Marine Ecosystems
- ▶ Island Archaeology
- ▶ Pacific Islands: Finding the Earliest Sites
- ▶ Pacific Ocean: Maritime Archaeology

References

Allen, G.R., J.P. Kinch, McKenna SA, and P. Seeto, eds. 2003. *A rapid marine biodiversity assessment of Milne Bay Province, Papua New Guinea – Survey II (2000)*. Washington, DC: Conservation International.

Ambrose, W., F. Petchey, P. Swadling, H. Beran, L. Bonshek, K. Szabo, S. Bickler, and G. Summerhayes. 2012. Engraved prehistoric *Conus* shell valuables from southeastern Papua New Guinea: Their antiquity, motifs and distribution. *Archaeology in Oceania* 47: 113–132.

Bickler, S. 1998. Eating stone and dying: Archaeological survey on Woodlark Island, Milne Bay province, Papua New Guinea. Unpublished PhD thesis, University of Virginia, Charlottesville.

Burenhult, G., ed. 2002. *The archaeology of the Trobriand Islands, Milne Bay Province, Papua New Guinea: Excavation season 1999*. Oxford: Archaeopress.

Egloff, B.J. 1979. *Recent prehistory in Southeast Papua*. Canberra: Australia National University.

Haddon, A.C. 1894. *The decorative art of British New Guinea: A study in Papuan ethnography*. Dublin: Royal Irish Academy.

Hamson, M., and R. Aldridge. 2009. *Art of the Massim and Collingwood Bay*. Palos Verdes Estates: Michael Hamson Oceanic Art.

Irwin, G., B. Shaw, and A. McAlister. 2019. The origins of the Kula Ring: Archaeological and maritime perspectives from the southern Massim and Mailu areas of Papua New Guinea. *Archaeology in Oceania* 54: 1–16.

Malinowski, B. 1922. *Argonauts of the Western Pacific*. London: Routledge and Kegan Paul.

Negishi, Y., and R. Ono. 2009. Kasasinabwana shell midden: The prehistoric ceramic sequence of Wari Island in the Massim, eastern Papua New Guinea. *People and Culture in Oceania* 25: 23–52.

Rehfeld, K., T. Munch, S. Ling Ho, and T. Laepple. 2018. Global patterns of declining temperature variability from the last glacial maximum to the Holocene. *Nature* 553: 356–359.

Ross, M.D. 1988. *Proto Oceanic and the Austronesian languages of Western Melanesia*. Canberra: Pacific Linguistics.

Seligmann, C.G. 1910. *The Melanesians of British New Guinea*. Cambridge: Cambridge University Press.

Shaw, B. 2015. The archaeology of Rossel Island, Massim, Papua New Guinea: Towards a prehistory of the Louisiade Archipelago. Unpublished PhD thesis, Australian National University, Canberra.

Shaw, B. 2017. Late Pleistocene colonisation of the eastern New Guinea islands? The potential implications of robust waisted stone tool finds from Rossel Island on the long term settlement dynamics in the Massim region. *Journal of Pacific Archaeology* 8: 1–16.

Shaw, B., S. Coxe, J. Haro, E. Hull, S. Hawkins, and G. Jacobsen. Forthcoming-a. Late Pleistocene colonisation of the Massim Islands during the last glacial maximum.

Shaw, B., S. Coxe, V. Kewibu, J. Haro, E. Hull, and S. Hawkins. Under Review. 2400-year cultural sequence in the Louisiade Archipelago (Massim region) of eastern Papua New Guinea reflects adaptive strategies to remote islands since Lapita settlement. *The Holocene*.

Shaw, B., V. Kewibu, J. Haro, S. Coxe, M. Leclerc, S. Hawkins, and E. Hull. Forthcoming-c. Lapita settlement of the Massim islands, Papua New Guinea.

Summerhayes, G., J. Field, B. Shaw, and D. Gaffney. 2017. The archaeology of forest exploitation and change in the tropics during the Pleistocene: The case of Northern Sahul (Pleistocene New Guinea). *Quaternary International* 448: 14–30.

Swadling, P. 2016. Mid Holocene social networks in far eastern New Guinea. *Journal of Pacific Archaeology* 7: 7–19.

Tochilin, C., W.R. Dickinson, M.W. Felgate, M. Pecha, P. Sheppard, F.H. Damon, S.H. Bickler, and G.E. Gehrels. 2012. Using U-Pb ages of detrital zircons to source temper sands in ancient ceramics: A case study from the Southwest Pacific. *Journal of Archaeological Science* 39: 2583–2591.

van Oven, M., S. Brauer, Y. Choi, J. Ensing, W. Schiefenhovel, M. Stoneking, and M. Kayser. 2014. Human genetics of the Kula Ring: Y-chromosome and mitochondrial DNA variation in the Massim of Papua New Guinea. *European Journal of Human Genetics* 22: 1–11.

Archaeology of the Phoenician Colonies

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Introduction

Between the ninth and seventh centuries BC, people of Levantine origin began to move to other areas in the Mediterranean, where they would settle permanently. Most of these migrants came from cities and towns on the coastline of central Syria-Palestine, a territory known in some Greek texts as Phoenicia. Far from being a politically unified area, this ancient region was fragmented in a multitude of small and competing polities. The most important were Sidon and Tyre, two polities known internationally for their production of certain luxury manufactures such as dyes and textiles, but especially for their involvement in regional and interregional trade. The inhabitants of all these cities, whom the Greeks called Phoenicians, shared a common language and script, lived in the same geographical environment, performed similar ritual and funeral practices, and shared cosmologies and religious beliefs. Nevertheless, they never recognized themselves as members of a common ethnic or cultural group.

These Levantine' migratory movements were intense and multiple and involved the displacement

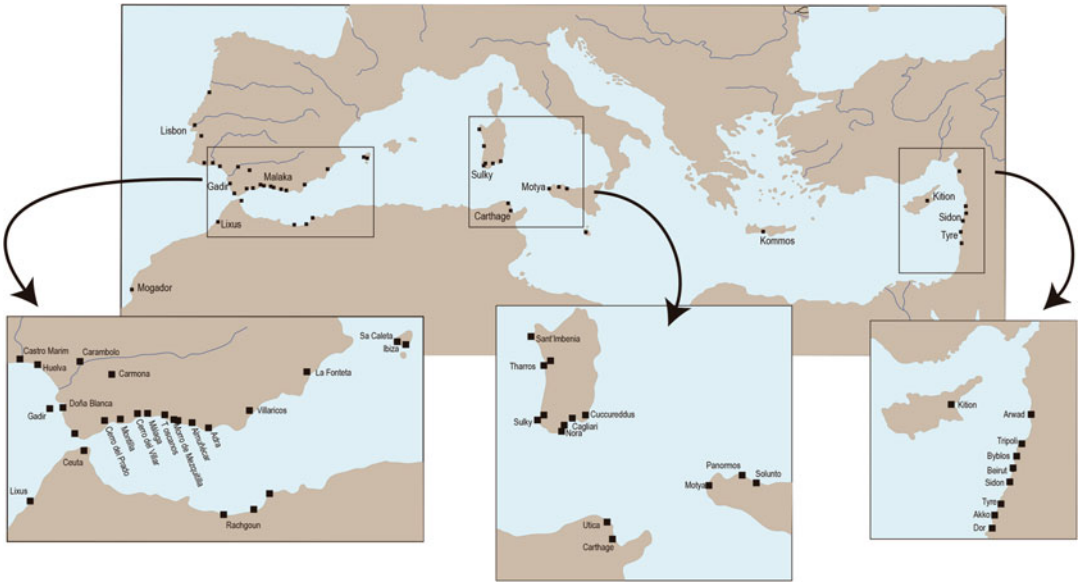

Archaeology of the Phoenician Colonies, Fig. 1 The Phoenician diaspora: main Levantine cities and overseas communities

of large numbers of people. Their migrations impacted many parts of the Mediterranean, most notably the island of Cyprus, the coastlines of modern-day Sicily, Sardinia and Tunisia, Ibiza and Formentera, and the coastlines of Iberia and the Maghreb (Fig. 1) as far as the Atlantic. These movements transformed the Mediterranean landscapes. Many of the newcomers settled in towns or ports previously inhabited or frequented by local groups, where they lived alongside the native peoples. In other cases, they founded new cities, small settlements, and ports of trade, as well as farms and rural places where they and their descendants formed hegemonic groups.

The term "Phoenician colonies" has traditionally been used to refer to the new settlements founded by these migrant communities in the western Mediterranean. Among them are the sites of Carthage, Utica, Mozia, Sulky, Ibiza, Malaka, Gadir, and Lixus, to name just a few examples. These settlements have traditionally constituted the main object of study in the discipline known as the archaeology of the Phoenician colonies. In recent decades, however, this perspective has broadened, thanks to the greater attention now being paid to the host territories and communities, and to the growing interest in the dynamics of connectivity and entanglement between the Levantine newcomers and the various peoples of the western Mediterranean. In fact, it seems fair to say that these new visions have shifted the discipline's focus of attention; scholars no longer center exclusively on the "colonies" and have begun to explore the landscapes of contact and hybridization that emerged from these experiences of mobility and migration.

Definition

The term "Phoenician colonies" refers to the new settlements created by groups of Levantine origin which moved westwards towards the rest of the Mediterranean and the Atlantic in the early first millennium BC. Nonetheless, the label is a controversial one; equally contentious is the concept of its derivate "colonization," conventionally used to describe these processes of mobility and the creation of settlements in distant territories.

The appropriateness of these terms to refer to the experiences of displacement of Levantine groups and the creation of Phoenician overseas communities began to be questioned in the late 1990s (van Dommelen 2012; see also Osborne

1998 for the ancient Greek diaspora). The criticisms held that the use of these terms generated anachronistic and biased visions of these migration experiences and, at the same time, helped to create a profoundly colonial body of knowledge regarding this past. The concepts of "colony" and "colonization," it was posited, have enabled colonial and Eurocentric views typical of the contemporary world to cross easily and uncritically into the context of the ancient Mediterranean; in this context, they have favored descriptions and interpretations of these processes and experiences that stress, on the one hand, the political, economic, and cultural subordination of the overseas communities to the Levantine homelands and, on the other, the superiority and dominance of the Phoenician newcomers over the host communities and territories.

Significantly, the founders or inhabitants of these overseas enclaves never spoke of "colonies"; the term was in fact coined by Latin authors who used it in their accounts written several centuries after the establishment of Levantine communities in the west, transferring concepts from the Roman world to distant, alien environments. In the Roman Empire, the term "colony" referred mainly to settlements or farmsteads awarded to army veterans in the conquered territories, where they became outposts in defense of the Roman territory. The term also designated cities located in distant lands that enjoyed special political status and acted as strategic enclaves for the deployment of the empire's cultural, economic, and military policies. These meanings were then passed on to the modern European world, where the Latin word "colony" was used to refer to overseas plantations and settlements whose inhabitants were subject to European states, and which helped to execute policies of economic exploitation, cultural dominance, and/or military control. The circle was completed when Mediterranean archaeology indiscriminately incorporated the terms, along with others such as metropolis or colonial system; in doing so, they transferred relations, practices, and experiences of modern-day colonialism to the Mediterranean and Atlantic world of the Iron Age.

In recent decades, however, the archaeology of the "western Phoenician communities" has allowed scholars to piece together an enormously complex panorama of experiences and dynamics. This new perspective is now challenging the simplistic, traditional visions based fundamentally on the sparse information transmitted by classical accounts *and read through the colonial lens* of the western modern thought.

Historical Background

At the dawn of the first millennium BC, products, aesthetics, know-how, and social practices that are conventionally defined as Phoenician reached the western end of the Mediterranean world. The oldest evidence of this flow of knowledge, ways of doing things, and material cultures has been recovered in south-western Iberia, beneath the modern-day city of Huelva, an active hub of connections since the tenth century BC occupied by local groups and located near rich mineral resources, mainly silver and copper. At this site a dozen transport jars of "Phoenician" typology dated to the end of the tenth century BC have been found (González de Canales et al. 2004). Their small number suggests that these connections were only sporadic, but their presence nonetheless reflects the emergence of a new trend in the mobility of Levantine material cultures and/or people across the Mediterranean.

The authentic transformation of these processes took place during the ninth century BC, especially during its final decades. At that time, connectivity and maritime mobility across the Mediterranean region grew significantly in terms of its intensity, volume, extension, and regularity. Over the course of the century, Levantine peoples gradually took center stage in these connections that crossed the entire Mediterranean and moved large quantities of people, products, practices, and technologies. Archaeological and textual evidence indicates that the polities located in the south of present-day Lebanon – such as Sidon, Akko, and especially Tyre – had a hegemonic role

in the management of this incipient sea connection (Gilboa et al. 2015; Aubet 2001).

Evidence of Levantine cross-Mediterranean mobility in the ninth century BC is concentrated in specific areas: Cyprus and southern Crete, areas in central Italy and along the Tyrrhenian Sea, Sardinia, the coast of Tunisia, and southern and south-western Iberia. The evidence begins to be more intense in the last decades of the ninth century and the beginning of the eighth. From this period, Levantine cooking pots, hybrid technologies, or ritual practices have been found that bear witness to the settlement of "Phoenician" people in western lands, either permanently or for long periods of time. These early settlements have been documented in enclaves such as Kition, Kommos, Utica, Sulky, Sant'Imbenia, Carambolo, Rebanadilla, and Huelva – all local settlements or trading posts where the presence and activity of local groups was predominant or particularly significant. They are all located in strategic sites in the Mediterranean maritime connections and, in some cases, have easy access to rich metal resources, especially copper and silver. The archaeological record of these enclaves suggests that groups or small trading communities were set up, comprising people of different origins and cultural backgrounds. In some of them, the Levantine groups were the majority.

The site of Huelva bears especially eloquent witness to these practices. Thousands of vessels traditionally labeled Phoenician have been recovered in this Atlantic port. Some are from the beginning of the ninth century BC, but the vast majority are more recent, dating from the end of the ninth century and the beginning of the eighth. In this period the traces of these connections in the archaeological record increase significantly, although radiocarbon dating yields somewhat older chronologies. The "Phoenician" objects recovered in Huelva comprise mainly tableware, containers, and transport jars (i.e., merchandise used in trade) but the presence of kitchenware alongside these tradeable items indicates that people from the Levant had indeed settled there (Delgado Hervás 2017). Together with this evidence of everyday activities, there is a large presence of production waste, especially of minerals such as silver, but there also traces of ivory carving, tools for making jewellery, writing tablets, and weight sets. These materials clearly reflect the presence of enclaves of people who mastered the technologies and know-how of the Levantine tradition – merchants and craftsmen who produced a large proportion of the goods that the locals required. Other articles, technologies, and practices suggest the importance of the local groups in this port and a minority presence of other Mediterranean people, such as Sardinian groups.

In the first half of the eighth century BC (or slightly earlier, according to radiocarbon dating), this new dynamic of cross-Mediterranean movement of Levantine groups intensified, and their strategies, settlement modes, and overseas lifestyles began to change. The number of migrants moving to the west at this time grew exponentially, and for the most part their settlements became permanent. These migratory movements, which began in the late ninth/early eighth century and lasted at least until the beginning of the seventh, are part of the Phoenician diaspora traditionally known as the Phoenician colonial expansion to the west.

In these western areas, the new migrants implemented a range of settlement strategies. Some of them, for instance, the groups that settled in areas of south-western Iberia or in Sardinia, did so among or alongside local communities, a strategy that resulted in particularly entangled social and cultural configurations (Arruda 2009; Roppa 2019). At the same time, other Levantine groups founded new settlements in the west, creating new centers either in previously uninhabited places or in spaces frequented or occupied by local groups in earlier periods. In both cases they constructed built environments, sacred places, cemeteries, and domestic spaces that broadly reproduced Levantine landscapes and lifestyles. These centers are traditionally known in the archaeological literature as Phoenician colonies. The material cultures, and especially the various ways of acting and doing

things that are recorded in these sites, suggest that these communities comprised people from diverse backgrounds: along with descendants of the people of the Levant we also find groups of local origin or from elsewhere in the Mediterranean and the Atlantic, with a notable level of coexistence and hybridization (Delgado Hervás and Ferrer 2012; Guirguis 2019). This is also suggested by genetic evidence recently obtained from DNA analyses in western Phoenician and Punic cemeteries (among others, Matisoo-Smith et al. 2018).

These communities formed small geographically dispersed enclaves, without any links across land but closely connected by sea. The main western Phoenician communities basically spread around two main seascapes: the first around the Strait of Gibraltar, embracing part of the Atlantic and Mediterranean coastlines of Iberia and the Maghreb, and the second in the Central Mediterranean, extending around the maritime triangle formed by the coast of Tunisia, the western tip of Sicily and southern Sardinia. These two archipelagos or clusters of Phoenician peoples maintained close connections with each other. Their communities shared language and script, lifestyles, material cultures, and ritual practices; but from a very early stage they also presented significant divergences, expressed in their settlement modes, their domestic spaces, their symbolic universes, and their funeral practices.

The first of these clusters, located in the area of the Strait of Gibraltar, comprised a large number of Phoenician communities living in newly created settlements or in local towns where sometimes they set up their own neighborhoods. The concentration was especially intense on the coast of Iberia, where numerous settlements dating between the end of the ninth century and the end of the eighth century BC have been found. The excavations carried out in these settlements have shown that the newcomers recreated built environments and domestic spaces of Levantine type and that from the end of the ninth century BC they built small cemeteries in the vicinity of some of these sites, often apparently for particular families, reflecting their will to create ancestral ties and memories in the new territories (Delgado Hervás 2017). The newcomers mainly settled by the sea, at sites such as La Fonteta, Morro de Mezquitilla, Rebanadilla-Cerro del Villar, Gadir, Doña Blanca, Carambolo, Huelva, and Lisbon, to name just a few, but there were also inland enclaves like Carmona. In the African lands below the Strait the Levantine diaspora had a lower demographic impact; although Near Eastern-style housing complexes have been excavated in Lixus, few Phoenician communities from these early stages are known here (Aranegui et al. 2011). It was in the seventh century BC that the presence of western Phoenicians in north Africa began to make itself felt.

Inside this cluster of Phoenician communities and people created around the Strait of Gibraltar, the settlement of Gadir stands out. Recent excavations carried out beneath the modern-day city of Cádiz (Botto 2014; Niveau de Villedary 2018) have revealed a first permanent Phoenician settlement, founded between the end of the ninth century and the beginning of the eighth century BC. The settlement was established on a group of islands off the Atlantic coast of Iberia, recreating the seascapes and lifestyles of Levantine cities like Arwad or Tyre (in fact, the close links between this last polity and Gadir are mentioned in the classical sources). Streets, domestic spaces, kitchenware, and even certain animals such as pet cats recall landscapes of the Mediterranean Levant, despite the clear signs of entanglement with local and other Mediterranean people, above all local but also Sardinian people, reflecting a multiethnic and multicultural community. The first houses of Gadir and the material evidence recorded in them indicate that migrant family groups (and not just male adults) played a major part in these experiences of mobility, as well as in the economy and in the trading activities from the earliest stages of the settlement (Delgado Hervás 2017).

However, the uniqueness of Gadir lies not in its residential areas but in its sacred landscape (Niveau de Villedary 2018). The concentration and the extension of funeral areas recorded is unknown in other Phoenician sites in and around the Strait, as are the number and the type of sanctuaries and religious practices hosted by this

small archipelago. Gadir was home to as many as three important sanctuaries built in archaic times, the most important of which is probably the temple dedicated to Melqart, the main deity of Tyre. Today, the roles of Gadir and this sanctuary at the westernmost point of the Phoenician world are the subject of controversy. Some researchers regard the town as a commercial metropolis and the temple of Melqart as a representation of the Tyrian state in the west, where it would have acted as a base for expeditions and for controlling flows of trade and business (Aubet 2001). Others, distancing themselves from these stereotyped views, have highlighted the symbolic and religious significance of Gadir in this western Phoenician cluster (Bonnet 2009); accordingly, Gadir and its temple of Melqart would be key features in the construction of a new identity in these communities born of migration and entanglement, keeping alive the memories of the diaspora and the link with the homeland.

The numbers of Levantines arriving in the central Mediterranean area and settling permanently also increased as the eighth century BC progressed. Together with settlements in local centers, new establishments were also founded. The latter exhibit material cultures, architectural designs, and lifestyles predominantly of Near Eastern type which bear witness to settlement by Levantine groups. At the same time, certain habitus and traditions related to Sardinian, North African, Sicilian, and even Iberian groups are detected. This entanglement of material cultures and ways of doing things suggests the presence of mixed communities (Guirguis 2019). On these coastlines the number of new settlements seems to have been lower than further west, but, nevertheless, from the seventh century BC these nuclei had populations that were far larger than those of the Phoenician settlements in Iberia. Likewise, their built environments and the size of their cemeteries and sacred areas indicate lifestyles of a purely urban nature that were not known until later in the Phoenician areas further to the west. An example is the settlement in Motya, established on an islet off the coast of Sicily. The arrival of people from several Levantine areas in Motya has been dated to the first half of the eighth century and is associated with contexts of a sacred nature. At the end of the eighth century and the beginning of the seventh, large numbers of people involving mixed groups from Syria, Phoenicia, and the Philistine region arrived in the island; they built large residential areas and workshops, as well as extensive cemeteries and sacred areas, among them a tophet (Nigro and Spagnoli 2017).

Carthage emerged as the greatest urban settlement of the Phoenician cluster as it spread across the Central Mediterranean. Its Phoenician name, Qart Hadasht, means "new city" and refers precisely to the foundation of a new city, as reflected in a famous founding myth that links its creation with people from Tyre. Its oldest archaeological levels have been dated to 760 BC, but the radiocarbon dating indicates an earlier occupation, at the end of the ninth century BC (Docter et al. 2005). From its early days, the city grew quickly and developed a complex structure: it is estimated that in the seventh and sixth century BC it could have covered an area of 25 ha and had a population of between 5000 and 8000 inhabitants (Telmini et al. 2014). Some of the cemeteries surrounding the city were built the eighth century BC. Their ritual and funerary expressions were deliberately conservative, reflecting a trend also found in other Phoenician areas of the Central Mediterranean. Several authors have suggested that these ritual practices played an important role in the construction of a common identity within communities marked by mobility, ethnic heterogeneity, and cosmopolitanism. The tophet, a sacred site dedicated to the cult of Baal Hammon and Tinnit where remains of animals and young children were deposited as offerings, seems to have had a special significance in the emergence and expression of this identity (Bonnet 2011; Quinn 2019).

Key Issues/Current Debates

The archaeology of Phoenician colonies is a relatively new field of study in Mediterranean archaeology. The discipline was created in the 1970s thanks to the work of Sabatino Moscati and

other pioneers. Since then its study has centered mainly on defining and analyzing the processes of displacement that gave rise to the creation of Phoenician settlements in the west. Special emphasis has been placed on determining the chronology of the first westward movements of people from the Levant and establishing the reasons behind them and also on characterizing the settlement modes of these migrant communities.

The chronology of the first movements of Phoenician groups to the west been a controversial issue especially since the 1990s, when radiocarbon analysis was used broadly to date Phoenician settlements or local Iron Age contexts with Phoenician materials. The calibrated radiocarbon dates showed a mismatch of some 50 and 100 years with respect to the conventional dating obtained from the study of ceramic typologies, which is based on a system that crosses and compares different Mediterranean ceramic sequences (López Castro et al. 2016). The focus on the chronological debate has distracted attention from other areas of the discipline that remain largely unexplored; but establishing the time frames of the diaspora is essential for a reliable characterization of their first movements and for an appraisal of their causes and the motivations of their protagonists. The chronological imprecision leaves an important question unanswered: did a series of the disconnected migratory movements act as drivers of the diaspora, each one with its own causes, motivations, and characteristics; or was it a single protracted movement that was the result of a projection and planning imposed from the top?

Top-down perspectives are predominant in Phoenician archaeology. They tend to categorize the movement of people or objects from the Levant recorded during the tenth and ninth centuries BC as projects of exploration or pre-colonization designed to locate areas for trade or for the exploitation of raw materials, especially metals. They argue that these voyages, which would eventually culminate in the creation of permanent trading communities, would have been led and sponsored by the aristocratic houses of the Levantine polities, headed by the royal houses themselves. Some authors define the so-called Phoenician diaspora or colonization as a directed, organized, and structured movement run mainly by the Tyrian state to generate new wealth through trade and the extraction of raw materials (especially silver) to meet the demand in the great states and empires of the Near East (Aubet 2001).

These top-down analyses tend to transmit a vision of the elites that is embodied in the few available written sources. But they are not always borne out in the archaeological evidence of the western scenarios. This evidence shows that the "Phoenician diaspora" has tended to be oversimplified; it suggests that there were different and long-standing experiences of mobility, which were inspired by wide-ranging and even contradictory motives. Likewise, the archaeological data indicate the prominence of multiple agencies, both in the displacements along the Mediterranean and in the processes of creation of the western Phoenician communities. One of the most important of these agencies was that of the certain western Mediterranean groups, among them people from the southwest of Iberia, Sardinia, and North Africa who played a particularly prominent role (Delgado Hervás 2017; Botto 2014; Guirguis 2019).

The relationship between newcomers and local groups, and the impact caused by the arrival of peoples from the Levant on the landscapes, material culture, and lifestyles of the Mediterranean, is among the focal points of the discipline. These topics have traditionally been explored via approaches of acculturation or center-periphery models focusing on the circulation of manufactures and raw materials between local elites and Phoenician merchants, and interpreting it mainly through the lens of prestige goods systems. In recent decades the influence of postcolonial thought has given way to new perspectives that stress concepts such as entanglement or hybridization (van Dommelen and Rowlands 2012). These new

approaches recover the voice of the local people in the construction of their own histories and highlight their agency and participation in the creation of the western Phoenician communities. These perspectives, however, have marginalized key issues in these "encounters" such as conflict or power relations. The focus on the heterogeneity of these areas, on the other hand, has raised the interest in issues of identity construction and community building, topics that have been explored through everyday practices and material cultures (Delgado Hervás and Ferrer 2012; Roppa 2019) and, in particular through ritual (Bonnet 2009, 2011; Quinn 2019).

Critical perspectives have recently questioned the use of the term "Phoenician," understood as an ethnic identity in the modern sense, that is, as a self-ascribed regional identity (Quinn 2019). The central argument is based on the absence of any terms that express a common identity shared by the inhabitants of the polities that the Greeks called Phoenician. Accordingly, the term corresponds to an expression of an etic type (that is, from the view of an external observer) rather than an emic one. Thus, the discourse analysis method has entered Phoenician studies and has done so with the aim to deconstruct the archaeological concept of "the Phoenicians" that Sabatino Moscati created in the 1970s. This recent critical look, woven basically from the classicism, has been harshly answered from influential sectors of the Phoenician archaeology (Oggiano 2019).

International Perspectives

The archaeology of the western Phoenician colonies or communities is, by its very nature, a translocal and transnational subject. The mobility of people, material cultures, and know-hows traditionally labeled Phoenician affected practically all the regions of the Mediterranean, as well as areas of the Atlantic located at its limits. The Phoenician diaspora took many different forms, ranging from simple, indirect, and occasional contacts to full-scale settlement in small enclaves, rural areas or cities. In other areas of the Mediterranean, their entanglement or hybridization with local groups was so intense that it is extremely difficult to trace separate, clearly defined identities or territories. The mobility of some of these peoples, their material cultures, and their lifestyles gave rise to new connected seascapes inside the Mediterranean area. Transposing present-day terms onto this historical past, these connections have sometimes been interpreted as a first Mediterranean "globalization." Whatever the case, the ways of life of these peoples established them as key agents in the process of Mediterraneanization that the inhabitants and the regions of the Mediterranean basin experienced, in different ways, throughout the Iron Age.

The wide geography of Phoenician archaeology has attracted the attention of archaeologists all over the world, although the most powerful academic centers of the discipline are in Mediterranean countries. Although researchers tend to focus on specific regions and sites, the translocal character of the core issues of the discipline has favored an intense dialogue between researchers working in different countries and regions. This dialogue has been continued in international research and heritage projects involving teams formed by researchers from different countries, and at frequent international meetings and conferences such as the International Congress of Phoenician and Punic Studies.

Future Directions

The incorporation of new methodologies from the archaeological sciences is one of the most important future directions in the archaeology of western Phoenician communities. These methodologies will provide quality evidence that will shed new light on some of the discipline's main concerns. Some projects have already embarked on this route and have

incorporated the study of ancient DNA and stable isotopes to analyze patterns of the mobility and migration of people (and also of animals) across the Mediterranean. This evidence opens up new horizons for analyzing issues that remain practically unexplored at present, such as family relationships, diet, breastfeeding and child care, or the impact of the introduction of new plants and animals on production economies and the landscape. Along with these methodologies, the analysis of organic remains contained in ceramics will provide new materials for the study of the production, mobility, and consumption of certain substances and their use in diet, care, or ritual practices.

Some of these methods from the archaeosciences will have an important impact on the study of topics related to the social life of these people and communities. The themes have been practically ignored in Phoenician archaeology, which has focused its attention on the study of chronologies, trade, and ritual. Topics such as domestic and everyday life, households and families, work, landscape and rural life, gender and infancies, minority groups and ordinary people, and power and conflict are some of the future directions for the discipline to explore. Together with these new themes and methodologies, the decolonization of the discipline's practices and discourses is also an important line of future research.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Greek Colonialism, Archaeology of
- ▶ Human Migration: Bioarchaeological Approaches

References

Aranegui, C., M. López-Bertran, and J. Vives-Ferrándiz. 2011. The strait and beyond: Local communities in Phoenician Lixus (Larache, Morocco). In *Ceramics of the Phoenician-Punic world: Collected essays*, ed. C. Sagona, 297–325. Leuven: Peeters.

Arruda, A.M. 2009. Phoenician colonization on the Atlantic coast of the Iberian Peninsula. In *Colonial encounters in ancient Iberia: Phoenician, Greek, and indigenous relations*, ed. M. Dietler and C. López-Ruiz, 113–130. Chicago: The University of Chicago Press.

Aubet, M.E. 2001 [1993]. *The Phoenicians and the West: Politics, colonies and trade*. Cambridge: Cambridge University Press.

Bonnet, C. 2011. On gods and earth: The tophet and the construction of a new identity in Punic Carthage. In *Cultural identity in the ancient Mediterranean*, ed. E.G. Gruen, 373–387. ISBN: 978-0-89236-969-0. HAL Id: hal-02009917.

Bonnet, Corinne. 2009. L'identité religieuse des Phéniciens dans la Diaspora. Le cas de Melqart, dieu ancestral des Tyriens. In *Entre lignes de partage et territoires de passage: le identités religieuses dans les mondes grec et roman: paganisms,"judaïsmes", "christianismes"*, ed. N. Belayche and Simon C. Mimouni, 295–308. Paris/Louvain: Peeters.

Botto, M., ed. 2014. *Los fenicios en la Bahía de Cádiz*. Pisa/Rome: Fabrizio Serra.

Delgado Hervás, A., and M. Ferrer. 2012. Life and death in ancient colonies: Domesticity, material culture and sexual politics in the western Phoenician world, eighth to sixth centuries BCE. In *The archaeology of colonialism: Intimate encounters and sexual effects*, ed. B. Voss and E.C. Casella, 195–213. New York: Cambridge University Press.

Delgado Hervás, A. 2017. Migrations phéniciennes vers l'Extrême-Occident: communautés de diásporas et groupes familiaux. In *Archéologie des migrations*, ed. D. Garcia and H. Le Bras, 183–196. Paris: La Découverte.

Delgado Hervás A. (2020) Archaeology of the Phoenician Colonies. In: Smith C. (eds) Encyclopedia of Global Archaeology. Springer, Cham

Docter, R.F., Niemeyer, H.G., Nijboer, J. van der Plicht, J. 2005. Radiocarbon dates of animal bones in the earliest levels of Carthage. In *Oriente e Occidente: Metodi e discipline a confronto. Riflessioni sulla cronologia dell'Età del Ferro in Italia*,ed. G. Bartoloni y F. Delpino, 557–577. Pisa/Roma: Istituti Editoriali e Poligrafici Internazionali.

Gilboa, A., P. Waiman-Barak, and R. Jones. 2015. On the origin of iron age Phoenician ceramics at Kommos, Crete: Regional and diachronic perspectives across the bronze age to iron age transition. *Bulletin of the American Schools of Oriental Research* 374: 75–102. https://doi.org/10.5615/bullamerschoorie.374.0075.

González de Canales, F., L. Serrano, and J. Llompart. 2004. *El emporio fenicio precolonial de Huelva: (ca. 900–770 a. C.)*. Madrid: Biblioteca Nueva.

Guirguis, M. 2019. Central North Africa and Sardinian connections (end of 9th – 8th century BC): The multiethnic and multicultural facies of the earliest western Phoenician communities. *Arid Zone Archaeology Monographs* 8: 111–125.

López Castro, J.L., A. Ferjaou, A. Mederos Martín, V. Martínez Hahnmüller, and I.B. Jerbania. 2016. La colonización fenicia inicial en el Mediterráneo Central: nuevas excavaciones arqueológicas en Utica (Túnez).

Trabajos de Prehistoria 73: 68–89. https://doi.org/10.3989/tp.2016.12164.
Matisoo-Smith, E., A.L. Gosling, D. Platt, O. Kardailsky, S. Prost, S. Cameron-Christie, C.J. Collins, et al. 2018. Ancient mitogenomes of Phoenicians from Sardinia and Lebanon: A story of settlement, integration, and female mobility. *PLoS One* 13 (1): e0190169.
Nigro, L., and F. Spagnoli. 2017. *Landing on Motya: The earliest Phoenician settlement of the 8th century BC and the creation of a West Phoenician cultural identity in the excavations of Sapienza University of Rome – 2012–2016*. Roma: Università "La Sapienza" di Roma.
Niveau de Villedary, A.M. 2018. Gadir revisited: A proposal for reconstruction of the archaic Phoenician foundation. *Vicino Oriente* 22: 91–109.
Oggiano, I. 2019. Who were the "Phoenicians"? A set of hypotheses inviting debate and dissent. *Journal of Roman Archeology* 32: 584–591.
Osborne, R. 1998. Early Greek colonization? The nature of Greek settlement in the west. In *Archaic Greece. New approaches and new evidence*, ed. N. Fisher and H. Van Wees, 251–270. London: Duckworth.
Quinn, J.C. 2019a. *In search of the Phoenicians*. Princeton: Princeton University Press.
Roppa, A. 2019. Sardinia. In *The Oxford handbook of the Phoenician and Punic Mediterranean*, ed. C. López-Ruiz and B.R. Doak. New York: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190499341.013.34.
Telmini, B., R. Docter, B. Bechtold, F. Chelbi, and W. Van de Put. 2014. Defining Punic Carthage. In *The Punic Mediterranean: Identities and identification from Phoenician settlement to Roman rule*, ed. J.C. Quinn and N.C. Vella, 113–147. Cambridge: Cambridge University Press.
Van Dommelen, P. 2012. Colonialism and migration in the ancient Mediterranean. *Annual Review of Anthropology* 41: 393–409.
Van Dommelen, P., and M. Rowlands. 2012. Material concerns and colonial encounters. In *Materiality and social practice. Transformative capacities of intercultural encounters*, ed. J. Maran and P.W. Stockhammer, 20–31. Oxford: Oxbow Books.

Futher Reading

Celestino, S., and C. López-Ruiz. 2016. *Tartessos and the Phoenicians in Iberia*. New York: Oxford University Press.
Aubet, M.E. 2001 [1993]. *The Phoenicians and the West: Politics, colonies and trade*. Cambridge: Cambridge University Press.
Quinn, J.C. 2019. *In search of the Phoenicians*. Princeton: Princeton University Press.
Quinn, J.C. 2014. In *The Punic Mediterranean: Identities and identification from Phoenician settlement to Roman times*, ed. N. Vella. Cambridge: Cambridge University Press.
LÓPEZ-RUIZ, C., and B.R. DOAK, eds. 2019. *The Oxford handbook of the Phoenician and Punic Mediterranean*. New York: Oxford University Press.

Archaeology: Definition

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Archaeology comes from the Greek term *arkhaiologia* meaning "the study of ancient things" and is defined as the study of past peoples and culture. Archaeologists develop interpretations about the past through the recovery and analysis of material culture (which may include graves, monuments, buildings, inscriptions, tools, pottery, etc.) and associated evidence (such as pollen, charcoal, residues, skeletal remains, etc.). In order to provide interpretations about the past, archaeologists must accurately recover and record all aspects of a site.

Archaeologists may study the recent (historical) or distant past and are interested in a diverse range of subjects including how humans organized their social groupings and interacted with and/or exploited the environment, living conditions, diet, health status, trade patterns, and burial choices to name a few. For this reason, archaeologists may have specific areas of expertise which could include the analysis of specific material culture (e.g., pottery), environmental samples, human and or nonhuman skeletal remains, dating techniques, and so on.

Cross-References

▶ Archaeological Fieldwork
▶ Bone Chemistry and Ancient Diet
▶ Bones: Preservation and Conservation
▶ Buildings Archaeology
▶ Ceramics: Scientific Analysis
▶ Environmental Assessment in Cultural Heritage Management
▶ Forensic and Archaeological Analyses: Similarities and Differences
▶ Journal of Material Culture
▶ Radiocarbon Dating in Archaeology
▶ Seeds: Conservation and Preservation
▶ Site Formation Processes
▶ Skeletal Biology: Definition

Archaeology: The World at 1800–1850

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State of Knowledge and Current Debates

Introduction

Archaeology as a social science is no stranger to the time in which it develops; therefore, it is constantly changing in its objectives and procedures. Similarly, it is not uniform, its development and practice are the function of its practitioners, and it relates to political and economic powers of every age and their interests. This eventually ends up forming dominant or official groups within the discipline that do not always coincide with the best of science or with what archaeology can do as a social science.

So although archaeology as a discipline starts emerging in Europe in the nineteenth century, the archaeology of the nineteenth century (the archaeology of capitalism or colonialism) starts at the end of the twentieth century. Industrial archaeology is one of the newest branches of archaeology, which is dedicated to the study of sites, methods, and machinery used in production processes introduced with the Industrial Revolution and the forms of social behavior and habitat resulting from such change. The term "industrial archaeology" arose in England and goes together with the concept of industrial heritage (Vincenti 2007). The overall aim is to go beyond written documents and graphics, but with diverse interests and approaches: for example, not with history as auxiliary but contrasting with what is believed to be known according to historiography, contributing to the explanation of the process of globalization that starts at this historic time. This archaeology has been practiced as an alternative to the study of documents of the Industrial Age, which have revealed biased in favor of the ruling classes and insufficient at allowing reliable research on the life of the subordinate classes, the peasantry, marginalized minorities (the end of African American slavery, aborigines from different parts of the world, communities or religious or political minorities). The starting point assumes that archaeological data not only allows the opportunity to balance the information but also to verify the truth or falsity of what the documents say and identify the discrepancies between them. It has therefore been the archaeology of capitalism, gender, "the border" – that is, the contact of the indigenous with settlers (with different approaches: the duality of domination-resistance and creolization or mestizaje).

Even the nineteenth century is investigated from archaeology with the aim of restating scientific methodology itself and revealing its biases (from feminism, for example) or searching for (pre)supposed incapacities and limits of archaeological methodology. Finally, it is being considering an archaeology of the modern era with profitable interest into what will be called industrial landscapes/industrial heritage, with industrial tourism routes included, especially in Europe, or to reclaim the recent history of other continents (from a vision of Native peoples not as a distant past, or as "acculturated passive" indigenous).

Although this nineteenth century archaeology began in Europe, in the same way as prehistoric archaeology, it rapidly spread to the USA and to areas that were colonized or industrialized in the nineteenth century: Australia, Central and South America, the Caribbean, Africa, and Asia. There are at present international journals, as well as Industrial or Historical Archaeology societies in different countries that publish journals and monographs where a large amount of information can be found. Its variety of approaches, objectives, and praxis are causing the various denominations within this Archaeology: historical, of capitalism, industrial, urban, ethnoarchaeology, colonial archaeology.

Global Perspective

Tierra Del Fuego Hunter-Gatherer-Fisher Societies

In this context, in 1988, a Catalan research team with Argentine collaboration began an ambitious ethnoarchaeological program in Isla Grande,

Tierra del Fuego. The shores of the Beagle Channel had been until the late nineteenth century an important part of the territory of aboriginal groups considered canoeists, namely, the group that the Austrian ethnographer Martin Gusinde had called *Yámana*. The aim of the project was basically methodological and ethnoarchaeological:to test the possibilities of modern archaeological methods to elucidate the nature of social relations that organize a hunter-gatherer society. In order to do this, excavations were carried out on sites that were last occupied by those societies, when they had already had contact with Europeans and were well documented and described. That is, eighteenth and nineteenth century Aboriginal settlements located on the coast of the Beagle Channel were excavated, and as an element of comparison, the northernmost settlements in the interior of the island corresponding to other native groups, called selknam by ethnographers, were also excavated. These were the yamana sites of Tunel VII: a settlement/hut with ten successive occupations; Lanasuhaia: settlement with a prolonged occupation of several months (Fig. 1); Alasawaia with the excavation of consumption remains of the last occupation of a settlement; Harberton, a midden shell burial of an adult (male); Mischiuen III a burial of an adult female in a rockshelter (reused as a burial area) and Cabaña Remolino, a site which hosted one of the last yámana ceremonies according to Gusinde, and in the heart of the island, the selknam sites of Ewan I a ceremonial hut and Ewan II, a hut with an occupation related to the one mentioned before.

The results of the above work allowed the archaeological documentation of the last moments of these societies and the causes of their disappearance (Estévez and Vila 2007).

These canoeist Aboriginal groups, whose history in the area dates back to 7000 years ago, lived in the nineteenth century (first half) basically exploiting coastal and marine resources (fisher-gatherer-hunters). They had a technology that today is described as simple with rigid social norms that maintained structural inequality between women and men at all levels. Previous archaeological work had shown that after a long historical process, a social organization had been achieved, which held control over food and consumer goods production as well as over biological reproduction.

With the archaeological evidence of the studied sites, the first indirect contacts with Europeans/whites were found. Shortly after the first European expedition passage through the Strait of Magellan in the sixteenth century, European raw materials had reached the area of the Beagle Channel (a fragment of glass in Recent Component Lancha Pakewaia site, 250 years BP at least). This means that the first indirect

Archaeology: The World at 1800–1850, Fig. 1 Lanashuaia archaeological site in Tierra del Fuego (Argentina)

European influence came 200 years before the first official expedition, the HMS Beagle.

In the nineteenth century sites, European materials are already present, although in small quantities (glass fragments) or have indirectly been documented through cutting marks left by metal instruments in some large animal bones. This European presence only involved changes in the raw materials used in their technological system, improving efficiency level: For example, glass or iron found on beaches from ships or shipwrecks was used to replace the mussel shells as knife blades or arrow stone heads and fragile bird bone awls. Initially, these new materials were worked with the same methods used for local raw materials (percussion, abrasion, polishing) and they were even given shapes that imitated traditional forms (awls are European metal nails shafted in bird long bones such as the traditional awls, the European iron blades are hafted transversally like the aboriginal mollusks-blade knives.) (Fig. 2).

Perhaps due to the fact that the archaeological sites are not yet fully documented at an extensive level, substantive changes either at settlement or social organization levels have not been observed as yet. Big changes are only confirmed later (in the second half of the nineteenth century), when there is written information of missionaries who settled in the area. Hut remains of the contact time do not differ from those of previous ages, although it is possible that at the time of the proto-contact and first contact, there were hut settlements formed by larger groupings of those described from the second half of the nineteenth century. This could be the case at the Lanashuaia site, and also of the camp sites that can be observed in the engravings of the first expedition to Cape Horn.

European Diseases

Although the first impact of diseases is not known, it is likely that new diseases and new outbreaks of existing ones, and which are archaeologically verifiable in human remains, drastically diminished the number of people. On the issue of diseases, we do not know the impact of those that could be transmitted at a distance, before the actual arrival of Europeans. However, there are documented infections that occurred from direct contact, although there are no written records until later when the missionaries had settled, who described episodes of mass mortalities. It is therefore possible that the ethnographic image constructed from the second half of the nineteenth century offers a different humanscape that could have originally existed in the time prior to European contact.

However, not enough human remains of those times have been analyzed yet, even though there are already enough excavated: a burial in a midden of an adult with two glass scrapers in Harberton, a young woman in the rockshelter Mishiwen III, near one of the first settler-

Archaeology: The World at 1800–1850, Fig. 2 Fueguian knives: the two to the *left*, traditional making with mollusk valve blade, the three at the *right* using European iron blades hafted in the traditional way

missionary settlements, or a burial in Acatushún midden, with an adult and six buttons associated.

However, it is known that there were direct contacts with crews of whaling ships and fur-sealers, crews with scientific and political expeditions, and later missionaries who actually not only introduced new diseases but favored certain everyday practices that negatively affected the health of the indigenous population.

At this time, the practice of abduction and translocation of indigenous people also began, which continued into the twentieth century. By 1829, during the first trip for scientific exploration of the South American coast, Lt. British Royal Navy Robert FitzRoy took three native young men and a girl from the coasts of the channel to Britain in the brigantine Beagle (Fueguia Basket, Jimmy Button, York Minster, Boat Memory). And in 1831–1836, the same FitzRoy now Commander on the second voyage of the Beagle (which is famous for the travel journal published by Charles Darwin) brought back the three surviving Fuegians: Fueguia Basket, Jimmy Button, and York Minster.

Christian Missions

It was on this 1836 journey, that the first failed missionary attempt occurred: Richards Matthews, appointed by the Church Missionary Society to remain among the Fuegians, stayed a few days at Wulaia Bay (now Chile) but resigned and returned to the ship. Later, in 1848, the second missionary attempt would take place, by Allan Gardiner in Picton Island (the mission failed and afterward the human remains of the first missionaries who died of scurvy and hunger were rescued). It was not until 1871 that the Anglican mission of Thomas Bridges and his family (Mary Ann Varder and her daughter) was definitively established in the channel. This first stable mission, a small village with farm gardens would become the modern city of Ushuaia which has not been excavated, nor have subsequent missionary settlements in the area.

Predation and Overexploitation of Native Resources by Europeans

One of the phenomena that excavations in Tierra del Fuego have shown is the relative and significant increase of fish remains together with the decrease in the proportion of sea lion consumption in these eighteenth and nineteenth century settlements (Tunel VII, Lanashuaia, Alasawaia) compared with their presence at sites of previous eras. It was interpreted as evidence of an frustrated attempt to change the strategies of subsistence. The pinnipeds resource had been one of the keys to maintaining the livelihood of these peoples, since the last breeding areas of these animals were in the outer islands and the Antarctic Ocean, away from the technological range of the indigenous population. So the intensification of fishing could be an attempt to develop an alternative resource against a continually descending abundance of pinnipeds. However, it is very likely that the rigidity of social norms, the catastrophic effect of diseases, and the scattering of the population, together with the subsequent missionary activity, did not allow a possible slow structural change, but precipitated the disintegration and dissolution of the native society.

It has been shown that even though the paleoclimatic record found at archaeological sites shows slight variations throughout the Holocene, there was not a natural biotic or abiotic cause to explain this final disturbance.

In the early nineteenth century, Euro-American seal and whale exploitation began in the Antarctic, although there are not yet too many historical details about its magnitude, temporality, dynamics, and intensity. However, in the 1990s of the twentieth century, archaeological projects were initiated in the Antarctic confirming the assumptions made about the causes that affected the issues mentioned before. Indeed, the whaling settlement excavations confirmed documentary sources pointing to a constant presence of sealers and whalers fishing boats directly slaughtering in the breeding zones with technologies much more lethal than the ones of the natives. This caused the catastrophic decline of marine mammals, a fundamental element in the diet of the canoeing people of the Fuegian archipelagos.

Archaeological excavations of camps and sealer shelters in Desolation Island and Cape Shirreff (South Shetland Islands) provided the first physical evidence of the coexistence of

foreign and indigenous hunters, demonstrating that these boats used male natives as workforce/sailors/pilots and women as sex objects. All of these contributed to the disintegration of native social organization. In the archaeological sites, indigenous artifact remains were found in direct association with remains of wood, ceramics, earthenware, iron, glass, and seeds from English or American origin of the nineteenth century. In Yamana Beach, close to two rockshelters that were used by sealers, a complete skull of a young mestizo adult woman and two femurs, apparently from the same person, were found.

It was also found in other beaches a marked architectural difference between settlements and, in some cases, constructive differences which are attributed by researchers to persons of different status within groups.

Since there is no radiometric method that could be applied to these archaeological findings reliably, the exact chronology is a problem. Consequently, due to the high homogeneity exhibiting archaeological materials and knowing that the first stage of hunting, between 1819 and 1825, was the most intense of all and which brought the largest number of hunters, there is a tendency to ascribe the findings to this moment. Furthermore, the type of pipes present in these sites strongly reinforces this assumption, since the pipes found in the sites are from the 1780–1820 period (Stehberg 2003: 177).

Another interesting archaeological project in this regard is the Spanish-Chilean project that sought the location of the Spanish ship San Telmo, considered as being lost in South Atlantic waters of Cape Horn in the spring of 1819 when it was sailing from Cadiz to El Callao, in the American coast of the Pacific Ocean (Stehberg 2003). It was sent together with three other ships and troops to try to help the Spanish royalists in the rebellious colonies in South America.

The archaeological study included not only the search and identification of the ship remains but also all evidences left by successive visitors to the area. In a large bay enclosed to the west by some islets called Telmo Island on old maps, a kind of shelter on a cliff was found that may have been artificially prepared. Throughout the area and in other large bay, the Media Luna, there was scattered wood debris, seal and sea lion remains, and some whale bones.

In a superficial survey, a skull was found which, according to an anthropological examination conducted at Santiago de Chile University, may correspond to an indigenous woman carried by sea lion hunters as servant in a boat.

Finally, five sites were located with scarce remains of estructures and disseminted materials corresponding to small temporary camps. Excavations in four of them provide the first evidence for the area that matches with similar settlements found in Byers Peninsula, King George Island, and elsewhere in the archipelagos of the South Shetland and Orkney.

The verification of the final process of aboriginal societies of Tierra del Fuego brings up the question of whether it was an isolated case because they were socially and technologically simple societies, or if it was a repeated and general process affecting small scale societies, whose subsistence was centered on hunting, fishing, and gathering.

To check this issue, the processes experienced by other native societies based on fishing-hunting-gathering should be analyzed.

Societies of the Northwest Coast of America

The recurrently considered more complex hunter-gatherer societies inhabited the land at the other end of the American Pacific coast. In the societies on the central coast of North America Northwest, archaeological research show that ethnographic descriptions have important anachronisms, errors, and gaps. Information contrasted archaeologically shows a similar process to Tierra del Fuego: The trigger for the contact was the exploration and fur demand since 1742. Firstly sea otter and then when they were rarefied from 1815, hunters turned to the inland fur trade (mostly for beaver).

Two archaeologists (A. Martindale and P. Prince) both point out a first protohistoric/proto-contact period previous to the nineteenth century in which European influences come indirectly, followed by a second period of exploration and fur trade in the early decades of the nineteenth century. During this time, the indigenous maintain

their economic autonomy and their production relations. After the first settlement of trading posts (Fort Simpson in the Tsimshian area and Fort McLoughlin, further south in the area Bella Colla), there would have been a post-contact phase in which trade and exchange increased until finally shopkeepers, settlers (in 1834, Fort Simpson is founded and in 1849, Fort Rupert), gold seekers (1858), European canneries and sawmills began to settle in the territory and from the second half of the century, eventually swallow the indigenous population in the market society.

Throughout this period, there is a change in relations between Europeans and Indigenous parallel to the process of change experienced by the European society itself (moving from business contact to colonization).

In the coastal Tsimshian area, the first direct contact occurred in 1787. But there is what we call proto-contact period in which, as in Tierra del Fuego, the natives are exposed to indirect influences of Europeans (diseases and European objects like coins and metallic elements, which have been found throughout the Skeena River course). This first European trade's indirect influence is archaeologically perceived besides the presence of some industrial objects, by the increasing number of fur animal remains in the settlements and especially changes in the settlement pattern itself. In the lower Skeena, permanent occupations change to seasonal occupations and new settlements are located, as Metlalka in natural harbors. Inside the lower course of the river, there is a shift to a hierarchy of settlements and larger villages appear along the Skeena and the confluences with tributaries (Exchamsiks and Kitsumkalum).

Another thing was happening in the middle course of the Skeena, in the Gitksan area, where fortified settlements were placed (e.g., sites of Kitwanga-GgTa1-in-Gitlaxdzawk Kitsumkalum Canyon and GdTc1-in Kitselas Canyon) with permanent occupations on the river to participate in the fur trade traffic between the interior and the coast, where European boats arrived. Settlements became more sedentary and large (up to 17 houses), but the houses got smaller and started having European elements.

In brief, there was an increase in the participation of the commercial economy (the subsistence economy losing importance) and a reduction in houses (social segmentation, which could be explained by the effect of diseases but also by the effects of internal segmentation).

The presence of exotic European assets empowers already existing tendencies as e.g., surplus accumulation, violent conflict (the towns became fortified), social inequalities, and the slave trade. The first two are very well documented in the town of Kitwanga Hill Fort dating from the period 1750 to 1859. There, European items are distributed homogeneously in the houses, but at the end of the period, they are more concentrated in certain areas of a central house (Prince 2001). There, fur animal remains are concentrated and exotic goods accumulation is documented as well as a much more varied diet than in the homes of the periphery which are more modest in their construction.

Despite these changes, social reproduction structure remains essentially unchanged in this proto-contact moment. While the size and number of houses in villages are different, the internal structure of the houses will not change substantially until late nineteenth century. Martindale attributes this resistance to change, among other things, to the fact that until the complete settlement of the European colony in Fort Simpson and especially to the final installation of the missionaries, the natives depend on the strategies and traditional subsistence-production relations.

This was documented in the Psacelay site (GbTh-4). In this town, the pre-contact houses are as described ethnographically as large (up to 11 ∗ 18 mm), multifamily, with internal divisions, with an uneven distribution of consumer goods and accumulation of surplus in the "noble" (the innermost) part of the house. In this site, one of the two pre-contact houses is abandoned coinciding with the presence of post-contact European elements in the other house (Martindale 2006); however, the internal structure remains the same. The same happens in the town of Ginakangeek (GbTh-2) where crafted glass, dishes with blue decoration, trapper tools, lead fishing weights, and rifle caskets were found in one of the houses.

Trade of European goods (iron, iron tools, muskets, copper plates, fabrics, paint, sugar, biscuits, molasses, rum, tobacco) was superimposed, taking advantage of preexisting sharing networks (dentaliums, slaves, eulachon oil, dried berries, canoes, etc.) and was used to enhance prestige, with natives as intermediaries and with European ships acting as intermediaries among the natives.

With the installation of Fort Simpson (Port Simpson, British Columbia), from 1834, the natives began to cluster around European settlements, increasingly abandoning their winter settlements. Although hunting and fur preparation was mainly carried out by autonomous indigenous peoples, here, as in Tierra del Fuego, written documents speak about hiring Indigenous labor: first Aleuts by the Russians (1810) and then Indians by the British of Fort Simpson. Furthermore, since 1840, we find the natives integrated to European settlements. From 1870, they become employees in sawmills, packaging plants and they even migrate to the city of Victoria (the settlement of Fort Victoria was installed in 1843).

From the European forts, diseases spread, with one in 1836, killing one third of the native population (Fig. 3).

Similarly in the area of Bella Colla, analysis of all materials at Kimsquit settlements demonstrates a gradual incorporation and modification of European goods which are incorporated into native life, which retains indeed most of its own elements. It is not until the second half of the nineteenth century that the use of these foreign items becomes widespread, albeit sometimes with native functions and uses. That is, European materials were selectively adopted. In some cases, they worked with these materials with traditional techniques, giving them new and original forms different than the ones they had before. However, sometimes, it was not just about replacing traditional items, but that using imported objects acquired added value or that these objects were used as prestige goods (firearms, buttons, uniform, transparent glasses, and keys).

The fur companies that entered from the east of the continent advanced by 1806 to establish forts (Fort St. James, Fort Kilmaurs, and Fort Connelly) in the headwaters of the Pacific. The missionaries of the Church Missionary Society arrived later and settled in 1822 in Red River (Rupert's Land), but in the Pacific Northwest, the first missionary (William Duncan member of the same Church Missionary Society) was installed in Port Simpson much later (in 1857), as in Tierra del Fuego. The objectives and strategies of these missionaries were the same at both ends of the American continent.

Archaeology: The World at 1800–1850, Fig. 3 Historical site Fort Langley. The original was built by the Hudson Bay Company in this place in 1839. Here, in 1858, the colony of British Columbia was proclaimed. The reproduction was built for the touristic visit

Australasia

Although there are different elements, the process that took place in the eastern Pacific had many similarities to the other end of the South Pacific. Archaeology has helped to restore a more complete picture of the early days of European settlement, particularly through the Australian Society for Historical Archaeology founded in 1970 by Judy Birmingham that published a newsletter from 1973. Later, in 1983, this publication became the Australian Journal of Historical Archaeology. This Society from 1991 was extended in Australasian Society for Historical Archaeology that publishes the ASHA Newsletter and Australasian Historical Archaeology Journal, as well as a series of occasional papers and monographs since 1984.

Archaeological works, many published by the Australasian Institute for Maritime Archaeology, have analyzed sunken and stranded shipwrecks and trade of materials transported. Whaling settlements, consumer goods factories (saltworks) and mines, farms, sheep farming, forts, war scenarios, military installations (e.g., the 1840 military settlement of Port Essington or Fort Ligar), prisons, missions, and urban development of cities such as Sydney, Wellington, and Auckland have also been studied. Indigenous life and activities of the subordinate population: Women, and female convicts and aboriginals have been taken into account.

The inrush of the Europeans occurs in an analogous manner: There were some initial Iberian and Dutch seafarers exploratory trips (the archives on the Peninsula are scarcely known and studied by Anglophones scholars), but it was the famous Cook's travels that, in an expansive social context of the metropolis, triggered the scalar increase of the contact. Shortly after his travels, fur seal and sea lion hunting boats started coming to the south coast and southeast, and in 1788, the European settlement in Australia with convicts started in Port Jackson (now part of Sydney). This settlement would be followed by the arrival of the missionaries and little by little, during the first half of the nineteenth century, the interior of the Australian continent was explored.

Although the first to establish seasonal jobs in Van Diemen's Land, present Tasmania, were sealers, the settlement, with soldiers, convicts, and free people, was officially founded in 1803 by a British expedition sent from Sydney to prevent the landing of the French. Colonization was very fast and fatal as evidenced in a punitive expedition of 1815 against the indigenous for killing as many as 930 sheep. The colony quickly became a sheep and livestock colony with hundreds of thousands of cattle, for which they had to take native territories.

The estimated colonial registered population grew from 7185 in 1821 to 24,279 in 1830.

The archaeology in New Zealand, as it is an island and it has similar social and environmental conditions, illustrates the parallels with Tierra del Fuego and the Northwest Coast.

In all of these sites, it can be seen that there was a proto-contact phase (with sailors of various nationalities around their shores) documented by some European items in indigenous contexts: nails, axes, glass, and collar beads. A period of more intense initial contact with seasonal whalers and sealers settlements would follow, which is seen in the increase of these materials in New Zealand (Smith 2005) and the installation of the first penal colonies on the continent. Archaeological research clearly illustrates this contact process in which Aborigines initially tried to take advantage of the presence of Europeans and the introduction of new items incorporating these enclaves within their own networks, which probably like occurred in Tierra del Fuego and in the Northwest Cost, also stimulated significant and stable clusters of people around settlements and European trading points. The settlement of men on the coast generated a certain symbiosis and also problems of isolation and survival of new settlers, transference from the aborigines to the settlers and mixed settlements.

In New Zealand, the first Europeans to settle seasonally were sealers (mostly in the western part of the South Island), in some settlements where, since 1792, they lived with Aboriginal women and their mestizo offsprings. The first official settlement was that of the missionaries of the Church Missionary Society in 1814 in Oihi, Bay of Islands (Middleton 2006).

Colonization was conducted shortly after the system of privileged companies that violated treaties (such as that of Waitangi in 1840) installed more than 20,000 settlers in just 10 years. From 1803 to 1854, there were over 74,000 convicts transported from the British Isles, including some 12,000 women. This expansion policy confined the indigenous, reduced to a quarter, to the most bad lands.

As in the Pacific Northwest (and later in Tierra del Fuego), in the 1850s, the gold rush attracted more settlers to the Australian continent.

Violence and Disease

From the first contact in 1769 between Cook and the Maori in New Zealand, there began the confrontation between Aboriginal and newcomers. In Australia just 4 months after the first settlement in 1788, there was a confrontation. In December 1790, there was the first recognized massacre of indigenous people. On the mainland, the killings continued unpunished until 1838, by military officers, settlers, and ranchers. But it would be extended along the entire nineteenth century (until 1932) as the frontier advanced, and the conflicts would be reproduced between newcomers: between free settlers and deported, and between squatters, ranchers, and farmers.

In Tasmania, although it is assumed that there must have been some previous encounters between Aboriginal peoples and sealers, the first known violent episode occurred the year after the European settlement in 1804. Violence against Aboriginal people did not cease until its peak (the so-called Black War) between 1823 and 1834. After a major "cleansing" operation in the districts already colonized, it culminated in the deportation of all survivors (about 220 people from different groups of Tasmanian) to Wyllbaenna settlement on Flinders Island in Bass Strait. Most would die during capture and confinement: 14 years after their confinement, in 1847, there were only 47 survivors (Birmingham 1992).

This process is quite similar to that which would occur later, with the advance of the sheep border, in Isla Grande of Tierra del Fuego on the Selknam population, which saw them imprisoned in missions, segregated, deported, and confined on Dawson Island.

In New Zealand (after Cook), hostilities were reproduced, this time between sealers and Maori, with the war called the Red Shirt War which lasted from 1809 until the 1820s. As in the Pacific Northwest, with the well-known case of John R. Jewitt from 1802 to 1807 (Jewitt and Stewart 1987), there were Europeans who trespassed over the border to become "Pakeha" Maori. Their knowledge of the habits, ways of acting, production processes, and access to European goods (such as muskets) made them highly appreciated by the natives. This would lead to the creation of a mestizo population segment as the one that had been formed, by 1821, on the islands of Bass Strait in Tasmania.

As in the North American coast, European interference stimulated some preexisting trends in native society. The cultivation of potatoes, as in the Tsimshian area, was quickly adopted and used as an exchange good by the indigenous, allowing them to enjoy lower dependence on subsistence seasonality and increase production and at the same time increase the workforce. This, together with the possibility of acquiring European guns, stimulated and increased preceding tensions, the war and slavery between groups and Maori peoples (as happened also in known cases of the east coast of Vancouver Island). Thus, bloody episodes occurred as in the so-called muskets war among Maori between 1807 and 1842.

The Treaty of Waitangi between the British and Maori, which was signed in 1840, served to turn the archipelago into a colony out of fear of French influence. The Treaty was not respected by the settlers, which resulted in the Maori wars between 1845 and 1872 wars that would definitely change the balance of forces in favor of the newcomers.

As it had occurred in Tierra del Fuego, in regard to armed violence, the kidnapping of natives and their removal to Europe soon followed. In 1790, two Aborigines were taken to show them to the king of England. Women and children abduction was also common in Tasmania occupation (especially between 1816 and 1818).

The first settlements of sealers resulted in the sexual predation on indigenous women for using

them as company for their campaigns between November and May each year. Europeans got them from the natives themselves in Tasmania and New Zealand in exchange for European objects, sealion furs and dogs. Some missionaries were engaged in kidnapping children (especially girls) and they kept them segregated in special enclosures, with the excuse of saving them from venereal disease. As in all the Americas, diseases reduced indigenous populations to a third. The first recorded epidemic occurred around the European settlement in April of the year following their establishment. Epidemics were reproducing regularly in 1792, 1822, 1831, etc. In their explorations, the Europeans continued finding people marked by smallpox, contributing to the suggestion that the diseases were introduced by Asian fishermen from the North before European arrival.

Sexually transmitted diseases, alcoholism, and segregation policy (implemented first by the missionaries and then by the colonial government itself) helped to dismantle the Aboriginal population's reproduction mode, it would take over a century to begin to recover and reorganize it.

Resource Predation

The early days of pinniped exploitation are poorly documented. Records begin in 1791. At the beginning, the aim were the skins (more than 45,000 skins were gathered per year) to be exchanged, first in China for handicrafts, spices, tea, and silks and then in London where oil, fat, and skins were selling well, and where industrial processes of preparation and preservation developed. It affected the regions from the southern shores of Australia to the southern islands of the Antarctic. In the southern coasts of New Zealand, it lasted until mid-1810, but in just 4 years from 1798 to 1802, pinnipeds were overexploited in all the region of the Strait of Tasmania, and the sealer boats had to move increasingly to the South. Business decreased due to hostilities with Maori in the south, with a slight recovery in 1823 after temporary cessation of fighting and the installation of small sedentary settlements. But animal populations in Australia and New Zealand were overkilled in 1830 and the potential for massive exploitations nearly depleted. The exploitation of pinnipeds for their fur and their fat was supplemented in South Australia, Tasmania, and New Zealand and southern islands with intensive exploitation of whales (for their fat, bones, and whalebones) well before 1803. This hunt was conducted from factories located in coves and bays. Depletion of animals near the coast and the competition of the kerosene as fuel by 1850 changed the type of exploitation, directing it to open sea.

In the productive activities of these exploitations, Aboriginal women and some men were incorporated. Aboriginal New Zealanders also participated in this marine exploitation working at the factories situated in the south of the archipelago. Small settlements were formed with a varying mix of natives and Europeans.

Social Dislocation and European Settlement

Missionaries' permanent installation in New Zealand in 1814, the coastal bases of whaling operations, New Zealand forest and linen exploitation, and agropastoral expansion increased these contact and the transferred materials. The rapid colonization of white people led to an advance of the frontiers, increase of armed fighting, and missionary activity. Survivors were relocated and reservations were established, missionaries tried to attract the natives to Christianity, to the European way of life, to resource exploitation of commercial interest and wage labor.

Excavations in the afore mentioned Wybalenna mission in Bass Strait, where Tasmanian natives were relocated between 1833 and 1847, may provide additional light on how Tasmanian Aboriginal society came to disappear. Archaeological work confirms the historians' views, which suggests that the Wybalenna settlement was not viable: Living conditions were the poorest and food was scarce; thus, some Aborigines died from malnutrition and disease. They spent time on hunting local native wildlife to supplement their diet: There is a mixture of bones of small marsupials, molluscs, and European domestic fauna (which will increase its proportion over time). They have also shown that not all residents alike accepted the conditions

imposed: There are knapped glass instruments and different proportions of local and imported animals in the different rooms. It is clear that there was an attempt to reeducate them in the habits (e.g., sweeping the rooms, ceramic tableware) and with the European system (pencils, ink). Other European items, such as buttons, beads, necklace beads, tobacco, and ceramic pipes, should be bought with coins, and thus, the incorporation of natives to the wage labor and market economy is demonstrated. The official establishment of the colonies and the transformation of the settlements into real urban administrative centers since 1840, as well as the establishment of cities such as Sydney (1852), Perth (1856), Melbourne (1847) by Queen Victoria, marks the end of this period of colonial settlement.

The End of Contacted Societies

In all these areas, were native societies subsisted on fishing or hunting, the same process is archaeologically documented, even though it differs qualitatively or is not completely synchronous at a local basis:

1. A proto-contact (indirect or isolated and littoral) whose effects are documented archaeologically by European materials (raw materials and other utensils reformatted with their own techniques and adapted to their own use) found in Aboriginal sites. There was first the impact of European diseases and the gradual adaptation of European technology in a context of social relationships and native subsistence systems. At the same time, a change in settlement patterns to position themselves in relation to this new foreign input, but still within the traditional relations systems, was experienced. Certain existing trends, such as aggregation, women subordination, social inequality, and, in their case, intergroup violence, were stimulated.
2. Direct contact and European settlement (travelers, traders, missionaries, miners, and settlers), which involved new episodes of catastrophic epidemics and sometimes fights/slaughters. These Europeans, after the first contacts that involved more or less violence, tried to kidnap or capture some native people to serve them later as translators or introducers in their society. European settlements that were installed by the mid-century acted as attractors of the indigenous population while spreading diseases, alcoholism and as bridgeheads for waged (independent) labor and bases for exploitation and competition for resources and territory.
3. The integration of natives as a laboring force (guides, trappers, hunters, food suppliers, translators, trade intermediaries) for both men and women, the latter always with the addition of sex, was produced.

Throughout this century, these groups were completely socially unstructured, and even physically almost gone by the first half of the nineteenth century, like the Tasmanians or Beotucos of Newfoundland. The survivors would be integrated into the market economy and even became dependent on it for their livelihood, forming part of the lower salaried classes of the new society.

The long history of these native societies came to a sudden end in the nineteenth century. They could not control the de-structuring effect on their social networks. Although perhaps it provided initially a series of specific daily improvements for a part of these native societies, it was eventually lethal to the survival of their organizational structures. Aboriginal societies would only be "resurrected" or reconstructed as entities, from World War II and for political reasons and following a political struggle.

In this intermission between the first contacts and the disappearances is when religious missions, industrial companies, gold seekers or adventurers, or sailors of marine resource exploitation companies and the different governments that were formed in the new countries that emerged from colonization, played an important role.

Global Causes

So far the description of processes that affected societies at the end of European colonial expansion has been explored. Since the verification of

the existence of this phenomenon and recurring global processes, the evidence reporting the global causes of the end of some social systems that had survived many crises over thousands of years should be analyzed. Allochthonous objects (metal, porcelain, glass, etc.) found in archaeological sites in settlements at the ends of America and Oceania from early nineteenth century came from maritime routes. These items relate to the newly emerging Europe in this century, the nation-state, colonial-expansionist-scientific-industrial-educated Europe.

In the first half of the nineteenth century, Europe was undergoing major changes. European capitalism of the emerging industrial revolution developed and consolidated new sources of energy (steam power machine). Transport systems (such as the train), with coal as fuel and iron as the backbone, widened markedly and there were large movements of people (from the countryside to the cities). All this led to, and was caused by, an increase in the demand for a means of production of increasingly sophisticated, luxury goods for the new upper class/bourgeois society and consumer products for the metropolitan working classes and the new colonial population in expansion. It was about a basically legitimist, clerical, and reactionary Europe, where nationalism and liberalism prevailed. Nationalism was an important political factor and the mercantilist theory provided a stimulus for the development of a new type of colony; the colony was established by Europeans as a social and economic expansion of the metropolis. This system, which required major sources of raw materials and new markets to sell their products, now also started its own colonial expansion. The exploration of last boundaries for evaluating potential resources briefly preceded colonial penetration, which was often justified by cultural and ideological-religious arguments: as a civilizing and/or evangelizing mission.

Therefore, the causes of the disappearance of those native life systems successfully achieved and experienced for so long, with local characteristics and specific crises themselves, were not internal. Commercial competition between nations led to the establishment of new colonies in the new lands, the processes that occurred in the contacts and meetings with the societies called "primitive"/ethnographic led quickly to their end. So their disappearance was caused by a confrontation with a growing external socio-economic system whose intrinsic emerging characteristics made it prevail, destroying those it contacted.

History, after the first contacts, is the history of European colonization.

Transformations in the Colonies

The greed and force of this new system are evident, not only in the new lands that the European metropolis occupied in this century, but in the former colonies established centuries before. The consequences of this struggle between European nations, between the metropolis and its former colonies, or between the new settlers and the Indigenous can be detected archaeologically, along all coasts through archaeological remains of the land and naval battles like the underwater remains of the iconic Trafalgar confrontation.

Rivalries between the major European powers for the appropriation and exploitation of the territories "discovered/conquered" were the first stimulus to scientific-political travels (with adventurers, pillaging, and kidnapping). The voyage of the HMS Beagle is the best-known example of the first half of the nineteenth century (Fig. 4). These trips were aimed at finding and evaluating new resources, exploring possibilities for their exploitation (sealers-whalers-gold-fur-trappers) and establishing new commercial circuits. Goods and circuits are known by archaeological analyses of wrecks and the distribution of allochthonous goods that have been found. From the records of the ships, the circulation of some goods can be followed. Goods that included: porcelain, spices, silk, and tea from China that were exchanged for fine furs of North America or from the Subarctic first, and later opium (in the first Opium War, England imposed its use in 1842); fuel, minerals, wool, cotton, tobacco, groceries, coffee, and sugar in the already established colonies in exchange for value-added products or industrial products (textiles, Staffordshire porcelain, alcoholic beverages, and consumer luxury goods for the ruling classes and the emerging

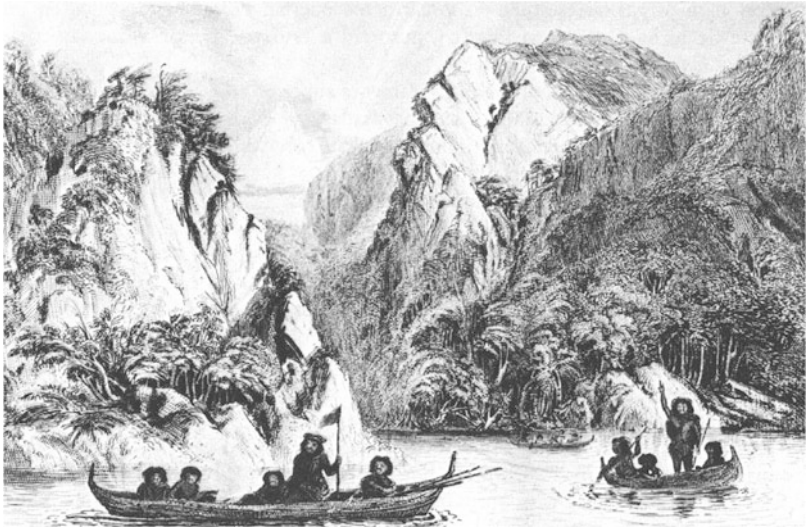

Archaeology: The World at 1800–1850, Fig. 4 Drawing of Fueguian canoeists made by T. Lanseer and reproduced as engraving in King 1839

middle classes), and of course work force (slave, forced or free, African, European, or Asian).

Under these economic conflicts between European nations, changes of "ownership" of some colonies occurred, for example, the purchase of Florida and Louisiana. Enrichment desires of the new Creole elites – both large producers and urban intermediaries – will lead to the independence of the countries in the early decades of the nineteenth century, processes that were not foreign to the interests of the metropolitan rival powers to get these new markets (such foreign interference had occurred since the first independence, that of the USA). The archaeology of Spanish and French Caribbean colonial fortifications perfectly indicates where the problem came from in the first place.

The idiosyncrasies of the different colonizations are reflected in the particularities of the archaeological evidence and settlement patterns, for example, among the Spanish, French or English Caribbean. The displacements and relocations of settlers also have their archaeological expression when compared archaeologically: for example, the housing structure of the Arcadians compared to the houses of the preinstalled settlers in the south of the United States of America.

The strength of the commercial circuits that were stimulated by the desire of exotic goods and imported products prompted the intensification of production in these ex-colonies, both imported products (coffee) as well as their own products such as rubber, guano, or tobacco. Thus, a new class of landowners, stockholders, and businessmen emerged, who often built a residence in the cities in addition to their large properties and homes in the countryside. As a reflection of what was happening in the metropolis, these emerging new classes in the new countries tried to follow European fashions, imitated behavior styles, architecture, luxury objects, furniture, fashion in clothing, etc. In order to fulfill their needs, they directly imported many luxury items.

The presence of European luxury goods and evidence of new production means is archaeologically confirmed: For example, there was a move from the small artisan press to the sugar mill with the early introduction of the steam engine and the railroad. The set of buildings for sugarcane processing, the sugar mills, have been archaeologically well studied in Cuba, Dominican Republic, Venezuela, and Argentina. In Cuba, for example, at the beginning of the century, sugar mills multiplied, numbering more than a thousand in the 1830s. They produced not only sugar but also began to produce rum. Coffee haciendas in Venezuela, Guatemala, and Cuba have also been archaeologically studied.

Tobacco and cotton were other colonial star products that began to rise in this period. In the USA, large landowner exploitations in the South to small farms in the North have been archaeologically studied. Agricultural intensification explains the flourishing of guano exploitation. In 1845, Peru began exporting this famous fertilizer due to high demand in North America and Europe to increase their agricultural production to cope with population growth.

The same happened with other products to meet industrial demands. For example, the rubber extracted in the subtropical forest was an essential commodity for British industry. There have also been archaeological studies documenting such exploitations.

The same intensification pressed the largest colonies into hinterland occupation where indigenous people survived. They had developed new political, social, and economic organizational strategies, taking advantage of new elements (horses, livestock, crops, weapons).

European expansion, occupation, and the final removal of indigenous people, that have an archaeological reflection at battlefields and military buildings, will start in the first half of the nineteenth century but will intensify and consummate in the second half, from the 1840s.

The most relevant examples of which we have archaeological traces are, in addition to "Maori war," the advance of the whites in South Africa, the "conquest" of the West in the USA, and the so called "war of the desert" in Argentine Patagonia. In Argentina, there was a sustained situation of an unstable border that had generated a native and mixed population which had developed new social and economic strategies: regrouping, mixing, working with cattle and horses, or the exploitation of salt to meet consumption and military demands of the European population, and even participating in the colonial and internal disputes. There is archaeological evidence for the transformation of the natives (e.g., watering hole structures) and Argentine and Spanish ancient forts. The effort to disintegrate the indigenous structure and absorb "undomesticated" – indigenous and gaucho – labor force will be completed with the intensification of the war, and archaeologically well reflected in the forts and border forts and in the means of production and consumer goods recovered at these sites.

The emergence of an urban class of intermediary traders contributed to the remodeling of existing colonial cities and their growth as a service center and as locations for primary processing industries. The case of Buenos Aires is quite illustrative, with a planification that had begun to regulate even before independence in Charles III's regulations (Schávelzon 2002). With the independences, their creole industries, local factories (e.g., china), and at the same time some old ways of organizing work of religious inspiration, such as the Capuchin monks in Venezuela, are terminated (Sanoja 1998).

The same powers (especially Britain), that favored the independence that allowed them to penetrate these markets, stimulated rivalries and interests or divergent plans that emerged between different local elites. Immediately after independence, there followed civil wars and wars between neighbors that tried to prevent the installation of large countries that could threaten the hegemony of the maximum emerging power.

The case of the best-known rivalry and also archaeologically best known was between the USA and Mexico. The expansion of the future new power was oriented not only to the north and west but also southwest, conflicting with Mexico with which they went to war, and they finally snatched 55% of Mexico's former territory.

Economic and Ideological Changes in the Metropolis

Large commercial transatlantic circuits generated a demand for raw materials and at the same time value-added products, which led to the development of mass production that installed a second phase of the industrial revolution, the mechanized factories. This process has been well studied by Industrial Archaeology in central and northern Europe.

The development of urbanization and industrialization on the continent, which had begun in the last third of the previous century, has continued into the first half of the nineteenth century. The demand for labor will attract people from the

countryside to the cities and industrial areas. Industrialization and mass production systems were developed: Fine porcelain production and transfer systems designs are an excellent example well-studied archaeologically. The chain of production processes accelerated the feedback of all these cycles: Textile mills, for example, required the development of new machinery which in turn stimulated metallurgy, the demand for metals and fuels, mining.

This development required a fundamental transformation in production relations. The change meant the end of slavery and the residues of feudal production relations, which were not carried out without resistance. Archaeology has studied the moment of the end of slavery, from the analysis of the remains of sunken slave ships in the Caribbean to the mills and large slave plantations or runaway slave shelters (e.g., in Cuba).

The capitalist mode of production would be based on non-slave wage labor, for which they had to reeducate the workforce. These new production relations had to be imposed by force against the resistance of certain classes of large agricultural producers, but were especially advantageous in industrial environments. Indeed, they had the advantage of reducing fixed costs, labor market flexibility to adapt to the increasing mechanization and massification and generating new cycles of consumption and profit (rental housing, consumer sales that are materialized in industrial colonies whose architectural and archaeological traces are found throughout Europe).

The restructuring of the labor force and economic growth will lead to large population translocations: mass migration of central and northern Europeans toward the colonies, and the displacement of people from India to South Africa. By mid-century, China also began to move toward the Americas. The loss of male labor in the wars between the metropolitan powers in the colonial liberation, in the emigration to the colonies, etc., needed to be replaced: It was therefore about placing women as reproducers (of the labor force and ideology) and also as a reserve labor force.

The political, legal, and economic status of women did not change significantly with the industrial society and liberalism. They continued to be the victims of discrimination. Female labor in factories and mines did become widespread, but in conditions of extreme exploitation and wage discrimination against their male coworkers. Moreover, women were banned from professional areas of greater responsibility and higher education.

Ideological Changes

The existence of labor force and free consumers demanded restructuring relations of social reproduction: the construction of an ideology for alienation and ideological domination on the one hand, and to stimulate the reproduction of the same workforce on the other hand. An ideological shift was essential to achieve a revolution in the reproductive sphere. Linking morals with reproduction has its paradigmatic theorizing in Malthus's work, which, among other things, would serve as a basis for the development of the theory of Evolution and, therefore, the foundation of biology. Parallel changes occurred in political ideology. Nationalism encouraged the identification of consumers with producers unifying and thus favoring domestic consumption in central nations and metropolitan product in the colonies. Colonial elites not only imported luxury items imposing European fashions but a good dose of liberal ideology and a new lifestyle in the image and likeness of the European bourgeoisie.

The cultural demand of these elites is linked to Neoclassicism and Romanticism, which ensures Archaeology of this period is reunited with its own origin. We are in front of the birth of archaeology as a discipline, in parallel to other sciences (such as geology or biology). Nationalism also brought an interest in the past and the role it could play in the construction and legitimation of the present. The remote past – prehistory, and in particular Greco-Roman civilization – becomes the focus of interest and is investigated/excavated. Romanticism, in turn, intensifies the interest for lost civilizations: Near East, Egyptian, Mayan and for a dark common past: Celts and megaliths.

The development of archaeology is linked to the demand for exotic and cultural consumer goods: It is expressed in the architecture

(neo-Gothic, neoclassical) that is documented in the excavations of mansions and gardens that speak for these interests of the bourgeoisie. In the early nineteenth century, the demand for antiques by states and collectors becomes so great that the great museums in Europe and the USA are created to preserve and exhibit relics of the past. Thus, the nineteenth century is the century of the museums, the pillaging of antiquities in Egypt, in Greece (Parthenon friezes are purchased), and exhibition of exotic people – "other peoples" – that reinforce the European system, civilization, and the status quo.

Resistances

However, the enforcement action of this capitalist system immediately provoked significant reactions and social crises. One can speak of the "Europe of revolutions": the bourgeois revolutions and independence revolutions of the colonies which are followed by other crises, revolts, and working class resistances. Unions and social movements emerged as Luddism, opposed mechanization and was severely repressed, Owen's utopian socialism (1839) that inspired the founding of utopian colonies. These culminated in the mid-nineteenth century with the publication of the Communist Manifesto (origin of scientific socialism), the publication of Proudhon's works (origin of anarchism), and the European revolutions of 1848.

In that same year 1848, the first American feminist collective document, the so-called Seneca Falls Declaration, which was approved on 19 July in a Methodist chapel of that locality in the state of New York, became public. This document first expressed what might be called a "feminist philosophy of history." A philosophy which denounces the abuses women had suffered throughout history.

Conclusion

The causes of the disappearance of native social systems based on controlled production and reproduction were structurally and contextually external and violent. Their origin must be sought in Europe and attributed to its initial capitalist system that begins to expand and consolidate in the first half of the nineteenth century. This required a globalization where colonies fructified, soon converted into independent countries, and for its resource and territory voracity implied delimitation of marginalities incompatible with the new system.

Archaeology allows complete our understanding of the global system expansion illuminating the dark side of the story: those elements that were considered not worthy but removable or to be ignored.

Cross-References

▶ Histories of the Archaeological Discipline: Issues to Consider

References

Birmingham, J. 1992. *Wybalenna: The archaeology of cultural accommodation in nineteenth-century Tasmania: A report on the historical archaeological investigation of the Aboriginal establishment on Flinders Island*. Sydney: Australasian Society for Historical Archaeology.

Estévez, J., and A. Vila. 2007. Twenty years of ethnoarchaeological research in Tierra del Fuego: Some thoughts for European shell middens archaeology. In *Shell middens in Atlantic Europe*, ed. N. Milner, O.E. Craig, and G.N. Bailey, 183–195. Oxford: Oxbow Books.

Jewitt, J.R., and H. Stewart. 1987. *The adventures and sufferings of John R. Jewitt: Captive of Maquinna*. Vancouver: Douglas & McIntyre.

King, P.P. 1839. *Narrative of the surveying voyages of His Majesty's Ships Adventure and Beagle between the years 1826 and 1836, describing their examination of the southern shores of South America, and the Beagle's circumnavigation of the globe*. London: Henry Colbum.

Martindale, A. 2006. Tsimshian houses and households through the contact period. In *Household archaeology on the Northwest Coast*, ed. E. Sobel, D.A. Trieu Gahr, and K.M. Ames, 140–158. Ann Arbor: International Monographs in Prehistory.

Middleton, A. 2006. Silent voices, hidden lives: Archaeology, class and gender in the CMS missions, Bay of Islands, New Zealand, 1814–1845. *International Journal of Historical Archaeology* 11 (1): 1–31.

Prince, P. 2001. Artifact distributions at the Kitwanga Hill Fort: Protohistoric competition and trade on the Upper

Skeena. In J.C. Cybulski (ed.) *Perspectives on northern Northwest Coast prehistory,* Archaeological Survey of Canada Mercury Series Paper 160, 249–268. Hull: Canadian Museum of Civilization.

Schávelzon, D. 2002. *The historical archaeology of Buenos Aires: A city at the end of the world*. New York: Kluwer Academic Publishers.

Smith, I. 2005. Retreat and resilience: fur seals and human settlement in New Zealand. In *The exploitation and cultural importance of sea mammals*, ed. G.G. Monks, 6–18. Oxford: Oxbow Books.

Stehberg, R. 2003. *Arqueología histórica antártica. Aborígenes sudamericanos en los mares sub antártico en el siglo XIX*. Santiago de Chile: Ediciones de la Dirección de Bibliotecas, Archivos y Museos: Centro de Investigaciones Diego Barros Arana.

Vicenti Partearroyo, A. 2007. Perspectivas sobre la arqueología industrial. Arqueoweb. Revista Sobre Arqueología En Internet 9(1). Available at: http://www.ucm.es/info/arqueoweb/pdf/9-1/vicenti.pdf. Accessed 12 Aug 2011.

Further Reading

Archeologia Postmedievale. Firenze: Edizioni All'insegna Del Giglio. Available at: http://www.edigiglio.it/default.asp.

AIMA Bulletins and Special Publications. Australasian Institute for Maritime Archaeology. Available at: http://aima.iinet.net.au/.

ASHA Newsletter, *The Journal Australasian Historical Archaeology* and *Ocasional Papers*. Australasian Society for Historical Archaeology. Available at: http://www.asha.org.au/.

Boletin de Arqueologia e Historia 5. La Habana: Gabinete de Arqueologia, Oficina del Historiador de la ciudad de La Habana.

Campbell, J. 2002. *Invisible invaders: Smallpox and other diseases in Aboriginal Australia 1780–1880*. Melbourne: University Press.

Funari, P.P.A., M. Hall, and S. Jones. 1999. *Historical archaeology, back from the edge*. London: Routledge.

Gallardo Abárzuza, M., and L.M. Carmona. 2005. Los naufragios de la batalla de Trafalgar. *Ph. Instituto Andaluz del Patrimonio Histórico* XIII (55): 86–92.

Groove, M.D. 2003. *An archaeological study of rural capitalism and material life: The Gibbs farmstead in southern Appalachia, 1790–1920*. New York: Springer.

Hall, M. & S.W. Silliman. (ed.) 2006. *Historical archaeology,* Blackwell Studies in Global Archaeology. Oxford: Blackwell Publishers.

Historical Archaeology. Society for Historical Archaeology (SHA) at the University of Montana. Available at: http://www.sha.org/.

International Journal of Historical Archaeology. New York: Springer.

Journal of the Society for Industrial Archeology and *Society for Industrial Archeology Newsletter*. Society for Industrial Archeology (SIAN). Available at: http://www.sia-web.org/.

Lawrence, S., ed. 2003. *Archaeologies of the British: Explorations of identity in Great Britain and its colonies 1600–1945*. London: Routledge.

Lawrence, S. 2006. Historical archaeology and colonialism. In *Cambridge companion to historical archaeology*, ed. D. Hicks and M. Beaudry, 69–86. Cambridge: Cambridge University Press.

Leone, M.P., and P.B. Potter Jr. 1999. *Historical archaeologies of capitalism*. New York: Plenum Press.

Middleton, A. 2008. *Te Puna – a New Zealand mission station*. New York: Springer.

Molina, L.E. 2005. Historia y arqueología de un antiguo ingenio azucarero del valle de Caracas, Venezuela. *Anales del Museo de América* 13: 199–224.

Orquera, L.A., and E.L. Piana. 1999. *Arqueología de la región del canal Beagle (Tierra del Fuego, República Argentina)*. Buenos Aires: Publicaciones de la Sociedad de Antropología Argentina.

Paisaje arqueológico de las primeras plantaciones de café en el sudeste de Cuba. n.d.. Available at: http://whc.unesco.org/en/list/1008. Accessed 21 Aug 2011.

Post-Medieval Archaeology. Society for Post-Medieval Archaeology. Available at: http://www.spma.org.uk/.

Revista de arqueología histórica argentina y latinoamericana. Sociedad Argentina de Antropología. Available at: http://www.saantropologia.com.ar/.

Ryan, L. 2008. List of multiple killings of Aborigines in Tasmania; 1804–1835. In J. Semelin (ed.) *Online encyclopaedia of mass violence*. Paris: Social Sciences Po, [online]. Available at: http://www.massviolence.org/List-of-multiple-killings-of-Aborigines-in-Tasmania-1804. Accessed 20 Aug 2011.

Sanoja, M. 1998. Arqueología del capitalismo. Santo Tomé y las misiones capuchinas catalanas de Guayana. In L. Molina & E. Amodio (ed.) *Técnicas y tecnologías en Venezuela durante la época colonial,* Boletín del Museo Antropológico de Quíbor 6, 135–160. Quibor: Museo de Quibor.

Smith, I. 1989. *Rediscovering Fort Ligar: Archaeology at R11/1656, Auckland*. Wellington: Head Office, Department of Conservation.

Smith, I.W.G. 2002. *The New Zealand sealing industry. History, archaeology, and heritage management*. Wellington: Department of Conservation.

Smith, I.W.G 2008. Maori, Pakeha and Kiwi: Peoples, cultures and sequence in New Zealand archaeology, in: G. Clark, F. Leach & S. O'Connor (ed.) Islands of inquiry colonisation, seafaring and the archaeology of maritime landscapes: 367–380. Canberra: Australian National University.

Smith, I.W.G. & N. Prickett. 2006. Excavations at the Oashore Whaling Station (M37/162) Banks Peninsula January–February 2004. Otago Archaeological Laboratory Report 3. Available at: http://www.otago.ac.nz/anthropology/anth/publications/OALR/Oashore_Exc.pdf. Accessed 10 Aug 2011.

Staniforth, M., S. Briggs, and C. Lewczak. 2001. Archaeology unearthing the invisible people: European women and children and Aboriginal people at South

Australian shore-based whaling stations. *Mains'l Haul: A Journal of Pacific Maritime History* 36 (3): 12–19.
Vila, A., and J. Estévez, eds. 2010. *La excepción y la norma: Las sociedades indígenas de la costa noroeste de Norteamérica desde la arqueología (Treballs d'Etnoarqueologia 8)*. Madrid: CSIC.
Vila, A., J. Estévez, and J.C. Romero, eds. 2006. *Investigaciones en el fin del mundo: La gente canoera de Tierra del Fuego*. Barcelona: Institució Milà i Fontanals & CSIC – UAB – DURSI.

Archaeometallurgy of Post-Columbian America

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Introduction

Outstanding research has been conducted on ancient metals all over the world within archaeometallurgy. Thus far, this research has addressed a wide range of topics, such as the origins and spread of metallurgy, mining technology, production and circulation of metals, functionality and use of artefacts, and post-depositional deterioration processes. However, archaeometallurgical studies on remains from historical sites (or postmedieval, in Europe) are less frequent. Though written documents, maps, paintings, and photographs, when available, are very useful complementary sources of information for this period, our knowledge of past technologies is not yet sufficiently thorough, as many sites were either poorly documented at the time, or not registered at all. For instance, investigations focused on metal artefacts and other related finds from ca. AD 1500 onward are of special value for their insights into innovations that took place in ferrous metallurgy during the industrialization period (see Bayley et al. 2008, in regard to the case of Britain).

Following the anthropological-sociological theoretical approach to technology proposed by French scholars, from Marcel Mauss to Pierre Lemonnier, metallurgy is here considered as a complex social phenomenon (a technical system) that comprises matter, objects, knowledge, values, gestures (operational sequences), and representations, which both shapes and is shaped by people's meaningful choices and actions. The social dimension of the aforementioned elements is inscribed in their practices and productions. Thus, archaeologists can reconstruct past technical systems through the analysis and interpretation of their material expressions, i.e., the evidence recovered from sites. Moreover, for modern period contexts, field-obtained information is usually combined with data from standing structures, documentary sources, and oral records. Within historical archaeology, intriguing advances have been made in the study of post-contact Native American sites, colonial settlements, battlefields, fortifications, urban and industrial facilities, and shipwrecks.

A brief account of research carried out on metal artefacts from these contexts, mostly developed from the 1990s onward, is offered in this entry. Emphasis is placed on the value of archaeometallurgy for the study of post-Columbian societies in the Americas, both Native American peoples and settlers from European origin. This entry is centered exclusively in archaeology-related topics, focused on aspects of past human lives, and leaving aside advances made in associated areas of study, such as corrosion analysis, conservation, and the authentication of cultural heritage metallic artefacts.

Definition

Archaeometallurgy has been a field of research in its own right for about 50 years. Nowadays, it is widely developed. Investigations carried out in the Near and Middle East, Central and Northern Europe, Mesoamerica and South America, Africa, and China have primarily addressed early metallurgy in those regions up to ca. AD 1500 (see Killick and Fenn 2012; Roberts and

Thornton 2014). Nonetheless, studies within archaeometallurgy are not necessarily circumscribed to a particular period. Available analytical methods and instrumentation crosscut most of the temporal limits that are commonly used in archaeology as a criterion for delimiting areas of research and can be potentially applied to studies covering multiple historical periods and themes. Echoing the words of Rehren and Belford, a separation between an essentially prehistoric approach (mainly based on archaeological remains) and a more historical one (where documentary sources are the primary evidence) is pointless for sites outside Europe. Other than a nominal distinction, the terms *archaeometallurgy* and *historical metallurgy* neither connote any fundamental difference in terms of theoretical and methodological approaches nor regarding research interests and times (Rehren and Belford 2013).

Metallurgical studies conducted within historical archaeology in the Americas as well as in other world regions could be framed within either archaeometallurgy or historical metallurgy. Research developed in these fields cover a wide range of technology-related topics within the modern period both in European countries and overseas: experimentation and improvements in industrial processes, knowledge of ferrous and nonferrous metals, introduction of new materials, development of mass production, endurance of craftsmanship practices, commercial activities and other central-periphery social relationships, and economic and ideological implications of using novel goods in different scenarios, to cite a few. Contributions made so far enable to glimpse the importance of these studies not only for mainstream subjects in historical archaeology but also for discussing invention and innovation processes, technological choices and values, as well as other issues of interest for material culture studies (anthropological archaeology), anthropology of techniques, history of technology and social ideas, and related fields (see Martinón-Torres and Killick 2013, for a discussion on the archaeological science role in the formulation of theory).

Historical Background

The dawn of archaeometallurgy goes back to long before the term was coined. The first metallurgical analysis of antiquities and archaeological remains appeared in the late eighteenth century. For more than a century, metalwork studies were largely devoted to chemical composition determination of iron and copper-based objects such as coins, weapons, and utensils, with the purpose to investigate the materials' quality, manufacturing processes, and their origin. On the other hand, thanks to Henry C. Sorby's contributions to metallographic examination during the 1860s, this technique became a reliable mean to characterize different metal specimens, including archaeological remains. During the twentieth century, mostly in the post-war period, new chemical characterization methods were developed: optical emission spectroscopy (OES), wavelength-dispersive X-ray spectroscopy (WDS), atomic absorption spectroscopy (AAS), and energy-dispersive X-ray fluorescence (EDXRF). Following their application in the laboratory and industry, scientists soon implemented different analyses to determine the composition of large samples of ancient metals, primarily from archaeological sites located in Europe, aiming to identify their provenance (see Rehren and Pernicka 2008). Nonetheless, it was until the 1970s that available analytical means became regularly implemented in truly archaeologically oriented research projects, to answer questions about the life of past human societies. This approach, which strongly depended on the theoretical and methodological development of archaeology, was related with the increasing trustworthy that archaeologists began to show on scientific methods since the previous decade. However, it was not immediately widespread, and ulterior improvements have revealed notorious contrasts between different regions.

Most of the international work on archaeometallurgy is focused on ancient technology, as already mentioned. In the Americas, initial efforts were focused on pre-Columbian metallurgy. Although the interest on this subject traces back to at least the mid-nineteenth century – and even

characterization of prehistoric artefacts were sporadically conducted since then – archaeometric analyses were developed from the mid-1970s onward. Archaeologists dealt with the origins of nonferrous metallurgy and its development by studying the mining, smelting and manufacturing processes, and the usage and circulation of metal artefacts in Native American complex societies. Interdisciplinary projects have been carried out in Argentina, Bolivia, Chile, Colombia, Mexico, Peru, and the USA, among other countries, by both local and foreign researchers. Several investigations on prehistoric metallurgy in the Americas were also conducted by European scholars, among them, from the Institute for Archaeo-Metallurgical Studies (University College London).

Generally, studies have been focused on the characterization of artefacts made of copper, silver, and gold, together with their alloys. Furthermore, they dealt with evidence associated with the metallurgical production process, including waste materials (e.g., minerals and slag), installations, and tools remains (e.g., furnaces, crucibles, and molds). Ethnohistoric and ethnographic research was also combined with data gathered from controlled smelting and casting experiments and from use-wear analysis of metallic instruments. Together, these works have contributed to the understanding of metalworking activities such as the technical knowledge, degree of specialization, scale of production, and functionality of artefacts. Studies performed by leading scholars such as Dorothy Hosler, Luis González, Heather Lechtman, Marcos Martinón-Torres, Izumi Shimada, Thilo Rehren, José Luis Ruvalcaba Sil, David Scott, and co-workers are worth mentioning (see Simmons and Shugar 2013, for a compilation of studies on pre-Hispanic Mesoamerican metallurgy; Cooke et al. 2008, for a brief introduction to ancient metallurgy in Southern South America; and González 2004, for a comprehensive research of this technology in the Argentinean north-western area).

Investigations of metal artefacts within historical archaeology followed a somewhat different course. Since the development of this field in the 1960s, detailed descriptions of morphological and functional features of European manufactures primarily based on a macroscopic examination and documentary sources were conducted. Over time, large typologies used as a reference for technological assessment were developed. Noël Hume's book *A Guide to Artifacts of Colonial America*, first published in 1969, is worth mentioning. It displays several categories of artefacts from the seventeenth and eighteenth centuries, such as buttons and buckles, coins, cutlery and spoons, firearms, and nails, described and illustrated profusely. This work and other akin contributions have been widely used by archaeologists with the aim to identify and perform a first approach to material remains recovered from historical sites. Metals from historic buildings, of interest both to historical archaeologists and art historians, were also subject of detailed cataloging (e.g., Gayle et al. 1992). Moreover, some isolated archaeometric work was carried out with non-archaeological artefacts from museums' collections, chiefly motivated by their historical significance, and following an object-driven approach. In Argentina, a metallurgical examination conducted at the National Energy Atomic Commission allowed authenticating a curved saber located at the National Historical Museum, which most likely belonged to Gen. José de San Martín, who took a leading role in the revolutionary actions against the Spanish rule in Argentina, Chile, and Peru, in the early nineteenth century. This kind of isolated study, even if they may have had certain utility, has usually shown heuristic limitations for archaeological interpretations, due to the lack of artefact contextualization and its limited scope.

Leaving aside a few exceptions, it was necessary to wait until the 1990s for the development of archaeometallurgical analyses of artefacts from historical sites. The development of investigations carried out in Argentina on sites with evidence of European occupation is marked when compared with other Latin American countries. The interdisciplinary work conducted by archaeologists, engineers, and other specialists at the Archaeometallurgy Group (*Grupo de Arqueometalurgia*) of the University of Buenos Aires, under the direction of Horacio De Rosa, should be noted. Over

15 years, several studies were performed on materials from shipwrecks, battlefields, fortlets, and rural and urban sites. Other comparable specialized research groups have been dedicated mostly to pre-Hispanic metallurgy and, in a lesser degree, to post-contact Native American technology. On the other hand, in historical archaeology handbooks and other reference books, there is barely any mention to the potential of metallurgical studies. In addition, several investigations developed in the region are still framed in terms of circumstantial collaborations: archaeologists submit their samples for analysis and then interpret data obtained by specialists who usually do not have a thorough understanding of the archaeological contexts and problems under consideration. This situation, fortunately, is progressively changing towards a closer collaboration between them.

Presented below, is a non-thorough but intriguing selection of works that account for the importance of a truly interdisciplinary approach for current debates in historical archaeology and related fields.

Key Issues/Current Debates

Post-contact Native American Sites

The encounter between Spanish colonizers and Native American people has been a research main topic within historical archaeology. Thus, several post-contact sites were studied for decades. Special interest was placed on the technological changes that this relation triggered, for instance, the adoption of iron utensils, tools, and weapons and its consequences on social practices and ideas. Microstructural and elemental composition analyses offer reliable data to determine the quality of archaeological remains and roughly distinguish the provenance (local vs. foreign) of different artefacts (see Hancock et al. 1991, for a discussion on similarities and differences between Native American copper and European trade cooper). For instance, Wayman and others recorded the metallurgical differences between Arctic native copper samples and nineteenth-century European manufactures made of smelted copper, along with an array of unidentified archaeological artefacts. This study shed light on the use of foreign materials by the Copper Inuit of the west-central Canadian Arctic, in particular the recovery of artefacts from a large cache of provisions abandoned in 1853 by the crew of the HMS *Investigator*, which sunk during an attempt to find the Sir John Franklin's lost expedition (Wayman et al. 1985). Likewise, ulterior works have been centered on identifying exotic materials in post-contact Native American sites, mostly based on the technical characteristics and chemical analysis of the main and trace elements of artefacts. However, only a few have explored the social implications of this widely extended process. The ways in which Native American societies transformed and assigned new meanings to European brass goods in accordance with their metallurgical knowledge and sociocultural worldview were analyzed by Ehrhardt (2005). Also in North America, other authors examined the contact consequences between Spanish and Pueblo inhabitants in colonial New Mexico during the first half of the seventeenth century, in particular related to Pueblo experimentation with metal production using copper and lead local ores, as well as their involvement in the refining of silver and the working and recycling of European copper goods. In this context, as the authors stated, "a complex mosaic of emergent experimentation in novel and hybrid technologies shaped by the requirements of colonial tribute demands, locally available resources, indigenous knowledge and practices, and frontier exchange relationships" was created (Lycett and Thomas 2008: 1651). Indigenous burials have also helped to clarify changes in mortuary patterns and idiosyncrasy after contact. Studies on human remains and the associated material culture in cemeteries show syncretic practices. This is in some cases evidenced by the use of metal artefacts from local and regional provenance, together with European manufactures most likely considered valuable goods, as offerings (e.g., Martinón-Torres et al. 2007). The continuity of traditional metallurgical techniques in colonial and recent times is of special interest to the understanding of Spanish impact on indigenous societies. The ethnographic

and historical work carried out by Rehren and his colleagues in the Poroco-Potosí region, Bolivian Andes, demonstrates that *huayrachinas* (small windblown furnaces) have been used for silver smelting over the last 500 years (e.g., Cohen et al. 2010). How different technological styles were articulated in Northwestern Argentina during colonial times was also discussed by Gluzman and González (2008). Studies conducted by Tapia and her team since the late 1990s on the procurement and use of exotic copper and iron artefacts by different indigenous groups of the Pampa region are also worth mentioning (e.g., Tapia et al. 2009). These cases exemplify how the study of metal remains from post-contact archaeological sites can contribute to anthropological discussions on technology and other social issues.

European Colonial Settlements

Different military, religious, industrial, and other European colonial sites were focus of historical archaeological research. In America, studies on fortified settlements (see below), religious reductions known as missions, mines, and slave villages and plantations, are worth mentioning. Everyday life, defensive strategies, changes in belief systems, labor organization, social differences, and re-signification of artefacts are among the wide repertory of research interests developed so far. Missions of different mendicant orders (e.g., Dominicans, Franciscans, and Jesuits) occupied an outstanding place in the colonial scenario during the seventeenth and eighteenth centuries. At their heyday, these urban centers included churches, schools, cloisters, cemeteries, houses for the indigenous people, and workshops. Several metal artefacts recovered from these installations, such as iron nails and other ironworks, have been analyzed by metallography and chemical analyses. Studies on archaeological remains from these and other historical sites, with focus on material quality and manufacturing processes, were conducted in Argentina by Pifferetti and his colleagues since the late 1990s. Data obtained helped to understand the processes of manufacture and use of ironworks in colonial missions (e.g., Pifferetti et al. 2009). The European exploitation of local mines during the colonial period has been studied by historians, archaeologists, and anthropologists for decades. Archaeometric approaches to the understanding of technical issues on mining, foundry, and metalworking processes have been developed over the last years by some researchers (e.g., Angiorama and Becerra 2017). Works on the production and circulation of silver and gold coins struck both in American and European mints between the sixteenth and eighteenth centuries, made from raw metals of Mesoamerican and South American sources, are of special value for numismatics and related fields (e.g., Le Roy Ladurie et al. 1990; see also investigations of Maria F. Guerra). These and other studies of copper pieces were mainly based on samples from museums' collections, even if metallurgical analyses have also been applied on archaeological coins from more recent times. For the understanding of the extractive activities developed in European colonial settlements, other nonmetallic associated materials, such as fire assay crucibles used for precious metals, were also subject to chemical and mineralogical analysis (e.g., Monette 2013).

Battlefields

Historical battlefields are nowadays one of the main topics within conflict archaeology in the USA. The research conducted during the 1980s on the Battle of the Little Bighorn (1876) was a milestone, and since the 1990s, the path was followed by other studies, first in the USA and later in Latin American countries such as Argentina, Brazil, Colombia, Cuba, and Mexico. These studies have contributed to the knowledge of battlefields' limits, warfare technology, troops' positions, and military tactics, among other issues, thus extending, detailing, and/or criticizing available data from documentary sources. As these brief events have often resulted in unicomponent sites, they are of special interest for the analysis of artefacts used at a very specific moment. On the other hand, since metal detectors are widely used for fieldwork, metal artefacts are common finds, mostly related with armament. Therefore, the technological assessment of artillery (e.g.,

cannons and ammunition), firearms (e.g., flintlock muskets, percussion smoothbores, breech-loading rifles, round balls and bullets, and casings), bladed weapons (e.g., sabers and knives), and also uniforms' accessories, mostly from nineteenth-century sites, has been well developed within this field. Data recovered from metallurgical analyses can help archaeologists to identify the remains belonging to different contenders, for instance, the ammunition used by the Federal and Confederate armies in American Civil War battles (Caporaso et al. 2008). Quality and provenance of iron for rifle barrels manufactured at the Springfield Armory at that time were also evaluated through metallurgical analyses of arms and contemporary iron from the Marshall's works in England (Gordon 1983). Works of this kind aided as well to the knowledge of industrial ferrous metallurgy in the USA (see below). On the other hand, evidence recovered from frontier warfare contexts is of special interest for studies on technological change, such as the process of modernization and standardization of the Argentinean army's armament during the second half of the nineteenth century (Leoni 2014). In addition, combining a morphometric approach with characterization analyses, technical specifications of different types of arms were determined. Extensive archaeometallurgical work with different artefacts from battlefields and other military sites has been carried out so far by some scholars (see Landa 2011). Nonetheless, and despite the potential of these studies for discussing technological issues, most research on metal remains is still based solely on typological classifications.

Fortifications and Other Installations

A wide range of permanent or temporary military sites at inland and coastal locations have been studied within historical archaeology. Along with battlefields, they constitute a remarkable data source for archaeological interpretations on past conflict. Different types of European fortified settlements are distributed across the continent, being South American sites worth to mention. Del Cairo Hurtado studied a Spanish coastal defense system at Cartagena de Indias, Colombia, focusing on the siege of the city by the British fleet under the command of Vice Admiral Edward Vernon in 1741 (e.g., del Cairo Hurtado 2011). Eighteenth-century forts and batteries that the Iberian Crowns established in Brazil and Uruguay to protect their territories were also studied by historians and archaeologists, Marcos Albuquerque among them, who examined their architectural characteristics and the settlers' daily practices. In Argentina, archaeological research has focused on several nineteenth-century forts and fortlets established in the Pampa region as part of the Buenos Aires government strategy to occupy and preserve the vast territory inhabited by Native American groups. As for material culture concerns, the weapons used at these fortifications have also been a central topic of study. Furthermore, new insight into the people who occupied these places was obtained by the analyses of uniform accessories, cooking utensils, tools, and other elements used in daily life. Procurement, use, reuse, and discard of artefacts within these sites, and their social implications for commissioned troops, are as well among the main subjects developed heretofore. Analyses of materials from the *Fortín* Otamendi (Buenos Aires, 1858–1869), *Fortín* Miñana (Buenos Aires, 1860–1863), and *Fortín* La Perra (La Pampa, 1883–1885) are also noteworthy (e.g., Tapia et al. 2007; Landa et al. 2009). Other artefacts recovered from different fortifications throughout America were also subject to characterization studies since the 2000s.

Urban Contexts and Industrial Facilities

Different central and peripheral urban areas and industrial facilities from the late eighteenth century onward were studied by archaeologists. Households, public buildings, factories and workshops, churches, cemeteries, detention centers, harbor structures, garbage dumps, and so on have been excavated. A plethora of materials related to diverse activities was recovered from these sites. And as well as in the earlier colonial establishments mentioned, metal remains are pervasive at these scenarios. Even if studies conducted so far on findings are mainly based on a

morphometric approach, specialists have also applied the available analytical means for their technological assessment. Gordon (1991) discussed technical issues related to the American crucible steelmaking process, introduced from England during early 1860s. The various uses of industrial iron and steel products also were considered by a few scholars. The contribution of Elban and Goodway (2004) to knowledge of the technology of wire cables used for mid-nineteenth-century girders in the USA can be highlighted. Despite the undoubted significance of these and other investigations for industrial and engineering history, they are mostly focused on specific features of isolated artefacts and usually neglect their value for the discussion of major archaeological problems. Interdisciplinary and diachronic studies such as that conducted by Unglik (1990) at the ironworks of Saint-Maurice, Quebec, are still scarce. Artefacts recovered from this place by Canadian Parks Service were mostly produced in a charcoal blast furnace using high-phosphorus iron ores and show different microstructures: gray, white, and mottled cast iron. Structure and composition variability of analyzed materials were associated with four occupational periods of the site, thus contributing to understand the technological changes developed there between 1667 and 1883. Research developed at a site belonging to the once San José de Flores settlement, nowadays a district of the City of Buenos Aires, is also worth to mention. There, evidence of thermoalteration was recognized in over 90% of a sample of iron artefacts recovered. This, along with the study of nonmetallic remains, allowed archaeologists to demonstrate that this place was a dumpster where garbage was burnt until the early twentieth century (Frustaci et al. 2011). It is also worth to mention recent works developed by Carlos Landa and his team on a rural village of about 500 inhabitants and on several posts of the Pampa region. The archaeometallurgical studies of a wide variety of remains from these sites supplied information about utensils, tools, and weapons used by the first people who settled in the region at the beginning of the twentieth century.

Shipwrecks

Watercraft technology associated with both Native American maritime and riverine activities, and European sailing to and from the Americas territories, has been addressed by maritime and nautical archaeologists. Archaeological researches on historical sites have been conducted by North American scholars since the late 1960s, mainly in Canada and the USA, while investigations in southern countries begs to be developed about 25 years later. Metallic elements found at wooden shipwrecks were subjected to different physical and chemical analyses since early 2000s. Remains of iron- and steel-hulled ships have not been dealt with until very recently, with the exception of the comprehensive investigation and preservation developed by Paul Mardikian and other conservation scientists on the hull of the American Civil War submarine *H.L. Hunley*, 1864 (e.g., González-Pereyra et al. 2010). Analyses conducted by Jones on the copper sheathing and tacks recovered from the Mica shipwreck, a nineteenth-century deepwater site located in the Gulf of Mexico, as well as on samples from other shipwrecks of the period, are also worth mentioning (Jones 2004). Further studies were performed on other historical sites, but they focused on very punctual samples and were merely descriptive. Within Latin America, extensive work has been done in Argentina. Metal artefacts recovered from the British sloop-of-war HMS *Swift* (1770), lost off Puerto Deseado, Santa Cruz, and from a late eighteenth-century Spanish merchant ship located in the city of Buenos Aires were studied during several years. Furthermore, several specific studies were done in other sites from the seventeenth to twentieth centuries (see Ciarlo 2015, for an account of these investigations). Moreover, much work has been carried out in this country with metal samples from shipwrecks located in Spain, such as the French warships *Fougueux* (1805) and *Bucentaure* (1805), the Spanish warships *Triunfante* (1795), and a British transport known as Deltebre I (1813) site (e.g., Ciarlo 2016). In recent years, analyses of this kind were introduced for the study of historical shipwrecks in Chile and Mexico, but there are still few published reports. These studies

have been performed on pieces such as hull fastenings and sheathing plates, to determine the manufacturing processes and materials' composition. In occasions, for which usable data on industrial patents and other documentary sources were available, the results obtained served as supplementary information to date and assess the provenance of the remains.

Future Directions

Metal remains are nearly ubiquitous in historical sites, and the potential for their study is clearly reflected in the results attained so far. These remains have proven valuable for our understanding of post-Columbian Native American and European societies. To predict the future of archaeometallurgical studies is, nonetheless, a risky endeavor. Archaeometallurgical studies on historical sites show a heterogeneous development nowadays, so no evident trend can be recognized. While considerable research has been conducted in certain sites, with emphasis on specific topics and materials, there is still a noticeable void in numerous others. As Pollard and Bray (2007) pointed out for archaeometry, strengthening existing interdisciplinary links and creating new ones on the basis of a genuine communication, shared objectives, and mutual academic respect will certainly be helpful for further developments in this field. The isolation of researchers, within and beyond archaeology, has resulted in nothing but theoretical-methodological stagnancy and misinterpretations. Both synthesizing data – not only from several sites but of different kinds of material evidence, also – and deepening discussions grounded on anthropological and sociological theory are fruitful paths to improve our understanding of metallurgy and the role it played in post-Colombian societies. This will certainly depend on whether scholars decide to embrace a still more essential approach: in archaeometallurgy, characterization analyses and interpretation of data should seek from the very start to answer archaeological questions. Ultimately, the latter will rely on the efficient integration of specialists throughout the whole research process. Current prospects include a wide compass of exciting research subjects, ranging from the ways of procurement and creative uses of foreign technologies by Native American peoples to the characteristics of blacksmith workshops and the emergence of local iron and steel industries. Even if the first steps have already been taken in this direction, archaeometallurgical studies on historical sites in the Americas should certainly be further explored.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Battlefield Archaeology
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historical Archaeology in Latin America
- ▶ Industrial Archaeology
- ▶ Metal Detecting in Archaeology
- ▶ Metallurgy
- ▶ Mission Archaeology in North America
- ▶ Modern World: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Urban Archaeology

References

Angiorama, C.I., and M.F. Becerra. 2017. Reverberatory furnaces in the Puna of Jujuy, Argentina, during colonial times (from the end of the 16th to the beginning of the 19th century A.D.). *Journal of Anthropological Archaeology* 48: 181–192.

Bayley, J., D. Crossley, and M. Ponting, eds. 2008. *Metals and metalworking: A research framework for archaeometallurgy*, HMS occasional publication 6. London: Historical Metallurgy Society. http://histmet.org/specpubs.html. Accessed 5 May 2017.

Caporaso, A.L., C.G. Carlson-Drexler, and J. Masters. 2008. Metallurgical analysis of shell and case shot artillery from the civil war battles of pea ridge and Wilson's creek. *Technical Briefs in Historical Archaeology* 3: 15–24.

Ciarlo, N.C. 2015. Arqueometalurgia de naufragios históricos en Argentina: estado de la cuestión y

perspectivas futuras. *Intersecciones en Antropología* 16: 161–178.

Ciarlo, N.C. 2016. Innovación tecnológica y conflicto naval en Europa Occidental, 1751–1815: aportes arqueológicos e históricos al conocimiento de la metalurgia y sus aplicaciones en los barcos de guerra. Unpublished Ph.D. dissertation, University of Buenos Aires.

Cohen, C.R., M. Van Buren, B. Mills, and T. Rehren. 2010. Current silver smelting in the Bolivian Andes: A review of the technology employed. *Historical Metallurgy* 44 (2): 153–162.

Cooke, C.A., M.B. Abbott, and A.P. Wolfe. 2008. Metallurgy in Southern South America. In *Encyclopaedia of the history of science, technology, and medicine in non-western cultures*, ed. H. Selin, 1658–1662. Dordrecht: Springer.

del Cairo Hurtado, C. 2011. Tácticas defensivas y tácticas ofensivas: Arqueología de una batalla en la Isla de Tierra Bomba, Cartagena de Indias, siglo XVIII. *Revista de Arqueología Histórica Argentina y Latinoamericana* 5: 11–34.

Ehrhardt, K.L. 2005. *European metals in native hands: Rethinking technological change, 1640–1683*. Tuscaloosa: University of Alabama Press.

Elban, W.L., and M. Goodway. 2004. Metallurgical investigation of an iron cable wire in a gries-gendell (severson) girder. *APT Bulletin: The Journal of Preservation Technology* 35 (2/3): 17–26.

Frustaci, J.L., H.D.E. Rosa, M.F. Caretti, and M.C. Lucchetta. 2011. Análisis de termoalteración de un conjunto de clavos de un sitio arqueológico del barrio porteño de Floresta. In *La arqueometría en Argentina y Latinoamérica*, ed. S. Bertolino, G.R. Cattaneo, and A.D. Izeta, 279–282. Cordoba: National University of Cordoba.

Gayle, M., D.W. Look, and J.G. Waite. 1992. *Metals in America's historic buildings*. Washington, DC: National Park Service.

Gluzman, G.A., and L. González. 2008. El contacto hispano-indígena a través de la metalurgia del antiguo noroeste de Argentina. In *Actas del VII Congreso Ibérico de Arqueometría*, ed. S. Rovira Llorens, M. García-Heras, M. Gener Moret, and I. Montero Ruiz, 522–530. Madrid: Quadro. http://humanidades.cchs.csic.es/ih/congreso_iberico/VII%20CIA.pdf. Accessed 5 May 2017.

González, L.R. 2004. *Bronces sin nombre*. Buenos Aires: Fundación CEPPA.

González-Pereyra, N., T. Brocard, S.A. Cretté, P. de Viviés, M.J. Drews, and P. Mardikian. 2010. The use of subcritical fluids for the stabilization of concreted iron artifacts. In *Metal 2010. Proceedings of the interim meeting of the International Council of Museums Committee for Conservation (ICOM-CC) Metal Working Group*, ed. P. Mardikian, C. Chemello, C. Watters, and P. Hull, 21–30. Charleston: Clemson University.

Gordon, R.B. 1983. English iron for American arms: Laboratory evidence on the iron used at the Springfield Armoury in 1860. *Historical Metallurgy* 17: 91–98.

Gordon, R.B. 1991. The origins of early american crucible steelmaking: Little competition to the sheffield masters. *JOM* 43 (2): 36–39.

Hancock, R.G.V., L.A. Pavlish, R.M. Farquhar, R. Salloum, W.A. Fox, and G.C. Wilson. 1991. Distinguishing European trade copper and northeastern North American native copper. *Archaeometry* 33: 69–86.

Jones, T.N. 2004. The Mica shipwreck: Deepwater nautical archaeology in the Gulf of Mexico. Unpublished M.A. dissertation, Texas A&M University. https://anthropology.tamu.edu/wp-content/uploads/sites/11/2016/07/Jones-MA2004.pdf. Accessed 5 May 2017.

Killick, D., and T. Fenn. 2012. Archaeometallurgy: The study of preindustrial mining and metallurgy. *Annual Review of Anthropology* 41: 559–575.

Landa, C. 2011. *Fierros Fronterizos. Los materiales de metal como indicadores de identidad y diferenciación social en la Frontera del sur (1776–1885)*. Madrid: Editorial Académica Española.

Landa, C., E. Montanari, F. Gómez Romero, H. de Rosa, N.C. Ciarlo, and I. Clemente Conte. 2009. Not only were spears and *facones* (big knives). Fire guns in Fortlet Otamendi (1858–1869). *Journal of Conflict Archaeology* 5 (1): 183–200.

le Roy Ladurie, E., J.-N. Barrandon, B. Collin, M. Guerra, and C. Morrisson. 1990. Sur les traces de l'argent du Potosí. *Annales Économies, Sociétés Civilisations* 45 (2): 483–505.

Leoni, J.B. 2014. Obsolete muskets, lethal remingtons: Heterogeneity and firepower in weapons of the frontier war, Argentina, 1869–1877. *Journal of Conflict Archaeology* 9 (2): 93–115.

Lycett, M.T., and N. Thomas. 2008. Metallurgy: Pueblo Indian adaptations of Spanish metallurgy. In *Encyclopaedia of the history of science, technology, and medicine in non-western cultures*, ed. H. Selin, 1651–1658. Dordrecht: Kluwer Academic Publishers.

Martinón-Torres, M., and D. Killick. 2013. Archaeological theories and archaeological sciences. In *The Oxford handbook of archaeological theory*, ed. A. Gardner, M. Lake, and U. Sommer. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199567942.013.004.

Martinón-Torres, M., R. Valcárcel Rojas, J. Cooper, and T. Rehren. 2007. Metals, microanalysis and meaning: A study of metal objects excavated from the indigenous cemetery of El Chorro de Maíta, Cuba. *Journal of Archaeological Science* 34 (2): 194–204.

Monette, Y. 2013. Ore testing at the first permanent French settlement in America, 1541–1543. Searching for the origins of fire assay crucibles used at Charlesbourg-Royal (Québec, Canada). *Applied Clay Science* 82: 91–100.

Pifferetti, A.A., C. Martignoni, L. Nosei, N.E. Walsöe de Reca, and G.E. Lascalea. 2009. Estudio y

A

caracterización de materiales metálicos de la reducción jesuítica Santa Ana, Misiones. In *Aproximaciones a la Reducción de Santa Ana y su contexto –ARSA–Misiones-Argentina*, ed. R.A. Poujade, 269–280. Posadas: Universidad Nacional de Misiones.

Pollard, A.M., and P. Bray. 2007. A bicycle made for two? The integration of scientific techniques into archaeological interpretation. *Annual Review of Anthropology* 36: 245–259.

Rehren, T., and P. Belford. 2013. The future of archaeometallurgy and historical archaeology. *The Crucible* 83: 6–7.

Rehren, T., and E. Pernicka. 2008. Coins, artefacts and isotopes – Archaeometallurgy and archaeometry. *Archaeometry* 50: 232–248.

Roberts, B.W., and C.P. Thornton, eds. 2014. *Archaeometallurgy in global perspective*. New York: Springer.

Simmons, S., and A. Shugar, eds. 2013. *Archaeometallurgy in Mesoamerica: Current approaches and new perspectives*. Boulder: University Press of Colorado.

Tapia, A.H., H. de Rosa, C. Landa, and E. Montanari. 2007. Preguntas arqueológicas y respuestas metalográficas. Artefactos de metal del Fortín La Perra (1883–1885). In *Metodologías científicas aplicadas al estudio de los bienes culturales*, ed. A. Pifferetti and R. Bolmaro, 51–58. Rosario: Humanidades y Artes Ediciones.

Tapia, A.H., C. Landa, H. de Rosa, and E. Montanari. 2009. Artefactos metálicos de las inhumaciones del Cementerio Indígena de Baradero. In *Arqueometría Latinoamericana*, ed. O.M. Palacios, C. Vázquez, T.A. Palacios, and E. Cabanillas, vol. 1, 263–269. Buenos Aires: National Atomic Energy Commission.

Unglik, H. 1990. *Cast irons from les Forges du Saint-Maurice, Quebec: A metallurgical study*, Studies in archaeology, architecture and history. Ottawa: Parks Service, Environment Canada.

Wayman, M.L., R.R. Smith, C.G. Hickey, and M.J.M. Duke. 1985. The analysis of copper artifacts of the copper inuit. *Journal of Archaeological Science* 12: 361–375.

Further Reading

Arano, D., Y. Espinosa-Morales, H. Barba, L. Jiménez, J.L. Ruvalcaba, and J. González-Sánchez. 2015. Metalurgia y degradación en clavos de aleación Cu/Zn que formaron parte de la estructura de un barco del siglo XIX. El caso del naufragio "El Tejas" en las costas de Quintana Roo, México. In *MetalEspaña 2015: Proceedings of the II Congreso de Conservación y Restauración del Patrimonio Metálico*, ed. E. Cano and J. Barrio, 73–83. Segovia: Real Casa de Moneda.

Hernandez, M., M. Hernandez-Escampa, C. Abreu, J. Uruchurtu, M. Bethencourt, and A. Covelo. 2016. Characterization of a historical cannonball from the fortress of San Juan de Ulúa exposed to a marine environment. *Archaeometry* 58 (4): 610–623.

Lleras Pérez, R. (dir.) 2007. *Metalurgia en la América antigua. Teoría, arqueología, simbología y tecnología de los metales prehispánicos* (Travaux de l'Institut français d'études andines 253). Bogota: Fundación de Investigaciones Arqueológicas Nacionales & Banco de la República.

Maldonado, B., and T. Rehren. 2012. El Desarrollo de la Minería y Metalurgia de Cobre en los Andes Sur Centrales, desde sus Raíces Precolombinas hasta Tiempos Modernos. In *Tesoros de los Andes. El Cobre Chileno para el Mundo*, ed. R. Slotta and I. Schnepel, 235–244. Bochum: Deutsches Bergbau-Museum.

Orser, C.E., ed. 2002. *Encyclopedia of historical archaeology*. New York: Routledge.

Pavlish, L.A., R.G.V. Hancock, and B. Ross. 2004. Instrumental neutron activation analysis of copper-rich samples from the Bead Hill site, Ontario, Canada. *Historical Metallurgy* 38 (2): 106–112.

Pichipil, M., H. de Rosa, C. Landa, and E. Montanari. 2012. Remington rifle brass cartridges: Witnesses of an age. *Procedia Materials Science* 1: 659–665.

Scott, D.A. 1991. *Metallography and microstructure in ancient and historic metals*. Marina del Rey: Getty Conservation Institute. http://www.getty.edu/conservation/publications_resources/pdf_publications/pdf/metallography.pdf. Accessed 5 May 2017.

Thomas, N.H. 2018. *Seventeenth-century metallurgy on the Spanish colonial frontier: Pueblo and Spanish interactions*, Anthropological papers of the University of Arizona, no. 79. Tucson: The University of Arizona Press.

Archaeometry Laboratory at the University of Missouri Research Reactor (MURR)

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Basic Information

The Archaeometry Laboratory at the University of Missouri Research Reactor (MURR) supports collaborative research on archaeological materials to answer questions about past human behavior (http://archaeometry.missouri.edu). Using information from trace-element and/or isotopic characterization of artifacts, raw materials, and human remains, the Archaeometry Lab at MURR works

with archaeologists to investigate resource utilization, trade and exchange, human migration, and environmental adaptation. The laboratory was established in 1988 with support from the National Science Foundation and the University of Missouri (Glascock et al. 2007).

Major Impact

The well-equipped Archaeometry Lab is one of the few laboratories in the world dedicated to performing this type of research and is unique for having these powerful analytical methods under one roof. The main analytical capabilities available in the Archaeometry Lab at MURR include:

- Neutron activation analysis (NAA) – The 10 MW Research Reactor is the largest university-owned research reactor in the world. MURR has the highest possible sensitivities for NAA, especially useful for bulk analysis of pottery, obsidian and other artifact types requiring minimal sample preparation.
- X-ray fluorescence (XRF) – Table top and portable XRF spectrometers enable nondestructive surface analysis of materials such as obsidian, metals, glazes, and paints.
- Inductively coupled plasma-mass spectrometry (ICP-MS) – Three spectrometers (i.e., quadrupole, high-resolution, and multi-collector) and associated equipment (i.e., laser ablation and microwave) provide the highest possible sensitivities by ICP-MS for trace elements and isotope ratios in a wide variety of artifact types.
- Petrography – A petrographic microscope enables the identification of minerals present in thin-sections of ceramic materials.

Laboratory personnel are highly trained and have several years of experience in collaborating on compositional analysis with the archaeological community. Laboratory personnel include the following professional scientists:

- Dr. Michael D. Glascock (Ph.D., 1975, Iowa State University) is a Research Professor and the Group Leader of the Archaeometry Lab with more than 35 years of experience with NAA and gamma-ray spectroscopy as applied to archaeology, geochemistry and environmental science. His research focus is on obsidian source and artifact characterization in Mesoamerica, South America, and the Russian Far East.
- Dr. Jeffery R. Ferguson (Ph.D., 2007, University of Colorado) is a Research Assistant Professor in the Archaeometry Lab. His research focus is on the archaeology of western and southwestern North America.
- Mr. Matthew T. Boulanger (M.A., 2009, University of Missouri; current Ph.D. candidate) is a Research Specialist in the Archaeometry Lab. His research focus is on the archaeology of eastern North America, landscape ecology, and geographic information systems applied to archaeology.

The Archaeometry Lab's scientists are supported by several skilled technicians most of whom are undergraduates at the University of Missouri. The student technicians perform sample preparation, collect analytical data, and archival of artifacts. They are also frequently involved in various aspects of data interpretation and report writing as part of their educational and research experience. The experiences gained by the undergraduate students who work for the Archaeometry Lab make them well prepared to perform graduate research in archaeology in the future.

The laboratory encourages short-term visits by graduate students and faculty from other universities who are collaborating with the Archaeometry Lab. The laboratory provides training in the preparation of artifacts for chemical analysis, offers recommendations regarding the selection of appropriate samples, gives guidance in selecting the appropriate trace-element and isotopic methods, and provides instruction in the application of multivariate statistical methods for data interpretation.

Customized software developed by the Archaeometry Lab for interpretation of

compositional data on artifacts and source materials is available. The Archaeometry Lab software performs many of the multivariate statistical operations commonly employed to interpret large multivariate datasets, including principal components analysis, canonical discriminant analysis, cluster analysis, Euclidean distance calculations, Mahalanobis distance calculations, missing value replacement, bivariate and trivariate plotting, and compositional profile plots. The software is distributed from the Archaeometry Lab webpages at no cost to the user.

Since 1988, the Archaeometry Laboratory at MURR has collaborated on hundreds of research projects ranging in size from one sample to 2,000 samples. The total database of analyzed archaeological samples numbers more than 110,000 specimens. Approximately 70% of the samples are ceramics and clays; 25% are obsidian artifacts and source specimens; and the remaining 5% are chert, basalt, limestone, metals, etc. The database enables many collections of artifacts, both small and large, to be traced to specific locations around the world. In recent years, more than compositional data 6,000 samples per year have been added to the compositional database. These data are continually added to our website and are available for download after publication by the principal investigator.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Neutron Activation Analysis (NAA): Applications in Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Glascock, M.D., R.J. Speakman, and H. Neff. 2007. Archaeometry at the University of Missouri Research Reactor and the provenance of obsidian artefacts in North America. *Archaeometry* 49: 343–357.

Archaeometry: Definition

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Brief Definition of the Topic

Archaeometry (*syn*. archaeological science) is a formal field of study whose practitioners apply techniques and approaches from the physical, material, chemical, biological, and Earth sciences and engineering to address archaeological questions and problems. Together, the sciences provide archaeology with empirical and systematic ways of collecting, analyzing, synthesizing, and interpreting data related to the inorganic and organic material record of human history. Investigations involve both instrumental and non-instrumental approaches and target materials research (e.g., properties of substances and their constituents) as well as chemical and biological substances and residues, from the molecular scale all the way up to macroscopically observable artifacts and ecofacts. Applications of archaeometry take place in field, lab, and museum settings and include a wide array of topics, such as radiocarbon dating, provenance of ceramics, stone tool production and use, properties of metals, diet and health in ancient populations, geophysical prospection, soil chemical residues, computer and statistical modeling, and the conservation of archaeological objects and historical monuments. Archaeometric techniques are fundamentally important to archaeological research, because they reveal the varied ways in which humans engage the material world and the range of Earth processes that are involved in this relationship – from the production, use, and modification of natural and synthetic materials to their ultimate deposition in the archaeological record, the cultural and natural processes that impact them until they are recovered by archaeologists, and their long-term care and conservation.

In the early 1950s, Christopher Hawkes at Oxford coined the term *archaeometry* to

characterize the growing emphasis of absolute dating, physicochemical analysis, and quantification in archaeology. By the late 1950s, an international journal, *Archaeometry*, was established, followed in 1961 by the first annual scientific meetings of the International Symposium on Archaeometry. That same year, Martin Aiken (1961) and Karl Butzer (1964) produced some of the first textbooks on the subject. In the 1970s, archaeometric research accelerated around the world, with an important textbook by Michael Tite (1972); a new international journal in 1974, *Journal of Archaeological Science*; and the creation of the Society for Archaeological Sciences in 1977. Today, the field is as vibrant as ever, with occasional edited volumes in the long-standing *Archaeological Chemistry* series from the American Chemical Society (since 1974) and the *Materials Issues in Art and Archaeology* series from the Materials Research Society (since 1988), many new textbooks (e.g., Brothwell and Pollard 2001; Edwards and Vandenabeele 2012; Goldberg and Macphail 2006; Larsen 2015; Malainey 2011; Pollard and Heron 2008; Price and Burton 2012; Rice 2015; Stuart 2007), and three new journals, *Journal of Archaeological Science: Reports*, *Archaeological and Anthropological Sciences*, and *STAR: Science and Technology of Archaeological Research*.

Cross-References

- ▶ Aitken, Martin
- ▶ Archaeological Chemistry: Definition
- ▶ Biomolecular Archaeology: Definition
- ▶ Butzer, Karl W.
- ▶ International Symposium on Archaeometry
- ▶ Society for Archaeological Sciences (SAS)

References

Aitken, M.J. 1961. *Physics and archaeology*. New York: Interscience Publishers.

Brothwell, D.R., and A.M. Pollard, eds. 2001. *Handbook of archaeological sciences*. Chichester: Wiley.

Butzer, K.W. 1964. *Environment and archaeology: An ecological approach to prehistory*. Chicago: Aldine Press.

Edwards, H., and P. Vandenabeele, eds. 2012. *Analytical archaeometry: Selected topics*. Cambridge, UK: The Royal Society of Chemistry.

Goldberg, P., and R.I. Macphail. 2006. *Practical and theoretical geoarchaeology*. Malden: Blackwell.

Larsen, C.S. 2015. *Bioarchaeology: Interpreting behavior from the human skeleton*. 2nd ed. Cambridge, UK: Cambridge University Press.

Malainey, M.E. 2011. *A consumer's guide to archaeological science: Analytical techniques*. New York: Springer.

Pollard, A.M., and C. Heron. 2008. *Archaeological chemistry*. 2nd ed. Cambridge, UK: The Royal Society of Chemistry.

Price, T.D., and J.H. Burton. 2012. *An introduction to archaeological chemistry*. New York: Springer.

Rice, P.M. 2015. *Pottery analysis: A sourcebook*. 2nd ed. Chicago: University of Chicago Press.

Stuart, B. 2007. *Analytical techniques in materials conservation*. Chichester: Wiley.

Tite, M.S. 1972. *Methods of physical examination in archaeology*. London: Seminar Press.

Further Readings

Buikstra, J.E., and L.A. Beck, eds. 2006. *Bioarchaeology: The contextual study of human remains*. Burlington: Academic.

Ciliberto, E., and G. Spoto, eds. 2000. *Modern analytical methods in art and archaeology*. New York: Wiley.

Henderson, J. 2000. *The science and archaeology of materials: An investigation of inorganic materials*. London: Routledge.

Killick, D. 2015. The awkward adolescence of archaeological science. *Journal of Archaeological Science* 56: 242–247.

Killick, D., and S.M.M. Young. 1997. Archaeology and archaeometry: From casual dating to a meaningful relationship? *Antiquity* 71: 518–524.

Lambert, J.B. 1997. *Traces of the past: Unraveling the secrets of archaeology through chemistry*. Reading: Addison-Wesley.

Rapp, G., Jr., and C.L. Hill. 1998. *Geoarchaeology*. New Haven: Yale University Press.

Taylor, E.R., and M.J. Aiken, eds. 1997. *Chronometric dating in archaeology*. New York: Plenum Press.

Tite, M.S. 1991. Archaeological science – past achievements and future prospects. *Archaeometry* 33: 139–151.

Trigger, B.G. 1988. Archaeology's relations with the physical and biological sciences: A historical review. In *Proceedings of the 26th international Archaeometry symposium*, ed. R.M. Farquhar, R.G.V. Hancock, and L.A. Pavlish, 1–9. Toronto: University of Toronto.

Archaeoparasitology

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Introduction

Parasites are a major cause of morbidity and mortality in the world today. Parasites are organisms that live in or on other organisms called hosts, obtaining sustenance and shelter from their hosts to carry out reproduction in host tissues and structures. Taxonomic diversity characterizes parasites, and they include a wide range of organisms ranging from single-celled protozoa to arthropods such as fleas. There are two general types of parasites: ectoparasites such as lice and endoparasites such as intestinal worms. The maladies provoked by parasites include malaria, elephantiasis, kala-azar, sleeping sickness, river blindness, dysentery, crabs, and guinea worm disease. These diseases, some commonplace and some exotic, were and are significant threats, especially for peoples whose social complexity did not include effective sanitation, hygiene, and germ theory awareness.

Past infection patterns were defined by human behaviors and environmental conditions. Archaeoparasitology explores these relationships. Researchers depend on archaeological data concerning subsistence, medicines, community size, water sources, social complexity, environment, trade patterns, and many other lines of archaeological investigation. Researchers are also familiar with principles of parasite ecology as applied to complex parasite life cycles. The archaeological questions that can be addressed are varied in scope. The longest application has been to broad based study of the large-scale cultural developments on infection and disease. There has been long-term interest in how the transition to agriculture, development of complex societies, and the evolution of empires affected parasitism. These issues were address by population studies of many sites across long periods of time. On the most restricted scale, archaeoparasitological analysis applied to a single burial or mummy can show infection intensity and medicinal response to symptoms of infection (Reinhard and Araújo 2012).

The success of the methods relates to the fecundity of parasites. Parasites produce thousands of larvae, cysts, or eggs. In archaeological contexts, even when the structures of cysts and eggs fully decompose, antigens and DNA can be diagnosed in the lab. Thus, archaeoparasitology is methodologically diverse. It is common now to see molecular biology (aDNA analysis), immunology (ELISA), louse quantification, and quantification of worm burden presented in the literature. Through this multidisciplinary approach, all types of parasites can be found. Gross pathology, as seen in mummies and skeletons, is another source of data.

Archaeoparasitologists use a diversity of concepts and theories in their work. The basic archaeological principles of association, context, features, dating, and stratigraphy. For any given region, reliance on archaeological assessment of cultural development, subsistence, and technology is needed. A wealth of theoretical perspectives has been generated by parasitology. The combination of parasitological theory and archaeological principles/assessments can be used to generate testable hypotheses. This emerging area is called pathoecology (Martinson et al. 2003; Reinhard and Araújo 2012). This review details some of these developments.

Pathoecology assesses infection risk based on an analysis of species of parasites diagnosed in a specific region and time. The health risk of infection is assessed with a knowledge of nutrition and behavior. The focus of pathoecology is on discovery of where parasite transmission took place. Field archaeology has a goal of identifying specific behavior features in sites and regions.

Archaeoparasitologists assess the infection potential of features that were conducive for parasite transmission. From the parasitological perspective, the nidus concept can to be applied to assessing transmission potential of features (Reinhard and Araújo 2012; Reinhard and Bryant 2008; Slepchenko and Reinhard 2018). Yevgeny Pavlovsky was a Russian parasitologist who developed the model of any given parasite infection being dependent on the overlap of parasite and host in a geographical space that favors transmission (Slepchenko and Reinhard 2018). The nidus is this space. From the archaeoparasitological perspective, this space can be as finite as a kissing bug infested room feature that enclosed dog and human susceptible hosts. Within this nidus, the nocturnal kissing bugs were the transmission vector for the parasite *Trypanosoma cruzi* which can cause American sleeping sickness, also Chagas disease. The sleeping dogs and humans became infected by the feeding of the bugs. In contrast, the nidus can be much larger. In prehistoric and historic times, people in Peru experienced susceptibility to leishmaniasis, a disfiguring disease that affects the nasal mucosa (Martinson et al. 2003). The *Leishmania* protozoa were transferred by sandfly vectors. The weak-flying sandflies are active at dusk in still-air environments such as forests and are active around animal burrows. Therefore, the nidus for infection can be as large as a forest in which people were carrying out late day activities. Several parasites were normally infecting the same population. Because the life cycles of the parasites are known, the overlapping nidi of several parasites can be deduced. Therefore, the nidi and risk behaviors of the populations can be inferred and compared as shown for Andean peoples and ancestral Pueblos (Reinhard and Araújo 2012; Reinhard and Bryant 2008). Thus, pathoecology is based on application of the nidus concept and can explain infection patterns for remote times and places.

Parasite pathoecology can be applied at very large scales to explore parasite patterns between continents. This has been done to understand differences in fecal-born parasitism, also called filth-borne infection. Decades of research has shown that filth-borne parasitism was extraordinarily common in Europe, from the origins of agriculture onward. Paradoxically, these parasites were well controlled in the prehistoric Americas. Archaeologically, the most common filth borne parasites are evinced by the long-lasting eggs of *Ascaris lumbricoides* and *Trichuris trichiura*. Reinhard and Pucu (2014) defined these patterns and explained the behaviors behind this contrast. Behaviors in Europe promoted infection. These included use of feces as fertilizer, unconfined disposal of excrement, poor personal hygiene, and crowding. Therefore, Europeans established nidi for transmission in water sources, gardens, streets, and other localities. It is likely that the humoral concept, the basis of European medicine, exacerbated the problem by failure to recognized contagion as an infection source. Prehistoric American populations had a number of behaviors that reduced exposure to filth. Population centers were less crowded than Europe. Many anthelminthic medical therapies were known. Sanitation systems restricted fecal contamination. There may have been a perception of infection causality. Agricultural practices limited pathogen transmission. Therefore, nidi for filth borne transmission were not established in American prehistoric societies. High fiber diet led to spontaneous clearance of worm infections (Reinhard and Pucu 2014). Therefore, from finite spaces in archaeological sites to large-scale comparisons, the nidus concept and pathoecology are very useful in understanding different trajectories of parasite-human associations.

Another large region with a unique history of parasitism is central Russia (Slepchenko and Reinhard 2018). Russia, the home of Yevgeny Pavlovsky who innovated the nidus concept, has a long history of parasitological investigation of archaeological sites. Burials and mummies are the foci of analysis (Figs. 1 and 2). Unlike the Europe, and similar to the prehistoric Americas, filth-borne worm infections were rare among central and western Russian indigenous people. Instead, people in this region were infected by parasites transmitted by consumption of animal products. In a parallel way, their dogs were also infected with fish borne parasites. Indeed, the first

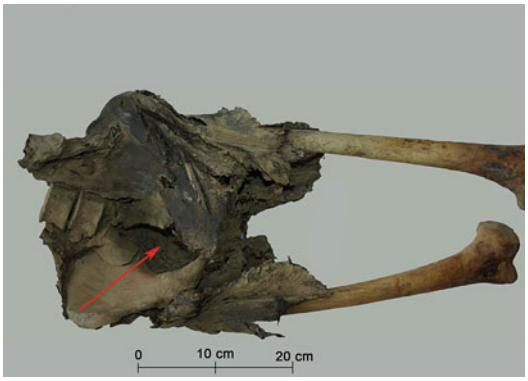

Archaeoparasitology, Fig. 1 A partial mummy analyzed from the Doge-Bary II burial ground were carried out in 1990–1998 by the Central-Asian expedition led by K.V. Chugunov. This is the only Russian mummy which was positive for whipworm eggs. The arrow indicates the area sampled (Slavinsky et al. 2018)

Archaeoparasitology, Fig. 2 A burial sampled from at Neftprovod II was excavated and sampled. (**a**) The location where the sediment sample was collected for the paleoparasitological analysis; (**b**) the location where the control soil sample was collected; (**c**) the arrow indicates the direction of north

archaeoparasitological studies in the region focused on dog coprolites. This evidence dated to the Neolithic and Mesolithic of the area of Moscow. The sites belong to Lyalovskaya and Verkhnevolzhskaya archaeological cultures. The samples revealed eggs of the tapeworms *Diphyllobothrium* sp., *Spirometra* sp., the nematodes *Dioctophyme renale,* Capillariidae*,* and the flukes *Alaria alata*, and *Opisthorchis felineus* (Slepchenko and Reinhard 2018). Of these parasites, the *Diphyllobothrium* fish tapeworm and the fluke *Opisthorchis felineus* infect humans. These cases result in the passage of eggs by human hosts. Pathology is caused by *O. felineus* in humans when it invades the biliary and pancreatic ducts. *Spirometra* sp. and *Dioctophyme renale* cause disease in humans. In the case of *Spirometra* sp., the parasite larvae migrate under the skin of humans forming nodules. A more severe disease, sparganosis, occurs if the larvae migrate to the brain or eyes. The kidney worm *D. renal* in humans occurs when the worms migrate to a kidney and reduces that kidney's function. Infections involved just one kidney, but the symptoms of infection can be severe or even fatal. From other parts of Russia, *O. felineus* in dog coprolites were diagnosed. These were from the Bronze and Iron Age site of Maray I in the forest-steppe zone of Western Siberia and the Yarte VI of the lower Yuribey river, Yamal Peninsula. *Strongyloides papillosus* was also found in Maray I. The seventeenth-century period of the Siberian Arctic city, Mangazeya, was analyzed with foci on dog coprolites and organic sediments. The parasites *O. felineus, Diphyllobothrium latum*, *Toxocara canis*, and *Fasciola hepatica* were found in the samples. The sheep liver fluke, *F. hepatica*, infects both dogs and humans. Dogs are the normal host for *T. canis*. When larvae of this parasite hatch from their eggs in the human intestine, they migrate from the intestine to surrounding tissue and even the spinal cord and eye. Therefore, subsistence based on incompletely cooked fish, and association with dogs and their parasites, defined the pathoecology of this city. A series of analyses of burial grounds in western Siberia confirm human infection with parasites transmitted by eating fish. These include the cemeteries of Zeleny Yar, Kikki-Akki, Vesakoyaha II, Vesakoyaha IV, and Nyamboyto I (Slepchenko and Reinhard 2018). The sites date from as early as the twelfth century to as late as the nineteenth century. *Diphyllobothrium latum* and *O. felineus* were the most common parasites discovered. Interestingly,

Archaeoparasitology, Fig. 3 A pelvis sample from the Bronze Age Neftprovod II burial ground in East Siberia revealed the presence of *Taenia* sp. eggs. This showed that the individual likely consumed raw or undercooked meat of roe deer, red deer, or elk infected with *Taenia*

eggs consistent with the beef tapeworm, *Taenia saginata*, were found in the Vesakoyaha VI and Vesakoyaha VII burial grounds (Fig. 3). Ethnographic and experimental studies indicate that people could have become infected by eating reindeer brain. The existing data from this large region of Russia show a unique pattern of infection resulting from dog association and eating incompletely cooked fish and meat.

Archaeological parasitology focuses primarily on the diagnosis of parasites from data sources such as latrines, coprolites, mummies, and other organic contexts. Especially in the Americas, coprolites and mummies provided epidemiological data sources for analysis of parasite distributions. It is a goal of archaeoparasitology to develop sufficiently extensive and compelling data sets to present true epidemiological pictures of ancient human-parasite interactions. A large base of persuasive evidence will reveal the parasite-human ecology of ancient people who had very different lives than any modern peoples. To accomplish this, archaeoparasitologists must demonstrate that parasitological patterns typical of modern host populations can be discerned through extensive archaeological study. An axiom in parasitology is that a minority of hosts carries the majority of parasites. This is known as the negative binomial distribution. Once methods were developed to quantify the relative number of parasites represented in any given sample, then the presence or absence of the negative binomial can be assessed. Several studies of both ectoparasites and endoparasites showed that the negative binomial is evident in archaeological series (Camacho et al. 2018). The strongest of these is the analysis of coprolites from La Cueva de los Muertos Chiquitos, Rio Zape, Durango, Mexico (Morrow and Reinhard 2017). This analysis of 100 coprolites dating between 1200 and 1400 years old revealed an ancient endemic health challenge from the most ubiquitous worm parasite of humans, pinworm. Egg per gram of sample values demonstrated an overdispersed pattern of distribution among the samples (66% uninfected, 25% less than 100 eggs/g, 8% between 100–500 eggs/g, and 1% over 500 eggs/g). In this analysis, 10% of the samples contained the vast majority of parasite eggs. The demonstration of negative binomial distribution in archaeology is of crucial importance because archaeoparasitology has equivalent epidemiological strength as modern surveys of living populations. The negative binomial was previously shown for lice in ancient Peruvians (Reinhard and Buikstra 2003). The infection quantification of large archaeological populations is becoming a revolution in archaeological parasitology.

With large sample sizes, temporal and social parameters of infection can be discerned. The parasitological analysis of latrine features can provide the best evidence of parasite emergence and control related to sanitation. Trigg and her colleagues (2017) combined data amassed from New England historic sites by several researchers between 1986 and 2007. The data included analysis of 114 latrine features from seven cities dating between AD 1650 and 1900. The key methodological feature of this analysis is that all researchers used the same quantification technique to calculate the number of parasite eggs per milliliter of latrine sediment. Also, the authors focused on the most durable eggs produced by the filth-borne parasites, *A. lumbricoides* and *T. trichiura*. Because historic archaeologists

often have direct documentation as to the status, occupation, and even names of families who used latrines, socioeconomic information can be overlaid on the archaeoparasitological data. Using this extensive data set, the authors defined biological and cultural variables that shaped the pathoecology of developing cities. Control of these parasites was gradually achieved, beginning with *T. trichiura* and eventually with both parasites by the end of the nineteenth century. Environmental and behavioral factors affected this change. This included changing microenvironments linked to urbanization, innovation of sanitation, and reduced use of urban spaces for fecal disposal. Initially, poorer households were infected due use of feces-contaminated yard spaces for food gardens. Also the poor had a delayed access to sanitation. This study reflects the progress of archaeoparasitology in historic archaeology, a field that can provide extensive samples with known and documented cultural information.

Investigation of the range and genetic configuration of parasites across time and large geographic ranges provides insight into evolution of parasites after host switching events. Such studies have modified our understanding of the ancient origins of today's parasitic diseases. For example, decades of research into the origins of Chagas disease and *T. cruzi* involving all types of analysis changed our perception and knowledge based regarding this protozoan parasite as reviewed by Reinhard and Araùjo (2014). Through most of the twentieth century, parasitologists thought that *T. cruzi* first arose to infect human in the Andes when animals were domesticated, and agricultural villages developed. Guinea pigs and dogs are and were alternative hosts. Accordingly, when dogs, humans, and guinea pigs began to live in kissing bug-infested domiciles, then infection became common in humans. This process was called domiciliation. It was a surprise when, in 2003, evidence of infection predating animal domestication was discovered. Also, discoveries of infection were made well outside of the Andean geographic range. Molecular biology became an important tool in diagnosing infection in mummies. When DNA diagnosis was achieved for a large series of mummies, an exciting and detail history of *T. cruzi* in the Andes was published. Among hunter-gatherers, there was a host switch to humans on the part of *T. cruzi* some 9,000 years ago. Infection persisted until colonial times in. In later papers, molecular biologists were able to test for the six variants of *T. cruzi* DNA. It was shown that the oldest infections were with wild strains of *T. cruzi* and probably were provoked by oral ingestion of contaminated food. Three domiciled strains infected Andean populations after agriculture and animal domestication. More recently, the analysis of *T. cruzi* DNA strains in modern populations raised another question. Molecular biologists identified a unique *T. cruzi* DNA, TcIDOM. This variant causes a significant proportion of South American human infections. However, it is a wild strain in North/Central America. The researchers who made this discovery proposed a new hypothesis. They hypothesized that TcIDOM had an origin in North America in paleo times. It was spread into South America by ancient migrations. In the process, it became domiciled. They acknowledged some problems with this hypothesis; (1) hunter-gatherer population densities were not large enough to support a continuous domestic cycle and (2) early populations were inherently unsuitable for the transmission of TcIDOM genotype because the populations were small and dynamic. Reinhard and Araújo (2014) addressed this hypothesis by reviewing the archaeology of the Lower Pecos Canyonlands in Texas and Coahuila. The archaeology of this regions shows that the Archaic population was large and sedentary enough to maintain transmission at least by 5000 years ago. In this region, earth oven cooking technology altered the landscape and boosted the wild infection cycle between rodents and kissing bugs. Hunting the wild rodent hosts of *T. cruzi* resulted in kissing bugs infesting human sleeping areas. Therefore, *T. cruzi* potentially underwent a *defacto* domiciliation among Archaic peoples in North America. The lessons learned from decades of archaeoparasitology focused on *T. cruzi* entirely transformed the scientific understanding of the origins of Chagas disease. The original Andean domiciliation was too simplistic. Intense

molecular scrutiny brought to light a more multifaceted web of host switching events involving six parasite strains over two continents and alternate transmission through kissing bug feeding and also oral ingestion of infective agents.

On a more basic level, simple archaeological documentation of time and location of infection benefits the understanding of emergent diseases. Viral and bacterial emergent diseases are widely sensationalized today. However, archaeoparasitology shows that parasites emerged and reemerged throughout time. Kuchta and his colleagues (2015) described the health challenge of Pacific broad tapeworm infection, *Adenocephalus pacificus* through 6,000 years of prehistory in context of modern infection patterns. This parasite normally infects sea lions. The final intermediate hosts, several species of fish, are and were eaten by dogs and humans. As a result, dogs and humans become infected in Peru and Chile as evidenced by mummies. In Archaic periods, infection prevalence fluctuated with climate conditions (Kuchta et al. 2016). Infection was variable after agriculture. Therefore, human and environmental conditions resulted in emergence, disappearance, and reemergence of infection.

The data reviewed thus far are based on the recovery and identification of microscopic eggs and larvae or molecular signals of the specific parasites. Gross pathology exhibited in skeletal remains provides additional evidence of parasitism. Some somatic infections result in calcifications recoverable in cemetery excavations. Working on cemeteries from a Medieval Icelandic hospital, Kristjánsdóttir and Collins (2010) recovered evidence of hydatid cyst disease and presented several cases. *Echinococcus granulosus*, a tapeworm, provokes hydatid cyst disease in humans. The liver and lungs are the most commonly affected, but cysts can form in other tissues as well. Large cysts form which may contain daughter cysts. The cysts can remain asymptomatic for months or years, and the cyst grows slowly and can take a decade to become 15–20 cm in diameter. The cysts calcify and form resistant structures that weather taphonomic processes that destroy soft tissue. Therefore, they can be found in skeleton context. The cyst calcification relates to its complex structure. The outer layer is composed of modified host cells that form a dense fibrous protection around the cyst. The middle layer is laminated without cellular structure. The inner layer is the germinal layer where larval tapeworms are produced. These larval forms accumulate within the cyst. Calcification is a result of host tissue reaction to the hydatid cyst that essentially walls off the cyst (Waters-Rist et al. 2014). Densely calcified inactive cysts are resilient evidence of infection when found in cemetery context (Kristjánsdóttir and Collins 2010).

Wild carnivores and ungulates are the usual hosts of *E. granulosus* (Waters-Rist et al. 2014). In Iceland, by medieval times, the parasite cycled between dogs and sheep. Sheep were the intermediate hosts infected with cysts. Dogs were the definitive host infected with egg-laying adult worms. The eggs were passed into the human environment in dog feces. The eggs, once fortuitously ingested by humans, formed hydatid cysts. Kristjánsdóttir and Collins (2011) note that hydatidosis was a prevalent endemic health problem in Iceland. The disease became the focus of a strict control campaign by the late 1800s. The AD 1493–1554 monastic hospital cemetery shows how severe the problem was in the evidence of hydatid cysts recovered in skeletal context. The eight cases were buried in close association to each other, suggesting that hydatidosis was a recognized syndrome by the monks. The largest hydatid cyst known from archaeological context was recovered from this hospital cemetery. All infected individuals were 50 years and the cysts were equally divided between men and women. Calcification of hydatid cysts was attained in 5% of 160 individuals excavated from the cemeteries. Only 20–30% of hydatid cysts calcify. Therefore, the percentage of the population infected could have been as high as 25%. This study shows how careful excavation of a large population can offer understanding of the creation of a prolonged cycle involving dogs and sheep that resulted human infection and disease (Kristjánsdóttir and Collins 2011).

The study of parasite decomposition, or taphonomy, is a new area of study. Certain parasites, such as *A. lumbricoides* and *T. trichiura*, lay durable eggs designed to stay infective for years. Eggs of such parasites preserve in archaeological contexts very well (Rácz et al. 2015). Other parasites such as hookworm have infective larvae that hatch out of the eggs shortly after entering the extracorporeal environment. These eggs and larvae preserve very poorly. Other parasites, such as pinworm, lay light eggs for airborne dissemination. These eggs preserve only in the optimal environments provided by coprolites and mummies. Various taphonomic conditions differentially affect preservation of parasites species (Morrow et al. 2016). Human remains from the same cemeteries show an absence of parasites with skeletonized burials and ubiquitous parasites in mummified burials (Seo et al. 2010).

Recognizing this difference, Korean researchers focused their work on mummies, making extraordinary discoveries concerning past distribution of parasite infections (Seo et al. 2014) (Fig. 4). The Korean researchers combine microscopic and molecular diagnoses. Fascinating work has based on mummies from Joseon Dynasty tombs fifteenth to nineteenth century. Seo and his colleagues diagnosed four species of food-borne helminths. All of these are trematodes, or flukes. Flukes are parasitic flatworms and in these studies, two species infected humans by fish or crab consumptions. The fish-borne flukes include *Clonorchis sinensis* (Chinese liver fluke) and *Metagonimus yokogawai*, an intestinal fluke. One-third of the mummies were infected with one or both of these flukes, five with *C. sinensis* and three with *M. yokogawai*. These analyses show that uncooked fish was commonly eaten by the people of Joseon society. Eating uncooked crab was the infection source of the lung fluke, *Paragonimus westermani* which was found in about one third of the mummies. Oysters were the source of the intestinal fluke, *Gymnophalloides seoi*, infecting about one eighteenth of the mummies (Fig. 4). In total, 11 of 18 Joseon mummies were infected with one or more species of fluke. Filth-borne parasites nematode worm parasites were also found (Fig. 5). When the nematode data are added to the picture, all 18 mummies were positive for one or more species. Ten mummies contained eggs of *A. lumbricoides* and 13 were positive for *T. trichiura*. Therefore, fecal pollution of the human environment was a problem (Fig. 6–7). Pinworm has an airborne and person-to-person infection transmission cycle. Pinworm eggs were found in two mummies which infection within habitations. A rare parasite, *Strongyloides stercoralis*, was discovered in a mummy. Infection occurs when larvae of these parasites burrow

Archaeoparasitology, Fig. 4 Coprolites remained inside the large intestine cavity of Korean mummy

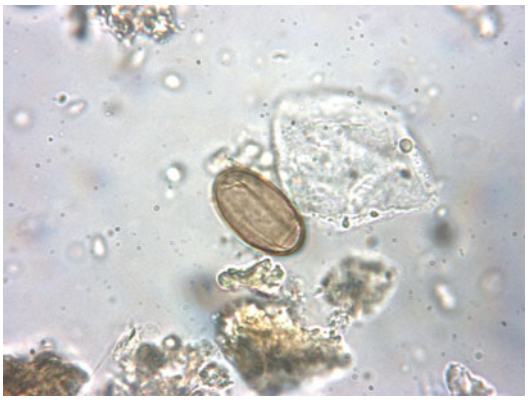

Archaeoparasitology, Fig. 5 *Gymnophalloides* seoi egg discovered in Korean mummy coprolite sample. People became infected by eating oysters, the intermediate host of this intestinal fluke. One in eighteen mummies, on average, were infected

through the skin. Another rare parasite, *Trichostrongylus*, was found. The larvae of this genus must be eaten to transmit infection. These last two parasites were found together in a single mummy. The pathoecology reflected by these 18 mummies is complex. The nidi of infection included the water sources from which fish, oysters, and crabs were gathered (flukes), the fields in which plants were harvested (*Trichostrongylus*), fecal contaminated cities (*A. lumbricoides* and *T. trichiura*), and even the enclosed structures in which the elite lived (pinworm).

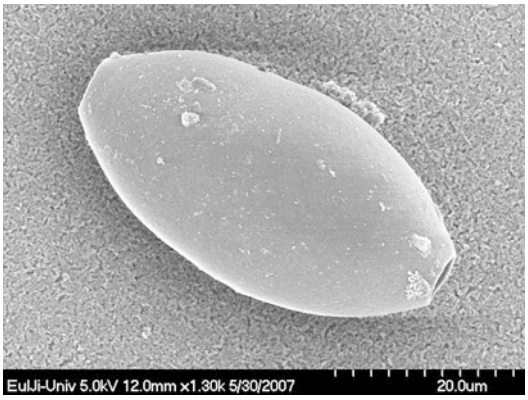

Archaeoparasitology, Fig. 6 Scanning electron microscopic image of *Trichuris trichiura* from Korean mummy (Yangju). The infection was due to fecal contamination of the environment

Reinhard (1992), in a foundation article, anticipated that parasitology would become a tool for the archaeologist. Specifically, he expected that parasite data would reveal details of diet, transhumance, trade, environmental contaminants, health, interaction with domestic animals, and human-parasite ecology and evolution. Today we see the maturation of archaeoparasitology as it has made contributions in all of these areas. However, as molecular biology continued to be refined as a diagnostic tool, the field made strides towards showing evolution of parasites through time and geographical space. From this perspective, archaeology is now contributing to parasitological theory of how parasites switch from animal hosts to humans and then persist and spread with humans. When human behavior developed in a way that promoted infection, then parasites

Archaeoparasitology, Fig. 7 Archaeoparasitological study showed that the archaeological strata of Old Seoul City containing many soil-transmitted parasite eggs, showing the possibility of fecal contamination of the human environment during dynastic period of Korea. Therefore, fecal contamination of the human environment was a problem since infection can be associated with unwashed food

became part of the enduring archaeological landscape.

References

Camacho, M., A. Araújo, J.J. Morrow, and K.J. Reinhard. 2018. Recovering parasites from mummies and coprolites: Establishing an epidemiological approach. *Parasites and Vectors*, (in press).

Kristjánsdóttir, S., and C. Collins. 2011. Cases of hydatid disease in medieval Iceland. *International Journal of Osteoarchaeology* 21: 479–486.

Kuchta, R., M.E. Serrano-Martínez, and T. Scholz. 2015. Pacific broad tapeworm Adenocephalus pacificus as a causative agent of globally reemerging Diphyllobothriasis. *Emerging Infectious Diseases* 21: 1697–1703.

Morrow, J.J., J. Newby, D. Piombino-Mascali, and K.J. Reinhard. 2016. Taphonomic considerations for the analysis of parasites in archaeological materials. *International Journal of Paleopathology* 13: 56–64.

Rácz, S.E., E. Pucu, E. Jensen, C. Mostek, J.J. Morrow, M.L. Van Hove, R. Bianucci, D. Willems, F. Heller, and K.J. Reinhard. 2015. Parasitology in an archaeological context: Analysis of medieval burials in Nivelles, Belgium. *Journal of Archaeological Science* 53: 304–315.

Reinhard, K.J. 1992. Parasitology as an interpretive tool in archaeology. *American Antiquity* 57: 231–245.

Reinhard, K.J., and A. Araújo. 2012. Synthesizing archaeology with parasitology in paleopathology. In *A global history of paleopathology*, ed. J. Buikstra and C. Roberts, 751–764. Oxford: Oxford University Press.

Reinhard, K.J., and A. Araujo. 2014. Prehistoric earth oven facilities and the Pathoecology of Chagas disease in the lower Pecos Canyonlands. *Journal of Archaeological Science* 53: 227–234.

Reinhard, K.J., and V.M. Bryant. 2008. Pathoecology and the future of coprolite studies. In *Reanalysis and reinterpretation in southwestern bioarchaeology*, ed. Stodder AWM, 199–216. Tempe: Arizona State University Press.

Reinhard, K.J., and E. Pucu. 2014. Comparative parasitological perspectives on paleoepemiological transitions: Americas and Europe. In *Moving the middle to the foreground: Interdisciplinary approaches to examining the second epidemiological transition*, ed. M.K. Zuckerman, 311–326. Hoboken: Wiley.

Seo, M., C.S. Oh, J.Y. Chai, S.J. Lee, J.B. Park, B.H. Lee, J.H. Park, G.H. Choi, D.W. Hong, H.U. Park, and D.H. Shin. 2010. The influence of differential burial preservation on the recovery of parasite eggs in soil samples from Korean medieval tombs. *Journal of Parasitology* 96: 366–370.

Seo, M., A. Araujo, K. Reinhard, J.Y. Chai, and D.H. Shin. 2014. Paleoparasitological studies on mummies of the Joseon dynasty, Korea. *Korean Journal of Parasitology* 52: 1–8.

Slavinsky, V.C., K.V. Chugunov, A.A. Tsybankov, S.N. Ivanov, A.V. Zubova, and S.M. Slepchenko. 2018. *Trichuris trichiura* in the mummified remains of southern Siberian nomads. *Antiquity*, (in press).

Slepchenko, S., and K. Reinhard. 2018. Paleoparasitology and pathoecology in Russia: Investigations and perspectives. *International Journal of Paleopathology*, (in press).

Slepchenko, S.M., S.N. Ivanov, A.V. Sergey Vybornov, T.A. Alekseevich, S.V. Sergeyevich, D.N. Lysenko, and V.E. Matveev. 2017. *Taenia* sp. in human burial from Kan River, East Siberia. *Memórias do Instituto Oswaldo Cruz* 112 (5): 387–390. https://doi.org/10.1590/0074-02760160442.

Trigg, H.B., S.A. Jacobucci, S.A. Mrozowski, and J.M. Steinberg. 2017. Archaeological parasites as indicators of environmental change in urbanizing landscapes: Implications for health and social status. *American Antiquity* 82: 517–535.

Waters-Rist, A.L., K. Faccia, A. Lieverse, V.I. Bazaliiskii, K.A. Katzenberg, and L.J. Losey. 2014. Multicomponent analyses of a hydatid cyst from an Early Neolithic hunter-fisher-gatherer from Lake Baikal, Siberia. *Journal of Archaeological Science* 50: 51–62.

Archaic *Homo sapiens*

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Introduction

In Asia and Africa, many human fossils of Middle and early Late Pleistocene age cannot be allocated to *Homo erectus* (sensu lato), premodern and anatomically modern *Homo sapiens*. They are generally allocated in a taxon, referred to as early or archaic *Homo sapiens*. But recently, a growing number of paleoanthropologists prefer to attribute some of them to other taxons such as *Homo heidelbergensis* or *Homo rhodesiensis*. Specimens of this kind, such as that from Kabwe and Bodo, will not be included in this entry. In the following section, fossils that are usually included in the taxon archaic *Homo sapiens* from Asia and Africa will be described.

Key Issues/Current Debates/Future Directions/Examples

Dali

The site is situated at a loess terrace in Dali County, northwestern China. The human fossil is a rather complete cranium, but the lower part of the face was deformed by the upward depression of the alveolar process. It is associated with Mode I lithics and mammalian fossils of late Middle Pleistocene age. U-series (^{231}Pa/^{230}Th) dating of an ox tooth, associated with the human cranium, gave an age of 209 ± 23 ka. The stratum of human skull is 13 m below a layer of paleosol which is estimated as around 247 ka with IRSL analysis, so the human fossil is earlier than this age; ^{230}Th analysis of the enamel and dentine of an associated rhinoceros gave ages of 258 + 34/−26 ka and 349 + 53/−38 ka, respectively; ESR analysis of the associated Lamprotula resulted in an age range of 297 to ~210 ka. All of these suggest a date of between 300 and 260 ka. The ESR/U-series date for animal teeth is around 281 ka.

The human cranium is rather robust and has many metrical features intermediate between *Homo erectus* and modern humans and shows a morphological mosaic between these categories. Some measurements and indices of Dali fall within the range of modern humans, whereas some features seem to be in the status intermediate between Middle Pleistocene hominins of eastern and western Eurasia. The cranial wall and brow ridges are as thick as that of the hominin from Locality 1 of Zhoukoudian. The brow ridge is thickest at its middle part. The most protruding point of the median sagittal profile of the frontal bone is located at its lower half. The cranial capacity is 1,120 cc. There is no supraorbital notch, foramen, and tubercle. In addition, it has many features similar to that of Jinniushan cranium. These are as follows: a median sagittal ridge at the lower part of the frontal squama; the fronto-nasal and fronto-maxillary sutures form a curve which is nearly horizontal but slightly convex upward; an angular torus; the superior border of the temporal squama is slightly curved; the notch between the squamosal and mastoid portions of the temporal is rather deep; the mastoid process is small; between occipital and nuchal planes there is an angular turn marked by a weak occipital torus which extends along the middle two-thirds of the occipital squama; the zygomatic arch is thin, and its upper border is slightly lower than the Frankfurt horizontal; the nasal profile is nearly vertical; the infero-lateral orbital margin is blunt and forms a nearly right angle; the anterolateral surface of the fronto-sphenoidal process of zygomatic bone faces more forward and the lower margin of the zygomatic process of the maxilla is curved.

Jinniushan

The site is a cave located on Jinniushan Hill, Yingkou Municipality, northeastern China. Human fossils include a nearly complete, but broken, human cranium, 6 vertebrae, 2 ribs, 1 left ulna, 9 carpal bones, 2 metacarpals, 7 digits of a hand, 1 left innominate, 1 patella, 11 tarsals, 2 metatarsals, and 13 digital bones of the foot. They are associated with Mode I lithics and a lot of mammalian fossils of Middle Pleistocene age. A U-series date on associated animal teeth is around 280 ka. The cranial capacity is 1,390 cc. The cranial wall is close to that of modern humans in thickness. Brow ridge is not thick, and its thickest point is at the medial part, while the thinnest is in the middle. The postorbital constriction is obvious. There is a supraorbital notch, and the supraorbital process is distinct. The nasal bones are wide. The upper incisors are shovel-shaped. The coronoid process of the ulna resembles that of modern humans in shape. The position of iliac buttress is more anterior than that in modern humans. This structure and the ischial tuberosity are gracile.

Xujiayao

The site is located on the west bank of the Liyigou River, 1 km southwest of Xujiayao Village, Yanggao County, North China. Human fossils include 12 parietal fragments, 2 fragments of occipital, a nearly complete temporal bone, lower part of a child maxilla with teeth, a mandibular fragment, and several teeth. The fossils were embedded in lacustrine deposits also associated

with Mode I lithics and mammalian fossils of early Late Pleistocene age. U-series dates on associated rhinoceros range between 125 and 104 ka.

Parietal No. 6 is rather complete, with distinct parietal tuberosity. It is slightly smaller and much thinner than Parietal No. 10 which is intact except for its anterior part. The branches of the middle meningeal artery are thinner than that in *Homo erectus* from Zhoukoudian but thicker and less ramified than that in modern humans. The supero-posterior corner of both parietals is naturally lacking, hinting at the possible existence of an Inca bone. Other parietal fragments are small. The Parietals Nos. 3 and 4 are similar to No. 6 in the presence of straight grooves on the outer surface. These grooves radiate forward, upward, and backward from the parietal tuberosity and seem to represent traces of scraping before death. The bregmatic region of Parietal No. 5 is full of dense small foramina that are probably due to osteoporosis or represent cribra cranii externa. No. 10 is a pair of partial posteromedial parietal bones from an adult. It exhibits a congenital defect, an enlarged parietal foramen. The posterior part of Parietal No. 14 has a small hole that seems to represent a healed wound. The thickness of most parts of the parietals is within the range of variation of *Homo erectus* from Zhoukoudian. Both occipital fragments (Nos. 7 and 15) are very thick. The cerebral fossa is larger and deeper than the cerebellar fossa in Occipital No. 7. A shallow supratoral sulcus exists on Occipital No. 15 but not on No. 7. The temporal bone is of left side. The mastoid process is small and the muscular markings on the surface of the temporal squama are strong. The thickness at the parietomastoid suture behind the parietal notch and at the occipitomastoid suture medial to the mastoid process is very close to the range of that in *Homo erectus* from Zhoukoudian. The length-height index of the temporal squama is 64.5. The tympanic plate is more medially located than that in *Homo erectus* from Zhoukoudian and Hexian. The thickness of the tympanic plate is intermediate between *Homo erectus* from Zhoukoudian and modern humans. The styloid process and stylomastoid foramen align with the mastoid notch. The transverse section of the pyramid is closer to *Homo erectus* from Zhoukoudian than to modern humans, but the upper border of the pyramid is as sharp as that in modern humans. The anterior nasal spine is distinct but not prominent. Five teeth are attached to the left maxilla. A newly erupted median incisor is shovel-shaped. The canine and molar have strong cingulum but the isolated left upper molar has no cingulum. All teeth are larger than that of female *Homo erectus* from Zhoukoudian, some measurements are even larger than the male from the latter.

Maba

The site is said to be situated in a cave on Shizishan Hill, 1.5 km southwest of Maba Village, Shaoguan Municipality, southern China. The human fossil is a skull-cap which was unearthed by local farmers. The mammalian fauna from the same cave provides a U-series date of between 135 and 128 ka. No stone artifacts were found.

A short median ridge exists on the frontal squama above the supraorbital groove, which is rather deep except for its median part. The frontal tubercle is weakly developed. The middle and lateral segments of the brow ridge are 11 and 12 mm thick, respectively. A top view of the skull shows the medial end of the brow ridge is located more anteriorly than the lateral end. There is a trace of the fusion of the metopic suture on the anterior surface of the glabellar region. The post-orbital constriction is as exaggerated as that of *Homo erectus* from Zhoukoudian. The frontal sinus is rather large. A semilunar scar 14 mm long exists on the outer surface posterolateral to the right frontal tubercle. On the inner cranial surface at the place roughly corresponding to this scar, there is a bulging about the same size. The parietal is 7.0 mm thick at both the bregmatic region and parietal tuberosity. The fronto-nasal and fronto-maxillary sutures form a more or less horizontal curve. The naso-malar angle is 146°. A median longitudinal narrow ridge exists on the nasal bones, the profile of which is close to a right angle. Most of the right orbit is preserved and is more or less spherical. Its infero-lateral margin is sharp instead of blunt. The orbital index is 88.0. There is no supraorbital notch, foramen, and

tubercle. The anterolateral surface of the right fronto-sphenoidal process of the zygomatic bone faces more forward.

Chaoxian

The site is situated at Yinshan Hill, Chaoxian County, eastern China. Fragments of occipital and maxilla, as well as three isolated teeth, were found from deposit of a limestone fissure, associated with mammalian fauna of Middle Pleistocene age. No artifacts were found. U-series date of associated animal teeth is between 200 and 160 ka.

The occipital torus consists of two curved eminences that are short and only slightly prominent. The transition between the occipital and nuchal planes is rounded. No external protuberance exists. The supratoral sulcus is indistinct, except for a small fovea seemingly corresponding to the suprainiac fossa. Distance between inion and endinion is 22.0 mm, and the thickness at the center of the occipital torus is 7.0 mm. The pyriform orifice is probably rather wide. The incisive canal extends more or less vertically. The massiveness of the teeth is within the range of *Homo erectus* of China. Attrition of anterior teeth (only the lateral incisors are preserved) is much greater than that of the molars. It has been suggested that this difference may imply that the anterior teeth functioned as tools for chewing hard and tough food.

Changyang

The site is in Longdong Cave, Changyang County, Central China. The lower part of a maxilla was found by local farmers, and an isolated left lower second premolar was found by Lanpo Jia from the same cave. No artifacts were found. U-series date of presumably associated mammalian teeth is around 195 ka. The straight line connecting the nasospinale and prosthion forms a 60° angle with a plane deduced from the occlusal surface of the first premolar and first molar attached on the maxilla. The massiveness of the premolar and molar is close to the lower limit and median value of *Homo erectus* of China, respectively.

Dingcun

The site is at the gravel on the third terrace along the east bank of the Fenhe River near Dingcun Village, Xiangfen County, North China. Human fossils include three teeth of a child and a fragment of infantile parietal bone. They are associated with Mode I lithics and mammalian fauna of Late Pleistocene age. U-series date of associated mammalian teeth is between 210 and 160 ka. Lamprotula fossils yielded a U-series date of 150–83 ka. Both upper median and lateral incisors are shovel-shaped with weak basal tubercles and fewer finger-like processes. All of these teeth are much smaller than the corresponding teeth of *Homo erectus*. The shape of the supero-posterior corner of the parietal indicates the possibility of the presence of an Inca bone.

Miaohoushan

The site is at a limestone quarry at Miaohoushan Hill, in Benxi Municipality, northeastern China. Two human teeth and a fragment of femur were found in association with mammalian fauna, with a U-series date of between 240 and 140 ka. The human upper canine is much smaller than that of *Homo erectus* from Zhoukoudian, and the lower molar is close to the lower limit of the latter.

Tongzi

The site is at Yanhuidong Cave, Tongzi County, southwestern China. Human fossils include five teeth. They are associated with Mode I lithics and mammalian fossils of Late Pleistocene age. U-series dated to between 180 and 110 ka. The upper median incisor is shovel-shaped, with three finger-like processes. The canine has a basal tubercle and cingulum. The left premolar has traces of cingulum. Cingulum is obvious and very weak in the left and right molars, respectively. The size of most of the teeth is within the range of *Homo erectus* from Zhoukoudian, except the canine and the left molar, the breadths of which are slightly shorter.

Dadong

The site is at Dadong Cave, Panxian County, southwestern China. Human fossils include two teeth. They are associated with Mode I lithics and

mammalian fossils of Late Middle Pleistocene age. The upper median incisor is shovel-shaped. The canine has a cingulum. The root of the canine shrinks suddenly near its tip. These teeth are slightly smaller than that of *Homo erectus* from Zhoukoudian.

Locality 4 of Zhoukoudian

An upper first premolar was found in association with mammalian fauna of Middle Pleistocene age and Mode I stone artifacts. Thermoluminescence dates for the associated ash layer is 257 ka. The size of this human premolar is within the range of *Homo erectus* but without cingulum.

Narmada

The right half of a human skull was found on the surface of an alluvial terrace along the Narmada River, 200 m west of Hathnora Village, central India. Stone artifacts and vertebrate fossils have been found from the sandy/silty boulder conglomerate in the area where the Narmada cranium was found. Based on the mammalian fossils, the Narmada cranium is inferred to be of late Middle Pleistocene age. The Narmada cranium is moderately large and long. Cranial capacity is estimated as 1,200 ml. The frontal is not very receding, and the vault is high and narrow. Its broadest part is across the enlarged mound-like supramastoid ridge. The temporal squama is very long but not very high. The parietal notch is vertical and bears an ossicle. The postorbital constriction is moderately shallow. The supraorbital torus is strongly arched and uniformly thick across. The orbital roof is moderately concave.

Zuttiyeh (Galilee)

The frontal bone with part of a left zygomatic was found in a cave on the edge of the Wadi Amud, below the Amud site, and about 3.5 km from the Sea of Galilee. The associated lithics are generally considered as pre-Mousterian from the Acheulean-Yabrudian industry, and an age of well over 200 ka has been suggested. The arched supraorbital torus of both sides connects across the glabella. The lateral portion of the torus is thinner. The forehead rises quite sharply behind a narrow supratoral groove. Five or six lesions are shown on the frontal. The interorbital region is wide. The anterior part of the zygomatic arch sweeps back, curving laterally very rapidly. Demarcation between the temporal and infratemporal fossae is very clear.

Jebel Irhoud

The human remains include a broken, but fairly complete, cranium, a skull-cap, a broken juvenile mandible, and a juvenile humerus. They were apparently unearthed near the bottom of a fissure in limestone near Chemaia, about 60 km east of Safi, Morocco. A precise provenance is recorded only for the humerus. Fauna from the deposit suggests an early Late Pleistocene age. ESR date estimates on three teeth found just above the humerus range from 90 to 125 ka. The site has yielded a Levalloiso-Mousterian lithic industry. The human crania are inferred to date to between 130 and 190 ka. These human fossils have been suggested to have Neanderthal affinities and are described as morphologically archaic, although foreshadowing modern humans. Cranial capacity of Jebel Irhoud I is 1,305 ml.

Salé

The base and rear of a braincase plus a partial left maxilla and a natural endocranial cast were found by quarry workers from dune deposits ~1.5 km from the coast at el-Hamra, Douar Caid bel Aroussi, Morocco. A 400 ka date seems plausible based on the local geological context. There are no associated archaeological deposits. The human skull is fairly small and tall with a capacity of 880 ml. It is broadest across the supramastoid regions which are slightly swollen. The temporal line is quite high and arches up slightly. The temporal squama is very short, but for its length it is quite high. The styloid process is thin. A rather large stylomastoid foramen lies between the styloid process and the base of the mastoid process. A hind view shows the cranial wall to be short and quite vertical. The transition from occipital to nuchal plane is rounded. The cranial bone is thick. Pathological thickening of the midsection of the frontal extends back over the bregma. The first and second upper molars apparently have

thick post-cingulum running down the side of the metacone to the small hypocone region.

Singa

The calvaria were found in calcrete deposits exposed on the west bank of the Blue Nile, some 46 km downstream from Singa, and ~320 km south of Khartoum, eastern Sudan. An early Late Pleistocene date was inferred based on the fauna recovered at Singa. U-Th dating of the calcrete adherent to the cranium gave a result indicating the minimum date for the fossil to be 133 ± 2 ka. The human calvaria might even have been associated with the final Acheulean. The human skull is relatively long and moderately high, with a short frontal rise that is fairly steep. The broadest part of the skull is across the parietal eminences. The temporal squama is relatively long and not very high. The parietomastoid suture is long and horizontal, and the parietal notch is very shallow and open. The mastoid process is very small, thin, and short. The supramastoid crest is distinct. The wall of the left auditory meatus is pathologically thickened. The temporal fossa is undifferentiated from the infratemporal fossa. A top view shows the supraorbital margin to be relatively straight, retreating moderately from the glabellar region; postorbital constriction is fairly strong. In general, the cranial bone is thin, except for thickening in the region of the externally, quite swollen, parietal tuberosities. Cranial capacity is estimated at 1,550–1,600 ml. The supraorbital tori are not very thick. The orbital roof is shallow.

Ndutu

The partial adult cranium was found from the lake margin sediments along western side of Lake Ndutu, at western end of Olduvai Gorge, northern Tanzania. The date is probably in the order of 400 ka or about 200 ka based on correlation with different volcanic tuffs in the region. Handaxes have been found at the site that were almost certainly from the same horizon as the human cranium. Reconstruction shows the braincase is small, short, broad, and quite low. Cranial capacity is 1,100 ml. The transition from occipital to nuchal planes is rounded. A hind view of the vault is almost square in outline. The broadest point would have been across the supramastoid crest. Diploe is thick, inner and outer tables are quite thin. The preserved left supraorbital torus is moderately thick. The posttoral surface is slightly depressed. The temporal squama is relatively long, probably arched and high. The mastoid processes are very stout. The supramastoid crests are moderate. The parietomastoid suture is relatively long and horizontal. There is a large wormian bone at the lambda region. Cerebellar fossae are larger and shallower than the cerebral fossae. The interorbital region would have been quite broad. On the left side, the anterior root of the zygomatic arch originates rather low, not too far above the alveolar margin. It appears that the anterior extent of the zygomatic arch faces more or less forward. Both left premolars have two distinct roots that probably bifurcated close to the neck.

Florisbad

The human fossils were found from spring deposit about 45 km northwest of Bloemfontein, South Africa. The sedimentary sequence consists of "peat" layers. Human and animal fossils were found at the level of lowest peat layer, Peat 1, for which U-series date is over 100 ka. In all levels below Peat 3, general Middle Stone Age artifacts have been reported. The partial calvaria are high and rounded. The frontal recedes somewhat directly from the supraorbital margin, with only a hint of a supratoral plane. The temporal line is low. A top view shows the glabellar region protrudes forward. The supraorbital margin is quite thick in the medial portion and thinner in the lateral portion. There is something of a break centrally between the medial and lateral portions of the torus. The orbital roof is very shallow and concave. The infero-lateral corner of the orbit is not sharply defined. The interorbital region is moderately wide. The cranial bone is thick with very thick diploe and extensive porotic hyperostosis, as well as large number of healed lesions, including pathological drainage or vascular tracts. A couple of large puncture marks and some scratch-like marks may reflect carnivore activity. The partial facial bone shows that the inferior margin of the anterior root of the zygomatic arch oriented forward and directly out sideways. The

third cranial fragment also has thick inner and outer tables and diploe.

Guomde

The cranial fragments were found on the surface of the Guomde Formation southeast of Ileret, on the northern sector of the east shore of Lake Turkana, northern Kenya. No archaeological findings have been reported for this site. The specimen KNM-ER 3884 represents the rear of a skull reconstructed from many individual pieces, plus a reconstructed maxilla with all the teeth, and the anterior part of a frontal. The cranial capacity is estimated to be 1,400 ml. The supraorbital tori are double arched and uniformly thick from side to side. There is no distinct supratoral sulcus or plane. Postorbital constriction is minimal. Stylomastoid foramen lies close to the base of a thin styloid process on the left side but far lateral to it on right side. The mastoid process is relatively thin. Canine fossa is not identifiable.

Eliye Springs (West Turkana)

The human cranium is a surface found near the freshwater Eliye Springs, on the southwestern shore of Lake Turkana, Kenya. No artifacts have been found. The neurocranium is large and high, with a cranial volume of more than 1,300 cc. In side view, the frontal rises fairly steep, the transition between the occipital and nuchal planes is somewhat angular. The temporal line is an obviously high curve. The temporal squama is rather long and very high. The demarcation between the temporal and infratemporal fossae is quite clear. The parietal notch is fairly deep and narrow. Postorbital constriction is weak. The frontal sinus is very large. The interorbital region is extremely wide. The nasal bones are broad. The left orbital roof is shallow. The nasal cavity is relatively small.

Ngaloba

The human fossils consist of a fairly complete calvaria with a maxilla and part of the nasal region. They were found on the surface of the Serengeti Plains of northern Tanzania, about 40 km south of Olduvai Gorge. U-series analyses on bone indicate the age ranging between 129 and 108 ka. A Middle Stone Age assemblage has been found from the Ngaloba Beds, both in situ and on the surface. The vault is narrow, with a long frontal. The supraorbital tori are thick, without a posttoral groove. The postorbital constriction is very weak. The transition from the occipital to the nuchal planes is rounded. The occipital plane appears "bunned" because the nuchal plane undercuts it strongly. There is neither a clearly defined occipital torus nor a well-defined external occipital protuberance. A posterior view shows the braincase forms a smoothly rounded curve. A small circular depression on the left parietal near the lambdoid suture is probably of pathological origin. The temporal squama is quite high, and the upper border is quite arched. The temporal and infratemporal fossae are separated by an angle in the alisphenoid. The tympanic plate is very thick. There is a supramastoid swelling instead of a crest. The mastoid process is medial-laterally narrow and not very projecting. The styloid process is relatively thick and is situated medially and in front of the large stylomastoid foramen. The cranial capacity was estimated to be 1,367 cc. The vault bone is quite thick, especially around the midline and in the occipital region. The interorbital region is quite broad. The nasoalveolar clivus is straight, moderate in length and angles slightly out and down. The junction between the maxillary body and the zygomatic process of the maxilla is fairly high above the alveolar margin. The lower border of the zygomatic process forms a sharp angle with the maxillary body. The right P1-M1 and left M1-M3 are preserved, none were very large.

Lake Eyasi

A partial cranium and other cranial fragments were found on the surface at an open-air site on the northeastern shore of Lake Eyasi, near Mumba Hill, northern Tanzania. They are believed to be of late Middle Pleistocene or early Late Pleistocene age. The archaeological context is uncertain. It may be of a terminal Middle Stone Age, or earliest Middle Stone Age. The skull is long and low with large brow ridges. The occipital is very thick, angle between nuchal and occipital planes is

quite obtuse. The angle between the occipital and nuchal planes is quite obtuse. The left cerebral fossa is large and deep, whereas the left cerebellar fossa is not as deep as the cerebral fossa. A larger mandibular fragment has a moderately deep symphyseal profile, in which the anterior surface angles back to the inferior margin, producing a low bulge. There are traces of a low keel above the bulge. A slight depression exists under the root of the lateral incisor. The thickest part of the symphysis is quite far above the inferior margin. The genial pit is shallow and broad. Small mental foramen lies quite high up below septum between two premolars. A much smaller mandibular fragment is confined to the symphyseal region. A low broad keel descends from the region below two median incisors, quickly broadens into a very wide triangular elevation, that becomes very salient closer to the inferior margin. Shallow depressions lie on either side of the keel. The postincisal plane is vertical. The thickest part of the symphysis is close to the inferior margin. Digastric fossae are very small.

Saldanha

The calvaria and fragment of mandibular ramus were found on the surface some 24 km east of Saldana Bay, Northern Cape, South Africa. The fauna from the same general area is said to be of early Middle Pleistocene age. Stone artifacts said to be of Late Acheulean have been found from the same general area. The braincase is large, long, and low. The widest part is in the supramastoid region. The cranial capacity is 1,225 ml. The squamosal suture may have been shallowly curved for most of its length. The occipital and nuchal planes form an angle. Along the junction of these planes, the bone bulges in a distinct horizontal torus with a small groove above and undercutting below. The cranial bone is moderately thick. The postorbital constriction is distinct but not exaggerated. The brow ridges curve strongly and smoothly back from the midline. The ridge is very thick especially at the middle of the orbits. The orbital roof is shallowly concave. The interorbital region is quite broad.

Despite the fact that archaic *Homo sapiens* has been considered a meaningless taxon by some paleoanthropologists, it has been a useful one in dealing with human evolution. As shown in the above descriptions, it has a rather broad diversity in morphology which exhibits a mosaic of archaic and more advanced traits. A few of these fossils have even been considered as belonging to *Homo erectus* or *Homo heidelbergensis*. Some of the morphological features of some specimens might reflect the transition between earlier populations (the paleospecies, *Homo erectus* and *Homo heidelbergensis*) and anatomically modern *Homo sapiens* or probably resulted from interbreeding between the paleospecies, *Homo erectus*, *Homo heidelbergensis*, *and Homo rhodesiensis*. Generally speaking, the lithics associated with archaic *Homo sapiens* of China are of Mode I technique, while the stone artifacts associated with the African archaic *Homo sapiens* are Acheulean, Levalloiso-Mousterian, or Middle Stone Age.

Cross-References

- ▶ Dali, Archaeology of
- ▶ *Homo erectus*
- ▶ *Homo heidelbergensis*
- ▶ *Homo sapiens*
- ▶ Human Evolution: Multiregional Origins
- ▶ Lithic Technology, Paleolithic
- ▶ Zhoukoudian, Archaeology of

Further Reading

Bae, C.J. 2010. The late Middle Pleistocene hominin fossil record of Eastern Asia: Synthesis and review. *Yearbook of Physical Anthropology* 53: 75–93.

Rightmire, P. 2008. *Homo* in the Middle Pleistocene: Hypodigms, variation, and species recognition. *Evolutional Anthropology* 17: 8–21.

Schwartz, J.H., and I. Tattersall. 2002. *The human fossil record, volume 2: Craniodental morphology of genus Homo (Africa and Asia)*, 1–603. Wiley-Liss.

Wu, X.Z., and F.E. Poirier. 1995. *Human evolution in China. A metric description of the fossils and a review of the sites*, 1–317. New York: Oxford University Press.

Architectural Sites: Monitoring

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Introduction

Monitoring is a crucial component of integrated site management planning, whereby, along with maintenance, it comprises one of the main policies that follow the stage of assessment and analysis of a site (Demas 2002: 45; Walton 2003: 6). The monitoring of architectural structures is not an end by itself, but is an important step in diagnosing the problems facing a structure, which would help in setting up appropriate interventions to remedy the situation. Hence, depending on the specificities of a site, the approach for monitoring its condition is established accordingly.

Definition

Architectural sites are those that comprise architectural elements or structures, which are typically referred to as archaeological sites and could date back to ancient times. Monitoring of these sites includes gathering data related to its condition over a period of time in order to understand the changes that occur on it as well as the factors that impact its condition. Issues related to the sites conservation, exposure, and visitor accessibility are factors that impact its long-term condition. Assessment of these issues helps to establish actions that are necessary for ensuring a site's conservation.

Key Issues/Current Debates/Future Directions/Examples

Monitoring is considered a significant step within a comprehensive process that aims at ensuring the sustainable conservation of a site. It follows assessing its existing physical condition and, often, should precede planning for designing and executing the appropriate interventions. Condition assessment is critical to establishing the baseline data that is necessary to monitor future changes to a site (Demas 2002: 39).

Monitoring programs can impact the way a site is managed. They help identify threats and risks at a particular site and hence provide the necessary criteria for designing priority actions in terms of mitigation and intervention measures. Additionally, such programs may potentially impact visitation at a site, in terms of numbers of visitors allowed at a certain hour, the paths that the visitors take, and, sometimes, even taking the decision to close off a site from visitation. Therefore, on the basis of a site's condition, the decision for the need and type of monitoring program would be considered and may precede any intervention measures. All of these factors should be considered when planning the management of a site, which also includes the tourism management aspect.

The Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO World Heritage Center 2012) stresses the necessity of having a set of "key indicators" to be used in monitoring the state of conservation of properties. These indicators would be used to provide updated information on the condition of sites and are numerical when possible. The choice of indicators would depend on the nature of the site. Examples could be the percentage of buildings requiring urgent intervention, the degree of movement in a building, or the rate of increase or decrease of an encroachment at a particular site (UNESCO World Heritage Center 2012: 111). Moreover, the ICOMOS Charter on "Principles for the Analysis, Conservation and Structural Restoration of Architectural Heritage" (ICOMOS 2003) states that the quantitative approach to diagnosis is carried out on the basis of monitoring, in addition to testing and analysis. Hence, monitoring can be considered as being critical to ensuring appropriate site management planning.

Prior to initiating a site's monitoring activity, a specific methodology should be devised based on the specifics of the site and its condition status. Walton (2003: 9–16) mentions a number of

methods used for monitoring the condition of archaeological sites in New Zealand. These comprise a review of existing previous records that can be used to compare a site's previous situation with the current one; the preparation of forms that can be used as a checklist to assess the current condition and the causes of damages that occur; mapping, which is crucial to assess and monitor condition; and photographic recording.

Monitoring of architectural sites implies the monitoring of its built features, which can include its standing structure of walls and roofs, its foundations, and its finishing materials or decorative surfaces that it comprises. Finishing materials and decorative surfaces would include constituents such as tile cladding, stucco, and wall paintings.

The methodology for monitoring architectural sites may include visual inspection, survey and documentation, and the quantitative recording of specific data. However, prior to the collection of monitoring data, it would be pertinent to acquire the baseline information (Walton 2003: 8), upon which the future periodic monitoring would depend. The baseline data provides the necessary information on the existing condition of the structure and its features and helps to establish the main features to be monitored. It also establishes the criteria and methodology for monitoring. Sometimes, existing available records help to assess the state of conservation of structures by analyzing the rate of its deterioration, if any, and could lead to understanding the causes that might have led to that state. Accordingly, the methodology for monitoring can be devised, which would help in determining the future actions to be undertaken in order ensure its future conservation (Demas 2002: 39). However, in order to ensure a certain level of consistency in the collection of monitoring data, forms are often used, which include an outline structure for the registration of specific information.

The decision concerning what should be monitored depends on the condition assessment carried out and the causes of damages identified. For example, at the World Heritage Site of Petra, the impact of visitors was noted as one of the possible factors for the erosion of sandstone monuments. Hence, two areas in Petra were monitored over a period of 10 years by Tom Paradise, who found that a factor of erosion can be due to human contact (Responsible Tourism n.d.). Such assessments have now been developed by linking them within a geographic information system (GIS) that can be used as a monitoring tool, whereby information was obtained and mapped out with tourist numbers and movement at the site, in order to assess and understand their impact along the paths they took (Paradise 2012).

In fact, GIS systems are increasingly being used as a tool for the management of sites, including their monitoring. GIS applications allow the collection and referencing of information and ensure the regular monitoring of monuments (Tantillo 2007).

In recent years, a number of modern techniques have been developed to acquire quantitative data for accurately monitoring the changes occurring on the condition of architectural elements. For example, the monitoring of monuments and decorative surfaces through an active stereo vision system that provides the possibility for acquiring accurate chromatic measurement of 3-D surfaces of a feature has been developed (Grattoni et al. 2002: 383–90).

Particularly, with regard to architectural sites, cracks can be an important indicator of the condition of a structure, and hence the monitoring of crack movement would help in determining a building's stability. For monitoring the movement of cracks, telltales and sensors can be used, which are sometimes connected to automated data loggers. Based on the results acquired, the information is analyzed and diagnosis is thus carried out. This is a necessary step prior to designing any remedial interventions.

Other methodologies for the monitoring of decay on architectural surfaces may include regular sampling and testing, as, for example, in a procedure for measuring gypsum efflorescence on surfaces undergoing capillary rise to monitor decay resulting from salt crystallization on wall paintings (Zehnder 1996: 1669–78), which allows to determine the extent and rate of deterioration, and can define whether a decay activity had ceased following specific treatments and interventions.

Monitoring helps not only to detect the changes which occur on architectural features and buildings but also to identify the potential threats that could be of an intrinsic nature, that is, within the structure itself or those which are considered as external. All such information would help to establish a set of conservation interventions that would help in remedying the situation and arresting potential threats. Nevertheless, the process of monitoring does not end at that stage. Quite often, and while the execution of interventions is carried out, monitoring might be necessary, especially when interventions are related to structural issues. Also, following the execution of conservation work, the monitoring methodology should be revised on the basis of the changes that have occurred and the new condition status. Hence, monitoring should be perceived as an ongoing process that is carried out according to an established methodology and is continuously revised in accordance with a site's condition and current needs.

Cross-References

- ▶ Aerial Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Nonstructural Sites: Monitoring

References

Demas, M. 2002. Planning for conservation and management of archaeological sites: A value based approach. In *Management planning for archaeological sites: An international workshop organized by the Getty Conservation Institute and Loyola Marymount University*, Corinth, 19–22 May 2000, ed. J.M. Teutonico and G. Palumbo, 27–54. Los Angeles: The Getty Conservation Institute.

Grattoni, P., R. Nerino, and G. Pettiti. 2002. Works of art monitoring by an active vision system. In *The first international conference on archaeology and conservation,* Jordan, 12–17 Aug 2002, ed. T.S. Akasheh, 383–390. Granada: Fundaciòn El Legado Andalusi.

ICOMOS. 2003. ICOMOS Charter – Principles for the analysis, conservation and structural restoration of architectural heritage (2003). Available at: http://www.international.icomos.org/charters/structures_e.pdf. Accessed 7 Oct 2012.

Paradise, T.R. 2012. Cultural heritage management and GIS in Petra, Jordan. *ArcNews*. Available at: http://www.esri.com/news/arcnews/summer12articles/cultural-heritage-management-and-gis-in-petra-jordan.html. Accessed 15 Oct 2012.

Responsible Tourism. n.d.. Available at: http://petranationaltrust.org/ui/ShowContent.aspx?ContentId=73. Accessed 13 Oct 2012.

Tantillo, M.D. 2007. *GIS application in the archaeological site of Solunto in XXI international CIPA symposium*, 01–06 Oct 2007, Athens. Available at: http://www.isprs.org/proceedings/XXXVI/5-C53/papers/FP138.pdf. Accessed 30 Sept 2012.

UNESCO World Heritage Center. 2012. Operational guidelines for the implementation of the world heritage convention. Paris: UNESCO World Heritage Center. Available at: http://whc.unesco.org/archive/opguide12-en.pdf. Accessed 8 Oct 2012.

Walton, T. 2003. *Methods for monitoring the condition of historic places*, Department of conservation technical series 27). Wellington: Department of Conservation. Available at: http://www.doc.govt.nz/upload/documents/science-and-technical/docts27.pdf. Accessed 30 Sept 2012.

Zehnder, K. 1996. Gypsum efflorescence in the zone of rising damp. Monitoring of slow decay processes caused by crystallizing salts on wall paintings. In *Proceedings of the 8th international congress on deterioration and conservation of stone*, Berlin, 30 Sept–4 Oct 1996, ed. J. Riederer, 1669–1678. Berlin: Moller Druck und Verlag.

Architecture, Roman

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Introduction

One of the most tangible remains of the Roman Empire is its distinct architecture: with complete buildings still standing in every corner of the empire, the Romans have quite rightly received fame as master builders and engineers. They revolutionized the art of building through

experimentation and innovation, two talents Pliny the Elder already describes as innate to their culture (Pliny, *HN* 36.101; Boethius and Ward-Perkins 1970: 3). This entry will not focus on enumerating building types, which recently have been majestically treated by Pierre Gros (1996 and 2001), or building materials and construction techniques, of which the standard publication is still that of Jean-Pierre Adam (1984). Instead, it considers a handful of specific developments and processes that created the architectural style that we now interpret as properly Roman.

Definition

A subject as large as "Roman architecture" has had many interpretations in the past and can be difficult to define with precision. In the broadest terms, it could pertain to any structure that was built in the city of Rome or by the Romans, and in such a case the account would have to start in the tenth century BCE, when the first Iron Age huts appear on the Palatine Hill. Furthermore, the first monumental architecture in the city, in the sixth century BCE, is entirely Etruscan in style. It was, however, submitted to Greek and Hellenistic influences during the fourth and third centuries BCE and further innovation under Augustus to finally find its own unique form. The identification of "Roman architecture" adopted in this entry is that specific style that has its origins in and around Rome in the third century BCE, with roots in foreign architectural practices, but which through experimentation and innovation developed into a style that can be considered truly Roman.

Historical Background

The further Hellenization of the Etrusco-Italic architecture in central Italy during the second and first centuries BCE and its resulting hybrid styles were eventually known as "*consuetudo Italica*," a term used by Vitruvius (V.11.1), the most famous of Roman architects. It is in this architectural tradition that he composed his treatise *De Architectura Libri Decem* (Ten Books on Architecture), the only surviving architecture manual from antiquity and, as far as we know, the first to consider architecture in general. Previous works, only known through citations in his text, were all Greek and related only to specific orders or buildings. Vitruvius himself, on the other hand, wrote a wide-ranging architectural manual, which not only enumerates building types and rules of thumb for their construction but also provides information on the ideal education and talents of architects, their duties and responsibilities, and their social status. As such, his treatise can be seen as the first to provide a historical narrative regarding the art of architecture.

Writing during the reign of Augustus (27 BCE to CE 14), he dedicated his book in the later years of the first century BCE, when new forms of architecture started to take shape following the application of new building materials, the growing confidence in architectural know-how, and the development of a new ideology (see below). As said, his work displays a thorough knowledge of Greek building practices and a certain partiality to conservative Republican traditions: he frequently refers to the writings of Greek architects, and his chapter on temple design is almost entirely embedded in Greek tradition. He furthermore ignores marble as a building material or the use of the Corinthian order in its developed Augustan form, both of which novelties were becoming standard practices in Rome by the time of his writing. Elsewhere, however, he clearly distinguishes between Roman and Greek architectural forms, for example, for theaters and domestic architecture. Such seeming contradictions between his writing and contemporary practice have made some scholars question Vitruvius' applicability to the field of Roman architecture, but in other's eyes, this trait has made him all the more valuable, as his work perfectly describes the crossroads that architectural practice found itself in at the close of the first century BCE (Anderson 1997: 3–15, esp. 5; Rowland and Howe 1999: 8–18).

Key Issues

It would be quite impossible here to give a complete overview of what Roman architecture was and encompassed, and for a thorough overview, one should still consult the unsurpassed *Etruscan and Roman architecture* (Boethius and Ward-Perkins 1970). Rather, in this section, I will focus on the different mechanisms at play before and after Vitruvius, explaining why architecture developed as it did and why we still recognize buildings as "Roman" while they are thousands of miles apart:

(a) Experimentation and innovation: building materials and techniques
(b) Organization and specialization: the "mechanization" of the trade
(c) The Augustan Revolution
(d) Imitation and emulation: Roman architecture in the provinces

Experimentation and Innovation: Building Materials and Techniques

After the Punic wars in Italy, the moralist rejections of the Greek influence of the late third and second centuries BCE could not prevent the luxuries that Romans encountered in the Hellenistic kingdoms from permeating into every aspect of daily life. Rome embraced a significant influx of architects from the East – a move noticeable for centuries as many architects still had Greek names – but did not fail to produce skilled architects itself: in 174 BCE, the Seleucid king Antiochus IV commissioned Decimus Cossutius, an architect from Rome, to complete the long-unfinished Olympieion at Athens (Gros 1983: 434; Anderson 1997: 22). The Roman drive for innovation was immediately visible as Cossutius changed the temple's style from Doric to Corinthian and the building material from local limestone to Pentelic marble. As Cossutius came from an influential family of architects, it is not unthinkable that he and this project in turn influenced architecture at Rome itself: there, the very first marble Corinthian temple, the Temple of Jupiter Stator in the Circus Flaminius, known from literary sources, was built only shortly afterwards, in 146 BCE, by the Greek architect Hermodorus of Salamis for Caecilius Metellus Macedonicus. It was followed at the end of the century by the earliest surviving marble Corinthian temple in Rome, the round temple by the Tiber.

This constant exchange of people and ideas between the Greek and Roman spheres led to further experimentation with arch and vault, two concepts never fully explored by previous cultures. Sometime during the latter half of the second century BCE, a completely new type of arch was successfully built within the new city walls of Falerii Novi that would then be commonly used until the early Empire (Boethius and Ward-Perkins 1970: 101–2). It is but an example of this bold experimentation that caused the Romans to achieve supremacy in building. While they probably learned the arch from the Etruscans, its potential was only realized under Hellenistic influence, and the increasing pressure for new building types (most of which originate from or start being built in this period, such as theaters, basilicas, baths, and warehouses), as well as important innovations in the composition of mortar, made them eventual experts of vaulting techniques. Mortar was used for walls as early as the third century BCE, but the real innovation lay in the addition of a new type of volcanic sand, pozzolana – its name revealing its origins near Puteoli in the Bay of Naples – to create a type of concrete which was not only stronger than the previous mortar but also waterproof and could cure underwater (MacDonald 1965: 3–5).

As confidence in this new substance grew, the Romans started to use it for the natural expansion of the arch, the barrel vault, and subsequently many other types of vaulting. Early surviving examples of the new technique show its success (the second century BCE vaults of the Stabian Baths in Pompeii are a good example), but perhaps the most important step in the barrel vault's development occurred when the new techniques were used for the substructures and buttresses of a specific group of sanctuaries in Latium: the Sanctuary of Fortuna Primigenia at Palestrina (Fig. 1), of Hercules Victor at Tibur, of Juno at Gabii, of Jupiter Anxur at Terracina, and the Tabularium,

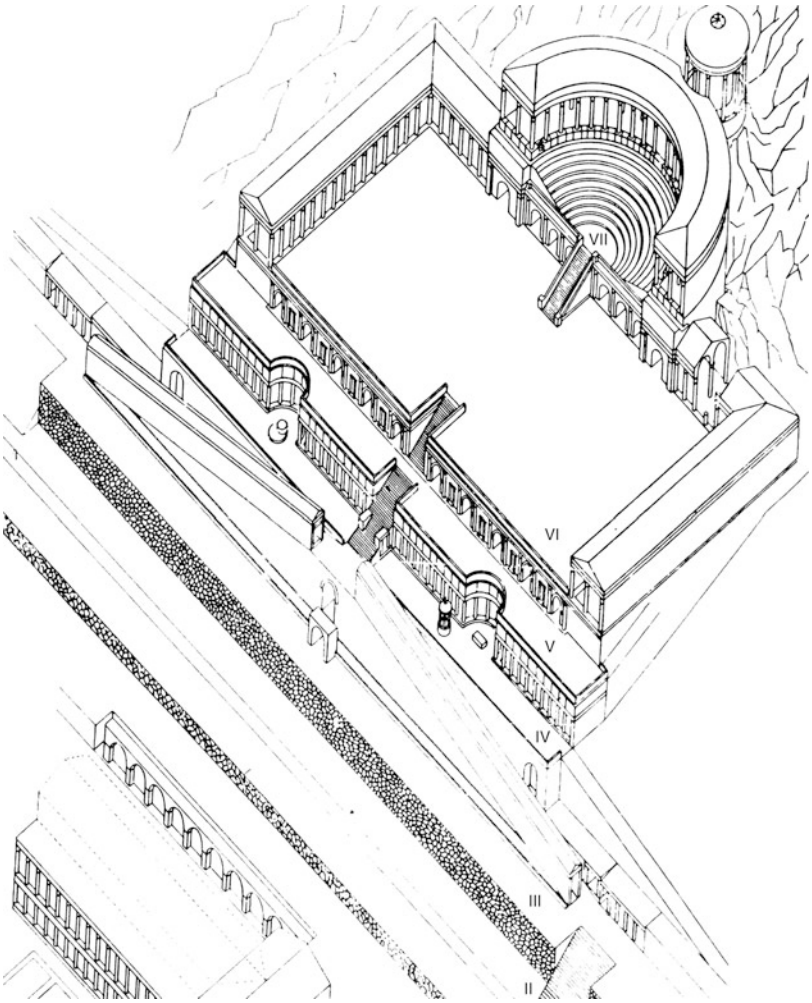

Architecture, Roman, Fig. 1 The Sanctuary of Fortuna Primigenia at Palestrina. (Boethius and Ward-Perkins 1970: 142, Fig. 78)

recently identified as the terrace for such a sanctuary in Rome. All date from the late second century BCE to the early first century BCE (Coarelli 1987, 2010: 129; Lancaster 2005: 5). Unmistakably based on the Hellenistic sanctuaries in the East, for instance those of Asklepios at Kos or of Athena at Lindos (Rhodes), they are very distinctly Roman in character, not only through this novel use of materials and vaulting techniques but also by the way in which they altered the landscape.

While their Greek precedents were built on terraces on natural substructures in dugout hillsides, using the curves of that landscape, as at Kos and Lindos, Romans used concrete, arches, and vaults to artificially alter – and ultimately, in their eyes, enhance – the landscape, implementing strict axes and symmetries and building upwards (Boethius and Ward-Perkins 1970: 122). The technological possibilities that architects acquired from these Latial sanctuaries made it possible for the Romans to build, in 55 BCE, the Theater of Pompey, the first completely freestanding stone theater in Rome, which used the same arching and vaulting techniques, though with updated materials. Further studies lent a profound understanding of building materials and paved the way for bold projects like the Domus Aurea, the Markets of Trajan, and the sophisticated design of the dome of the Pantheon. The deliberate choice to use different types of aggregate in the concrete of the building and dome, so the weight decreases as

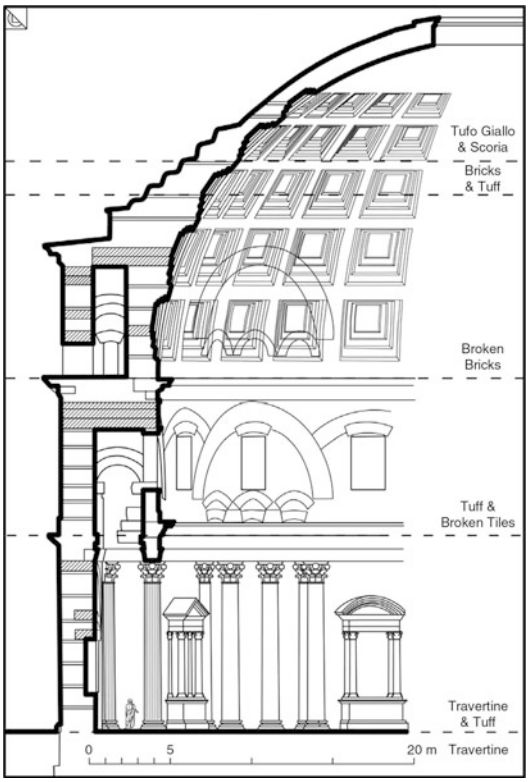

Architecture, Roman, Fig. 2 A section of the Pantheon. (Lancaster 2005: 62, Fig. 46)

the height increases, was experimented on in the earlier Baths of Trajan, but perfected in the Pantheon (Fig. 2), ultimately contributing to the fact that the building is still standing today. It was subsequently used for the largest vaults and domes, as at the Baths of Caracalla, the Baths of Diocletian, and the Temple of Minerva Medica (Lancaster 2005: 158–61).

Organization and Specialization: The "Mechanization" of the Trade

Key to the development of new techniques and building types is not only the drive for experimentation and a thorough understanding of the capacities of one's building materials but also the availability of resources, their potential for easy handling on-site, and most of all, an established and well-organized framework in which to operate. Unfortunately, there is a distinct lack of ancient sources on the actual on-site duties of the architect, contractor, or other master builder in the Roman period, even with the survival of Vitruvius' handbook. We are better informed about the Greek Classical Period, when architects were mentioned in the publicly displayed building contracts for major temples. For a long time, the *architekton* was an occasional occupation, only required for large projects such as temples and stoas, which were only commissioned once every generation (Coulton 1995: 27–9). In the Hellenistic Period, the emergence of the new monumental building types and the wealth of individual patrons and new kingdoms, rather than the *polis* as commissioner, gave rise to architect becoming a proper full-time profession, sometimes under permanent patronage. Ironically, such craft specialization also brought with it the anonymity of the architect (but not yet a loss of prestige), as from then on and continuing into the Roman period, the most important name to remain attached to a building was that of the patron. Good examples are the Attalid kings at Pergamon, Pompey and his Theater, Agrippa and his Pantheon, or Maxentius and his basilica. And thus, to identify Roman architects of the late Republic, we depend mainly on evidence from tombstones and other inscriptions or passing references in Cicero, Vitruvius, and other contemporary writers. Generally, it appears that, especially but not exclusively for small construction projects, architects were at the same time designer, master builder, contractor, and on-site supervisor site (Gros 1983: 431, 452).

With the specialization of the job also came a specialization of the trade. Construction sites became much better organized, with both unskilled labor and highly skilled workmen (*fabri*) contracted for specific tasks. Among these, one would find the *mensores* or surveyors to set out the site, *fabritignuarii* to build the walls, the *tectores* as plasterers, and the *redemptor* – the contractor – to supervise. The Roman building trade was organized with military precision: the guild of builders (the *collegium* of the *fabritignuarii*) at Ostia had reached 350 members by the end of the second century CE; in Rome it had around 1350 members at the same time. Ordinary members were called the "body of booted soldiers" and were divided into 16 cohorts in Ostia, 60 in Rome, each headed by a *decurio*,

while the patron of the *collegium* was a *praefectus*. What is most surprising, however, is that the 350 members of the guild in CE 198 were men of high status: patrons themselves or at least contractors, architects, and heads of "firms" who could afford to pay the entrance fee. This shows that the entire body of builders must have been significantly larger, even at a relatively small town like Ostia. There can be no doubt that by the end of the second century CE, building must have been a very lucrative business with a possible 20,000 people active at any one time in Rome alone (DeLaine 1997: 197–201, 2000: 121, 132), which must have been a continuous building site for the majority of two centuries.

Advantages of such a military organization are obvious: ultimately, it would lead to more uniform construction techniques as well as a quick output rate. Another important change that led to these developments took place with the invention of Roman concrete, as set out above: concrete walls needed an outer facing, and a standardization of the process would mean faster and stronger building. Vitruvius (II.8.1–4) tells us about two facing techniques of his time: the old-fashioned *opus incertum*, in which tufa blocks of irregular size were fitted into an irregular pattern, and the then new *opus reticulatum*, where square-faced tufa blocks were placed in diagonal lines (Fig. 3). The Latial sanctuaries still show *opus incertum* in their walls, but reticulate took over soon afterwards and it is fair to say that it created a shift in Roman building practice: for the first time in the building trade, it is possible to speak of mass production. Since all reticulate blocks were the same shape and size, they could be mass-produced by organized teams of stone cutters, possibly even slaves. This had several consequences: specific skill was needed at the quarry to cut the reticulate blocks, as opposed to the irregular-sized *incertum* blocks, and the mason's time to place the blocks while building walls was reduced significantly. This complete mechanization of the construction site led to the decline in the little prestige that the *architectus* had enjoyed during the late Republic, and in the early Empire his job was basically reduced to that of the *redemptor* or contractor (Torelli 1995: 227–230). The only exceptions are, unsurprisingly perhaps, architects that can be linked to specific emperors and designing, rather than executing, grand imperial projects in the first two centuries CE: Celer and Severus for Nero, Rabirius for Domitian, Apollodorus of Damascus for Trajan, and Hadrian himself (for their careers, see Anderson 1997: 52–67).

As the standardization and mechanization continued, we notice the appearance of specialized "ateliers," where building materials could be ordered and bought prefabricated, as opposed to custom commissioned per new project. Nowhere is this more visible than in the use of fired brick and marble. Fired bricks were first used in the early first century BCE and retained the standard

Architecture, Roman, Fig. 3 Examples of *opus incertum* in the Sanctuary of Jupiter Anxur in Terracina, of early *opus reticulatum* in the Theater of Pompey in Rome, and of developed *opus reticulatum* in the Baths of the Trinacria in Ostia, Italy. (Photos by author)

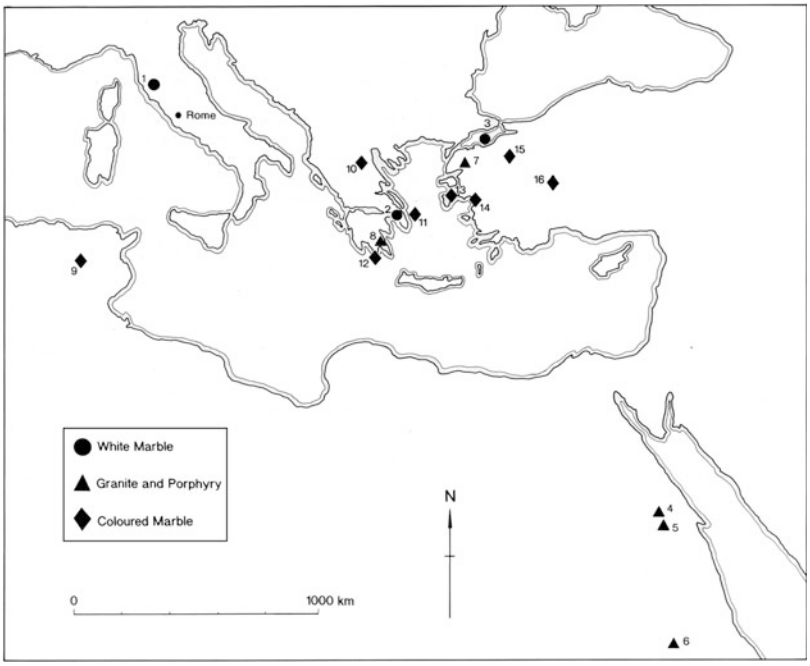

Architecture, Roman, Fig. 4 Map of the main marble quarries in the Roman Empire. (DeLaine 1997: 95, Fig. 54): *1*. Luna, *2*. Pentelic, *3*. Proconnesian, *4*. red porphyry, *5*. Mons Claudianus granite, *6*. Aswan granite, *7*. Troad granite, *8*. green porphyry (*serpentino*), *9*. Numidian (*giallo antico*), *10*. Thessalian (*verde antico*), *11*. Carystian (*cipollino*), *12*. *rosso antico*, *13*. Chian (*portasanta*), *14*. *Africano*, *15*. *breccia corallina*, *16*. Dokimeion (*pavonazzetto*)

sizes given to them then, hence the uniformity one can detect in Roman brick buildings that are still standing. But not only were their size and triangular shape standardized; occasionally also signs of a mechanized production process are visible from stamps that carry the name of either the owner (of the brickyards or *figlinae*) or the maker. In the late first century CE and firmly from CE110 onwards, bricks were more regularly stamped with date and names of the owner, of the brickyard, and sometimes even of the slave that made them. These owners were part of the elite, but over time (and definitely by the beginning of the second century CE), most brickyards became the property of the imperial family, causing further uniformity in production and acquisition processes (DeLaine 2000: 134).

Around this time, the same thing happened to the marble trade. The Romans' first acquaintance with the stone occurred via the marble statues and architectural elements that were looted as war booty from Greece and the East in the second century BCE. Its popularity grew quickly, and already Caesar, under whom the quarries for white Carrara marble were opened up, started taxing marble as a luxury good. Unlike the Greeks, however, Romans especially favored colored marbles for decorative purposes, almost all of which were quarried outside of Italy (Fig. 4). Triggered by the annexation of Egypt as Augustus' personal property, including its quarries of red porphyry and gray and pink granite, the potential economic benefits were soon realized and by the middle of the second century, almost all the major quarries in the provinces entered the hands of the imperial family. With this monopoly came a first significant reorganization of the marble trade, now overseen by imperial officials, and the processes of extraction, transportation, and sale were rigorously controlled and inspected. At a later stage, production (and accompanying revenue) was even further increased by the focus on mass production of half-finished products (e.g., sarcophagi) and on the creation of stocks, rather than on individual orders and individual building projects. Exploitation of the quarries reached new heights because of these changes: it is estimated that between 100 and 160 CE, the quarries at Dokimeion, Turkey, produced over 500,000 m^3 of marble (Waelkens 1990: 61–72). Long-distance trade in decorative stones on this scale remained unique prior to the modern period.

The Augustan Revolution

After two centuries of building in the newly created Hellenistic-Italic way, the reign of Augustus gave rise to the development of a new decorative program in Rome, which from there spread throughout the Roman world and ultimately defined what we still recognize today as "Roman." This was not a total break with what went on before: the same building types continued to be built, while building techniques continued to develop along the lines explored above. But it is obvious from Augustus' testament, the *Res Gestae Divi Augusti*, that he invested heavily in architecture, cleverly using it as another – successful – propagandistic tool and part of the implementation of an official visual language in his reorganization of Roman society, which he applied to every aspect of daily life, from coins to wall paintings to silver drinking cups (Zanker 1987). In order to legitimize his rule, Augustus needed to exhibit certain continuity between the old Republic and the new order and particularly achieved this through architecture: by evoking a partly Greek classical past in a new jacket, Augustus confirmed that Rome culturally equaled, if not surpassed, Greece.

This architectural innovation deliberately focused on specific building types, most notably temples and theaters. Early instances of the new style can be found at the Temple of Apollo Palatinus (36–28 BCE) and the Temple of Apollo Sosianus (almost contemporary and identical in execution), but already immediately after, it found its characteristic incarnation in the Temple of Mars Ultor (started in the 30s BCE) in the Forum of Augustus, dedicated in 2 BCE (Fig. 5). Many characteristics of its design and decoration became the norm and embodiment of the new Augustan architecture: it was completely built from Carrara marble (not just marble-clad); it incorporated the Romans' predilection for frontal views (as opposed to the Greek viewability from all sides), in this case by a *peripteros sine postico* plan (i.e., with columns only on three sides); it rose on a high podium (an incorporated Italic custom); and above all, its Corinthian order had been transformed into the developed Roman Corinthian, which among other minutiae included a heavy focus on acanthus leaves (which became

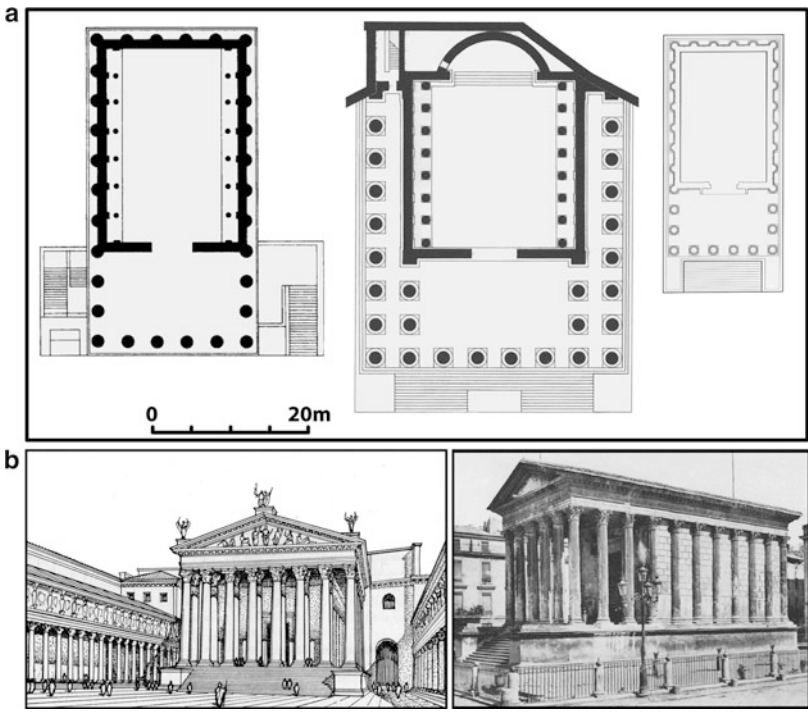

Architecture, Roman, Fig. 5 (**a**) Comparative plans of the Temple of Apollo Sosianus, Temple of Mars Ultor, and the Maison Carrée. (Stamper 2005: 120, Figs. 89, and 133, Fig. 97); (**b**) reconstruction of the Temple of Mars Ultor. (Boethius and Ward-Perkins 1970: 190, Fig. 85) and a photo of the Maison Carrée. (Zanker 1987: 256, Fig. 201)

omnipresent in Augustan art) and a new type of cornice enriched with modillions and coffering, finally giving the Corinthian order its own cornice, which it never had in Greece (Gros 1996: 145–47; Wilson Jones 2000: 139–42). Furthermore, whereas before the outside appearance of a temple needed visually to be the most impressive (following Greek and Hellenistic customs, as one still sees at the sanctuary of Fortuna at Palestrina), now the interior grew in importance and was decorated accordingly, with different types of lavish colored marbles for both flooring and the multistoried columnar displays along the walls. It is likely that in the new visual imagery, the different marble types were representations of the different geographical regions they came from, by then all Roman provinces. In short, the use of multicolored marbles stood symbol for the wealth, breadth, and power of the Roman Empire under Augustus or, even, the *Pax Augusta*.

Apart from temples, theaters also became the carriers of the new Augustan ideology. The Senate had only recently allowed the construction of permanent theaters in Rome, and thus they had a lot of potential to allow for innovation and manipulation. In the Campus Martius, Augustus constructed no less than three theaters (of Marcellus, of Balbus, and a thorough restoration of that of Pompey), together with other places for entertainment, the Saepta Julia and the amphitheater of Marcus Scaurus, in all of which he frequently mixed with the people (Zanker 1987: 151–57). Although this was a less subtle display of propaganda, it obviously pleased the people and the success of the theater was exported to every outpost of the empire; together with temples, they proved to be perfect vehicles for the dissemination of the Augustan ideology, and in one of those instances where Vitruvius (V, 3–9) seems to have been favorable of contemporary developments in architecture, he devotes a disproportionate amount of text on the Roman theater.

Imitation and Emulation: Roman Architecture in the Provinces

It is therefore not surprising to see the same architectural developments arise outside of Italy during the principate of Augustus. Before this time, Rome had only marginally, if at all, been involved in the architecture of the provinces. In the East (Greece, Asia Minor, the eastern Balkans, and Cyrenaica), a sophisticated, Hellenistic architectural tradition had existed for centuries, while in the West (Spain, Gaul, western Germany, Britain, and western North Africa), architectural traditions were poor and one could argue that any sign of monumentality was lacking. It is only to be expected that local influences and traditions continued to reverberate through the Roman occupation, but it is quite an achievement that today, we would instantly recognize cities or buildings as Roman from their architectural remains, even if they were located thousands of miles apart and had significantly different cultural backgrounds.

Both Spain and the south of France (*Gallia Narbonensis*), although part of the Roman Empire since 206 and 121 BCE, respectively, only received a distinctive monumentalization in their architecture from Augustus onwards, and it is noteworthy that the early examples seem to have been directly inspired by what went on in Rome: the Maison Carrée at Nîmes (Fig. 5), the temple to Augustus and Livia at Vienne, and the temple to Rome and Augustus at Barcelona were all based directly on the Temple of Mars Ultor. At Nîmes, the decoration is even so similar to that of the Ara Pacis, the other Augustan propaganda monument in the Campus Martius in Rome, that the same architect and/or workmen are believed to have worked on it. This influence from Rome continued: in Italica (Spain), birthplace of Trajan and Hadrian, Hadrian built the Traianeum, modeled on the same temple, while at Avenches (Switzerland), an almost exact copy to the Forum of Peace of Vespasian was built in Flavian times (Gros 1996: 151–59, 170, 184).

That there was much room for regional experimentation and other cultural influences, however, is clear from case studies on the so-called forum-basilica complex. This building type, in which the forum was lined with a basilica on one side and the main temple axially laid out lengthwise, could first be found at Silchester (United Kingdom), Lugdunum Convenarum (Saint-Bertrand-de-Comminges, France), and Baelo Claudia (Spain) in the first century CE, not just imitating but also

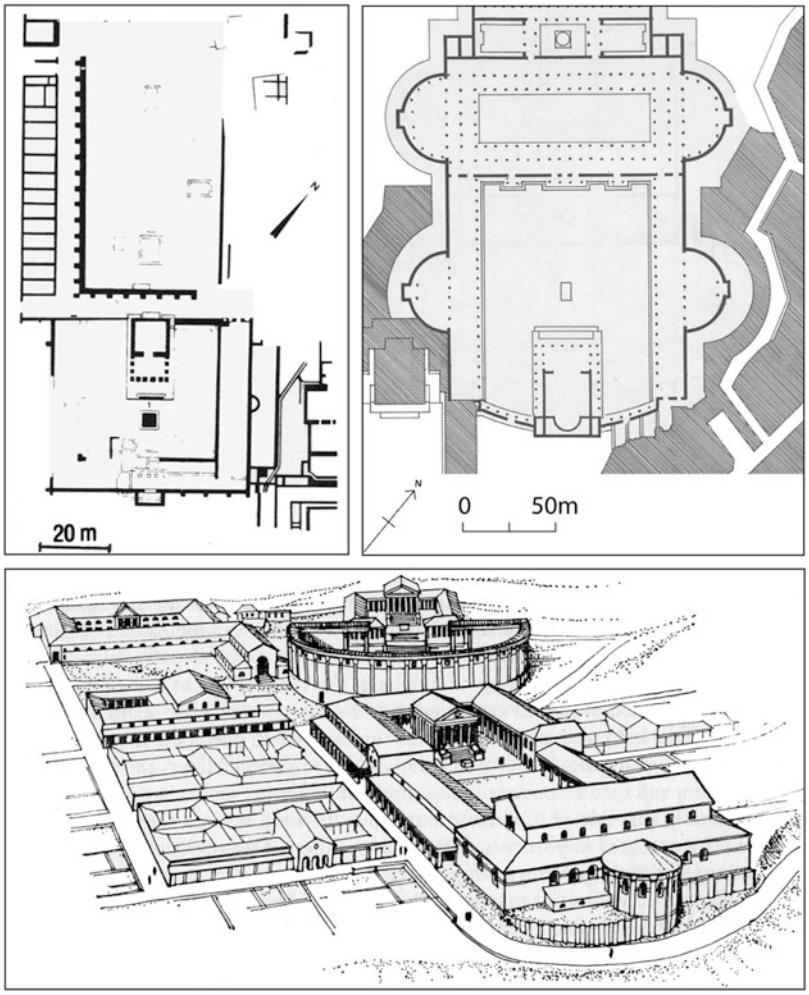

Architecture, Roman, Fig. 6 Plans of the forum-basilica complex at Lugdunum Convenarum. (Bedon et al. 1988: 218) and of Trajan's Forum in Rome according to R. Meneghini. (after Stamper 2005: 177, Fig. 133) and reconstruction of the complex at Augusta Raurica. (Boethius and Ward-Perkins 1970: 343, Fig. 131)

improving and standardizing the model of the Italian forum. After the transformation, it was exported back into Rome to find its ultimate translation into the Forum of Trajan, only to be copied again in the provinces, as at Augusta Raurica (Augst, Switzerland) (Gros 1996: 220–3; Fig. 6).

In North Africa, where a limited monumental architectural tradition had existed before, a much more hybrid style emerged, as not two but three cultural spheres came together: Roman, Berber, and Punic. Here, Roman-style temples could be dedicated to indigenous deities and vice versa, but decorative details often remained Punic in style. A representative example can be found at Lepcis Magna, when between CE14 and 19, a temple to Rome and Augustus was built. Its Ionic order, heart-shaped angle piers, and wooden architraves were all remnants of an indigenous Punic tradition, but at the same time, the temple was peripteral *sine postico*, approachable from the front only, and rested on a tall, vaulted podium with flanking stairs (Boethius and Ward-Perkins 1970: 466–67).

Asia Minor, the wealthiest of the Eastern provinces, tells a different picture altogether. The province of Asia, though already an early "conquest" (it was given to Rome by the last king of Pergamon in 133 BCE), kept its architecture quite comfortably rooted in the Hellenistic tradition for more than another 200 years. Roman

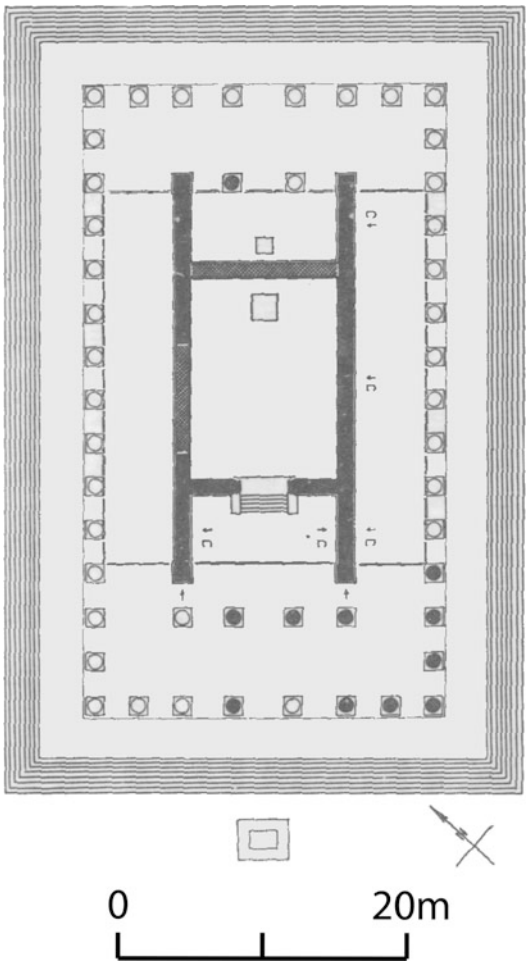

Architecture, Roman, Fig. 7 Plan of the Temple of Augustus and Rome at Ankara. (Akurgal 1973: 285, Fig. 118)

influences only started to trickle down slowly and in a piecemeal manner in the Augustan era. The Temple of Augustus and Rome at Ancyra was so rooted in Hellenistic fashion that it was once considered to have been built in the second century BCE (Fig. 7), while the contemporary Temple of Augustus and Men at Pisidian Antioch (but not the surrounding portico) followed the styles laid out at Rome, down to the details of the acanthus leaves. From Flavian times onwards, more hybrid structures with heavy influences from both backgrounds emerged. The Temple of Domitian at Ephesus and the Antonine Sanctuary of Zeus at Aizanoi are Ionic pseudodipteral temples (which pretend to have two rows of surrounding columns, but only have one), similar in style to the temple at Ancyra, but both were raised on a high podium (Boethius and Ward-Perkins 1970: 389–92; Lyttelton 1987). When pure Roman buildings arose, they are often directly linked to imperial involvement: an example is the Sanctuary of Asklepios Soter in Pergamon, the patron of which, Lucius Cuspius Pactumeius Rufinus, Hadrian met and befriended on his first visit to the city in CE124. It is likely that the sanctuary was dedicated in CE 129, on Hadrian's second visit, by which time it also included an exact half-scale copy of the Pantheon in Rome (Gros 1996: 182–183). By CE 142, Rufinus had achieved his goal of becoming consul in Rome.

This reluctance to take over Roman architecture wholesale probably lay at the base of the emergence of a specific type of architecture now commonly referred to as "marble style." The abundant availability of marble in the provinces of Greece, Asia Minor, and North Africa; the emergence of a rich elite in late Flavian and early Trajanic times; and the desire to compete not only between cities but also for political positions in Rome gave rise to a construction frenzy of monumental buildings for public use. While Rome was still turned to for inspiration, the style is very much a provincial emulation of what was contemporary custom in Italy. Based on the stage buildings of theaters in Rome (especially those of Scaurus [Pliny *HN* 34.36] and of Pompey), spectacular columnar facades of multiple orders and multiple marble types now started to appear in other buildings: monumental fountains or *nymphaea* (e.g., Olympia, Miletus [Fig. 8], Ephesus, Perge, Lepcis Magna), honorific arches (e.g., Lepcis Magna, Perge, the Arch of Hadrian at Athens), bath buildings (where a central room with this feature is now often called "Marmorsaal," e.g., Sardis and the Harbour Baths at Ephesus), and other public buildings (e.g., the Library of Celsus at Ephesus). It was only exported into Rome at a later stage, perhaps not coincidentally when under Septimius Severus (CE 193–211), the emperor from Lepcis Magna, a monumental fountain at the foot of the Palatine, called the Septizonium, was

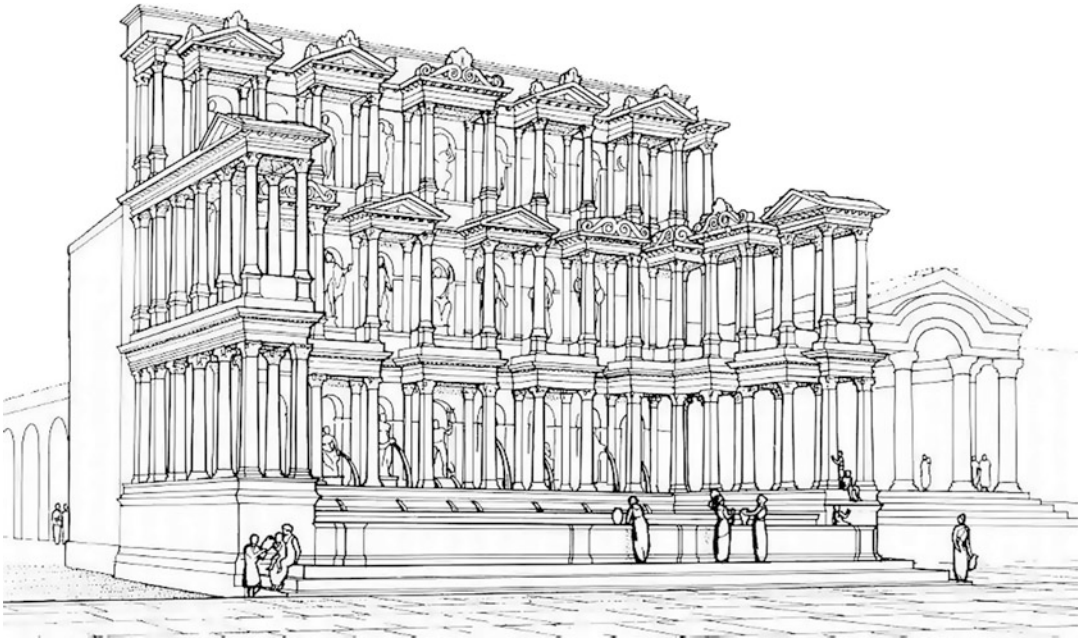

Architecture, Roman, Fig. 8 Reconstruction drawing of the *nymphaeum* at Miletus. (Boethius andWard-Perkins 1970: 404, Fig. 153)

constructed in this style (Boethius and Ward-Perkins 1970: 403–6).

Conclusion

It is clear that these four "drivers" can explain most of the development in the architecture in the Roman Empire. While stronger local influences survived in some places and unique variations exist everywhere, overall this consistent style of forms was established which today allows us to recognize structures all over Europe, North Africa, and the Middle East as part of the same architectural tradition.

Future Directions

Still acutely lacking in architectural studies is a thorough examination of the non-Etruscan, local Italic traditions in Italy at the advent of and during the Hellenization of the architecture. This transition has never been fully documented and the standard work on Hellenistic buildings of Italy is now over a century old (Delbruck 1907). More positively, recent decades (1990s and 2000s) have seen a still continuing shift of focus from the 1960s and 1970s increase in books on urbanism and building types to the neglected field of the constructional aspects of Roman architecture, including detailed studies on the way building sites were organized and on identifying individual groups of builders in the same building or town (e.g., DeLaine 1997; Lancaster 2005). New excavations, as well as never-executed detailed studies of even the most famous monuments, will contribute heavily to this research in the coming years.

Cross-References

- ▶ Amphitheater
- ▶ Fortifications, Archaeology of
- ▶ Topography of Rome
- ▶ Urban Planning, Roman
- ▶ Western Roman Provinces, Archaeology of the

References

Adam, J.-P. 1984. *La construction romaine*. Paris: Picard.

Akurgal, E. 1973. *Ancient civilizations and ruins of Turkey*. Istanbul: Hisat Kitabevi.

Anderson, J.C. 1997. *Roman architecture and society*. Baltimore: Johns Hopkins University Press.

Bedon, R., R. Chevalier, and P. Pinon. 1988. *Architecture et urbanisme en Gaule Romaine*. Vol. 2. Paris: Editions Errance.

Boethius, A., and J.B. Ward-Perkins. 1970. *Etruscan and Roman architecture*. Harmondsworth: Penguin Books.

Coarelli, F. 1987. *I santuari del Lazio in etàrepubblicana (Studi NIS Archeologia 7)*. Rome: La Nuova Italia Scientifica.

Coarelli, F. 2010. Substructio et Tabularium. *Papers of the British School at Rome* 78: 107–132.

Coulton, J.J. 1995. *Ancient Greek architects at work. Problems of structure and design*. Ithaca: Cornell University Press.

DeLaine, J. 1997. The baths of Caracalla. In *A study in the design, construction, and economics of large-scale building projects in imperial Rome (Journal of Roman Archaeology supplement 25)*. Portsmouth: Journal of Roman Archaeology.

DeLaine, J. 2000. Building the eternal city: The building industry of imperial Rome. In *Ancient Rome: The archaeology of the eternal city*, ed. J. Coulston and H. Dodge, 119–141. Oxford: Oxbow.

Delbruck, R. 1907–1912. *Hellenistische Bauten in Latium*. Strassburg: K.J. Trübner.

Gros, P. 1983. Statut social et rôle culturel des architectes (période hellénistique et augustéenne). In P. Gros (ed.) Architecture et société: de l'archaïsme grec à la fin de la République romaine: actes du colloque international, organisé par le Centre national de la recherche scientifique et l'Ecole française de Rome, Rome 2–4 décembre 1980. *Collection de l'École française de Rome* 66: 425–452.

Gros, P. 1996–2001. *L'architecture romaine, du début du III° siècle avant J.C., à la fin du Haut-Empire, 2 volumes*. Paris: Picard.

Lancaster, L. 2005. *Concrete vaulted construction in imperial Rome. Innovation in context*. Cambridge: Cambridge University Press.

Lyttelton, M. 1987. The design and planning of temples and sanctuaries in Asia Minor in the Roman imperial period. In *Roman architecture in the Greek world*, ed. S. Macready and F.H. Thompson, 38–49. London: Society of Antiquaries.

MacDonald, W. 1965–1986. *The architecture of the Roman Empire*. Vol. 2 volumes. New Haven/London: Yale University Press.

Rowland, I.D., and T.N. Howe. 1999. *Vitruvius. Ten books on architecture*. Cambridge, Cambridge University Press.

Stamper, J.W. 2005. *The architecture of Roman temples. The republic to the middle empire*. Cambridge: Cambridge University Press.

Torelli, M. 1995. Innovations in Roman construction techniques between the first century B.C. and the first century A.D. In *Studies in the Romanization of Italy*, ed. M. Torelli, 212–245. Edmonton: University of Alberta Press.

Waelkens, M. 1990. Technique de carrière, prefaçonnage et ateliers dans les civilisations classiques (mondes Grec et Romain). In *Pierre éternelle du Nil au Rhin. Carrière et préfabrication*, ed. M. Waelkens, 53–72. Brussels: Crédit Communal.

Wilson Jones, M. 2000. *Principles of Roman architecture*. New Haven and London: Yale University Press.

Zanker, P. 1987. *Augustus und die Macht der Bilder*. Munich: C.H. Beck.

Archival Research and Historical Archaeology

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Introduction

> Historical archaeology is a multi-disciplinary field that shares a special relationship with the formal disciplines of anthropology and history, focuses its attention on the post-prehistoric past, and seeks to understand the global nature of modern life (Orser 2004: 19).

Few archaeologists would have self-identified as a "historical archaeologist" before 1960 (Harrington 1952, 1955). In that year Stanley South started the Conference on Historic Sites Archaeology in conjunction with the Southeast Archaeological Conference. Later, in 1967, the Society for Historical Archaeology was founded. Yet, by that date, there had already been more than a century of what has been termed "text-aided archaeology" (Little 1992) in the Old World on Biblical, Chinese, Egyptian, Greek, Roman, and more recent medieval and post-medieval sites, and in the New World on ancient Mayan and early modern colonial sites in both terrestrial and underwater contexts. Most of these early endeavors were conducted with an eye toward sites associated with elites and were focused on historic preservation and site interpretation, that is,

to provide artifacts for display and evidence for reconstruction. Over time these evolved into numerous subfields (e.g., classical, medieval, maritime) while retaining their focus was on the post-prehistoric or historic, literate societies (Fontana 1965; Schuyler 1970). In the United States the historic preservation movement created an interest in sites of the historic period starting at such renowned sites as Williamsburg and Jamestown in Virginia and Fort Necessity in Pennsylvania.

In English-speaking North America the focus on the birth of the early modern global economy steadily began. Methodologically, "historical" archaeologists draw equally on both archaeological and documentary records to consider the processes associated with cultural continuity and change in the face of modernization and in giving a voice to those who were largely mute in the documentary record – women, people of color, children, and the poor. In 1977, the publication of South's method and theory book brought historical archaeology into a reliance on empirical patterns and systematic analysis of archaeological materials. Today historical archaeologists use the methods of history, anthropology, and archaeology to study the past. That is, to paraphrase Schuyler (1977), they use the written word, spoken word, observed behavior, and preserved behavior in their research.

Definition

Archives, simply put, are repositories in which public records or other primary historical records are stored. This may range from the great national archives such as the National Archives in the UK (http://www.nationalarchives.gov.uk/), formerly known as the Public Records Office located in Kew outside of London; the US National Archives and Records Administration (http://www.archives.gov/) located adjacent to the Capitol building in Washington, DC; the French Archives nationales, especially the overseas territories division (*Archives nationales d'outre mer*) (http://www.archivesnationales.culture.gouv.fr/); or the Archivo General de Indias in Seville (http://www.mcu.es/archivos/MC/AGI/index.html) where documents pertaining to four centuries of Spanish exploration and colonial administration are housed. Smaller repositories may focus on businesses (e.g., Hudson Bay Company Archives in Winnipeg), labor (e.g., George Meany Memorial Archives in Silver Spring, Maryland), the lives of specific individuals (e.g., Ludwig Beethoven at the Ira F. Brilliant Center for Beethoven Studies at San Jose State University in California), or places (e.g., the Louisbourg Institute of Cape Breton University; Santa Barbara Mission Archive-Library). In several European countries, there can be regionally run archives – in the England, for instance, each county has its own records office which holds archives especially pertaining to county matters, although not exclusively so. Regional and even local libraries may also have archival holdings. Sometimes primary documents are published such as those relating to French seventeenth-century trade items in the Illinois country (Pease and Werner 1934) or invoices for the Presidio of Santa Barbara (Perissinotto 1998). These provide researchers and students with real-world "touchstones" for the material culture of the fur trade or the Spanish colonial frontier, respectively.

The "written word" can include contemporary plans and insurance maps; newspapers; vital records concerning such matters as deaths, burials, marriages, and baptisms; deeds; probate inventories; census data; ethnohistorical and geographical accounts; and quantifiable documentary evidence including those relating to the value of exports, port activity, custom's duties, and expenditures for defense. All are especially useful for situating people and their associated settlements within the larger culture and world economy. For example, invoices, ledger books, reports, and eyewitness accounts have been used to identify artifacts and features found at Spanish California mission and presidio sites (Skowronek and Thompson 2006) and have been used to create ethnohistories of Native Peoples in the region (e.g., Hoover 1977).

Other forms of useful documentary evidence include contemporary letters and bureaucratic reports. From piracy and related economic concerns to diet and disease, documents have enormous descriptive value for the picture they paint of a community and the concerns of portions of

the populace. Additionally, these reports and letters may contain information on the construction and condition of buildings and vessels. This information might be used to chronicle building phases of a structure or to identify a shipwreck on the basis of the presence or absence of certain aspects of material culture. HMS *Fowey*, lost off the Cape of Florida in 1748, was identified using a combination of court martial proceedings and other primary documents using this technique (Skowronek and Fischer 2009). While documentary evidence can provide a revealing look at the options and choices available to past peoples, they do have limitations which often can be addressed by an analysis of the presence or absence of material evidence. For example, in the sixteenth-century letters from Santa Elena and St. Augustine in the Florida colony, there were complaints that when it came to diet only "vermin and scum" were available to sustain the communities. In fact, study of faunal and floral evidence demonstrates that a wide variety of both domesticated and wild comestibles were available to the settlers (Reitz and Scarry 1985). Other sixteenth-century Spanish communities vociferously complained of seemingly endless attacks by pirates or a continuing problem of smuggling. Study of the material culture from these sites demonstrates that role of piracy and smuggling was overblown in these documents and by subsequent researchers. In fact, the presumed contraband formed a rather insignificant part of the material record, and the vast majority of what was found may well have arrived through fully legal avenues of trade (Skowronek 1992).

Oral history, once a mainstay of history, fell out of favor at the end of the nineteenth century among those studying the West and its colonies. By that time the written word was considered to be the absolute and definitive primary source of information on the past. With a growing number of archives and publishing outlets, historians and political leaders of the era saw any form of non-written material as a lesser and weaker form of evidence associated with preliterate societies and illiterate peoples. As a result oral history passed into the realm of anthropologists and folklorists. By the last third of the twentieth century, social historians began to turn back to oral histories and the evidence provided by other social scientists to study the past. Oral history can fill in the gaps on particular subjects about which there is little or no information. Oral history can complement both the documentary and archaeological records with human experience and perception (Newland 1997). One of the early landmark projects in the USA which demonstrated the strength of the various avenues of inquiry was conducted at the Mott Farm in Rhode Island (Brown 1978). This study combined documentary history, oral history, and archaeology to more clearly illuminate a 300-year-long picture of human-land interactions. The farm, dating from the seventeenth century, was owned by the Mott family to just before the turn of the twentieth century. For the next century, another family lived on the property renting a portion of the home to a series of families. Brown's study included the traditional study of primary documents associated with the Mott family which provided information on how that family economically fared in their 200 years on the property. This included study of tax records, probates, and personal records. While similar documents were available for the twentieth-century occupants, these were supplemented with oral histories conducted with surviving members of those families. From these, information on trash disposal, outhouse location, and other usually forgotten aspects of life were recorded and later confirmed in the archaeological record.

Key Issues

Scholars continue to struggle over the primacy of the material, written, and spoken records. Documents may be overvalued in the face of contradictory material evidence. Documents may be unsystematically and uncritically used. Oral histories and ethnographic and ethnohistorical accounts associated with the direct historic approach to studying the past may be taken as unchanging traditions. Finally, there are continuing misperceptions regarding the nature of "science" and "history" as being separate and not comparable (Feinman 1997). What this means in the study of the past is that documents should neither be used uncritically nor

given precedence over material culture. Rather, historical analysis should be conducted in a systematic and scientific manner which contextualizes the documentary and material records against both the regional and larger global communities in which they were created. Both are likely to have what Michel-Rolph Trouillot (1995) has termed "mentions" and "silences," and what is left out of a written or material record is often as informative as what has been included.

Some 50 years have passed since the use of documentary evidence in archaeology was formalized under the umbrella of historical archaeology. The founders of the field were trained as prehistorians in anthropology programs. Their first forays, and those of many of their students, into this endeavor were poorly received by their colleagues and historians as being neither history nor science. Now, a new generation of historical archaeologists has taken to the field versed in the social sciences and humanities and questioning the ideas promoted in the culture history, processual, and post-processual approaches. Today the archaeological, ethnographic, documentary, and spoken records are powerful methodologies for the examination of history through the lens of historical archaeology (Little 2007). By using these complementary and nonexclusive data sets a more accurate and unbiased view of past peoples, and their associated cultures may be discerned by those willing to undertake an interdisciplinary open-minded approach to understanding the past.

Cross-References

- ▶ Charlton, Thomas H.
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Dating Methods in Historical Archaeology
- ▶ Deagan, Kathleen A.
- ▶ DeCorse, Christopher
- ▶ Deetz, James (Historical Archaeology)
- ▶ Historic Jamestowne
- ▶ Industrial Archaeology
- ▶ Little, Barbara J.
- ▶ Muckelroy, Keith (Underwater and Maritime Archaeology)
- ▶ Noël Hume, Ivor
- ▶ North America (USA): Historical Archaeology
- ▶ Oral Sources and Oral History
- ▶ Orser, Jr., Charles E.
- ▶ Plantation Archaeology
- ▶ Plimoth Plantation: Public Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Society of the Ship
- ▶ South, Stanley A.
- ▶ Western Europe: Historical Archaeology

A

References

Brown, M., III. 1978. The use of oral and documentary sources in historical archaeology: Ethnohistory at the Mott Farm. *Ethnohistory* 20: 347–360.

Feinman, G.M. 1997. Thoughts on new approaches to combining the archaeological and historical records. *Journal of Archaeological Method and Theory* 4: 367–377.

Fontana, B. 1965. On the meaning of historic sites archaeology. *American Antiquity* 31: 83–89.

Harrington, J.C. 1952. Historic site archaeology in the United States. In *Archaeology of the eastern United States*, ed. J.B. Griffin, 295–315. Chicago: University of Chicago Press.

Harrington, J.C. 1955. Archaeology as an auxiliary science of American history. *American Anthropologist* 57: 1121–1130.

Hoover, R.L. 1977. Ethnohistoric Salinan acculturation. *Ethnohistory* 24: 261–268.

Little, B.J., ed. 1992. *Text-aided archaeology*. Boca Raton: CRC Press, Inc.

Little, B.J., ed. 2007. *Historical archaeology, why the past matters*. Walnut Creek: Left Coast Press.

Newland, J.D. 1997. The disciplinary viewpoint from history and its application to historical archaeology. *Proceedings of the Society for California Archaeology* 10: 110–115.

Orser, C.E., Jr. 2004. *Historical archaeology*. Upper Saddle River: Pearson, Prentice Hall.

Pease, T.C., and R.C. Werner. 1934. Statement of account for Illinois trade. In *The French foundations, 1680–1693*, 162–175. Springfield: Illinois State Historical Library.

Perissinotto, G. 1998. *Documenting everyday life in early Spanish California: The Santa Barbara Presidio Memorias y Facturas, 1779–1810*. Santa Barbara: Santa Barbara Trust for Historic Preservation.

Reitz, E.J., and M. Scarry. 1985. *Reconstructing historic subsistence with an example from sixteenth-century Spanish Florida*, Special publication series, vol. 3. Glassboro: Society for Historical Archaeology.

Schuyler, R.L. 1970. Historical and historic sites archaeology as anthropology: Basic definitions and relationships. *Historical Archaeology* 4: 83–89.
Schuyler, R.L. 1977. The spoken word, the written word, observed behavior and preserved behavior: The contexts available to the archaeologist. In *Historical archaeology: A guide to substantive and theoretical contributions*, ed. R. Schuyler, 269–277. Farmingdale: Braidwood Publishing.
Skowronek, R.K. 1992. Empire and ceramics: The changing role of illicit trade in Spanish America. *Historical Archaeology* 26: 109–118.
Skowronek, R.K., and G.R. Fischer. 2009. *HMS Fowey lost . . . and found!* Gainesville: University Presses of Florida.
Skowronek, R.K., and E. Thompson. 2006. *Situating Mission Santa Clara de Asís: 1776–1851, documentary and material evidence of life on the Alta California frontier: A timeline*. Berkeley: Academy of American Franciscan History.
South, S.A. 1977. *Method and theory in historical archaeology*. New York: Academic Press.
Trouillot, M.-R. 1995. *Silencing the past: Power and the production of history*. Boston: Beacon Press.

Further Reading

Lyon, E. 1984. *Santa Elena: A brief history of the colony, 1566–1587*, Research manuscript series, vol. 193. Columbia: Institute of Archaeology and Anthropology, University of South Carolina.

Arctic Ocean and Bering Sea: Maritime Archaeology

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Physical Geography, Oceanography, and Climate

The Arctic Ocean is a unique place, with no analogue elsewhere on the planet. The world's largest confined ocean, its permanent sea-ice cover, creates a hostile and difficult environment for human research and occupation but is a crucial component of global climate and the ecology of the world ocean. The region's oceanographic characteristics, climate regime, and human adaptations are not matched by any other, and these factors have been emphasized in recent years as indicators of global warming bring dramatic changes to the Arctic.

Oceanographers consider the Arctic Ocean and its bordering seas to be the body of water surrounding the North Pole and bordered by Europe, Siberia, Alaska, Canada, and Greenland, occupying an area of approximately 14 million km^2 (Fig. 1). Major island groups are found off the European and Siberian coasts (Svalbard, Franz Josef Land, Novaya Zemlya, Severnaya Zemlya, and the New Siberian Islands) and throughout Canada's Arctic Archipelago. Bordering seas are the Barents, Kara, Laptev, East Siberian, Chukchi, Beaufort, Greenland, and Norwegian Seas. Broad and shallow continental shelves extend from the European and Siberian coasts and beneath the Chukchi Sea but are much narrower and deeper off Greenland and North America (approximately 30% of the surface area of the Arctic Ocean is underlain by continental shelves). Maximum depths are attained in the two main sub-basins of the Arctic Basin (the Eurasian and Canadian, with depths of c. 4200 and 3800 m, respectively). The Arctic Ocean is connected to the North Atlantic Ocean through Baffin Bay, and the Greenland and Norwegian Seas, and to the Bering Sea and North Pacific Ocean through Bering Strait. The largest rivers flowing into the Arctic Ocean are the Ob, Yenisei, and Lena (Siberia), and the Mackenzie (Canada).

The Bering Sea is bounded by Siberia on the west, Alaska to the east, and the Aleutian Islands chain to the south. The Bering Sea has its own special oceanographic characteristics, being neither Arctic nor temperate, with a fairly free exchange of water through the Aleutian arc with the North Pacific, and a quite restricted exchange with the Arctic Ocean through the narrow and shallow Bering Strait (c. 85 km wide and 45 m deep). In a typical winter, sea ice extends south to the Pribilof Islands but retreats north past Bering

Topographic map of the Arctic
(Source: CAFFs Arctic Biodiversity Trends 2010)

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 1 Map of the Arctic Ocean and Bering Sea

Strait during the summer. The Bering Sea is one of the most productive marine ecosystems on earth, especially along its extensive continental shelves.

The Arctic climate zone can be defined in a number of different ways. Two of the most prevalent are by latitude (above 66.56° N, the "Arctic Circle") and by temperature (the region bounded by the 10 ° C summer isotherm) (both shown in Fig. 1). The climate of the Arctic is characterized by strong seasonality: long, cold, and dark winters and short summers with long daylight hours (Nuttall and Callaghan 2000). The climate of the ocean itself is shaped by the year-round presence of the Arctic pack ice and by the physical processes of freezing and thawing of river, lake, and sea ice. The presence of ice cover has major influences on physical and biological processes within the ocean and atmosphere, as well as implications for human use and occupation. The Arctic Ocean is almost entirely ice-covered during the winter, while minimum ice extent is attained in late summer. However, Arctic sea-ice cover has undergone significant changes in the past two decades, with record lows for both summer minimum and winter

maximum ice extent. The lowest seasonal minimum extent was recorded in September 2012 and the second lowest in 2016. The overall trend is toward shorter ice-cover seasons and thinner ice cover in general. These data have raised speculation that the Arctic Ocean may see entirely ice-free summers as soon as 2030 (Stroeve et al. 2012). The rapidly changing conditions in the Arctic have important ramifications for global climate, human presence and research, as well as the archaeological record of the region.

Historical Background

Exploration and settlement of the Arctic is a very recent endeavor in terms of overall human history, coming essentially at the tail-end of over a million years of human dispersal from Africa. In the later Pleistocene, between approximately 45,000 and 25,000 years ago, modern humans expanded north and east across Eurasia into new regions. These previously unexplored habitats included Siberia up to approximately 60° N (and potentially further on a seasonal basis). These areas were, however, largely abandoned during the peak of the Last Glacial Maximum (LGM, c. 20,000–18,000 years ago) (Hoffecker 2005). In Western Europe, the Fenno-Scandinavian glaciers began to retreat around 12,000 BCE, and the earliest occupations of Northern Norway are dated to c. 10,000 BP. Many of the regional cultures arising in Scandinavia during the Mesolithic show a clear orientation toward maritime subsistence. The vast expanse of Northern Eurasia was also reoccupied during the climatic amelioration following LGM, with a variety of Late Pleistocene and Early Holocene cultures arising across most of Siberia.

The growth of polar ice caps and continental glaciations during the Pleistocene resulted in sea levels lowered as much as 120 m below those of the modern era. During much of the Middle and Late Pleistocene, the shallow continental shelf between Siberia and Alaska was thus exposed as dry land. The exposed land connection is often referred to as the "Bering Land Bridge," and the region from eastern Siberia to the Yukon Territory, encompassing the now-submerged Bering Land Bridge, is called "Beringia" (Hadleigh West 1996).

The existence of a land bridge between Asia and North America (and adjacent areas of exposed continental shelf) is of paramount importance for understanding theories of human colonization of the Americas. Although the possibility of maritime migration has been proposed (Dixon 1999), prevailing theories favor an overland route for the first humans in North America. The oldest archaeological sites in Alaska date to c. 15,000 BP, and by c. 4500 BP Paleo-Eskimo peoples had settled in northern Greenland.

Successful settlement of the Arctic was dependent on a number of specialized technologies and adaptations, especially those designed and used for maritime subsistence (such as skin boats and toggling harpoons). Tools such as the needle (for use in tailored clothing and sewing skin boat covers) were prerequisites for survival in the Arctic. Equally important was deep and intense knowledge of the Arctic marine environment, especially sea ice. A succession of cultures can be seen across the North American Arctic, from Paleo-Eskimo to Dorset and finally Thule peoples. The Thule migration from Alaska across the Canadian Arctic to Greenland around 1300 CE is remarkable for its speed and distance – nearly 4000 km from Bering Strait to Greenland, occurring over a single generation and possibly over just a few seasons! One possible impetus for this "dash across the top of the world" may have been trade in metals and other goods with Norse inhabitants of Greenland. Archaeological investigations of sites in Canada and Greenland show undoubted contact between Norse and indigenous inhabitants of the Arctic. The cultural affiliation of the people who encountered the Norse in Newfoundland and Labrador is not certain, but in the northern areas, they were met by Thule Eskimos – the ancestors of modern Inuit peoples. The nature of these interactions is a fascinating topic, explored by archaeologists in Canada and Greenland (see Fitzhugh and Ward 2000; Maschner et al. 2009).

The oldest maritime sites in the Arctic are camps and settlements of prehistoric maritime

cultures. The faunal remains discovered in these sites suggest use of a wide variety of maritime resources: from intertidal mollusks and fish to seals, walrus, and whales. Construction of reliable watercraft was both a necessity and a challenge in the treeless circumpolar environment. Most indigenous peoples in the coastal Arctic used skin boats: open (umiaks) and decked (kayaks). The frames of both umiaks and kayaks were constructed of driftwood and covered, as a rule, with marine mammal skins. Ivory, bone, or antler frame members were also occasionally used, and in some cultures the cover was made of caribou and even polar bear skins. The frames were lashed with baleen and sinew.

The overall chronology of skin boat development in circumpolar regions remains uncertain. As a key element of subsistence, skin boat technology has arguably been used since the very beginning of human population in the region. Recent maritime migration theories suggest that skin boats might have been a vehicle of human expansion across Beringia c. 20,000–10,000 BP (Dixon 1999). The oldest archaeological evidence for skin boats is a wooden rib from a kayak-like vessel excavated at the 4000-year-old Saqqaq site, West Greenland. Two-thousand-year-old ivory models from the Ekven cemetery near East Cape, Siberia, represent both umiaks and kayaks. Birch bark miniatures of umiaks and kayaks as well as fragments of skin boat frames from the Miyowagh and Hillside sites on St. Lawrence Island in the Bering Strait are within the same date range. Skin boat parts were recorded at the Birnirk site in the vicinity of Point Barrow (500–1300 CE), at the Deering site in Kotzebue Sound (821–1200 CE), at the Qilalukan site on Baffin Island, and in cave sites on Kagamil and Kanaga Islands in the Aleutian chain (890–1667 CE). On Labrador, remains of kayak frames and paddles have been discovered in late prehistoric/early contact period graves at various sites. Skin boat frame finds have also been recorded in archaeological sites of both west and east Greenland (Gulløv 1997). All archaeological skin boat components have been found in terrestrial sites; no underwater remains have been discovered to date. The presence of boat fragments in house remains and middens indicates reuse of wooden components and suggests a ritualistic significance of skin watercraft. Ethnographic data show that fragments of both kayaks and umiaks were kept as amulets ensuring prosperity and long life. In Greenland, ivory line holders from old kayaks were worn as protective charms on amulet belts. Stem and stern posts were often taken from older, dilapidated vessels and used in the construction of new boats, thus transferring the expertise of the previous generation in both physical and metaphysical senses. Boat elements among grave finds may also indicate that skin boats were considered necessary in the afterlife of the deceased.

Although important, all these finds provide only fragmentary information about the constructional details of circumpolar skin boats. Intact skin boat assemblages are rare in the circumpolar archaeological record. About one third of a kayak frame with associated implements was discovered in 1921 in Washington Land, North Greenland. Found on a hill slope, 40 m. above the sea, the kayak had been put there for future use some time in sixteenth or seventeenth century. The Peary Land umiak, the oldest complete circumpolar skin boat known today from the archaeological record, was deposited in similar circumstances (Fig. 2). Discovered by a Danish expedition to Peary Land, northeast Greenland, in 1949, it dates to the fifteenth century CE (Petersen 1986). Iron fasteners and an oak timber indicate that the makers of the Peary Land umiak were in contact with the Norse. Contact with nonnative explorers, settlers, and whalers in the Arctic had significant impacts on many aspects of indigenous life, including watercraft. Shifts in technology and subsistence resulting from newly introduced materials and trading opportunities, as well as from the decline of human and whale populations, changed skin boat construction and use. Today only a handful of native communities in the circumpolar north maintain traditional skin boat building.

The historical exploration of the Arctic is a topic that has fascinated the public (especially the race for "firsts" in polar exploration and achievement). The history of Arctic exploration

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 2 Skin boats

by European nations (essentially a maritime endeavor) has its roots in the sixteenth-century push for easier and more direct routes between Europe and Asia. Three routes were considered or attempted at various times: a route directly across the Arctic Ocean, the "Northwest Passage" through the Davis Strait and the Canadian Arctic Archipelago, and the "Northeast Passage" along the northern coasts of Scandinavia and Eurasia. Numerous expeditions, including those of Martin Frobisher (1576–1578), John Davis (1585), and William Baffin (1616), ventured into the eastern Arctic in search of routes across the top of North America (Delgado 1999). The Northeast Passage was also tried, for example, by Willem Barentsz in 1596. Others attempted to find the western terminus of the Northwest Passage by sailing through Bering Strait (i.e., James Cook, in 1778). Various traces of these expeditions, including remains of vessels, camps, and gravesites, have been investigated by archaeologists in the high Arctic.

The first attempt to find a sea route from Europe to Asia via the Northwest Passage was undertaken by Martin Frobisher in 1576–1578. Frobisher reached Baffin Bay and established a camp on Baffin Island, where the expedition prospected for gold. Frobisher's account is among the earliest written records of European-Inuit interaction. The Frobisher camp on Baffin Island has been excavated by joint Smithsonian Institution/Canadian Museum of Civilization project (the "Meta Incognita" project). The project also collected Inuit oral traditions relating to the Frobisher expedition (McGhee 2001).

Among the earliest attempts to sail the Northeast Passage was the voyage undertaken by Dutchman Willem Barentsz in 1596. Barentsz and his crew were forced to spend a winter on the northeastern tip of the island of Novaya Zemlya after their ship was crushed by ice in the Kara Sea (Fig. 3). Barentsz himself died during the trip, and the survivors among his crew returned to Amsterdam via Russia. The site of Barentsz's camp on Novaya Zemlya was apparently untouched for over 200 years but has been visited several times since then – initially by other mariners and finally by collectors and enthusiasts. A number of artifacts thus found their way into museum collections, mostly the Rijksmuseum in Amsterdam and the Arctic and Antarctic Museum in St. Petersburg. Most of the recovered objects pertain to shipboard life of the late sixteenth century, well-preserved by the cold climate. An archaeological survey of the site, undertaken in 1992 by a joint Dutch-Russian team, found little but wooden foundations of a house built of driftwood and ship's timbers by Barentsz and his crew (Hacquebord 1995).

Despite high costs and complicated logistics, underwater investigations have also been carried out in the Arctic. The first substantive underwater archaeology in the Arctic was a survey of the vessel *Maud*, a three-masted wooden schooner built in Asker, Norway, in 1917 for polar explorer Roald Amundsen. Amundsen, who had been the first to pass through the Northwest Passage in the sloop *Gjoa*, intended to reach the North Pole by freezing the ship in sea ice and drifting north. *Maud* was custom-built for his proposed Arctic research. Amundsen sailed from Norway in July of 1918, headed for the Northeast Passage. By mid-September of 1918, *Maud* was frozen in the

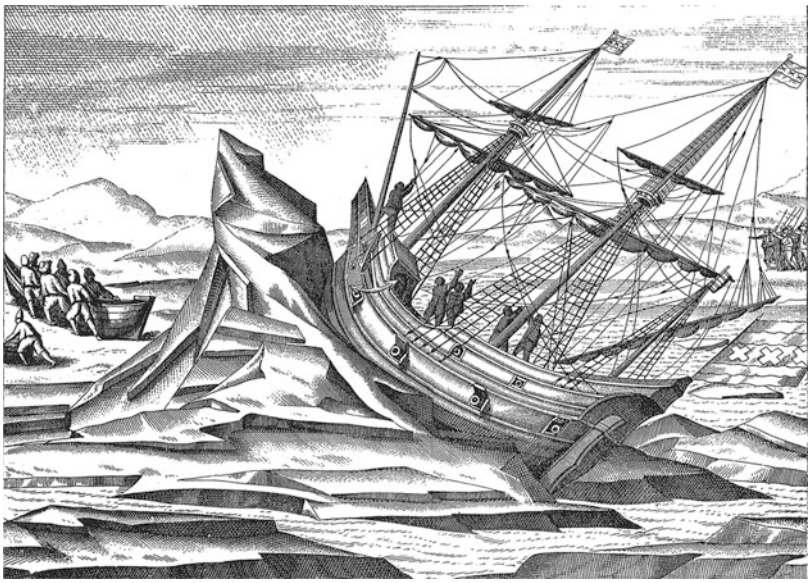

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 3 Frobisher's camp on Baffin Island

ice in the Laptev Sea. When *Maud* finally broke free in late summer of 1919, she was able to sail for only 11 days before freezing in again for the winter, this time near the mouth of the Kolyma River. After breaking free in the summer of 1920, Amundsen and his crew were able to pass through Bering Strait and put into Nome, Alaska. *Maud* was thus the second vessel to navigate the Northeast Passage (after N.A. Nordenskjold's *Vega*), and Amundsen became the first to pass through both the Northeast and Northwest Passages. Amundsen made two more attempts to freeze *Maud* in pack ice and drift to the pole but was thwarted each time, and the project eventually ran out of funds. *Maud* was seized by creditors in Seattle in 1922 and sold at the auction to the Hudson's Bay Company. The new owners renamed the vessel *Baymaud* and sent her to resupply company outposts in the Western Arctic.

In late 1927 the vessel froze in the ice at Cambridge Bay (Victoria Island). Shortly thereafter a leak developed that required repair facilities not available in the Arctic, and the vessel sank at her moorings in 1930. An underwater site inspection undertaken in 1996 determined that while the lower hull was substantially sound, much of the upper structure had degraded, largely due to ice action. The weather deck, except at the bow, is nearly completely destroyed, and the upper hull sides have been significantly broken down (Delgado 1997) (Fig. 4). *Maud* is officially owned by the Norwegian town of Asker, which bought the wreck from the Hudson's Bay Company in 1990. In August 2016, a team from Asker refloated the vessel and plans to transport her to Norway on a custom-built barge to be restored and opened as a museum ship.

Among the most sought-after underwater targets in the Arctic are those connected with the voyage and attempted rescue of the Franklin Expedition. In May of 1845, British Royal Navy ships HMS *Erebus* and HMS *Terror*, under the command of Sir John Franklin, departed England on a much-publicized expedition in search of a viable Northwest Passage route from Europe to Asia. Both vessels were reinforced for operation in the ice, and both had already seen service in previous Arctic voyages. Provisions were taken for a voyage of up to 3 years duration, as the expedition expected to overwinter on their passage. Both ships became trapped in ice in late 1846 in the Canadian archipelago. Franklin himself died in 1847, along with at least 23 crew members. The remainder of the crew abandoned the vessels and attempted an overland escape. None survived, and the vessels were lost to the ice.

After several years with no word or sign of Franklin, rescue operations were mounted. In

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 4 *Maud*, courtesy of Parks Canada

1850 the Royal Navy dispatched Captain Robert McClure with 66 men in HMS *Investigator*. McClure's orders were to round South America, pass through Bering Strait, and search for Franklin at the western end of the supposed Northwest Passage. Once in the western Arctic, McClure recognized Melville Island and realized that he had connected with parts of the archipelago previously reached from the east. After freezing in at Mercy Bay on Banks Island, the crew endured two harrowing winters before abandoning ship and sledging east. McClure and his crew were eventually rescued by other Royal Navy ships and upon their return to England were credited with the official discovery of the Northwest Passage.

The remains of HMS *Investigator* as well as the graves of three crew members were located in 2010 by a Parks Canada expedition. The wreck and associated debris field, initially located using side-scan sonar, rest in shallow water with the hull bottom buried in sediment. The hull appears to be substantially intact, although masts, rigging, and bulwarks have collapsed (likely as a consequence of damage from winter sea ice). Divers documented the vessel and recovered diagnostic artifacts and samples during a follow-up expedition in the summer of 2011 (Fig. 5). Parks Canada continued the search, and Franklin's vessel HMS *Erebus* was located in September 2014 in Queen Maud Gulf south of Victoria Island. A second breakthrough happened in September 2016 with the discovery of HMS *Terror* further north in Terror Bay. Both vessels rest upright on the bottom with significantly intact hulls. HMS *Terror* is

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 5 Documenting the remains of HMS *Investigator*, courtesy of Parks Canada

particularly well-preserved, with bowsprit and portions of masts intact. The wrecks have been designated a Canadian National Historic Site due to the significance of Franklin's voyage and the importance of the two ships in the history of Arctic exploration and navigation as well as the establishment of Canadian sovereignty in the Arctic. Several other wrecks have been identified in Canadian Arctic waters (notably *Albany* and *Discovery* (1720) in Hudson's Bay and *Breadalbane* (1853) in Lancaster Sound). All three are in excellent condition, owing to depth or protective landforms which have protected them from serious damage from sea ice.

The whaling industry followed close on the heels of the polar explorers and also left remains for archaeology. Whalers were active in the Greenland and Barents Seas by the early seventeenth century, although commercial whaling in the Western Arctic began only in 1848. Over the next century, more than 2700 whaling voyages were made into Arctic waters at the cost of more than 150 ships lost and the near extinction of the bowhead whale (Bockstoce 1986). Occasionally entire whaling fleets would be lost. In 1871, for example, almost the entire Yankee whaling fleet was trapped in the ice in the Chukchi Sea. Thirty-one ships were crushed and destroyed in this single incident. A project focusing on the wrecks of 1871 fleet, undertaken in 2005–2008, documented extensive wreckage and artifacts washed up along the shore of northwestern Alaska (Fig. 6). However, diver surveys of side-scan sonar targets were unable to identify in situ remains.

Underwater investigations are somewhat rarer along the Russian coast of the Arctic Ocean, although numerous wrecks are known historically. One significant wreck, the steam vessel *Chelyuskin*, was located in 2006 in the Chukchi Sea and declared an archaeological site. The *Chelyuskin*, a freighter that sailed eastbound from Murmansk in 1933 to prove the viability of transiting the Northeast Passage, was caught in sea ice, crushed, and sank off the north coast of the Chukotka Peninsula. The vessel was located with sonar in 2006 and subsequently visited by divers; the ship's identity was confirmed by recovered pieces sent to the shipbuilder for authentication.

Whaling stations and other early "Arctic frontier resource" settlements on Svalbard have also been subjects of investigation, primarily by Dutch and Norwegian researchers. Svalbard (Spitsbergen) was discovered by Willem Barentsz in 1596 while searching for a Northeast Passage route to Asia. The Englishman Henry Hudson, while serving in the Dutch East India Company, reported many whales in the area, and commercial whaling started in 1611. Shore stations were established by English and Dutch whaling enterprises throughout the Svalbard

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 6 Wreckage from the 1871 whaling fleet disaster, Wainwright, Alaska

archipelago as well as on Jan Mayen Island. Large furnaces were built to render whale blubber and wooden houses to lodge personnel. Although most whaling stations were abandoned by the early eighteenth century, mineral prospecting and mining camps soon took their place. Archaeological investigations of early camps and stations on Svalbard reflect not only the resource exploitation that followed the "Heroic Age of Polar Exploration" but also the subsequent geopolitical motives for establishing and maintaining settlements in the Arctic (Hacquebord and Avango 2009).

In contrast to the Arctic Ocean, maritime and underwater archaeology in the Bering Sea is in a state of complete infancy. Very few investigations have been attempted, despite the potential for significant cultural resources. One of the most significant projects to date is the joint Russian-Danish excavation of the campsite of Vitus Bering, on Bering Island. Bering and his crew shipwrecked on the island, at the western end of the Aleutian chain, in 1741 when returning from Alaska to Siberia. The investigation found ship's guns and timbers and identified the grave of Bering himself, who died and was buried during the sojourn on the island.

The only substantive underwater project conducted so far in the Bering Sea is the investigation of a side-wheel steamship, the *Eliza Anderson*, which wrecked at Dutch Harbor (Unalaska Island), in 1899. The vessel, in a worn and decrepit state, had been hastily outfitted to bring prospectors north from Seattle during the Klondike Gold Rush. The wreck was identified and surveyed in 2006 (Fig. 7).

Key Issues/Current Debates

There is currently no articulated comprehensive theory of Arctic maritime archaeology – partly due to gaps in scientific knowledge of the Arctic in general. Despite years of study by dedicated scientists, many basic questions remain to be answered. For example, we still do not have a definitive sea-level history for the Bering Strait or Arctic continental shelves, and bathymetry is patchy at best. The development of theoretical approaches to terrestrial archaeology in the Arctic has moved at a faster pace (i.e., Blankholm 2009; Westerdahl 2010), with several specialist journals dedicated to anthropological questions of the region. Regional maritime adaptations are regularly mentioned, although seldom analyzed in a circumpolar context. One reason for the lack of a more comprehensive theoretical approach may be due to a deficiency of truly multidisciplinary investigations; an accurate understanding of the full range of Arctic sites and formation processes requires the participation of not only a range of archaeological specialists but also marine and sedimentary geologists, oceanographers, cold-climate ecology scientists, and native tradition bearers.

Underwater site formation processes specifically may require a much broader assimilation of geophysical knowledge than heretofore assembled. For example, coastal erosion dynamics, vegetation regimes, and other ecological parameters are unlike those of any other region on earth and require investigation and definition. However, the most complex element of the Arctic maritime environment (and potentially significant for the preservation of submerged cultural remains) is the cyclical growth and movement of sea ice.

Ice formation and extent along Arctic coasts is seasonally variable. Ice formation generally begins in October and reaches an annual maximum in February or March; melting begins in May or June, and pack ice retreats during July and August. Most of the Arctic continental shelf is therefore under ice cover for 7–10 months each year. Pack ice is subject to immense wind fields, generated over a large area. The convergence of fields of moving pack ice (or pack ice impacting with shorefast ice) results in linear deformation features called pressure ridges. The intense pressures eventually build up ice masses both above the water's surface (ice sails) and below (ice keels). Ice gouging occurs where ice keels are driven into the seabed and are moved by the

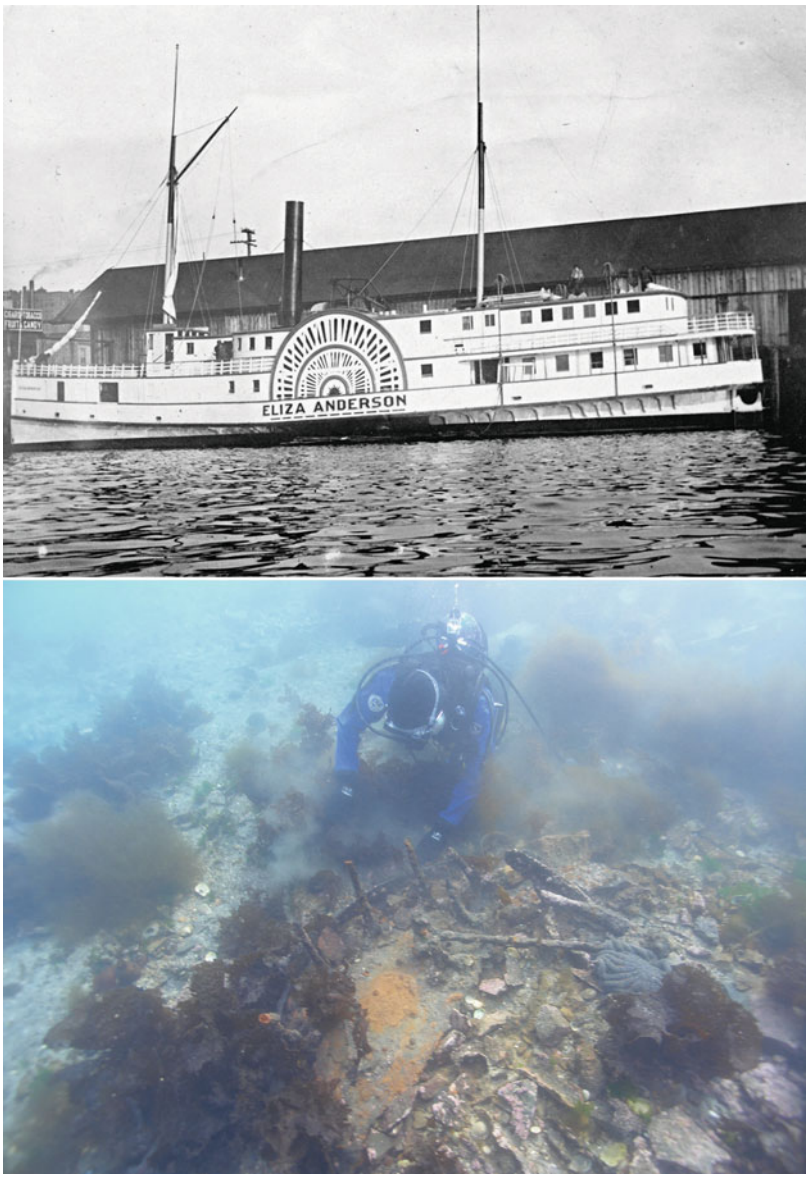

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 7 Remains of the *Eliza Anderson*, Dutch Harbor, Alaska

accumulated energies of the encompassing pack ice structure. The resulting furrows or tracks in the seafloor are described as ice gouges or ice scour (Wadhams 2000). Ice grounding and gouging is common in all Arctic coastal waters, from the sea's edge to considerable depths. Deep gouges tend to produce high flanking ridges to either side, creating combined vertical relief of up to 8 m. The highest gouge densities are in water between 20 and 40 m deep, as are maximum gouge depths. Gouges in water deeper than about 55 m are assumed by some researchers to be relict from periods of lower sea level, as modern ice features do not generally have keels extending beyond 60 m deep.

No comprehensive study has been undertaken regarding the potential effects of ice gouging on submerged archaeological sites and the

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 8 Sea ice, courtesy of National Snow and Ice Data Center

consequent ramifications for site formation processes. Regarding the Chukchi Sea, the US Minerals Management Service has concluded that "shipwrecks are likely to have survived in the area, especially those that may be at a depth beyond intensive ice gouging" (Mineral Management Service (MMS) 2007). Archaeological investigations of historic period shipwrecks near Wainwright on the Alaskan Chukchi coast found considerable amounts of nineteenth-century wreckage in the beach and intertidal zones, presumably gouged from the seafloor and washed ashore. Investigations in the Canadian Arctic have similarly concluded that wrecks would survive only if protected from pack ice. When considering the potential for archaeological resources along the Arctic Ocean margins, the effects of the ocean's dynamic and complex environmental processes must be taken into account (Fig. 8).

International Perspectives

Since the earliest European attempts to find northern sea routes to Asia and claim Arctic lands, the region has been the focus of geopolitical maneuvering and intrigue. The situation has only intensified as climate change opens Arctic waters and resource exploration increases. While there is a regular high-level intergovernmental forum of Arctic nations (the Arctic Council), many issues remain to be resolved. Maritime borders are unsettled or in dispute. As of 2016 not a single Arctic nation had ratified the United Nations Convention on the Protection of the Underwater Cultural Heritage (and several were actively opposed to the convention). International collaboration on scientific projects is common in the Arctic, but it remains to be seen whether such cooperation will be extended in the future to underwater archaeological investigations.

Future Directions

Archaeology in the Arctic Ocean faces two major interrelated sets of challenges in the near future: climate change and human impacts. As described in an article by Hans Peter Blankholm (2009), much recent concern and attention has been focused on environmental and ecological implications of climate change, while culture-historical issues have been relatively neglected. However, archaeological resources, both terrestrial and submerged, will undoubtedly be affected by changes now occurring in the Arctic.

The warming climate is resulting in pronounced reductions in sea ice, seasonal snow,

permafrost, and glacial features, with a corresponding shift in landscape processes. What does this mean for archaeological resources in the affected areas? Continuing widespread loss of discontinuous permafrost and increase in the active layer of remaining permafrost will trigger erosion and subsidence of ice-rich landscapes and change local and regional hydrologic processes. Coastlines will be increasingly exposed to wave action and storm surge. Direct impacts from coastal erosion as well as the loss of stable preservation (frozen site matrices) will be varying degrees of resource exposure, degradation, and destruction of buried/frozen cultural material. The effects on submerged archaeological sites are less clear, although reduced sea ice may result in reduced potential for damage from ice scour.

The other major factor likely to impact Arctic archaeological resources (especially in a submerged environment) is a dramatically increased human presence in the region. Approximately four million people currently live in the Arctic. Increased accessibility and intensified resource exploitation will likely bring larger number of people into the far north. Oil and gas drilling on Arctic continental shelves is already intensifying in Alaska's Chukchi and Beaufort Seas, Norway's Barents Sea, and elsewhere. Impacts to submerged archaeological sites are possible from extraction and transportation facilities, pipelines, and related infrastructure. Reduced sea ice will create opportunities for increased open-water transportation (especially cargo shipping but also cruise tourism) (Nuttall and Callaghan 2000). As the Arctic enters this uncertain phase, protection and responsible investigation of the region's cultural heritage is a key concern.

Cross-References

- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Indigenous Archaeologies
- ▶ Indigenous Peoples, Working with and for
- ▶ Maritime History
- ▶ Parks Canada: Historical Archaeology
- ▶ Peopling of the Americas
- ▶ Site Formation Processes
- ▶ Submerged Prehistoric Landscapes
- ▶ Underwater Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

Blankholm, H.P. 2009. Long-term research and cultural resource management strategies in light of climate change and human impact. *Arctic Anthropology* 46 (1–2): 17–24.

Bockstoce, J.R. 1986. *Whales, ice, & men: The history of whaling in the Western Arctic*. Seattle: University of Washington Press.

Delgado, J.P. 1997. *Made for the ice: A report on the wreck of the Hudson's bay company ship Baymaud, ex-Polarskibet Maud*. Vancouver: Vancouver Maritime Museum and Underwater Archaeology Society of British Columbia.

Delgado, J.P. 1999. *Across the top of the world: The quest for the northwest passage*. New York: Checkmark Books.

Dixon, E.J. 1999. *Bones boats & bison: Archaeology and the first colonization of western North America*. Albuquerque: University of New Mexico Press.

Fitzhugh, W.W., and E.I. Ward, eds. 2000. *Vikings: The North Atlantic saga*. Washington: Smithsonian Institution Press.

Gulløv, H.C. 1997. *From middle ages to colonial times: Archaeological and ethnohistorical studies of the Thule culture in south west Greenland 1300–1800 AD. Meddeleser om Grønland, man and society 23*. Copenhagen: National Museum of Denmark.

Hacquebord, L. 1995. In search of het behouden huys: A survey of the remains of the house of Willem Barentsz on Novaya Zemlya. *Arctic* 48 (3): 248–256.

Hacquebord, L., and D. Avango. 2009. Settlements in an Arctic resource frontier region. *Arctic Anthropology* 46 (1–2): 25–39.

Hadleigh West, F., ed. 1996. *American beginnings: The prehistory and paleoecology of Beringia*. Chicago/London: University of Chicago Press.

Hoffecker, J. 2005. *A prehistory of the north, human settlement of the higher latitudes*. New Brunswick/London: Rutgers University Press.

Maschner, H., O. Mason, and R. Mcghee, eds. 2009. *The northern world, AD 900–1400*. Salt Lake City: University of Utah Press.

Mcghee, R. 2001. *The Arctic voyages of Martin Frobisher: An Elizabethan adventure*. Seattle: University of Washington Press.

Mineral Management Service (MMS). 2007. Alaska continental shelf Chukchi Sea planning area. Oil and gas

lease sale 193 and seismic surveying activities in the Chukchi Sea. Final environmental impact statement: 1–3. Anchorage: Minerals Management Service, Alaska OCS Region.

Nuttall, M., and T.V. Callaghan, eds. 2000. *The Arctic: Environment, people, policy*. Amsterdam: Harwood Academic Publishers.

Petersen, H.C. 1986. *Skinboats of Greenland*. Roskilde: The Viking Ship Museum.

Stroeve, J.C., M.C. Serreze, M.M. Holland, J.E. Kay, J. Malanik, and A.P. Barrett. 2012. The Arctic's rapidly shrinking sea ice cover: A research synthesis. *Climate Change* 110: 1005–1027.

Wadhams, P. 2000. *Ice in the ocean*. Amsterdam: Gordon and Breach Science Publishers.

Westerdahl, C., ed. 2010. *A circumpolar reappraisal: The legacy of Gutorm Gjessing (1906–1979)*, BAR international series. Vol. 2154. Oxford: Archaeopress.

Further Readings

Anisimov, O., D.G. Vaughan, T.V. Callaghan, C. Furgal, H. Marchant, T.D. Prowse, H. Vilhjalmsson, and J.E. Walsh. 2007. Polar regions (Arctic and Antarctic). In *Climate change 2007: Impacts, adaptation and vulnerability. Contribution of working group II to the fourth assessment report of the intergovernmental panel on climate change*, ed. M.L. Parry, O.F. Cranziani, J.P. Palutikof, P.J. Van Der Linden, and C.E. Hanson, 653–685. Cambridge: Cambridge University Press.

Barnes, P.W., D.M. Rearic, and E. Reimnitz. 1984. Ice gouging characteristics and processes. In *The Alaskan Beaufort Sea: Ecosystems and environments*, ed. P.W. Barnes, D.M. Schell, and E. Reimnitz, 185–212. Orlando: Academic Press.

Barr, W. 2007. Discovery of the wreck of the soviet steamer Chelyuskin on the bed of the Chukchi Sea. *Polar Record* 43: 67–70.

Barry, R.G. 1989. The present climate of the Arctic Ocean and possible past and future states. In *The Arctic seas: Climatology, oceanography, geology, and biology*, ed. Y. Herman, 1–46. New York: Van Nostrand Reinhold Company.

Blankholm, H.P. 2004. Earliest Mesolithic site in northern Norway? A reassessment of Sarnes B4. *Arctic Anthropology* 41 (1): 41–57.

Bonnichsen, R., B.T. Lepper, D. Stanford, and M.R. Waters, eds. 2005. *Paleoamerican origins: Beyond clovis*. College Station: Texas A&M University Press.

Brigham-Grette, J., A.V. Lozhkin, P.M. Anderson, and O.Y. Glushkova. 2004. Paleoenvironmental conditions in western Beringia before and during the last glacial maximum. In *Entering America: Northeast Asia and Beringia before the last glacial maximum*, ed. D.B. Madsen, 29–61. Salt Lake City: University of Utah Press.

Bronshtein, M. 2007. *World of Arctic maritime hunters: Steps into the unknown. Exhibition catalogue*. Moscow/Anadyr: State Museum of Oriental Art.

Coachman, L.K., and K. Aagaard. 1974. Physical oceanography of the Arctic and subarctic seas. In *Marine geology and oceanography of the Arctic seas*, ed. Y. Herman, 1–72. New York: Springer.

Coachman, L.K., K. Aagaard, and R.B. Tripp. 1975. *Bering strait: The regional physical oceanography*. Seattle/London: University of Washington Press.

Collins, H. 1937. Archaeology of St. Lawrence Island, Alaska. Washington: Smithsonian Miscellaneous Collections 96(1).

Comiso, J.C., C.L. Parkinson, R. Gersten, and L. Stock. 2008. Accelerated decline in the Arctic Sea ice cover. *Geophysical Research Letters* 35. https://doi.org/10.1029/2007GL031972.

Cooke, A., ed. 1984. *Sikumiut: "The people who use sea ice"*. Ottawa: Canadian Arctic Resources Committee.

Dixon, E.J. 2011. Late pleistocene colonization of North America from Northeast Asia: New insights from large-scale paleogeographic reconstructions. *Quaternary International* 2011. https://doi.org/10.1016/j.quaint.2011.02.027.

Eicken, H., L.H. Shapiro, A.G. Gaylord, A. Mahoney, and P.W. Cotter. 2006. *Mapping and characterization of recurring spring leads and Landfast ice in the Beaufort and Chukchi seas*. Anchorage/Fairbanks: MMS Alaska Environmental Studies Program; University of Alaska Geophysical Institute.

Fitzhugh, W.W., ed. 1975. *Prehistoric maritime adaptations of the circumpolar zone*. The Hague: Mouton Publishers.

Fitzhugh, W.W., and J.S. OLIN, eds. 1993. *Archeology of the Frobisher voyages*. Washington: Smithsonian Institution Press.

Fladmark, K. 1979. Routes: Alternative migration corridors for early man in North America. *American Antiquity* 44: 55–69.

Ford, J. 1959. *Eskimo prehistory in the vicinity of point barrow, Alaska*. New York: Anthropological Papers of the American Museum of Natural History.

Grønnow, B. 1994. Qeqertasussuk – The archaeology of a frozen Saqqaq site in Disko Bugt, West Greenland. In *Threads of Arctic prehistory: Papers in honor of William E. Taylor, Jr*, Archaeological survey of Canada, mercury series, ed. D. Morrison and J.-L. Pilon, vol. 149, 197–238. Hull/Quebec: Canadian Museum of Civilization.

Herman, Y., ed. 1989. *The Arctic seas: Climatology, oceanography, geology, and biology*. New York: Van Nostrand Reinhold Company.

Hill, J.C., and N.W. Driscoll. 2008. Paleodrainage on the Chukchi shelf reveals sea level history and meltwater discharge. *Marine Geology* 254: 129–151.

Hood, B. 2006. *Towards an archaeology of the nain regin, labrador*. Contributions to circumpolar anthropology 7, Arctic Studies Center, National Museum of Natural History. Washington: Smithsonian Institution.

Hood, D.W., and E.J. Kelly. 1972. Introduction. In *Oceanography of the Bering Sea*, ed. D.W. Hood and E.J. Kelly, xv–xxi. Fairbanks: University of Alaska Institute of Marine Science.
Hopkins, D.M. 1967. *The Bering land bridge*. Palo Alto: Stanford University Press.
Hopkins, D.M., J.V. Matthews Jr., C.E. Schweger, and S.B. Young, eds. 1982. *Paleoecology of Beringia*. New York: Academic Press.
Hultén, E. 1937. *Outline of the history of Arctic and boreal biota during the quaternary period*. Stockholm: Borforlag Aktiebolaget Thule.
Jablonski, N., ed. 2002. *The first Americans: The Pleistocene colonization of the New World*, Memoirs of the California Academy of Sciences number. Vol. 27. San Francisco: University of California Press.
Jakobsson, M., J.V. Gardner, P.R. Vogt, L.A. Mayer, A. Armstrong, J. Backman, R. Brennan, B. Calder, J.K. Hall, and B. Kraft. 2005. Multibeam bathymetric and sediment profiler evidence for ice grounding on the Chukchi borderland, Arctic Ocean. *Quaternary Research* 63: 150–160.
Knuth, E. 1952. The Danish expedition to Peary Land, 1947-49. *The Geographical Journal* 118 (1): 1–9.
Kozlowski, J., and H. Bandi. 1984. The Paleohistory of circumpolar Arctic colonization. *Arctic* 37 (4): 358–372.
Krupnik, I., C. Aporta, S. Gearheard, G.L. Laidler, and L.K. Holm, eds. 2010. *SIKU: Knowing our ice – Documenting inuit Sea-ice knowledge and use*. Dordrecht: Springer.
Len'kov, V.D., G.L. Silant'ev, and A.K. Staniukovich. 1992. *The komandorskii camp of the bering expedition*. Trans. K. Arndt, ed. O. Frost. Anchorage: Alaska Historical Society.
Macinnis, J.B. 1985. *The land the devours ships: The search for the Breadalbane*. Toronto: CBC Enterprises.
Madsen, D.B., ed. 2004. *Entering America: Northeast Asia and Beringia before the last glacial maximum*. Salt Lake City: University of Utah Press.
Mathiassen, T. 1927. The Thule culture and its position within the Eskimo culture. Copenhagen: Gydendalske Boghandel, Nordisk Forlag.
Mcghee, R. 2009. When and why did the Inuit move to the eastern Arctic? In *The northern world, AD 900–1400*, ed. H. Maschner, O. Mason, and R. Mcghee, 155–163. Salt Lake City: University of Utah Press.
Mcmanus, D.A., J.S. Creager, R.J. Echols, and M.L. Holmes. 1983. The Holocene transgression on the Arctic flank of Beringia: Chukchi Valley to Chukchi estuary to Chukchi Sea. In *Quaternary coastlines and marine archaeology*, ed. P. Masters and M. Flemming, 365–388. New York: Academic Press.
Morrow, J.E., and C. Gnecco, eds. 2006. *Paleoindian archaeology: A hemispheric perspective*. Gainesville: University Press of Florida.
Nelson, W.H., and F. Barnett. 1955. A burial cave on Kanaga Island, Aleutian Islands. *American Antiquity* 20 (4): 387–392.
Rogers, J.S. 2009. The *Eliza Anderson*: An early Puget Sound steamer shipwrecked in Dutch Harbor, Alaska. *The sea chest. Journal of the Puget Sound Maritime Historical Society* 43 (2): 51–61.
Savours, A. 1999. *The search for the north west passage*. New York: St. Martin's Press.
Stroeve, J.C., M.M. Holland, W. Meier, T. Scambos, and M.C. Serreze. 2007. Arctic Sea ice decline: Faster than forecast. *Geophysical Research Letters* 34. https://doi.org/10.1029/2007GL29703.
Veer, G.D. 1964 (reprint of 1876). *The three voyages of William Barentsz to the Arctic regions*. New York: Burt Franklin.
Westerdahl, C. 1992. The maritime cultural landscape. *International Journal of Nautical and Maritime Archaeology* 21: 5–14.

Argentina: Maritime Archaeology

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Introduction

Despite its long-standing tradition in archaeology and its vast maritime littoral and other waterways, the study of the relationship between humans and water through material remains has not had much development in Argentina.

The traditional focus has been in pre-Hispanic societies, either nomadic or sedentary, and almost exclusively from a land perspective. The few cases when water was considered within the cultural system under study were usually triggered by the presence of artifacts (like harpoons or other fishing devices) or ecofacts (such as fish, shellfish, or sea mammals remains) in the archaeological record. Until recently topics such as navigation and watercrafts per se, whether prehistoric or more recent, have been almost absent in the Argentinean archaeological research projects, let alone venturing into the water to study submerged archaeological remains of any sort.

Since the mid-1990s, however, the fields of maritime and underwater archaeology have been steadily growing, leading to a number of research projects and various other activities dealing with the country's underwater cultural heritage.

Definition

As the discipline of maritime archaeology continues to develop, so does its definition and the debate on the various topics of study it can comprise (Catsambis et al. 2011). In general terms, however, it could be defined as the study, through material remains, of past human cultures in their relation with the sea and occasionally with inland waters. Typical examples of the latter have to do with seafaring, given that oceans, rivers, and lakes are frequently connected and are navigated without distinction.

It is in that broad sense that the concept of maritime archaeology is used in this entry. Besides, although ships are not the only subjects of study, they were chosen to be the focus here not only because of their direct association with water but also because they are good representatives of maritime archaeology in Argentina.

Historical Background

Prior to the development of maritime and underwater archaeology with scientific standards, there had been various instances in which submerged archaeological remains were dealt with (see Elkin 2002; Ciarlo 2008). In the first decades of the twentieth century, they mostly had to do with isolated finds of shipwreck elements which ended up in museum or private collections, in most cases lacking contextual information.

By the 1970s archaeologist Jorge Fernández became involved in the extraction of a wooden canoe from a lake in Patagonia by guiding from the surface the work performed by professional divers and by later describing and interpreting the find (Fernández 1978).

The 1980s was characterized by several activities conducted by an ICOMOS-Argentina working group, mainly comprised by architects-divers, who had the initiative of building capacity in underwater archaeology techniques (see Elkin 2002). The main project in which this group became involved was the survey of the British sloop of war HMS *Swift*, sank in Puerto Deseado – currently Santa Cruz Province – in 1770, and which had been discovered by local divers in the early 1980s. The work was focused on the in situ recording of the hull structure as well as the excavation of some artifacts (Murray 1993; García Cano 1998).

In the early 1990s, a nonprofit organization called Fundación Albenga, directed by Architect J. García Cano, continued to work at the *Swift* site undertaking nonintrusive surveys (García Cano 1996).

The mid-1990s represents a major turning point in the discipline, with the simultaneous birth of two research teams in which archaeologists-divers played a leading role. One of the teams, known as PROAS for the acronym of *Programa de Arqueología Subacuática*, is based at the National Institute of Anthropology in Buenos Aires, under the direction of this author. The other one is based at the National University of Rosario (Santa Fe Province), under the direction of Mónica Valentini. Both groups have been very active since then – sometimes working in partnership with other institutions – and they usually involve specialists from other fields who contribute to the interdisciplinary aspects of the projects. Additionally, both teams have not only been conducting archaeological research but also implementing many initiatives related to raising awareness on the protection of underwater cultural heritage and contributing to capacity building at different levels (Elkin 2003; Valentini 2003).

Key Issues

This section presents the main ongoing or recent archaeological projects in maritime archaeology for which published data is already available. Figure 1 shows the geographic location of each of the case studies.

Argentina: Maritime Archaeology, Fig. 1 Map of Argentina with the location of the areas, sites, and projects mentioned in this entry. *a* Nahuel Huapi Lake, *b* Zencity wrecksite, *c* Reta wrecksite, *d* Valdés Peninsula, *e* HMS *Swift* wrecksite, *f Hoorn* wrecksite, *g* Monte León National Park, and *h* Atlantic coast of Tierra del Fuego

Studies on Navigation in Patagonian Lakes

The ethnographic and historical record of the Patagonian lakes, rivers, and maritime shorelines (on both sides of the Andes) provides descriptions on three main types of canoes made of local tree species which were used at the time of contact with European explorers, missionaries, and settlers. One was the *dalca*, made of

sawn wooden planks and which could be dismantled to be transported on land. Another type was made of sawn bark planks and was mostly used by the Yamanas and Alakaluf in the southernmost tip of the continent; these groups mainly travelled along maritime waterways connecting the numerous islands and fjords around Tierra del Fuego. The third type of canoe, called *huampo* or *huampu* in some regions, was dug out from a single tree trunk with the aid of fire and initially using lithic and occasionally shell-made tools, later replaced by metal ones.

As stated earlier, back in the 1970s, archaeologist Jorge Fernandez was the first one to address the study of a wooden canoe. It was dug out from a single trunk of a beech tree and was recovered from the Nahuel Huapi Lake close to the city of Bariloche. Since, aside from the use of fire, there was evidence of the use of metal tools in its manufacture and traces of metal corrosion, it was chronologically attributed to a period between the mid-seventeenth and late nineteenth century (Fernández 1978).

Ferncndez continued to study and compare various other canoes of this type found by different people in the Andean lakes of Northwest Patagonia, also taking into account historical, ethnographic, and geographic information in his research. On that basis, combined with early archaeological evidence in an island in the Nahuel Huapi Lake which cannot be reached without some watercraft device, he concludes that the seafaring tradition in the region (including the rivers and lakes on the western side of the Andes) must date from prehistoric times (Fernández 1997).

The topic of the Patagonian lake district seafaring has been addressed more recently by other researchers, in Argentina especially by Romina Braicovich (Braicovich 2006; Braicovich and Caracotche 2008). She studied a number of dugout canoes found in the Nahuel Huapi Lake, including some of the ones previously studied by Fernández (Fig. 2). She concludes that all of them probably belonged to local people who lived in the area between the late 1800 and the early decades of 1900 (Braicovich 2004 in Braicovich 2006: 62–3). However, like Fernandez and like Hajduk (Hajduk 1997 in Hajduk and Valentini 2002), she also points out the existence of rock paintings and radiocarbon datings of c. 2000 BP in Victoria Island in the Nahuel Huapi Lake, which suggest that the local aboriginal groups had been navigating in that area since much earlier times (Braicovich 2006: 55–6).

Argentina: Maritime Archaeology, Fig. 2 Dugout canoe known as *Canoa Correntoso* extracted in 1968 from the Nahuel Huapi Lake, close to the town of Villa La Angostura. (Photograph from the Historical Museum Archive, Villa La Angostura, Neuquén)

Far away from the Patagonian lake district, similar indirect evidence of seafaring comes from Isla de los Estados (Staten Island), east of Tierra del Fuego in the South Atlantic Ocean. The island has an archaeological record which goes back to 2700 BP, although no boat remains from those times were found yet (Borrero 2001).

Studies on Shipwreck Sites in the Río de la Plata and the Atlantic Ocean Coast

The Zencity Shipwreck

This site consists of a wooden ship found in 2008 in the city of Buenos Aires, in the riverfront district of Puerto Madero, a place where many landfills have taken place particularly after a harbor was built in the late nineteenth century.

The find took place during the excavations for an urban development construction complex called Zencity. The recording and excavation of the site was therefore conducted as rescue archaeology within a period of 90 days, as a Project of the Dirección de Patrimonio e Instituto Histórico of the Ministry of Culture of the City of Buenos Aires. A recent publication by M. Valentini and J. García Cano (Valentini and Cano 2011) provides a summary of the main results achieved so far in the archaeological research of this site.

The Zencity wreck was a medium-sized (no more than 30 m of deck length) vessel, with a complete hold from bow to stern, and a design which optimized the use of stowage space. The in situ recording of hull and artifacts was done with the aid of the computer software PhotoModeler, which allows a 2D and 3D digital reconstruction.

The combination of the constructive characteristics of the ship and the analysis of the archaeological remains indicate it was a Spanish merchant ship which arrived to the city of Buenos Aires in the second half of the eighteenth century. Preliminary dendrochronological dating of various oak timbers places the ship's construction in the mid-eighteenth century.

The hull was made of European oak, which suggests the vessel was built in the northern region of Spain, where oak forests were available. This northern Spain shipbuilding tradition, known as Cantabrian tradition, made an intensive use of oak trees and produced vessels which were highly sought after due to their resistance, durability, and strength.

Regarding the artifact collection, the most abundant items are ceramic containers known as *botijas* (olive jars), which were found in the stowage sectors of the ship's hold (Fig. 3). Over 200 *botijas* of different sizes were found, both complete and fragmented. They all have a cone-shaped base and lack handles, a practical shape for sea transportation. There is evidence of wheel throwing for the manufacture of the body, while the neck could be finished by hand. Some of these *botijas* were found sealed with a stopper in place and with olive seeds inside.

The *botijas* from the Zencity wreck represent one of the largest collections in Argentina of this type of container. It was used in the oceanic trade

Argentina: Maritime Archaeology, Fig. 3 Some of the botijas found in the Zencity wreck. (Photograph courtesy of Mónica P. Valentini and Javier García Cano)

between Spain and the port of Buenos Aires in colonial times and played an essential role in the transportation and storage of products for this remote region of the Spanish empire.

Other type of artifacts found in the site includes metal fittings such as wrought iron tacks, nails, and bolts, all of them consistent with the Spanish manufacture techniques reported for the period, as well as different types of smoking clay pipes, most of them fragmented. The rest of the collection comprises various metal, wood, and ceramic artifacts, as well as animal bone remains.

The hull structure of the ship was reburied in a nearby location that provides similar environmental conditions to the ones which had preserved the ship for so long. It was then covered with various layers of geotextiles and other materials which contribute to its preservation. The reburial site is monitored by constant soundings in precise locations which allow the control of variables such as humidity, salts, oxygen, and acidity.

As it is the case with other former European maritime powers, the study of merchant ships has been often neglected in comparison with warships built by or for the state, and the Zencity wreck presents an excellent opportunity to shed light on the topic.

The Reta Shipwreck

Reta is a seaside resort located nearly 600 km south of the city of Buenos Aires. Due to the presence of an unidentified wooden wreck located on the beach above the intertidal zone, in 2002 a joint team from the University of Rosario and the *Fundación Albenga* conducted a survey and excavation of the site (Fig. 4) that revealed a nearly 30-m-long structure. Subsequent metallographic and chemical studies made on samples of plates and tacks from the metal sheathing showed that the first consisted of a copper-zinc alloy (60% and 40%, respectively), which was patented by Muntz in 1832 and soon became of general use (Lorusso et al. 2003). On the basis of the survey and research, the authors have concluded that the ship very probably dates from the late nineteenth century (Valentini 2003).

The Peninsula Valdés Project

The Valdés Peninsula in Chubut Province is a UNESCO World Natural Heritage site, featuring a spectacular marine wildlife. The nearby city of Puerto Madryn, gateway to the peninsula, is also the main scuba-diving destination in Argentina, offering a number of activities including shipwreck diving.

Argentina: Maritime Archaeology, Fig. 4 Survey of the Reta wrecksite. (Photograph courtesy of Mónica P. Valentini and Javier García Cano)

The context summarized above seemed to provide a good platform for developing public awareness and public outreach initiatives. With that general goal in mind, the PROAS team started a pilot project in the Madryn-Valdés area which comprised a preliminary survey of existing shipwrecks (both historic and modern), followed by a more detailed in situ recording and investigation of selected sites. In the long term, the Madryn-Valdés Project is expected to contribute to the development of cultural tourism in the area.

The first field seasons and archival research conducted in the initial stages of the project revealed the presence of some 30 shipwrecks and ship-related sites in the area, 6 of which were selected on the basis of their historical, archaeological, and/or touristic significance (Elkin and Murray 2008). The site that has been studied more thoroughly to date will be described below.

Bahía Galenses 2 (BG2) consists of the remains of an unidentified wooden vessel located in one of the Southern beaches of Puerto Madryn city. Lying in the intertidal zone, it consists of a 28-m-long section of a hull that was becoming increasingly exposed to the elements. A preliminary nonintrusive survey suggested that the original vessel may have been built in the eighteenth or nineteenth century.

With the goal of conducting a more specific assessment of the cultural and chronological affiliation of this wreck, archaeological field seasons were carried out between 2006 and 2016 (Fig. 5). The work consisted of the following (Elkin et al. 2015; Murray et al. 2009):

Completing a site plan of the exposed structure.

Digging several test pits around the perimeter in order to better understand the nature and position of the structure.

Excavating three cross-section trenches in the middle and end sectors of the site (considered potentially diagnostic).

Surveying diagnostic features of the structure.

Taking samples of the wooden structure, metal fittings, and any other material that could contribute to its understanding.

Argentina: Maritime Archaeology, Fig. 5 Recording of structural components of BG2 site

Excavating the surroundings of the main site, where parts of a ship structure and an apparent cauldron were located.

The archaeological research revealed that the structure is part of a wooden-sailing ship, probably a merchant or fishing vessel of 300–500 t burden, which could have sank due to a fire possibly around the mid-nineteenth century. Botanical taxonomic analysis indicated that European and American wood were used in the construction. Interestingly, the archaeological evidence seems to coincide with historical documentation that indicates the presence of a shipwreck in the area by the time the first Welsh settlers arrived, as well as with the reported salvage of wood from such wreck by the Welsh (Coronato 1997). This inference is based on the fact that some of the buried timbers show evidence of non-recent cutting with an axe or a similar sharp-edge tool. Further botanical and chemical analyses will be conducted for BG2 seeking a better understanding of this wrecksite.

The HMS Swift

HMS *Swift* was a British sloop of war lost in 1770 after striking a sunken rock in the Deseado estuary, Santa Cruz Province, Southern Argentina.

The site was discovered in 1982 by local divers from Puerto Deseado at a depth of 18 m within what is nowadays the commercial harbor area. After several interventions in the site during the 1980s and early 1990s – mainly by the aforementioned ICOMOS-Argentina working group – since 1998 the archaeological research has been conducted by the underwater archaeology team of the National Institute of Anthropology.

The *Swift* is characterized by its outstanding preservation, constituting one of the most complete archaeological examples of an eighteenth-century Royal Navy sloop worldwide. This is mainly due to the anaerobic conditions created by the fine-grained sediment that covers the archaeological remains. It is estimated that about 60% of the original wooden hull structure is preserved and the archaeological assemblage comprises a great variety of artifacts made of ceramic, metal, glass, wood, stone, and bone. Other organic remains have been found too, mostly associated with clothing, food, and rigging. During a field season conducted in 2005–2006, a complete human skeleton was unexpectedly discovered.

The general goal of the project was to record in situ as much of the hull structure as possible and to excavate selected sectors of the ship in order to address the main research themes under study: ship construction, contemporary technologies, relationship between material culture and status, diet, site formation processes, and, due to the finding of human remains, health and other bioanthropological topics. Along 15 field seasons conducted to date, significant progress has been accomplished (Elkin et al. 2007, 2011).

Regarding the study of the ship construction, the main results indicate that significant alterations have taken place in the rigging and the decks layout, probably with the purpose of adapting the vessel to transoceanic sailing and other aspects of its service.

The technological characteristics of the ship itself and the artifact collection is, in general terms, consistent with what was standard for the cultural and chronological period under study.

As for the relationship between material culture and status, despite the presence of Chinese export porcelain and other high-quality and elaborate artifacts associated with the officers, some other items they used, including furniture and personal belongings, were made quite coarsely or lacking decorative traits. It is worth noting, nonetheless, that some of the furniture was provided by the British Admiralty and would not necessarily reflect the officers' choice. Regarding the ordinary seamen, to date only a few artifacts can be associated to them. These mainly consist of leather shoes, wooden bowls or parts of them, and glass beer-type bottles.

The food remains found in the site allowed concluding that the diet was quite varied, including fruit and vegetables – although not necessarily fresh – and complemented with local resources such as penguin eggs.

The study of site formation processes revealed a significant attack of marine borers both in some sectors of the main deck of the ship and in some of the artifacts, the latter located at different depths within the sediment matrix. The characteristics of the tunnels correspond to those made by molluscs, although no living or dead specimens which could allow their precise taxonomic identification were found.

The discovery of human remains in the site opened a new line of research within the project, initially based on the hypothesis that they corresponded to one of the three men reported as dead after the sinking, two of which were private marines.

The bones correspond to a male individual, around 25 years of age (range 17–34), measuring 1.67 m of height, probably right handed, and with an overall good health. In turn, the analyses of several elements which were found in association with the skeleton such as buttons, buckles, and fragments of leather corresponding to spatterdashes indicated that the person found in the site must have been wearing a uniform of some sort. Additionally, chemical studies conducted on traces of cloth attached to the upper body revealed it was red wool like the jackets which were worn only by the marines.

On a parallel research strand, DNA was extracted from selected bone samples taken from the archaeological skeleton. However, the fact that it is mitochondrial DNA – only transmitted by females – poses considerable challenges in the tracking down of relatives. Nonetheless, genealogical studies will be conducted in an attempt to identify the skeleton found in the *Swift* site at an individual level.

The 2010 field season at the *Swift* allowed investigating the topic of health on board by means of excavating a compartmented wooden chest full of what seemed to be medicinal items. Most of the containers correspond to pharmaceutical vials of the time, an interpretation which is already being supported by the analyses of some of the contents (Edwards and Maier 2011 in Elkin et al. 2011). These include substances such as pure mercury – believed to cure syphilis – and extracts of natural substances which could have been used for treating various ailments.

The Hoorn

In the early seventeenth century, Dutch merchants Jacob Le Maire and Willem C. Schouten engaged in a major sea voyage in search of a new passage to the Spice Islands. Shortly after crossing the Atlantic Ocean, the two vessels of the expedition entered into the Deseado estuary, and one of them, the *Hoorn*, accidentally caught fire and was lost while being careened on the shore in 1615.

A bilateral research project conducted by Argentinean and Dutch archaeologists (Damián Vainstub and Cristian Murray, from PROAS-Argentina, and Martijn Manders, from the National Service for Archaeological Heritage (ROB) of Holland) began in 2003 with the goal of locating and studying the remains of the vessel. The combination of a thorough review of various historical sources, an analysis of the coastal geomorphology, and some surveys along selected coastal zones allowed to locate the wrecksite. A few elements from the *Hoorn* were found on an intertidal pebble beach, although no structural remains of the ship could be seen. The main archaeological evidence comprised allochthonous rocks interpreted as ballast materials,

Argentina: Maritime Archaeology, Fig. 6 Analyzing the images of the side-scan sonar survey in the Hoorn project

various ceramic shards from the chronological and cultural context under study, and melted metallic fragments made of pewter and brass alloys, silver, and lead (some of which contained carbon fragments and seeds inside), which surely resulted from the fire on board (Murrray et al. 2007).

Subsequent side-scan sonar and magnetometer (Fig. 6) surveys, combined with selected scuba diving, focused on the adjacent seabed. This allowed the location of ferrous concretions which were later X-rayed, revealing the impressions of corroded iron artifacts such as nails, fittings, and bolts (Murrray et al. 2007, 2008).

No hull remains were found underwater or on land, probably due to the combination of the dynamic environment of the location and to salvage activities that must have taken place along several centuries.

Despite the relatively few archaeological remains from the *Hoorn* that have survived, it is the earliest identified shipwreck site in Argentina to date.

The Monte León Project

Monte León is a national park located in Santa Cruz Province, being the first one in the country's national parks system to include an ocean coastline and which stretches along some 40 km.

Although the entire Patagonian coast has been intensively explored – and eventually colonized –

from the sixteenth century onward, from the maritime history point of view, the central coast of Santa Cruz Province, where the Park is located, has an additional appeal: one of the vessels of Hernando de Magallanes, the Nao *Santiago*, was lost in the area in 1520, in the context of the renowned voyage around the world carried out between CE 1519 and 1522.

Partly due to this situation, which causes periodical amateur expeditions in seek of the famous wreck, but also with the more general goal of assessing the maritime heritage of the park, the PROAS team was requested to conduct a coastal field survey.

After an initial compilation of various sources which could shed light on the potential nature and location of archaeological remains related to seafaring in the region (including, of course, historical documents related to Magellan's expedition), two seasons were carried out in the park in 2006 and 2007, respectively.

The archaeological surveys were conducted along the intertidal zone, which not only was the most reasonable one for a baseline study but also because it was the one in which the various documents analyzed in relation to Magellan's expedition suggested that the *Santiago* was lost.

During both field trips, interviews with local people were conducted, and the recording of materials previously extracted from the area took place.

Although no remains were found of the *Santiago* (nor any vessel from the period), the archaeological survey of the coast of the Monte León National Park revealed the presence of at least two wooden shipwrecks. Both of these probably date from the second half of the nineteenth century, both are between 300 and 500 t burden, and one of them was built with European woods (Elkin 2011). It is expected that future research will allow testing some hypotheses regarding which specific vessels the archaeological remains belong to.

The Atlantic Coast of Tierra del Fuego Project

The archipelago of Tierra del Fuego and surrounding islands is located at the southernmost part of the Americas, and it is characterized by quite challenging navigation conditions. Prior to the opening of the Panama Canal in 1914, seafaring between the Atlantic and Pacific oceans required facing the rough waters of the region, leaving behind a large number of shipwrecks which are reported in various historical accounts.

In 2010 the *Museo del Fin del Mundo*, based in the city of Ushuaia, sets forth an archaeological project which includes the goal of locating remains of historical shipwrecks along the Atlantic coast of Tierra del Fuego island and conducting preliminary surveys on them. The first field season allowed to locate around 20 sites consisting of various types of shipwreck remains (Vázquez et al. 2010), and further surveys allowed a better understanding of the sites, the methodological approaches which appeared to be more effective in them, and their site formation processes (Elkin et al. 2017).

Future Directions

Along two decades of development, and with the aid of more experienced countries that have provided theoretical and practical training in maritime and underwater archaeology, Argentina is now quite well positioned in the field. Little by little the specialty is also attracting younger generations of students and graduates who engage in various activities such as courses, underwater and coastal work, and even in the production of university-level dissertations. Since 2016 the Department of Anthropology of the School of Philosophy and Letters of the University of Buenos Aires has started to offer an undergraduate level regular academic course in maritime or underwater archaeology.

The awareness regarding the importance and fragility of the underwater cultural heritage is also increasing within the sport diving community and the general public. The Argentinean professionals who work in maritime archaeology periodically carry out courses, lectures, mass media interviews, and other activities that contribute to that goal.

Regrettably, however, the human and financial resources not only in Argentina but in the whole South American region are still too scarce to implement anything but small-scale projects, even without excavation. Additionally, the field of conservation of waterlogged materials is almost inexistent.

As for management, the national legislation provides a blanket protection for all underwater archaeological sites of at least 100 years of age, but due to the aforementioned scarcity of resources, the effective protection and management of such heritage is still far from becoming a reality. In the meantime, a central goal at the national government level is the development of a register of underwater cultural heritage sites, which will eventually be integrated into an archaeological register hosted at the National Institute of Anthropology. So far the data – obtained in the vast majority from written and oral sources – has been compiled either in the form of simple spreadsheets or in a database in access format. The next step will consist of starting to use GIS tools that can provide cross-references between the data and specific geographical locations. In turn, this will allow defining areas with greater or lesser potential for underwater cultural heritage and optimizing the planning and implementation of archaeological surveys. The use of remote sensing techniques, still very seldom used in the country, would certainly contribute to achieve such goal.

Last but not least, in 2010 Argentina ratified the UNESCO Convention on Underwater Cultural Heritage. Such a significant political step, combined with the existing basis of professionals and avocationals engaged in maritime and underwater archaeology, leads to believe that the field will continue to grow and so will the knowledge of the maritime past of the nation.

Cross-References

- ► Convention on the Protection of the Underwater Cultural Heritage (2001)
- ► Underwater Archaeology

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References

Borrero, L. 2001. *El Poblamiento de la Patagonia. Toldos, milodones y volcanes*. Buenos Aires: Emecé Editores.

Braicovich, R. 2004. Las canoas del Parque Nacional Nahuel Huapi. Tesis de Licenciatura en Antropología. Departamento de Antropología, Facultad de Humanidades y Artes, Universidad Nacional de Rosario. MS.

Braicovich, R. 2006. Las canoas monóxilas del lago Nahuel Huapi. In *Arqueología Histórica en América Latina. Temas y discusiones recientes*, ed. P.P.A. Funari and F.R. Brittez, 49–70. Mar del Plata: Suárez.

Braicovich, R., and S. Caracotche. 2008. Una biografía de las canoas monóxilas de la región andina norpatagónica. Perspectivas para su memoria y conservación. En CD-ROM. *3eras Jornadas de Historia de la Patagonia*. San Carlos de Bariloche: Organizado por Centro Regional Universitario Bariloche; Universidad Nacional del Comahue.

Catsambis, A., B. Ford, and D. Hamilton, eds. 2011. *Oxford handbook of maritime archaeology*. Oxford: Oxford University Press.

Ciarlo, N. 2008. La arqueología subacuática en Argentina. Reseña histórica de los antecedentes, desarrollo de la especialidad y estado actual de las investigaciones. *Revista de Arqueología Americana* 26: 41–70.

Coronato, F. 1997. The first Welsh footstep in Patagonia: The primitive location of port Madryn. *The Welsh History Review* 18 (4): 639–666.

Edwards, H. G. M. and M.S. Maier. 2011. Análisis por espectroscopia Raman de especímenes arqueológicos del naufragio del HMS Swift, 1770. In: Elkin, D. C. Murray, R. Bastida, M. Grosso, A. Argüeso, D. Vainstub, C. Underwood y N. Ciarlo. 2011. El naufragio de la HMS Swift (1770). Arqueología marítima en la Patagonia. Sección Estudios Especializados, 101–108. Buenos Aires: Vázquez Mazzini Editores.

Elkin, D. 2002. Water. A new field in Argentinean archaeology. In *International handbook of underwater archaeology*, ed. C.V. Ruppé and J.F. Barstad, 313–329. New York: Kluwer Academic/Plenum Publishers.

Elkin, D. 2003. Arqueología Marítima y Patrimonio Cultural Subacuático en Argentina. El trabajo actual desarrollado por el Instituto Nacional de Antropología y Pensamiento Latinoamericano. In *Protección del Patrimonio Cultural Subacuático en América Latina y el Caribe*, 26–33. La Habana: UNESCO.

Elkin, D. 2011. Shipwreck archaeology in South America. In *Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D. Hamilton, 685–707. Oxford: Oxford University Press.

Elkin, D., and C. Murray. 2008. Arqueología subacuática en Chubut y Santa Cruz. In *Arqueología de la costa patagónica-Perspectivas para la conservación*, ed. I. Cruz and S. Caracotche, 109–124. Río Gallegos: Universidad Nacional de la Patagonia Austral.

Elkin, D., A. Argüeso, M. Grosso, C. Murray, D. Vainstub, R. Bastida, and V. Dellino. 2007. Archaeological research on HMS *Swift*: A British sloop-of-war lost off Patagonia, Southern Argentina, in 1770. *International Journal of Nautical Archaeology* 36 (1): 32–58.

Elkin, D., C. Murray, R. Bastida, M. Grosso, A. Argüeso, D. Vainstub, C. Underwood, and N. Ciarlo. 2011. *El naufragio de la HMS Swift (1770) – arqueología marítima en Patagonia*. Buenos Aires: Vázquez Mazzini Editores.

Elkin, D., C. Murray, M. Grosso, G. Gutiérrez, M. Trassens, and R. Bastida. 2015. Investigaciones interdisciplinarias en sitios arqueológicos de naufragio en el golfo Nuevo (Provincia del Chubut): Primeros resultados. *Cuadernos del Instituto Nacional de Antropología y Pensamiento Latinoamericano* 24 (1): 20–39.

Elkin, D., C. Murray, and M. Grosso. 2017. Arqueología de naufragios históricos en la costa atlántica fueguina. In *Patrimonio a orillas del mar: Arqueología del litoral atlántico de Tierra del Fuego*, ed. M. Vázquez, D. Elkin, and J. Oría, 207–237. Ushuaia: Editora Cultural de Tierra del Fuego.

Fernández, J.C. 1978. Restos de embarcaciones primitivas en el lago Nahuel Huapi. In *Anales de Parques Nacionales*, vol. XIV, 45–77. Buenos Aires: Ministerio de Economía, Secretaría de Estado de Agricultura y Ganadería.

Fernández, J.C. 1997. Canoas arqueológicas de un palo (Huampus) recuperadas en los lagos andinos del noreste patagónico. Clarificación de los encuentros navales que en 1883 Sostuvieron patrullas del 7° de Caballería de Guarnición en Neuquén. *Anuario de la Universidad Internacional SEK* 3: 49–63.

García Cano, J. 1996. Operación no intrusiva en un sitio de arqueología subacuática en Argentina. El caso de la Sloop H.M.S. Swift. *Anuario de la Universidad Internacional SEK* 2: 45–65.

García Cano, J. 1998. HM sloop of war *Swift*, lost in Patagonia 1770. In *Excavating ships of war*, ed. M. Bound, vol. 2, 177–181. Oxford: University of Oxford, Anthony Nelson.

Hajduk, A. 1997. Tras los "puelches del Nahuelguapi". Ampliación de estudios arqueológicos en el Sitio Puerto Tranquilo (P.T.I.) - Isla Victoria, Parque Nacional Nahuel Huapi (Departamento Los Lagos, Provincia del Neuquén). Informe al CONICET. MS.

Hajduk, A., and M. Valentini. 2002. Prospecciones subacuáticas en el Nahuel Huapi: El caso del sitio Cancha de Pelota. In *Actas del I Congreso Nacional de Arqueología Histórica*, 369–387. Buenos Aires: Corregidor.

Lorusso, H., H. G. Svoboda, and H. De Rosa. 2003. Caracterización microestructural de componentes metálicos hallados en el pecio de Reta. San Carlos de Bariloche *Jornadas SAM/CONAMET* 1103–1106.

Murray, C. (Coord.) 1993. *Corbeta de Guerra HMS Swift -1763-. Historia, naufragio, rescate y conservación*. Buenos Aires: Comité Argentino del ICOMOS, Museo Provincial Mario Brozoski y Municipalidad de Puerto Deseado.

Murray, C., D. Vainstub, M. Manders, and R. Bastida. 2007. El naufragio del Hoorn -1615-. Prospecciones costeras y subacuáticas en la Ría Deseado (Santa Cruz – Argentina). In *VI Jornadas de Arqueología de la Patagonia. Arqueología de Fuego-Patagonia. Levantando piedras, desenterrando huesos… y develando arcanos,* 351–355. Punta Arenas. Ediciones CEQUA.

Murray, C., D. Vainstub, R. Bastida, and M. Manders. 2008. *Tras la estela del Hoorn – Arqueología de un naufragio holandés en la Patagonia*. Buenos Aires: Vázquez Mazzini Editores.

Murray, C., M. Grosso, D. Elkin, F. Coronato, H. De Rosa, María A. Castro, R. Bastida, and N. Ciarlo. 2009. Un sitio costero vulnerable: El naufragio de *Bahía Galenses* (Puerto Madryn, Chubut, Argentina). In *Arqueología de la Patagonia: Una mirada desde el último confín*, Tomo 2, ed. M. Salemme, F. Santiago, M. Alvarez, E. Piana, M. Vazquez, and M.E. Mansur, 1093–1108. Ushuaia: Editorial Utopías.

Valentini, M.P. 2003. Reflexiones bajo el agua. El papel de la Arqueología Subacuática en la protección del Patrimonio Cultural Sumergido en la Argentina. In *Protección del Patrimonio Cultural Subacuático en América Latina y el Caribe*, 37–45. La Habana: UNESCO.

Valentini, M.P., and J.G. Cano, eds. 2011. *Un mercante español en el puerto de Buenos Aires. Historias y hallazgos de Puerto Madero*. Buenos Aires: Dirección de Patrimonio e Instituto Histórico. Ministerio De Cultura. Ciudad Autónoma de Buenos Aires.

Vázquez, M., M. Álvarez, R. Barberena, K. Borrazzo, L. Borrero, D. Elkin, M. Grosso, C. Murray Cristian, J. Oría, M. Salemme, and F. Santiago. 2010. Programa Arqueológico Costa Atlántica: hacia la preservación del patrimonio arqueológico costero en tierra del fuego. In *Arqueología Argentina en el Bicentenario de la Revolución de Mayo. VII Congreso Nacional de Arqueología Argentina. Tomo II*, ed. R. Bárcena and H. Chiavazza, 558–562. Mendoza: Facultad de Filosofía y Letras, Universidad Nacional de Cuyo.

Argentine Society of Anthropology

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The Argentine Society of Anthropology (SAA) was founded on April 24, 1936 by a group of pioneers dedicated to Anthropology and other related disciplines. The founding meeting was chaired by the then director of the Ethnographic and Anthropological Museum (Faculty of Philosophy and Letters of the University of Buenos Aires), Félix F. Outes. Francisco de Aparicio, Eduardo Casanova, José Imbelloni, Fernando Márquez Miranda, Enrique Palavecino, Felix Outes, and Milcíades Vignati were also present. The Society has had a long and fruitful life, although with the ups and downs of the entities of this nature, inevitably linked to the political and economic swings of the country. Today it has dedicated more than eight decades to the national anthropological discipline (http://www.saantropologia.com.ar).

The mission of the Argentine Society of Anthropology, as expressed in Art. 2 of its Statutes, is "to promote anthropological research in the country and coordinate the efforts of those who today dedicate themselves to studies of this nature." From the beginning, the Society brought together different specialists in the anthropological sciences, although archaeologists predominated, a situation that remains unchanged to this day. In its beginnings, those interested in these sciences also joined, which markedly enlarged the list of associates. Since 1936, a Board of Directors was established, made up of a president and several members, whose positions were adjusted along the time, according to the needs (Secretary, Treasurer, titular and alternate Vocal Members, Account Reviewers). In a meeting held on May 4, 1936, it was stipulated to continue with the meetings at the headquarters of the Anthropological and Ethnographic Museum (today the "Juan B. Ambrosetti" Ethnographic Museum) which is situated since 1927 in the building built in the nineteenth century by the architect Benoit, located in Moreno 350 of the City of Buenos Aires (Pérez Gollán and Dujovne 1996).

In 1938 appeared the volume 1 of the journal *Relaciones of the Argentine Society of Anthropology*, corresponding to the year 1937, directed by Francisco de Aparicio and conformed by 17 articles and a memory that reviewed the activities of the Society. This volume was followed by three others in 1940, 1942, and 1944. Shortly after, a printed bulletin "Bulletin of the Argentine Society of Anthropology" was inaugurated, which since 1942 served as a communication channel with the partners and which is currently continuing on the Internet. Another outstanding task carried out by the Society was the completion of the Anthropology Weeks, annual meetings of specialists that took place in different cities of the interior and in the capital itself (Podestá 2007).

The rising rhythm of the Society was interrupted in 1945, and it was deprived of the subsidy it received. This fact was going to inaugurate a series of ups and downs in the history of the Society that printed a state of uncertainty to our association. Beginning in the 1970s, new figures, such as those of Eduardo M. Cigliano and Carlos J. Gradin, gave renewed strength and character to the Society. Gradin was able to finalize the edition of 16 volumes of Relaciones journal, through a great personal dedication and with the collaboration of CONICET that subsidized the printing of the magazine for many years (Podestá 2007). The journal *Relaciones of the Argentine Society of Anthropology* is a publication with referees of national and international prestige. It is dedicated to publishing unpublished articles, notes, and commentaries based on research that provide original information about the various specialties of anthropology (archeology, sociocultural anthropology, bioanthropology, ethnohistory, linguistics, and related disciplines), which provide relevant and useful conclusions for the scientific community. In accordance with national and international standards, it has renewed its inclusion in the Basic Nucleus of Argentine Scientific Journals of

CONICET, which constitutes a guarantee of the excellence of the publication. For more than a decade, the publication has been subsidized by the National Endowment for the Arts (FNA). In addition, the contribution of the partners was always the main economic support of the publication, as it continues to be today. Currently 42 volumes have been published, every 6 months (No. 1 and 2) in digital format, and annually, both together in printed format. The SAA currently gathers as members nearly 550 professionals and students of the country related to all specialties of Anthropology.

Currently the official headquarters of the SAA is located in the Ethnographic Museum "J. B. Ambrosetti" of the Faculty of Philosophy and Letters of the UBA. The SAA maintains relationships with other national institutions of the discipline such as the Association of Professional Archaeologists of Argentina (AAPRA), the Graduate School in Anthropology (CGA), and the Association of Professionals in Archeology of Tucumán.

The SAA develops an intense editorial work. Since 1999, it has been publishing Doctoral Theses, Bachelor Thesis, Publications, and Co-editions collections, which now total 42 titles. Recently a new series called Divulgation was inaugurated, which aims to reach a nonprofessional audience.

In addition, the SAA participates in the organization of scientific events. It collaborates forming the permanent organizing committee of the Jornadas de Arqueología de la Patagonia (since 1993) and of the Archeology Congress of the Argentine Pampean Region (since 1998). It organizes conferences and courses of diffusion and scientific training on anthropological or related topics, as well as book presentations, and events of a scientific nature. It represents the Argentinean anthropological community at a national and international level.

The SAA is a member of the International Federation of Rock Art Organizations (IFRAO) through its Rock Art Research Committee (CIAR-SAA), representing Argentina internationally in topics related to the research and dissemination of Argentine rock art. It has an updated library specialized in Anthropology formed through the national and international inter-institutional exchange and a documentary file gathered from the first years of its history. It is part of the Permanent Meeting of Scientific Associations of Argentina (EPAC). It also highlights researchers of national anthropological work for their scientific merits, naming them Honorary Partners. It annually holds an Ordinary General Assembly in which the members are concerned with the balance and accounting report, the new printed volume of Relaciones, and the books published by any of their editorial series. Issues of relevance to the SAA are discussed, the amounts of the annual quota are fixed, and consensus decisions are taken by vote. Every 2 years the Board of Directors is renewed by presenting lists and the vote of the members present in the Assembly. It is also an opportunity for meeting and celebration between partners.

References

Pérez Gollán, José Antonio, and Marta Dujovne. 1996. *El Museo Etnográfico: funciones y balance de una gestión*, Runa, Archivo para las Ciencias del Hombre. Vol. XXII, 119–131. Buenos Aires: Instituto de Ciencias Antropológicas – Museo Etnográfico "J. B. Ambrosetti", Facultad de Filosofía y Letras, Universidad de Buenos Aires.

Podestá, M. 2007. 70 años en la vida de la Sociedad Argentina de Antropología. *Relaciones* XXXII: 9–32. Buenos Aires.

Armed Conflict and Archaeology: Ethical Issues

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Introduction

Confronting the ethical issues of protecting the archaeological record during armed conflicts has arguably never been more challenging than during the first quarter of the twenty-first century. The use of heritage as a propaganda tool by terrorists and non-state actors has cut across more than a half

century of painstaking international legislation and lobbying which aimed at barricading cultural heritage behind a protective legal cordon that would be respected by all parties during a war. Before the Internet, 24 hour news, and social media, it was relatively easy for archaeologists to remain cocooned within academia or within professional archaeology units preoccupied with their own ethical struggles with developers and funding. Now archaeologists are forced daily to question their own role in armed conflict. Images of the destruction of artifacts in Mosul Museum, a (photoshopped) mushroom cloud above the Temple of Baalshamin at Palmyra and the murder of Dr. Khaled al-Asaad, Head of Antiquities at Palmyra, have stripped away any vestiges of doubt that archaeology can be elevated above the horrors of war. With this new accessibility to information come new ethical challenges to be faced.

Definition

The rapidly changing nature of warfare and a volatile geopolitical situation have presented archaeologists with new ethical challenges. At the time of writing, the events of Syria and Iraq dominate world news; therefore much of this work relates directly to these armed conflicts. However, some issues, such as looting, are of more universal application.

Key Issues/Current Debates/Future Directions/Examples

In the aftermath of the destruction of World War II, there was a concerted effort in the international community to find ways to protect cultural heritage during future wars. In November 1945 UNESCO was born, and most of its first decade was devoted to the formulation of the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict. This called on all parties in a conflict to respect their own cultural heritage and that of the enemy. Getting individual countries to sign up to the convention and enact it as a part of their national law has been a lengthy process and is still ongoing. As of the summer of 2018, 133 states parties have, in one form or another, adopted the Convention.

In areas other than legislation, UNESCO worked to cultivate an international response in line with the founders' intentions of using cultural heritage to unite nations, rather than divide them. In the 1960s, in an unprecedented act of collaboration, an international team worked together to relocate and excavate 23 temples in upper Egypt, ahead of their inundation by the waters of the newly built Aswan Dam; in 1966 specialists from many nations assisted Florence and Venice in emergency conservation works after their priceless treasures were caught in floods; in 1970 a convention was passed to regulate the international trafficking of cultural property, and in 1972 the convention that led to the setting up of the World Heritage List was launched, official recognition that some heritage is so valuable that we all have an interest in it.

The first indications that these measures not only might be insufficient to safeguard heritage during conflict but could themselves become the agents of its destruction surfaced during the Balkans' conflicts of the 1990s. As Yugoslavia broke up, the official lists of heritage sites, compiled in order to ensure their protection, instead were used to pick targets for attacks on rival groups (Wasalek 2015: 53). The situation demonstrated the Achilles' heel of all the provisions that had been built up since World War II. The measures passed by UNESCO and the UN, and the heritage laws enacted through individual states parties, relied entirely on the premise that conflicts would be fought between nation states who would, nominally at least, conform to international law. There was no strategy for dealing with conflicts where the participants were outside the structure of government and who had no interest in, or intention of, obeying the rules. The issue became apparent during the Balkans' conflict, but ultimately was not fully addressed before political developments overtook these considerations. Ex-Yugoslavia gradually devolved into a series of smaller states, and the fighting died out. Eventually the non-state forces became part of a series of new states. Lessons learned resulted in an additional protocol, which was added to the Hague Convention in 1999 as an attempt to strengthen its effectiveness

in conditions of civil war. A decade later the problem of non-state actors would be revived in the Middle East, but this time there would be no evolution into a new formal state structure.

In 2003 the USA and its allies, most prominently the UK, invaded Iraq in order to depose Saddam Hussein. The legality of the invasion has been repeatedly questioned, and within the nations that supplied the allied forces, there was very vocal opposition from some sectors of the population. Public opinion was increasingly negative as it became all too evident that the attack itself and the plans for post-invasion government were woefully inadequate (Chilcot 2016; Isakhan 2016: 270). Graphic images of the destruction of Iraq's cultural heritage came to symbolize the chaos that the invasion had brought to the country. Television reports (Labott and Clancey 2003) of the looting of the Baghdad Museum, under the noses of American troops, conveyed to an increasingly hostile public that the American military had no interest in protecting Iraqi society and culture (Matthiae 2015: 233–235). Even worse was the subsequent placing of a US base on top of the archaeological site of Babylon (Isakhan 2016: 272–273; Moussa 2008). This decision could not be excused as an oversight in the heat of battle; it pointed to a deeper institutional problem.

It is against this backdrop that some archaeologists began to question the ethical justification for any involvement with the armed forces. Archaeologists and heritage specialists had long been employed by the military as civilian employees in domestic military zones. In the wake of the Iraq invasion, more specialists were engaged in the field to deal with damage, both to the archaeology and to the image of the US military, caused by the conflict. Suspicion of the motives behind these supplementary military-sponsored archaeological initiatives was such that some archaeologists called for a complete boycott, extending even to the conservation of archaeological monuments and artifacts and the drawing up of no-strike lists to protect heritage sites of particular interest (Albarella 2009; Hamilakis 2003).

The debate came to a head at the World Archaeology Congress in 2008 in Dublin (Stone 2011: 4–9). Discussions, which at times became very heated, were polarized between those urging collaboration with the military in order to mitigate the disasters of Iraq and prevent similar events in the future and those who felt that the military were so compromised, both in terms of being there in the first place and subsequently with reference to their behavior, that any contact with them should be shunned. Opinions at the time were strongly held, but within a few years, these debates would fade in importance as events threw up an entirely different conflict scenario.

In 2010 the so-called Arab Spring was the beginning of a series of popular uprisings across six countries of North Africa and the Middle East. As rebel groups fought governments, the spectre arose once again of how to protect cultural heritage when the threat comes from forces outside a state structure. Initially, neither government forces nor rebel groups seemed to be particularly interested in heritage sites, and western governments were wary of direct involvement that would require troops on the ground, though air support was sometimes given. The ground rules were to change significantly when the so-called Islamic State of Iraq and the Syria (ISIS) terrorist group became a threat in 2014. Their political ambitions aimed at a great deal more than overthrowing governments. Their stated desire was to create a caliphate across the Middle East, and they used cultural heritage in practical and symbolic ways to further this aim.

The practical benefit they gained was financial. ISIS forces looted archaeological sites and sold the antiquities to fund their activities. The scale of this has been widely disputed (Tilley 2016). Reliable data for illegal trafficking have always been difficult to come by but, in this case, even more so, as both ISIS and other agencies (see below) had reason to exaggerate the scale of activity. On the other hand, official figures, coming only from verified sources, will almost certainly always be far too low.

Whatever the level of financial support coming from antiquities looting, the symbolic impact of destroying heritage sites and museum collections was probably ultimately of more benefit to ISIS. They filmed their activities and, avoiding mainstream press outlets that would have censored the

material and required verification, released their recordings through social media. Their stated reason was to destroy the work of the infidel, in particular figurative art contrary to the teachings of the Koran (Matthiae 2015: 240). However, there is little doubt that they also intended to sow panic and fear and aimed to promote an image of themselves as invincible warriors through acting out a well-rehearsed role as hero (Harmanşah 2015: 173–176). Isakhan and Zarandona (2018: 11) have stressed how the media images of destruction disseminated by ISIS are carefully planned and executed in order to convey a complex message of religious, historical, and political symbolism. Archaeologists found themselves torn between wanting to pass on social media images in order to raise awareness of the threat to heritage and the realization that this was exactly what ISIS wanted.

Within a few years, the debates concerning the relationship between archaeologists and the military that had dominated Dublin WAC seemed largely redundant. No longer was the danger to heritage in conflict zones coming from negligent national armies, but instead, the threat was dispersed among many and varied unofficial groups that had different agendas. Some of the groups not only endangered heritage through neglect, or using it for military purposes, but actively sought it out to destroy as a propaganda tool. At the same time, there was far less need for archaeologists to fear the impact of regular military forces. For western states, the debacle that became post-invasion Iraq turned the tide decisively against military intervention. Subsequent foreign military personnel operating in the area were usually confined to specialist roles such as humanitarian aid, training, or intelligence work. In June 2015 a new initiative from UNESCO called "Unite4heritage" was launched. Among its activities was the setting up of a task force that drew on the experience of the widely admired Art and Antiquities Unit of the Italian Carabinieri. As well as responding to emergency situations where heritage sites are deliberately targeted, the unit also conducts training on techniques of stability policing so that local enforcement agencies can tackle long-term issues such as looting and trafficking.

Since the period of the Balkans' conflicts, there have also been changes in the way archaeologists are employed in conflict areas, which have raised new ethical considerations. Alongside those employed by state institutions, large museums, and universities, a number of nongovernmental organizations (NGOs) devoted to archaeology and heritage now operate. Some of these are well established, but other organizations have grown up more recently and are usually on a smaller scale. While many do good work and are driven by highly motivated individuals, others are of varying qualities. Privately, some archaeologists have questioned their effectiveness and the risks of funding projects through them, especially in areas that are highly complex geopolitically, where inexperienced workers can constitute a danger to themselves and others. There is a concern that some organizations might be tempted to overstate the threat to heritage in order to gain media attention and maximize their fundraising. This adds yet another element of uncertainty to an already confused situation caused by the absence of reliable data concerning the scale of destruction and the desire of groups such as ISIS to exaggerate the impact of their activities. There have also been concerns that archaeologists focus too much on the heritage in conflict areas without due consideration for the population (Rowlands 2011: 205).

Probably the greatest damage to archaeology in conflict areas in the early twenty-first century has come from widespread looting (Isakhan 2016: 273; Matthiae 2015: 236). Satellite imagery has made all too apparent the scale of the problem across almost all conflict zones, and clearly this has not been limited to groups such as ISIS using antiquities to finance their operations. Ordinary people, their lives destroyed by being caught up in the war, know they can make money by looting their local archaeological sites, and as every archaeologist recognizes, they are very aware of where the sites are located. The people on the bottom rung of this trade get very small sums of money for the objects they steal, usually just about enough to survive on, but as the antiquities pass upward through the supply chain and are traded by middle men, the profits increase dramatically.

Once they cross over the national border and can be traded on the open market, the amounts rise exponentially.

The shady transactions that characterized the art market in the twentieth century have been well documented (Felch and Frammolino 2011). The tough stance taken by the Italian authorities, culminating in the arrest in 2004 of a Getty curator charged with buying stolen antiquities for the museum, sent shock waves through the art world. It was clear that the web of intrigue spread far and wide and included museums, art galleries, conservators, art dealers, academics, and auction houses. The individuals at the top of this murky world were, for the most part, highly educated and privileged, and few seem to have had any moral qualms about their behavior. Indeed many saw themselves as philanthropists working for the good of society, rather than as dealers of stolen property. The Italian police saw things differently. The threat of imprisonment succeeded where decades of negotiation had failed. As a result buying procedures were cleaned up, and many institutions brought in strict rules concerning due diligence, conflict of interest, and provenance checking. However, old habits die hard, and the influx of looted material from the war-torn areas of Syria and Iraq in particular has found an easy path onto the art markets, perhaps not to iconic museums, such as the New York Met or the Getty as in the past, but instead to a plethora of smaller collectors, galleries, museums, auction houses, and dealers. In July 2017 the arts and crafts chain, Hobby Lobby, was fined $3 million and had 5500 antiquities confiscated, because they had been looted from Iraq (Feuer 2017). The objects were widely assumed to have been destined for the Museum of the Bible, under construction in Washington, DC, and owned by Hobby Lobby's President, Steve Green.

Undoubtedly the continued success of illegal antiquities looting is related to the relative ease of the operation, the improbability of detection, and the light sanctions imposed even if caught. However, antiquities would not be looted if there were not a market for them, and this is an area where many within the field feel that archaeologists could be more ethically aware. If museums and art galleries did not buy items without full documentation, if auction houses investigated provenance more diligently, if academic publishers refused to publish works that contained information on looted objects (which has been demonstrated to raise the value of an item on the illegal market), if scholars refused to verify the authenticity of looted objects, if archaeologists thoroughly recorded and published all their excavations, and if museums had a complete database of their collections with full descriptions and photographs, these measures, taken together, would substantially impact the illegal art market. Ultimately, it is the ethical decisions made in the small, unheroic, daily acts of archaeologists' professional lives that have the greatest impact.

In one sense the ethical priorities today are little different to those of previous generations of archaeologists, but, whereas our predecessors were often unaware of larger geopolitical forces and ill equipped to see how their work might fit into a broader agenda, current dilemmas stem from the opposite problem. We have to make sense of a surfeit of information of varying reliability, we hear a multiplicity of voices and viewpoints, and we live in a world of instantaneous global communication capable of provoking a concatenation of events with unintended consequences. The 1954 Hague Convention seems to hark back to an era where sides to a conflict could be relatively easily defined. Today's fast-moving, complex, interconnected world presents us with a more fragmented scenario that we often struggle to comprehend and that requires a constant reassessment of ethical choices.

Cross-References

- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Cultural Heritage Management and Armed Conflict

▶ Cultural Property, Trade, and Trafficking: Introduction
▶ Iraq: Archaeological Heritage
▶ Looting and Vandalism (Cultural Heritage Management)
▶ Military Personnel Training in Archaeology
▶ Stone, Peter G.

References

Albarella, U. 2009. Archaeologists in conflict: Empathising with which victims? *Heritage Management* 2 (1): 105–114.

Chilcot, J. 2016. *The Iraq inquiry*. http://www.iraqinquiry.org.uk/the-report/. Accessed 28 July 2017.

Felch, J., and R. Frammolino. 2011. *Chasing Aphrodite: The hunt for looted antiquities at the world's richest museum*. Boston/New York: Houghton Mifflin Harcourt.

Feuer, A. 2017. Hobby lobby agrees to forfeit 5,500 artifacts smuggled out of Iraq. *New York Times*, 5 July 2017. https://www.nytimes.com/2017/07/05/nyregion/hobby-lobby-artifacts-smuggle-iraq.html. Accessed 28 July 2017.

Hamilakis, Y. 2003. Iraq, stewardship and 'the Record': An ethical crisis for archaeology. *Public Archaeology* 3 (2): 104–111.

Harmanşah, O. 2015. ISIS, heritage, and the spectacles of destruction in the global media. *Near Eastern Archaeology* 78 (3): 170–177.

Isakhan, B. 2016. Heritage under fire: Lessons from Iraq for cultural property protection. In *A companion to heritage studies*, ed. William Logan, Máiréad Nic Craith, and Ulrich Kockel, 268–279. Chichester: Wiley Blackwell.

Isakhan, B., and José Antonio González Zarandona. 2018. Layers of religious and political iconoclasm under the Islamic state: Symbolic sectarianism and pre-monotheistic iconoclasm. *International Journal of Heritage Studies* 24 (1): 1–16.

Labott, E and J. Clancey. 2003. US: We didn't anticipate looting. *CNN News*, 15 April 2003. http://edition.cnn.com/2003/WORLD/meast/04/15/sprj.irq.museum.looting/. Accessed 28 July 2017.

Matthiae, P. 2015. *Distruzioni, Sacheggi e Rinascite: Glia Attacchi al Patrimonio Artistico dall'Antichità all'Isis*. Milano: Mondadori Electa.

Moussa, M.U. 2008. The damages sustained to the ancient city of Babel as a consequence of the military presence of coalition forces in 2003. In *The destruction of cultural heritage in Iraq*, ed. Peter G. Stone and Joanne Farchakh Bajjaly, 143–150. Woodbridge: The Boydell Press.

Rowlands, M. 2011. Response to 'Relations between Archaeologists and the Military in the Case of Iraq'. In *Cultural heritage, ethics and the military*, ed. Peter G. Stone, 203–205. Woodbridge: The Boydell Press.

Stone, P. 2011. Introduction: The ethical challenges for cultural heritage experts working with the military. In *Cultural heritage, ethics and the military*, ed. Peter G. Stone, 1–28. Woodbridge: The Boydell Press.

Tilley, A. 2016. ISIS, blood antiquities, and the international black market. *Human Security Centre Blog*, 1 February 2016. http://www.hscentre.org/policy-unit/isis-blood-antiquities-international-black-market/. Accessed 6 Aug 2017.

Wasalek, H. 2015. Destruction of the cultural heritage in Bosnia-Herzegovina: An overview. In *Bosnia and the destruction of cultural heritage*, H. Walasek with contributions by R. Carlton, A. Hadžimuhamedović, V. Perry and T. Wik, 23–142. Franham: Ashgate.

Further Readings

Kila, Joris D. 2012. *Heritage under seige: Military implementation of cultural property protection following the 1954 Hague convention*. Leiden/Boston: Brill.

Rush, L., and L. Benedettini Millington. 2015. *The Carabinieri command for the protection of cultural property: Saving the world's heritage*. Woodbridge: The Boydell Press.

Sørenson, Maria Louise Stig, and D. Viejo-Rose, eds. 2015. *War and cultural heritage: Biographies of place*. Cambridge, UK: Cambridge University Press.

Stone Peter, G., and Joanne Farchakh Bajjaly, eds. 2008. *The destruction of cultural heritage in Iraq*. Woodbridge: The Boydell Press.

Arnold, Bettina

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Basic Biographical Information

Bettina Arnold obtained her B.A. in Archaeology from Yale University in 1983 and her M.A. and Ph.D. degrees in Anthropology from Harvard University in 1986 and 1991, respectively. She is professor of anthropology at the University of Wisconsin-Milwaukee, where she was the codirector of the Center for Celtic

Studies from 2000 to 2009 as well as the coordinator of the Museum Studies Graduate Program from 1996 to 2012. Her area of expertise is the Pre-Roman European Iron Age, but in the course of her career, she has participated in archaeological projects ranging from the Middle Bronze Age through the early medieval period in Western Europe.

Major Accomplishments

Since 1999 she has codirected an excavation project in southwest Germany focused on the burial record of the early Iron Age Heuneburg hillfort and its environs; two burial mounds associated with this site were excavated by the Landscape of Ancestors project between 1999 and 2002. Finds from those excavations were featured in *Die Welt der Kelten: Zentren der Macht – Kostbarkeiten der Kunst*, a major exhibition in Stuttgart in 2012–2013. Her work has been directed toward the following specific research topics: the archaeological interpretation and analysis of complex societies, particularly as reflected in mortuary contexts; material culture as a symbolic system and a means of communicating social relationships; the archaeological interpretation of prehistoric gender configurations in burial contexts; and the sociopolitical history of archaeology and museum collecting, especially their involvement in identity construction in the nineteenth- and twentieth-century nationalist and ethnic movements in Europe and the United States. She published a groundbreaking article on the use and abuse of archaeology for political purposes in Nazi Germany in *Antiquity* in 1990 that has been reprinted repeatedly since its first appearance. In addition to founding and acting as editor of the online peer-reviewed journal *e-Keltoi*, she is a member of numerous editorial boards, including the *History of Archaeology* series for Oxford University Press and the *History of Archaeology Commission* of the UISPP.

Cross-References

- ▶ Engendered Archaeologies
- ▶ Erasure of the Past
- ▶ Gender, Feminist, and Queer Archaeologies: European Perspective
- ▶ Museums and Memory Experiences
- ▶ Nationalism and Archaeology
- ▶ Popular Culture and Archaeology

References

Arnold, B. 1998. The power of the past: Nationalism and archaeology in 20th century Germany. *Archaeologia Polona* 35–36: 237–253.

Arnold, B. 2011. The illusion of power, the power of illusion: Ideology and the concretization of social difference in early Iron age Europe. In *Ideologies in archaeology*, ed. R. Bernbeck and R. McGuire, 151–174. Albuquerque: University of Arizona Press.

Arnold, B. 2012a. The lake dwelling diaspora and natural history museums: Identity, collecting and ethics. In *The Oxford handbook of wetland archaeology and beyond*, ed. F. Menotti and A. O'Sullivan, 865–881. Oxford: Oxford University Press.

Arnold, B. 2012b. The Vix princess redux: A retrospective on European Iron age gender and mortuary studies. In *La Arqueología funeraria desde una perspectiva de género*, ed. L. Prados Torreira, 215–232. Madrid: UA Ediciones.

Arnold, B. 2012c. Gender and temporality in Iron Age west-central Europe. *Social Science History 36*(1): 85–112.

Arnold, B. 2015. Archaeology and politics in the 21st century: Still Faustian, but not much of a bargain. In *Paradigm found: Archaeological theory, past, present and future. Essays in honor of Evžen Neustupný*, ed. K. Kristiansen, L. Smejda, and J. Turek, 178–185. Oxford: Oxbow.

Arnold, B., and D.B. Counts, eds. 2010. *The master of animals in old world iconography*. Budapest: Archaeolingua.

Arnold, B., and D.B. Gibson, eds. 1995. *Celtic chiefdom, Celtic state: The evolution of complex social systems in prehistoric Europe*. Cambridge, UK: Cambridge University Press.

Arnold, B., and N. Wicker, eds. 2001. *Gender and the archaeology of death*. Walnut Creek: AltaMira Press.

Galaty, M., and C. Watkinson, eds. 2006. *Archaeology under dictatorship*. New York: Springer.

Kohl, P., and C. Fawcett, eds. 1995. *Nationalism, politics, and the practice of archaeology*. Cambridge, UK: Cambridge University Press.

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Dean E. Arnold. (Photo courtesy of Dean E. Arnold and Wheaton College Marketing Communications)

Basic Bibliographic Information

Dean Edward Arnold is an acclaimed scholar internationally known as one of the founders of ceramic ethnoarchaeology, specifically the organization and technology of pottery production, which is a subject of his classic book *Ceramic Theory and Cultural Process* (Arnold 1985, 2011). (Carol Kramer and William A. Longacre were later progenitors of this field of scholarship.) His long-term comprehensive analysis of a single pottery-making community in Yucatán, Mexico, is, to our knowledge, the longest, continuous academic study of any craft production – pottery or other material culture anywhere – documenting synchronic and diachronic changes over nearly five decades. Arnold is a keen observer and prolific scholar, lecturer, and writer, sharing his knowledge with his peers in the Americas and Europe. He continues to contribute to the profession and is currently writing another book, to date having authored five books, co-edited two books, and written more than 70 articles and book chapters about potters, pottery production, and related subjects covering topics ranging from the ecology of production to the standardization of ceramic pastes and the social organization of potters. Currently, Arnold is an adjunct curator, Social Sciences Section (Anthropology) in the Integrative Research Center, at The Field Museum in Chicago, where he continues his research in Latin American anthropology. He is also professor of anthropology (emeritus), Wheaton College, Illinois, since July 2012, having served on its faculty for 39 years.

Arnold received his B.A. in anthropology from Wheaton College, Illinois, in 1964 and an M.A. in anthropology at the University of Illinois Urbana-Champaign having submitted a thesis entitled *Maya Blue: A New Perspective* (1967a) – published as *Sak lu'um in Maya culture and its possible relationship to Maya Blue* (1967b). His thesis advisor, Donald W. Lathrap (1927–1990), an American archaeologist, had studied under Alfred L. Kroeber and Carl Sauer at the University of California, Berkeley, and had taken his doctorate under Gordon R. Willey at Harvard University in 1962. Lathrap specialized in the study of Peru and Amazonia and would again serve as Arnold's doctoral advisor. Following fieldwork in Peru, Arnold received his Ph.D. in anthropology at Illinois having written *The emics of pottery design from Quinua, Peru* (1970) as his dissertation, later publishing several articles derived from his dissertation fieldwork in the Peruvian highlands (1972, 1975, 1983, 1993, 1998, 2005a). The influences of Kroeber, Willey, and Lathrap may be seen in Arnold's research. During his undergraduate studies and his matriculation at Illinois, he was exposed to all four fields of anthropology (archaeology, ethnology/anthropology, human biology, and linguistics) and during his subsequent academic and research career would make use of all of them in teaching and research (e.g., Arnold 2005a, 2005c; Arnold and Frisbey 1972, Neuenswander and Arnold, eds. 1977). Arnold was awarded a National Defense Foreign Language fellowship (1966–1969) and in 1969 received the Fourth Prize in the Sigma Xi Student

Paper Competition at the University of Illinois Urbana-Champaign.

He spent 3 years teaching at the Pennsylvania State University as assistant professor of anthropology (1970–1973) and conducted research in the Valley of Guatemala as a member of the Kaminaljuyú Project directed by William T. Sanders, where he studied pottery making in the Valley, later using these data as pioneering work in what some have called ethnoarchaeometry (Arnold 1978; Arnold et al. 1978, 1991, 2000; Neff et al. 1990). Arnold next went to the Universidad Nacional San Antonio Abad in Cuzco, Peru, as a Fulbright lecturer and also worked with the National Institute of Culture excavating an Inca storage/habitation site called Cata-casa-llaqta above Cuzco. He returned to Wheaton College in 1973 as a faculty member in the Department of Sociology and Anthropology, beginning as an assistant professor of anthropology (1973–1977), and was promoted to associate professor (1977–1982) and then to full professor (1982–2012). Arnold was a Fulbright scholar a second time in México in 1984 with an American Republics Research Grant, enabling his return to Yucatán, México, to continue his study of potters in the city of Ticul that he began in 1965. He has also done archaeological fieldwork in the American Southwest and archaeological research in the tropical forests of Bolivia (Arnold and Prettol 1988), but his primary, ongoing research interest was the long-term study of the relationship of social and technological change among potters in Ticul, Yucatán, México, having studied them extensively over a period spanning 43 years. As noted, this work is remarkably the longest, continuous academic study of any craft production – pottery or other material culture. At Wheaton – a Christian, residential, and highly ranked liberal arts college and graduate school, Arnold taught 22 different courses, most frequently: Introduction to Anthropology, Biculturalism, Human Origins, Medical Anthropology, Ceramics and Culture, Cross-Cultural Ethics, Latin American Peoples, and Pre-Columbian Civilizations, as well as the Senior Capstone class.

Arnold was also a research associate at the Field Museum of Natural History in Chicago, now The Field Museum (1988–1990, 1993–2011). In 1996, having been nominated by his peers, he was awarded the Society for American Archaeology's Award for Excellence in Ceramic Studies. He was also honored as a Fellow of the American Anthropological Association and Fellow of the American Association for the Advancement of Science (AAAS). Arnold was Visiting Fellow at Clare Hall, a college of the University of Cambridge (1985), is a lifetime member of the college, and was a three-time visiting scholar in the Department of Archaeology in the University (1985, 1992, and 2000). Additionally, he participated in numerous academic conferences including the annual meetings of the Society for American Archaeology and the American Anthropological Association. The latter is also the venue for annual Ceramic Ecology Symposia where he often presented his current research and previewed his forthcoming articles and book chapters (Mouat and Arnold 1988).

In 2003 Arnold was awarded the Charles R. Jenkins Certificate of Distinguished Achievement by the National Executive Council of Lambda Alpha and in 2008 was recipient of the Distinguished Service to Alma Mater Award from the Wheaton College Alumni Association (Wheaton College 2008a, 2008b). His ability to relate anthropological topics and Christianity is remarkable (Arnold 2005b, 2006b; Moshier et al. 2007). He was a High Table Member of Corpus Christi College at the University of Cambridge in 2000 and was recognized as a Distinguished Member of the American Anthropological Association in 2017. In addition, he was previously selected for inclusion in the 1st edition of *Who's who of emerging leaders in America* (1987) as well as multiple editions of *Who's who in the Midwest* and recently received the Albert Nelson Marquis Lifetime Achievement Award. He and his wife, June, the recently retired Director of Health Professions at Wheaton, have two grown daughters, Michelle and Andrea, and four grandchildren.

Major Accomplishments

Arnold, in a recent AAAS interview, stated that although he was very interested in and had written a great deal about pots and potsherds, "It was the potters that fascinated me. Archaeologists are not

very well informed about how people made pots, and about how potters lived. That's the thing that drives me" (O'Hara 2012). This cogently sums up the philosophy behind his extensive ethnographic research on pottery production, using the study of contemporary potters to evaluate assumptions archaeologists use in their study of the past. Arnold's accomplishments and contributions to ethnography, archaeology, and ceramic studies may be viewed in several formats (by chronological phases, geographic regions, and/or topics); these are combined below. His physicochemical studies of Peruvian and Yucatecan pottery and ceramic materials (Arnold 1971, 1972), with geologist Bruce Bohor (1975, 1977) and archaeometrician Hector Neff (Neff et al. 1988, 1990) and with a host of others (Arnold et al. 1991, 1999, 2000, 2007a, 2008, 2012) illustrate his research skills. Arnold's contributions to ceramic ecology (1975, 1991; Mouat and Arnold 1988) and to our understanding of the intricacies of pottery production – including forming techniques (1999; Arnold et al. 2007b), standardization (2000; Arnold and Nieves 1992), potters' organization (2006a, 2008, Arnold et al. 2013), production analysis (2017a), culture change (2008, 2012, 2015, 2017b), and even conducting fieldwork (1995) – are without equal in the archaeological and anthropological literature.

Arnold's most salient accomplishment lies in the esteemed book he wrote early in his career, *Ceramic Theory and Cultural Process*, published by Cambridge University Press (1985) which has stood the test of time. The author's status in ethnoarchaeological studies was evident in being asked to examine critically his own research and reflect upon it a quarter century after its publication (Arnold 2011). He drew upon the theoretical perspectives of systems theory, cybernetics, and cultural ecology and utilized cross-cultural comparisons to help elucidate the origins and evolution of the pottery-making craft. In the 1980s this was an innovative approach to the archaeological interpretation of ceramics, since the book was about ceramic production and not about the pottery itself; it concerns the relationships between ceramics, the potters themselves, the environment, and culture and society. It challenged the traditional belief in anthropology that because clay is plastic, culture was the only variable that affected ceramic production. His book focuses on generalizations, not universals. His second book, *Ecology of Ceramic Production in an Andean Community*, also published by Cambridge (1993), was written originally as a sequel, linked the ecological (physical and biological environments), historical, and archaeological contexts of pottery production in Quinua, Peru, with broader implications for those individuals concerned with archaeological ceramics of the Andean Middle Horizon. This volume expanded his prior *Current Anthropology* publication (1975), challenging beliefs held by Alfred L. Kroeber, John Rowe, and others.

Three subsequent books on ceramic ethnoarchaeology are a trilogy that is a synthesis of four his decades of research on the pottery-making community in the city of Ticul. In *Social Change and the Evolution of Ceramic Production and Distribution in a Maya Community* (2008), Arnold focuses on the important questions of how and why ceramics and their production changed through time between 1965 and 1997. Potters had become aware of new changes in forming and firing methods and were acculturated; at the same time, consumer demand fluctuated, and political and economic systems changed. In this new climate, Arnold reports and evaluates these by tracing social change among potters and transformations in the production and distribution of their pottery in this Mexican community. A second volume, *The Evolution of Ceramic Production Organization in a Maya Community* (2015), was a follow-up that examines how social and spatial organization of units of pottery production change diachronically. The focus is on production personnel and the spatial organization of their workplace in Ticul including traditional household and the development of new types of production organization. Massive social change and the reorientation of pottery production to the tourist market are documented. Recently developed entrepreneurial, attached, and government-sponsored workshops were short-lived but did not persist. The changing production organization also reveals that intermittent crafting, multi-crafting, and risk management also play important roles disclosing the complexity of the craft production in the present and in antiquity. He also provides valuable illustrations and floor plans of

numerous workshops and elaborates their contents and the organization of pottery production, a boon to archaeologists. In *Maya Potters' Indigenous Knowledge: Cognition, Engagement, and Practice* (2018) Arnold drew upon engagement theory to describe the indigenous knowledge of traditional Maya potters in Ticul. In this heavily illustrated narrative account, he examines craftspersons' knowledge and skills, their engagement with their natural and social environments, the raw materials they use, and the process for making pottery. Following Lambros Malafouris, Tim Ingold, and Colin Renfrew, Arnold argues that potters' indigenous knowledge is not just in their minds but extends to their engagement with the environment, raw materials, and the pottery-making process itself and is recursively affected by visual and tactile feedback. More recently Yumi Park Huntington, Arnold, and Johanna Minich have edited textbook and reader, *Ceramics of Ancient America: Multidisciplinary Approaches* (2018) that combine methodologies from art history, archaeology, and ethnography. The introductory essay by the editors is enlightening and further demonstrates Arnold's interdisciplinary skills.

In the late 1960s, Arnold demonstrated that one of the principal components (palygorskite), an azure pigment used by the ancient Maya called Maya Blue, was still being used by contemporary Maya (1967a, b; Arnold and Bohor 1975). He demonstrated that the modern Yucatec Maya were aware of its unique properties and used it for pottery temper and for the treatment of illnesses (Arnold 1967a, 1967b, 1971, 2005c, 2008, 2012; Arnold et al. 2007a). Arnold is currently writing a book about Maya Blue, and he is also preparing a report of the excavations of the Inca site of Cata-casa-llaqta on the edge of Cuzco, Peru, that he co-excavated with colleagues from the National Institute of Culture in 1972–1973.

Dean E. Arnold continues to attend professional meetings to advise and mentor his colleagues and help us better understand pottery and the people who made, used, and discarded them – a tenant of ceramic ecology. He is the earliest founder of ceramic ethnoarchaeology, doing it and publishing before Carol Kramer and William A. Longacre. Arnold is a gentleman and gentle man, beloved by his peers and students and rightly called by many the "Dean of Ceramic Studies."

Cross-References

- ▶ Archaeological Fieldwork
- ▶ Ceramic Ecology
- ▶ Ceramics: Scientific Analysis
- ▶ Cognitive Archaeology
- ▶ Cultural Ecology in Archaeology
- ▶ Dating Techniques in Archaeological Science
- ▶ Ethnoarchaeology
- ▶ Geoarchaeology
- ▶ Kolb, Charles C.
- ▶ Matson, Frederick R.
- ▶ Middle-Range Theory in Archaeology
- ▶ Post-processual Archaeology
- ▶ Sanders, William T.
- ▶ The Potter's Wheel

References

Arnold, D.E. 1967a. *Maya blue: A new perspective*. MA thesis. Urbana: University of Illinois, Department of Anthropology.

Arnold, D.E. 1967b. *Sak lu'um in Maya culture and its possible relationship to Maya blue. Research reports 2*. Urbana: University of Illinois, Department of Anthropology.

Arnold, D.E. 1970. *The emics of pottery design from Quinua, Peru*. Unpublished Ph.D. dissertation. Urbana: University of Illinois, Department of Anthropology.

Arnold, D.E. 1971. Ethnomineralogy of Ticul, Yucatan potters: Etics and emics. *American Antiquity* 36: 20–40.

Arnold, D.E. 1972. Mineralogical analyses of ceramic materials from Quinua, Department of Ayacucho, Peru. *Archaeometry* 14: 93–102.

Arnold, D.E. 1975. Ceramic ecology of the Ayacucho Basin, Peru: Implications for prehistory. *Current Anthropology* 16: 183–203.

Arnold, D.E. 1978. The ethnography of pottery making in the Valley of Guatemala. In *The ceramics of Kaminaljuyú*, ed. R.K. Wetherington, 327–400. University Park: Pennsylvania State University Press.

Arnold, D.E. 1983. Design structure and community organization in Quinua, Peru. In *Structure and cognition in art*, ed. D. Washburn, 56–73. Cambridge: Cambridge University Press.

Arnold, D.E. 1985. *Ceramic theory and cultural process*. Cambridge: Cambridge University Press.

[paperback ed. 1988; reprinted 1989, 1997, 1998; now in print on demand format].

Arnold, D.E. 1991. Ethnoarchaeology and investigations of ceramic production and exchange: Can we go beyond cautionary tales? In *The legacy of Anna O. Shepard*, ed. R.L. Bishop and F.W. Lange, 321–345. Boulder: University Press of Colorado.

Arnold, D.E. 1993. *Ecology of ceramic production in an Andean community*. Cambridge: Cambridge University Press.

Arnold, D.E. 1995. 'Carry identification when conducting field research' and 'be careful about what you wear'. In *Mistakes social scientists make: Error and redemption in the research process*, ed. R.A. Seltzer, 79–81. New York: St, Martin's Press.

Arnold, D.E. 1998. Ancient Andean ceramic technology: An ethnoarchaeological perspective. In *Andean ceramics: Technology, organization, and approaches, MASCA research papers in science and archaeology*, ed. I. Shimada, 353–367. Philadelphia: University of Pennsylvania, MASCA Research Center.

Arnold, D.E. 1999. Advantages and disadvantages of vertical-half molding technology: Implications for production organization. In *Pottery and people: A dynamic interaction*, ed. J.M. Skibo and G.M. Feinman, 50–80. Salt Lake City: University of Utah Press.

Arnold, D.E. 2000. Does the standardization of ceramic pastes really mean specialization? *Journal of Archaeological Method and Theory* 7: 333–375.

Arnold, D.E. 2005a. Early Inca expansion and the incorporation of local ethnic groups: Ethnohistory and archaeological reconnaissance in the region of Acos, department of Cusco, Peru. *Andean Past* 7: 219–249.

Arnold, D.E. 2005b. How do scientific views on human origins relate to the Bible? In *Not just science: Questions where Christian faith and natural science intersect*, ed. D.F. Chappell and E.D. Cook, 129–140. Grand Rapids: Zondervan.

Arnold, D.E. 2005c. Maya blue and palygorskite: A second possible pre-Columbian source. *Ancient Mesoamerica* 16: 51–62.

Arnold, D.E. 2006a. Las vasijas como símbolos. El caso del gremio de alfareros de Ticul, Yucatán. In *Etnoarqueología: El contexo dinámico de la cultura material a través del tiempo*, ed. E. Williams, 105–112. Zamora: El Colegio de Michoacán.

Arnold, Dean E. 2006b. Why are there so few Christian anthropologists? Reflections on the tensions between Christianity and anthropology. *Perspectives on Science and Christian Faith* 58: 266–282.

Arnold, D.E. 2008. *Social change and the evolution of ceramic production and distribution in a Maya community*. Boulder: University Press of Colorado.

Arnold, D.E. 2011. *Ceramic theory and cultural process* after 25 years. *Ethnoarchaeology* 3: 63–98. An invited contribution to the "Classics Review" series.

Arnold, D.E. 2012. The social evolution of potters' households in Ticul, Yucatán, México 1965–1997. In *Ancient households of the Americas: Conceptualizing what households do*, ed. J.G. Douglass and N. Gonlin, 163–187. Boulder: University Press of Colorado.

Arnold, D.E. 2015. *The evolution of ceramic production organization in a Maya Community*. Boulder: University Press of Colorado.

Arnold, D.E. 2017a. Raw material selection, landscape, engagement, and paste recipes: Insights from ethnoarchaeology. In *Matières à penser: Raw materials acquisition and processing in early Neolithic pottery productions, 29 and 30 May 2015*, ed. L. Burnez-Lanotte, 15–27. Paris: Société Préhistorique Française.

Arnold, D.E. 2017b. The ethnoarchaeology of an abandoned potter's workshop in Ticul, Yucatán, México. In *Innovative approaches and explorations in ceramic studies*, ed. S.L. López Varela, 119–128. Oxford: Archaeopress.

Arnold, D.E. 2018. *Maya potters' indigenous knowledge: Cognition, engagement, and practice*. Boulder: University Press of Colorado.

Arnold, D.E., and B.F. Bohor. 1975. Attapulgite and Maya blue: An ancient mine comes to light. *Archaeology* 28 (January): 22–29.

Arnold, D.E., and B.F. Bohor. 1977. The ancient clay mine at Yo' Kát, Yucatan. *American Antiquity* 42: 575–582.

Arnold, D.E., and N. Frisbey. 1972. Cross-cultural learning in the classroom. In *Readings in intercultural communication*, ed. D.S. Hoopes, vol. 2, 112–115. Pittsburgh: University of Pittsburgh, Research Center for International Communication.

Arnold, D.E., and A.L. Nieves. 1992. Factors affecting standardization. In *Ceramic production and distribution: An integrated approach*, ed. G.J. Bey III and C.A. Pool, 93–113. Boulder: Westview Press.

Arnold, D.E., and K. Prettol. 1988. Aboriginal earthworks near the mouth of the Beni, Bolivia. *Journal of Field Archaeology* 15: 357–466.

Arnold, D.E., P.M. Rice, W.A. Jester, W.N. Deutsch, B.K. Lee, and R.I. Kirsch. 1978. Neutron activation analysis of pottery and pottery materials from the Valley of Guatemala. In *Ceramics from Kaminaljuyú*, ed. R.K. Wetherington, 543–586. University Park: Pennsylvania State University Press.

Arnold, D.E., H.N. Neff, and R.L. Bishop. 1991. Compositional analysis and 'sources' of pottery: An ethnoarchaeological approach. *American Anthropologist* 93: 70–90.

Arnold, D.E., H.N. Neff, R.L. Bishop, and M.D. Glascock. 1999. Testing interpretative assumptions of neutron activation analysis: Contemporary pottery in Yucatán, 1964–1994. In *Material meanings: Critical approaches to the interpretations of material culture*, ed. E. Chilton, 61–84. Salt Lake City: University of Utah Press.

Arnold, D.E., H.N. Neff, and M.D. Glascock. 2000. Testing assumptions of neutron activation analysis: Communities, workshops and paste preparation in Yucatán, Mexico. *Archaeometry* 42: 301–316.

A

Arnold, D.E., H.N. Neff, M.D. Glascock, and R.J. Speakman. 2007a. Sourcing the palygorskite used in Maya blue: A pilot study comparing the results of INAA and LA-ICP-MS. *Latin American Antiquity* 18: 44–58.

Arnold, D.E., J.H. Wilson, and A.L. Nieves. 2007b. Why was the potter's wheel rejected? Social choice and technological change in Ticul, Yucatán, México. In *Pottery economics in Mesoamerica*, ed. C.A. Pool and G.J. Bey III, 59–87. Tucson: University of Arizona Press.

Arnold, D.E., J.R. Branden, P.R. Williams, G.M. Feinman, and J.P. Brown. 2008. The first direct evidence for the production of Maya blue: Rediscovery of a technology. *Antiquity* 82: 152–164.

Arnold, D.E., B.F. Bohor, H.N. Neff, G.M. Feinman, P.R. Williams, L. Dussubieux, and R. Bishop. 2012. The first direct evidence of pre-Columbian sources of palygorskite for Maya blue. *Journal of Archeological Science* 39: 2252–2260.

Arnold, D.E., H.S. Wynne, and J. Ostoich. 2013. The materiality of social memory: The potters' *gremio* in Ticul, Yucatán, México. *Ethnoarchaeology* 5 (2): 81–99.

Moshier, S.O., D.E. Arnold, L.L. Funck, R.J. Lewis, A.J. Smith, J.H. Walton, and W.R. Wharton. 2007. Theories of origins: A multi- and interdisciplinary course for undergraduates at Wheaton College. *Perspectives on Science and the Christian Faith* 59: 289–296.

Mouat, L., and D.E. Arnold. 1988. Ceramic ecology and pottery production in El Porvenir, Honduras. In *A pot for all reasons: Ceramic ecology revisited*, ed. C.C. Kolb and L.M. Lackey, 239–261. Philadelphia: Temple University, Laboratory of Anthropology.

Neff, H., R.L. Bishop, and D.E. Arnold. 1988. Reconstructing ceramic production from ceramic compositional data: An example from Guatemala. *Journal of Field Archaeology* 15: 339–348.

Neff, H., R.L. Bishop, and D.E. Arnold. 1990. A reexamination of the compositional affiliations of formative period whiteware from highland Guatemala. *Ancient Mesoamerica* 1: 171–180.

Neuenswander, H.L., and D.E. Arnold, eds. 1977. *Cognitive studies of southern Mesoamerica*. Dallas: Summer Institute of Linguistics. English and Spanish editions.

O'Hara, D. 2012. Dean Arnold pieces together mystery of Maya blue. *AAAS member spotlight*, 12/19/2012. https://www.aaas.org/dean-arnold-pieces-together-mystery-maya-blue.

Park Huntington, Y., D.E. Arnold, and J. Minich, eds. 2018. *Ceramics of ancient America: Multidisciplinary approaches*. Gainesville: University Press of Florida.

Further Reading/Internet Resources

Dean, E. 2015. Arnold: Curriculum Vitae. https://www.wheaton.edu/media/anthropology/faculty-files/Dean-Arnold-CV.pdf [includes a list of his publications and conference presentations].

Dean, E. 2019. Arnold: Publications. https://fieldmuseum.academia.edu/DeanArnold [19 (out of 22 book reviews), 2 talks, 6 conference presentations; currently most of his 77 published articles on his CV are online].

Wheaton College Alumni Association Award. 2008. Distinguished service to Alma Mater. YouTube https://www.youtube.com/watch?v=420ZhF_hYRc. (5:19).

Wheaton College: Dean E. Arnold, Sociology and Anthropology Department. 2015. https://www.wheaton.edu/academics/programs/sociology/sociology-and-anthropology-department/emeriti-faculty/dean-e-arnold/.

Arqueologia Industrial

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Basic Information

Arqueologia Industrial is a biannual peer-reviewed academic journal published by the Portuguese Society for Industrial Heritage (Associação Portuguesa para o Património Industrial), which is the Portuguese National Representative of The International Committee for the Conservation of the Industrial Heritage (TICCIH), with the support of the River Ave Valley Textile Industry Museum, edited by José Manuel Lopes Cordeiro (Minho University, Braga, Portugal). *Arqueologia Industrial* publishes scholarly research, essays, and reviews of books published in the field of industrial archaeology and its museology.

Recent issues published articles on archaeological works in a lime kiln at Madeira Island, the social and urban space of Vista Alegre Porcelain Factory, or the archaeology of a Brazilian iron mill (seventeenth-eighteenth centuries). The debate on the creation of an international heritage charter on industrial heritage by ICOMOS with the cooperation of TICCIH was also discussed in current issues. Future directions will seek to address issues of industrial landscapes, reuse of industrial heritage, and the use of industrial heritage for tourism purposes.

Official website: http://www.museudaindustriatextil.org.

Major Impact

The first issue of *Arqueologia Industrial* was published in 1987, as a newsletter of the Industrial Archaeology Program of the University of Minho Archaeology Unit. Two numbers were published in 1987 and 1988. The aim was to create a periodical that would meet the interest on industrial archaeology which then began to assert themselves in Portugal. The success of this initiative led to transform the newsletter into a scientific journal, allowing a deeper approach of their subject. After finding a sponsor, the journal restarted its publication in 1993 with its second series, under the project of the River Ave Valley Textile Industry Museum, being published jointly by the Industrial Archaeology Program and the Vila Nova de Famalicão County Council, on a biannual publication frequency, but corresponding to a double issue. Unfortunately, due to several difficulties, the journal was forced to stop its publication, returning with its third series in 1997, under the project of the Oporto Museum of Science and Industry, and published two numbers, also on a biannual frequency. Due to the extinction of the Museum project, it was necessary to find another editor, to allow its continuity. The solution was found in 2005, and the fourth series has been published jointly by the Portuguese Society for Industrial Heritage (TICCIH Portugal) and the River Ave Valley Textile Industry Museum, again with the sponsorship of the Vila Nova de Famalicão County Council. It has been published regularly ever since, maintaining the biannual frequency (a double issue), extending its contents also to research on Brazil's industrial archaeology.

Cross-References

► Industrial Archaeology
► Industrial Heritage in Archaeology

Further Reading

Mendes, J.A. 1996. Caminhos e problemas da historiografia portuguesa. In *História da história em Portugal, séculos XIX–XX*, ed. L.R. Torgal, J. Mendes, and F. Catroga, 373–429. Lisboa: Círculo de Leitores.

Arsebük, Güven

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Basic Biographical Information

Güven Arsebük was born in Istanbul in 1936. He graduated from Robert's College and, inspired by his high school literature teacher, decided to study archaeology. At this time there were two different certificate programs: in prehistory and classical archaeology in the Archaeology Department of Istanbul University. Arsebük graduated from the prehistory program in 1962.

In 1963 and 1964, during his military service, he translated L.S.B. Leakey's *Adam's Ancestors: The Evolution of Man and His Culture* into Turkish. Following his military duty, he went to the University of Tubingen to study anthropology, genetics, Paleolithic, prehistory, and ethnology education for a year under the Thyssen scholarship. On return to Turkey he was assigned to Istanbul University as professorial assistant in 1966.

With a Fulbright scholarship he took lectures at the University of Chicago including human evolution from F. Clark Howell, science of Paleolithic ages from L. Freeman, Pleistocene geography from K. Butzer, and prehistory from Robert J. Braidwood. He received his M.A. in 1964.

Arsebük was promoted to associate professor in 1981, becoming a professor in 1990 following the publication of his book *Human and Evolution*.

Major Accomplishments

Arsebük is considered one of the pioneering archaeologists who developed anthropological and archaeological methods on the "human"-based approach. He, for the first time in Turkish archaeological tradition, examined an archaeological subject using an anthropological method in his Ph.D. dissertation titled "The Relations Problematic

Between Karas Type and Dark Burnished Ware Pottery in Altınova."

After his undergraduate study he participated in many excavations and projects such as the 1958 Side excavations led by Arif Müfid Mansel, following on from 1959 to 1961 Hattuşa directed by Kurt Bittel. Arsebük also participated in the salvage and conservation project for ancient monuments of Lower Euphrates and Keban. As well, with Ufuk Esin, he worked on the Tepecik, Tülintepe, and Değirmentepe excavations.

Güven Arsebük led an international team in excavations between 1988 and 1990, revealing the oldest Paleolithic settlement in Turkey to date. The Yarımburgaz Cave, located in the Küçükçekmece district in İstanbul, was dated from 400,000 to 150,000 BP.

Güven Arsebük served as a representative of Istanbul University's Faculty of Literature for UNESCO from 1990 to 1993. He is a board member of the American Research Institute in Turkey, a member of the American Association of Physical Anthropology in New York, a founder and member of the Turkish Institute of Archaeology, a member of the Germen Institute of Archaeology, and a member of New York Academy of Sciences and of the Turkish Academy of Sciences.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Archaeology as Anthropology
- ▶ Evolutionary Anthropology: Issues, News, and Reviews
- ▶ Human Evolution: Theory and Progress

Further Reading

Arsebük, G. 1983. Tülintepe: Some aspects of a prehistoric village. In *Beiträge zur Altertumskunde Kleinasiens – Festschrift für Kurt Bittel*, ed. R.M. Boehmer and H. Hauptmann, 51–57. Mainz: Verlag Philip von Zabern.

Arsebük, G. 1983. Dünden bugüne arkeoloji. In *Cumhuriyet Dönemi Türkiye Ansiklopedisi*, 66–75. Istanbul: İletişim Yayınları.

Arsebük, G. 1990. *İnsan ve Evrim, Türk Tarih Kurumu Basımevi*. Ankara. (İkinci baskı; 1995, Ege Yayınları, İstanbul).

Arsebük, G. 1993. Yarımburgaz: A lower Paleolithic cave site near Istanbul. In *Between the rivers and over the mountains*, ed. M. Frangipane, 23–36. Rome: Universita di Roma.

Arsebük, G. 2003a. Kim bu Neanderthal'ler: Kökleri kurumuş uzak soydaşlarımız mı, küçümsenen ve reddedilen atalarımız mı, yoksa hiç bir şeyimiz mi? In *Koyden kente- Yakın Doğu'da ilk yerleşmeler* (Ufuk Esin'e Armağan 5), ed. M. Özdoğan, 21–31. Arkeoloji ve Sanat Yayınları.

Arsebük, G. 2003b. Plio-pleistosen'de olası yaşam biçimleri ve ülkemizde Paleolitik çağlar: Bir deneme. *Colloquium Anatolicum* II: 111–126.

Arsebük, G. 2004. İnsan ve Plio-pleistosen'de besin saglama yöntemleri. *TÜBAAR* 7: 133–139.

Arsebük, G., and M. Özbaşaran. 1999. Pleistocene archaeology at the cave of Yarımburgaz in eastern Thrace/Turkey: Preliminary results. In *The Palaeolithic archaeology of Greece and adjacent areas*, ed. G.N. Bailey, 59–72. Athens: British School at Athens Studies.

Kuhn, S., F.C. Howell, and G. Arsebük. 1996. The middle Pleistocene lithic assemblage from Yarımburgaz cave, Turkey. *Paléorient* 22 (1): 31–49.

Stiner, M., F.C. Howell, and G. Arsebük. 1996. Cave bears and Paleolithic artifacts in Yarımburgaz Cave, Turkey: Dissecting a palimpsest. *Geoarchaeology* 11 (4): 279–327.

Art Origins: The Emergence of Graphic Symbolism

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State of Knowledge and Current Debates

Introduction

We have all asked ourselves when art first appeared; when humans first drew, painted, engraved, or sculpted forms in order to transmit concepts and ideas different from their formal materiality. It is not easy to answer that question because the information is based on archaeological evidence (with the limitations that this implies in terms of the object and the contextualization of

its chronology and use) and modern conditioning factors about the understanding of the objects.

The first consideration is obvious: what is art? To discuss this would be to enter an unending debate. To avoid that, as it is not the objective of this book, it is preferable to express our position directly. Art is a tangible creation through which the author, either an individual or a representative of a society, potentially transmits an idea or concept which goes (or may go) beyond formal materialization; a "formal vehicle" that a person or a group endows with a particular meaning. Therefore, it is a formal constructed graphic language, perceived and understood by the members of the human group that created it and which may also possess a potential meaning beyond the "precise moment" of its creation and thus possess a sense of timelessness.

It should also be added that art is not necessarily associated with beauty. The current state of discussion of this topic in our discipline has demonstrated that aspect of beauty forms part of the "vehicle" of the meaning that the forms generate in the observer and interpreter of the graphic creation. This is to say that with a greater perception of beauty (something that pleases the eye and, by extension, the "spirit" of the observer), there is great ease of comprehension and/or acceptance of the message.

The study of the origins of art, or graphic languages, is not simple as we do not possess all the evidence that would enable a precise conclusion. However, archaeology, with the material evidence that has reached us and which it has succeeded in discovering, is endeavoring to seek the origins. It is a constant and intense search in which scientific debate is not out of place.

Human Singularity and Symbolism: Commonplaces, Origins, and Developments

When we talk or write about artistic creations, it is not unusual for people to regard them as a human singularity. It is something that distinguishes us from other animals. Therefore, art and its origin and development are closely linked to biological, cognitive, behavioral, and also philosophical concepts.

The bipartite view that defined human exclusiveness, both cultural and physical, has now been overcome. According to anatomical morphology, about six million years ago, we separated from an ancestor (*Sahelanthropus tchadensis*) that linked us with chimpanzees, from which we barely differ genetically. From that time, anthropologists identify traits that define the hominization process: changes in dentition, modification of skeletal structure leading to an erect posture and bipedalism, and gradual increase in brain size. Those and other changes slowly followed one another in a process that took different directions, resulting in alterations to the diet, metabolism, and, ultimately, in our ontogenesis.

The increase in brain size and weight very probably represent the greatest singularity of human primates in biological terms. In the first 1.5 million years the brain size of our genus doubled its volume and in the 2.5 million years of its existence it has grown at least threefold. This growth also implied modification in brain morphology.

These changes permitted the consolidation of previously acquired skills and the development of others –new capacities of planning and awareness linked to cognitive skills, which in their most complex form involve, among other abilities, rationalization, abstraction, reflexion, intellection, creation, structuration, and ranking – that involved modifying elements in the natural environment and the construction of exosomatic materialities. Those skills and abilities correspond to processes and changes that are the responses to interactions. These involve possible solutions that when they consolidate as repeated strategies result in adaptations of the species or group. Interactions between individuals of the same species, interactions with other species, and interactions with changing environmental factors define relationships and physical and cultural modifications that generate mechanisms and strategies for adaptation and survival, or otherwise extinction.

The systematization and later socialization of skills, and the adaptation to diverse natural and social environments, determine survival as a species and singularize the Homo genus.

What other forms of evidence make the human primate unique and when and where did they occur? Or indeed, what archaeological information is available? A brief and simple answer might propose that it was the construction of symbols, of new socially accepted extrasomatic realities. In this setting, the creation of graphic languages, including art, is one of the most important forms of evidence and helps to define us. It is a skill and ability that is closely linked to the sense of death and other phenomena that cannot always be traced easily by archaeology.

However, imbuing certain materials or certain actions with a meaning that goes beyond their materiality can be identified in the archaeological record despite the difficulties. One of these is the fact that archaeology is limited by the tangible nature of the remains, which implies the difficulty in documenting actions that leave no physical trace.

Media symbolism, or media, has been interpreted as representative of "modern behavior" (Zilhão 2011), as it integrates individual or collective actions linked to burials, the acquisition of an oral system of articulated communication, the production and transformation of materials with a social dimension (like ochre and personal adornments), and the construction of graphic symbolism, such as art. These forms of behavior and their emergence and development correspond to adaptations closely connected with biological and socio-demographic causes that result in changes in the relationships between individuals (Mithen 1996; Shennan 2001). Before discussing art, the other forms of evidence of symbolism will be briefly reviewed.

Burials and Death

Death is a biological fact, involving the termination of a physical materiality, that is, the end of life of a living organism, and a transformation that provokes diverse feelings and responses, depending on the species; thus, different forms of behavior have been described for humans and non-human primates (Cronin et al. 2011).

However, does the fact of death in the Homo genus display any singularity? The archaeological record has documented human remains several million years old, some of which were found in domestic contexts, which may imply that the body was a source of food. However, in some cases cannibalism can be linked to ritual purposes, with a symbolic component. This has been proposed for the remains from Homo antecessor to the Bronze Age (Saladié and Rodriguez-Hidalgo 2017).

The oldest accumulation of human bodies in a separate place away from a domestic setting corresponds to *Homo heidelbergensis* (Sima de los Huesos, Atapuerca, Spain), with an age of 400,000 years (Carbonell et al. 2003). This case has been taken as an early example of the link between a place and the dead, in the sense of our concept of a cemetery.

The archaeological record corresponding to *Homo neanderthalensis* and *Homo sapiens*, from about 120,000 years ago, displays a gradually more abundant repetition of evidence in Europe, Asia, and Africa (Pettitt 2011). The protection of the bodies becomes more frequent, as well as the presence of potentially symbolic elements buried with the dead; ochre, animal remains, stone tools, beads, and even the presence of flowers have been suggested. Following bereavement, humans conceive abstract feelings that seek transcendence and endow the deceased with a social dimension. These are symbolic feelings that go beyond the behavior of animal primates and possibly arise out of the absence of answers to reflections on immateriality, non-life, and afterlife.

Adornments

The conception and use of adornments made from sea shells, teeth, and pieces of bone and ivory are documented in a concrete pattern of emergence and expansion (d'Errico and Stringer 2011; Zilhão 2013): the first evidence in Africa about 120,000 years ago, the subsequent spread to Europe and Asia, and a widespread use about 40,000 years ago. It is a form of behavior that has been identified among both *Homo neanderthalensis* and *Homo sapiens*.

It is not easy to determine their function, but they obviously served some social and/or personal function. Based on ethnographic analogies, the creation and use of personal adornments are

linked to ideas of beauty and of identification of a family or clan, or they may indicate a social position or intra-social differentiation, although not necessarily in the same way as our concept of vertical ranking. Their symbolic value is evident, and also their objective of seeking to transmit an idea, a concept, or an image with supra-individual implications.

Body Paint and Decoration

The interpretation of the value of symbolism mediated through body paint is still undecided (Wadley et al. 2009; d'Errico et al. 2009) and only the application of ethnographic models in combination with archaeological findings will enable progress to be made. Working with coloring matter has been proposed at African sites of about 275,000 years of age (as Twin Rivers and Sai Island sites), but it was with *Homo sapiens* and *Homo neanderthalensis* that evidence of pigment being crushed into powder or affected by heat becomes more common (Soressi and d'Errico 2007).

The presence of these pigments, mainly red hues, has been regarded as representative of symbolic behavior (body paint for social and/or group differentiation), although some scholars prefer functional interpretations (to protect the skin, for medicinal purposes, conservation, hafting implements, etc.). It is not easy to decide on any explanation. However, anthropology shows that the hypothesis of body decoration cannot be discarded and striations caused by use-wear on the surfaces of coloring matter and the preparation of pigments by mixing minerals support its feasibility, but cannot be discarded the hypothesis the striations caused by use-wear on the surfaces of coloring matter.

Verbal Language: Invisible Symbolism

Human evolution involved the development and consolidation of social skills: the formation of singular strategies connected with the ability to carry out group activities implying degrees of organization, understanding, and cohesion. Among other factors, a verbal language (with a particular structure, varied vocabulary, conceptualization based on abstraction, and varied recursiveness, as well as a possible symbolic dimension) must have been essential for positive and full communication.

Anthropological studies of the vocal tract, auditory system, the ability of speech, and the neuronal development of some brain areas (Krause et al. 2007; Christianses and Kirby 2003; Martínez et al. 2008; Quam et al. 2016) show that language was not exclusive to our species, *Homo sapiens*. However, capacity is potential; the possession of those similarities does not necessarily imply that those humans enjoyed a language resembling ours. It is likely that the context, and subsistence and social pressure, would determine its development and complexity.

The Traditional View of the Emergence of Art: Historiography and the Academic Background Until 20 Years Ago

The scientific community in general assumed that the origin of art was exclusively linked to the European Anatomically Modern Human. The great theoreticians of the twentieth century, the French prehistorians Breuil (1952) and Leroi-Gourhan (1965), constructed their ideas on prehistoric art based on that axiom. Consequently, until recently it was widely accepted that: (a) the earliest possible date for the emergence of art would be about 40,000 or 35,000 years ago (BP, before the present); (b) its appearance was connected exclusively with the European Upper Palaeolithic; and (c) its development should be understood in terms of an evolutionary conception of forms. The biological, cultural, and philosophical setting of this assumption was the singularity not only of humans but of our species. Thus, it was the "first biological me" (the first European *Homo sapiens*) who developed art, artistic creations, and formal graphic languages.

However, what was the reason for this assumption? Did any data exist with which to propose a time limit and the link between art and a single human species? In fact, very little information, often of dubious quality, existed. Engraved figurative portable art was (and still is) scarce or does not exist in some regions until 20,000 years BP. For rock art, no objective numerical dates had been obtained; no precise dates to attribute a

creation to one time or another. Only superimpositions of motifs had been documented, where it was only known which motif had been produced first or last in a relative order.

However, the most powerful conditioning factor was the construction and consideration of the term *Homo sapiens*. When Linnaeus (1758) proposed it in the mid-eighteenth century, it was not based on metric or morphological traits as we might define *Homo sapiens* today. For the naturalist, *Homo sapiens* corresponded to a wise person, capable of understanding, with abstract reasoning and the capacity of introspection and speculation, who used linguistic systems and performed conceptual and symbolic operations. In other words, the definition did not come from the traits of physical anthropology but from cognitive factors.

Over time, with the discovery and description of new species (e.g., *Homo neanderthalensis* in 1864, *Homo erectus* in 1892 and *Homo heidelbergensis* in 1908), the term *Homo sapiens* became increasingly based on the anatomic conceptualization (to differentiate our species with the newly described ones) and it lost its original sense and meaning.

During this semantic change, an equation was drafted and it has been maintained as an axiom until till recently. *Homo sapiens* is equal to the (only) human capable of creating symbols and therefore of creating artistic works that contain and transmit an idea.

But what exactly did those researchers propose regarding the origins of art? Breuil and Leroi-Gourhan constructed chrono-stylistic schemes to express their ideas. In the early twentieth century, Breuil (1952) affirmed that in its origins (about 40,000 BP, at the start of the Aurignacian-Gravettian cycle) the first art consisted of finger-fluting in clay (curved lines forming meanders, sometimes parallel or with the appearance of macaroni), red hand paintings, large red discs or dots, red or engraved lines (including some radial types that he defined as huts), and red X-shapes. He also noted the existence of some animal figures that were very simple in their outlines, anatomical details and perspective, and generally incomplete. His criteria to classify the depictions were superimposition in (seemingly) diachronic panels and an evolutionary perspective that he applied to the different motifs, the simpler, the older they were.

In the mid-twentieth century, Leroi-Gourhan (1965) proposed a new scheme for European prehistoric art based on styles. The oldest, Style I, which began in about 32,000 BP, included what he interpreted as genital symbols, mainly attributed to the female gender, and animals drawn with very simple lines and designs. He also considered the existence of cupmarks carved into the rock and lines on bones. However, in the same period of time in which he defined Style I, in 1964 he published his book *Le Geste et la Parole* (Leroi-Gourhan 1964–1965), which imagined a phase before that first style. He called this a prefigurative style and determined that it would have started about 50,000 BP and consequently must have been linked to *Homo neanderthalensis*, as *Homo sapiens* could not have reached Western Europe earlier than 45,000 BP. In this phase he included lines (sometimes crossing over each other and sometimes parallel) engraved on bones and less often on stones, which had been found mostly in France and only on portable objects. It should be noted that although Leroi-Gourhan continued to work almost until his death, he did not develop or comment on that first style any further.

It was Lorblanchet, in his book *La naissance de l'art. Genèse de l'art préhistorique* (1999), who essayed a study of the bones and stones with "marks" that could be attributed to "Homo erectus, Neanderthals and proto-Cro-Magnon." His study concluded by highlighting the existence of intentional and symbolic linear motifs on bones and stones, some of them simple and others more complex and organized. He also acknowledged exceptional cases of geometric forms that might also be attributed a symbolic intention.

Therefore, it can be affirmed that until a few years ago it was generally thought that rock art (or parietal art, the art on walls) began with signs and some simple animal figures in about 40,000 or 35,000 BP, that is to say in connection with anatomically modern humans.

In contrast, for portable art (decoration on bones, stones, antlers, etc.) there was no

consensus. While some researchers accepted the existence of linear and geometric engravings associated with human species paleontologically prior to *Homo sapiens*, others rejected that possibility either out of simple incredulity or because they thought that the lines were not created intentionally but by various taphonomic processes (such as grooves caused by trampling, butchering animals, etc.).

The Origin and Initial Development of Art or Graphic Symbolism in Europe

The study of the first formal graphic language is based on the oldest evidence of altering natural elements as a form of media. Graphic constructions are a kind of formal language (art?) constructed with lines and groups of lines that form linear, geometric, and exceptionally natural (zoomorph and anthropomorph) structures. As explained above, although this form of behavior has traditionally been associated with anatomically modern humans in Europe, an increasing number of older examples are being documented in Europe.

Evidence of Portable art before Anatomically Modern Humans

Graphic behavior has been documented in early stages of the Palaeolithic in Europe. The oldest evidence was associated with a Lower Palaeolithic group of stone flakes in Bulgaria. It is a bone with series of lines, found at the site of Kozarnica and dated to a million years ago (Guadelli and Guadelli 2004). It should be noted that there is no consensus in the scientific community as to whether this can be regarded as portable art, as some researchers suggest that these lines might be butchery marks.

In contrast, greater agreement has been reached about a group of engravings at the German site of Bilzingsleben, dated to between 350,000 and 250,000 years ago (Mania and Mania 1988; Mania 1991; Steguweit 1999). Some bones display more or less parallel lines while one contained a series of parallel lines in a vertical position "framed" by oblique lines (Fig. 1a). Another motif clearly tends to a geometric pattern: a double rectangle whose interior is associated with lines (Fig. 1b). However, the most surprising object is a bone with lines that create a figurative motif (Fig. 1c): an indeterminable animal of which the body, head, and a forelimb can be clearly distinguished. The representation is very simple, but with the necessary reservations, its figurative character seems evident. In this case, it would be one of the oldest figures known.

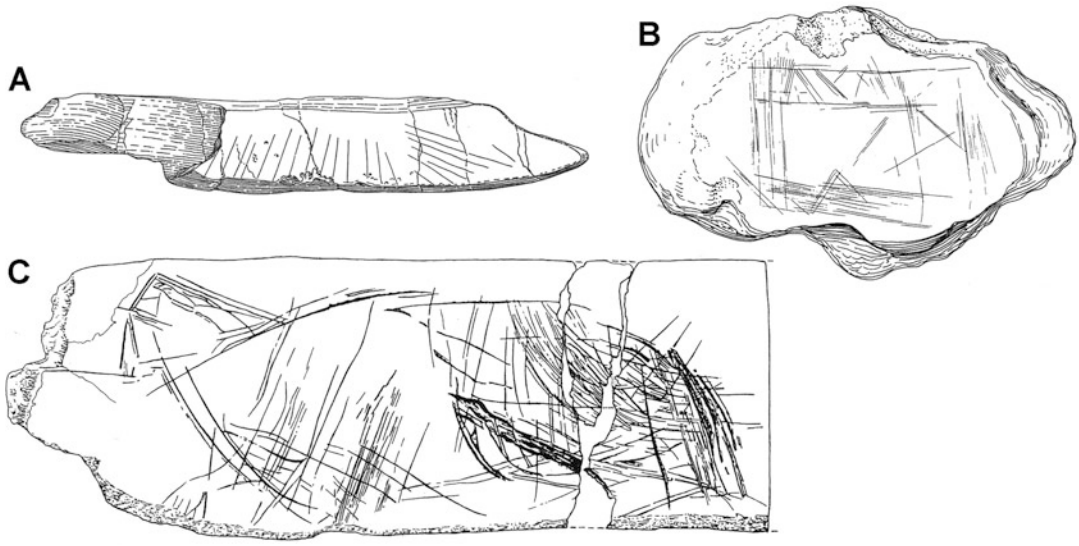

Art Origins: The Emergence of Graphic Symbolism, Fig. 1 Bone artifacts from Bilzingsleben dated between 350,000 and 250,000 BP. (**a**) Organized and rhythmic linear composition; (**b**) motif tending toward a geometric shape; (**c**) figurative representation of an indeterminate animal (Dietrich Mania)

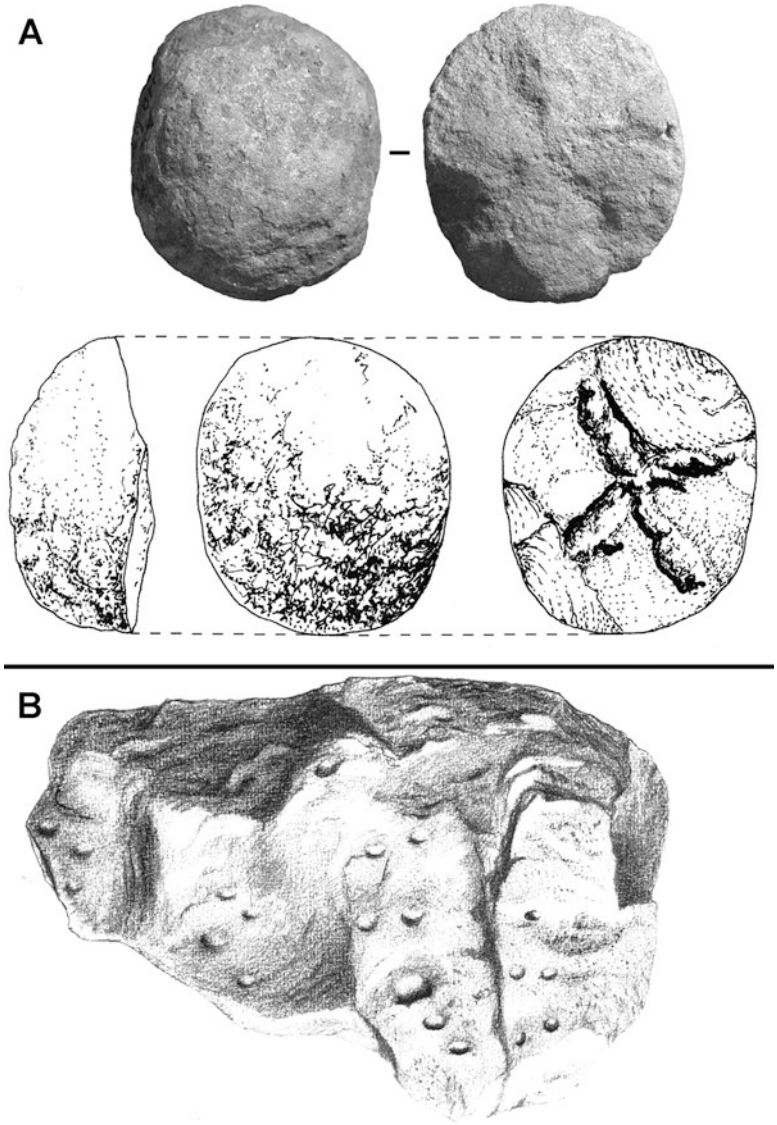

Art Origins: The Emergence of Graphic Symbolism, Fig. 2 (**a**) Stone artifact from Axlor dated in about 45,000 BP with a cross-shaped linear motif (Marcos García-Diez et al.). (**b**) cupmarks on a boulder at the site of La Ferrasie associated with Neanderthal burials (Michel Lorblanchet)

However, the numbers of examples, as well as the thematic diversity of the linear compositions, increase in the Mousterian (Lorblanchet 1999; García-Diez et al. 2013a; Zilhão 2013). From about 150,000 BP onward, the number of objects with simple linear motifs gradually increases and has been documented at such sites as Abri Suard, Saint Anne I, Oldisleben 1, Vaufrey, Tata, El Castillo, and Prolom II. From about 60,000 BP, in the middle and final phases of the Middle Palaeolithic, the number of objects and motifs increases further, on both bones and stones (e.g., at Le Moustier, Abri Lartet, Marillac, Le Petit Puymoyen, La Quina, Cotencher, La Ferrassie, L'Ermitage, Turské Mastale, Axlor – Fig. 2a – and Temnata). These portable objects display diverse linear patterns, sometimes based on lines arranged in a rhythmic, ordered, and hierarchic composition. They are mainly constructions formed by straight, more or less parallel lines. They coexist with other representations in Europe, such as the cupmarks at La Ferrassie (Fig. 2b) associated with human burials or the highly debated "Neanderthal mask" at La Roche-Cotard.

Evidence of Rock Art Before Anatomically Modern Humans

Just as graphic symbolism has been documented on portable objects more than 40,000 years old, the evidence of rock art associated with Neanderthal populations has recently gained strength via a series of new direct dates.

Dating rock art is not simple. Until a few years ago the only method in use was radiocarbon dating by accelerator mass spectrometer, and this could only be applied to motifs drawn with charcoal, organic matter, or organic binders. This meant that most motifs painted in red, mainly with iron oxides, and engravings could not be dated.

However, recent advances in the Uranium-Thorium method now allow very small samples of calcite to be dated and precise results to be obtained. Since some parietal motifs are partially covered by calcite, or were painted on top of calcite, it is therefore possible to obtain dates that give an idea of the time when the paintings were produced. This method can provide either an ante quem date (when the figure is beneath the calcite and must have been painted before that date) or a post quem date (when the figure is on top of calcite and must have been painted after that date).

After studying the stratigraphic relationship between the paintings and the calcite (i.e., which is on top and which is underneath), samples were recently taken in several caves in Spain and France with rock art that was thought to belong to an early period. Over 500 results were obtained. In three Spanish caves, the results have shown that the paintings were more than 40,000 years old and therefore from a time before anatomically modern humans reached the Iberian Peninsula (Hoffmann et al. 2018).

La Pasiega Cave in Cantabria, Spain, is a well-known important Palaeolithic rock art site, on UNESCO's World Heritage list. Studies carried out in the cave have identified hundreds of painted and engraved animal figures and symbols. In its maze-like passages, one of them, called Galería C, contains a panel with red signs and animals. A ladder-shaped sign (Fig. 3) consisting of two parallel vertical lines with horizontal lines at different heights is partly covered by a small calcite formation that was dated by the U-Th method. The three results obtained show that this sign was painted over 64,800 years ago (Hoffmann et al. 2018).

Similar results were achieved in the center of the Iberian Peninsula, in Maltravieso Cave in Cáceres. A stencilled hand (Fig. 4) produced by placing the hand on the wall and spraying red pigment around it using a rudimentary air-brush was dated to at least 66,700 BP (Hoffmann et al. 2018).

And in the south of Spain, in Ardales Cave in the Province of Malaga, as many as 12 significant dates were obtained. The samples were all taken on a large pillar where geological processes had formed calcite "curtains" with "pleats" that curve in and out (Fig. 5a). Red pigment had been sprayed on both the concave and convex parts of these to create elliptical shapes. It was possible to take samples from both above and below the pigment and associated with different shapes (Fig. 5b). The results showed that these red paintings were first produced before 65,500 years ago, that a second phase of graphic activity took place between 48,700 and 45,300 years ago, and very probably a third one between 45,500 and 38,600 BP (Hoffmann et al. 2018).

All these results confirm the existence of rock art inside caves at a time when the Iberian Peninsula was inhabited by Neanderthals. Those human populations used a non-figurative type of graphic language (shapes formed by dots and lines, and hands that from a creative perspective cannot be considered figurative as they correspond to the shape around a hand placed against a wall) produced with red pigment. Their position inside the caves, the need for a form of lighting, the preparation of the pigment and its mixing with water, and the application technique (by spraying, at least in Maltravieso and Ardales) confirm the intentional character and therefore human origin of the graphic activity.

Additionally, the confirmation in Ardales Cave of several phases of activity in precisely the same passage and on the same surfaces indicates the repetition of shapes and languages and the use of parietal motifs that were included in later

Art Origins: The Emergence of Graphic Symbolism, Fig. 3 Red ladder-shaped motif in La Pasiega Cave painted at least 64,800 years ago (Dirk Hoffmann et al.)

creations. This shows that forms of communication existed, implying the transmission of information connected with the decorated places. However, we also have to consider that transmission of ideas probably experienced changes from one to the next episode changing the meaning, function, and significance but not the vehicle. This gave those places a monumental character and a symbolic significance that transcended the motifs themselves.

These results and the conclusions derived from them shatter the traditional conception of rock art exclusively attributable to anatomically modern humans. Above all, they allow cave art to be explored and understood in a different way. How can it be denied now that some stencilled hands, discs, and simple linear signs were the graphic creations of *Homo neanderthalensis*? Could the discs and hands in such caves as El Castillo in Spain or Merveilles in France have been painted by Neanderthal humans? This does not mean that all the hands (García-Diez et al. 2015) and discs were Neanderthal creations. It must now be accepted that some artistic forms were generated in a particular time (whenever that was) and lasted over time until they were reused from the graphic point of view with the same or a different symbolic meaning (d'Errico et al. 2016). This is very human behavior and should not surprise us.

Thus, we know that in Ardales Cave, Neanderthal humans made use of the iconography generated hundreds or thousands of years before by anatomically similar groups. And this symbolic space was equally used as a symbolic place by later human groups belonging to the species *Homo sapiens* (Cantalejo et al. 2006). Other cases of the repetition of motifs have been documented in El Castillo Cave (Pike et al. 2012; García-Diez et al. 2018) in a time before 35,000 BP and even the reuse of figures is evident in the same cave. In a visually clearer way, in Altamira Cave, figures were created on the

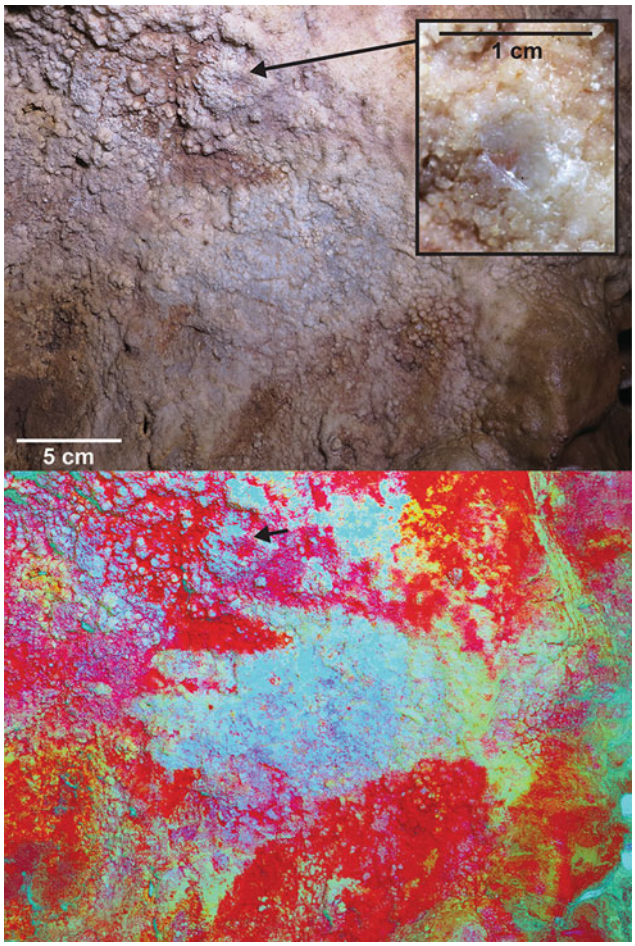

Art Origins: The Emergence of Graphic Symbolism, Fig. 4 Red hand stencil in Maltravieso Cave painted at least 66,700 years ago (Dirk Hoffmann et al.)

Ceiling of the Polychromes during at least 25,000 years (García-Diez et al. 2013b).

Another example of rock art associated with populations older than anatomically modern humans is the group of engraved lines in Gorham's Cave in Gibraltar (Rodríguez-Vidal et al. 2014).

The Origin and Initial Development of Art or Graphic Symbolism in Asia

The appreciation of the symbolic and graphic abilities of human societies in Europe must be assessed against a wider geographic background. Although Europe used to be regarded as the continent where graphic symbolism emerged and from where it dispersed to other regions, new discoveries are challenging that Eurocentric view and it has become necessary to consider the evidence in Africa and Asia.

In Asia, the oldest evidence was found at the site of Trinil; it is associated with *Homo erectus* and is dated in about 540,000 BP. It is freshwater mollusk shell on which more or less parallel and angular lines were engraved (Fig. 6) and which have been related to the cognitive sphere and capacities of neuromotor control (Joordens et al. 2015).

At a more recent time, in at least 105,000 BP, at Lingjing (Li et al. 2019) flat bones were engraved with approximately parallel lines (Fig. 7a) and ochre was used to highlight the engravings. It has been suggested that these engravings were the work of Denisovan humans. A stone at Qafzeh in Israel, dated in about 95,000 BP, was engraved with mostly parallel straight lines. Finally, a stone

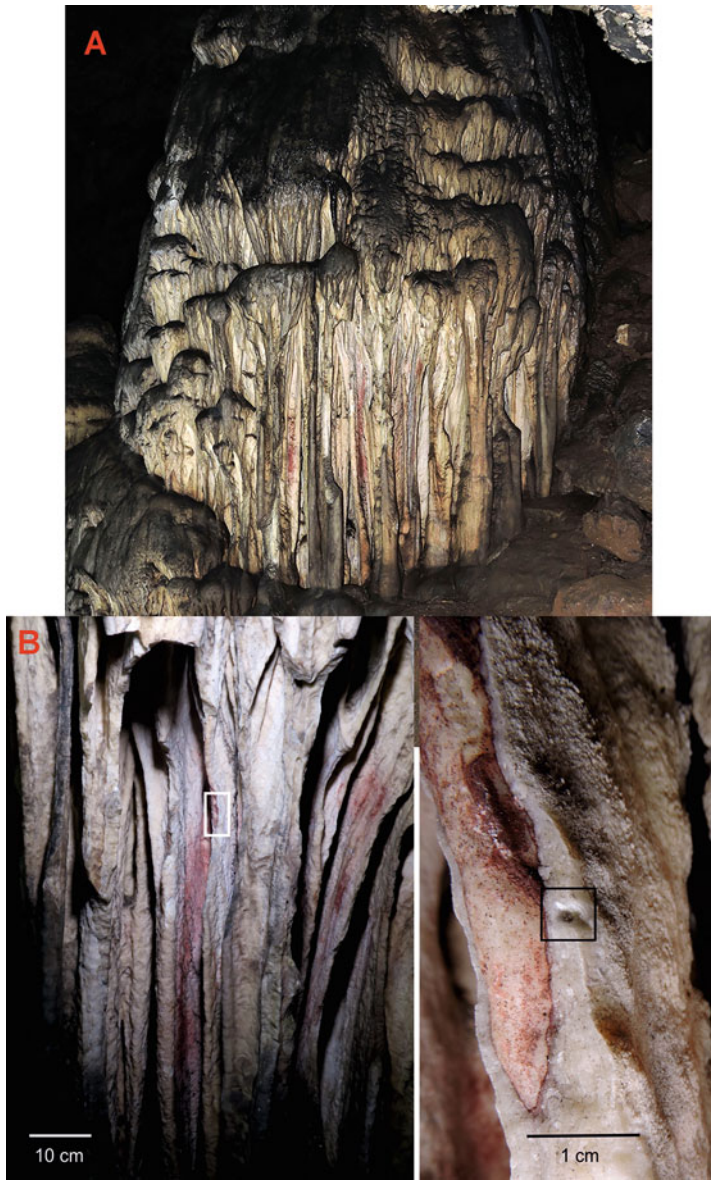

Art Origins: The Emergence of Graphic Symbolism, Fig. 5 Ardales Cave. (**a**) column on which oval-shaped motifs were drawn between at least 65,500 years ago and 38,600 years ago. (**b**) detail of one of the color stains that has been dated (Dirk Hoffmann et al.)

at Quneitra (Marshack 1996) in Syria, with a date of 60,000 BP, contains numerous parallel lines, some of them forming a kind of repeated semicircular shape (Fig. 7b).

One of the most significant objects in Asia, although also problematic, was found at the site of Berekhat Ram (d'Errico and Nowell 2000) in the Golan Heights, on the borders of Israel, Lebanon, Jordan, and Syria. It must have been produced by *Homo erectus* as it has been dated to at least 230,000 BP. A series of incisions were made in a small reddish volcanic rock and some surfaces were abraded possibly to make them smoother. The stone is naturally in the shape of the human body, with the head differentiated from the torso, and the breasts from the torso. This artifact has therefore been considered as a feminine anthropomorphic figurine (Fig. 8a), and specific human actions have been identified in the differentiation of its anatomical regions. It is not exactly a sculpted figure, but a natural stone whose shape attracted the attention of someone who

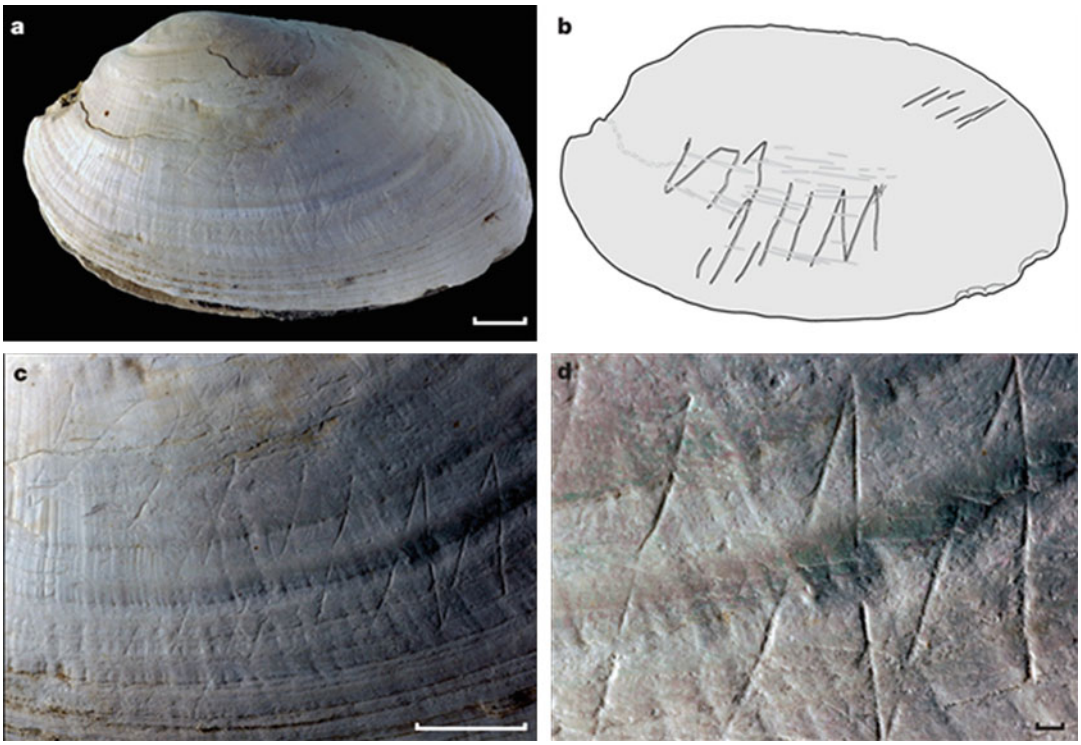

Art Origins: The Emergence of Graphic Symbolism, Fig. 6 Shell from Trinil with angular and approximately parallel lines, dated in 540,000 BP (Josephine Joordens et al.)

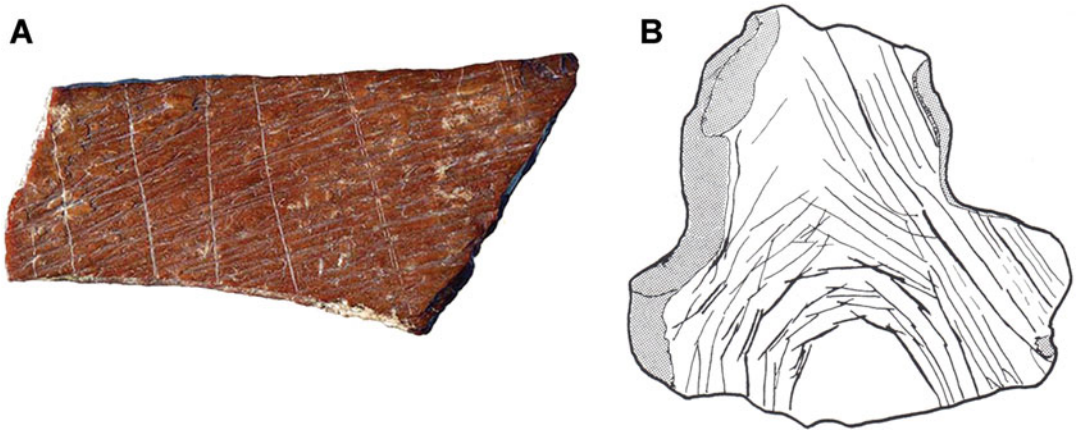

Art Origins: The Emergence of Graphic Symbolism, Fig. 7 (**a**) Lingjing, plaque with roughly parallel lines dated in 105,000 BP (Francesco d'Errico and Luc Doyon). (**b**) stone artifact from Quneitra with roughly parallel lines, some of them with a reiterated semicircular form (Alexander Marshack and Christopher Henshilwood)

emphasized the anatomical features it suggested. If this is correct, and it seems quite feasible, it would be one of the first figurative representations documented in the archaeological record.

The Origin and Initial Development of Art or Graphic Symbolism in Africa

In a similar way to the previous figure from the Golan Heights, at an Acheulean site dated to at

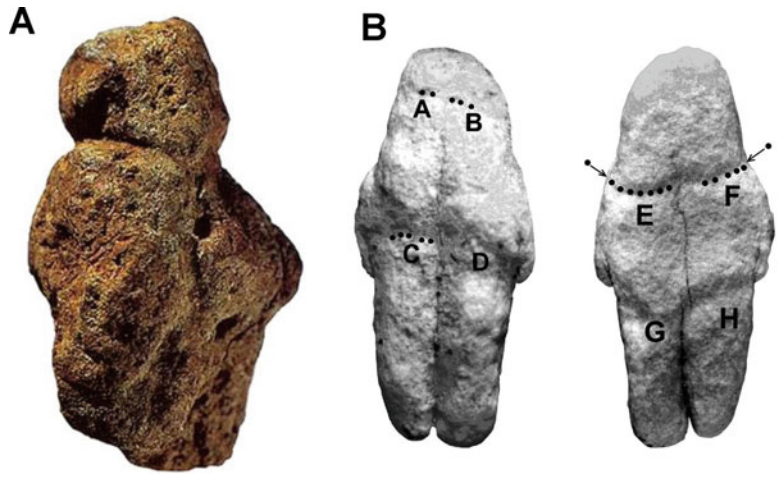

Art Origins: The Emergence of Graphic Symbolism, Fig. 8 "Proto-sculptures." (**a**) From Berekhat Ram, dated in at least 230,000 BP, a volcanic rock with a natural human shape which was modified to stress its female form (Pinterest). (**b**) From Tan-Tan, dated in about 300,000 BP, a quartzite stone with a natural human shape which was modified with lines to differentiate anatomical regions and emphasize its suggestive shape (Der Spiegel)

least 300,000 BP a quartzite object was found in a natural shape that suggested a human figure with the head, torso, and lower limbs. This is the proto-sculpture from Tan-Tan in Morocco (Bednarik 2003) to which some small modifications were made and which may have been painted as remains of hematite have been identified on its surface (Fig. 8b). However, its acceptance in the scientific community is significantly less positive than in the case of the figure from Berekhat Ram.

Some other objects in Africa predate anatomically modern humans as they are reliably dated to about 200,000 BP, but there is no consensus. Possibly the clearest example was found in Wonderwerk Cave (South Africa) where a stone plaque displays approximately parallel lines and is dated no later than 270,000 BP (Bednarik and Beaumont 2012).

However, the most representative and unquestionable evidence of early graphic activity in the continent comes from the Middle Stone Age, in an archaeological and anthropological context of *Homo sapiens*. Some objects with linear engravings (Henshilwood and Marean 2011; d'Errico et al. 2012), dated to at least 100,000 BP, have been recorded at Pinnacle Point, Klasies River Mouth caves, Hollow rock shelter, and Border Cave, among other sites.

The South African site of Blombos Cave (Henshilwood et al. 2018) has provided an important ensemble of graphic evidence in a time between 97,000 and nearly 70,000 BP. Different techniques (incised engraving and drawing in red) were applied on surfaces of bone and ochre. Two objects display linear decoration consisting of parallel and angular lines forming a pseudo-zigzag, one of them partially framed in a possibly rectangular shape (Fig. 9).

A little more modern, between 65,000 and 59,000 BP, are the ostrich egg shells decorated with geometric motifs in Diepkloof (Texier et al. 2010) and Lipdrift (Henshilwood et al. 2014) shelter. In both cases the linear decoration exhibits a certain degree of compositional complexity, as series of parallel lines and cross-hatching can be observed in an organized and structured design (Fig. 10).

This range of archaeological evidence has accumulated mostly in the last 20 years, during which time d'Errico's research has played a major role in assessing the importance of those objects. They imply questioning the notion of the European origins of art.

However, for the Asian and African sites, it must be accepted that graphic symbolism was linked to the development of cognitive abilities

Art Origins: The Emergence of Graphic Symbolism, Fig. 9 Stone from Blombos Cave with a pseudo-zigzag motif framed inside a possible rectangular shape and dated in 77,000 BP (Stephen Alvarez)

and the construction of visual representations that were shared within the human group in order to transmit information. The iteration of linear motifs, particularly compositions based on parallel and sometimes angular lines, which occasionally became more complex with cross-hatched motifs, indicates a certain degree of graphic regularity.

In a diachronic sense, more or less organized linear compositions are documented on both continents associated with earlier human species. Thus, in Asia they are found from 500,000 BP onward but become relatively more frequent after 125,000 or 100,000 BP. This relationship between density of finds and chronology is repeated in Africa, where from about 100,000 BP onward examples of graphic activity become relatively more numerous, although in connection with anatomically modern humans. Additionally, great diversity is seen in the compositions, and some scholars have attempted to differentiate "regionalisms," such as in the case of the ostrich egg shells.

One final aspect, which may be quite important, was the use of stones with a natural shape that suggested the human body and which were modified slightly to indicate anatomical features or regions. Few examples have been found, but it seems that these "proto-sculptures" can be interpreted as the first graphic evidence based on the formal use of suggestive perceptions that involved anthropogenic modifications. These objects were probably created in Asia about 230,000 years ago, and possibly in Africa 300,000 years ago, in both cases associated with archaic human species.

Toward an Appraisal of the Origins of Art and the First Graphic Symbolism

Making use of the environment with cognitive abilities and skills is constant among primates, but the human singularity lies in the capacity to modify it and create new materialities.

Another ability of the Homo genus is the construction of materialities that express meaning beyond their tangible form. In this context, graphic forms were artificial social containers of information and new means of relationships among members of a group. The information they contained was governed by the social rules determined by the individual or social group. Nature was transformed, new materialities were created, and they were given a new meaning, thus creating an "artificial nature" with a human origin.

Examples that have been described representing the emergence of graphic behavior show that these cognitive abilities and skills are not necessarily limited to anatomically modern humans. In contrast, they demonstrate an association with *Homo erectus*, *Homo heidelbergensis*, and *Homo neanderthalensis*, and it has even been suggested with Denisovan humans.

It is still too early to attempt an overall account of the origins and development of this graphic

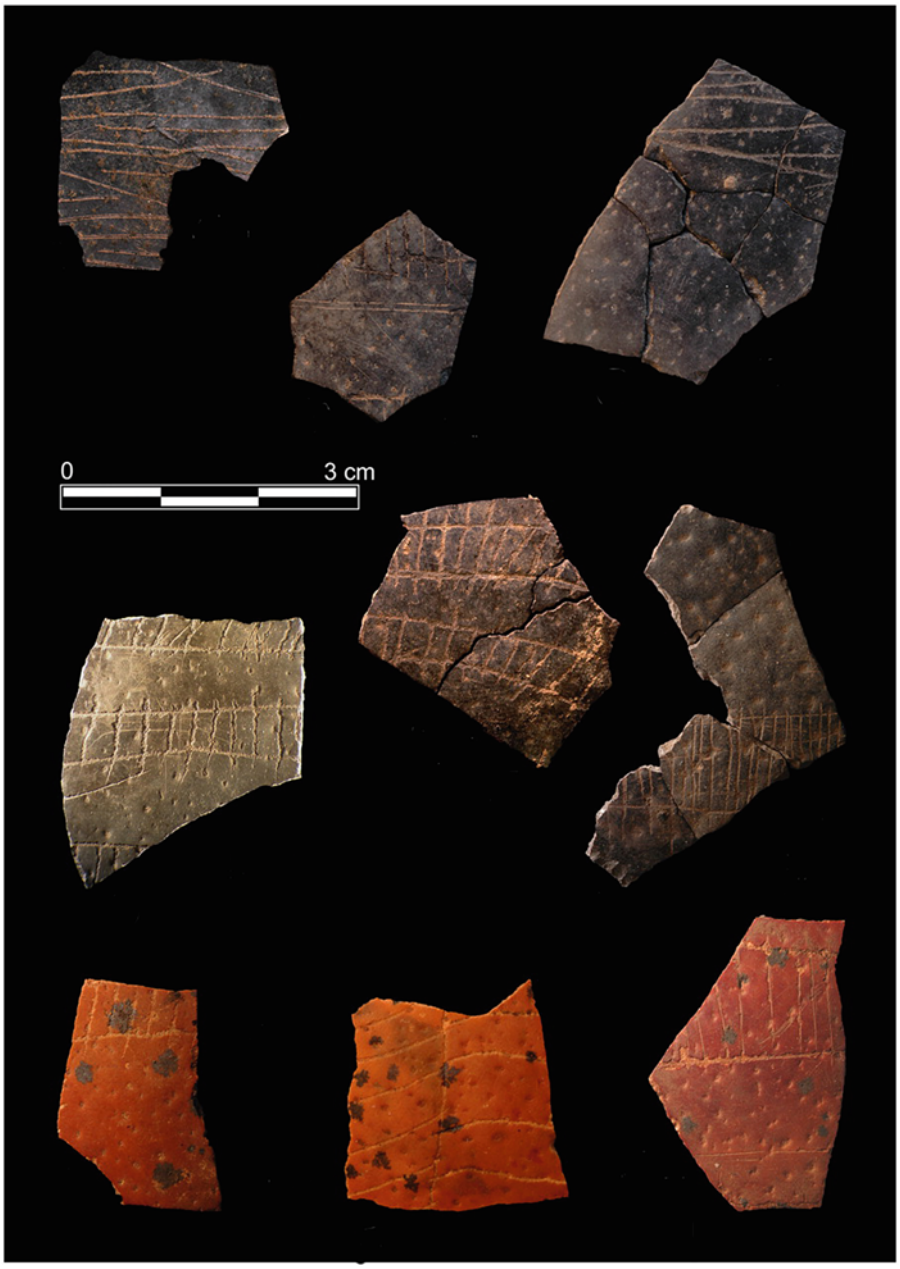

Art Origins: The Emergence of Graphic Symbolism, Fig. 10 Ostrich eggshell fragments with diverse linear motifs, dated in 60,000 BP (Pierre-Jean Texier et al.)

symbolism. There is disperse evidence of linear motifs in Europe from at least about 250,000 BP, in Asia from about 540,000 BP and in Africa from at least 270,000 BP. In the three continents the engraved motifs and compositions are based on parallel and angular lines, while in Europe some rectangular geometric shapes have been recorded.

Some simple figurative motifs have been documented on the three continents in a time of about 300,000 or 250,000 BP. The clearest examples at Bilzingsleben and Berekhat Ram, and the most problematic (because of the lack of exact evidence) at Tan-Tan, certify the existence of very simple animal depictions (which do not

allow the animal species to be identified) and the use of natural suggestive shapes that were altered slightly to emphasize the human appearance of the stone, in a kind of "proto-sculpture." These examples demonstrate the cognitive ability of archaic humans who were able to perceive the shape and alter it slightly with technical actions that imply abstraction of reality, mental transformation of it and an alteration of nature through shapes created using neuromotor control.

With the available data, it is possible to provisionally propose a second phase within the emergence of graphic symbolism. In Europe from about 150,000–100,000 BP onward, in Asia from 100,000 BP, and in Africa also from about 100,000 BP, the number of known examples in the archaeological record increases, although they are still scarce. The difference is that, while in Europe and Asia these examples were created by early humans (*Homo neanderthalensis*, *Homo erectus*, and Denisovan humans), in Africa they were the work of anatomically modern humans. More evidence has been documented in the latter continent and possible graphic regionalisms may have arisen, representing graphic and symbolic formulas that were intended to mark social and group identities.

In Europe, from at least 60,000 BP, with the presence of Neanderthal populations, portable objects display greater evidence of motifs that continue to be mostly linear. However, those groups also achieved a new symbolic landmark in the social transcendence and durability of graphic communication systems.

The certification of rock art in caves with an age of at least 65,000 years demonstrates the capacity not only of creating but also of transferring communication condensed in symbols and in confined places. This creativity also acquired a timeless quality as those graphic representations lasted in time after they had been produced and may have been seen by later human populations that even used them with the same or a different meaning. These symbols were depicted in underground spaces which acted like a "hard disk" in which the motifs and information were stored for later times.

Different intensities in the presence of graphic symbolism can be detected over at least 500,000 years during the development of the skills and abilities of graphic representation. A gradually more frequent presence of this evidence of social interaction and communicative behavior can be documented on a timeline, revealing a progressively greater social importance of those media, attesting to changes in cultural, social, and territorial organization of the human groups, possibly as a consequence of modifications in the demographic structure.

With the advent of anatomically modern humans in Europe, rock and portable art acquired a new dimension as it became socially more important in different parts of the planet. Regionalism grew increasingly accentuated as animal figures and a previously unknown diversity of linear and geometric structures (signs) appeared. It is still necessary to obtain numerical dates for the ensembles and understand the territorial extent of Palaeolithic art to advance in the comprehension of how humans created those graphic structures to transmit information and condition social and cultural development.

A Final Brief Reflection

In recent years great progress has been made in prehistory as regards the cognitive dimension. The study of graphic representations has shown that the characteristics Linnaeus attributed to his definition of *Homo sapiens* are not exclusive to Homo paleontologically sapiens populations or anatomically modern humans. *Homo erectus*, *Homo heidelbergensis*, *Homo neanderthalensis*, and even Denisovans conceptualized external reality and transmitted information using graphic languages based on shapes.

This means that from a cognitive point of view, following Linnaeus, we should reserve the term *Homo sapiens* exclusively to Homo paleontologically sapiens populations or we should make clear if this term is being used in an anatomical or cognitive sense or even conceived in a genetic way.

In any case, it is now clear that symbolic abilities and skills of a graphic nature, based on the construction of motifs, have existed for at least 500,000 years, associated with anatomically archaic humans. The presence of those media, with their implications for communication and

social interaction, is being identified over gradually longer timespans, as has been explained.

Future Perspectives

The study of the origin and development of graphic symbolism is currently an important subject of scientific debate. Our understanding of this archaeological reality has varied greatly in the last 20 years, and therefore the present state of our knowledge will surely also change.

To make progress, add nuances and modify the data and conclusions, we must work on dating the rock art and understanding the density of Neanderthal graphic production. When did it begin? What is its spatiotemporal distribution? It is possible that the chronological attribution of some representations, especially non-figurative motifs, currently assigned to the early Upper Palaeolithic, should be reconsidered. We must also overcome the Eurocentric standpoint that conditions our territorial understanding of the phenomenon and be open to any non-European evidence that has been well-tested chronologically.

At the same time, it is necessary to reexamine from a taphonomic perspective engraved bone or stone objects that have been attributed to anatomically archaic humans and discard any examples in which the lines are due to natural causes or are butchery marks. This will achieve a better understanding of the phenomenon and the density of evidence. It is also important to contextualize the objects chronologically in order to understand how graphic symbolism emerged in each region and its possible dispersion.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art, Paleolithic
- ▶ Art, Types of
- ▶ Côa Valley Rock Art Sites
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Europe: Prehistoric Rock Art
- ▶ From Sautuola to Cartailhac
- ▶ Mobiliary Art, Paleolithic
- ▶ Paleoart Studies: Scientific Methods
- ▶ Pigment Analysis in Archaeology
- ▶ Siega Verde Rock Art Sites
- ▶ Techniques of Paleolithic Art

References

Bednarik, R. 2003. A figurine from the African Acheulian. *Current Anthropology* 44 (3): 405–413.

Bednarik, R., and P.B. Beaumont. 2012. Pleistocene engravings from Wonderwerk Cave, South Africa. In *Pleistocene art of the world, Actes du Congrès IFRAO, Bulletin de la Société Préhistorique Ariège-Pyrénées, LXV-LXVI (CD), 2010–2011*, ed. J. Clottes, 561–570.

Breuil, H. 1952. *Quatre cents siècles d'art pariétal. Les cavernes ornées de l'âge du renne*. Montignac: Centre d'Études et de Documentation Préhistoriques.

Cantalejo, P., R. Maura, M.M. Espejo, J. Ramos, J. Medianero, A. Aranda, and J.J. Durán. 2006. *La Cueva de Ardales: Arte prehistórico y ocupación en el Paleolítico Superior. Estudios, 1985–2005*. Málaga: CEDMA.

Carbonell, E., M. Mosquera, A. Ollé, X.P. Rodríguez, R. Sala, J.M. Vergès, J.L. Arsuaga, and J.M. Bermúdez de Castro. 2003. Les premiers comportements funeraires auraient-ils pris place à Atapuerca, il y a 350.000 ans? *L'Anthropologie* 107: 1–14.

Christiansen, M.H., and S. Kirby. 2003. Language evolution: Consensus and controversies. *Trends in Cognitive Sciences* 7 (7): 300–307.

Cronin, K.A., E.J.C. Van Leeuwen, I.C. Mulenga, and M.D. Bodamer. 2011. Behavioral response of a chimpanzee mother toward her dead infant. *American Journal of Primatology* 73 (5): 415–421.

d' Errico, F., and A. Nowell. 2000. A new look at the Berekhat ram figurine: Implications for the origins of symbolism. *Cambridge Archaeological Journal* 10 (1): 123–167.

d' Errico, F., R.G. Moreno, and R.F. Rifkin. 2012. Technological, elemental and colorimetric analysis of an engraved ochre fragment from the Middle Stone Age levels of Klasies River Cave 1, South Africa. *Journal of Archaeological Science* 39: 942–952.

d' Errico, F., L. Ban, A. Picart, M. García-Diez, and J. Zilhão. 2016. The technology of earliest art of European art: El Castillo cave (España). *Journal of Archaeological Science* 70: 48–65.

d'Errico, F., and C.B. Stringer. 2011. Evolution, revolution or saltation scenario for the emergence of modern

cultures? *Philosophical Transactions of the Royal Society B* 366: 1060–1069.

d'Errico, F., M. Vanhaeren, Ch. Henshilwood, G. Lawson, B. Maureille, D. Gambier, A.M. Tillier, M. Soressi, and K. van Niekerk. 2009. From the origin of language to the diversification of language. What can archaeology and palaeoanthropology say? In *Becoming eloquent. Advances on the emergence of language, human cognition, and modern culture*, ed. F. d'Errico and J.M. Hombert, 13–68. Amsterdam: Benjamins.

García-Diez, M., B. Ochoa, and I. Barandiarán. 2013a. Neanderthal graphic behaviour: The pecked pebble from Axlor rockshelter. *Journal of Anthropolological Research* 69: 397–410.

García-Diez, M., D.L. Hoffmann, J. Zilhão, C. de las Heras, J.A. Lasheras, R. Montes, and A.W. Pike. 2013b. Uranium series dating reveals a long sequence of rock art at Altamira cave (Santillana del Mar, Cantabria). *Journal of Archaeological Science* 40: 4098–4106.

García-Diez, M., D. Garrido, D.L. Hoffmann, P.B. Pettitt, A. Pike, and J. Zilhão. 2015. The chronology of hand stencils in European Paleolithic rock art: Implications of new U-series results from El Castillo cave (Cantabria, España). *Journal of Anthropological Science* 93: 1–18.

García-Diez, M., D. Garrido, J. Angulo, and P.A. Fernández Vega. 2018. *Monte Castillo, the Sacred Mountain. Over 65,000 Años of Palaeolithic cave art in Cantabria: World heritage*. Santander: Gobierno de Cantabria.

Guadelli, A., and J.L. Guadelli. 2004. Une expression symbolique sur os dans le Paléolithique inférieur. Étude préliminaire de l'os incisé de la grotte Kozarnika, Bulgaire du nord-ouest. In *L'homme de Néanderthal: La spiritualité*, ed. M. Otte, vol. 106, 87–95. Liege: ERAUL.

Henshilwood, C., and C.W. Marean. 2011. Middle Stone Age engravings and their significance for the debate on the emergence of symbolic material cultures. In *Homo symbolicus: The dawn of language, imagination and spirituality*, ed. C. Henshilwood and F. d'Errico, 75–96. Amsterdam: John Benjamin.

Henshilwood, C., K.L. van Niekerk, S. Wurz, A. Delagnes, S.J. Armitage, R.F. Rifkin, K. Douze, P. Keene, M.M. Haaland, J. Reynard, E. Discamps, and A.S. Mienies. 2014. Klipdrift shelter, southern cape, South Africa: Preliminary report on the Howiesons Poort layers. *Journal of Archaeological Science* 45: 284–303.

Henshilwood, C.S., F. d' Errico, K.L. van Niekerk, L. Dayet, A. Queffelec, and L. Pollarolo. 2018. An abstract drawing from the 73000 year-old levels at Blombos cave, South Africa. *Nature* 562: 115–118.

Hoffmann, D., Ch. Standish, M. García-Diez, P. Pettitt, A. Milon, J. Alcolea, P. Cantalejo, H. Collado, R. Balbín, M. Lorblanchet, J. Zilhão, and A. Pike. 2018. U-Th dating of Neanderthal crusts reveal Neanderthal origin of Iberian Peninsula. *Science* 359: 912–915.

Joordens, J.C.A., F. d'Errico, F.P. Wesselingh, S. Munro, J. Vos, J. Wallinga, Ch. Ankjærgaard, T. Reimann, J.R. Wijbrans, K.F. Kuiper, H.J. Mücher, H. Coqueugniot, V. Prié, I. Joosten, B. van Os, A.S. Schulp, M. Panuel, V. van der Haas, W. Lustenhouwer, J.J.G. Reijmer, and W. Roebroeks. 2015. Homo erectus at Trinil on Java used shells for tool production and engraving. *Nature* 518: 228.231.

Krause, J., C. Lalueza-Fox, L. Orlando, W. Enard, R.E. Green, H.A. Burbano, J.J. Hublin, C. Hänni, J. Fortea, M. de La Rasilla, J. Bertranpetit, A. Rosas, and S. Pääbo. 2007. The derived FOXP2 variant of modern humans was whared with Neandertals. *Current Biology* 17: 1908–1912.

Leroi-Gourhan, A. 1964–1965. *Le Geste et la parole. Tome I: Technique et language. Tome II: La memoire et les rythmes*. Paris: Michel.

Leroi-Gourhan, A. 1965. *Préhistoire de l'art occidental*. Paris: Mazenod.

Li, Z., L. Doyon, H. Li, Q. Wang, Z. Zhang, Q. Zhao, and F. d'Errico. 2019. Engraved bones from the archaic hominin site of Lingjing, Henan Province. *Antiquity* 93 (370): 886–900.

Linnaeus, C. 1758. *Systema naturæ: Per regna tria naturaæ, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Holmiæ (Estocolmo): Impensis Direct Laurentii Salvii.

Lorblanchet, M. 1999. *La naissance de l'art. Genèse de l'art préhistorique*. Paris: Errance.

Mania, U. 1991. Zur Vorstellungswelt des Homo erectus von Bilzingsleben. In *Menschwerdung Millionen Jahre Menschheitsentwiclung*, ed. J. Hermann and H. Ullrich, 287–296. Berlin: Wiley-VCH Verlag.

Mania, D., and U. Mania. 1988. Deliberate engravings on bone artefacts of Homo erectus. *Rock Art Research* 5 (2): 91–107.

Marshack, A. 1996. A middle Paleolithic symbolic composition from the Golan Heights: The earliest known depictive image. *Current Anthropology* 37 (2): 356–365.

Martínez, I., J.L. Arsuaga, R. Quam, J.M. Carretero, A. Gracia, and L. Rodríguez. 2008. Human hyoid bones from the middle Pleistocene site of Sima de los Huesos (Sierra de Atapuerca, Spain). *Journal of Human Evolution* 54: 118–124.

Mithen, S. 1996. *The prehistory of mind: A search for the origins of art, religion and science*. London: Thames and Hudson.

Pettitt, P. 2011. *The Palaeolithic origins of human burial. London*. New York: Routledge.

Pike, A., D.L. Hoffmann, M. García-Diez, P. Pettitt, J. Alcolea, R. de Balbín, C. González, C. Heras,

J.A. Lasheras, R. Montes, and J. Zilhão. 2012. U-series dating of Paleolithic art in 11 caves in Spain. *Science* 336: 1409–1413.

Quam, R., C. Lorenzo, I. Martínez, A. Gracia-Tellez, and J.L. Arsuaga. 2016. The bony labyrinth of the middle Pleistocene Sima de los Huesos hominins (Sierra de Atapuerca, Spain). *Journal of Human Evolution* 90: 1–15.

Rodríguez-Vidal, J., F. d'Errico, F. Giles, R. Blasco, J. Rosell, R.P. Jennings, A. Queffelec, G. Finlayson, D.A. Fa, J.M. Gutiérrez, J.S. Carrión, J.J. Negro, S. Finlayson, L.M. Cáceres, M.A. Bernal, S. Fernández, and C. Finlayson. 2014. A rock engraving made by Neanderthals in Gibraltar. *PNAS* 111 (37): 13301–13306.

Saladié, P., and A. Rodriguez-Hidalgo. 2017. Archaeological evidence for cannibalism in prehistoric Western Europe: From Homo antecessor to the bronze Age. *Journal of Archaeological Method and Theory* 24 (4): 1034–1071.

Shennan, S. 2001. Demography and cultural innovation: A model and its implications for the emergence of modern human culture. *Cambridge Archaeological Journal* 11 (1): 5–16.

Soressi, M., and F. d'Errico. 2007. Pigments, gravures, parures: les comportements symboliques controversies des Néandertaliens. In *Les Néandertaliens. Biologie et cultures*, 297–309. Paris: CTHS.

Steguweit, J. 1999. Intentionelle Schnittmarken auf Tierknochen von Bilzingsleben: Neue lasermikroskopische Untersuchungen. *Praehistoria Thuringica* 3: 64–79.

Texier, P.J., G. Porraz, J. Parkington, J.P. Rigaud, C. Poggenpoel, Ch. Miller, Ch. Tribolo, C. Cartwright, A. Coudenneau, R. Klein, T. Steele, and Ch. Verna. 2010. A Howiesons Poort tradition of engraving ostrich eggshell containers dated to 60,000 years ago at Diepkloof rock shelter, south Africa. *PNAS* 107 (14): 6180–6185.

Wadley, L., T. Hodgskiss, and M. Grant. 2009. Implications for complex cognition from the hafting of tools with compound adhesives in the middle stone age, south Africa. *Proceedings of the National Academy of Sciences* 106: 9590–9594.

Zilhão, J. 2011. The emergence of language, art and symbolic thinking. A Neanderthal test of competing hypotheses. In *Homo symbolicus. The dawn of language, imagination and spirituality*, ed. F. d' Errico and Ch. Henshilwood, 111–131. Amsterdam: John Benjamin Publishing Company.

Zilhão, J. 2013. Neandertal-modern human contact in Western Eurasia: Issues of dating, taxonomy, and cultural associations. In *Dynamics of learning in Neanderthals and modern humans. volume 1: Cultural perspectives*, ed. T. Akazawa, Y. Nishiaki, and K. Aoki, 21–57. Tokyo: Springer.

Further Reading

Bednarik, R.G. 2003. The earliest evidence of palaeoart. *Rock Art Research* 20 (2): 3–28.

Bednarik, R.G. 2017. *Palaeoart of the ice age*. Newcastle upon Tyne: Cambridge Scholars Publishing.

Cabrera, V., A. Pike-Tay, and F. Bernaldo de Quirós. 2004. Trends in middle Paleolithic settlement in Cantabrian Spain: The late Mousterian at Castillo Cave. In *Settlement dynamics of the middle Palaeolithic and middle stone age II*, 437–460. Tübingen: Kerns Verlag.

Capitan, L., and D. Peyrony. 1921. Les origines de l'art à la Aurignacien moyen-nouvelles fouilles à La Ferrassie. *Revue d'Anthropologie* XXXI: 92–112.

Chazan, M., and L.K. Horwitz. 2009. Milestones in the development of symbolic behaviour: A case study from Wonderwerk cave, south Africa. *World Archaeology* 41: 521–539.

Crémades, M. 1996. L'expression graphique au Paléolithique inférieur et moyen: l'exemple de l'abri Suard (La Chaise-de-Vouthon, Charente). *Bulletin de la Société Préhistorique Française* 93 (4): 494–501.

Crémades, M., L. Laville, N. Sirakov, and J. Kozlowski. 1995. Une pierre gravée de 50000 ans B.P. dans les Balkans. *Páleo* 7: 201–209.

d'Errico, F., C. Henshilwood, G. Lawson, M. Vanhaeren, A.M. Tillier, M. Soressi, F. Bresson, A. Maureille, J. Nowell, L. Lakarra, L. Backwell, and J. Nowell. 2003. Archaeological evidence for the emergence of language, symbolism, and music: An alternative multidisciplinary perspective. *Journal of World Prehistory* 17 (1): 1–70.

Deacon, T. 1997. *The symbolic species*. London: Penguin.

Defleur, A. 1993. *Les sépultures moustériennes*. Paris: CNRS.

Henshilwood, C., and F. d'Errico, eds. 2011. *Homo symbolicus: The dawn of language, imagination and spirituality.* Amsterdam: John Benjamins.

Henshilwood, C.S., F. d' Errico, and I. Watts. 2009. Engraved ochres from the middle stone age levels at Blombos cave, south Africa. *Journal of Human Evolution* 57: 27–47.

Hoffmann, D.L., C.D. Standish, M. García-Diez, P.B. Pettitt, J.A. Milton, J. Zilhão, J.J. Alcolea-González, P. Cantalejo-Duarte, H. Collado, R. de Balbín, M. Lorblanchet, and A. Pike. 2018a. Response to comment on "U-Th dating of carbonate crusts reveals Neandertal origin of Iberian cave art". *Science* 362: eaau1736.

Hoffmann, D.L., C.D. Standish, A.W. Pike, M. García-Diez, P.B. Pettitt, D. Angelucci, V. Villaverde, J. Zapata, J.A. Milton, J. Alcolea-González, P. Cantalejo, H. Collado, R. de Balbín, R. Lorblanchet, J. Ramos, G-Ch. Weninger, and J. Zilhão. 2018b. Dates for Neanderthal art and symbolic behaviour are reliable. *Nature Ecology & Evolution* 2: 1044–1045.

Hovers, E., B. Vandermeersch, and O. Bar-Yosef. 1997. A middle Palaeolithic engraved artefact from Qafzeh Cave, Israel. *Rock Art Research* 14: 79–87.
Knight, C., G. Power, and I. Watts. 1995. The human symbolic revolution: A Darwinian account. *Cambridge Archaeological Journal* 5 (1): 75–114.
Mackay, A., and A. Welz. 2008. Engraved ochre from a middle stone age context at Klein Kliphuis in the Western cape of south Africa. *Journal of Archaeological Science* 35: 1521–1532.
Marquet, J.C., and M. Lorblanchet. 2003. A Neanderthal face? The proto-figurine from La Roche-Cotard, Langais (Indre-et-Loire, France). *Antiquity* 77 (298): 661–670.
Marshack, A. 1996. A middle Paleolithic symbolic composition from the Golan Heights: The earliest known depictive image. *Current Anthropology* 37 (2): 356–365.
Martin, H. 1910. Fragment d'omoplate de bovidé avec traits gravés intentionnels trouvés dans le Moustérien supérieur de La Quina (Charente). *Bulletin de la Société Préhistorique Française* 7: 40–42.
Mellet, E., M. Salagnon, A. Majkic, S. Cremona, M. Joliot, G. Jobard, B. Mazoyer, N. Tzourio, and F. d' Errico. 2019. Neuroimaging supports the representational nature of earliest human engravings. *Royal Society Open Science* 6: 190086.
Mithen, S. 2005. *The singing Neanderthals: The origin of music, language, mind and body.* London: Weidenfeld and Nicolson.
Moncel, M.H. 2003. Tata (Hongrie). Un assemblage microlithique du début du Pléistocène supérieur en Europe Centrale. *L'Anthropologie* 107: 117–151.
Noble, W., and I. Davidson. 2009. *Human evolution, language and mind: A psychological and archaeological inquiry.* Cambridge: Cambridge University Press.
Pettitt, P.B. 2003. Is this the infancy of art? Or the art of an infant? A possible Neanderthal face from La Roche-Cotard, France. *Before Farming* 11: 1–3.
Peyrony, D. 1934. La Ferrassie. Moustérien-Périgordien-Aurignacien. *Préhistoire* III: 1–92.
Raynal, J.P., and R. Seguy. 1986. Os incisé acheuléen de Sainte-Anne 1 (Polignac, Haute-Loire). *Revue Archeologique du Centre de la France* 25 (1): 79–80.
Steguweit, J. 1999. Intentionelle Schnittmarken auf Tierknochen von Bilzingsleben: Neue lasermikroskopische Untersuchungen. *Praehistoria Thuringica* 3: 64–79.
Stepanchuk, V.N. 1993. Prolom II, a middle Paleolithic site in the eastern Crimea with non-utilitarian bone artefacts. *Proceedings of the Prehistoric Society* 59: 17–37.
Zilhão, J. 2007. The emergence of ornaments and art: An archaeological perspective on the origins of behavioural modernity. *Journal of Archaeological Research* 15: 1–54.

Art Studies: Normative Approaches

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Introduction and Definition

The theoretical proposals that search for regularities, or "norms," in different materials of the archaeological record have been very important since the beginnings of archaeology and are still foundations for current scientific research. Nevertheless, their success, failure, or relative advantages have been marked by the different interpretations that each theoretical approach has applied to the regularities found in the archaeological record.

For the archaeology of art, throughout the history of the discipline, various normative approaches have been developed, some with applications for portable art and others for rock art. These have varied according to particular situations in different academic contexts.

In the USA the normative approaches have been more linked to the general concepts of the "Culture-History School," which in its North American trend adopted particular features which differentiated it from similar approaches in other parts of the world. In this case, it was intimately linked to "normative theory" (sensu Binford 1965), which has applied fundamentally to portable art research, particularly in the study of pottery designs, looking for recurrent features that would allow the definition of "ceramic styles."

On the other hand, in Europe, the search for regularities in terms of shared norms has been more related to postulates based on Structuralism, Semiotics and Cognition, and has been specifically applied to Paleolithic parietal art research.

Historical Background

Normativism Inspired in the "Culture-History School"

In spite of the fact that the "Culture-History School" has had great influence in the development of archaeology, both in Europe and America, in its specific relation to the archaeology of art, the North American branch of this school has been more prominent, particularly in respect to portable art and monumental art.

In North America the Culture-History School is best represented by the work of Whilley and Phillips (1958), in which "cultural areas" were defined for the American continent and "chronological-cultural periods" were proposed to tackle the pre-Hispanic occupation of the continent. The characterization of the areas and the periods was carried out from an inductive epistemology which held the notion that "culture" was a "mental norm" shared by the members of a society.

Such a notion starts from a passive vision of material culture, considering it as an expression of such mental norms. The temporal-spatial distribution of material culture with specific features was taken as an indicator of presence-absence of the "bearers of such norms," and these were understood as "archaeological cultures."

Art did not escape such conception, being interpreted as the materialization of ideas, and stylistic standardization as the graphic and concrete expression of cultural norms based on such ideas. Thus conceived, art in all its forms was taken as an indicator relevant to identify archaeological cultures, which helped in the characterization of periods and cultural areas.

The definition of "artistic styles" was carried out through the detailed description of designs and techniques of portable art and pottery (rock art was practically omitted from this and other theoretical frameworks of the American trend). After that, and following the identification of recurrent features, "styles" were defined, which were in turn associated, via induction, to a "culture" and to a "people."

Such "artistic styles" were considered as reflexes of cultural and symbolic norms of such people, whose members were seen as their "passive bearers." In sum, art was conceived as a passive means of expression of ideas, understood as "mental cultural norms."

These conceptions have had a great influence in the development of archaeology and a great part of the systematization of knowledge about American archaeology managed today has been established on its grounds.

In spite of these contributions, later theoretical proposals such as the New Archaeology have strongly criticized these conceptions and their results. In effect, Binford (1965, 2001) wrote a history of the development of "normativism" in North American archaeology, pointing out its important limitations and emphasizing that one of its more important flaws is to hinder the analysis of variability in the archaeological record.

In spite of the theoretical clash between the "normative theory" (sensu Binford) and Processualism-New Archaeology, there has been a great influence of the former over the latter. In effect, Lyman and O'Brien (2004) consider that as an alternative, many of the normative propositions are crystallized when they are explicitly used in the interpretations of the data generated by the New Archaeology followers. Thus, in relation to the archaeology of art, authors such as Deetz, Hill, Longacre, and Whallon (among other New Archaeology followers) developed studies of ceramic designs, and, when analyzing them statistically, they identified design groups which they interpreted as elements which were culturally and normatively significant (Lyman and O'Brien 2004).

Proposals Based on Structuralism, Semiotics, and Cognition

While in North American archaeology the "normative theory" was being developed, it was confronted with the "New Archaeology," and both were being applied in the archaeology of art, particularly in portable art analyses. Simultaneously, in Europe other theoretical lines were being applied, particularly to analyze rock art.

In effect, postulates based on Structuralism, Semiotics, and Cognition started to be used

towards the early 1960s, in order to face the study of European Paleolithic parietal art.

Such tenets, influenced by rationalist French thought, were applied mainly by Laming Emperaire (1962) and Leroi Gourhan (1965) to the study and interpretation of Paleolithic parietal art, considering that:

(a) It was the product of the projection of mental structures, crystallized in artistic creation.
(b) Such mental structures were organized through binary oppositions (proposed by Saussure's linguistics and Levi Strauss's structuralism).
(c) This was recognizable in rock art through the spatial distribution of specific motifs, which was not random but rather structured via determined oppositions and associations.

Taking these considerations into account, recurrences in motifs and their associations in specific places of the sites were searched for, interpreting them as symbolic expressions of myths, expressed via graphic forms, and which were spatially structured through dual associations (*mythograms*).

Specific combinations between motifs and with the bedrock topography entailed a specific meaning, whose analysis should be tackled considering them as the significant symbol associations and not as anecdotal tales of real or imaginary events. Such different combinations would have different meanings according to their topographic-iconographic structuration.

The analysis of these different topo-iconographical combinations should be carried out as if they were "grammatical structures," trying to access the underlying "syntax" or "grammatical code." Such analysis tended to access the knowledge of the "composition rules" which were implicit to the distribution of specific rock art motifs in specific bedrock locations, avoiding a literal interpretation or an exclusively symbolic interpretation, given that their deep meaning was actually lost.

Once the "composition rules" were identified, each of the two aforementioned authors carried out different structuralist analyses, focusing their attention on specific associations observed between animal figures and abstract designs of supposed sexual content. Each one constructed stylistic schemes using, also, elements of other theoretical approaches: such as diachronic cultural evolutionism and culture-history normativism, interpreting differently the nature of such recurrent combinations.

Such free interpretation within the same theoretical position, together with the identification of patterns which could not just be ascribed to a single "visual grammar," or to a specific "mythogram," is some of the main problems faced by this theoretical proposal.

Today, this proposal has been entirely discarded in terms of its interpretive aspects, but some of its contributions still persist and are mainly referred to methodological lines which provide relevant information, such as:

1. The search for chronological indicators in the combination of stratigraphic information with the assessment of superimpositions in art, the analysis of variations in techniques, and in stylistic conventions through time
2. The identification of the persistence of more than one "artistic style or stage" in relation to the duration of determined "lithic industry" found in an excavation
3. The interest for the study of the socioeconomic aspects of rock art production, as much as its social uses in the past, postulating that such aspects could only be accessible through the identification of recurrent patterns which are verifiable in the archaeological record

Problems, Contributions, and Perspectives from Normative Approaches

The proposals and applications of these normative theoretical frameworks need to be analyzed in the particular historical-academic contexts in which they were created and used. Only then can they be properly assessed in terms of their problems and contributions to current research.

Firstly, in the two mentioned cases, a great interest in *developing methodological tools* is observed: these are particularly oriented towards ways of tackling time and space in the analysis of

different types of material culture related to portable art and rock art production. To this end, "periods" and "cultural areas" were established within American normative approaches, and "stages" and/or "styles" were defined within the French structuralism with cognitive-semiotic roots. This is understandable in these moments of history of archaeological research, in which absolute dating methods were lacking to date materials in the archaeological record (C14 dating was only available from 1955 onwards); thus, the priority was to have chronological referent for art's relative chronology and for its spatial distribution.

With the development of radiocarbon dating technique, and with the ample possibility of its use in excavated archaeological materials, around 1960 the urgent need to establish chronologies via relative methods diminished, although its importance did not (and does not) disappear, both for excavated materials and also, mainly, for most of rock art research.

In turn, the attempts to develop interpretive tools for regularities observed in the archaeological record were also product of particular situations of the trajectories of each of these theoretical proposals. Thus, *American normativism* was inclined to develop typological analyses, in order to observe similarities and differences in artifact types and complexes, with the end of identifying "archaeological cultures" and to determine limits among them. Established in this manner, each formal variation detected in the artifacts was interpreted as a chronological indicator. Such proposal was considered from the 1970s as a theory about "cultural transmission" in time and space. For this reason it was criticized, claiming that it ignored the great variability of the archaeological record, which was the product of intra- and intergroup differences in "cultural systems." Such criticism emphasized that the main wrong belief of normativism was to assume that archaeological societies were internally homogenous, in their organizational aspects and in their actions, leaving open and unexplained a possible explanation of the great internal variability documented for past and present societies (Binford 2001: 12).

The theoretical approaches based on *French Structuralism*, *Semiotics*, *and Cognition* frameworks, in spite of also having relative chronology as one of their main aims, they attempted a deeper kind of interpretation, trying not only to access the abovementioned "rules of grammatical visual composition" understood as a code of communication represented in parietal art but also proposed a complex explanation of symbolic character. Such explanation considered that the conceptual scheme of thought of prehistoric societies was based on dichotomies manifested in the recurrent associations of motifs which represented opposed principles of sexual nature, which identified a specific animal (horse or bison) with a specific abstract motif (lineal or figure) with a male or female principle, and which, associated to another animal, characterized with the opposed sexual character, formed a composition scheme. From this assumption they drew the conclusion of the existence of a male–female dualism in the representations, forming inextricable associations between topic and symbolism, which organized the ideological world of the Paleolithic societies. Such explanation was extremely criticized a posteriori, and due to this the interpretation about animal-sign sexual dichotomy was abandoned. Afterwards some of the most interesting ideas of this framework were pinpointed as useful, such as the importance given to context, the introduction of questions about the social organization of the art producers, and the interpretation of motifs as possible ethnic markers.

Key Issues/Current Debates

The search for recurrent regularities in the archaeological record, be it of artifacts, of designs, and/or structure features, remains the basis of archaeological research. On the grounds of such regularities, "categories," "types," "styles," "classes," and many other categories used to "order" the apparent "chaos" in the past material record have been developed and used. In fact, as Gnecco and Langebaek (2006) state, such a kind of "organizing" thought, which they term "typological thought," is our guide, a lense through which we

categorize the world around us (plants, peers, emotions, etc.), but although we cannot live without "typological thought," we can in fact escape from its tyranny. These authors (Gnecco and Langebaek 2006) understand "tyranny" as the inherent limitation to reduce the great world variability to manageable and narrow proportions, and they propose that to escape from such tyranny, it is necessary to:

(a) Accept that the already constructed typologies order the world does not mean that the world only fits in them and that we cannot invent new categories, new ways of interpretation, new analytical avenues.
(b) Remember that typologies have an unnecessary tendency towards universalization, which the scientific abuse of typologies gave them a universal character which is not part of their definition, given that typologies are only universal if the theory that builds them needs them to be.
(c) Understand that the typological tyranny essentializes and is ahistoric because it empties all categories of time and space.
(d) Recognize that typologies, as any other social product, do not escape from ideological struggle, and, for this reason, they are not neutral constructions but power mechanisms. In this sense, typological reasoning is, also, a political theory.

In respect of this latter point, the example proposed by Gnecco and Langebaek (2006) is very clear, since they stress that the bases for evolutionism were established on social typologies (savagery, barbarism, civilization) which translate cultural differences into temporal hierarchies, while such hierarchies supported the ideology on which the European colonial expansion was based during the nineteenth century. Hence, such process converted social typologies not in disciplinary findings but in mechanisms of colonial domination whose typological tyranny is hidden with arguments of objective neutrality.

These authors also assert that, in fact, the generalization of typological thought appears almost next to the formal origin of archaeology as a discipline and coincides historically with the formation of the nation-states and the nineteenth-century colonial expansion, which fostered ideologically the classical evolutionism which held the existence of cultural hierarchies. Later, following the same perspective, towards the 1960s, archaeological theory adopted neo-evolutionist typologies about society, which have had a great importance in the interpretations of the human social past. In fact, these have been used in a prescriptive manner, leading the archaeologists to be more interested in "confirming" the existence of types from a few cultural traces than to try to develop imaginative interpretations, sensitive to local contexts, inquiring into different dimensions of social life. Thus the tyranny of typological thought has reduced the interpretive spectrum in a dramatic manner (Gnecco and Langebaek 2006: ix-x).

For these reasons, the cited authors propose that, although typologies are inevitable (since they create nets of meaning in which symbols make sense), their "tyranny" can be faced in archaeological practice if they are used from a *critical*, *heuristic* perspective (as means to reach alternative and suggestive interpretations and not as ultimate and definitive ends) and not in a *prescriptive* manner (instead of using them as threads that need to be followed, they have to be used as constitutive parts of complex and connective weaves) (Gnecco and Langebaek 2006: ix-x).

International Perspectives and Future Directions

Following the considerations done by the previously cited authors, it can be said that it is important to (a) discern *recurrent patterns* in the archaeological record and (b) be *cautious* and have *ample criteria* when proposing interpretations about them.

In fact, the existence of regularities in the archaeological record, be they defined as "artifact types," "patterns of element associations," "recurrent features," etc., are the tip of the iceberg to make complex questions about past societies. The way in which these questions are asked and the

ways designed to answer them will be the key to their success or failure when applying them as a significant research method.

With the archaeology of art, this is particularly important given that graphic designs offer a wide range of interpretive possibilities. In fact, beyond the abuses committed in terms of establishing "styles" in the traditional manner when studying portable art or rock art in different parts of the world, a wider approach to the analysis of these very same items can allow to ask more complex and varied questions about the societies that produced them.

To do so, it is important to open lines of inquiry that take into account "variability" at the time to interpret regularities observed in the archaeological record and its changes, searching for causal factors among them. In this sense the analysis of variability must always have three basic instances: (a) temporal variation (different chronology), (b) spatial variation (different society), and (c) intra-society variation (different function/s). This is applicable both to portable art and rock art, but they do require different approaches.

In effect, portable art has the same features than any other artifact, with the addition of bearing graphic representations. Therefore it can be analyzed with the same methods applied to study the archaeological record in general, adding some specific strategies to analyze its designs.

Rock art, instead, is different because the plastic representations have been made on top of natural media, without any "object" or artifact to bear them. This situation has led rock art to be left aside from archaeological research (mainly in the North American school), particularly because given it is not embedded in a sedimentary matrix, its relative chronological ascription was very difficult, and, until recently, its absolute dating was impossible; otherwise, it was studied from non-archaeological approaches but recurring to other disciplines (fundamentally in Europe, such as in France and Spain).

However, in other countries, interesting archaeological approaches to rock art have been developed. It is interesting to mention here that such countries are not central places in terms of archaeological theory and/or method development, and among them it is worth mentioning the cases of Australia and Argentina. Australia has greatly contributed to the development of "informed methods" (sensu Chippindale and Nash 2004), following the great number of works carried out in areas where Aboriginal communities still have direct links to the production – use – meaning of rock art. Argentina, in turn, has developed more in relation to the "formal methods" (sensu Chippindale and Nash 2004).

In effect, Gradin (1978) proposed an integral method for rock art analysis that attempts to differentiate rock art production in particular regions (space), through an archaeological sequence (time) and in correlation with different human groups (culture). Such an approach considers that rock art has to be studied at regional scale, articulating information from excavated sites and from rock art sites. He proposes the consideration of three fundamental aspects in rock art analysis:

(a) Topography: *spatial* location (position, accessibility, visibility, specific rock surfaces selection, etc.)
(b) Representation: rock art production processes as *material culture* (topic selection, graphic mode in which it is produced, techniques, etc.)
(c) Chronology: its position in the regional archaeological sequence (superimpositions, fallen rocks with rock art contained in datable sediments, etc.) to assess their consecutive production through time

With these criteria he developed analytical units (motifs, stylistic groups, stylistic modalities, etc.), and their presence-absence observation, spatial or temporal recurrence, etc., allowed him to establish rock art sequences in Argentinean Patagonia. His model was applied by other authors to specific areas of Northwest Argentina.

In spite of the fact that this methodology, which is very useful to establish regional sequences, focuses mainly on temporal variability (a common situation in most part of archaeological typologies), its usefulness can be significantly widened if it is complemented by other approaches.

Rock art taphonomy (sensu Chippindale and Nash 2004) points out that "differential survival" of rock art images is a critical issue. This variable, however, presents serious difficulties when trying to estimate "comparative arts of survival" required to estimate the postdepositional processes – via natural or human agents – which could affect rock art at the scale of motif, site, area, or region. For this reason, it is important to take into account:

A. When analyzing the incidence of *natural processes*, assess:
   (a) The possibility of complete destruction of sites due to causes such as mass erosion or redeposition, typical of specific geological processes
   (b) The state of conservation of sites with current archaeological visibility, considering:
      1. Bedrock composition, surface processes (exfoliation, biotic growth, accretions, etc.)
      2. Degree of exposure to natural mechanical weathering agents (solar, wind, rain erosion, etc.)
      3. Features of the bedrock protection (e.g., drip line)
      4. Cardinal orientation of the site
      5. Natural agents acting locally and extension of their potential or real damage, among many other factors
B. When analyzing the incidence of human agents, conceived as the actions carried out after the production of rock art representations at a given moment of the sequence, it is important to assess:
   1. The production of new motifs superimposed to others previously made
   2. Events of repainting or reengraving
   3. Use of part of previous motifs to create new ones
   4. Premeditated total or partial destruction
   5. Total or partial cover with sediment or constructions product of later uses of the site

Rock art functions entail that the causal factors due to which rock art representations were created are fundamental variables to be assessed during research.

A-As noted above, the focus placed in the chronological appreciation of rock art resulted, in most cases, in the consideration that observed variation in a specific attribute ("type") assemblage was considered to have been caused by changes through time. This has been detrimental to the assessment of functional variation in rock art production.

B-Functional variation is understood as the diversity of representations that may have been made by the same society in a single moment of the sequence, due to different factors and for different purposes (sacred sites vs. domestic sites; male sites vs. female sites; territorial marks vs. aggregation sites, among many other possibilities). To assess the possible function that specific rock art representations may have had is critical at the moment of proposing interpretive approaches to it.

Both the considerations about *taphonomy* and about *function* are intimately connected with the considerations about *chronology*. In fact, to attempt the inference of a relative production sequence of rock art in a specific region, it is essential to assess both the possible differential occurrence of rock art due to postdepositional variables, as much as the existence of diverse types of rock art representations due to functional variables in specific chronological segments. Such interconnection is so vital that an erroneous assessment of any of these variables can lead to an erroneous estimation of the others.

Taking this into account, the construction of regional relative sequences becomes more complex since it not only requires the consideration of more variables but also of more research questions. Nevertheless, their construction is still a fundamental tool for rock art studies since it is a key to frame rock art in time and space, in order to articulate them with the general regional archaeological sequence.

Nowadays, even counting in some cases with the possibility of obtaining absolute dates with AMS, it is crucial to count first with a well-established relative sequence, given that this

sequence is the guide to the sampling process to date specific relevant motifs within such sequence. This procedure reduces the number of samples to date (avoiding unnecessary destruction), increases the strategy efficiency (covering the whole sequence and/or functional variables), and saves time and economic and professional resources.

Thus, the importance given the development of *regional rock art sequences*, taking into account all the mentioned variables, makes it possible to answer more complex research questions, thus putting the evidence provided by the archaeology of art in a privileged place within the regional studies of past societies.

Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Binford, Lewis R. (Theory)
- ▶ Laming-Emperaire, Annette
- ▶ Leroi-Gourhan, André
- ▶ South American Rock Art
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Willey, Gordon Randolph

References

Binford, L.R. 1965. Archaeological systematics and the study of culture process. *American Antiquity* 31: 203–210.

Binford, L.R. 2001. *Constructing frames of reference: An analytical method for archaeological theory building using ethnographic and environmental data sets*. Berkeley: University of California Press.

Chippindale, C., and G. Nash. 2004. Pictures in place: Approaches to the figured landscapes of rock art. In *The figured landscapes of rock art. Looking at picture in place*, ed. C. Chippindale and G. Nash, 1–36. Cambridge: Cambridge University Press.

Gnecco, C., and C. Langebaek, eds. 2006. *Contra la tiranía tipológica en arqueología: una visión desde suramérica*. Bogotá: Universidad de los Andes, Facultad de Ciencias Sociales – CESO.

Gradin, C. 1978. Algunos aspectos del análisis de las manifestaciones rupestres. *Revista del Museo Provincial Tomo 1. Arqueología. Neuquén*: 120–33.

Laming Emperaire, A. 1962. *La signification de l'art rupestre paléolithique*. Paris: Picard.

Leroi-Gourhan, A. 1965. *Prehistoire de l'art occidental*. Paris: Mazénou.

Lyman, R., and M. O'Brien. 2004. A history of normative theory in Americanist archaeology. *Journal of Archaeological Method and Theory* 11 (4): 369–396.

Willey, G., and P. Phillips. 1958. *Method and theory in American archaeology*. Chicago: University of Chicago Press.

Art, Paleolithic

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Introduction

Around 100,000 BP (before present), a new class of artifacts began to appear at archaeological sites in Africa and the Middle East. These items included pierced marine shells probably worn as personal adornment (e.g., Qafzeh, Israel; Oued Djebbana, Algeria) as well as pieces of bone and ochre that display deliberate nonfigurative markings (e.g., Klasies, South Africa; Pinnacle Point, South Africa; Blombos, South Africa). Additionally, the presence of red ochre and related materials to prepare this pigment (e.g., Blombos, South Africa) is present in Africa and the Middle East with evidence of ochre color curation dating back further to 200,000 BP and possibly even beyond (e.g., Saï Island, Sudan; Twin Rivers, Zambia). These artifacts are often cited as the earliest evidence for the "creative explosion" associated with the *Homo sapiens* species, but until 40,000 BP, these potential examples of symbolic behavior remain infrequent and confined to portable objects. Around 40,000–60,000 BP, the frequency of symbolic artifacts increases. This is correlated with the spread of modern humans across the Old World. Around this time, rock art and sculptural art emerged. Paleolithic art is generally divided into three main categories:

1. Parietal art: Also known as rock art, this category includes all paintings, engravings, drawings, and stencils (Davidson 1997: 125) found on immovable surfaces such as the walls, floors, and ceilings of rock shelters and caves. There is also some evidence in Europe of parietal art having been created in open-air settings (e.g., the engravings at Fornols-Haut in France and the Côa River Valley in Portugal). Due to taphonomic processes such as wind and rain, these outdoor decorated locations have generally not survived.

   The majority of the paintings were done with either red or black paint, most commonly produced using red ochre and charcoal, respectively. However, there are also some sites where the mineral manganese oxide was used to create the black color. Other less common colors include yellow, purple, and brown (also derived from ochre), and in rare instances white paintings made using kaolin clay have been identified. Preparation was required to produce the paints, including the grinding of the pigments and the use of formulas created by mixing the color component with binders (e.g., water, urine, animal fat) and extenders (e.g., feldspar, biotite, talc, clay). Engravings were done using either a tool to mark the stone, or in cases where the surface included softer materials such as clay, a finger was sometimes used to create the image. The creation of drawings involves the use of dry material in the form of ochre crayons or charcoal sticks as opposed to the use of liquid paint formulas. Stencils refer primarily to the creation of negative hands, which were produced by a method known as spit painting, where the paint or raw pigments were blown over a hand placed against the surface in order to leave an outline.
2. Portable art: This subcategory includes all portable artifacts found at Paleolithic sites that incorporate a symbolic or artistic element. This includes everything from weapons or tools that have been embellished or decorated (e.g., atlatls) to plaques or pebbles that have been painted or engraved as well as the large number of figurines that have been found at sites across Europasia. The materials used to make these portable objects include but are not limited to stone, bone, antler, ivory, and clay.
3. Personal adornment: Most of these pieces are found in elaborated burials and appear to have been worn as jewelry. These artifacts are differentiated from the portable art by being items specifically produced to adorn the human body in some manner. The most common materials used to make these ornaments are pierced teeth, marine shells, ivory, and bone. Large numbers of ivory beads have also been recovered, many of which bear evidence of having been sewn onto clothing and headwear (e.g., the three elaborate burials from an Upper Paleolithic site in Sungir, Russia).

Paleolithic images are generally divided into two categories: figurative imagery, which is defined as identifiable art and most often refers to animal and human depictions, and nonfigurative imagery, which includes all abstract or geometric images not easily identifiable as being real-world objects or entities. One type of imagery that appears to be absent at nearly all rock art sites older than 10,000 BP is landscape (e.g., trees, mountains, or rivers) as well as images of everyday life including structures such as housing (but see Utrilla et al. 2009, mountains and water features; Garcia-Diez and Vaquero 2015, huts and campsites). Even though the art found in different global regions is varied, there are several overarching themes that are identifiable at sites worldwide:

1. Animal imagery: While the specific subject matter might be determined by the environment in which the art is being produced (e.g., mammoths in Europe, kangaroos in Australia, eland in South Africa), the inclusion of animal imagery at rock art sites and on portable objects is almost universal. At Paleolithic rock art sites across Europe, animal imagery is usually the dominant theme (e.g., horse, bison, mammoth, ibex, deer), and many of the portable art pieces also include animals in their decoration.
2. Human imagery: Images of humans whether they are accurate depictions or more stylized representations are also found at rock art sites globally. In some cases, these representations have been categorized as being therianthropic,

Art, Paleolithic, Fig. 1 Megaloceros, ibex, and human with protruding spears – Cougnac, France. (Photo by J. Clottes)

appearing to portray a human-animal hybrid (e.g., the sorcerer at Les Trois-Freres, France). They are also found occasionally on portable objects. In Europe in particular, there is an entire collection of human figurines from the Paleolithic period (see discussion about these figurines in the "How Old Is the Art?" section). The inclusion of human images at rock art sites varies widely between regions, with them being fairly unusual at European sites but more common at contemporaneous sites in Australia.

3. Abstract imagery: Also known as geometric signs, these images include everything from simple dots and lines to more complex geometric shapes such as tectiforms or scalariforms (see Fig. 1). Geometric signs are found at rock art sites around the world, and in regions such as Europe, these abstract images outnumber the figurative representations at most Paleolithic sites (Bahn and Vertut 1997: 166). These markings are also found on many portable art objects, including items of personal adornment. While this category is often defined as including all images that are not recognizable as items from the mundane world, it has been argued that some of these markings could in fact represent weapons, tools, or other physical manifestations of human behavior (Figs. 2, 3, and 4).
4. Hand imagery: This is ubiquitous in rock art and includes negative hand stencils, positive handprints, and stylized hands. Negative hand stencils are created when a hand is placed against a flat surface such as a cave wall and pigment is blown around it. When the hand is

Art, Paleolithic, Fig. 2 "The sorcerer" – therianthropic figure – Gabillou, France. (Photo by J. Clottes)

Art, Paleolithic, Fig. 3 Panel of geometric signs – Niaux, France. (Photo by J. Clottes)

Art, Paleolithic, Fig. 4 Panel of hand stencils – Gargas, France. (Photo by J. Clottes)

removed, a negative outline of the hand remains. Positive handprints are created when pigment is applied directly to the palm and the fingers of the hand, and the hand is then placed against a flat surface. Stylized hands are free-hand drawings which often include abstract images. Hand imagery is subdivided into its own category as it cannot be presupposed that the intention of the Paleolithic artist was to reduce the representation of a human to a handprint or that a handprint could represent an entire human.

Definition

In its broadest sense, the term Paleolithic art encompasses all deliberately modified surfaces and artifacts created prior to 10,000 BP that were thought to have been produced with symbolic intent. Traditionally Paleolithic art has been identified with symbolic artifacts and images found at archaeological sites from the Upper Paleolithic period in Europe, dating roughly to between 10,000 and 40,000 BP. However, this expression is also sometimes used as a blanket term to refer to all parietal art, portable art, and personal adornment found globally and dated before the end of the Pleistocene period (before 10,000 BP). This art is generally associated with modern humans, though there are several artifacts from Europe that have been identified as being produced by Neanderthals (e.g., a necklace from the French site of

Arcy-sur-Cure). There has even been recent speculation that some of the oldest art may have been created by Neanderthals, though this remains to be proven.

Historical Background

The discovery and acceptance of Paleolithic art was a gradual process that took place over the course of the nineteenth century. Beginning in the 1820s, portable art objects started being excavated at sites across Europe. Some of the earliest discoveries were in France, where they were believed to be of Celtic origin. It was not until the 1860s that the notion of these artifacts being from the Ice Age was proposed. This was partially due to a greater acceptance of geological chronologies of the earth, as well as discoveries of these objects in archaeological layers with ancient tools and extinct animal species (Bahn and Vertut 1997: 14).

While the recognition and incorporation of portable artifacts and items of personal adornment into the archaeological literature was fairly straightforward, the same cannot be said for the parietal art. The idea that art of this caliber could have been made by such "primitive savages" was hard for many of the Paleolithic archaeologists of the nineteenth century to accept, and it was not until the very end of the 1800s that parietal art was officially incorporated into the category of Paleolithic art (Bahn and Vertut 1997: 20). For example, in 1878 some wall engravings covered in calcite were noted at the site of Chabot in France along with the discovery of Paleolithic tools. While these were thought to be prehistoric in origin, the concept of this behavior being a regular occurrence took much longer to be accepted and was for the meantime ignored. At that time, Paleolithic archaeologists refused to believe that the bison paintings on the ceiling of Altamira in Spain, first discovered in 1879, could have been made by ancient humans due to their level of sophistication. However, as more and more parietal art was discovered, including sites where the images on portable art objects matched those on the walls, scholars finally came to accept the age of the art. By the early 1900s, many studies had been initiated to investigate this phenomenon further.

Key Issues/Current Debates

How Old Is the Art?

As previously mentioned, deciding which objects should be incorporated into the category of Paleolithic art was problematic in the past and is still a source of contention today. In fact, the term "Paleolithic" refers to tool industries found only in Europe, not those of Africa, Asia, or Australia. For this reason, many archaeologists prefer to use the term Pleistocene art. Instead of referring to archaeological materials from a particular region, the Pleistocene is a worldwide geological epoch that coincides with the last Ice Age and is thus a more inclusive term. The Pleistocene begins around 1.75 million years ago and ends around 10,000 years before the present. The emergence of art varies across the globe but becomes abundant in the Old World around 40,000 years ago.

Africa: The earliest images from Africa come from the cape of South Africa in the form of abstract markings on different mediums. Engraved bones are present at Blombos Cave and Klasies River Caves. Engraved ochre is also present at Blombos Cave. The previously mentioned objects all date to between 70,000 and 100,000 years ago. Around 80,000 BP, inscribed ostrich eggshells are present at sites such as Diepkloof Rock shelter. These objects were created during a period known as the Middle Stone Age (MSA). The MSA is preceded by the Early Stone Age and is followed by the Late Stone Age. Objects from the Middle Stone Age have been notoriously difficult to date as radiocarbon dating only extends to 40,000 years, and potassium/argon dating cannot be used on materials younger than 500,000 years old (McBrearty and Brooks 2000). Therefore, depending on the context, detailed stratigraphic knowledge must be combined with other dating methods such as argon/argon, infrared-stimulated luminescence, thermoluminescence, or optically stimulated luminescence. Figurative images are

present on ochre slabs at Apollo 11, in Namibia and Nswatugi, Zimbabwe, and date to the late MSA, around 27,000–25,000 years ago. Pleistocene imagery may have an earlier origin, as ochre "pencils" were discovered at Klasies River dating to over 100,000 years and at Howiesons Poort to 65–80 ka. Hematite "pencils" have been dated to 100,000+ years at Border Cave, South Africa. Unfortunately, unlike Europe, Africa lacks large limestone caves that have favorable conditions for preserving rock art (McBrearty and Brooks 2000).

Australia: Pleistocene art in Australia is difficult to date as much of the imagery was created using ochre in open-air settings. At present, archaeologists are only able to date charcoal and cannot directly date ochre. Additionally, charcoal is more susceptible to weathering in open-air environments. It is also challenging to numerically date engravings on a rock in contrast to objects that have been buried. Images in Australian art are diverse and include geometric signs, animals, humans, finger fluting, handprints, and chimeras. The oldest "art" in Australia comes in the form of cupules, circular depressions that are created on a rock surface. Cupules at Pilbara Northern Queensland, Turtle Rock, and Sandy Creek are thought to be at least 30,000 years old (Bednarik 2010). Early animal depictions in Kimberly region are believed to be 40,000 years old. In terms of geometric forms, circular shapes on a bolder in Spear Hill/Abydos are dated to 20,000–27,000 years ago with older symbols found in the surrounding vicinity (Bednarik 2010). Finger fluting at the Gallus site dates to at least 20,000 years. While much of the parietal art is difficult to date, relative chronologies have placed the artwork in a late Pleistocene/early Holocene time frame.

Asia: As in Australia, cupules are arguably the oldest "art" found in Asia. In India, at Auditorium Cave a cupule with a line running along part of the edge was dated to the "Acheulian" (Bednarik 1994). Recently numerous hand stencils and two animal depictions were discovered across seven caves sites in Sulawesi, Indonesia (Aubert et al. 2014). One of the handprints was dated to 39,900 years ago, making it the oldest hand stencil in the world. Also on Sulawesi, an artifact that was used to produce standardized beads, bone pendants, ochre, and incised stone artifacts were recovered dating back to 30,000–22,000 years ago (Brumm et al. 2017). Both of these recent discoveries question the notion that Europe was the center of artistic development for our species.

As in other regions, statuettes and two-dimensional images were also created. An ostrich eggshell with engravings was found at Patna, India, and dated to 25,000 years before present. Beads were created from a variety of mediums including shells, pebbles, as well as deer and fox teeth at the Upper Cave of Zhoukoudian. These materials date to 13,000–18,000 years BP (Bednarik 2013). Perforated shell beads were found associated with a burial at Qafzeh Israel dating to around 92,000 years ago. However, the objects that have received the most attention are the anthropomorphic and animal figurines from Mal'ta and Buret', Siberia. These diverse ivory figurines date to around 23,000 years old. Recently, a shell tool with a geometric engraving was reanalyzed and argued to be created by *Homo erectus*. While it is unclear as to whether the engraving was used for abstract, functional, communication, or another purpose, it does make us question whether *Homo sapiens* were the only species capable of creating art.

Europe: The Paleolithic of Europe can be divided into three major subdivisions, lower, middle, and upper. Both parietal and portable art emerge in Europe during the Upper Paleolithic. Specifically, the oldest rock art and figurines date to the Aurignacian industry, which begins in Europe approximately 40,000 years ago. Common subjects include negative hands, geometric signs, and animals. Depictions of humans in European rock art are relatively rare, and animals such as horses, bison, and mammoths dominate cave walls. Although personal adornments are widespread by the Aurignacian, some archaeologists have argued that the ornaments from Grotte du Renne were created by Neanderthals in the Chatelperronian (for a critical view on this topic, see Higham et al. 2010). Two recently discovered images have also been associated with

Neanderthals. One is an engraving from a cave in the Gibraltar region that resembles a tic-tac-toe symbol. The other is an image of what may represent seals found in a cave in Malaga, Spain. While paleoanthropologists acknowledge that Neanderthals were in these areas when the images were created, it is less certain as to whether *Homo sapiens* were also in the region at the same time. In regard to portable art, with the exception of the "Venus" of Hohle Fels and the "Venus" of Galgenberg, all of the Aurignacian figurines are of animals. Starting with the Gravettian, an abundance of predominately female anthropomorphic figurines becomes widespread across Europe. Male figurines and those that lack secondary sexual characteristics can be found in collections at the following sites: Mal'ta, Kostenki I, and Dolní Věstonice. The anthropomorphic statuettes vary in size, material used, body position, stylistic features, and contextual details. The female figurines are commonly referred to as "mother goddesses" or "earth mothers," although evidence of a shared belief system has not been corroborated. Animal figurines were still created during the Gravettian and are found in abundance at Dolní Věstonice, Pavlov, Predmostí, Petrkovice, and Kostenki I, often in conjunction with female figurines (Bahn and Vertut 1997). Both animal and anthropomorphic statuettes continue to be created in the Magdalenian but become less realistic and instead are more stylized.

Who Made the Art?

The early interpretations of Paleolithic art reflected an androcentric bias in archaeology. It was commonplace to assume that the art had been made by men and small boys. One of the most prevalent of these interpretations focused on a male shaman producing rock art while in a trance. According to Bednarik (2008: 173), the shamanistic or totemistic interpretation of the rock art has remained popular theoretically because such interpretations add a greater "perceived value" or "worth" to the artwork. However, neither of these theoretical interpretations are scientifically testable, and the perpetuation of these androcentric interpretations further promotes an unsubstantiated bias in archaeology today (Sharpe and Van Gelder 2009: 324). A more current interpretation acknowledges that Paleolithic art was created by both males and females of varying ages. Preliminary studies employing the 2D/4D ratio (second to fourth digit) to determine sex from hand stencils have done so with a reasonable degree of probability. In addition, the presence of small handprints and footprints in caves such as Chauvet and Cosquer in France makes it apparent that children were present and active within the caves as well. Regardless of age or sex, all of these interpretations have assumed that Paleolithic art was the product of anatomically modern humans alone. However, new uranium-series disequilibrium dates taken from calcite deposits overlying or underlying art found at a series of Spanish caves, most notably El Castillo, have turned this assumption on its head. With dates of up to 40,000 years, these finds suggest that Neanderthals could have also engaged in cave painting, but with modern humans already being in Europe by this time, it is difficult to determine who may have been the first parietal artists (Pike et al. 2012).

However, multiple personal adornments, colorants, and decorated bone tools were discovered in Châtelperronian levels at Grotte du Renne, Arcy-sur-Cure, France. This suggests that even if Neanderthals were not making cave art or mobile art, they were engaging in different artistic behaviors.

Why Did They Do the Art?

Since the discovery of the first portable and parietal art in Europe in the late 1800s, researchers have tried to understand why Paleolithic artists engaged in this behavior. "Art for art's sake" was a prominent theory of the nineteenth century referring to the belief that Paleolithic art had been created for decorative and aesthetic purposes only, but this hypothesis has now largely been abandoned. Early functionalist theory relied heavily on ethnographies of "primitive" societies and correlating the need for food back to the

images on the cave walls. The functionalist approach includes:

1. Hunting magic: This hypothesis was derived from ethnographies of modern hunter/gatherers who hunted with stone tools and produced rock art in order to enhance the success of their hunt. Animal imagery which includes "missiles," blood, and/or wounds has been used to support this theory. Other nonfigurative images have been interpreted as tracks and droppings to corroborate the theory that animal imagery was produced as a means of transmitting hunting knowledge.
2. Sympathetic magic: Like a "voodoo" doll, this hypothesis relies on the concept that animals depicted in rock art influence animals in reality.
3. Fertility magic: This hypothesis was based on the discovery of pregnant and/or copulating imagery including the "precopulatory bison" of Tuc d'Audoubert, France, and the numerous "Venus" figurines.
4. Trophyism: This asserts that hunting was done as much out of necessity as it was to impress females. Animal imagery was produced by a male to impress a female with his hunting abilities and to ultimately increase his reproductive success.
5. Shamanism: This relies on the concept of a male shaman producing rock art while in a trance. Purported examples of shamanism in rock art include the "leaping cow" from Lascaux, France; the "sorcerer" from Les Trois-Freres, France; and the mammoth ivory half-man, half-lion figurine from Hohlenstein-Stadel, Germany.

Along with the above theories of meaning, there are also several major theoretical approaches that have been employed in the study of Paleolithic art; these include:

1. The *structuralist* movement was inspired by the linguistic works of Ferdinand de Saussure and first brought to popularity by the French anthropologist Claude Levi-Strauss. This approach rejected the "straight-line" development of art from simple to complex and from abstract to naturalistic. The creation of images were not unique artistic events, images were intentionally selected for by species type or abstract design, and they were created in specific locations within a particular site, in deliberate association to other images. Two of the main proponents of this approach within the field of Paleolithic art were Andre Leroi-Gourhan and Annette Laming-Emperaire.
2. Settlement archaeology developed out of the *processualist* movement and involved the study of the spatial distribution of human activities and particular occupations within a single room, house, overall site, or region where landscapes were passive backdrops. The focus was on demography, technology, how people used the land, and how the land constrained the people.
3. The *post-processualist* movement involves examining the social aspects, such as the material connection to the land and the human interaction with the land. Within this theoretical framework, there are three main ways that researchers have chosen to approach the art:
   1. Archaeology of place: Landscape was active and complex and recognized that cultural heritage was shaped through tradition and memory. People, places, and features are considered integral, and landscape is seen as shaping and being shaped by human experience.
   2. Social geography: This relies on the idea that Paleolithic peoples moved in and through the landscape and that a regional scale of analysis was required. While "meaning" may be culturally specific, the phenomenological approach or the conscious human experience of everyday life allows scholars to approach landscape and built locations, such as painted caves, as they were perceived, represented, and experienced by Paleolithic peoples.
   3. Pleistocene visual culture (Soffer and Conkey 1997): This relies on the argument

that Paleolithic imagery is about materiality, meaning making, and recognizing that Paleolithic peoples were active, social agents in constructing their world (Conkey 2009). The images they produced, in terms of materials, colors, shapes, placement, and association, are all part of creating meaning and are therefore integral to the larger picture.

Prehistoric Pornography?

As has been previously mentioned, the idea that adolescent boys created Paleolithic imagery may have influenced Guthrie's (2006) idea that the female statuettes and bas-reliefs were a form of prehistoric pornography. He argued that the mostly "naked" statuettes shared similar body proportions having small waists and broad hips; this is referred to as having a low waist-to-hip ratio. This body type is considered beautiful cross-culturally and is also linked with fertility and overall health in females (Zaadstra et al. 1993; Singh and Singh 2006). However, upon analysis of the actual statuettes, Tripp and Schmidt (2013) found that the figurines actually share a high-average waist-to-hip ratio. This body type is not seen as attractive in modern populations and is linked to infertility and several mental and physical health conditions. Overall, the amount of diversity among the figurines in terms of style, contextual details, and materials makes it difficult to find a single explanation that can explain the earliest anthropomorphic art.

Art as Communication

Beyond its aesthetic properties, art can also be seen as a type of visual communication system as it is composed of graphic marks, many of which carry culturally agreed upon meanings. It is likely that experimentation with visual marks during the Pleistocene paved the way for the later development of writing. While the meanings of these early images remain elusive due to the time depth and lack of living informants, art is often used to educate; to record information about seasonal, historic, or ritual events; and to claim ownership of places or objects, as well as sometimes signaling individual identity or group membership. While all Paleolithic art potentially has this capacity, many of the geometric signs have specific usage patterns that point to there being a specific purpose and intention in their inclusion by the artist (von Petzinger 2016). Additionally, in a recent cladistics analysis, Tripp (2016) found evidence of numerous intentional stylistic similarities among anthropomorphic "Venus" figurines from various Russian Plains Gravettian sites, suggesting that there were shared art-making traditions as well as communication between the sites.

International Perspectives

At present, there is no one international means of rock art tourism and conservation, but rather, such decisions are made at each country's discretion. As a result, there is differential preservation of rock art around the world. In 1970, UNESCO created a set of guidelines for cultural tourism management and the preservation of World Heritage Sites with the intent to balance conservation efforts with providing cultural tourists with a meaningful experience through public education. South Africa's rock art sites receive around 240 million "cultural tourists" a year, and in consequence, the rock art is caught between the competing interests of impact assessors, who are concerned with the conservation, ethics, and ownership of the art, and those involved in the commodification, pricing, and promotion of the rock art as tourist attractions (Deacon 2006). The Dampier Archipelago of Australia contains the largest concentration of rock art in the world with an estimated million petroglyphs associated with other archaeological materials, such as shell middens and quarries. However, the archipelago has been threatened by years of development and industrialization, and it has led to the slow degradation of the rock art and the destruction of the cultural heritage over time (Mulvaney 2011). In 2007, the rock art paintings of the Sierra de San Francisco canyons of Baja California Sur, Mexico, were threatened despite the fact that they were on the UNESCO World Heritage List. Development of the land, in particular the plan to build roads through the canyons to create ease of access, threatened the art that had long been protected by

its remoteness, the need for mules, and local guidance (Clottes 2008). In France, Lascaux Cave has long been endangered through the proliferation of a fungus initially brought on by the influx of tourists after the cave was first discovered. To save the art at Lascaux and Altamira in Spain, replicas of the caves were built which are open to the public. At other caves, controlled visitations, digital recordings, photographic archiving, and the production of virtual cave tours have all contributed to the preservation of the art. In all instances of rock art conservation, however, it is critical that we bear in mind that the greatest threat to the art is human in origin and that it is predominantly due to ignorance and a lack of interest (Clottes 2008).

Future Directions

Future directions in the study of Paleolithic art include incorporating theoretical background with innovative scientific techniques. Tosello and Fritz (2007), for example, experimented with a 3D scanner to record the imagery found on cave walls. This technology allows researchers the ability to record images in more precise detail. Investigators, for example, are able to scan images and screen out modern graffiti, darken lines that are deteriorating, and prevent the flattening of 3D images. They were also able to use this technology to analyze individual brushstrokes of two rhinoceros on the panel of horses in Chauvet Cave. Their results allowed them to make inferences about the intention, skill levels, and cognitive processes of the artist.

Since the antiquity of rock art was first proposed in Europe during the late 1800s, this continent, and in particular its western region, has held a preeminent place in the discipline. Europe has often been the benchmark against which other rock art is compared both in terms of stylistic analysis and temporal sequencing due to the existing chronology of direct and indirect dates that have been collected from rock art sites. As interest and funding are directed toward the parietal art found in other parts of the world, this is beginning to challenge the assumption that the oldest art in the world is from W. Europe. Additionally, as dating methods improve, this will allow researchers to pursue more precise questions. As the many examples cited in this entry show, there are in fact sites from the Paleolithic period around the globe, and as new dating techniques are applied at these locations, we may find that the time line for the origins and dispersal of this behavior will need to be completely rewritten.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Australian Paleoart
- ▶ Bone Tools, Paleolithic
- ▶ Côa Valley Rock Art Sites
- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ Conkey, Margaret Wright
- ▶ Crimean Upper Paleolithic
- ▶ Cueva de las Manos, Río Pinturas Cave Art
- ▶ Davidson, Iain
- ▶ East Asia: Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Paleolithic Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Glacial Advances in Asia, Europe, and North America
- ▶ *Homo sapiens*
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Kostenki: Geography and Culture
- ▶ La Riera Cave: Geography and Culture
- ▶ Leroi-Gourhan, André
- ▶ Mobiliary Art, Paleolithic
- ▶ Paleoart Studies: Scientific Methods
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Siega Verde Rock Art Sites
- ▶ Valcamonica Rock Art

References

Aubert, M., A. Brumm, M. Ramli, T. Sutikna, E.W. Saptomo, M.J. Morwood, G.D. van den Bergh,

L. Kinsley, and A. Dosseto. 2014. Pleistocene cave art from Sulawesi, Indonesia. *Nature* 514: 223–227.
Bahn, P.G., and J. Vertut. 1997. *Journey through the ice age*. Berkeley: University of California Press.
Bednarik, R.G. 1994. The Pleistocene art of Asia. *Journal of World Prehistory* 8 (4): 351–375.
Bednarik, R.G. 2008. Children as Pleistocene artists. *Rock Art Research* 25 (2): 173–182.
Bednarik, R.G. 2010. Australian rock art of the Pleistocene. *Rock Art Research* 27 (1): 95–120.
Bednarik, R.G. 2013. Pleistocene paleoart of Asia. *Arts* 2 (2): 46–76.
Brumm, A., M.C. Langley, M.W. Moore, B. Hakim, M. Ramli, I. Sumantri, B. Burhan, A.M. Saiful, L. Siagian, Suryatman, R. Sardi, A. Jusdi, Abdullah, A.P. Mubarank, Hasliana, A.A. Oktaviana, S. Adhityatama, G.D. van den Bergh, M. Aubert, J. Zhao, J. Huntley, B. Li, R.G. Roberts, E.W. Saptomo, Y. Perston, and R. Grun. 2017. Early human symbolic behavior in the Late Pleistocene of Wallacea. *Proceedings of the National Academy of Sciences of the United States of America* 114 (16): 4105–4110.
Clottes, J. 2008. Rock art: An endangered heritage worldwide. *Journal of Anthropological Research* 64 (1): 1–18.
Conkey, M.W. 2009. To find ourselves: Art and social geography of prehistoric hunter gatherers. In *Past and present in hunter gatherer societies*, ed. C. Schnire, 253–276. New York: Academic.
Davidson, I. 1997. The power of pictures. In *Beyond art: Pleistocene image and symbol*, ed. M. Conkey, O. Soffer, D. Stratmann, and N.G. Jablonski, 125–159. Berkeley: University of California Press.
Deacon, J. 2006. Rock art conservation and tourism. *Journal of Archaeological Method and Theory* 13 (4): 376–396.
Garcia-Diez, M., and M. Vaquero. 2015. Looking at the camp: Paleolithic depiction of a hunter-gatherer campsite. *PLoS One* 10 (12): 1–17.
Guthrie, R.D. 2006. *The nature of Paleolithic art*. Chicago: University of Chicago Press.
Higham, T., R. Jacobi, M. Julien, F. David, L. Basell, R. Wood, W. Davies, and C.B. Ramsey. 2010. Chronology of the Grotte du Renne (France) and implications for the context of ornaments and human remains within the Châtelperronian. *Proceedings of the National Academy of Sciences of the United States of America* 107 (47): 20234–20239.
McBrearty, S., and A.S. Brooks. 2000. The revolution that wasn't. *Journal of Human Evolution* 39: 453–563.
Mulvaney, K. 2011. Dampier Archipelago: Decades of development and destruction. *Rock Art Research* 28 (1): 17–25.
Pike, A.W.G., D.L. Hoffmann, M. Garcia-Diez, P.B. Pettitt, J. Alcolea, R. De Balbin, C. Gonzalez-Sainz, C. de las Heras, J.A. Lasheras, R. Montes, and J. Zilhao. 2012. U-series dating of Paleolithic art in 11 caves in Spain. *Science* 336: 1409–1413.
Sharpe, K., and L. Van Gelder. 2009. Women and girls as upper palaeolithic cave 'artists': Deciphering the sexes of finger fluters in Rouffignac cave. *Oxford Journal of Archaeology* 28 (4): 323–333.
Singh, D., and D. Singh. 2006. Role of body fat and body shape on judgment of female health and attractiveness: An evolutionary perspective. *Psychological Topics* 15 (2): 331–350.
Soffer, O., and M. Conkey. 1997. Studying ancient visual cultures. In *Beyond art: Pleistocene image and symbol*, Memoirs of the California Academy of Sciences 23, ed. M. Conkey, O. Soffer, D. Stratmann, and N.G. Jablonski, 1–16. San Francisco: California Academy of Sciences.
Tosello, C., and G. Fritz. 2007. The hidden meaning of forms: Methods of recording Paleolithic parietal art. *Journal of Archaeological Method and Theory* 14 (1): 48–80.
Tripp, A.J. 2016. A cladistics analysis exploring regional patterning of the anthropomorphic figurines from the Gravettian. In *Cultural phylogenetics concepts and applications in archaeology*, ed. L.M. Straffon, 179–202. Cham: Springer.
Tripp, A.J., and N.E. Schmidt. 2013. Analyzing fertility and attraction in the Paleolithic: The venus figurines. *Journal of Archaeology, Ethnology and Art of Eurasia* 41 (2): 54–60.
Utrilla, P., C. Mazo, M. Cruz Sopena, M. Martinez-Bea, and R. Domingo. 2009. A palaeolithic map from 13,660 calBP: Engraved stone blocks from the Late Magdalenian in Abauntz Cave (Navarra, Spain). *Journal of Human Evolution* 57 (2): 99–111.
von Petzinger, G. 2016. *The first signs: Unlocking the mysteries of the world's oldest symbols*. New York: Atria Books (Simon & Schuster).
Zaadstra, B., J.C. Seidell, P.A. Noord, E.R. van der Velde, J.D. Habbema, B. Vrieswijk, and J. Karbaat. 1993. Fat and female fecundity: Prospective study of the effect of body fat distribution on conception rates. *British Medical Journal* 306 (6876): 484–487.

Art, Types of

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Introduction/Historical Background

The major classification of types of art from the traditional perspective of art history is based on

three main types: visual arts, applied arts, and performing arts. However, this classification has been created by scholars devoted to the study of art from a modern and Western point of view and is based on the idea of expressing individual values and skills inside a network that commodifies artistic creations (Corbey et al. 2004: 357–362). As all classification attempts, this definition does not fit perfectly into the study of arts on other places or from all times. Indeed, there is a long discussion regarding the definition of art from an archaeological point of view.

Keeping in mind that both, art history and archaeology, were born as academic disciplines during the eighteenth century, it is worth mentioning how the two disciplines have approached and understood artworks since then. Generally speaking, Western societies have had a definition of prehistoric, indigenous, or ancient arts based on the projection of the concepts which structure our modern system of art. This is certainly created during the eighteenth century when the concept of art was divided into two main types: "fine arts" and "crafts" or "popular arts" (Shiner 2001: 3–5). All the artworks recovered from archaeological or ethnographical record were labelled within the latter definition. Since then, many conceptual debates and theoretical foundations have classified and approached art (see Fiore 2014 for the review of the theoretical frameworks). One of the major concerns is to define what makes an archaeological material to be defined as art. A basic starting point to deal with this topic is to remind that in many occasions we describe specific material culture as art for convenience only and it is generally agreed that people who created what we labelled as "artworks" as well as the people who subsequently viewed them throughout time never thought of them in this way (Corbey et al. 2004; Chippindale and Taçon 2006 among others).

Definition

Categorizing artworks recovered from archaeological fieldwork is a challenge. Studies of the "archaeologies of art" are deeply fragmented by period, medium or scholarly tradition creating fuzzy boundaries to write a concise definition. For instance, Prehistoric European art has been studied from a regional, stylistical, and chronological point of view (see Robb 2015), whereas ethnoarchaeological research undertook in Africa or Australia (Ouzman 2005; Domingo et al. 2017) not only deals with these issues but also pays special attention to cultural sensibilities and ethics due to their work with indigenous communities and their material culture and ideologies.

Which are the features to define specific material culture as artistic pieces? One can defend that archaeological and ethnoarchaeological artworks might have some degree of visual impact; they are somehow distinct from others often indicated by the time, effort, skill, and imagination put in their making and present some patterns in their form or decoration which communicate beliefs, values, or affective meaning. In addition, such works are often aesthetically pleasing to their makers (Corbey et al. 2004: 361–362). Interestingly, aesthetics in archaeology has been challenging the preeminence not only of the visual in art research but also has widened its definition by introducing materials of everyday life like cooking pots or weapons that according to our modern eye are not defined as art and if so are closely related to crafts rather than fine arts. This is nicely illustrated by the study of J. Coote (1992) that demonstrates how cattle is the primary aesthetic locus for African Nilotic societies instead of any art piece. In the same vein, the material culture perspective is an inclusive methodology that focuses on how artworks are agential and have to be seen in terms of their participation, engagement, and actions, rather than simply as objects and images to be passively viewed (Gell 1998; De Marrais and Robb 2013).

With this premise in mind, a basic division between types of art can be between visual arts, focused on art-object research, and performative ones, centered on activities undertook whether by their creators or their participants. The most famous arts of this kind are dance and music. It is generally agreed the preeminence of visual perception in dealing with artworks, especially in

visual arts. However, recent studies advocate for multisensory experiences to engage with arts and introduce the aural, kinetic, and haptic sensations when creating, using, and perceiving artistic creations (Gosden 2001; Hamilakis 2013).

Regarding visual arts, four main types can be presented, keeping into consideration the support onto which artifacts are manufactured: fixed art, portable art, architectural art, and body art. Every type of art can be categorized into other subtypes: as a matter of guide, fixed art is divided into cave art or open-air art; portable art is divided into ornamental artworks or decorated vessels; architectural art can encompass palaces, tombs, or ceremonial buildings; finally, body art can be divided into permanent and ephemeral. Furthermore, these typologies present common features in terms of technique. For instance, engravings or paintings can be associated to more of the one type mentioned above: on a rock, on the body, or on a wall of a building.

All types of art can be scrutinized from a formal point of view. Relevant issues to be considered are the materials, the shape and size of the artifacts, or their dimensionality (2D or 3D). Other formal issues are color, texture, symmetry, harmony, and the distribution and pattern, if any, of the decorative motifs.

Considering that all types of art have some link with a referent, several categories to define an artwork are created. In a first typological attempt, images can be representative and nonrepresentative. Inside the representative, two kinds are distinguished according to the relation that the image have with the represented. On the one hand, there are the so-called figurative images, which present an iconic relation with what is represented, for example, an engraved figure that can be easily defined as a certain animal (deer, bear, etc.). On the other hand, the nonfigurative images present a link, real or imagined, with some extern referent, but the connection is not iconic. For instance, a wavy line can be interpreted as an abstract representation of a snake. Moving to the nonrepresentative images, they are always nonfigurative as they do not present a link with an external referent. Thus, they become abstract images (based on Graphic 1 from Fiore 2011: 114).

Key Issues/Examples

Beginning with fixed art, its main feature is that it is permanent in a specific place and it is normally referred to rock art, as rocks and bedrocks inside caves are the main surface. Likewise, fixed/rock art is also located on more visible or open-air supports like shelters. The techniques to decorate the surfaces are two: painted and engraved and sometimes a combination of both occurs. This art has also been labelled as landscape art because the lasting location creates a significant link between art and place, understood environmentally and socioculturally (Dobrez 2016). Besides the technique, the iconography and the style, key issues when studying rock art are twofold. On the one hand, in relation to landscape, it can be approached in terms of visibility, access, topography, and proximity to natural resources and to burials or settlements. On the other, the physical and morphological features of the rocks themselves (surface, textures, or shape) are also worth considering (David 2002). Therefore, the location of rock art is not randomly selected. A relevant case study is the painted and beeswax art from the Ingaanjalwurr rock-shelter in Western Arnhem Land. It has been demonstrated that this art is likely to have been produced during a short burst of activity incorporating the European-contact period and was used as a temporary camp on journeys between settlements. Interestingly, the beeswax and the paintings of sorcery figures have been interpreted as Aboriginal strategies to record the impact of European illnesses spreading quickly, so that these artworks materialize a moment of drastically social change (May et al. 2017).

To finish with the fixed art, recently, a more comprehensive approach that goes beyond the visual features of fixed art is being undertaken. Concretely, it refers to the acoustic properties of rocks and the creation of specific soundscapes and music (Díaz-Andreu and Mattioli 2017). It has been demonstrated that both are significant issues

when deciding the location of artwork by the artists.

The second main type of art is the "portable art" also known as "mobiliary art" because compared with the fixed art, it is easily moveable. Inside this label, two categories are identified: decorated artifacts and artifacts shaped with specific forms (Domingo Sanz et al. 2008: 15). Both categories can coexist because, for instance, a zoomorphic jug can be decorated following a specific pattern. One can distinguish between bidimensional and tridimensional too, and a wide range of materials are used. Two-dimensional drawings or carvings can be made on diverse supports like bone, stone, wood, clay, fabric, glaze, metal, or plaster. Among tridimensional objects, the figural can be also manufactured with the previous materials. Amid the modes of production stand out the handmade or mold-made. Regarding clay, the wheel-made technique is also worth mentioning, especially in relation to figurines and pottery. Portable art can be finely crafted and highly detailed, but it can also be sketchy or schematic.

Multiple categories and definitions can also be added according to the repetitive pattern whether of the object or the decorative motives. These features are useful to define styles, understood as the formal and technological characteristics of an artistic object, and can also contribute to identify artistic traditions from chronological and geographical perspectives (Domingo Sanz and Fiore 2014). Besides the aesthetic and artistic qualities of these pieces, portable or mobile artworks might also be approached by highlighting their use and functionality like decorating the body, serving food and beverages, producing sounds and music, and burying the deceased or commercial deals, among others. Generally speaking, portable or mobiliary artworks can be labelled as expressive objects that are differentiated from others because they are used in special settings or ceremonies and are usually restricted to specific social groups defined by gender, age, or kinship, among others. Pottery can be an appropriate example. Although plain tableware are not usually defined as artistic materials, figural and geometric paintings or carvings on ceramics transform them into artworks. More often than not, contexts uncover the special category of this kind of decorated objects.

Australian Aboriginal bark painting is also worth mentioning as an example of the complex and multiple meanings of portable art. For instance, a group of bark paintings featuring a type of Macassan boat (South Sulawesi indigenous ethnic group) used in the long journeys across Indonesia and Southern Australia has been analyzed. Besides showing the interaction between the two groups, it has been argued that these paintings embedded cultural meanings in connection to Aboriginal belief systems. In fact, painting these boats is connected to stories of creation, land, and ancestors for Aboriginal people due to the interaction with Macassan sailors (May et al. 2009).

Artworks erected or located in a fixed place can be labelled as architectural and/or monumental art. This type of art is normally related to funerary practices or to ancestor cults and other settings highly ritualized like palaces or religious and communal spaces. Furthermore, it can also present statuary, sometimes in the shape of statue-stele. Göbekli Tepe (Turkey) has provided with a striking example of such an art: dated between 9600 and 8500 BC, it is the oldest monumental/architectural artwork, so far. It consists of several circular constructions made of a combination of T-shaped stone pillars (up to 5 m height) and blocks for walls mortared with clay. Interestingly, some of pillars are carved with human and animal forms, becoming statue-stele too (Schmidt 2010). Mudbricks are a ubiquitous building material, created from a combination of clay, water, and organic cohesive elements such as straw. Walls, floors, and roofs can be recovered with plastic decoration like tiles, reliefs, engraves, sculptures, friezes, or frescoes. In many occasions, this type of art brings together locations, buildings, and people through the enactment of power and the visualization of prestige.

The last type of visual art is body art. It is normally assumed that body art is exclusively related to human bodies, but it is also possible that humans apply some kind of body decoration

to animals. A good example comes from eastern Iberia during the late Iron Age (300–200 BC), where painted pottery reveals decorated horses with necklaces holding bells and flowers on heads (Bonet and Vives-Ferrándiz 2017).

Techniques for embellishing bodies are varied and can be divided in two main types. On the one hand, body art applied on the skin like painting, tattooing, scarifying, branding, and piercing (Schildkrout 2004). On the other, artworks considered wearable art like dresses, jewels, or masks can also be categorized as body art because they are intended to be attached to the body. A major distinction concerns its permanence, as body art can be ephemeral (body and facial painting or wearable art) or durable (tattooing). In the same vein, the authorship is another relevant issue as this type of artwork includes self-ornamentation or ornamentation by others.

Body art is much more than decoration understood in terms of fashion and beauty cannons from a contemporary and western point of view. In fact, body art is inextricably related to the creation of identities. Body artworks visualize identities but also help to create social distinctions, e.g., status, gender, age, race, or kinship, among others. The displaying of designs and objects on the body is as fundamental as to being decorated. Visual information is no less relevant, as body art can be tremendously eye-catching in terms of shape, colors, or textures. For instance, during the European Bronze Age (3000–800 BC), some people were interested in sparkling artworks made of bronze. Once polished, these ornaments might have helped to define "shining bodies" and a set of social values (Harris et al. 2013: 87–94).

Art applied directly on the body, whether permanent or ephemeral, is difficult to detect because they have low archaeological visibility. Some bodies, such as those who have preserved the skin, like mummies, show traces of tattoos and scarification. For example, the Tyrolean Iceman known as Ötzi (3300–3250 BP) presents 61 tattoo marks across his body. They have been interpreted as tattoos that were part of a therapeutic treatment (Deter-Wolf et al. 2016: 21). From an anthropological-ethnographic perspective, body arts have been studied in depth (see, for instance, Alfred Gell's (1993) work on Polynesia), and it has been defined as participating in rituals of personal transformation. Texts, photographs, and interviews can also record examples of body art. On a different vein, materials that participated in the corporeal art that outlast bodies are paint residues, pigments, and painting tools. In addition the containers of these products have also been identified like small "makeup" boxes made out of fine materials like ivory or glass.

Wearable art is linked to an array of heterogeneous material culture, and one can distinguish between nonperishable materials such as metals, bone, and stone, which are recorded abundantly. At any rate, buttons, fibulae, pins, or diadems plus objects sewn onto the garments or other supports such as shells, animal bones (especially teeth), or feathers are recorded abundantly. An illustrating case study is the use of bone, teeth, and shell in Australia intended not only to decorate the body but also to participate in ritual and esoteric practices (Akerman 2018). Dresses and decorative artworks made out of perishable materials are not easily preserved, although in some special conditions, garments crafted with cotton, linen, esparto, wool, or fur are preserved due to a proper conservation atmosphere.

Finally, another indirect material to study body art is the representation of bodies whether on stone, clay, wood, etc. In many occasions these representations feature body ornamentation such as makeup, scarification, jewels, or wearable art. They might reveal corporeal art.

Performative arts provide the last type of art. This term includes music, dancing, and drama like theater or recitation as well as temporary gatherings and ceremonies that involve artworks. Unfortunately, recovering these arts from the ancient societies is an arduous task because this type of art, as it name indicates, performs some activity taking place in a specific moment and, thus, is ephemeral. However, the material culture and texts related to performances provide us with information.

Musical instruments are good pieces of evidence, from bone flutes to metallic horns. Archaeomusicology is a specific area of expertise that preserves and studies organological topics

and tries to reproduce the sounds of the past (Jiménez Pasalodos 2011). Dancing is connected to music. Here the evidence is always indirect through representations of people in certain gestures that are interpreted as dances because they follow a repetitive pattern or combine several body positions (Garfinkel 2010). Sometimes, these figures, whether isolated or in group, are accompanied by musicians.

Regarding theater or recitation, written sources are essential as they preserve some texts to sing or recite. Architectural art is also a direct evidence of performative arts as some of them were played in monumental buildings like theaters, temples, or ceremonial buildings (Inomata and Coben 2006). Direct observation, contemplation through photographs or audio and visual recordings, or participation, if possible, are good sources of information.

Other performative arts include ceremonies and gatherings like funerary rites. Ethnoarchaeological case studies have recorded artworks that were used during these enactments. For instance, bone chaplets of Arrernte, Australia, were wore by the widow and younger sisters of a dead man. These artworks were used in funerary ceremonies and once they finished the chaplets would be destroyed and dipositive in the grave (Akerman 2018: 203).

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Archaeology and Art
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art Studies: Normative Approaches
- ▶ Ephemeral Art
- ▶ Form in the Archaeology of Art
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Megalithic Art: A Visual Repertoire for the Dead
- ▶ Mobiliary Art, Paleolithic
- ▶ Portable Art Recording Methods
- ▶ Rock Art, Forms of
- ▶ Sensory Archaeology
- ▶ Style: Its Role in the Archaeology of Art

References

Akerman, K. 2018. The esoteric and decorative use of bone, shell, and teeth in Australia. In *The archaeology of Portable art Southeast Asian, Pacific, and Australian perspectives*, ed. M.C. Langley, M. Litster, D. Wright, and S.K. May, 199–219. London: Routledge.

Bonet, H., and J. Vives-Ferrándiz. 2017. *L'enigma del vas. Obra mestra de l'art ibèric*. Valencia: Diputació de València (translated to English).

Chippindale, C. & Taçon, P.S.C. 2006 What's in a word, what's in a hyphen? A modest proposal that we abandon the words 'petroglyph' and 'pictograph', and hyphenate 'rock-painting', 'rock-engraving', 'rock-art'among the words we use. Rock Art Research 23 (2): 254–257.

Coote, J. 1992. 'Marvels of everyday vision': The anthropology of aesthetics and the cattle-keeping nilotes. In *Anthropology, art and aesthetics*, ed. J. Coote and A. Shelton, 245–273. Oxford: Clarendon Press.

Corbey, R., R. Layton, and J. Tanner. 2004. Archaeology and art. In *A companion to archaeology*, ed. J. Bintliff, 367–379. Malden: Blackwell Publishing.

David, B. 2002. *Landscapes, rock art and the dreaming*. London: Leicester University Press.

DeMarrais, E., and J. Robb. 2013. Art makes society: An introductory visual essay. *World Art* 3 (1): 3–22.

Deter-Wolf, A., B. Robitaille, L. Krutak, and S. Galliot. 2016. The world's oldest tattoos. *Journal of Archaeological Science: Reports* 5: 19–24.

Díaz-Andreu, M., and T. Mattioli. 2017. Rock art, music, and acoustics: A global overview. In *The Oxford handbook of the archaeology and anthropology of rock art*, ed. B. David and I.J. McNiven. Oxford Handbooks Online. https://doi.org/10.1093/oxfordhb/9780190607357.013.8.

Dobrez, L. 2016. Theoretical approaches to rock art studies. *Rock Art Research* 33 (2): 143–166.

Domingo Sanz, I., and D. Fiore. 2014. Style. Its role in the archaeology of art. In *Encyclopedia of global archaeology*, ed. C. Smith, vol. 10, 7104–7111. Berlin: Springer.

Domingo Sanz, I., D. Fiore, and S.K. May. 2008. Archaeologies of art: Time, place, and identity in rock art, portable art, and body art. In *Archaeologies of art: Time, place and identity*, ed. I. Domingo Sanz, D. Fiore, and S.K. May, 15–27. Walnut Creek: Left Coast Press.

Domingo, I., C. Smith, and S.K. May. 2017. Etnoarqueología y arte rupestre: Potencial, perspectivas y ética. *Complutum* 28 (2): 285–305.

Fiore, D. 2014. Archaeology of Art: Theoretical Frameworks. In Encyclopedia of global archaeology, ed. C. Smith, vol. 1, 436–448. Berlin: Springer.

Fiore, D. 2011. Materialidad visual y arqueología de la imagen. Perspectivas conceptuales y propuestas metodológicas desde el sur de Sudamérica. *Boletín*

del Museo Chileno de arte precolombino 16 (2): 101–119.
Garfinkel, Y. 2010. Dance in prehistoric Europe. *Documenta Praehistorica* XXXVII: 205–214.
Gell, A. 1993. *Wrapping in images: Tattooing in polynesia*. Oxford: Clarendon Press.
Gell, A. 1998. *Art and agency: An anthropological theory.* Oxford: Clarendon Press.
Gosden, C. 2001. Making sense: Archaeology and aesthetics. *World Archaeology* 33 (2): 163–167.
Hamilakis, Y. 2013. *Archaeologies and the senses. Human experience, memory, and affect*. Cambridge: Cambridge University Press.
Harris, O.J.T., K. Rebay-Salisbury, J. Robb, and M.L.S. Sørensen. 2013. The body in its social context. In *The Body in history. Europe from the palaeolithic to the future*, ed. J. Robb and O.J.T. Harris, 64–97. Cambridge: Cambridge University Press.
Inomata, T., and L.S. Coben, eds. 2006. *Archaeology of performance: Theaters of power, community, and politics*. Lanham: Altamira Press.
Jiménez-Pasalodos, R. 2011. A "phenomenology of soundscape": Archaeoacoustics, landscapes and environment in music archaeology. In *Actas das IV Jornadas de Jovens em Investigaçao Arqueológica (I)*, ed. J. Cascalheira and C. Gonçalves, 443–446. Do Algarve: Promotoria Monografica 16.
May, S.K, J.F. McKinnon, and J.T. Raupp. 2009. Boats on bark: An analysis of Groote eylandt aboriginal bark-paintings featuring Macassan Praus from the 1948 arnhem land expedition, Northern territory, Australia. *The International Journal of Nautical Archaeology* 2–17. https://doi.org/10.1111/j.1095-9270.2009.00230.x
May, S.K., D. Shine, D. Wright, T. Denham, P.S.C. Tacon, M. Marshall, I. Domingo Sanz, F. Prodeaux, and P. Stephens. 2017. The rock art of Ingaanjalwurr Western Arnhem land, Australia. In *The archaeology of rock art in Western Arnhem land, Australia*, ed. B. David, P.S.C. Tacon, J. Delannoy, and J.M. Geneste, 51–68. Canberra: ANU Press.
Ouzman, S. 2005. Silencing and Sharing Southern African indigenous and embedded knowledge. In *Indigenous archaeologies: Decolonising theory and practice*, One world archaeology, ed. C. Smith and H. Martin Wobst, vol. 47, 208–225. Florence: Taylor and Francis.
Robb, J. 2015. Prehistoric art in Europe: A deep-time social history. *American Antiquity* 80 (4): 635–654.
Schildkrout, E. 2004. Inscribing the body. *Annual Review of Anthropology* 33: 319–344.
Schmidt, K. 2010. Göbekli Tepe – the Stone Age Sanctuaries. New results of ongoing excavations with a special focus on sculptures and high reliefs. *Documenta Praehistorica* 37: 239–256. https://doi.org/10.4312/dp.37.21
Shiner, L. 2001. *The invention of art: A cultural history.* Chicago: University of Chicago Press.

Further Reading

Brunt, P., and N. Thomas. 2012. *Art in oceania: A new history*. London: Thames and Hudson.
Fiore, D. 2005. Social images through visual images: The use of drawings and photographs in the Western representation of the aborigines of Tierra del Fuego (southern South America). In *Public Archaeology*, vol. 4, ed. B. Sillar and C. Fforde, 169–182.
Moxey, K. 2008. Visual studies and the iconic turn. *Journal of Visual Culture* 7: 131–146.
Robinson, D.W. 2013. Legitimating space: Art and the politics of place. *World Art* 3: 121–139.
Robins, M., and K. Hays-Gilpin. 2000. The bird in the basket: Gender and social change in basketmaker iconography. In *Foundations of Anasazi Culture*, ed. P.F. Reed, 231–250. Salt Lake City: University of Utah Press.
Whitley, D.S., ed. 2001. *Handbook of rock art research*. Lanham: AltaMira Press.

Ascenzi, Antonio

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Basic Biographical Information

An Italian pathologist and paleoanthropologist, Antonio Ascenzi was born in Boulogne-sur-Mer, France, on May 4, 1915. He gained his medical doctor's degree from the Sapienza University of Rome in 1940. This was followed by qualification as a professor in pathology and histology in 1951 and another in anthropology in 1960. An educator at the universities of Rome and Pisa, he lectured in the fields of pathological anatomy, physical anthropology, and human paleontology (Massenti 1991). Ascenzi was appointed to the position of full professor at Rome University in the years 1968–1985. He was a member of the Superior Council for Public Education between 1966 and 1970. In addition, he accepted membership of the Commission for Auxiliary Sciences of Archaeology within the National Council for Research in 1966, of the international board for the research laboratory at the Calot Institute in 1970 and of the National Lincean Academy in 1987 (Massenti 1991; Giuffra et al. 2010). In 1973, he was appointed president of the Italian

Institute of Human Paleontology, a post that he held for the rest of his life. During his career, Antonio Ascenzi received a number of important awards, including a gold medal for merits in the fields of education, culture, and art in 1984 (Massenti 1991; Ascenzi 2001). He died in his home at Albano Laziale on December 18, 2000.

Major Accomplishments

Over the last century, Antonio Ascenzi has been one of the most prominent figures of Italian biological anthropology. He greatly contributed to the study of archaeological human remains by applying a wide range of scientific methods to their analyses, including light microscopy, electron microscopy, histology, histochemistry, and radiology (Giuffra et al. 2010). Among his paleoanthropological achievements, we can include the finding of an incomplete Neanderthal mandible in 1950 at Guattari cave and the study of additional hominid remains from Saccopastore, the Circeo cape, and Archi. In addition, he researched the traits of the noted Ceprano calvaria, currently considered an early stock of *Homo heidelbergensis*. This important specimen also revealed the presence of healed trauma and of a congenital malformation of the sphenoid sinus (Giuffra et al. 2010). Fascinated by paleopathology, the scientist contributed to the diffusion of this discipline in Italy and focused on the diagnosis of thalassemia in skeletal remains (Giuffra et al. 2010). Antonio Ascenzi was also interested in bone alterations and taphonomy and carried out experimental archaeology in order to shed light on postdepositional processes on the bone buried in the dirt or immersed in water (Giuffra et al. 2010). Last but not least, he was interested in mummified remains and headed investigations of the Uan Muhuggiag infant mummy from Libya, as well as those of the famous Grottarossa mummy, a rare example of Roman mummification (Aufderheide 2003). In this specific study, analyses revealed the presence of lines of arrested growth, osteopenia, anthracosis, and pleurisy, all of which are of paleopathological relevance (Cockburn et al. 1998). For all of these significant contributions, Ascenzi is considered the "father" of modern paleopathology and mummy studies in Italy (Fornaciari 2013).

Cross-References

► Animal Paleopathology
► Mummy Studies

References

Ascenzi, M.-G. 2001. Obituary. Antonio Ascenzi, M.D. (1915–2000). *Calcified Tissue International* 68: 130.
Aufderheide, A.C. 2003. *The scientific study of mummies*. Cambridge: Cambridge University Press.
Cockburn, T.A., E. Cockburn, and T.A. Reyman, eds. 1998. *Mummies, disease, and ancient cultures*. 2nd ed. Cambridge: Cambridge University Press.
Fornaciari, G. 2013. A brief history of Italian paleopathology. *Medicina nei Secoli – Arte e Scienza* 25 (1): 13–34. [in Italian].
Giuffra, V., S. Minozzi, S. Marinozzi, and G. Fornaciari. 2010. Antonio Ascenzi (1915–2000), a pathologist devoted to anthropology and paleopathology. *Pathologica* 102: 1–5.
Massenti, C. 1991. *Ascenzi, Antonio. Enciclopedia Italiana, V Appendice, A-D*, 246. Roma: Treccani.

Further Readings

Bonucci, E. 2005. Antonio Ascenzi. *Rendiconti Lincei, Supplemento* 9 (16): 5–20.
Buikstra, J., and C. Roberts, eds. 2012. *The global history of paleopathology. Pioneers and prospects*. New York: Oxford University Press.
Wood, B., ed. 2011. *Wiley-Blackwell encyclopedia of human evolution*. Chichester: Wiley-Blackwell.

Ash: Geoarchaeology

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Introduction

Ash plays a significant role in archaeology both as a building block of stratigraphic accumulation and as an alkaline source in taphonomic pathways. It

is found all over the world and can be of considerable value in understanding cultural activity. Ash is a major component of many cave stratigraphies (e.g., Brochier 1983; Berna et al. 2012; Shahack-Gross and Ayalon 2012), where leaching is minimal and occupation or animal stabling has occurred regularly throughout history. Ash also occurs at open-air sites under arid climatic regimes (Cremaschi and Trombino 1999), in pit fills where the shape and bulk of the deposit discourage dissolution, and in layers where the surrounding sediments are sufficiently alkaline (e.g., Canti 2007).

Definition

The word "ash" covers the remains of any burnt material and appears commonly in nineteenth- and early twentieth-century chemical analysis meaning "the component that cannot be oxidized." In practical parlance, however, it refers to the material left over from solid fuel fires. Archaeological ash can occasionally be the result of coal burning, particularly with the growth of industrial archaeology; however, in most cases, ash found in excavations results from the burning either of plant material or dung derived from herbivores. This entry will deal only with ash from plants and dung.

Historical Background

Although ash was reported from excavations throughout the twentieth century, it has only been studied analytically during the last 50 years or so. As with other aspects of archaeological science, early analytical studies did not approach the subject systematically, so an understanding was only built up slowly from individual pieces of work, such as the elemental analyses of ash mounds in central southern India (Zeuner 1959).

Folk (1973) was the first to indicate the true botanical origin of the calcium carbonate which forms a large part of many ash bodies, but this material and its relationship to the more siliceous ashes derived from grasses and herbivore dung (see below) were not fully understood until the work of Brochier (1983, 1996) and Brochier et al. (1992).

Subsequently, the major focus for published work on ash has been the diagenetic pathways in the Mediterranean and Middle Eastern caves. In these environments, ash, guano, and bone provide uniquely reactive contextual chemistry involving transformation pathways of numerous different phosphatic minerals, which enable valuable interpretations to be made both of the original inputs and the preservation of the environmental remains (Karkanas et al. 2000; Stiner et al. 2001).

Key Issues and Current Debates

What Is Ash?

Various parts of plants have been burnt throughout history by all cultures to produce heat. The materials used can range from fine grasses to woody stems with leaves or logs from large trees. All these plant products are predominantly made of carbon-rich compound such as cellulose and lignin which burn away. However, they also contain a significant mix of mineral components that are left behind (either intact or modified) to become the ash layers found in archaeological excavations. The major mineral components are calcium carbonate (derived by burning from calcium oxalate crystals in the original plant) and silica which mostly comes through unchanged from phytoliths in or around plant cells.

The calcium oxalate crystals come in two major forms, both of which are preserved in the final ash body. The first of these is prismatic crystals, which form various rhomboidal shapes and commonly line the veins in leaves of numerous plant species (Fig. 1). The second is druses, which are aggregates of radially deployed crystals typically found lining veins or in the parenchymatous tissue (Fig. 2).

The shapes of the opaline silica remains are highly variable. Some form discrete bodies known as phytoliths, while others result from encrustation of the cells and retain a cellular shape after the organic remains have burned away (Fig. 3).

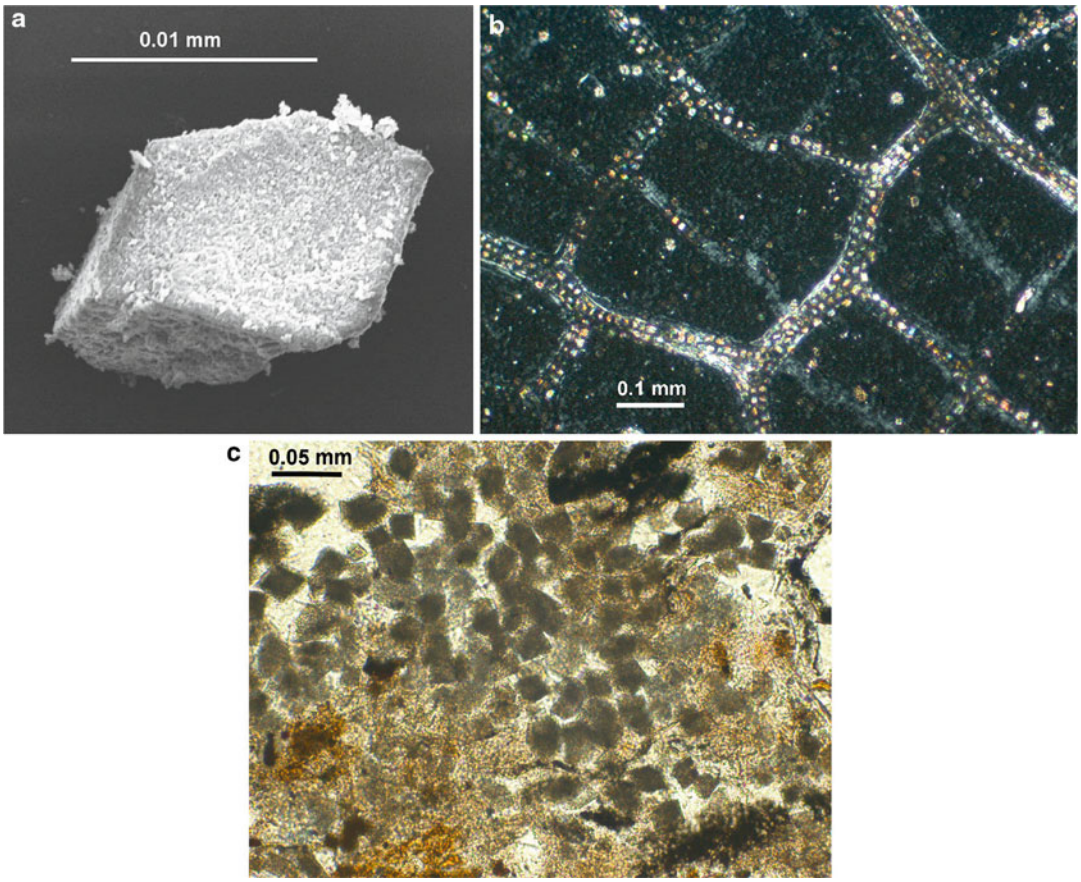

Ash: Geoarchaeology, Fig. 1 (**a**) Prismatic calcium oxalate crystal from *Laurus nobilis* (SEM photo), (**b**) prismatic crystals in leaf veins of *Quercus robur* (bleached whole leaf in crossed polarized light), (**c**) prismatic crystals converted to calcium carbonate in modern bonfire ash from mixed sources (plane polarized light)

These compounds represent two major trends in plant mineralization. Some form of silica is present in most plant species but especially rich in the grasses; calcium oxalate is widespread in herbaceous plants and trees but is absent from the grasses. There are other mineral components in ash, and there are further complexities in the physiological and botanical relationships. A more complete discussion can be found in Canti (2003).

An additional modified form of ash occurs when some of these components become fused together. This happens when the ash contains a significant proportion of fluxing agents such as sodium and potassium which lower the melting point when mixed with silica (Robinson and Straker 1991). The results can vary from delicate crisp frameworks of the original plant silica through to lumps of glassy clinker-like material, sometimes vesicular (Fig. 4) due to gas bubbles developing in a liquid melt (Folk and Hoops 1982; Canti 2007).

Once ash has been fully mineralized, the resulting chemical mix has considerable value to people without access to modern chemicals. Careful species selection can make for worthwhile differences in the salts obtainable from ash – a fact still exploited by non-Western peoples today (see Lemonnier 1984). The chemical makeup is variable but is frequently of such a composition that it can be used to glaze ceramics, usually with small additions of clays or other oxides (Rogers 1991). A long tradition of ash glazing built up in Asia over the last 1,000 years, producing some of

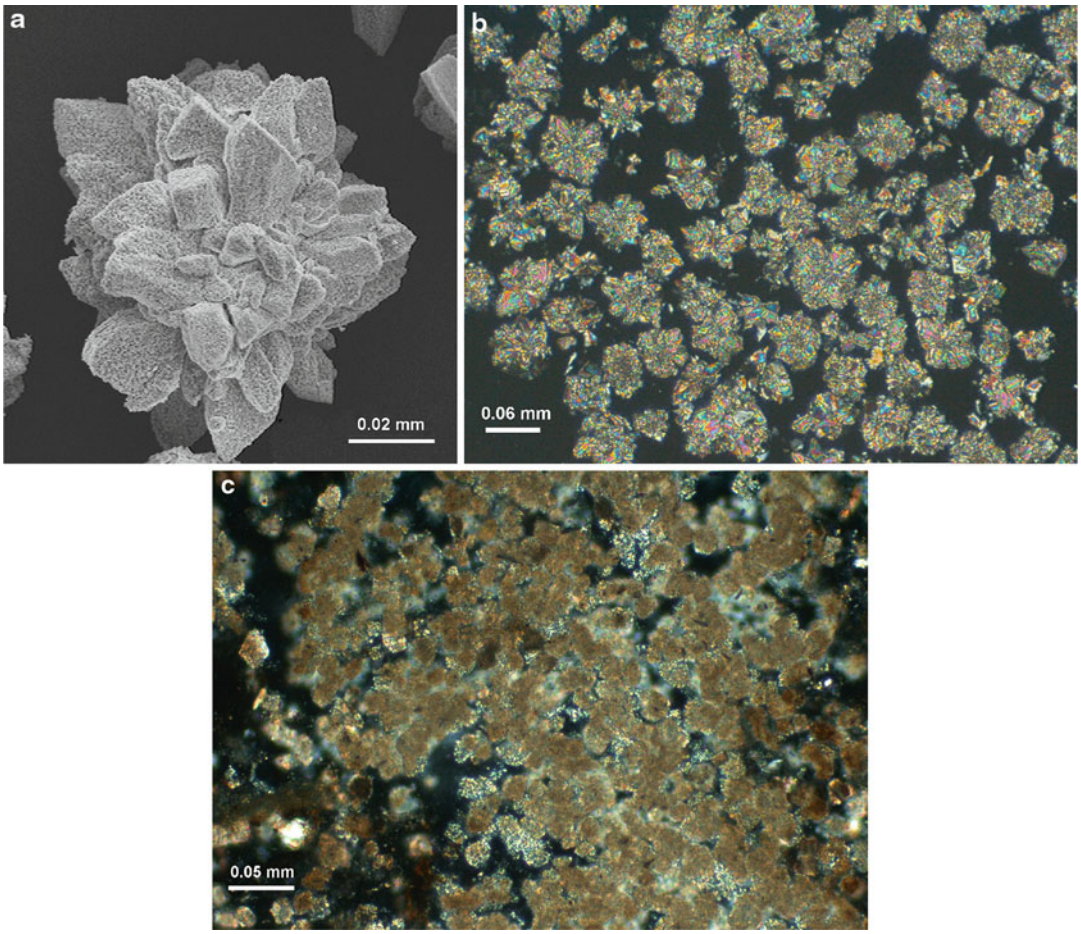

Ash: Geoarchaeology, Fig. 2 (**a**) Druse crystal from *Rheum raponticum* burnt at 700 °C (SEM photo), (**b**) druse calcium oxalate crystals from *Rheum raponticum* (crossed polarized light), (**c**) druse crystals converted to calcium carbonate in modern bonfire ash from mixed sources (plane polarized light)

the most exquisite ceramics (see Leach 1940). The melting characteristics of ash also made it one of the first major ingredients used in glass manufacturing (Turner 1956).

The predominant geographical location of ash research has been cave studies in calcareous Mediterranean rocks. In conjunction with the use of polarized light microscopy as a major analytical method, this has led to a particular emphasis being placed upon distinguishing geological and pyrogenic calcium carbonate. The stratigraphy in these locations commonly contains both forms of calcium carbonate, and they are often difficult to tell apart under the microscope. Although the modified calcium oxalate crystals are easy to recognize intact, they can disintegrate or become compressed and sometimes recrystallized in such a way as to obscure the differences in origin.

Two approaches have been employed to try and achieve the desired distinction. Firstly, comparison of the different calcite peaks produced by infrared analysis can distinguish the main forms of calcite in sediments where recrystallization has not occurred (Regev et al. 2010). Secondly, examination of C and O isotopes distinguishes the sources because of the differences in the original isotopic composition of the plant matter, air, and limestone which form the inputs.

As well as successfully separating the ash from the rock, the isotopic approach has raised further

Ash: Geoarchaeology, Fig. 3 Silica remains of burnt *Equisetum* sp. (plane polarized light)

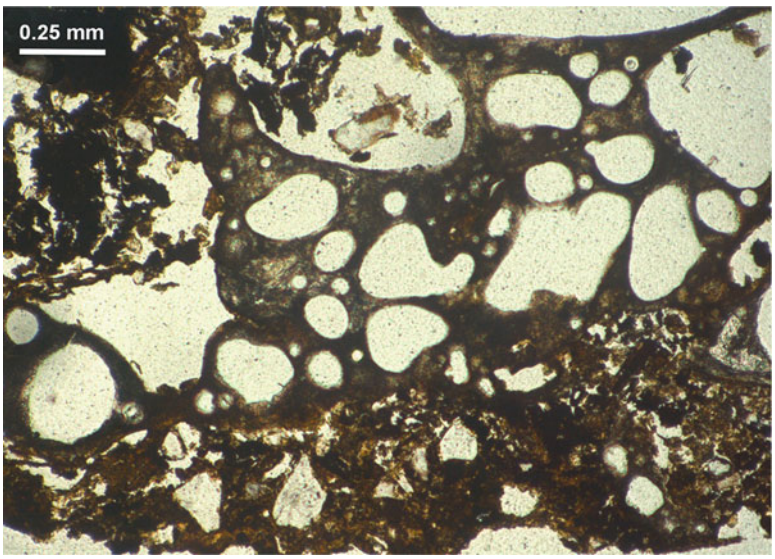

Ash: Geoarchaeology, Fig. 4 Vesicular ash melt from excavations in Woolmonger St., Northampton, UK (plane polarized light)

questions by showing that the ash itself has different isotopic compositions (Shahack-Gross et al. 2008). These differences arise primarily from the fact that there are two distinct pathways to the formation of calcium carbonate from calcium oxalate. The first is a low-temperature (400–500 °C) transformation in which $CaCO_3$ forms directly by loss of CO, i.e., simply redeploying the carbon already in the crystal (Dollimore 1987; Frost and Weier 2003, 2004). The carbon in the plant oxalate will be isotopically consistent with the fuel plant's photosynthetic pathway and will thus tend to fall into one of the well-known C3- or C4-type plant carbon groupings.

The second is the high-temperature transformation which goes through modification stages similar to traditional lime burning for mortar and plaster. At around 600–700 °C, carbon dioxide (CO_2) is given off leaving quicklime (CaO) which then hydrates to form calcium hydroxide $Ca(OH)_2$. Over time, this hydroxide absorbs atmospheric CO_2 to reform calcium carbonate ($CaCO_3$) again. A combination of these two pathways inevitably occurs in real fires, and the isotopic compositions of archaeological ash can thus be shown to reflect mixing lines involving the original plant matter, as well as atmospheric and geological inputs (Shahack-Gross and Ayalon 2012).

Folk (1973) pointed out the potential value of calcitic ash for radiocarbon dating based on the chemistry of this high-temperature transformation in which the carbonate from atmospheric sources would have a radiocarbon date the same as the atmosphere at the time of the fire. However, he did not allow for the low-temperature form of transformation in which calcium oxalate changes to calcium carbonate without atmospheric inputs. This type of transformation would lead to a radiocarbon date similar to the carbon in the original oxalate crystals and thus be analogous to the "old wood effect" where charcoal used for dating a layer is found to be older than the formation of that layer.

In an effort to clarify the potential of plant ash for radiocarbon dating, Regev et al. (2011) burnt different plant materials of known radiocarbon characteristics at different temperatures and compared the results from the ash with the results from the original material. They found that, when burnt at low temperature (500 °C), the ash largely retained the original calcium oxalate radiocarbon concentration but with a slight shift toward atmospheric concentrations. As would be expected, all the material burnt at high temperature (900 °C) showed complete CO_2 exchange with the atmosphere. The mechanism for the low-temperature shift remains unknown.

International Perspectives

The high percentage of calcium carbonate that characterizes most ash means that its archaeological occurrence at outdoor sites is inevitably negatively correlated with rainfall and, apart from the wet tropics, tends toward a similar relationship with latitude as well. In more northerly climates, the calcareous component of ash is commonly leached away, and only the charcoal is left behind, attesting to its former presence. Sites on calcareous geology will retain ash where it gets sufficiently buried to be protected against leaching. These cases are sometimes deep pit fill deposits associated with domestic waste disposal or industrial installations such as the corn drying ovens at Grateley, Hants, UK (Cunliffe and Poole 2008). Rare occurrences are sometimes found elsewhere, if enough alkaline material is present. At Flixborough, Humberside, UK, blown siliceous sand with only a minor calcareous component was deep enough to preserve ash in significant quantities, influencing the taphonomy at the site and retaining Anglo-Saxon bone layers in very good condition (Canti 2007).

Further south, ash deposits are more commonly found, and the analytical value can be high in situations where the burning of plant matter is accompanied by other lines of evidence. In particular, information from the more detailed botanical attribution of plant silica remains, and the concentrations of fecal spherulites (calcium carbonate remains from dung) can together stimulate deductions about industrial or agricultural activity. The Numidian layers at Althiburos in northern Tunisia, for example, were composed of ashy sediments that provided excavators with insights into the detail of animal keeping and domestic life (Portillo and Albert 2011). Concentrations of inflorescence or whole plant phytoliths, in association with fecal spherulites, provided information on feeding style and seasonality, while spherulites in oven ash showed the use of dung as fuel. At Atar Haroa, an Iron Age site in the Negev Highlands of Israel, Shahack-Gross and Finkelstein (2008) were similarly able to distinguish indoor ash deposits derived through dung and wood burning from external dung-only deposits by utilizing phytoliths and spherulite analysis.

Dung burning appears to be the central reason for the huge ash spreads that occur in parts

of central Africa and southern India. These are mounds many meters high in some cases or covering hundreds of square meters in others. They contain elements of ordinary soil, ash, and fused ash – the latter being the reason for much analytical discussion (Zeuner 1959; Allchin 1963; Thy et al. 1995). Cattle dung was piled up at various times in history and prehistory and then deliberately or accidentally burned producing enough heat to cause fusion (see above).

Future Directions

If the shift toward atmospheric carbon shown by Regev et al. (2011) could be understood, it might open the way to using ash for radiocarbon dating. In practical application, there would still be the problem of diagenetic alteration, as ash in the presence of water can undergo calcium carbonate precipitation at any time between deposition and excavation, and that would be likely to introduce carbon from other sources. However, it could be possible to overcome this through careful sample selection, perhaps using microscopy or isotopic separation.

The greater detail recently made possible in the isotopic distinctions of ash types and their formation pathways clearly gives a new direction in the study of this remarkable material. As ever with archaeological science, the challenge remains in taking the laboratory understanding out to the field and using it to produce real interpretations among the indistinct or mixed contexts of real-life archaeological sites.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Charcoal: Preservation and Conservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Site Formation Processes
- ▶ Taphonomy in Human Evolution

References

Allchin, F.R. 1963. *Neolithic cattle keepers of South India. A study of the Deccan ashmounds*. Cambridge: Cambridge University Press.

Berna, F., P. Goldberg, L. Kolska Horwitz, J. Brink, S. Holt, M. Bamford, and M. Chasan. 2012. Microstratigraphical evidence of *in situ* fire from the Acheulean strata at Wonderwerk Cave, North Cape Province, South Africa. *Proceedings of the National Academy of Sciences of the United States of America*. https://doi.org/10.1073/pnas.1117620109.

Brochier, J.E. 1983. Bergeries et feux néolithiques dans le Midi de la France, caractérisation et incidence sur le raisonnement sédimentologique. *Quartar* 33/34: 181–193.

Brochier, J.E. 1996. Feuilles ou fumiers? Observations sur le rôle des poussières sphérolitiques dans l'interpretatation des dépôts archéologiques holocènes. *Anthropozoologica* 24: 19–30.

Brochier, J.E., P. Villa, M. Giacomarra, and A. Tagliacozzo. 1992. Shepherds and sediments: Geoethnoarchaeology of pastoral sites. *Journal of Anthropological Archaeology* 11: 47–102.

Canti, M.G. 2003. Aspects of the chemical and microscopic characteristics of plant ashes found in archaeological soils. *Catena* 54: 339–361.

Canti, M.G. 2007. Geoarchaeological studies at Flixborough-North Conesby: Understanding the burial environment, taphonomy and preservation conditions. In *The early medieval settlement remains from Flixborough, Lincolnshire: the occupation sequence, c.AD 600–1000*, ed. C. Loveluck and D. Atkinson, 17–23. Oxford: Oxbow Books.

Cremaschi, M., and L. Trombino. 1999. Forming processes in the Uan Afuda sequence. Palaeoenvironment and human activities: A micromorphological approach. In *The Uan Afuda Cave (Tadrart Acacus, Libyan Sahara) archaeological investigations of late Pleistocene and early Holocene human occupations*, Arid zone archaeology monograph, ed. S. Di Lernia, vol. 1, 27–38. Edizioni all'Insegna del Giglio: Rome.

Cunliffe, B., and C. Poole. 2008. *Grateley South, Grateley, Hants, 1998 and 1999*, Oxford University School of Archaeology Monograph. Vol. 71. Oxford: English Heritage and Oxford University School of Archaeology.

Dollimore, D. 1987. The thermal decomposition of oxalates. A review. *Thermochimica Acta* 117: 331–363.

Folk, R.L. 1973. The geological framework of Stobi. In *Studies in the antiquities of Stobi*, ed. J. Wiseman, vol. 1, 37–57. Austin: University of Texas and National Museum of Titov Veles.

Folk, R.L., and G.K. Hoops. 1982. An early Iron-age layer of glass made from plants at Tel Yin'am, Israel. *Journal of Field Archaeology* 9: 455–456.

Frost, R.L., and M.L. Weier. 2003. Thermal treatment of weddellite – A Raman and infrared emission

spectroscopic study. *Thermochimica Acta* 406: 221–232.
Frost, R.L., and M.L. Weier. 2004. Thermal treatment of whewellite – A thermal analysis and Raman spectroscopic study. *Thermochimica Acta* 409: 79–85.
Karkanas, P., O. Bar-Yosef, P. Goldberg, and S. Weiner. 2000. Diagenesis in prehistoric caves: The use of minerals that form in situ to assess the completeness of the archaeological record. *Journal of Archaeological Science* 27: 915–929.
Leach, B. 1940. *A potter's book*. London: Faber and Faber.
Lemonnier, P. 1984. La production de sel végétale chez les Anga (Papousaie Novelle-Guinée). *Journal d'Agriculture Traditionelle et de Botanique Appliquée* 31: 71–126.
Portillo, M., and R.M. Albert. 2011. Husbandry practices and livestock dung at the Numidian site of Althiburos (el Médéina, Kef Governorate, northern Tunisia): The phytolith and spherulite evidence. *Journal of Archaeological Science* 38: 3224–3233.
Regev, L., K.M. Poduska, L. Addadi, S. Weiner, and E. Boaretto. 2010. Distinguishing between calcites formed by different mechanisms using infrared spectrometry: Archaeological applications. *Journal of Archaeological Science* 37: 3022–3029.
Regev, L., E. Eckmeier, E. Mintz, S. Weiner, and E. Boaretto. 2011. Radiocarbon concentrations of wood ash calcite: Potential for dating. *Radiocarbon* 53: 117–127.
Robinson, M., and V. Straker. 1991. Silica skeletons and macroscopic plant remains from ash. In *New light on early farming; recent developments in palaeoethnobotany*, ed. J. Renfrew, 3–13. Edinburgh: Edinburgh University Press.
Rogers, P. 1991. *Ash glazes*. London: A. & C. Black.
Shahack-Gross, R., and I. Finkelstein. 2008. Subsistence practices in an arid environment: A geoarchaeological investigation in an Iron Age site, the Negev Highlands, Israel. *Journal of Archaeological Science* 35: 965–982.
Shahack-Gross, R., and A. Ayalon. 2012. Stable carbon and oxygen isotopic compositions of wood ash: An experimental study with archaeological implications. *Journal of Archaeological Science*. https://doi.org/10.1016/j.jas.2012.06.036.
Shahack-Gross, R., A. Ayalon, P. Goldberg, Y. Goren, B. Ofek, R. Rabinovich, and E. Hovers. 2008. Formation processes of cemented features in karstic cave sites revealed using stable oxygen and carbon isotopic analyses: A case study at Middle Paleolithic Amud Cave, Israel. *Geoarchaeology* 23: 43–62.
Stiner, M.C., S. Kuhn, T.A. Surovell, P. Goldberg, L. Meignen, S. Weiner, and O. Bar-Yosef. 2001. Bone preservation in Hayonim Cave (Israel): A macroscopic and mineralogical study. *Journal of Archaeological Science* 28: 643–659.
Thy, P., A.K. Segobye, and D.W. Ming. 1995. Implications of prehistoric glassy biomass slag from east-central Botswana. *Journal of Archaeological Science* 22: 629–637.
Turner, W.E.S. 1956. Studies of ancient glass and glass-making processes. Part V. Raw materials and melting processes. *Journal of the Society of Glass Technology* 40: 277–300.
Zeuner, F.E. 1959. On the origin of the cinder mounds of the Bellary district, India. *Bulletin of the Institute of Archaeology, University of London* 2: 37–44.

Further Readings

Franceschi, V.R., and P. Nakata. 2005. Calcium oxalate in plants: Formation and function. *Annual Review of Plant Biology* 56: 41–71.

Ashby, Thomas

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Basic Biographical Information

Thomas Ashby (1874–1931) was an archaeologist who specialized in the study of the topography of ancient Rome and its hinterland, the campagna romana. Born on October 14, 1874, he was the only child of Thomas and Rose Ashby, Quakers who owned a brewery in Staines, Middlesex. After Winchester College, Ashby won a scholarship to Christ Church, Oxford, studying ancient history, classics, and archaeology with Francis John Haverfield and J.L. Myres. He pursued a doctorate on Roman antiquities, exploring the hinterland of Rome in the company of the British and American Archaeological Society of Rome which included his father as well as the distinguished Italian archaeologist, Rodolfo Lanciani (1845–1929). He died while on a visit to London on May 15, 1931.

Major Accomplishments

In 1902, he became the first student of the British School at Rome, continuing this institutional association when he became the school's assistant

director (1903–1906) and then its third and most distinguished director from 1906 to 1925. During his directorship, with Eugénie Strong as his assistant director from 1909 to 1925, he established the school as an academic force in Italy, overseeing the move to the present location in the Valle Giulia and winning critical operational support from the British government's newly founded British Academy in 1919. In 1924, the school's executive committee decided not to renew either Ashby or Strong after 1925 to the dismay of the academic community in Rome. Thereafter, Ashby, who had married May Price-Williams in 1922, moved to a small apartment in Rome, where he lived until his death in 1931.

Ashby was primarily a topographer of Rome and its hinterland during the Roman period. As an avid photographer and walker, he followed the Roman roads and aqueducts out of the ancient metropolis, mapping them as he did. He was also a serious bibliophile, assembling a significant library of post-Renaissance books about Rome and its hinterland. The most important of a prodigious number of publications included many essays and reports on the monuments in the campagna romana, which later formed the nucleus of his popular book, *The Roman Campagna in Classical Times* (Ashby 1927), and his encyclopedic, posthumous masterpiece, *The Aqueducts of Ancient Rome* (Ashby 1935). He also published important studies of metropolitan Rome such as a revision of Samuel B. Platner's *A Topographical Dictionary of Rome* (Platner and Ashby 1929) and *Turner's Visions of Rome* (Ashby 1925).

Ashby's interests were not confined to antiquity. This energetic scholar also studied Sardinian nuraghi and the prehistoric megalithic tombs of Malta and Gozo and wrote an ethnographic study on Italian life and folklore: *Some Italian Scenes and Festivals* (Ashby 1929). His collection of photographs, besides his archive of notes, remains an important source for the study of Italy before mechanized agriculture and of Rome as it was being made into a capital city. Deeply respected by his Italian contemporaries, this shy and serious scholar established a benchmark for topographic fieldwork in Italy that was not surpassed until the 1960s.

Cross-References

- ▶ Infrastructure in the Roman World: Roads and Aqueducts
- ▶ Topography of Rome

References

Ashby, T. 1927. *The Roman Campagna in classical times*. London: Benn.

Ashby, T. 1925. *Turner's visions of Rome*. London: Halton and Truscott Smith.

Ashby, T. 1929. *Some Italian scenes and festivals*. London: Methuen & Co.

Ashby, T. 1935. *The aqueducts of ancient Rome*. Oxford: Clarendon Press.

Platner, S.B., and T. Ashby. 1929. *A topographical dictionary of Rome*. Oxford: Oxford University Press.

Further Reading

Hodges, R. 2000. *Visions of Rome: Thomas Ashby, archaeologist*. London: British School at Rome.

Smith, A.H. 1931. Thomas Ashby, 1874–1931. *Proceedings of the British Academy* 17: 515–541.

Wiseman, T.P. 1990. *A short history of the British School at Rome*. London: British School at Rome.

Ashmore, Wendy

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Basic Biographical Information

Archaeologist, anthropologist, and mentor, Wendy Ashmore was born on June 26, 1948 in Los Angeles, California. In the 1950s, at the height of McCarthyism, her family moved to Mexico City for a year. The experience fueled her interest in Mesoamerican studies. Educated at the University of California, Los Angeles (B.A. in Anthropology, 1969), and University of Pennsylvania (Ph.D. in Anthropology, 1981), she taught at Rutgers (1981–1992) and the University of Pennsylvania (1992–2000) before joining the

Ashmore, Wendy, Fig. 1 Wendy Ashmore. (Photo by Amy Goldenberg)

faculty at the University of California, Riverside. She has carried out archaeological investigations of ancient Maya and neighboring Mesoamerican peoples in Guatemala (Quiriguá), Honduras (Gualjoquito, Copan), and Belize (Xunantunich). Notable in its appreciation for the significance of empirical data and their relationship with theory and practice, Ashmore's research led successively over the years to new ways of thinking about settlement patterns, the significance of households, civic planning, and their linkages with landscapes, cosmology, and gender. Paramount across all of these is the social use and understanding of space. By exposing the social contours of archaeological spaces, Ashmore's work led the way for nuanced studies of the diverse peoples that make up any past society (Fig. 1).

Major Accomplishments

Ashmore's initial research at Quiriguá (1975–1979) and Gualjoquito (1983–1986), the later codirected with Edward Schortman and Patricia Urban, were among the first studies of prehistoric settlements and households. Examining a 96 km^2 area adjoining and in the periphery of the Maya center of Quiriguá, Ashmore (1979, 2007) identified the varied lives of Quiriguá residents and how these resonated with broader social and political dynamics.

Ashmore's pioneering research in settlement and household archaeology in the 1970s and 1980s helped elevate these studies to their now central position in archaeology. In two seminal volumes, *Lowland Maya Settlement Patterns* (1981) and *Household and Community in the Mesoamerican Past* (1988, coedited with Richard Wilk), she and her colleagues synthesized past research, defined relevant social constructs and their archaeological correlates, and suggested fruitful avenues for future scholarship. These volumes remain defining statements; they set the stage for the post-1980s explosion of settlement and household studies in Mesoamerica and beyond that allowed archaeologists to expose the lives of the full range of people in ancient societies.

Archaeological theory in the 1990s was framed by a strong dichotomy. In broad brushstrokes, American processual archaeology, espousing a scientific epistemology grounded in cultural materialism, neoevolutionism, and cultural ecology, was contrasted with European postprocessual archaeology, which favored historical explanations, employing hermeneutic and critical epistemologies to understand symbolic and ideological aspects of past societies. Ashmore's research played an important role in bridging these two poles. By critically thinking through the concept of social process – a concept with roots in processual archaeology – Ashmore was able to show how the archaeological record was simultaneously material and conceptual and part of an ongoing construction of its inhabitants in a manner that was convincing to processualists and postprocessualists.

Ashmore's Copan North Group Project (1988–1989) was pivotal in crystallizing such an approach. Through detailed excavation and analysis of architecture, iconography, artifacts, and burials at Copan's North Group, she demonstrated

that the Classic Maya expressed ideational beliefs through material and spatial forms that were accessible to archaeologists. In her groundbreaking article "Site Planning Principles and Concepts of Directionality among the Ancient Maya" (1991) and in many subsequent articles and book chapters in English and Spanish, Ashmore's work in spatial archaeology has shown that how people organize and conceptualize space, shapes and is shaped by society and social action (e.g., Ashmore 1998; Ashmore and Sabloff 2002).

This larger project led to another field defining work: *Archaeologies of Landscape* (1999, coedited with Bernard Knapp), a volume in which themes that Ashmore previously developed within Mesoamerican archaeology were applied to studies from around the world. Later, Ashmore (2006) brought landscape archaeology into productive concert with gender studies by illustrating how gender and landscapes can be co-constituting.

Bringing together previous interests, as the Archaeology Division of the American Anthropological Association's Distinguished Lecturer in 2000, she developed an approach to socializing the spaces of the archaeological record demonstrating how spaces, places, and landscapes are cultural domains that are lived and experienced differently by people across their lives. This lecture "'Decisions and Dispositions': Socializing Spatial Archaeology" later published in *American Anthropologist* (2002) illustrated that by socializing spatial analysis, archaeologists could reveal people's materialized "decisions and dispositions" throughout the life histories of the places they study.

Her long-standing interest in invigorating, rather than silencing, the varied voices in archaeological thought came together in an edited volume *Voices in American Archaeology* (2010, coedited with Dorothy Lippert and Barbara Mills). This volume brought into dialogue diverse voices of the discipline to consider the political and professional implications of archaeology and its future.

For Ashmore, research and scholarship always entailed pedagogy and mentorship. Prominently seen in the Xunantunich Archaeological Project (1991–1997), codirected with Richard Leventhal, she developed research as a vehicle for her students. Through regional settlement, household, and community survey and excavation in the environs of the polity capital of Xunantunich, Ashmore and her students explored the social, political, and ideational underpinnings of life in the region as Xunantunich rose and fell (e.g., Ashmore 2010).

Respected as a teacher and colleague, Ashmore has received numerous teaching and service awards. Her role as a mentor extends beyond her students and colleagues to a broader arena through two textbooks – *Discovering our Past* and *Archaeology* – used in classrooms national and internationally (Sharer and Ashmore 2003; Ashmore and Sharer 2010). The former has been translated into Chinese and Polish.

Since the 1970s, Ashmore has employed theoretically sophisticated methodologies and problem formulations to provide increasingly textured interpretations and understandings of the evidence, the society, and even the methodology itself. Throughout her career, she has defined significant new fields of archaeology from settlement and household to landscape studies and reformulated fieldwork to expose the peripheries of sites and explore ideational domains. These contributions have been accompanied by increasingly nuanced interpretations and understandings of the diverse and changing social structures of Mesoamerican societies. Her work influenced even her critics due to its considerable attention to empirical evidence.

Cross-References

- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Landscape Archaeology
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mesoamerica: Complex Society Development

References

Ashmore, W. 1979. *Quiriguá reports, Volume I*, Museum monograph, vol. 37. Philadelphia: University of Pennsylvania Museum.

Ashmore, W. 1981. *Lowland Maya settlement patterns*. Albuquerque: University of New Mexico Press.

Ashmore, W. 1991. Site planning principles and concepts of directionality among the ancient Maya. *Latin American Antiquity* 2: 199–226.

Ashmore, W. 1998. Monumentos políticos: sitios, asentamiento, y paisaje alrededor de Xunantunich, Belice. In *Anatomia de una civilización: aproximaciones interdisciplinarias a la cultura Maya*, ed. A. Ciudad Ruiz, Y. Fernández Marquínez, J.M. García Campillo, M.J. Iglesias Ponce de León, A.L. García-Gallo, and L.T. Sanz Castro, 161–183. Madrid: Sociedad Española de Estudios Mayas.

Ashmore, W. 2002. Decisions and dispositions: Socializing spatial archaeology. *American Anthropologist* 104: 1172–1183.

Ashmore, W. 2006. Gender and landscapes. In *The handbook of gender in archaeology*, ed. S.M. Nelson, 199–218. Walnut Creek: Altamira Press.

Ashmore, W. 2007. *Settlement archaeology at Quiriguá, Guatemala. Quiriguá Reports, Volume IV*, Museum monograph, vol. 126. Philadelphia: University of Pennsylvania Museum.

Ashmore, W. 2010. Antecedents, allies, antagonists: Xunantunich and its neighbors. In *Provincial politics: The rise and fall of Xunantunich*, ed. L.J. LeCount and J. Yaeger, 46–64. Tucson: University of Arizona Press.

Ashmore, W., and A.B.. Knapp. 1999. *Archaeologies of landscape: Contemporary perspectives*. Oxford: Blackwell Publishers.

Ashmore, W., and J.A. Sabloff. 2002. Spatial order in Maya civic plans. *Latin American Antiquity* 13: 201–215.

Ashmore, W., and R.J. Sharer. 2010. *Discovering our past: A brief introduction to archaeology*, 5th rev ed. New York: McGraw-Hill.

Ashmore, W., D. Lippert, and B.J. Mills. 2010. *Voices in American archaeology*. Washington, DC: Society for American Archaeology Press.

Sharer, R.J., and W. Ashmore. 2003. *Archaeology: Discovering our past*, 3rd rev. ed. New York: McGraw-Hill.

Wilk, R.R., and W. Ashmore. 1988. *Household and community in the Mesoamerican past*. Albuquerque: University of New Mexico Press.

Further Reading

Lecount, L.J., and J. Yaeger. 2010. *Provincial politics: The rise and fall of Xunantunich*. Tucson: University of Arizona Press.

Asian Paleolithic Association (APA)

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Basic Information

The Asian Paleolithic Association (APA) is an international organization which aims at promoting and enhancing the academic communication of Paleolithic Archaeological and Paleoanthropological research in Asia. In 2007, an agreement was made by the representatives from Russia, China, Japan, and Korea, which addressed the establishment of an association on Paleolithic research in Asia and the adjacent area. The title *Asian Paleolithic Association* was for the first time proposed in this agreement. In June of 2008, during the *International Symposium Commemorating the Centennial Anniversary of Academician A.P. Okladnikov – The Current Issues of Paleolithic Studies in Asia and Contiguous Regions*, held in Novosibirsk of Russia, scholars from Russia, China, Japan, Korea, North America, and European countries reached an agreement of officially setting up this organization. This meeting was thus proposed as the inaugural conference and the first annual meeting of APA.

Each member country of the APA, referring to Russia, China, Japan, and Korea, keeps an independent, equal, and reciprocal relationship. The annual meeting is held in these four countries, in turn, each year or 2 years. There is no independent secretariat system; however, each country will serve two representatives who would be in charge of the task force for the preparation process for the annual meeting.

In October 19–23, 2009, the second annual meeting *International Symposium on Paleoanthropology in Commemoration of the 80th Anniversary of the Discovery of the First Skull of*

Peking Man was held in Beijing, China. In October 10–15, 2010, the third annual meeting was held in Gongju, Korea. In November 25–30, 2011, the fourth annual meeting *Symposium on the Emergence and Diversity of Modern Human Behavior in Palaeolithic Asia* was held in Tokyo, Japan. And in 2012, the fifth annual meeting was held in Russia.

In June 26–30, 2013, the sixth annual meeting was held in Yinchuan, China, and in November 12–14, 2014, the seventh annual meeting was held in Kongju, South Korea. In June 24–28, 2016, the eighth annual meeting was held in Tokyo, Japan.

Major Impact

This organization is young but flourishing. Since its naissance, the research and the academic communication of Paleolithic archaeology in Asia has been strongly activated. During the past four annual meetings, representatives have presented various topics including the origin of early *Homo*, the origin of modern humans, the migration of early *Homo* and early modern humans, and the varieties and communication of different Paleolithic complexes, lithic analyses, taphonomy and zooarchaeology in prehistoric contexts, paleoanthropology, paleoenvironmental archaeology, and so forth. More technologies and scientific methods have been applied in these fields and brought more clues and evidence for archaeology in Asia. APA would behave as the driving and cohesive force and continue to promote and enhance these research fields in the future.

Cross-References

- ▶ East Asia: Paleolithic
- ▶ Human Evolution: Theory and Progress
- ▶ Lithic Technology, Paleolithic
- ▶ South Asia: Paleolithic

Askarov, Akhmadali A.

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Basic Biographical Information

Askarov Akhmadali Askarovich (born in 1935) (Fig. 1) is an academic with the Academy of Science of Uzbekistan, a doctor of historical sciences, and a professor in ancient history of Central Asia. He is an organizer of archaeological science in Uzbekistan.

After graduating from the historical faculty at the State Pedagogical Institute in Tashkent in 1957, A.A. Askarov worked as a teacher in the middle school. From 1958 to 1961, he studied at the postgraduate school in Leningrad's Department of the Institute of Archaeology, under the scientific

Askarov, Akhmadali A., Fig. 1 A.A. Askarov

supervisor of Professor M.P. Gryaznov. In 1963 he defended a thesis on the theme "Lower Reaches of Zeravshan River in Bronze Age." In 1977 he was awarded the degree of doctor of historical sciences for the thesis "Bronze Age of Southern Uzbekistan: to the Problem of Development of Local Centres of Ancient-Eastern Civilizations."

A.A. Askarov has been a scientific fellow since 1961. Since 1966 he has been deputy of director of Institute of History and Archaeology of Uzbekistan USSR and since 1970 director of the Institute of Archaeology of Uzbekistan.

Major Accomplishments

The scientific interests of A.A. Askarov have focused on prehistorical archaeology – the histories of ancient tribes of Bronze and Early Iron times. Askarov has participated actively in works of significant large expeditions (Baikal, Krasnoyarsk, Makhandarian, Sud-Turkmenistan), led by such famous Russian scientists as M.P. Gryaznov, Y.G. Gulyamov, and V.M. Masson. A.A. Askarov has led the Surkhandarya Complex Expedition since 1970.

A.A. Askarov has made an enormous contribution to research into the history and spiritual culture of the ancient steppe tribes of Southern Asia. He has elaborated an archaeological periodization for development of the steppe tribes's cultures of Bronze and Early Iron times for Lower Reaches of Zeravshan River. In addition, he has reconstructed the whole history of tribes and settlements for this region in the second millennium BCE.

A.A. Askarov has been conducting significant researches in Uzbekistan for about 40 years. His achievements are well recognized in the study of proto-urban civilization, the genesis of urbanization, the transformation of primitive-communal cultures, and the formation of an early-class society through the archaeological materials. He has prepared and published more than 300 works, including 12 monographs and 2 tutorial books. A number of these works were published abroad. One of the monographs is dedicated to the ancient agricultural civilization of Southern Uzbekistan "Kuchuk-Tepe" and was presented to the world by the publishing house of Institute of Archaeology in Berlin. Askarov is one of the authors of the six-volume *History of Civilization of Central Asia*, produced by UNESCO. Under his editing, 13 volumes of the series *History of Material Culture of Uzbekistan*, 10 monographs, and numerous of booklets in Uzbek language were published.

For many years, A.A. Askarov conducted stationary excavations and planigraphical investigations of monuments of antiquity in Uzbekistan. Thanks to his field studies and discoveries, the existence of an earlier unknown South Uzbekistan center of Ancient Bactrian Civilization was proved. The Ancient Bactrian Centre was uncovered and comprehensively characterized by Askarov. Based on his scrutiny of the Sapalli Culture sites (Sapallitepa and Djarkutan sites), he defined a historical place of these objects in the cultural system of Ancient East and in wide context of intercultural relations of neighboring cultures and civilizations.

Askarov's unique discoveries have important historical meaning, including him finding of silk, bast, and cotton tissues in burials of Sepallitepa. This contributed to proving that the production of natural cotton and silk in Uzbekistan was started in the Bronze Age. He was one of the first who raised the question that the territory of Uzbekistan may have been one of the homelands of silk weaving and cotton weaving.

Askarov's discovery of the cult center – the Temple of Fire in Djarkutan – provided important evidence on the genesis of a Zoroastrian ideology during the late Bronze Age. Research into this unique complex provided an opportunity to track sources of Zoroastrian doctrine and to obtain new dates (second half of second millennium BCE) for the appearance of the cult of fire in the history of Zoroastrianism.

The history of irrigated agriculture in Uzbekistan has become more ancient by a thousand years due to the rich archaeological material uncovered in long-term field investigations by A.A. Askarov. The great merit of Askarov's investigations lies with his research into the culture of late molding painted pottery. His study demonstrated that the carriers of this tradition were local tribes of the

end of the second and beginning of the first millennium BCE. These tribes were transitioning to agriculture under the influence of more developed ancient urbanistic and agricultural communities of the south.

The numerous archaeological discoveries were done thanks to Askarov; his publications have been recognized with world scientific community as significant contributions in study of early history of Central Asian Civilizations. The results of these researches are widely used not only as theoretical works but have entered into the scientific and pedagogical programs of universities.

Askarov also suggested a new conception of the ethnogenesis of the Uzbek people, according to which the historical formation of the Uzbek people as a people took place on the basis of centuries-old, mutual ethnic assimilation of the indigenous Turkic, Sogdian, Khorezm, and Bactrian tribes and peoples of Central Asia in the territory of modern Uzbekistan and its environs.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Gryaznov, Mikhail P.
- ▶ Masson, Vadim M.
- ▶ Sarianidi, Victor I.

References

Askarov, A.A. 1966. *Andronovo culture near the Zerafshan river (Contributions to the Archaeology of the Soviet Union with special emphasis on Central Asia, the Caucases and Armenia III, 1)*. Cambridge, MA: Peabody Museum.

Askarov, A.A. 1973a. *Sapallitepa*. Tashkent: FAN.

Askarov, A.A. 1973b. *Drevnezemledel'cheskaya kultura epokhi bronzy yuga Uzbekistana [Ancient agricultural culture of Bronze Age in southern Uzbekistan]*. Tashkent: FAN.

Askarov, A.A. 1982. *Kuchuk-Tepe (Beiträge zur allgemeinen und vergleichenden Archäologie. Sonderdruck 4)*. Bonn: Deutsches Archäologisches Institut, Kommission für Archäologie Außereuropäischer Kulturen (KAAK).

Askarov, A.A. 1999. *Pastoral and nomadic tribes at the beginning of the first millennium B.C.*, History of Civilizations of Central Asia 20. Delhi.

Askarov, A.A. 2001. Les origines de I ancienne culture de la Bactriane. In *La Bactriane au carrefour des routes et des civilisations de I Asie central*. Paris.

Askarov, A.A. 2015. *Istoria proiskhozhdeniya uzbekskogo naroda (History of genesis of Uzbek people, published in Uzbek language)*, 675. Tashkent: O'zbekiston.

Askarov, A.A., and V.I. Ionesov. 1991. *Zhertvoprinosheniya zhivotnykh v pogrebal'noi praktike osedlykh zemledel'tsev Drevney Baktrii [Sacrifice of animals in mortuary practice of settled farmers in ancient Bactria]*, Istoria Material'noy Kultury Uzbekistana 25, 22–33. Tashkent: IMKU.

Askarov, A., and T. Shirinov. 1988. *Le Temple du feu de Dzarkutan. Histoire et cultes de L'Asie Centrale preislamique. Colloque*. Paris: UNESCO.

Assemblage Thinking

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Introduction

Assemblage thinking is a concept that originally derived from the work of French philosophers Giles Deleuze and Félix Guattari in their book *A Thousand Plateaus: Capitalism and Schizophrenia* (1980). This concept has been further developed and applied within the fields of social sciences by Bruno Latour and political sciences by Manuel DeLanda; however, these applications depart from Deleuze and Guttari's original concept, which derives from the French word "agencement" – a noun that means an arrangement or layout and has greater semantic depth than the English term "assemblage." Despite this, the application of assemblage thinking within the archaeological discipline has drawn upon a mixture of Latour's and DeLanda's rendering of the concept, which has been applied to form the field of symmetrical archaeology.

Definition

Assemblage thinking provides a means to describe and understand the relationship between the heterogeneous actors that form particular social assemblages or societies. Heterogeneous actors comprise "(all) those enormously varied physical entities we refer to as 'material culture', [and] are beings in the world alongside other beings such as humans, plants, and animals" (Olsen 2012: 212). Actors include texts, equipment, practices, and organizations, as well as less tangible entities such as decisions, ideas, concepts, and metaphors (Harman 2007: 36; Olsen 2007: 582). Therefore,

> everything that exists must be regarded as an [actor]. . .We cannot begin by splitting actants into zones of animate and inanimate, human and non-human, or subject and object. Every entity is something in its own right, and every entity becomes involved in associations, love affairs, and duels with many others (Harman 2007: 36).

In Latour's (2005) manifesto, *Reassembling the Social: An Introduction to Actor-Network Theory*, assemblage is used as a metaphor to understand agency between heterogeneous actors that comprise social assemblages (or networks). For Latour (2005) the agency of actors is possessed in connections between actors rather than in actors themselves, with agency relative to and distributed via the assemblage or network within which they are situated. Therefore, actors work together to form an assemblage and exercise agency via said assemblage; without the assemblage, an actor has no agency (Harman 2007: 43).

On the other hand, DeLanda's (2006) social philosophy, *A New Philosophy of Society: Assemblage Theory and Social Complexity*, posits the heterogeneous actors that comprise social assemblages both have material and expressive intrinsic qualities independent of their relationship with other actors. For DeLanda (2006: 18–19), an actor has the ability to influence, stabilize or destabilize particular assemblages, regardless of whether such actors are connected to or remain outside a given assemblage.

While Latour (2005) and many of his of Science and Technology Studies (STS) contemporaries have drawn upon assemblage thinking in the development of Actor-Network Theory (ANT) to study the sociology of scientific knowledge production, DeLanda (2006) has applied assemblage thinking in order to provide an alternative account for the historical formation of institutions, governments, cities, nations, modes of production, and capitalism.

Key Issues/Current Debates/Future Directions/Examples

While the term assemblage has a long history of use in archaeology as a classificatory term to describe a group of artifacts, the renewed interest in assemblage as a metaphor within the archaeological discipline is influenced by the recent "material turn" within the social sciences and humanities; however, Hamilakis and Jones (2017: 80) argue: ". . .our growing fascination with the concept has to do, to a large extent, with our familiarity with archaeological assemblages, with the primacy that this word holds on our collective disciplinary imagination."

The development of symmetrical archaeology has been a pivotal field in this renewed interest. Symmetrical archaeology seeks to apply the ANT concept of *symmetry* in order to draw attention to the often marginalized or silenced agency of non-humans, which has been concealed by the creation of modern thought that emerged during the Enlightment. During this period French philosopher René Descartes asserted the human mind was active and separate from all other non-human matter, promoting an anthropocentric understanding of our modern existence that resulted in a dichotomy or disentanglement between humans and nonhumans. This anthropocentric understanding resulted in the assumption that the primacy of agency rests with humans, with nonhumans misrepresented "(as) inert, stable, and ultimately entirely vulnerable to human action and conception" (Knappet 2012: 194).

In contrast, the premise of symmetrical archaeology considers the status and agency of humans and nonhumans as symmetrical. Under a

symmetrical rhetoric, nonhumans are not passive, inert, or inanimate but are actors with the capacity to act alongside human actors. Thus, the concept of symmetry seeks to promote the equal agency of human and nonhuman actors in order to create a "flat ontology," which treats all human and nonhuman democratically and moves away from an anthropocentric view of agency.

In applying this concept, symmetrical archaeology argues the archaeological discipline produces anthropocentric histories that emphasize the "Indian [sic] behind the artefact" (Braidwood 1958: 734), but have failed to recognize the agency of nonhumans or things. In essence, things have been forgotten. For example, key practitioner of symmetrical archaeology Bjørnar Olsen (2007: 580, 582) believes the archaeological discipline and the histories it produces have kept things at arm's length:

> (what) we see is basically a prolonged asymmetry, in which things continue to be treated as secondary or epiphenomenal to some cultural or social 'first instance'. . .[where] the material inhabitants were plastic and receptive, sitting in silence waiting to be embodied with cultural significance.

Alternatively, symmetrical archaeology can offer a distinct and reconceptualized focus on things, where the metaphor of an assemblage is used to better understand the agency of things. For example, things make a difference, not just because of their agency and ability act, but because of the mutually constitutive connection that exists between human and nonhuman actors as part of an assemblage or network (Latour 2005). A symmetrical approach seeks to consider the connections or entanglements that exist between humans and nonhumans that have been misrepresented and oversimplified by modern thought. In doing so, proponents of symmetrical archaeology argue being sensitive to these entanglements can result in far more complex archaeological interpretations (Olsen et al. 2012: 14).

While this emphasis on agency existing in the connections between humans and nonhumans draws upon the Latourian strand of assemblage thinking, Olsen (2012: 219) maintains nonhumans have a distinct "thingness" or "thingly quality" that also aligns symmetrical archaeology with DeLanda's rendering of this thinking. In applying these renderings, the key criticisms of symmetrical archaeology – which are also the key criticisms of ANT – relate to its emphasis on the equal agency of human and nonhuman actors and its "flat ontology." Critics claim this democratic approach does not account for or challenge preexisting systems of asymmetrical power and authority or inequality (Amsterdamska 1990; Restivo 2005; Whittle and Spicer 2008). Despite this, ANT understands hegemonic systems of power and authority as a product or effect of preexisting assemblages; assemblages that ANT seeks to describe and understand (Latour 2005: 64).

Building upon the development of symmetrical archaeology, Ian Hodder's (2012) *Entangled: An Archaeology of the Relationships Between Humans and Things* also draws upon the assemblage metaphor to explore the spatial and temporal relationships between humans and nonhumans. In doing so, Hodder (2012: 91–94) initially explores the concept of ANT but soon rejects it on the basis of its symmetry and instead favors the concept of entanglement to convey the dependence that exists between human and nonhumans; in essence, humans and nonhumans are dependent on and affect each other as a result of their entanglement. Drawing on DeLanda's rendering of assemblage thinking, Hodder (2012: 95) also emphasizes the contingent material properties of nonhumans, which not only contribute to their entanglement with humans but also allows for their archaeological study through time. In doing so, Hodder uses examples from his long-term research at Çatalhöyük in Turkey in order to demonstrate such entanglement. Employing the use of a "tanglegram," Hodder (2012: 67) demonstrates how the use of clay as a physical property to produce house bricks resulted in environmental change that in-turn produced change in subsistence behaviors. As a result of their dependence on clay, the population at Çatalhöyük became entrapped into an entangled relationship with this resource that produced new entanglements with their environment. In short, Hodder (2012: 171) argues human populations are destined to depend further on non-humans, becoming entrapped into an irreversible, evolving

relationship of progression that leads to increased entanglement over time.

Taking the application of assemblage thinking one step further, Rodney Harrison (2011) provides a philosophical discussion to address a different dichtomy that emerged as a result of the Enlightment: the dichtomy between past and present. This dichtomy – which is also discussed at length by practitioners of symmetrical archaeology (see Olsen 2012; Olsen et al. 2012) – promotes a metaphorical understanding of archaeology-as-excavation, whereby archaeology is seen as a practice that discovers a hidden or buried past separate from the present. Harrison (2011: 155–157), however, argues this modernist conception of archaeology-as-excavation should be replaced with an alternative metaphor of archaeology-as-surface-survey, whereby the past and present exist on the same temporal plane or surface. In utilizing this metaphor, archaeological practice can be reconceptualized as a process of "assembling/reassembling" the past and present, where the past is an actor with agency in present that intervenes and forms part of the assemblage that comprises contemporary archaeological practice; or as Harrison (2011) describes it, an archaeology *in* and *of* the present.

More recently, Harrison (2015) has applied this philosophy more thoroughly to reconceptualize heritage as a concept that emerges from a process of assembling the past, present, and future, stating that:

> While heritage is produced as part of a conversation about what is valuable from the past, it can only ever be assembled in the present, in a state of looking toward, and an act of taking responsibility for, the future (Harrison 2015: 35).

Harrison (2015) argues that reconceptualizing heritage as an assemblage allows for a process of reassembling the practices responsible for its production, resulting in the production of new knowledges; or as Harrison (2015: 24, 28) refers to them, "new heritage ontologies," which enact new or alternative pasts, presents, and futures to privilege particular philosophies and economic, social, or political interests. Above all, Harrison (2015: 37) argues that describing, disassembling, and understanding the practices responsible for the production of heritage is the first step towards reassembling practice to allow for new or alternative heritage ontologies. This proposition has, however, been challenged more recently by Wiltshire (2017) who maintains this argument does not recognize the ongoing resistance, engagement, influence, and agency of Indigenous peoples in actively reassembling these disciplines, their practices, and the knowledges they produce.

Gavin Lucas (2012) and Chris Fowler (2013) have also sought to reconceptualize archaeological practice as an assemblage in order to address another persistent dichotomy: the dichotomy between archaeological theory and practice. Accordingly, Lucas (2012: 1) maintains particular archaeological practices remain accepted or normalized, informed by a positivist assumption that such practices represent an objective and linear process of data collection. Furthermore, Lucas (2012: 239) argues:

> . . .the process of translation that archaeologists routinely use today are so taken for granted that they appear obvious and unproblematic. . .we no longer need to worry about them how or why they work, we just use them. . .

This positivist assumption not only justifies the ongoing use of these practices, but ensures archaeological practice to remains sheltered from theoretical reflection. To address the persistent dichotomy between theory and practice, Lucas (2012) and Fowler (2013) reconceptualize archaeological practice as an assembling that comprises artifacts, people, and equipment, discussing the ways an archaeologist plays an active role in producing and shaping the nature of archaeological knowledge. In doing so, these authors seek to challenge the positivist assumption that knowledge production results purely from objective observations, in turn challenging the premise of theory-practice dichotomy.

Lastly, recent research by Hamilakis (2017) has sought to move away from the material, nonhuman focus emphasized by other applications of assemblage thinking within the archaeological discipline, to illuminate some of the agency of intangible sensorial, affective, and emotional actors that exist as part of an assemblage. In particular, Hamilakis (2017) discusses an archaeological feature in West Crete associated with a series of communal feasting

events, which he interrupts as a "sensorial assemblage" where affective memories evoked and produced play an important role in the assemblage that comprises large scale eating and drinking events. Similarly, recent research undertaken in southern Australia by Liebelt (2016) and Wiltshire (2017) has also sought to highlight some of the contemporary emotions that mediate the connection between people and archaeological traces. In particular, Liebelt (2016) explores non-Aboriginal people's emotional responses and attachment to Aboriginal heritage located on rural properties, whereas Wiltshire (2017) uses auto-ethnography to highlight emotions experienced as archaeologist that are usually obscured from linear accounts of archaeological practice.

Cross-References

- ▶ Actor Network Theory (ANT)
- ▶ Materiality in Archaeological Theory
- ▶ Symmetrical Archaeology

References

Amsterdamska, O. 1990. Surely, you must be joking, monsieur Latour! *Science, Technology and Human Values* 15: 495–504.

Braidwood, R. 1958. J. Vere Gordon Childe 1892–1957. *American Anthropologist* 60: 733–736.

Delanda, M. 2006. *A new philosophy of society: Assemblage theory and social complexity*. London: Bloomsbury.

Deleuze, G., and F. Guattari. 1980. *A thousand plateaus: Capitalism and schizophrenia*. Mineapolis: University of Minnesota Press.

Fowler, C. 2013. *The emergent past: A relational realist archaeology of early bronze age mortuary practices*. Oxford: Oxford University Press.

Hamilakis, Y. 2017. Sensorial assemblages: Affect, memory and temporality in assemblage thinking. *Cambridge Archaeological Journal* 27 (1): 169–182.

Hamilakis, Y., and A. Jones. 2017. Archaeology and assemblage. *Cambridge Archaeological Journal* 27 (1): 77–84.

Harman, G. 2007. The importance of Bruno Latour for philosophy. *Cultural Studies Review* 13 (1): 31–49.

Harrison, R. 2011. Surface assemblages: Towards an archaeology in and of the present. *Archaeological Dialogues* 18 (2): 141–161.

Harrison, R. 2015. Beyond "natural" and "cultural" heritage: Toward an ontological politics of the heritage in the age of the Anthropocene. *Heritage and Society* 8 (1): 24–42.

Hodder, I. 2012. *Entangled: An archaeology of the relationships between humans and things*. Oxford: Wiley-Blackwell.

Knappett, C. 2012. Materiality. In *Archaeological theory today*, ed. I. Hodder, 2nd ed., 188–207. Cambridge: Polity Press.

Latour, B. 2005. *Reassembling the social: An introduction to actor-network-theory*. Oxford: Oxford University Press.

Liebelt, B.G. 2016. Aboriginal occupation traces in agricultural assemblages, Yorke Peninsula/Guuranda, South Australia. Unpublished Ph.D. dissertation, University of Western Australa.

Lucas, G. 2012. *Understanding the archaeological record*. Cambridge: Cambridge University Press.

Olsen, B. 2007. Keeping things at arm's length: A genealogy of asymmetry. *World Archaeology* 39 (4): 579–588.

Olsen, B. 2012. Symmetrical archaeology. In *Archaeological theory today*, ed. I. Hodder, 2nd ed., 208–228. Cambridge: Polity.

Olsen, B., M. Shanks, T. Webmoor, and C. Witmore. 2012. *Archaeology: The discipline of things*. Berkeley: University of California Press.

Restivo, S. 2005. Politics of Latour. *Organization and Environment* 8 (1): 111–115.

Whittle, A., and A. Spicer. 2008. Is actor network theory critique? *Organization Studies* 29 (4): 611–629.

Wiltshire, K.D. 2017. All things are connected: An auto-ethnography of archaeological practice with and for the Ngarrindjeri nation. Unpublished Ph.D. dissertation, Flinders University.

Asses/Donkeys: Domestication

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Basic Species Information

Ancient African wild asses (*Equus africanus* Fitzinger, 1857) are the wild ancestors of donkeys (Beja-Pereira et al. 2004; Kimura et al. 2011). There are two living subspecies of African wild asses, Somali wild asses (*Equus africanus*

somaliensis Noack, 1884; Synonym: *E. a. somalicus* Sclater, 1884) and Nubian wild asses (*Equus africanus africanus* von Heuglin and Fitzinger, 1866). Somali wild asses or Dibokali are critically endangered (Moehlman et al. 2008). Nubian wild asses of Sudan and the Eritrean Red Sea Hills may now be extinct (Kimura et al. 2011; Moehlman et al. 2008). Atlas wild asses (taxonomy unclear so-called *Equus africanus atlanticus*) were distributed in northwestern Africa until Roman times.

Somali wild asses have shiny grayish coats; white muzzles, belly, and legs; and dark stripes on their lower legs. They do not have dark shoulder-crosses (Moehlman et al. 2008). In contrast, Nubian wild asses have variable shoulder-crosses and no leg-stripes. African rock art and Roman mosaics suggest that Atlas wild asses had both leg-stripes and shoulder-crosses (Marshall 2007). African wild asses are desert adapted, and in keeping with this, domestic donkeys have labile metabolic rates and water sparing mechanisms. Domestic donkeys are predominantly gray with a bold shoulder-cross and no leg-stripes. Although considerable regional variability exists, donkey coat colors are not greatly varied and breed diversity is minimal.

Genetic research has shown that there are two mitochondrial haplogroups of domestic donkeys worldwide, referred to as Clade I and Clade II, and that variability is greatest in northeastern Africa (Beja-Pereira et al. 2004). On the basis of these data, the distribution of ancient cattle herders across northeast Africa and linguistic evidence from northeast Africa, scholars have argued that Saharan pastoralists domesticated donkeys – perhaps more than once (Blench 2000; Beja-Pereira et al. 2004; Marshall 2007). Similarities in mitochondrial haplotypes demonstrate that the ancient Nubian wild ass is the ancestor of Clade I donkeys. Indeed, some of the haplotypes of historic Nubian wild asses sampled from the Sahara and Sudan are identical to those of modern donkeys of Clade I, suggesting that they may be related to the ancestral populations from which the wild ass was domesticated (Kimura et al. 2011). It is yet unclear, however, which historical population of African wild ass was the maternal ancestor of Clade II donkeys. Analysis of 440 bases of the mitochondrial control region showed that Somali wild asses are separated from Clade II donkeys by at least 12 mutations, and to date, ancient DNA has not been recovered from Atlas wild asses (Kimura et al. 2011). Coalescence analysis suggests, however, that the divergence among ancient Nubian wild asses, Somali wild asses, and the ancestor of Clade II donkeys goes back ~100,000 years and that maternal domestication processes were operating on at least two ancient populations or subspecies.

Domestic donkeys occur in archaeological sites as early as >5000 years ago in Southwestern Asia, and as a result, this has also been suggested as a region of domestication (Vila 2006). To date, however, there is no clear evidence that the African wild ass existed in southwestern Asia prior to the Holocene (Marshall 2007; Kimura et al. 2011). Nevertheless, Asia was an important center for ceremonial and trade-based use of donkeys (Vila 2006). Genetic data demonstrate that the wild ass of the region, the onager (*Equus hemionus*), was not an ancestor of the donkey (Beja-Pereira et al. 2004). Ancient texts and osteological analyses indicate, however, that Sumerians bred their donkeys with wild onagers and that these hybrids were used to pull chariots (Vila 2006; Weber 2008). Subsequently, female horses were bred with male donkeys to produce another hybrid – the mule. Mules are stronger than donkeys and still used today, but they are not fertile and do not produce offspring.

Domestication of the donkey was slow and complex. This process was influenced by the behavior of African wild asses and by use of donkeys for transport rather than for meat (Marshall and Weissbrod 2011). African wild asses do not fit traditional profiles for domestication; they have a fission-fusion social system with long-term bonds only between females and their foals (Moehlman et al. 2008; Marshall and Weissbrod 2011). Dibokali breed well in captivity but, in keeping with their social organization, display fewer affiliative behaviors than more

social equids such as horses. As a result of behavior and management patterns, donkeys in Africa and Asia are seldom intentionally bred (Marshall and Weissbrod 2011) and have many characteristics of their wild ancestors. Nevertheless, donkeys are more social than wild asses and breed younger. Like other domestic animals, donkeys are also smaller and have proportionally smaller brains than their wild ancestors. Donkeys did not decline in size, however, until late in the domestication process (Rossel et al. 2008).

Archaeology suggests that donkeys were domesticated by 6000–5000 years ago. Egyptian sites of Maadi and El Omari date to ~4500 BCE and Abydos to 3000 BCE. Domestic donkeys were present in southwest Asia by >3000 BCE (Vila 2006). At Abydos, animals buried in a royal mortuary complex were skeletally indistinguishable from African wild ass, but vertebral and limb pathologies demonstrated that they were used for transport (Rossel et al. 2008). Research on modern pastoralist donkey management has helped to explain selection during donkey domestication by showing that herders value donkeys with the size, strength, and hardiness of their wild ancestor (Marshall and Weissbrod 2011). There is little impetus for controlled breeding and reasons to counteract the effects of selection in anthropogenic environments and genetic drift by breeding domestic donkeys with wild asses. As transport animals, early donkeys played a major role in the creation of ancient trade routes in northeast Africa and Asia, were ritually and politically significant, and played an important role in the development of mobile African herding societies. Donkeys are widely relied on today for household transport and trade in arid and poorer regions of the world (Rossel et al. 2008).

Cross-References

- ▶ African Stone Age
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Animal Paleopathology
- ▶ Domestication: Definition and Overview
- ▶ East and Southern African Neolithic: Geography and Overview
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Horses: Domestication
- ▶ Zooarchaeology

References

Beja-Pereira, A., P.R. England, N. Ferrand, S. Jordan, A.O. Bakhiet, M.A. Abdalla, M. Mashkour, J. Jordana, P. Taberlet, and G. Luikart. 2004. African origins of the domestic donkey. *Science* 304: 1781.

Blench, R.M. 2000. A history of donkeys, wild asses and mules in Africa. In *The origins and development of African livestock: Archaeology, genetics, linguistics and ethnography*, ed. R.M. Blench and K.C. MacDonald, 339–354. London: UCL.

Kimura, B., F.B. Marshall, S. Chen, S. Rosenbom, P.D. Moehlman, N. Tuross, R.C. Sabin, J. Peters, B. Barich, H. Yohannes, F. Kebede, R. Teclai, A. Beja-Pereira, and C.J. Mulligan. 2011. Ancient DNA from Nubian and Somali wild ass provides insights into donkey ancestry and domestication. *Proceedings of the Royal Society Biological Sciences* 278: 50–57.

Marshall, F. 2007. African pastoral perspectives on domestication of the donkey. In *Rethinking agriculture; archaeological and ethnoarchaeological perspectives*, ed. T. Denham, J. Iriarte, and L. Vrydaghs, 371–407. Walnut Creek: Left Coast Press.

Marshall, F., and L. Weissbrod. 2011. Domestication processes and morphological change: Through the lens of the donkey and African pastoralism. *Current Anthropology* 52(S4). Available at: http://www.jstor.org/stable/id.1086/658389.pdf. Accessed 1 July 2011.

Moehlman, P.D., H. Yohannes, R. Teclai, and F. Kebede. 2008. Equus Africanus. IUCN2010 IUCN Red list of threatened species [2010.4]. 1 Sept 2011.

Rossel, S., F. Marshall, J. Peters, T. Pilgram, M.D. Adams, and D. O'Connor. 2008. Domestication of the donkey: Timing, processes, and indicators. *Proceedings of the National Academy of Sciences* 105: 3715–3720.

Vila, E. 2006. Data on equids from late fourth and third millennium sites in northern Syria. In *Equids in time and space: Papers in honour of Vera Eisenmann*, ed. M. Mashkour, 102–123. Oxford: Oxbow Books.

Weber, J.A. 2008. Elite equids: Redefining equid burials of the mid to late 3rd millennium BC from Umm el-Marra, Syria. In *Archaeoozoology of the Near East VIII*, ed. E. Vila, L. Gourichon, A. Choyke, and H. Buitenhuis, 499–520. Lyon: Maison de l'Orientet de la Mediterranee.

Association for Environmental Archaeology (AEA)

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Association for Environmental Archaeology (AEA), Fig. 1 Association for environmental archaeology logo

Basic Information

The Association for Environmental Archaeology (AEA) (www.envarch.net) (Fig. 1) is an international organization that promotes the study of human interactions with environments through archaeology and related disciplines. The AEA was originally established in 1979 to encourage communication between workers in environmental archaeology in the UK but has since become more international in its outlook – more than one-quarter of its approximately 400 members currently live outside the UK, mostly in Europe, but also USA, Canada, Asia, and Australia. Members' interests are wide ranging, including archaeobotany, zooarchaeology (both vertebrate and invertebrate), geoarchaeology, paleoecology, and biological anthropology, as well as related fields, such as ancient economies. Membership is open to all, including university, museum, government, and commercially based workers, as well as research students and nonprofessionals with an interest in environmental archaeology. In addition to individual membership, institutional membership is also available. Honorary members are appointed on occasion to recognize persons who have made a major contribution toward the aims of the Association.

Major Impact

The AEA is one of the largest organizations of environmental archaeologists in the world. A major output is its international peer-reviewed journal, *Environmental Archaeology: The Journal of Human Palaeoecology* (http://www.tandfonline.com/loi/yenv20). Four issues are currently published each year and sent to all members. The journal contains papers on a variety of aspects of environmental archaeology, including methodology, synthesis, and theory. The journal publishes substantial research papers and shorter reports, focusing on new techniques, philosophical discussions, current controversies, and suggestions for promising directions of research. Critical reviews of recent academic publications are also published in a book review section. Taylor and Francis took over publication of the journal in 2015; prior to this, the journal was published by Oxbow Books and Maney Publishing. The current AEA journal, *Environmental Archaeology*, was launched in 1997. The previous journal of the AEA was *Circaea*, of which 12 volumes were published between 1983 and 1996. All volumes of *Environmental Archaeology* and *Circaea* are currently available online to AEA members.

Two AEA conferences are held each year, which are open to all, and conference bursaries are available to members to enable attendance. The spring event is often a 1-day meeting, while the autumn event is usually a major conference. These meetings are designed to keep members up to date with recent advances and new approaches in environmental archaeology. Meeting locations in recent years include Britain, Denmark, Germany, Japan, Ireland, Italy, the Netherlands, and Poland. The 1-day meeting often includes short papers on work in progress and provides an opportunity for research students to present data. Papers presented at the annual conference are often more substantial and focused on a particular theme. In the past, conference proceedings have been published in monograph form, including

volumes on subsistence, specialization and surplus (Groot et al. 2013), environmental archaeology of industry (Murphy and Wiltshire 2002), human settlement and marginality (Coles and Mills 1998), taphonomy (Huntley and Stallibrass 2000), and economies and environments in the North Atlantic region (Housley and Coles 2004). Collections of papers from conferences have also appeared as special issues of the journal, for example, *Worlds Apart? Human Settlement and Biota of Islands* and *Environmental Archaeologies of Neolithisation*. The AEA organizes a seminar series, which sponsors and publicizes individual seminars at different institutions on any aspect of environmental archaeology. A Small Research Grants Scheme was established in 2015, and the AEA administers the "John Evans prize," an annual competition for the best undergraduate and postgraduate dissertations on any aspect of environmental archaeology, which is open to students across the world. An AEA Archaeological Society Membership Prize has also been established to recognize the contribution of local archaeological societies to environmental archaeology.

The AEA newsletter is published quarterly each year, and together with the website, they keep members informed about new research, relevant meetings and conferences, recent publications in environmental archaeology, job opportunities, and external websites and organizations. An AEA Discussion List (ENV-ARCH) has been established via JISC mail to encourage members from a variety of backgrounds to pose questions and discuss their work in a wider forum. The AEA has also published working papers on the teaching of environmental archaeology in UK higher education and on environmental archaeology and archaeological evaluations in England, which are available from the AEA website.

The affairs of the AEA are governed by its constitution and handled by an elected Management Committee, which consists of a Chair, Secretary, Treasurer, Membership Secretary, Journal Editor, Newsletter Editors, Conference Officer, Publicity Officer, Website Officer, Prize Administrator, Bookclub Administrator, Grant Administrators, Student Representatives, and Ordinary Members.

A

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Archaeobotany
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Environmental Archaeology and Conservation
- ▶ Geometric Morphometrics and Environmental Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data
- ▶ Strategic Environmental Archaeology Database (SEAD)
- ▶ Zooarchaeology

References

Coles, G., and C. Mills, eds. 1998. *Life on the edge: Human settlement and marginality (Symposia of the Association for Environmental Archaeology 13)*. Oxford: Oxbow Books.

Groot, M., D. Lentjes, and J. Zeiler, eds. 2013. *Barely surviving or more than enough? The environmental archaeology of subsistence, specialisation and surplus food production*. Leiden: Sidestone Press.

Housley, R.A., and G. Coles, eds. 2004. *Atlantic connections and adaptations: Economies, environments and subsistence in lands bordering the North Atlantic*, Symposia of the Association for Environmental Archaeology 21. Oxford: Oxbow Books.

Huntley, J.P., and S. Stallibrass, eds. 2000. *Taphonomy and interpretation*, Symposia of the Association for Environmental Archaeology 14. Oxford: Oxbow Books.

Murphy, P., and P.E.J. Wiltshire, eds. 2002. *The environmental archaeology of industry*, Symposia of the Association for Environmental Archaeology 20. Oxford: Oxbow Books.

Association for Industrial Archaeology (AIA)

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Basic Information

The Association for Industrial Archaeology (AIA) grew out of a number of conferences organized at the University of Bath in the UK in the early 1970s. Since its first formal meeting in 1973, AIA has since grown to become the foremost national organization for people who share an interest in the UK's industrial archaeology and industrial heritage. From the beginning, it has been an organization in which the amateur and the professional meet. Although the discipline of industrial archaeology was first championed by the Council for British Archaeology (CBA) and supported by many professional archaeologists, the early recording work on industrial sites was carried out by volunteers and they still form the main body of the association. Much of the recording was carried out by groups of people in the individual counties, and the AIA, early in its existence, decided to introduce a category of membership for affiliated societies, and so the AIA represents a far larger number of people than its individual membership, amounting to several thousand. The AIA holds an annual meeting for members of its affiliated societies as well as inviting them to its annual conference.

The AIA recognizes high standards of survey, interpretation, and publication by a number of awards to both professional and amateurs each year, as well as making grants for the restoration of industrial sites by volunteers. An international refereed journal, *Industrial Archaeology Review*, has been produced twice a year since 1977 (Palmer 2018). Members receive an illustrated newsletter four times a year as well as a gazetteer of industrial sites in whichever region the annual conference is held: now numbering over 30, these provide a useful list of sites of industrial interest in the UK. Further details concerning these and other activities can be found on the association's website: http://industrial-archaeology.org/. The AIA's liaison office is based at the Ironbridge Institute, Ironbridge Gorge Museum, Coalbrookdale, UK. The association has a governing council elected on an annual basis. At the time of writing, the association's chairman is Dr. Michael Nevell, the secretary is David de Haan, and treasurer is John Jones. The current honorary president is Professor Marilyn Palmer, and former incumbents include Tom Rolt, Professor Angus Buchanan, and Sir Neil Cossons, several of whom now serve as honorary vice-presidents.

Major Impact

The AIA has always tried to champion the cause of industrial archaeology and the industrial heritage at the national level and has worked closely both with the CBA and with national organizations such as English Heritage, Historic Scotland, and Cadw. In 1991, the AIA launched a pamphlet, *Industrial Archaeology: Working for the Future*, which was essentially an examination of the scope of industrial archaeology and a set of research priorities, with recommendations for urgent action. These found their way unto various strategy documents produced by English Heritage. This was supplemented in 1993 by a research project, the Index Record of Industrial Sites, aimed at the creation of a national database of industrial sites, which inter alia produced a set of terms for the components of such sites. These were incorporated into the national Thesaurus of Monument Types as well as being used locally to record industrial sites into county sites and monument records. Further efforts were made to influence national strategies in industrial archaeology in several ways, especially by a conference resulting in the publication of a research strategy in 2005, *Understanding the Workplace: a Research Framework for Industrial Archaeology in Britain*. The AIA has also, for many years, run a seminar for professional archaeologists on current research and thinking in industrial archaeology prior to its annual conference. Specific topics for this seminar have included the defense heritage,

urban regeneration and the adaptive reuse of industrial buildings, and the recording and excavation of twentieth-century sites. Between 2008 and 2011, the AIA, in conjunction with the CBA, ran 11 training schools in each of the English Heritage regions in an effort to train those who had responsibility for local planning to understand the significant features of industrial sites and structures so that these could be retained in the process of adaptive re-use. This resulted in a further publication, *Industrial Archaeology: A Handbook* (Palmer et al. 2012).

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Historical Metallurgy Society Ltd.
- ▶ Industrial Archaeology
- ▶ Industrial Heritage Association of Ireland (IHAI)
- ▶ Ironbridge Gorge Museum Trust (IGMT)
- ▶ Ironbridge Institute
- ▶ Museo Nacional de los Ferrocarriles Mexicanos
- ▶ Palmer, Marilyn
- ▶ Society for Industrial Archeology (SIA)

References

Palmer, M. 2018. Forty years of industrial archaeology review; a personal view. *Industrial Archaeology Review* 40 (2): 58–64. https://doi.org/10.1080/03090728.2018.1515983.

Palmer, M., M.D. Nevell, and M. Sissons, eds. 2012. *Industrial archaeology: A handbook*, CBA practical handbook. Vol. 21. York: Council for British Archaeology.

Further Reading

Association for Industrial Archaeology. n.d.. Available at http://industrial-archaeology.org/.

Gwyn, D., and M. Palmer. (ed.). 2005. Understanding the workplace. A research framework for industrial archaeology in Britain. *Industrial Archaeology Review* 27. https://doi.org/10.1179/030907205X50441. (Accessed 4 May 2012).

Palmer, M. 1991. Industrial archaeology: working for the future. Association for Industrial Archaeology (also published under the same title in *Industrial Archaeology Review* 14(1); https://doi.org/10.1179/030907291787712539 (Accessed 9 October 2012).

Association Internationale pour l'Histoire du Verre (AIHV)

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Basic Information

The Association Internationale pour l'Histoire du Verre (AIHV) was founded by Joseph Philippe in 1956 as the Journées Internationales d'Histoire du Verre. He was then the Director of the Musée Curtius in Liège, Belgium, and he organized the first congress of the AIHV, which was held in that city in 1958. Seventeen congresses have been held, at about 3-year intervals, since that time, in Leyden, Damascus, Ravenna–Venice, Prague, Cologne, Berlin–Leipzig, London–Liverpool, Nancy, Madrid–Segovia, Basel, Vienna, Amsterdam, Venice–Milan, New York City–Corning, London, Antwerp, and Thessaloniki. The 19th congress took place September 17–21 in Piran, Slovenia, followed by a post-congress tour September 22–23 to Croatia.

Major Impact

In addition to hearing about new research in glass, congress participants can view special exhibitions and visit museums, galleries, and private collections. The congresses also provide AIHV members an opportunity to meet their colleagues from other countries. Those members include several hundred archaeologists, art historians, artists, collectors, museum curators, *graduate students, scientists, and researchers from more than 30 countries*. Papers presented at AIHV congresses are published in the organization's *Annales*. From 1958 to 1983, the association also published bulletins that included information about glass collections in various countries, usually where the congresses were located.

The AIHV was reorganized in 1983, when it adopted its current name. It is now governed by statutes under Dutch law as it was headquartered

in the Netherlands at that time. The president and the board of directors are elected for 3-year terms. The general secretary is appointed by the board and serves as long as he or she is willing. The official languages are English, German, and French, and papers may be presented in any of these languages at the congresses. For other communications to members, only French and English are employed.

Membership in the AIHV is open to all. Students are admitted free of charge. For all others, the annual subscription fee includes a copy of the *Annales*.

Cross-References

► Corning Museum of Glass
► Glass: Conservation and Preservation

Further Reading

Association Internationale pour l'Histoire du Verre. n.d. Available at: http://www.aihv.org.

Asylum, Human Rights, and Cultural Heritage

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Definitions

Asylum — Pertinent international legal instruments do not include any definition of "asylum." However, it may be defined as "the protection granted by a sovereign State on its own territory to an alien (or stateless person) who has been forced to leave the country of her/his nationality (or habitual residence) due to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion." This definition is directly drawn from Article 1A(2) of the 1951 Geneva *Convention relating to the Status of Refugees* (Geneva Convention), on account of the substantial coincidence existing between "asylum" and "protection of refugees."

Human Rights — Human rights are the rights and freedoms inherent to all human beings – for the whole length of their existence – regardless of race, color, sex, nationality, ethnic origin, language, religion, or any other status or condition. Human rights are all interrelated, interdependent, and indivisible.

Cultural Heritage — In international law there is no univocal, universally accepted definition of "cultural heritage." The existing pertinent international conventions include their own working definitions, which – although expressed in similar terms – vary depending on the specific purposes pursued by each relevant instrument. However, the cultural heritage of a people may be considered as including "the works of its artists, architects, musicians, writers and scientists and also the work of anonymous artists, expressions of the people's spirituality, and the body of values which give meaning to life. It includes both tangible and intangible works through which the creativity of that people finds expression: languages, rites, beliefs, historic places and monuments, literature, works of art, archives and libraries" (UNESCO *Mexico City Declaration on Cultural Policies*, 1982). Cultural heritage may be of either material or intangible character,

as well as a combination of both tangible and intangible expressions. For most elements of cultural heritage, it is impossible to dissociate their tangible and intangible components.

Introduction

Asylum is one of the most ancient social and legal phenomena of human history. As a legal institute, it represents a direct emanation of the need of human beings to be protected against the dangers threatening their life, which is inherent in human nature.

Asylum is strictly intertwined with human rights under a threefold perspective. First, the right to asylum is considered itself a human right, proclaimed inter alia by Article 14 of the *Universal Declaration of Human Rights* (1948). Secondly, asylum is usually invoked – and eventually granted by the requested State – in order to prevent serious breaches of the human rights of the asylum-seeker. Thirdly, an asylee (i.e., a person to whom asylum has been granted) in a foreign country is entitled to protection of her/his fundamental human rights, including those guaranteed by relevant international conventions.

An asylum-seeker obtaining protection in a foreign country is usually disconnected from her/his cultural heritage, which normally represents an essential component of her/his cultural identity and, hence, a very significant element of her/his existence. Therefore, the problem arises of whether and to what extent, in legal terms, the right of asylees to cultural heritage is today guaranteed.

Historical Background

Although with changing fortunes, asylum has always had a place in human history. It first developed especially as a *religious* phenomenon, characterized, since the times of Ancient Greek, by the inviolability of the temple, where all or certain categories of human beings (depending on the different epochs of Greek history) could find shelter. The impact of asylum on social life drastically decreased in the age of the Romans, when the rule of law was strongly entrenched in the society and asylum was seen as an obstacle to the just administration of justice. With the fall of the Roman Empire, religious asylum knew its brightest season, as it often was the only existing defense against the legal disorder characterizing most territories in Europe; its importance progressively grew in parallel with the extension of the secular power acquired by the Christian Church. From the fourth to the tenth centuries AD, religious asylum was considered as a natural and inalienable right of the human being. Its use was strongly promoted by the Church, as it increased its power on, and control of, temporal affairs. Only in the sixteenth century, after a few centuries during which its legitimacy was challenged by the holders of the secular power, religious asylum started to decline, leading to its progressive and inexorable downfall, although it continued to be practiced up to the XX Century. In the meantime, with the development and stabilization of the idea of "State" and the embryonic manifestations of the concept of "territorial sovereignty" – in the context of which law was progressively replacing religion in the government of temporal affairs – the connotation of asylum which prevailed was the *territorial* one, conceived as expression of the inviolability of the territories where the different human communities were politically organized. Asylum then started to take the modern connotation of the term. On the one hand, the awareness of the need to promote international cooperation in the repression of crimes progressively increased, resulting, since the beginning of the seventeenth century, in the development of extradition treaties aimed at ensuring prosecution of the authors of common crimes. On the other hand, and at the same time, as a result of the growing intolerance for freedom of thought and religion which characterized many absolute monarchies in Europe, asylum started to be perceived as the only shelter against tyranny for those who claimed their freedom to express their ideas, assuming the connotation of *political asylum*. The latter finally reached the status of

positive rule of customary law – at least among Western countries – in the nineteenth century, and its existence was authoritatively sanctioned by Article 14 of the *Universal Declaration of Human Rights* (1948), which states that: "(1) Everyone has the right to seek and to enjoy in other countries asylum from persecution. (2) This right may not be invoked in the case of persecutions genuinely arising from non-political crimes or from acts contrary to the purposes and principles of the United Nations." Such a provision, however, did *not* recognize a right of asylum-seekers to *obtain* protection in a foreign country in case of persecution, but only their right to *request* asylum. States retained their unconditioned discretion to decide whether or not the benefit had to be granted, while, in the event that the request of asylum was accepted, it could not be considered as an unfriendly act by the State of origin of the asylee (Lenzerini 2009). In the meantime – particularly from the XIX Century – also the practice of granting asylum in foreign embassies and consulates notably developed, especially in Latin America, leading *diplomatic asylum* to attain the status of local custom in force for the majority of Latin American countries (Francioni 1973).

The generally unrestricted freedom of States to decide whether or not asylum had to be granted, irrespective of the circumstances characterizing the personal situation of the asylum-seeker, started to be constrained in the twentieth century, thanks to the adoption of international multilateral treaties regulating the matter. The most important of such treaties is undoubtedly the Geneva Convention, which at Article 1A(2) defines a refugee as a person who, "[a]s a result of events occurring before 1 January 1951 and owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it." The temporal limitation established at the beginning of the definition was removed by the 1967 New York *Protocol relating to the Status of Refugees*, by virtue of which the provisions of the Convention became of general application. Article 33 of the Convention proclaims the principle of *nonrefoulement*, stating that "[n]o Contracting State shall expel or return ('refouler') a refugee in any manner whatsoever to the frontiers of territories where his life or freedom would be threatened on account of his race, religion, nationality, membership of a particular social group or political opinion." This principle has later elevated to the status of rule of customary international law (Lenzerini 2009).

Key Issues and Current Debate

While some of the major host countries of asylees base their practice of granting asylum on their historical traditions of hospitality (two of the four major host countries of refugees – i.e., Pakistan and Lebanon (see Fig. 1) – have not even ratified the Geneva Convention), at the international level asylum is generally considered as corresponding to the protection accorded to refugees in application of the Geneva Convention and of the prohibition of *refoulement*, taking into account that the forms of protection subsumed within the scope of operation of "asylum" (intended in broad terms) may take diverse denominations in the different countries of the world.

At the end of 2017 the number of persons forcibly displaced (i.e., compelled to move from their locality and/or environment against their will) worldwide, hence in need of international protection, was 68.5 million. Such rate included 25.4 million refugees, 40 million internally displaced people, and 3.1 asylum-seekers (UNHCR 2017). More generally, during the last decade, the number of people in need of international protection has constantly increased (see Fig. 2).

In the absence of international obligations to share the burdens of asylum-seekers and refugees in situations of particular pressure for certain States, this increment determines situations of

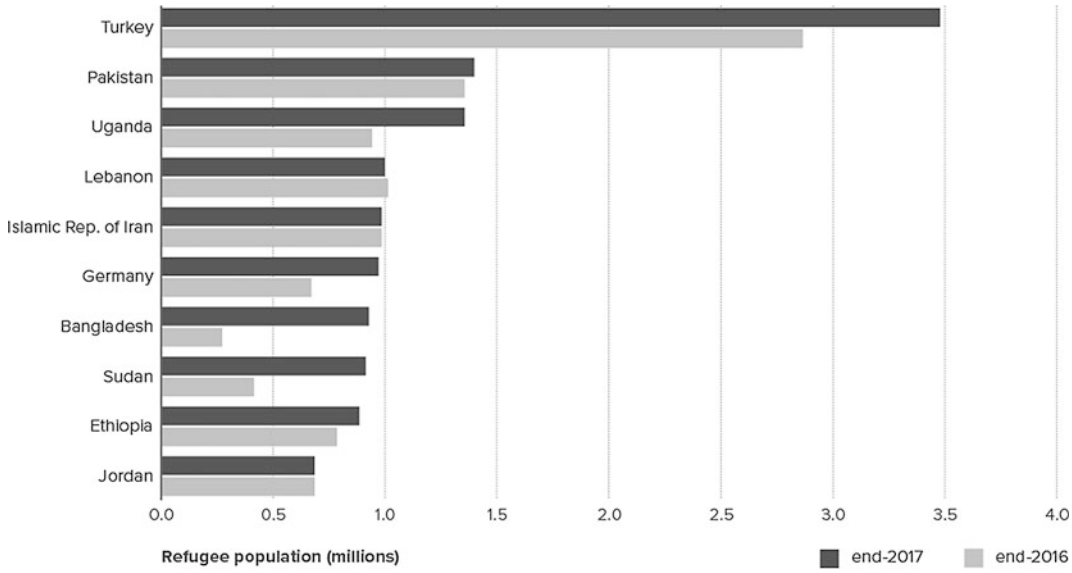

Asylum, Human Rights, and Cultural Heritage, Fig. 1 Major host countries of refugees – © UNHCR (https://www.unhcr.org/globaltrends2017/)

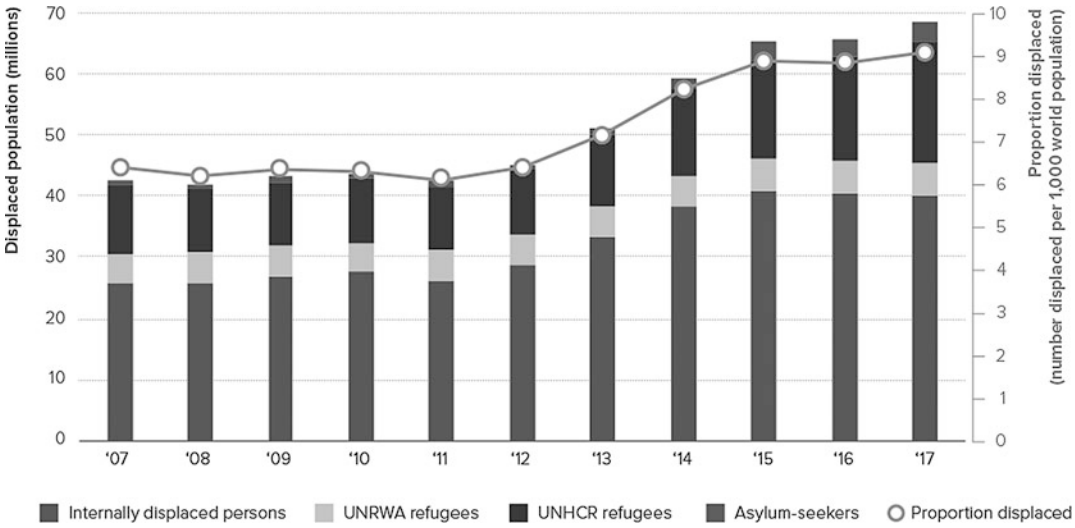

Asylum, Human Rights, and Cultural Heritage, Fig. 2 Trend of global displacement and proportion displaced 2007–2017 – © UNHCR (https://www.unhcr.org/globaltrends2017/)

emergency in the territories most pressured by such flows, increasing the threats for the human rights of the people concerned, particularly for the reason that said States may hardly be capable and/or willing to adequately take care of them and provide to their basic needs. These situations represent huge threats to the realization of international human rights law. In fact, no reasonable doubts arise on the fact that asylum-seekers and refugees are entitled to the full measure of

internationally recognized human rights – including certain specific rights which are particularly necessary in light of their peculiar situation and needs. However, the fact of whether or not such rights include prerogatives related to cultural heritage – and especially the scope and extent of such specific rights – is more debatable.

International Perspectives

Asylum and Human Rights

The purpose of asylum – in its contemporary international connotation – is to guarantee protection in favor of persons having a well-founded fear of persecution and to prevent that their fundamental human rights are infringed. It follows that the human-rights-related implications arising from asylum and refugee protection may be categorized into three different ontological plains: (1) prohibition to deport asylum-seekers and refugees to countries where their fundamental human rights would be at risk (principle of *non-refoulement*); (2) guarantee of the enjoyment of fundamental human rights for asylum-seekers and refugees during the whole length of the procedure aimed at verifying the existence of the conditions necessary for the determination of refugee (or other equivalent) status; (3) assurance of the enjoyment of human rights during the whole period of time the person will remain in the territory of the country of asylum after the status of refugee (or other equivalent form of international protection) has been recognized.

As regards the principle of *non-refoulement*, it consists in the prohibition of deporting an asylum-seeker to a country where her/his fundamental human rights would be threatened. In practice, it is especially applied when the violation faced by the asylum-seeker would consist in instances of torture or inhuman or degrading treatment or punishment. However, it is also applicable to situations where other fundamental human rights – particularly right to life and freedom from slavery and servitude – are under threat. The prohibition in point corresponds to a State obligation existing not only within the territory of the country concerned, but extends to all areas where the government, through its organs or agents, effectively exercises its jurisdiction *de jure* and/or de facto. For instance, in the case of *Hirsi Jamaa and Others v. Italy* (Application No. 27765/09, judgment of 23 February 2012), the European Court of Human Rights (ECtHR) considered the respondent State responsible of a violation of Article 3 of the 1950 *European Convention on Human Rights* (prohibition of torture or inhuman and degrading treatment or punishment), for the fact that its navy had intercepted on sea a boat carrying several asylum-seekers, taken the latter on board and carried them to Libya, which was considered a dangerous country. Despite the fact that the whole event took place on the high seas, hence outside the sovereignty of whatever State, Italy was considered responsible of the violation because "the applicants were under the continuous and exclusive *de jure* and *de facto* control of the Italian authorities." Furthermore, the prohibition in point extends not only to *direct refoulement* (i.e., to cases when the asylum-seeker is *directly* deported to a dangerous country), but also to *indirect* one – which takes place when deportation occurs to a country which is safe in itself, but from which it is possible that the person is transferred to a dangerous State (see *Hirsi Jamaa and Others v. Italy*, para. 146). While para. 2 of Article 33 of the Geneva Convention excludes from protection against *refoulement* any refugee "whom there are reasonable grounds for regarding as a danger to the security of the country in which he is, or who, having been convicted by a final judgment of a particularly serious crime, constitutes a danger to the community of that country," similar provisions of more recent adoption – particularly Article 3 of the 1984 UN *Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment* – exclude that the prohibition in point may be the object of exceptions. Also, in its pertinent judgments, the ECtHR is used to reiterate that "the conduct of the person concerned, however undesirable or dangerous, cannot be taken into account, with the consequence that the protection afforded by Article 3 [of the European Convention on Human Rights] is broader than

that provided for in [Article] [...] 33 of the [Geneva Convention]" (see, inter alia, *Case of Saadi v. Italy*, Application No. 37201/06, judgment of 28 February 2008, para. 138).

During the procedure for the determination of refugee status (or other equivalent forms of international protection, including "subsidiary protection" provided for by EU Directive 2011/95/EU of 13 December 2011), asylum-seekers are to be considered as belonging to "a particularly underprivileged and vulnerable population group in need of special protection" (ECtHR, *Case of M.S.S. v. Belgium and Greece*, Application No. 30696/09, judgment of 21 January 2011, para. 251). The UNHCR Executive Committee has considered essential that "asylum-seekers who have been temporarily admitted pending arrangements for a durable solution should be treated in accordance with [certain] minimum basic human standards," which include the enjoyment of "the fundamental civil rights internationally recognized," the right to "receive all necessary assistance and be provided with the basic necessities of life including food, shelter and basic sanitary and health facilities," the right to be subjected to "no discrimination on the grounds of race, religion, political opinion, nationality, country of origin or physical incapacity," the right "to be considered as persons before the law, enjoying free access to courts of law and other competent administrative authorities," the right to respect for family unity, the right of minors and unaccompanied children to be granted special assistance, as well as the possibility to obtain "all the necessary facilities to enable them to obtain a satisfactory durable solution" for their situation (UNHCR Executive Committee 1981). With respect to detention of asylum-seekers, it is first of all to be noted that detention in itself is *not* a violation of human rights and international law in general. However, in order to be lawful, detention needs to respect very strict conditions. In particular, "detention may be resorted to only on grounds prescribed by law to verify identity; to determine the elements on which the claim to refugee status or asylum is based; to deal with cases where refugees or asylum-seekers have destroyed their travel and/or identity documents or have used fraudulent documents in order to mislead the authorities of the State in which they intend to claim asylum; or to protect national security or public order." Asylum-seekers must be protected against "unjustified or unduly prolonged detention." Detention measures taken in their respect "should be subject to judicial or administrative review," their conditions of detention must be humane, and they should "not be accommodated with persons detained as common criminals" or "be located in areas where their physical safety is endangered" (UNHCR Executive Committee 1986). In addition of respecting the said guarantees of fair treatment, in order to be "lawful" detention of asylum-seekers must not be arbitrary, meaning that it must "have a legal basis in domestic law," must be "compatible with the rule of law, a concept inherent in all the Articles of the [European] Convention [on Human Rights]," and the authorities' orders of detention must be "sufficiently accessible and precise, in order to avoid all risk of arbitrariness" (see ECtHR, *Case of Amuur v. France*, Application No. 19776/92, judgment of 25 June 1996, para. 50).

After the recognition of refugee status, granting of subsidiary protection or any other equivalent form of protection that may be accorded at the domestic level, the person concerned is obviously entitled to the full measure of internationally recognized human rights, to the same extent of any other human being. More specifically, refugees are explicitly attributed certain rights by the Geneva Convention, including the following: right to acquire movable and immovable property, and other rights pertaining thereto, according to a treatment not less favorable than that accorded to aliens generally in the same circumstances (Article 13); right to protection of industrial property, including inventions, designs or models, trademarks, trade names, as well as rights in literary, artistic, and scientific works, to the same level as is accorded to nationals of the country of asylum (Article 14); right of association (regarding nonpolitical and nonprofit-making associations and trade unions), with the guarantee of "the most favorable treatment accorded to nationals of a foreign country, in

the same circumstances" (Article 15); right of access to courts (Article 16); right to engage in wage-earning employment, with the guarantee of the most favorable treatment accorded to nationals of a foreign country in the same circumstances (Article 17); right to self- employment "in agriculture, industry, handicrafts and commerce and to establish commercial and industrial companies," according to a treatment "not less favorable than that accorded to aliens generally in the same circumstances" (Article 18); right of access to liberal professions, granting them a treatment "not less favorable than that accorded to aliens generally in the same circumstances" (Article 19); right to housing, again with the guarantee of a treatment "not less favorable than that accorded to aliens generally in the same circumstances" (Article 21); right to access to elementary education, with the guarantee of "the same treatment as is accorded to nationals" (Article 22); right to be granted "the same treatment with respect to public relief and assistance as is accorded to [. . .] nationals" (Article 23); labor rights and right to social security, according to the conditions established by Article 24; right to administrative assistance (Article 25); right to freedom of movement, "subject to any regulations applicable to aliens generally in the same circumstances" (Article 26); right to receive identity papers (Article 27) and travel documents (Article 28); right to transfer assets brought into the territory of the host State (Article 30).

A "Right to Cultural Heritage" for Asylees?

Among the rights explicitly recognized in favor of asylees, no mention is made to a "right to cultural heritage." Such a right is normally not even contemplated in human rights treaties as a right generally attributed to human beings, although, as explained below, some of such treaties provide for certain cultural rights of migrants. This said, it is indubitable that cultural heritage determines notable implications in terms of human rights. Cultural heritage is "intertwined with identity and territory" (Silverman and Ruggles 2007), and it "is impossible to separate a people's cultural heritage from the people itself and that people's rights" (UN Special Rapporteur in the field of cultural rights 2016). Safeguarding the connection between individuals or communities and their own cultural heritage is an indispensable prerequisite for ensuring their effective enjoyment of a number of human rights, including (but not limited to) right to religion, freedom of expression, right of minorities to enjoy their own culture, right to take part in cultural life – which includes the right "to benefit from the cultural heritage and the creation of other individuals and communities" (Committee on Economic, Social and Cultural Rights 2009) – right to cultural identity, as well as right to property (Lenzerini 2019). The very concept of *human dignity*, "which informs [. . .] human rights [. . .] includes peoples entitlement to the respect of the cultural heritage that forms an integral part of their identity, history and civilization" (Francioni 2004). This position is confirmed by the practice of human rights monitoring bodies. For instance, the African Commission on Human and Peoples' Rights has affirmed that "[p]rotecting human rights [. . .] requires respect for, and protection of, [the] religious and cultural heritage essential to [a] group identity" (*Centre for Minority Rights Development (Kenya) and Minority Rights Group International on Behalf of Endorois Welfare Council v. Kenya*, Communication 276/2003, May 2009, para. 141). In the end, it is reasonable to assert that today a *right to cultural heritage* exists under international law (Orser 2007; Alderman 2013), in the form of an implied right arising from the concrete operation of several human rights explicitly recognized by relevant international instruments.

The next question to be addressed is whether and to what extent such a right to cultural heritage applies to asylees. This question is relevant under at least three different profiles.

First, it may be reasonably assumed that asylees, like other categories of migrants and/or members of diasporas, have the right to preserve their connections with the cultural heritage located in their original homeland (Orser 2007; Committee on Economic, Social and Cultural Rights 2009), especially as regards the heritage which is particularly significant for their cultural

identity. Article 31 of the 1990 *International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families* militates in favor of this conclusion, affirming that "States Parties shall ensure respect for the cultural identity of migrant workers and members of their families and shall not prevent them from maintaining their cultural links with their State of origin." An equivalent provision is included in Article 12(f) of ILO Convention No. 143 of 1975 *concerning Migrations in Abusive Conditions and the Promotion of Equality of Opportunity and Treatment of Migrant Workers*. Similarly, Article 5 of the 1995 Council of Europe's *Framework Convention on the Protection of National Minorities* requests States parties "to promote the conditions necessary for persons belonging to national minorities to maintain and develop their culture, and to preserve the essential elements of their identity, namely their religion, language, traditions and cultural heritage". However, while it is not reasonably deniable in principle, the conclusion in point triggers concrete questions which are hardly answerable a priori, e.g., how long (i.e., for how many generations) the right in point continues to exist, or whether and to what extent asylees or other migrants have rights as regards decisions about the management and use of cultural properties in their (and their ancestors') original homeland (Orser 2007; Blake 2015).

Secondly, asylees – like other categories of migrants – have the right to transfer their own cultural property in the country of asylum, as well as, in principle, to establish there their own cultural (particularly religious) institutions. This is a necessary implication of the right of migrants to have their cultural identity preserved (Committee on Economic, Social and Cultural Rights 2009). In the last decades, "forms of cultural expression have flourished in urban areas [of many countries], under the impetus of communities descended from immigrant families," also with the aim "to maintain links with the countries of origin" (Wihtol de Wenden 2007). Examples described in literature include, among others: the Russian-Lipovans, cruelly persecuted since the seventeenth century and forced to flee in several European countries, including Spain, particularly the Basque country, and Italy, where they have imported their Orthodox Church's ancient heritage (Vlaskina 2017); the over 30,000 Chilean refugees who escaped to Sweden since 1973, fleeing the cruelties of the Pinochet regime and producing "a lot of tangible and intangible heritage" in the host country (Colomer 2013); the Tibetan refugee community living in India since the 1950s, the members of which have carried "with them a rich cultural heritage" (Adams 2005); and the cultural group Tadiazt, who fled from Mali and settled in Mberra refugee camp, in Mauritania, where they "perform their traditional songs in the camp in order to keep their oral culture alive and to transmit it to the young people living in the camp" (Chechi 2016).

The third profile concerns the question whether asylees acquire any right over the cultural heritage belonging (in cultural terms) to the country of asylum and to other human communities living therein, in the sense of obtaining a decisional role in the context of the management of such a heritage. In principle this is to be excluded – as "perhaps simply inhabiting a region should not automatically bestow heritage rights" (Orser 2007) – at least until when they fully integrate in the host country and may be considered as being part of its social and cultural milieu. However, this can in no way affect their entitlement to protection of cultural rights, their right to take part in cultural life, and their right to enjoy their own intangible cultural heritage. In fact, "cultural rights and cultural heritage preservation can play [a decisive role] in the integration and rehabilitation of refugees and displaced persons after trauma" (UN Secretary General 2016). In many cases, refugees turn "to various forms of [intangible cultural heritage and] cultural expressions that help them live through disasters [. . .] Within new environments, the performing arts or crafts skills can [. . .] provide a source of livelihood, whereas traditional knowledge may be harnessed for survival" (Chatelard 2017). At the same time, the right "to benefit from the cultural heritage and the creation of other individuals and communities" (Committee on

Economic, Social and Cultural Rights 2009) – more generally, to have access to multiple heritages – and, specifically, the possibility to enjoy the cultural heritage of the host country, may be fundamental in order to favor integration of asylees in such country.

Future Directions

While the existence of cultural-heritage-related rights of asylees may be drawn from a systematic and ontological interpretation of international human rights law, today the process towards guaranteeing the effective realization of such rights is still at an embryonic level. The speeding-up and strengthening of this process is first of all necessary in the interest of asylees themselves – as the lack of effectiveness of such rights, in addition to the denial of their internationally recognized human rights, "may bring about [their] marginalisation [. . .] and the concealment of their heritage practices from the public sphere" (Chechi 2016), as well as, eventually, the loss of their distinctive cultural identity. Also, the lack of adequate national policies aimed at ensuring the effective realization of rights to cultural heritage of asylees certainly hinders their successful integration into the social environment of the country of asylum. At the same time, countries of asylum and the international community as a whole would also greatly benefit from the promotion of such rights, for the reason that asylees may provide a huge contribution to the preservation of cultural heritage and to the promotion of pluralism and cultural diversity (Chechi 2016). Surely, to make this possible, it is necessary to foster the awareness that, in the States of asylum, "today national identity comprises another component" (Wihtol de Wenden 2007), i.e., migrants in general and asylees in particular.

Cross-References

- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Interpretation
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Intangible Cultural Heritage
- ▶ World Heritage and Human Rights

References

Adams, W.F. 2005. Tibetan refugees in India: integration opportunities through development of social, cultural and spiritual traditions. *Community Development Journal* 40: 216–219.

Alderman, K.L. 2013. The human right to cultural property. *Michigan State International Law Review* 20: 69–81.

Blake, J. 2015. *International cultural heritage law*. Oxford: Oxford University Press.

Chatelard, G. 2017. *Survey report. Intangible cultural heritage of displaced syrians*. Paris: UNESCO. https://ich.unesco.org/doc/src/38275-EN.pdf.

Chechi, A. 2016. Migrants' cultural rights at the confluence of international human rights law and international cultural heritage law. *International Human Rights Law Review* 5: 26–59.

Colomer, L. 2013. Managing the heritage of immigrants: elderly refugees, homesickness, and cultural identities. *The European Archaeologist* 39: 17–22.

Committee on Economic, Social and Cultural Rights. 2009. General Comment No. 21. UN Doc. E/C.12/GC/21.

Francioni, F. 1973. *Asilo diplomatico. Contributo alla teoria delle consuetudini locali nel diritto internazionale*. Milano: Giuffrè Editore.

Francioni, F. 2004. Beyond state sovereignty: The protection of cultural heritage as a shared interest of humanity. *Michigan Journal of International Law* 25: 1209–1228.

Lenzerini, F. 2009. *Asilo e diritti umani. L'evoluzione del diritto di asilo nel diritto internazionale*. Milano: Giuffrè Editore.

Lenzerini, F. 2019, forthcoming. Intentional destruction of cultural heritage. In *Oxford handbook of international cultural heritage*, ed. F. Francioni and A. Vrdoljak. Oxford: Oxford University Press.

Orser, Jr C.E. 2007. Transnational diaspora and rights of heritage. In *Cultural heritage and human rights*, ed. H. Silverman and D.F. Ruggles, 92–105. New York: Springer.

Silverman, H., and D.F. Ruggles. 2007. Cultural heritage and human rights. In *Cultural heritage and human rights*, ed. H. Silverman and D.F. Ruggles, 3–27. New York: Springer.

UN Secretary General. 2016. Cultural rights. UN Doc. A/71/317.

UN Special Rapporteur in the Field of Cultural Rights. 2016. Report of the Special Rapporteur in the field of cultural rights. UN Doc. A/71/317.

UNHCR. 2017. Global trends 2017. https://www.unhcr.org/globaltrends2017/.
UNHCR Executive Committee. 1981. Conclusion No. 22 (XXXII), Protection of Asylum-Seekers in Situations of Large-scale Influx.
UNHCR Executive Committee. 1986. Conclusion No. 44 (XXXVII), Detention of Refugees and Asylum-Seekers.
Vlaskina, N. 2017. The Russian-Lipovans in Italy: Preserving cultural and religious heritage in migration. In *Cultural heritage in migration*, ed. N. Vukov et al., 41–54. Sofia: Paradigma.
Wihtol de Wenden, C. 2007. Immigration and cultural rights: political recognition and cultural acceptance. *Museum International* LIX: 24–29.

Atalay, Sonya

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Basic Biographical Information

Dr. Sonya Atalay is a Native American (Anishinabe-Ojibwe) anthropologist and archaeologist and a prominent advocate for community-based and participatory research (CBPR). Dr. Atalay is one of the first of her people to undertake tertiary studies in archaeology.

Atalay grew up in Michigan. She completed her B.A. in Anthropology and Classical Archaeology at the University of Michigan, Ann Arbor, in 1991. In 1997 Atalay first undertook field excavations at the site of Çatalhöyük in Turkey, analyzing clay and ceramics to investigate prehistoric cooking practices. She completed her M.A. in Anthropology at the University of California, Berkeley, in 1998.

In 2003, Atalay obtained her Ph.D. in Anthropology at UC Berkeley. Subsequently, she has been awarded the positions of UC Berkeley President's Postdoctoral Fellow (2003–2005) and Stanford University's NSF Postdoctoral Scholar (2005–2007). From 2007 to 2012, Dr. Atalay held the role of Assistant Professor in the Department of Anthropology at Indiana University as well as Adjunct Assistant Professor in American Studies, Near Eastern Languages and Cultures, and Central and Eurasian Studies. She is currently Assistant Professor at the University of Massachusetts, Amherst, in Anthropology and the Commonwealth Honors College.

Dr. Atalay is a member of the Society for American Archaeology, the American Anthropological Association, the World Archaeological Congress and the Native American and Indigenous Studies Association. She has served as Chair of the Society for American Archaeology Committee on Native American Relations, as well as the Society for American Archaeology Indigenous Populations Interest Group. She was one of the founding board members of the Coalition for Indigenous Archaeology. Dr. Atalay is also a first degree Midewiwin of the Three Fires Midewiwin Society, concerned with maintaining traditional knowledge and spiritual teachings of the Anishinabe people.

Major Accomplishments

Dr. Sonya Atalay has made important and inventive contributions to the field of community archaeology. She began working at Çatalhöyük analyzing clay materials (Atalay 2005) but became increasingly interested in broadening the local community's involvement on-site. In 2005, Dr. Atalay launched the Çatalhöyük community-based participatory research (CBPR) program (Atalay 2012). Instead of only employing local residents as excavation labor and ethnographic informers, Atalay's new project sought to engage locals on an equal level to the archaeologists, as collaborators and research partners. With local communities consulted about the sorts of participation they desire, the Çatalhöyük CBPR project has grown to include an annual festival, a theater group, production of comic books and newsletters, and archaeological lab-guide training for local children and teens. Particular effort has been put into increasing archaeological and scientific literacy among local communities, which has led to opportunities for internship positions and joint authorship for locals. Dr. Atalay characterizes her approach to community archaeology as

being "by and with" local communities, instead of "on and for" (Atalay 2010).

Dr. Atalay seeks to demonstrate that community archaeology methods are applicable worldwide. To this end she has worked in collaboration with a number of Native American communities in Michigan and Indiana. Dr. Atalay has worked with the Sullivan County American Indian Council to produce geographical and oral history surveys of the Waapaahsiki Siipiiwi Mound in Fairbanks, Indiana. This project includes the development of an interpretive walking trail around the mound to help protect the site and educate visitors. Since 2009, Dr. Atalay has assisted an initiative by the Ziibiwing Center of the Saginaw Chippewa Indian Tribe of Michigan to protect the Sanilac petroglyphs site. This involves seeking protection not only for the fragile petroglyphs themselves but also for the indigenous intellectual property they represent. The project has been funded as a case study by the Intellectual Property Issues in Cultural Heritage project (IPinCH). Dr. Atalay is assisting with the implementation of a tribal management plan to ensure that traditional owners decide how investigations of the site are conducted, as well as how widely documentation of this sacred knowledge may be shared.

A significant focus of Dr. Atalay's work has been on the decolonization of archaeology. Invited to guest-edit an issue of *American Indian Quarterly*, Dr. Atalay featured articles on the subject of decolonization and offered her own critique of the National Museum of the American Indian and its approach to presentation (Atalay 2006). Since 2004, Dr. Atalay has researched issues of cultural preservation and repatriation surrounding the Native American Graves Protection and Repatriation Act (NAGPRA). This includes investigation of human remains classified as "culturally unidentifiable" as well as Dr. Atalay's role as Coprincipal Investigator for the Stone Street Recovery and Mitigation Project. She has worked with the Saginaw Chippewa Indian Tribe towards documenting ancestral remains held by the University of Michigan, with the ultimate aim of repatriation due to begin in late 2012. Dr. Atalay was appointed to NAGPRA's review committee in 2009.

From 2007 to the present, Dr. Atalay has taught undergraduate and graduate classes in Anthropology at Indiana University, topics ranging from food archaeology to NAGPRA and CBPR methods. In keeping with her commitment to making academic work more widely accessible, she has also made many presentations on public archaeology for school-aged children.

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Decolonization in Archaeological Theory
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA

References

Atalay, S. 2005. Domesticating clay: The role of clay balls, mini balls, and geometric objects in daily life at Çatalhöyük. In *Changing materialities at Çatalhöyük: Reports from the 1995–99 seasons*, Çatalhöyük Project, ed. I. Hodder, vol. 5, 139–168. London: British Institute at Ankara.

Atalay, S. 2006. No sense of the struggle: Giving voice to our survivance at the National Museum of the American Indian. *American Indian Quarterly* 30 (4): 597–618.

Atalay, S. 2010. 'We don't talk about Çatalhöyük, we live it': Sustainable archaeological practice through community-based participatory research. *World Archaeology* 42 (3): 418–429. https://doi.org/10.1080/00438243.2010.497394.

Atalay, S. 2012. *Community based archaeology: Research with, by and for indigenous and local communities*. Berkeley: University of California Press.

Further Reading

Atalay, S., ed. 2006. Decolonizing archaeology – Efforts to transform a discipline. *American Indian Quarterly* 30(3).

Atalay, S. 2007. Global application of indigenous archaeology: Community based participatory research in Turkey. *Archaeologies* 3 (3): 249–270.

Atalay, S. 2008. Pedagogy of decolonization: Advancing archaeological practice through education. In *Collaborating at the trowel's edge: Teaching and learning in*

indigenous archaeology, ed. S.W. Silliman, 123–144. Tucson: University of Arizona Press.
Atalay, S. 2009. Raise your head and be proud Ojibwekwe. In *Being and becoming Indigenous archaeologists*, ed. G. Nicholas, 45–54. Walnut Creek: Left Coast Press.
Atalay, S. 2012. 'Diba Jimooyung' – Telling our story: Colonization and decolonization of archaeological practice from an Anishinabe perspective. In *World Archaeological Congress (WAC) handbook on post-colonialism in archaeology*, ed. U. Rizvi and J. Lydon, 61–72. Walnut Creek: Left Coast Press.

Atlantic Ocean: Maritime Archaeology

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Introduction

Maritime archaeologists have never conceived of the Atlantic as a unified subject for study in the same way that Atlantic world historians have. While much maritime archaeological work has been done beneath the surface of the Atlantic Ocean, those doing the projects have typically pursued them in reference to their own particular research interests and questions rather than seeing such research as part of a unified approach to understanding the maritime development of the Atlantic world. Consequently, the maritime archaeology conducted in the Atlantic consists of a mix of scholarship focusing on many diverse geographical and temporal areas. This is no doubt influenced by the vast size that the Atlantic covers. Its waters flow across two hemispheres and connect four continents; from prehistory to the present, many cultures have utilized Atlantic waters for subsistence, transportation, trade, and warfare. Despite the lack of a unified approach, however, the maritime archaeology of the Atlantic can be seen as contributing to scholarly understanding of several significant research areas. Key research themes that maritime archaeologists have addressed using Atlantic sites include the study of ships of exploration, the impact of global commerce and warfare during the past 500 years, and the protection of underwater cultural heritage from treasure hunting. In recent years, Atlantic sites have also been used to examine significant emerging perspectives such as deepwater archaeology, prehistoric underwater archaeology, and maritime cultural landscapes.

Key Issues and Current Debates

Shipwrecks from the Age of Exploration

The Spanish and Portuguese were leaders in the field of global exploration, and shipwrecks from the Atlantic have contributed greatly to the understanding of early Iberian global seafaring. The earliest known European shipwreck site in the New World is the Molasses Reef wreck from the Turks & Caicos Islands, which sank in the early 1500s. This wreck and the slightly later Highborn Cay shipwreck from the Bahamas are typically included in discussions of Caribbean sites, but both actually lie in the Atlantic Basin. Because of their early dates, the Molasses Reef and Highborn Cay shipwrecks are significant finds, but in both cases, archaeologists did not arrive on the scene until after the sites had been damaged by treasure hunters (a pervasive problem in Atlantic maritime archaeology that will be discussed in greater detail later in this entry). Formal archaeological work at the Molasses Reef site began in 1982 under an Institute of Nautical Archaeology (INA) team led by Donald Keith (Keith et al. 1984). Excavations conducted from 1982 to 1986 revealed that the vessel was armed with at least 18 swivel guns and personal weapons such as crossbows, *arquebuses* (shoulder-fired guns), *harquebuts* (hand cannons), and cast iron grenades. A pair of *bombardetas* were aboard, but were not fitted for use at the time of sinking (Keith 1988: 60–63). Additional artillery included one *cerbatana*, a carriage-mounted gun. Items of ship's equipment from the site include one anchor, an axe head, a lead-sounding weight, and a possible pump valve. Ceramic sherds from olive jars, storage pots, bowls, and basins were also present. As a whole, the ordnance and artifact assemblage

suggests a Spanish origin for the vessel. Alternatively, analysis has shown that much of the ballast came from Lisbon, Portugal, so the ship may have been Portuguese instead (Lamb 1988). Unfortunately, only about 2% of the ship's hull remained; extant timbers suggest a vessel about 20 m long and 5–6 m in beam (Oertling 1989a).

The Highborn Cay wreck (Keith 1988: 59–60; Oertling 1989b; Smith et al. 1985) was discovered by divers in 1965 and subjected to salvage in the late 1960s. Archaeologists became interested in the site in the 1980s, after noting similarities between the artifacts from this site and those from the Molasses Reef wreck. Excavations were begun in 1986 and soon revealed a vessel similar in size to the Molasses Reef vessel, but with much better hull preservation. Fragments of the ship's backbone, including the keel, stem, and keelson, which included a mast step, were preserved. Other surviving timbers included frames, outer hull planking, ceiling (interior) planking, and footwales (longitudinal timbers on the interior that provide strength at the turn of the bilge). The ship was armed with at least 2 *bombardetas* and 13 swivel guns. Few ceramics were found; these include sherds from a bowl and a small pitcher. Likewise, only one personal artifact, a knife handle, was discovered. The paucity of personal artifacts and the fact that two of the three anchors discovered at the site seem to have been deployed at the time of sinking have led to the interpretation that the ship sank at anchor and that the crew had sufficient time to take their possessions with them when they abandoned the vessel. It seems possible, however, that some personal possessions may have been removed by salvors before archaeological excavations began.

The site of Red Bay, Labrador, Canada, provides some of the best evidence for early Iberian contact with the New World (Grenier et al. 2007). In the sixteenth century, Red Bay was utilized by Basque seafarers pursuing whales. The Basque had a whaling tradition that dates back to at least the twelfth century, but by the early modern period, stocks of whales off the European coast had been heavily depleted. With the discovery of the New World, intrepid Basque sailors soon began exploiting whales on the far shore of the Atlantic. From July through October, pods of right whales migrate through the Straits of Belle Isle. Red Bay, located close by, provided an ideal anchorage for fleets hunting these whales. Archaeological excavations on the shores of Red Bay in 1977 first provided evidence for tryworks used to render whale oil, while archival research in Spain revealed that several whaling vessels had been lost in the bay. Following the clues provided by the archives, in 1978 archaeologists discovered the remains of one such vessel, believed to be the galleon *San Juan*, which sank in 1565. Subsequent archaeological fieldwork has revealed three other galleons, along with the remnants of whaleboats. The Red Bay site complex is particularly significant for the details that it provides about life aboard whaling ships and rendering operations ashore, as well as for the information provided about Iberian ship construction, as the cold waters preserved the hulls to a greater extent than is commonly found on wrecks from lower latitudes. The Red Bay archaeological project is also noteworthy for its methodology. The hull of *San Juan* was excavated, dismantled, brought ashore, and recorded in great detail, then reburied on the bottom. Returning the timbers to the seabed obviated the need for costly, long-term conservation of the hull remains yet provided for their protection.

Another significant early Iberian vessel is the Western Ledge Reef wreck from Bermuda (Watts 1993). This shipwreck, which dates to about 1600, was discovered in 1964 and salvaged periodically until the late 1980s. From 1988 to 1991, East Carolina University and the Bermuda Maritime Museum recorded and excavated the site. Artifacts include cannon, versos, a bronze bell, navigational dividers, and sherds from olive jars, pitchers, and colono ware. The latter, along with bones from a white-tailed deer, indicate that the Western Ledge vessel had probably been to North America and was likely returning to Europe when it struck Bermuda's reef. The artifacts indicate that the ship was probably Spanish. A significant portion of the hull, including parts of the keel, keelson with mast step, sternpost, stern knee, frames, outer hull planking, ceiling planking, and transom planking, was preserved. The hull remains were

deemed significant enough to raise and conserve; at the time of this writing, the hull timbers are undergoing analysis and reconstruction.

The Azores Islands served as a critical waymark for Iberian vessels returning to Europe from both the New World and the East Indies. In the 1990s, archaeologists began a program to document and preserve the Azores' maritime heritage. A key focus of this program has been Iberian ships from the Age of Exploration. Investigations at Angra Bay, Terceira Island, revealed several shipwrecks. One of these, designated Angra D, represents the substantially preserved hull of a large Iberian vessel from about 1600 (Garcia and Monteiro 2001). The ship was probably close to 40 m in length, with a beam of about 8 m, and displaced approximately 700–800 t. Surviving timbers include the entire keel and keelson, the sternpost assembly, the main mast step, nine riders, numerous frames, outer hull planking, footwales, ceiling planking, and stanchions. The vessel lay on one side, with the result that parts of deck beams, which are often not preserved, were buried by overburden and thus survived. Rope and a double block provide evidence for the rigging; other artifacts provide abundant testimony to shipboard life. These include wicker baskets and barrel staves, combs, a religious figurine, a thimble, and pins. Chinese porcelain compliments the ubiquitous olive jars in the ship's ceramic assemblage. Bones from cow, chicken, and fish, along with almonds, raisins, and corn, testify to the crew's diet.

Although extent of hull preservation varies widely among the Iberian wrecks from the Atlantic Ocean, these, taken in concert with other Iberian vessel finds from the Caribbean, Gulf of Mexico, Great Britain, and continental Europe, have revealed enough about construction details to allow Oertling (2005) to postulate an "Atlantic tradition" vessel type. This consists of a package of 11 constructional features that seem common to fifteenth- and sixteenth-century Iberian vessels. Significant among these are the use of dovetailed mortise and tenon joints at the intersection of floors and first futtocks, a feature that provides the most readily identifiable indication that a wreck is Iberian. Another feature that can be used to readily identify Iberian vessels is a mast step formed from an enlarged section of the keelson and supported by lateral buttresses on either side. Iberian-Atlantic tradition vessels also feature preassembled central frames (the number varies based on the size of the ship) that indicate that Iberian naval architects were able to plan the shape of the central part of the hull before construction (Castro 2007), a significant advance over earlier European shipbuilding methods. Other significant features of this tradition include Y-shaped frames at the stern and keelsons notched to fit over the tops of the floor timbers.

A significant question concerning Iberian shipbuilding is whether or not archaeological sites can be used to identify particular types of vessels known from historical records. Atlantic sites such as Red Bay have proved critical in identifying galleons, as there is a good deal of certainty that the wrecks discovered there are those of historically known vessels such as the *San Juan*. Other types remain elusive. The caravel was one of the most important Age of Exploration ships; these small vessels were ideal for exploring unknown waters. Two of Columbus' vessels, *Nina* and *Pinta*, were caravels, and Vasco de Gama also employed them in his successful voyage to India. The evidence indicates that Iberian vessels shared the majority of their constructional details in common, despite size, so it does not seem possible to identify caravels on the basis of construction. Based on size, however, three of the Atlantic wrecks, the Molasses Reef, Highborn Cay, and Western Ledge Reef shipwrecks, offer tantalizing candidates for caravels. Future research may be able to solve this puzzle.

While Iberian vessels dominate the Age of Exploration shipwrecks investigated in the Atlantic, one significant early English site has also been excavated. This is the remains of the *Sea Venture*, which wrecked in Bermuda in the summer of 1609 while en route to the Jamestown colony (Wingood 1982; Adams 1985). Very little is known about early seventeenth-century English ship construction, and *Sea Venture*'s hull provides much needed archaeological evidence. About 15.5 m of the keel survived, with additional evidence to indicate that it was originally

approximately 22 m long. At its forward end, part of the keel to stem scarf remains. The size of keel indicates that *Sea Venture* was probably originally around 30 m long on deck, which agrees well with historical records that state that the ship was of 100 t. Fragments of eighteen frames, including floor timbers and futtocks, survive. Remains of deadwood, outer hull planking, ceiling planking, and sleepers (like footwales, these were longitudinal timbers that provided support at the turn of the bilge) were also recorded. In addition to the information it provides about seventeenth-century English ship construction, the *Sea Venture* excavation is also notable for the careful attention to stratigraphy (Adams 1985: 279–284), something not seen on many underwater excavations.

Global Commerce and Warfare

The Age of Exploration laid the groundwork for European expansion. Over the past five centuries, European colonization and commerce, along with their attendant warfare, shaped the world in which we live today. It is no exaggeration to say that today's globalization is merely the most recent aspect of a phenomenon that began 500 years ago. During that time, the Atlantic Ocean has served as a key highway for European expansion, and maritime archaeologists have investigated numerous sites that provide evidence for this.

The Spanish and Portuguese were leaders in the Age of Exploration, a key goal of which was the growth of commerce. In the seventeenth century, Portuguese merchant vessels transited the Atlantic on their way to bring back the wealth of the East Indies. The wreck of one such vessel has been investigated in detail by archaeologists. This vessel, the nau *Nossa Senhora dos Mártires*, sank at the mouth of the Tagus River, Portugal, in September 1606 on its return voyage from India (Castro 2003, 2005). The ship was carrying a cargo of peppercorns, many of which were salvaged soon after it sank, along with much of the ship's armament, fittings, and stores. The site was subjected to further damage in the 1980s, when sport divers looted the wreck. Archaeological excavations from 1996 to 1997, however, revealed that much valuable information remained. The presence of a large quantity of peppercorns provided evidence for the wreck's identity and its cargo. The ship's equipment, including three astrolabes, dividers, and sounding leads, were also recovered. Asian pottery in the form of Chinese, Burmese, and Japanese ceramics hints at the details on cross-cultural contacts that shipwrecks such as this can offer. The Pepper Wreck is also valuable for the data that it provides about seventeenth-century Portuguese ship construction and design. Analysis of the surviving hull structure, which includes a portion of the bottom forward of amidships, combined with historical shipbuilding treatises and iconography, allowed Castro to create a reconstruction of the ship's original shape and dimensions. Further research will include the construction of models to test hull strength and hydrodynamic properties (Castro and Fonseca 2006). Recently, another possible Portuguese East Indiaman has been investigated at Oranjemund, Namibia. This site is located in a high-energy environment just offshore. Investigations in 2008 revealed portions of the ship's hull and tin, lead, and copper ingots. Numerous personal artifacts were also found. Coins from the wreck suggest that the ship sank shortly after 1525; based on this, the vessel has been tentatively identified as the Indiaman *Bom Jesus*, lost on its outbound voyage in 1533 (Werz 2010). Additional research is planned for the near future.

The Oranjemund Shipwreck highlights the potential that the southern Atlantic coast of Africa holds for examining European merchant vessels lost while voyaging to or returning from Asia. In addition to Portuguese vessels, Dutch East Indiamen regularly followed a similar route around the Cape of Good Hope. One of the first VOC ships to be investigated in South African waters was the *Meresteyn*, lost in 1702 at Saldanha Bay, north of Cape Town. Unfortunately for archaeology, the site was looted following its discovery in 1971. Archaeologists did, however, have the opportunity to record some artifacts before they were auctioned (Marsden 1976). These consist primarily of small arms equipment and personal possessions which, lacking context, provide little in the way of data regarding life aboard the ship. Cases such as the looting of the

Meresteyn helped increase public awareness of the need to protect historic shipwrecks in South Africa. When sport divers discovered two other VOC shipwrecks, those of the *Oosterland* and *Waddinxveen*, at Table Bay in the 1980s, they reported them to the appropriate authorities. As a result, archaeologists had the opportunity to examine these ships, which were sunk in a storm in May 1697 while on their return voyage to Europe. To date, scholarly research has included interdisciplinary investigations by archaeologists, oceanographers, geologists, botanists, and other specialists (Werz 2009).

One of the best VOC shipwreck sites in Atlantic waters is that of the *Mauritius*, which sank in the Gulf of Guinea on its return voyage in 1609 (L'Hour et al. 1990). The wreck was discovered in 1985 and excavated in 1986. Excavations revealed that a section of the hull, approximately 15 m × 6 m, survived. Extant structure includes portions of the keel, 24 floors, 22 first futtocks, outer hull planking, ceiling planking, and pine sheathing that once protected the outer hull. Evidence for timbers that have now vanished is preserved as well; for example, bolts protruding into the interior at the floor – first futtock overlap – show that the ship originally had footwales to provide extra strength at the turn of the bilge. *Mauritius*' hull is significant because it provides an example of a double-planked East Indiaman. The inner layer of hull planking was treenailed to the frames, while the outer layer was fastened to the inner with nails. Lead sheathing was sandwiched between the two layers of planking. About 122 t of zinc ingots, peppercorns, and Chinese porcelain provide evidence for the types of cargo transported back to Europe aboard a returning Indiaman.

At least seven VOC wrecks have been identified in British waters; of these, five can be considered to be Atlantic sites. The Dutch East Indiamen *Lastdrager* (1653), *Kennemerland* (1664), and *De Liefde* (1711) were all lost in the Shetland Islands. The bow section of *Lastdrager* was salvaged in the 1970s and some 3,000 artifacts recovered (Stenuit 1974), but unfortunately, these were sold at auction and so lost to scholarly examination. The *Kennemerland* site was the subject of a long-term study by the noted British maritime archaeologist Keith Muckelroy (Muckelroy 1978). Muckelroy's analyses focused on determining the types of information that could be contained within highly scattered wreck sites, along with developing methodologies for the best ways to study such sites. Muckelroy also utilized the *Kennemerland* site in a seminal examination of formation processes at underwater sites. Like *Kennemerland*, *De Liefde* represents a scattered wreck site. Excavations in the 1960s, however, revealed a highly varied collection of artifacts, including gold, silver, and copper coins, small arms, ceramics, utensils, and personal items (Bax and Martin 1974). The wreck of the VOC ship *Adelaar*, which sank in the Outer Hebrides Islands in 1728, has also been investigated (Martin 2005). Like the wrecks in the Shetlands, the *Adelaar* site was highly scattered due to the dynamic nature of the wreck site. As at the *Kennemerland* site, however, investigations revealed that meaningful archaeological patterns were still present. These sites have helped to counter the argument advanced by treasure hunters that shipwrecks located in dynamic environments cannot provide useful archaeological data and thus should be allowed to be salvaged. A final VOC shipwreck in British Atlantic waters, the *Hollandia*, wrecked in the Isles of Scilly in 1743. The site was located in 1971 and subsequent excavations undertaken (Cowan et al. 1975). *Hollandia* was outward bound when it went down, and the finds from the wreck include over 35,000 silver coins. Marsden (1978) has discussed the significance of the finds of coinage from outward-bound VOC ships such as *Hollandia*, *De Liefde*, and *Amsterdam* (which wrecked near Hastings in 1749). Far from being merely treasure, the coins from the sites such as these provide evidence for a key economic system in eighteenth-century Europe. The Dutch East India Company paid for Asian goods with coinage that they had to secure in turn primarily from Spanish sources in the New World. Marsden shows that further study of VOC shipwrecks is needed in order to illuminate the complex economic interactions that enabled this system to work. Marsden's study offers strong evidence for the

need to examine coinage from shipwreck sites archaeologically rather than viewing it simply for its monetary value.

Atlantic global commerce included not only goods but also the unfortunate transportation of human cargoes. It is estimated that more than ten million Africans were forcibly transported across the Atlantic and sold into slavery in the New World. Maritime archaeologists have yet to investigate this trade to the same degree as historians. One site that is currently undergoing study is the slave ship *Trouvadore*, which wrecked in 1841 off East Caicos in the Turks and Caicos Islands (Leshikar-Denton 2010a: 638). When it sank, *Trouvadore* was carrying nearly 200 African slaves; the majority of these landed safely on the Turks and Caicos Islands, where many descendants live to this day. The *Trouvadore* site was discovered in 2004 and has been investigated by Ships of Discovery and the Turks & Caicos National Museum. Site interpretation involves working with the local islanders to investigate, interpret, and present a site that may provide key for shedding light on a dark chapter in maritime history.

European expansion was accompanied by naval warfare, as nations sought to build empires, protect trade, and threaten the commerce of rivals. Maritime scholars have examined the archaeology of Atlantic naval warfare at numerous sites. Wrecks from the 1588 Spanish Armada (Martin and Parker 1999) have revealed how the Spanish fleet suffered from a variety of problems, such as inferior cannon that were not well-suited to warfare at sea. Other significant Atlantic naval sites investigated through maritime archaeology include the British frigate *Dartmouth* (Adams 1974), HMS *Maidstone* (de Maisonneuve 1992), and the CSS *Alabama* (Watts 2007). To date, most studies of warships have been site specific and concerned largely with examining famous vessels. Sites such as the Spanish vessel *Salvador*, however, which was lost off the coast of Uruguay in 1812 while transporting troops to quell a revolt (Nasti 2001), highlight the potential that maritime archaeology has for addressing issues such as colonialism, which has significance to the wider field of archaeology.

Treasure Hunting and Heritage Protection

While looting of archaeological sites on land remains a problem throughout the world, nowhere is this problem more apparent than on underwater sites. Since the beginning of the field, maritime archaeologists have waged a constant struggle with treasure hunters who seek to exploit underwater sites for commercial gain, on the one hand, and a public that often does not understand the distinction between legitimate archaeology and treasure salvage or the need to protect underwater archaeological sites on the other hand. While destruction of underwater sites by treasure hunting is a worldwide problem, some of the key battles, and some of the most recent developments concerning the protection of underwater cultural resources, have occurred in the Atlantic. Many of the wrecks discussed above were looted before archaeologists arrived on the scene. In other cases, treasure salvors have been granted legal access to shipwrecks, and thus the exploitation and dispersal of these sites has occurred perfectly legally. One such case from the Atlantic Ocean is the pirate vessel *Whydah*, which sank off Cape Cod, Massachusetts, in 1717. Despite the attempts of authorities to provide for proper archaeological procedures, the *Whydah* episode resulted in a debacle, as archaeologists were not able to perform their duties to satisfactory standards (Elia 1992).

The problem of treasure hunting has been complicated by the difficulty in finding a legal framework to protect underwater archaeological sites. The 1982 Law of the Sea Convention specifies that coastal states have control over cultural resources located in their Territorial Seas (up to 12 nautical miles from the coast) and Contiguous Zones (up to 24 nautical miles). Beyond this, coastal states may claim rights to an Exclusive Economic Zone that extends out to 200 nautical miles; some nations have also claimed rights out to the limits of the continental shelf. In these areas, however, the Law of the Sea provides no explicit protection for cultural resources. Thus, any archaeological sites beyond 24 nm have no legal protection under the Law of the Sea and can be exploited by anyone with the capability to do so. Technological developments in deep sea

exploration have made these deepwater sites ever more accessible to treasure hunters. In 1987, for example, the Columbus-America Discovery Group led by Tommy Thompson discovered the wreck of the steamship *Central America*, which lay some 200 miles off the coast of South Carolina in approximately 2,400 m (8,000 ft) of water (Kinder 2009). ROVs were used to locate and subsequently salvage the wreck, which went down in a storm in 1857 while carrying 21 t of gold. Salvage efforts recovered an estimated $100–150 million in gold, along with myriad other artifacts. Although the salvagers specifically stated that scientific knowledge was one of the goals of the project, this has yet to materialize; instead, the recovered gold is offered for sale. A similar story comes from another Atlantic shipwreck, the steamer *Republic*, which sank about 100 miles off the coast of Georgia in 1865 with a cargo of gold and silver coins (Vesilind 2005). The wreck was discovered in 2003 by US-based Odyssey Marine Exploration, Inc., who salvaged an estimated $75 million in coinage from the site. Like the *Central America* salvors, Odyssey claims to be conducting archaeological research, but it is clear that commercial exploitation remains the company's chief goal; Odyssey offers *Republic* artifacts, including coins, bottles, and chunks of coal, for sale on its website. Whether or not such groups record and publish sites to archaeological standards, the commercial nature of these enterprises contradicts the ethical principles of archaeological bodies such as the Society for Historical Archaeology (SHA) and Society for American Archaeology (SAA).

Projects such as the *Central America* and *Republic* have been allowed to occur because, until recently, there was no legal framework for preventing the exploitation of underwater sites located beneath the high seas. This bleak picture for the future of Atlantic maritime archaeology, however, has been lessened somewhat in recent years by the adoption of the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage (Leshikar-Denton 2010b). The Convention entered into force in January 2009, when 20 nations had signed it. To date, 40 nations, including 16 that border the Atlantic, have signed the Convention. The 2001 Convention provides standards for the protection of underwater cultural heritage, defined as "all traces of human existence having a cultural, historical, or archaeological character which have been partially or totally underwater, periodically or continuously, for at least 100 years." Unlike the Law of the Sea Convention, the 2001 UNESCO Convention thus embraces the protection of all underwater sites, regardless of geographical location. It remains to be seen how well the Convention can be enforced on the high seas, but the agreement is a definite step forward in cooperation between nations to protect submerged cultural resources. The Convention also contains standards for the proper study of underwater resources; these include properly trained maritime archaeologists, a preference for in situ preservation and noninvasive methodologies, and a prohibition against exploiting underwater sites for commercial gain. Some notable maritime nations, such as the United States and the United Kingdom, are not signatories, but in the case of the former, government cultural resources managers are finding ways to implement the Convention's rules into their policies (Varmer et al. 2010).

Another way to protect underwater cultural heritage is by designating special geographical areas as protected zones. The United States' National Marine Sanctuaries Act provides a model for such legislation. The NMSA provides for the protection of natural and cultural resources in certain designated areas. At each sanctuary, officials are responsible for inventorying and managing shipwrecks and other submerged cultural resources located within the bounds of each sanctuary. The first sanctuary officially designated under the NMSA was the USS *Monitor* National Marine Sanctuary, designated to protect the site of that Civil War ironclad shipwreck off the coast of North Carolina in 1975. Two others, Gray's Reef National Marine Sanctuary (1981) and Stellwagen Bank National Marine Sanctuary (1992), have been created off the US Atlantic seaboard. The NMS program represents a highly effective strategy for preserving maritime heritage for future generations.

Future Directions

Maritime archaeological work in the Atlantic Ocean to date has been primarily focused on the topics discussed above, but as the field of maritime archaeology evolves, new perspectives continually emerge.

Deepwater Archaeology

Given the amount of maritime traffic throughout history, deepwater fieldwork will no doubt become an important part of future maritime archaeological work in the Atlantic. The discovery of the world's most famous shipwreck, the RMS *Titanic*, in 1985 at a depth of 3,800 m (c. 12,500 ft) sparked worldwide interest but has resulted in little archaeological work to date. As the wreck lies in international waters, rights to the wreck were granted to RMS Titanic Inc., which has subsequently conducted salvage operations at the site. According to the company's website (rmstitanic.net), more than 5,000 artifacts have been raised. This work, along with that of other salvage companies, has resulted in damage to parts of the site and the removal of artifacts without proper archaeological recording and with little regard for site preservation issues. Pleas by archaeologists finally resulted in collaboration between RMS Titanic, the Institute of Nautical Archaeology (INA), the National Oceanic and Atmospheric Administration office of National Marine Sanctuaries, the National Park Service's Submerged Resources Center, Woods Hole Oceanographic Institute, and other groups (Delgado 2010). Under the archaeological direction of maritime archaeologist James Delgado, RMS Titanic mounted an expedition in 2010 to map the *Titanic* site using sonar and 3D optical imagery. This information will be used to develop the first archaeological plan of the entire wreck site.

Issues raised by the *Titanic* experience – site access, resource sustainability, and site management – will apply to other deepwater archaeology projects in the Atlantic for years to come. Already, other famous shipwreck sites, such as the World War II German battleship *Bismarck* and HMS *Hood*, have been located, and more discoveries are sure to follow. Maritime archaeologists have not yet reached a consensus regarding how best to conduct deepwater research. Treasure salvors argue that such research cannot be performed by archaeologists because of the skills, expenses, and equipment involved and have thus pushed for collaboration between commercial salvage companies and archaeologists. These claims have been elegantly countered, however, by maritime archaeologist Jonathan Adams (2007), who notes that cooperation is incompatible because archaeologists are bound by ethical standards not to exploit artifacts for commercial gain and because archaeologists do indeed have the potential to carry out deepwater projects. Adams cites successful deepwater archaeological work in the Mediterranean and Black Seas in support of his arguments and urges archaeologists to integrate future deepwater research into the types of international research and management plans advocated by the 2001 UNESCO Convention. This seems the most sensible course. A key goal for deepwater research in the Atlantic is for maritime archaeologists to convince the public, who often do not understand the differences between treasure hunters and archaeologists, that deepwater shipwrecks represent finite resources that should be managed for the benefit of all rather than being exploited for the profit of a few.

Prehistoric Underwater Archaeology

In recent decades archaeologists have come to realize that much valuable data concerning prehistoric habitation sites and the spread of humans around the globe lies under water. Eustatic sea level rise at the end of the Pleistocene resulted in the inundation of many prehistoric coastal sites, which now lie submerged on the continental shelves. Until recently, most interest in submerged prehistoric sites has come from prehistoric terrestrial archaeologists. Maritime archaeologists, with their specialized knowledge in underwater archaeological methodology and access to high-tech underwater surveying equipment, however, have the potential to make significant contributions to the study of submerged prehistoric settlements and coastal migration routes. To date, most such research in the Atlantic has been conducted off the

coasts of North America and Europe (Benjamin et al. 2011; Gusick and Faught 2011). Such research typically has two main thrusts: (1) the reconstruction of submerged paleolandscapes and (2) the identification of paleoshorelines. A primary goal is to develop predictive models for locating submerged prehistoric sites, which can then be studied using underwater archaeological techniques. Because of the nature of this work, research into submerged prehistoric landscapes typically involves interdisciplinary collaboration between maritime archaeologists and other specialists such as geoarchaeologists, marine scientists, and geologists. In the coming years, research into this area should help refine scholarly understanding of issues such as the peopling of the Americas.

Maritime Cultural Landscapes

The last two decades of maritime archaeology have witnessed a surge of interest in the "maritime cultural landscape" approach, an idea promulgated by Swedish maritime archaeologist Christer Westerdahl (1992). The maritime cultural landscape approach advocates studying shipwrecks as part of the cultural systems that produced them rather than as isolated sites. Such an approach is well-suited to future work in the Atlantic basin, which consists of a mosaic of diverse, overlapping, interconnected systems. Several recent projects in the Atlantic serve as guideposts for future work in looking beyond shipwrecks to wider cultural processes. One innovative study utilized data from the sloop of war HMS *Swift*, lost off the coast of Patagonia, Argentina, in 1770, to examine British actions in a colonial context (Dellino-Musgrave 2006). The study used artifacts excavated from the wreck site, primarily pottery, to illuminate the ways that material culture was used to express status relations and maintain a sense of "Britishness" in a colonial setting. Archaeologist Richard Gould, long a proponent of using shipwrecks to examine cultural processes, has interpreted the wreck of the nineteenth-century barque *North Carolina* as a possible crime scene (Gould 2005). *North Carolina* went aground on Bermuda under suspicious circumstances on January 1, 1880. Archaeological fieldwork revealed discrepancies between the material culture evidence and historical accounts of the sinking. Gould concludes that these may represent evidence that the vessel was deliberately wrecked, possibly with the intent to collect insurance money. A final recent project that takes maritime archaeological interpretation beyond the site is the study of the *H.L. Hunley* and USS *Housatonic* naval battlefield (Conlin and Russell 2006). In 1864, *Hunley* sank *Housatonic* in the Atlantic Ocean just off Charleston, South Carolina, becoming the first submarine to sink an enemy vessel in combat. Unfortunately for the crew of the *Hunley*, the submarine sank soon after fatally damaging the union warship. Following its discovery in 1995, the *Hunley* was raised; as part of the overall research project, the *Housatonic* and surrounding area have been examined as well. Maritime archaeologists utilized methodology adapted from that pioneered by historical archaeologists on battlefield sites such as the Little Bighorn. This approach views the entire site as a landscape, the features and artifacts of which can reveal information regarding the progress of the battle. In this case, the battlefield survey helped provide a greater understanding of the engagement between *Hunley* and *Housatonic* than that provided solely by historical accounts.

Cross-References

- ▶ Caribbean Maritime Archaeology
- ▶ Maritime Landscapes
- ▶ Pacific Ocean: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ Society of the Ship
- ▶ Submerged Prehistoric Landscapes

References

Adams, J. 1974. The *Dartmouth*, a British frigate wrecked off Mull, 1690. *International Journal of Nautical Archaeology* 3: 269–274.

Adams, J. 1985. *Sea venture*: A second interim report – Part I. *International Journal of Nautical Archaeology* 14: 275–299.

Adams, J. 2007. Alchemy of science? Compromising archaeology in the deep sea. *Journal of Maritime Archaeology* 2: 48–56.

Bax, A., and C.J.M. Martin. 1974. *De Liefde*: A Dutch East Indiaman lost on the Out Skerries, Shetland, in 1711. *International Journal of Nautical Archaeology* 3: 81–90.

Benjamin, J., C. Bonsall, A. Fischer, and C. Pickard, eds. 2011. *Submerged prehistory*. Oxford: Oxbow Books.

Castro, F. 2003. The Pepper Wreck, an early 17th-century Portuguese Indiaman at the mouth of the Tagus River, Portugal. *International Journal of Nautical Archaeology* 32: 6–23.

Castro, F. 2005. *The Pepper Wreck: A Portuguese Indiaman at the mouth of the Tagus River*. College Station: Texas A&M University Press.

Castro, F. 2007. Rising and narrowing: 16th-century geometric algorithms used to design the bottom of ships in Portugal. *International Journal of Nautical Archaeology* 36: 148–154.

Castro, F., and N. Fonseca. 2006. Sailing the Pepper Wreck: A proposed methodology for understanding an early 17th-century Portuguese Indiaman. *International Journal of Nautical Archaeology* 35: 97–103.

Conlin, D.L., and M.A. Russell. 2006. Archaeology of a naval battlefield: *H.L. Hunley* and USS *Housatonic*. *International Journal of Nautical Archaeology* 35: 20–40.

Cowan, R., Z. Cowan, and P. Marsden. 1975. The Dutch East Indiaman *Hollandia* wrecked on the Isles of Scilly in 1743. *International Journal of Nautical Archaeology* 4: 267–300.

Delgado, J. 2010. *Titanic* blog. Available at: http://inadiscover.com/blogs/titanic-blog/. Accessed 15 Dec 2010.

Dellino-Musgrave, V. 2006. *Maritime archaeology and social relations: British action in the southern hemisphere*. New York: Springer.

De Maisonneuve, B. 1992. Excavation of the *Maidstone* a British man-of-war lost off Noirmoutier in 1747. *International Journal of Nautical Archaeology* 21: 15–26.

Elia, R. 1992. Ethics of collaboration: Archaeologists and the *Whydah* project. *Historical Archaeology* 26: 105–117.

Garcia, C., and P. Monteiro. 2001. The excavation and dismantling of Angra D, a probable Iberian seagoing ship, Angra bay, Terceira Island, Azores, Portugal. Preliminary assessment. In *Proceedings of the international symposium on archaeology of medieval and modern ships of Iberian-Atlantic tradition*, ed. F.J.S. Alves, 431–447. Lisbon: Instituto Portugués de Arqueologia.

Gould, R. 2005. The wreck of the barque *North Carolina*, Bermuda, 1880: An underwater crime scene? *American Antiquity* 70: 107–128.

Grenier, R., M.-A. Bernier, and W. Stevens, eds. 2007. *The underwater archaeology of Red Bay: Basque shipbuilding and whaling in the 16th century*. Ottawa: Parks Canada.

Gusick, A.E., and M.K. Faught. 2011. Prehistoric archaeology underwater: A nascent subdiscipline critical to understanding early coastal occupations and migration routes. In *Trekking the shore: Changing coastlines and the antiquity of coastal settlement*, ed. N.F. Bicho, J.A. Haws, and L.G. Davis, 27–50. New York: Springer.

Keith, D.H. 1988. Shipwrecks of the explorers. In *Ships and shipwrecks of the Americas: A history based on underwater archaeology*, ed. G.F. Bass, 45–68. London: Thames & Hudson.

Keith, D.H., J.A. Duff, S.R. James, T.J. Oertling, and J.J. Simmons. 1984. The Molasses Reef wreck, Turks and Caicos Islands, B.W.I.: A preliminary report. *International Journal of Nautical Archaeology* 13: 45–63.

Kinder, G. 2009. *Ship of gold in the deep blue sea: The history and discovery of the world's richest shipwreck*. New York: Grove Press.

Lamb, W.R. 1988. *The provenance of the stone ballast from the Molasses Reef wreck*. Unpublished M.A. dissertation, Texas A&M University.

Leshikar-Denton, M. 2010a. Caribbean maritime archaeology. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 629–659. Oxford: Oxford University Press.

Leshikar-Denton, M. 2010b. Cooperation is the key: We can protect the underwater cultural heritage. *Journal of Maritime Archaeology* 5: 85–95.

L'Hour, M., L. Long, and E. Rieth. 1990. The wreck of an "experimental" ship of the "Oost-Indische Companie": The *Mauritius* (1609). *International Journal of Nautical Archaeology* 19: 63–73.

Marsden, P. 1976. The *Merestyn*, wrecked in 1702, near Cape Town, South Africa. *International Journal of Nautical Archaeology* 5: 201–219.

Marsden, P. 1978. A reconstruction of the treasure of the *Amsterdam* and the *Hollandia*, and their significance. *International Journal of Nautical Archaeology* 7: 133–148.

Martin, C.J.M. 2005. The *Adelaar*: A Dutch East-Indiaman wreck in 1728 off Barra, Outer Hebrides, Scotland. *International Journal of Nautical Archaeology* 34: 179–210.

Martin, C.J.M., and G. Parker. 1999. *The Spanish Armada*. Manchester: Manchester University Press.

Muckelroy, K. 1978. *Maritime archaeology*. Cambridge: Cambridge University Press.

Nasti, A. 2001. Recovery and conservation of navigational instruments from the Spanish troopship Salvador which sank in 1812 in Maldonado Bay, Punta del Este, Uruguay. *International Journal of Nautical Archaeology* 30: 279–281.

Oertling, T.J. 1989a. The Molasses Reef wreck hull analysis: Final report. *International Journal of Nautical Archaeology* 18: 229–243.

Oertling, T.J. 1989b. The Highborn Cay wreck: The 1986 field season. *International Journal of Nautical Archaeology* 18: 244–253.

Oertling, T.J. 2005. Characteristics of fifteenth- and sixteenth-century Iberian ships. In *The philosophy of shipbuilding: Conceptual approaches to the study of*

wooden ships, ed. F. Hocker and C. Ward, 129–136. College Station: Texas A&M University Press.
Smith, R.C., D.H. Keith, and D. Lakey. 1985. The High-born Cay wreck: Further exploration of a 16th-century Bahaman shipwreck. *International Journal of Nautical Archaeology* 14: 63–72.
Sténuit, R. 1974. Early relics of the VOC trade from Shetland: The wreck of the flute Lastdrager lost off Yell, 1653. *International Journal of Nautical Archaeology* 3: 213–256.
Varmer, O., J. Gray, and D. Alberg. 2010. United States: Responses to the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage. *Journal of Maritime Archaeology* 5: 129–141.
Vesilind, P.J. 2005. *Lost gold of the republic: The remarkable quest for the greatest shipwreck treasure of the civil war era*. Tampa: Shipwreck Heritage Press.
Watts, G.P., Jr. 1993. The Western Ledge Reef wreck: A preliminary report on investigation of the remains of a 16th-century shipwreck in Bermuda. *International Journal of Nautical Archaeology* 22: 103–124.
Watts, G.P., Jr. 2007. Archaeological investigation of the Confederate commerce raider CSS Alabama 2002. Available at: http://www.hnsa.org/conf2004/papers/watts.htm. Accessed 12 Dec 2010.
Werz, B. 2009. *The shipwrecks of the Oosterland and Waddinxveen: 1697, Table Bay*. Johannesburg: Zulu Planet.
Werz, B. 2010. Sub-Saharan Africa's oldest shipwreck: Historical-archaeological research of an early modern era Portuguese merchantman on the Namibian coast. *Mariner's Mirror* 96: 430–442.
Westerdahl, C. 1992. The maritime cultural landscape. *International Journal of Nautical Archaeology* 21: 5–14.
Wingood, A.J. 1982. *Sea Venture*. An interim report on an early 17th century shipwreck lost in 1609. *International Journal of Nautical Archaeology* 11: 333–347.

Atlantic World: Historical Archaeology

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Introduction

Archaeologists have only recently begun to identify their research as part of Atlantic studies (see Kelso 2010) despite the Atlantic World being a central focus of the subfield of historical archaeology since its inception. This being the case, the research carried out by archaeologists of the Atlantic World has been, and continues to be, categorized under a number of studies falling within several discrete subfields, such as colonial, indigenous, contact era, African Diaspora, New World, and a host of other "archaeologies," within the larger field of historical archaeology in the Americas, parts of Western Europe, and West and Southern Africa. Because a specific "Archaeology of the Atlantic World" was not a distinct research focus in the early years of historical archaeology, nor has it emerged as a discrete area of study despite a growing interest, defining it now requires an examination of a number of disparate research agendas.

The earliest explorations of "historic" sites as part of the new historical archaeology emerging in the 1950s were conducted at sites such as Jamestown and Williamsburg, known and memorialized for their strong associations with the founding of the United States as well as European expansion and settlement in the New World, and not as part of a broader agenda to examine the Atlantic World. Those archaeologists that did use the term "Atlantic World" in describing their work sought to designate a specific time frame within the larger field of historical archaeology, rather than a particular subject matter or research agenda. As the field of historical archaeology was developing, emphasis was placed on defining this historical period, characterized by both European contact and settlement of the Americas, beginning at the end of the fifteenth century, with the voyages of Columbus, and extending into the present. It can be argued that much of historical archaeology was, and remains, largely Atlantic World archaeology, and this is primarily due to the subject's early thematic focus and its strong emphasis on trans-Atlantic interactions. This is not only seen in both early and current research at Jamestown and Williamsburg but in some of the earliest investigations in the Caribbean as well (see Deagan in Kelso 2010). Just as the discipline of historical archaeology had trouble defining its subject in the early days, those explicitly studying the Atlantic World have had similar difficulties including the denotation of discrete regional and

temporal boundaries, although these debates have largely been the domain of historians (Bailyn 2005).

Definition

An immediate predecessor of the industrial age, the Atlantic era is concurrently referred to as the "postmedieval," "early modern," and "capitalist world" by historical archaeologists depending on their own national background and training. A single, explicit definition of what the Atlantic World was is not possible, largely as a result of the number of areas and powers involved in trans-Atlantic commerce over the course of roughly four centuries. While there is no single, all-encompassing definition of the scope, size, and period of the Atlantic World, those studies attempting to define a general framework have largely fallen under the purview of historians (Bailyn 2005). Most historians of Atlantic history agree that "during a significant chunk of time, extending at least from 1500 through 1800, the Atlantic World—which is to say, Western Europe, the Americas, and West Africa—was sufficiently integrated. . ." (Coclanis 2007: 113), thus requiring an integrative research agenda that highlights the connections, responses, and consequences of this integration in a unitary fashion. Following this definition, in the broadest sense, the period of the Atlantic World begins in the mid-fifteenth century with European exploration in West Africa and ends sometime in the mid- to late nineteenth century with the advent of the industrial age in Europe, in addition to the period of abolition of slavery in the Americas. As a historical concept, the term "Atlantic World," therefore, refers to those regions with a shore on the Atlantic Ocean and their historical interconnectedness or integration, through maritime exchange that brought about cultural encounters and in turn the mass movement of people between these areas. The latter was spearheaded by European efforts at commerce and colonization, initially in Africa and later in the Americas, including the early period of indentured servitude in the Caribbean and Chesapeake, for example, followed by the era of the trans-Atlantic slave trade throughout the Atlantic sphere. Colonization as part of the early Atlantic is also considered in Ireland.

In the most basic geographical sense, the Atlantic World comprises all coastal regions of Europe, Africa, and the Americas physically connected by the Atlantic Ocean. Additionally, the areas of the Americas and Africa that are often included in studies of the Atlantic World by researchers may include associated interior regions but are limited by historical incorporation into various European colonial ventures. Attempts to restrict the geographical and temporal boundaries of this period are further complicated by the various stages of Atlantic development tied to the dominance of successive European powers throughout its existence. The initial period begins with Portuguese ventures in West Africa culminating with their rivalry with the Spanish in South America. Immediately on their heels were the Dutch, English, and French as well as an array of smaller players, such as the Danes, all seeking their own territories in Africa and the Caribbean, as well as in continental North and South America. Thus, within the Atlantic World, researchers have highlighted a series of smaller "Atlantics" tied to European nationalistic ventures culminating in colonial boundaries. This is most aggressively seen in the English-French rivalry in the Caribbean and West Africa.

Historical Background

Historical archaeology of the Atlantic World began with historic sites archaeology in the United States in the mid-twentieth century. Drawing on the earlier definitions of J. C. Harrington and Bernard Fontana, who were among the pioneers in this field, Robert Schuyler (1970: 84) later defined the field's focus as "the expansion of European culture into the non-European world starting in the fifteenth century and ending with either, industrialization or the present, depending on local conditions." Some of the first historical sites investigated in the United States were in Virginia, for example, Jamestown, and represented some of the earliest moments of

English commercial expansion. Even though Schuyler (1970: 85) states that the field's subject matter may begin as early as 1415, with the "Portuguese penetration of Africa," he addresses the fluid nature of this period noting that the regions subject to European expansion geographically "fluctuated from decade to decade" and the fact that the bulk of the initial studies classified as historic sites archaeology were carried out in the United States and more particularly the southeast (e.g., the work of Ivor Noël Hume in Virginia). Hence, as a field, historical archaeology began with an emphasis on European exploration in the New World demonstrating a distinctly Americanist perspective (Gilchrist 2005). These early projects highlighted the United States' beginnings and the experience of settlers and colonists in a foreign land yet specifically addressed their successes, failures, and resourcefulness in creating the larger Atlantic World.

This early perspective led to an emphasis on the English Atlantic sphere, while little attention was given to other European groups or indigenous communities (Deagan 1982: 161–162). Another definition addressing historical archaeology's focus in the Atlantic World era was presented by James Deetz. While Americanist in perspective, this definition is slightly less Eurocentric in nature. In it the author describes the field as "the archaeology of the spread of European cultures throughout the world since the fifteenth century, and its impact on the indigenous people" (Deetz 1977: 5). In the revised text, Deetz (1996: 5 emphasis added) altered the latter half of this statement to read "and *their* impact on *and interaction with the cultures of indigenous peoples*." This amended statement recognizes that both "European" and "indigenous" people are not monolithic entities, and as such, there were multiple experiences of contact and interaction throughout the Atlantic era. Additionally, it reflects a growing trend within historical archaeology to define a more global subject matter, thus opening a dialogue between archaeologists in the Americas, Europe, and parts of Africa (e.g., Falk 1991).

The emergence of historical archaeology in Europe postdates studies in the United States, even though the subject matter roughly corresponds with the era of the Atlantic trade, including its regional focus in the United Kingdom. Its designation as "Post Medieval" has had a tendency to marginalize its practitioners from the larger debates within global historical archaeology (Gilchrist 2005: 330), resulting in the gradual integration of the two perspectives. Attempts have been made to unite the field around investigations that largely fall within Atlantic studies (e.g., Egan and Michael 1999; Horning and Brannon 2009). Here again, the experience of the European has been the primary focus of study, as well as the impact and introduction of new commodities from the Americas and West Africa on European society.

Key Issues and Current Debates

Research within historical archaeology has moved from the sites of major events and influential men, like the homes of Thomas Jefferson, George Washington, and James Madison, to include the local or everyday lives of the invisible masses residing on these properties, as well as within urban spaces, examining topics of race, ethnicity, gender, and economic marginalization through multi-scalar perspectives. In fact, many of the debates that permeate historical archaeology as a whole are magnified within those focusing on the Atlantic era, notably those surrounding race or racialization (e.g., Orser 1996). This is also reflected in current research being carried out within Atlantic World studies as a whole. More specifically, there is an emerging emphasis on indigenous experiences and successes within the Atlantic. This is seen in studies of Native American communities when approached from an indigenous rather than a settler's perspective (Blanton and King 2004) and in investigations of indigenous trading communities in West Africa (DeCorse 2001).

Archaeologists have also followed the lead of Atlantic historians in defining the various "Atlantics" that coexisted. These are defined by a group of people sharing ethnic or national origins, a region, or a nation and its colonial or mercantile

empire. Likewise, the indigenous spheres of interaction are also receiving greater attention. The most explicit example of this is the recent attempt to construct a dialogue between historical archaeologists working on Atlantic period sites in Africa and contemporary African Diaspora sites in the Americas (Ogundiran and Falola 2007; Gijanto and Horlings 2010). Most importantly, archaeological investigations of Atlantic era sites in West Africa have significantly increased since the 1990s (e.g., DeCorse 2001; Monroe and Ogundiran 2012; Gijanto 2016). Other attempts at defining various Atlantics along nationalistic or imperial lines are less overt but nonetheless can be found in studies of the Irish (Orser 1996: 89–105; Horning in Kelso 2010) and, more recently, the Spanish and Portuguese (Funari and Senatore 2015), for example. Regional approaches that examine multiple people include those focusing on North America and South America, with a particular emphasis on Brazil as part of an Iberian Atlantic (e.g., Funari 2006; Deagan in Kelso 2010), or the Caribbean and its British and French regions (e.g., Kelly and Hardy 2011). In addition to terrestrial investigations, maritime archaeologists working within historical archaeology have investigated a number of Atlantic era sites in the United States (the *La Belle* by Texas A&M), the Caribbean (most famously Port Royal, Jamaica), and more recently in Africa including Ghana (The *Elmina* Wreck by Syracuse University) and South Africa (George Washington University's collaborative Southern African Slave Wrecks Project).

Beyond attempts to investigate regions or types of Atlantics, the approach taken by archaeologists considers a range of analytical models primarily aimed at understanding identity within specific socioeconomic spheres of interaction. This includes the work by Stephan Silliman (2009) on the northeastern Pequot in the United States, which presents a new perspective on the colonial experience through a postcolonial lens. This and other works investigate what it means to be "indigenous" and how this changes through the course of the Atlantic World era through interaction, trade, and at times subjugation. These issues are addressed by Silliman by utilizing theories of memory and highlighting the lived experience of everyday life by drawing on practice and agency theories.

International Perspectives

The large geographical expanse, involvement of multiple communities, and emphasized relationships between native and European communities have prompted historians and historical archaeologists to approach the Atlantic World in a variety of ways as discussed above. Though drawing primarily on geographical positioning, the connections formed between these regions through maritime travel, colonialism, immigration, and the slave trade manifested in strong political and cultural ties formed through commerce and exploration. The earliest archaeological excavations carried out as part of historical archaeology, or historic sites archaeology as it was originally named, were conducted at sites tied to discovery and early settlement by Europeans in the United States like Plymouth, Massachusetts, and Williamsburg, Virginia. In general, historical archaeology has been defined by its practitioners by its subject matter – namely, sites of European contact in the New World. While the former view of the Atlantic is consequently created from a New World perspective tied to mercantile conquest, in British archaeology this period falls under the umbrella of postmedieval studies including the development of the plantation system in Ireland in the seventeenth century (see Horning in Kelso 2010). In reaction to the restrictive nature of the Americanist-driven definition of the field, archaeologists have identified this period as a subject for historical archaeologists who employ concepts that are much more global in nature, such as the notions of the "Modern" (Johnson 1995) or "Capitalist" (Orser 1996) World. Both conceptions incorporate the period of the Atlantic World, though each extends the subject matter of the field into the late nineteenth and twentieth century. The emphasis on the spread of capitalism put forth in Matthew Johnson's (1995) and Charles Orser's (1996) formulations is in line with the idea of a modern world-system, originally formulated by

Immanuel Wallerstein (1974), that emerged as a result of European trans-Atlantic commerce. All of these research agendas have been criticized for their Eurocentric bias and particularly the emphasis they place on European experiences in, and their conquering of, the New World and parts of Western and Southern Africa. This includes the expansion of capitalism – deemed a European invention – and the decline of local polities in the Americas and in Africa. The recognition that maritime exploration did create the Atlantic, many argue, should not overshadow the experiences of local communities throughout the Americas and Africa in creating the Atlantic World. It is this point that historical archaeologists have been grappling with since they began to define the focus of their field.

To some extent, studies of culture contact and colonial encounters in the United States represent a move away from a focus on European settlement toward an understanding of the impact of this on indigenous populations. As Deetz indicates, this was a key topic of inquiry in historical archaeology, and many of the early studies argued for a loss of native culture. More recently, emphasis has shifted to include consideration of indigenous responses and reactions within colonial encounters in more active terms, through acts of resistance, cultural resilience, and hybridity. Furthermore, archaeologists from Europe, parts of Africa, the Caribbean, and Brazil in addition to the United States have begun to examine local interpretations of the capitalist system driving the Atlantic World. A prominent example of the shift away from the "European experience" within the United States is the subfield of African Diaspora archaeology which focuses on sites associated with populations of African descent in the Americas (and even some in Africa). African Diaspora archaeology's subject matter begins with the trans-Atlantic slave trade and continues into the twentieth century, yet the period that falls under the purview of the Atlantic World is usually considered to begin with the initial arrival of Africans in Maryland and Virginia in the seventeenth century and ends with the abolition of slavery in different areas of the Americas (see Fennell, Chan, Weik, Hauser, and Schávelzon in Ogundiran and Falola 2007). Outside of the United States, various Caribbean Islands have received equal attention with a particular emphasis on plantations and Maroon sites (see Haviser 1999) as well as spheres of African-European interaction in West and South Africa (see Monroe, Stahl, and Ogundiran in Ogundiran and Falola 2007; see Schrire in Falk 1991; DeCorse 2001).

Future Directions

Currently, Atlantic World archaeology is coming into its own. This is evidenced by the increase in sessions at the *Society for Historical Archaeology* annual meetings explicitly addressing the topic, such as the 2009 session "The French Fishery in Newfoundland: The Trans-atlantic Landscape of an Atlantic Borderland" or the 2010 session "The Chesapeake in the Atlantic World." Most recently, the 2012 meeting included sessions entitled "African Diaspora in Global Context," "Atlantic Connections and New Dimensions of Archaeology at Maryland's Birthplace," and "Conflict and Violence in the Making of the Atlantic World." These examples represent a shift from identifying the Atlantic as a temporal period to a more nuanced approach of connections and relationships between spaces and people. While the Atlantic World has been a topic of interest since the early days of historical archaeology, attempts to develop a pragmatic research agenda and to gather interested researchers for debate and discussion are still in the formative stages (e.g., Kelso 2010 drawing on the 2007 Society for Historical Archaeology Plenary session "Old World, New World, Culture in Transformation").

As seen in the titles listed above, archaeologists are focusing on the connections between regions and how these shaped local experiences in the Atlantic World. Many of these connections are being traced through the consumption of a single class of goods such as Barbara Heath's (2016) recent study examining the cowry shell trade including its use as currency providing a new interpretation of these objects at North American sites. Another tact being taken is the inclusion of studies of the Atlantic World within postcolonial archaeology, highlighting

indigenous experience and the legacy of globalization of colonialism.

What remains to be seen is if a single Atlantic World archaeology will emerge from these inquiries or if the field will remain dissipated within historical archaeology as a whole. What is clear, however, is that the growing interest in historical archaeology in the United Kingdom coupled with the increase of researchers focusing on Atlantic era sites in West Africa is driving the current rise in such investigations.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Funari, Pedro Paulo A. (Indigenous Archaeology)
- ▶ Historic Jamestowne
- ▶ Modern World: Historical Archaeology
- ▶ Noël Hume, Ivor
- ▶ North America (USA): Historical Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Schuyler, Robert L.
- ▶ Southern Africa: Historical Archaeology
- ▶ West and Central Africa: Historical Archaeology

References

Bailyn, B. 2005. *Atlantic history: Concepts and contours*. Cambridge, MA: Harvard University Press.

Blanton, D.B., and J.A. King, eds. 2004. *Indian and European contact in context: The mid-Atlantic region*. Gainesville: University of Florida Press.

Coclanis, P.A. 2007. Re-orienting Atlantic history. In *The Atlantic in global history: 1500–2000*, ed. J. Cañizares-Esquerra and E.R. Seeman, 111–127. Upper Saddle River: Pearson/Prentice Hall.

Deagan, K. 1982. Avenues of inquiry in historical archaeology. In *Advances in archaeological method and theory*, ed. M.B. Schiffer, vol. 5, 151–177. New York: Academic Press.

Decorse, C.R., ed. 2001. *West Africa during the Atlantic slave trade: Archaeological perspectives*. London: Leicester University Press.

Deetz, J. 1977. *In small things forgotten: An archaeology of early American life*. New York: Doubleday.

Deetz, J. 1996. *In small things forgotten: An archaeology of early American life*. 2nd ed. New York: Anchor Books.

Egan, G., and R.L. Michael, eds. 1999. *Old and new worlds*. Oxford: Oxbow Books.

Falk, L., ed. 1991. *Historical archaeology in global perspective*. Washington, DC: Smithsonian Institution Press.

Funari, P.P.A. 2006. Conquistadors, plantations, and Quilombo: Latin America in historical archaeological context. In *Historical archaeology*, ed. M. Hall and S.W. Silliman, 209–229. Oxford: Blackwell.

Funari, P.P.A., and M.X. Senatore, eds. 2015. *Archaeology of culture contact and colonialism in Spanish and Portuguese America*. New York: Springer.

Gijanto, L. 2016. *The life of trade: Events and happenings in Niumi's Atlantic Center*. New York: Routledge.

Gijanto, L., and R. Horlings. 2010. Connecting African diaspora and West African historical archaeologies. *Historical Archaeology* 46 (2): 134–153.

Gilchrist, R. 2005. Introduction: Scales and voices in world historical archaeology. *World Archaeology* 37: 329–336.

Haviser, J.B., ed. 1999. *African sites archaeology in the Caribbean*. Princeton: Marcus Wiener Publishers.

Heath, B. 2016. Cowrie shells, global trade, and local exchange: Piecing together the evidence for colonial Virginia. *Historical Archaeology* 50 (2): 17–46.

Horning, A., and N. Brannon, eds. 2009. *Ireland and Britain in the Atlantic world*. Dublin: Worldwell Ltd.

Johnson, M. 1995. *An archaeology of capitalism*. Oxford: Blackwell.

Kelly, K.G., and M.D. Hardy, eds. 2011. *French colonial archaeology in the Southeast and Caribbean*. Gainesville: University of Florida Press.

Kelso, W.M., ed. 2010. *Archaeology of early European colonial settlement in the emerging Atlantic world*. Rockville: Society for Historical Archaeology.

Monroe, J.C., and A. Ogundiran, eds. 2012. *Power and landscape in Atlantic West Africa: Archaeological perspectives*. Cambridge, UK: Cambridge University Press.

Ogundiran, A., and T. Falola, eds. 2007. *Archaeology of Atlantic Africa and the African diaspora*. Bloomington: Indiana University Press.

Orser, C.E. 1996. *A historical archaeology of the modern world*. New York: Plenum.

Schuyler, R.L. 1970. Historical and historic sites as anthropology: Basic definitions and relationships. *Historical Archaeology* 4: 83–89.

Silliman, S.W. 2009. Change and continuity, practice and memory: Native American persistence in colonial New England. *American Antiquity* 74 (2): 211–230.
Wallerstein, I. 1974. *The modern world-system: Capitalist agriculture and the origins of the European world-economy in the sixteenth century*. Vol. 1. New York: Academic Press.

Further Readings

Leone, M.P., and J.E. Knauf, eds. 2015. *Historical archaeologies of capitalism*. 2nd ed. New York: Kluwer Academic/Plenum Publishers.
Silliman, S.W., and T.A. Witt. 2010. The complexities of consumption: Eastern Pequot cultural economics in eighteenth-century New England. *Historical Archaeology* 44: 46–68.
Singleton, T.A., ed. 1999. *"I, too, am America". Archaeological studies of African-American life*. Charlottesville: University of Virginia Press.

Atoll Archaeology in the Pacific

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Introduction

As islands formed by biogenic agents (unconsolidated carbonate sediments deposited by waves on reef platforms), atolls and table reefs, or low coral islands without lagoons, can be regarded as especially constraining habitats for human settlement. The challenges faced by people, both past and present, include low soil fertility, absence of perennial surface freshwater, and extreme vulnerability to flooding by storm surge and sea-level rise due to low elevation of the highly fragmented landmass, only a few meters above mean sea level. There are about 300 atolls and low coral islands in the Pacific and thousands of individual islets (*motu*). Several archipelagoes are dominated by these limestone islands, such as the Tuamotus, the Central and Eastern Carolines, the Marshall Islands, Kiribati, and Tuvalu.

Because of their small size, limited and at time fluctuating resources, and relative isolation, atolls are often perceived as marginal environments. While some human communities did not endure (Di Piazza and Pearthree 2001), a remarkable number were sustainable for centuries, taking advantage of opportunities many atolls provided and indicating a long history of resilience to environmental variability (Fitzpatrick et al. 2016). Despite these achievements, atolls have received relatively little coverage by Pacific archaeologists.

Definition

Derived from the Maldivian word, *atolu*, atolls are annular-shaped mid-ocean reefs surrounding a central lagoon, open to the sea in at least one place, which have formed on top of subsiding volcanoes, as theorized by Darwin and later confirmed by drilling. These reefs can be divided into several zones and associated marine habitats. Reef platforms that form atolls consist of reefs that reach sea level, notably along the windward margin. The seaward limit of the reef flat is demarcated by a reef crest, commonly an algal rim, and growing upwards of 1 m above low water mark in a high energy environment. Erosion of reef material results in the accumulation of unlithified or poorly consolidated sand or gravel that form *motu*, a Polynesian-derived word which some authors have equated with the term "islet" or dry land that may be isolated or near-continuous. Table reefs or reef islands are single coral islands lacking a lagoon. However, the archaeology of the latter will also be included in this entry.

Historical Background

Although Micronesian and Polynesian atolls have been the focus of detailed ethnographic research since the first half of the twentieth century, archaeological research lagged behind the work carried out on "high" islands. Initially, archaeological coverage was mainly concerned in documenting surface remains, mostly *marae*, or ritual structures

found in other parts of Polynesia. On atolls, these consist of a rectangular court delimited by low enclosing walls or coral slab alignments, with an elevated altar platform at one end. Shrines of various shapes and sizes incorporating coral and shells (giant clams) are also found on several other atolls. Fish traps built from stacked coral boulders can often be seen on the ocean-side reef flat. Another important feature of the landscape is the presence of extensive pits excavated down to the freshwater lens (Ghyben-Hertzberg lens), occasionally reinforced by coral slabs, to cultivate giant swamp taro (*Cyrtosperma merkusii*).

It was assumed that because of resource limitations, atolls must have been settled after better-endowed volcanic islands had been colonized and human populations pushed the limits of their carrying capacity. In view of atoll geomorphological instability, it was also believed that catastrophic events such as cyclones would have resulted in considerable disturbance of cultural deposits.

It was not until the 1960s, with Janet Davidson's (1971) pioneering excavations on the Polynesian Outlier of Nukuoro in the Eastern Caroline Islands, that the existence of in situ stratigraphy was confirmed. During the following two decades, atoll archaeology progressed, with additional coverage of the Caroline and Marshall Islands in Micronesia, due in large part to the expansion of US federally funded historic preservation programs on islands in free association with the USA. Archaeological discoveries in the Carolines further demonstrated that stratified deposits, albeit disturbed in some cases, could still be identified even on atolls and other island types located in the cyclone belt (Intoh 1981; Leach and Ward 1981). As was the case with most of the archaeology at the time, culture history and questions of origin through the study of artifact types dominated the research agenda.

Key Issues/Current Debates

Recent atoll archaeology has attempted to emulate research carried out on other islands in the Pacific, with attention focusing on the interplay between the environment and humans. Historical ecology (Fitzpatrick and Intoh 2009) has emerged as one of the most useful and comprehensive approaches to understanding how environments (land and seascapes) were affected by climate change/variability, early human settlement, historical interactions, and modern development. Similar to applications in other insular settings, the combination of the natural and social sciences using paleoecology, archaeology, land-use history, and long-term ecological research is potentially informative for examining natural and cultural phenomena behind changes to atoll ecosystems.

Atoll archaeology anchored to an historical ecology approach may lead to a better understanding of the following key issues: (1) the timing of human settlements, (2) paleoclimatology, (3) human impact on resources, and (4) issues of adaptation and sustainability.

Early Human Settlements on Atolls

Islets are geologically young, having developed only in the last millennia (mid-late Holocene). The transition from corals to unconsolidated sediments required for islet buildup varied across time and space, even within the confines of individual atolls, and the emergence of land suitable for permanent human occupation appears to have taken place several centuries later.

In a review of mid-Holocene highstand conditions and their relationship with the timing of human settlement, Dickinson (2003) computed a chronology for the decline of sea levels and the *crossover dates* in different parts of the Pacific island region, finding a close correspondence between the availability of suitable landmass and the first appearance of human activities. The crossover dates specify the inferred time for each island group when declining late-Holocene sea level first carried ambient high tide level below mid-Holocene low tide level. Before the crossover date, relict mid-Holocene paleoreef flats were still overtopped by the sea at high tide. The end of the highstand for Tuvalu, Kiribati, and the Marshall Islands is estimated at 200 B.C., with a crossover date of about A.D. 1100. By contrast, for the Tuamotus in the eastern Pacific, the highstand ends at A.D. 800, with a crossover date of A.D. 1400.

Western Kiribati (Gilbert Islands), together with the Marshall Islands and atolls in the eastern

Carolines, produced radiocarbon dates for human occupation comparable to neighboring "high" islands, between 1,800 and 2,000 years ago, some 500–700 years after the formation of habitable land. Although certainly variable, a time lag is expected for the development of the Ghyben-Hertzberg lens as sea level dropped and conditions changed allowing for sustained land-based livelihoods (Athens 2018).

The Polynesian atolls of Tuvalu, which have received scant archaeological coverage, appeared to have been settled by about A.D. 1000. Farther east, there is evidence for exposed coastal sediments from Kiritimati (Christmas Island), in the Line Islands of Kiribati by about 1000 B.C., prompting some archaeologists to suggest that this large atoll could have been settled during the early Austronesian expansion associated with the Lapita Cultural Complex or later. However, the earliest evidence for human occupation on this and other atolls in the Line and Phoenix Islands only extend back to the twelfth century A.D.

The early dates from eastern Micronesia can be attributed to the greater tidal range in the central Pacific, allowing relict mid-Holocene paleoreef flats to project farther above low tide level, enabling accumulation of unconsolidated sediment to form islets at an earlier stage of sea-level decline. Thus, the absence of intervening stable landforms on the reefs that would later form the atolls of Tokelau and the northern Cook Islands would have effectively isolated the "high" islands of West and East Polynesia, providing a possible explanation for the chronological gap between Lapita settlements in Samoa and the much later dates obtained from East Polynesia and the intervening atolls.

There are controversial dates from Bikini Atoll in the northern Marshalls that may push back settlement to a time coinciding with the Lapita expansion into the southwest Pacific about 3,000 years ago (Streck 1990). Because contamination of carbon samples by modern radioactivity would produce younger rather than older dates, the wood charcoal dates could be derived from old drift logs of long-lived species. Without proper identification, these dates should be considered anomalous. Moreover, this chronology does not match up to the bulk of radiocarbon dates from the Marshalls or elsewhere in Central/Eastern Micronesia (Levin et al. 2019; Poteate et al. 2016; Weisler et al. 2012). Of related interest is evidence for coral island formation on the Jabat, a table reef in the Marshalls, when sea level was rising rather than falling, with supratidal deposits forming as early as 4,500 years ago (Kench et al. 2014). It may that islets on smaller reef platforms predate islet formation on larger atolls, with implications for questions related to the chronology of temporary and permanent human occupation.

Paleoclimatology

There is little direct evidence of the effects of past climates and related changes in vegetation composition or variation in sea level, which may have affected agricultural productivity on atoll societies (Weisler 2001b). Core samples from peat bogs on Teraina in the Line Islands indicated no major vegetation change in the last millennium. Proxy evidence for ENSO variability in the Marshall Islands is attested by tuna remains Lambrides and Weisler 2018).

The abandonment of the Line and Phoenix Islands prior to European contact may relate to increased climatic instability during the mid-second millennium A.D., interrupting long-distance exchanges and leading to declines in land and marine resources, caused by falling sea level (Nunn et al. 2007). Human settlement of these archipelagoes spans the period after A.D. 1000 until A.D. 1600 at a time when people expanded into the marginal East and South Polynesian islands. Long-distance voyaging may have been facilitated by environmental conditions at the time, the Medieval Warm Period, bracketed between A.D. 750 and A.D. 1250 (Nunn 2007:59). However, this scenario has been challenged by climate data from the central Pacific, highlighting the influence of climate variability, at a variety of scales, on Pacific societies and the biota and landscapes with which they interacted.

In eastern Micronesia, initial human settlement about 2,000 years go may be related to heightened ENSO conditions, coinciding with the formation of habitable land on atolls following drawdown of the mid-Holocene highstand.

Human Impact on Resources

An important topic in Pacific Island archaeology is the study of human impact on island ecosystems. Data gathered over several decades of research revealed that indigenous communities significantly altered colonized habitats prior to Western contact. Most of the data are derived from terrestrial ecosystems and include evidence of vegetation burning (charcoal influxes) together with accelerated rates of erosion. Analyses of plant microfossils have also revealed changes in vegetation profiles, although it is not always clear whether these changes can be attributed to human agency, natural causes, or a combination of both. Impacts can also lead to faunal depression, extirpation, and extinction, often occurring in the early periods of human settlement. By contrast, the impact on marine resources is less well documented.

It has been suggested that without significant anthropogenic impact, the islands of Remote Oceania (east of the main Solomon Islands Chain and including all the islands and atolls of Micronesia), would not have been successfully colonized by people lacking a well-established agricultural base. While the importance of food production among early colonizing groups, namely the bearers of the Lapita Cultural Complex still needs to be demonstrated, agriculture expanded later in time. Without a doubt, some of these human-induced impacts had a destructive effect on island biota, but it would be difficult to imagine sustained human livelihoods on atolls in the absence introduced root and tree crops, earning their reputation as "consummate man-made environments" (Kirch 2017:163).

Atoll communities relied heavily on tree crops, such as breadfruit, pandanus, and coconuts, not only to meet their dietary needs but also to supply raw material for a host of products. Perennial arboriculture – agroforestry (the practice of cultivating wild and/or domesticated arboreal species) is a distinguishing characteristic of the earliest agriculture in the Pacific Islands, emerging in the southwest Pacific (Near Oceania) at the end of the Pleistocene, after more than 30,000 years of human settlement. It still constitutes an important component of contemporary atoll landscapes. Several cultivars could be stored, and it may be said that food preservation technology (e.g., to produce fermented breadfruit and dried pandanus paste) reached its zenith on atolls, as people developed ways to process certain foods that could last through periods of scarcity and for use as sea rations.

Agroforestry is a sustainable system of food production by virtue of the relative permanence of land use providing a wide range of subsistence needs, with crops requiring little direct cultivation beyond occasional mulching and replanting. Micronesia's "breadfruit revolution" (Petersen 2006) between 1000 and 1500 A.D. has been explained in terms of the successful hybridization of seeded and seedless varieties originating from opposite directions (western and eastern Micronesia), which enabled population increase and the spread of the Eastern Carolinian matriclan form of social organization, along with political and religious cult practices. Hybrid varieties, which are salt tolerant, provided atoll communities with a major new food source, thus allowing populations to increase.

Another important traditional food, particularly on the wetter atolls, was the giant swamp taro. This member of the aroid (Araceae) family may have preceded human settlement, as indicated by coring records on the "high" island of Pohnpei in Micronesia. Natural dispersal could have occurred by rafting of vegetative parts in clumps of soil protected within roots of drifting uprooted trees. Alternatively, dispersal could have taken place by deposition of fertile seeds from birds' guts.

Pits excavated down to the freshwater lens for the cultivation of giant swamp taro are among the most outstanding anthropogenic features of atoll landscapes. In Kiribati, more than 20 cultivars have been identified, with some varieties grown mainly for prestige and ceremonies. Giant swamp taro cultivation entails a sophisticated system of mulching and fertilization using leaves from a variety of trees. Pits were commonly excavated in the middle of islets where the lens is usually thicker.

Given the dynamic nature of atoll geomorphology, anthropogenic surface remains can easily be obliterated unless located well inland, such as

giant swamp taro pits and associated mounds formed by sediment spoils from excavated pits. Like arboriculture, giant swamp agriculture has a long history on atolls, as illustrated by excavation and dating of ancient surface soils under pit spoil dirt in adjacent mounds (Weisler 1999). One of the first tasks that early settlers were required to perform was to clear vegetation in preparation for giant swamp taro pit digging, because corms (swollen underground plant stems) can take between 9 months to several years to mature. Giant swamp taro tubers have the highest carbohydrate content per unit among the aroids and can tolerate high water levels or even flooding, provided it does not result in an inflow of seawater.

Intensification of food production for giant swamp taro was spatially limited by islet size and thickness of the freshwater lens. As shown by research in the Marshall Islands, continued sea level decline after about 2,000 years ago resulted in land accretion, encouraging people to extend their activity space. Unlike other forms of agricultural intensification such as those practiced on "high" islands, giant swamp taro cultivation did not result in accelerated soil erosion and together with arboriculture constituted a sustainable subsistence practice.

The high ratio of reef to land area, typical of most atolls, provided colonizing groups and their descendants with abundant sources of protein as well as raw material (fish, turtle, and bird bone, coral, beach rock, and shell) for the manufacturing of tools and ornaments. Despite their abundance, marine resources were on occasion subjected to avoidance practices, which would have enabled stocks to recover.

To a large measure, species resilience, together with flexible fishing/shellfish gathering strategies targeting a broad range of taxa, would account for the sustainable use of marine resources (Harris and Weisler 2018; Ono and Addison 2013; Thomas 2014). An exception appears to be the extirpation of the Bullmouth helmet shell (*Cypraecassis rufa*) from Utrōk Atoll in the Marshall Islands (Weisler 2001a), but the overall assessment suggests little change in habitat selection, richness, evenness, or diversity. In addition, the presence or absence of marine species in a particular habitat is partly determined by chaotic and unpredictable recruitment events that shape the structure of reef assemblages over time.

Species resilience is one attribute that may result in sustainability. Nevertheless, even highly resilient organisms can become vulnerable if predation increases because of a growing predator population and/or the introduction of new extractive technologies. The disappearance of large species of giant clams in other insular settings is attributed to their long planktonic stage (allowing for wide dispersal but also resulting in high mortality rates), slow growth, low reproductive success of adults, and sporadic mass mortality in wild populations. It may therefore come as no surprise that some communities resorted to gathering live giant clams from deeper water and transplanting them in "gardens" to locations near the shoreline for later consumption or use as raw material (after removal of the animal), as noted in Kiribati (Gilbert Islands Group – Thomas 2014) and on Takuu Atoll, Papua New Guinea (Moir 1990).

Archaeologists recognize the paucity of data on pre-European contact resource depression, extirpation, and extinction on atolls compared with other island types. In the absence of information on faunal losses in the Line and Phoenix Islands, the demographic histories of these atolls and table reefs cannot be easily explained in terms of anthropogenic change that might have compelled their inhabitants to abandon settlements. In other cases, the timing of species loss remains unclear, for example, the extirpation of rails possibly coinciding with European-introduced invasive mammals.

Adaptation and Sustainability

Research aimed at understanding the relation between the distribution of cultural remains and islet buildup is exemplified by work carried out in the Marshall Islands. Based on an ecological model for atoll settlement and adaptation, the densest (and generally oldest) traces of human occupation are predicted to be on the wider islets, notably in their central portion. This is where the freshwater lens is most developed and thus capable to support agricultural production, especially

giant swamp taro. Moreover, these areas afforded the best protection from salt spray. Other environmental parameters for understanding settlement adaptation include islet location in relation to the prevailing winds, proximity to canoe passes through the reef, and elevation above mean sea level in assessing the risk of damage caused by cyclones and high waves.

However, ecological models of settlement patterns, even for initial settlement, might not adequately explain where people lived in the past. Cultural factors described ethnographically, such as those pertaining to one's status, were shown to determine where high- and low-ranking individual kin groups could establish their residence and organize their activities.

Nevertheless, archaeological data from Ujae and Maloelap in the moderately wet central Marshall Islands show that in the past there was a tendency for settlements to be aggregated into one main village, even on large islets, in association with giant swap taro pits. The habitation area then expanded from the center toward the lagoon, facilitated by land progradation in that direction. Over time, the other islets being smaller were subsequently exploited by people living in the main village for various resources, including birds, turtles, fish, and shellfish, perhaps as a result of a decline in resources near populate areas. It may be that with falling sea level in the mid-second millennium A.D., emerging reef surfaces would have enabled the subsequent development of islets, allowing population dispersal. Later dates for the occupation of smaller islets support this hypothesis (Nunn 2007:145, 147).

Environmental stress, as experienced on many atolls, both in the past and present, can be partly reduced by the use of social capital. Land tenure systems and kinship networks enabled people to maximize choice of residence and group affiliation to access resources. Land tenure systems developed to safeguard terrestrial production among kin groups while also enabling neighboring communities to access resources in times of need. Various cooperative strategies ensured that people could claim rights to resources made possible, for example, by adoption and intermarriage, trade, and sometimes cyclical migrations to alleviate problems of over- and under-population (Alkire 1978). Sustainability could also be achieved by avoidance practices. For example, the concept of *mo* in the Marshall Islands still applies within some inhabited and uninhabited atolls where large bird colonies live and turtle nesting is known. By chiefly decree, northern atolls lacking sufficient rainfall to support permanent human settlement were designated as "game reserves" to be exploited at certain times and in an orderly and ritualized way.

On small islands, including atolls, the need to devise strategies for managing population growth may have arisen quickly, so as not to outstrip resources. Warfare, cannibalism, infanticide, and abortion may have contributed to population regulation, but there were other strategies such as ritual celibacy, prolonged lactation, and adoption. In some instances, under-population may have been a more serious threat to community survival than population pressure. Initially, relatively large families and clans would be necessary to ensure adequate levels of food production. Atoll populations used flexible social processes for the control of fertility and rates of reproduction and actively managed recovery from the demographic challenges of contingency events and ensured their continuity as enduring settlements.

Interisland contacts would confer advantages in the event of demographic instability and shortages of food and raw materials as a result of environmental perturbation, such as that caused by droughts or cyclones. Because of their overall marginality, atolls occupy a prominent position in discussions centered on exchanges with "high" islands. One of the best-documented ethnographic cases of extensive networks was the *sawei*, which hierarchically linked Gagil District on Yap to the atolls of the Western Caroline Islands, a tribute and exchange network spanning more than 1,000 km (Hunter-Anderson and Zan 1996). Although it is unclear when this elaborate network first emerged, archaeologists have found pottery produced on Yap and carried to atolls

some 1,400 years ago. Atolls in the Eastern Caroline Islands, such as Ant near Pohnpei have also yielded basalt artifacts and pottery dating to about 2,000 years ago (Rainbird 2004:163–166). Exotic materials, notably geochemically "fingerprinted" basalt stone adzes have been found in the Tuamotus, Line, and Phoenix Islands, some traced to distant archipelagoes, perhaps via intermediary stops for down-the-line exchanges (Di Piazza and Pearthree 2001; Weisler and Walter 2017).

Atolls were also in contact with each other to form "clusters," as in the Marshall Islands, in light of differences in terrestrial productivity linked to latitudinal variation in rainfall (Alkire 1978). Atolls also differed in size, as well as degree of lagoon closure, shape, and depth, which also affected marine productivity.

Some observers have suggested that people living on atolls were more keenly aware of resource limitations than communities living on lager continental or volcanic islands and thus realized at an early stage the need to conserve resources. In examining the sustainability of natural resource use on atolls, the absence of statistically significant changes in the archaeological record may be indicative of a new number of factors, such as species resilience, diverse extractive strategies, low impact technologies, low human population densities, efficient use of resources (e.g., through an understanding of environmental cues and fluctuations), and the application of intentional and unintentional management practices.

Future Directions

While atoll archaeology in the Pacific has progressed in recent years, there are still a number of questions about cultural development and change, and how these may be linked to various levels of environmental impacts/transformations. As Kirch (1997:18–19) explains in his introduction to a discussion of environmental change and human society in the Pacific Islands, historical ecology aims at understanding "the complex and reciprocal connections linking human populations with the myriad other life forms that share their world." The mutually reinforcing processes of population growth, intensification of production, environmental change, and sociopolitical evolution are relatively well understood on some islands. By contrast, there is little archaeological evidence from atolls that would allow us to draw parallels with some of the "high" islands to further our understanding of the "Big Structures and Large Processes in Oceanic Prehistory" (Kirch 2017:269–287).

That social evolution did take place cannot be doubted, but it appears to be poorly reflected in the archaeological record. Atolls certainly imposed limitations on the range of cultural expressions. Because atolls generally lack monumental architecture indicative of social complexity and their environment severely curtailed further agricultural intensification over time, archaeologists may want to pay more attention to allied disciplines such as historical linguistics and other approaches such as oral traditions to shed light on social transformations that are presumed to have taken place since initial human settlement.

Atolls provide limited potential for intensification of food production using traditional methods. However, studies of atoll agriculture in the Gilbert Islands show that people have over time selected and improved on a variety of tree and root crops, as exemplified by nearly 200 cultivars of pandanus and over 20 varieties of giant swamp taro, differing in quality, taste, and age at maturity. In addition, in the Gilberts, traditional methods of food preservation enabled the accumulation of surplus like on other atolls but were not known to support an elite.

Archaeologists may be able to establish a chronology of giant swamp taro pits, suggesting that expansion of this food production system could be linked to population increase, as argued for the Tuamotus. With a shift in the subsistence economy after Western contact, few giant swamp taro pits were excavated and several were abandoned. Likewise, coral-lined fishponds may indicate intensification of marine food production (Figs. 1, 2, 3, 4, 5, and 6).

Atoll Archaeology in the Pacific, Fig. 1 Aerial view of an atoll. (Photo: F. Thomas)

Atoll Archaeology in the Pacific, Fig. 2 Coral-aligned shrine. (Photo F. Thomas)

Atoll Archaeology in the Pacific, Fig. 3 Giant swamp taro in pit. (Photo: F. Thomas)

Atoll Archaeology in the Pacific, Fig. 4 Excavation of swamp taro pit spoil mounds. (Photo: F. Thomas)

Atoll Archaeology in the Pacific, Fig. 5 Fish trap. (Photo: F. Thomas)

Atoll Archaeology in the Pacific, Fig. 6 Shell tools. (Photo: F. Thomas)

Cross-References

- ▶ Central Pacific Islands: Sea-Level Change and Sites
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Pacific Islands: Finding the Earliest Sites

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References

Alkire, W.H. 1978. *Coral islanders*. Arlington Heights: AHM.

Athens, J.S. 2018. Archaeology of the eastern Caroline Islands, Micronesia. In *The Oxford handbook of prehistoric Oceania*, ed. E.E. Cochrane and T.E. Hunt, 271–301. Oxford: Oxford University Press.

Davidson, J.M. 1971. *Archaeology of Nukuroro Atoll: A Polynesian outlier in the eastern Caroline Islands*. Auckland: Bulletin of the Auckland Institute and Museum 9.

Di Piazza, A., and E. Pearthree. 2001. Voyaging and basalt exchange in the Phoenix and line archipelagoes: The viewpoint from three mystery islands. *Archaeology in Oceania* 36: 146–152.

Dickinson, W.R. 2003. Impact of mid-Holocene hydro-isostatic highstand in regional sea level on habitability of islands in Pacific Oceania. *Journal of Coastal Research* 19: 489–502.

Fitzpatrick, S.M., and M. Intoh. 2009. Introduction: Archaeology and historical ecology in the Pacific Basin. *Pacific Science* 63: 463–464.

Fitzpatrick, S.M., V.D. Thompson, A.S. Poteate, M.F. Napolitano, and J.M. Erlandson. 2016. Marginalization of the margins: The importance of smaller islands in human prehistory. *Journal of Island and Coastal Archaeology* 11: 155–170.

Harris, M., and M. Weisler. 2018. Two millennia of mollusk foraging on Ebon Atoll, Marshall Islands: Sustained marine resource use on a Pacific atoll. *Archaeology in Oceania* 53: 41–57.

Hunter-Anderson, R.L., and Y. Zan. 1996. Demystifying the *sawei*, a traditional interisland exchange system. *ISLA: A Journal of Micronesian Studies* 3: 1–45.

Intoh, M. 1981. Reconnaissance archaeological research on Ngulu Atoll in the Western Caroline Islands. *Asian Perspectives* 24: 69–80.

Kench, P.S., S.D. Owen, and M.R. Ford. 2014. Evidence for coral formation during rising sea level in the Central Pacific Ocean. *Geophysical Research Letters* 41 (L0590000): 820–827.

Kirch, P.V. 1997. Introduction: The environmental history of oceanic islands. In *Historical ecology in the Pacific Islands: Prehistoric environmental and landscape change*, ed. P.V. Kirch and T.L. Hunt, 1–21. New Haven: Yale University Press.

Kirch, P.V. 2017. *On the road of the winds: An archaeological history of the Pacific Islands before European contact. Revised and expanded edition*. Oakland: University of California Press.

Lambrides, A.B.., and M.I. Weisler. 2018. Late Holocene Marshall Islands archaeological tuna records provide proxy evidence for ENSO variability in the western and Central Pacific Ocean. *Journal of Island and Coastal Archaeology* 13: 531–562.

Leach, F., and G. Ward. 1981. *Archaeology on Kapingamarangi Atoll: A Polynesian outlier in the Eastern Caroline Islands*. Dunedin: Department of Anthropology, University of Otago.

Levin, M.J., K. Seikel, and A. Miles. 2019. A partial chronological sequence of human habitation for Pingelap Atoll (Pohnpei state, Federated States of Micronesia). *Radiocarbon*. https://doi.org/10.1017/RDC.2019.30

Moir, B.G. 1990. Comparative studies of 'fresh' and 'aged' *Tridacna gigas* shell: Preliminary investigations of a reported technique for pretreatment of tool material. *Journal of Archaeological Science* 17: 329–345.

Nunn, P.D. 2007. *Climate, environment and society in the last millennium*. Amsterdam: Elsevier.

Nunn, P.D., R. Hunter-Anderson, M.T. Carson, F. Thomas, S. Ulm, and M.J. Rowland. 2007. Times of plenty, times of less: Last-millennium societal disruption in the Pacific Basin. *Human Ecology* 35: 385–401.

Ono, R., and D.J. Addison. 2013. Historical ecology on 600 years of fish use on Atafu Atoll, Tolelau. In *Prehistoric marine resource use in the Indo-Pacific Region*, ed. R. Ono, A. Morrison, and D. Addison, 59–83. Canberra: Terra Australis 39, ANU Press.

Petersen, G. 2006. Micronesia's breadfruit revolution and the evolution of a culture area. *Archaeology in Oceania* 41: 82–92.

Poteate, A.S., S.M. Fitzpatrick, W.S. Ayres, and A. Thompson. 2016. First radiocarbon chronology for Mwoakillloa (Mokil) Atoll, Eastern Caroline Islands, Micronesia. *Radiocarbon* 58: 169–178.

Rainbird, P. 2004. *The archaeology of Micronesia*. Cambridge: Cambridge University Press.

Streck, C.F., Jr. 1990. Prehistoric settlement in eastern Micronesia: Archaeology on Bikini Atoll, Republic of the Marshall Islands. *Micronesica Suppl* 2: 247–260.

Thomas, F.R. 2014. Shellfish gathering and conservation on low coral islands: Kiribati perspectives. *Journal of Island and Coastal Archaeology* 9: 203–218.

Weisler, M.I. 1999. The antiquity of aroid pit agriculture and significance of buried A horizons on Pacific atolls. *Geoarchaeology* 14: 621–654.

Weisler, M.I. 2001a. Life on the edge: Prehistoric settlement and economy on Utrōk Atoll, northern Marshall Islands. *Archaeology in Oceania* 36: 109–133.
Weisler, M.I. 2001b. *On the margins of sustainability: Prehistoric settlement of Utrōk Atoll, northern Marshall Islands*. Oxford: BAR International Series 967.
Weisler, M.I., and R. Walter. 2017. East Polynesian connectivity. In *The Routledge handbook of archaeology and globalization*, ed. T. Hodos, 369–385. London: Routledge.
Weisler, M.I., H. Yamano, and Q. Hua. 2012. A multidisciplinary approach for dating human colonization of Pacific atolls. *Journal of Island and Coastal Archaeology* 7: 102–125.

Attenbrow, Valerie J.

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Basic Biographical Information

Valerie Jane Attenbrow, also known as Val Attenbrow, is an Australian Archaeologist and Museum Research Scientist at the Australian Museum. Her interests lie predominately in Australian Indigenous Archaeology related to variations in territorial occupation. She graduated in 1976 with an honors degree from the Department of Anthropology at Sydney University. Her Honors thesis examined the Aboriginal occupation of the far south coast of New South Wales, focusing specifically on the subsistence patterns of the Holocene period.

Once graduating, Attenbrow began working as a consultant archaeologist in the Cultural Resources Division of the New South Wales National Parks and Wildlife Service. During this period, and in conjunction with the salvage excavation program for the Mangrove Creek Dam, she began work on the Upper Mangrove Creek catchment area. The results of her excavations provided the necessary momentum for more research and fieldwork in the vicinity, which Attenbrow undertook as part of her Ph.D. at the University of Sydney.

Attenbrow also examined the Aboriginal occupation of Port Jackson and the surrounding Sydney region in 1987–1988 as part of a grant-sponsored project initiated by Hunters Hill Municipal Council. It involved the review of historical documents from the late eighteenth and early nineteenth centuries pertaining to the descriptions of Aboriginal life (albeit not comprehensively) in and around Port Jackson and Botany Bay. Attenbrow began the Port Jackson Project in 1989, which she envisaged would correct the variation present in British records concerning the life and culture of the Aboriginal people in the area. The archaeological evidence she procured through excavations resulted in the development of far more reliable timeframes than the documented evidence, alone, could achieve.

Concurrently, Attenbrow began working for the Australian Museum in its Anthropology Division. Her research since then, which is based at the museum, has seen the completion of several large-scale and successful projects, including the Port Jackson Project and the publication of *Sydney's Aboriginal Past* (Attenbrow 2002). She is now a Principle Research Scientist in the Anthropology Unit, Research Branch of the museum. While at the museum, Attenbrow has continued to analyze excavated assemblages from Upper Mangrove Creek, Port Jackson, and those belonging to other museum collections.

Major Accomplishments

Val Attenbrow's career in archaeology has spanned over three decades and, despite being primarily focused on regional New South Wales, includes other notable contributions to the field of archaeology and a considerable number of published works in the form of books, journal articles, papers, and reviews. In fact, as of early 2011, Attenbrow had a total of 73 published works to her name, both as sole author and coauthor.

Sydney's Aboriginal Past (Attenbrow 2002) is considered to be Attenbrow's magnum opus and represents the culmination of much of her life's

work. The book examines three time periods: pre-colonial (pre-1788), British colonization (at 1788), and early colonial (1788–1820), while the documents she examined in 1987–1988 pertaining to Port Jackson and Botany Bay provide the work's foundation. Within those three time periods, she examines, discusses, and clarifies various issues, including the variation present in British records of Aboriginal life, the array of Aboriginal languages and the barrier this created between the indigenous population and the colonists, and the complex social structures of Aboriginal society. Attenbrow also used her work, in this area, to explore aspects of indigenous life ranging from how food and tools were obtained to the belief systems used in the area and how this affected personal adornment to the use of images and rock art, providing a thorough overview of Aboriginal life in the Port Jackson region.

Some of Attenbrow's other prominent works include *Upper Mangrove Creek catchment* (1988) and *Reduction Continuum and Tool Use* (2005) (coauthored with Peter Hiscock). Her latest publications include a chapter in "Trekking Shore: Changing Coastlines and the Antiquity of Coastal Settlement" entitled *The Role of Marine Resources in the Diet of Pre-Colonial Aboriginal People and Land Use Patters Around Port Jackson, Sydney, New South Wales* (2011). Attenbrow has also been the coeditor of "Australian Archaeology" with Betty Meehan (for volumes 30–35, published from 1989 to 1992) and the editor of "AA Short Reports" (for volumes 42–49, published from 1996 to 1999).

Attenbrow has received a Life Membership Award from the Australian Archaeological Association (AAA) in 2002 and was awarded the Mulvaney Book Award in 2004 by the AAA for her book *Sydney's Aboriginal Past* (2002). Consequently, Attenbrow has not only established herself as an insightful interpreter of Sydney's regional archaeological past but as one who has also contributed substantially to the broader understanding of Australia's Aboriginal past (White 2006).

Cross-References

- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Colonial Encounters, Archaeology of
- ▶ White, J. Peter

References

Attenbrow, V. 1988. Thesis abstract. The Upper Mangrove Creek catchment. A study of quantitative changes in the archaeological record. *Australian Archaeology* 26: 110–111.

Attenbrow, V. 2002. *Sydney's Aboriginal past: Investigating the archaeological and historical records*. Sydney: UNSW Press.

Attenbrow, V. 2011. The role of marine resources in the diet of pre-colonial Aboriginal people and land use patterns around Port Jackson, Sydney, New South Wales. In *Trekking the shore: Changing coastlines and the antiquity of coastal settlement*, ed. N. Bicho, J. Haws, and L.G. Davis, 450. New York: Springer.

Hiscock, P., and V. Attenbrow. 2005. Reduction continuums and tool use. In *Lithics 'down under': Australian perspectives on lithic reduction, use and classification*, British Archaeological Reports International Monograph series, ed. C. Clarkson and L. Lamb, 43–55. Oxford: Archaeopress.

White, P.J. 2006. Forward. In V. Attenbrow *Terra Australia 21: W hat's changing: Population size or land-use patterns? The archaeology of Upper Mangrove Creek, Sydney Basin*, 7. Canberra: The Australian National University E Press.

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Basic Biographical Information

Born in New Ulm, Minnesota, in 1922, Arthur Carl Aufderheide (Fig. 1) studied pre-medicine at Saint Olaf College in Northfield, Minnesota (1940–1942), and medicine at the University of Minnesota, Twin Cities (1943–1946). After

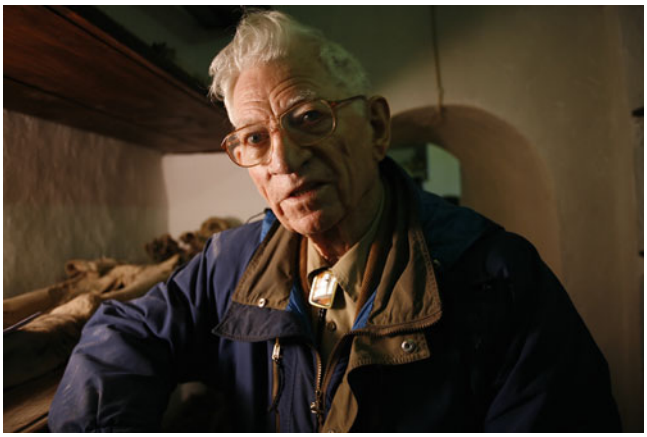

Aufderheide, Arthur Carl, Fig. 1 The late Arthur Aufderheide (1922–2013) during his 2008 field mission in Sicily (image courtesy of the Sicily Mummy Project)

graduating, he took an internship in pathology at the Rochester General Hospital, New York (1946–1947), and subsequently served in the US army, in Germany (Nystrom and Cartmell 2012). During his time in Europe, he participated to a military training program in pathology at the Vienna General Hospital, Austria, followed by a pathology residency at the Minneapolis Veterans Administration Hospital, Minnesota (1949–1952). In 1953, he moved to Duluth, Minnesota, where he became the chief of the Department of Pathology of Saint Mary's Hospital (1955–1974). Additionally, in 1972, he became the head of the Department of Pathology at the newly opened School of Medicine, University of Minnesota-Duluth (Nystrom and Cartmell 2012). Since 1977, he had taught courses in physical anthropology and circumpolar cultures at the Department of Anthropology of the same institution, with the latter reflecting his vivid interest in the Arctic, where he traveled as many as seven times between 1964 and 1980 (Krajick 2005). The new academic position in Duluth required research, but due to the lack of patient care, he decided to concentrate on skeletal biology and paleopathology, focusing on elemental analysis of bone tissue as well as soft tissue abnormalities (Nystrom and Cartmell 2012). In 1982, he traveled to Arica, Chile, in order to attend a short course on paleopathology that was a vital experience for his career. Later, in 1985, he and his wife Mary Lillian Buryk (1923–2017), a registered nurse and musician whom he married in 1946, had their first mummy-hunting trip in South America. There, they obtained soft tissue samples to investigate and analyze, creating a large mummy tissue archive known as the International Mummy Registry, which contained thousands of specimens from several countries around the globe. Between 1987 and 1998, they visited four continents to dissect and sample preserved remains (Nystrom and Cartmell 2012). Since his background lay in medicine, he relied upon autopsy and morphological inspection to identify both pathology and pseudopathology (Nystrom 2015). A decade after his last field mission in Egypt, he journeyed to Sicily, Italy, for an additional mummy expedition sponsored by the National Geographic Society. Shortly afterward, he was awarded an honorary membership by the American Society of Embalmers and the European Academy of Bolzano, Italy, where he and Mary would travel in 2009 for the opening of a mummy exhibition at the South Tyrol Museum of Archaeology. In 2008, he officially retired, becoming an emeritus professor of his university. He died in 2013; he was survived by his wife and three children. In 2017, his mummy dissection kit, which he had left in Sicily some 9 years earlier, was donated to the historical and ethnoanthropological Town Museum of Savoca, where it can be seen on display (Nystrom 2013).

Major Accomplishments

Aufderheide is best known for applying biomedical techniques to spontaneously or

anthropogenically mummified archaeological human remains, demonstrating that invaluable bio-anthropological information can successfully be extracted from such remains (Aufderheide 2003). He also demonstrated that ancient mummies are sources of vital importance to answer specific hypothesis-driven research questions. One major achievement of the scholar was his understanding of the epidemiological pattern of Chagas' disease, a condition determined by the parasite *Trypanosoma cruzi* that affected the populations inhabiting the Pacific coast of Chile and Peru for as much as 9000 years (Nystrom and Cartmell 2012). Specifically, he and his colleagues showed the lack of chronological, demographic, or cultural patterning, suggesting that the disease has maintained a constant prevalence over time. His inspection and study of large numbers of mummified remains also enabled a more complete understanding of mortuary practices, as well as postdepositional changes, and mummification mechanisms, an aspect that he categorized based on his own observations (Aufderheide 2003). In this respect, his 1991 study of the Venzone mummies of northern Italy refuted a long-standing theory, advanced in the nineteenth century, that a fungus was responsible for the mummification process, due to water extraction from the cadavers (Ortner and Aufderheide 1991). His outstanding experience also led to the generation of some of the most comprehensive textbooks on both hard and soft tissue. His *Cambridge Encyclopedia of Human Paleopathology* (Aufderheide and Rodríguez-Martín 1998) was the first reference book where soft tissue abnormalities were described, and popularized the identification of this type of findings among biological anthropologists and bioarchaeologists. This was further expanded in his book on *The Scientific Study of Mummies* (Aufderheide 2003), the most significant reference in the field, which includes a mummy form and a protocol for the quantification of mummy tissue. Later on, in 1998, as a follow-up of his inspection of five Melanesian overmodeled skulls, he developed an interest in this topic, which enabled him to identify a dozen ancient cultures that carried out this unique mortuary ritual aimed at restoring the appearance of the face after death (Aufderheide 2009). He, along with his wife Mary, was instrumental in the establishment of the World Congress of Mummy Studies, the most important venue for scholars involved in the field; the first meeting took place on the island of Tenerife, Spain, in 1992, and the meetings are now (2018) in their tenth iteration, marking the 25th anniversary since its creation. With over 100 academic articles and four books, as well as a vast number of collaborations, he left a clear mark on the history of bioarchaeology and mummy studies. However, it was his great generosity, his willingness to mentor young scholars, and his ability to share his impressive knowledge that continue to live on within the mummy community.

Cross-References

- ▶ Animal Paleopathology
- ▶ Bioarchaeology: Definition
- ▶ Mummy Studies
- ▶ Taphonomy: Definition

References

Aufderheide, A.C. 2003. *The scientific study of mummies*. Cambridge: Cambridge University Press.

Aufderheide, A.C., ed. 2009. *Overmodeled Skulls*. Duluth: Heide Press.

Aufderheide, A.C., and C. Rodríguez-Martín. 1998. *The Cambridge encyclopedia of human paleopathology*. Cambridge: Cambridge University Press.

Krajick, K. 2005. The mummy doctor. *The New Yorker* 81 (13): 66–75.

Nystrom, K.C., and L. Cartmell. 2012. Arthur C. Aufderheide (1922-). In *The Global History of Paleopathology: Pioneers and Prospects*, ed. J. Buikstra and C. Roberts, 14–21. Oxford: Oxford University Press.

Nystrom, K.C. 2013. Arthur Aufderheide 1922-2013. *Paleopathology Newsletter* 164: 16–18.

Nystrom, K.C. 2015. Aufderheide, Arthur Carl. In *Mummies around the world: An encyclopedia of mummies in history, religion, and popular culture*, ed. M. Cardin, 13–15. Santa Barbara: ABC-Clio.

Ortner, D.J., and A.C. Aufderheide, eds. 1991. *Human paleopathology: Current syntheses and future options*. Washington, D.C.: Smithsonian Institution Press.

Further Readings

Aufderheide, A.C. 2004. Preface. In *The Mummies of Venzone. Morphology, Radiology and CAT scan*, ed. G. Baggieri and M. di Giacomo, 8–11. Rome: MelAMi.

Piombino-Mascali, D. 2015. Mummies of Venzone. In *Mummies around the world: An encyclopedia of mummies in history, religion, and popular culture*, ed. M. Cardin, 250–252. Santa Barbara: ABC-Clio.

Standen, V.G., B.T. Arriaza, C.M. Santoro, and I. Muñoz. 2014. The innovative legacy of Arthur Aufderheide to the paleopathology. *Chungara, Revista de Antropología Chilena* 46 (1): 3–9.

Aurignacian Cultural Unit

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Introduction

The Aurignacian is an early Upper Paleolithic cultural unit from the middle of the Last Glacial Period (c. 43–35 thousand years before present; ka B.P.) originally identified in southwest France. It is currently known to be largely distributed from the Lower Don Valley in Eastern Europe to southern Great Britain and the Ebro River Valley in Spain. There are other sites with later ages (34–26 ka B.P.) and those found farther afield, but their chronology, attribution, and stratigraphic integrity are often unclear (Fig. 1). The bearers of the Aurignacian cultural unit are thought to have primarily inhabited glacial steppic landscapes and archeological assemblages are frequently associated with butchered horse, reindeer, and mammoth remains.

The Aurignacian marks the onset of the Upper Paleolithic and is connected to some of the earliest regional blade (lithic blanks that are at least twice as long as they are wide with parallel longitudinal edges and at least one ridge on the dorsal face) and bladelet (small blades >10 mm in width) technology and is generally accepted as a proxy for the first expansion of modern humans into western Eurasia (Bar-Yosef and Zilhão 2006). The Aurignacian is also known for its bone industry, decorative personal ornaments, and abstract/figurative artforms. It is thought to succeed the Middle Paleolithic Mousterian and transitional cultural units (e.g., Châtelperronian, Szeletian, Lincombian, Jerzmanovician) and precede the Gravettian cultural unit.

Definition

Archeological assemblages are conventionally assigned to the Aurignacian cultural unit by the presence of certain stone and bone tools (Fig. 2). However, assemblages have also been ascribed to it by analyzing the operational sequences (*chaîne opératoires*) of assemblages to reconstruct the chronological ordering of the different steps in reduction strategies. Aurignacian stone technology is characterized by the use of flakes and blades as blanks for "formal tools." Whereas blades were the exclusive blank production method during the later stages of the Upper Paleolithic (*serial* production), Aurignacian lithic production relied on an *assortment* of different blank and blade forms that it shares with the preceding Middle Paleolithic Mousterian or Micoquian (*Keilmessergruppen;* Richter 1997: 253).

Formal tools used as decisive criteria to identifying the Aurignacian are:

- Carinated scrapers – bladelet cores mostly effectuated on thick flakes that may have also been used as tools.
- Bladelets laterally blunted with alternate, inverse, or direct retouch (Dufour bladelets, Font-Yves/Krems points) produced from prismatic/pyramidal cores or carinated scrapers.
- Bone, antler, and ivory tools in the forms of split-based, massive-based, simple-based, lozangic and double bevel-ended (biconical) points with rhombic outlines.

Additional criteria include:

- Thick elongated blades with steep, sometimes scaliform edge retouch (*Aurignacian retouch*).

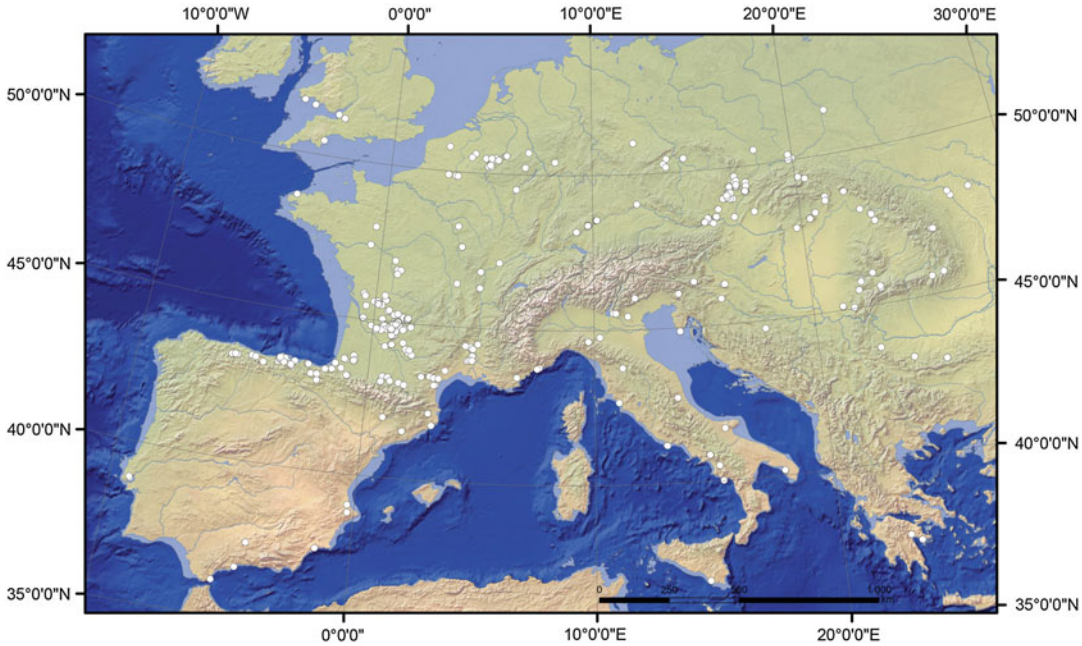

Aurignacian Cultural Unit, Fig. 1 Map of reported sites attributed to the Aurignacian in Europe with 80 m coastline outlined in light blue. (After Schmidt and Zimmermann 2019; data available at https://doi.org/10.5880/SFB806.42)

On some of these blades, Aurignacian retouch is found along the midsections of both lateral edges to produce "waisted" or "strangled" forms.

- Burins – flakes with a narrow, sharp edge at the tip produced by striking a small flake obliquely from the edge of the burin flake. Characteristic Aurignacian burin forms are the busked (*busqué*) and Vachon type burins made from blades or thick flakes.
- Endscrapers – flakes or blades modified at their distal end by removing parallel scars to shape a convex edge. Specific Aurignacian endscraper subtypes include atypical carinated, thick nose-ended, shouldered (or flat nose-ended), nucleiform, and rabots.
- Personal ornaments in the form of pierced tooth, shell, bone, and stone beads. Characteristic Aurignacian forms are varied and demonstrate distinct spatiotemporal varieties (e.g., basket-shaped) and production methods.
- Abstract and figurative mobiliary and parietal artforms representing human and animal forms and bone flutes pointing to an early musical tradition.

Historical Background

The Aurignacian cultural unit was named after the Aurignac rock shelter (Haute-Garrone, France) discovered in 1852 and later studied by É. Lartet. At the turn of the twentieth century, the Aurignacian was formally described by H. Breuil and E. Cartailhac who defined three successive phases: the Ancient, Middle, and Upper Aurignacian covering the first half of the Upper Paleolithic typological succession.

In the 1930s, following excavations at the site of La Ferrassie (Dordogne, France), D. Peyrony redefined the Aurignacian to apply (Karavanić 2000; Patou-Mathis et al. 2016) solely to Breuil and Cartailhac's Middle Aurignacian phase ascribing the Ancient Aurignacian to the Lower Perigordian (today known as the Châtelperronian) and the Upper Aurignacian to the Upper

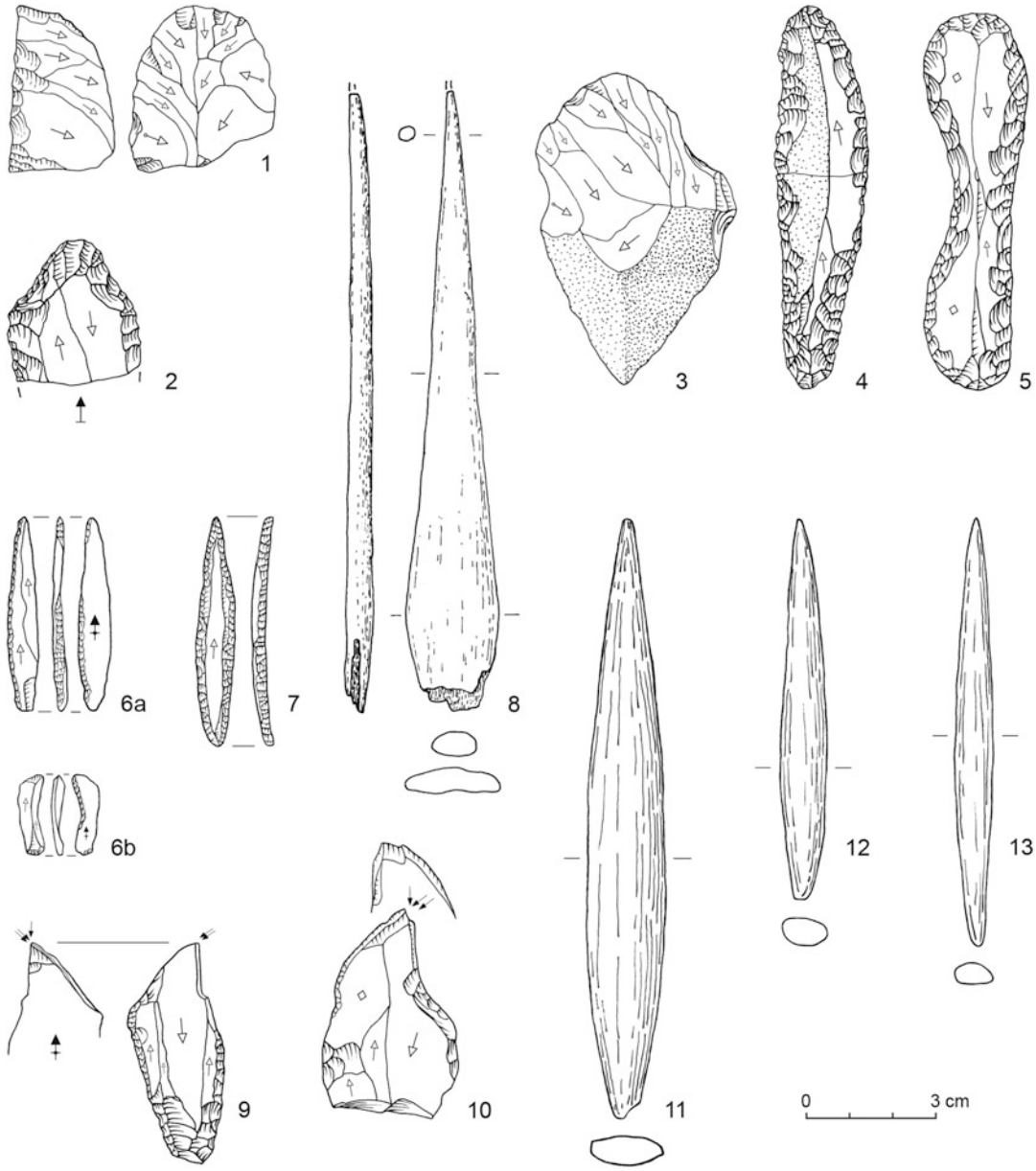

Aurignacian Cultural Unit, Fig. 2 Index fossils of the Aurignacian: (1) carinated scraper: (2) carinated nosed scraper; (3) nosed scraper; (4) Aurignacian blade; (5) strangulated blade; (6) Dufour bladelets (a-Dufour subtype; b-Roc de Combe subtype); (7) Fonte-Yves bladelet; (8) spit-based point; (9) Busqué burin; (10) Vachons burin; (11) flattened lozangic point; (12) oval-sectioned lozangic point; (13) biconical point. 1–7, 9–11, 13 after Davies 2001 and 12 after Albrecht et al. (1972) Taf. 2

Perigordian (today known as the Gravettian). Peyrony maintained the contemporaneity of the Perigordian and Aurignacian Upper Paleolithic cultures in southwest France and subdivided the main divisions of his scheme based upon the French sites of La Ferrassie and Laugerie-Haute (Dordogne): the Lower Perigordian containing two phases (I–II), the Aurignacian having five (I–V), and the Upper Perigordian covering three (IV–VI). It was later argued that many of

Peyrony's assemblages were stratigraphically mixed and that the retouched bladelets found within the Perigordian II assemblages were more akin to Aurignacian assemblages. Based on its inferior stratigraphic position at sites in southwest France, the Perigordian II was therefore assumed to precede the earliest Aurignacian phase (Aurignacian I) and was renamed the Aurignacian 0. These assemblages frequently contained fewer and less elaborate types and absolute numbers of bone and stone tools than the Aurignacian I suggesting a development of the Aurignacian over time. Later, based on his excavations at Abri Mochi in Liguria (Italy), G. Laplace argued for two diachronic phases: the Protoaurignacian and archaic Aurignacian that roughly correspond with the Aurignacian 0 and I scheme (Laplace 1966).

It is worth noting that this historical background provided summarizes the evolution of the French school given the importance of the initial discovery of the eponymous assemblage in France and the large number of sites and breadth of research. Nevertheless, Aurignacian research elsewhere in Europe has a long history that did not always develop in parallel and thus may reflect different past trajectories.

Key Issues/Current Debates

Variants of the Aurignacian Across Time and Space

Today, the Aurignacian is separated into many variants that are thought to be temporally or spatially meaningful. The first is the **Protoaurignacian** (i.e., Proto-aurignacian, Fumanian) characterized by the production of large (c. 30–45 mm), straight bladelets (subtype *Dufour*) from prismatic and pyramidal cores seen by some as the oldest phase of the Aurignacian.

In southwest France, northern Italy, and Spain, when found together, the Protoaurignacian is always superimposed by the **Classic (Early) Aurignacian** where bladelets are generally produced from carinated cores. This production method resulted in smaller bladelets (c. 15–20 mm) with characteristic "twisted" profiles that were often retouched into Dufour bladelets (subtype *Roc du Combe*). However further east, where the Protoaurignacian is less known, Classic Aurignacian assemblages often directly follow the Middle Paleolithic and so-called transitional industries and are associated with radiocarbon dates as old as the first occurrence of the Protoaurignacian in the Mediterranean thus making it difficult to simply consider the two assemblages as successive stages of the same cultural unit (Banks et al. 2013; and comments).

It is also thought by some that the Classic Aurignacian later grew into the **Late (Evolved) Aurignacian** that is defined as having a larger, more varied tool kit including (backed) microblades. However, such assemblages often share many cultural traits associated with the Gravettian, possibly relating to mechanical admixture, or suggesting that they represent a distinct cultural phenomenon.

A further cultural unit, the **Olschevian** was originally defined as a similar, yet discrete cultural unit based on osseous tools with less significant stone tools. In recent years, the Olschevian has been largely subsumed under the Aurignacian nomenclature and is now seen as a regional expression of specialized hunting sites of an Eastern Alpine subgroup (e.g., Olseva, Mokriška caves) of the Aurignacian cultural unit.

The **Levantine Aurignacian** is another classification for mostly younger lithic assemblages found along the coastal Levant in Israel, Lebanon, and possibly Turkey and Syria (e.g., Yabroud, Umm El Tlell, Ksar-Akil, Kebara, Üçağızli). Still, the Levantine Aurignacian is technologically and geographically poorly understood and its relationship to other Upper Paleolithic cultural unit including the European Aurignacian is still unknown (Williams 2006). It shares only some of the hallmarks of the Aurignacian, with a spatial gap of over 1000 km and radiometric dates significantly younger than the European Aurignacian (the "Levantine Aurignacian" seems to start around 38–34 ka B.P. – the time when its European counterpart terminated). The more the Levantine Aurignacian is technologically and geographically better understood, the more

questionable its relationship to the European Aurignacian has become (Williams 2006).

For completeness, we must mention a number of terms that are currently out of favor yet are still present in the preexisting literature. The first of which is the **Pre-Aurignacian,** a term that was originally defined as a Middle Paleolithic blade industry understood as a harbinger of the Aurignacian by A. Rust when he excavated Yabroud rock shelter (Rust 1950). This term is now seen as synonymous with the Amudian cultural unit that is more than 200 ka B.P. and may relate to the earlier Hummalian cultural units.

Other terms are the **Epi-Aurignacian/Aurignacian V** that comprise assemblages with Aurignacian-like carinated elements. These few sites, ranging from Portugal to Eastern Europe, were originally thought to have been part of a final stage of the Aurignacian cultural unit (c. 25 ka B.P.) following a curious temporal hiatus. Today, these units are seen as an independent cultural unit associated with the poorly understood transition from the terminal Gravettian to proto-Solutrean cultural units (Verpoorte et al 2019).

Who Made the Aurignacian?

The predominant theory is that the Aurignacian is the first cultural unit manufactured exclusively by modern humans in western Eurasia because of the similar chronology of the archeological assemblages and modern human fossils (Churchill and Smith 2000; Hoffecker 2009). Still, there are few well-excavated sites containing associated Aurignacian artifacts and hominin remains. Early fossils accompanying Protoaurignacian assemblages are reported in western Eurasia at Le Piage (France), Riparo Bombrini (Italy) and Fumane (Italy), and Isturitz (France), though the attributions of the lithics to the Protoaurignacian, the fossils to modern humans or the association between the two might remain debatable in some cases.

Similarly, modern human remains in subsequent Classic Aurignacian/Aurignacian-like contexts are also rare but those found at Kostenki (Russia), Bacho Kiro (Bulgaria), Deravá Skala (Slovakia), La Ferrassie, Fontéchevade, La Quina Aval, Brassempouy (France), and Fossellone (Italy) suggest stronger evidences.

After 35 ka B.P., more complete modern human specimens from sites in France, Germany, Czechia, Hungary, and Romania are better known. Of particular interest is the site of Mladeč (Czechia) where dates (c. 35.5 ka B.P.) from unambiguous modern human samples are associated with Aurignacian artifacts. At Muierii, Cioclovina (Romania), Istállós-kő and Görömböly-Tapolca (Hungary), modern human fossils are well known and well dated though their provenance and association with the small Aurignacian assemblages is equivocal. In Western Europe, cranial fragments and teeth coming from Aurignacian-bearing layers have been found in France (La Crouzade, Les Rois, and La Combe) and Germany (Hohlenstein-Stadel, Sirgenstein, Kleine Ofnet, Schafstall, and Geißenklösterle; Hublin 2015).

When Did the Aurignacian Start and How Did It Spread?

If the Aurignacian cultural unit is associated with modern humans, then the origin of the Aurignacian through space and time is a key issue to understanding modern human dispersals into and across Eurasia. Many authors would suggest that the Protoaurignacian originated around 43 ka B.P. and was replaced by the Classic Aurignacian at around 38 ka B.P.

There is also debate concerning the age of the Protoaurignacian as possibly contemporaneous with the beginning of the Classic Aurignacian (Nigst et al. 2014), thus assigning regional roles to both phenomena. The dating of major Classic Aurignacian sites is often still disputed, but many authors would agree that the Aurignacian cultural unit was firmly established across western Eurasia by around 38 ka B.P.

Some authors have classified all Aurignacian assemblages earlier than c. 41.5 ka B.P. as Upper Paleolithic cultural units preceding the Aurignacian, postulating that they may even have been made by Neandertals rather than modern humans (Zilhão and d'Errico 1999). This would favor a dispersal/replacement model though there is little indication of technological and typological

continuity with the local European Mousterian cultural unit. The Classic Aurignacian is also remarkably consistent across Europe and we have no concrete evidence of the polycentric development of various diagnostic Aurignacian attributes (Davies 2001).

Where Does the Aurignacian Originate From?

A prevalent model suggests that the Protoaurignacian originated from the Early Ahmarian Upper Paleolithic cultural unit in the Levant some 43 ka B.P. based on the production of similar fine blades and bladelets. However, the Early Ahmarian Cultural Unit is rather heterogeneous and a paucity of robust chronology allows for multiple interpretations as to the whether the Early Ahmarian was indeed a progenitor to the Protoaurignacian. A contrasting view is that the Aurignacian arose within Central and Western Europe, developing out of local preceding transitional industries (e.g., Châtelperronian) and/or Initial Upper Paleolithic (e.g., Bohunician, Streletskayan, Kozarnikian/Bachokirian) cultural units that were manufactured by modern humans possibly mirroring an in situ biological evolution from Neandertals to modern humans (Bar-Yosef 2006) or a vice versa acculturation process.

Others have suggested that the Aurignacian originated on the Central Asian Plateau from the Zagros Aurignacian/Baradostian/Rostamian cultural units (e.g., Shanidar, Yafteh, and Warwasi) that in turn evolved from the preceding local Mousterian traditions, though it is not entirely clear if this observation is a result of stratigraphic mixing or the result of distinct, yet contemporaneous hominin groups (Otte 2014). A single modern human tooth was identified in association with a Baradostian assemblage at Eshkaft-e Gavi, though there are no reliable associated age estimates. Small assemblages from Iran, Iraq, and Afghanistan demonstrate similar flake, blade, and bladelet reduction strategies that produced retouched bladelet forms described as Arjeneh points (similar to the El Wad points of the Levantine Aurignacian) and Dufour bladelets, accompanied by carinated endscrapers and burins that may have technological links to the Levantine and European Aurignacian (Olszewski and Dibble 1994).

Other evidence from the Altai Mountains also suggest that the local Middle Palaeolithic gradually evolved into the Initial Upper Palaeolithic (Kara-Bom variant; c. 42 ka) and the Early Upper Palaeolithic (Ust-Karakol variant), the latter of which contains many Aurignacian-like forms (e.g., carinated scrapers, bone tools, and personal ornaments) implying a convergent emergence of modern human anatomical and behavioral features (Derevianko and Shunkov 2009). Still, stratigraphic mixing has questioned the validity of this in situ transition and the dating and attribution to specific hominins remains an open question. One possibility is that the Upper Palaeolithic developments in the Altai were made by modern human hybridization given the abundant evidence for species interbreeding. At a minimum, such research highlights the vast amount of archaeological research that still needs to be done further east.

If Aurignacian origins indeed lie in the Levant or further east, then the mechanisms underlying how it spread westward to Europe has been a central question in recent years with no clear consensus of if migration occurred as a wave, as an axial route and if modern humans moved along the European interior via the Russian Plain, followed major waterways such as the Danube catchment, or along the southern Mediterranean coastal edge. One theory proposes the various Aurignacian subdivisions may have developed in different geographical domains and that the Danube represented a preferential corridor for the diffusion of Classic Aurignacian cultural unit (Conard and Bolus 2008), while the Mediterranean coastline was followed by makers of Protoaurignacian cultural unit (Mellars 2006). However, the inability to prove any supraregional internal chronology of the Aurignacian poses a major obstacle in tracing its place of origin.

Why and How Did the Aurignacian Develop?

Generally, in Western Europe (from the Upper Danube to the Ebro), the Aurignacian is seen as

an intrusive entity linked to a population change from the last Neanderthals (the bearers of the preceding Châtelperronian) and early modern humans as bearers of the Aurignacian. By contrast, archeologists working in Central and Eastern Europe underline the role of "transitional industries" in triggering the emergence of the Early Upper Paleolithic with possible shared zones of contact between Neanderthals and modern humans. Moreover, across Europe, evidence is growing for the intensification processes already visible during the late Middle Paleolithic, such as bladelet production, tool curation, bone tool use, prey diversification, regional traditions, and population growth.

A decade ago, some scholars objected to the perception that modern humans might have acculturated native Neandertal populations with Upper Paleolithic innovations such as symbolism and suggest that Neandertals could have inculcated incoming modern human populations with Upper Paleolithic behaviors. Such a reinterpretation depends upon reassessing the available evidence, especially that from the earliest phases of the Aurignacian in Europe, and particularly in Central and Eastern Europe. Protoaurignacian assemblages are especially vulnerable to such reinterpretations because of their small sizes and low typological diversity.

It has long been suggested that Neandertals were influenced by the incoming modern human Aurignacian groups. Since the discovery of the St. Césaire fossils in 1979, the Châtelperronian has been associated with that Neandertals, while the skeletal remains we have for the Aurignacian suggest a comparatively robust connection between the Aurignacian and modern humans. The Croatian site of Vindija, containing an apparent connection between Neandertal remains and Aurignacian osseous points, has been used by some researchers to question the validity of this consensus and the typological and technological discreteness of the Aurignacian. However, the atypical composition of the Aurignacian assemblages at this site has led researchers to question the nature of the association.

International Perspectives

The study of the Aurignacian and by association, the first modern human peopling of Europe is important to understanding the processes of colonization and sustained occupation of the edges of the Eurasian continent through a diverse geological region with different biomes during a period of dramatic climatic changes where a well-understood preexisting hominin population was already present. In some regions, such as southwest France, Moravia, and southern Russia, the number and size of archeological sites constitute a large enough sample to draw meaningful conclusions about the nature of the Aurignacian. In others, for example, parts of Eastern Europe, Western and Central Asia, Russia and coastal Europe, the few-known instances do not easily render themselves for behavioral or chronological interpretations. Additionally, many of the famous Aurignacian sites were excavated in the past when methods and techniques were disparate, making it difficult to extrapolate data and compare assemblages. Thus, a main goal of the future research is to understand the compositional integrity and standardization of the Aurignacian systematics from Western Europe. Surprisingly, the current Aurignacian debate still focuses mostly on typochronology and punctual scientific results (radiometric dating, DNA-analysis, isotope studies, etc.), neglecting ample available information on intra-site variability, human mobility, and annual cycles of seasonally induced behavioral patterns.

Future Directions

The main goal of Aurignacian studies is to ascertain its deeper meaning for modern human prehistoric life. Two lines of evidence that are crucial to this understanding are found in better chronological and spatial control that require continued focus on site and assemblage integrity alongside in-depth analyses of recently excavated assemblages and existing collections.

A matter that still needs clarification is identifying the stimuli that elicited the Aurignacian and determining what allowed it to spread so rapidly.

Key to this is establishing the reasons for the different data between various Aurignacian assemblages through time by investigating the development of these cultural units from regional perspectives. It is still unclear whether all the cultural unit described as Aurignacian are the same or if earlier assemblages (e.g., Early Ahmarian) are comparable to the later ones. The range of technologies at the beginning of the Upper Paleolithic could be explained in several ways. Among them, the rapid adaptation of the bladelet concept and the introduction of new bone tools may have played major roles. High levels of modern human mobility may have also permitted cultural interactions between different regional groups with exchanges of technological knowledge over large territories. In this regard, the association of the Aurignacian cultural unit with the spread of modern humans requires the design of a large-scale study that compares Eurasian early and initial Upper Paleolithic cultural units, such as the Baradostian, Rostamian, Early Ahmarian, and Emiran.

Part of understanding the development of the Aurignacian through time also involves discerning what early steps were necessary for its phylogenetic change. This includes identifying environmental/cognitive changes and the modes of cultural transmission that allowed it to develop and pinpointing when and where these steps took place. Answering such questions are found in a wide range of ongoing palaeoenvironmental, cognitive, and experimental research.

A further line of investigation necessitates identifying the specific functions of Aurignacian assemblages and how they impacted hominin survival and reproduction. For example, it has been long suggested that osseous points and bladelets were used as armatures for composite weaponry. However, it is still unclear if this was the case and/or how they may have been used. Such answers lie within the growing body of functional analyses of newly excavated assemblages that employ the advancing techniques in micro-wear, residue, and technological analysis.

Another important part of understanding the Aurignacian or the Upper Paleolithic more broadly rests on deciphering the evolutionary history of the cultural unit. This includes determining how it compares to the other toolkits and subsistence strategies employed by contemporary related species that may help to understand the mechanisms that allowed it to rise. Part of this involves decoding why the Aurignacian and laminar technology in a broad sense evolved in the way it did and not in another.

The lithic and osseous assemblages provide only a small window into early Upper Palaeolithic technological solutions and therefore struggle to reveal other aspects of the human past. If the Aurignacian Cultural Unit indeed represents a distinct ethno(linguistic) group, then there are a number of associated findings that can contribute to our understanding of Aurignacian behavior. The growing corpus of Aurignacian-associated parietal and mobiliary art appears to contain broad stylistic (e.g., pointillistic, dotted or dashed lines) and thematic (figurative, large animals; vulvae) threads (though with notable differences, e.g., between the Swabian Jura and southern France) linking artworks across Europe. These raise questions of rituals, religion, social connections and may provide insight into the way early humans perceived the natural environment. The associated human burial at Kostenki, (and to a lesser extent Mladeč) may likewise reflect possible changes in mortuary behavior. However, given the dearth of archaeological evidences, robust answers to these issues lie in increased transdisciplinary approaches.

Finally, the locations and configurations of Aurignacian sites, sometimes with features suggestive of dwelling structures invite discussions concerning settlement patterns, demography, and ecology. Such approaches are still challenging due to our current understanding of chronology and site preservation, but advances in geomorphology, experimental archaeology, and site formation processes on both local and regional scales may ultimately help to resolve some of these issues.

While the current coarse-grained record still permits several scenarios for how the Aurignacian formed and spread, the current data still points to

an origin rooted in the Levantine or Western Asian Initial Upper Paleolithic. The development to the Aurignacian seems to have been triggered by early arrivals of modern humans either indirectly or directly after ca. 43 ka in Europe. Still, while it may be tempting to attribute Aurignacian cultural unit subdivisions to different populations, genetic admixture is proving increasingly multifaceted and relating assemblages to specific hominin groups is becoming increasingly problematic and complicated.

Cross-References

- ▶ Altai: Paleolithic
- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Crimean Upper Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Paleolithic Art
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian

References

Albrecht, G., J. Hahn, and W.G. Torke. 1972. *Merkmalsanalyse von Geschoßspitzen des mittleren Jungpleistozäns in Mittel-und Osteuropa*. Stuttgart: W. Kohlhammer.

Banks, William E., Francesco d'Errico, and João Zilhão. 2013. Human–climate interaction during the early Upper Paleolithic: Testing the hypothesis of an adaptive shift between the Proto-Aurignacian and the Early Aurignacian. *Journal of Human Evolution* 64 (1): 39–55. https://doi.org/10.1016/j.jhevol.2012.10.001.

Bar-Yosef, O. 2006. Neanderthals and modern humans: A different interpretation. In *When Neanderthals and modern humans met*, 467–482. Tübingen: Springer.

Bar-Yosef, O., and J. Zilhão. 2006. *Towards a definition of the Aurignacian: Proceedings of the symposium held in Lisbon, Portugal, June 25–30, 2002*. Lisboa: Instituto Português de Arqueologia and American School of Prehistoric Research.

Churchill, Steven E., and Fred H. Smith. 2000. Makers of the Early Aurignacian of Europe. *American Journal of Physical Anthropology* 113 (s 31): 61–115.

Conard, Nicholas J., and Michael Bolus. 2008. Radiocarbon dating the Late Middle Paleolithic and the Aurignacian of the Swabian Jura. *Journal of Human Evolution* 55: 886–897.

Davies, William. 2001. A very model of a modern human industry: New perspectives on the origins and spread of the Aurignacian in Europe. *Proceedings of the Prehistoric Society* 67: 195–217. https://doi.org/10.1017/S0079497X00001663.

Derevianko, A.P., and M.V. Shunkov. 2009. Development of early human culture in northern Asia. *Paleontological Journal* 43 (8): 881. https://doi.org/10.1134/S0031030109080061.

Hoffecker, John F. 2009. The spread of modern humans in Europe. *Proceedings of the National Academy of Sciences* 106 (38): 16040–16045. http://www.pnas.org/content/106/38/16040.short

Hublin, Jean-Jacques. 2015. The modern human colonization of Western Eurasia: When and where? *Quaternary Science Reviews* 118: 194–210. https://doi.org/10.1016/j.quascirev.2014.08.011.

Karavanić, I., 2000. Olschewian and appearance of bone technology in Croatia and Slovenia, in: Central and Eastern Europe from 50.000-30.000 BP International Workshop in the Neanderthal Museum.

Laplace, Georges. 1966. *Recherches sur l'origine et l'évolution des complexes leptolithiques*. Vol. 4. Paris: École Française de Rome.

Mellars, Paul. 2006. Archeology and the dispersal of modern humans in Europe: Deconstructing the 'Aurignacian'. *Evolutionary Anthropology: Issues, News, and Reviews* 15 (5): 167–182. http://onlinelibrary.wiley.com/doi/10.1002/evan.20103/full

Nigst, Philip R., Paul Haesaerts, Freddy Damblon, Christa Frank-Fellner, Carolina Mallol, Bence Viola, Michael Götzinger, Laura Niven, Gerhard Trnka, and Jean-Jacques Hublin. 2014. Early modern human settlement of Europe North of the Alps occurred 43,500 years ago in a cold steppe-type environment. *Proceedings of the National Academy of Sciences* 111 (40): 14394–14471. https://doi.org/10.1073/pnas.1412201111.

Olszewski, Deborah I., and Harold L. Dibble. 1994. The Zagros Aurignacian. *Current Anthropology* 35 (1): 68–75. http://www.jstor.org/stable/2744144

Otte, M. 2014. Central Asia as a core area: Iran as an origin for the European Aurignacian. *International Journal of the Society of Iranian Archaeologists* 1 (1): 27–32.

Patou-Mathis, M., Vercoutère, C., Lengyel, G., Szolyák, P., Mester, Z., 2016. New interpretation of the Upper Palaeolithic human occupations at the Istállóskő Cave (Bükk Mountains, Hungary). Eurasian Prehistory 13: 77–90.

Richter, J. 1997. *Der G-Schichten-Komplex der Sesselfelsgrotte ; zum Verständnis des Micoquien*. Saarbrücken: Saarbrücker Dr. und Verlag. (Forschungsprojekt 'Das Paläolithikum und Mesolithikum des unteren Altmühltals II' Sesselfelsgrotte, 3).

Rust, A. 1950. *Die Höhlenfunde von Jabrud, Syrien*. Neumünster: K. Wachholtz.

Schmidt, I., Zimmermann, A., 2019. Population dynamics and socio-spatial organization of the Aurignacian: Scalable quantitative demographic data for western and

central Europe. PLOS ONE 14, e0211562. https://doi.org/10.1371/journal.pone.0211562.
Verpoorte, A., et al. 2019. Improving the chronological framework for Laugerie-Haute Ouest (Dordogne, France). *Journal of Archaeological Science: Reports* 23: 574–582. https://doi.org/10.1016/j.jasrep.2018.11.017.
Williams, J.K. 2006. The Levantine Aurignacian: A closer look. Towards a definition of the Aurignacian. *Trabalhos de Arqueologia* 45: 317–352.
Zilhão, João, and Francesco d'Errico. 1999. The chronology and taphonomy of the earliest Aurignacian and its implications for the understanding of Neandertal extinction. *Journal of World Prehistory* 13 (1): 1–68. https://doi.org/10.1023/A:1022348410845.

Australasian Historical Archaeology

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Introduction

Australasian historical archaeology is a diverse field of archaeological techniques and knowledge focused around the settler societies of Australia and New Zealand. This appellation not only echoes a shared colonial past between the two countries but also demarcates a common disciplinary milieu, a milieu which has seen increased collaboration in recent decades. In the practice of Australasian archaeology, the subfield of historical archaeology commonly relates to the study of a period beginning with the arrival of the first Europeans who came with the intent of colonizing Australasia. However, the boundaries of the subfield are not always clear or uncontested and are subject to redefinition as new techniques are adopted and new understandings deployed. Maritime history constitutes an important part of the colonial story in Australasia, and maritime archaeology overlaps with historical archaeology owing to shared research methods and a similar time frame (Burke and Smith 2007: 215). Therefore, any general consideration of Australasian historical archaeology must be undertaken alongside a consideration of Australasian maritime archaeology (Lawrence and Davies 2009: 629).

The colonial pasts of New Zealand and Australia stem from similar origins within the British diaspora, and these pasts are considerably intermingled, although the initial colonies can be readily understood to have differing populations, since Australia was a penal colony and New Zealand began as a settlement with free settlers. The first flow of population to the east coast of Australia in 1788 over 40 years before New Zealand was vigorously colonized and also means a difference in the length of colonial development. Furthermore, each society and region in Australasia were radically altered by the response of Indigenous peoples to colonization. The range of Indigenous responses has resulted in widespread variation, not only between the two countries but also within them. It should also be understood that strong ties still exist between the history and current societies of the two countries. Most of New Zealand was part of the colony of New South Wales until 1825, and the flow of free settlers increased in Australia at around the same time that substantial levels of immigration began in New Zealand. Each country also pursued similar strategies of domination in an attempt to control and subjugate the Indigenous inhabitants of Australasia. The countries were drawn together more tightly through the nineteenth and twentieth centuries and their shared heritage, and geographical proximity has led to strong cultural similarities. Importantly, the diverse background of immigrants to Australasia from all over the world means that it has a broad multicultural composition.

Although there are a number of succinct and instructive descriptions of Australasian historical archaeology as a discrete entity (e.g., Lawrence and Karskens 2003; Lawrence and Davies 2009; Paterson and Heath 2009), the historical archaeology of Australia and New Zealand has not been subjected to an exhaustive, unified analysis. This is as much a result of the distinctive development

of the discipline within each country as it is of different frames of reference currently at work. A noticeable lack of a shared comprehensive self-reflection underscores a current effort within Australasian historical archaeology to implement studies of a broader geographical scope as a starting point for wider discussions. This effort is a sign of a growing regional "Australasian" consciousness within the subfield, fostered in part by the Australasian Society for Historical Archaeology (ASHA) and the Australasian Institute for Maritime Archaeology (AIMA).

Despite a group of studies undertaken in the early twentieth century in New Zealand by the anthropologist Elsdon Best, the discipline principally flourished throughout Australasia from the start of the 1960s. This began with an awakened understanding on behalf of scholars that the material culture of the historical period was useful in answering research questions, even if these questions were only a subordinate interest to their concerns about the ancient past. This academic awakening was soon spurred on by changes occurring within wider society. In both countries, the burgeoning public interest in national history led to historical heritage receiving legislative protection from national and regional governments. This legislation encouraged the growth of professional historical archaeologists who were capable of meeting the new legal requirements for both government and private organizations. The growth of archaeological consultants within historical archaeology, and consequently the increase of reports intended for private consumption rather than publication, has led to the expansion of a considerable body of gray literature. Although there are some studies that have moved to change this, such as the work of the Archaeology of Sydney Research Group that promotes research and publications from consultant archaeologists as well as academics.

Statutory bodies in both Australia and New Zealand are responsible for the protection of historical archaeological heritage and of ensuring adequate standards in historical archaeological practice. This position is chiefly occupied in New Zealand by the New Zealand Historic Places Trust and in Australia by the Australian Heritage Council and smaller state bodies. Legislations such as the *Resource Management Act 1991* and the *Historic Places Amendment Act 1975* in New Zealand and the *Environment Protection and Biodiversity Conservation Act 1999* and a variety of state acts in Australia provide statutory frameworks for the protection of historical heritage. There are also a number of non-statutory bodies like the National Trust, Australasian Society for Historical Archaeology (ASHA), Australasian Institute for Maritime Archaeology (AIMA), Australian Archaeological Association, and New Zealand Archaeological Association that promote the protection of historical archaeological heritage. Various local and community groups throughout Australasia also take an interest in protecting the historical archaeological heritage that they are most connected with.

Definition

Australasian historical archaeology is the study of the colonial past of Australia and New Zealand through the investigation of material culture. The time frame that is studied commonly extends from 1788 to the present day, and it can be seen that historical archaeology in Australasia is largely based on an event, the annexing of land by European colonists, rather than criteria concerned with an arbitrary "documentary" threshold of historicity in society. The legislative and practical framework constructed around Australian and New Zealand territory means that the vast majority of Australasian historical archaeology is physically placed in Australasia.

The temporal focus of historical archaeology in Australasia is primarily from the beginning of serious colonization onward, although periods of exploration of the region by Europeans and interactions between Indigenous Australians and Indonesian peoples occurring as far back as the beginning of the seventeenth century are often included. The Makassar seasonally visited the north coast of Australia in search of the *trepang* (sea cucumber) since at least the eighteenth century and the Dutch explorers left their material culture, often in the form of shipwrecks, along the west and north coasts of Australia since the seventeenth century. The sometimes implicit

emphasis on the arrival of the colonizers often means that in practice, there is a sharp distinction drawn between Australasian historical and Indigenous archaeology, a distinction reinforced by legislation and cultural heritage management frameworks. This division is particularly the case in Australia but less so in New Zealand where historical period Māori sites were first investigated in order to better understand the precolonial past (Smith 1991: 8). This interest in Indigenous cultural continuity across the barrier of European colonization has been sustained throughout the history of New Zealand historical archaeology. Contrarily, only recently has there been an attempt to return an understanding of Indigenous Australian people to the historical landscape in Australia. This attempt has arisen largely from assertions by Indigenous Australians that their histories did not cease with the arrival of the colonists. This means that the temporal boundary between "prehistoric" and historical Australasia is far from fixed, even less so than the temporal boundary between precolonial and colonial Australasia, despite what has often been believed.

The spatial scope of Australasian historical archaeology is directed primarily to the mainland of Australia, Tasmania, the North and South Island of New Zealand, and a number of other islands scattered throughout the Pacific. Australia and New Zealand also lay claim to portions of the Antarctic, and the material remnants of scientific exploration receive archaeological attention from both countries. The Australasian geopolitical area is critical to the practice of historical archaeology, and much research relies on government funding or government-backed regulators. Important archaeological sites spread throughout the world are associated with the history of the ANZACs, Australian and New Zealand soldiers who fought alongside one another in the First World War. The story of the ANZACs constitutes a history that is critical to centralizing and unifying national identities in both countries, although many archaeological sites are located outside of Australasia. While the geopolitical boundaries of the Australasian region are important in maintaining and fostering the subfield, the global dispersal of Australasian historical archaeological sites means that the scope of Australasian historical archaeology is global.

Broad concepts like capitalism and immigration provide the bedrock of analysis in Australasian historical archaeology, yet it also makes use of a wide variety of more specific themes and categories to control and understand its data. These are somewhat arbitrary, and entirely open to question, these concepts help structure the investigation and provide a measure of comparison that is becoming more and more critical to the subfield. There are as many different categories of site "as there are different types of human behavior in the past" (Burke and Smith 2007: 196), yet a broad enumeration will give an idea of what comprises the regular subject of historical archaeological discourse in Australasia.

An important first step in the use of categories in Australasia is usually the sketching of cultural boundaries interior to Australasian society. This is largely to do with the broader area of knowledge that the site can then be placed in and the resultant ease of comparison that the framework of knowledge then provides (Smith 2004: 260). The rich multicultural background of Australasia means that the cultural groupings are many and varied, with some examples of cultural groupings often deployed being Indigenous Australian, British, Chinese, Irish, Dutch, German, and Māori. An example of the multiplicity that is encountered once the above broad categories are investigated more closely is seen through the use of the concept of Indigenous Australian cultural identity in the analysis of the historical period. With hundreds of Aboriginal nations, each cultural group is distinct and possesses its own language or dialect and its own worldview. Further evidence of the mutability of these categories can be seen in work relating to Chinese immigrants in the Australasian goldfields in the nineteenth century. These immigrants tended to come from southern China's Guangdong province, and their language was Cantonese rather than Mandarin. Selecting the right cultural framework with which to interpret results is often a matter of accurate historical research and the correct scale of analysis. Cultural categories such as these are often employed simultaneously across a variety of site types.

Australasian Historical Archaeology, Table 1 A selection of subjects, themes, topics, and site types in Australasian historical archaeology. (Slightly modified and heavily abbreviated from Schacht 2010)

Examples of subjects	Examples of themes	Examples of sites
Settlement	Cross-cultural encounters	Trading station, mission station, rock-shelter, campsite, and rural estate
	Convicts and incarceration	Convict households, squatters' estates, prisons, female convict factories, and convict ships
Development	Defense	Battlefields, hangars, airfield bomb shelters, Pa, and searchlight bunkers
	Infrastructure and transport	Wreck site, shipyard, dry dock, road verge, tramway, and rail bridge
People and society	Status and class	Schools, churches, urban houses company offices, and cemeteries
	Ideology, cult, and religion	Churches, mosques, temples, Bora rings, cricket pitch, shrine, and town halls
Economy	Primary industries	Quarry, mine, farm, sealers camp, logging camp, and tryworks
	Consumption	Corner shop, urban house site, warehouse, wreck site, quay, and farmhouse

These site types cut across the broader category and tend to reflect the masculine occupations of the past to the exclusion of historical actors who were not adult males (Burke and Smith 2007: 208). Although this is true, when this typing is considered in the broadest possible fashion, a consideration of these types helps to flesh out any definition of Australasian historical archaeology, even if only to characterize the content of how the past is constructed by historical archaeologists in Australasia. A framework produced by Ilka Schacht (2010) for a thematic research framework in Australian archaeology provides a good starting place for this understanding, and Table 1 is a small selection of subjects and themes drawn from this work with the addition of some New Zealand examples.

Historical Background

An incipient investigation of historical sites was evident in Australasia as early as 1921, yet it was only in the 1960s that systematic historical archaeological work began to be undertaken by academic and museological institutions. The first studies contained significant elements of post-contact, industrial, military, and, in Australia, maritime archaeology. Owing to a growing historical consciousness in Australasia, there was a broad enactment of legislation protecting historical heritage from the 1970s. This legislation spurred an increase in archaeological activity in Australia and New Zealand through the 1970s and 1980s, with the former country emphasizing the role of private consultants and the latter that of government-employed archaeologists (Smith 1991: 8; Lawrence and Davies 2011: 12). From the early 1990s, formal steps were taken to solidify the links between Australia and New Zealand, and studies with a wider regional focus were completed. The varied development of historical archaeology in Australasia has shaped the current debates and areas of concern within the discipline today.

The earliest form of historical archaeological thinking in Australasia was the investigation of colonial era Māori *Pa* and British military fortifications by the anthropologist Elsdon Best in New Zealand in the 1920s (Smith 1991: 6). Although relying heavily on historical sources and producing work of a primarily descriptive nature, Best dealt with sites from the colonial period and explained structural changes in Māori military fortifications (Smith 1991: 6).

In 1959, archaeologists in New Zealand excavated a series of deposits dating from the nineteenth century Māori site at Orongo Bay, Gisborne, deposits that were superposed over earlier prehistoric deposits (Smith 1991: 7). Later in 1959 and 1960, excavations were undertaken at the site of the British military's Paremata Barracks

near Wellington (Smith 1991: 7). In New Zealand in the 1960s, investigation was focused mainly on post-contact Māori sites, and most of those conducting historical archaeology had received their training in prehistoric archaeology (Smith 1991: 8). During this decade, the New Zealand Archaeological Association began to include historical sites within its site recording scheme (Smith 1991: 8), marking an acknowledgment of the applicability of archaeological techniques to the colonial past. A project in New Zealand that was representative of the emphasis on the study of Māori sites in this decade was the Tongariro Power Development Project (Smith 1991: 8) (Fig. 1).

The predominance of a prehistoric and anthropological background for the emerging discipline of historical archaeology in New Zealand was not mirrored in Australia, where scholars were also drawn from a variety of subject areas such as classical archaeology, history, and geography (Lawrence and Davies 2009: 629). As in New Zealand, a small number of small-scale early studies, primarily driven by historical research but that included elements of archaeological understanding, were undertaken from 1933 up until the 1960s (Paterson and Heath 2009: 113–114). The first substantial, and substantially excavation based, historical archaeological work in Australia was aimed at training postgraduate students in the University of Sydney, the University of Melbourne, and the Australian National University (Lawrence and Davies 2011: 12). Sites excavated as part of this original phase included Port Essington in the Northern Territory and the Irrawang Pottery in New South Wales (Paterson and Heath 2009: 114). The investigations at Irrawang Pottery in the second half of 1969 directed by Judy Birmingham formed a cornerstone of Australian historical archaeology, and industrial archaeology has since been a core focus of Australian historical archaeology (Fig. 2).

The 1970s saw a strengthening of the position of historical archaeology in Australasia, primarily

Australasian Historical Archaeology, Fig. 1 Extensive excavations in Hobart at 15 Hunter Street, Sullivans Cove, showing the areas of excavation, interpretive signage, and nearby inn "The Drunken Admiral" that is of the same era as the excavated site. Historical standing structures, public interpretation, and urban excavation are three key features of Australasian historical archaeology. (Photograph taken by Anthony Jenner and courtesy and copyright of Austral Archaeology Pty Ltd.)

Australasian Historical Archaeology, Fig. 2 Excavation at the Phoenix Foundry in South Australia unexpectedly revealed intact molding floors and large, elaborate casting molds. The footings for cranes that were used to move the molds into place can be seen as the white objects at the top and bottom of the photograph. (Photograph taken by Justin McCarthy and courtesy of and copyright of Austral Archaeology Pty Ltd.)

through the passing of legislation protecting historical heritage and the growth of awareness of the importance of historical heritage among the Australasian public. In Australia, the decade opened with the founding of the Australian Society for Historical Archaeology in 1970 (Lawrence and Davies 2011: 14). Following this, the Hope Inquiry was appointed by the Federal Government in 1972 and 1974 to investigate historical heritage in Australia. It included two archaeologists in its appointments and led to the inclusion of historical archaeological places in the Register of the National Estate (Lawrence and Davies 2011: 13). The Register of the National Estate provided statutory protection for sites throughout Australia, and these inclusions marked the beginning of a series of localized legislative acts across the country aimed at protecting historical heritage. Undergraduate courses in historical archaeology were offered for the first time by Judy Birmingham at Sydney University in 1974. At around this time, the publication of historical archaeology regarding Australian sites widened in scope and increased in quantity. The publications included books, monographs, and articles dealing with site and artifact studies as well as maritime archaeology and heritage management (Paterson and Wilson 2000: 83). In 1977, the first archaeological excavation took place at Port Arthur, an early convict settlement of some size in Tasmania, and this place was to become a testing and training ground for Australian historical archaeology until the present day.

In New Zealand, there was the implementation of the *Historic Places Amendment Act* in 1975, guaranteeing the protection of sites over 100 years old, and the 1976 seminar by the New Zealand Archaeological Association that set out a conscious plan for promoting historical archaeology. Important archaeological studies were also undertaken during this time by Neville Ritchie in the Clutha Valley and Nigel Prickett at Taranaki (Smith 1991: 8). The Clutha Valley project produced the then largest and most detailed historical archaeological study undertaken in New Zealand, and it specifically focused on the archaeological

remnants of the Chinese gold miners associated with the industrial history of the area. This survey marked the first substantial interest in the archaeology of the overseas Chinese in Australasia. Around the same time, Prickett had been investigating the fortifications remaining from the Taranaki wars of the 1860s and 1870s, the first extensive investigation that involved significant amounts of European heritage in New Zealand (Smith 1991: 8). These projects provided important training to the following generation of New Zealand historical archaeologists.

Although the awareness of the value of maritime sites in Australia was growing as a result of activities by amateur divers through the end of the 1960s, it was in the beginning of the 1970s that the first steps toward maritime archaeology were taken in the west of Australia. The practice of maritime archaeology in Australasia arose from the need to successfully manage a number of early Dutch wreck sites along the coast of Western Australia that had become subject to looting and harm (Gibbs 2004: 37). The Western Australian Maritime Museum led the early maritime investigations of the Dutch wrecks, carefully excavating four of them between 1973 and 1976 and displaying cannon, elements of the hull, and cargo from the ship *Batavia* (Lawrence and Davies 2009: 632). The excitement of the history associated with the wreck and the splendor of the cargo significantly raised the public profile of maritime archaeology in Australia. Over the coming decades, while the majority of academics showed considerable apathy in promoting the interests of maritime archaeology, the Western Australian Maritime Museum, in association with James Curtin University, trained the current generation of maritime archaeologists in Australia (Gibbs 2004: 37).

The 1980s saw the growth of consultants working in the private sector practicing historical archaeology in Australia, while in New Zealand, routine funding by the government meant that a considerable number of historical archaeological publications appeared. As an indication of this, over 70% of historical archaeological surveys were conducted for two government bodies: the Forest Survey and Lands and Survey (Smith 1991: 9). The bulk of sites dealt with during this time in New Zealand were industrial, primarily mining, but by the end of the decade, an increase in urban excavation meant that many more domestic sites were also being investigated. The investigation of Māori sites continued to be a staple of New Zealand archaeology through this period, while there was an increase in the investigation of maritime archaeology, beginning in the 1980s (Smith 1991: 9) (Fig. 3).

The situation in Australia was slightly different, as private consultants conducted a large share of the historical archaeological investigations and the foundations for historical archaeology established in academia in the 1970s were consolidated. Graham Connah began teaching historical archaeology at the University of New England in Armidale, and Tim Murray at La Trobe occupied the nation's first position dedicated to historical archaeology (Lawrence and Davies 2011: 14). The "Little Lon" excavation in Melbourne, the Queen's Theatre excavation in Adelaide, and the beginning of excavations in the Rocks in Sydney are examples of extensive urban excavations that began to occur throughout the cities of Australia as the legislation formed in the previous decade was enforced (Lawrence and Davies 2011: 14). Reports published during this time increased in sophistication and attention to detail, especially regarding the artifactual assemblages retrieved as part of the excavation.

The 1990s saw the coalescence of an Australasian historical archaeological consciousness and the formalization of the partnership between Australian and New Zealand archaeologists. This connection across the Tasman Sea had been building for some years since the growth of archaeology in each country. In 1990, the Australian Society for Historical Archaeology held a conference in New Zealand and 2 years later formally changed its name to the Australasian Society for Historical Archaeology, the name of its journal undergoing a similar change. Soon after in 1995, a joint conference was held with the Australian Institute of Maritime Archaeology, which, in 2001, also changed their title to incorporate Australasian. During this time, more appointments were made in Australian universities for positions

Australasian Historical Archaeology, Fig. 3 Precise excavation and recording in progress at Oihi Bay, New Zealand. With a Māori Pa and an early mission station Oihi Bay, it represents a significant contact site. (Photograph courtesy of and copyright of Andrew Blanshard, Department of Conservation, New Zealand)

relating to historical archaeology, and maritime archaeology began to be accepted in the academic establishment. Australia followed New Zealand in investigating Chinese heritage in this decade with a nationwide study (Ritchie 2003: 4). Maritime archaeology also began to lead the way in terms of creating studies with a broad geographical scope, such as the Archaeology of Whaling in Southern Australia and New Zealand project.

The first decade of the twentieth century saw for the first time cohesive trends across Australasia: the continued rise of consultant historical archaeologists in Australasia and a growth of regional projects undertaken by archaeologists in both countries. Scholarly and governmental initiatives, at both regional and national levels, began to concentrate on implementing the digital capture of archaeological data as well as constructing and maintaining historical archaeological databases. Alongside this was a marked increase in the amount of historical excavation in New Zealand (Smith 2004: 257) and a practical concern with the absence of a thorough investigation of the Indigenous Australian colonial past (Harrison 2010: 90). This congruity between historical archaeological practitioners in the two countries has led to a tentative collaboration on practical projects and an even more tentative approach to theoretical issues.

Key Issues/Current Debates

Current debates in Australasian historical archaeology cover a wide range of areas, from the manner that archaeological findings might be communicated to society to ways of understanding and drawing out insight into the working of ethnicity, class, and gender from the archaeological record. Despite the recurrence of the same issues throughout Australasia and a forum for regional discussion, debates still tend to be localized in either Australia or New Zealand with the problems directed toward a national rather than Australasian basis. This mild form of parochialism arises from the value invested in historical archaeology as a tool of nation building as much as it does from the difference in the trajectories of disciplinary development between the countries.

A number of key issues in Australasian historical archaeology are shared between New Zealand and Australia, namely, concerns over a growth of

a large body of unpublished archaeological research, questions about the appropriate scale to conduct studies, possibilities of establishing comparability between sites, and doubts about historical archaeology's role within wider society. Given the difference in the course of development of historical archaeology in the two countries, several critical issues are localized in each country but are still central to current understanding. An example of this is the role of post-contact archaeology in Australia, while in New Zealand, there is a distinct lack of development in the understanding of maritime historical archaeological sites (Carter and Dodd n.d.). The key issue of the appropriate scale that investigations may be conducted at is a core issue in understanding historical archaeology as it relates to the unity of Australasian historical archaeology as a whole.

A consistent issue across Australasia is the high volume of the reports of private consultants that are never offered for publication and therefore are not available to the public or to other archaeologists (Smith 2004; Connah 2007). In both Australia and New Zealand, this growth of unpublished, or gray, literature is often linked with the inability of historical archaeology to communicate its findings to the public. Therefore, this fuels concerns over the place of historical archaeology in wider society. In some ways, it is also seen to hamper the establishment of studies of appropriate scale in Australasia, as essential research that might otherwise be available has been withheld from the grasp of researchers (Connah 2007: 106). This is not always the case as the New Zealand Historic Places Trust maintains a library of thousands of online historical archaeological reports produced by consultants and government departments across Australia make reports available on request. Obversely, the monetary cost of subscription to quality historical archaeological journals or online databases often means that access is prohibited to consultants who are not affiliated with an academic institution.

The lack of explicit theory has often been commented on in Australasian historical archaeology (e.g., Murray 2002) and is often linked to the tension between consultant and academic practices noted above. The most serious attempt to systematically produce and apply a novel theory with a substantial data set thus far has been by Burke (1999) where an analysis of the structural relationship between capitalist ideology and historical architecture is undertaken on a regional basis. A concern with the theory and utility of artifact studies has also been an increasing issue in Australasian historical archaeology, and several papers over the last decade have begun to address the difference between artifact cataloging and artifact analysis (e.g., Crook et al. 2002) or the role of functional categories in analysis itself (Brooks 2005). These artifact studies represent a departure from North American artifactual models and a fast developing independent strand of archaeological theory and method.

The emphasis on post-contact Māori heritage in New Zealand historical archaeology has been continuous, while in Australia, the study of colonial British society eclipsed that of post-contact Indigenous sites in the latter decades of the twentieth century. The recent attention paid to the Indigenous Australian experience of the colonial past, first by Indigenous Australians themselves and more recently by archaeologists, is "transforming the discipline from within" (Harrison 2010: 90). A number of studies have recently been published that reflect a departure from the typical subject matter of Australian historical archaeology and innovations in methods for the archaeological approach to the recent past (e.g., Byrne et al. 2001; Lydon 2009).

Although all these issues touch upon one another, a central problematic that binds most of these issues together is the struggle to introduce a broader scale to the analysis of projects. The comparison of artifact assemblages between sites needs proper frames of reference and coherent analysis, not just cataloging. Critically, as seen in the landmark works of Byrne et al. (2001), Lydon (2009), and Middleton (2008), studies of Australasian contact history benefit enormously from wider contextual studies. The idea of a cultural landscape has severe implications regarding scope and methodological procedure, the issues of which are yet to be completely drawn out. The problems presented by an increasing amount of gray literature leave gaps in the data accessible to larger-scale studies.

Future Directions

The key issues that are of concern to historical archaeologists in Australia and New Zealand have given rise to a number of clear future directions. The broadening of scope of historical archaeological studies to include broader regional spatial and temporal boundaries is one likely future direction. Developments in the understanding of historical assemblages will introduce more nuanced understandings of the meaning that is derived from individual sites. These directions call for broader research frameworks, wide-ranging but not exclusive themes, and more flexible artifact categories. From the early twentieth century, there has also been a growing interest in the practical application, analytical power, and communicative potential of information technology within the subfield.

The improvement of the manner in which historical archaeologists communicate with each other and the public is a necessary direction that must be taken in order to overcome a proliferation of wasted literature. The directions that this is likely to take are twofold: an increased community involvement in archaeological projects themselves and a clearer theoretical understanding of what is of importance to the people that archaeologists engage with. Lessons from contact archaeology will be of particular importance in this regard, for it has introduced a more nuanced and responsive positioning of archaeologists and communities than has previously existed. Therefore, of critical importance to the future of Australasian historical archaeology are openness; engagement with the requirements of regional, national, or local communities; and a growth in the awareness of archaeologists about their current and possible roles in creating the historical past.

Cross-References

- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Australia: Maritime Archaeology
- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Buildings Archaeology
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Capitalism in Archaeological Theory
- ▶ Community Archaeology
- ▶ Connah, Graham
- ▶ Critical Historical Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ French Guiana: Archaeology and Minority Communities
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Industrial Archaeology
- ▶ Interpretation in Archaeological Theory
- ▶ Labor Archaeology
- ▶ Missionization and Mission Archaeology in New Zealand and Australia
- ▶ Multicultural Archaeology
- ▶ Overseas Chinese Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Spatial Analysis in Field Archaeology
- ▶ Stakeholders and Community Participation

References

Brooks, A. 2005. Observing formalities – The use of functional artefact categories in Australian historical archaeology. *Australasian Historical Archaeology* 23: 7–14.

Burke, H. 1999. *Meaning and ideology in historical archaeology. Style, social identity, and capitalism in an Australian town*. New York: Plenum Press.

Burke, H., and C. Smith. 2007. *Digging it up down under: A practical guide to doing archaeology in Australia*. New York: Springer Science+Business Media.

Byrne, D., H. Brayshaw, and T. Ireland. 2001. *A social significance discussion paper*. Sydney: Department of Environment Climate Change and Water.

Carter, M., and A. Dodd. n.d.. Maritime archaeology in New Zealand: Trials, tribulations and opportunities. Available at: http://www.themua.org/collections/items/show/1235. Accessed 9 Mar 2012.

Connah, G. 2007. Creating the cannon: Materializing Australian historical archaeology. *Australasian Historical Archaeology* 25: 105–107.

Crook, P., S. Lawrence, and M. Gibbs. 2002. The role of artefact catalogues in Australian historical archaeology: A framework for discussion. *Australasian Historical Archaeology* 20: 26–38.
Gibbs, M. 2004. Maritime archaeology in Australia. In *Archaeology from Australia*, ed. T. Murray, 36–54. Melbourne: La Trobe University.
Harrison, R. 2010. Review of fantastic dreaming: The archaeology of an aboriginal mission, written by Jane Lydon. *Australasian Historical Archaeology* 28: 90–91.
Lawrence, S. 2011. *An archaeology of Australia since 1788*. New York: Springer Science+Business Media.
Lawrence, S., and P. Davies. 2009. Natives and newcomers in the antipodes: Historical archaeology in Australia and New Zealand. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 629–646. New York: Springer Science+Business Media.
Lawrence, S., and G. Karskens. 2003. Historical archaeology in the antipodes. *Historical Archaeology* 37: 1–6.
Lydon, J. 2009. *Fantastic dreaming: The archaeology of an aboriginal mission*. Plymouth: AltaMira Press.
Middleton, A. 2008. *Te Puna – A New Zealand mission station*. New York: Springer Science+Business Media.
Murray, T. 2002. But that was long ago: Theory in Australian historical archaeology. *Australasian Historical Archaeology* 20: 8–14.
Paterson, A., and B. Heath. 2009. Current research in Australia and New Zealand: An overview. *Historical Archaeology* 43: 113–118.
Paterson, A., and A. Wilson. 2000. Australian historical archaeology: Retrospects and prospects. *Australian Archaeology* 50: 81–89.
Ritchie, N. 2003. Taking stock: 20 years of Australasian 'overseas Chinese archaeology'. *Australasian Historical Archaeology* 21: 4–11.
Schacht, I. 2010. Towards a thematic research framework in Australian historical archaeology. *Australasian Historical Archaeology* 28: 61–76.
Smith, I. 1991. The development of historical archaeology in New Zealand. *Australian Historical Archaeology* 9: 6–13.
Smith, I. 2004. Archaeologies of identity: Historical archaeology for the 21st century. In *Change through time: 50 years of New Zealand archaeology*, ed. L. Furey and S. Holdaway, 251–262. Auckland: New Zealand Archaeological Association.

Further Readings

Austral Archaeology Pty Ltd, P. Bell and G. Grimwade. 1999. *A thematic survey of sites of Chinese Australian history*. Report prepared for the Chinese Museum of Chinese Australian History, Melbourne.
Best, E. 1927. *The Pa Māori*, Dominion Museum Bulletin 6. Wellington: Dominion Museum.
Birmingham, J. 1976. The archaeological contribution to history: Some Australian nineteenth-century studies. *World Archaeology* 8: 306–317.
Burke, H., and C. Smith. 2004. *The archaeologist's field handbook*. Sydney: Allen & Unwin.
Cameron, D., and D. Donlon. 2005. A preliminary archaeological survey of the ANZAC Gallipoli Battlefields of 1915. *Australasian Historical Archaeology* 23: 131–138.
Coutts, P. 1986. Towards the development of a colonial archaeology in New Zealand. Part 1. *Australian Journal of Historical Archaeology* 1: 55–66.
Egloff, B. 1994. From Swiss family Robinson to Sir Russell Drysdale: Towards changing the tone of historical archaeology in Australia. *Australian Archaeology* 39: 1–9.
Greig, K. 2007. NZHPT national research framework: Discussion paper. Submitted to the New Zealand Historic Places Trust. Copies available from the New Zealand Historic Places Trust, Wellington.
New Zealand Historic Places Trust Pouhere Taonga. n.d. New Zealand Historic Places Trust Pouhere Taonga. Available at: http://www.historic.org.nz/. Accessed 9 Mar 2012.
Ritchie, N. 1990. The Clutha Valley archaeological project 1977-1987: A summary report. *Archaeology in New Zealand* 33: 4–20.
Smith, C., and H. Burke. 2006. Glass ceilings, glass parasols and Australian academic archaeology. *Australian Archaeology* 62: 13–25.
The Archaeology of Whaling in Southern Australia and New Zealand Project. 2000. Available at: http://ehlt.flinders.edu.au/archaeology/department/research/projects/awsanz/index.html. Accessed 9 Mar 2012.
The Australian Heritage Council. n.d. The Australian heritage council. Available at: http://www.environment.gov.au/heritage/ahc/index.html. Accessed 14 Mar 2012.

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Basic Information

The Australasian Institute for Maritime Archaeology (AIMA) is an incorporated, not-for-profit organization, dedicated to the preservation of

underwater cultural heritage. Based in Australia, it has sponsored work throughout Australia, Asia, and the Indian and the Pacific Ocean. AIMA's objectives are to support and undertake scientific research within the field of maritime archaeology and to publish the results of this work. AIMA is an incorporated body with a Constitution. All members must agree to abide by the Constitution and its accompanying Code of Ethics upon joining or renewing their membership. AIMA works closely with, and provides advice to, State, Territory, and Australian Federal Government on policy pertaining to underwater cultural heritage, such as the *Historic Shipwrecks Act 1976* and the *UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001*. The URL for AIMA is: http://www.aima-underwater.org.au.

Major Impact

In Australia, AIMA has supported important archaeological investigations on shipwreck sites, including *Batavia* (1629) in Western Australia; HMS *Sirius* wrecked at Norfolk Island; HMS *Pandora* (1791) off far north Queensland; *Sydney Cove* (1797) wrecked in Bass Strait, Tasmania; *Zanoni* (1867) in South Australia; and *City of Launceston* in Victoria (1865). AIMA plays an important role in the dissemination of maritime archaeological research. It has an active publications program, including a quarterly newsletter and an annual journal, the AIMA Bulletin, as well as special publication reports. AIMA also organizes an annual conference and provides scholarship money for members to conduct fieldwork and research.

AIMA plays an active role in international maritime archaeology. The organization strongly supports the *UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001* and is formally accredited by UNESCO as a nongovernment organization member of the Scientific and Technical Advisory Body to the State Parties to the Convention. AIMA also supports the work of the International Committee for Underwater Cultural Heritage (ICUCH) with several of our members represented on the committee and holds an associate membership to the Advisory Council for Underwater Archaeology (ACUA). AIMA members have been involved in training programs in China, Thailand, Taiwan, and Sri Lanka. Joint cooperative projects to assist and support existing or developing maritime archaeological programs have been undertaken in Kenya, Oman, Sri Lanka, Malaysia, Indonesia, Thailand, the Philippines, the Solomon Islands, Korea, and Japan.

AIMA, in conjunction with the Nautical Archaeology Society (NAS – United Kingdom), teaches a four-part course on maritime archaeology. This internationally recognized course is currently run in the United Kingdom, South Africa, Canada, Micronesia, and the USA, among other places. The aim of this course is to introduce the methods and procedures used in maritime archaeology and to generate awareness of underwater cultural heritage preservation in Australia. On completion of each of the courses, students are awarded an AIMA/NAS certificate, which is internationally recognized.

AIMA often lobbies on issues of interest to its membership, such as amendments to underwater cultural heritage legislation in Australia and the region. It has formal ties with other archaeological organizations including the Australasian Society for Historical Archaeology and the Australian Archaeological Association with which it occasionally holds joint conferences.

Cross-References

► Australia's Archaeological Heritage
► Maritime Archaeological Organizations
► Underwater Archaeology

Further Reading

The Australasian Institute for Maritime Archaeology Inc. n.d. Available at: http://www.aima-underwater.org.au

Australasian Society for Historical Archaeology (ASHA)

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Basic Information

The Australasian Society for Historical Archaeology (ASHA) is an organization that represents historical archaeologists from Australia and New Zealand. It is primarily a society for the interchange of ideas and information related to specific sites, regional analyses, and global perspectives of historical archaeology within the archaeological community, the general public, the cultural heritage industry, and the different tiers of government in both countries. ASHA was founded in 1970 as the Australian Society for Historical Archaeology primarily by Sydney-based archaeologists, and it developed out of initiatives by the New South Wales National Trust and the University of Sydney. One of the leaders of this was Judy Birmingham of the University of Sydney (Lawrence 2006: 5) who was the first secretary and later President of ASHA. It held the first of its now annual conferences in Sydney in 1980. Since then, conferences have been held in all parts of Australia and New Zealand, including half way between the two on Norfolk Island. Joint conferences are often held with the Australasian Institute for Maritime Archaeology and occasionally with the Australian Archaeological Association. The ASHA website is at www.asha.org.au.

Major Impact

ASHA has always had an active publication record and has produced a members' newsletter since the beginning of the Association and started producing its journal, *The Australian Journal of Historical Archaeology*, in 1983, under the editorship of Graham Connah. The 1990 conference held in Auckland acted to strengthen the ties between Australian and New Zealand historical archaeologists, leading to the change in the association's name to the Australasian Society for Historical Archaeology. This move was mirrored in a change in the journal's name with the publication of volume 10 in 1992 as *Australasian Historical Archaeology*. ASHA also publishes monographs and landmark doctoral theses in separate publication series.

The ties between historical archaeologists of New Zealand and Australia are more than institutional as both countries share a similar history of British colonization and, for example, an early reliance on mining and pastoral industries, and dependence on the sea for transport, defense, and resources (such as whaling and sealing). Consequently, the research interests of ASHA members from both sides of the Tasman Sea often align. Most of the professional work of ASHA members though does not lie in academe or in museums; most work either in the cultural heritage industry or for the government bodies that regulate that industry. As such, it has always been ASHA's mission to make the results of this consultancy work available to the wider archaeological community and the general public. ASHA also promotes excellence in historical archaeology with an awards program that consists of the annual R. Ian Jack Award for Best Honours Thesis, Judy Birmingham Award for Best Historical Archaeology Consulting Report, Martin Davies Award for Best Public Archaeology Initiative, the biannual Maureen Byrne Award for Best Postgraduate Thesis, the quin-annual Graham Connah Award for Best Publication, and the occasional Ilma Powell Honorary Life Membership Award for Distinguished Service.

Cross-References

► Australasian Historical Archaeology
► Connah, Graham

References

Lawrence, S. 2006. President's foreword. *Australasian Historical Archaeology* 24: 5.

Australia and the Origins of Agriculture

Rupert Gerritsen
National Library of Australia, Canberra, ACT, Australia

Introduction

The advent of agriculture as a particular form of food production, along with animal domestication, marks the beginning of an unparalleled transformation in human affairs. The transition that took place, from hunter-gatherers to agriculturalists, underpinned the evolution of a number of great civilizations. Usually the development of agriculture based on rye, wheat, and barley in western Asia, and rice and millet in China, is identified as the archetype for the development of the first pristine agriculturally based societies in human history. Over time extensive investigations in a range of disciplines have been conducted in an endeavor to understand the phenomenon, investigations which have attempted to answer such basic questions as when, where, and how did it happen, and perhaps most importantly, why did it happen at all? More recently, it has been realized that developments in hunter-gather societies were more varied and complex than originally portrayed, and that different pathways and forms of "food production" were conceivable. Accordingly, other patterns of development have come to be recognized, one in particular involving the formation of distinctive, complex, socioeconomic, and sociopolitical structures. Societies exhibiting such characteristics are often labeled as "Complex Hunter-Gatherers" or "Affluent Foragers." However, this phenomenon has made the whole question of the origins of agriculture more complex.

Research into the location and timing of the "agricultural revolution" over the last 100 years or so has resulted in the determination, at least in proximate terms, of when and where such developments took place. In the process, it has become apparent that it was not a discrete event but a circumstance that occurred independently in a number of different places at different times. However, some degree of consensus appears to have been reached in characterizing what happened – that certain groups managed to accomplish, unaided, the transition from hunting and gathering to farming (pristine development), apparently in the space of only a few centuries. The characterization of that transition does depend, however, on the paradigmatic viewpoint. Usually such explanations are framed in anthropological or economic terms, but the process has been described within a biological evolutionary framework.

Agriculture arose independently, or was adopted, at least once on all the inhabited continents, with the reputed exception of Australia. A variety of reasons have been put forward for this apparent anomaly, although it has recently been argued that agriculture was in fact practiced by a limited number of groups in two parts of Australia at the time that British colonization began (Gerritsen 2008). The evidence for relies principally on ethnohistorical and ethnographic information at the moment, rather than archaeology.

Definition

Australia is defined here as the modern political unit, which includes mainland or continental Australia, Tasmania and all offshore islands, and all the islands in Torres Strait, to within a few kilometers of the coast of mainland Papua New Guinea.

The Indigenous population of Australia is usually referred to generically as Indigenous Australians, and this embraces Torres Strait Islanders between the tip of Cape York and the south coast of Papua New Guinea, Aboriginal people of continental Australia, and the Tasmanians. Where Indigenous societies are discussed here, it is in the sense of "traditional" societies, their form at the time when initial contact with Europeans and other outsiders commenced, or began to have a significant influence.

A great variety of definitions of agriculture have been proposed. While it would appear from this that there is little definitional consensus, in

behavioral terms, the principal elements appear to be propagation (sowing, planting, usually of "domesticates"), husbandry (soil preparation, maintenance of moisture and fertility, exclusion of competitors, protection from predators), harvesting, and finally storage. The scale or areal extent of these activities would also appear to be a significant factor, though not always explicitly stated.

Whatever definition of agriculture is considered, all consider deliberate planting as a central activity. One attribute that has been included in definitions of agriculture is the requirement that the crops being grown and harvested are "domesticated." However, this requirement has been widely challenged in recent times (Gerritsen 2008: 29–31). Many, but not all, cultivated food plants appear to undergo morphological [phenotypic] changes and/or speciation, some quite quickly, once they are systematically planted, and in so doing may become human-dependent. But intensive harvesting, without planting, may also produce some of those changes, while plants that are systematically harvested may not undergo genetic changes, which depends on the harvesting method as well as the plant's genetic responsiveness (Gerritsen 2008: 29–31, 38–41, 83–4). Moreover, it is becoming evident that in early agriculture, the crops being grown were wild, "undomesticated," crops. In southwest Asia, current evidence indicates wild, undomesticated or only partially domesticated cereals were being grown well into the Neolithic, the period when it is usually accepted agriculture was becoming, or had become, established (Gerritsen 2008: 31, 41, 74). Rice (*Oryza sativa*) is another case in point. It had been cultivated for at least 3000 years as "ancient cultivated rice," only becoming "domesticated" at the end of the Chinese Middle Neolithic (Gerritsen 2008: 31, 75, 83–4). Some have endeavored to distinguish this period as "pre-domestic agriculture" or "pre-domestic cultivation" (Gerritsen 2008: 30–1). The evidence indicates that initially agriculture took some time to become established as the predominant means of food production and even in the latter part of the Pre-Pottery Neolithic B, from around 9800 cal. BP, hunting, fishing, and wild food procurement (such as nuts and lentils) still provided a substantial proportion of the food supply (Gerritsen 2008: 41).

Although not always explicitly stated, storage or conservation of the yield from crops that are grown is also a central feature of agricultural systems. While physical storage is usually seen in the case of seed, nut, and some tuber crops, it is a frequent practice with vegetatively reproduced staples, such as taro, sweet potatoes, and yams, for the tubers to be left in situ and harvested as needed.

In much of the writings and publications on the origins of agriculture, the term "Neolithic" is treated as almost being synonymous. Broadly speaking, as agriculture, or a mixed economy, such as animal husbandry and agriculture, starts to become the predominant mode of subsistence, permanent habitations, small permanent settlements, much higher levels of sedentism and systematic storage are evident. Although these characteristics emerge from the antecedent period, the Natufian in southwest Asia for example, they are strongly associated with all Neolithic cultures.

Often activities such as clearing, tilling, weeding, fertilizing, watering, and protection of crops are also included in the definition of agriculture. However, there are no systematic studies to support those generalizations and current evidence indicates that at least some may well be much later developments, refinements, or optimization behaviors adopted when agriculture had already become the dominant means of food production.

In summary, agriculture, particular early agriculture, must involve at least propagation (sowing and planting), some husbandry (soil preparation, maintenance of moisture and fertility, exclusion of competitors, protection from predators), harvesting, and finally storage on a significant scale.

Historical Background

The first documented contact Australia had with the outside world took place in March 1606, when a Dutch ship, the *Duyfken*, sailed down and charted 300 km of the western side of Cape York

in Queensland, having contact with some of the Indigenous population, probably the Anggamudi or Wik peoples, as they did. In the following 164 years, most of Australia's coasts were unveiled to the outside world and in 1788, the British established a colony at Port Jackson (Sydney) on the east coast. In the succeeding decades, British colonies were established in many parts of Australia. Where these settlements took hold and expanded the Indigenous population was decimated by massacres, epidemics, loss of land, sources of traditional sustenance, and neglect. One of the justifications used for the expropriation of the continent and the dispossession of the Indigenous inhabitants was the claim that they did not till the land and therefore did not use it productively.

Since that time, evidence has come to light from a variety of sources that Indigenous Australians did plant and sow in traditional circumstances. This includes species of yam (*Dioscorea* spp.) in the Cape York region in Queensland – on east Cape York among the Umpila at Lockhart River and islands offshore, and among the Walmbaria and Mutumi of Flinders Island and the adjacent mainland – and west Cape York among the Wik-Mungkan and possibly the Tjungundji. Planting of yams has also been noted at Kalumburu in the very north of Western Australia. Hynes and Chase reported the Pama Malnkana of northern Queensland planted coconuts (*Cocos nucifera*), while the Uradhi of northern Cape York cultivated the sweet potato (*Ipomoea batatas*) prior to contact with Europeans. Noted Australian poet Dame Mary Gilmore claimed in the 1930s that she had participated in traditional planting of grass seeds, and native fruits such as *quandong* (*Santalum acuminatum*), with Wiradjuri companions as a young girl in central New South Wales in the early 1870s.

A number of other examples have come to light in recent times, often observed by anthropologists and ethnobotanists. The seeds of a perennial herb, *kurumi*, tentatively identified as *Tecticornia arborea*, were carefully scattered in the cracks of the clay pan in the Western Desert of central Western Australia. In 1976, Kimber reported having observed planting in Central Australia of four different species, including two foods – "native fig" (*Ficus* sp.) and *yella* ("bush potato," *Ipomoea costata*). The practice of planting *Ipomoea* spp. has been reported elsewhere in Australia. Ethnobotanist Fiona Walsh also recorded that the Mardu, of the central north of the Western Desert, traditionally broadcast the seeds of "bush tomatoes" (*yalijarra – Solanum diversiflorum*), over burnt ground near their camp prior to rains. In all 19 species have been identified as having been planted by 21 different groups, many as a traditional practice (Gerritsen 2008: 19–23, 58–9) (Fig. 1).

Perhaps the earliest evidence that some Indigenous groups did sow and plant originated with Augustus Gregory, a noted explorer and Surveyor-General of Queensland, who had worked as a young surveyor in Western Australia. He reported in 1886 that in the 1850s, he had observed that the Nhanda of the Victoria District on the central west coast of Western Australia:

> never dug a yam without planting the crown in the same hole so that no diminution of food supply should result (Gregory 1886: 23).

Earlier, the first British explorers, led by Lt. (later Sir) George Grey, to pass through the Victoria District, in April 1839, had come across what appeared to be large yam grounds in the northern part of the Victoria District:

> April 4 1839: And as we wound along the native path my wonder augmented; the path increased in breadth and its beaten appearance, whilst along the side of it we found frequent wells, some of which were ten and twelve feet [3–4 m] deep, and were altogether executed in a superior manner. We now crossed the dry bed of a stream, and from that emerged upon a tract of light fertile soil quite overrun with warran [original emphasis] plants [the yam plant – Dioscorea hastifolia], the root of which is a favourite article of food with the natives. This was the first time we had seen this plant on our journey, and now for three and a half consecutive miles [5.6 kms] traversed a piece of land, literally perforated with holes the natives made to dig this root; indeed we could with difficulty walk across it on that account whilst the tract extended east and west as far as we could see (Grey 1841: 12).

The next day Grey's part encountered what appeared to be permanent settlements of considerable size on the banks of Hutt River:

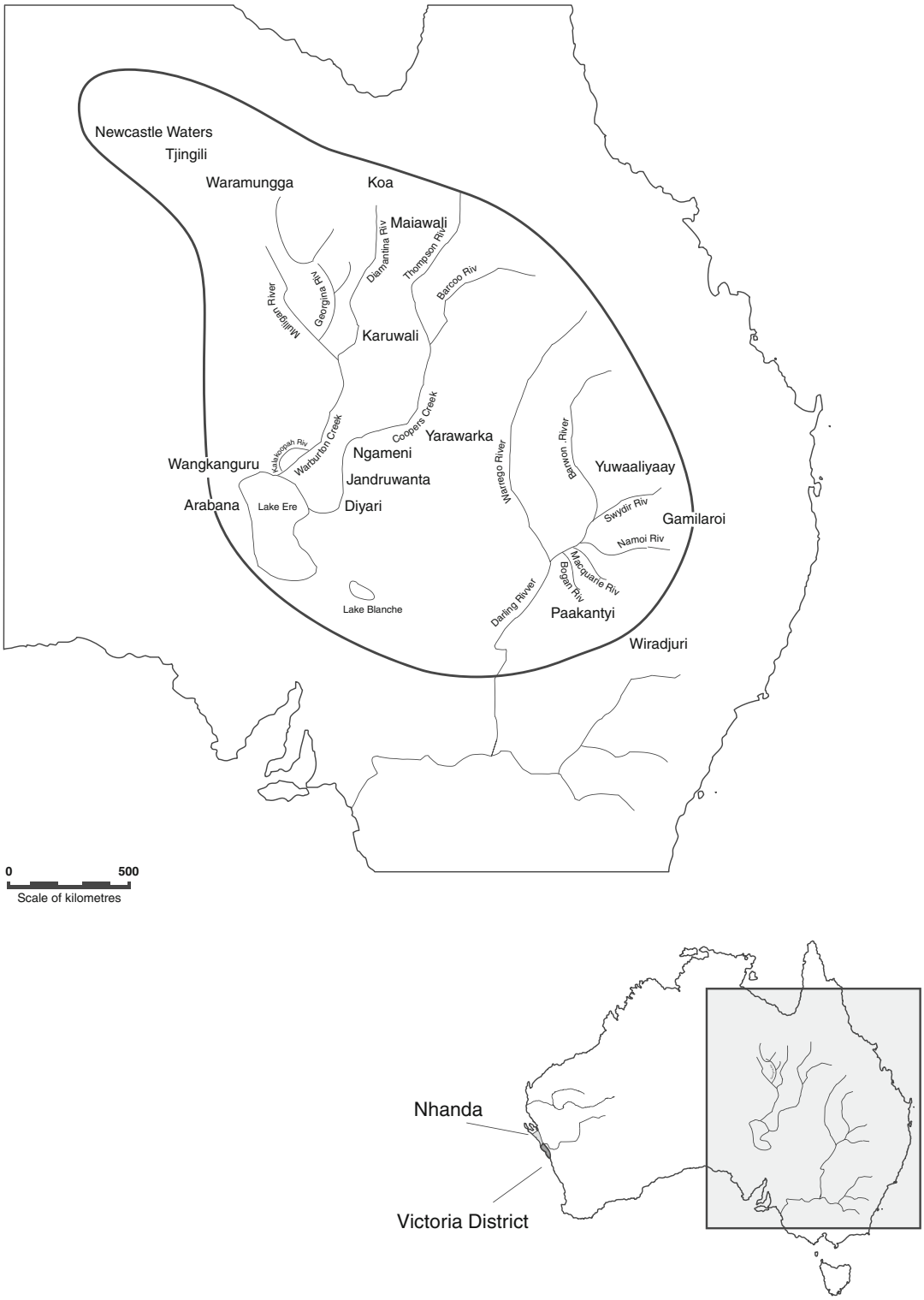

Australia and the Origins of Agriculture, Fig. 1 Map of the Corners Region, and the location of the Nhanda and Victoria District

> Being unable to ford the river here, we followed it in a SE direction for two miles [3.2 kms], and in this distance passed two native villages, or, as the men termed them, towns – the huts of which they were composed differed from those in the southern districts, in being built, and very nicely plastered over the outside with clay, and clods of turf, so that although now uninhabited they were evidently intended for fixed places of residence (Grey 1841: 19).

As Grey proceeded, he came across other settlements. It would appear that yams were grown in the alluvial river valleys of a series of small rivers running through the Victoria District, such as the Arrowsmith River. Grey noted that "the whole of this valley is an extensive warran ground" (Grey 1841: 54).

The domiciles mentioned by Grey were described in greater detail by other explorers, and appear to have been dome-shaped, constructed with timbers about 15 cm in thickness, 1.8-m high, coated in clay, and capable of easily accommodating 10 or more people. Subsequent research indicated that there were at least four substantial, permanent, settlements in the Victoria District, the largest having had an estimated population of nearly 300, with the occupants evincing a high degree of sedentism (Gerritsen 2000, 2008: 34, 37–8, 77) (Fig. 2).

Based on the definition of agriculture – propagation, husbandry (watering from wells, Gerritsen 2008: 34–5), harvesting and storage (in-ground), of a significant extent – the Nhanda and their southern neighbors, the Amangu, were engaging in agriculture, as well as exhibiting many of the characteristics of a Neolithic society.

The second part of Australia where early agriculture was evolving at the time of contact is termed the "Corners Region," where the corners of New South Wales, South Australia, Queensland, and the Northern Territory meet. This does not appear to have been a unitary phenomenon as the area is generally quite arid. The pattern of development is linked to wide alluvial rivers and lakes, but as the region is drought-prone it was characterized by a "pulsation" pattern of exploitation. Many groups would live, often in settlements with permanent shelters, tethered to permanent watercourses, lagoons, or other water sources until rains fell, or a flood occurred. They would then rapidly disperse to take advantage of the bounty produced as the arid countryside sprang to life, only to retreat again to the more secure supplies of food and water as the country dried out.

Early explorers noted extensive stands of millet or distributions of ngardu in clay pans in numerous parts of the Corners Region. For example, explorer and Survey-General of New South Wales, Major Thomas Livingstone Mitchell, first noted on the lower-central Darling River in 1835 that,

Australia and the Origins of Agriculture, Fig. 2 Site of former village: Hutt River (Gerritsen 2002: 6)

> In the neighbourhood of our camp the grass had been pulled, to a great extent and piled in hay-ricks, so that the aspect of the desert was softened into the agreeable semblance of a hay field . . . we found the ricks or hay cocks extended for miles. . .. All the grass was of one kind, a new species of 'Panicum' related to 'P. effusum' . . . not a spike of it was left in the ground (Mitchell 1839: 237–8).

Similarly, on upper Coopers Creek in south west Queensland, Augustus Gregory had observed in 1864 that the Maiawali or Koa people,

> reap a Panicum grass. Fields of 1,000 acres [400 hectares] are there met with growing this cereal. The natives cut it down by means of stone knives, cutting down the stalk half way, beat out the seed leaving the straw which is often met with in large heaps; they winnow by tossing seed and husk in the air, the wind carrying away the husks (Gregory 1887: 132).

A number of lines of evidence point to the sowing of this grass, *Panicum decompositum*, or its close relatives, known by a variety of Aboriginal names such as *tindil*, *cooly*, and *katoora*. This includes an account of a *katoora* planting ceremony by the Karuwali of southwest Queensland, numerous references in the *Markanjankula* myths of the Wongkanguru to clearing, tilling, and planting of grass seeds and ngardu, and an oral tradition about broadcast seeding of these in the region by an informant of Arabana descent (Gerritsen 2008: 60–1). In this account, a variety of groups in the Corners Region named would:

> chuck a bit there. Not much, you know. Wouldn't be a handful . . . a little bit, spread it you see – one seed there, one seed there, . . . chuck a little bit of dirt on, not too much though. And soon as the first rain comes . . . it will grow then (Kimber 1984: 16).

It would seem that there was a trade in these seeds, carried in specially made bags called *apwa*, weighing up to 23 kg (Gerritsen 2008: 60).

As soon as the British intruded into this region, they noted villages and large population concentrations. For example, on the upper-central Darling River early in February 1829, explorer Captain Charles Sturt reported:

> Early in the day we passed a group of seventy huts, capable of holding twelve to fifteen men each. They appeared to be permanent habitations, and all of them fronted the same point of the compass (Sturt 1833: 89).

Some 16 years later, close to the New South Wales/South Australian border, Sturt again struck upon another village. Composed of boughs and clay, each dwelling had a smaller one attached, as can be seen in a contemporary drawing (Fig. 3).

Some quite large structures were also observed by a number of explorers, some up to 27 m in circumference and capable of accommodating 30–40 people (Gerritsen 2008: 48). In addition, there were frequent references by explorers, surveyors, pioneers, and amateur ethnographers entering the region to "villages" and clusters of dwellings, as being "permanent," "well-built," "substantial," "clay-covered," or "multiroom" (Gerritsen 2008: 47–9, 66–7).

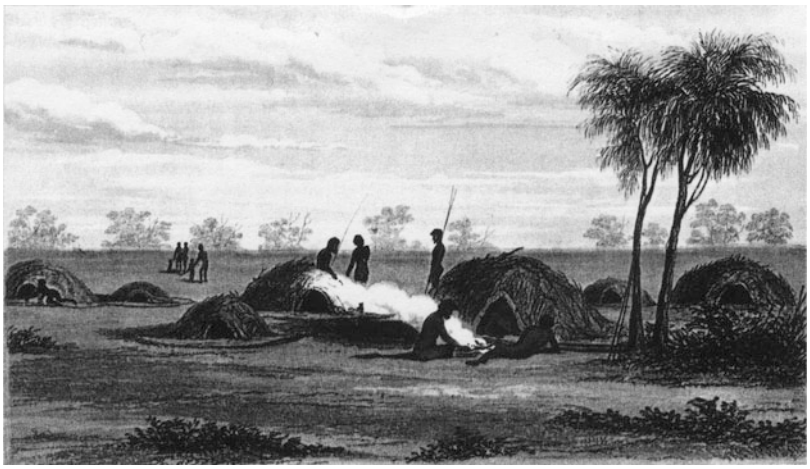

Australia and the Origins of Agriculture, Fig. 3 "Native Village in the Northern Interior" (Sturt 1849: 254)

Population concentrations mentioned by those explorers and the like often reported encounters with groups of many hundreds, sometimes thousands, assembling, congregating, or residing in particular locations (Gerritsen 2008: 50–1). Alas there have been no specific archaeological studies of settlements in the region, although recent archaeological surveys report such things as "flaked stone" covering an area of three square kilometers on the banks of a large waterhole, Lake Idamea, in southwest Queensland and "vast numbers" of surface sites, some with "millions" of artifacts, in the Lake Eyre South region (Gerritsen 2008: 49, 67n327). These higher populations were supported not only by extensive cultivation of *Panic* grasses, ngardu, and "bush onions" (*Cyperus bulbosus*; Gerritsen 2008: 60) and collecting plant-derived foods and hunting, but surprisingly by fish traps, net fishing, and shellfish, as well as net hunting (Gerritsen 2008: 43–6). Analysis, in terms of matching observational and limited archaeological evidence with the known correlates of sedentism, also indicates the people in this region were clearly exhibiting higher levels of sedentism (Gerritsen 2008: 51–5, 63–9, 77–9).

"Direct" or "Proper" storage, as distinct from caching and stockpiling, was also a feature of the Corners Region, many examples have been identified (Gerritsen 2008: 55–8). Stores of grass and other seeds were often observed, packed in 45–50-kg skin bags and clay casings. Edible gum, in "vast quantities" (Sturt 1833: 118–9), fish meal, dried fruits, and many other consumables were also seemingly preserved and stored. The Diyari utilized seed grain pits (Gerritsen 2008: 56), and a drover, Ashwin, came across a Tjingili settlement in 1871, in the north of the Corners Region, with a larger structure in the center where it is estimated about 1 t of grass seeds was stored (Gerritsen 2008: 57). The most likely explanation for the smaller structures associated with the dwellings depicted in Sturt's illustration of a "Native Village" is that these were storage structures (Gerritsen 2008: 57–8).

One of the fundamental changes which appears to take place when a society shifts from hunting and gathering to agriculture is a shift in the division of labor. While archaeological evidence of the division of labor in prehistory is limited, it is consistent with that ethnographically observed in hunter-gatherers, whereby men typically hunt while women collect plant foods and catch small game (Gerritsen 2008: 85–7). In both the Victoria District and the Corners Region, there is evidence of a shift in the division of labor, with men systematically engaging in planting, harvesting, parching, threshing, storing, and even preparing plant foods (Gerritsen 2008: 43, 88–90).

Key Issues/Current Debates

It had been the long-standing consensus that Australian and Tasmanian Aboriginal populations were nomadic hunter-gatherers. Consequently, the issue of why agriculture had not developed or been adopted in continental Australia and Tasmania was the subject of much theorizing and speculation. However, the growing realization that in traditional circumstances Indigenous Australians manipulated the environment in significant ways to enhance its productivity, particular through the use of fire, termed "firestick farming" (Jones 1969), and other forms of intervention, leading to the concept of "domiculture" (Hynes & Chase 1982) began to challenge these preconceptions. In concert with this, a growing body of archaeological evidence has been emerging that "intensification" had been in progress in Australia over the last 5000 years (Lourandos 1997; Gerritsen 2008: 5–15). Evidence of an aquacultural economy, permanent dwellings and settlements, and a higher degree of sedentism in western Victoria also began to emerge in the 1970s. The traditional Aboriginal population here have accordingly been identified as Complex Hunter-Gatherers (Williams 1988), and the region is still under active investigation (Builth 2006; Richards 2011).

Most recently, the proposition that some groups actually practiced agriculture (Gerritsen 2008), and the extent of intervention in the environment, conceptualized as "farms without fences" (Gammage 2011: 281–304), has raised significant conceptual and definitional issues. These have brought to the fore questions concerning the characterization of agriculture, and the distinction between

agricultural systems and the procurement practices of Complex Hunter-Gatherers/Affluent Foragers. Hallam (2011: 125) thus questions whether it is actually "meaningful to separate 'agriculture' as one unitary category throughout space and time?"

The interrelationship between agriculture and sedentism has also brought the issue of sedentism in traditional Indigenous Australian communities into sharp relief. Accounts of seemingly permanent dwellings and settlements, some reportedly quite large, had in the past simply been dismissed or treated as anomalies. The first systematic study of traditional Indigenous architecture by Memmot (2007) has provided a broader perspective, with some discussion on the interpretation of the observational evidence now occurring (e.g., Memmot 2007: xviii, 327, 331; Gerritsen 2011: 36–41).

Undoubtedly the question of agriculture in Australia, and attendant evidence of sedentism, will be a matter of ongoing debate. The debate is, however, likely to be as much about paradigms as about evidence. As can be seen, there has been already been a shift away from the universal characterization of traditional Indigenous culture as simple hunter-gatherers, but what are the alternatives, and can traditional Indigenous societies be described in unitary, generic, terms anyway?

International Perspectives

Since World War II, as information and evidence began to accumulate, a variety of theories on the origins of agriculture were formulated. Braidwood's "hilly flanks" theory focused on population concentrating in the lower Zagros Mountains in the northern Fertile Crescent. Flannery's "edge theory," and Binford's "marginality theory," also saw population concentration as critical, driven by climate change. Explanations based on "population pressure" began with Boserup in 1965 and culminated with Cohen's *The Food Crisis in Prehistory* in 1977. Since that time, many variants of these theories have arisen. Shortly after Cohen published his work, Barbara Bender pioneered the innovative "social competition" class of explanations, an idea taken up by many researchers, particularly by Brian Hayden with his "competitive feasting" model. In the 1980s Ofer Bar-Yosef and his collaborators developed a cultural ecology explanation, the "Levantine Primacy Model," based on the idea that some areas were better favored with domesticable plants and animals than others. An idea first proposed by Darwin in 1868, "weed theories" have been frequently been espoused in the latter half of twentieth century, such as the "dump heap hypothesis" and Smith's "floodplain weed theory." These suggest that humans had inadvertently created habitats for weedy food plants which were then taken into cultivation. Most recently, Gerritsen (2008) has considered the question, with particular reference to Australia, in terms of economic development. This treats agriculture as a form of specialization arising from two factors – higher population densities and innovation rates in areas of higher net natural productivity, and long-term advantageous information acquisition at nodal points in communication, viewed as long-range scale-free networks.

Over the last 11,500 years, agriculture was independently developed in as many as 11 areas outside of Australia (Gerritsen 2008: 141–2). In endeavoring to provide an explanation for the origins of agriculture, the theoretical frameworks or models that have been proposed ought to be able to account for the all the occurrences of agriculture in terms of location and timing, to establish their validity. If the case for agriculture in Australia is supported, then it would provide an excellent opportunity to test those frameworks and models.

Future Directions

As yet there have been no archaeological investigations to directly test the hypothesis that the nominated groups in Australia were indeed engaging in agriculture. The evidence put forward by Gammage also points to the necessity for such studies to more broadly conceive and embrace landscape archaeology more fully. In concert with this, settlement archaeology could be a fruitful field of enquiry. Despite numerous historical

accounts of Indigenous Australians living in permanent structures and settlements, outside of western Victoria (Williams 1988; Gerritsen 2000; Builth 2006), there have been no attempts to investigate such sites. Nevertheless, some recent efforts have focused on field work to at least identify the specific location of some reported settlement sites (Gerritsen 2000, 2002). While such issues could command some attention, given the constraints of limited archaeological resources, in a nation that covers a whole Âcontinent, with a range of other important priorities, progress may well be slow.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Complex Hunter-Gatherers

References

Builth, H. 2006. Gunditjmara environmental management: The development of a fisher-gatherer-hunter society in temperate Australia. In *Beyond affluent foragers: Rethinking hunter-gatherer complexity*, ed. C. Grier, J. Kim, and J. Uchiyama, 4–23. Oxford: Oxbow Books.

Gammage, B. 2011. *The biggest estate on earth: How Aborigines made Australia*. Crows Nest: Allen & Unwin.

Gerritsen, R. 2000. *The traditional settlement pattern in south west Victoria reconsidered*. Canberra: Intellectual Property Publications.

Gerritsen, R. 2002. *Nhanda villages of the Victoria District, Western Australia*. Canberra: Intellectual Property Publications.

Gerritsen, R. 2008. *Australia and the origins of agriculture* (BAR International series, 1874). Oxford: Archaeopress.

Gerritsen, R. 2011. *Beyond the frontier: Explorations in ethnohistory*. Canberra: Batavia Online Publishing.

Gregory, A.C. 1886. Inaugural address. *Proceedings of the Queensland Branch of the Geographical Society of Australasia* 1: 18–25.

Gregory, A.C. 1887. Memorandum on the Aborigines of Australia, in H.L. Roth (comp.) On the origin of agriculture. *Journal of the Anthropological Institute of Great Britain and Ireland* 16: 131–133.

Grey, G. 1841. *A journal of two expeditions in north-west and western Australia during the years 1837–1839*. Vol. 2. London: T. and W. Boone.

Hallam, S. 2011. Review of 'the biggest estate on earth: How Aborigines made Australia'. *Australian Aboriginal Studies* 2: 123–126.

Hynes, R.A., and A.K. Chase. 1982. Plants, sites and domiculture: Aboriginal influence on plant communities in Cape York Peninsula. *Archaeology in Oceania* 17: 38–50.

Jones, R. 1969. Firestick farming. *Australian Natural History* 16: 224–228.

Kimber, R.G. 1984. Resource use and management in central Australia. *Australian Aboriginal Studies* 1984 (2): 12–23.

Lourandos, H. 1997. *Continent of hunter-gatherers: New perspectives in Australian prehistory*. Cambridge/Melbourne: Cambridge University Press.

Memmot, P. 2007. *Gunyah, Goondie and Wurley: The Aboriginal architecture of Australia*. St Lucia: University of Queensland Press.

Mitchell, T.L. 1839. *Three expeditions into the interior of eastern Australia*. Vol. 1. London: T. and W. Boone.

Richards, T. 2011. A late nineteenth-century map of an Australian Aboriginal fishery at Lake Condah. *Australian Aboriginal Studies* 2: 64–87.

Sturt, C. 1833. *Two expeditions into the interior of southern Australia*. Vol. 1. London: Smith, Elder.

Sturt, C. 1849. *Narrative of an expedition into central Australia . . . in the years 1844–46*. Vol. 1. London: T. & W. Boone.

Williams, E. 1988. *Complex hunter-gatherers: A Late Holocene example from temperate Australia* (BAR International series, 423). Oxford: British Archaeological Reports.

Further Reading

Flood, J. 2004. *Archaeology of the dreamtime*. Marleston: J.B. Publishing.

Keen, I. 2004. *Aboriginal economy and society: Australia on the threshold of colonisation*. Melbourne: Oxford University Press.

Australia, New Zealand, and Papua New Guinea: Museums

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Introduction

Museums across Australia, Aotearoa New Zealand, and Papua New Guinea are diverse and

exist in a variety of settings. These countries share ancient geographic links and recent histories, yet each has differing cultures and landscapes. The museums of these nations also share a common colonial heritage, but each has different trajectories of development. They range from those which are federally, state, or territory funded, and operate in large cities, to those in small towns, universities, and not-for-profit and volunteer-managed organizations. The nature of their archaeological collections are equally as diverse, but reflect the three principal fields of archaeology undertaken in this region, Indigenous, historic, and maritime. However, the majority of objects held in collections are described as "ethnographic" and are chiefly materials from Indigenous nations across Oceania and Australia, mostly procured in the nineteenth century. There are also collections of archaeological assemblages derived from known contexts, such as excavated material and surface collections.

Undoubtedly, for many archaeologists, museums play the role of a repository for artifacts, kept for future post-excavation exhibition or analysis. To others, museum collections are centers of vast research potential. But more than this, museums are a visible means through which many societies affirm a role for themselves and their relationship to other cultures, to the past and the natural environment. This is not just in the sense of a physical building, but as a metaphor for the construction of a consensus notion of identity and behavior, and a collective memory. Museums in Australia, New Zealand, and Papua New Guinea, like elsewhere, are, however, western constructions and as such can only reflect their societies and the Indigenous cultures within the boundaries from which they have emerged. As such, they are sites of continuing reappraisal and negotiation. They are also sites where archaeological material collected has been used and re-contextualized for purposes of nationalism, to illustrate social history and underscore political narratives, and even reconciliation. They are centers for debate over repatriation, and have moved from the role of collector and classifier to that of advocate and community center.

Definition

The focus of this entry is on museums in Australia, Aotearoa New Zealand, and Papua New Guinea that are engaged in the conservation and exhibition of heritage objects and artifacts, and hold collections of archaeological significance. At the core, they are defined by the frequently cited International Council of Museums (ICOM) definition (2007) as nonprofit, permanent institutions that primarily function to preserve, research, teach, and make objects and information accessible to the public. However, this entry also recognizes that there is a growing shift at the boundaries of what defines museums in this region. For example, a museum may be a keeping place, site, community space, or even a website. This is in part because museums in recent years across Australia, New Zealand, and Papua New Guinea have moved to develop more appropriate relationships with Indigenous communities, and recognize the right of Indigenous authority and control. This has affected the ways in which material is displayed, collected, and repatriated and how new spaces are created. Museums also reflect social change, and are increasingly reliant on new technologies. As such, the definition of a museum is moving from that of a repository to places of knowledge and custodianship, where there need not be any physical evidence of collections at all.

Historical Background

The development of museums in Australia, New Zealand, and Papua New Guinea is inextricably linked to their colonial pasts. At the heart of their foundations lie the philosophies of science, collecting, exploration, exhibition and Empire; hegemonies of primitive, of otherness. They were colonial museums, established by British, white, bourgeois professionals to assert their gentility, and, as MacKenzie (2009: 120) notes, to establish networking opportunities, clubs for like-minded scientific gentlemen and their interests in natural history. The first in Australia, founded in Sydney in 1845, was originally known as the Colonial Museum (now the

Australian Museum) and was followed by the establishment of a plethora of others in the nineteenth century, including the Tasmanian Museum and Art Gallery (1852); the now Museum of Victoria (1854); the South Australian Museum (1861); the Queensland Museum (1862); and the Western Australian Museum (1891). Each colony, and then state, had its own government and its own museum.

The South Australian Museum exemplifies the deliberate exporting of museum as a symbol of a middle class "civilized" society and many of the characteristics of other Australian museums. Adelaide, which is a planned city (as opposed to penal colony), had its museum conceived as part of its original vision. When it was established in 1861, it needed to be filled, and in addition, the bourgeois of Adelaide needed to be on the world map. The exhibitions of "curiosities" were from the many Pacific and other "exotic" cultures. Such "relics" from other cultures became status symbols as discoveries were made on colonial frontiers. Across Australia, collectors were much more interested in obtaining artifacts from the Pacific Islands than Australia, and local Indigenous cultures were undervalued or seen as uninteresting. This legacy is reflected in the collection of most institutions, for example, the Australian Museum collection includes 60,000 artifacts from the South Pacific and 40,000 from Indigenous Australians (see http://australianmuseum.net.au). At the South Australian Museum, displays about Indigenous Australian cultures did not take primacy until as late as the 1990s. In the nineteenth century, such emergent nations saw museums as places to display their identity, history, and conquests; subordinate classes and minorities were excluded by definition. Consequently, to visit a museum was to witness the power of the ruling culture.

In the 1880s, there was a shift to collect the "ethnography" of Aboriginal people, as well as the continued lust for Pacific material. This was in part a reflection of influential individuals and their interests, such as Edward C. Stirling at the South Australian Museum, George French-Angas and Pierson Ramsay at the Australian Museum, and Walter Baldwin-Spencer at the National Museum of Victoria (see MacKenzie 2009). At this time, there was a prevalent belief that Aboriginal people were a "dying race." The focus was on collection, rather than display, before these cultures became "extinct." This led to almost frenzied amassing of cultural material, stolen, looted, and traded from Indigenous communities, much of which was initially exported to the United Kingdom; "For at least the first 60 years of settlement, Australian scientists cheerfully and uncritically dispatched the most interesting specimens to the country most of them still called home" (Anderson and Reeves 1994: 83). In Adelaide, there were many Indigenous people living in the immediate area of the museum, these communities were plundered and then as exploration, rail and missionaries proceeded across the state into what now is the Northern Territory, this collecting continued at rapid pace. The South Australian Museum (like all other state museums) also has a significant collection of human remains (for a discussion see Fforde 2004). In 1956 their then curator boasted that their collection of skulls numbered over 1,000 (MacKenzie 2009: 169). Burial grounds such as that at Swanport, South Australia, were also looted.

The imbalance in power relations between colonizer and colonized is exemplified by this scurry for Indigenous artifacts and human remains and their subsequent trade and commodification. The collecting of Indigenous lithics across Australia commenced in around 1900 in a non-systematic fashion. Collecting tended to focus on highly recognizable stone artifact types, such as axes, grindstones, hammer stones, and on secret/sacred objects such as cylcons and tcheringas. The assemblage from the first formal Australian archaeological excavation undertaken at Ngaut Ngaut in 1927 is located at the South Australian Museum. Museums in Australia, however, failed to recognize the diversity and validity of different Indigenous nations with distinctive cultures and also the antiquity and sacredness of the artifacts they had amassed. This positioned museums as "agent" of the dominant white population and some museums still

continue to hold on to cultural material, including that of a secret and sacred nature.

The origins of museums in Aotearoa New Zealand are not unlike that of Australia. The British Empire unfolded a network of colonial museums across the globe, and associations of scholarly and middle class scientific gentlemen similarly acquired and collected tokens from the "primitive" and the "dying" Maori. Many Maori sites were looted, including burials and sacred places, including marae (Hakiwai 2005). With the Treaty of Waitangi in 1840, there is a defined start date for British rule and the importation of culture. A small museum was first established in Auckland in 1850, then the Colonial Museum was founded in 1865 in Wellington (the first predecessor of the Te Papa Museum); subsequently, the Otago museum in 1868, and Christchurch in 1870 was established (see McCarthy 2011). Ethnographic collecting commenced immediately, in places such as Auckland where Maori populations were dense, and with the New Zealand wars in progress, obtaining cultural items was opportunistic and swift. The myth that the white settlement of New Zealand was more peaceful and civil than other colonies because of the Treaty of Waitangi can be contested by examining its colonial museums. Like Australia, land and cultural appropriation, acquisitions of human remains, and legacies of war and disease are evidenced in museum collections. Observers such as McCarthy (2011) and MacKenzie (2009) both accept the collaboration of some British allied Maori groups in the acquisition of cultural material, even taonga (sacred material) and marae (sacred meeting houses) and their contents. The exhibition "Te Maori" (beginning in 1986) was a watershed for New Zealand museum practice and politics and has been characterized as the beginning of Maori decolonization, "Maori people were taking back control over the representation of their culture" (McCarthy 2011: 54). As a direct result of the "Te Maori" exhibition, Maori communities have subsequently been recognized in cultural protocols and guardianship, and involved in collaboration, consultation, and governance.

Most museums around the world contain at least one mask or other artifact from Papua New Guinea. Enormous numbers of Indigenous artifacts were collected by western scientists, missionaries, traders, and explorers visiting Papua New Guinea during the 1870s and 1880s. In this sense, the history of museums in Papua New Guinea differs – it was a center for material that were taken outside of the country, collected opportunistically and at a frenetic pace to fill museum display cases overseas (particularly Germany) up until World War Two. It was a destination for countless scientific expeditions (Gosden and Knowles 2001) but less for settlement and economic investment. The desire to establish a national museum in this country was comparably late. This may be because there was not a suitable or large enough permanent, middle class, white population to warrant the establishment of such an institution, as local Indigenous populations were not the target audience. Support was initiated by two governors, McGregor and Murray, and resulted in the enactment of the Antiquities Ordinance Act in 1913. Although this legislation showed clear intention to protect Papua New Guinea's cultural heritage for future generations, it was only in 1954 that an Act was passed to provide for the foundation of a public museum. The first National Museum was subsequently established in Port Moresby in 1959. In 1966, the J.K. McCarthy Museum, a branch of the National Museum, was established at Goroka in the Eastern Highlands Province. In 1969, the first Papua New Guinean, Lepani Watson, was appointed to serve on the Board of Trustees. Michael Somare was elected President of the National Museum's Board of Trustees in 1971. Four years later, G.N. Mosuwadoga became the first Papua New Guinean appointed as Director. In 1979, the Museum became officially known as the National Museum and Art Gallery of Papua New Guinea and houses and supports substantive anthropological and archaeological collections and research, "reinforcing an awareness that the culture and lifestyle of Papua New Guinea are as rich as those of any other country" (Wari 1980).

In Australia, the twentieth century also saw the slow rise of a national consciousness and identity. Arguably there is a still a broad lack of interest or

knowledge of Australian history and particularly archaeology, pre- and post-European colonization. However, it was in the latter part of the twentieth century that a second wave of growth in museums occurred and stirred an interest in an Australian heritage. During these decades, new institutions were established, new buildings constructed, and collections increased. The 1960s saw a rapid growth in historical museums, predominately in the regional areas of Australia (Szekeres 2011). However, the dominant narrative presented was of pioneers and settlers, to the exclusion of both "ethnic" and Indigenous people. Change began to occur with the establishment of small museums by groups of post-World War two migrants in an attempt to continue and preserve their own cultural heritage and traditions. For example, the Ukrainian Museum opened in Adelaide in the late 1970s, run by the Ukrainian Women's Association to house their artifacts and archives. Likewise the Polish museum at Polish Hill River in the Clare Valley, where Poles had settled as early as 1838, was opened. These small institutions signify major shifts. The first, particularly among communities of non-Anglo backgrounds, declared that Australia was, in fact, a multicultural nation. It prompted non-Anglo--Australians to want to see themselves and their heritage being represented. Jewish people arrived in Australia along with the British in 1788 on the First Fleet, but where was their story and material culture? It was not until 1982 that the Jewish Museum of Australia opened, followed 2 years later by the opening of the Holocaust Museum in Melbourne. Such a recent establishment is surprising, for Melbourne has the largest number of Jewish Holocaust survivors outside of Israel and the USA. In the same way, Chinese people have a long history of largely unacknowledged settlement in Australia but did not open a museum to tell their stories until 1985.

A second shift to occur in the 1970s was a questioning of gender hierarchies of representation in all aspects of Australian cultural life, including museums. At this time, the androcentric nature of Australian museum culture and displays was also challenged, for until then, the representation of women of all backgrounds and time periods was simply nonexistent (see Anderson 1990; Goodall 1990). A turning point for Australian museums was also the 1975 Piggot Report. This is primarily known for its support and recommendations for a new national museum to be constructed in Canberra, focusing on three themes or galleries: "Aboriginal man in Australia"; "European man in Australia"; and "the Australian environment and its interaction with the two named themes" (Piggot 1975: 71). The Report was also important in putting forward the case to display Aboriginal history across all major museums. Subsequently, the National Museum of Australia Act 1980 was developed and the National Museum of Australia was opened in 2001. The Council of Australian Museum Associations (CAMA) meanwhile developed a policy for museums and Indigenous communities. Previous Possessions, New Obligations (PPNO) was released in 1993, addressed all aspects of museum practice and acknowledged that Indigenous people had primary rights in respect of control and interpretation of their culture (and revised in 2005 as the Continuous Cultures, Ongoing Responsibilities policy document). By the late 1990s, every major museum in Australia had redeveloped its exhibitions of Indigenous cultural material, often in consultation with the communities they sought to represent. Similarly, museum philosophies significantly changed in New Zealand in the 1990s with the adoption of the principal of biculturalism in museums (see Smith 2006; McCarthy 2011). The Museum of New Zealand Te Papa Tongarewa in Wellington was developed on the premise of biculturalism in its construction, management, and organization in an attempt to reconcile its Maori collections with colonial legacies. Since it opened in 1998, "Te Papa" has been popularly supported for its innovativeness in the areas of public access, bicultural history, and Maori authorship. Despite this, Te Papa perhaps still perpetuates an old museum paradigm – Maori cultural material attributed a sense of reverent, static history, while Pakeha (white people) are represented through sometimes superficial blockbuster displays.

Key Issues and Current Debates

It is evident that in museums across Australia, Papua New Guinea, and New Zealand, there have been important improvements made in the portrayal of cultural diversity. Although it is impossible to adjust modern moralities to the past, the message of museums has changed to one that tells the story of the fundamental place of Indigenous nations. Museums are for many, and particularly for tourists, they function as a site of first "contact" with an Indigenous culture. The increased emphasis on engaging and reconciling with Indigenous people has seen, for example, the repatriation of Indigenous human remains and cultural material. But a key issue remains – who are these museums for? Tourism Research Australia's 2009 survey of Cultural and Heritage Tourism in Australia found that international cultural and heritage visitors made up more than half (51%) of all international visitors to Australia in 2009 and, of these, 57% visited a museum. The most recent report by the Australian Bureau of Statistics (2009) estimated that there were 30.7 million annual museum admissions. What is missing from these reports is the percentage of visitors that were, for example, Indigenous Australians, or Vietnamese Australians or Sudanese Australians. The percentage is likely to be small. In museum studies, there have been discourses on global, multicultural, post-colonial, post-modern, and reflexive representation (see Corsane 2005) but in a nutshell, museums *are* western institutions still largely *for* western educated visitors.

The issue of museum visitation is linked to the concept of what is "heritage" in Australia and New Zealand. Although a personally defined concept (see studies by Deakin University 2010 and Aplin 2002), consistently problematic in debates on heritage is that British colonial is what is commonly understood to be meant by the term. Through studying the attitudes of Asian Australians, Clark (2007) found that transnational migrants feel a strong attachment to local and global identities, but a weak attachment to the national identity. Her research found that pride was felt least in Australia's "history" compared to all other achievements and national symbols, such as sport or politics. This may be related to the fact that there were prevalent and legally entrenched racist attitudes toward Asians in Australian up until 1970, but this is not a scenario confined only to Asian Australians. The endorsement of particular cultural symbols by museums, and the larger social and political need to foster a sense of loyalty among migrants from culturally diverse backgrounds through a consensus notion of heritage (see Kofman 2005), which is British, are perhaps more subtle reasons. Szekeres (2011) observed of the National Museum of Australia that its "migration section" was "small, constrained and sometimes misleading and inaccurate." This is not to say that exhibitions should include such a multiplicity of interests as to incorrectly portray historical realities, but simply ones more precisely contextualized.

In Australia, there was also a heritage "movement" in the 1970s, largely focused on the conservation of historic buildings. As a consequence, federal and state legislation that followed saw the beginnings of Cultural Heritage Management and rescue archaeology. Since the 1970s, there has been a large growth in the excavation of archaeological sites across Australia, Papua New Guinea, and New Zealand. As a consequence, there are also a rapidly increasing number of artifacts and collections to be stored and conserved. The curation of the material retrieved from archaeological excavations is most often problematic and a major issue for museums and archaeologists themselves. Schacht (2008) identifies a "curation crisis" in the "inadequate recovery, documentation, and legislative protection of artefacts and in the insufficient resources for their storage, conservation, and management. This has resulted in threats to both the physical condition of excavated collections and their accessibility for research, thus impacting on their research significance." Artifacts recovered mostly make their way to museums, local governments, university laboratories, some with archaeologists themselves. They are a burden on storage and administration, and as pointed out by Robins as early as 1988 (Robins 1988), many archaeologists themselves also contribute to the chaos of museum collections due to an inadequate understanding of the role and

function of a museum, which is not an infinite repository. Excavated material is often of archaeological merit, but of little monetary or aesthetic value. There is little incentive for museums to display such material – mundane, broken, and unremarkable. Most artifacts, once the excavation process is finalized, are not reused or displayed, but lie in boxes separated from context often with dubious documentation and conservation, perhaps with some cataloging. In Australian archaeology, there is greater emphasis on and interest in the process of fieldwork over theory, systems, and landscape over artifacts. There is a low level of training of archaeologists in terms of conservation in the responsibilities toward the collections they create "little recognition of the fact that the organisation, documentation and deposition of collections with a museum is an extension of the process of site management" (Robins 1988: 116).

The only guidelines in Australia to deal with the significance of artifacts are by the Heritage Collections Council of Australia (2001) which provides a framework for the assessment of individual objects, and identifies as primary criteria, historical, aesthetic, and social or spiritual significance but not specifically characteristics of archaeological collections. Schacht (2008) argues that the debate in the archaeological literature has stressed the subjective nature of significance; however, this approach has led to archaeologists rarely identifying any significance of the artifact collections they excavate and manage, and has resulted in the underutilization of the collections in research. An additional issue is the gendered division of labor in this sector. According to data released by the Australian Bureau of Statistics (2009) for the same category of work, women are earning only 63% as much as men. The museum sector also employs a greater number of women than men, and most artifact-based archaeology is undertaken by more women than men.

Across many museums artifacts are often left to speak for themselves in post-modern methods of display and can be ineffective in communicating the more nuanced and complex readings of history and cultural material. This is particularly problematic with artifacts from Indigenous archaeological sites with still hang in an uneasy space in traditional museums. To be able to understand the significance of an archaeologically recovered artifact, the museum visitor needs to have a shift in their understanding and ideas about the past, or a particular culture, and engage with those ideas. This may be easier for most museum visitors attending an exhibition of archaeology from Egypt or Europe – understanding the significance and meaning of a 2,000-year-old sword or necklace is easy and familiar. Viewing and understanding the significance of a 15,000-year-old grindstone or piece of ochre or Indigenous cultural material that is often presented as a bundle of curious, beautiful, unfamiliar objects from an unexplainable, distant past is difficult, unfamiliar, and intangible. Artifacts are often left mute, and for a non-archaeologist, their use or significance (apart from basic observations about function or style, such as in the case of, for example, a boomerang, or a series of 100 boomerangs) is simply elusive. Nor should the contexts be espoused with overt certitude by archaeologists. As pointed out by Stone (2005), archaeologists and curators still have problems in interpreting and displaying material to Indigenous people, but there are also issues in providing meaning to a broad public, a matter that can only be addressed by broader changes in terms of education and perceptions of the significance of the archaeology of Australia, as well as Papua New Guinea and New Zealand.

International Perspectives

The most significant and contested issue for museums in Australia, New Zealand, and Papua New Guinea, which has the greatest impacts on institutions internationally, is undoubtedly repatriation. The past 30 years has seen the emergence and growth of this issue, for the reason that there are likely to be thousands of human remains and sacred items scattered across museums from the United Kingdom and Germany to France and the United States of America. Human and cultural material was procured, acquired, looted, or stolen up until the 1930s (see Fforde 2004). The issue is driven by Indigenous communities and is largely

dependent on the development of goodwill between the traditional owners, governments, and museums. In most cases, it involves lobbying overseas governments and institutions on the cultural significance of repatriation, and is supported by federal governments in Australia, New Zealand, and Papua New Guinea. Although most overseas institutions would argue that there is scientific value in continuing to research human remains, what little research has been undertaken was done without the permission of descendent communities. The retention of human remains by museums in Europe and North America against the wishes of claimants is perceived as a continuance of colonial oppression (Hubert and Fforde 2005: 111). Many institutions perpetuate a discourse of ownership, a perceived duty to retain an inheritance from the past for a research future, which is effectively a denial or devaluing of alternative cultural meaning.

In terms of Australian museums, repatriation is managed by eight collecting institutions and assistance is provided where necessary by the National Museum of Australia and/or the relevant major state or territory museums to the federal Indigenous Repatriation Program, including research to establish the provenance of ancestral remains and the identification of overseas collections of ancestral remains and the holding of remains in temporary "keeping places." There have been over 1,000 repatriations to communities in Australia since 2000. Since 2003, New Zealand authorities have followed a policy of facilitating the repatriation of Māori ancestral remains from museums around the world (see Hole 2007). To date, Te Papa and its predecessor, the National Museum, has repatriated ancestral remains from twelve countries bringing home close to 322 skeletal remains and estimates that there are over 500 still awaiting return.

Future Directions

The presentation and recognition of the archaeology of Australia, New Zealand, and Papua New Guinea and the contribution that museums can make to this process is yet to be fully realized. The attitude and perhaps ignorance to the archaeology that occurs daily is probably best summed up by a question asked by an ABC journalist of TV host Tony Robinson of "Time Team" fame in when on a recent visit to Australia to promote his book on Australian history:

> In the Time Team series you're unearthing stuff that dates back as far as the Iron Age. Of course, Australia is a much younger country, and I wonder whether lack of brevity of history doesn't make for boredom to a certain extent?. (Ali Moore, Lateline 21/11/2011)

Of course, the answer given was that Australia has some of the world's oldest archaeology, some more than 50,000 years old. The fault lies here with archaeologists, museum professionals, and education sectors in the failure to communicate broadly the meaning and nature of archaeology of this region, and that our own archaeology is not taught in schools. Museums have tended to focus on collections and exhibitions rather than on other aspects of museums' policies and programs such as education, community engagement, and public programs, as well as engagement with archaeologists. This is also linked to the fact that museum education programs have traditionally been oriented to supporting school curricula, and archaeology as part of the school curricula is yet to be realized. Perhaps future generations, educated with an understanding of their own regional archaeologies, will be able to comprehend the significance of a flake and a core just as well as a coin or hatchet.

Online access to collections complements such a change to both education and public programs. Many museum objects can be already be viewed online, for example, the Collections Australia Network is part of the Federated Open Search Project where it is possible to search the online collections of the Powerhouse Museum, Museum Victoria, National Museum of Australia, Picture Australia, NSW State Records and Libraries Australia via their website. There were 51.5 million unique online visits to Australian museums with a total of 127.3 million web pages viewed in 2007–08 (ABS). With increased access to the internet, better and continuously evolving technologies, online collections are certainly the

future for museums. Changes in architecture have already taken place as a response to the changing role of the museum as a cultural center, rather than a repository for objects, such as Bunjilaka at the Melbourne Museum. Indeed, objects and collections may not be an essential focus of museums of the future.

Museums have traditionally conserved and classified, interpreted, and exhibited. The shift has already begun from the role of a classifier to one of advocate – in terms of social critique and the repatriation process. There is a shift in the role as custodian to one of stewardship, from preservation to one of cultural maintenance. Authority and authorial voices remain very important in this debate, especially in the context of collections that are archaeological or ethnographic in nature. Perhaps museums of the future may not be staffed with primarily white, tertiary educated professionals, but a workforce that is more reflective of the collections they hold and audiences they engage with. Positive change and development can also occur with proactive and genuine community collaboration and interaction, be it with Indigenous communities or archaeologists that may result in enduring, valued, and meaningful museums.

Cross-References

► Museums and Memory Experiences
► Royal Exhibition Building

References

Anderson, M. 1990. Women's history and material culture. *Museums Australia Journal*. (Out of the box- a special issue on women in museums): 3–7.

Anderson, M., and A. Reeves. 1994. Contested identities: Museums and the nation in Australia. In *Museums and the making of 'ourselves': The role of objects in national identity*, ed. F.S. Kaplan, 158–167. London: Leicester University Press.

Aplin, G. 2002. *Heritage identification, conservation, and management*. Oxford: Oxford University Press.

Australian Bureau of Statistics. 2009. Museums, Australia, 2007–08 (cat. no. 8560.0). Available at: http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/7BA052B8A3E7AC78CA2575850013F961/$File/85600_2007-08.pdf

Clark, J. 2007. Perceptions of Australian cultural identity among Asian Australians. *Australian Journal of Social Issues* 42 (3): 303–320.

Corsane, G., ed. 2005. *Heritage, museums and galleries: An introductory reader*. London/New York: Routledge.

Deakin Uiversity. 2010. *National survey of public attitudes to Australian heritage*. Report prepared for the Australian Government Department of Sustainability, Environment, Water, Population and Communities. Available at: http://www.environment.gov.au/soe/2011/report/heritage/3-2-population-growth.html

Fforde, C. 2004. *Collecting the dead: Archaeology and the reburial issue*. London: Duckworth.

Goodall, H. 1990. Representing the daughters of the dreamings: Aboriginal women and museums. *Museums Australia Journal* (Out of the box- a special issue on women in museums): 12–16.

Gosden, C., and C. Knowles. 2001. *Collecting colonialism: Material culture and colonial change*. New York: Berg.

Hakiwai, A. 2005. The search for legitimacy: Museums in Aotearoa, New Zealand – A Maori viewpoint. In *Heritage, museums and galleries: An introductory reader*, ed. G. Corsane, 154–162. London/New York: Routledge.

Hole, B. 2007. Plaything for the foe: The repatriation of human remains in New Zealand. *Public Archaeology* 1 (1): 5–27.

Hubert, J., and C. Fforde. 2005. The reburial issue in the twenty-first century. In *Heritage, museums and galleries: An introductory reader*, ed. G. Corsane, 107–121. London/New York: Routledge.

International Council of Museums. 2007. ICOM code of ethics for museums, 2007. Available at: http://icom.museum/ethics.html

Kofman, E. 2005. Migration, citizenship and the reassertion of the nation-state in Europe. *Citizenship Studies* (Special issue on spaces, places and scales of citizenship) 9(6): 453–467.

MacKenzie, J.M. 2009. *Museums and empire: Natural history, human cultures and colonial identities*. Manchester: Manchester University Press.

McCarthy, C. 2011. *Museums and Maori heritage professionals, Indigenous collections, current practice*. Wellington: Te Papa Press.

Moore, A. 2011. Interview 21/11/2011. Lateline, Australian Broadcasting Corporation. *Tony Robinson turns historical eye on Australia*. Available at: http://www.abc.net.au/lateline/content/2011/s3372540.htm

Piggot, P. 1975. *Museums in Australia 1975: Report of the committee of inquiry on museums and national collections including the report of the planning committee on the gallery of Aboriginal Australia*. Canberra: AGPS.

Robins, R. 1988. The protection and preservation of archaeological collections: A museum perspective. *Australian Archaeology* 27: 155–120.

Schacht, I. 2008. *Determining research significance in archaeological collections from historic sites*. Unpublished Ph.D. dissertation, Deakin University.
Smith, H. 2006. The museum of New Zealand Te Papa Tongarewa. In *South Pacific museums: Experiments in culture*, ed. C. Healy and A. Witcomb. Victoria: Monash University ePress.
Stone, P. 2005. Presenting the past: A framework for discussion. In *Heritage, museums and galleries: An introductory reader*, ed. G. Corsane, 215–227. London/New York: Routledge.
Szekeres, V. 2011. Museums and multiculturalism: Too vague to understand, too important to ignore. Available at: http://www.nma.gov.au/research/understanding-museums/VSzekeres_2011.html
Wari, K. 1980. The function of the National Cultural Council in coordinating cultural development in Papua New Guinea. In *Preserving Indigenous cultures: A new role for museums*. 1978 UNESCO Regional Seminar, ed. R. Edwards, and J. Stewart. Canberra Australian Government Publishing Service.

Further Reading

Tourism Research Australia. 2010. Cultural and heritage tourism in Australia, 2009 snapshot. Available at: http://www.ret.gov.au/tourism/tra/Pages/default.aspx

Australia: Cultural Heritage Management Education

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Cultural heritage management (CHM) education is a vital component in managing cultural heritage resources, since it produces each new generation of professionals who work across its many allied fields. In Australia, as in other countries, CHM encompasses a wide range of specialist subfields, from built heritage (conservation or landscape architecture), materials conservation, and heritage planning to museum studies, Indigenous heritage, archaeology, and professional history. This mosaic has created a complex system of educational opportunities for those seeking professional qualifications to practice and has also created its own particular suite of problems.

While such breadth is partly a strength, in that there are many formal and informal options for education across all sectors of the population, it is also a weakness, in that the field is highly fragmented, with few opportunities for coordination or collaboration, and a clear need for benchmarking, quality standards, and a national outlook on tackling educational and skills needs. One recent study identified this fragmentation as the key problem preventing the sector from responding effectively to regional skills shortages, emerging priorities for skills development, or contributing to nationally significant research agendas and cultural and environmental challenges (Ireland et al. 2013). No enforceable professional standards or national accreditation relating to heritage education and training currently exists in Australia.

Current routes for CHM education in Australia follow a variety of formal and informal pathways. Formal paths are the various degrees, diplomas, or certificates offered through universities or colleges of technical and further education (TAFEs). Informal mechanisms are usually offered through various not-for-profit cultural heritage organizations (such as museums, the National Trust, or Conservation Volunteers Australia) or non-government statutory bodies, such as the Historic Houses Trust of NSW or the Port Arthur Historic Site Management Authority. Informal training mechanisms usually aim to encourage a more general "culture of care" around heritage through educating the public in the conservation of heritage places, creating greater knowledge of heritage management issues, or changing visitor behavior at heritage sites.

Formal Cultural Heritage Management Education in Australia

Australian higher education has traditionally been split across the university and TAFE sectors, with TAFEs being viewed as vocational (the government language for the training they offer is known as Vocational Education and Training, or VET), rather than academic. The gap between the two sectors is perhaps most clearly measured by the

forms that heritage education within each typically takes. Heritage as offered through a TAFE College is typically only available as a module within a larger course on tourism, Aboriginal languages, guiding, or land management and conservation. The exceptions to this are more tailored courses in Indigenous heritage management designed by some universities and offered in conjunction with state government partners, usually in response to legislative changes that require particular skills. Heritage trades (i.e., stone masonry, thatching, traditional joinery or carpentry, and other craft-based skills) are also only available through TAFE or through a traditional apprenticeship system (although only 2% of apprentices learn heritage skills in this way; Godden Mackay Logan 2010: 16). Current literature, however, points to such trades being in chronic shortage, due to the disappearing knowledge of heritage crafts, the advancing age of knowledgeable tradesmen, and the lack of incentives for them to take on new apprentices. There are thus very few opportunities to pass on existing heritage trade knowledge and skills (Godden Mackay Logan 2010: 15–16).

At universities the traditional path remains a 3-year undergraduate plus 1-year honors degree (usually a combination of coursework and thesis), although this, too, has been challenged in recent times. Major changes to the Australian education sector in the 1980s and overall increases in the proportion of the population seeking a higher degree qualification resulted in more students studying at tertiary institutions and created broader scope for vocational courses in heritage to be introduced (Beck and Balme 2005:32). Through the 1990s, changes happening outside the academy became relevant in driving a demand for CHM employment, creating increased demand for more and better skilled graduates, and transforming the CHM education landscape in the process. The importance of native title-related work after the introduction of the Native Title Act 1993 (see also McNiven, this volume), urban expansion in southeastern Australia, and the mining boom in Western Australia saw the numbers employed in the heritage sector grow substantially throughout the late 2000s and early 2010s, leading some universities to try and address the former divergence between the training offered in a degree, the vocational training offered by TAFE, and apprenticeship-style opportunities to learn "on the job."

This is most obvious in developments around graduate coursework programs related to various aspects of professional archaeological and heritage practice. In 2005 a national survey of archaeologists identified a need for a vocationally oriented fourth year option (i.e., a graduate diploma) that was different to the traditional research-oriented honors year. While isolated attempts to create graduate diploma degrees in heritage date back to the 1980s, several universities responded more successfully to recent needs by developing vocationally oriented options that mix formal, informal, and "on-the-job" aspects of training. Recently, several universities have also become dual-sector institutions (i.e., both universities and TAFEs), allowing them to offer both degrees and VET training.

Informal Cultural Heritage Management Education in Australia

Raising public awareness of heritage as an important issue in Australian society is also an important heritage education goal. Public interest in heritage generally, and in some of the particular disciplines that study heritage, such as archaeology, is directly related to the social basis for cultural heritage management, since the key to successful heritage management lies in collaborative work with communities, traditional owners, and other stakeholders. The two are combined most often through interpretive works on or about a site or public archaeology programs ("education through experience") built into the process or the outcomes of cultural heritage management work, including open days, public site visits, and tours (see also Ryzewski and Carman, this volume).

Large urban excavations in the 1990s at The Rocks in Sydney and Little Lonsdale Street in Melbourne, for example, both engaged

hundreds of volunteers in public archaeological activities and education as part of the development work at these sites. The best long-term outcome of such projects is probably The Big Dig Archaeology Education Centre in The Rocks, which was purpose-built to provide an ongoing range of educational experiences in archaeology and the heritage of Sydney. Many other projects lead to smaller, more site specific, but no less valuable, informal educational outcomes, such as options for interpretation of particular sites.

In NSW the public basis for CHM and resulting tools for public outreach have been codified more strongly through historic site legislation that often requires the incorporation of public education facets into cultural heritage management plans, especially for state-significant historical archaeological sites. The work of the Heritage Branch of NSW has been devoted to promoting public awareness by building various promotional mechanisms to standard archaeological and other consultancies.

The variety of, need for, and sustained interest in cultural heritage management educational opportunities across Australia hold great potential for the future of managing cultural heritage resources. Creating better links between universities, TAFEs, community organizations, and volunteer and vocational sectors will bring the disparate facets of CHM education closer together and mend some of the rifts that currently fragment it.

More Information

Information and tools for heritage education: https://environment.gov.au/heritage/info/education.html

Heritage courses available in NSW: https://www.environment.nsw.gov.au/Heritage/research/heritagecourses.htm

Heritage Trades and Professional Training Project: http://www.environment.gov.au/resource/heritage-trades-and-professional-training-project

The Big Dig Archaeology Education Centre: https://thebigdig.com.au/

Cross-References

▶ Cultural Heritage and Communities
▶ Cultural Heritage Management and the Colonial Culture
▶ Cultural Heritage Outreach

A

References

Beck, W., and J. Balme. 2005. Benchmarking for archaeology honours degrees in Australian universities. *Australian Archaeology* 61: 32–40.

Godden Mackay Logan Heritage Consultants, La Trobe University and Donald Horne Institute for Cultural Heritage. 2010. *Heritage trades and professional training project*. Report prepared for heritage Victoria on behalf of heritage chairs and officials of Australia and New Zealand.

Ireland, T., A. Guthrie, R. Mackay, and A. Smith. 2013. Historical archaeology and Australia's cultural heritage sector: Emerging issues for education and skills. *Australasian Historical Archaeology* 31 (1): 3–13.

Australia: Domestic Archaeological and Heritage Management Law

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Introduction

Heritage law in Australia is dynamic and challenging. It is closely connected to the broader framework of environmental planning, protection, and regulation. Australia's first heritage management legislation dates from the 1970s. It was enacted in response to the widespread public concern regarding the destruction and loss of many important natural and cultural places as the Australian urban landscape rapidly modernized during the 1960s and 1970s. Since that time, the theory, practice, and public interest in natural and cultural heritage conservation has changed considerably. It has evolved from an ad hoc

community-driven movement focused on saving natural environments, historic places, and buildings through activism and protest to an increasingly complex multilevel system of heritage laws and procedures.

Australia has a federal system of governance. It is comprised of the Commonwealth, six states, and two mainland territories, each of which has its own statutes for heritage management. Urban planning, development, and heritage conservation are considered matters of interest to the states (Logan 2007). Yet, the demarcation of roles and responsibilities between the Commonwealth and the states and territories has been the subject of ongoing debate and review in many areas, including heritage management (Aplin 2002). The Council of the Australian Government Heads of Agreement for the Commonwealth and State Roles and Responsibilities for the Environment established a three-tier system for the management of heritage in Australia in 1997. As part of that Agreement, responsibility for listing, conserving, and managing heritage of national, state, and local significance is delegated to the Commonwealth, the states and territories, and local governments, respectively (Productivity Commission 2006).

The multilevel system of heritage law is administered by various agencies and authorities and requires adherence to heritage conventions, charters, codes, manuals, and standards of practice that are primarily executed and evaluated by tertiary-educated heritage professionals and specialists. Reflecting the unique qualities and diversity of Australia's heritage, the legislative framework protects natural heritage, Aboriginal and Torres Strait Islander heritage (Indigenous), historic places, archaeology, historic shipwrecks, and industrial and movable heritage.

Definition

In recent years, understandings of what constitutes heritage in Australia have been influenced by increasing ethnic and cultural diversity, shifting public attitudes and broader trends in the field. As such, defining heritage and what it comprises is the subject of ongoing debate and refinement (Conroy 2007). Implementing new legislation is a significant practical undertaking and given the dynamic context, it is often difficult to ensure that heritage law reflects current definitions and community values.

Notwithstanding the energetic efforts of the National Trusts in the postwar period, in Australia, heritage came to political prominence through the concept of the National Estate. The "National Estate" was first coined in Australia by Prime Minister Gough Whitlam in 1972, following the example of the American President, John F. Kennedy (Veale et al. 2012). Initially, there was some imprecision in the use of the term, but by 1974 and the release of the *Report of National Estate*, it was defined as comprising the *natural and cultural environment, archaeological and scientific areas and cultural property which are of outstanding significance to the World, to the Nation or of aesthetic, historical, scientific, social, cultural, ecological or other special value to any part of the nation, including a region or locality that should be conserved, managed and presented for the benefit of the community* (Hope 1974).

In 1979, *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (the Burra Charter) was adopted. The Burra Charter established a series of best-practice conservation principles and processes that are underpinned by the central concept of cultural significance. Reflecting the definition of the National Estate, under Article 1.2 of the Burra Charter, cultural significance is defined as aesthetic, historic, scientific, social, or spiritual value for past, present, or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places, and related objects which may have a range of meanings for individuals and groups (Australia ICOMOS 1999). While the Charter has not been officially adopted in legislation, its principles and processes are evident in heritage management law throughout Australia.

Notwithstanding the influence of the Commonwealth and the Burra Charter, variation in the definitions used in Australian heritage law persists. These variations provide an indication as to what defines heritage in each jurisdiction.

In most instances, legislation defines and protects Indigenous and non-Aboriginal (historic) places and objects separately. Typically, "heritage" is not specifically defined in the legislation; rather, a series of criteria are used to assess whether a place or item has sufficient cultural value or significance to be protected at local, state and territory, Commonwealth, or national levels. For example, the Heritage Acts in South Australia (SA), Victoria (Vic), Queensland (Qld), Tasmania, and Western Australia (WA) specify a place is of heritage significance if it can be demonstrated to satisfy one or more heritage criteria. Under the New South Wales (NSW) *Heritage Act 1977*, items of environmental heritage are protected. This definition includes natural places, as does the Australian Capital Territory's (ACT) *Heritage Act 2004*, which protects places of natural or cultural significance (Boer and Wiffen 2006). The *Heritage Conservation Act 1991* (Northern Territory NT) includes places and objects of social, aesthetic, or scientific value and may include geology, fossils, archaeology, objects, buildings, precincts, works, relics, gardens, coastlines, landscapes, and ruins the *Heritage Act 1993* (SA) conserves places of cultural value, including places of geological and palaeontological significance.

Generally in Australian heritage law, a distinction is made between heritage places and archaelogical objects and relics. Specific provisions to protect objects and relics are included in most heritage acts in Australia. Historic shipwrecks are defined as a special type of object which are protected by State and Territory legislation in conjunction with the Commonwealth *Historic Shipwrecks Act 1976* which protects wrecks and associated relics that are 75 years or older.

The *Victorian Heritage Act 1995* protects places and objects of significance to the State (excluding Aboriginal heritage). Under that Act, an archaeological relic is defined as any archaeological deposit; artifact, remains, or material evidence related to non-Aboriginal occupation that is 50 or more years old (*Victorian Heritage Act 1995* Section 3). Similarly, in NSW, under the *Heritage Act 1977*(NSW), a relic is any deposit, artifact, object, or material evidence that relates to the settlement of NSW not being Aboriginal settlement and is of State or local heritage significance (*Heritage Act 1977*). Until amended in 2001, the *National Parks and Wildlife Act 1974* also included provisions for the protection of relics, however, in that statute relics related to Aboriginal occupation. Unlike Victoria and NSW, in WA, under the *Heritage of Western Australia Act 1990* and the SA *Heritage Act 1993*, archaeological relics are not referred to, though in WA regard may be given to archaeological value when a place is being considered for entry onto the Register. In SA, a place of archaeological significance may be registered, and a permit is required to remove cultural artifacts from such places.

Across Australia, Indigenous heritage is variously defined. The definitions tend to reflect the different approaches that emerged when Indigenous heritage law was initially passed in the 1970s. In Northern Australia emphasis is placed on the protection of sacred sites and includes any land that is sacred to Aboriginal people or of significance according to Aboriginal tradition. Conversely, across Southern Australia, Indigenous heritage legislation was defined by reference to material evidence (relics or objects) related to Aboriginal occupation such stone artifacts, campsites, and hearths. For example, under the *Aboriginal Relics Act 1975*, Tasmania, a relic is defined as the physical remains of past Aboriginal occupation prior to 1876 and can include middens, stone arrangements, engravings, and rock art. Most definitions for relics and objects exclude those made for the purpose of sale. The assessment and protection of these types of evidence was and is still largely managed by archaeologists, whereas assessments in Northern Australia are predominately undertaken by anthropologists (Office of Environment and Heritage 2012). In NSW, under the *National Parks and Wildlife Act 1974*, Aboriginal objects and Aboriginal places of significance to Aboriginal people are protected. An Aboriginal place is defined in the Act as being a place that, in the opinion of the Minister, is or was of special significance with respect to Aboriginal culture (Section 84 NPW Act 1974 (NSW)) *National Parks and Wildlife Act 1974*.

Historical Background

In Australia, heritage management law has had a relatively short history when compared to countries overseas. Despite this, heritage law and the periodic reforms demonstrate how the theory and practice of conservation has evolved and how major trends, public and private attitudes, interests, and pressures have been interpreted and applied to the legal framework for the identification, management, and protection of significant heritage places, objects and relics.

Heritage Legislation: Australian States and Territories

One of the earliest pieces of heritage legislation, the *Native and Historic Objects Heritage Protection Ordinance* was passed in 1955 in the NT (North 2006). Elsewhere, in NSW, the *Crown Lands Consolidation Act 1913* included provisions for the establishment of reserves to protect Aboriginal art sites. Some years later, amendments to the *Local Government Act* in 1945 included provision for places or objects of historical or scientific interest to be preserved (NSW Heritage Office 2000). Yet across Australia, most heritage law dates from the 1970s and reflects the political response to the community's growing concerns about the destruction and loss of the historic and natural environment. The table below lists the main federal and state and territory heritage and related statutes in force at the time of writing (Table 1).

In 1974, Victoria led the other states and territories when the *Historic Buildings Preservation Act 1974*, which focused on protecting buildings of historic or architectural significance, was enacted. NSW had passed the *National Parks and Wildlife Act* (NPW Act) in 1967, the same year that the *Aboriginal and Historic Relics Preservation Act 1965 (SA)* came into force. Reflecting the American legislative model, the *NPW Act 1967* established the National Parks Service and a formal mechanism for the reservation of National Parks, State Parks, and Historic Sites; which were areas comprising buildings, objects, monuments, or events of national significance. In 1969, significant amendments were made to the

Australia: Domestic Archaeological and Heritage Management Law, Table 1 Commonwealth, state and territory heritage and planning legislation

Australian state or territory	Current heritage legislation
New South Wales	*National Parks and Wildlife Act 1974*
	Heritage Act 1977
	Environmental Planning and Assessment Act 1979
	Historic Houses Trust Act 1980
Queensland	*Newstead House Trust Act 1939*
	Queensland Heritage Act 1992
	Aboriginal Cultural Heritage Act 2003
	Torres Strait Islander Cultural Heritage Act 2003
	Cape York Peninsula Heritage Act 2007
	Sustainable Planning Act 2009
Victoria	*National Parks Act 1975*
	Planning and Environment Act 1987
	Victorian Heritage Act 1995
	Aboriginal Heritage Act 2006
Tasmania	*Aboriginal Relics Act 1975*
	Land Use Planning and Approvals Act 1993
	Historic Cultural Heritage Act 1995
Western Australia	*Aboriginal Heritage Act 1972*
	Maritime Archaeology Act 1973
	Heritage of Western Australia Act 1990
	Planning and Development Act 2005
Northern Territory	*Northern Territory Aboriginal Sacred Sites Act 2006*
	Heritage Conservation Act 1991
	Planning Act 2009
South Australia	*Historic Shipwrecks Act 1981*
	Aboriginal Heritage Act 1988
	Heritage Act 1993
	Development Act 1993
	Planning and Land Management Act 1988
Australian Capital Territory	*Heritage Act 2004*
	Planning and Development Act 2007
Commonwealth	*Historic Shipwrecks Act 1976*
	Aboriginal and Torres Strait Islander Protection Act 1984
	Protection of Movable Cultural Heritage Act 1986
	Environment Protection and Biodiversity Conservation Act 1999

NPW Act, and the objectives for cultural heritage broadened to include the conservation of objects, places, or features (including biological diversity) of cultural value within the landscape, including places, relics, and features of significance to Aboriginal people, and places of social value to the people of NSW, and places of historic, architectural, or scientific significance. Amendments to the *NPW Act* in 1974 created provisions for the gazettal of Aboriginal places which affords protection to places of cultural significance regardless of whether objects are present.

In NSW, with the passing of the *Heritage Act 1977* (NSW) and the *Environmental Planning and Assessment Act 1979 (NSW)*, heritage protection became part of an integrated system of planning and environmental management. Some states took considerably longer to legislate for heritage protection, most notably Qld and WA. Both states passed legislation almost a decade later than NSW due to the lack of political will and the economic power of the mining industry (Spearitt 2012). Tasmania, with its tangible convict heritage, was without formal heritage protection until 1995, yet with negligible urban development and growth, there was no imminent threat to heritage places. The first wave of legislation passed during the 1970s tended to focus on historic heritage, natural heritage was generally protected through national parks and reserves, Aboriginal heritage was afforded blanket protection, and consideration of movable heritage objects was typically overlooked (Marshall 2010).

The legislative mechanisms and regulations for heritage management in Australia play a crucial and central role in the management of Australia's heritage at local, state and territory, and national levels. In all jurisdictions, similar legislative and administrative systems have been established. While the extent to which heritage is managed and regulated under each act varies, essentially four main types of legislation are apparent (Pearson and Sullivan 1995). Firstly, there are acts that separately protect Indigenous and historic sites including cultural places, heritage, sites, and relics. Secondly, a number of acts manage heritage through land or site management. Examples include forestry, national parks, or historic houses legislation that typically includes provision for the conservation of heritage within the estate they manage. The *Historic Houses Act 1980* (NSW) provides for the care, control, and management of historic houses, and other buildings of historic importance is an example. One of the oldest acts of this type still in force is the *Newstead House Trust Act 1939* (Qld), which establishes a board of trustees for the Newstead House and for the conservation, education, enjoyment, and public access to Brisbane's oldest residence. Thirdly, land use planning legislation in most states and territories includes specific provisions that regulate development with regard to places of environmental heritage value. Finally, some acts such as the National Trust Acts establish the Trusts in each state and territory and provide for the preservation, maintenance of places of historical, artistic, and scientific interest and the compilation of registers of heritage places.

With regard to historic heritage legislation such as the *Heritage Act 1977* (NSW), *Heritage of Western Australia Act 1990* (WA), *Heritage Conservation Act 1991* (Northern Territory NT), *Queensland Heritage Act 1992* (Qld), *Heritage Act 1993* (SA), *Heritage Act 1995* (Vic), the *Historic Cultural Heritage Act 1995* (Tas), and the *Heritage Act 2004* (ACT), the objectives typically comprise maintaining and managing a heritage register, the establishment of a heritage council to provide advice to government, manage statutory listings, and review proposed changes to listed items; regulation and control over development affecting listed places, the preparation of guidelines, and standards for heritage practice; assistance with the provision of heritage advisory services to local councils; and funding to assist individuals and communities with the costs of conserving heritage.

It is in the area of Aboriginal and Torres Strait Islander heritage law that there is considerable variation between jurisdictions. NSW was the second government in Australia to enact legislation to protect Aboriginal heritage. Under the *NPW Act 1974* (NSW), it is an offence to harm an Aboriginal object or Aboriginal place. When the Act was passed, there was no requirement for Aboriginal people to be involved in determining

or protecting their heritage. Recent changes such as the guidelines for Aboriginal consultation and the approaches mooted as part of the Aboriginal heritage law reform place much greater emphasis on Aboriginal involvement. This shift is apparent in other states and territories and reflects a heightened awareness of Australia's obligations under the 2007 United Nations Declaration of the Rights of Indigenous People, combined with the ongoing determination and advocacy of Aboriginal people to identify and conserve their heritage.

In South Australia, the *Aboriginal Heritage Act 1988* is the third such act in as many decades. It provides for the conservation of Aboriginal heritage through blanket protection for Aboriginal sites, objects, and remains. The Act provides for an Aboriginal Advisory Committee which goes some way toward recognizing the rights and role of Aboriginal people in heritage protection. The Act is currently under review, its effectiveness having been undermined by unsuitable administrative policies and procedures, alongside political and public apathy (Whiltshire and Wallis 2008). Principles that are part of the legislative review in SA, including the recognition of Aboriginal custodianship and enabling Aboriginal people to negotiate heritage agreements, indicate the current provisions related to Aboriginal involvement are outdated, particularly given the influence of the *Native Title Act 1992* (Cwlth) on heritage protection. In WA, the *Aboriginal Heritage Act 1972* is the primary statute protecting Aboriginal cultural heritage. It provides blanket protection for places and objects customarily used by or traditional to the original inhabitants of Australia or their descendants. The Act is currently under review and is widely regarded as having proved ineffective in protecting Aboriginal heritage. By contrast, in Victoria, the *Aboriginal Heritage Act 2006* has generally enhanced the protection of Aboriginal cultural heritage, provided greater certainty in the context of development and improved Aboriginal engagement in the process. The "efficacy and efficiency" of this Act is currently under review focused on a number of operational and substantive issues including the integration of cultural heritage management with land use planning, according respect and status to Aboriginal people, and penalties and enforcement (Department of Planning and Community Development 2012).

Federal Heritage Legislation

In 1973, Australia ratified the UNESCO World Heritage Convention, only the sixth nation to do so. This initiative, combined with the policy objective of the Whitlam Federal Labor Government from 1972 to 1975 to preserve and enhance the quality of the National Estate, established the fundamentals of the Australian heritage system. The 1974 Committee of Inquiry into National Estate, chaired by R. M. Hope (Hope Inquiry), helped define the concept of the National Estate which was eloquently summarized by the Tasmanian Premier, as the "the things we want to keep" (Australian Government Publishing Service 1974). The *Australian Heritage Commission Act 1975* was a key recommendation of the Hope Inquiry and the first Act of Parliament to protect heritage at Commonwealth level. The Act created the Australian Heritage Commission with responsibility for the identification, promotion, and conservation of Australia's National Estate and established the Register of the National Estate (RNE) an inventory of Australia's natural, historic, Aboriginal and Torres Strait Islander heritage which has special value for present and future generations. Aside from the lists of heritage places assembled by the various chapters of the National Trust, the RNE was Australia's first national heritage list included natural, Indigenous, and historic places. Any person was able to nominate a place for the Register. It reflected the community-driven, inclusive view of heritage that was a feature of the progressive new nationalism of the Labor Party under Gough Whitlam (Davison and McConville 1991).

Characterized by an ambitious political and social agenda, this period was arguably the highpoint for Australian heritage conservation. Similarly, the focus on Indigenous affairs intensified during this time, resulting in significant changes to legislation and policy at both federal and state levels. The *Commonwealth Aboriginal Land Rights (Northern Territory) Act 1976*, the *Aboriginal Heritage Protection Act 1972* (WA), and the *Northern Territory Aboriginal Sacred*

Sites Ordinance 1978 were passed. And while the Australian Heritage Commission's work on the Aboriginal National Estate was "tentative and slow," the understanding and appreciation of Indigenous cultural heritage burgeoned (Commonwealth of Australia 1985). The *Indigenous and Torres Strait Islander Act 1984* (Commonwealth) passed a decade later reflected just how far the understanding of Aboriginal issues had come, particularly, how past dispossession and dispersal of the Aboriginal and Torres Strait Islander peoples and their present disadvantaged position in Australian society had impacted on Indigenous people. Under the Act, Indigenous people may apply to the Federal Minister for Environment to make a protective order over areas of significance where those areas are under threat of damage or destruction.

Since 1996, much of the political largess of the Whitlam Labor years has been eroded at federal level despite significant legislative and administrative reforms. The *Environment Protection Biodiversity and Conservation Act 1999* (EPBC Act) which repealed the AHC Act and the *World Heritage Places Conservation Act 1983* is the Commonwealth's principle heritage law. The EPBC Act (s. 528) defines "heritage value" as the place's natural and cultural environment having aesthetic, historic, or social significance, or other significance, for current and future generations of Australians. Included in the Act's objectives are the promotion and conservation of biodiversity, the protection and conservation of heritage, and assisting with the implementation of Australia's international environmental responsibilities such as those under the World Heritage Convention. Under the EPBC Act, Commonwealth environmental assessment processes are triggered by matters of national environmental significance. Such matters include the likely significant impact on world heritage values or any significant impact on the national heritage values of a place on the National Heritage List (NHL). Amendments to the EPBC Act in 2003 created the NHL and the Commonwealth Heritage List (CHL) and in so doing clarified that the role of the Commonwealth is to protect places of outstanding significance to the nation and places on Commonwealth-owned and administered land that are of significance. Following these changes to the EPBC Act, the Australian Heritage Council was established under the *Australian Heritage Council Act 2003*. This Council replaced the Australian Heritage Commission.

While strengthening the protective mechanisms for National and Commonwealth heritage, the EPBC Act simultaneously narrowed it. Under the concept of the National Estate, heritage was broad, community driven, and inclusive. At its height, the Register of the National Estate (RNE) included 13,000 places. Since the amendments creating the NHL and CHL were passed in 2003, fewer than 500 places have been listed on the NHL and CHL, a fraction of total number of places listed on the RNE. Led by the federal government, reform of Australia's national environmental law is underway. Reforms and reviews to other heritage statues, especially in the area of Indigenous heritage law are currently in progress in NSW, Western Australia, Victoria, and South Australia.

In the wake of funding cuts, sweeping public sector realignments and the prevalent view that heritage is a cost burden for owners and developers requiring complex assessment and approvals processes, the future of heritage protection law in Australia is uncertain.

Key Issues/Current Debates

Presently, there are a series of challenging issues and debates influencing heritage law and conservation practice in Australia. Climate change, environmental sustainability, urban development, mining, and economic growth in the context of global economic uncertainty and a lack of bipartisan government leadership on heritage have had an impact on heritage management and protection.

Current reforms to both Indigenous and historic heritage management frameworks and regulation provide evidence of the continuing process of change and refinement necessary to ensure approaches reflect community will and achieve conservation outcomes. Despite this, a growing sense of dissatisfaction with the government regarding its failure to provide strong leadership and direction for heritage management is evident.

On the one hand, there is concern voiced by Indigenous people and others that current statutory mechanisms lack credibility and effectiveness and are not sufficient to conserve our irreplaceable cultural heritage. On the other hand, some heritage owners (public and private) contend current heritage laws impose onerous cost burdens, restrict development, and provide little certainty in the statutory approval process.

With regard to Indigenous cultural heritage protection, there appears to be discontent and a heightened consciousness about the level of destruction and the lack of systematic and robust data. This is occurring at the same time that Indigenous people are demanding genuine engagement in decision-making about the management and conservation of their heritage. Moreover, the statutory focus and "blanket protection" of Indigenous archaeology within a system that is perceived to regulate destruction rather than protect culture and heritage has been challenged. The authority and validity of the scientific paradigms applied to Indigenous archaeology have also been questioned in a context where communities are endeavoring to achieve recognition and the conservation of deeper intangible values such as knowledge, song, and dance. Some legislative reforms have provided for the integrated assessment and protection of values, including intangible values and an increased level of community involvement. Yet, overwhelming heritage regulation and protection is still biased toward physical evidence and much archaeology continues to be practiced as an objective science based on the modernist processual model, in vogue when much of Australia's heritage legislation was enacted (Colley 2002). It could be argued, however, that the failure to deliver the protection of Aboriginal heritage is not entirely the result of flawed legislation but may be more due to the lack of political will and beleaguered public administration.

Reflecting broader influences in the field, the protection of cultural landscapes and intangible values has received considerable attention, and the scope of heritage continues to broaden. The widening definition of heritage and the increasing emphasis on intangibles such as language, story, and cultural practices raises challenges for Australian governments in developing appropriate legislative and protective management systems. This trend toward inclusivity is at odds with that of government, particularly at federal level, whereby the philosophy underlying the concept of the National Estate as a representation of our "full environmental and cultural history" has been rejected in favor of a system which protects a "few national jewels" (Yencken 2008).

International Perspectives

Australia is a signatory to many international charters and conventions and continues to play a prominent role in heritage internationally through the activities of ICOMOS.

Founded in 1976, Australia ICOMOS is a national chapter of ICOMOS International. In 1977, ICOMOS members met in the historic mining township of Burra, South Australia, and focused on preparing a version of the *International Charter for the Conservation and Restoration of Monuments and Sites* (the Venice Charter) which would be suitable for conservation practice in Australia. The *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (the Burra Charter) was adopted in 1979. The Burra Charter accepted the principles and philosophy of the Venice Charter but placed greater emphasis on the conservation of culturally significant heritage places rather than ancient monuments and buildings.

Members of Australia ICOMOS attend the triennial ICOMOS International General Assembly, and many Australian members have positions on ICOMOS International Scientific Committees including twentieth-century heritage, cultural landscape, archaeological heritage management, polar heritage, and interpretation and presentation to name a few. Presently, Australia has an elected member of the Executive Committee of ICOMOS International.

Future Directions

Australia's governance, combined with the framework of statues, land use planning and management regimes, inventories, and registers, has

resulted in cumbersome heritage management system. Generally, separate Acts still protect natural, Indigenous, and historic heritage. This frequently results in fragmented heritage assessments and inadequate protection that fails to acknowledge the complex and significant interrelationships that exist between nature, history, places, objects, values, and people.

In Indigenous heritage, trends include a greater emphasis on Indigenous engagement (especially native title owners and claimants) and a shift toward values-based assessment methodology, combined with steps toward proactive rather than a reactive system for heritage protection.

With regard to historic heritage, governments appear to be less willing to list heritage places where objections are raised. This approach follows the findings of the Productivity Commission (2006) report. Unless alternatives are explored such as tax incentives or advisory services, heritage is likely to continue to be perceived by some as an economic burden.

What has emerged as a key issue since the Council of Australian Governments clarified the role and responsibility for governments at federal, state, and local levels is just how vulnerable our heritage is particularly when government funding has declined appreciably and population growth, urban development, economic growth, and climate change continue apace (State of the Environment Committee 2011). In response to these ongoing and emerging threats, the future direction for heritage is dependent on political will and continuing community regard based on a shared understanding that heritage is our inheritance from the past and constitutes an important part of our cultural identity which is worth passing on to future generations.

In the 2011 State of the Environment Report, two key issues are identified that are determined to have the most significant impact on the integrity and future condition of Australia's heritage. Firstly, government will need to play a part in the preparation of heritage assessments that provide representative and adequate areas of protected land and comprehensive heritage listings. Secondly, and perhaps most importantly, governments, heritage places owners, and communities will have to manage places in response to the known and emerging threats and in the face of diminishing resources by adopting an approach that is based on the integration of and respect for different forms of knowledge (State of the Environment Committee 2011).

Perhaps the release of the Australian Heritage Strategy Public Consultation Paper in April 2012, with its accompanying series of essays, is evidence that the federal government may be committed to once again assuming a leadership, whether this is the case remains to be seen.

Cross-References

- ▶ Australasian Historical Archaeology
- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Australia: Maritime Archaeology
- ▶ Australia's Archaeological Heritage
- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Heritage and Archaeology
- ▶ Heritage Legislation, The Introduction of: Disciplining Through Law
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: History and Context
- ▶ Historical Archaeology
- ▶ Indigenous Archaeologies: Australian Perspective

References

Aplin, G. 2002. *Heritage. Identification, conservation, and management*. South Melbourne: Oxford University Press.

Australia ICOMOS. 1999. The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance 1999. Burwood: Australia ICOMOS Incorporated.

Boer, B., and G. Wiffen. 2006. *Heritage law in Australia*. South Melbourne: Oxford University Press.

Colley, S. 2002. *Uncovering Australia. Archaeology, Indigenous people and the public*. Crows Nest: Allen & Unwin.
Commonwealth of Australia. 1985. Australia's national estate. *The role of the Commonwealth*. Canberra: Australian Government Publishing Service.
Conroy, R. 2007. Planning for heritage conservation and management. In *Planning Australia: An overview of urban and regional planning*, ed. S. Thompson. Port Melbourne: Cambridge University Press.
Davison, G. 1991. The meanings of 'heritage'. In *A heritage handbook*, ed. D. Davison and C. McConville. St. Leonards: Allen & Unwin.
Department of Planning and Community Development. 2012. Issues and options paper. Review of the Aboriginal Heritage Act 2006. Melbourne: State Government Victoria.
Hope, R.M. 1974. *Report of the national estate*. Canberra: Australian Government Publishing Service.
Logan, W.S. 2007. Reshaping the 'sunburnt country': Heritage and cultural politics in contemporary Australia. In *Geographies of Australian heritages loving a sunburnt country?* ed. R. Jones and B.J. Shaw. Surrey: Ashgate.
Marshall, D. 2010. Australian Capital Territory Heritage Act review. Canberra: Minister for the Arts & Heritage. Available at: http://www.environment.act.gov.au/__data/assets/pdf_file/0005/232736/reduced_ACT_Heritage_Act_Review_4Aug10.pdf. Accessed on 25 May 2012.
New South Wales Heritage Office. 2000. Heritage listing in New South Wales: A brief history. Parramatta: NSW Heritage Office.
North, M.A. 2006. Protecting the past for the public good: Archaeology and Australian heritage law. Unpublished Ph.D. dissertation, University of Sydney.
Office of Environment and Heritage. 2012. Aboriginal heritage legislation in NSW. *Comparing the NSW Aboriginal heritage system with other Australian systems*. Sydney: Office of Environment and Heritage.
Pearson, M., and S. Sullivan. 1995. *Looking after heritage places. The basics of heritage planning for managers, landowners and administrators*. Carlton: Melbourne University Press.
Productivity Commission. 2006. *Conservation of Australia's historic heritage places* (Report 37). Canberra: Commonwealth of Australia.
Spearitt, P. 2012. What is heritage? *Australian heritage strategy. Commissioned essays*. Canberra: Department of Sustainability, Environment, Water, Population and Communities. Available at: http://www.environment.gov.au/heritage/strategy/pubs/essay-whatisheritage-spearitt.pdf. Accessed 25 May 2012.
State of the Environment Committee. 2011. *Australia state of the environment 2011*. An independent report presented to the Australian Government Minister for Sustainability, Environment, Water, Population and Communities. Canberra: DSEWPaC.
Veale, S., R. Freestone, and K. Ruming. 2012. Making heritage a national responsibility: The Commonwealth and the national estate 1969–1974. In *Urban transformation booms, busts and other catastrophes*. 11th Australasian Urban History/Planning History conference. Perth: University of Western Australia.
Wiltshire, K.D., and L. Wallis. 2008. A history of Aboriginal heritage protection in South Australia. *Journal of Environment Planning and Law* 25 (2): 98–114.
Yencken, D. 2008. The politics of the national estate. *Dissent* 27.

Australia: Indigenous Cultural Property Return

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Introduction

Although there are some earlier exceptions, the return of Aboriginal and Torres Strait Islander cultural property from museums in Australia has been a point of significant debate since the 1970s. Driven by the voice of Indigenous Australians and undertaken in often tense dialogue with museum professionals, anthropologists, and archaeologists (and these groups are not necessarily all mutually exclusive), the debate has led to significant development in museum ethics, policy, and practice in Australia, a change in the way that "ownership" of such items (and thus decision making about, or influence over, them) is viewed, and has consequently resulted in the return of some types of cultural property to Indigenous groups in this country (Turnbull and Pickering 2010; Pickering 2011). The Australian history of the return of Indigenous cultural property is an informative case study, as similar changes within the same time frame occurred in other countries with indigenous populations, such as New Zealand, the United States, and Canada, and because Aboriginal people were prominent in bringing the repatriation issue to international attention, influencing policy change and instigating debate

in a number of countries overseas (Fforde and Ormond Parker 2001; Simpson 2002).

Definition

Although there are particular legal definitions used in international conventions and national legislation, in its broadest meaning, the term "cultural property" encompasses any item which has been produced by a group or culture. The terms cultural "property," "heritage," "material," and "objects" are often interchangeable in common parlance, although the term "property" often implies concepts of ownership more than the others, and while intangible heritage is widely accepted as part of cultural "heritage," it is less frequently incorporated into definitions of cultural "property." However, definitions will vary depending upon cultural context and may differ particularly depending upon their use in legal instruments.

In the repatriation context in Australia, the particular emphasis in the return of cultural property has been upon human remains and objects of special significance (usually secret/sacred, ceremonial, and sometimes funerary objects). What is defined as "human remains" has also been a point of discussion and again can vary depending upon cultural context and museum policy. In particular, it has been debated whether remains which have been made into (or incorporated into) objects should, or should not, be considered as "the deceased" and thus be covered by relevant repatriation policy. What an institution may consider to be "human remains" may not necessarily accord with what a claimant community considers to be within this category. In addition, although the identification of the supply of copies (digital or otherwise) of images and sound recordings as "repatriation" by some institutions is arguably not strictly correct (as originals are not provided or, in cases such as sound recordings, were not removed), the program of holding establishments and community organizations to provide/acquire such items is also frequently considered to fall within the "return of cultural property" rubric and ethos and is (and has been) a significant movement in itself.

The majority of Indigenous cultural property in Australian museums has been acquired over the past 150 years. Before this time, such items were generally sent overseas. They were acquired by Australian state and regional museums and also by university departments, learned societies, and private collectors. Up until the Second World War, human remains were obtained largely for the purposes of studying racial difference and were taken from wherever the dead could be found. Collections include skeletal material in the great majority, most commonly crania, but soft tissue remains were also acquired. With the demise of race-based science in the postwar period, remains were increasingly placed in collecting institutions via archaeological excavation, with scientific interest increasingly focused on areas such as paleodemography and paleopathology. In Australia and North America, it was common for Indigenous human remains found by chance, say in the course of construction, to be placed in collecting institutions (often via the police or coroner) rather than to be reburied as European remains would have been if discovered in similar circumstances. It was an example of this type of differential treatment that led to the beginning of the reburial movement in the USA (Zimmerman 1989: 60–61).

Until at least the 1970s, the evidence that the acquisition of human remains by whatever means had been undertaken with the permission of kin or source communities (or even with their knowledge) is limited, if not completely absent. Indeed in the nineteenth century, there is enough evidence within the historical literature to show that collectors were aware that their activities were not supported by Aboriginal or Torres Strait Islander people, with clear instances of concern and opposition documented, as well as some examples of requests for return (Turnbull 1994). From the 1970s onwards, legislation has been adopted at State, Territory, and Federal level that is designed to protect Indigenous sites and significant cultural property from the type of acquisition and export practices that were so common previously. Such legislation provides legal requirements for action,

Australia: Indigenous Cultural Property Return, Table 1 Summary of Australian State, Territory, and Federal legislation providing protection for Aboriginal and Torres Strait Islander heritage, including sites, human remains, and objects. (From www.environment.gov.au/heritage/laws/indigenous/index.html. Accessed 7 June 2012)

Jurisdiction	Principal Indigenous heritage legislation
Australian Capital Territory	*Heritage Act 2004*
	Heritage Objects Act 1991
New South Wales	*Heritage Act 1977*
	National Parks and Wildlife Amendment (Aboriginal Ownership) Act 1996
Northern Territory	*Aboriginal Sacred Sites Act 1989*
	Heritage Conservation Act 1991
Queensland	*Aboriginal Cultural Heritage Act 2003*
	Torres Strait Islander Cultural Heritage Act 2003
South Australia	*Aboriginal Heritage Act 1988*
Tasmania	*Aboriginal Relics Act 1975*
Victoria	*Aboriginal Heritage Act 2006*
	Heritage Act 1994
Western Australia	*Aboriginal Heritage Act 1972*
Federal	*The Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
Federal	*Protection of Movable Cultural Heritage Act 1986*
Federal	*The Environment Protection and Biodiversity Conservation Act 1999*

for example (which includes consultation with source communities), should human remains be discovered or objects be at threat of international export. Key pieces of Australian legislation are summarized in Table 1.

The development of policy and practice relating to the return of Aboriginal and Torres Strait Islander human remains and significant cultural material occurs to a degree in tandem, and their history is interlinked. However, there are significant differences, and for this reason, a brief, separate, history of each is provided here.

Human Remains

With the exception of some early examples of requests for the return of remains that have been documented in the nineteenth and early twentieth centuries, in Australia, the start of the campaign for the return of human remains in collecting institutions and those newly discovered through construction can be traced to the late 1960s. Aboriginal law and that of Torres Strait Islander people holds that the deceased must be interred with appropriate ceremony on their traditional country and people have a responsibility to ensure that this occurs, with the potential for serious consequences if it does not. Circumstances of the removal and scientific use of remains have also been voiced as a matter of deep concern, particularly in relation to the role that racial science has played in the colonial process (Hubert 1989). Respect for the wishes of the dead was a primary consideration voiced by those at the forefront of the campaign for the return of Aboriginal remains, such as the Foundation for Aboriginal and Islander Research Action (FAIRA) and the Tasmanian Aboriginal Centre (TAC) (e.g., Weatherall 1989; Mansell 1990; TAC 2001). Those who argued in support of the retention of remains did so on the basis of scientific importance and the loss of knowledge that would result if they were reburied (e.g., Mulvaney 1991). However, the history of the reburial movement traces an increasing shift in museum and disciplinary ethics, policy, and practice away from this stance to one that continued to recognize the scientific importance of remains but recognized also the preeminent right of Indigenous Australians to determine the future of their ancestral remains whether housed in museum collections or newly discovered (Webb 1987; Fforde and Hubert 2006; Pickering 2011).

By the early 1970s, some Australian museums were beginning to change their policies regarding the accession and curation of human remains, including resolution to no longer accept newly discovered Aboriginal remains without express permission from the source community, and to remove remains from display. This decade also witnessed the first examples of the return of remains to communities, such as that in 1976 by the Australian Institute for Aboriginal Studies (AIAS – now the Australian Institute for Aboriginal and Torres Strait Islander Studies (AIATSIS)) of skeletal remains discovered in a Melbourne

garage, to the appropriate community on Groote Eylandt. However, the most significant event to occur during this period was the return of Truganini's remains to the Tasmanian Aboriginal community in 1974 following decades of campaigning by this community and their supporters. Truganini is a famous Tasmanian Aboriginal woman in history whose stated wish for her bones not to become part of a museum collection was recorded by the Reverend H.D. Atkinson in 1869. Despite this, her remains were dug up shortly after her funeral and were later placed on display in the Tasmanian Museum (now the Tasmanian Museum and Art Gallery). A history of the eventually successful attempts to have Truganini's remains returned to the Tasmanian Aboriginal community and her wishes respected can be found in Ryan (1981).

In the 1980s, Aboriginal campaigns for the return of remains from institutions in Australia achieved notable successes, including government support and the amendment of legislation that might restrict museums from deaccessioning such items. During this decade, groups received remains from, for example, the Tasmanian Museum and Art Gallery and the Queen Victoria Museum in 1984, from the National Museum of Australia in 1986, from the University of Queensland in 1988, and from the Museum of Victoria in 1989. Nearly all of these returns had only been achieved after lengthy campaigning by relevant Aboriginal groups and had met significant opposition from the scientific and museum community. However, by the late 1980s, most Australian museums had adopted policies which responded positively to Aboriginal requests for the return of the remains of named or known individuals, those who had died post-contact, those whose line of descent to a modern community could be demonstrated, or those which had been obtained in "unethical" circumstances (Fforde 2004: 112). By the end of the 1990s, these categories were no longer viable, and with the successful campaign for the return of fossil remains excavated at Kow Swamp in 1991 and the unconditional return of the ancient cremated remains of "Mungo Woman" to the people of the Willandra Lakes region in 1992, broader policies encompassing all human remains regardless of age, provenance, or circumstances of acquisition became the norm.

Museums Australia is the national organization for museums in this country, and its document *Continuous Culture, Ongoing Responsibilities: Principles and Guidelines for Australian Museums Working with Aboriginal and Torres Strait Islander Cultural Heritage* (2005) well articulates the new approach to Indigenous collections. And while Australia has no legislation regarding the return of human remains to compare with that of the *Native American Graves and Repatriation Act* (1990) in the USA, through State legislation and museum policy (both individual and via representative bodies), it is now the case that Aboriginal and Torres Strait Islander people may successfully claim the human remains of their ancestors housed in Australian museums and collecting institutions.

Significant Cultural Material

In the repatriation context in Australia, significant cultural material is generally considered to be those items classified as secret/sacred objects, a large number of which were acquired by museums and private collectors. As defined by Museums Australia (2005: 19), "Secret/sacred materials are items of special religious and spiritual significance to Aboriginal and Torres Strait Islander peoples. They have an associated tradition of restricted access and have never been accessible to all members of a community. Such items are usually associated with men's and women's private ceremonies which are not open to outsiders or to certain people within their society of origin." Cultural context is important in the definition of objects as secret/sacred and their degree of restriction; thus Museums Australia recognizes and acknowledges that it is "the community of origin who ascribe the special status of cultural material and knowledge" (2005: 19).

Responding to Aboriginal concerns, in the early 1970s, some Australian museums began to remove secret/sacred objects from display and to place them in storage areas inaccessible to the public. This decade also witnessed the first return of such items to keeping places established in

some remote communities. The South Australian Museum (SAM) in Adelaide, which had acquired significant numbers of secret/sacred objects particularly from Central Australia, played a prominent early role in developing dialogue with communities about the future of these items in its collections. When reflecting on this history, the Senior Curator and Director later noted, "Since their removal from the public gaze, sacred objects have become a difficult issue for museum curators. If such objects cannot be displayed, then it was clear that as objects of research and publication they were not an easy category with which to deal" (Clarke and Anderson 1997: 172). Indeed, removal from display and placement in museum storage did little, if anything, to increase the chances of access to these objects by their traditional owners or even to increase the chances of their knowing what was held in collections.

Serious discussions at the SAM were prompted in the early 1980s by a fortuitous visit from a group of senior Aboriginal men who were in Adelaide to try to stop the sale of secret/sacred objects collected by Professor T.G.H. Strehlow which were then in private hands (Clarke and Anderson 1997: 173). They were shocked to discover large collections at the SAM of which they had no prior knowledge, and the Museum in response undertook to "get its house in order" (Clarke and Anderson 1997: 173). Increasing realization of the extent of museum holdings then led to requests being sent to all museums in Australia requesting the return of secret/sacred objects. From the mid-1980s onwards, the SAM conducted extensive consultation with senior Aboriginal custodians in Central Australia to discuss the future of the secret/sacred objects in its collections, which resulted in the return of some objects and the decision by many communities to leave some or all of their objects in the museum for safekeeping, as well as visits by appropriate community members to the museum's newly built restricted access store.

In the same decade, other museums across Australia began to research their collections of secret/sacred objects and to open dialogue with traditional custodians about their future. While the SAM Board would only consider the return of secret/sacred objects, and particularly those which were still required for ceremonial function, other museums broadened their definition of what type of object was considered "returnable." Other avenues were also pursued, including the long-term loan of secular objects, commonly to community-led cultural centers. Repatriation policies such as those followed by the SAM, combined with the prevalence in collections of secret/sacred objects originating from remote areas, meant that unlike human remains, the return of secret/sacred objects has generally been more geographically confined to Central and Northern Australia.

Research undertaken by museums, Aboriginal groups, and their representatives to locate restricted material in institutional and private collections increased the amount of information available. The work of Museums Australia and its precursor, the Australian Council of Museums, to develop ethical guidelines for the management (including return) of significant cultural material demonstrates the change in the museum profession that has occurred in response to long-running Aboriginal concerns and campaigns. Thus, *Continuing Cultures, Ongoing Responsibilities: Principles and Guidelines for Australian Museums Working with Aboriginal and Torres Strait Islander Cultural Heritage* adopted by Museums Australia in 2005 clearly sets out instructions for the acquisition, return/repatriation, custodianship and access, and display of secret/sacred material, which at all times recognizes the high significance of these items and the right of appropriate Aboriginal and Torres Strait Islander people in source communities to determine their future and management.

Key Issues and Future Directions

In the case of both human remains and secret/sacred objects, it is common for these items to have been separated from any associated provenance information (if this existed). This factor, combined with their frequent placement, a consequent (often unorganized), in storage, and loss of institutional memory, has meant that considerable

research is often required to determine as far as possible how and where they were acquired. This type of information is crucial for repatriation, not only to identify the appropriate source community with whom to consult but also because communities do not wish to receive objects or the deceased who are not from their traditional country. The question of what to do with unprovenanced human remains and secret/sacred objects is a significant issue.

Some communities have established keeping places to hold secret/sacred objects – whether returned to them from museums or placed there by their custodians as other locations have become unsafe or inappropriate. As noted by Wallace and Akerman (2008), where and how best to store secret/sacred objects raises a number of questions for communities which require a variety of different solutions. A range of different types of keeping places have been established since the 1960s, and communities face practical and financial challenges in maintaining structures against often harsh climatic conditions, and sometimes vandalism and theft. Human remains are rarely planned to be held permanently in keeping places, although this may occur for a period prior to re-interment.

Funding has been a significant issue in the return of Indigenous cultural property in Australia, which can often be a lengthy and costly process for both museums and communities. Funded by Commonwealth, State, and Territory governments, the *Return of Cultural Property* (RCP) program (1993–1997) followed by the *Return of Indigenous Cultural Property* (RICP) program (1999–present) has provided funds to both museums and communities towards four specific objectives: "identify the origins of all ancestral remains and secret/sacred objects held in the museums where possible; notify all communities who have ancestral remains and secret/sacred objects held in the museums; appropriately store ancestral remains and secret/sacred objects held in the museums at the request of the relevant community; arrange for repatriation where and when it is requested" (Truscott 2006: 2). The National Principles developed by the RICP program strongly align with those of Museums Australia (2005). Nonetheless, the substantial and long-term costs for community organizations, which are associated, for example, with employment of repatriation officers, information management, community consultation, museum visits, acquiring and maintaining keeping places, and conducting funerals, are considerable and remain perhaps the most significant practical issue for communities in the repatriation process. The sheer scale of the number of human remains and secret/sacred objects acquired by collectors in Australia and overseas in the nineteenth and early twentieth centuries means that this issue will be faced by Aboriginal and Torres Strait Islander communities for many years to come.

Cross-References

- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Australia: Repatriation Acts
- ▶ Human Remains in Museums
- ▶ Indigenous Peoples, Working with and for
- ▶ Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ Vermillion Accord on Human Remains (1989) (Legislation)

References

Clarke, P., and C. Anderson. 1997. A brief history of Aboriginal men's secret sacred objects in Australian museums. In *Unlocking museums: The proceedings of the 4th National Conference of Museums Australia*, 172–176. Darwin: Museums Australia.

Fforde, C. 2004. *Collecting the dead: Archaeology and the reburial issue*. London: Duckworth.

Fforde, C., and J. Hubert. 2006. Indigenous human remains and changing museum ideology. In *A future for archaeology*, ed. R. Layton, S. Shennan, and P. Stone. London: UCL Press.

Fforde, C., and L. Ormond Parker. 2001. Repatriation developments in the UK. *Indigenous Law Bulletin* 5 (6): 9–13.

Hubert, J. 1989. A proper place for the dead: A critical review of the 'reburial' issue. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 131–166. London: Routledge.

Mansell, M. 1990. The case for bringing Shiney home. *Australian Financial Review* 28.

Mulvaney, J. 1991. Past regained, future lost: The Kow Swamp Pleistocene burials. *Antiquity* 65: 12–21.

Museums Australia. 2005. *Continuing cultures, ongoing responsibilities: Principles and guidelines for Australian museums working with Aboriginal and Torres Strait Islander cultural heritage*. Museums Australia Inc.

Pickering, M. 2011. Dance through the minefield: The development of practical ethics for repatriation. In *The Routledge companion to museum ethics. Redefining ethics for the twenty-first century museum*, ed. J. Marstine, 256–274. London: Routledge.

Ryan, L. 1981. *The Aboriginal Tasmanians*. St Lucia: University of Queensland Press.

Simpson, M. 2002. The plundered past: Britain's challenge for the future. In *The dead and their possessions: Repatriation in principle, policy and practice*, ed. C. Fforde, J. Hubert, and P. Turnbull, 199–217. London: Routledge.

Tasmanian Aboriginal Centre. 2001. Submission to the Department of Media, Culture and Sport Working Group on Human Remains. WGHR35. Available at: http://webarchive.nationalarchives.gov.uk/http://www.culture.gov.uk/hr_cons_responses/wg_submission/S35Parti.pdf. Accessed 10 June 2012.

Truscott, M. 2006. Repatriation of Indigenous cultural property. Paper prepared for the 2006 Australian State of the Environment Committee, Department of the Environment and Heritage, Canberra. Available at: http://www.deh.gov.au/soe/2006/emerging/repatriation/index.html.

Turnbull, P. 1994. To what strange uses: The procurement and use of Aboriginal peoples' bodies in early colonial Australia. *Voices* 4 (3): 5–20.

Turnbull, P., and M. Pickering, eds. 2010. *The long way home: The meaning and values of repatriation*. New York: Berghahn Books.

Wallace, G., and K. Akerman. 2008. *For now and forever: An analysis of current and emerging needs for Aboriginal cultural stores and repositories in Western Australia*. Perth: Western Australian Museum.

Weatherall, R. 1989. Aborigines, archaeologists and the rights of the dead. Paper presented at the 1989 WAC Inter-Congress, Vermillion, South Dakota.

Webb, S. 1987. Reburying Australian skeletons. *Antiquity* 61: 292–296.

Zimmerman, L. 1989. Made radical by my own: An archaeologist learns to accept reburial. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 60–67. London: Routledge.

Australia: Maritime Archaeology

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Introduction

Indigenous sites underwater, historic shipwrecks, abandoned vessels, survivor camps, jetties, and aircraft underwater, together with the archaeological evidence associated with maritime industries such as whaling or shipbuilding, comprise the maritime archaeological heritage of Australia and its surrounding waters (Gibbs 2006; Nutley 2006). Indigenous people have been present in Australia for at least 50,000 years, and they arrived by voyaging in some form of watercraft making them among the earliest "maritime" people that we know of. While it is considered unlikely that we will ever find physical or archaeological evidence of early Indigenous watercraft, interesting experimental maritime archaeology can still be attempted. Furthermore, as a result of rising sea levels since the Last Glacial Maximum (LGM), some of the earliest terrestrial archaeological sites associated with Australia's Indigenous peoples have been inundated and now lie beneath the sea (Nutley 2006: 84–88). As a result part of the maritime archaeological record in Australian waters potentially goes back at least 50,000 years.

We know that the Dutch, both deliberately and accidentally, came into contact with Australia after 1600 CE. Soon afterwards Dutch, British, and other vessels began to be wrecked around Australia with the first, that we know of, being the English East India Company ship *Trial* lost in

1622 (Green 1977). Over the next 400 years, thousands of vessels were lost in the waters around Australia, and since the early 1970s, maritime archaeologists have conducted a number of significant excavations of historic shipwrecks in Australia (Nash 2006: 55–68). In addition, while there has been a focus in Australian maritime archaeology on "historic shipwrecks," there has also been important research on abandoned vessels, jetties, aircraft underwater, and other kinds of maritime archaeological sites (Gibbs 2006; Nutley 2006).

Definition

Maritime archaeology in Australia has included the archaeological investigation of the remains of ships (shipwrecks), boats (boat finds), other watercraft or vessels, and aircraft underwater as well as cultural material that was accidentally dropped, lost overboard, or deliberately deposited into the water body. Maritime archaeological evidence can include the remains of structures that were originally built wholly or partly underwater (such as fish traps, bridges, piers, jetties, and wharves). In addition archaeology may examine the remains of human activity that originally took place on dry or marshy land that have subsequently been inundated (or submerged), either by rising water levels or by marine (or fluvial) erosion. Maritime archaeology is a subdiscipline of archaeology associated with the sea, seafaring, and human interactions with the sea. Maritime archaeology can also include sites and artifacts that are not underwater but that are related to maritime activities such as lighthouses, harbor constructions, or shore-based maritime industries such as shipbuilding, whaling, or sealing.

Historical Background

It was the finding of two seventeenth-century Dutch East India Company (VOC) ships during the early 1960s (*Batavia* lost in 1629 and *Vergulde Draeck* sunk in 1656) that first prompted the Western Australian Government to enact legislation designed to protect shipwrecks through the *Museum Act Amendment Act* of 1964 (Jeffery 2006: 124). While this provided a legislative basis for the protection of historic shipwrecks, such as the VOC shipwrecks, there were still no trained, experienced, or qualified maritime archaeologists working in Australia in the late 1960s. This changed in 1971 when the Western Australian Museum employed Jeremy Green who had worked on shipwrecks in the UK with Colin Martin and in the Mediterranean with people like George F. Bass and Michael Katsev (McCarthy 2006: 2). Green brought others to Western Australia from overseas including Myra Stanbury and Patrick Baker who would go on to become long-serving staff members of the Maritime Archaeology Department. Also in the 1970s, other key staff including Graeme Henderson and Michael McCarthy joined the Department, and at the same time, the Materials Conservation Department was gearing up to conserve the artifacts generated by large-scale underwater archaeological excavations.

Starting in the 1970s, the WA Museum conducted a number of terrestrial and underwater excavations of VOC shipwrecks such as *Batavia* (1629), *Vergulde Draeck* (1656), and *Zeewijk* (1727) as part of what was known as the Dutch Shipwrecks Program (Green 1989). Excavations of later period sites like the ex-slaver *James Matthews* (1841), the merchant vessel *Eglinton* (1852), and SS *Xantho* were conducted under the Colonial Shipwrecks Program (McCarthy 2000; Stanbury 2003; Henderson 2009). The excavated assemblages are held by the Maritime Archaeology Department and some material is now on display in the Western Australian Maritime Museum Shipwreck Galleries in Fremantle (Hosty 2006: 155–57; Fig. 1).

In 1976 the Australian Federal Government (the Commonwealth of Australia) enacted the *Historic Shipwrecks Act* (*HSA*) 1976 which fundamentally changed the basis for legislative protection and management of historic shipwrecks in Australia. By 1988 all states and territories had enacted state legislation for the protection of historic shipwrecks and/or requested that the Federal government apply the *HSA* to waters off their

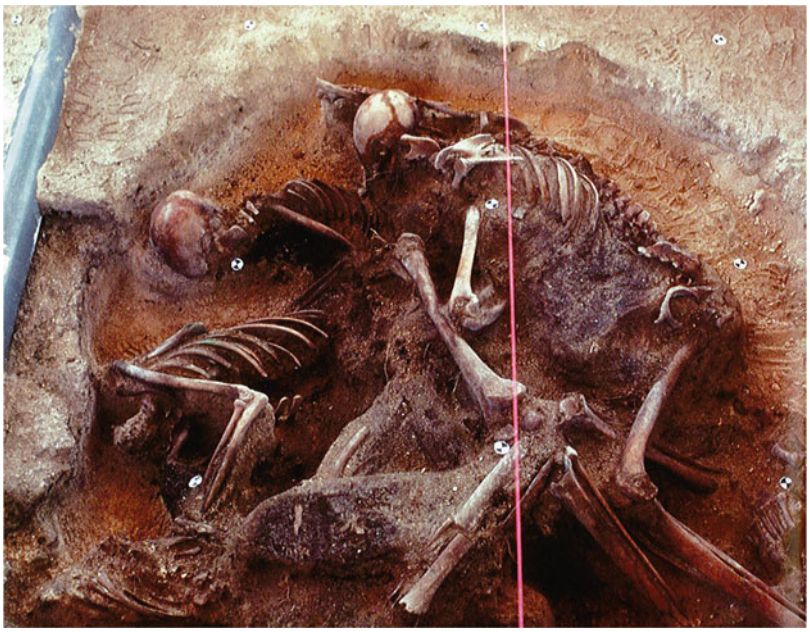

Australia: Maritime Archaeology, Fig. 1 Excavation of a mass grave from *Batavia* shipwreck on Beacon Island (Western Australian Museum)

coastlines. As a result of amendments to the legislation in the early 1990s, the *Historic Shipwrecks Act* 1976 now provides legislative protection to all shipwrecks (but not other kinds of underwater cultural heritage such as aircraft) which sank more than 75 years ago (a rolling date) and that are located in the territorial seas, contiguous zone, and Exclusive Economic Zone (EEZ) from the High Water Mark out to 200 nautical miles offshore (Jeffery 2006: 123–36).

Key Issues

Education is identified as the first key issue as maritime archaeology is a multifaceted discipline that requires both theoretical learning and practical skills training. Fortunately Australia has been one of the few countries in the world that has a long and sustained tradition over more than 30 years of running tertiary education courses in maritime archaeology. The need for tertiary level teaching in maritime archaeology in Australia was first acknowledged in the mid-1970s when the Western Australian Museum canvassed several options for university teaching in maritime archaeology including a 3-year Bachelor's degree course and a Graduate Diploma. In 1980, a 12-month Graduate Diploma in Maritime Archaeology (GDMA) was introduced by the WA Institute of Technology (later renamed Curtin University) and was taught in association with the Department of Maritime Archaeology at the WA Maritime Museum. The GDMA was offered on five occasions between 1980 and 1995 (in 1980/81, 1981/82, 1986, 1990, & 1995/96). At different times since 1990, universities in Western Australia (Curtin University and the University of Western Australia), Queensland (James Cook University), and South Australia (Flinders University) have all offered undergraduate and/or postgraduate courses as well as research higher degree (Ph.D.) supervision (Staniforth 2009). Currently Flinders University has the largest and most active teaching and research programs at an Australian university (Fig. 2).

The second key issue revolves around the activities of the Australasian (formerly Australian) Institute for Maritime Archaeology (AIMA) and volunteer involvement in Australian maritime archaeology. One of the great strengths of Australian maritime archaeology over the years has been the activities of AIMA, which was formed in Adelaide in 1981.

Australia: Maritime Archaeology, Fig. 2 Flinders University Intensive Program in Underwater Cultural Heritage, 2009 (Maritime Archaeology Program, Flinders University)

Membership of AIMA includes not only trained, professional maritime archaeologists (which would be a very small and exclusive club indeed) but many other interested people including volunteers. One important contribution made by AIMA has been the regular publication of *The Bulletin of the Australian Institute for Maritime Archaeology* initially twice a year but in recent years only once a year as well as a quarterly newsletter that is available on the AIMA website. Another has been the regular annual conferences that have been run by AIMA for nearly 30 years, usually in September which not only bring together most Australian maritime archaeologists and underwater cultural heritage managers each year to talk about their work, exchange ideas, and hold various meetings but have also provided the opportunity for many others to come to Australia from all over the world. For a decade now the annual AIMA conference has usually been held jointly with the annual conference of one or more of the other related organizations in Australia (and New Zealand) including the Australasian Society for Historical Archaeology (ASHA), the Australian Association for Maritime History (AAMH), and the Australian Archaeological Association (AAA). In the late 1990s AIMA purchased a license to run the internationally recognized Nautical Archaeology Society (NAS) training program, which was then tailored to suit the Australian situation as the AIMA/NAS training program which has proved of enormous benefit by providing a flow of new membership, fulfilling important public education and awareness needs, as well as being used by universities for training students. AIMA also provides a national umbrella body for the avocational (amateur) organizations that exist in some, but not all, Australian states including the Maritime Archaeology Association of Western Australia (MAAWA), the Society for Underwater Historical Research (SUHR), and the Maritime Archaeology Association of Victoria (MAAV).

Research is the final key issue but has always had a relatively strong track record in Australian maritime archaeology, which has contributed to the development of the methods used in maritime archaeology worldwide (Green 1990) as well as to our understandings of specific aspects of shipbuilding and large-scale historical processes including colonialism, consumerism, and capitalism (Staniforth 2003). This chapter will examine three case studies of historic shipwreck excavations of vessels that date from the last decade of the eighteenth century: HMS *Sirius*, HMS *Pandora*, and *Sydney Cove* in order to consider some of the key issues in maritime archaeology in Australia that have arisen over the last three decades.

HMS Sirius (1790)

HMS *Sirius* was the flagship, and largest, Royal Navy vessel to accompany the First Fleet to Australia in 1788. In 1790 under the command of Captain John Hunter, and together with HMS *Supply*, the vessel made a voyage to Norfolk Island to transport convicts and Royal Marines to that island in order to establish a colony there. For HMS *Sirius*, the voyage ended in disaster on 13 March 1790 when the ship was driven backwards onto the reef near the new settlement of Kingston (Nash 2006: 56–58; Stanbury 2007: 25–26). The wreck of HMS *Sirius* was a highly significant event in Australian history generally and specifically in the history of Norfolk Island. The connections to the events of the First Fleet and British convict settlement of Australia make the site of great significance to Australians.

Three seasons of fieldwork were conducted in 1985, 1987, and 1988, with funding from the Australian Bicentennial Authority (ABA), sponsorship from private companies, and support from a number of museums and government agencies. These archaeological expeditions were led by maritime archaeologist Graeme Henderson from the WA Museum and included a team of about 12 experienced professional maritime archaeologists and avocational volunteers (Henderson and Stanbury 1988, Stanbury 2007). A fourth expedition funded by the Australian Federal Government's Historic Shipwrecks Program took place in 2002 (Fig. 3).

The site is located in very shallow water of two to three meters depth that is regularly subjected to very heavy wave action. Experience gained on shallow water "surf-zone" sites in Western Australia, such as *Batavia*, had demonstrated that valuable information could still be obtained from such sites. The survey and recording work was carried out using SCUBA equipment and conducted from an inflatable dive boat anchored on the seaward side of the surf zone. Apart from a substantial ballast pile consisting of cast-iron ballast pigs (or ingots) known as "kentledge," most of the artifacts were located in gullies and holes in the limestone reef flat. The four expeditions, and a program of artifact conservation and cataloguing carried out over the last 20 years and largely funded with grants from the Federal Government's Historic Shipwrecks Program, have provided accurate survey data as well as raising and conserving hundreds of small artifacts. The archaeological assemblage contained a wide variety of material from a copper coin to large anchors, but most consists of material primarily associated with the structure of the ship, its

Australia: Maritime Archaeology, Fig. 3 View from seaward with dive boat and surf breaking over *Sirius* wreck site (Western Australian Museum)

fastenings and fittings, and a smaller amount of equipment and personal belongings relating to the crew and passengers.

A number of specialist reports have been written and articles published in respected international journals such as the *International Journal of Nautical Archaeology* (IJNA) as well as a popular paperback book called *Sirius – Past and Present* (Henderson and Stanbury 1988; Stanbury 2007). Artifacts from *Sirius* are now on display both in the lower floor of the Norfolk Island Museum (Pier Store) on Norfolk Island and some loan material has been on display at the Australian National Maritime Museum (ANMM) in Sydney. In addition some material from HMS *Sirius* was incorporated into a major exhibition that toured Australia during 1988 and 1989 titled *Shipwreck – Discoveries from our Earliest Shipwrecks 1622–1797*. (Hosty 2006: 160–61).

HMS Pandora (1791)

As a consequence of the famous and well-documented mutiny on HMS *Bounty* on 26 April 1789, the Royal Navy dispatched the 24-gun frigate HMS *Pandora* under the command of Captain Edward Edwards to the South Pacific in 1790. After capturing some of the mutineers, HMS *Pandora* ran onto a reef-top during the night of 29 August 1791 and the next day sank into deeper water (Gesner 1991, 2007; Nash 2006: 58–62).

In November 1977 the site of HMS *Pandora* was relocated by two rival groups of divers with the assistance of an airborne magnetometer carried aboard an RAAF (Royal Australian Air Force) maritime reconnaissance aircraft. The wreck was reported to the Australian Federal Government and initially inspected in April 1979 by a team led by maritime archaeologist Graeme Henderson, and including Patrick Baker, from the WA Museum. The site is in an extremely remote location, some 50 nautical miles offshore, which would normally fall outside the claimed offshore jurisdiction of many countries, certainly during the 1970s. Nevertheless, Australia had recently passed the *Historic Shipwrecks Act* 1976 which claimed a 200 nautical mile jurisdiction and so HMS *Pandora* was declared as a historic shipwreck in November 1979. The Queensland Museum was made responsible for managing historic shipwrecks in Queensland including HMS *Pandora* and in 1981 the Museum appointed Ron Coleman as curator of maritime archaeology. Also in 1981 HMS *Pandora* was given protected zone status that requires a permit to enter a zone extending for a radius of 500 m from the wreck. The site is still a protected zone, which probably makes it one of the longest periods (now 27 years) of direct, and effective, government control over access to a historic shipwreck anywhere in the world.

Between 1983 and 1989 the Queensland Museum undertook several expeditions to survey and partially excavate the site. Initial funding came from the Australian Federal Government, and with support from maritime archaeologists in a variety of interstate organizations, as well as volunteers, some test excavations were completed and a permanent grid structure was established on site. It was found that a substantial section of the ship's lower timbers had survived on the starboard side including relatively intact areas of the lower hull as well as the collapsed remains of upper works and cabins with their contents (Gesner 1991, 2007).

The remains of HMS *Pandora* lie in approximately 30–34 m of water which, together with the remote location more than 600 km from the nearest major port (Cairns), makes any archaeological investigation both person-intensive and expensive. By about 1990 the problems of the short dive times allowable with SCUBA diving and having to hire "live-aboard" vessels for large teams had led to the conclusion that without large-scale funding, the excavations should probably cease. Expeditions in 1993 and 1995 concentrated on sediment and core sampling with only limited excavation but, importantly in light of subsequent developments, trialled the use of Surface-Supplied Breathing Apparatus (SSBA) that increased dive times and improved communications (Gesner 2007; Fig. 4).

The situation changed in the mid-1990s when the Queensland state government offered the Queensland Museum $1,000,000 for the project, subject to matching funds being raised from the private sector. The nonprofit *Pandora* Foundation

Australia: Maritime Archaeology, Fig. 4 Diver next to one of *Pandora*'s main anchors (Western Australian Museum)

was established in Townsville in 1996 and raised a further $2,500,000 from local businesses and donations, which placed the *Pandora* project back on track to continue excavations. The Queensland government subsequently also announced that it would provide more than $17,500,000 for a major museum development (the Museum of Tropical Queensland) in Townsville which would house and exhibit the *Pandora* material in one of the new museum's major galleries (Hosty 2006: 158).

A series of five expeditions between 1995 and 1999 raised several thousand artifacts including ship's equipment, human skeletal remains, crew items, and "collected" artifacts from the Pacific islands (Gesner 2000, 2007). Over the years a number of research reports, catalogues, and commentaries based on the material culture assemblages from HMS *Pandora* have been completed (Gesner 1991, 2007). The "collected" artifacts or "artificial curiosities" are of considerable interest for what they tell us about the cultural interactions between the "West" and the "Other." British exploration vessels and their crews would collect the material culture of the Indigenous inhabitants of Australasia and the Pacific. The collected artifacts from HMS *Pandora* are of particular importance as they represent collecting by all social strata among the *Pandora* officers and crew, rather than just the "official" or elite collections that made their way into collections of the British Museum, Museum of Natural History, and the like. After the 1999 expedition the project focussed on the opening of the new Museum of Tropical Queensland in April 2000 and, despite plans to continue excavation work, no further expeditions have taken place to date (Nash 2006: 62). There is considerable maritime archaeological potential remaining on the HMS *Pandora* site, particularly in the bow area, which has not been excavated to date. In addition, the existing archaeological assemblages provide excellent comparative collections for other investigations of late eighteenth-century Royal Navy vessels in other parts of the world.

Sydney Cove (1797)

Sydney Cove was wrecked on 9 February 1797 during a voyage from Calcutta in India to the newly established, penal colony at Port Jackson (Sydney). The merchant vessel had been consigned by Campbell and Clark, a small trading enterprise involved in trading European, Indian, and Chinese goods, primarily around the coasts of the Indian subcontinent, and for whom trading to Australia would be a new venture (Staniforth 2003: 65–99; Nash 2009). It was carrying a speculative, mixed cargo including bags of rice, sugar, tobacco, salted meats, tar, vinegar, soap, candles, leatherware, Indian textiles, livestock, Chinese

porcelain, as well as 7,000 gal (31,500 l) of rum (Nash 2009: 32–53).

The site of *Sydney Cove* was relocated by sports divers in January 1977 in only 4–6 m of water, approximately 400 m off Preservation Island in Bass Strait. Despite the recent enactment of the Commonwealth *Historic Shipwrecks Act* (1976), the Tasmanian government proclaimed the underwater site itself, and the associated land sites where a part of the salvaged cargo had been stored and the survivors' camp was located, as a Historic Site on 29 March 1977 under the Tasmanian *National Parks and Wildlife Act* 1970. Survey work and test excavations were undertaken in the late 1970s and further work was carried out in the 1980s to install permanent survey controls around the wreckage. Some artifacts including the partially intact rudder and two cannon were raised during this early work (Nash 2009: 94–99).

An extensive program of archaeological excavation on the underwater site was carried out between 1991 and 1994 under the direction of Mike Nash of the Tasmanian Parks and Wildlife Service, with funding from the Federal Government Historic Shipwrecks Program and conservation assistance from the Queen Victoria Museum in Launceston. Support also came in the form of personnel and equipment from federal and interstate government agencies backed up by numerous volunteers. Diving operations were conducted using surface-supplied air from an 11-m charter vessel *Strait Lady* and SCUBA tanks were only used for some photographic and video recording. A total of 216 m^2 of the site was excavated using water dredges and underwater recording was carried out with a rigid grid frame system. Among the artifact assemblages were more than 200 kg of mostly broken polychrome overglaze and blue underglaze Chinese Export Porcelain, which was commonly imported into the Australian colonies before 1830 which, in addition to its functional utility, tells us about some of the meanings attached to ceramics in the early colony (Staniforth and Nash 1998; Staniforth 2003: 86–99). The excavation also revealed interesting features about the construction of *Sydney Cove* such as the use of traditional Indian methods of protecting the hull including the use of waterproof resins and a thin layer of sacrificial planking, over which the latest imported technology of copper sheathing, over a backing of woollen felt, was laid. The final expedition in March 1994 recovered the entire site using more than 500 polypropylene sandbags, and periodic monitoring has demonstrated this to be a cheap but effective means of stabilizing the site after excavation (Nash 2009: 111, 131–4; Fig. 5).

To commemorate the bicentenary of the loss of *Sydney Cove*, an exhibition was developed which opened at the Queen Victoria Museum in

Australia: Maritime Archaeology, Fig. 5 Divers recording an excavated section of *Sydney Cove's* hull (Parks and Wildlife Service, Tasmania)

Launceston in February 1997. This exhibition travelled around Australia for 2 years funded by the Federal Government's *Visions* exhibition touring program before returning to Launceston where the archaeological assemblage is now held. In 2002 and 2004 two further terrestrial expeditions were conducted to locate and excavate part of the survivor camp, which included at least one dwelling, at the south end of Preservation Island (Nash 2009: 190–209).

International Perspectives

Australian maritime archaeology is widely respected internationally and Australian maritime archaeologists often individually, but sometimes with institutional support and backing, have taken leading roles in a variety of regional Asia-Pacific and international activities. For more than three decades, Jeremy Green of the WA Maritime Museum, for example, has taken a leading role in research and teaching maritime archaeology in Thailand, China, and Sri Lanka through programs like SPAFA as well as conducting research on Dutch East India Company (VOC) ships in Malaysia and Asian-built vessels throughout the Asia-Pacific region. Furthermore, AIMA, and individual maritime archaeologists such as Jeremy Green, support for maritime archaeology projects and programs in the Asia-Pacific region has been an important contribution to the development of the subdiscipline in the region.

Graeme Henderson, also from Western Australia, was the first head of ICUCH – International Committee on the Underwater Cultural Heritage – and he took a leading role in the drafting of both the ICOMOS Charter on the Protection of Underwater Cultural Heritage 1996 and the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001. David Nutley has been the Secretary and is now Vice-President of ICUCH and Mark Staniforth is currently a member of ICUCH. Staniforth also served for two terms on the ACUA – Advisory Council on Underwater Archaeology (2000–2008) including 3 years as deputy Chair (2001–2003) and 3 years as Chair (2004–2007) as well as 3 years on the board of the Society for Historical Archaeology (SHA) in his capacity as ACUA Chair. Wendy Van Duivenvoorde currently serves on the ACUA Board.

Future Directions

Clearly one part of the future directions for maritime archaeology in Australia lies with the tertiary education system, which has expanded in recent years partly as a result of the establishment of the Maritime Archaeology Program (MAP) at Flinders University (Staniforth 2009). Flinders University is currently the only university in Australia to develop and sustainably undertake a fully integrated program of teaching in maritime archaeology from undergraduate to research higher degree level in the form of the Maritime Archaeology Program in the Department of Archaeology. In addition to the ongoing teaching of maritime archaeology at Flinders University, it is considered likely that other Australian universities are likely to take up the teaching of maritime and underwater archaeology at various levels during the next decade. Collaborative research projects involving universities can also be expected to undergo expansion with some signs that this is starting to happen with the Australian Historic Shipwreck Protection Project (AHSPP) receiving a large ARC Linkage grant in 2011 as well as the appointment of the first post-doctoral fellow in maritime archaeology in Australia (Jun Kimura) at Murdoch University in 2012.

Australian maritime archaeology has a long history of "holistic" approaches to the integration of related underwater and terrestrial archaeological sites going back to the 1970s *Zeewijk* excavations, but recent decades have also seen the broadening of maritime archaeology activity to include the study of Indigenous sites underwater, abandoned vessels, jetties, aircraft underwater, survivor camps, and shipyards (Gibbs 2006; Nutley 2006). This kind of holistic approach is another likely future direction for Australian maritime archaeology and, together with the (eventual) ratification of the UNESCO

Convention for the Protection of the Underwater Cultural Heritage (2001) by the Australian government, is likely to provide the basis for increased activity in these areas of maritime archaeology.

On the other hand state and Federal Government funding cuts, the lack of updated legislation and the loss of positions within government heritage agencies and museums have been ongoing problems for more than a decade (Staniforth 2000) and show signs of continuing well into the future. Unfortunately the comment made in 2000 that "the legislation is seriously dated and in need of a complete rewrite" remains as true today as it was more than a decade ago (Staniforth 2000: 91). The same paper also suggested that "not-for-profit" and community-based organizations provided opportunities for the expansion of activity in maritime archaeology (Staniforth 2000: 91–2). While the opportunities in the "not-for-profit" sector have seen limited progress over the last decade, there remains one area where future expansion is still possible.

Cross-References

- ▶ Australasian Institute for Maritime Archaeology Inc. (AIMA)
- ▶ Australia's Archaeological Heritage
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Green, Jeremy N.
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Modern Vessel Archaeology (Iron and Steel Wrecks)
- ▶ Pacific Ocean: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ Shipyard Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Southern Ocean and Antarctic Maritime Archaeology
- ▶ Underwater Archaeology

References

Gesner, P. 1991. *Pandora: An archaeological perspective*. Brisbane: Queensland Museum.

Gesner, P. 2000. HMS Pandora project – A report on stage 1: Five seasons of excavation. *Memoirs of the Queensland Museum, Cultural Heritage Series* 1 (2): 1–52.

Gesner, P. 2007. HMS *Pandora* 1791: Pursuit of the bounty. In *Shipwreck archaeology in Australia*, ed. M. Nash, 39–50. Nedlands: University of Western Australia Press.

Gibbs, M. 2006. Maritime archaeology at the Land-Sea interface. In *Maritime archaeology: Australian approaches*, ed. M. Staniforth and M. Nash, 69–82. New York: Springer/Kluwer/Plenum Press.

Green, J.N. 1977. *Australia's oldest wreck: The loss of the trial, 1622*, British Archaeological Reports Supplementary series 27. Oxford: Archaeopress.

Green, J.N. 1989. *The AVOC Retourschip Batavia, wrecked Western Australia, 1629. Excavation report and artefact catalogue*, British Archaeological Reports International series 489. Oxford: Archaeopress.

Green, J.N. 1990. *Maritime archaeology: A technical handbook*. New York: Academic.

Henderson, G. 2009. *Redemption of a slave ship: The James Matthews*. Welshpool: Western Australian Museum.

Henderson, G., and M. Stanbury. 1988. *The Sirius past and present*. Sydney: Collins.

Hosty, K. 2006. Maritime museums and maritime archaeological exhibitions. In *Maritime archaeology: Australian approaches*, ed. M. Staniforth and M. Nash, 151–162. New York: Springer/Kluwer/Plenum Press.

Jeffery, B. 2006. Historic shipwreck legislation. In *Maritime archaeology: Australian approaches*, ed. M. Staniforth and M. Nash, 123–136. New York: Springer/Kluwer/Plenum Press.

McCarthy, M. 2000. *Iron and steamship archaeology: Success and failure on the SS Xantho*. New York: Springer/Kluwer/Plenum Press.

McCarthy, M. 2006. Maritime archaeology in Australasia: Reviews and overviews. In *Maritime archaeology: Australian approaches*, ed. M. Staniforth and M. Nash, 1–11. New York: Springer/Kluwer/Plenum Press.

Nash, M. 2006. Individual shipwreck site case studies. In *Maritime archaeology: Australian approaches*, ed. M. Staniforth and M. Nash, 55–67. New York: Springer/Kluwer/Plenum Press.

Nash, M. 2009. *Sydney Cove: The history and archaeology of an eighteenth-century shipwreck*. Hobart: Navarine Publishing.

Nutley, D. 2006. Underwater archaeology. In *Maritime archaeology: Australian approaches*, ed. M. Staniforth and M. Nash, 83–96. New York: Springer/Kluwer/Plenum Press.

Stanbury, M. 2003. *The Barque Eglinton: Wrecked Western Australia 1852*, Australian Institute for Maritime

Archaeology Special Publication 13. Fremantle: Western Australia Maritime Museum.
Stanbury, M. 2007. HMS *Sirius*: Relic of the First Fleet. In *Shipwreck archaeology in Australia*, ed. M. Nash, 25–38. Nedlands: University of Western Australia Press.
Staniforth, M. 2000. A future for Australian maritime archaeology. *Australian Archaeology* 50: 90–93.
Staniforth, M. 2003. *Material culture and consumer society*. New York: Springer/Kluwer/Plenum Press.
Staniforth, M. 2008. Collaboration is the key: Developing field and work skills in collaboration with government, museum and commercial underwater cultural heritage organizations. In *Proceedings of the 13th annual meeting of the European Association of Archaeologists (Zadar, Croatia, 18–23 September 2007), session: Underwater archaeology*, ed. I. Radic Rossi, A. Gaspari, and A. Pydyn, 111–120. Zagreb: Hrvatsko arheolosko drustvo – Profil.
Staniforth, M. 2009. Work integrated learning in maritime archaeology: An Australia approach. *The International Journal of Learning* 16 (8).
Staniforth, M., and M. Nash. 1998. *Chinese export porcelain from the wreck of the Sydney Cove (1797)*, Australian Institute for Maritime Archaeology Special Publication 12. Gundaroo: Australasian Society for Historical Archaeology.

Further Reading

Nash, M., ed. 2007. *Shipwreck archaeology in Australia*. Nedlands: University of Western Australia Press.
Staniforth, M., and M. Nash, eds. 2006. *Maritime archaeology: Australian approaches*. New York: Springer/Kluwer/Plenum Press.

Australia: Repatriation Acts

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Introduction

There are estimated to be thousands of Indigenous Australian human remains in the collections of Australian and international institutions and, in addition, hundreds of thousands of culturally meaningful artifacts (see Fforde 2004; Cubillo 2010). As such, repatriation is a significant issue in Australia for Indigenous communities and also for archaeologists and those working in museums and cultural heritage. Repatriation is also significant as part of a wider assertion of the rights of Indigenous Australians to control their own cultural material, archaeological sites, sacred landscapes, and heritage. Thus, the collections of Indigenous human remains and sacred objects on a deeper level both represent and continue the colonial process. Watson (2003) noted the importance of acts of repatriation when combined with an understanding of other legacies of British colonization, such as the entrenched social and economic disadvantages still suffered by Indigenous people, and how and why these remains have come to be in such collections. In recent years a philosophy of repatriation has been established in Australia and principles have been endorsed by federal, state, and territory ministers and governments, as well as museums. There is no overarching legislation equivalent to the NAGPRA in the United States, but since 2000, individual acts of repatriation have been undertaken as a matter of policy by successive federal governments. In practice this is done through the administration of the Indigenous Repatriation Unit, which negotiates with both overseas and domestic institutions, but efforts to put forward claims are primarily driven by Indigenous communities. The code of ethics of the Australian Archaeological Association (AAA), one of the largest archaeological organizations in Australia, requires that members acknowledge the importance to Indigenous peoples of ancestral remains, objects, and sites.

Definition

In Australia, repatriation has been referred to as the "repatriation debate" and the "reburial issue" (Fforde 2004; Wilson 2006). It concerns the return of human remains, grave goods, sacred objects, or objects of cultural significance to the individuals, groups, or nations that represent the original owners. Reburial refers more specifically to the reinterment of human remains that were archaeologically excavated. Repatriation is part of a general reassertion of Indigenous control over cultural heritage and of human rights. Following

Wilson (2006), repatriation can be defined as more than the return of "something" or "someone" and extends to include the return of authority, power, and control to Indigenous peoples. It thus allows for any important object to be returned and which signifies an important shift in power relations.

Historical Background

Museums in the eighteenth and nineteenth centuries were an expression of the western conviction in concepts of progress, classification, and empire. They displayed the trophies and curiosities of colonial expansion – the specimens, artifacts and human remains, and classification that contributed to the study of race. Theoretical platforms such as monogenism, polygenism, phrenology, eugenics, and social Darwinism reduced Indigenous people to museum curiosities and likened them to fossils for comparative anatomical analysis. When Australia was colonized by the British in 1788, Indigenous peoples collided with perceptions built on such racial theories. Consequently, Indigenous Australian human remains were procured to expand the discourse on Caucasian superiority. From colonization to the 1950s, Indigenous remains were removed, without permission, from burial grounds, hospitals, and morgues, and sent, sold, or traded to museums, universities, and private collections in Australia and overseas (see Fforde 2004). Remains are known to be held in more than 180 museums and in 26 countries (Simpson 2001: 239). A multitude of false premises were put forward about the nature and origins of Indigenous Australians, with one of the most prevalent and pervasive representing them as degenerate, or "primitive," as lowest on the hierarchy of human civilization (Turner Strong 1986; McGregor 1997). A discourse of extinction emerged from the 1860s of a "dying race" and ultimately led to a culture of protectionism and the enactment of legislation such as the *Half Caste Act of 1885* (Victoria) that forced the removal of mixed race children from their parents. The forced removals of Indigenous children occurred across Australia and are now known as the "stolen generations." As argued by Watson (2003: 38–9), "by reducing Aboriginal people to wretched and doomed creatures, science wiped the European slate clean of culpability for genocide, and justified invasion."

From the mid-1960s, Indigenous organizations such as the Tasmanian Aboriginal Centre (TAC) and the Foundation for Aboriginal and Islander Research Action (FAIRA) began campaigning for the return of their "Old People" and cultural property from institutions in Australia and overseas. In 1976, the Tasmanian Museum and Art Gallery was the first museum in Australia to repatriate Aboriginal remains to community. It was also at this time that there was increased interest in Australian archaeologists studying their own continent and undertaken at Australian sites. Excavations of skeletal remains such as at Kow Swamp and Lake Mungo changed the discourse of Australian archaeology and reassessed the age and nature of colonization of the continent. This work provided evidence of the antiquity of Indigenous occupation, and the nature and timing of the colonization of Australia, as well as the origins of Indigenous Australians, are still principal research areas.

In 1984 the *Aboriginal and Torres Strait Islander Heritage Protection Act* (APA) was adopted. The *APA* (*1984*) was successful in establishing dialogues between museums and Indigenous communities on the repatriation process. However, in the same year the Australian Archaeological Association (AAA) gave only conditional support to the return of human remains to Indigenous communities and to what it saw as the *destruction* of remains, (such as those discovered at Kow Swamp and at Lake Mungo), arguing that this constituted a loss of artifacts which could impact the understanding of human cultural development or biological evolution (Meehan 1984). John Mulvaney, a leading Australian archaeologist, was cynical about the fate of human remains being wholly decided by the appropriate Indigenous community, publicly stating that these remains hold "potential clues to many issues common to all races" and that study is "significant for Aboriginal self-knowledge of their origins and cultural development." (Mulvaney 1989, 1991). Repatriation in the

1980s can thus be characterized as a debate between "science" and Indigenous "politics" (later, after requests and lobbying by communities, the Kow Swamp remains were significantly repatriated in 1990, followed in 1992 by those from Lake Mungo).

The Australian government began funding the repatriation of Indigenous Australian remains from overseas in the 1990s. This funding was first provided through the Aboriginal and Torres Strait Islander Commission (ATSIC), followed by a succession of other federal government departments. As distinct from the USA, Australia has no federal repatriation legislation, only policy. The broad responsibilities for identifying and protecting Indigenous heritage including archaeological sites lie with Australia's state and territory governments. State legislation and how it is interpreted and enforced differs. In some states, such legislation is little more than tokenistic. Indigenous heritage can be protected to varying degrees and developers can apply for a permit or certificate to allow them to proceed with activities that might affect Indigenous heritage. Watson (2003) noted that under Australian common law, there is no provision for ownership of human remains. However, institutions in Australian (and primarily in the United Kingdom) have not relinquished collections of human remains but have worked around this by classifying them as objects. The only Commonwealth Act that may support a repatriation claim is the aforementioned *APA* (*1984*). It is also unlikely that Indigenous people could claim the right to human remains under Native Title legislation, as it is confined to rights and interests in lands and waters. Watson (2003: 40) observed that Native Title rights might exist over burial grounds and in appropriate cases may be available to restrain excavations, but this has not been tested to date.

In 1998 the Australian Cultural Ministers Council endorsed a strategic plan to return human remains and secret sacred objects held in the eight major Australian museums back to their communities of origin. The resulting Return of Indigenous Cultural Property Program (RICP) was administered by the then Federal Department of Environment, Water, Heritage and the Arts (DEWHA). In 2009, the Australian government formally announced support for the Declaration on the Rights of Indigenous Peoples; of relevance is Article 12 which states that:

"Indigenous peoples have the right to the repatriation of their human remains." In August 2011 the government consolidated the international and domestic repatriation programs into one program, the Indigenous Repatriation Program, to seek the unconditional return of Indigenous ancestral remains from overseas institutions and the return of secret sacred objects from Australian major museums to their communities of origin. Australian legal recognition has effectively adhered to its obligations under the *UN Declaration* and which, in a sense, allows it to be more progressive and adapted and implemented more rapidly. For example, the federal policy states that study on Indigenous human remains must be undertaken with consultation and with the informed consent of traditional owners or their identified representatives and that invasive physical research, such as the sampling of teeth, should not be undertaken.

In terms of Australian museums, repatriation is managed by eight collecting institutions: the Australian Museum, the Museum and Art Gallery of the Northern Territory, Museum Victoria, the National Museum of Australia, the Queensland Museum, the South Australian Museum, the Tasmanian Museum and Art Gallery, and the Western Australian Museum. The "Previous Possessions, New Obligations" policy (PPNO) was instigated in 1993 by Museums Australia. The PPNO was important in that it attempted to build relationships with Indigenous communities by way of Indigenous employment, by gaining their input into policy formulation and by increasing their representation on museum boards. Assistance is still provided where necessary by the National Museum of Australia and/or the relevant major state or territory museums to the federal Indigenous Repatriation Program, including research to establish the provenance of ancestral remains and the identification of overseas collections of ancestral remains and the holding of remains in temporary "keeping places."

There have been over 1000 repatriations to communities in Australia since 2000. Notable among these are the 2003 return of the remains of over 300 ancestors of the Ngarrindjeri nation

from the University of Edinburgh in collaboration with the National Museum of Australia Repatriation Unit and, in the following year, another 74 from Museum Victoria under the RICP, as well as the Oxford Museum. In 2011 the Natural History Museum in London returned 138 ancestral remains to the Torres Strait Islands in the largest single return to Australia to date. Also in 2011, an important precedent was set with the Smithsonian Institution's National Museum of Natural History's first international repatriation when it returned ancestors to the community of Gunbalanya in West Arnhem Land. This is also an example of positive collaboration – here between the community and archaeologist Sally May. In this situation, it was May's research for her dissertation and subsequent publication (May 2010) that acted as the catalyst for the repatriation process.

Key Issues, Current Debates, and Future Directions

Following the ratification of The Vermillion Accord in 1989 by the World Archaeological Congress (WAC), the Australian Archaeological Association (AAA) identified a need for a code of ethics endorsing Indigenous control of their cultural heritage. The code of ethics was adopted in 1992 and amended in 2004; it makes clear that the primacy of ownership, curation, and protection of skeletal remains must ultimately reside with Indigenous Australians. It must be noted that the majority of Australian archaeologists do work with Indigenous cultural heritage and some do carry out research on skeletal remains. This, however, must be undertaken in collaborative arrangements with the permission of traditional owners and by way of negotiation. As pointed out by Smith and Burke (2003), it is difficult to measure the impact of codes of ethics of the AAA and of the Australian Association of Consulting Archaeologists Incorporated (AACAI) in terms of implementation and behavior, apart from any explicit violations of the code. However, it can be said that the vast majority of Australian archaeologists accept, support, and expect a level of Indigenous control and approval if working on Indigenous sites (see Smith and Burke 2007). This is a distinguishing aspect of Australian archaeology.

Undoubtedly, some Australian archaeologists believe that Indigenous remains are of greater value to science than to descendant communities, particularly those working with collections of human remains in museums. This position may be more difficult to defend without strong evidence of ongoing, relevant, and ethical research outcomes (such as publications). Archaeologists do not stand alone from the moral compass of the broader community; there is a need to demonstrate responsiveness to the needs and aspirations of both Indigenous and non-Indigenous communities. Working ethically also requires a consideration of changing social attitudes (such as the reconciliation movement in Australia) and of whether it is acceptable to treat the human remains of Indigenous and non-Indigenous people differently. Simpson has argued "if museums are to demonstrate they have shaken off the colonial mantle they must address fully the issue of repatriation. To have a blanket 'no returns' policy reflects a failure to recognise or acknowledge the relevance of the concepts of spiritual ownership, cultural patrimony and the cultural importance of certain objects to cultures that did not die out in the nineteenth century, as was expected." (Simpson 2001: 246). Of course, all Indigenous cultures survive and continue today, and the repatriation process allows a handing back of some degree power and control. Positive outcomes can arise from the repatriation process and have demonstrably enabled archaeologists and museums to grow and maintain relevance, not only with Indigenous peoples but also with the broader Australian community. The point must also be made that not all Indigenous communities are antiscience nor necessarily work in opposition to non-Indigenous archaeologists (see Atalay 2008). Through the repatriation process, it may be possible to foster a greater sense of collaboration, dialogue, and capacity to gain a deeper understanding of cultural material and alternate world views.

To progress the debate, it is imperative that potential cultural material, in addition to human remains and grave goods (often termed secular objects), be repatriated. Museums frequently

display these objects, such as boomerangs, spears, shields, and clap sticks, to present a story on traditional life. These have not been included in repatriations to date, primarily as collecting institutions do not categorize them as holding the same cultural significance as human remains and known secret sacred material. This is a failure to recognize that such objects, obtained mostly without permission, may also be of significance to Indigenous peoples or that some Indigenous peoples have a spiritual connection to their cultural property regardless of its nature or age. It also fails to recognize that those outside the relevant community may not possess a complete understanding of the role and knowledge of certain artifacts nor the right to be privy to this information which should be based on social position, age, and gender.

An acute aspect of the repatriation debate in Australia concerns the support provided once human remains are returned to a community. Though Indigenous communities are in no way responsible for the removal of their ancestors and cultural material, they are required to carry the burden of the repatriation process. This involves enormous responsibility in terms of time, finances, and cultural resources, as well as an emotional burden, particularly for elders (see Wilson 2006). There is the responsibility that remains are returned in a dignified and culturally appropriate manner, with resources and land for reburial. The April 2010 Discussion Paper on the review of the International Repatriation Program by the Federal International Repatriation Advisory Committee identified a lack of appropriate land as a major problem for a number of communities, particularly if there must be a large number of reburials. This entails negotiating with federal, state/territory, local governments, and private landowners and finding relevant and appropriate sites that now, for example, are housing estates. Further to this there are also issues surrounding access and site protection. Current federal funding does not have the provisions for keeping places (either their establishment, or maintenance, or for holding remains where the specific cultural group is not able to be identified), for the purchase of land, or ongoing site management and protection. The issue of compensation has also been touched on by Hemming and Wilson (2010) and would assist with such issues. However, the issue of Native Title compensation has generated division in Australia. This raises complexities around who is entitled to compensation and on what basis, what might constitute just terms for that compensation, and who is to pay. In reality this may risk further isolating some institutions (particularly outside Australia) who are already resistant to the repatriation process.

Archaeologists have played a role in the disempowerment of Indigenous Australian communities through the appropriation and dispersal of their cultural material. Yet archaeologists do have the potential to be positive agents of change in partnership with Indigenous communities by way of acts of repatriation such as that that has occurred in Gunbalanya. Through collaboration, rigorous archaeological research can be undertaken that also has real impact, now.

Cross-References

- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Repatriation and Race in Indigenous Archaeology

References

Atalay, S. 2008. Multivocality and Indigenous archaeologies. In *Evaluating multiple narratives: Beyond nationalist, colonialist, imperialist archaeologies*, ed. J. Habu, C. Fawcett, and J.M. Matsunaga, 29–44. New York: Springer.

Cubillo, F. 2010. Repatriating our ancestors: Who will speak for the dead? In *The long way home: The meanings and values of repatriation*, ed. P. Turnbull and M. Pickering, 20–27. Oxford: Berghahn Books.

Fforde, C. 2004. *Collecting the dead: Archaeology and the reburial issue*. London: Duckworth.

Hemming, S.J., and C.J. Wilson. 2010. The first 'stolen generations': Repatriation and reburial in Ngarrindjeri

Ruwe (country). In *The long way home: The meanings and values of repatriation*, 183–198. Oxford: Berghahn Books.
May, S. 2010. *Collecting cultures: Myth, politics, and collaboration in the 1948 Arnhem Land Expedition*. Walnut Creek: AltaMira Press.
McGregor, R. 1997. *Imagined destinies: Aboriginal Australians and the doomed race theory, 1880–1939*. Melbourne: Melbourne University Press.
Meehan, B. 1984. Aboriginal skeletal remains. *Australian Archaeology* 19: 122–147.
Mulvaney, D.J. 1989. Bones of contention. *The Bulletin* 9: 104–109.
Mulvaney, D.J. 1991. Past regained, future lost: The Kow Swamp Pleistocene burials. *Antiquity* 65: 12–21.
Simpson, M.G. 2001. *Making representations: Museums in the post-colonial era*. London: Routledge.
Smith, C.E., and H.D. Burke. 2003. In the spirit of the code. In *Ethical issues in archaeology*, ed. L. Zimmerman, K.D. Vitelli, and J. Hollowell-Zimmer, 177–197. Walnut Creek: AltaMira Press.
Smith, C.E., and H.D. Burke. 2007. *Digging it up down under: A practical guide to doing archaeology in Australia*. New York: Springer.
Turner Strong, P. 1986. Fathoming the primitive: Australian Aborigines in four explorers' journals, 1697–1845. *Ethnohistory* 33 (2): 175–194.
Watson, N. 2003. The repatriation of Indigenous remains in the United States of America and Australia: A comparative analysis. *Australian Indigenous Law Reporter* 8 (1): 33–44.
Wilson, C. J. 2006. Return of the Ngarrindjeri: Repatriating old people back to country. Unpublished Honours dissertation, Flinders University.
Wilson, C.J. 2007. Ngarrindjeri experiences of repatriation: Engaging in an effective consultation process for returning old people. *Indigenous Law Bulletin* 6 (29): 16–18.

Australia's Archaeological Heritage

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Introduction

Archaeology in Australia covers a time from around 60,000 years ago to the present day. Many of Australia's World Heritage properties consist of large protected area landscapes, and archaeological sites from all historic and prehistoric periods are likely to be contained within them. However, for the most part, the archaeological values within these landscapes have played a minor role in the presentation of the country's suite of World Heritage Areas. Exceptions to this are the Willandra, Kakadu, and Tasmanian Wilderness WHAs, which are mixed natural and cultural sites where archaeological evidence was fundamental to establishing Outstanding Universal Value (OUV). Archaeological excavation programs have also contributed to our understanding of many of the individual sites in the Australian Convict Sites WHA.

For many years following the advent of radiometric dating techniques, the quest to find the oldest site and have the final word on the first human settlement of the continent dominated archaeological debate in Australia. This quest led to many important discoveries but also limited the range of archaeological inquiry. While there is still great interest in Pleistocene sites, the post-processual movement has provided a sense of legitimacy to a range of different inquiries. New dating techniques measuring modern carbon and optically stimulated luminescence (OSL) have coincided with a rise in archaeological interest in the recent past.

The practice of so-called historical archaeology began as a way of exploring settler history. Problematically, it developed as a strand that was seen to be non-Indigenous and often involved practitioners that had no undergraduate training in Indigenous archaeology, anthropology, or history. However, a strong emergence of interest in the contact period in the 1990s led to a spate of projects that focussed on the Aboriginal settler contact and post-contact relationships.

Historical Background

Australia became a signatory to the World Heritage Convention on August 22, 1974, and has since served four terms on the World Heritage Committee. In the 38 years since becoming a signatory, 19 Australian sites have been inscribed

on the World Heritage List. Of these only three sites, the Australian Convict Sites, the Royal Exhibition Building in Melbourne, and the Sydney Opera House, have been listed for cultural values alone, and four others are mixed natural and cultural sites: Kakadu, Uluru-Kata Tjuta, Tasmanian Wilderness, and Willandra Lakes (see Table 1). To some extent, this range of sites can be understood in the context of the nation's changing understanding of "Australian" identity, advances in archaeology, and the emergence of cultural heritage as an important interdisciplinary field which has been pioneered by archaeologists.

Archaeology was not seriously practiced as a discipline until 1929 with the first systematic excavation at Devon Downs Rockshelter on the lower Murray River (see Mulvaney and Kaminga 1999). The growth of archaeology in Australia reflected a growing interest in the origin of Australia's Indigenous peoples, led largely by the South Australian Museum where Norman B. Tindale worked and the Australian Museum where F. D. McCarthy was the curator. It was not until the 1960s that archaeological positions were established at Australian universities and filled by qualified personnel. A growing interest in archaeology in the 1960s and 1970s led to discoveries that radically changed both our academic knowledge and the public's perception of Aboriginal society and its antiquity.

The discovery of Aboriginal occupation sites dating to the Pleistocene altered the perception of Aboriginal people and their culture, laying to rest the idea that the continent had only recently been settled. In the Pleistocene, sea levels were much lower and the landmass now called Australia was part of a larger area scientists refer to as Sahul. Many of the earliest sites in Australia are presumed to be now submerged below current sea levels. The antiquity and geographic distribution of Pleistocene sites in Australia are important in demonstrating how humans occupied most of the continent in the Pleistocene despite climatic extremes.

While archaeological practice in Australia has been critiqued by its Indigenous people as a fundamentally colonial exercise, by demonstrating and empirically proving the antiquity of Aboriginal occupation of Australia archaeology has also undoubtedly contributed to major political shifts in the recognition of Aboriginal rights. Archaeological discoveries dramatically revised the dates for Aboriginal colonization of the continent and provided the ammunition for Aboriginal people to engage with land managers and environmentalists, pointing out that in the millennia of Aboriginal occupation, they had shaped Australia's so-called "natural" landscapes.

Key Issues/Current Debates

Pleistocene Sites and World Heritage

Australia's earliest WH sites focussed on the country's Pleistocene archaeological heritage, reflecting the impact of these discoveries.

Willandra Lakes WHA is a semiarid landscape of dried lake beds located in far southwestern New South Wales (Fig. 1). It was inscribed on the World Heritage List in 1981 for outstanding cultural and natural universal values under criteria iii and viii. Here more than any other WHA in Australia the archaeological and geomorphological evidence played a crucial role in establishing the Outstanding Universal Value of the area (see Fig. 2).

The most well-known archaeological site in Australia is the Lake Mungo Lunette in the Willandra Lakes WHA. A hearth radiocarbon dated to 31,000 years BP is underlain by another half meter of cultural deposit, suggesting that the basal date for the cultural deposit is in fact much older about 40,000 years BP; some speculate even earlier at 60,000 years ago. Mungo provides early evidence of human ritual and all it implies about the complexity of the society and cosmological beliefs of the people who left these traces. This evidence includes a 26,000-year-old burial, which is the world oldest known cremation, and a 30,000-year-old ochre burial.

In addition to addressing the timing of colonization, this WHA illustrates one of the enduring themes of archaeological research in Australia – that of human relationships with the environment through time. Other evidence from archaeological sites within the WHA includes the remains of giant marsupials and seed-grinding stones from

Australia's Archaeological Heritage, Table 1 Table of Australian World Heritage Sites inscribed for cultural value (Criteria numbers have been converted to the current numbering convention)

Number	Site name	Inscription date	Cultural Criteria	Natural Criteria	Archaeology period	Archaeology	Area Originally listed	Currently listed (ha)	Notes
185	Willandra Lakes	1981	iii	Viii	Pleistocene (indigenous)	Crucial to both natural and cultural OUV	Difficult to ascertain easily as not specified in the nomination dossier. Dossier says the Willandra lakes Region = 6000 km2 (600,000 ha)	240,000	Area reduced (19Comm Decision 1995)
147	Kakadu National Park	1981	I,v	Vii, ix, x	Pleistocene to current day (indigenous)	Archaeology important but Rock Art the most central to the cultural OUV	6,144 km2 (614,400 ha)	1,979,766	Extension 1987, 1992
447	Uluru-Kata-Tjuta	1987 inscribed for natural values. 1994 re-inscription (as cultural landscape)	V, vi	Vii, viii	Primarily Holocene	Evidence for criterion 5	132,566 ha	132,566	Again humans and environment-intensification at 5,000BP and increase in ritual intensity.
181	Tasmanian Wilderness	1983, extension plus cultural listing in 1989 (cultural)	I ii, iv, vi	Vii, viii, ix, x	Pleistocene	Yes	769,355 ha	1,407,513	+ a buffer zone of 3747 ha
1306	Australian Convict sites	2010	Iv, vi	No	Colonial 1788–1877	Supplementary although key source of information in some of the sites	1502.51 ha	1502.51	+3883.42 buffer
166	Sydney Opera House	2007	i	No	20th Century	No	5.8 ha	5.8	+buffer 438
1131	Royal Exhibition Building & Carlton Gardens	2004	ii	No	19th Century	No	26 ha	26	+buffer 55

Australia's Archaeological Heritage, Fig. 1 Willandra Lakes World Heritage Area. (Copyright Mark Mohell & DSEWPaC, used with permission)

18,000 years BP. Recently, the area has revealed poignant evidence of Australia's earliest inhabitants in the form of footprints of ancient family groups preserved in clay.

The Tasmanian Wilderness WHA was inscribed on the World Heritage List in 1982 for its natural values and extended in 1989 for both its outstanding natural and cultural universal values. It is listed under seven of the ten criteria (criteria iii, iv, vi, vii, viii, ix, x) and is one of the largest conservation reserves in Australia. Climatic changes in the ancient past influenced landscape development. Rising sea levels formed Bass Strait and the Australian mainland became inaccessible; the resulting isolation experienced by Tasmanian Aboriginal people and the cultural effects of this isolation captured the interest of archaeologists.

Kutikina Cave is one of about 40 Pleistocene sites so far discovered in the Tasmanian Wilderness WHA. However, at the time of the original nomination in 1982, there had been no systematic survey for Aboriginal sites, and Kutikina (Fraser Cave) in the Lower Franklin River was the only specific site mentioned in the nomination dossier. It was described as:

> one of the six archaeologically richest limestone caves sites in the western Pacific. A radiocarbon date from the base of part of the cave deposit indicates human occupation in the area about 21,000 years ago. . ..further research is proposed. . .It may be claimed already that an antiquity of 21,000 years establishes southern Tasmania as the most southerly known penetration of the earth's land surface during ice age times' (Nomination Dossier 1982: 13).

These sites are of great significance and their discovery contributed greatly to the campaign to protect the area from logging and from proposed dam construction. However, the original justification for listing on cultural values was only four paragraphs, while the natural values justification was nine pages long, which provides some indication of how the archaeology,

As a cultural property the region is of outstanding universal value because:

- the remains of Homo sapiens sapiens in the Lake Mungo lunette establish that modern man had dispersed as far as southeastern Australia before 30,000 years ago
- complex ritual and symbolic systems are indicated by the 30,000 years old ochred burial and by the 26,000 year old cremati (the oldest cremation site in the world)
- these skeletal remains provide amongst the earliest evidence of Homo sapiens sapiens anywhere in the world and establish the great antiquity of Australian Aborigines
- some of the world's earliest substantial evidence for the exploitation of freshwater resources occurs here in quantity
- the evidence enables a reconstruction of the economic life of Homo sapiens sapiens, showing a remarkable adaptation to local resources and the interaction between culture and the changing natural environment
- grindstones to produce flour from wild grass seeds were used here in the late Pleistocene, at much the same time as their use in the Middle East.
- pigments were transported to these lakeshores before 32,000 BP
- the typology of early Australian stone tools was defined as a result of research in this region

An aesthetic sense, ritual, and concern for deceased kin are surely the hallmarks of mankind. The Willandra discoveries have established the great antiquity and richness of Aboriginal culture and have caused a significant reassessment of Aboriginal prehistory and its place in the history of modern man. The discoveries have linked the origins of modern society in the Old World with one across Wallace's Line in Australia.

Australia's Archaeological Heritage, Fig. 2 Extract from the nomination dossier – Willandra Lakes WHA

although significant, was something of an afterthought in the assessment process. By the time the 1989 extensions were proposed, about 37 Pleistocene archaeological sites were known. The justification for inscription under criteria ii, v, and vi is more clearly articulated on the basis of its information about past Aboriginal settlement.

Rock Art and World Heritage in Australia

"Rock art is the most widespread cultural manifestation of humankind… it is a manifestation of human conceptual thought and of the beliefs that are at the heart of traditional societies" (ICOMOS 2010: 1). Aboriginal paintings, drawings, and engravings occur in many parts of Australia. There has been a wealth of research into subjects as diverse as the

contemporary meaning to Australia's Indigenous people, what the depictions reveal about environmental change and extinct species, and development of techniques for dating and recording the art itself. Significant rock art sites occur in many of the country's protected area reserves outside of current WHAs. Some highly significant sites such as those in the Burrup Peninsula, Western Australia, and in Laura in North Queensland are still at risk from development pressures. Rock art sites also exist in WHAs listed for their natural criteria alone such as the Blue Mountains WHA. However, the only WHA to date where rock art has directly contributed to the case for establishment of the OUV of the landscape is Kakadu National Park.

Kakadu National Park was inscribed on the World Heritage List in three stages over 11 years, commencing in 1981 for both outstanding cultural and natural universal values. It was listed under criteria i, vi, vii, ix, and x. The site description notes that:

This unique archaeological and ethnological reserve has been inhabited continuously for more than 40,000 years. The cave paintings, rock carvings and archaeological sites record the skills and way of life of the region's inhabitants, from the hunter-gatherers of prehistoric times to the Aboriginal people still living there. It is a unique example of a complex of ecosystems, including tidal flats, floodplains, lowlands and plateaux, and provides a habitat for a wide range of rare or endemic plant and animal species (see http://whc.unesco.org/en/list/147).

Kakadu is a landscape of dramatic vistas, renowned for its beautiful freshwater wetlands and rock art sites. The paintings cover a long chronological span, the oldest date back nearly 20,000 years and the most recent are from contemporary times. Prior to its inscription, there had been a long push to ensure that this area was conserved and protected from mining, and in fact the gazettal of a national park over part of this area arose from recommendations made in the Ranger Uranium Inquiry. While the presence of Indigenous inhabitants was noted in the original nomination dossier, the emphasis was on the archaeological evidence of the Indigenous past, rather than the contemporary Aboriginal community. It was not until the third extension nominated in 1992 (Australian Government 1992: 87–88) that the focus of the nomination dossier changed to more comprehensively incorporate the living traditions of the Traditional Owners and cultural continuity:

The cave paintings, rock carvings and archaeological sites present a record of the skills and lifeways of the region's inhabitants, from the hunters and gatherers of prehistoric times to the Aboriginal people still living there (Australian Government 1992).

This was an important shift in thinking about heritage and not just in Australia. It was around this time in 1992 that the World Heritage Committee convened a meeting of specialists to redraft the Operational Guidelines to include the concept of associative cultural landscapes more explicitly in a way that allowed for the recognition of Indigenous cultural values.

While it is the Aboriginal rock art that was the key evidence to support the inscription of this cultural property on the World Heritage List in 1981, there are also a number of Pleistocene archaeological sites in the WHA. The original nomination dossier provides a glimpse of the contemporary debates about the dates and process of Indigenous colonization of the continent (White 1971; Jones 1973). At the time of the nomination, the emerging results from Lake Mungo were challenging some of the assumptions derived from the archaeological work in the Kakadu area in the late 1960s (e.g., White 1967).

Cultural Landscape, World Heritage, and Archaeology in Australia

The changes to the Operational Guidelines adopted in 1992 defined three categories of cultural landscapes including (1) a landscape designed and created intentionally by man, (2) an organically evolved landscape, and (3) an associative cultural landscape.

Australia has actively engaged with the development of cultural landscape concepts within the Convention and quickly moved to renominate Uluru-Kata Tjuta following the successful nomination by New Zealand of Tongariro – the first cultural landscape to be listed. Uluru-Kata Tjuta

WHA remains the only cultural landscape listed in Australia. This reserve is in the arid inland and comprises extensive sand plains, dunes, and alluvial desert, dominated by the Uluru monolith and Kata Tjuta. The focus of the park has always been on the monolith Uluru (formerly known as Ayers Rock) which has drawn curious tourists since the 1940s. This interest, while a catalyst, for conservation from tourists gave rise to the long-term struggle of Anangu to retain their traditional way of life and control of their spiritual sites (Layton 1986). This WHA was first inscribed in 1987 for its natural values and it was not until 1994 that it was reinscribed for its cultural values under categories v and vi. The ICOMOS evaluation (p. 100) notes:

> To write that the landscape is *associated with* the narratives, songs, and art of the *tjukurpa*, while accurate from a western perspective, does not do full justice to Anangu ontology and is a poor translation of Anangu concepts. For the Anangu this landscape is the product of heroic ancestors' actions and can be read as a text specifying the relationship between the land and its indigenous inhabitants laid down by the *tjukurpa*. The very rock of Uluru and Kata Tjuta is proof of the heroes' actions and being [criterion vi].

Archaeological evidence of Aboriginal adaptation and change includes the introduction of new tool types and the creation of new forms of rock art as well as changes to camping patterns and social organization over the past 5,000 years. However, the recommendation of ICOMOS (1994) supporting the re-inscription illustrates that though this evidence may have been useful to authenticate the time depth and adaptive nature of Anangu society, it is their relationship and interaction with their landscape and the way it embodies their spiritual beliefs that is the core of the Outstanding Universal Value.

The Archaeology of the Recent Past and World Heritage in Australia

The Australian Convict Sites WHA (Fig. 3) is one of the nation's most recent additions to the WH List. It comprises 11 properties spread across Tasmania, Norfolk Island, NSW, and Western Australia. It was inscribed in 2010 under criteria iv and vi. It incorporates Australia's first ever WH site in private ownership. Each of these places include substantial archaeological values and several, e.g., the Female Factory, Port Arthur, the Hyde Park Barracks, and Parramatta Park, have had extensive archaeological programs associated with them; however, there is little overt acknowledgment of the archaeological values of these places in the nomination dossier.

Australia's Archaeological Heritage, Fig. 3 Student volunteers excavate the site of convict sawpits and tan pits at Port Arthur Historic Site, part of the Australian Convict Sites WHA (Image courtesy of Port Arthur Historic Site Management Authority)

In the case of the remaining cultural sites, i.e., the Royal Exhibition Building and Carlton Gardens in Melbourne (inscribed 2004) and the Sydney Opera House (inscribed 2007), a consideration of archaeological evidence played no role in their nomination. Interestingly, the Draft Conservation Plan for the Royal Exhibition Building included with the nomination dossier did not address the issue of any associated archaeological deposits and how they would be managed. This

reflects a problem with architecturally focussed heritage planning, in that it does not always include multidisciplinary input from archaeologists.

As we have seen, Australia's first cultural nominations can be understood in a national context of the dramatic discoveries of Australia's Indigenous Pleistocene past in the late 1960s and 1970s. Aboriginal activism was re-energized through the scientific discoveries of the antiquity of Aboriginal settlement, the heated environmental battles over the so-called wilderness, and large-scale development proposed in "natural" areas (e.g., Ranger Uranium Mine Inquiry, the proposed Jabiluka mine near Kakadu, and the Tasmanian hydroelectric scheme dam proposal) in the 1970s and 1980s, and the expansion of Australia's protected area reserves. Since that time, government resourcing for the assessment of new areas has dwindled, as too has resourcing for the heritage sector generally.

Heritage bodies have repeatedly lobbied the Australian government to populate its Tentative List through strategic and thematic studies to no avail. There are substantial community-driven campaigns not yet supported by government advocating consideration of a number of cultural properties including the Goldfields, Canberra, Adelaide Park Lands, Cornish mining sites Budj Bim, and the rock art of the Dampier Archipelago. Currently, the assessment of Cape York Peninsula provides opportunities for Indigenous landowners in the region to contribute to any future nomination and develop new models for cultural landscapes shaped by continuing traditions. Ongoing concern over the issues such as costs of managing World Heritage Sites, the globalization of "culture" through international processes such as the World Heritage Convention, the commercialization of significant cultural places through the conflation of world heritage as tourism, and the rights and interests of local communities is debated as hotly within Australia as elsewhere. There are conflicting political positions adopted within Australian society on the impacts of World Heritage listing on Indigenous rights which continue to hamper the development of new models driven by Indigenous Traditional Owners.

Archaeological research is nationally under-resourced compared with other areas of research. While a number of persistent archaeologists continue to carry out field research, the main forms of archaeology now practiced in Australia are consulting and salvage archaeology which are not likely to give rise to dramatic archaeological evidence, and if they do, it is often too late to save it.

International Perspectives

The human species did not evolve on the Australian continent but arrived here somehow from elsewhere. Evidence to date suggests that these first colonists were modern humans (*Homo sapien sapiens*). Just how, when, and why they arrived is still under debate. International discoveries, such as *Homo floresiensis* in 2003 not far away on the Indonesian island of Flores (Morwood et al. 2004) and a geochronologically dated site in Malaysia at 1.8 million years ago (Majid 2003), are still being made that may potentially change theories about colonization of the region. Such discoveries in turn spark new research questions for Australian archaeologists and may have implications for future transnational serial nominations.

More broadly, the relationship between humans and their environment and responses to environmental change are enduring themes in archaeological research in Australia. The specter of Global Climate Change that now confronts the world has re-energized this area of study with many researchers looking to the consequences of past change and human responses.

Australia's contribution to the articulation of the cultural landscape concept along with the listing of Uluru-Kata Tjuta WHA as a cultural landscape so quickly after the 1994 changes to the Operational Guidelines is significant within the history of the convention (Rossler 2006), and Australian archaeologists remain active in developing new approaches and methodologies relating to the identification of cultural landscapes and in particular articulating the links between tangible and intangible heritage.

Future Directions

The future for World Heritage in Australia is unclear, along with the role that archaeology might play in any future nomination. There have been repeated calls for a serial rock art nomination incorporating the most significant art sites across the nation. The oldest dated rock art site in Australia (>24,600 years BP) is found in the Laura region of Cape York Peninsula (Cole and Watchman 2005), renowned for its distinctive rock art style which is a major tourist attraction in the region. Unfortunately, management of this area is under-resourced and the Traditional Owners struggle to manage tourism impacts on these sites. Investment in management of these sites has been at best sporadic.

Cape York Peninsula is currently being considered as a cultural landscape created and maintained through the continuing association of the Indigenous Traditional Owners. Similarly, there are Indigenous community calls to renominate the Gondwana Rainforests WHA as cultural landscape. There continues to be an opportunity to develop new models and methodologies to assess, describe, and manage associative cultural landscapes.

It is unlikely that there will be standalone nominations relating to Australia's recent past. In many cases, comparative analysis will show that many such sites are similar to those of other colonial nations. This does not diminish the importance of such sites to the Australian people. They can be effectively protected through local, state, and national mechanisms in most cases. However, it is possible that transnational serial nominations of some of these places would be successful (assuming a future government commitment to support them). One example is the proposal for a transnational nomination of the Cornish mining sites.

The Torres Straits is a region that is not represented in Australia's suite of WH places, and Torres Strait Islander cultural heritage is underrepresented on relevant national and state heritage registers. This is a vibrant cultural landscape which was and continues to be a cultural nexus between Melanesian Papua New Guinea (PNG) and mainland Australia and has deep historic connections through their shared Sahul prehistory.

Cross-References

- ▶ Australian Rock Art
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Chile's World Archaeological Heritage and Its Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ Global Archaeology
- ▶ Heritage and Archaeology
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Kakadu National Park: Rock Art
- ▶ Lake Mungo, Archaeology of
- ▶ Local Populations and Global Heritage

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References

Australian Government. 1992. *Nomination dossier*. World Heritage Area Extension: Kakadu National Park.

Cole, N., and A. Watchman. 2005. AMS dating of rock art in the Laura Region, Cape York Peninsula, Australia – protocols and results of recent research. *Antiquity* 79: 661–689.

ICOMOS. 1994. Advisory Body evaluation Uluru Kata-Tjuta National Park, Northern Territory Australia No. 447 Rev. Unpublished report to the 18th Session of the World Heritage Committee.

ICOMOS. 2010. *Rock Art pre-nomination guidelines, in the framework of the World Heritage Convention*. Paris: ICOMOS.

Jones, R.M. 1973. Emerging picture of Pleistocene Australians. *Nature* 246: 275–281.

Layton, R. 1986. *Uluru, an Aboriginal history of Ayers Rock*. Canberra: Australian Institute of Aboriginal and Islander Studies.
Majid, Z. 2003. *Archaeology in Malaysia*. Penang: Centre for Archaeological Research Malaysia, Universiti Sains Malaysia.
Morwood, M.J., R.P. Soejono, R.G. Roberts, T. Sutikna, C.S.M. Turney, K.E. Westaway, W.J. Rink, J.-X. Zhao, G.D. van den Bergh, Rokus Awe Due, D.R. Hobbs, M.W. Moore, M.I. Bird, and L.K. Fifield. 2004. Archaeology and age of a new hominin from Flores in eastern Indonesia. *Nature* 431: 1087–1091.
Mulvaney, J., and J. Kamminga. 1999. *Prehistory of Australia*. St. Leonards: Allen and Unwin.
Rossler, M. 2006. World heritage cultural landscapes: A UNESCO flagship programme 1992–2006. *Landscape Research* 31: 333–353.
White, C. 1967. The prehistory of the Kakadu people. *Mankind* 2: 426–431.
White, C. 1971. *Man and environment in northwest Arnhem Land, in Aboriginal man and Environment in Australia*, 141–157. Canberra: ANU Press.

Further Reading

Bowler, J.M., R. Jones, H.R. Allen, and A.G. Thorne. 1970. Pleistocene human remains from Australia: A living site and human cremation from Lake Mungo. *World Archaeology* 2: 39–60.
Fowler, P.J. 2003. *World heritage cultural landscapes 1992–2002*. Paris: UNESCO World Heritage Centre.
UNESCO. 2005. *Operational guidelines for the implementation of the World Heritage Convention*. Paris: UNESCO.

Australian Archaeological Association Inc. (AAA)

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Basic Information

Formally established in 1972, the Australian Archaeological Association Inc. (AAA) has grown to become the largest archaeological organization in Australia (http://www.australianarchaeology.com/). Aimed at encompassing all subfields within the discipline, including Indigenous archaeology, historical and industrial archaeology, ethno-archaeology, and maritime archaeology, the association now represents a diverse membership of professionals from the private, government, tertiary, and museum sectors, students, and others with an interest in archaeology. The association's membership encompasses archaeologists and cultural heritage practitioners (including many Indigenous archaeologists and cultural heritage practitioners) from across Australia and the world and as of 2012 comprises approximately 1000 people.

The AAA holds a conference each year, this being the major national annual meeting of archaeologists, attracting delegates from across Australia and internationally. This conference is hosted by a different institution each year in varying locations across the country to encourage attendance from a broad-cross section of the archaeological community. *Australian Archaeology*, a refereed journal published twice a year since 1974, is the official publication of AAA. In line with the aims of the association, this journal accepts original articles in all fields of archaeology and other subjects relevant to archaeological research and practice in Australia and nearby areas. This includes subject matter covering research and cultural heritage management focused on prehistoric, historic, and contemporary periods.

Through the annual conference, publication of the journal, and the use of various social media platforms, the aims of AAA are to promote the advancement of archaeology, to provide an organization or forum for the discussion and dissemination of archaeological information and ideas, to publicize the need for the study and conservation of archaeological sites and collections, and to increase public awareness of the aims of archaeology in Australia.

Major Impact

Since its inception, AAA has lobbied the Australian federal and state governments, and private industry on behalf of its members, and has prepared submissions on a range of archaeological and cultural heritage-related issues. These

include heritage legislation reform, research funding, and best practice in consulting archaeology (several instances in collaboration with the Australian Association of Consulting Archaeologists Inc. and the Australasian Society for Historical Archaeology).

The AAA actively promotes and supports Indigenous and student engagement with archaeology through the annual conference (often via the provision of funding support for attendance and participation) and promotes the importance of Australia's archaeological heritage as a major sponsor of annual National Archaeology Week events run across the country every year in May. Additionally, the AAA supports and promotes teaching and learning in archaeology across schools and higher education through the Australian National Committee for Archaeology Teaching and Learning (ANCATL).

The association's flagship journal, *Australian Archaeology*, is internationally recognized as a high-quality peer-reviewed forum for the publication of archaeological research from across Australasia. The journal is indexed in the Arts and Humanities Citation Index of the Web of Knowledge, SCOPUS, Australian Public Affairs Information Service (APAIS), and Anthropological Literature and Anthropological Index Online and has been ranked as a tier A journal by the European Reference Index for the Humanities and French Agence d'Evaluation de la Recherche et de l'Enseignement Supérieur.

Cross-References

- ▶ Australasian Institute for Maritime Archaeology Inc. (AIMA)
- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Australian Association of Consulting Archaeologists Inc. (AACAI)

Further Reading

Australian Archaeological Association Inc. (AAA). n.d. Available at: http://www.australianarchaeology.com/.

Australian Archaeology: Pioneers and Traditions

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Introduction

Australia's first archaeological observations were made by early explorers and colonists or noted by observers primarily working in other disciplines (Smith and Burke 2007: 1). The first excavation in Australia was undertaken by the governors of the Colony of New South Wales with a focus on human burials (Horton 1991: 3–5), while the first to employ the method of stratigraphic analysis were anthropologists Herbert Hale and Norman Tindale, who undertook archaeological excavations at Devon Downs in 1929 (Hale and Tindale 1930).

Formal archaeological work in Australia began in the 1950s when John Mulvaney returned from courses at Cambridge University and introduced archaeological study into the Australian curriculum (Mulvaney 2011). Mulvaney began work on a number of archaeological excavations around Australia and instructed and mentored a number of students who would become leaders in the field, including Isabel McBryde, Jim Allen, and Ian Glover.

In the 1970s, a series of political circumstances spurred by a confluence between the Aboriginal land rights movement and public environmental concerns led to the creation of state heritage legislation, After this, the amount of archaeological work conducted in Australia dramatically increased, both with development of heritage surveys required by legislation and in academic circles, with several universities opening archaeology departments.

While Australia's first department of archaeology had been instituted at the University of Sydney in 1948, the focus was not specific to Australian archaeology. Later, archaeologists with an Australian focus arrived at the university,

with Vincent Megaw and Richard Wright arriving in 1961 and Rhys Jones in 1963. John Mulvaney was appointed to the History Department University of Melbourne in 1953, later moving to ANU. Isabel McBryde took up the first titled position in Prehistory and Ancient History at the University of New England, Armidale, in 1960, while Jack Golson was appointed to the Anthropology Department at Australian National University in 1961, which was then just moving into the field of archaeology.

Key Issues

Since this time, Australia has grown a thriving discipline covering a range of research topics. The nature and timing of human settlement in the continent has been a long standing topic of interest in Australian archaeology, with the first estimate being made in 1884 by Reverend Peter MacPherson, who postulated an age of 400 years BP for human arrival on the basis of his excavations in Victoria (Horton 1991: 34–43). This date was quickly superseded with the commonly accepted date of human arrival in Australia now being an estimated 50,000 years BP (see Hiscock 2008: 1). The archaeology of the periods of European contact and industrialization has developed into a major field.

The first Australian book dedicated to an overview of archaeological field methods was written in 1983 by Graham Connah (see Connah 1983), which was followed by a more detailed treatment of field methods and related topics by Heather Burke and Claire Smith (see Burke and Smith 2004). The method of ethnographic analogy has often been employed in Australian archaeology and in many cases has served to inform our interpretation of the past (Hiscock 2008: 268–85).

One of Australia's strengths in archaeology has been its analysis of sociopolitical issues, particularly the reflexive analysis of its relationship as a discipline with Aboriginal people (see Burke et al. 1994). This has evolved from simple consultation in the early days to numerous community-based research projects, informed, and sometimes initiated by Indigenous people (Greer et al. 2002). This has begun to transform archaeology in Australia from a field that studied the history of indigenous people to one that cannot only learn more about the past but also benefit contemporary peoples. Employment in cultural heritage management increased dramatically in the early twenty-first century, in response to the legislative requirements of a mining boom in Australia. In 2012, there were over 1000 members of the Australian Archaeological Association.

Cross-References

- ▶ Allen, Jim
- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Burke, Heather
- ▶ Field Method in Archaeology: Overview
- ▶ Golson, Jack
- ▶ Jones, Rhys Maengwyn
- ▶ McBryde, Isabel
- ▶ Mulvaney, John
- ▶ Smith, Claire

References

Burke, H., and C. Smith. 2004. *The archaeologists field handbook*. Crows Nest: Allen and Unwin.

Burke, H., C. Lovell-Jones, and C. Smith. 1994. Beyond the looking-glass: Some thoughts on sociopolitics and reflexivity in Australian archaeology. *Australian Archaeology* 38: 13–22.

Connah, G. 1983. *Australian field archaeology: A guide to techniques*. Canberra: Australian Institute of Aboriginal Studies.

Greer, S., R. Harrison, and S. McIntyre-Tamwoy. 2002. Community-based archaeology in Australia. *World Archaeology* 34 (2): 265–287.

Hale, H.M., and N.B. Tindale. 1930. Notes on some human remains in the Lower Murray Valley, SA. *Records of the South Australian Museum* 4: 145–218.

Hiscock, P. 2008. *Archaeology of ancient Australia*. London/New York: Routledge.

Horton, D.R. 1991. *Recovering the tracks: The story of Australian archaeology*. Canberra: Aboriginal Studies Press.

Mulvaney, D.J. 2011. *Digging up the past*. Sydney: University of New South Wales Press.

Smith, C., and H. Burke. 2007. *Digging it up down under: A practical guide to doing archaeology in Australia*. New York: Springer.

Australian Association of Consulting Archaeologists Inc. (AACAI)

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Basic Information

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The Australian Association of Consulting Archaeologists Inc. (AACAI) was established in the 1970s as an organization for professionals working in all fields of contract and public archaeology. AACAI aims to uphold and promote the discipline of archaeology and to advance the welfare of members. AACAI has a Constitution, a Code of Ethics, and a Consulting with Aboriginal Communities Policy Document. It is affiliated with the Australian Archaeological Association Inc and is a Foundation Member of the Council for the Humanities, Arts and Social Sciences.

Major Impact

The Australian Association of Consulting Archaeologists Inc. is a national organization with local chapters in Queensland, New South Wales, Victoria, South Australia, and Western Australia. The National Executive Committee (NEC) deals with national issues, including membership applications, AACAI policy, and general administration, while State Chapters deal with local matters. AACAI may also provide technical and professional advice, and dispute resolution. It runs an occasional Professional Development Workshop Series. It also publishes a newsletter, a recommended minimum fee scale, and is preparing an Australian Archaeology Consultancy Monograph Series.

The National Executive Committee of AACAI oversees issues of wide-ranging importance for consultants, clients, and the community. The Membership and Publications Committees answer to the NEC. State Chapters of AACAI deal with specific issues relating to practice in different parts of Australia with different jurisdictions and heritage organizational structures. The Chapters hold specialist workshops, seminar series, and act as the first contact point for consultants. Workshops are organized on specialized topics that assist in the professional development of consultants and which help to inform them on issues that affect their work, such as changes to legislation. Recent workshops include the analysis and management of spatial data (GIS applications) and the implications of the GST on business practice and accountability.

AACAI produces a newsletter, which keeps the members and subscribers up to date with a cross section of archaeological issues in Australia and overseas. Each Newsletter includes updates on workshops and lectures of interest to consultants.

AACAI's Register of Consultants lists all Members. For Full Members, the Register lists contact details, academic qualifications, general fields of work (as ratified by the Membership Committee), special fields of expertise, specialist studies, and consulting experience. The Register provides summary contact details, expertise, and availability of Associate Members and lists all Affiliate Members. The AACAI website lists all financial Full Members' details as well as all policy documents. AACAI can serve to lobby collectively on issues deemed to be of interest to its professional membership, such as amendments to heritage legislation. It has formal ties with other archaeological organizations, including the Australian Archaeological Association.

Cross-References

► Australian Archaeological Association Inc. (AAA)
► Ethics in Archaeology
► Heritage and Archaeology

Further Reading

Australian Association of Consulting Archaeologists Inc. (AACAI). n.d. Available at: www.aacai.com.au

Australian Deserts: Extreme Environments in Archaeology

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State of Knowledge and Current Debates

Introduction

The first Australians passed through biogeographic filters of the increasingly depauperate islands of Wallacea to enter the most arid continent ever occupied by preindustrial era humans. But were Australia's deserts marginal, extreme, and risky environments for these hyper-adaptive modern humans? We must recall that they were part of a "fast track" southern diaspora of modern humans from Africa to Australia who had already shown extraordinarily adaptive abilities. Given that the Last Glacial Maximum expanded Australia's deserts even further and made for some truly extreme environments, what does archaeology tell us of how Ice Age Australians dealt with the most common environments in Sahul? By the time Europeans arrived in Australia, the deserts were more densely packed with people than ever before, a process that had escalated in the late Holocene to create the renowned desert societies known to ethnographers. Even then, these were some of the lowest density populations ever observed (in some instances one person per 100–200 km^2) (Hiscock 2008). Australian deserts, and desert peoples, have now moved close to the center of Australian society for the first time, providing a vital pump for art and ideas from the desert outward. Here we review Australia's deserts from an archaeological perspective.

Modern humans left Africa between approximately 70,000 years ago (cal BP (years before 1950) is used here to denote calendar years; years BP and BP are used to denote radiocarbon years; ka is used to denote thousands of years ago and generally relates to OSL ages. The Pleistocene period extends from 2 million to c. 10, 000 years ago, and then the Holocene epoch begins) and reached Sahul at the eastern end of this diaspora before 50,000 years ago (Smith 2013). This was an impressive accomplishment, since it entailed crossing through Wallacea, which encompasses the islands of the Lesser Sundas including Flores and Timor, and would have required a series of substantial water crossings out of sight of land (Fig. 1). With the exception of Flores, the archaeological evidence left by the early colonists is indisputably the product of modern human behavior (Balme et al. 2009).

Currently the oldest sites are found in Arnhem Land in the north of the continent. These sites are not far from the coast today but would have been a significant distance inland at the time of first occupation. Dates of between 65,000 and 50,000 BP have been obtained for sediments in association with the lowest stone artifacts recovered at rockshelter sites Malakunanja and Nauwalabila 1 based on the optically stimulated luminescence (OSL) method (Fig. 1). Sites in the inland arid zone such as at Lake Gregory (*Parnkupirti*) have been dated to between 50,000 and 45,000 (Veth et al. 2009). Using the radiocarbon technique that dates charcoal and other organic remains, dates in the order of 50,000–45,000 cal BP have been obtained for sites in both northern and southern Australia (Balme et al. 2009). A spectacular limestone cave in the extreme southwest of Western Australia, Devil's Lair, currently has the oldest radiocarbon date for occupation approximately 48,000 BP (Turney et al. 2001) – to get here would have required passing by, or through, the arid regions of the northwestern reaches of the

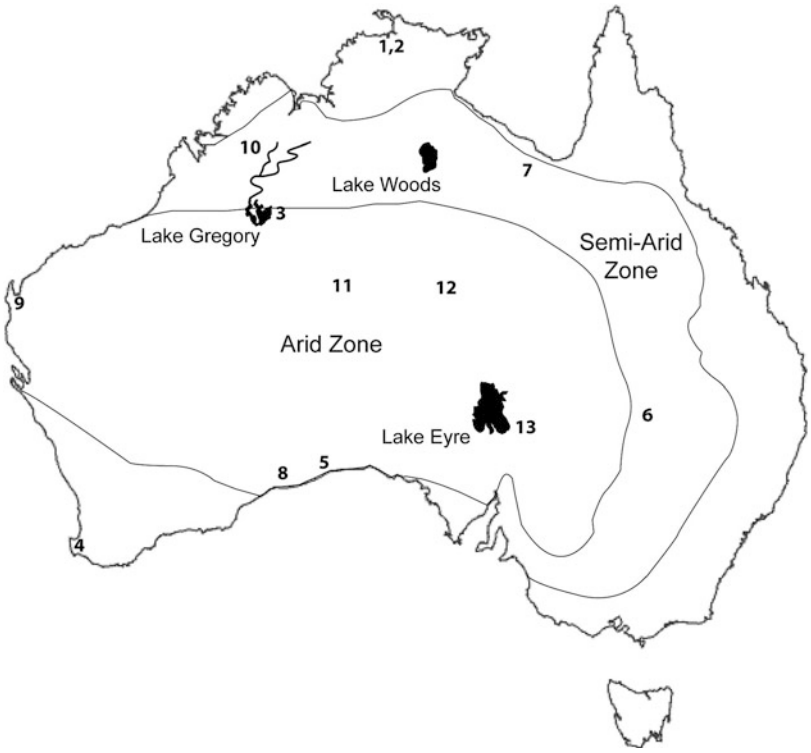

Australian Deserts: Extreme Environments in Archaeology, Fig. 1 Map of archaeological sites discussed in text: (1) Malakunanja rockshelter, (2) Nauwalabila rockshelter, (3) Parnkupirti, (4) Devil's Lair rockshelter, (5) Allen's Cave, (6) Cuddie Springs, (7) GRE 8 rockshelter, (8) Madura Cave, (9) Mandu Mandu rockshelter, (10) Riwi rockshelter, (11) Puritjarra rockshelter, (12) Arltunga, and (13) Killalpaninna mission

continent. Thus, while once thought to have been barriers to human occupation until the Holocene, with many analogues to the Great Basin of the USA, desert sites from Australia in the order of 40,000 BP predating glacial aridity are now well established (Hiscock and Wallis 2005; Smith 2013).

Australian deserts are not uniform, and the impact of environmental transformations over time was variable. The deserts exist across a massive belt of semiarid and arid Australia. In the east arid, regions around Lake Eyre contrasted with the large occasionally active river systems such as Cooper Creek. While people such as *Diyari* benefited from rivers, others were suited to more extreme deserts, such as Wangkangurru dwelling in the dune fields of the Simpson Desert. Moving westward, Central Australia is broken by sets of ranges occupied by *Arrandic* speakers, which had long provided a highly elevated refuge at the continent's heart. Further west, the massive Western Desert combines several separate deserts, both sandy and gravel in form. For humans in these environments, such as *Martu* and *Pintupi* peoples, life in the sand-dune country required the use of ephemeral waters and more reliable water in rock holes found in small ranges like the Cleland Hills. Reaching the Western Australian coast, the Pilbara is a vast set of ranges extending from the Western Desert to the arid Indian Ocean coast, now clearly never abandoned at any stage in Australia's past. In the south, the Nullarbor Plain also borders an ocean, the Southern Ocean, abutted by a vast flat, often un-vegetated plain, with little surface water.

The Climate of the Arid Zone

The climatic history of Australia's desert provides a critical frame through which to understand human uses of the arid regions which have witnessed some of the most dynamic human-landscape transformations anywhere (Veth 2005).

The climate of arid Australia is characterized by several drivers, notably the northern summer monsoons, cyclones, and pseudo-monsoons in the north and winter westerlies and frontal systems in the south (Sturman and Tapper 1996). The major river systems that bring rain from the monsoon

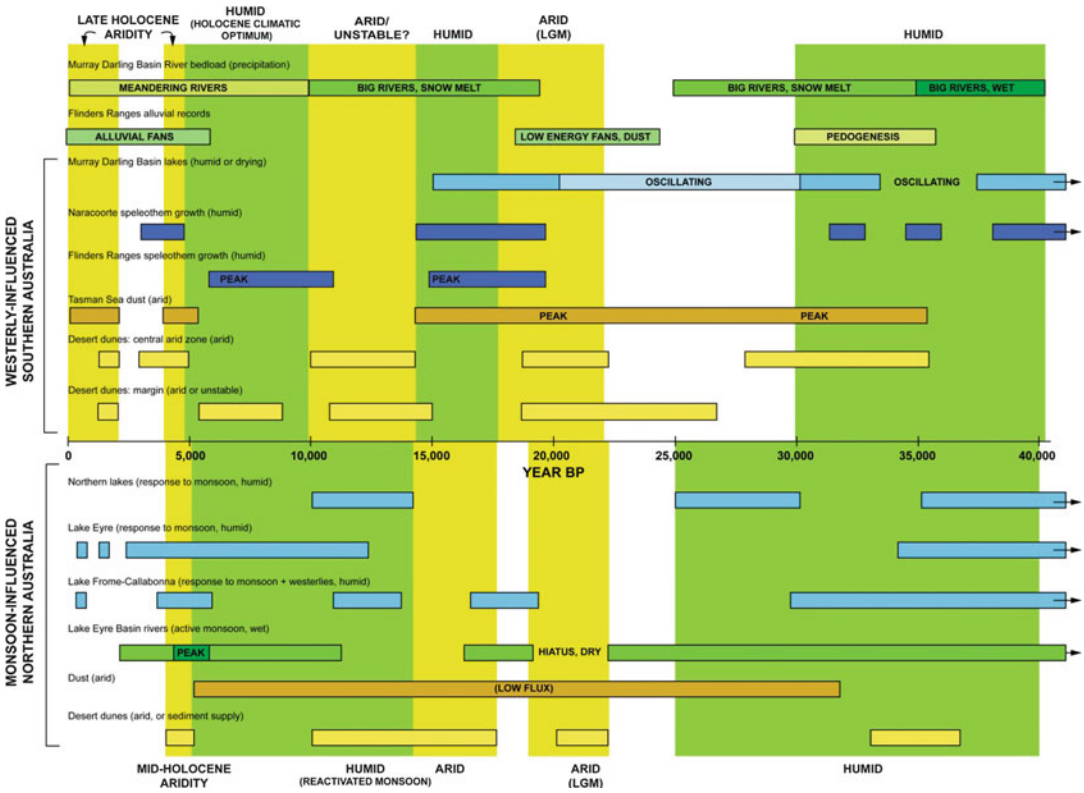

Australian Deserts: Extreme Environments in Archaeology, Fig. 2 A summary of paleoclimatic proxies from northern and southern Australia (Fitzsimmons et al. 2012)

belt into the arid interior and fill water bodies such as Lake Gregory, Lake Woods, Lake Eyre, and Lake Frome also play a significant role in the availability of water and thereby accessibility of the desert (Williams et al. 2010). Changes in the strength and location of these systems, therefore, have large influence over the effective precipitation in the arid interior and indirectly affect other hunter-gatherer requirements, including food resources, vegetation, fire regimes, and water availability.

At the time of human arrival, the arid zone was cool but humid, with several of the large lakes (including Lake Frome, Lake Gregory, and Lake Eyre) containing water from intensified summer monsoons and/or an equatorward displacement of the winter westerlies (Fitzsimmons et al. 2012). These conditions, which would have allowed the exploration of much of the arid interior, persisted until the onset of the Last Glacial Maximum (LGM) beginning at ~30,000 years BP and peaking at ~23,000–18,000 years BP.

The LGM in Australia was a period of significant cooling and increased aridity (Fig. 2) and saw a decline in annual temperatures by as much as 10 °C compared with present day; glaciation of uplands in the Snowy Mountains and Tasmania; reduction in rainfall by 60% or more, especially in the interior through the weakening of the summer monsoons and poleward displacement of winter westerlies; changes in vegetation structure to generally more steppe-like and grassland-dominated environments; lower lake levels; increasing dune activity and dust transport; and an expansion of the arid zone into semiarid and mesic environments (Williams et al. 2009; Petherick et al. 2011; Fitzsimmons et al. 2012). Sea levels were also at their lowest through this period, at ~120 m below modern day levels, and led to increased continentality across the interior. In the arid

zone, only the Murray-Darling Basin system showed evidence of continuing resources, being fed by water from the ice fields covering the Snowy Mountains during this period. Fluvial activity at the headwaters of the Cooper River and high lake levels at Lake Lewis, however, suggest episodic wet events occurred within, or on the margins of, the arid zone throughout the LGM.

Following the LGM, the Terminal Pleistocene/Holocene transition saw rapid environmental change. Increasing temperatures initially outpaced precipitation and, at least for prehistoric people, probably led to some of the driest conditions in the last 50,000 years (Markgraf et al. 1992). Sea levels rose rapidly and by 12,000 years BP had reached present-day levels, inundating the continental shelf and likely displacing significant populations in the (now) Timor and Arafura Seas. Lake Carpentaria would similarly be inundated by ~8000 years BP. Recent studies show this period to be one of increasing complexity, with the southern parts of the continent having a brief humid phase between ~17,000–15,000 years BP before increasing aridity at ~14,000–10,000 years BP, while in the north the lapsed monsoon saw dry conditions until after 14,000 years BP after which it got progressively wetter (Fitzsimmons et al. 2012). In the center of Australia, the Todd River reveals evidence of paleo-floods initiating from 14,000 years BP and continuing into the early Holocene (Smith and Ross 2008).

In the early Holocene, ameliorating climate would have allowed far greater access into the arid interior. An area that had generally been fairly inhospitable to long-term occupation now had increasing resources due to an intensification of the monsoon system brought about by the inundation of the Sahul Shelf (Smith 2013). Rainfall from the increased monsoons fed the major rivers systems running into the center of the continent, and Lake Eyre, Lake Frome, and Lake Gregory were, again, all full (Smith et al. 2008).

From approximately 5000 years BP, the current El Niño-Southern Oscillation (ENSO) cycle was initiated (Shulmeister 1999). Beginning as a period of increased effective precipitation and enhancement of the monsoons across Australia, the climate quickly turned to prolonged drying and increased variability. Intensification of ENSO would have caused the movement of the Intertropical Convergence Zone northward, increased the anticyclonic conditions overlying the region, and thereby reduced the likelihood of monsoon or rain-laden low-pressure systems into the Australian interior. Between ~3700 and 2000 BP, this intensification of ENSO caused significantly drier conditions in Australia and increasing climatic variability in the arid interior. A number of different datasets all demonstrate that ENSO, and specifically El Niño events, was consistently stronger and more frequent during this period. However, while the overall effect of ENSO was to reduce rainfall in this period, increasing variability would have seen significant rainfall in the interior occasionally.

The intensification of El Niño events continued and may have increased until approximately 1500 years BP. Several Australian paleoclimatic datasets suggest amelioration from 2000 to 1700 years BP or later. Consequently, the climate of the last 2000 years was considerably more stable than the mid-Holocene, although there were the well-known climate shifts of the wetter Medieval Climatic Anomaly at 1200–800 years BP and the cooler Little Ice Age at 600–200 years BP (Williams et al. 2010).

Regional Trends: Time-Series Analysis

Recent approaches in the use of time-series analysis provide a good opportunity to explore the first-order response of prehistoric people to the climatic changes outlined above. Techniques to explore regional response fall into three main categories: (1) the use of summed probability approaches – involving the compilation of radiocarbon data from archaeological sites as an indicator for population size and/or mobility (Fig. 3a); (2) the interpretation and compilation of individual site records to give an inference of peak occupation periods (Fig. 3b); and (3) artifact z-scores, a standardization approach taken from recent paleofire studies that allows integration of a wide range of spatial and temporal records into one regional curve (Fig. 3c) (Williams 2012).

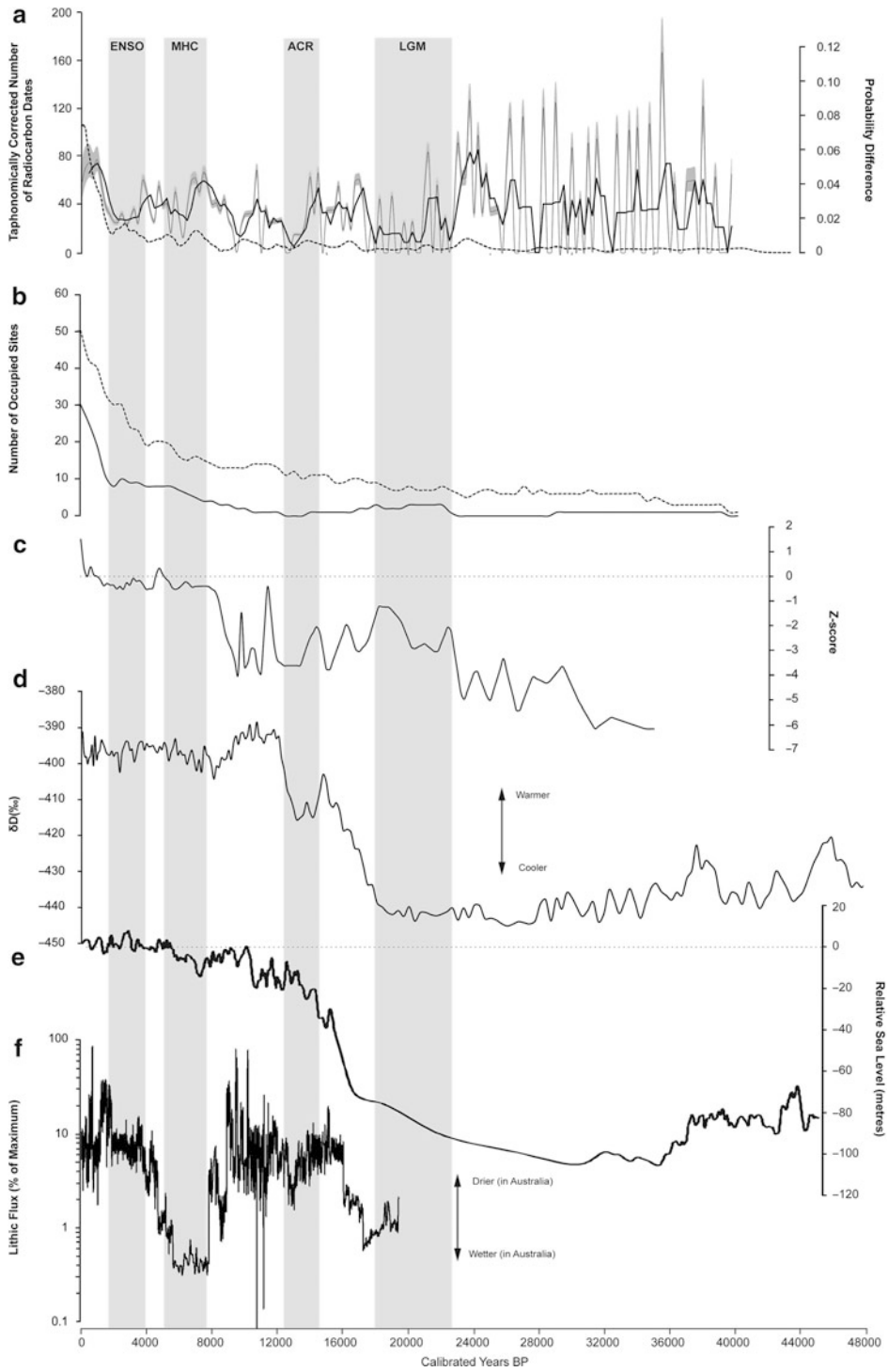

Australian Deserts: Extreme Environments in Archaeology, Fig. 3 A graph showing proxies for population and/or human activity compared with paleoclimatic records. (**a**) Summed probability distribution (*dashed*) of radiocarbon dates from archaeological sites in the arid zone. Taphonomic correction of the radiocarbon data is also presented (*dark gray line* provides the corrected values with associated 95% confidence intervals (*pale*

As Fig. 3 demonstrates, occupation of the arid zone began soon after colonization. There are now eight sites that would have been located within the expanded arid core of Australia before and during the Last Glacial Maximum. The oldest is *Parnkupirti*, located on a tributary of the once mega-lake of Lake Gregory in the southeastern Kimberley dated from 50 to 45 ka. Lake Gregory itself would have once been a very large freshwater lake fed by the Kimberley ranges to the north and containing shellfish, fish, water fowl, and myriad of fauna such as emu and macropods. Other sites in the Kimberly are dated to 45 ka, while at the western edge of the Central Australian ranges, Puritjarra rockshelter shows evidence for occupation between 40 and 35 ka BP. On the Nullarbor Plain to the south, Allen's Cave has an OSL date of 40 ka, while the earliest occupations at Lake Mungo to the east are estimated by OSL to lie in the range of 50–46 ka. To the northeast, Cuddie Springs dates to 38,500 years ago, while a shelter near Lawn Hill in Queensland (GRE 8) has a radiocarbon determination of 41,500 cal BP (Hiscock 2008; Smith 2013).

Following colonization, human activity and/or prehistoric populations grew slowly until the LGM, when several of the indices show a decline in data. This corresponds with well-documented abandonment of large tracts of the arid interior, population decline, and the falling back of surviving populations into refugia, including the Pilbara, Central Australian ranges, and Murray-Darling Basin (Veth 1989, 2005) (Fig. 4). (It should be noted that the z-score results here are heavily influenced by the Puritjarra rockshelter record, which formed a refugia during this event, and explain the increase in artifact discard during this time.) After a brief recovery, a similar decline in activity is evident during the ACR. Not previously considered in archaeological literature, the ACR probably saw a similar human response as the LGM. With the exception of the LGM and ACR, the data suggests that the Terminal Pleistocene was generally a period of decline or period abandonment in the arid interior.

After the ACR and in tandem with ameliorating climate, significant increases in populations/human activity can be observed in the Terminal Pleistocene/early Holocene between ~12,000 and 8000 years BP (Smith 2013). A significant increase in both radiocarbon data and artifact rates can be observed during this period, and several sites were occupied for the first time (e.g., Puntutjarpa rockshelter in the Musgrave Ranges, Norina Cave and Madura Cave on the Nullarbor Plain, and Marillana A rockshelter in the Pilbara uplands) or contain evidence of intensified occupation (e.g., Allen's Cave on the Nullarbor Plain and Puritjarra rockshelter in the Cleland Hills).

The initiation of ENSO during the late Holocene led to a series of changes in the configuration of Aboriginal populations, between ~4000 and 2000 years BP, including responses inferred as regional abandonment and population decline. During this period, the use of hafting technology, the appearance/proliferation of microlithic tools (e.g., tula adzes and backed blades), and the standardization of stone tools, intensifying long-

Australian Deserts: Extreme Environments in Archaeology, Fig. 3 (continued) gray shading); *black line* presents a 3-point (equivalent to 750-year) moving average. No smoothing or zero trimming was attempted); (**b**) using data from 58 archaeological sites in the arid zone, a graph showing number of occupied archaeological sites by 500-year time intervals (*dashed lined* shows number of sites; *solid line* shows periods of increased artifact discard or other archaeological indices), (**c**) mean z-scores of artifact discard rates (effectively a regional signal) of nine Central Australian rockshelters: Wanmarra, Wanga East (WO4), Ilarari 17, Rrewurlpmurlpme Kweke, Intirekwerle, Urre, Kweyunpe 6, Therreyererte, and Puritjarra. (**d**) EPICA Dome C ice core deuterium/hydrogen ratios – a proxy for temperature, (**e**) sea-level change from sediments in the Red Sea, (**f**) a record of El Niño-Southern Oscillation from an ocean core, SO147-106KL, off the coast of Peru – a proxy for rainfall. Climatic periods are shown, including the Last Glacial Maximum (*LGM*), Antarctic Cold Reversal (*ACR*), mid-Holocene climatic optimum (*MHC*), and intensification of El Niño-Southern Oscillation (*ENSO*). See Williams (2012) for further information and methods presented in this figure

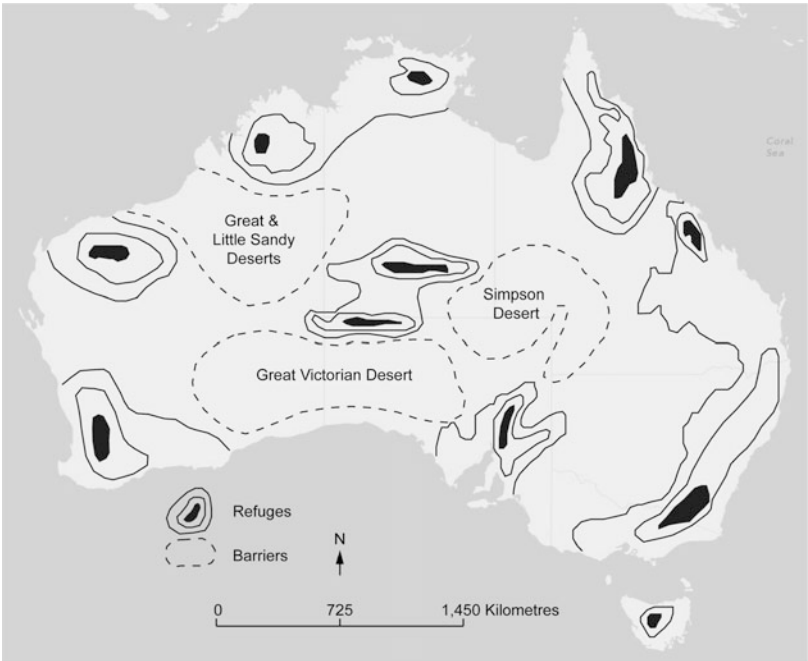

Australian Deserts: Extreme Environments in Archaeology, Fig. 4 Conceptual map of barriers (sand sheets), refuges (uplands), and corridors (interstitial lowlands) used by Aboriginal people during climate perturbations from earliest pluvial phase, expansion of the arid interior during the Last Glacial Maximum, and then subsequent amelioration and climatic fluctuations of the Holocene. Developed by Veth (1989) as a heuristic model to provide a framework for understanding some of the dynamism in the timing, settlement, and mobility of desert societies, this has been supported in large by 25 years of desert studies (cf. Hiscock 2008). The new cryptic refuge model of Smith (2013) sees smaller satellite refugia outside of the major uplands – as deduced from studies of faunal biogeography – especially for persistence of populations during the LGM

distance trade and ritual networks, all occur for the first time (Smith 2013).

After 2000 years BP, hunter-gatherer populations may have increased exponentially, a fact identified by several authors but yet to be adequately explained (Smith and Ross 2008). Importantly, this increase is still prominent in the taphonomically corrected data, indicating it is not an artifact of site loss through time (Williams 2012). This period also saw a series of new adaptive responses to climatic variability, including marked increase in use of marginal and outlying sites, the extended use of existing sites, increased territoriality expressed through greater differentiation of rock art, and more intensive use of lower calorific food resources, such as *Acacia* and grass seed processing. Recent work has shown this period to be increasing complex with human responses to events such as the Medieval Climatic Anomaly (Williams et al. 2010).

Human Response to Extreme Environments

Conditions were generally more favorable when groups entered Sahul c. 50,000 years ago, meaning that people were not entering the daunting and ostensibly "dangerous" landscapes lamented by early European explorers – although this can be in part explained by European lack of familiarity with these environments. These favorable conditions then became more diverse and in many cases challenging by 30,000 BP. This has been labeled the "desert transformation model." In this scenario, groups first adapted to more benign climates and then made changes in their settlement behavior, technology, economy, dietary suites, and material culture to accommodate significant changes in the landscape.

Environmental reconstructions suggest that while conditions would have been colder than today, other factors may have promoted early movement inland. Hiscock and Wallis (2005) make the case that:

> In many regions it is likely that up until 45,000 years ago – and perhaps to 30,000 years ago in some locations – the availability of fresh surface water would have been at least as good, if not better, than during the Holocene. . .The greater relative availability and predictability of resources. . .would have facilitated exploration and exploitation of these unique interior landscapes.

These recent environmental reconstructions, coupled with the patterning of radiocarbon dates and economic evidence from numerous archaeological sites, support a very early movement of people into well-watered inland regions, and here we would argue the "extreme" deserts of Australia.

Groups not only occupied radically different environments in a relatively short period of time; they also began to develop signature regional traits. Interestingly many of these are sources from the then expanded arid zone of Australia. These are inferred from differences in tool production, long-distance exchange networks (witnessed in movement of ochre specimens), complex funerary practices (such as at Lake Mungo at the Willandra Lakes), and very different group-identifying behaviors that have been interpreted from different art styles thought to date to the Pleistocene period (such as the engraved Archaic Faces found from the Pilbara and then in a vast swathe across the western, central, and arid lands on the eastern border).

Lumps of faceted ochre, grindstones on which ochre has been ground, and slabs smeared with ochrous pigment date back to c. 42,000 years ago, from sites in the southwest Kimberley and from a burial site in Lake Mungo, from excavations in Arnhem Land, and from excavations dated to >32,000 BP from Central Australia (Hiscock 2008). It is assumed that ochres were used in the earliest pigment art and that it was likely part of the repertoire of Indigenous Australians (Veth et al. 2011).

Shell beads were important signals of modern behavior in Africa and the Levantine. Representing items of personal adornment and identity, they have now been recovered from Australasia as well. The two key sites of Mandu Mandu Creek rockshelter and Riwi lie on the edge of the deserts of northwest Australia and have yielded "strands" of 22 cone shells older than 32,000 BP and 10 tusk shells dated to approximately 30,000 BP, respectively (Balme and Morse 2006). Such regionally distinct personal wear is seen to have helped in mediating interactions within and between groups.

Long-distance exchange can be inferred from artifacts that lie well outside their supply zone and can be sourced accurately. The oldest comes from a burial site in the Willandra Lakes, more than 40,000 years old, where the closest source for ochre is the Barrier Range some 250 km distant. Ochre as old as 32,000 BP was transported 125 km to the Central Australian site of Puritjarra, while ochres from Mandu Mandu Creek rockshelter in northwestern Australia were transported over 300 km as early as 25,000 BP. Pearl, baler, and tusk shell were moved up to 500 km from as early as 30,000 BP.

During the period of intensified aridity in the Last Glacial Maximum, the ways that humans used the arid zones have been debated. Most agree that certain regions such as inland ranges acted as potential refuges, with other less watered environments being abandoned. This thesis is presented in Peter Veth's (1989) *Islands in the Interior*, where people retreated to ranges in the Pilbara, Flinders, Kimberly, and Central Australia, with the remainder of the arid regions being used in more sustained ways in post-LGM climatic regimes. The main dune fields representing some of the more extreme and challenging environments were thought to remain largely unoccupied prior to 5000 years BP, although some use of sandhill country occurred during the Pleistocene (Smith 1993). The significance of refugia is clear, particularly in the Pleistocene. In building on Veth's paradigm, Smith has recently proposed a model for "cryptic refugia" borrowing from biological studies that suggest that some areas outside of uplands acted as refugia

for scattered populations of various species and that a similar model for scattered human groups may be appropriate. If so, populations would need to survive in smaller numbers spread over a former range, relying on pockets of microhabitats (Smith 2013).

European Contact

Following rare, accidental, and deliberate coastal landfalls in the seventeenth and eighteenth centuries, the arrival of European colonists in Australia in the late eighteenth century heralded a dramatic change from a continent of Indigenous hunter-foraging societies with deep-time attachments to local environments (as they were at the time of contact) to a settler nation wherein migrants vastly outnumbered Indigenous peoples. In terms of world history, Australia is colonized "late," with various colonies (mainly penal in nature) around Australia only after 1788 CE.

Unsurprisingly, Australia's massive interior desert regions remained outside the colonization "frontier" until the mid-nineteenth century. Explorers entered (but did not necessarily survive) the arid lands and encountered the peoples already resident there, although many only saw signs of occupation as they passed by camps and sites. Knowledge was a critical barrier to exploration. Some explorers such as Eyre traveled with Aboriginals, while others such as Canning at times forced Aboriginal people to blaze trails. By the 1860s, explorers had provided knowledge essential for the establishment of isolated outposts strung across Australia's central deserts. These in turn allowed trans-global communication in the form of the Overland Telegraph connecting south-eastern Australian colonies to Darwin, then by submarine cable to Singapore and the British Imperial realms. Another very different communication occurred in and around the telegraph repeater stations for each was established in the traditional country of desert communities – this settings provided the location for significant "early historical" observations about Australian Aboriginal society best reflected in the ethnographic observations of Baldwin Spencer and F. J. Gillen. These and other later observations form the foundation from which ethnographic knowledge of desert societies is constructed (see Keen 2003 for further discussion).

From this time onward, Australia's deserts become the setting for increasingly diverse encounters between Indigenous Australians and outsiders (mainly British, but including other ethnicities to create diverse desert societies located well beyond the colonial "frontier"). Nineteenth- and twentieth-century explorations were fuelled by the desire to access land for stock and suitable droving routes (the Canning Stock Route, e.g., cuts across the Western Desert), imaginary interior water sources (the various permutations of "inland seas"), mineral prospectors (such as the announcement by Harold Lassiter in the 1920s of a centralian goldfield), scientific knowledge, and a place beyond the gaze of colonial authority. Exploration led to the establishment of stock-droving routes that crossed the deserts, linked by water and infrastructure, and to various mineral industries, such as Arltunga in the White Range – Central Australia's first official town following gold discovery in 1887 (Holmes 1989).

The early historical period of Australia's desert, from a European perspective, occurred almost a century after British colonization/invasion. We expect environmental and demographic changes resulting from introduced species to have moved well in advance of colonists (and thus European historical observers). When Europeans arrived, there were few large native fauna and European-introduced species – particularly camels, horses, cows, sheep, goats, dogs, cats, rabbits, and foxes – that had changed the Australian environment dramatically after 1788, resulting in the decline and extinction of many endemic mammalian fauna (Rolls 1984). The ancient Australian soils had never been exposed to hooves, and these animals created havoc (and still continue to) around natural water resources. New plants crowded out native grasses and other plants, at a time when any forms of Indigenous land management – such as the use of fire – were in a state of flux. Few pastoralists looked kindly on the use of fire, seeing it as a threat to stock and the newly installed pastoral infrastructure.

Equally diseases need to be understood – what effect did they have in the early period? Did desert

populations plummet, as has been argued by some? The archaeological record is rarely sensitive enough to rigorously measure fluctuations in population in these critical years, given that it is largely a surface record (Campbell 2002). Certainly, the maintenance of long-distance trade networks as observed in Central Australia, for ochre, *pituri* (native tobacco), grindstones, and ceremonies, suggests some robustness in these desert societies following the disruptive arrival of colonists.

We need to distinguish within the various arid and semiarid environments across the continent whether they were colonized by Europeans and other non-Indigenous peoples or not. Many regions were suitable for sheep and cattle pastoralism – other massive desert regions were simply unviable. A gradient of arability emerged from the margins of semiarid regions where stock could be raised, through to those that could not – a situation exacerbated by environmental degradation and fine climatic variation in the more "extreme" or marginal arid environments.

Another significant element of historical period deserts was the introduction of camels and handlers from various origins in West and South Asia – although widely termed "Afghan" or "Ghan" – a name commemorated in the Alice Springs to Darwin transcontinental railway (Stevens 1989). Little archaeology has yet been done of their camps, places of worship, and work. Equally the arrival of missionaries is a significant archaeological topic, only addressed at a handful of sites such as the Killalpaninna Lutheran Mission on the Birdsville Track (Birmingham and Wilson 2010).

The largest corpus of post-contact archaeological work has been carried out on pastoral sites, some simply interested in pastoralism and others interested in pastoral settings as part of a broader regional process of culture contact. In Lake Eyre, for instance, the archaeological record reveals that Aboriginal people continued to live in and around their estates on vast sheep stations – providing labor, knowledge, and economic security through their seasonal availability. However, only some remained "inside" the pastoral domains, and others remained "outside" as "wild strangers" – at least in the perception of Europeans. Conversely in the northern realms, the demands for work married better with seasonal work demands, with the wet season being a time for the fulfillment of cultural responsibilities (Paterson 2008).

For many today the cultural heritage of deserts reflects pastoralism, remote communities, or survival – or not. Bean (1910) reflected: "There, around Lake Eyre, and over some part of Central Australia you may see them today – deserted homesteads standing out from the desert with the marks of old settlement around them. That is what sheep mean to Australia." The other record of heritage often overlooked is an Indigenous record, which too has historical components.

To summarize, the archaeological study of post-contact deserts can be divided into (1) rural and regional heritage studies interested in buildings, mine, and infrastructure (Gill and Paterson 2007); (2) culture contact between Aboriginal people and various outsiders (Veth et al. 2008), particularly pastoralists; (3) Indigenous responses to historical contingencies, as reflected in subsistence, settlement, depictive traditions (especially rock art) (Taçon et al. 2012), and colonial/government authority and labor demands (Paterson 2008); and (4) "longue duree" approaches that articulate historical events into longer time scales, such as Smith's study of the Cleland Hills (Smith 2005).

In extraordinary events of global relevance, played out locally on patches in the Western Deserts, as late as the 1960s, Aboriginal people who had never seen white people "came out" of the desert and "came into contact" with white Australians for the first time. These events represented the last extreme environments of earth to come into the fold of the wider global community.

Cross-References

- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Australian Paleoart

▶ Complex Hunter-Gatherers
▶ Evolutionary Anthropology: Issues, News, and Reviews
▶ First Australians: Origins
▶ Indigenous Archaeologies: Australian Perspective

References

Balme, J., and K. Morse. 2006. Shell beads and social behaviour in Pleistocene Australia. *Antiquity* 80: 799–811.

Balme, J., I. Davidson, J. McDonald, N. Stern, and P. Veth. 2009. Symbolic behaviour and the peopling of the southern arc route to Australia. *Quaternary International* 202: 59–68.

Bean, C.E.W. 1910. *On the wool track*. London: A. Rivers.

Birmingham, J., and A. Wilson. 2010. Archaeologies of cultural interaction: Wybalenna Settlement and Killalpaninna Mission. *International Journal of Historical Archaeology* 14 (1): 15–38.

Campbell, J. 2002. *Invisible invaders: Smallpox and other diseases in Australia 1780–1880*. Carlton South: Melbourne University Press.

Fitzsimmons, K.E., T.J. Cohen, P.P Hesse, J. Jansen, G.C. Nanson, J-H. May, T.T. Barrows, D. Haberlah, A. Hilgers, T. Kelly, J. Larsen, J. Lomax, and P. Treble. 2012. Late Quaternary palaeoenvironmental change in Australian drylands. *Quaternary Science Reviews*. Available at https://doi.org/10.1016/j.quascirev.2012.09.007.

Gill, N., and A.G. Paterson. 2007. A work in progress: Aboriginal people and pastoral cultural heritage in Australia. In *Loving a sunburned country? Geographies of Australian heritages*, ed. R. Jones and B. Shaw, 113–131. Aldershot: Ashgate.

Holmes, K. 1989. Arltunga: A minor goldfield in arid Central Australia. *Australian Journal of Historical Archaeology* 7: 43–49.

Hiscock, P. 2008. *Archaeology of ancient Australia*. New York: Routledge.

Hiscock, P., and L. Wallis. 2005. Pleistocene settlement of deserts from an Australian perspective. In *Desert peoples archaeological perspectives*, ed. P. Veth, M.A. Smith, and P. Hiscock, 34–57. Massachusetts: Blackwell Publishing.

Keen, I. 2003. Aboriginal economy and society at the threshold of colonisation: A comparative study. *Before Farming* 3 (2): 1–24.

Markgraf, V., J.R. Dodson, A.P. Kershaw, S.M. McGlone, and N. Nicholls. 1992. Evolution of late Pleistocene and Holocene climates in the circum-south Pacific land areas. *Climate Dynamics* 6: 193–211.

Paterson, A.G. 2008. *The lost legions: Culture contact in colonial Australia (Indigenous Archaeologies series)*. Walnut Creek: AltaMira Press.

Petherick, L.M., P.T. Moss, and H.A. McGowan. 2011. Climatic and environmental variability during the termination of the Last Glacial Stage in coastal eastern Australia: A review. *Australian Journal of Earth Sciences: An International Geoscience Journal of the Geological Society of Australia* 58 (6): 563–577.

Rolls, E.C. 1984. *They all ran wild: The story of pests on the land in Australia*. Sydney: Angus and Robertson.

Shulmeister, J. 1999. Australasian evidence for mid-Holocene climate change implies precessional control of Walker circulation in the Pacific. *Quaternary International* 57 (58): 81–91.

Smith, M.A. 1993. Biogeography, human ecology and prehistory in the Sandridge Deserts. *Australian Archaeology* 37: 35–50.

Smith, M.A. 2005. *Peopling the Cleland Hills: Aboriginal history in western Central Australia 1850–1980*. Canberra: Aboriginal History Inc.

Smith, M.A. 2013. *The archaeology of Australia's deserts*. New York: Cambridge University Press.

Smith, M.A., and J. Ross. 2008. What happened at 1500-1000 BP in Central Australia? Timing, impact and archaeological signatures. *The Holocene* 18 (3): 387–396.

Smith, M.A., A.N. Williams, C.S.M. Turney, and M. Cupper. 2008. Human environment interactions in Australian drylands: Exploratory time-series analysis of archaeological records. *Holocene* 18 (3): 389–401.

Stevens, C. 1989. *Tin mosques & ghantowns: A history of Afghan camel drivers in Australia*. Alice Springs: Paul Fitzsimmons.

Sturman, A., and N. Tapper. 1996. *The weather and climate of Australia and New Zealand*. Oxford: Oxford University Press.

Taçon, P.S.C., J. Ross, A.G. Paterson, and S. May. 2012. Picturing change and changing pictures: Contact period rock art of Australia. In *Companion to rock art*, ed. J. McDonald and P. Veth, 420–436. Malden: Wiley-Blackwell.

Turney, C.S.M., M.I. Bird, L.K. Fifield, R.G. Roberts, M. Smith, C.E. Dortch, R. Grun, E. Lawson, L.K. Ayliffe, G.H. Miller, J. Dortch, and R.G. Cresswell. 2001. Early human occupation at Devil's Lair, southwestern Australia 50,000 years ago. *Quaternary Research* 55: 3–13.

Veth, P. 1989. Islands in the interior: A model for the colonisation of Australia's arid zone. *Archaeology in Oceania* 24: 81–92.

Veth, P. 2005. Cycles of aridity and human mobility: Risk minimisation among late Pleistocene foragers of the Western Desert, Australia. In *Desert peoples archaeological perspectives*, ed. P. Veth, M.A. Smith, and P. Hiscock, 100–115. Massachusetts: Blackwell Publishing.

Veth, P., P. Sutton, and M. Neale. 2008. *Strangers on the shore: Early coastal contact in Australia*. Canberra: National Museum of Australia Press.

Veth, P., M. Smith, J. Bowler, K. Fitzsimmons, A.N. Williams, and P. Hiscock. 2009. Excavations at

Parnkupirti, Lake Gregory, Great Sandy Desert: OSL Ag for occupation before the Last Glacial Maximum. *Australian Archaeology* 69: 1–10.
Veth, P., N. Stern, J. Balme, J. McDonald, and I. Davidson. 2011. The role of information exchange in the colonization of Sahul. In *Information and its role in hunter-gatherer bands. Ideas, debates, and perspectives*, ed. R. Whallon, W.A. Lovis, and R.K. Hitchcock, vol. 5, 209–220. Los Angeles: Cotsen Institute of Archaeology Press.
Williams, A.N. 2012. The use of summed radiocarbon probability distributions in archaeology: A review of methods. *Journal of Archaeological Science* 39: 578–589.
Williams, A.N., S. Ulm, I. Goodwin, and M. Smith. 2010. Hunter-gatherer response to late Holocene climatic variability in northern and Central Australia. *Journal of Quaternary Science* 25 (6): 831–838.
Williams, M., E. Cook, S. van der Kaars, T.T. Barrows, J. Shulmeister, and P. Kershaw. 2009. Glacial and deglacial climatic patterns in Australia and surrounding regions from 35000 to 10000 years ago reconstructed from terrestrial and near-shore proxy data. *Quaternary Science Reviews* 28: 2398–2419.

Further Reading

Magee, J., G.H. Miller, N.A. Spooner, and D. Questiaux. 2004. Continuous 150 k.y. monsoon record from Lake Eyre, Australia: Insolation-forcing implications and unexpected Holocene failure. *Geology* 32 (10): 885–888.
Paterson, A.G., N. Gill, and M. Kennedy. 2003. An archaeology of historical reality? A case study of the recent past. *Australian Archaeology* 57: 82–89.

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology

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Introduction and Definition

The statutory authority of the Australian Commonwealth (federal) government known as the "Australian Institute of Aboriginal Studies" from 1964 to 1989 and "The Australian Institute of Aboriginal and Torres Strait Islander Studies" (1989 to present) has as its primary function support of research into Indigenous Australia (Anonymous 1964, 1989). Archaeology was a central focus of the Institute from its inception. The 1961 "Conference on Aboriginal Studies" held under the auspices of the Social Science Research Council that led to the founding of the Institute heard presentations by representatives of each of the disciplines comprising the then fields of Australian Aboriginal Studies: anthropology, human biology, linguistics, prehistory and material culture, and strong arguments for a national research center (Stanner and Sheils 1963; Mulvaney 1963: 33–51; Horton 1986: 83). The Institute's first two principals (chief executive officers), Fred McCarthy (Fig. 1) and Peter Ucko (Figs. 2 and 3), were archaeologists, and chairs of the Institute's Council were involved in prehistoric archaeology Professor Neil W.G. Macintosh (1906–1977), Professor of Anatomy at the University of Sydney and a foundation member of AIAS, between 1966 and 1974; and Professor D. John Mulvaney AO CMG (1925–), known as the "father of Australian archaeology," during the years 1982 and 1984 (Figs. 4 and 5). Most of the first generation of Australian academic archaeologists was involved with the Institute in at least its first decade, guiding not only its activities but also the development in Australia of the discipline itself.

Historical Background

Australian Archaeology Before the Institute

In his address to the 1961 conference, John Mulvaney (1963: 34, 44–5) reviewed the state of Australian archaeology, speaking of the necessity for "typological exactitude," obtaining "more than one age estimation from each site," and of the difficulty of covering the costs of field research. On the same occasion, McCarthy (1963: 53–5) recorded what he saw as the "urgent needs" of Australian archaeology and spoke of the "neglect" of the discipline: there were no university courses in archaeology, no support for research from funding bodies, and neither a

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 1 Dr. Frederick D. McCarthy (1905–1997), first principal (second from L) with Professor D. John Mulvaney AO CMG, Professor W.E.H. Stanner CMG (1905–1981), one of the founders of the Institute, and Dr. Norman Tindale AO (1900–1993), at The Australian National University, Canberra, May 1980, on the occasion of granting honorary doctorates to McCarthy and Tindale. (Photograph courtesy of D.J. Mulvaney)

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 2 Dr. Peter J. Ucko (1938–2007), second principal, contemplating an archaeological manifestation/Aboriginal cultural heritage place near Gove, on a visit to the Northern Territory in 1976. (Photograph courtesy of D.J. Mulvaney)

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 3 Professor Peter Ucko at University College London signing copies of his festschrift 7 January 2006, a day of seminars and celebration of him, his work, and his collegiality ("Peter's Day"). (Photograph: Lydia Maher, courtesy of Jane Hubert)

specialist journal nor a professional association to organize regular meetings. There were extremely limited employment opportunities; the few persons active were based in museums. Opportunities for publication were similarly limited; while there had been short articles on archaeology in

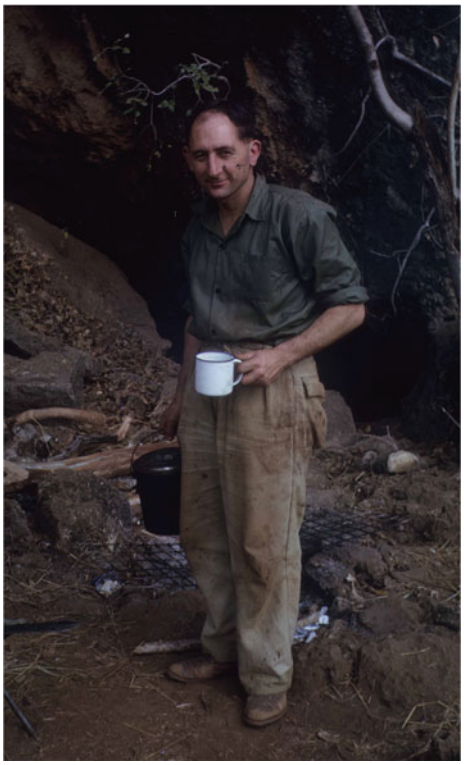

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 4 Professor D. John Mulvaney AO CMG (1925–), Chair of Institute Council, at Kintore, Northern Territory, 1963. (Photograph courtesy of D.J. Mulvaney)

Australian anthropological journals and in museum proceedings, Mulvaney's (1961) major review of Australian prehistory had been published in Britain. The only opportunity for disciplinary meetings was at congresses of the Australia and New Zealand Association for the Advancement of Science. There was no legislation in most jurisdictions to protect archaeological sites or to control field research. Australian archaeology was neither professional nor self-sufficient.

The Institute Established: 1961–1964

In December 1961, an Interim Council was appointed to make recommendations toward "the permanent establishment of a national research organisation" (Stanner and Sheils 1963: xiv). In 1964, following the passage of the *Australian Institute of Aboriginal Studies Act* confirming a 22-member Council and a foundation membership of 100, the first principal was appointed. McCarthy (1905–1997) was ethnologist and curator at the Australian Museum in Sydney; while his scholarly pursuits were broad, archaeology and cultural materials studies were central to his interests. He was one of the few archaeologists active in Australia in the previous three decades, known for his systematic excavations of rockshelters in the Sydney area

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 5 John Mulvaney with (L) Dr. Rhys Jones (1941–2001) and Don Ranson at Kutikina Cave, Tasmania, in 1983. John was involved in the successful national heritage listing of the site. Rhys was an early grantee, long-term Member of the Institute and served on its Prehistory Advisory Committee as member and chair for many years as a sometime member of the Institute Council. (Photograph courtesy of D.J. Mulvaney)

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Table 1 Institute grants for archaeology from 1961 to 1970

Topic	Excavation	Survey and excavation	Survey	Ethnoarchaeology	Radiocarbon age determination	Other project types
Number	13	7	5	3	31 (201 analyses)	6

(Attenbrow and Khan 1994), and for a book on stone tools, for many years the main scholarly work on Australian lithic assemblages (McCarthy 1967/1976). McCarthy, with the assistance of staff initially comprising a secretary, technical officers, and a librarian, commenced building the Institute and establishing its role vis-a-vis other institutions concerned with Australian Aboriginal studies.

Key Issues/Current Debates

Institute Research Grants

The Institute's Interim Council was empowered to provide grants for research, and some of the first went to support archaeological endeavors. The initiative was welcomed; Megaw (1963: 298), acknowledging a fundamental change, noted that "... from the point of view of archaeology in Australia the momentous decision is that of the principle of Government sponsorship for research projects ...". Listing of successful grants in the Institute *Newsletter* effectively publicized the grants process and encouraged further applications at a time when new researchers were being trained in universities.

Twelve of the 63 initial grants in 11 disciplinary categories went to archaeology. By 1968, when McCarthy (*Newsletter* 2(3): 34–6, 38–41) reported assistance for archaeological research, that support was being manifested across the continent, and it was probable that most of the research in Australian prehistoric archaeology was being funded by the Institute and involved not only Australian-based researchers but also archaeologists from Great Britain and the United States. Toward the end of his term as principal, McCarthy (*Newsletter* 3(1): 1–101), summarizing research support during the Institute's first decade, showed that archaeology represented more than one fifth of the total grants for all disciplines and the range of research covered (Table 1).

Major projects supported included excavations at Mount Cameron West, Kow Swamp, and Koonalda Cave; there were also 21 projects to record and research rock art. Funds were provided for films on stone tool manufacture and the Kow Swamp excavations. In the 1970s, with the development of various university departments and State agencies, while archaeology became less dependent upon the Institute, AIAS was still a major source of funding for archaeological research. Toward the end of the next decade, the deputy principal was able to report that a similar proportion of grants had been allocated to archaeology and related fields as had been the case in the 1960s (*Newsletter* n.s.13: 6–21).

Throughout the 1990s, Institute annual reports record that archaeology and related disciplines were substantial recipients of research grant funding. Fifty years after its establishment, despite many changes of emphasis, about one quarter of the Institute's support for external projects in the 2011 grant round was applied to archaeological projects. When the Institute's Grants Program was suspended indefinitely in 2011, the Australian Archaeological Association protested on behalf of its membership.

Support for Publication

An early initiative of the Institute was to provide for the publication of the results of research and related activities. Aside from publishing short archaeological reports in its *Newsletter*, the Institute provided substantial financial contributions toward publication of articles, monographs, books, and technical manuals. The first scholarly article in the *Newsletter* was by archaeologists Megaw and Glover (*Newsletter* 2(3): 4–15); it was accompanied by another on comparison of skeletal materials and a first listing of radiocarbon age determinations. The second principalship,

that of Peter Ucko (1938–2007) who took up his appointment in 1972 from a lectureship in archaeology at University College London where he had been responsible for influential books on European rock art, domestication, and urbanism, coincided with the term of a reforming Australian government, an extension of the Institute's role and fundamental changes in its governance and emphases. In January 1974, Ucko initiated a new series of the *Newsletter*, which subsequently carried an increasing proportion of reports and scholarly articles. The Institute's journal, *Australian Aboriginal Studies*, which replaced the *Newsletter*, was started in 1983 and continues today, albeit in a reduced format less suitable for presentation of archaeological material.

In the 1960s, the institute made contributions to the cost of publication of papers in the existing Australian anthropological journals and various museum series. Publication subsidies were provided also for books, including covering the cost of illustrations for a new edition of McCarthy's *Australian Aboriginal Stone Implements* (1976) and assisting with the publication of McBryde's (1974) New England survey (*Newsletter* 3(1): 38–9). By 1970, however, the Institute had its own publication section responsible for the production of books and audiotapes, as well as the *Newsletter* and annual reports. Various publication series were initiated including manuals and monographs on archaeology and "material culture." The first was the radiocarbon dating manual prepared by Henry Polach and Jack Golson, *Collection of Specimens for Radiocarbon Dating and Interpretation of Results* (1966).

This was followed, over the next decade, by *A Guide to Field Methods and Laboratory Techniques* (Mulvaney 1968); *Aboriginal Antiquities in Australia: Their Nature and Preservation* (edited by McCarthy, Isabel McBryde and Mulvaney 1970); *The Preservation of Australia's Aboriginal Heritage: Report of National Seminar on Aboriginal Antiquities in Australia, May 1972* (edited by Edwards 1975); *Stone Tools as Cultural Markers: Change, Evolution, and Complexity* (edited by Richard Wright 1977); and *Form in Indigenous Art: Schematisation in the Art of Aboriginal Australia and Prehistoric Europe* (edited by Ucko 1977). These works were central to the development of the discipline. From the 1980s, the emphasis of Institute publication changed, notable archaeological exceptions being *A Record in Stone: The Study of Australia's Flaked Stone Artefacts* (Holdaway and Stern 2004) and *The Social Archaeology of Australian Indigenous Societies* (edited by Bruno David, Bryce Barker and Ian J. McNiven 2006).

Support for Positions in Archaeology and Related Disciplines

A major contribution to the discipline was the Institute's funding of positions within museums, universities, and the research program of the Institute itself. In an early example, the Institute sought to provide greater access to radiocarbon analysis and to strengthen the provision of new radiocarbon facilities by paying the salary of an analyst at The Australian National University (ANU). A total of seven professional positions were funded in the 1960s, along with research assistants (eight), technical assistants (two), and State-based research officers (*Newsletter* 3(1): 36–7). This initiative continued during Ucko's principalship, when the Institute funded the establishment of university chairs of archaeology and "material culture," as well as providing for lectureships, usually on the basis of an agreement that the university would continue funding the position at the end of the period of assistance.

In the mid-1970s, Ucko obtained a significant expansion of Federal government funding; he established several research positions based at the Institute. There were to be five research consultants (five-year appointments) and 14 (three-year) research fellowships. Two of the former and two of the latter research positions were in archaeology or related disciplines (*Newsletter* 3: 4–5). An important addition was the appointment in 1974 of a paleoecologist, David Horton, who worked with archaeologists on faunal assemblages (*AIAS Annual Report* 1975 to 1976).

A significant proportion of the Institute's research funding has supported postgraduate positions. Two of the postdoctoral fellows in archaeology in the 1980s, John Beaton and Colin

Pardoe, were based at the Institute; the former adapted the extensive kitchen facilities of the old hostel that housed the Institute to his archaeological laboratory.

Support for Conferences and Specialist Meetings

The 1961 conference provided valuable reviews at that time of the various disciplines of "Aboriginal Studies" (Stanner and Sheils 1963; Horton 1986). It set a useful precedent, encouraging discussions of a wide range of research concerns, and it was followed by other national subject-focused meetings, encouraged and sponsored by the Institute's Council. Institute-supported meetings and conferences were important not only for establishing a collective sense of the discipline of archaeology but also for widening appreciation and agreement on particular matters and sometimes prompting action outside the Institute. In 1963, a "Conference on Nomenclature of Implements and Cultures" was held at the Australian Museum in Sydney (McCarthy 1965). Mulvaney (1986a) wrote that it was the first specialist meeting in Australia of the discipline, Megaw (1963) reported favorably to a wider readership, a subcommittee was established so that the problems raised about typology could be pursued further (*Newsletter* 3(1): 38), and the discussions contributed to the new edition of McCarthy's (1967) manual on the subject, which, decades later, Holdaway and Stern (2004: xiv) could describe as still the ". . .classic typology of Australian stone tools."

Issues of significance to particular disciplines were discussed by members at subsequent biennial General Meetings. In 1964, McCarthy (*Newsletter* 2(1): 3) outlined to the Prehistory Panel his program for encouraging archaeological research toward Australia-wide studies of surface campsites to allow the study of stone tool types in a broader context. At the 1966 General Meeting, discrete disciplinary conferences covered covered human biology, and prehistory and "material culture"; the latter Panel, convened by Mulvaney, explored the need to standardize methods and procedures for recording sites (*Newsletter* 2(4): 49); Mulvaney subsequently edited *Australian Archaeology: A Guide to Field Techniques* (1968; revised 1972; third edition by Connah in 1983).

In 1968, archaeologists combined with ethnographers for a four-day conference on "Monuments and Antiquities: Their Control and Preservation" convened by McCarthy, Robert Edwards, and Mulvaney. McCarthy (1970) described its goal as to place pressure on State and Territory jurisdictions to introduce legislation to protect "Aboriginal antiquities" and to provide for their conservation; the conference proceedings were available several months later (published 1970). At the 1972 General Meeting, a "National Seminar on Aboriginal Antiquities" was convened by Edwards (published 1975) and another by Alan Thorne on "The Settlement of Aboriginal Australia" (*Newsletter* 3(5): 24–5).

The major conference held in conjunction with the 1974 General Meeting was notable for its broad scope, the participation of distinguished international scholars, and some controversy over lack of involvement of Indigenous Australians. The prehistory symposium, "Stone Tools as Cultural Markers: Change, Evolution and Complexity" was published in Canberra and internationally (edited by Wright 1977), as was the symposium on "Form in Indigenous Art" (edited by Ucko 1977). In February 1975, the Institute organized a meeting to discuss computerization of records of collections of Aboriginal artifacts held in State and Territory collections. This was followed by another to discuss problems associated with the export of Aboriginal artifacts; it recommended several actions to control the trade, and the Material Culture Advisory Committee recommended that the Institute help Australian museums purchase objects of national significance that had been refused an export permit (*Newsletter* 5: 15–6). Other biennial conferences followed – the archaeology focus in 1976 was on "Aboriginal artifacts" – but none were on a similar scale and with a comparable commitment to publication of the presentations and resulting discussions as for the 1974 conference.

Seminars have been another important opportunity for Institute researchers and grantees to present the results of their researches. Regular seminars were started by Ucko soon after he

became principal, involving, particularly, Institute-funded grantees who were visiting the Institute, and there were several presentations in the initial series of seminars by archaeological researchers.

Currently, the Institute coordinates two semesters of seminars that occasionally include presentations on archaeology and related topics. Specialist meetings were an integral part of the 1970s Sites of Significance Program, and the Rock Art Protection Program supported conference attendance, especially by Indigenous participants.

Some 32 years after McCarthy's 1963 "Conference on Nomenclature. . .," another meeting, a workshop organized by the Institute and La Trobe University staff members, was held at the Australian Museum (February 1995) with the intention of reviewing McCarthy's typology; a new and comprehensive work on "Australia's Flaked Stone Artefacts" resulted (edited by Holdaway and Stern 2004). Over the last decade, however, specialist meetings have been few and usually held in association with the Institute's major conferences.

The Influence of Institute Committees

In the early 1960s, the Institute used panels of experts for advice on, particularly, the allocation of grant funds; these committees set high standards in the allocation of grants and also guided the development and direction of each of the disciplines. On taking up his appointment as principal in 1972, Ucko developed this concept, enhancing the roles of the disciplinary advisory committees that had previously conducted their business by correspondence. Committee members now meet in Canberra twice each year, not only to advise the Council on grant applications, fellowships, and related matters but also to debate the direction of the development of each discipline and, where necessary, to commission urgent research. Ucko (*Newsletter* 1: 5) emphasized that the task of committees was to formulate research priorities. In 1973, there were 14 committees with up to 12 members each (*Newsletter* 1: 1–4,7). Of relevance here are the Prehistory, and Material culture, Advisory Committees, and the "Committee on Sites of Significance," established under the chairmanship of the deputy principal to oversee the activities of the National Site Recording Program. A few years later, all Institue committees had an additional member in the person of an Indigenous Australian who was working in or who had a particular interest in the relevant field of study. Institute research staff served as "executive officers" for each committee.

The value of the activities of these committees in developing the direction and practice of archaeology in Australia cannot be overemphasized; over the years that the committees were in operation, many senior practitioners were involved in the discussions and deliberations, and the Institute committees were seminal in the development and professionalization of archaeology in Australia. Much earlier, McCarthy had written how the involvement of the principal and members of the Council in making decisions about the allocation of grants gave the Institute a strong role in deciding archaeological research priorities and enhancing professionalism in various disciplines; he claimed (1965: 307) that the Institute was ". . . not only a source of funds for research, but a co-coordinating and advisory body, building up slowly a corpus of information available nowhere else." This process was enhanced by the committee system and may be seen as a major contribution to archaeology and other disciplines of "Aboriginal Studies."

A period of "financial austerity" curtailed the activities of the Institute's committees in the early 1980s (*Newsletter* 17: 4–6), and in 1989, following the passing of the Institute's new Act, most were terminated. A "Research Advisory Committee" including eight elected disciplinary representatives deliberated on grants applications. Some of the wider functions of the Institute's Sites of Significance Committee – which had advised on the allocation of grants under external funding (below) – was superseded by annual meetings of a "National Aboriginal Sites Authorities Committee" hosted in turn by the various State and Territory heritage agencies, involving professional, technical, and Indigenous staff.

Sites of Significance and Rock Art Protection: Externally Funded Programs

The Institute has, on two occasions of significance to Australian archaeology, accepted major external funding to conduct and promote research programs.

Early in his term in office, McCarthy had established a "Catalogue of Aboriginal Relics" to deal with the volume of records being provided by researchers, culled from the literature, and from the voluminous correspondence that he maintained with amateur fieldworkers; copies of the cards were sent to museums and provided the basis of some State site record systems; there was a concern for standardization of terms and recording procedure (*Newsletter* 2(2): 20; 3(5): 26–7). Following the meeting on the need for archaeological legislation at the Institute's 1968 conference, and another on "A National Register of Aboriginal Sites" in 1972, a committee had made recommendations to the Commonwealth government concerning a scheme "to protect and salvage prehistoric monuments and antiquities in Australia." In 1973 – in a period of rapid resource development – funds were provided by the Commonwealth to the Institute for the implementation of a National Site Recording Program (*Newsletter* 3(6): 13): the Institute "... has been vested with responsibility of all sites of either traditional or historic importance to the aboriginal people"; a committee, chaired by the deputy principal, was established with representatives of State and Territory authorities, "one fully initiated Aboriginal man," and others. (In Australia, where responsibility for land tenure rests with the States and Territories, such sensitivities could be mediated by such inclusive membership, but it is not clear how one Indigenous Australian could speak for the many and no doubt various Indigenous interests).

The committee was to meet at least twice each year; it was to formulate a coordinated program and allocate funds to record sites, and a National Register of Sites was to be maintained (*Newsletter* 3(6): 14). Two years later, 22 positions in the various jurisdictions had been filled (*Newsletter* n.s. 3: 11); there were regular meetings of site recorders to discuss processes and other matters of professional interest, a major example being the 1979 site recorders meeting at Kioloa that "...provided an opportunity for site recorders and others, but Aborigines in particular, to meet people currently engaged in research into Australian prehistory" (Dix 1980: 8). There was much to be done, and the expectation that all places of significant heritage value could be recorded was unrealistic.

The Institute continued to provide funding for site recording for several years. By the early 1980s, all Australian States and Territories had archaeological legislation in place and had established their own programs to record and protect Indigenous heritage places with professionally qualified personnel and programs to train and employ Indigenous site recorders. The Sites of Significance Program provided further opportunities for employment of archaeologically trained fieldworkers and thus the development of the field of public or consulting archaeology in Australia, an area in which a substantial proportion of graduates find work. The Australian Association of Consulting Archaeologists, a professional body established in 1979, has 50 full members and more associates and affiliates.

The national Rock Art Protection Program (RAPP) was established at the request of the then Minister for Aboriginal Affairs to provide for the protection of Indigenous Australian rock art. The RAPP was funded by the Commonwealth government for 12 years from 1986, after which time the Institute continued to provide for a similar range of projects for the next decade. The scope of the RAPP ranged from the physical preservation and management of endangered sites, including those threatened by natural elements and by interference from humans and animals, to the support of new research and applied projects including the development of new dating techniques. As with the Sites of Significance Program, it required the cooperation of State and Territory authorities and that of Indigenous knowledge-holders and custodians of the cultural places involved. It has been argued that the program made a significant contribution to the development of systematic studies of Australian rock

and influenced research and practice in these fields elsewhere in the world (Ward 2011).

Indigenous Australian Influences on the Institute and on Australian Archaeology

No Indigenous Australians were present at the 1961 conference; there were, however, many present who had worked in depth with Indigenous communities and would have had their interests in mind (*Newsletter* 1(1): 9–10). In the first decade of the Institute's research activities, there are many instances of the involvement of Aboriginal persons, mainly in association with various grantees, for instance, in bringing traditional knowledge-holders to the Institute to work with researchers. The difficulty that some archaeologists had experienced in obtaining access to sites to conduct their fieldwork was the subject of an Institute meeting in 1971 (Mulvaney 1986b: 105). After the attention brought by the "Eaglehawk and Crow Letter" (signed by Widders and another five activists) on the rationale for the 1974 Biennial Conference and the orientation of the Institute's research program in general, the process of change within the Institute was hastened; along with the opportunities to serve Indigenous interests presented by the *Aboriginal Land Rights (Northern Territory) Act of 1976*, it has been seen as marking "... more or less the start of negotiated anthropology within Australia" (Peterson 1990: 17 fn).

Organizationally, Ucko and the Council encouraged a positive program of "Aboriginalisation" (Ucko 1983; Moser 1995). Indigenous knowledge-holders and community leaders became Members, and, from 1975, an Aboriginal Advisory Committee provided a firmer Aboriginal voice on other committees and in the activities of the Institute in general (*Newsletter* 3: 6). From 1976 a "social issues adviser" participated in the discussions of each advisory committee, so that Indigenous interests could be considered in the various research programs (*Newsletter* 7: 10–1). More Indigenous staff were employed at the Institute, and Indigenous Australians were offered training in research (*Newsletter* 5: 7, 10: 28–9); Indigenous-requested research and training projects were emphasized alongside lists of grants awarded (e.g., *Newsletter* 7: 25). These initiatives were confirmed by a resolution at the 1976 biennial meeting (Newsletter 7: 7). In 1981, outside the Sites of Significance Program, there were ten Indigenous trainees based at the Institute (*Newsletter* 15: 8).

The arrangements for Indigenous participation on the Council and its advisory committees were described as "... the most significant development of all in the 1970s" (*Newsletter* 15: 8). The new direction was formalized by the Institute's revised governing statute (Anonymous 1989); this provided for an Aboriginal-controlled Council with a minority elected component and a disciplinary-based Research Advisory Committee – it was a structure that may been seen as a culmination of the undertakings begun in 1974 toward collaborative governance and research endeavor.

In 1976, there was initiated a category of Aboriginal-requested grants, particularly for the mapping of sites of significance. Concurrently, the Institute continued to provide support through the grants process for the training of Indigenous fieldworkers in site survey and management, despites significant cuts to its budget (*Newsletter* 5: 1–4, 12–3). The new Prehistory Committee decided that its scope should include the ecological studies of living Aboriginal groups (*Newsletter* 1: 7); it reiterated its interest in the investigation of ecological relationships of contemporary Indigenous communities as well as with other archaeological research foci; it discussed ways in which Indigenous Australians might be supported to gain formal qualifications in archaeology (*Newsletter* 11: 11).

Also in the late 1970s, the Sites of Significance Program broadened its scope from archaeological and historic places to include ethnographic places and areas of significance to Indigenous communities – a reflection of the increasing participation in the program of Indigenous fieldworkers. Ucko (*Newsletter* 1: 13) wrote that the program not only reinforced the involvement of the Institute in field research but also that it provided employment opportunities for Indigenous researchers. This had been accomplished through the provision of funds to State and Territory authorities for

Indigenous training programs. The site recorders' meetings had a strong Indigenous involvement.

The archaeology and sites programs, in particular, participated in major changes in direction and emphasis of the Institute's research. When the initial conference and the leadership of Interim Council, then that of McCarthy and his executive and committees, firmly located archaeology within "Aboriginal Studies" it also forged relationships between archaeologists and Indigenous Australians that either had not existed or were at best tentative. These were developed during Ucko's tenure, in conferences, specialist meetings, and in the regular meetings of the disciplinary committees and workshops that they organized. For the year that he left the Institute, Ucko (*Newsletter* 11: 6) emphasized the significant changes in the degree of Indigenous participation in the functions of the Institute.

In the research grants process, applicants were required to demonstrate not only appropriate Indigenous participation but also, through an evaluation by the Research Ethics Committee, appropriate dealing with Indigenous community interests, including cultural and intellectual property rights, and defining procedures for the communication of research results to the communities involved. Jointly initiated applications for projects, those combining Indigenous agendas with technical expertise, tended to have greater chance of success in what had become a highly competitive grants program.

All of this resulted in a growing appreciation both of the depth of Indigenous culture and its legitimacy, on the one hand, and, on the other, of the professional and technical heritage of the discipline and its potential to serve Indigenous aspirations (e.g. McBryde 1985). Archaeologists had to consider Indigenous interpretations of sites and their roles in a wider cultural landscape; concurrently, archaeological results – particularly dating that emphasized the longevity of Indigenous occupation of the continent – quickly became incorporated into Indigenous discourses. As Australian archaeology developed academically and professionally, and beyond the direct involvement with the Institute, it was able to move more readily to an appreciation of broader societal and ethical responsibilities. Places were made for Indigenous students in archaeology; several ANU graduates, for example, work or have worked as consultant archaeologists or in museum research. Not only has research regularly and systematically involved consideration of Indigenous interest and participation but spaces have been made for research initiated and conducted by Indigenous scholars (e.g., Johnston 2009). This process of legitimating and privileging Indigenous voices in archaeology may be seen to have begun in the 1970s at meetings in Canberra.

Future Directions

The Institute was established more than 50 years ago by academics and politicians concerned that much knowledge of the Indigenous cultures of Australia was being lost. Archaeology, one of the founding disciplines, was described as a neglected area of study. Through various avenues, including Institute sponsorship of meetings and conferences, support for specialist committees, for research grants, and for lectureships and chairs, support for publication of research monographs, by encouraging the development of legislation to protect Indigenous cultural heritage places, and insisting on the collaboration with Indigenous communities, the Institute became closely involved in the development and professionalization of archaeology in Australia.

By the turn of the millennium, the role of the Institute in the development of prehistoric archaeology in Australia was muted. The discipline had become a popular university teaching subject with associated research strengths and with its own specialist journals, and with access to various sources of funding; it had its own national association organizing conferences and specialist meetings, encouraging the participation of students in fieldwork and conference activities, and lobbying governments. It constituted a professional discipline with its own institutional base, one largely independent of the Institute. As well, the focus of the Institute itself had changed. It was widely accepted that the traditional disciplines, such as social anthropology, linguistics, and prehistory,

were not necessarily the main sources of knowledge about Indigenous Australian cultures. During his principalship, supported both by the new involvement of Indigenous interests and the acceptance of the research community, Ucko saw the direction of the Institute had fundamentally changed from one of recording knowledge about a past culture to exploring aspects of contemporary peoples. The Institute's governance formally recognized Indigenous interests as did its research agenda; there was a strong emphasis upon collaborative research. Although its grant program continued to be accessed by younger archaeologists, archaeological research was no longer central to the Institute's research and other activities. Archaeology, however, would not have become an independent discipline in the way that it did without the early and continued support of the Institute.

The future is less clear; the continuing reorientation of the Institute's research interests has taken it far from its foundation disciplines including archaeology. The ideal expressed by previous administrations of having staff expertise to maintain a purview of research across the range of Australian Indigenous Studies largely has been forgotten. In parts of the southeast, some community members have revived an understanding of their cultural heritages by drawing upon archaeological research results, but it may well be another generation before there are enough Indigenous Australians who value such research for their own ends for archaeology again to be a central focus of the Institute.

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Australian Rock Art
- ▶ Conservation and Management of Archaeological Sites
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Heritage and Public Policy
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Kow Swamp
- ▶ McCarthy, Frederick D.
- ▶ Rock Art Sites: Management and Conservation
- ▶ Ucko, Peter (Indigenous Archaeology)

References

AIAS (Australian Institute of Aboriginal Studies). Newsletter volume 1, number 1 (1985) to volume 3, number 6 (1973); new series number 1 (1974) to number 17 (1982).

Anonymous. 1964. *An act relating to the Australian Institute of Aboriginal Studies (56 of 1964)*. Canberra: Commonwealth Government Printer.

Anonymous. 1989. *The Australian Institute of Aboriginal and Torres Strait Islanders Act (149 of 1989)*. Canberra: Australian Government Publishing Service.

Attenbrow, V., and K. Khan. 1994. FD McCarthy. His work and legacy at the Australian Museum. In *Archaeology in the North. Proceedings of the 1993 Australian Archaeological Association Conference*, 5–16. Darwin: North Australia Research Unit, The Australian National University.

Australian Institute of Aboriginal Studies. Annual report 1975 to 1976.

Dix, W.C. 1980. Review of the achievement of the Sites of Significance Program. *Site Recorders' Newsletter* 1 (4): 4–7.

Holdaway, S., and N. Stern. 2004. *A record in stone: The study of Australia's flaked stone artefacts*. Canberra: Aboriginal Studies Press.

Horton, D. 1986. The 1961 conference. *Australian Aboriginal Studies* 1: 83–84.

Johnston, D. 2009. AIATSIS Conference 2009: Indigenous archaeologies and the urban environment: Maintaining our culture and heritage. Available at: aiatsis.gov.au/research/conf2009/programDay1.html. Accessed 27 July 2012.

McBryde, I. 1974. *Aboriginal prehistory in New England: An archaeological survey of northeastern New South Wales.* Sydney: Sydney University Press.

McBryde, I., ed. 1985. *Who owns the past?* Melbourne: Oxford University Press.

McCarthy, F.D. 1963. Commentary 1961 Conference of Aboriginal Studies. In *Australian Aboriginal studies*, ed. W.E.H. Stanner and H. Sheils, 52–56. Melbourne: Oxford University Press.

McCarthy, F.D. 1965. The Australian Institute of Aboriginal Studies. *Australian Journal of Science* 27: 305–315.

McCarthy, F. D. 1967/1976. *Australian Aboriginal stone implements: Including bone, shell and teeth implements*. Sydney: The Australian Museum Trust (2nd rev edn. 1976).

McCarthy, F.D., ed. 1970. *Aboriginal antiquities in Australia: Their nature and preservation*. Canberra: Australian Institute of Aboriginal Studies.
Megaw, J.V.S. 1963. The Australian Institute of Aboriginal Studies and the Conference on Nomenclature of Implements and Culture. *Antiquity* 37: 298–301.
Moser, S. 1995. The 'Aboriginalization' of Australian archaeology. The contribution of the Australian Institute of Aboriginal Studies to the indigenous transformation of the discipline. In *Theory in archaeology. A world perspective*, ed. P.J. Ucko, 154–177. London: Routledge.
Mulvaney, D.J. 1961. The Stone Age of Australia. *Proceedings of the Prehistoric Society* 27: 56–107.
Mulvaney, D.J. 1963. Prehistory. In *Australian Aboriginal studies*, ed. W.E.H. Stanner and H. Sheils, 33–51. Melbourne: Oxford University Press.
Mulvaney, D.J. 1986a. A sense of making history. Australian Aboriginal studies 1961–1986. *Australian Aboriginal Studies* 2: 48–56.
Mulvaney, D.J. 1986b. Archaeological retrospect. *Antiquity* 60 (229): 96–107.
Peterson, N. 1990. 'Studying man and man's nature': The history of the institutionalisation of Aboriginal anthropology. *Australian Aboriginal Studies* 2: 3–19.
Stanner, W.E.H., and H. Sheils, eds. 1963. *Australian Aboriginal studies*. Melbourne: Oxford University Press.
Ucko, P.J. 1983. Australian academic archaeology: Aboriginal transformation of its aims and practices. *Australian Archaeology* 16: 11–26.
Ward, G.K. 2011. The role of AIATSIS in research and protection of Australian rock. *Rock Art Research* 28 (1): 7–16.

Further Reading

Davidson, I., C. Lovell-Jones, and R. Bancroft, eds. 1995. *Archaeologists and Aborigines working together*. Armidale: University of New England Press.
Golson, J. 1986. Old guards and new waves: Reflections on antipodean archaeology 1954–1975. *Archaeology in Oceania* 12: 1–12.
Golson, J. 2007. Peter Ucko's 'Humane archaeology'. In *A future for archaeology*, ed. R. Layton, S. Shennan, and P. Stone, 7–15. Walnut Creek: Left Coast Press.
Horton, D. 1991. *Recovering the tracks. The story of Australian archaeology*. Canberra: Aboriginal Studies Press.
Horton, D. n.d. Dream. The Watermelon Blog. Available at: http://davidhortonsblog.com/dreaming/. Accessed 19 June 2012.
Lambert, J. A. 2011. *A history of the Australian Institute of Aboriginal Studies 1959–1989: An analysis of how Aboriginal and Torres Strait Islander people achieved control of a national research institute*. Unpublished Ph.D. dissertation, The Australian National University.
McNiven, I.J., and L. Russell. 2005. *Appropriated pasts: Indigenous peoples and the colonial culture of archaeology*. Lanham: AltaMira Press.
Moser, S. 1995. *Archaeology and its disciplinary culture: The professionalisation of Australian prehistoric archaeology*. Unpublished Ph.D. dissertation, University of Sydney.
Mulvaney, D.J. 2011. *Digging up a past*. Sydney: UNSW Press.
Mulvaney, D.J., and J. Kamminga. 1999. *Prehistory of Australia*. St. Leonards: Allen & Unwin.
Roberts, A. L. 2003. *Knowledge, power and voice: An investigation of indigenous South Australian perspectives of archaeology*. Unpublished Ph.D. dissertation, Flinders University of South Australia.
Tatz, C., and J. Lambert. 2007. Eaglehawk and Crow. In *A future for archaeology*, ed. R. Layton, S. Shennan, and P. Stone, 17–29. Walnut Creek: Left Coast Press.

Australian Paleoart

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Introduction

Australia, almost the size of Europe but with a population only a third of that of France or Britain, boasts not only the greatest concentration of rock art in the world but also the highest number of rock art researchers relative to population size. The perhaps most interesting aspect of Australian rock art research is that the country's rock art scholars are significantly less inclined to attempt interpretation of rock art than those of any other world region. Bearing in mind that Australia is universally agreed to have the strongest ethnographic evidence for the original meanings of rock art (Fig. 1), this presents a paradox.

It is the awareness of the uncertainties of etic interpretations that has prompted Australian researchers to opt for scientific investigation in lieu of the creation of a modern mythology about rock art and its meanings. They have therefore been particularly active in such fields as physical rock art analysis, age estimation, survey work, preservation techniques, and methods of site

Australian Paleoart, Fig. 1 Traditional Custodian at Wandjina site he is responsible for, in the Kimberley, NW Australia

management, while interpretation is largely limited to what has been obtained by ethnographic means.

Definition and Historical Background

Paleoart comprises rock art and portable art-like material of preliterate societies. Rock art is basically divided into petroglyphs (made by a *reductive* process, such as pounding, hammering, pecking, engraving, scratching, or finger marking of soft cave deposits) and pictograms (made by an *additive* process, such as painting, drawing, stenciling, or application of beeswax). In contrast to the prehistoric mobiliary art of other continents, that of Australia is limited to just a few types and these remain largely undated.

Similarities between the earliest types of rock art in Australia and southern Asia have suggested that the first colonizers, Middle Paleolithic seafarers from Indonesian islands, brought with them a tradition of creating rock art when they arrived, possibly in the order of 60,000 years ago. A significant part of the surviving Australian rock art, estimated to be in the order of 10% of the total corpus, is thought to be of the Pleistocene. Such age appears to be mostly confined to petroglyphs, as is the case in most parts of the world. Although the presence of Pleistocene rock art has been suggested since the early twentieth century, such antiquity has only been demonstrated since the 1980s. It applies to much of the cave petroglyphs in the southern coastal region and to particularly erosion-resistant rock facies of open-air sites in various parts of the continent.

Australian paleoart has been studied in one way or another since the early nineteenth century, but until the 1980s, its scientific contemplation was sporadic and intermittent. The establishment of the Australian Rock Art Research Association in 1983 led to a significant intensification of research and publishing efforts, and the first world congress in the field, held in Darwin in 1988, prompted the establishment of the International Federation of Rock Art Organizations.

Australian Rock Art

With such a large national corpus of rock art, the creation of inventories is a long-term process involving many individuals and research teams. Because the greatest concentrations of rock art tend to be in the north of the country, this is where much of the survey work has been focused (Fig. 2). The major concentrations are the petroglyphs of the Pilbara, the paintings of the Kimberley and Arnhem Land, and the mixed corpora

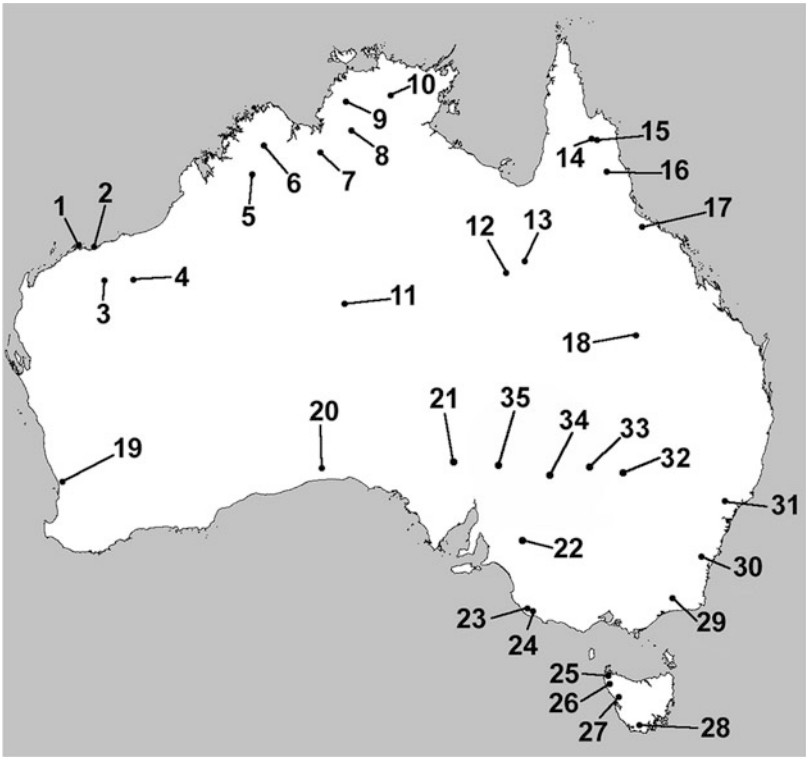

Australian Paleoart, Fig. 2 Some important rock art sites and site complexes in Australia: *1* – Murujuga/Dampier, *2* – Depuch Island, *3* – Pilbara, *4* – Spear Hill-Abydos complex, *5* – Tangalma/Carpenters Gap Shelter, *6* – Kimberley complex, *7* – Jinmium, *8* – Ingaladdi, *9* – Laurie Creek, *10* – Kakadu complex, *11* – Puritjarra and Wanga East, *12* – Carbine Creek, *13* – Saxby Waterhole, *14* – Sandy Creek Shelter, *15* – Early Man Shelter, *16* – Walkunder Arch Cave, *17* – Turtle Rock, *18* – Ken's Cave, *19* – Orchestra Shell Cave, *20* – Koonalda Cave, *21* – Pimba, *22* – Devon Downs, *23* – Karlie-ngoinpool, Karake, Prung-kart, Malangine, and Koongine Caves, *24* – Paroong and Yaranda Caves, *25* – Preminghana, *26* – Sundown Point, *27* – Trial Harbour, *28* – Judds Cavern, *29* – New Guinea 2, Cave, *30* – Gnatalia Creek and Waterfall Cave, *31* – Mt. Yengo Rockshelter, *32* – Cobar, *33* – Mutawinji, Sturts Meadows, *34* – Olary-Yunta site complexes, *35* – Flinders Ranges sites

of the Victoria River region and the far north of Queensland (Cape York Peninsula). Noteworthy is also the stencil art centered on the Carnarvon Ranges in Queensland and concentrations in central Australia and eastern South Australia (Flood 1997).

While the sites in the north have attracted the greater interest, comprehensive inventories have been attempted in some southern regions, such as Gariwerd (Grampians mountains) in Victoria, the Olary and Flinders Ranges region of South Australia, in western and coastal New South Wales, and a small selection of petroglyph sites in Tasmania (Sims 1977). It is impossible at this stage to provide reliable quantitative estimates of Australian rock art, and in view of the size of the national recording task, this will remain so for many more years. However, in assembling the best estimates from leading specialists working in the main regions, one would expect that there should be between 100,000 and 200,000 rock art sites in Australia. The largest of them comprise several tens of thousands of motifs, but as a very rough estimate of average numbers, a figure in the order of perhaps 500 motifs per site seems reasonable. Hence, the total number of rock art images is certainly in the tens of millions, roughly half of which are petroglyphs. Pleistocene rock art comprises mostly petroglyphs and consists exclusively of nonfigurative motifs. For the past 100 years, there have been sporadic claims that extinct Pleistocene species or their tracks have

Australian Paleoart, Fig. 3 Gwion Gwion art (inappropriately called "Bradshaw figures"), Kimberley

Australian Paleoart, Fig. 4 Arnhem Land rock art at Nourlangie, painted in 1964

been depicted in Australian rock art, but none of these are scientifically credible.

A number of taxonomies endeavoring to identify stylistic traditions have been proposed, but unless they were very narrowly based, spatially or temporally, they tend to be contradicted by evidence in too many cases. Therefore, no accepted continent-wide stylistic sequence is available, and most traditions, genres, or styles tend to be too heterogeneous for simplistic categorization. Nevertheless, several genres are widely recognized as valid traditions, especially the Wandjina and Gwion Gwion (formerly "Bradshaw"; Fig. 3) painting styles in the Kimberley region, the Woodstock anthropomorphs of the Pilbara, the x-ray paintings of Arnhem Land (Chaloupka 1993) (Fig. 4), the Quinkan figures of Cape York Peninsula (Fig. 5), the stencil traditions

of central Queensland, the widely distributed track and circle petroglyphs of the arid zones, and the early petroglyphs and finger flutings of the limestone caves (Fig. 6). Each of these broadly identified genres features a variety of motifs co-occurring with the characteristic leitmotifs, some of which are thought to be chronologically diagnostic.

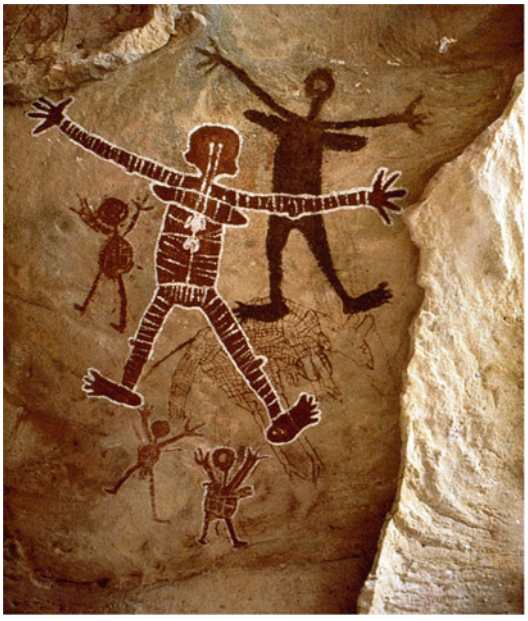

Australian Paleoart, Fig. 5 Quinkan rock art, Laura, Cape York Peninsula

Currently the occurrence of authentic cave art has been confirmed in 49 Australian limestone caves, distributed over four regions across the southernmost parts of the mainland and in Tasmania (Bednarik 1990). Most Australian cave art consists of petroglyphs and a significant portion of it is of the Pleistocene, although several genres or styles have been recognized. Six of the Australian caves containing rock art have also yielded evidence of underground chert mining, most of which also seems to date from the Pleistocene.

Analytical Studies

Scientific analytical work began in Australia with the introduction of direct dating and nano-stratigraphy during the 1970s (see Ward and Tuniz 2000 for review). The tradition of rock art dating developed by Australian researchers since then has been instrumental in developing scientific research globally. Nearly all analytical rock art dating methods currently in use were initially developed or introduced in Australia: carbon nuclide and uranium series analysis of carbonates, radiocarbon analysis of oxalates and inclusions in accretive mineral crusts, carbon isotope dating of organic materials in paint residues, luminescence analysis of sand grains in wasp nests, micro-erosion and other weathering indices analyses of petroglyphs, colorimetric analysis of pictograms

Australian Paleoart, Fig. 6 Karake-style petroglyphs on the ceiling of Malangine Cave, Mt. Gambier, which have been minimum dated through uranium-thorium analysis of a concealing reprecipitated calcite skin (speleothem) deposited 28,000 ± 2000 years BP

and patinae, and carbon dating of beeswax figures. Methods introduced elsewhere, such as the determination of cation ratios in rock varnishes or of cosmogenic radiation products, had to be subsequently rejected as unsuitable. Nanostratigraphy, first introduced in the 1970s (Bednarik 1979), has during the 1990s been developed into a stunningly sophisticated technique (Watchman 2000). In one case, ten radiocarbon dates spanning 26,000 years were obtained from a sequence of mineral layers only 2.11 mm thick. This kind of work has been made possible by the introduction of innovative techniques such as focused laser extraction of carbon-bearing substances (Watchman 1993), replacing manual excavation of microscopic stratigraphies.

Analytical work with rock art is not limited to dating attempts, however. For instance, Cole and Watchman (1992) have examined paint residues to locate evidence of binder substances as well as incidental inclusions, such as brush fibers, vegetable remains, pollen, and airborne matter, all of which can provide useful information about the circumstances of the painting event. Other applications of analytical methods developed in Australia include investigations of paint recipes (e.g., Clarke and North 1991; Ridges et al. 2000), "internal analysis" of engravings in deep limestone caves, the differentiation between natural and human rock markings (Bednarik 1994), and the study of petroglyph technology (Bednarik 1998), which includes the analysis of the tools that were used in creating petroglyphs.

The Ethnography of Australian Rock Art

Ethnographic studies of rock art have been conducted by many scholars, providing the world's most comprehensive record of this dimension (Layton 1992). The key message from Australian rock art studies is that unless one is a participant in the culture in question, one has no scientific access to what the rock art means or depicts. Much of rock art "research" outside of Australia comprises such practices and Australian ethnographic rock art research has shown that it has to be rejected. This is the result of observations of the production and use of rock art having been made throughout the twentieth century in some parts of the country and the continuation of the importance of this cultural element within an existing, functioning society. Such research has always shown that the valid interpretations of rock art are vastly more complex than an outside observer would be able to deduce: interpretations concocted by uninitiated outsiders are almost universally false (Macintosh 1977). We know from various contemporary traditional peoples that their perception of the world can differ significantly from that of, for example, modern Europeans, so it would be hasty to assume that people of the distant past perceived the world as any modern group does. Hence it is to be expected that the intricate iconographic meanings of paleoart are not effectively accessible to us.

It is precisely *because* of Australia's superb access to Indigenous ontologies and cosmologies that the continent's rock art researchers have learned to exercise restraint in the invention of interpretative mythologies. Elsewhere in the world the researchers of entirely alien cultures have simply assumed what motifs depict, by projecting their own iconographic perception and contemporary beliefs and mores onto the mute and usually undated rock art. The most important message from Australia is therefore that it is inappropriate to call the simplistic application of alien belief systems to an iconography "research"; it is simply autosuggestion.

Moreover, collaboration between Australian researchers and traditional custodians of rock art sites has shown that other Aboriginal perspectives of rock art can also differ significantly from those of researchers. Archaeology, in particular, has effectively disempowered Aborigines and denied them their identity (Piotrowski and Ross 2011: 38), essentially by posing as the state's interpreter of their past and the gatekeeper of their cultural heritage.

Management and Protection

Australian rock art preservation and site management practices owe much to the efforts of a small number of researchers who have been instrumental in establishing an Australian tradition of site care (Rosenfeld 1985). The underlying strategy is that by selecting well-known and easily accessible

sites for public viewing, attention is drawn to these localities, while the locations of others can and do remain confidential. Vast numbers of sites are on privately owned land, and as many landowners are quite conservation minded, this offers considerable protection, particularly in remote regions. Sites selected for public visitation are usually intensively developed, often with marked access paths, raised walkways and viewing platforms, "psychological barriers" as well as physical barriers of various types, interpretation material, and visitor books. Vandalism by visitors of Australian sites has decreased sharply over recent decades as a result of subtle public education measures (Gale and Jacobs 1986), especially through the mass media. Active conservation measures include graffiti removal, stabilization of deteriorating rock, the installation of artificial drip lines and other changes to hydrology, modification of microclimate, removal of fire hazards, dust suppression, and installation of protective barriers.

Public attitude is itself an important safeguard in rock art protection: it can be more effective than laws, fences, or signs. The change in the public perception of rock art, from one of almost complete indifference and ignorance just a few decades ago to a largely positive attitude, coincides with the establishment and progress of the Australian Rock Art Research Association. AURA has since the mid-1980s successfully lobbied the media and public agencies to promote site protection. Not only have these changes had profound effects on the prospects of Australian rock art to survive, they have had equally significant effects on the public's perception of Aboriginality as such, that is, of the value and relevance of traditional Australian culture.

This shows how far-reaching the results of campaigns to raise the cultural status of rock art can be in some circumstances. In the Australian experience, the public funds made available to conservation programs are in fact quite modest, compared to, for example, those expanded in France. This seems to indicate that the actual level of funding is not necessarily the decisive factor in the success of protection measures for rock art. The most important factor is that such endeavors need to be supported by an altruistic, nongovernmental body such as a scholarly society. State bureaucracies and the mass media can both be usefully enlisted in such efforts, but the impetus must come from dedicated and genuinely motivated individuals with a long-term commitment. Indeed, Australian protective legislation for rock art and other Indigenous heritage resources is both inadequate and can be easily circumvented with the help of compliant archaeological consultants.

This is best illustrated with the most comprehensive Australian campaign to preserve a body of rock art, the campaign to save the one million or so petroglyphs of the Dampier Archipelago, northwestern Australia. They have long been under threat of destruction, both physical and by acidic emissions (Fig. 7), and by 2001 a significant portion of the corpus had been destroyed. The international campaign to save the Dampier rock art has diverted dozens of billions of dollars of industrial development from the threatened sites and secured their listing for National Heritage protection. The International Federation of Rock Art Organizations accomplished this with public support but against sustained opposition from the responsible state agencies, the corporations destroying rock art, and the consulting archaeologists.

Portable Paleoart

In contrast to Australia's rich endowment of rock art, the portable component of the continent's paleoart is surprisingly light. It comprises essentially two forms: cylcons and tjuringa. The first of these, cylindrical-conical objects usually made of sandstone, slate, basalt, or limestone, occur in parts of Queensland and New South Wales. They range in length from 15 cm to over 1 m and in the order of half of them bear some engraved marks. Their purpose is not securely established but among the hypotheses suggested that of a phallic significance is perhaps the most likely.

Although the ethnographic tjuringa (also churinga, atywerrenge, tywerrenge, etc.) are generally made of wood, in the past they were also fashioned from schist or sandstone. Such stone objects were decorated much in the manner of the wooden versions, and they are highly sacred. Access to them is restricted to initiated men, and therefore few researchers who have studied them

Australian Paleoart, Fig. 7 This flame tower of a natural gas processing plant emits 14,000 t of nitrogen oxide per year, which forms nitric acid in the atmosphere. Note the petroglyph panel on the *left*, 400 m from the plant

have published about them. Stone tjuringa are thought to have been made by the Dreamtime ancestors themselves, whereas wooden ones are surrogate replicas of them. It is incorrectly assumed that stone tjuringa, and the complex rituals they engendered, were limited to the Arrernte tribe of central Australia.

A series of Pleistocene limestone plaques found in two caves (Devils Lair and Koonalda Cave) have been described as engraved but in all cases were demonstrated to bear only taphonomic markings. Other materials, such as woodcarvings or paintings, have not survived from early periods and are not considered here.

Current Debates

There have been many proposals over the past 100 years that zoomorphs or animal tracks in Australian rock art are attributable to extinct Pleistocene fauna. Perhaps they were subconsciously inspired by the cave art of southwestern Europe. However, with the exception of the numerous probable depictions of thylacines, both in the form of petroglyphs and paintings, none of these claims have much credibility. The thylacine or Tasmanian wolf only became extinct on the mainland during the late Holocene and in Tasmania in the 1930s. All other animals supposedly represented in Australian rock art are thought to have expired several tens of thousands of years ago. Most of these proposals refer to poorly protected paintings on rapidly eroding sandstone that should not be expected to be more than a very few millennia old. Moreover, the only justification of these claims is that the supposedly diagnostic features of the images suggest the extinct fauna, even though no zoomorphs in Australian rock art are naturalistic, in the sense of resembling textbook images of the species in question. The proponents of these "interpretations" effectively claim that they somehow know which aspects are diagnostic and which are not. For instance, in a recent example, a goose-like image was interpreted as a depiction of Genyornis on the basis of its head shape, and yet only squashed specimens of the species' skull have been recovered. The image was found well outside the known geographical distribution of the species, it had been subjected to rainwater damage, and Genyornis is thought to have died out well over 40,000 years ago. All other claims of this nature are similarly flawed, and there is currently no figurative rock art known in Australia that can be safely attributed to the Pleistocene.

Another issue currently debated in Australia is the relationship of archaeological consultants with

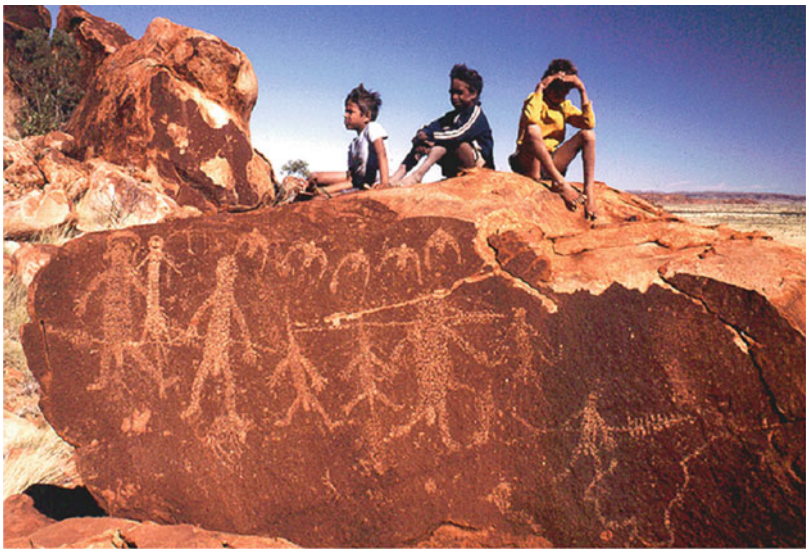

Australian Paleoart, Fig. 8 Petroglyphs at the Spear Hill Complex, eastern Pilbara, with young Aboriginal initiates

their often very powerful corporate clients, particularly when it concerns rock art. The two parties in this debate are people who believe that it is the role of the consultants to facilitate the needs of resource companies at all costs, and those who feel that consultants should be impartial but facilitate the preservation of the cultural heritage resources they investigate. This debate is not endemic to Australia; it can be found in various forms in many countries, but in Australia it tends to be interpreted as a contest of national economic interest or greater good of the nation versus Indigenous heritage, instead of being seen as a confrontation between economic and cultural values. This is because Australia has yet to attain the maturity of a nation that regards its entire cultural heritage as the patrimony of *all* of its inhabitants. In other words, vestiges of cultural apartheid have yet to be overcome in Australia.

International Perspectives

Australian rock art is of interest from an international perspective for several reasons. The amount of sound ethnographic knowledge about its meaning, purpose, production, and cultural roles is significantly greater than anywhere else (Fig. 8). Indeed, in most world regions, there is no such information at all available, and particularly in the endeavors of explaining European paleoart, Australian ethnography has long been recruited for positing bridging analogies. This is ironic because it is precisely the reluctance of Australian rock art scientists to interpret rock art, based on their recognition that etic interpretation is futile in the absence of emic understanding, which distinguishes Australian researchers most from those of the rest of the world.

Another reason to be of special interest is the sheer size of the Australian corpus of rock art, which is to some extent attributable to excellent preservation conditions in a predominantly semiarid environment. Also, Australia has not experienced any significant iconoclasm, which has had much effect in many parts of the world, and much of this rock art is in exceedingly remote parts of the country. The efforts of recent decades to preserve and manage this rock art have contributed as well, and these have also attracted international attention. These practices have been widely replicated in other continents.

Finally, the quality of rock art research being conducted in Australia or by Australian scholars abroad has established scientific standards in recent decades that have international recognition. In recent years, Australian rock art scientists have undertaken work in literally dozens of countries and in all continents. The discipline's preeminent journal, international conference, and organizational structure are all based in this country, and

Australian rock art scientists are frequently consulted internationally.

Future Directions

Protection and management issues encountered with Australian rock art have shown the need to expand the inventory of this vast resource and to attempt creating a comprehensive national register of it. Development projects of various types, especially in the mining and energy industries, are expanding relentlessly into the most remote parts of the country. The safety of the majority of sites, relatively secure until fairly recently, is being increasingly compromised because legislative protection either is inadequate or is being circumvented by exploiting flawed legislation. The most effective remedy to this is to win broad public support for the preservation of Indigenous cultural heritage. This strategy has already been shown to be the most expedient, and it needs to be developed further. In particular, a deliberate effort is required to change the widely held public perception that Aboriginal rock art is the cultural inheritance *only* of the Indigenes. In this sense the rock art can play a significant role in national reconciliation and in facilitating the development of an inclusive attitude to national heritage.

The establishment of a national inventory of rock art is not only required for the purpose of protection and cultural heritage management; it is also of significance to its scientific study. Despite the great efforts that have been made in this direction, the size of the task will involve many more years of recording work. Considering that rock art is being degraded not only though human intervention but also through natural deterioration, this is a task of some urgency and should have precedence over other archaeological work. Future directions therefore demand that greater efforts be focused on endangered rock art, and this would initially involve a change of emphasis in university teaching priorities. This development has already become evident with the recent establishment of facilities at three Australian universities to specialize in rock art studies.

Cross-References

- ▶ Dampier Archipelago Petroglyphs
- ▶ Gwion Gwion
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Kakadu National Park: Rock Art
- ▶ Rock Art, Forms of

References

Bednarik, R.G. 1979. The potential of rock patination analysis in Australian archaeology – Part 1. *The Artefact* 4: 14–38.

Bednarik, R.G. 1990. The cave petroglyphs of Australia. *Australian Aboriginal Studies* 1990: 64–68.

Bednarik, R.G. 1994. The discrimination of rock markings. *Rock Art Research* 11: 23–44.

Bednarik, R.G. 1998. The technology of petroglyphs. *Rock Art Research* 15: 23–35.

Chaloupka, G. 1993. *Journey in time*. Chatswood: Reed Books.

Clarke, J., and N. North. 1991. Pigment composition of post-estuarine rock art in Kakadu National Park. In *Rock art and posterity: Conserving, managing and recording rock art* (Occasional AURA Publication 4), ed. C. Pearson and B.K. Swartz, 80–87. Melbourne: Australian Rock Art Research Association, Inc.

Cole, N., and A. Watchman. 1992. Painting with plants: Investigating fibres in Aboriginal rock paintings at Laura, North Queensland. *Rock Art Research* 9: 27–36.

Flood, J. 1997. *Rock art of the dreamtime*. Sydney: Angus & Robertson.

Gale, F., and J. Jacobs. 1986. Identifying high-risk visitors at Aboriginal art sites in Australia. *Rock Art Research* 3: 3–19.

Layton, R. 1992. The role of ethnography in the study of Australian rock art. In *Rock art and ethnography* (Occasional AURA Publication 5), ed. M.J. Morwood and D.R. Hobbs, 7–10. Melbourne: Archaeological Publications.

Macintosh, N.W.G. 1977. Beswick Creek Cave two decades later: A reappraisal. In *Form in indigenous art*, ed. P.J. Ucko, 191–197. Canberra: Australian Institute of Aboriginal Studies.

Piotrowski, S., and A. Ross. 2011. Aboriginal epistemologies and interpretations of art and place. *Australian Archaeology* 73: 33–40.

Ridges, M., I. Davidson, and D. Tucker. 2000. The organic environment of paintings on rock. In *Advances in dating Australian rock-markings* (Occasional AURA Publication 10), ed. G.K. Ward and C. Tuniz, 61–70. Melbourne: Australian Rock Art Research Association, Inc.

Rosenfeld, A. 1985. *Rock art conservation in Australia* (Special Australian Heritage Publication series 6). Canberra: Australian Government Publishing Service.

Sims, P.C. 1977. Variations in Tasmanian petroglyphs. In *Form in indigenous art: Schematisation in the art of Aboriginal Australia and prehistoric Europe*, ed. P.J. Ucko, 429–438. Canberra: Australian Institute of Aboriginal Studies.

Ward, G.K. & C. Tuniz. (eds.) 2000. *Advances in dating Australian rock-markings*. (Occasional AURA Publication 10), 80–83. Melbourne: Australian Rock Art Research Association, Inc.

Watchman, A. 1993. The use of laser technology in rock art dating. *The Artefact* 16: 39–45.

Watchman, A. 2000. Micro-excavation and laser extraction methods for dating carbon in silica skins and oxalate crusts. In *Advances in dating Australian rock-markings* (Occasional AURA Publication 10), ed. G.K. Ward and C. Tuniz, 35–39. Melbourne: Australian Rock Art Research Association, Inc.

Australian Rock Art

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Introduction and Definition

The earliest evidence of human occupation on the Australian continent is a piece of faceted red ochre dated to 50–60 ka, recovered from an excavation at Malakunanja II, in the Arnhem Land Region of the tropical north (Fig. 1). While not conclusive evidence for the production of rock art, this and other similar finds indicate that Australia's earliest inhabitants were at the very least processing pigment. Hampered by difficulties in dating rock art assemblages and the limited potential for the preservation of rock art of such great antiquity, identification of the earliest rock art remains a challenging goal for Australian researchers.

Australia is the world's smallest and driest, permanently inhabited continent with an area of about 7.6 million square kilometers. The geographic location of the continent and its size mean that it encompasses a wide range of climate zones. The climate along the southeastern margins of the mainland and island Tasmania is classified as temperate. In the north, tropical climates are marked by hot summers and heavy monsoonal rains, while the climate of the vast interior covering almost two thirds of the continent is arid or semiarid and is characterized by low and unpredictable rainfall. Rock art is found in all climatic zones from the highest snow-covered mountain ranges in the southeast to the vast sand-ridge deserts of the center and the rugged and remote gorges and coastal islands of the north and northwest (Fig. 1).

In northern, central, and western regions of Australia, rock art remains an integral part of Aboriginal culture and belief systems. Although varying in form and detail across the country, the concept of "the Dreaming" is a universally held philosophy that spells out the relationship between Ancestral Beings who created the land, Aboriginal people, and nature (Berndt and Berndt 1988). Aspects of the Dreaming are manifested in rock art throughout Australia, and the origin of many paintings and engravings is attributed to the creation period or Dreamtime. While new assemblages are rarely created today, remarking or other practices that involve traditional maintenance of the potency of rock art sites continue where sites are accessible to communities, now often located in distant towns. In other regions where European colonization has resulted in dislocation of people from traditional lands, specific knowledge of the meaning and function of rock art assemblages has been lost, although the significance of the rock art remains integral to today's custodians.

The richness of Aboriginal life and the variability of cultural practices across the country have been captured in numerous ethnographic records collected in the nineteenth and early twentieth centuries by researchers such as R. H. Mathews, B. Spencer and F. Gillen, W. Roth, H. Basedow, J. R. B. Love, D. S. Davidson, A. P. Elkin, and T. G. H. Strehlow and more recently by C. and R. Berndt, C. Mountford and R.A. Gould, N. Munn, H. Morphy, R. Layton, I. Crawford, and V. Blundell. The complexity of rock art as a symbolic system, alongside the multivalent meanings attributed to single motifs recorded in these ethnographies, has warned rock art researchers of the futility of relying on literal interpretations of individual motifs alone, a point made strongly by academics, John Clegg (1991) and Iain Davidson (1997). Similarly, the

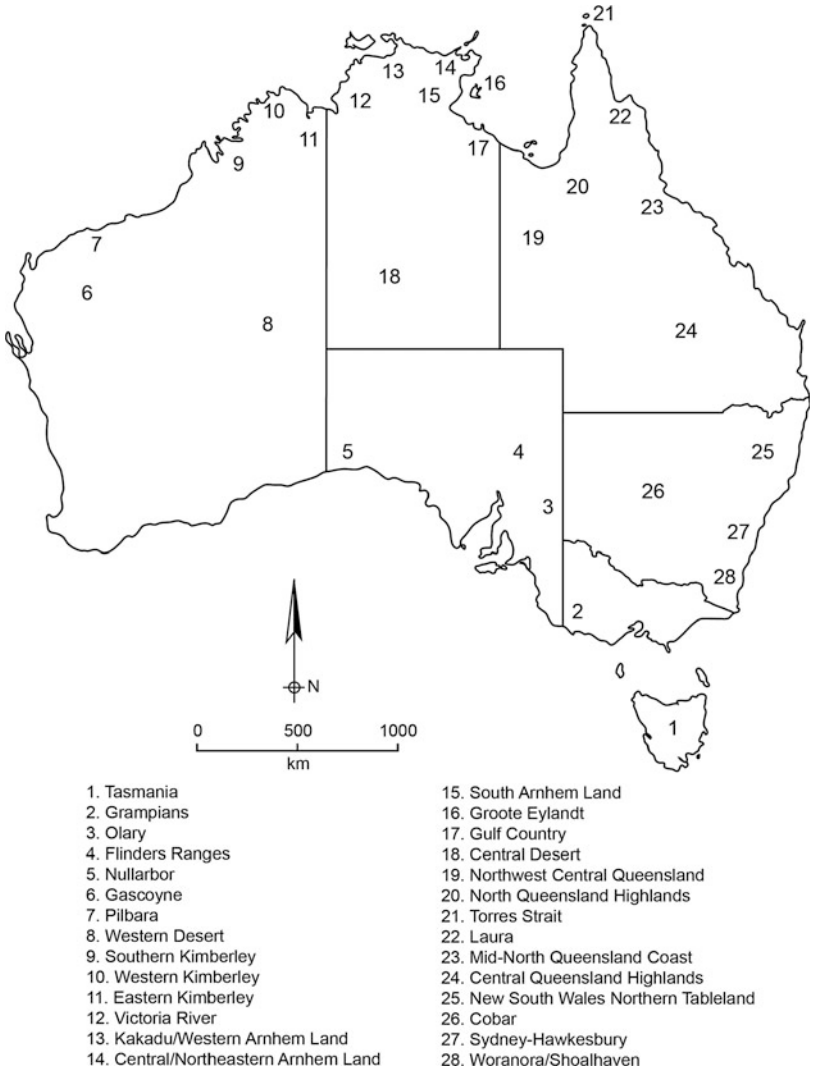

Australian Rock Art, Fig. 1 Australian rock art provinces. (Modified from Layton 1992)

use of simple ethnographic analogy to explain the content or composition of assemblages across regions is acknowledged as problematic. In addition, running contrary to earlier cultural evolutionary ideas that saw Aboriginal people living a substantially unchanged life over thousands of years, the archaeological record attests to the dynamic nature of Aboriginal society especially through the Holocene. To a large degree, these factors have directed Australian rock art research away from speculative interpretation of the meaning of motifs towards research questions that seek to develop an understanding of the role that rock art played in social organization, economies, and ideologies through time.

There are more than 100,000 recorded rock art sites in Australia with many more being added to databases held by universities and state government agencies each year. Rock art is typically found in rockshelters, along cliff lines, on open rock platforms, in gorges, or on angular boulders forming low hills rather than in deep caves. In arid regions where water is scarce, rock art sites are associated with water supplies however meagre. Most techniques including petroglyphs (produced by pecking, abrading, incising, or pounding) and pigment art (pictographs: incorporating painting, stencilling, printing, and drawing) are found in all major art provinces in varying proportions. Motifs created with beeswax pellets have a limited

Australian Rock Art, Fig. 2 Typical Central Australian engravings. (Photo by June Ross)

distribution in the north. Studies show that geological substrates alone do not govern the selection of technique used to create rock art assemblages but rather choice of technique can be attributed to regional, temporal conventions. For example, engravings have been produced on the relatively soft Hermannsburg sandstones of Central Australia but are also found on the extremely hard and dense gabbros and granophyres of the Pilbara in the west. Extensive panels of engraved art produced on open rock surfaces dominate the assemblage recorded throughout the central and southern arid zones, while in the northern regions of Cape York, Arnhem Land, Victoria River District, and the Kimberley, rock art painted on shelter walls is most common. On friable white sandstone in the Central Queensland Highlands, stencilling is the most commonly documented technique, whereas on the Woronora Plateau south of Sydney, drawings predominate on similarly light-colored sandstones. In most art provinces, a variety of techniques occur together although specific techniques may dominate during different time periods: the Sydney region stands out as one where two different art media were practiced contemporaneously (McDonald 2008). At the Kuyunba rock art complex in Central Australia, more recent assemblages of drawing, printing, pounding, abrading, and scratching have been recorded in addition to production methods used to create earlier assemblages, i.e., engraving, painting, and stencilling.

Space precludes a comprehensive overview and detailed descriptions of the rock art from each style province and the changes that took place through time. Very briefly, the rock art of the Central Desert region is dominated by engraved assemblages with a limited graphic vocabulary dominated by circle variants, animal tracks especially bird and kangaroo tracks, lines, arcs, mazes, dots, and pits (Fig. 2). Believed to have its origin in the Pleistocene, the same suite of motifs continued to be produced in the more recent painted assemblage and is retained today in Western Desert acrylic paintings produced for a national and international art market. In contrast, engraved rock art from the Western Desert and Pilbara regions, some of which is also thought to be of great antiquity, is dominated by depictions of animals especially kangaroos (Fig. 3), birds, and marine species such as fish, turtle, and anthropomorphic figures. Most striking are a series of intaglio faces now labelled archaic faces that are found throughout arid regions across the continent (McDonald 2005).

The rock art of Arnhem Land and the Kimberley regions is dominated by painted assemblages with marked stylistic changes through time. Across both regions, pecked cupules, grass prints, large naturalistic figures, and hand stencils were replaced by elegant, monochrome anthropomorphic figures decorated with an array of tassels, aprons, headdresses, and other accoutrements: known as dynamic figures in Arnhem Land and

Australian Rock Art, Fig. 3 Macropod engraving from the Dampier Archipelago. (Photo by Ken Mulvaney)

Gwion figures across the Kimberley where they appear in a highly decorated form (Fig. 4). Assemblages in both regions also have accurate depictions of animals from their respective regions. Differences between the arts of the two regions become marked in the more recent art assemblages. In Arnhem Land, polychrome X-ray figures display not only the profile of the animal or anthropomorphic figure but also the internal organs and/or skeleton. Over the last 3,000 years in the Kimberley, large spirit figures called Wanjinas were painted on rockshelter walls. Wanjinas are known by individual names and stories of their exploits in the Dreamtime continue to be passed on to younger generations. Often many meters long, these are painted in red, black, and sometimes yellow on a prepared white background and feature two large black eyes, a halo-type headdress, but no mouth.

Australian Rock Art, Fig. 4 Gwion figures, Kimberley. (Photo by June Ross)

Historical Background

Prior to the 1970s, Australian rock art studies generally involved description and quantification of assemblages. This resulted in detailed documentation of sites such as those recorded by Fred McCarthy on Groote Eylandt, Dupuch Island, Port Hedland, and the Cobar Pediplain; Ian Crawford in the Kimberley; Robert Edwards in the Olary and Central Desert regions; and B. S. Wright in the Pilbara. Based on these early

descriptions, several researchers (D.S. Davidson, F. McCarthy, C. P. Mountford) proposed pan-Australian rock art sequences constructed around motif classification and geographic distribution. However, it was the evolutionary stylistic sequence proposed by Lesley Maynard (1979) – and her archaeological approach to art assemblages – that influenced much of the later thinking related to regional styles and stylistic distribution.

The 1970s saw a dramatic increase in Australian rock art studies driven by the arrival of a number of overseas researchers with international reputations (e.g., Peter Ucko, Andrée Rosenfeld, and Patricia Vinnicombe). For the first time, Australian universities offered specialist units in rock art studies within archaeology degrees at ANU (Andrée Rosenfeld and Howard Morphy) and Sydney University (John Clegg) and later at UNE (Mike Morwood and Iain Davidson). This stimulated a proliferation of regional studies in the following decades, for example, Bruno David in the North Queensland Highlands and with Josephine Flood in the Victoria River District; Paul Taçon and Darrell Lewis in Arnhem Land; Andrée Rosenfeld in Central Australia and Cape York where Mike Morwood and Noelene Cole also worked; Pat Vinnicombe in the Sydney Basin, Kimberley, and Pilbara; Michel Lorblanchet at Skew Valley; Claire Smith in Jawoyn country in southern Arnhem Land; Iain Davidson and June Ross in northwest central Queensland; and Jo McDonald and John Clegg in both the Sydney Basin and western New South Wales. More recent regional studies have been undertaken by Ken Mulvaney in the Dampier Archipelago, ben Gunn and June Ross in the Central Desert; Jo McDonald and Peter Veth in the Dampier Archipelago and Western and Great Sandy Deserts; Paul Taçon in the Wollemi and Kakadu National Park; Sally May, Chris Chippindale, Bruno David, Bryce Barker, Daryl Wesley, and ben Gunn in Arnhem Land; Liam Brady and Bruno David in the Torres Strait; Julie Dibden and Jillian Huntley in the Woronora Plateau; Al Paterson in the Pilbara; and Mike Morwood and June Ross in the Kimberley.

Running parallel to these studies, important groundwork was laid by dedicated individual researchers such as Percy Trezise in Cape York, Eric Brandl and George Chaloupka (1993) in Arnhem Land, and Grahame Walsh and David Welch in the Kimberley. Relative stylistic chronologies in each of these regions are underpinned by the extensive fieldwork, careful documentation, and analysis of rock art over many decades by these committed enthusiasts.

The dynamics of the 1980s can be attributed to two significant influences. First, the archaeological milieu in which rock art was taught encouraged students to think of rock art as an archaeological dataset to be studied by formal methods. From this time, most major rock art projects were undertaken as part of collaborative research projects involving excavation as well as disciplines such as paleofaunal and paleobotanical studies, which provided social and environmental contexts against which to set an understanding of art assemblages. Datasets were routinely analyzed using statistical analyses including cluster analysis and principal component analysis.

However, by far the most influential changes to the way rock art was perceived resulted from the introduction of new international theoretic approaches that complemented archaeological methods being fostered in Australia. Interest shifted from the concept of art as an object in its own right to a focus on rock art created by the intentional actions of humans in the past. The particular way of producing the art, the "style" was viewed as a means of communication. As Martin Wobst argued, art assemblages can encode a range of social, economic, and ritual information. Conceived in this way, the form and structure of assemblages could thus be seen to express group interaction or differentiation, social boundaries or social organization.

This notion was extended by Clive Gamble, based on ethnographic information from Australia's deserts. He saw a corresponding relationship between the form of art assemblages, the type of social networks people utilized in the past, and availability of resources. Areas with poor resources would have homogeneous art assemblages over vast areas indicating open social networks, while conversely, resource-rich areas

would have heterogeneous art styles, each distinctly different from its neighbors, corresponding with closed social networks and territoriality. Open social networks are seen as a means to allow flexibility and mobility in areas subject to unpredictable climates. The theory of information exchange has been widely adopted as an explanatory tool for diachronic changes in the content and composition of rock art assemblages found across the Australian continent. For example, Mike Morwood identified tightening of social networks and a corresponding change in the composition of the rock art assemblages across the Central Queensland Highlands around 3,000 years ago (2002).

The theory that Polly Weissner popularized, "identification via comparison," where each individual or group understands their place in the world by comparing aspects of their material culture with others has been similarly influential in Australia. In the case of rock art, people could choose to produce art that was stylistically similar to others to cement their group status, or conversely, they could choose to differentiate themselves by producing singular art assemblages. Using rock art or material culture in this way, people in the past could mediate their interactions with others. As Australian Aborigines were hunter-gatherers, regularly moving across the landscape, rock art provided an ideal tool to flag identity and mediate predictable interaction in their absence. Ross et al. (2008) have argued that the production of distinctive anthropomorphic figures within a bounded area in northwest central Queensland provided a mechanism that bonded local inhabitants while at the same time flagging to outsiders coming into the area to trade that they needed to mediate their behavior in some way (Fig. 5).

Australian Rock Art, Fig. 5 Anthropomorphic motif, Northwest Central Queensland. (Photo by June Ross)

Ceremonial gatherings involving large aggregations of people from distant locations are well documented in Australian ethnographies. Meg Conkey identified the structure of graphic elements on bone artifacts, which she contended enabled her to trace the history of aggregation at sites in Northern Spain. Identification of similar structural criteria, particularly richness and diversity in the rock art assemblage at sites within the Australian arid zone, has provided a means to distinguish aggregation sites in the absence of ethnographic evidence. Jo McDonald and Peter Veth (2012) attributed the stylistic diversity in rock art assemblages in the Western Desert to the aggregation of people from different groups across the region. Brett Galt-Smith tested the identification of aggregation sites based on Conkey's criteria against assemblages from sites known to have been the focus of large ceremonial gatherings during the late nineteenth century in Central Australia. He found that Conkey's criteria were useful markers of large aggregation but were less successful in identifying more localized aggregations.

There has been resistance in Australia to one international interpretive framework. Shamanism and the associated altered states of consciousness espoused by David Lewis-Williams as an explanation for the production and form of rock art assemblages in South Africa, Europe, and other parts of the world have not been widely adopted by researchers in Australia, largely because there

is no ethnographic evidence for shamanism within Australia. Although ethnographies recount some instances where altered states of consciousness might have been achieved – when performers accompanied ceremonial activities with long periods of rhythmic beating using clapsticks or when young men endured periods of fasting during initiation – none records any association between these activities and the production or content of rock art.

The establishment of an Australian rock art organization and the passing of heritage and environmental legislation have also contributed to the direction and growth of rock art studies in Australia. In 1984, the Australian Rock Art Association (AURA) was launched by Robert Bednarik. Conferences organized under the auspices of AURA have drawn international researchers to Australia, and the publication of its biannual journal provides a forum for dissemination and discussion of the results of both national and international rock art studies.

Political change and the promotion of ethical considerations and recognition of Indigenous ownership and intellectual property have also influenced the path of rock art studies in Australia. Today, most rock art projects are run in collaboration with Aboriginal or Torres Strait Islander owners who now participate in research as active partners with their own agendas and priorities. Many work as rangers managing rock art or other cultural heritage sites on their country, while others have developed tourist programs aimed at educating visitors about the Indigenous significance of sites.

Key Issues and Current Debates

Reliable chronometric dating of assemblages remains central to the research efforts in Australian rock art. The longevity of rock art production across the continent is signalled not only by the extreme weathering of some engraved assemblages but also by the marked stylistic changes identified in many regional rock art provinces as well as the presence of ochre crayons in excavated sediments dating back from the recent past to the time when the original occupants arrived on the continent. Despite concentrated efforts, attempts to date rock art have met with limited success.

David et al. (2013) have reviewed the evidence for establishing the age of ancient pictographs in Australia and note that few proposed dates involve direct and reliable dating of identifiable rock art motifs. Rather, early dated examples include pigments only seen in cross section sandwiched between gypsum-oxalate crusts, the problem being that the very mineral skins that provide a substance to date also obscure the art. The use of radiocarbon dating on other organic materials as a means to date pictographs has met with mixed results. It has been used to successfully date wax motifs, the earliest of these from a turtle motif in Arnhem Land and dated to around 4,500 BP. Samples from a single charcoal drawing located in the Sydney Basin provided two vastly different ages, a problem likely to have resulted from substrate contamination. The radiocarbon dating of charcoal ash adhered to the bottom of a stone slab painted with a partial black motif provides the oldest date (28,000 BP) for Australian rock art although the motif is unclear. More contentious has been the minimum date of approximately 17,500 BP proposed for a Northern Kimberley Gwion figure and hand stencil obtained by Bert Roberts from an overlying mud wasp nest using optically stimulated luminescence. Criticism has been directed towards the technique, but most disquiet results from concerns about the relationship of the section of the nest being dated to the underlying figures (Aubert 2012). Additional concerns were raised when dating of oxalate skins by Alan Watchman indicated a mid-Holocene date for the same stylistic period.

Continued improvements in the preparation and extraction processes for radiocarbon sampling such as plasma oxidation and accelerator mass spectrometry have been used to date charcoal drawings and organics within pigment. Results have provided a range of dates for late Holocene assemblages in the Western Desert, Arnhem Land, and the Kimberley enabling researchers to build temporal frameworks for the dynamic changes that occurred in the last few thousand years. Uranium series, a dating technique used successfully by Maxime Aubert in China and East Timor, is

now being trialled in the Kimberley at locations where art is beneath a covering of precipitated flowstone. Even with ongoing improvements to dating techniques, Rosenfeld and Smith (1997) argue for the continued importance of developing a fine-grained understanding of relative stylistic sequences to complement and inform dating projects. Chippindale and Taçon (1998) provide a comprehensive summary of methods that can be adopted to develop such sequences in Australia.

Researchers seeking to date engravings in the past had to rely on recovering examples from stratified deposits. Andrée Rosenfeld dated deposits associated with engravings excavated from the Early Man Shelter in Cape York to about 14,000 BP. Today, dating techniques focus on establishing ages for mineral coatings covering engravings such as silica skins, calcium oxalate crusts, rock varnish, and localized calcium carbonate deposits, thus providing a minimum date for the underlying art. After a promising start, cation-ratio dating of rock varnish has proved unreliable, and likewise, the dating of carbonate deposits has met with little success. Outcomes from Alan Watchman's radiocarbon dating of oxalate crusts have provided more convincing results. Crusts overlying pecked cupules in the East Kimberley provided age estimates up to 5,840 years old, while the dating of crusts overlying similar suites of rock art at two different sites in Central Australia returned to mid-Holocene dates (Smith et al. 2009). The latter example provided a means of validating Watchman's results. The rock art had been engraved on slabs of roof-fall lying on shelter deposits. Radiocarbon dates were obtained from deposits immediately under the slabs of roof-fall providing a maximum age for the engravings thus bracketing the age of the art between maximum and minimum ages obtained using two different techniques.

Dating studies are now being augmented by analyses of the chemical and mineral composition of pigments and ochres to provide information on the composition of paints and the origin of pigments. Further, a detailed understanding of the composition of pigments provides data that can inform management decisions relating to conservation of art for future generations. The chemical fingerprint of paint samples can be established in the field in situ using portable X-ray fluorescence without damage to the art although Jillian Huntley's research flags some limitations to this technique (Huntley 2012). Alternatively, samples are removed and then processed and analyzed under laboratory conditions.

Interest in gestural marks or associated rock art traditions has continued to grow in Australia as the role and significance of these marks become more apparent. The process of interacting with rock surface continues to retain its significance for traditional owners in some regions although rubbing with a hand frequently replaces earlier practices. While assemblages of pecked cupules and abraded grooves have been regularly recorded in the past, few have been quantified or subjected to rigorous analysis. The recording of abraded areas, battered and flaked edges and random pecking on, or associated with art panels has largely been neglected. Studies on flaked edges at rock art sites in the Northern Kimberley are currently underway in an effort to establish if this practice had a ritual or economic function.

A range of other key issues are currently under debate. Speculations dating to the late nineteenth century that extinct megafauna or their tracks had been depicted in Australian rock art have been revived, although these assertions are not universally accepted. Over recent years, claims have been made for a range of painted motifs judged to be iconic depictions of *Genyornis, Zaglossus, Palorchestes*, *Diprotodon* and *Thylacoleo*, taxa deemed to have become extinct on the Australian continent around 40,000 years ago. Identifications rely either on the likeness of the motifs to hypothetical reconstructions of extinct fauna or on the comparative size of the depictions considered to be larger than any related taxa present today. Further, the presence of depictions of megafauna has been used by some researchers as a temporal proxy to extend their chronological framework and underpin relative sequences.

Bruno David (2002) has argued that both Aborigines and other Australians see the Dreaming as atemporal. Yet when he examined the archaeological manifestations of the Dreaming as we know it from ethnographic times, he concluded that the evidence from multiple sites across Australia reveals a dynamic and emergent culture

rather than an unchanging one or even one of great antiquity. This has implications for the understanding of the decline or cessation of earlier art styles and the rise of distinctive regional rock art assemblages that appeared during the late Holocene.

By the time of European contact, Australia was a continent of Aboriginal nations, each with its own language, ceremonial practices, and rock art style. Earlier more homogeneous rock art styles produced over vast areas were replaced with differing regional styles. Identification of the forces responsible for driving changes in rock art assemblages has been the focus of rock art studies in many regions, with available datasets or theoretical perspectives influencing conclusions. In the late 1960s, researchers hypothesized that the demise of the production of elegant monochrome Gwion figures (formerly known as Bradshaw figures) and the later emergence of polychrome Wanjina-style figures over the past few thousand years resulted from the diffusion of ideas from a new wave of immigrants from Southeast Asia. In Arnhem Land, researchers identified dramatic changes in the topography of the region resulting from fluctuating sea levels and an increase in population density supported by resources from the rich alluvial plains that formed (Taçon 1989). Estuarine species depicted in earlier rock art such as mullet and saltwater crocodiles were replaced by paintings of freshwater species such as magpie geese and water lilies. In Central Australia, the change from a relatively homogeneous engraved assemblage to dramatic site-specific motifs produced during the last 1500 years was attributed to changes in social organization necessitated by pressures from increased population resulting from the onset of more productive but unpredictable climates.

Contact rock art is now regarded as an important Indigenous archive. Clarke and Frederick (2006) demonstrate in their detailed study of recent rock art on Groote Eylandt that analysis of the content and form of the motifs as well as the social, geographic, and historical contexts of contact rock art can be used to examine the complexity of relationships, meanings, representations, and exchanges that resulted from cross-cultural interaction between Aboriginal people and newcomers. This view is supported by the findings of Paul Taçon and Sally May (Arnhem Land), June Ross and Ursula Frederick (Central Australia), Alastair Paterson (Pilbara), Jo McDonald (Sydney Basin), Noelene Cole (Cape York), and Liam Brady (Torres Strait) in their analyses of contact rock art. The history of contact and cross-cultural exchange varied across regions between rural, town, and mining settlements, but analysis of contact rock art assemblages demonstrates that Aboriginal people should more accurately be viewed as keen observers and active participants in past cross-cultural exchange rather than simply as passive victims.

While the threat to rock art assemblages posed by the mining boom of the last decade has led to an increased awareness of conservation and management issues associated with the preservation of sites, direct government financial support for specific rock art management programs and heritage agencies has been reduced. However, the proportion of government funds channelled through the Australian Research Council has seen a far greater proportion of available grant money being awarded to archaeological projects with strong rock art components. In threatened areas, rock art recording and management strategies are generally completed as consultancies commissioned by resource companies or as negotiated offset arrangements where resource companies fund research to better understand the resource generally.

There is a marked trend today, for rock art to be included as a major component in large regional archaeological projects in Australia. Neither is it unusual for projects to incorporate multiple proxies from varied scientific disciplines in order to formulate the clearest picture of the past. The range of disciplines associated with projects such as *Lifeways of the First Australians* in the Southern Kimberley, *Change and Continuity* in the Northwest Kimberley, the *Canning Stock Route: Rock Art and Jukurrpa Project* in the Western Desert, or *Connecting Country: The Jawoyn Homeland Project* in Southern Arnhem Land is more diverse than ever before. Rock art researchers now work side by side with geomorphologists; geochronologists; physical geographers;

anthropologists; historians; geologists; palynologists; ecologists; faunal, botanical, ochre, and shell experts; GIS specialists; photographers with specialist technical skills; and filmmakers, each providing ever more specialized knowledge.

Future Directions

In the past decade, three university rock art centers have been established: the Australian National University's *Rock Art Research Centre* in Canberra founded under the guidance of Howard Morphy, Griffith University's *Place, Evolution and Rock Art Heritage Unit* led by Director Paul Taçon and situated on the Queensland Gold Coast, and the University of Western Australia's Perth *Centre for Rock Art Research + Management* with Jo McDonald as Director. Initiatives instigated by these fledgling bodies include raising the awareness of heritage and rock art management issues amongst government agencies and the general population, facilitating and broadening the scope and relevance of rock art research, funding of visiting international scholars, organizing professional workshops, providing worldwide access to remote rock art sites via internet forums such as Google, and dramatically increasing the number of students studying rock art at tertiary level across Australia. The amount of industry and institutional funds committed to these centers attests to the significance of role that rock art is seen to play in Australians' past, present, and future.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Chaloupka, George
- ▶ Clegg, John K.
- ▶ Dampier Archipelago Petroglyphs
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Kakadu National Park: Rock Art
- ▶ Morwood, Michael
- ▶ Rosenfeld, Andrée
- ▶ Wobst, H. Martin

References

Aubert, M. 2012. A review of rock art dating in the Kimberley, Western Australia. *Journal of Archaeological Science* 39: 573–577.

Berndt, R.M., and C.H. Berndt. 1988. *The world of the first Australians*. Canberra: Aboriginal Studies Press.

Chaloupka, G. 1993. *Journey in time*. Chatswood: Reed.

Chippindale, C., and P.S.C. Taçon, ed. 1998. The many ways of dating Arnhem Land rock-art, north Australia. In *The archaeology of rock-art*, 90–104. Cambridge: Cambridge University Press.

Clark, A., and U. Frederick. 2006. Closing the distance: Interpreting cross-cultural engagements through indigenous rock art. In *The archaeology of Oceania: Australia and the Pacific*, ed. I. Lilley, 116–133. Oxford: Blackwell.

Clegg, J. 1991. !Pictures of pictures of. . .. In *Rock art and prehistory*, Oxbow monograph, ed. A. Rosenfeld and P. Bahn, vol. 10, 109–111. Exeter: Short Run Press.

David, B. 2002. *Landscapes, rock-art and the dreaming*. London: Leicester University Press.

David, B., J.-M. Geneste, F. Petchey, J.-J. Delannoy, B. Barker, and M. Eccleston. 2013. How old are Australia's pictographs? A review of rock art dating. *Journal of Archaeological Science* 40: 3–10.

Davidson, I. 1997. The power of pictures. In *Beyond art: Pleistocene image and symbol*, Memoirs of the California academy of sciences, ed. M. Conkey, O. Soffer, D. Statmann, and N.G. Jablonski, vol. 23, 125–169. San Francisco: University of California.

Huntley, J. 2012. Taphonomy or paint recipe: In situ portable x-ray fluorescence analysis of two anthropomorphic motifs from the Woronora Plateau, New South Wales. *Australian Archaeology* 75: 78–94.

Layton, R. 1992. *Australian rock art: A new synthesis*. Cambridge: Cambridge University Press.

Maynard, L. 1979. The archaeology of Australian rock art. In *Exploring the visual art of Oceania*, ed. S.M. Mead, 83–110. Honolulu: University of Hawai'I Press.

McDonald, J.J. 2005. Archaic faces to headdresses: The changing role of the rock art across the arid zone. In *Desert peoples: Archaeological perspectives*, Blackwell studies in global archaeology, ed. P. Veth, P. Hiscock, and M. Smith, 116–141. Boston.

McDonald, J.J. 2008. *Dreamtime superhighway: An analysis of Sydney Basin rock art and prehistoric information exchange* (Terra Australis 27). Canberra: ANU EPress. Available at: http://epress.anu.edu.au/ta27_citation.html.

McDonald, J., and P. Veth. 2012. The social dynamics of aggregation and dispersal in the Western Desert. In *A companion to rock art*, Blackwell companion to anthropology series, ed. J.J. McDonald and P.M. Veth, 90–102. Malden: Blackwell Publishing.

Morwood, M.J. 2002. *Visions from the past: The archaeology of Australian Aboriginal art*. Washington, DC: Smithsonian Institution Press.

Rosenfeld, A., and C. Smith. 1997. Recent developments in radiocarbon and stylistic methods of dating rock-art. *Antiquity* 71: 405–411.
Ross, J., D. Valenzuela, M. Hernandez-Lhosa, L. Briones, and C.M. Santoro. 2008. More than the motifs: The archaeological analysis of rock art in arid regions of the Southern Hemisphere. *Revista Chungara, Chile* 40: 273–294.
Smith, M.A., A. Watchman, and J. Ross. 2009. Direct dating indicates mid-Holocene age for archaic rock engravings in arid central Australia. *Geoarchaeology* 20: 191–203.
Taçon, P.S.C. 1989. From the 'dreamtime' to the present: The changing role of Aboriginal rock paintings in western Arnhem Land, Australia. *The Canadian Journal of Native Studies* 9 (2): 317–339.

Further Reading

Bednarik, R., ed. Rock art research. Journal of the Australian Rock Art Research Association (AURA) and of the International Federation of Rock Art Organizations (IFRAO).
David, B., and D. Chant. 1995. Rock art and regionalism in north Queensland prehistory. *Memoirs of the Queensland Museum* 37 (2): 357–528.
David, B., and M. Wilson, eds. 2002. *Inscribed landscapes: Marking and making place*. Honolulu: University of Hawai'i Press.
Flood, J. 1997. *Rock art of the dreamtime: Images of ancient Australia*. Sydney: Angus & Robertson.
Hiscock, P. 2008. *Archaeology of ancient Australia*. Oxon: Routledge.
McDonald, J.J., and P. Veth, eds. 2012. *A companion to rock art*. Malden: Wiley Blackwell.
Smith, M.A. 2013. *Archaeology of Australia's deserts*. Cambridge: Cambridge University Press.
Ucko, P.J., ed. 1977. *Form in indigenous art*, Prehistory and material culture series. Vol. 13. Canberra: Australian Institute of Aboriginal Studies.
Walsh, G.L. 2000. *Bradshaw art of the Kimberley*. Toowong: TararakkaNowanKas Publication.

Australopithecines

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Introduction

The term "australopithecines" derives from the subfamily name Australopithecinae that was first used by Gregory and Hellman (1938). It differentiated the ape-men *Australopithecus* and *Paranthropus* from the subfamily Homininae or humans that included the genera *Homo* and *Pithecanthropus* and which are abbreviated to "hominines."

Australopithecines are known from Plio-Pleistocene sites in South and East Africa and in Chad. Claims for their presence at sites outside of Africa have not been confirmed. Australopithecines have over the years been variously referred to as ape-men, man apes, near-men, or Dartians after Raymond Dart who named *Australopithecus* in 1925. These names reflect the characteristics of the Australopithecines as being manlike primates with apelike features.

Key Issues/Current Debates

The first known Australopithecine was blasted out of a limestone tufa cliff at Buxton Limeworks near Taung, South Africa, in 1924. A natural endocranial cast and a block of calcified matrix displaying sections of cranium and mandible were, with other fossils, saved by miner M. de Bruyn and taken to the mine manager's office. Later, they were sent by geologist R. B. Young to Professor Raymond Dart who had asked Young to look out for monkey fossils. Dart found that the natural brain cast fit into some exposed bone in the matrix block. After he had cleaned away the hard matrix, he realized that he had the face and brain cast of a primate that he considered an ape on the way to becoming man. It was the skull of a child of about 4 years, and Dart noted that the molar teeth, though large, were humanlike, that the deciduous canine was much smaller than that of an ape, and that the position of the foramen magnum indicated that it would have walked upright. The brain size was however apelike, and other ape features were the projecting muzzle, flat nose, and facial premaxillary suture (Fig. 1).

Dart (1925) named the fossil *Australopithecus africanus* or southern ape of Africa. Many of his colleagues were skeptical of his claims that it was a human ancestor, but the Scots doctor and paleontologist Robert Broom supported Dart's interpretation and determined to prove it with an adult

Australopithecines, Fig. 1 The Taung child, type specimen of *Australopithecus africanus*

Australopithecines, Fig. 2 Lower face of Sts 52, a male *Australopithecus africanus*

skull. This he did in 1936 when he recovered a crushed adult cranium with good brain cast that had been blasted out during limestone quarrying at the Sterkfontein Caves, South Africa. Broom at first named it *Australopithecus transvaalensis*, but after discovery of a child mandibular symphysis 2 years later, he created a new genus *Plesianthropus* for the Sterkfontein fossils (Broom and Schepers 1946). Broom, later aided by his young zoologist assistant John Robinson, recovered many Australopithecine fossils (Fig. 2) from the Sterkfontein Caves including, in 1947, part of a skeleton with a pelvis that proved conclusively that they walked upright (Broom et al. 1950). They also in 1947 blasted out a well-preserved cranium, Sts 5, that Broom said was a female *Plesianthropus*, and thus the local *Star* newspaper named it Mrs. Ples. The cranium had no teeth preserved but was given a cranial capacity of 475 cc. Later, it was considered that these fossils belong to the same species as the Taung child, i.e., *Australopithecus africanus*, and the name *Plesianthropus* was abandoned.

From 1966 onward, Phillip Tobias and Alun Hughes and later Ron Clarke conducted systematic excavations at the caves and added considerably to the inventory of fossils. Most publications in recent years have considered there to be only one species, *Australopithecus africanus*, in South Africa, but Clarke (2013) has demonstrated that many of the fossils belong to a second larger-toothed, bulbous-cusped, flat-faced species. Clarke found this second species to be the same as some Australopithecine fossils that Dart's team of the Kitching brothers and Alun Hughes had found at the Makapansgat Limeworks Cave beginning in 1947. Dart (1948) named this species *Australopithecus prometheus* (Fig. 3). These date to around 3 million years ago and are contemporary with *Australopithecus africanus* at both Makapansgat and Sterkfontein. At this latter site, they are found in a deposit (Member 4 of the Sterkfontein Formation) dating to between 2.4 and 3 Ma. Males and females of each species can be determined. For example, within *Australopithecus africanus*, StW 53 is a male (although often wrongly assigned to *H. habilis* – see Clarke 2013), and Sts 5 is a female. Within *Australopithecus prometheus*, StW 252 (Fig. 4) is a male, and Sts 71 is a female (Clarke 2013). In 1998, Clarke (1998) announced a near-complete skeleton of an earlier *A. prometheus* discovered by himself, Stephen Motsumi, and Nkwane Molefe in Member 2 in the Silberberg Grotto of the Sterkfontein Caves (see Fig. 5; Clarke 2019; Clarke and Kuman in press). It dates to 3.67 Ma (Granger et al. 2015). The complete leg and arm lengths of this individual prove for the first time

that at least in this one species *Australopithecus* had legs much longer than arms.

A third South African species was named *Australopithecus sediba* (Berger et al. 2010). It was discovered in 2008 by Matthew and Lee Berger in a cave deposit at Malapa, about 13 km north of Sterkfontein. It has been described on two partial skeletons, a juvenile male with much of its cranium and mandible and an adult female, and dates to ca. 1.9 Ma. It has similarities to *A. africanus*, rather than to *A. prometheus*.

The first discovery in East Africa of what eventually proved to be an early species of Australopithecine occurred in 1939 when L. Kohl-Larsen found a maxillary fragment at Garusi (now Laetoli) near Olduvai, Tanzania. The deposits in which it was found are now known to date to about 3.6 Ma. Survey work done by Mary Leakey and her team in the 1970s (Leakey et al. 1976) uncovered many more such fossils, including a mandible (Laetoli hominid 4, Fig. 6) which became the type specimen of a new species *Australopithecus afarensis* (Johanson et al. 1978). They grouped the Laetoli *Australopithecus* with similar fossils they had discovered at Hadar in the Afar region of Ethiopia. These fossils included the partial skeleton, known as Lucy, and they possessed features, in particular the lower third premolar, which are more apelike than those of the South African *Australopithecus*. Some other very significant fossils of this species are the reconstructed male skull AL 444–2 (Kimbel et al. 2004), an infant skeleton with a skull (Alemseged et al. 2006), a partial skeleton without skull from Woranso-Mille, Ethiopia (Haile-Selassie and Su 2016), and the trail of Laetoli footprints.

This trail (Fig. 7), representing two individuals walking side by side, was discovered by Paul Abell in 1978. He noticed what appeared to be a humanlike heel impression in an outcrop of volcanic tuff. Subsequent excavation revealed a 41-m-long trail made by one large and one small individual. Although the footprints are those of a bipedal walker, they demonstrate some apelike features, including a slightly divergent big toe and a medial expansion of the abductor muscle of the big toe. Such features are consistent with the foot anatomy of the *A. prometheus* StW 573 skeleton from Sterkfontein. That fossil also has a slightly divergent and mobile big toe that would have been useful for tree climbing.

A canine tooth found at Laetoli in 1935 was so large that Louis Leakey thought it was a monkey. It was only in 1981, with the hindsight of many similar discoveries of large canines, that Tim White recognized this canine in the British

Australopithecines, Fig. 3 MLD 2, mandible of *Australopithecus prometheus* from Makapansgat

Australopithecines, Fig. 4 StW 252 cranium of *Australopithecus prometheus* from Sterkfontein Member 4

Australopithecines, Fig. 5 The skeleton of *Australopithecus prometheus* (StW 573) from Sterkfontein Member 2, ca 3.67 Ma. (Photo courtesy of Paul John Myburgh)

Australopithecines, Fig. 6 Laetoli Hominid 4, the type mandible of *Australopithecus afarensis*

Australopithecines, Fig. 7 Laetoli footprints of *Australopithecus afarensis*

Museum as that of an *Australopithecus afarensis* discovered 1 year before Broom's first adult *Australopithecus* from Sterkfontein. An anterior portion of mandible with all its premolars and canines and one incisor from Koro Toro in Chad, dating to about 3.5 Ma, has similarities to *Australopithecus afarensis* but was named as a new species, *Australopithecus bahrelghazali*, by Brunet (1996).

Jaws of an even earlier and more primitive species of *Australopithecus*, dating to 4.2 Ma ago, were discovered by Meave Leakey's team at Kanapoi in Kenya and named *Australopithecus anamensis* (Leakey et al. 1995). This followed the recovery from that area of a hominid distal humerus by Bryan Patterson's Harvard expedition

in 1965. Two years later, Patterson's team recovered part of a hominid right mandibular ramus with a heavily worn first molar at the site of Lothagam near the shore of Lake Turkana, Kenya. This fossil site, rich in Miocene fauna, had been found by Larry Robbins, at that time a University of California, Berkeley, student, and it is possible that the hominid mandible is a representative of *Australopithecus anamensis*. It was generally thought that *A. anamensis* was directly ancestral to *A. afarensis*. However, the discovery of a 3.8 Ma old cranium of *A. anamensis* from Woranso-Mille, Ethiopia prompted Haile-Selassie et al. (2019) to question that scenario, especially as the two species overlapped in time by at least 100,000 years.

In August 1999, Justice Erus, a member of Meave Leakey's field team, discovered at the site of Lomekwi west of Lake Turkana in Kenya, a cranium dating to about 3.3–3.5 Ma. Although like *A. afarensis* it had a small brain and relatively small teeth, it differed in having a broad, flat face. Hence it was given the name *Kenyanthropus platyops* (Leakey et al. 2001). In this respect, it has similarities to the much later *Homo habilis* cranium, KNM-ER 1470, and could possibly be ancestral to that species. Also from ca. 3.3 to 3.5 Ma at Woranso-Mille in Ethiopia were found a maxilla and two mandibles that differ from both *K. platyops* and *A. afarensis*, and thus they were placed in a new species *Australopithecus deyiremeda* (Haile-Selassie et al. 2015). Thus as these authors observe, there are indications of multiple hominid species in East Africa overlapping in the same areas at the same time.

Another *Australopithecus* species dating to 2.5 Ma was recovered from Bouri, Middle Awash, Ethiopia, and named as *Australopithecus garhi* by Asfaw et al. (1999). A partial cranium has very large cheek teeth, combined with a large, prognathic anterior dentition. A partial arm (incomplete humerus, radius, and ulna) and femur shaft are also attributed to this species.

From much younger deposits in Olduvai Gorge, Tanzania, and from East Lake Turkana, there are some hominid fossils that have generally been accepted as representing *Homo habilis* but which have close resemblances, including small brain size, to the South African *Australopithecus africanus*. These fossils dating to under 2 Ma are OH 24, OH 62, OH 13, and KNM-ER 1813. They occur in the same areas and same age deposits as much larger-brained fossils of *Homo habilis*. Thus, they seem to represent late-surviving *Australopithecus africanus* or a closely related form.

Although the earliest stone tools date back to 3.3 Ma at Lomekwi in Kenya and from 2.6 Ma in Ethiopia at Gona and Ledi-Geraru (see "▶ Oldowan Industrial Complex"), none has ever been found with *A. anamensis*, *A. afarensis*, *A. africanus*, or *A. prometheus*. At later sites, it seems more probable that early *Homo* was responsible for the tools. In the 1950s, Raymond Dart published many articles, as well as a book, claiming that *Australopithecus* had a bone tool culture that he named the osteodontokeratic. Subsequent investigations have shown that there is no justification for such claims and that the accumulations of damaged skulls and broken bones were the natural result of carnivore predation, porcupine collecting, and rock fall and pressure within the cave deposits. The complete hand of *A. prometheus* at 3.67 Ma from Sterkfontein shows that very early hominids possessed a hand physically capable of making stone tools. At least by 3.3 Ma, stone tools were being made at Lomekwi in Kenya, possibly by *K. platyops* (see "▶ Oldowan Industrial Complex").

Another form of Australopithecine in addition to *Australopithecus* is the flat-faced, large-toothed ape-man called *Paranthropus*. This was first discovered by a schoolboy, Gert Terblanche, at Kromdraai, near Sterkfontein, South Africa, in 1938, and named *Paranthropus robustus* by Robert Broom. Details on this form of ape-man are given under the entry *Paranthropus* in this encyclopedia.

The several species of Australopithecine are represented over a large part of Africa, and although there have in the past been suggestions that isolated teeth and jaw fragments from China and Java are Australopithecine, there has been no indisputable support for this. It seems probable that the fossils in question are those of *Homo habilis* that had spread from Africa to Asia.

Paleoenvironmental information suggests that many of the Australopithecines were associated with woodland or tropical forest close to lakes and rivers. Their diet, as suggested by their dentition, varied from omnivorous to more vegetarian for *Paranthropus*. All Australopithecines were bipedal with humanlike hand proportions, humanlike (but large) cheek teeth, and small brain size ranging from about 430 ccs in some *Australopithecus* to 530 ccs in some *Paranthropus*.

These apelike brain sizes, and many other apelike features in the skull and skeleton, coupled with the humanlike bipedality, hands, and teeth, mark them as transitional between Miocene ape and Pleistocene human. There is, however, no clarity on which, if any, of the several known Australopithecine species (except perhaps for *K. platyops*) was ancestral to *Homo*, which was a contemporary of both *Paranthropus* and late forms of *Australopithecus*, e.g., at Olduvai Gorge Bed I.

Cross-References

- ▶ Dart, Raymond Arthur
- ▶ *Homo Habilis*
- ▶ Leakey Family
- ▶ Oldowan Industrial Complex
- ▶ Olduvai Gorge Archaeological Site
- ▶ *Paranthropus*
- ▶ Tobias, Phillip V.

References

Alemseged, Z., F. Spoor, W.H. Kimbel, R. Bobe, D. Geraads, D. Reed, and J.G. Wynn. 2006. A juvenile early hominin skeleton from Dikika, Ethiopia. *Nature* 443: 296–301.

Asfaw, B., T. White, O. Lovejoy, B. Latimer, S. Simpson, and G. Suwa. 1999. *Australopithecus garhi*: A new species of early hominid from Ethiopia. *Science* 284: 629–635.

Berger, L.R., D.J. de Ruiter, S.E. Churchill, P. Schmid, K.J. Carlson, P.G.M. Dirks, and J.M. Kibii. 2010. *Australopithecus sediba*: A new species of Homo-like Australopith from South Africa. *Science* 328: 195–204.

Broom, R., and G.W.H. Schepers. 1946. *The South African fossil ape- men: The Australopithecinae (Memoir 2)*. Pretoria: Transvaal Museum.

Broom, R., J.T. Robinson, and G.W.H. Schepers. 1950. *Sterkfontein ape- man Plesianthropus. (Memoir 4)*. Pretoria: Transvaal Museum.

Brunet, M. 1996. *Australopithecus bahrelghazali*, une nouvelle espèce d'Hominidé ancien de la région de Koro Toro (Tchad). *Comptes Rendus de l'Académie des Sciences, Paris, Série IIa* 322: 907–913.

Clarke, R.J. 1998. First ever discovery of a well-preserved skull and associated skeleton of *Australopithecus*. *South African Journal of Science* 94: 460–463.

Clarke, R.J. 2013. *Australopithecus* from Sterkfontein caves South Africa. In *The paleobiology of Australopithecus*, ed. K. Reed, J. Fleagle, and R. Leakey, 105–123. New York: Springer.

Clarke, R.J. 2019. Excavation, reconstruction and taphonomy of the StW 573 *Australopithecus prometheus* skeleton from Sterkfontein caves, South Africa. *Journal of Human Evolution* 127: 41–53.

Clarke, R.J., and K. Kuman. In press. The skull of StW 573, a 3.67 my old *Australopithecus prometheus* skeleton from Sterkfontein caves, South Africa. *Journal of Human Evolution* 134.

Dart, R.A. 1925. *Australopithecus africanus*, the man-ape of South Africa. *Nature* 115: 195–199.

Dart, R.A. 1948. The Makapansgat proto-human Australopithecus prometheus. *American Journal of Physical Anthropology* 6: 259–284.

Granger, D.E., R.J. Gibbon, K. Kuman, R.J. Clarke, L. Bruxelles, and M.W. Caffee. 2015. New cosmogenic burial ages for Sterkfontein member 2 *Australopithecus* and member 5 Oldowan. *Nature* 522: 85–88.

Gregory, W.K., and M. Hellman. 1938. Evidence of the australopithecine man-apes on the origin of man. *Science* 88: 615–616.

Haile-Selassie, Y., and D.F. Su. 2016. *The postcranial anatomy of Australopithecus afarensis*. Dordrecht: Springer.

Haile-Selassie, Y., L. Gibert, S.M. Melillo, T.M. Ryan, M. Alene, A. Deino, N.E. Levin, G. Scott, and B.Z. Saylor. 2015. New species from Ethiopia further expands middle Pliocene hominin diversity. *Nature* 521: 483–488.

Haile-Selassie, Y., S.M. Melillo, A. Vazzana, S. Benazzi, and T.M. Ryan. 2019. A 3.8-million-year-old hominin cranium from Woranso-Mille, Ethiopia. *Nature* 573 (7773): 214–219.

Johanson, D.C., T.D. White, and Y. Coppens. 1978. A new species of the genus *Australopithecus* (primates: Hominidae) from the Pliocene of eastern Africa. *Kirtlandia* 28: 2–14.

Kimbel, W.H., Y. Rak, and D.C. Johanson. 2004. *The skull of Australopithecus afarensis*. Oxford and New York: Oxford University Press.

Leakey, M.D., R.L. Hay, G.H. Curtis, R.E. Drake, M.K. Jackes, and T.D. White. 1976. Fossil hominids from the Laetoli beds, Tanzania. *Nature* 262: 460–465.

Leakey, M.G., C.S. Feibel, I. McDougall, and A. Walker. 1995. New four-million-year-old hominid species from Kanapoi and Alia Bay, Kenya. *Nature* 376: 565–571.

Leakey, M.G., F. Spoor, F.H. Brown, P.N. Gathogo, C. Kiarie, L.N. Leakey, and I. McDougall. 2001. New hominin genus from eastern Africa shows diverse middle Pliocene lineages. *Nature* 410: 433–440.

Further Reading

Brunet, M., A. Beauvilain, Y. Coppens, E. Heintz, A.H.E. Moutaye, and D. Pilbeam. 1995. The first australopithecine 2,500 kilometres west of the Rift Valley (Chad). *Nature* 378: 273–275.

Clarke, R.J., and T.C. Partridge. 2010. *Caves of the apemen*. Johannesburg: Wits University Press.

Leakey, M.D., and J.M. Harris. 1987. *Laetoli: A Pliocene site in northern Tanzania*. Oxford: Clarendon Press.

Reader, J. 2011. *Missing links*. Oxford: Oxford University Press.

Robinson, J.T. 1972. *Early hominid posture and locomotion*. Chicago: University of Chicago Press.

Schwartz, J.H., and I. Tattersall. 2005. *The human fossil record, volume 4: Craniodental morphology of early hominids (genera Australopithecus, Paranthropus, Orrorin), and overview*. New Jersey: Wiley-Liss.

Authentication and Conservation in Archaeological Science

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Introduction

Authenticity is one of the most influential factors for determining the course of action of heritage in need of conservation. Determining exactly what constitutes a site or objects' authentic state can be problematic and challenging because there is not one history rather a series of histories and stakeholders to consider. Authenticity in conservation is guided by the ethics behind how a place or object should be perceived and protected.

Since the late seventeenth to early nineteenth century, when archaeology as a science developed in the "age of enlightenment," authenticity has referred to the material condition of something original and unique. For this period of Western cultural history, authenticity denoted a relation to genuine identity. The physicality (tangibility) of archaeology and the concept of successive strata served primarily for dating and proof process of authenticity. Archaeological objects unearthed within specific layers became recovered symbols of that historical occupancy. Collectors were known to refer to archaeological objects as ranging from genuine antiquities to imitations of high artistic merit and forgeries of little value. Early conservation treatments sought to retrieve the past through restoration or to bring an artifact back to an original condition. The degree of discernable restoration treatment could move an artifact up or down within this authenticity scale based on visual determinations and skill of the observer.

In the second half of the twentieth century, new technologies enabled tests (laboratory results) for determining authenticity through provenance and dating to accompany the previous role of strata or archaeological typology (documentation). Technical studies replaced the role of assessing aged decay and patina for assigning authenticity. Within Western conservation by the end of the twentieth century, interventions meant to "improve" were considered inauthentic.

Today, at its simplest, authenticity refers to the presence of original material. But authenticity is much more. A practical approach for assessing physical authenticity in conservation treatments may include four authenticities: materials, workmanship, design, and setting. Jokilehto (1993: 59–75) elaborates that treatment must maintain authenticity by maximizing retention of historical material and ensuring harmony with original design and workmanship and not allowing new additions to dominate over the original fabric but respecting the archaeological potential.

If authenticity is the ability to convey significance, then in archaeology, it is also context dependent because sites and their objects can have different meanings at different times, in different places and to different people. Lowenthal (1999) clarifies that this should include origin and

evolution and the recognition of multiple histories and stakeholders.

In addition, social value authenticity helps to clarify aspects of (value) spirituality or possibly sentimentality. Economic authenticity helps to clarify sustainability and development (tourism, trade, insurance, or market value).

Beyond these refinements, one sometimes hears reference to *an aura of authenticity* about a place or object. However, there are many examples that illustrate that rather than being an attribute, both aura and authenticity can be created. This conundrum is what makes the discussion of authenticity and conservation an interesting challenge for all concerned with the preservation and protection of sites, monuments, and objects of cultural heritage.

Definition

Cultural sites and objects are particularly vulnerable to deterioration due to their past utilitarian roles, postexcavation lack of maintenance, and continuous exposure to agents of decay. Unfortunately, warning signs that conservation is needed become visible after deterioration has already taken place. Some terms of condition that reflect a loss of accuracy include:

- Dilapidation or structural deterioration: a state of disrepair or nonfunction by misuse, neglect, or abandonment often resulting in loss of validity
- Dismemberment or fragmentation: a state of being divided, cut, torn, broken into parts, and resulting in loss of integrity
- Disfigurement or surface insecurity: a state of instability or vandalism, potentially resulting in loss of legitimacy
- Recreation or use of replacement parts: non-original components added to augment the structure using nonindigenous technologies and materials, potentially leading to loss of accuracy
- Disenfranchisement: heritage that is deprived of the traditions of community use and loss of accuracy or relevance

In practice, authenticity has a significant effect on our choices of conservation interventions (Jerome 2008: 4). Unfortunately, the word conservation has slightly different meanings for professionals working in the environment of built immovable heritage (sites, monuments, and structures) and professionals working with moveable object collections (in museums). Conventional uses of the terms related to conservation are included in Table 1.

The comparison of basic definitions of conservation, preservation, and restoration for immovable and movable heritage shows that the fields are not in sync. For heritage professionals dealing with sites and buildings, conservation is the umbrella term for the overall goal of the profession, while object conservators use the term preservation for this purpose. It is useful to note that in the United States, conservation does not typically apply to buildings, but to other cultural objects. Preservation for buildings and sites refers to the steps taken to achieve overall conservation, while objects conservators refer to the conservation methods needed to achieve overall preservation of artifacts, hence in the USA the difference in titles: preservationists (sites and buildings) and conservators (objects).

Though the working definitions for conservation and preservation differ between the fields, both definitions fall under the relatively new term heritage science which involves managing change and risk and maximizing social, cultural, and economic benefit not just today but in such a way that we can pass on to future generations that which we have inherited. Scientists carrying out heritage science research range across a number of physical and natural science disciplines and their applications, including archaeological science, building science, engineering and technology, computer science, conservation, environmental science, physics, chemistry, biology, engineering, and environment (House of Lords 2006: 2.21 and 3.17). Olsen (2001: 213) warns that at times heritage scientists assume that knowledge is open and available to all, but in reality it is the powerful nations that are the subjects of knowledge and the rest of the world is rendered as object.

Authentication and Conservation in Archaeological Science, Table 1 Terminology

Immovable (Sites and built environment)	Moveable (Objects)
Conservation: all efforts designed **to understand** cultural heritage monuments, groups of buildings, and sites of cultural value); know its history and meaning; and ensure its material safeguard and, as required, its presentation, restoration, and enhancement (World Heritage Convention. Article I)	*Conservation:* all **measures and actions** aimed at safeguarding tangible cultural heritage while ensuring its accessibility to present and future generations. Conservation embraces preventive conservation, remedial conservation, and restoration. All measures and actions should respect the significance and the physical properties of the cultural heritage item (International Committee on Museums-Conservation Committee)
Preservation: methods of maintaining the historical integrity of a building with limited alterations or additions; methods of stabilizing and preventing further decay (National Trust for Historic Preservation). This term is considered more specific than conservation	*Preservation:* the **protection** of cultural property through activities that minimize chemical and physical deterioration and damage and that prevent loss of informational content (American Institute for Conservation). This term is considered to be broader than conservation
Restoration: methods used in rebuilding buildings and structures with **historically accurate materials** to achieve historical authenticity in keeping with a particular time period or event. There is a focus on maintenance of intact historic features, replacement of lost features, and removal of inappropriate features (US Secretary of the Interior's Standards for the Treatment of Historic Properties, 1995)	*Restoration:* all actions directly applied to a single and stable item aimed at facilitating its appreciation, understanding, and use. These actions are only carried out when the item has lost part of its significance or function through past alteration or deterioration. They are based on respect for the original material. Most often such actions modify the appearance of the item. Examples of this restoration are retouching a painting, reassembling a broken sculpture, reshaping a basket, filling losses on a glass vessel (International Committee on Museums-Conservation Committee). In the United States, it refers more specifically to the treatment procedures intended to return cultural objects to a known or assumed state, often through the **addition of non-original material** (American Institute for Conservation)
Reconstruction: is the process of depicting, by means of **new construction**, the form, features, and detailing of a nonsurviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location (US Secretary of the Interior's Standards for the Treatment of Historic Properties)	*Reconstruction:* is less commonly used with objects but may refer to an aspect of the conservation or restoration process where new materials are used to create a replacement part of the structure (i.e., a missing chair leg) or if collapsed parts are reassembled
Rehabilitation: actions that emphasize the **retention and repair** of historic materials on deteriorated property with a focus on those materials, features, finishes, spaces, and spatial relationships that, together, give a property its historic character (US Secretary of the Interior's Standards for the Treatment of Historic Properties)	Term not commonly used
Anastylosis: reconstruction or reassembly of collapsed or fallen parts into their original place and when necessary, incorporating new materials (World Heritage Sites)	Term not commonly used

Historical Background

"Each generation views authenticity in a new guise, reflecting its new needs for truth, new standards of evidence, and new faiths in the uses of heritage" (Lowenthal 1999). A coherent philosophy for conservation began to emerge in the last quarter of the nineteenth century. At this time, manuals for the conservation of ancient buildings were developed, and authenticity was identified as a concern. By the 1920s, Marshall (1923: 10) wrote: "Although there are many ancient buildings whose state of disrepair suggests at first sight a renewal, it should never be forgotten that their *historical value is gone when their authenticity is*

destroyed, and that our first duty is not to renew them but to preserve them."

Philosophies, treaties, various heritage charters, and conventions were organized and laid the foundation for the advancement of doctrine, practice, and dialogue in conservation. Lowenthal (1999) summarizes that the focus has moved from possession of authenticity to an "authenticity of materials and form, of structure and process, and of aim and intent, moving from exclusive concerns with buildings and artifacts to broader considerations of landscape and nature, folklife and folklore, ideas and beliefs."

Highlights from some of the important international gatherings that have defined conservation for archaeological sites and monuments are outlined below.

The Athens Charter for Restoration of Historic Monuments, organized by the International Museums Office in 1931, established basic principles for an international code of practice for conservation. It recognized a common responsibility to safeguard monuments for future generations as our duty to hand them on in the full richness of their authenticity. Reference is made that "the work of consolidation [use of modern materials such as reinforced concrete] should whenever possible be concealed in order that the aspect and character of the restored monument may be preserved" (Article 4) and that "the architects and curators of monuments should collaborate with specialists in the physical, chemical, and natural sciences with a view to determining the methods to be adopted in specific cases" (Article 5.1).

The Venice Charter for the conservation and restoration of monuments and sites, organized by the International Congress of Architects and Technicians of Historic Monuments in 1964, established that "it is our duty to hand them [ancient monuments] on in the full richness of their authenticity" (Preamble) and that "ruins must be maintained and measures necessary for the permanent conservation and protection of architectural features and objects discovered must be taken" (Article 15). This Charter also identified conservation judgments as necessarily relative and contextual as opposed to a belief in international absolutes.

The guidelines developed in Venice in the 1960s became problematic when authenticity in heritage went beyond the stone remains of past structures that have inherent relative permanence. Consideration of rebuilding to preserve traditional techniques and forms of living and changing cultures or those created from more ephemeral (i.e., organic) materials challenge the call for permanent conservation and protection in Article 15.

The Burra Charter was first adopted in 1979 and has been revised several times. In 1999, it became known as Burra: The Australia ICOMOS Charter for Places of Cultural Significance. It established that "places of cultural significance must be conserved for present and future generations" (Preamble). "Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects. Places may have a range of values for different individuals or groups" (Article 1).

The Nara Document on Authenticity, organized by the World Heritage Committee in 1994, opened the world to discussions involving the essential role of understanding of authenticity during the scientific study of cultural heritage. It expanded the range of values for authenticity to accommodate the mainstream Japanese conservation practices of dismantling, repair, and reassembly. The broader framework for authenticity analysis developed at Nara inspired regional meetings that were held in Africa, Europe, the Americas, Australia, and China. The Nara Document establishes that "the conservation of authenticity contributes essentially to the clarification and illumination of the collective memory of humanity" (Article 4) and "judgments of values and authenticity must be considered and judged within the cultural contexts to which they belong" (Article 11).

The Declaration of San Antonio, organized by ICOMOS in 1996, suggested expanding proofs of authenticity to include reflection of true value, integrity, context, identity, use, and function. It states that "the authenticity of our cultural resources lies in the identification, evaluation, and interpretation of their true values as perceived

by our ancestors in the past and by ourselves now as an evolving and diverse community" (that coexist but often assign different values to them) (Article 1) and "when an archaeological site is no longer used by the descendants of [its] builders, the material evidence of the site provides the most direct link to the past which makes it possible for the present inhabitants to perceive and interpret the sites meaning and value" (Article 5).

The Zimbabwe Meeting Recommendations in 1999 state: "In the context of the World Heritage Convention, the notions of authenticity and integrity cannot be expressed in isolation.... The meaning of the heritage is usually a combination of values created by people. These values include norms and belief systems, as well as material and technological aspects. In most instances culture and nature are inseparable." Basically, it suggests that language, indigenous knowledge, skills, and technology should participate and be documented in preservation and management of heritage. Munjeri has clarified that "in traditional African societies, it [authenticity] is not based on the cult of physical objects 'the tangible' and certainly not on condition and aesthetic values.... The solution lies in recognizing that indigenous communities are at heart, 'ecosystem people' integrally linked to the ecosystem they inhabit. They are part of the integrity equation" (Munjeri 2001: 18–9). This truly complicates the equation by expanding the boundaries of authenticity into the slippery slopes of landscape and identity.

The World Heritage Operational Guidelines (2005, Article 81) provides insight into authenticity and includes a list of information resources: form and design, materials and substance, use and function, traditions and techniques, location and setting, spirit and feelings, and other internal and external factors such as management systems, language, and other forms of intangible heritage. It addresses the reconstruction of archaeological remains or historic buildings or districts as acceptable only on the basis of complete and detailed documentation and recognizes the role to some extent of conjecture (Article 24).

The conservation of objects is a smaller aspect of archaeology than buildings, sites, and monuments, and there are no doctrines, charters, and declarations to illustrate historical perspective. By the end of the nineteenth century, there was an increasing recognition of the importance of preservation for antiquities and a justification for the creation of conservation handbooks. Most provide explanation for deterioration and treatment processes, and the use of before and after photographic documentation is identified in some. By the mid-twentieth century, handbooks for collectors, archaeologists, and museum curators were developed because appreciation and study mandated that objects be cleaned, restored, and repaired. By the last quarter of the twentieth century, an intensification of laboratory training was recommended for the conservation of objects.

The conservation of moveable historic and artistic objects is guided by various codes of ethics developed by professional conservators in numerous countries. These codes are statements of values, standards, and aims that guide the conservator through a complex range of issues. Beginning in the mid-twentieth century, professional organizations for the conservation of historic and artistic works were formed to break with the tradition of the craftsman-restorer. The codes provided generalized and idealized standards of behavior for the new professionals of the later twentieth century who owe their professional training to formal graduate studies devoted specifically to the field of conservation.

Most codes of ethics continue to focus on physical or tangible cultural heritage. For example, the American Institute for Conservation code requires that "statements about age, origin, or authenticity should be based on the physical evidence derived from an object, rather than on opinions, and should include an explanation that scientific data alone cannot provide definite attributions."

Conservators are governed by a respect for the integrity of the object or its unmarred, unimpaired, or uncorrupted condition. Some codes specifically clarify that integrity may include physical, historic, and aesthetic integrity, while others have added a reference to conceptual integrity. The American Institute for Conservation's code calls for "an informed respect for cultural property, its unique character and significance, and the people or person who created it." An important aspect of the Canadian Association of Conservation code is an emphasis placed on

"full documentation without fraudulent intent... the presence and extent of any restoration or reconstruction must be detectable, though they need not be conspicuous." The historian Cesare Brandi is often credited with introducing modern principles for the conservation of art that led to a rejection of imitative restoration and heightened respect for the traces of time and concepts of authenticity in 1963. This concept respects the original and present contexts in the process of reintegration while making the intervention discernable at close range.

In addition to the unwritten "six foot, six inch" rule, meaning a restoration should be discernable at six inches but not at six feet, there is the principle of reversibility that has been a long-standing focus of the conservation codes of ethics. It refers to the capacity of a treatment to be undone or reversed, at a later date, without resulting in damage or change to the object. This is inclusive of any materials such as adhesives or restorations that may be added. Despite numerous commonalities in theoretical approach and practice, the needs of different materials have led many specialist conservators to develop different attitudes and approaches to treatment. Conservators of moveable objects tend to specialize by divisions based on material composition (ceramics, wood, glass, metal, painting, paper, or stone). Other times, the specialties represent types of objects (paintings, books, textiles, sculpture, or architecture), or they may refer to the academic discipline that objects broadly belong to (archaeological, ethnographic, decorative arts, historical, or fine arts) or to a type of material function (furniture, costume, or musical instruments).

At the end of the twentieth century, contexts of value began to influence the conservation of moveable objects. Important examples of change include (1) the concept of a single standard toward conservation treatment (the highest and most exacting standard of treatment for each work) was determined to be impractical, (2) the role of cultural sensitivity that allows acknowledgment of indigenous feelings and the connectedness of different values and priorities toward conservation became significant, and (3) a caution about the removal of dirt and residues because analysis may identify past uses, signature a provenance, or provide a date or place of origin.

Also, it is important to point out where discussions of authenticity do not appear. For instance, it is not mentioned in the 1990 Federal Regulation 36 CFR 79: Curation of Federally Owned and Administered Archaeological Collections, which was promulgated to provide minimum standards for the long-term management and care of archaeological collections, including associated records and reports. Notably, the regulations consider actions that need to be taken for both new and existing collections. Likewise, the Salzburg Declaration of 2009 on the Conservation and Preservation of Cultural Heritage established a new collaborative platform to more effectively preserve the world's cultural heritage, but it does not specifically discuss authenticity. Perhaps the assumption that modifying an object should be done for the sake of authenticity is problematic because all conditions are equally authentic (Muñoz-Viñas 2005: 91–113).

Key Issues/Current Debates

Conservation, as the overall goal for heritage science, has evolved from how to conserve to why conserve to for whom we should conserve. Archaeological sites, monuments, and objects may hold values that conflict with one another. Authenticity is critical to consider in conservation, but it is relative, and as a term it has different meanings in different contexts.

Conservation has focused on the material qualities of archaeological remains to meet the test of authenticity and to implement treatments that arrest and stabilize the process of decay. What was seen as objective criteria, relating to design, material, and workmanship, was used to establish the authentic character for treatment. This works well when cultural heritage monuments and objects belong to a society that has ceased to exist, because faithfulness to original objects, materials, contexts, and aims become a shared common denominator (Lowenthal 1999).

Considering authenticity to be a condition in relation to context means that the revealing of relevant values is also a basis for treatment. But basing authenticity on judgments of intangible value is subjective. Values are subject to cultural and educational processes that may change over

time. Also over time attempts to conserve cultural contexts and aims become more relative and subject to interpretation and negotiation, especially when multiple stakeholders are involved.

Thus, two of the important issues that have emerged regarding authenticity and conservation involve (1) concerns that over-restoration or reconstruction of the tangible original should not destroy value and integrity as in the Venice Charter and (2) concerns that link to intangible cultural values of heritage, which have been maintained over time, should be a primary consideration for meaning and validity as in the Nara Document.

Conservation can claim to provide authenticity through analysis and technical study, but it can also inadvertently remove material authenticity by cleaning away critical evidence. In fact, scientific analysis in the course of conservation is better at producing evidence than it is at proving authenticity. Examples include dating techniques applied to a composition material or elemental analysis of materials known for being indicative of a particular group (based on a body of reference material) or that the wear patterns on an object surface are human made. Continuous developments in science and changes in conservation treatments can complicate investigations into authenticity for ancient sites, monuments, or finds. For instance, Myrberg (2004) summarizes the role of authenticity in ancient monument preservation and provides a problematic example involving a labyrinth on the Swedish archipelago. He asks: "What is a true monument of the past? Many monuments have been reused over the centuries, rebuilt, added to or copied – processes that continue into the present… should their use or even their construction in the present be considered less meaningful than their use or construction in, say, the eighteenth century or the Neolithic?"

An authentic value of inspiration may also be important to conservation particularly when it is linked to artistic, historic values. Brajer (2009) illustrates a confusing history of many re-restorations for wall paintings in a Danish church beginning in the nineteenth century due, in part, to the use of medieval techniques and materials and innovative tricks to achieve the appearance of original wear and tear. The resulting condition was a hotchpotch of overlapping repairs, reconstructions, and over-paintings, presenting a picture of repeated disintegration and partial recreation. A growing consciousness regarding the meaning behind the previous restoration efforts helped the conservators establish a link between value (the source of meaning) in treated objects and the authenticity manifested in them (integrity of meaning).

As conservators learn to look beyond the context of original materials to cultural dialogues and engagements or dialectics, they are better able to deal with interpretative issues that involve complex arrays of contexts, sets of data, or multiple stakeholders. Conflicts such as treatments that conserve the research interests of archaeology with tourism or public values can be negotiated. For example, when the Lucy hominid remains were selected for a traveling exhibition, research scientists were concerned about object safety and their loss of research access. Despite the fact that public visitors to the National Museum of Ethiopia had for years been inspired by a display of a cast and that they thought was original, organizers for the traveling exhibit were convinced that only the real Lucy fossil would be adequate to generate tourism dollars. Conservation compromises allowed the Lucy remains to travel safely, to be handled only by her keeper, to be available to both researchers and museum visitors, and to bring home financial reward.

International Perspectives

International perspectives on authenticity and conservation focus a great deal on notions of tangible and intangible aspects, global and local expertise, and universal and particular principles. The founding of the International Council of Monuments and Sites (ICOMOS) in 1965 by UNESCO initiated a global network of professionals devoted to heritage conservation. The World Heritage Convention of 1972 pledged to safeguard heritage resources deemed to be of *universal* value to all of humanity. Various philosophies, treaties, heritage charters, and conventions have laid the foundation for conservation practice and dialogue. "Imbalances between [in] different regions and types of heritage have led to different approaches to conservation, fueling tensions and undermining exchanges of

ideas and experiences" (Luxen 2004). Today, the relevance of these documents, which have moral rather than legal authority, is sometimes contested, but they serve to remind and challenge us.

Throughout the world, heritage conservation with value based on original fabric is very different from heritage with living or great spiritual value. Dialogue between professionals from different cultures around the world continues to improve the understanding and practice of conservation. Various international meetings in Africa have identified the importance of culture and nature, while in the Far East, the importance of traditional crafts skills as cultural heritage conservation has been acknowledged with the concept of "living cultural treasure." In the Americas, a common indigenous concept of authenticity suggests that "any object or structure reproduced, replicated, repaired, stabilized or restored by descendants of the original craft persons or members of the same ethnic party loses no integrity" (Ladd 1999: 22). In other words, "a structure can be authentic if it closely resembles an ancient structure in form and design or if its spirit and feeling is that of an ancient building" (Holtorf and Schadla-Hall 1999: 235).

Conservators working with archaeological objects in museum collections often find decisions regarding appropriate conservation treatment to be difficult. If values can be aesthetic, historic, scientific, social, or spiritual and may reflect past, present, or future generations, then objects of similar type including ancient originals, historic or honest copies, recent replicas, forgeries, or deceptive replicas created with some original parts married from different objects may all be authentic. Examination and analysis can detect materials of construction; methods of technological production; natural corrosion, residue, salt, or other accretion products versus chemical finishing, false patina, or modern adhesive and paint products; and typical wear marks versus machine tool marks. Based on conservation studies, objects may retain a value but have their authenticity, and cultural significance reassigned. Just as a fragmentary object condition may be an argument for authenticity, replicas can be born out of demand for continuing tradition (sometimes referred to as heritage craft), a lack of the original, or the need to fulfill market demand. Additionally, restoration techniques that include repainting may come to represent an important history for a piece. The concept of authenticity continues to be a fundamental value in the decision making in the conservation and interpretation of archaeology, new approaches towards the display and use of collections are challenging conventions, making the roles of curators, conservators, and archaeologists increasingly complex (Gordon et al. 2014).

Conservation is still challenged in how to include and evaluate the role of authenticity in treatment decision making, how to reconcile the difference between scientific conservation and the revival of heritage craft, and how to allocate time and funding for the conservation of spectacular monuments and objects at the expense of less spectacular ones. Several authors (Layton et al. 2001; Muñoz-Viñas 2005; Stanley-Price and King 2009) have offered thoughtful discussion on these subjects. Justifications for reconstruction (returning a place to a known earlier state by the introduction of new material into the fabric) would rarely meet the requirements of the Charters that they are based on but can and do satisfy a variety of vital stakeholders nonetheless.

Future Directions

Local knowledge and public participation have become recognized components in site preservation efforts. Avrami (2009) explains that social theorists offered their application to planning, which resulted in "broader participation of stakeholders, challenged top-down expert-driven models, and helped to transform planning into a more social and contextually-responsive endeavor."

The stewardship of sites and monuments is very tied to subjective relationships between people and places. The repainting treatment project of the Kamehameha statue in Hawaii is an example of how a conservation project could be directed with community-centered goals. The first goal included standard conservation procedures, except they were based on the community's decision about whether to paint or gild the statue and how to train local community members to effectively maintain the sculpture into the future. The

second goal was to establish a link to future regional development with traditional arts, heritage preservation, and community identity. The use of participatory conservation offers a model for bringing this knowledge into play-making the conservation process a vehicle for public engagement and as a tool for critical discourse about how conservation represents the past (Wharton 2002). Measures of monitoring treatment relevance, improving management frameworks, and humanizing documentation may also benefit from the inclusion of various stakeholders.

Finally, repatriation rights for sites and objects for indigenous groups are but one example of how decisions of conservation can vary for different people at different times. A critical aspect of the repatriation process in the United States is the role of consultations in determining control, treatment, and disposition of human remains and sacred objects and is outlined in 43 CFR 10.5, 10.8 (a), and 10.9 (b). The repatriation process can be subjective and political, and it can actually be an appropriate reverse of conservation when objects and human remains excavated from a burial are reinterred together, or when sacred objects are left to naturally deteriorate as intended.

Sullivan (1998: 8) aptly identifies two important issues that are relevant for all future discussions: "(1) that over-restoration or reconstructions not destroy the value for which the site is listed as a World Heritage Site and (2) that the idea of authenticity is indissolubly linked to cultural value and only has meaning and validity in this context. Thus an appropriate treatment to conserve authenticity will vary depending on the primary cultural values of the place."

Authenticity in conservation has come to require a sense of respect for the place, the indigenous people, and the local history and implies a means of linking to the future as part of a flow of time. Stressing an understanding of knowledge rather than collecting, testing, and presenting facts is important for the integrative stewardship of sites or the preventive conservation and management of collections. National symbolism, continuing function or reuse, education and research, tourism promotion, and site preservation are all linked to sustainability of cultural heritage. Debate over how best to conserve material culture will continue. Some will argue for minimal intervention, while others will argue for extensive restoration and active use of cultural heritage. The recognition of cultural relativism and contested meanings embedded in material objects has formally entered conservation literature (Odegaard 1995; Clavir 2002).

Significant Charters and Declarations for Conservation

Athens Charter for Restoration of Historic Monuments, 1931. http://www.icomos.org/docs/athens_charter.html

Venice Charter for the Conservation and Restoration of Monuments and Sites, 1964. http://www.international.icomos.org/charters/venice_e.htm

36CFR60.4 US National Park Service Regulations for National Register of Historic Places (National Historic Preservation Act of 1966) last revised 2010. http://www.nps.gov/nr/publications/bulletins/nrb38/nrb%2038%20page%204.htm

Burra Charter; the Australia ICOMOS Charter of Places of Cultural Significance, 1979. http://www.icomos.org/burra_charter.html

Nara Document on Authenticity, 1994. http://www.international.icomos.org/naradoc_eng.htm

The Declaration of San Antonio, 1996. http://www.icomos.org/docs/san_antonio.html

The Zimbabwe Meeting Recommendations, 1999. http://www.africa2009.net/common/reports/r-zimb00.pdf

World Heritage Operational Guidelines, 2005. http://whc.unesco.org/archive/opguide05-en.pdf

Salzburg Declaration on the Conservation and Preservation of Cultural Heritage, 2009. http://www.imls.gov/pdf/SalzburgDeclaration%20.pdf

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Authenticity in Archaeological Conservation and Preservation

References

Avrami, E. 2009. Heritage, values, and sustainability. In *Conservation; principles, dilemmas and uncomfortable truths*, ed. A. Richmond and A. Bracker, 177–183. Oxford: Butterworth-Heinemann.

Brajer, I. 2009. The concept of authenticity expressed in the treatment of wall paintings in Denmark. In *Conservation; principles, dilemmas and uncomfortable truths*, ed. A. Richmond and A. Bracker, 84–99. Oxford: Butterworth-Heinemann.

Clavir, M. 2002. *Preserving what is valued; museums, conservation, and first nations*. Vancouver: University of British Columbia Press.

Gordon, R., E. Hermens, and F. Lennard, eds. 2014. *Authenticity and replication: The 'real thing' in art and conservation*. London: Archetype Publications.

Holtorf, C., and T. Schadla-Hall. 1999. Age as artefact: On archaeological authenticity. *European Journal of Archaeology* 2: 229–247.

House Of Lords. 2006. *Science and heritage*, 9th report of session 2005–06 (HL paper 256). London: The Secretary Office Limited.

Jerome, P. 2008. An introduction to authenticity in preservation. *APT Bulletin* 39: 3–7.

Jokilehto, J. 1993. Treatment and authenticity. In *Management guidelines for world heritage sites*, ed. B. Feilden and J. Jokilehto, 59–75. Rome: ICCROM-UNESCO-ICOMOS.

Ladd, E. 1999. The A:Shiwi (The Zunis), case study B. In *Authenticity in the conservation and management of the cultural heritage of the Americas. Proceedings of the Interamerican symposium*, ed. G. Araoz, M. MacLean, and L. Kozak, 19–24. Washington, DC: US/ICOMOS.

Layton, R., P. Stone, and J. Thomas. 2001. *Destruction and conservation of cultural property (One world archaeology)*. London: Routledge.

Lowenthal, D. 1999. Authenticity: Rock of faith or quicksand quagmire? *GCI Newsletter* 14: 5–7.

Luxen, J.L. 2004. Reflections on the use of heritage charters and conventions. *GCI Newsletter* 19: 4–9.

Marshall, J. 1923. *Conservation manual*. Calcutta: Government of India Printing.

Moshenska, G. 2015. Curated ruins and the endurance of conflict heritage. *Conservation & Management of Archaeological Sites.* 17 (1): 77–90.

Munjeri, D. 2001. The notions of integrity and authenticity: The emerging patterns in Africa. In *UNESCO authenticity and integrity in an African context*, 14–19. Paris: UNESCO.

Muñoz-Viñas, S. 2005. *Contemporary theory of conservation*. Oxford: Elsevier Butterworth-Heinemann.

Myrberg, N. 2004. False monuments? On antiquity and authenticity. *Public Archaeology* 3: 151–161.

Odegaard, N. 1995. Artist intent; the role of contextual and historical study in the conservation of material culture. *Journal of American Institute for Conservation* 34: 187–193.

Olsen, B. 2001. The end of history? Archaeology and the politics of identity in a globalized world. In *Destruction & conservation of cultural property*, ed. J. Layton, R. Stone, and G. Peter, 42–55. London: Routledge.

Stanley-Price, N., and J. King, eds. 2009. *Conserving the authentic; essays in honor of Jukka Jokilehto*. Rome: ICCROM.

Sullivan, S. 1998. Technical issues. In *Discussion papers for the Bureau of the World Heritage Committee 22nd session, Paris, 22–27 June*, 1–12. Paris: UNESCO.

Wharton, G. 2002. Conserving the Kamehameha I monument in Hawai'i: A case study in public conservation. In *Preprints of the 13th Triennial Meeting Rio de Janeiro, September 22–27, 2002 of International Council of Museums Conservation Committee (ICOM-CC)*, vol. 1, 203–208. London: James & James Ltd.

Authenticity and Pastness in Cultural Heritage Management

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Brief Definition of the Topic

Authenticity is about what you can trust to be what it purports to be, and cultural heritage is about what evokes the past in a given social context. Consequently, authentic cultural heritage is about what you can trust and evokes the past in society. This quality is often assessed by various ways of determining the age of the heritage in question. But dating does not sufficiently take into account the perceptions of the audience. For something to evoke the past in a given social context, it does not have to be old. Instead of focusing on age, we must therefore focus on the perceived quality of being of the past, as it is the presence or absence of this perception that determines whether or not something is trusted to evoke the past in society.

The Austrian art historian Alois Riegl's (1857–1905) argued in a classic essay on "The Modern Cult of Monuments" that the visual perception of traces, such as corrosion, patina, and general wear and tear, "testify to the fact that a monument was not created recently but at some point in the past" and thus confer age value on the

monument (Riegl 1982 [1903]: 32). What becomes apparent in age value is not, however, the historical origin of a given object but its pastness. Pastness denotes the perceived quality of something to be of the past (Holtorf 2013, 2017). The presence or absence of pastness is not related to an object's physical properties and age but the result of a particular perception and, as such, firmly situated in a given social and cultural context (see also Dawdy 2016). A ruin may possess pastness because its walls are in an obvious state of decay, irrespective of when it was built. Similarly, an object on display in a glass case as part of a historical exhibition may be considered of the past because a label or guide is saying so. If we want to understand and manage cultural heritage with regard to all the important roles it fulfills in contemporary societies, an important question for future research is under which conditions human audiences perceive such pastness and whether or not the concept has global validity.

Holtorf (2017) argued that there are three specific criteria of which at least one, but better several, needs to be fulfilled for pastness to be present:

- Pastness requires physical clues: an object acquires age value through material traces of wear and tear, decay, and disintegration.
- Pastness requires correspondence with expectations: audiences need to recognize objects of the past as such.
- Pastness requires a narrative: a plausible and meaningful story has to link past origin and contemporary presence of a given object.

Instead of asking whether a given object originated in the past and, if so, when, we should henceforth pose the question whether it possesses pastness, in other words whether it is trusted by relevant audiences to evoke the past in society. Established distinctions between authentic and fake, original and copy, past and present, old and new, and other and same are not helpful for understanding the character and function of heritage in the contemporary world and, therefore, need to be overcome. Recognizing the significance of pastness means that there is a need for heritage studies and the professional heritage sector to concern themselves with a much wider range of objects and phenomena in society than has conventionally been the case.

Cross-References

- ▶ Age Estimation
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Experiencing Cultural Heritage
- ▶ Heritage: Public Perceptions

References

Dawdy, Shannon Lee. 2016. *Patina: A profane archaeology*. Chicago: University of Chicago Press.

Holtorf, C. 2013. On pastness: A reconsideration of materiality in archaeological object authenticity. *Anthropological Quarterly* 86 (2): 427–443.

Holtorf, C. 2017. Perceiving the past: From age value to pastness. *International Journal of Cultural Property* 24 (4): 497–515.

Riegl, Alois. 1982. The modern cult of monuments: Its character and its origin [1903]. *Oppositions* 25: 21–51.

Authenticity and the Manufacture of Heritage

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Introduction

The desire for authenticity pervades all facets of modern life. Authenticity, accordingly, constitutes an important site on which tradition and modernity have been debated and reformulated. The recovery of tradition – the cataloguing of the

past through material, social, and cultural forms – has allowed narratives of modernity as a future-oriented enterprise imaginable. As illuminated in writings on the interlocking pair of tradition and modernity (e.g., Mitchell 1991; Wright 1991), tradition came into being only when it was imagined as a defining complement of modernity not only temporally – with tradition linked to the past and modernity with the future – but also spatially through the built environment (see Roy 2004).

If authenticity is an important discursive site of tradition and modernity, the built environment serves as an actual terrain on which the recovery of tradition, on one hand, and the elaboration of modernity, on the other, have been displayed. Nowhere is the recovery of tradition more apparent than in defining the meaning of heritage. Like tradition, heritage implies continuity not only with the past but with a past determined to be historically suitable. Yet as Eric Hobsbawm and Terence Ranger (1983) 1) have stressed, "traditions" that "appear or claim to be old are often quite recent in origin and sometimes invented" as is captured in their concept, "invented traditions." The notion of invented traditions suggests that the distinction between tradition and modernity is itself constructed and that authenticity as a proxy for originality or as a marker of differentiation must be questioned.

Extending the concept of invented traditions to the built environment, this entry examines how heritage sites that may appear authentic are oftentimes manufactured in the service of the tourism economy. Specifically, it looks at how heritage itself has become a commodity that is valued through circuits of travel and consumption. Tradition and heritage, recovered and restored as well as invented and manufactured, have been central to the making of the nation-state and in constructing nostalgia-based notions of identity. From an economic standpoint, heritage sites have become invaluable sources for communities, cities, and nations through which to cultivate symbolic capital and accumulate profits. As heritage sites become increasingly commodified and commercialized under late capitalism, the authenticity of heritage has become a taken-for-granted concept whose meanings are assumed but not specified.

The built environment, or "space" broadly conceived, has been identified as part of the web of social experience crucial to forging cultural consciousness (Harvey 1990). When viewed at the intersection of tradition and built form, the built environment has been understood as a "system of settings" or a "cultural landscape" (Rapoport 1989). These conceptualizations highlight the built environment's crucial role as a mediator of values, symbols, power relations, and culture. Rooted in the interdisciplinary perspectives of architectural history and urban studies, this entry focuses on the meaning of authenticity and the manufacturing of heritage evident in the proliferation of placemaking practices and the revalidation of locality as it relates to two shifts. The first shift is economic with tourism, a central vehicle for the acquisition of culture and the experience of authenticity. Tourism generates economic and symbolic values for localities vying for positions in a global order of places. Capitalism, with its infinite ability to commodify everything, has engendered new regimes of production and consumption where commodities are no longer manufactured goods but cultural landscapes, among them heritage environments. The second shift is discursive. Tourism both advances and depends on the trope of authenticity. As evidenced in former colonial cities that are refashioned for global tourism, for example, the marketing of such sites draws upon and extends older myths on the authenticity of "the Orient" or "Africa." The production of these landscapes, cultural commodities under contemporary capitalism, has transformed space and history and made them spectacular. Heritage, by extension, can be understood as a spectacle on display where the phantasmagoria of authenticity is also the source of its profitability (AlSayyad 2001).

Definition and Historical Background

Genealogies of a Concept

Built environments unite capitalism and culture as exemplified in landscapes that are packaged for consumption in the global economy of tourism. In such regimes of tourism, heritage is manufactured

for consumption. Manufactured heritage has become a new norm in tourism development with entire built environments constructed to cater to and order difference. Paradoxically, the advance of mass tourism has led to the dismantling of actually existing traditional places and historic sites. Because the built environment is both spatial and visual, the trope of authenticity has been central to a system of classification and representation of place in these cultural landscapes. Authenticity conditions knowledge of a place and underwrites the values that are brought to bear upon this knowledge. That heritage is manufactured is to suggest that heritage, culture, and tradition are part of the modes of production not of the industrial economy, but of the cultural economy. Rather than goods that are produced to be consumed, heritage along with the signs and representations of culture is manufactured for consumption. Heritage as a commodity aligns with its root definition as property that is owned.

The purpose of this evaluation of the manufacture of heritage is not to expose an assumed artificiality or constructedness of heritage per se. Rather, the proliferation of manufactured heritage necessitates a look at how heritage is fashioned. Part of this fashioning is the language of authenticity, whether for its symbolic power or in the ways authenticity as an idea imparts value to the traveling experience. Etymologically, authenticity is from the Greek word *authentikos* or genuine. It denotes a state of being in accordance with fact or reality, truth in substance, or in origins and authorship. In social life, however, authenticity functions as a keyword. According to Nancy Fraser and Linda Gordon (1994), following Raymond Williams (1976), keywords used to describe social life are "active forces in shaping it." By underscoring the constitutive dimension of language, Williams shows how keywords are sites through which social experience is mediated and defined. Earlier, Theodor Adorno (2003 [1964]) cautioned against the allure of semantic games that compromise the task of critical thought. The "fact that the words of the jargon sound as if they said something higher than what they mean. . .the terms of the jargon of authenticity are. . .words that are sacred without sacred content" (Adorno 2003 [1964]: 6). Directed at existentialist philosophers who relied on authenticity as a key trope to critique society's values, Adorno stressed the ideology of language in what he called the "jargon of authenticity." For Adorno, jargon was like an "aura." Following Walter Benjamin, an aura refers to a "strange weave of space and time: the unique appearance or semblance of distance, no matter how close it may be" (Benjamin 2005 [1931]: 518) and provides a means to understand the possibilities of authenticity yielded by new cultural forms.

In the study of the built environment, authenticity is both constitutive in the sense elaborated by Williams and ideological in the way stressed by Adorno. As a keyword, authenticity has held a dialectical hold over the field of heritage studies in its ability to shape the discourse as well as name one of its key premises. As a jargon, authenticity is used extensively in heritage debates, though with limited analytical utility. Authenticity is often treated as a state of being or as a fundamental characteristic inhered in the built environment. Authenticity ascribes value to heritage or those buildings, landscapes, and monuments historically validated and contextually valued through their transmission across generations. Conversely, built heritage is assumed to be authentic as a space that instantiates history or heritage that displays the past from the position of the present. Indeed, authenticity occupies a paradoxical position in that odd coupling, "authentic heritage." The yoking of these two terms – authenticity and heritage – renders "authentic" an empty signifier or exposes its redundancy specifically when the term "heritage" is unpacked.

Heritage, which derives from the Old French meaning to inherit, denotes property that is valued and transmitted across generations. This ascription of value is crucial. Heritage, whether in the form of objects, traditions, or material culture, acquires its value from a history established through documentary evidence as well as through a set of authorized narratives. For travelers, the authenticity of tourism imparts "distinction" in the sense outlined by Pierre Bourdieu (1984) to those who "consume" heritage sites, exotic locales, and faraway destinations. Bourdieu's focus on the

political dimension of consumption suggests that tourism is one of many strategies used by social groups to maintain and reproduce class power and privilege.

The "interpretative turn" (Rabinow and Sullivan 1987 [1979]) in the social sciences was an epistemological as well as methodological shift away from positive science to a hermeneutic approach in the analysis of human practices, discursive strategies, and systems of knowledge. Decades later in 2003, a similar turn took place when UNESCO (the United Nations Educational, Scientific and Cultural Organization) set out to include "intangible heritage" in its definition of cultural heritage. UNESCO has long ignored the political dimension of culture appealing to culture's universality. In expanding the meaning of heritage, the UN agency expanded its original mandate as a steward of culture. Following its reclassification, intangible heritages – those immaterial practices such as oral traditions and performing arts – were deemed to have equal claim to heritage status as much as tangible heritage or buildings, monuments, and objects that have long served as the core of heritage.

The distinction between intangible and tangible heritage relies in part on the trope of authenticity as well as the difference of materiality. But what is equally at play in this expanding category of heritage is the nexus of power and knowledge – experts in planning, preservation, and architecture as well as in history and anthropology who are able to recover places, norms, and customs and categorize them. Such categorization suggests that authenticity is not an essence or a thing, but rather contextually driven if not malleable. Places and objects are not inherently authentic. Rather, heritage and authenticity are interpretative categories with certain icons of visibility – the monument or the landscape – that are part of multiple systems of significance, practice, and meaning.

Before going into greater discussion of the manufacture of heritage, it is important to situate the emergence of heritage as part of an emergent cultural consciousness. This desire for knowledge and culture was institutionalized through specific mediums that are central to heritage preservation today – mediums based on specific formalized apparatuses of intelligibility. Among these institutions of intelligibility, codified through colonialism, have been the museum and the world exhibition. These two institutions reflect a nexus of power and knowledge over place that in turn legitimated the colonial enterprise. The museum was part of the classificatory system of the colonial state that functioned as a "pictorial census" (Anderson 1991 [1983]) or a means of governing through categories of identity that allowed for culture to be fixed to a delimited locale or territory. The world exhibition was another institution through which culture – through its visibility – was given object status. These apparatuses continue to be relevant today.

Key Issues

From Colonialism to Global Capitalism

As outlined in AlSayyad (2001), heritage can be contextualized within three historical moments. The first corresponds to late colonialism during which interest in indigenous heritage became initially catalogued and classified. The second period followed decolonization in the period of post-colonial nationalism during which newly emerging nation-states used heritage and authenticity as markers, paradoxically enough, to assert a modern identity. The last is this era of twenty-first-century global capitalism where heritage production has become a new frontier of accumulation, placemaking, and positioning. The periodization below serves to illuminate relevant debates rather than to indicate strict historical brackets. In what follows, this entry examines the intersection of authenticity and heritage through the lens of the built environment. The manufacture of heritage can be considered the aesthetic organization of space-history under the demands of modernity. All heritage is manufactured in the way that all traditions are invented. Heritage must also be seen as the articulation and management of difference and as a preoccupation with defining a position and place in a globalizing world. The concern here is with the ways in which historical knowledge is not only mediated through something called heritage but how it is mediated through space, that is,

in built form. This requires moving away from a normative reading of heritage as a set of truths and essences but rather as social constructions and systems of representation that make claims to truth, to identity, and to history.

Authenticity as Recovery: The Colonial Ordering of the World

Modernity has been a central platform of engagement with the meanings, discourses, and representations of heritage and tradition. In his treatise on experiences of modernity, Marshall Berman (1988) juxtaposes the inauthentic modernity of St. Petersburg, what he calls the "modernism of underdevelopment" with the authentic modernity of Paris associated with progress, reason, and the future. While modernities of the Global South have been riddled with questions surrounding the authenticity of the copy or modernity as mimicry, traditions are assumed to be locatable in and native to the Third World. Authenticity and tradition have been treated as stable and positive configurations, associated with the weight of the past deemed to contrast to the dynamism and change of modernity. Yet as noted below, heritage and tradition were representations of culture and power that were erected into reality.

The first systematically visual display of heritage emerged through the world exhibition and the museum. Museums and exhibitions became the staging grounds on which colonial heritage could be rationalized and represented for the consumption of metropolitan viewers. In the colonial order of things, tradition and modernity could be mapped according to the separation of the world between the West and the non-West or in more recent parlance between the Global North and Global South. Authenticity was reconstituted under colonial rule as the grounds from which to recover tradition and heritage. Thus, tradition was located in non-Western societies and modernity in the West. However, the colonies were also important sites to experiment with modernity and to work through what would become policies of public health, education, sanitation, and urban planning. The colonial encounter was thus crucial in sustaining if not consolidating structural dualisms that have framed much of Western social thought – modernity versus tradition, use-value versus exchange value, and core versus periphery. The museum along with the exhibition transformed objects into historical evidence and valorized landscapes as heritage. The colonial imagination, through such instruments as the exhibition and the museum, was made into reality as colonial administrators and scholars categorized heritage environments and displayed them for public consumption.

Scholars of postcolonial theory and cultural studies have pointed to the multiple temporalities and reconstructions of history associated with the emergence of colonial nostalgia as a cultural phenomenon, as a nostalgia that positions the past as critique of present, or as a cultural practice connected to revisionist history and politics. Edward Said (1978) has identified this process as the "citationary structure" of Orientalism where the repetition and the circulation of the same notions become sedimented and legitimized as assertions of authenticity and truth.

An example of authenticity as recovery can be found in the Cairo Street or Rue de Caire that was built as part of the Paris Exposition of 1889. As detailed by Zeynep Çelik (1992), Cairo Street was willingly financed and authored by Delort de Gleon, a wealthy Frenchman who had lived in Egypt for a quarter of a century. His concern for authenticity was so deep that he imported dirt and donkeys directly from Egypt as well as actually existing historic structures including a Quranic school and a water fountain that were disassembled, shipped to Paris, and finally installed at the exposition site. Gleon argued that the Rue de Caire was in fact more authentic than the streets of Cairo based on the reasoning that it was impossible to find an untouched, and thus authentic, street in Cairo.

Authenticity and Postcolonial Nationalism

Benedict Anderson (1991 [1983]) argues that nationalism was made possible and new communities imaginable through the interplay between technology and the relations of capitalist production. In order for a nation to be modern, it had to produce a past. Time, made continuous and linear, became central to the construction of an

appropriate history and identity that would be coextensive with territory of the imagined community of the nation. Chronological time, measured by the clock and calendar, coupled with the technologies of capitalism made it possible to represent the nation. Such forms of representation – whether print commodities like the newspaper – made new communities imaginable.

Landscapes were brought into the horizons of intelligibility and knowledge through other forms of representation as well, among them the map and the census, allowing the contours of any community (including the nation) knowable and visible. As writings by Hobsbawm and Ranger (1983), Anderson (1991 [1983]), and Shils (1981) have illuminated, establishing continuity with the past has been essential to the process of making a particular assemblage of people, practices, and histories into a coherent body. In a similar vein, to produce continuity with a past – that is, to produce a history – also entailed the production of place. Together these systems of representation have come together to produce the heritage of place, that is, through practices that establish social cohesion or symbolize belonging for real and artificial communities.

Nation-states, newly formed with the end of decolonization, were active in making national identities that would be projected on an international stage. Following World War II, postcolonial nations engaged in cultivating national identity in the architecture of capitol buildings (Vale 1992). Vernacular architecture has also provided another stage to cultivate national identity. Returning to Egypt, the work of the architect Hassan Fathy provides a case of heritage that was manufactured at the behest of the government. Fathy continues to be a key interlocutor of Egyptian national identity and one of its most well-cited authors of heritage. What is now deemed authentic vernacular architecture, based on traditional mud construction and the housing layouts of medieval Cairo, was indeed Fathy's interpretation and construction of those forms. In the 1940s, the Egyptian Department of Antiquities commissioned Fathy to build a model village for the inhabitants of the village of Gurna located on the west bank of the river Nile near the necropolis of Luxor. The model village of New Gurna would be a relocation site for these inhabitants. Though the village remained unfinished and the project abandoned by Fathy, New Gurna became internationally admired for its usage of local materials and Fathy for his appropriation of forms. His work continues to help define national heritage and postcolonial authenticity. In a recent twist, UNESCO set out to "safeguard" New Gurna beginning in 2011 through the restoration and preservation of the village, further cementing the authenticity of what was a manufactured heritage.

Authenticity in an Era of Global Capitalism

In the realm of architecture and urban design, the critique of high modernism coupled with the reconfiguration of capitalism and society together has renewed debates on heritage and authenticity. Heterogeneity, difference, and distance have become the hallmarks of a cultural industry that must deal with the time-space compression of global capitalism. What began as an interrogation of culture in the 1980s and 1990s in the social sciences and humanities has led to an emphasis on the politics of difference, a turn that has entailed a rejection of totalizing and abstract narratives in favor of the contingent and variable identities and spaces. Coupled with this epistemic shift has been a recalibrated role of culture in the political economy – what David Harvey (1990) has referred to as culture in the embrace of capitalism – evident in tailored projects in architecture, heritage, and urban design. If the built environment constitutes one dimension of the complex of experience crucial to forging new cultural sensitivities, the expanding importance of heritage sites as regimes of accumulation and difference making can be seen as its dialectical twin.

In looking at the question of mediation of authenticity through space, AlSayyad (2001) has noted increasing demand for built environments that promise unique cultural experiences. A countervailing weight to the intensifying flows of the global has been the revalidation of place and local difference. The manufacture of heritage supports the Marxist view on the infinite capacity of capitalism to commodify everything. Among these commodities are cultural landscapes.

Amidst the fragmentation generated by flexible accumulation and the condition of postmodernity, the identities of built environments have become new frontiers of cultivation and manipulation.

Following AlSayyad (2001), practices of manufacturing can be categorized as such: an emphasis on iconography where iconography becomes culture, the memorialization of history established through visuality, and an emphasis on the profitability rather than facticity of history. Tourism exposes the paradoxes of authenticity as an ideal and as a pursuit. On one hand, tourism is predicated on the desire for an authentic experience, to see life as it is really lived. Yet tourism, as part of the visual economy of consumption, has also been associated with the superficiality of engagement with the figure of the tourist content with inauthentic experiences. What is taken to be authentic may in fact be a performance of authenticity or indigeneity, with culture and place circumscribed, rationalized, ordered, and exploited. Representations of place – peoples, geographies, culture, and nature – are central elements to a visual economy that links the political economy of capitalism to the aestheticization of space and the appropriation of culture and history.

The city of Las Vegas represents the most explicit site of manufactured heritage where any pretense of authenticity or reality is dispensed with altogether. Here the sophisticated themed casino complexes proffer "authentic fakery" (AlSayyad 2001). Vegas boasts a fake Sphinx and miniature pyramid at Luxor, the self-contained Venice canals, and a scaled-down Arc de Triomphe and Eiffel Tower based on the mimicry of authentic places. The Brooklyn Bridge runs parallel to the Strip, and the Statue of Liberty sits on the corner of Las Vegas Boulevard and Tropicana Avenue. The 20-acre New York-New York Hotel and Casino aims to evoke the glamor of New York without the city's grit or density. As "spectacle" organizes both economy and society in the United States in general and Vegas in particular, Vegas has been able to capitalize on its ability to adapt to the demands and needs particularly of the middle class. Specific to Vegas is its characteristic malleability, its ability to brand itself anew, pointing to the absence of a fixed identity for the city. It is a place where "nothing is real" which is understood as its selling point that has ensured its viability throughout its history.

Future Directions

The authentic fakery of Las Vegas is best understood in relation to the "fake authenticity" (AlSayyad 2001) of Santa Fe, New Mexico. Santa Fe's pueblo adobe forms, though rooted in the history of the area, are in fact constructions of cement and wood disguised as adobe. The unity of appearance of Santa Fe afforded by the Santa Fe style of architecture became codified through a series of urban planning efforts in the early twentieth century. And, what is now known as the "Santa Fe style" was defined by the Museum of New Mexico in the 1910s. The city is, according to Wilson (1997: 4), "an unusually successful illusion of authenticity." The fabrication of its identity and the manufacture of Santa Fe's heritage were designed to revive the local economy through tourism.

The power of the manufacture of heritage is beautifully captured by Andreas Huyssen:

> One of modernity's permanent laments concerns the loss of a better past, the memory of living in a securely circumscribed place, with a sense of stable boundaries and a place-bound culture with its regular flow of time and a core of permanent relations. Perhaps such days have always been a dream rather than a reality, a phantasmagoria of loss generated by modernity itself rather than its prehistory. But the dream does have staying power. (2000: 34)

Authenticity continues to be a resilient trope through which locality and identity are cultivated. As the preceding discussion has shown, what determines authenticity is the frame of reference. Disneyland, the quintessentially American landscape, is a case in point. Disneyland's Main Street evokes the nostalgia for small town America. The street's design was inspired by two towns in particular, Marceline, Missouri, and Fort Collins, Colorado. Marceline was Walt Disney's boyhood home and Fort Collins the birthplace of Disneyland's first director, Harper Goff. Facing economic decline in the late 1990s, Marceline sought to further cement its fate to Disneyland and transform itself into its

official hometown. In a move that shows the circular movement of authenticity, the town renamed its Kansas Avenue to "Main Street USA" after the gateway to Disneyland Park. Many of the architectural flourishes of Disney's Main Street come directly from Fort Collins. Disneyland's City Hall is a replica of the courthouse in Fort Collins, drawn at three-quarters scale. As Fort Collins grows and attempts to preserve its heritage, it also has resorted to a process that some have called Disneyfication (Iovine 1998). Here lies the greatest dilemma for authenticity: the authentic object has to rely on its own replica to maintain its survival rendering the authentic and the replica a reciprocal pair in a continuous dynamic.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Cultural Heritage and the Public

References

Adorno, T.W. 2003 (1964). *Jargon of authenticity.* London: Routledge.

AlSayyad, N. 2001. Global norms and urban forms in the age of tourism: Manufacturing heritage, consuming tradition. In *Consuming tradition, manufacturing heritage: Global norms and urban forms in the age of tourism*, ed. N. AlSayyad, 1–33. New York: Routledge.

Anderson, B. 1991 (1983). *Imagined communities: Reflections on the origins and spread of nationalism*. London: Verso.

Benjamin, W. 2005 (1931). *Selected writings, volume 2, part 2, 1931–1934*. Cambridge, MA: Belknap Press of Harvard University Press.

Berman, M. 1988 (1982). *All that is solid melts into air: The experience of modernity.* New York: Penguin.

Bourdieu, P. 1984. *Distinction: A social critique of the judgement of taste*. Cambridge, MA: Harvard University Press.

Çelik, Z. 1992. *Displaying the orient: Architecture of Islam at nineteenth-century world's fairs*. Berkeley: University of California Press.

Fraser, N., and L. Gordon. 1994. A genealogy of dependency: Tracing a keyword of the US welfare state. *Signs* 19 (2): 309–336.

Harvey, D. 1990. *The condition of postmodernity: An inquiry into the origins of cultural change*. Oxford: Basil Blackwell.

Hobsbawm, E., and T. Ranger, eds. 1983. *The invention of tradition*. Cambridge: Cambridge University Press.

Huyssen, A. 2000. Present pasts: Media, politics, amnesia. *Public Culture* 12: 21–38.

Iovine, J. 1998. A tale of two main streets: The towns that inspired Disney are searching for a little magic of their own. *The New York Times*, 15 October 1998.

Mitchell, T. 1991. *Colonising Egypt*. Berkeley: University of California Press.

Rabinow, P., and W.M. Sullivan 1987 (1979). *Interpretive social science: A second look*. Berkeley: University of California Press.

Rapoport, A. 1989. On the attributes of 'traditions'. In *Dwellings, settlements, and tradition: Cross-cultural perspectives*, ed. N. AlSayyad and J.-P. Bourdier, 77–105. Lanham: University Press of America.

Roy, A. 2004. Nostalgias of the modern. In *The end of tradition?* ed. N. AlSayyad, 63–86. London: Routledge.

Said, E. 1978. *Orientalism*. New York: Vintage.

Shils, E. 1981. *Tradition*. Chicago: University of Chicago Press.

Vale, L. 1992. *Architecture, power, and national identity.* New Haven: Yale University Press.

Williams, R. 1976. *Keywords: A vocabulary of culture and society.* New York: Oxford University Press.

Wilson, C. 1997. *The myth of Santa Fe: Creating a modern regional tradition*. Albuquerque: University of New Mexico Press.

Wright, G. 1991. *The politics of design in French colonial urbanism*. Chicago: University of Chicago Press.

Authenticity in Archaeological Conservation and Preservation

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Introduction

The Pioneers

"Authentic" is defined in the *Merriam-Webster Dictionary* as "*a*: worthy of acceptance or belief as conforming to or based on fact, *b*: conforming to an original so as to reproduce essential features,

and *c*: made or done the same way as an original." This adjective derives from the ancient Greek *authentēs*, meaning "perpetrator or master." The entry for "authenticity" in the *Shorter Oxford Dictionary* (2nd edition, 1936) defines it as "the quality of being authentic," dating from as early as 1657, with four examples of specific applications: (1) as being authoritative or duly authorized, (2) as being true in substance (1762), (3) as being genuine (1760), and (4) as being real, actual (1851).

Concern for authenticity, however defined, in the approach to the restoration and conservation of historic buildings and monuments did not begin to manifest itself fully until the nineteenth century. However, the role of the painter Raphael (Raffaele Santi) in the early sixteenth century played a significant role in the conservation of the earliest surviving monuments of Rome. It was, however, the work of such pioneers as Karl Friedrich Schinkel (1781–1841) and Eugène Emmanuel Viollet-de-Duc (1814–1879) that created an awareness of the need for a systematic approach toward the restoration and conservation of ancient and historic buildings.

The early twentieth century saw the development of a more analytical approach toward the conservation and restoration of the historic heritage. Two names stand out in this theoretical field, those of the Austrian Alois Riegl (1857–1905) and the Italian Cesare Brandi (1906–1988). Following a detailed analysis of the requirements of a state monuments service, Riegl published *Der modern Denkmalcultus, sein Wesen, seine Entstehung* (The modern cult of monuments: its character and its origin) in 1903. In this he identified two main groups of values:

Memorial values (age value, historical value, and intended memorial value)

Present-day values (use value, art value, newness value, and relative art value)

This penetrating classification retains its fundamental validity up to the present day.

Brandi's work dovetails in with that of Riegl, whose classification he expanded slightly into the aesthetic and the historical. He set out three essential elements in any interventions relating to the conservation and restoration element of heritage preservation:

Any reintegration should be easily recognizable at close hand, but at the same time it should not adversely impact the unity that is being restored.

The role of material that directly results in the images is irreplaceable in so far as it forms the aspect and not the structure.

Any restoration should be made in such a way that it will not be an obstacle to subsequent future interventions – indeed, these should be facilitated.

Key Issues/Current Debates/Future Directions/Examples

The Venice Charter

Brandi's holistic approach to conservation and restoration has not always been accepted uncritically, but by and large it still constitutes the contemporary approach to the subject. He did not make use of the term "authenticity" in any of his many publications, but it is implicit in everything he wrote. The first significant use of the word seems to have been in the 1964 International Rescue Convention, produced by the Second International Congress of Architects and Specialists of Historic Buildings and best known as the Venice Charter (to commemorate the historic city in which the conference took place).

The Charter is a remarkable document, providing as it does a detailed ethical and practical framework for the conservation and restoration of the built heritage. It is interesting that the word "authenticity" occurs only once in the Charter: its preamble states that "The common responsibility to safeguard [*historic monuments*] for future generations is recognized. It is our duty to hand them on in the full richness of their authenticity." Article 9 contains the single use of the adjective "authentic": the object of restoration is defined as "to preserve and reveal the aesthetic and historic value of the monument and is based on respect for original material and authentic documents." The fact that there is no definition or explanation of this term, however, suggests that the concept was in general use by the 1960s.

The 1964 Venice conference had been convened at the prompting of UNESCO, which was moving toward the drafting of a convention on the protection of the world cultural and natural heritage. It also resulted in the creation in the following year of the International Council on Monuments and Sites (ICOMOS) with the express responsibility of applying the conservation philosophy and recommendations of the Venice Charter. With the signing of the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (better known as the World Heritage Convention) in 1972, ICOMOS was designated an advisory body to the UNESCO World Heritage Committee, responsible for the cultural heritage.

Authenticity and the World Heritage Convention

The practical implementation of the Convention is set out in the *Operational Guidelines for the Implementation of the World Heritage Convention*, which has been subjected to considerable modification and emendation since its first edition in 1977. That text requires that properties inscribed on the World Heritage List should "meet the test of authenticity in design, materials, workmanship, and setting." It goes on to specify that "authenticity does not limit considerations to original form and function, but includes all subsequent modifications and additions, which in themselves possess artistic or historical values." The attributes deemed to be appropriate in evaluating authenticity underwent minor changes over the following years: in 1980, for example, this included the statement that "the [World Heritage] Committee stressed that reconstruction is only acceptable if it is carried out on the basis of complete and detailed documentation on the original and to no extent on conjecture." With the recognition by the Committee in 1992 of cultural landscapes as constituting a distinct category of cultural heritage, evaluation of their distinctive character and components was added to the existing four qualities.

The current (2011) text of the *Operational Guidelines* is more detailed and more comprehensive, as the following excerpts show:

> Depending on the type of cultural heritage, and its cultural context, properties may be understood to meet the conditions of authenticity if their cultural values are credibly expressed through a variety of attributes including form and design, materials and substance, use and function, traditions, techniques, and management systems, location and setting, language and other forms of intangible heritage, spirit and feeling, and other internal and external factors.
>
> Attributes such as spirit and feeling do not lend themselves easily to practical applications of the conditions of authenticity, but nevertheless are important indicators of character and sense of place, for example, in communities maintaining tradition and cultural continuity.
>
> In relation to authenticity, the reconstruction of archaeological remains or historic buildings or districts is justifiable only in exceptional circumstances. Reconstruction is acceptable only on the basis of complete and detailed documentation and to no extent on conjecture.

This amplification of the concept of authenticity in the World Heritage context (and thereby in the understanding of the international cultural heritage community) is due primarily to a series of debates and discussions that resulted indirectly from the ratification of the Convention in 1992 by the Government of Japan. Japanese heritage experts and government officials had been aware for some time of the prevalent view outside Asia that the approach to conservation, and more particularly reconstruction, in some non-European cultures was radically different to that elsewhere, notably in Europe and North America. This perception was seen as posing a fundamental problem in the nomination and inscription of many important Asian heritage monuments.

The Nara Document

The World Heritage Committee at its 16th Meeting in Santa Fe (USA) in December 1992 identified an urgent need for a critical evaluation of "the criteria governing . . . authenticity and integrity" and called upon ICOMOS to organize a meeting of experts to that end. A 3-day Preparatory Workshop was held in Bergen (Norway) on 31 January to 2 February 1994, funded by the Norwegian and Canadian Governments. On the recommendation of ICOMOS, the Japanese Government agreed to fund a major international conference on authenticity, which took place in Nara in 1–6 November 1994.

The Nara Conference brought together 45 leading experts in the field of preservation of cultural heritage: they represented international organizations and 26 countries from round the world. Following a number of statements from representatives of international bodies, the Chairman of the conference called upon delegates in turn to define their understanding of the meaning of authenticity and its application by their organizations or countries. This revealed a startling variability between regions and latter-day cultures, which demonstrated the truth of a statement by one distinguished expert: "Authenticity is in practice never absolute, always relative" (David Lowenthal in Larsen 1995). It also underlined the need for a more specific definition of what constitute the fundamental principles of authenticity based upon the international perceptions that emerged during 3 days of papers and intensive discussions. The result of this timely and revealing meeting was the Nara Document on Authenticity, which has become the touchstone for assessing authenticity.

The main points of the Document may be summarized as follows:

> Cultural heritage diversity exists in time and space, and demands respect for other cultures and their belief systems. Where cultural values appear to be in conflict, respect for cultural diversity demands acknowledgment of the legitimacy of the cultural values of all parties.
>
> Conservation of all cultural heritages is rooted in the values attributed to it, understanding of which depends, in part, on the degree to which information sources about these values may be understood as credible or truthful.
>
> Knowledge and understanding of these sources of information, in relation to original and subsequent characteristics of the cultural heritage and their meaning, is a requisite basis for assessing all aspects of authenticity.
>
> Authenticity is thus the essential qualifying factor concerning values, understanding of which plays a fundamental role in all scientific studies of the cultural heritage, in conservation and restoration planning, as well as within the inscription procedures used for the World Heritage Convention and other cultural heritage inventories.
>
> All judgements about values attributed to cultural properties as well as the credibility of related information sources may differ from culture to culture, and even within the same culture. It is thus not possible to base judgements of values and authenticity within fixed criteria. On the contrary, the respect due to all cultures requires that heritage properties must be considered and judged within the cultural contexts to which they belong.
>
> Therefore, it is of the highest importance and urgency that, within each culture, recognition be accorded to the specific nature of its heritage values and the credibility and truthfulness of related information sources.
>
> Depending on the nature of the heritage, its cultural context, and its evolution through time, authenticity judgements may be linked to the worth of a great variety of information sources. Aspects of the sources may include form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling, along with other internal and external factors. The use of these sources permits elaboration of the specific artistic, historic, social, and scientific dimensions of the cultural heritage being examined.

The ICOMOS Ename Charter for the Presentation of Cultural Heritage

The Charter for the Interpretation and Presentation of Cultural Heritage Sites (known across the world as the Ename Charter) was approved by ICOMOS at its 16th General Assembly in Québec (Canada) in 2008. This charter deals with an aspect of authenticity that is not covered elsewhere. Its stated objective is to establish seven cardinal principles upon which interpretation and presentation, in whatever form or medium is deemed appropriate in specific circumstances, should be based. Principle 4 is directly relevant to this survey:

Preservation of Authenticity The interpretation and presentation of cultural heritage sites must respect the basic tenets of authenticity in the spirit of the Nara Document (1994).

> **4.1** Authenticity is a concern relevant to human communities as well as material remains. The design of a heritage interpretation programme should respect the traditional social functions of the site and the cultural practices and dignity of local residents and associated communities.
>
> **4.2** Interpretation and presentation should contribute to the conservation of the authenticity of a cultural heritage site by communicating its significance without adversely impacting its cultural values or irreversibly altering its fabric.
>
> **4.3** All visible interpretive infrastructure (such as kiosks, walking paths, and information panels), when deemed appropriate and necessary must be sensitive to the character, setting and the cultural

and natural significance of the site, while remaining easily identifiable.

4.4 On-site concerts, dramatic performances, and other interpretive activities – when deemed appropriate and sensitive to the character of the site – must be carefully planned to minimise disturbance to the local residents and to the physical surroundings of the site.

It remains to be seen to what extent this admirable charter will influence the interpretation and presentation of the cultural heritage in the years to come.

The Riga Charter

The Riga Charter on Authenticity and Historical Reconstruction in Relationship to Cultural Heritage, known as the Riga Charter, is an international statement of the scope, objectives, and participants in cultural heritage projects. The charter was adopted at Riga (Latvia) on 23 and 24 October 2000 at the Regional Conference on Authenticity and Historical Reconstruction in Relationship to Cultural Heritage, initiated by ICCROM.

It focuses on reconstruction and supplies additional comments on the existing provisions in this field of the Venice Charter and other doctrinal texts including the Nara Document. These as well as the UNESCO World Heritage Convention establish a presumption against reconstruction of the cultural heritage, except in circumstances where reconstruction is necessary for the survival of the property, where a property is incomplete through damage or alteration, where it reconfirms the cultural significance of a property, or in response to loss through disasters, whether of natural or human origin. Reconstruction must, however, be carried out without conjecture or compromising existing in situ remains and must be legible, reversible, and the minimum necessary for conservation and presentation. It takes note of the fact that issues of reconstruction and authenticity have become of particular concern, particularly in countries that have recently regained their independence.

The Charter contains the following definition of authenticity (Article 4):

Authenticity is a measure of the degree to which the attributes of cultural heritage (including form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling, and other factors) credibly and accurately bear witness to their significance, believe that replication of cultural heritage is in general a misrepresentation of evidence of the past, and that each architectural work should reflect the time of its own creation, in the belief that sympathetic new buildings can maintain the environmental context, but that *in exceptional circumstances*, reconstruction of cultural heritage, lost through disaster, whether of natural or human origin, may be acceptable, *when* the monument concerned has outstanding artistic, symbolic or environmental (whether urban or rural) significance for regional history and cultures; provided that appropriate survey and historical documentation is available (including iconographic, archival or material evidence); the reconstruction does not falsify the overall urban or landscape context; and existing significant historic fabric will not be damaged; and providing always that the need for reconstruction has been established through full and open consultations among national and local authorities and the community concerned.

Authenticity and Archaeological Sites and Monuments

Most debate about authenticity has tended in the past to concentrate on historic buildings. On the whole ancient structures and archaeological sites have been given considerably less attention by heritage conservators and managers. As a result there are some archaeological monuments on the World Heritage List where reconstruction has gone well beyond the strict application of the concept of *anastylosis*, and the level now considered to be "acceptable only on the basis of complete and detailed documentation and to no extent on conjecture." The creation of structures on major archaeological sites for the form of which there is little, if any, justification either in the remains themselves or in the available contemporary literature is to be found most frequently associated with so-called theme parks or similar enterprises. The number of these is happily declining, but archaeologists and heritage organizations must constantly watch out, since this can be a profitable business in the wrong hands.

In this context, ICOMOS is to be commended for its initiative in approving the Ename Charter, which, it is to be hoped, will be widely approved and adopted by the heritage community.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)

References

Larsen, K.E., ed. 1995. *Nara conference on authenticity/ conférence Nara sur l'authenticité*. Paris: UNESCO.

Further Reading

Brandi, C. 2005. *Theory of restoration*. Trans. C. Rockwell. Florence: Nardini Editore.

ICOMOS. 2004. *International charters for conservation and restoration*, Monuments and Sites. Vol. I. Berlin: ICOMOS.

Jokilehto, J. 1999. *A history of architectural conservation*. London: Butterworth-Heinemann.

Jokilehto, J. 2006. Considerations on authenticity and integrity in World Heritage context. *City & Time* 2: 1–16.

Jokilehto, J., ed. 2008. *The World Heritage List – What is OUV? Defining the outstanding universal value of cultural World Heritage properties*, Monuments and Sites. Vol. XVI. Berlin: ICOMOS.

Larsen, K.E., and N. Marstein, eds. 1994. *Conference on authenticity in relation to the World Heritage Convention: Preparatory workshop*. Oslo: Riksantikvaren.

Lowenthal, D. 1999. Authenticity: Rock of faith or quicksand quagmire? *Getty Conservation Institute Newsletter* 14 (3).

Titchen, S.M. 1995. *On the construction of outstanding universal value*. Unpublished Ph.D. dissertation, Australian National University.

Authenticity in Archaeological Writing and Representation

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State of Knowledge and Current Debates

Authenticity as a concept is integral to the discipline of archaeology. Discriminating between real artifacts and forgeries, determining secure provenance, and investigating how past actually happened are all activities at the core of producing archaeological knowledge and can be seen essentially as quests for authenticity. The idea of authenticity, moreover, takes on especial importance with regard to the writing and representation of archaeological knowledge. Since the beginnings of archaeological research, archaeologists have expressed concern regarding their ability to present the past as realistically as possible and to communicate the nature of archaeological work in an accurate way that a variety of diverse audiences will be able to understand.

However, the definitions of "accuracy," "realism," and "authenticity" as they pertain to archaeology have been in a state of near-constant change for nearly two centuries. The concept of authenticity necessitates an external or original referent which a representation or piece of writing is aiming to approximate and implies some means, however amorphous, of determining how closely the representation approximates the original. Over the course of the history of archaeology, practitioners of the discipline have defined both this referent and the criteria for authentic representation very differently. When examining examples and discussions of archaeological writing over time, there appear at least three identifiable phases in practical and theoretical expressions of the relationship between authenticity and representation in archaeology. And now, a new phase is emerging coincident with the development of digital technologies in fieldwork and archaeological analysis. Each of these phases is described and explained here, with examples from each phase and a discussion of how these phases have blurred into one another historically. The contemporary state of the relationship between authenticity and archaeological representation is also outlined, with some suggestion of what this relationship is likely to develop into in the near future.

For most of its early history in the eighteenth and nineteenth centuries, archaeological work was characterized by a pursuit of authenticity in the sense of verifying facts and rendering a more accurate story of the past. This ambition was perhaps best expressed in the first issue of the journal *Archaeologia*, the longtime flagship

publication of the Society of Antiquaries of London. In a preface to its first issue, the editors wrote that

> "the History and Antiquities of Nations and Societies have been objects of inquiry to curious persons in all ages, either to separate falshood from truth, and tradition from evidence, to establish what had probability for its basis, or to explode what rested only on the vanity of the inventors and propagators" (1770: i).

Expeditions and excavations began in earnest, accordingly, to tie the accounts from ancient texts to real places and object assemblages. Archaeologists explored and dug in order to identify cities mentioned in the Bible and in classical writing. They worked as well to recreate prehistoric periods known only from happenstance finds. And, from the earliest meetings of the various European scholarly and antiquarian societies, these researchers "had formed a design of communicating their discoveries to the public" (1770: i).

In order to succeed in this design, archaeological researchers working in the eighteenth and nineteenth centuries published both letters and memoirs describing their findings and experiences while recovering direct evidence of the past. The letters were initially sent to excavation sponsors or fellow members of scholarly societies. Letters were later bound together and published as volumes of the societies' journals. Memoirs, meanwhile, were composed with a public audience in mind from the start and worked to tell the complete story of an archaeological expedition, offering a satisfying narrative with a clear beginning, middle, and end. Being highly personal, both of these early forms of archaeological publications communicated extremely vivid and emotive perspectives on the work that they reported (Hodder 1989). They were written in first-person voice and dramatically guided the reader through the moment-by-moment thought process of the author. The reader would learn about difficulties encountered, periods of uncertainty, and lingering questions that make the breakthroughs, discoveries, and advancements in knowledge all the more exciting. These documents acted as thick descriptions which recreated the total and sensational experience of excavation, offering a vicarious engagement with the work of archaeology.

Expeditions from this time period also enlisted the work of specialized draftsmen and architects responsible for drawing the monuments, remains, and objects discovered over the course of the archaeological research program. Expertly drawn and detailed, these images published particularly in the memoirs of early archaeologists added to the veracity of the archaeological text (Molyneaux 1997; Moser 2012). Over time, visual conventions and codes developed, and these sorts of images – in distinct black and white lines, carefully shaded and drawn to scale – conveyed a neutrality and reliability essential to the goal to distill facts from fables. Many publications from this time period additionally included drawings of reconstructed scenes, imagining a building or settlement as it would have looked when inhabited in antiquity and featuring depictions of living people in ancient costume. Like the vivid detail in the text itself, these kinds of science-based reconstructions enhanced the relatability of archaeological representations from this early period, expanding the immersive quality of archaeological fieldwork and projecting it into the past. Both the writing and the visual representations contained in early archaeological works surrounded their readers with sensory detail that communicated an overabundance of facts but through a deeply human and personal lens.

At the same time, however, the coverage of the material objects retrieved through these early excavations remained almost purely descriptive (Connah 2010; Sinclair 1989). While the methods and process of the excavation were expressed in enthusiastic, sensational terms, the artifacts and archaeological deposits were presented and illustrated without passion. Indeed, writers of this early time period generally resisted attempting to extrapolate about the past or to draw conclusions about ancient lives and societies based on the assemblages they recovered. They instead conformed to what Anthony Sinclair (1989: 221) has called translating the museum into text or what Graham Connah (2010: 21) has termed the "laundry list" approach – a dense inventory briefly mentioning a number of the significant things found during the research process. Stylistic and

artistic details might be provided, along with basic measurements, but there was no contextual analysis or historical conjecture about the original uses or meanings of these objects.

The archaeological text from the first two decades of the discipline, therefore, aimed at two simultaneous authenticities. The first was an authentic representation of the past, based on concrete archaeological evidence – the elimination of exaggeration, distortion, or aggrandizement from shared ideas about historical civilizations. This was, after all, the underpinning of the archaeological scholarly societies established in the eighteenth century. It was this type of authenticity that the descriptive lists of objects targeted, attempting to eliminate room for error or problematic personal bias.

Meanwhile, the second form of authenticity that these narratives aimed to accomplish was a realistic and relatable recounting of the processes of exploration and excavation. This second authenticity centered on one's ability to share the full experience of the fact-finding endeavor, to enable a reader to envision the voyage, from beginning to end, from inside the author's body. And whether the authors themselves explicitly recognized it or not, the storytelling in early memoirs of archaeological undertakings was rife with artistic exaggeration and poetic flourishes (Hodder 1989; Connah 2010).

It is worth noting that these two forms of authenticity are in many ways opposed to one another. While the first involves taking an established conceptualization of the past and stripping away everything for which there is not tangible, identifiable evidence, the second form of authenticity requires building up a story from intangible memories, interactions, and encounters. The first is reductive, the second additive. In the writing dating from this time period, authenticity took a radically different form depending whether it was the distant or immediate past being represented. The authentic representation of the distant past, the past of antiquities, necessitated a commitment to exactitude in narrative, data description, and visualization. But the authentic representation of the more direct past – the recently concluded archaeological work – required an account so thoroughly and vibrantly descriptive that one could imagine oneself to have experienced the thing itself. There is a dichotomy – even a friction – between the authenticity entailed in representing the archaeological past in early archaeological writing and the authenticity involved in representing the archaeological endeavor.

This dichotomy, however, diminished in the mid-twentieth century. The trends in and discourse around archaeological writing followed broader disciplinary trends through the advent of processualism and New Archaeology. The movement toward emphasizing positivism and hypothesis testing transformed the nature of authenticity that archaeologists sought to achieve in their writing and therefore transformed archaeological writing itself. The processual movement brought about an increased suspicion around subjective, individual experience, instead seeking transportable middle-range theory and universal laws applicable to many sites and regions. This shift also emphasized rigorous methodologies and making fieldwork as reproducible as possible (while acknowledging that archaeological excavation cannot be repeated).

Amidst this transition in the discipline of archaeology, the aim of rendering an accurate, and therefore authentic, portrayal of the past persisted from the early phases of archaeological writing through the periods of processualism's major influence. In representing the past, archaeologist-authors still emphasized direct evidence and avoided speculation and elaboration in narrative form as much as possible. Technical drawings, photographs, data tables, and charts appeared in greater and greater numbers to supplement direct and comprehensive descriptions of archaeological assemblages, adhering to strict disciplinary scientific codes (Molyneaux 1997; Moser 2012).

This is not to say, however, that the representation of archaeological assemblages obeyed precisely the same ideals as in earlier periods. Interpretation of archaeological remains was now welcomed rather than categorically avoided, but any interpretation needed to be firmly motivated by demonstrated rules based on, for

instance, experimentation or ethnographic analogy. The analysis of archaeological objects followed the scientific method, proposing and testing hypotheses, utilizing mathematical models whenever necessary and possible, and summarizing findings in a dispassionate manner. See, for example, Walter Taylor's admonishments to archaeologists before him, which became an influential aspect of New Archaeology:

> It behooves the archeologist not to maintain the untenable position of 'sticking to the facts,' meaning the renunciation of inference, hypothesis, and testing. It rather is incumbent upon him to derive his observational data as objectively as possible, to differentiate between observed fact and derived inference, to make explicitly labeled interpretations of as detailed and full a nature as possible, and then to look, either in the ground or among the data at hand, for more evidence by which his hypotheses may be tested. Thus, more interpretation is called for, not less! (Taylor 1983: 115)

Something that changed quite dramatically from the earlier examples of archaeological writing was that practitioners of positivist or processual archaeology tended to narrate their own work in an equally straightforward and empirical way. No longer was an authentic depiction of archaeological work reliant on recreating one's particular and personal experience of the excavation process. The believability of a site report did not anymore inhere in the reader's ability to relive the total experience, but rather in stripping away subjectivity and emotive response. Processualism applied the same standards of authenticity to writing about the archaeological endeavor that early archaeologies applied to writing about antiquities and history. For instance, the pioneer of processual archaeology Lewis Binford wrote in several essays about the problems with implicit biases in anthropological and archaeological writing (1972). He instead praised "scientists" who "make their assumptions explicit and are ready to defend their arguments within an explicit logical framework" (1972: 7).

Changes in archaeological documentation during the excavation process supported this movement away from subjective experience in representing the archaeological process. It was during this same period of time that preprinted recording forms, or pro forma, entered the discipline and rapidly became an essential component of nearly every field excavation (Pavel 2010). Free-form site notebooks endured as a recording medium, but most often as supplementary to the pro forma archaeological record. Instead, preprinted sheets with defined prompts, multiple-choice questions, and circumscribed areas for responses became a mainstay on scientific archaeological excavations. The conformity of these forms unified archaeological recording, creating a more comparable and consistent body of data than the letters and diaries that served to document archaeological findings in the early phases of the discipline.

This emphasis on similarity over idiosyncrasy similarly transformed the rhetoric of archaeological publications. Instead of first-person narration, site reports became almost exclusively written in third-person voice or from the perspective of an ambiguous, often unnamed "we" (Gero 1996; Hodder 1989; Spector 1993). The excavation procedure was made to sound natural and self-evident; the confusion, happy successes, and despairing failures were evened out. Along with this emotive flattening and dispersal of personal perspective came the elimination of discussions of uncertainty and yet-to-be-answered questions. Site reports followed a conventional format or template, including a discussion of the location of an excavation, hypothesis, a detailed account of methods, presentation of data, and analysis of the results motivated by as universal interpretive rules as possible.

In the on-site recording strategies, in visualizations and illustrations, and in post-excavation publications, then, there was an appeal to a consistently defined authenticity through the period of processualism's greatest influence in archaeology. All of these records worked to represent, as accurately as possible, *both* the excavation process and the archaeological past in a way that any observer would agree on. The referent for authentic archaeological writing was objective reality in the past and in the present. Archaeologists in this tradition believed, therefore, that they were all writing about the same thing – the same past and the same way of knowing about it. Accordingly,

archaeological writing developed strict conventions designed to aid archaeologists in writing unified narratives. If archaeologists were writing about the same things, adhering to the same rules and values for both excavation methodology and archaeological interpretation, then their accounts should look remarkably similar. And they did (Hodder 1989).

Starting in the late twentieth century, however, scholars across the humanities and social sciences began asking questions motivated in large part by postmodernism. These questions challenged hegemonic claims to objective reality, instead emphasizing positionality, subjectivity, and the construction of reality. In anthropology, this influence can be seen especially in the concerns expressed by the authors of *Writing Culture* (Clifford and Marcus 1986) who confronted the norms of traditional ethnographic writing. They argued that traditional tropes and styles claimed an unjustified scientific authority. They suggested experimentation and greater creativity in anthropological writing could lead to new, innovative, and more convincing representations of other cultures and communities. More thoughtful and inventive writing forms could in turn appeal to a different sort of authenticity, one based on a poetic resemblance or proximity to the lived experience of ethnographic fieldwork.

In the 1980s and 1990s, archaeologists began to express similar points of view. In 1988, James Deetz stated that "archaeologists are increasingly expressing concern over the positivist view that objectivity can be achieved" and characterized "pure unqualified objectivity" as "beyond our reach" (Deetz 1988: 16). In the same year, Paul Courbin (1988: 80) argued that archaeology is "far from a really 'scientific' procedure and from conclusions that are above all suspicion." A decade later, critiques of positivism sharpened; Adrian Praetzellis, for instance, described "throwing positivism out the window" as "liberating" (Praetzellis 1998: 1). Notably, his comments appeared in a volume of *Historical Archaeology* devoted entirely to the subject of storytelling in archaeology.

In place of positivism, many archaeologists (along with social scientists and humanists from other disciplines) argued that the knowledge generated through archaeological research is constructed rather than simply uncovered. There is, they asserted, no objective truth that archaeologists discover; instead, individual human archaeologists, through imagination and dialogue, create stories about the past based on fragmentary evidence. According to those who promoted this constructivist view of archaeological knowledge, all of the decisions made by researchers and excavators throughout the archaeological process were shaped by the particular interests, priorities, and subjectivities of those people. Ian Hodder, an advocate for this point of view, described, for example, the range of different criteria that one could viably choose in order to categorize a deposit of soil as a single layer (Hodder 1999). One could look at, for example, the color of the soil when dry, the color of the soil when wet, the color of the soil at a given time of day, the texture of the soil, the feel against the trowel, the sound against the trowel, the smell of the soil, and even chemical analysis. Hodder argued (1999) that there are a similar range of choices available for every step of the excavation process from site definition to artifact recovery to data entry to laboratory analysis. Deciding which decision-making criteria to use in any given excavation, and at any particular moment, determines at an elemental level what is preserved in the archaeological record, shaping future analysis and the ultimate content of archaeological knowledge.

This skepticism around the possibility of positivism and applicability of empiricism to the archaeological process was a crucial motivation underlying the development of postprocessual archaeologies (Shanks and Tilley 1987). As close examination of the archaeological process revealed how essential subjective perspectives were to every dimension of that process, and as anthropology more broadly tested the relevance of objectivism for ethnographic writing, postprocessual archaeologists increasingly raised similar questions with regard to archaeological writing in particular. Joan M. Gero rebuked the forms of archaeological writing which had by now become conventional for "deliberately obscuring the practical organization of knowledge construction" and for implying through passive language and scientific language that "anyone would have

come to the same conclusions" (Gero 1996: 257). Rosemary A. Joyce expressed a similar critique, looking in particular at passive scientific phrasing common in archaeological writing – sentences such as "the figurine cache suggests. . ." (2002: 117). This is problematic, she asserted, because through this language archaeologists attribute their own voices and interpretations to the artifacts themselves. The conclusions – indeed, theories and hypotheses – described in this way are made to sound as if they were pulled out of the ground in a form as concrete as the physical assemblage.

The postprocessual critique of conventional archaeological writing took aim at the ideas about authentic archaeological writing advanced by processual archaeologists. Rather than seeing scientific language and formats as the most effective means of communicating accurately and precisely, postprocessual archaeologists argued that this mode of writing was decidedly *inauthentic*. The language of objectivism, they maintained, artificially removed the people from excavation narratives and interpretations of the past. It masked the interpersonal character of excavation, the full range of influential factors on decision-making and interpretation – in essence, the *real* process of knowledge production in archaeology. Postprocessual critiques of archaeological writing argued that instead of purifying narratives of the research process and descriptions of the archaeological past down to its most basic, secure, and truthful form, traditional styles of writing in archaeology presented distinctly partial and false accounts of history and how archaeologists study it.

Instead, they argued for a fuller depiction of the archaeological process and the conjecture and uncertainties regarding the archaeological past. Recreating the archaeological experience more accurately necessitated alternative forms and languages in archaeological writing. Remarkably, what they were advocating more closely approximated the letters, diaries, and memoirs of archaeology's earliest periods, at least with regard to descriptions of the research procedure (Hodder 1989, 1999; Joyce 2002). They were looking for the same emotional content, sensory experience, pitfalls, human interaction, and vivid context that early archaeological writing provided. But it was not only with regard to the archaeological process that they argued for such a more vibrant representational approach. For many postprocessual archaeologists, writing about the distant past should feel similarly immersive, relatable, and open to interpretation.

There are, then, three broadly identifiable phases in the relationship between authenticity and archaeological writing through the history of the discipline. The first, from the early period of archaeology, distinguished between the distilled authenticity of impersonal descriptions of archaeological objects and the authenticity of a vividly and creatively narrated archaeological process. In the second phase, during the dominance of processualism, archaeologists pursued nearly exclusively the former sort of authenticity, seeking objectivity and the abolishment of bias in both the interpretation of archaeological remains and the presentation of the excavation process. Then, in the third phase, postprocessualists encouraged quite the opposite, advocating for an embrace of subjectivity and sensory experience in descriptions of archaeological fieldwork and in the analysis of the archaeological record.

It is essential to note, of course, that as with any attempt to draw distinct chronological periods, these phases blur and fold into one another. An example of this is the work of R.G. Collingwood, who published multivolume corpora of inscriptions and highly descriptive accounts of Roman sites and assemblages in the United Kingdom. His 1930 text, *The Archaeology of Roman Britain*, for instance, contained comparative plans of towns and military forts along with typologies evoking the level of detail and comprehensive coverage of a museum index. It appeals to the sort of authenticity of the earliest archaeological practice – the direct museum-like description of assemblages of objects and archaeological remains. Collingwood, however, as a philosopher of history at the same time argued that historical events and lifeways cannot be directly observed – and significantly, that the thought processes and experiences of people in the past are impossible to access (Collingwood 1946). Accordingly, Collingwood maintained that those who study the past must use their imaginations to "reconstruct" historical events and the perspectives of past actors on

those events. His attention to the activities and hermeneutic processes of contemporary scholars of antiquity and in particular his argument that there is always, inevitably, a separation between the past as it actually happened and history as it is interpreted in the present resonate strongly with the arguments of the postprocessual movement in archaeology. Ian Hodder (1995) has in fact cited Collingwood's work as a major inspiration for the arguments of postprocessualism regarding the active and constant interpretation involved in the excavation endeavor. Collingwood as an archaeologist may have appealed to the sort of authenticity common within archaeology of his own time period while anticipating the arguments about positionality and authenticity characteristic of archaeology in the late twentieth century.

Kent Flannery's work similarly evinces the imperfection of delimiting three distinct phases in the dynamic relationship between archaeological representation and authenticity. Flannery advocated for the expanded application of systems theory in archaeology, based on the argument that conceiving of culture as a system consisting of elemental parts enables archaeologists to examine those elemental parts using objective mathematical models (Flannery 1968). His explanation and elevation of systems theory was influential within the processual movement, appealing to processualism's search for universalism and empiricism. An approach which ideally could be applied equally to any site in any place, from any period, conformed to that pursuit of identifying and resolving bias, subjectivity, and idiosyncrasy central to mid-twentieth-century archaeology. Meanwhile, however, Flannery is well known for experimenting with extremely creative writing styles – styles very distant from the straightforward presentation of assumptions and "explicit logical framework" that Binford championed. He experimented with fictional writing, in particular fiction that blurred the boundaries between reality and imagination. His 1976 volume *The Early Mesoamerican Village* illustrates his dual commitments to an authentic representation based on scientific objectivity and one based on a full and nuanced depiction of dialogue and debate. In it, he spends ample time discussing scientific methods, research design, and in particular the adequacy of various sampling strategies. At the same time, he creates three distinct exaggerated characters representing the conflicting interests and goals between which any archaeologist must mediate over the course of the excavation process. "The three allegorical characters introduced in the parable," Flannery says, "are all part of one personality. All of us engaged in Formative archaeology have varying degrees of each – skeptical graduate student, real Mesoamerican archaeologist, and great synthesizer – carrying on a dialectic inside our heads" (1976: 4).

Flannery's emphasis on indeterminacy, on emergent ideas, and on dialogue foreshadowed postprocessualists' concerns with these same issues as they recognized the essential role teamwork and communality play in the production of archaeological knowledge (Hodder 1999; Joyce 2002). His willingness to break with traditional archaeological writing formats signaled changes to come. The 1990s saw an explosion of unconventional archaeological texts, many of which employed real and imagined dialogues like Flannery's allegory to illustrate the centrality of discussion to the archaeological endeavor. Ian Bapty's "The Agony and the Ecstasy" (1990) presented an imagined conversation between three characters: Bapty's own Inward Voice, his Outward Voice, and the silent, invisible Past. While the Outward Voice speaks like a scholar, employing technical vocabulary and complex syntax, the Inward Voice criticizes the Outward Voice for speaking in such a flat, unemotional way, encouraging the audience to consider the irremovable influence of any given author's personal perspective in his work. Adrian and Mary Praetzellis's "A Connecticut Merchant in Chinadom" (1998) also took the form of a play. Their script put a fictive archaeologist into dialogue with the subject of her work during the archaeologist's presentation at the annual Society for Historical Archaeology conference.

Other dialogues placed real archaeologists in conversation with one another. Ruth Tringham's "Households with Faces" (1991) included what she called a "radio story" imagining a conversation between herself, Marija Gimbutas, Ian

Hodder, and Andrew Sherratt. Her purpose was to illustrate that each of their divergent viewpoints made significant and complementary contributions to the discipline's knowledge of prehistory, not only individually but more importantly when they confronted and dovetailed with one another. Further emphasizing the centrality of dialogue and debate to archaeological writing coming out of this tradition, other texts reprinted conversations between archaeologists that actually transpired. Rosemary Joyce's *The Languages of Archaeology* (2002) was an example of this, as was Barbara Bender's *Stonehenge: Making Space* (1998). Both present actual, if slightly edited, email conversations between archaeologists whose consensus, disagreement, and collaboration led to the texts in their published form.

Plays and published dialogues like these evinced postprocessualists' interest in generating novel ways of making clear the interpretive processes of archaeology and particularly in unmasking the aspects that had previously been hidden underneath the rhetoric of positivism. Breaking free from the constraints of scientific writing conventions, for these writers, enabled a truer presentation of how conclusions were actually being reached through the archaeological research process. And, at the same time, archaeologists were similarly dissatisfied the way that dry, scientific descriptions of the past understudy did not reflect the cognitive, cultural, and sensory experiences of historical communities which interested many archaeologists. Simultaneous with the proliferation of creative writing forms illustrating the complexity of archaeological knowledge production, then, came a parallel proliferation of creative writing concerning the archaeological past.

Roderick McIntosh, for instance, in *Peoples of the Middle Niger*, alternated scholarly discussions of archaeological and historical evidence with chapters of fictional narrative, which he called "historical imagination" (1998). Mark Edmonds did the same in *Ancestral Geographies of the Neolithic*, in order to allow for a more complex image of "the character of life at the time" (1999: x). Both constructed immersive experiences of multisensory worlds, attempting to capture more fully the lived experience of the communities that they study through archaeological evidence. Mary Beaudry's "Farm Journal" presented fictional journal entries composed by Beaudry (or, as she says, "discovered" (Beaudry 1998: 20)). The journal entries were based on one real diary kept by a resident of the site she is analyzing, together with "a variety of documents, a data-rich archaeological record, and [her] own imagination" (Beaudry 1998: 20). They presented well-informed but imagined first-person perspectives on everyday life at the site examined in the text, offering details that are rich, emotive, and oftentimes mundane – allowing the writing to fill gaps left by the fragmentary archaeological record. Perhaps the most influential example of an academic fictive approach to writing the archaeological past is Janet Spector's landmark book *What this Awl Means* (1993), which followed a single artifact – an awl – from its creation to its eventual deposition when it is lost by a Dakota girl. The story was made up, but was grounded in the total scientific knowledge available about Dakota life at the time. Spector's book was extremely emotional and used the Wahpeton language to enhance the atmosphere of her story. Texts such as these, presenting imagined pasts based on material archaeological evidence, demonstrate the aim of postprocessual archaeology to approach a more total and sensual representation of the archaeological past.

Some writing of this kind intermingled fictive approaches to writing about both the archaeological past and the process of archaeological reasoning. In addition to Tringham's "radio story" in which real archaeologists had an imagined conversation about actual archaeological evidence, her chapter "Households with Faces" contained a section entitled "Fantasy>Fact" in which she imagined the experience of a woman living in Neolithic Opovo (contemporary Serbia), watching her house burn after a man's death. The narrative shifted from third-person voice to first person and presented a stream of consciousness of sensory experiences ("My hair's scorching. It makes my eyes water. I'm crying!" (Tringham 1991: 124)). Carmel Schrire, in *Digging through Darkness* (1995), also evocatively wrote the past, attempting to give her audience a direct and personal experience of the archaeological period understudy. She employed invented

"testimonies" – fictional documentary sources which could have been created by the people living at Oudepost, the South African site she examines in her book. She included these to add "texture" – a sense of authenticity – to her historical analysis (Schrire 1995: 157). But Schrire's description of the archaeologists involved in the excavations at Oudepost was similarly rich, full of details about their appearances and personalities. Her narration of the excavation proceeded in a way so that the reader could see how the idiosyncrasies of the archaeologists involved bore on the ultimate knowledge created through the research process. Indeed, Schrire called the book as a whole – containing as it did accounts of both the distant past and of the archaeological process – "a collection of fictions" (Schrire 1995: 10).

Examples like these illustrate how intertwined were archaeologists' concerns with conveying the full complexity of both the distant past and the archaeological process. Paying attention to the total human experience of one necessitated similar attention to the representation of the other. These were twin concerns with the potential distortions of an objectivist lens in archaeological writing, twin concerns with an authentic presentation of the context and human experience of past and present.

It may seem oxymoronic that this pursuit of authentic representation in archaeology turned toward writing fiction and imagined dialogues. But advocates for and practitioners of these sorts of creative writing styles argued that they in fact more accurately – more authentically – reflected the archaeological encounter. For one thing, the writing tropes of fictional writing allowed for the foregrounding of both the interpersonal interactions that characterize archaeological work and the imaginative extrapolation from secure archaeological evidence (Hodder 1999; Joyce 2002). They permitted a first-person narrator, a human being present in the manuscript, responsible for the analysis presented, rather than an abstract "we" or "they." The flexible temporality inherent in fictional writing enabled an exploration of the shifting and often difficult-to-reach time scales involved in archaeological research (Joyce 2002). Furthermore, fictional writing allowed a direct illustration of how entangled data collection, interpretation, storymaking, and publication are within archaeological research (Hodder 1999). For these reasons, borrowing writing styles from fiction authors was ideal for authentically capturing the aspects of reality postprocessualism emphasized.

Even though accurate representation has always been an aim in archaeology, through shifting standards as to what "accurate" has meant across the history of the discipline, it was only during the 1980s and 1990s that archaeologists paid substantial, explicit attention in their theory and publications to writing. This period saw a dramatic expansion in the amount of archaeological writing *about* writing, at the same time that anthropologists were also writing about writing. Experimentation with creative forms of expression across disciplines represented a practical application of more abstract theoretical debates regarding narrative and writing.

But those theoretical debates have largely subsided in recent decades, both in archaeology and in related academic disciplines. Writing, representation, and authenticity are no longer such key foci, no longer generate impassioned defenses of objectivity versus positionality and personality. Within archaeological literature, the concepts of materiality and ontology have recently supplanted issues of text and representation as the major theoretical arenas. At the same time, attitudes in archaeology regarding the notion of authenticity have changed quite dramatically. More archaeologists now question the very notion of authenticity – whether it is helpful, whether it is even possible, and whether it can in fact be damaging as an ideal goal for cultures, objects, and representation in archaeology (Graves-Brown 2013; Jones 2010; Myrberg 2004). The notion that authenticity is unchanging and attainable has been thoroughly challenged, while the opposite idea – that authenticity is wholly socially constructed – is claimed to be problematic for its failure to explain the prevailing importance of authenticity for archaeologists and members of the public.

Instead, archaeologists are today embracing a broadening range of digital technologies for archaeological excavation, analysis, and presentation of results. The debates surrounding these

technologies by and large acknowledge that these technologies produce virtual realities and approximate models that can never replace the real, original source (Barceló et al. 2000). They might be considered, following Adam Rabinowitz (2015), "digital surrogates." This term, Rabinowitz has emphasized, necessitates an awareness that a digital representation of an object, deposit, or site may be extremely faithful, may be capable of providing as direct an experience of the original as possible, but at the same time, "the digital 3D model is not a true surrogate for the original... digital surrogates in particular have their own independent reality as objects or works requiring their own documentation and explanation" (Rabinowitz 2015: 35–36). Virtual records and representations in archaeology, as in any setting, are produced through a series of decisions, according to a set of priorities established by teams of human researchers. Accordingly, it is essential not to lose sight of the insights achieved through archaeological inquiry into writing and fiction regarding the importance of documenting decision-making and exploring subjectivity.

But the relationship between authenticity and digital archaeological representation does not end with a reemphasis on the same problems and solutions raised within the discipline at the end of the last century. Much of the allure of virtual reality in archaeology rests in its capabilities that transcend traditional means of documentation and representation – and even, in many ways, the real thing. Digital and 3D models can be manipulated and measured in ways that excavated remains cannot, even during the excavation process. One can alter the lighting conditions, look at structures upside down, zoom in and out, and run algorithms and computer models to test hypotheses about resource availability, lighting conditions, acoustic conditions, hydrology, climate, and a wide range of other topics. These capabilities imbue virtual archaeology with characteristics of what Jean Baudrillard called "hyperreality" (Gillings 2002; Baudrillard 1983). According to this view, digital simulations and models in archaeology create a reality that is in many ways substantially, materially different from the real referent – not necessarily in terms of factual basis, but certainly in terms of affect, aura, and affordance. These virtual technologies invite a qualitatively different experience of the archaeological record. The notion of hyperreality can be seen quite clearly in the capability of digital technologies to create immersive reconstructions of damaged archaeological sites and tangible, printed copies of unique artifacts, especially ones that have been destroyed. With these new and continually developing technological abilities, archaeological representation can in fact transcend the limitations of the real, physical archaeological record.

As digital archaeology becomes less of a subfield of archaeological practice and becomes instead the status quo, the definition and role of authenticity will accordingly change as well. As Mark Gillings has stated in his discussion of the relation between virtual reality and authenticity in archaeology:

> "The standards we use to judge the veracity of any claim to realism are fluid and inherently historical... Authenticity is not solely a property of form, but is instead a property of process and a relationship, or connectedness, between people and the world" (Gillings 2002: 25).

The new capabilities of digital technologies in archaeology transform this relationship. It seems that archaeology, therefore, is entering a fourth phase in what it deems to be "authentic" representation – a phase characterized by a challenge to the notion of authenticity itself. This phase questions whether it is possible to do better than pursue authenticity, to produce something which holds more potential than accurate documentation and publication. It retains from earlier periods the commitment to scientific precision and evidence-based reasoning, as well as the prioritization of preserving the total means by which a given perspective on the past was produced. Archaeologists seem now to be blending, therefore, the key concerns raised over the course of the discipline's development in their presentation of archaeological remains. The definition of authenticity as it relates to archaeology, having been in constant flux throughout this history, is once again being renegotiated in ways that are likely to have significant and lasting impacts for the future of archaeology.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation
- ▶ Narrative and Storytelling for Archaeological Education
- ▶ New Archaeology, Development of
- ▶ Processualism in Archaeological Theory
- ▶ Recording in Archaeology
- ▶ Writing Archaeological Fiction

References

1770. An historical account of the origin and establishment of the Society of Antiquaries. *Archaeologia* 1 (1): i–xxxix.

Bapty, Ian. 1990. The agony and the ecstasy; the emotions of writing the past, a tragedy in one act for three voices. *Archaeological Review from Cambridge* 9 (2): 233–242.

Barceló, Juan A., Maurizio Forte, and Donald H. Sanders, eds. 2000. *Virtual reality in archaeology*. Oxford: Archaeopress.

Baudrillard, Jean. 1983. *Simulations*. New York: Semiotext(e).

Beaudry, Mary C. 1998. Farm Journal: First Person, four voices. *Historical Archaeology* 32 (1): 20–33.

Bender, Barbara. 1998. *Stonehenge: Making space*. Oxford: Berg.

Binford, Lewis R. 1972. *An archaeological perspective*. New York: Seminar Press.

Clifford, James, and George E. Marcus. 1986. *Writing culture: The poetics and politics of ethnography*. Berkeley: University of California Press.

Collingwood, R.G. 1930. *The archaeology of roman Britain*. London: Metheun & Company.

Collingwood, R.G. 1946. *The idea of history*. Oxford: Clarendon Press.

Connah, Graham. 2010. *Writing about archaeology*. Cambridge: Cambridge University Press.

Courbin, Paul. 1988. *What is archaeology? An essay on the nature of archaeological research*. Chicago: University of Chicago Press.

Deetz, James. 1988. History and archaeological theory: Walter Taylor revisited. *American Antiquity* 53 (1): 13–22.

Edmonds, Mark. 1999. *Ancestral geographies of the Neolithic*. London: Routledge.

Flannery, Kent V. 1968. Archaeological systems theory and Early Mesoamerica. In *Anthropological archaeology in the Americas*, ed. Betty J. Meggers, 67–87. Washington, DC: Anthropological Society of Washington.

Flannery, Kent V., ed. 1976. *The Early Mesoamerican Village*. New York: Academic Press.

Gero, Joan M. 1996. Archaeological practice and gendered encounters with field data. In *Gender and Archaeology*, ed. Rita P. Wright, 251–280. Philadelphia: University of Pennsylvania Press.

Gillings, Mark. 2002. Virtual archaeologies and the hyperreal: Or, what does it mean to describe something as *Virtually*-Real? In *Virtual reality in geography*, ed. Peter Fisher and David Unwin, 17–34. London: Taylor and Francis.

Graves-Brown, Paul. 2013. Authenticity. In *The Oxford handbook of the archaeology of the contemporary World*, ed. Paul Graves-Brown, Rodney Harrison, and Angela Piccini, 219–231. Oxford: Oxford University Press.

Hodder, Ian. 1989. Writing archaeology: Site reports in context. *Antiquity* 63 (239): 268–274.

Hodder, Ian. 1995. Of Mice and Men: Collingwood and the development of archaeological thought. In *Philosophy, history, and civilization*, ed. D. Boucher, I. Connolly, and T. Modood, 364–383. Cardiff: University of Wales Press.

Hodder, Ian. 1999. *The archaeological process: An introduction*. Oxford: Blackwell.

Jones, Sîan. 2010. Negotiating authentic objects and authentic selves: Beyond the deconstruction of authenticity. *Journal of Material Culture* 15 (2): 181–203.

Joyce, Rosemary A. 2002. *Languages of archaeology: Dialogue, narrative, and writing*. Oxford: Blackwell.

McIntosh, Roderick James. 1998. *The peoples of the middle Niger: The Island of Gold*. Malden: Blackwell.

Molyneaux, Brian Leigh, ed. 1997. *The cultural life of images: Visual representation in archaeology*. London: Routledge.

Moser, Stephanie. 2012. Archaeological visualization: Early artifact illustration and the birth of the archaeological image. In *Archaeological theory today*, ed. Ian Hodder. Cambridge: Polity Press.

Myrberg, Nanouschka. 2004. False monuments? On antiquity and authenticity. *Public Archaeology* 3 (3): 151–161.

Pavel, Catalin. 2010. *Describing and interpreting the past: European and American approaches to the written record of excavation*. Bucharest: Editura Universitatii Din Bucuresti.

Praetzellis, Adrian. 1998. Why every archaeologist should tell stories once in awhile. *Historical Archaeology* 32 (1): 1–3.

Praetzellis, Adrian, and Mary Praetzellis. 1998. A connecticut merchant in Chinadom: A play in one act. *Historical Archaeology* 32 (1): 86–93.

Rabinowitz, Adam. 2015. The work of archaeology in the age of digital surrogacy. In *Visions of substance: 3D*

imaging in mediterranean archaeology, ed. Brandon R. Olson and William R. Caraher, 27–42. Grand Forks: The Digital Press @ The University of North Dakota.
Schrire, Carmel. 1995. *Digging through darkness: Chronicles of an archaeologist*. Charlottesville: University of Virginia Press.
Shanks, Michael, and Christopher Tilley. 1987. *Social theory and archaeology*. Cambridge: Polity Press.
Sinclair, Anthony. 1989. This is an article about archaeology as writing. *Archaeological Review from Cambridge* 8 (2): 212–231.
Spector, Janet D. 1993. *What this Awl Means: Feminist archaeology at a Wahpeton Dakota Village*. St. Paul: Minnesota Historical Society Press.
Taylor, W.W. 1983/1948. *A study of archeology. Carbondale: Southern*. Illinois: University Press.
Tringham, Ruth. 1991. Households with faces: The challenge of gender in prehistoric architectural remains. In *Engendering archaeology: Women in prehistory*, ed. Joan Gero and Margaret Conkey, 93–131. Oxford: Blackwell.

Further Reading

Allen, Mitchell, and Rosemary Joyce. 2010. Communicating archaeology in the 21st Century. In *Voices in American anthropology*, ed. Wendy Ashmore, Dorothy T. Lippert, and Barbara J. Mills, 270–290. Washington, DC: The Society for American Archaeology Press.
Fagan, Brian. 2016. *Writing archaeology: Telling stories about the past*. 2nd ed. New York: Routledge.
Gear, W.M., and Kathleen O. Gear. 2003. Archaeological fiction: Tripping through the minefield. *The SAA Archaeological Record* 3 (5): 24–27.
Holtorf, Cornelius. 2007. *Archaeology is a brand! The meaning of archaeology in contemporary popular culture*. Walnut Creek: Left Coast Press.
Kintigh, Keith W. 2005. Writing archaeology: Analyses and archaeological argumentation. *The SAA Archaeological Record* 5 (4): 33–35.
Landau, Misia. 1991. *Narratives of human evolution*. New Haven: Yale University Press.
Lesure, Richard G. 2015. Emplotment as epic in archaeological writing: The site monograph as narrative. *Norwegian Archaeological Review* 48 (2): 57–74.
Mickel, Allison. 2012. *Archaeologists as authors and the stories of sites*. Saarbrucken: Lambert Academic Publishing.
Pluciennik, Mark. 1999. Archaeological narratives and other ways of telling. *Current Anthropology* 40 (5): 653–678.
Porr, Martin, and Jacqueline Matthews. 2016. Thinking through story: Archaeology and narratives. *Hunter Gatherer Research* 2 (3): 249–274.
Tilley, Christopher. 1989. Excavation as theatre. *Antiquity* 63: 275–280.
Wiley, Alison. 1993. Facts and fictions: Writing archaeology in a different voice. *Canadian Journal of Archaeology* 17: 5–25.
Wilkinson, David. 2007. Writing archaeology and writing fiction. *The Archaeologist* 65: 18–19.

A

Authority and Legitimacy in Political and Social Archaeology

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Introduction and Definition

Authority is, according to the dictionary included in Mac computers: "the power or right to give orders, make decisions, and enforce obedience." It is also "the power to influence others, esp. because of one's commanding manner or one's recognized knowledge about something," as well as "the confidence resulting from personal expertise." There is yet another meaning of this word: "a person with extensive specialized knowledge about a subject; an expert."

Whereas somebody is legitimate when he or she is "conforming to the law and to rules," archaeology is legitimate when it operates according to the legal system that regulates social life in a State and when it follows the rules it defines, as a discipline, for the practice of the profession. Despite the differences between these concepts, it is evident that they are closely related: archaeology's authority emanates from, among others, its own legitimacy. However, there are other, more important and more ancient sources for its authority.

Key Issues/Current Debates/Future Directions/Examples

Archaeology has the authority to talk about humankind's past through the study of the material culture of societies of yesteryear. It is the voice of the experts (those mentioned by the dictionary) on that matter, and in order to be able to be considered one, the individual needs to have obtained a formal education (with degree and all) in a University. As a discipline, then, it seeks to produce knowledge founded upon rules and

protocols that underlay its academic practices, and in order to learn to do that well, it is necessary to get a formal education. In Randall McGuire's opinion, archaeology is above all a craft, which means that its practitioners need to acquire not only the aforementioned knowledge imparted by institutions of higher education, but also a series of motor skills that allow them to actually put that knowledge into practice (McGuire 2008: 85).

This situation of privilege is in manifest conflict with the worldview and opinions of other social groups, especially in those countries where different ethnic populations co-exist. This scenario becomes really tense when archaeologists show little interest or respect for the opinions offered by indigenous groups. As a matter of fact, archaeologists have total control over their investigations and they can unilaterally pick and design their research agendas – which in general benefit the scholar's career and very rarely favor indigenous demands or needs. This, according to Jeffrey C. Bendremer and Elaine L. Thomas, can be described as a colonial situation (Bendremer and Thomas 2008: 60). Whether this is an appropriate classification or not for postcolonial societies, the truth is that this kind of situation comes from a power differential similar to the one described by Edward Said in his study about Orientalism: it is an asymmetric distribution of power that makes it possible for a group to elaborate a dominant and authoritative discourse about another group, and not the other way around (Said 1978).

Although it can be argued (successfully, I suspect) that, in the framework of postcolonial societies formerly dominated by colonial powers, it is not quite right to qualify the situations of oppression as colonial or colonialist; it is true, though, that in the past they were so. That is, the present-day situations of oppression are the product or the consequence of colonial legacies: the legacies left by the different colonial situations of the past, and also the epistemological frameworks from which scientific authority emanates developed, as Walter Mignolo has convincingly demonstrated in *The Darker Side of the Renaissance*, in an era that is normally characterized as early modernity or the Renaissance, but which we forget is also a colonial one (Mignolo 1995). According to this author, the traits of Modernity that are usually celebrated (scientific progress, emancipatory drive, and a long etcetera), are just the reverse (the dark side) of the colonial endeavors that took place during the first stage of European expansion. It is probably not an exaggeration nor an imprecision to suggest that the authority archaeology enjoys in the present has its origin in the prestige that surrounded science and knowledge production in the societies that emerged from the European expansion of the sixteenth century. The societies that together are known as the West are the dominant ones, as is well known, in the realm of knowledge production – the protocols, rules, and practices that characterize modern science originated and developed in them. This is a group of societies that expanded throughout the whole planet, carrying with them not only the seeds of capitalism but also a worldview based on a scientific and philosophical approach that finds its foundation in Cartesian assumptions about subject and object, mind and res extensa, and other equally foundational dichotomies (Londoño 2010: 382). From that matrix emerges not only the paradigm of modern science, in general, but also the archaeological paradigm known as New Archaeology or processual archaeology, in particular. As is well known, this new way of doing archaeology presented itself as truly scientific. Therefore, its myth of origin, according to Gavin Lucas, was to imagine itself as a conscious and scientific practice (Lucas 1995: 37). Some of archaeology's prestige and authority stems from its claim about having objectivity, universality, and exteriority as its foundation (Gnecco 2006: 82). This is why one of the most important sources of authority for the discipline is, as mentioned above, Western education and its institutions (Gnecco and Ayala Rocabado 2010: 32). And it is so, among other reasons, because scientific discourse was very useful for the administration and control of populations in the periphery (Funari 2006: 74).

The authority of the discipline comes, also, from its role in the task of building national narratives, both in the countries that endeavored the colonial enterprise and in those that emerged after being colonies of the former. According to Ian Hodder, the "scientific" archaeology (my quotation marks) that develops in the nineteenth century was made

possible thanks to the State's interest in finding ways to control historical heritage (Hodder 1999: 170). In the same vein, Wilhelm Londoño avers that archaeology was (and is) a very useful dispositif that confirmed the success of the modern project; that is to say, it confirmed the dissolution of indigenous peoples' communal ties and the discontinuity between the indigenous peoples of the present and their pre-contact ancestors (Londoño 2010: 392). This kind of statement proffered by the discipline explains why it played such a fundamental role in the dispossession of indigenous lands: because archaeology declared them dead or vanished, it made it possible for those lands to be left at the disposal of the State and private interests (Haber 2010: 56).

In the countries of what today comprise central capitalism, such as the United States and those of Europe, archaeology is strongly related to a social class, in spite of the claims about being an objective science that characterize the discipline's spokespersons since the advent of the New Archaeology. As a matter of fact, the birth of the modern Nation-State is specifically tied to a social class, the bourgeoisie, that needed the help of archaeology and other disciplines to both legitimate that experiment in State organization and to rewrite the past of human occupations of the territory (Trigger 1989). It should be also pointed out that, as McGuire suggests, in the countries where settler colonialism developed, archaeology has become a neo-colonial endeavor, because it has dedicated itself to write the history of the ancestors of present-day indigenous peoples by the descendants of the settlers (McGuire 2008: 77–78), while in more recent times it has become a strong ally of the segment of society known as the middle class in both Europe and the United States (McGuire 2008: 88) – and it can be argued that this has happened in other parts of the world as well.

From the 1980s, however, archaeology has had to face a series of challenges undertaken by individuals coming from social groups that do not feel represented by the rules, epistemological assumptions, protocols, practices, and the knowledge produced by the discipline. The bourgeois, Europeanized, and masculine nature of archaeological practice could not continue to pretend to be an objective view of humankind's material past. Its practices, which were dedicated, from its beginnings as a discipline, to favor the interests of the dominant segments of society, began to be rejected from several fronts. Those criticisms were grouped in an umbrella concept known as postprocessualism, which as a multi-headed Hydra attacked, from different angles, the fundamental tenets of processual archaeology. Among the different, new ways of doing archaeology, one, indigenous archaeology, deserves special mention. It is a practice that proposes to take into account the interests, desires, and opinions of indigenous societies of the present.

It is probably in this new way of understanding and doing archaeology that the most effective and long-lasting attack on both the discipline's claim to authority as a group (as McGuire correctly points out, the structure of the profession follows the guild model), and the legitimacy of its aspiration to be the only authorized agent to study and make sense of the past, can be found. As a matter of fact, one of the things indigenous peoples demand from the discipline is to stop having the monopoly of decision-making throughout the archaeological process. In this type of situation, the conflicts are played out and negotiated in different fields of action, and the arguments used by the parties involved cover a wide range that goes from the cultural to the political (and the economic). Yet, without a doubt, the most important, the most decisive sphere were the conflict is discussed, is the legal system. This is why it can be argued that the approval of a series of laws throughout the world, from the 1990s on, about repatriation and restitution of human remains and associated materials (of which the one known as NAGPRA, approved in 1990 in the United States, is paradigmatic), has had unique repercussions in the way in which the discipline is imagined and practiced, because it forces archaeologists to communicate, consult, and collaborate with indigenous living peoples.

As Joe Watkins has rightly pointed out, it is a pity that archaeologists had not themselves promoted this kind of democratic practice before the law forced them to do it, because it precluded the possibility that consultation and collaboration with indigenous subjects could be the product of

a conscious ethical decision on their part (Watkins 2000: xii). The fact is that thanks to this kind of legislation, archaeologists are not (in several countries), today, the only legitimate actors for the task of interpreting the past – that is, they are not the only agents that can decide on matters related to indigenous pasts. Nowadays, indigenous groups have the opportunity to be part of those processes of decision-making, which relativizes and undermines archaeologists' previously exclusive authority.

These indigenous struggles for obtaining the chance to be part of the interpretation, preservation, and study of their own past, are attempts at restituting some equilibrium in the face of the above mentioned differential of power that Sonya Atalay calls power imbalance, that kept indigenous peoples outside the processes that led to decisions regarding their own cultural heritage (Atalay 2011: 48). According to this author, those struggles against the existent power imbalance may end up benefitting other oppressed communities at a global scale (Atalay 2011: 48). The efforts made in that direction have taken diverse forms, one of which is the development of archaeological programs by some indigenous communities (for example, the Navajo, discussed in Watkins 2000: 93–103) who endeavor to study their own past without the help or intrusion of intermediaries. This is not the most common case, because the number of indigenous groups that do not have an archaeology program is much higher than the one of those who have one. More frequent is the case of individuals belonging to indigenous communities who decide to dedicate themselves to the profession in order to change it from within, so to speak (see a rather complete panorama of this growing group of people in the book edited by Nicholas). Last but not least, a modality that becomes more common with time: programs of collaborative archaeology in which individuals of different ethnic backgrounds undertake archaeological investigations in which indigenous values that were absent in mainstream practices are now present. The presence and importance of said values depend, in good part, on two undertakings: consultation and collaboration among different groups.

Some authors, like Nina Versaggi, opine that the kind of consultation required by the law, which is a one-time thing or an event, is not enough to reestablish some equilibrium in the distribution of power among the actors. On the contrary, in her view, consultation must be both continuous and meaningful; it must be a process instead of an event (Versaggi 2006: 30). For other authors, consultation, although a vital element in the whole process, is not enough because only collaboration leads to "praxis" – that is, to a series of conscious actions that intend to change the world (McGuire 2008: 8). For another author, Cara Lee Blume, the collaboration process differs from consultation in that the former means "to work together" (Blume 2006: 210). And according to the same author, the only way collaboration can happen is through the participation of indigenous communities in all the stages of the research process, which implies, for archaeologists, to share power, so that indigenous participants can be part of the instances when decisions are made (Blume 2006: 198). In this way, the new scenario contributes to fight the power imbalance that Atalay talks about and the power differential, if your prefer Said's parlance.

In sum, for at least a couple of decades, archaeologists' authority as the only legitimate agents for the interpretation of the past of the diverse communities that inhabited the planet, has been systematically questioned.

Although this is a situation that puts them in a less privileged position than in the past, it is arguably an opportunity to produce a better science, and a less biased, more democratic knowledge. This is why special attention should be paid to what Cristóbal Gnecco proposes as possible ways in which archaeology could recover some legitimacy in these times when the discipline is undergoing a certain degree of decolonization: to help in the processes of recovery of the local traditions and histories that it contributed to silence and erase in the (sometimes much too recent) past; to become public; to question its long association with the national narratives; and to abandon the academic ghetto to embrace and reach, at last, a wider variety of social sectors than it used to (Gnecco 2008: 30–1). What can be done, then, is to use the expert knowledges that have traditionally been at the service of the exclusion and subalternization of the West's others, to favor the

causes and projects defended and undertaken by the latter (Verdesio 2005: 142). This is in tune with what Funari says about the World Archaeological Congress (WAC): its objective is to promote an archaeology that seeks to liberate, instead of to exploit, the world (Funari 2006: 74).

Cross-References

- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Professionalization: Archaeology as an "Expert" Knowledge

References

Atalay, S. 2011. Raise your head and be proud Ojibwekwe. In *Being and becoming indigenous archaeologists*, ed. G. Nicholas, 45–54. Walnut Creek: Left Coast Press.

Bendremer, J.C., and E.L. Thomas. 2008. The tribe and the trowel. An indigenous archaeology and the Mohegan archaeological field school. In *Collaborating at the trowel's edge. Teaching and learning in indigenous archaeology*, ed. S.W. Silliman, 50–66. Tucson: University of Arizona Press.

Blume, C.L. 2006. Working together. Developing partnership with American Indians in New Jersey and Delaware. In *Cross-cultural collaboration. Native peoples and archaeology in the northeastern United States*, ed. J.E. Kerber, 197–212. Lincoln/London: University of Nebraska Press.

Funari, P.P. 2006. The World Archaeological Congress from a critical and personal perspective. *Archaeologies* 2 (1): 73–79.

Gnecco, C. 2006. A three-takes tale: The meaning of WAC for a pluralistic archaeology. *Archaeologies* 2 (2): 80–86.

Gnecco, C. 2008. Manifiesto moralista por una arqueologia reaccionaria. In *Puentes hacia el pasado. Reflexiones teóricas en arqueologia*, Serie Monografica de la Sociedad Chilena de Arqueologia, vol. 1, 23–33. Santiago de Chile: Sociedad Chilena de Arqueologia.

Gnecco, C., and P. Ayala Rocabado. 2010. Qué hacer? Elementos para una discussion. In *Pueblos indigenas y arqueologia en America Latina*, ed. C. Gnecco and P. Ayala Rocabado, 23–47. Bogota: Universidad de los Andes.

Haber, A. 2010. Arqueologia indigena y poder campesino. In *Pueblos indigenas y arqueologia en America Latina*, ed. C. Gnecco and P. Ayala Rocabado, 51–61. Bogota: Universidad de los Andes.

Hodder, I. 1999. *The archaeological process. An introduction*. London: Blackwell.

Londoño, W. 2010. Las arqueologias indigenas o la lucha contra la tercera transformacion de Fausto: reflexiones desde comunidades de Colombia y Argentina. In *Pueblos indigenas y arqueologia en America Latina*, ed. C. Gnecco and P. Ayala Rocabado, 373–397. Bogota: Universidad de los Andes.

Lucas, G. 1995. Interpretation in contemporary archaeology. Some philosophical issues. In *Interpreting archaeology. Finding meaning in the past*, ed. I. Hodder, M. Shanks, A. Alexandri, V. Buchli, J. Carman, J. Last, and G. Lucas, 37–44. London/New York: Routledge.

McGuire, R.H. 2008. *Archaeology as political action*. Berkeley/Los Angeles/London: University of California Press.

Mignolo, W. 1995. *The darker side of the renaissance. Literacy, territoriality and colonization*. Ann Arbor: University of Michigan Press.

Said, E. 1978. *Orientalism*. New York: Vintage.

Trigger, B. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.

Verdesio, G. 2005. La mudable suerte del amerindio en el imaginario uruguayo: su lugar en las narrativas de la nación de los siglos XIX y XX y su relación con los saberes expertos. In *Hacia una arqueología de las arqueologías sudamericanas*, ed. A. Haber, 115–150. Bogotá: Ediciones Uniandes.

Versaggi, N.M. 2006. Tradition, sovereignty, recognition. NAGPRA consultation with the Iroquois Confederacy of Sovereign Nations of New York. In *Cross-cultural collaboration. Native peoples and archaeology in the northeastern United States*, ed. J.E. Kerber, 18–31. Lincoln/London: University of Nebraska Press.

Watkins, J. 2000. *Indigenous archaeology. American Indian values and scientific practice*. Walnut Creek: Altamira Press.

Nona Avanesova

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Basic Biographical Information

Nona A. Avanesova is a recognized expert in the field of the Paleo-Metal Age of the population of the Eurasian Steppe cultures and South of Uzbekistan. She is an authoritative researcher and

Nona Avanesova, Fig. 1

practicing field archaeologist, a professor at the Samarkand State University (Fig. 1).

In 1967 she graduated with honors from the History Faculty of Samarkand University. She was soon sent to Leningrad, where she was accepted as an intern at the State Hermitage. By this time she began her first publications and participation in scientific conferences.

She graduated from the graduate school in Leningrad, specializing in archaeology in the Department of Archeology of the Leningrad State University and in the Leningrad branch of the Institute of Archeology of the Academy of Sciences. Upon her return to Samarkand, she was accepted as assistant to the chair of archeology, where she currently works as a Professor.

In 1986 N. Avanesova became the head of the Department of Archeology of the History Faculty of Samarkand University. In 1999, at the invitation of the dean of the Humanities Faculty of the Higher School of the Sorbonne University, Nona Avanesova lectured on the problems of the Bronze Age of the steppe part of Eurasia. In 2016 she was awarded the honorary title of visiting professor of the Samara State Institute of Culture.

Major Accomplishments

The scientific heritage of Nona Avanesova includes the huge massive studies of historical and archaeological material on the Paleo-Metal epoch of Central Asia and cultures that combine the synthesis of agricultural and cattle-breeding traditions.

Her scientific research is connected with fieldwork and the excavations of archaeological monuments of the Stone and Bronze centuries in Kazakhstan, Tajikistan, and Southern Siberia. Under the leadership of Mikhail P. Gryaznov in 1979 in Leningrad, Avanesova defended her doctoral thesis. The theme of her scientific work is "The Problems of the History of Andronov Cultural Unity (on Metal Products)." The sphere of her professional interests includes many topics – the development of ancient crafts, cultural genesis, mythology, symbolic practices, funeral rite, intercultural communication, museum practice, and more.

In 1985, academician A.A. Askarov invited her to study the monuments of the Sapalli Culture of the South of Uzbekistan. Since then, the necropolis of the Bronze Age Buston VI has become the main object of archaeological research of N. Avanesova [1995, 1996, 1997, 2013a, 2016a, 2016b].

For three decades, unique materials were collected, and fundamentally new ways of illuminating the historical roots of the peoples of Central Asia and the ethno-cultural contacts of the ancient settled agricultural and cattle-breeding inhabitants of the Eurasian continent were proposed. N.A. Avanesova put forward a reasoned enough hypothesis that ritual sets of artifacts of the necropolis of Buston VI can be reconstructed as a specific figurative subject letter, which is based on the subjects of the Rigveda.

N.A. Avanesova discovered in the structure of the necropolis a series of specific structures

(boxes) for the cremation of the deceased. She studied this material thoroughly. Currently, throughout the territory of the Eurasian continent, these buildings are the oldest crematoria, dating from the end of the second millennium BC.

After the analysis of these materials, some issues of the cultural genesis of the Proto-Bactrian civilization were revised. In addition, significant additions and changes to the issue have been made, such as the formation of the oldest trade routes in the vast area of the Great Silk Road.

These and many other issues are reflected in more than 150 scientific works published by Nona A. Avanesova in Uzbekistan, Kazakhstan, Russia, Tajikistan, Germany, France, England, and the USA [Avanesova 1991, 1995, 1996a, 1997, 1998, 2013a, 2016a, b) and Avanesova and Ippolitova 2016]. She is the author of four textbooks and four monographs: "Culture of Steppe Cattle-Breeding Tribes of Bronze Age of Asian Part of USSR" (in Russian, 1991), "Sarazm Céramaques (Chalcolithique et Bronze Ancien)" (co-authors B. Lyonnet and A.Isakov). The last monograph "*Buston VI – the Necropolis of Fire-worshippers of Pre-Urban Bactria*", published in late 2013, provoking a wide interest among many foreign specialists, already in 2016 was translated into English [Avanesova 2016a].

For more than 30 years, Nona A. Avanesova has been the head of the Archaeological Museum-Laboratory at the Samarkand State University. The museum's holdings include about 60,000 exhibits in a wide chronological range – from the eras of Paleolithic to the Late Middle Ages. Nona A. Avanesova has many remarkable achievements.

Cross-References

- ▶ Askarov, Akhmadali A.
- ▶ Burial Archaeology and the Soviet Era
- ▶ Gryaznov, Mikhail P.
- ▶ Lev, David N.
- ▶ Masson, Vadim M.
- ▶ Sarianidi, Victor I.

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References

Avanesova, N.A. 1991. *Kultura pastusheskikh plemyon epokhi bronzy Aziatskoy chasti SSSR (Culture of steppe cattle-breeding tribes of Bronze Age of Asian part of USSR)*. Tashkent.

Avanesova, N.A. 1995. *Bustan-VI une nécropole de I'âge du Bronze dans I'ancianne Bactriane (Ouzbekistan mérdional): Témoignages de cultes du feu*, Arts Asiatigues. Tome L–Paris.

Avanesova, N.A. 1996. *Buston VI the Reculiarites of the Protobactrian complex of Uzbekistan*, Information Bulletin UNESCO No 20. Moscow.

Avanesova, N.A. 1997. *Spät bronze zeit liche kultur kontakte in der baktrischen Fluboase nach den Befunden der Nekropole Bustan-6*, AMIT Band 29. Berlin.

Avanesova, N.A. 1998. Historical fate of Proto-Bactrian civilization. *Journal of Indo-European Studies* 27(2). New Haven.

Avanesova, N. A. 2013a. Funeral rites in the necropolis of Buston VI as a mirror of cultural interactions. In: *Cultural transfers in Central Asia: Before, during and after the silk road*. Paris/Samarkand: IICAS.

Avanesova, N.A. 2016a. *Buston VI – the necropolis of fire-worshippers of pre-urban Bactria*. Samarkand. IICAS.

Avanesova, N.A. 2016b. Le ritual funéraile de la nécropole de Buston VI. In *Asie central: Transferts culturels le long de la soie*. Paris.

Avanesova, N.A., and A.G. Ippolitova 2016. Representation of Samarkand in space of contemporary time (Review on book "A concise encyclopedia of foreign Samarkandiana: Culture linking the world" (2014) by A.I. Ionesov and V.I. Ionesov). Bulletin of IICAS Publication of the International Institute for Central Asian Studies (Samarkand), vol. 23. Samarkand: IICAS.

Aviation Archaeology

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Brief Definition of the Topic

Aviation Archaeology involves the investigation of material remains associated with the act of

flying. It encompasses aircraft and includes, but is not limited to aeroplanes, helicopters, hot air balloons, gliders, flying boats, antiaircraft installments, terminals, airbases, airfields, control towers, camps, and airstrips. The personal effects of people associated with aviation whether in a civilian or wartime environment also form part of the material culture of aviation archaeology. Examples may include airbase and aircraft construction and repair equipment, pilot-related resources, as well as materials associated with airbases, camps, control towers, and hangars.

Aviation sites have greatly transformed landscapes throughout the world, and yet the development and appreciation of aviation archaeology as an area of academic inquiry is only recent as it has been treated as a subset of historical archaeology and conflict archaeology. The relative neglect of aviation sites is due to a misconception that all material remains relating to aviation have been recorded in the archives and that therefore additional information cannot be obtained (McCarthy 2004: 82). The best example of this misunderstanding is the aeronautical engineering advances and alterations evident in World War II aircraft wrecks, which were not recorded in the archives. Investigations of archival materials related to aviation activities have brought to light the limited and often incomplete nature of information contained in reports (Shanahan 2014). There are repairs, modifications, and the construction of aviation structures and aircraft which do not feature in written records. The examples of reports having been lost or misplaced reinforce the necessity for contemporary archaeological investigations to complement the incomplete written record.

Misconceptions regarding the nature of aviation sites and materials are not the only challenge associated with the study of aviation archaeology. This subfield of archaeological inquiry is confronted with three major challenges. First is the issue of defining the site boundaries of aviation sites. This field of inquiry ranges from the investigation of terrestrial and maritime small, mobile sites such as aircraft wrecks as well as large, permanent terrestrial sites like control towers and hangars. Secondly, relic collectors and aviation enthusiasts often locate aviation sites before archaeologists. This leads to information loss and material damage when materials are taken off site or removed from their primary context on site. For this reason, aviation archaeologists have few intact sites from which to establish methodologies and comprehend site formation processes. Finally, heritage legislation worldwide regarding aviation sites is insufficient and often nonexistent. The lack of protection for sites allows relic collectors and enthusiasts to interfere with sites without guidelines. Often, the only protection offered to aviation sites is when aircraft wrecks are associated with human remains.

Archaeological work undertaken in Australia and the United Kingdom has generated positive improvements, understanding, and the development of aviation archaeology as a recognized subfield of archaeological inquiry. Jung and McCarthy (2001; 2004: 184), for example, have established site significance criteria and site report cards in Australia that will assist in archaeological fieldwork. Investigations regarding metals on aeroplanes in marine environments conducted by conservation staff at the Western Australia Museum have allowed World War II aircraft to be removed from rivers and ocean floors in Europe and placed under conservation management plans. In 2002 and 2003, English Heritage produced two guidance manuals relating to World War II aviation heritage sites, their management, and significance. Finally, the Australian Department of Sustainability, Environment, Water, Pollution, and Communities expanded the Australian National Shipwreck Database to include aircraft (Wilkinson 2012: 34). This development has led to discussions regarding the inclusion of aircraft in federal and state heritage legislation in Australia. Examples of such inclusions are evident in the 2011 Northern Territory *Heritage Act*. Similar legislation is currently being developed in the United Kingdom and throughout the Pacific.

As the field of aviation archaeology develops, so will archaeologists' understanding of site formation, conservation and management of aviation sites worldwide. These developments will reduce the severity of challenges associated with this sub-

field of inquiry and decrease misconceptions and neglect that impact on aviation archaeology today.

Cross-References

- ▶ Archival Research and Historical Archaeology
- ▶ Battlefield Archaeology
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Historical Archaeology

References

English Heritage. 2002. *Military aircraft crash sites: Archaeological guidance on their significance and future management*. London: English Heritage.

English Heritage. 2003. *Historic military aviation sites: Conservation management guidance*. London: English Heritage.

Jung, S. 2001. Wings beneath the sea: The aviation archaeology of Catalina flying boats in Darwin Harbour, Northern Territory. Masters of Arts dissertation, Northern Territory University.

McCarthy, M. 2004. Historic aircraft wrecks as archaeological sites. *Bulletin Australian Institute for Maritime Archaeology* 28: 81–90.

Shanahan, F. 2014. World War II conflict aviation archaeology. Managing World War II aviation sites in Australia and the Marshall Islands. Unpublished Honours thesis, La Trobe University.

Wilkinson, D. 2012. Underwater aircraft sites in Australia: A summary of what has been learnt so far. *Bulletin Australian Institute for Maritime Archaeology* 36: 31–35.

Further Reading

Deal, M., L. Daly, and C. Mathias. 2015. Actor – Network theory and the practice of aviation archaeology. *Journal of Conflict Archaeology* 10: 3–28.

Holyoak, V. 2001. Airfields as battlefields, aircraft as an archaeological resource: British military aviation in the first half of the 20th century. In *Fields of conflict: Progress and prospect in battlefield archaeology proceedings of a conference held in the Department of Archaeology University of Glasgow*, ed. P. Freeman and A. Pollard, 253–264. Oxford: Archaeopress.

Lake, J. 2002. Historic airfields: Evaluation and conservation. In *Materiel culture. The archaeology of 20th century conflict*, ed. J. Schofield, W. Johnson, and C. Beck, 172–188. London: Routledge.

Shanahan, F. 2016. Coomalie: A living history. *The Historic Environment* 28: 62–73.

Avocational Archaeology

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Introduction and Definition

Finding a suitable term to describe people who do archaeology without being paid a salary, who do it mostly as a leisure pursuit, is not easy. Many terms have acquired emotional baggage through misuse over the years or have inadequate definition to be accurately used. Avocational is often used as the opposite of professional but is a term seldom used in the UK. We usually talk about the voluntary sector and of volunteers, although this can apply more widely to work placement students as well as people doing archaeology outside the professional sector. An older term is amateur archaeologists, although this has been used as a dismissive term by professionals as though being amateur were somehow less worthy or of lesser standard. It is often seen therefore as a politically incorrect term, the use of which involves an attitude of condemnation towards nonprofessional and therefore slipshod standards. The proper use of the word amateur simply means working for pleasure rather than financial gain. It is therefore entirely appropriate to use as a way of describing people who do archaeology without being paid a salary. Avocational is also a term that begs questions about assumptions and definitions. I will use all three terms interchangeably since the use of one term alone will become tedious through sheer repetition and some variation is needed for stylistic aesthetics.

Avocational archaeologists are people with a passion for the past as experienced through archaeology but have not chosen to follow a professional career in the subject. They are volunteers in their archaeology. Moreover, they are not content to watch archaeology from the sidelines. They

are not mere spectators. People who watch archaeology programs on television are not avocational archaeologists. Nor are people who visit heritage sites or stand behind barriers watching excavations in progress. Nor are people who attend lectures in archaeology. Avocational archaeologists are those who practice archaeology in whatever form during their spare time without personal income or profit.

One question immediately springs to mind as to how comparable these volunteer archaeologists are to professionals in their level of skills and contribution to the study and protection of the past. The role of education is to make sure that volunteers work to the same level as professionals and put into practice the appropriate disciplinary standards.

Where volunteers work within the context of professional organizations, perhaps on work placements as students or as volunteers carrying out agreed special tasks, then they will be trained and fully incorporated into professional levels of practice by their host organization. Where they work on their own as individuals or as part of local groups and societies, the issue of training and education becomes more important.

Historical Background

Archaeology began as an amateur pursuit. In the United Kingdom, most of the early archaeologists of the seventeenth, eighteenth, and nineteenth centuries were volunteers. Some of the great names in the history of archaeology had no employment as an archaeologist. Sir John Evans (1823–1908) was a paper manufacturer, while Sir John Lubbock, Lord Avebury (1834–1913), was a banker. It was in the nineteenth century from the 1840s to the 1870s that most of the county archaeological societies were created. The members of these societies were mostly middle-class professionals with the income and time to devote to archaeological study, such as doctors, clergymen, and lawyers. They carried out archaeological fieldwork and published the results of excavations and surveys. Some early volunteer archaeologists were active over long careers. John Mortimer, a corn merchant, excavated more than 300 barrows in Yorkshire from 1863 to 1900 to what was a very high standard for the nineteenth century.

Newer, more local archaeological societies were founded throughout the twentieth century, especially from the 1950s to the 1980s. The social makeup of their members was wider than in the nineteenth century but was still mostly educated middle class. However, the context of their activities was changing. The 1970s saw a great expansion in professional archaeology, in both universities and field units. The profession grew from around 200 people in 1960 to around 4500 in 2000 and around 6500 in 2010. With greater domination by professional archaeologists, the discipline began to systematize its practices and develop an idea of appropriate professional standards. A set of National Occupational Standards was drawn up by the then Institute of Field Archaeologists (founded in 1982 and now the Institute for Archaeologists) in 2002. Nevertheless, the professional sector is small in numbers compared with the amateur sector. A report by the Council for British Archaeology identified more than 200,000 people belonging to local voluntary societies and groups with an active interest in the historic environment (Thomas 2010).

The way that archaeology developed in the United Kingdom as an amateur discipline has meant that there is no legal sanction against anyone carrying out archaeological work, including excavation. There is no system of licensing of practicing archaeologists within England, Scotland, or Wales (although there is in Northern Ireland). Avocational archaeologists can therefore carry out archaeological investigations. The UK also has a vibrant metal-detecting sector who can also legally detect for finds and may be considered by some as part of the avocational sector (although views among archaeologists on this inclusion of detectorists as part of "the family" are sharply divided).

The avocational sector of archaeology has a long tradition of fieldwork and publication and can research parts of archaeology the modern professional sector seldom has time or resources for. Amateur archaeologists are not limited to working in opportunities provided by the

planning system, and are especially strong in being able to carry out research in rural areas, and have often pioneered new areas of research, such as the archaeology of industry, transport, or twentieth-century defenses.

Key Issues

Given that avocational archaeologists in Britain carry out fieldwork, one of the key issues is how to maintain adequate standards in archaeological fieldwork. Some archaeologists may have an instinctive distrust of amateurs. They are "not one of us" and have not been through the same education and training. However, many amateur archaeologists have been active in the field for decades and have levels of experience rarely matched in the professional sector. Some will also have university archaeology degrees, having not chosen to pursue a career in a poorly paid profession and found more lucrative jobs instead while keeping their interest alive as a leisure time pursuit.

What the voluntary sector needs is training in knowledge of archaeological artifacts and sites, the acquisition of methodological or technical archaeological skills. In part this can come from the previous generation of volunteers within their local societies. However, the main source of knowledge and skills has traditionally been university teaching through part-time courses aimed at the general public. The terms used to cover these courses have changed over the years from extramural provision to continuing education to lifelong learning. Whatever the term used, they involve university staff, postgraduates, or highly qualified professionals delivering evening and weekend courses through lectures and seminars and summer field schools based around excavation or field survey. Some of these field schools were long-term research projects such as that at Wharram Percy run by Maurice Beresford from 1950 to 1990 and the Shapwick project run by Professor Mick Aston from 1989 to 1999. One advantage of such courses was that the adult students could be taught by postgraduates at the cutting edge of academic research, and the postgraduates gained early experience at teaching which would be useful for an academic career.

Gradually, funding for these kinds of university courses came under increasing pressure. While some universities still manage to run a program of archaeology lifelong learning courses, many no longer do so. The pressures on these courses stem from an instrumentalist vision of education held by government which demands that in return for state funding, higher education must deliver tangible benefits for society. Such benefits are usually seen as financial and economic. Do courses help people find work? Do courses benefit the local or national economy? Archaeology belonged firmly within a tradition of liberal adult education: education as worthwhile for its own sake as humanizing the individual. It was clearly out of step with instrumentalist views about education. Government funding for adult education became diverted towards vocational training courses, and archaeology found itself left out in the cold. Only where there is strong managerial support for traditional education have liberal adult education courses survived, and such courses are expected to be as self-funding as possible.

Participation in such courses by mainstream academic staff and postgraduates was also under pressure due to the relentless drive for research excellence as almost the only measure of academic worth and funding in higher education. Excellence in teaching has long played second fiddle to research, and courses no longer compete on the academic CV at the same level as the peer-reviewed research paper in a prestigious journal. Now that the UK government has accepted that a measure of universities' impact outside academia on wider society should be a measure to take into account for receipt of funding, it may be that attitudes will change.

Since 1994, there has been funding for community-led heritage projects through the Heritage Lottery Fund, augmented by a separate Local Heritage Initiative funding from 2000 to 2006. As a result, there has been a renewed expansion of local heritage groups, many of which engage in archaeology. The funding has supported not only existing groups but also the

founding of new ones, often on an intensely local geographical base. This has meant an increasing demand for education and training in archaeology. In order to meet this demand, the profession has begun to employ people with the necessary skills in community outreach. In many cases, these new posts have been project funded, only rarely treated as part of the core function of the organization. What these community archaeologists can do is both train local people in archaeological skills and arrange access to professional equipment and specialist help. The old model of university-based support for amateur archaeology is being augmented, and in many areas replaced, by a partnership between professional archaeological organizations and local amateur societies.

International Perspectives

Great Britain (that is the United Kingdom less Northern Ireland) is somewhat out of step with the rest of Europe. Most other European countries operate a system of licensing, where only licensed (in practice only professional) archaeologists can carry out or supervise archaeological excavation. This is not the case in Great Britain. The continental position has been given prominence in the European Convention on the protection of the archaeological heritage (revised) as passed by the Council for Europe at Valletta in 1992 (known simply as the Valletta Convention), in which Article 3 (ii) states that each signatory will undertake:

> To ensure that excavations and other potentially destructive techniques are carried out only by qualified, specially authorised persons.

The signing of the convention by the UK government caused considerable alarm in sectors of British amateur archaeology. In practice, the interpretation of the convention is left to individual states, and the responsible bodies in the UK have no intention of enforcing a system of licensing or in restricting voluntary sector archaeology. Systems of protection through the scheduling of important sites, the role of archaeologists within the planning system, and the usually good relationships between local societies and professional organizations, along with the long record of high-quality fieldwork by many societies, are deemed enough to ensure that the archaeological resource is protected from inexperienced destruction.

Future Directions

Avocational archaeology in the United Kingdom seems to be in a secure position. Provision of education and training for amateur archaeologists is recognized as needed within the profession. Future trends in that provision may be towards a more systematized and nationally recognized framework instead of the varied and local responses currently in place.

Moves by the Institute for Archaeologists towards gaining the status of a chartered body, and therefore towards improving the status of archaeologists as chartered professionals in the same way as being doctors or engineers, could be seen as potentially closing off the discipline into chartered and unchartered sectors. It is important therefore that the IfA has within it a voluntary and community archaeology special interest group and that the IfA continues to be open to membership from both professional and amateur archaeologists. The IfA's annual conference is a major meeting point for the discipline where training in archaeology can occur. Importantly, the IfA also oversees the vocational Qualification in Archaeological Practice, based on the National Occupational Standards. This is an important avenue of training and education for the voluntary sector. Some have already taken advantage of this, although the costs of taking the qualification may be a deterrent for others. The qualification is based on best practice in archaeology, defined by the Institute for Archaeologists through their standards and guidance. The Council for British Archaeology, funded by English Heritage, has been leading a project, the Introduction to Standards and Guidance in

Archaeological Practice (ISGAP), to translate these into a form that is more user friendly and suitable for the voluntary sector across the whole United Kingdom. The introduction highlights best practice for voluntary groups and outlines standard procedures for carrying out archaeological research and investigation. The project's documents have recently been made available at http//:www.isgap.org.uk.

The Council for British Archaeology has been successful in attracting sponsorship to organize funded placements for community outreach officers to help train a new generation of archaeologists with the skills needed for supporting the voluntary sector. There are also a few postgraduate courses in archaeology in public engagement in archaeology helping to provide a future generation of professional archaeologists who are enthusiastic about supporting the voluntary sector.

While many people would not think of metal detectorists as avocational archaeologists, there is no doubt that they are part of the community of interest in the remains of the past and can be seen as part of the wider family that has archaeologists at its center. They produce data which adds to our archaeological knowledge. The Portable Antiquities Scheme in England and Wales does much to educate and train detectorists through its network of Community Liaison Officers. Detectorists also commonly enroll on traditional lifelong learning courses to increase their own knowledge of archaeology.

The future for avocational archaeology in Britain seems secure, so long as the funding is in place to make sure that amateur archaeologists of all kinds have access to the support they need for knowledge and skills from the professional sector. Archaeology in Great Britain is a partnership between professionals and amateurs, in which both are stronger that they would be alone.

Case Studies

The biennial British Archaeological Awards recognize excellence in various aspects of archaeology. One of the awards is the Pitt-Rivers Award for the best project by volunteers. There were two joint winners in 2012: the Norfolk Historic Buildings Group and the Washingborough Archaeology Group.

The Norfolk Historic Buildings Group produced a report on buildings within the village of Buckenham. They had a 5-year plan to survey the buildings, and as some of the members had previous experience of building recording, they were able to train the others on the necessary techniques. Heritage Lottery Funding allowed them to get dendrochronology dates for some of the houses and to publish their results. They produced the largest collection of vernacular houses to have been dated by dendrochronology in the county of Norfolk.

The Washingborough Archaeology Group was a founder member in 2001 of the Witham Valley Archaeological Research Committee. The group concentrated on intensive field walking and auger surveying under the rapidly eroding peat soils of the valley. This identified many archaeological sites and provided an accurate topographical map of the valley. The work was funded by other organizations which also provided surveying equipment in return for access to the results of their work. Specialist reports were produced by the group with some professional support.

The prestigious special award of the Graham Webster Laurels went to the Upper Nene Archaeological Society which has been excavating at Piddington Roman Villa for 27 years. Along the way, they have trained their own members and encouraged them to become specialists in various archaeological disciplines. The society raised their own funds to buy a redundant chapel and turn it into to a modern museum with a viewing area and rooms where students and local school children are given training.

The British Archaeological Awards also have another category, the IfA Award, for the best professional or professional/voluntary archaeological project that demonstrates a commitment to professional standards and ethics in archaeology. In 2012, this went to the Whiteleaf Hill Local Nature Reserve Project. This was a project initiated by community representatives with the help of Buckinghamshire County Council and Oxford Archaeology. The local community excavated, conserved, and interpreted the remains on

Whiteleaf Hill for future generations. The sites included a Neolithic barrow, a Bronze Age dyke and two supposed round barrows, First World War practice trenches, sunken trackways, and ancient and modern woodland. The project involved an emphasis on research and conservation but also integration of the historic and natural environment and an education program for local schools, all under strong community leadership.

A separate award, the Marsh Award for Community Archaeology, was held in 2011. The winner of this award was the Dartmoor Cairn Survey and Repair Project that started in 2005. This recognized the work of the Dartmoor Preservation Association (DPA) Conservation Team, Dartmoor National Park Authority (DNPA), and English Heritage in providing opportunities for volunteers to become involved in a professionally led project. Cairns that marked Bronze Age burials or territories were slowly being altered by people adding or removing stones. The project created opportunities for different groups such as scouts and other youth groups, businesses seeking team-building projects, and students requiring work experience to get involved. The quality of the work done was exceptionally high and depended on the close working partnership between the volunteers and the organizations involved.

Summary

Avocational archaeology, also described as voluntary or amateur archaeology, is a thriving part of the discipline in the Great Britain. Avocational archaeologists work without being paid and receive no personal financial benefit for their work. It has a long history of research and publication and continues to contribute to our understanding of the archaeological remains of all periods from prehistory to the modern world. Many amateur archaeologists have a great deal of field experience and high levels of archaeological skills. A key part of the voluntary sector's success lies in the education and training that amateurs receive from professional archaeologists based in universities, archaeological agencies, and field units. This support has traditionally been through university continuing education courses, although less so than previously due to changes in government funding. More recently, support is becoming more widely available through the new field of community archaeology where professional archaeologists support local societies and groups directly in the field. Much amateur activity is supported by funding from the Heritage Lottery Fund, which helps local groups buy in the professional expertise they may need for specialist tasks and helps with costs of publication of their findings. The profession is beginning to realize that the study of the past is too big a task for a small number of financially hard-pressed professionals. Together, professional and avocational archaeologists make a formidable research team.

Cross-References

- ▶ Archaeological Licenses
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage Outreach
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Professionalization: Archaeology as an "Expert" Knowledge
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Stakeholders and Community Participation
- ▶ Volunteers in Archaeology

References

Thomas, S. 2010. *Community archaeology in the UK: Recent findings*. York: Council for British Archaeology.

B

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Basic Biographical Information

Nur Balkan-Atlı was born in 1953 in Aydın, Turkey After graduating from Robert College, she went to Paris and studied prehistory, anthropology, and ethnology at Sorbonne University. She received her M.A. and Ph.D. with a dissertation titled *The Neolithization of Anatolia* from the Sorbonne University in 1985. Atlı was assigned as a specialist to the Prehistory Department of İstanbul University in 1987 and was promoted to Assistant Professor in 1995 and then Professor in 2000.

Major Accomplishments

Nur Balkan Atlı's major field of study is the Paleolithic period of prehistoric archaeology and lithic technologies. Since 1995, she has mostly focused on the obsidian beds and working areas in the Cappadocia region in Turkey. After working in El Kown, Qdeir (Suriye), Cafer Höyük (Malatya), and Aşıklı Höyük (Aksaray) on excavations, she started an ongoing study through the Cappadocia Obsidian Research Project. She is connected to the French Institute of Anatolian Studies and is a researcher and a member of the monitoring committee.

Nur Balkan Atlı is also a foreign member of the French CNRS Archiorient Group, a local consultant of the European Commission INCO-MED Programme, and a member of the American Research Institute of Turkey and similar scientific institutions. She currently serves on the editorial board of journals including "Anatolia Antiqua" and "Paliorién." She has published the book *La Niolithisation de l'Anatolie* and numerous scientific articles.

Cross-References

► Art, Paleolithic
► Lithic Technology, Paleolithic

Further Reading

Balkan-Atlı, N. 1993. Els primers poblats neolithics d'Anatòlia. *Cota Zero* 9: 25–30.

Balkan-Atlı, N. 1994. *La Néolithisation de l'Anatolie*. Istanbul: IFEA; Paris: Editions Broccard.

Balkan-Atlı, N. 1995. Preliminary report of the chipped stone industry of Değirmentepe, an Ubaid settlement in eastern Anatolia. In *Readings in prehistory: studies presented to Halet Çambel*, 127–148. İstanbul: EgeYayınları.

Balkan-Atlı, N. 1998. The aceramic Neolithic of central Anatolia: recent finds in the chipped stone industry. In *Light on top of the Black Hill*, Studies presented to Halet Çambel, ed. G. Arsebük, M.J. Mellink, and W. Schirmer, 81–94. İstanbul: EgeYayınları.

© Springer Nature Switzerland AG 2020
C. Smith (ed.), *Encyclopedia of Global Archaeology*,
https://doi.org/10.1007/978-3-030-30018-0

Balkan-Atlı, N. 2003. Use of obsidian at Değirmentepe: an Ubaid settlement in eastern Anatolia. In *From villages to cities. Early villages in the Near East*, ed. M. Özdoğan, H. Hauptmann, and N. Başgelen, 373–384. İstanbul: Arkeolojive Sanat Yayınları.

Balkan-Atlı, N. 2004. A short report on flint and obsidian finds. In *Die Akropolis von Perge, Band 1*, ed. H. Abbasoğlu and W. Martini, 79–81. Mainz: Zabern.

Balkan-Atlı, N. 2005. Paleolitikten Günümüze Obsidiyen. *Haberler* 19: 1–3.

Balkan-Atlı, N. 2008. Obsidiyenin Geçmişten Günümüze Yolcuğu. In (ed.) Euergetes, Prof. Dr. Haluk Abbasoğlu 65. Yaş. Armağanı, ed. S. Delemen, A. Çokay-Kepçe, Ö. Özdizbay, and S. Turak, 127–132. Suna-İnan Kıraç Akdeniz Medeniyetleri Araştırma Enstitüsü.

Balkan-Atlı, N., and D. Binder. 2007. Kaletepe – ein neolithischer Obsidianwerkplatz. In *Die ältesten Monumente der Menschheit*, 213. Karlsruhe: Badisches Landesmuseum.

Balkan-Atlı, N., and M.C. Cauvin. 2007. Das schwarze Gold der Steinzeit. In *Die ältesten Monumente der Menschheit*, 207–213. Karlsruhe: Badisches Landesmuseum.

Cauvin, M.C., and N. Balkan. 1985. CaferHöyük: Analyse de l'outillage lithique. *Cahiers de l'Euphrate* 4: 53–85.

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Basic Biographical Information

Jane Balme is an Australian archaeologist and leading researcher in the archaeology of Indigenous Australia. She is currently associate professor in archaeology at the School of Social Sciences, University of Western Australia.

Jane grew up mainly in Western Australia and was awarded her bachelor's degree in anthropology in 1979 from the University of Western Australia. As a graduate assistant in archaeology at the Western Australian Museum, she worked on cave sites in South West Australia. This sparked her interest in archaeology, and she enrolled in a PhD at the Australian National University in Canberra. Her PhD research on Pleistocene fishery on the Darling River in western New South Wales was awarded in 1990. She has worked as a consultant to the National Parks and Wildlife Service of New South Wales and as a lecturer in the Archaeology and Palaeoanthropology Department at the University of New England.

Jane has extensive research experience in the field, having worked on projects with Indigenous groups in northern and western New South Wales, southern Arnhem Land, the Kimberley region of North West Australia, and South West Australia. Most of her work has been on the archaeology of Indigenous Australia, and she has a particular interest in the Pleistocene period, the symbolic evidence of early art and adornment, and the role that symbolic differentiation between populations may have played in the colonization of the continent. She has also published on gender organization in hunter-gatherer societies, archaeology education, and public perceptions of archaeology.

Major Accomplishments

Jane Balme's research to date has been in three principal areas: social behavior and organization in early Australian Indigenous groups (e.g., Balme et al. 2009; Balme and O'Connor 2016), including Pleistocene Australia (e.g., Balme and Morse 2006; Balme and O'Connor 2014) and the nature of relationships between Indigenous groups and new European arrivals (e.g., Balme and O'Connor 2015); the development of gendered social organization, particularly in hunter-gatherer societies (e.g., Balme and Bowdler 2006; Balme and Bulbeck 2008; Balme and O'Connor 2016; Bowdler and Balme 2010); and archaeology as a discipline (e.g., Beck and Balme 2005).

She has held major research grants, usually in collaboration with other researchers. This has included funding under the Discovery Program of the Australian Research Council, as well as grants from the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS), the Ian Potter Foundation, and the Australian Heritage Commission.

Jane has also contributed greatly to the Australian Archaeological Association (AAA),

the professional body for Australian archaeologists. She has held several positions in AAA over the years, including secretary and chair of the Australian National Committee for Archaeology Teaching and Learning. She is a consulting editor to *Australian Archaeology*, AAA's peer-reviewed journal.

Cross-References

- ▶ Bowdler, Sandra E.
- ▶ First Australians: Origins
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ O'Connor, Susan

References

Balme, J., and S.E. Bowdler. 2006. Spear and digging stick: The origin of gender and its implications for the colonization of new continents. *Journal of Social Archaeology* 6 (3): 379–401.

Balme, J., and C. Bulbeck. 2008. Engendering origins: Theories of gender in sociology and archaeology. *Australian Archaeology* 67: 3–11.

Balme, J., and K.H. Morse. 2006. Shell beads and social behaviour in Pleistocene Australia. *Antiquity* 80 (310): 799–811.

Balme, J., and S. O'Connor. 2014. Early modern humans in Island Southeast Asia and Sahul: Adaptive and creative societies with simple lithic industries. In *East of Africa: Southern Asia, Australia and human origins*, ed. R. Dennell and M. Porr, 164–174. Cambridge, UK: Cambridge University Press.

Balme, J., and S. O'Connor. 2015. A 'port scene', identity and rock art of the inland southern Kimberley, Western Australia. *Rock Art Research* 32 (1): 75–83.

Balme, J., and S. O'Connor. 2016. Dingoes and Aboriginal social organisation in Holocene Australia. *Journal of Archaeological Science: Reports* 7: 775–781.

Balme, J., I. Davidson, J. McDonald, N. Stern, and P. Veth. 2009. Symbolic behaviour and the peopling of the southern arc route to Australia. *Quaternary International* 202: 59–68.

Beck, W., and J. Balme. 2005. Benchmarking for archaeology honours degrees in Australian universities. *Australian Archaeology* 61: 32–40.

Bowdler, S.E., and J. Balme. 2010. Gatherers and grannies: Further thoughts on the origins of gender. *Australian Feminist Studies* 25 (66): 391–405.

Bam: Archaeological and Social Investigations After the Earthquake

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Introduction

Bam is a desert city engaged in citrus and palm cultivation, whose residents dwelt in handmade mud-brick houses around an ancient citadel, which is a World Heritage Site (UNESCO 2005). It is located in the southern border of the Lut desert, in southeastern Iran. Despite this fringe location, it has traditionally served as a center for local trade. On December 26, 2003, the city was reduced to ruins by an earthquake in only 12 s. Approximately 40,000 people died, 30,000 were injured (Tahmasebi et al. 2005), and 100,000 people were made homeless (Mann 2005: 3). *Disaster ethnoarchaeology: Bam after the earthquake* was an ethnoarchaeological project aimed at recording this dramatic change (Dezhamkhooy and Papoli 2010; Papoli 2010; Papoli et al. 2011) (Fig. 1).

Key Issues/Current Debates/Future Directions/Examples

The project, which took place in five seasons from 2004 to 2007, was conducted by 40 archaeologists, 24 women and 16 men, Ph.D. candidates, and M.A. and B.A. students, all familiar with the local and cultural context and supported by the previous directors of the *Bam research foundation*. In the first four seasons, data gathering was based on an *ethnoarchaeological approach*. In the last season (2007), six ruined houses of different status and district were investigated by archaeological excavation. The main mission of the project was to discover the impact of the catastrophe

Bam: Archaeological and Social Investigations After the Earthquake, Fig. 1 Bam citadel after earthquake

on the intimate lives of the residents. In addition, the project also sought to understand from the strata how the settlement had previously been affected by Bam's inhospitable and unstable environment – drought, winds, and frequent earthquakes (see Mahalati 1988).

The lifeways of Bam and its immediate environment were surveyed in five categories: mortuary practices, material culture, population mobility, trade and market patterns, and domestic architecture. Data were gathered through observation and by questionnaires designed to record patterns of life before the earthquake. The recorded changes to everyday life were studied over the short, medium, and long term. Also recorded were accounts of the gradual return to normal conditions.

Recording damaged buildings was a key part of the archaeological inquiry. Bam's domestic architecture was first divided into three general architectural styles: modern (structures built on metal frames), semi-modern (plaster and clay mortar on metal frames), and traditional (made of mud-brick). Approximately 673 houses and 383 destroyed shops (Fig. 2) were evaluated during the first three seasons. These buildings were classified by their degree of damage: destruction of decorations, destruction of walls and roofs, or total destruction. The state of the buildings was compared with the socioeconomic status of the occupants, by district. For example, it was shown that most casualties occurred in the traditional type of housing, most vulnerable to earthquake and occupied by the least wealthy.

The excavations of the six houses (Fig. 3) showed that most of them had already been searched to discover the remains of the dead and to remove valuable materials. Most of the furniture remained. Divisions recorded within the houses led to information about the use of space and the implied spatial imperatives of gender, class, and wealth. People of higher status had more private spaces such as bedrooms or divided spaces based on gender and age, while the less wealthy had more common spaces, such as one bedroom for all the family. Differences in status were evident in other material culture too. The last moments of the six families were reconstructed from the disposition of the surviving cultural material.

There were interesting differences between the archaeological findings and the statements made on the questionnaires, no doubt through a reluctance to admit to activities of which authorities may have disapproved – such as sexual practices, drinking, or even watching some satellite channels. The earthquake and the subsequent

Bam: Archaeological and Social Investigations After the Earthquake, Fig. 2 Buildings for recording (shops)

Bam: Archaeological and Social Investigations After the Earthquake, Fig. 3 A store room of the Hafizabadi House under excavation Trench 1

archaeological excavations opened up private spaces such as bedrooms, revealing intimacies of everyday life, love letters, and personal entertainment tools.

Since the investigators were themselves indigenous, their relations with Bam residents developed naturally. But the feelings of the archaeologists were nevertheless strongly affected by the roles they were obliged to adopt. International and national aid initiatives rapidly altered the circumstances, the attitudes, and the decisions of residents. In addition, the changing policies of the Iranian government were determinant, eventually bringing the project to an end.

Cross-References

- ▶ Cultural Heritage Site Damage Assessment
- ▶ Disaster Response Planning: Earthquakes

References

Dezhamkhooy, M., and L. Papoli. 2010. The archaeology of last night. . . What happened in Bam (Iran) on 25–6 December 2003. *World Archaeology (Archaeology and Contemporary Society)* 42 (3): 341–354.

Mahalati, M. 1988. *Bam geography*. Kerman: Tolou Azadi Publishing Company. (In Persian).

Mann, P., ed. 2005. *Active tectonics and seismic hazards of Puerto Rico, the Virgin Islands, and offshore areas*, Geological society of America special paper 385. Washington, DC: Geological Society of America.

Papoli, L. 2010. Public and private lives in Iran: An introduction to the archaeology of the 2003 Bam earthquake. *Archaeologies: Journal of the World Archaeological Congress* 6: 29–47.

Papoli, L., O. Garazhian, and M. Dezhamkhooy. 2011. Exchange system patterns in Bam southeastern Iran after the earthquake (December 2003): An ethnoarchaeological study. *Ethnoarchaeology* 3: 29–61.

Tahmasebi, M., et al. 2005. Musculoskeletal injuries associated with earthquake: A report of injuries of Iran's December 26, 2003 Bam earthquake casualties managed in tertiary referral centers. *Journal of Injury* 36 (1): 27–32.

UNESCO. 2005. *Bam Citadel* (*Iran*). UNESCO report 1208. Available at: http://whc.unesco.org/archive/advisory_body_evaluation/1208.pdf

Bamiyan Buddhas

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Introduction

The Bamiyan Buddhas were situated in the Hindu Kush mountains, in the central highlands of Afghanistan. They were the largest standing Buddhas in the world (Grun et al. 2004). The two main statues were built in 554 CE and 507 CE (Janowski 2011: 47) and were known in modern times as the West Grand Buddha and the East Grand Buddha. They were, respectively, 53 m and 38 m high (Grun et al. 2004: 178). The statues were carved into niches in the valley of Bamiyan, a center of Buddhist culture from the second century CE until the eighth century, and were part of a large complex of Buddhist temples, many of which still survive. The valley and the remains of the Buddhas are now a world heritage site (UNESCO 2003).

In March 2001, Afghanistan's effective government, the Taliban, destroyed the Bamiyan Buddhas in the face of huge international opposition and in defiance of international law (Francioni and Lenzerini 2003). Later discussion of the Buddhas centered on the stabilization of the larger site of Bamiyan and the possible reconstruction or restoration of the destroyed statues.

Definition

These two statues of the standing Buddha were located in the Bamiyan Valley, 200 km north-west of Kabul, in the Hindu Kush mountain ranges, 2500 m above sea level. The statues were carved directly into the cliff face. The geology of the cliffs consists of conglomerate and siltstone layers, with the siltstone being particularly vulnerable to the actions of water (Margottini 2004). The region experiences hot summers and very cold winters, and the freeze thaw cycle puts further pressure on the cliffs and the remains of the Buddhas.

The Western statue was the larger of the two. Before its destruction it was the largest standing Buddha in the world. It stood at 53 m high and was constructed between 591 and 644 AD. The Eastern statue was slightly smaller at 38 m and was built between 544 and 595 AD (Grun et al. 2004; Blánsdorf et al. 2009; Janowski 2011). A smaller statue of a seated Buddha was located between the Eastern and Western Great Buddhas, and it was destroyed as well.

In modern times the statues appeared to be without faces or arms. The lower legs of the larger Buddha were badly damaged in the seventeenth and eighteenth centuries by the moguls Shah Aurangzeb and Nadir Shah (Grun et al. 2004). The clearest ancient description of the statues is by Hsuan-Tsang, a Chinese monk who visited the site in 630 CE. He described the Buddhas as being gilded and decorated with precious stones. They also wore masks, and while the lack of facial features in modern times is often attributed to

vandalism, it is possible that this was an original feature designed to accommodate the wooden masks (Cotter 2001). The statues were originally constructed by carving their rough shape into the cliffs. The intricate gowns of the Buddhas were shaped by applying stucco to the rough carving, and the lower arms were made of wood (Knobloch 2002).

The statues were sculpted in the Gandharan style that blends Greco-Roman artistic traditions with Indian and Buddhist religious art (Grun et al. 2004). This suggests that the building of the statues was initiated at an earlier time than radiocarbon dates given above would suggest. Grun et al. (2004) state that the building of the Buddhas was instigated by the Kushan Dynasty, who ruled the area from the first to the third century CE. The Western, larger statue represents Vairocana, the "Light Shining throughout the Universe" Buddha, and the Eastern, smaller statue Shakyamuni, "The Awakened One of the Shakya Clan" (AIIS 2004). The artistic style represented here is believed to have inspired other sites in China such as Dunhuang.

The Buddhas were first recorded in Western literature by Alexander Burnes in 1832 (Grun et al. 2004). The first archaeological work at the site was undertaken by the Delegation Arche'ologique Francaise en Afghanistan in the 1920s and 1930s. The French recorded the site, began preservation work on some of the murals, and produced the first guide book to the Bamiyan Valley (Grun et al. 2004). A number of Japanese and American researchers continued working at Bamiyan in the late twentieth century, recording details, completing a photographic survey, and preserving the great statues. Most research at the site was put to a halt with the Soviet invasion in 1979.

Chiovenda (2014) records local Hazara myths about the statues. The Hazara name them *Salsal (Sang-Sal)* and *Shamama (Shamuma)* and assign gender to them, these names and genders are also recorded in the nineteenth-century ethnographic accounts of the statues from Moorcroft (1842) and Burns (1886). Some Hazara people identified the statues as representing the apical ancestors of their people; others recount a myth involving a wedding between the prince and princess of neighboring states within the valley who were turned to stone at the conclusion of the wedding ceremony (Chiovenda 2014).

Key Issues/Current Debates/Future Directions/Examples

In March 2001, the Taliban regime of Afghanistan, which controlled Bamiyan at the time, destroyed the Buddhas. The destruction of the Buddhas was part of a systematic destruction of all images in Afghanistan that were considered to be idolatrous. While the Buddhas were not the only victims of this wave of destruction, they were the most visible, and their destruction has come to symbolize the violence of the Taliban regime (Centlivres 2008; Janowski 2011).

It is possible that the Taliban's actions were more politically than religiously motivated. In 2001, Afghanistan had been at war for more than 20 years, and the Taliban had begun pushing for full control of the nation. In 1999, the Taliban made a commitment to protect Afghanistan's cultural heritage (ICOMOS 2001), but by 2001, the United Nations had imposed a number of sanctions on the country and had refused to acknowledge the Taliban as the government of Afghanistan, despite their effective control of the country. In this volatile political environment, the destruction of the Buddhas can be interpreted as an assertion of power on the part of the Taliban, rather than an action that was motivated solely by religious beliefs (Francioni and Lenzerini 2003).

The destruction of the Bamiyan Buddhas by the Taliban led to a reconsideration of the nature of war crimes and crimes against humanity. Francioni and Lenzerini (2003) found that the destruction of the Buddhas differs from the usual destruction of cultural heritage during wars because of the careful documentation of the destruction and the lack of a clear military objective. Instead, it can be viewed as act of defiance of the United Nations and of the international community (Francioni and Lenzerini 2003: 620). From this viewpoint, the destruction of the Bamiyan Buddhas can be viewed as a planned

action in a symbolic war between the Taliban and others.

In 2003, the United Nations inscribed the cultural landscape and archaeological remains of the Bamiyan Valley onto the World Heritage List (UNESCO 2003) under criteria i, ii, iii, iv, and vi. This area is currently listed as World Heritage in Danger. The inscription specifies the niches in which the Buddhas once stood, the sacred cave system, the remaining Buddhist art, and several other elements of the surrounding landscape as the main elements of the site (UNESCO 2003). Since the fall of the Taliban regime, the new Afghani government has attempted to preserve what remains of the Bamiyan Buddhas and their surrounds. The government has been working with UNESCO to stabilize the site, which is at risk due to natural process and the effects of the blasting that was done to destroy the Buddhas (Margottini 2004; Manhart 2004). Archaeological work has resumed at the site (Hammer 2010), and a systematic recording of the niches that remain has been undertaken, including computer and 3D modeling of the site (Grun et al. 2004).

When archaeologists visited the site in 2002, they discovered that the Buddhas had not been completely pulverized and that the remains were substantial and that reconstruction of the Buddhas was technically possible (Lawler 2002). Since this time, there has been debate over what should happen at the site. UNESCO does not support reconstruction, campaigning for a stabilization of the remaining aspects of the site and the preservation and display of the pieces of the Buddhas in a museum context. Many local people and members of the Afghani government support full reconstruction on economic grounds; they believe the reconstruction of the Buddhas will promote tourism and give the country a much needed economic boost (Gall 2003). This discussion is still ongoing in 2017 (Lluveras-Tenorio et al. 2017).

In 2013, a 3D laser light image of the Buddhas was projected in the niches in a special event. This illustrates one of the methods that has been suggested for interpretation of the site (IEEE Spectrum 2015). A 2009 report states that the geological and hydrological stabilization work being undertaken to preserve the niches in which the Buddhas once sat has mostly been completed, but that work is still ongoing in preserving the system of caves in the cliffs (Cripper and Margottini 2009).

The discussion over what to do with the remains of the Buddhas has led to a reassessment of the ethics of restoration and reconstruction in the academic literature (Gall 2003; Manhart 2004; Centlivres 2008; Janowski 2011). The UNESCO 10th expert working group released its recommendation for the Bamiyan site in 2011. They found that "in view of the available scientific data and estimated financial requirement, a total reconstruction of either of the Buddha sculptures cannot be considered at the present time" (UNESCO 2011). However, this does not rule out reconstruction at some point in the future. The remains of the Buddhas are currently stored for preservation, mostly at the foot of the niches in which they once stood (Lluveras-Tenorio et al. 2017).

Cross-References

- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ UNESCO's World Heritage List Process
- ▶ Vandalism and Looting (Ethics)
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes

References

AIIS. 2004. The American Institute of Indian Studies' photo archive. Available at http://dsal.uchicago.edu/images/aiis/. Accessed 1 Oct 2012.

Blánsdorf, C., M.-J. Nadeau, P.M. Grootes, M. Hũls, and S. Pfeffer. 2009. Dating of the Buddha statues AMS 14C dating of organic materials. In *The giant Buddhas of Bamiyan safeguarding the remains*, ed. ICOMOS, 231–236. Berlin: Hendrik Babler Verlag.

Centlivres, P. 2008. The controversy over the Buddhas of Bamiyan. *South Asia Multidisciplinary Academic Journal* 2 (Special issue 'Outraged communities: Comparative perspectives on the politicization of emotions in South Asia'). Available at http://samaj.revues.org/992. Accessed 3 Sept 2013.

Chiovenda, M.K. 2014. Sacred blasphemy: Global and local views of the destruction of the Bamyan Buddha

statues in Afghanistan. *Journal of Muslim Minority Affairs* 34 (4): 410–424.
Cotter, H. 2001. Buddhas of Bamiyan: Keys to Asian history. *New York Times*, March 3, p. 3.
Cripper, C., and C. Margottini. 2009. Conclusions. In *After the destruction of giant Buddha statues in Bamiyan (Afghanistan) in 2001: A UNESCO's emergency activity for the recovering and rehabilitation of cliff and niches*, Natural science in archaeology, ed. C. Marottini. New York, United States of America: Springer.
Francioni, F., and F. Lenzerini. 2003. The destruction of the Buddhas of Bamiyan and international law. *European Journal of International Law* 14 (4): 619–651.
Gall, C. 2003. Tackling a tall order: The Bamiyan Buddha. *New York Times*, April 23, p. 13.
Grun, A., F. Remondino, and L. Zhang. 2004. Photogrammetric reconstruction of the Great Buddha of Bamiyan, Afghanistan. *The Photogrammetric Record* 19 (107): 177–199.
Hammer, J. 2010. Searching for Buddha: In the remote Afghanistan valley where in 2001 the Taliban destroyed two colossal 1,500-year-old statues, archaeologist Zemaryalai Tarzi is determined to find a reclining third Buddha. *Smithsonian* 41 (8): 46.
ICOMOS. 2001. Save the cultural heritage of Afghanistan: Appeal by ICOMOS and ICOM. Available at http://www.afghan-network.net/News/Archives/2001/Press-icomos.html. Accessed 1 Oct 2012.
IEEE Spectrum. 2015. Bright Beams Bring Buddhas Back. *IEEE Spectrum* 52 (8): 20–21.
Janowski, J. 2011. Bringing back Bamiyan's Buddhas. *Journal of Applied Philosophy* 28. https://doi.org/10.1111/j.1468-5930.2010.00512.x. 47.
Knobloch, E. 2002. *The archaeology & architecture of Afghanistan*. Stroud: Tempus.
Lawler, A. 2002. Buddhas may stretch out, if not rise again. *Science* 298 (5596): 1204.
Lluveras-Tenorio, A., R. Vinciguerra, E. Galano, C. Blaensdorf, E. Emmerling, M. Perla Colombini, L. Birolo, and I. Bonaduce. 2017. GC/MS and proteomics to unravel the painting history of the lost giant Buddhas of Bāmiyān (Afghanistan). *PLoS One* 12 (4): e0172990.
Manhart, C. 2004. UNESCO's role in the rehabilitation of Bamiyan in Afghanistan. *Landslides* 1: 311–314. https://doi.org/10.1007/s10346-004-0033-1.
Margottini, C. 2004. Instability and geotechnical problems of the Buddha niches and surrounding cliff in Bamiyan Valley, central Afghanistan. *Landslides* 1: 41–51. https://doi.org/10.1007/s10346-003-0010-0.
UNESCO. 2003. Cultural landscape and archaeological remains of the Bamiyan Valley. Available at http://whc.unesco.org/en/list/208. Accessed 1 Oct 2012.
UNESCO. 2011. 10th expert working group meeting for the safeguarding of the cultural landscape and archaeological remains of the Bamiyan Valley World Heritage property, Afghanistan, NRICP, Tokyo, Japan (6–8 December 2011) recommendations. Available at http://whc.unesco.org/uploads/news/documents/news-838-1.pdf. Accessed 1 Oct 2012.

Ban Chiang: Agriculture and Domestication

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B

Basic Site Overview

Ban Chiang is a prehistoric settlement located in the northeastern part of the Khorat Plateau in Thailand. It came to prominence in the 1960s when elaborately decorated pottery vessels were found there. Excavations by Thai archaeologists then identified similar vessels in a cultural sequence that spanned the early Neolithic to the end of the Iron Age. The painted vessels were restricted to late Iron Age burials. These excavations coincided with claims based on the nearby site of Non Nok Tha that copper-based technology dated to the fourth millennium BCE which, if validated, would of necessity make Southeast Asia an independent center for the discovery of bronze casting.

Ban Chiang was soon to be almost entirely ransacked by looters, initially fed by visitors from a large, nearby American air base. Appreciating the potential significance of this site, the University of Pennsylvania Museum of Archaeology and Anthropology and the Thai Fine Arts Department appointed Chester Gorman and Pisit Charoenwongsa to direct rescue excavations. Two small areas were identified where looters had not yet penetrated, and fieldwork took place in 1974 and 1975. The cultural sequence of both areas, when combined, began with burials containing ceramic vessels decorated with incised and impressed patterns that typify the Southeast Asian early Neolithic. These lay under further human graves assigned to the Bronze Age, although copper-based mortuary offerings were very rare indeed. With the Iron Age, grave goods included bimetallic spears with an iron blade and socketed bronze haft, glass beads, deeply incised clay cylindrical rollers, and bones from domestic pigs and dogs.

Evidence of Early Agriculture

Radiocarbon determinations were initially derived from charcoal which came from two principal sources. The majority of samples were accumulated from fragments of charcoal recovered from grave fill, while a few came from in situ hearths. Gorman and Charoenwongsa (1976) reported that these confirmed the startlingly early date for the initial Bronze Age at 3600 BCE and further claimed that iron forging was under way between 1600 and 1200 BCE. This divided scholarly opinion down the middle, and Ban Chiang became a cause célèbre.

The untimely death of Chester Gorman in 1981 led to the appointment of Joyce White to analyze and publish the results of the 1974–1975 excavations. Appreciating the internal contradictions in the charcoal-based chronology, she began first to reinterpret the results and then, with the advent of AMS dating of very small organic samples, turned to a new dating program that involved extracting and dating the rice chaff that had been used in prehistory to temper mortuary pots.

This experimentally involved three different pretreatments. The two most relevant involved dating either the actual fragments of rice teased out of the pot matrix or the organic fraction of the entire

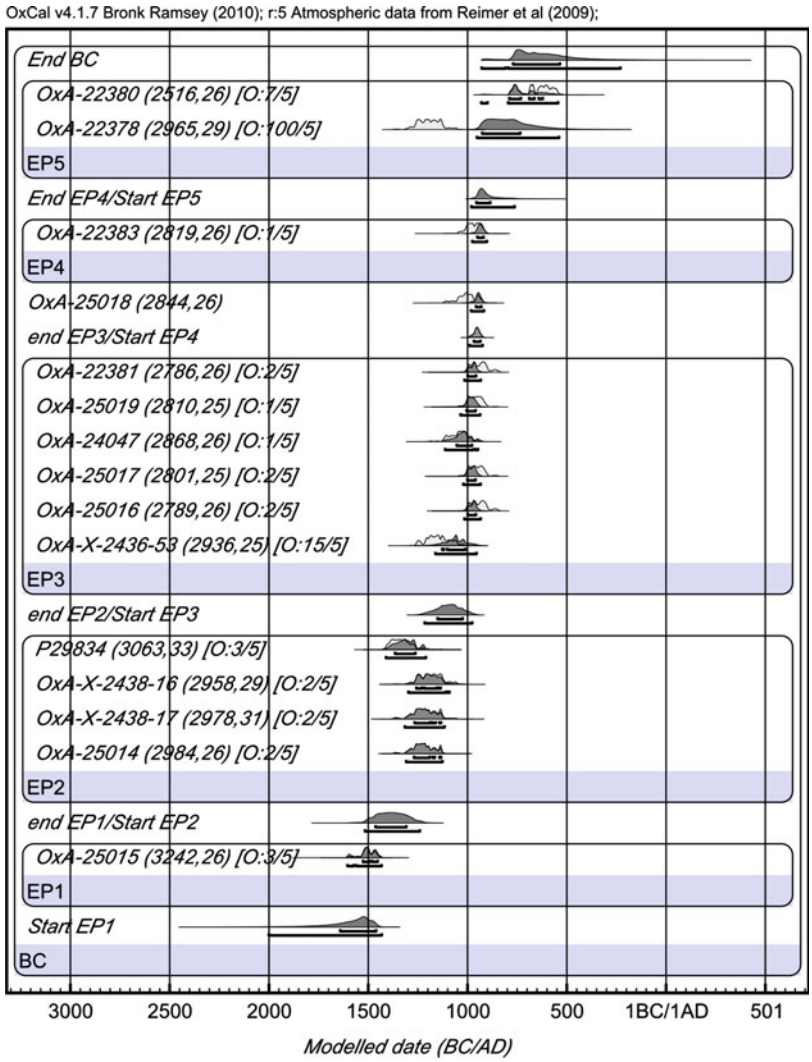

Ban Chiang: Agriculture and Domestication, Fig. 1 The radiocarbon dates of human and pig bones from Ban Chiang. *EP1* early Neolithic, *EP2* later Neolithic, *EP3* early Bronze Age, *EP4–5* later Bronze Age

crushed potsherd. A problem arose when dates obtained from both pretreatments from the same pot or burial presented offsets of centuries or even millennia. In the event, White has proposed a new chronology for Ban Chiang derived from six crushed potsherd determinations and one from rice phytoliths. These, she has suggested, indicate initial settlement of the site by Neolithic rice farmers in the third millennium BCE and the transition into the Bronze Age in 2000–1800 BCE (White 2008). This would mean that the inhabitants of Ban Chiang either themselves developed metallurgical capabilities or derived their knowledge from a source other than early Chinese states.

White and Hamilton (2009) have subsequently composed a model which identifies the source of the bronze casting tradition at Ban Chiang in the Seima-Turbino transcultural phenomenon of the Urals. Their proposed route for the passage of the necessary specialists covers at least 2500 km of Western China.

There are problems with this proposal. The first is the reliability of their radiocarbon chronology based on ceramic tempers. Although prima facie, this seems a valid technique, since the rice chaff is most unlikely to have inbuilt age, it is now recognized that clay itself can contain up to 15% of carbon, and this provides a spuriously early result. However, new methods for pretreating and dating bone, and then interpreting the results, provide a means of testing and refining their chronological framework. This has now been undertaken on the basis of the bones of those who lived at Ban Chiang and of the animals they interred with the dead (Higham et al. 2011a, b; 2015). The results harmonize with the chronologies obtained at other sites in Southeast Asia. The initial settlement of the site by Neolithic rice farmers took place in the sixteenth century BCE. This date for the initial settlement by farmers is several centuries later than in Northern Vietnam and Central Thailand. The transition to the Bronze Age occurred in the late eleventh century BCE (Fig. 1). As with other sites, iron forging began in the fifth century BCE.

With the expansion of fieldwork throughout mainland Southeast Asia in the last two decades, it is now possible to place Ban Chiang in its proper cultural perspective. It was one of many sites which was initially settled by rice farmers whose ultimate origin was the valley of the Yangtze River. This thrust south took place in the last few centuries of the third millennium and saw the incomers adapting and integrating with the indigenous hunter-gatherers. The problem with Ban Chiang as a source of information on the nature of rice agriculture is that no flotation was undertaken there during the excavations of 1974–1975 and no report on the site's stratigraphy, sequence, and any plant remains has been published.

The new Neolithic communities maintained exchange contacts with the rapidly developing states of the Yangtze, which brought jades and bronzes into Lingnan and Northern Vietnam, in exchange for cowries, turtle shell, and probably other desirable items such as kingfisher feathers. This exchange network probably involved the movement of specialist bronze casters south, for by the eleventh century, copper-based axes,

Ban Chiang: Agriculture and Domestication, Fig. 2 Bronze mortuary offerings like these bangles were very rare at Ban Chiang

Ban Chiang: Agriculture and Domestication, Fig. 3 One of the few Iron Age-painted pots recovered during the 1975 excavation at Ban Chiang

chisels, bells, awls, bangles, socketed spears, and anklets formed the base repertoire of the Southeast Asian Bronze Age (Fig. 2). At some highly strategic sites, such as Ban Non Wat, this stimulated the rapid growth of aggrandizer groups interred with great wealth in princely graves. But at more remote locations such as Ban Chiang, the Bronze Age graves were poor. Iron was probably introduced into Southeast Asia through the development of a major maritime trade artery linking the region with both India and China. Again, some Iron Age sites, such as Prohear in Cambodia, were exceptionally wealthy in terms of exotic bronze drums and golden ornaments. Ban Chiang, however, being remote from the main trade links, was still poor save for its remarkable red on buff-painted pottery vessels (Fig. 3).

Cross-References

► Agriculture: Definition and Overview
► Rice: Origins and Development

References

Gorman, C.F., and P. Charoenwongsa. 1976. Ban Chiang: A mosaic of impressions from the first two years. *Expedition* 8 (4): 14–26.

Higham, C.F.W., K. Douka, T.F.G. Higham. 2015. A new chronology for the Bronze Age of Northeastern Thailand and its implications for Southeast Asian prehistory. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0137542

White, J.C. 2008. Dating early bronze at Ban Chiang, Thailand. In *From Homo erectus to the living traditions*, ed. J.-P. Pautreau, A.-S. Coupey, V. Zeitoun, and E. Rambault, 91–110. Bougon: European Association of Southeast Asian Archaeologists.

White, J.C., and E. Hamilton. 2009. The transmission of early Bronze Age technology to Thailand: New perspectives. *Journal of World Prehistory* 22: 357–397.

Further Reading

Higham, C.F.W. 2012. *Early Thailand: From prehistory to Sukhothai*. Bangkok: River Books.

Higham, C.F.W., R. Ciarla, T.F.G. Higham, A. Kijngam, and F. Rispoli. 2011a. The establishment of the Bronze Age in Southeast Asia. *Journal of World Prehistory* 24 (4): 227–274.

Higham, C.F.W., T.F.G. Higham, and A. Kijngam. 2011b. Cutting a Gordian knot: The Bronze Age of Southeast Asia, timing, origins and impact. *Antiquity* 85: 583–598.

White, J.C. 1982. *Ban Chiang. The discovery of a lost Bronze Age*. Philadelphia: University of Pennsylvania Press.

White, J.C. 1997. A brief note on new dates for the Ban Chiang cultural tradition. *Bulletin of the Indo-Pacific Prehistory Association* 16: 103–106.

Ban Non Wat, Archaeology of

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Introduction

Ban Non Wat is one of the many moated prehistoric sites that concentrate in the basin of the Mun River in Northeast Thailand (Higham and Kijngam 2009, 2011, 2012a, b; Higham 2011a, b; Higham et al. 2011). It is a key site for

understanding the later prehistory of Southeast Asia for three principal reasons. A large area has been excavated over ten seasons. It has revealed a long and continuous sequence of occupation, and it has been dated on the basis of 76 radiocarbon determinations that have been subjected to Bayesian analysis.

Definition

This site is unique in Southeast Asia for the clarity and length of its prehistoric cultural sequence and the size of the analyzed material. There are 12 phases that begin with hunter-gatherers, followed by 2 Neolithic, 6 Bronze Age, and 3 stages of Iron Age occupation, each associated with human burials.

Key Issues

There are two key issues that dominate the interpretation and wider relevance of Ban Non Wat. The first is the application of AMS radiocarbon dating and Bayesian statistics to provide a valid chronological framework, and the second is to illuminate social change over 2000 years of continuous occupation that led ultimately to the formation of early states.

Current Debates

This site has contributed new and relevant information that tests alternative models on prehistoric cultural developments in Southeast Asia: the relationships between intrusive Neolithic rice farmers, the timing of the initial Bronze Age, the impact of copper-base metallurgy on social organization, and the social changes that took place with the adoption of iron technology.

The area excavated concentrates in the middle of this circular site, which has a maximum diameter of 320 m, with ten smaller excavation squares distributed in a linear fashion between the moats. The moats and banks that ring Ban Non Wat have also been excavated and dated. One of the problems that has hampered our interpretation of Southeast Asian prehistory has been the small areas excavated relative to the size of individual sites. By opening a large area, we have identified spatial patterns of activity on an unprecedented scale.

The sequence begins with occupation by hunter-gatherers, one radiocarbon determination on a shell midden falling in the sixteenth millennium BCE. However, the first of 12 fully documented cultural phases began in the early second millennium BCE, when the site was employed as a cemetery for a series of flexed burials that in all probability represent people of the local hunter-gatherer tradition. These would have found a richly endowed habitat, offering plentiful resources including fish, shellfish, and a wide variety of animals that included at least four species of deer, pigs, and wild cattle.

This phase partially overlaps the initial settlement by rice farmers, whose ultimate origin lies in the Yangtze Valley. They are represented at Ban Non Wat by their occupation middens and a cemetery, the radiocarbon determinations showing that they arrived in the seventeenth century BCE. The dead were interred with elaborate mortuary rituals. A man and a woman were found in a seated position within large, lidded pottery vessels notable for their elaborate incised, impressed, and painted designs. Two individuals were buried with cowrie shell ornaments, indicating long-distance exchange with coastal groups. Other offerings included pig bones, shellfish, and bivalve shells thought to have had ritual significance. Infants were interred in lidded pots identical in form to those used for adults but naturally smaller.

This first Neolithic phase was followed by a second, dated between about 1250 and 1050 BCE. There was a decline in the quality of the now virtually undecorated pottery vessels placed with the dead and generally a poverty of other mortuary offerings. However, this was prelude to a dramatic change in the mid-eleventh century BCE, when the initial Bronze Age phase at the site saw the dead interred in deep graves, within wooden coffins associated not only with copper-base socketed axes but also up to 15 finely fashioned

Ban Non Wat, Archaeology of, Fig. 1 Bronze Age burials

pottery vessels and a rich array of shell jewelry. Bronze Age 1 occupation gave way in the tenth century to arguably the most significant of all phases of occupation, for Bronze Age 2 witnessed a veritable starburst of social display in what can legitimately be described as princely burials (Fig. 1). This degree of wealth, unprecedented in the Bronze Age of Southeast Asia, saw men, women, and infants interred in very large graves, associated with up to 80 superbly painted mortuary vessels in many forms. Again, copper-base axes were placed with the dead, including some infants, as well as awls, chisels, anklets, and bells. There was a profusion of exotic marine shell jewelry including beads, earrings, and bangles, as well as marble bangles and earrings. The dead were also interred with fish and pig remains that strongly suggest that mortuary feasting took place at the time of burial.

Such feasting is a means whereby social aggrandizers can leverage their status through public demonstrations of hospitality and wealth. For at least eight generations, according to the radiocarbon chronology, this wealthy lineage retained its high status, while contemporary graves elsewhere on the site, and in a nearby settlement, were markedly poorer.

Part way through the third phase of the Bronze Age, in the ninth century BCE, this degree of wealth sharply declined. Although some individuals were still buried with multiple exotic ornaments, the majority were markedly poorer, with only a handful of pottery vessels and a few shell ornaments being associated. Now the dead were buried in cemeteries laid out in row, with many graves disposed head to toe in columns. One grave stands out. It was the burial of a young man accompanied by 29 clay molds for casting bronze socketed axes and bangles. The latter were cast in a manner not hitherto documented in Southeast Asia. A series of molds were set in place like books on a shelf, and the molten metal was then cast into them simultaneously. This is a form of mass production, but curiously, no bangles were found in any of the contemporary graves.

The sixth and final Bronze Age phase is dated from the seventh to the early fifth centuries BCE and saw some modifications to the ceramic forms while retaining the basic repertoire for decoration. Again, the dead were interred with modest offerings when compared with the initial phases of the Bronze Age. Now, however, many were accompanied by spindle whorls and lumps of clay. The former were used to manufacture the filaments prior to weaving, and the latter may be used as a dye or a mordant. It seems that the community in question was beginning to specialize in fabric production.

This continued seamlessly into the early Iron Age. Four Iron Age phases have been identified in the upper Mun Valley, and at Ban Non Wat, we can trace a seamless transition from the late Bronze Age to the earliest Iron Age as the cemetery expanded over time in an easterly direction. Thus, we can identify the point in this sequence where the first iron artifacts were placed with the dead and date it to the second half of the fifth

century BCE. This is the first time that this has been done in Southeast Asia. It is most significant that very rare beads and other ornaments of agate, carnelian, and glass were also found with the first people buried with iron. These forms of ornamentation are known to have been stimulated by exchange contact across the Bay of Bengal into India, and their conjunction at Ban Non Wat suggests that they came together, as a package, into the interior of Southeast Asia.

The first items to be forged from iron include large socketed spears, hoes, points, and bangles. There are also kits of small tools, such as knives and awls. The early Iron Age also saw a notable increase in the number of bronzes found, these taking the form of anklets, rings, and bangles on occasion cast using the lost wax method. Lead and tin items were also found, albeit rarely. During this earliest of the four Iron Age phases, many pots were placed with the dead, and these often contained complete fish skeletons. Pigs, cattle, and water buffalo limbs were also found in human graves, suggesting that feasting was a feature of this period.

A vital feature of Ban Non Wat, and many other Mun Valley Iron Age settlements, is that they were surrounded by multiple banks and moats. These are considerable engineering works that have for long been enigmatic. However, we excavated long trenches across them at several sites and identified not only the profile of the moats but the date of the encircling banks. It seems that the moats had a flat base, the banks being formed by heaping up the accumulated surface soil. The relevant radiocarbon determinations indicate construction in the third and fourth phases of the Iron Age, dating from about CE 200 to 600. The moats were fed by the rivers that then flowed past each settlement and could have been controlled to maintain a constant supply of water. Their actual purpose is not known, but they were probably multifunctional. Defense is one probability; we know that conflict was by now prevalent. The food offerings in Iron Age graves also remind us that wherever there is water in this region, there are also fish. There is also the possibility that the moats were an expression of the social standing of those who conceived them, for the later Iron Age was a period when immensely rich individuals were interred at the site of Noen U-Loke, only 1.8 km from Ban Non Wat. However, new information gained from the water flotation supports a new interpretation. During the Bronze and early Iron Ages at this site, the seeds of weed plants that invade rice fields were predominantly adapted to dryland farming. During the later Iron Age, we find a transition into plants that prefer wet conditions. This change occurred at the same time as moat construction, a sharp fall in the strength of the monsoon that brought a much drier climate, and the forging of iron ploughshares and sickles (Wohlfarth et al. 2016). The dead were now interred in graves filled with rice, and some individuals were accompanied by very rich mortuary offerings. These simultaneous changes are seen as the reflection of an agricultural revolution that saw rice being cultivated in irrigated rice fields that involved ploughing with the strength of domestic water buffaloes.

The terminal Iron Age in the upper Mun Valley overlaps the period known in Southeast Asia as Chenla, when the first inscriptions were composed. From these, we can read of chiefs, known as *pon*, who exercised authority over water reservoirs and whose communities included weavers, rice farmers, and herdsmen. It was from this social matrix that the civilization of Angkor was generated (Higham 2014). Thus, at Ban Non Wat, we can trace the entire course of prehistory from hunter-gatherers through the Neolithic, Bronze, and Iron Age to the origins of civilization.

Future Directions

The next stage in archaeological research in the Mun Valley of Northeast Thailand is to excavate further moated sites to provide comparative information on the course of prehistoric social change. This needs to identify further evidence for the presence of hunter-gatherers and their interactions with early rice farmers. The presence of a rich

Bronze Age elite at Ban Non Wat will come into sharper focus if similar groups can be found at other sites in the region. An elite can only be properly defined if contemporary poor lineages can be identified. These Iron Age sites are so large that their internal structure needs to be investigated. Thus, excavations at Non Ban Jak, a moated mound near Ban Non Wat, have revealed a residential quarter for the first time, with a lane separating rooms belonging to two different houses.

Cross-References

- ▶ Dating Techniques in Archaeological Science
- ▶ South and Southeast Asia: Historical Archaeology

References

Higham, C.F.W. 2011a. The Bronze Age of Southeast Asia: new insight on social change from Ban Non Wat. *Cambridge Archaeological Journal* 21: 365–389.

Higham, C.F.W. 2011b. The Iron Age of the Mun Valley Thailand. *The Antiquaries Journal* 91: 1–44.

Higham, C.F.W. 2014. From the Iron Age to Angkor: New light on the origins of a state. *Antiquity* 88: 822–835.

Higham, C.F.W., and A. Kijngam. 2009. *The origins of the civilization of Angkor, Volume III: The excavation Ban Non Wat, introduction*. Bangkok: The Fine Arts Department of Thailand.

Higham, C.F.W., and A. Kijngam. 2011. *The origins of the civilization of Angkor, Volume IV: the excavation Ban Non Wat: the Neolithic occupation*. Bangkok: The Fine Arts Department of Thailand.

Higham, C.F.W., and A. Kijngam. 2012a. *The origins of the civilization of Angkor, Volume V: the excavation Ban Non Wat: the Bronze Age*. Bangkok: The Fine Arts Department of Thailand.

Higham, C.F.W., and A. Kijngam. 2012b. *The origins of the civilization of Angkor, Volume VI: The excavation Ban Non Wat: the Iron Age*. Bangkok: The Fine Arts Department of Thailand.

Higham, C.F.W., R. Ciarla, T.F.G. Higham, A. Kijngam, and F. Rispoli. 2011. The establishment of the Bronze Age in Southeast Asia. *Journal of World Prehistory* 24: 227–274.

Wohlfarth, B., C.F.W. Higham, K.A. Yamoah, A. Chabangborn, S. Chawchai, and R.H. Smittenberg. 2016. Human adaptation to mid- to late-Holocene climate change in Northeast Thailand. *The Holocene* 26 (4): 614–626.

Ban Non Wat: Agriculture and Domestication

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Basic Site Overview

Ban Non Wat is a large prehistoric site located in the upper Mun Valley of Northeast Thailand surrounded by a double set of moats and banks. Like the concentration of similar sites in this region, it sits upon a major route linking Central Thailand with the Khorat Plateau and beyond to the Mekong River and has immediate access to a vital resource, salt. Excavations began in 2003 and continued until 2010. An unprecedented large area has been uncovered, and few sites if any in Southeast Asia are as well documented.

Evidence of Early Agriculture

The cultural sequence is divided into 12 phases. These began with occupation by hunter-gatherers, who interred the dead in a tightly flexed position. A probable shell midden has provided a radiocarbon determination in the 16th millennium BCE, but the burials belong to the second millennium BCE. This was followed by two phases of Neolithic burials, six Bronze Age, and three Iron Age phases, all represented by human burials. This sequence has been dated on the basis of 75 determinations, some taken from in situ charcoal from hearths and others from the freshwater shellfish regularly placed as mortuary offerings with the dead. The Bayesian analysis of these dates shows that the initial Neolithic settlement began in the mid seventeenth century BCE. The transition from the late Neolithic to the Bronze Age took place in the late eleventh century BCE, while the Iron Age began in the second half of the fifth century BCE (Higham and Higham 2009).

For the first time in Southeast Asia, it has therefore been possible to assess the nature and pace of cultural change over a period of over two millennia in the context of a secure chronological framework. The initial settlement by Neolithic farmers saw that the inhabitants share the cemetery with those who chose to inter the dead in a flexed position. Such interaction between intrusive rice farmers and indigenous hunter-gatherers has become increasingly recognized in other Southeast Asian sites. Evidence for agriculture comes from the remains of rice in middens and a burial, while the dog, pig, and cattle bones come from domestic stock. The Neolithic inhabitants interred their dead either in an extended and supine position or within lidded mortuary vessels. The latter involved both adults and infants (Fig. 1). Pottery vessels were elaborately decorated with incised, impressed, and painted designs of considerable sophistication that are paralleled in other Neolithic sites from Central Thailand to Vietnam and north into China. Other grave goods include exotic cowrie shells, shell beads, bivalve shells, and pig bones (Higham and Kijngam 2011). The middens contain a wide variety of bones from hunted animals, fish, and shellfish. It was clearly an environment that provided an abundance of food.

Ban Non Wat: Agriculture and Domestication, Fig. 1 Burial 28 dates to the early Neolithic at Ban Non Wat and contained a man in a seated position within a large, lidded ceramic vessel decorated with incised and impressed patterns and painted designs

The transition into the Bronze Age is documented on the basis of seven graves that contain adults, infants, and children (Higham 2011a; Higham and Kijngam 2012). All reveal a sharp increase in the elaboration of mortuary rituals and the quantity of offerings placed with the deceased. Thus, where a couple of pots might be found with late Neolithic individuals, with Bronze Age 1, this rose to as many as 17. Socketed copper axes were a regular finding in these burials, as were shell beads and pig bones. This initial Bronze Age phase lasted perhaps no more than two generations before Bronze Age 2, when mortuary wealth rose to such a degree of wealth that we can describe the burials as princely (Fig. 2). Again, copper-based axes were regularly encountered, even with infants, as well as chisels, awls, and bells. The dead wore unparalleled quantities of exotic shell and marble ornaments, particularly bangles, beads, and earrings. Over 80 fine ceramic vessels were found, in many and varied forms, some bearing sophisticated painted designs (Fig. 3). A singular feature of these burials is that some men and women were partially exhumed and then the bones were replaced in a carefully placed heap within the grave. This might have been undertaken so that distinguished ancestors were incorporated within social rituals. There is little doubt that during this phase, Ban Non Wat harbored an elite social group that had secured preferential, perhaps restricted, access to exotic valuables that included copper, shell, and marble. The phase lasted from about 1000 to 850 BCE.

The ensuing phase saw a continuation of very wealthy graves, incorporating tens of thousands of shell beads, multiple shell bangles, and several bronzes. However, with phase 3B, the mortuary wealth fell sharply although the basic protocols associated with interring the dead continued: the same orientation, placement of pottery vessels, and creation of rows of graves. This relative poverty continued into Bronze Age 4, when graves covered the excavated area and were placed not only in rows but also head to toe. Bronzes were now very rare indeed, although one burial contained a bronze founder, a man accompanied by multiple molds for

Ban Non Wat: Agriculture and Domestication, Fig. 2 Burial 197 was one of the richest graves of the early Bronze Age at Ban Non Wat. The man was interred with several copper implements, richly decorated pots, and exotic shell bangles

casting bangles and two bivalve molds for axes. The final Bronze Age witnessed new forms of ceramic vessel, several containing complete fish skeletons as food offerings, as well as spindle whorls and clay that may well have been used to dye cloth.

Iron Age burials formed a seamless continuation from the late Bronze Age with virtually identical pottery vessels but also the first iron in the form of spears, knives, tool kits, and bangles. Three spears had iron blades and cast on bronze hilts. The first glass, carnelian, and agate ornaments were also found (Higham 2011b).

The excavation of a series of squares lineally across the site has shown how the settlement area progressively expanded over time. During the Iron Age, the floor of an area that had been used to impound domestic cattle and water buffalo was identified on the western edge of the site, and complex water control features on the eastern edge were in place as, toward the end of the Iron Age, the moats and banks round the site were constructed. In late Iron Age burials, there was a proliferation of glass ornaments in graves, along with more carnelian, agate, gold, and bronzes that reflect social change heralding the imminent development in the region of early states from the fifth to sixth centuries CE.

Ban Non Wat: Agriculture and Domestication, Fig. 3 Some of the mortuary vessels placed with the dead at Ban Non Wat were decorated with fine-painted designs (Reconstructed illustrations by Dr. Warrachai Wiriyaromp)

Cross-References

▶ Agriculture: Definition and Overview
▶ Rice: Origins and Development

References

Higham, C.F.W. 2011a. The Bronze Age of Southeast Asia: New insight on social change from Ban Non Wat. *Cambridge Archaeological Journal* 21 (3): 365–389.
Higham, C.F.W. 2011b. The Iron Age of the Mun Valley, Thailand. *The Antiquaries Journal* 91: 1–44.
Higham, C.F.W., and T.F.G. Higham. 2009. A new chronological framework for prehistoric Southeast Asia, based on a Bayesian model from Ban Non Wat. *Antiquity* 82: 1–20.
Higham, C.F.W., and A. Kijngam. 2011. *The origins of the civilization of Angkor. Volume IV: The excavation Ban Non Wat: The Neolithic occupation*. Bangkok: The Fine Arts Department of Thailand.
Higham, C.F.W., and A. Kijngam. 2012. *The origins of the civilization of Angkor. Volume V: The excavation Ban Non Wat: Bronze age*. Bangkok: The Fine Arts Department of Thailand.

Further Readings

Higham, C.F.W. 2012. *Early Thailand: From prehistory to Sukhothai*. Bangkok: River Books.
Higham, C.F.W. 2014. *Early Southeast Asia: From the first humans to the civilization of Angkor*. Bangkok: River Books.

Bananas: Origins and Development

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Basic Species Information

A Multipurpose Crop

Bananas (*Musa spp.*) are a key domesticate of subsistence farmers across the wet tropics and subtropics. Although they are one of the most important commercial crops in the world, about 85% of banana production is for local food consumption.

The wild banana plant, which does not produce edible fruit, is still used for many other purposes within the primary center of banana diversity or natural range. Among remote societies of South and Southeast Asia, these uses include leaves for roof thatching, flower bracts as legume, leaf sheaths for fibers, and several parts of the plant for medicinal purposes (Kennedy 2009). These practices are likely to have a very long history and would have been crucial to the generation of cultivated banana varieties (cultivars).

Recent genetic, archaeological, and linguistic findings have substantiated this assumption (Perrier et al. 2011). These multidisciplinary studies have enabled the first reconstruction of the entire history of banana domestication and dispersal, from wild species to the current vast array of edible banana varieties.

The Key Role of Human Intervention

Banana plants are among the largest herbs in the world, and some specimens can reach 10 m height. As herbs, they propagate by means of seeds and side-shoots, called suckers. The cultivars are mostly sterile, with seedless fruits and very limited pollen production. Artificial propagation is vegetative (clonal) whereby suckers are collected and replanted. As a consequence, the presence of banana plants beyond the primary diversity center can only be due to human intervention, usually cultivation.

The planted suckers need about 1 year for fruiting and bunch harvest. Repeated vegetative propagation yields many cultivars with similar genetic composition. Thus, the plants are genetic markers of the people that introduced them originally to a region.

Botanical Background: Groups and Subgroups

The monocotyledon Musaceae family includes the Asian and African genus *Ensete*, the genetically proximal Asian *Musella* genus, and the East Asian genus *Musa*, which is divided into sections with 22 (Eumusa, Rhodochlamys) and 20 chromosomes (Australimusa, Callimusa). Almost all the cultivars belong to the Eumusa section and are diploid or triploid hybrids from *Musa acuminata*

(A-genome) alone or from hybridization with *Musa balbisiana* (B-genome) (De Langhe and de Maret 1999). Wild AA grow naturally within the humid-warm tropics part of the diversity center – from India to New Guinea – while wild BB are mostly confined to the drier periphery to the north, from NE India, over monsoonal Southeast Asia, to the Philippines.

Current cultivars are classified into groups according to the respective genome origins: edAA (for edible AA compared to the wild AA), AAA, AB, AAB, and ABB. In this classification, A and B indicate the genomes of the parental wild species. The existence of edBB and of BBB has still not been firmly established.

A cultivar group of minor significance, including Fe'i bananas, is confined to the Pacific region and is derived from Australimusa species (Kennedy 2008). It is not discussed further in this entry.

Only a modest minority of the about 600 cultivars have been strictly reproduced clonally. Many cultivars are the product of somatic mutations, slight genetic and/or epigenetic changes causing modest differentiation in features such as size, plant color, fruit form, and bunch structure. Within each group, the resulting sets of cultivars are called subgroups. They are quite distinct from each other. It is estimated that some subgroups, such as the AAB Plantains in Africa or the AAB Plantains in the Pacific, may contain up to 100 cultivars, all of them probably being mutants from one or a few original clones. Since somatic mutation is a relatively rare process, these considerable subgroups would suggest vegetative propagation over many centuries or millennia since the time of introduction to the respective regions.

Timing and Tracking Domestication

Stepwise Domestication of the Banana

Genetic research has shown that edAA were the original cultivars, from which all the triploid varieties and a few AB cultivars derived by various crossings. The evolution from wild to edible AA involved seed suppression and progressive parthenocarpy development. It is assumed, but not yet firmly demonstrated, that the latter evolution has been caused by century-long cloning. The development of partial to complete sterility, however, calls for the classical explanation that these edAA are in fact hybrids between wildAA parents of significantly different genetic composition, as is the common case with interspecific hybrids. Indeed, the species *M. acuminata* displays a quite pronounced morphological variation all over the *Musa* primary diversity center, with the variants confined to restricted areas. They have therefore been called "subspecies," and at least eight wild AA ssp. are recognized. Research with mtDNA and cpDNA markers has eventually demonstrated that edAA are inter-subspecific hybrids in various combinations, which explains the diversity in current AA cultivars (Perrier et al. 2011).

The pattern of banana domestication implies that plants from region-specific wildAA subspecies were moved between regions by human populations, for the natural hybridizations to become possible. Archaeological and linguistic investigation has revealed that such movements would have happened in the area of New Guinea and Eastern Indonesia even before the arrival of Austronesian-speaking peoples, perhaps around 4,000–3,500 years ago (Donohue and Denham 2009).

Triploidy Formation

Partially sterile AA cultivars can produce viable diploid gametes. If these are fertilized by haploid pollen, triploid bananas can be formed. Human interaction would have brought different cultivars into contact with other edAA as well as with wild AA subspecies and even the BB species. The addition of A or B genomes to these AA cultivars produced the large range in AAA, AAB, and ABB subgroups.

Because triploid bananas are more vigorous and robust than diploid ones, they largely dominate in all regions where the crop has been introduced. The ABB are typical for the drier tropics, while AAA, AAB, and the few AB thrive best in the humid tropics.

The current distribution of traditionally grown cultivars is rather complex, with more or less

characteristic sets in different regions of the tropics. For example, the AAB African Plantains are the only subgroup found in the lowlands of West and Central Africa, while an altitude-preferring AAA subgroup is typical for East Africa. The two subgroups probably have different histories, with different people responsible for their introductions at different times. On the other hand, the AAB Pacific Plantains are the only Eumusa traditionally grown in the Pacific islands to Hawa ii, which strongly indicates that their distribution is linked to the colonization of the Pacific by Austronesian-speaking ancestors.

The Need for Multidisciplinary Research

Banana plants do not contain wood, and the lack of seeds and pollen in the cultivars leaves phytoliths and starch grains as the most common vestiges of their existence in the past, which explains the difficulty in tracking their archaeological visibility (see Denham et al. 2009). The center of diversity poses the additional problem of distinguishing the phytoliths of wild bananas from those of cultivars, except for the metric distinction between edAA and AAA (Vrydaghs et al. 2009).

Circumstantial archaeobotanic evidence of domestication has only been found thus far. It has been demonstrated that *Musa* phytoliths found during the excavations in Kuk (New Guinea), dating to 7,000–6,400 cal BP, belonged to plants that were managed by humans (Denham et al. 2003). On the other hand, phytoliths found in West Africa in pits radiocarbon-dated to c. 2,500 cal BP do not belong to wild *Musa*, since they are beyond the natural range of *Musa* spp.; they, therefore, indicate introduction of the AAB Plantain under cultivation by that time (Mbida et al. 2001).

The above-explained example of AAB African and Pacific Plantains and altitude-preferring AAA shows how the complex geographical distribution pattern of subgroup presence can be a helpful historical marker of different human populations (see Perrier et al. 2011). Within this historical framework, linguistic research proves to be remarkably productive. Traditional generic names for crops are highly conservative within a language family, and analysis of their reflexes can provide the tracks for the presence of the corresponding people. A striking example is the evolution of the generic term ∗qaRutay, still used among the Aeta people in the Philippines, but of which an elucidated sequence of reflexes over Indonesia and Asia seems to mirror the movement of cultivated bananas from Eastern Indonesia to India (Donohue and Denham 2009). It is tempting to suppose that analogous sequences of subgroup generic names and their reflexes could shed light on many details of this human intervention.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Nkang: Early Evidence for Banana Cultivation on the African Continent
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Vegeculture: General Principles

References

De Langhe, E., and P. de Maret. 1999. Tracking the banana: Its significance in early agriculture. In *The prehistory of food: Appetites for change*, ed. C. Gosden and J. Hather, 377–396. London: Routledge.

Denham, T.P., S.G. Haberle, C. Lentfer, R. Fullagar, J. Field, M. Therin, N. Porch, and B. Winsborough. 2003. Origins of agriculture at Kuk Swamp in the Highlands of New Guinea. *Science* 301: 189–193.

Denham, T.P., E. De Langhe, and L. Vrydaghs, ed. 2009. The history of banana domestication. *Ethnobotany Research and Applications (Special Issue)* 7.

Donohue, M., and T.P. Denham. 2009. Banana (*Musa* spp.) domestication in the Asia-Pacific region: Linguistic and archaeological perspectives. *Ethnobotany Research and Applications* 7: 293–332.

Kennedy, J. 2008. Pacific bananas: Complex origins, multiple dispersals? *Asian Perspectives* 47: 75–94.
Kennedy, J. 2009. Bananas and people in the homeland of genus *Musa*: Not just pretty fruit. *Ethnobotany Research and Applications* 7: 179–197.
Mbida, C.M., H. Doutrelepont, L. Vrydaghs, R.L. Swennen, R.J. Swennen, H. Beeckman, E. de Langhe, and P. de Maret. 2001. First archaeological evidence of banana cultivation in central Africa during the third millennium before present. *Vegetation History and Archaeobotany* 10: 1–6.
Perrier, X., E. De Langhe, M. Donohue, C. Lentfer, L. Vrydaghs, F. Bakry, F. Carreel, I. Hippolyte, J.-P. Horry, C. Jenny, V. Lebot, A.-M. Risterucci, K. Tomekpe, H. Doutrelepont, T. Ball, J. Manwaring, P. de Maret, and T.P. Denham. 2011. Multidisciplinary perspectives on banana (*Musa* spp.) domestication. *Proceedings of the National Academy of Sciences (USA)* 108: 11311–11318.
Vrydaghs, L., T. Ball, H. Volkaeart, I. van den Houwe, J. Manwaring, and E. De Langhe. 2009. Differentiating the volcaniform phytoliths of bananas: *Musa acuminata*. *Ethnobotany Research and Applications.* 7: 239–246.

Ranuccio Bianchi Bandinelli, Fig. 1 Ranuccio Bianchi Bandinelli

Ranuccio Bianchi Bandinelli

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Basic Biographical Information

Ranuccio Bianchi Bandinelli was an Italian archaeologist, art historian, and politician (Fig. 1). He was born in Siena on the 19th of February 1900; his father, Mario Bianchi Bandinelli Paparoni, came from a noble family of Siena; and his mother, Margarete Ottilia von Korn Rudelsdorf, belonged to a noble family from the Lower Silesia. Unfortunately his mother died prematurely in 1905 when Bianchi Bandinelli was only 5 years old.

Bianchi Bandinelli was initially homeschooled by Rosa Arbesser, his grandmother from his mother's side, originally from Wien. He started to go to the public school in 1915, at the classical gymnasium F. Guicciardini in Siena (nowadays called E.S. Piccolomini), but shortly after he was interned because of the First World War. He started the military service in 1917 and attended the Academia of Turin for a year and a half only since he didn't want to become an official.

In 1918 he began to study archaeology at the University of Rome, and 5 years later he achieved his degree with a thesis about the Etruscan city of Chiusi. His thesis was then published in the series *Monumenti Antichi dei Lincei*.

In 1924 he got married to Maria Garrone and they had two daughters: Marta was born on the same year, 1924, and Sandra 4 years later.

Initially, Bianchi Bandinelli was uncertain about his career; he had to choose between taking care of the family's business while keeping archaeology as a secondary activity or making it his primary occupation.

He finally decided to focus on archaeology, and after teaching at the gymnasium in Siena, he became the professor of archaeology and history of Greek and Roman art in Cagliari in 1930. In the same year, his father passed away, and Bianchi

Bandinelli decided to sell *Villa il Pavone*, the family's house.

From 1930 to 1931, he taught in Groninga, in the Netherlands, while from 1934 to 1938, he was a professor at the University of Pisa. Later on he worked at the University of Florence (1939–1943) from which he had to resign during the Republic of Salò. Shortly after, he was taken hostage by the fascists and in 1944 he decided to become a member of the PCI (Italian Communist Party), in November 1944 he could go back to his position in Florence.

Once the war ended, he was appointed General Director of Antiques and Fine Arts with the task of coordinating the activities of restoration of monuments that had been damaged by the bombing; it was also his intention to start a project to retrieve and protect stolen works of art. Bianchi Bandinelli resigned from this position in June 1947, mainly because of political impediments to his work. At that point he decided to start teaching again first in Cagliari (1947–1950), then in Florence (1950–1957), and finally in Rome (1957–1964).

He stopped working as a professor in November 1964 frustrated by the conditions of Italian universities at that time. He continued to promote his way of thinking by supporting young students and publishing various papers to maintain alive his engagement against the carelessness of the public administrations toward the degradation of the artistic heritage.

Ranuccio Bianchi Bandinelli died in Rome on the 17th of January 1975.

Major Accomplishments

Bianchi Bandinelli conducted a life rich in intense cultural and political activities; he promoted numerous initiatives and published several important books that are still recommended as textbooks to Italian university students.

In 1926, after publishing his thesis, Bianchi Bandinelli worked for a little while at the Archaeological Museum in Florence where he was in charge of the Etruscan artifacts. On the same year, he submitted a project in order to create an archaeological map of the territory to promote the many archeological sites and Italian monuments. His major area of interest was in fact Etruscan art and its relationship with classical art, both Roman and Greek.

Between 1927 and 1928, he conducted an archaeological excavation in Sovana, Tuscany.

In 1935, together with Carlo Ludovico Ragghianti, he launched a magazine called *La Critica d'Arte* to host debates about the storical/artistic field. From a political point of view, the magazine was greatly influenced by the liberal ideas of the philosopher Benedetto Croce, and for this reason it was suppressed by the Fascist regime in 1943.

In 1940, he was invited by Gerhart Rodenwaldt to speak at a conference on classical art; the ideas of Bianchi Bandinelli deeply changed the understanding of classical art and influenced the work of scholars in the following years.

Several of his most relevant articles were collected by the magazine *Storicità dell'arte classica* in 1943 (See Bianchi Bandinelli 1943). Through those articles, we can summarize the intellectual work of Bianchi Bandinelli: the importance of the connection between artistic facts and historical substrate and the attention for the personality of the artists. Bianchi Bandinelli was also a follower of the teachings of Bernhardt Schweitzer, a German classical archaeologist and professor.

Between the years 1948 and 1959, he promoted several initiatives: he tried, with no results, to reform the *modus operandi* of the government department responsible for monuments and other treasures; he fought against the reconstructions promoted by the government that often, because of economic interests, ended up damaging the monumental and artistic heritage of the country. He was also very determined when expressing his ideas regarding classical art, determination that often led to debates with other scholars, such as Otto Brendel.

In the early 1960s, he started a magazine called *Studi Miscellanei*. He also founded *Dialoghi di archeologia* in 1967 in order to publish the contributions of younger students. In fact, despite

having left the university in 1964, he continued to mentor students. Andrea Carandini and Mario Torelli were among his followers, and their work is still a reference for university students.

He dedicated the last years of his life to the publication of some of his most important books (See Bianchi Bandinelli 1963, 1969, 1970, 1973 and 1976); this work summarizes his thoughts as an archaeologist and art historian. He highlighted how the historical and artistic heritage had to be interpreted taking into account its various levels, since each side of an artistic object would reveal a specific element: social, economic, and political.

Some of his ideas may be considered dated by looking at more recent studies, but the results of his dedication in the fields of archeology and history of art have surely provided his own students and future researchers with a solid base for their studies).

Cross-References

- ▶ Architecture, Roman
- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Classical (Greek) Archaeology
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Iconography in the Roman World
- ▶ Iconography, Etruscan
- ▶ Tombs, Etruscan

References

Bianchi Bandinelli, R. 1943. *Storicità dell'Arte Classica*. G.C. Sansoni.

Bianchi Bandinelli, R. 1963. *Arte Etrusca e Arte Italica*. Istituto della Enciclopedia Italiana.

Bianchi Bandinelli, R. 1969. *Roma. L'arte romana al centro del potere*. (BUR Arte, 2014 ed.).

Bianchi Bandinelli, R. 1970. *Roma. La Fine dell'Arte Antica*. (Rizzoli, 1981 ed.).

Bianchi Bandinelli, R. 1973. *Etruschi e Italici prima del dominio di Roma*. (Rizzoli, 2000 ed.).

Bianchi Bandinelli, R. 1976. *Introduzione all'archeologia classica come storia dell'arte antica*. (Laterza, 2011 ed.).

Further Reading

Barbanera, M. 2003. *Ranuccio Bianchi Bandinelli. Biografia ed epistolario di un grande archeologo*. Milano: Skira.

Banpocun, Archaeology of

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Introduction

Banpocun (Pan-p'o-ts'un) or Banpo is a site of the Neolithic Yangshao culture, located near Banpo village on the eastern bank of the Chan River, east of Xi'an, Shaanxi province, China. The entire site is estimated to be c. 5 ha in size, of which an area of 1 ha was uncovered during five seasons of excavation carried out from 1954 to 1957, led by Shi Xingbang of the Institute of Archaeology at the Chinese Academy of Sciences (Fig. 1). Archaeological deposits were divided into two phases. The early phase contained very rich material remains and was named the Banpo variant (*leixing*), dating to c. 4800–4300 BCE. Fewer ruminants were found from the late phase, named the Xiwangcun variant or Late Banpo variant, generally dating to c. 3500–3000 BCE (Institute of Archaeology, Chinese Academy of Sciences 1963). The entire excavated area of the Banpo site has been preserved as China's first on-site museum, the Xi'an Banpo Museum, which was first constructed in 1958 and rebuilt in 2006. Banpo has been further excavated in recent years, but a new excavation report has not yet been published.

Definition

Banpo is the first Yangshao culture site excavated on a large scale, providing rich data for understanding the economy, culture, and social organization of a Neolithic settlement. It is the type site

Banpocun, Archaeology of, Fig. 1 Excavation of the Banpo site

of the Banpo phase, and many contemporary sites sharing similar settlement layout and material assemblages later have been found over a large region in the middle Yellow River valley.

Key Issues/Current Debates/Future Directions/Examples

Settlement Layout

The residential area of the Banpo settlement is located in the center of the site, about 3 ha in area, including 46 buildings, more than 200 ash pits (mostly used as storage before abandonment), 2 livestock pens, and nearly 70 children's burial urns. Dwellings appear to have been divided into two clusters, separated by a shallow ditch, 1.5 m deep and 2 m wide. Each dwelling cluster consisted of one large building, up to 160 m^2 in size, surrounded by a number of medium and small structures, measuring 30–40 m^2 and 12–20 m^2 in size, respectively. The residential area was fortified by a moat, 5–6 m deep and 6–8 m wide. To the north of the ditch was a cemetery, and to the east were pottery kilns (Fig. 2).

The dwellings of the Banpo phase were either semisubterranean or at ground level. Each house had a hearth at the center and a doorway opening to outside. All the structures were built with wattle-and-daub walls and foundations, and the upper walls and roofs were supported by wooden posts. These houses were mostly circular structures, but a few were square or rectangular in shape (Fig. 3).

A population level of 5–600 for the entire village has been estimated by the excavator mainly on the basis of the extent of the settlement and the sizes and layout of the houses. The actual population size, however, is difficult to assess, because a large part of the settlement has not been excavated.

Material Remains

Ceramics (more than 500,000 potsherds) are the most numerous material remains excavated, accounting for 80% of the artifactual assemblage at Banpo. Pottery was probably made on site, suggested by the presence of six kilns. Nearly 1,000 vessels have been restored and are classified into four categories, including serving receptacles, water containers, cooking utensils, and storage vessels. Ceramics are mainly reddish or orange in color, some painted with human, animal, plant, or geometric designs (Fig. 4).

Twenty-two incised symbols have been found on the black band near the rim of pottery *bo* bowls (Fig. 5). They occurred singly, perhaps identifying

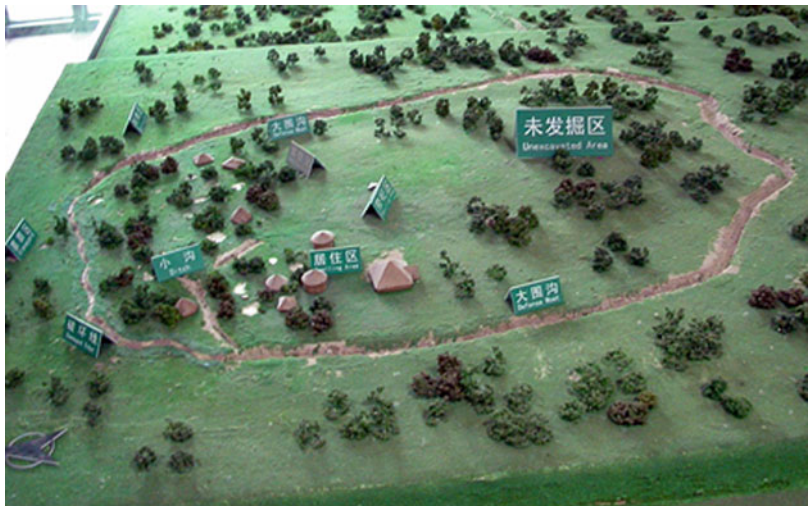

Banpocun, Archaeology of, Fig. 2 Model of the Banpo settlement

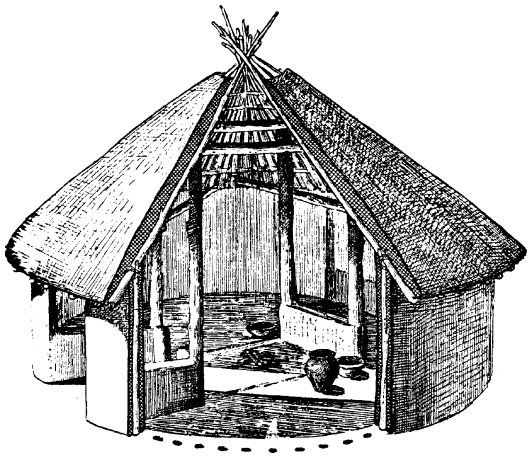

Banpocun, Archaeology of, Fig. 3 Reconstruction of a Banpo house

Banpocun, Archaeology of, Fig. 4 Painted pottery vessel from Banpo

the makers of the pottery or possibly the owners. Such pottery marks have been found at several Yangshao culture sites, and some of these forms appear to resemble certain numerals in the oracle-bone inscriptions of the Shang dynasty dating to the late second millennium BCE. It is possible that the Yangshao pottery signs were one of the sources of the Shang writing, but these pottery marks have not normally been regarded by archaeologists as indicating the contemporary existence of a writing system.

More than 5,000 tools were excavated from the site, variously made of stone, bone, deer antler, and pottery. The tool types include axe, adze, spade, knife, grinding stones (slab and hand stone), arrowhead, spearhead, harpoon, net-sinker, and fishhook. They have been classified into three categories, based on their presumed functions, as agricultural, hunting-fishing, and craft-manufacturing implements.

Agriculture appears to have played an important role in the subsistence economy. Carbonized remains of foxtail millet (*Setaria italic*) were found at the site in significant quantities; cabbage

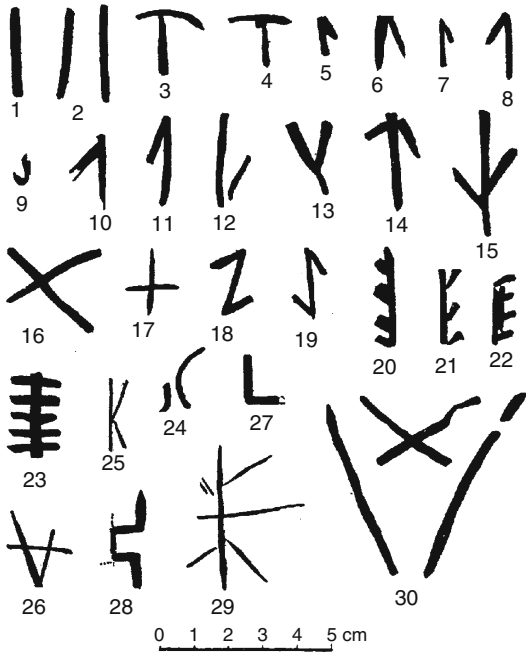

Banpocun, Archaeology of, Fig. 5 Banpo pottery marks

seeds (*Brassica* sp.), hazel nuts, chestnuts, hackberry seeds, and pine nuts were also present. Other types of plants may also have been used by the Banpo people; but due to the absence of flotation method at the time of excavation, floral remains were not systematically uncovered.

Matting, basketry, and weaving were part of the craft production, evidenced by impressions of baskets, mats, and textiles on the bottoms of pottery vessels. A large number of spindle whorls, a type of weaving tool, have also been found at the site. It is unclear exactly what materials were used for making textiles at Banpo, but traditionally hemp and kudzu were among the indigenous plants used for weaving in China, as mentioned in ancient texts, such as *The Book of Odes*.

Many animal bones have been found at the site, identifiable as mammals, birds, and fish. Pig (*Sus domestica* L.) and dog (*Canis familiaris* L.) were clearly domesticated. Bones from many species of wild animals were present, including two types of deer (*Pseudaxis hortulorum* Sw. and *Hydropotes inermis* Sw.), sheep (*Ovis* sp.), bovine (Bovidae indet.), horse (*Equus* sp.), fox (*Vulpes* sp.), rabbit (*Lepus* sp.), gazella (*Gazella* sp.), chicken (*Gallus* sp.), and carp (Cyprinidae indet.). Pig bones were the most numerous in the faunal assemblage, followed by Chinese river deer (*Hydropotes inermis* Sw.). Hunting and fishing were important subsistence activities as evidenced by a great variety of wild animal remains and numerous arrowheads, harpoons, net-sinkers, and fishhooks.

Burials

A total of 174 adult burials and 73 children's urn burials have been excavated. Adult burials were found in pit graves, mostly located in the cemetery. Among 118 nondisturbed burials, 71 contained grave goods. Except for two cases in which two males and four females, respectively, were interred, each burial usually contained one skeleton in an extended position with the head pointing to the west or northwest. Grave goods consist mostly of pottery, ranging between one and 17 items, with an average of 5–6 pieces in each burial.

Children's urn burials have been found mainly near houses. They were associated with no funerary items, except one case which contained a small pot. It is noteworthy, however, that a burial belonging to a child of about 3–4 years old was furnished with an oblong wooden coffin and contained six ceramic vessels, three stone pellets, an earring, and a set of 76 bone beads girdled around the waist. This burial, dating to the late Banpo phase, was unique in terms of its rich furnishing, suggesting that social stratification may have emerged during the late phase of the settlement's occupation.

Social Organization

Banpo society was evidently egalitarian in nature during its early phase. There is no indication of social hierarchy present in the burial or residential remains. This site, however, has been routinely described by archaeologists in China as a typical Neolithic matriarchal or matrilineal settlement (see the Xi'an Banpo Museum website:

http://www.bpmuseum.com/en/), as opposed to the patriarchal or patrilineal society that presumably developed in the late Neolithic period. The concept of matriarchal society, primarily based on the nineteenth–century evolutionary theory proposed by Henry Lewis Morgan (1877, *Ancient Society*) and Friedrich Engels (1884, *The Origin of the Family, Private Property and the State*), was systematically introduced to China by Guo Moruo (1930) in the 1930s. Banpo was the first archaeological case in which Chinese scholars attempted to employ such a theoretical framework to interpret Neolithic social organization, in support of Marxist doctrine.

The Banpo excavator argued that matrilineal rules of descent are reflected in the two collective burials at the site, one each exclusively of females or males, and that this pattern contrasts with the single-male or single-female burial pattern characteristic of the monogamous family in patrilineal society. The rich child burial was interpreted as belonging to a girl, indicating that females enjoyed a high social status then. The settlement pattern was also described as arranged in a way suitable for the pairing marriage, believed to have been practiced in a matrilineal society (Institute of Archaeology, Chinese Academy of Sciences 1963: 226–33). The statement that the Yangshao culture was a matriarchal society soon became a standard phrase adopted in many archaeological publications, although evidentiary support is lacking in the archaeological record of some cases (Yan 1989). The reported evidence for matriarchal practice at Banpo is clearly less than convincing. For example, the rich child burial said to be of a girl is problematic, as the sex of a skeleton 3–4 years old cannot be determined. Although some criticisms were made, demonstrating faults in both theory (Pearson 1988; Tong 1998: 262–72) and applications (Wang 1983, 1987), the classical evolutionary model was commonly accepted among Chinese archaeologists then and has continued to be influential, but to a lesser extent, today (e.g., Institute of Archaeology, Chinese Academy of Social Sciences 2010: 204, 413, 652–3).

Cross-References

▶ China: Museums
▶ Chinese Field Methods

References

Institute of Archaeology, Chinese Academy of Sciences. 1963. *Xi'an Banpo [Banpo in Xi'an]*. Beijing: Cultural Relics Press.

Institute of Archaeology, Chinese Academy of Social Sciences, ed. 2010. *Zhongguo Kaoguxue: Xinshiqi Juan [Chinese archaeology: Neolithic Volume]*. Beijing: Chinese Social Sciences Press.

Moruo, G. 1930. *Zhongguo Gudai Shehui Yanjiu [A study of ancient Chinese society]*. Shanghai: Lianhe Shudian.

Pearson, R. 1988. Chinese Neolithic burial patterns: Problems of method and interpretation. *Early China* 13: 1–45.

Tong, E. 1998. *Renlie yu Wenhua [Humans and cultures]*. Chongqing: Chongqing Press.

Wang, N. 1983. Zhongguo kaogu faxianzhong de "dafangzi" ["Great houses" found in Chinese archaeology]. *Kaogu Xuebao* 3: 271–294.

Wang, N. 1987. Yangshao burial customs and social organization: A comment on the theory of Yangshao matrilineal society and its methodology. *Early China* 11–12: 6–32.

Yan, W. 1989. Banpo leixing de maizang zhidu he shehui zhidu [The burial patterns and social organization of the Banpo type]. In *Yangshao Wenhua Yanjiu [On the Yangshao culture]*, ed. W. Yan, 262–302. Beijing: Cultural Relics Press.

Barley: Origins and Development

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Basic Species Information

Barley (*Hordeum vulgare* L.) Poaceae derives from the Old English *baere* related in origin to the Latin *farina* or flour (Ayto 1990) and is known variously as *da mai* (China), *orge* (French), *gerste* (German), *orzo* (Italian), and *cebada* (Spanish) (van Wyk

2005). Barley is a major crop in global agriculture. Modern statistics (e.g., from faostat.fao.org) indicate that barley production globally follows only wheat, rice, and maize. Barley can be turned into breads and porridges, as well as beers and whiskies.

Barley was one of the founder crops of early agriculture in Southwest Asia and parts of the earliest farming systems that spread across Neolithic Europe, North Africa, and the Indus Valley. Its wild progenitor is *Hordeum spontaneum* K. Koch, which occurs widely in the eastern Mediterranean eastwards to Central Asia in the open woodland steppe through to the taller grass steppe zone (Hillman 2000; Harris 2010). Wild populations further west, such as in the Maghreb region of North Africa as well as some of those on its eastern margins, may or may not be aboriginally wild but could be feral populations. Barley is a generally more tolerant cereal than wheat, with which it is often found. Barley can be grown on more saline soils and with lower rainfall. It can also tolerate colder conditions than wheat. Thus, barley has reached to higher altitudes and higher latitudes than wheat (see Fig. 1).

Major Domestication Traits

Genetics and archaeology combine to imply that barley was domesticated more than once across the greater Near East, with three origins a likely minimum (Fuller et al. 2012). All are located across Southwestern to Central Asia (Fig. 1). Such evidence includes two genetic variants that make non-brittle domestic-type ears, and several other gene frequencies have geographic structure suggesting differences between east and west (Morrell and Clegg 2007). Genetic differentiation suggests a western Levantine domestication area and an eastern domestication, perhaps in the greater Iranian plateau region. While most wild and cultivated barleys are grown over the winter and flower in the spring, controlled by day length, other varieties have lost the linkage of day length to flowering and are well suited to spring/summer cultivation at higher latitudes or altitudes. These photoperiod-insensitive (summer) barleys derive from domestication of a separate wild population in the mountains of Iran (Jones et al. 2008).

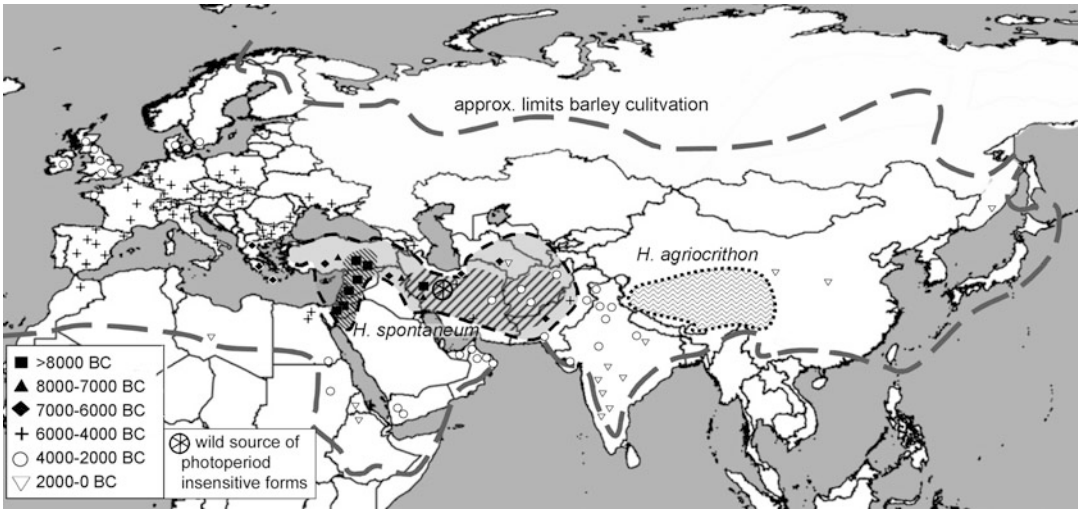

Barley: Origins and Development, Fig. 1 Map showing the approximate maximum limits of traditional barley cultivation (*thick dashed line*) in relation to its wild range (*gray zone*). The map differentiates likely eastern and western subzones within the wild range that had separate domestications, as well as the locations for the development of original photoperiod-insensitive barley in Iran. The *symbols* show representative archaeobotanical finds that chart the earliest spread of barley

Timing and Tracking Domestication

Archaeobotanical evidence tracks both the evolution of domesticated barley, at least with regard to its western Levantine origin. Sites in several parts of the Levant have reported evidence for pre-domestication cultivation, most often involving apparent arable weed flora associated with morphologically wild barley remains (Fuller et al. 2012). Such evidence goes back to the PPNA period (9700–8800 BCE). Subsequently there is evidence for gradual morphological change including the steady increase in the percentage of non-shattering barley rachis remains and in average grain size (width and thickness) of grain samples over time. Both lines of evidence point towards change between the Late PPNA (c. 9000 BCE) and the Late PPNB 7000–6000 BCE and indicate gradual domestication over a ~3,000-year period.

Archaeobotanical evidence for barley is widespread, allowing the spread of this crop to be tracked (Fig. 1). It was an essential part of the founder crop package that dispersed from the "Fertile Crescent" westwards to Neolithic Europe, starting about 7000 BCE and reaching the British Isles just after 4000 BCE. Similarly, it spread rapidly eastwards to the Indus Valley and Turkmenistan, where it is present by 6000 BCE. The dispersal into Egypt and up the Nile is later (c. 4000 BCE), while the spread of barley in monsoonal India or to southern Arabia took place after 3000 BCE. The first barley in southern India or China appears to date more recently than 2000 BCE.

Barley has evolved into a number of distinct varieties, illustrated diagrammatically in Fig. 2. Whether barley has 2 or 6 rows of grains on the ear and has free-threshing (naked) grains or hulled ones should be separable in archaeobotanical

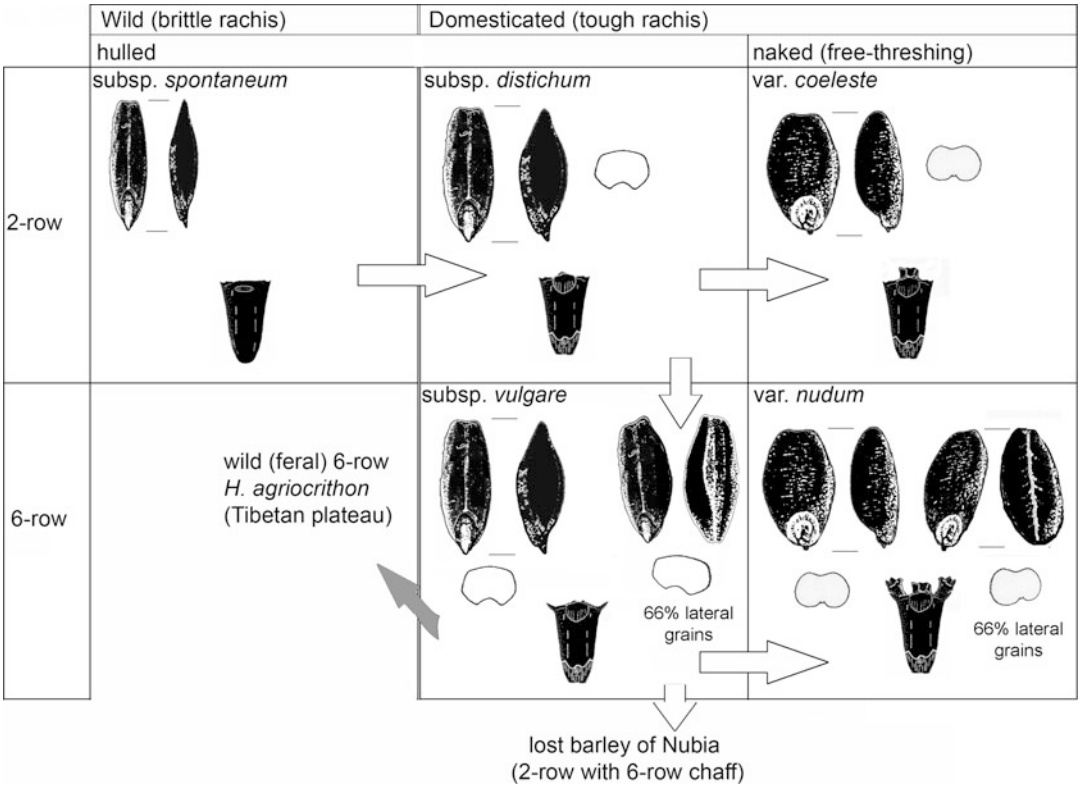

Barley: Origins and Development, Fig. 2 Diagram of the main types of barley and evolutionary pathways between them. These are illustrated by potential archaeobotanical differences in grain and rachis morphology

remains (see Fig. 2). Wild barley normally has two rows of grains, and grains have tightly fitting hulls; this is a two-row, hulled, and shattering wild type. The first change with domestication is the loss of spike shattering, which can be tracked archaeologically with the recovery of tough rachis remains. Two changes that occurred after were the increase to six-row and the development of free-threshing (or naked) barley. While naked barley appears to have evolved once, originally in early two-rowed forms, 6-row barley has evolved 3 times, including local independent parallel mutations in eastern Asia and the western Mediterranean (Komatsuda et al. 2007).

Thus there are three main variant genes that create six-row barley (*Hordeum vulgare* var. *hexastichium*), a condition that only exists among domesticated races, and these also show east/west patterning (Tanno and Takeda 2004). In ancient Nubia there was a unique, now lost, barley that has six-row architecture and chaff and only produces two grains. Palmer et al. (2009) demonstrate that this has 6-row genetics and may represent a local reversion as adaptation to the extreme aridity in Nubia. Recent work on genetic variation in wild barley (*Hordeum spontaneum*), which unlike wheat has a large eastern range extension into Pakistan, Afghanistan, and Central Asia, shows systematic variation in allele frequency. Morrell and Clegg (2007) have demonstrated that allele frequencies in cultivated landraces are best explained by two origins from differentiated wild barley populations, one of which was in the Levant, while the other is suggested to lie somewhere from Zagros mountains eastwards towards Central Asia.

Hordeum agriocrithon, a wild six-row barley of the Tibetan Plateau, is likely to be a feral derivative of domesticated 6-row barley or a hybridization from a 6-row crop into two-rowed *H. spontaneum*, rather than truly wild (Tanno and Takeda 2004). All naked barleys, including the naked 6-row commonly grown in the Tibetan Plateau, share the same nude genetic mutation (Pourkheirandish and Komatsuda 2007). This suggests that they derive this trait from the early naked barleys that had appeared by the Late Pre-Pottery Neolithic of Southwest Asia.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Chickpea: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Lentil: Origins and Development
- ▶ Pigeon Pea: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Wheats: Origins and Development

References

Ayto, J. 1990. *The glutton's glossary: A dictionary of food and drink terms*, 16–17. London: Routledge.

Fuller, D.Q., G. Willcox, and R.G. Allaby. 2012. Early agricultural pathways: Moving outside the 'core area' hypothesis in Southwest Asia. *Journal of Experimental Botany* 63 (2): 617–633.

Harris, D. 2010. *Origins of agriculture in western Central Asia. An environmental-archaeological study.* Philadelphia: University of Pennsylvania Press.

Hillman, G. 2000. Plant food economy of Abu Hureyra. In *Village on the Euphrates, from foraging to farming at Abu Hureyra*, ed. A. Moore, G. Hillman, and T. Legge, 372–392. New York: Oxford University Press.

Jones, H., F.J. Leigh, I. Mackay, M.A. Bower, L.M. Smith, M.P. Charles, and W. Powell. 2008. Population-based resequencing reveals that the flowering time adaptation of cultivated barley originated east of the Fertile Crescent. *Molecular Biology and Evolution* 25 (10): 2211–2219.

Komatsuda, T., M. Pourkheirandish, C. He, P. Azhaguvel, H. Kanamori, D. Perovic, N. Stein, A. Graner, T. Wicker, A. Tagiri, U. Lundqvist, T. Fujimura, M. Matsuoka, T. Matsumoto, and M. Yano. 2007. Six-rowed barley originated from a mutation in a homeodomain-leucine zipper I-class homeobox gene. *Proceedings of the National Academy of Sciences* 104 (4): 1424–1429.

Morrell, P.L., and M.T. Clegg. 2007. Genetic evidence for a second domestication of barley (*Hordeum vulgare*) east of the Fertile Crescent. *Proceedings of the National Academy of Sciences* 104 (9): 3289–3294.

Palmer, S.A., J.D. Moore, A.J. Clapham, P. Rose, and R.G. Allaby. 2009. Archaeogenetic evidence of ancient Nubian barley evolution from six to two-row indicates local adaptation. *PLoS One* 4 (7): e6301.

Pourkheirandish, M., and T. Komatsuda. 2007. The importance of barley genetics and domestication in a global perspective. *Annals of Botany* 100: 999–1008.
Tanno, K., and K. Takeda. 2004. On the origin of six-rowed barley with brittle rachis, agriocrithon [*Hordeum vulgare* ssp. *vulgare f. agriocrithon* (Åberg) Bowd.], based on a DNA marker closely linked to the vrs1 (six-row gene) locus. *TAG Theoretical and Applied Genetics* 110 (1): 145–150.
van Wyk, B.-E. 2005. *Food plants of the world: An illustrated guide*. Portland: Timberland Press Inc.

Barrow Area Sites: Nuvuk, Utqiaġvik, and Birnirk

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Introduction

The Utqiaġvik (formerly Barrow) area is home to several important archaeological sites. Among these are the sites that fall under the general heading of Utqiaġvik, including Utqiaġvik proper, Ukkuqsi, and Kugok; Nuvuk; and Birnirk (type site of the Birnirk culture) (Fig. 1).

The earliest "archaeology" in the Utqiaġvik area was done by nonprofessionals, often by purchasing artifacts from residents who excavated for pay. Notable among them were Murdoch (1892), Stefansson (1914), Wissler (1916), Ford (1959), and Van Valin (1941), a Barrow schoolteacher.

James A. Ford excavated at Nuvuk in 1932, Utqiaġvik in 1932, and Birnirk in 1936. Ford's report (1959) on his excavations on the Chukchi coast defined harpoon head typology for this region and provided extensive and well-illustrated descriptions of artifacts from Birnirk through contact period sites.

Definitions

Utqiaġvik

Utqiaġvik is the traditional Inupiaq name for the community formerly known as Barrow. The name Utqiaġvik (or Utkiavik) also refers to the archaeological component of the community as a whole, which also includes two areas that are sometimes referred to separately, Ukkuqsi and Kugok. The precontact settlement was on the Chukchi Sea coast, concentrated on high ground on either side of Kugok Ravine. It consisted of at least 60 mounds, which had been built up in part by superposition of sod-covered semi-subterranean houses.

Utqiaġvik has a very limited number of radiocarbon dates, given the amount of excavation that has taken place at the site. However, it has long been recognized as having been occupied from Late Western Thule times until the present day, and the majority of the material excavated from the site corresponds to this understanding. However, Birnirk burials were recovered from the Kugok area of the site as early as 1932 (Ford 1959), and more recently a Western Thule burial was recovered from a pit dug through the floor of a Birnirk house at Ukkuqsi (Zimmerman et al. 2000). Lithics that have been identified as Arctic Small Tool Tradition (ASTt) have also been recovered from Utqiaġvik, indicating that the area was being used at least as early as 4000–5000 BP.

Utqiaġvik was originally mapped by Ford in 1932, with more extensive mapping by Stanford in 1968 (who began the mound numbering system) and the Utkiavik Archaeological Project (UAP). A number of the mounds have been hidden or destroyed by modern construction of roads. All portions of the site except Kugok are threatened by coastal erosion and sea level rise.

Utqiaġvik

In 1981 through 1983, major excavations were carried out at the Utqiaġvik site (Hall and Fullerton 1990). These excavations concentrated primarily on houses, although some work was done on activity areas outside the structures. The vast majority of the material excavated was late precontact and postcontact. The excavations of Mound 34, which included a prehistoric *qargi* (ceremonial center), were published in a monograph (Sheehan 1997).

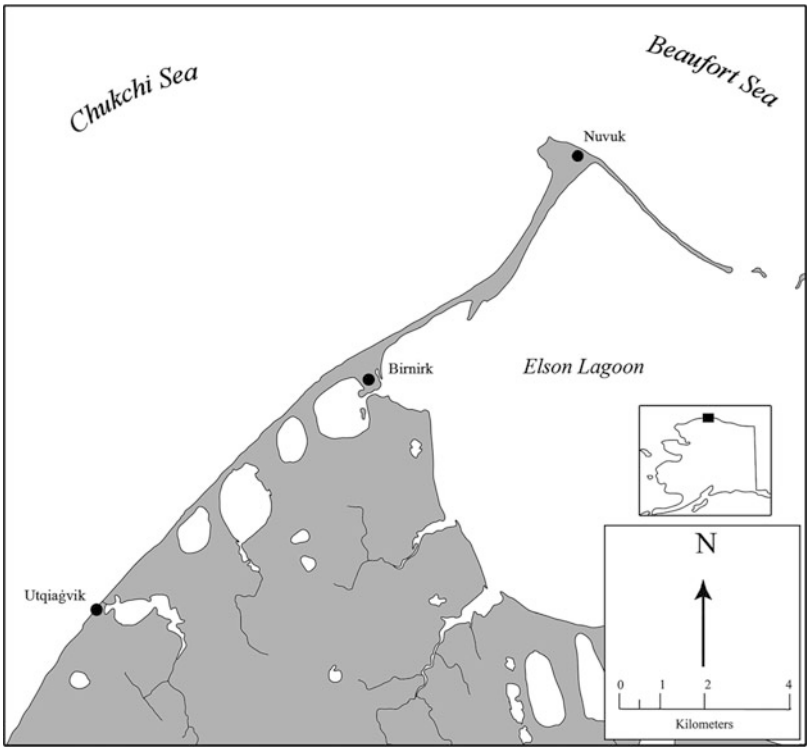

Barrow Area Sites: Nuvuk, Utqiaġvik, and Birnirk, Fig. 1 Map of Utqiaġvik-area sites

In 1986, a number of blocks of tundra from the Utqiaġvik site slumped onto the beach. In 1990, a salvage excavation of the single remaining slump block was carried out. Radiocarbon dates averaged 1281–1395 calAD (Mason 1991).

A number of human remains have been recovered from Utqiaġvik. Ford recovered the frozen and partly desiccated bodies of two women from the floor of a house that some Utqiaġvik residents had begun excavating in imitation of Ford's work (Ford 1959). The Utqiaġvik Archaeology Project recovered a number of individuals in a similar state of preservation from a collapsed house in Mound 44 at Utqiaġvik (Newell 1984). These were catastrophic, not deliberate, burials.

Kugok

Kugok is the name of the ravine that bisects the settlement of Utqiaġvik. It contains a stream that was a summertime freshwater source for the residents. The name is generally applied to a group of mounds at the head of the ravine, which contained Birnirk burials. Van Valin may have recovered some Birnirk burials in this area. Ford reported the recovery of 15 individuals (Ford 1959:25–30). Four additional individuals were recovered by the Utqiaġvik Archaeological Project (UAP) in 1981.

Ukkuqsi

Ukkuqsi is the name given to the subarea of Utqiaġvik located around the mouth of Kugok ravine, particularly a large mound on the south side of the ravine. In 1994, the frozen body of a young girl was exposed by erosion (Zimmerman et al. 2000). The autopsy indicated that she most likely died of starvation and had experienced disabling health issues in life. Artifacts recovered during excavation ranged in age from postcontact glass beads found at and near the surface to two harpoon heads and a Birnirk throwing board from the floor of a house through which the meat pit in which the little girl had been buried had been cut.

Nuvuk

Nuvuk is located at the tip of the Point Barrow spit. At contact, the settlement was larger than Utqiaġvik; the last residents moved away in the late 1940s. Until recently, Nuvuk had been considered a late

Barrow Area Sites: Nuvuk, Utqiaġvik, and Birnirk, Fig. 2 Excavating at Nuvuk. Burial excavations foreground and test pit excavation in rear. Beaufort Sea in background. View northeast

precontact through postcontact site and therefore of little archaeological interest. Recent work by a large community archaeology project (Jensen 2009a, b, 2012) has revealed the largest known cemetery in North Alaska, with graves dating from Early Thule (possibly late Birnirk) through late Western Thule. Radiocarbon dates on the graves range from 720–980 calAD up to 1640-present calAD, which accord fairly well with the direct dating of the individuals (Coltrain et al. 2016). That work also revealed a precontact/contact period work area located on lower ground at a distance from the graveyard and the winter village, with radiocarbon dates ranging from 1480–1670 calAD up to 1680–1930 calAD, and an artifact inventory including metal tools and imported wood, indicating some use after time of contact. There was also an earlier occupation at Nuvuk that contained the first evidence for Ipiutak north of Point Hope, including portions of two structures and faunal remains. Radiocarbon dates place it between 330 and 390 calAD. Nuvuk is currently the best dated of the Utqiaġvik-area sites (Fig. 2).

Wilbert Carter (1966) described Nuvuk in 1953 made up of 19 "locations" with indications of houses. Some had multiple houses or rooms, giving a total of 46 houses or meat caches. His work resulted in the recovery of a number of artifacts, which he interpreted as recent (i.e. pre- and postcontact Inupiat), although illustrations in some of his reports suggest that early material was present.

When the Nuvuk Archaeological Project (NAP) began excavation (Jensen 2012), the village had eroded, but graves were noted in the erosion face. Initial salvage excavations of these graves revealed what proved to be the precontact cemetery. An adjacent Christian graveyard has markers dating from the early 1900s. During the period immediately preceding contact Utqiaġvik-area residents had shifted to surface "burials." There is an extensive modern history of collection of human remains from the surface in the Nuvuk vicinity, which presumably removed many of these individuals from the Nuvuk mortuary precinct.

Barrow Area Sites: Nuvuk, Utqiaġvik, and Birnirk, Fig. 3 Some of Birnirk mounds from the air. Note Elson Lagoon waters encroaching. View NNW

The human remains excavated from Nuvuk by the NAP were carefully documented by physical anthropologists prior to their reburial. Samples were retained for ancient DNA (aDNA) extraction, stable isotope analysis, and radiocarbon dating (Coltrain et al. 2016, Raff et al. 2015, Tackney 2016).

Birnirk

Birnirk (Piġniq in Inupiaq) is located at the base of the Point Barrow spit, between Elson Lagoon and the Chukchi Sea. It is made up of a group of 16 mounds near the shore of the lagoon, separated from the Chukchi Sea by a series of gravel beach ridges. Birnirk is the type site of the Birnirk culture and is currently designated a US National Historic Landmark. Some parts of the site are threatened by sea level rise (Fig. 3).

James Ford's work indicated that the major occupation at Birnirk was relatively early, predating what was then known of occupation at Utqiaġvik. However, some of Carter's later work, as well as explorers' accounts, suggest that the site was occupied to some extent past the time of contact. Radiocarbon dates from the site are range from 680–890 calAD to 1460–1650 calAD. However, most dates, including those on harpoon heads chosen to date the transition between Birnirk and Thule (Morrison 2001), cluster between 900 and 1200 cal AD. Ford produced very detailed (1′ contour) maps of Birnirk. These maps were published together with his description of his 1930s work (Ford 1959). This remains the best published information on the site.

Stefánsson reportedly recovered one individual from Birnirk, but no further documentation is available. Ford (1959) recovered a number of individuals here, as did Carter, although it is not clear if they were the result of deliberate burials. The stratigraphy of the mounds at Birnirk is extremely complicated. It is unclear if the human remains were recovered from within houses, as in the cases at Utqiaġvik, or were deliberately buried in grave structures, as seems to have been the case at Nuvuk and Kugok.

Key Issues/Current Debates/Future Directions/Examples

A key research issue is clarifying the occupational history of these sites. Only Nuvuk has a reasonable suite of radiocarbon dates (Jensen 2009a, 2009b). Both Birnirk and Utqiaġvik could benefit from a program of systematic dating of well-chosen existing specimens. However, modern

excavation standards are quite different than when Birnirk was last excavated, so some controlled excavation would help. There is a large well-excavated collection from Utqiaġvik. However, the existence of multiple Birnirk burials at Kugok, coupled with the Birnirk finds from the house floor at Ukkuqsi, suggests that there was at least a small Birnirk occupation at Utqiaġvik, which apparently was not encountered by earlier excavators. Resolving this issue will make it feasible to address other questions.

One question of interest concerns changes in the material culture found at the sites, and whether they relate solely to in situ cultural development or whether a population replacement from elsewhere was involved. The aDNA studies from Nuvuk (Tackney 2016), coupled with modern DNA studies of the North Slope (Raff et al. 2015), suggest that population replacement was not a major factor. Improved chronological control should better identify the timing of changes in material culture, as well as apparent changes in social and cultural organization. This will permit these changes to be situated in an environmental context, in order to investigate the human ecodynamics.

A related question is what role the Utqiaġvik area played in the development of the Thule culture and whether it was the source for the Thule migration. Various conflicting theories exist, an extreme one of which includes a multicentury abandonment of the Utqiaġvik area. Although the stratigraphy at the sites, the known radiocarbon chronology, and the aDNA evidence appear inconsistent with this scenario, better understanding of individual site chronologies will clarify the situation.

The broad outlines of paleoeconomy in the Utqiaġvik area are understood from prior excavations. However, none of the sites has had a rigorous zooarchaeological study carried out. Midden deposits still exist at Birnirk and Utqiaġvik where productive studies could be carried out.

All of these sites are severely threatened by coastal erosion and sea level rise. The warming of permafrost and concurrent deepening of the active layer is also a major threat to the generally excellent preservation that currently exists at these sites.

Cross-References

- ▶ Biomolecular Archaeology: Definition
- ▶ Bone Chemistry and Ancient Diet
- ▶ Cape Krusenstern Societies
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Outreach
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Ethics and Human Remains
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Permafrost Digging
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Zooarchaeology

References

Carter, W. 1966. Archaeological survey of Eskimo, or earlier, material in the vicinity of Point Barrow, Alaska. Final Report: 31 January 1966. Report to Office of Naval Research and Arctic Institute of North America.

Coltrain, J.B., J. Tackney, and And D.H. O'Rourke. 2016. Thule whaling at Point Barrow, Alaska: The Nuvuk cemetery stable isotope and radiocarbon record. *Journal of Archaeological Science: Reports* 9: 681–694.

Ford, J.A. 1959. Eskimo Prehistory in the Vicinity of Point Barrow, Alaska. *Anthropological Papers of the American Museum of Natural History* 47: 1. New York.

Hall, E.S., Jr., and L. Fullerton, eds. 1990. *The Utqiaġvik Excavations*. Barrow: The North Slope Borough Commission on Iñupiat History, Language and Culture.

Jensen, A.M. 2009a. Radiocarbon dates from recent excavations at Nuvuk, Point Barrow, Alaska and Their Implications for Neoeskimo Prehistory. In *On the Track of the Thule Culture from Bering Strait to East Greenland: Proceedings of the SILA Conference "The Thule Culture–New Perspectives in Inuit Prehistory": Papers in Honor of Research Professor H. C. Gulløv*, ed. Bjarne Grønnow, 45–62. Copenhagen: Danish National Museum.

Jensen, A. M. 2009b. Nuvuk: Point Barrow, Alaska: The Thule Cemetery and Ipiutak Occupation. Unpublished PhD dissertation at Bryn Mawr College. On file at University Microfilms, Inc.

Jensen, A.M. 2012. Culture and change: learning from the past through Community Archaeology on the North Slope. *Polar Geography* 35: 211–227.

Mason, O.K. 1991. Chronological Inferences from Harpoon and Arrow Heads Form Mound 44 Slump. In *Coastal Erosion and Salvage Archaeology at Utqiagvik, Alaska: The 1990 Excavation of the Mound 44 Slump Block*, ed. O.K. Mason, S.C. Gerlach, and S.L. Ludwig. Fairbanks, AK: Occasional Papers of the Alaska Quaternary Center No. 4.

Morrison, D. 2001. Radiocarbon Dating the Birnirk-Thule Transition. *Anthropological Papers of the University of Alaska, NS* 1 (1): 73–85.

Murdoch, J. 1892. *Ethnological Results of the Point Barrow Expedition. Ninth Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution 1887–88, by J.W. Powell, Director.* Washington, DC: Government Printing Office.

Newell, R.R. 1984. The Archaeological, Human Biological, and Comparative Contexts of a Catastrophically-Terminated Kataliqaaq House at Utqiaġvik, Alaska (BAR-2). *Arctic Anthropology* 21 (1): 5–52.

Raff, J.A., M. Rzhetskaya, J. Tackney, and M.G. Hayes. 2015. Mitochondrial diversity of Iñupiat people from the Alaskan North Slope provides evidence for the origins of the Paleo-and Neo-Eskimo peoples. *American Journal of Physical Anthropology* 157 (4): 603–614.

Sheehan, G.W. 1997. *In the Belly of the Whale: Trade and War in Eskimo Society*, Aurora Monograph Series. Vol. VI. Anchorage: Alaska Anthropological Association.

Stefansson, V. 1914. *The Stefansson-Anderson Arctic Expedition of the American Museum: Preliminary Ethnological Report. Anthropological Papers of the American Museum of Natural History.* Vol. 14(1). New York: Trustees of the American Museum.

Tackney, J. 2016. Arctic Prehistory Through Ancient DNA. [PhD Dissertation]. Salt Lake City, UT: University of Utah.

Van Valin, W.B. 1941. *Eskimoland Speaks*. Caldwell, Idaho: The Caxton Printers, Ltd.

Wissler, C. 1916. *Harpoons and Darts in the Stefansson Collection*, Anthropological Papers of the American Museum of Natural History. Vol. 14(2), 397–443. New York: Trustees of the American Museum.

Zimmerman, M., A.M. Jensen, and G.W. Sheehan. 2000. Aġnaiyaaq: The Autopsy of a Frozen Thule Mummy. *Arctic Anthropology* 37 (2): 52–59.

Basilica in Classical Archaeology

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Introduction and Definition

The Latin term basilica is a transliteration of the Greek Βασιλική ("belonging to the king", "royal") and generally refers to a wide and sumptuous covered hypostyle hall, mainly associated with a forum square (Gros 2001: 260–89, with bibliography). This definition is ably demonstrated by an important inscription from the Roman theater of Iguvium (modern Gubbio) (*CIL* XI.5920a-b = *ILS* 5531: "Cnaeus Satrius, son of Cnaeus, a colonial commissioner, provided the *basilicae* with paneled ceilings") ("*C*]*n*(*aeus*) *Satrius Cn*(*aei*) *f*(*ilius*) *Rufus*, *IIIIvir iur*(*e*) *dic*(*undo*)/*basilicas sublaqueavit*. . ."). The term can also be employed to designate rooms with the same spatial and architectonic characteristics belonging to other public, and even private, complexes (Gros 2003, 2004). As a matter of fact, as the *basilicae forenses*, the two *basilicae* of Gubbio's theater, built flanking the scenic sector during the early Augustan period, constituted large and luxurious halls provided with columns, roofing, and pavement, designed for the reception, passage, and shelter of citizens in a manner similar to the more common *basilicae* of forum spaces. The basilica, therefore, was a monumental, multivalent space that, in the case of a *basilica forensis*,

added the basic functions of hospitality and accommodation to the judicial, administrative, and commercial activities specifically linked to the forum and which originally had been conducted outdoors.

Key Issues/Current Debates/Future Directions/Examples

The typology, elaborated in Rome from the end of the third century BCE onward, was most likely inspired by similar structures of the Hellenistic eastern Mediterranean (e.g., Wilson 2005). The basilica gradually replaces *atria* with *tabernae* that would normally border forum squares of the middle Republican period. These buildings were modeled along the lines of the traditional Italo-Roman atrium house and were mostly private property that could be rented for public activities, such as auctions, or religious activities, such as the *Tubilustrium* (Varro *LL* 6.14). The *atrium Regium* of the Forum Romanum, located between the *forum Piscarium* and the *Comitium* in the area of the Basilica Aemilia, is considered, also thanks to the onomastic correspondence (*aule basilike* = *atrium Regium*), the "ancestor of the Roman basilicas" (Gros 2001: 260–4). The construction of Basilica Porcia in 184 BCE, the first to be designated, as many *atria* previously, with the gentilician name (*nomen gentilicium*) of the founder (*De viris illustribus*, 47), has been realized at the site of "*atria duo* [. . .] *et quattuortabernas*"; and to be more precise at the site of *atrium Maenium* and *atrium Titium*, purchased by Cato the Elder with public funds in the area of the *Lautumiae* (Liv. 39.44.7). An analogous development takes place in Republican colonies as demonstrated by the forum of Cosa, which is bordered on three sides by *atria publica* that anticipate the construction of the basilica (c. 120 BCE) (Brown et al. 1993: 207–45).

The influx of Hellenistic traditions soon rendered the buildings of the republican tradition both inadequate and outdated, an inadequacy that led to the genesis and elaboration of the prototypical basilica. This transformation is evident in the monumental center of Rome in the space of only a few decades, with the identification, attested in Plautus (*Curculio* 1–472; *Captivi* 813–815), of the *atrium Regium* as a basilica. The construction of the Basilica Porcia (184 BCE) and the Basilica Aemilia (179 BCE during the censorship of M. Fulvius Nobilior) soon followed, as did the Basilica Sempronia (169 BCE). All of these building projects conferred both effectiveness and regularity to the Forum Romanum. The complex archaeological research into the first urban *basilicae* seems to demonstrate the gradual architectural development of this typology, which quickly acquires monumentality thanks to the installation of internal arcades erected to delimit wider naves and through the longitudinal axis of the building with respect to the square (Coarelli 1985: 135–66). This collocation may be noted in the several cities of Republican Italy, including Cosa, Alba Fucens, Ardea, and Aquileia, although it must be noted that one of the best known *basilicae* of the late second century BCE, that of Pompeii, opens up on to the city's forum along one of its short sides (Ohr 1991).

The basilica of Pompeii is of great interest for many reasons: it preserves in the substantially intact interior one of the recurrent elements of forum *basilicae*, namely, the *tribunal* (David 1983), which was a high podium (sometimes with columns) where magistrates used to sit during judicial proceedings. The example at Pompeii, furthermore, anticipates with some of its architectonic and planning details the model of basilica that Vitruvius would postulate in the late first century BCE (Gros 1984) when he planned the colony of Fanum Fortunae, an example that remains unknown to archaeology (*Arch*. 5.1.6–10). The isolation of the internal space by means of continuous walls at the expense of the more common arcades and the use of a so-called "colossal" order for the internal colonnade are principal factors of the analogy drawn between Fanum Fortunae and Pompeii. The basilica of Pompeii, however, respects the Vitruvian prescriptions in the organization of the central space and for the presence of the *tribunal* as well. The position of the building is different compared to the forum square and, accordingly, the *tribunal* inside the basilica that in the Vitruvian model is

located in relation with an *aedes Augusti* in a quadrangular exedra that opens at the end of the minor, central axis. The pattern of the exedra with judicial, administrative, and/or religious functions will be replicated with success in many *basilicae* starting in the early Imperial period, as demonstrated by the cases of Rusellae, Lucus Feroniae, Iuvanum, Saepinum, Herdonia, and Gnathia as discussed by Gros (2001: 270).

Rooms with apsidal or even more simple quadrangular *exedrae*, very common annexes inside the basilica starting from the early Imperial period, were used as *tribunalia* or as traditional curia (Balty 1991), but, as shown by the Vitruvian basilica with its *aedes Augusti*, they could include inside statues of dynasts ideally destined to protect and guarantee the correct execution of administrative and judiciary activities (cf. also the statuary groups of the *basilicae* of Velleia, Otricoli, and Bologna).

"The basilica is provided with an apse defined as a *tribunal*, a curia, and a sanctuary of Augustus at the same time, it is probably the monument which architecture expresses more effectively compared to others the new hierarchy of functions imposed by the political structure at the beginning of the Imperial period. No other composition allows us to appreciate better the sense of the evolution of power that took place between the end of the Republic and the beginning of the Empire; the consensus organization that implied an institutional and urban relationship between the sacred and the political at the beginning is now overcome by a subordination of the judiciary to the sacred, where the sacred assumes the forms of the Imperial cult [. . .] This takeover of judiciary (*tribunal*) and administrative (curia) functions under the aegis of power is typical of the monarchical drift of a system in which the local autonomies traditionally recognized by the citizen status have the right to exist only in a restricted and symbolically controlled framework . . . ." (Gros 2001: 296–7).

In the meantime, from the final decades of the first century BCE, the *basilicae* that bordered the Forum Romanum were also linked with more or less radical projects dedicated to the Imperial family and their glorification. The Basilica Aemilia, the only one among the more ancient Roman *basilicae* to survive in any measure, which for centuries had celebrated the name of the famous Republican *gens*, had a two level arcade dedicated to Caius and Lucius Caesar added on its facade facing the square in front of the *tabernae novae* (14–2 BCE) (Coarelli 1985: 173–89). This construction replaced arcades that were already present from the previous chronological phases (Coarelli 1985: 201–9). An even more decisive action took place on the southern side of the Forum Romanum that had been partially occupied by the Basilica Sempronia since 169 BCE. It was now removed and replaced by Basilica Iulia, started by Julius Caesar and completed by Augustus; it was thereupon destroyed by fire almost immediately and was therefore rebuilt and rededicated to the emperor's adopted children (12 CE).

The planimetric organization of these two, exceptional urban *basilicae*, numbered among the most beautiful buildings ever built in Rome, was similar and, in clearly emphatic forms, also repeated the common pattern of the basilica type: a wide central room with a major height (*spatium medium*), surrounded by one or more aisles on which could stand galleries or an ambulatory and anticipated by a facade or *porticus* opening toward the forum's square. As building types became progressively more monumental during the Imperial period, an even more radical application of this tendency may be observed in the Basilica Ulpia of the Forum of Trajan (106–113 CE), which was, at the time, the largest basilica ever built with 8500 m^2 of covered space and five naves (Fig. 1). The main novelty of the Basilica Ulpia is represented by the presence of two apses at the nave's sides, and this pattern will have great fortune into the realization or renovation of some important peripheral *basilicae*, mostly in Africa (e.g., Aquileia, Augusta Raurica, Leptis Magna, Bulla Regia, Sabratha, Volubilis) (Gros 2001: 282–7).

If, as observed, in Rome and in the urban centers of the western Mediterranean, a strict relationship existed between the basilica and the *porticus* (Nünnerich-Asmus 1994), this relationship is not well attested in the eastern provinces of

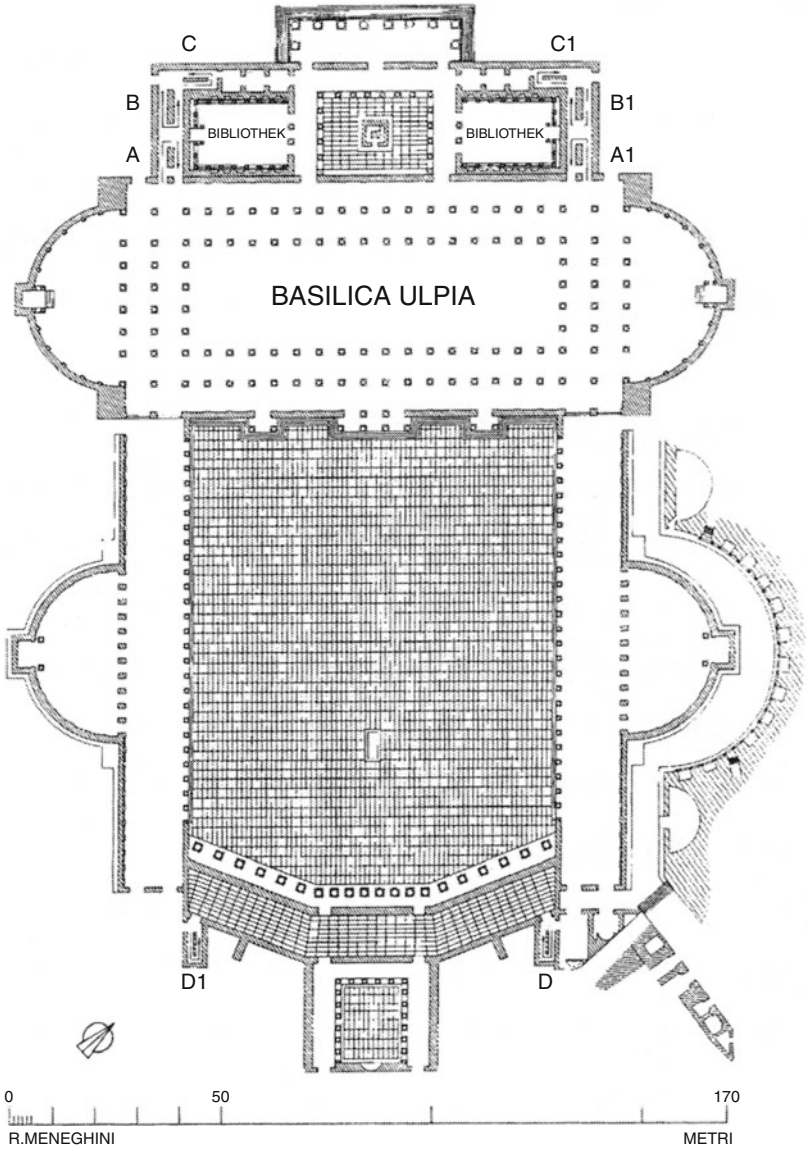

Basilica in Classical Archaeology, Fig. 1 The Basilica Ulpia in the Forum of Trajan. (From Gros and Torelli 2007: 227, Fig. 121, with kind permission)

the Roman empire. As a matter of fact, considering, for example, the plans of the *basilicae* of Ephesus and Smyrna, it is difficult to formally distinguish them from the numerous, long *stoai* that usually bordered the civic *agorai*. On the other hand, the three *basilicae* of the *agora* of Corinth, a *colonia libertinorum* that became capital of the Roman province of Achaea under Augustus, are linked to the Western rules.

A "normal" pattern that, applied also to the *basilicae* of other provincial capitals such as Tarragona and Carthage, will have a long life in the West, partially transformed under the influence of the architecture of public baths – *basilicae thermarum* are also well known – and by the need for dynastic propaganda implemented with more and more daring and emphatic forms. In Rome the Basilica of Maxentius (or Basilica Nova) was completed by Constantine I. The great nave, covered by three cross vaults, does not adopt the usual side aisles with columns, but rather employs a system of three large rooms per side interconnected and covered by mighty barrel vaults, according to construction indications that

resemble closely the colossal rooms of the Imperial baths. The long central room, whose rhythm was quite different from the side rooms, was focused at its western side on an apse that hosted a colossal acrolithic statue of the emperor as Zeus enthroned (the fragments of which are now housed in the Palazzo dei Conservatori of the Capitoline Museums in Rome). This statue, god on earth with his gaze cast *instinctu divinitatis* toward the sky, together with analogous *simulacra* and apses, must have contributed to select the basilica as the ideal building type to celebrate the Christian god as well.

Cross-References

- ▶ Agora in the Greek World
- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman
- ▶ Forum
- ▶ Imperial Cult, Roman
- ▶ Romanization
- ▶ Stoa
- ▶ Topography of Rome

References

Balty, J.-C. 1991. Curia Ordinis. *Recherches d'architecture et d'urbanisme antiques sur les curies provinciales du monde romain*. Brussels: Académie Royale de Belgique.

Brown, F.E., E.H. Richardson, and L. Richardson Jr. 1993. *Cosa III. The buildings of the forum*, Memoirs of the American academy in Rome. University Park: The Pennsylvania State University Press.

Coarelli, F. 1985. *Il Foro Romano. Periodo repubblicano e augusteo*. Rome: Quasar.

David, J.M. 1983. Le tribunal dans la basilique. Evolution fonctionelle et symbolique de la République à l'Empire. In *Architecture et société: de l'archaïsme grec à la fin de la République romaine: actes du Colloque international*, Rome, 2–4 décembre 1980, 219–241. Rome: École française de Rome.

Gros, P. 1984. La basilique de forum selon Vitruve. La norme et l'expérimentation. In *Bauplanung und Bautheorie der Antike: Bericht über ein Kolloquium veranstaltet vom Architekturreferat des Deutschen Archäologischen Institutes mit Unterstützung der Stiftung Volkswagenwerk in Berlin vom 16.11. bis 18.11.1983*, 49–69. Berlin: Wasmuth.

Gros, P. 2001. *L'architettura romana. Dagli inizi del III secolo a. C. alla fine dell'alto Impero* (trans: Guidobaldi, M. P.). Milan: Longanesi.

Gros, P. 2003. Basilica sous le Haut-Empire. Ambiguïtés du mot, du type et de la fonction. *BABesch* 78: 191–204.

Gros, P. 2004. La basilique dans la maison des notables. In *Autocélébration des élites locales dans le monde romain. Contexte, textes, images (IIe s. av. J.-C. - IIIe s. ap. J.-C.)*, ed. M. Cébeillac-Gervasoni, 311–328. Clermont-Ferrand: Centre de Recherches sur les Civilitations Antiques.

Gros, P., and M. Torelli. 2007. *Storia dell'urbanistica. Il mondo romano*. Rome-Bari: Laterza.

Nünnerich-Asmus, A. 1994. *Basilika und Portikus. Die Architektur der Säulenhallen als Ausdruck gewandelter Urbanität in später Republik und früher Kaiserzeit*. Köln: Böhlau.

Ohr, K. 1991. *Die Basilika in Pompeji*. Berlin/New York: Walter de Gruyter.

Wilson, R.J.A. 2005. On the origin of the Roman civic basilica. The Egyptian connection. In *Omni pede stare. Saggi architettonici e circumvesuviani in memoriam Jos de Waele*, ed. S. Mols and E.M. Moormann, 128–139. Naples: Electa.

Bass III, William M.

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Basic Biographical Information

Education and Professorships

Dr. William "Bill" Bass (Fig. 1) was born in 1928 and raised in Virginia, receiving a B.A. in Psychology from the University of Virginia and his MS in Anthropology from the University of Kentucky. He had already earned two university teaching positions in departments of anthropology a year and a half prior to completion of his doctorate from the University of Pennsylvania in 1961. These appointments were Instructorships at the Universities of Nebraska and Kansas. Bass's graduate mentors, Drs. Charles Snow and Wilton Krogman, heavily influenced him throughout his career. With the Ph.D., he earned Assistant, Associate, and full Professorships

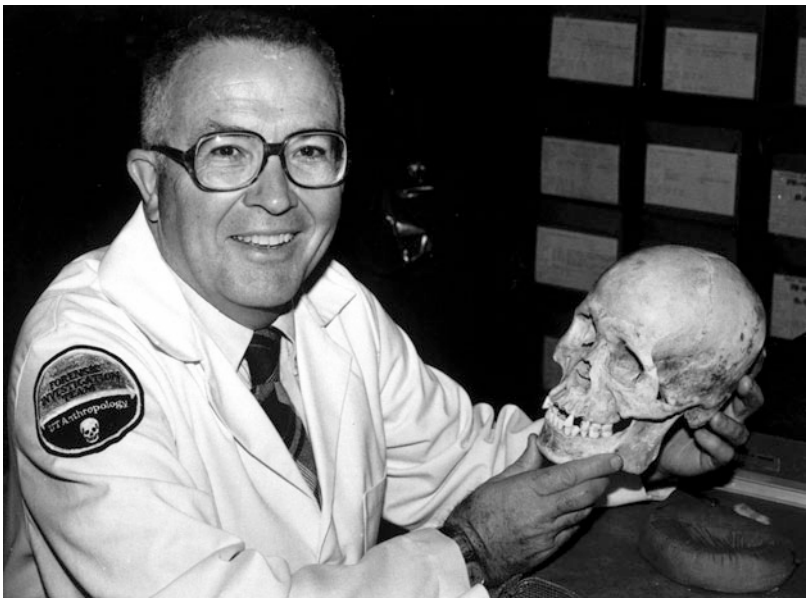

Bass III, William M., Fig. 1 Dr. William M. Bass, III, in the Human Osteology Laboratory at the University of Tennessee, Knoxville, c. 1978

during his tenure at Kansas from 1961 to 1971. He came to the University of Tennessee in 1971 to head the Department of Anthropology and develop a graduate program, remaining chairperson until 1992. Bass became Professor Emeritus in 1998, after 6 years as Professor and Director of the Forensic Anthropology Center.

Major Accomplishments

Bioarchaeology

Dr. Bass guided his student excavation crews during the summers of 1956 through 1959 pioneering the formulation of prehistoric Plains mortuary site archaeology. As the physical anthropologist for the Smithsonian Institution's River Basin Survey, Bass and his students excavated numerous cemetery sites, chiefly in South Dakota at Sully, a protohistoric Extended Coalescent site, Mobridge; a protohistoric Postcontact Coalescent, Le Beau phase site; and Leavenworth, a historic Arikara site, uncovering hundreds of burials that produced thousands of human skeletons in exquisite states of bone and dental preservation. From 1961 until 1970, Bass was field director for the National Science Foundation and National Geographic Society that serially funded field excavations of prehistoric skeletal remains from the Northern and Central Plains region, particularly, South Dakota.

Half a century of graduate students from Kansas and Tennessee and numerous researchers studied these pristine skeletal collections creating data sets and quantitative and qualitative methods and techniques to answer questions about the Plains people's prehistoric lifeways, from demography to pathology and warfare. Those students, Douglas Ubelaker, Walter Birkby, Richard Jantz, Pat Willey, and Ted Rathbun, to name a few, all continued studying becoming professors of human skeletal biology in both bioarchaeological and forensic contexts. In 1994, Douglas Owsley and Richard Jantz dedicated to Bass an exciting volume, *Skeletal Biology in the Great Plains*, culminating much of these results.

Dr. Bass's interest in bioarchaeology continued at the University of Tennessee where in the late 1970s he and Professor Walter Klippel directed, with US National Park Service funding, the excavation of a large Mississippian cemetery at the Averbuch site in central Tennessee. Similar to the Plains skeletal series, the Averbuch remains of nearly 1000 skeletons have provided a research base for numerous theses, dissertations, and research articles. A book that Bass initiated during

his tenure at Kansas, *Human Osteology, A Laboratory and Field Manual*, now in its 5th edition (Bass 2005), has served as a cornerstone text in the teaching of human osteology at both undergraduate and graduate levels.

Forensic Anthropology

Dr. Bass's initial exposure to forensic anthropology was with Dr. Charles Snow making a positive identification from a burned body, and Drs. Bass and Krogman are the only anthropologists who have examined the remains of the Lindbergh baby. The victim was the 20-month-old son of famed trans-Atlantic aviator Charles A. Lindbergh and his author wife, Anne Morrow Lindbergh. The child was kidnapped from the family home in 1932, and skeletal remains were discovered several months later.

These mentors sparked an interest that Bass formally developed into a graduate curriculum at the Universities of Kansas and Tennessee. While he performed human identification services in Kansas, a near, full-time shift of interest to forensic anthropology occurred when he became Head of Anthropology at the University of Tennessee. During this transition, Bass realized that academic departments of physical anthropology were producing new professors more rapidly than university positions could support. He also noticed an ever-increasing reliance among the pathologists, medical examiners, and coroners he was consulting with, for a resource with expertise in forensic osteology.

During his first year in Tennessee, Dr. Bass was exposed to several cases where the remains were neither skeletal nor fresh. This contrasted to his work in Kansas where most remains were skeletal. In 1977, the examination of Confederate Civil War Colonel William Shy, a casualty from the 1864 Battle of Nashville (Bass 1997), made a profound impression on Bass; science had no idea how long it took for soft tissues to decompose. Bass turned his research energy to studying soft tissue decomposition, the process of skeletonization, and requested an outdoor laboratory to document the process. By 1980, he began in earnest witnessing decomposition events firsthand with bodies donated from medical examiners. Time since death estimation became a steadfast research focus of a fledgling crop of Bass's graduate students dedicated to understanding this process.

The dual reputation of an engaging and theatrical teaching presence and a burgeoning avant-garde research program deciphering the stages in human decomposition combined to the granting of the prestigious award of National Professor of the Year in 1985 by The Council for Advancement and Support of Education. Subsequent to that recognition, Bass created the Forensic Anthropology Center, an endowed research program in the Department of Anthropology focusing on research in all realms of forensic anthropology, including archaeology and other diverse components of victim decomposition and scene dynamics.

As Dr. Bass's expertise and reputation in understanding decomposition strengthened because of his outdoor laboratory observations at the research "facility," he was summoned to examine more cases and venture estimations of time since death for medicolegal testimony. This prompted more cases, more research, and more students. Virtually everything we now understand about the entomological foundations of decomposition originated from studies initiated at Bass's facility by him and his students. Besides a comprehensive understanding of how temperature guides gross decomposition events, soft tissue histology from organ biopsy has been examined during the decomposition process along with soil and odor biochemistry and situational scenarios with burial, body position, clothing, coverings, fabric variety, trace evidence, cadaver dog exposure, and water submersion. In 1994, a symposium in honor of Dr. Bass was presented by his students at the American Academy of Forensic Sciences meeting, and the following year those papers were published in a special volume (see "References").

Cross-References

► Bioarchaeology: Definition
► Ethics and Human Remains

▶ Forensic Anthropology: Definition
▶ Human Remains in Museums
▶ Human Skeletal Remains: Identification of Individuals
▶ North American Plains: Geography and Culture
▶ Skeletal Biology: Definition
▶ Taphonomy in Bioarchaeology and Human Osteology
▶ Time Since Death in Bioarchaeology and Human Osteology

References

Bass, W. 1997. Outdoor decomposition rates in Tennessee. In *Forensic taphonomy, the postmortem fate of human remains*, ed. W.D. Haglund and H.M. Sorg, 181–186. Boca Raton: CRC Press.

Bass, W. 2005. *Human osteology, a laboratory and field manual*. 5th ed. Columbia: Missouri Archeological Society.

Further Readings

Owsley, D.W., and R.L. Jantz. 1994. *Skeletal biology in the Great Plains – migration, warfare, health and subsistence*. Washington: Smithsonian Institution Press.

Willey, P., and R. Jantz. 1995. Symposium: Papers honoring William M. Bass, Ph.D., by his students. *Journal of Forensic Sciences* 40: 727–789.

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Basic Biographical Information

George F. Bass was born in Columbia, South Carolina, on 9 December 1932. He graduated from The Johns Hopkins University in 1955 with an M.A. in Near Eastern archaeology and attended the American School of Classical Studies at Athens, Greece, between 1955 and 1957. During that time he participated in preclassical excavations at Lerna in Greece and Gordion in Turkey. After serving in the US Army as a lieutenant in South Korea (1957–1959), he began doctoral studies in classical archaeology at the University of Pennsylvania.

In 1960, at the request of his department chairman, Rodney Young, Bass learned to dive prior to excavating a Bronze Age shipwreck of around 1200 BCE reported by journalist Peter Throckmorton off Cape Gelidonya, Turkey. That summer, with Throckmorton, Bass directed the excavation of the wreck, the first ancient wreck excavated in its entirety on the seabed and the first excavated and published by a diving archaeologist. With this excavation, Bass set the example for future underwater archaeological research by demonstrating that shipwrecks could be recorded and excavated to the same rigorous archaeological standards applied to terrestrial sites. Based on the ship's cargo of scrap bronze, and copper and tin ingots, Bass concluded that the ship was Canaanite in origin and that the role of Bronze Age Near Eastern seafarers had gone mostly unnoticed because their trade goods consisted primarily of raw materials, which left no trace in the archaeological record, because on arrival they were soon manufactured into artifacts characteristic of the importing cultures – a view now widely accepted, but radical for its time.

While excavating a seventh-century CE Byzantine wreck (1961–1964) and a fourth-century CE Late Roman wreck (1967–1969) at Yassıada, Turkey, Bass implemented new techniques and tools, including an underwater telephone booth, a submersible decompression chamber without surface support, and a method of mapping shipwrecks by stereophotogrammetry. In 1964, he launched the two-person *Asherah*, the first commercially built research submersible in the United States.

In 1964, Bass received his doctorate from the University of Pennsylvania and joined its faculty. In 1967, Bass's team was the first to locate an ancient shipwreck, with side-scan sonar, a second or first century BCE Hellenistic wreck near Yalıkavak, Turkey. He assisted the excavations of a Bronze Age city on Santorini, Greece, in 1968; spent a sabbatical year at the University of Cambridge (1969–1970); and in 1971 excavated a preclassical site in southern Italy, his last terrestrial excavation.

In 1973, Bass resigned from the University of Pennsylvania to form an institution devoted to the exploration and study of underwater cultural heritage, the American Institute of Nautical Archaeology (AINA). AINA's first field project was a Turkish-coastal survey that located a dozen ancient shipwrecks. In 1976, Bass affiliated AINA with Texas A&M University, which started a graduate program in nautical archaeology, a new branch of archaeology that has achieved academic recognition largely through his and his colleagues' work. A Distinguished Professor Emeritus at Texas A&M since 2000, Bass directed the Nautical Archaeology Program (NAP) until 1993. AINA – renamed the Institute of Nautical Archaeology (INA) in 1979 – became world-renowned by conducting underwater research on four continents. In 2000, INA added a research and conservation center in Bodrum, Turkey.

In the 1970s, Bass initiated the excavations of two shipwrecks of the American War of Independence: the American privateer *Defence* in Penobscot Bay, Maine, and the British "Cornwallis Cave Wreck" in the York River, Virginia, before turning the excavations over to other scholars. He was no less active in the Caribbean, initiating surveys and excavations in Jamaica and the Turks and the Caicos Islands, all of which he turned over to colleagues and students.

Between 1977 and 1979, Bass excavated an eleventh-century CE shipwreck at Serçe Limanı, Turkey, which was then the earliest known wooden hull built according to modern construction methods. In 1979, INA purchased the 65-ft, steel-hulled *Virazon*, which Bass had taken to Turkey on loan from the US Navy in 1964, and outfitted it with a recompression chamber and equipment for underwater surveys and excavations.

In 1984, Bass began the deepest large-scale excavation ever conducted under water, of a Bronze Age ship lost around 1300 BCE at Uluburun, Turkey. Its cargo of raw materials and personal possessions provided further evidence for Bass' theory of Bronze Age Near Eastern traders that he had proposed in his book on the Cape Gelidonya wreck. In 1985, Bass turned over the Uluburun excavation to another of his students.

Bass codirected with former students the excavations of the fifth-century BCE Tektaş Burnu wreck (1999–2001) and the sixth-century BCE Pabuç Burnu wreck (2002–2003) in Turkey. During that time, INA acquired a two-person submersible of revolutionary design, *Carolyn*, and built a 45-ft catamaran to support it in its successful surveys.

Major Accomplishments

Bass has been widely recognized for his significant achievements and contributions to the field of nautical archaeology. He has been awarded the Archaeological Institute of America's Gold Medal for Distinguished Archaeological Achievement (1986), the Explorers Club's Lowell Thomas Award (1986), the National Geographic Society's La Gorce Gold Medal (1979) and its Centennial Award (1988), the J.C. Harrington Medal from The Society for Historical Archaeology (1999), and the Historical Diving Society's Pioneer Award (2006). In 2002, President George W. Bush presented Bass with the National Medal of Science. The Archaeological Institute of America established a lecture series in his honor and presented him with the Bandelier Award for Service to Archaeology (2011); he was elected a fellow of the American Academy of Arts and Sciences in 2012. Bass received honorary doctorates from Boğaziçi University in Istanbul (1987) and the University of Liverpool (1998).

Bass has written, coauthored, and edited eleven books; published more than 200 scholarly and popular articles; and lectured around the world. His books include *Archaeology Under Water* (1966), *A History of Seafaring Based on Underwater Archaeology* (1973), *Archaeology Beneath the Sea* (1975), *Yassı Ada I: A Seventh-Century Byzantine Shipwreck* (1982), *Ships and Shipwrecks of the Americas* (1988), *Beneath the Seven Seas: Adventures with the Institute of Nautical Archaeology* (2005), *Serçe Limanı* I: *An Eleventh-Century Shipwreck* (2004), *Serçe Limanı* II: *The Glass of an Eleventh-Century Shipwreck* (2009), and *Archaeologist Beneath the Sea* (2012).

Cross-References

- ▶ Frost, Honor
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Throckmorton, Peter

References

Bass, G.F. 1966. *Archaeology under water*. London/New York: Thames & Hudson/Praeger.

Bass, G.F. 1973. *A history of seafaring based on underwater archaeology*. New York: Walker.

Bass, G.F. 1975. *Archaeology beneath the sea*. New York: Walker.

Bass, G.F. 1982. *Yassı Ada I: A seventh-century Byzantine shipwreck*. College Station: Texas A&M University Press.

Bass, G.F. 1988. *Ships and shipwrecks of the Americas*. New York: Thames and Hudson.

Bass, G.F. 2004. *Serçe Limanı I: An eleventh-century shipwreck*. College Station: Institute of Nautical Archaeology, Texas A&M University Press.

Bass, G.F. 2005. *Beneath the Seven Seas: Adventures with the Institute of Nautical Archaeology*. London: Thames & Hudson.

Bass, G.F. 2009. *Serçe Limanı II: The glass of an eleventh-century shipwreck*. College Station: Institute of Nautical Archaeology, Texas A&M University Press.

Bass, G.F. 2012. *Archaeologist beneath the sea*. Istanbul: Boyut.

Bates, William Brian (Badger)

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Basic Biographical Information

William Brian (aka "Badger") Bates was born in 1947 at Wilcannia, New South Wales (NSW). His mother Emily Clark (circa 1925) was the youngest daughter of Annie Moysey, a Kurnu Paakantyi matriarch from the Louth area. His stepfather Gilbert Bates was from Yancannia in the Mutawintji area, and his biological father was Mick "Stinger" Hornell, a non-Indigenous man from White Cliffs, NSW. Bates is an elder of the Paakantyi group from the Paaka or Darling River between Wentworth and Bourke. His closest association is with the Kurnu Paakantyi country between Wilcannia and Bourke including the Darling and Warrego River junction, the lower Paroo River, and Mutawintji. He was raised by his extended family, and his main cultural educator was grandmother Granny Moysey, with whom he traveled his country, learning language, history, and culture. At the age of 8, his grandmother began to teach him how to carve emu eggs and make wooden artifacts which later became part of his artistic repertoire.

He worked as an Aboriginal sites officer with the National Parks and Wildlife Service, Broken Hill, NSW, for 22 years (1983–2005) until the age of 59, when he retired to focus on art and his role as a cultural heritage advisor full-time. Badger worked with many Australian archaeologists including Peter Clark and Allen Thorne (Mungo National Park); Dan Witter, Jeanette Hope, Harvey Johnson, and Sarah Martin (National Parks Regional Archaeologists); Colin Pardoe (Lake Victoria project); Ben Gunn (Mutawintji rock art projects); as well as Simon Holdaway and Trish Fanning on the Western NSW Archaeological Project. Badger's cultural knowledge was vital for understanding Australian archaeology particularly, the process for cooking in heat-retainer ovens and eating marrow from kangaroo tail cooked in ashes for which archaeologists began to realize why kangaroo bones were broken into small pieces in some sites. Badger has attended and spoken at many national and international conferences, including ICOMOS and Indigenous Land Conferences where he presented papers in Mutawintji. He continues to campaign for more substantial involvement of Aboriginal people in the management of National Parks and Reserves throughout Western NSW.

Bates is regarded as both a traditional and contemporary Indigenous artist who is well known nationally for his carving and linoprint. Bates works in a variety of media including wood, stone, lino, metal, and found objects and produces themes that include anthropological, archaeological, and political references associated

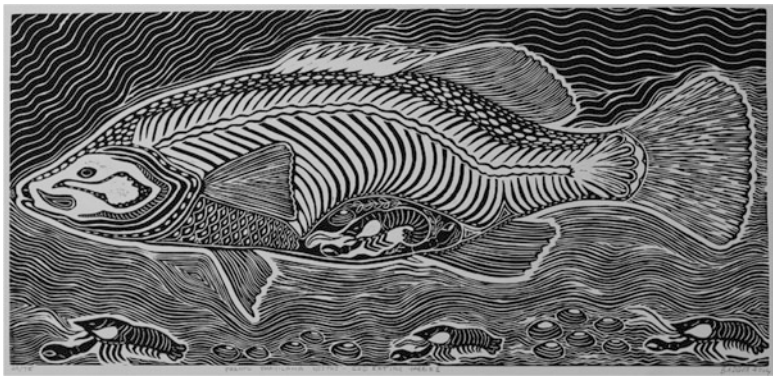

Bates, William Brian (Badger), Fig. 1 Parntu Thayilana Wiithi – Cod Eating Yabbies, linocut print (2004)

with his cultural attachment to the Darling, Lower Paroo, and Lower Warrego Rivers. His artwork is an extension of Indigenous oral traditions and in his work shares important knowledge about ceremonial and mythological places, traditional lifeways, stories about the ancestral spirits, as well as contemporary issues such as the degradation of the Darling River. As an art educator, Bates has held several roles while teaching linocut, sculpture, and carving including TAFE lecturer at Wilcannia; outback field trip mentor for the College of Fine Arts, University of New South Wales; artist's residency at Wilcannia Arts Community in 2006 and 2007; and mentor for the River Red Gum art project, NSW, in 2011.

Bates has been heavily involved in activism, education, archaeology, native title, cultural heritage management, and water issues in the Murray-Darling Basin. He successfully campaigned on behalf of Indigenous land rights and the protection of significant sites against unacceptable management, spoilage by mining, agricultural practices, and urban expansion. This included the Mutawintji National Park hand back and the recent largest native title claim in NSW for the Barkandji people (Figs. 1, 2, 3, and 4).

Bates, William Brian (Badger), Fig. 2 Stone Sculpture – Stolen Generations Memorial, Mt. Annan, Sydney, 2007

Major Accomplishments

Contributions to Archaeology and Cultural Heritage in NSW

During his extensive period working as an Aboriginal sites officer for the National Parks and Wildlife Service, NSW, for 22 years (1983–2005), Badger was heavily involved in Indigenous cultural heritage management and archaeology within this region. This included ongoing protection and management of many cultural and archaeological sites in Western NSW (i.e., burials and middens at Lake Victoria and

Menindee Lakes; rock art sites at Mutawintji, Sturts Meadows, and Peery; and stone quarries, open sites, and stone arrangements at Tibooburra),

Bates, William Brian (Badger), Fig. 3 Badger at a canoe scar cut out by his grandmother Granny Moysey circa 1922, Wilcannia

and he campaigned against unacceptable management practices and lack of Indigenous involvement at Mutawintji National Park between 1983 and 1998. Badger was also instrumental in the controversial return of "Mungo Girl" from ANU, after the Paakantyi, Ngiyampaa, and Muthi Muthi elders sent him to Canberra to support their case in 1992. Furthermore, he was a cultural educator, providing education and training to archaeologists and other community members about the cultural and spiritual dimensions of archaeological materials and country.

More recently, Bates has been involved with native title and issues related to water management in the Murray-Darling Basin area including the Wentworth to Broken Hill water pipeline for which a statement was released by the Barkandji native title holders on Darling River on 26 July 2017. Badger was involved in nearly 18 years of determinations related to the sixth native title determination in New South Wales and the largest – covering 128,000 square kilometers – from Wentworth at the Victorian border to Wanaaring which includes Broken Hill, Wilcannia, Menindee, Pooncarie, and Dareton.

Selected Art Exhibitions

2010. Museum of Contemporary Art, Sydney, "In The Balance: Art for a Changing World," Badger exhibited three linocut prints as part of a group exhibition.

Bates, William Brian (Badger), Fig. 4 Dandry Gorge Sculpture Connections (2009) featured in Artscape *Sculptures in the Scrub*

2009. "Tin Huts, Grilled Fish & Johnny Cakes," solo exhibition of linocut prints, wooden, metal, and found object sculptures. Mildura Regional Gallery.

2009 and touring till 2012. Objects Gallery and Australian Museum exhibition "Menagerie, Animal Sculptures by Aboriginal and Torres Strait Islander Artists." Badger contributed three sculptures.

2008. "Life on the Darling" exhibition of Badger's linocut prints and sculptures, together with paintings of other Wilcannia artists Phillip Bates, Murray Butcher, and Willy Hunter, Australian Museum, Sydney.

2007. "Bubbles on the Surface II" at Monash University Gippsland Campus, solo exhibition featuring Badger's recent linocut prints and wooden sculptures.

2005. Solo exhibition of 20 linocut prints, Hazelhurst Regional Gallery and Arts Centre, Gymea, Sydney.

2004. "Wilcannia Mission School Kid," inaugural solo exhibition for the opening of the relocated Broken Hill Regional Art Gallery, Sully's Building, featuring linocut prints, wood, and steel sculptures.

2009. "Marella: The Hidden Mission." Badger contributed three linocut prints.

2009. Wilcannia Artists in Residence and Community Artists. Exhibition of the eight artists and community participants of the 3-year program. Broken Hill Regional Art Gallery.

2008. "Bubbles on the Surface III" exhibition, Switchback Gallery, Monash Gippsland, featuring work of Badger Bates and Treahna Hamm, with Daphne Wallace and Chrissie Joy Marshall. Badger contributed 23 works, including linocut and photopolymer prints and embossings, wooden sculptures, and metal sculptures.

2006. New England Regional Art Museum (NERAM) exhibition "Bubbles on the Surface I" with Daphne Wallace, focusing on indigenous artists interpreting their association with water, in this case the Narran River and Narran Lake and the Darling River.

2005. "First People: First State," an exhibition of NSW Indigenous Art, NSW Parliament House, Sydney, with other NSW indigenous artists.

Prizes and Awards

Winner of Outback Art Prize in collaboration with artist Jodi Daley (2015)

Finalist in the Inaugural NSW Indigenous Art Prize in 200.

Murdi Paaki Regional Council Citizen of the Year 200.

Murdi Paaki Regional Council Community Service Award in 1997 for Outstanding Services to Heritage & Culture

NSW National Parks Aboriginal Heritage Achievement Award (1993)

Key Publications

Bates, B. & S. Martin. 2010. *Following Granny Moysey: Kurnu Paakantyi Stories from the Darling, Warrego and Paroo Rivers*. Unpublished Community Report.

Sommerville, M. Bates, B. de Carteret, P. Hamm, T. Marshall, C. Martin, S. & D. Wallace. 2008. *Always Unfinished Business of Singing the Country*. Exhibition catalogue for 'Bubbles on the Surface 111'. Victoria: Switchback Gallery.

Somerville, M. Marshall, C. Barker, L. & B. Bates. 2008. Flows and intensities: travelling water stories in inland Australia, in A. Mayne (ed.) *Beyond the Black Stump: Histories of Outback Australia*: 278–305. South Australia: Wakefield Press.

Wallace, D. & B. Bates 2006. *Bubbles on the Surface, Exhibition Catalogue*. Victoria: Monash University.

References

Australian Museum. 2011. Available at: http://australianmuseum.net.au/image/Carved-Emu-Egg-Badger-Bates-Echidna-Side-2/

Bates, B., and S. Martin. 1999. *Badger Bates' oral history*. Report prepared for the National Parks and Wildlife Service NSW.

Beckett, J., L. Hercus, S. Martin, and C. Colyer. 2004. *Mutawintji aboriginal cultural association with Mutawintji national park*. Glebe: Office of the Register, NSW.

Breen, J, and G. Coote. 2015. Largest native title claim in NSW acknowledges Barkandji people in state's far west, Australian Broadcasting Commission (ABC). Available at: http://www.abc.net.au/news/2015-06-16/nsw-largest-native-title-claim-determination/6549180.

Culture Victoria. 2011. *Stories, collections, places*. Available at: http://www.cv.vic.gov.au/stories/badger-bates/
Design and Art Australian Online. 2011. Available at: http://www.daao.org.au/bio/william-brian-badger-bates/
Muller, J. 2015. The story of Badger Bates, a Barkandji man, Australian Broadcasting Commission (ABC) Open. Available at: https://open.abc.net.au/explore/98842

Baths and Bathing, Greek

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Introduction

Across time and in every culture, bathing is a primal necessity, and the bathing techniques and practices of a culture are revealing for its social concepts, values, and ideas. Thus, the analysis of bathing culture in Greek societies from the Archaic through Hellenistic periods (c. sixth to first century BCE) gives intriguing insights into changing attitudes towards key issues such as cleanliness, purity, leisure, collective pleasure, and enjoyment.

The evidence of Greek bathing culture includes three different sources:

1. Bathing images that are mainly represented on vases from sixth to fifth century BCE Athens and also on some South Italian vases of the fourth century BCE. These images show either nude young women or nude young men washing their entire body at high pedestal basins (*louteria*). Genders are strictly separated in these scenes, but bathing is still performed predominantly collectively, in groups of 2–5 persons. This corpus of bathing images is unique in the ancient Mediterranean world, and in its highly standardized imagery also has no parallel in any later cultures. While many aspects of these images are debated, it is obvious that they served primarily to display perfectly beautiful, well-groomed nude bodies in an intriguing variety of poses and did not faithfully depict contemporary bathing practices and facilities. Even as largely fictional representations, the bathing images were clearly shaped by and in turn reinforced and reflected contemporary social concepts of beauty, body, and gender (Kreilinger 2007; Stähli 2013).
2. Literary, epigraphic, and papyrological texts from different regions of the Mediterranean. Some date to the fifth to first centuries BCE and others come from the Roman Imperial period, but cite earlier authors or clearly refer to earlier periods. While the texts are scanty overall and heterogeneous in date, genre, and provenance and offer no detailed description of a visit to Greek baths, they can be exploited for important information about the reputation, use, and management of baths, as well as related topics such as concepts of cleanliness.
3. Archaeological remains of over 200 bathing facilities from the fifth century BCE onwards that are located across the entire Mediterranean. These remains are by far the most important and conclusive evidence for an assessment of Greek bathing culture and will be the main focus in the following.

Definition

Greek societies washed and bathed regularly for ritual-cultic purification, personal hygiene, and relaxation and recreation. While purifying ablutions and simple cleansing required only cold water and could be performed in natural bodies of water or at simple basins, thorough cleansing and particularly relaxing bathing practices entailed the development of purpose-built bathing facilities, including a sophisticated technology to heat water and spaces. How Greek bathing facilities can be clearly distinguished from that of other ancient Mediterranean cultures (e.g., Etruscan, Punic, Roman) is debated; identification is mainly based on date (above all fifth to first century BCE), context (e.g., Greek city, Greek sanctuary, Greek *gymnasion*), and bathing program (see below).

"Greek" bathing facilities were mainly found in three different contexts:

1. Houses and royal palaces, which provided mostly single rooms for individual bathing and rarely more extended bath suites for collective bathing. Bathing forms employed mainly hot water and occasionally hot air to induce sweating. Comprehensive statistics cannot be provided for this vast category, because standards varied widely between different cities. Thus, while in Olynthos (northern Greece, 432–348 BCE) about 27% of the known 86 houses had their own bathing room, in Delos (Cycladic island, 167/166–69 BCE) this standard was only provided in about 14% of the known 89 houses. In general it is obvious that a private purpose-built room for bathing was always a luxury and never became standard in the Greek world (Trümper 2010).
2. Sports facilities (*gymnasia/palaistrai*) that provided single rooms for collective bathing and sometimes more extended bathing facilities. The default bathing form consisted of simple basins for washing with cold water; these were occasionally complemented by pools for collective cold plunge baths. By contrast, hot bathing was only rarely and tentatively introduced and exclusively in the form of sweat baths. Bathing facilities were most likely a standard of sports facilities, because athletes had to clean themselves after training. However, of the 22 Greek *gymnasia* that are partially or fully excavated, only 13 so far have yielded evidence of bathing facilities (Delorme 1960; von den Hoff 2009; Trümper 2013a).
3. Independent publicly accessible baths ("public" baths, *balaneia*) which offered a broad variety from single to multiple collective bathing facilities, always including bathing forms with hot water and, much more rarely, hot air for sweating. By contrast, cold water was used for washing hands and feet and only exceptionally for immersion baths. While the "public" baths were mostly freestanding buildings, they could also be incorporated in larger building complexes, albeit always as self-contained, independently accessible units. Most of them were built in urban or suburban contexts, with the exception of four examples in extraurban sanctuaries, among them most prominently the sanctuary of Zeus in Olympia. Currently, 70 "public" baths are known from the entire Mediterranean, 39 of which were discovered in the southeastern Mediterranean (Libya, Cyprus, and mostly Egypt), 22 in the northeastern Mediterranean (Turkey, and mostly Greece), and nine in the western Mediterranean (mostly Sicily and South Italy) (Trümper 2006, 2009; Lucore and Trümper 2013).

The "public" baths, built exclusively for the purpose of bathing, offer the best evidence for reconstructing the development and crucial changes of bathing standards. House owners strove to emulate the standards and innovations of "public" bathing culture, whereas bathing facilities in *gymnasia* developed largely independently, obviously for sociocultural reasons. According to literary sources, hot baths had a somewhat dubious reputation, at least in fifth and fourth century BCE Athens, because they would destroy the morals and bodies of bathers, most notably young men, who were supposed to devote their day to exercising in the *gymnasion* instead of to idle chatter in the *balaneion* (especially Aristophanes, *Nubes 1046, 1053–1054;* see also Plutarch, *Demetrius 24.2–3;* Athenaeus, *Deipnosophistae 1.18c;* Trümper 2013b).

Historical Background

Literary sources from the second century CE refer to the existence of *balaneia* ("public" baths) in Sybaris (Greek colony in South Italy) at the end of the sixth century BCE (Athenaeus, *Deipnosophistae* 12.518 c). This may be an anachronism, however, because Sybaris was notorious for its wealth and luxurious lifestyle, of which public hot baths obviously constituted an indispensable part for an author of the Roman Imperial period. The earliest archaeological remains date only to the fifth century BCE. The earliest *balaneion* so far was discovered in Athens

outside the city wall near the Dipylon Gate. It has been dated to the period when the city and particularly its fortifications were rebuilt after the Persian wars (after 480/479 BCE). Slightly later, around 400 BCE, the most famous sanctuary of the Greek world, that of Zeus in Olympia, was provided with its first *balaneion* for the convenience of the visitors (see below). At the end of the fifth century BCE, private bathrooms are testified to in some houses, such as the houses of Olynthos, which were, on average, large and well appointed (Trümper 2010).

When cities and sanctuaries were gradually monumentalized and provided with standard building programs from the fourth century BCE onwards, the number of bathing facilities increased. Thus, ten of the 70 *balaneia* were constructed in the fourth century BCE, in Greece, Asia Minor (Turkey), and a Greek colony in France (Marseille). At the same time, *gymnasia* appeared as monumental edifices with simple cold water bathing facilities (Delorme 1960; von den Hoff 2009; Trümper 2013a).

The revolution of Greek bathing culture occurred in the Hellenistic period (end of fourth century to 31 BCE), however, both in terms of quantity and quality. Thus, most of the known *gymnasia* and particularly 59 of the 70 known *balaneia* were built in this period, in settlements all over the Mediterranean. Furthermore, innovative concepts and standards of bathing were introduced in all different urban-architectural contexts (see below). This agrees well with general sociocultural trends of the Hellenistic period, notably a significant increase in the dissemination and refinement of urban culture; a new focus on individual well-being, pleasure, and luxury; and major advances in the fields of science, technology, as well as architecture and urban planning. While most of the Hellenistic societies were affected by these same trends, distinct bathing practices developed in different regions of the Mediterranean. Three different regions can be discerned: the western, northeastern, and southeastern Mediterranean (Trümper 2006, 2009). Regional diversity was most likely due to different traditions, behaviors, and norms in societies that were now often multiethnic and multicultural. For example, Greek settlers that were invited by the new Greek rulers (Ptolemies, 306–31 BCE) to settle in recently conquered Egypt brought their own bathing practices, and Greek *balaneia* appeared all over Egypt from the third century BCE onwards. According to written sources, indigenous people also frequented these Greek baths and may have had significant impact on the development of an idiosyncratic Graeco-Egyptian bathing culture (see below).

Despite the significant changes in bathing culture from the fifth through first century BCE, the important feature of patronage did not alter during this period. Written sources confirm that *balaneia* were predominantly, if not exclusively, privately owned and managed as profitable business investments (e.g., IG 2^3 84, 418/417 BCE; IG 2^2 2495, 335/334 BCE; ID 98, B, 33–34, 377/376–374/373 BCE; Isaeus, *Dikaiogenes* 22–24; Isaeus, *Philoktemon* 33; for references in Ptolemaic papyri, see Préaux 1947: 44). They did not figure among the standard building tasks of cities, such as political-administrative buildings, theaters, and *gymnasia*, nor were they popular targets for generous donors before the first century BCE. Exceptions were probably the few baths in sanctuaries that were under the responsibility and supervision of the respective administrations (see especially the *diagramma* of Andania, IG 5,1 1390, lines 106–111, 91/90 BCE or first century CE). Thus, the "public" aspect of most *balaneia* refers to their accessibility – publicly accessible for entrance fees – and not to their patronage, ownership, or management. By contrast, *gymnasia*, including their bathing facilities, were commonly financed by the cities and were the preferred objectives of private benefactors from the second century BCE onwards.

Key Issues/Current Debates

Greek bathing culture was first studied comprehensively and masterfully by the French scholar René Ginouvès (1962). Although the archaeological evidence has almost doubled since 1962 and research questions have changed significantly, Greek bathing culture did not receive much

attention, particularly in comparison to the more popular Roman equivalent. Instead, it has long been underestimated in its significance, both for the ancient Greek world and in modern scholarship, notably cultural and sociohistorical studies.

This changed only recently, with the reexamination and excavation of numerous Greek baths (e.g., Caulonia, Locri Epizefiri, Morgantina, and Velia in Italy; Hephaistia, Olympia, Pella, and Thessaloniki in Greece; Buto/Tell el-Fara'in, Euhemeria/Quasr el-Banat, Karnak, Kom el-Khamsin, Krokodilopolis/Medinet el-Fayoum, Schedia, Taposiris Magna/Abusir, and Theadelphia/Kharabet Ihrit in Egypt) and with the first international conference dedicated to this topic, which took place in Rome in 2010 (Lucore and Trümper 2013).

Greek baths are now explored as important evidence of sociocultural concepts, practices, and traditions. A key concern is to carefully reconstruct all bathing practices and standards, their social significance, and the technologies and resources they required. Major emphasis is placed on chronological development and regional differences and the political, social, and cultural factors that may have affected and inspired changes and diversity. This reassessment of Greek bathing culture is based on new excavations that employ modern methods and technologies, a critical reevaluation of old excavations, and extensive cross-cultural studies, notably comparisons with societies whose bathing culture is well known and thus may give crucial insights into the sociocultural complexity and intricate connotations of bathing.

Balaneia ("Public" Baths)

Balaneia in the Northeastern Mediterranean

The development of Greek bathing culture can be demonstrated exemplarily in the sanctuary of Zeus in Olympia, which was provided, from about 400 BCE onwards, with a sequence of *balaneia* that were constantly refurbished and modernized. The first *balaneion* ("Older Sitzbath"), built around 400 BCE, included only one bathing form, notably 11 small hip-bathtubs (or sitz bathtubs) for simple cleansing shower baths (Fig. 1). Warm water was poured over the sitting bather with vessels, either by the bather or by an attendant; the used water was then collected in a hemispherical cavity at the bottom of the

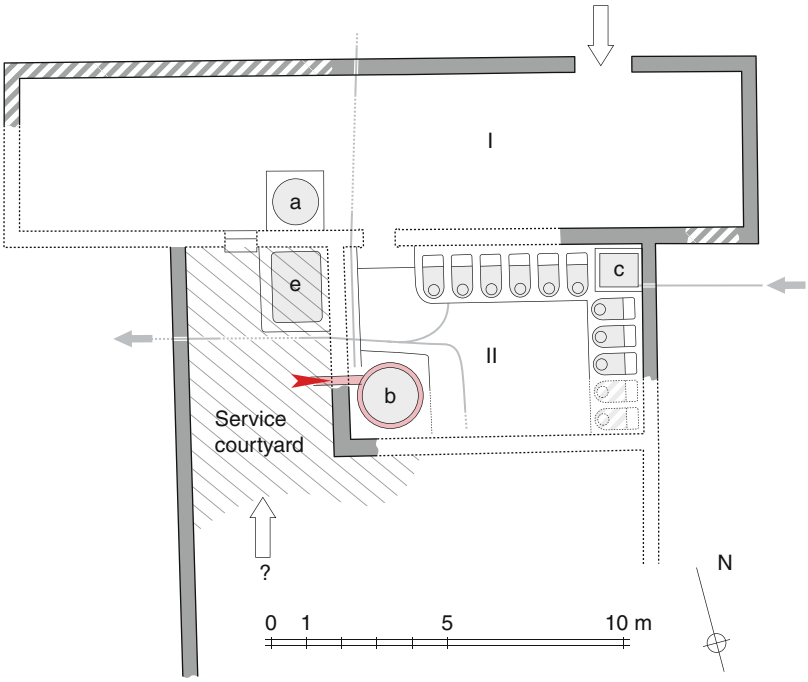

Baths and Bathing, Greek, Fig. 1 Olympia, "Older Sitzbath": plan of the second phase, late fourth century BCE; © Thibaud Fournet. (After Kunze and Schleif 1944: pl. 13)

bathtub and had to be bailed out by hand. While hip-bathtubs were arranged in Olympia along the walls of a rectangular room (II), in other baths round bathing rooms (*tholoi*) predominated. Although the bathing process was performed individually, the lack of walls or screens between bathtubs assured that bathing in a *balaneion* was overall a collective experience. Better preserved baths show that niches were inserted in the walls above bathtubs for storing clothes, bathing utensils, and occasionally oil lamps. Furthermore, bathing rooms were, in general, decorated with waterproof pavements, stucco, and furniture. The Olympian bathroom, probably from the beginning and certainly after a remodeling in the late fourth century BCE, had a cauldron for heating water, which was operated and supplied from an adjacent service courtyard (with water reservoir e). While the function of the large entrance hall (I, with well a) that was taken over from a previous building cannot be safely identified, it may have been used for activities related to bathing (strolling, waiting, light exercise, drinking water supply).

This first bath was replaced by another ("Younger Sitzbath") around 300 BCE (Fig. 2), which provided essentially the same bathing standard as its predecessor, albeit with increased capacity (room III with 20 hip-bathtubs), multifunctional lounges (I, II), and improved service installations. The latter were now located outside the bathing room, but adjacent to it (furnace with boiler in h, water reservoir f) so that hot water was conveniently available through an opening between furnace and bathing room. These key elements – a room with hip-bathtubs and, well separated from this, service facilities for storing and heating water – constituted the standard of all *balaneia* from the fourth century BCE onwards. These baths were simple and mostly functional in design and decoration. Most challenging was the roofing of round rooms, whose interior diameter could be about 11 m (c. 40 hip-bathtubs). In this case, a central support was required, evidence of which in the form of bases was found in several baths (e.g., in Athens: Dipylon Bath, Baths outside the Piraeus and Diochares Gates). Some fourth century BCE baths in Greece, however, had lavish decoration with polychrome figured pebble mosaics in bathrooms or entrance rooms suggesting that this building type had gained in prestige and importance (e.g., Ambrakia; Athens, Bath outside Diochares Gate; Corinth, Centaur Bath; Piraeus, Serangeion Bath). Another innovation of fourth century BCE baths was the

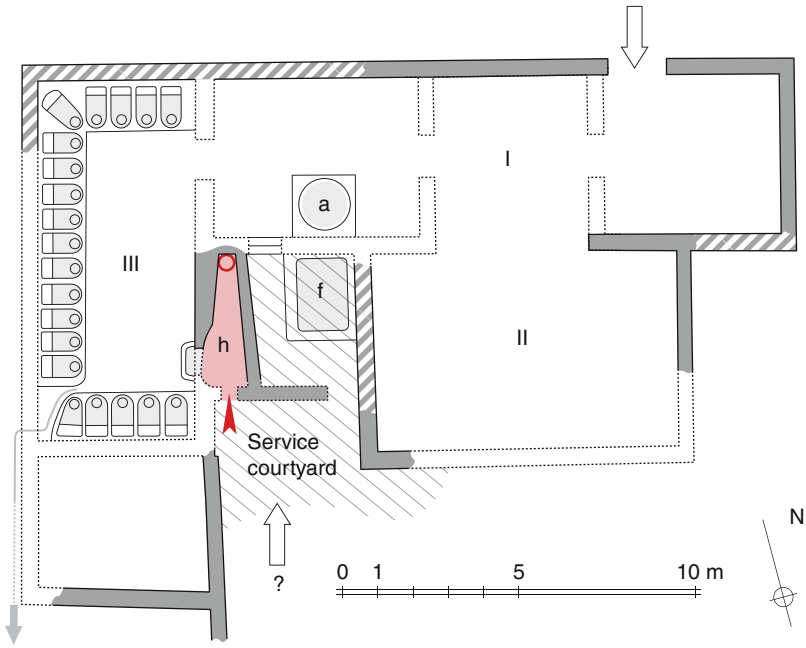

Baths and Bathing, Greek, Fig. 2 Olympia, "Younger Sitzbath": plan, c. 300 BCE; © Thibaud Fournet. (After Kunze and Schleif 1944: pl. 16)

duplication of bathing rooms with hip-bathtubs (mostly two *tholoi*; e.g., Ambrakia; possibly Piraeus, Serangeion Bath), which were most likely designed for use by the different sexes. Written sources testify that women frequented *balaneia* and that gender separation was a major concern. Some papyri from third century BCE Egypt mention a women's *tholos* and possibly also a men's *tholos*, suggesting that baths with double *tholoi* reserved one round bathing room for each of the sexes (Ginouvès 1962: 222–3; Meyer 1992; Trümper 2012). By contrast, if *balaneia* with single bathing rooms were used by both sexes, gender separation could only have been achieved through different bathing hours.

The simple functional *balaneion*, introduced in the fifth century BCE at the latest and consolidated and partially refined in the fourth century BCE, was continuously used through the first century BCE and in some regions even beyond that date. At the same time, a significant change in bathing standards occurred in the Hellenistic period, from the third century BCE onwards, with the introduction of new relaxing bathing forms. Cross-cultural studies on bathing clearly show that two criteria are considered as standard for relaxing bathing: heat and time. This means that a certain amount of time has to be spent in a comfortably warm or even hot environment that consists commonly of water, dry heat, or steam. All relaxing bathing forms also have a physically cleansing component, through the use of water or sweating. Relaxing bathing forms are thus not a real antipode to merely cleansing ones, but include and thereby substitute for them. In Greek bathing culture, the new relaxing bathing forms entailed and required advanced technology, increased monetary expense, and, above all, a collective societal endorsement of leisure, pleasure, and indulgence. They would most likely have enticed people to extend their visits to the baths and would have increased the importance of bathing as a social event.

To return to Olympia, shortly before its abandonment in the first quarter of the second century BCE, the "Younger Sitzbath" was provided with such a new relaxing bathing form, whose nature cannot be safely determined, but which was heated with hot air that circulated in a subterranean channel (hypocaust system) (Fig. 3: IV, i, supplied by new water reservoir g). The successor of this bath ("Late Hellenistic Bath"), built in the second half of the second century BCE, incorporated fully developed modern standards (Fig. 4): a – still predominant – *tholos* with 13 hip-bathtubs (a), two large bathtubs for individual relaxing immersion baths in hot water (c), and a small round room for collective sweat bathing in hot air (b). The two new bathing forms were heated by a sophisticated hypocaust system (e) that also provided hot water for the hip-bathtubs.

Several other baths in Greece offered a similarly complex bathing program, among them the fully excavated example in the sanctuary of Asklepios in Gortys (Peloponnesus) (Ginouvès 1959) (Fig. 5). Although this bath was, probably in the second century BCE, inserted into a preexisting building with a different function, its design represents key elements of the new standard: a clear separation of bathing (A–F, V) and service (W–Z) sections; a lavish colonnaded entrance (*propylon* A); a *tholos* (G) with nine hip-bathtubs; a room (D) with three individual immersion bathtubs; a small round collective sweat bath for about four bathers (E); several multifunctional lounges and a distributive room with benches and various cold water basins (B, C with basins θ and λ, H); a fully developed hypocaust system with a ring-shaped channel for heating water, the relaxing bathing forms and parts of two lounges (B, C); and finally double entrances to the bathing section (A and I, both with statue bases π and ρ; third service entrance to room W) for differentiated use. The archaeological evidence even suggests that bathers could not pass over the hypocaust system (Y) from the distributive room C to the *tholos* G; thus, the two bathing sections were probably entirely independent, just using a common heating system (Y). The nature of this differentiated use cannot be safely determined, but the different circulation patterns may have provided the option to choose between a quick cheaper merely cleansing bath (G–I) versus an extended costlier stay in the relaxing section (A–F, V).

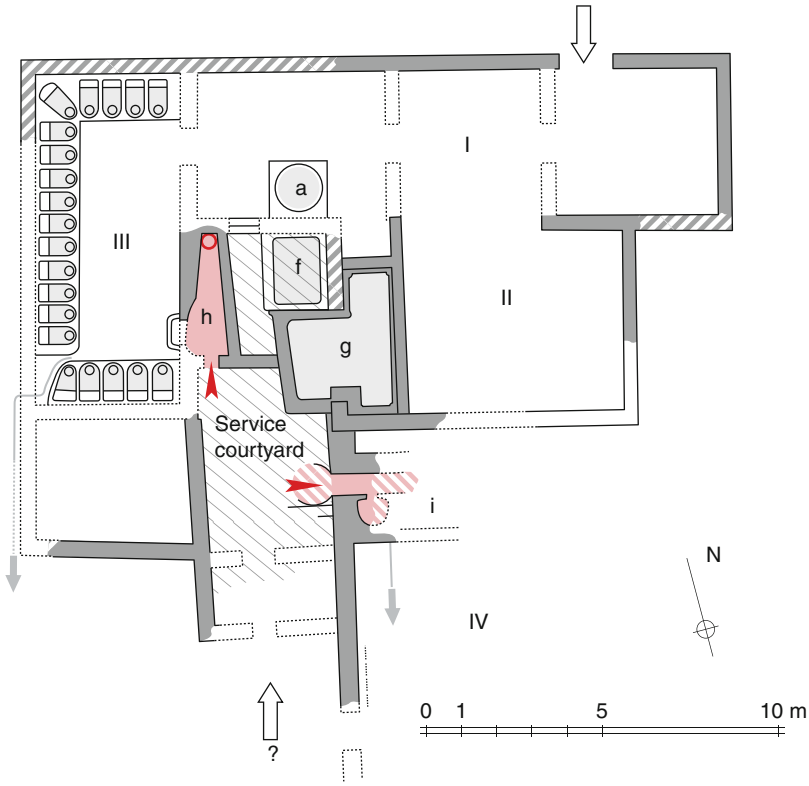

Baths and Bathing, Greek, Fig. 3 Olympia, "Younger Sitzbath": plan, c. early second century BCE; © Thibaud Fournet. (After Kunze and Schleif 1944: pls. 16–17)

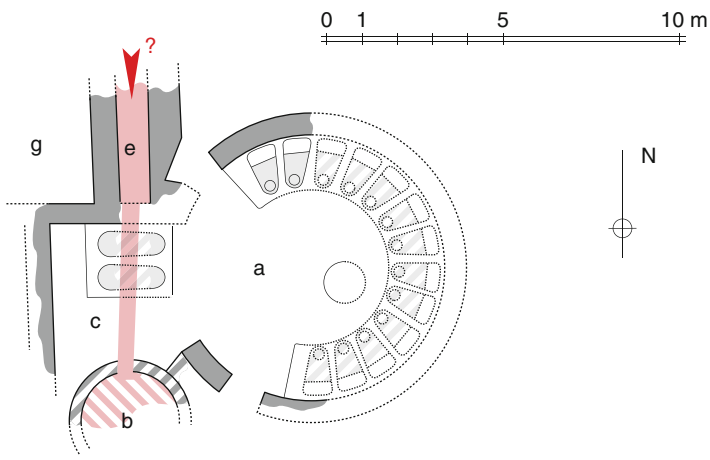

Baths and Bathing, Greek, Fig. 4 Olympia, "Late Hellenistic Bath": plan, second half of second century BCE; © Thibaud Fournet. (After Sinn et al. 2003: 619, Figs. 4–5)

While this bath is located in an urban or suburban sanctuary of the healing god Asklepios, it did not necessarily serve as a specific medical-therapeutic facility. Water was not supplied by a particular mineral spring, and the bathing program has parallels in urban-secular baths. Despite major progress of medicine in the Hellenistic period, neither medical texts nor the archaeological remains of other Asklepios sanctuaries reveal a particular concern with the development of specific therapeutic bathing practices (Flemming 2013). Similarly, general ritual purifying bathing did not require sophisticated *balaneia* with hot bathing forms, but

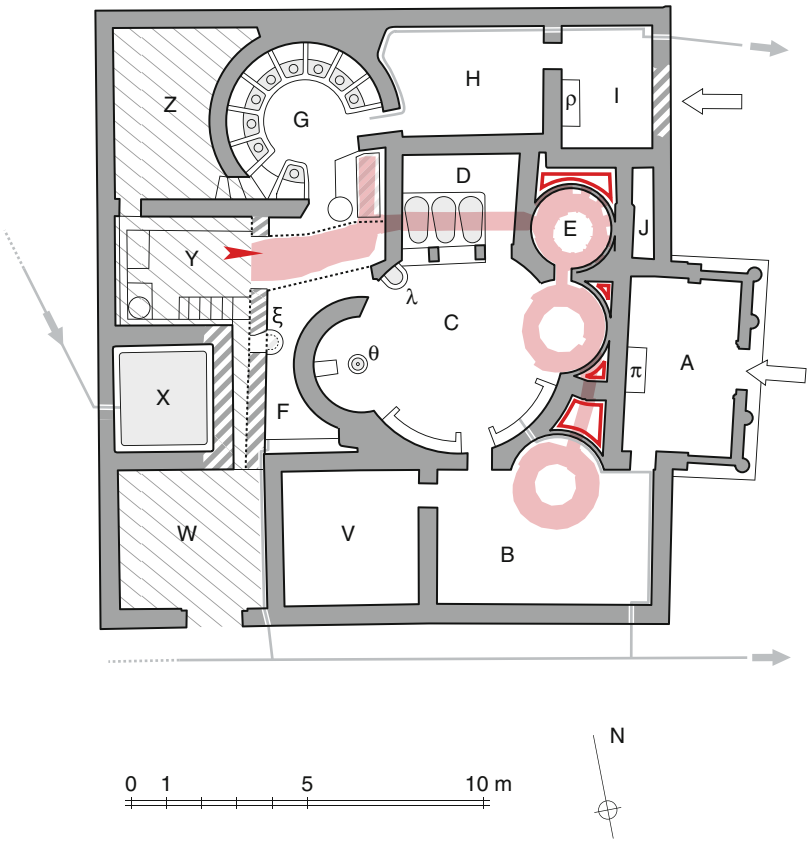

Baths and Bathing, Greek, Fig. 5 Gortys, Bath in the Sanctuary of Asklepios: plan, c. second century BCE; © Thibaud Fournet. (After Ginouvès1959: 165, Fig. 187)

consisted mainly of washing parts of the body (hands, head, and feet) at simple basins with cold water. Therefore, *balaneia* in sanctuaries most likely granted visitors the same cleansing and relaxing bathing experience and convenience as their equivalents in urban-secular contexts (Trümper 2013b).

In the northeastern Mediterranean, the complex refined bath type and its simpler equivalent were used well into the first centuries BCE and CE and then gradually replaced by new bathing standards, notably Roman baths. The sanctuary in Olympia was again among the first sites in Greece to be provided with a fashionable Roman-type bath around 40 BCE ("Greek Hypocaust Bath"). This bath no longer included a cleansing section with hip-bathtubs, but only a large pool for collective relaxing immersion baths in hot water (see below). This pool, as well as the entire bathing room, was now heated by a modern hypocaust system with brick pillars.

Balaneia in the Western Mediterranean

New bathing standards were also introduced in other regions of the Mediterranean in the Hellenistic period, albeit with noticeable differences. The most sophisticated and advanced bathing culture was developed in the western Mediterranean, notably Sicily and South Italy. Most of the nine known baths in this region were built in the mid-third century BCE and abandoned around 200 BCE and included two distinct sections, spatially and conceptually clearly separated. For example, the well-preserved *balaneion* in the Agora of Megara Hyblaea (Sicily) (Fig. 6) had a cleansing section with traditional *tholos* (k, c. 20 hip-bathtubs), two multifunctional rooms with benches (l, m), an entrance from the adjacent street (o?), and a large bottle-shaped furnace for heating water (j). By contrast, the much larger and better appointed relaxing section had its own entrance on the Agora (a), a series of multifunctional

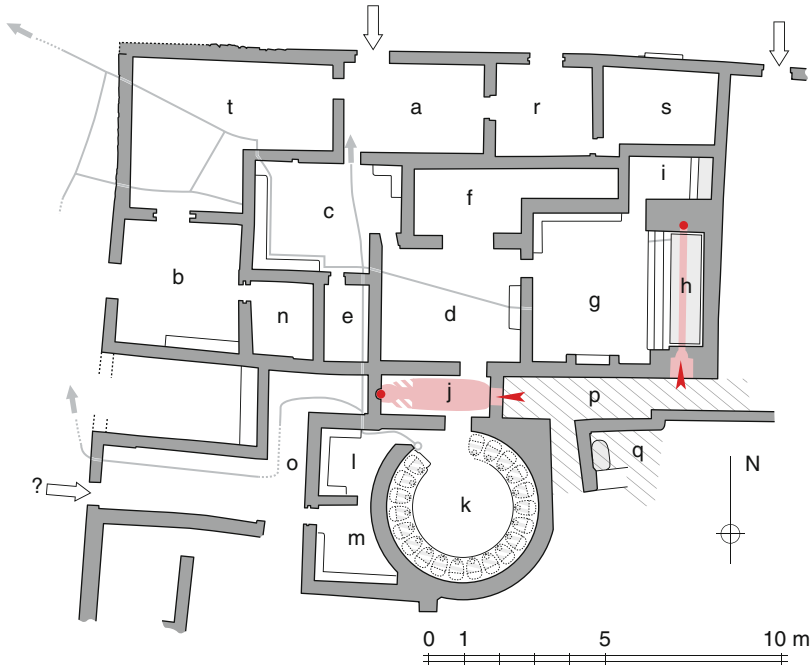

Baths and Bathing, Greek, Fig. 6 Megara Hyblaea, Bath in the Agora: plan, c. mid-third century BCE; © Thibaud Fournet. (After Vallet et al. 1983: 51, Fig. 37)

rooms with (c, d) or without (e, f) benches, and a large bathing room (g) with a bench and a collective immersion pool (h). The latter was heated by its own hypocaust channel to keep the water warm. This large collective heated immersion pool differs significantly from the individual immersion bathtubs in northeastern baths; not only was its construction, operation, and maintenance far more costly, but it promoted above all a truly collective bathing experience, requiring bathers to use the same water and to face potential physical contact.

Both the cleansing and the relaxing sections in the *balaneion* of Megara Hyblaea were served by the same conveniently located service facilities (service courtyard p, well room q). While the central distributive room of the relaxing section (d) also had an access to the bottle-shaped furnace (j), probably for drawing warm water for various basins (in rooms d and g), room j was most likely completely filled by installations for heating water and thus could not be crossed in order to proceed from the relaxing to the cleansing section, and vice versa (cf. the similar situation in the bath of Gortys, see above). Hierarchy was clearly established by size, accessibility, and decoration, both within each section and between the sections. Thus, while all bathing rooms were provided with waterproof mortar pavements, only some of these pavements were decorated with small stone or marble pieces: room g with the immersion pool received the most intricate decoration pattern, followed by room d and *tholos* k, then room f, then room c, and finally, at the bottom of the decoration scale, rooms e, i, l, and m which had simple mortar pavements without any decoration.

It is obvious that the heating systems of these western Greek baths were more advanced than those of their northeastern equivalents, but the precise reconstruction and functioning of the furnaces and hypocaust systems is currently still much debated (Lucore 2013). The large bottle-shaped furnaces may have held large water basins or a series of juxtaposed (metal) cauldrons, heated by hot air from below; the immersion pools may have been supplied by their own hot water boiler or by innovative intricate devices such as a "tortoise" (*testudo*). The latter, so far only known from Roman baths and authors, consisted of a semicylindrical metal container that was situated over the fire in the furnace, on a slightly lower

level than the bottom of the immersion pool. This container was closed at one end and open at the other, towards the immersion pool so that water could circulate constantly between the pool and the hot tortoise and thus be kept warm.

Other groundbreaking technologies were used in and maybe even developed for western Greek baths, most notably vaulting techniques. In the North Baths at Morgantina, the *tholoi* with hip-bathtubs and two rectangular bathing rooms were covered with a dome (diameter 5.75 m) and barrel vaults (spans of 5.00 and 5.00 m), respectively (Lucore 2009, 2013). These vaults were made of interlocking hollow terracotta tubes that were covered with a rough mortar on both sides and on the interior with additional painted plaster. Apart from the stunning aesthetic effect that these innovative vaults must have had on viewers, domed and vaulted roofs also had practical advantages: heat would have spread more evenly and condensation would not have dripped from the ceiling, but run along the curved walls. In the long run, the advance of vaulting techniques that was closely connected to the development of both Greek and, above all, Roman baths would allow the spanning of ever larger, impressive spaces.

Why the patrons and builders of western Greek baths pressed so much ahead in the development of the designs and related technologies of baths in comparison to their peers in the eastern Mediterranean, cannot be safely determined. Western Greek cities prospered in the third century BCE and were centers of inventions in the arts and sciences. This favorable, stimulating cultural and historical climate may well have had an impact on the promotion of the local bathing culture (Lucore 2009).

The western Greek baths shared significant characteristics with early Roman baths, which developed in the early second century BCE at the latest and are currently known from some 17 cities in Italy, France, and Spain. These early Roman baths commonly included only one or two multifunctional entrance rooms or lounges for activities related to bathing (*apodyterium*, *tepidarium*) and a single bathing room with a collective heated immersion pool (*caldarium*) (Tsiolis 2013). Thus, the crucial difference between western Greek and early Roman baths is that the latter entirely abandoned the separate cleansing section with hip-bathtubs.

Currently, the evidence of western Greek baths and early Roman baths is strangely distributed: no city has yielded clear evidence of both a Greek bath and an early Roman bath (second or early first century BCE), with the possible exception of Pompeii. Indeed, the famous Stabian Bath in Pompeii has often been identified as a Greek bath that was transformed into a Roman bath in the second century BCE, but the complex history of this building is much debated and requires critical reassessment. Another recently excavated example, the bath of Fregellae (Latin colony southeast of Rome, 328–125 BCE), provided evidence of two phases (Tsiolis 2013). The bath of the second phase, dated to the early second century BCE, was clearly Roman, but the predecessor from the late third century BCE cannot be fully reconstructed. While it certainly contained a relaxing section with a heated collective immersion pool, the existence of a separate cleansing section cannot be fully excluded – the more so because remains of a bottle-shaped furnace, a characteristic feature of the cleansing section in western Greek baths, have recently been uncovered.

Therefore, the intriguing relationship between Greek and Roman baths cannot yet be fully assessed and reconstructed. It seems only obvious that the western Mediterranean was the "think tank" of bathing culture in the decades around 200 BCE and very much influenced its development in future centuries. Greek baths may have anticipated their Roman equivalents for a short period in the crucial advancement of bathing culture, notably in the development of both collective leisure bathing as a sociocultural concept and the appropriate technological requirements. Alternatively, these innovative features could have been developed simultaneously in different settings, with two different results, notably the rather short-lived western Greek cleansing and relaxing bath type and the more successful early Roman relaxing bath type, which was maintained and refined in the following centuries.

Balaneia in the Southeastern Mediterranean

In contrast to the bathing culture in the northeastern and western Mediterranean, that of the southeastern Mediterranean was more conservative and austere. In southeastern *balaneia*, hip-bathtubs were, from the second century and probably already third century BCE onwards, only complemented by individual immersion bathtubs that were not heated by a hypocaust system, but simply filled with hot water. Arranged mostly in separate rooms in groups of 2–6, the immersion bathtubs were always far outnumbered by the hip-bathtubs, suggesting that cleansing bathing always prevailed (Fig. 7: 1–2, 7). While in about half of all *balaneia*, rooms with hip-bathtubs were duplicated, this almost never occurred for rooms with immersion bathtubs. Thus, relaxing bathing was clearly reserved for a few privileged bathers and possibly even for one of the sexes, notably the male. The *tholos* or *tholoi* commonly constituted the center and focus of the *balaneia* and were surrounded by extended corridor systems and secondary (bathing or service) rooms. Idiosyncratic to southeastern baths, these corridors certainly

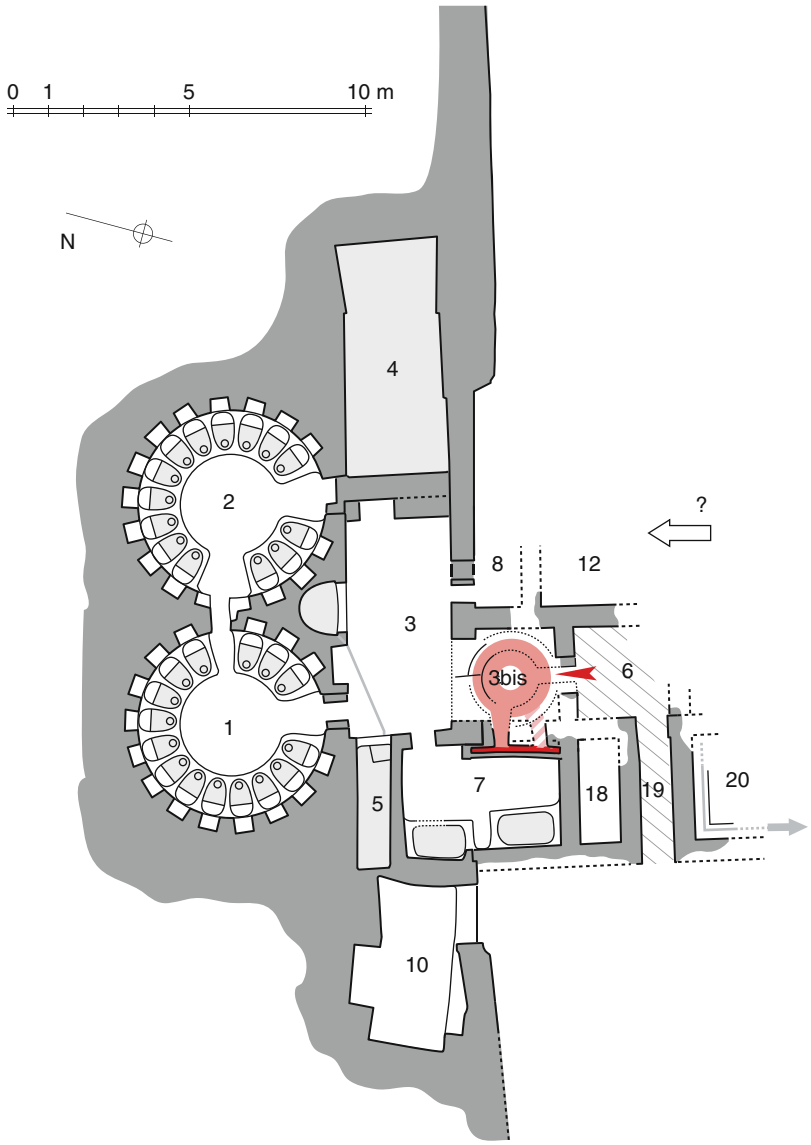

Baths and Bathing, Greek, Fig. 7 Taposiris Magna/Abusir, Bath: plan of the second phase, c. 100 BCE; © Thibaud Fournet & Bérangère Redon. (Fournet and Redon 2013: 245, Fig. 6)

facilitated circulation but may also have served for strolling and as a substitute for multifunctional lounges that were mostly missing in these baths.

Recent research on the Hellenistic bath of Taposiris Magna (northern coast of Egypt, west of Alexandria; Fig. 7) has shown that heating systems of southeastern baths could be far more complex and sophisticated than hitherto assumed (Fournet and Redon 2009, 2013). This bath was partially cut into the rock (rooms 1–5, 10, northern part of room 7) and is therefore exceptionally well preserved. Its heating system (3bis), however, refined in a second phase around 100 BCE, was built in front of the rock-cut parts, close to the *tholoi* with hip-bathtubs (1, 2). While the circular furnace served primarily to heat water for the bathtubs, it also heated adjacent spaces through openings (3) and a heating wall (7). The latter is similar to the wall heating systems of Roman baths, where hot air circulated in "hollow walls." Made of large tiles, the heating wall in Taposiris Magna heated the small relaxation section of the bath (7).

Some southeastern *balaneia* were modernized under Roman rule (after 30 BCE) by transforming *tholoi* into sweat baths or constructing collective cold or hot water pools, but the Greek bathing concept was still astonishingly long-lasting. Thus, Greek baths, with a clear focus on simple cleansing hip-bathtubs, were still used and even constructed in the second century CE, and Roman bathing customs were overall only reluctantly introduced and accepted. This may be one of the reasons why Egypt has yielded more evidence of Greek baths than any other region in the Mediterranean and why the Egyptian baths show significantly more traces of constant repairs and remodeling than their equivalents in other regions. Remarkable also is the distribution of baths which clearly reflects the enormous popularity of public bathing in this country. Thus, even small settlements (e. g., Euhemeria/Quasr el-Banat, Theadelphia/Kharabet Ihrit) were provided with two large public baths, and large cities with an even denser network of such establishments (e.g., in both Buto/Tell el-Fara'in and Krokodilopolis/Medinet el-Fayoum four public baths were found so far).

Sports Facilities *(Gymnasia/Palaistrai)*

While bathing facilities of sports facilities remained largely simple and ascetic for the above-mentioned sociocultural reasons, even they were affected by the dramatic evolution of bathing culture in the Hellenistic period, albeit to a different degree than the *balaneia*. The default athletic bathing form, notably simple bathing rooms with basins for cold water ablutions (*loutron/loutra*), was continuously built and used from the fourth through the first century BCE. Epigraphic sources show that these *loutra* enjoyed a certain popularity and prestige because generous donors paid for their construction and refurbishment from the second century BCE onwards. For example, according to inscriptions, the bathing facilities of the *gymnasion* in Pergamon (Asia Minor/Turkey, capital of the Attalid kingdom), built in the first half of the second century BCE at the expense of King Eumenes II, were improved several times by well-known local citizens, notably in the late second century BCE and again in the mid-first century BCE. Although the building is fully excavated, these improvements cannot be safely identified in the archaeological record, however, and they seem not to have changed the general bathing standard (Trümper 2013a).

In some other *gymnasia*, however, the austere *loutra* were either supplemented or even substituted by extravagant facilities for collective sweat bathing in hot air in the second century BCE. These consisted either of rectangular rooms with barrel vaults (Delos, "Sea Palaestra," and "Gymnasium") or of large round rooms (diameters of 5.90–10.20 m: Assos in Asia Minor/Turkey, Eretria and Thera in Greece, Solunto and possibly Akrai in Sicily) (Trümper 2008: 250–75, 2013a). For example, the *gymnasion* of Eretria (Euboea/Greece, Fig. 8) was built at the end of the fourth century BCE with a simple *loutron* (B) and remodeled in the second half of the second century BCE to include a large round sweat bath (G). These round rooms are well known and were much debated for a long time, and only recent research has ascertained that both the challenging roofing (with conic or domed roofs) and the heating (most likely with hot stones or braziers) could be realistically accomplished.

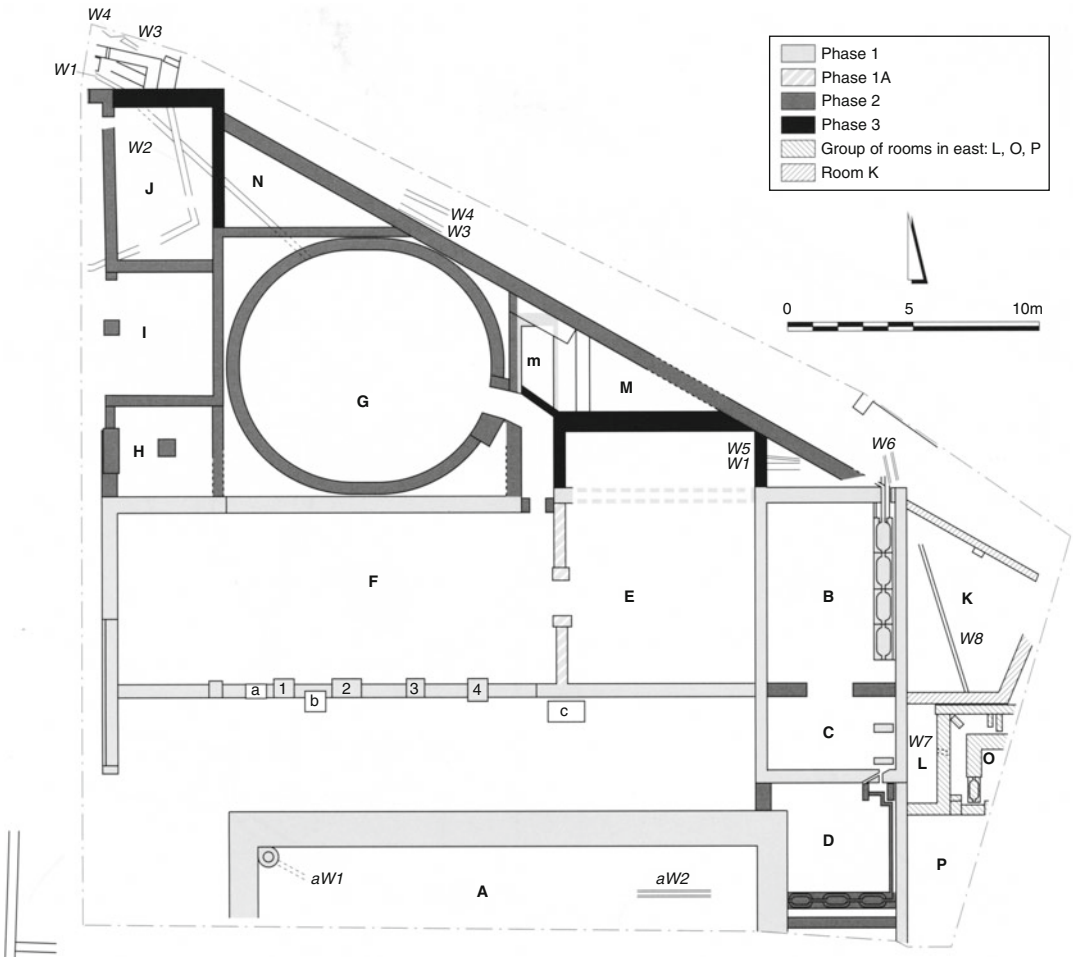

Baths and Bathing, Greek, Fig. 8 Eretria, Gymnasion: phase plan; phase 1 end of fourth century BCE, phase 2 second half of second century BCE; Mango 2003: 56, Fig. 58

While these various sweat baths must already have revolutionized the experience and concept of athletic bathing, the most significant change occurred only from the late first century BCE onwards when independent sophisticated Roman baths were built in or next to Greek *gymnasia* and hot water was used for the first time in the Greek athletic context. For example, the *gymnasion* of Pergamon was provided with a Roman bath ("West Bath") in the first century CE and a second larger equivalent ("East Bath") in the second century CE (Trümper 2013a). Consequently, in Asia Minor (Turkey) the formerly two distinct concepts – Roman bath and Greek *gymnasion* – were merged into a new building type in the first and second centuries CE, the so-called Bath-Gymnasia. This granted the survival of the Greek *gymnasion* by simultaneously accommodating a dramatically changed concept and perception of bathing.

Future Directions

Since research on Greek baths and bathing culture has only been revived in the last 10–15 years, many of the issues addressed here still require more in-depth analysis. Most important is the full publication of recent and ongoing excavations of both Greek *balaneia* in the different regions of the Mediterranean and early Roman baths in the western Mediterranean. This will provide crucial new insights into important aspects such as the often

neglected and little known history of baths (date of construction, remodeling phases, and abandonment); heating and vaulting technologies; water management, particularly water supply, which is so far poorly understood, especially with regard to quantity and consistency or seasonal variances as well as distribution within the baths; circulation patterns and user differentiation; and the urban context of baths that is often insufficiently known.

Based on such comprehensive fundamental research, broader synthetic questions could be reassessed, most notably the possible sociohistorical reasons for obvious regional differences in bathing culture, including the complex interrelation and transition between Greek and Roman bathing customs.

While the bathing images on vases have been much studied in recent years (Kreilinger 2007; Stähli 2013), a comprehensive assessment of all written sources related to bathing in the Greek world is still missing.

A reassessment of all different sources – images, texts, and archaeological remains – could finally result in a more differentiated comparative evaluation of the discourses on Greek bathing culture in the various media. Greek bathing culture could then finally receive the attention it deserves, both in interdisciplinary studies of the ancient Mediterranean world and in cross-cultural studies on bathing and related topics.

Cross-References

- ▶ Baths and Bathing, Roman
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Sicily and Magna Graecia, Archaeology of

References

Delorme, J. 1960. *Gymnasion. Étude sur les monuments consacrés à l'éducation en Grèce (des origines à l'empire romain)*, Bibliothèque des Écoles françaises d'Athènes et de Rome 196. Paris: de Boccard.

Flemming, R. 2013. Baths and bathing in Greek medicine. In *Greek baths and bathing culture. New discoveries and approaches*, BABESCH Suppl. 23, ed. S.K. Lucore and M. Trümper, 23–32. Leuven: Peeters.

Fournet, T., and B. Redon. 2009. Les bains souterrains de Taposiris Magna et le bain de tradition hellénistique en Égypte. In *Le bain collectif en Égypte*, Études urbaines 7, ed. M.-F. Boussac, T. Fournet, and B. Redon, 113–137. Cairo: Institut Français d'Archéologie Orientale.

Fournet, T., and B. Redon. 2013. Heating systems of Greek baths: New evidence from Egypt. In *Greek baths and bathing culture. New discoveries and approaches*, BABESCH Suppl. 23, ed. S.K. Lucore and M. Trümper, 239–263. Leuven: Peeters.

Ginouvès, R. 1959. *L'établissement thermal de Gortys d'Arcadie*, Études Péloponnésiennes 2. Paris: Vrin.

Ginouvès, R. 1962. *Balaneutikè. Recherches sur le bain dans l'antiquité grecque*, Bibliothèque des Écoles françaises d'Athènes et de Rome 200. Paris: de Boccard.

Kreilinger, U. 2007. *Anständige Nacktheit. Körperpflege, Reinigugnsriten und das Phänomen weiblicher Nacktheit im archaisch-klassischen Athen*, Tübinger Archäologische Forschungen 2. Rahden/Westfalen: Marie Leidorf.

Kunze, E., and H. Schleif. 1944. *IV. Bericht über die Ausgrabungen in Olympia*. Berlin: de Gruyter.

Lucore, S.K. 2009. Archimedes, the North Baths at Morgantina and early developments in vaulted construction. In *Nature and function of water, baths, bathing and hygiene from antiquity through the Renaissance*, ed. C. Kosso and A. Scott, vol. Technology and Change in History 11, 43–59. Leiden: Brill.

Lucore, S.K. 2013. The North Baths at Morgantina. In *Greek baths and bathing culture. New discoveries and approaches*, BABESCH Suppl. 23, ed. S.K. Lucore and M. Trümper, 151–179. Leuven: Peeters.

Lucore, S.K., and M. TrÜmper, eds. 2013. *Greek baths and bathing culture. New discoveries and approaches*, BABESCH Suppl. 23. Leuven: Peeters.

Mango, E. 2003. *Das Gymnasion*, Eretria Ausgrabungen und Forschungen 13. Gollion: Infolio éditions.

Meyer, B. 1992. Les femmes et les bains publics dans l'Égypte grecque, romaine et byzantine. In *Proceedings of the XIXth International Congress of Papyrology, Cairo, 2–9 September 1989*, ed. A.H.S. El-Mosalamy, 51–60. Cairo: Ain Shams University, Center of Papyrological Studies.

Préaux, C. 1947. *Les Grecs en Égypte d'après les archives de Zénon*. Bruxelles: Office de Publicité.

Sinn, U., C. Leypold, and C. Schauer. 2003. Olympia – eine Spitzenstellung nicht nur im Sport. Eine neuentdeckte Badeanlage der hellenistischen Zeit. *Antike Welt* 34: 617–623.

Stähli, A. 2013. Women bathing: Displaying female attractiveness on Greek vases. In *Greek baths and bathing culture. New discoveries and approaches*, BABESCH Suppl. 23, ed. S.K. Lucore and M. Trümper, 11–21. Leuven: Peeters.

Trümper, M. 2006. Baden im späthellenistischen Delos, I: Die öffentliche Badeanlage im Quartier du Théâtre. *Bulletin de Correspondance Hellénique* 130: 143–229.

Trümper, M. 2008. *Die 'Agora des Italiens' in Delos. Baugeschichte, Architektur, Ausstattung und Funktion*

einer späthellenistischen Porticus-Anlage, Internationale Archäologie 104. Rahden/Westfalen: Marie Leidorf.

Trümper, M. 2009. Complex public bath buildings of the Hellenistic period. A case-study in regional differences. In *Le bain collectif en Égypte*, Études urbaines 7, ed. M.-F. Boussac, T. Fournet, and B. Redon, 139–179. Cairo: Institut français d'archéologie orientale.

Trümper, M. 2010. Bathing culture in Hellenistic domestic architecture. In *Städtisches Wohnen im östlichen Mittelmeerraum. 4. Jh. v. Chr.-1. Jh. n. Chr., Akten des Internationalen Kolloquiums vom 24.-27. Oktober 2007 an der Österreichischen Akademie der Wissenschaften*, ed. S. Ladstätter and V. Scheibelreiter, 529–572. Wien: Österreichische Akademie der Wissenschaften.

Trümper, M. 2012. Gender differentiation in Greek public baths. In *SPA. Sanitas Per Aquam. Tagungsband des Internationalen Frontinus-Symposiums zur Technik- und Kulturgeschichte der antiken Thermen. Aachen, 18.-22. März 2009*, BABESCH Suppl. 21, ed. R. Kreiner and W. Letzner, 37–45. Leuven: Peeters.

Trümper, M. 2013a. Modernization and change of function of Hellenistic gymnasia in the imperial period: Case-studies Pergamon, Miletus, and Priene. In *Das kaiserzeitliche Gymnasium*, Wissenskultur und gesellschaftlicher Wandel 34, ed. W. Habermann, P. Scholz, and D. Wiegandt. Berlin: Akademie Verlag.

Trümper, M. 2013b. Urban context of Greek public baths. In *Greek baths and bathing culture. New discoveries and approaches*, BABESCH Suppl. 23, ed. S.K. Lucore and M. Trümper, 33–72. Leuven: Peeters.

Tsiolis, V. 2013. The baths at Fregellae and the transition from *Balaneion* to *Balneum*. In *Greek baths and bathing culture. New discoveries and approaches*, BABESCH Suppl. 23, ed. S.K. Lucore and M. Trümper, 89–111. Leuven: Peeters.

Vallet, G., F. Villard, and P. Auberson. 1983. *Mégara Hyblaea 3. Guide des fouilles*. Paris: Boccard.

von den Hoff, R. 2009. Hellenistische Gymnasia: Raumgestaltung und Raumfunktionen. In *Stadtbilder im Hellenismus*, Die hellenistische Polis als Lebensform 1, ed. A. Matthaei and M. Zimmermann, 245–275. Berlin: Verlag Antike.

Further Reading

An overview of recent and current research is available in the proceedings of the recent conference on *Greek Baths and Bathing Culture. New Discoveries and Approaches* (Lucore and Trümper 2013). The 14 English contributions include summaries of recent and ongoing fieldwork (Caulonia, Fregellae, Locri Epizefiri, Monte Iato, Morgantina, and Velia in Italy; Hephaistia/Lemnos and Thessaloniki in Greece; Euhemeria/Qasr el-Banat, Taposiris Magna/Abusir, and Theadelphia/Kharabet Ihrit in Egypt) as well as synthetic assessments of topics such as bathing images; bathing in Greek medicine; heating systems; vaulting systems, also in relation to contemporary science (Archimedes); urban context of Greek public baths; and the relationship between Greek and Roman baths. The second part of this book consists of a catalog of all currently known Greek *balaneia* (for each bath: short catalog text, bibliography, standardized plan).

This topic is currently not conveniently and easily accessible in recent English handbooks or textbooks. The standard handbook is still Ginouvès 1962 (in French), which is excellent, but partially outdated for the assessment of bathing images and the archaeological evidence of baths.

Baths and Bathing, Roman

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Introduction

Public baths were arguably the primary social institution of the Roman world. A trip to the local public bath was both a practical and pleasurable ritual, fundamental to the routine of daily life – we have evidence of everyone from slaves to the emperor himself frequenting the public baths on occasion. Many baths also catered for experiences well beyond that of simply getting clean; bathers could spend several hours in the baths, socializing or attending to a multitude of other needs and desires.

The baths were at the forefront of Roman architectural, engineering, and design development. The forms expressed in the bath buildings, along with their materials and technologies, were among the most innovative, ambitious, and impressive of their day and have remained influential through to modern times. Public baths were a ubiquitous feature of most cities and towns, irrespective of size, as well as in many sanctuaries and military camps; they became a defining feature of Roman civilization throughout the Empire and beyond.

Sources and Reception

It is obvious from the sheer number of baths alone (see section "Types of Bathing Facilities") that the

act of public bathing was extremely popular, and their centrality to daily life is confirmed by the fact that references to bathing are to be found everywhere, including in official inscriptions, on informal graffiti, in school books, on tombstones, and of course in the literary sources, where they are frequently mentioned by poets (most notably Martial), historians, philosophers, and the like.

The sources make frequent references to positive aspects of the baths, including their grandeur, beauty, atmosphere, and social and medical benefits. However, as to be expected with any popular institution, they were not universally praised and we do hear the occasional dissenting voice. Gripes with the baths ranged from annoyance at the drunken, lecherous, licentious, sycophantic, or arrogant behavior of some regular visitors, to instances of theft (a common issue at the baths, subject to strict laws, and, if the laws did not work, curse tablets [Fagan 1999: 36–38]), to the water being too dirty, cold, or hot (Nielsen 1990: 18; Fagan 1999: 181–186). There were also moral objections to the popularity of the baths, with several commentators raising concerns about the negative effects on society of the perceived indulgences and luxuries offered at the baths (Seneca Letters 86 is one such lament). These objections, though eloquent, would appear to be the viewpoint of a conservative minority, and even their objections were not serious enough, in most cases, to stop the critics themselves from frequenting the baths, further highlighting their importance as a social and cultural hub.

Definition

The Roman public bathhouse in its many contexts may be distinguished from earlier forms of public bathing (see the entry on "▶ Baths and Bathing, Greek", in this encyclopedia) and defined by the existence of three primary characteristics: (1) a complex heating system based around the hypocaust, (2) bathing rooms of differing temperatures, and (3) the presence of communal pools. While some of these elements could be present in the earlier "Greek-style" baths (with which the Roman baths had many aspects in common – see section "Historical Background"), it is the combination of these elements that epitomizes the Roman style of public bathing regardless of context.

Heating

A Roman bath was heated by the hypocaust; an underfloor system of heating that was fully developed by the early second century BCE. Prior to this time, heating of rooms and water tended to be carried out with the use of braziers or on occasion by simpler forms of underfloor heating (see section "Historical Background" and the entry on "▶ Baths and Bathing, Greek", in this encyclopedia). The hypocaust functioned by allowing hot air and gasses to flow through a space created beneath the floor of a room (Fig. 1). The most common way to create this space was to raise the floor via the use of multiple square or circular brick columns (*pilae*), typically standing between c. 0.70–1.40 m in height, and placed roughly 0.80 m apart from center to center. Resting on the *pilae* was the floor matrix, usually consisting of large square tiles (*bipedales*), upon which was laid a 0.30–0.40-m-thick brick and mortar packing into which the desired surface material was laid.

The heat was generated by a simple, slow-burning furnace (*praefurnium*), consisting of a fire placed in one or more openings in the external wall below the floor of the heated room (Fig. 1). Two spur walls (not pictured) were often built either side of this opening (and either side of the wall) to help draw the hot air and gasses through the system. The hot air and gasses eventually rose up through flues set into the wall and exited the system via vents set just below the eaves of the building (see also "tubulation" below). As to be expected, there were many design variations with the hypocaust system, not least with the *pilae*. One such variation – and a notable example of ancient recycling – is still to be seen in Athens, with the reuse of 17 Hellenistic period columnar grave monuments as *pilae*.

Service areas were invariably situated outside these heated rooms. Depending on the size or build of the bath, these areas could vary from simple semi-open spaces (usually with some

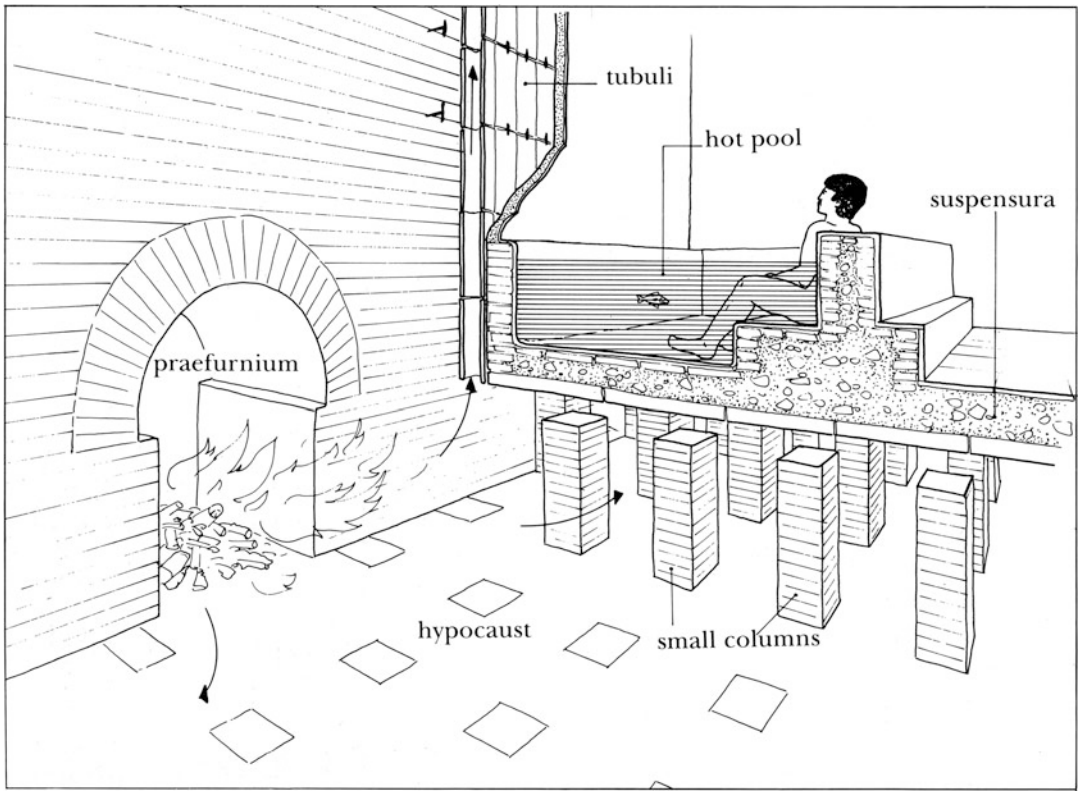

Baths and Bathing, Roman, Fig. 1 The heating system of a Roman bath (modelled on the *caldarium* of the Central Baths in Pompeii). (Image: Jean-Pierre Adam (2011), with permission)

form of screening to hide the work areas from the public) through to a complex network of underground passages (such as those at the Baths of Caracalla in Rome). It was from these services areas that the water supply for the baths was also controlled. The water to be used in the heated pools was piped into large metal boilers that were often sensibly positioned above the furnace (Fig. 2). Once heated by the boiler, the water could be mixed with cold water (as required) by the service attendants as it was being piped into the pools: a particularly well-preserved example of a water-supply system was found in a villa at Boscoreale, a settlement buried in 79 CE by the same eruption of Mt. Vesuvius that destroyed Pompeii and Herculaneum. Some baths also incorporated a semicylindrical metal container known as the *testudo* into their water-heating systems (Fig. 2). The closed end of this device was placed above the furnace in direct contact with the fire, while the open end was incorporated into the sidewall of the pool. This configuration allowed the pool water to circulate directly above the furnace, thereby maintaining a much warmer water temperature for the bathers.

From the first century BCE onwards, it became common to create hollow passages in the walls of the heated rooms (beyond the basic, but necessary flue system), in a technique known as tubulation. This provided several structural and functional benefits: it allowed for the improved circulation and extraction of hot air and gasses; it provided the walls with dry lining, thereby alleviating dampness in such a hot and humid environment; and it led to a more efficient use of fuel through the effects of radiant heat contributing to a higher room temperature while simultaneously allowing for a more uniform and safer temperature for the floors and the walls – an important concern for the patrons (Nielsen 1990: 17–8; Yegül and Couch

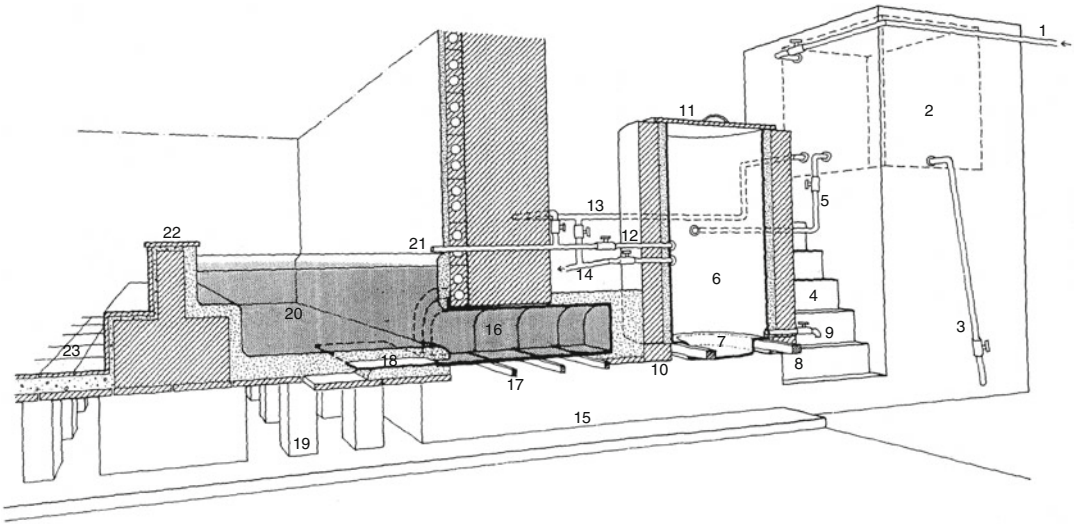

Baths and Bathing, Roman, Fig. 2 Reconstruction of the heating and water systems of a *caldarium*, including boiler and *testudo*. (© Koninklijke Brill NV (after Manderscheid 2000: 496))

2003: 175; Schiebold 2006; Yegül 2010: 88–9). The radiant heat generated by tubulation also allowed for larger heated rooms to be built and for these rooms to be well lit, because large windows could now be placed in the walls of heated rooms without the loss of too much temperature. The interplay between the sun and the variously decorated surfaces of the baths, coupled with the potential for pleasant views, added to the spectacle of a visit to the baths. As Seneca colorfully informs us (*Letters* 86.8), well-lit baths were popular among patrons.

Tubulation appeared in several forms and subtypes, varying over time and region, but two forms, *tegulae mammatae* and *tubuli*, were by far the most commonly utilized throughout the Empire (Fig. 3). *Tegulae mammatae*, literally "tiles with nipples," consisted of specially constructed flat tiles with projecting studs on each corner that were attached to the wall with metal clamps. *Tubuli* were custom-made hollow box-shaped tiles, open at both ends and often on the sides. These could be stacked on top of, and next to, each other to create an interconnecting network. *Tubuli* are considered to have been the most effective method for heating, as the air and gasses circulated through *tubuli* with less turbulence than with other solutions (Adam 1994: 269). They also had the added benefit of not necessarily requiring the use of costly, and ultimately ephemeral, metal clamps to attach them to the wall, thus saving on both materials and effort while also extending the life of the building. The use of *tubuli* essentially superseded *tegulae mammatae* in many parts of the Empire from the end of the first century CE onwards. However, the continued use of *tegulae mammatae* would seem to be a trend throughout Greece and in parts of the Western Empire (Nielsen 1990: 15, 1999: 36; McCallum 2010). There are also many examples of more than one type being utilized within the same building, as was the case in the Great Bath at Corinth where three different systems have been observed (Biers 2003: 310). Tubulation was also utilized in some bath ceilings, providing further insulation and structural benefits, including in the thermal baths at *Aquae Sulis* (Bath, England).

When taking into account that the floor, walls, ceilings, pools, and water boilers were all heated by the same furnace, in effect every element of a room could be heated from a single source of fire under the floor – an ingenious and very efficient system.

Variated Temperatures

Not only did the Romans heat certain rooms of the baths, but they also manipulated the temperatures

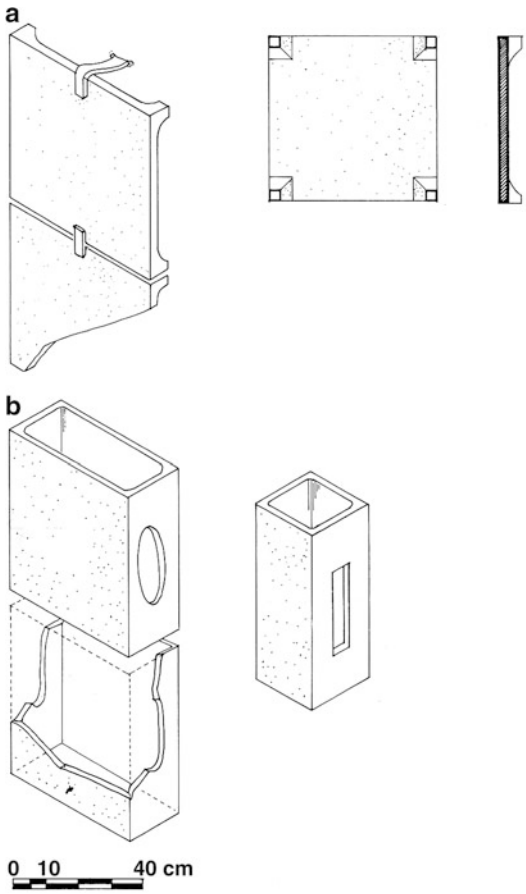

Baths and Bathing, Roman, Fig. 3 Detail of a diagram showing (**a**) tegulae mammatae (**b**) tubuli. (© Fikret Yegül (after Yegül 2010: 88, Fig. 38))

of these rooms and their waters to provide a variated experience for the bather as they moved from room to room. Consequently, the three fundamental room types experienced when taking a Roman bath were the cold bathing room (*frigidarium*), the warm room (*tepidarium*), and the hot bathing room (*caldarium*). Many baths also included a dedicated sweat room, referred to variously as a *sudatorium* or *laconicum*. Depending on the establishment this could be based around a wet heat or a dry heat.

Communal Pools

The physical process of bathing in a Roman bathhouse took place primarily in communal, fully immersible pools, often large enough for several people to bath simultaneously. Typically two or more pools were present in both the *frigidarium* and the *caldarium*; the *tepidarium* often functioned as a heat lock between the cold and hot rooms, although pools are present on occasion. In addition to communal pools, many baths (especially down to the first century CE) also featured a pedestalled washbasin (*labrum* –). This piece of bathing furniture had a long history in public bathing, from at least the Greek Archaic period onwards. Also extremely popular in Roman baths (and some earlier Greek gymnasia) were large swimming pools (*natatio*); these could be indoor or outdoor, heated or unheated, depending on the climate and the establishment.

Auxiliary Rooms

Aside from the rooms devoted to the actual act of bathing, public baths, regardless of size, also regularly included a dedicated changing room (*apodyterium*) with niches for the bather's clothes and personal effects as well as oiling rooms, latrines, and, depending on time and place, a courtyard and/or a large all-purpose indoor room for light exercise or socializing. Some baths even featured facilities for massage and sunbathing, as well as shops, mills, offices, large garden areas, running tracks, fountains, and cult spaces (typically of the Imperial family or Mithraea), with the largest baths even including further educational and entertainment zones such as libraries, lecture halls, class rooms, and eclectic art galleries (for a discussion of the individual elements of the baths, see Nielsen 1990: Appendix). The patronage and display of sculptural art in the bathhouses presented the Imperial family, local administrators, athletic clubs, and other personages and institutions of note a wonderful opportunity to honor gods and mortals while increasing their own status and reputation. Public baths regularly provide us with impressive examples of Roman art, along with copies of Greek sculpture and even pilfered Greek originals.

The written sources inform us that the rooms of the baths were also home to more ephemeral services and entertainments (professional and otherwise): food and drink sellers, depilators, poets, jugglers, musicians, dancers, mimes, and even

male and female prostitutes are all known to have added to the bathing experience. One of the liveliest descriptions of the atmosphere in a small bath is from Seneca, who in the mid-first century CE complains of the noise made by people enjoying themselves or making a living at the baths (*Letters* 56.1-2). With so much available space and so many facilities on hand, some of the largest baths even became regular places of assembly for events and political gatherings, thereby taking on some of the roles traditionally reserved for the forum.

Bathing Pattern

There appears to have been no universal set pattern to how one would experience the baths; they vary tremendously in layout and features (as to be expected over such an immense chronological and geographical expanse), suggesting that, in essence, the baths could be approached how the individual bathers themselves desired. Furthermore, very few surviving sources describe in any great depth and clarity what was to them an everyday process. Undoubtedly, force of habit and the inherent restrictions imposed by the layout of the individual bathhouse would have played a role, as would have contemporary medical advice. One way to approach the bathing process would be to pay the fee (if there happened to be one at that particular establishment), get changed in the *apodyterium*, oil up, then work up a sweat (via light exercise or a dedicated sweating room), before finally entering the bathing rooms proper (perhaps most often in the basic order of *tepidarium*, *caldarium*, *frigidarium*), where first the oil, sweat, and potential dirt could be scraped off with a *strigil* (– soap was not widely used in the Roman Empire) and then one could enjoy a dip in the various plunge pools or even a swimming pool. A hefty dose of socializing and the enjoyment of any of the other delights on offer would supplement this process. Eventually the bather would return to the *apodyterium* to get changed and exit the establishment.

Types of Bathing Facilities

The widespread popularity and long history of the baths meant that many types of bathing establishment existed throughout the Empire. The two most basic types were freestanding baths and bathing facilities attached to larger complexes. There was of course a lot of variation within these two basic types.

B

Freestanding Bathhouses

The most common type of public bathing establishment throughout the Empire was the freestanding bathhouse, dedicated primarily to the act of bathing and socializing for groups of people. They varied greatly in size and accessibility (see Key Issues). The ubiquitous, smaller freestanding establishments are commonly referred to as *balnea*, while the larger and more imposing baths tend to be referred to as *thermae*. The interchangeability of these terms, and indeed many of the terms related to the baths in ancient times, still causes problems today (see Nielsen 1990: 3, Appendix; DeLaine 1993: 352–4; Fagan 1999: 14–9 with further references).

Balnea were often privately owned and varied greatly in layout and size, with some very innovative and unique design variations – in part caused by the necessity of fitting into preexisting town plans and the lay of a particular plot of land. Thermae tended to be state- or city-run enterprises; they were often more symmetrical in design and layout but were nevertheless among the most innovatively designed and decorated buildings to be found in a city of the Empire. In Rome alone, during the fourth century CE, census documents record that an incredible 856 small baths and some 10 or 11 massive thermae were in use (the exact number varies for both categories – *Notitia Urbis Regionum* and *Curiosum Urbis Romae* Regionum; Fagan 1999: 41–2; Yegül 2010: 2–3). Agrippa constructed the first thermae in the city of Rome during the last quarter of the first century BCE, and then we know of increasingly more elaborate and monumental thermae constructed by leading citizens and emperors, including (but not limited to) Nero, Titus, Domitian, Trajan, Commodus, Septimius Severus, Caracalla, Decius, Diocletian (the largest of the Roman Imperial thermae), Maxentius, and Constantine. Many other major cities also

featured at least one thermae, including, but by no means limited to, Constantinople, with at least 8 thermae and 153 small baths (*Notitia Urbis Constantinopolitanae*; Yegül 2010: 3, 183), Carthage, Ephesus, Antioch, Lepcis Magna, Paris, Trier and Athens, with at least 2 thermae and over 50 small baths of various types (McCallum 2010). Even Ostia, the port of Rome, has seen several thermae and over 20 smaller baths uncovered during excavations (Yegül 2010: 69).

Bathhouses Attached to Larger Complexes

Bathing facilities were also regularly constructed as an element of much larger complexes, including gymnasia, military forts, sanctuaries, thermo-mineral resorts, domestic dwellings, and even churches.

Gymnasia

In those parts of the Empire where the gymnasium was an important cultural institution, notably in Greece and the Hellenized East, the tradition continued of incorporating bathing facilities to assist with cleaning after exercise (a practical tradition considering their exercise regime combined dirt, sweat, and oil), the difference being that during the first centuries of the Empire, most were outfitted with the latest in Roman heating technologies (see the entry "▶ Baths and Bathing, Greek", in this encyclopedia).

Conversely, many standard freestanding Roman baths incorporated some elements of the gymnasium into their design, most notably with the appearance of a small courtyard for light exercise, but it is with the great bath-gymnasium complexes of Asia Minor that we see the truest fusion of the features and activities of the Roman bath and the Greek gymnasium. Some of the most notable examples of this phenomenon are preserved at Ephesus (Harbour Bath-Gymnasium, Vedius Bath-Gymnasium, East Bath-Gymnasium, Theatre Baths), Sardis (Imperial Bath-Gymnasium – Fig. 4), Perge (South Gate Baths), and Miletus (Bath-Gymnasium of Faustina).

Military Baths

Wherever Romans went, so went the baths. As a result, baths were a regular feature of military forts (*castrum/castra*) around the outskirts of the Empire. These baths can be divided into two categories: large legionary thermae, typically located inside the fortress, and smaller *castellum* baths, which lay outside of the fort (Nielsen 1990: 77). The baths were designed by the military architects that accompanied the army, and it was these same architects who were often responsible for designing and constructing the baths in the newly conquered, assimilated, or created settlements at the frontiers of the Empire. As a result, we see in places like Roman Britain that the settlement baths regularly share design similarities with the baths from nearby military forts.

The Roman military can thus be seen as an important contributor to the spread of baths throughout the provinces of the Empire, with the baths themselves playing a significant role in the complex process of sociopolitical and cultural interaction and domination known as Romanization.

Sanctuary and Thermo-mineral Baths

Any place where large crowds of people would be gathering or staying for an extended period benefitted from having public baths, and this was certainly the situation at sanctuaries where devotees congregated for days or even weeks at a time, be it for festivals (athletic or otherwise) or for healing. Baths were an integral part of many healing sanctuaries, as the medical writers of the time regularly recommended water-based cures for the treatment of various ailments. No more is this relationship more apparent than with the huge thermo-mineral bath centers in places such as Baiae in the Bay of Naples (Italy) and Allianoi in modern Turkey (located some 20 km northwest of ancient Pergamon). Thermo-mineral resorts such as these were extremely popular healing and holiday destinations, with the town of Baiae in particular gaining a reputation as a debauched playground of the well-to-do. Baiae was a very long-lived resort, in use from at least the early

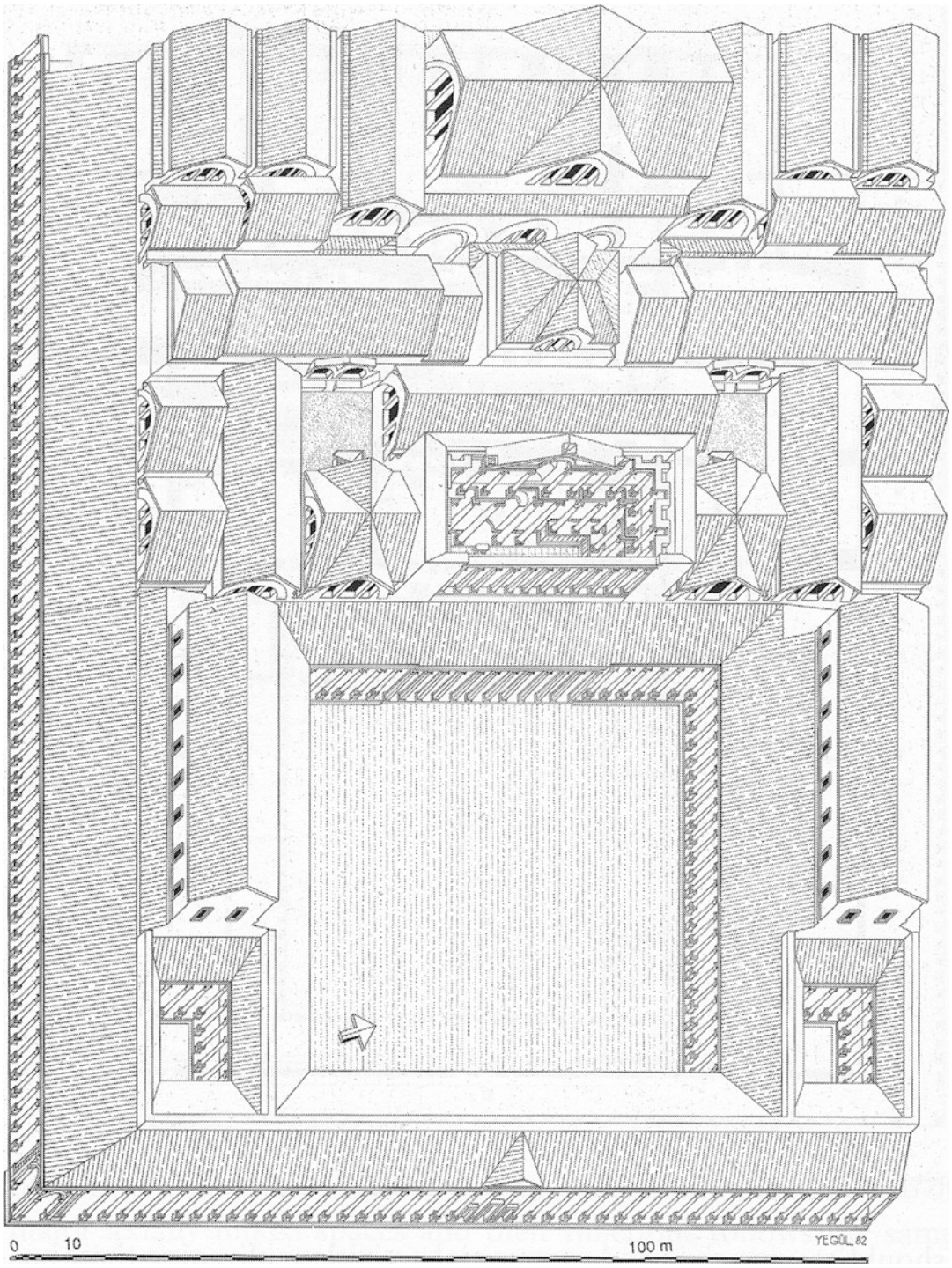

Baths and Bathing, Roman, Fig. 4 Axonometric restoration of the Imperial Bath-Gymnasium complex at Sardis. (© Fikret Yegül (after Yegül 2010: 164, Fig. 74))

Roman Republican period through to the seventeenth century CE. Allianoi made the news again recently, threatened ironically by the very thing that gave it life – water – with the construction of the Yortanli dam condemning this ancient health retreat to be lost once more to history in late 2010/early 2011.

Houses, Villas, and Palaces

Bathing facilities were a common, but by no means universal, feature of domestic properties throughout the Empire. These ranged in size from small bathrooms with a simple tub through to luxurious miniature versions of public bathing establishments for use by several individuals simultaneously, be they family, friends, or business associates. Some of the best-preserved early examples are, not surprisingly, from the towns of Pompeii and Herculaneum; however, from the later Roman period, several huge and centrally located residences have been found in cities throughout the Empire, including Constantinople and Athens (Fig. 5). These buildings are sometimes referred to as palaces, with bathing facilities on par with their more public brethren.

It is important to stress that not every property had elaborate bathing facilities; this is especially true of the multistory apartment complexes (*insulae*) where the greater urban population lived in Rome and other large cities. For these people the public baths were a vital utility.

Church/Baptistery Baths

The adoption of Christianity as the official religion of the Empire over the course of the fourth century CE did not halt the construction and use of

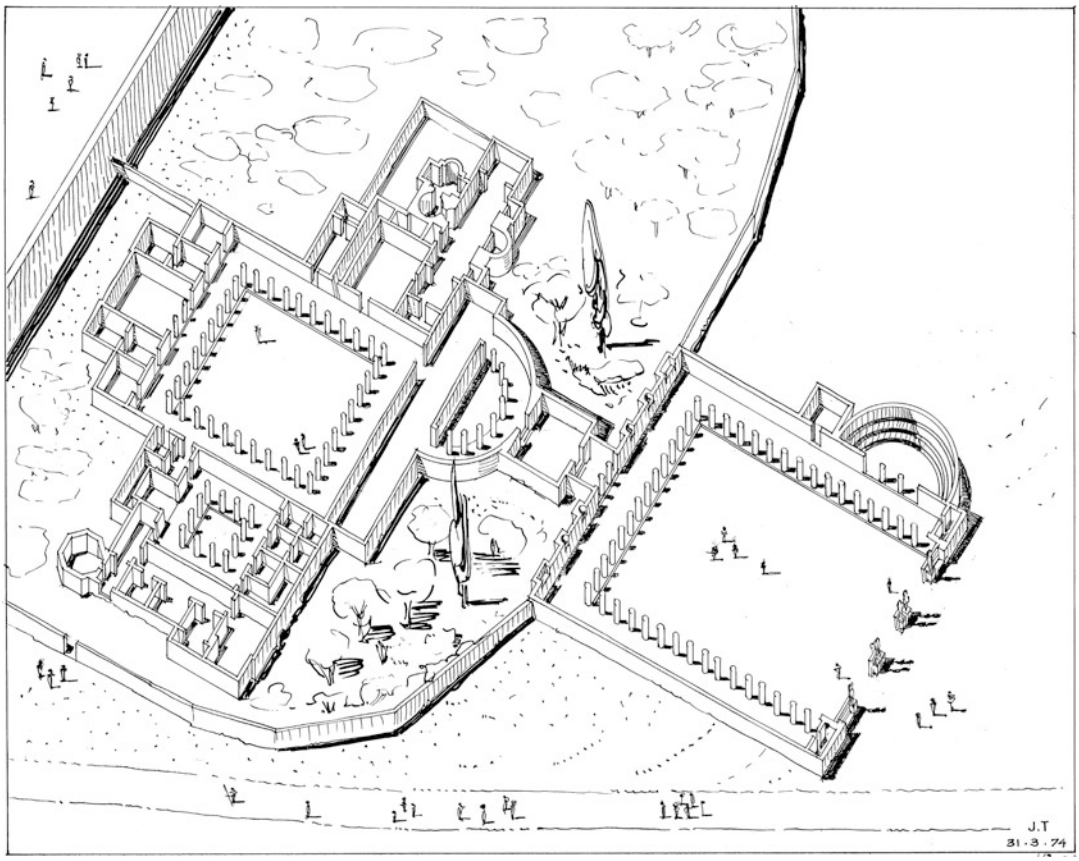

Baths and Bathing, Roman, Fig. 5 Cut-away perspective of the Palace of the Giants by J. Travlos. (© American School of Classical Studies at Athens: Agora Excavations)

public baths. Indeed, it was not uncommon to build baths in connection with churches and monasteries or to utilize preexisting bathing establishments as baptisteries (see section "Historical Background").

Historical Background

Origins of the Roman Bath

The origins of Roman public bathing may be sought from several sources, although the degree of influence imparted by each source is debated and routinely subject to reassessment when new evidence is uncovered or published. A major influence is undoubtedly to be found in the long-standing public bathing and gymnastic habits of the classical and Hellenistic Greek world, especially from the Greek colonies in South Italy and Sicily (see the entry on "▶ Baths and Bathing, Greek", in this encyclopedia). There is also evidence to suggest that local bathing traditions of rural central Italy may have played their part in the development of Roman-style bathing and architecture, most notably through the use of bathing rooms with graduated temperatures in their farm houses (Varro *Ling*. 9.68; Fagan 2001: 417; Yegül 2010: 45–7). The influence of Etruscan and Punic public bathing habits on Roman bathing habits is currently less well understood.

The development of the hypocaust is a popular topic of debate. Based on the writings of Pliny the Elder (*Natural History* 9.168) and Valerius Maximus (11.1.1), the tradition has been to link the development of the hypocaust to the Campanian oyster farmer and merchant Sergius Orata (flourished c. 90 BCE–80 BCE), but the archaeological evidence (and critical literary analysis) shows that this is incorrect. Examples of fully fledged hypocausts are known already from Central Italy at Fregellae (Latium) in the early second century BCE, from the late second century BCE in Pompeii (Stabian Baths), and from the second and first centuries BCE in Greece (Gortys, Olympia, and Athens) and Sicily (Megara Hyblaea) (DeLaine 1989; McCallum 2010; see the entry on "▶ Baths and Bathing, Greek" in this encyclopedia), while more simple predecessors are known already in the Eastern Mediterranean from the sixth century BCE onwards (DeLaine 1989; Fagan 2001; Yegül 2010, 81–2, 84–6; see the entry on "▶ Baths and Bathing, Greek", in this encyclopedia). Wall heating (tubulation) on the other hand is considered to be of completely Roman/Italian origin (Yegül 2010: 86; although note the recent evidence from Taposiris Magna in Egypt and the hollow walls at Gortys mentioned in DeLaine 1989: 112).

The thermo-mineral resorts at Baiae and Himera in Sicily were in use from at least the early stages of the Republican period. It is therefore possible that aspects of the later public baths, such as the large communal pools, advanced heating systems, and not least the acceptance of public bathing as an enjoyable and socially acceptable event in Rome, may have some roots here (DeLaine 1989: 123; Fagan 2001; Yegül 2010: 49–50).

Whatever the exact origins of the Roman style of bathing, it is clear from the archaeology and their appearance in the literary sources that they were certainly a feature of Republican Roman life from at least the third century BCE onwards and that making a visit to a public bath became a commonplace daily event over the course of the second to first centuries BCE. As mentioned previously, the Roman bathing habit spread with the Empire. Those provinces with pre-existing public bathing cultures incorporated Roman bathing norms to differing degrees (notably in the Hellenized East and Egypt), but the adoption of Roman technologies and habits is seen everywhere to some extent.

Christianity

Over time, as to be expected, there are some changes to the public bathing habit, but the core experience remained fairly stable for an extraordinarily extended period. Even after Christianity was adopted as the official religion of the Empire during the fourth century CE we do not see an instant effect on the popularity of the baths, and there was certainly no universal ban on public bathing or even seriously sustained official opposition from the Church. Indeed, in some instances, the Church owned and operated public baths as a

profitable business, and other times we see baths used for ablutions on religious holidays or attached to churches and monasteries for use as charity baths or for baptisms (Nielsen 1990: 147–8; Yegül 2010: 185, 202–3). Even bishops and monks were known to bathe in the baths and sometimes even with women (Nielsen 1990: 147).

There was some Christian opposition to the excessive wealth displayed at the baths and the phenomenon of mixed bathing (Nielsen 1990: 148 and see below) as well as to some of the more pleasurable and extracurricular aspects of a visit to the bath. We see this expressed clearly in the late sixth century CE by Pope Gregory the Great (540–604): "[Baths are] for the needs of the body. . .not for the titillation of the mind and sensuous pleasure" (Gregorius I Papa *Registrum Epistolarum* I, xiii, 3; Yegül 2010: 204). Additionally, some devotees did pursue the concept of *alousia* (abstinence from washing), but it was nothing like the phenomenon seen in Europe for some two centuries from the mid-sixteenth century CE. More serious was Christian opposition to exercise and nudity and indeed the whole cultural and educational institution of the gymnasium; this did lead to the dwindling of the gymnasium/exercise segment of the baths. The effects of this opposition were especially clear in the East, where the bath-gymnasium complexes had previously been so popular (Yegül 2010: 182, Chapter 11).

The Decline of the Roman Bathing Habit

While the Roman public bathing habit in some sense never ceased completely (it still lives on in altered form in the Turkish bathing habit), by the seventh century CE, and earlier in many places, it had undoubtedly ceased to be the widespread and integral social institution it once was. So what caused this to happen?

The downfall of many of the bathing establishments, especially the larger ones, can be linked to the civic and economic disorder and profound societal changes brought about by various "barbarian" incursions in Rome and throughout the Empire during the so-called Migration Period in the fifth through eighth centuries CE; the fate of the large baths was inextricably linked to the fate of the wider city. In a time of regular infrastructure damage, severe hardship, and depopulation, cities were simply unable to repair and maintain multiple city baths – they were too expensive to keep running, and, critically, they required a functional and plentiful water supply. The aqueducts, which could run for dozens of kilometers outside of the city, were especially prone to sullying or destruction by besieging armies, and priority was needed to be given to drinking water over the baths.

Baths continued to be built and maintained much later in the East than West, perhaps due to a more stable environment during these centuries of upheaval and change, but even these baths were in serious decline by the ninth century CE (Yegül 2010: 200). Undoubtedly, some of the thousands of smaller bathing establishments, with their much more modest water-supply needs, continued operating in some form or another, especially in the early Islamic East, where public bathing has continued through to the modern hammam still used in places like Turkey, Syria, Iran, and Tunisia today. We also know that many thermo-mineral health resorts remained in use over the next 1000 years, most notably Baiae, which, as mentioned previously, continued in use until the seventeenth century. Despite the existence of these remnants of Roman bathing, it is clear that by the seventh century CE, the public baths had ceased to be a cornerstone of daily life.

Key Issues/Current Debates

While the Roman baths have received scholarly treatment at various times previously, interest in baths and the act of bathing in the Roman world has increased dramatically in the past 30 years, most notably through the 1980s and 1990s when there was a surge of literature and new approaches to balneological studies (including, but certainly not limited to, general works by Brödner (1983), Heinz (1983), Pasquinucci (1987), Nielsen (1990), Yegül (1992, 2010), Fagan (1999, 2001), and DeLaine and Johnston (1999); also several important articles by DeLaine that critically assess the state of the discipline, DeLaine (1988, 1992, 1993, 1999a, b); and the comprehensive bibliographies compiled by Manderscheid in 1988 and

2004). This expanding scholarly corpus has incorporated the archaeological, literary, and epigraphic evidence over a vast chronological and geographical scale to provide us with a reasonably solid understanding of many aspects of the practical, physical, social, technological, and cultural aspects of bathing during the Roman period. Several of the current, and in some cases seemingly eternal, debates and key issues have been touched upon already (origins of the Roman style, developments over time, how they were perceived, their role as agents of Romanization, and the reasons behind the eventual decline of the Roman-style bathing habit); now three more are briefly addressed: "Who was bathing?" "How widespread was mixed bathing?" and "Why were the baths so popular?"

Who Was Bathing?

The question of who was bathing in the public baths is complicated in the sense that we are dealing with such disparate evidence over a huge expanse of geography and time. Further exacerbating this state of affairs is that the situation would have varied from bath to bath. Individual bathing establishments varied not only in size but also in degree of accessibility and exclusivity. While the largest baths catered for most, if not all, elements of the population with their immense size and cheap or free bathing (male/female, adult/child, rich/poor, and apparently even slave), the vast majority of baths were smaller facilities, inevitably catering to a more limited clientele based purely on their size alone. It is then perhaps best to envisage, and the sources suggests as much, that most public bathing establishments were similar to the nightclubs, cafes, or pubs of many modern cities. A particular bath attracted a certain clientele based on their facilities, decor, location, cleanliness, entry charge, and reputation (which could change very quickly). The choice of bath was apparently important enough among high society that one could enquire of a stranger which baths they used (Ammianus Marcellinus 28.4.10; Fagan 1999: 20). Furthermore, some bathing facilities explicitly served a specific gender, class, guild, or religious group, and of course those baths operating inside sanctuaries and military camps, or attached to buildings such as gymnasia and the like, would have all been accessed by, and potentially restricted to, certain groups. By gaining an understanding of the various locational contexts of bathhouses, we open a window into the principles of social ordering of the people who utilized these facilities.

How Widespread Was Mixed Bathing?

That both men and women around the Empire utilized the public baths is beyond all doubt, but the extent to which men and women bathed together has been a regular source of debate and disagreement. There can be no doubt that mixed bathing did occur throughout the long history of Roman baths (indeed several emperors and even the Church attempted, unsuccessfully, to legislate against it, with the last decree coming as late as the eighth century CE), but the degree to which it was the norm or how much it varied from place to place over time and facility is uncertain. The available evidence reveals several solutions when it comes to men and women using the baths:

1. Separate establishments for men and women (a phenomenon more common in the earliest and latest Roman baths).
2. A single establishment with separate entrances and duplicated facilities (not necessarily of identical size or quality). Not all facilities were duplicated in some baths, suggesting some shared areas in those instances.
3. A single establishment with different bathing times for men and women. This solution is still seen today in some hammams (Turkish baths).
4. Freely mixed bathing (a regular theme in Martial and Imperial decrees).

Why So Popular?

The vast popularity of the public baths can be explained citing both practical and sociocultural reasons. The core function of public baths was obviously to get clean, and this was an important community service in a time when bathing facilities in many homes were simple or nonexistent. Bathing in water is in itself a physiologically relaxing and pleasurable experience. This experience, coupled with the communal aspects of the baths

(socializing, networking, seeing, and being seen), ensured that bathing was a relaxed, potentially intimate, and important social event. Over time, these characteristics led to bathing becoming a daily habit ingrained in the social flow of Roman society, which in turn caused the facilities, both bathing and secondary, to be expanded and improved. As the secondary facilities and services expanded, people would have even more reason to spend more time in the pleasant environment of the baths (they could eat, drink, exercise, primp, study, and socialize all in the one building). The extreme popularity of the baths led emperors, local officials, and other rich benefactors to construct and maintain ever larger and awe-inspiring edifices, for both the public benefit and to increase their reputation among the populous. By offering heavily subsidized or even free entry, they could further enhance the positive effect for both themselves and the baths. This cycle fed on itself for centuries, and the public baths became arguably the dominant social and cultural institution in the Roman world, to the extent that by the late Roman period, the largest baths in some towns had overtaken several of the social and political functions of the forum.

Future Directions

With the relatively recent surge in bath-related scholarship, our knowledge of Roman baths and bathing has increased markedly. However, there is still plenty of important work to do, especially at the individual, local, and regional levels. Thanks to the central and long-lived role baths played in Roman society (both in the heartland and the provinces), their ubiquitousness within most settlements, and the sturdy nature of their construction, new evidence for baths is regularly being uncovered. Improved excavation and data collection techniques ensure that the baths being excavated today can provide us with much more information than was previously possible. This, coupled with an abundance of previously exposed material that has either never been published or only summarily published, means there is fundamental work to do at the level of individual bathing establishments.

Similarly, while many have examined baths at local and regional levels in the past, there is a great disparity in the quantity and quality of work that has been done. By gaining deeper understandings at the local and regional levels (where there is quite a lot of variation), we will be in a much stronger position to discuss how the baths and Roman bathing culture were integrated and utilized in the disparate corners of the Empire.

At the general level, fundamental questions concerning origins, development, transformation, and decline are still open for further discussion, and there remains more to learn about the functioning of baths in their various contexts, their decoration, secondary facilities, and post-Roman existence, particularly in the West.

In a topic so universal and fundamental to the Roman experience as the baths, the potential and importance of continued study is clear. Future directions for balneological studies are almost as numerous as the baths themselves. Evidence, both old and new and archaeological and literary, needs to be (re)appraised using current analytical methods and theoretical frameworks. Coupled with the magnificent opportunities provided by advances in digital technology and cloud computing, there is tremendous potential for different questions to be asked and new perspectives to be gained in the world of Roman bathing.

One such digital project, to be undertaken by the author, is an online catalog of Greek and Roman baths. Previously, two major general catalogs of Roman baths have been compiled featuring baths from throughout the Empire: Manderscheid (1988/2004), which is in essence a collection of bibliographic references but also works as a catalog, and Nielsen (1990), who cataloged 387 baths. Due to their wide-ranging nature, self-imposed limits, and increasing age, these lists are invariably incomplete, but they nevertheless provide an excellent starting point for future research. Building on these solid foundations, the author is in the very early stages of developing and implementing a multi-relational online database to allow information on baths, Roman and otherwise, from all over the Mediterranean and beyond to be cataloged and available in a freely accessible and easily updatable website. The author will add more information about this online database as work progresses.

Cross-References

- ▶ Architecture, Roman
- ▶ Baths and Bathing, Greek
- ▶ Urban Planning, Roman

References

Adam, J.P. 1994. *Roman building: Materials and techniques* (trans: Matthews, A.). Bloomington: Indiana University Press.

Adam, J.P. 2011. *La construction romaine, materiaux et techniques*. 6th ed. Paris: Picard.

Biers, J.C. 2003. Lavari est vivere: Baths in Roman Corinth. In *Corinth XX: Corinth, the centenary 1896–1996*, ed. C.K. Williams II and N. Bookidis, 303–319. Athens: The American School of Classical Studies at Athens.

Brödner, E. 1983. *Die römischen Thermen und das antike Badewesen: Eine kulturhistorische Betrachtung*. Darmstadt: Wissenschaftliche Buchgesellschaft.

Delaine, J. 1988. Recent research on Roman baths. *Journal of Roman Archaeology* 1: 11–32.

Delaine, J. 1989. Some observations on the transition from Greek to Roman baths in Hellenistic Italy. *Mediterranean Archaeology* 2: 111–125.

Delaine, J. 1992. New models, old modes; continuity and change in the design of public baths. In *Die römische Stadt im 2. Jahrhundert n. Chr. Der Funktionswandel des öffentlichen Raumes*, ed. H.-J. Schalles, H. von Hesberg, and P. Zanker, 257–275. Köln: Rheinland-Verlag GMBH.

Delaine, J. 1993. Roman baths and bathing. *Journal of Roman Archaeology* 6: 348–358.

Delaine, J. 1999a. Introduction: Bathing and society. In *Roman baths and bathing: Proceedings of the first international conference on Roman baths held at Bath, England, 30 March – 4 April 1992. Part I: Bathing and society*, Journal of Roman archaeology supplementary series, ed. J. DeLaine and D.E. Johnston, vol. 37, 7–16. Portsmouth: Journal of Roman Archaeology.

Delaine, J. 1999b. Introduction: Baths – The urban phenomenon. In *Roman baths and bathing: Proceedings of the first international conference on Roman baths held at Bath, England, 30 March – 4 April 1992. Part II: Design and context*, Journal of Roman archaeology supplementary series, ed. J. DeLaine and D.E. Johnston, vol. 37, 157–163. Portsmouth: Journal of Roman Archaeology.

Delaine, J., and D.E. Johnston, eds. 1999. *Roman baths and bathing: Proceedings of the first international conference on Roman baths held at Bath, England, 30 March – 4 April 1992*, Journal of Roman archaeology supplementary series. Vol. 37. Portsmouth: Journal of Roman Archaeology.

Fagan, G.G. 1999. *Bathing in public in the Roman world*. Michigan: University of Michigan Press.

Fagan, G.G. 2001. The genesis of the Roman public bath: Recent approaches and future directions. *American Journal of Archaeology* 105 (3): 403–426.

Heinz, W. 1983. *Römische Thermen. Badewesen und Badeluxus im römischen Reich*. München: Hirmer.

Manderscheid, H. 1988. *Bibliographie zum römischen Badewesen: Unter besonderer Berücksichtigung der öffentlichen Thermen*. München: H. Manderscheid.

Manderscheid, H. 2000. The water management of Greek and Roman baths. In *Handbook of ancient water technology*, ed. Ö. Wikander, 467–535. Leiden: Brill.

Manderscheid, H. 2004. *Ancient baths and bathing: A bibliography for the years 1988–2001*, Journal of Roman archaeology supplement. Vol. 55. Portsmouth: Journal of Roman Archaeology.

McCallum, M.J.L. 2010. Bathing in ancient Athens: With special reference to the baths excavated in the area of the Athenian Agora. Unpublished PhD dissertation, University of Sydney.

Nielsen, I. 1990. *Thermae et balnea: The architecture and cultural history of Roman public baths* (trans: Crabb, P., 2nd ed. 1993). Århus: Århus University Press.

Nielsen, I. 1999. Early provincial baths and their relations to early Italic baths. In *Roman baths and bathing: Proceedings of the first international conference on Roman baths held at Bath, England, 30 March – 4 April 1992. Part I: Bathing and society*, ed. J. DeLaine and D.E. Johnston, 35–43. Portsmouth: Journal of Roman Archaeology.

Pasquinucci, M. 1987. *Terme romane e vita quotidiana*. Modena: Panini.

Schiebold, H. 2006. *Heizung und Wassererwärmung in römischen Thermen*. Siegburg: DWhG.

Yegül, F.K. 1992. *Baths and bathing in classical antiquity*. New York: The Architectural History Foundation.

Yegül, F.K. 2010. *Bathing in the Roman world*. Cambridge: Cambridge University Press.

Yegül, F.K., and T. Couch. 2003. Building a Roman bath for the cameras. *Journal of Roman Archaeology* 16: 153–177.

Battlefield Archaeology

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Introduction

A dedicated archaeological approach to the study of historic battlefields is a recent development, beginning with work at the Little Bighorn, USA battlefield in the 1980s where the methodology of

using metal detectors to locate spent bullets was first applied. Since then, it has spread to the UK and mainland Europe, with some work in other parts of the globe. While the battlefield archaeology community is still relatively small, interest in the field has grown so it now can boast regular conference series and a dedicated journal, as well as more than one course of formal study.

Definition

Battlefield archaeology is a term used in two ways. In one – very specific – sense (and the one used in this entry), it is the application of particular techniques to study the material residues of past battles. As used in this sense, it focuses upon sites where armies came together to engage in a formalized style of fighting which was heavily rule bound and sanctioned. Battlefield archaeology generally therefore excludes sites of conflict between less organized bodies of armed people such as uprisings and revolts, sieges, and smaller and more fluid military actions such as skirmishes.

In a second, looser, sense it covers the archaeological study of all aspects of conflict from the most ancient to the most recent, regardless of period or style, and not limited to sites of violence but extending to military encampments and bases, issues of logistics, prisoner-of-war camps, and the location and reburial of the dead from past wars. The currently preferred term for this wider concern is "conflict archaeology," with "battlefield archaeology" reserved for its more specific sense (Fig. 1).

The archaeology of historic battlefields requires, as well as the usual skills of the archaeologist, a specific set of techniques and technology. While some battlefields will contain built features – trenches, walls, palisades, and other earthworks, buildings, and mass graves – to be surveyed, excavated, and interpreted in accordance with standard archaeological practice, others do not. For these, the primary evidence will come from scatters of material left in the topsoil or plowsoil and detectable by metal detector. The evidence that is available will depend upon the period of the fight, the weapons used, the type of action – whether mainly infantry or mainly cavalry – and postdeposition factors that will determine survivability. As well as soil chemistry, overbuilding, and changes in land use, the effects of collecting and looting will have significant impacts upon the material.

Historical Background

While battles as events have been the focus of historical interest since the discipline of history

Battlefield Archaeology, Fig. 1 Metal detector survey at the Oudenaarde battlefield, Belgium, September 2011

was first invented, a specific interest in the material record of battlefields took longer to develop. Early efforts include those of Edward Fitzgerald from 1842, whose work at Naseby in England includes the recording of field names and other topographical features, drawing the contemporary appearance of the landscape, noting where local people had found artifacts from the battle, and recording where local tradition placed particular events of the battle. Fitzgerald's work went on to include the digging of test pits and finding a mass grave. At about the same time, Richard Brooke was pursuing his interest in the battlefields of the Wars of the Roses, inspired in him by his birth near the site of the battle of Stoke. His *Visits to the Battlefields in England of the Fifteenth Century* comprises largely discussions of the historical sources he drew upon and concerns the events of the fight and the names of the prominent killed and wounded. He does, however, provide useful sketch maps of each site, some of which are of more practical use today than more modern ones.

Subsequent interest has largely remained in the realm of Brooke's primary concern, of identifying the places where battles took place, rather than using them as research objects in their own right. Once identified, the tendency is to assume that the landscape as seen today is similar – if not identical – to that on the day of the battle. As Foard makes clear in his criticism of both the standard form of battlefield "guide" and the English Heritage *Register* (1995) which so closely resembles such guides, most publications on battlefields continue to "place stylised battle formations and key topographical features… almost arbitrarily against a modern map base" (Foard 2001: 88). Frequently, however, students of military history have taken the trouble to visit the sites of the battles they discuss and to relate the topography to contemporary accounts. Nevertheless, the primary focus has always been upon the literary evidence for battle action, rather than what evidence the place itself could provide.

However, a group of unrelated twentieth-century research moved closer to a direct concern with the battlefield itself, and while all have much to teach us in pursuing this field, only the last has led to the recent explosion of interest in battlefield archaeology. The first exercise in battlefield archaeology in the twentieth century took place in the late 1950s and early 1960s, when the then military government of Portugal sought – among other things – to celebrate Portugal's military past by promoting the deeds of its medieval chivalry. Excavations in advance of building a monument and a museum at the site of the battle of Aljubarotta, where Portugal first emerged as an independent state, revealed a mass grave and battlefield features. This exercise in battlefield archaeology has gone largely unnoticed by the battlefield archaeology community. A decade later in England, work at Marston Moor (an English Civil War battle site) and roughly contemporary geological work at Maldon (site of a Viking attack on the East Saxons, CE 991), testify to the importance of topographical research and careful reconstruction of the historic landscape by revealing how accounts based upon the modern appearance can be highly misleading. At Marston Moor, the realization that the sunken road which played such a large part in nineteenth- and twentieth-century accounts of the battle was a feature added in the eighteenth century (and therefore was not present on the day of the battle) altered understanding of contemporary seventeenth-century accounts. At Maldon, confirmation that a significant change in sea level had occurred from the tenth century to the twentieth forced a reassessment of the one contemporary account of the battle; this in turn required the removal from the accepted story of the battle several events which had been added later to allow the modern appearance of the site to fit the ancient account (see Carman and Carman 2006: 7–8).

The combination of careful recording of artifact scatters, topographic research, and the search for remains of the dead at the Little Bighorn site in the USA (Scott et al. 1989) finally brought battlefield archaeology attention, and these techniques have since been applied in the USA at Palo Alto, Texas (Haecker and Mauck 1997), in the UK at Towton (Fiorato et al. 2000), and elsewhere (e.g., see Freeman and Pollard 2001; Pollard and Banks 2006; Scott et al. 2007). As a result of successful battlefield archaeology projects in a number of

countries, the number of specialist battlefield archaeologists in Europe has grown over the years and the field is increasingly recognized as one of significance. The most recent *Fields of Conflict* conference – the leading conference in the field – held in Germany had participants from 14 countries of Europe as well as the USA and Canada.

Key Issues and Current Debates

Practitioners of battlefield archaeology have in general been more concerned with issues of methodology than other aspects of the field. In part, this is because the techniques are still under development and – although there is general agreement on the approach to be taken – questions arise as to specifics. In part, it is because both the underlying purpose of battlefield archaeology and the underlying theory go unquestioned. The purpose is generally taken to be to provide an insight into past military practice, drawing on inspiration from military history. The theoretical approach, whether acknowledged or not, is an overtly processualist one, deriving directly from the search for "patterns" – as evident in the work on the Little Bighorn site. Despite the expressly anthropological concerns of that research, more recent attempts to incorporate anthropological theories of war into the field (e.g., Carman and Carman 2006) have generally been resisted.

The much-cited book *Archaeological Perspectives on the Battle of the Little Bighorn* (Scott et al. 1989) is largely the inspiration for the rise of battlefield archaeology over the past two decades. Taking advantage of the cutting of the grass at the Custer Memorial site, Scott and his colleagues used metal detectors to trace the fall of bullets and the ejection of cartridges across the space of the fight between units of the seventh US Cavalry and Lakota and Cheyenne warriors. Differences in weapons used by one group of participants from those used by others allowed the researchers to identify Native American shot from that of the soldiers, and the distribution especially of cartridge cases across the space identified the movement of individual weapons – and therefore of men and formations – through the space. From this, a model of the sequence of events emerged which confirmed Native American accounts frequently dismissed. Other work on soldier burial sites allowed also the identification of individuals, the opportunity to infer the location of the bodies of missing soldiers, and the chance to develop a picture of the "typical" soldier for the late nineteenth century in North America. In particular, the researchers sought to identify the "patterns" revealed by the distribution of bullets across the space: the "static" pattern of the present distribution of bullets and casings, the "dynamic" pattern of movement through space this represented, and from this the standardized "post-Civil War battlefield pattern" of military behavior that would provide a model for interpreting other sites of the period.

A combination of discussions by Pratt and Sivilich (see papers in Scott et al. 2007) allows an appreciation of the techniques of battlefield archaeology as they have developed since the 1980s. Pratt outlines an effective survey technique by metal detector, whereby two operators survey an area, each using a different machine and at a 90° angle to one another, locating individual finds on a GPS recorder. As he puts it, by using this survey technique, "coverage [of ground] is improved and typically result[s in an] increase of collected artifacts or more thoroughly substantiates the lack of metal remains" (Scott et al. 2007: 8). Sivilich in the same volume provides a useful survey of what can be learned from musket balls deposited on pre- to mid-nineteenth-century battlefield sites, which (because they are used in smooth-bored weapons and are lacking the distinctive features of rifle markings) cannot be associated with individual weapons. These include an idea of the type of weapon for which the ball was made, derived from its diameter and weight. Similarly, it is possible to identify whether it had been fired – from scorching and powder burns on one side and the distinctive "ring" around the center caused by scraping along the inside of the gun barrel – or dropped, by the continued presence of mold seams and sprues from manufacture. A scatter of fired bullets can be assumed to have

been aimed at a target but to have missed it unless deformed and to have traveled beyond it, whereas bullets fired and deformed may have hit the target but with insufficient force to cause harm: A combination of this information may indicate where the soldiers being fired at stood. A scatter of dropped bullets may indicate where firing soldiers stood. A particular development has been experimental work on firearms in order to ascertain what finds of shot on sites of battle may indicate. It is clear that fired bullets discovered by metal detector will mostly have failed to hit a target, but what is not immediately obvious is how far the bullet may have traveled beyond where any target was standing and how it may have been deflected by bouncing. Examples include work on case shot and on eighteenth-century muskets in the USA. Although not – as at Little Bighorn – indicating the movement of weapons and therefore individuals through the battlefield space, this kind of information can inform an understanding of the placement of troops during the action.

A central issue remains the search for sites to investigate. The precise location of battles from earlier historical periods is rarely known from written records, and much effort can be spent in locating them. In recent years, two battles from the Roman period have been securely located entirely by archaeological effort, both in northern Germany: Kalkriese, the site of the destruction of Varus' three legions in CE 9 (Rost 2007; Wilbers-Rost 2007), and a previously unknown action from the third century CE at Harzhorn. In both cases, scatters of material brought archaeologists to the site, and careful analysis of the distribution allowed an understanding of the fight to be constructed. At Kalkriese, excavations brought to light the barrier constructed by the Germans to prevent the escape of Roman troops into the surrounding country, thereby trapping them between attackers and swampy ground.

Elsewhere, a combination of material scatters and close reading of the available textual evidence allowed the identification of the likely site of the eleventh-century CE battle of Fulford in England (Jones 2011). Close reading of topographic descriptions contained in the main contemporary texts allowed the identification of likely locations. Environmental and other survey then established the extent to which each of them might match the description given in those texts. Survey by metal detector then sought to locate the material evidence at each site that a battle of the period had taken place. What was found – rather than scatters of weaponry such as arrowheads, broken swords, and spears – was intensive evidence of metalworking, including artifacts such as anvils and other metalworking tools, the bases of hearths, and incomplete and unfinished metal objects such as arrowheads. In similar vein – but also including an explicit search for evidence of fighting – the much later battle of Bosworth was finally located only in 2009 after extensive topographical research supported by metal detector survey.

The problems of investigating earlier sites are well recognized by battlefield archaeologists. It is therefore no surprise that the bulk of battlefield research focuses on later periods, where the location of actions is more firmly established. Such work covers the periods from the sixteenth to the nineteenth centuries, with clusters around certain periods within that time frame. Here, other questions dominate. In particular, in an effort to establish the value and legitimacy of battlefield research, effort has been spent on proving the techniques of battlefield archaeology to official agencies who are then encouraged to arrange for the preservation of key sites so that they will in turn become available for investigation and study.

However, battlefield archaeology is no more than 15 years old in Europe and is still young as a specialized field. Techniques are increasingly well established, an increasing number of scholars are taking an interest, and broader research questions – such as the development of gunpowder warfare from the fifteenth to seventeenth centuries – are emerging. Although a close-knit community of battlefield archaeologists has been formed, especially through the *Fields of Conflict* conferences from 2001, the largest impact of developments in the field has yet to be recognized, and the recognition by official agencies of the value of this kind of work has also yet to be achieved beyond English-speaking countries.

International Perspectives

Battlefield archaeology was until recently an entirely Anglophone field, limited to American, Irish, and British archaeologists. However, it is now a global field with practitioners from all across Europe and beyond.

In the USA, much work focuses on battles from the nineteenth century. The work at the Little Bighorn site established the basic techniques of battlefield survey by metal detector and established the value of such an approach (Scott et al. 1989). Such work has since expanded to the battles of the American Civil War (Geier and Potter 2001) and to other military actions against Native Americans (see papers in Scott et al. 2007).

In much of Europe, the focus lies upon earlier periods – especially the seventeenth and eighteenth centuries. The last battles in England and Scotland were fought in 1685 and 1746, respectively, and so British battlefield archaeology in particular has focused on these centuries. Foard has worked extensively on the battlefields of Naseby and especially Edgehill, both of the English Civil War of the mid-seventeenth century. Edgehill remains the only early modern battlefield to have been subject to total survey, following extensive historical and topographical research to reconstruct the seventeenth-century landscape. This, together with metal detector survey, established that the traditional accounts of the battle were seriously wrong in the way they positioned troops, affecting any understanding of the course of the action (Foard 2005). Work at Naseby also provided a revised sequence for the battle, including evidence for initial success by Royalist infantry, and their "fighting retreat" after subsequent defeat (http://battlefieldstrust.com/). At Culloden in Scotland, survey in advance of the construction of a new visitor's center soon established that the traditional accounts of the action and its limitation to certain ground only were incorrect (Pollard 2006). Elsewhere in Europe, research on battlefields of these periods has been carried out and is ongoing in Belgium at Oudenaarde, in Germany at Lützen, in the Ukraine at Poltava, in Sweden at Landskrona (Knarrström 2006), and in Spain at Almenar and Talamanca (Rubio 2008).

A limited amount of work has been undertaken beyond North America and Europe, including preliminary surveys of nineteenth-century battlefields in South America (Pollard 2007).

Future Directions

The identification of unknown or disputed sites has led battlefield archaeologists into periods otherwise little examined and where it is uncertain what material residues of conflict may be encountered. These "signatures" (Sutherland and Holst 2005) are well known for battles of the seventeenth to nineteenth centuries where firearms predominate, but for earlier periods are less clear. The work at both Kalkriese (CE 9) and Fulford (1066) suggest that a key indicator of early battle sites may not be deposits of weapons, such as arrowheads, or of human remains, as at Towton (1461), but evidence of prebattle metalworking.

Some historic periods suffer from a lack of explicit focus. The sixteenth century in Europe, although a period that may be considered significant in terms of a shift of warfare style from "shock" to gunpowder and the commencement of Europe's global expansion as a colonizing force, is relatively untouched apart from studies of fortifications or shipping. However, work on sites related to Spanish expeditions into North America in this period provides an interesting alternative approach (see Scott et al. 2007). The late nineteenth century is also low in coverage, except for North American conflict with Native Americans: This may partly be explained by the generally successful exportation of warfare by the major European states to colonial contexts from the close of the Napoleonic Wars to 1914. There are some exceptions to this general rule such as the Crimean War, the Franco-Austrian and Franco-Prussian Wars, and the wars of German and other national unifications from mid-century, although these too remain largely unexamined from an archaeological perspective. Consequently, there is a chronological leap from the eighteenth century to the twentieth century, the

latter forming an entirely separate area of study from that of the historic period (Schofield et al. 2002).

Further developments which are beginning to emerge include the recognition that the archaeology of periods beyond those of the historic may have things to contribute to the study of historic battlefields (Carman 2012). However, the battlefield archaeology of more recent periods remains an issue to be addressed: The standard techniques of battlefield archaeology – landscape regression and metal detector survey – do not necessarily lend themselves well to reinterpretations of the sites of the large and highly technological warfare of the last century, confirming this as a separate field of investigation.

Cross-References

▶ Fortifications, Archaeology of
▶ Metal Detecting in Archaeology

References

Carman, J. 2012. *Archaeologies of conflict*. London: Duckworth.

Carman, J., and P. Carman. 2006. *Bloody meadows: Investigating landscapes of battle*. Stroud: Sutton.

English Heritage. 1995. *Register of historic battlefields*. London: English Heritage.

Fiorato, V., A. Boylston, and C. Knusel. 2000. *Blood red roses: The archaeology of a mass grave from the battle of Towton AD 1461*. Oxford: Oxbow.

Foard, G. 2001. The archaeology of attack: Battles and sieges of the English Civil War. In T. Freeman & A. Pollard (ed.) *Fields of conflict: Progress and prospects in battlefield archaeology, proceedings of a conference held in the Department of Archaeology, University of Glasgow, April 2000* (British Archaeological Reports International series 958): 87–104. Oxford: Archaeopress.

Foard, G. 2005. *History from the field: The Edgehill battlefield survey*. London: Battlefields Trust.

Freeman, T. & A. Pollard. (ed.) 2001. *Fields of conflict: Progress and prospects in battlefield archaeology, proceedings of a conference held in the Department of Archaeology, University of Glasgow, April 2000* (British Archaeological Reports International series 958). Oxford: Archaeopress.

Geier, C.R., and S.R. Potter, eds. 2001. *Archaeological perspectives on the American Civil War*. Gainesville: University Press of Florida.

Haecker, C.M., and J.G. Mauck. 1997. *On the prairie of Palo Alto: Historical archaeology of the U.S.-Mexican War battlefield*. College Station: Texas A&M University Press.

Jones, C. 2011. *Finding Fulford: The search for the first battle of 1066*. London: WPS.

Knarrström, B. 2006. *Slagfältet: om bataljen vid Lanskrona 1677 och finden från den första arkeologiska undersökningen av ett svenskt slagfält*. Saltsjö-Duvnäs: Efron & Dotter.

Pollard, T. 2006. *Culloden battlefield: Report on the archaeological investigation* (GUARD Report 1981). Glasgow: University of Glasgow.

Pollard, T. 2007. Seven eventful days in Paraguy: Reconnoitering the archaeology of the War of the Triple Alliance. In *Fields of conflict: Battlefield archaeology from the Roman Empire to the Korean War, volume 2: Nineteenth and twentieth century fields of conflict*, ed. D. Scott, L. Babits, and C. Haecker, 314–335. Westport: Praeger.

Pollard, T., and I. Banks, eds. 2006. *Past tense: Studies in the archaeology of conflict*. Leiden: Brill.

Rost, A. 2007. Characteristics of ancient battlefields: The battle of Varus (AD9). In *Fields of conflict: Battlefield archaeology from the Roman Empire to the Korean War*, ed. D. Scott, L. Babits, and C. Haecker, 50–57. Westport: Praeger.

Rubio, X. 2008. *Almenar 1710: victòria anglesa a catalunya*. Camp de Mart 1. Barcelona: DIDPATRI.

Schofield, J., W.G. Johnson, and C. Beck, eds. 2002. *Matériel culture: The archaeology of 20thcentury conflict*. London: Routledge.

Scott, D.D., R.A. Fox, M.A. Connor, and D. Harmon. 1989. *Archaeological perspectives on the battle of the Little Big Horn*. Norman: University of Oklahoma Press.

Scott, D., L. Babits, and C. Haecker, eds. 2007. *Fields of conflict: Battlefield archaeology from the Roman Empire to the Korean War*. Westport: Praeger.

Sutherland, T. & M. Holst. 2005. Battlefield archaeology: A guide to the archaeology of conflict. British Archaeology Jobs Resource. Available at: http://www.scribd.com/doc/404876/BATTLEFIELD-ARCHAEOLOGY-THE-ARCHAEOLOGY-OF-CONFLICT. Accessed 14 Feb 2012).

Wilbers-Rost, S. 2007. Total Roman defeat at the battle of Varus AD 9. In *Fields of conflict: Battlefield archaeology from the Roman Empire to the Korean War*, ed. D. Scott, L. Babits, and C. Haecker, 121–132. Westport: Praeger.

Further Reading

Allsop, D., and G. Foard. 2007. Case shot: An interim report on experimental firing and analysis to interpret early modern battlefield assemblages. *Journal of Conflict Archaeology* 3: 111–146.

Battlefields Trust website. Available at: http://battlefieldstrust.com/. Accessed 25 July 2012.

Battlefields Protection Program, US National Park Service. Available at: http://www.nps.gov/history/hps/abpp/batpubs.htm. Accessed 25th July 2012.

Carman, J. 2005. Battlefields as cultural resources. *Post-Medieval Archaeology* 392: 215–223.
do Paço, A. 1962. Em tormo de Aljubarotta. I-O Problema dos ossos dos combatentes da batalha. *Anais da Academia Portugesa da História* 2: 115–163.
do Paço, A. 1963. The battle of Aljubarotta. *Antiquity* 37: 264–271.
Doyle, P., and M.R. Bennett, eds. 2002. *Fields of battle: Terrain in military history*. Dordrecht: Kluwer.
Foard, G. 1995. *Naseby. The decisive campaign*. Whitstable: Pryor Publications.
Foard, G. 2003. Sedgemoor 1685: Historic terrain, the 'archaeology of battles' and the revision of military history. *Landscape* 4: 5–15.
Foard, G. 2008. Conflict in the pre-industrial landscape of England: A resource assessment. Leeds: University of Leeds. Available at: http://battlefieldstrust.com/resource-centre/battlefieldsuk/periodpageview.asp?pageid=831. Accessed 17 Aug 2011.
Greene, J.A., and D.D. Scott. 2004. *Finding Sand Creek: History, archaeology and the 1864 massacre site*. Norman: University of Oklahoma Press.
Haecker, C.M., E.A. Oster, A.M. Enríquez & M.L. Elliott. 2007. Indian resistance in New Spain: The 1541 battlefield of Peñol de Nochistlán, an exemplar of indigenous resistance, in D. Scott, L. Babits & C. Haecker. (ed.) 2007. Fields of conflict: battlefield archaeology from the Roman Empire to the Korean War 174–192. Westport: Praeger.
Newman, P. 1981. *The battle of Marston Moor*. Strettington: Anthony Bird Publications.
Petty, G., and S. Petty. 1993. A geological reconstruction of the site of the Battle of Maldon. In *The battle of Maldon. Fiction and fact*, ed. J. Cooper, 159–169. London/Rio Grande: The Hambledon Press.
Piekarz, M. 2007. It's just a bloody field! Approaches, opportunities and dilemmas of interpreting English battlefields. In *Battlefield tourism: History, place and interpretation*, Advances in Tourism Research, ed. C. Ryan, 29–47. Amsterdam: Elsevier.

Bauer, Alexander

Alexander A. Bauer
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Basic Biographical Information

Alexander A. Bauer is an archaeologist whose research foci are the archaeology of the Near East and Eurasia, ancient trade, archaeological method and theory, archaeological ethics, and cultural heritage law and policy. Having studied the prehistory of the eastern Mediterranean as an undergraduate in the Department of Classical and Near Eastern Archaeology at Bryn Mawr College with professors James C. Wright and J.P. Dessel, he earned his Ph.D. in anthropology at the University of Pennsylvania in 2006, where he studied interregional interaction during the pre-Colonial period of the Black Sea region, first under the guidance of Dr. Fredrik T. Hiebert and then Dr. Robert W. Preucel. He is currently an assistant professor of anthropology at Queens College and the Graduate Center of the City University of New York.

Major Accomplishments

Since 2005, Dr. Bauer has served as the editor (in chief) of the *International Journal of Cultural Property*, an interdisciplinary journal on cultural heritage law and policy. He has conducted fieldwork in Greece, Israel, Jordan, the United States, and Turkey, where he is currently associate director of the Sinop Regional Archaeological Project, under the direction of Dr. Owen Doonan. He has served as a senior editor of the second edition of the *Oxford Companion to Archaeology* (Oxford University Press, 2012). His 2001 article with Robert W. Preucel entitled "Archaeological Pragmatics" was among the first archaeological engagements with Peircean semiotics, and since then, he has continued to research and write on its utility for archaeology.

Cross-References

▶ Cultural Property, Trade, and Trafficking: Introduction
▶ Ethics in Archaeology
▶ Ethics of Collecting Cultural Heritage
▶ Heritage and Public Policy
▶ Preucel, Robert W.
▶ Semiotics in Archaeological Theory

Further Reading

Bauer, A., ed. 2010. *Social archaeologies of trade and exchange*. Walnut Creek: Left Coast Press.
Bauer, A. 2012. *New directions in museum ethics*. London: Routledge.
Brodie, N., J. Doole, and C. Renfrew, eds. 2001. *Trade in illicit antiquities*. Cambridge: McDonald Institute for Archaeological Research.
Brodie, N., M. Kersel, C. Luke, and K. Tubb, eds. 2006. *Archaeology, cultural heritage, and the antiquities trade*. Gainesville: University Press of Florida.
Carman, J. 2005. *Against cultural property. Archaeology, heritage and ownership*. London: Duckworth.
Preucel, R.W. 2006. *Archaeological semiotics*. Oxford: Blackwell.
Preucel, R.W., and A. Bauer. 2001. Archaeological pragmatics. *Norwegian Archaeological Review* 34: 85–96.
Renfrew, C. 2000. *Loot, legitimacy and ownership*. London: Duckworth.
Waxman, S. 2008. *Loot. The battle over the stolen treasures of the ancient world*. New York: Times Books.

Beach, Timothy

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Basic Biographical Information

Timothy Beach is a geographer who uses geoarchaeological techniques, such as archaeological geomorphology and pedology, to illuminate the dynamic interrelationships between ancient humans and their environments. Originally from California, he earned his Ph.D. in Geography from the University of Minnesota in 1989, concentrating on geomorphology, soils, and geology. He has taught at Georgetown University in Washington, DC, since 1993, where he currently holds the Cinco Hermanos Chair in Environment and International Affairs. He is also Professor of Geography and Geoscience in the Science, Technology, and International Affairs program at Georgetown's well-known School of Foreign Service. Previously, he was for 8 years the Director of the Center for the Environment at Georgetown. He has been awarded a John Simon Guggenheim Fellowship and has held a Dumbarton Oaks Fellowship in Pre-Columbian Studies. In 2006, he was elected a Fellow of the American Association for the Advancement of Science.

Beach has worked in the United States, Germany, Syria, and Iceland. He has performed fieldwork at important archaeological sites in Turkey (e.g., Beach and Luzzadder-Beach 2008), but the majority of his research, and that for which he is best known, has been carried out in the ancient Maya lowlands, in Mexico, Guatemala, and Belize. In this region, he has participated in many research projects that have focused on different sites to address varied but interrelated scientific problems using a wide range of field and laboratory techniques. Through interdisciplinary collaborations, he has made major contributions to our understanding of ancient Maya climate, agriculture, agricultural intensification, and the development of anthropogenic soils and landscapes. These studies have allowed him to significantly influence the debates surrounding both the origins and collapse of ancient Maya civilization as well as its economy and adaptation (Fig. 1).

Major Accomplishments

In the state of Yucatán, Mexico, he has worked extensively at the important Classic site of Chunchucmil (e.g., Beach 1998), where he has helped elucidate the paradox of an enormous and populous archaeological site situated in a region with low agricultural potential. At Mayapán, also in Yucatán, he has studied the extensive black earth midden that blankets most of the 4 km^2 ceremonial and residential zone of the site, a mysterious anomaly in the region.

His and his colleagues' extensive work in the Pasión River region around Dos Pilas in the Department of Petén, Guatemala, has helped clarify the complexity of the Classic Maya collapse. In contrast to previous paleoclimatic studies that implicated drought as the primary cause of societal implosion at the end of the Classic period

Beach, Timothy, Fig. 1 Map of the Maya region showing important sites where Timothy Beach has carried out geoarchaeological research

(c. CE 800–900), Beach and his colleagues found little evidence for drying. Nor did they find significant evidence for environmental degradation, such as accelerated soil erosion, during the peak of population in the Late Classic period, another favored environmental explanation of the collapse (e.g., Dunning et al. 1998). Subsequently, Beach's intensive research in northwest Belize has reinforced the inference that the Maya collapse was not triggered by a singular, apocalyptic event, such as a drought, or even by a series of them; instead, it was a complex, long-term, and heterogeneous set of processes without a prime mover (Dunning et al. 2012; Luzzadder-Beach et al. 2012).

His work in northwest Belize in the vicinity of Blue Creek has also helped resolve a sometimes contentious dispute about the nature of Maya agricultural intensification. Previous researchers viewed the ancient Maya wetland fields either as similar to the Aztec raised fields in the Valley of Mexico or as a largely natural phenomenon caused by a combination of sea-level rise and associated landscape aggradation. Beach and his colleagues have shown, however, that their more extensive data sets can be better explained by new models that combine elements of both older models with evidence for additional variations in patterns and methods of field construction (e.g., Beach et al. 2009). This work has also clarified the timing and mechanisms of landscape aggradation in the region, which can now be attributed primarily to gypsum precipitation caused by a rising water table, although other factors contributed to a lesser degree (Luzzadder-Beach and Beach 2009).

Beach and his colleagues' work in the large karst depressions that occupy some 40% of the Maya lowlands, known locally as *bajos*, has contributed evidence that these features played an important ecological role in the development of Maya civilization in the Preclassic period (Dunning et al. 2002). Previously, some scholars had argued that these wetlands were marginal environments of little direct significance to Maya cultural evolution.

Beach's scholarship cannot be understood in isolation, for he has collaborated closely with a

number of geographers and archaeologists. Among these collaborations, the closest and most persistent has been that with his partner, Sheryl Luzzadder-Beach, a Professor of Geography at George Mason University in Virginia who specializes in hydrology and water chemistry. Beach has also worked closely with Nicholas P. Dunning, a geographer with similar interests at the University of Cincinnati. Beach's partnerships with archaeologists such as Stephen Houston, Arthur Demarest, Thomas Guderjan, and the late Bruce Dahlin undoubtedly influenced his research by stimulating interactions with specialists investigating related questions using different approaches.

In summary, Tim Beach has contributed significantly to our understanding of ancient Maya civilization. He has helped to dispel the myth of the "pristine landscape," according to which American Indians had only a minimal impact on their environment. Beach's overarching contribution has been to show how the geosciences can paint a detailed and nuanced portrait of cultural ecological history that does not succumb to an overly simplistic environmental determinism. His work illustrates how such a portrait can be realistic, scientific, and humanistic when colored by a fine appreciation of the complexity of human agency and filled in by sufficiently detailed and diverse data.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Chemistry: Definition
- ▶ Chan: A Tropical Rain Forest Site in Belize
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Karstic Landscapes: Geoarchaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Mesoamerica: Complex Society Development
- ▶ Olmec: Geography and Culture
- ▶ People as Agents of Environmental Change
- ▶ Site Formation Processes
- ▶ Taphonomy, Regional
- ▶ Taphonomy: Definition
- ▶ Urban Dark Earth

References

Beach, T. 1998. Soil constraints on northwest Yucatán, Mexico: Pedoarchaeology and Maya subsistence at Chunchucmil. *Geoarchaeology* 13 (8): 759–791.

Beach, T., and S. Luzzadder-Beach. 2008. Aggradation around Kinet Höyük, an archaeological mound in the eastern Mediterranean, Turkey. *Geomorphology* 101 (3): 416–428.

Beach, T., S. Luzzadder-Beach, N. Dunning, J. Jones, J. Lohse, T. Guderjan, S. Bozarth, S. Millspaugh, and T. Bhattacharya. 2009. A review of human and natural changes in Maya lowlands wetlands over the Holocene. *Quaternary Science Reviews* 28: 1710–1724.

Dunning, N., D. Rue, T. Beach, A. Covich, and A. Traverse. 1998. Human-environment interactions in a tropical watershed: The paleoecology of Laguna Tamarindito, El Petén, Guatemala. *Journal of Field Archaeology* 25: 139–151.

Dunning, N., S. Luzzadder-Beach, T. Beach, J. Jones, V. Scarborough, and T. Culbert. 2002. Arising from the *bajos*: The evolution of a Neotropical landscape and the rise of Maya civilization. *Annals of the Association of American Geographers* 92 (2): 267–283.

Dunning, N., T. Beach, and S. Luzzadder-Beach. 2012. *Kax* and *kol*: Collapse and resilience in lowland Maya civilization. *Proceedings of the National Academy of Sciences* 109: 3652–3657.

Luzzadder-Beach, S., and T. Beach. 2009. Arising from the wetlands: Mechanisms and chronology of landscape aggradation in the northern coastal plain of Belize. *Annals of the Association of American Geographers* 99 (1): 1–26.

Luzzadder-Beach, S., T. Beach, and N. Dunning. 2012. Wetland fields as mirrors of drought and the Maya abandonment. *Proceedings of the National Academy of Sciences* 109: 3646–3651.

Beans: Origins and Development

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Basic Species Information

The genus *Phaseolus* comprises some 70–80 species (Freytag and Debouck 2002), distributed exclusively in the Americas (Delgado-Salinas et al. 2006) but with a clear focal point in Mexico and Central America. This region contains the largest number of species of the genus; it also harbors a very diverse range of environments in which the genus *Phaseolus* radiated following the last major tectonic event, namely, the appearance of the Transverse Volcanic Axis in Mexico. It is in this diverse landscape that five *Phaseolus* species were domesticated (Fig. 1). Of these five species, common bean (*P. vulgaris*) is by far the one with the broadest geographic distribution (Fig. 2) and largest agronomic, nutritional, and economic impact. Other domesticated species are runner bean (*P. coccineus*), tepary bean (*P. acutifolius*), lima bean (*P. lunatus*), and year bean (*P. dumosus*). In addition to the Mesoamerican domestications, two additional domestications took place in the Andes, one each for common bean (southern Andes, between southern Peru and northwestern Argentina) and lima bean (western Ecuador).

The five domesticated *Phaseolus* species have overlapping, yet distinct, geographic distributions, ecological adaptations, life histories, and reproductive systems (Table 1 and Fig. 2). Common bean grows in mesic environments (i.e., at intermediate temperatures [yearly average of

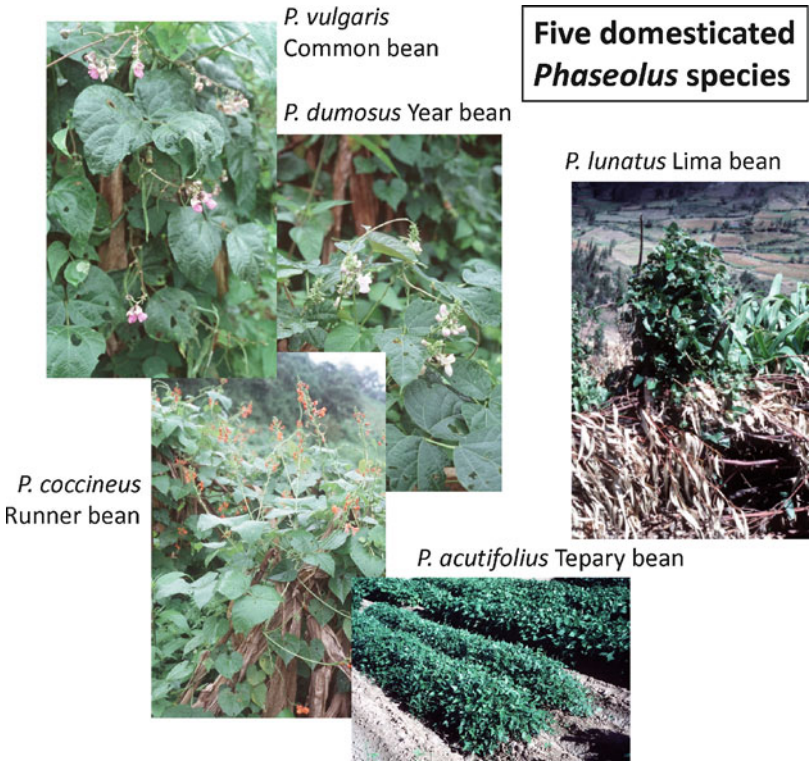

Beans: Origins and Development, Fig. 1 Five domesticated *Phaseolus* species. Lima bean is phylogenetically more distant from the other four species

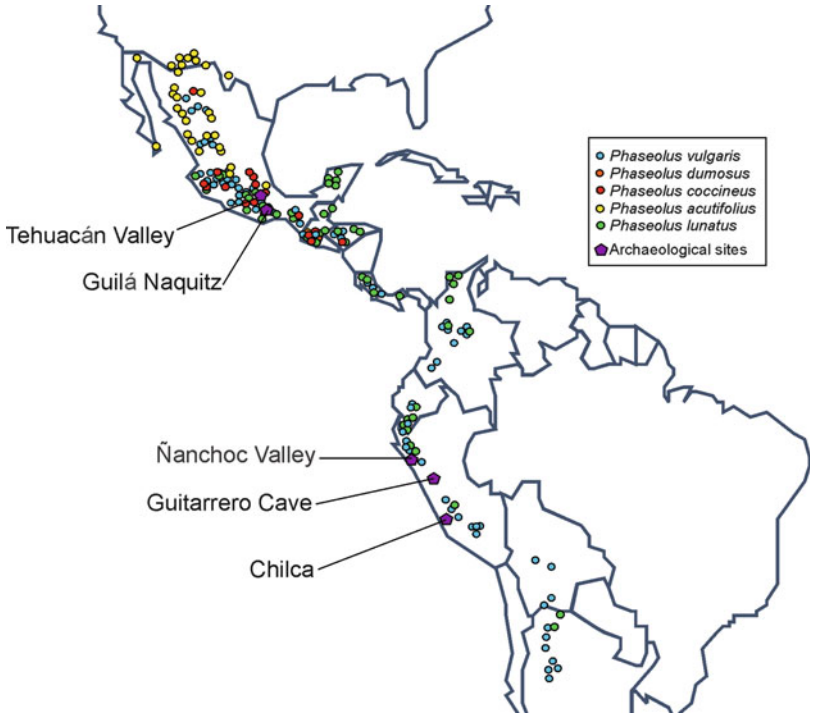

Beans: Origins and Development, Fig. 2 Geographic distribution of the wild progenitors of the five domesticated *Phaseolus* species and sites with the oldest *Phaseolus* archaeobotanical remains (see Table 2)

Beans: Origins and Development, Table 1 Comparative of five domesticated *Phaseolus* species

	Common bean	Year bean	Runner bean	Tepary bean	Lima bean
Growth habit	Upright bush to climbing; includes bush determinate	Climbing	Mostly climbing; some bush, including bush determinate	Prostrate bush	Upright bush to climbing; includes bush determinate
Reproduction	Predominantly selfing	Predominantly outcrossing	Predominantly outcrossing	Selfing, cleistogamous	Selfing to outcrossing
Adaptation	Mesic	Mesic to cool	Cool, humid	Hot, dry	Selfing to outcrossing
Number of domestications	2	1	1 or 2	1	2
Locations of domestication	West-central Mexico	Guatemala	Mexico	Northwest Mexico	Mesoamerica and Ecuador/N. Peru

24 °C] and rainfalls [around 600 mm/year]) at the transition between dry, deciduous, and pine forests. This species is annual with cycle lengths for most varieties from 80 to 120 days. Its reproductive system is primarily autogamous.

Nevertheless, bursts of outcrossing can take place occasionally, which can significantly affect the distribution of genetic diversity within and among populations (Papa et al. 2005; Zizumbo-Villarreal et al. 2005). Runner bean is the domesticated bean species with adaptation to the coolest (and humid) environments. Its tuberous root system, in addition, provides a way for plants to survive winter frosts as new stems can regrow from the roots. Thus, this species is also perennial, surviving for several years. It is an allogamous species, which relies obligatorily on foraging by carpenter bees and humming birds for seed production (Búrquez and Sarukhán 1980). In contrast with runner bean, tepary bean originated in

warmer, arid environments. It is a short-lived (part of its drought adaptation) annual species, with a highly selfing (even cleistogamous) reproductive system. Lima bean is perhaps the species with the broadest adaptation of all five domesticated species. It is generally grown in warmer, more humid environments. It is a long-lived, annual species with a mixed autogamous-allogamous reproductive system. Finally, as a stabilized hybrid between common and runner beans, the year bean has intermediate characteristics between these two parental species.

Domestication has induced drastic changes in the two most domesticated *Phaseolus* species, common and lima bean. These two species show the full array of traits characteristic of crop domestication (the "domestication syndrome"). In these seed-propagated crops, two domestication traits stand out. Compared to their wild progenitors, domesticated varieties show a reduction or elimination of seed dormancy and dispersal. As a consequence, domesticated common and lima beans have ready germination and limited grain loses from premature pod shattering. In addition, in contrast with wild ancestors, which have exclusively a climbing, viny growth habit with indeterminate branches, these two domesticates' growth habits range from viny to a more compact growth habit with fewer and shorter branches. In some cases, domesticated varieties have a bush growth habit and determinate branches. This trend to smaller plants correlates with a more precocious life cycle, an essential characteristic of most agricultural production systems. Additional changes included gigantism (increase in organ size, especially pods and seeds); development of photoperiod insensitivity, which broadened latitudinal adaptation; acquisition of broad phenotypic diversity for the principal harvested organ pods and especially seeds (e.g., the colorful array of domesticated bean seeds) as a result of selection for novelty; and reduction in toxic compounds, such as the cyanogenic glycosides in lima bean. The inheritance of the domestication syndrome has been investigated in common bean (Koinange et al. 1996). The results show that the inheritance of the domestication syndrome in common bean was relatively simple genetically; few, major genes were responsible for a majority of the phenotypic variation (i.e., domestication traits have a generally high heritability). In addition, these genes are distributed on few chromosomes, and several crucial genes seem to be loosely linked. This genetic architecture would allow a relatively speedy evolution under domestication, provided selection was applied regularly and with sufficient strength (Gepts 2004).

Timing and Tracking Domestication

Molecular analyses in wild and domesticated forms of the various domesticated *Phaseolus* species have provided a picture of "hyperdomestication" in the genus. Not only are there five different domesticated species, but two species – common and lima bean – have been domesticated twice (Fig. 1). Common bean was domesticated in western Mexico and the southern Andes (Kwak et al. 2009; Kwak and Gepts 2009; Chacón et al. 2005). Likewise, lima bean was domesticated in Mexico and Ecuador (Gutiérrez-Salgado et al. 1995; Serrano-Serrano et al. 2012). In both species, these two domestications occurred in distinct geographic regions from already diverged wild progenitors (named the Mesoamerican and Andean gene pools). Runner bean was domesticated once (and possibly twice) in Mexico (Angioi et al. 2009). In contrast, both tepary and year bean were domesticated only once, in northwestern Mexico and Guatemala, respectively (Schinkel and Gepts 1988, 1989; Freytag and Debouck 2002; Blair et al. 2012). Within species, some traits have appeared multiple times, adding to the picture of hyperdomestication. One example in common bean is the multiple origin of the determinacy, which originated independently four times in the Andean gene pool and once in the Andean gene pool, based on DNA sequence data of the gene responsible for the determinacy phenotype (Kwak et al. 2012). This sequence or a related one is also responsible for the presence of

Beans: Origins and Development, Table 2 Oldest archaeobotanical remains of *Phaseolus* spp.

Location	Taxon (status)	Type	^{14}C Age (year B.P.)	Age (year cal. B.P.)	Source
Andes					
Ñanchoc Valley, Peru	*Phaseolus sp.* (domesticated)	Starch grains from teeth calculus	8,210–6,970	8,600–7,000	Piperno and Dillehay (2008)
Chilca, Peru	*P. lunatus* (domesticated)	Pod, non-carbonized	5,600	6,400	Kaplan and Lynch (1999)
Guitarrero Cave, Peru	*P. vulgaris* (domesticated)	Seed, non-carbonized	4,300	5,000	Kaplan and Lynch (1999)
Mesoamerica					
Oaxaca Valley, Mexico	Phaseolinae (wild)	Seed and pod, non-carbonized	7,600	8,300	Kaplan and Lynch (1999)
Tehuacán Valley, Mexico	*P. vulgaris* (domesticated)	Pod, non-carbonized	2,285	2,300	Kaplan and Lynch (1999)
Tehuacán Valley, Mexico	*P. acutifolius* (domesticated)	Seed, non-carbonized	2,360	2,400	Kaplan and Lynch (1999)
Tehuacán Valley, Mexico	*P. coccineus* (domesticated)	Seed, non-carbonized	410	500	Kaplan and Lynch (1999)

determinacy in Mesoamerican and Andean lima beans and in runner bean.

The overall picture created by these domestication studies is one in which farmers have actively shaped the domesticated diversity of beans at multiple taxonomic levels and times and in different areas of the Americas where the genus *Phaseolus* originated. Rather than relying on a single domesticate such as in maize, farmers have adopted different bean species for cultivation in different environments and have further selected – presumably independently – similar phenotypic variation. This may have been made possible by the relatively young age of the genus *Phaseolus* (4–5 Ma; Delgado-Salinas et al. 2006) such that the domestication potential was maintained in part of the genus, while allowing for the development of differential adaptation among species (Kwak et al. 2012).

Archaeological and linguistic data point to the antiquity of bean cultivation both in Mesoamerica and Andean South America. The first archaeobotanical remains of *Phaseolus* were identified in Peru in the nineteenth century (de Candolle 1882). Since then, additional remains have been obtained in both regions (Table 2 and Fig. 2), the oldest of which suggests a presence of domesticated forms by 8,000 years B.P. (^{14}C age) in Peru but only 2,300 years B.P. (^{14}C age) in Mexico. Glottochronological analyses show that the oldest language for which a term for bean has been identified is a Proto-Mayan language (3,400 B.P.; Brown 2006).

The fact that the oldest age available was obtained from micro-remains rather than macro-remains and the glottochronological data suggests that current dates for bean domestication are most likely underestimates. Furthermore, many of the remains originated in very arid areas, outside the distribution of wild progenitors and putative domestication areas determined by genetic means (e.g., west-central Mexico for one of the two common bean domestications: Kwak et al. 2009). Thus, a more active search for archaeobotanical micro-remains (starch grains, phytoliths) in late pre-agricultural or early agricultural contexts should be pursued.

Cross-References

▶ Agriculture: Definition and Overview
▶ Andes: Prehistoric Art

- ▶ Andes: Prehistoric Period
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Flannery, Kent Vaughn
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Maize: Origins and Development
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Mesoamerica: Complex Society Development
- ▶ Mesoamerica: Strengths and Weaknesses of the Current Classification
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Mesoamerica's Archaic Period
- ▶ Mexico's Heritage and Management
- ▶ Phytolith Studies in Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Squash: Origins and Development

References

Angioi, S.A., F. Desiderio, D. Rau, E. Bitocchi, G. Attene, and R. Papa. 2009. Development and use of chloroplast microsatellites in *Phaseolus* spp. and other legumes. *Plant Biology* 11: 598–612.

Blair, M.W., W. Pantoja, and L.C. Muñoz. 2012. First use of microsatellite markers in a large collection of cultivated and wild accessions of tepary bean (*Phaseolus acutifolius* A. Gray). *Theoretical and Applied Genetics* 125: 1137–1147.

Brown, C.H. 2006. Prehistoric chronology of the common bean in the New World: The linguistic evidence. *American Anthropologist* 108: 507–516.

Búrquez, A., and J. Sarukhán. 1980. Biología floral de poblaciones silvestres de *Phaseolus coccineus* L. I. Relaciones planta-polinizador. *Boletín de la Sociedad Botánico de México* 39: 5–25.

Chacón, S.M.I., B. Pickersgill, and D.G. Debouck. 2005. Domestication patterns in common bean (*Phaseolus vulgaris* L.) and the origin of the Mesoamerican and Andean cultivated races. *Theoretical and Applied Genetics* 110: 432–444.

De Candolle, A. 1882. *L'origine des plantes cultivées. [The origin of cultivated plants]*. New York: Appleton.

Delgado-Salinas, A., R. Bibler, and M. Lavin. 2006. Phylogeny of the genus *Phaseolus* (Leguminosae): A recent diversification in an ancient landscape. *Systematic Botany* 31: 779–791.

Freytag, G.F., and D.G. Debouck. 2002. *Taxonomy, distribution, and ecology of the genus Phaseolus (Leguminosae – Papilionoideae) in North America, Mexico and Central America*. Fort Worth: Botanical Research Institute of Texas.

Gepts, P. 2004. Domestication as a long-term selection experiment. *Plant Breeding Reviews* 24 (Part 2): 1–44.

Gutiérrez Salgado, A., P. Gepts, and D. Debouck. 1995. Evidence for two gene pools of the Lima bean, *Phaseolus lunatus* L., in the Americas. *Genetic Resources and Crop Evolution* 42: 15–22.

Kaplan, L., and T. Lynch. 1999. *Phaseolus* (Fabaceae) in archaeology: AMS radiocarbon dates and their significance for pre-Columbian agriculture. *Economic Botany* 53: 261–272.

Koinange, E.M.K., S.P. Singh, and P. Gepts. 1996. Genetic control of the domestication syndrome in common-bean. *Crop Science* 36: 1037–1045.

Kwak, M., and P. Gepts. 2009. Structure of genetic diversity in the two major gene pools of common bean (*Phaseolus vulgaris* L., Fabaceae). *Theoretical and Applied Genetics* 118: 979–992.

Kwak, M., J.A. Kami, and P. Gepts. 2009. The putative Mesoamerican domestication center of *Phaseolus vulgaris* is located in the Lerma-Santiago basin of Mexico. *Crop Science* 49: 554–563.

Kwak, M., O. Toro, D. Debouck, and P. Gepts. 2012. Multiple origins of the determinate growth habit in domesticated common bean (*Phaseolus vulgaris* L.) *Annals of Botany*: online.

Papa, R., J. Acosta, A. Delgado-Salinas, and P. Gepts. 2005. A genome-wide analysis of differentiation between wild and domesticated *Phaseolus vulgaris* from Mesoamerica. *Theoretical and Applied Genetics* 111: 1147–1158.

Piperno, D.R., and T.D. Dillehay. 2008. Starch grains on human teeth reveal early broad crop diet in northern Peru. *Proceedings of the National Academy of Sciences* 105: 19622–19627.

Schinkel, C., and P. Gepts. 1988. Phaseolin diversity in the tepary bean, *Phaseolus acutifolius* A. Gray. *Plant Breeding* 101: 292–301.

Schinkel, C., and P. Gepts. 1989. Allozyme variability in the tepary bean, *Phaseolus acutifolius* A. Gray. *Plant Breeding* 102: 182–195.

Serrano-Serrano, M.L., R.H. Andueza-Noh, J. Martínez-Castillo, D.G. Debouck, and S.M.I. Chacón. 2012. Evolution and domestication of Lima bean in Mexico: Evidence from ribosomal DNA. *Crop Science* 52: 1698–1712.

Zizumbo-Villarreal, D., P. Colunga-GarcíaMarín, E. Payró De La Cruz, P. Delgado-Valerio, and P. Gepts. 2005. Population structure and evolutionary dynamics of wild–weedy–domesticated complexes of common bean in a Mesoamerican region. *Crop Science* 35: 1073–1083.

Beaudry, Mary C.

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Basic Biographical Information

Mary Carolyn Beaudry is an anthropological archaeologist who has specialized in historical archaeology, mainly in the eastern United States, and has made broad theoretical and practical contributions to household archaeology, the archaeology of gender and inequality, and archaeological material culture studies.

Beaudry received her first degree in Anthropology from the College of William and Mary (1973) and her M.A. (1975) and Ph.D. (1980) in Anthropology from Brown University. Beaudry was advised at Brown by James Deetz, who made a long-lasting impact on her research: an influence most visible in her doctoral thesis, *"Or What Else You Please to Call It": Folk Semantic Domains in Early Virginia Probate Inventories* – which used probate inventories to study the material culture of Virginian households in the seventeenth and eighteenth centuries.

A period working in the cultural resource management sector during the 1980s led to a series of scholarly publications, most notably the 3-volume *Interdisciplinary Investigations of the Boott Mills, Lowell, Massachusetts*, which was edited by Steve Mrozowski. In this publication, Beaudry pioneered methods of associating excavated assemblages with historical households, reconstructed from documentary sources. In 1996, her account of the "boarding households" of nineteenth-century Lowell, written to Mrozowski and Grace Ziesing, contributed an important empirical case study to the development of the archaeology of gender in the United States. Beaudry's edited volume, *Documentary Archaeology in the New World*, developed her interests in the archaeological use of historical documents further.

Major Accomplishments

Beaudry's research into material culture has developed in both theoretical directions – for example, in her 2001 paper with Anne Yentsch on "American Material Culture in Mind, Thought, and Deed" or in her coedited volume *The Oxford Handbook of Material Culture Studies* (2010, edited with Dan Hicks) – and in more applied directions, for example, with her introduction to *Findings: The Material Culture of Needlework and Sewing* (2006). A central theme in such work has been the idea that archaeological material culture can provide distinctive insights into otherwise undocumented lives.

Her most sustained contributions to archaeology have, however, been a series of influential reflections on method and theory in historical archaeology – from her 1996 account of "reinventing historical archaeology" to her coedited *Cambridge Companion to Historical Archaeology* (2006, edited with Dan Hicks).

Beaudry has been an active member of the Society for Historical Archaeology (serving as President in 1989), as well as the Council for Northeast Historical Archaeology, and has been a leading figure in the development of international collaborations and exchanges in historical archaeology, especially between the UK and the USA. While Beaudry's fieldwork has led her as far afield as the Outer Hebrides and Montserrat, it is her sustained contributions to the archaeology of early American life in the eastern United States and to the archaeology of gender and households that has dominated her publication record.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Archival Research and Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Consumption, Archaeology of
- ▶ Deetz, James (Historical Archaeology)
- ▶ Engendering Historical Archaeology
- ▶ Households and Domesticity: Historical Archaeology

▶ Industrial Archaeology
▶ Labor Archaeology
▶ Modern World: Historical Archaeology
▶ North America (USA): Historical Archaeology
▶ Plimoth Plantation: Public Archaeology
▶ Semiotics in Archaeological Theory
▶ Social Identity in Historical Archaeology
▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
▶ Urban Archaeology

References

Beaudry, M.C. 2006. *Findings: The material culture of needlework and sewing*. New Haven: Yale University Press.

Beaudry, M.C., and D. Hicks, eds. 2006. *The Cambridge companion to historical archaeology*. Cambridge: Cambridge University Press.

Hicks, D., and M.C. Beaudry, eds. 2010. *The Oxford handbook of material culture studies*. Oxford: Oxford University Press.

Yentsch, A.E., and M.C. Beaudry. 2001. American material culture in mind, thought, and deed. In *Archaeological theory today*, ed. I. Hodder, 214–240. Cambridge: Polity Press.

Further Reading

Beaudry, M.C. 1980. "Or what else you please to call it": Folk semantic domains in early Virginia probate inventories. Unpublished Ph.D. dissertation, Brown University.

Beaudry, M.C. 1984. Archaeology and the historical household. *Man in the Northeast* 28: 27–38.

Beaudry, M.C. 1988. Words for things: Linguistic analysis of probate inventories. In *Documentary archaeology in the New World*, ed. M.C. Beaudry, 43–50. Cambridge: Cambridge University Press.

Beaudry, M.C. 1989a. Household structure and the archaeological record: Examples from new world historical sites. In *Households and communities: Proceedings of the 21st Annual Chacmool Conference*, ed. S. MacEachern, D.J.W. Archer, and R.D. Garvin, 84–92. Alberta: Department of Archaeology, University of Calgary.

Beaudry, M.C. 1989b. *Interdisciplinary investigations of the Boott Mills, Lowell, Massachusetts, Volume III: The boarding house system as a way of life*, Cultural Resources Management series. Vol. 21. Boston: National Park Service, North Atlantic Regional Office.

Beaudry, M.C. 1994a. Women historical archaeologists: who's counting? In *Equity issues for women in archaeology*, Archaeological Papers of the American Anthropological Association, ed. M.C. Nelson, S.M. Nelson, and A. Wylie, vol. 5, 225–228. Washington, DC: American Anthropological Association.

Beaudry, M.C. 1994b. Cowgirls with the blues? A study of women's publication and the citation of women's work in historical archaeology. In *Women in archaeology*, ed. C.P. Claassen, 138–158. Philadelphia: University of Pennsylvania Press.

Beaudry, M.C. 1996. Reinventing historical archaeology. In *Historical archaeology and the study of American culture*, ed. B.L. Herman and L.A. De Cunzo, 473–497. Winterthur: Henry Francis du Pont Winterthur Museum.

Beaudry, M.C. 1999. House and household: The archaeology of domestic life in early America. In *Old and new worlds*, ed. G. Egan and R.L. Michael, 117–126. Oxford: Oxbow Books.

Beaudry, M.C. 2001. Of crofters, kelp, and greed: Perspectives from historical archaeology on 18th- and 19th-century life on South Uist in Scotland's Outer Hebrides. *Context* 16: 29–31.

Beaudry, M.C. 2004. Doing the housework: New approaches to the archaeology of households. In *Household chores and household choices: Theorizing the domestic sphere in historical archaeology*, ed. K.S. Barile and J.C. Brandon, 254–262. Tuscaloosa: University of Alabama Press.

Beaudry, M.C. 2005. Concluding comments: Revolutionizing industrial archaeology. In *Industrial archaeology: New directions*, ed. E. Conlin Casella and J. Symonds, 301–314. New York: Springer.

Beaudry, M.C. 2006. Stories that matter: Material lives in 19th-century Boston and Lowell, Massachusetts, USA. In *Cities in the world 1500–2000: Proceedings of the Society for Post-Medieval Archaeology Conference*, ed. A. Green and R. Leech, 249–268. London: Maney Publishing.

Beaudry, M.C. 2010. Privy to the feast: 'Eighty to supper tonight'. In *Table settings: The material culture and social context of dining, AD 1700–1900*, ed. J. Symonds, 62–79. Oxford: Oxbow Books.

Beaudry, M.C., ed. 1988. *Documentary archaeology in the New world*. Cambridge: Cambridge University Press.

Beaudry, M.C., and E.P. Berkland. 2007. The archaeology of the African Baptist meeting house of Nantucket, Massachusetts. In *Archaeology of Atlantic Africa and African Diaspora*, ed. A. Ogundiran and T. Folala, 395–412. Bloomington: Indiana University Press.

Beaudry, M.C., and S.A. Mrozowski, eds. 1987a. *Interdisciplinary investigations of the Boott Mills, Lowell, Massachusetts, Volume I: Life in the boarding houses: A preliminary report*, Cultural Resources Management series. Vol. 18. Boston: National Park Service, North Atlantic Regional Office.

Beaudry, M.C., and S.A. Mrozowski, eds. 1987b. *Interdisciplinary investigations of the Boott Mills, Lowell, Massachusetts, Volume II: The Kirk Street agents' house*, Cultural resources management series. Vol. 19.

Boston: National Park Service, North Atlantic Regional Office.
Beaudry, M.C., and S.A. Mrozowski. 2001. Cultural space and worker identity in the company city: 19th-century Lowell, Massachusetts. In *The archaeology of urban landscapes: Explorations in slumland*, ed. A. Mayne and T. Murray, 118–131. Cambridge: Cambridge University Press.
Beaudry, M.C., and J. Symonds, eds. 2011. *Interpreting the early modern world: Transatlantic perspectives*. New York: Springer.
Beaudry, M.C., K.J. Goldstein, and C. Chartier. 2003. Archaeology of the Plymouth colony in Massachusetts. *Avalon Chronicles* 8: 155–186.
Mrozowski, S.A., G.H. Ziesing, and M.C. Beaudry. 1996. *Living on the Boott: Historical archaeology in 19th-century Lowell, Massachusetts*. Amherst: University of Massachusetts Press.
Walker, J., M.C. Beaudry, and D. DiZeriga Wall. 2011. Poverty in depth: A new dialogue. *International Journal of Historical Archaeology* 15: 629–636.
White, C.L., and M.C. Beaudry. 2009. Artifacts and personal identity. In *The international handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 209–225. New York: Springer.
Yentsch, A.E., and M.C. Beaudry, eds. 1992. *The art and mystery of historical archaeology: Essays in honor of James Deetz*. Boca Raton: CRC Press.

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Basic Biographical Information

Sir John Davidson Beazley (1885–1970) was a founding figure in the modern study of Greek ceramics. Building on (then innovative) nineteenth-century modes of stylistic analysis, he refined a system of attribution and identification, for Attic pottery with black- and red-figure decoration from the sixth to fourth centuries BCE. He was born in Glasgow, Scotland, to Mark John Murray Beazley and Mary Catherine Davidson. He attended King Edward VI School in Southampton and Christ's Hospital before enrolling in Balliol College, Oxford University. There he excelled and was tutored by the well-known classicists Cyril Bailey and A.W. Pickard-Cambridge. In 1908 he was elected as student and tutor at Christ Church, a position he held until 1925, when he became the Lincoln Professor of Classical Archaeology at Oxford, a position he would hold for the next 30 years. He was knighted in 1949. He met Marie Bloomfield in 1913 and married her on August 13, 1919. They lived and traveled together for forty-eight years, until her death in 1967. Beazley died on May 6, 1970 in Oxford. He and his wife had no children (Ashmole 1970).

Major Accomplishments

Beazley's contribution to the field of Greek archaeology is immense, demonstrated by the publication of over 250 articles and monographs on Greek vase painting and other topics of Classical antiquity (Ashmolean Museum 1967: 177–188). He systematically identified and attributed "hands" of specific vase painters, who were otherwise unknown, by examining the inherent style expressed in their painting. His methodology was based heavily on Giovanni Morelli and Bernard Berenson, who used a similar method to study Renaissance painting (Kurtz 1985: 236). Adolf Fürtwangler, Paul Hartwig, and Friedrich Hauser also influenced his work, although Beazley differentiated himself from these scholars by his emphasis on vase painters of all qualities, not just the masters, and stylistic analysis. Beazley's technique involved the analysis of details such as ears, eyes, drapery of fabric, and decorative details like borders, with the belief that such features were formulaically repeated by an artist (Ashmole 1970: 453–4). In this way, he identified both individual artists and workshops of painters working under one master. His method allowed for the refinement of relative chronology in pottery playing a major role in the dating of archaeological contexts, and his method remains the foundation on which approaches to iconographic and iconological studies in Classical art are based. Scholars such as Martin Robertson and Richard Neer, among others, have since addressed problematic aspects of Beazley's methodology

and attributions (Robertson 1976; Neer 1997). Beazley's most substantial publications were volumes on both red- and black-figure Athenian vase painters from the Archaic and Classical periods. These were *Attic Red-Figure Vase-Painters* (1942) and *Attic Black-Figure Vase-Painters* (1956). In addition, he produced monographs on vases in a large number of collections around the world and wrote a number of works on the Berlin Painter, whom he considered to be his favorite (Ashmole 1970: 454). The "Beazley Archive," built from his collection of photographs, drawings, and notes, is housed at the Ashmolean Museum but also exists as a major online database (http://www.beazley.ox.ac.uk/index.htm). It is now one of the quintessential sources for the study of Greek vases (Beazley Archive n.d.). Students of Beazley, who studied under him at Oxford or trained closely in his methodologies, include Humfry Payne, T. J. Dunbabin, Llewelyn Brown, Dietrich von Bothmer, A.D. Trendall, and Martin Robertson (Ashmole 1970: 451–2).

Cross-References

- ▶ Ceramics, Ancient Greek
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Iconography in the Roman World
- ▶ Symposion

References

Ashmole, B. 1970. Sir John Beazley. *Proceedings of the British Academy* 56: 443–461.

Ashmolean Museum. 1967. *A select exhibition of Sir John and Lady Beazley's gifts, 1912–1966*. London: Oxford University Press.

Beazley, J.D. 1942. *Attic red-figure vase-painters*. Oxford: Clarendon Press.

Beazley, J.D. 1956. *Attic black-figure vase-painters*. Oxford: Clarendon Press.

Beazley Archive. n.d.. Available at: http://www.beazley.ox.ac.uk/index.htm. Accessed 16 Aug 2011.

Kurtz, D.C. 1985. Beazley and the connoisseurship of Greek vases. *Greek Vases in the J. Paul Getty Museum* 2: 237–250.

Neer, R. 1997. Beazley and the language of connoisseurship. *Hephaistos* 15: 7–30.

Robertson, M. 1976. Beazley and after. *Münchner Jahrbuch der Bildenden Kunst* 27: 29–46.

Beck, Wendy E.

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Basic Biographical Information

Wendy Elizabeth Beck is an Australian archaeologist. She grew up in Melbourne, attended Laburnum Primary School, and graduated from Methodist Ladies College, Kew, in 1975. She completed a B.Sc. at the University of Melbourne during 1976–1978 with a double major in microbiology and biochemistry. After attending a Summer School held by the Victorian Archaeological Survey in 1978–1979, she was converted to archaeology and undertook postgraduate study in prehistory at LaTrobe University (1979–1985). While there she took part in several large research excavations (see Fig. 1). In 1981 she was awarded a Visiting Fellowship from the Australian Institute of Aboriginal Studies which funded her research into Aboriginal toxic food plant processing. Her Ph.D. was awarded in

Beck, Wendy E., Fig. 1 Wendy Beck excavating at Moonlight Head, Victoria, in 1980 (Photo: D. Frankel)

1986 and her principal thesis supervisors were Drs. David Frankel and Neville White, together with AIATSIS mentor Dr. Betty Meehan. Her Ph.D. *Technology, Toxicity and Subsistence: A Study of Australian Aboriginal Plant Food Processing* was the first Victorian doctorate awarded in Australian archaeology and included fieldwork in Arnhem Land in addition to laboratory research. In 1985 she worked as a postdoctoral Fellow (Australian National University) on a bush food dietary project sponsored by the Office of the Supervising Scientist in the Alligator Rivers Region of the Northern Territory. In 1986 she was appointed Lecturer to the Department of Archaeology and Palaeoanthropology, University of New England, NSW, where she is currently employed as Associate Professor.

Beck, Wendy E., Fig. 2 Wendy Beck at Barley Fields Lagoon, New South Wales, in October 2012 (Photo: J. Appleton)

Major Accomplishments

Her most significant contributions to archaeology fall into several fields:

1. Plants and Gendered Archaeology (1981–Present)

Her Ph.D. research concerned Aboriginal plant knowledge and included analysis of a range of different sources: archaeology, ethnographic fieldwork in northern Australia, and documentary resources, as well as laboratory work in chemistry and genetics. She was also interested in the survival and recovery of macroscopic and microscopic plant remains. She coedited the first volume which comprehensively reviewed practical methods as well as research case studies of archaeological plants in Sahul (Beck et al. 1989). Another related issue is gendered archaeology, and she also researches links between plants and women in prehistory as well as women as archaeologists and researchers (Balme & Beck 1995).

2. Place Studies in Archaeology (1989–Present)

Major research interests are how archaeology helps to understand how and why people used spaces and the concept of place as an organizing principle. In her research, there are a number of levels from World Heritage areas, through regions, down to the individual site. Her research in Indigenous community archaeology has also included a number of scales, ranging from the spatial analysis of a single rockshelter (Balme & Beck 2002) to spatial patterns at Gumbaingirr nation level (Beck & Somerville 2002) to upland wetland landscapes (Beck 2006a) (see Fig. 2) and World Heritage places (Beck 2006b). This research has been funded by five Australian Research Council grants. The *Yarrawarra Place Book* series was published jointly by UNE and Yarrawarra Aboriginal Corporation and represented a major research outcome for the 1997 ARC Industry Collaborative Grant project "Ecotourism on the Mid-North Coast of NSW." It presents original research results in archaeology, oral history, and history but presented in an accessible interpretative form. The books and accompanying teacher's kit were shortlisted for a publishing award (The Australian Educational Publishing Awards) and awarded the 2001 ATSIC Many Rivers NAIDOC Community Achievement Award. The first book of the series

(*Arrawarra: Meeting Place*) was also used to develop a school teaching kit with the Australian Marine Parks Authority in 2006. Professor Rosemary Joyce wrote:

> Some of the most engaging contemporary archaeological writing, works that exploit the possibilities of narrative and dialogue to the fullest. . .a series of five interpretative booklets published by the University of New England and the Yarrawarra Aboriginal Corporation. . . .Embedded in a narrative of place, the archaeological reports work both as alternative forms of knowing the place, and as clearly positioned voices with a unique, and consequently valuable, perspective (Joyce 2002: 128).

3. Learning and Teaching in Higher Education (2004–Present)

She has contributed to developing and applying standards in archaeology study, stressing the range of transferable and subject-specific skills which can be gained, as well as how general Humanities degrees can assist students to become employable. In 2009 she was awarded an ongoing Teaching Fellowship by the Australian Learning and Teaching Council for "Improving Graduate Employability by Implementing Subject Benchmarks" which has funded some of her research on standards (Beck & Clarke 2008; Sinclair & Beck in press).

4. Service to the Archaeology Profession (1980–Present)

While in Melbourne as a postgraduate, she was a member and Secretary of the Anthropological and Archaeological Society of Victoria, and after moving to UNE, she became President of the Australian Archaeological Association in 1989–1990. She was founding Chair of the Australian National Committee on Archaeology Learning and Teaching (an AAA subcommittee) in 2005 and continues in an active role. She has been a member of many UNE committees, including Academic Board, Promotions, Ph.D., and Teaching and Learning.

She is a successful earner of competitive research grants and has been awarded over 20 external research grants, worth over $2 million dollars (AUD). Wendy Beck has also been an Australian Research Council (ARC) Assessor for archaeology grant applications from 2001 until the present, and she has reviewed at least 200 ARC applications. She has also completed two large reports for the NSW National Parks and Wildlife Service, *A Cultural Heritage Assessment of Mt. Yarrowyck* (2003 with Somerville, Duley & Kippen) and *Aboriginal Cultural Heritage Offsets in Mining Areas* (2011 with Bartel).

She also has a successful record in fostering the research of others. At UNE she runs successful one-day research writing "retreats" for a wide variety of groups, including both postgraduates as well as Professors (Beck et al. 2008). She has supervised a steady throughput of graduated Higher Degree Research students (D. Donlon, P. Gaynor, R. Cliff, A. Gorman, H. Burke, R. James, D. Vale, S. Martin, R. Fife, C. Clarke) together with B.A. (hons) and dissertation students, most of whom have continued with archaeological careers.

Cross-References

- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Frankel, David
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Heritage and Higher Education
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Meehan, Betty

References

Balme, J., and W. Beck. 2002. Starch and charcoal: useful measures of activity areas in archaeological rockshelters. *Journal of Archaeological Science* 29: 157–166.

Balme, J., and W. Beck, eds. 1995. *Gendered archaeology*, Occasional Papers in Prehistory series. Canberra: Department of Archaeology and Natural History, Australian National University.

Beck, W. 2006a. Aboriginal archaeology. In *High lean country. Land, people and memory in New*

England, ed. A. Atkinson, J. Ryan, I. Davidson, and A. Piper, 88–97. Sydney: Allen and Unwin.

Beck, W. 2006b. Narratives of world heritage in travel guidebooks. *International Journal of Heritage Studies* 12 (6): 521–535.

Beck, W., and M. Somerville. 2002. Embodied places in Indigenous ecotourism: The Yarrawarra project. *Australian Aboriginal Studies* 2002 (2): 4–13.

Beck, W., A. Clarke, and L. Head, eds. 1989. *Plants in Australian archaeology*, Tempus series. Vol. 1. Brisbane: University of Queensland Anthropology Museum.

Beck, W., K. Dunne, J. Fisher, J. O'Sullivan, and A. Sheridan. 2008. Turning up the heat: collaboration as a response to a chilly research environment. *TEXT* 12(2) online. Available at: http://www.textjournal.com.au (Accessed 1 Oct 2012).

Joyce, R. 2002. *The languages of archaeology, dialogue, narrative and writing*. Oxford: Wiley Blackwell.

Sinclair, A. & W. Beck. in press. Archaeology education 'standards' in Australia and the United Kingdom. *Research in Archaeological Education Journal*, online. Available at: http://www.heacademy.ac.uk/hca/archaeology/RAEJournal.

Further Reading

Balme, J., and W. Beck. 1996. Aboriginal mounds in south eastern Australia. *Australian Archaeology* 42: 39–52.

Beck, W. 1992. Aboriginal preparation of Cycas seeds in Australia. *Economic Botany* 46: 133–147.

Beck, W. 1994. Women in archaeology: Australia and the United States. In *Equity issues for women in archaeology*, Archaeological Papers of the American Anthropology Association, ed. P. Nelson, S. Nelson, and A. Wylie, vol. 5, 99–104. Washington, DC: American Anthropological Association.

Beck, W. in press. Did Australian hunter gatherers invent agriculture? Revisiting contested views of Aborigines and agriculture. *Contributions in Ethnobiology*. Society for Ethnobiology.

Beck, W., and J. Balme. 1994. Gender in Aboriginal archaeology: recent research. *Australian Archaeology* 39: 39–46.

Beck, W., and J. Balme. 2003. Dry rainforests: a productive habitat for Australian hunter-gatherers. *Australian Aboriginal Studies* 2003 (2): 4–20.

Beck, W., and J. Balme. 2005. Benchmarking for archaeology honours degrees in Australian universities. In Australian Archaeology 61, ed. S. Colley & S. Ulm (Special issue on education in archaeology, 32–40.

Beck, W. & C. Clarke. 2008. Archaeology teaching and learning in Australia 2003–2008. Perspectives from the academy. *Research in Archaeological Education Journal* 1 [electronic]. Available at: http://www.heacademy.ac.uk/hca/archaeology/RAEJournal.

Beck, W., and E. Dotte. in press. The analysis of plant macroremains. In *Archaeology in practice: a student's guide to archaeological analysis*, ed. J. Balme, and A. Paterson, 296–315 (for 2nd rev edn). Oxford: Blackwell.

Beck, W., and L. Head. 1990. Women in Australian prehistory. *Australian Feminist Studies* 11: 29–48.

Beck, W., and A. McConnell. 1986. The practice of archaeology in Victoria: A proposal for guidelines. *Artefact* 11: 3–11.

Beck, W., and M. Somerville. 2005. Conversations between disciplines: Historical archaeology and oral history at Yarrawarra. *World Archaeology* 37 (3): 467–482.

Beck, W., and R. Torrence. 2006. Starch pathways. In *Ancient starch*, ed. R. Torrence and H. Barton, 53–75. Walnut Creek: Left Coast Press.

Beck, W., R. Fullagar, and N.G. White. 1988. Archaeology and ethnography, the Aboriginal use of cycad as an example. In *Archaeology with ethnography*, Occasional Papers in Prehistory, ed. B. Meehan and R. Jones, vol. 15, 137–147. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University.

Beck, W., C. Brown, D. Murphy, T. Perkins, A. Smith, and M. Somerville. 2002. *Yarrawarra places. Making stories*, Yarrawarra Place Stories series. Vol. 5. Armidale: University of New England.

Beck, W., K. Dunne, J. Fisher, J. O'Sullivan & A. Sheridan. 2006. *A capella* and diva: A collaborative process for individual academic writing. *M/C Journal* 9(2), online. Available at: http://journal.media-culture.org.au/0605/09-divas.php (Accessed 1 Oct 2012).

Brown, C., W. Beck, T. Perkins, A. Smith, and M. Somerville. 2000. *The old camp*, Yarrawarra Place Stories series. Vol. 3. Armidale: University of New England.

Murphy, D., W. Beck, C. Brown, T. Perkins, A. Smith, and M. Somerville. 2000. *No-man's land: Camps at Corindi South*, Yarrawarra Place Stories series. Vol. 2. Armidale: University of New England.

Smith, A., and W. Beck. 2003. The archaeology of no man's land: Indigenous camps at Corindi Beach, mid north coast NSW. In *Archaeology in Oceania* 38. Special issue on cross-cultural contact in archaeology, ed. A. Clarke and A. Paterson, 63–74.

Smith, A., W. Beck, C. Brown, D. Murphy, T. Perkins, and M. Somerville. 2001. *Red Rock. Camps, holidays and exchange*, Yarrawarra Place Stories series. Vol. 4. Armidale: University of New England.

Somerville, M., W. Beck, C. Brown, T. Perkins, and A. Smith. 1999. *Arrawarra: Meeting place*, Yarrawarra Place Stories series. Vol. 1. Armidale: University of New England.

Theunissen, R., J. Balme, and W. Beck. 1998. Headroom and human trampling: Cave ceiling height determines the spatial patterning of stone artefacts at Petzkes Cave, northern NSW. *Antiquity* 72 (275): 80–89.

Webster, J., W. Beck, and B. Ternai. 1984. Toxicity and bitterness in Australian Dioscorea bulbifera L. and Dioscorea hispida Dennst. from Thailand. *Journal of Agricultural and Food Chemistry* 32: 1087–1090.

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Basic Biographical Information

Robert Bednarik (Figs. 1 and 2) was born in Vienna but since the 1970s has become a highly regarded Australian-based scholar achieving recognition in the field of prehistoric rock art with a host of publications and projects to his name. His foremost interest lies with the minds of ancient people and how they became human or "civilized;" the origins of the human ability, intellect, and imagination; and in a selection of fields that provide complementary information. This embraces the early stages of art and language and technological growth providing a gauge of early human faculties and capabilities, for example, seafaring, paleo-art of the Ice Age, stone tools, and the use of beads. This talented scholar retains a wry sense of humor despite his immense success and contributions to the field of archaeology, in particular rock art.

Major Accomplishments

Robert Bednarik has held a number of high-profile positions throughout his career. These include being a cofounder of the International Federation of Rock Art Organizations (IFRAO) in 1988; secretary of the Australian Rock Art Research Association (AURA), which he founded in 1983, and editor of its journal, *Rock Art Research*, and monograph series; a national coordinator of the International Comite pour l'art Rupestre (CAR), for the International Council on Monuments and Sites (ICOMOS); and being a member of the International Union of Prehistoric and Protohistoric Sciences (IUSPP) Commission on Rock Art.

Bednarik is a passionate champion of Aboriginal rights, energetically campaigning for Aboriginal control of sites of indigenous heritage, and is frequently engaged in endeavoring to thwart the destruction of rock art worldwide. He has also conducted comprehensive ethnographic research among Aborigines.

Bednarik has cultivated novel techniques for assessing weathering of silica minerals and for studying cave climate; has also created an apparatus to measure the porosity of rock; directed the first comprehensive survey of wall markings in caves; is the pioneer in the investigation of Pleistocene seafaring; and established taphonomic logic in 1993 and metamorphology in 1995. He was one of the earliest individuals in the world to date rock art directly with radiometric methods (reprecipitated carbonates in Malangine Cave, Australia); developed the first non-interfering rock art dating method (microerosion method, initially applied at Lake Onega, Russia); and was

Bednarik, Robert G., Fig. 1 Robert Bednarik at the entrance shaft of the cave art site near Mount Gambier

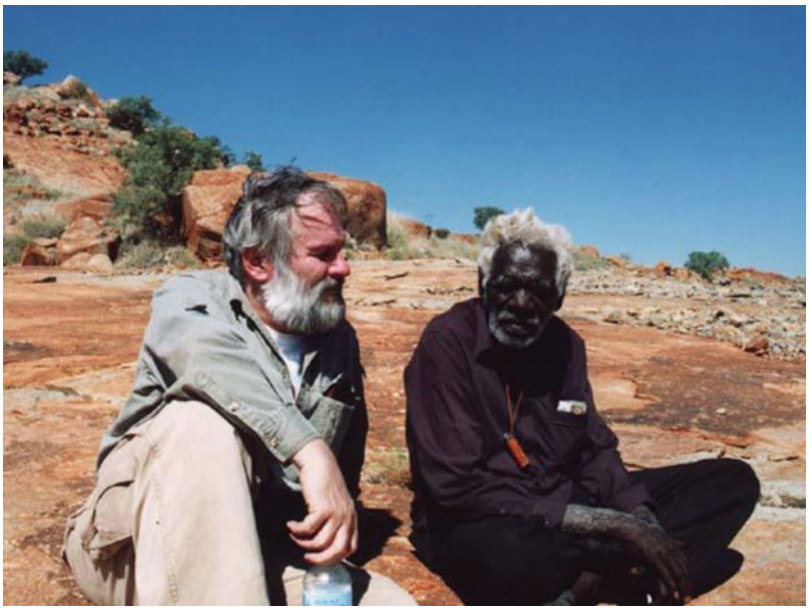

Bednarik, Robert G., Fig. 2 Senior Rock Art Custodian Monty Hale at huge eastern Pilbara petroglyph site, with IFRAO President R. G. Bednarik

an advocate for advanced statistics in Australian archaeology (Brainerd-Robinson method).

Many of the key scientific discoveries in several countries, including the oldest known rock art in the world, first Paleolithic art of China, first petroglyphs in central India, principal petroglyph concentration in the world (1967–1970, Dampier Archipelago, Western Australia), and a great deal of the cave art of Australia, are a credit to the remarkable work ethic of Bednarik.

Specialized Projects

Robert Bednarik's specialized projects include research into portable Paleolithic art of Eurasia and the beginnings of art and symbolism; early fieldwork at major Pilbara rock art concentrations in Western Australia, undertaken between 1967 and 1970; Pleistocene seafaring and maritime replication studies; and numerous geomorphological and sedimentary/pedological projects.

Robert Bednarik has published over 400 refereed scientific periodicals, in 32 languages, principally in cognitive epistemology and paleo-art studies, also general and replicative archaeology, soil science, speleology, deontology, semiotics, and geomorphology. His overall publication record is over 1200 print publications. He has appeared in several film documentaries and given an excess of 200 interviews with print and electronic media, in many parts of the world.

Robert Bednarik has conducted intensive fieldwork in across the world, especially in central, northern, eastern, western, and southern Europe. He has also undertaken fieldwork in Siberia, India, China, Canada, the USA, Mexico, the Caribbean, various South American countries, southern Africa, Morocco, and in all regions of Australia.

Cross-References

► Australian Paleoart
► Europe: Prehistoric Rock Art

Further Reading

Bednarik, R.G. 1997. The earliest evidence of ocean navigation. *International Journal of Nautical Archaeology* 26 (3): 183–191.

Bednarik, R.G. 2000. Crossing the Timor Sea by Middle Paleolithic raft. *Anthropos* 95: 37–45.

Bednarik, R.G. 2009. The Middle-Upper Paleolithic transition revisited. In *Sourcebook of Paleolithic transitions: Methods, theories and interpretations*, ed. M. Camps and P. Chauhan, 272–283. New York: Springer.

Bednarik, R.G. 2010. *The incredible human journey*. Documentary. (Performance R.G. Bednarik as himself. Season 1, Ep. 4).
Bednarik, R.G. 2011. *The human condition*. New York: Springer.
Bednarik, R.G. n.d. AURANET – Welcome to the home site of Australian Rock Art Research Association, Inc. Available at: http://home.vicnet.net.au/~auranet/aura/web/index.html (Accessed 22 Oct 2012).
Bednarik, R.G. n.d. Homepage. Available at: http://home.vicnet.net.au/~auranet/auraweb/web/index.html (Accessed 20 Oct 2012).
Martin, S. (dir.). 2008. First to cross the ocean. In *Naked Science*. Documentary. (Performance R.G. Bednarik as himself, Season 5, Episode 9).
Reddy, P.C., ed. 2006. *Exploring the mind of ancient man (Festschrift to Robert G. Bednarik)*. New Delhi: Research India Press.
Whitley, D.S., ed. 2001. *Handbook of rock art research*, 532–535. Walnut Creek: AltaMira Press.

Behavioral Archaeology

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Introduction

Behavioral archaeology is a social science with a unique approach to the study of human behavior. Inspired by the New Archaeology early in the 1970s, J. Jefferson Reid, William L. Rathje, and Michael B. Schiffer ambitiously redefined archaeology as a discipline that focused on the role objects play in all human activities past and present. By giving material objects an active role in behavior, they could extend the rigor of archaeological analyses of artifacts into other social science arenas, giving archaeology a more central role in the production of method and theory. Not surprisingly, behavioral archaeologists developed new models of inference for handling archaeological evidence and material culture. This has led to detailed studies of how technologies are developed and change as well as the extension of behaviorally oriented studies on subjects such as ritual and communication that have typically not been arenas for object-focused studies of behavior. Indeed, behavioral research anticipated the renewed interest in material culture studies described in the recent materiality literature (Hicks and Beaudry 2010).

Definition

Behavioral archaeology is a social science whose subject matter is the interaction between people and other objects (e.g., people, portable artifacts, architecture, places) in all times and places. At the core of behavioral archaeology is the recognition that material objects are not a separate realm acted upon by people but instead are an attribute of human action. In behavioral archaeology, human behavior is defined as interaction between people and things. The material matrix that envelopes people during their entire lives is the proper subject matter of those seeking to understand organization and change in human activities. Thus, behavioral archaeology, while a necessary component of any traditional archaeological research project, reaches beyond that role to understand the material matrix that is the human world of action.

Historical Background

The roots of this material culture-centered approach to behavior lie in reactions to functionalist (1940s and 1950s) and neoclassical evolutionary social theory (1960s and 1970s). In the 1940s and 1950s, functionalist archaeologists broke with visions of cultures as a historically contingent clustering of culture traits (e.g., pottery types, projectile point types, house forms) created by the migrations, innovations, or borrowing of their participants. By theorizing culture as a set of integrated institutions (kinship, religion, politics, economy), artifacts became indirect traces of human activities comprising these institutions. For example, treating artifacts and architecture as the indirect traces of activity led to settlement pattern studies in the 1950s and stimulated the rise of archaeological survey methods and further

inferences about political organization, technology, and human-environment relationships (see Willey and Sabloff 1980). The subsequent 1960s was a revolutionary time in archaeology that inspired many young graduate students to push archaeological boundaries.

New Archaeologists during the 1960s promoted a theoretically driven archaeology, arguing that new questions required new models of culture and its attributes. They redefined cultures as ecologically adapting systems that integrated people, objects, and energy. Employing a neo-evolutionary framework (White 1949), they analytically refashioned functional institutions into adaptive technological, social, and ideological subsystems (Binford 1962). They assumed that technology was at the heart of basic survival, and so these subsystems could be placed in a causal hierarchy with subsistence technologies as the sources of change whose effects rippled up through the social organizational and belief subsystems. New Archaeologists called the generalizations they used to describe causal relationships in these subsystems material correlates or correlates (e.g., Hill 1970). Ethnoarchaeology, which began in the functionalist era, was expanded by the New Archaeology and became a prominent means for developing correlates for building models of past systems and subsystems. It was in this context of change that behavioral archaeology was created.

Two doctoral students working as teaching assistants (J. Jefferson Reid and Michael B. Schiffer) for William L. Rathje at the University of Arizona in the early 1970s argued that archaeology could be its own social science that focused not simply on past peoples or artifacts but instead on the interaction among them in all times and places (Reid et al. 1975). Behavior defined relationally as an interaction with material objects was the analytical lynchpin around which the burgeoning studies of prehistoric, historic, and contemporary societies revolved. They therefore defined behavioral archaeology as "the study of material objects regardless of time and space in order to describe and explain human behavior" (Reid et al. 1975: 210). Their goal was twofold: (1) to systematize what they believed New Archaeology could become and (2) simultaneously address some of its weaknesses.

By the early 1970s, it had become apparent that the systems approach as applied in archaeology tended to obscure or simply ignore lower-scale behavioral variability critical for explaining the structure of archaeological deposits and, arguably, addressing the evolutionary questions that the New Archaeologists posed. Initially, behavioral archaeologists viewed their efforts as consistent with the goals of the New Archaeology.

Trained as a Mayanist, Rathje recognized the symmetry between the study of ancient Maya cities and the study of garbage in contemporary cities and founded the Le Projet du Garbage, applying archaeology to the present (see Rathje and Murphy 1992). Reid and Schiffer developed behavioral archaeology method and theory in their dissertations and subsequent research. Reid (1985, 1995) has largely focused on prehistoric archaeology, while Schiffer has tended to pursue a broader method and theory agenda (see LaMotta and Schiffer 2001). In early work, Schiffer developed a behaviorally based model of inference and applied it in studies of the formation processes of archaeological deposits (Schiffer 1976, 1987). Subsequently he turned his attention to experimental and historical studies of technology (e.g., Schiffer and Skibo 1987; Schiffer et al. 1994a), communication (Schiffer and Miller 1999), and the history of science (e.g., Schiffer 2008). Recent students have expanded the reach of behavioral archaeology to include ritual and religion (Walker 1995, 1998, 2002; Hollenback 2010a), landscapes (Zedeño 1997; Hollenback 2010b), and social power (Walker and Schiffer 2006).

Key Issues/Current Debates

Three broad contributions of behavioral archaeology have shaped debates in the discipline: the synthetic model of inference, a behaviorally based approach to technology studies, and extensions of a behavioral approach to what have traditionally been considered nonbehavioral realms including ritual and religion, communication, and political power.

The Synthetic Model of Inference

Beginning with the New Archaeology's interest in material correlates, behavioralists' initial contributions revolved around systematically laying out a behavioral approach to the material matrix of human activity. They described forms of artifact variability, categories for organizing that variability, and a synthetic model of inference for drawing that variability together in explanations of human behavior. Eventually these studies were pulled together in Schiffer's (1987) *Formation Processes of the Archaeological Record*.

Behavioralists argued that new archaeologists had heavily theorized ongoing cultural systems but that the same could not be said for the proximate activities making up those systems nor for the human and natural actions that instrumentally contributed to the formation of the archaeological record. Initial papers laid out the important distinction between patterning in ongoing cultural systems or "systemic contexts" and patterns in the archaeological record, "archaeological contexts." Behavioralists argued that to link these patterns, we needed to identify the causally connected sequences of behaviors that eventually transformed these patterns from cultural contexts into archaeological contexts (Schiffer 1976; Sullivan III 1978). They described these sequences as "behavioral chains" illustrated by flow models. They also used the more anthropocentric term "life histories" in order to emphasize that human behaviors and lives are inseparable from object histories in the material matrix. To measure patterning in these contexts and sequences of behaviors, they defined four dimensions of archaeological variability: formal, spatial, quantitative, and relational (Rathje and Schiffer 1982; Schiffer 1987). The formal category includes any physical measure that can be taken on an object (weight, specific gravity, completeness, length, width, color, etc.); the other dimensions have more constraints. In any given activity, one or more objects are associated with each other (relational), their frequencies (relative and absolute) can be counted, and their location(s) in space measured. The term correlate, adapted from the new archaeology, became the regularities in interactions between people and objects recognizable in these life histories, measured in relation to the four dimensions of variability.

This research revealed that patterns of cultural deposition could be modeled quantitatively for a community by employing variables such as the number of an object type in use, the length of its use life, duration of use period, and rates of reuse (Schiffer 1976). The implications of these and other variables dramatically changed how archaeologists perceived the opportunities afforded by different sites and archaeological contexts. Any archaeological interpretation requires a series of inferences and can be conceptualized as a series of hypothetical people and object life histories. A behavioral consideration of those hypothetical histories can only lead to better, more-informed interpretations. Even seemingly pedestrian inferences about the dates of an assemblage are deeply enmeshed in formation process questions. How do the relative frequencies of pottery in a site reflect known or hypothesized cultural phases, given the variability in ceramic life histories, as denoted by the variables listed above? Similarly, how does the life history of a piece of organic material with a specific radiocarbon date shed light on the dates of materials associated with it in an archaeological context (Dean 1978)?

The synthetic model of inference drew together various sources of actualistic knowledge, including ethnography, ethnoarchaeology, history, and experiments, to create correlates that could be used in inferences about unknown relationships between past peoples and objects. Such a model necessarily assumes continuities between past and present relationships: (1) the sequential nature of behaviors forming objects' histories, (2) the causal contribution objects make to behaviors that propel the forward motion of activities in life histories, and (3) four kinds of measurement that make possible the empirical study of object performances and life histories. To call attention to the generalizations concerning artifact disposal activities and subsequent archaeological patterning, Schiffer coined the terms c- and n-transforms, which denote the effects that natural and human or cultural processes have on the formation of archaeological deposits. The articulation of this

model and its parts led to a break between new archaeologists and behavioralists.

The Pompeii Premise

The initial discussion of behavioral chains, systemic and archaeological contexts, and the lawlike relationships between people and artifacts, although offered as contributions to the cause of new archaeology, was quickly recognized as different and even threatening by Binford and other new archaeologists because it demonstrated that a realm of messy behavioral variability had not been accounted for in their broad theoretical perspectives. For some new archaeologists, the behavioral perspective became a subject for puerile satire (Flannery 1982), but for others, it represented a theoretical heresy requiring extirpation (Binford 1981). Binford (1964) had claimed that the archaeological record was like a fossil, preserving the skeleton of past cultural subsystems. Behavioralists, however, knew like any taphonomist that the organization of peoples' relationships with objects changed from their living context (systemic context) to the archaeological context and that understanding how that transformation occurred was central to any archaeological inference. Behavioralists therefore criticized metaphorical references to the archaeological record as a fossilized cultural system, labeling them as the Pompeii premise (e.g., Schiffer 1985).

Binford (1981) took up the challenge and a debate ensued over whether there was a Pompeii premise in archaeology. As it was framed by Schiffer and Binford, the issue was whether the archaeological record accurately reflected the past and its implications for archaeological research. Binford argued that it did, while Schiffer (1987) argued that patterning in the archaeological record was a distortion of past cultural systems. Binford uncritically suggested that because Schiffer highlighted the differences in archaeological and systemic contexts and advocated bridging them through the reconstruction of past object life histories, he would only be satisfied to work with Pompeii-like assemblages where the transformations were purportedly trivial. Schiffer argued that to study the proximate causes of variability in archaeological deposits, one had to consider the archaeological record as transformed in order to take advantage of the information offered by any particular archaeological context. In hindsight, this debate concerned two different visions for material culture study and the role of archaeological research in that study.

For Binford, the archaeological record was analytically conceptualized as the product of the interacting subsystems and therefore necessarily if only vaguely encompassed all the variability in life histories of objects, including their disposal, as attributes of the system. Therefore, the system could not be a transformation of itself. For Schiffer and others, the archaeological record was a creation of specific natural and human interactions that changed through the course of peoples' and objects' lives. As such, the debate exposed the differing scales of analysis that were central to the visions behavioralists and New Archaeologists had for archaeology. New Archaeologists had a priori a causal theory of evolutionary change they sought to implement, while behavioralists had an understanding of the material matrix of human behavior they sought to document and explore. Although it was never explicitly stated, this debate seems to have freed behavioralists to pursue their vision without further attempting to justify it within a unified archaeology. They realized that to pursue studies of the material matrix, they would need to shape their own questions, methods, and data independently of the strictures of social evolutionary theory.

Schiffer and others turned their attention to exploring behavioral approaches to technology and expanding the role of behavioral research to topics such as communication and ritual where the material matrix of behavior had been undertheorized.

Technology

Given the expanded understanding of behavior as interaction with objects, it runs awfully close to general understandings of technology. Technologies being central to understanding the material matrix of behavior, behavioralists have focused on how they perform in particular contexts and how they change over time. They elaborated the

concept of performance characteristics for studying activity-based interactions, especially during use (Skibo and Schiffer 2008), and have employed the processes of invention, development, manufacture, and adoption in framing questions about technological change (Schiffer 2011).

Performance Characteristics

Inspired by the work of Braun (1983), behavioralists recognized that to study the behaviors associated with technologies – indeed all interactions with objects – they needed to develop an analytical concept that could capture the causal influences that material objects contribute to interactions with people. Archaeologists had long known that the material properties of objects such as temper in pottery or the toughness of chipped stone tools affected how people used them. Yet analysis of the performance of an object in a specific interaction requires more than a listing of its formal properties. A performance characteristic is a capability, competence, or skill that can be exercised in an activity-specific interaction. Formal properties, influenced by an object's chemical and physical properties, affect performance characteristics. In traditional pottery, for example, temper, surface treatments, and wall thickness affect how rapidly a vessel can heat its contents – a performance characteristic known as heating effectiveness. Heating effectiveness might be favored in cooking pots but not typically in serving vessels. A performance characteristic is a relational construct, not an essential property of an object. Thus, a vessel's closeness to the fire influences its heating effectiveness in a specific cooking activity.

Braun's (1983) interpretation of performance characteristics was focused narrowly on the interactions that an object required in order to perform its utilitarian functions. To accommodate other kinds of interactions, behavioralists have expanded the concept of performance characteristics to include any sort of interaction between objects and other objects, between people and objects, and so forth (Schiffer and Miller 1999; Skibo and Schiffer 2008; Schiffer 2011). And so behavioral archaeologists speak of sensory performance characteristics as relating to basic human senses (sight, sound, touch, taste, smell); performance characteristics also pertain to human competences in, for example, social and economic interactions; thus, an object's replacement cost is a performance characteristic that affects interactions in an acquisition activity. Communication of group identities – indeed any social information – as well as communication with supernatural entities may also be framed in terms of particular performance characteristics. In the hands of behavioral archaeologists, performance characteristics have become a versatile construct essential for studying object interactions of any kind in activities.

Study of Technological Change

In approaching the study of technological change, one of archaeology's oldest preoccupations, behavioralists recognize that generalizations – theories, models, etc. – ought to be process specific, focused either on invention, development, manufacture, or adoption (Schiffer 2011). Thus, in dealing with invention processes, behavioralists have fashioned the cascade and cultural imperative models. The cascade model specifies that during the course of developing a complex technological system (anything from a bow and arrow to a nuclear submarine) performance problems arise. To solve a performance problem requires a burst of inventive activities, which may lead to a solution; further problems are usually encountered, which generate other invention cascades. The cultural imperative model states that the vision of an imagined technology, as defined by anticipated performance characteristics, is held by a constituency, a group of people who believe that its creation is inevitable. Thus, whenever apparently appropriate parts or components become available, a flurry of inventive activities takes place as people strive to materially realize the cultural imperative. It would appear that the cultural imperative model is applicable mainly to industrial societies. Behavioral archaeologists also made contributions to the study of adoption processes by creating the performance matrix – a heuristic for comparing the performance characteristics of two or more technologies among which consumers choose (Schiffer 2010,

2011). A well-constructed performance matrix, which includes all potentially relevant performance characteristics, usually displays patterns, such as one technology that excels in use-related performance characteristics, while another excels in manufacture-related ones. These patterns furnish grist for the archaeologist's explanatory mill. First employed in a study of ceramic change in the eastern United States (Schiffer and Skibo 1987), the performance matrix has been elaborated and employed in diverse studies of technological change (Skibo and Schiffer 2008; Schiffer 2010, 2011).

Performance and the Expansion of Behavioral Studies

Simultaneously with the development of behavioral approaches to archaeological inference and the study of technology, in the 1980s archaeology witnessed the advent of postprocessual archaeology. This new school of thought dramatically changed the landscape of archaeological method and theory. In his postprocessual manifestos, Hodder (e.g., 1985) argued among other ideas that that the "materialist" scientific approaches favored by processualists ignored the roles of peoples' beliefs in shaping their actions, relegating beliefs to the least causal realm of ideology, which left no room for individuals to shape the organization of cultures. Initially this postprocessualism seemed an anathema to behavioral archaeologists who saw themselves as scientists. Many wondered whether the discussion of beliefs and mind would shift attention away from concrete behavioral variability and toward immaterial conceptual variability. However, as debates evolved inside and outside of behavioral archaeology, it became clear that the issue of scale exposed in the Pompeii premise debate was one shared with postprocessualism, as particular behaviors could, independently of the scale of system organization, contribute directly to the formation of archaeological deposits. Further, it was also clear that human behavioral variability extended to any activity involving objects; therefore, activities pertaining to ritual and religion, communication, and technological organization that did not pragmatically relate to subsistence were still interesting and important arenas for behavioral research. Consequently, the postprocessual critiques actually opened up opportunities for behavioralists to show how their approach could be fruitfully applied to these important topics without necessarily accepting the assumptions of postprocessualists concerning the role of science or the centrality of "meaning" as an analytic construct for studying human behavior.

In the 1990s, behavioralists plunged directly into these contested realms. Walker et al. (1995) called this "expanding behavioral archaeology" and referred to themselves as new behavioral archaeologists. They stressed the importance of a relational understanding of behavior and its relevance to a broad range of research topics including ritual site formation processes, political power, and technological change. Given that interactions with material objects take place in ritual and political realms, which also affect archaeological deposits, it made perfect sense to explore how such realms were materially constituted – regardless of one's ultimate stance on evolutionary causal hierarchies. Similarly, given that behavioralists were committed to studying behavior rather than the archaeological record per se, Schiffer could undertake, from a behavioral perspective, case studies of technological change using the history of radios and electric cars (Schiffer 1991; Schiffer et al. 1994b).

Ritual Studies

Walker (1995, 1998, 2002) and others (e.g., Montgomery 1993; Zedeño 2008) have sought to extend the study of behavioral archaeology to include ritual and religion. The lessons learned so far are that – like all behaviors – ritual behaviors contribute to the forward motion of object life histories and that those histories can be identified in the archaeological record because they affect the four dimensions of artifact variability. Like all activity-based interactions, performance characteristics come into play, but they are complicated and cannot be corralled by assumptions about the pragmatic uses of the objects.

A legacy of the New Archaeology's hierarchy of material causality had been a conflation of

those activities deemed materially less causal (i.e., ritual practices) and the material evidence of those activities. It was a traditional assumption, well into the 1990s, that ritual activities left little material evidence. Yet this makes no sense in terms of the material matrix created by human behavior. All activities are by definition materially constituted; thus, given the plethora of ritual activities in every society worldwide, it is a physical impossibility that these diverse behaviors leave no archaeological traces. Acting on the basis of the traditional assumption, few traces were found, which only highlights the strength that theoretical assumptions may have over the formation of questions, methods, and data. As behavioralists began to look for evidence of ritual in object life histories, they found it everywhere. In well-documented archaeological contexts such as the pueblos of the American Southwest, it was evident that much time and energy went into the ritual construction, use, and disposal of ceremonial architecture as well as associated artifacts. It also became clear that, by relegating religion to the immaterial realm of ideology without pragmatic consequence rather than treating it as a kind of activity, archaeologists had assumed that ritual artifacts could be identified by default as nonutilitarian objects. Examination of known behavioral contexts such as ethnographies demonstrated that this was far too simplistic. Indeed, in the American Southwest, the houses of all nonpueblo peoples are central to ritual activities; moreover, everyday subsistence staples such as corn and water are the most revered ceremonial objects among many southwestern cultures. Finally, reuse is a critical factor in understanding their life histories, as many artifacts can move into and out of ritual contexts independently of our preconceived notions of utility. What appear to be old, even well-worn cooking pots and water jars are often used by Hopi peoples in their most sacred ceremonies.

Ritual and religious studies are just beginning to take advantage the material matrix. Recent ritual research (Walker 2008, 2009) has begun to combine study of performance characteristics, oral traditions, and interaction with nonhuman beings. Behavioral approaches to communication offer a useful model for integrating these facets of ritual studies.

Communication Studies

In one of the most innovative applications of behavioral archaeology, Schiffer and Miller (1999) designed an object-based model of communication. Typically communication studies focus on the transfer of information between two or more people and prioritize the intentions of the information senders. This move represents the height of common sense, but it fails to take advantage of, and indeed is actually undermined by, the complexity of the material matrix of behavior. Communication – like all other interactions – involves objects, and so an exclusive attention to people leaves out significant parts of the communicative process. What is more, although people may intend to send information, what is actually sent is only as real as what the receiver gets. Therefore, attending only to the sender's intent is fraught with problems. Also, much information is sent and received independently of conscious goals on either end.

Schiffer and Miller as behavioralists were aware of the limitations of conventional formulations based on prioritizing the sender's perspective and called attention to a symmetry between the process of communication and the process of archaeological inference. Archaeologists, after all, receive information about past peoples through interaction with artifacts. The process is often a lot slower than communication in everyday interactions, but they argue that the processes are analogous. Accordingly, they proposed a receiver-oriented approach to the study of communication in which artifacts as well as people are incorporated into the process. They developed a model composed of three information-related roles: senders, emitters, and receivers. In simple formulations similar to traditional "mediated" models of communication, one person (the sender) encodes or inscribes information through interaction with an artifact (the emitter), and from that artifact's subsequent performance, the receiver obtains information. This process of

communication would be tracked by studying how receivers reacted to information they gleaned in an interaction with the emitter. However, there is no reason to restrict communication to such a narrow range of possibilities. In theory, these roles could be played by any of the interactors. Thus, an artifact could, while interacting with a person, modify that person who would then nonverbally emit information to another person. A serrated knife (sender), for example, inscribes its signature in a mortal wound (emitter) that emits information to a forensic pathologist (receiver). Perhaps even more interesting is the possibility of passing information about the hidden world of supernatural entities. While the process is a material one, there is no reason that the information need be materially scientific. After all, how much information flowing through the material matrix has been so vetted? In many cultural contexts, evidence of the presence and intentions of witches, spirits, or other nonhuman agents are received regularly.

Future Directions

Behavioral archaeology has consistently fine-tuned its understanding of human behavior as the interaction of people with objects while simultaneously expanding its reach into the material matrix created by that behavior. Likely behavioralists will continue to study formation of archaeological deposits, technology, ritual, landscapes, communication, and social power. Behavioral archaeology like any productive program is constantly building and systematizing its assumptions and their implications for future research. In seeking to bring order to studies of a material matrix that by its very nature changes and moves through time, behavioralists find that a broad range of social and sensory performance characteristics remain only minimally integrated. Recent application of the synthetic model of inference to the study of communication has demonstrated that interactions between people and objects and the attendant performances of interactors highlight a logical equivalence between behavior and flows of information. This equivalence suggests that for some questions interactions are fruitfully studied as behaviors and for other questions as communicative processes. Likely behavioral archaeologists will continue to explore these and other symmetries as they push deeper into the material matrix of human object interactions.

Future directions in behavioral archaeology are only limited by a researcher's creativity in asking and answering behavioral questions about any human behavior in the material matrix. One area that should see much more attention is scientific activities, as practiced in any society. Discovery processes, for example, have been resistant to the generalizations of historians, philosophers, and social scientists. We suggest that a behavioral approach can make useful contributions because it is grounded in the people-artifact interactions that are the settings for discovery.

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Ethnoarchaeology
- ▶ Material Culture and Education in Archaeology
- ▶ Materiality in Archaeological Theory
- ▶ Processualism in Archaeological Theory
- ▶ Technological Studies in Archaeological Science

References

Binford, L.R. 1962. Archaeology as anthropology. *American Antiquity* 28: 217–225.

Binford, L.R. 1964. A consideration of archaeological research design. *American Antiquity* 29: 425–441.

Binford, L.R. 1981. Behavioral archaeology and the 'Pompeii Premise'. *Journal of Anthropological Research* 37: 195–208.

Braun, D.P. 1983. Pots as tools. In *Archaeological hammers and theories*, ed. A. Keene and J. Moore, 107–134. New York: Academic Press.

Dean, J.S. 1978. Independent dating in archaeological analysis. *Advances in Archaeological Method and Theory* 1: 223–255.

Flannery, K.V. 1982. The golden Marshalltown: A parable for the archeology of the 1980s. *American Anthropologist* 84: 265–278.

Hicks, D., and M.C. Beaudry, eds. 2010. *The Oxford handbook of material culture studies*. Oxford: Oxford University Press.

Hill, J.N. 1970. *Broken K Pueblo: Prehistoric social organization in the American Southwest*, University of Arizona Anthropological Papers. Vol. 18. Tucson: University of Arizona.

Hodder, I. 1985. Postprocessual archaeology. *Advances in Archaeological Method and Theory* 8: 1–26.

Hollenback, K.L. 2010a. Ritual and religion. In *Behavioral archaeology: Principles and practice*, ed. M.B. Schiffer, 156–163. London: Equinox.

Hollenback, K.L. 2010b. Landscapes. In *Behavioral archaeology: Principles and practice*, ed. M.B. Schiffer, 186–193. London: Equinox.

LaMotta, V.M., and M.B. Schiffer. 2001. Behavioral archaeology: Towards a new synthesis. In *Archaeological theory today*, ed. I. Hodder, 14–64. Cambridge: Polity Press.

Montgomery, B.K. 1993. Ceramics analysis as a tool for discovering processes of pueblo abandonment. In *Abandonment of settlements and regions: Ethnoarchaeological and archaeological approaches*, ed. C.M. Cameron and S.A. Tomka, 157–164. Cambridge: Cambridge University Press.

Rathje, W.L., and C. Murphy. 1992. *Rubbish! The archaeology of garbage*. New York: HarperCollins.

Rathje, W.L., and M.B. Schiffer. 1982. *Archaeology.* New York: Harcourt Brace Jovanovich.

Reid, J.J. 1985. Formation processes for the practical prehistorian. In *Structure and process in southeastern archaeology*, ed. R.S. Dickens Jr. and H.T. Ward, 11–33. Tuscaloosa: University of Alabama Press.

Reid, J.J. 1995. Four strategies after twenty years: A return to basics. In *Expanding archaeology*, ed. J.M. Skibo, W.H. Walker, and A.E. Nielsen, 15–21. Salt Lake City: University of Utah Press.

Reid, J.J., M.B. Schiffer, and W.L. Rathje. 1975. Behavioral archaeology: Four strategies. *American Anthropologist* 77: 864–869.

Schiffer, M.B. 1976. *Behavioral archeology.* New York: Academic.

Schiffer, M.B. 1985. Is there a 'Pompeii premise' in southwestern archaeology? *Journal of Anthropological Research* 41: 18–41.

Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico Press.

Schiffer, M.B. 1991. *The portable radio in American life*. Tucson: University of Arizona Press.

Schiffer, M.B. 2008. *Power struggles: Scientific authority and the creation of practical electricity before Edison*. Cambridge: MIT Press.

Schiffer, M.B., ed. 2010. *Behavioral archaeology: Principles and practice*. London: Equinox.

Schiffer, M.B. 2011. *Studying technological change: A behavioral approach*. Salt Lake City: University of Utah Press.

Schiffer, M.B., and A.R. Miller. 1999. *The material life of human beings: Artifacts, behavior, and communication*. London: Routledge.

Schiffer, M.B., and J.M. Skibo. 1987. Theory and experiment in the study of technological change. *Current Anthropology* 28: 595–622.

Schiffer, M.B., J.M. Skibo, T.C. Boelke, M.A. Neupert, and M. Aronson. 1994a. New perspectives on experimental archaeology: Surface treatments and thermal response of the clay cooking pot. *American Antiquity* 59: 197–217.

Schiffer, M.B., T.C. Butts, and K.K. Grimm. 1994b. *Taking charge: The electric automobile in America*. Washington, DC: Smithsonian.

Skibo, J.M., and M.B. Schiffer. 2008. *People and things: A behavioral approach to material culture*. New York: Springer.

Sullivan, A.P., III. 1978. Inference and evidence: A discussion of the conceptual problems. *Advances in Archaeological Method and Theory* 1: 182–222.

Walker, W.H. 1995. Ceremonial trash? In *Expanding archaeology*, ed. J.M. Skibo, W.H. Walker, and A.E. Nielsen, 67–79. Salt Lake City: University of Utah Press.

Walker, W.H. 1998. Where are the witches of prehistory? *Journal of Archaeological Method and Theory* 5 (3): 246–308.

Walker, W.H. 2002. Stratigraphy and practical reason. *American Anthropologist* 104: 159–177.

Walker, W.H. 2008. Warfare and the practice of supernatural agents. In *Warfare in cultural context*, ed. A.E. Nielsen and W.H. Walker, 109–135. Tucson: University of Arizona Press.

Walker, W.H. 2009. Practice and the afterlife histories of witches and dogs. In *Memory work: Archaeologies of material practices*, ed. B.M. Mills and W.H. Walker, 137–158. Santa Fe: School of American Research Press.

Walker, W.H., and M.B. Schiffer. 2006. The materiality of social power: The artifact-acquisition perspective. *Journal of Archaeological Method and Theory* 13: 67–88.

Walker, W.H., J.M. Skibo, and A.E. Nielsen. 1995. Introduction. In *Expanding archaeology*, ed. J.M. Skibo, W.H. Walker, and A.E. Nielsen, 1–12. Salt Lake City: University of Utah Press.

White, L.A. 1949. *The science of culture: A study of man and civilization*. New York: Grove Press.

Willey, G.R., and J.A. Sabloff. 1980. *A history of American archaeology.* San Francisco: W. H. Freeman & Company.

Zedeño, M.N. 1997. Landscapes, land use, and the history of territory formation: An example from the Puebloan southwest. *Journal of Archaeological Method and Theory* 4: 67–103.

Zedeño, M.N. 2008. Bundled worlds: The roles and interactions of complex objects from the North American Plains. *Journal of Archaeological Method and Theory* 15: 362–378.

Béla Cserni

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Basic Biographical Information

Béla Cserni (1842–1916) is considered the first urban archaeologist of Transylvania (today Romania), the discoverer of one of the few preserved Roman gubernatorial palaces (*praetorium consularis*), and the founder of the first archaeological museum of Alba Iulia (Gyulafehérvár, Karlsburg). Born in the Habsburg Empire as a son of a Czech soldier and a Saxon mother in Hermannstadt (Sibiu, Nagyszeben), Cserni was raised in the Roman-Catholic orphanage, where he enriched his knowledge on local history, classical studies, and natural sciences too. In 1861 he moved to Alba Iulia, where he became a German teacher. Beside his pedagogic activity, he became a doctor in natural sciences in 1882 and a foremost specialist of the local flora and fauna of the region. After he witnessed the destruction of a large part of *Apulum*, the Roman city under Alba Iulia in 1864, Cserni's interest changed radically and formed consciously himself as a historian and scholar of antiquity. In 1886 the foundation of the Association of Historical, Archaeological and Natural Sciences of Fehér County marked also Cserni's life, who became the first librarian and museum keeper of the society. Due to his work and activity, the Association will open the first museum of Alba Iulia in 1888. This event marked also the beginning of the first systematic archaeological excavation in the city and the beginning of urban archaeology in Transylvania. As member of various scientific and cultural societies and associations in the Austro-Hungarian Empire, Béla Cserni built up an unusually rich academic network, which will help him in his endeavor as historian of the Roman city of Apulum. Having a rich correspondence with more than 30 renown scholars from all over Europe and visiting more than 50 museums, Béla Cserni relocated the Roman site of Apulum and the Transylvanian scholarship on an international scene. He died at 16 April 1916 in Alba Iulia (Gyulafehérvár, Karlsburg). His works and rich intellectual heritage was cited continuously by Hungarian and Romanian literature (often as Adalbert Cserni) during the twentieth century, but the contextualization of his importance among the European pioneers of archaeology begun just recently (Szabó 2016).

Major Accomplishments

Cserni's activity marked the fast development of museology and urban archaeology in Transylvania and, indirectly, Central Europe. His work in Alba Iulia represents the end of a four century long antiquarian tradition, marked by private collections and the first museums or institutions such as the Batthyaneum from Alba Iulia or the Brukenthal Collection from Sibiu. Cserni, as one of the numerous intellectuals of Europe, who specialized themselves in an autodidact way, became the first urban archaeologist of Transylvania, although less specialized as the best school of the region in that time, marked by the name of Béla Pósta and his team from Cluj (Kolozsvár).

Between 1888 and 1907 in 15 seasons, Cserni and his small team excavated the biggest Roman archaeological site (12,000 m^2) of that time in Central-East Europe. Although, he never recognized that he discovered the *praetorium consularis*, the palace of the governors of Dacia, his contribution in establishing the rules of urban archaeology in local context was essential (Bolindet et al. 2011; Schäfer 2014). Similarly, he was the first who identified the territory of the *Colonia Aurelia Apulensis* (today Partos, Alba Iulia, RO), the biggest Roman conurbation of Dacia, where he excavated numerous Roman houses, one of them being the first published in details from this city (Cserni 1912a, b). Among the two major sites, he excavated also the first identified Roman cemetery of the city and in numerous, non-Roman sites too.

His museum in less than two decades owned the biggest Roman collection in Central Europe, visited by numerous renown scholars of Europe.

Béla Cserni, Fig. 1 Béla Cserni, founder of urban archaeology in Transylvania. Source: Szabó (2016)

Publishing the first comprehensive synthesis on the archaeological finds of Apulum, Cserni published also the first topographic map of the Roman city (Cserni 1901).

Beside his rich activity as pioneer of urban archaeology, museology, and public archaeology, Cserni introduced also the photographic documentation in his work (Fig. 1).

Cross-References

- ► Architecture, Roman
- ► Béla Pósta
- ► Domestic Architecture, Roman

References

Bolindet, Viorica, George, Bounegru, and Rada, Varga. 2011. Palatul guvernatorului Daciei romane din Apulum, Cluj Napoca.

Cserni, B., 1901. *Alsó-fehér vármegye története a római korban* Nagyenyed.

Cserni, B., 1912a. Jelentés a Colonia Apulensis területén végzett ásatásokról. *Múzeumi és Könyvtári Értesítő* 2–3. füzet: 106–114.

Cserni, B., 1912b. Jelentés a Colonia Apulensis területén végzett ásatásokról II. *Múzeumi és Könyvtári Értesítő* 4: 257–283.

Schäfer, Praetoria. 2014. *Paläste zum Wohnen und Verwalten in Köln und anderen römischen Provinzhaupstädten*. Köln.

Szabó, C.S. 2016. *Béla Cserni and the beginnings of urban archaeology in Alba Iulia*. Cluj-Napoca: Mega Publishing House.

Béla Pósta

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Basic Biographical Information

Béla Pósta (22nd August, 1862–16th April, 1919) was the founder of the famous archaeological school from Cluj (Kolozsvár, Klausenburg) in Transylvania (today Romania). His school revolutionized not only the archaeological fieldworks but also professionalized the museology and the first archaeological departments of the Austro-Hungarian Empire (Petruț 2015, 167–168; Szabó 2016). Born in Kecskemét, he studied law in the Pázmány Péter University, but later the doyen of the golden age of Hungarian archaeology, Károly Torma, influenced him to change his interest toward the humanities and, especially, archaeology Banner (1962). In 1883 Pósta became trainee and later in 1895 museum-keeper in the Hungarian National Museum in Budapest (Vincze 2014, 21). His interests were focusing mostly on numismatics and the archaeology of the eighth to tenth century AD. During his numerous visits in foreign universities, he enriched his social and academic network and professionalized himself as an archaeologist and museologist too. From 1899 till his death, his activity is strictly related to his famous group and school from Cluj, Transylvania. Here, beside his activity as archaeologist and professor of newly founded university, Pósta became a prominent member of the local cultural and political elite and member of numerous cultural institutes and associations (Vincze 2014, 537–546). He died in

1919, a period which marked also the end of an era in the Transylvanian archaeology and ideology. His work and heritage was later transmitted and preserved by his students and friends and, recently, by the Pósta Béla Archaeological Association from Cluj-Napoca, Romania.

Major Accomplishments

The impact of Béla Pósta and his school was immense not only in Transylvania but, indirectly, in the whole Austro-Hungarian Empire. His school and activity emerged in a period, when the Austro-Hungarian Empire tried to find his imperial politics in the European and even world politics. The internal changes and infrastructural development of the region urged also the institutionalization and centralization of museums and the archaeological works and discipline as such. Following the archaeological methods and techniques of the most advanced German and Italian schools, the Hungarian scholars of the age of positivism created a still appreciable school in Central-East Europe.

Between 1899 and 1919, he and his team reorganized in Cluj the largest archaeological and numismatic collection, creating a pioneering model for modern museology in the region, later followed by numerous institutions in the region. In the same period, Pósta became professor of archaeology in the University of Cluj, where he revolutionized the discipline, creating a school which will give the first professional team of archaeologists of the next decades. Among his students we find renowned epigraphists and classical archaeologists, Árpád Buday, János Banner, and Sándor Ferenczi. They will continue Pósta's didactic work not only in the new political order of Romania but also in Hungary, keeping alive also the international relationships established by Pósta and his institution. From 1907, Béla Pósta served as the inspector of more than 30 museums and collections of the Hungarian part of the empire. Reorganizing the collections, he created the basics of the modern museology in Hungary and Transylvania too and centralized the financial and infrastructural system of museums of Central Europe. In the period of 1900–1915, Pósta and his team had 58 excavations in the Austro-Hungarian Empire; many of them – such as in Marosszentanna, Mezőbánd, Porolissum, and in the Roman Catholic Cathedral of Alba Iulia (Gyulafehérvár) – were groundbreaking discoveries of the period (Vincze 2014, 374–494). Pósta's rich correspondence with the great scholars and archaeologists of Europe proves his important role in the formation of the first, specialized and professionalized archaeologist in this part of the continent (Fig. 1).

Béla Pósta, Fig. 1 Béla Pósta, founder of modern archaeological school in Transylvania. Source: Erdélyi Digitális Adattár

Cross-References

► Béla Cserni

References

Petruț, D. 2015. Egy elfeledett erdélyi tudományos és kulturális mozgalom emlékezete, Székelyföld. *Kulturális folyóirat* 19 (12): 167–173.

Szabó, CS. 2016. *Béla Cserni and the beginnings of urban archaeology in Alba Iulia*. Cluj Napoca.

Vincze, Z. 2014. *A kolozsvári régészeti iskola a Pósta Béla korszakban (1899–1919)*. Kolozsvár.

Further Readings

Banner, J. 1962. *Pósta Béla születésének évszázados ünnepe 1862–1962*. Előszó. Budapest.

Bell, Gertrude

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Basic Biographical Information

Gertrude Margaret Lowthian Bell was born on 14 July 1868 in Washington Hall, County Durham, England. She came from a line of wealthy ironmasters. Her grandfather, Sir Isaac Lowthian Bell, and her father, Sir Hugh Bell, were heavily involved in politics. Her mother died when she was a young child, and she was brought up by her stepmother Dame Florence Bell, who was a playwright and author.

Gertrude Bell's early education was at Queen's College in London. She enrolled at Lady Margaret Hall, Oxford University in 1886. She specialized in modern history, becoming the first woman to earn a first-class degree in the subject. She was not formally trained in archaeology, aside from a few weeks spent with Dr. David Hogarth in Greece while on holiday in 1898 (Burgoyne 1958; Winstone 1978). The beginning of her lifelong passion for the Middle East can be traced to a visit in 1892 to her uncle, who was an ambassador serving in Tehran, Iran (Winstone 1978). In 1899, she began a period of sustained travel in Asia, Europe, Mesopotamia, and Arabia. She became fluent in Arabic, Turkish, and Persian and wrote of her experiences in five works that were published in the two decades preceding the First World War (Howell 2006). During this war, Gertrude Bell worked as a spy for the British Government gathering information on Turkish railways and forming alliances with Arab tribes, alongside T.E. Lawrence. Following the British capture of Baghdad in 1917, Bell became heavily involved with the political reinvention of Mesopotamia due to her understanding of the area and fluency in the language. Bell was a passionate believer in Arab independence and assisted in setting up infrastructure and installing ruler Faisal I as monarch of Iraq (Burgoyne 1958).

Major Accomplishments

Gertrude Bell's career focused on the archaeology of Greater Syria, Mesopotamia, Asia Minor, and Arabia. Her major accomplishments in archaeology include scholarly publications on Byzantine monuments in Asia Minor, the establishment of legislation and methods that significantly improved the protection of cultural heritage in Iraq, and establishment of the National Museum of Iraq. However, she is perhaps best known for her role in developing the political borders in the Middle East after the First World War, particularly those of Jordan and Iraq.

In her own words, Gertrude Bell considered herself "nothing better than an antiquarian at heart" (Bell 1927). However, many of her scholarly works on Byzantine monuments in Asia Minor are still considered the standard works on the subject (Howell 2006). Bell conducted several surveys over the course of her travels, especially during her 1905 trip to western Syria and Anatolia (Lawler 2008). Chief among these surveys was her work at Binbirkilise, with the resulting book completed with Sir William Ramsay considered "one of the most enduring works of scholarship" of the area (Ousterhout and Jackson 2008: ix). Bell's book *The Palace and Mosque at Ukhaidir* (1914) is considered by some to be "her most important contribution to archaeology" (Lukitz 2006).

One of Bell's major contributions to archaeology is the early development of practical methods for a government to work with archaeologists to protect a country's cultural heritage. She played an eminent role in setting up the necessary infrastructure needed for serious and scholarly excavation rather than the treasure hunting and amateur

excavation seen in the Middle East before the First World War. The stable political climate in Iraq that existed at that time brought renewed interest from archaeologists to conduct excavations in Iraq. Responding to a need for updated antiquities legislation, Bell began writing a Law of Excavations, which was enacted at the end of 1922 (Bell 1927). The progressive attitude of these laws and their favorable conditions for archaeologists allowed the development of new techniques and new methods of excavation. In this way, Bell's work is still relevant and influential on younger generations of archaeologists.

Gertrude Bell pioneered the idea of retaining antiquities in their country of origin rather than transporting them to European museums or collections. In 1926, she established the National Museum of Iraq, which held one of the world's greatest collections of Mesopotamian antiquities prior to the 2003 invasion by the United States and its allies (Wallach 1996; Lawler 2008). Driven by her love of the country, Bell became Iraq's Honorary Director of Antiquities in 1922. She dedicated the last years of her life to developing Iraqi national identity through ownership of its cultural heritage (Winstone 1978). To implement this, Bell traveled to archaeological sites at the end of each excavation season to divide the finds between the archaeologist and Iraq (Winstone 1978). She also traveled to places where local people were undertaking their own excavations and bought any significant finds (Bell 1927). She left behind a competent record of archaeological sites, including a highly valuable photo record of 7000 photos, taken between 1900 and 1918.

Gertrude Bell is lauded today as a pioneering woman in archaeology. It is somewhat ironic, then, that she opposed the right of women to vote, contending that women were not ready to vote while they remained confined to the domestic sphere (Bell 1927). This may be due in part to the influence of her stepmother, Dame Florence Bell, who encouraged her involvement in the intellectual activities of the Anti-Suffrage League (O'Brien 2000). Yet Gertrude Bell's commitment to education and female betterment was still demonstrated through her dedicated promotion of the education of Iraqi women.

The times in which Gertrude Bell practiced archaeology were vastly different from those of the modern day. She practiced during a period when the British Empire held great sway over much of the wider world and when archaeology was practiced as an eccentric oddity, with little external account ability. Archaeologists of the time were yet to embrace the scientific approaches of "new archaeology" or address the politics of cultural ownership, a matter which is so pressing today. Gertrude Bell excelled in both areas: her thoroughness and attention to detail were congruent with the tenets of scientific archaeology; and her political awareness, respect for people whose cultures she studied, and support for repatriation and self-rule is a model for postcolonial archaeology today. Beyond this, Gertrude Bell was a role model for the archaeologist as hero – feminist hero.

Cross-References

- ▶ Iraq: Archaeological Heritage
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics

References

Bell, G.L. 1914. *Palace and Mosque at Ukhaidir: A Study in Early Mohammadan Architecture*. Oxford: Clarendon Press.

Bell, G.L. 1927. *The letters of Gertrude Bell, selected and edited by Lady Florence Bell*. New York: Boni and Liveright.

Burgoyne, E. 1958. *Gertrude Bell from her personal papers*, 1889–1914. London: Ernest Benn Limited.

Howell, G. 2006. *Gertrude Bell: Queen of the desert, shaper of nations*. New York: Farrer, Straus and Giroux.

Lawler, A. 2008. Preserving Iraq's battered heritage. *Science* 321: 28–30.

Lukitz, L. 2006. *A quest in the Middle East: Gertrude Bell and the making of modern Iraq*. New York: Palgrave Macmillan.

O'Brien, R. 2000. *Gertrude Bell: The Arabian diaries, 1913–1914*. New York: Syracuse University Press.

Ousterhout, R.G., & Jackson M.P.C. 2008. Editors' Foreword, In W.M. Ramsay & G. L. Bell (eds.) *The Thousand and One Churches*, first published 1909. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology, pp. ix–xxxiv.

Wallach, J. 1996. *Desert queen: The extraordinary life of Gertrude Bell*. New York: Bantam Doubleday Dell Publishing Group, Inc.
Winstone, H.V.F. 1978. *Gertrude Bell*. London: Jonathan Cape Ltd.

Beltrán Martínez, Antonio

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Beltrán Martínez, Antonio, Fig. 1 A. Beltran (aged 82)

Basic Biographical Information

Antonio Beltrán Martínez became professor at the Department of Archaeology, Epigraphy and Numismatics at the University of Zaragoza in 1949, the place from which he worked most of his academic life. For 60 years and with a clear mind until the very end, he was a prolific university lecturer, manager, and researcher, while at the same time, he was an excellent communicator with an incredible ability to maintain the interest of all kinds of audiences, academic as well as general public. He inspired the creation of publications, museums, and cultural parks and organized 27 archaeology conferences. He founded the series of archaeological monographs for the University of Zaragoza, where he published the majority of his books. Among many other honors, he was named the city's official Chronicler, and he was awarded the Aragón Award. Author of more than a 100 books and more than a 1,000 articles (367 on rock art), he was a true scholar with a knowledge so encyclopedic that he could write numismatics handbooks as well as speak about the food culture of Aragón, the typical dress, or the local patron saint.

However, what made him truly happy was the study of rock art, the subject to which he dedicated his later research career and which brought him international recognition. He was member of the International Rock Art Committee (ICOMOS), represented Spain in the International Union of Prehistoric and Protohistoric Sciences (IUPPS), and chaired the ninth Commission of Prehistoric Art. He travelled wherever there was rock art, like Kakadu National Park in Australia, Serra da Capivara in Brazil, and the paintings in Namibia. He collaborated in the defense of the Portuguese rock art site at Foz Coa. He was always ready to go to the most inaccessible caves, like Los Estrechos in Albalate where, at almost 80 years of age, he rope climbed to study the schematic paintings (Figs. 1, 2, and 3).

Major Accomplishments

A brief itinerary of his work relating to rock art can be divided into two distinct stages:

1. From 1966 to 1988: Fieldwork outside of Aragón: he studied various Paleolithic caves in the French Pyrenees, and he travelled all the Spanish east coast studying post-Paleolithic art and travelled to the Canary Islands to study its engravings and paintings. Among his publications, three archaeological monographs about Paleolithic art stand out (Le Portel, 1966; Bedeilhac, 1968 y Niaux, 1973), five more about the Levantine rock art (1969: los Grajos; 1970: Valdelcharco; 1972: Cañaíca del Calar y Fuente del Sabuco; 1976: La Sarga; 1988: Peña Rubia) or schematic art (1972: Lecina), and two books about the rock art of the Canary Islands (Barranco de Balos, 1971; Gáldar, 1973). His book of synthesis *Arte Rupestre*

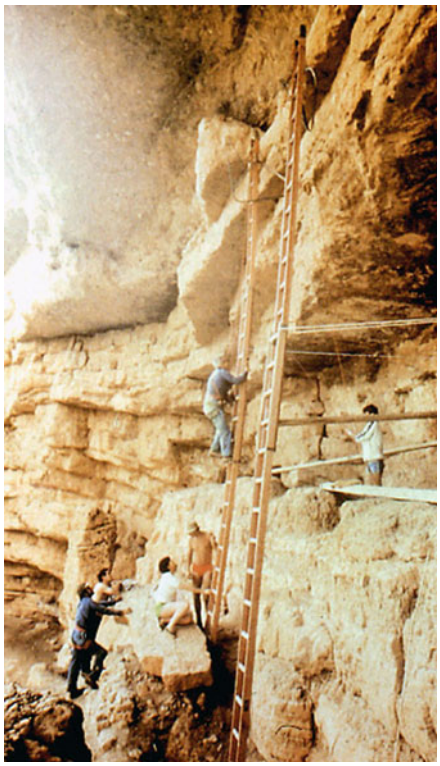

Beltrán Martínez, Antonio, Fig. 2 A. Beltran (aged 75) climbing up a ladder to take photographs of the schematic rock paintings of Los Estrechos (Albalate del Arzobispo, Spain)

Levantino (Levantine rock art) (Zaragoza, 1968) provided a global vision about the geographical location, technique, and themes and approached the problem with chronology advocating the most popular sequence, from the most naturalistic to the most schematic, theory that years later he himself would question. He published Italian versions in Milan like *Da cacciatori ad allevatori: l'arte rupestre del Levante spagnolo* (1980) and *Arte rupestre preistorica* (1993), which were also translated into English and French.

2. From 1989 to 2006: At the age of 60, he focused only on Aragón and began doubting his own chronological system. In his book of synthesis *Arte prehistórico en Aragón* (1993) (*Prehistoric Art in Aragón*), he includes surprising results about the chronology of schematic art. This versatile style that he believed to be typical of the Bronze Age acquired an apparent great antiquity with the appearance of geometric figures at Riparo Villabruna, similar to those from Chaparros site, located below "open-legged" Levantine motifs, which brought him to speak of a continuity since the end of Paleolithic art. On the other hand, the appearance of the sealed figures

Beltrán Martínez, Antonio, Fig. 3 A. Beltrán (aged 90) presides his last Ph.D. jury in the University of Zaragoza

of Porto Badisco (Port Badisco) or the discovery of the Petracos style in Alicante forced him to outline the Neolithic chronology and to distinguish the semi-naturalist from the purely schematic.

Although he studied the schematic paintings of Estadilla in Huesca (1989), he focused with great eagerness on Bajo Aragón (lower Aragón, Teruel) where he led the creation of Río Martín's Cultural Park, the place he was most fond of. He dedicated his last eight monographs to the Levantine rock art sites located within this park (1994: La Higuera; 1995: Tía Chula y Cañada de Marco; 1989 and 1997: Los Chaparros y los Estrechos de Albalate; 1998: El Mortero; 2000: Garroso; 2002: Valdelcharco; 2005: Cerro Felío). In 2005 he finally published a complete catalogue of Río Martín. The impatient octogenarian seemed to want to quickly wrap up his knowledge before taking his final breath, which he did few months later, at 90 years of age.

Cross-References

- ▶ Côa Valley Rock Art Sites
- ▶ Europe: Prehistoric Rock Art
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Rock Art, Forms of

Further Reading

Beltrán Martínez, A. 1968. *Arte rupestre levantino*. Zaragoza: Departamento de Prehistoria y Arqueología, Fac. Letras.

Beltrán Martínez, A. 1971. *Los abrigos del Barranco de Balos*. Gran Canaria: Las Palmas de Gran Canaria.

Beltrán Martínez, A. 1974. *Las pinturas rupestres de La Sarga (Alcoy)*. Valencia: Servicio de Investigación Prehistórica de la Excma. Diputación Prov. de Valencia.

Beltrán Martínez, A. 1980. *Da cacciatori ad allevatori: l'arte rupestre del Levante spagnolo*. Milán: Jaca Book.

Beltrán Martínez, A. 1989. *El arte rupestre aragonés*. Zaragoza: Aportaciones de las pinturas prehistóricas de Albalate del Arzobispo y Estadilla.

Beltrán Martínez, A. 1993. *Arte rupestre preistorica*. Milano: Jaca Book.

Beltrán Martínez, A. 1993. *Arte prehistórico en Aragón*. Zaragoza: Ibercaja.

Beltrán Martínez, A. 2005. *Corpus de arte rupestre del Parque Cultural del Río Martín*. Alacón: Asociación Parque Cultural del Río Martín.

Beltrán Martínez, A., R. Robert, and J. Vézian. 1966. *La cueva de Le Portel*. Zaragoza: Facultad de Letras.

Beltrán Martínez, A., R. Robert, and R. Gailli. 1967. *La cueva de Bédeilhac*. Zaragoza: Facultad de Letras.

Beltrán Martínez, A., R. Robert, and R. Gailli. 1973. *La cueva de Niaux*. Zaragoza: Departamento de Prehistoria y Arqueología, Fac. Letras.

Beltran Martinez, A., and J.M. y Alzola. 1973. *La cueva pintada de Gáldar, Gran Canaria*. Zaragoza: Departamento de Prehistoria y Arqueología, Fac. Letras.

Beltrán Martínez, A., J. Royo, E. Ortiz, J. Paz, and C. Gordillo. 2002. *Las pinturas rupestres del abrigo de Val del Charco del Agua Amarga de Alcañiz*. Zaragoza: Departamento de Prehistoria y Arqueología, Fac. Letras.

Utrilla, P. 2007. Antonio Beltrán y el arte rupestre post-paleolítico. *Caesaraugusta* 79: 49–69.

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Basic Biographical Information

José Berenguer obtained his licentiate degree in prehistory and archaeology from the Universidad de Chile (UCH) in 1975 and his Ph.D. in Anthropology from the University of Illinois at Urbana-Champaign in 2002. He had begun his higher education as a geography major at UCH in 1971 but was unable to complete that program owing to the military coup that occurred in Chile in 1973. However, he credits those early studies with instilling a certain geographical orientation in his research. Dr. Berenguer served as professor in UCH's Department of Anthropology from 1978 to 1982 and from 1992 to 1999. In 1979, he worked as an investigator at the Instituto Otavaleño de Antropología in Ecuador. He is currently head curator at the Museo Chileno de Arte

Precolombino (www.precolombino.cl), where he has curated approximately 30 exhibitions, edited more than 20 exhibit catalogs, and served as editor in chief of the institution's scientific journal for more than three decades (www.boletinmuseoprecolombino.cl). He served three terms as director of the Sociedad Chilena de Arqueología and two terms as editor of that organization's scholarly journal and has been a member of the Archaeology and Anthropology Research Group of the National Science and Technology Development Fund (FONDECYT). He also served a consultant for the nomination of the Inka Road/*Qhapaq Ñan* to UNESCO's list of World Heritage sites. Since 1984, he has obtained a variety of research grants from organizations such as the Wenner-Gren Foundation, the Tinker Foundation, Chile's National Science and Technology Fund (FONDECYT), and the country's National Fund for Cultural Development and the Arts (FONDART). A selection of his leading publications is available on ResearchGate and Academia.edu.

Major Accomplishments

Dr. Berenguer began his professional career as part of the "Toconce Group," an interdisciplinary team that was formed in 1977 to conduct research in the interior of Northern Chile's Antofagasta Region. The group's distinctive approach included involving local indigenous communities in their work and employing indigenous knowledge to further their understanding of the pre-Hispanic past – an approach that has influenced later generations of archaeologists in Chile. One of the group's most important, albeit largely unrecognized, contributions was to lay the foundations for an "archaeology of ritual" that extended beyond funerary rites – a groundbreaking approach in the field at that time. The group's studies on ritual activity in the *chullpas* (funerary towers) of Toconce and the link between those structures and local sacred geography are still considered seminal works on the topic.

One of Dr. Berenguer's current lines of investigation examines the rock art of the Atacama Desert. Aware that rock art can only be incorporated into prehistoric studies when situated chronologically, he has led an unprecedented effort to build a master sequence for the Loa River rock art styles (Berenguer et al. 1985), an initiative that is being continued by more recent investigators in Northern Chile. One of his most important works focuses on the rock art of Taira, in the upper Loa Valley. Contrary to conventional approaches of the time – which were marked by the understandable rejection of the importance and use of ethnographic analogies in interpreting European paleolithic art, along with the not always justified extrapolation of those limitations to other forms of rock art studies around the globe – in the mid-1980s, he interpreted the images found at Taira in relation to the multiplication and conservation of livestock herds, basing this interpretation on the cosmogenies of present-day Andean herding communities, historic documents, and detailed analysis of the images themselves (Berenguer and Martínez 1986). Dr. Berenguer has also proposed that the natural environment is yet another signifier in the message conveyed by those images and that no study of rock art should fail to take geography into account. In another contravention of the prevailing orthodoxy, on the basis of Andean ethnography, in the mid-1990s, Dr. Berenguer proposed that the Taira images are icons with agency, a kind of ritual "symbolic work" (Berenguer 1995).

A parallel line of investigation examines the Tiwanaku presence in Northern Chile. From Dr. Berenguer's perspective, the presence of Tiwanaku materials in Northern Chile indicates that an extensive sphere of interaction had been established. For close to 30 years, his comprehensive work on this topic (Berenguer and Dauelsberg 1989) has provided other researchers with an inexhaustible source of hypotheses to test. Indeed, his expertise in the archaeology of the image has led him to identify snuff tablets for hallucinogenic substances in the hands of well-known Tiwanaku statues. Given the prevalence of certain representations – individuals in a state of trance, snuff tablets, and other elements of the psychotropic complex – in the art of that Altiplano society, Dr. Berenguer concludes that Tiwanaku was a state with a strong shamanic component. Following from this, he postulates that the images

were part of an iconography of power that circulated selectively in the Tiwanaku sphere by means of icon objects related to the consumption of visionary plants (Berenguer 1998).

Yet another of his lines of research, which has emerged from the museum exhibitions he has curated, focuses on the headdresses of the Atacama Desert. As in his previous work with rock art styles and his later work on the San Pedro de Atacama cultural sequence, here Dr. Berenguer organized the headdresses into a timeline before investigating their role as markers or diacritics of social interaction, in addition to studying their designs and uses (Berenguer 2006). He interprets dome-shaped headdresses, for example, as combat helmets, which prompts him to question the local tendency to deny knowledge of conflicts in the pre-Hispanic past. In fact, Berenguer does not believe that the pre-Hispanic exchange networks of the South-Central Andes would have required a climate of "social harmony," as other investigators have proposed – a hypothesis that he views as functionalist and hardly compatible with human nature (Berenguer 2002).

Dr. Berenguer's doctoral research advanced the prevailing models of caravan traffic for the South-Central Andes and made him an immediate authority on that kind of traffic, interregional interaction, and roadway archaeology (Berenguer 2002). His approach articulated several kinds of evidence – from small settlements, trails of llama caravans, traveler's rites, and rock art. One of his most innovative contributions to the study of that traffic was his investigation into internodal spaces or zones *between* population hubs. An interesting application of that approach is found in his study of the Inca road network in Northern Chile. Having noted that local archaeologists commonly studied elements such as roads, settlements, high-altitude shrines, and mining and metallurgical operations separately, Berenguer approached his investigation of the *Qhapaq Ñan* from a comprehensive perspective that incorporated all of these different components (Berenguer 2007). Along the same lines, one of his recent regional analyses brings together information analyzed separately by other researchers in order to characterize the Inca model in Antofagasta Region as one of productive clusters and extractive enclaves (Berenguer and Salazar 2017).

Berenguer is convinced that archaeological study should include the recent past and even the present, and he has had the opportunity to reaffirm this conviction in forensic archaeology work related to the search for and exhumation of the remains of individuals "disappeared" and assassinated for political motives during Chile's military dictatorship. A major hallmark of Berenguer's career as an archaeologist, and one that is closely linked to his activities as a museum curator, is his commitment to the dissemination of scientific information to the public. In Chile, this kind of linkage between scholars and the broader society is only just beginning to be valued in the career of a scientist, particularly because of the social role that all knowledge production must have. Today, Dr. Berenguer's main aim is to expand our understanding of the visual cultures of pre-Hispanic desert societies. As a proponent of realist theory in archaeology, for Berenguer, it is not enough to identify patterns and events in images; one also has to discover the social structures and practices that lie behind those images, and he has applied this approach also to understanding the Middle (Berenguer 1998) and Late (Berenguer and Salazar 2017) Horizons in pre-Hispanic Northern Chile.

Overall, Berenguer believes his greatest contribution cannot be found in the results and findings of his investigations but in the ideas that have emerged from them, ideas that have been and continue to be discussed and tested by researchers in different fields. What's important says Berenguer is not that they think we're right but that our ideas make them think and drive them to make their own contribution to furthering the archaeological study of human societies.

References

Berenguer, José. 1995. El arte rupestre de Taira en el contexto de los problemas de la arqueología atacameña. *Chungará* 27 (1): 7–43.

Berenguer, José. 1998. La iconografía del poder en Tiwanaku y su rol en la integración de zonas de

frontera. *Boletín del Museo Chileno de Arte Precolombino* 7: 19–37.
Berenguer, J. 2002. Tráfico de caravanas, interacción interregional y cambio cultural en la prehistoria tardía del desierto de Atacama. Ph.D. Dissertation, University of Illinois, at Urbana-Champaign.
Berenguer, José. 2006. Señales en la cabeza. Los tocados de *Wirakocha* en el norte de Chile/Head emblems. *Wirakocha*'s headdresses in Northern Chile. In *Gorros del desierto/Headdresses from the desert*, ed. Luis Cornejo, 8–90. Santiago: Museo Chileno de Arte Precolombino.
Berenguer, José. 2007. El camino inka del Alto Loa y la creación del espacio provincial en Atacama. In *Producción y circulación prehispánicas de bienes en el sur andino*, ed. Axel Nielsen et al., 413–443. Córdoba: Editorial Brujas.
Berenguer, José, and Percy Dauelsberg. 1989. El Norte Grande en la órbita de Tiwanaku. In *Culturas de Chile, Prehistoria*, ed. Jorge Hidalgo, Carlos Aldunate, Virgilio Schaippacasse, and Iván Solimano, 129–180. Santiago: Editorial Andrés Bello.
Berenguer, José, and José Luis Martínez. 1986. Camelids in the Andes: Rock art, environment and myths. In *Animals into art*, ed. Howard Morphy, 390–416. London: Unwin Hyman.
Berenguer, José, and Diego Salazar. 2017. Territorialización del modelo minero inkaico en el río Salado: Una aglomeración productiva entre Lípez y San Pedro de Atacama. *Boletín del Museo Chileno de Arte Precolombino* 22 (1): 51–69.
Berenguer, José, Carlos Aldunate, Victoria Castro, Luis Cornejo, and Carole Sinclaire. 1985. Secuencia del arte rupestre en el Alto Loa: Una hipótesis de trabajo. In *Estudios en arte rupestre*, ed. Carlos Aldunate, José Berenguer, and Victoria Castro, 87–105. Santiago: Museo Chileno de Arte Precolombino.

Berenike, Archaeology of

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Introduction

Ptolemy II Philadelphus founded the Egyptian Red Sea emporium of Berenike (23° 54.62′ N/35° 28.42′ E) in c. 275 BCE naming it after his mother. Berenike, approximately 825 km south southeast of Suez and about 260 km east of Aswan, was the southernmost Red Sea emporium in Ptolemaic and Roman Egypt (Fig. 1). This entrepôt functioned for approximately eight centuries until peacefully abandoned sometime before the mid-sixth century CE for unknown reasons. Creating this settlement was part of a larger Ptolemaic infrastructure project, which included (re)excavating a Nile-Red Sea canal (termini at/near Bubastis in the delta-near Klysma/Suez in the pre-Roman era; at Babylon opposite Fayum-near Klysma/Suez in Roman times) and establishing other ports along the Red Sea coast, both in Egypt and farther south on the African littoral. Ptolemaic authorities also built roads, forts, and unfortified watering stations in the Eastern Desert of Egypt linking Red Sea ports to counterparts on the Nile and joining emporia on the Nile and Red Sea to mining settlements. At the latter the Ptolemies sought primarily gold and amethysts (Sidebotham et al. 2008; Sidebotham 2011).

The Romans increased exploitation of mineral wealth in the Eastern Desert (beryls/emeralds, amethysts, gold, copper, and hard stone, including marble, for buildings, sarcophagi, and statuary). Many, if not all, of these endeavors were government sponsored. The Romans enlarged Red Sea ports in Egypt and expanded the highway system in the Eastern Desert. The Romans also renovated/extended old roads and constructed new ones. Along these thoroughfares, the Romans constructed additional watering points, *praesidia* (forts), *skopeloi* (watch and signal towers), and other infrastructure. Roads in the Eastern Desert in both Ptolemaic and Roman times consisted primarily of cleared tracks of varying widths with surface debris pushed to the edges forming windrows in many cases. Some roads, both primary and those within or leading to quarries and mines, were artificially elevated to facilitate passage across difficult terrain. Primary means of transport were camels, donkeys, and horses. There was also human pedestrian traffic and wheeled conveyances used within quarry and mining settlements. Route-marking cairns of varying sizes were built of locally acquired stone, and graves lined many of these desert tracks; none of the highways appears to have been paved, and few, if any, milestones were erected (Sidebotham 2011).

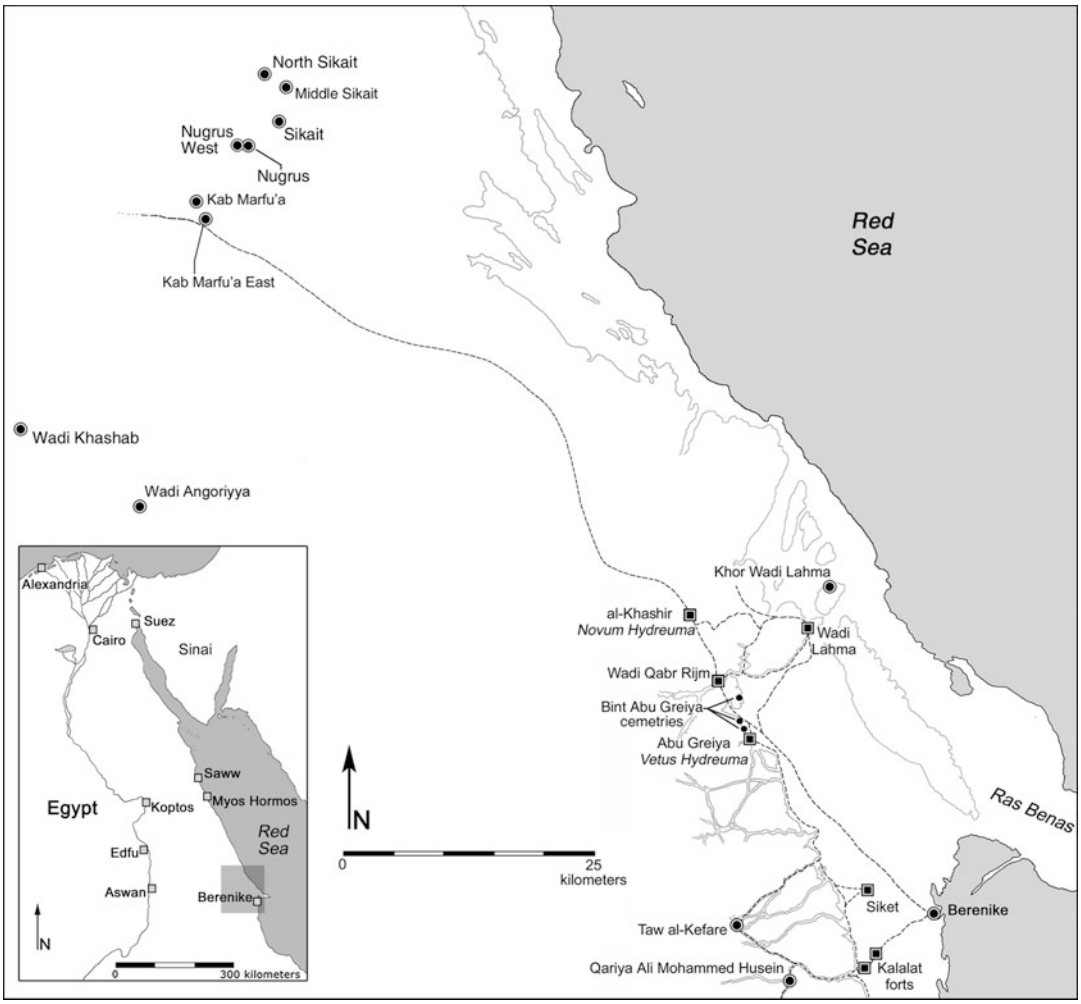

Berenike, Archaeology of, Fig. 1 Map of the region (M. Hense)

G.B. Belzoni (re)discovered Berenike in 1818, and throughout the nineteenth and early twentieth centuries, European visitors (including J.G. Wilkinson, J.R. Wellsted, H. Barth, E.S. Purdy, R.E Colston, W. Golénischeff, E.A. Floyer, and T. Bent, among others) conducted cursory examinations and cleared portions of the so-called Serapis Temple (now named the Great Temple) on the highest part and near the center of the site. The current project, 1994–2001 (University of Delaware, USA; Leiden University, the Netherlands/UCLA) and 2008–present (University of Delaware-Polish Centre of Mediterranean Archaeology, University of Warsaw), has undertaken systematic, scientific surveys, geological coring, geomagnetic examination, excavations, documentation of a broad array of finds (ecofacts and artifacts both organic and inorganic), and extensive publication (Fig. 2) (Sidebotham 2011, 2017, 2018; Sidebotham and Wendrich 1995, 1996, 1998a, b, 1999, 2000, 2001-2002, 2007; Sidebotham and Zych 2010, 2011, 2012, 2016; Zych et al. 2016).

The ruins of Berenike cover approximately 28.5 ha with a maximum east-west length of about 700 × 400 m (in one area an additional 5000 m^2) north-south. Geological coring combined with studies of seismic and tectonic activities in the Red Sea in general indicates sea-level

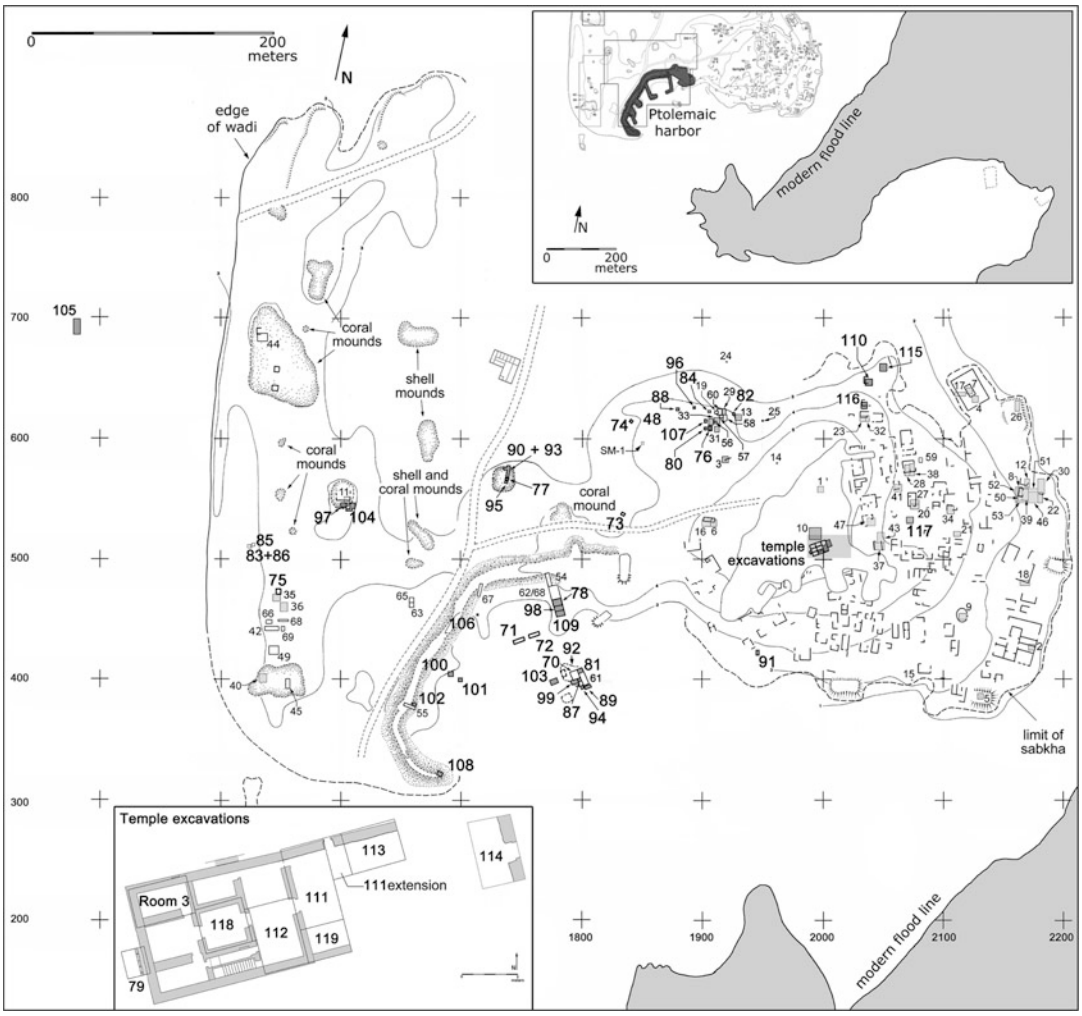

Berenike, Archaeology of, Fig. 2 The site plan (M. Hense)

changes over the past two millennia; inflow of sediments via wadis debouching into the Red Sea immediately north and south of Berenike resulted in silting of the northern, southern, and southwestern harbors. The ancient inhabitants made no attempt, apparently, to dredge (as contrasted with Myos Hormos, a Ptolemaic-Roman port c. 300 km north of Berenike) to keep the harbors operational; instead, due to progradation of the coastline, residents moved the settlement ever eastward. Excavations thus far have shown that the Ptolemaic settlement lay farthest west, the early Roman community was east of that, and the late Roman city lay the farthest east of all (Figs. 2 and 3). Of course, there is some overlap of portions of later periods of occupation atop earlier ones (Sidebotham 2011).

Archaeological evidence indicates three peak periods at Berenike: early-middle Ptolemaic (mid-third to mid-second centuries BCE), early Roman (first to early second century CE), and late Roman (mid-fourth through fifth centuries CE). There was, apparently, a mini-renaissance in the late second and early third centuries CE (the Severan period). These were interspersed with nadirs (late Ptolemaic, second-first centuries BCE; middle Roman, much of the second to fourth centuries CE; and later Roman, mid-late

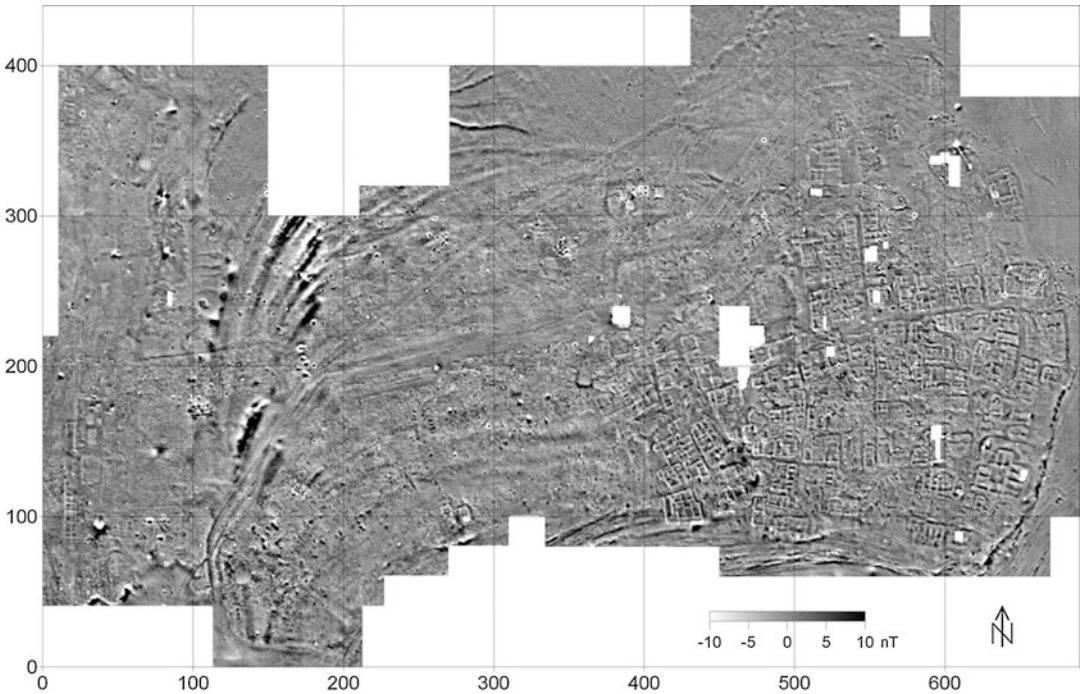

Berenike, Archaeology of, Fig. 3 The geomagnetic survey map (Survey by D. Święch and R. Ryndziewicz. Processed by T.M. Herbich)

fifth to mid-sixth centuries CE) until abandonment sometime before the mid-sixth century CE.

Definition

Ptolemaic Era

Initially, Berenike's raisons d'être were to meet the needs of the Ptolemaic government and military: importation of elephants (likely either the bush, *Loxodonta africana*, or forest, *Loxodonta cyclotis*, species) for military use, gold, and ivory. Some merchandise for civilian consumption and conveyed by private entrepreneurs also passed through Berenike on which the government levied substantial taxes. In Ptolemaic times Berenike was in contact mainly with other areas of Egypt, Nilotic and Red Sea coastal Africa, and the eastern Mediterranean/Levant. There were diplomatic exchanges between Ptolemaic Egypt and Aśoka, the Mauryan king of India, in the third century BCE and some contact with southern Arabia. A road across the Eastern Desert linked Berenike to (Contra)Apollonopolis Magna (modern Edfu) on the Nile c. 340 km to the northwest (Sidebotham 2011).

Ptolemaic areas of Berenike lay primarily in the western part of the site, also some in the northern and central portions, and included zones for manufacturing activities (brick making, the production of lead, copper alloy, iron, creation of small-scale sculpture), a ditch (possibly for retaining elephants), and remains of a tower and other fortification walls, which had been badly robbed in the Augustan era. These fortifications indicate military presence in the early Ptolemaic era and are rare examples of Hellenistic urban defenses found anywhere in Egypt. A rectangular-shaped excavation into bedrock in Ptolemaic times immediately behind some of the fortifications contained five tunnels, one of which was hydraulic; incomplete excavations prohibit identification of four of these features (Sidebotham and Zych 2016). There are human skeletons

deposited at some unknown date in antiquity atop some of the Ptolemaic ruins. Some of these human remains preserved evidence of immediate post-mortem disturbance with extremities gnawed by scavengers. Ptolemaic trash deposits lay north of the southwestern-most harbor. Ptolemaic-era building materials include gypsum/anhydrite, limestone, and assorted stones. Fired brick appears in a section of a cistern from this era; this material is not evident in other excavated structures on the site though individual loose fired bricks appear throughout the archaeological record in the Roman period (see *infra*).

Artifacts and ecofacts (Faunal and Floral remains) from the Ptolemaic era include amphora sherds from Rhodes, Knidos, and other areas of the Aegean (some with stamped handles: mainly from Rhodes); fine wares from Campania and Rhodes; fragments of lead sheets; some preserving holes for sheathing ships' hulls; copper alloy and iron nails and tacks; some sculpture; beads; an intaglio, likely depicting a deity; ostraka written in Demotic; burned industrial waste; and some organic remains (faunal, botanical, basketry, cordage, matting). There are also some Ptolemaic silver and *aes* coins. Excavations in an early Ptolemaic trash deposit documented a broken faience scarab-heirloom with a hieroglyphic text from the tenth century BCE (twenty-first Dynasty Pharaoh Siamun). Faunal analysis – including the presence of camel and pig – indicates mainly an Egyptian and desert dwelling population in Berenike at this time (Sidebotham 2018).

Contemporary records reveal great interest in the Red Sea during the reign of Ptolemy VIII (r. 169–116 BCE) as the creation of an official at this time, though possibly later, styled the *strategos kai epistrategos tes Erythras kai Indikes Thalassas* indicates. These together with a text of the same monarch from the main temple at Berenike suggest it was during his reign that the Great Temple, initially found and partially cleared by Belzoni, and which he identified as a temple to Serapis, was constructed. The top of a broken stele depicting traditional Egyptian deities excavated in the Great Temple appears to be of Ptolemaic date. The era of Ptolemy VI–VIII (180–116 BCE) was one of extensive temple construction elsewhere in Egypt. Strabo (2.3.4) reported toward the end of his reign that Ptolemy VIII sponsored Eudoxus of Cyzicus to explore the Red Sea and Indian Ocean. This passage corroborates other sources that record official (and, likely private entrepreneurial) interest in those regions at that time (Sidebotham and Zych 2016).

Early Roman Era

Roman (30 BCE to mid-sixth century CE) activities at Berenike were more commercial and civilian in nature than under the Ptolemies, though the Roman military was present especially in the early Roman period. The volume of trade also increased. During the Roman occupation Berenike's networks expanded geographically throughout much of the Mediterranean basin. In early Roman times, these stretched as far west as Gaul, the Iberian Peninsula, and Mauretania (Morocco) and at least as far east as India and Sri Lanka on a regular basis. Interaction with the Persian Gulf was minimal and indirect via emporia in southern Arabia (e.g., Sumhuram/Moscha Limen, Qana'). Ships traveling between India and the Red Sea also stopped at these and other south Arabian ports, for example, the island of Socotra. There appears to have been little exchange between Berenike and the Indian Ocean coast of Africa. At this time Berenike was one conduit in a network that included routes (intra-Mediterranean, trans-Saharan, Amber, trans-Arabian, and so-called Silk) linking portions of Africa, Asia, and Europe together. There are numerous ancient literary references to Berenike and its importance in the commerce of this era (e.g., Strabo, Pliny the Elder, *Periplus Maris Erythraei*). The Roman government reaped a handsome income from taxes and tolls levied on merchandise imported from outside the empire. The government also profited from the transport of products, people, and animals across the Eastern Desert. Documents recording these levies are evident from the first and second centuries CE and include the Koptos Tariff (May 90 CE) and the so-called Muziris Papyrus (mid-second century CE). In the Roman period, the main thoroughfare connected Berenike to the Nile emporium of

Koptos (modern Quft), c. 381 km to the northwest [north of (Contra)Apollonopolis Magna/Edfu].

Early Roman remains at Berenike comprise portions wharfs and quay walls beneath later Roman edifices on the eastern edge of the site. Early Roman structures also appear in the southwestern harbor with putative wharfs/quays and other unidentifiable features including a sunken rectilinear-shaped one made of white gypsum/anhydrite ashlars. The appearance and method of construction of the latter closely resemble those of the Great Temple at the topmost part of the city, which may be Ptolemaic or early Roman in its original construction. This may suggest a chronological as well as functional relationship between the Great Temple and this enigmatic sunken structure. One theory proposes that the sunken feature was a Red Sea version of a Nilometer (Zych et al. 2011; Sidebotham and Zych 2012; Sidebotham 2014). There are early Roman (mainly second and third quarters of the first century CE) rubbish deposits north of the city, which have produced numerous ostraka, papyri, stamped and painted jar stoppers, other organic and inorganic remains, and floral and faunal ecofacts. There are also edifices in the city center (Great Temple and associated structures). The latter include small-scale industrial facilities and structures of unknown function. The scant remains of early Roman-era structures thus far excavated indicate construction from limestone boulders and gypsum/anhydrite ashlars quarried from nearby sources. Excavations also documented fragments of window pane glass from early Roman contexts suggesting that the apertures of some structures from this era had glass fittings.

Early Roman period finds include extensive organic and inorganic remains of artifacts and ecofacts mainly, but not exclusively, from the early Roman rubbish deposits north of the city (as noted *supra*) (Cappers 2006; Zieliński 2011). Most written documents from the site date from this era (ostraka, papyri, inscriptions on stone and dipinti on wood and shell, and stamped and/or painted plaster jar stoppers). Most ostraka are public documents, while the majority of papyri detail private affairs though one of the latter is a literary papyrus containing references to the rites of Cybele (Ast and Lougovaya 2015). One ostraka archive contains information on activities at the Roman customs house/customs gate in the city at this time (first century CE), while another deals with the army's involvement in the transport and procurement of fresh water for Berenike (also first century CE) (Bagnall et al. 2000, 2005; Ast and Bagnall 2016). Quantitatively, most identifiable coins found from all phases of site occupation (both billion and *aes*) also date from this era. Finds from the southwestern harbor include ship timbers and a ship's frame made of cedar wood, rigging, lead hull sheathing, brailing rings made of wood and animal horn, and ships' ballast comprising vesicular basalt imported from Qana' on the Indian Ocean coast of southern Arabia (Sidebotham 2008, 2011). There was also redeposited industrial waste, stone – including large amounts of imported obsidian – sard, selenite, beryl, worked turtle and mother-of-pearl shell, leather, and cordage, and evidence of extensive patching and recycling of various qualities of textiles and cloth. There are extensive burned deposits: possible evidence of charcoal manufacture using discarded ships' timbers or evidence for an extensive and accidental fire that swept through the southwestern harbor sometime in the first or second century CE. The population at this time came from throughout the Mediterranean basin (Europe, North Africa, Middle East), Egypt, the Red Sea, and Indian Ocean littorals.

In early Roman times and later, there was military presence both at the port and in *praesidia* (Forts) in the environs. Ten *praesidia*, ranging from southwest to northwest of the city and varying from c. 7 km to about 25 km distant, protected approaches to Berenike in the early Roman period. Some of these installations witnessed Ptolemaic occupation and later Roman use as well. Several hundred early Roman-era ostraka from the trash dump north of the city center (noted *supra*) indicate that the Roman army secured, transported, and distributed potable water likely from some *praesidia* closest to Berenike (viz., Siket and two in Wadi Kalalat) for consumption in the city and, perhaps, for use aboard outbound ships (Sidebotham 2011). Military and police units also guarded/patrolled the route between

Berenike and the Nile at Koptos and some of the mines (notably beryl/emerald and likely gold) in the region. Some soldiers were regular Roman military, while others were auxiliaries (including Palmyrene mounted troops in at least the late second and early third century CE) (Sidebotham et al. 2008).

Late Roman Era

In the late Roman period, ceramic and numismatic evidence indicates that Berenike's network contracted in the north and west to include primarily the eastern Mediterranean/Levant; contacts between Berenike and other areas of the Red Sea-Indian Ocean basin including south Asia (India and Sri Lanka; there is also a bead from Jatim in eastern Java and possibly specimens from Vietnam and/or Thailand) remained extensive. The main Nile terminus for the late Roman-era road lay, as in early Roman times, at Koptos. The latest literary reference to Berenike is in 524/525 CE in the *Martyrium Sancti Arethae* (27–29), but the port had clearly declined in importance by that time. By the mid-sixth century, Berenike lay abandoned due, perhaps, to continued harbor silting, a plague (bubonic), which Procopius mentions passing through the region and/or increased competition from south Arabian, Axumite, and other middlemen. There is no evidence of Islamic occupation. Recent excavations in the Great Temple recorded three fragments of a Middle Kingdom (eighteenth century BCE) stele of the Pharaoh Amenemhet IV. These may join with one Belzoni recovered from the temple, but which is now lost. These fragments may indicate the presence of a roadstead here at that time, which supported communications between Saww (in Wadi Gawasis on the coast ca. 350 km north of Berenike) and Punt (Hense at al. 2015).

The bulk of the visible remains at the eastern edge and central parts of the site, but also somewhat in the southwestern harbor, are late Roman structures (mid-fourth into the fifth century CE) though these lay, in some instances, at least, above earlier remains. These late Roman structures were built primarily of fossilized coral heads; these buildings have quoins, staircases, and some thresholds made from recycled gypsum/anhydrite ashlars – including at least one bilingual (Greek-Latin) inscription built into a wall – recovered from earlier edifices. Three other first- and early second-century CE inscriptions found in the courtyard of a multistoried structure of late Roman date, and likely taken from the Great Temple, which lay just to the west, seem to have also been destined for recycling into late Roman structures in the central-eastern part of Berenike. Teak and cedar wood timbers, likely recycled from dismantled ships, often appear as supports built horizontally into fossilized coral head walls or forming partial roofing or shelving for buildings in this period. Recycling of wooden ship parts into architecture had a long tradition in Egypt dating back thousands of years (Sidebotham 2008, 2014; Sidebotham and Zych 2016). Excavations have documented a few fired bricks with plaster adhering suggesting the presence of some hydraulic facility that has yet to be identified. These together with the recovery of fragments of some glass bath flasks may point to the presence of a bath somewhere in the city that has yet to be identified.

Structures in the central and eastern parts of the site comprise cult centers, small-scale industrial areas, multistoried commercial-residential buildings, and trash dumps; the latter were deposited atop, inside, and outside of abandoned buildings. In the southwestern harbor are remains of a late fourth to fifth century CE temple adjacent to a sunken structure of unknown function built of white gypsum/anhydrite ashlars (described *supra*). This late Roman harbor temple seems to have accommodated several cults, both Greco-Roman, Egyptian, southern Arabian and, perhaps, Nubian/Meroitic (Rądkowska et al. 2010; Sidebotham et al. 2015; Sidebotham 2014). The only formal necropolis thus far identified in/near the city seems to date from at least the late Roman era. In addition, hundreds of late Roman-era tombs lay atop low hills situated west/west southwest of Berenike; most of these have been robbed at some unknown date. Early Roman burials with grave goods have been documented near the Ptolemaic hydraulic feature (noted above). There are also early and middle Roman-era tombs in the abandoned modern military bunker area northwest of the city.

Late Roman-era finds include many botanical and faunal remains, both organic and inorganic artifacts (especially ceramics, textiles – some imported from India – basketry, matting and cordage, glass, beads, industrial waste, and coins). Late Roman (mainly after the mid-fourth century CE) *aes* coins, primarily of the smaller denominations, are the second most abundant on site (after the early Roman issues).

A few non-Roman coins also date from this era: an issue of Axumite King Aphilas (c. 270/290–before 330 CE), a second century CE Satavahana coin, a silver example of Rudrasena III of the Kshatrapa dynasty in India (dating 362 CE) (Sidebotham and Wendrich 2007) and a few, apparently, barbarous *aes* specimens of unknown provenance. The few written (non-numismatic) documents from this era of the city's history comprise laconic dipinti and graffiti on sherds, one of which is written in Aramaic or Hebrew. The population was primarily Egyptian (both desert dwelling and marine oriented based on faunal analysis of items they consumed) though there is evidence of contact with and, perhaps, people from Axum, southern Arabia, and the Indian subcontinent/Sri Lanka who were trading with, passing through, or dwelling in the city at that time.

Key Issues/Current Debates

General Observations

Berenike was very cosmopolitan. Twelve different written languages (European, African, and Asian), a variety of religious practices, and an array of floral and faunal remains (a reflection of diet and, often, ethnicity) as well as finer ceramics indicate the presence of diverse groups of men, women, and children, as do burial practices/skeletal remains. Texts recorded on stone document that some women played a prominent role in the life of the city, at least in early Roman times. Remains of an animal necropolis indicate that cats and kittens, dogs, and puppies as well as baboons and vervet or grivet monkeys were among some of the pets of the residents in the early Roman era. A few of the animal remains preserved iron collars, one of which had been decorated with beads (Sidebotham and Zych 2016). In addition to commercial activities, there must have been cultural interaction among the diverse populations, both those dwelling in Berenike and also between the city's residents and itinerant visitors.

The port's ethnically diverse inhabitants ranged from those of lesser means to relatively wealthy as reflected in some of the finds (e.g., gold and pearl earring; undecorated gemstones and intaglios from signet rings; Proconnesian marble imported from northwestern Asia Minor and elsewhere used as floor/wall revetment; escargot shells from southern France/northern Italy; fancy tapestries used as wall hangings/furniture or floor coverings; other semiprecious stones – including a sapphire; and beads, many made of semiprecious stones and gold foil). Dedicatory inscriptions made by both men women residing in Berenike also indicate a portion of the population that was relatively wealthy. One inscription of the early second century CE mentions an aromatics warehouse in Berenike indicating that merchandise passed through the emporium enroute from markets in the Red Sea-Indian Ocean littorals to destinations in Egypt and the wider Mediterranean world (Ast and Bagnall 2015). Excavation of substantial amounts of black peppercorns, found both individually and in a large Indian-made jar containing 7.55 kg of this spice, and other imported commodities indicates that some exotic products were also consumed in Berenike itself.

Aside from a number of religious cult centers and some quays, wharfs, and piers, no other types of public buildings (e.g., baths, theaters, stadia, circuses, etc.) or monuments, except for a position of a *tetrapylon*/*tetrakionion* (viz., triumphal arches, dedicatory columns, etc.) have thus far been identified in the excavations. In addition, while most areas of the city have undergone at least some excavation, the majority of the southern side of the site has not.

Some industrial activities took place at Berenike: brick manufacture, production of lead, copper alloy, and iron nails, tacks, and fittings (for ship maintenance and repair, furniture making,

and likely some architectural applications); recycling of glass; making items from mica, beryl, sard, obsidian, selenite and turtle and mother-of-pearl shell; manufacture of cordage; basketry and matting; wood, leather, and animal horn working; and small-scale sculptural production in both Ptolemaic and Roman times. More *ad hoc* was the frequent patching, repair, and recycling of clothing and other objects made from textiles.

Scholars have debated extensively the nature of the commerce passing through Berenike and the trade between the ancient Mediterranean basin on the one hand and the "East"/northwestern Indian Ocean littoral (southern Arabia, East Africa, South Asia, to a much lesser extent the Persian Gulf) on the other. The long-held view that this was mainly a "luxury" trade for the elite must be reconsidered/modified in light of all the evidence (literary and archaeological) associated with Berenike and other contemporary Red Sea and Indian Ocean/Persian Gulf emporia. Reexamination of literary sources dealing with this commerce also suggests that this trade was not primarily one dealing in luxuries, but included both "necessities" and also more "exotic" items. The term "luxury" must be used with great caution as it would have depended on the socio-economic status of those using the items and in what context such items were consumed; often the term "luxury" reflects modern cultural bias rather than ancient sensibilities (Sidebotham 2011).

Some of the more noteworthy/unusual imports found in excavations at Berenike, mainly from the Roman era, were black peppercorns, coconut, rice, bamboo, jobs' tears (grass seeds from northeastern India), rosary beads (*Abrus precatorius* L seeds – rosary peas – from India), mung beans, *Boswellia* (genus of frankincense), seeds of the baobab tree, mastic, camphora, perhaps sandalwood, teakwood (from south India), and cedar wood (likely from Lebanon) (Cappers 2006; Zieliński 2011). The teak and cedar, for the most part, appear to have been the remains of dismantled ships recycled into the walls or ceilings of buildings or as shelving. There was a millennia-long Egyptian tradition for such reuse of ship timbers. Other imports included Indian textiles; resin from the Syrian fir tree (*Abies cilicica*) used in mummification and as an antiseptic and diuretic, sapphires (from south India/Sri Lanka); pearls (including five on a gold-wire earring); lapis lazuli; beads made of glass and semi-precious stones (many from South Asia, one from Java, some perhaps from Vietnam/Thailand); banded agate cameo blanks (from northwestern India); travertine (from southern Arabia) balsam; Indian (both fine wares and cooking/coarse wares), south Arabian and Axumite pottery; as well as some sherds of Persian Gulf and Nabataean provenance. Some sherds remain unidentifiable and may derive from the Indian Ocean coast of Africa. No extant literary evidence mentions some of these, while others were likely not trade items (pottery and beads) but ancillaries to commerce (containers for commodities) or were personal baggage of residents and visitors. Most pottery from Berenike is amphorae deriving from throughout the Mediterranean basin, Egypt, and the Middle East.

Conclusion

Excavations at Berenike and elsewhere in the Mediterranean, Red Sea, and Indian Ocean basins (including the Persian Gulf) over the past 30–35 years have documented the existence of "intercontinental" contacts (diplomatic and commercial and exchange of ideas and technologies) in Hellenistic times among Europe, Africa, and Asia. The scale of these connections was commercially greater in volume, involving a wider array of items (goods ranging from "luxury" to prosaic) and more extensive geographically in the Roman era and certainly more substantial overall in Roman times than previously believed. There is more evidence of diplomatic contacts and other exchanges in the early Roman period than in previous times. After a dramatic decrease in the Middle Roman period, vibrant contacts resumed in the late Roman (mid-fourth into the fifth century CE) era. Cultural exchanges (including philosophies and technologies) are more difficult to identify and measure, but most certainly occurred (Sidebotham 2011).

Concomitant to fieldwork at Berenike, the project has also conducted wide-ranging surveys and excavations in the environs and farther afield in the Eastern Desert, between the Red Sea coast and the Nile. This research provides a wider context in which to understand better Berenike's interactions with and importance to local and regional settlements as well as with the broader network within Egypt, the Mediterranean basin, and the Red Sea-Indian Ocean regions. The chronological range of sites spans from Neolithic (a cattle cemetery) to late Roman; the project also documented an RAF airfield from WWII. Types of sites documented by our regional fieldwork between the Nile and the Red Sea include roads, individual graves, *necropoleis* (animal and human), mines, quarries, fortified and unfortified road stations, route-marking cairns and *skopeloi*, and putative Christian *laura* communities (Sidebotham et al. 2008; Sidebotham 2011).

The American-Polish project will continue excavations at Berenike and survey-excavation in the desert hinterland for the foreseeable future.

Cross-References

- ▶ Economy, Roman
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Late Antique Egypt, Archaeology of
- ▶ Red Sea: Maritime Archaeology

References

Ast, R., and R.S. Bagnall. 2015. The receivers of Berenike. New inscriptions from the 2015 season. *Chiron* 45: 171–185.

Ast, R., and R.S. Bagnall. 2016. *Documents from Berenike, volume 3: Greek and Latin texts from the 2009–2013 seasons*. Brussels: Fondation Égyptologique Reine Élisabeth.

Ast, R., and J. Lougovaya. 2015. Cybele on the Red Sea. New verses from Berenike. *Greek Roman and Byzantine Studies* 55: 654–687.

Bagnall, R.S., C. Helms, and A.M.F.W. Verhoogt. 2000. *Documents from Berenike, volume 1: Greek ostraka from the 1996–1998 seasons*. Brussels: Fondation Égyptologique Reine Élisabeth.

Bagnall, R.S., C. Helms, and A.M.F.W. Verhoogt. 2005. *Documents from Berenike, volume 2: Texts from the 1999–2001 seasons*. Brussels: Fondation Égyptologique Reine Élisabeth.

Cappers, R.T.J. 2006. *Roman foodprints at Berenike: Archaeobotanical evidence of subsistence and trade in the Eastern Desert of Egypt*. Los Angeles: Cotsen Institute of Archaeology.

Hense, M., O.E. Kaper, and R.C.A. Geerts. 2015. A stela of Amenemhet IV from the main temple at Berenike. *Bibliotheca Orientalis* 72 (5–6): 586–602.

Rądkowska, J., S.E. Sidebotham and I. Zych. 2010. The Late Roman Harbor Temple of Berenike. Results of the 2010 Season. *Polish Archaeology in the Mediterranean* 22: 209–228.

Sidebotham, S.E. 2008. Archaeological Evidence for Ships and Harbor Facilities at Berenike (Red Sea Coast), Egypt. In R.L. Hohlfelder, ed., *The Maritime World of Ancient Rome*. Ann Arbor: University of Michigan Press: 305–324.

Sidebotham, S.E. 2011. *Berenike and the ancient maritime spice route*. Berkeley: University of California Press.

Sidebotham, S.E. 2014. Religion and Burial at the Ptolemaic-Roman Emporium of Berenike, Egypt. *African Archaeology Review* 31: 599–635.

Sidebotham, S. 2017. Zwischen Wüste und Meer. Der Hafen von Berenike in ptolemäisch-römischer Zeit. *Antike Welt* 2 (17): 60–69.

Sidebotham, S.E. 2018 (forthcoming). In C. Zazzaro and A. Manzo, eds., *Proceedings of The Red Sea Project VII. The Red Sea and the Gulf: Two Alternative Maritime Routes in the Development of Global Economy, from the Late Prehistory to Modern Times. The seventh international conference on the peoples of the Red Sea region and their environment. Università di Napoli L'Orientale 26th–30th May 2015*. Leiden: Brill, forthcoming.

Sidebotham, S.E., and W.Z. Wendrich, eds. 1995. *Berenike 1994. Preliminary report of the 1994 excavations at Berenike (Egyptian Red Sea coast) and the survey of the Eastern Desert*. Leiden: Centre of Non-Western Studies.

Sidebotham, S.E., and W.Z. Wendrich, eds. 1996. *Berenike 1995. Preliminary report of the 1995 excavations at Berenike (Egyptian Red Sea coast) and the survey of the Eastern Desert*. Leiden: Centre of Non-Western Studies.

Sidebotham, S.E., and W.Z. Wendrich. 1998a. Berenike: Archaeological fieldwork at a Ptolemaic-Roman Port on the Red Sea coast of Egypt: 1994–1998. *Sahara* 10: 85–96.

Sidebotham, S.E., and W.Z. Wendrich, eds. 1998b. *Berenike 1996. Report of the 1996 excavations at Berenike (Egyptian Red Sea coast) and the survey of the Eastern Desert*. Leiden: Centre of Non-Western Studies.

Sidebotham, S.E., and W.Z. Wendrich, eds. 1999. *Berenike 1997. Report of the 1997 excavations at Berenike and the survey of the Egyptian Eastern Desert, including excavations at Shenshef*. Leiden: Centre of Non-Western Studies.

Sidebotham, S.E., and W.Z. Wendrich, eds. 2000. *Berenike 1998. Report of the 1998 excavations at Berenike and the survey of the Egyptian Eastern Desert, including excavations in Wadi Kalalat*. Leiden: Centre of Non-Western Studies.

Sidebotham, S.E. and W.Z. Wendrich. 2001–2002. Berenike archaeological fieldwork at a Ptolemaic-Roman Port on the Red Sea coast of Egypt 1999–2001. *Sahara* 13: 23–50.

Sidebotham, S.E., and W.Z. Wendrich, eds. 2007. *Berenike 1999/2000. Report on the excavations at Berenike, including excavations in Wadi Kalalat and Siket, and the survey of the Mons Smaragdus region*. Los Angeles: Cotsen Institute of Archaeology.

Sidebotham, S.E., and I. Zych. 2010. Berenike: Archaeological fieldwork at a Ptolemaic-Roman Port on the Red Sea coast of Egypt 2008–2010. *Sahara* 21: 7–26 & Plates A1–A7.

Sidebotham, S.E., and I. Zych, eds. 2011. *Berenike 2008–2009. Report on the excavations at Berenike, including a survey in the Eastern Desert*. Warsaw: Polish Centre of Mediterranean Archaeology, University of Warsaw.

Sidebotham, S.E., and I. Zych. 2012. Berenike: Archaeological fieldwork at a Ptolemaic-Roman Port on the Red Sea coast of Egypt 2011–2012. *Sahara* 23: 29–48.

Sidebotham, S.E., and I. Zych. 2016. Results of the winter 2014–2015 excavations at Berenike (Red Sea coast), Egypt & related fieldwork in the Eastern Desert. *Journal of Indian Ocean Archaeology* 12: 1–33.

Sidebotham, S.E., M. Hense, and H.M. Nouwens. 2008. *The Red Land. The illustrated archaeology of Egypt's Eastern Desert*. Cairo: American University in Cairo Press.

Sidebotham, S.E., I. Zych, J.K. Rądkowska, M. Woźniak. 2015. Berenike Project. Hellenistic fort, Roman harbor, Late Roman temple, and other Fieldwork: archaeological work in the 2012 and 2013 seasons. *Polish Archaeology in the Mediterranean* 24/1: 294–324.

Woźniak, M. and J.K. Rądkowska. 2011. In Search of Berenike of the Ptolemies. The Hellenistic fort of Berenike Trogodytica, its location, form and development (part one). *Polish Archaeology in the Mediterranean* 23/1: 505–526.

Zieliński, J. 2011. Archaeobotanical remains. In S.E. Sidebotham and I. Zych, eds., *Berenike 2008–2009. Report on the Excavations at Berenike, Including a Survey in the Eastern Desert*. Warsaw: Polish Centre of Mediterranean Archaeology, University of Warsaw: 59–66.

Zych, I., J.K. Rądkowska, I.C. Liñeiro and S.E. Sidebotham. 2011. The Square Feature in the Harbor: Excavations in Berenike in 2010–2011. *Polish Archaeology in the Mediterranean* 23/1: 245–263.

Zych, I., S.E. Sidebotham, M. Hense, J.K. Rądkowska, and M. Woźniak. 2016. Archaeological fieldwork in Berenike in 2014 and 2015: From Hellenistic rock-cut installations to abandoned temple ruins. *Polish Archaeology in the Mediterranean* 25: 315–348.

Berlin Wall

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B

Introduction

In a surprise action during the night of August 12/13, 1961, the Communist government of East Germany (the German Democratic Republic or GDR) erected barbed-wire barriers to stop all traffic between East and West Berlin (Hertle 2011). These linked up with a system of barriers already in existence along the border between West Berlin and the GDR, effectively isolating West Berlin and controlling all access to it. The closed border quickly grew into a fortification system that became universally known as the Berlin Wall.

Since 1945, Berlin as the capital of Germany had been under Four-Power administration, internally divided into the Soviet sector (East Berlin) and the American, British, and French sectors (West Berlin). While the inner German border between the GDR in the east and the Federal Republic of Germany in the west (both founded in 1949) had been effectively sealed since 1952 as part of the Iron Curtain, communication and traffic between the western and eastern sectors of Berlin had remained practically unhindered, with many East Berliners crossing daily into West Berlin to work or to study and West Berliners buying cheap goods in East Berlin, thus adding to the pressures on East German economy. Even more problematic was the fact that Berlin remained, all through the 1950s, the one loophole in the Iron Curtain: East Germans could travel to East Berlin, the capital of the GDR: once in East Berlin, they could cross to West Berlin, be registered as fugitives from the GDR, receive West German citizenship and move out to West Germany via the official transit routes, particularly the air corridors. Until 1961, not less than 2.7 million East Germans

had left in this way – a dramatic loss for a country of roughly 17 million inhabitants (Wilke 2011).

The East German decision to close the border in Berlin depended on Soviet approval which was finally granted in the summer of 1961 (Harrison 2005). Part of the power play between the Soviet leader Nikita Khrushchev and US President John F. Kennedy, the closing of the border, and the propagandistically effective move of erecting a wall in the center of Berlin were not initially meant to be permanent, but to intimidate the West into agreeing to proposals of turning West Berlin into a "Free City" evacuated by the Western powers and dominated by the East. When it became clear that this strategy had failed, the GDR was faced with the task of turning the improvised barriers into a permanent "border regime" (Schmidt 2011a).

Key Issues/Current Debates/Future Directions/Examples

The Berlin Wall as a Structure

Within days, the barbed-wire barrier erected through Berlin was replaced by a wall – although it is worth noting that this first wall never extended beyond the city center. This first border wall was composed of breeze-block elements that were available in large numbers as they had been produced for the early prefabricated apartment houses of the GDR. This wall, usually about 2 m high, was topped by barbed wire strung along Y-shaped metal stakes (Fig. 1). Its perhaps deliberately brutal design and the fact that it was very unstable support the interpretation that this wall was largely built for propaganda purposes: It is known that the East German military favored the barbed-wire fencing that surrounded most of West Berlin and that it was Party Chief Ulbricht who insisted on a wall, presumably because it was more impressive visually.

During the following months, this initial structure was fortified and augmented in a number of ways, and in many places, the wall was raised by adding of extra courses. As a reaction to several successful escapes by fugitives breaching the wall with heavy vehicles, the breeze-block wall was sometimes replaced by barriers made of massive concrete slabs. Equally solid concrete elements were also employed in other locations, notably in Bernauer Strasse after the demolition of houses which stood directly on the border. Although involving only a limited modification of the earlier breeze-block structure, this concrete barrier has been termed the "second generation" Wall.

When it gradually became clear that the West was not going to give in to the Communists' demands and that the closed border in Berlin would become a permanent feature, the GDR

Berlin Wall, Fig. 1 Section of the Berlin Wall built in 1961 (Michael-Reiner Ernst)

began to devise a border system. In mid-1962, a border zone was institutionalized. Many buildings were demolished to make space for a death strip of varying depths – mostly about 50 m. A patrol road and a light strip parallel to the border were laid out, rough observation towers built of masonry or as wooden structures were erected, and the rear of the border strip, facing east, was secured by fences and a restricted area (Feversham and Schmidt 1999).

From the mid-1960s onward, all these border structures were superseded by a system of new border elements, consisting of a border wall constructed from concrete slabs set between concrete posts and topped by a sewage pipe (rendering it impossible for fugitives to get a grip on the top of the wall), a series of specially designed watchtowers featuring polygonal observation cabins on top of slender cylindrical concrete shafts, various anti-vehicle ditches and other obstacles such as "area barriers" consisting of metal grids with large steel spikes to impale fugitives trying to jump into the death strip from its eastern wall. Guard dogs in specially constructed runs also were an important feature, but – unlike the inner German border – no mines were ever used along the Berlin Wall.

Whilst this "third generation" Wall constituted a definite improvement over the improvised first version both in visual and structural terms, it proved to have so many defects and weaknesses that it was superseded, from the mid-1970s onward, by a "fourth generation," dubbed Grenzmauer 75 by its builders ("Border Wall 75"). This format was the result of an extensive research and trial program. Test walls were assembled from various prefabricated concrete elements – originally developed for agricultural purposes – and were exposed to simulated attacks. As a result of these tests, the L-shaped element UL12.41–1.2-m wide and 3.6-m high – was deemed most suitable for the border purposes (Fig. 2).

The "Border Wall 75" needed no foundations and was far stronger than its predecessor. Furthermore, it presented a smooth face toward West Berlin: an aspect of some significance to the GDR rulers who, from the early1970s onwards, became increasingly preoccupied with the image of their state toward the international public – an image tainted by the all-too obvious brutality of the border fortifications (Schmidt 2011a). The seamless and smooth western face of the "Border Wall 75" was quickly perceived as a limitless public canvas that seemed to invite the application of graffiti (Gründer 2007).

It should be noted that the structures of the border strip visible in Berlin – such as the border wall and the watchtowers – only constituted a part of all the elements that constituted the border system as this also comprised the extensive infrastructure required to control the border, such as the barracks for the border guards (roughly 10,000 soldiers) who patrolled the border with orders to shoot "border perpetrators" on sight rather than let them escape (Maurer 2011). The barracks of the five border regiments of Border Command Centre were arranged at different locations around West Berlin (Klausmeier 2009).

The Fall and Rise of the Wall

The story of the bloodless revolution that led to the sudden fall of the wall on November 9, 1989, has often been told (Henke 2009). In spite of warning voices, there was a broad consensus in favor of clearing away the hated border surrounding West Berlin as thoroughly as possible. Official demolition, carried out mostly by GDR Border Guards, began on June 13, 1990, in Bernauer Strasse, and was largely completed by the October 3, 1990, the day of German reunification. Thanks to efforts initiated by GDR Institute for Heritage Conservation as early as December 1989 and continued by the Berlin State Conservation Authority, a total of seven sections of the Wall and other border installations were listed and preserved as Historic Monuments by 1992. By 2011, this number had risen to 27, following intensive field research in and around Berlin (from Baker 1993 and Klausmeier and Schmidt 2004 to Cramer 2011; Berlin Wall GIS n.d.). While Berliners and their politicians had, all through the 1990s, mostly tried to forget the time of the division and to ignore the remnants and scars of the Wall in their city, the 2000s saw the rise of a new awareness of the Wall's significance, culminating in the

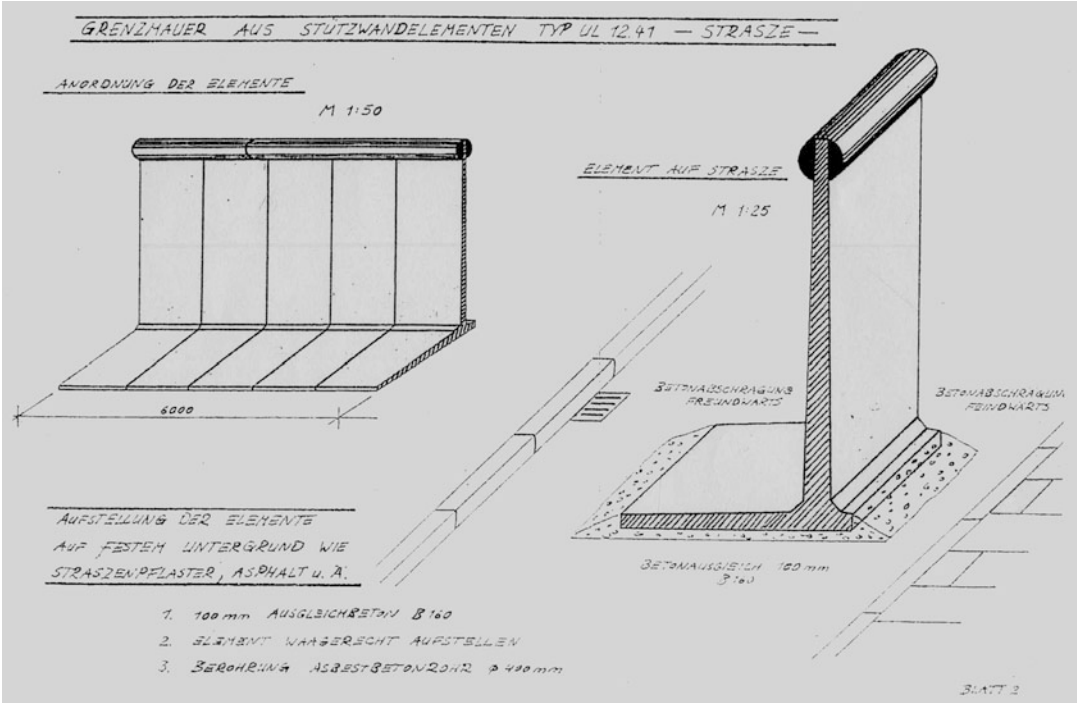

Berlin Wall, Fig. 2 Construction principles of 'Border Wall 75' (BTU)

celebrations of the 20th anniversary of the fall of the Wall. The Stiftung Berliner Mauer (Berlin Wall Foundation) funded in 2008 jointly by the Federal Republic of Germany and the Land of Berlin and its Landscape of Memory and Documentation Centre in Bernauer Strasse, both grown out of a private initiative in the 1990s, are a result of this new policy (Stiftung Berliner Mauer n.d.).

Perception and Cultural Significance

From the very start, public perception of the Berlin Wall was clouded and distorted by propaganda efforts. For example, even today, most people worldwide, when they think of the Berlin Wall, only ever imagine its western aspect. This is due to the fact that the GDR, whose name for the Wall was the "Anti-Fascist Protection Rampart," was interested in sustaining the fiction that the Wall was facing west – to repel the GDR's external enemies – rather than admitting that it was in fact facing east and had the primary purpose to prevent East Germans from leaving their own country. This fiction was upheld by rigorous control of any visual representation of the border's eastern aspect (hidden deeply within a restricted area) and aided by an attitude of the West of accepting the Border Wall they could see and touch as the only important element of the complex border fortifications.

By contrast, the eastern-facing wall – misleadingly called the "hinterland security wall" although it was, in functional terms, the main facade of the border installation – was never pictured or published in East or West. Therefore, the view of the border from the east must today be reconstructed as a computer visualization (Fig. 3). Perhaps ironically, the fact that the Berlin Wall was largely identified with the border wall and the watchtowers led to the effect that these elements were demolished with particular thoroughness whereas considerably more survived of the "hinterland wall" and other largely unnoticed border elements. Archaeological field research was able to identify previously unknown but revealing elements such as the "perimeter defenses": concrete walls, fences, and various obstacles (such as the

Berlin Wall, Fig. 3 Computer visualization of the border seen from the east (BTU)

heavy square concrete tubs known as "flower bowl barricades"); there were also metal grids barring windows close to the border strip, various spiky obstacles to prevent people from scaling fences and walls as well as additional light installations illuminating any possible hiding places in the vicinity of the hinterland Wall.

The color markings for Vordere Postenbegrenzung ('patrol limit') may be seen as a particularly graphic element of the border system revealed by archaeological field research and interpreted through oral history (Klausmeier and Schmidt 2004: 26). These markings, usually displayed on the lamp-post along the western side of the patrol road (Fig. 4), signified the line which ordinary border guards were not allowed to cross: If they did, they would themselves be regarded and treated as border violators. In fact, many Border Guards did attempt to flee, some of them either killing comrades or losing their own lives in the attempt (Hertle and Nooke 2011).

The exaggerated, even exclusive importance of the border wall in public perception is reflected in the curious phenomenon of the cult of Wall fragments. These are taken invariably from the Border Wall, and more specifically from its graffiti'd western face: No Wall fragment is deemed authentic unless it shows the colorful traces of paint layers. Immediately after the fall of the Wall in November 1989, "wallpeckers" began to hack fragments from the Wall; millions of these fragments were taken away by tourists and sold all over the world – like splinters from the True

Berlin Wall, Fig. 4 'Patrol limit', color marking on lamp-posts along the patrol road (BTU)

Cross, proof of our deliverance from the Cold War. The cult of Wall fragments is the result of a radical change of identity experienced by the Wall on November 9, 1990: From a symbol of oppression and death it had, by its unheralded fall, suddenly become an icon of liberation and hope. But not only small fragments of the Wall found their way to countless places around the globe: At least 120 Berlin Wall monuments, mostly made of full-size elements of the Border Wall, exist outside Germany, most of them in public, often very prominent spaces, but also within museums and public buildings – a unique case of a building or monument dispersed in authentic elements over all continents and recontextualized in many different forms (Kaminsky 2009; Schmidt 2011b).

The Berlin Wall has been a symbol and icon for many things (Kuhrmann et al. 2011) although the joyful memory of its fall overlays, for most people and particularly non-Germans, the memory of oppression and death. It is often used in comparison with other painful borders in the world although it should be pointed out that, unlike most other walls and fortified borders throughout history, the Berlin Wall was built to keep people in, not out.

Cross-References

- ▶ Cold War
- ▶ Social Archaeology
- ▶ Social Memory in Archaeological Theory

References

Baker, F. 1993. The Berlin Wall: Production, preservation and consumption of a 20th-century monument. *Antiquity* 67: 709–733.

Cramer, J. 2011. *Die Baugeschichte der Berliner Mauer*. Petersberg: Imhof.

Feversham, P., and L. Schmidt. 1999. *Die Berliner Mauer heute, Denkmalwert und Umgang – The Berlin Wall today, cultural significance and conservation issues*. Berlin: Verlag Bauwesen.

Gründer, R. 2007. *Berliner Mauerkunst*. Köln/Weimar/Wien: Böhlau.

Harrison, H.M. 2005. *Driving the Soviets up the wall*. Princeton: Princeton University Press.

Henke, K.-D., ed. 2009. Revolution und Vereinigung 1989/90. *Als in Deutschland die Realität die Phantasie überholte*. Munich: DTV.

Hertle, H.-H. 2011. *The Berlin Wall story: Biography of a monument*. Berlin: Links.

Hertle, H.-H., and M. Nooke. 2011. *The victims at the Berlin Wall 1961–1989: A biographical handbook*. Berlin: Links.

Kaminsky, A., ed. 2009. *Die Mauer in der Welt*. Berlin: Berlin Story.

Klausmeier, A. 2009. Das Gesamtsystem Grenze – Zur Bedeutung der Infrastruktur im Hinterland der Grenzanlagen. In *Die Berliner Mauer. Vom Sperrwall zum Denkmal*, Schriftenreihe des Deutschen Nationalkomitees für Denkmalschutz, ed. A. Kuhrmann, vol. 76/1. Bonn: DNK.

Klausmeier, A., and L. Schmidt. 2004. *Wall remnants – Wall traces*. Berlin: Westkreuz.

Kuhrmann, A., A. Dorgerloh, and D. Liebermann. 2011. *Die Mauer in der Kunst*. Berlin: Links.

Maurer, J. 2011. *Dienst an der Mauer. Der Alltag der Grenztruppen rund um Berlin*. Berlin: Links.

Schmidt, L. 2011a. The architecture and message of the 'wall', 1961–1989. *German Politics & Society* 29 (2): 57.

Schmidt, L. 2011b. Die universelle Ikonisierung der Mauer. In *Die Mauer. Errichtung, Überwindung, Erinnerung*, ed. K.-D. Henke. Munich: DTV.

Wilke, M. 2011. *Der Weg zur Mauer. Stationen der Teilungsgeschichte*. Berlin: Links.

Further Reading

Berlin Wall GIS. n.d.. Available at: www.berlin-wall-map.com. Accessed 10 Jan 2012.

Stiftung Berliner Mauer. n.d.. Available at: www.stiftung-berliner-mauer.de/en/. Accessed 10 Jan 2012.

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Basic Biographical Information

Robert "Bob" Bettinger (known simply as "Dr. Bob" to students of any age or degree) was born in Berkeley in 1949 and raised in the boom years of postwar California. Regular family expeditions from the Bay Area north to Fortuna (along the Eel River, in the redwood timber country of

northern California) induced lifelong interests in archaeology and ethnography. Indeed, it was the splendor and mystery of Native California that drew him to the prospects of anthropology in the first place, and to this day his research in archaeology is notable for its attention to ethnographic detail and insight.

As a college student at the University of California, Riverside, he was introduced to the challenges of archaeological fieldwork and to faculty commitments to economic anthropology, ecology, and analytical parsimony. Graduating Phi Beta Kappa in 1970, he continued his education at Riverside, completing a Ph.D. in 1975 under the guidance of Sylvia Broadbent, Erv Taylor, James O'Connell, and Martin Orans. During this time, O'Connell sent him to the Reese River Valley of Nevada to work with David Hurst Thomas on a pioneering effort to test hypotheses built from ethnographic records with systematic archaeological survey, sampling, and quantitative analysis. Bettinger's own dissertation (Bettinger 1975) expanded Thomas's Reese River program to the Owens Valley of California where better archaeological and ethnographic data helped to refine the analysis and interpretation of spatial patterns in hunter-gatherer activity.

By 1974 he was on faculty at New York University, where he made tenure in 1980. During the years at NYU, Bettinger and Thomas (also in New York, at the American Museum of Natural History) made the cross-country trek with their families to work in the Great Basin on a variety of collaborations and independent projects including excavations at Gatecliff Rockshelter, and systematic surveys in Monitor Valley, Nevada and Owens Valley, California. In addition to the volumes of first-rate research that came of it, the Great Basin archaeology of the 1960s and 1970s earned a separate reputation: a generation of archaeologists trained in western North America was raised on the preposterous exploits of these desert expeditions; subsequent generations were raised on the equally preposterous mythology of them.

A move to an untenured position at the University of California, Davis in 1980 brought him closer to home, closer to work, and on to a new research program in the White Mountains of eastern California. Some of the most enduring legacies of this period were the discovery of the highest elevation villages in North America and the behavioral logic explaining their existence (Bettinger 1991a). Tenure came quickly (by 1982) and this he attributes largely to the impact of a theoretical collaboration with the late Martin Baumhoff that explained the spread of the Numa, and the Uto-Aztecan language family, across the desert West (Bettinger and Baumhoff 1982).

In 1989, Bettinger and Great Basin veterans Robert Elston and David Madsen traveled to the interior of China on an invitation to apply the method and theory of Americanist archaeology to the Alashan Desert of Inner Mongolia (Bettinger et al. 1994). This international collaboration continues today and has expanded into neighboring Chinese provinces of Ningxia and Gansu, while remaining focused on late Pleistocene and early Holocene adaptive strategies and the origins of agriculture (Bettinger et al. 2010).

Major Accomplishments

Coursing through these regional, temporal, and topical foci is a career-long effort to refine and improve the theoretical foundations of hunter-gatherer archaeology. At the root of this effort is old-fashioned cultural ecology: Julian Steward's ethnography and interpretation of aboriginal life in the Great Basin permeate Bettinger's writing, from his dissertation on "man-land relationships" to some of his most recent work on the origins of private property. However, the early 1970s were awash in novel, elegant approaches to the biology of social organisms, and Bettinger (along with many other scholars) was unsatisfied with Steward's understanding of change through time. From this dissatisfaction emerged a new paradigm in human evolutionary ecology, and Bob Bettinger has been part of it ever since. Both his explanation for the Numic Spread, and the papers that preceded it were pioneering efforts to combine the economic logic of evolution in rational actors with the time-space dynamics of a multi-peaked

adaptive landscape. His ground-breaking, green-covered handbook on the evolutionary ecology of hunter-gatherers (Bettinger 1991b) continues to guide students through the simplifying logic of foraging theory and economic modeling. A more recent manual of step-by-step instructions, exercises, and practical applications (Bettinger 2009) makes the foraging models easier to learn. Critics of rational actor economic models often argue that their simplicity is unrealistic and that humans (indeed, any organisms) are too complex and too unprogrammed to follow such reductionist logic. Proponents of evolutionary ecology are of course aware of this complexity but prefer to approach the evolutionary consequences of it conservatively. They might instead begin with the insights of the basic evolutionary framework, expanding piecemeal to explore more complicating features of human behavior affecting inheritance, adoption, variation, and survival. For example, if the very mechanics of human learning and information-transfer affect the evolutionary process, how might these patterns of learning and evolution be detected in the archaeological record? Bettinger and colleague Jelmer Eerkens (1999) provide us with one of the earliest and to date one of the best applications of this cultural transmission theory in archaeology, by evaluating Great Basin projectile points and the spread of bow-and-arrow technology.

Underpinning this career-long dedication to the patterns of human cultural evolution is a very general philosophy for archaeology: "good science can handle meager data with excellent theory, but without really good theory you better have damn-good data." To students and colleagues from California to China and Argentina to Siberia, this oft repeated dictum is known as "Robert's Rule."

In 2007 Bettinger received the annual Award for Excellence in Archaeological Analysis from the Society for American Archaeology.

Cross-References

- ▶ Altitude Environments in Archaeology
- ▶ Analogy in Archaeological Theory
- ▶ Cultural Ecology in Archaeology
- ▶ East Asia: Paleolithic
- ▶ Foraging to Farming Transition: Global Health Impacts, Trends, and Variation
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Lithic Technology, Paleolithic
- ▶ Middle-Range Theory in Archaeology
- ▶ Millets: Origins and Development
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Surface Survey: Method and Strategies

References

Bettinger, R.L. 1975. *The surface archaeology of Owens Valley, eastern California: Prehistoric man-land relationships in the Great Basin*. Unpublished Ph.D. dissertation, University of California, Riverside.

Bettinger, R.L. 1991a. Aboriginal occupation at high altitude: Alpine villages in the White Mountains of eastern California. *American Anthropologist* 93: 656–679.

Bettinger, R.L. 1991b. *Hunter-gatherers: Archaeological and evolutionary theory*. New York: Plenum Press.

Bettinger, R.L. 2009. *Hunter-gatherer foraging: Five simple models*. Clinton Corners: Eliot Werner Publications.

Bettinger, R.L., and M.A. Baumhoff. 1982. The Numic spread: Great Basin cultures in competition. *American Antiquity* 47: 485–503.

Bettinger, R.L., and J. Eerkens. 1999. Point typologies, cultural transmission, and the spread of bow and arrow technology in the prehistoric Great Basin. *American Antiquity* 64: 231–242.

Bettinger, R.L., D.B. Madsen, and R.G. Elston. 1994. Prehistoric settlement categories and settlement systems in the Alashan Desert of Inner Mongolia, PRC. *Journal of Anthropological Archaeology* 13: 74–101.

Bettinger, R.L., L. Barton, and C.T. Morgan. 2010. The origins of food production in north China: A different kind of agricultural revolution. *Evolutionary Anthropology* 19: 9–21.

Further Reading

Bettinger, R.L. 2001. Holocene hunter-gatherers. In *Archaeology at the millennium: A sourcebook*, ed. G.M. Feinman and T.D. Price, 137–195. New York: Kluwer Academic/Plenum Publishers.

Bettinger, R.L., R.G. Elston, D.B. Madsen, Z. Li, and Y. You. 1990. Transitional paleolithic-neolithic settlement and subsistence in Alashan League, western Inner Mongolia, People's Republic of China. *Current Research in the Pleistocene* 7: 1–3.

Bettinger, R.L., R. Malhi, and H. McCarthy. 1997. Central place models of acorn and mussel processing. *Journal of Archaeological Science* 24: 887–899.
Bettinger, R.L., B. Winterhalder, and R. McElreath. 2006. A simple model of technological intensification. *Journal of Archaeological Science* 33: 538–545.
Richerson, P.J., R. Boyd, and R.L. Bettinger. 2001. Was agriculture impossible during the Pleistocene but mandatory during the Holocene? A climate change hypothesis. *American Antiquity* 66: 387–411.
Thomas, D.H. 1973. An empirical test for Steward's model of Great Basin settlement patterns. *American Antiquity* 38: 155–176.
Weber, A.W., and R.L. Bettinger. 2010. Middle Holocene hunter-gatherers of Cis-Baikal, Siberia: An overview for the new century. *Journal of Anthropological Archaeology* 29: 491–506.
Wilke, P.J., R.L. Bettinger, T.F. King, and J.F. O'Connell. 1972. Harvest selection and domestication in seed plants. *Antiquity* 46: 203–209.
Young, D.A., and R.L. Bettinger. 1992. The Numic spread: A computer simulation. *American Antiquity* 57: 85–99.

Bhattacharya, Dibyendu Kanti

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Basic Biographical Information

Dibyendu Kanti Bhattacharya (Fig. 1) was born on June 28, 1939. He was the son of Mr. Jitendra Mohan Bhattacharya and his wife Manorama. He has five brothers and two sisters. When he was 5 years of age, he was not a healthy person, and he once heard his parents discussing that he could not survive for long and he should be allowed to do whatever he wished while he was alive. This whisper affected him strongly, and he would never give in to his weakness. Even today, in the throes of severe asthma during certain parts of the year, he has never stinted from his teaching, research, and fieldwork. In May 1958, he ran away from home and joined the Bhoodan movement under Vinoba Bhave because he wished sincerely to work for the people. He remained in there for 6 months travelling all over Sholapur district in Maharashtra. Due to this, he had trouble

Bhattacharya, Dibyendu Kanti, Fig. 1 Photo of Bhattacharya, Dibyendu Kanti

in getting admitted to the University of Delhi in the M.Sc. course. He completed his M.Sc. in 1960, securing a first division, and was awarded a Ph.D. in 1965, his thesis titled *A Study of ABO, RH-HR, MN Blood Groups Among the Anglo-Indians of India With a Note on Some Other Morphological Traits* from the Department of Anthropology, University of Delhi.

He was the lecturer at the Department of Anthropology, Lucknow University, in 1965–1966. In 1966, he joined as a lecturer at the Department of Anthropology in the University of Delhi. In 1969, he was married to Pratibha, a grandniece of Veer Savarkar. In December 1971, he went to Germany and stayed there for 3 years. He also went to Great Britain, Denmark, Norway, Sweden, Austria, and Switzerland.

In August 1974, his daughter was born. He became a reader in 1985 and in 1991 became a Professor in the Department of Anthropology, University of Delhi. Between 1993 and 1996, he was the Head of the Department, Department of Anthropology, and University of Delhi. He was the visiting Professor at the Department of Anthropology, Lucknow University (in April 1997), at the Karnataka University, Dharwad (September, 2002) S.V. University, Tirupati, in October 2002.

He was the member of the UGC's visiting team to evaluate the tenth plan at Vidyasagar University, Midnapur, in November 2002. He is an

associate of the Journal Current Anthropology, published by the Wenner-Gren Foundation from the USA. He is a member of the Anthropological Society of Nippon, Japan, and a life member of the Indian Science Congress Association, Kolkata; the Indian Anthropological Association, Delhi (of which he was one of the founders); the Ethnographic and Folk Culture Society, Lucknow; the Indian Society for Prehistory and Quaternary Studies, Pune; the Indian Archaeological Society, New Delhi; and the S.C. Roy Institute of Anthropological Studies, Ranchi.

Bhattacharya speaks English, Hindi, Bengali, German, and Marathi fluently. His major geological areas of interest include in other areas of Madhya Pradesh, the Chotanagpur region, and West Bengal, though he has also worked in other areas including Rajasthan, Orissa, Gujarat, and Maharashtra.

Major Accomplishments

Professor Bhattacharya has spanned a career in Indian Archaeology for almost 40 years. In his career, he has been bestowed with many honors. During his time at the Department of Anthropology in the Lucknow University, he was assigned an almirah in which he found several bones. On asking he was informed that these bones were from a place called Roopkund in the Uttaranchal Himalayan region. After reading up on the mysteries of this region, he had decided to work on this and other materials found from the region. This was awarded recently, when he and others worked on this material in 2001 for the National Geographic Program to give a summary on the findings of the Roopkund Mystery.

In 1972 he had written the first of his textbooks on this subject. He was awarded a D.Litt. from Ranchi University in 1983, in which he worked on a major outline of European prehistory entitled Paleolithic Europe. This book was later published by the Humanities Press. When Prof. Bhattacharya came back to India, he had written a book on stone tool typology, realizing that such a work was unique and had not been systematized. In India, under the guidance of Prof. Bhattacharya, the first such typo-technologies of Stone Age tools were available. Till date, even in many foreign universities, such a typo-technology is not aught and is expected often to be worked out by the students on their own. As a result, his special interest ranged from Physical Anthropology, Palaeoanthropology, Prehistoric Archaeology, and Human Ecology.

He delivered the Panchanan Mitra lecture at the Asiatic Society, Kolkata, in 1993. He was granted the Dharni Dhar Memorial Plaque by the Department of Anthropology, Calcutta University, on March 13, 1997. He was unanimously selected the President of the Anthropology and Archaeology Section of the 86th Indian Science Congress held in Chennai in January 1999.

He also delivered the first D.N. Majumdar Memorial Lecture at Lucknow on March 2, 2003. He was also the coordinating author for the chapter on "Cultural Services" sponsored by the Millennium Ecosystem Assessment. As a result, he visited Indiana University, Bloomington and Indianapolis, USA (in January 2003); Frankfurt, Germany (in May 2003); and Czech Republic (in October 2003).

Cross-References

- ► Archaeology and Anthropology
- ► Archaeology as Anthropology
- ► Bone Tools, Paleolithic
- ► Heritage and Archaeology
- ► Interpretation in Archaeological Theory
- ► Material Culture and Education in Archaeology
- ► Mousterian Industry Tradition

Further Reading

Bhattacharya, D.K. 1977. *Palaeolithic Europe: A summary of some important finds with special reference to central Europe*. Atlantic Highlands/Oosterhout: The Humanities Press/Anthropological Publications.

Bhattacharya, D.K. 1989, 1999, 2003. *An outline of Indian prehistory*. 12th ed. Delhi: Palaka Prakashan.
Bhattacharya, D.K. 1992. Punctuation model in culture change – A case of Mesolithic in India. *Journal of Indian Anthropological Society* 27 (3): 201–207.
Bhattacharya, D.K. 1993. Is prehistory dead in India? *Journal of Asiatic Society* 35 (3): 52–73.
Bhattacharya, D.K. 1997. Interpretative archaeology for India. *The Eastern Anthropologist* 50 (3–4): 369–380.
Bhattacharya, D.K. 1999. Prehistory in India: An urgent need for change. *Man in India* 79 (1–2): 1–20.
Bhattacharya, D.K. 2000. Anthropology in prehistoric archaeology: The Indian scene. In *Studies of man issues and challenges*, ed. M.K. Bhasin, 23–31. Kamal-Raj Enterprise: Delhi.
Bhattacharya, D.K., and M.K. Singh. 1997–1998. The Palaeolithic evidence from Pathalgarwa in Bihar. *Puratattva* 28: 12–25.

Bhimbetka Rockshelters

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Introduction

Bhimbetka is a hill containing over 200 caves and rockshelters located 45 km south of Bhopal, of Raisen district, near the Bhiyapura village of Madhya Pradesh, situated along the Bhopal-Hoshangabad highway, in the northern fringes of the ancient Vindhyachal range. The rock paintings were discovered by V. S. Wakankar, who surveyed the area in 1957. Since 1990, this complex of sites is protected and maintained by the Archaeological Survey of India and recognized as World Heritage by UNESCO. Other adjoining hills are equally rich in caves and rockshelters, and altogether there are over 1300 of them in an area of 10 km length from east to west. More than 500 of these sites contain paintings. Excavations in over a dozen shelters at Bhimbetka have revealed a continuous occupational history from Acheulian to Mesolithic times. The paintings are found on walls and ceilings of the shelters, usually on large even surfaces but sometimes also in small hollows or niches. The majority are within easy reach but some are situated at considerable heights and also at inconvenient places where standing support would be needed.

Key Issues/Current Debates/Future Directions/Examples

Content and Style of the Art

The majority of the paintings are in red or white colors but some are also in green. Based on the Raman spectra and the elemental analysis, mineral-based pigments such as calcite, gypsum, hematite, whewellite, and goethite could be identified to have been used for painting. The latter are most poorly preserved and are probably the oldest. Broadly the paintings can be divided into two cultural and chronological phases: (1) prehistoric and (2) historic. The prehistoric paintings are dominated by the depiction of wildlife, which includes various species of deer, antelopes, wild boar, elephant, rhinoceros, tiger, wild buffalo, wild cattle, fox, jackal, and fish. Birds are shown but are rare. The animals are shown individually as well as in groups and in standing, grazing, moving, and running positions. Some animal figures are marked by composite characters, like those of a boar and a bull, and probably represent mythical creatures. There are frequent hunting scenes with men hunting individually or in groups and using spears, bows and arrows, traps, and snares. The spears and arrows are tipped and barbed with what appear to be microliths. Other food-gathering activities shown include men and women fishing and climbing trees with baskets suspended on their backs to collect fruit, flowers, and honey. There are scenes of human life like group dances, drinking, pregnancy, care of the sick, and mourning. Two petroglyphs excavated in Auditorium Cave (Bhimbetka III-24) were covered by the uppermost part of a substantial Acheulian layer, which according to R. Bednarik must be the oldest rock

art in the world. This assertion remains controversial and has yet to see wide acceptance by rock art researchers in India and beyond. The later and historic paintings, which are often superimposed over earlier paintings, have limited repertoire of themes. They mostly depict royal processions and battle scenes with men riding caparisoned horses and elephants and fighting with metal tipped spears, bows and arrows, swords, and shields (Figs. 1, 2, and 3).

A brief description of seven periods of the rock art in Bhimbetka is as follows:

Bhimbetka Rockshelters, Fig. 1 Deer of Bhimbetka

Period I-(Upper Paleolithic) These are linear representing, in green and dark red, huge figures of animals, such as bison and boar beside sticklike human figures.

Period II-(Mesolithic) Smaller in size compared to the earlier period, the stylized figures using symbols in this group show linear decorations on the body containing animals, human figures, and hunting scenes giving a clear picture of the weapons they used like barbed spears, pointed sticks, bows, and arrows. The depiction of communal dances, birds, musical instruments, mother and child, pregnant women carrying dead animals, drinking, and burials appear to capture motion in different situations.

Period III-(Chalcolithic) Similar to the paintings on the pottery of the Chalcolithic, these drawings reveal that during the period, the cave dwellers of this area were in contact with the agricultural communities of the Malwa plains and exchanged goods with them moving towards more civilized societal colony.

Periods IV and V-(Early Historic) The figures of this group have a schematic and decorative style and are painted mainly in red, white, and green. The presentation of riders, depiction of religious symbols, tunic-like dresses, and the existence of scripts of different periods are significant

Bhimbetka Rockshelters, Fig. 2 Mail Hall of Bhimbetka

Bhimbetka Rockshelters, Fig. 3 Bull of Bhimbetka

departure from the earlier period. The religious beliefs are represented by figures of Yaksha, tree gods, and magical sky chariots.

Periods VI and VII-(Medieval) These paintings are formed out of geometric, linear, and more schematic, but they show degenerations and crudeness in their artistic style compared to the earlier stage may be due to mass production of routine themes. The colors used by the cave dwellers were prepared combining manganese, hematite (soft red stone), and wooden coal. Paintings on the concepts of Brahmanical gods like Ganesh and Nataraja are considered the contribution of this period.

There is considerable variety in the portrayal of animal figures of the earlier phase. The animal body is drawn only in outline, or it is wholly or partially filled with color or is decorated by geometric patterns like straight or wavy lines, dots, crisscrosses, and other more complex designs. The animal figures are characterized by naturalism, vitality, and vigor. The majority of these paintings are highly mature artistic creations and suggest a long evolutionary period behind them. In contrast, the paintings of the historic phase are stylized, repetitive, and devoid of realism. The latest among them depict animals in a highly distorted and conventionalized manner. It is obvious that the artists who drew them were no longer inspired by natural life around them but were only repeating traditionally accepted motifs.

Cross-References

- ▶ Art, Paleolithic
- ▶ Australian Paleoart
- ▶ Australian Rock Art
- ▶ Europe: Paleolithic Art
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Willendorf II: Geography and Culture

Further Reading

Bednarik, R.G. 1994. The Pleistocene art of Asia. *Journal of World Prehistory* 8 (4): 351–375.

Blinkhorn, J., N. Boivin, P.S.C. Taçon, and M.D. Petraglia. 2012. Rock art research in India: Historical approaches and recent theoretical directions. In *A companion to rock art*, ed. J. McDonald and P. Veth, 179–196. Oxford: Blackwell Publishing Ltd.

Misra, V.N. 1978. Prehistoric cave art at Bhimbetka, central India. In *Conservation of rock art*, ed. C. Pearson, 69–70. Sydney: Institute for the Conservation of Cultural Material.

Ravindran, T.R., A.K. Arora, M. Singh, and S.B. Ota. 2012. On- and off-site Raman study of rock-shelter paintings at world-heritage site of Bhimbetka. *Journal of Raman Spectroscopy* 44 (1): 108–113.

Samaddar, S.G. 2010. Primitive Picassos of Bhimbetka. *Science and Culture* 76 (3–4): 102–106.
Wakankar, V.S. 1976. Bhimbetka – The prehistoric paradise. *Prachya Pratibha* III (2): 7–29.

Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)

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Basic Biographical Information

Lewis R. Binford (1931–2011) was born November 21, 1931 in Norfolk, Virginia.

He studied wildlife biology at Virginia Polytechnic Institute. But military service in Japan during the Korean War led him to an interest in other cultures, and, after the war, he studied anthropology and archaeology at the University of North Carolina. He attended graduate school at the University of Michigan, graduating in 1964 with a dissertation on the archaeology and ethnohistory of coastal Virginia.

Binford taught at the Universities of Chicago, California (Santa Barbara and Los Angeles), New Mexico, and Southern Methodist University. He published over 150 papers, books, reviews, and comments and received much recognition, including election to the National Academy of Sciences.

Major Accomplishments

Binford was the chief architect of the *new* or *processual* archaeology. In the 1950s, archaeologists focused on artifact classification, and they saw artifacts as reflections of mental templates, useful for tracking the migration of cultures or the diffusion of ideas. Through a series of papers, Binford (1962, 1964, 1965, 1967, 1968a) challenged archaeologists to do more, to fully participate in anthropology, and to rely on scientific methods. Revolutionary at the time, Binford's approach became *de rigueur* by the 1970s (see compendiums of his papers in Binford 1972, 1983b, 1989).

Binford took a materialist approach to prehistory, relying on Leslie White's concept of culture as *man's extrasomatic means of adaptation*. He focused on hunter-gatherer societies and helped pioneer ethnoarchaeology (with research among the Nunamiut and Australian Aborigines), as well as faunal analysis, sampling, spatial analysis, and the use of statistical methods. He introduced concepts that are now so common in archaeology that one forgets he invented them, e.g., residential and logistical mobility, foragers and collectors, curated and expedient tools, technological organization, and, most importantly, middle-range theory (e.g., 1978a, 1979, 1980).

Middle-range theory was aimed at making reliable inferences from archaeological remains. Binford argued that archaeologists relied on simple rules of thumb for interpretations (1977, 1981a, 1983a). Using the geological principle of uniformitarianism, he sought unambiguous links between human behavior or natural processes and their material traces. His work with the Nunamiut was pivotal here (1978b). Grounded in the food utility of different parts of animal anatomy, he used Nunamiut butchering practices to show how faunal assemblages differed depending on circumstances (e.g., fall hunts designed to store food vs. spring hunts for immediate consumption). The resulting patterns in Nunamiut faunal assemblages could then be used to interpret archaeological assemblages – not as analogues but as middle-range theory because the *causes* of the patterns were sought and explained in terms of the intrinsic elements of animal anatomy. As long as ancient and modern animal anatomy was the same, the patterns of different butchering goals should also remain the same.

Binford was not interested in an ethnographic reconstruction of the past. Instead, he argued that archaeology's power lay in its ability to see processes on a scale that ethnography could not – time spans of thousands of years and spatial

variation across continents. He used specific archaeological cases to understand processes of change and causes of diversity among hunter-gatherers. Consequently, he was never a prehistorian of a particular region. Nonetheless, he contributed seminal research to several important questions, including the meaning of variability in Mousterian stone tool assemblages, the origins of agriculture, and the role of hunting in human evolution.

French archaeologist François Bordes argued that variability in Mousterian stone tool assemblages reflected different mental templates and hence different *tribes* of Neanderthals. Binford (Binford and Binford 1966) argued that the assemblages reflected different functional uses of a cave as the settlement system shifted to adapt to changing circumstances (1982). Likewise, he argued that agriculture was not the inevitable product of the accumulation of knowledge but was instead an adaptation to high population density (1968b). In the 1980s, he used ethnoarchaeological and taphonomic research on faunal remains to argue that our earliest human ancestors were not hunters of large game, who foraged in much the same manner as modern hunter-gatherers, but were instead lowly scavengers of the animal carcasses left behind by large carnivores (1981b, 1983a). His studies of variability in lower Paleolithic stone tool assemblages led him to argue that those early makers of stone tools were not simply shorter, hairier versions of ourselves but hominins who were not human in the way we know humans.

His magnus opus, *Constructing Frames of Reference* (2001), was the result of a lifelong effort to compile ethnographic data on hunter-gatherer societies and environmental data in order to model prehistoric life based on paleoclimatic reconstructions.

Binford was a thinker who thrived on challenging orthodoxy and authority. He was a prolific writer, a mesmerizing speaker, an excellent teacher, and a theoretician who understood dirt archaeology. While many of his specific interpretations may not stand the test of time, he helped shape archaeology into the field it is today.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology and Anthropology
- ▶ Archaeology as Anthropology
- ▶ East Asia: Paleolithic
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ European Middle Paleolithic: Geography and Culture
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Mousterian Industry Tradition
- ▶ New Archaeology, Development of
- ▶ Zooarchaeology

References

Binford, L.R. 1962. Archaeology as anthropology. *American Antiquity* 28: 217–225.

Binford, L.R. 1964. A consideration of archaeological research design. *American Antiquity* 29: 425–441.

Binford, L.R. 1965. Archaeological systematics and the study of culture process. *American Antiquity* 31: 203–210.

Binford, L.R. 1967. Smudge pits and hide smoking: The use of analogy in archaeological reasoning. *American Antiquity* 32: 1–12.

Binford, L.R. 1968a. Archaeological perspectives. In *New perspectives in archaeology*, ed. S.R. Binford and L.R. Binford, 5–32. Chicago: Aldine Publishing Company.

Binford, L.R. 1968b. Post-Pleistocene adaptations. In *New perspectives in archaeology*, ed. S.R. Binford and L.R. Binford, 313–342. Chicago: Aldine Publishing Company.

Binford, L.R. 1972. *An archaeological perspective*. New York: Seminar Press.

Binford, L.R. 1977. General introduction. In *For theory building in archaeology*, ed. L.R. Binford, 1–13. New York: Academic.

Binford, L.R. 1978a. Dimensional analysis of behavior and site structure: Learning from an Eskimo hunting stand. *American Antiquity* 43: 330–361.

Binford, L.R. 1978b. *Nunamiut ethnoarchaeology*. New York: Academic.

Binford, L.R. 1979. Organization and formation processes: Looking at curated technologies. *Journal of Anthropological Research* 35: 255–273.

Binford, L.R. 1980. Willow smoke and dogs' tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45: 4–20.

Binford, L.R. 1981a. Behavioral archaeology and the Pompeii premise. *Journal of Anthropological Research* 37: 195–208.

Binford, L.R. 1981b. *Bones: Ancient men and modern myths*. New York: Academic.
Binford, L.R. 1982. The archaeology of place. *Journal of Anthropological Archaeology* 1: 5–31.
Binford, L.R. 1983a. *In pursuit of the past: Decoding the archaeological record*. London: Thames and Hudson.
Binford, L.R. 1983b. *Working at archaeology*. New York: Academic.
Binford, L.R. 1989. *Debating archaeology*. New York: Academic.
Binford, L.R. 2001. *Constructing frames of reference: An analytical method for archaeological theory building using ethnographic and environmental data sets*. Berkeley: University of California Press.
Binford, L.R., and S.R. Binford. 1966. A preliminary analysis of functional variability in the Mousterian of Levallois facies. *American Anthropologist* 68: 238–295.

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Basic Biographical Information

Lewis Roberts Binford was born on November 21, 1931, to J. Lewis Binford, from rural Appalachia, and Eoline Roberts Binford, of the genteel Tidewater area of Virginia. When he died on 11 April 2011, newspapers around the world noted his passing and memorialized his accomplishments. Binford was the quintessential southern gentleman, a charismatic lecturer, and an inspirational teacher, who, through force of personality, great intellect, and roll-up-your sleeves hard work, transformed the conduct of archaeology. He loved life and living, which for him was synonymous with learning and challenging. Everything he did during his time on the faculties of the University of Chicago (1961–1965), University of California–Santa Barbara (1965–1966), University of California–Los Angeles (1966–1968), University of New Mexico (1968–1991), and Southern Methodist University (1991–2003) was accomplished with infectious gusto, attracting both loyal admirers and some detractors, too.

Binford's formal education included undergraduate studies in wildlife management and wildlife biology at Virginia Polytechnic Institute, laying a foundation for his scientific ecological approach. From 1952 through 1954, he served in the US Army as an interpreter to anthropologists charged with the post-World War II transition in the western Pacific, which exposed him to new career possibilities. When he returned to school at the University of North Carolina, he shifted to anthropology, studying with Joffre Coe and completing a B.A. (1957). His M.A. (1958) and Ph.D. (1964) were completed at the University of Michigan, where he was influenced by Leslie White, champion of the scientific study of culture change, and where he challenged James Griffin, dean of eastern North American culture history.

Family and the school of hard knocks also shaped Binford. His father was an important influence, and, like others, Binford's family circumstances during the Great Depression and after were difficult; even as a boy he was working to help his family get by. There were no handouts for Binford and anything that came his way was through hard work, which continued throughout his life. His skills as a carpenter fed him during graduate school and served as a counterpoint for his writing; students in the 1970s and 1980s saw him transform his house in Corrales, New Mexico, by day and, by night, transform archaeology as he crafted *Nunamiut Ethnoarchaeology*, *Bones: Ancient Men and Modern Myth*, and other tracts. And, from an early age, Binford was keen observer of the human condition, noting the tensions between class and privilege (associated with his mother's family) and getting the job done so one could eat (seen in his father's family) (Sabloff 1998). The challenges to voices of authority for their insistence on privilege over substance, unmistakable in Binford's early career, perhaps emanated from these formative experiences.

Major Accomplishments

In 1962, Lewis Binford (1962a) published "Archaeology as Anthropology" in the flagship journal for archaeology in the United States,

American Antiquity. Adapting Leslie White's (1959) definition of culture as a system, with material culture viewed as simultaneously operating in technomic, socio-technic, and ideo-technic cultural subsystems, Binford argued that ALL aspects of culture were archaeologically accessible, fundamentally transforming archaeological discourse (Watson 1995).

"The most competitive people are the ones who do the most similar things" noted Binford (Sabloff 1998: 8), referring to the late 1950s debates between Julian Steward and Leslie White. This also described his own working style. For Binford, insights emerged not from the discovery of facts in the field but from thinking about and through these encounters with the real world. To this end, public debate with other competent thinking debaters – in print or, better still, in person – was a vital learning tool. Thus, he challenged Robert Braidwood, preeminent Near Eastern scholar, on the nature of the origins of agriculture there (Binford 1968); sparred with François Bordes, master of the French Middle Paleolithic, over the interpretation of Mousterian assemblages (referred to as the form vs. function debate, authored with his third wife, Sally Binford; Binford and Binford 1966); and jousted with Glynn Isaac, the reigning expert on early hominid behavior in East Africa, over interpretation of east African materials (Binford 1987). His 2001 book, *Constructing Frames of Reference* (for which he acknowledges the substantial assistance of his fifth wife, Nancy Medaris Stone) represents in part his response to the critique of Processual Archaeology offered by Ian Hodder and others beginning in the 1980s. Binford rarely passed up a good argument, and, after putting away the boxing gloves, he often supped and celebrated with his opponent.

Binford's accomplishments and contributions are best described as fundamental and groundbreaking. He is often acknowledged for launching, with collaborators at the University of Chicago, the New Archaeology (later, Processual Archaeology), a self-styled movement within archaeology that asserted that archaeology could contribute fully to the project of anthropology and need not be the hapless sibling of cultural anthropology, crippled by an impoverished data set. The 1968 edited volume, *New Perspectives in Archaeology* (coedited with Sally Binford), presented early challenging case studies. As part of this large and continuing effort to refashion archaeology, Binford laid several metaphysical, paradigmatic, conceptual, and methodological foundations that the discipline continues to build upon today.

Metaphysically, Binford (and others, notably, David Clarke and Michael Schiffer) moved the discipline from one based in simple synchronic reconstruction, consistent with functional goals, to one situated in a taphonomic or formational metaphysic, i.e., recognizing and exploiting the many agents that interact to form archaeological deposits. His work with Middle Paleolithic and hominid deposits emphasized that others besides protohumans accumulate and arrange bones in caves and that fire was not a gift uniquely given to humans (*Bone: Ancient Men and Modern Myths*, 1981). This less often acknowledged metaphysical transformation has greatly expanded archaeological interpretative possibilities.

From the inception of archaeology, debate has ensued over the nature of archaeological science. In the 1950s, archaeological science involved an eminent authority amassing observations on archaeological deposits and, from these, weaving a comprehensive interpretation based in common sense (sensu Dunnell 1982). Binford argued for a very different version of archaeological science. For him, science was solely about the evaluation of ideas, whatever their source, with experience. This meant that one had to identify what one securely knew (both archaeologically and in the contemporary world), identify the domains of ignorance, and then build bridges from knowledge to illuminate ignorance. *Constructing Frames of Reference* (Binford 2001) is an explicit statement and extended example of Binford's version of science. Here, in an effort he worked on throughout his career (see Binford 1980), Binford organized and presented two sets of information about hunter-gatherer-fishers between which he tacked to identify provocative patterns in need of further exploration. The first includes basic structural information on physical environments, along

with an energy-based model of how clever human predators deploying different organizational structures operate in those environments. The second includes a compendium of ethnographically documented hunter-gather-fishers and how in fact they are found to have behaved in different environments. Binford moves back and forth between these two domains, identifying patterned variation seen in foragers through time, proposing explanations for this variation, and, contra his earlier critics, recognizing the contingent role of prior organizational poses.

Buttressing his metaphysical and paradigmatic innovations, Binford's methodological innovations are many. Two stand out. The first are various tools for managing archaeological variation. Certainly, a budding appreciation for the important role of variation in phenomenon under scientific scrutiny is evident in the work of 1950s archaeologists (e.g., see the Ford-Spaulding debate). With his 1964 *American Antiquity* article, "A Consideration of Archaeological Research Design", Binford brought to archaeology the parlance of sampling, which has since been reified in practice in heritage archaeology. His 1966 paper with Sally Binford, "A Preliminary Analysis of Functional Variability in the Mousterian of Levallois Facies", was one of the early applications of multivariate analysis in archaeology, identifying dimensions of variation in Near Eastern Middle Paleolithic assemblages. With the desktop computing revolution in the 1980s, such applications have become more routine and sophisticated.

In addition, Binford enlightened a critical component of the archaeological enterprise, which he referred to early on as middle-range theory (1977; see also formation theory, middle-range research, midrange theory, source-side knowledge, bodies of reference knowledge). That is, recognizing that archaeological materials cannot speak for themselves, Binford emphasized that archaeologists must give archaeological materials a language with which to speak. This language comes from the contemporary world and requires development by archaeologists for archaeological interpretation. Binford's 1967 *American Antiquity* article, "Smudge Pits and Hide Smoking: The Use of Analogy in Archaeological Reasoning", was his first article expressly concerned with how archaeologists assign meaning to archaeological materials. Thinking on this topic matured as Binford confronted Middle Paleolithic assemblage variation and its interpretation, recognizing that the functional interpretation he and Sally Binford had offered represented a "just so story" slightly more compelling than that offered by Bordes. As illustrated in his *Nunamiut Ethnoarchaeology* (1978b), middle-range work proceeded on two fronts. Binford turned to work with contemporary native hunters in the Brooks Range of Alaska not as analog for the Middle Paleolithic ice age but to understand some of the many conditions under which variation was introduced into faunal assemblages. In addition, he undertook experimental studies to map the economic dimensions of carcasses, against which assemblage variation could be assessed. Ethnoarchaeological, experimental, and other taphonomic studies established what Binford referred to as intellectual anchors to be used in interpreting archaeological patterning. Construction of similar intellectual anchors was attempted for spatial data (Binford 1978a) and chipped stone assemblages (Binford and O'Connell 1984).

Further maturation on this topic is clear in his *Constructing Frames of Reference*, in which he moved beyond "middle-range theory" as a simple Rosetta stone connecting pattern and process. In part, this is owed to his enduring interest in culture systems, how they are organized and how they change through time. Middle-range research, confined as it is to ethnographic scale phenomenon, could not illuminate the supra-generational phenomena that so interested Binford. *Constructing Frames of Reference* offers a research strategy for such phenomena.

Throughout his career, Binford was an innovator and a pioneer. His 1962 regression formula for dating pipestems is still widely cited in historical North American archaeology (Binford 1962a). And, while employed by the National Park Service on the Carlyle Dam project in southern Illinois, he collaborated in pioneering

systematic surface collection (Binford et al. 1970).

Over the last several decades, the contributions of Lewis Binford, the provocateur and the scientist, have been increasingly recognized. Binford received honorary degrees from the University of Southampton (1983), Pierre Mendez France University (1999), the University of Leiden (2000), and the University of Verona (2005). In 1986, he received the Huxley Medal from the Royal Anthropological Institute. He was elected a corresponding fellow of the British Academy in 1997 and elected to the US National Academy of Sciences in 2001. In 2008, he received the Lifetime Achievement Award from the Society for American Archaeology. An asteroid (213629 Binford = 2002 QK67) orbiting the Sun between Mars and Jupiter was named for him in 2010. His 1984 book *In Pursuit of the Past*, distilled by John Cherry and Robin Torrence from a series of lectures delivered in Europe in the early 1980s, has been reissued (2002) and translated into multiple languages.

Cross-References

- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Hypothesis Testing in Archaeological Theory
- ▶ Middle-Range Theory in Archaeology
- ▶ Post-Processual Archaeology

References

Binford, L.R. 1962a. A new method of calculating dates from kaolin pipe stem samples. *Southeastern Archaeological Conference Newsletter* 9 (1): 19–21.

Binford, L.R. 1962b. Archaeology as anthropology. *American Antiquity* 28 (2): 217–225.

Binford, L.R. 1964. A consideration of archaeological research design. *American Antiquity* 29 (4): 425–441.

Binford, L.R. 1967. Smudge pits and hide smoking: The use of analogy in archaeological reasoning. *American Antiquity* 32 (1): 1–12.

Binford, L.R. 1968. Post-Pleistocene adaptations. In *New perspectives in archaeology*, ed. S.R. Binford and L.R. Binford, 313–341. Chicago: Aldine.

Binford, L.R., ed. 1977. *For theory building in archaeology*. New York: Academic.

Binford, L.R. 1978a. Dimensional analysis of behavior and site structure: Learning from an Eskimo hunting stand. *American Antiquity* 43 (3): 330–361.

Binford, L.R. 1978b. *Nunamiut ethnoarchaeology*. New York: Academic.

Binford, L.R. 1980. Willow smoke and dogs' tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45 (1): 4–20.

Binford, L.R. 1981. *Bones: Ancient men and modern myths*. New York: Academic.

Binford, L.R. 1987. Searching for camps and missing the evidence? Another look at the lower Paleolithic. In *The Pleistocene old world: Regional perspectives*, ed. Olga Soffer, 17–32. New York: Plenum Press.

Binford, L.R. 2001. *Constructing frames of reference: An analytical method for archaeological theory building using hunter-gatherer and environmental data sets*. Berkeley: University of California Press.

Binford, L.R., and S.R. Binford. 1966. A preliminary analysis of functional variability in the Mousterian of Levallois facies. *American Anthropologist* 68 (2): 238–295.

Binford, S.R., and L.R. Binford, eds. 1968. *New perspectives in archaeology*. Chicago: Aldine.

Binford, L.R., and J.F. O'Connell. 1984. An Alyawara day: The stone quarry. *Journal of Anthropological Research* 40 (3): 406–432.

Binford, L.R., S.R. Binford, R. Whallon, and M.A. Hardin. 1970. Archaeology at Hatchery West. *Memoirs of the Society for American Archaeology* 24.

Dunnell, R.C. 1982. Science, social science, and common sense: The agonizing dilemma of modern archaeology. *Journal of Anthropological Research* 38 (1): 1–25.

Sabloff, P.L. 1998. *Conversations with Lew Binford: Drafting the new archaeology*. Norman: University of Oklahoma Press.

Wandsnider, L., and S.J. Holdaway. In review. Lewis Binford, palimpsests and the Pompeii premise. In a special edition of *Journal of Anthropological Archaeology*.

Watson, P.J. 1995. Archaeology, anthropology, and the culture concept. *American Anthropologist* 97 (4): 683–694.

Further Reading

Kuhn, S.L., and M.K. Stiner. 2011. Lewis R. Binford, 1931–2011. *Evolutionary Anthropology* 20: 121–122.

Meltzer, D.J. 2011. *Lewis Roberts Binford 1931–2011: A bibliographic memoir*. Washington, DC: National Academy of Sciences.

Renfrew, C. 1987. An interview with Lewis Binford. *Current Anthropology* 28: 683–694.

Sabloff, J.A. 1998. Postscript: The intellectual legacy of Lewis R. Binford. In *Conversations with Lew Binford: Drafting the new archaeology*, ed. P.L. Sabloff, 77–92. Norman: University of Oklahoma Press.

Bioarchaeology in the Roman Empire

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State of Knowledge and Current Debates

Much of a person's life history is written on his or her bones. Skeletal remains of past populations are palimpsests of information about the behaviors people engaged in during their lives. The bioarchaeological study of burials from around the Roman Empire is a relatively new undertaking but has proven to be an essential line of evidence for understanding the demographic makeup, health status, and dietary regimes of the heterogeneous peoples that comprised the imperial population. Bioarchaeologists are therefore leading the way in answering questions about the life experiences of all social classes in the Roman Empire. By integrating bioarchaeological studies with traditional analyses of material culture and texts and with innovative and interdisciplinary biochemical analyses, the diversity of the Romans in all areas of the Empire is becoming apparent.

State of Knowledge

Bioarchaeology is the study of skeletal remains from archaeological sites (Buikstra 1977; Larsen 2015; Martin et al. 2013). The term osteoarchaeology is also used, primarily in Europe, and through the years both terms have been broadly defined as including skeletal material from both humans and animals. Owing to the influence of New Archaeology, however, since the 1970s, bioarchaeology has conventionally dealt with the physical remains of humans from burials found in the archaeological record. In the USA, bioarchaeology is considered a subspecialty of biological anthropology, whereas in Europe the field is more closely allied with archaeology and anatomy.

An individual skeleton is the unit of analysis in bioarchaeology, but inferences about past behavior can only be reconstructed through a survey of the population and its sociocultural context. As such, bioarchaeology is an interdisciplinary field, incorporating techniques and theoretical approaches drawn largely from biology, chemistry, anatomy, demography, anthropology, and archaeology. When used as a way to study the people of the Roman Empire, bioarchaeology also draws from classical philology, historiography, epigraphy, architecture, and artifact studies in order to situate the skeletal population under consideration within a cultural milieu.

In one sense, the roots of classical bioarchaeology can be found in ancient authors. In the mid-fifth century BCE, Herodotus, reporting on the aftermath of a Persian War battle (*Histories* 3.12.2-3), noticed that the skulls of the Persians were brittle, whereas those of the Ethiopians were quite strong, and he attributed this difference to sun exposure by the Africans. While Herodotus was not correct in this correlation, his observation foreshadowed discussions in biological anthropology of the effects of the environment on the human skeleton.

The osteological study of burials has been a part of Roman archaeology since at least the nineteenth century. At this time, cursory analysis of skeletons with the objective of culling demographic histories was always subsumed by publication of grave goods in large site reports, sending biological material to languish in appendices. The biological sex of a skeleton was assigned based on associated artifacts as often as it was estimated by biological markers. In the early twentieth century, biological anthropology in the USA and Europe developed similarly, as researchers attempted to look at skeletons, especially the skull, for evidence of diffusionary traits. Coupled with such pseudoscientific tools as Retzius' cephalic index, biological anthropology in Italy, for example, became heavily invested in discovering the "true race" of the Italians and explaining the Mezzogiorno and American anthropology in finding a biological basis to support the practices of slavery, racism, and forced removal of Natives. Skeletal measurements, when twisted to fit preconceived notions of racial superiority, represented both a reliance on early empiricism and the rise of nationalist movements in Europe and America. This legacy of cranial indices and -cephalic

suffixes, unfortunately, is still seen today in some Mediterranean bioarchaeological publications, but the field has evolved immensely in the last decade.

Bioarchaeology in the English-speaking world arose as an independent field of research in the 1970s under the guidance of US anthropologist Jane Buikstra and other proponents of the science-focused New Archaeology. Researchers began to study skeletal collections housed around the world in order to answer research questions beyond chronology and typology of burials. In the 1980s, with the advent of post-processual archaeology, bioarchaeologists started asking how diet, behavior, and disease differed along the lines of status and gender. By the 1990s, bioarchaeology was coming into its own. Data recording practices and techniques were standardized in the USA (Buikstra and Ubelaker 1994), and European researchers similarly adopted their own standards (e.g., Brickley and McKinley 2004). At the end of the twentieth century, several international laboratories and research centers that deal with classical bioarchaeology had been established, such as the Wiener Laboratory at the American School of Classical Studies at Athens, the Servizio di Antropologia of the Soprintendenza Speciale per i Beni Archeologici di Roma, the Centre National de la Recherche Scientifique in France, and English Heritage in the UK.

In the twenty-first century, bioarchaeology increasingly employs chemical techniques such as isotope and DNA analyses to answer questions about population interaction, dietary differences, and the origin and spread of disease. There has also been a trend toward osteobiography or creating detailed, individualized life histories from skeletal remains, often accompanied by a forensics-based facial reconstruction. Classical bioarchaeology today is balancing scientific and humanistic approaches in order to understand life in antiquity.

Current Debates

Although classical archaeology was founded on an historical tradition in which material remains were mainly used to illustrate the vast body of Latin literature, today's Roman bioarchaeologists ask their own questions about what life was like in ancient times, in part to provide a history to those segments of society that did not merit inclusion in elite writing. Key areas of Roman bioarchaeology research in the past decade have focused on questions about diet, migration, and disease in the Empire. The majority of this research has been done on skeletal assemblages from Italy and from Britain and has been published in the traditional venue of peer-reviewed anthropology journals. As more bioarchaeologists have begun focusing on the periphery of the Empire, however, new research can be found in a variety of languages and publication venues. There is additionally a growing movement toward synthetic treatment of bioarchaeological data from the classical world that is reaching an audience made up of anthropologists, classicists, historians, and the general public.

1. *Diet: What Were People Eating Around the Empire?*

The Imperial Roman diet, particularly for the lower classes, has been reconstructed primarily through the agricultural writings of authors such as Cato, Varro, and Columella. People in all parts of the Empire subsisted on cereals, fruits, and vegetables generally in the form of bread, olive oil, and wine. There is little evidence in historical records, however, of the diversity that existed in the Roman diet, and there has been disagreement about the role of seafood and the consumption of millet. Bioarchaeologists have weighed in with chemical analyses of skeletal tissue in an effort to demonstrate that different imperial populations used different alimentary resources.

Carbon and nitrogen isotope analyses from bone collagen yield a general picture of a person's diet in the years leading up to death. Because carbon enters the food chain through photosynthesis, a human's carbon isotope ratio is largely affected by the kind of plants he or she ate. Additionally, there are two major photosynthetic pathways, which mean that carbon isotopes can distinguish a diet reliant on temperate grasses such as wheat and barley from a diet reliant on

tropical grasses such as millet and sorghum. Nitrogen in the human diet is obtained primarily through consumption of other organisms, so understanding nitrogen isotopes means understanding an organism's position in the food chain. The values of nitrogen isotopes therefore range from very low, indicating a diet composed of legumes, to very high, indicating a diet composed primarily of aquatic resources.

Isotope research on skeletons from Imperial Italy has shown great differences in diet. In the shadow of the city walls of Rome, people were eating more millet and less seafood than were people from Portus Romae (Prowse et al. 2004; Killgrove and Tykot 2013, 2017). Skeletons from the early Christian necropolis of San Callixtus in the Roman suburbs further revealed an ascetic diet for this religious group, with consumption of freshwater fish from the Tiber River (Rutgers et al. 2009). Correlation between frequency of external auricular exostosis, an ear pathology related to cold water immersion, and nitrogen isotope values for people from Portus and Velia, a site on the Tyrrhenian coast, further demonstrates that the population of Imperial Italy was indeed consuming both freshwater and saltwater resources (Craig et al. 2009; Crowe et al. 2010). Differences in diet at Portus have also been found to reflect age, with children eating more terrestrial food and older adults consuming more olive oil and wine (Prowse et al. 2005), and there is evidence that foreigners at Rome changed their diet after immigrating and consumed less millet (Killgrove and Montgomery 2016). Further south, dietary isotope research on Herculaneum (Craig et al. 2013; Martyn et al. 2017) has produced data on varied diets that line up with archaeological and paleobotanical studies from the site.

Outside of Italy, palaeodiets varied within populations and through time in Roman Britain (Müldner 2013); nevertheless, isotope studies on several skeletal series have revealed that Romano-British people ate a largely terrestrial diet composed of plants, meat from herbivores, and a small amount of marine or freshwater fish. Other studies have focused on sites along the Roman *limes*, such as at Leptiminus in Tunisia (Keenleyside et al. 2009), the Dalmatian Coast of Croatia (Lightfoot et al. 2012), Denmark (Jørkov et al. 2010), and Spain (López-Costas and Müldner 2016), and similarly reveal a wide range of exploited foodstuffs. Whereas people in North Africa were eating some marine resources and adult diet was different from kids' diets, there was virtually no consumption of fish in Denmark, and everyone was eating similar food. Croatia and Spain provide evidence that being part of the Empire affected people's daily diets; while the Roman period meant more marine resources consumed in Croatia, in Spain the transition to a higher marine diet happened in the post-Roman period.

Chemical analyses of skeletal remains are therefore providing bioarchaeologists with information about the diets of individuals and of populations throughout the Empire, giving new insight particularly into the diet of lower-class Imperial residents. Finally, a newly published, open-access database of isotopes in the Greco-Roman world called IsoArcH is poised to generate breakthroughs in both palaeodiet and migration questions in the coming years (Salesse et al. 2017).

2. *Migration: How Were People Moving Around the Empire?*

The phenomenon of migration and its implication for the demographic structure of the Empire has previously been investigated through census records and inscriptions on tombstones. As the center of Imperial power, Rome itself had a great number of free immigrants and slaves who hailed from elsewhere. Identifying immigrants and slaves in the archaeological record has been challenging, however, because most were not noted as such in inscriptions or through artifact assemblages in graves. A major contribution of bioarchaeology in recent years has been the application of chemical techniques to identify population diasporas within the Empire.

Isotopes of strontium and oxygen are most commonly used to distinguish immigrants from locals in a skeletal assemblage. Strontium is incorporated into the human body during growth via groundwater, and the strontium isotope ratio derived from a human's dental enamel reflects

the geology of the area in which the person grew up. Lower strontium values generally indicate younger geology, such as volcanic areas, while higher values are indicative of older rock. Oxygen isotopes incorporated during tissue development are related to the overall climate of the area; lower values suggest a person grew up in a colder, wetter climate, and higher values suggest life in a warmer, drier climate. Some strontium and oxygen isotope studies have been done in the Roman Empire, but until significantly more data are available, interpretations are necessarily conservative in nature.

In the Roman suburbs, a strontium and oxygen study of dental enamel from the first molar, which forms between birth and 3 years of age, revealed numerous people who arrived at Rome from elsewhere (Killgrove and Montgomery 2016). Many of these immigrants to Rome apparently ate different diets as children, as the carbon isotopes demonstrated. Similarly, an oxygen isotope analysis of the first, second, and third molars from individuals buried at Portus Romae suggested a large chunk of the population moved there during childhood (Prowse et al. 2007), but work at Velia in southwest coastal Italy found no potential immigrants (Stark 2017). It is not currently possible to pinpoint an immigrant's homeland, but general trends in the data from Imperial Italy suggest that people were arriving in these cities from nearby areas such as the Apennines but also from areas with strikingly different geology and climate. Further, research on migration in the Roman suburbs suggests that the practice was not confined to young men, as there is ample evidence of immigrant women and children in the bioarchaeological record.

Migration did not occur just to Rome and to other large urban centers. In Southern Italy, a combination of oxygen isotope and ancient DNA analysis revealed an adult female with East Asian ancestry, whose burial form and grave goods otherwise did not indicate she originated elsewhere (Prowse et al. 2010). In the Romano-British burial ground of Spitalfields, a woman who was buried in a decorated lead coffin was shown through Pb isotope analysis to have originated in Rome (Montgomery et al. 2010). Several strontium and/or oxygen isotope studies have been conducted on Romano-British skeletal series in the past decade; by and large, they reveal a great deal of mobility in the area. At the sites of York, Gloucester, and Lankhills, for example, only about half of the people studied could be considered locals, while about 15–20% were from elsewhere in England, and 20–35% were long-distance migrants. Even far-flung areas like Aila in Jordan boasted immigrants during the Empire. A strontium study at that site found that the vast majority of people came from distant homelands, likely as workers to support its role as a trade center (Perry et al. 2017).

Isotope analyses of skeletal tissue are therefore yielding new information on patterns of migration within the Roman Empire as well as on the demographic makeup of both urban and rural settlements. Physical mobility within the Empire was quite high, and immigration was not by any means unidirectional. In many places, the importation of food and use of aqueducts complicates the interpretation of the isotope data. The reasons for population mobility are also still largely uncertain. Diasporas of people likely occurred with slavery and to a lesser extent with military service, but migration may also have been an option for families and for free individuals looking for work or for a spouse. The growing database of strontium and oxygen isotope data is revealing the great distances that people migrated in antiquity, and new applications of DNA analysis point the way forward for bioarchaeologists interested in contributing to the conversation about mobility and migration in the Empire. In the future, the challenge will be to integrate the scientific data drawn from chemical analyses of skeletons with the historical evidence from inscriptions and censuses to glean new information about the demographic fluctuations of imperial populations.

3. *Disease and Health: Who Got Sick in the Roman Empire?*

Only within the last 10 or 15 years have reports of trauma and disease in the archaeological record evolved from case studies of pathological conditions to large-scale research into the prevalence of

specific diseases in imperial populations. The recent debate on health in the Roman Empire starts with a look at systemic factors that may have increased people's stress, including urbanization, malnutrition, hygiene, and sanitation, as well as the comorbidity of various infectious diseases and parasites. The health of an individual and of a population is multifaceted, and researchers have employed skeletal remains from both Rome and Britain, in addition to primary and secondary source material, to argue that the Empire was not a particularly salubrious place to live.

Pathological data from several skeletal series in Rome have been published (e.g., Piccioli et al. 2015), although much of the information comes from incompletely analyzed skeletal series. Most research suggests that there were significant health stressors for people living in the city and suburbs, as evidenced by high frequencies of enamel hypoplasia and cribra orbitalia and by a decrease in overall stature during the Empire. Hypoplasias are defects in the formation of dental enamel and can be caused by a number of health issues, including malnutrition, disease, and weaning; cribra orbitalia is generally considered to result from iron-deficiency anemia, which in turn can be caused by nutritional deficiencies or disease; and variation in adult stature, particularly a trend in shorter stature, results when an individual is stressed during childhood, as from disease or malnutrition. In general, skeletal series from Rome show higher frequencies of enamel hypoplasia and cribra orbitalia and shorter stature than do series from Britain, likely owing to the urban nature of Rome, which had high population density and unequal resource allocation. Through time, the British skeletal series also provide evidence for a decrease in stature as well as increased exposure to anthropogenic lead in the Roman period. One suggestion for the decline in health during the Roman Empire is the presence of endemic malaria in the Mediterranean. Malaria in antiquity has been the subject of debate for a number of years; however, the skeletal evidence is still inconclusive, particularly since not all Roman skeletal series show high frequencies of cribra orbitalia. Currently, understanding disease frequencies around the Empire is complicated by the lack of standardization in data collection practices, by the lack of analyses of large cemetery series, and by the focus on individuals and on specific, unusual pathologies (Killgrove 2017, 2018).

DNA analysis may present a way forward in studies of disease in the Roman Empire, although this technique is still very new. Using pathogen DNA analysis to identify the genes of organisms responsible for disease, recent research has discovered evidence of malaria in two individuals who lived in Italy during the early Empire (Marciniak 2016; Marciniak et al. 2016), has found a case of leprosy outside of Rome in the middle Empire (Rubini et al. 2014), and has determined that the cause of the Justinian plague in the sixth century CE was the same organism that caused the Black Death centuries later (Wagner et al. 2014; Harbeck et al. 2013). While pathogen DNA analysis is still time-consuming and expensive, it is likely that in the coming years, technology will advance and lower these barriers to testing Roman remains. A complementary technique is paleoparasitology, in which ancient soil or sewage is microscopically examined for evidence of parasite eggs. This technique so far has produced widespread evidence of roundworm and whipworm in the Roman Empire (Mitchell 2017; Dufour et al. 2016) as well as the protozoan *Giardia* (Williams et al. 2017).

In spite of these advances, it remains difficult to fully understand morbidity and mortality in a population, as they are complicated processes dependent on a variety of environmental and sociocultural factors. With few fully published skeletal series outside of Roman Britain, the disease ecology within the Empire as a whole is still largely unknown. Research that synthesizes the available historical and osteological information on population size, sanitation, nutrition, and disease is becoming more common in bioarchaeological research in general, opening up a worldwide discussion about health and disease in antiquity (e.g., Harper 2017; Scheidel 2018). Combined with the growing use of chemical techniques to identify pathogens, bioarchaeological research is beginning to

produce novel information about health in the Roman Empire.

4. *International Outreach*

The international picture of Imperial Roman bioarchaeology in the twenty-first century is considerably wide ranging, although still concentrated largely on Italy, Britain, and Greece, which have produced a wealth of skeletal remains in the past few decades. In the former Roman provinces, work is underway in Aegyptus, Arabia Petraea, Africa Proconsularis, Dalmatia, Gaul, Germania, Hispania, and Asia Minor, to name a few. Although the population of bioarchaeological practitioners has diversified since the end of the twentieth century, British researchers remain at the forefront of the field, thanks to large skeletal series such as Poundbury Camp and cutting-edge technology. The bioarchaeology of Roman Britain is yielding in-depth reports on paleopathology, demography, mobility, and diet. These techniques are just beginning to be applied in Italy at Rome, at circum-Vesuvian sites, and at suburban and rural sites by Italian researchers affiliated with the archaeological superintendencies and universities and by European and North American scholars. Although there is not yet an international database of Roman skeletons, a movement toward data sharing and open access is underway in American biological anthropology, which will pave the way for synthetic treatments of bioarchaeological information by its international creators. Additional data are starting to come out in the form of 3D scans and photogrammetric models produced by Roman bioarchaeologists and archaeologists.

In this age of digital connections, however, information on classical bioarchaeology is being shared across linguistic divides not just at international conferences but also through social networking, newsgroups, blogs, and interdisciplinary journals. This includes academic researchers writing about classical history and archaeology news, for instance, Kristina Killgrove and Sarah E. Bond both write online columns at Forbes.com. Additionally, a multitude of other blogs and websites exist as Roman bioarchaeology moves to embrace the digital humanities and public outreach.

Future Directions

The past decade has seen bioarchaeological research expand from the core of the Roman world to the lesser-investigated provinces of the Empire. More work is needed, however, in places like Hispania, Gaul, Illyricum, Asia Minor, Syria, and Judaea. The city of Rome itself has produced thousands of skeletons in recent years, but most cemeteries remain at least partially unpublished, making synthetic treatments challenging at the moment. Future studies at both the center and periphery of the Empire will make it easier to understand the diversity of the heterogeneous peoples who comprised the imperial population.

Moving forward, Roman bioarchaeologists will be able to address research questions about disease ecology, identity formation, and population interaction. Paleopathological research has primarily been focused on identifying diseases in the skeletal record of the Roman Empire, but more could be done to understand the ecology of those diseases. In Rome, for example, wildly varying frequencies of skeletal markers of stress and infection suggest living in different areas of the city and suburbs put people at different risk for diseases such as malaria. Investigating the topography, climate, and water sources of Rome is just as important as doing macroscopic and chemical analyses of skeletons for understanding morbidity patterns, and a bioarchaeological approach that incorporates disease ecology will move the study of Roman health forward.

Isotope and DNA analyses have already yielded key information about migration within the Roman Empire, by isolating individuals who traveled to and from Italy during their lifetimes. These data, however, have seldom been used to draw conclusions about identity formation in the multiethnic Empire, which would be a key step forward for Roman bioarchaeology. Pushed even further, data from chemical analyses combined with material remains and demographic models may allow Roman bioarchaeologists to investigate the practice of slavery in a novel manner. With more isotope analyses and additional DNA

studies, a bioarchaeological approach to understanding Roman slavery cannot be far off.

Almost 40 years ago, Colin Renfrew (1980: 297) wrote that there was a place "for anyone who can command the data and the scholarship of the Great Tradition while employing the problem-orientation and the research methods of current anthropological archaeology." Bioarchaeologists who work in the Roman Empire have taken up this challenge and are weaving together scientific and humanistic data on a daily basis. Roman archaeology has already benefitted immensely from a bioarchaeological approach that integrates textual, artistic, and other material evidence with biological remains to create a more holistic picture of all levels of life and culture in the Roman world.

In the past decade, bioarchaeological research in the Roman Empire has surged from basically nothing to an active international research program tackling difficult questions about diet, disease, and demographics from a scientific standpoint. Bioarchaeologists in the Roman world have only recently begun to reflect on the accumulated data, yet bioarchaeological approaches have already clearly demonstrated that the Roman Empire was a strikingly diverse place. Heterogeneous groups of people from different homelands lived in cities, rural outposts, and forts on the *limes*. Their diets were composed primarily of cereals, meat, and plants, but the proportions of these resources and the types consumed differed dramatically. The people likely differed biologically in their risk of mortality and culturally in their attempts to mitigate disease and induce health. The last decade of research has demonstrated that literature is a great way of framing life in the Roman Empire but that bioarchaeology is necessary to complete the picture.

Cross-References

- ▶ Archaeoparasitology
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Bioarchaeology: Definition
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone: Chemical Analysis
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Demography of the Ancient Roman World
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Palaeopathology: The Study of Ancient Disease in Archaeological Human and Nonhuman Remains

References

Brickley, Megan, and Jacqueline I. McKinley, eds. 2004. *Guidelines to the standards for recording human remains*. (IFA Paper No. 7). Southampton: British Association for Biological Anthropology and Osteoarchaeology.

Buikstra, Jane E. 1977. Biocultural dimensions of archeological study: A regional perspective. In *Biocultural adaptation in prehistoric America*, Southern anthropological society proceedings, No. 11, ed. R.L. Blakely, 67–84. Athens: University of Georgia Press.

Buikstra, Jane E., and Douglas H. Ubelaker, eds. 1994. *Standards for data collection from human skeletal remains*, Arkansas archeological survey research series No. 44. Fayetteville: Arkansas Archeological Survey.

Craig, Oliver E., Marco Biazzo, Tamsin C. O'Connell, Peter Garnsey, Cristina Martinez-Labarga, Roberta Lelli, Loretana Salvadei, G. Tartaglia, A. Nava, L. Renò, and A. Fiammenghi. 2009. Stable isotopic evidence for diet at the Imperial Roman coastal site of Velia (1st and 2nd Centuries AD) in Southern Italy. *American Journal of Physical Anthropology* 139 (4): 572–583.

Craig, Oliver E., Luca Bondioli, Luciano Fattore, Tom Higham, and Robert Hedges. 2013. Evaluating marine diets through radiocarbon dating and stable isotope analysis of victims of the AD 79 eruption of Vesuvius. *American Journal of Physical Anthropology* 152 (3): 345–352.

Crowe, Fiona, Alessandra Sperduti, Tamsin C. O'Connell, Oliver E. Craig, Karola Kirsanow, Paola Germoni, Roberto Macchiarelli, Peter Garnsey, and Luca Bondioli. 2010. Water-related occupations and diet in two Roman coastal communities (Italy, first to third century AD): Correlation between stable carbon and nitrogen isotope values and auricular exostosis prevalence. *American Journal of Physical Anthropology* 142 (3): 355–366.

Dufour, Benjamin, Maxence Segard, and Matthieu Le Bailly. 2016. A first case of human trichuriasis from a Roman lead coffin in France. *Korean Journal of Parasitology* 54 (5): 625.

Harbeck, Michaela, Lisa Seifert, Stephanie Hänsch, David M. Wagner, Dawn Birdsell, Katy L. Parise, Ingrid Wiechmann, et al. 2013. Yersinia pestis DNA from skeletal remains from the 6th century AD reveals insights into Justinianic Plague. *PLoS Pathogens* 9 (5): e1003349.

Harper, K. 2017. *The fate of Rome: Climate, disease, and the end of an Empire*. Princeton: Princeton University Press.

Jørkov, Marie Louise S., Lars Jørgensen, and Niels Lynnerup. 2010. Uniform diet in a diverse society. Revealing new dietary evidence of the Danish Roman Iron Age based on stable isotope analysis. *American Journal of Physical Anthropology* 143 (4): 523–533.

Keenleyside, Anne, Henry Schwarcz, Lea Stirling, and Nejib Ben Lazreg. 2009. Stable isotopic evidence for diet in a Roman and Late Roman population from Leptiminus, Tunisia. *Journal of Archaeological Science* 36 (1): 51–63.

Killgrove, K. 2017. Imperialism and physiological stress in Rome and its environs (1st–3rd centuries AD). In *Colonized bodies, worlds transformed: Toward a global bioarchaeology of contact and colonialism*, ed. H. Klaus and M. Murphy, 247–277. Gainesville: University Press of Florida.

Killgrove, K. 2018. Using skeletal remains as a proxy for Roman lifestyles: The potential and problems with osteological reconstructions of health, diet, and stature in Imperial Rome. In *Diet and nutrition in the Roman world*, ed. C. Holleran and P. Erdkamp, 2018. London: Routledge.

Killgrove, Kristina, and Janet Montgomery. 2016. All roads lead to Rome: Exploring human migration to the Eternal City through biochemistry of skeletons from two Imperial-era cemeteries (1st–3rd c. AD). *PLoS One* 11 (2): e0147585.

Killgrove, Kristina, and Robert H. Tykot. 2013. Food for Rome: A stable isotope investigation of diet in the Imperial period (1st–3rd centuries AD). *Journal of Anthropological Archaeology* 32 (1): 28–38.

Killgrove, Kristina, and Robert H. Tykot. 2017. Diet and collapse: A stable isotope study of Imperial-era Gabii (1st–3rd centuries AD). *Journal of Archaeological Science: Reports*, early view (2017).

Larsen, Clark Spencer. 2015. *Bioarchaeology: Interpreting behavior from the human skeleton*. Cambridge: Cambridge University Press.

Lightfoot, Emma, M. Mario Šlaus, and Tamsin C. O'Connell. 2012. Changing cultures, changing cuisines: Cultural transitions and dietary change in Iron Age, Roman, and early Medieval Croatia. *American Journal of Physical Anthropology* 148 (4): 543–556.

López-Costas, Olalla, and Gundula Müldner. 2016. Fringes of the empire: Diet and cultural change at the Roman to post-Roman transition in NW Iberia. *American Journal of Physical Anthropology* 161 (1): 141–154.

Marciniak, Stephanie. 2016. Hunting for pathogens: Ancient DNA and the historical record. In *Beyond the bones: Engaging with disparate datasets*, ed. M. Mant and A. Holland, 81–100. New York: Academic Press.

Marciniak, Stephanie, Tracy L. Prowse, D. Ann Herring, Jennifer Klunk, Melanie Kuch, Ana T. Duggan, Luca Bondioli, Edward C. Holmes, and Hendrik N. Poinar. 2016. *Plasmodium falciparum* malaria in 1st–2nd century CE southern Italy. *Current Biology* 26 (23): R1220–R1222.

Martin, Debra L., Ryan P. Harrod, and Ventura R. Pérez. 2013. *Bioarchaeology: An integrated approach to working with human remains*. New York: Springer.

Martyn, R. E. V., P. Garnsey, L. Fattore, P. Petrone, A. Sperduti, L. Bondioli, and O. E. Craig. 2017. Capturing Roman dietary variability in the catastrophic death assemblage at Herculaneum. *Journal of Archaeological Science: Reports*, early view 2017.

Mitchell, Piers D. 2017. Human parasites in the Roman World: Health consequences of conquering an empire. *Parasitology* 144 (1): 48–58.

Montgomery, J., J.A. Evans, S.R. Chenery, V. Pashley, and K. Killgrove. 2010. 'Gleaming, white and deadly': Using lead to track human exposure and geographic origins in the Roman period in Britain. In *Roman diasporas: Archaeological approaches to mobility and diversity in the Roman empire*, Journal of Roman archaeology, supplementary series, vol. 78, 199–226. Portsmouth: Journal of Roman Archaeology.

Müldner, Gundula. 2013. Stable isotopes and diet: Their contribution to Romano-British research. *Antiquity* 87 (335): 137–149.

Perry, Megan A., Cammie Jennings, and Drew S. Coleman. 2017. Strontium isotope evidence for long-distance immigration into the Byzantine port city of Aila, modern Aqaba, Jordan. *Archaeological and Anthropological Sciences* 9 (5): 943–964.

Piccioli, A., V. Gazzaniga, and P. Catalano, eds. 2015. *Orthopedic pathologies in Roman Imperial age*. New York: Springer.

Prowse, Tracy L., Henry P. Schwarcz, Shelley R. Saunders, Roberto Macchiarelli, and Luca Bondioli. 2004. Isotopic paleodiet studies of skeletons from the Imperial Roman-age cemetery of Isola Sacra, Rome, Italy. *Journal of Archaeological Science* 31 (3): 259–272.

Prowse, Tracy L., Henry P. Schwarcz, Shelley R. Saunders, Roberto Macchiarelli, and Luca Bondioli. 2005. Isotopic evidence for age-related variation in diet from Isola Sacra, Italy. *American Journal of Physical Anthropology* 128 (1): 2–13.

Prowse, Tracy L., Henry P. Schwarcz, Peter Garnsey, Martin Knyf, Roberto Macchiarelli, and Luca Bondioli. 2007. Isotopic evidence for age-related immigration to imperial Rome. *American Journal of Physical Anthropology* 132 (4): 510–519.

Prowse, T.L., J.L. Barta, T.E. von Hunnius, and A.M. Small. 2010. Stable isotope and ancient DNA evidence

for geographic origins at the site of Vagnari (2nd–4th centuries AD), Italy. In *Roman diasporas: Archaeological approaches to mobility and diversity in the Roman empire*, Journal of roman archaeology, supplementary series, vol. 78, 175–198. Portsmouth: Journal of Roman Archaeology.

Renfrew, Colin. 1980. The great tradition versus the great divide: Archaeology as anthropology? *American Journal of Archaeology* 84 (3): 287–298.

Rubini, Mauro, Yilmaz S. Erdal, Mark Spigelman, Paola Zaio, and Helen D. Donoghue. 2014. Paleopathological and molecular study on two cases of ancient childhood leprosy from the Roman and Byzantine Empires. *International Journal of Osteoarchaeology* 24 (5): 570–582.

Rutgers, Leonard Victor, M. Van Strydonck, M. Boudin, and C. Van der Linde. 2009. Stable isotope data from the early Christian catacombs of ancient Rome: New insights into the dietary habits of Rome's early Christians. *Journal of Archaeological Science* 36 (5): 1127–1134.

Salesse, Kevin, Ricardo Fernandes, Xavier de Rochefort, Jaroslav Brůžek, Dominique Castex, and Élise Dufour. 2017. IsoArcH.eu: An open-access and collaborative isotope database for bioarchaeological samples from the Graeco-Roman world and its margins. *Journal of Archaeological Science: Reports*, early view (2017).

Scheidel, W., ed. 2018. *The science of Roman history: Biology, climate, and the future of the past*. Princeton: Princeton University Press.

Stark, Robert James. 2017. *Ancient lives in motion: A bioarchaeological examination of stable isotopes, nonmetric traits, and human mobility in an Imperial Roman context (1st–3rd c. CE)*. Ph.D. Dissertation, McMaster University.

Wagner, David M., Jennifer Klunk, Michaela Harbeck, Alison Devault, Nicholas Waglechner, Jason W. Sahl, Jacob Enk, et al. 2014. Yersinia pestis and the Plague of Justinian 541–543 AD: A genomic analysis. *The Lancet Infectious Diseases* 14 (4): 319–326.

Williams, Faith S., Theo Arnold-Foster, Hui-Yuan Yeh, Marissa L. Ledger, Jan Baeten, Jeroen Poblome, and Piers D. Mitchell. 2017. Intestinal parasites from the 2nd–5th century AD latrine in the Roman Baths at Sagalassos (Turkey). *International Journal of Paleopathology* 19: 37–42.

Further Reading

Agarwal, S.C., and B.A. Glencross, eds. 2011. *Social bioarchaeology*. New York: Wiley-Blackwell.

Buikstra, J.E., and L.A. Beck, eds. 2006. *Bioarchaeology: The contextual analysis of human remains*. New York: Academic Press.

Capasso, L. 2001. *I fuggiaschi di Ercolano: paleobiologia delle vittime dell'eruzione Vesuviana del 79*. Rome: "L'Erma" di Bretschneider.

Filippi, F., ed. 2011. *Archeologia e Giubileo: gli interventi a Roma e nel Lazio nel piano per il Grande Giubileo del 2000*. Naples: Electa Napoli.

Katzenberg, M.A., and S.R. Saunders, eds. 2008. *Biological anthropology of the human skeleton*. New York: Wiley-Liss.

Lazer, E. 2009. *Resurrecting Pompeii*. New York: Routledge.

Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments

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Introduction and Definition

The analysis and interpretation of human skeletal remains focus largely on what can be learned from these remnants, as well as the individuals and populations they represent. The terms bioarchaeology, human osteology, and human skeletal biology all refer to scholarly inquiry in this area, but each conveys a distinct emphasis. Osteology represents the most traditional term used, with its accent on comparative morphology. Skeletal biology also refers to comparative morphological study but recognizes the dynamic nature of skeletal growth and maintenance, as well as biomechanical and environmental factors that shape bone morphology. Bioarchaeology includes all of the above but focuses on remains recovered from archaeological contexts with special consideration to the associations of biological and cultural factors.

Historical Background

The academic roots of this discipline extend back primarily to Europe and Asia with an interest in the evidence for human evolution (paleoanthropology) linked with the recovery of ancient human remains. The early discovery and interpretation of fossil hominids required knowledge of comparative skeletal anatomy. Such

perspective could be ascertained from collections of modern human remains recovered from archaeological contexts.

Although some human remains were recovered through construction activities and other accidental encounters, increasingly, collections were assembled from systematic archaeological excavations. Such excavations not only yielded human skeletal material but usually abundant associated cultural information as well. This information frequently enabled the remains to be dated and placed in cultural context. As these collections grew in number and size, they facilitated the development, growth, and evolution of the discipline.

Academic interest in skeletal analysis during the nineteenth century focused largely on the skull with the general belief that it presented the primary evidence for the topics of research at the time, including human variation and documentation of regional physical types. The evidence for disease was also of interest due to the medical background of many of the field's practitioners.

A key historical development in the emergence of human skeletal biology was the 1855 formation of the Society of Anthropology of Paris by Paul Broca (1824–1880). A surgeon by profession and an expert in neuroanatomy, Broca called together key professionals in the fields of medicine, anthropology, archaeology, and related areas to focus on academic advancements relating to the interpretation of human skeletal remains. This effort led to the development of measuring techniques, instrumentation, and training. Most importantly, it provided a forum for scholarly discussion and interaction, with a stress on human skeletal anatomy and its interpretation.

Shortly thereafter (1861), German physical anthropologists gathered in Göttingen for scientific interaction and to discuss standardization of methodology. Subsequent meetings led to the 1866 formation of the journal Archiv für Anthropologie, a publication later sponsored by the Deutsche Gesellschaft für Anthropologie (DGA). Prior to that time, the noted German scientist Johann Friedrich Blumenbach (1752–1840) had assembled large international collections of human remains in Göttingen. Other large nineteenth-century German collections were organized by pathologist Rudolf Virchow (1821–1902) in Berlin and Alexander Ecker (1816–1887) in Freiburg. German efforts to promote standardization in methodology led to the 1882 Frankfort agreement in which the Frankfort horizontal was defined, a standard for cranial orientation still of universal acceptance today. Another key contribution consists of the 1914 publication of Lehrbuch der Anthropologie, written by Rudolf Martin (1864–1925), which contained a detailed presentation of standard techniques of analysis.

The developments in France and Germany described above were echoed in varying ways throughout Europe and other areas of the world in the nineteenth and early twentieth centuries. Globally, academics assembled collections of human remains, developed scholarly organizations and publications, and initiated training programs. Research inquiries continued to conform to those established in the early nineteenth century.

Aleš Hrdlička (1869–1943) represents a key figure in the historical development of human skeletal studies in the Americas. An 1881 immigrant from Bohemia (now the Czech Republic) to the United States, Hrdlička assembled large collections of human remains at the Smithsonian Institution in Washington, D.C. Although medically trained, he had studied in Paris with Broca and developed a strong interest in anthropology. His own 1920 publication *Practical Anthropometry* complemented Martin's work and contributed to the standardization of methodology. He also founded the American Journal of Physical Anthropology in 1918 and later the American Association of Physical Anthropologists in 1930.

By the mid-twentieth century, scholarly institutions around the world had assembled large collections of human remains, developed standard approaches for recording data, initiated training programs, and inaugurated publication programs with a strong focus on comparative human osteology. Much of the goal of this effort was to collect skeletal data in a standard format to

facilitate comparative studies. Compilations of measurements and observations frequently were presented as appendices to archaeological reports and tabulated in monographs. Throughout these advancements in comparative studies, work within the field remained tied to its traditional topics of investigation.

As data and collection sizes grew, researchers, particularly in North America, gradually recognized the value of a more problem-oriented approach to skeletal analysis and interpretation. Although comparative morphological studies continued, researchers began to emphasize the dynamic nature of bone growth, development, and maintenance. This emphasis led to studies of bone remodeling, histological age changes, details of bone response to disease insult, and environmental influences. Biomechanical factors were considered in more elaborate research designs that evaluated bone strength and stress factors. Skeletal collections continued to be regarded as reservoirs of information on past population relationships. However, a new emphasis appeared, recognizing that bone morphology also reflected factors of the environment, nutrition, disease, and human behavior, including occupation/habitual use of the skeleton. This perspective is generally reflected in the shift to use of the term "skeletal biology" to define the field. Sorting out the factors of genetics and environment on skeletal morphology became a major issue and subject of research.

A related key historical development involves strengthening of statistical rigor in analysis of skeletal morphology. Much of this effort can be traced to the biometric school established by Karl Pearson (1857–1936) in 1903. Enhanced statistical treatment of skeletal biology data enabled more robust interpretation and assessment of the probabilities involved.

The general trend toward more problem-oriented studies also stimulated novel methods of recording data and observations. These were designed to address specific research issues and moved away from the standardized approaches previously adhered to.

Key Issues/Current Debates

The use of cranial indices and recognition of cranial variation gradually gave way to biological distance studies. These problem-oriented approaches also recognized the genetic component in skeletal, especially cranial, morphology but utilized large, well-documented samples and statistical analyses that presented the variation and probabilities involved. The traditional use of cranial measurements continued and enhanced with observations of discrete traits on the skeleton, dental measurement, and dental observations. Very recently, distance studies have included three-dimensional shape analysis made possible by sophisticated computer software and new instrumentation. These approaches not only enabled a more powerful and revealing look at likely population relationships of the past but also a more nuanced presentation of the variability involved. The recent amplification and analysis of ancient human DNA recovered from archaeological contexts provide modern perspective on past population relationships.

Many of the areas of new interest in skeletal biology relate to the realization that the non-genetic influences on skeletal morphology present opportunities for expanded research. Historically, those interested in using cranial morphology to assess human variation either ignored environmental influences or regarded them as undesirable factors detracting from the research mission. However, others emphasized that these influences presented valuable information on human behavior, adaptation, occupation, and habitual posture. This functional orientation also had deep roots, especially in Germany with the work of Virchow, Julius Wolff (1836–1902), and others. These early researchers recognized the relationship between structural features of bone and the nature of the external stresses/forces acting upon it. Investigators in more modern times built upon the knowledge advanced by these early workers to examine cross-sectional geometry, patterns of trauma, and arthritic alterations as well as other indicators of musculoskeletal stress. Bones are shaped by how

they are used; thus, shape analysis potentially reveals information on use.

Routine analysis of remains from archaeological contexts calls not only for detailed inventory but also estimates of sex and age. Methodology for the estimation of sex and age continues to evolve and recognizes the dynamics of growth and development as well as human variation in the expression of sexual dimorphism and the process and timing of adult aging. Data on the age and sex distribution of skeletal samples have led to advances in the field of paleodemography.

Modeled after the demographic study of living populations, paleodemography utilizes age and sex information to construct life tables, mortality curves, survivorship curves, and related expressions of demographic profiles. Such formulations produce valuable projections of life expectancy, age-specific mortality, and similar statistics of past populations that can be compared with those of modern times. However, procedures in this field have sparked lively debate, especially regarding the accuracy of age estimation and sampling issues.

Paleopathology has remained an area of interest throughout the history of skeletal inquiry. Much of the early history of paleopathology studies focused on the evidence for and history of specific diseases, especially leprosy, tuberculosis, and syphilis. Such interest has been sustained and continues today. Modern developments include more sophisticated models of differential diagnosis, improved documentation of studied samples, and new molecular approaches aimed at identification of specific pathogens.

A significant development also has been a population approach to the study of disease. Termed paleoepidemiology, this approach consists of examining the prevalence of expressions of mortality in the past, especially viewed in cultural, geographic, and temporal context. This research focus departs from attempts to diagnose particular diseases in favor of gathering population data on categories of disease/morbidity that reflect such factors as population size and density, diet, nutrition, sedentism, and sanitation. Such research has proven especially valuable in examining long-term temporal trends of morbidity and mortality in specific regions of the world. The endeavor is closely linked with the methodology and results of paleodemography and regional studies of adaptation, including those in archaeology. Research in this area also has addressed quality of life factors and added thoughtful perspective to traditional analyses.

The term bioarchaeology emphasizes the integration of biological information gleaned from skeletal analysis with the cultural/archaeological information available from the provenience. This term recognizes the nature of many of the large skeletal collections throughout the world and their known archaeological contexts. Data on sex, age at death, disease alterations, cultural effects on the skeleton, estimates of living stature, and other biological variables can be correlated with cultural mortuary site information when working with well-documented collections. Such research enables studies of status, gender roles, social relationships, and factors contributing to mortuary site complexity. In broader context, related studies contribute to understanding of dietary adjustment, environmental adaptation, demographic patterns, migration, and regional disease expression. Such studies are completely dependent on sufficient archaeological documentation, not only regarding burial provenience but site and regional complexity as well.

Advances in the discipline of bioarchaeology depend extensively not only on the availability of adequate documented collections but also appropriate interpretive models and methodology. Methodology has grown increasingly technological and sophisticated in recent decades. Early studies in this discipline focused primarily on procedures and instruments to manually gather data. This approach recognized the interests of the time but also the limitations of data analysis. Data synthesis was limited by what could be processed using adding machines and simple calculations. In more recent times, computers have enabled sophisticated approaches including the formulation of large databases and complex statistical analyses.

Technological advances in other areas have also opened up new approaches to research. Advances in microscopy and thin-section preparation brought histological analysis into prominence within the discipline. Impacts were especially evident in methodology for age at death estimation and disease diagnosis. Scanning electron microscopy facilitated studies of microwear on occlusal tooth surfaces, contributing to interpretations of diet and the use of teeth as tools. Radiocarbon dating enabled more exact chronological placement of skeletal collections and improved interpretation of the associated cultural information. In forensic anthropology, radiocarbon analysis with reference to the modern bomb curve also has facilitated time since death determination.

Dietary reconstruction became possible through analysis of elemental isotopes and trace elements. In particular, the isotopes of carbon, nitrogen, hydrogen, oxygen, and strontium potentially reveal dietary food chain information. Carbon isotope analysis has been used to identify consumption of plants with distinct photosynthetic pathways. The availability of dietary information enabled the use of more sophisticated bioarchaeological studies of associations of disease, diet, and environmental context. These in turn could be related to paleodemographic information for a more holistic approach to understanding past populations.

Radiographs and X-ray technology in general have proven very important for skeletal biology research. Radiographic techniques have enabled nondestructive studies of mummified remains and a more sophisticated analysis of skeletal structure. Examples include recognition and interpretation of lines of arrested growth in long bones, patterns of cortical thickness in studies of age change and cross-sectional biometrical analyses, and trauma interpretation. Recent computerized tomography (CT) scan technology has improved the precision of such analysis and offered three-dimensional approaches.

Forensic anthropology shares many of the techniques of other areas of skeletal biology but includes some methods that are unique to its own field. Forensic anthropology refers to the application of knowledge and methodology in physical anthropology to medicolegal problems. Such problems usually involve identification of recovered human remains and deciphering what happened to them. This interpretation consists of determining if recovered evidence represents skeletal or dental tissue; recognizing species; estimating age at death, sex, living stature, time since death, and ancestry; evaluating evidence for identification; assessing postmortem alterations (taphonomy); and interpreting any evidence for foul play.

The history of forensic anthropology closely follows that of skeletal biology/osteology in general with a stronger North American focus. The academic roots extend back to early European pioneers but much of the development occurred in North America as a response to needs within the medicolegal community. Although Aleš Hrdlička was involved in some forensic application, his successors in the United States, T. D. Stewart (1901–1997), J. Lawrence Angel (1915–1986), Wilton Krogman (1903–1987), Mildred Trotter (1899–1991), Ellis R. Kerley (1924–1998), William M. Bass, Clyde Snow (1928–2014), and others, provided momentum. Key administrative developments include the formation of the Physical Anthropology Section of the American Academy of Forensic Sciences in 1972 and the American Board of Forensic Anthropology in 1977. The former provided an annual forum for discussion and presentation of research results in forensic anthropology. The latter offered a certification program for qualified forensic anthropologists who had a Ph.D. degree and experience and could pass a written and practical examination. In 2017, membership of all types in the anthropology section of the AAFS totaled 538 and 117 forensic anthropologists had been awarded diplomate status by the ABFA.

Global interest in forensic anthropology has strengthened in recent years due to augmented

training programs, growing recognition of the value of incorporating forensic anthropological perspective with medicolegal initiatives, and the investigation of human rights issues. Anthropologists are especially needed in recovery efforts and have been utilized extensively by such organizations as the International Commission on Missing Persons (ICMP), the International Committee of the Red Cross (ICRC), the Argentine Forensic Anthropology Team (EEAF), and many others.

Work in forensic anthropology relates very closely with other areas of skeletal biology. Most of the techniques of human skeletal biology are needed in the analysis of human remains in a forensic context. Information garnered from forensic analysis and research improves interpretation in the more general field of skeletal biology, especially in regard to trauma interpretation.

Future Directions

From its inception, the discipline has been dependent on the availability of well-documented collections of human remains throughout key areas of the world. Through the work of pioneers like Blumenbach, Virchow, Hrdlička, Samuel Morton (1799–1851), Bass, and many archaeologists worldwide, documented collections of human remains have been compiled and made available for research. These assemblages include key reference collections of individuals, whose age at death, sex, and partial life histories are documented, providing a strong foundation for the development of methodology. The bulk of the collections are from archaeological contexts and store the information about past lives and living conditions that can potentially be made available through research. Further advances in the field are dependent upon their growth and continued availability to researchers.

Fortunately, well-documented collections continue to be assembled worldwide. This development reflects the growing recognition of how much can be learned from them and how vital that knowledge is to forensic applications, justice, and understanding of the human condition, past, and present. In addition, these collections are originating from previously underrepresented areas of the world. They provide new perspective on human variation in all of the science areas investigated. They also allow regional development of methodology that meets the needs of anthropologists working in the area.

In contrast, some areas of the world have witnessed developments regarding repatriation and/or other constraints on the growth of skeletal collections. A strong expression in this development has occurred in the United States through policies and laws that affect continued curation of some collections of human remains. In the United States, many collections relating to the American Indian communities, including some of great antiquity, have been transferred to American Indian groups desiring custody. Similar developments have occurred in Australia and other parts of the world on a lesser scale. Likewise, policies and laws have also affected the disposition of recently recovered ancient human remains, limiting growth of new collections.

While these developments appear to restrict future expansion and maintenance of some collections in particular world areas, they also have stimulated systematic data collection. Recognizing that the affected collections may not be available to future researchers, thoughtful protocols have been developed to capture key measurements, observations, and images that likely will be useful for future research. These initiatives have stimulated attempts to develop standards for data collection, reminiscent of the efforts by the early pioneers of Broca, Martin, Hrdlička, and others. With the availability today of computer technology, large databases can be assembled that will hopefully facilitate the work of future physical anthropologists.

The discipline has evolved extensively over the centuries and continues to change. The future appears bright as many highly motivated and intelligent students continue to enter the field,

especially in the areas of paleopathology and forensic anthropology. New technology and improved interpretive models enable novel issues to be addressed, with growing applications in forensic anthropology. Research has become increasingly interdisciplinary, frequently involving teams of specialists. The early pioneers would be amazed at how far this field has advanced but likely pleased that their work enabled so much of the progress to be made.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Dental Anthropology
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Osteology Reference Collections
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition
- ▶ Stature Estimation
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Taphonomy: Definition

Further Readings

Buikstra, J.E., and L.A. Beck, eds. 2006. *Bioarchaeology: The contextual analysis of human remains*. Amsterdam: Academic.

Larsen, C.S., ed. 1997. *Bioarchaeology: Interpreting behavior from the human skeleton*. Cambridge: Cambridge University Press.

Spencer, F., ed. 1997. *History of physical anthropology: An encyclopedia*. New York: Garland Publishing.

Bioarchaeology: Definition

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Brief Definition of the Topic

Bioarchaeology is the study of human remains from archaeological contexts. Although the term was first used in reference to the study of animal remains, it has generally become exclusive to human remains, but sometimes called human osteoarchaeology or human bioarchaeology. The field emphasizes integrative, interdisciplinary analysis of the links between biology and culture in past societies. This approach has contributed to an informed understanding of the range of social, behavioral, and economic conditions and circumstances that have shaped the human experience – especially health and well-being, lifestyle, and quality of life – during the last 10,000 years of human evolutionary history.

Cross-References

- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Evolutionary Anthropology: Issues, News, and Reviews
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition

Further Reading

Agarwal, S.C., and B.A. Glencross, eds. 2011. *Social bioarchaeology*. Chichester: Wiley-Blackwell.

Buikstra, J.E., and L.A. Beck, eds. 2006. *Bioarchaeology: The contextual analysis of human remains*. Burlington: Academic Press.

Larsen, C.S. 1997. *Bioarchaeology: Interpreting behavior from the human skeleton*. Cambridge: Cambridge University Press.

Larsen, C.S., and P.L. Walker. 2010. Bioarchaeology: Health, lifestyle, and society in recent human evolution. In *A companion to biological anthropology*, ed. C.S. Larsen, 379–394. Chichester: Wiley-Blackwell.

Biological Distance in Bioarchaeology and Human Osteology

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Introduction

Biological distance, or biodistance, is a measure of relatedness or divergence among groups separated by time and/or geography based on morphological variation (Buikstra et al. 1990). Biological distance studies, which are undertaken to reconstruct population history and to assess ancestry, dominated bioarchaeological research during the nineteenth and early twentieth centuries. The earliest attempts to comprehend human variation and measure relatedness among human groups, through the construction of typological racial classifications, fell short of their predicted goals. These early attempts, which led to the mistaken belief that humanity could be divided into a finite number of pure races, were flawed in theory and method. Advances in evolutionary theory, including quantitative and population genetics, and improvements in computing and statistical procedures in the early twentieth century provided a much firmer foundation for measuring and interpreting morphological variation within and between human groups.

Because of the demonstrated correlation between phenotypic and genotypic similarities, measures of biological distance in bioarchaeology are generally determined through the application of quantitative methods to metric and nonmetric variation recorded in skulls, teeth, and skeletons. Ancient DNA (aDNA) and other biochemical and geochemical traits are relatively new additions to biodistance studies.

Studies of cranial form, most notably cranial measurements (or craniometrics) that quantify morphology, figured prominently in the early development of the discipline and continue to occupy a central role in modern biological distance studies today. While morphological variation, especially quantitative variation, is subject to nongenetic or environmental influences, this category of variation is generally assumed to reflect genetic similarity resulting from neutral evolutionary forces (genetic drift, gene flow, and mutation). There is now an emerging consensus that craniometric data can be used as a proxy to genetic data, hence the popularity of this category of variation in biodistance studies. Teeth, especially dental nonmetric traits, have also figured prominently in assessing biological distance among ancient and modern populations. Standardization of dental scoring methods, the high genetic component, and the conservatism of this category of variation have made the dentition a popular choice for reconstructing population history.

Mathematically based methods, which are often based on quantitative and population genetic analyses, allow bioarchaeologists to address a broad array of research topics that include:

- Estimating biological relationships, temporally and spatially, for reconstructing the structure and history of past populations, origins, and human dispersals (e.g., Byrd 2014).
- Investigating microevolutionary processes (e.g., gene flow, genetic drift, selection) and the influence of geography and other isolating mechanisms on the observed patterns of biological relatedness (e.g., Smith 2011).
- Identification of postmarital residence patterns, familial and kin groupings, cemetery structure, social status, immigrants, and admixture (e.g., Cook and Aubry 2014; Stojanowski and Schillaci 2006).
- Sorting of commingled skeletal and dental remains and assignment of an unknown individual (or skull) to a known reference group in repatriation claims and forensic cases (e.g., Ross et al. 2016; Seidemann et al. 2009).
- Provide an important context for addressing other topics in bioarchaeology such as paleopathology, paleodemography, health, diet, etc. (e.g., Sutter and Verano 2007).

Definition

Biological distance, or biodistance, through the application of multivariate statistical procedures to metric and nonmetric skeletal/dental traits, is a measure of biological relatedness (similarity/dissimilarity) among populations separated by time and/or geography (Buikstra et al. 1990).

Key Issues

Although equally applicable to morphological/phenotypic variation, the discussion of the key issues in biological distance studies will focus on the use of cranial measurements, or craniometrics, unless otherwise noted.

Underlying Assumptions

While phenotypic, including craniometric, variation is subject to nongenetic or environmental influences (e.g., diet and climate) and past diversifying selection, there is overwhelming consensus that this category of variation generally reflects underlying genotypic variation. Those groups that display more phenotypic similarity are more closely related than those that do not. Furthermore, a number of studies have demonstrated that human cranial morphology, including craniometry, is moderately heritable, which strengthens their use in biodistance analyses (e.g., Sjøvold 1984; Carson 2006; Martínez-Abadías et al. 2009).

Geographic Patterning and Neutrality of Craniometric/Phenotypic Variation

Beginning with the pioneering work of W.W. Howells (1973), there is now near universal acceptance that human cranial variation is geographically structured making it highly attractive for reconstructing population history and for assessing ancestry.

While some aspects of cranial morphology may be influenced by climate (Hubbe et al. 2009) and subsistence (e.g., von Cramon-Taubadel and Pinhasi 2011), various lines of evidence have demonstrated that neutral evolutionary forces (e.g., mutation, gene flow, and genetic drift) primarily shape global patterns of human phenotypic and cranial variation under an isolation by distance model (Harvati and Weaver 2006; Relethford 2004; Roseman 2004; von Cramon-Taubadel 2009, 2014; Betti et al. 2010). The adoption and application of an explicit microevolutionary framework based on population genetic theory in the analysis of phenotypic data allows the effects of past gene flow, genetic drift, and natural selection to be modeled thus allowing cranial variation to be used as a proxy for genetic data estimating population structure and history. Additionally, because craniometric variation is geographically structured, high levels of classification accuracy are achievable when crania from different parts of the world are compared (Relethford 2009).

Categories of Data and Traditional Morphometric Methods

Two main categories of data, metric and nonmetric, have been traditionally associated with biodistance studies in bioarchaeology and human osteology. Metric data includes measurements recorded in the skull, postcranial skeleton, and teeth. Measurements (e.g., linear measurements, arcs, subtenses, and indices) represent continuous variables traditionally recorded using calipers in traditional morphometrics or, Cartesian coordinates of anatomical landmarks recorded using 3-D digitizers in geometric morphometrics nonmetric traits represent discontinuous or discrete variables (e.g., metopic suture, os inca, shovel-shaped incisors) that are recorded on a presence/absence basis or some gradation from absence to complete expression of the trait. More recently, a third category of data for use in biodistance studies is recognized, ancient DNA. The precision and relative ease of recording metric and nonmetric data as well as the noninvasive nature of the technique have promoted the use of metric and nonmetric data in the genomic and post-NAGPRA age. The Native American Graves Protection and Repatriation Act (NAGPRA), which was enacted in 1990, is a federal law in the United States that requires federal agencies to provide opportunities for federally recognized American Indian tribes and Native Hawaiian organizations to obtain

(and often repatriate) culturally affiliated human remains and artifacts.

Studies of biological distance, beginning in the 1970s, increasingly relied on the application of multivariate statistical procedures to craniometric data. Multivariate statistical procedures comprise a family of related mathematical procedures that allow the simultaneous analysis of many random but interrelated variables whose effects cannot be interpreted individually in a meaningful manner. These procedures are exceptionally well suited for investigating patterns of biological variation, measuring relatedness among groups, and making other inferences of the variables and groups selected. The primary multivariate statistical procedures applied to craniometric traits in biological distance studies include principal components analysis, stepwise discriminant function (canonical) analysis and Mahalanobis generalized distance. Various clustering algorithms, such as the unweighted pair-group method using arithmetic averages (UPGMA), facilitate interpretation of relatedness between groups through the construction of dendrograms (see section "An Example of Biological Distance Analysis"). C.A.B.. Smith's Mean Measure of Divergence (MMD) remains one of the most popular distance statistics for analyzing dental and cranial nonmetric traits.

Because most multivariate procedures, such as Mahalanobis distance, require complete sets of data, missing measurements must be replaced by various estimation methods. Replacement of missing data can only be applied when a few measurements (per individual) are missing. This means only complete or nearly complete crania can be ultimately selected for analysis using multivariate statistics. An alternative strategy is to reduce the number of variables (measurements) entered into the analysis. A more detailed discussion of the methods used for analyzing metric data is provided in Pietrusewsky (2008a).

In addition to traditional landmark measurements (e.g., linear distances, areas, volume, angles), the use of Cartesian coordinates of cranial landmarks recorded in two or three dimensions using digitizing equipment is a recent alternative approach for quantifying size and shape. Geometric morphometric techniques, including Procrustes analysis, have become standard tools for analyzing coordinate data (Slice 2007).

B

Continuing Interest in Cranial Shape and Craniometrics

The popularity and justification for the continued use of traditional morphometric data and analysis in bioarchaeology, human osteology, and forensic anthropology is supported by a number of factors. Chief among these are the standardization, ease of recording, precision, cost effectiveness, and repeatability of the methods involved with the recording of craniometric data. Also, the conservative nature, direct link to the past, amenability to analysis using multivariate statistical procedures, the existence of a heritability component, strong geographic patterning, and selective neutrality make this category of variation ideal for use in biodistance studies. Compared to geometric morphometric data, the statistical analysis and computer technology associated with traditional morphometric data is less daunting than that associated with geometric morphometrics. The recent restrictions imposed on human DNA studies and loss of skeletal collections due to repatriation make existing data archives (e.g., Howells' Craniometric Data) incalculable for future biodistance research.

Model-Free and Model-Bound Approaches

The earliest biological distance studies were largely model free approaches that focused more on the overall similarities among groups than on the causes of the observed patterns of variation. Later studies applied a population genetic framework for analyzing quantitative traits (e.g., Relethford and Blangero 1990; Roseman 2004; Smith 2011). These model-bound approaches allowed the estimation of microevolutionary processes such as gene flow, genetic drift, etc. However, because some model-free approaches (even though they do not involve formal estimation of model parameters) are based on population genetic models (i.e., isolation-by-distance model), the distinction between model-free and model-bound approaches to understanding population

structure and history is not always clear (Relethford 2016).

Selection of Samples and Variables

Because skeletal series represent only samples of past biological populations, which often span considerable periods of time and may be biased in their representation, extreme caution should be exercised when skeletal (cranial) samples are used in biological distance studies. Using relatively large samples that are free of systematic bias helps to alleviate some of the concerns. Likewise, the selection of traits that are less susceptible to environmental and cultural influences further insures that the results of biological distance analysis more closely estimate genetic relatedness.

Some Current Topics

Origin and Dispersal of Modern Humans/ Primate Evolution

Refinements in methods and techniques continue to influence work in biological distance studies. Some of the recent studies involving quantitative cranial phenotypic data are associated with testing modern human out-of-Africa dispersal models and the implications these have for the origin of anatomically modern humans (e.g., Reyes-Centeno et al. 2015). The association of craniometric variation and geography has been viewed within the context of this larger debate. The question of whether long distance gene flow mediated by geographic distance (isolation by distance model) or population dispersal such as with the spread of modern humans out of Africa 100–150,000 years ago is responsible for this observed correlation, have been examined (e.g., Weaver et al. 2008). Biological distance studies have also been used in the reconstruction of phylogenetic relationships in the primate fossil record (Smith and von Cramon-Taubadel 2015).

Peopling of the Americas

Studies in biological distance contribute to reconstructions of population history at both the global and regional levels. Craniometric studies that address the peopling of the Americas are illustrative of regional analysis (e.g., von Cramon-Taubadel et al. 2017). Many other studies examining the population history of various regions and time periods, too numerous to cite in this entry, have appeared in the literature in recent years.

Transition from Hunting-Gathering to Agriculture

Another debate that biological distance studies have contributed to in recent years is the transition to farming in Europe and whether indigenous hunter-gatherers were replaced (demic diffusion model) by agriculturalists from the Near East or whether these indigenous groups adopted farming practices (cultural diffusion model) from their neighbors (e.g., Hubbe et al. 2009; Paschetta et al. 2016; Pinhasi et al. 2015; von Cramon-Taubadel et al. 2013). Studies that focus on the transition to farming in other regions of the world have also appeared.

Boas' Immigration Studies and Cranial Plasticity/Climate and Environmental Influences

Several recent investigations (e.g., Jantz and Logan 2010) examined the statistical and biological significance of Franz Boas' immigration studies as they relate to cranial plasticity. Often these studies are discussed within the broader context of the debate over genetic and environmental influences on craniometric variation and the degree to which skeletal and dental morphology are influenced by environmental and/or selection pressures (e.g., Betti et al. 2010; González-José et al. 2005; Harvati and Weaver 2006; Hubbe et al. 2009; von Cramon-Taubadel et al. 2013).

In the field of forensic anthropology, discussion continues over the existence of races and the use of computer software programs (e.g., FORDISC and CRANID) designed to assigned unknown individuals to a reference group (e.g., Jantz and Ousley 2005; Wright 2010).

Regions of the Skull and Biodistance Studies

Several recent studies have identified the possible influence of environmental factors that may affect cranio-facial morphology. These, in turn, have led

Biological Distance in Bioarchaeology and Human Osteology, Table 1 Fifty-six male cranial samples used in the example

Sample (abbrev.)	No. of crania	Location[a] and number of crania	Remarks
Polynesia			
1. Tonga-Samoa (TOG)	19	BER-3; AMS-2; DRE-1; PAR-1 BPB-4; AIM-2; AUK-5; SIM-1	Fourteen specimens are from Tonga and five are from Samoa. Included in the Tongan series are three skulls from Pongaimotu excavated by McKern in 1920; two from To-At-1 and To-At-2 excavated by Janet Davidson in 1965; and five from To-At-36 excavated by Dirk Spennemann in 1985/1986. The remaining specimens are from museums in Berlin, Paris and Sydney. The skeletons from the three burial mounds (To-At-1, To-At-2, and To-At-36) date to the Chiefdom Period in Tonga (460-0 cal BP). Although the exact dates for the remaining crania are not known, the majority are believed to be prehistoric
2. Easter Island (EAS)	50	BER-5; DRE-9; PAR-36	Pinart collected most of the crania in Paris in 1887 at Vaihu and La Perouse Bay, Rapa Nui (Easter Island). The exact dates of these specimens are not known
3. Hawaii (HAW)	60	BPB-20; HON-20; SIM-20	An equal number of specimens have been randomly chosen from three different skeletal series: Mōkapu (O'ahu), Honokahua (Maui), and Kaua'i. All specimens are presumed to be prehistoric (pre-1778)
4. Marquesas (MRQ)	63	PAR-49; LEP-1; BLU-1; BPB-12	Crania are from four islands, Fatu Hiva, Tahuata, Nuku Hiva and Hiva Oa. The exact dates of these specimens are not known
5. New Zealand (NZ)	50	BRE-3; PAR-21; SAM-1; AIM-13; GOT-1; ZUR-5; DRE-6	A representative sample of New Zealand Maori crania from the North and South Islands of New Zealand. The exact dates of these specimens are not known
6. Chatham Islands (CHT)	45	DUN-8; OTM-2 WEL-4; CAN-10 AIM-3; DRE-5 AMS-2; DAS-3 GOT-4; PAR-4	Moriori crania from the Chatham Islands, New Zealand. The exact dates of these specimens are not known
7. Society Islands (SOC)	44	PAR-33; BPB-11	Crania are from the island of Tahiti, Society Islands. The exact dates of these specimens are not known
8. Tuamotu Archipelago (TUA)	18	PAR-18	The majority of the specimens are from Makatea in the Tuamotu Archipelago. The exact dates of these specimens are not known
Island Melanesia			
9. Fiji (FIJ)	42	BER-1; SAM-3 ; QMB-1; DRE-4 FRE-3; CHA-1; BPB-11; PAR-7 AMS-3; DUN-6; SIM-2	Crania are from all major islands including the Lau Group in the Fiji Islands. The exact dates of these specimens are not known

(continued)

Biological Distance in Bioarchaeology and Human Osteology, Table 1 (continued)

Sample (abbrev.)	No. of crania	Location[a] and number of crania	Remarks
10. Vanuatu (VAN)	47	BAS-47	Most of the specimens were collected by Felix Speiser in 1912 from Malo, Pentecost and Espirtu Santo Islands, Vanuatu. The exact dates of these specimens are not known
11. Loyalty Islands (LOY)	50	BAS-43; PAR-7	Crania are from Mare, Lifou, and Ouvea Island Groups, Loyalty Islands. The exact dates of these specimens are not known
12. New Caledonia (NCL)	50	BAS-34; PAR-16	Crania are from several coastal and inland locations on New Caledonia. The majority of these specimens were collected in the late nineteenth century. The exact dates of these specimens are not known
13. Santa Cruz Islands (SCR)	46	SAM-4; AMS-2; BAS-40	The crania in Basel were collected by Felix Speiser in 1912 (Speiser 1928). The exact dates of these specimens are not known
14. Solomon Islands (SOL)	49	DRE-3; BER-1; NMV-1; QMB-3; AMS-16; DAS-10; BAS-14; GOT-1	Crania are from New Georgia (5), Guadacanal (9), San Cristobal Island (7), and other locations in the Solomon Islands. The exact dates of these specimens are not known
15. New Britain (NBR)	50	CHA-20; DRE-30	The specimens from New Britain in Dresden were collected by A. Baessler in 1900 and those in Berlin were collected by R. Parkinson in 1911. The specimens were collected from trading posts near Rabul in the Gazelle Peninsula and most likely represent Tolai crania. The exact dates of these specimens are not known
16. New Ireland (NIR)	53	AMS-4; BER-2; BLU-6; DRE-18; GOT-15; QMB-1; SAM-6; TUB-1	Most of the crania in Dresden were collected by Pöhl in 1887–1888 from the northern end of the island; the specimens in Göttingen were collected during the Südsee Expedition in 1908. The exact dates of these specimens are not known
17. Admiralty Islands (ADR)	50	DRE-20; GOT-9; CHA-6; TUB-15	Specimens from Hermit, Kaniet, and Manus Islands of the Admiralty Islands. The exact dates of these specimens are not known
New Guinea			
18. Sepik R. (SEP)	50	DRE-33; GOT-10; TUB-7	The specimens in Dresden were collected by Otto Schlaginhaufen in 1909 from various locations along the Sepik River, Papua New Guinea. The exact dates of these specimens are not known
19. Biak Island (BIK)	48	DRE-48	Most (45) of the specimens were collected by A.B.. Meyer in 1873 on Biak Island (Mysore), Geelvink Bay, Irian Jaya. The exact dates of these specimens are not known

(continued)

Biological Distance in Bioarchaeology and Human Osteology, Table 1 (continued)

Sample (abbrev.)	No. of crania	Location[a] and number of crania	Remarks
20. Purari Delta (PUR)	50	DRE-50	Decorated (engraved) skulls obtained by Gerard and Webster between 1900 and 1902 are from along the Purari River and Purari Delta regions, Papua New Guinea. The exact dates of these specimens are not known
Australia/Tasmania			
21. Murray R. (MRB)	50	AIA-39; DAM-11	Australian Aboriginal crania were collected by G.M. Black along the Murray River (Chowilla to Coobool) in New South Wales between 1929 and 1950. The exact dates of these specimens are not known
22. New South Wales (NSW)	62	AMS-21; DAS-41	Australian Aboriginal crania from the coastal locations in New South Wales. The exact dates of these specimens are not known
23. Queensland (QLD)	54	AMS-21; DAS-3; QMB-30	Australian Aboriginal crania from the southeastern and middle-eastern regions of Queensland. The exact dates of these specimens are not known
24. Northern Territory (NT)	50	AIA-4; AMS-3; MMS-1; NMV-38; QMB-1; SAM-3	Australian Aboriginal crania from Port Darwin (39) and Arnhemland (36) in the Northern Territory, Australia. The exact dates of these specimens are not known
25. Swanport, S.A. (SAS)	36	SAM-36	Australian Aboriginal crania representing the Tarildekald and Warki-Korowalde tribes in the lower Murray River basin. The specimens were collected by F.R. Zeitz in 1911 from an aboriginal cemetery located approximately 10 km southeast of the Murray Bridge in South Australia (Howells 1973:21). The exact dates of these specimens are not known
26. Western Australia (WA)	47	WAM-47	Australian Aboriginal crania from central (20), eastern (4), northern (14), and southern (9) regions of Western Australia. The exact dates of these specimens are not known
27. Tasmania (TAS)	26	THM-22; CHA-1; SAM-2; NMV-1	The crania represent Tasmanian Aborigines. The exact dates of these specimens are not known
Micronesia			
28. Guam (GUA)	46	BPB-42; PAR-4	Pre-Spanish Chamorro crania associated with *latte* structures collected in the 1920s by Hans Hornbostel along Tumon Beach, Tumon Bay, Guam. The majority of these specimens represent prehistoric (pre-1521) Chamorro
Island Southeast Asia			
29. Sumatra (SUM)	39	BER-1; BRE-1; DRE-5; LEP-4; PAR-3; ZUR-25	The specimens in Zürich are designated "Battak," specific locations within the island of Sumatra are not known. The

(continued)

Biological Distance in Bioarchaeology and Human Osteology, Table 1 (continued)

Sample (abbrev.)	No. of crania	Location[a] and number of crania	Remarks
			exact dates of these specimens are not known
30. Java (JAV)	50	BER-1; BLU-8; CHA-9; DRE-1; LEP-24; PAR-7	Crania were collected from several different localities in Java. The exact dates of these specimens are not known
31. Borneo (BOR)	34	BER-2; BRE-2; DRE-6; FRE-4; LEP-8; PAR-12	A great many of the specimens are indicated as representing Dayak tribes, some have elaborate decorations. The exact dates of these specimens are not known
32. Sulawesi (SLW)	41	BAS-7; BER-10; DRE-4; FRE-7; LEP-5; PAR-8	An exact location is known for many of these specimens. The exact dates of these specimens are not known
33. Lesser Sunda Islands (LSN)	61	BAS-5; BER-15; BLU-2; CHA-1; DRE-24; LEP-1; PAR-6; ZUR-7	Crania from Bali (13), Flores (9), Sumba (1), Lomblem (2), Alor (2), Timor (11), Wetar (2), Leti (4), Barbar (1), Tanimbar (13), Kai (2), and Aru (1) Islands of the Lesser Sunda Islands. The exact dates of these specimens are not known
34. Southern Moluccas Islands (SML)	65	FRE-48; DRE-17	Crania are from Seram (48) and Buru (17) Islands of the Southern Molucca Islands. The exact dates of these specimens are not known
35. Sulu (SUL)	38	LEP-1; PAR-37	The specimens in Paris were collected by Montano-Rey circa 1900. The exact dates of these specimens are not known
36. Philippines (PHL)	28	BER-9; DRE-19	Most specimens are from Luzon Island. The exact dates of these specimens are not known
Mainland Southeast Asia			
37. Vietnam (VTN)	49	HCM-49	Near modern crania from Hanoi (Van Dien Cemetery) and Ho Chi Minh City
38. Bachuc Village, (BAC)	51	BAC-51	Victims of the 1978 Khmer Rouge massacre in Bachuc Village in western Angiang Province, Vietnam
39. Cambodia and Laos (CML)	40	PAR-40	A combined sample of crania from various locations in Cambodia and Laos collected between 1877 and 1920. The exact dates of these specimens are not known
40. Thailand (THI)	50	SIR-50	Most of the specimens represent dissecting room cases from Bangkok
41. Burma (BUR)	16	ZUR-16	The crania in Zürich are from a series (Cat. Nos. 93–125) of skulls collected in Mandalay, Myanmar (Burma), described in a catalogue dated circa 1900. The exact dates of these specimens are not known

(continued)

Biological Distance in Bioarchaeology and Human Osteology, Table 1 (continued)

Sample (abbrev.)	No. of crania	Location[a] and number of crania	Remarks
Japan			
42. Kanto (KAN)	50	CHB-50	A dissecting room population of modern Japanese from the Kanto District of eastern Honshu. The majority of the individuals were born during the Meiji period (1868–1911) and died well before 1940
43. Tohoku (TOH)	53	SEN-53	Dissecting room specimens of modern Japanese from the Tohoku District in northern Honshu Island
44. Kyushu (KYU)	51	KYU-51	Modern Japanese, which derive mostly from Fukuoka Prefecture in Kyushu Island. Other specimens are from Yamaguchi, Saga, Nagasaki, and adjoining prefectures
45. Ainu (AIN)	50	SAP-18; TKM-5; TKO-27	Modern to near modern skeletons collected by Koganei in 1888–1889 from abandoned Ainu cemeteries in Hokkaido
46. Ryukyu Islands (RYU)	60	KYO-18; KAN-21; RYU-8; KYU-5; TKO-8	Eighteen near modern crania are from Tokunoshima Island of the Amami Islands located north of the Okinawa Group in the central Ryukyu Islands; 21 specimens are from two different locations on Kume Island, an island located west of Okinawa Island: Yattchi (17) and Hiyajo (4); 21 specimens are from five separate islands in the Sakishima Group of the southern Ryukyu Islands: Hateruma Island (2); Miyako (4); Iriomote Island (2); Ishigaki Island (1), and Yonaguni Island (12)
China and Northeast Asia			
47. Shanghai (SHA)	50	SHA-50	The specimens are mostly from post-Qing (pre-1911) cemeteries in Shanghai
48. Nanjing (NAJ)	49	SHA-49	The series represents near modern crania exhumed from the modern city of Nanjing, Jiangsu Province, eastern China
49. Chengdu (CHD)	53	SHA-10; CHE-43	A majority of these specimens date to the Ch'en Dynasty (A.D. 1644–1911) and are from Chengdu, Sichuan Province in western China. Ten crania are from Leshan, Lizhong County, Sichuan Province
50. Hong Kong (HK)	50	HKU-50	Specimens represent individuals who died in Hong Kong between 1978 and 1979
51. Taiwan (TAI)	47	TPE-47	Modern Chinese living in Taiwan who trace their immediate origins to Fujian and Guangdong Provinces on the mainland of China

(continued)

Biological Distance in Bioarchaeology and Human Osteology, Table 1 (continued)

Sample (abbrev.)	No. of crania	Location[a] and number of crania	Remarks
52. Hainan Island (HAI)	47	TPE-47	Near modern Chinese whose ancestors began migrating from the Canton region of China to Hainan Island around 200 B.C. (Howells 1989:108). This material was excavated by Takeo Kanaseki in Haikou City on Hainan Island
53. Manchuria (MAN)	50	TKO-50	Many of the specimens are from northeastern China or the region formerly referred to as "Manchuria," which today includes Heilongjiang and Jilin Provinces and adjacent northern Korea. A great many of these specimens are identified as soldiers, or cavalrymen, who died in battle in the late nineteenth century A.D
54. Korea (KOR)	32	KYO-7; SEN-3, TKM-2; TKO-20	Specific locations in Korea are known for most of these near modern specimens
55. Mongolia (MOG)	50	SIM-50	The skulls are identified as coming from Ulaanbaatar (Urga), Mongolia and were purchased by A. Hrdlička in 1912
56. Atayal (ATY)	36	TPE-28; TKM-7; TKO-1	The Atayal are the second largest surviving Aboriginal tribe in Taiwan. The specimens are Atayal slain in the Wushe incident in 1930. The specimens were collected by Takeo Kanaseki in 1932

[a]*AIM* Auckland Institute and Museum, Auckland, New Zealand, *AIA* Australian Institute of Anatomy, Canberra, Australia, *AMS* The Australian Museum, Sydney, Australia, *AUK* University of Auckland, Auckland, New Zealand, *BAC* Bachuc Village, Angiang Province, Vietnam, *BAS* Naturhistorisches Museum, Basel, Switzerland, *BER* Museum für Naturkunde, Berlin, Germany, *BLU* Anatomisches Institut, Universität Göttingen, Göttingen, Germany, *BPB* B. P. Bishop Museum, Honolulu, USA, *BRE* Über-see Museum, Bremen, Germany, *CAN* Canterbury Museum, Christchurch, New Zealand, *CHA* Anatomisches Institut der Chairté, Humboldt Universität, Berlin, Germany, *CHB* Chiba University School of Medicine, Chiba, Japan, *CHE* Dept. of Anatomy, Chengdu College of Traditional Chinese Medicine, Chengdu, China, *DAM* Dept. of Anatomy, University of Melbourne, Melbourne, Australia, *DAS* Dept. of Anatomy, University of Sydney, Sydney, Australia, *DUN* Dept. of Anatomy, University of Otago, Dunedin, New Zealand, *DRE* Museum für Völkerkunde, Dresden, Germany, *FRE* Institut für Humangenetik und Anthropologie, Universität Freiburg, Freiburg im Breisgau, Germany, *GOT* Institut für Anthropologie, Universität Göttingen, Göttingen, Germany, *HCM* Faculty of Medicine, Ho Chi Minh City, Vietnam, *HON* Honokahua, Maui, Hawaii, USA, *HKU* University of Hong Kong, Hong Kong, *KAN* Kanegusuku Storage Room, Board of Education Cultural Division, Kanegusuku, Okinawa, Japan, *KYO* Physical Anthropology Laboratory, Faculty of Science, Kyoto University, Kyoto, Japan, *KYU* Dept. of Anatomy, Faculty of Medicine, Kyushu University, Fukuoka, Japan, *LEP* Anatomisches Institut, Karl Marx Universität, Leipzig, Germany, *MMS* Macleay Museum, University of Sydney, Sydney, Australia, *NMV* National Museum of Victoria, Melbourne, Australia, *OTM* Otago Museum and Art Gallery, Otago, New Zealand, *PAR* Musée de l'Homme, Paris, France, *QMB* Queensland Museum, Brisbane, Australia, *RYU* University of the Ryukyus, Naha, Okinawa Island, Japan, *SAM* South Australian Museum, Adelaide, Australia, *SAP* Dept. of Anatomy, Sapporo Medical College, Sapporo, Japan, *SEN* Dept. of Anatomy, School of Medicine, Tohoku University, Sendai, Japan, *SHA* Institute of Anthropology, College of Life Sciences, Fudan University, Shanghai, China, *SIM* National Museum of Natural History, Smithsonian Institution, Washington, DC, USA, *SIR* Dept. of Anatomy, Siriraj Hospital, Bangkok, Thailand, *THM* Tasmanian Museum and Art Gallery, Hobart, Australia, *TKM* Medical Museum, University Museum, University of Tokyo, Tokyo, Japan, *TKO* University Museum, University of Tokyo, Tokyo, Japan, *TPE* Academia Sinica, Nankang, Taipei, Taiwan, *TUB* Institut für Anthropologie u. Humangenetik, Universität Tübingen, Tübingen, Germany, *WAM* Western Australian Museum, Perth, Australia, *WEL* National Museum of New Zealand, Wellington, New Zealand, *ZUR* Anthropologisches Institut, Universität Zürich, Zürich, Germany

to specialized studies that examine the shape of individual bones of the cranium to identify which are more strongly correlated with neutral genetic expectation and thus better suited for use in reconstructing human population history and primate phylogeny (e.g., Harvati and Weaver 2006; Reyes-Centeno et al. 2015; Smith and von Cramon-Taubadel 2015). While some regions of the human cranium (e.g., temporal bone, neurocranium) have been shown to support the neutral model of evolution better than others (e.g., mandible, facial and occipital regions) all regions of the skull have similar heritability patterns making cranial measurements recorded in these regions equally informative phylogenetically (e.g., Martínez-Abadías et al. 2009).

Future Directions

There is now abundant evidence global patterns of cranial shape are the result of neutral microevolutionary processes. As such, cranial variation (metric and nonmetric) can be used as a proxy for genetic data for addressing questions of biological relationships and history of past populations. Future work in studies of biological distance is anticipated to build on previous work in evolutionary quantitative genetics and contribute to a broad array of evolutionary questions in bioarchaeology, human osteology, and physical/biological anthropology. Refinements in quantitative methods including Bayesian statistical modeling and new imaging technology will undoubtedly continue to shape future work in this field. The use of geometric morphometrics and Cartesian coordinates of cranial landmarks for analyzing size and shape will also likely become more common in the field. While the use of digitizing equipment for recording 3D coordinate data is expected to increase in future work, reliance on traditional landmark measurements made with hand-held calipers will persist as an attractive, convenient, and less costly alternative.

The multivariate statistical procedures associated with traditional morphometric analysis such as principal components analysis, discriminant (canonical) analysis, and Mahalanobis distance will continue to occupy an important role in future biodistance studies. The reliance on multivariate methods associated with biological distance studies, old and new, reinforces the need for students to be familiar with the mathematical and theoretical aspects of these quantitative methods.

Although the majority of studies in biodistance have focused on the crania, mandibles, and teeth, some researchers have recently turned their attention to the postcranial skeleton (e.g., Betti et al. 2013). As have been demonstrated for craniodental variation, bones of the postcranial skeleton also demonstrate neutral variation and have the potential to address questions regarding population history. Likewise, the analysis of aDNA and other geochemical data will attract future research in biological distance. Combining data from multiple sources (e.g., Ricaut et al. 2010) will likewise provide new opportunities for reconstructing evolutionary and population history.

As never before, access to computers, imagining technology, user-friendly software for conducting biological distance studies, and sharing of data and quantitative methods will guide and inspire future studies.

Given the current repatriation claims and issues surrounding the accessibility of skeletal remains, the creation of data banks, and the sharing of data worldwide will provide a wealth of information that is nonrenewal. Many of the skeletal series examined in biodistance studies just a few decades ago using traditional morphometrics (e.g., Polynesians and Australian Aboriginals) are no longer accessible to future researchers. Likewise, because of the absence of genomic data for much of human prehistory, morphological data remains a powerful, and perhaps the single, source of information for analyzing human evolutionary history (von Cramon-Taubadel et al. 2017).

An Example of Biological Distance Analysis

In this example, two multivariate statistical procedures, stepwise discriminant function (canonical) analysis and Mahalanobis distance, are applied to 27 landmark cranial measurements recorded in 56 modern and near modern male cranial samples for understanding the population history of the Asia-Pacific region (Table 1, Fig. 1) (Pietrusewsky 2008b). Discussion of these results

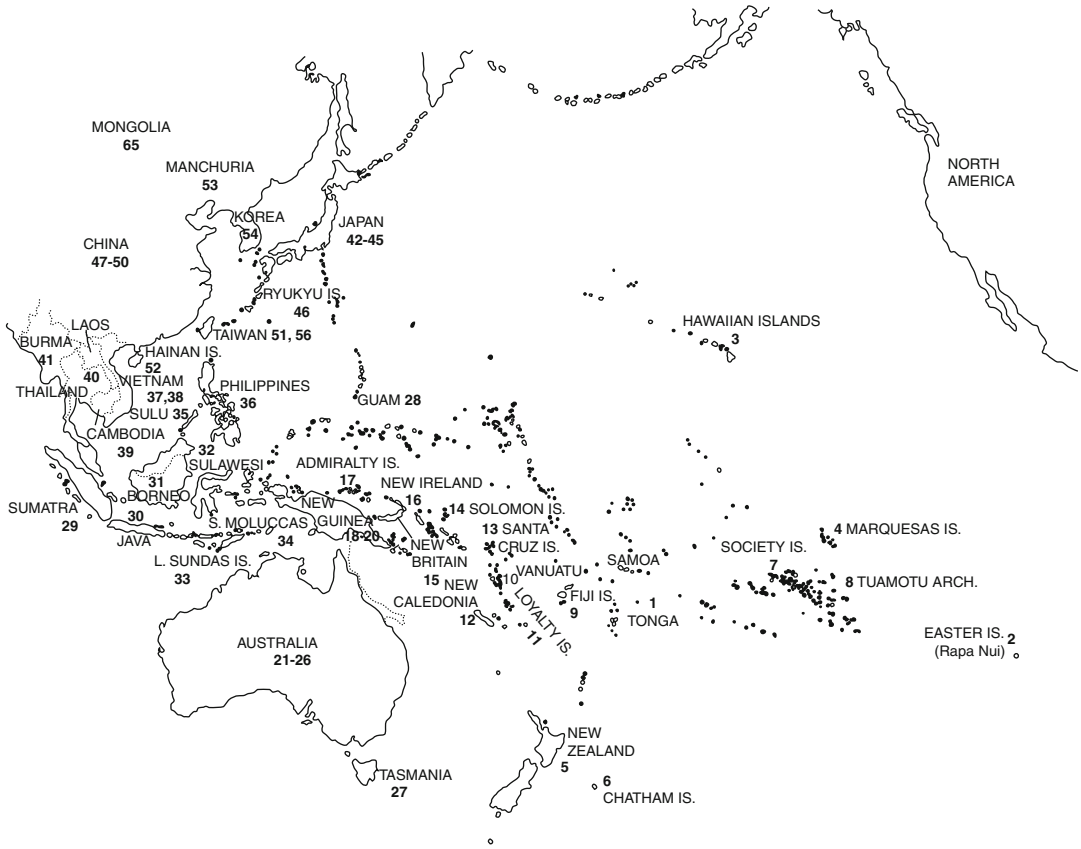

Biological Distance in Bioarchaeology and Human Osteology, Fig. 1 Map showing the approximate locations of the 56 cranial samples used in the example. See Table 1 for a description of the samples (This figure, reproduced here courtesy of Etty Indriati of Gadjah Mada University, Yogyakarta, Indonesia, was originally published in Pietrusewsky (2008b))

is restricted to a canonical plot of group means and the dendrogram of Mahalanobis distances, with detailed discussion provided in Pietrusewsky (2008a).

Stepwise Discriminant Function Analysis

Three clusters emerge when the group means for the 56 group are plotted on the first two canonical variates (Fig. 2). One of these includes the cranial series from Australia, New Guinea, and geographical Melanesia. A second cluster includes the cranial series representing Polynesia and Guam. Cranial series from Mainland Southeast Asia and East Asia form a third major constellation. Of note, the cranial series from the Southern Moluccas, Admiralty Islands, and Lesser Sunda Islands occupy an intermediate position between the Polynesian and Australo-Melanesian cranial series.

Mahalanobis Generalized Distance

Applying the UPGMA clustering algorithm to Mahalanobis distances results in the dendrogram shown in Fig. 3. The primary division evident in this diagram places all the cranial series from Australia and Melanesia in one branch while the second includes the cranial series from Polynesia, Southeast Asia, and East Asia. Within these major divisions there is internal differentiation that generally mirrors geography. It is also worth noting that New Zealand Maori (Polynesia), Southern

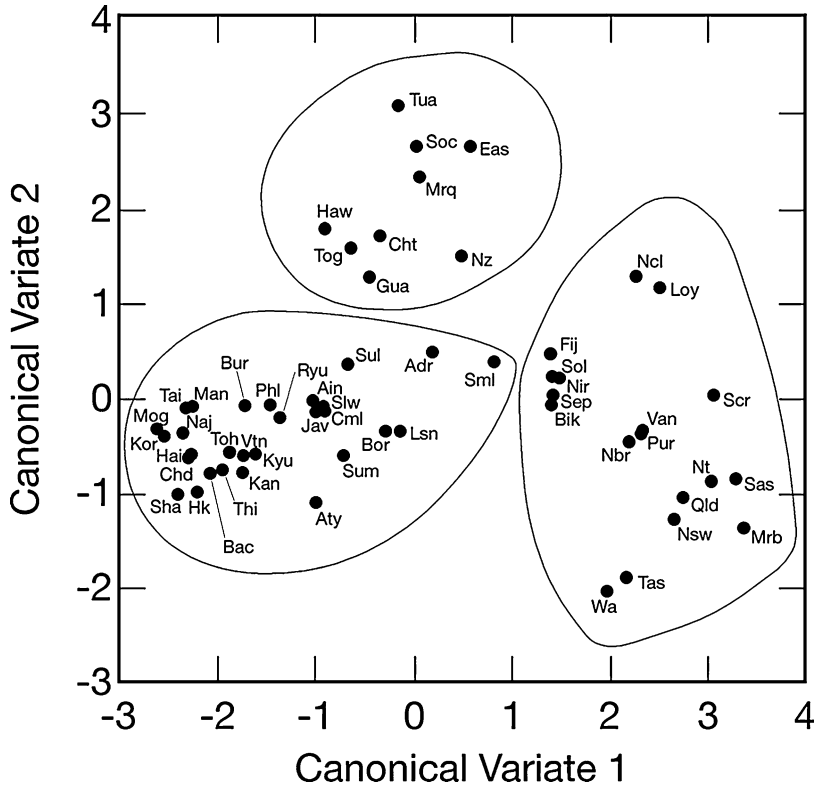

Biological Distance in Bioarchaeology and Human Osteology, Fig. 2 Plot of 56 group means on the first two canonical variates resulting from the application of stepwise discriminant function analysis to 27 cranial measurements. Abbreviations of the cranial samples are explained in Table 1 (This figure, reproduced here courtesy of Etty Indriati of Gadjah Mada University, Yogyakarta, Indonesia, was originally published in Pietrusewsky (2008b))

Moluccas (island Southeast Asia), and the Admiralty Islands (Melanesia) cranial series form a cluster that ultimately links with the Australian-Melanesian branch in this diagram.

Australia/Melanesia Versus Southeast/East Asia and Remote Oceania

The presence of two major divisions demonstrated in these results supports archaeological, linguistic, and genetic models that the indigenous inhabitants of Australia, Tasmania, and geographical Melanesia share a common origin that is unrelated to that for the modern inhabitants of Southeast Asia and East Asia. The sharp separation between Polynesian and Australian-Melanesians series further reinforces archaeological and linguistic models. These models hypothesize an earlier colonization of Australia, New Guinea, and neighboring regions of Near Oceania and a much later colonization that led to the peopling of previously uninhabited Remote Oceania.

Southeast Asia and North/East Asia

These results further allow an examination of some of the current archaeological models advanced to explain the population history of East and Southeast Asia. The sharp contrast between East/North Asian and Southeast Asian cranial series does not support linguistic and archaeological models that argue that the

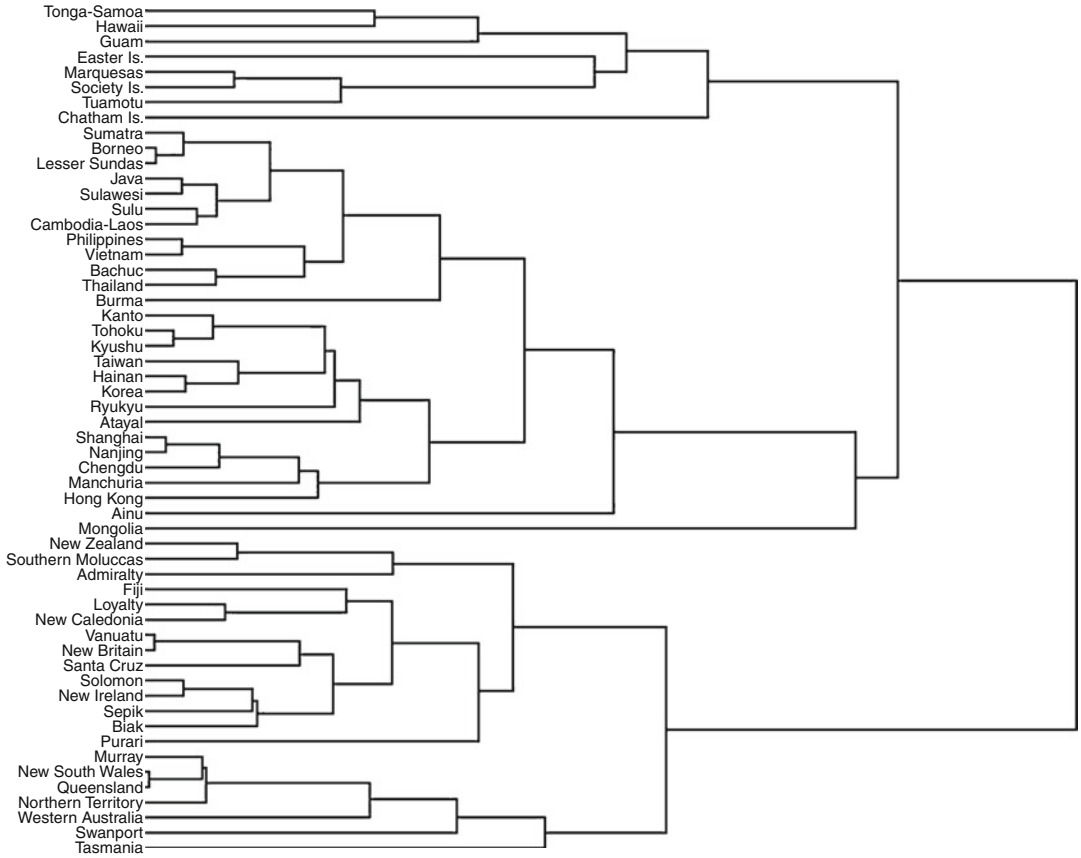

Biological Distance in Bioarchaeology and Human Osteology, Fig. 3 Dendrogram (or diagram of relationship) that results from applying UPGMA clustering algorithm to Mahalanobis distances using 27 cranial measurements recorded in 56 male groups (This figure, reproduced here courtesy of Etty Indriati of Gadjah Mada University, Yogyakarta, Indonesia, was originally published in Pietrusewsky (2008b))

indigenous inhabitants of Southeast Asia were replaced by immigrant groups of people of a more northern origin during Neolithic times.

Island Southeast Asia/Polynesian Homeland

These results also support an ancestral Polynesian homeland in East/Southeast Asia and not one within geographically adjacent Melanesia. The connection between New Zealand Maori (a Polynesian series) and the Southern Moluccas (Island Southeast Asia) cranial series supports a probable island Southeast Asian origin of the Polynesians, an association also demonstrated in previous analyses of genetic data.

References

Betti, L., F. Balloux, T. Hanihara, and A. Manica. 2010. The relative role of drift and selection in shaping the human skull. *American Journal of Physical Anthropology* 141 (1): 76–82.

Betti, L., N. von Cramon-Taubadel, A. Manica, and S.J. Lycett. 2013. Global geometric morphometric analyses of the human pelvis reveal substantial neutral population history effects, even across sexes. *PLoS One* 8 (2): e55909.

Buikstra, J.E., S.R. Frankenberg, and L.W. Konigsberg. 1990. Skeletal biological distance studies in American physical anthropology: Recent trends. *American Journal of Physical Anthropology* 82 (1): 1–7.

Byrd, R.M. 2014. Phenotypic variation of transitional forager–farmers in the Sonoran Desert. *American Journal of Physical Anthropology* 155: 579–590.

Carson, E.A. 2006. Maximum likelihood estimation of human craniometric heritabilities. *American Journal of Physical Anthropology* 131 (2): 169–180.

Cook, R.A., and B.S. Aubry. 2014. Aggregation, interregional interaction, and postmarital residence patterning: A study of biological variation in the late prehistoric middle Ohio Valley. *American Journal of Physical Anthropology* 154 (2): 270–278.

von Cramon-Taubadel, N. 2009. Congruence of individual cranial bone morphology and neutral molecular affinity patterns in modern humans. *American Journal of Physical Anthropology* 140 (2): 205–215.

von Cramon-Taubadel, N. 2014. Evolutionary insights into global patterns of human cranial diversity: Population history, climatic and dietary effects. *Journal of Anthropological Sciences* 92: 43–77.

von-Cramon-Taubadel, N., and R. Pinhasi. 2011. Craniometric data support a mosaic model of demic and cultural Neolithic diffusion to outlying regions of Europe. *Proceedings of the Royal Society B* 278 (1720): 2874–2880. https://doi.org/10.1098/rspb.2010.2678.

von Cramon-Taubadel, N., J.T. Stock, and R. Pinhasi. 2013. Skull and limb morphology differentially track population history and environmental factors in the transition to agriculture in Europe. *Proceedings of the Royal Society B* 280: 20131337. https://doi.org/10.1098/rspb.2013.1337.

von Cramon-Taubadel, N., A. Strauss, and M. Hubbe. 2017. Evolutionary population history of early Paleoamerican cranial morphology. *Science Advances* 3 (2): e1602289. https://doi.org/10.1126/sciadv.1602289.

González-José, R., F. Ramírez, M. Sardi, N. Martínez, M. Hernández, and H.M. Pucciarelli. 2005. Functional-cranial approach to the influence of economic strategy on skull morphology. *American Journal of Physical Anthropology* 128 (4): 757–771.

Harvati, K., and T.D. Weaver. 2006. Human cranial anatomy and the differential preservation of population history and climate signatures. *Anatomical Record. Part A* 288A: 1225–1233.

Howells, W.W. 1973. *Cranial variation in man: A study by multivariate analysis of patterns of difference among recent human populations (Papers of the Peabody Museum No. 67)*. Cambridge, MA: Peabody Museum, Harvard University.

Howells, W.W. 1989. *Skull shapes and the map: craniometric analyses in the dispersion of modern Homo. Cambridge, MA: (Papers of the Peabody Museum No. 79)*. Cambridge, MA: Peabody Museum, Harvard University.

Hubbe, M., T. Hanihara, and K. Harvati. 2009. Climate signatures in the morphological differentiation of worldwide modern human populations. *Anatomical Record* 292: 1720–1733.

Jantz, R.L., and M.H. Logan. 2010. Why does head form change in children of immigrants? A reappraisal. *American Journal of Human Biology* 22 (5): 702–707. https://doi.org/10.1002/ajhb.21070.

Jantz, R.L., and S.D. Ousley. 2005. *Fordisc 3: Computerized forensic discriminant functions, version 3.1*. Knoxville: University of Tennessee.

Martínez-Abadías, N., M. Esparza, T. Sjøvold, R. González-José, M. Santos, and M. Hernández. 2009. Heritability of human cranial dimensions: Comparing the evolvability of different cranial regions. *Journal of Anatomy* 214 (1): 19–35.

Paschetta, C., S. De Azevedo, M. González, M. Quinto-Sánchez, C. Cintas, H. Varela, J. Gómez-Valdés, G. Sánchez-Mejorada, and R. González-José. 2016. Shifts in subsistence type and its impact on the human skull's morphological integration. *American Journal of Human Biology* 28 (1): 118–128. https://doi.org/10.1002/ajhb.22746.

Pietrusewsky, M. 2008a. Metric analysis of skeletal remains: Methods and applications. In *Biological anthropology of the human skeleton*, ed. M.A. Katzenberg and S.R. Saunders, 2nd ed., 487–532. New York: Wiley.

Pietrusewsky, M. 2008b. The modern inhabitants of Island Southeast Asia: A craniometric perspective. In *Proceedings of the international seminar on Southeast Asian paleoanthropology: Recent advances on Southeast Asian paleoanthropology and archaeology*, ed. E. Indriati, 185–201. Yogyakarta: Laboratory of Bioanthropology and Paleoanthropology, Faculty of Medicine, Gadjah Mada University.

Pinhasi, R., V. Eshed, and N. von Cramon-Taubadel. 2015. Incongruity between affinity patterns based on mandibular and lower dental dimensions following the transition to agriculture in the Near East, Anatolia and Europe. *PLoS One* 102: e0117301.

Relethford, J.H. 2004. Global patterns of isolation by distance based on genetic and morphological data. *Human Biology* 76: 499–513.

Relethford, J.H. 2009. Race and global patterns of phenotypic variation. *American Journal of Physical Anthropology* 139 (1): 16–22.

Relethford, J.H. 2016. Biological distances and population genetics in bioarchaeology. In *Biological distance analysis: Forensic and bioarchaeological perspectives*, ed. M.A. Pilloud and J.T. Hefner, 23–33. New York: Elsevier.

Relethford, J.H., and J. Blangero. 1990. Detection of differential gene flow from patterns of quantitative variation. *Human Biology* 62: 5–25.

Reyes-Centeno, H., N.M. Hubbe, T. Hanihara, and C. Stringer. 2015. Testing modern human out-of-Africa dispersal models and implications for modern human origins. *Journal of Human Evolution* 87: 95–106.

Ricaut, F.-X., V. Auriol, N. von Cramon-Taubadel, C. Keyser, P. Murail, B. Ludes, and E. Crubézy. 2010. Comparison between morphological and genetic data to estimate biological relationship: The case of the Egyin Gol Necropolis (Mongolia). *American Journal of Physical Anthropology* 143 (3): 355–364.

Roseman, C.C. 2004. Detecting interregionally diversifying natural selection on modern human cranial form by using matched molecular and morphometric data. *Proceedings of the National Academy of Sciences of the United States of America* 101 (35): 12824–12829.

Ross, A.H., C.A. Juarez, and P. Urbanova. 2016. Complexity of assessing migrant death place of origin. In *Biological distance analysis: Forensic and bioarchaeological perspectives*, ed. M.A. Pilloud and J.T. Hefner, 265–283. New York: Elsevier.

Seidemann, R.M., C.M. Stojanowski, and F.J. Rich. 2009. The identification of a human skull recovered from an eBay sale. *Journal of Forensic Sciences* 54 (6): 1247–1125.

Sjøvold, T. 1984. A report on the heritability of some cranial measurements and non-metric traits. In *Multivariate statistical methods in physical anthropology*, ed. G.N. Van Vark and W.W. Howells, 223–246. Dordrecht: Reidel Publishing Company.

Slice, D.E. 2007. Geometric morphometrics. *Annual Review of Anthropology* 36: 261–281.

Smith, H.F. 2011. The role of genetic drift in shaping modern human cranial evolution: A test using microevolutionary modeling. *International Journal of Evolutionary Biology* 2011. Article ID 145262, 11 pp. https://doi.org/10.4061/2011/145262.

Smith, H.F., and N. von Cramon-Taubadel. 2015. The relative correspondence of cranial and genetic distances in papionin taxa and the impact of allometric adjustments. *Journal of Human Evolution* 85: 46–64.

Speiser, F. 1928. Anthropologische messungen aus dem St. Cruz-Inseln. Archiv für Anthropologie 19 (2/3): 89–146.

Stojanowski, C.M., and M.A. Schillaci. 2006. Phenotypic approaches for understanding patterns of intracemetery biological variation. *Yearbook of Physical Anthropology* 49: 49–88.

Sutter, R., and J. Verano. 2007. Biodistance analysis of the Moche sacrificial victims from Huaca de la Luna Plaza 3C: Matrix method test of their origins. *American Journal of Physical Anthropology* 132 (2): 193–206.

Weaver, T.D., C.C. Roseman, and C.B. Stringer. 2008. Close correspondence between quantitative- and molecular-genetic divergence times for Neanderthals and modern humans. *Proceedings of the National Academy of Sciences of the United States of America* 105: 4645–4649.

Wright, R.V. 2010. Guide to using the CRANID6 programs CR6aIND: For linear and nearest neighbours discriminant analysis. http://www.box.net/shared/static/n9q0zgtr1y.EXE. Accessed 22 Jan 2010.

Further Reading

Alt, K.W., M. Benz, W. Vach, T.L. Simmons, and A.N. Goring-Morris. 2015. Insights into the social structure of the PPNB Site of Kfar HaHoresh, Israel, based on dental remains. *PLoS One* 109: e0134528. https://doi.org/10.1371/journal.pone.0134528.

Betti, L., N. von Cramon-Taubadel, A. Manica, and S.J. Lycett. 2014. The interaction of neutral evolutionary processes with climatically-driven adaptive changes in the 3D shape of the human os coxae. *Journal of Human Evolution* 73: 64–74.

von Cramon-Taubadel, N. 2013. Evolutionary insights into global patterns of human cranial diversity: Population history, climatic and dietary effects. *Journal of Anthropological Sciences* 91: 1–36.

von Cramon-Taubadel, N. 2016. Biodistance in global perspective: Assessing congruence of morphological, genetic, and environmental population distance matrices. In *Biological distance analysis: Forensic and bioarchaeological perspectives*, ed. M.A. Pilloud and J.T. Hefner, 425–445. New York: Elsevier.

von Cramon-Taubadel, N., and S.J. Lycett. 2014. A comparison of catarrhine genetic distances with pelvic and cranial morphology: Implications for determining hominin phylogeny. *Journal of Human Evolution* 77: 179–186.

von Cramon-Taubadel, N., and L. Schroeder. 2016. Testing the equivalence of modern human cranial covariance structure: Implications for bioarchaeological applications. *American Journal of Physical Anthropology* 161 (2): 355–366.

Galland, M., D.P. Van Gerven, N. von Cramon-Taubadel, and R. Pinhasi. 2016. 11,000 Years of craniofacial and mandibular variation in Lower Nubia. *Scientific Reports* 6: 31040.

Johnson, K.M., and K.S. Paul. 2016. Bioarchaeology and kinship: Integrating theory, social relatedness, and biology in ancient family research. *Journal of Archaeological Research* 24 (1): 75–123.

Lycett, S.J., and N. von Cramon-Taubadel. 2016. Biology and culture: Shared pathways of transmission among post-contact Native Americans on the western Great Plains. *Scientific Reports* 6: 25695.

Lycett, S.J., and N. von Cramon-Taubadel. 2013. Understanding the comparative catarrhine context of human pelvic form: A 3D geometric morphometric analysis. *Journal of Human Evolution* 64: 300–310.

Meyer, C., C. Lohr, D. Gronenborn, and K.W. Alt. 2015. The massacre mass grave of Schöneck-Kilianstädten reveals new insights into collective violence in Early Neolithic Central Europe. *Proceedings of the National Academy of Sciences of the United States of America* 112 (36): 11217–11222.

Movsesian, A.A. 2013. Nonmetric cranial trait variation and population history of Medieval East Slavic tribes. *American Journal of Physical Anthropology* 152 (4): 495–505.

Movsesian, A.A., V.Y. Bakholdina, and D.V. Pezhemsky. 2014. Biological diversity and population history of Middle Holocene hunter-gatherers from the Cis-Baikal region of Siberia. *American Journal of Physical Anthropology* 155 (4): 559–570.

Paul, K.S., C.M. Stojanowski, and M.M. Butler. 2013. Biological and spatial structure of an early classic period cemetery at Charco Redondo, Oaxaca. *American Journal of Physical Anthropology* 152 (2): 217–229.

Pietrusewsky, M., A. Lauer, C.H. Tsang, K.T. Li, and M.T. Douglas. 2016. A biodistance analysis of mandibles from Taiwan, Asia and the Pacific: A search for Polynesian origins. In *Biological distance analysis: Forensic and bioarchaeological perspectives*, ed. M.A. Pilloud and J.T. Hefner, 447–461. New York: Elsevier.

Pilloud, M.A., and J.T. Hefner, eds. 2016. *Biological distance analysis: Forensic and bioarchaeological perspectives*. New York: Elsevier.
Relethford, J.H. 2010. Population-specific deviations of global human craniometric variation from a neutral model. *American Journal of Physical Anthropology* 142 (1): 105–111.
Roseman, C.C., and T.D. Weaver. 2004. Multivariate apportionment of global human craniometric diversity. *American Journal of Physical Anthropology* 125 (3): 257–263.
Ross, A.H., and E.H. Kimmerle. 2009. Contribution of quantitative methods in forensic anthropology: A new era. In *Handbook of forensic anthropology and archaeology*, ed. S. Blau and D.H. Ubelaker, 479–489. Walnut Creek: Left Coast Press Inc.
Schillaci, M.A., and C.M. Stojanowski. 2003. Postmarital residence and biological variation at Pueblo Bonito. *American Journal of Physical Anthropology* 120 (1): 1–15.
Smith, H.F. 2009. Which cranial regions reflect molecular distances reliably in humans? Evidence from three-dimensional morphology. *American Journal of Human Biology* 21 (1): 36–47.
Smith, H.F., T. Ritzman, E. Otárola-Castillo, and C. Terhune. 2013. A 3-D genometric morphometric study of intraspecific variation in the ontogeny of the temporal bone in modern *Homo sapiens*. *Journal of Human Evolution* 65: 479–489.
Stojanowski, C.M., and W.N. Duncan. 2015. Engaging bodies in the public imagination: Bioarchaeology as social science, science, and humanities. *American Journal of Human Biology* 27 (1): 51–60.
Stojanowski, C.M., and K.J. Knudson. 2014. Human mobility responses to climatic deterioration and aridification in the Middle Holocene Southern Sahara. *American Journal of Physical Anthropology* 154 (1): 79–93.
Van Vark, G., and W.W. Howells. 1984. *Multivariate statistical methods in physical anthropology*. Dordrecht: D. Reidel Publishing Company.

Biometry in Zooarchaeology

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Introduction

The measurement of bones is a routine aspect of zooarchaeological analysis. Requiring minimal equipment and relatively little experience, it nonetheless has the potential to contribute to many of the discipline's major recurring themes, including domestication, herd management, hunting strategies, and environmental change. Most analysts currently use the same standard set of measurements for mammals and birds – published by Angela von den Driesch in 1976 – allowing considerable scope for comparison between sites. A number of promising new statistical techniques such as mixture analysis have been applied to zooarchaeological biometry in recent years, but the development likely to have the biggest impact in the near future is the establishment of online repositories of measurement data, facilitating large-scale meta-analyses.

Definition

In the context of vertebrate zooarchaeology, biometry refers to the measurement of individual dimensions of hard tissues – primarily bone – and the calculation of simple indices. Common uses of measurements include species identification, sex determination, age estimation, assessment of domestication status, and tracing environmental changes.

Key Issues/Current Debates/Future Directions/Examples

Techniques and Standardization

For measurements to be useful, they must be repeatable and comparable. It is therefore necessary both to use equipment capable of producing reliable, accurate measurements and to ensure standardization between analysts in the exact dimensions to be measured.

The most common tools for zooarchaeological biometry are simple sliding calipers – typically digital, although many analysts prefer to use purely mechanical vernier or dial versions (Fig. 1). These have a main pair of (typically) straight arms allowing accurate external measurements up to 150 or 200 mm on moderate-sized bones, and usually also a smaller secondary pair of arms for simple internal measurements of foramina, diastemata, etc. Technical precision is typically 0.01 mm,

Biometry in Zooarchaeology, Fig. 1 Dial calipers being used to measure a cod vertebra. (Photo by author)

although this will rarely be achieved in practice due to observer error.

Larger calipers are also available, as are specialized versions with longer, narrower, and/or angled arms to permit measurement of larger or more awkwardly shaped bones. More commonly, however, such measurements are taken using a measuring box. Various designs exist but all feature a horizontal surface marked with a scale and two vertical blocks perpendicular to this: the first fixed at the zero point and the second capable of sliding along the scale in order to take a measurement on a bone held against the first. Measuring boxes are particularly useful when more than two measurement (i.e., contact) points are required in order to ensure the correct orientation for the dimension to be measured.

For very small bones, measurements can be taken through a microscope using a scaled graticule, or alternatively using digital image analysis. Finally, curved measurements are occasionally taken using a simple tape measure, for example for the outer length of a horn core or the basal circumference of an antler.

Inter-analyst comparability can only be achieved through the use of standard measurement definitions and clear indication of the standards employed in each case. Fortunately, a near-universal standard for terrestrial mammals and birds exists in Angela von den Driesch's *A Guide to the Measurement of Animal Bones from Archaeological Sites* (1976) – a comprehensive and fully illustrated list of measurements designed for the major taxa encountered on Holocene sites in Europe, with abbreviations allowing easy reference to specific measurements (e.g., "Bd" = distal breadth). These can generally also be applied for related taxa found in other parts of the world, but run into trouble for species that differ substantially in morphology, such as beavers or primates. Other measurement lists do exist, but are typically specialized sets to be used as supplements rather than alternatives to von den Driesch (e.g., additional sheep metapodial measurements in Davis 1996). The degree of morphological variation in fish makes definition of standard measurements more difficult, although some of those set out by Morales and Rosenlund (1979) are widely used. The existence of widely accepted standards allows for inter-site comparison and compilation of measurement databases such as ABMAP, hosted by the UK's Archaeology Data Service.

Log-Ratio Techniques

Isolated measurements may be useful if they can be compared with published datasets, but for many purposes a large sample of measurements from the same assemblage is required. Even in a large collection of bones, the number of measurable specimens of any given element and portion (e.g., distal humerus) may be very small, however, and it is often impossible to draw meaningful interpretations from measurements of individual elements.

The log standard index (LSI) or "log-ratio method" can be used to circumvent this problem by combining measurements from multiple elements. Originally developed by paleontologists, it was introduced to archaeology by Hans-Peter Uerpmann (1979) and Richard Meadow (1981). Each measurement in the assemblage is converted into an index representing its magnitude relative to the equivalent measurement on a "standard animal" – either a modern specimen, average values from a modern population, or a more or less complete archaeological skeleton. This is done by dividing the observed measurement by the standard measurement and then taking the base-10 logarithm: a measurement identical to that on the standard will result in an LSI value of

zero; a positive value indicates that the specimen is larger than the standard; and a negative value that it is smaller. The zero point is thus fairly arbitrary, but the LSI values can be used to assess the size distribution of specimens in an assemblage (Fig. 2).

One problem with this technique is that it assumes that *shape* does not vary systematically, that is, that the relative proportions of the standard animal are identical to those in the archaeological populations under study. Differences in relative proportions between the standard and the target population(s) have a blurring effect, increasing the dispersion of LSI values and making it harder to distinguish subgroups within the archaeological material. In theory this can be minimized by choosing an appropriate standard – ideally from as close as possible to the target assemblage in both time and space – but there is often little choice: studies of prehistoric cattle, for example, almost always use the "Ullerslev cow," a Danish Neolithic aurochs (Degerbøl and Fredskild 1970). Equally problematically, there may be systematic differences in proportions between the subgroups that one is trying to distinguish, for example males and females or wild and domestic specimens.

Of course, LSI values also provide a means to investigate shape changes, which may be of considerable interest in their own right. Given a large enough sample, LSI values may be plotted by element, with variation in mean values revealing differences in anatomical proportions compared to the standard (e.g., Davis 1996). Shape variation between individuals within a single population is also an issue, and Davis notes that while measurements in the same axis – that is, lengths *or* breadths *or* depths – tend to be highly correlated throughout the body, correlations are typically weaker *between* these categories.

In addition, pooling measurements from multiple elements is likely to lead to sample inflation: the same individual may be represented multiple times, increasing apparent sample size, violating assumptions of independence, and making "significant" results more likely in statistical tests. The LSI approach can be very powerful despite these problems, but wherever possible it should be used to supplement rather than replace analysis of size on an element-by-element basis.

Estimating Body Size/Weight

Bone measurements and derived indices are both useful for assessing relative size, but neither represents data of interest in and of themselves. It is often useful to estimate a more intuitively meaningful dimension from the measurements: whether discussing domestication-linked size reduction in the Neolithic or livestock improvements in the postmedieval period, for example, most readers will get a better idea of the changes involved if they are expressed in terms of withers height (i.e., height at the shoulder) rather than, say, metacarpal distal breadth or an index of size relative to one specific Danish aurochs. In some cases the role of derived size estimates may go further.

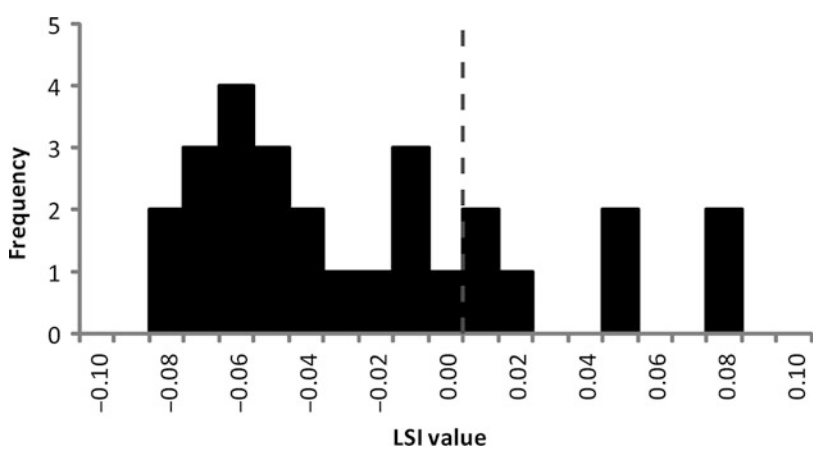

Biometry in Zooarchaeology, Fig. 2 Distribution of LSI value for goats (*Capra hircus*) from Çatalhöyük, West Mound, by reference to Uerpmann's (1979) standard animal. The *dotted line* marks the position of the standard (Author's own data)

For fish, the distribution of estimated total lengths may help to infer capture technology, while length is also a proxy for age (see below).

Modern reference data have been used to calculate linear regression equations for deriving major dimensions of numerous species from common bone measurements (e.g., May 1985 for horse withers height, Jones 1991 for gadid fish total lengths). In most cases these are simple bivariate linear regressions (Fig. 3), although it is also possible to build several measurements into a multiple regression. Such regression equations should ideally only be used for archaeological specimens which fall within the range of the reference data used in their construction (interpolation); application to specimens outside this range (extrapolation) may not be reliable. They should also ideally be based upon measurements taken in approximately the same axis as the dimension to be estimated, but this is not always practical. For example, withers height in livestock can be most reliably estimated from long bone *lengths*, but since long bones are typically fragmented in zooarchaeological assemblages, it may be necessary to use breadth or depth measurements instead, accepting a weaker correlation and hence larger error term (see Davis 1996).

For other purposes it may be the weight of an animal (or at least the weight of meat and fat) that is of most interest to the zooarchaeologist, but predicting live weight is more complicated than estimating height or length. Since weight is correlated with volume – a three-dimensional property – it should increase in a cube ratio relative to any given dimension, resulting in a non-linear regression curve. An additional complication is introduced by allometry: that is, size-correlated variation in anatomical proportions. In the context of zooarchaeology, the most important allometric effect is that between overall body size and the proportion of the body consisting of bone. Whereas weight depends on volume and hence increases in a cube ratio, the ability of bones to support this weight is (broadly speaking) a function of cross-sectional area – a two-dimensional property – and thus only increases in a square ratio. As animals get heavier, the size of their bones must therefore increase disproportionately in order to support their weight, further complicating the relationship between bone measurements and animal size.

Age and Sex Determination

Sex ratios may be of considerable interest to zooarchaeologists, shedding light on herd management or hunting techniques. Sex can most reliably be determined from qualitative differences such as pelvic or dental morphology, but many species also show marked quantitative sexual dimorphism, with males typically larger among mammals and the opposite occasionally true for birds. Unless dimorphism is extreme, however, distinguishing male and female specimens on the basis of measurements is necessarily

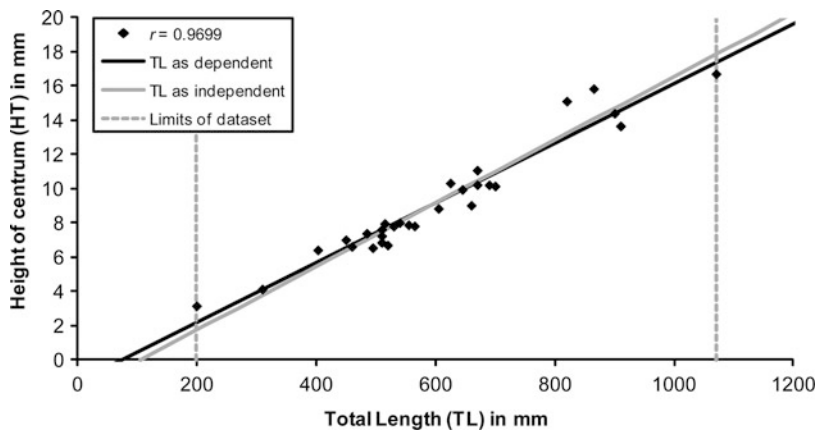

Biometry in Zooarchaeology, Fig. 3 Linear least-squares regression of first vertebra centrum height and total length in cod (*Gadus morhua*). The exact line depends on which variable is treated as dependent, neither being strictly correct. Length estimation is only reliable within the limits of the original dataset (Author's own data)

a probabilistic rather than absolute process: while the very largest and smallest specimens may be attributable to sex groups with some confidence, there is typically considerable overlap between male and female ranges. Even where it is impossible to determine the sex of individual bones, however, it may nonetheless be possible to estimate sex ratios within the assemblage as a whole, based on the shape of the observed distribution.

Since size distribution depends on a range of genetic and environmental factors, it must be treated as population specific; that is, one cannot rely on size ranges observed in modern populations to assign archaeological bones to sex groups. Rather, the zooarchaeologist must plot the available measurements and look for clustering empirically. In exceptional cases discrete size groups may emerge, but the best one can normally hope for is a continuous but bimodal distribution, which may be easier to interpret following smoothing with the kernel density estimate technique (Fig. 4). The degree to which sex groups can be determined within a population depends not only on the degree of dimorphism and the variation within each group but also on their relative abundance: where a small number of (larger) males are present alongside a much greater number of (smaller) females – as is typical in domestic herds – the male peak size may be obscured by the upper tail of the female distribution, perhaps visible only as a small "shoulder" towards the upper end of the overall distribution. A size distribution exhibiting positive skew may well indicate a small number of male specimens (or perhaps the inclusion of a few wild individuals – see below). Without independent information on the degree of dimorphism, it is very difficult to estimate relative frequency, although mixture analysis may help by fitting two (or more) normal distributions to the data as closely as possible (Monchot et al. 2005).

Where two groups emerge, these *may* represent males and females, although other factors such as the presence of wild and domestic populations (see below) may be responsible. If a few specimens of known sex (based on nonmetric characters) are included in the dataset, then they can be used to help test the assumption that observed size clusters represent sex groups. An additional complication among domestic animals is the possibility of castration, effectively introducing a third sex group. The exact effect of castration varies depending on the technique and timing (Moran and O'Connor 1994), but as a rule-of-thumb castrates tend to have relatively long bones due to delayed epiphyseal fusion (Davis 2000, see also Popkin et al. 2012). This effect is visible for metacarpal length versus breadth in a study of

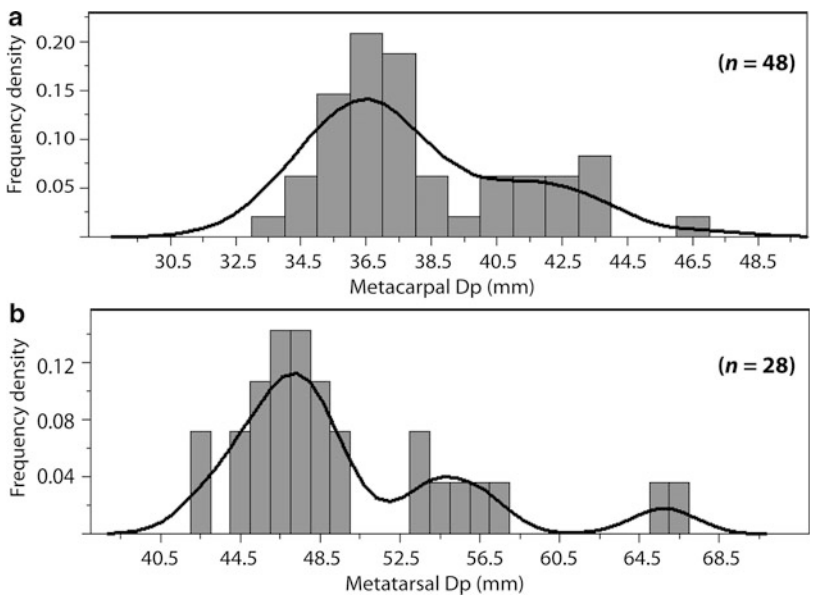

Biometry in Zooarchaeology, Fig. 4 Histograms of metacarpal (**a**) and metatarsal (**b**) proximal breadths for cattle (*Bos taurus*) from Neolithic Gomolava, Serbia, with overlaid kernel density estimates. The main groups *probably* represent domestic females and males, while the upper outliers may be wild specimens. (After Orton 2008)

known-sex Shetland sheep, but there is too much overlap between rams, ewes, and wethers (castrated males) for reliable application to archaeological specimens (Davis 2000).

Metric data are generally of more limited use for determining age at death, although taxa with continuous ("indeterminate") growth, notably fish, are an exception. On a fine scale, the size of young fish may even be used to make inferences regarding season of catch. In the case of mammals, however, growth more or less ceases in most elements by the point of epiphyseal fusion, and wide variation in growth rate (see e.g., Popkin et al. 2012) means that measurement of immature specimens is of little use for estimating age.

Metric data may nonetheless contribute to understanding of kill-off patterns of domestic stock at an assemblage level. For obvious reasons, size distributions are normally constructed only from mature specimens – indeed, many zooarchaeologists do not even measure immature bones – and hence represent only the (sub)adult fraction of a population. Since males are typically slaughtered younger than females in domestic herds, size distributions will be heavily biased towards female specimens. Where measurements are available for unfused or otherwise immature specimens, however, these are likely to be biased in the other direction – towards males. Counterintuitively, the unfused bones may thus actually be larger on average than their mature counterparts, especially for late-fusing elements. Comparing the size distributions of fused and unfused specimens element by element, from earlier to later fusing, can thus help to identify the timing of the main male cull (Fig. 5), although once again the presence of castrates would complicate matters.

Finally, the use of tooth measurements to estimate age at death should be mentioned. Since tooth crowns wear down over time, particularly among herbivores, the remaining height of the crown can theoretically be used to estimate the length of time for which the tooth has been in use and by extension the age of the animal (e.g., Klein and Cruz-Uribe 1983). Several variants on this "crown-height" approach have been developed, with a range of different measuring protocols and varying complexity in the formulae used to estimate age, but

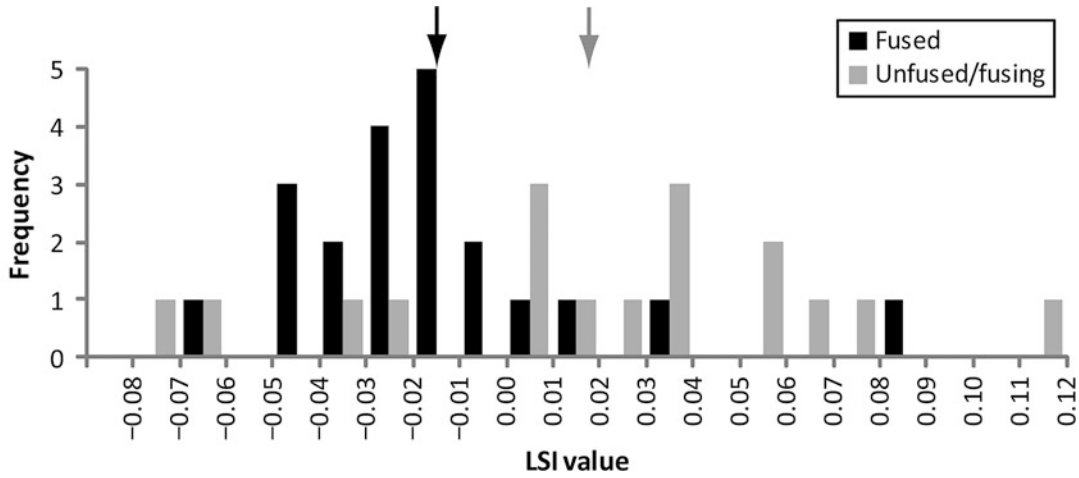

Biometry in Zooarchaeology, Fig. 5 Distribution of LSI values for distal metacarpals of sheep (*Ovis aries*) from Çatalhöyük West Mound, including both fused and unfused/fusing specimens. *Arrows* show mean values. The narrower range and smaller average size seen for mature specimens suggests that they are predominantly female and thus that most males were killed before fusion of the distal metacarpal (18–30 months according to Zeder 2006) (Author's own data)

all suffer from several drawbacks – most notably inability to account for variation in the height of the unworn crown (see Twiss 2008).

Domestication

One of the most hotly debated applications of zooarchaeological biometry is to the detection of domestication and the distinction of wild and domestic specimens within an assemblage. Most species saw a rapid reduction in both size and dimorphism following domestication, thought to be due to the relaxation of certain selection pressures that applied within wild populations (Zohary et al. 1998). Biometry is thus one of the main lines of evidence that has been used to document the process of animal domestication, alongside changing age and sex structures, pathologies, and artifactual data.

Changes in morphology must necessarily have lagged behind the changes in human-animal interaction that represent domestication per se, but the speed with which size reduction manifested is hard to establish. Tracing size declines in a population over time will only ever provide a terminus ante quem for domestication in this sense, although the question of when domestication can be said to have occurred is in any case as much a theoretical as a practical one. Ideally, biometry should be complemented by assessment of changes in age and sex profiles, the latter being likely slightly to predate reduction in size.

Of course, domestication is only one possible cause of size decline: intensive selective hunting can depress the size of available prey over time, for example, while environmental changes may result in shifts in size distribution among wild populations without any human intervention. A stronger case that size decline represents domestication can be made where other species with similar habitats can be shown not to have undergone the same changes over the same time span (e.g., Arbuckle and Makarewicz 2009).

Once a domestic population of a species has been established, hunting of wild individuals may nonetheless continue. Separating wild and domestic individuals within a zooarchaeological assemblage – or at least estimating their relative abundance – presents a challenge analogous to that of distinguishing sex groups, but with the added complication that both wild and domestic populations will include male and female groups. One cannot even assume that the offset between the sexes is the same in each population, since dimorphism is often much reduced in domestic herds (Zohary et al. 1998).

Where both wild and domestic populations of a dimorphic species are likely to be present in an assemblage, interpreting the size distribution can become quite complicated, with a trimodal distribution not uncommon (Figs. 4b; 6). Mixture analysis may again help to tease apart components within relatively large samples, but cannot entirely circumvent fundamental problems of equifinality: statistics may help to identify and quantify subgroups within a sample, but cannot reveal what they represent. Once again, the presence of a few known-sex specimens can help to choose between different interpretations of a bi- or trimodal size distribution (Fig. 7).

		Group 1	Group 2	Group 3
Bimodal	*a*	dom. ♀	dom. ♂	
	b	wild ♀	wild ♂	
	c	dom. ♀, ♂	wild ♀, ♂	
	d	dom. ♀, ♂, wild ♀	wild ♂	
Trimodal	*e*	dom. ♀	dom. ♂, wild ♀	wild ♂
	f	dom. ♀, ♂	wild ♀	wild ♂

Smaller ← → **Larger**

Biometry in Zooarchaeology, Fig. 6 Potential interpretations of observed bi- or trimodal size distributions for a dimorphic species with wild and domestic forms. Options *a* to *f* are not exhaustive but represent some of the more likely interpretations (excluding the possibly of castrates)

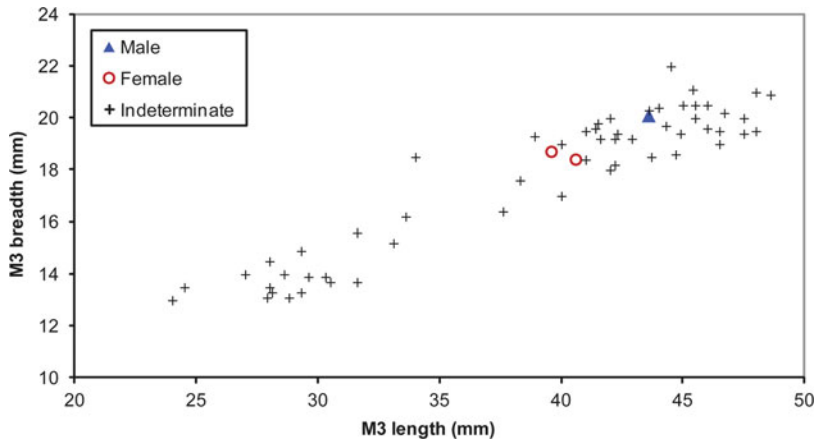

Biometry in Zooarchaeology, Fig. 7 Lower third molar measurements from pigs (*Sus scrofa*) at Neolithic Gomolava, Serbia, with sex highlighted where known (from canine morphology). The two clusters could represent either male and female or wild and domestic (options *a*/*b* or *c*, respectively, in Fig. 6), but the presence of both sexes in the upper cluster strongly supports the latter. (After Orton 2008)

Cross-References

- ▶ Geometric Morphometrics and Environmental Archaeology
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data
- ▶ von den Driesch, Angela
- ▶ Zooarchaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

References

Arbuckle, B.S., and C.A. Makarewicz. 2009. The early management of cattle (*Bos taurus*) in Neolithic central Anatolia. *Antiquity* 83: 669–686.

Davis, S.J.M. 1996. Measurements of a group of adult female Shetland sheep skeletons from a single flock: A baseline for zooarchaeologists. *Journal of Archaeological Science* 23: 593–612.

Davis, S.J.M. 2000. The effect of castration and age on the development of the Shetland sheep skeleton and a metric comparison between bones of males, females and castrates. *Journal of Archaeological Science* 27: 373–390.

Degerbøl, M., and B. Fredskild. 1970. The Urus (*Bos primigenius* Bojanus) and Neolithic domesticated cattle (*Bos taurus domesticus* Linne) in Denmark. *Det Kongelige Dansk Videnskabernes Selskab, Biologiski Skrifter* 17: 1–177.

Jones, A.K.G. 1991. The fish remains from excavations at Freswick Links, Caithness. Unpublished Ph.D. dissertation, University of York.

Klein, R.G., and K. Cruz-Uribe. 1983. The computation of ungulate age (mortality) profiles from dental crown heights. *Paleobiology* 9: 70–78.

May, E. 1985. Widerristhöhe und Langenknochenmaße bei Pferden – ein immer noch aktuelles Problem. *Zeitschrift für Säugetierkunde* 50: 368–382.

Meadow, R.H. 1981. Early animal domestication in South Asia: A first report of the faunal remains from Mehrgarh, Pakistan. In *South Asian archaeology 1979*, ed. H. Härtel, 143–179. Berlin: Dietrich Reiner Verlag.

Monchot, H., M. Mashkour, and J.-D. Vigne. 2005. Kernel smoothing and mixture analyses for the determination of the sex ratios at death, at the beginning of the domestication of ungulates. In *First steps of animal domestication: New archaeozoological approaches*, ed. J.-D. Vigne, J. Peters, and D. Helmer, 55–60. Oxford: Oxbow.

Morales, A., and K. Rosenlund. 1979. *Fish bone measurements: An attempt to standardize the measuring of fish bones from archaeological sites*. Copenhagen: Steenstrupia.

Moran, N.C., and T.P. O'Connor. 1994. Age attribution in domestic sheep by skeletal and dental maturation: A pilot study of available sources. *International Journal of Osteoarchaeology* 4: 267–285.

Orton, D.C. 2008. Beyond hunting and herding: Humans, animals, and the political economy of the Vinča period. Unpublished Ph.D. dissertation, University of Cambridge.

Popkin, P.R.W., P. Baker, F. Worley, S. Payne, and A. Hammon. 2012. The Sheep Project (1): Determining skeletal growth, timing of epiphyseal fusion and morphometric variation in unimproved Shetland sheep of known age, sex, castration status and nutrition. *Journal of Archaeological Science* 39: 1775–1792.

Twiss, K.C. 2008. An assessment of the archaeological applicability of faunal ageing methods based on dental wear. *International Journal of Osteoarchaeology* 18: 329–351.

Uerpmann, H.-P. 1979. *Probleme der Neolithisierung des Mittelmeerraums* (Beihefte zum Tübinger Atlas des Vordern Orients, Reihe A 27). Wiesbaden.
von den Driesch, A. 1976. *A guide to the measurement of animal bones from archaeological sites*. Cambridge, MA: Harvard University Peabody Museum.
Zeder, M.A. 2006. Reconciling rates of long bone fusion and tooth eruption and wear in sheep (*Ovis*) and goat (*Capra*). In *Recent advances in ageing and sexing animal bones*, ed. D. Ruscillo, 87–118. Oxford: Oxbow.
Zohary, D., E. Tchernov, and L.K. Horwitz. 1998. The role of unconscious selection in the domestication of sheep and goats. *Journal of Zoology* 245: 129–135.

Further Reading

Meadow, R.H. 1999. The use of size index scaling techniques for research on archaeozoological collections from the Middle East. In *Historia Animalium Ex Ossibus: Beiträge zur Palaoanatomie, Archäologie, Ägyptologie, Ethnologie, und Geschichte der Tiermedizin*, ed. J. Schibler, 285–300. Rahden: Verlag Marie Leidorf.
Payne, S., and G. Bull. 1988. Components of variation in measurements of pig bones and teeth, and the use of measurements to distinguish wild from domestic pig remains. *Archaeozoologia* 2: 27–66.

Biomolecular Archaeology: Definition

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Brief Definition of the Topic

Biomolecular archaeology, a subfield of archaeometry, is the study of ancient molecules (especially nucleic acids, proteins, lipids, and carbohydrates) produced by past living organisms, most often applied to identifying organic residues from archaeological sites and objects, recovering DNA from human tissues and skeletal remains, and studying genetic parameters of plant and animal domestication. Research seeks to understand the processes that result in the preservation of biomolecules as well as the ways in which biomolecules can be used to reconstruct paleoenvironments and, more broadly, assess human biological and cultural evolution. Analytical techniques derive principally from chemistry (e.g., mass spectroscopy, isotope analysis), evolutionary biology (e.g., PCR), and proteomics (e.g., immunoassay, decoding genomes), among other sources. Important syntheses of the field and applications are provided by Hedges and Sykes (1992), Evershed (2008), and Brown and Brown (2013). Analytical methods and research examples are covered in recent texts by Gaines et al. (2008) and Brown and Brown (2011). Since 2004, there has been a biennial International Symposium on Biomolecular Archaeology hosted at various institutions around the world.

Cross-References

▶ Archaeological Chemistry: Definition
▶ Archaeometry: Definition
▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology

References

Brown, T.A., and K.A. Brown. 2011. *Biomolecular archaeology: An introduction*. Malden: Wiley-Blackwell.
Brown, K.A., and T.A. Brown. 2013. Biomolecular archaeology. *Annual Review of Anthropology* 42: 159–174.
Evershed, R.P. 2008. Organic residue analysis in archaeology: The archaeological biomarker revolution. *Archaeometry* 6: 895–924.
Gaines, S.M., G. Eglinton, and J. Rullkotter. 2008. *Echoes of life: What fossil molecules reveal about earth history*. Oxford: Oxford University Press.
Hedges, R.E.M., and B.C. Sykes. 1992. Biomolecular archaeology: Past, present and future. *Proceedings of the British Academy* 77: 267–283.

Further Readings

Biers, W.R., and P.E. McGovern, eds. 1990. *Organic contents of ancient vessels: Materials analysis and archaeological investigation*. Philadelphia: University of Pennsylvania Press.
Brown, T.A., and K.A. Brown. 1992. Ancient DNA and the archaeologist. *Antiquity* 66: 10–23.
Evershed, R.P. 1993. Biomolecular archaeology and lipids. *World Archaeology* 25: 74–93.
Evershed, R.P. 1999. Lipids as carriers of anthropogenic signals from prehistory. *Philosophical Transactions of the Royal Socity B: Biological Sciences* 354 (1379): 19–31.

Lambert, J.B., and G. Grupe, eds. 1993. *Prehistoric human bone: Archaeology at the molecular level*. Berlin: Springer.

Oudemansa, T.F.M., and J.J. Boona. 1991. Molecular archaeology: Analysis of charred (food) remains from prehistoric pottery by pyrolysis – Gas chromatography/mass spectrometry. *Journal of Analytical and Applied Pyrolysis* 20: 197–227.

White, R., and H. Page, eds. 1992. *Organic residues in archaeology: Their identification and analysis*. London: United Kingdom Institute for Conservation, Archaeology Section.

Bird, Junius

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Basic Biographical Information

Junius Bird was born in 1907 in Rye, New York, and from an early age was attracted to both archaeology and maritime adventures. As a young man, he participated in several expeditions to the Arctic Ocean, starting in 1927 when he joined Bartlett's Arctic expedition. He entered the field of archaeology without academic training, but his field knowledge and capacity led him to a post as a field assistant at the American Museum of Natural History in New York. From that base, he participated in numerous archaeological expeditions to different regions of the Americas, especially in Canada, the United States, and Central America, particularly in Panama, Peru, and Chile. In time, he became the museum's head curator of South American archaeology. In 1932, he visited Navarino Island, north of Cape Horn, where he spent several months surveying the entire north shore, excavating a shell midden at Puerto Pescado. It was there that he began the systematic application of stratigraphic principles to archaeological research, and he became convinced of the possibilities for archaeological discoveries in Patagonia and Tierra del Fuego.

In 1934, Bird and his wife, Peggy, departed to South Chile for a period of two and half years to survey its channels. There, they explored the maze of southwestern channels by sailing for six months in a 19-foot sailboat. This was a dangerous trip through a sparsely populated and almost unknown area characterized by heavy rainfall and continuous storms. The trip was successful due to the discovery of many sites, mostly shell middens, and opened up a whole new region for archaeological research (Martinic 1984). Following this trip, Bird began the archaeological exploration of the Patagonian steppes, discovering important sites in Cañadón Leona and Pali Aike.

Major Accomplishments

Bird was the definitive fieldman, with the capacity to produce good results with minimal equipment. He was famous for traveling the dirt roads of the Patagonian steppes in a Model T Ford. He constructed his own dump sifters, perfecting them over time. During his coastal trips, he discovered shell middens in many places, some of which he placed chronologically by making meticulous geological observations. It must also be noted that Bird made several relevant and astute taphonomic observations about the process of accumulation of bones in caves. He was a keen observer of what we now call formation processes.

As a result of these trips, particularly those to South Chile, Bird discovered some of the earliest evidence of the presence of humans in the Americas. He discovered in the Pali Aike Volcanic Field some of the sites that would become classic references when discussing human interaction with extinct Pleistocene fauna in the Americas. Both at Pali Aike and the Fell Caves, he was able to recover ground sloth (*Mylodon darwinii*) and horse (*Hippidion saldiasi*) bones as well as abundant camelid (*Lama* sp.) bones associated with hearths and lithic and bone artifacts. The lithics discovered include the world-famous "fishtail" projectile points, a marker of the earliest Americans.

Junius Bird's interest in Patagonia continued until the end of his life. He returned several times to collect samples for specific analyses. For example, he was among the first archaeologists to use Willard Libby's discovery of the radiocarbon dating technique to date human occupations, and using this technique, he was able to place human arrival in southern South America at around 11,000 years BP. This is more or less the oldest age that can be defended today, some sixty years later, for the first human peopling. He also returned to excavate new sites. His last field work in Patagonia took place in 1980, when he excavated the Tom Gould site, a rich open-air site in Pali Aike (Massone 1989–1990).

Bird's publications constitute classic references not only for the archaeology of the early peopling of America (i.e., Bird 1938, 1946, 1988) but also for the history of human occupation at different places along the Pacific coasts of South America.

One important result of Bird's studies is that he constructed a cultural and chronological scheme for Patagonia that is still in use today (Martin et al. 2011). However, it must be emphasized that he never restricted the scope of his interest to Patagonia, and his excavations in North Chile and North Peru rank among the most important archaeological antecedents for modern archaeology in South America.

After a long and productive life, Junius Bird died in New York in 1982. The people who knew him noted his enthusiasm and skills in the field, as well as the clarity of his research goals. Junius Bird's great contributions to our present understanding of Patagonian archaeology cannot be exaggerated.

Cross-References

- ▶ Glacial Landscapes: Environmental Archaeology
- ▶ Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia

References

Bird, J. 1938. Antiquity and migrations of the early inhabitants of Patagonia. *Geographical Review* 28: 250–275.

Bird, J. 1946. The archaeology of Patagonia. In *Handbook of South American Indians, volume 1: The marginal tribes*, ed. J.H. Steward, 17–29. Washington (DC): Smithsonian Institution Press.

Bird, J. 1988. *Travels and archaeology in South Chile*. Iowa City: University of Iowa Press.

Martin, F.M., L.A. Borrero, and M. San Román. 2011. World of volcanoes. Core samples, lava tubes and other traps of information. In *Peuplements et préhistoire en Amériques*, ed. D. Vialou, 261–270. Paris: Éditions du Comité des Travaux Historiques et Scientifiques.

Martinic, M. 1984. Noticia histórica sobre una prospección arqueológica realizada por Junius Bird a lo largo de la costa nororiental del estrecho de Magallanes (1937). *Anales del Instituto de la Patagonia (Serie Ciencias Sociales)* 15: 43–45.

Massone, M. 1989–1990. Investigaciones arqueológicas en la Laguna Thomas Gould. *Anales del Instituto de la Patagonia* 19: 87–99.

Black Death: Cultures in Crisis

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Introduction

Between the years 1346 and 1353 CE, a terrible disease swept across Europe, the Middle East, and North Africa, bringing death and desolation in its wake. This widespread epidemic, now known as the "Black Death", caused dramatic losses, surpassing those of any large-scale disaster recorded before. In Europe, the disease killed an estimated 30–60% of the population over a 5-year period (Benedictow 2004). Its impact elsewhere in the Old World is not as well-known, but historical evidence suggests massive depopulation as well (Borsch 2014). By causing such a large demographic collapse, the Black Death initiated or enhanced major social, economic, and political

changes throughout Western Eurasia and Northern Africa (Horrox 1994; Borsch 2014). It also constituted the starting point of a period of high mortality, marked by recurrent outbreaks of the disease over the next four centuries (Biraben 1975). Due to its many effects on society and culture, the Black Death is generally considered as one of the most significant events of the late medieval world and as a turning point in European history.

Definition

The Black Death was the first and most devastating outbreak of the second plague pandemic, a major series of epidemics that took place between the mid-fourteenth and the late eighteenth centuries CE. It is noteworthy that the term is a recent coinage that seemingly came into use not before the eighteenth century. In medieval sources, the epidemic was referred to using various and more general terms, including *epidemia*, pestilence, great death, and great mortality. It is commonly, but inaccurately, said that the term "Black Death" originated in the petechial hemorrhages (dark spots of blood under the skin) that sometimes accompanied the disease. The name more likely comes from a mistranslation of the Latin expression *atra mors*, where *atra* may mean either "black" or "terrible" (Benedictow 2004).

The second plague pandemic, as well as the Justinian plague (i.e., the first plague pandemic of the sixth to eighth centuries CE), has long been considered to have been caused by the bacterium *Yersinia pestis*, i.e., the same etiological agent responsible for modern plague outbreaks. This gram-negative coccobacillus, which evolved from the closely related enterobacterium *Y. pseudotuberculosis*, is one of the most virulent pathogens known to humans. Humans, however, are only accidental hosts for the bacterium. Plague is primarily a disease of rodents (such as rats, marmots, and squirrels), which constitute permanent reservoirs for the bacterium. In modern-day epidemics, humans are most commonly infected by inoculation with the bacterium via the bites of fleas that had previously fed on infected animals (in particular, the rat flea *Xenopsylla cheopis*).

Plague can present in different clinical forms depending on the route of the infection. By far the most common is bubonic plague, in which *Y. pestis* bacteria spread to lymph nodes, where they multiply and give rise to enlarged purulent abscesses (the so-called buboes). Other symptoms of the disease include headaches, aching joints, nausea, and vomiting. Without antibiotic treatment, about 40–70% of those affected with the disease die in about a week after appearance of the first symptoms due to cardiotoxins released from the buboes. Although rare occurrences in modern outbreaks, the bacteria can also enter the blood stream or migrate to the lungs, leading to highly fatal forms of the disease (septicemic plague and pneumonic plague, respectively). Pneumonic plague is the only clinical form that has the ability to spread directly between humans, through inhalation of respiratory droplets from an infected individual.

A number of scholars have raised questions about whether or not the Black Death actually was an epidemic of plague, pointing to differences in mortality rate and epidemiology between the medieval epidemic and late nineteenth/early twentieth plague outbreaks. In recent years, however, ancient DNA (aDNA) analysis of skeletal remains of plague victims provided conclusive evidence that *Y. pestis* was the causative agent of the second pandemic, including the Black Death (Haensch et al. 2010; Spyrou et al. 2019). aDNA studies also confirmed its involvement in the first plague pandemic (Feldman et al. 2016) and revealed that the bacteria already caused human infections as early as 5,000 years ago, while acquiring its ability for flea-borne transmission only during the Bronze Age (Spyrou et al. 2018). That *Y. pestis* was responsible for the Black Death is thus no longer a subject of controversy. Nevertheless, the reasons why the disease spread so fast and was so deadly in the medieval period are still to be elucidated.

Historical Background

Origin and Spread

The exact geographic origin of the Black Death, as well as the route the disease followed prior to its entry into Europe, remains uncertain. Most historians agree that the epidemic began somewhere in Asia and traveled westward during the early fourteenth century, either via Silk Road merchants or via the Mongol army. An East Asia origin has been proposed based on genetic data, as modern *Y. pestis* strains that are directly ancestral to the lineage diversification that gave rise to the strains involved in the second plague pandemic have been identified in China near historical trade routes (Cui et al. 2013).

The first clear records of the Black Death place the disease in the Lower Volga and Black Sea regions in the mid-1340s. According to chronicler accounts, plague had been transferred to Europe from the Black Sea port of Caffa (modern Feodosia, Crimea), at that time a Genoese trading station. In 1345–1346, the Italian colony was besieged by troops of the Golden Horde (the Mongols who ruled over the steppes of southern Russia) who, after plague erupted in their ranks, allegedly infected the inhabitants by catapulting the bodies of victims over the city walls (Horrox 1994). Whether or not this story is accurate, the disease spread in the city, and the Genoese were forced to flee. Some ships managed to leave Caffa in the fall of 1347, passing through Constantinople (modern Istanbul) and stopping in Messina (Sicily) before returning to Genoa. By the end of the year, the disease raged in Constantinople, Greece, and most of the Mediterranean islands (Crete, Sicily, Sardinia) and reached Marseilles in France and Alexandria in Egypt. The epidemic then disseminated rapidly both northward across Western Europe and westward across North Africa. Within a year, plague spread across France, Italy, and Spain. By the end of 1349, it had colonized most of the British Isles and Germany. Continuing northeastward, plague infected Eastern Europe and the Low Countries in the next year, and reached the city of Moscow in 1352. In less than 5 years, the disease had spread everywhere, from Spain to the Urals and from Greece to Norway, sparing only a few regions.

After the Black Death, plague continued to rage in Europe and Northern Africa, as evidenced by the hundreds of recorded outbreaks for which it seems to have been responsible between 1353 and the late eighteenth century (Biraben 1975). While some studies have suggested that these later plague epidemics were caused by climate-driven reintroductions of the bacterium from reservoirs in Asia, genetic evidence currently favors its persistence in Europe in local rodent reservoirs (Spyrou et al. 2019).

Consequences of the Black Death

Although an accurate death toll is impossible to calculate in the absence of reliable demographic statistics, it is estimated that the Black Death killed one-third to over one-half of the European population. Faced with a disaster of such an unprecedented magnitude, many contemporaries of the epidemic considered that the disease was a punishment from God for the sinfulness of mankind (Horrox 1994). This belief led, at first, to increased demonstrations of popular piety in an attempt to appease God's wrath. Public processions and masses were organized in many communities across Europe, and the Church encouraged the faithful to various forms of penance, including devotion to saints, pilgrimage, and monetary offerings. In some parts of Europe, the Flagellants gained a large popularity, the members of this extreme penitential movement traveling from town to town and making bodily penance by scourging themselves in public. The ineffectiveness of any of these actions to stop the spread of the disease rapidly gave rise to other opinions and conspiracy myths, notably allegations that the plague had been caused by human agency (Horrox 1994). Accusations were leveled against virtually anyone viewed as an outsider, including foreigners, travelers, the poor, and lepers. But more than any others, the Jews were the most frequent scapegoats. Accused of causing the epidemic by poisoning wells and rivers, many Jews were harassed and expelled from communities, and thousands were massacred, particularly in Spain, southern France, and the Rhine valley.

At a loss to explain the cause of the Black Death, many people tried to escape the disease by fleeing from infected areas, abandoning their homes, villages, and cities. Others, who could not afford to flee, cloistered themselves away and avoided public venues for fear that the disease spread from person to person. The popular belief in contagion also led some people to refuse to care for the sick and to bury the dead, and these duties were often left in hands of the more charitable and the poor (Fig. 1). As a result of the excessive number of corpses accumulating, burial sometimes could no longer be carried out individually, and victims were buried anonymously in mass graves. In some cities, existing graveyards became saturated and mass burial grounds were established, as in London where two such cemeteries were opened at East and West Smithfield.

Beyond its immediate effects, the Black Death also had profound long-term consequences. The most obvious was a drastic population decline, which was long-lasting due to repeated outbreaks of plague in the following decades and centuries. Although not matching the mortality levels of the Black Death, these later epidemics resulted in demographic stagnation in Europe, and populations did not return to their pre-Black Death levels until the sixteenth century in France, Italy, and Spain, and not until the eighteenth century in England (Pamuk 2007). The massive depopulation caused a shortage of labor that ultimately resulted in an improvement in the standards of living for the working classes. While before the Black Death peasants had little latitude to negotiate wages, labor obligations, or rents, those who survived the epidemic were now able to bargain for more favorable terms of employment as the supply of land generally exceeded demand. Similarly, craftsmen and paid laborers were able to charge higher prices for their services and goods. It resulted in a dramatic increase of real wages for both peasants and urban workers, while prices for food and housing generally went down (Horrox 1994; Benedictow 2004). Governments quickly attempted to curtail these economic shifts by adopting laws to limit wages and the movement of workers. These laws were only

Black Death: Cultures in Crisis, Fig. 1 People burying victims of the Black Death in Tournai, Belgium. Miniature by Pierart dou Tielt illustrating the *Tractatus quartus* by Gilles Li Muisis (ms. 13,076–13,077 fol. 24v., Tournai, c. 1353)

partially successful, and they motivated social uprisings such as the 1381 Peasants' Revolt in England.

Overall, the Black Death resulted in a redistribution of wealth, a reduction in social inequalities, and an improvement in housing and diet for people of all social strata. It likely contributed to the end of the feudal system and diversification of the European economic culture (Horrox 1994). By reducing population size, the epidemic indeed offered the opportunity to use some lands for other purpose than raising food crops, which led to a progressive shift from grain farming to animal husbandry. Similarly, some of the grain mills could be repurposed and were used to saw wood, to full cloth, or to operate bellows. The high cost of labor also encouraged the development of laborsaving technologies and the rationalization of working procedures, with the aim of increasing productivity.

The Black Death and later plague outbreaks also had long-lasting cultural and psychological effects on the European population, which are particularly apparent in art and literature. The dreadful trauma of these epidemics instilled an atmosphere of gloom and doom in society, leading writers and painters to move away from optimistic themes and to turn to an obsession with the plague and death. The *Danse Macabre* ("Dance of Death"), in particular, became an increasingly common theme in art through the course of the fifteenth century, which emphasizes the fragility of life and unforeseeable nature of death.

Key Issues/Current Debates

A long-standing topic of interest to historians, the Black Death has also gradually become the focus of active archaeological research in recent decades. Various approaches and methods from a wide range of subdisciplines have been used to attempt to detect physical evidence of the epidemic in the archaeological record, with the ultimate objective to confirm or refute claims about the effects of plague inferred from documentary sources. Possible archaeological evidence of the mass mortality caused by the Black Death and its social outcomes include mass graves, the abandonment or reduction in size of settlements, aborted building projects, and a decrease in goods production. To establish causal relationships between the epidemic and such archaeological findings is challenging as any one of them could potentially result from causes other than plague. In addition, some of these features are difficult to identify, and none is as common as could be expected, suggesting a great diversity of human responses to the Black Death and necessitating the use of multiple lines of evidence to reach informed interpretations.

Archaeological Evidence of Population Decline and Economic Disruption

Landscape archaeology was the first branch of archaeology to provide a significant contribution to the scholarly study of the Black Death, through studies on deserted medieval villages (Fig. 2), which boomed in the 1950s, notably in England. Before these investigations, many deserted villages were thought to have been abandoned due to the depopulation caused by the Black Death and their subsequent failure to recover. Archaeological excavation and chronological characterization of a number of such settlements dismissed this hypothesis, showing that most investigated villages were not abandoned until the fifteenth century or later, when fields used for crops were transformed into pastures (Beresford and Hurst 1971). These results led to changed perceptions of the impact of the Black Death on rural communities and suggested that most of them were resilient when faced with the epidemic. This does not mean, however, that villages as well as cities were not severely affected by population losses. In recent years, the mass mortality associated with the Black Death was persuasively demonstrated through a program of intensive test pitting carried out on over 50 settlements from eastern England (Lewis 2016). Using frequency and spatial distributions of pottery sherds as a proxy of human presence, this study revealed population decline at all sites and frequent contraction of the settlements in the 150-year period that followed the epidemic when compared with the 150-year period that preceded it. While variable from one

Black Death: Cultures in Crisis, Fig. 2 Example of a deserted medieval village at Hound Tor in Devon, England. (Photo from Google Earth)

site to another, the decline in the number of pottery sherds was on average 45% across the region, with severe reductions recorded in both small villages and towns, as well as in both nucleated and more dispersed settlements, thus suggesting widespread depopulation.

The economic consequences of the Black Death are difficult to evaluate based on archaeological features and artifacts alone. However, archaeological and earth sciences may provide indirect evidence of some of them. For example, analysis of ice core samples from an Alpine glacier revealed a dramatic drop in atmospheric lead levels concomitant with the Black Death, suggesting a sudden cessation of metallurgical production during the epidemic (More et al. 2017). Paleoecological reconstructions of vegetation in northwestern Europe from pollen diagrams show significant changes in land use during the late medieval period, some of which may have been initiated or hastened by the Black Death. While the identified decline in cereal production probably began in Britain and France before the epidemic, the increase in forest cover in the second half of the fourteenth century may be the direct consequence of abandonment of farmlands and grazing lands due to a shortage of farmers (Yeloff and Van Geel 2007). Similarly, a large-scale analysis of dendrochronologically dated European wooden constructions and comparison with annual records of plague epidemics revealed a correlation between building activity and the number of plague outbreaks, with the greatest decrease in construction occurring in the years following the larger epidemics (Charpentier Ljungqvist et al. 2018).

Burial Evidence of Mass Mortality

It is a common assumption that, due to brutal decimation of communities caused by the mid-fourteenth plague outbreak, burial traditions were strongly disrupted, and many victims were buried in mass graves. Multiple burials, therefore, are generally considered as the most reliable physical evidence on which to infer the possible relationship of a burial ground with the Black Death.

It is noteworthy, however, that not all victims of the epidemic were buried in mass graves and that a large, albeit unquantifiable proportion of them were interred in individual graves that are generally indistinguishable from those used under conditions of normal mortality. This means, in turn, that certain sites of interment for plague victims may contain mainly, if not uniquely, individual graves, making them much more difficult to identify in the archaeological record.

Multiple burials are easily detectable through archaeological excavation (Fig. 3), as far as appropriate excavation and recording methods are used, in particular careful observations of the spatial arrangement of the skeletal elements to distinguish them from collective graves (i.e., places where several bodies were deposited successively over time). It is challenging, however, to establish the relationship of a mass grave with the Black Death, as plague does not produce

Black Death: Cultures in Crisis, Fig. 3 Multiple burials from Black Death sites at Toulouse (**a**) and Saint-Laurent-de-la-Cabrerisse (**b**) and from late sixteenth century plague cemeteries at Les Fédons (**c**) and Dendermonde (**d**). (Images courtesy of M. Gourvennec (Archeodunum), A. Gaillard (Acter Archéologie), D. Castex (CNRS – PACEA), and E. Goudie Falckenbach (Antea Group), respectively)

lesions on bones and thus cannot be diagnosed based on visual, macroscopic, or radiological examination of skeletal remains. Both historic documents and dating information may be instructive, but they are rarely precise enough to link a specific burial site with a specific mass mortality event. Analysis of the age distribution of the skeletal assemblage may also be informative, as plague was shown to have a specific demographic signature, which can be recognized across space and time (Castex and Kacki 2016). A secure diagnosis of plague, however, can be achieved only through biomolecular analysis of the victim remains. Over the past two decades, both paleogenetic approaches (e.g., Haensch et al. 2010) and paleoimmunological techniques (e.g., Kacki et al. 2011) have successfully been applied for the retrospective diagnosis of the disease. In recent years, newly introduced paleogenomic methods have produced groundbreaking results, permitting not only the detection of plague-specific aDNA sequences but also the reconstruction of the whole genome of ancient strains of *Y. pestis*, thus opening the possibility of tracking genetic changes in the bacterium over centuries. These studies have produced compelling evidence for low genetic diversity and absence of mutations that account for increased virulence in the *Y. pestis* strains associated with the Black Death (Spyrou et al. 2019).

So far, archaeological excavations and subsequent molecular analyses of skeletal remains have made it possible to identify some 50 European burial sites related, wholly or in part, to the second plague pandemic, most of them in England, France, Germany, and Italy (Fig. 4). Among them, 16 can be confidently attributed to the Black Death, while the others are related to later plague outbreaks up to the eighteenth century. Burial patterns observed at these sites reveal a great diversity in the way the communities responded behaviorally to plague mortality, and progressive changes in funerary practices over the

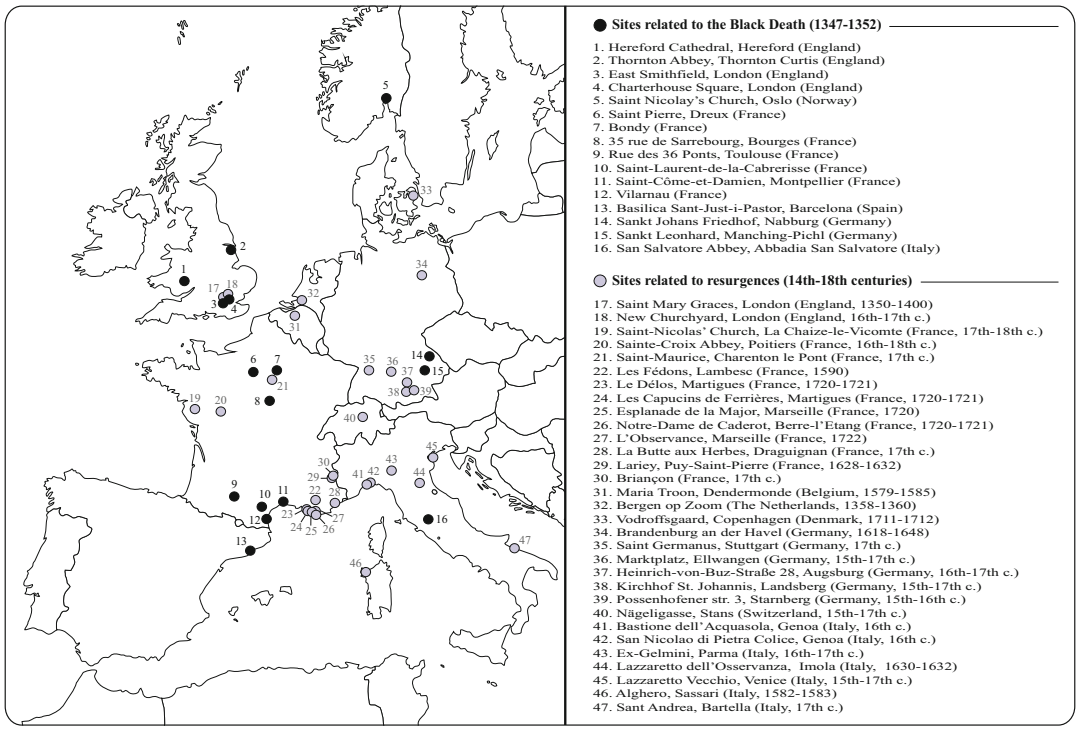

Black Death: Cultures in Crisis, Fig. 4 Location map of European archaeological sites from which the graves of second pandemic (fourteenth to eighteenth century CE) plague victims have been excavated

course of the second pandemic (Kacki et al. 2019). They suggest that during the Black Death people generally attempted to adhere closely to traditional burial customs. With the exception of a few burial grounds created especially for plague victims, such as the East Smithfield cemetery in London, most of the victims were buried in graveyards that were previously in use before the epidemic. Contrary to frequent assumptions, the deceased, although sometimes put in mass graves, were treated with great care, most of them being placed in the graves in an extended supine position, oriented east to west, with their heads to the west as in most Christian burials. During later plague outbreaks, burial practices underwent noticeable changes. Most of the victims were then buried in dedicated cemeteries, and their skeletons show more heterogeneous orientations and more random positions (e.g., prone positions, head-to-foot arrangements). Archaeological evidence also reveals that from the seventeenth century onward, most bodies were covered in lime, while this practice was unusual in earlier centuries.

Bioarchaeological Research on the Black Death

Skeletal remains derived from plague pits, which constitute the only direct evidence of whom the victims were, have become the focus of increasing interest in bioarchaeology over the past 20 years. Their analysis may provide insight into the patterns of mortality associated with the disease (as inferred from the demographic composition of plague assemblages) and on the variations in individual risk of death with respect to various biological factors (e.g., pre-existing health status, dietary status). By this means, bioarchaeology contributes to revealing the epidemiological patterns of plague in past societies and to evaluating how its impact differed depending on environmental, socioeconomic, and/or behavioral factors.

A large part of the bioarchaeological research on the Black Death has centered on the 1348/1349 East Smithfield cemetery in London. The multiple paleodemographic studies conducted on this site resulted in mixed results, some concluding that the epidemic affected all age groups equally (Gowland and Chamberlain 2005), while others highlighted similarities between this skeletal sample and attritional assemblages, which were interpreted as an evidence that the Black Death killed discriminately with respect to age (DeWitte 2010). The major limitation with these studies is that all relied on the examination of a single site, making their conclusions difficult to generalize to explain epidemiological patterns of plague. In recent years, comparative analysis of various European skeletal assemblages associated with the Black Death and later plague outbreaks have produced results in favor of the non-selective nature of the disease, by revealing a similar pattern of mortality across these various sites, which fits with the expected age composition of a living population (Castex and Kacki 2016; Kacki 2017). In neither of these studies, sex was shown to strongly affect the risk of death.

In addition, a few studies have used paleopathological data to evaluate whether those individuals in poor health were more likely to die during the Black Death. Specifically, DeWitte's pioneering analysis of the East Smithfield assemblage has shown that people who developed skeletal stress markers earlier in life were more likely to die during the Black Death than those without lesions, thus supporting the hypothesis that *Y. pestis* infection was selective with respect to pre-existing health (DeWitte and Wood 2008). This conclusion is challenged, however, by the results of the study of four other plague burial grounds, which failed to demonstrate any significant difference in the risk of dying from the disease between individuals with and without skeletal lesions (Kacki 2017). The reason why these two studies differ in their conclusions is still to be elucidated, but this might lie either in temporal and/or spatial variation in the patterns of selectivity of plague or in methodological differences resulting in biased interpretations. In any case, further investigation on other large plague assemblages and consideration of other proxies for health (e.g., skeletal growth patterns, dietary status) will be needed to more confidently assess the influence of pre-existing health on the risk of dying from plague.

International Perspectives

Much of the archaeological research on the Black Death has thus far focused on the Western Europe. England, in particular, has been central to the work of many scholars, whether they are interested in the social consequences of the plague-driven depopulation or in the mortality patterns associated with the disease. Bioarchaeological research on plague victims from the British Isles, for a long time restricted to studies on the East Smithfield cemetery, has been expanded in recent years to other burial assemblages, giving rise to interdisciplinary programs such as the *After the Plague* project (http://www.aftertheplague.com/). There is also a long tradition of research on past epidemics in France, notably with respect to the study of plague pits and the skeletons they contain. Although much work was done on burial grounds linked with early modern plague outbreaks (e.g., the 1720 Great Plague of Marseille), recent discoveries and investigations provided more data on the Black Death, which is now at the center of various scientific projects, such as the French National Research Agency's MORTUI research program.

Until recently, little attention has been paid to the possible physical evidence of the Black Death in other parts of the Old World. Such evidence are, for now, virtually absent from the Asian archaeological record, and they are limited in Eastern Europe to the identification of *Y. pestis* aDNA in a few fourteenth-century skeletons from the Volga region of Russia (Spyrou et al. 2019). A few studies have lately tackled the question of plague outbreaks in Africa based on the examination of archaeological evidence suggestive of population decline. These studies revealed changes in settlement patterns in late fourteenth-century sub-Saharan Africa, a result considered as strongly supporting the still-debated hypothesis that the Black Death reached this region of the continent (Chouin 2018). However, other evidence for the disease, such as that for increased mortality and/or molecular detection of the bacterium in skeletal remains, is still lacking. Acquiring such evidence will be far more challenging than it has been for Europe, considering both the scarcity of mass graves in the archaeological record of medieval Africa and the generally poor preservation of aDNA in warm, tropical areas.

Future Directions

Over the past decades, archaeological research has contributed to improve perceptions of the demographic impact of the Black Death and its consequences on medieval societies. However, the research conducted so far is clearly biased toward Western Europe. To draw a broader picture of the epidemic and its aftereffects will require future research that transcends European borders and produces more data for Asia and Africa. In this regard, analysis of settlement patterns in various parts of these continents will be important to assess possible changes in population density during the fourteenth century. Definite inferences about the geographical spread of the disease, however, will require molecular detection of *Y. pestis* aDNA from skeletal remains exhumed from these regions. Careful archaeological excavations focused on identifying deviant burial practices, along with improved paleomicrobiological techniques, will undoubtedly increase the chances of gaining such evidence in the future.

A better assessment of the depopulation caused by the Black Death, both in Europe and beyond, could probably be achieved through the generalization of quantitative studies such as those conducted on pottery sherds in England (Lewis 2016). Be it by a test pit approach or through the analysis of archaeological finds recovered from extensive excavations, comparison of the amount of material remains from the pre- and post-Black Death periods will likely permit a more subtle quantification of the diverse impact of the epidemic in various localities and regions. In addition to ceramic remains, this approach would benefit from including other types of archaeological material, such as small metal finds or faunal remains related to animal consumption.

In order to gain a more globalized understanding of the origins and impact of the Black Death, it would be desirable that future research include more environmental studies. Such studies can

inform how climate may have affected the development of the epidemic, as well as the impact of population size reduction on the environment. Ice core analysis and dendroclimatology are both promising in this area.

The scientific study of skeletal remains of plague victims is probably the area with the most potential for future research. Bioarchaeological studies have already produced insightful results on the mortality patterns associated with plague epidemics, but the studies performed to date do not provide definitive conclusions about the epidemiology of the disease across the course of the second pandemic. In the absence of mutations accountable for higher virulence in ancient strains of *Y. pestis* (Spyrou et al. 2019), the factors that made the Black Death so deadly are still to be fully characterized, as are the reasons why the mortality rates decreased in later plague outbreaks. Future studies should address these questions, by expanding anthropological analysis to samples from different areas and time periods to track geographic and temporal differences in plague mortality patterns by age, sex, pre-existing health condition, and other biological factors. If differences are found, they will provide greater insight on how environmental and socioeconomic background influenced the mortality associated with the disease. Archaeogenetic research on both the bacterial strains and human hosts will also be fundamental in reconstructing disease dynamics. Analysis of a growing number of ancient *Y. pestis* strains will permit a detailed reconstruction of phylogenetic history of the bacteria, and help to refine scenarios about the spread of the disease in the various regions of the Old World. On the other hand, comparison of the genomes of Black Death victims with those of post-Black Death individuals has the potential to reveal if host genetic factors played a role in the immune competence of medieval populations and in the overall mortality level during the Black Death.

In addition to improving understanding of the factors acting upon plague epidemiology, bioarchaeological research can provide evidence for the aftereffects of the Black Death on living conditions, health, and life expectancy in medieval populations. Temporal trends in health and survival may be revealed by comparison of pre- and post-Black Death skeletal samples from the same site or locality, but few anthropological studies have investigated this question so far. The results of these studies suggest that both survivorship and health improved in the London population in the aftermath of the epidemic (DeWitte 2018). Further investigations on other burial sites, from distinct geographical backgrounds, are now needed to assess if similar improvements in living standards also occurred in other cities and in the countryside, in England and elsewhere. Future research would be enhanced by including stable isotope analysis to provide direct measurements of changes in diet between the pre- and post-epidemic periods. Combined with molecular data on the gene pool of the survivors, this approach could ultimately reveal how the Black Death shaped the biological characteristics of late medieval European populations.

Cross-References

- ▶ Bioarchaeology: Definition
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Extreme Environments in Archaeology: Disaster
- ▶ Human Remains: Historic Cemeteries
- ▶ Medieval Archaeology
- ▶ Palaeopathology: The Study of Ancient Disease in Archaeological Human and Nonhuman Remains

References

Benedictow, O.J. 2004. *The Black Death, 1346–1353: The complete history*. Woodbridge: Boydell Press.

Beresford, M., and J. Hurst. 1971. *Deserted medieval villages*. Leicester: Lutterworth.

Biraben, J.-N. 1975. *Les Hommes et la peste en France et dans les pays européens et méditerranéens. I – La peste dans l'histoire*. Paris: Mouton.

Borsch, S. 2014. Plague depopulation and irrigation decay in Medieval Egypt. *The Medieval Globe* 1: 125–156.

Castex, D., and S. Kacki. 2016. Demographic patterns distinctive of epidemic cemeteries in archaeological

samples. *Microbiology Spectrum* 4. https://doi.org/10.1128/microbiolspec.PoH-0015-2015.

Charpentier Ljungqvist, F., W. Tegel, P.J. Krusic, A. Seim, F.M. Gschwind, K. Haneca, F. Herzig, K.-U. Heussner, J. Hofmann, D. Houbrechts, R. Kontic, T. Kyncl, H.H. Leuschner, K. Nicolussi, C. Perrault, K. Pfeifer, M. Schmidhalter, M. Seifert, F. Walder, T. Westphal, and U. Büntgen. 2018. Linking European building activity with plague history. *Journal of Archaeological Science* 98: 81–92.

Chouin, G. 2018. Reflections on plague in African history (14th–19th c.). *Afriques. Débats, méthodes et terrains d' histoire* 9: 2228.

Cui, Y., C. Yu, Y. Yan, D. Li, Y. Li, T. Jombart, L.A. Weinertd, Z. Wang, Z. Guo, L. Xu, X. Zhang, H. Zheng, N. Qin, X. Xiao, M. Wu, X. Wang, D. Zhou, Z. Qi, Z. Dua, H. Wu, X. Yang, H. Cao, H. Wang, J. Wang, S. Yao, A. Rakin, Y. Li, D. Falush, F. Balloux, M. Achtman, Y. Song, J. Wang, and Y. Zhang. 2013. Historical variations in mutation rate in an epidemic pathogen, *Yersinia pestis*. *Proceedings of the National Academy of Sciences* 110: 577–582.

DeWitte, S.N. 2010. Age patterns of mortality during the Black Death in London, AD 1349–1350. *Journal of Archaeological Science* 37: 3394–3400.

DeWitte, S.N. 2018. Stress, sex, and plague: Patterns of developmental stress and survival in pre-and post-Black Death London. *American Journal of Human Biology* 30: e23073.

DeWitte, S.N., and J.W. Wood. 2008. Selectivity of Black Death mortality with respect to preexisting health. *Proceedings of the National Academy of Sciences* 105: 1436–1441.

Feldman, M., M. Harbeck, M. Keller, M.A. Spyrou, A. Rott, B. Trautmann, B. Trautmann, H.C. Scholz, B. Päffgen, J. Peters, M. McCormick, K. Bos, A. Herbig, and J. Krause. 2016. A high-coverage *Yersinia pestis* genome from a 6th-century Justinianic plague victim. *Molecular Biology and Evolution* 33: 2911–2923.

Gowland, R.L., and A.T. Chamberlain. 2005. Detecting plague: Palaeodemographic characterisation of a catastrophic death assemblage. *Antiquity* 79: 146–157.

Haensch, S., R. Bianucci, M. Signoli, M. Rajerison, M. Schultz, S. Kacki, M. Vermunt, D.A. Weston, D. Hurst, M. Achtman, E. Carniel, and B. Bramanti. 2010. Distinct clones of *Yersinia pestis* caused the Black Death. *PLoS Pathogens* 6: e1001134.

Horrox, R. 1994. *The Black Death*. Manchester: Manchester University Press.

Kacki, S. 2017. Influence de l'état sanitaire des populations du passé sur la mortalité en temps de peste: Contribution à la paléoépidémiologie. *Bulletins et Mémoires de la Société d'Anthropologie de Paris* 29: 202–212.

Kacki, S., L. Rahalison, M. Rajerison, E. Ferroglio, and R. Bianucci. 2011. Black Death in the rural cemetery of Saint-Laurent-de-la-Cabrerisse (Aude-Languedoc, southern France, 14th century): Immunological evidence. *Journal of Archaeological Science* 38: 581–587.

Kacki, S., S. Tzortzis, D. Castex, and M. Signoli. 2019. Prévention, prophylaxie, pratiques médicales et gestion sanitaire au cours de la deuxième pandémie pesteuse. In *Archéologie de la santé, anthropologie du soin*, ed. A. Froment and H. Guy, 119–133. Paris: La Découverte/Inrap.

Lewis, C. 2016. Disaster recovery: New archaeological evidence for the long-term impact of the 'calamitous' fourteenth century. *Antiquity* 90: 777–797.

More, A.F., N.E. Spaulding, P. Bohleber, M.J. Handley, H. Hoffmann, E.V. Korotkikh, A.V. Kurbatov, C.P. Loveluck, S.B. Sneed, M. McCormick, and P.A. Mayewsk. 2017. Next-generation ice core technology reveals true minimum natural levels of lead (Pb) in the atmosphere: Insights from the Black Death. *GeoHealth* 1: 211–219.

Pamuk, Ş. 2007. The Black Death and the origins of the 'great divergence' across Europe, 1300–1600. *European Review of Economic History* 11: 289–317.

Spyrou, M.A., R.I. Tukhbatova, C.-C. Wang, A. Andrades Valtueña, A.K. Lankapalli, V.V. Kondrashin, V.A. Tsybin, A. Khokhlov, D. Kühnert, A. Herbig, K.I. Bos, and J. Krause. 2018. Analysis of 3800-year-old *Yersinia pestis* genomes suggests Bronze Age origin for bubonic plague. *Nature Communications* 9: 2234.

Spyrou, M.A., M. Keller, R. Tukhbatova, C.L. Scheib, E. Nelson, A. Andrades Valtueña, G. Neumann, D. Walker, A. Alterauge, N. Carty, C. Cessford, H. Fetz, M. Gourvennec, R. Hartle, M. Henderson, K. Von Heyking, S.A. Inskip, S. Kacki, F.M. Key, E.L. Knox, C. Later, P. Maheshwari-Aplin, J. Peters, J.E. Robb, J. Schreiber, T. Kivisild, D. Castex, S. Lösch, M. Harbeck, A. Herbig, K.I. Bos, and J. Krause. 2019. Phylogeography of the second plague pandemic revealed through analysis of historical *Yersinia pestis* genomes. *Nature Communications* 10: 4470.

Yeloff, D., and B. Van Geel. 2007. Abandonment of farmland and vegetation succession following the Eurasian plague pandemic of AD 1347–52. *Journal of Biogeography* 34 (4): 575–582.

Further Reading

Bos, K.I., V.J. Schuenemann, G.B. Golding, H.A. Burbano, N. Waglechner, B.K. Coombes, J.B. McPhee, S.N. DeWitte, M. Meyer, S. Schmedes, J. Wood, D.J.D. Earn, D.A. Herring, P. Bauer, H.N. Poinar, and J. Krause. 2011. A draft genome of *Yersinia pestis* from victims of the Black Death. *Nature* 478: 506–510.

Byrne, J.P. 2004. *The Black Death*. Westport: Greenwood Press.

Campbell, B.M.S. 2016. *The great transition*. Cambridge: Cambirdge University Press.

Castex, D. 2008. Identification and interpretation of historical cemeteries linked to epidemics. In *Paleomicrobiology: Past human infections*, ed. D. Raoult and M. Drancourt, 23–48. Berlin: Springer.

Colet, A., J.X. Muntané i Santiveri, J. Ruíz Ventura, O. Saula, M.E. Subirà de Galdàcano, and C. Jáuregui.

2014. The Black Death and its consequences for the Jewish community in Tàrrega: Lessons from history and archeology. *The Medieval Globe* 1: 63–96.
Dols, M.W. 1977. *The Black Death in the Middle East*. Princeton: Princeton University Press.
Gottfried, R.S. 1983. *The Black Death: Natural and human disaster in medieval Europe*. New York: The Free Press.
Green, M.H. 2014. *Pandemic disease in the medieval world: Rethinking the Black Death*. Kalamazoo: ARC Medieval Press.
Herlihy, D. 1997. *The Black Death and the transformation of the West*. Cambridge: Harvard University Press.
Lagerås, P. 2016. *Environment, society and the Black Death*. Oxford: Oxbow Books.
Margerison, B.J., and C.J. Knüsel. 2002. A comparison of attritional and catastrophic cemeteries: The palaeodemography of the medieval plague cemetery at the Mint Site, London. *American Journal of Physical Anthropology* 119: 134–143.
Pollitzer, R. 1954. *Plague*. Geneva: World Health Organization.
Schmid, B.V., U. Büntgen, W.R. Easterday, C. Ginzler, L. Walløe, B. Bramanti, and N.C. Stenseth. 2015. Climate-driven introduction of the Black Death and successive plague reintroductions into Europe. *Proceedings of the National Academy of Sciences* 112: 3020–3025.
Signoli, M., I. Séguy, J.-N. Biraben, and O. Dutour. 2002. Paleodemography and historical demography in the context of an epidemic: Plague in Provence in the eighteenth century. *Population* 57: 829–854.
Spyrou, M.A., R.I. Tukhbatova, M. Feldman, J. Drath, S. Kacki, J. Beltran de Heredia, S. Arnold, A.G. Sitdikov, D. Castex, J. Wahl, I.R. Gazimzyanov, D.K. Nurgaliev, A. Herbig, K.I. Bos, and J. Krause. 2016. Historical *Y. pestis* genomes reveal the European Black Death as the source of ancient and modern plague pandemics. *Cell Host & Microbe* 19: 874–881.

The Black Sea

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Introduction

Since the end of the nineteenth century until now, a significant amount of information has been accumulated about the port system of the West Pontic coast. Nevertheless, the complex interdisciplinary approach which contributes to the full and qualitative clarification of the cultural and historical development of the present Bulgarian coasts and their immediate hinterland is not yet fully implemented. The issue of the nature, functions, and external view of the antique and ancient port basins of the Western Black Sea coast has been practically ignored.

To properly understand historical events, it is not enough to only know what happened and when it happened but also where it happened and how the particularities of a given place have affected the course of the event. It is necessary to know not only the person and how he had lived but also the environment where he was active, in other words in what conditions he had lived through different historical periods and in different places. It is necessary to study the geological, climatic, and other physic-geographic features, the flora and fauna of a given place at the moment, and the changes that have occurred there in the past. Otherwise stated, the archeology of the environment or geo-archeology makes us familiar to the history of people's attitude toward the Earth and to the subject of interest – to the matter of the attitude of the coastal population to the sea in general.

Moreover, there is no reason the coastline be considered only as a stretch of land and, respectively, the shelf only as part of the seafloor relief. It is necessary to take into account the fact that throughout all their historical development, these genetically related territories have been dewatered and inundated repeatedly. Therefore, the overriding task here is to clarify the natural conditions over the centuries and their impact on the port system and, on the other part, on the ancient navigation and trade.

Geography

The Black Sea (Fig. 1) covers an area of 466,200 km^2, while its catchment basin's area is of 1,874,904 km^2, of which 0.817 million km^2 belong to Danube River, representing 43.57% of the total. The total length of Black Sea catchment area's watersheds is of 11,200 km, of which 8650 km is on European territory. The Black Sea basin length between Burgas, Bulgaria, and Poti,

The Black Sea, Fig. 1 Map of the Black Sea. (Source: Google Earth Pro)

Georgia, is of 1200 km, while the maximum width is of 610 km and reached the Western part of the basin, between Oceanov, Ukraine, and Eregli Cape, Turkey. The average width is 367.82 km. The maximum depth of the Black Sea is 2245 m, according to the first Russian expedition data. Recent measurements identified a maximum depth of only 2212 m (Vespremeanu and Golumbeanu 2018: 27–47).

In the Holocene Epoch, changes in natural environment on the Black Sea basin varied from region to region. Therefore, the complete paleogeographic reconstruction of the terrain, including the coastline, needs data from different fields of knowledge – geology, geomorphology, paleoclimate, and archeology. Data obtained from underwater surveys are of particular importance for this study.

The development of the relief in the littoral zone is a result of the complex interaction of endogenous (internal) and exogenous (external) factors. Vertical movements of the lithosphere and the hydrosphere can be unidirectional or with a different sign. A number of coasts are characterized by slow positive or negative tectonic movements influenced by sea level fluctuations which are conditioned by climate change, water balance, the impact of gravitational interaction, intense sedimentation, and geoidal eustasy.

Changes in climate cause global cyclic periods of cold and warmth that have a significant effect on the sea level, which in the ages of maximum glaciations has dropped to 100–500 m below the present level. There are a number of hypothesis trying to explain climate changes as a result of solar radiation oscillations during astronomical cycles, self-oscillations due to the development of glaciers, self-oscillations due to decrease and increase of plant biomass, migration of geographic and magnetic poles, and changes in the composition of the atmosphere. It should be noted that the littoral zone during the Holocene was mainly controlled by eustatic fluctuations of the sea level complicated by tectonic movements as this factor has been manifested regionally.

Geology, Paleogeography, and Black Sea Level During the Holocene

The Black Sea is a unique water body with very specific features and characteristics that distinguish it from other sea basins. Even the origin is not fully understood by geological point of view. Till the end of the 1970s, the geological history of the Black Sea is considered by positions of fixistic ideas of the Russian Earth Science School. Since the early 1980s, attempts have been made to apply the new plate tectonics.

It is considered that the Black Sea depression was formed after the Cretaceous period not earlier than 65 million years ago. The Mesozoic surface of the Western Black Sea bed goes beyond its modern boundaries and continues in the Babadag Cretaceous decrease in Northern Dobrudzha, Romania, as well as in the Lower Kamchiya and the Bourgas decrease in Bulgaria. The central structure of the region is the Black Sea Plain, which is considered to be one of the many tectonic depressions of the ancient Tethys Ocean (Hristova 2016).

From the Middle Miocene to present time, the Black Sea depression has developed as a single structure, but the thickness of Miocene sediments in the Western Black Sea trough is twice as low as the Eastern Black Sea, where the thickness is 2 km. The Neogene and Quaternary deposits occur horizontally in the central part of the Black Sea as they blend to the land. During the Pleistocene-Quaternary, the sinking of the seabed continued, and the sediment thickness is greatest in the northwestern part of the Western Black Sea trough, where it reached 3 km (Hristova 2016).

The interest in the Holocene changes at the level of the World Ocean is determined by the impact they cause on the human existence and its socioeconomic development. Although that in terms of the Black Sea region a significant number of publications have been devoted to this problem, the lack of relation of the results obtained for the Black Sea and these of the Mediterranean Sea is noteworthy. The interdisciplinary approach used to solve the problem suggested the involvement of geological, geomorphological, archeological, and historical methods, data, and information. To this end, a thorough analysis of the existing literature, including the latest data from deep-sea studies, has been made.

In recent decades, archeologists, historians, geologists, and geographers are increasingly paying attention to the fluctuations of the Black Sea level. This interest is dictated by the aspirations to satisfactorily explain one or another event or phenomenon related to the geological or human history along the Black Sea shores. In most studies, an attempt was made to include archeological materials to prove a hypothesis or claim. Undoubtedly, archeological data is one of the most reliable and undisputable evidence of changes in the contours of the coastline.

Climate changes cause planetary cycling of warm and cold spells that affect the sea level. However, during the Holocene, the littoral zone was mainly controlled by eustatic sea fluctuations. In the Quaternary (the last two million years), the connection of the Black Sea with the Mediterranean and the Caspian Sea has been periodically cut off and restored which has led to a change in the salinity of the basin and alteration of the halophilic Mediterranean molluscan fauna with the euryhaline Caspian brackish-water one and vice versa. In the transgressive phases of the Caspian Sea, there was a one-sided outflow from the Caspian to the Black, Marmara, and Mediterranean seas, thus forming a peculiar cascade of seas occurring in the conditions of the low level of the World Ocean and the Mediterranean Sea during the glaciations. During the interglacial optimum, a maximum transgression of the World Ocean and flowing of Mediterranean water through the Dardanelles, the Marmara Sea and the Bosphorus into the Black Sea has occurred. The Black Sea transgressions were synchronous with those of the World Ocean because then the connection between them was restored.

During the Würm III glaciation (25,000–17,000 cal. years BP), the New Euxinian stage of the Black Sea geological history came, when the level of the World Ocean dropped to 120 m below the present level. On the place of the Black Sea, the New Euxine lake-sea

was formed. Brackish-water molluscan communities, psychrophilic and freshwater Diatomeae and Dinoflagellata, developing in low salinity and low temperatures were predominant there. The modern continental shelf and the Azov Sea were occupied by extensive alluvial valleys. The littoral zone of this lake-sea was marked by a series of accumulative shoreline or barrier banks – sandbar type, located at depths of 20–120 m below the modern sea level (Fig. 2). Littoral sediment deposits of thickness from a few centimeters to 1 m were discovered. Shellfish aleurite and marl New Euxinian deposits contain a characteristic molluscan fauna among which the *Dreissena rostriformis distincta* (75%) species is predominant.

At that time, the connection between the Black Sea and the Caspian Sea took place through the Manych Strait, which existed until the end of the Pleistocene in the place of the present Manych Depression. The transgressions of the Black Sea and the Caspian Sea were opposite in phases due to the isolation of the Caspian Sea from the World Ocean. Unlike the Black Sea, during a climatic optimum, the level of the Caspian Sea was higher than the Black Sea because meltwater of the Peri-Caspian Depression drained there (Chepalyga 2005).

In the central shelf zone, New Euxinian deposits differ significantly both in thickness and composition. They are presented by gray soft-plastic aleurite loam with shellfish and shellfish detritus. In the sections, a molluscan community of poor species composition is established: *Dreissena polymorpha Pall* (over 50%), *Clesiniola variabilis Eichw,* etc. Their thickness reaches 20 m. The distribution of the New Euxinian deposits of the shelf reaches to isobaths of 28–30 m.

The New Euxinian regression covers the time interval from 30000 to 8000 cal. ago. The level of the then low-saline freshwater lake reached up to 100–115 m below the present level. The geophysical image shows a vast gulf that has existed in the area of the then Danube delta. The basin is of the lake type where deepwater lake sediments have been deposited. Such underwater landscapes are observed almost everywhere

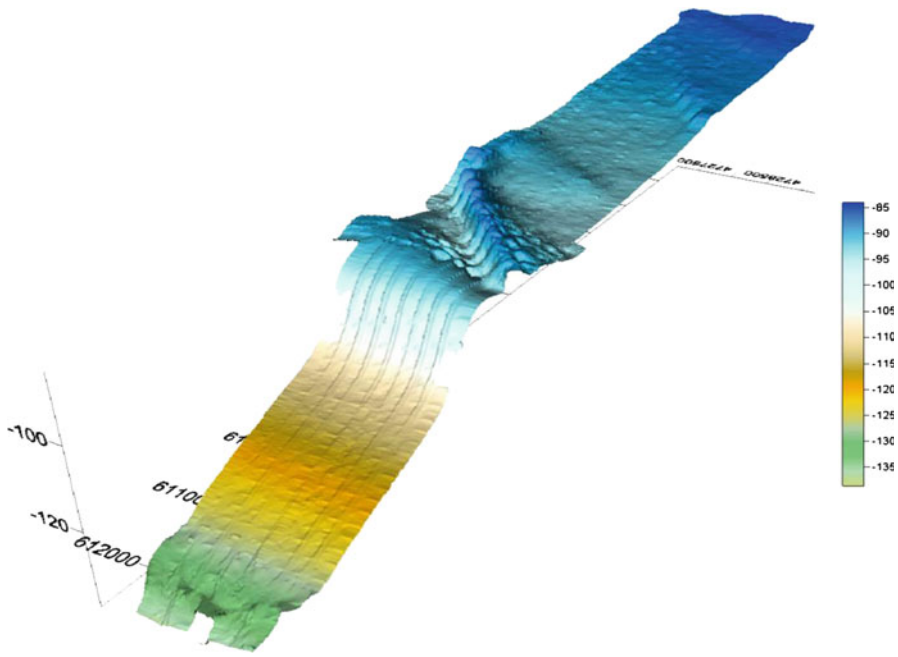

The Black Sea, Fig. 2 Image of old Black Sea shoreline east of Emine Cape. (2009 expedition, RV "Akademik") (after Peev and Hristova 2016)

on the periphery of the continental shelf in the western part of the Black Sea coast.

One of the proofs that it is the Late Pleistocene to Early Holocene coastline is the mussel bank discovered in 2002. During deep underwater diving, it was discovered at a depth of 148 m, which marks the underwater part of the Early Holocene coastline for sure. Most likely, these are the shells of *Mytilus galloprovincialis*, a species living at low depths (Peev and Hristova 2016: 477).

During the glacial epochs, the level of the World Ocean was considerably lower than in modern times, as at that time coastal landscapes that were attractive to human settlements have existed. The early Holocene coastline of the Black Sea basin passed in front of the abovementioned accumulative sand formations.

In this paleographic situation, it became clear why in today's Bulgarian lands there is no data on Mesolithic habitats, with the exception of Pobiti Kamani, Varna District. However, this site cannot be stratified, and the finds discovered there are attributed to the above epoch only through comparison. During the Late Paleolithic and the Mesolithic ages, today's Black Sea shelf was a vast valley watered by many rivers. Even if it is not assumed that the 100–120 m isobath was the ancient coastline, but as it is more popular – 40–45 m – it is again clear that a large part of the shelf has been a land. Therefore, the Mesolithic man's settlements could be found at the bottom of today's continental shelf and more precisely in the areas where the Paleo-valleys of the rivers flowing into the Black Sea were situated.

The novelties in underwater archeology and the other sciences studying the past of the Black Sea pose the question of the oldest navigation in the Pontus in a new light. In the establishment of the regular trade contacts with the Eastern Mediterranean, one cannot overlook the issue of the last connection of the Black Sea with the Marmara and the Aegean seas and the formation of the Black Sea-Mediterranean corridor.

The history of the Black Sea since the time of the last Würm III glaciation is of particular interest. The first thing worth mentioning is that there is no consensus among scientists about the pattern of sea level changes from 28,000 to 25,000 cal. years BP. Some researchers such as Arhangelskiy and Strahov (1938) and other authors more recently Aksu (Aksu et al. 2002: 4–10) think that the New Euxine lake has been gradually transformed into a sea basin and has been recolonized by the Mediterranean organisms during the post-glaciation transgression of the World Ocean. According to these scholars, the transgression began about 9500 cal. BP, when the two-way flow through Bosphorus between the Black Sea and the Marmara Sea was established.

In the 1990s, geologists and oceanographers created a new model of the Black Sea formation and evolution during the last few thousand years. The formation of the Black Sea as a saline-water basin may have happened later than previously assumed. This group of scholars (Ryan et al. 1997; Major et al. 2002, etc.) assumed that the transformation has not been gradual, but abrupt. In their opinion, the transformation of the lake into saline-water basin was a real ecological disaster for the world of the freshwater organisms. The studies of the sediments from the seabed reveal that the lower layers contain remains of freshwater organisms and those overlying them – of saltwater, deposited after the transformation of the freshwater lake-sea. The most interesting is that between these layers there is practically no (or it is minimal) separating zone. This suggests that in terms of geology, the change has happened very quickly. About 7600 cal. years BP, there was an event in the Black Sea that had huge consequences for the ecological situation in the then freshwater lake. This geocatastrophic event is conditionally and completely unsuitably called by some archeologists "Noah's Flood" (Ryan and Pitman 1998; Dimitrov and Dimitrov 2003). Then an abrupt rise of the Black Sea level has started until its alignment with that of the Marmara Sea and the World Ocean.

According to a third scenario (Fedorov 1978, 1982: 151–156; Balabanov and Izmaylov 1988: 54–62; Balabanov 2006: 711–730; Yanko-Hombach 2006: 146–203, etc.), the transition from a freshwater lake into a sea was not gradual or catastrophic but fluctuating, i.e., during the last 18,000 years, there were

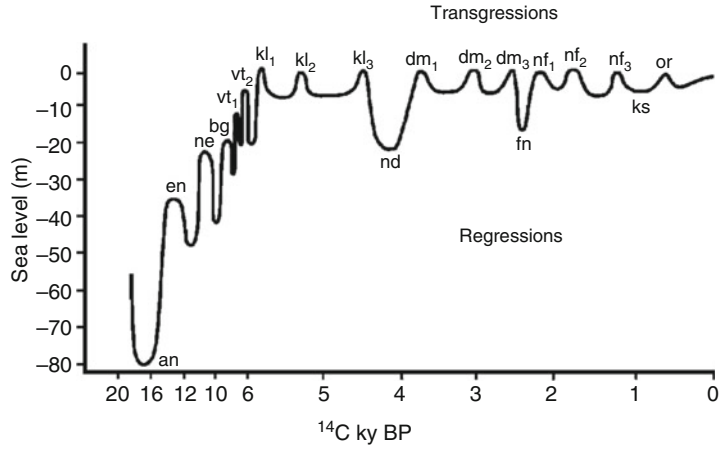

The Black Sea, Fig. 3 Black Sea level changes over the last 20,000 years. (After Chepalyga 2002)

periods of rapid rise of the Black Sea level as well as regressions (Fig. 3).

The good conservation of the New Euxinian littoral formations at 100–120 m below the present level is indicative for their sudden inundation and bringing out of the wave influence. At the Pleistocene-Holocene border, Mediterranean waters of 35‰ salinity, having in mind that until then the salinity of the sea-lake was 5–7‰, flowed into the Black Sea over the Bosphorus threshold. According to some calculations (Ryan and Pitman 1998: 141–144), the spilling of Mediterranean waters had catastrophic consequences for both the coastline and the organism world.

About 10,000 years BP, the level of the World Ocean was about 44 m lower than the present level (Lambeck 1996: 601), as during this period for the Black Sea it was significantly lower – about 90–115 m below the present level. As noted, according to recent studies, the formation of Holocene deltas of the rivers started about 8000 years ago, when, according to the isotope curve and the curve of the sea levels, a sudden rise (ranging from 5 to 15cm/year) of the level with about 14 m is indicated (Stanley and Warne 1994: 228–231). In the Black Sea, this transgression is called New Black Sea transgression.

In the publications related to the problem of the Black Sea level fluctuation, no comparison of the Aegean and the Mediterranean data was made. In works devoted to the subject (Fedorov 1978), without detailing the situation for Antiquity and the Middle Ages, some points related to the eustatic fluctuation of the Black Sea during Holocene have been considered. As a rule, these publications follow the traditional scheme established as early as in 1950s and 1960s. The issue has been examined more thoroughly by Lazarov (1975: 37–38, 125–134) and especially by Filipova-Marinova and Hristova (2001: 59–64) and Peychev and Peev (2006).

Zenkovich in his monograph "Morphology and Dynamics of the Soviet Coasts of the Black Sea" (Zenkovich 1958) thinks that during the postglacial time, the Black Sea level did not exceed the present level. Initially the pace of the Black Sea transgression (about 8000 BP) was high, but subsequently it became slower.

In the central part of the continental shelf, Lower Holocene (Bugazian) littoral facies of sandy gravel sediments with shellfish detritus at an absolute depth of 30–34 m were revealed. Probably, within this interval, there was also the Early Holocene coastline. C^{14} absolute age at the bases of the Lower Holocene layers are 7480 ± 540 и 8080 ± 20 BP. Sediments situated above are dated 6890 ± 630 (Dimitrov 1982: 46).

During the coring in the mouth of the Veleka River at the interval of 42.10 m up to 26.9 m in the lagoon-firth deposits on the *Cardium-Mytilaster* complex, there has been made radiocarbon dating. They show an absolute age of 9945 ± 160 BP and 8355 ± 75 BP (Filipova-Marinova and Hristova 2001: 59). The rise of the sea level from 40 to about 12–15 m below the present one is also noted at the formation of

the seaside lakes along the west coast of the Black Sea.

There are a number of sunken prehistoric settlements known to be found on the west coast of the Black Sea, which in the scientific literature have long not described as "pile dwellings." Recently, in some works, there has been an attempt to precisely establish their nature.

The remains of the eight submerged settlements from the second phase of the Eneolithic Age (Ivanov 1993: 19–26) and one in the aquatory of the Sozopol Port (Draganov 1995: 233–239) were found on the banks of the Varna-Beloslav liman. The main results of the studies made indicate the presence of two cultural layers (Eneolithic and Early Bronze), without establishing residential horizons, known from the cultural deposits of the land. The piles of residential buildings have remained in place and later gave the wrong idea that they are part of a platform on which ancient dwellings were built.

In contrast to Varna-Beloslav Lake, along the southern Bulgarian coast, two of the submerged prehistoric settlements – in the aquatory of Sozopol harbor (Draganov 1995: 233–239) and at Urdoviza Cape (Draganov 1995: 226–233) – have been studied with a relative success.

The Eneolithic settlement at Sozopol belongs to Kodjadermen-Gumelniţa-Karanovo VI and the Early Bronze one – to the 6th–5th horizons of the Ezero tell (Draganov 1995: 236). The depths at which cultural layers are found are 6–9 m. Recent studies on the situation of the prehistoric settlements of the west coast of the Black Sea unambiguously show that they were located on the first unflooded river terrace (Peev 2004: 164) and not on wooden platforms as it is widespread in the archeological literature. Chronologically, they refer to the culture of Varna (Todorova 1984: 41, 45–51) and existed in the second half of the fifth millennium BC, which undoubtedly proves that during this period the Black Sea level was certainly lower than the present one with at least 9 m for the time interval of 4600–4100 cal. BC.

Life in these most developed settlements in the world for their time abruptly stopped at the very end of the fifth millennium BC. One possibility is that this has happened as result of a natural disaster in which the settlements of the bearers of the Varna culture were flooded. Evidence of a sudden rise in the Black Sea level at that time we find at these submerged Eneolithic settlements. The dredging works in the area of Varna Lake and the underwater archeological excavations of Arsenala settlement and Sozopol revealed wooden piles of dwellings with preserved bark and numerous ceramic vessels and tools which have been very precious for their time. If the water has been rising slowly, people would have been able to took them, and if the settlements ceased to exist as a result of an invasion of steppe tribes that came somewhere north, it is unlikely the invaders to have left them.

After the abrupt rise of the Black Sea level at the end of the fifth millennium BC, there is a new regression that lasted until the end of the third millennium BC. The settlements were situated on the unflooded terraces of the then river valleys, except, probably, for the village located near Cape Ata. The established Black Sea coastline during the existence of the prehistoric settlements in the Late Eneolithic Age was 9–10 m below the present level, and in the Early Bronze Age, it was at about 8 m. At that time, modern coastal lakes were still sea bays and were not separated from the sea by sandspits. The latter is tied to the rising sea level and lasted to Antiquity as described by the ancient authors (*Polyb.* IV, 41; *Str.* I, 3, 4).

According to Fedorov (1978) on the coasts of the Black Sea and the Sea of Azov, there are New Black Sea terraces with a height of 3–5 m and age of 3500–4000 BP and Nimphean terraces with a height of 1 m and age of 1500 BP, as, between the time of their formation, the Phanagorian regression took place. After the Nimphean transgression, the level of the Black Sea decreased (Korsun regression), and in the last few centuries it has been slowly increasing (Laz transgression).

Geological evidence for a significant rise of the Black Sea level is found on the northern Bulgarian coast. On the terraces from the area of Balchik Tuzla and the town of Kavarna, shellfish are dated 5140 ± 270 and 5650 ± 100 BP, respectively (Krystev et al. 1990: 212).

Most likely, the terraces, which are interpreted as indicators for sea level rise of up to +4 and +5 m above the present one, are the result of tsunami waves. There are no data from the Mediterranean for such an abrupt rise of the World Ocean. Tsunami waves have been observed in the Black Sea continuously, even in prehistoric times. The Byzantine chronographer, Theophan, describes such a disaster that came upon Odessos, Dionisiopolis, and Aphrodisia in 544 AD (*Theoph.* 537).

After the eventual abrupt rise of the Black Sea level at the end of the fifth millennium BC, there is a new decrease (regression) that continues to somewhere until the end of the third millennium BC.

From the Pitsunda Cape at the Abkhazia coast, Balabanov et al. (1981: 90) mark a level of −6–6.2 m in 5240 ± 96 BP. From the Bulgarian coast, settlements of the Early Bronze Age of the Varna-Beloslav Lake, Atia Cape, Sozopol, Ropotamo, and Kiten are known. Their cultural remains are found at a depth of about 5–6 to 8–9 m at Kiten, which corresponds entirely to the data from the Mediterranean coast. The pottery form Urdoviza is identified as typical for the Ezero tell and is referred to the 8th–5th horizons. Eighteen radiocarbon datings refer Kiten (Urdoviza) to the second phase of the Early Bronze Age together with Ezerovo II and Mihalich phase of the Ezero culture from Thrace. According to them, the time interval of the existence of the settlement is 4180–4040 BP (between 2850 and 2600 cal. BC) (Görsdorf and Boyadzhiev 1996: 157–158).

The subsequent rise of the level of the Black Sea at the end of the third millennium BC is traced by the interruption of the life in the coastal settlements from the Early Bronze Age. At Rybakovka village, Odessa region, Ukraine, in the area of the sandspit of the Berezan liman, there is a terrace of 2 m above the present sea level. This is the only site from which a sample was taken and a radiocarbon dating was made. The age of the terrace is 3900 ± 100 BP (Konikov 2006). A sounding revealed 0.90 m of modern diluvium from the slope and under it typical marine deposits with thickens of 1 m and at the bottom buried beaches. Konikov (2006) believes that this is the undisputed proof of a transgression of about 1.5 m above the present sea level.

The humid period that began in the Neolithic Age ends in the third millennium BC. The drastic change in climate affects the economy and the life in Egypt and coincides (perhaps not accidentally) with the weakening of the central government and the straightening of the provincial aristocracy and nomarchs in Ancient Egypt.

In the area of Balchik Tuzla Lake on a 5-meter-high terrace, shells from *Ostrea edulis* L. are dated to 3120 ± 50 BP (Krystev et al. 1990: 214). It should be noted that nowhere else in the Black Sea region or in the Mediterranean region is there an evidence of such a rise in the sea level.

In the Late Holocene (the last 3000 years), the coastal morphology is controlled by the sea transgressions and regressions as evidenced by the submerged ancient ruins (Flemming 1978). This is the case with the Black Sea.

When restoring the coastline since the ancient times, it is extremely important to determine sea fluctuations. Due to the scant data we have for the operation of the port basins along the Western Black Sea coast, this information is of great value. For example, a huge number of stone anchors of the second millennium BC have been discovered along the Bulgarian coast. The science refers them to the shipping during the Late Bronze Age. Since until now there are no ports of this age established with an absolute certainty, involvement of geomorphological and underwater surveys could support searches in this direction.

Many of the stone anchors mentioned above have been discovered in areas that do not imply the presence of a port basin today, because they are not sheltered from sea storms. However, if we restore the ancient coastline, we will see that at least one of them (Caron Limen) has had a natural protection from the strong northeastern and eastern winds. This site will be discussed in details in the following entry. Nowadays, at Shabla Cape there is a 400-meter-long pier which is set on a reef with a maximum depth of 4 m in the its eastern part. At these levels of the Black Sea, the reef was apparently at the level or slightly above the level of the sea.

The so-called Phanagorian regression began in the middle of the second millennium BC and lasted until the Late Antiquity. The Black Sea level during the Late Bronze Age was approximately about −1.6 to −5 m below the present one. The period from the beginning of the first millennium BC until the sixth century AD is characterized by low global temperatures. The river outflow has decreased a lot, and as a result the level of the Black Sea basin has dropped. The peak of the Phanagorian regression should be referred to the fifth–third century BC. According to various authors and the interpretation of the facts, the maximum varies from −2–3 m to −11 m below the present sea level. According to Xant (*Xant*), during the time of the Artaxerxes III of Persia (465–425 BC), "there was a great drought." This fact is also a support for the peak of the Phanagorian regression, which we refer to the fifth–third century BC.

In general, the Black Sea level at the beginning of this period (sixth century BC) is fixed at −4 m to reach up to −2 to −3 m at its end (sixth century AD).

The next stage of the changes in the Black Sea level is the Nimphean transgression. This period (the eight- the middle of the tenth- century) we assume as the maximum of the transgression for both the Mediterranean and the Black Sea. All ports on the Bulgarian coast cease to operate by the end of the sixth and the beginning of the seventh centuries. The conclusion is that from the Late Antiquity onward, there is a rise in the sea level. It is associated with the Nimphean transgression, which is a reason for the flooding of the ports and parts of the ancient towns along the Black Sea coasts.

As mentioned above, probably in 544, some Western Black Sea towns were severely hit by a tsunami wave, followed by a great earthquake (*Theoph.* 537). Theophan listed Odessos, Dionisiopolis, and Aphrodisia. It is very likely that other ports were damaged as well, and this might be one of the reasons for them to cease operation.

After the sixth century, there was obviously a relatively rapid rise of the sea level. The foundations of a Chersonesus tower from the sixth to the beginning of the seventh century are at a depth of −1 m, and the peak of the Nimphean transgression is referred to the seventh to eighth century. However, as we mentioned above, we consider the maximum of the transgression to be in the eighth to the middle of the tenth century. The medieval Develtus, located west of the Mandra Lake, was still a port city at the beginning of the eighth century. As the Byzantine historian Niketas Choniates wrote, in 1203, the depositioned Byzantine emperor Alexios III Angelos (1195–1203) arrived in the city by boat.

Later there was a drop in the sea level. This is the so-called Korsun regression named after the town of Korsun (the ancient Chersonesus). However, the existence of such regression is quite controversial. Data are mainly gathered from the northern shores of the Black Sea as the peak is set to −3–3.5 m (Shilik 1997–1999: 25). Indeed, some of the results obtained support this view – for example, walls and towers of Chersonesus from the eleventh to twelfth century, another tower again from Chersonesus from the thirteenth to fourteenth century, the foundations of the St. Nicholas Church from the end of the fifteenth century at Kiliya, discovered at a depth of −2.5 m below the present sea level (Shilik 1997–1999: 25). However, there is no such data from the other parts of the Black Sea and the Mediterranean coasts. Probably there were local neotectonic movements.

In this case, it would most aptly be spoken of as a mild eustatic drop in the Black Sea level, which is a result of the general cooling of the climate in Europe in the thirteenth and fourteenth centuries (Hay et al. 1991: 1211–1235).

However, there had obviously been a water level decline, and we find evidence of this in medieval and Renaissance sea maps. These considerations are fully supported by the maps of the thirteenth to eighteenth centuries where the coast is presented in details.

The current rise in the Black Sea level began in the second half of the seventeenth century. This is the so-called Laz transgression. The formation of a sandspit at the mouth of the Batova River is dated according to a complex of *Donax trunculus*

(L.), Chione gallina (L.), and others to 290 ± 90 BP (Krystev et al. 1990: 215).

The comparative analysis and the interpretation of the various data imply the following conclusions:

The fluctuation of the Black Sea level is among the main factors for coastal evolution, and it, in turn, is controlled by the level of the World Ocean.

Based on the existing data, a Black Sea level curve for the past 12,000 has been drawn up, which will be further refined with the production of new data. In this thesis, this is the first time a comparative analysis of the data from the Black Sea and the Mediterranean Sea is made, which significantly changes some of the former perceptions.

In the analysis of the received curve, the nonexistence (or at least not in the mentioned dimensions) of the Korsun regression, widely described in scientific literature, is noticeable. In this case, we could talk about a slight drop in the sea level due to the cooling of the climate in Europe.

History and Archeology

Cultural and historical development of the societies in the Antiquity is determined by a number of factors, which influence them independently and as a whole – geographic factor, demographic factor, means of production, religion, etc. Disregarding or amplifying the influence of just one of them will inevitably lead to distortion of the historical reality in the interpretation and reach the wrong interferences.

The task here is to trace the main stages in the history and culture of the Western Black Sea coast within the context of the common Mediterranean history. In this regard it should be noted that the sea has always been a distinct area – aquatory – region, defined by overseas connections, commercial, military, and political, including the migration of people and ideas (King 2006: 27–28). In the millennial history, coastal and hinterland communities have long been influencing each other and the geographically remote regions of the Mediterranean (mostly Eastern ones), which have reflected on the sociopolitical life, economy, religious beliefs, and folklore.

Periodization is necessary when studying historical reality. Methods may be different, so that differences may be possible when periodizing the past, including the cultural and historical development of the Western Black Sea coast.

The period ninth/eighth to fifth millennium BC (Neolithic and Eneolithic) is characterized by climatic optimum, which was the prerequisite for the rapid development of the human society in economic and cultural terms. The climate is warmer and more humid, and this has altered the lifestyle of the inhabitants of the Middle East and Southeast Europe. This is the time of blooming of the brilliant Neolithic cultures in Southeastern Europe and Asia Minor to reach their apogee through the Chalcolithic period and to unexpectedly wane at the end of the fifth millennium BC. At the end of the period, a social stratification is observed. The higher and most striking expression of this ideology of the Late Eneolithic society of Southeastern Europe is the Chalcolithic Necropolis of Varna and in particular burial site No 43. In this order of thought, the ancient Thrace civilization is asynchronous, earlier in time and similar in meaning to the ideology of the Old Kingdom of Egypt.

The earliest traces of statehood in Thrace are visible at the metallurgical center near the banks of the Varna Lake (especially the golden ornaments from the Chalcolithic Necropolis of Varna; from the so-called Palace Complex on the Big Island of Durankulak; from the giant for their time copper mines in the area of Mechi Kladenets, the region of Stara Zagora and Strandzha coast; from the fortification facilities (palisades) in some villages; etc.) The bloom of this community is based on the extraction and trading mainly of copper, gold, and salt.

However, if we are speaking specifically about the Western Black Sea coast, it could not be noted that Copper Age civilization was connected with the sea and has developed maritime trade. This is evidenced by the spread of copper and copper products far north of the mines of Thrace – in the Black Sea steppes – the numerous shells of the Spondylus, *Dentalium*,

and *Glicerimus* mollusks in the northeastern part of the Balkan Peninsula and along the Danube River to Central Europe; and remnants of fishing and clay figurines of vessels.

The so-called Transitional Period (Middle Neolithic) (4150–3200 cal. BC) stands between the Eneolithic and Early Bronze Age. Despite the favorable climatic conditions on the Western Black Sea coast, according to data of the palynological studies, there is no evidence of human activity (Filipova-Marinova 2006: 35, 50). This confirms the existence of a hiatus of about 800 cal. years between the late Eneolithic and early Bronze Age. Todorova shortens this period by introducing the terms of "Post-Chalcolithic" and "Proto-Bronze Age" (Todorova 1995: 89–92).

Undoubtedly, the cultures of the Balkan Peninsula coast, Asia Minor, and Aegean islands are inextricably bound up with sea in the Early Bronze Age as well. This is evidenced by the numerous coastal settlements where the fishery as a livelihood occupies a much more significant place in the economy than in the Chalcolithic as well as the established Circum-Pontic and north Aegean archeological communities. In the Early Bronze settlements on the Western Black Sea Coast lives a population that knows, values, and can take advantage of the resources offered by the sea.

In the third millennium BC, Egyptian merchant fleets constantly visited the ports of the Red Sea, the Land of Punt, and the eastern Mediterranean coast – North Africa, Syro-Phoenician coast, Cyprus, and Crete. What is the probability that Egyptian ships have visited the Western Black Sea coast? The hypothesis is supported by the evidence of commercial contacts between the Western Pontus and the Eastern Mediterranean in the second millennium BC. Such archeological contest, though dated to the Late Bronze Age, is created by a number of finds – metal oxhide-shaped cake ingots, the silver needle from Medgidia, the golden tiara from a Hellenic tomb in Odessos, etc.

The almost identical historical development of Thracian lands established the scientific use of the *terminus technicus* "Mycenaean Thrace." In fact, the first author to use the term "Mycenaean Thrace" was Filov in 1920 (Filov 1920: 40–53). State-forming processes similar to those in the Achaean states are also observed among the local Thracian tribes. In this sense, the Western Black Sea region, and thence the banks of the Lower Danube, together with the valleys of Struma, Mesta, and Maritsa, cover this term more fully.

The second half of the second millennium BC (the Late Bronze Age) is an extremely dynamic period in the history of the Black Sea and the Eastern Mediterranean region. This is the time of the bloom of the bronze metallurgy and the trade of its products. Moreover, during these centuries, Thracian tribes consolidated, and the Thracian civilization, which was included in the common for the then world political, economic, and cultural relations, was formed (Bonev 2003).

There are already a lot of monuments and finds from the Balkan Peninsula supporting the idea of Mycenaean Thrace. An oxhide ingot is depicted on a pottery discovered in a prehistoric settlement near Burgas, Bulgaria; the metal ingot from the village of Cherkovo, Burgas area; bun ingots from aquatory of Maslen nos Cape; copper oxhide ingots discovered in Razgrad District; and ingots from Ruse and Elhovo area, Bulgaria (Bonev 2003; Leshtakov 2007). As a result of the parallels drawn with the finds from the Mediterranean, chronologically the ingots of Cherkovo, Kaliakra, and Ruse could be referred to fifteenth to fourteenth century BC and those from Razgrad area to fourteenth to twelfth century BC.

Here is the place to mention the Achaean presence in the written monuments found in the Black Sea. The most known writing is the myth of the famous Journey of the Argonauts in search of the Golden Fleece, described by Apollonius of Rhodes in his Argonautica (*Ap. Rh.* Argon.). In this particularly valuable to us source, the author supplies information about the nations inhabiting the lower course of Istros and provides extremely important information on early navigation in the Black Sea from the second half of the second to the end of the second or the beginning of the first millennium BC associated with the legendary Journey of the Argonauts.

He lived in the third century BC but brought us back the events that have happened at the end of the second to the beginning of the first millennium BC. The ship itself was equipped with a sail and ten oars. Argonautica makes reference to the early penetration of Aegean people in the Black Sea basin. But as mentioned above, there is archeological evidence for the appearance of Mediterranean seafarers dating back to the sixteenth to fourteenth century BC, a few centuries before the Argonauts.

Other Greek legends also mention contacts of East Mediterranean peoples with the population along the Black Sea coast. For example, such is the story of the stay of Odysseus in the country of the Cimmerians (Odyssey, books X, XI, and XII – B. Dimitrov suggests that the action takes place in the Black Sea); the myth of the stay of Achilles on the Island of Leuke (present-day Zmeinÿi, Ukraine) at the delta of Danube River (*Arktin of Miletos* Aeth.; *Arr.* PPE 32–34); and the myth of the stay of the daughter of Agamemnon – Iphigenia – in Tauris (*Euripides* IT). However, myths do not enable us to chronologically specify when in time the Mediterranean ships have entered the Black Sea.

The active navigation on the Western Black Sea coast is marked by the numerous stone anchors, the metal ingots bun, and oxhide-shaped models and images of vessels. Of course, the images and models of boats can be related to the Solar Boat and have a purely cult purpose (Bonev 2003: 42, 43), but ingots are indisputably commercial in nature and have been imported or exported from the Thracian lands by ships. In Diodorus Siculus (?–35 BC), the author of *Bibliotheca historica* (consisting of 40 books), we find the well-known in the science of history information about the Thracian Thalassocracy in Aegae (VII, 13). Although it refers to the Aegean Sea, this information is particularly valuable with the confirmation that Thracian tribes were actively engaged in navigation.

The permanent settlement of ancient Greek communities along the Black Sea coast is referred to the seventh century BC. Some city-states established their colonies (ἀποικία), but no one was able to surpass Miletus (*Plin.E.* NH IV, 29, 112). Miletus was the most prosperous city on the Ionian coast and the main trading center in Aegea. Its colonies in the Euxinian Pont were among the largest and most significant cities: Sinope, Panticapaeum, Olbia, Histria, Tomis, Odessos, and Apollonia (Fig. 4). Another metropolis which founded many colonies is Megara. The Thracian tribes on the Black Sea coast were in direct contact with the Greek settlers, who permanently settled in their lands and thus influenced the overall historical development of Thracia Pontica.

After the middle of the first millennium BC, the development of the ancient Greek poleis not only connected all Black Sea coasts but also included them in a broader system of exchange with the Mediterranean coast. By the fourth century BC, Thrace gradually became an agricultural country by exporting more and more grain and livestock to Hellas. This integration in the common Mediterranean processes continued to the beginning of the first century AD when the southern Danubian Thracian lands were turned into the Roman province of Moesia and Thrace (46 cal.), at that, on the periphery of a vast state.

The victory over the Mithridates VI of Pontus (111–63 cal. BC.) extended the borders of Rome to the Euphrates River. The spread of Roman power to Egypt and Asia to certain extent reduced the importance of the Black Sea ports. In its prime, the early Roman Empire included more than half of the Black Sea coast – from the Dniester River through Thrace to the north, westward to Asia Minor to the south, and Caucasus to the east. So far, on the western coast, the finds from the so-called Italic amphorae from the second century BC to the first to second centuries AD, widespread in the Mediterranean, are very few. In underwater surveys, pottery from this period is discovered, which was mainly made in the southern Black Sea coastal towns located along the Asia Minor coast (Kassab-Tezgör and Tatlican 1998).

The old connections established during the Hellenic resettlement were revived in the fourth century, when, from periphery, the Balkan Peninsula lands became the center of the state and the coastal towns to economically powerful

The Black Sea, Fig. 4 The ruins of ancient settlement Istria, Romania. (Source: Author)

centers. The overseas trade with the forest-steppe area of the Northern Black Sea coast intensified especially after the relocation of the capital to Constantinople (330 cal.), by trading leather, fish, etc. Craftsmanship, trade, and hence the navigation intensified as well, and a number of ports were restored. This is evidenced by the numerous and diverse amphorae and other pottery from the fourth to sixth centuries, which were used for storing goods when transported.

The increased importance of the Black Sea coast is supported by the fact that on 18.V.536, the Byzantine Emperor Justinian I (527–565) made Odessos a center of a vast maritime area with an appointed prefect, which, besides the Western Pontic coast, included Scythia, the Cycladic islands, the region of Caria in Asia Minor, Cyprus, and Rhodes (*Iust.Nov.* 13, III).

Constantinople, whose geographical situation is extremely favorable, kept in its powers the entire trade by the Black Sea, the Archipelagos, and the Mediterranean. Wheat, vegetable oil, salt, leather, iron, iron ore, etc. were imported for the needs of the northern neighbors of the Byzantine Empire – Gothic and other tribes – and furs, copper, and wax were imported.

At the end of the eleventh century, the Black Sea hegemony of Byzantium was broken. The Byzantius fleet experienced more tangibly the influence of the Roman towns – states. Venice was the most active one at the beginning, later followed by Genoa and Pisa. The fight for superiority among the Italians was extremely severe. The Byzantine merchants suffered a hard blow when in 1204 the knights of the Fourth Crusade conquered "the Capital of the World" – Constantinople and the Byzantine Empire disappeared from the historical scene for a certain period of time.

On 13.III.1261 in Nymphaion (Asia Minor), the emperor Michael VIII Palaiologos (1259–1282) signed a trade contract with Genoa. According to its terms, the Black Sea should have remained closed for foreign ships except for Genoa's and Pisa's. Thus the beginning of Genoa's domination in the Black Sea field was set. In 1263 the Venetians defeated Genoa's navy, which supported the Byzantines. Michael

VIII Palaiologos signed a contract with the Venetians, too, on 18.V 1265, which was ratified in 1268. In this way the Venetians received great trade privileges, and the rivalry with the Genoas sharpened. The Emperor, forced to trim, renewed the terms of the Nymphaion contract with Genoa.

In the thirteenth to fourteenth century, Genoa, Venice, and Raguza merchant ships sailed across the Black Sea. The foreign trade of Byzantine was mainly in the hands of Italians. Byzantine fleet was in decline and was almost completely replaced by the strong fleets of the trade republics.

In 1453 the Ottoman Turks conquered Constantinople, an event that led to a delay in the historical development of the whole Southeast Europe. The Turks pushed Italian merchants, who had trading posts in Tana and Kaffa, away from the Black Sea trade in the last quarter of the fifteenth century (e.g., Kaffa was conquered in 1479). With the beginning of the sixteenth century, the Black Sea was closed more than ever and turned into a Turkish lake. Merchants from the town of Raguza gave up trading by the Black Sea, too.

The history of navigation on the Black Sea was being written by the navigators of the Ottoman Empire and Russia during the following centuries.

The Black Sea name (Black Sea, Mer Noire, Mare Nero, Schwarze Mer, Cernoe More, Kara Deniz) is given recently, dating since the medieval times and has no connection with the ancient names – Pontus Axeinus and Pontus Euxinos.

References

Aksu, A., R. Hiscott, P. Mudie, A. Rochon, M. Kamisnki, T. Abrajano, and D. Yaşar. 2002. Persistent Holocene outflow from the Black Sea to the Eastern Mediterranean contradicts Noah's Flood hypothesis. *Geological Society of America Today* 12 (5): 4–10.

Arhangelskiy, A., and N. Strahov. 1938. Геологическое строение и история развития Черного моря (Geological structure and history of development of the Black Sea). Moscow: Geological Institute of USSR Academy of Sciences. (in Russian).

Balabanov, I. 2006. Holocene sea-level changes of the Black Sea. In *The Black Sea flood question: Changes in coastline, Climate and human settlements*, ed. V. Yanko-Hombach, A.S. Gilbert, N. Panin, and P.M. Dolukhanov, 711–730. Dordrecht: Springer.

Balabanov, I., and Y. Izmaylov. 1988. Изменение уровенного и гидрохимического режимов Черного и Азовского морей за последние 20000 лет (Amendment of sea-level and hydrochemical regime of the Black Sea and Sea of Azov for the last 20000 years). *Water Resources* 6: 54–62. (in Russian).

Balabanov, I., V. Kvirkvelia, and D. Ostrovsky. 1981. Новейшая история формирования инженерно-геологических условий долгосрочный прогноз развития береговой зоны полуострова Пицунда (The newest history of the formation of engineering and geological conditions and long-term predictive development of the coastal zone of Pitsunda Peninsula). Tbilisi: Metsniereba. (in Russian).

Bonev, Al. 2003. Ранна Тракия. Формиране на тракийската култура – края на второто – началото на първото хилядолетие пр. Хр. (Early Thracia. Formation of the Thracian culture – The end of the 2nd – the beginning of the 1st millennium BC). Excavations and research Tome XXXI. Bulgarian Academy of Sciences, Sofia (in Bulgarian).

Chepalyga, A. 2002. Черное море (Black Sea). In Динамика ландшафтных компонентов и внутренних морских бассейнов Северной Евразии за последние 130 000 лет. (Dynamics of terrestrial landscape components and inner marine basins of Northern Eurasia during the Last 130000 years), ed. A. Velichko, 170–182. Moscow: GEOS. (In Russian).

Chepalyga, A. 2005. Influence of the late glacial Eurasian water flow on the Black Sea – Mediterranean corridor. In Black Sea – Mediterranean corridor during last 30 ky (abstracts), 29–31. Istanbul.

Dimitrov, P. 1982. Радиовъглеродни датировки на дънни утайки от българския черноморски шелф (Radiocarbon dating of sediments from the Bulgarian Black Sea shelf). *Oceanology* 9: 45–53. in Bulgarian.

Dimitrov, P., and D. Dimitrov. 2003. *The Black Sea, the flood and the ancient myths*. Varna: Slavena.

Draganov, V. 1995. Submerged coastal settlements from the final Eneolithic and the early Bronze Age in the sea around Sozopol and Urdoviza Bay near Kiten. In *Prehistoric Bulgaria*, ed. D. Bailey and I. Panayotov, 225–241. Madison: Prehistory Press.

Fedorov, P. 1978. Плейстоцен Понто – Каспия (Pleistocene Ponto – Caspian). Proceedings of the geological institute of USSR Academy of Sciences, Vol. 310. Moscow: Nauka. (in Russian).

Fedorov, P. 1982. Послеледниковая трансгрессия Черного моря и проблема изменения уровня океана за последние 15000 лет (The post-glacial transgression of the Black Sea and the problem of the sea-level changes over the last 15000 years). In: *Changes of the seas and oceans level during the last 15000 years*, 151–156. Moscow: Nauka. (in Russian).

Filipova-Marinova, M. 2006 Палинологични данни за динамиката на растителността и промените в климата по българското черноморско крайбрежие през кватернера (Palynological data about dynamics of vegetation and climate changes along the Bulgarian Black Sea coast during the Quaternary). Dissertation for DSc in biology, Sofia (in Bulgarian).

Filipova-Marinova, M., and R. Hristova. 2001. Sea level fluctuations in the Western part of the Black Sea during the Holocene. *Comptes rendus de l'Académie bulgare des Sciences* 52 (5): 59–64.

Filov, B. 1920. Тракийско – микенски отношения (Thracian – Mycenaean relationships). In: *In honnorem prof. Iv. Shishmanov*, 40–53. Sofia. (in Bulgarian).

Flemming, N. 1978. Holocene eustatic changes and coastal tectonics in the Northeast Mediterranean: Implications for models of crustal consupmtion. *Philosophical Transactions of the Royal Society of London A* 289: 405–458.

Görsdorf, J., and Y. Boyadzhiev. 1996. Absolute chronologie der Bulgarishen Urgeschichte. *Eurasia Antiqua* 2: 157–158.

Hay, B., M. Arthur, W. Dean, E. Neff, and S. Honjo. 1991. Sediment deposition in the Late Holocene abyssal Black Sea with climatic and chronological implications. *Deep Sea Research* 38: 1211–1235.

Hristova, R. 2016. Българският черноморски шелф и крайбрежие – геоложка еволюция и климатични промени (The Bulgarian Black Sea shelf and coast during the Quaternary – geological evolution and climate changes). Sofia: Sofia University Press. (in Bulgarian).

Ivanov, I. 1993. A la question de la localisation et des etudes des sites submerges dans les lacs de Varna. *Pontica* XXVI: 19–26.

Kassab-Tezgör, D., and I. Tatlican. 1998. Fouilles des ateliers d'amphores a Demirci. *Anatolica Antiqua* VI: 426–442.

King, Charles. 2006. *The Black Sea. A history*. Oxford: Oxford University Press.

Konikov, E. 2006. Sea–level fluctuations and coastline migration in the Northwestern Black Sea area over the last 18 ky based on high-resolution lithological-genetic analysis of sediment architecture. In *The Black Sea flood question: changes in coastline, Climate and human settlements*, ed. V. Yanko-Hombach, A.S. Gilbert, N. Panin, and P.M. Dolukhanov, 406–435. Dordrecht: Springer.

Krystev, T, O. Parunin, and A. Svitoch. 1990. Радиоуглеродная хронология новейших отложений побережья и шельфа болгарского сектора Черного моря (Radiocarbon chronology of the newest deposits of the coast and shelf of the Bulgarian sector of the Black Sea). In *Geological evolution of the Western part of the Black Sea during the Neogene – Quaternary*, 211–216. Sofia: Bulgarian Academy of Sciences. (in Russian).

Lambeck, K. 1996. Sea – level changes and shore – line evolution in Aegean Greece since Upper Paleolithic time. *Antiquity* 70: 588–611.

Lazarov, M. 1975 Потъналата флотилия (The Sunken Fleet). Varna : Georgi Bakalov. (in Bulgarian).

Leshtakov, K. 2007. The Eastern Balkans in the Aegean economic system during the LBA. Ox-hide and bun ingots in Bulgarian lands. In *Between the Aegean and Baltic seas: Prehistory across borders*, ed. I. Galanaki, H. Tomas, Y. Galanakis, and R. Laffineur. Proceedings of the international conference Bronze and early Iron Age interconnections and contemporary developments between the Aegeans and the regions of the Balkan Peninsula, Central and Northern Europe. University of Zagreb 11–14 April 2005. Aegaeum 27. Liège, 447–458.

Major, C., W. Ryan, G. Lericolais, and I. Hajdas. 2002. Constraints on Black Sea outflow to the Sea of Marmara during the last glacial/interglacial transition. *Marine Geology* 190: 19–34.

Peev, P. 2004. Submerged settlements along the West Black Sea coast. The problem of situation. In *The geoarchaeology of river valleys*, ed. H. Dobrzhanska, E. Jerem, and T. Kalicki, 161–169. Budapest: Archaeolingua.

Peev, P., and R. Hristova. 2016. Black Sea continental shelf in the context of offshore European prehistory. *Comptes rendus de l'Académie bulgare des Sciences* 69 (4): 475–480.

Peychev, V., and P. Peev. 2006. *Evolution of the Bulgarian Black Sea coast after the Early Holocene*. Varna: Slavena. (in Bulgarian) = Пейчев В, П. Пеев (2006) Еволюция на българското черноморско крайбрежие след ранния холоцен. Изд. Славена, Варна.

Ryan, W., and W. Pitman. 1998. *Noah's Flood*. New York: Simon and Schuster.

Ryan, W., W. Pitman III, C. Major, K. Shimkus, V. Moskalenko, G. Jones, P. Dimitrov, N. Gorur, M. Sakinc, and H. Yuce. 1997. Evidance of an abrupt submergence of the Black Sea shelf during the Holocene: Implications for climate and human diaspora. *Marine Geology* 138: 119–126.

Shilik, K. 1997–1999. Колебания уровня Черного моря по геологическим, археологическим и историческим данным (The Black Sea level fluctuations according to geological, archaeological and historical data). *Dobrudzha* 14–16: 10–36. (in Russian)

Stanley, D., and A. Warne. 1994. Worlwide initiation of Holocene marine deltas by deceleration of sea-level rise. *Science* 265: 228–231.

Todorova, H. 1984. Добруджа през праисторическата епоха (Dobrudzha during Prehistoric age). In *History of Dobrudzha*, ed. A. Fol, and S. Dimitrov, Tome 1, 23–71. Sofia: BAS. (in Bulgarian).

Todorova, H. 1995. The Neolithic, Eneolithic and transitional period in Bulgarian prehistory. In *Prehistoric Bulgaria*, ed. D. Bailey and I. Panayotov, 79–98. Madison: Prehistory Press.

Vespremeanu, E., and M. Golumbeanu. 2018. *The Black Sea: Physical, environmental and historical perspectives*. Cham: Springer.

Yanko-Hombach, V. 2006. Controversy over Noah's Flood in the Black Sea: Geological and foraminiferal evidence from the shelf. In *The Black Sea Flood question: Change in coastline, climate and human settlements*, ed. V. Yanko-Hombach, A.S. Gilbert, N. Panin, and P.M. Dolukhanov, 149–203. Dordrecht: Springer.

Zenkovich, V. 1958. Морфология и динамика советских берегов Черного моря (Morphology and dynamics of the Soviet Union Black Sea coasts). Tome 1. Moskow: USSR Academy of Sciences. (in Russian).

Black, Davidson

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Basic Biographical Information

Davidson Black, FRS, was born on July 25, 1884, in Toronto, Ontario, Canada, and died on March 15, 1934, in Beijing, China. As a Canadian-trained anatomist and medical doctor, he was best known for his anatomical descriptions and naming of a new fossil human species, *Sinanthropus pekinensis*. Unlike most foreigners, Black got along extremely well with his Chinese colleagues as he treated them as equals and involved them in decision-making. He was known as 步達生 (pinyin: Bù Dáshēng) in China.

His father died when Dyo (as he was known by his family) was 2 years old and was brought up by his mother and uncles. Many summers were spent in the Kawartha Lakes region of southern Ontario, and when he was old enough for employment, he worked as a biological field assistant and a voyageur/fire ranger in forested regions of northern Ontario and later as a mining engineer for the Geological Survey of Canada on Vancouver Island. During these jobs, he got to know his First Nations' friends and was given the name "Mushkemush Kemit" (thought to be an Ojibwe phrase meaning "fast through the forest"). Like his father, he had a fragile heart, further weakened during a bout of rheumatic fever during his mid-teens. He eventually died at the height of his anthropological career at age 49 of congenital heart failure.

Starting in 1903 he studied at the University of Toronto, where he graduated with his Bachelor's degree in Medicine in 1906. He promptly returned to the University to complete his Arts degree, but with a delay in completing language requirements, he formally graduated in 1911. Before convocating, in 1909 he took a full-time teaching position in Anatomy at Western Reserve University in Cleveland, and during one of his visits to his Toronto home, he met Adena Nevitt, his future wife. Adena (second daughter of Richard Barrington Nevitt, a prominent Toronto physician who was a medical doctor for the Northwest Mounted Police) and Davidson married in December 1913. They had two children, a son Davidson (b. 1921) and daughter Nevitt (b. 1925). It was Black's close Anthropology colleague Wingate Todd who recommended that Black travel to England to work with well-respected neuroanatomist (Sir) Grafton Elliot Smith. Black followed Todd's advice during a sabbatical in 1914 when he visited Elliot Smith at his University of Manchester laboratory just as Elliot Smith was pondering the newly discovered Piltdown fossil puzzle. This visit was Davidson Black's first introduction to Anthropology, which fired his scientific imagination! Eventually returning to Cleveland (and with his new contacts in England including Woodward Smith and (Sir) Arthur Keith), Black set about to build anthropological teaching collections. Through this work, Black was introduced to American Henry Fairfield Osborn and the work of fellow Canadian William Diller Matthew, both of whom were intrigued by the potential of Asia as a fossil-hunting ground. Matthew's 1915 writings convinced Black that Asia was central to the search for primate ancestors.

In 1917 (after three attempts to join the war effort, because of his weak heart), Black joined the Canadian Medical Corps and was based at a military camp in southern England. During this overseas experience, unknown to Black, his medical passions were being discussed by members of the American Rockefeller Foundation, an agency that had initiated plans for a "Johns Hopkins" of the East. Black was being considered for the position of Neurology/Embryology professor at the newly conceived Peking Union Medical College, in Beijing, China. This invitation was Black's chance to now fully dedicate himself to the questions of Asian prehistory. In September 1919, Adena and Davidson Black arrived in China.

Major Accomplishments

Davidson Black is often identified as "discoverer" of Peking Man or *Homo erectus* from China. He did not discover these fossil human remains but instead initially recognized three teeth as belonging to a human ancestor that had not been identified previously. In 1927, Black published a monograph in which he named this species – *Sinanthropus pekinensis*.

Black was keen to search for human ancestors in Asia but had to concentrate on his professorial duties. Initially he published scientific analysis of human remains found by his Swedish colleague J.G. Andersson who worked for the Geological Survey of China. In 1926 Black learned of two fossil teeth found near Zhoukoudian (Dragon Bone Hill) village southwest of Beijing. He recognized these two teeth as human and arranged for Rockefeller Foundation funding for systematic excavations starting in 1927. Upon finding a third tooth, in situ, Black was confident in identifying the first-ever fossil human remains from China. By now the College recognized Black's dedication to Anthropology and also the key role that the PUMC along with the Geological Survey/Society of China might make to the human sciences, and Black was allowed to focus his energies on research. Black was central in the creation of a "union" between the GSC and PUMC that became a human origins facility known as the Cenozoic Research Laboratory. Annual excavations by teams of young men and boys resulted in the discovery of numerous teeth and jaw fragments and in 1929 the first evidence of a "complete" human cranium (Skull III) from the site by Pei Wenzhong. Black's responsibility was describing and analyzing these human finds; his papers were published by the GSC and in a journal called *Palaeontologia Sinica*. Davidson Black was the voice for *Sinanthropus* as he travelled to conferences in southern Asia, North America, and throughout Europe, illustrating replica examples and visual images (photographs and drawings) of these fossils to his scientific associates.

Black received numerous honors including:

- Grabau Medal, Geological Society of China in 1929
- Honorary D.Sc., University of Toronto in 1930
- King Gold Medal, Peking Society of Natural History
- Fellow of the Royal Society in 1932 for work on *Sinanthropus* (Croonian Lecture entitled *The Discovery of Sinanthropus*)
- Daniel Giraud Elliot Medal for work on Peking Man from US National Academy of Sciences awarded for 1931, conferred posthumously in 1934
- Recognition of his work in human origins with the species name *Gigantopithecus* "*blacki*"

Cross-References

- ▶ Peking Man
- ▶ Weidenreich, Franz
- ▶ Zhoukoudian, Archaeology of
- ▶ Zhoukoudian: Geography and Culture

References

Matthew, W.D. 1915. Climate and evolution. *Annals of the New York Academy of Sciences* XXIV: 171–318.

Further Reading

Black, D. 1927. The lower molar hominid tooth from the Chou Kou Tien deposit. *Palaeontologia Sinica Geological Survey of China, Series D* VII (1): 1–26.

Cormack, J.L. 2003. Davidson Black and his role in Chinese palaeoanthropology. In *Current research in Chinese Pleistocene archaeology*, British Archaeological Reports International series 1179, ed. S. Chen and S. Keates, 9–19. Oxford: Archaeopress.

Hood, D. 1964. *Davidson Black. A biography.* Toronto: University of Toronto Press.

Jia, L., and W. Huang. 1990. *The story of Peking Man. From archaeology to mystery.* Beijing: Foreign Languages Press.

Tobias, P.V., Q. Wang, and J. Cormack. 2001. The establishment of palaeo-anthropology in South Africa and China: With especial reference to the remarkable similar roles of Raymond A. Dart and Davidson Black. *Transactions of the Royal Society of South Africa* 56 (1): 1–9.

Blombos Cave: The Middle Stone Age Levels

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Introduction

Blombos Cave, an archaeological site situated on the southern Cape coastline, South Africa, contains Middle Stone Age (MSA) deposits dated at between c. 130 and 72 ka (ka = 1000 years ago), possibly the most important period in the early development of modern human behavior. Since 1992 each excavation season at the site has yielded important new information on the behavioral evolution of *Homo sapiens*. This includes, at c. 75 ka, among the earliest known evidence for the manufacture of personal ornaments on shell beads, formal bone tool production, engraving of abstract designs on ochre and bone, the deliberate heating of silcrete, a lithic raw material, and the subsequent manufacture of bifacial stone points on this material using pressure flaking. In the 100 ka levels, a complex toolkit was uncovered that provides the oldest known evidence for the use of containers and for the production of an ochre-rich pigment or paint. These findings from Blombos Cave and subsequent reanalysis and excavation of other contemporary sites have resulted in a paradigm shift with regard to our understanding of the timing and location of the development of modern human behavior.

Definition

In tandem with the anatomical evolution of modern *H. sapiens* in Africa after 200 ka was the increasing capacity for symbolically driven behavior. Exactly when or how this capacity first translates into a material culture that carried symbolic meaning is unclear. Innovative material culture recovered from Blombos Cave provides a clear signal that by 100 ka human behavior was mediated by symbols. This evidence is likely only one part of a behavioral mosaic, a "wind of change" throughout the African Middle Stone Age that culminated in the diasporas at c. 60–80 ka – a series of human expansions from Africa that first introduced fully symbolic *sapiens* behavior to Eurasia and the rest of the world.

Key Issues/Current Debates/Future Directions/Examples

A major research challenge in archeology is identifying when and how symbols were used for the first time to mediate hominin behavior. Once in place, this innovation provided an ability to share, store, and transmit coded information and played a crucial role in creating the social conventions and identities that now characterize human societies. Over the last decade, the Blombos Cave (BBC) results have challenged long-held beliefs that the origins of behavioral modernity and the first use of symbolic material culture lay in Europe and commenced about 40,000 years ago. The focus for modern human behavioral origins has since switched to Africa and now generates lively debate, worldwide. Further analyses of the BBC materials and ongoing excavations at the site continue to contribute to this debate. A new dimension, paleoclimatic reconstruction, has been added to this research paradigm and suggests that the variable climates that characterized the Late Pleistocene had a major effect on the continuity of key cultural innovations. The adaptive responses of *Homo* to changing climates are however poorly understood; researching the role of climate in shaping the cognitive evolution of *H. sapiens* is, therefore, a priority. It is expected that existing and future results from BBC and other nearby sites will provide important information for understanding the development of human behavior within the context of climatic variability in the southern African Late Pleistocene.

Description of Blombos Cave

Blombos Cave lies 300 km east of Cape Town and is situated in a steep wave-cut calcrete cliff, 100 m from the Indian Ocean, and 34.5 m above modern sea level (34°25′S, 21°13′E) (Figs. 1, and 2). It is set into the calcified sediments of the Tertiary Wankoe Formation, and the calcareous environment is at least partially responsible for the good preservation of the recovered deposits (Henshilwood et al. 2001b).

Stratigraphy and Ages

The earliest Later Stone Age (LSA) occupation is c. 2 ka. The MSA levels are divided into four phases comprising a number of discrete layers within each phase (Fig. 3). These phases are named M1, upper M2, lower M2, and M3.

Blombos Cave: The Middle Stone Age Levels, Fig. 1 Blombos Cave site entrance

Blombos Cave: The Middle Stone Age Levels, Fig. 2 Interior of Blombos Cave (Image: Magnus Haaland)

A hiatus level composed of undisturbed aeolian sand above the M1 phase, DUN (Fig. 3), is dated to c. 70 ka. This layer of sand sealed the mouth of the cave and it reopened after the mid-Holocene high sea level stand at c. 4–3 ka. The upper part of the M1 phase dates to c. 73 ka and the upper M2 phase to c. 75 ka. The lower M2 phase layers date to c. 85 ka. The M3 phase dates to c. 100–94 ka and the ages of the lower levels, below level CQ hiatus, are currently being determined. The majority of dates were determined using optically stimulated luminescence (OSL) (Jacobs et al. 2006), but other methods, such as thermoluminescence (TL) (Tribolo et al. 2006) and uranium-thorium (U/Th) (Henshilwood et al. 2011), have also been employed.

Material Culture: M1 and Upper M2 Phases (Still Bay c. 75–72 ka)

The M1 and upper M2 phases fall within the Still Bay complex. Artifacts from these phases include bifacial stone points, bone tools, marine shell beads, and engraved ochre (Fig. 4).

Bifacial Points (Fig. 4a): Still Bay points, or "leaf-shaped" points, are a distinct type restricted to the Still Bay techno-tradition of southern Africa. Henshilwood et al. (2001b: 429) state "We propose 'Still Bay sub-stage' as a regional, culture-stratigraphic term for assemblages with fully bifacially flaked, lanceolate shaped points." The bifacial points from BBC are made from silcrete, quartzite, and quartz. A macrofracture study of these points shows that some were used as spear points for hunting but that others probably served also as multifunctional tools (Lombard 2007). Approximately half of the silcrete points were heat treated and then finished using the pressure flaking technique (Mourre et al. 2010). Through three-dimensional form analysis, it appears that the shape of bifacial points gradually changed through time (Archer et al. 2015), which would indicate that the Still Bay was not a static technological entity. In addition, the methods used to manufacture the BBC bifacial points differ from those at another Still Bay site, Sibudu, 1000 km northwest of BBC (Soriano et al. 2015), which suggests that people creating bifacial points at these different

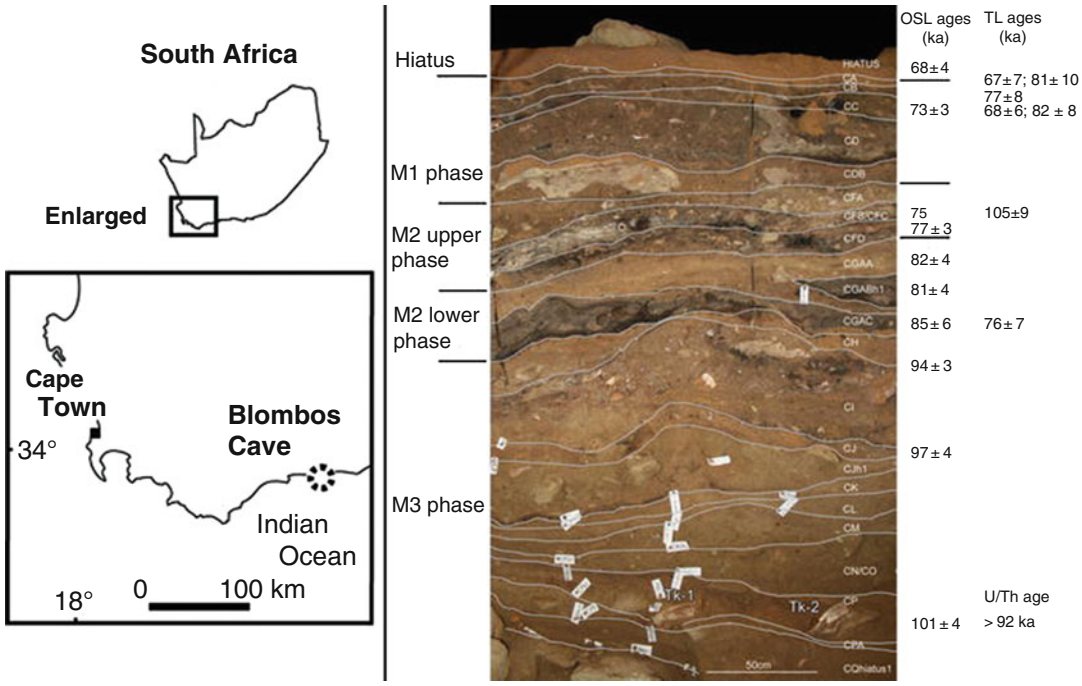

Blombos Cave: The Middle Stone Age Levels, Fig. 3 Location of Blombos Cave showing west section of the excavation. Upper M1 and M2 Lower, and M3 are occupation phases within the Middle Stone Age levels. The ages of each phase are shown at right (*OSL* optically stimulated luminescence, *TL* thermoluminescence, ka = 1000 years, U/Th = uranium/thorium)

locations were not necessarily part of the same, close, cultural entity.

Bone Tools (Fig. 4b): Bone tools are an unexpected technological innovation in the Still Bay at BBC. Regarded as a distinctive marker in the Eurasian transition to modern cognitive behavior, they are rare at MSA sites. More than thirty formal bone artifacts have been recovered from the Still Bay levels at BBC (Henshilwood et al. 2001a; d'Errico and Henshilwood 2007). The majority are awls made on long-bone shaft fragments, further manufactured by scraping and then used to pierce soft material such as leather, or small shells to make beads (d'Errico et al. 2005). At least some bone tools that were carefully polished after being shaped by scraping are probably projectile points made for hafting. It is noteworthy that points are treated differently to awls. The high polish on these points has no apparent function that can be detected but seems rather a technique that gives a distinctive appearance – an "added value" – to these artifacts. These may have formed part of a material culture exchange system among groups to maintain or even enhance social relations. The BBC bone tools provide comprehensive evidence for systematic bone tool manufacture and use, but we cannot be certain if this was also the case at other Still Bay sites. A note of caution is that we are not certain that the production of worked bone gives a modern character to all MSA material culture since little is known about the evolutionary significance of bone shaping (Henshilwood and Marean 2003). Symbolic marking on the bone is a likely feature that supports a symbolic interpretation. Microscopic analysis of a bone fragment marked with eight parallel lines from the Still Bay levels at BBC indicates they are the result of deliberate engraving and were possibly made with symbolic intent (d'Errico et al. 2001).

Engraved Ochres (Fig. 4c): Red ochre is a hydrated iron oxide with sufficient hematite (Fe_2O_3) content to be used as pigment. At BBC more than 2000 pieces of ochre, many bearing signs of utilization, have been recovered from

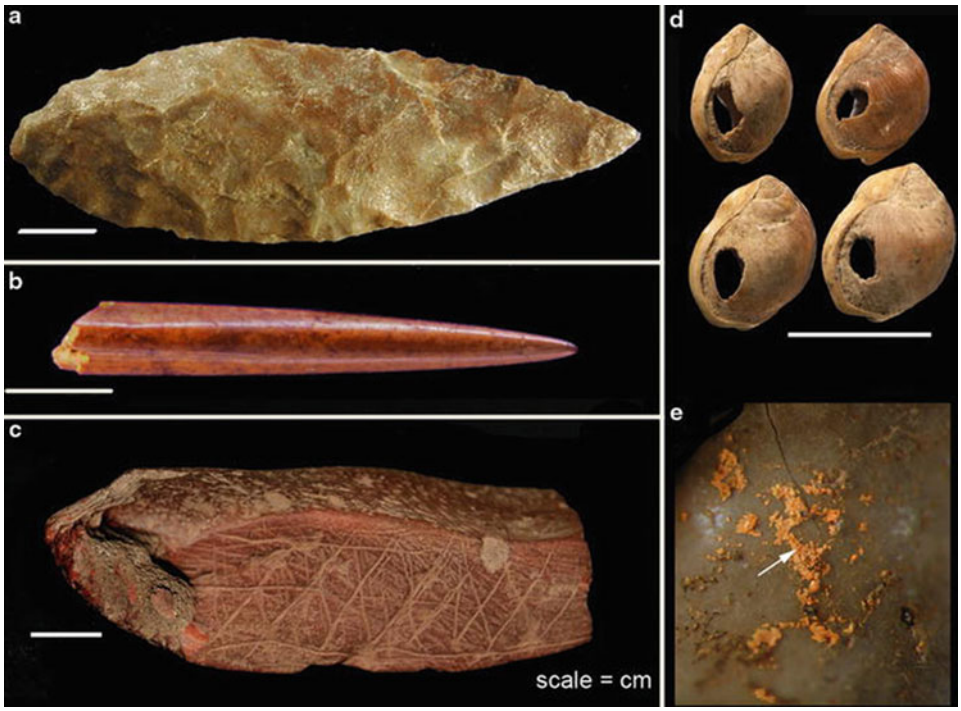

Blombos Cave: The Middle Stone Age Levels, Fig. 4 Artifacts from the Still Bay levels at Blombos Cave: (**a**) silcrete bifacial point, (**b**) formal bone tool, (**c**) engraved ochre SAM (AA-8938), (**d**) Nassarius kraussianus shell beads, and (**e**) ochre deposit on a shell bead (Images by C. Henshilwood & F. d'Errico)

the Still Bay phases. During excavations in 1999 and 2000, two ochre pieces with deliberately engraved cross-hatched patterns AA-8937 (Fig. 4c) and AA-8938 were discovered from the M1 phase (Henshilwood et al. 2002). Two ground facets are present on specimen AA-8937, and on the larger of these, the cross-hatched design is engraved. It is clear that the design results from deliberate intent and it is arguably among the most complex and clearly formed of objects claimed to be early abstract representations (d'Errico et al. 2003). Six additional engraved ochre pieces from the Still Bay phases have subsequently been recovered (Henshilwood et al. 2009).

Marine Shell Beads (Fig. 4d, e): A strong argument for early behavioral modernity in the Upper Paleolithic is the presence of personal ornaments. The discovery of more than 65 *Nassarius kraussianus* ("tick shell") beads in the Still Bay phases at BBC has added a new dimension to the modern human behavior debates (Henshilwood et al. 2004; d'Errico et al. 2005). All the recovered "tick" shells were carefully pierced using a bone tool to create a keyhole perforation. These were then strung, perhaps on cord or sinew and worn as a personal ornament. Repeated rubbing of the beads against one another and against the cord resulted in discrete use-wear facets on each bead that are not observed on these shells in their natural environment. These use-wear patterns are the principal factor that defines the shells as beads. Microscopic residues of ochre occur inside some of the beads and result from deliberate coloring or by transfer when worn.

The wearing and display of personal ornaments during the Still Bay phase was not idiosyncratic. Discrete groups of beads with wear patterns and coloring specific to that group were recovered from various levels and squares within the site (Vanhaeren et al. 2013). This patterning suggests that at least a number of individuals may have worn beads, perhaps on their person or attached to clothing or other artifacts. The shell beads also provide insights into

technological aspects of the Still Bay including the ability to drill, the use of cord or gut for threading, and the probable tying of knots to secure the beads. A comprehension of self-awareness or self-recognition is implied by the wearing of beads or other personal ornaments and was likely an important factor in cognitive evolution that was selected for long before the introduction of beads. Further, syntactical language would have been essential for the sharing and transmission of the symbolic meaning of personal ornaments within and between groups and also over generations, as is also suggested for the engraved ochre pieces.

Material Culture: Lower M2 Phase (c. 85 ka)

Bone tools, bifacial points, and shell beads are absent from the lower M2 phase. The intensity of the cultural deposits is low in this phase but includes a few basin hearths; a very large hearth in layer CGAC; small quantities of blades, flakes, and cores in silcrete, quartz, and quartzite; and some small ochre pieces. Some of the ochre pieces are ground or scraped but none have deliberate engravings. A detailed analysis of these artifacts is currently underway and the overall impression is that human occupations in the M2 phase were of short duration and possibly that the size of the groups was also limited.

Material Culture: M3 Phase (c. 100–94 ka)

In this lower phase, lithics are abundant and silcrete is the dominant raw material. Retouch on the lithics is rare, and the main characteristic of the industry is the predetermination of blank shape through core reduction (Douze et al. 2015). No bone tools have been recovered.

Modified ochre is common in this phase and eight slabs deliberately engraved with either cross-hatched, Y-shaped, or crenulated designs were recovered (Henshilwood et al. 2009). This indicates a tradition for the production of geometric engraved representation in the MSA at BBC with roots that go back in time to at least 100 ka and which includes the production of a number of different patterns. The findings support the view that the use of ochre during the MSA at BBC was not only functional but that it also served, perhaps primarily, in a symbolic role. In a wider context, this was also likely the case at other MSA sites in the southern Cape. Incised ochre pieces recovered from these latter sites also fall within the definition of engraved representations and demonstrate that there was a spatial and temporal continuity in the production and use of symbols in the region. The intrasite similarity of the abstract designs and methods used for the motifs at BBC and on regional intrasite level during the MSA is consistent with the continuity found in more recent symbolic systems that have been globally described for the Later Pleistocene and early Holocene.

Ochre-Processing Workshop, M3 phase (Fig. 5): In 2008 an ochre-processing workshop consisting of two toolkits was uncovered in the 100,000-year-old levels at Blombos Cave, South Africa. Analysis shows that a liquefied pigment-rich mixture was produced and stored in two *Haliotis midae* (abalone) shells and that ochre, bone, charcoal, grindstones, and hammerstones formed a composite part of the toolkits.

As both toolkits were left in situ and as there are few other archeological remains in the same layer, it seems the site was used primarily as a workshop and was abandoned shortly after the compounds were made. Dune sand then blew into the cave from the outside, encapsulated the toolkits, and by happenstance ensured their preservation before the next occupants arrived, possibly several decades or centuries later.

Recent support for a southern African origin for *H. sapiens* comes from genomic and phenomic diversity studies. The recovery of these toolkits at Blombos Cave adds evidence for early technological and behavioral developments associated with *H. sapiens* to this scenario. It documents the first known instance for the deliberate planning, production, and curation of a pigmented compound and for the use of a container. Evidence for the complexity of the task includes procuring and combining raw materials from various sources (implying they had a mental template of the process they would follow), possibly using pyrotechnology to facilitate fat extraction from bone, using a probable recipe to produce the

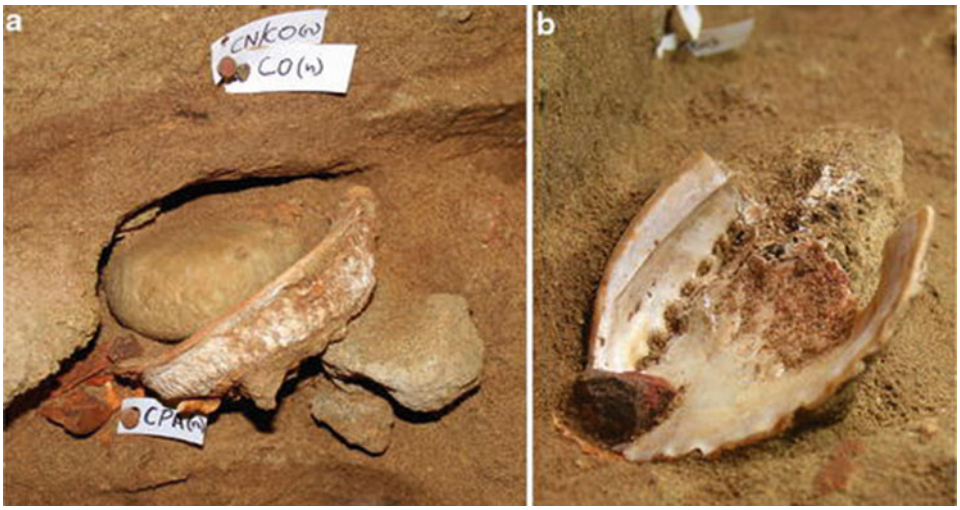

Blombos Cave: The Middle Stone Age Levels, Fig. 5 Ochre-processing toolkits in situ showing toolkit 1 (Tk1) (**a**) and toolkit 2 (Tk2) (**b**) (Images Grethe Moéll Pedersen)

compound, and the use of shell containers for mixing and storage for later use. An elementary knowledge of chemistry and the ability for long-term planning suggest conceptual and cognitive abilities previously unknown for this time and serve as a benchmark during the early evolution of the technological and cognitive abilities of *H. sapiens* in southern Africa (Henshilwood et al. 2011).

Subsistence in the MSA Levels

The faunal collection from Blombos shows that MSA people practiced a subsistence strategy that included a very broad range of animals. This means they were able to hunt large animals, such as eland, but also gathered, collected, or trapped small animals such as tortoises, hyraxes, and dune mole rats. They also brought seal, dolphin, and probably whale meat back to the cave. The latter two were almost certainly scavenged from beach washups, but seals may have been speared or clubbed.

The shellfish provide early evidence for the use of seafoods. Shellfish were collected and brought back to the cave, and the M3 phase, with an age of c. 100 ka, is a particularly rich shell midden. Common species include the giant periwinkle (*Turbo sarmaticus*), limpets (Patella sp.), and brown mussels (*Perna perna*). Species variations may, with larger sample sizes, inform us of past changes in ocean paleotemperatures.

Fish remains are present, but not abundant, in all phases at BBC. Fish remains are more abundant in the LSA, but a wider range of species are present in the MSA. Chemical analysis of fish bone from the LSA and MSA levels using the carbon/nitrogen method confirms the antiquity of the MSA specimens. Most of the species present are not known to wash up after cold-water upwelling events; hence, scavenging of washups was not the primary source of fish. No artifacts that appear to be obvious fishing equipment have been found, but the range and sizes of species present indicate that a number of methods must have been employed. These include baited hooks, spearing, and tidal traps. Comparison of the elements from the same species that have survived in the MSA relative to the LSA at BBC has shown a large deficit in the MSA – in other words, age-related taphonomic processes have resulted in the loss of many fish bones, and there were likely many more fish deposited in the MSA than we can currently see. Fish are seldom reported from other southern African MSA sites, and by implication, it was thought that MSA people

were incapable of exploiting coastal resources efficiently. The evidence for fishing at BBC and Klasies River contradicts this theory (Van Niekerk 2011).

The overall subsistence pattern at BBC signifies that no clear distinction can be made between Later Stone Age and Middle Stone Age subsistence behavior at the site (Henshilwood et al. 2001b; Henshilwood 2008). The implication is that during the MSA occupations, the subsistence mode was essentially modern.

Human Remains

The amount of human material recovered from the Blombos MSA is small – seven teeth (Grine et al. 2000; Grine and Henshilwood 2002). The crown diameters of at least some of these teeth suggest that the people at Blombos were probably anatomically modern. This conclusion is supported by similar evidence from a nearby archeological site, Klasies River, that dates to a similar time period.

Summary

The origins of "modern" human behavior generate lively debate, worldwide, but an African evidence for its origins has long remained elusive. Published results from the Blombos Cave excavations complement recent and older findings from a number of African MSA sites that suggest some aspects of "modern behavior" evolved during the early Late Pleistocene in Africa. The discoveries at Blombos clearly reflects the acquisition of fully modern cognitive abilities by southern African populations by at least 100,000 years.

Cross-References

- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ Fossil Records of Early Modern Humans
- ▶ Hominids, Earliest African
- ▶ Out-of-Africa Origins
- ▶ Pinnacle Point: Excavation and Survey Methods

References

Archer, W., P. Gunz, K.L. Van Niekerk, C. Henshilwood, and S. McPherron. 2015. Diachronic change within the still bay at Blombos cave, South Africa. *PLoS One* 10 (7): e0132428.

d'Errico, F., and C.S. Henshilwood. 2007. Additional evidence for bone technology in the southern African middle stone age. *Journal of Human Evolution* 52: 142–163.

d'Errico, F., C.S. Henshilwood, and P. Nilssen. 2001. An engraved bone fragment from ca. 75,000-year-old middle stone age levels at Blombos cave, South Africa: Implications for the origin of symbolism and language. *Antiquity* 75: 309–318.

d'Errico, F., C.S. Henshilwood, G. Lawson, M. Vanhaeren, M. Soressi, F. Bresson, A.M. Tillier, B. Maureille, A. Nowell, and L. Backwell. 2003. The search for the origin of symbolism, music and language: A multidisciplinary endeavour. *Journal of World Prehistory* 17: 1–70.

d'Errico, F., C.S. Henshilwood, M. Vanhaeren, and K.L. Van Niekerk. 2005. *Nassarius kraussianus* shell beads from Blombos cave: Evidence for symbolic behaviour in the middle stone age. *Journal of Human Evolution* 48: 3–24.

Douze, K., S. Wurz, and C.S. Henshilwood. 2015. Technocultural characterization of the MIS 5 (c. 105–90 Ka) Lithic Industries at Blombos cave, southern cape, South Africa. *PLoS One* 10 (11): e0142151.

Grine, F.E., and C.S. Henshilwood. 2002. Additional human remains from Blombos cave, South Africa: (1999–2000 excavations). *Journal of Human Evolution* 42: 293–302.

Grine, F.E., C.S. Henshilwood, and J.C. Sealy. 2000. Human remains from Blombos cave, South Africa: (1997–1998 excavations). *Journal of Human Evolution* 38: 755–765.

Henshilwood, C.S. 2008. *Holocene prehistory of the southern cape, South Africa: Excavations at Blombos cave and the Blombosfontein nature reserve*. Oxford: Archaeopress.

Henshilwood, C.S., and C.W. Marean. 2003. The origin of modern human behavior: A review and critique of the models and their test implications. *Current Anthropology* 44: 627–651.

Henshilwood, C.S., F. d'Errico, C.W. Marean, R.G. Milo, and R. Yates. 2001a. An early bone tool industry from the middle stone age at Blombos cave, South Africa: Implications for the origins of modern human behaviour, symbolism and language. *Journal of Human Evolution* 41: 631–678.

Henshilwood, C.S., J.C. Sealy, R. Yates, K. Cruz-Uribe, P. Goldberg, F.E. Grine, R.G. Klein, C.A. Poggenpoel, K. Van Niekerk, and I. Watts. 2001b. Blombos cave, southern cape, South Africa: Preliminary report on the 1992–1999 excavations of the middle stone age levels. *Journal of Archaeological Science* 28: 421–448.

Henshilwood, C.S., F. d'Errico, R. Yates, Z. Jacobs, C. Tribolo, G.A.T. Duller, N. Mercier, J.C. Sealy, H. Valladas, and I. Watts. 2002. Emergence of modern human behavior: Middle stone age engravings from South Africa. *Science* 295: 1278.

Henshilwood, C.S., F. d'Errico, M. Vanhaeren, K.L. Van Niekerk, and Z. Jacobs. 2004. Middle stone age shell beads from South Africa. *Science* 304: 404–404.

Henshilwood, C.S., F. d'Errico, and I. Watts. 2009. Engraved ochres from the middle stone age levels at Blombos cave, South Africa. *Journal of Human Evolution* 57: 27–47.

Henshilwood, C.S., F. d'Errico, K.L. Van Niekerk, Y. Coquinot, Z. Jacobs, S.-E. Lauritzen, M. Menu, and R. Garcia-Moreno. 2011. A 100,000-year-old ochre-processing workshop at Blombos cave, South Africa. *Science* 334: 219–222.

Jacobs, Z., G.A.T. Duller, A.G. Wintle, and C.S. Henshilwood. 2006. Extending the chronology of deposits at Blombos cave, South Africa, back to 140 ka using optical dating of single grains of quartz. *Journal of Human Evolution* 51: 255–273.

Lombard, M. 2007. Evidence for change in middle stone age hunting behaviour at Blombos cave: Results of a macrofracture analysis. *South African Archaeological Bulletin* 62: 62–67.

Mourre, V., P. Villa, and C.S. Henshilwood. 2010. Early use of pressure flaking on lithic artifacts at Blombos cave, South Africa. *Science* 330: 659.

Soriano, S., P. Villa, A. Delagnes, I. Degano, L. Pollarolo, J.J. Lucejko, C. Henshilwood, and L. Wadley. 2015. The still bay and Howiesons Poort at Sibudu and Blombos: Understanding middle stone age technologies. *PLoS One* 10: e0131127.

Tribolo, C., N. Mercier, M. Selo, H. Valladas, J.-L. Joron, J.-L. Reyss, C. Henshilwood, J. Sealy, and R. Yates. 2006. TL dating of burnt lithics from Blombos cave (South Africa) and the antiquity of modern behaviour. *Archaeometry* 48: 341–357.

Van Niekerk, K. L. 2011. *Marine fish exploitation during the middle and later stone age of South Africa*. Unpublished PhD dissertation, University of Cape Town.

Vanhaeren, M., F. d'Errico, K.L. Van Niekerk, C. Henshilwood, and R.M. Erasmus. 2013. Thinking strings: Additional evidence for personal ornament use in the middle stone age at Blombos cave, South Africa. *Journal of Human Evolution* 64: 500–517.

Further Reading

Henshilwood, C.S., and J. Sealy. 1997. Bone artefacts from the middle stone age at Blombos cave, southern cape, South Africa. *Current Anthropology* 38 (5): 890.

Jacobs, Z., E.H. Hayes, R.G. Roberts, R.F. Galbraith, and C.S. Henshilwood. 2013. An improved OSL chronology for the still bay layers at Blombos cave, South Africa: Further tests of single-grain dating procedures and a re-evaluation of the timing of the still bay industry across southern Africa. *Journal of Archaeological Science* 40 (1): 579–594.

Soressi, M. 2005. Aux origines de la «modernité» comportementale en Afrique du sud il ya 75 000 ans. *Annales de la Fondation Fyssen* 20: 124–131.

Blue Shield

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Introduction

The last quarter century has been a particularly traumatic period for cultural heritage exposed to damage by armed conflicts and natural disasters. Armed conflicts can be international or internal in nature, often causing humanitarian casualties as well as damage to cultural heritage. The damage is often deliberate, as in looting of sites and collections or the destruction of cultural heritage as a part of ethnic strife. Bosnia, Kosovo, Afghanistan, Iraq, Georgia, Egypt – these are just a few of the countries which have seen damage done to their heritage in recent years. Natural disasters were even more numerous in this period and were often more deadly and destructive than armed conflicts.

Since 2005, the International Council of Museums Disaster Relief Task Force (ICOM DRTF) has monitored at least 27 natural disasters affecting cultural property (taken from unpublished email correspondence between ICOM-DRTF members.) These include the Indian Ocean tsunami, the Haiti earthquake, and the Japan earthquake/tsunami/Fukushima nuclear meltdown, among many others. Natural disasters and armed conflicts are obviously here to stay and, in fact, may increase with global climate change and political instability. The Blue Shield may offer some hope to prevent or mitigate damage to cultural property in future disasters through networking, monitoring, and emergency planning and response.

Definition

The Blue Shield is an overarching term describing a group of organizations whose goal is to promote the protection of cultural property in the event of armed conflict and natural disasters. These are divided into the International Committee of the Blue Shield (ICBS) and its member organizations, the Blue Shield National Committees (BSNCs) and their individual and organizational members, and the Association of National Committees of the Blue Shield (ANCBS). The Blue Shield organizational structure is loosely based on the Red Cross model, which includes the International Committee of the Red Cross (ICRC), the various Red Cross committees in each individual country (such as the American Red Cross), and the International Federation of the Red Cross (IFRC), which helps coordinate the activities of the national committees. The Blue Shield is sometimes referred to as "the Red Cross for culture."

Historical Background

A follow-up to the 1899 and 1907 Hague Conventions (both setting forth rules of war), the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict is the first international treaty dealing exclusively with cultural heritage during war. Drafted in response to the damage and looting of cultural heritage during World War II, the 1954 Hague Convention deals primarily with conflicts between nations and describes each nation's responsibilities toward cultural heritage (1954 Hague Convention, Chapter 1). Basically, these include planning during peacetime for the protection of each nation's domestic cultural property should an armed conflict occur and to safeguard and respect the cultural property of other States Parties with whom they are in armed conflict. The treaty also describes the protective symbol of the Blue Shield and the terms of its use to designate protected cultural property and personnel (Fig. 1).

The 1954 Hague Convention was violated repeatedly during the Bosnian conflict (1992–1996), with evidence that some military forces deliberately destroyed cultural sites bearing the blue shield, the international symbol for the protection of cultural property during armed conflict. This included the destruction of multiple mosques, minarets, churches, and other religious institutions, along with the infamous shelling of the historic city of Dubrovnik and the Stari Most

Blue Shield, Fig. 1 Blue Shield symbol used to mark the archaeological site at Tikal in Guatemala. (Photo courtesy David Mitchell)

Bridge. Several individuals have been charged with war crimes under the United National International Criminal Tribunal for the former Yugoslavia.

The situation in Bosnia initiated a discussion within the international cultural property community about how to better support the 1954 Hague Convention. The International Committee of the Blue Shield was founded in 1996 and is headquartered in Paris, also the home of UNESCO, which administers the Hague Convention treaty. In addition, a Second Protocol to the Hague Convention was drafted in April 1999 and came into force in 2004. Its purpose is to strengthen the main convention by including more specific language about punishing violations.

Key Issues/Current Debates

International Committee of the Blue Shield (ICBS)

ICBS consists of the International Council on Archives, the International Council of Museums (ICOM), the International Council on Monuments and Sites (ICOMOS), the International Federation of Library Associations (IFLA), and the Coordinating Council of Audiovisual Archives Associations (CCAAA). Its board is made up of the five directors general of these organizations with a rotating presidency. While ICBS does not have a permanent office or staff, the staffs of these individual organizations coordinate and carry out the daily activities of the ICBS.

The mission of ICBS is to "work for the protection of the world cultural heritage by coordinating preparations to meet and respond to emergency situations as well as post-crisis support" (http://icom.museum/what-we-do/programmes/museums-emergency-programme/international-committee-of-the-blue-shield.html). The Second Protocol to the 1954 Hague Convention mentions ICBS and recognizes its role as an advisory body to international organizations such to the intergovernmental Committee for the Protection of Cultural Property in the Event of Armed Conflict at UNESCO and the International Criminal Court.

National Committees of the Blue Shield

Blue Shield national committees (BSNCs) strive to mirror the structure of the ICBS as closely as possible by including the national equivalent cultural organizations. For example, the International Council of Museums–USA is a founding member of the US Committee of the Blue Shield and represents the interests of museum professionals interested in implementing the 1954 Hague Convention here in the USA.

Each BSNC must apply for and receive official recognition from the ICBS; however, there is a great deal of flexibility from country to country. In some countries, the BSNC is a function of the Ministry of Culture or some other government body; in others it may be formed by other NGOs or organizational members, and in still others, such as the US, it may be a nonprofit organization with both individual and institutional members.

There are now more than 20 BSNCs, with many more under construction. Their primary mission is to promote implementation of the 1954 Hague Convention in their individual countries. The treaty is essentially a legal agreement between nations, and the BSNC members, as citizens of their respective nations, can influence political leaders, coordinate and train their militaries, and generally raise public awareness. In addition, BSNCs have a responsibility to raise awareness about the importance of domestic emergency preparedness and response for culture, both within their own countries as well as to help colleagues abroad. This may take place either as part of their own national humanitarian response or as part of the Blue Shield network. (see www.uscbs.org for an example of a BSNC).

An emerging function of BSNCs may be an active role in raising military awareness about protecting sites during armed conflict. Prior to the 2011 NATO "No-Fly Zone" in Libya, the US Committee of the Blue Shield worked with archaeologists and other NGOs within the Blue Shield network such as ICOM, ICOMOS, and the Archaeological Institute of America, to produce a list of coordinates of important Libyan cultural sites. USCBS then shared this information with the US Department of Defense prior to the

initiation of the no-fly zone, resulting in minimal damage to cultural sites during the NATO bombing.

Association of National Committees of the Blue Shield (ANCBS)

ANCBS was formed by a group of BSNCs and the ICBS by the 2008 Hague Accord to better coordinate the efforts of BSNCs, particularly with regard to emergency response (www.ancbs.org). The founding of ANCBS came in part from the feeling among cultural heritage professionals that there was not a timely or effective international response to the looting of the Iraq National Museum in 2003 and that BSNCs could better coordinate an emergency response in such situations. It also seemed natural that the National Committees have their own organizational structure for mutual coordination.

The ANCBS board consists of members (mostly the presidents or chairs) of various BSNCs and is based in The Hague, which in addition to being the home of the 1954 Hague Convention is also deemed the "international city of peace and justice" because it is home to the International Criminal Court. The board meets regularly in The Hague and in other cities around the world, as well as with the ICBS board in Paris.

Current Debates

One roadblock to the success of the Blue Shield is the perception that it is wrong to worry about saving culture during natural disasters and armed conflicts. While humanitarian assistance must always come first, a response for cultural property often comes too late or does not come at all. Up until recently, it has also been left out of emergency planning and response. This is changing slowly and is an area where BSNCs can make a real difference by raising awareness in their respective countries. One recent example is the US Committee of the Blue Shield's organizing a partnership with a number of US NGOs and government organizations after the 2010 Haitian earthquake. As a result, a very small percentage of the total US government humanitarian aid package for Haiti was set aside for culture, resulting in the Smithsonian Haiti Cultural Recovery project (www.haiti.si.edu).

Future Directions

As more BSNCs develop and ICBS becomes better staffed and funded, Blue Shield will become a more effective advocate for implementation of the 1954 Hague Convention and for emergency response for cultural heritage. Better preparedness and increased awareness among the population, governments, and military leaders will hopefully lead to a decrease in the loss to our shared cultural heritage worldwide.

Cross-References

- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ International Council of Museums (ICOM)
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)

Further Reading

Blue Shield. 2012. *Blue shield's network website*. Available at: www.ancbs.org

Riedlmayer, A. 2002. *Destruction of cultural heritage in Bosnia-Herzegovina, 1992–1996: A post-war survey of selected municipalities*. Available at: http://hague.bard.edu/reports/BosHeritageReport-AR.pdf

Smithsonian Institute. 2012. *Haitian cultural recovery project*. Available at: www.haiti.si.edu

UNESCO. 1954. *Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict*. Available at: http://portal.unesco.org/culture/en/ev.php-URL_ID=35744&URL_DO=DO_TOPIC&URL_SECTION=201.html

US Committee of the Blue Shield. 2012. *USCB home page*. Available at: www.uscbs.org

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Basic Biographical Information

Alexander Afanasievich Bobrinsky (1930–2010) (Fig. 1) was an outstanding Soviet and Russian researcher of ceramics and ancient pottery production. From 1952 until 1956, Bobrinsky was a student of the History Department at the Lenin Moscow State Pedagogical Institute, and during 1959–1962, he was a postgraduate in archaeology in Lomonosov Moscow State University under the scientific leadership of corresponding member of Russian Academy of Sciences, Artemiy V. Artsihovsky. In 1962, Bobrinsky successfully finished a thesis titled *Pottery Wheels of Eastern Europe in 9–13th Centuries AD*, and in 1979, he completed his doctor of history thesis, *Pottery Production in Eastern Europe. Sources and Methods of Study.* From 1963 until 2010, he worked as a leader of the History and Ceramics Laboratory at the Institute of Archaeology Russian Academy of Sciences.

As early as 1959, Bobrinsky began to collect a database of ethnographic information on the rural pottery production of various peoples from Eastern Europe, the Caucasus, and Central Asia. That work included, on the one hand, mass and systematic fill-in-the-blank requests of the population of these regions, and, on the other hand, many years of studying at recent rural pottery production centers. This work produced a tremendous resource of ethnographic data from about 1,000 pottery centers of European Russia, Baltic countries, the Ukraine, Belarus, Moldova, Caucasus, and Central Asia. This compendium became the basis for deeper understanding of important regularities in the history of ancient pottery production.

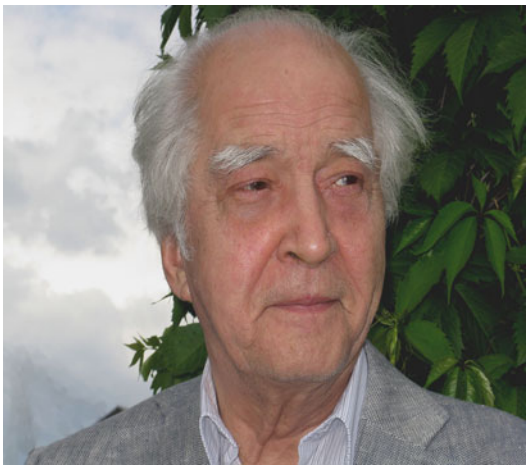

Bobrinsky, Alexander A., Fig. 1 Alexander Afanasievich Bobrinsky

Major Accomplishments

A.A. Bobrinsky is a creator of the new "Historical-and-Cultural Approach" for analysis of ancient pottery production. The core of this approach consists of the reconstruction of concrete potters' skills and cultural traditions in pottery technology, vessels' shapes, and pottery decoration through archaeological ceramics. In this field, A.A. Bobrinsky elaborated a general system of pottery technology investigation (1978, 1999), and new methods to study the shape of vessels (1987, 1988, 1991). Furthermore, his research revealed the main historical regularities in the development of special constructions for firing of vessels – bonfires, ovens, stoves, and kilns (1991, 1993). Moreover, Bobrinsky proposed well-proven new theories of the emergence, initial development and evolution of pottery wheels (1993, 1996), pottery kilns (1991), and ancient pottery production as well (1993, 1997, 1999, 2006). In recent years, he has focused a lot of attention on methods for studying the sex and age of ancient potters, ascertained through the nail prints on ceramics (2008).

All the new methods elaborated by Bobrinsky aimed to solve a core scientific goal – ceramics as a valuable source of historical information on ancient populations. A.A. Bobrinsky always tried to impart his knowledge to young scholars and that is why a strong scientific school in the study of ancient ceramics and pottery production now exists in Russia and in the countries of the former USSR.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Interpretation in Archaeological Theory
- ▶ Modern Material Culture, Archaeology of
- ▶ Medieval Pottery Research Group (MPRG)
- ▶ Medieval Russia (Rus'), Archaeology of
- ▶ Technological Studies in Archaeological Science

Further Reading

Bobrinsky, A.A. 1978. *The pottery of Eastern Europe. Source and methods of study.* Moscow (in Russian).

Bobrinsky, A.A. 1991. *Pottery workshops and kilns in Eastern Europe (based on materials from 2nd–5th centuries AD)*. Moscow (in Russian).

Bobrinsky, A.A. 1993. *The pottery wheel and its origin*. Ekaterinburg (in Russian).

Bobrinsky, A.A. 1999. Pottery technology as an object of historical and cultural study. In *Actual problems of ancient pottery investigation,* Collected monographs, 5–109. Samara (in Russian).

Bobrinsky, A.A. 2008. Determination of potter's sex through its nail prints on ceramics. In *Problems of recent archaeology. Collected papers to the memory of V.A. Bashilov,* 316–345. Moscow (in Russian).

In Memoriam. n.d. Available at: http://antiquity.ac.uk/tributes/bobrinsky.html

Bolt-Holes of Kilimanjaro, Northern Tanzania

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Introduction

Internal and external conflicts and frictions within the society has been part of the society's complexity. Such conflicts usually result onto direct confrontation between one group within the community and against another neighboring community. This has led human society to develop various war techniques and tactics to both defeat the enemy and shield its subjects. The origin, development, and complexity of such war defense mechanisms differed from community to community, location, and natural environment. Therefore, defense strategies developed by such societies form one of the most important processes in human history, as it has fundamentally changed social stratification and defined the complexity of the society and its cultural development. This has as well created professionalization and social inequality – standing army, army generals, and other leaders – ownership and distribution of natural resources. Because of these significances, the study of the ancient society's defense structures such as underground tunnels, trenches, ditches, and stone fortification has been one of the most important topics in the field of archaeology, anthropology, history, as well as other related disciplines of sciences and social sciences. This entry provides an account of a precolonial underground tunnel in Northeastern Tanzania.

Definition

The Chagga precolonial bolt-holes can be defined as a subterranean where a person can escape and hide. These are underground security chambers artificially constructed and are purely a local innovation. Bolt-holes were used as fastness for people and their goods during wars. The Chagga are a Pasto-agricultural community settling on the southern slopes of Mount Kilimanjaro. They are well-known for their economic and political enterprise and have a long history and reputation as ambitious, entrepreneurial, and adaptable (Fisher 2012; Pietilä 2007). According to Mkenda (2009, p. 60) *Wachagga* in (plural) and *Mchagga* (singular) have or shared "sufficiently, though inexhaustively" common cultural traits along with their language known as KiChagga. Scholars of Chagga literature maintain the form "Chagga" as both noun (singular and plural) and adjective.

This usage has been followed whenever possible throughout this thesis. The Chagga have acquired different interpretations from different scholars. Some refer to them as "mountain people," (Mkenda 2009, p. 60) as they identify strongly with Mount Kilimanjaro. Some used it as a place name (Krapf 1960[1860]); Meyer 1891) and some used the term to refer to people (Krapf 1960 [1860]). It is stressed here that from the early travelers' documents, the Kilimanjaro people have been bearing this name probably from the beginning of the second millennium CE or earlier; this is contrary to the suggestion by Stahl (1964) and Wimmelbücker (2002) who argue that "Chagga" was a place name with no reference to people and that the population on Kilimanjaro started to bear the name only from the 1890s.

Historical Background

The term "Chagga" is complex and sometimes perplexing. Plausibly, the first uses of the term "Chagga" and most especially its appearance in written records connoted that it was a unifying word signifying a common identity to the Chagga people of Kilimanjaro (Bender 2013). From the time of European exploration of colonies by missionaries, explorers, and traders and all the events at the beginning of the 1890s, the mountain's disparate residents had been referred to as a single people – the Chagga. "This designation argues Bender, probably stemmed from their perception of the mountain as a single, unified landscape, as well as from the similarities of the various mountain communities in terms of agricultural and cultural practices" (Bender 2013, p. 200). In written documents, the term appears as Mchagga, Wachagga, Chagga, Chaga, Waschagga, Jagga, WA-caga, or Dschagga, all referring to the same people. This thesis uses the term "Chagga" because it is the common usage and the most preferred by the Chagga people whom I interviewed.

Almost all scholars who have written about the Chagga from the eighteenth century to date used the term differently (Bender 2013; Campbell et al. 2004; Moore 1986; Moore and Puritt 1977; Stahl 1964; Yakan 1999). Some scholars have referred to the Chagga as a subculture of the Bantu inhabiting the fertile yet crowded slopes of Mount Kilimanjaro (Yakan 1999). This group is among the most politically active, entrepreneurial, and best educated in Tanzania (Stahl 1964). Chagga entrepreneurial culture is unique and acknowledged throughout the country. This culture can be traced from precolonial times, especially from the 1600s when the Chagga were actively engaging in regional trade. They traded with the Kamba to the north linking to the Mazrui Empire in Mombasa. When the Mazrui Empire declined and Zanzibar further to the south rose, the trade caravan through Ukamba also collapsed (Stahl 1964). The caravan now opted to move between the coast and Lake Victoria. This route took them across the southern slopes of Kilimanjaro. The Chagga benefited again in this trade making them the main group who supplied provisions to the caravan in addition to a safe passage. This led to the development of the Chagga states and increased social complexity through power, wealth, and vibrant agricultural economy (Campbell et al. 2004, pp. 46–50; Moore and Puritt 1977, pp. 11–15; Stahl 1964).

Generally, the whole question of Chagga origin, settlement, and identity needs to be given further thought. More fresh data, mostly archaeological data, is required. Works by Soper in Northeastern Tanzania and southeast Kenya shed only some light for Kwale and Maore pottery ware and related types which date to around the first millennium CE. These dates relate to Bantu-speaking groups, of which the Chagga are one. However, Soper (1982a, p. 235, b) makes very clear that evidence for the later Iron Age, particularly for explaining the spread of the Bantu, is scattered, fragmentary, and undated. Hence, there is a need for fresh well-documented chronological data for dating, to establish a clear historical origin, identity, and settlement pattern in Kilimanjaro.

Natural caves and other underground man-made features have played very important role in shaping the history of mankind. Such structures reflected and defined the relationship between man and his environment (Mostafa 2012, p. 37). Human being has been using the underground environment for war purposes since about 5500

BP (Eastler 2005, p. 21). Eastler is of the opinion that the use of natural cave might date back much earlier in human history. Ancient Egyptians provide us with the best example of development and use of the underground "especially in the construction of: tombs, warehouses, water passages, and tunnels which were used as accesses to tombs, worshipping rooms and the warehouses" (Salam 2002, p. 295; Mostafa 2012). This entry focuses on the Chagga and the precolonial tunnels (Figs. 2 and 3) in Kilimanjaro – Tanzania (Fig. 1). The bolt-hole were widely used system of defensive

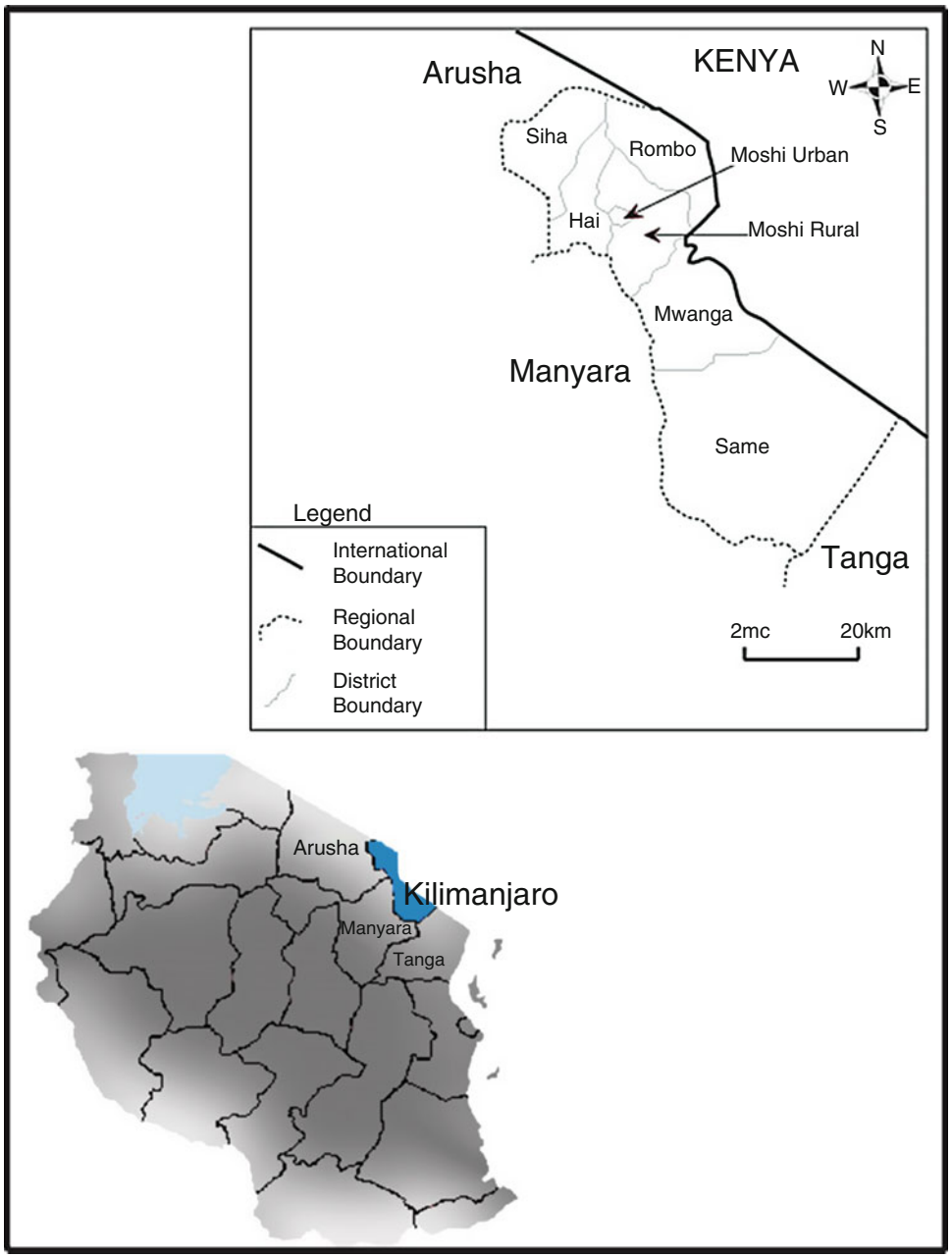

Bolt-Holes of Kilimanjaro, Northern Tanzania, Fig. 1 Kilimanjaro regional map with an insert of Tanzania map

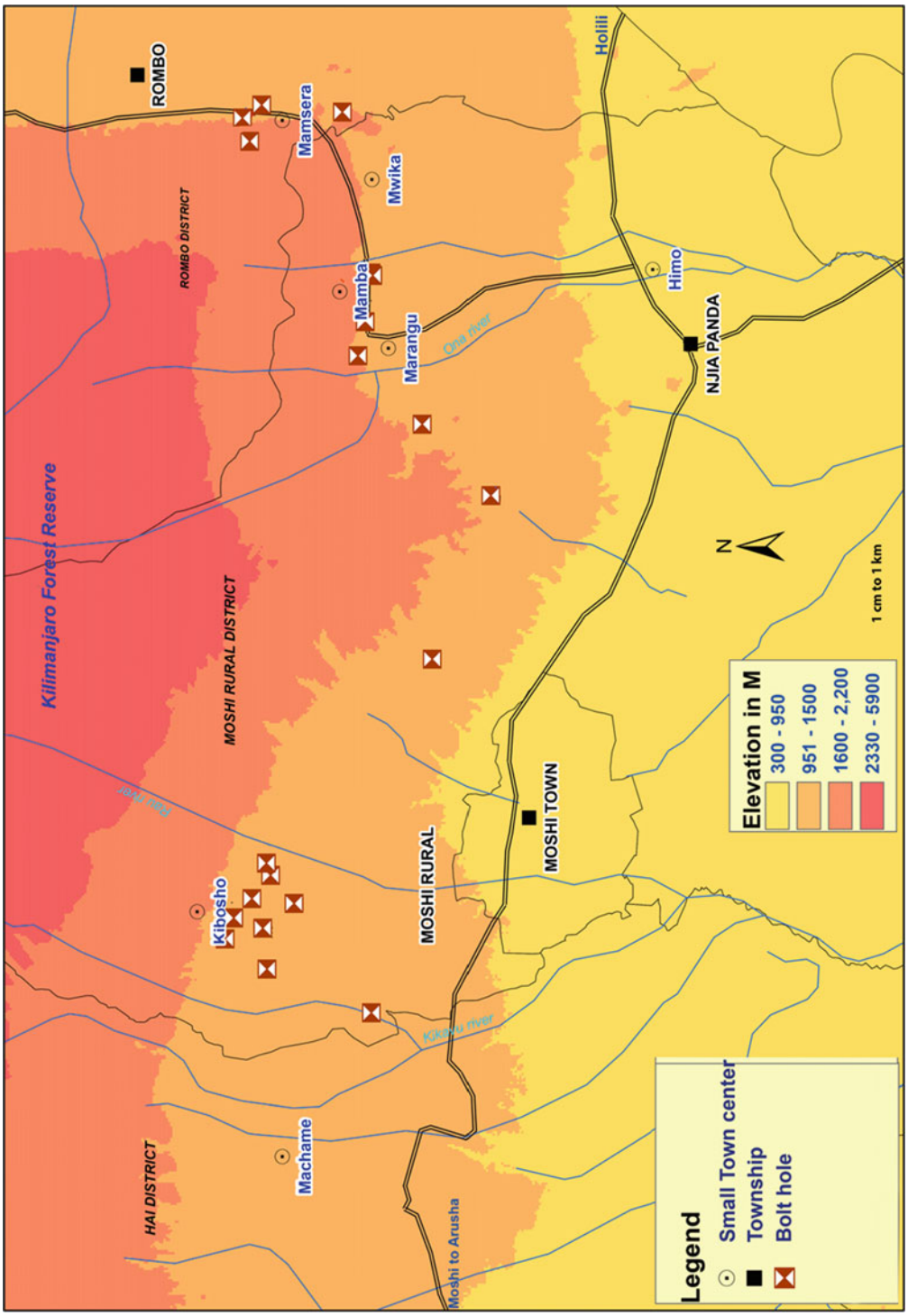

Bolt-Holes of Kilimanjaro, Northern Tanzania, Fig. 2 Bolt-hole distribution in Kilimanjaro

B

Bolt-Holes of Kilimanjaro, Northern Tanzania, Fig. 3 A section of Malanje bolt-hole in Kibosho – the arrow point to a recess chamber

structure in Kilimanjaro. Every Chagga village constructed and used these underground mega features. There are no established chronologies of the bolt-holes; however, oral accounts in Kibosho trace this technology from Mangi Tatuo who ruled Kibosho between 1861 and 1862 (Silayo 2009; Stahl 1964). The underground structure (Fig. 3), known as *"ndeshe" singular/ "mireshe" plural*, was very complex. The enemy could not easily follow when the Chagga retreated. They have features like alcove chambers – occupied only by soldiers when retreating. Several of such recesses were observed during detailed survey of the Mamsera, Mwika, Marangu, and Kibosho bolt-holes. These structures were found to have several cubicles for various functions such as kitchen, store, sleeping, and livestock chambers.

The choice of location for construction of the bolt-hole was very important. According to oral histories, river banks and forested areas with heavy vegetation were preferred. Clack (2009) examined the Laban cave (surveyed and documented by Silayo 2012) and Nkowoyo Kyalia bolt-hole and argues that the two bolt-holes were strategically placed. The area has also been characterized with heavy forest which impeded visibility as well as sound (Fernandes and Nair 1986). The significance of the monumental archaeological remains and other material culture found in Kilimanjaro lies in the fact that they have ideological and affective connotations attached to them. For example, the Chagga underground bolt-holes and royal compounds speak volumes about the complexity of the Chagga precolonial society. These are intrinsically connected to the Chagga precolonial polity with which the Chagga as a group are proudly identified; as Festo Mkenda (2009) puts it, the Chagga identify themselves with a group rather than as individuals.

Climate of Kilimanjaro

Muller (1983) presents Kilimanjaro area as defined by a "seasonally dry, tropical climate." The area also has four hydrological seasons with bimodal rainfall pattern (Schüler and Hemp 2016). Schüler and Hemp further argue that climate in Kilimanjaro depends on the elevation on the mountain as well as the exposure of the mountainside (Schüler and Hemp 2016, p. 2) This could have been the reason for Juhani Koponen's argument that Chagga were not in position to suffer

food shortage (Koponen 1988, p. 645), and if it had happened, then it would have been in the areas torn by war.

Scholars have argued that the Chagga knowledge of the seasons and climate is affected much by their immediate environment such as the coffee-banana belt, the forest, and cultivated lands (Blot 2006). For the Chagga, water supply represents "large-scale climatic patterns" and determines climatic development (Tagseth 2010). Variation in water supply means change of climate and seasons which also influences cultural and social life. To keep pace with the climate and seasonality, the Chagga had to pay attention to the direction and movements of clouds. Oral histories contend that with the traditional knowledge on climate and seasons, they could tell when there would be heavy rain and the direction of the rain. For example, if the heavy rain cloud was observed on the plains and possibly moving toward the mountain, then they would receive heavy rain in the farmland and banana-coffee grove. If the cloud was spotted stationary on the mountain, then rivers would flood as it was expected to rain in the forest. This knowledge triggered the Chagga to prepare their farms and furrows in a timely manner. Blot (2006) argues that there is a key dissimilarity between the traditional view of climate and that of the modern climatologist. He says that the difference is that the traditional view of climate pays attention only to describing the cloudy season, while modern climatologists also attend to hydrological cycles, plant growth, and harvesting. The Chagga cultural life cycle had to match climate as they relied on the good rainfall both to water the farms and to fill the furrows, which were their main engines for survival. Therefore, climatically, reliable rainfalls on the slopes, with differentiations according to altitude, facilitated agriculture that supported relatively dense populations. Principally the Chagga people quite heavily populate the area surrounding the mountain. Presently, the Chagga people still use the forest for many household and medicinal products, for fuel wood, small-scale farming, beekeeping, hunting, charcoal production, and logging. Such activities indicate close attachment and social interaction with the mountain on one side and the Chagga population on the other side (UNEP-WCMC 2011).

I argue that it is by understanding the Chagga's view of environment and their culture – the relations between humans (Chagga) which act as a social link and their environment, which act as a natural link –that we can understand the nature of the Chagga social complexity. Analysis of the relationship between the mountain and the Chagga shows that they attach strong symbolic meaning to their environment. This profound attachment, argues Sébastien (2010, p. 2), leads to social relations and technical progress while conflicts over natural resources are primarily of a social nature.

Therefore, the fertile, well-watered slopes of Mount Kilimanjaro have for millennia been home to Chagga society. Ancestors of the present populations began to settle the lower slopes of the mountain in successive waves from 500 CE. Settlements tended to be located on river banks/ridges, rivers, and streams with fast-moving water heading toward the plains. These rivers acted as boundaries. The Chagga, exploiting numerous rivers for irrigation, developed an agrarian economy based upon intensive cultivation. Over several centuries, this led to each ridge of the mountain developing into an autonomous political space comprised of several different clans, each led by a leader called Mangi and ceremonial specialists (Bender 2013; Moore and Puritt 1977). Though politically independent, clans on the same ridge often forged alliances for purposes such as defense and also had regular contact through both warfare and trade (Bender 2013; Wimmelbücker 2002). Under these conditions in mind, Chagga could have developed a form of complex social political units building strong defense structures such as bolt-holes and other earthworks.

Key Issues/Current Debates

There are some issues of concern about Chagga bolt-hole – origin of the idea, technology, personnel, and tools used for construction as well as name of the structure – these issues warrant a

further research and inquiry into the Chagga oral history. I have argued that the Chagga did not borrow bolt-hole technology from any neighboring country and one cannot say certainly that it was brought by migrants. This is due to the fact that, apart from Gweno people, there are no records of similar structures in the neighboring countries. Although the Gweno people from the pare Mountains, south of Kilimanjaro, have the same kind of defense, scholars agree that the technology was borrowed from the Chagga and sometimes the Chagga were hired by chiefs from Pare and Usambara hills to construct the bolt-holes in exchange for hoes and other iron implements such as spears and swords, as well as animals like cows and goats (Fosbrooke and Sassoon 1965). Although the issue of tools and construction method has not yet been cleared, this is a local origin and innovation. The Chagga made proper use of local resources and topography of their land to device security measures to keep them safe. The different names used by various scholars to refer to the bolt-holes are of more of stylistic than semantic. Scholars would choose name for depending on what they think the structures are and look like. For example, scholars have used different names to refer to these structures: they include Chagga underground bolt-holes (Clack 2009; Fosbrooke 1954; Fosbrooke and Sassoon 1965; Silayo 2009, 2012), dugouts (Jones 1941), hideouts (Tagseth 2008), and caves (Chami 2005).

International Perspectives

These were used purposely to protect the chiefdom's power and wealth. Andrew Reid describes a ditching system in Uganda and argues that the ditches date to the fifteenth century and were dug on the hilltop. The ditches were cut to a depth of about five meters and run for more than a kilometer (Reid 2013). He further argued that the lack of tangible evidence for the settlement of the sites with ditches disqualifies the argument that they were used for defensive purposes; rather, he argued that ditches represented power and were associated with rituals, spirits, and the seat of the political authority (Reid 2013).

Generally, earthworks have been used to explore chronology of settlement and development of social complexity in precolonial societies and suggest a complex social and political organization (Boachie-Ansah 2013, p. 37). This is due to the fact that, argues Kiyaga-Mulindwa (1978, p. 196), earthworks are a result of intensive labor bringing in a considerable proportion of the population. The amount of work and labor force and complexity of the structures strongly suggest well-organized social organizations that express a high level of mobilization, control, and coordination (Boachie-Ansah 2008.) The Chagga tunnels and earthworks are no exception. They express the sophistication and complexity of the community during the precolonial epoch and, as Clack (2009, p. 325) put it, played a very significant role in the Chagga "cultural relations."

Future Directions

Though many works have been done in the last decades, there are still issues under debate. Issues like construction methods and tools, dating of the structures, allocation of functions for the room by gender and hierarchy, and the whole theoretical discourse of social complexity and emergence of chiefdoms, such as the role played by the defense structures in the process of social complexity among the Chagga and what role did it play in defining the nature of the Chagga chiefdoms. This calls for more sophisticated multidisciplinary digital methods such as GIS in archaeology, aerial and satellite images and photographs, ground-penetrating radar for locating artifacts hidden below ground, as well as LIDAR which can scan the surface through vegetation. An interdisciplinary approach to study chiefdoms and social complexity in Africa has also been used successfully in southern Africa by Eldredge (2015). She uses detailed and wide knowledge of oral and archival sources coupled with archaeological and linguistic sources to compare independent forms of evidence that point to similar developments and articulate the relationship between the growth of chiefdoms and the emergence of social complexity in Southern Africa. The use of these methods

in Tanzania, therefore, will help to further understand the ditches and underground bolt-holes of the Chagga as well as locating more artifacts that could be used to shed more light on the Chagga history. The wealth of precolonial cultural heritage observed in Kilimanjaro is just a fraction of what may be discovered among the 120 ethnic groups found in Tanzania. The most dominant and powerful kingdoms such as the Hehe, Pare, and the Nyamwezi are well studied ethnographically, but their historical archaeology remains *terra incognito*. Archaeologists have to widen researches to cover aspects of chiefdoms, identity, and social complexity. This will enhance a holistic understanding of the precolonial history of Tanzania, Eastern Africa, and Africa in general.

References

Bender, M.V. 2013. Being "Chagga": Natural resources, political activism, and identity on Kilimanjaro. *The Journal of African History* 54 (02): 199–220.

Blot, J. 2006. Development of plant ground cover, ecological factors. In *Kilimanjaro mountain, memory, modernity*, ed. F. Bart, J. Mbonile, and F. Devenne. Dar es Salaam: Mkuki na Nyota publishers.

Boachie-Ansah, J. 2008. *Wodoku: An archaeology of Accra early Nungua settlement Morrisville*. Accra: Lulu Publishing Company.

Boachie-Ansah, J. 2013. Excavations at an earthwork site at Asaman and their implications for the archaeology of the forest areas of southern Ghana. In *Current perspectives on the archaeology of Ghana*, ed. J. Anquandah, B. Kankpeyeng, and W. Apoh. Legon- Accra: Sub-Saharan Publishers.

Campbell, D.J., S.B. Misana and J.M. Olson. 2004. *Comparing the Kenyan and Tanzanian Slopes of Mt. Kilimanjaro: why are the neighbouring land uses so different*, Land use change impacts and dynamics (LUCID) project working paper 44.

Chami, A.R. 2005. The contribution of caves in the study of ancient settlement patterns: The case of Western Kilimanjaro, Tanzania. Dissertation, University of Dar es Salaam.

Clack, T.A.R. 2009. Sheltering experience in underground places: Thinking through precolonial Chagga caves on Mount Kilimanjaro. *World Archaeology* 41 (2): 321–344.

Eastler, T.E. 2005. Military use of underground Terrain. A brief historical perspective. In *Studies in military geography and geology*, ed. D.R. Caldwell, J. Ehlen, and R.S. Harmon. Springer Science & Business Media, Dordrecht- Netherlands, Kluwer Academic Publisher

Eldredge, E.A. 2015. *Kingdoms and chiefdoms of southeastern Africa: Oral traditions and history, 1400–1830*. Vol. 64. Rochester: University of Rochester Press.

Fernandes, E.C., and P.R. Nair. 1986. An evaluation of the structure and function of tropical homegardens. *Agricultural Systems* 21 (4): 279–310.

Fisher, T. 2012. Chagga elites and the politics of ethnicity in Kilimanjaro, Tanzania. Thesis, The University of Edinburgh.

Fosbrooke, H. 1954. Chagga forts and bolt holes. *Tanganyika Notes and Records* 37: 115–129.

Fosbrooke, H., and H. Sassoon. 1965. Archaeological remains on Kilimanjaro. *Tanganyika Notes and Records* 64: 62–64.

Jones, W.W. 1941. African dugouts. *Tanganyika Notes and Records* 11: 11.

Kiyaga-Mulindwa, D. 1978. The earthworks of the Birim Valley Southern Ghana. Thesis, Johns Hopkins University.

Koponen, J. 1988. War, famine, and pestilence in late precolonial Tanzania: A case for a heightened mortality. *The International Journal of African Historical Studies* 21 (4): 637–676.

Krapf, J.L. 1960[1860]. *Travels, researches, and missionary labors during an eighteen years' residence in eastern Africa*. London: Trübner and Co.

Meyer, H. 1891. *Across east African glaciers: An account of the first ascent of Kilimanjaro*. London, George Philip & son.

Mkenda, F. 2009. Building National Unity in sub-Saharan Africa: The Impact of State Policies on the Chagga Community in Northern Tanzania. Thesis, Oxford University.

Moore, S.F. 1986. *Social facts and fabrications" customary" law on Kilimanjaro, 1880–1980*. Cambridge: Cambridge University Press.

Moore, S.F., and P. Puritt. 1977. *The Chagga and Meru of Tanzania: East Central Africa*. London: Routledge.

Mostafa, A.A.F. 2012. Caves of the Nile Valley (governorate of Assiut, middle Egypt): A long-term interaction between human societies and their environment. *Géomorphologie: Relief, Processus, Environnement* 18 (1): 37–44.

Muller, M. 1983. *Handbuch ausgewahlter Klimastationen der Erde*, 4. verbesserte Aufl. Forschungsstelle Bodenerosion Mertesdorf (Ruwertal). Trier: Universitat Trier, Gerold Richter.

Pietilä, T. 2007. *Gossip, markets, and gender: How dialogue constructs moral value in post-socialist Kilimanjaro*. Wisconsin: University of Wisconsin Press.

Reid, A. 2013. The emergence of states in great lakes africa. In *Oxford handbook of African archaeology*, ed. P. Mitchell and P. Lane. Oxford: Oxford University Press. Available.

Salam, M.E. 2002. Construction of underground works and tunnels in ancient Egypt. *Tunnelling and Underground Space Technology* 17 (3): 295–304.

Schüler, L., and A. Hemp. 2016. Atlas of pollen and spores and their parent taxa of Mt Kilimanjaro and tropical East Africa. *Quaternary International* 425: 301–386.

Sébastien, L. 2010. The Chagga people and environmental changes on Mount Kilimanjaro: Lessons to learn. *Climate and Development* 2 (4): 364–377.
Silayo, V.V. 2009. The archaeology of Chagga traditional defense system, a case of Kibosho Kilimanjaro. Thesis, University of Dar es Salaam.
Silayo, V.V. 2012. Mamba-Mamsera bolt-holes: A forgotten cultural landscape. *Studies in the African Past* 10: 127–139.
Soper, R. 1982a. Bantu expansion into eastern Africa: Archaeological evidence. In *The archaeological and linguistic reconstruction of African history*, ed. Christopher Ehret and Merrick Posnansky Berkeley: University of California, 223–238.
Soper, R. 1982b. Archaeo-astronomical Cushites: Some comments. *AZANIA: Journal of the British Institute in Eastern Africa* 17 (1): 145–162.
Stahl, K.M. 1964. *History of the Chagga people of Kilimanjaro*. Vol. 2. London: Mouton.
Tagseth, M. 2008. Oral history and the development of indigenous irrigation. Methods and examples from Kilimanjaro, Tanzania. *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography* 62 (1): 9–22.
Tagseth, M. 2010. Studies of the waterscape of Kilimanjaro, Tanzania Water management in hill furrow irrigation. Thesis, Norwegian University of Science and Technology, Trondheim.
UNEP-WCMC. 2011. *Worl heritage sites protected areas and world heritage: Kilimanjaro national park*. UNESCO. Cambridge, UK
Wimmelbücker, L. 2002. *Kilimanjaro: A regional history. Volume I production and living conditions, c. 1800–1920*. Hamburg: Lit Verlag Münster.
Yakan, M.Z. 1999. *Almanac of African peoples & nations*. New Brunswick: Transaction Publishers.

Bonavia, Duccio

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Basic Biographical Information

Duccio Bonavia, born in Spalato (Dalmatia) on March 27, 1935, was the son of Aurelio and Neda Bonavia, both native Italians. After the Second World War, when Duccio was 14 years old, his family moved to Peru in July 1949 and settled in Lima. In 1965, Duccio received his Peruvian citizenship while still retaining his Italian citizenship (Fig. 1).

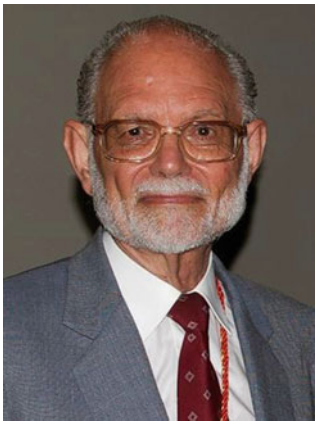

Bonavia, Duccio, Fig. 1 Duccio Bonavia

Duccio received his primary education from a school in Spalato (1940–1944) and his secondary education in Bassano del Grappa, Possagno, and Treviso (1945–1947). He finished his high school studies at Colegio Italiano Antonio Raimondi in Lima (1950–1951). He then enrolled in the National Engineering School, today known as the National University of Engineering, where he intended to study architecture (1952–1954). Duccio, however, did not enjoy his engineering courses and soon switched to the University of San Marcos (1955–1960) where he studied archaeology and anthropology.

Duccio married Ana Mori Tomatis from Lima though of Italian descent on June 15, 1962. They had two children, Bruna and Aurelio. Both children went on to earn their Ph.D., Bruna in biology and Aurelio in microbiology. Anita was the great love of Duccio's life, both at home and in their travels together. Duccio dedicated several of his publications to Anita.

After the death of his wife in 2004, Duccio was practically alone in Lima. He decided to move to Saskatchewan in Canada to be with his daughter, Bruna, and her husband, Thomas Fisher, and their sons, Lucas and Stephen. Duccio's son, Aurelio, lives in Seattle. Duccio left Lima in the spring of 2010 and lived in Canada for a year. Duccio died at the age of 77 on Saturday, August 4, 2012, in Magdalena de Cao, Ascope in Peru. He died during the last phase of his fieldwork at Huaca Prieta, Magdalena de Cao on the north coast of Peru.

Duccio and Tom Dillehay were codirectors of the research project.

Just a few days before Duccio left for his last trip to Peru, he finished editing the English translation of his book on corn (Cambridge University Press). His research on the subject was kept in characteristically good order and is ready for another scholar to continue. In Peru, he donated his archaeology library to the University of Trujillo as well as his collection of plant and small animal samples, which were left to the archaeobiology lab at the university. The remainders of his things including his extensive library on Peruvian archaeology were sent to his most recent residence in Saskatchewan. It was Duccio's wish that after his passing, his library would be donated as well.

Major Accomplishments

Duccio's career in archaeology began when he studied under Dr. Raúl Porras Barrenechea, a professor of history at the University of San Marcos. His teachers at the university also included Jorge C. Muelle, an art historian; Luis E. Valcáreal, an Andean ethnohistorian; Ella Dunbar Temple, a specialist in colonial institutions; Mons. Pedro Villar Córdova and Edward P. Lanning, both archaeologists; and, lastly, José María Arguedas, an anthropologist with a great passion for indigenous cultures. For Duccio, archaeology was not only a scientific discipline but a great passion for the living cultures of the past.

While he was still a student, he participated in the *First Roundtable for Anthropological Sciences*, organized by the University of San Marcos in 1958, and, with Lumbreras and Caycho, presented his archaeological study of Aya Orjo (1958). The same year, at the Second National Congress of Peruvian History, Duccio presented another paper dedicated to the analysis of ceramics from Puerto Viejo, Chilca (1959).

Duccio obtained his Bachelor's degree in 1960 with a thesis called *On the Teatino Style*. A year later, he received his Doctor of Letters with his thesis *Six Occupation Sites from the Bottom of the Lurin River Valley*. Both of Duccio's theses were in the field of ethno-archaeology and were completed at the University of San Marcos in Lima.

Immediately after obtaining his academic degrees, Duccio embarked upon a number of archaeological explorations, including excavations in the Huarmey Valley on behalf of the Botanical Museum at Harvard University (1960). He explored the northern Peruvian valleys with Donald Thompson (1961) and organized the Italo-Peruvian expedition in northern Peru (1961). He explored the Casma Valley with Donald Collier in 1962, and from 1962 to 1963, he took over the Catastro project dedicated to the pre-Hispanic monuments in the Lima Valley. This last project was commissioned by the Metropolitan Deliberations Board and included participation from Ramiro Matos and Félix Caycho. The report was published in five volumes, which are currently in the archaeological monuments inventory in Lima. From the 1960s through today, more than 70 % of the registered archaeological sites in the Lima Metropolitan area were destroyed.

In 1965, Duccio traveled to Rome to represent the National Culture Commission of Peru and participated in postgraduate courses on new techniques in archaeological exploration, which was sponsored by the Lerici Foundation (1965). From 1967 to 1968, he obtained a scholarship from the French government to further his studies in the Quaternary Geology Laboratory at the University of Bordeaux in France under the guidance of Professor François Bordes.

Duccio was a consistent participant in conferences and academic events dedicated to Andean archaeology, such as the XXXVII International Congress of Americanists in 1966 (La Plata, Argentina), the XXXVII International Congress of Americanists in 1968 (Stuttgart, Germany), and the International Congress of Americanists in 1970 and the XLI International Congress of Americanists in 1974 (Mexico). He also participated in the International Symposium "Criticism and Perspectives of Andean Archaeology" organized by the National Institute of Culture of Peru, UNDP, and UNESCO (Paracas, 1980) as well as the World Archaeological Congress in Southampton, UK, in September of the same year. He was a speaker at the Symposium "Recent Advances in

the Understanding of Plant Domestication and Early Agriculture" in 1986. He also organized the international meeting on the "State of Peruvian Archaeology" with Ramiro Matos (Lima, 1988) and the Symposium on "French Research in Peru" with the French Embassy, IFEA, and ORSTOM (Lima, 1988).

Duccio Bonavia taught at several Peruvian and foreign universities such as the National University of San Cristóbal de Huamanga in Ayacucho (1963–1964), the University of San Marcos (1964–1970), and the Peruvian University of Science and Technology (1968). He was a professor in the Biology Department at the University Peruana Cayetano Heredia de Lima (1971–2005). He was also twice a professor at the Friedrich Wilhelms University in Bonn, Germany, and participated in a seminar on anthropology under Max Uhle (1981 and 1983–1984).

His academic merits earned him several positions such as Honorary Professor at the National University of Trujillo (1994), Extraordinary Investigative Professor at the Peruana Cayetano Heredia University (2002), Honorary Professor at Ricardo Palma University in Lima (2005), and Doctor Honoris Causa at the National University of Trujillo (2006). Duccio also spoke several languages including Italian, French, Spanish, Serbo-Croatian, and English, following in the footsteps of his mentor Dr. Jorge C. Spring (Jorge C Muelle). Dr. Spring and Duccio were good friends and hosted several visitors to the National Museum of Anthropology.

Duccio was a member of the Society for American Archaeology, the Société des Americanistes de Paris, Société des Americanistes (Switzerland), Société Préhistorique Française, and the Institute of Andean Studies. He was an honorary member of the Permanent Council of the International Union for Prehistoric and Protohistoric Sciences (USA). He also served as a representative of Peru at the Peruvian Historical Society and the National Academy of History. He was also a corresponding member of the Royal Academy of Spanish History and the National Academy of Argentinian History and a member of the Sciences Academy of Latin America and a life member of the College of Peruvian Archaeologists and also of the Società Dalmata di Storia Patria.

Duccio traveled extensively throughout Peru, mainly in the coastal valleys as well as several places in the sierra and the jungle. With a team from the Biophysics Laboratory from the University Peruana Cayetano Heredia, he climbed the Pariacaca Mountain in 1985 to study the Inka sanctuary of the same name.

Among his major studies in the field of archaeology was a study of a Mochica mural painting in the Valley of Nepeña (1958), an exploration of the north coast with Ernesto Tabío and Donald Thompson (1959), a stratigraphic excavation at Ancon (1960), and an excavation at Huarmey commissioned by the Harvard Botanical Museum (1960). He organized the scientific expedition to the jungles of Ayacucho sponsored by the National University of San Cristóbal de Huamanga (1963). He also organized the excavations at the ruins of Yaro (Pajaten, 1966) and in the Chancay River basin (Lambayeque) under the auspices of the Royal Ontario Museum (1971), among others.

Duccio has contributed to the creation and the strengthening of several institutions devoted to Peruvian archaeology. He was the Chief of Investigations at the Archaeological Museum at the University of San Marcos (1956–1961). He was the head of the technical team of the Metropolitan Deliberations Board in their studies of historic and archaeological sites (1963), head of the Explorations Department of the National Museum of Anthropology and Archaeology in Lima (1964), then assistant director (1968–1979), and an archaeologist affiliated with the National Archaeological Board in Lima (1963). He was a member of the Committee of Monuments as part of the Peruvian Commission of UNESCO (1967), a consultant to the Ford Lima Foundation (1975–1980), founder of the Laboratory of Prehistory in the Department of Biology at the University Peruana Cayetano Heredia (1978), a member of the Commission for the technical rating of archaeological projects at the National Institute of Culture (1979–1985), and a founding member

and director of the Peruvian Association for the promotion of the social sciences (FOMCIENCIAS 1980).

Duccio received several fellowships throughout his life, including one from the Harvard Botanical Museum for his excavations in Huarmey (1960) and from the Ministry of Foreign Affairs of France for his studies at the University of Bordeaux with professor François Bordes (1967–1968), from the Royal Ontario Museum (Canada), from the Ford Foundation to excavate in Huarmey (1974), from the John Simon Guggenheim Memorial Foundation (New York, USA), and from the Harvard Botanical Museum (1976–1977), to investigate preceramic corn in Huarmey. He also received fellowships from CONCYTEC to draw a map of mural paintings in Peru (1983) and from the Ford Foundation to analyze the conditions of university teaching in archaeology in Peru along with Ramiro Matos (1989–1990). Their report was subsequently published.

He received funding from the French Institute of Andean Studies in 1993 to write a book on Andean camelids and to translate into English the Fish and Wildlife Service (1999). To write his last book on corn, he received funding from the University San Martín de Porres (2006).

Duccio's academic bibliography is incredibly varied and comparable to the classics in American anthropology. He dabbled in art, pre-Colombian urbanism, botany, zoology, ecology, paleopathology, the indigenous diet, parasitology, physiology of height, and some aspects of medicine. The following bibliography includes 14 books, seven monographs, 44 inserts as chapter books, 139 specialized articles in magazines, 39 articles, and 20 reviews and comments devoted to the publications of his colleagues. He has been a big supporter of the theory of the second center of domestication of corn in the Andes.

Cross-References

► Andes: Prehistoric Art
► Andes: Prehistoric Period

Further Reading

Bonavia, D. 1974. *Ricchata Quellccani: pinturas murales prehispánicas*. Lima: Fondo del Libro del Banco Industrial del Perú.

Bonavia, D. 1982. *Preceramico Peruano: Los Gavilanes – mar, desierto y oasis en la historia del hombre*. Lima: Instituto Arqueológico Alemán.

Bonavia, D. 1985. *Mural painting in ancient Peru*. Traducción de P. J. Lyon. Bloomington: Indiana University Press.

Bonavia, D. 1991. *Perú, hombre e historia: De los orígenes al siglo XV*. Lima: Edubanco.

Bonavia, D. 1996. *Los camélidos sudamericanos: una introducción a su estudio*, T. 93 Serie Travaux de l'Institut Français d'Etudes Andines. Lima: IFEA, UPCH, Conservation International.

Bonavia, D. 2008a. *El maíz: su origen, su domesticación y el rol que ha cumplido en el desarrollo de la cultura*. Lima: Universidad de San Martín de Porres. Fondo Editorial.

Bonavia, D. 2008b. *The South American camelids*. Los Angeles: UCLA, Cotsen Institute of Archaeology.

Bonavia, D., and R. Matos. 1992. *Enseñanza de la arqueología en el Perú. Informe evaluativo*. Lima: Fomciencias.

Bone Chemistry and Ancient Diet

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Introduction

Dietary practices are a fundamental aspect of human life, from the basic caloric necessities to the socioeconomic variables which affect food production, acquisition, preparation, and consumption and how that may vary seasonally as well as over an individual's lifetime. Archaeologists have used many different data sources to study ancient dietary practices, including direct evidence from animal bones, macrobotanical plant remains, pollen and phytoliths in the soil, organic residues in pottery, and coprolites, as well as indirect evidence from skeletal pathology,

dental wear patterns, ethnographic observations, writings, and artistic depictions. Nevertheless, for most such studies, the results are just the determination of the main menu, with animal foods the only source of semiquantitative dietary estimates.

It was only in the late 1970s that a new area of research developed – bone chemistry – which has expanded considerably our understanding of human dietary practices (Vogel and van der Merwe 1977). Biochemically, you are what you eat, and bones, teeth, and other tissues preserved in the archaeological record may be analyzed and provide direct information about the diet of individuals. This has led to research on how diets may vary based on age, sex, and socioeconomic status, as well as between different sites and time periods (here are some of the recent synthetic publications about stable isotope analyses and human diet: Tykot 2004, 2010; Pollard and Heron 2008; Lee-Thorp 2008; Price and Burton 2011; Makarewicz and Sealy 2015).

Specifically, the combination of stable carbon and nitrogen isotopes in bone collagen and other tissues, and carbon and oxygen isotopes in bone apatite or tooth enamel, may be used to reconstruct prehistoric diet because of differential isotope fractionation between certain plant groups of atmospheric carbon dioxide during photosynthesis and trophic level increases in nitrogen isotopes. This allows us to distinguish between plants that follow different photosynthetic pathways; those which are nitrogen fixing versus absorption; and consumption of foods from different trophic levels, especially aquatic fish and mammals versus terrestrial plants and animals, but also between hunter-gatherers and agriculturalists, and even address short-term dietary change through microsampling of tooth roots and hair. Trace elements such as barium and strontium provide additional information about food sources and diet, while oxygen isotope analysis is used to study potential seasonality of shellfish gathering, and along with strontium and lead isotope analysis the mobility of the consumers.

Reliable isotope results have been obtained from samples of our early human ancestors, while the use of modern instruments which require only tiny samples and have a low per-sample cost has led to hundreds of archaeological bone chemistry studies around the world, with frequent publications in the *Journal of Archaeological Science*, the *American Journal of Physical Anthropology*, *Archaeological and Anthropological Sciences*, and the *International Journal of Osteoarchaeology*.

Key Issues

Principles of Stable Isotope Analysis

There are two stable isotopes each for carbon (^{12}C, ^{13}C) and nitrogen (^{14}N, ^{15}N), and three for oxygen (^{16}O, ^{17}O, ^{18}O) (Fig. 1). The lightest isotopes for each are the most abundant in nature (c. 99% for each), while the small but measurable amount of variation in the heavier isotopes is measured in parts per thousand or per mil (‰). High-precision stable isotope measurements using stable isotope ratio mass spectrometers are reported using the delta notation ($\delta^{13}C$, $\delta^{15}N$, $\delta^{18}O$) relative to internationally recognized standards:

For carbon and oxygen, the standard is *Belemnitella americana* from the Pee Dee limestone formation in South Carolina, while for nitrogen, it is AIR.

While all terrestrial plants photosynthesize CO_2 from the atmosphere and turn it into complex carbon-based molecules, there are three different photosynthetic pathways for plants which result in differences in their carbon isotope ratios which are then passed on to their consumers (Fig. 2). Trees,

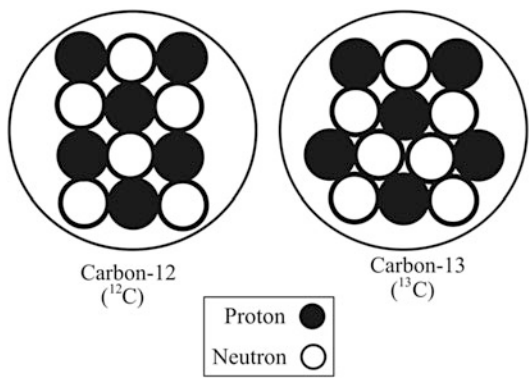

Bone Chemistry and Ancient Diet, Fig. 1 Stable isotopes with different numbers of neutrons in the nucleus

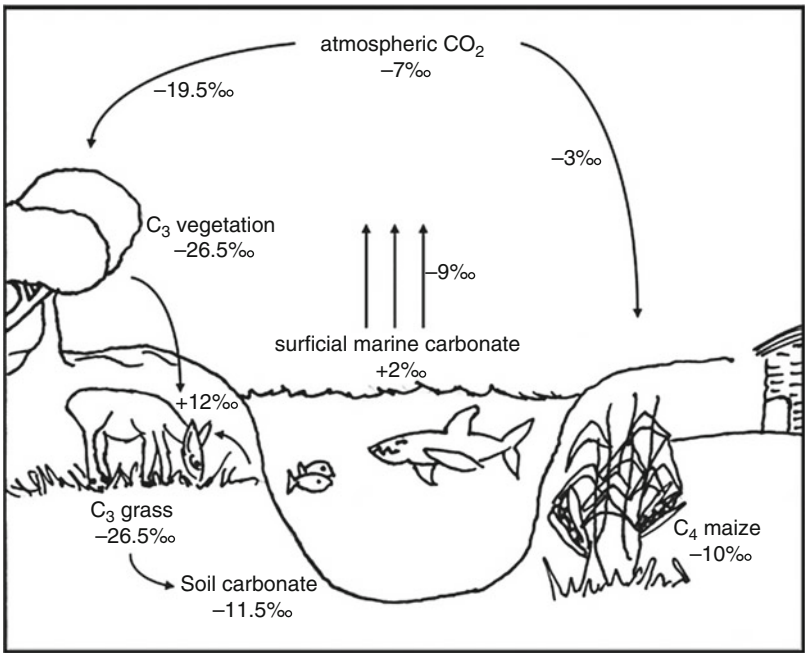

Bone Chemistry and Ancient Diet,
Fig. 2 General pattern of photosynthesis showing carbon isotope fractionation

shrubs, and grasses from temperate regions follow the C_3 (Calvin-Benson) pathway and have $\delta^{13}C$ values averaging about −26.5‰, while grasses native to hot, arid environments follow the C_4 (Hatch-Slack) pathway and have $\delta^{13}C$ values averaging about −12.5‰ (although maize is more positive, c. −10‰). There are also some differences between particular species of plants and for the same plant grown at different latitudes (Fig. 3). Succulent plants like cactus utilize the CAM (crassulacean acid metabolism) photosynthetic pathway, with carbon isotope ratios often similar to those of C_4 plants but much more variable due to local ecological settings. In heavily forested areas, a canopy effect occurs due to incomplete atmospheric mixing and results in even more negative carbon isotope ratios. Atmospheric carbon isotope ratios have become depleted by about 1.5‰ since the industrial revolution, so values obtained on modern terrestrial plants and animals must be adjusted accordingly for comparison with most archaeological studies.

Wheat, barley, and rice are the most widely used domesticated C_3 cereal crops, while maize (corn), millet, and sorghum are the main C_4 domesticates. Stable carbon isotope analysis therefore has been widely used to address the importance of maize in the Americas and millet in Europe, Africa, and Asia.

For isotopic analysis of human remains to study diet, different tissues may be tested. Bone is made of a complex organic material called collagen (mostly a combination of essential and nonessential amino acids) and the bone mineral known as apatite (calcium hydroxyphosphate carbonate). Tooth enamel has a similar structure to bone apatite, while tooth roots have both collagen and apatite. Hair is made of keratin, a proteinaceous compound like collagen.

Empirical carbon isotope data for large mammals, along with data for laboratory-raised rats and mice, indicate that bone collagen $\delta^{13}C$ is metabolically enriched about +5‰ relative to diet, although this value is affected by the proportion of protein in the total diet and any differences in $\delta^{13}C$ values between protein and energy sources. Studies have shown that bone collagen is disproportionately produced from the protein portion of the diet, while bone apatite and tooth enamel are produced from a mixture of dietary protein, carbohydrates, and fats (lipids). Experimental data on rats show that bone apatite is enriched about +9.5‰ relative to the whole diet, regardless of the variety or isotopic composition

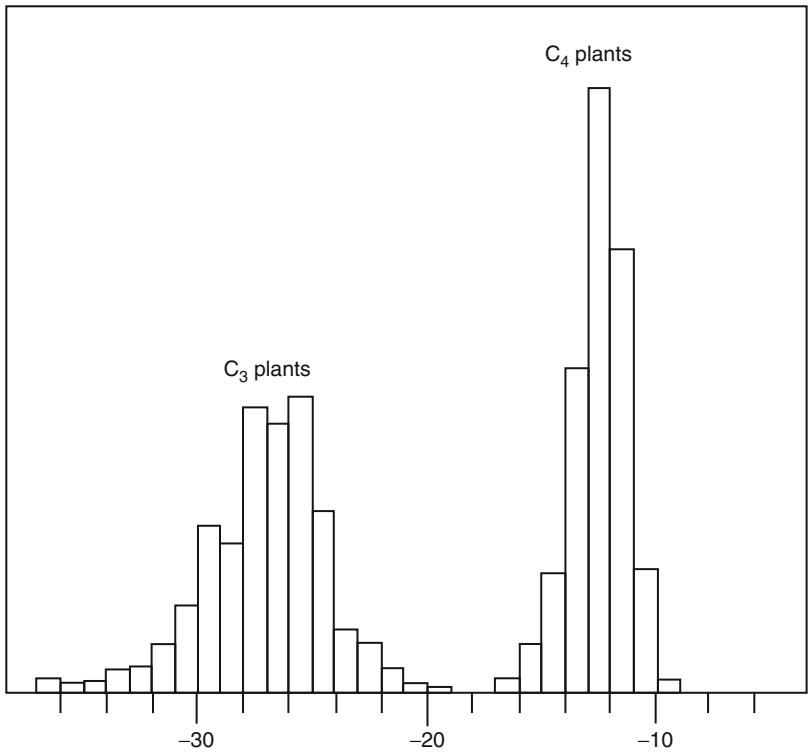

Bone Chemistry and Ancient Diet, Fig. 3 Carbon isotope ratios for modern C_3 and C_4 plants

of the foods consumed (Ambrose and Norr 1993; Tieszen and Fagre 1993), while data for larger herbivores and humans suggest that the diet-apatite spacing is about +12‰ (Tykot et al. 2009). Stable carbon isotope analysis of both bone collagen and apatite thus permits quantitative estimates of several dietary patterns.

Carbon isotope ratios for freshwater and marine foods are more variable than terrestrial plants and animals, due to differences in carbonate values in the water and trophic status, with marine (saltwater) fish having positive $\delta^{13}C$ values similar to that of maize. Fish and sea mammals, however, typically have much higher nitrogen isotope values, and their high protein content contributes much more carbon to bone collagen than does maize (c. 10% protein) or other plants. In contrast, carbon isotope ratios for bone apatite, which equally represent dietary carbohydrates, fats, and proteins, allow for the identification of just a few percent of C_4 plants in an otherwise C_3-based diet.

Nitrogen isotope ratios for plants depend primarily on whether they obtain their nitrogen by symbiotic bacterial fixation or directly from soil nitrates but also vary according to rainfall, altitude, and other factors. Plant values also may be elevated due to human-led fertilization practices. From their local baseline values, nitrogen isotope ratios increase about 3‰ for each trophic level due to metabolism, with lots of variation among marine organisms. Humans dependent on terrestrial plants and animals usually have $\delta^{15}N$ values in bone collagen of about 6–10‰, whereas consumers of freshwater or marine fish and sea mammals may have $\delta^{15}N$ values of 15–20‰. The most accurate interpretations may be made when there are isotopic data available for the animal and plant foods likely to have been consumed by a specific population, so testing is often

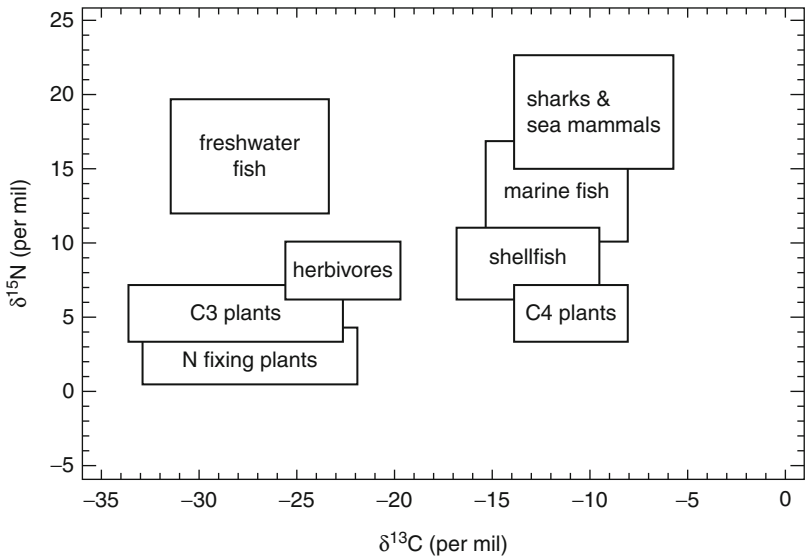

Bone Chemistry and Ancient Diet, Fig. 4 Carbon versus nitrogen isotope ratios for a typical food web. Isotope ranges may vary by region

done not just on human remains but also faunal and floral samples found at archaeological sites (Fig. 4).

Oxygen isotope analyses are also used to study ancient diet. Oxygen isotope values relate directly to local climate, temperature, and humidity and are used for determining the seasonality of shellfish, climate studies, mobility, and their impacts on dietary patterns. Analyses have been done on oxygen in both the carbonate and phosphate components of bone apatite and tooth enamel. Strontium isotope ratios directly represent the geographic area of food production/acquisition and thus the mobility of dietary resources and/or their consumers. Strontium isotope analysis has been used for migration studies in many parts of the world (see Meiggs and Freiwald's entry "▶ Human Migration: Bioarchaeological Approaches," in this encyclopedia).

Adult human bone collagen and bone apatite have resorption/replenishment rates estimated at 7–15 years or more, depending on the particular bone, so that isotopic analysis of bones of adults provides the average diet for many years prior to death. Tooth tissues, however, do not turn over, so their isotope values represent diet from the time of formation, regardless of age at death. Tooth formation begins in utero for deciduous teeth and ranges from 0 to 18+ years of age for permanent teeth. The analysis of multiple teeth from the same adult individual may reveal the age of weaning (first the introduction of solid foods and later the cessation of breast feeding) since a nursing infant is effectively a carnivore and will have much higher $\delta^{15}N$. Differences between juvenile teeth and adult bone values may reflect changes in diet due to geographic movement (e.g., for marital reasons) or change in status.

Stable isotope analysis of multiple human tissues can provide a science-based dietary life history of an individual. Although collagen is rarely preserved in bones predating the Upper Paleolithic and even for recent time periods is often badly degraded in hot and moist environments, bone apatite has provided reliable results throughout the Holocene and tooth enamel for early hominins back into the Miocene. Microanalysis of tooth segments (or hair or fingernails, when preserved) may be done to address short-term isotopic dietary variability, perhaps due to seasonal mobility or harvesting practices.

Sample Preparation and Stable Isotope Analysis

For isotope analysis of archaeological bone, the first step is to remove any potential contamination, either from the soil or from added preservatives, for a sample weighing about 1 g. It is then

necessary to separate the specific tissues to be analyzed. For collagen, this involves demineralization of the bone using acid and separation from any residual lipids. The procedures used in the Laboratory for Archaeological Science at the University of South Florida involve demineralization in 2% hydrochloric acid (72 h), removal of base-soluble contaminants using 0.1 M sodium hydroxide (24 h before and after demineralization), and dissolution of residual lipids in a 2:1:0.8 mixture of methanol, chloroform, and deionized water (24 h) (Fig. 5).

Bone collagen is often not well preserved, and a yield of less than 1% is considered unreliable for isotope analysis (bone originally has more than 20% collagen). The main issue for low yields is that degradation may have resulted in unequal breakdown and loss of the different amino acids, which individually have different isotope values because of the different chemical reactions involved in their initial production. The amount of carbon and nitrogen measured by the mass spectrometer, relative to the size of the sample put in for analysis, and the C to N ratio of the gases produced (which should be the same as in living organisms) are additional tests of reliability. Duplicate 1 mg samples of collagen pseudomorphs are placed in tin capsules and analyzed for $\delta^{13}C$ and $\delta^{15}N$ in continuous flow mode using a Carlo-Erba NA2500-II EA with a Costech Zero-Bank autosampler, coupled with a Thermo Delta + XL stable isotope ratio mass spectrometer in the Paleolab at USF (Fig. 6a).

Bone Chemistry and Ancient Diet, Fig. 5 Chemical extraction of bone collagen for isotope analysis

Bone apatite and tooth enamel carbonate are prepared using procedures designed to remove nonbiogenic carbon without altering the biogenic carbon isotope values (see Tykot 2004). About 10 mg of powdered sample is immersed in 2% sodium hypochlorite to dissolve organic components (24 h for enamel, 72 h for bone apatite), followed by the removal of nonbiogenic carbonates using 1.0 M buffered acetic acid for 24 h. The integrity of apatite and enamel samples is assessed through yields obtained in each stage of the pretreatment process and the CO_2 yield during the mass spectrometry analysis. More complex tests of sample reliability have been used in some laboratories, however, including Fourier transform

Bone Chemistry and Ancient Diet, Fig. 6 Stable isotope mass spectrometers in the Paleolab at the University of South Florida connected (**a**) to a CHN analyzer for collagen and other organic samples; (**b**) to a gas bench for bone apatite, enamel, and other carbonate materials

infrared spectroscopy (FTIR). Apatite and enamel samples weighing 1 mg are isotopically analyzed on a ThermoFisher MAT253 IRMS coupled to a GasBench-II + continuous-flow interface (Fig. 6b). It is a scientifically sound idea to perform repeat isotope analyses for outliers when testing a group of individuals thought to have had similar isotope values.

For both bone collagen and apatite/enamel carbonate analysis, reference gases and solid standard samples are analyzed to ensure reliability of the isotope results. The analytical precision for stable isotope ratio mass spectrometers is typically 0.1‰ or less for ^{13}C and ^{18}O and 0.2‰ for ^{15}N.

Estimating the percentage of C_4 plants in human diet is fairly straightforward for herbivores and human agriculturalists, if seafood was not available and animals were not consuming wild C_4 grasses, by simple interpolation between the endpoints of bone apatite for a pure C_3-based diet versus a pure C_4-based diet. Rather than using the average endpoints of −26.5‰ and −12.5‰, the specific carbon isotope values for the C_3 plants most likely consumed should be used, since they do vary between grasses (e.g., wheat, barley, rice) and legumes, etc., in order to set an accurate baseline. For a C_4 endpoint based on maize, the value would be about −10‰. So if the range was from −24‰ to −10‰ (14‰), then each per mil more positive than −24‰ would represent about 7% maize in the overall diet.

When animal or aquatic foods are a significant part of the diet, the bone collagen carbon and nitrogen isotope data are necessary to include in the percentage calculations. Mathematical models have been developed to combine collagen and apatite isotope data for distinguishing between plant and animal food sources with similar isotopic signatures, more recently by using multivariate statistics (Froehle et al. 2012).

Trace Element Analysis

A number of studies have been done measuring and interpreting trace elements in bone mineral, including Sr, Ba, Fe, Cu, Mg, Mn, Zn, and Pb. Lead is a toxic element known to accumulate in bone due to the usage of lead-based drinking, cooking, and eating materials, as well as toy soldiers, paint chips, and other items children have ingested. Strontium and barium however are structural substitutes for calcium in bone apatite and tooth enamel and show significant trophic level variation in their concentrations. Both Sr and Ba are acquired by plants through the soil and are then passed on to their consumers, with a decrease in concentrations for each trophic level. This fractionation is even greater for Ba than Sr due to its chemical structure as barite ($BaSO_4$) in the soil. There is, however, considerable geological variability in the soils, so that archaeologists must be extremely careful in making interpretations about the relative importance of plants versus meat in the diet. Testing of herbivorous and carnivorous animals, and plant foods if available, from the same area is highly recommended. In addition, care is needed in taking samples from bone with minimal contamination or diagenesis (Burton and Price 2000). Most elemental analyses of bone have been done by ashing the sample, dissolution, and using an ICP spectrometer; some more recent studies where sample removal was not allowed have been done nondestructively using an X-ray fluorescence spectrometer (Fig. 7).

Trace element measurements of bone are reported relative to calcium, e.g., Sr/Ca and Ba/Ca, or logarithmically, e.g., log (Ba/Sr). Much greater differences in the Sr and Ba concentrations and in the Ba/Sr ratios have been observed for marine versus terrestrial diets.

Recent Applications

Stable isotope analysis of human remains to study ancient diets has expanded considerably in the past 20 years, with several dozen or more publications in each of the last few years. The main issues being addressed include:

Early hominin dietary practices
Seafood consumption by near-coastal populations
Dietary contribution of freshwater resources from lakes and rivers
Mesolithic-Neolithic dietary changes

Bone Chemistry and Ancient Diet, Fig. 7 Nondestructive trace element analysis of bone using a portable X-ray fluorescence spectrometer

Importance of millet in East Asia, Africa, and Europe
The spread of maize in the New World
Dietary differences based on sex and/or status
Weaning practices
Mobility and migration

Following is an overview of two areas of my own research, specifically the importance of maize and seafood in different areas of peninsular Florida and the dietary practices of coastal and island inhabitants in the Mediterranean.

Florida

Bone collagen and apatite for more than 100 human individuals from 7 sites in peninsular Florida were analyzed by stable isotope mass spectrometry to test for the presence and increasing importance of maize in the southeastern United States (Tykot et al. 2005; Kelly et al. 2006). Previous studies, mostly on bone collagen, had clearly indicated maize was a dietary staple for the Mississippian culture by about 1000 CE, but it had been thought that maize may never even have reached southern Florida. At the inland site of Melton Mound, however, positive carbon isotope ratios especially for bone apatite and tooth enamel fully support that C_4 plants such as maize were a small but noticeable part of the diet by 600–800 CE. Four sites near the Gulf Coast were tested, with individuals from Bayshore Homes (Safety Harbor period) and Dunwoody (Late Caloosahatchee) averaging much lower $\delta^{15}N$ in bone collagen and more positive $\delta^{13}C$ for bone apatite, relative to the earlier Bay Pines (Weeden Island I) and Pillsbury (Manasota) sites, while the $\delta^{13}C$ results for bone collagen were similar for all four (Fig. 8). This strongly supports that it was a plant such as maize (with much less protein than fish but having an equal impact on apatite $\delta^{13}C$ values) did become a dietary staple in this region by the early second millennium CE. For all sites, however, there was also a large range of variation among individuals, and at least at one site, it seems that males had higher nitrogen isotope values than females, perhaps due to greater fish consumption. This is being investigated further through elemental analysis of Ba and Sr, which in a separate study has shown a much greater importance of seafood at sites on the Gulf Coast when compared with those near Miami on the Atlantic side of Florida (Fig. 9).

The Mediterranean Region

In the Mediterranean world, while seafood is a regular part of many modern people's diet, there is little in the way of shell mounds or other archaeological evidence that it was a staple in ancient times, even prior to the Neolithic. However, for Mesolithic sites on the Atlantic coast, including Portugal and Spain, isotope studies have shown that seafood was a major part of the diet (e.g., Richards and Hedges 1999). In contrast, an early study using both stable isotope and elemental analysis on Mesolithic coastal sites of Arene Candide in Liguria and Grotta dell'Uzzo in Sicily

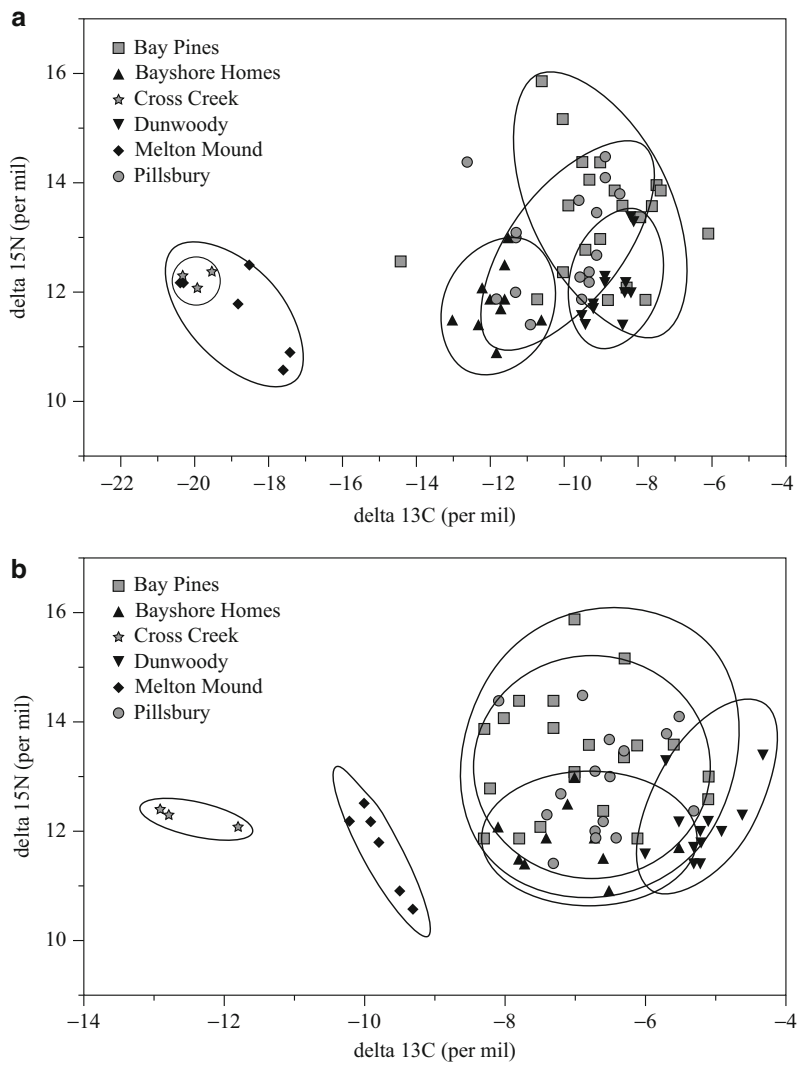

Bone Chemistry and Ancient Diet, Fig. 8 Stable isotope data for selected precontact archaeological sites in Florida. (**a**) $\delta^{15}N$ versus collagen $\delta^{13}C$; (**b**) $\delta^{15}N$ versus apatite $\delta^{13}C$

(Francalacci 1989; Mannino et al. 2011) suggested that seafood was not a staple in the Mediterranean, and beginning in the Neolithic when there were domesticated sheep, goat, cattle, pig, wheat, barley, and other crops, studies by many scholars have shown it was negligible at sites in Italy, Croatia, Greece, Tunisia, and even on the islands of Sardinia (Lai et al. 2007), Malta, the Balearics, and Crete. There are some modest isotopic differences in diet based on status in the Late Bronze Age, e.g., at Mycenae (Richards and Hedges 2008), while freshwater fish become important at some sites, but even in Roman times when there was regular, large-scale maritime seafaring, it appears there was little seafood consumption even at the port site of Isola Sacra near Rome (Prowse et al. 2004; Killgrove and Tykot 2013) (Fig. 10). It is important, however, to have isotope data for fish and shellfish in the specific region of study since there are cases where their isotope values are rather negative and thus overlapping with terrestrial plant and animal values. African millet, a C_4 plant, was apparently present in Europe in the Neolithic, but not isotopically noticeable until the Bronze Age in northern Italy (Tafuri et al. 2009) and Iron Age at sites in Greece and Slovenia (Murray and Schoeninger 1988).

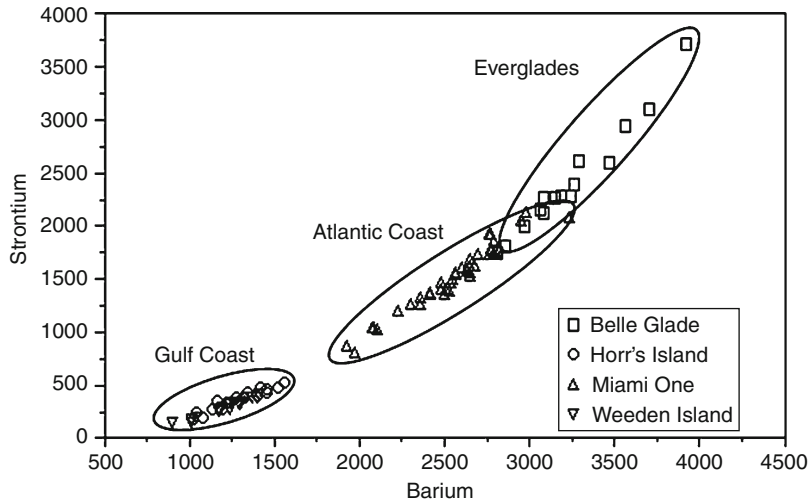

Bone Chemistry and Ancient Diet, Fig. 9 Barium versus strontium trace element data (uncalibrated) for selected Florida sites showing differences based on geographic regions

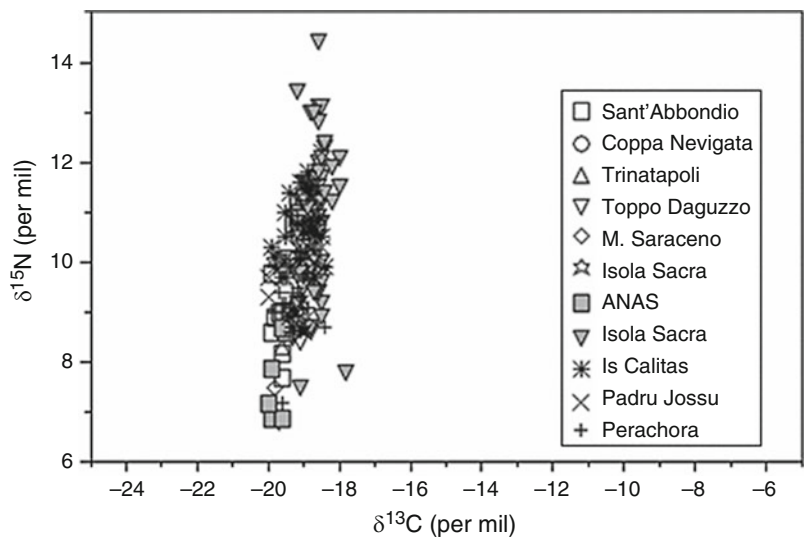

Bone Chemistry and Ancient Diet, Fig. 10 Human bone collagen $\delta^{13}C$ versus $\delta^{15}N$ for selected Bronze-Iron Age sites in the central Mediterranean

Future Directions

The analytical methods and examples presented above for human bone and other tissues do not include all of the scientific ways to study ancient diets. Stable isotope analyses have been done on individual amino acids in bone collagen, on cholesterol preserved in bones and teeth, on dental calculus, on carbonates and humic matter in soils, and on organic residues (lipids) absorbed in pottery. Still being developed are other ways to study diet, including isotopic analyses of calcium, sulfur, and hydrogen, and decreasing even further the size sample necessary for analysis.

Cross-References

- ▶ Bioarchaeology in the Roman Empire
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Bone: Chemical Analysis

▶ Isotope Geochemistry in Archaeology
▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
▶ Isotopic Studies of Husbandry Practices
▶ Maize: Origins and Development

References

Ambrose, S.H., and L. Norr. 1993. Experimental evidence for the relationship of the carbon isotope ratios of whole diet and dietary protein to those of bone collagen and carbonate. In *Prehistoric human bone: Archaeology at the molecular level*, ed. J.B. Lambert and G. Grupe, 1–37. New York: Springer.

Burton, J.H., and T.D. Price. 2000. The use and abuse of trace elements for paleodietary research. In *Biogeochemical approaches to paleodietary analysis*, ed. S.H. Ambrose and M.A. Katzenberg, 159–172. New York: Plenum.

Francalacci, P. 1989. Dietary reconstruction at Arene Candide cave (Liguria, Italy) by means of trace element analysis. *Journal of Archaeological Science* 16: 109–124.

Froehle, A.W., C.M. Kellner, and M.J. Schoeninger. 2012. Multivariate carbon and nitrogen stable isotope model for the reconstruction of prehistoric human diet. *American Journal of Physical Anthropology* 147: 352–369.

Kelly, J.A., R.H. Tykot, and J.T. Milanich. 2006. Evidence for early use of maize in peninsular Florida. In *Histories of maize: Multidisciplinary approaches to the prehistory, linguistics, biogeography, domestication, and evolution of maize*, ed. J.E. Staller, R.H. Tykot, and B.F. Benz, 249–261. Orlando: Academic.

Killgrove, K., and R.H. Tykot. 2013. Food for Rome: A stable isotope investigation of diet in the Imperial period (1st–3rd centuries AD). *Journal of Anthropological Archaeology* 32: 28–38.

Lai, L., R.H. Tykot, J.F. Beckett, R. Floris, O. Fonzo, E. Usai, M.R. Manunza, E. Goddard, and D. Hollander. 2007. Interpreting stable isotopic analyses: Case studies on Sardinian prehistory. In *Archaeological chemistry: Analytical techniques and archaeological interpretation*, ACS symposium series 968, ed. M.D. Glascock, R.J. Speakman, and R.S. Popelka-Filcoff, 114–136. Washington, DC: American Chemical Society.

Lee-Thorp, J.A. 2008. On isotopes and old bones. *Archaeometry* 50: 925–950.

Makarewicz, C.A., and J. Sealy. 2015. Dietary reconstruction, mobility, and the analysis of ancient skeletal tissues: Expanding the prospects of stable isotopes research in archaeology. *Journal of Archaeological Science* 56: 146–158.

Mannino, M.A., R. Di Salvo, V. Schimmenti, C. Di Patti, A. Incarbona, L. Sineo, and M.P. Richards. 2011. Upper Palaeolithic hunter-gatherer subsistence in Mediterranean coastal environments: An isotopic study of the diets of the earliest directly-dated humans from Sicily. *Journal of Archaeological Science* 38: 3094–3100.

Murray, M.L., and M.J. Schoeninger. 1988. Diet, status, and complex social structure in Iron Age central Europe: Some contributions of bone chemistry. In *Tribe and polity in late prehistoric Europe*, ed. B. Gibson and M. Geselowitz, 155–176. New York: Plenum Press.

Pollard, A.M., and C. Heron. 2008. The chemistry of human bone: Diet, nutrition, status and mobility. In *Archaeological chemistry*, ed. A.M. Pollard and C. Heron, 346–382. Cambridge: The Royal Society of Chemistry.

Price, T.D., and J.H. Burton. 2011. Environment and diet. In *An introduction to archaeological chemistry*, ed. T.D. Price and J.H. Burton, 187–212. New York: Springer.

Prowse, T., H.P. Schwarcz, S. Saunders, R. Macchiarelli, and L. Bondioli. 2004. Isotopic paleodiet studies of skeletons from the Imperial Roman-age cemetery of Isola Sacra, Rome, Italy. *Journal of Archaeological Science* 31: 259–272.

Richards, M.P., and R.E.M. Hedges. 1999. Stable isotope evidence for similarities in the types of marine foods used by Late Mesolithic humans at sites along the Atlantic coast of Europe. *Journal of Archaeological Science* 26: 717–722.

Richards, M.P., and R.E.M. Hedges. 2008. Stable isotope evidence of past human diet at the sites of the Neolithic cave at Gerani; the Late Minoan III cemetery of Armenoi; grave circles A and B at the palace site of Mycenae; and Late Helladic chamber tombs. In *Archaeology meets science: Biomolecular investigations in Bronze Age Greece*, ed. Y. Tzedakis, H. Martlew, and M.K. Jones, 220–230. Oxford: Oxford Books.

Tafuri, M.A., O.E. Craig, and A. Canci. 2009. Stable isotope evidence for consumption of millet and other plants in Bronze Age Italy. *American Journal of Physical Anthropology* 139: 146–153.

Tieszen, L.L., and T. Fagre. 1993. Effect of diet quality and composition on the isotopic composition of respiratory CO_2, bone collagen, bioapatite, and soft tissues. In *Prehistoric human bone: Archaeology at the molecular level*, ed. J.B. Lambert and G. Grupe, 121–155. New York: Springer.

Tykot, R.H. 2004. Stable isotopes and diet: You are what you eat. In *Physics methods in archaeometry. Proceedings of the international school of physics "Enrico Fermi"*, ed. M. Martini, M. Milazzo, and M. Piacentini, 433–444. Bologna: Società Italiana di Fisica.

Tykot, R.H. 2010. Isotope analyses and the histories of maize. In *Histories of maize in Mesoamerica. Multidisciplinary approaches*, ed. J.E. Staller, R.H. Tykot, and B.F. Benz, 130–141. Walnut Creek: Left Coast

Press (Adapted version of 2006 chapter in *Histories of maize*, Academic Press).
Tykot, R.H., J.A. Kelly, and J.T. Milanich. 2005. Stable isotope analysis and subsistence adaptations along the Gulf Coast of Florida from the Archaic through Safety Harbor periods. *Geoarchaeological and Bioarchaeological Studies* 3: 517–520.
Tykot, R.H., F. Falabella, M.T. Planella, E. Aspillaga, L. Sanhueza, and C. Becker. 2009. Stable isotopes and archaeology in central Chile: Methodological insights and interpretative problems for dietary reconstruction. *International Journal of Osteoarchaeology* 19: 156–170.
Vogel, J.C., and N.J. van der Merwe. 1977. Isotopic evidence for early maize cultivation in New York State. *American Antiquity* 42: 238–242.

Bone Density Studies in Environmental Archaeology

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Introduction

Archaeologists and paleontologists have long recognized that the ability of bones to survive in the fossil record varies as a function of their intrinsic physical characteristics. Of these characteristics, bone density has become the most commonly used proxy measure of the potential of a specific skeletal element to survive site formation processes. In the analysis of archaeological faunal assemblages, bone density data have provided a framework for the assessment of preservational bias. Density-mediated destruction of faunal remains may result in a *sample assemblage* that is not representative of the *deposited assemblage* (terminology after Klein and Cruz-Uribe 1984), and this bias may affect the interpretation of important lines of faunal evidence such as skeletal element abundance, age/mortality profiles, and species representation. Studies have documented a wide range of bone density across the various elements within a skeleton, demonstrating the importance of basing counts of elements (MNE) and individuals (MNI) in archaeological assemblages on skeletal portions of high density.

The primary challenges in bone density research have been the derivation of accurate density measurements and the establishment of methodological standards. Over the past three decades, density data sets have been published for numerous species of mammals, birds, and fish. However, researchers have employed different methods in measuring and calculating "bone density" values. As a result, published bone density data sets vary significantly in their accuracy and are typically not suitable for comparison with one another. Most studies have been based on very small samples; those that have involved large samples have documented significant intraspecific variation in bone density.

Definition

Bone is made up of an organic matrix, a mineral component, and water. The organic matrix is primarily collagen, with a small proportion of non-collagenous proteins. The mineral component consists almost exclusively of hydroxyapatite, a calcium phosphate (Martin et al. 1998). The (dry) mass of a bone divided by its volume is known as its *apparent density* or *structural density*. Lyman (1984) emphasized a further distinction between *true density* (mass divided by volume exclusive of pore space) and *bulk density* (mass divided by volume inclusive of pore space); "pore space" includes any medullary cavity. Many studies have employed techniques that measure exclusively the mineral component of bone samples, producing data on *bone mineral density*.

The "bone density" data sets published in archaeological literature differ in terms of which property ("true density" or "bulk density") they attempt to represent and how accurately these properties have been measured. This variability reflects the diversity of methodologies used by researchers and has resulted in a current state of uncertainty in which "bone density" may refer to a certain property in one study but a different property in another. Consequently, the bone density data set from any given study is typically

unsuitable for comparison with those from others. This observation may even apply to studies conducted by the same research group; in a number of cases, researchers have altered their methodology for calculating bone density over time, with the result that the data produced in their more recent studies are not appropriate for comparison with those of their earlier studies. In numerous cases, methodological shortcomings have resulted in published bone density data that are inaccurate and of limited use in archaeological analyses (Lam and Pearson 2005). The methodology for any study must be examined carefully in order to determine the actual property to which "bone density" refers.

Key Issues/Current Debates/Future Directions/Examples

Archaeological studies of bone density were first conducted by some of the pioneers of taphonomic research (Brain 1969; Behrensmeyer 1975; Binford and Bertram 1977), who were interested primarily in applying these data to interpretations of the Plio-Pleistocene archaeological record. Perhaps the most well-known application of bone density studies was that of Brain (1969), in his assessment of Dart's proposal of an osteodontokeratic culture among australopithecines. Brain observed that the faunal preservation at the early South African cave sites more likely reflected patterns of bone density than selection, use, and manufacture by early hominins.

These early studies of bone density used water displacement to measure a range of artiodactyl skeletal elements, but differences in methodology resulted in inconsistencies between the density data produced by each study. Subsequently, most studies of bone density have been conducted using photon densitometry, a technique introduced to zooarchaeological research by Lyman (1984). Photon densitometry provided the advantages of being nondestructive and able to measure elements at very specific locations – known as "scan sites" or "regions of interest" (ROIs). While the earlier water displacement studies had measured the density of entire elements (providing a single value for each element) or, in the case of long bones, proximal and distal halves, Lyman's use of scan sites took into account the heterogeneous composition of most skeletal elements by defining multiple points of measurements for each. The scan sites defined by Lyman have become accepted as standard locations of density measurement by subsequent researchers, with modifications made to account for morphological variations among different taxa.

Despite Lyman's attempt to provide standardized parameters for bone density studies, the adoption of photon densitometry ironically resulted in greater incompatibility among the bone density data sets produced in the past two decades. Photon densitometers measure bone mineral *content* across a scan site (Fig. 1). In order to transform this measure of bone mineral content into a (bone mineral) *density* value, researchers must independently determine the volume of the scan site – the cross-sectional area of the site multiplied by its thickness, which is typically set by the machine (e.g., 1 mm). Despite having in common their use of photon densitometry, Lyman and other researchers employed different methods to estimate this cross-sectional area, affecting the accuracy and comparability of their density data sets. The end result has been that the practical definition of "bone density" varies from study to study. In some studies, the cross-sectional areas of all scan sites have been assumed to be a rectangle or a circle. Other studies have devoted greater effort to produce more precise measurements of the shape of the bone cross section. However, photon densitometry cannot determine the volume or shape of internal cavities; at best, it can measure *bulk density*, but not *true density*. With a few exceptions, researchers who employed photon densitometry did not take the additional steps to exclude internal cavities in their calculations of "density"; the failure to account for such cavities results in artificially low density values at the scan sites where they occur.

In order to address this shortcoming of photon densitometry, computed tomography (CT) has been used to measure bone mineral density for several species of mammal (Lam et al. 1999).

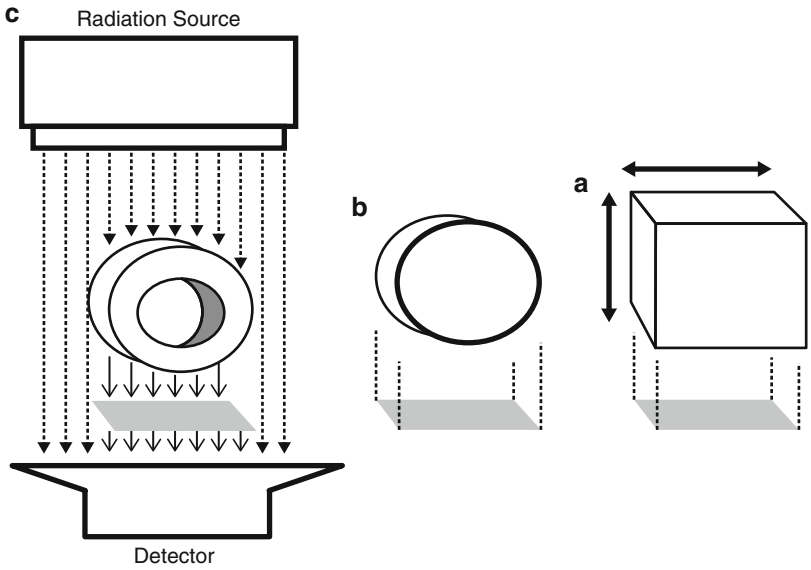

Bone Density Studies in Environmental Archaeology, Fig. 1 A schematic representation of photon densitometry, after Kreutzer (1992). The detector cannot determine the shape of the bone; it measures bone mineral *content*. The accuracy of the density value derived for each scan site (in this illustration, the middle shaft portion of a long bone) directly reflects the accuracy of the determination of the cross-sectional area. In "A," the cross section of the scan site is estimated to be a *rectangle* of maximum width and height. Such data underestimate the density of all scan sites and are categorized here as Class A. In "B," the external outline of the cross section is measured, but the internal cavity is not. Data produced in this manner are categorized as Class C and represent *bulk density*. They underestimate *true density* wherever an internal cavity occurs. Data that account for both external and internal shape ("C") are categorized as Class D and represent *true density*. The assessment of internal shape must be conducted independently of photon densitometry

The use of CT enabled precise assessment of the cross-sectional shape, including that of internal cavities, of each scan site and resulted in the most accurate bone mineral density measurements to that point. CT analysis of several ungulate taxa documented the highest bone density to be, among cranial elements, in the teeth and the petrous and, among postcranial elements, in the middle shaft portions of long bones (Lam et al. 1999).

Despite the advantages of CT, the use of photon densitometry has remained common in bone density studies. Recently, another nondestructive technology – digital photodensitometry – has been introduced to archaeological research into bone density. This technology allows the examination of large samples at low cost but, like photon densitometry, cannot measure internal cavities (Symmons 2004). In order to produce accurate density measurements, these technologies must be supplemented with the use of an independent method, such as water displacement or CT, that can determine the size of internal cavities.

The problematic effects of multiple methodologies of variable accuracy and precision can be seen in the divergent density values that have been produced for a single taxon (Fig. 2). Lam and Pearson (2005) conducted a review of bone density studies in archaeology, categorizing published density data sets for mammalian taxa into one of four classes: A–D, from least accurate to most accurate. Class A studies calculated density as if the cross section of the bone was a rectangle, with sides of maximum width and height (Fig. 1a). This invariably represents an overestimation of the cross-sectional area, resulting in an underestimation of bone density. The degree of inaccuracy varies with scan site,

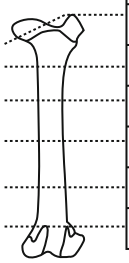

	I	II	III	IV	V
FE 1	0.28	0.34	0.57	1.03	0.60
FE 2	0.16	0.40	0.38	0.75	0.61
FE 3	0.20	0.39	0.46	0.76	0.66
FE 4	0.36	0.51	0.69	1.01	1.33
FE 5	0.24	0.41	0.54	0.81	0.56
FE 6	0.22	0.23	0.35	0.85	0.50

bone mineral density (g/ml)

Bone Density Studies in Environmental Archaeology, Fig. 2 Published bone density values for different scan sites of a sheep or goat femur, taken from five different studies. Columns I, II, and III represent Class A data; column IV represents Class C data (bulk density); column V represents Class D data (true density). (See Lam and Pearson (2005) for sources)

depending on how closely the cross section of that site corresponds to a rectangular shape.

Studies categorized as Class B and Class C accounted for the external shape of the cross section, with Class B studies using a rough, geometric estimate (e.g., circle, triangle, polygon) and Class C studies deriving an actual measurement of the external outline of the scan site; however, neither accounted for the presence and size of the medullary cavity. The accuracy of Class B data varies according to how closely the geometric estimate matches the shape of the cross section. Class C data should be accurate for scan sites that have no internal cavity (Fig. 1b). Only Class D data demonstrate accuracy across all scan sites, accounting for both the shape of the external contour and any internal cavities, but data sets in this class remain few. Some studies have derived density values in more than one class for comparative purposes. Class C density values have been found to be up to 1000% higher than Class A values and Class D values up to 120% higher than Class C values for the same scan site (Lam and Pearson 2004).

The publication date of a bone density study does not inform as to the accuracy of the data it presents. In the past decade, some studies have continued the publication of Class A data, while others have presented methodological advances such as the combination of photon densitometry (to measure bone mineral content) and CT (to determine cross-sectional area) in the same study (Novecosky and Popkin 2005).

Class D data have proven significant in documenting the large difference in density between the epiphyses and shafts of long bones, a difference obscured by the inclusion in Class A–C data of the marrow cavity in the density calculations (Fig. 2). This observation has illustrated the importance of incorporating shaft fragments into the quantification of long bone abundance. Such fragments are more likely to survive in the archaeological record than those of epiphyses. Quantification based primarily on epiphyses will underestimate the overall abundance of long bones for situations in which density-mediated destruction has occurred; in addition, it may result in a bias for metapodials, which have relatively dense epiphyses and represent low-utility elements, over high-utility long bones such as femora, whose epiphyses are less dense. At Paleolithic sites, the failure to count shaft fragments may lead to a biased overrepresentation of low-utility elements, potentially resulting in the erroneous interpretation that the assemblage was accumulated through scavenging behavior (Marean and Kim 1998).

Lyman's (1984) bone density data set for deer was used widely by researchers, even in cases in which the species of interest was not deer. In the past twenty years, efforts have been made to collect density data for other species – primarily mammals (including humans [Galloway et al. 1997]), but also several species of fish (e.g., Butler and Chatters 1994) and bird (e.g., Cruz and Elkin 2003). Some studies of mammal species have observed significant intertaxonomic differences in bone density patterns; however, it remains unclear the extent to which they reflect differences in research methodology rather than actual differences in density. Lam et al. (1999) derived bone mineral density values for a small sample of bovid, cervid, and equid species, finding that overall patterns of bone density were extremely consistent among the three groups. Other studies (e.g., Gutiérrez et al. 2010) have found, for individual scan sites, a high degree of variation in bone density

among individuals within the same taxon. While some of this variation may be attributable to differences in age, with the bones of juveniles being less dense than those of adults, the effects of other variables such as sex, diet, health, and activity levels on bone density require further investigation. A thorough documentation of the range of intrataxonomic variability is a prerequisite to any assessment of differences in bone density between species.

Additional challenges to be addressed include the use of bone density data in quantitative analyses. The standard use of correlation/regression analysis in many studies to examine the relationship between bone density and bone survivorship requires the condition that each individual identified in a faunal assemblage was originally represented by an entire skeleton. It also requires the condition that all the preserved remains of that skeleton were recovered and identified. As neither condition is likely to hold for most archaeological fauna assemblages, researchers must modify their quantitative analyses as appropriate (Lam and Pearson 2004; Novecosky and Popkin 2005). Continued research is required to produce accurate density values for larger samples, to assess the range of intrataxonomic and intertaxonomic variability in bone density, and to provide effective methods for incorporating bone density data into archaeological analyses.

Cross-References

- ▶ Binford, Lewis R. (Theory)
- ▶ Dart, Raymond Arthur
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Middle-Range Theory in Archaeology
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Taphonomy in Human Evolution
- ▶ Vertebrate Taphonomy in Archaeological Research
- ▶ Zooarchaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

References

Behrensmeyer, A.K. 1975. The taphonomy and paleoecology of Plio-Pleistocene vertebrate assemblages east of Lake Rudolf, Kenya. *Bulletin of the Museum of Comparative Zoology* 146: 473–578.

Binford, L.R., and J.B. Bertram. 1977. Bone frequencies and attritional processes. In *For theory building in archaeology*, ed. L.R. Binford, 77–153. New York: Academic Press.

Brain, C.K. 1969. The contribution of Namib Desert Hottentots to an understanding of australopithecine bone accumulations. *Scientific Papers of the Namib Desert Research Station* 39: 13–22.

Butler, V.L., and J.C. Chatters. 1994. The role of bone density in structuring prehistoric salmon bone assemblages. *Journal of Archaeological Science* 21: 413–424.

Cruz, I., and D. Elkin. 2003. Structural bone density of the lesser rhea (*Pterocnemia pennata*) (Aves: Rheidae). Taphonomic and archaeological implications. *Journal of Archaeological Science* 30: 37–44.

Galloway, A., P. Willey, and L. Snyder. 1997. Human bone mineral densities and survival of bone elements: A contemporary sample. In *Forensic taphonomy: The postmortem fate of human remains*, ed. W.D. Haglund and M. Sorg, 295–317. Boca Raton: CRC Press.

Gutiérrez, M.A., C. Kaufmann, M. González, A. Massigoge, and M.C. Álvarez. 2010. Intrataxonomic variability in metapodial and femur bone density related to age in guanaco (*Lama guanicoe*). Zooarchaeological and taphonomical implications. *Journal of Archaeological Science* 37: 3226–3238.

Klein, R.G., and K. Cruz-Uribe. 1984. *The analysis of animal bones from archeological sites*. Chicago: University of Chicago Press.

Kreutzer, L.A. 1992. Bison and deer bone mineral densities: Comparisons and implications for the interpretation of archaeological faunas. *Journal of Archaeological Science* 19: 271–294.

Lam, Y.M., and O.M. Pearson. 2004. The fallibility of bone density studies and their use in archaeological analyses. *Journal of Taphonomy* 2: 99–116.

Lam, Y.M., and O.M. Pearson. 2005. Bone density studies and the interpretation of the faunal record. *Evolutionary Anthropology* 14: 99–108.

Lam, Y.M., X. Chen, and O.M. Pearson. 1999. Intertaxonomic variability in patterns of bone density and the differential representation of bovid, cervid, and equid elements in the archaeological record. *American Antiquity* 64: 343–362.

Lyman, R.L. 1984. Bone density and differential survivorship of fossil classes. *Journal of Anthropological Archaeology* 3: 259–299.

Marean, C.W., and S.Y. Kim. 1998. Mousterian large mammal remains from Kobeh Cave (Zagros Mountains, Iran): Behavioral implications for Neanderthals and early modern humans. *Current Anthropology* 39: S79–S113.

Martin, R.G., D.B. Burr, and N.A. Sharkey. 1998. *Skeletal tissue mechanics*. New York: Springer.
Novecosky, B.J., and P.R.W. Popkin. 2005. Canidae volume bone mineral density values: An application to sites in western Canada. *Journal of Archaeological Science* 32: 1677–1690.
Symmons, R. 2004. Digital photodensitometry: A reliable and accessible method for measuring bone density. *Journal of Archaeological Science* 31: 711–719.

Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts

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Introduction

Differentiating human and nonhuman bone has important applications in both archaeological and forensic contexts and can be particularly challenging when skeletal remains are fragmentary. Archaeologists often make initial determinations about whether skeletal remains are human or not in the field, although more detailed analyses often take place in the laboratory, particularly for bulk bone recovered during excavation. In cases where skeletal remains are found unexpectedly, one of the first questions in establishing whether the remains have forensic significance involves determining whether they are of human or nonhuman origin. Differentiating human and nonhuman bone can be achieved through a variety of methods, including gross, histological, and molecular analyses. More detailed reviews of these methods can be found in Hillier and Bell (2007), Mulhern (2016), and Mulhern and Ubelaker (2012).

Definition

Human bone is most likely to be confused with mammalian bone, particularly mammals that are about the same size. However, the human skeleton is adapted for bipedal locomotion, resulting in many easily distinguishable skeletal features throughout the skeleton, particularly related to the morphology of joints and muscle attachment sites. The human skull is also readily identifiable, with the combination of a very large brain case and flat face. In general, human bones show less pronounced muscle markings and flatter, less sculpted joint surfaces than nonhuman mammalian bones. For a photographic reference for distinguishing human and nonhuman mammalian bone, see France (2009).

A large cranial vault and thinner cranial bones distinguish the human skull from other mammals of comparable size. Also, the opening to the brainstem (foramen magnum) is located directly underneath the skull in humans and toward the back of the skull in quadrupedal animals. The human face shows no projection of the nasal area or the jaws, unlike other mammals.

In humans, the spine exhibits a characteristic "S" shape when fully articulated to accommodate upright posture. In addition, the size of the vertebrae becomes dramatically larger toward the lumbar spine because of the need to support body weight. In quadrupeds, the articulated spine has more of a "C" shape with vertebrae that are more uniform in size throughout the spine. Features found on some nonhuman vertebrae and not human vertebrae include interlocking accessory processes and an anterior ridge on the centrum.

The human thorax is most similar to an ape, with a broad, shallow rib cage resulting in ribs that have a more pronounced c-shaped curve than seen in a typical quadruped. Humans have a long clavicle and very mobile shoulder, elbow, and wrist joints. Also seen in apes, this combination of features is not characteristic of other mammals of similar size. Most mammals have greatly reduced or absent clavicles as well as more stable, restricted shoulder girdles and elbow and wrist joints. Specific skeletal features to look for in humans included a rounded humeral head, reduced olecranon process of the ulna, and broad contact between the capitulum of the humerus and the radial head.

The human pelvis is unique among mammals, with a bowl shape capable of supporting internal organs with an upright posture. The broad iliac

blades accommodate the repositioning of gluteal muscles needed to offset torque forces caused by supporting the body weight on alternating limbs during bipedal striding.

The lower limbs in humans show many adaptations to bipedal locomotion. The thighs are angled from hip to knee to position the limbs directly underneath the body. This can be seen in the medial angle of the femur. The hip, knee, and ankle joints in humans are robust to accommodate body weight. The human tarsals are also very robust compared to other mammals. Humans have five digits in the foot; the first (medial) digit is the most robust. Many mammals have a reduced number of digits. Due to similarities in size and overall morphology, bear paws are commonly mistaken for human feet (and hands) in North America, particularly when partially fleshed with the claws missing. Anatomical differences between a human foot and bear foot include the relative length of the digits; humans have longer medial digits and bears have longer lateral digits. Also, the tarsal bones of a bear are not as robust as their human counterparts and the metatarsal heads of bears each have two associated sesamoid bones, whereas only the first metatarsal head in humans exhibits sesamoids. Specific features of the lower limbs characteristic of humans include a femoral greater trochanter that is shorter than the femoral head, a lateral lip on the anterior aspect of the distal femur that helps to hold the patella in place, and a platform-like talus.

In addition to an opposable thumb, the articular ends of metacarpals, metatarsals, and phalanges are smooth and rounded in humans for enhanced flexibility and mobility, whereas these elements often exhibit ridges and grooves for stability in nonhuman bone.

In cases where it is not possible to confirm or exclude human origin based on gross analysis, histological methods may be useful (Mulhern and Ubelaker 2012). Histological analysis is necessarily destructive and requires specialized equipment and training. Preparation of histological specimens typically involves removing a cross section of a bone and grinding it down to a thin wafer that can be mounted on a microscope slide for viewing under a light microscope. The overall organization of histological structures, as well as the size and shape of structures, may provide important clues regarding the bone's origin.

Mammals that grow quickly in size such as cows, deer, and sheep typically have bone that exhibits a plexiform structure, with a rectangular organization (Fig. 1). This type of pattern is not found in human bone and, if observed, can be used to rule out bone of human origin (Mulhern and Ubelaker 2012). A pattern of linear bands of primary and/or secondary osteons is commonly found in nonhuman bone (Fig. 2). Three dimensional techniques for observing bone microstructure have recently revealed that osteon banding may also be found in human bone (Anndronowski et al. 2017). Human bone is usually characterized by haphazardly distributed secondary osteons, or

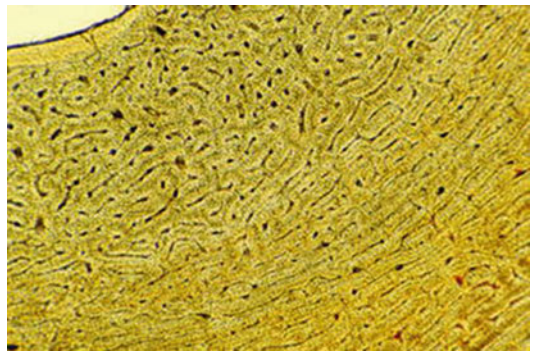

Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts, Fig. 1 Plexiform bone in a sheep femur

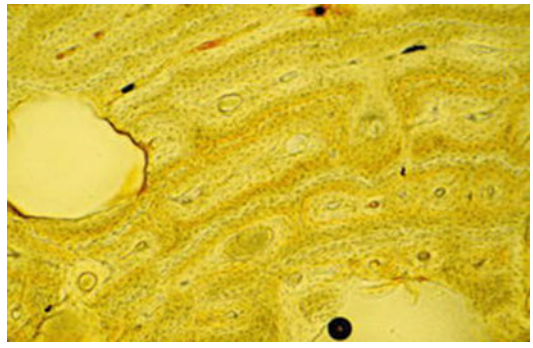

Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts, Fig. 2 Osteon banding in a miniature swine femur

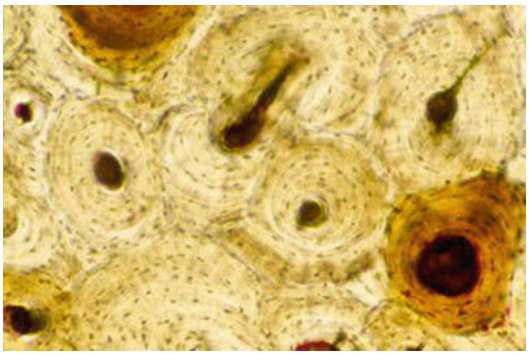

Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts, Fig. 3 Haversian bone in a human femur

Haversian systems embedded within lamellar bone (Fig. 3), but is not unique in this respect, as many other mammals (including those with plexiform bone) also have bone with this type of pattern. In particular, large carnivores exhibit Haversian bone like humans. This is potentially problematic in a forensic context, since size of the bones could be similar.

Key Issues/Current Debates

Attempts have been made to apply metric analysis of histological structures (such as osteon size or Haversian canal size) to identify differences among species, but the accuracy of many of these studies is questionable because they are based on small sample sizes (Mulhern and Ubelaker 2012).

Overall, studies show that humans have larger Haversian canals than most mammals, however most studies are based on relatively small sample sizes, so the extent of variability is not well understood. Osteon sizes in humans overlap those of other mammals, particularly those with medium or large body sizes. Several studies have also attempted to develop discriminant function equations that can be used for distinguishing human and nonhuman bone based on histomorphometrics. This new area of research involves an investigation of the circularity of osteons, which suggests that osteons in nonhuman bone are more circular than those found in human bone. A complete review of these methods can be found in Mulhern and Ubelaker (2012).

Biomolecular methods including radioimmunoassay and mitochondrial DNA analysis have also been used for species identification, which is particularly important in wildlife forensics; applications of these studies are summarized in Mulhern (2016). Collagen peptide mass fingerprinting has also emerged as a promising area for species identification, with published studies primarily in bioarchaeology (e.g., Buckley et al. 2009). The cost of such methods and access to specialized equipment makes gross analysis and histological methods preferable when possible.

Future Directions

Future directions for distinguishing human and nonhuman bone include an expansion of our understanding of the variability of bone histology among species as well as among and within bones of individuals, particullarly with nondestructive, three-dimensional imaging techniques. As more studies involving larger sample sizes provide additional data, the accuracy of methods used to distinguish human and nonhuman bone based on histological structures will likely improve. In addition, wider and cheaper access to biomolecular methods will allow for more accurate analysis of fragmentary remains.

Cross-References

- ▶ Bioarchaeology: Definition
- ▶ Bone: Chemical Analysis
- ▶ Bone: Histological Analysis
- ▶ Bone, Trauma in
- ▶ Commingled Remains
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy: Definition

References

Anndronowski, J.M., Pratt, I.V., and D.M.L. Cooper. 2017. Occurence of osteon banding in adult human cortical bone. *American journal of physical Anthropology* 1–8. http://doi.org/10.1002/ajpa.23297.

Buckley, M., M. Collins, J. Thomas-Oates, and J.C. Wilson. 2009. Species identification by analysis of bone collagen using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry. *Rapid Communications in Mass Spectrometry* 23: 3843–3854.

France, D.L. 2009. *Human and nonhuman bone identification: A color atlas*. Boca Raton: CRC Press.

Hillier, M.L., and L.S. Bell. 2007. Differentiating human bone from animal bone: A review of histological methods. *Journal of Forensic Sciences* 52 (2): 249–263.

Mulhern, D.M. 2016. Differentiating human from non-human skeletal remains. In *Handbook of forensic anthropology and archaeology*, ed. S. Blau and D.H. Ubelaker, 2nd ed., 197–212. New York: Routledge.

Mulhern, D.M., and D.H. Ubelaker. 2012. Differentiating human from nonhuman bone microstructure. In *Bone histology: An anthropological perspective*, ed. C. Crowder and S. Stout, 109–134. Boca Raton: CRC Press.

Bone Tools, Paleolithic

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Introduction

"Bone tool" is a generic term used to identify implements made of various animal tissues that include bone, tooth, antler, and ivory. During the Paleolithic (2.6 Ma to ~10,000 BP), these tools took different forms and have been studied by archaeologists to address a variety of questions. Researchers have investigated early purported bone tools in an attempt to identify firm criteria to distinguish between marginally modified or used tools and bones altered by natural causes. Bones interpreted as genuine tools have been investigated to gain a better understanding of early hominin adaptation, technology, and cultural traditions. Different research questions have concerned the emergence and diversification of formal bone tools, defined as functional artifacts shaped with techniques specifically conceived for bony tissue, such as scraping, grinding, grooving, and polishing. For much of the twentieth century, formal bone tools were seen as a technological innovation directly stemming from the spread of anatomically modern humans across Europe at the beginning of the Upper Paleolithic and strictly associated with a suite of critical inventions that followed this peopling event (cave and mobiliary art, personal ornaments, blade technology, complex funerary practices, musical instruments, etc.). Upper Paleolithic bone industries were used in this framework to support the scenario of a cognitive revolution occurring in Europe at c. 40,000 years ago. The discovery of bone awls and projectile points at a number of Still Bay (d'Errico and Henshilwood 2007) and Howiesons Poort (Backwell et al. 2008) sites from southern Africa, securely dated to between 75 and 60 ka, has challenged this view, but not the significance attributed by many archaeologists to this category of material culture. The early appearance of bone tools in the African Middle Stone Age, together with pigments and personal ornaments, has been used to support the so-called Out-of-Africa scenario for the origin of behavioral modernity, linking the origin of our species in Africa around 200,000 years ago with the gradual emergence of modern culture on that continent. In this context, bone tools are interpreted as a significant behavioral corollary of the emergence of anatomically modern humans in Africa. However, some authors have cautioned that Middle Stone Age sites with advanced bone tools are rare and that the cognitive implications of formal bone tool manufacture are uncertain (Backwell et al. 2008). In addition, bone industries that show a level of technological complexity, equivalent to

that normally associated with Upper Paleolithic cultures produced in Europe by modern humans, are associated with transitional technocomplexes such as the Châtelperronian in France and Spain and the Uluzzian in Italy and Greece. The former technocomplex is now firmly attributed to Neanderthals, but the authorship of the latter is uncertain due to the scarcity and ambivalent features of the human remains associated with those layers. This implies that the ability to produce formal bone tools may not be the preserve of modern humans. In parallel with these studies, the complexity of Upper Paleolithic bone tools has stimulated research seeking to document the technological, typological, and functional changes that characterized bone tool industries in Eurasia between 40 and 10 ka. In this review we will focus on these different topics and summarize recent advances in the field.

Definition

A bone tool is taken here to be an implement that can be used to achieve a task or modify or produce an item. This definition does not include categories of bone artifacts used in nonfunctional activities, such as musical instruments, notations, and ornaments. This entry focuses on Paleolithic bone tools from Africa and Europe.

Historical Background

Earlier Stone Age of Africa

Ever since Dart interpreted bones from Makapansgat as tools, an interpretation largely rejected, research interest has focused on whether some bone objects from early hominin sites should be interpreted as artifacts or the result of nonhuman taphonomic processes, which are known to produce pseudo-bone tools morphologically similar to human modified or used artifacts. Criteria for characterizing the patterns produced by specific agents are not always clearly defined, and the issue of equifinality compounds the problem. In light of this, it has become widely accepted that in order to distinguish between pseudo-tools and true tools, it is necessary to adopt an interdisciplinary approach, combining the analysis of a wide range of bones modified by known agents, taphonomic analysis of the fossil assemblages from which the purported bone tools derive, microscopic studies of possible traces of manufacture and use, experimental replication of the purported tools, and the quantification of the wear pattern. In 1959 Robinson proposed that a metapodial shaft fragment with a smoothed and pointed end from Sterkfontein Member 5 West (~1.7–1.4 Ma) was a tool. Thirty years later Brain described 68 similarly modified bones and horn cores from Members 1–3 at Swartkrans, dated ~1.8–1 Ma. Comparative scanning electron microscope inspection of replicas of the worn area on archaeological specimens, and experimental shaft fragments used to extract tubers from the ground and work skins, suggested to Brain and Shipman that the wear patterns on the smoothed tips of the Swartkrans specimens matched those produced experimentally. The anthropogenic nature of the material was later confirmed by Backwell and d'Errico (2001), based on comparison with a large reference collection comprising fauna modified by ten nonhuman agents, morphometric and fracture analysis of bone flakes from Swartkrans Member 1–3, experimental use of shaft fragments in a variety of tasks, microscopic analysis of natural, experimental, and archaeological wear patterns, and quantification of striation width and orientation on archaeological and experimental specimens. The breakage patterns and size of the bone tools, compared with the remainder of the faunal remains, indicated that early hominins selected heavily weathered, elongated and robust bone fragments for use as tools (Fig. 1). The wear pattern on the Swartkrans tools fitted most closely that created when excavating termite mounds in the Sterkfontein Valley. Evidence of shaping by means of grinding on some of the more robust horn cores suggests that the users had the cognitive ability to modify bone intentionally for optimal efficiency in the task for which they were used. These authors described 16 new bone tools from Swartkrans and used the enlarged collection to search for patterns of variation between members. No significant differences

Bone Tools, Paleolithic, Fig. 1 Selection of bone tools from the South African early hominin sites of Swartkrans (*top*) and Drimolen (*bottom*). (Images: Backwell & d'Errico)

were observed between Members 1–3 in the type and size of the bone fragments used as tools, as well as in the length and type of the wear pattern, demonstrating that no major changes occurred through time in the bone type favored and the motion in which the tools were used. A functional study of the Sterkfontein and Swartkrans bone tools was also conducted by Van Ryneveld, who experimentally used bone tools in a number of tasks and compared the resulting patterns with that present on the Swartkrans specimens using scanning electron microscopy. She concluded, based on visual comparison between wear patterns and the productivity of the various activities involved, an anthropogenic origin for the wear and that archaeological tools were used to excavate subterranean plant foods in dolomitic ground, debark softwood trees, process hides, and extract termites from their mounds. More recently, Backwell and d'Errico (2008) recognized 14 bone pieces from the nearby site of Drimolen as digging tools (Fig. 1), indicating that the use of these tools was widespread at sites in the Sterkfontein Valley. In an attempt to refine the functional interpretation of the bone tools from Swartkrans and Drimolen, they conducted a statistical analysis of 2D and 3D roughness variables obtained from a representative sample of archaeological, ethnographic, and experimental bone tools (d'Errico and Backwell 2009). Results show that the wear pattern on the early hominin bone tools from Drimolen is incompatible with that of tuber digging and very similar to termite foraging and fruit processing. Members

1–3 at Swartkrans contain the remains of the robust australopithecine *Paranthropus robustus*, while Members 1 and 2 have additionally yielded the remains of *Homo erectus*. The absence of this taxon in Member 3, from where most of the bone tools derive, suggests, but does not prove, that these implements were used by *Paranthropus robustus*. The association of a high number of *Paranthropus* remains with bone tools and the virtual absence of stone tools at Drimolen reinforces the hypothesis that *Paranthropus robustus* was the user of the South African bone tools. A different bone tool tradition is observed in East Africa, where Mary Leakey reported 125 artificially modified bones and teeth from Olduvai Beds I and II bearing evidence of intentional flaking, battering, and abrasion. These specimens derive from massive elephant, giraffe, and *Libytherium* limb bones, and to a lesser extent from equids and bovids, as well as from hippopotamus and suid canines. Shipman analyzed the collection microscopically and concluded that 41 of the bone pieces were modified by hominins and the remainder bore ambiguous traces, or evidence of abrasion by sediment. A patella, astragalus, femoral condyle, and magnum bearing puncture marks were interpreted as anvils, and 35 implements were described as bones shaped by flaking prior to use. Twenty-six were interpreted as light-duty implements used on soft substances (hide-working), and the remaining 11 described as heavy-duty tools utilized on mixed substances, perhaps in butchering or digging activities. Backwell and d'Errico (2004) reanalyzed the collection, focusing on fracture patterns and flake removals. Comparative microscopic analysis of different areas of the purported Olduvai tools, and of the edges of bone pieces from the rest of the faunal assemblage, suggested to these authors that the surfaces of all of the purported bone tools are affected by post-depositional abrasion, rendering impossible the interpretation of the function of the tools based on the wear pattern alone. However, analysis of breakage patterns and removals identified a reduced number of pieces that are likely candidates for having been intentionally knapped. These comprise fresh bone shaft fragments and epiphyseal pieces bearing five or more flake scars, some of which are contiguous, with one or more anomalously invasive primary removals (Fig. 2). Most of them reveal a particularly high proportion of bifacially arranged removals, and they are virtually unaffected by carnivore damage. They proposed that some bones functioned as handheld hammers (Fig. 2). An interesting aspect of their results lies in the stratigraphic occurrence of the bone tools. While Leakey and Shipman identified bone tools in all the beds, they identify, with one possible exception, bone tools only in Bed II. This suggests modification of bone fragments by knapping is not a behavior associated with the Oldowan, but with the more developed phases of this technological tradition (Developed Oldowan B) and/or the Early Acheulean. Knapped bone tools appear more systematically, according to their results, in coincidence with the appearance of remains of *Homo erectus* in middle and upper Bed II. The presence in a Bed II site of an intentionally knapped bone hand axe constitutes supplementary evidence that *Homo erectus* was responsible for the production of at least some of these bone tools. Similarly flaked bones are reported from other Acheulean sites, namely, Ternifine in Algeria, the Grotte des Ours in Morocco, and Gesher Benot Ya'aqov in Israel. Bones bearing traces interpreted as resulting from use are also reported at Melka-Konturé, Ethiopia, in layers dated to 1.7 Ma.

Lower Paleolithic of Europe

Intentionally flaked tools are reported from 12 Lower Paleolithic sites in Europe, eight of which are in Italy. Acheulean-type bifaces, made by flaking elephant long bones, are known from three Middle Pleistocene sites in Italy: Castel di Guido, Fontana Ranuccio, and Malagrotta (Costa 2010). The Castel di Guido and Fontana Ranuccio specimens, in particular, show multiple scars on both faces with clear negative bulbs of percussion (Fig. 3). The use of long bone shaft fragments and an equid phalanx used to retouch stone artifacts is documented at the Middle Pleistocene site of Boxgrove in England. Putative bone and ivory

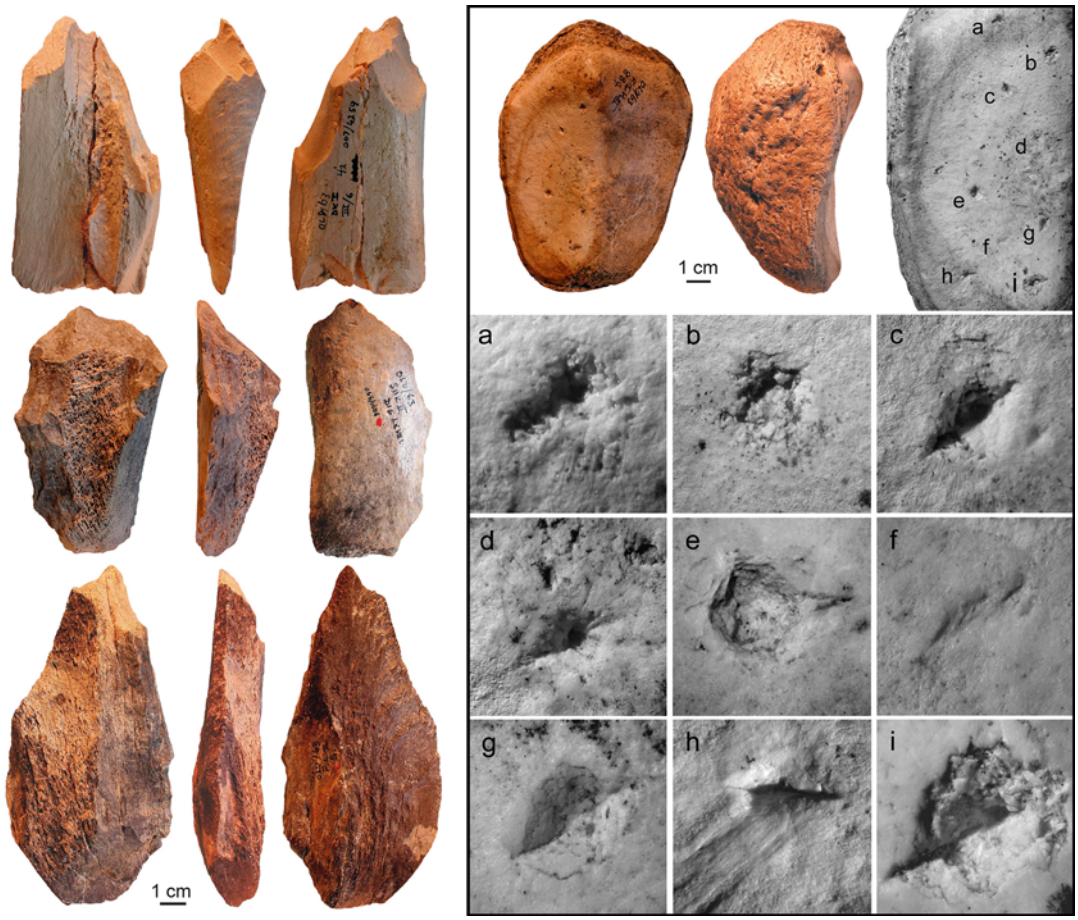

Bone Tools, Paleolithic, Fig. 2 Selection of bone tools from Olduvai Gorge showing intentional shaping through knapping (*left*), and an elephant patella (*right*), with impact marks (details) resulting from repeated striking against a pointed stone. (Images: Backwell & d'Errico)

points have been reported from at least six Lower Paleolithic sites in Europe, namely, Mesvin in Belgium, Bilzingsleben in Germany, Lunel Viel in France, Castel di Guido in Italy, and Torralba and Ambrona in Spain. Shaped bone and ivory points from the sites of Torralba and Ambrona were thought to have been used as awls or with wooden hafts, with the use of hafted bone and ivory points implying the employment of a spear armature technology. However, a reappraisal of the ivory points from Torralba, Ambrona, and Castel di Guido concluded that these pieces are natural, resulting from the accidental breakage of the tusks during the life of the animal (Villa and d'Errico 2001).

Middle Paleolithic of Europe

The use of bone or antler bases to retouch stone artifacts is documented at many Mousterian sites from Europe including Combe Grenal, Artenac, and La Quina in France, Riparo di Fumane and Riparo Tagliente in Italy, and on the Crimean peninsula (Patou-Mathis 2002). Recently, a human skull fragment from the Mousterian site of La Quina has been shown to be the oldest evidence of a human bone used as a tool in the form of a retoucher (Verna and d'Errico 2011). Bone and antler points are reported from at least 12 Middle Paleolithic sites: Butesti and Budzujeni in Moldavia, Prolom II in Crimea, Salzgitter-Lebenstedt in Germany, the Broion cave in Italy,

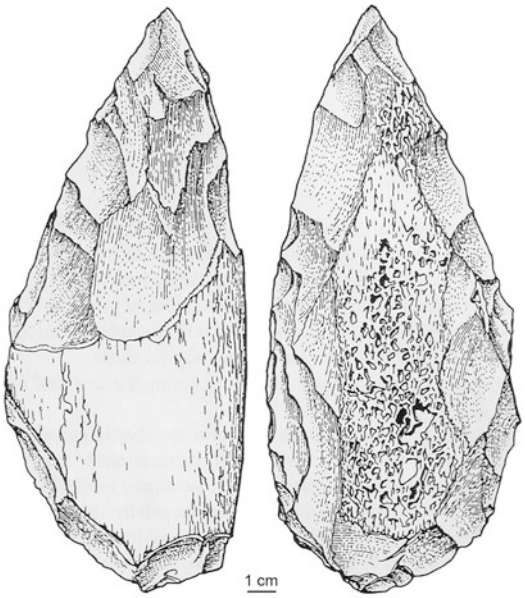

Bone Tools, Paleolithic, Fig. 3 Lower Paleolithic bone hand axe made of *Elephas antiquus* limb bone from Castel di Guido, Italy. (Drawing: F. d'Errico)

Castillo in Spain, and several French sites such as Combe Grenal, Vaufrey, La Quina, la Grotte de l'Hermitage, Pech de l'Azé 1, and Camiac. Some of the pieces were interpreted as points hafted on throwing or thrusting spears, while others were described as awls and borers. A collection of mammoth ribs and fibulae from Salzgitter-Lebenstedt in Germany is said to have been intentionally pointed and/or flattened, but these objects require reappraisal before they can be accepted as genuine artifacts because similar objects have been shown to be the result of natural processes. Bone described as intentionally flaked or retouched has been reported from a number of Mousterian sites (e.g., Cueva Morin and La Quina), but the possibility that flaking may have resulted from fracture for marrow extraction by humans or carnivores has been excluded in only a few cases. Firm evidence of worked, and in some cases decorated, bone awls comes from Châtelperronian and Uluzzian sites in France and Italy (d'Errico et al. 2011). Findings at Arcy-sur-Cure and Quincay in France (Fig. 4), dated to between 40 and 38 ka BP, have yielded good evidence of complex bone technology in the form of shaped and decorated awls. The late Mousterian levels at Buran Kaya III in Crimea have yielded one bone haft made of a horse metapodial and several bone tubes made on wolf and hare long bones, dated to between 36 and 32 ka BP.

African Middle Stone Age

An increasing number of bone tools are reported from Middle Stone Age (MSA) sites in Africa. These include bone objects from Broken Hill (Kabwe), Zambia, attributed to the early MSA and thought to be associated with *Homo heidelbergensis* (elsewhere named *Homo rhodesiensis*) and interpreted as two gouges and a point. A point from Mumbwa Cave is considered doubtful. Other evidence for bone working in the MSA is provided by barbed and unbarbed bone points from the Katanda sites (Fig. 5) in the Semliki Valley, Democratic Republic of the Congo, dated ~90–60 ka (Yellen et al. 1995). A point tip, a mesial fragment, an almost complete spear point, a tanged bone point, and 26 awls are reported from M1 and M2 layers at Blombos Cave, with ages ~84–72 ka (Fig. 6). A single massive point, different from those found in the MSA and LSA layers at Blombos Cave, was recovered in the dune sand layer, with an age of ~70 ka (d'Errico and Henshilwood 2007). An awl and a possible flaked shaft fragment come from the Blombos M3 phase, with an age of 98.9 ± 4.5 ka. The morphological variability in the bone points from Blombos Cave, and the size and weight of the one complete specimen, suggests that they are more likely spear points than arrow points. The interpretation of the Blombos bone artifacts as spear points is consistent with ethnographic and recent archaeological stone point dimensions, which show spear tips to be five times larger than arrow heads. A bone point from Peers (Skildergatkop) Cave was retrieved from either the Howiesons Poort (HP) or Still Bay layers at the site. A recent study of carbon-nitrogen ratios in the Peers point, and a sample of Later Stone Age (LSA) and MSA faunal remains from this site, confirms that the point originates from MSA layers (d'Errico and Henshilwood 2007). A single bone point was discovered at Klasies River in layer 19 of Shelter 1a at the

Bone Tools, Paleolithic, Fig. 4 Selection of Châtelperronian bone tools from Grotte du Renne at Arcy-sur-Cure, France (*left*), and Uluzzian sites from Italy. (Images: d'Errico/Vanhaeren/Borgia)

base of the HP. A date of approximately 80–60 ka, centered on 70 ka, was suggested for the HP at Klasies River. The only other pointed bone implements known from the MSA come from Sibudu Cave. These items include a polished bone pin attributed to the late MSA, from layer Co with an age of ~35 ka, a second bone pin, from layer PGS, and a large bone point from layer GS. These two items occur in the HP sequence with age estimates >61 ka. In addition to a small spatula-shaped tool, the discovery of a collection of worked bone at Sibudu Cave (Backwell et al. 2008) confirms a bone tool industry for the Howiesons Poort technocomplex. Comparative microscopic and morphometric analysis of the large bone point from Sibudu with bone tools from southern African Middle and Later Stone Age deposits, an Iron Age occupation, nineteenth-century San hunter-gatherer toolkits, and bone tools used experimentally in a variety of tasks revealed that it is most similar to arrow points from LSA, Iron Age, and historical San

Bone Tools, Paleolithic, Fig. 5 Selection of barbed bone points from Katanda, Democratic Republic of the Congo, interpreted as harpoons used for fishing. (Images: F. d'Errico)

sites. This is interpreted, together with the extreme symmetry recorded in the tip of the Sibudu point, as a shift from the use of hand-delivered bone spearheads in the Still Bay (at Blombos) to bow and arrow technology in the HP. If confirmed, the bone point from Sibudu Cave pushes back the origin of bow and bone arrow technology by at least 20,000 years, substantiating arguments in favor of the hypothesis that crucial innovations took place during the MSA in Africa. The Sibudu bone point also falls within the morphological variability of a type of unpoisoned fixed bone arrow point used by Bushmen for hunting small game and birds, which is in accordance with the associated fossil fauna, represented mostly by small forest antelope.

African Later Stone Age

Projectile bone points and awls are associated with the Border Cave Early LSA assemblage, with an age of ~36 ka BP, and bone points similar to those known ethnographically occur at many LSA sites in southern Africa, including Rose Cottage, Oakhurst, and Nelson Bay caves, as well as Jubilee, Bushman Rock, and Giant's Castle Rockshelters (Deacon and Deacon 1999). Unlike MSA points, which were typically modified through scraping, LSA points evidence shaping through scraping and grinding. Later Stone Age bone tool categories include finely worked arrowheads, linkshafts, spatulas, polished needles, awls, fish hooks, gorges, and pegs, many of which are incised and decorated. The production of a range of tools from different raw materials is thought to imply increased technological and social complexity and the possible emergence of craft specialization. Later Stone Age bone tools are frequently associated with a suite of other innovations that include microlithic stone tool industries, rock art, and decorative items like beads and shell pendants. Formal bone tools, as with many of the innovations that became common in the LSA,

Bone Tools, Paleolithic, Fig. 6 Bone tools from the Middle Stone Age deposits at Blombos Cave. (Images: d'Errico/Henshilwood)

were already present, although rare, in the MSA. Grinding to shape formal tools is the only shaping technique that is virtually absent before the Later Stone Age.

Upper Paleolithic of Europe

This period is characterized by previously unseen complexity in the techniques used to manufacture bone artifacts, greater diversity in the raw materials used, and a proliferation of bone tool types and patterns used to decorate them (Camps-Fabrer 1988; Knecht 1993). During this period we also observe for the first time clear consistencies in the geographic distribution and association of bone tools, with some types widespread over large regions and others characterizing an area or a specific cultural facies. The Upper Paleolithic can be seen in this respect as a time in which all

Bone Tools, Paleolithic, Fig. 7 (**a**) Aurignacian split base point from Spy, Belgium; (**b**) Early Gravettian spear point from Mazière, Belgium; (**c**) fragment of a spear point with bladelet inserts, and spear point (**d**) from the Upper Magdalenian levels of Pincevent, France. (Images: courtesy M. Vanhaeren)

the bone/organic tools specific to hunter gatherers of high latitude appear and become established. Projectile point types, size, and the way in which they are prepared for hafting reveal a previously undocumented variability and complexity, suggesting the emergence of prey-specific and perhaps season-specific hunting equipment (Fig. 7). Evidence for the use of complex foreshaft and detachable projectile points appears at the beginning of the Upper Paleolithic and becomes more elaborate at the end of this period. Among the new tools that appear for the first time in this period, we find the boomerang – a specimen in mammoth ivory was discovered at Oblazowa, Poland, in levels dated to 23 ka BP (Valde-Nowak et al. 1987) – bone needles, spear throwers, and perforated batons at French sites dated to ~20 ka BP (Fig. 8). Harpoons made of reindeer and red deer antler become common in the Magdalenian ~13 ka BP (Julien 1982). Bone and antler tools used as soft hammers, pressure flakers, and punches used for intermediate percussion flaking also become common during this period. A number of tools used in hunting and domestic activities, typologically labelled as perforated batons, spatulas, pegs, and knives, still need to be investigated to elucidate their most likely functions.

Bone Tools, Paleolithic, Fig. 8 Harpoon (**a**) and *baton percée* (**b**) from the Late Magdalenian levels of the La Madeleine shelter, Tursac, France; (**c**) spear thrower decorated with a female ibex interpreted as giving birth. (**a** and **c**, courtesy of Musée National de Préhistoire, Les Eyzies-de-Tayac; **b**, photo Descouens, courtesy National History Museum of Toulouse)

Key Issues/Current Debates

A review of the literature shows that research interest in prehistoric bone tools has focused mainly on three areas. The first concerns verifying the existence, deciphering the functions of early hominin bone tools dated to between 1 and 2 Ma, and identifying who used them. The second area of interest concerns formal bone tools from MSA deposits in Africa, and whether they may be taken as reliable proxies for the emergence of modern humans and so-called modern behavior. The third relates to Upper Paleolithic bone industries and the reasons for the high degree of technical and symbolic investment in their production. The manufacture of bone and ivory implements using techniques specifically conceived for these materials, such as scraping, grinding, grooving, and polishing, is generally considered to be associated with modern human behavior and advanced cognition. A reason for this view is that the final shape of a bone tool manufactured with these techniques can be accomplished with a high degree of accuracy, which makes "formal" bone tools especially appropriate for inferring the degree of standardization and complexity of a technical system. Another reason is that the production of tools from a range of raw materials is thought to imply a diversified strategy of raw material acquisition and the possible emergence of craft specialization and increased complexity in social roles. A third reason for linking social and cognitive complexity with the presence of bone tools is the view that elaborated bone tools are a technological innovation associated with the spread of anatomically modern humans across Europe at the beginning of the Upper Paleolithic, forming part of the suite of critical inventions that followed this peopling

event. As such, Upper Paleolithic bone tool industries have been used to support the scenario of a cognitive revolution occurring in Europe at ~40 ka, but the discovery of bone awls and probable projectile points at a number of securely dated MSA sites in South Africa challenges this view.

International Perspectives

The emergence of bone technologies has traditionally been considered as coeval with the arrival of modern humans in Europe. Recent discoveries and reappraisal of old evidence reveal a more complex pattern, with two traditions of bone modification and utilization in South and East Africa during the Early Stone Age, convincing instances of bone shaping through percussion at a number of Acheulean and Mousterian sites from Europe, and the systematic use of bones as retouchers in the Lower and particularly Middle Paleolithic of Eurasia. Clear evidence of complex bone technologies is found at Middle Stone Age sites in sub-Saharan Africa, at late Neanderthal sites from France and Italy, and at early Upper Paleolithic sites from Europe, Siberia, and the Near East. Abundant and diverse evidence for the use of bone as a raw material is associated with most Upper Paleolithic cultures, starting with the Ancient Aurignacian at ~40 ka. The broad implications of this emerging pattern for the cultural evolution of our lineage have not been explored in detail, mostly because researchers focus their attention on a single topic, site, or time period. Outdated paradigms regarding the evolution of stone and bone tool technology appear to have become established in the literature and thus in the minds of many scholars. It is widely accepted, for example, that the development of technology was a gradual process that proceeded in parallel with biological evolution and that the early use of bone tools was essentially immediate, involving only a short series of single-stage operations, and thus a low degree of conceptualization. It is also thought that bone tools shaped by knapping simply reflect the transfer of the percussion flaking technique from stone to bone and that early humans were incapable of developing sophisticated techniques specifically conceived for bone. Multidisciplinary research in the fields of archaeology, primatology, paleoanthropology, ethnography, genetics, and radiometric dating indicates a different scenario. The Paleolithic record of bone and stone tools shows that hominin technological evolution advanced in a nonlinear manner and that from the outset bone tools exhibit signs of innovation, manifest as implements intentionally modified through knapping and grinding. Current findings are at odds with the idea that hominins of the genus *Homo* were the only modifiers of early bone tools and do not support the hypothesis that the manufacture of formal bone tools is the exclusive domain of behaviorally modern humans. The identification of a discontinuous pattern, with innovations appearing and disappearing, or being associated in a way that does not match the expected trend, supports the view that bone and complex lithic technology do not necessarily represent reliable hallmarks of "modern behavior" and cannot be attributed an unequivocal evolutionary significance. A paucity of sites that have been excavated or dated using modern standards makes it difficult to establish whether the apparent disappearance of cultural innovations, particularly when these are embodied in small, fragile items, is due to sampling, excavation methods, destructive taphonomic processes, variability in subsistence strategies, or a loss of previously acquired cultural traits. In order to explain the discontinuous pattern in hominin technological evolution and the trans-species phenomenon of bone tool utilization in prehistory, we need to evoke social, demographic, and climatic factors, and their potential impact on similar innovations among geographically dispersed populations in Africa and Eurasia.

Future Directions

There is a cogent need to promote collaborative interdisciplinary research, bringing together specialists from different research traditions to analyze material and find the most suitable ways forward. We need to combine technological and

morphometric attributes of bone tools to evaluate differences between sites and periods and identify regional clines and diachronic evolutionary trends. Finally, a georeference database of bone tool distribution across regions in which there are abundant sites with bone tool industries would assist in addressing the link between cultural and environmental change.

Cross-References

- ▶ African Stone Age
- ▶ Archaic *Homo sapiens*
- ▶ Australopithecines
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Dart, Raymond Arthur
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Handaxes and Biface Technology
- ▶ *Homo habilis*
- ▶ *Homo heidelbergensis*
- ▶ *Homo neanderthalensis*
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Neanderthals and their Contemporaries
- ▶ Oldowan Industrial Complex
- ▶ Olduvai Gorge Archaeological Site
- ▶ *Paranthropus*
- ▶ Southern and East African Middle Stone Age: Geography and Culture

References

Backwell, L.R., and F. d'Errico. 2001. Evidence of termite foraging by Swartkrans early hominids. *Proceedings of the National Academy of Sciences* 98 (4): 1358–1363.

Backwell, L.R., and F. d'Errico. 2004. The first use of bone tools: A reappraisal of the evidence from Olduvai Gorge, Tanzania. *Palaeontologia Africana* 40: 95–158.

Backwell, L.R., and F. d'Errico. 2008. Early hominid bone tools from Drimolen. *Journal of Archaeological Science* 35 (11): 2880–2894.

Backwell, L.R., F. d'Errico, and L. Wadley. 2008. Middle Stone Age bone tools from the Howiesons Poort layers, Sibudu Cave, South Africa. *Journal of Archaeological Science* 35 (6): 1566–1580.

Camps-Fabrer, H. 1988. *Fiches typologiques de l'industrie osseuse prehistorique. Cahier I, Sagaies*. Aix-en-Provence: Université de Provence.

Costa, A. 2010. A geometric morphometric assessment of plan shape in bone and stone Acheulean bifaces from the Middle Pleistocene site of Castel di Guido, Latium. In *New perspectives on old stones: Analytical approaches to Paleolithic technologies*, ed. S. Lycett, 23–42. New York: Springer.

Deacon, H.J., and J. Deacon. 1999. *Human beginnings in South Africa*. Cape Town: Dave Philip.

d'Errico, F., and L.R. Backwell. 2009. Assessing the function of early hominin bone tools. *Journal of Archaeological Science* 36: 1764–1773.

d'Errico, F., and C. Henshilwood. 2007. Additional evidence for bone technology in the southern African Middle Stone Age. *Journal of Human Evolution* 52 (2): 142–163.

d'Errico, F., V. Borgia, and A. Ronchitelli. 2011. Uluzzian bone technology and its implications for the origin of behavioural modernity. *Quaternary International*. https://doi.org/10.1016/j.quaint.2011.03.039.

Julien, M. 1982. *Les harpons Magdaléniens*. Paris: supplément à Gallia Préhistoire.

Knecht, H. 1993. Early Upper Paleolithic approaches to bone and antler projectile technology. In *Hunting and animal exploitation in the later Palaeolithic and Mesolithic of Eurasia*, ed. G.L. Peterkin, H.M. Bricker, and P. Mellars, 33–47. Washington, DC: Archeological Papers of the American Anthropological Association.

Patou-Mathis, M. 2002. *Retouchoirs, compresseurs, percuteurs . . .Os à impressions et éraillures*. Paris: Société Préhistorique Française.

Valde-Nowak, P., A. Nadachowski, and M. Wolsan. 1987. Upper Palaeolithic boomerang made of a mammoth tusk in south Poland. *Nature* 329: 436–438.

Verna, C., and F. d'Errico. 2011. The oldest evidence for the use of human bone as a tool. *Journal of Human Evolution* 60: 145–157.

Villa, P., and F. d'Errico. 2001. Bone and ivory points in the Lower and Middle Palaeolithic of Europe. *Journal of Human Evolution* 41: 69–112.

Yellen, J.E., A.S. Brooks, E. Cornelissen, M. Mehlman, and K. Stewart. 1995. A Middle Stone Age worked bone industry from Katanda, Upper Semliki Valley, Zaïre. *Science* 268: 553–556.

Bone, Trauma in

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Introduction

Forensic anthropology is playing an ever increasing role in medicolegal death investigations. Beyond osteological analysis in a laboratory setting, forensic anthropologists work with law enforcement agencies to search for clandestine graves, assist at crime scenes in the recovery of human remains and

associated evidence, assist medical examiners with trauma analysis in relatively recent cases, and conduct research, casework, and educational programs through academic settings. At the core of medicolegal death investigations are questions about cause and manner of death which may determine whether or not a crime was committed. Bioarchaeologists may apply a similar protocol of osteological methods to historic and archaeological populations for individual or population level trauma analysis. For forensic anthropologists who apply these methods to homicide investigations, the role is increasingly demanding as they are called to testify in court about human identification, interpretations about inflicted trauma, and the time since death.

Deaths resulting from traumatic injuries are better contextualized through the study of skeletal trauma. On an individual level, ante- and perimortem injuries provide details about a person's life and death, and healed trauma reflects injuries or events that occurred throughout a person's life while those occurring in association with the death event may indicate the manner of death. Across a population, the prevalence of trauma provides information about activities, mobility, warfare, and the general health of a population. Several comprehensive literature reviews and original studies are included in Grauer (1995), Larson (1997), Roberts and Manchester (2005), and Buikstra and Beck (2006).

The population approach has been more widely used in bioarchaeological research involving analysis of historic or archaeological populations. However, a population approach to documenting trauma is critical to war crime and genocide investigations in which establishing the scale and widespread pattern of injuries prove the occurrence of unlawful mass atrocities (Kimmerle and Baraybar 2008). Consequently, the analysis of trauma in bone has many applications for anthropological research today.

Historical Background

Skeletal trauma has been used to document injuries that occurred during a person's life (antemortem trauma) as it may be useful in human identification when antemortem records are available for comparison or show patterns of activity (Fig. 1). In traditional approaches, the process of documenting skeletal trauma has been largely descriptive and focused on fracture classification (Ortner and Putschar 1981; Mann and Murphy 1990; Buikstra and Ubelaker 1994; Galloway 1999). Increasingly, contextual information is incorporated into an interpretation of which injuries occurred and to some extent, the circumstances surrounding the event. Contextual information may include burial factors at the crime scene, clothing, associated artifacts, radiography and other scanning technologies, bone density, and histology (Brogdon et al. 2003; Kimmerle and Baraybar 2008; Komar and Buikstra 2008).

Bone, Trauma in, Fig. 1 Close-up view of left face showing healed, antemortem fractures to the nasal bones and maxilla

Key Issues

Terms and Concepts

Skeletal trauma is typically described by the mechanism of force: sharp, blunt, sharp-blunt, or projectile trauma (Table 1). Injuries resulting from gunfire (GSW) are categorically placed with blunt trauma as they produce a crushing force to the bone. However, for practical purposes, GSW

Bone, Trauma in, Table 1 Mechanisms of skeletal trauma

Category	Mechanism of force	Examples
Blunt trauma	Crushing, bending, twisting	Hammer, bat, club, crowbar, fist or foot (stomping)
Sharp trauma	Cutting, stabbing, puncturing	Knife or blade, saw
Blunt-sharp trauma	Crushing, cutting, hacking	Machete, axe, hatchet
Blasting trauma	Crushing, projectile, burning	Explosive ordinances, mortars, grenades, pipe bombs
Gunfire trauma	Crushing, projectile	Handgun, rifle, shotgun, submachine or machine gun

injuries are often uniquely categorized. Likewise, projectile trauma may include gunfire or explosives. Injuries resulting from explosive or blasting forces result from blunt trauma, projectile trauma, pressure changes, and burning. Increasingly, modern investigations into crimes occurring during conflicts include many examples of explosive injuries such as those resulting from the shelling of civilian populations, mortars, grenades, or other acts involving explosive devices. Since these types of injuries result from several mechanisms (i.e., projectile and blunt trauma), they are also often described in a unique category.

The timing of fractures or injuries is critical to correctly interpreting the circumstances surrounding the incident (Table 2). Trauma occurring at the time of death and in association with the death event is called perimortem trauma. Differentiating perimortem "injuries," "fractures," "defects," or "trauma" from postmortem "damage," "breakage," or "scavenging" is often highly scrutinized in court when one party wants to cast doubt on the timing of the injuries or the opinionated cause of death (Fig. 2).

The use of the terms "ante-" and "perimortem" trauma can also be confusing at times, since the pathologists occasionally combine "ante- and perimortem trauma" into one category of "antemortem." The difference is the presence of tissue

Bone, Trauma in, Table 2 Timing of fractures

Category	Morphological characteristics of fractures and/or defects
Antemortem (injury occurred prior to death and is NOT associated with the death event)	Fractures show signs of healing, i.e., porosity, new bone growth, callus formation, or infectious lesions
Perimortem (injury occurred at or around the time of death and IS associated with the death event)	Fractured margins are sharp and even. Bone may bend inward or away from direction of force. Radiating fractures from point of impact may be present
Postmortem	Damage to bone may include breakage, weathering, and erosion due to soils and water, or animal scavenging. Damaged margins tend to be uneven and rough in texture without evidence of radiating fractures. Bone elasticity is diminished and fractures are not consistent with "bending" quality of living tissue

Bone, Trauma in, Fig. 2 Postmortem breakage – an artifact of taphonomic processes, not inflicted trauma. (Modified from Kimmerle and Baraybar 2008)

reaction to the injured area, be it inflammation or repair, which does not have time to develop in the perimortem period. Usually, such determination can be based on microscopic rather than gross examination. An anthropologist, relying on skeletal evidence, also attempts to differentiate trauma

that occurred while a person was living (antemortem) from that which is associated with the death event (perimortem). This can be based on evidence of healing or patterns of the injury and its survivability. However, the window of timing would be typically wider than the one based on microscopic evaluation of inflammatory reaction, which has sequential pattern. Examination of skeletal remains usually would not inform directly about the mechanism of death, for example, hypovolemic/hemorrhagic shock and suffocation; however, it may be often reasonably inferred, and on occasion, microscopic findings at the injury site may be helpful.

In the course of homicide investigations, differentiating perimortem trauma from postmortem artifacts is important for determining the cause of death and other mitigating factors such as the intent to kill vs. wound or the atrociousness of the crime. In human rights investigations, such as those associated with modern conflicts, patterns of injuries may be indicative of specific crimes that are committed and differences are often observed among civilian causalities vs. genocide victims (Meddings 1997; Coupland and Meddings 1999; Michael et al. 1999). Due to protective clothing and the nature of modern combat, fewer casualties sustain gunfire injuries to the thorax. However, a group of casualties exhibiting multiple gunfire injuries to the thorax, shot back to front, are more likely civilians or executed soldiers rather than soldiers who were lawfully killed on the battlefield.

The protocol and methods used to identify, document, analyze, and present trauma are applied to both past (i.e., bioarchaeological) and current populations (i.e., forensic cases or war crime investigations) (see Table 3). However, the context, location, culture, and timing of the incident must be taken into account when approximating a specific weapon or the general circumstances around the mechanism of the injury. For example, a semi-patterned defect on a skull may be the result of blunt trauma. Determining the specific weapon used and context of events that occurred will depend on whether the skull relates to a recent homicide victim or, for example, a Roman soldier from the third century.

Bone, Trauma in, Table 3 Protocol for trauma analysis

Specific anatomical location
• Describe the bone, side, and aspect of each area affected
• Where necessary and/or possible, reconstruct bony fragments. Establish the number of injuries which may consist of one or more bone fractures/defects
Type of fracture and/or defect
• Simple or comminuted/complex
• Complete, incomplete, partial
• Linear, radiating, concentric
• Fracture line or defect: describe morphology, size, and location
• Mechanism of force such as crushing, compression, or twisting/spiral
Number of injuries
• This may be fewer than the number of fractures if one injury caused multiple bones to fracture
Sequence of multiple injuries
• To sequence multiple bone injuries, assess where the factures or evidence of injuries overlap one another
Direction and speed or "velocity" of force
• Use only very general or broad descriptions and avoid commenting on "velocity" in cases of GSW. The range of ammunition and types of weapons do not conform to allow a standard use of these terms
• Location of injuries should include bone, side, region, and aspect
• Direction of force should be broadly descriptive, i.e., "left to right" or "up to down"
Timing of injury
• Morphological characteristics of fracture margins (ante- or perimortem)
• Histological analysis of fracture margins for timing of injury
• Report any postmortem damage if present and differentiate from traumatic injuries
Documentation methods
• Draw, sketch, and photograph bones
• Document injuries both prior to and following cleaning, washing, or processing
• Radiograph bones and clothing
• 3D imaging through laser or CT scanning
• Microscopy of fractured edges, particularly useful for cut marks and sharp trauma
• Histology of fractured edges may assist with timing of injury (i.e., ante- vs. perimortem)

Understanding the context and accounting for a number of variables about the individual and population are important for creating the most accurate and comprehensive interpretation of events.

Bone, Trauma in, Table 4 Epidemiological approach to interpreting skeletal trauma

Demography (i.e., age, sex, ancestry of decedent)
Context (i.e., facts about the scene, modes of deposition, witness statements, crime scene forensic evidence such as blood patterns)
Location of death (i.e., public place or private residence)
Burial factors (i.e., primary or secondary crime scene/ burial location, buried or surface remains, use of containers for concealment)
Intent
Scientific protocols
Methods for differential diagnosis
Weaponry and ballistics science
Cause, manner, and mechanisms of death

Therefore, part of the protocol for interpreting skeletal trauma should include a range of factors as discussed in Table 4.

Interpreting skeletal trauma by direct examination of the skeletal remains reveals evidence that soft tissues or radiographs alone cannot always demonstrate. In some cases, the number of skeletal fractures is greater than the number of soft tissue injuries evidenced by an external examination of the body. In contrast, inflicted trauma resulting in death may consist of soft tissue injuries without the presence of skeletal fractures or defects. There is a misperception that without soft tissues, investigators are limited in their ability to reach definitive conclusions about the cause or manner of death. Even in cases where the specific cause of death is unknown (whether due to decomposition, the mechanism of injury or incomplete recovery), the manner of death may be homicide as evidenced by the circumstances of the death. In such cases, the context and other investigative facts combined with skeletal trauma enable a ruling such as "*homicide due to unspecified traumatic causes, homicidal violence*, or *battered baby/child syndrome*."

The morphology of skeletal trauma is shaped by internal (i.e., the particular area of bone affected), extrinsic (i.e., the type of weapon), and other factors (i.e., whether or not it resulted from act of volition). By reconstructing the bony fragments, information may be gained about the type of weapon, the number, and in some cases, the sequence of injuries. The critical first step is to differentiate perimortem trauma from postmortem or taphonomic artifacts. In other words, fractures that result at the time of death and may have contributed to the death have to be differentiated from animal scavenging, warping due to ground pressure for buried remains, surface weathering, or excavation damage (Fig. 2).

Documentation of Skeletal Trauma

The documentation of injuries should include a description of the specific bone/side/aspect affected and the particular features present such as the type of fracture or defect, its size, and extent. Skeletal trauma may consist of a fracture, dislocation, subluxation, or defect. Fractures may be classified as simple and complete, partial/ incomplete or "greenstick," comminuted, spiral, compression, depressed, hinge, or buckle. A number of references define and outline characteristics for each type of fracture, as well as the common eponymous fractures referred to in pathology (refer to Ortner and Putschar 1981; Mann and Murphy 1990; Buikstra and Ubelaker 1994; Galloway 1999; Kimmerle and Baraybar 2008; Waldron 2009).

Mechanisms of Injury

Once skeletal injuries are delineated, the morphology of wounds, defects, and fractures provides information on the mechanism of injury (Kimmerle and Baraybar 2008). The common mechanisms and general characteristics for each category are summarized below:

- Blunt Trauma
  - Characterized by an object that crushes tissue. Skeletal tissue bends and may have a depressed or bent appearance. If enough force is applied, the tissue will fracture.
  - An object may strike the individual or the individual may be expelled toward an object (i.e., a person's head hits the dashboard of a car during a motor vehicle accident).
  - Gunfire injuries and shrapnel or explosive injuries are forms of blunt trauma, but generally are categorized separately due to the amount of force and other characteristics

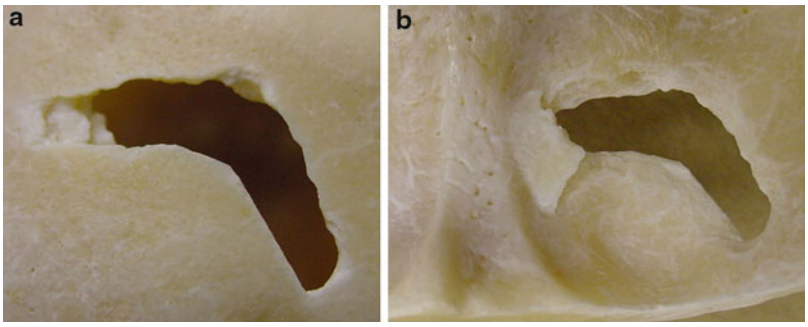

Bone, Trauma in, Fig. 3 Patterned cranial defect resulting from blunt impact. The ectocranial (**a**) and endocranial (**b**) views are demonstrated. (Modified from Kimmerle and Baraybar 2008)

Bone, Trauma in, Fig. 4 Patterned cranial defect with concentric and depressed fractures, resulting from blunt impact from a long, linear object. (Modified from Kimmerle and Baraybar 2008)

also involved with these mechanisms such as burning and the presence of shrapnel.

- Examples of objects resulting in blunt trauma include a fist, baseball bat, hammer, and floor (Figs. 3, 4 and 5).

- Sharp Trauma
  - A penetrating object that cuts tissues and bone.
  - May be associated with blunt trauma, particularly with hacking types of weapons such as machetes or axes. Hacking trauma is often classified as sharp-blunt trauma due to the amount and nature of the force applied as well as the characteristics of hacking instruments.
  - Sharp trauma includes different types of wounds: stabbing, incised, and puncture.
  - Stab and incised wounds to bone often result in cut marks, whereas puncture wounds may result in patterned defects depending on the instrument/weapon.
  - Sharp trauma such as cut or saw marks resulting from postmortem dismemberment should be carefully delineated as such. While it may not be possible to determine whether the person was alive

Bone, Trauma in, Fig. 5 Multiple blunt impacts to the right side of the skull, toward the posterior aspect of the cranium. Multiple points of impact evident by the depressed and concentric fracture patterns. (Modified from Kimmerle and Baraybar 2008)

Bone, Trauma in, Fig. 6 Anterior view of body of a cervical vertebra illustrating numerous linear cut marks, resulting from sharp trauma. (Modified from Kimmerle and Baraybar 2008)

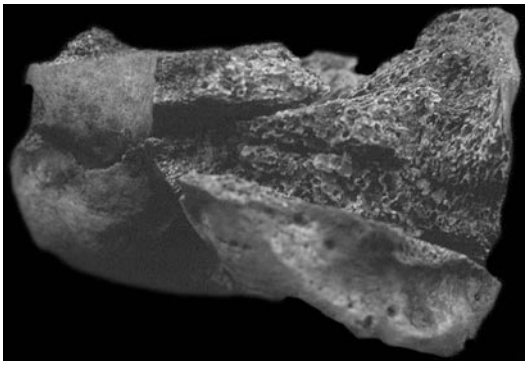

Bone, Trauma in, Fig. 7 The lateral aspect of the distal articular surface of the left femur with multiple depressed and cut areas of bone resulting from numerous injuries with a machete. The presence of crushed, bent, and cut bone is indicative of hacking trauma. (Modified from Kimmerle and Baraybar 2008)

at the time of dismemberment if there is not clear evidence of the cause of death, it should be pointed out when sharp trauma is present in the form of dismemberment as opposed to incised or puncture wounds from cases of stabbing. The number, location, and type of sharp defects in the areas of major joints provide strong evidence of dismemberment.

- Many postmortem artifacts such as animal scavenging and surface cracking due to weathering may mimic sharp trauma.
- Examples include knife, axe, hatchet, machete, and glass (Figs. 6 and 7).

Bone, Trauma in, Fig. 8 Gunshot entrance wound, resulting from a handgun. The small circular defect has two very small radiating fracture lines (**a**) and (**b**). The bullet did not exit the skull but extended to the left side and ricocheted leaving behind gunshot residue evident in the radiograph

Bone, Trauma in, Fig. 9 Gunshot entrance wound resulting from an AK47. Note the larger diameter of the defect featured in Fig. 8 and the presence of radiating fractures. (Modified from Kimmerle and Baraybar 2008)

- Gunfire
  - Injuries characterized by a handgun, rifle, shotgun, submachine, or machine gun (Figs. 8, 9, 10, 11 and 12).
  - The class of weapon, general distance of shot (close vs. distant), number, and sequence of injuries may be determined from skeletal injuries.

Bone, Trauma in, Fig. 10 Gunshot exit wound. Note its irregular shape and the external beveling along defect margins. (Modified from Kimmerle and Baraybar 2008)

Bone, Trauma in, Fig. 11 Gunshot exit wound. Note the external beveling along defect margins and extensive fracturing. (Modified from Kimmerle and Baraybar 2008)

- Skeletal defects tend to be patterned and reflect the shape of the projectile. Therefore, bullets that hit bone perpendicular have a circular appearance with a diameter consistent with the size of the bullet. Projectiles that are irregularly shaped or hit the bone at an angle or tangentially will produce a sideways or irregular-shaped defect.
- Bullets that penetrate the body may fracture more than one bone and/or change direction within the body or calvarium, sometimes referred to as "ricochet." The number of wounds needs to be delineated from the number of injuries as one bullet may cause several wounds.

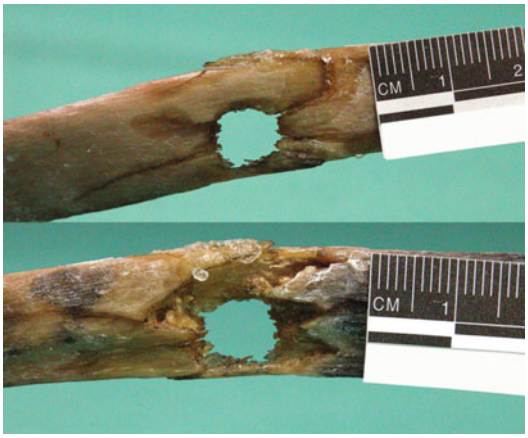

Bone, Trauma in, Fig. 12 Gunshot wound, through and through to rib showing entrance and exit sides of the bone with radiating fractures and beveling. (Modified from Kimmerle and Baraybar 2008)

- Blast Injuries
  - Creates thermal, blunt, sharp, and penetrating trauma (Fig. 13).
  - Shrapnel creates irregular-shaped penetrating defects in skeletal tissue and may become embedded in bone.
  - Skeletal defects and fracture morphology are largely affected by extrinsic factors such as the type and amount of explosive, location of the incident (i.e., in an enclosed space vs. outdoors), and the type of surrounding materials which may become projected shrapnel.
- Burning Injuries
  - Causes discoloration, fractures, bone shrinkage, and dismemberment.
  - Trauma inflicted prior to burning is still evident even after severe burning.
  - Burning may result from the incident at time of death, such as an automobile accident or explosion. Burning may also be used postmortem in an attempt to hide or destroy evidence.
- Evidence of Chronic Abuse, Neglect, or Torture
  - Skeletal evidence of prolonged abuse or torture has been used in domestic cases

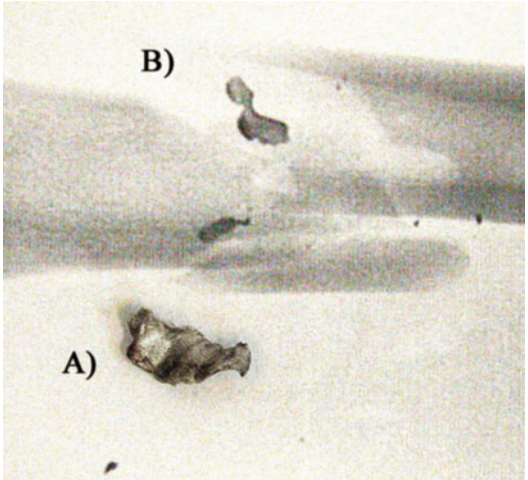

Bone, Trauma in, Fig. 13 Shrapnel recovered from thigh region following mortar attack. The metal fragment (**A**) is shown next to the radiograph which depicts the fragment embedded in the bone (**B**)

involving children and the elderly and in international courts involving political detainees or prisoners of war.

– Evidence of chronic abuse includes multiple fractures in various stages of healing, nutritional deficiencies, malnutrition or starvation, untreated medical conditions, or insufficient health and dental care.

Uncovering Abuse When the Baby "Falls"

Six cases of child deaths from Lincoln, Nebraska, resulting from blunt trauma are compared to illustrate patterns of intentional vs. accidental trauma. Five of the six cases involved female victims, ranging in age from several months to 3 years. Of these cases, five were homicides and one was an accident. Among the homicides, three parents reported that the infant "fell" accidentally upon seeking medical treatment for their children. Victims in all cases had multiple blunt injuries throughout the body: head trauma (5/5), neck (2/5), chest (2/5), abdomen and back (1/5), and extremities (4/5). In all cases, brain trauma was present, though only one case exhibited cranial fractures. Further, in only two cases was evidence of prior neglect or abuse present. In all cases, medical intervention was sought. Survival time ranged from 27 min to 4 days. The amount of activity among victims immediately following the injury ranged from immediate incapacitation to full activity/movement and alertness. The infant who survived the longest had shown the most amount of activity following the injury but went into cardiac arrest three days after the incident. In only one case were there no signs of trauma visible externally.

The only male victim (10 months old) suffered the greatest amount of injuries with multiple traumas to each region of the body. He further suffered a 5.2-cm cranial fracture and two fractures to the seventh and eighth ribs that were in the process of healing, thereby showing evidence of a prior incidence of abuse. Three soft tissue injuries were evident on the face and back of the head. In this case, the infant had soft tissue injuries evident on the abdomen and back with associated organ damage in the abdomen. It was alleged that the infant "fell" from the arms of his mother's boyfriend. In a second case, the infant reportedly "fell" in the bathtub yet was found to have soft tissue injuries on the head, face, buttocks, and hand, including human bite marks. This infant also had a 25-g subdural hematoma (pooling of the blood in the space between the dura and meninges or outer and middle layers of the brain covering) but no skeletal fractures.

It is common in cases of child abuse that the parent or caregiver tells authorities that the child fell or had an accident, even while seeking medical treatment for inflicted trauma (Kimmerle and Chrowstowski 2011). Therefore, it is incumbent upon investigators, medical examiners, and forensic anthropologists working on such cases to present clear evidence that will either support or refute such claims. Investigators had such a case when a 10-month-old male infant was taken to the emergency room by his father. It was alleged that the infant fell from the father's arms and hit his head on the floor. The infant sustained multiple injuries on the head, neck, chest, abdomen, and back, including multiple brain injuries. Postcranial fractures were present but no skull fractures were present. In this example, investigators had all lines of possible evidence open for interpretation. Since medical intervention was sought, there was abundant documentation about the injuries at the time of autopsy. However, this is not always the case, when the remains of abused children are hidden or

Bone, Trauma in, Table 5 Differential case factors for accidental versus inflicted trauma in comparative baby death cases

Factors	Case I	Case II	Case III
Manner	Homicide	Homicide	Accident
Circumstances	Reportedly fell from arms of caretaker	Reportedly fell in bathtub	Fell downstairs
Demography	10-month-old male	3-year-old female	1-year-old female
Injury location	Head, neck, chest, abdomen, back, extremities	Head, extremities	Head, extremities
Survival time	8.5 h	46.9 h	78 h
Amount activity	Immediately incapacitated	Immediately incapacitated	Unknown
Skeletal fractures	Skeletal fractures	No fractures	No fractures
Prior evidence of abuse	Fractures in various stages of healing	None	None

buried. In such cases, it may be years before the remains are uncovered and the incidence is investigated. When this occurs, it may be that skeletal trauma is the only physical evidence present to support or refute allegations of abuse.

The injury occurred at 7:00 am and the infant died at 3:30 pm, having survived 8½ h with medical intervention. Immediately following the injury, the infant was incapacitated and never exhibited any sign of physical activity. The postmortem examination revealed healing fractures from prior injuries. In Table 5, the epidemiological factors for three cases are presented, the case study discussed here and two comparative examples which illustrate some of the epidemiological variants present. All three cases represent infants, ages 10 months to 3 years, who either died as a result of a fall or were reported to have "fallen." In a comparative case (Case 2), the death was reported to have resulted from injuries the 3-year-old child received after falling in the bathtub. Further investigation of witness statements and an autopsy revealed in fact this was a case of abuse and it was ruled a homicide. In contrast, Case 3 consists of a 1-year-old female who fell and died of her injuries several days later. There was no history or indication of abuse, and the manner of death was ruled an accident. In all three cases, the children died of blunt trauma and all three sustained brain trauma, though only one case exhibited skeletal fractures (Case 1).

Bone, Trauma in, Fig. 14 Fragmented bone remains with clothing recovered from outdoor crime scene in snow

Establishing Cause and Manner of Death

The skeletal remains of a 20–30-year-old male along with clothing, a shotgun, pellets, and a shell casing were recovered in a remote, wooded area along a roadside during the winter months (Fig. 14). The bones of the face, cranial vault, and mandible were fractured (Fig. 15). The fracture patterns and scalloped edges along the fractured margins of the left temporal, frontal, and occipital bones were indicative of a shotgun injury. Further, the fractured edges and semicircular defects were the same color and texture as the rest of the bone and were consistent in appearance and morphology of perimortem injuries.

The maxilla was completely fractured along the palatine suture and bilaterally in the transverse

Bone, Trauma in, Fig. 15 Fragmented cranial vault (left lateral view) following near contact shotgun wound to the mouth. Note the scalloped edges along the inferior fractured margins

Bone, Trauma in, Fig. 17 Fractured palate showing shotgun entrance wound

Bone, Trauma in, Fig. 16 Maxilla and mandible of shotgun case. Pellets entered through the open mouth

Bone, Trauma in, Fig. 18 Left mandible showing fractured condyle and ramus following shotgun wound to the mouth

plane inferior to the zygomatic processes (Fig. 16). The palate exhibited an irregular-shaped defect (Fig. 17). The mandible was bilaterally fractured in between the mandibular body and ascending rami. The left coronoid process was also completely fractured from the ascending ramus of the mandible (Fig. 18). The specific fracture patterns and defects present in this example demonstrate the causative agent while the manner of death is determined based on associated evidence and the police investigation. In this case, there was a single shotgun wound in the face and cranium, from front to back. While the mechanism of death may not be known without the presence of soft tissues, the cause of death is inferred from the shotgun wound to the head. Based on circumstantial information, the manner was ruled a suicide.

International Perspectives

Illegal detainments, torture, and extrajudicial executions are some of the most common forms of human rights violations throughout the world. They can also be some of the most challenging

cases to prove as victims tend to "disappear" and cases may not be investigated until many years after the fact. International and local investigations for the prosecution of torture, war crimes, and genocide rely heavily on forensic anthropological and pathological evidence of perimortem injuries for these same reasons (i.e., examples tried by the International Criminal Tribunal for the Former Yugoslavia (ICTY): *The Prosecutor v. Rutaganda (ICTR-96-3), The Prosecutor v. Krstić (IT-98-33)*, and *The Prosecutor v. Brdjanin and Zupljanin (IT-99-36)*). For example, in the case of the *Prosecutor v. Limaj* et al. *(IT-03-66), Milutinovic* et al. *(IT-05-87), Popovic* et al. *(IT-05-88)*, skeletal evidence of torture was critical at trial. Numerous factures throughout the ribs and limbs exhibited bone remodeling in various stages of healing dating from weeks to months, thereby demonstrating evidence of repeated beatings (blunt trauma) during the period of detainment (Kimmerle and Baraybar 2008). Additional injuries in the form of skeletal defects resulting from gunshot wounds to the head and body showed no evidence of healing and were classified as perimortem trauma, proving the cause and manner of death was homicide due to multiple gunfire injuries. In this example, skeletal injuries provided evidence that several crimes were committed including torture and homicide.

Collectively, the body of research into skeletal evidence used to document torture is limited. A review of extrajudicial executions from various published reports and publications from Central and South America and the Balkans were discussed in Kimmerle and Baraybar (2008) representing a collective sample of 45 cases. In all of these examples, the mechanism of death was attributed to blunt trauma (BFT), sharp-blunt trauma (i.e., machete), or gunfire injuries (GSW) associated with some form of BFT resulting primarily from beatings prior to death. The type and location of skeletal fractures are documented, including evidence of antemortem fractures that were in various stages of healing at the time of death. In most cases, individuals were detained prior to death and the history of abuse reflects torture as documented by the associated medicolegal death investigations. Among the cases reviewed from the literature, BFT was the most common mechanism of injury (77.7%), followed by gunshot wounds (66.6%), and sharp-blunt trauma (24.4%). The overall distribution of fractures illustrates that the thorax is most commonly affected (64.4%), followed by the skull (35.5%), arms and legs (2.0%), and lower back (0.04%). Several other interesting patterns were noted:

- All cases of documented torture involved males, aged 14–68 years.
- These cases typically represented enforced detainment, repeated beatings, and finally murder.
- All cases with fatal gunshot wounds also had blunt trauma from assault to the ribs and sternum, indicating beatings prior to death.
- Almost 78.0% of cases of extrajudicial execution involved BFT to the chest, indicating beatings prior to death.
- In four of these cases, individuals also had previous fractures in various stages of healing – further indicating torture during their detainment prior to the fatal attack.

Evidence of sharp-blunt trauma was present in 11 cases involving machetes. Interestingly, among these cases, the arms and legs were also injured in addition to the thorax. "Defensive wounds" on the forearms and hands were present in 81.8% (9/11) of cases. Only 35.5% of cases involved the skull, but among these, gunshot injuries were also present in addition to blunt force injuries. It is important to note that the context is critical when trying to summarize trends such as these. In cases involving machetes, gunshot wounds were typically not present. Therefore, if one considers only cases with blunt force or gunfire injuries, the overwhelming majority of extrajudicial executions (88.2%) include both mechanisms of injury.

Population level analyses of trauma may also provide evidence of the particular type of crimes committed and will be critical in attempting to prove cases of genocide and war crimes. Specifically, injuries that are widespread demonstrate patterns of abuse or maltreatment, such as the ubiquitous machete trauma present in the 1994 Rwandan genocide which provides evidence of the intent to kill civilians outside the context of lawful warfare.

Future Directions

Today, methods used in forensic anthropology and bioarchaeology document physical evidence of the patterns of crimes committed and increasingly provide critical evidence at trial. There is need for further research in the areas of skeletal trauma, histological timing of fractures from degraded bone, and the ways in which paleopathology and population studies can be used for analyses of modern populations. Increased research and education with specific regard to international applications will further help improve best practice standards and expand the role of forensic anthropology in criminal investigations.

Cross-References

- ▶ Burned Remains in Forensic Contexts
- ▶ Dental Anthropology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Time Since Death in Bioarchaeology and Human Osteology

References

Brogdon, B.G., H. Vogel, and J.D. McDowell, eds. 2003. *A radiologic atlas of abuse, torture, terrorism, and inflicted trauma*. Boca Raton: CRC Press.

Buikstra, J.E., and L.A. Beck. 2006. *Bioarchaeology: The contextual analysis of human remains*. Amsterdam: Academic Press.

Buikstra, J.E., and D.H. Ubelaker. 1994. *Standards for data collection from human skeletal remains (Arkansas Archaeological Survey Research series 44)*. Fayetteville: Arkansas Archaeological Survey.

Coupland, R.A., and D.R. Meddings. 1999. Mortality associated with the use of weapons in armed conflicts, wartime atrocities, and civilian mass shootings: Literature review. *British Medical Journal* 319: 407–410.

Galloway, A., ed. 1999. *Broken bones: Anthropological analysis of blunt force trauma*. Springfield: Charles C. Thomas.

Grauer, A.L., ed. 1995. *Bodies of evidence: Reconstructing history through skeletal analysis*. New York: Wiley-Liss.

Kimmerle, E.H., and J.P. Baraybar, eds. 2008. *Skeletal trauma: Identification of injuries resulting from human rights abuse and armed conflict*. Boca Raton: CRC Press.

Kimmerle, E.H., and L. Chrostowski. 2011. Medico-legal issues in battered baby syndrome. In *The juvenile skeleton in forensic abuse investigations*, ed. A.H. Ross and S. Abel, 109–124. London: Springer-Verlag.

Komar, D.A., and J.E. Buikstra, eds. 2008. *Forensic anthropology: Contemporary theory and practice*. New York: Oxford University Press.

Larson, C.S. 1997. *Bioarchaeology: Interpreting behavior from the human skeleton*. Cambridge: Cambridge University Press.

Mann, R.W., and S.P. Murphy. 1990. *Regional atlas of bone disease: A guide to pathologic and normal variation to the human skeleton*. Springfield: Charles C. Thomas.

Meddings, D.R. 1997. Weapons injuries during and after periods of conflict: Retrospective analysis. *British Medical Journal* 315: 1417–1420.

Michael, M., D.R. Meddings, S. Ramex, and J.L. Gutierrez-Fisac. 1999. Incidence of weapon injuries not related to interfacional combat in Afghanistan in 1996: Prospective cohort study. *British Medical Journal* 319: 415–417.

Ortner, D.J., and W.G.J. Putschar. 1981. *Identification of pathological conditions in human skeletal remains (Contributions to Anthropology series 28)*. Washington (DC): Smithsonian Institution Press.

Roberts, C., and K. Manchester. 2005. *The archaeology of disease*. 3rd ed. Ithaca: Cornell University Press.

Waldron, T. 2009. *Palaeopathology (Cambridge Manuals in Archaeology)*. Cambridge: Cambridge University Press.

Bone: Chemical Analysis

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Introduction

The general structure and chemical composition of bone are similar for all individuals, but there is some tolerance for minor variation in the elemental and isotopic composition of both the organic

and inorganic components of bone tissue. This variation is tied to the local environment and to the diet. Both trace elements and stable isotopes act as natural tracers that provide information to archaeologists about details of the lives of past people, including diet, place of residence, and migration. Bone is a porous material composed of small crystals of hydroxylapatite. This small crystal size is beneficial in life since the bone is a storehouse for calcium and phosphorus. Bone mineral can quickly be mobilized from the skeleton when needed for physiological functions. From the perspective of the archaeologist, the small and poorly formed crystals are not an advantage because buried bone picks up and exchanges chemical constituents with the surrounding soil and water. Tooth enamel is also composed of hydroxylapatite but with larger crystal size and less organic content. Following early attempts to use chemical variation in the bone as a source of information about the past, studies of trace elements have largely been abandoned due to concerns about chemical exchange in the burial environment. Studies of stable isotopes in bone collagen from archaeological human bone have grown enormously since the early studies in the 1970s. Much of this research has been presented in edited volumes by Price (1989), Sillen and Armelagos (1991), Lambert and Grupe (1993), Bocherens et al. (1999), Ambrose and Katzenberg (2001), and Koch and Burton (2003) which resulted from the Advanced Seminars on Paleodiet.

Definitions

Bones are the skeletal elements that provide structural support for the vertebrate body. "Bone" refers to the tissue that makes up bones. That tissue has both an organic (approximately 30%) and an inorganic (approximately 70%) component. The organic component is predominantly collagen (90%), a structural protein, and a small amount of other proteins, collectively referred to as non-collagenous proteins. The inorganic component of the bone is made up of hydroxylapatite, a calcium phosphate mineral [$Ca_{10}(PO_4)_6(OH)_2$]. The chemical analysis of the organic component of the bone most often refers to the study of stable isotopes of elements included in the collagen, such as carbon, nitrogen, and sulfur. The chemical analysis of the inorganic component of the bone refers to the analysis of trace element substitutions in hydroxylapatite and their isotopes, and stable isotopes of carbon and oxygen in the carbonate (CO_3), that substitutes in minor quantities for phosphate (PO_4), an additional source of oxygen. Most trace elements substitute for calcium and are chemically similar to calcium These include other alkaline earth elements such as barium and strontium, and lead, which is not an alkaline earth element. Some trace elements, such as strontium and lead, may be measured for overall quantity (elemental analysis) and for stable isotope variation. Strontium isotopes are used as environmental tracers in migration studies, and earlier studies of strontium as a trace element remain important because they explain how strontium, and therefore strontium isotopes, find their way into bones and teeth from environmental sources.

Stable isotopes are variant forms of an element with the same number of protons and electrons but varying numbers of neutrons. Unlike radioisotopes, stable isotopes do not decay, so their quantity in a substance does not change over time. For most elements, one isotopic form predominates with very minor quantities of other isotopes. For example, 99% of all carbon occurs as ^{12}C with 1% ^{13}C. Nitrogen occurs as ^{14}N (99.6%) and ^{15}N (0.4%), while there are four stable isotopes of sulfur (Fry 2006). Stable isotope ratios for carbon, nitrogen, oxygen, and sulfur are usually expressed using delta notation as follows:

$$\delta \text{in‰} = \frac{R_{(\text{sample})} - R_{(\text{standard})}}{R_{(\text{standard})}} \times 1000$$

where R = the ratio of the number of heavier to lighter isotopes.

Due to the difference in the number of neutrons, the isotopes of an element have different

atomic weights and, therefore, react slightly differently in chemical reactions including those associated with physiological functions. This results in changes in the ratio of the heavier and lighter stable isotopes from one step to another in biochemical processes such as photosynthesis, digestion, and tissue formation. Details on stable isotope terminology, measurement, and standards can be found in textbooks by Fry (2006) and Hoefs (1997).

Carbon is found in both the organic and inorganic components of the bone. In hydroxylapatite, carbonate substitutes for phosphate in minor quantities (approximately 5%). Oxygen isotopes may be measured from carbonate or phosphate.

Trace elements are chemical elements that occur in minor quantities in a substance. Prior to the development of more sensitive analytical equipment, trace elements were defined as those present in quantities too small to be measured. With more sensitive instruments, trace elements can be measured and are normally present in parts per million (ppm) or parts per billion (ppb). In bone, trace elements from group two of the periodic table often substitute for Ca in hydroxylapatite. Such elements include magnesium (Mg), strontium (Sr), and barium (Ba). Strontium isotopes are most often measured in tooth enamel rather than the bone due to concerns about post-depositional exchange (diagenesis). Strontium has several natural isotopes, and the ones used in archaeological studies are ^{87}Sr and ^{86}Sr. The former is referred to as radiogenic strontium since it forms from the decay of ^{87}Rb. Therefore, measurements of strontium isotopes are not termed "stable" isotopes, but simply strontium isotopes or radiogenic strontium.

Instrumentation

Stable isotopes of lighter elements such as carbon, oxygen, hydrogen, nitrogen, and sulfur are analyzed on a light isotope mass spectrometer (Katzenberg 2008). Heavier elements such as strontium are analyzed on a solid source mass spectrometer also referred to as a thermal ionization mass spectrometer (TIMS).

Key Issues

Diet Early studies in both trace element and stable isotope analysis focused on determining diet and dietary change over time. The trace element strontium was known to vary between plants and animals given constant background levels, based on studies in health physics (reviewed by Burton 2008). Researchers interested in the relative contributions of plant and animal foods in the diet attempted to analyze strontium as well as strontium/calcium ratios in prehistoric human skeletal remains to chart dietary change. Burton and Wright (1995) demonstrated that the relationship between strontium in bone and dietary input is not linear. While trace elements are no longer the method of choice for paleodiet studies, the information gained from these studies is critical for reasonable interpretation of strontium isotope data used in migration studies.

Stable carbon isotopes were first studied by archaeologists interested in the introduction of maize in the diets of people in the Americas. Maize consumption is evident in bone collagen since maize is a C_4 plant and therefore contains more ^{13}C relative to ^{12}C in comparison to C_3 plants. Economically important plants which use the C_4 mode of photosynthesis include maize, millet, sorghum, and sugarcane. These plants are adapted to hot and dry conditions. Most plant species growing in moist conditions follow the C_3 mode of photosynthesis and contain relatively less ^{13}C to ^{12}C. The difference in the stable carbon isotope ratio ($\delta^{13}C$) in these plant types is passed along to consumers. This was first demonstrated in the 1970s by Vogel and van der Merwe (1977) with numerous applications subsequently (see reviews by Katzenberg 2008; van der Merwe 1982). Plants obtain carbon from atmospheric carbon dioxide (CO_2). Organisms from the ocean obtain their carbon from dissolved carbonate in seawater, which is enriched in ^{13}C in comparison to atmospheric CO_2; therefore $\delta^{13}C$ values are higher in marine organisms, and this difference is passed on to consumers. This was first demonstrated by Tauber in 1981 and Chisholm and colleagues in 1982 with subsequent applications by many scholars.

Stable isotopes of nitrogen have been used to explore trophic level differences in diet. There is enrichment of the heavier isotope (^{15}N) with each step in a food web (Minigawa and Wada 1984). In a terrestrial environment, leguminous plants generally have lower $\delta^{15}N$ values than non-leguminous plants. Animals feeding on plants will have $\delta^{15}N$ values approximately 3‰ higher than their food. Carnivorous animals will exhibit an additional 3‰ increase, and omnivores will have values intermediate with respect to carnivores and herbivores. Unfortunately this is not always the case as there are additional variables to consider. As is true for all stable isotope studies, the source of nitrogen determines the $\delta^{15}N$ values at the base of the food web. Fertilizers used to provide nitrogen to growing plants will have an impact on plant $\delta^{15}N$ values, which, in turn, influence $\delta^{15}N$ values higher up the food web. For example, the use of manure will raise the $\delta^{15}N$ value of nitrogen available to plants. Because of such variables, it is important to analyze potential food items in addition to human skeletal remains when attempting a dietary reconstruction. In aquatic and marine systems, $\delta^{15}N$ values also increase with trophic levels, but there are more steps in the food web, resulting in very high $\delta^{15}N$ values in aquatic and marine mammals and piscivorous fish. This makes it possible to use stable nitrogen isotopes to investigate the relative use of terrestrial and aquatic or terrestrial and marine foods in dietary reconstructions (e.g., Coltrain et al. 2004; Katzenberg et al. 2012).

Stable isotopes of oxygen have been used to study mobility in prehistoric societies. The tissue of choice for oxygen isotope analysis is tooth enamel (e.g., Buzon et al. 2011), but some studies have also been carried out on the phosphate in hydroxylapatite (e.g., White et al. 2007). Oxygen isotope ratios in human tissues reflect ingested water, and oxygen isotopes in water vary due to latitude, altitude, and distance from the coast (Bowen et al. 2005).

Strontium isotopes have also been used in mobility studies as they reflect the underlying bedrock in a region. Derived through food and water, strontium isotope studies must consider both the regional geology and the diet. Unlike the other isotopes discussed so far, strontium isotope studies do not use the delta notation. Instead, the ratio of $^{87}Sr/^{86}Sr$ is simply expressed as a number, usually to five significant decimal places depending on the precision of the analytical instrument (Bentley 2006). Strontium isotopes have been used to study migration in many regions of the world with increasing baseline data becoming available. Often, oxygen and strontium isotopes are both used to provide two perspectives for assessing mobility.

With the increasing use of isotopic data to explore residence and migration in archaeology and ecology, researchers have described "Isoscapes," or isotope maps (West et al. 2010 and chapters therein and Grupe and McGlynn 2016 and chapters therein). This global and interdisciplinary cooperation allows researchers to use existing isotope data for comparison when identifying nonlocal individuals and suggesting where they may have come from based on complementary sources of information such as shared cultural complexes or known seasonal migration patterns.

All bone chemistry studies are based on chemical tracers that are taken up during life. However, bone is a porous substance, and researchers must always perform tests to determine whether chemical tracers have been altered in the burial environment. The chemical exchange that can occur after death is referred to as diagenesis. For studies of bone collagen, preservation is assessed from the percentage of carbon and nitrogen in the sample and from the ratio of carbon to nitrogen (C/N) in the sample. Well-preserved collagen has a C/N ratio of 3.2. Some tolerance for variation is allowed, but most researchers reject samples if the C/N falls below 2.9 or exceeds 3.6 (Ambrose 1990). For bone mineral, it is more difficult to assess diagenesis (Burton 2008). Some researchers use infrared spectroscopy to evaluate the crystallinity of the bone. Normally the bone is poorly crystallized in comparison to hydroxylapatite in the earth, but with exchange in the burial environment, bone may become more crystallized, and the relative amounts of calcium and phosphate my shift. Improvements in methods to detect diagenesis are ongoing (e.g., Willmes et al. 2016).

Future directions of bone chemical research in archaeology involve increasing knowledge of other isotopic systems such as sulfur and hydrogen. Stable isotopes of sulfur are useful in detecting marine versus terrestrial foods in the diet, but sulfur is present in very low quantities in bone collagen. Increasingly sensitive analytical instruments have made it possible to analyze such isotopic systems in smaller quantities. Stable isotopes of hydrogen and oxygen have been used in wildlife studies for tracking movements, and the same types of studies can be done with humans (Bowen et al. 2005; Ehleringer et al. 2010). Other improvements in analysis include the use of laser ablation to isolate small regions of a sample, such as parts of a tooth, to analyze seasonal variation in diet (Sponheimer et al. 2006).

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Migration in Historical Archaeology
- ▶ Zooarchaeology by Mass Spectrometry (ZooMS)

References

Ambrose, S.H. 1990. Preparation and characterization of bone and tooth collagen for isotopic analysis. *Journal of Archaeological Science* 17: 431–451.

Ambrose, S.H., and M.A. Katzenberg, eds. 2001. *Biogeochemical approaches to paleodietary analysis*. New York: Kluwer Academic/Plenum Publishers.

Bentley, R.A. 2006. Strontium isotopes from the earth to the archaeological skeleton: A review. *Journal of Archaeological Method and Theory* 13: 135–187.

Bocherens, H., G.J. van Klinken, and A.M. Pollard. 1999. Proceedings of the 5th advanced seminar on paleodiet, Centre de Recherches Archeologiques, Valbonne, 1–5 September 1997. *Journal of Archaeological Science* 26: 593–728.

Bowen, G.J., L.I. Wassenaar, and K.A. Hobson. 2005. Global application of stable hydrogen and oxygen isotopes to wildlife forensics. *Oecologia* 143: 337–348.

Burton, J. 2008. Bone chemistry and trace element analysis. In *Biological anthropology of the human skeleton*, ed. M.A. Katzenberg and S.R. Saunders, 2nd ed., 443–460. Hoboken: Wiley.

Burton, J., and L.E. Wright. 1995. Nonlinearity in the relationship between bone Sr/Ca and diet: Paleodietary implications. *American Journal of Physical Anthropology* 96: 273–282.

Buzon, M.R., C.A. Conlee, and G.J. Bowen. 2011. Refining oxygen isotope analysis in the Nasca region of Peru: An investigation of water sources and archaeological samples. *International Journal of Osteoarchaeology* 21: 446–455.

Chisholm, B.S., D.E. Nelson, and H.P. Schwarcz. 1982. Stable carbon isotope ratios as a measure of marine versus terrestrial protein in ancient diets. *Science* 216: 1131–1132.

Coltrain, J.B., M.G. Hayes, and D.H. O'Rourke. 2004. Sealing, whaling and caribou: The skeletal isotope chemistry of Eastern Arctic foragers. *Journal of Archaeological Science* 31: 39–57.

Ehrlinger, J.R., A.H. Thompson, D.W. Podlesak, G.J. Bowen, L.A. Chesson, T.E. Cerling, T. Park, P. Dostie, and H. Schwarcz. 2010. A framework for the incorporation of isotopes and isoscapes in geospatial forensic investigations. In *Isoscapes: Understanding movement, pattern and process on earth through isotope mapping*, ed. J.B. West, G.J. Bowen, T.E. Dawson, and K.P. Tu, 357–387. Dordrecht: Springer.

Fry, B. 2006. *Stable isotope ecology*. New York: Springer.

Grupe, G., and G.C. McGlynn, eds. 2016. *Isotopic landscapes in bioarchaeology*. Berlin: Springer.

Hoefs, J. 1997. *Stable isotope geochemistry*. Berlin: Springer.

Katzenberg, M.A. 2008. Stable isotope analysis: A tool for studying past diet, demography and life history. In *Biological anthropology of the human skeleton*, ed. M.A. Katzenberg and S.R. Saunders, 2nd ed., 413–441. Hoboken: Wiley.

Katzenberg, M.A., H.G. McKenzie, R.J. Losey, O.I. Goriunova, and A. Weber. 2012. Prehistoric dietary adaptations among hunter-fisher-gatherers from the Little Sea of Lake Baikal, Siberia, Russian Federation. *Journal of Archaeological Science* 39: 2612–2626. https://doi.org/10.1016/j.jas.2011.08.010.

Koch, P.L., and J. Burton. 2003. Bone chemistry. In *International journal of osteoarchaeology*, vol. 13. Chichester: Wiley.

Lambert, J.B., and G. Grupe. 1993. *Prehistoric human bone: Archaeology at the molecular level*. Berlin: Springer.

Minagawa, M., and E. Wada. 1984. Stepwise enrichment of ^{15}N along food chains: Further evidence and the relation between δ^{15}N and animal age. *Geochimica et Cosmochimica Acta* 48: 1135–1140.

Price, T.D. 1989. *The chemistry of prehistoric bone*. Cambridge: Cambridge University Press.

Sillen, A., and G. Armelagos. 1991. Proceedings of the 2nd advanced seminar on paleodietary research: Chemistry and paleodiet. *Journal of Archaeological Science* 18 (3): 225–226.

Sponheimer, M., B.H. Passey, D.J. Deruiter, D. Guatelli-Steinberg, T.E. Cerling, and J.A. Lee-Thorp. 2006. Isotopic evidence for dietary variability in the early hominin *Paranthropus robustus*. *Science* 314: 980–982.

Tauber, H. 1981. ^{13}C evidence for dietary habits of prehistoric man in Denmark. *Nature* 292: 332–333.

van der Merwe, N.J. 1982. Carbon isotopes, photosynthesis, and archaeology. *American Scientist* 70: 596–606.
Vogel, J.C., and N.J. van der Merwe. 1977. Isotopic evidence for early maize cultivation in New York State. *American Antiquity* 42: 238–242.
West, J.B., G.J. Bowen, T.E. Dawson, and K.P. Tu, eds. 2010. *Isoscapes: Understanding movement, pattern and process on earth through isotope mapping*. Dordrecht: Springer.
White, C., T. Price, and F. Longstaffe. 2007. Residential histories of the human sacrifices at the Moon Pyramid, Teotihuacan: Evidence from oxygen and strontium isotopes. *Ancient Mesoamerica* 18 (1): 159–172.
Willmes, M., L. Kinsley, M.-H. Moncel, R.A. Armstrong, M. Aubert, S. Eggins, and R. Grün. 2016. Improvement of laser ablation in situ micro-analysis to identify diagenetic alteration and measure strontium isotope ratios in fossil human teeth. *Journal of Archaeological Science* 70: 102–116.

Bone: Histological Analysis

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Introduction

The analysis of hard tissue (bone and tooth) can be approached on many levels, ranging from the macroscopic to the molecular level. Intermediate to this range is the tissue level or histological level of organization. By definition, *histology* means *the science of the tissues*. More specifically, *histological analysis* is the study of the microscopic anatomy of tissues in plants and animals. Thus, histological analysis requires specialized equipment to prepare tissues for analysis and to magnify structures, making them visible. There are two analytical approaches used in anthropology when studying microstructures. One, referred to as histomorphology, is the qualitative analysis of microstructure morphology and organization. The other, referred to as histomorphometry, is the quantitative study of the microscopic organization and structure of tissue. These analyses can be performed using a static or dynamic approach to studying tissue. Static histological analysis allows for the evaluation of a tissue at a particular point in time. For example, anthropologists typically study histological samples from deceased individuals, which would only provide an assessment of the tissue at the time of death. Dynamic histological analysis allows for the evaluation of bone over a period of time. In order to observe microstructural responses using this method, analysis is performed in vitro or in vivo and the subject is exposed to various labeling techniques for histological tracking of cells. Regardless of the approach, histological analysis is an essential tool in many disciplines outside of medicine and biology.

The histological analysis of hard tissue within the discipline of anthropology has been used to study historical human remains from archaeological sites, as well as to assist with modern forensic investigations. Through histomorphology and histomorphometry, anthropologists are able to develop techniques to distinguish human from nonhuman bone, estimate age at death, evaluate biomechanical load history, assess skeletal health, and categorize pathological conditions. To fully interpret the information gathered through these techniques one not only needs to appreciate the limitations of evaluation methods, but more importantly have an understanding of the biology underlying the creation of histomorphological structures and the intrinsic and extrinsic factors that affect bone (or tooth) microstructure.

Bone is a dynamic tissue, constantly changing over an organism's life and providing a record of structural, mechanical, and compositional changes that anthropologists study in order to interpret the biological information hidden within. Teeth, with their hard enamel, are the most likely remains of an organism to endure through time. While a wealth of information is stored within the histological structure of teeth, the following text will be limited to discussions regarding cortical bone histology. For further reading about dental histology and its use within anthropology, see Guatelli-Steinberg and Huffman (2011).

Key Issues

Bone Biology and Cortical Bone Histomorphology

At the gross level, bone classifies as either cancellous (trabecular) or compact (cortical). Cancellous bone is porous, consisting of a network of thin spicules called trabeculae. Cortical bone is densely mineralized and relies on a vascular system to pass oxygen, nutrients, and waste in and out of bone. At the histological level, there are two basic bone types, woven and lamellar. Woven bone is laid down quickly; a structurally weak temporary construct of poorly organized collagen fibers and mineral crystals (Fig. 1). Lamellar bone takes longer to form but is stronger than woven bone due to its highly organized "plywood" arrangement of collagen bundles (Fig. 2). Embryonic skeletal development consists almost wholly of woven bone, which is slowly replaced by lamellar bone as an individual grows. As such, woven bone occurs rarely in the adult skeleton, except at sites of fracture healing and/or pathological conditions.

Mature compact bone is comprised of Haversian systems, which are characterized by uninterrupted, centripetally deposited lamellae surrounding a centrally located Haversian canal. The layers of concentric lamellae connect to each other via Volkman's canals, which are smaller and run at oblique angles to create a network for circulating blood and nutrients throughout the bone. Complete Haversian systems are bordered by a scalloped reversal line and are also known as secondary osteons (Fig. 3). Secondary osteons are a product of bone remodeling (bone turnover).

Two main processes directly shape bone, modeling and remodeling. In modeling, bone is removed in one location and added in another. Through periosteal and endosteal formation and

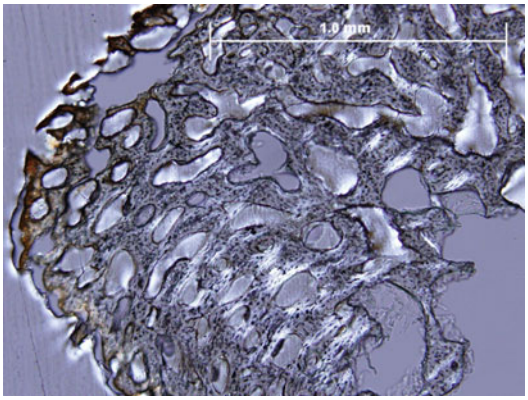

Bone: Histological Analysis, Fig. 1 Histologically, woven bone is characterized by wide spaces and poor organization. It is found in immature bone and at the sites of fracture repair or pathological conditions. (Pig rib at 100× magnification)

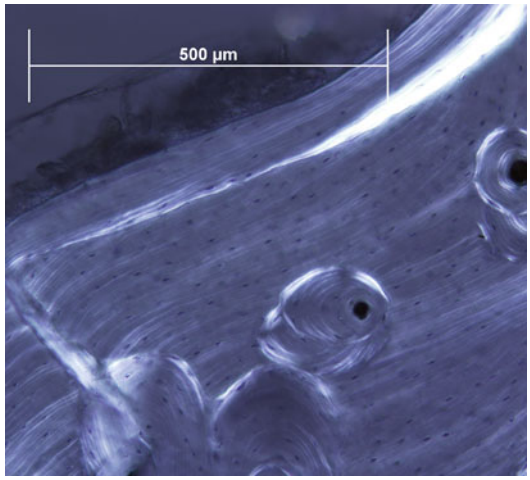

Bone: Histological Analysis, Fig. 2 Lamellar bone is characterized by organized, parallel bands of bone. The secondary osteons are signs of remodeling in these lamellae. (Human rib at 200× magnification)

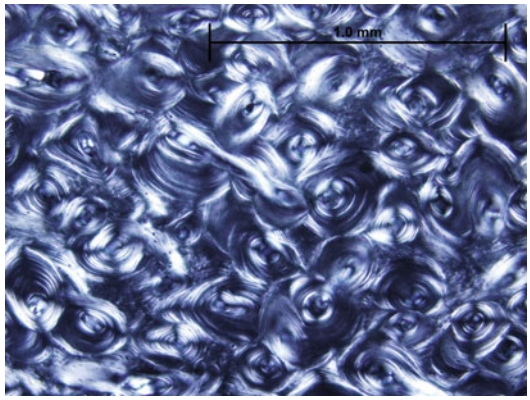

Bone: Histological Analysis, Fig. 3 Human Haversian bone showing secondary osteons. (Human femur at 100× magnification)

resorption, bone modeling modifies bone size, shape, and relative orientation (Maggiano 2011). Bone remodeling, or internal bone turnover, is the process of continuous removal of older bone with the replacement of new bone throughout life. It occurs through the localized coupling of osteoclasts and osteoblasts forming an assembly of cells called the basic multicellular unit, or BMU (Frost 1969). Active BMUs follow a pattern of activation, resorption, and formation of bone known as the A-R-F sequence (Martin et al. 1998).

Unlike bone modeling, remodeling generally does not affect the overall size and shape of the bone. Bone remodeling is often described as having two functions: microscopic fracture repair and maintaining metabolic homeostasis of the bone matrix. Microscopic fracture repair is likely the primary function of bone remodeling, allowing the skeleton to adapt to its mechanical environment by reducing the risk of fractures and repairing damage created by repetitive cycles of mechanical loading (Burr 2002). Both modeling and remodeling can occur on the four bone envelopes: the periosteal, Haversian (intracortical), endosteal, and trabecular surfaces (Frost 1969, 1987; Parfitt 2002). Because each envelope is distinct, modeling and remodeling can occur at different times, rates, and magnitudes within the bone.

Applications of Bone Histology in Anthropology

Anthropologists are increasingly performing histological analysis to study both ancient and modern bone. As with other anthropological analyses of bone, the interpretation of histological results must be made within the context of skeletal biology. Histological analysis of skeletal remains in anthropology is applied to (but not limited to) the following categories: the differentiation of human from nonhuman bone, constructing the biological profile, reconstructing habitual activities or traumatic episodes in life, and the diagnosis of pathological conditions including an overall assessment of skeletal health. The following provides a brief summary of each type of analysis.

Human Versus Nonhuman

In instances where bone is too fragmentary, too weathered, or in some other way rendered unidentifiable by macroscopic observation, histological analysis can serve to differentiate human from nonhuman bone. Histological methods are less destructive, easier to perform, and less expensive than DNA analysis for distinguishing human from nonhuman bone. The typical method to differentiate human from nonhuman bone is to evaluate specific qualitative microstructural traits considered distinctive of nonhuman species. Researchers attribute two particular features of bone microanatomy to nonhuman species, plexiform bone and osteon banding. Plexiform bone is a fibrolamellar bone type described as having a "brick wall" appearance, a result of the linear vascular spaces that separate the lamellar "bricks" when plexiform bone is viewed in cross section (Martin et al. 1998: Fig. 4). Osteon banding is defined as distinct rows of five or more primary and/or secondary osteons, which often alternate with bands of lamellar bone (Mulhern and Ubelaker 2001).

In the absence of these easily observable and definitive nonhuman features, morphological characteristics of secondary osteons are often considered. Bone deposition and remodeling processes are similar in human and nonhuman mammals, making secondary osteons a prevalent feature of bone microstructure in most animals.

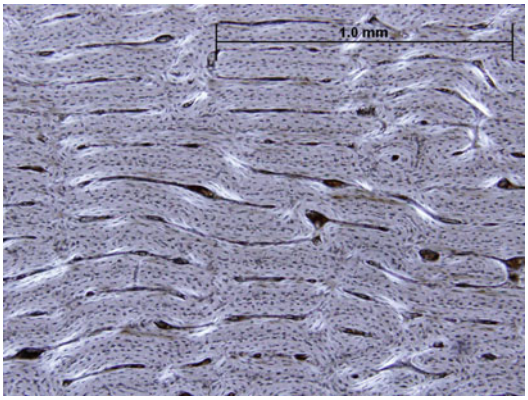

Bone: Histological Analysis, Fig. 4 Plexiform bone is brick-like in appearance and characteristic of non-human bone. (Pig humerus at 100× magnification)

Early research focused heavily on size differences in human and nonhuman microstructure, but provided little in the way of broadly applicable methods for identifying human or nonhuman material. Jowsey (1966) established that secondary osteon size varied across species and that there are age-related changes in Haversian canal size. More recently, it has been shown that human osteons tend to be elliptical, whereas nonhuman osteons tend to be circular. This supports anecdotal evidence that nonhuman osteons appear more circular than human osteons, suggesting that circularity may be a key variable to differentiate human from nonhuman Haversian bone. While histomorphometric data (i.e., osteon area and osteon circularity) appear promising for differentiating human and nonhuman bone, current methods lack sufficient validation and should be used with caution.

Constructing the Biological Profile

In anthropology, constructing a biological profile for unknown skeletal remains consists of a series of analyses that include the estimation of sex, age, ancestry, and stature, as well as the recognition of pathological conditions. Within forensic anthropology, the biological profile may be used in two ways: the first is to provide biological information that may be used to support the identification of an individual and the second is to use the information to narrow a potential missing person's list to streamline investigations involving unknown human remains. Outside of forensic applications, the biological profile is used to construct the demographics of ancient human populations (paleodemography). Considering the components of the biological profile, the estimation of age currently constitutes the majority of histological research in anthropology. While histological methods have not been used to estimate sex or ancestry, research has demonstrated that a relationship between histological variables and these factors likely exist. Although research suggests allometric relationships (e.g., relationship of body size to shape) with histological structures, stature estimation is not within the scope of histological analysis. Therefore, this section discusses histological age estimation with consideration of sex and ancestry as contributing factors in histological variation.

Age Estimation

The estimation of age at death is an essential part in the reconstruction of population demographics and the individual analysis of human remains. Estimating the age at death of children and young adults can be performed with greater accuracy owing to methods that are based on the growth and development of the human skeleton. Skeletal growth and development are regulated by endocrine and genetic factors producing biological age indicators that have a more predictable relationship with chronological age. The estimation of age at death for adults, in most cases, demonstrates a progressive decrease in accuracy as chronological age increases. Most methods for adult age estimation are based on degenerative changes of the skeleton, which can vary between individuals, geographic populations, and ancestral groups. The premise of histological age estimation is based upon clinical and anthropological research demonstrating that bone turnover occurs in cortical bone at a predictable rate over an individual's lifetime. As turnover occurs over time, the relative density of secondary osteons will increase, which should be evident until remodeling rates begin to fluctuate during the later decades of life (Fig. 5).

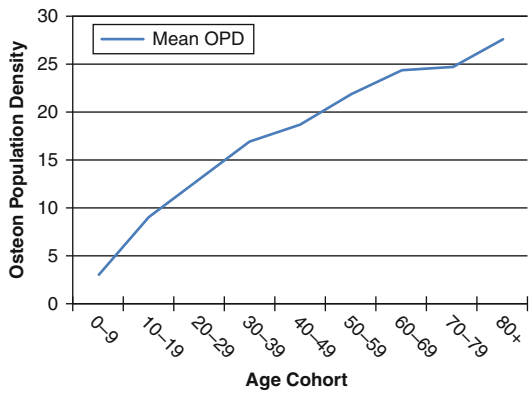

Bone: Histological Analysis, Fig. 5 Mean osteon population density (OPD) values for a known age sample separated into age cohort showing the relationship of OPD with age

Since the introduction of the first quantitative histological approach for the estimation of age at death by Ellis Kerley in 1965, histological parameters of age-related bone turnover have been well-documented in the anthropological literature for various skeletal elements. Crowder (2005) reviewed some of the most frequently employed methods, determining that the assessment of bone histology is a useful method for estimating age, producing accuracy values that are comparable to many gross morphological methods. Considering the myriad of methods, only a few have received significant attention within the field culminating in multiple validation studies applied to archaeological, cadaveric, and forensic samples. Regardless of the method, analysis involves evaluating a cross section or portion of a cross section of bone at the histological level and collecting variables that exhibit a relationship with chronological age. As with any method, it is imperative to perform the analysis as it is described in the literature.

Current methods typically quantify the amount of intact or fragmentary osteons within the cross section or region of interest within a cross section. More recently, histologists have turned to osteon geometry (i.e., shape and size) as an age indicator creating new approaches to the analysis of bone. Two variables that have received considerable attention are osteon circularity and area, which have both been found to correspond with age. Osteon circularity examines the geometry of the osteon in relation to a circle. Osteon area establishes the amount of bone area within the reversal line of an osteon. Research has indicated that mean osteon area decreases and circularity increases in older individuals; however, the control mechanisms for osteon size and shape over time are not fully understood and may be related to factors such as bone formation rates, activation frequency, and osteon population density. The material currently available for elucidating the specific relationship between osteon geometry and age is at a preliminary stage and significantly more research is needed.

Sex and Ancestry

While it has been documented that bone density and the rate of bone remodeling differ between the sexes and between individuals from different ancestral groups, there is no agreement among studies that these differences exist with measurable consistency. Many histological methods for age estimation have developed sex-specific and ancestry-specific equations (Thompson 1979; Cho et al. 2002), while others indicate no significant differences between groups (Stout and Paine 1992). Sex differences observed in histological variables are likely related to biological factors involving the endocrine system that affect bone turnover in the female skeleton, such as pregnancy, lactation, and menopause. Females experience bone loss associated with a drop in estrogen levels following menopause, which manifests in the loss of trabecular connectivity and increased porosity within the Haversian envelope of cortical bone. Biocultural factors (i.e., fecundity, breastfeeding practices, types of food consumed, or activity levels) may produce or extenuate histological differences between males and females that significantly impact bone biology. For example, a division of labor between sexes in a population may produce higher activity levels in one sex, causing bone to respond differently to the mechanical stresses and resulting in a perceived sex difference.

Histological differences observed between ancestral groups may be attributed to the population variability in cortical bone mass and density. Differences in skeletal growth velocity and duration will result in differences in bone mass and density. African-Americans, compared to European-Americans, have a slower bone turnover rate and a higher subperiosteal apposition rate resulting in greater bone volume (Cho et al. 2002). While differences in hormone levels that govern growth and development vary between populations, cultural aspects should also be considered when evaluating population variation at the histological level. Socioeconomic status may produce differences in activity levels, diet, and overall health, which may manifest at the histological level in bone.

Considering that histological methods produce conflicting results regarding sex and ancestry, it is also possible that some perceived group differences are an artifact of small sample sizes, skewed

sample distributions, or differences in histological sampling location. Therefore, caution should be followed when interpreting histological variables and results. Overall, population variation in bone histology likely reflects biological, genetic, and cultural factors.

Physical Activity

Biomechanical strain levels may vary depending on patterns of physical activity, which may be attributed to sex or ancestral group differences. Bone, being a dynamic tissue, will respond to biomechanical forces, or lack of forces, by altering bone resorption and formation rates (Inque et al. 2000). All bones receive biomechanical loading, including non-weight-bearing elements. Through histological analysis one may evaluate the microstructural changes caused by this biomechanical loading. A difficulty in anthropological studies is interpreting the load history where strain data are lacking or insufficient (Skedros 2011). The evaluation of mechanical loading in bone provides an understanding of bone adaptation within the lifetime of an individual in that bone structure and/or material organization will change in response to certain loading conditions (including reduction of loading as seen in disuse osteoporosis). The effects of stress/strain on bone are varied; however, bone must remain mechanically stable to reduce fracture risk. Biomechanical loading resulting from physical activity, assuming that the loading conditions are outside the normal physiological stress/strain range, provides stimuli that can accelerate intracortical bone remodeling. Studies from archaeologically derived contexts suggest the effect of habitual behaviors on bone results in both changes in gross geometry and intracortical bone remodeling. Therefore, one must consider that subsistence patterns and activity patterns vary between populations over geography and time.

Considerable research suggests that variation in the size and shape of osteons is linked to the biomechanical loading of bones. The analysis of this variation may be helpful in interpreting the load history of past and present populations; however, the challenge is in differentiating load history from other biological variables. While a well-substantiated framework for interpreting load history remains to be developed, Skedros (2011) introduced a worksheet/checklist of considerations to facilitate the interpretation in limb-bone diaphyses and ribs. Further work is needed to establish the control mechanisms determining osteon shape and size.

Pathological Conditions

Pathological conditions in skeletal remains can be often classified into particular disease groups through histological analysis. The interpretation of morphological structures at the histological level in archaeologically derived bone is particularly difficult due to postmortem changes and the maceration process, when compared to the information available from fresh tissue samples. Identifying pathological conditions in bone provides the basis for reconstructing the etiology and epidemiology of disease in past populations (Schultz 2001).

In the forensic context, the evaluation of pathological conditions in bone may assist with the determination of the cause of death. Of particular interest to forensic pathologists is identifying pathological conditions that increase the fracture risk of bone. Two conditions commonly explored that result in abnormally brittle bones are *osteogenesis imperfecta* and osteoporosis. In addition, metabolic conditions, dietary deficiencies, or other pathological conditions often lead to abnormal secondary osteon counts, which if used for histological age estimation, will produce inaccurate results. When evaluating bone for potential pathological conditions, it is important to consider the role of diagenesis and the impact of taphonomic factors that may mimic the histomorphology of diseased bone (Schultz 2001). Diagenesis refers to post-depositional changes that may affect both the chemical and structural integrity of the bone caused by taphonomic agents, such as water intrusion, bacteria, and fungi (Jans et al. 2004). Failure to recognize diagenetic agents may affect the reliability of histological analyses.

Conclusions

Skeletal remains are a storehouse of information regarding the biological processes experienced during the life of the individual. The use of histological methods in anthropology can strengthen other analytical results and provide information that cannot be obtained from gross methods alone. Through the qualitative evaluation of histomorphology and quantification of bone remodeling through histomorphometry, anthropologists are able to develop techniques to estimate age at death, evaluate load history, and assess skeletal health, contributing to the comprehensive understanding of skeletal biology.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Dental Anthropology
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition
- ▶ Stature Estimation
- ▶ Taphonomy in Bioarchaeology and Human Osteology

References

Burr, D.B. 2002. Targeted and nontargeted remodeling. *Bone* 30: 2–4.

Cho, H., S.D. Stout, R.W. Madsen, and M.A. Streeter. 2002. Population-specific histological age- estimating method: A model for known African-American and European-American skeletal remains. *Journal of Forensic Sciences* 47: 12–18.

Crowder, C.M. 2005. Evaluating the use of quantitative bone histology to estimate adult age at death. Ph.D. dissertation, University of Toronto.

Frost, H.M. 1969. Tetracycline based histological analysis of bone remodeling. *Calcified Tissue Research* 3: 211–237.

Frost, H.M. 1987. Bone "mass" and the "mechanostat": A proposal. *Anatomical Record* 219: 1–9.

Guatelli-Steinberg, D., and M. Huffman. 2011. Histological features of dental hard tissues and their utility in forensic anthropology. In *Bone histology: An anthropological perspective*, ed. S.D. Stout and C. Crowder, 91–107. New York: CRC Press.

Inque, M., H. Tanaka, T. Moriwake, M. Oka, C. Sekiguchi, and Y. Seino. 2000. Altered biochemical markers of bone turnover in humans during 120 days of bed rest. *Bone* 26: 281–286.

Jans, M.M.E., C.M. Nielsen-Marsh, C.I. Smith, M.J. Collins, and H. Kars. 2004. Characterisation of microbial attack on archaeological bone. *Journal of Archaeological Science* 31: 87–95.

Jowsey, J. 1966. Studies of Haversian systems in man and some animals. *Journal of Anatomy* 100: 857–864.

Maggiano, C.M. 2011. Making the mold: A microstructural perspective on bone modeling during growth and mechanical adaptation. In *Bone histology: An anthropological perspective*, ed. S.D. Stout and C. Crowder, 45–90. New York: CRC Press.

Martin, R.B., D.B. Burr, and N.A. Sharkey. 1998. *Skeletal tissue mechanics*. New York: Springer Press.

Mulhern, D.M., and D.H. Ubelaker. 2001. Differences in osteon banding between human and nonhuman bone. *Journal of Forensic Sciences* 46: 220–222.

Parfitt, A.M. 2002. Misconceptions (2): Turnover is always higher in cancellous than in cortical bone. *Bone* 30: 807–809.

Skedros, J.G. 2011. Interpreting load history in limb bone diaphyses: Important considerations and their biomechanical foundations. In *Bone histology: An anthropological perspective*, ed. S.D. Stout and C. Crowder, 153–220. New York: CRC Press.

Schultz, M. 2001. Paleohistopathology of bone: A new approach to the study of ancient diseases. *Yearbook of Physical Anthropology* 116: 106–147.

Stout, S.D., and R.R. Paine. 1992. Brief communication: Histological age estimation using rib and clavicle. *American Journal of Physical Anthropology* 87: 111–115.

Thompson, D.D. 1979. The core technique in the determination of age at death in skeletons. *Journal of Forensic Sciences* 24: 902–915.

Further Reading

Hillier, M.L., and L.S. Bell. 2007. Differentiating human bone from animal bone: A review of histological methods. *Journal of Forensic Sciences* 52: 249–263.

Kerley, E.R. 1965. The microscopic determination of age in human bone. *American Journal of Physical Anthropology* 23: 149–164.

Robling, A.G., and S.D. Stout. 2000. Histomorphometry of human cortical bone: Applications to age estimation. In *Biological anthropology of the human skeleton*, ed. M.-A. Katzenburg and S.R. Saunders, 149–171. New York: Wiley-Liss Inc.

Bones: Preservation and Conservation

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Introduction

This entry discusses the conservation of a common archaeological remain: bones or, more specifically, bony elements. Our main purpose is to consider bony elements, common to all vertebrate, human and animal, from archaeological contexts and their final destinations in museums and laboratories.

Definition

What Is a Bone?

The bone is made of two main elements: organic (collagen protein) and mineral (hydroxyapatite $Ca_{10}(PO_4)_6(OH)_2$). These elements have very different functions and properties that in combination allow the bone to be at the same time hard and flexible, and as such it is an excellent raw material for several archaeological artifacts (White and Folkens 2000), such as Amazonian flutes, Paleolithic and Neolithic needles, and Paleolithic sculptures.

In a body, bones serve to protect and support soft tissues, to produce blood cells, as a storage facility for fat, and as a reservoir of calcium. Bony elements vary in size and shape according to the species and the individuals, but these are normally also related to sex and, in the case of fauna, domestication. Living bone is constantly transforming; it can repair and reshape itself depending on the type of stress it is put under.

The proportion of mineral and organic parts in bony materials depends on the function of the structure: bones, teeth, tusks, antlers, and shells all have different functions, and therefore the compositions and forms can differ quite a bit, for example, teeth have more mineral parts than the bone, shafts are hollow, while tusks are dense and compact, etc. The composition of bony elements affects the way these structures can be manipulated and has implications on their reactions to taphonomic processes following deposition (and after being excavated!).

Key Issues/Current Debates/Future Directions/Examples

Taphonomic Processes: "What Damages Buried Bony Elements?" and "What Can Preserve Bony Elements?"

The word taphonomy entered the academic record in 1940 when the Russian researcher Yefremov applied it to define "the study of the laws of burial" in paleontological contexts. Eventually its meaning was extended to the study of fossilization processes and paleoecological biases resulting from the passage of a body (human or animal) from a living community to a fossil one and from the environment where the body was buried (Behrensmeyer 1978). In these past decades, the term taphonomy is being used by many archaeologists as synonym for "the study of conservation and degradation processes."

Even though bony elements have a very significant percentage of mineral components – giving a false impression of being a stonelike material – there are numerous processes that can damage the structure of bones, be it mammal, reptilian, avian, or fish:

1. Decomposition: The bacteria responsible for soft tissue decomposition can also "attack" the organic part of the bones.
2. Environment: Exposition to weather conditions, rain, sun, wind, snow, and temperature can cause cracking and breaking.
3. Burial and transportation: A rapid burial is an essential element for conservation; long-term transportation can physically destroy bones completely.
4. Soil characteristics: Acidity, mineral composition, and granulometry (clay, sand, or silt) all affect preservation. In fine sands, the surface of

bones can become coarse with time, while in clay, soil "attaches" itself to the bone, being difficult to separate – some cleaning procedures might even damage the bones if the sediment is too attached.

5. Pre-depositional treatment: Human and animal bones frequently undergo some kind of treatment prior to being buried or discarded. One should expect treatments that vary from defleshing to cremation, boiling, painting, etc. All of these activities have impacts on preservation. For instance, burnt bones survive quite well but are normally highly fragmented, while teeth usually "explode" into micro-unidentifiable fragments when burnt. Mummification processes, be they natural or artificial, can help preserve not just bones but also soft tissue and keratin elements (like hairs and nails); nevertheless a mummified body can decompose if the environmental conditions change.

Most bones found in archaeological sites are in fact decomposing not fossilizing; the site's environment affects the rate of this process. For instances, in tropical areas, where the soil is normally very acidic, the weather conditions are quite rough (temperature and humidity are high), and microbiological activity is extremely intense, bones sometimes do not preserve beyond a few hundred years (or less), and when they are recovered, the deterioration is so advanced that it renders identification and other analyses (like dating) difficult or impossible. Meanwhile in Europe, where the soils are neutral or slightly basic, it is quite normal to find non-fossilized bone in archaeological sites thousands of years old. Some kind of equilibrium is needed in order for long-term preservation to exist.

It is important to note that finding preserved bone does not mean finding fossils. Fossils are bones or teeth that no longer have organic parts, because they have been replaced by mineral elements in contact with the soil.

What Can We Learn from Bony Materials?

The study of bony materials can provide information about a range of archaeological questions, and these applications justify the long-term storage of bone (Lyman and Fox 1997):

1. Differentiating human from animal contexts (see Figs. 1 and 2)
2. Estimating minimum individual number, sex, age, stature, and health
3. Domestication processes for animals
4. Cultural materials and artifacts
5. Feeding habits
6. Disposal habits
7. Environment
8. Population patterns
9. Funerary practices
10. Death patterns (isolated, catastrophic, etc.)

Bones: Preservation and Conservation, Fig. 1 Animal bones recovered from an Amazonian site. Notice conservation. (Photo by V. Moraes)

Bones: Preservation and Conservation, Fig. 2 Funerary urn containing one cremated individual, the bones are very fragile. (Photo by C. Moraes)

How to Preserve Bony Elements?

Unfortunately, few museums around the world have the proper means to care for all their archaeological artifacts. Yet, simple and practical actions do exist and can help preserve bony elements for long periods of time. To conserve such artifacts correctly, one must understand:

1. The conditions where the elements were found. Changing the environment too abruptly and permanently usually leads to deterioration of the organic parts and sometimes to total destruction.
2. The bony elements conditions at the moment of their retrieval. If the conservation conditions at the field are precarious, it may be necessary to apply stabilizing agents, in order to remove, finish the excavation, and follow cleaning procedures, if necessary, in the laboratory.
3. The final destination: Most organic materials react rather badly to environment variation. So, in order to preserve these elements, there must be continuity! This means understanding and controlling the environment at the final destination.

Collagen (organic part) in the bony elements reacts to the removal from the soil by drying and shrinking or by moistening and swelling; in both cases, this leads to cracking of the bone's surface and, sometimes, inner structures.

"When," "How," and "Why" to Clean Bones Are Dependent on the Conditions in Which the Bony Elements Were Found and the Projected Analyses

Before starting the cleaning procedures, it is necessary to make a thorough evaluation of the bony element, noting how preserved or damaged it is. Dry and wet materials react differently once taken from dry soil or flooded areas, and the preventive actions (glues, consolidants) that might have been needed may subsequently interfere with the cleaning procedures. Another important factor to be taken into consideration is that bones (human and animals) are often remodelled into artifacts or transformed by pre-depositional treatments; therefore, cleaning should not "erase" or "remove" these traces, when possible X-rays can assist in this process of evaluation.

Differently from other more robust archaeological remains, like stone and some ceramics, washing with abundant water and brushes can damage bony elements by removing the superficial layers or causing them to crack and eventually break into small fragments. Therefore, many archaeologists are experimenting dry-cleaning their materials with scalpels and using controlled solvents in specific areas. Scalpels are delicate to use because they are very sharp and therefore dangerous, but usually it is easier to clean with a scalpel. Even hard and attached clay soils can be removed without much effort, and if by misfortune, the archaeologist "carves" the bone, it leaves a very distinctive mark, easily differentiated from prehistoric artifacts. Wooden utensils demand the application of more strength during cleaning procedures and can eventually cause the bone to shatter, but it is still a very good utensil. Solvents are good for removing incrustations that cannot be cleaned mechanically, but they must be used carefully because in large amounts, they can erode the bone's surface.

Bony elements that are found in wet/damp conditions are best cleaned before the surrounding soil dries out completely. As we mentioned before, this process must be done slowly and carefully; abrupt changes in the micro-context of the bones can cause damages. Once dried, bones should not be remoistened.

Issues of Long-Term Storage

Like in all scientific work, in archaeology, one should leave part of the material studied for future analyses: thinking of future researchers who might create better techniques or have different opinions.

Conducting archaeological excavations implies recovering old materials that need to be

Bones: Preservation and Conservation, Fig. 3 An example of storage procedures: human bones being stored in polypropylene material. (Photo by A. Rapp Py-Daniel)

cared for a very long time. Appropriate storage areas are a problem for archaeologists and museums all around the world. The need for space is forcing some archaeologists to rethink their fieldwork plans and to choose smaller expeditions where fewer materials are recovered.

Scientific collections demand special care. Most recovered bones were in a slow (or not so slow) process of decomposition, and this needs to be taken into account when planning excavations and long-term storage. Remembering that all organic materials should only be stored once they are completely stabilized, one must first think of the bone's condition and which materials will be in direct contact with the bony elements (see Fig. 3).

As Cronyn (2004) states, stabilization can either be passive or active – unfortunately, most laboratories only have the first option. A passive stabilization involves controlling the "new" environment and allowing the bony materials to dry (or keeping them wet) until they achieve an equilibrium. The density of the bony materials (bones, ivory, etc.) will also have an impact on the time it will take for stabilization to occur. When bony materials have to go through an abrupt change in the environment, like the removal from wet conditions, the application of a chemical product (Cronyn 2004) to consolidate and "force" stability is usually needed – the most frequently used are PVAC and polyethylene glycol.

Once the archaeological remains are stabilized, storage considerations should include appropriate conditions:

- Bony materials should be in direct contact with "soft" materials, like plastic bags or preferably bags made of polypropylene, that are neutral and not toxic.
- Storage should not be in paper bags or cardboard boxes that decompose rapidly and attract animals like termite and ants.
- The integrity of the bony material is a key element; when cracking and breaking are observed, it is valuable to consider storage in areas where there is little handling.
- Cracking bones should not be kept in direct contact with each other.
- Large and heavy bones should not be stored with small fragments or teeth.
- Common sense is always the best policy.

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Bioarchaeology: Definition
- ▶ Bone: Chemical Analysis
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone Density Studies in Environmental Archaeology
- ▶ Bone Tools, Paleolithic
- ▶ Conservation in Museums
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Zooarchaeology

References

Behrensmeyer, A.K. 1978. Taphonomic and ecologic information from bone weathering. *Paleobiology* 4: 150–162.

Cronyn, J.M. 2004. *The elements of archaeological conservation*. London: Routledge.

Lyman, L., and G. Fox. 1997. A critical evaluation of bone weathering as an indication of bone assemblage formation. In *Forensic taphonomy: The postmortem fate of human remains*, ed. W. Haglund and M. Sorg, 223–247. Boca Raton: CRC Press.

White, T.D., and P.A. Folkens. 2000. *Human osteology.* 2nd ed. San Diego: Academic.

Further Reading

Binford, L.R. 1981. *Bones: Ancient men and modern myths*. New York: Academic.

Duday, H. 2005. L'archéotanatologie ou l'archéologie de la mort. In *Objets et méthodes en paleoanthropologie*, ed. O. Dutour, J.-J. Hublin, and B. van der Meersch, 153–216. Paris: Comité des travaux historiques et scientifiques (CTHS).

Rodgers, B.A. 2004. *The archaeologist's manual for conservation – A guide to non-toxic, minimal intervention artifact stabilization*. New York: Kluwer Academic Publishers.

Boni, Giacomo

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Basic Biographical Information

Born in Venice, Italy, on April 25, 1859, Giacomo Boni was a prominent figure in the development of the discipline of Roman archaeology and, in particular, a key figure in the excavation of contexts connected to early Rome. Boni studied architecture in Venice and worked there as an architect but is best known for his excavations at Rome, especially those in and around the Forum Romanum undertaken from 1898 onward. He saw military service in World War I and resumed his fieldwork in 1916. He was appointed as a member of the Italian senate in 1923 and died in Rome, Italy, on July 10, 1925, and is interred in the Orti Farnesiani on the Palatine Hill.

Major Accomplishments

Boni's excavations in Rome resulted in many significant archaeological discoveries, and it is for this work that he is most well-known; in fact, Boni was a pioneer in terms of excavation methodology. Boni's stratigraphic excavations in the center of Rome were revolutionary, as no one had ever undertaken deep soundings at Rome that followed stratigraphic principles before (Ammerman 1990: 630). Indeed, Boni's stratigraphic excavation was one of the first of its kind in the field of Classical archaeology. Beginning in 1903, Boni's excavation reached a depth of more than 6 m, taking him below the modern water table, an excavation in which his early experience as an architect working in Venice proved useful. In the deep soundings at the center of the Forum Romanum, Boni would document more than 30 anthropic strata that told the story of the artificial landfill project undertaken in the archaic period to raise the ground level of the Forum itself. These layers, and Boni's work, would be returned to in the middle of the twentieth century by Swedish archaeologist Einar Gjerstad.

Boni's excavations also revealed important finds in and around the area of the Forum Romanum. These included the Iron Age necropolis near the Imperial temple of Antoninus Pius and Faustina known as the *Sepolcretum* (1902), the *Lapis Niger* (1899–1905), and the *Regia*, as well as sites on the slope of the Palatine Hill including the House of the Griffins. Despite interrupting his work to serve in World War I, Boni returned to digging at Rome and continued to work there until the end of his life.

Cross-References

► Forum
► Lanciani, Rodolfo
► Topography of Rome

References

Ammerman, Albert J. 1990. On the origins of the forum Romanum. *American Journal of Archaeology* 94: 627–645.

Further Reading

Ammerman, Albert J. 2016. On Giacomo Boni, the origins of the forum, and where we stand today. *Journal of Roman Archaeology* 29: 293–311.

Capodiferro, A., and P. Fortini. 2003. *Gli scavi di Giacomo Boni al foro Romano, Documenti dall'Archivio Disegni della Soprintendenza Archeologica di Roma* I.1 (Planimetrie del Foro Romano, Gallerie Cesaree, Comizio, Niger Lapis, Pozzi repubblicani e medievali). (Documenti dall'archivio disegni della Soprintendenza Archeologica di Roma 1). Rome: Fondazione G. Boni-Flora Palatina.

Coarelli, F. 1983–1985. *Il Foro Romano*. 2 v. Rome: Quasar.

Coarelli, F., ed. 2004. *Lexicon topographicum urbis Romae/Suppl. 2,1, Gli scavi di Roma: 1878–1921*. Rome: Quasar.

Consolato, S. 2006. Giacomo Boni, l'archeologo-vate della Terza Roma. In *Esoterismo e fascismo: storia, interpretazioni, documenti*, ed. G. De Turris. Rome: Edizioni mediterranee.

Gjerstad, E. 1953–1973. *Early Rome*. 6 v. Lund: C. W. K. Gleerup.

Romanelli, P. 1970. Boni, Giacomo, in *Dizionario Biografico degli Italiani*, 75–77. Rome: Istituto dell'Enciclopedia Italiana fondata da Giovanni Treccani.

Steinby, E. M. 1993–2000. *Lexicon Topographicum Urbis Romae*. 6 v. Rome: Quasar.

Tea, E. 1932. *Giacomo Boni nella Vita del suo tempo*. 2 v. Milan: Ceschina.

Whitehouse, D. 1996. Boni, Giacomo. In *Encyclopedia of the history of classical archaeology*, ed. N.T. de Grummond, vol. 1, 171–172. Westport: Greenwood Press.

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Basic Biographical Information

Luis Alberto Borrero is an Argentine archaeologist, born in the Patagonian city of Río Gallegos and raised in Azul (Buenos Aires Province). He completed his undergraduate studies in anthropology in 1978 and received his Ph.D. in 1986. Both studies were undertaken at the University of Buenos Aires, where Borrero has held a professorship since 1986. Luis Borrero has been a Research Fellow for the National Research Council of Argentina (CONICET) since 1983.

After receiving his Ph.D., Borrero was awarded several scholarships and grants to complete specialized training programs abroad, many of them pertaining to methodological issues including taphonomic analysis, formation processes, ethnoarchaeological research, and dating techniques in archaeology (1980–1991) (Borrero and Yacobaccio 1989).

In the late 1980s, Luis Borrero started the Magallania Archaeological Project, focusing research attention on regions north and south of the Magellan Strait (Fuego-Patagonia, southern South America) (Borrero 1991).

Major Accomplishments

Luis Borrero's research is centered on Patagonian hunter-gatherers, with particular emphasis on theoretical and methodological issues in hunter-gatherer archaeology, Pleistocene megafaunal extinctions, and the initial peopling of southern South America. Since the very beginning of his career, Borrero has made significant contributions to the discipline, including theoretical models, actualistic data, and insightful analyses of the archaeological record.

While finishing his doctoral dissertation, Borrero began his research on taphonomy, which initially included longitudinal studies of guanaco (*Lama guanicoe*) remains in Tierra del Fuego, and later incorporated similar studies of several other mammalian taxa (Borrero 1990, 2007). His pioneering work in taphonomy as well as his early research on formation processes in archaeology promoted a methodological transformation in Argentine archaeology (Gutierrez et al. 2007).

By integrating taphonomy, geoarchaeology, and distributional archaeology, Borrero proposed a "regional taphonomy" approach, which has been the framework for his intensive fieldwork, predominantly in Argentine and Chilean Patagonia (Borrero 2001a, b). Borrero's research on Pleistocene megafaunal extinctions in South America is primarily based on his own fieldwork

in Última Esperanza, Chile. Borrero has published comprehensive assessments of the respective roles of human exploitation and climate change in South American faunal extinctions during the Pleistocene-Holocene transition (Borrero 1997, 1999a, 2008; Borrero and Martin 2012).

Borrero's contribution to our understanding of the peopling of southern South America (Borrero 1994–1995, 1996, 1999b, 2006, 2011) includes a three-stage model (exploration, colonization, and effective occupation), which details material expectations for archaeological records of the peopling of previously unoccupied areas. This model is currently a major framework for Patagonia research and has been shown to be applicable elsewhere.

Luis Alberto Borrero has received numerous awards for his contributions to the discipline of archaeology, including the *Bernardo Houssay's Award to Scientific and Technological Research* (Argentina 2004) and the Award for Excellence in Latin American and Caribbean Archaeology of the Society for American Archaeology (USA 2014). He has trained a large number of practicing archaeologists, producing a deep and lasting influence on Argentine archaeology.

Cross-References

- ▶ Hunter-Gatherers, Archaeology of
- ▶ North American Megafauna Extinction: Climate or Overhunting?
- ▶ North American Terminal Pleistocene Extinctions: Current Views
- ▶ Peopling of the Americas
- ▶ Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia
- ▶ Site Formation Processes
- ▶ Taphonomy: Definition

References

Borrero, L.A. 1990. Taphonomy of Guanaco bones in Tierra del Fuego. *Quaternary Research* 34: 361–371.

Borrero, L.A. 1991. Evolución cultural divergente en la Patagonia austral. *Anales del Instituto de la Patagonia* 19: 133–140.

Borrero, L.A. 1994–1995. Arqueología de la Patagonia. *Palimpsesto. Revista de Arqueología* 4: 9–69.

Borrero, L.A. 1996. The Pleistocene-Holocene transition in southern South America. In *Humans at the end of the ice age: The archaeology of the Pleistocene-Holocene transition*, ed. L.G. Straus, B.V. Eriksen, J.M. Erlandson, and D.R. Yesner, 339–354. New York: Plenum Press.

Borrero, L.A. 1997. The extinction of megafauna: A supra-regional approach. *Anthropozoologica* 25 (26): 209–216.

Borrero, L.A. 1999a. The faunas of the Pleistocene/Holocene boundary in the Seno de la Ultima Esperanza, Chile. In *Zooarchaeology of the Pleistocene/Holocene boundary*, ed. J. Driver, 59–62. Oxford: BAR International Series.

Borrero, L.A. 1999b. The prehistoric exploration and colonization of Fuego-Patagonia. *Journal of World Prehistory* 13 (3): 321–355.

Borrero, L.A. 2001a. Regional taphonomy. The scales of application to the archaeological record. In *Animals and man in the past* (ARC-Publicatie 41), ed. H. Buitenhuis, and W. Prummel, 17–20. Groningen: ARC.

Borrero, L.A. 2001b. Regional taphonomy. Background noise and the integrity of the archaeological record. In *Ethnoarchaeology of Andean South America. Contributions to archaeological method and theory*, ed. L.-A. Kuznar, 243–254. Ann Arbor: International Monographs in Prehistory.

Borrero, L.A. 2006. Paleoindians without mammoths and archaeologists without projectile points? The archaeology of the first inhabitants of the Americas. In *Paleoindian archaeology. A hemispheric perspective*, ed. J.E. Morrow and C. Gnecco, 9–20. Gainesville: University Press of Florida.

Borrero, L.A. 2007. Longitudinal taphonomic studies in Tierra del Fuego, Argentina. In *Taphonomy and zooarchaeology in Argentina*, ed. M. Gutiérrez, L. Miotti, G. Barrientos, G. Mengoni Goñalons, and M. Salemme, 219–233. Oxford: BAR International Series.

Borrero, L.A. 2008. Extinction of Pleistocene megamammals in South America: The lost evidence. *Quaternary International* 185: 169–174.

Borrero, L.A. 2011. The theory of evolution, other theories, and the process of human colonization of America. *Evolution and Education Outreach* 4: 218–222.

Borrero, L.A., and F.M. Martin. 2012. Ground sloths and humans in southern Fuego-Patagonia: Taphonomy and archaeology. *World Archaeology* 44 (1): 102–117.

Borrero, L.A., and H.D. Yacobaccio. 1989. Etnoarqueología de asentamientos Aché. Cazadores-recolectores del Paraguay Oriental. *Journal de la Société des Américanistes* LXXV: 7–33.

Gutiérrez, M., L. Miotti, G. Barrientos, G. Mengoni Goñalons, and M. Salemme. 2007. *Taphonomy and zooarchaeology in Argentina*. Oxford: BAR International Series.

Bowdler, Sandra E.

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Basic Biographical Information

Sandra Bowdler is now Emeritus Professor in Archaeology at the University of Western Australia. She grew up in Sydney, Australia, and obtained a first class honors degree with university medal in Anthropology from the University of Sydney in 1971. She then worked as a tutor at the University of Papua New Guinea before going on to undertake, and in 1979 complete, a PhD in the Research School of Pacific Studies at the Australian National University on aspects of archaeology of Hunter Island, Tasmania. Toward the end of her Ph.D., she took up a lecturing post at the University of New England where she stayed for 4 years before working as a consultant archaeologist particularly to the Forestry Commission of New South Wales. In 1983, Sandra Bowdler was appointed as foundation chair in archaeology at the University of Western Australia. This appointment so early in her professional life is a testament to the contribution that she had made to the discipline so early in her career. Professor Bowdler continued in that position until her retirement in 2008.

Major Accomplishments

In the course of her archaeological career, Sandra Bowdler's research has spanned a diversity of themes, theoretical concerns, and geographic areas, although her interest has been primarily in the Australasia and Southeast Asia regions. Sandra's early research on coastal midden sites in New South Wales was particularly concerned with the way in which Aboriginal people had organized themselves. In writing up her first professional excavations of these middens, Sandra attempted a new type of midden study that was both testable, in line with the then "New Archaeology," and the same time was "about people." Social groups, especially women, had been invisible in Australian archaeological writings and Bowdler (1976) remains one of the few pieces of research in Australia that has exploited the potential of using gender as an analytical category. Her interest in the way in which gender is constructed in the past has continued throughout her career. Sandra's early research on coastal middens expanded to include an interest in all aspects of coastal archaeology but particularly the unique conditions imposed for colonization (e.g., Bowdler 1977, 2010), Tasmania (e.g., Bowdler 1984a), and the use of small offshore islands (e.g., Bowdler 1995).

Sandra brought a new level of professionalism to consulting archaeology in Australia during her brief period as a consultant in the 1980s. Consultancy in Australia has expanded exponentially, and Sandra's challenging contributions on significance assessment (e.g., Bowdler 1984b) and the imperative to make consultancies relevant to timely research questions remain as important today as they were at the time of publication.

Working as a consultant meant that Sandra also had to confront the many of grievances of Indigenous peoples in the heritage process and in archaeological practice generally. Questioning the objectivity of concepts of "significance" and whether or not scientific objectivity was possible in a heritage framework were big issues for archaeologists at the time. Sandra advocated the primacy of Indigenous interests in archaeology. When the

rights of Indigenous people to repaint their sites was questioned by some academics and rock art practitioners following the 1987 Ngaringin Cultural Continuity Project, Sandra took a strong ethical stand arguing that Indigenous rights should take precedence over non-Indigenous national heritage agendas and urging those critical of the repainting project to "ask themselves what is more important, the preservation of a few relics of the recent past, or the active continuation of that living culture?" (Bowdler 1988: 523).

In the 1990s, Sandra became increasingly interested in the Southeast Asian region, in the colonization of Sunda and Sahul by modern humans, and in comparisons between the material cultures of the two regions. This led to comparative studies of Pleistocene stone industries from Australia and Southeast Asia and her interest in the Hoabinhian culture complex (e.g., Bowdler 2006).

Despite her retirement, Sandra continues her interest in archaeology and, since 2015, she has been the chief editor of *Australian Archaeology,* the journal of the Australian Archaeological Association. Her other main interest is music, especially baroque music, and she contributes reviews to a variety of opera magazines and online forums.

Cross-References

- ▶ Balme, Jane
- ▶ First Australians: Origins
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Hunter-gatherers, Archaeology of
- ▶ Indigenous Archaeologies: Australian Perspective

References

Bowdler, S. 1976. Hook, line and dilly bag: An interpretation of an Australian coastal shell midden. *Mankind* 10: 248–258.

Bowdler, S. 1977. Coastal colonisation of Australia. In *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia and Australia*, ed. J. Allen, J. Golson, and R. Jones, 205–246. London: Academic Press.

Bowdler, S. 1984a. *Hunter Hill, Hunter Island*, Terra Australis 8. Canberra: Dept. Prehistory, Research School Pacific Studies, the Australian National University.

Bowdler, S. 1984b. Archaeological significance as a mutable quality. In *Site surveys and significance assessment in Australian archaeology*, ed. S. Sullivan and S. Bowdler, 1–9. Canberra: Dept. Prehistory Research School Pacific Studies, the Australian National University.

Bowdler, S. 1988. Repainting Australian rock art. *Antiquity* 62: 517–523.

Bowdler, S. 1995. Offshore island and maritime explorations in Australian prehistory. *Antiquity* 69: 945–958.

Bowdler, S.E. 2006. The Hoabinhian: Early evidence for SE Asian trade networks? In *Uncovering Southeast Asia's past: Selected papers from the 10th international conference of the European Association of Southeast Asian Archaeologists*, ed. E.A. Bacus, I.C. Glover, and V.C. Pigott, 355–359. Singapore: National University of Singapore Press.

Bowdler, S.E. 2010. The empty coast: Conditions for human occupation in southeast Australia during the late Pleistocene. In *Altered ecologies: Fire, climate and human influence on terrestrial landscapes*, Terra Australia 32, ed. S. Haberle, J. Stevenson, and M. Prebble, 177–185. Canberra: ANU E Press, http://epress.anu.edu.au?p=18701, http://epress.anu.edu.au.

Further Reading

Balme, J., and S. O'Connor, eds. 2008. More unconsidered trifles: Papers to celbrate the career of Sandra Bowdler. *Australian Archaeology*: 67.

Bradshaw (Gwion) Figures: Initial Observations Drysdale River, Kimberley 1986/88

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State of Knowledge and Current Debates

The Region

The Drysdale River is one of the largest rivers in the Kimberley region of north-west Australia. It rises near Mt Hann and flows north some 400 kilometers to Napier Broome Bay in the Timor Sea (McGregor and Chester 1992) (Fig. 1). It was first

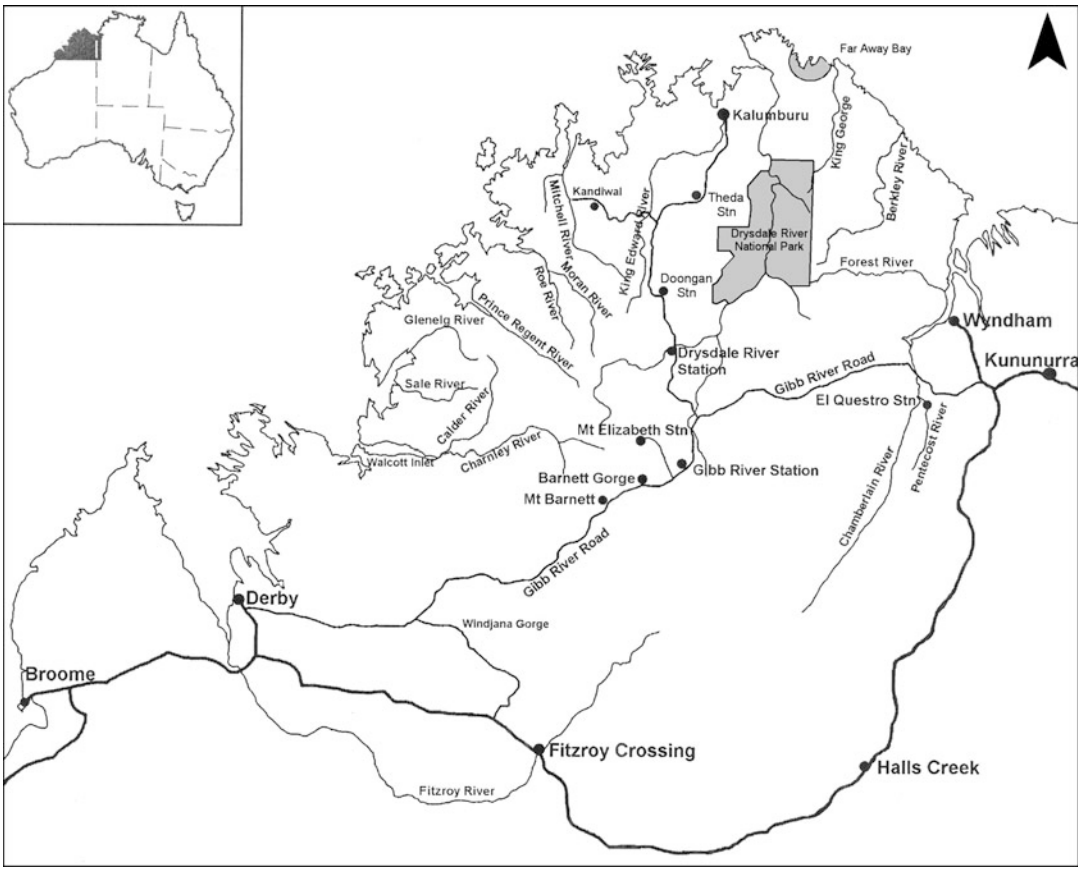

Bradshaw (Gwion) Figures: Initial Observations Drysdale River, Kimberley 1986/88, Fig. 1 North East Kimberley region showing Drysdale River, Drysdale River National Park. (Rainsbury 2009)

made known to Europeans in 1886 by Charles Burrows who came upon the river while seeking pastoral lands for the Victorian Squatting Company (Schmiechen 1992; Rainsbury 2009). The river valley covers 16 000 square kilometers – with a permanent population of around ten people – mainly cattle station owners, managers and employees. The country the river flows through is isolated, diverse, and for large sections extremely rugged, impassable to vehicles, and difficult on horseback. Like the other major Kimberley rivers, it is subject to massive fluctuations in water flow driven by the annual wet season monsoons. During the "wet" from November to April, up to 1400 millimeters of rain falls in the catchment (Kabay and Burbidge 1977), turning a placid string of waterholes into a raging torrent, in places 2 kilometers wide. In the winter months of the "dry," the river virtually disappears into huge sandy beds and boulder-choked gorges. Only a series of waterholes and deep *Pandanus*-fringed reaches remain.

The terrain cut by the river varies immensely. Near its headwaters the river meanders across a broad, gently undulating plateau. White barked gums and spiky *Pandanus* line the river, and the surrounding plains are covered with savannah woodlands. In the lower reaches, the country changes dramatically. The landscape is deeply eroded into tortuous gullies and strangely shaped rock outcrops. Stately gums give way to stunted eucalypts, acacias, and paperbarks, and the air is thick with the cloying scent of *Spinifex*. The river twists its way through ever steepening, boulder-strewn gorges. Ochre-colored terraced cliffs dominate the skyline. This is a particularly rich and

diverse environment with much wildlife and plant foods. As such it provided a sheltered and food-rich territory for an extended period of occupation by the early Aboriginal inhabitants.

The nearest major population center is the Aboriginal community at Kalumburu, located on the King Edward River west of the Drysdale River mouth. Originally founded as a catholic mission by Benedictine monks from Spain, it became a gathering point for the various tribal groups who traditionally occupied the surrounding lands (Perez 1977).

The Operation Raleigh Expedition

In May 1986 an international expedition under the auspices of Operation Raleigh and led by Clive Richardson completed the first successful descent of a major section of the Drysdale River. From its starting point at Drysdale River Station, the expedition travelled some 320 kilometers to Napier Broome Bay (Richardson 1986) (Fig. 2). At the time of the expedition, no Europeans were known to have travelled the length of this major river. I was fortunate to accompany the expedition as scientific leader with one of my main responsibilities to record Aboriginal cultural heritage discovered along the way, especially rock art. The expectation was that examples of the well-known Wandjina figures would be found. These dramatic paintings of ancestral Dreaming beings had been of great interest to missionaries Ernest Worms (1955) and James Love (1917, 1936) and later to anthropologists Adolphus Elkin (1930), Charles Mountford (1937), and members of the German Frobenius.

German Frobenius Expeditions (1938–1939). In the 1960s Ian Crawford, Curator of Anthropology and Archaeology at the Western Australian Museum, was taken to some of the great Wandjina sites by Traditional Owners. He published his findings in a 1968 book, *The Art of the Wandjina*. I had studied his book meticulously and expected to find many examples of Wandjina art on our river descent.

The river journey proved extremely challenging for many of the young international expeditioners, with rapidly falling water levels necessitating long days of hard paddling to avoid possible lengthy portages. For much of the middle part of our decent, we passed through the Drysdale River National Park. This park was gazetted as a Class B reserve in 1973 and upgraded to a Class A reserve in 1974 (Kabay and Burbidge 1977). It is one of the most remote and least-accessible parks in the Kimberley, with limited vehicle access. The Drysdale River traverses the length of the park for some 80 kilometers. Many key locations in the park were named by Kabay and Burbidge during a 2-week biological survey carried out in 1975.

It was while navigating the twisting gorge below Solea Falls that an abundance of Aboriginal rock art was discovered on nearby rock walls and overhangs (Schmiechen 1986). This was not the expected Wandjina art but consisted almost entirely of the pre-Wandjina styles then collectively referred to as Bradshaw art. Among the figures found were many examples of what were referred to by Crawford (1977) as "Classic Bradshaws" – generally monochrome red, elegant, naturalistic human figures, heavily adorned with ceremonial accoutrements and carrying boomerangs. As consecutive Drysdale galleries were found, I recognized five distinct types of Bradshaws. In 1988 I returned to the Drysdale River with a small team and began a systematic exploration and recording program of what has turned out to be one of the most concentrated bodies of Bradshaw art in the northern Kimberley (Schmiechen 1993; Veth et al. 2018). Later that year at the first Australian Rock Art Research Association (AURA) Congress in Darwin, I presented a paper that provided a historical background to rock art research on the Drysdale, with an account of my 1986 and 1988 fieldwork, and a preliminary stylistic analysis of the art. To help fill out the history of rock art research on the Drysdale River, an edited version of that paper is presented here for the first time.

Background to Kimberley Rock Art Research

In the late 1830s, George Grey undertook several exploratory expeditions in the Kimberley and

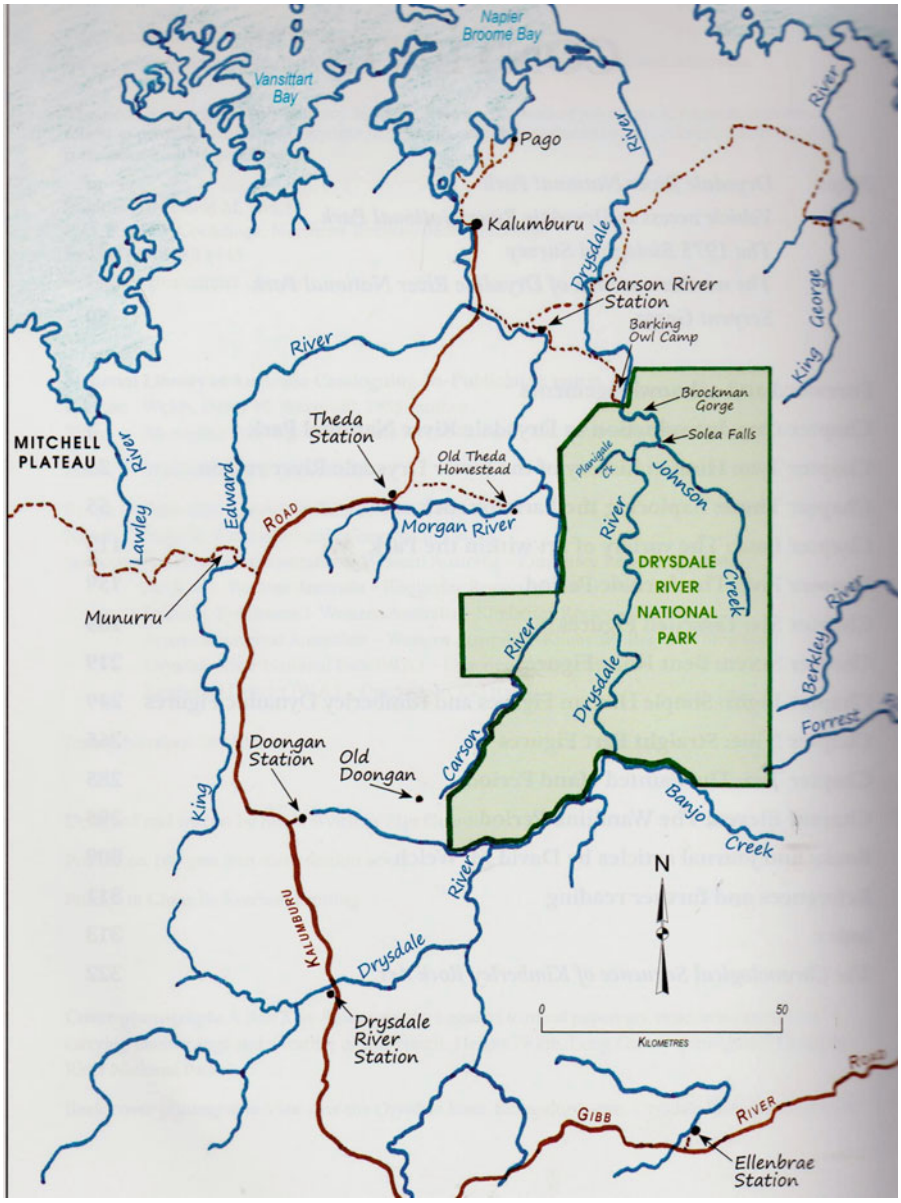

Bradshaw (Gwion) Figures: Initial Observations Drysdale River, Kimberley 1986/88, Fig. 2 Drysdale River National Park. (Welch 2016)

recorded some of the first impressions of Aboriginal rock art along the Glenelg River. The paintings he found were some of the now famous Wandjina figures (Grey 1841). Some 50 years later, while surveying the pastoral potential of land near the Prince Regent River, Joseph Bradshaw recorded the first European observation of a very different style of Kimberley rock art. Bradshaw (1892) described his find in the following way:

We saw numerous caves and recesses in the rocks the walls of which were adorned with native paintings, coloured in red, black, brown, yellow, white and pale blue. Some of the human figures were life size, the bodies and limbs were attenuated, and represented as having numerous tassel shaped adornments appended to the hair, neck, waist, arms and legs, but the most remarkable fact in connection with these drawings is that wherever a profile face is shown the features are of a most pronounced aquiline type, quite different from

> those of any natives we encountered. lndeed, looking at some of the groups one might almost think him viewing the painted walls of an ancient Egyptian temple. These sketches seem to be of great age, but over the surface of some of them were drawn in fresher colours, smaller and more recent scenes, and rude forms of animals, such as the Kangaroo, Wallaby, Porcupine, Crocodile, etc.

Little additional information about these mysterious figures was forthcoming for many decades.

The establishment in 1908 of the Drysdale River Mission at Pago, not far from the Drysdale River mouth, provided the first permanent European settlement in the region and a base from which later explorers and researchers could examine the surrounding country (Perez 1977; McGregor and Chester 1999; Walsh 2000). During his extensive survey of the Kimberley in 1901, Frederick Brockman followed much of the lower Drysdale, and the naturalist on the expedition, F.M. House, photographed several Wandjina sites they found on their travels. Most of his comments related to the now well-known Wandjina figures. In 1910, entomologist Gerald Hill sketched a number of rock paintings around Napier Broome Bay near the Pago Mission (Walsh 2000; Donaldson 2012; Rainsbury 2017). Among them were a number of small red anthropomorphic figures in a variety of action poses. C.P. Mountford, in a paper published by the Royal Society of South Australia in 1937, offered an interpretation of these figures and compared them with Bradshaw's sketches. Mountford had seen a significant array of Aboriginal art across Australia and made the comment that one of the Napier Broome Bay figures represented "one of the finest examples of Aboriginal art in which action is portrayed."

C. Price Conigrave was in the Kimberley in 1911 on a private expedition, primarily to make a botanical collection. He visited the lower Drysdale and tried to follow it south but was blocked by the river gorge near Solea Falls (Conigrave 1938; Rainsbury 2016). He reported the discovery of ground images – human and animal silhouettes made on the flat ground surface by clearing the internal parts of the image. He also reported a series of rock art sites but provided no details about them.

In 1927–1928 anthropologist A.P. Elkin conducted fieldwork near Walcott Inlet on the west Kimberley coast, studying the Wandjina rock art of the region. On seeing some strange profile figures, he commented that they were not typically Aboriginal and were similar to the paintings described by Bradshaw. Unfortunately, he never elaborated on his observations in any subsequent publication.

In 1938 the German Frobenius-Expedition undertook a major scientific survey of the then little-known body of Kimberley rock art and its associated culture. Their main focus was the visually dominant Wandjina art, although they did acknowledge a stylistically distinctive and different art body. Agnes Schulz, one of the expedition's artists, published an account of their findings in 1956. She described a number of faded human figures which she named "Bradshaw paintings," due to their apparent similarity to Joseph Bradshaw's original finds. From then on the connotation "Bradshaw paintings" loosely encompassed a wide range of styles of mainly small red figures that predated Wandjina art. The Frobenius Expedition learnt that local Aborigines considered these "Bradshaw" figures as being of great antiquity and well outside the current mythological context. The Aborigines claimed no cultural relationship to these paintings and generally disregarded their existence. Other recorders observed similar responses denying any association with the Bradshaw art (Worms 1955; Crawford 1968; Walsh 1994, 2000).

Pallottine missionary Father Ernest Worms was another early recorder of anthropological data in the Kimberley. In 1953–1954 he made several expeditions from Broome into the central and far northern portions of the region, specifically to search for these small red figures (Worms 1955). He discovered numerous examples and claimed to have found some portraying action more realistically than the one Mountford had described so enthusiastically. Worms described their characteristic chocolate-brownish shade and the extreme finesse of their execution, especially when compared to the much more crudely

executed Wandjina art. Worms also observed that the pigment of the small red figures seemed to have fused so completely with the underlying sandstone that they resisted all attempts to scrub it off. He noted that his Aboriginal companions and guides did not show the slightest interest in this type of art which they stated were the products of another people, long before their time. They told him that both the paintings and the painters were called "Giro Giro." Worms commented on the similarity of his finds with those of Hill, and based on their faded and deteriorated appearance and on the comments of his guides, he was convinced of their great age.

Dr Andreas Lommel, a German anthropologist and member of the 1938 Frobenius Expedition, was intrigued by these paintings and in 1954–1955 returned to the Kimberley to follow up on his earlier work (Lommel and Lommel 1959). He made numerous discoveries of the then designated "Bradshaw style" figures, often in conjunction with Wandjina sites. In his subsequent publication, *Die Kunst des fünften Erdteils*, he called these figures "the elegant style," a most apt description for the more exquisite Classic Bradshaw figures.

In the mid-1900s a number of pastoral leases were established on the western side of the Drysdale, but little exploration activity was carried out along the river's course due to the inaccessibility of the terrain. In the 1960s and 1970s, further attempts at evaluating Bradshaw art were made by Ian Crawford, Curator of Anthropology and Archaeology Western Australian Museum (Crawford 1968, 1977), and also by Melbourne-based professional photographer Dacre Stubbs (1974, 1981). Both postulated a number of ideas on the evolution and possible origin of the art. Crawford drew on his own work and the findings of previous observers, particularly Lommel and Lommel (1959), to define the main features of the "Bradshaw style." His definition (Crawford, 1977) encompassed the following characteristics:

1. Human figures with distinctive body features – muscles, shoulders, and stomachs accentuated, sometimes facial profiles clearly and carefully depicted with curvaceous delineation.
2. Small – usually around 30 cm but up to 130 cm.
3. Predominantly red in color – some evidence that they may have included other colors.
4. Implements shown mainly boomerangs and barbed spears.
5. Nearly always shown in vertical aspects (standing, dancing, running).
6. Usually in group arrangements in action sequences. Some individuals may be single relics.
7. Exhibit use of a very fine painting technique use of fine brushes.
8. Widely distributed – often in poor state of preservation and found in all manner of sites from large galleries to isolated boulders.
9. The classic form of these figures is quite distinct from other figures, with some similarities. Possibly some of these are contemporaneous.

Crawford suggested that the barbed spears associated with these figures were a possible indication of age. In the art this type of spearhead was superseded by depictions of what appeared to be leaf-shaped stone spearheads. Spearheads of this type first appear in Kimberley archaeological deposits some 3000 years ago (Crawford 1968).

Dacre Stubbs, author of *Prehistoric Art of Australia* (1974), had a long fascination with Bradshaw art and spent considerable time and effort on many field trips to collect information, culminating in an unpublished manuscript, *Kimberley Mystery Paintings*, written in 1980. In many of his findings he concurs with the observations of Crawford. Additional features noted by Stubbs included the lack of a clear indication of gender typical of much other Aboriginal art (Worms also noted this) and the depiction of elaborate decoration and ornamentation, including many types of headdress, skirts, bags, armlets, wristlets, anklets, scarf-like arrangements, and implements like batons, fans, and fronds. Stubbs further noted that Classic Bradshaw figures were mostly filled-in silhouettes with very few outline figures and that a nonaggressive mode prevailed among the representations. He believed most figures were shown in dancing and ceremonial poses, often with a characteristic bent knee action.

The Kimberley Foundation Australia (KFA) was formed in 2002 as a philanthropic

organization to encourage scientific research of Kimberley Aboriginal rock art, in conjunction with the Traditional Owners, as a means to preserve and promote its national and international significance. In recent years KFA has been instrumental in obtaining funding for a number of major research projects, including two Australian Research Council (ARC) linkage grants for projects that are at the forefront of current academic research, utilizing much of the data from the extensive surveys undertaken in the Drysdale and King George River regions since 1988.

Bradshaw Art: Changing Nomenclature

As mentioned earlier, the name "Bradshaw art" or "Bradshaw figures" was first used by Agnes Schulz of the Frobenius Expedition, in reference to explorer and pastoralist Joseph Bradshaw who had first described these figures and in the apparent absence of a clear Aboriginal name (Schulz 1956). However, the various Aboriginal groups in the north Kimberley do have their own names for these paintings including Gwion Gwion, Kiera-Kirow, Kirakiarn, and Giro Giro (Walsh 1988, 2000; Welch 1990, 1993a, 2015, 2016; Rainsbury 2010). The Ngarinyin term Gwion Gwion was the title of a book published in 2000 (Doring 2000) and is now the generally accepted name among academic researchers, though usually abbreviated to just "Gwion."

Not only has the original European term "Bradshaw" been largely replaced with "Gwion Gwion" or "Gwion," but in a 2012 publication, Donaldson applied local Wunambal names to the various styles of Bradshaw art identified by myself (1993), Walsh (1994, 2000), and Welch (1993a, b, 2015, 2016). Travers and Ross (2016) have followed this convention, recognizing the Wunambal Gaambera descriptors as published by Donaldson.

Crawford (1977) first used the term Classic Bradshaw to describe the ornamented, naturalistic human figures, curvaceously delineated and depicting clear body features, such as muscle and shoulders, stomachs, and sometimes facial profiles. On the 1986 Raleigh Expedition, I had identified two clear variants, distinguished mainly by their stance and material adornments. I initially designated them as types A and B and described them as such at the 1988 AURA conference. These were later referred to by Welch (1993a, b) as Tassel and Bent Knee Figures and by Walsh (1994, 2000) as Tasselled and Sash Bradshaws (Walsh 1994, 2000). In the course of my subsequent work and in this paper, I refer to them collectively as Classic Bradshaws and individually as Tassel and Bent Knee Bradshaws (Schmiechen 1993) (Fig. 3).

Lee Scott-Virtue and Dean Goodgame, long time Kimberley rock art researchers, take a completely different approach to the term Classic Bradshaw. They present a chronological sequence in which they identify four major stylistic periods in what they continue to refer to as "Bradshaw art." They also suggest a distribution pattern for the figures in each period. The earliest of their styles, Classic Bradshaws, they divide into Classic Realistic and Classic Abstract. The remaining periods are described as Complex Bradshaw, Stylised Bradshaw, and Simple Bradshaw (Scott-Virtue and Goodgame 2017).

At the time I wrote my 1988 paper, the term "Bradshaw" was not an issue with the local Traditional Owners and was still in general use among rock art researchers. Acceptance of the Ngarinyin name Gwion Gwion had not occurred. While acknowledging the appropriateness of adopting the terminology Aboriginal people use for their cultural heritage, as this paper largely reproduces my 1988 report, I have retained the term "Bradshaw." A lightly edited version of the section of my 1988 paper that describes the styles of rock paintings discovered on the Drysdale River is reproduced below.

Bradshaw Figures: Stylistic Variations and Similarities – Some Initial Conclusions Drawn from Two Expeditions to the Drysdale River Area in 1986 and 1988

The rock art discovered on the Drysdale River in 1986 and 1988 encompassed the whole spectrum

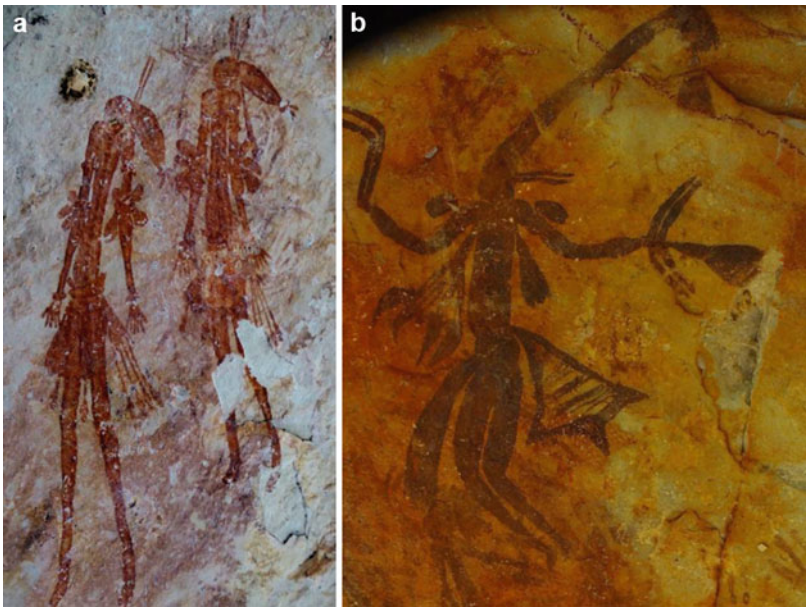

Bradshaw (Gwion) Figures: Initial Observations Drysdale River, Kimberley 1986/88, Fig. 3 (**a**, **b**) Classic Bradshaws. Type A Tassel Bradshaws and Type B Bent Knee Bradshaw, Drysdale River

of styles that had been ascribed within the Bradshaw classification. Initial analyses of these figures show a number of clearly identifiable styles with specific characteristics. Much of the art seen was in fair to good condition, with some examples seemingly as clear as the day they were painted. The bonding with the sandstone of the pigments used in the various styles of Bradshaw art has rendered them impervious to all but actual ablation of the rock. As described in 1988, these identified styles are outlined below.

Classic Bradshaws

By far the most visually striking were the many well-preserved examples of the so-called Classic Bradshaw style. These finely painted figures were notable for their sense of flowing movement and grace. In many cases they seem to float across the walls of the shelters, an impression accentuated by bent knees and downward pointing feet. Alasdair McGregor, a noted professional artist who accompanied the 1988 expedition, commented particularly on the fine brush work and marvelled at the exquisite detail of their execution (McGregor personal comment in the field, 1988). In almost every case, these figures are shown in profile and always appear as filled-in silhouettes, mainly in monochrome and ranging in color from a dark brown-black, like dried blood, to varying shades of mulberry hue, terracotta, and a bright-red-brick color which gives the appearance of very recent application. A relatively recent application is unlikely as there is little if any discernible pigmentation left, and only a shadowlike image remains on the rock face. Another distinguishing feature of the Classic Bradshaws is the extensive and varied ornamentation, apparel, headdresses, and hairstyles. Ornaments and accessories include shoulder tufts like epaulettes, flowing tasselled underarm ornaments, elbow tassels, wristlets, anklets, dilly bags including a distinctive kite like version, palm fronds, fanlike objects (possibly bird wings), batons, and multiple boomerangs. Spears appear only rarely with these figures and in the examples found they are all single-barbed.

Head ornamentation is varied and highly elaborate. Most common are different forms of cones. These included short upright cones (later dubbed "dunce caps" by Walsh 1994), commonly topped with a frond or a tassel. Some figures wore long sweeping cones, often of body length, topped with tufts or tassels. Some of them have feathers protruding backward from their base. One figure was

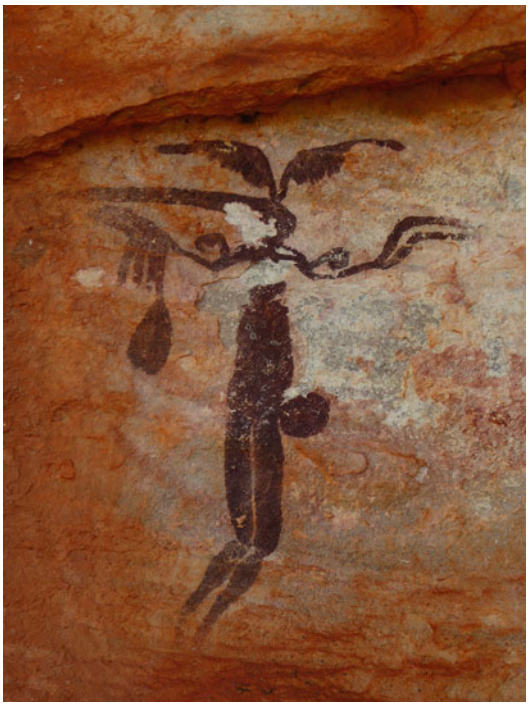

Bradshaw (Gwion) Figures: Initial Observations Drysdale River, Kimberley 1986/88, Fig 4 Bent Knee Bradshaw Winged Figure, Drysdale River

Bradshaw (Gwion) Figures: Initial Observations Drysdale River, Kimberley 1986/88, Fig 5 Classic Tassel Bradshaws – "ceremonial couple," Drysdale River

recorded with very clear and finely painted wings extending from the front of the headdress (Fig. 4). This was unusual and had not been noted in previous accounts. We designated this as the "Winged Figure." Only a small number of such figures has been recorded in subsequent surveys. Oval-shaped hairdos or head garments, commonly adorned with feathers, also occurred. Predominant was a long tied-back hair-bun, ending in a knot with feathers attached.

As great as the variety of headdresses was, so it was with apparel worn. This included a lap-lap type sash streaming out from the waist at the front and rear. Another common feature was a very distinct three-strand waist belt where each strand ended in a distinctive pom-pom with two or three tassels from its end. This was widespread among figures from this area and also among examples from other regions a considerable distance away. Other garments included fringed skirts, strand-like grass skirts, and full-length skirts. These were generally pinched in to accentuate the waist. Some figures wore boa-like objects, shown as a series of dotted lines. Very fine detail of physical features is shown in these figures, especially in the more elaborate examples. Leg and arm muscles are clearly defined, shoulders are high and accentuated, and bodies are shown as tall and slender with nipped in waists and commonly with a distinctive stomach bulge. In every aspect these features match Lommel's description of "elegant art" (Lommel and Lommel 1959).

Sexual features were not readily apparent and genitalia were never visible. It has been suggested that these figures represent only males in ceremonial attire. This viewpoint may have originated from the idea that in traditional society most ceremonial activity was a male domain. This assumes that the people who created the Bradshaw figures subscribed to similar traditions, but there is no evidence this was the case. Indeed, within some groups of figures, there are differences that could be taken to indicate both male and female figures.

An example here is (Fig. 5) a pair of exquisitely ornamented figures, both with similar

tied-back hairstyles adorned with feathers and wearing scarf-like arrangements. One figure is larger than the other and there are some notable differences in apparel. The larger figure has the three-strand waist appendage with the characteristic pronged tassels extending from one end. The smaller figure has a skirt pinched in at the waist and reaching to mid-thigh. The size differential and the difference in dress raise the possibility that the figures represent a man and a woman in ceremonial attire.

The three-pronged waist appendage with its distinct end tassels may well have been a feature of male dress, while the flowing skirts and dress-like garments may have been worn by women. In nearly all cases, the figures shown with weapons such as spears and boomerangs wear the tassel belt or sash style garment. These are only initial conclusions, and more careful analyses should help to establish or refute these patterns. At this time we can only speculate on the meaning of what is depicted, and it would be a mistake to assert that the figures shown represent only males.

Many of the characteristics discussed so far agree in essence with observations and conclusions made by Worms, Lommel, Crawford, and Stubbs. There are, however, additional features among the Drysdale figures which add to and alter some of the previous perceptions. The size range ascribed to Bradshaw figures has generally been that of miniatures from 30 to 130 centimeters (Crawford 1977). Bradshaw described his finds as being life size, yet this seems to be uncommon with most examples recorded being more in the miniature category. Common size on the Drysdale was 8 to 80 centimeters. A number of life-size figures were found on the Drysdale, the largest being 165 centimeters (similar large figures have been recorded from other locations in recent years).

The Bradshaw figures have generally been regarded as being shown mostly in group scenes, with few individual depictions. Crawford thought that isolated figures could have been relics from once larger scenes. Group compositions were common on the Drysdale, often frieze-like or in elaborate tableaus, but a number of examples of paired figures or lone figures were also found. These were often interspersed with other motifs. In some cases the isolated, lone examples seem to have been very deliberately placed, sometimes in secluded but prominent positions such as on a large boulder in a gully or, such as in the case of the superb Winged Headdress figure (Figure 4), in a shelter part way up the escarpment with extensive vistas over the river and surroundings.

Earlier recorders also noted that nearly all compositions contained only figures of people and there seemed little if any association with animal motifs. On the Drysdale a number of examples were found where finely painted animals, usually kangaroos, were included in the scenes with Classic Bradshaw figures. In one gallery a panel of Classic Tassel Bradshaws was found associated with macropod tracks, kangaroos, and a stingray (Fig. 6).

One of the most distinct examples of animals associated with Classic Bradshaw figures was found under a small overhang high on a sandstone bluff overlooking the river. This composition consists of two ornamented Bent Knee Figures and

Bradshaw (Gwion) Figures: Initial Observations Drysdale River, Kimberley 1986/88, Fig 6 Classic Tassel Bradshaws – macropods and stingray, Drysdale River

Bradshaw (Gwion) Figures: Initial Observations Drysdale River, Kimberley 1986/88, Fig. 7 Classic Bent Knee Bradshaw figures with rock possums, Drysdale River

three animals. Two of the animals are drawn equal in size to the figures and have been tentatively identified as rock possums (Fig. 7). The whole effect is reminiscent of a coat of arms. No other figures or symbols are present, and the total composition is of the same color and patination.

Little evidence of over-painting was found in the sites recorded, and most sites contained figures and motifs in a wide variety of styles. The Classic Bradshaw figures are distinct and easily recognizable and certainly represented a pinnacle in form, composition, and execution that ranks with any rock art to be found in Australia.

Simplified Bradshaws

Along with the Classic Bradshaw figures were examples of other figures, similar in many ways but with clear differences. Examples included lines of finely drawn figures in frontal perspective and holding hands, to very simple stick figures in chain-like arrangements. Most notable among these figures was a greater rigidity of perspective, a more stylized appearance, and a lack of fine detail. In addition, physical features such as musculature were less clearly delineated, and ornamentation was not as elaborate as with the Classic Bradshaws. Headdresses of varying designs, tassel waist-belts and sashes were still present but not as detailed as those of the Classic Bradshaws. Implements depicted included single-barbed spears, boomerangs, a stick-like baton, and dilly bags resembling a round object. The size range was from 10 to 30 centimeters.

In most cases the figures are in upright poses. However, in a number of examples, the figures are shown squatting, kneeling, and in one case sitting astride a log-like object which gives the impression of a watercraft. A single example was found sitting front-on in the lotus position, with face and hands turned to one side. Only one example was found which gave any indication of facial features in profile. This came closest to Joseph Bradshaw's original description of the figures he found having aquiline facial features.

Bichrome Figures with "Hooked Sticks"

Another distinct style evident was a series of bichrome figures. Many showed fine artistic execution similar to the Classic Bradshaw figures, but they generally lacked an equivalent degree of ornamentation and naturalistic physical detail. These figures tended to be more rigid and did not have the flowing appearance of the Classic Bradshaws. They showed evidence of originally having several colors, with the outline in dark red pigment and a white and yellow infill (Fig. 8).

Bradshaw (Gwion) Figures: Initial Observations Drysdale River, Kimberley 1986/88, Fig. 8 Bichrome figures from bichrome rock, Drysdale River

A common feature was gaps in the headdress and/or the hands and feet missing, probably where another color was used that has not bonded to the rock surface. In nearly all cases, they were associated with multi-barbed spears and a hooked stick that probably represents a spear-thrower.

Later surveys showed that many of these figures had more than one color, and Welch (1993a, b, 2015) later changed his original Bichrome descriptor to Straight Part Figures; Walsh (1994) termed them Clothes Peg Figures. Veth et al. (2018) describe them as Static Polychrome Figures.

Figures in Action Scenes

Numerous examples of finely painted red figures in action scenes were also found. These showed a wide variation in style and execution. They tended to be miniatures, ranging in size from 10 to 30 centimeters. All were drawn in shades of red ochre, varying from dark to bright red. Their most recognizable characteristic was the portrayal of dynamic action sequences, including groups running, jumping, and in scenes hunting kangaroos. They have no ornamentation other than a conical or wedge-shaped headdress. Weapons depicted were boomerangs and hand-thrown single-barb spears. Physical features are generally not shown in any detail although some exceptions occur. Nearly all such figures are silhouettes. As with the Classic Bradshaw figures, they appear to have bonded with the fine-grained sandstone and are like shadow images, with no trace of surface pigment.

In many ways these paintings were similar to the San art of southern Africa, although there is no evidence to suggest any links. In their fluid and delicately worked action scenes, these figures come closest, perhaps, to the Dynamic Figures of Arnhem Land. Both have clear representations of action, expressed with great power and feeling though the Arnhem Land examples tend to show a greater impression of movement.

One of the most impressive scenes discovered is a tableau hunting scene (Fig. 9). This shows a figure with a cone-shaped headdress running with arms outstretched and herding a group of finely detailed kangaroos toward another figure on the other side. The kangaroos are depicted closely bunched and jumping into each other in their attempts to escape. The composition is bright red, as though it was done only yesterday, yet there is no discernible pigment left on the rock surface, only an "imprint." This panel was at Nurini, one of the few sites where I was able to record the local traditional name.

Many of these paintings are similar to some of the Arnhem Land figures described by Mountford (1937). In his 1988 work, *Australia's Greatest Rock Art*, Walsh claims that the local Aborigines called

Bradshaw (Gwion) Figures: Initial Observations Drysdale River, Kimberley 1986/88,
Fig. 9 Kangaroo hunting scene panel from Nurini art site, Drysdale River

these figures "Kiera-Kirow," a variation of the term "Giro Giro" used by Worms to describe all pre-Wandjina art, including the style of red figures described here. These figures certainly are clearly distinguishable from the Classic Bradshaw figures and represent another stylistic variation. They do however have similarities with the Classic Bradshaw figures with regard to color, size, naturalistic presentation, and being impregnated into the rock like shadow images. They occur in the same areas and often the same shelter as Classic Bradshaws, giving rise to the possibility that they may be contemporaneous. Figures of this type were called Elegant Action Figures by Walsh (1994).

Other Motifs

Apart from the different styles among the anthropomorphic figures generally classed as Bradshaw, there is a large array of other motifs. Among them are mammals (including what appears to be a dugong and a whale's tail), fish, snakes, plants, some grotesque spirit creatures, handprints and stencils, and various apparently abstract designs and patterns.

Wandjina Figures

The recent Aboriginal art tradition of the Kimberley has been dominated by the Wandjina style. These dramatic paintings are characterized by white staring faces with prominent dark eyes and lashes, and most are surrounded by large haloes, often with radiating spikes emanating from them. Noses are depicted, but no mouths are shown. Wandjinas are the ancestral spirit beings and form an important part of the ongoing cultural and art tradition of the Kimberley.

Only three of the many sites recorded along the Drysdale contained Wandjina depictions. None of these paintings showed any sign of repainting, commonly recorded on other Wandjina sites, and none had the whitewashed background commonly associated with such figures. Among an extensive array of figures and motifs in one large shelter named as Yuruluru by Robert Unhango were two Wandjinas lying on their side and joined at the waist, and another depicted from the waist up (Fig. 10). All three had heavy red ochre haloes with radiating spikes. The eyes on these Wandjinas were accentuated with fine red lashes, and, typically, no mouths were shown. There was little to suggest any repainting in recent years, and the visual state and condition suggested considerable age. Unlike the Bradshaws and other finely painted motifs in the same shelter, the Wandjina paintings were deteriorating, and their pigments did not exhibit any obvious bonding with the rock surface. It was interesting that this site contained side by side virtually all the styles discussed here,

Bradshaw (Gwion) Figures: Initial Observations Drysdale River, Kimberley 1986/88, Fig. 10 Twin Wandjinas at Yuruluru, Drysdale River

including Classic Bradshaw figures, the superb miniature red figures in the kangaroo hunting scene already described (Figure 9), and a line of more rigid frontal perspective figures holding hands.

Research Since 1988

In the same year that I presented my paper at the AURA conference in Darwin in 1988, Darrell Lewis published a new analysis of the west Arnhem Land rock art sequence, focusing particularly on depicted material culture items. By comparing his analysis with the available information on Kimberley art, he found many striking similarities and parallel changes between certain styles of Bradshaw figures and particular styles of human figures in west Arnhem Land. He suggested that Bradshaw art could be divided into two consecutive periods, the first being dominated by Classic Bradshaws and the second involving different styles of Bradshaw figures, many of which were bichromes and carrying a "new" artifact, a hooked stick which probably represented a prototype spear-thrower. Lewis argued that these were the equivalents of the Arnhem Land Dynamic figures and the subsequent "Hooked Stick" figures. He suggested that when these styles were being produced, the two regions were culturally and temporally linked. Based on evidence from Arnhem Land, Lewis suggested that the Classic Bradshaws were of terminal Pleistocene-early Holocene age.

My 1988 paper sparked the interest of two noted avocational researchers, Grahame Walsh and David Welch. In the following years, Walsh and Welch independently undertook extensive recording and analysis of the Bradshaw art body, producing numerous papers and books. Both eventually proposed a more complex Kimberley rock art chronology than the preceding simple "Wandjina-Bradshaw" division (Welch 1990, 1993a, 2015, 2016; Walsh 1994, 2000).

Following extensive fieldwork recording over 700 sites, Welch proposed a three-phase chronological sequence which was expanded to six distinct periods. With no actual dating of the art, he based his chronology on pigment, weathering, content, spatial arrangement, and superimposition (Welch 1990). He presented this chronology at the 1992 AURA Congress in Cairns and refined it in his subsequent publications (Welch 1990, 1993a, 2015, 2016).

A chronology developed by Walsh (1994) was a highly elaborate sequence of styles, groups, and

subgroups of Bradshaw figures, and he suggested that most were considerably older than 20,000 years. He also saw three distinct stylistic phases and divided each of these into a number of subgroups (Walsh 1994, 2000). Lewis (1997) challenged Walsh's chronology as unnecessarily complex and showed that his dating suggestions were unsustainable and often contradictory. More recently the Kimberley style sequence has been further described by Travers and Ross (2016), Veth et al. (2018), and Scott-Virtue and Goodgame (2017).

The Kimberley Foundation Australia (KFA) is a major catalyst in leveraging funding and initiating a number of academic research projects. The first significant project, "Continuity and Change," examined aspects of the Kimberley rock art and was conducted by the late Mike Morwood and June Ross on Mitchell Plateau from 2009 to 2011. Their work was followed in 2014 and 2015 by two other extensive projects, the "Kimberley Dating Project 1" and "Kimberley Visions: rock art dynamics of Northern Australia." The dating project has now been extended as, "An absolute timescale for the Aboriginal rock art of the Kimberley region – landscape processes and multiple chronometers." It will apply new knowledge of the complex processes on sandstone surfaces across the north Kimberley, and an innovative combination of four scientific dating methods developed in the earlier work. The project expects to establish a well-dated sequence for Kimberley rock art based on replication of results and confirmation across different methods KFA (2019). An initial paper on the dating of fossilized mud wasp nests located on top of rock art motifs as a means to establish minimum dates has been published (Finch et al. 2019), and a forthcoming paper will provide some of the much sought-after dates for the rock art chronology. All these projects are multi-university, multidisciplinary, government, and philanthropically funded projects partnering with Traditional Owner groups.

Conclusion

The 1986 and 1988 Drysdale River surveys uncovered a substantial body of well-preserved and diverse rock art and extended the geographic range of Bradshaw art eastward from its previous known distribution. Surveys since 1988 have extended this distribution to most parts of the north Kimberley. An interesting feature of the art found in the Drysdale River National Park and surrounding areas is the rarity of the more recent Wandjina art styles. The concentration of Bradshaw art in this area is certainly significant and possibly among the largest found so far.

In 1988 I remarked that the coexistence of such a large concentration of seemingly different art styles in the region could help future researchers develop insights into the stylistic development of the art in the northeast Kimberley. I suggested the possibility that few firm conclusions may be possible but that there surely was enough information available in the surviving images to provide an excellent picture of some of the social aspects of a people who have passed with time. The skill and elegance of these figures as depicted on the walls of the shelters remain a true joy to all those fortunate to behold this treasure of our national heritage.

The systematic exploration and recording program I began in 1988 has continued annually until the present time. Through much the same period, similar work was carried out on nearby Theda Station by Grahame Walsh and at Faraway Bay west of the King George River by Lee Scott-Virtue and Dean Goodgame. The result of this work was to highlight the extent and complexity of Kimberley rock art, particularly the art body preceding the Wandjina period. Well over 2000 sites have been recorded in these locations. Most recently works by research teams from the University of Western Australia (UWA) and Melbourne University have added further to the number of previously recorded sites and indicate that the Drysdale National Park, nearby Theda and Doongan stations and the King George River, has one of the highest concentrations of recorded rock art sites in the Kimberley (Veth et al. 2018).

Post Script

Since the initial discoveries in 1986 of a major rock art body along the Drysdale River and particularly in

the northern section of the Drysdale River National Park, there have been substantial developments in surveying and recording and new analyses of what is clearly a rock art heritage of world significance. This focus of this work has been especially directed to the distinctive, naturalistic Gwion or Bradshaw figures and associated stylistic variations.

News of this art find in the media and my presentation at the first Australian Rock Art Research Association (AURA) Congress in Darwin in 1988 precipitated a flurry of avocational activity and also a substantial increase in the numbers of recreational and commercial bushwalkers who found and recorded parts of this widespread art body, along with the extensive discoveries and recordings by Schmiechen, Walsh, Welch, Donaldson, Scott-Virtue, and Goodgame in the north and northeast Kimberley. Over the last 30 years, over 900 additional sites have been recorded by Donaldson, and examples from his work have appeared in his three volumes on Kimberley rock art (Donaldson 2012, 2013a, b).

The growing publicity since the late 1980s has placed national and world attention on the diversity, antiquity, and preservation of this dramatic body of rock art in the Kimberley. It is a powerful statement of Aboriginal culture imprinted into the landscape. Aboriginal people have now regained title to much of the Kimberley and are increasingly working in partnership with the new wave of academic researchers to document and analyze this amazing body of rock art. The challenge for the future is how to tell the story and share and value this cultural heritage with future generations as an integral part of Australia's deep history.

References

Bradshaw, J. 1892. Notes on a recent trip to Prince Regent's river. *Melbourne: Royal Geographical Society of Australia of Australia (Victorian Branch) Transactions* 9 (2): 90–103.

Conigrave, C.P. 1938. *Walk-about*. London: Dent.

Crawford, I.M. 1968. *The art of the Wandjina*. Melbourne: Oxford University Press.

Crawford, I.M. 1977. The relationship of Bradshaw and Wandjina art in North-West Kimberley. In *Form in indigenous Art*, ed. P.J. Ucko. Institute of Aboriginal and Torres Strait Islander Studies: Canberra.

Donaldson, M. 2012. *Kimberley rock art volume one: Mitchell Plateau Area*. Mt Lawley: Wildrocks Publications.

Donaldson, M. 2013a. *Kimberley rock art volume two: North Kimberley*. Mt Lawley: Wildrocks Publications.

Donaldson, M. 2013b. *Kimberley rock art volume three: Rivers and ranges*. Mt Lawley: Wildrocks Publications.

Doring, J. 2000. *Gwion Gwion: Secret and sacred pathways of the Ngarinyin aboriginal people of Australia*. Köln: Könemann.

Elkin, A.P. 1930. Rock paintings of north-west Australia. *Oceania* 1 (3): 257–279.

Finch, D., A. Gleadow, J. Hergt, V.A. Levchenko, and D. Fink. 2019. New developments in the radiocarbon dating of mud wasp nests. *Quaternary Geochronology* 51: 110–154.

fr. Perez, E. 1977. *Kalumburu, the Benedictine mission and the Aborigines*. Kalumburu: Benedictine Mission.

Grey, G. 1841. *Journals of two expeditions of discovery in North-West and Western Australia during the Years 1837, 38 and 39 vol I and II*. London: T. & W. Boone.

Kabay, E.D., and A.A. Burbidge. 1977. *A biological survey of the Drysdale River National Park North Kimberley, Western Australia*. Perth Western Australia: Department of Fisheries and Wildlife.

Kimberley Foundation Australia. (2019). https://www.kimberleyfoundation.org.au/

Lewis, D. 1988. The rock paintings of Arnhem Land, Australia: Social, ecological, and material culture change in the post-glacial period. In *British archaeological reports, British archaeological reports no S415*. Oxford: Hadrian Books.

Lewis, D. 1997. Bradshaws: The view from Arnhem Land. *Australian Archaeology* 44: 1–17.

Lommel, A., and K. Lommel. 1959. *Die Kunst des fünften Erdteils*. München: Staatliches Museum für Völkerkunde.

Love, J.R.B. 1917. Notes on the Wororra Tribe North – Western Australia. *Royal Society of South Australia Transactions 41*: 21–38.

Love, J.R.B. 1936. *Stone age bushmen of today*. London: Blackie.

McGregor, A., and Q. Chester. 1999. *The Kimberley. Horizons of stone*. Frenchs Forest NSW: New Holland.

Mountford, C.P. 1937. Examples of Aboriginal art from the Napier Broome Bay and Parry Harbour, North Western Australia. *Transactions of the Royal Society of South Australia* 61: 30–40.

Rainsbury, M.P. 2009. River and coast: Regionality in North Kimberley Rock Art. Unpublished PhD. Thesis, Department of Archaeology, Durham University: Durham UK.

Rainsbury, M.P. 2010. *Rock art notes: Drysdale River National Park*. Durham: Unpublished field notes.

Rainsbury, M.P. 2016. Forgotten images: Charles Price Conigrave and the Kimberley exploring expedition of 1911. *Rock Art Research* 33 (1): 91–102.

Rainsbury, M.P. 2017. Rock art watercolours: The Kimberley Paintings of Hill and d'Emo. *Rock Art Research* 34 (2): 247–248.

Richardson, C. 1986. *Operation Raleigh – A report on the first descent of the Drysdale River*. London: *Royal Geographical Society*.

Schmiechen, H.J. 1986. Survey of Aboriginal rock art and cultural sites. Drysdale River, East Kimberley, Western Australia. Report of Findings Drysdale River Expedition 1986, Operation Raleigh. Unpublished Report. Perth: WA Department of Indigenous Affairs.

Schmiechen, H.J. 1992. Drysdale River National Park: Visitor management and aboriginal heritage issues. MA Thesis, Mawson Graduate Centre for Environmental Studies, University of Adelaide: Adelaide.

Schmiechen, H.J. 1993. *Shadows in stone*. *A report on Aboriginal rock art survey expeditions 1988 and 1991*. Drysdale River National Park, Kimberley Western Australia. Unpublished Report. Australian Institute of Aboriginal and Torres Strait Islander Studies: Canberra.

Schulz, A.S. 1956. North-West Australian rock paintings. *National Museum of Victoria Memoirs No 20*: Melbourne.

Scott-Virtue, L., and D. Goodgame. 2017. Stylistic variations of Bradshaw figures. In *Australia's forgotten rock paintings*, ed. A. Weiler and R. Weiler. Oldenburg: Hanse-Wisenschaftskolleg.

Stubbs, D. 1974. *Prehistoric art of Australia*. Melbourne: Macmillan.

Stubbs, D. 1981. *Before history – From earlier fleets – 11, hemisphere – An aboriginal anthology 1981*. Woden: Curriculum Development Centre.

Travers, M., and J. Ross. 2016. Continuity and change in the anthropomorphic figures of Australia's northwest Kimberley. *Australian Archaeology* 82 (2): 148–167.

Veth, P., C. Myers, P. Heaney, and S. Ouzman. 2018. Plants before farming: The deep history of plant-use and representation in the rock art of Australia's Kimberley region. *Quaternary International* 489: 26–45.

Walsh, G.L. 1988. *Australia's greatest rock art*. Bathurst: E. J. Brill/Robert Brown and Associates.

Walsh, G.L. 1994. *Bradshaws: Ancient rock paintings of North West Australia*. Caourage: Edition Limitee.

Walsh, G.L. 2000. *Bradshaw art of the Kimberley*. Toowong Queensland: Takarakka Nowan Kas Publications.

Welch, D. 1990. The Bichrome art period in the Kimberley, Australia. *Rock Art Research* 7: 110–124.

Welch, D. 1993a. The early rock art of the Kimberley, Australia: Developing a chronology. In *Time and space. Dating and spatial considerations in rock art research*, Occasional AURA Publication 8, ed. J. Steinbring, A. Watchman, P. Faulstich, and P.S.-C. Tacon. Melbourne: Australian Rock Art Research Association.

Welch, D. 1993b. Early naturalistic human figures in the Kimberley, Australia. *Rock Art Research* 10: 24–37.

Welch, D. 2015. *Aboriginal paintings of the Drysdale River National Park Kimberley Western Australia*: David M. Welch.

Welch, D. 2016. *From Bradshaw to Wandjina. Aboriginal paintings of the Kimberley region*. Western Australia: David M. Welch.

Worms, S.A. 1955. Contemporary and prehistoric rock painting in central and north Kimberley. *Anthropos* 50: 546–566.

Further Reading

Donaldson, M.J., and K.F. Kenneally, eds. 2007. *Rock art of the Kimberley*. Perth: Kimberley Society.

Layton, R. 1992. *Australian rock art: A new synthesis*. Cambridge: Cambridge University Press.

Lommel, A. 1952. *Die Unambal – ein Stamm in Nordwest-Australien*. Hamburg: Museum fur Völkerkunde.

Welch, D.M. 2014. *Aboriginal paintings at Munurru, Kimberley, Western Australia*. Coolalinga Northern Territory: David M. Welch.

Braidwood, Robert John

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Basic Biographical Information

Robert John Braidwood (Fig. 1) was born July 29, 1907, in Detroit, Michigan. He completed a degree in architecture at the University of Michigan in 1929 and spent several months in an architectural office. However, the Great Depression made his future as an architect tenuous. He decided to go back to school to take courses in anthropology, a field that had interested him during his undergraduate years. He took an ancient history class taught by Leroy Waterman, director of the University of Michigan excavations at Tell Umar (the ancient city of Seleucia) in Iraq. Braidwood's skill at drafting and free-hand lettering made such a positive impression on Waterman that he invited the young man to join the 1930–1931 season at Seleucia as surveyor and draftsman. Braidwood returned to Michigan to complete his B.A. (1932) and M.A. (1933) in anthropology and was then hired (1933–1938) by the University of Chicago's Oriental Institute as field assistant to the Syrian Expedition working

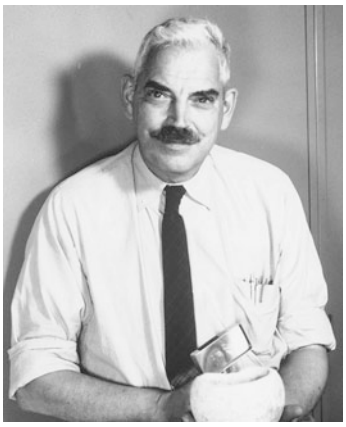

Braidwood, Robert John, Fig. 1 Braidwood with Jarmo artifact, Oriental Institute, University of Chicago, c. 1965. (Photo courtesy of P. J. Watson)

in the Amuq (the Plain of Antioch). In 1937, he married Linda Schreiber, whom he had first met during their undergraduate years at Michigan, the two forming a team that endured for the next 66 years. In 1938, he entered a doctoral program at the Oriental Institute (also taking coursework in Anthropology), which he completed in 1942. From 1941 to 1945, Braidwood was a part-time faculty member of the University of Chicago. In 1945 he was promoted to professor with joint appointments in the Oriental Institute and in Anthropology, a position he held until his retirement in 1978. He and Linda continued to participate in the Turkish Prehistoric Project for several more years.

Braidwood was the first archaeologist to seek empirical evidence (floral and faunal remains) for the beginnings of agriculture and pastoralism in Western Asia. He began his work initially at the site of Jarmo in northern Iraq (Braidwood and Braidwood 1950, 1953). Funding from the US National Science Foundation in 1954–1955 (the third Iraq-Jarmo Project field season) enabled Braidwood to add a botanical expert, a zoologist, a geologist, and a radiocarbon specialist to his field staff. When the 1958 nationalist revolution in Iraq made fieldwork there impossible, he transferred this collaborative research team to Iran (the Iranian Prehistoric Project 1959–1960) and then to Turkey (the Joint Turkish Prehistoric Project-Istanbul/Chicago, Diyarbakır region, 1963–2003) (Braidwood and Çambel 1980). Jarmo was the first "oldest food-producing community" to be revealed, the precursor of many other such communities now known in the Levant, Turkey, Iraq, Iran, and elsewhere (Braidwood 1967, 1973; Braidwood et al. 1983). Archaeologists around the world have joined the Braidwoods in pursuing evidence for the origins of plant and animal domestication and of food-producing economies in many regions of Asia, Europe, Africa, Oceania, and the Americas.

Braidwood received numerous honors over his career. He was elected to the National Academy of Sciences, the American Academy of Arts and Sciences, and the American Philosophical Society. He was made a foreign correspondent or honorary fellow of the German Archaeological Institute, the Austrian Academy of Sciences, and the Society of Antiquaries. He was also awarded honorary degrees by the Sorbonne and the University of Rome. In 1971, the Archaeological Institute of America presented him with its Gold Medal for Distinguished Archaeological Achievement, and the American Anthropological Association designated him its Distinguished Lecturer in Archaeology. In 1995, the Society for American Archaeology awarded him the Fryxell Medal for Interdisciplinary Research in Archaeology.

Major Accomplishments

The "agricultural revolution" is foundational to the origins of urbanized, state-based civilization in southern Mesopotamia. Braidwood's interest in the topic derived in part from publications by Harold Peake and Herbert Fleure (*The Corridors of Time*, eight volumes, Yale University Press, 1920s–1930s), V. Gordon Childe (1934), and Raphael Pumpelly (1908). His primary accomplishment was introducing, demonstrating, and advocating interdisciplinary archeological field research aimed at recovering primary evidence (physical remains of the earliest plant and animal domesticates) documenting agropastoral origins in western Asia. Moreover, he initiated a major

conceptual shift regarding West Asian agricultural origins when he based his fieldwork program – not in the lower Tigris-Euphrates region – but rather in the natural habitat zone of the first domesticates (e.g., goats, sheep, wheat, barley, legumes): rain-watered uplands above the irrigation-based, earliest Mesopotamian cities. He referred to this nuclear zone as "the hilly flanks of the Fertile Crescent" (Braidwood and Braidwood 1950, 1953; Braidwood and Braidwood et al. 1983).

Braidwood also implemented a radical change in the organization of Near Eastern fieldwork. Fieldwork was traditionally carried out at big sites employing dozens, even hundreds, of workmen whose main job was to open up large-scale exposures of architectural remains. Recovery of artifacts was centered primarily on those that were complete or nearly so, beautiful, or intrinsically interesting to those directing the excavations. Braidwood's crews of workmen were smaller and much more closely supervised by field staffs that included botanical, geological, and zoological experts at a time when the collaborating scientists had to bootleg field and analytical time from their regular jobs. It was only many decades after the NSF-funded Jarmo field season of 1954–1955 that new subdisciplines of archaeobotany/paleoethnobotany, geoarchaeology, and zooarchaeology came to characterize modern archaeology.

Another of Braidwood's accomplishments was to highlight the period immediately preceding the first appearance of established agropastoral economies. He called this the "era of incipient food production" and was the first archaeologist to direct attention toward elucidating key characteristics of those Early Holocene foraging/hunting-gathering peoples who created the first agricultural and pastoral economies.

As early as the 1950s, Braidwood was also advocating ethnographic research in Near Eastern villages where many ancient techniques and practices (e.g., building and maintaining adobe or puddled-adobe structures; caring for mixed flocks of sheep and goats and processing their wool, hair, and milk; growing and processing wheat, barley, and legumes) were so successful that they could still be seen and documented thousands of years later in contemporary communities (e.g., Watson 1979; Kramer 1982).

Braidwood's primary contributions to archaeological knowledge center upon his research and publications concerning one of the most important transitions in the human past, namely, the origins of agriculture and pastoralism in western Asia. His work on this topic inspired an international research trajectory whose practitioners continue to expand, revise, and refine knowledge of agricultural and pastoral economies ancestral to the array of food-producing systems currently supporting human societies upon this planet.

Cross-References

- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Childe, Vere Gordon (Theory)
- ▶ Ethnoarchaeology
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Paleoethnobotany
- ▶ Zooarchaeology

References

Braidwood, R.J. 1967. *Prehistoric men*. 7th ed. Glenview: Scott-Foresman.

Braidwood, R.J. 1973. Archaeology: View from southwestern Asia. In *Research and theory in current archaeology*, ed. C.L. Redman, 33–46. New York: Wiley.

Braidwood, R.J., and L. Braidwood. 1950. Jarmo: A village of early farmers in Iraq. *Antiquity 24*: 189–195.

Braidwood, R.J., and L. Braidwood. 1953. The earliest village communities of southwestern Asia. *Journal of World History* 1: 278–310.

Braidwood, R.J., and H. Çambel. 1980. *The Joint Istanbul-Chicago Universities' Prehistoric Research Project in southeastern Anatolia I: Comprehensive view; the work to date, 1963–1972*. Istanbul: Istanbul Üniversitesi Edebiyat Fakültesi Yayınları.

Braidwood, R.J., L. Braidwood, B. Howe, C.A. Reed, and P.J. Watson, eds. 1983. *Prehistoric archeology along the Zagros Flanks*, Oriental Institute Publication. Vol. 105. Chicago: University of Chicago Press.

Childe, V.G. 1934. *New light on the most ancient east*. London: Kegan Paul.

Kramer, C. 1982. *Village ethnoarchaeology: Rural Iran in archaeological perspective*. New York: Academic.

Pumpelly, R., ed. 1908. *Explorations in Turkestan. Expedition of 1904. Prehistoric civilizations of Anau: Origins, growth, and influence of environment.* Vols. 1 & 2. Washington, DC: Carnegie Institution of Washington.

Watson, P.J. 1979. *Archaeological ethnography in western Iran*, Wenner-Gren Publications in Anthropology. Vol. 57. Tucson: University of Arizona Press.

Further Reading

Braidwood, R.J. 1937. *Mounds in the Plain of Antioch, an archeological survey*, Oriental Institute Publication. Vol. 48. Chicago: University of Chicago Press.

Colledge, S., and J. Conolly, eds. 2007. *The origin and spread of domestic plants in Southwest Asia and Europe*. Walnut Creek: Left Coast Press.

Current Anthropology. 2009. The origins of agriculture. *Current Anthropology* 50 (5): 591–711.

Denham, T.P., J. Iriarte, and L. Vrydaghs, eds. 2007. *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*. Walnut Creek: Left Coast Press.

Watson, P.J. 1999. Robert John Braidwood. In *The great archaeologists. Encyclopedia of archaeology*, ed. T. Murray, 495–505. Santa Barbara: ABC-CLIO Inc.

Watson, P.J. 2005. Robert John Braidwood. Biographical memoirs. *Proceedings of the American Philosophical Society* 149 (2): 234–241.

Watson, P.J. 2006. *Robert John Braidwood 1907–2003. Biographical memoirs*. Washington, DC: National Academy of Sciences.

Zeder, M.A. 2008. Domestication and early agriculture in the Mediterranean Basin: Origins, diffusion, and impact. *Proceedings of the National Academy of Sciences* 105: 11597–11604.

Zeder, M.A., D.G. Bradley, E. Emshwiller, and B.D. Smith. 2006. *Documenting domestication: New genetic and archaeological paradigms*. Berkeley: University of California Press.

Brazil: Cultural Heritage Management Education

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Introduction

Although cultural heritage management (CHM) has become a legal and effective concern in Brazil since the end of the 1980s, professional training as regards its legal and methodological specificities is still at its beginnings, mostly due to an apartheid between "archaeological" (i.e., Native-American) and "historical" (colonial or more recent) heritages. While historical heritage has long been recognized and explored, usually by means of historical and architectural perspectives (with museological/educational resonances), most of Native American heritage remained within academic research circuit and under specific legal protection background. This has promoted little concern for issues such as site management and collections curatorship, as well as its use for educational approaches.

Historical Background

The development of an "official Brazilian culture" (since Independence Day) has segregated Native American societies (and their material record) into the "ghetto of the exiled memories," that is, their existence is known but from a very exogenous and diffuse perspective (Bruno 2007). Thus, Native cultural contents have been systematically kept outside from formal education, as well as from the first legal diplomas (from 1937) regarding national heritage, focused, as they were, on "historical" heritage. The first "national museums," appearing by the end of the nineteenth century, are historical in nature and devoted also to Natural History and Ethnology. There is interest in archaeological research, but it has never been considered mainstream at any official institution, the first formal archaeologist been hired only in the 1920s. But, interestingly, these museums have gathered, since their very beginning, several important archaeological collections assembled by amateurs or naturalists, usually treated as of secondary importance.

From the 1950s on, systematic archaeological research takes off, but the predominance of research interests led by foreign initiatives (or "missions") prevents adopting the notion of management as a priority. In the following decades (up to the 1990s), most archaeological investigations have been performed by academic research groups housed at universities, usually

more concerned with scholarly perspectives than management approaches (Funari 2004).

Heritage management in Brazil has appeared as a way to cope with the increasing destruction of archaeological remains due to fast economic development. This is the spirit of the first archaeological law, from 1961: to preserve, it is necessary to prevent/punish the destruction. With a few exceptions, there is no concern as regards management or education. Through the following decades, the IPHAN has been responsible for the protection and management of archaeological sites and collections, but with a legal and operational apparatus apart from historical/architectural sites and also strange from general national politics on museums and historical heritage management. (The Instituto do Patrimônio Histórico e Artístico Nacional – IPHAN (National Historical and Artistic Heritage Institution), established in the 1930s, has always been a reduct of architects; the first archaeologists have been hired only in the 1980s).

The formidable expansion of preventive (or "contract") archaeology (CRM projects) since the end of the 1980s and the overwhelming multiplication of recorded archaeological sites have evinced the need for the development of heritage management plans and strategies in three different levels: legal (with more specific diplomas regarding how to proceed as regards archaeological contexts), educational (law-enforced inclusion of heritage education programs into CRM projects), and museological (regarding the organization and management of the archaeological collections). Again, it must be stressed that these policies have been developed with no formal connection with established national heritage and museums programs, having a legal and operational apparatus on its own (for a more comprehensive review see DeBlasis 2010).

Current Debates

Heritage Management and Archaeology in Brazil: The Status of Art

As stated above, the inception of "education" into archaeological professional and academic career is recent and law-enforced in Brazil, becoming mandatory in every single research project since 2002. Legal diplomas, albeit well intentioned, have created a sort of "cake recipe," a report formula that (re)produces rather innocuous results from a scientific and educational standpoint, unfortunately supported by regulating agencies.

Education through, or for, heritage has long been an important concern into museums relationship toward the public (especially art education) and other means of scientific diffusion, as well as interpretive communication (tourism), particularly as regards historical heritage. These programs have strongly benefited from the development of robust pedagogical approaches such as the well-known *liberation education*, essentially based in learning and enhancing critical consciousness from the concrete experience of the surrounding reality (Freire 2000, 2005) and "educational city," enhancing urban identity and citizenship. There is also a strong focus on environmental education and sustainability, as well as education toward social inclusion, mostly among risk groups. Museological pedagogy, exploring communication through collections/landscapes and using memory indicators (and the so-called places of memory), has also known an enormous development, together with heritage education through material/cultural evidence (Horta 1984; Hooper-Greenhill 1995).

Particularly as regards archaeology, educational efforts have been confined to a few museums (usually linked to universities), focusing on the scientific perception of the discipline and exploring, occasionally, experimental archaeology. Through the last 10 years, a bigger concern with public archaeology has emerged, due to the growing awareness, by archaeologists, of the social, ethnical, and political problems involved on the praxis of their profession (DeBlasis 2010). A very interesting case came out within a project near the Xingu indigenous reservation, located at the southern Amazonian area, where archaeology (and archaeologists), with the support of the IPHAN, has led local community interests to be included into the scope of the project and to the creation of additional reservation territories based on indigenous knowledge.

Future Directions

Although it is possible to recognize the existence of advanced heritage legislation in Brazil, well tuned to environmental and sustainability perspectives, it is still poorly connected to formal education. Curiously enough, the management of archaeological heritage has taken an alternate path, apart from the mainstream educational tendencies and divorced from national museums politics. The protection of archaeological collections is a nuclear management problem today, due to its impressive accumulation in regional museums appearing everywhere, with few curatorial concerns. Despite the recent multiplication of grad schools of archaeology all over the country, the attention given to these and other management problems is still very timid. The distance between standard research procedures and effective management initiatives, on one side, and formal heritage education, on the other, needs urgent bridging. This rather peculiar situation, that is, the absence of site and collections management issues at the school curricula, as well as the overwhelming expansion of CRM projects all over the country, jeopardizes the continuity and acquisition of higher standards in heritage education in Brazil.

Besides these difficulties, public outreach of the archaeological heritage studies, whether academic or CRM based, is slowly growing, and in fact archaeologists themselves have become more attentive to it. Cultural sections of the most important newspapers show full-page texts on brand new discoveries; ecological TV programs bring archaeological reports every now and then, and easy reading books for the general public have also been published. Public education has become one of the forefront activities on recent archaeological research projects, and archaeologists now go to local schools and community centers to speak about the past, the environment, the things they find, history, and material culture – after all, what the hell are they (we) doing? It also has become common seeing flocks of school kids visiting archaeological excavations, often conducted by trained guides. Important to remember, public education has become mandatory in CRM projects from 2002 on, and these activities also must be reported at the project outset. But very often, unfortunately, the lack of prepared personnel brings, to these opportunities for effective educational contact and interaction, a rather deceptive outcome.

To overcome this situation, CHM education must be expanded to encompass a fully humanistic, as well as technical, professional formation for archaeologists and heritage managers. Archaeological practitioners need to go beyond descriptive standards and normative interpreting categories. They must dare to incorporate the living landscapes into their imaginary and cartography and realize that their work makes a difference for a more encompassing, socially and environmentally diversified future.

Cross-References

- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Community Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Constructivism in Archaeology Education
- ▶ Cuba: Archaeological Heritage Rescue and Management
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Heritage Management: Project Management
- ▶ Heritage and Public Policy
- ▶ Heritage Areas
- ▶ Heritage Landscapes
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Multicultural Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Sustainability and Cultural Heritage
- ▶ Sustainable Cultural Tourism Policies: Overview

References

Bruno, M.C.O. 2007. Museology as a pedagogy for heritage. In *Sociomuseology*, ed. C. Bruno, M. Chagas, and M. Moutinho, 129–144. Lisbon: Edições Universitárias Lusófonas.

DeBlasis, P. 2010. Twenty years of heritage resource management in Brazil: A brief evaluation (1986–2006). In *Cultural heritage management: A global perspective*, ed. P.M. Messenger and G.S. Smith, 38–47. Gainesville: University Press of Florida.

Freire, P. 2000. *Pedagogy of the oppressed*. London: Continuum. (originally published in 1970).

Freire, P. 2005. *Education for critical consciousness*. London: Continuum.

Funari, P.P. 2004. Public archaeology in Brasil. In *Public archaeology*, ed. N. Merriman, 202–210. London: Routledge.

Hooper-Greenhill, E., ed. 1995. *Museum, media message*. London: Routlege.

Horta, M.D.L.P. 1984. *Educação patrimonial*. Rio de Janeiro: SPHAN/ProMemória.

Brazil: Historical Archaeology

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Introduction

Following a general trend in South America, historical archaeology in Brazil has experienced a growth since the mid-1980s. This contribution reviews its history and development, particularly in the last 20 years. It begins by focusing on the wider South American context and proceeds with an analysis of some of the most outstanding projects undertaken in Brazil over the last two decades or so.

Definition

Historical archaeology in Brazil is a field that started to be developed in the 1960s, initially without any difference, whether in goals or in methods, from the prehistoric archaeology. In the last 20 years, it has had a significant development, insofar as the focus on a descriptive culture-historical approach has being gradually substituted by approaches more influenced by contemporary social theory. In recent decades, Brazilian and other South American historical archaeologists, in an effort to move away from the strong influence of North American historical archaeology, have been concerned with building a proper identity for the field, based on the historical and cultural particularities of South American countries (Funari et al. 1999; Lima 1999; Senatore and Zarankin 2002).

Historical Background

Historical Archaeology in South America

The emergence of historical archaeology in many South American countries occurred concurrently with the development of prehistoric archaeology, during the first half of the twentieth century; however, it was only in the 1960s that more systematic studies started to take place. During the 1960s and 1970s, research on historical sites was usually conducted by non-archaeologists – amateurs, historians, and architects (Lima 1993; Funari 1994). Basically, their investigations shared as a main goal the contribution towards the building of national identities based on the colonial European splendor. These early works are characterized by a set of common features, such as the straightforward correlations between material culture and documentary data, the rescue of valuable historic artifacts and structures, and supplying information for restoration projects.

It was only in the 1980s that archaeology in South America started to develop as an independent field of knowledge, being recognized its potential in the construction of alternative discourses about the past. As a consequence, historical archaeology started to enjoy an independent status for the first time. In this way, archaeologists began to create multiple visions about recent history, which could be opposed to or different from official history or "master narratives."

This multiplication of counter-hegemonic discourses was closely related to the end of military dictatorships and the consolidation of democratic governments in Latin America (Funari 1994). The new sociopolitical context allowed archaeology to experience an accelerated growth, a process which was particularly intensified during the 1990s. This growth was reflected in the development of several research programs that focused on the study of diversified problems and regions, in the creation of specific courses in undergraduate and graduate programs, in the spread of national and international meetings, and in the increasing number of publications.

Historical Archaeology in Brazil

Historical archaeology in Brazil (Fig. 1) emerged during the 1960s, when some scholars started to give attention to southern Jesuit missions from the seventeenth and eighteenth centuries in the states of Paraná and Rio Grande do Sul and to northeastern European-indigenous contact sites from the sixteenth century in the state of Pernambuco (Lima 1993). Most of these former historical archaeologists had been trained as prehistorians in that same decade to participate on a wide research program, the Programa Nacional de Pesquisas Arqueológicas (National Program of Archaeological Research), coordinated by Betty Meggers and Clifford Evans, from the Smithsonian Institute. This program identified some of the major archaeological complexes for the Brazilian territory. These archaeologists, following the goals of the culture-historical approach, were concerned with the identification and spatial-temporal delimitation of complexes of artifacts. Such complexes, named traditions and phases, were considered as material correlates of specific prehistoric cultures. In the case of the historical sites, the major focus was on pottery, analyzed with the purpose of building typologies to be inserted in specific historical phases and traditions (e.g., Symanski 2009). Although subjected to several criticisms, this approach was productive during the 1960s and 1970s, when scholars such as Igor Chmyz, Marcos Albuquerque, José Brochado, and Pedro Mentz Ribeiro studied the locally made pottery found in European-indigenous contact sites. Their goal was to discuss acculturative processes involving indigenous populations in contact with colonizers, an issue that continued to be approached up to the mid-1980s.

During the 1970s historical archaeology in Brazil experienced a slow development. Among its major accomplishments was its insertion in restoration projects of architectural national monuments, like fortresses and churches, but employed as a mere technique, totally subordinated to architecture. As new perspectives appeared in the 1980s, archaeologists became increasingly conscious of the potential of the discipline to investigate subjects that could lead to reinterpretations of the official history, such as unprivileged groups, social memories, and daily practices (Lima 1993). In this way attention started to be given to more ordinary kinds of sites. Tania A. Lima and Margarida D. Andreatta began to study urban and rural households in São Paulo and Rio de Janeiro, while Carlos M. Guimarães excavated maroon settlements in Minas Gerais. Paulo E. Zanettini (e.g., 1996), in turn, studied the peasant village of Canudos, in Bahia, which was the core of a messianic movement of contestation violently suppressed by the Brazilian army in the early Republican period (1896–1897).

Although most of the works undertaken in historical archaeology in the 1980s were still descriptive in nature, some scholars started to apply more analytical approaches. This was the case of Carlos Guimarães' study of settlement patterns in maroon sites of Minas Gerais (e.g., Guimarães 1988) and of Tania A. Lima's and Paulo E. Zanettini's studies on the relationships between European wares and household socioeconomic variability in Rio de Janeiro (e.g., Lima 1995) and São Paulo.

Key Issues/Current Debates

The 1990s witnessed an increasing interest in types of sites that had been overlooked until then. These included mining areas, collective trash dumps, colonial houses, slave quarters,

Brazil: Historical Archaeology, Fig. 1 Map of Brazil showing the locations mentioned in this text

cemeteries, colonial roads, and plantations. This diversification was largely the result of two factors: the establishment of contract archaeology, which slowly emerged in the previous decade, and the expansion of graduate programs in archaeology (Symanski 2009). Regarding the theoretical landscape, the setting established since the 1990s has been characterized by a diversity of influences, including processual, symbolic, post-structuralist, and critical approaches.

The processual approach influenced urban archaeology projects in the cities of São Paulo and Porto Alegre, through the systemic concept of city site, and consumer behavior studies concerning the relationships between European wares and household socioeconomic status (Symanski 2009). In the cities of São Paulo and Porto Alegre, the concept of city site has been used as a heuristic tool in general programs of cultural resources management developed by these cities' town halls cultural offices. The goal has been to consider any site located in the urban space as a product of the wider urbanization process and thus to study the material remains of this process and their relationship with the development of urban lifeways. Consumer behavior studies, in turn, have focused on the variability of nineteenth-century European wares in urban and rural contexts, discussing, on one hand, diachronic changes in these items as related to changes in social practices in direction to a Western European ideal of domesticity and, on the

other, synchronic changes according to specific social and cultural backgrounds that could have influenced the consumers' choices. These studies have demonstrated that European ideals of consumption were far from being uniformly incorporated by the Brazilian society, rather, distinct social and cultural groups attributed distinct sets of value to these items, in some cases, as those of the urban elites, emulating European tastes and social behaviors but in others, as seem to have been the case with some farmers, peasants, and slaves, rejecting or adapting such values according to local cultural logics.

In the mid-1990s, Tania Lima published three articles that can be considered the foundations of the post-processual historical archaeology in Brazil (Lima 1994, 1995, 1996). Based on a strongly poststructuralist perspective, she studied the practices and representations of nineteenth-century society in Rio de Janeiro and the ways in which this changed as a result of European-influenced ideals of modernization that were increasingly incorporated during the second half of that century. Through the analysis of contexts which included cemeteries and households, Tania Lima discussed issues such as the representations linked to death, practices of personal hygiene and health, and the habits and rituals involving the social and private consumption of meals. During this same period, Pedro Funari was engaged in developing a critical and interpretative program for Brazilian historical archaeology, discussing the disciplinary status of the field, the relationship between written documents and material culture, and the rescue of the history of underprivileged and marginalized groups (Funari et al. 1999). These works represent the starting point of the development of works that, since then, have explored a diversity of issues including power relations, gender, social and cultural identities, and the structuring role of the built environment and landscape.

In Brazil, as in other Latin American countries, there has been a strong focus on the processes of change caused by the development and expansion of industrial capitalism. This system produced changes in practically all spheres of social and private life, including the separation between domestic and working spaces, the segmentation of meals, the mechanical measurement of time, the intensification of the process of urbanization, and the adoption of European-influenced ways of life. Although the influence of North American historical archaeology perspectives regarding these issues is undeniable, archaeologists studying the emergence of modern society in Latin America have tended to highlight the economic, social, and cultural specificities of this region (Lima 1999; Funari 2002; Senatore and Zarankin 2002). A case in point is Tania Lima's research which focused, on the one hand, on the strategies developed by the European industrialized countries, through the imposition of ideologies and practices involving the growing consumption of their industrialized items, and, on the other, on the creative ways in which Brazilian society was able to mix these practices with its own traditions, creating hybrid expressions (Lima 1999). Some scholars, like Ana Sousa, Luis Symanski, and Fernanda Tocchetto (e.g., 2003), have followed this line of investigation, discussing how groups with distinct social and cultural backgrounds, such as urban merchants, planters, industrial laborers, peasants, and slaves, differentially incorporated, rejected, or even ignored the ideology of industrial capitalism, despite the ubiquity of European industrialized items in these sites.

Landscape archaeology is another avenue of inquiry that has revitalized Brazilian historical archaeology in the last decades. Pioneering these approaches was Tania Lima's (1994) study on the representations of death in the nineteenth-century cemeteries of Rio de Janeiro. In this work she discusses the ways in which changes in these representations were related to wider changes in the social, economic, and political dimensions of Brazilian society, during its transition from the Imperial to the Republican period. Subsequent works include Marcos Souza's study of the socio-spatial organization of a southern colonial fortress in Laguna (Santa Catarina state) and its role as an expression of the colonizing ideology of the Portuguese Crown (Souza 1995); Ana Souza's analysis of the role of a southeastern colonial road in the production and reproduction of social relationships among its users, including planters, peasants, merchants, slaves, and travelers (Souza

1995), and Beatriz Thiessen's discussion of the ways in which the façade and Greek-style sculptures of an early twentieth-century German-Brazilian beer industry in the city of Porto Alegre expressed the discourses of an emerging bourgeois in the early Republican period (Thiesen 2006). Landscape approaches have been applied as well in plantation archaeology. This is exemplified by Marcos Souza's discussion of the arrangement of the landscape of the plantation – *engenho* – São Joaquim, in Pirenópolis (Goiás state), which was constructed according to Enlightenment ideals that created differentiated temporalities among planters and slaves (Souza 2007). Symanski's (2007) study on the tactics applied by enslaved groups to subvert the hierarchically organized space of the plantations of Chapada dos Guimarães (Mato Grosso state) is another good example of a landscape-scale analysis.

The processes of construction and maintenance of ethnic and cultural identities have also received growing attention from scholars. Regarding the archaeology of southern Jesuitical missions, Fernanda Toccheto's work represents a departure from the traditional focus on acculturation, approaching the maintenance of traditional techniques of ceramic production among the indigenous population as a strategy of cultural resistance to Jesuit domination (Tocchetto 2003). It must be noted that since the 1990s, research on the Jesuit missions decreased insofar as archaeologists started to study the material remains related to African slavery. Research of this kind of context was inaugurated by Carlos Guimarães in 1980, as aforementioned. In 1990, Carlos Guimarães and his colleagues excavated the Quilombo do Ambrósio, recovering a significant amount of low-fired earthenware, pipes, and zooarchaeological material. In 1992 and 1993, Charles E. Orser, Pedro Funari, and Michael Rowlands conducted research on the largest maroon settlement known from Brazil, namely, the seventeenth-century Quilombo dos Palmares, located in the state of Alagoas (Funari 1999). They recovered indigenous and colonial coarse earthenwares and European majolicas. Additionally, early in the 1990s, Tania Lima and colleagues excavated the slave quarters of the coffee plantation São Fernando in Vassouras (Rio de Janeiro state), recovering a small assemblage composed of European whitewares and glass fragments (Lima et al. 1993). This scarcity of material was interpreted by the authors as indicative of the slaves' very low standards of life and supported the idea – currently surpassed – that the contexts of African slavery in Brazil were characterized by the paucity of material culture.

More recently, research on plantations in Central, Western, and Southeastern Brazil, carried out, respectively, by Marcos Souza, Luis Symanski, and Camilla Agostini, has revealed a large amount of material items related to slave lifeways, including coarse earthenware vessel forms such as pans, bowls, and storage jars; European whitewares consisting of plates, cups, saucers, and bowls; glass bottles, copper ornaments, and iron tools. Discussions regarding these artifacts have taken into account their role in the building of a sense of collectivity in the slave community, the development of an internal economy in the slaves quarters, the affirmation of discrete identities in the plantations space, and the existence of a market specifically directed to slaves and African-descent consumers, characterized by low-price commodities such as coarse earthenwares.

A growing interest in the archaeology of African-Brazilian experience has encouraged scholars to apply models of cultural encounters more sophisticated than acculturation, which, traditionally, has been the dominant model in the study of Jesuit missions and Euro-indigenous contact sites. This is the case with models of creolization, transculturation, and ethnogenesis, which tend to highlight the selective appropriation and reinterpretation of the culture of the "other," as well as the mutual cultural influence between colonizers and colonized, which results in the emergence of new cultural forms. The case of the Quilombo dos Palmares has been approached from the perspective of such models by Scott Allen, who has studied the ceramics from this site, and Pedro Funari (1999), who highlighted the multicultural configuration of this maroon settlement and the processes of interaction between maroons and other groups that occupied the region.

Marcos Souza (2000), in his study of the colonial mining village of Ouro Fino (Goiás state), has discussed the ways in which a culturally diversified population, composed by Portuguese, Portuguese-Brazilians, Amerindians, Africans, and African descents, used regionally made material culture to build a wide sense of regional identity founded over a baroque worldview. Nevertheless, this effort to build a common creole culture was rejected in the domestic sphere, where Souza notices the maintenance of strong ethnic and gender asymmetries, expressed in the dichotomy between European majolicas and the locally made pottery, which reflected the differences between white men and enslaved women of African descent.

The research carried out by Marcos Souza and Luis Symanski (2009) on three sugar plantations and one maroon settlement in Chapada dos Guimarães (Mato Grosso state) addressed the process of creolization of African and African-descent groups through a diachronic perspective on the period between 1780, when the first sugar plantations were established in the region, and 1888, when most of these establishments were abandoned due to the abolition of slavery in Brazil. In the earlier decades, the African component was restricted to a low number of regional identities, predominantly from the Mina Coast, in West Africa, and from Benguela, southern Angola, and the locally made pottery presented little decorative variability, predominating designs in zigzags, diamonds, and waves, generally incised over exposed coils in the upper part of the vessels. This setting changed during the second third of the nineteenth century, when large numbers of Africans, from Western, Central, and Eastern Africa, arrived in the region and Mina and Benguela slaves strongly dropped in number. The locally made pottery from the contexts of this second period, in turn, presented a much larger decorative variability, with the introduction of new techniques, such as stamped, impressed, punctured, and finger-nailed decoration, in a wide diversity of motifs and combinations. Finally, in the last third of the nineteenth century, a creole generation, which was born on these plantations, started to dominate the demographic regional setting, coming to represent more than three quarters of the slave population in the 1870–1888 period. During this period, decorated vessels strongly dropped in popularity, demonstrating that the decorative dimension of the locally made pottery had little significance to this more culturally homogeneous, creole generation. These correlations suggested that Africans used these items to express cultural differences whereas African-Brazilians did not, demonstrating that in this region, the process of creolization was strongly linked to generational changes in the slaveholdings.

Marcos Souza has also studied the slave quarters of the São Joaquim sugar plantation in Pirenópolis (Goiás state), focusing on the active role that material culture exerted in the social universe of the enslaved groups. He concludes that the process of creolization in that context involved the formation of a coherent cluster of references by those groups, which was constantly recreated and reinvented over the generations (Souza 2007).

Another field that has seen significant development in recent years is underwater historical archaeology, particularly through the work of Gilson Rambelli (e.g., 2002), who has studied shipwrecks along the Brazilian coast. Rambelli has created a Laboratory of Underwater Archaeology and is responsible for the formation of a new generation of Brazilian underwater archaeologists.

Also, Pedro Funari has recently raised awareness among Brazilian archaeologists the diverse issues regarding archaeological practice, the political enrollment of archaeologists inside the local communities in which they work, and the effects that interpretations about the past can have over the present. The growing importance of these discussions has led Funari to create a Public Archaeology Center at the University of Campinas, São Paulo (Funari 2004). This focus on the political role of archaeology has also led to the emergence of new issues, such as the archaeology of repression (Funari et al. 2009), the decolonization of the discipline, and the development of what Daniel Miller has termed "material culture studies," which involves the archaeology of present daily life (Zarankin 2010).

International Perspectives

Although most of the academic production in historical archaeology in Brazil is still directed just to a national or sometimes Latin American audience, this picture has tended to change since the 1990s, when some Brazilian archaeologists started to discuss the singularities of social conformation at the local level, highlighting the role of agents in the definition of the practices they use to construct their identities (e.g., Funari et al. 1999; Lima 1999, 2002). The work of Pedro Funari and Tania Andrade Lima, especially, is well known internationally, being frequently cited in articles and books in Europe and United States. Currently, Brazilian historical archaeology is entering a phase of growing internationalization, with an increasing number of scholars publishing articles in some of the major international journals dedicated to the field. It must also be noted that Brazil has had an important role in the development of historical archaeology in Latin America in this century, particularly by spreading academic research results. This is in great part due to the publication, since 2008, of the journal *Vestígios – Revista Latino-Americana de Arqueologia Histórica*, a biannual periodical edited by Andrés Zarankin and Carlos Magno Guimarães and published by the Federal University of Minas Gerais, the aim of which is to promote interaction between scholars working in the field of historical archaeology across Latin America.

Future Directions

In the last 20 years, Brazilian historical archaeology has attained a state of maturity, constituting a fully integrated field of study in the country's research agenda. The heterogeneity that currently characterizes the field is also its major strength, insofar as it guarantees a plurality of perspectives, critical for the building of more inclusive, multivocal pasts, which are essential for the social development of a country historically characterized by enormous social inequalities. The current development of the field in Brazil illustrates a growing concern with the study of underprivileged groups, such as slaves, peasants, immigrants, Amerindians, and urban proletarians. These studies will serve not only to highlight the living and working conditions and identities of these groups in the past but also to strengthen the memory and identities of the contemporary descendant communities, insofar as public archaeology has been growing as an important part of archaeological agenda in academic as well as in cultural resource management researches.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Brazil: Cultural Heritage Management Education
- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Critical Historical Archaeology
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Funari, Pedro Paulo A. (Historical Archaeology)
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historical Archaeology
- ▶ Historical Archaeology in Latin America
- ▶ Landscape Archaeology
- ▶ Latin American Social Archaeology
- ▶ Lima, Tania Andrade
- ▶ Modern World: Historical Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Plantation Archaeology
- ▶ Post-Processualism, Development of
- ▶ Processualism in Archaeological Theory
- ▶ Urban Archaeology

References

De Souza, M.A.T. 1995. Arqueologia da paisagem e sítios militares. Um estudo de um forte colonial em Laguna – Santa Catarina, Brasil. *Historical Archaeology in Latin America* 6: 113–122.

De Souza, M.A.T. 2000. *Ouro fino*: arqueologia histórica de um arraial de mineração do século XVIII em Goiás. MA dissertation, Universidade Federal de Goiás.

De Souza, M.A.T. 2007. Uma outra escravidão: A paisagem social no Engenho de São Joaquim, Goiás. *Vestígios – Revista Latino-Americana de Arqueologia Histórica* 1: 61–92.

De Souza, M.A.T., and L.C.P. Symanski. 2009. Slave communities and pottery variability in western Brazil: The plantations of Chapada dos Guimarães. *International Journal of Historical Archaeology* 13: 513–548.

Funari, P.P. 1994. South American historical archaeology. *Historical Archaeology in Latin America* 3: 1–14.

Funari, P.P. 1999. Etnicidad, identidad y cultura material: un estudio del cimarrón Palmares, Brasil, siglo XVII. In *Sed non Satiata – Teoría Social en la Arqueología Latinoamericana Contemporánea*, ed. A. Zarankin and F. Acuto, 77–96. Buenos Aires: Ediciones del Tridente.

Funari, P.P. 2002. A arqueologia histórica em uma perspectiva mundial. In *Arqueologia da sociedade moderna na América do Sul: cultura material, discursos e práticas*, ed. A. Zarankin and M. Senatore, 107–116. Buenos Aires: Ediciones del Tridente.

Funari, P.P. 2004. Public archaeology in Brazil. In *Public archaeology*, ed. N. Merriman, 202–210. London/New York: Routledge.

Funari, P.P., M. Hall, and S. Jones, eds. 1999. *Historical archaeology: Back from the edge*. London: Routledge.

Funari, P.P., A. Zarankin, and M. Salerno, eds. 2009. *Memories from darkness: Archaeology of repression and resistance in Latin America*. New York: Kluwer/Springer.

Guimarães, C.M. 1988. Os quilombos do século de ouro (Minas Gerais - século XVIII). *Estudos Economicos* 18: 7–43.

Lima, T.A. 1993. Arqueologia histórica no Brasil: balanço bibliográfico (1960–1991). *Anais do Museu Paulista, Nova Série, História e Cultura Material* 1: 225–262.

Lima, T.A. 1994. De morcegos e caveiras a cruzes e livros: a representação da morte nos cemitérios cariocas do século XIX. *Anais do Museu Paulista, Nova Série, História e Cultura Material* 2: 87–150.

Lima, T.A. 1995. Pratos e mais pratos: louças domésticas, divisões culturais e limites sociais no Rio de Janeiro, século XIX. *Anais do Museu Paulista, Nova Série, História e Cultura Material* 3: 129–191.

Lima, T.A. 1996. Humores e odores: ordem corporal e ordem social no Rio de Janeiro, século XIX. *História, Ciências, Saúde* 2: 46–98.

Lima, T.A. 1999. El huevo de la serpiente: Una arqueologia del capitalismo embrionário en el Rio de Janeiro del siglo XIX. In *Sed non satiata – teoria social en la arqueologia Latinoamericana contemporánea*, ed. A. Zarankin and F. Acuto, 189–238. Buenos Aires: Ediciones del Tridente.

Lima, T.A. 2002. Os marcos teóricos da arqueologia histórica: Possibilidades e limites. *Revista Estudos Ibero Americanos* 28: 7–23.

Lima, T.A., M.C.O. Bruno, and M.P.R. da Fonsec. 1993. Sintomas do modo de vida burguês no Vale do Paraíba, Séc.XIX: Fazenda São Fernando, Vassouras, RJ Exploração arqueológica e museológica. *Anais do Museu Paulista* 1: 179–206.

Rambelli, G. 2002. *Arqueología até debaixo d'água*. São Paulo: Maranta.

Senatore, M., and A. Zarankin. 2002. Leituras da sociedade moderna: Cultura material, discursos e práticas. In *Arqueologia da sociedade moderna na América do Sul: Cultura material, discursos e práticas*, ed. A. Zarankin and M. Senatore, 5–18. Buenos Aires: Ediciones del Tridente.

Symanski, L.C. 2007. O domínio da tática. Práticas religiosas de origem africana nos engenhos de Chapada dos Guimarães (MT). *Vestígios – Revista Latino-Americana de Arqueologia Histórica* 1: 7–36.

Symanski, L.C. 2009. Arqueologia histórica no Brasil: uma revisão dos últimos 20 anos. In *Cenários regionais em arqueologia Brasileira*, ed. W. Morales and F. Moi, 279–310. São Paulo: Annablume.

Thiesen, B.V. 2006. Significados nas representações escultóricas da fachada da Cervejaria Bopp & Irmãos, Porto Alegre. *Anais do Museu Paulista* 14: 167–194.

Tocchetto, F. 2003. *Fica dentro ou joga fora?* Sobre práticas cotidianas em unidades domésticas na Porto Alegre oitocentista. *Revista Arqueologia* 16: 59–69.

Zanettini, P.E. 1996. *Arqueologia histórica de Canudos*. Salvador: Universidade do Estado de Bahia.

Zarankin, A. 2010. Cuerpos congelados: una lectura metafórica de paredes y muros en Belo Horizonte, Minas Gerais, Brasil. *Arqueologia Rosarina Hoy* 2: 79–89.

Further Reading

Sousa, A.C. 1995. Caminhos enquanto artefatos: relações sociais e econômicas no contexto do Caminho Novo e suas variantes (secs. XVIII e XIX). *Historical Archaeology in South America* 6: 67–88.

Breadfruit: Origins and Development

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Basic Species Information

Taxonomy

Breadfruit has been a major staple crop for millennia in the islands of Oceania, where hundreds of cultivars have been developed and named. The first accepted botanical description of breadfruit dates back to 1773 by Sydney

Parkinson, one of the artists who accompanied Joseph Banks on the voyage of the *Endeavour*. Since then a proliferation of names for breadfruit and its close relatives have been published, leading to much confusion in the literature about the correct scientific name for and the delimitation of the domesticated breadfruit. Recent examination of both morphological and molecular characters of hundreds of samples of breadfruit from throughout Oceania as well as related species has lead to a better understanding (Zerega et al. 2005a). The domesticated breadfruit is *Artocarpus altilis* (Parkinson) Fosberg (the most commonly seen synonyms include *A. communis* (Forster) and *A. incisa* (Thun.) L.f.). Two closely related species that contributed to breadfruit domestication are *A. camansi* Blanco and *A. mariannensis* Trécul (Fig. 1). Hybrids *A. altilis x mariannensis* also exist (Fosberg 1960).

Species Description

Artocarpus altilis is a large evergreen tropical tree that can reach up to 30 m tall. It is monoecious with separate male and female inflorescences on the same tree and produces copious amounts of white sticky latex throughout the plant. There is great diversity in the leaf and fruit (breadfruit is technically a compound fruit) characteristics of breadfruit. Adult leaves are typically glossy, dark green, and pinnately lobed and range in size. The number and size of the lobes can vary greatly, with some cultivars having no lobes at all. Fruits are variable in size (up to 20 cm wide × 30 cm long), skin color (typically yellowish to greenish), flesh color (creamy white to pale yellow), surface texture (smooth, bumpy, or spiny), and whether or not seeds are present. Seedless cultivars are typically triploid.

Although the tree is primarily grown for its starchy fruit, it is a multipurpose crop. The tree itself is used in multicropping agroforestry systems in the tropical Pacific Islands. The wood is prized for its resistance to termites and is used for dugout canoes, carvings, and in construction; the bast fibers can be used to produce cloth and cordage, the latex can be used as an adhesive, for caulking or birdlime; and all parts of the tree are

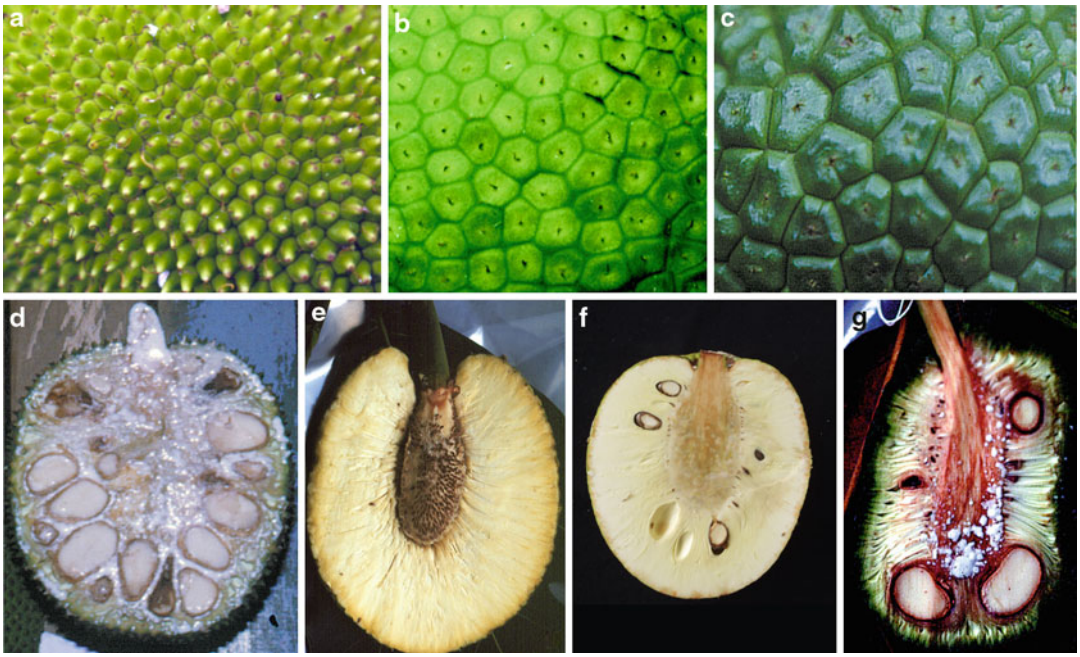

Breadfruit: Origins and Development, Fig. 1 Breadfruit and its relatives. Fruit surface and cross sections of *A. camansi* (**a**, **d**), *A. altilis* (**b**, **e**, **f**), and *A. mariannensis* (**c**, **g**)

used for a variety of medicinal purposes (Jones et al. 2011a).

Geographical Distribution

Oceania is home to the greatest morphological and genetic diversity of breadfruit, and this is where the crop was originally domesticated. In the eighteenth century, Europeans began distributing a select few cultivars beyond the Pacific Islands and today it can be found in over 80 countries throughout the tropics. However, the diversity of cultivars outside of Oceania is extremely low (Zerega et al. 2005b). Breadfruit remains most widely cultivated in Oceania, with the Caribbean region second. Breadfruit is considered an underutilized crop that has great potential in the future and its distribution throughout the tropics continues to expand. Outside of the tropics, it is often well known due to its role in the infamous mutiny aboard the *H.M.S. Bounty* in 1789.

The progenitor species of breadfruit, *A. camansi* (breadnut) and *A. mariannensis*, are both cultivated for their fruits and seeds in their native ranges and beyond. Breadnut is native to New Guinea and the Moluccas and probably naturalized in the Philippines. It is also cultivated for its seeds in parts of Southeast Asia, the Caribbean Islands, tropical Central and South America, and Africa. *Artocarpus mariannensis* is native to the Mariana Islands and Palau and has been introduced to other Micronesian and Polynesian islands.

Major Domestication Traits

The hundreds of named breadfruit cultivars found in Oceania were domesticated from either *A. camansi* alone or from both *A. camansi* and *A. mariannensis*. Selection in breadfruit appears to have focused on increased flesh content, at the expense of seeds (many cultivars are seedless), and through a decrease in the fruit core size. In addition, the fruit surface texture is smoother in the domesticate, making it easier for peeling (Jones et al. 2013). These characteristics may have been selected for since they make pit fermentation easier – a traditional way for Pacific Islanders to store food and ensure a predictable food supply. The change in seediness correlates with a change in propagation methods; the progenitor species are seed propagated, while breadfruit is predominantly vegetatively propagated with most of the seedless cultivars being sterile triploids. Seeded cultivars are most common in the southwestern Pacific Islands, while seedless cultivars are most common in Micronesia and the eastern islands of Polynesia. Virtually all breadfruit found elsewhere in the tropics is seedless. In addition to the loss of seeds, other changes occurred in the texture and color of the fruit flesh and surface, as well as in leaf shape, size, and leaf pubescence. To date, limited studies have been conducted on the change in nutritional content of breadfruit compared to its progenitor species (Jones et al. 2011b).

Timing and Tracking Domestication

Archaeological remains of breadfruit have been found on several islands throughout Oceania; however, available records are limited and a systematic study aimed at tracing the history of its domestication based on these data does not exist. Breadfruit is a significant part of the culture in Oceania, and there are numerous legends throughout the islands about its origins. Although the exact details differ, many of these stories in Polynesia describe the tree arising from the body of a god or man who willingly sacrificed himself in order to provide sustenance to a family or village during a time of famine. The similarities suggest that the stories may have been passed along with the breadfruit from island to island.

Genetic and morphological data from hundreds of breadfruit cultivars and the two progenitor species are now available and have begun to paint a picture of breadfruit origins and its path of human-mediated distribution throughout the islands of Oceania (Zerega et al. 2004). Breadfruit in Melanesia and Polynesia bear the genetic fingerprint of breadnut alone, while much of the breadfruit in Micronesia bears the fingerprint (and morphological characteristics) of both progenitor species. Considering these data in light of

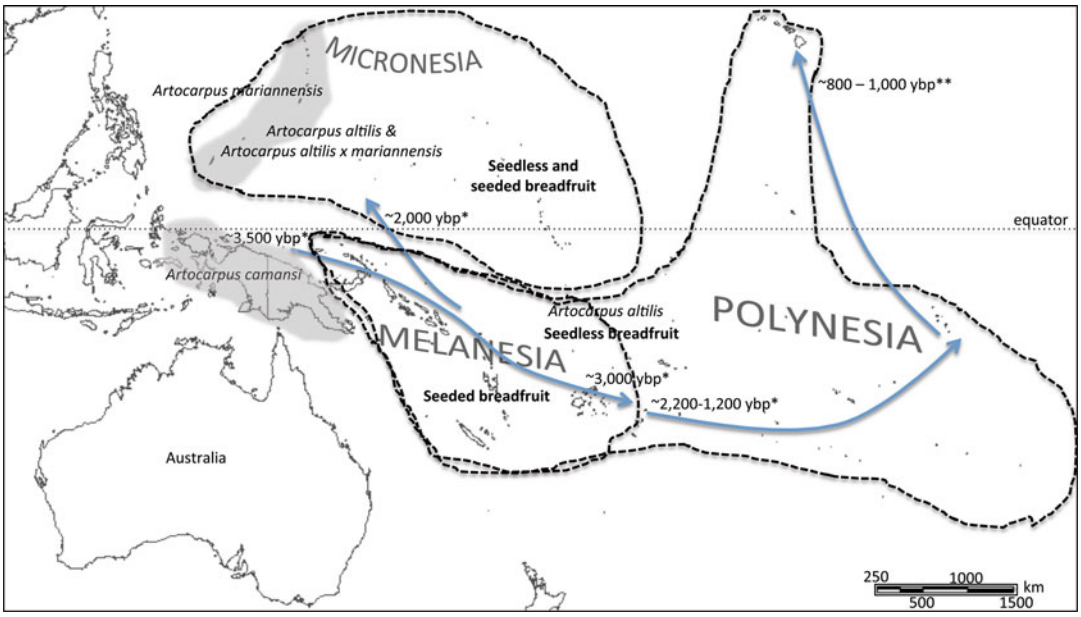

Breadfruit: Origins and Development, Fig. 2 Distribution and proposed human-mediated migration of breadfruit and its relatives. The native range of *A. camansi* and *A. mariannensis* are shaded in gray. The range of domesticated breadfruit and hybrids and their level of seediness are indicated within the dotted lines. Arrows indicate general directions of human migrations and are simplified from actual migration routes. Times are estimates of Lapita migrations likely carrying breadfruit or its progenitors and are given in years before present (YBP) and come from Kirch (2000)∗ or McCoy et al. (2010)∗∗

what is known about human colonization of the islands helps explain this pattern (Fig. 2).

The Lapita were a seafaring people on the move out of Southeast Asia, and they quickly fanned eastward from northern New Guinea about 3,500 years ago, spreading through Melanesia and Polynesia bringing plants (like breadnut) with them. *Artocarpus* seeds remain viable for only a few weeks, so as the distances of voyages increased into the more remote and not yet colonized islands of Polynesia, vegetative propagation through root cuttings would have been the preferred method of transport – this is also true for many other important crops in Oceania which are vegetatively propagated, including *Colocasia esculenta* (taro), *Dioscorea spp*. (yams), and *Piper methysticum* (kava). Successive generations of vegetative propagation eventually gave rise to seedless triploid cultivars that were preferentially selected. Additionally, the genetic diversity and level of seediness of breadfruit decreases eastward from Melanesia into Polynesia with the progressive narrowing of the gene pool with subsequent migrations. Generally, the prominence of seedless cultivars increases as one travels from New Guinea eastward through Melanesia (where seeded cultivars are common) into western Polynesia (where few-seeded and seedless cultivars are prevalent) and into eastern Polynesia (where virtually all cultivars are seedless triploids). Finally, a long-distance migration from eastern Melanesia (possibly from Vanuatu or the Solomon Islands) into Micronesia brought *A. camansi*-derived breadfruit into the range of *A. mariannensis* where the two species hybridized, giving rise to a new suite of breadfruit diversity bearing the genetic fingerprints of both progenitor species.

Cross-References

- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Oceania: Historical Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology

References

Fosberg, F.R. 1960. Introgression in Artocarpus in Micronesia. *Brittonia* 12: 101–113.

Jones, A.M.P., D. Ragone, N.G. Tavana, D.W. Bernotas, and S.J. Murch. 2011a. Beyond the bounty: Breadfruit (Artocarpus altilis) for food security and novel foods in the 21st century. *Ethnobotany Research & Applications* 9: 129–149.

Jones, A.M.P., D. Ragone, K. Aiona, W.A. Lane, and S.J. Murch. 2011b. Nutritional and morphological diversity of breadfruit (Artocarpus, Moraceae): Identification of elite cultivars for food security. *Journal of Food Composition and Analysis* 24: 1091–1102.

Jones, A.M.P., S.J. Murch, J. Wiseman, and D. Ragone. 2013. Morphological diversity in breadfruit (Artocarpus, Moraceae): Insights into domestication, conservation, and cultivar identification. *Genetic Resources and Crop Evolution* 60: 175–192.

Kirch, P.V. 2000. *On the road of the winds: An archaeological history of the Pacific Islands before European contact*. Berkeley: University of California Press.

McCoy, M.D., M.W. Graves, and G. Murakami. 2010. Introduction of breadfruit (Artocarpus altilis) to the Hawaiian Islands. *Economic Botany* 64: 374–381.

Zerega, N.J.C., D. Ragone, and T.J. Motley. 2004. Complex origins of breadfruit: Implications for human migrations in Oceania. *American Journal of Botany* 91: 760–766.

Zerega, N.J.C., D. Ragone, and T.J. Motley. 2005a. Systematics and species limits of breadfruit (Artocarpus, Moraceae). *Systematic Botany* 30: 603–615.

Zerega, N.J.C., D. Ragone, and T.J. Motley. 2005b. Genetic diversity and origins of domesticated breadfruit. In *Darwin's harvest: New approaches to the origins, evolution, and conservation of crops*, ed. T.J. Motley, N.J.C. Zerega, and H.B. Cross, 213–238. New York: Columbia University Press.

Further Reading

Jarrett, F.M. 1959. Studies in Artocarpus and allied genera, III. A revision of Artocarpus subgenus Artocarpus. *Journal of the Arnold Arboretum* 40 (115–9): 307–323.

Ragone, D. 1997. *Promoting the conservation and use of underutilized and neglected crops series, volume 10: Breadfruit, Artocarpus altilis (Parkinson) Fosberg*. Rome: International Plant Genetic Resources Institute.

Breasted, James Henry

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Basic Biographical Information

James Henry Breasted (1865–1935) was an American Egyptologist best known for his work as a historian, philologist, and epigrapher and as the founder of the Oriental Institute at the University of Chicago. Born in 1865 in Rockford, Illinois, Breasted was from a family of modest means; his father was a hardware store owner and, later, a traveling salesman. Consequently, Breasted's path to academia was fraught with financial struggle. The need to support his family was a factor in the considerable amount of educational outreach work – from public lectures to popularizing books – that he accepted; as a result, he became one of the most widely known historians of his generation (Ambridge 2010; for examples of popular work, see Breasted 1908, 1916).

Between 1880 and 1890, Breasted studied at several institutions: Northwestern College in Naperville, IL, where he concentrated in Latin; the Chicago College of Pharmacy; and the Chicago Theological Seminary. After excelling in Hebrew at the seminary, he was encouraged to pursue graduate work in Semitic languages with William Rainey Harper at Yale University (Breasted 1943: 13–25; Abt 2011: 4–16). After a year of study at Yale, and with the encouragement of Harper, Breasted departed for Germany in order to obtain a doctorate in Egyptology, a field of study not yet well established in American academia. In 1891 he matriculated at the Humboldt University of Berlin (known at the time as Friedrich-Wilhelms-Universität) and studied for the next 3 years under Adolf Erman, one of the foremost Egyptologists in Germany. By the fall of 1894, Breasted had completed his doctorate with a dissertation on the sun hymns of the New Kingdom pharaoh Akhenaten; married Frances Hart, a fellow American expatriate living in Berlin; secured a position as assistant in Egyptology at the University of Chicago; and embarked on his first tour of Egypt (Breasted 1943: 33–40, 58–66; Abt 2011: 23–40). He would remain with the University of Chicago for the duration of his career.

Major Accomplishments

Breasted excelled in languages; among those that he commanded were German, French, Latin, Hebrew, Arabic, ancient Egyptian (including

Coptic), and Assyrian. With his educational background rooted in philology, he gradually pioneered new epigraphic methods of copying, recording, and photographing ancient inscriptions. Crucial to the development of his epigraphic methodologies were the years from 1894 to 1908, when he was granted several leaves of absence from the University of Chicago in order to conduct research abroad. From 1899 to 1901, he toured the major museums of Europe, where he photographed, transcribed, and translated all of the museums' historical inscriptions of ancient Egypt (Wilson 1936: 99; Breasted 1943: 103–15; Abt 2011: 75–8). This work contributed to Adolf Erman's Egyptian dictionary – the *Wörterbuch der ägyptischen Sprache* – and culminated in Breasted's own multivolume *Ancient Records of Egypt*, published in 1906. His first tour of Egypt occurred in the winter season of 1894/1895, during which he recorded inscriptions at major archaeological sites in the Nile valley north of Aswan. In the winter seasons of 1905/1906 and 1906/1907, he led expeditions through both Upper and Lower Nubia from Naga in the south to Beit el-Wali in the north, further refining his epigraphic methods (for photos of these expeditions, see Larson 2006).

In the years between 1908 and 1919, Breasted focused on teaching, writing, and administration; he was the chair of the University of Chicago's Department of Oriental Languages and Literatures as well as the director of the Haskell Oriental Museum (now the Oriental Institute Museum). The most notable publications from the first half of his career include his popular and widely read *A History of Egypt from the Earliest Times to the Persian Conquest* (1905); *Ancient Records of Egypt* (1906); *Development of Religion and Thought in Ancient Egypt* (1912); and *Ancient Times, a History of the Early World* (1916), a textbook written for high school students.

Ancient Times had a significant impact on the future of American Egyptology when the book received a favorable response from Frederick Gates, business advisor to John D. Rockefeller, Sr. and his son, John D. Rockefeller, Jr. Consequently, Breasted sought research funding from the Rockefeller Foundation and in 1919, John D. Rockefeller, Jr. committed to 5 years of financial support, enabling Breasted to found the Oriental Institute at the University of Chicago. The Institute's first project in 1919/1920, led by Breasted, was a 9-month reconnaissance survey throughout the Middle East, a region of the world undergoing profound changes in the aftermath of World War I. On this trip, Breasted's team evaluated such sites as Ur, Lagash, Babylon, Assur, Nineveh, and Khorsabad (Emberling 2010).

With continued funding from Rockefeller, Breasted established permanent field headquarters for the Oriental Institute in Luxor, Egypt. Named "Chicago House," the site still serves as the base for the Institute's ongoing Epigraphic Survey of Theban temples, a project initiated by Breasted in 1924. By 1928, Breasted secured a multimillion-dollar grant from the Rockefeller Foundation, resulting in a permanent endowment for the Oriental Institute and the construction of the Institute's research center, completed in 1931 (Abt 2011: 284–6, 345–9). Although Breasted did not identify himself as an archaeologist – he acknowledged the difference between the goals and methodologies of his epigraphic work and those of excavations run by such archaeologists as Flinders Petrie and George Reisner – in his capacity as director of the Oriental Institute he initiated excavations at such sites as Megiddo, Çatal Hüyük, Khorsabad, Tell Asmar, and Persepolis.

The heavy administrative duties of the Oriental Institute slowed Breasted's own research during the second half of his career. Two notable publications from this period are *The Edwin Smith Surgical Papyrus* (1930) and *The Dawn of Conscience* (1934). His wife, Frances, died in 1934; in June of 1935, he married his wife's younger sister, Imogen. The marriage was short-lived, however, as Breasted fell ill on the return journey from a tour of the Middle East in that same year. By the time his ship arrived in New York, Breasted had developed a streptococcal infection and he died on December 2, 1935, at the age of 70. He was survived by three children: Charles, James Henry, Jr., and Astrid.

Cross-References

- ▶ Empire in the Ancient Near East, Archaeology of
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ History and Archaeology: Relationship over Time (US Perspective)

References

Abt, J. 2011. *American Egyptologist: The life of James Henry Breasted and the creation of his Oriental Institute*. Chicago: University of Chicago Press.

Ambridge, L. 2010. History and narrative in a changing society: James Henry Breasted and the writing of ancient Egyptian history in early twentieth century America. Unpublished PhD dissertation, University of Michigan.

Breasted, J.H. 1908. *Egypt through the stereoscope: A journey through the land of the Pharaohs*. New York: Underwood & Underwood.

Breasted, J.H. 1916. *Ancient times, a history of the early world*. Boston: Ginn and Company.

Breasted, C. 1943. *Pioneer to the past: The story of James Henry Breasted, archaeologist*. Chicago: University of Chicago Press.

Emberling, G., ed. 2010. *Pioneers to the past: American archaeologists in the Middle East, 1919–1920*. Chicago: Oriental Institute of the University of Chicago.

Larson, J. 2006. *Lost Nubia: A centennial exhibit of photographs from the 1905–1907 Egyptian expedition of the University of Chicago*. Chicago: University of Chicago Press.

Wilson, J. 1936. Biographical memoir of James Henry Breasted, 1865–1935. *National Academy of Sciences Biographical Memoirs* 18: 94–121.

Further Reading

Abt, J. 1996. Toward a historian's laboratory: The Breasted-Rockefeller museum projects in Egypt, Palestine and America. *Journal of the American Research Center in Egypt* 33: 173–194.

Ambridge, L. 2012. Imperialism and racial geography in James Henry Breasted's ancient times, a history of the early world. *Journal of Egyptian History* 5: 49–70.

Kuklick, B. 1996. *Puritans in Babylon: The ancient Near East and American intellectual life, 1880–1930*. Princeton: Princeton University Press.

Marcanti, R. 1977. *The 1919/20 Breasted expedition to the Near East: A photographic study*. Chicago: University of Chicago Press.

Wilson, J. 1964. *Signs and wonders upon Pharaoh: A history of American Egyptology*. Chicago: University of Chicago Press.

British Isles: Medieval Archaeology

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B

Introduction

As a geographic entity the British Isles refers to the two large northwest European islands of Great Britain (England, Scotland, and Wales) and Ireland and the smaller offshore islands which belong in their jurisdictions. The term is not popular in the Republic of Ireland, independent of British rule since 1922 and a republic since 1949, but, with attempts to re-brand the two islands as an Atlantic archipelago not having had much success, Irish commentators across a multiplicity of scholarly fields refer instead to "Britain and Ireland" (or "Ireland and Britain"). Historically, the "British Isles" is acceptable, however, and has no relationship with issues of modern sovereignty.

Definition

Traditionally, there are two problematic areas of definition, one of the discipline itself and one of the temporal boundaries and internal temporal subdivisions of the Middle Ages. These matter less to those medieval archaeologists (increasing in number) who engage directly with archaeological theory than they do to archaeologists of a more traditional, cultural-historical, persuasion, but they remain at the core of the discipline nonetheless.

Regarding the former, there are two ways of viewing Medieval Archaeology. One is period based: it is simply the study of the archaeological record of the Middle Ages and differs from prehistoric archaeology only insofar as a historical record provides clues to understanding and dating material remains. The second is sensitive to the particular epistemological challenges posed by a

written record alongside a material record and is conscious of the skills required to negotiate the historical record without feeling reliant on those skills. In many ways, this distinction between two types or conceptions of Medieval Archaeology parallels a similar distinction in the field of Historical Archaeology.

Regarding the second of the two problematic areas of definition, the debate as to the start and end dates of the Middle Ages is a slightly irrelevant one in that there was no understanding among medieval people that they were in the middle of anything. But the consensus now is that if a start date for the Middle Ages in the British Isles is required, the best option is to assign the collapse of the Roman Empire in the early fifth century and the near-simultaneous diffusion of Christianity from that Roman world into the "Celtic West," to the very end of the premedieval period. This brings the insular chronology into line with that of much of Continental Europe, especially western Europe and the Mediterranean lands. The watershed in England, southern Wales, and southern Scotland is marked specifically by the departure of Roman legions and, in eastern England, by the beginnings of Anglo-Saxon period, the latter a phenomenon that is still hotly debated. The transition from premedieval to medieval is less well defined in other parts of Britain, but the indigenous populations of these areas, speaking what are described by modern scholars as Celtic languages, would not have been unaffected by the presence of Roman culture and so would not have been unaffected by its ending, even if it took time for the cultural implications of the Roman departure to be absorbed. Ireland was not part of the Roman Empire, but the earliest documentation of Christianity dates from the early fifth century and specifically the sending by the pope of a bishop (Palladius) to minister to Christians (presumably Roman traders) resident on the island. A later though still fifth-century bishop, Patrick, is credited with the conversion of the people of Ireland, though other unnamed missionaries must have been involved and the process must have continued into the 500 s if not also the 600 s.

There is less consensus on the end date of the Middle Ages, mainly because moments or events which stand out as historically pivotal do not necessarily chime with shifts in worldviews or changes in material practice, the indicators that archaeologists use in periodizing. For archaeologists who like historical correlatives, the period of Henry VIII's reign (1509–1547) provides two key touchstones: his establishment of the Protestant Church in the 1530s and the dissolution of the monasteries between 1536 and 1541. Archaeologists who work more independently of historical narratives prefer to focus on the emergence of Renaissance culture or the shift from "feudalism," which is a hotly contested concept, to "capitalism," which is slightly less hotly contested (Gaimster and Stamper 1997; Gaimster and Gilchrist 2003). For these phenomena there is no fixed chronology and certainly none that can be applied to all parts of the British Isles. There is at least some agreement that, even in the most remote parts of the islands, the medieval period is over by the start of the seventeenth century.

Key Issues/Current Debates/Future Directions/Examples

Aspects of the medieval past on the two islands, whatever the chronological boundaries given to that past, have been the specific subject of archaeological investigations as we might understand them today since the early twentieth century (Gerrard 2003). Archaeological work of the 1800s, fitful with respect to the medieval heritage, is best regarded under the heading of "antiquarianism": conservation work on medieval monuments in Great Britain, for example, usually necessitated wall-chasing trenches, dug and emptied with little concern for data other than structural and material. Among the key works establishing the modern discipline was E.T. Leeds, *The Archaeology of the Anglo-Saxon Settlements* (1913), a work which, through opening up the potential of archaeological investigations to reveal the origins of the English people, laid the foundation for the especially enduring richness-of-tradition of Anglo-Saxon archaeological scholarship, a foundation built upon by the discovery of the Sutton Hoo Anglo-Saxon burial in 1939. There are no such benchmarks in Ireland until the publications of the excavations of a series of

early medieval sites by Hugh O'Neill Hencken of *The Harvard Mission to Ireland 1932–36*. To the preoccupation with Anglo-Saxon and Celtic archaeologies during the first decades of the last century was added a concern, mainly in the 1970s, for Viking Archaeology, the impetus being the urban excavations in York and Dublin. By that stage the discipline had its own dedicated society, the Society for Medieval Archaeology, founded in 1957, the journal of which, *Medieval Archaeology*, still generously offers a forum for pan-European investigations but is still largely comprised of papers on British themes. Research on the High Middle Ages, the period starting with the Norman invasion of England of 1066, followed by the Anglo-Norman spread into lowland Scotland and (especially) eastern Ireland in the twelfth century, was less systematically conducted, reflecting somewhat ironically the much greater diversity and volume of high-medieval archaeological material on the one hand and the availability of an historical record to provide an overarching interpretative framework on the other. That is not to say that there was no systematic research; on the contrary, projects like the excavations at Wharram Percy, and organizations such as the Medieval Pottery Research Group (founded in 1975), created a rich tradition. Works of synthesis only appeared late in the century (Clarke 1984; Barry 1987; Yeoman 1995), after the Society for Medieval Archaeology had celebrated its quarter-century anniversary with a volume of essays (Hinton 1983) which revealed a youthful discipline in thrall to historical narratives and, arguably, struggling to achieve some rapprochement with the New Archaeology (or processual archaeology, as we call it now).

The last quarter of the century has seen significant growth in Medieval Archaeology in these islands. The expansion of lectureships in British and (mainly in the 1990s) Irish universities puts it alongside longer-established areas on the educational curriculum. Medieval Archaeology remains a strongly cross-disciplinary pursuit in these islands, and most archaeologists possess a cognizance of the historical record and an ability to make sense of it without feeling enslaved by it. Traditional questions remain on the agenda – the origins of the English village and, by extension, the origins of Englishness itself; rural settlement in Scotland and Wales; and the fugitive archaeology if Gaelic-Irish communities in high medieval Ireland – but answers, while not definitive, are more advanced. More significantly, progress in "scientific archaeology" – the reconstruction of diet from skeletal remains and DNA analysis of human populations and remote sensing (such as LiDAR) on the other – has had a transformative impact on our understanding of medieval populations and their activities and, to the credit of practitioners, has been advanced with full cognizance of the importance of connecting "scientific" understandings to "cultural understandings." Moreover, there has been a parallel growth in awareness of the value of thinking theoretically beyond traditional culture-history (although it is markedly less advanced in Ireland, where even the New Archaeology was eschewed in the 1970s), than in the United Kingdom; comparison between the publication celebrating of the Society for Medieval Archaeology's half-century anniversary (Gilchrist and Reynolds 2009) and that of 25 years earlier shows the extent to which the subject has grown in recent years.

Cross-References

- ▶ Burial Excavation, Anglo-Saxon
- ▶ Council for British Archaeology (CBA)
- ▶ Crannog Investigations in Scotland
- ▶ Medieval Pottery Research Group (MPRG)
- ▶ Society for Medieval Archaeology
- ▶ Urban Archaeology
- ▶ York Archaeological Trust

References

Barry, T.B. 1987. *The archaeology of medieval Ireland*. London: Routledge.

Clarke, H. 1984. *The archaeology of medieval England*. London: British Museum Press.

Gaimster, D., and R. Gilchrist, eds. 2003. *The archaeology of reformation 1480–1580 (The Society for Post-Medieval Archaeology Monograph 1)*. Leeds: Maney.

Gaimster, D., and P. Stamper, eds. 1997. *The age of transition. The archaeology of English culture, 1400–1600*. Oxford: Oxbow.

Gerrard, C.M. 2003. *Medieval archaeology. Understanding traditions and contemporary approaches*. London: Routledge.
Gilchrist, R., and A. Reynolds, eds. 2009. *Reflections: Fifty years of medieval archaeology*. Leeds: Maney.
Hinton, D.A., ed. 1983. *25 years of medieval archaeology*. Sheffield: Department of Prehistory & Archaeology, University of Sheffield.
Yeoman, P. 1995. *Medieval Scotland: An archaeological perspective*. London: Batsford.

Further Readings

Austin, D. 1990. The 'proper study' of medieval archaeology. In *From the Baltic to the Black Sea: Studies in medieval archaeology*, ed. D. Austin and L. Alcock, 9–42. London: Routledge.
Driscoll, S.T. 1984. The new medieval archaeology: Theory vs history. *Scottish Archaeological Review* 3 (2): 104–108.
Edwards, N. 1990. *The archaeology of early medieval Ireland*. London: Batsford.
O'Keeffe, T. 2000. *Medieval Ireland: An archaeology*. Stroud: Tempus.
Steane, J. 1985. *The archaeology of medieval England and Wales*. London: Croom Helm.

British Museum

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Basic Information

Situated in Great Russell Street, London, the British Museum (http://www.britishmuseum.org/) was created by an Act of Parliament in 1753 and opened to the public in 1759. Governed by a board of 25 trustees in accordance with the British Museum Act of 1963 and the Museums and Galleries Act of 1992, the museum is a non-departmental public body, sponsored by the Department for Culture, Media and Sport. The museum's stated purpose is "to hold for the benefit and education of humanity a collection representative of world cultures and to ensure that the collection is housed in safety, conserved, curated, researched and exhibited" (British Museum n.d.).

The British Museum originated with the collection belonging to physician and naturalist, Sir Hans Sloane (1660–1753), which consisted of natural history specimens, ethnographic material, antiquities, jewelry, coins, medals, prints, and Orientalia. This was combined with a large library of manuscripts assembled by Sir Robert Cotton, and the Harleian Library, the manuscript collection of the earls of Oxford. Expanded in 1757 with the addition of King George II's donation of the old Royal Library, the museum thus originally mainly consisted of natural history specimens, books, and manuscripts. In 1772, the museum acquired its first collection of notable antiquities with the Greek vases belonging to Sir William Hamilton. In 1807, it created a specific Department of Antiquities which, in 1860, was divided into three: Greek and Roman Antiquities, Oriental Antiquities, and Coins and Medals. In the early 1880s, the museum divested itself of its Natural History collection, consequently making space for its expanding collection of antiquities. In 1997, the books and manuscripts making up the National Library were moved from the British Museum to their new home at St Pancras, and the Museum's circular Reading Room subsequently incorporated, in 2000, into the redesigned Great Court (Wilson 2002).

Today the Museum is made up of ten departments, primarily consisting of antiquities, which together contain eight million objects: The Department of Ancient Egypt and Sudan houses material from the Nile Valley, spanning the Predynastic Neolithic c.10,000 BCE to the Coptic Christian period in the twelfth century CE. It includes such famous objects as the colossal bust of Ramesses II, the Gayer Anderson cat, the Amarna tablets, and the Rosetta Stone. The Department of Greece and Rome houses Mediterranean antiquities dating from the Bronze Age to the fourth century CE and includes bronze sculpture, Greek vases, elements from the Mausoleum at Halicarnassus and the Temple of Artemis at Ephesus, and the controversial Elgin Marbles. The Department of the Middle East focuses upon the material culture of Mesopotamia, Iran, the Levant, Anatolia, Arabia, Central Asia, and the Caucasus from the Neolithic period to the present.

It contains objects such as Sumerian material from the royal cemetery at Ur, the Old-Babylonian "Queen of the Night" plaque, the Black Obelisk of Shalmaneser III, and the lion-hunt reliefs from the Assyrian palaces at Nimrud and Nineveh.

The museum's Department of Prehistory and Europe focuses on the Paleolithic and Neolithic periods, the Bronze and Iron Ages, Roman Britain, and the Medieval and Renaissance periods up to the present. It houses such objects as the seventh-century CE Sutton Hoo Anglo-Saxon ship burial and the Lewis Chessmen. It works in conjunction with the Department of Portable Antiquities and Treasure which coordinates the Portable Antiquities Scheme through which archaeological objects found by members of the public are recorded and which administers the Treasure Act 1996 on behalf of the UK Government. The Department of Asia contains material spanning the Neolithic c. 4000 BCE to the present and includes the Buddhist limestone reliefs from Amaravati. The Department of Africa, Oceania, and the Americas combines ethnographic, historical, archaeological, and contemporary material and includes the controversial Benin bronzes. The Department of Coins and Medals is concerned with the history of coinage from the seventh century BCE to the present. The Department of Prints and Drawings contains the National Collection of Western prints and drawings, dating from the fifteenth century to the present day, and the Department of Conservation and Scientific Research works with the other departments to conserve and study the collection.

Major Impact

The British Museum can claim to be the first national museum in the world. Its collection is among the largest and most extensive in existence and formed the basis of what later became the Natural History Museum which opened in 1881 and the British Library created in 1973. The museum has a long association with archaeological excavation, beginning with Charles Fellow's expedition to Xanthos in Asia Minor in 1840. It supported Austen Henry Layard's excavations in Assyria which resulted in the discovery of Ashurbanipal's great library of cuneiform tablets. The museum was also involved in the creation of the Egypt Exploration Fund in 1882. The museum maintains an active role in many national and international archaeological fieldwork projects. It encourages its staff to participate in excavation and fieldwork and is one of the chief British sources of funds for research excavation. The museum is also inextricably involved in the debate about the Return of Cultural Property, with the Elgin Marbles, the Rosetta Stone, and the Benin Bronzes as the most prominent among the contested objects in its collection (Wilson 2002).

The museum is the UK's most popular visitor attraction (FitzGerald 2012) and seeks to actively engage with the public. Museum facilities such as departmental study rooms and libraries are accessible to members of the public undertaking their own research. The museum collection is available online with a searchable database containing 2,335,338 records which represent over 4,000,000 objects, 1,018,471 of which are accompanied by one or more photographs. The British Museum Press publishes books relating to exhibitions and aspects of the collection, and the museum also has three online journals – *The British Museum Studies in Ancient Egypt and Sudan*, *British Museum Technical Research Bulletin*, and *Bronze Age Review*. The museum website also includes a blog containing regular posts by members of staff on recent news, exhibitions, acquisitions, aspects of the collection, and archaeological excavations. The museum works in partnership with universities to offer higher education courses, actively encourages visits by school groups, and holds family-focused events.

Cross-References

- ▶ Conservation in Museums
- ▶ Encyclopedic Museum
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage Museums and the Public
- ▶ Heritage Theory
- ▶ Parthenon (Elgin) Marbles: Case Study
- ▶ Repatriation: Overview

References

Fitzgerald, N. 2012. Foreword. In *The British Museum 2011/2012 review*. London: The British Museum.

The British Museum Management and Governance. n.d. Available at: http://www.britishmuseum.org/about_us/management/museum_governance.aspx. Accessed 24 Aug 2017.

Wilson, D.M. 2002. *The British Museum: A history*. London: The British Museum Press.

Further Reading

Bohrer, F.N. 1994. The times and spaces of history: Representation, Assyria, and the British Museum. In *Museum culture: Histories, discourses, spectacles*, ed. D.J. Shearman and I. Rogoff, 197–222. Mineapolis: University of Minnesota Press.

Coombes, A.E. 1994. *Reinventing Africa: Museums, material culture, and popular imagination in late Victorian and Edwardian England*. New Haven: Yale University Press.

Hoberman, R. 2011. *Museum trouble: Edwardian fiction and the emergence of modernism*. Charlottesville: University of Virginia Press.

Hooper-Greenhill, E. 1992. *Museums and the shaping of knowledge*. London: Routledge.

Moser, S. 2006. *Wondrous curiosities: Ancient Egypt at the British Museum*. Chicago: University of Chicago Press.

Schubert, K. 2009. *The curator's egg: The evolution of the museum concept from the French revolution to the present day*. London: Ridinghouse.

Wilson, D.M., ed. 1989. *The collections of the British Museum*. London: British Museum Publications Ltd.

British Pioneers and Fieldwork Traditions

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From its antiquarian origins, the development of field method in Britain reflects attempts by archaeologists to balance the merits of survey against excavation, research against rescue, and empiricism against theorized interpretation. While early methods lacked consistency, most were based on a modified form of empiricism known as inductivism: observations in the field gathered together to create interpretative statements (Marsden 1983). Richard Colt Hoare (1758–1838), excavator of more than 500 sites in the early 1800s, memorably summed up the position by declaring that "We speak from facts not theory" as the epigraph to *Ancient Wiltshire* published between 1812 and 1820. Importantly, a community of practice emerged to foster a network of amenity societies.

The late nineteenth century was a watershed in the development of archaeological fieldwork. Positivism strengthened as the preferred philosophy, suiting archaeology well by perpetuating distinctions between "facts" as things that could be observed and "laws" or "interpretations" as statements making sense of the facts. Maintaining the integrity of the facts therefore became important, and one of the main steps toward achieving this involved structuring investigation methods and recording systems. Leading this field was General Pitt Rivers (1827–1900) whose interests in social evolution carried through to developing a method of excavation that charted sequences of activity at particular sites. In practice this meant recording every object so it could be replaced accurately in its findspot through the use of plans and section drawings – essentially three-dimensional recording of finds. A generation later Mortimer Wheeler (1890–1976) added the need to record strata (every layer) three-dimensionally as well. To achieve this he developed an excavation method that still bears his name – the Wheeler System – in which the area of investigation was divided into squares with balks between. Each square was separately excavated, and the plans and four sections of each were carefully drawn (Wheeler 1954).

Continental methods of *open-area excavation* were meanwhile imported into Britain, notably by Gerhard Bersu (1889–1964) at Little Woodbury, Wiltshire, in 1938–1939. This approach to excavation and recording had far-reaching consequences after the Second World War, but even during the war, a small team of archaeologists led by W.F. Grimes (1905–1988) recorded sites in this way before they were destroyed by the construction of military installations. Noteworthy was Grimes' rigorous open-plan excavation of the

Burn Ground long barrow, Gloucestershire, in 1940–1941 where he planned every stone in the mound. After the war, rebuilding programs coupled with industrial expansion, agricultural extensification, urban regeneration, and infrastructure renewal created many opportunities for archaeological investigation. Subsequent changes in methodology can be gauged from five successive textbooks on the subject by Richard Atkinson (1946), John Coles (1972), Philip Barker (1977), Steve Roskams (2001), and Martin Carver (2009).

Operationally, work has expanded into hitherto under-investigated environments such as occupied towns, wetlands, uplands, agricultural land, and coastlands, often with rich rewards. Practically, there was much experimentation with the shape and size of excavation trenches, including uses of quadrant methods, *planum* systems, and large-scale open-area excavation taken from continental innovations. However in Britain attention remained focused on the removal of individual layers, or *contexts* as they became widely known, in the reverse stratigraphic order to deposition. Teasing apart complicated sequences, finding natural construction or erosional surfaces, positive and negative features, deposits and cuts, became a technical as well as an intellectual challenge (Hodder 1999). Finds were associated with contexts as the basic unit of recovery, and the application of archaeological site science promoted systematic sampling for ecofacts and artifacts down to microscopic levels as well as the recovery of environmental indicators and chemical characterization.

In field survey, the tradition based on the idea of cultural property and monuments promoted by Pitt Rivers was continued for much of the twentieth century by government-sponsored "Royal Commissions" which had the remit of recording everything visible on the surface (Crawford 1960). Aerial photography was adopted for archaeology immediately after World War 1 and exported to the countries of the then British Empire. The postwar period saw the development of "landscape archaeology," a set of more sophisticated and analytical approaches that focused on wide geographical areas and assumed that the land was regularly overwritten by successive generations to form a "palimpsest" (Darvill 2001). Aerial photography, remote sensing, ground surveys, place-name studies, and past cartography were among the many primary sources used to create landscape regression models – snapshots of a landscape as it might have been at a particular period. Uniquely, in England, where treasure hunting on private property remains legal, a new voluntary scheme has encouraged the reporting of objects found by metal detectorists. The *Portable Antiquities Scheme* has produced an immense harvest of reported finds, creating a rich geographical database of dated artifacts, the majority of metal.

From the 1960s representatives from museums, universities, local and national archaeological societies, local authorities, and the government agencies began working together to meet the needs of *rescue archaeology* in their locality. While the rescue of archaeological strata in Britain is not obligated by law, in 1990 its justification was embedded in Planning Policy Guidance Note 16 (=PPG16 *Archaeology and Planning*) for England, with similar statements for other parts of Britain. Periodically updated, most recently in 2012 as the *National Planning Policy Framework*, these remain the basis for the funding of archaeological intervention by the private sector. An excess of 4,000 investigations a year have been undertaken in England alone since 2000. This has coincided with a revolution in IT, resulting in innovative approaches to on-site data capture and the subsequent production and processing of plans, sections, photographs, and descriptive records. Compiled in *client reports*, these are presented to the commercial sponsors of the work in fulfillment of contract.

More than 90% of archaeological fieldwork in Britain is now prompted by planned commercial development. It comprises predetermination work, such as desk-based assessments, field evaluations, and Environmental Impact Assessments, and post-determination work that focuses on mitigating impact, implementing conservation measures, recording buildings, and investigating deposits faced with destruction through a range of techniques that include both trenching and open-area excavation. Conceptually, the

archaeological resource of the 1970s and 1980s, *heritage* as it was called in the 1990s, has now been redefined as *historic environment* assets. Large-scale projects remain common, including, for example, the high-speed railway line from London to the Channel Tunnel, Terminal 5 at London's Heathrow Airport, and the Hinkley Point C nuclear power station. But size is less important than quality. Since revisions to the planning system in 2012, and the gathering strength of "localism" as a political philosophy, integrating archaeology with local communities and using the knowledge generated to create public value have taken center stage.

From about 2006, economic instability and the global recession had various effects on archaeological fieldwork traditions in Britain. Initially, the profession scaled back in the face of lower demand for archaeological services (Aitchison 2010), although by 2017 had bounced back to earlier levels of activity. The respite in activity also allows the chance to take stock of achievements over the previous 20 years (Darvill et al. 2018): to rebalance the scope and aims of fieldwork, reconcile positivist and relativist approaches under the rubrics of creative science and community engagement, promote academic recognition and definitions of the discipline, and integrate opportunities offered by development-driven research with the power of problem-orientated research – in fact, a twenty-first century version of the agenda faced 300 years ago by the founders of Britain's fieldwork traditions.

References

Aitchison, K. 2010. United Kingdom archaeology in economic crisis. In *Archaeology and the global economic crisis. Multiple impacts and possible solutions*, ed. N. Schlanger and K. Aitchinson, 25–30. Tervuren: Culture Lab Editions. http://ace-archaeology.eu/fichiers/25Archaeology-and-the-crisis.pdf. Accessed 10 Jan 2012.

Atkinson, R.J.C. 1946. *Field archaeology*. London: Methuen.

Barker, P. 1977. *Techniques of archaeological excavation*. London: Batsford.

Carver, M. 2009. *Archaeological investigation*. London: Routledge.

Coles, J. 1972. *Field archaeology*. London: Methuen.

Crawford, O.G.S. 1960. *Archaeology in the field*. London: Phoenix.

Darvill, T. 2001. Traditions of landscape archaeology in Britain: Issues of time and scale. In *One land, many landscapes. Papers from a session held at the European Association of Archaeologists Fifth Annual Meeting in Bournemouth 1999*, BAR International Series 987, ed. T. Darvill and M. Gojda, 33–46. Oxford: Archaeopress.

Darvill, T., K. Barrass, B. Russell, and E. Milner. 2018. *Archaeology in the PPG16 Era: Investigations in England 1990–2010*. Oxford: Oxbow Books & Historic England.

Hodder, I. 1999. *The archaeological process. An introduction*. Oxford: Blackwell.

Marsden, B. 1983. *Pioneers of prehistory. Leaders and landmarks in English archaeology (1500–1900)*. Ormskirk: Hesketh.

Roskams, S. 2001. *Excavation*. Cambridge: Cambridge University Press Manuals in Archaeology.

Wheeler, M. 1954. *Archaeology from the Earth*. Oxford: Clarendon Press.

British School at Athens

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Basic Information

The British School at Athens is a research institute for Hellenic studies across all fields and periods. Situated in the center of Athens, the school consists of a hostel for resident scholars, an extensive library with map and archive collections, a small museum, and the Fitch Laboratory for science-based archaeology. At Knossos, the BSA maintains a residential field center and Stratigraphical Museum which form the base for its excavations and research in Crete. Work conducted by the school was published in the *Journal of Hellenic Studies* until the establishment of the first volume of the *Annual* for the 1894–1895 session. Each year since 1955, the school has produced a digest of all fieldwork in Greece, *Archaeology in Greece*,

jointly with the Hellenic Society and now supplemented online in a collaboration with the French school. The school's website is at www.bsa.ac.uk.

Foundation and Early History

As the discipline of archaeology rapidly developed in the nineteenth century, a number of countries established foreign schools in Greece. The first to open in Athens was the École française d'Athènes in 1846, followed by the Deutsches Archäologisches Institut in 1874, and in 1881 the American School of Classical Studies. The idea for a British institute in Athens was championed by Sir Richard Jebb, whose "Plea for a British Institute at Athens" in the *Fortnightly Review* in May 1883 provided the impetus for a public meeting held by the Prince of Wales, later King Edward VII, at Marlborough House in London, with guests including Lords Salisbury and Rosebery and the Prime Minister, William Gladstone. A committee was formed for the school which gathered donations toward the construction of a building in Athens.

During a visit to Athens in 1878, Jebb had contacted Charilaos Trikoupis, then foreign minister of Greece. In 1882, Trikoupis became prime minister and the following year offered a plot of land donated by the monastery of Petraki for the school on the slopes of Mt. Lykavittos. Opened in November 1886, the school building (now the Director's residence) was completed according to a design by the first Director, Francis Penrose, who had studied Athenian architecture for the Society of Dilettanti. Increased student numbers necessitated the building of a separate hostel at the lower end of the garden in 1897, which after three subsequent enlargements now comprises accommodations, offices, and common areas and is linked to the Penrose Library, built in 1904 and itself subsequently enlarged.

Financially, the school was reliant upon subscriptions and donations until Her Majesty's Treasury was persuaded to support the institution with an annual grant. Today the school continues to receive significant funding from the British government through the British Academy.

Major Impact

Archaeological Fieldwork

From its origins, the school was interested in a wide spectrum of fields: anthropology and ethnography, history, epigraphy, linguistics, art, and architecture. Among its archaeological fieldwork, the school has excavated widely in the Cyclades, Crete, Laconia, and Macedonia. One of the earliest major digs was at Phylakopi on Melos, begun in 1896, which began a long-standing focus for the school on the prehistory of Greece. Duncan Mackenzie's stratigraphical work here was advanced for its time, providing him with skills he would later bring to Knossos in 1900 as the deputy of Sir Arthur Evans.

In the early years of the twentieth century, the school began its long association with Sparta and its surrounding Laconian territory. Excavation began at Sparta in 1906, and investigations over a 100 years have uncovered the shrine of Athena Chalkioikos and the city's theater, the Sanctuary of Artemis Orthia, the Menelaion, Agios Stefanos, Kouphovouno, and Pavlopetri.

The school also maintains a long association with Mycenae. In 1920, the then Director of the school, Alan Wace, began working within the citadel as well as excavating the prehistoric cemetery outside it, investigating all nine tholos tombs in the surrounding area; his work was continued by Lord William Taylour in several seasons between 1960 and 1969; Wace's daughter, Elizabeth French (BSA Director, 1988–1994), has continued the school's work there in cooperation with the Greek Archaeological Service in the Mycenae survey.

Other important excavations carried out by the school include the following: the harbor and sanctuary site at Perachora in the Corinthia, conducted between 1930 and 1933 by the then Director Humfry Payne; work on the islands of Chios and Mytilene, including the 1930s excavations of Winifred Lamb at Kato Phana and Thermi, respectively; and at Lefkandi in Evia, where investigation of the settlement of Xeropolis began in 1964 under Mervyn Popham and Hugh Sackett, followed by discoveries in the cemeteries, including the remarkable Toumba building.

The BSA also has a strong tradition in archaeological survey from the broad regional surveys of Wace and Thompson in Thessaly and Macedonia and John Pendlebury on Crete to the pioneering intensive surveys of Melos by Colin Renfrew and John Cherry. In more recent years, large-scale field surveys have investigated Laconia, Boeotia, Kythera, and the Knossos valley, adding greatly to the methodological underpinning of this important field.

Crete

The school has a history of involvement in Crete beginning with the formation of the Cretan Exploration Fund in 1899, a joint venture between Sir Arthur Evans and the then Director D. G. Hogarth. Evans began digging the palace at Knossos in 1900, while Hogarth investigated the town, as well as the Dictaean Cave, one of the supposed birthplaces of Zeus. In 1901 and 1902, R. Carr Bosanquet excavated at the east Cretan site of Praisos, discovering inscriptions in the non-Greek language of Eteocretan; he later excavated the Minoan town of Palaikastro, where further excavations have continued since the 1960s.

Evans continued his work at Knossos for 21 years, with regular reports in the *Annual of the British School at Athens*. The spectacular excavations caught the imagination of the world in much the way that Schliemann's earlier excavations at Troy and the shaft graves at Mycenae had done. In 1926, Evans donated his entire Knossos estate to the school, including the palace, his own house (the Villa Ariadne), various other excavated areas, and outlying buildings. A Knossos curatorship was instituted, thus establishing a permanent BSA presence on site. In 1955, the school donated the bulk of the estate to the Greek state, retaining the Curator's house and a residential and study facility, and is responsible for the Stratigraphical Museum, where the bulk of recent excavation finds are housed.

BSA Collections

The BSA library covers all aspects of Hellenic studies, holding more than 70,000 books and over 1300 periodical titles with special emphasis on art, archaeology, epigraphy, archaeological sciences, Modern Greek, and Balkan history and society. The archives form the official repository for the records of the BSA, including documents from fieldwork projects, corporate papers, personal collections of BSA members, various historical documents associated with the early travelers to Greece, a photographic archive, and a unique collection of photographs and drawings from the Byzantine Research Fund. A museum houses a study collection of antiquities donated or excavated by the school and a sherd collection of survey pottery from across Greece. The core of the original library and antiquities collection were donated in 1899 by the executors of the Philhellene George Finlay (1799–1875), who first came to Greece in 1823 aged 24, became actively involved with the Greek struggle for independence with Lord Byron, and settled in Athens for the remainder of his life.

The Fitch Laboratory

Founded in 1974, the Mark and Ismene Fitch Laboratory promotes the integrated use of scientific methods and techniques in the archaeological study of material culture. Its research focus is on the study of ancient pottery and metals from Greece and the central and eastern Mediterranean employing optical microscopy and chemical analysis techniques. The Fitch houses reference collections of animal and fish bones, seeds, and pottery thin sections.

Cross-References

► American School of Classical Studies at Athens (ASCSA)

References

Beard, W.M., and C.A. Stray. 2005. The academy abroad: The nineteenth-century origin of the British School at Athens. In *The organisation of knowledge in Victorian Britain*, ed. M.J. Daunton, 371–387. London: British Academy/OUP.

Calligas, E., and J. Whitley. 2005. *On site: British archaeologists in Greece*. Athens: Motibo.

Gill, D.W.J. 2011. *Sifting the soil of Greece: The early years of the British School at Athens (1886–1919)*. London: ICS.
Huxley, D., ed. 2000. *Cretan quests: British explorers, excavators and historians*. London: British School at Athens.
Llewellyn-Smith, M., E. Calligas, and P. Kitromilides. 2009. *Scholars, travels, archives: Greek history and culture through the British School at Athens*. London: British School at Athens.
Waterhouse, H. 1986. *The British School at Athens: The first hundred years*. London: Thames and Hudson.
Waterhouse, H., ed. 1989. *Ανασκαφές: A celebration of the centenary of the British School at Athens, 1886–1986*. London: Camberwell Press.

Brown Top Millet: Origins and Development

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Basic Species Information

Brown top millet, which goes by the scientific name *Brachiaria ramosa* (L.) Stapf. or *Urochloa ramosa* (L.) R.D. Webster, is known locally as *pedda-sama* and *korne*, and has a limited cultivation largely confined to southern India. Domestic and wild/weedy forms of brown top millet are found in agricultural systems, often within the same field. It is used as both a human food crop and fodder. Outside of India, it is grown in some parts of the USA as a fodder crop, largely to provide food for game birds, and was introduced from India around 1915. Although its distribution is highly relict today, restricted to parts remote parts of Andhra Pradesh, Karnataka, and Tamil Nadu states in southern India (Kimata et al. 2000), it appears to have been a major staple crop in the late prehistory of the wider region of the Deccan (Fuller et al. 2004).

In several parts of India, brown top millet is known by local names which translate to "illegal wife of little millet [*Panicum sumatrense*]," reflecting its tendency to grow within fields of little millet as a mimic weed (Sakamoto 1987). Brown top millet can grow with either a compact or open panicle and can have either shattering or indehiscent spikelets. The domestic form, however, tends to act like other domestic cereals and is both compact and partially indehiscent (Kimata et al. 2000). Where brown top millet occurs as a weed of other millet fields, it is usually treated as an insurance crop.

Major Domestication Traits

Brown top millet is particularly tolerant of drought and is well adapted to semiarid areas. It grows well at altitudes of 2000–2500 m, with 75–150 cm annual rainfall (Roecklein and Leung 1987). Cultivation is more common in the dry areas of Karnataka and Andhra Pradesh at lower elevations, South India, than in other parts of the world. Brown top millet grows and matures over around 90 days, a shorter time than several other millets including pearl millet (*Pannisetum glaucum*). It is usually grown as a single crop and not incorporated into mixed field systems. Harvesting in the early morning while the dew is still on the crop reduces the amount of grain lost through panicle shattering. Shattering (dehiscence) is reduced compared to the wild forms, but it is still partially shattering. The crop tends to be cut at the base, then winnowed, dehusked, and polished. Because it is semi-shattering, its grains can become dislodged just by being dried which reduces the need to thresh, although it requires dehusking like most other millets. Straw and chaff is often used as animal fodder; however, the grain is reserved for human consumption and is said to be tastier than rice. Brown top millet tends to be ground into flour and used to make flat breads (*roti, dosa*) or polished and boiled to make gruel (*anna, kheer*). Some of these foods are used in religious rituals, which may partly account for its persistence in cultivation (Kimata et al. 2000).

The identification of brown top millet grain and spikelets can be difficult due to its similarity to *Setaria italica* (Fig. 1). Although the panicle is distinct from *Setaria* by being looser and non-

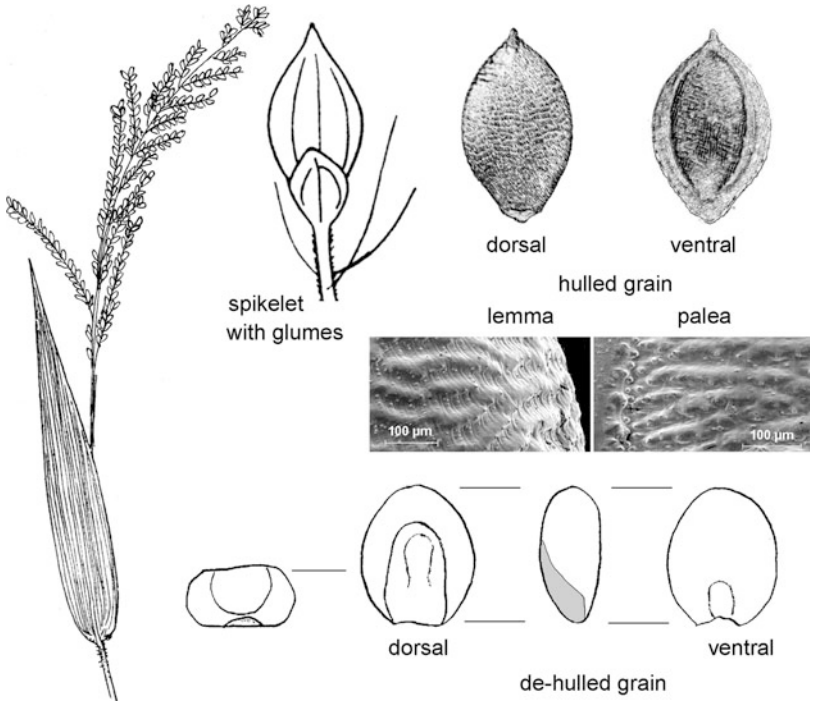

Brown Top Millet: Origins and Development, Fig. 1 Drawing of *Brachiatia ramosa* panicles, spikelet, hulled and de-hulled grains, showing the rugose husk patterns of the lemma and palea. SEM images of lemma and palea patterns inset

bristly, the grains themselves are very similar. Grains are ovate to round and have a long embryo, roughly two thirds to three fourths of the length of the grain. They tend to be smaller than *Setaria italica* and squatter in cross section. The surface of well-preserved grains can be used for identification as these have a distinctive undulating pattern, although this again has similarities to *S. italica* (Fuller et al. 2004). The husk has a fine beaded and rugose pattern, which again has some resemblance to that of *Setaria* spp., but it is somewhat coarser than *S. italica* and finer than *S. verticillata*.

Timing and Tracking Domestication

The domestication of brown top millet probably occurred in South India, in the Deccan, and it spread during prehistory outward to other parts of India (Fig. 2). Charred grains identified as "*Brachiaria ramosa* type" have been recovered from most Neolithic South Indian sites where systematic archaeobotanical work has occurred. On these sites brown top millet has a high ubiquity and relative frequency. Dating the time of domestication is complicated by the fact that little archaeobotanic work has been carried out on early Neolithic or preceramic period (Mesolithic sites); however, the evidence suggests that this crop, along with other South Indian crops (i.e., *Macrotyloma uniflorum, Vigna radiata* and *Setaria verticillata*), developed from indigenous wild populations around the beginning of the third millennium BCE (Fuller 2006). During this period, local millets and legumes were incorporated into an agro-pastoral system, part of the ash-mound culture of the southern Neolithic of India, which employed both mobile cattle pastoralism and small-scale crop cultivation. Brown top millet spread out from the Deccan to Tamil Nadu in the south (Cooke et al. 2005) and Gujarat in the north by the end of the second millennium BCE. Small quantities of the grain have also been found from Chalcolithic (late second–early first millennium BCE) sites in Odisha (Orissa) in the east and some sites in the Ganges plains (Harvey 2006), however, the number of grains recovered does not suggest cultivation and may represent wild plants.

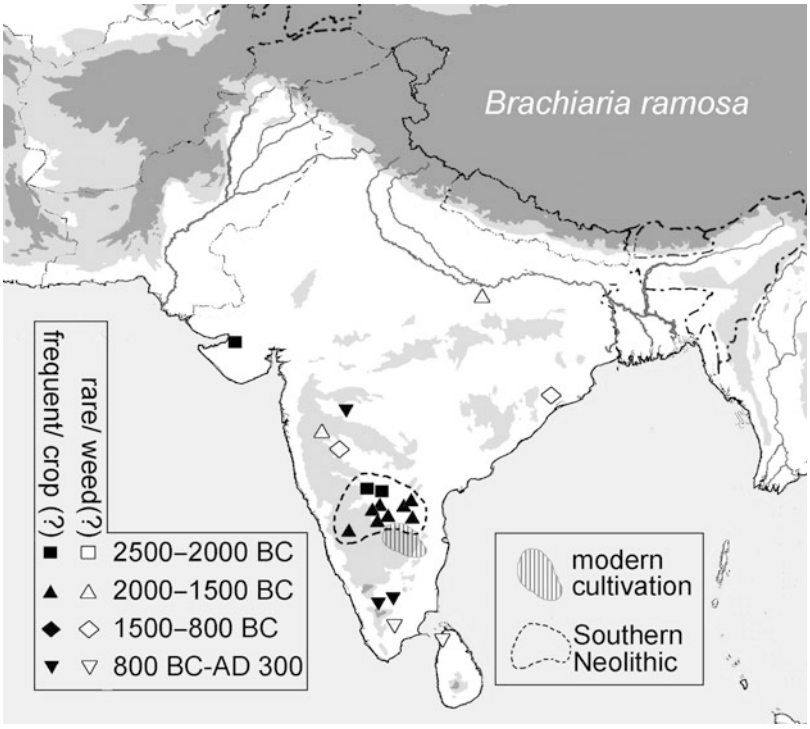

Brown Top Millet: Origins and Development, Fig. 2 Distribution map of archaeological finds of *Brachiaria ramosa* in relation to the Southern Indian Neolithic and modern cultivation of this crop

Over time, brown top millet has seen reduced use, although it was still present at the site of Paithan in Maharashtra up to the seventh century CE. Its gradual reduction in use can be attributed to displacement by alternative, more productive millets, including the African millets (*Sorghum bicolor*, *Eleusine coracana*), as well as foxtail millet (*Setaria italica*) that probably contributed to this. Today brown top millet is a relict cultivar but one with some important ritual uses.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Finger Millet: Origins and Development
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Millets: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Cooke, M., D.Q. Fuller, and K. Rajan. 2005. Early historic agriculture in southern Tamil Nadu: Archaeobotanical research at Mangudi, Kodumanal and Perur. In *South Asian archaeology 2003: Proceedings of the European association for South Asian archaeology conference*, Bonn, 7th–11th July 2003, ed. U. Franke-Vogt and J. Weisshaar, 329–334. Aachen: Linden Soft.

Fuller, D.Q. 2006. Agricultural origins and frontiers in South Asia: A working synthesis. *Journal of World Prehistory* 20: 1–86.

Fuller, D.Q., R. Korisettar, P.C. Venkatasubbaiah, and M.K. Jones. 2004. Early plant domestications in southern India: Some preliminary archaeobotanical results. *Vegetation History and Archaeobotany* 13: 115–129.

Harvey, E.L. 2006. Early agricultural communities in northern and eastern India: An archaeobotanical investigation. Unpublished PhD dissertation, University College London.

Kimata, M., E.G. Ashok, and A. Seetharam. 2000. Domestication, cultivation and utilization of two small millets, *Brachiaria ramosa* and *Setaria glauca* (Poaceae) in South India. *Economic Botany* 54 (2): 217–227.
Roecklein, J.C., and P. Leung. 1987. *A profile of economic plants*. New Brunswick: Transaction Publishers.
Sakamoto, S., ed. 1987. *A preliminary repost of the studies on millet cultivation and its agro-pastoral culture complex in the Indian subcontinent (1985)*. Kyoto: Kyoto University Research Team for the Studies on Millet Cultivation and Its Agro-pastoral Culture Complex in the Indian Subcontinent.

Buckley, Kristal

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Basic Biographical Information

Kristal Buckley (AM) received her B.A. (Hons) from Australian National University in 1980. She holds a Graduate Diploma in Social Sciences from the University of New England (1985). Her Master of Public Policy degree was conferred in 1998 from the University of Melbourne.

Major Accomplishments

Kristal Buckley (AM) has served as an International Vice-President of ICOMOS since 2005, and has been an active contributor to many aspects of the work of the International Executive Committee including the ICOMOS World Heritage programme and Scientific Council, and with ICOMOS members and National Committees in the Asia-Pacific region. Trained in archaeology, anthropology, and public policy, Kristal Buckley is a lecturer in Cultural Heritage at Deakin University's Cultural Heritage Centre for Asia and the Pacific in Melbourne, Australia. She has worked as a heritage consultant in private practice and in government. She served as a full member of the Heritage Council of Victoria for 9 years, and has represented cultural heritage professionals at advocacy and advisory forums at the national level. Her work in Australia has included Indigenous and non-Indigenous heritage projects, policy, and management, with an emphasis on community involvement. She is a member of the ICOMOS ISC for Intangible Cultural Heritage. She has also worked as an advisor to governments in environmental policy – particularly in relation to sustainability and climate change and was recently appointed as Member of the Order of Australia for significant service to conservation and the environment, particularly in the area of cultural heritage, and to education.

Cross-References

► Australia: Cultural Heritage Management Education
► Australia's Archaeological Heritage
► Community Archaeology
► Indigenous Archaeologies: Australian Perspective
► Indigenous Peoples, Working with and for
► Stakeholders and Community Participation

Further Readings

Beeton, B., et al. 2006. *Australia, state of the environment, 2006. Independent report to the Australian Government Minister for the Environment and Heritage*. Canberra: Department of the Environment and Heritage.
Marquis-Kyle, P., and M. Walker. 2004. *The illustrated Burra Charter*. Melbourne: Australia-ICOMOS.
Smith, A., K. Buckley, and K. 2007. Convict landscapes: Shared heritage in New Caledonia. *Historic Environment* 20: 27–31.

Buckwheat: Origins and Development

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Basic Species Information

Buckwheat, including common buckwheat (*Fagopyrum esculentum* Moench.) and tartary

buckwheat or bitter buckwheat (*Fagopyrum tartaricum* (L.) Gaertn.), is one of only three important non-grass starchy grain crops, or pseudo-cereals, the others being grain amaranth (*Amaranthus* sp.) and various chenopods, such as Andean quinoa (*Chenopodium quinoa*). An important crop of marginal lands, buckwheat, is grown in nearly every country that cultivates grain crops and is usually consumed locally (Campbell 1976), but it is especially important in colder regions of high altitude or high latitude in Asia. It is mainly grown for the starchy white endosperm of its seeds which produces buckwheat flour used for pancakes and *blini*, and soba noodles (Japan). The whole hulled seeds are used as breakfast food and to thicken soups. Dehulled grains, milled to remove the pericarp, are used in *kasha*, a traditional Russian dish. Buckwheat has a level of around 9% protein, has 330–350 kcal per 100 g, and does not contain gluten. Buckwheat is grown as a green manure, is a common animal feed, and is also a major honey-producing plant (Campbell 1997; Van Wyk 2005).

The name *Fagopyrum* is derived from the Greek *fagos*, beech and *pyrum*, wheat. The common name, buckwheat, is from *Buchswein*, German for beech wheat on account of the triangular seeds that look like small beech nuts. Other common names include: *Sarrisin* (French); *grano saraceno*, *fagopiro* (Italian); *kyoubaku*, *soba* (Japanese); *trigo-sarraceno* (Portuguese); *grano sarraceno* (Spanish). Many of the common names, *Sarrasin*, *gran saraceno*, *trigo-sarraceno*, *grano sarraceno*, mean Saracen grain, demonstrating buckwheat's eastern origins, although it actually comes from much further east (van Wyk 2005). For Chinese, it is *qiao-mai*, and in Hindi *kotu*. Less widely cultivated is *F. tartaricum*, the Siberian, Indian, Tartary, or bitter buckwheat, which is especially important for its height tolerance in the Himalayas and Tibet. Another species occasionally cultivated in northeastern India and southwest China is *Fagopyrum emarginatum*.

Major Domestication Traits

Buckwheat is an annual plant with a succulent hollow angular stem, swollen nodes, and alternate triangular acute leaves 5–10-cm long (Fig. 1). It has terminal and axillary white pink red or yellow flowers, which produce small dry fruits (achenes), which are gray brown to black. These may be technically classified as a diclesium, and after removing the outer dry bracts, yield an edible reddish nutlet with white starchy endosperm (Fig. 1) (Stevens 1912). Comparison of domesticated and wild species suggests selection for annual habit, non shattering inflorescence, low seed dormancy, and increased seed size, much as in cereal crops (Fuller and Allaby 2009). Common buckwheat is normally self-incompatible,

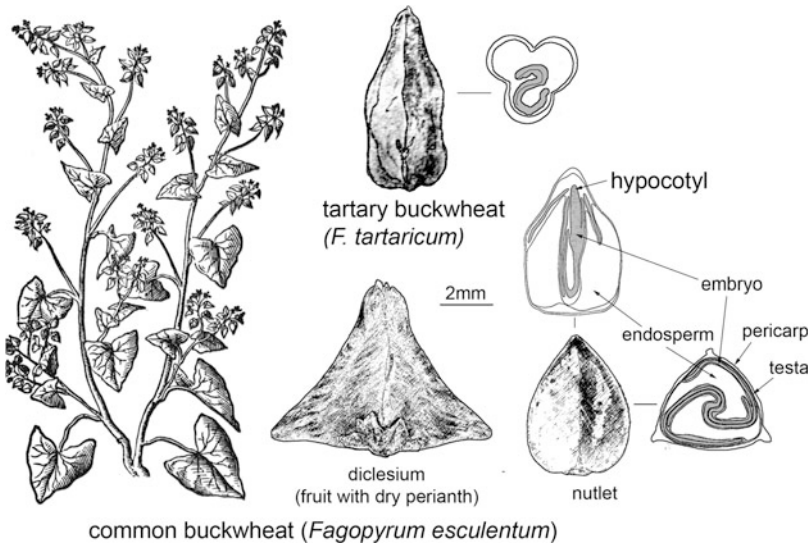

Buckwheat: Origins and Development, Fig. 1 Images of buckwheat, showing the growth habit of cultivated buckwheat (*Fagopyrum esculentum*), the fruit and nutlet with cross sections, with a comparison of the nutlet and cross section of tartary buckwheat (*Fagopyrum esculentum*)

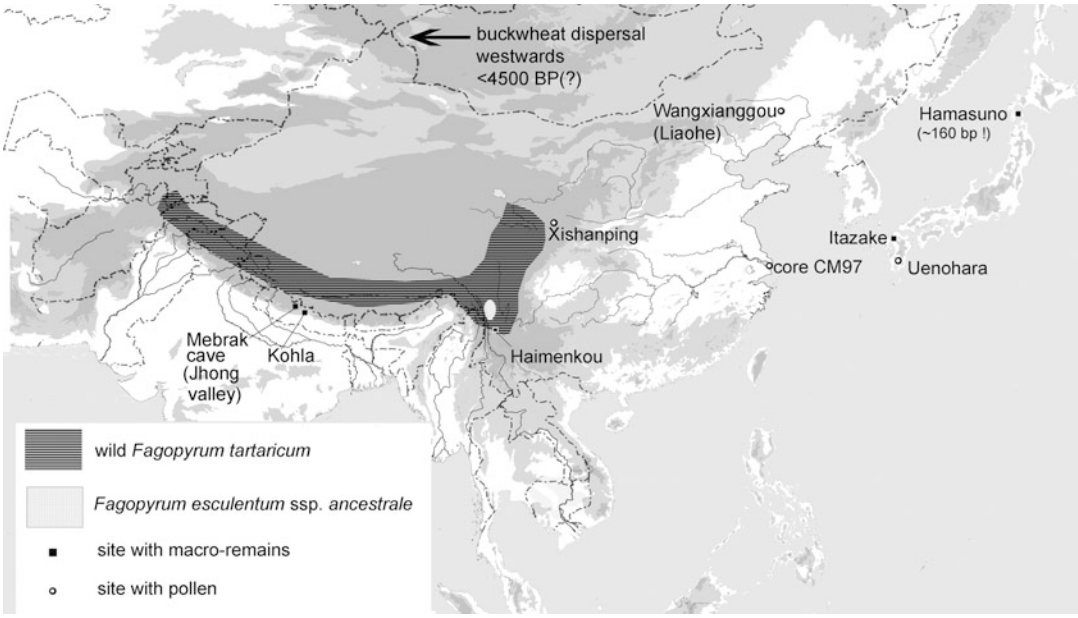

Buckwheat: Origins and Development, Fig. 2 Map showing distribution of wild *Fagopyrum tartaricum*, the subzone of wild *F. esculentum*, and archaeological and palynological sites that have produced early evidence for buckwheat

and tartary buckwheat readily self-pollinates (Campbell 1976). Plants grow to full height of around 1 m in about 6 weeks and the seeds ripen at around 10–11 weeks. This short growth cycle allows for cultivation in highly marginal habitats and short high elevation summers, although buckwheat has low yield compared to other grain crops. Buckwheat extends easily to above 3000 m under cultivation, and is grown alongside barley at the highest elevations. Tartary buckwheat is even better adapted to the highest elevations, up to c. 4000 m.

Buckwheat originates in the Tibetan plateau or nearby mountains of Yunnan, southwest China. There 16 wild species of *Fagopyrum*, all focused on the Himalayan and southwest China region (Campbell 1997). The wild progenitor of *F. esculentum* is thought to be *F. esculentum* ssp. *ancestralis*, which has a limited distribution in the mountains of western Yunnan and Sichuan (Fig. 2). It has a narrow distribution, growing at 1000–1500 m above sea level in barren rocky habitats with poor soils along the Jinsha River, Yunnan, and the Yalong River in Sichuan never entering cultivated fields (Ohnishi 2004). Wild tartary buckwheat, *F. tartaricum* ssp. *potanini*, is more widespread on the Tibetan plateau (Fig. 2; see Campbell 1997; Ohnishi 2004).

Timing and Tracking Domestication

Archaeological remains are rare, and much evidence for its spread comes from pollen appearances in palaeoenvironmental sequences. These data have been recently assessed by Boivin et al. (2012), with particular reference to the dispersal westward toward Europe. Pollen finds in three areas of China from c. 4500 BP suggest that cultivation began by the early Third Millennium BCE at the latest (Fig. 2). Finds include from the Liaohe river basin in northeast China after c. 2200 BCE, Xishanping in Gansu to the northwest, where pollen could be as early as c. 2500 BCE, although there are some stratigraphically inconsistent AMS dates might be only about 1000 BCE (Li et al. 2007). Additional evidence comes from the Lower Yangzte, suggesting some buckwheat cultivation in the hills south of

the Yangzte as early as 4500 BP. Finds from Japan all occur after 4000 BP, with an early reported nutlet from Hamanasuno in north Japan being shown to be intrusive by AMS dating. A few macro-remains finds can be placed in the First Millennium BCE, including from central Nepal and at Haimenkou, Yunnan (Boivin et al. 2012). Later evidence from Nepal is that of Kohla, a site at over 3000 m from the twelfth to thirteenth century CE.

The westward dispersal across Eurasia is particularly controversial. Some have suggested that pollen evidence indicates Neolithic presence in Europe by the Fifth Millennium BCE (Janik 2002), but a critical review of the archaeological and historical evidence would suggest buckwheat reaches the eastern margins of Europe not earlier than about 4000 years ago, and central and western Europe only in the late Middle Ages, c. CE 1300 (Boivin et al. 2012). Despite the importance of this crop for allowing expansion of human settlement into some of the most marginal and cold environments, there is still little known of its early cultivation and dispersal.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Boivin, N., D.Q. Fuller, and A. Crowther. 2012. Old World globalization and the Columbian exchange: Comparison and contrast. *World Archaeology* 44 (3): 452–469.

Campbell, C.G. 1976. Buckwheat, *Fagopyrum* (Polygonaceae). In *Evolution of crop plants*, ed. N.W. Simmonds, 235–237. London/New York: Longman.

Campbell, C.G. 1997. *Buckwheat: Fagopyrum esculentum Moench. Promoting the conservation and use of underutilized and neglected crops*. Vol. 19. Rome: The International Plant Genetic Resources Institute.

Fuller, D.Q., and R. Allaby. 2009. Seed dispersal and crop domestication: Shattering, germination and seasonality in evolution under cultivation. In *Fruit development and seed dispersal*, Annual plant reviews, ed. L. Ostergaard, vol. 38, 238–295.

Janik, L. 2002. The wandering weed: The journey of buckwheat (Fagopyrum sp.) as an indicator of human movement in Russia. In *Ancient interactions: East and West in Eurasia*, ed. K.R. Boyle, C. Renfrew, and M. Levine, 229–308. Cambridge: McDonald Institute for Archeaological Research.

Li, X., J. Dodson, X. Zhou, H. Zhang, and R. Masutomoto. 2007. Early cultivated wheat and broadening of agriculture in Neolithic China. *Holocene* 17 (5): 555–560.

Ohnishi, O. 2004. On the origin of cultivated buckwheat. In *Proceedings of the 9th international symposium on buckwheat*, Prague, 2004, 16–21. Prague: Research Institute of Crop Production.

Stevens, N.E. 1912. The morphology of the seed of buckwheat. *Botanical Gazette* 53 (1): 59–66.

van Wyk, B.-E. 2005. *Food plants of the world: An illustrated guide*. Portland: Timberland Press Inc.

Buikstra, Jane E.

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Basic Biographical Information

Jane Ellen Buikstra (1945–) is one of the most influential and outstanding American anthropologists in the field. Her scientific and academic work has had global influence. She obtained her Bachelor's degree in Anthropology from DePauw University in Indiana in 1967, and her Master's (1969) and Doctorate (1972) degrees from the University of Chicago.

She had faculty positions at Northwestern University, University of Chicago, and University of New Mexico. She was Research Associate at the Field Museum of Natural History, the Museum of the American Indian, the University of Florida, and the National Museum of Natural History. Buikstra is currently a Regent's Professor of

Bioarchaeology and Director of the Center for Bioarchaeological Research of the School of Human Evolution and Social Change at Arizona State University, Tempe, Arizona.

She has a long association with the Center for American Archaeology where she is President of the Board of Directors. This institution has had a very important role in the development of bioarchaeology. Associated field seasons in Kampsville, Illinois, have included training and educational programs associated with continuous research in numerous archaeological sites including Koster and Mound House as part of contract work with the Central Illinois Expressway program.

Buikstra defined and promoted the field of bioarchaeology, a specialty of archaeological research focused in the integration of information recovered from human remains in the reconstruction of ancient lifeways. This approach has redefined the role of physical anthropologists and archaeologists working with mortuary remains. The specialist trained in the study and recovery of human biological evidence is involved from the recovery fieldwork up to a range of specialized studies including chemistry, diet, growth and health, genetics, and paleodemography. In the area of paleopathology, Buikstra is recognized for promoting the use of rigorous differential diagnosis in the evaluation of lesions in human remains (e.g., Buikstra and Roberts 2012).

Buikstra has received numerous awards and distinctions in recognition of her accomplishments. She was elected a member of the National Academy of Sciences in 1987; was the Harold H. Swift Distinguished Service Professor at the University of Chicago, the Leslie Spier distinguished Professor of Anthropology at the University of New Mexico, and the George E. Burch Fellow in Theoretic Medicine and Affiliated Sciences at the Smithsonian Institution; and received the Pomerance Award for Scientific Contributions to Archaeology from the Archaeology Institute of America.

Buikstra's work has focused on the study of prehistoric skeletal collections incorporating cultural and biological data to evaluate evolutionary change, growth, health, and development. Her studies include important contributions to more fully understanding mortuary behavior, demography, paleopathology, biological distance, and paleonutrition, among numerous topics related to the adaptation and history of prehistoric societies. Buikstra has published numerous articles, books, reviews, and nontechnical publications (see Further Reading section below).

Her publications and academic work show an intense dedication to the promotion of science, the field of anthropology, and the status of women. Buikstra has mentored students and scientists from all over the world, including Indonesia, Australia, Peru, Chile, Argentina, Spain, China, and Ireland, and has contributed to academic programs and professional meetings. Buikstra and her collaborators have significantly influenced aspects of the scientific work involving the recovery, study, and conservation of human remains, both ancient and modern.

Major Accomplishments

Buikstra has received numerous grants to support her research including from the National Science Foundation, the National Institute of Health, Wenner-Gren Foundation, National Geographic Society, National Endowment for the Humanities, the Illinois Department of Transportation, and the Illinois Historic Preservation Agency, among others. She has directed and participated in bioarchaeological projects in most parts of the world, numerous projects in the North American Midwest, as well as in the Canadian Arctic, Argentina, Brazil and Peru, as well as in Spain, Israel, Turkey, and Honduras.

Buikstra has actively participated in professional associations and committees. She has served in different capacities including the top positions in the American Anthropological

Association, the American Association for the Advancement of Science, the American Association of Physical Anthropologists, the American Board of Forensic Anthropology, and the Society for American Archaeology.

Buikstra has also contributed as editor of several professional journals such as *American Anthropologist*, the *Journal of the American Association of Physical Anthropologists*, *Evolutionary Anthropology*, the *International Journal of Osteoarchaeology*, *International Journal of Paleopathology*, the *Journal of Forensic Sciences*, and the *Journal of Anthropological Research*, *Chungara*, of the University of Tarapaca in Chile. She has participated, in and promoted research groups that have proposed standards for the analysis of ancient human remains, the evolution of infectious diseases such as tuberculosis, and research and ethical aspects of the fields of forensic and biological anthropology and archaeology.

The ongoing career of Jane Buikstra is characterized by excellence in science reflected in her numerous publications and academic work and her strong commitment to teaching and professional development which has outreached to different parts of the globe.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Children in Bioarchaeology and Forensic Anthropology
- ▶ Cremation in Archaeological Contexts
- ▶ Demographic Transitions
- ▶ Dental Anthropology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Ethics and Human Remains
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Osteology Reference Collections
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition
- ▶ Stature Estimation

References

Buikstra, J., and C. Roberts. 2012. *The global history of paleopathology: Pioneers and prospects*. New York: Oxford University Press.

Further Readings

Buikstra, J.E. 1976. *Hopewell in the Lower Illinois Valley: A regional approach to the study of biological variability and mortuary activity (Northwestern University Monograph 2)*. Evanston: Northwestern University.

Buikstra, J.E. 1977. Differential diagnosis: An epidemiological model. *Yearbook of Physical Anthropology* 1976: 316–328.

Buikstra, J.E. 1981. A specialist in ancient cemetery studies looks at the burial issue. *Early Man* 3: 26–27.

Buikstra, J.E. 1982. Reburial: How we all lose. *California Archaeological Newsletter* 1: 1–4.

Buikstra, J.E. 1995. Tombs for the living. . . . or for the dead: The Osmore ancestors. In *Tombs for the ancestors*, ed. T. Dillehay, J. Bastien, J. Brown, and J. Buikstra, 229–280. Washington (DC): Dumbarton Oaks Research Library and Collection.

Buikstra, J.E., and L.A. Beck. 2006. *Bioarchaeology: The contextual analysis of human remains*. New York: Academic Press.

Buikstra, J.E., and D. Ubelaker, eds. 1994. *Standards for data collection from human skeletal remains: Proceedings of a seminar at the Field Museum of Natural History*. Fayetteville: Arkansas Archaeological Survey Press.

Buikstra, J.E., T.D. Price, J.H. Burton, and L.E. Wright. 2004. Tombs from Copan's Acropolis: A life history approach. In *Understanding early classic Copan*, ed. E.-E. Bell, A. Marcello, A. Canuto, and R.J. Sharer, 191–212. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Komar, D., and J. Buikstra. 2007. *Forensic anthropology: Contemporary theory and practice*. New York: Oxford University Press.
Roberts, C., and J. Buikstra. 2008. *The bioarchaeology of tuberculosis: A global view on a reemerging disease*. Gainesville: University Press of Florida.

Building Biographies

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Introduction

Developing a biography of a building can be an important way of obtaining information about the activities and beliefs of past societies. The term "building biography" was first used in historical studies, where the approach is different from that of archaeology. In the historical tradition, the house is studied more as the frame around which a family or other social group or institution is investigated, as a case study to gain inside into social conditions of a certain period in a certain area (Russell Ellis et al. 1985; Dakers 1993; Silver 1994; Zaknic 2004; Alexander 2008). Such studies incorporate non-architectural evidence, such as photos and written records made during the lifetime of the building. As these forms of evidence are not available in much archaeological research, an archaeological building biography must focus on evidence from the architectural body itself.

The archaeological building biography was developed from the biographical study of artifacts, a concept influenced by anthropological theory that perceives artifacts as objects with a life history, from which conclusions can be drawn about the human society that produced them and used them. While the term "building biography" is used explicitly only in some archaeological publications (Gerritsen 1999a; Rogasch 2012), the underlying concept is employed in many more.

Definition

A building biography interprets architecture by focusing on the sequences of human activities and decisions that went into creating a building, using a building, and abandoning a building, part of a building, or a group of buildings. It is an interpretative model based on which research questions can be developed, and appropriate methods of analysis can be chosen to answer them. The aim is to reach an interpretation of larger processes in past societies from a detailed study of human activities that are preserved in the architectural record.

Key Issues/Current Debates/Future Directions/Examples

The key assumption of the biographical approach is that when people interact with "things," the people, the things, and the relationships between them are altered during and by this interaction. Among the many possible different paths each of these intertwined biographies could theoretically take, only certain biographical possibilities are actually realized, and this range of acceptable options is determined by the given social context (Kopytoff 1986: 66, 68; Bernbeck 2008: 52).

The possible archaeological application of the concept was first explicitly outlined in a book edited by Appadurai (1986) in his book *The Social Life of Things*, and subsequently embraced by many archaeologists and used on a broad range to research questions (for overviews, see *World Archaeology Journal* 31(2) 1999; Skibo and Schiffer 2008). A number of terms are used to capture the target of these studies: "life" or "social life" (Appadurai 1986; Horne 1994: 170; Tringham 1995: 98), "use life" (Banning and Byrd 1987: 321; Tringham 1995; Tringham and Stevanović 2012), "life history" (Appadurai 1986: 41; Tringham 1995: 97; Gerritsen 1999a: 82; Holtorf 2002; Tringham and Stevanović 2012), "life course" or "life cycle" (Horne 1994: 185; Boivin 2000: 367; Matthews 2005), "development cycle" (Banning and Byrd 1987: 309, 321; Boivin 2000: 367), "career" (Appadurai 1986: 41;

Horne 1994: 185) and "biography" (Appadurai 1986: 17; Tringham 1995: 97; Gerritsen 1999a: "biography" and "cultural biography").

Archaeologists concerned with research into architecture soon adopted the biographical approach. Through building biographies, archaeologists have reconstructed household-related processes (Banning and Byrd 1987: 321; Tringham 1995: 97; Gerritsen 1999a; Boivin 2000; Matthews 2005; Tringham and Stevanović 2012); rituals and beliefs (Banning and Byrd 1987: 322; Gerritsen 1999a); issues of ownership (Banning and Byrd 1987: 323; Gerritsen 1999a: 95); the interplay between architecture and the surrounding landscape (Tringham 1995: 97; Gerritsen 1999a: 93); community construction (Düring 2005; Rogasch 2012); and mobility practices (Gerritsen 1999a; Bernbeck 2008; Rogasch 2012).

The following beneficial results of the biographical approach to architecture have been pointed out by researchers using it, and their reviewers:

1. *Comprehensiveness*: A biography considers the entire life of a building, from pre-construction to post-abandonment, and thus fully appreciates all available data and interpretational possibilities.

   Traditionally architectural studies focus on what they perceive as the main or intended use phase of the building (Tringham 1995: 81). However, recent archaeological research has demonstrated the interpretational potential of knowledge employed and choices made during and even before a construction process (Gerritsen 1999b: 109; Love 2012) and behavior during house abandonment (Gerritsen 1999a: 83–5, 87–91; Matthews 2005; Rogasch 2012).
2. *Resolution*: As a biography renders importance to the small scale, it fosters meticulous analysis and the recognition of important differences in the biographies of different architectural units, whose interpretation can lead to a clearer and more realistic picture of societies. This counteracts the tendency in architecture studies to brush over inconsistencies in search for a greater truth (Tringham 1995: 95; Vellinga 1999: 98–99): in terms of temporal resolution, that often results in a more fine-grained relative sequence of events even in the absence of absolute dating.
3. *Dynamism*: Such high-resolution sequences facilitate the identification of dynamic processes happening around a building (Vellinga 1999; Nevett 1999), which reflects complex realities observed in modern societies (Horne 1994; Carsten and Hugh-Jones 1995) better than the traditional archaeological thinking of seeing architecture as static (Tringham 1995: 65; Vellinga 1999: 98). The term "biography," as drawing comparisons with human life histories, points out the unplanned nature of life ways that resulted in biographies which could not have been foreseen when the life started.
4. *Workability*: It is possible and relevant to apply the biographical approach on different scales: the biography of one wall, one post, one room, one building (Rogasch 2012), a settlement (Bernbeck 2008), up to the biography of a landscape with built and unbuilt spaces (Vermeulen 2001; Pollard and Reynolds 2002; Gerritsen 2003; Darvill 2006; Roymans et al. 2009). It can therefore be applied to all evidence at hand, even if only fragments of buildings have been excavated.

For a *critical evaluation* of the biographical approach in general, see Holtorf's (2002) work who states that the concept is too loosely defined and used rather arbitrarily ("intellectual virus") to solve very different kinds of problems (also remarked by Nevett 1999: 102).

Nevett (1999: 102; similarly Vellinga 1999) criticizes that biographical studies often simply collect a lot of facts without actually subjecting them to systematic analysis, thus resulting in "lack of explanatory force of the biographical approach" (Gerritsen 1999b: 109) or even the perception that "the application of the biographic approach to the study of late prehistoric houses is ultimately inadequate" (Vellinga 1999: 101).

This shows again that a building biography is a model of interpretation that does not replace analysis. The biography has to be filled with detailed

evidence generated through traditional tools of architecture research such as stratigraphical research or studies of building materials and constructions techniques. The number of very recent publications in the list of references below demonstrates that the biographical study of architecture is constantly being refined and will develop further in the near future.

Cross-References

- ▶ Buildings Archaeology
- ▶ Buildings, Archaeological Study of
- ▶ Historical Archaeology

References

Alexander, D. 2008. *A biography of the Pentagon*. Minneapolis: Zenith Press.

Appadurai, A., ed. 1986. *The social life of things: Commodities in cultural perspective*. Cambridge: Cambridge University Press.

Banning, E., and B. Byrd. 1987. Houses and the changing residential unit: Domestic architecture at PPNB Ain Ghazal, Jordan. *Proceedings of the Prehistoric Society* 53: 309–325.

Bernbeck, R. 2008. An archaeology of multi-sited communities. In *The archaeology of mobility: Nomads in the Old and in the New World*, ed. H. Barnard and W. Wendrich, 43–77. Los Angeles: Cotsen Institute of Archaeology, University of California at Los Angeles.

Boivin, N. 2000. Life rhythms and floor sequences: Excavating time in rural Rajasthan and Neolithic Çatalhöyük. *World Archaeology* 31 (3): 367–388.

Carsten, J., and S. Hugh-Jones, eds. 1995. *About the house: Lévi-Strauss and beyond*. Cambridge: University Press.

Dakers, C. 1993. *Clouds: The biography of a country house*. New Haven: Yale University Press.

Darvill, T. 2006. *Stonehenge: The biography of a landscape*. Stroud: Tempus.

Düring, B. 2005. Building continuity in the central Anatolian Neolithic: Exploring the meaning of buildings at Aşıklı Höyük and Çatalhöyük. *Journal of Mediterranean Archaeology* 18 (1): 3–29.

Gerritsen, F. 1999a. To build and to abandon. *Archaeological Dialogues* 6 (2): 78–97.

Gerritsen, F. 1999b. A house built on rock? A reply to Nevett, Sharples and Vellinga. *Archaeological Dialogues* 6 (2): 107–110.

Gerritsen, F. 2003. *Local identities: Landscape and community in the late prehistoric Meuse-Demer-Scheldt region*. Amsterdam: Amsterdam University Press.

Holtorf, C. 2002. Notes on the life history of a potsherd. *Journal of Material Culture* 7 (1): 49–71.

Horne, L. 1994. *Village spaces: Settlement and society in northeastern Iran*. Washington, DC: Smithsonian Institute Press.

Kopytoff, I. 1986. The cultural biography of things: Commoditization as process. In *The social life of things: Commodities in cultural perspective*, ed. A. Appadurai, 64–91. Cambridge: Cambridge University Press.

Love, S. 2012. The geoarchaeology of mud brick architecture: A methodological study from Çatalhöyük, Turkey. *Geoarchaeology* 27: 140–156.

Matthews, W. 2005. Life-cycle and life-course of buildings. In *Çatalhöyük perspectives: Reports from the 1995–1999 seasons*, ed. I. Hodder, 125–150. Oxford: Oxbow Books.

Nevett, L. 1999. Abandoned but not forgotten: Gerritsen on the domestic lifecycle. *Archaeological Dialogues* 6 (2): 102–104.

Pollard, J., and A. Reynolds. 2002. *Avebury: The biography of a landscape*. London: University College London.

Rogasch, J. 2012. Biography of a Neolithic storage building. *Neolithics* 2011 (2): 43.

Roymans, N., F. Gerritsen, C. Van der Heijden, K. Bosma, and J. Kolen. 2009. Landscape biography as research strategy: The case of the South Netherlands Project. *Landscape Research* 34 (3): 337–359.

Russell Ellis, W., T. Chao, and J. Parrish. 1985. Levi's Place: A building biography. *Places* 2 (1): 57–70.

Silver, N. 1994. *The making of Beaubourg: A building biography of the Centre Pompidou, Paris*. Cambridge: MIT Press.

Skibo, J., and M. Schiffer. 2008. *People and things: A behavioral approach to material culture*. New York: Springer.

Tringham, R. 1995. Archaeological houses, households, housework, and the home. In *The home: Words, interpretations, meanings, and environments*, ed. D. Benjamin, 79–107. Aldershot: Avebury.

Tringham, R., and M. Stevanović. 2012. *Last house on the hill: BACH area reports from Çatalhöyük, Turkey*. Los Angeles: Cotsen Institute of Archaeology Press.

Vellinga, M. 1999. Merits and limits of the biographic approach. *Archaeological Dialogues* 6 (2): 98–101.

Vermeulen, F. 2001. Cultural biography of the protohistorical and Roman landscape of the Civitas Menapiorum. In *Ancient lines in the landscape: A geo-archaeological study of protohistoric and Roman roads and field systems in northwestern Gaul*, ed. M. Antrop and F. Vermeulen, 17–23. Leuven: Peeters.

Zaknic, I. 2004. *Le Corbusier – Pavillon Suisse: The biography of a building*. Basel: Birkhäuser.

Further Reading

Rybczynski, W. 2011. *The biography of a building: How Robert Sainsbury and Norman Foster built a great museum*. London: Thames and Hudson.

Sharples, N. 1999. Place, house, person. *Archaeological Dialogues* 6 (2): 104–107.

Buildings Archaeology

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Introduction

This entry seeks to outline the context and current practice of buildings archaeology. It focuses primarily on the UK but sets current practice here within the wider context of Northern Europe, the USA, and Canada. The entry commences with a definition of the discipline, during which its emergence in the late twentieth century as a subdiscipline of archaeology is charted. Key issues and current debates in the practice of buildings archaeology are then considered. These include its internationally significant role in the documentation and preservation of global cultural heritage, the development of recording methods and techniques, and interpretative issues such as the application of stratigraphic analysis to standing buildings, the impact of theoretical paradigm shifts on the discipline, and the potential of new virtual and visualization technologies to transform both methodological and interpretative approaches in the future.

Definition

"Buildings' archaeology" can be defined as the application of the archaeological principles of systematic recording, analysis, and interpretation to "above ground archaeology" or standing buildings. In many countries, buildings' archaeology has emerged from well-established traditions of researching and analyzing buildings within disciplines such as art and architectural history. Indeed, the development of the discipline often provoked anxiety and hostility from specialists within these fields. However, in the UK, a distinctive approach to recording buildings also emerged in the 1980s out of the specific context of "rescue archaeology." Here, buildings' archaeology rapidly became associated with the application of "metrically accurate" recording methodologies and "stratigraphic" principles of analysis to the phasing and interpretation of buildings. During the 1990s and early part of the twenty-first century, the emergence of buildings' archaeology has coincided with, and informed, approaches to the "documentation" and preservation of cultural heritage. Throughout this period, the interpretation of buildings has also been informed and enhanced by critical engagement with developments in contemporary archaeological theory. While these trends are most evident in the approaches followed in the UK, they have much in common with the well-established German tradition of "*bauforschung*" or "*stadtbaugeschicte*," which form part of both commercial practice and many archaeology curricula (Grossman 2001), with the Swedish and Danish practice of buildings' archaeology, building history and "documentation hermeneutics" (Haedersdal 1999–2000), and Belgian building recording (Mignot and de Meulenmeester 2003).

Historical Background

Buildings archaeology in the UK traces its origins to the emergence of a systematic and scientific approach to the observation and recording of buildings by early Antiquarians associated with the Society of Antiquaries of London, founded in 1707. During the nineteenth century, architectural history emerged as a self-conscious specialism, particularly in the field of ecclesiastical buildings, where the analysis of past examples of Gothic architecture was linked both to the desire to develop systematic typologies of the style and to its use as a source for contemporary architectural designs within the Oxford and Cambridge movements.

It was only in the later part of the twentieth century, however, that the discipline of buildings' archaeology really emerged in the UK. Throughout the 1970s, groups of like-minded archaeologists and architectural historians began to develop what became known as "church archaeology": a multidisciplinary approach to excavating, recording, and researching all aspects of church sites, buildings, fittings and fixtures, and

burials. Techniques were informed by the contemporary development of "rescue" archaeology, where large-scale open-area excavations at sites such as Coppergate (York) and The Brooks (Winchester) shed important light on the below-ground remains of medieval buildings and provided a model for the integrated historical and archaeological analysis of medieval structures (Carver 2009). Rescue archaeology also led to rare examples of the systematic excavation and recording of a pair of medieval and later town houses along the city wall at Shrewsbury. Gradually, as traditional industries declined and development pressures increased in the 1980s and 1990s, larger numbers of industrial structures also formed the focus for archaeological recording of both buildings and the evidence of industrial processes which had occurred within them.

Gradually, the significance of historic buildings as part of the archaeological resource began to be accepted in the UK. In 1979, the Ancient Monuments and Archaeological Areas Act provided statutory protection for those buildings which had been designated scheduled ancient monuments, while in 1990, listed buildings were also protected under the Listed Buildings and Conservation Areas Act, although parish churches and cathedrals are subject to separate legislation under the Ecclesiastical Exemption (revised 2010) and Care of Cathedrals Measure (revised 2011).

Key Issues/Current Debates

From tentative origins within church, rescue and industrial archaeology, buildings' archaeology emerged gradually in the 1990s as a distinctive subdiscipline within the field. However, its development sparked strong responses from other disciplines, particularly architectural history. Church archaeology had demonstrated how the methods of below-ground recording, particularly the idea of a "total" recovery of data destroyed during the excavation process, could be transferred to the recording of standing buildings. However, doubts were raised about the problems inherent in the "misapplication to building recording of the practices of dirt archaeology." Buildings archaeology was largely a nondestructive recording process, associated only rarely with the creation of "preservation by record" where a building was to be completely destroyed. However, building recording methods did seek to replace art historical approaches to recording buildings, which were considered to be partial and subjective, with a more objective and totalizing approach to recording.

At the heart of this debate lay a fundamental difference of opinion about what constituted authority within the disciplines of architectural history and archaeology in the UK. A consensus began to emerge, first that the idea of the "total" record was a chimera, and, second that from the moment a decision was taken to record a building, choices were made about what – and what not – to record. The subjectivity of the recording process itself was acknowledged (Grenville and Morris 1992: 301), and the importance of recording and interpretation being driven by clear research questions and a thorough understanding of building types was also emphasized. Today, one of the most important legacies of this debate for buildings' archaeology is the idea that although it is impossible – and perhaps undesirable – to be objective in the recording of buildings, it is still important to document the process in a systematic and accessible manner, which can be interrogated and reinterpreted by subsequent scholars.

As early as the 1990s, the value of recording as "an essential prerequisite and accompaniment to the repair and conservation process" was emphasized by buildings' archaeologists and conservation practitioners in the UK. The role of buildings' archaeology was argued to be not simply that of facilitating alteration but also informing decision-making. This might involve weighing up possible development proposals against the perceived value or significance of a building, and academics argued strongly that a necessary precursor of conferring value on a building was scholarly "understanding." These debates had important implications for the relationship between buildings' archaeology and conservation.

Example 1

A landmark volume, *Buildings Archaeology*: *Applications in Practice* (Wood 1994), brought together academics and practitioners from across the commercial and public sector, including English Heritage (EH), the RCHME, the National Trust, National Parks, and archaeological units in a series of thematic essays and case studies demonstrating the value of buildings' archaeology within the heritage and conservation sector. "Extensive" survey examples featured in the volume included a survey of an entire building type – "bastles" – by the Northumberland National Park and a survey of three nineteenth-century industrial Welsh "housing stocks," both of which were designed to target recording and conservation resources effectively. More "intensive" survey examples included targeted recording for limited alterations in English Heritage's secular buildings and the detailed recording by the Lancaster Unit of major conservation works at the scheduled monument Furness Abbey in advance of major restoration works. Two further case studies involved intensive survey prior to demolition of vernacular buildings and dismantling prior to re-erection at Kellington church.

Another example of this role of buildings' archaeology is Pearson and Meeson's (2001) edited volume, *Vernacular Buildings in a Changing World*: *Understanding*, *Recording and Conservation*. Many of the case studies in this volume were concerned to emphasize the significance and the potential of the vernacular architecture resource and to highlight the particular vulnerability of vernacular, often unlisted buildings, to insensitive alteration and development without adequate archaeological recording. Through a series of case studies, the volume reflects critically on tensions within the system: the lack of effective use by Conservation Officers of PPG15; the misconception that "conservation" was synonymous with resistance to change; and the lack of dialogue between buildings' archaeology and other professions, such as conservation architects, surveyors, structural engineers, and planners.

Throughout the latter part of the twentieth century, debates about the interrelationship of legislation and planning guidance, academic research frameworks, and commercial practice have continued to dominate the discourse of buildings' archaeology. Of particular significance in recent years has been the way in which research-based building recording has been placed at the heart of heritage practice and planning guidance, largely as a result of the widespread dissemination of international heritage conventions and charters such as Athens, Venice, Burra, and Faro. The global cultural and economic impact of developments in international conservation charters and conventions has recently been explored by Letellier and The Getty Institute's (2012) two-volume publication, volume 2 of which consists of a series of international conservation-led recording case studies (see also ICOMOS 1990). In the UK, the high-level philosophical concepts such as "significance" and "value" defined in these charters have become embedded in national policy guidelines, such as EH's (2008) *Conservation Principles*. *Informed Conservation* (Clark 2001) has also had particular resonance for buildings' archaeology, coining the acronym CoBRA (Conservation-Based Research and Analysis) to describe "the research, analysis, survey and investigation necessary to understand the significance of a building and its landscape and thus inform decisions about repair, alteration, use and management."

Example 2

Informed Conservation not only explained the value of understanding as the basis of defining significance but also discussed the appropriate levels of information required for different kinds of conservation projects, the forms of strategic document used and the specific analytical techniques available. Throughout, examples drawn from the work of EH's own metric survey team, such as the eighteenth-century town house, Danson House, Bexleyheath, were used to illustrate CoBRA in practice. Although CoBRA has never really made it into the common parlance of buildings' archaeologists, its principles have become widely accepted. Other useful published examples include Acton Court, Burlington House, and Stowe. In Spring 2009, an entire edition of EH's *Conservation Bulletin* provided examples of

"Conservation Principles in Practice," and Heaton (2007) and Neale (2010) provide a similarly useful surveys of case studies in which attitudes to the "restoration" of historic buildings have been transformed by initiatives such as *Conservation Principles*. At the time of writing, major changes are occurring in the UK's system of planning policy and guidance which are already having an impact on the role of building recording in the heritage and conservation process (Morrice 2011; Heaton 2012).

The Practice of Building Recording: Guidelines and Principles

Early reactions against the idea of total and objective recording methodologies in the UK gradually informed the development of principles and guidelines governing a "selective" approach to recording. This was enhanced by the increasing recognition that archaeological projects needed to justify a level of recording appropriate not only to the significance of the building but also the practical and financial constraints imposed by the commercial sector. Buildings archaeology in the UK tends to draw on two main guidance documents. EH's (2006) *Understanding Historic Buildings*: *A Guide to Good Practice* provides "clear practical guidance on the ways in which the wealth of historical evidence embodied in buildings can be gathered and disseminated for the lasting benefit and enjoyment of all." At the heart of the guidance is the definition of four "levels of recording" (where 1 is the most basic and 4 the most complex form of record) described in relation to three forms of record: written, drawn, and photographic. A table within the guidance maps the "circumstance" and "principle need" of recording against the four levels and forms of record. Similar, but subtly different, commercial priorities can be seen in the professional guidance of the UK's Institute of Field Archaeologists' *Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures* (2008). Once again, the need for archaeological building investigation and recording to be driven by a written specification or project design, in which appropriate levels of survey, accuracy, and the forms of reports are identified, is emphasized.

Understanding Historic Buildings emphasizes that its guidance is not intended to be prescriptive or definitive and acknowledges that different levels of recording may be required by different user groups, while different levels might be adopted within a single project or across a single site. Nevertheless, they provide a standard which is widely used by those commissioning and delivering building recording in the UK. Although neither of these documents provide explicit guidance on recording or interpretative methods, they do acknowledge technological advances are reflected in both documents, with sections on digital photography and digital archiving. However, both also emphasize the importance of historical research and the use of documentary sources, maps, and pictorial sources in researching and interpreting buildings. This contrasts with the methodology of buildings' archaeology outlined in the UK's principle textbook on the subject, where the use of documentary sources is relegated deliberately to Chap. 12 on the grounds that "The archaeology of buildings is really about the study of the evidence of the buildings themselves" and that undertaking documentary research prior to survey and interpretation can, "at the risk of sounding priggish, affect the purity of the purely archaeological analysis" (Morriss 2000: 165)!

Guidance on the practice of recording buildings can be found in a variety of sources. Morriss' (2000) volume provides basic guidance on hand survey, but one of the most useful step-by-step guides to historic building survey methods is that of Swallow et al.'s (2004). The volume provides a factual description of different survey methods but also reflects critically on their potential and limitations. It also provides a series of case studies which reflect on the interrelationship of selective recording principles and the choice of particular recording methods. This "toolbox" approach to guiding practitioners through choices of survey methods and case studies is also evident in EH's (2003) *Measured and Drawn* and in the second volume of Letellier and The Getty Institute's (2012) recent publication, with which English Heritage were closely involved. Useful individual

articles on particular techniques can also be found on the building conservation directory website: http://www.buildingconservation.com/articles/.

As well as guidance on survey methods, UK buildings' archaeology has also sought to establish standardized conventions relating to the visual outputs of building survey methods. Early guidance on the artistic conventions and production of standardized plans, sections, and elevations was also provided by the Association of Archaeological Illustrators and Surveyors (1995). Specific guidance on the use of CAD has also been produced (English Heritage 1998 and the Archaeology Data Service's 'CAD Guide to Good Practice': (http://ads.ahds.ac.uk/project/goodguides/cad/)).

Currently, there is considerable debate within buildings' archaeology in the UK about the relationship between the increasingly technological aspects of building survey, such as laser scanning and the analysis and interpretation of buildings. Some practitioners have argued that laser scanning offers a new, more objective, and "total" method of recording historic buildings. However, interestingly, projects such as Heritage3D (http://www.heritage3d.org/) have also recognized the current limitations of such technologies and emphasized the need for laser scanning to be selected on the same grounds as alternative recording techniques, namely, its ability and suitability to answer the research questions, or problems being posed.

Another current debate concerns visualization and the use of virtual reality models. Projects such as the historical theater modeling project, Theatron (www.theatron.co.uk), have demonstrated the potential of virtual reality technologies to generate visually pleasing computer graphics designed to evoke the visual experience of now-lost buildings. However, they have also raised questions about the extent to which "a" virtual model can inadvertently close down alternative and multiple interpretations of the same evidence. Heritage technologies can not only mask the process of recording but also "gap" between recording and subsequent scholarly interpretation. Increasingly, digital heritage practitioners have called for the development of a more critical approach to the use of computer reconstructions. This has resulted in the development in the UK of the "London Charter for the Computer-Based Visualisation of Cultural Heritage" initiative (www.thelondoncharter.org; Beacham et al. 2006). The London Charter encourages greater "transparency" in the creation and use of models through the publication of the "paradata" on which they are based.

Example 3

The Guild Chapel, Stratford-upon-Avon (Warwickshire), is a recent example of an integrated buildings' archaeology and virtual modeling research project (Giles et al. 2012). The chapel is an internationally significant late fifteenth-century building built by the Guild of the Holy Cross and Hugh Clopton, a guild member, merchant, and former Lord Mayor of London. The project sought to use a virtual model to reconstruct the chapel's original decorative scheme of wall paintings, which were partially destroyed at the Reformation but which came to light during restoration works in the nineteenth and twentieth centuries, when they were drawn by a series of Antiquarians. A metric survey of the chapel was used as a basis for a digital model. However, rather than seeking to reconstruct "the" appearance of the Guild Chapel, the model and its accompanying text was used explicitly to present the "paradata" of the wall paintings by layering different Antiquarian drawings and descriptions of the same images over each other, so that their similarities and differences can be compared directly by the user him/herself. In this way, the project seeks to remind the user of the "gaps" between the reality of the past and the interpretative processes of recording and representation discussed above.

One issue that greatly dominated the emergence of UK buildings' archaeology, but which no longer seems current, is the use of stratigraphic analysis in the interpretation of historic buildings (Grenville and Morris 1992: 301). Early buildings archaeologists maintained that stratigraphic recording provided a more systematic and reliable form of record than the fluid and partial records made by other disciplines. From the outset,

however, it was acknowledged that there were profound differences between the unconsolidated contexts of below-ground archaeology and the consolidated structures encountered within buildings, particularly with regard to the principle of superimposition and the definition of stratigraphic contexts.

Example 4

The most cogent discussion of these issues to date has been by Jones (2000), analysis of the ceiling over and partitioning of a medieval "Cruck Cottage," Cuppenham (Hampshire). Jones argues that stratigraphic units must be defined by the investigator in relation to the purpose and level of the record. At Cruck Cottage, context numbers were given not only to individual roof timbers but also to evidence of human activity such as "smoke blackening" to illuminate the process of "closure" in vernacular buildings. Jones' work also demonstrates how the systematic use of stratigraphic terms such as "cut" and "fill" or "abutment" provides a much clearer way of describing relationships within and between contexts than the traditionally ambiguous concept of the "building break" used more commonly in architectural history.

Early enthusiasm for the application of stratigraphic analysis to buildings encouraged the development within organizations such as the Central Archaeology Service at English Heritage of "recording manuals" and pro formas for the recording of "built structures" and "timber structures." However, skeptics of the stratigraphic approach have tended to question the value of such time-consuming recording methods, which, in presenting all information as being of equal value, "fail to guide the user to that which is significant." In Morriss' (2000: 154–5) volume, while the importance of the principle of analyzing the relationship between contexts is acknowledged, it is argued that the use of colored phase drawings is far easier and more effective method of interpretation than the creation of context sheets and Harris matrices. Over the past ten years, the detailed application of stratigraphic analysis to standing buildings, the use of pro formas and production of site matrices, seems to have become less common in both academic and commercial practice. However, rather than representing its abandonment of stratigraphic analysis, it can be argued that this represents the maturity of the discipline. The key significance of stratigraphic analysis for buildings' archaeology was that it represents "an intellectual framework which can be used to organize the different sources of evidence used to interpret a building." While the *principles* and *terminology* of stratigraphic analysis have been widely adopted and used in buildings' archaeology, it appears that they have been combined highly effectively with conventional and traditional ways of communicating and presenting such analysis – in the form of written descriptions, phased drawings, and reconstructions.

Theory and Buildings Archaeology

Alongside its function within the cultural heritage process, buildings' archaeology has also continued to explore theoretical approaches to the research and interpretation of historic buildings (Hicks and Horning 2006). Although early approaches to the interpretation of vernacular and industrial buildings tended to be very descriptive and functionalist, gradually buildings' archaeologists began to embrace structuralist and contextualist approaches such as the idea of "generative grammars," borrowed from historical archaeology in the US, and spatial analysis techniques such as space syntax and "isovist" or viewshed analysis (Locock 1994). As postmodern, or "post-processual," theoretical approaches began to impact the discipline, and buildings' archaeologists began to eschew the kinds of totalising narratives which these studies often produced and to focus rather on the complexity of the material evidence and the diversity of historical interpretations which could emerge from detailed building analysis (see Reynolds 2009). Current studies are particularly interested in the potential of applying "biographical" approaches to the study both of the individual occupants of buildings and the material biographies or histories of buildings themselves and of developing more phenomenological or experiential approaches to the theoretical interpretation of buildings. More

broadly, UK archaeologists have extended their remit to include the study of buildings across the historical period, including polite houses and gardens, institutional architecture, industrial buildings, and contemporary buildings.

International Perspectives and Future Directions

In 2012, the role of building recording, documentation and information management as being at the heart of cultural heritage and resource management appears to be recognized internationally. It is embedded in the charters and policies of ICOMOS and in European and US legislation and practice. The value of research-informed conservation for understanding and conserving high-profile, internationally significant buildings and much humbler, regionally and nationally significant structures is also acknowledged. The potential of building recording methodologies to be extended to wider cultural landscapes, and to inform structural and condition surveys, has also been demonstrated and recognized. The gradual acceptance of the methodology across the heritage profession has resulted in dialogue and information exchange, rather than the interdisciplinary hostility and protectionism which characterized its early days. New technologies are also being harnessed to enhance the presentation and interpretation of research. As building recording is gradually embedded in academic curricula, a new generation of professionals is emerging internationally, with a greater understanding of its benefits and potential to enhancing understanding and inform conservation.

The greatest threat to the future development of the field is the economic crisis currently affecting most of Europe and North America. The loss of conservation professionals at both local, regional, and national level due to budget cuts, and the absence of dialogue between practitioners, is a major source for concern in the UK. The desire to boost the construction industry by removing or waiving existing legislation and policy also threatens the role of recording in the planning and development process in many countries, regions, and localities. Commercial units are under greater pressure than ever to deliver rapid results for minimum cost. Moreover, leading organizations, such as English Heritage in the UK and Parks Canada in North America, have experienced drastic budget cuts to units involved not only in recording but also in setting standards and monitoring their application within the profession. Only time will tell how the discipline emerges from this latest challenge, but it seems likely that academics and professionals will need to collaborate more than ever if we are to ensure that building recording continues to inform the understanding, conservation, and management of historic buildings and places into the twenty-first century.

Cross-References

- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Historic Building Conservation: Current Approaches
- ▶ Historic Site and Historic Building Preservation: Overview
- ▶ Households and Domesticity: Historical Archaeology
- ▶ Post-medieval Archaeology
- ▶ Society for Medieval Archaeology
- ▶ York Archaeological Trust

References

Beacham, R., H. Denard, and F. Niccolucci. 2006. An introduction to the London Charter. In *The evolution of information communication technology in cultural heritage: Where Hi-Tech touches the past – Risks and challenges for the 21st century*. CIPA/VAST/EG/EuroMed, ed. M. Ioannides et al. Budapest: Archaeolingua.

Carver, M.O.H. 2009. *Archaeological investigation*. London: Routledge.

Clark, K. 2001. *Informed conservation: Understanding historic buildings and their landscapes for conservation*. London: English Heritage.

English Heritage. 2003. *Measured and drawn: Techniques and practice for the metric survey of historic buildings*. Swindon: English Heritage.

English Heritage. 2006. *Understanding historic buildings: A guide to good recording practice*. Swindon: English Heritage.

English Heritage. 2008. *Conservation principles: Policies and guidance for the sustainable management of the historic environment*. London: English Heritage.

Giles, K., A. Masinton, and G. Arnott. 2012. Visualising the Guild Chapel, Stratford-upon-Avon: Digital models as research tools in historical archaeology. *Internet Archaeology* 32. https://doi.org/10.11141/ia.32.1.

Grenville, J., and R. Morris. 1992. Archaeological approaches to the recording of buildings. *The Field Archaeologist* 16: 300–301.

Grossman, G.U. 2001. *Neue Untersuchungen zu Baumaterial und Hausbau*. Marburg: Jonas Verlag.

Haedersdal, E. 2000. *Om att förstå ett hus: den dynamiska modellen: dokumentationsmetoder, vårdplan och restaureringsideologi*. Lund: Lund University, Architectural Conservation and Restoration.

Heaton, M. 2007. Building paleopathology: Practical applications of archaeological building analysis. *Structural Survey* 27 (2): 119–137.

Heaton, M. 2012. Building recording: What's the point? *The Archaeologist* Summer 2012: 32–41.

Hicks, D., and A.J. Horning. 2006. Historical archaeology and buildings. In *The Cambridge companion to historical archaeology*, ed. D. Hicks and M. Beaudry, 273–292. Cambridge: Cambridge University Press.

ICOMOS. 1990. *Guide to recording historic buildings*. London: Butterworth Architecture.

Institute of Field Archaeologists. 2008. *Standard and guidance for the archaeological investigation and recording of standing buildings or structures*. Manchester: IFA.

Jones, M. 2000. The stratigraphic examination of standing buildings: Problems and solutions. In *Interpreting stratigraphy: Site evaluation, recording procedures and stratigraphic analysis*, British archaeological reports international series S910, ed. S. Roskams, 113–124. Oxford: Archaeopress.

Letellier, R. 2012. *Recording, documentation and information management for the conservation of heritage places*. Shaftesbury: Donhead Publishing Ltd.

Locock, M., ed. 1994. *Meaningful architecture: Social interpretations of buildings*. Aldershot: Avebury.

Mignot, P., and J. de Meulemeester. 2003. *Archéologie du bâti, la Bauforschung: le point de vue de l'archéologue*. Naumur: Les Cahiers de l'Urbanisme 44.

Morrice, R. 2011. Planning policy statement 5. Planning for the historic environment. In *The building conservation directory*. Available at: http://www.buildingconservation.com/articles/planning-policy/planning-policy.htm. Accessed 2 Sept 2012.

Morriss, R.K. 2000. *The archaeology of buildings*. Stroud: Tempus.

Neale, J. 2010. Modern restoration? Case studies in the light of English Heritage's conservation principles. *Association for Studies in the Conservation of Historic Buildings Transactions* 33: 35–46.

Pearson, S., and B. Meeson, eds. 2001. *Vernacular buildings in a changing world: Understanding, recording and conservation*, Council for British archaeology research reports, vol. 126. York: Council for British Archaeology.

Reynolds, A. 2009. The archaeology of buildings: Introduction. *World Archaeology* 41 (3): 345–347.

Swallow, P., R. Dallas, S. Jackson, and D. Watt. 2004. *Measurement and recording of historic buildings*. 2nd ed. London: Donhead.

Wood, J., ed. 1994. *Buildings archaeology: Applications in practice*. Oxford: Oxbow Books.

Further Reading

Association of Archaeological Illustrators and Surveyors. 1995. *The survey and recording of historic buildings*, Technical Paper 12. Oxford.

Bold, J. 1990. The recording of standing buildings. *Vernacular Architecture* 21: 16–17.

Clark, K. 2001. The role of understanding in buildings conservation. In *Vernacular buildings in a changing world: Understanding, recording and conservation*, Council for British archaeology research reports, vol. 126, ed. S. Pearsone and B. Meeson, 41–52. York: Council for British Archaeology.

Cooper, N. 1988. Architects and historians: Recording historic buildings. *Association for Studies in the Conservation of Historic Buildings Transactions* 13: 42–45.

Davies, M. 1993. The application of the Harris Matrix to the recording of standing structures. In *The practices of archaeological stratigraphy*, ed. E.C. Harris, 167–180. London/San Diego: Academic Press.

English Heritage. 2005. *The presentation of historic buildings survey in CAD*. Swindon: English Heritage.

Ferris, I.M. 1989. The archaeological interpretation of standing buildings. *Vernacular Architecture* 20: 12–17.

Goodrick, G., and M. Gillings. 2000. Constructs, simulations and hyper-real worlds: The role of virtual reality (VR) in archaeological research. In *On the theory and practice of archaeological computing*, ed. G. Lock and K. Brown, 41–58. Oxford: Oxbow.

Meeson, B. 1989. In defence of selective recording. *Vernacular Architecture* 20: 18–19.

Malm, G. 2001. *Archaeology and buildings; Papers from EAA, 1999*. Oxford: Archaeopress.

Malm, G. 2003. *Toward an archaeology of buildings: Contexts and concepts*. Oxford: Archaeopress.

Molyneux, N. 1991. English heritage and recording: Policy and practice. In *Recording historic buildings: A symposium*, ed. RCHME, 24–30. London: RCHME.

Mynors, C. 2006. *Listed buildings, conservation areas and monuments*. 4th ed. London: Sweet & Maxwell.

Pearson, S. 2001. Exploring the issues: Changing attitudes to understanding and recording. In *Vernacular buildings in a changing world: Understanding, recording and conservation*, Council for British archaeology research reports, vol. 126, ed. S. Pearson and B. Meeson, 41–52. York: Council for British Archaeology.

Roskams, S. 2000. *Interpreting stratigraphy: Site evaluation, recording procedures and stratigraphic analysis*, British archaeological reports international series S910. Oxford: Archaeopress.
Smith, J.T. 1989. The archaeological investigation of standing buildings: A comment. *Vernacular Architecture* 20: 20.
Stocker, D. 1992. Broken toes or interdisciplinary ballet: Architectural history, archaeology and the recording of buildings. *The Field Archaeologist* 16: 302–303.
Trebsche, P. 2009. Does form follow function? Towards a methodical interpretation of archaeological building features. *World Archaeology* 41 (3): 505–519.
Westman, A. 2000. Upright stratigraphy: Understanding and recording buildings in London. In *Interpreting stratigraphy: Site evaluation, recording procedures and stratigraphic analysis*, British archaeological reports international series S910, ed. S. Roskams, 107e–12. Oxford: Archaeopress.
Wrathmell, S. 1990. Why the archaeologist cannot be a camera. *Scottish Archaeological Review* 7: 37–40.
Young, C. 2010. Conventions and charters: A shifting focus. *Association for Studies in the Conservation of Historic Buildings Transactions* 33: 58–68.

Buildings, Archaeological Study of

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Introduction

The study of buildings has always formed a significant part of archaeological endeavor. In Britain, research, illustration, and publication began to mount through the first half of the nineteenth century, not least through the national work of John Britton and Robert Willis and their regional contemporaries. These early students of historic buildings applied archaeological standards of draftsmanship and subsequent dissection, phasing, and analyses that permitted logical insights about dating, periodization, and typology. Indeed, Willis used the term "archaeology" to describe his recording techniques and their application at several English cathedrals. He knew the value of demonstrating structural and dating arguments through making proper records, and his work remains as valid today as it ever was. Of course, succeeding generations would set new standards and devise new procedural models, but Willis stands close to the start of the archaeological tradition that requires accurate measurement and drawing before an analysis is undertaken.

B

Key Issues/Current Debates/Future Directions/Examples

Research and Understanding

For Willis, and the subsequent researchers that he inspired, it was enough to demonstrate the academic benefits that accrued from the study of buildings. The notion of "pure" research for its own sake, simply to find out, may be unfashionable these days, but it is still alive. In this age of public accountability, however, academic curiosity and challenge may not be enough to secure the necessary financial or legislative support. Other benefits, such as opportunities for innovation and community engagement, must be demonstrated. Today, the study of buildings needs to be set within a wider intellectual context, and the archaeologist must ensure that research programs are carefully considered and coordinated with others in similar fields before work begins.

In recent years, the role of the archaeologist and the application of modern archaeological practice have been extended to inform the conservation and management of historic buildings. This is based on the firm belief that it is not possible to conserve or manage a building without first understanding its history. There is a need to know how and why a building was constructed, how the spaces within a building and between buildings were altered and used through time, what survives of the building and what has been lost, as well as any association with individuals and events. In this way, the study of buildings is inevitably drawn down the path of research – albeit research directed toward a practical outcome. This understanding is documented through the process of making analytical records.

The ultimate aim of understanding buildings is to define their *significance*, so that the historical asset may be retained and enhanced. In particular,

it is essential to recognize those aspects that make buildings important enough to justify the necessary conservation time and effort. It is impossible to say, for example, whether or not a particular roof structure should undergo extensive repair or be renewed until it is known what date that roof structure is and how important it is relative to comparable roof structures elsewhere. To put it in a single word, the importance of a building or group of buildings will need to be "*characterized*" and to gain credibility that characterization must be well documented.

Having characterized a building, the knowledge gained can then be used to address any sensitive management problems. This may lead to more intensive study to inform particular conservation or development proposals. Clearly not all buildings need to be studied in the same detail: different circumstances will demand different responses. The scope and level of documentation need to be economically tailored to particular conditions and will be dependent on a number of factors, such as the type and complexity of the building and the nature and scale of proposed works. Consideration should carefully be given to the appropriate kinds of analytical recording in each case. For instance, further research will be especially important for elaborate works programs on multiphase buildings where a greater understanding of the structural and material performance of the fabric is required to avoid damage and allow for appropriate preservation. Where, for example, it is necessary to deconstruct the timber frame of a building to repair decay, or where partial demolition of its masonry to remove rusting metal cramps cannot be avoided, it will be important to prepare precise records. For the dismantling of buildings for re-erection elsewhere, for example, in a museum, very detailed three-dimensional recording and numbering of all components will be required, in order to recreate the disposition and assembly of as much of the original fabric as practicable.

In such situations, the role of the archaeologist, often working in close partnerships with other disciplines, needs to be properly integrated with the project direction and monitoring team, usually under the leadership of the project architect. The most satisfactory projects will be those which, from the earliest possible stage, work with and take into account the skills and experience of a wide variety of specialists. As well as archaeologists, these may include architectural historians, structural engineers, materials specialists, and others (Fig. 1).

It should be noted that as a part of an historic building conservation or development project, the work of an archaeologist differs significantly from that associated with conventional archaeological fieldwork, in that the data can form a vital part of

Buildings, Archaeological Study of, Fig. 1 The major repair project at Ightham Mote, Kent (UK), undertaken on behalf of the National Trust, had the benefit throughout of an archaeologist working alongside the architect and contractor to inform the process and record what was discovered. (Photo: Jason Wood)

the subsequent works specification. Scaled drawings and photographs often provide the essential basis for detailed works proposals and consent applications. Such records may also be used for issuing instructions to building contractors. The need for accuracy and legibility are therefore paramount.

Techniques for Studying Buildings

Documentary research is important to establish the architectural and historical interest of a building and to elucidate the evidence for its history and development. This can be achieved in a number of ways. Most research should start with the obvious sources – the relevant statutory designation, a survey of standard reference works and existing secondary sources on both the individual building and of that class of building in general. Local authority record systems and record offices are often a good source of information, as well as national records and specialist archives. It is advisable not to restrict research to locally available material, as in many cases, crucial information will lie in national collections and may have been overlooked in the past.

In general, work should concentrate initially on the sources most likely to reveal evidence for the history of the fabric of the building, such as maps, plans, photographs, and other historic images. Most studies will benefit from a map regression exercise. This involves gathering copies of all relevant maps, starting with the most recent and working back through the whole sequence of every period. Topographical or other drawings, published views, and photographs are especially useful. Their collation can be time consuming, but the effort is not often wasted as these images frequently shed light on the original context and tell much about a building's function and pattern of alterations. Beyond these sources is a whole range of information including title deeds, taxation lists, and rate books, which can all be helpful to construct a simple chronology of ownership and tenancy.

Oral history has an important role to play in the study of buildings. People who have direct experience of a building's use and adaptation in the recent past may present opportunities to gather supporting evidence for changes in form or function. For example, the redevelopment of industrial buildings can benefit from contact with former employees resulting in a greater understanding of any surviving plant and its significance, informing decisions on retention or disposal. Defining significance is now a process that increasingly goes beyond expert values to encompass the wider community and to embrace public history. Capturing peoples' views and attitudes about buildings that are significant to them can be illuminating. A crucial aim must be to encourage people to tell their own stories, to share their personal and often "unofficial" history, and to explore further the forces that link these memories to specific buildings.

Fabric Survey and Analysis

Historical research alone is not sufficient: there must always be some degree of engagement with the fabric of the building. Drawings are an indispensable part of studying buildings. These can be produced using a variety of different survey methodologies, equipment, and related software packages:

Hand-measured survey involves the use of tape measures, plumb bobs, frames, and surveyor's levels.

Instrument-based survey involves the use of total station theodolite control, consisting of a closed-traverse run around and through a building, followed by trigonometric intersection of suitably observed points on a façade, or electronic distance meter tacheometry utilizing microprisms for cross sections through complex enclosed structures.

Photographic-based survey (often used in conjunction with hand-measured and instrument-based control) includes

Rectified photography, consisting of single photographs or a mosaic of overlapping photographs taken using large- or medium-format cameras aligned square to the object

Photogrammetry, based on stereophotography taken using metric cameras

Laser-based survey using terrestrial laser scanners. These record three-dimensional positions at a predetermined resolution over a chosen area, generating thousands of high-accuracy coordinates. The coordinates are stored as a series of XYZ measurements which visually constitute a point

Buildings, Archaeological Study of, Fig. 2 Laser scanning carried out by the University of Birmingham at Chedworth Roman Villa, Gloucestershire (UK), on behalf of the National Trust. (Photo: Jason Wood)

cloud that represents the geometric form of the building being scanned in three dimensions. Laser scanners also operate in complete darkness and are therefore unaffected by varying light levels, unlike more traditional recording methods (Fig. 2).

The resulting drawings are usually provided as a set of scaled plans, sections, elevations, and details (Fig. 3):

Plans: The requirement may include basement, ground and upper level floor plans, including plans of ceilings, vaults, and roof structures, showing relevant external and internal detail and features. The location of all sections and elevations should be identified. Plans are the fundamental product to which all other material can be related.

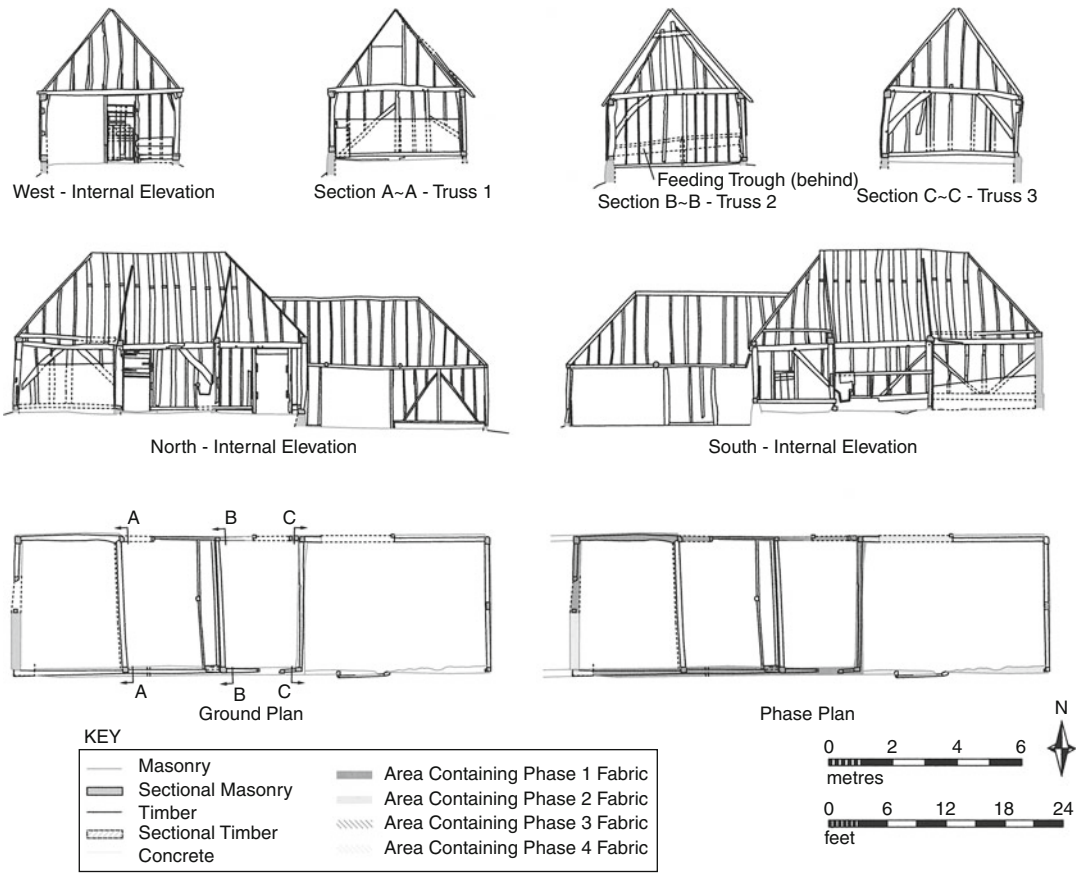

Buildings, Archaeological Study of, Fig. 3 Plans, elevations, and sections of the timber-framed stable block at Abbey Farmstead, Faversham, Kent (UK), recorded in advance of repair and refurbishment works. (Drawing: Lancaster University Archaeological Unit; courtesy of Oxford Archaeology and Swale Borough Council)

Sections: The requirement may include sections corresponding to the bay divisions or axes through the relevant parts of a building. These should normally define the principal wall plane and also include detail through adjacent openings and voids such as windows, doors, passageways, and smaller features such as putlog holes and beam sockets, as well as roof and floor detail. The height locations of all plans should be identified.

Elevations: The requirement may include external and internal elevations of the relevant parts of a building, depicting architectural features with associated detail (Fig. 4). Walls adjoining

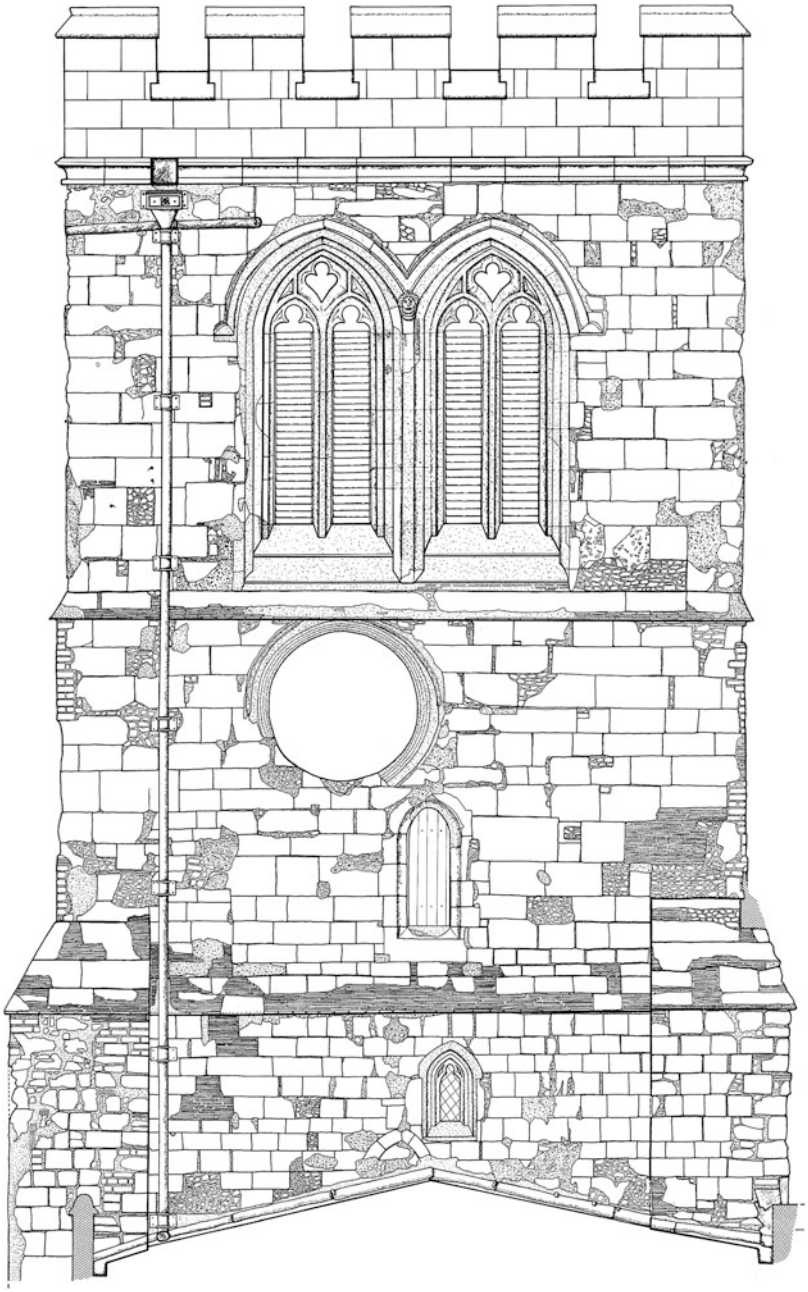

Buildings, Archaeological Study of, Fig. 4 An elevation drawing of the church tower of St. George of England, Toddington, Bedfordshire (UK). Recording and analysis provided accurate base level information about the nature and historical development of the fabric to inform the repair program. (Drawing: Network Archaeology Ltd.; courtesy of Toddington PCC)

Buildings, Archaeological Study of, Fig. 5 An annotated ground plan showing suggested periods and phases of part of Whalley Abbey, Lancashire (UK). (Drawing: Lloyd Evans Prichard)

elevations should be depicted in section. The height locations of all plans should be identified.

Details: The requirement may include separate plans, sections, and elevations of representative openings and architectural features, with exploded views to supplement the two-dimensional record where appropriate (for example, carpentry joints), and representative architectural, decorative, and ornamental details, both loose and in situ (molding profiles, inscriptions, setting-out lines, tooling, nail positions, masons' and carpenters' marks, graffiti, etc.).

It is not possible, however, to understand an historic building on the basis of record drawings alone. Close analysis of the fabric will be required to establish the relative chronology of the building and its structural phases:

Analytical records: The requirement may include annotating the plans, sections, and elevations to depict boundaries between different types of building material (stone, brick, tile, wood, metal, glass, etc.); surface finishes (mortar, render, plaster, daub, paint, industrial lining, etc.); building periods, phases of construction and repair; constructional detail (wall alignments and thicknesses, bonding patterns, blockings, putlog holes, beam sockets, chase scars, butt joints, building lifts, work-gang breaks, fittings, etc.); occupational detail (wear marks, blackened timbers, industrial residues, etc.); and evidence for abandonment or demolition (robbing, salvaging, fire damage, etc.).

Interpretation records: The requirement may include plans, sections, and elevations depicting outline reconstruction of the principal elements and features, for each of the periods identified. Output may be presented as an annotated plane (Fig. 5) or three-dimensional or cutaway projection (Fig. 6).

Intervention records: "As-built" records, showing the extent of conservation or development works, should depict areas of rebuilding,

Buildings, Archaeological Study of, Fig. 6 A cutaway reconstruction drawing of the church at Furness Abbey, Cumbria (UK). (Drawing: David P Cooper)

rebedding, repointing, grouting, new fabric insertions, etc. "As-built" records are particularly important where a component or structure is dismantled, repaired, and then reassembled.

General photographic recording of the external and internal appearance of the significant parts of the building should be undertaken. Close-up photography will also often be required for architectural details.

Finally, detailed physical or chemical analysis of certain building materials, surface finishes, or residues can often provide essential corroborative information including technological and supplementary dating evidence.

Cross-References

- ▶ Buildings Archaeology
- ▶ Historic Site and Historic Building Preservation: Overview

Further Reading

Dallas, R., ed. 2003. *Measured survey and building recording for historic buildings and structures (Guide for Practitioners 4)*. Edinburgh: Historic Scotland.

Malm, G., ed. 2001. *Archaeology and buildings (British Archaeological Reports International series 930)*. Oxford: Archaeopress.

Morriss, R.K. 2000. *The archaeology of buildings*. Stroud: Tempus Publishing.
Parron-Kontis, I., and N. Reveyron, eds. 2005. *Archéologie du bâti*. Paris: Editions Errance.
Schuller, M. 2002. *Monuments & sites VII: Building archaeology*. Munich: ICOMOS.
Wood, J., ed. 1994. *Buildings archaeology: Applications in practice (Oxbow Monograph 43)*. Oxford: Oxbow Books.
Wood, J. 2006. Historic buildings. In *Archaeological resource management in the UK: An introduction*, ed. J. Hunter and I. Ralston, 2nd ed., 97–109. Stroud: Sutton Publishing.

Bulgaria: Maritime Cultural Heritage Management

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Introduction

The Bulgarian Black Sea aquatory and its coastline reveal to us their extraordinary richness of cultural and historical heritage of national and world importance, whereas the locals keep the century knowledge of intangible traditional maritime culture. This huge volume of archaeological, historical and cultural, tangible and intangible, movable and unmovable heritage has been described and analyzed in detail in the scientific literature. However, the biggest part of it is still unknown for the broader audience. It is only kept in the memory of the locals, in the museums' storages, and in the exposition halls, which are not always able to represent it appropriately enough in order to provoke the public to get acquainted with it and to take an active part in its protection. At the same time, if the potential of the Bulgarian maritime cultural heritage is used effectively and with care for the heritage, this will ensure its preservation, will bring it closer to the general public, engaging local people, and thus guaranteeing the sustainable development of the Bulgarian Black Sea region. An effective approach for management and socialization of this heritage is needed in order the above measures to be achieved. However, some studies and publications have been developed lately. They provide guidance for possible successful approaches of management and socialization of this heritage, analyzing their potential outcomes. The management of Bulgarian maritime cultural heritage covers the maritime historical and archaeological artifacts from the Bulgarian Black Sea coastline and water area, and the traditional maritime culture.

Definition

The maritime cultural and historical heritage represents the tangible and intangible forms of expression with cultural, historical, and/or archaeological character, influenced by the proximity of the sea, and expressed in the material and spiritual culture of the coastal societies. It includes, but is not limited to, underwater cultural heritage; coastal fortresses; archaeological remains of the communities, who inhabit the region; ports and navigation structures; maritime landscapes; traditional maritime cultural, etc.

The Bulgarian maritime cultural and historical heritage as part of the world cultural heritage redounds to building identity, and it is crucial for the shared sense of community. Although, it is limited and nonrenewable resource, when managed effectively and rationally, it will play a significant role in the scientific studies, the tourism, and the sustainability development of the Bulgarian Black Sea region. It should be highlighted that in order the maritime cultural heritage to be socialized and managed, first and foremost, all requirements for its protection, preservation, and conservation must be met. Only then, all other management approaches for popularization and reaching the public, who will be the active part in maritime cultural heritage protection, can be applied successfully.

Part of the maritime cultural and historical remains that deserve to be managed and socialized are the submerged pile settlements. The study of the submerged settlements brings information about the economic life and socioeconomic

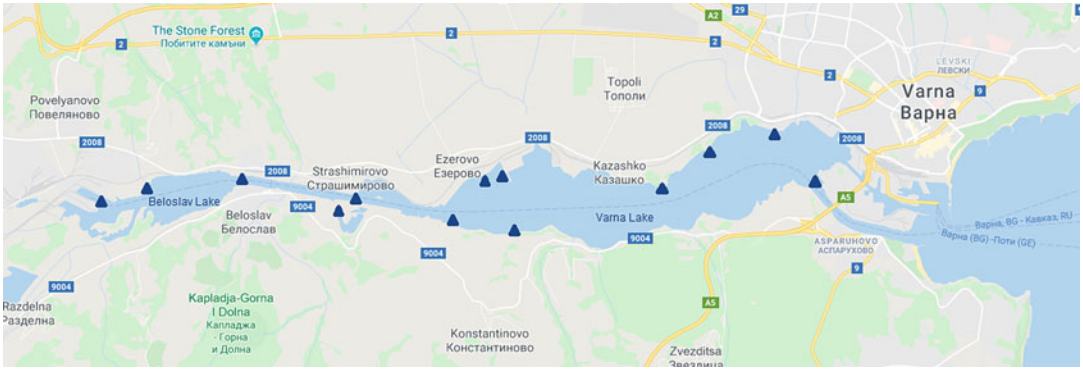

Bulgaria: Maritime Cultural Heritage Management, Fig. 1 Location of the submerged pile settlements in Varna and Beloslav Lakes as per Mikhail Lazarov (Лазаров 2009, 16–19)

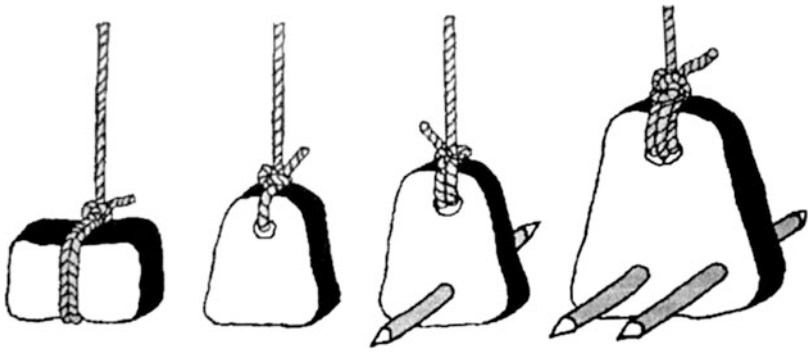

Bulgaria: Maritime Cultural Heritage Management, Fig. 2 Reconstruction of stone anchors (Димитров и др. 1982, 446). From left to right: 1. stone weight with a grove; 2. stone anchor with a single hole; 3. stone anchor with two holes ("Thracian" anchor); 4. stone anchor with three holes (composite anchor or classic stone anchor)

structure of the communities inhabiting them. Fully or partially excavated submerged settlements in Bulgarian Black Sea water include (Лазаров 2009): 14 pile settlements (or 13 as in one case it can be assumed that it is one settlement developed in two different historical periods) in the Varna and Beloslav Lakes from the Eneolithic and Early Bronze Age (Fig. 1, p. 9); Late Eneolithic and Early Bronze Age settlement from the water area of the port of Sozopol; anonymous commercial-settlement-emporium in Vromos Bay from Antiquity; Thracian pile settlement from the Early Bronze Age in the Urdoviza peninsula's aquatory; and a settlement in the Ropotamo river estuary, which testifies habitation of this territory with interruptions from the 4th century BC to the Ottoman period. Relation between these settlements and other objects from the Turkish and Georgian coast has not been established yet (Angelova and Draganov 2003, 20).

Another extremely interesting group of objects from the Bulgarian sea aquatory are the stone anchors (Fig. 2, p. 10). Bulgaria is the country with the richest collection of stone anchors. The most acceptable period for stone anchors dating is the wide range of the II millennium BC (Лазаров 2009). The petrographic analysis of 150 stone anchors from Bulgarian Black Sea aquatory showed that 139 are made of stones/rocks from the Bulgarian region. Part of the anchors (around 16%) are made of rocks, which are not typical for the Western Black Sea region (Лазаров 2009). The huge amount of stone anchors, especially in the waters off the Bulgarian Black Sea coast, is indisputable proof of early Thracian seafaring

(Фол 2009, 58). The affiliation of the stone anchors found along the Bulgarian Black Sea coast to local and not Mediterranean species does not exclude the possibility these anchors to mark Bronze Age trade routes (Frost 1982, 280–289). The idea of early Thracian seafaring is supported by Porozhanov (Порожанов 2012, 253–254), too, and by the results from the excavation of the submerged settlements located in Varna and Beloslav Lakes, which demonstrate already developed fishery that requires vessels. The anchors that mark places for forced mooring are from different periods: anchors with wholes from the Bronze age, through stone and lead stocks, till the Late Roman and Early Byzantium iron anchors. The discovery of such anchorages provides the opportunity to draw conclusions for the typology of the lost anchors, and additionally, which sea routes were followed, during which period and with what type of ships (Frost 1982, 280–289).

According to Kalin Porozhanov (Порожанов 1984, 9), the seafaring in Ancient Thrace was caused by mining and metallurgy, because between XVI and VII century BC, the presence of copper, tin, lead, and iron is essential for the production of tools of labor and weapons that are vital for the survival and subsistence of the locals. Mikhail Lazarov (Лазаров 2009, 54–55) also supported the opinion that for the transfer of metal in Ancient times, the sea routes were used. In addition, the gold and copper mining earliest for Europe documented in Thrace was spread via the sea "routes" (Порожанов 2012, 253). Therefore, maybe it is not a coincidence that the oldest golden artifacts in the world are dated back in the Chalcolithic period and are excavated in the Varna Chalcolite necropolis located in a close proximity to Varna Lake.

The shipwrecks are the other group of objects that deserves to be mentioned. Some of the oldest vessels found in our waters are the so-called single-tree-trunk-boats some of which very well preserved. One of these boats was found in Varna Lake. Beside the Thracian pile settlement excavated in the Urdoviza peninsula's aquatory, a shipwreck has also been studied there. It is a unique in constructive terms sailboat probably from the period XVI–XVII century (c.), and according to Porozhanov (Порожанов 2000, 152), it was used for trading, fishing, or both, given its excellent seaworthiness for navigation in the Black Sea. Exceptionally fruitful for the underwater archaeology was the Black Sea MAP (Maritime Archaeology Project) project, which took place in the period of 2015–2017, with the aim to study the Bulgarian shelf, and deep depth in order to outline the changes of sea level in different historical periods (Милчева 2017). A main participant in the project was the Bulgarian Centre of Underwater Archaeology, which is the only one for the whole Black Sea region. The seabed and the underwater sites have been scanned with multibeam echosounder, which allows the archaeologists to map the sea bottom and thanks to the digital photogrammetry method, to have real 3D images of the underwater sites. Around 80 shipwrecks have been documented during the project implementation, some extremely well preserved and from different epochs (Greek colonization, Roman Empire, Byzantine era, Middle Ages). Specific for all documented shipwrecks is the very high level of conservation due to the oxygen-free environment at the depths of the Black Sea. An almost whole and perfectly preserved shipwreck of a Roman period has been located at 2000 m depth. A unique example is a Genoese or Venetian ship from the XIV century, which is the only known such specimen in the world, and which for now on is only known from images on ceramic pottery. The earliest shipwreck is dating back in V century BC (Greek colonization) at 1700 m depth with ropes rigging still preserved. All shipwrecks have their 3D models produced in the course of the project. This successful project sets Black Sea on the world archaeology map.

The excavated and documented archaeological sites on land along the Bulgarian coastline are also numerous.

Starting from north to south, first in the list is the so-called Big Island in the Durankulak Lake – a place with a thousand years of history. During systematic archaeological studies of the tell on the island prehistoric necropolis, Eneolithic buildings, a settlement from the Late Bronze and

Early Iron Age, Ancient cave temple, Ancient funerals and sacrificial pits, Medieval dwellings, and Ancient Bulgarian necropolis were found and excavated.

An archaeological reserve, also designated as a protected area in 1987, due to the rare and endangered plant and animal species and their habitats, is Yayla terraced area. Several necropolises and rock tombs, an Early Byzantine fortress and a Late Antique winery, cave dwellings, a rock sanctuary, and a rock church were archaeologically studied on the territory of the reserve.

The longest cape along the Bulgarian Black Sea coast and the fortress on it are known today as Kaliakra. The fortification system was being built, developed, and restructured for two millennia (second half of the IV c. BC to XVI c. AC) in three stages with three fortress walls. In this way, the Roman authority in Little Scythia not only adopted the Thracian principle of fortress construction but continued and further developed it (Джингов et al. 1990, 184). The archaeology of the site is represented by Thracian sanctuary, hydraulic system, and monumental public building from the Eneolithic, Roman bath, Ancient, and Medieval necropolis, etc.

In today's town of Balchik (the Ancient Dionisopolis), remains from the Hellenistic, Roman, and Ottoman period of fortification and reconstruction were found. The time have captured remains from the fortification system; from several temples (of God Apollon, Diana and Apollo from Pithya) and a unique Thracian temple "Pontic God's Mother," localized by the found marble fragments of statues and votive tiles; numerous fragments of statues of other gods, too; many tombs; and the earliest Bulgarian bi-ritual necropolis.

The city of Varna has retained its name since the Middle Ages when it was built on the remains of the Ancient Odessos. Toncheva (Тончева 1964, 6) describes Odessos as a large harbor/port slave-owning city-state founded in 570 BC by brave Greek colonists from Milet – an Asia Minor city. The remains of Ancient Odessos include fortress walls and towers, Late Antique streets and buildings, Roman baths, and Early Christian churches. But even before the colonization of this territory, there was life in the Eneolithic era, which continued in the Early Bronze Age, too. The Varna archaeology encompass several chronological periods and a huge variety of objects and archaeological finds. The Chalcolithic here has bequeathed us the oldest gold in the world.

South of Varna, on St. Atanas Cape, is situated a multilayer site with archaeological remains from different historical periods (Йотов and Минчев 2013). A few structures from the Archaic to the Roma epoch have been preserved: Thracian cult center (VI c. BC–I c. AC) and Heracles Sanctuary (I–III c. AC). Most of the sites and remains are dated back in the Late Antiquity, and the main site from the period is the fortress (end IV–beginning VII c. AC) – small harbor/port city with residential structures, wineries, ergasteries, and early Christian sacral center with baptistery.

On an island with 25 hectares area, artificially connected to the land, is located Nessebar – a small Black Sea town, which plays an important role in the religious, cultural, and trade life in the Antiquity and Middles Ages. And today Nessebar impresses with its extremely well-preserved forms of Medieval church architecture and Renaissance housing structures. Parts of its fortification system, remains of buildings, water supply system, furnaces, pits, and an extremely representative necropolis from different historical periods have been excavated on its territory. The archaeological material takes us back to the second millennium BC, when Ancient Nessebar traded with other Black Sea and Mediterranean people via sea routes. The Ancient City of Nessebar is part of the UNESCO World Heritage List of immovable cultural properties since 1983.

During the Antiquity and the Middle ages Anhialo (today's town of Pomorie), which from Greek means "close to the salt" (Кузев and Гюзелев 1981, 356), was located between the Salt Lagoon and the Bay of Burgas, where its fortified settlement existed till XII c. (Лазаров and Гюзелев 2013, 13). Anhialo was famous for not only the salt extraction/production but with a unique Thracian domed tomb, too. In center of the tomb, covered with a brick

annular semi-cylindrical vault, rises a hollow column that extends upwards like a mushroom and merges with the round wall of the hall. This structure makes the Anhialo tomb one of the most brilliant works of ancient architecture, unknown elsewhere (Лазаров 2013, 33).

Remains of buildings from the Classical era, remains of an early Byzantine fortress with a fortification system (4 towers were excavated), and in the fortified interior space – remains of more than ten structures and marble elements, which implies the presence of a temple, were documented on Cape Accra, next to the town of Chernomorets (Христов 2013a). The fortification system continues underwater in the Gulf of Vromos, which is below the sea level today as a result of transregressive processes over time. The excavated structures in the south-east part of the gulf are an anonymous ancient trade settlement – an emporium situated in the directly controlled urban area of Apollonia Pontica.

Apollonia Pontica (today Sozopol) is a complex, multifaceted, rich, and interesting in cultural and historical aspect site. Its existence dated to the Neolithic and Early Bronze Age, evidence of which has been discovered during archeological excavations on land and underwater. The Apollonia's necropolis is impressive in terms of territory and number of burial facilities. The historical part of the town is now an archaeological reserve and it keeps remains from the settlement and from the fortification, which was reconstructed in the Middle Ages. Middle Ages are the period when churches and monasteries were built. On the Sozopol's island St. Ivan a huge monastery (St. Yoan Prodrom) with exquisite architecture, two temples with murals and a scriptorium operated (Попконстантинов et al. 2009, 712). A relic probably with Yoan Batist was discovered on the island. Several production complexes were in operation at the time of habitation on the territory of Apollonia Pontica: production of sgrafito pottery; foundry furnace and smithy; metallurgical workshop with archaeological material, attesting completed technological process of bronze production, etc.

Impressive is the cultural and historical heritage from the village of Sinemorets. Two Thracian tombs and fortified settlement with remains from two chronological periods (Hellenistic and Ottoman) were excavated on and around its territory. Of particular interest to the science are the results of the archeological excavations, during which a burial of a rich Thracian noble woman was studied in one of the mounds. She was probably a priestess with aristocratic social position. A unique coin treasure was discovered within the Hellenistic fortification, which gave a new impetus to the research on coinage during the Thracian ruler Mostis (Йорданов, Агре 2016, 45).

The maritime culture of Thracia Pontica should also be mentioned in the context of Bulgarian maritime cultural heritage as it has been formed within the boundaries of the three seas – Ponta (Black Sea), Propontida (Marble Sea), and Thracian Sea (Aegean Sea). Remains from the Thracian rock sanctuary were located on cape Beglik Tash (Fig. 3, p. 10). All the elements from the cult rock complex are from unrefined natural rocks and roughly carved stone slabs. Thus, the Thracians preserved the natural monumental appearance that they deified as a symbol of eternity (Дражева et al. 2004, 155). The most popular pre-Greek temple in Thracian Pontica and in the whole East Mediterranean world was situated on Samothrace island (today a Greek island in Aegean Sea) (Фол 2009, 68). The Samothrace gods were patron saint of sailors and shipping and this cult extended north of Samothrace (Фол 1998, 11).

There are some other sites from different historical periods excavated along the Bulgarian Black Sea coastline – around Chirakman cape, Bourgas, Sozopol island St. Kirik and Julita, Urdoviza (today Kiten), Ahtopol, etc. and represented by settlement structures, fortresses remains, necropolis, religion temples, etc.

Part of the maritime cultural heritage is also its intangible expression or the traditional maritime culture, because it is a product of the interaction between people and the sea. And this interaction determines the characteristics of the maritime culture of the people living in the coastal region. Part of the traditional maritime culture are the typical for the region fishing

Bulgaria: Maritime Cultural Heritage Management, Fig. 3 Thracian rock sanctuary on cape Beglik Tash

nets and fishing tools; traditions in the shipbuilding and boatbuilding; customs, rituals, and beliefs for good catch; practices related to the worship of the saints of sailors and fishermen; types of edible fish and their conservation; methods for salt extraction/production; fish trading; etc.

Key Issues/Current Debates/Future Directions/Examples

The need for activities toward successful management and socialization of maritime cultural heritage in Bulgaria is indispensable. As shown in the lines above, Bulgaria possesses a large collection of maritime archaeological, historical, and cultural resources, which high cultural potential can arouse public interest to them, if they are effectively preserved and successfully popularized. Oppose to that, at present, the management and socialization of this heritage in Bulgaria are almost not presented. There are still just a few examples of successful managing practices. The possible reason for this is the insufficient activity in this direction. In the field of maritime cultural heritage, our society just begins to understand and measure the globalization effects. The cultural tourism with its cohesion with the trends of the rapidly developing global economy creates an increasing need and demand for intercultural and international contacts, and interdisciplinary education. Bulgaria also has the cultural resource to take an active part in such international initiatives. This will be of great importance for the international promotion of the Bulgarian maritime cultural heritage, for its preservation, and for registering of Bulgaria on the world's cultural heritage map. In this context, the need for sustainable cultural tourism should be emphasized, because the cultural tourism must under no circumstances compromise the physical condition and characteristics of any maritime cultural sites.

The cultural heritage does not play role only on the global scene but it is also a mechanism for building local identity. This is the reason why it is extremely important the local communities to be

involved in the cultural heritage preservation, whether terrestrial or underwater.

Maritime cultural and historical heritage in Bulgaria need public support, because it has not yet firmly established itself in the mind of the population as a resource that must be protected and managed rationally. Adequate, active, and purposeful actions for management and socialization of Bulgarian maritime cultural heritage will be developed; the studies and the popularization of this heritage will soon impose a change in the mindset and the attitude of Bulgarians, and in the cultural tourism sector. With a well-developed national policy on management and socialization of cultural heritage, as well as with the penetration of educated and qualified professionals, and with the support of the society, there can be real opportunities for development of successful management programs. These programs will guarantee not only the Bulgarian maritime cultural and historical heritage physical survival but also its social accessibility, and thus, the sustainable development of the seaside region.

However, there are few examples for successful management practices. Late Antique fortified settlement with port on the St. Atanas Cape, Byala, with winery, medieval basilica, baptistery, etc., which have been restored and reconstructed (Fig. 4, p. 11). The monastery St. Anastasia and other buildings on the island of the same name have been restored and turned into a functioning museum, old-fashioned pharmacy, restaurant, and places for relax. Additionally, there are several museum exhibitions – two devoted to underwater archaeology and the other representing in traditional museum environment (in archeological, historical, and ethnographic museums) the tangible cultural heritage.

But there is still much more to be done regarding the maritime cultural heritage management. The main part of the management approaches in

Bulgaria: Maritime Cultural Heritage Management, Fig. 4 Medieval basilica in the Late Ancient fortress on St. Atanas Cape

the process of socialization of the maritime cultural and historical artifacts is their protection, conservation, assessment of their condition, and of the risk of significant increase in tourists' visits. Apart from the needed regulatory changes, the management approaches toward preservation of the tangible and intangible cultural heritage for the future generations encompass establishment of guidelines for development of underwater reserves with controlled access; criteria for declaring "reserve" status for shipwrecks or archaeological underwater structures; Stone Anchors Corps database, which is supposed to include the physical description of the anchors, petrographic analysis results, 3D images (of all anchors, and of some of the most significant anchorages), mapping of their place of discovery; National Register of Archaeologically Important Maritime Sites; and National Register of Bulgarian Traditional Maritime Culture.

The stone anchors are artifacts of not only local or national but of international importance. Some of them are of foreign origin but were found in Bulgarian waters due to international seafaring and international trade contacts. The sea routes were important dynamic determinants in the maritime cultural landscape, and usually the only way to draw these routes is the presence of stone anchors. The fact that the main types of stone anchors from the Bulgarian Black Sea are like those found in the Mediterranean provides a new perspective to the study of European navigation history. If a Stone Anchors Corps is developed as part of a management strategy, it will turn into a main instrument for deeper study of the European maritime history, types of vessels, maritime routes and trade, international maritime contacts, etc. in the Ancient times. Such interdisciplinary project will build strong relations between IT, science, geology, culturology, education, art, and tourism. This approach will create a net between all maritime countries, in which waters stone anchors (or part of anchors) were found.

Analogical to this database, an Amphorae Corps of objects found in the Black Sea could be developed as part of the management strategy for maritime cultural heritage.

National Register of Archaeologically Important Maritime Sites should include: all types of archaeological objects; all documented shipwrecks; shipwrecks which identity has not been determined yet; underwater ports, harbors, and port facilities; underwater fortresses; submerged settlements, and other structures, etc. The description of each object should cover all the information known about it, the context of its discovery, 3D images, and recommendations for its preservation.

Part of the maritime cultural heritage is the intangible heritage, too. The coastline inhabitants are perceived as guardians of the intangible maritime cultural heritage, as their connection to the coast and the sea is intrinsic of their identity (Borek 2015, 157–158). Intangible cultural heritage is preserved by the society whose members practice and recreate its forms of expression. It is not fixed and unchangeable in time. As it is alive and dynamic, it will always change. Therefore, a National Register of Bulgarian Traditional Maritime Culture should not be considered as an archive but as a living organism that should be updated periodically.

To the list of management approaches should be added the maritime cultural trails – underwater and along the coastline. The underwater trails, and underwater reserves and parks around shipwrecks are a proven in situ method for promoting public access to maritime cultural sites. But adequate management is needed to maintain the maritime cultural heritage and its physical and biological environment. In Bulgarian context, appropriate underwater trails may cover the themes of shipwrecks, ports and anchorages, settlements. The cultural trails on land can be represented by lighthouses; fortresses; tombs and necropolises; churches and monasteries; Thracian mysteries (including Thracian sanctuaries, rock sanctuary, temples, and cult centers excavated and documented along the Bulgarian Black Sea coast).

Although Bulgaria is rich of maritime cultural heritage artifacts and sites, it still does not have a national maritime museum. Its development is crucial for the management of this heritage in Bulgaria. Because of the traditions of this European country in the shipbuilding and

boatbuilding, a Museum of Shipbuilding should be considered as an appropriate option this tradition to be shown to the broader audience. An interactive Museum of Navigation on the Bulgarian Black Sea will represent the history of the lighthouse's construction and maintenance from the mid XIX century to modern times.

Many of the historical and archaeological sites on land have the opportunity to be developed as open-air museums: Anhialo Salt Marshes; Prehistoric necropolises; Apolonia open-air museum (including production complex for sgrafito ceramics, limestone mining quarry, metallurgical workshop, scriptorium for manuscripts and their binding, foundry and forge); Sea fishery and fish market; etc.

The Bulgarian government currently devotes limited resources to management and socialization of maritime cultural heritage, the alternative of the public funding is the public-private partnership, the transborder cooperation between Bulgaria, Romania and/or Turkey, international cooperation with the other Black Sea countries, etc. We, as members of the society, must strive to preserve our common cultural heritage in order to guarantee its survival for future generations.

Cross-References

- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Experiencing Cultural Heritage
- ▶ Intangible Cultural Heritage
- ▶ Maritime Landscapes
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ Underwater Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

Angelova, H., and V. Draganov. 2003. Underwater archaeological excavations of submerged Late Eneolithic and Early Bronze Age settlements in Kiten and Sozopol (South Bulgarian Black Sea Coast). In *Thracia Pontoca VI.2: In Honorem Mihaili Lazarov*, 9–22. Sofia: Istitute of Thracology Prof. Alexander Fol.

Borek, N. 2015. The role of artists in safeguarding intangible cultural heritage of coastal communities in Brazil: Between preservation and tourism promotion an interdisciplinary action-research study on the interaction between the artist, the tourism and the local community. In *Heritages and memories from the sea: 1st international conference of the UNESCO Chair in Intangible Heritage and Traditional Know-How: Linking heritage 14–16 January 2015, Évora, Portugal. Conference proceedings*, 155–163.

Frost, H. 1982. Stone Anchors as Clues to Bronze Age Trade Routes. In *Thracia Pontica I Premier Symposium international: thème generale "La Mer Noire et le Monde Mediterranéen", Sozopol, 9–12 Octobre 1979. I (1982)*, 280–289.

Агре, Д., ред. 2016. *Тракийски владетелски дом край село Синеморец. Т. 1*. София: Авалон.

Джингов, Г., Балканска, А., Йосифова, М. 1990. *Калиакра. Т. 1: Крепостно строителство*. София: Издателство на БАН

Димитров, Б., Порожанов, К., Орачев, А. 1982. Пристанищата на Аполония и на Месамбрия. В: *Тракийски паметници. Т. 3. Мегалитите в Тракия. Част 2. Тракия Понтика*, 438–458. София: Наука и изкуство.

Дражева, Ц., Недев, Д., Панайотова, К. 2004. Тракийско светилище в м. Беглик Таш, на територията на ловно стопанство „Аркутино", община Приморско. В: *Археологически открития и разкопки през 2003 г*, 154–155. София: НАИМ-БАН.

Йотов, В., Минчев, А. 2013. *Късноантична крепост (V–VI в.)*. Варна: на нос Свети Атанас.

Кузев, А., В. Гюзелев, съст. 1981. *Български средновековни градове и крепости. Т. 1. Градове и крепости по Дунав и Черно море*. Варна: КИ „Георги Бакалов".

Лазаров, М. 2009. *Древното корабоплаване по Западното Черноморие (до завладяването му от римляните)*. Варна: Славена.

Лазаров, М. 2013. *Античният Анхиало (I хил. пр. Хр. – VI в. сл. Хр.)*, 21–41. Поморие/Бургас: Древност и съвремие/Геопан.

Лазаров, М., В. Гюзелев. 2013. *История на Поморие*, 13–20. Поморие/Бургас: Древност и съвремие/Геопан.

Милчева, Ж. 2017. Находки под водата. *Осем* 11 (107): 30–39.

Попконстантинов, К., Дражева, Ц., Костова, Р. 2009. Средновековен манастир „Св. Йоан Продром“ на о. „Св. Иван“ – Созопол. В: *Археологически открития и разкопки през 2008 г*, 708–713. София: НАИМ-БАН.

Порожанов, К. 1984. Европейският Тракийски бряг на Черно море между XVI и VII в. пр.н.е. В: *Студентски проучвания, V*, 7–28. София: СУ „Св. Климент Охридски“.

Порожанов, К. 2000. Потъналият кораб при Урдовиза (предварителни бележки). В: *Известия на Народния музей Бургас*, 3, 149–154. Бургас: Археологически музей – Бургас.

Порожанов, К. 2012. *Тракийската цивилизация в началата на два континента и по крайбрежията на три морета*. София: Рал Колобър.

Тончева, Г. 1964. *Потънали пристанища*. Варна: Държавно издателство.

Фол, А. 1998. Боговете на Понта. В: *Боговете на Понта*, ред., съст., М. Лазаров, 9–11. Варна: ВСУ „Черноризец Храбър“.

Фол, А. 2009. *Тракийската култура: Казано и премълчано*. София: ТАНГРА ТанНакРа.

Христов, И., съст. 2013a. *Акра: Проучване на ранновизантийска крепост на полуостров Свети Никола при град Черноморец. Т. 1*. София: Unicart.

Further Reading

Leshikar-Denton, M., and D. Scott-Ireton. 2007. A Maritime Heritage Trail and shipwreck preserves for the Cayman Islands. In *Out of the blue: Public interpretation of maritime cultural resources*, ed. J. Jameson and D. Scott-Ireton, 64–83. Springer.

Terrell, B.G. 2003. Florida Keys National Marine Sanctuary Shipwreck Trail: A model for multiple-use resource management. In *Submerged cultural resource management: Preserving and interpreting our maritime heritage*, ed. J. Spirek and D.A. Scorr-Ireton, 151–163. New York: KA/PP.

Thracia Pontica I-VI.2.: Symposium international. All volumes, Sofia.

Археологически открития и разкопки през 1977–2019 г. Всички томове. София.

Велев, М., Василев, В. 1982. *Чиракман – Карвуна – Каварна: Сборник*. София: София-пресс.

Иванов, И. 1979. *Варненският некропол и неговото място в праисторията на Източното Средиземноморие. България в света от древността до наши дни. Т. 1*, , 94–102. София: Наука и изкуство.

Йорданов, С., Агре, Д. 2016. Монетно съкровище от Синеморец. В: Агре, Д. (ред.) 2016. Тракийски владетелски дом край село Синеморец. Т. 1, 45–183. София: Авалон.

Лазаров, М., ред., съст. 1998. *Боговете на Понта*. Варна: ВСУ „Черноризец Храбър“.

Младенов, М., Р. Змеев, съст. 1985. *Риболовът в бита и културата на българите: Сборник с изследвания*. Силистра: ЕИМ-БАН.

Прокопов, И., К. Порожанов, Щ. Щерионов. 2009. *Традиционна морска култура по българското Черноморие*. София: Рал Колобър.

Тракийски паметници. Т. 3. Мегалитите в Тракия. Част 2. Тракия Понтика. София, 1982.

Христов, И., съст. 2013b. *Подводни археологически проучвания в залива Вромос, акваторията на гр. Черноморец. Емпорион в хората на Аполония Понтика. Т. 1*. София: Unicart.

Burger, Richard

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Basic Biographical Information

Richard Lewis Burger (Fig. 1) is an anthropological archaeologist from the United States known for his work on the emergence of civilization in the Central Andes. Born in Manhattan, New York on September 4, 1950, he was the oldest child of Norman Burger, a lawyer and CPA, and Marion Levy, a bacteriologist and special education teacher. Both of his parents were archaeology enthusiasts, and his father served as the first president of the Long Island Chapter of the Archaeological Institute of America. Burger was educated in the public school system of Great Neck, New York. He received a bachelor's degree in archaeology in 1972 from Yale College, studying under Thomas Patterson and Michael Coe, and a doctorate in anthropology from the University of California, Berkeley, in 1978, studying under John Howland Rowe and Dorothy Menzel. Burger is married to Peruvian archaeologist Lucy

Burger, Richard, Fig. 1 Richard Lewis Burger

Salazar, with whom he has collaborated on many research projects.

Burger joined the faculty at Yale University in 1981 and is the Charles J. MacCurdy Professor in the Anthropology Department, chair of the Council on Archaeological Studies, and Curator in the Division of Anthropology at the Peabody Museum of Natural History. While at Yale, he has served as chair of the Anthropology Department (1990–1994) and as director of the Peabody Museum of Natural History (1995–2002). In Peru, he has taught at the San Marcos University (UNMSM) and the Catholic University (PUCP) in Lima and is an honorary member of the faculties of the University of Cusco (UNSAAC) and the University of Iquitos (UPI). He serves as co-curator in the Museo Machu Picchu, Casa Concha in Cusco, Peru, and since 2006 has been president of the Institute of Andean Research in New York.

Burger has directed numerous field projects in Peru, with a particular focus on the northern highlands and central coast. For his doctoral research, he directed the Chavín/San Marcos Archaeological Project (1975–1976) in the Callejón de Conchucos, Áncash, that included excavations at Chavín de Huántar, Pojoc, and Waman Wain. For his postdoctoral research, he directed the Huaricoto Project (1978–1980) in the Callejón de Huaylas, Áncash, as well as the Lurín Valley Project that included excavations at Cardal (1984–1987, 2007–2008, 2017–2019), Mina Perdida (1990–1991, 1993–1994), and Manchay Bajo (1998–1999) in the Lurín Valley, Lima. He has led survey projects in the south-central highlands of Huancavelica and Ayacucho (1999–2000) and Apurimac (2003–2006) to identify obsidian sources.

Upon the completion of his doctorate, Burger was awarded the Organization of American States Postgraduate Fellowship, and he has served as chair of the Senior Fellows of Pre-Columbian Studies at Dumbarton Oaks, Washington D.C. He received the Seton Elm-Ivy Award by Yale University and the City of New Haven for his activities as director of the Peabody Museum, the Wilbur Cross Award Connecticut Humanities Scholar of the Year by the Connecticut Humanities Council for his role as co-curator of the traveling exhibit on Machu Picchu, and the Phillip Johnson Book Award by the Society of Architectural Historians for the exhibit catalog of the Machu Picchu exhibit (Burger and Salazar 2004).

Major Accomplishments

Burger's theoretical focus in archaeology is the emergence of civilization. He favors a definition of civilization as "a society with a high level of cultural achievement in arts and sciences as made visible in the form of material objects" (Burger 1992: 9), a qualitative and subjective framing that is more in line with the common usage of the term than the trait list approach of V. Gordon Childe. While acknowledging that all civilizations are complex societies, given that advanced cultural accomplishment implies the existence of a body of esoteric knowledge, specialized artisans, surplus labor/food, and the social mechanisms for its appropriation, Burger argues that the sociopolitical basis of each civilization must be left open for investigation rather than assumed to be shared among all cases. This approach focuses attention on the emergence of complexity and its cultural expression without anticipating (and biasing) the results by incorporating them into definitions of the terms civilization or complex society.

Burger has dedicated his career to understanding the sociocultural processes behind the rise of early

civilizations in the Central Andes. Part of this effort has been synthesized in his book, *Chavín and the Origins of Andean Civilization* (1992). He suggests that the developmental trajectory followed in Peru may represent a pathway dissimilar from those documented elsewhere and that the organization of early Andean civilization may have been fundamentally different from those civilizations in the Old World and Mesoamerica. Burger argues that only once the range of variation in the emergence of the world's earliest civilizations is known can anthropologists begin to formulate coherent explanations for their appearance. By studying the emergence of indigenous civilizations in the Central Andes, archaeologists can begin to question the universality of Western narratives regarding early complexity – such as the importance of states and elites – and discard biases against non-Western institutions and knowledges.

Much of Burger's research has focused on how religious institutions, rather than stratified states, constituted the primary source of power among early Andean civilizations. In taking humanity's interest in the divine seriously, rather than viewing it as beyond the purview of scientific archaeology, Burger's research has opened up new interpretative possibilities for how and why complex social organizations developed in the case of the Central Andes.

The Late Preceramic Period (3500–1800 B.C.) marks the first time that Andean peoples came together to create monuments as the physical expressions of their social organizations. Burger and Salazar's work at the site of Huaricoto has discerned a pattern of early monumentality in the north-central highlands in which different segments of a small-scale society came together at a single site to build small chambers with central hearths for burnt offerings (Burger and Salazar-Burger 1980). They describe this architectural pattern the "Kotosh Religious Tradition," drawing attention to the fact that these chambers were used exclusively for ritual offerings and kept clean of any other activities. These ceremonial centers of clustered ritual chambers constitute the earliest monuments in the Peruvian highlands and demonstrate the importance of religion as an integrative force in very early complex societies in the Central Andes.

The Initial Period (1800–800 B.C.) saw the continued development of monumental architecture in the Central Andes with the appearance of discrete cultural traditions along the coast, highlands, and tropical forest. Burger and Salazar have conducted long-term research on the tradition of U-shaped temples of the Manchay culture on the central coast of Peru. Focusing on the Lurín Valley just south of the Lima metropolitan area, they have excavated three large U-shaped temples of Cardal, Mina Perdida, and Manchay Bajo. These civic-ceremonial centers served religious and political functions as sites where people living in nearby villages would carry out periodic ritual activities like processions and offerings (Burger and Salazar 2008). Based on many seasons of excavations, Burger has shown that there is little evidence for social stratification, long-distance trade, or large resident populations at these centers. In analyzing the architectural sequences of U-shaped temples, Burger has shown that they were built as many small construction episodes over long periods of time and could have been constructed by relatively small groups of people. From these data, Burger argues that the basis of Manchay ceremonial centers was not a stratified state apparatus but rather an egalitarian religious institution that linked a multitude of small-scale independent sociopolitical units.

By the Early Horizon (800–200 B.C.), the Chavín religion appeared as the first sociocultural phenomenon with the artistic and scientific achievement of civilization that affected the Central Andes as a whole. This innovative religious ideology known for its elaborate iconography spread from civic-ceremonial centers like Chavín de Huántar across a large swath of Peru, creating a context of interacting societies that saw watershed advances in metallurgy, weaving, hydraulic engineering, trade infrastructure, botany, husbandry, mining, and lithic technology (Burger 1992). Burger's chronological and socioeconomic studies of Chavín de Huántar (e.g., Burger 2019) have illustrated that in the context of the Chavín religion, Andean civic-ceremonial centers developed into sites with proto-urban resident communities, elite differentiation, and asymmetrical trade relations. Burger's research has shown that these traits,

hallmarks of civilization elsewhere in the world, only appear in the Central Andean case after many millennia of sociocultural processes related to the formation of religious institutions.

Burger's research on the development of civilization at interregional scales has led him to develop scientific techniques for studying the long-distance movement of artifacts made of obsidian and cinnabar. Alongside Frank Asaro, he carried out a pioneering geochemical study of obsidian artifacts that successfully identified distinct obsidian sources used in the ancient Central Andes (Burger and Asaro 1977). With these chemical groups identified, Burger and colleagues carried out surveys in the south-central highlands of Peru to find the physical locations of obsidian sources (e.g., Burger and Glascock 2000). Similarly, with Colin Cooke and Holger Hintelmann, Burger has pioneered the sourcing of cinnabar and demonstrated the long-term importance of Huancavelica, the area responsible for producing most of the cinnabar traded over long distances throughout prehistory (Burger et al. 2016). With the links between artifact and source location laid bare, greater understandings of the social and historical processes involved in exchange can be created. Burger's combination of scientific and humanistic approaches has also led him to engage in iconographic analysis as well as collaborate in faunal and carbon isotope studies. Burger and Salazar have also made important contributions to Inca studies through their exhibitions and analyses of Hiram Bingham's Machu Picchu collections, first at the Yale Peabody Museum of Natural History (Burger and Salazar 2004) and then at the Museo Machu Picchu, Casa Concha in Cusco.

An overarching emphasis of Burger's research agenda has been the creation of detailed site chronologies using ceramic, radiocarbon, and architectural data. He maintains that a firm chronological framework is indispensable for analyzing diachronic developments and incorporating them into larger frameworks of prehistory. Additionally, his research consistently highlights the importance long-distance interaction in the past and the creation of interregional theoretical frameworks for the purpose of coherently integrating regional data sets. Burger's goal of crafting a better understanding of time and space in the Central Andes comes from his enduring appreciation of culture-history as foundational for achieving any of the interpretative goals of other theoretical movements, processual, post-processual, and beyond.

Cross-References

▶ Andes: Prehistoric Period
▶ Early Complex Society in South America, The Development of

References

Burger, Richard L. 1992. *Chavin and the origins of Andean civilization*. London: Thames and Hudson.

Burger, Richard L. 2019. Understanding the socioeconomic trajectory of Chavín de Huántar: A new radiocarbon sequence and its wider implications. *Latin American Antiquity* 30 (2): 1–20.

Burger, Richard L., and F. Asaro. 1977. *Trace element analysis of obsidian artifacts from the Andes: New perspectives on pre-Hispanic economic interaction in Peru and Bolivia*. LBL-6343. Berkeley: Lawrence Berkeley Laboratory.

Burger, Richard L., and Lucy Salazar Burger. 1980. Ritual and religion at Huaricoto. *Archaeology* 33 (6): 26–32.

Burger, Richard L., and Lucy Salazar Burger, eds. 2004. *Machu Picchu: Unveiling the mystery of the Incas*. New Haven: Yale University Press.

Burger, Richard L., and Lucy Salazar Burger. 2008. The Manchay culture and the coastal inspiration for Highland Chavín civilization. In *Chavín: Art, architecture, and culture*, ed. William Conklin and Jeffrey Quilter, 85–105. Los Angeles: Cotsen Institute of Archaeology Press at UCLA.

Burger, Richard L., and Michael D. Glascock. 2000. Locating the Quispisisa Obsidian source in the Department of Ayacucho, Peru. *Latin American Antiquity* 11 (3): 258–268.

Burger, Richard L., Kris E. Lane, and Colin A. Cooke. 2016. Ecuadorian cinnabar and the Prehispanic trade in vermilion pigment: Viable hypothesis or red herring? *Latin American Antiquity* 27 (1): 22–35.

Further Reading

Burger, Richard L. 1984. *The Prehistoric Occupation of Chavin de Huántar, Peru*, University of California publications in anthropology. Vol. 14. Berkeley/Los Angeles: University of California Press.

Burger, Richard L. 1988. Unity and heterogeneity within the Chavin horizon. In *Peruvian prehistory*, ed. Richard Keatinge, 99–144. Cambridge: Cambridge University Press.

Burger, Richard L. 1993. The Chavin horizon: Stylistic chimera or socioeconomic metamorphosis. In *Latin American horizons*, ed. Don Rice, 41–82. Washington

D.C: Dumbarton Oaks Research Library and Collection.
Burger, Richard L. 2011. What kind of hallucinogenic snuff was used at Chavín de Huántar? An iconographic identification. *Ñawpa Pacha* 31 (2): 123–140.
Burger, Richard L. 2013. In the realm of the Incas: An archaeological reconsideration of household exchange, long-distance trade, and marketplaces in the pre-Hispanic Central Andes. In *Merchants, markets, and exchange in the pre-Columbian world*, ed. Kenneth G. Hirth and Joanne Pillsbury, 319–334. Washington D.C.: Dumbarton Oaks Research Library and Collection.
Burger, Richard L., and Jerrold B. Leikin. 2018. Cinnabar use in Prehispanic Peru and its possible health consequences. *Journal of Archaeological Science: Reports* 17: 730–734.
Burger, Richard L., and Ramiro Matos Mendieta. 2002. Atalla: A center on the periphery of the Chavín horizon. *Latin American Antiquity* 13 (2): 153–177.
Burger, R., and L.C. Salazar. 2014. Centro de qué? Los sitios con arquitectura pública de la cultura Manchay en la costa central del Perú. El Centro Ceremonial Andino: Nuevas Perspectivas para los Períodos Arcaico y Formativo. *Senri Ethnological Studies* 89 (2014): 291–313.

Burial Archaeology and the Soviet Era

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> Also the dead remain silent – until it is time for them to speak.
> Stanislaw Jerzy Lec

Introduction

There is something paradoxical in the fact that in 1943, the representatives of one totalitarian dictatorship, the Germans, began the excavation of the graves of the victims of another totalitarian dictatorship, i.e., the Soviet Union. The location was the site of the mass murder of Polish officers, NCOs, and officials at Katyn in Russia (e.g., Drazkowska 2010; Johansson 2010). The Stalinist terror (e.g., Conquest 1992) applied not only to the citizens of the Soviet Union but also to segments of the population regarded as politically dangerous in the areas conquered and occupied by the Soviets. It must also be mentioned that the archaeological profession suffered heavily from the terror (e.g., Klein 1997; Formozov 2006; Platonova 2010: 184–188).

After the collapse of the Soviet Union, the search for the remains of the victims of the terror and their exhumation has become a new area of work for archaeologists. Numerous mass graves have been discovered, but there have also been systematic searches for them. The reasons for this have been above all human, humanitarian, and political. The work of locating these grave sites outside the Russian Federation has been carried out actively in the Baltic republics, Poland, and the Ukraine (Tamm et al. 2008). In human terms, the need for archaeological and physical-anthropological exhumation is obvious and needs no explanation. The nations, ethnic groups, families, and individuals that experienced the terror have finally been given a chance to know the fate of their lost members and loved ones and their possible places of burial and to complete the process of individual and collective grieving (on the commemoration of the terror in present-day Russia, see Etkind 2009, and on commemoration and role of Katyn in European memory, see Etkind et al. 2012). According to Zoe Crossland (2011: 286 and cited literature), this involves "the increasingly pressing question of the memory and commemoration of recent conflict."

Apart from the human aspect, the reasons for investigating the material remains of the Soviet terror can be summarized as three main considerations (see, e.g., Zemitis 2005): (1) the legal aspect with research for the purposes of establishing historical truth and possible crimes against humanity (e.g., Kalbarczyk 2008), (2) the preservation and cherishing of the memory of the dead, and (3) to generate interest in history. The goals of national unity have also been in the background, and the present administration seeking reforms has reinforced its own legitimacy by revealing the victims of the old system of government (Paperno 2001: 89–90).

Since these investigations, however, are due more to human, humanitarian, and political reasons than the actual needs of research, their nature cannot always be merged with archaeological or

forensic procedures in completely unproblematic ways (Crossland 2011). The Estonian, Latvian, and Lithuanian research teams, however, involve a prominent archaeological, physical-anthropological, and medical contribution. They have also made use of expertise from beyond their own national borders (e.g., Lõugas 1991: 83). Lithuanian experts, in particular, have been employed in the other Baltic countries. The origins of Lithuanian forensic anthropology date from the 1960s, one of its roots being the exhumation of mass graves of the Holocaust (Garmus and Jankauskas 1999). Thus, the Soviet system provided the necessary training for later exhumation work.

Key Issues/Current Debates/Future Directions/Examples

Investigations have been organized in the Baltic countries by the institutes of archaeology of the national academies of science, the departments of archaeology, medicine and anthropology of the universities, and antiquarian societies (Tamm et al. 2008). This work has also involved large numbers of volunteers, various state and municipal bodies, and organizations including the successors of the state security organizations.

These investigations have produced much genetic material. In 2013 in Poland, to intensify the use of this material, together with archaeological and historical evidence, the Pomeranian Medical University in Szczecin founded the Polish Genetic Database of Victims of Totalitarianisms (PBGOT, www,pbgot.pl) to identify the remains of unidentified victims of both Communist and Nazi totalitarian regimes (Ossowski et al. 2016).

While the investigations have primarily concerned mass graves, execution sites of officers and other ranks of national armies and places where resistance fighters of the long period of occupation were killed have also been excavated. (Pillak 2016a: 184–185). A separate area of work consists of locating the graves of heads of the state and other dignitaries and the identification of their remains (Jankauskas et al. 2008). The grave and remains of Konstantin Päts, the last president of the first Estonian Republic, for example, were located, and the remains were reinterred in a solemn state ceremony in Tallinn (Lõugas 1991; Verdery 1999; Puustak 2008; Pillak 2016b), while the body of Karlis Ulmanis, the last pre-Soviet president of Latvia, has not been found (Zemitis 2005: 2). The remains of Prime Minister Imre Nagy of Hungary have also been exhumed (Tallai and Keve Kund 2008).

There was, in fact, interest in the Soviet Union in the remains of dignitaries and especially of Tsar Nicholas II and his family. There was a secret search for them already in the late 1970s, and investigations were officially resumed in 1991, leading to the scientific identification of the remains, their reburial, and canonization (Rousselet 2011). In Russia, however, the main focus has been on investigating the burial sites of victims of mass murders. The main organization involved in this work is Memorial (http://www.memo.ru), which also operates in Ukraine, Kazakhstan, Latvia, Georgia, and Italy, in addition to Russia. One of Memorial's main objectives has been "the awakening and preservation of societal memory of the severe political persecution in the recent past of the Soviet Union." In fact, the perpetuation of the memory of the victims was the very idea around which Memorial was formed. These activities have involved the preparation of "Books of Memory," special publications listing victims of Soviet repression (e.g., Gil'di and Braudze 2010). Memorial's activities have been actively followed and hindered by state authorities. It has have declared to be a "foreign agent," an organization accepting foreign funding and being engaged in political activity. Even its "liquidation" has been suggested (https://en.wikipedia.org/wiki/Memorial_(society)).

The main part of the work of Memorial has been the search for the burial sites of victims of the terror and related exhumation. The Soviet terror particularly concerned ethnic minorities, and some examples and results from their territories can be presented. Large numbers of mass graves

have been found in Russian Karelia, including Sandarmokh in the District of Medvezh'egorsk (Karhumäki), the largest known burial site of victims of the Stalin terror of 1937–1938 in Northwestern Russia, which was discovered in 1997 (Etkind 2009: 182–184). The 9,000 executed victims at Sandarmokh represent approximately 60 different nationalities (on burial sites in Karelia, see, e.g., Trubin 1989; Korablev n.d.).

In the Republic of Mari El in Central Russia, research was launched during the period of *perestroika*, and as early as by 1991, at least 12,000 bodies had been found in 200 identified mass graves (Patrushev 1991) within a 13-km radius of Joskar-Ola, the capital of the republic. The purges were particularly aimed at liquidating the intelligentsia of the Mari people. By way of comparison, it should be noted that under Stalin the republic had a population of approximately 600,000.

The work of the association of children of the victims of the repression of the Mari is an example of how searches were carried out for the graves. Firstly, people with knowledge of the executions were sought and interviewed. Eye-witness accounts were supported by aerial photographs of forested areas from 1955 with the notable detail of depressions on the surface of the ground where no trees grew. The investigations involved the local authorities and students of history at the Mari University under the direction of an archaeologist. The excavations revealed details of execution methods, and artifacts ranging from the headwear of members of the national intelligentsia to officers' sword belts pointed to ethnic and professional groups. The artifacts indicate the wide social spectrum of the victims. The process also included the erection of monuments at the burial sites (Patrushev 1991).

The research conducted in Mari El is a good example of the investigation of graves. The results include the surveying of burial sites based on archive materials, interviews, and aerial photographs, establishing the numbers of victims and their ethnic and social backgrounds, the reconstruction of methods of execution, and remembrance. For the time being, compilations of this area of archaeological work have not appeared in the former area of the Soviet Union. Katyn and other execution sites of Poles were not the only mass graves excavated and studied by the Nazis. Paradoxically, the results concerning the mass graves at Vinnytsia, issued in 1944 by the publishing house of the National Socialist Party, are still the most thorough forensic studies of mass graves from the area of the former Soviet Union (Paperno 2001 and literature therein).

In some cases, excavations have left unverified the wildest assumptions concerning grave sites. There is also, e.g., a rumor in Minsk that the local porcelain factory tried to improve its wares by adding powdered bone of human skeletons collected for this purpose. No one has yet been able to prove this claim, but people familiar with the period believe that it may well be true (Lõugas 1991: 80).

As Lõugas (1991: 84) writes: "Every East European archaeologist is familiar with the Early Iron Age 'kosti' of Glayadenevo Baskiria, 25 km from the city of Ufa. It is a mountain of bones, containing the remains of thousands of animals. This site is a well-known point of departure and comparison for the study of similar sites and antiquities of smaller scale. Perhaps a chronological starting point for future archaeologists will be the 'East European and Siberian layer of bones' from the second quarter of the twentieth century."

Military graves in the former Soviet Union must also be mentioned in connection with Soviet-era burials. Interest has now arisen in Russia in keeping and maintaining them. The Red Army usually left its dead unburied in the field. Now the remains have begun to be collected into military cemeteries, the care of which has begun.

An additional theme here consists of the burial sites and remains of lost soldiers of former enemy nationals in the present area of the Russian Federation. An example is the situation involving Finland and the Soviet Union/Russia. Finns have shown interest in the Finnish war dead of the areas ceded to the Soviet Union and the repatriation of

their remains. This work was launched by the Finnish Ministry of Education, and it has led to a Finnish-Russian agreement on keeping the memory of both Finnish soldiers who died in Russia and Russian (Soviet) soldiers fallen in Finland and an official statute on its implementation. These activities are of a bilateral nature. Finns assist Russians in their search for remains of soldiers in Finland, provide information on finds of this nature, and participate in keeping and maintaining the grave sites.

There are also results from Finland. The Association for Cherishing the Memory of the Dead of the War (http://www.sotavainajat.net/perussivut/sivut/english.htm; see also Blinnikka 2004) continues the work previously carried out by the Ministry of Education. This work and its results are cited below as described by the Association.

In practice, the work involves searching for and bringing back remains of Finnish soldiers from the battlefields of the wars of 1939–1945 that are currently located in Russia. During the wars between 1939 and 1945, approximately 13,000 Finnish soldiers were either lost on the battlefields or reported missing. The identification of the dead and their burial in their home areas is the main goal of the work. The remains of more than 1,100 Finnish soldiers have been found so far. Of these, the identities of almost 400 soldiers have been established. The majority of the c. 90,000 killed were evacuated and buried in the home graveyards (on repatriation and identification, see Palo et al. 2007).

Another field of activity is the restoration and maintenance of seven field graveyards in the ceded territory. These were established during the war and are today a final resting place for nearly 900 Finnish soldiers. Later, monuments have been raised at each of these graveyards.

During the wars of 1939–1945, around 4,000 Finnish soldiers were captured as prisoners of war. Of them, a little more than 2,100 were able to return to Finland after the war. It has been confirmed that 760 soldiers perished during their captivity. The fate of the others is still unknown. Five monuments have been raised in the locations of the former prisoner of war camps for those who perished there.

Cross-References

- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives

References

Blinnikka, A., ed. 2004. *Sotavainajiamme rajan takaa. Suomen sodissa 1939–45 kentälle jääneiden etsinnät ja muiston vaaliminen*. Jyväskylä: Sotavainajien muiston vaalimisyhdistys.

Conquest, R. 1992. *The great terror: A reassessment*. London: Pimlico.

Crossland, Z. 2011. The archaeology of contemporary conflict. In *Oxford handbook of the archaeology of ritual and religion*, ed. T. Insoll, 285–306. Oxford: Oxford University Press.

Drazkowska, A. 2010. Conservation of textiles excavated from Polish officers collective graves in Katyn and Kharkiv (Russ. Kharkov). *Fasciculi Archaeologiae Historicae* XXIII: 97–102.

Etkind, A. 2009. Post-soviet hauntology: Cultural memory of soviet terror. *Constellations* 16 (1): 182–200.

Etkind, A., R. Finnin, U. Blacker, J. Fedor, S. Lewis, M. Mälksoo, and M. Mroz. 2012. *Remembering Katyn*. Cambridge, MA: Polity Press.

Formozov, A.A. 2006. *Русские археологи в период тоталитаризма. Историографические очерки*. Москва: ZHAK.

Garmus, A., and R. Jankauskas. 1999. Methods of person's identification from skeleton in Lithuania. *Medicina Legalis Baltica* 3–4: 5–21.

Gil'di, L.A., and M.M. Braudze, eds. 2010. *Книга памяти финнов. Финнам, репресированным за национальную принадлежность в СССР. Том I*. Санкт-Петербург: ГЙОЛЬ.

Jankauskas, R., V. Urbanivicius, and A. Garmus. 2008. Clandestine burials of KGB victims in Vilnius, Tuskulėnai site. In *Poliitillised repressioonid 1940. ja 1950. aastatel*, ed. J. Tamm, K. Vahar, and H. Solnask, 30–36. Tallinn: Eesti Muinsuskaitse Selts.

Johansson, P. 2010. *Stalins mord i Katyn och dess historiska efterspel 1940–2010*. Stockholm: Carlssons.

Kalbarczyk, S. 2008. Exhumations as the source of knowledge about crimes the soviet authorities committed on the citizens of the Polish state. In *Poliitillised repressioonid 1940. ja 1950. Aastatel*, ed. J. Tamm, K. Vahar, and H. Solnask, 37–54. Tallinn: Eesti Muinsuskaitse Selts.

Klein, L.S. 1997. *Das Phänomen der sowjetischen Archäologie*. Frankfurt/M/Berlin/Bern/New York/Paris/Wien: Peter Lang.

Korablev, N.A. n.d. Справка памятники Захоронение жертв массовых репрессий" (1938–1939 гг.), 20-й км дороги Медвежегорск – Попенес. Карельского научного центра РАН. (Unpublished report).
Lõugas, V. 1991. The archaeology of terror. Archaeological excavations of mass-murder sites in the Soviet Union. *Fennoscandia archaeologica* 7: 77–84.
Memorial (Society). https://en.wikipedia.org/wiki/Memorial_(society). 21 Aug 2017.
Ossowski, A., M. Kuś, T. Kupiec, M. Bykowska, G. Zielińska, M.E. Jasiński, and A.L. March. 2016. The polish genetic database of victims of totalitarianisms. *Forensic Science International* 238: 41–49.
Palo, J.U., M. Hedman, N. Söderholm, and A. Sajantila. 2007. Repatriation and identification of Finnish World War II soldiers. *Croatian Medical Journal* 48: 528–535.
Paperno, I. 2001. Exhuming the bodies of soviet terror. *Representations* 75: 89–118.
Patrushev, V. 1991. Stalinin ajan tragedian jäljet. *Helsingin Sanomat*, 25 Oct 1991, p. 2.
Pillak, P. 2016a. Archaeology as a tool for better understanding our recent history in P. Florjanowicz (ed.) When the Valetta meets Faro. The reality of European archaeology in the 21st century. Proceedings of the international Conference Lisbon, Portugal, 19–21 March 2015. EAC Occasional Papers No. 11: 175–186.
Pillak, P. 2016b. Disclosing the Traumas of History: The Case of the First Estonian president. Proceedings of the 20th International Conference on Cultural Heritage and New Technologies 2015 (CHNT20, 2015). Vienna 2016. http://www.chnt.at/proceedings-chnt-20/.
Platonova, N.I. 2010. *Платонова Н.И. История археологической мысли в России. Вторая половина XIX – первая треть XX в*, 184–188. Санкт-Петербург: Нестор-История.
Puustak, Ü. 2008. President sünnimaa mulda. In *Poliitillised repressioonid 1940. ja 1950. Aastatel*, ed. J. Tamm, K. Vahar, and H. Solnask, 23–29. Tallinn: Eesti Muinsuskaitse Selts.
Rousselet, K. 2011. Constructing moralities around the tsarist family. In *Multiple moralities and religions in post-soviet Russia*, ed. J. Zigon, 146–167. New York/Oxford: Berghahn Books.
Tallai, G., and H. Keve Kund. 2008. The fate of Imre Nagy. In *Poliitillised repressioonid 1940. ja 1950. Aastatel*, ed. J. Tamm, K. Vahar, and H. Solnask, 47–54. Tallinn: Eesti Muinsuskaitse Selts.
Tamm, J., K. Vahar, and H. Solnask, eds. 2008. *Poliitillised repressioonid 1940. ja 1950. aastatel*. Tallinn: Eesti Muinsuskaitse Selts.
Trubin, A. 1989. Vainovuosien telotuspaikka löydetty. *Punalippu* 10 (89): 137–142.
Verdery, K. 1999. *The political lives of dead bodies. Reburial and postsocialist change*. New York: Columbia University Press.
Zemitis, G. 2005. Archaeology of terror. Latvian experience in terror archaeology. Conference in Tallinn on 20 and 21 Oct 2005. Available at: http://vip.latnet.lv/lpra/zemitis.htm.

Burial Excavation, Anglo-Saxon

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B

Brief Definition of the Topic

Human burials constitute a major source of evidence for human history. Burials excavated by archaeologists may report on both the individual commemorated and on society more broadly. Human remains may be encountered as burnt bone in containers or in pits (*cremations*), or as skeletons in graves (*inhumations*), or as mixed collections of bones, created by communal deposition (as in European Neolithic long barrows), or by reburial (*charnel*). The state of the remains (and their potential for further research) is dependent on the local terrain and consequent degree of decay (see "► Site and Artifact Preservation:

Burial Excavation, Anglo-Saxon, Fig. 1 A cremation urn

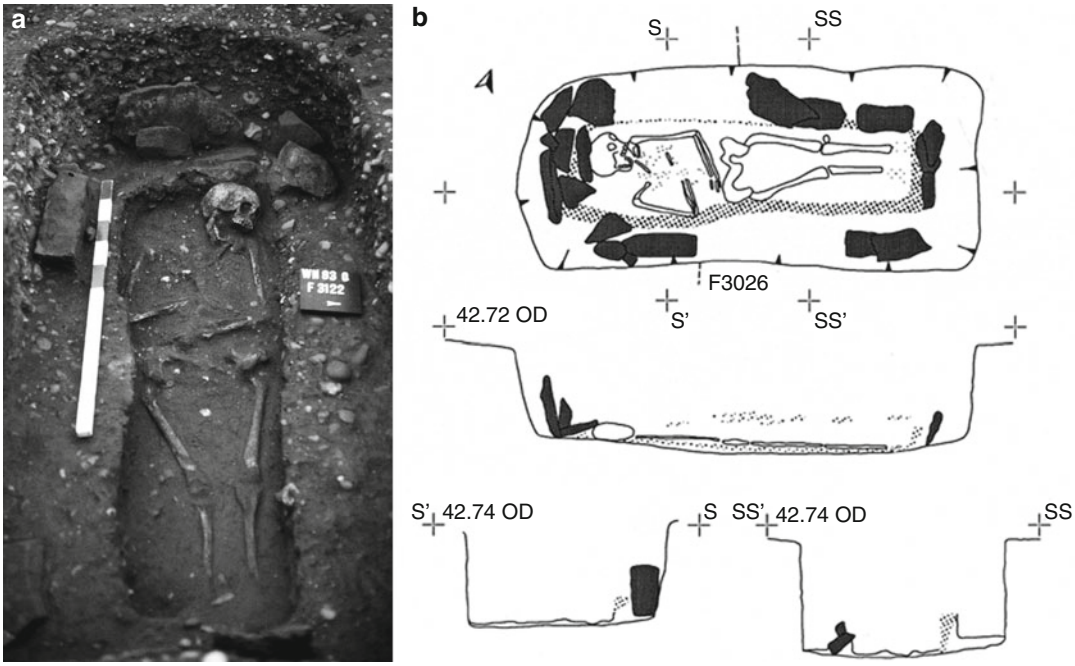

Burial Excavation, Anglo-Saxon, Fig. 2 An inhumation with typically poor bone preservation. The stones are part of the burial rite

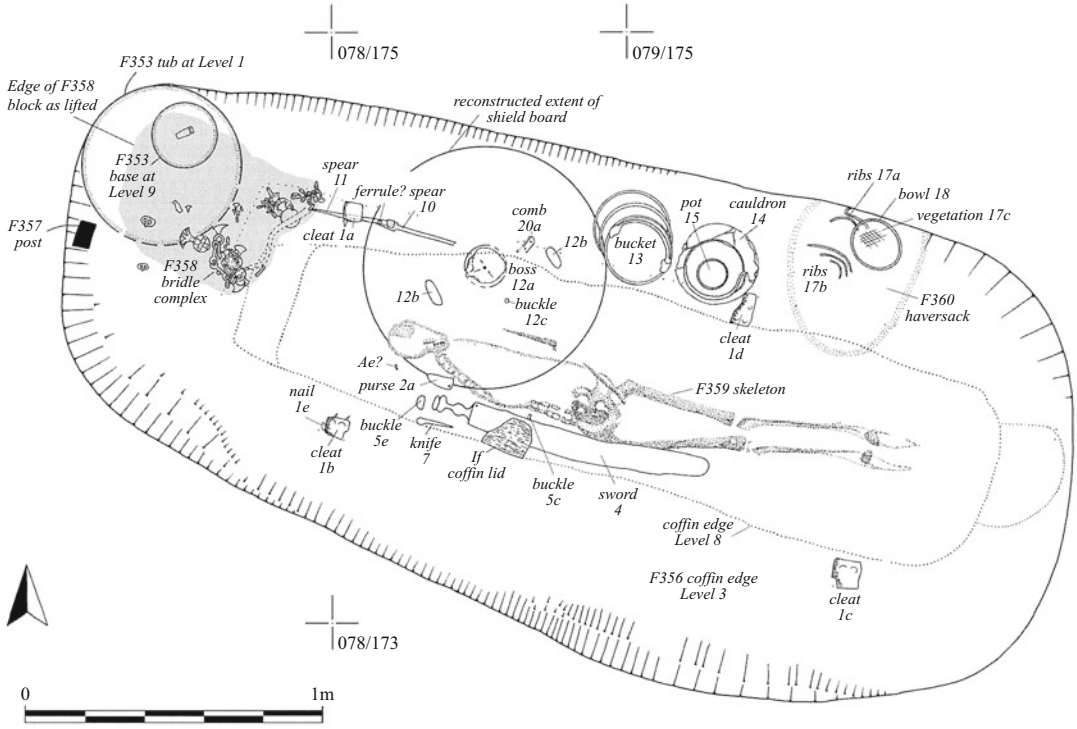

Burial Excavation, Anglo-Saxon, Fig. 3 Plan of a furnished inhumation. (From Sutton Hoo, Mound 17)

Natural and Cultural Formation Processes"; that associated with human remains is termed *taphonomy*). In general, acid soils (e.g., sands and gravels) attack bones, while more alkaline soils (chalk) tend to preserve them better. Anaerobic conditions (excluding air) can preserve the soft tissues. Thus *bog burials* (seen in the Scandinavian Iron Age) have preserved skin and inner organs and even the last meal of the deceased, but the acid solution of the bog has nevertheless dissolved the bone (Glob 1969).

The purpose of excavating cemeteries is to gain an insight into the population and thinking of an ancient community and generally involves two lines of inquiry: the study of the burial rites and the study of the skeletal material. The *burial rites* include the form of the grave, its orientation, and the disposition and character of the objects placed in the grave – the *grave goods*. In burial rites, variat ions in space imply different ranks or families; variations through time may relate to changes in religious or political thinking. *Skeletal material* reveals evidence for basic demography through a study of anatomy: This gives age at death, sex, major diseases, and injuries. The carbon contained in the collagen in the bone (including cremated bone) can be extracted and *radiocarbon*-dated, using the proportions of carbon isotopes. Carbon and nitrogen isotopes present in the bone are also used to assess the emphasis of diet (it will show whether the diet of an individual had a strong or weak marine intake, i.e., fish). Oxygen and strontium isotopes trapped in teeth indicate the character of the groundwater where a person grew up. *Ancient DNA* (aDNA) can now be recognized in skeletal material.

The excavation of Anglo-Saxon burials (fifth to seventh century), used here as an example, has generated a notable range of techniques (Williams 2006; Carver 2009: 131–8). The pits containing cremations are exposed on the surface by troweling, and the pot exposed and removed, intact wherever possible, for excavation indoors (Fig. 1). The contents of the pot are removed in very small spits to document the association of the fragments of burnt bone with each other and with the fragments of grave goods. The objective is to discover which humans, animals, and grave goods had originally been on the funeral pyre.

Inhumations accompanied by grave goods are commonly encountered in Anglo-Saxon cemeteries (Fig. 2). The graves are revealed on the surface by troweling, and the grave fill is then removed in 5- or 10-cm spits against the long axis: This will provide a profile through the grave. The skeleton and all the grave goods (e.g., sword, shield, brooch) are photographed and plotted individually on a grave plan (Fig. 3).

An example of a research project at an Anglo-Saxon cemetery is given by Sutton Hoo. A ship burial discovered by chance at the site in 1939 drew attention to its potential. The site was subjected to a 2-year evaluation in the 1980s, with a view to determining what had survived the effects of taphonomy, plowing, and treasure hunting, and a project design was then published. In addition to regional surveys, this design proposed the excavation of 1 ha of the

Burial Excavation, Anglo-Saxon, Fig. 4 The burial under Mound 17 being excavated from a cradle

4 ha site, encompassing five of the 18 known burial mounds (and the spaces in between).

Burial Excavation, Anglo-Saxon, Fig. 5 A 'sandman' burial' where the form of the body is preserved (but less so the bone).

Several of the mounds contained cremations, two had contained ships, and one contained a young man buried in a coffin (Fig. 4). His horse was buried in a separate pit adjacent. In the later Saxon period (eight to eleventh century), this high-ranking pagan cemetery became a place of execution.

The ground conditions at Sutton Hoo were hostile, and although fragments of bone were sometimes present, human bodies had decayed markedly in the acid sand, creating "sand fossils" rather than skeletons. The majority of burials, still marked by mounds, had been severely pillaged, scattering bone and objects. The medieval use of the mounds as rabbit warrens had further dispersed the burials.

Nevertheless, the horse and rider burial was undisturbed and could be excavated in precise detail. The execution burials (sand fossils) proved susceptible to excavation in three dimensions, and their shapes were sufficient to show examples that had been killed by hanging or beheading (Fig. 5). The chamber in a pillaged mound, Mound 2, was surveyed by intensive chemical mapping, which showed the location of the now vanished body, a copper alloy cauldron, and other grave goods (Fig. 6). In spite of the evident battering the

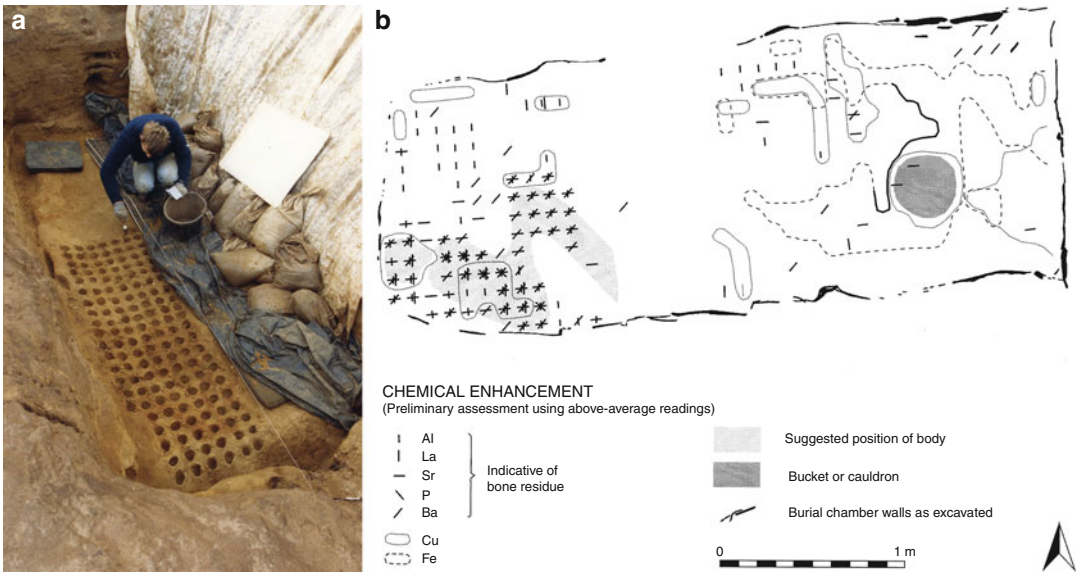

Burial Excavation, Anglo-Saxon, Fig. 6 Chemical mapping of the floor of a robbed chamber

cemetery has suffered through the ages, there was sufficient bone to radiocarbon-date the whole sequence, from 580 to 1050, and align it with the typological dates of the rich grave goods from the famous ship burial.

Cross-References

► Excavation Methods in Archaeology

References

Carver, M. 2005. *Sutton Hoo. A seventh-century princely burial ground and its context*. London: British Museum Press.
Carver, M. 2009. *Archaeological investigation*. London: Taylor & Francis.
Glob, P.V. 1969. *The bog people*. London: Faber & Faber.
Williams, H. 2006. *Death and memory in early medieval Britain*. Cambridge: Cambridge University Press.

Further Reading

Lucy, S. 2000. *The Anglo-Saxon way of death*. Stroud: Sutton Publishing.

Burial Mound Dissection in Sweden

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Introduction

In 1949, it was decided to excavate the first of the four Migration Period large mounds in Högom at a cemetery a few kilometers west of Sundsvall in the county of Medelpad, North Sweden. Concentrations of large mounds (>20 m in diameter) in Scandinavia are known at Old Uppsala in Uppland, Bertnem in Trøndelag, and Borre and Snartemo. Often arranged in rows, these are high status burials representing generations of regional leadership. The four mounds in Högom ("mounds") Medelpad north Sweden clearly belonged to this exclusive group. When investigations began in 1949, the site had been largely forgotten and was encumbered by houses, barns and cellars, driveways, and threshing places. The National Heritage Board decided to purchase the area, remove the buildings, and restore a cultural landscape around the cemetery. But before restoration, it was decided to investigate the most damaged of the burial mounds (No. 2). The project was one of exceptional innovations.

Key Issues/Current Debates/Future Directions/Examples

The mound was 40-m across and at least 4-m high, and in accordance with the excavation methods of the late 1940s, it was initially investigated with a trench. This was placed on the NE side of the mound on the site of a demolished building. Beneath the topsoil, the excavators encountered a stone cairn, which was then exposed in its entirety (Fig. 1). It proved to be 20-m across, and seen from a tower was clearly no random heap, but the stones had been deliberately sorted by size. To record this information, the whole cairn was carefully planned, stone by stone.

Burial Mound Dissection in Sweden, Fig. 1 Dagmar Selling, excavator (with Sverker Janson) of Högom Mound 2, working on the central cairn (Ramqvist 1992, Fig. 17a)

Burial Mound Dissection in Sweden, Fig. 2 Metal buttons on the leggings of the buried person showing in the compressed roof of the chamber (Ramqvist 1992, Fig. 24)

Burial Mound Dissection in Sweden, Fig. 3 Metal plates being driven beneath the chamber with jacks (Ramqvist 1992, Fig. 25)

Burial Mound Dissection in Sweden, Fig. 4 The encased burial chamber is unloaded outside the laboratory in Stockholm

While the stones were being removed, it became apparent that there was a central burial chamber measuring 5 × 2 m in plan that had been constructed in timber. It had been compressed by the weight of the mound into a compact layer 10-cm thick containing all the wood, the body, and the objects, some of which showed through the matt surface of the compressed wooden roof (Fig. 2). Attempts to excavate the chamber in situ were frustrated by the hardness of the wooden layer; more forceful digging threatened to destroy the objects.

Inspired by the successful lifting of a whale jawbone during the excavation of a Stone Age settlement in Bohuslän (western Sweden) in 1935, it was decided to try and lift the whole chamber in order to excavate it in the laboratory. This much more challenging project was achieved by engineers from the construction firm, Hallström & Nisses of Sundsvall. To provide access, a wide and deep trench was dug around the chamber, making an archaeological record of the layers disturbed. The chamber proved to be resting on silty deposits without a wooden floor.

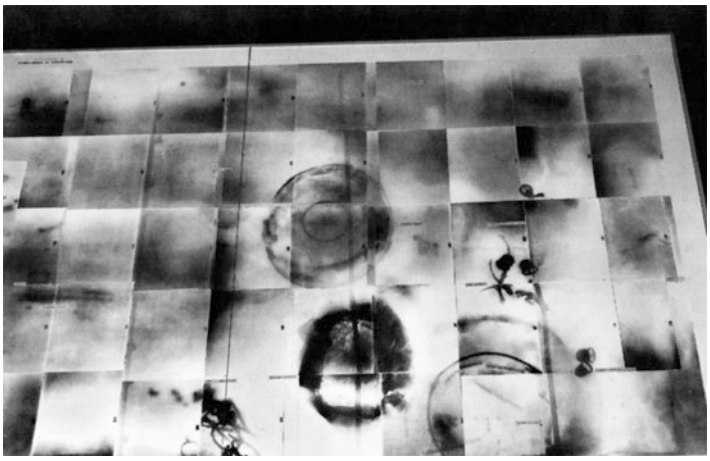

Burial Mound Dissection in Sweden, Fig. 5 The set of X-ray plates from the eastern part of the chamber showing the bridle and cauldron in position in the laboratory (Ramqvist 1992, Fig 28b)

The engineers then built a wooden box around the chamber and drove steel pipes beneath it, with horizontal steel plates jacked into position above them to create a base for the chamber deposit (Fig. 3). The wooden box was infilled with plaster to prevent movement of the deposit and the whole encased in a steel frame. It was then lifted and transported to the National Historical Museum in Stockholm.

When unloading the box in Stockholm (Fig. 4), it was turned completely upside-down, so that the continuing investigation could take place "from below," with the impenetrable roof now as the base. Before excavation in the laboratory, the entire deposit was X-rayed, producing a set of plates at 1:1 which proved to be an invaluable guide to the indoor excavators (Fig. 5). The burial was excavated in minute detail. Dating to c. 500 CE, it is known as one of the richest and best excavated in the Baltic area.

In 1984, the site was surveyed in detail and the previously unexcavated perimeter around the cairn was examined, revealing large postholes of a building erected before the mound, probably a three-aisled long house. The whole site was eventually published by Ramqvist (1992).

Cross-References

- ▶ Archaeological Record
- ▶ Excavation Methods in Archaeology
- ▶ Scandinavia/Northern Europe: Historical Archaeology
- ▶ Scandinavia: Field Methods
- ▶ Trade and Transport in the Ancient Mediterranean

References

Ramqvist, P.H. 1992. *Högom. Part 1. The excavations 1949–1984 (Archaeology and environment 13)*. Umeå: Umeå University.

Burial Practices and Tombs in the Roman World

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Introduction

The choices people make about the treatment of the dead can be used to understand a society's attitudes toward death and beliefs about the afterlife. Information concerning burial practices and commemoration in the Roman world come from both ancient texts and archaeological evidence. Ancient literary sources can provide rich contextual evidence for Roman beliefs and practices surrounding death and burial, yet it is important

to remember that many of these ancient sources were written by elite male members of society and likely reflect a limited segment of Roman society. The archaeological record also provides invaluable information on burial practices, but only a small percentage of burials have survived intact from the Roman period and are overrepresented by monumental tombs that belonged to a small elite segment of Roman society. Through the integration of different lines of evidence, general patterns can be discerned, but it is important to emphasize that there was not one universal "Roman" way of burying the dead throughout the Roman world and that these practices varied both geographically and temporally.

Definition

The term "burial" refers to the act of placing the deceased in the ground and can also indicate the location where the deceased is interred, which is often used interchangeably with "grave." "Burial practices" refer to the activities surrounding the preparation of the deceased for burial and deposition of the remains in the ground or in some type of burial structure. A "tomb" can be used to refer to the general location where the deceased is buried, but is more commonly used to describe a freestanding architectural structure that is used to house the dead.

Key Issues

Death Pollution

A number of factors influenced the treatment and burial of the dead in ancient Rome. The widespread belief in death pollution, both spiritual and physical, meant that rituals were required to separate the deceased from the living and to cleanse the survivors of any contamination associated with death (Toynbee 1971; Lindsay 2000). Attitudes toward the dead were also influenced by the belief that some part of the individual continued to exist after death and could influence the living, so appropriate burial practices were required to guarantee a smooth transition into the afterlife. A "proper" burial guaranteed that the deceased made this transition successfully, ensured that deceased spirits were not restless, and helped to reintegrate survivors back into society (Hope 2000).

The period of mourning, known as the *feriae denicales*, began with the death of the individual and ended after the ninth day. Pine or cypress branches were placed outside the front door of the house to advise other members of the community that a death had occurred (Lindsay 2000). Once the body was washed and prepared for burial, either by family members or by hired professionals for more affluent members of society, the body was then laid out for a period of time in the home. For wealthier members of society, the display of the deceased and the funeral procession may have been an elaborate affair involving professional mourners and actors hired to wear the wax masks (*imagines*) of the deceased's ancestors and public eulogies in honor of the deceased in the forum (Flower 1996; Lindsay 2000). For a description of an elite Roman funeral procession, see Polybius (*Histories* 6.53–54). For the majority of people in the Roman world, however, the funeral procession from the home of the deceased to the grave or tomb was likely a modest affair carried out by the family.

The association of death with pollution and contagion also had an impact on the location of burials and tombs. Roman law dictated that burial had to occur outside the sacred boundary of the city (the *pomerium*), with the exception of a small number of elite members of Roman society who were buried within the walls of the city (Patterson 2000; Retief and Cilliers 2006). The tombs of aristocrats and their household members often lined the main roads leading into the city, such as those found along the Via Appia outside Rome and the Street of the Tombs outside Pompeii. Less wealthy members of society were buried in a variety of structures in cemeteries outside the city (see "Burials and Tombs," below), but these cemeteries were often not clearly defined (Hope 2000).

After the funeral ceremony, the participants consumed a meal, the *silicernium*, at the site of

interment or cremation, and food and drink were also offered to the deceased. Food was an essential part of the transition of the deceased from the world of the living to the afterlife, and the ritual of feasting with the dead continued through annual festivals to commemorate the dead. After returning from the funeral, family members and other mourners had to be cleansed of the pollution associated with death with water and fire (the *suffitio*), and the house of the deceased had to be purified to once again reintegrate the survivors back into society. At the end of the 9 days, another meal (the *cena novendialis*) was held to mark the end of the mourning period and the reintegration of the mourners back into society. Some ancient texts also refer to the practice of sacrificing a sow to the goddess Ceres at the grave site so that the burial was legally considered a grave (Lindsay 1998; Erasmo 2008).

Inhumation

Inhumation involved placing the body either directly into the ground or inside a burial container (e.g., coffin or sarcophagus) for burial. If communal tombs were used, the individual might be placed in a freestanding sarcophagus, interred in a space along the walls (e.g., *loculi* in Roman catacombs), or buried in pits in the floor of the tomb. In order to have a proper burial, it was important for soil to be scattered over the deceased; otherwise, the spirit was trapped between the worlds of the living and the dead and would remain restless (Hope 2000; Graham 2006). Disturbing a burial or damaging a tomb was a criminal offense.

The burial or tomb was viewed as the house of the deceased, consistent with the belief in the afterlife and that the spirits of the dead still required sustenance through regular offerings of food and wine, and a permanent place to reside (Patterson 2000; Wallace-Hadrill 2008). The deceased was typically buried with personal items or grave goods that would be of use in the afterlife, such as pottery vessels and oil lamps, although the quantity and quality of the objects would vary according to the gender, age, and status of the individual. The presence, absence, quality, or quantity of grave goods must be interpreted with caution, as changing patterns in burial practices may also be related to shifting attitudes of those responsible for burial (e.g., asceticism). Literary sources from the fifth century BCE to the second century CE also describe the common practice of placing a coin in the mouth of the deceased to pay the ferryman, Charon, for transport across the river Styx to the underworld. The archaeological evidence, however, does not support the ubiquitous use of coins in burials or the consistent placement of coins in the mouth of the deceased when present (Hope 2009). Coins are not found in all Roman burials, and when present, they are found in association with other areas of the body. Thus, the prescribed ideals for Roman burial ritual could be adapted or ignored depending on local customs, cost, and individual choice.

Cremation

Cremation of the dead involved transporting the deceased to the cemetery and burning the body in the location of the burial (*bustum*) or cremating the body in an area of the cemetery reserved for this process (*ustrinum*). In *bustum* burials, the individual was placed on a wooden pyre above the grave, and as the cremation progressed, the burnt remains and ashes would fall into the burial along with any grave goods that were placed with the body. The presence of *bustum* burials can be recognized archaeologically by the presence of cremated remains interspersed with ash and traces of carbonized wood (Fig. 1). These funerary pyres did not usually produce enough heat to fully incinerate the bones of the deceased, so carbonized bone fragments are often present. Once the pyre cooled, the remains were sprinkled with wine and the grave would be filled in by soil and/or covered by a more permanent tomb structure.

After the deceased was cremated in an *ustrinum*, the remains were sprinkled with wine and soil and then placed in a container that would eventually be interred in a columbarium or family tomb (see "Burials and Tombs," below). Remains of *ustrina* from the Roman period have been found associated with the mausoleum of Augustus in the Campus Martius and along the Via Appia outside Rome. The preparation and tending of the

Burial Practices and Tombs in the Roman World, Fig. 1 In situ cremation burial (*bustum*) showing areas of carbonized wood (left) and ash (lower right). Cremated bone is distributed throughout the burial and grave goods are in the foreground

funerary pyre likely required specialized knowledge in order to ensure that the remains would be properly cremated and required the skills of a professional pyre burner (*ustor*) (Noy 2000; Graham 2006). An incomplete or partial cremation was considered an insult to the deceased and was potentially dangerous to the living because the deceased had not been properly laid to rest (Noy 2000). The ancient authors Cicero and Varro describe the practice of removing a fragment of the body (*os resectum*) prior to cremation for later reburial, which is attributed to the requirement of symbolically burying the deceased to ensure a proper burial (Retief and Cilliers 2006). This ritual is often described in the literature on Roman burial practices, although obtaining archaeological evidence for this practice is unlikely due to the fragmentary nature of cremated remains and the uncertainty concerning where the body part, usually described as a finger bone, would later be deposited (Hope 2009). It has also been suggested that the body fragment would be placed in the urn along with the ashes (*ossilegium*) (Erasmo 2008).

Changing Patterns of Cremation and Inhumation in the Roman World

Ancient texts indicate that inhumation was the standard method of disposal of the dead in pre-Roman Italy and that the practice of cremation slowly gained popularity between the fourth and first centuries BCE (Graham 2006). This burial custom was not universally adopted throughout Roman Italy and there is archaeological evidence that inhumation remained the predominant practice among local populations in southern Italy, possibly linked to the influence of Greek colonies and their burial practices in the region (Davies 1977). The persistence of inhumation may also have been related to the retention of indigenous cultural practices in response to Roman expansion, or it may simply have been due to financial considerations and the reportedly lower cost of inhumation. Cremation remained the predominant custom in urban centers such as Rome from the first century BCE through the second century CE, but beginning in the second century CE, inhumation regained popularity and became widespread across the Roman Empire (Graham 2006; Hope 2009). Recent explanations for the shift from cremation to inhumation after the second century CE have discounted the idea that this was linked to the spread of Christianity and was more likely the result of changing patterns in burial display and commemoration (Morris 1992; Graham 2006; Bodel 2008).

The Burial of Infants and Children

Writers from the Roman period advised parents to be stoic about the loss of very young infants since they were not yet fully integrated into Roman society. Infants less than 40 days old were to be buried in or around domestic buildings and those under the age of 6 months could not be cremated, although the assertion that Romans did not provide young infants with proper burials is not supported by archaeological evidence from

Burial Practices and Tombs in the Roman World, Fig. 2 Libation burial with two curved imbrices inserted vertically in the soil above the burial cover

around the Roman world (Carroll 2011, 2018). Archaeological and epigraphic evidence indicate that infants under 1 year of age are underrepresented in cemeteries from the Roman period, but this does not necessarily reflect a lack of concern or grief over the loss of a child (Hope 2009; Carroll 2011). Preservation of infant remains and the ability to recognize and recover the bones of young children may also contribute to the underrepresentation of infants in the archaeological record (Norman 2010; Carroll 2011). The commonly held view that the funerals of infants and children were held at night, due to the association with death pollution and due to their marginal status in society, has recently been challenged (Carroll 2018). Infants were sometimes buried in broken amphorae, interpreted as symbolic of the infant's return to the womb (Norman 2010). Older children were cremated or buried in a similar manner to adults and there are proportionally more funerary epitaphs to children over the age of 1 year, possibly reflecting the increased emotional investment of the parents in older children and the public expression of grief over the loss (Hope 2009). A recent survey of archaeological evidence for infant burials in the Roman world reveals considerable variation in the location of their graves both within cemeteries and settlements (Carroll 2018).

Maintaining Relationships with the Dead

The relationship between the living and the dead did not end after the burial rituals. There was an ongoing connection between the living and the dead, consistent with the belief that the spirits of the dead could affect the living and that it was the responsibility of surviving family members to maintain the burial or tomb. Regular visits to the grave would occur throughout the year to commemorate birthdays and the anniversary of the day the person died. The Roman festival of *Parentalia* (13th–21st of February) was held annually to honor the deceased members of the family. Food and wine (libations) would be offered at the grave site to share with the deceased, often through the presence of libation tubes inserted in the ground above the burial (Fig. 2), or food could be left on potsherds or at small altars at the grave site (Dolansky 2011). The consumption of food at the grave site is further attested archaeologically by the presence of dining benches inside or outside communal tombs, such as those found at the necropolis of Isola Sacra near the Roman port city of Ostia (Fig. 3). The festival of *Lemuria* took place on the 9th, 11th, and 13th of May each year when restless spirits returned to their homes and rituals were performed by the patron of the house to make the spirits leave. Burial was also a means of commemoration, and so tombs were not only for the dead but were also competitive expressions of status for the living to witness as they passed by.

Burials and Tombs

Single Burials

Simple inhumations – Poorer members of society were likely buried in simple pits in the ground or

Burial Practices and Tombs in the Roman World, Fig. 3 House tomb with two benches (*biclinia*) for funerary banquets flanking the main door

in a burial container like a wooden coffin. The location of these burials may have been unmarked or indicated with a grave marker that could vary in size and permanence. Sometimes stone *stelae* marked the location of the burial, or more elaborate funerary altars were placed over the burials that were designed to resemble a sacrificial altar (Hope 2009). Fragmentary amphorae were sometimes reused in burial contexts to mark the location of a burial in a cemetery and also to act as libation tubes, such as those found outside the monumental tombs at the necropolis of Isola Sacra near Rome (Fig. 4).

Cappuccina burials – This was a common burial structure found throughout the Roman world in which the deceased would be placed in a simple pit or laid out on a series of large flat roof tiles (*tegulae*). The deceased was then covered by a series of paired *tegulae* inclined over the body in an inverted "V" shape, with the narrowest part of the burial at the top (Fig. 5). The ridge formed by each pair of tiles would sometimes be capped with curved tiles (*imbrices*) or fragments of pipe. The burial would then be partially or completely covered with soil.

Libation burials – Not all burials possessed libation tubes, but when present, they were simple pit burials, sometimes covered with a series of

Burial Practices and Tombs in the Roman World, Fig. 4 Amphora burial from the Roman necropolis of Isola Sacra

Burial Practices and Tombs in the Roman World, Fig. 5 Cappuccina burial from the Roman cemetery at Vagnari, south Italy

horizontal *tegulae* and a terracotta tube or two *imbrices* were inserted vertically in the soil above the burial (Fig. 2). Cappuccina burials could also have libation tubes inserted into the soil above the grave.

Sarcophagi – Stone boxes with flat or gabled lids that were often elaborately carved with biographical scenes of the deceased, mythological scenes, hunting scenes, or representations of military conquests on the exterior, but the interior was usually left undecorated. This type of burial container gained popularity among wealthier members of society with the shift from cremation to inhumation in the second century CE and was usually placed inside larger monumental tombs (Morris 1992).

Cassone – Barrel-vaulted brick structures built directly above single inhumation or cremation burials, examples of which are found in the necropolis of Isola Sacra and the Vatican necropolis in Rome (Graham 2006).

Multiple Burials

Puticuli ("little pits") – There are a small number of references in ancient texts to the existence of mass graves outside the Esquiline gates in Rome that were used for the disposal of slaves and poorer members of society. Excavations in Rome by Rodolfo Lanciani in the nineteenth century reportedly revealed the presence of "hundreds" of these pits containing human and animal remains, although the archaeological evidence for these estimates has been called into question (Graham 2006). A critical examination of the archaeological and literary evidence reveals that the Esquiline pits were only used for a short period of time (i.e., between the third and second centuries BCE) and were likely not used as a normal mode of disposal for the poor in the city of Rome, but rather may have been associated with epidemics or other catastrophic events (Patterson 1992; Graham 2006). Horace refers to the presence of a graveyard scattered with bones on the Esquiline hill, which was eventually covered over by gardens in the first century BCE and may have been a cemetery for poorer members of society (Morris 1992; Bodel 2000). It has been suggested that cremation in public crematoria became the common mode of disposal of the urban poor during the Imperial period (Bodel 2000; Patterson 2000).

Columbaria – Communal tombs containing a series of niches intended to hold cremation urns (*cineraria*) that gained popularity in the first

Burial Practices and Tombs in the Roman World, Fig. 6 Interior wall of a tomb at Isola Sacra showing a series of niches for cremation urns

century BCE and stayed in fashion through the second century CE (Morris 1992; Bodel 2008). *Columbaria* varied in size, from small family tombs (Fig. 6) to larger structures that contained hundreds of niches and could be built above or below ground. These communal tombs could contain members of the patron's extended family, along with household members including slaves, freedmen, and their descendants (Patterson 2000). Funerary societies, called *collegia*, also existed to provide less wealthy members of society a means to ensure a proper funeral through regular payments to the society, which guaranteed that members would be interred in communal *columbaria* upon their death (Toynbee 1971). These funerary clubs did not, however, replace the role of the family in the proper disposal of the dead but acted in cooperation with the family to guarantee a proper funeral and final resting place (Patterson 2000; Bodel 2008).

Catacombs – A form of subterranean collective burial in ancient Rome that gained popularity in the second century CE, following the gradual shift in burial practice from cremation to inhumation. This period also coincides with the emergence and spread of Christianity in the Roman world, but catacombs were not originally a Christian phenomenon and likely developed from earlier forms of subterranean burial chambers called *hypogea* (Morris 1992; Bodel 2008). The catacombs discovered outside the city of Rome are characterized by complex subterranean tunnels carved into the volcanic rock with niches lining the walls (*loculi*) for individual interments and the presence of larger chambers (*cubicula*). According to Bodel (2008), the criteria for identifying catacombs are independent entrances at ground level, space for large numbers of inhumations, and the capacity for extension of existing galleries to accommodate further burials.

Monumental tombs – The size and structure of monumental tombs varied according to the tastes and wealth of the owners, the competitive expression of social status, and changing fashions in commemoration. Masonry-built tombs varied in appearance from simple open-air tomb enclosures to a wide variety of tomb structures including houses, towers, temples, and pyramids (Toynbee 1971; Hope 2009). From the first century BCE through the second century CE, these communal tombs were in fashion, and the tombs of elite members of society often lined the main roads outside the city. Tombs from the Republican period were mainly constructed for members of the immediate family, but in the Imperial period they included members of the extended family, their slaves, and freedmen (Patterson 2000).

House tombs, like those found at the necropolis of Isola Sacra near Ostia, are rectangular roofed structures with doorways, windows, internal decoration (e.g., mosaics and frescoes), and some with benches for funerary banquets (Hope 1997). Earlier tombs contained small niches for funerary urns, consistent with the preference for cremation up to the second century CE, while later tombs also contained spaces in the walls for inhumations (*arcosolia*) and others contained spaces underneath the floors (*formae*) for additional burials.

According to Toynbee (1971), circular tombs found in Roman Italy likely developed from the Etruscan tumuli found near Rome. The most famous example of a circular tomb is the mausoleum of Augustus located in the Campus Martius in Rome, characterized by a series of concentric walls surrounding a central chamber. The structure was covered by an earthen mound and a statue of Augustus was on the top of the mound (Toynbee 1971; Hope 2009). Other famous examples of circular tombs include the tomb of Caecilia Metella, the *tomba rotunda* of Lucilius Peto, and the mausoleum of the emperor Hadrian, more commonly known as Castel Sant'Angelo.

International Perspectives

Systematic and comprehensive excavation of urban and rural cemeteries found on Roman period sites will help to identify variability in patterns of burial and commemoration. In addition, better integration is needed between epigraphic evidence (when present), the analysis of burials and their contents, and the osteological analysis of the people buried within. Excavation and analysis of burials should be undertaken by archaeologists and bioarchaeologists who are trained in the identification of human remains, particularly the recognition of small, delicate infant remains, so that the maximum amount of information can be obtained from each burial. This will help to provide a more nuanced understanding of differences in burial treatment and attitudes toward the dead based on variables such as age, gender, and health (e.g., Gowland and Redfern 2010; Prowse 2011). Recently, Graham (2018) has called for a more deliberate examination of sensory experiences related to the physical landscape of Roman cemeteries.

B

Future Directions

Much of what we know about the burial practices and tombs in the Roman world comes from literary evidence and monumental tombs associated with large urban centers like Rome and Pompeii. What ultimately happened to the enslaved and poor after death is not well known, particularly with respect to the existence and role of *puticuli*, and what we know about these mass graves is cited mainly from one nineteenth-century source. Continued research on the burial treatment of traditionally underrepresented members of Roman society (i.e., women, children, slaves, rural populations) will contribute to a greater understanding of burial practices and commemoration of different segments of ancient Roman society.

Cross-References

- ▶ Bioarchaeology in the Roman Empire
- ▶ Cremation in Archaeological Contexts
- ▶ Demography of the Ancient Roman World
- ▶ Ethics and Human Remains
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Tombs, Etruscan
- ▶ Tombs, Greek (Iron Age)

References

Bodel, J. 2000. Dealing with the dead: Undertakers, executioners, and potter's fields in ancient Rome. In *Death and disease in the ancient city*, ed. V.M. Hope and E. Marshall, 128–151. London: Routledge.

Bodel, J. 2008. From columbaria to catacombs: Collective burial in pagan and Christian Rome. In *Commemorating the dead: Tests and artifacts in context. Studies of Roman, Jewish and Christian burials*, ed. L. Brink, O.P. Green, and D. Green, 177–242. Berlin: Walter de Gruyter.

Carroll, M. 2011. Infant death and burial in Roman Italy. *Journal of Roman Archaeology* 24: 99–120.

Carroll, M. 2018. *Infancy and earliest childhood in the Roman world – 'A fragment of time'*. Oxford: Oxford University Press.

Davies, G. 1977. Burial in Italy up to Augustus. In *Burial in the Roman world*, ed. R. Reece, 13–19. London: The Council for British Archaeology.

Dolansky, F. 2011. Honouring the family dead on the Parentalia: Ceremony, spectacle, and memory. *Phoenix* 65: 125–158.

Erasmo, M. 2008. *Reading death in ancient Rome*. Columbus: The Ohio State University Press.

Flower, H.I. 1996. *Ancestor masks and aristocratic power in Roman culture*. Oxford: Clarendon Press.

Gowland, R., and R. Redfern. 2010. Childhood health in the Roman world: Perspectives from the centre and margin of the empire. *Childhood in the Past: An International Journal* 3: 15–42.

Graham, E.-J. 2006. *The burial of the urban poor in Italy in the late Roman republic and early empire*, British archaeological reports international series. Vol. 1565. Oxford: Archaeopress.

Graham, E.-J. 2018. There buds the Laurel': Nature, temporality, and the making of place in the cemeteries of Roman Italy. *Theoretical Roman Archaeology Journal* 1 (1): 1–16. https://doi.org/10.16995/traj.147.

Hope, V.M. 1997. A roof over the dead: Communal tombs and family structure. In *Domestic space in the Roman world: Pompeii and beyond*, Journal of Roman archaeology supplementary series, ed. R. Laurence and A. Wallace-Hadrill, vol. 22, 69–88. Portsmouth: Journal of Roman Archaeology.

Hope, V.M. 2000. Contempt and respect: The treatment of the corpse in ancient Rome. In *Death and disease in the ancient city*, ed. V.M. Hope and E. Marshall, 104–127. London: Routledge.

Hope, V.M. 2009. *Roman death*. London: Continuum.

Lindsay, H. 1998. Eating with the dead: The Roman funerary banquet. In *Meals in a social context*, ed. I. Nielsen and H.S. Nielsen, 67–80. Aarhus: Aarhus University Press.

Lindsay, H. 2000. Death-pollution and funerals in the city of Rome. In *Death and disease in the ancient city*, ed. V.M. Hope and E. Marshall, 152–173. London: Routledge.

Morris, I. 1992. *Death-ritual and social structure in classical antiquity*. Cambridge: Cambridge University Press.

Norman, N.J. 2010. Death and burial of Roman children: The case of the Yasmina cemetery at Carthage – Part I: Setting the stage. *Mortality* 7: 302–323.

Noy, D. 2000. Half-burnt on an emergency pyre: Roman cremations which went wrong. *Greece and Rome* 47: 186–196.

Patterson, J.R. 1992. Patronage, collegia and burial in imperial Rome. In *Death in towns: Urban responses to the dying and the dead, 100–1600*, ed. S. Bassett, 15–27. Leicester: Leicester University Press.

Patterson, J.R. 2000. Living and dying in the city of Rome: Houses and tombs. In *Ancient Rome: The archaeology of the eternal city*, ed. J. Coulston and H. Dodge, 259–289. Oxford: Oxford University Press.

Prowse, T.L. 2011. Diet and dental health through the life course in Roman Italy. In *Social bioarchaeology*, ed. S.C. Agarwal and B.A. Glencross, 410–437. Oxford: Wiley-Blackwell.

Retief, F., and L.P. Cilliers. 2006. Burial customs and the pollution of death in ancient Rome: Procedures and paradoxes. *Acta Theologica* 26 (Suppl 7): 128–146. http://historyoftheancientworld.com/2010/10/burial-customs-and-the-pollution-of-death-in-ancient-rome-procedures-and-paradoxes/.

Toynbee, J.M.C. 1971. *Death and burial in the Roman world*. London: Thames and Hudson.

Wallace-Hadrill, A. 2008. Housing the dead: The tomb as house in Roman Italy. In *Commemorating the dead: Text and artifacts in context. Studies of Roman, Jewish, and Christian burials*, ed. L. Brink, O.P. Green, and D. Green, 39–77. New York: Walter de Gruyter.

Further Reading

Brink, L., O.P. Green, and D. Green. 2008. *Commemorating the dead: Texts and artifacts in context. Studies of Roman, Jewish, and Christian burials*. Berlin: Walter de Gruyter.

Carroll, M. 2006. *Spirits of the dead: Roman funerary commemoration in western Europe*. Oxford: Oxford University Press.

Carroll, M., and J. Rempel. 2011. *Living through the dead: Burial and commemoration in the classical world*. Oxford: Oxbow Books.

Davies, P.J.E. 2004. *Death and the emperor: Roman imperial funerary monuments from Augustus to Marcus Aurelius*. Austin: University of Texas Press.

Eisner, M. 1986. *Zur Typologie der Grabbauten im Suburbium Roms*. Mainz: Philipp von Zabern.

Hope, V.M. 2007. *Death in ancient Rome: A sourcebook*. London: Routledge.

Hope, V.M., and J. Huskinson. 2011. *Memory and mourning: Studies on Roman death*. Oxford: Oxbow Books.

Hope, V.M., and E. Marshall. 2000. *Death and disease in the ancient city*. London: Routledge.

Hopkins, K. 1983. *Death and renewal. Sociological studies in Roman history*. Vol. 2. Cambridge: Cambridge University Press.

Pearce, J., M. Millett, and M. Struck. 2000. *Burial, society, and context in the Roman world*. Oxford: Oxbow Books.

Rebillard, E. 2009. *The care of the dead in late antiquity*. Ithaca: Cornell University Press.

Reece, R. 1977. *Burial in the Roman world*. London: The Council for British Archaeology.
Stevens, S.T. 1991. Charon's obol and other coins in ancient funerary practice. *Phoenix* 45: 215–229.

Burial Practices in Europe

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Introduction

Burials can provide a wealth of information on a society (Tarlow and Stutz 2013). This is not only through the anthropological assessment of any human remains present in the burial but also through the interpretation of the factors behind the treatment and burial of the dead. Accordingly, the burial practices of any given society can provide information on societal status, cultural customs, and religious or spiritual belief systems (Pearson 2003). In Europe, people have been burying their dead since the Paleolithic period, with the earliest undisputed intentional burial in Europe at the Neanderthal site of Krapina in Croatia, dating back to approximately 130,000 years ago (Russell 1987). Furthermore, the types of burials are highly variable across Europe, ranging from simple grave burials to elaborate monumental tombs containing the burials of multiple individuals.

Definitions

In this entry "burial" refers to the act of interring the remains of a deceased individual either within the ground or above ground in a structure designed to house the remains, such as a tomb. In this entry the term "burial practices" is used to refer to any practices or activities related to the burial of the dead, such as a religious funerary rite, or how the dead were buried. The term "grave" is used to refer to an underground burial that does not involve interment in a burial structure, such as a tomb.

Key Issues

Factors that Influence the Treatment and Burial of the Dead

There are a number of factors which can influence the treatment and burial of the dead in any given society; these range from practical concerns regarding decomposition to cultural practices, societal status, and spiritual or supernatural beliefs (Pearson 2003). From a practical standpoint, the burial of the dead was one way of combatting the unpleasant effects of bodily decomposition. Burials removed the smell of the decomposing body from the living space, with the secondary effect of reducing the ability of the body to attract carrion animals and insects (Pearson 2003). However, it is important to consider that a burial is limited by the availability of burial space. In dense urban environments, this can be a particular challenge.

In some cultures, such as the Romans, there was also the belief of "death pollution," whereby the living could be contaminated by the dead (Hope 2000). By burying the dead, and by cleansing themselves of traces of death, the living would no longer be seen as at risk of being polluted by death. There were also those who believed that some part of the dead would continue to exist after death and impact the living if proper burial practice was not completed. In some cultures this fear of the dead affecting the living manifested in a fear of the dead rising from their graves to terrorize and cause harm to the living and led to specific burial practices to combat the perceived risk (Murphy 2008, see "Aberrant Burials" below).

Burials can also be a marker of the status of the deceased individual(s) within society, with elaborate burials and rich grave goods typically interpreted as an indicator of the buried person being of the elite or having favored status (Conneller 2013). In particular, the cost of the

construction of elaborate or large burial monuments or the effort required for the burial could indicate elite specific burials. Grave goods, the materials the individual was buried with, could include everything from weaponry, pottery, jewelry, animal bone, animals, and boats to chariots (Pearson 2003). By comparison, burials of lower-class individuals were generally simpler and less elaborate. However, this is dependent on the context, and it is important to note that a simple burial may not be indicative of lower status if that society did not practice elaborate burials as a rule.

Finally, burials can also be influenced by, and show evidence of, some manner of religious or spiritual belief. This can be shown through the inclusion of particular grave goods, the patterns of burial, and the positioning of the body relative to monuments, cardinal directions, or astrological features (Pearson 2003). Even the manner of burial can provide information regarding the beliefs and customs of a particular group. For example, the Christian Church espoused the idea of bodily resurrection, and given that cremation reduced the body to fragments of bone and ash, it was not practiced by a large majority of Medieval Christian Europe (Brennan 2014).

Cremation vs. Inhumation

There are two broad types of burial present in the archaeological record: cremation burials and inhumations. Cremation burials are those where the body of the deceased has first been burnt, usually on a pyre, and the remaining bone fragments and ash have been collected for subsequent burial or for internment within a burial structure (McKinley 2013). In contrast, inhumation refers to burials where cremation has not occurred. Both involve effort on the part of those performing the burial: as for an inhumation a grave must be dug or a burial structure to house the dead constructed, whereas for cremation, a pyre or crematorium must be constructed, and the body must be burnt until all that remains is fragments and ash (McKinley 2013).

Examples of Burial Practices in Europe

Burials can involve either a single individual or multiple individuals. They can involve the burial of the deceased below ground or burial via interment in a burial structure. The following parts of this entry will provide a brief overview of the burial practices that have been documented in Europe. It is important to note that the burial practices of Europe span both a large temporal period and geographic space, and thus not all iterations of burials will be covered here. In addition, some burials are an amalgamation of multiple types of burial practices; thus there may be significant overlap between the ostensibly already broad categories.

Simple Inhumations

Simple inhumations involved the burial of the dead in a grave. A grave is used in this entry to refer to an underground burial where the deceased is placed directly in the ground rather than in a tomb. Grave burials can include both coffins and grave goods, but do not relate to burial in a tomb structure. Simple inhumations have been used since our ancestors first began to bury the dead, either through digging a grave or from repurposing natural features such as depressions in cave floors and subsequently covering the dead placed within them (Riel-Salvatore and Gravel-Miguel 2013). The term mass grave is used to refer to a single burial containing multiple individuals, who typically died at or about the same time. A site containing multiple burials, such as a cemetery, is not a mass grave unless those individuals were buried in the same grave. Mass grave inhumations are commonly the result of violence (such as war) or a pandemic illness (such as the plague).

Coffins, Cists, and Sarcophagi

These burials involve the placement of the deceased individual in a sealed physical structure for burial, either above or below ground. Coffins (alternatively known as caskets) are rectangular or six-sided elongated boxes with a

lid, in which the deceased are placed for burial (Colman 1997). They are most commonly made of wood and are buried below ground in cemeteries, although they can be present in tombs. Cists are small stone-built boxes, which can contain the bodies of the dead or their cremated remains (Cunliffe 2001). Cists can be found on their own or in association with burial mounds and other monuments.

Sarcophagi are rectangular boxes typically made of stone and like a coffin serve to hold the body of the deceased (Toynbee 1996). They can be located above ground as a freestanding monument, within churches, inside burial structures such as burial mounds or tombs, or buried below ground. Sarcophagi were used in Ancient Greece and Rome, up until approximately 500 CE where they fell out of favor in Christian Rome (Toynbee 1996). However, they continued to be used for the burial of elite figures in Christian Europe, such as rulers or important members of the clergy.

Catacombs and Crypts

The term catacombs refers to underground burial complexes, sometimes referred to as cities of the dead or necropolis. These spaces include passages and galleries, often with recesses for graves to be dug or for the placement of tombs, sarcophagi, or funerary urns (Toynbee 1996). The most famous of these in Europe are the Catacombs of Rome, which date back to 200 CE and comprise at least 40 separate burial complexes and include multiple religious groups (Toynbee 1996). These are located outside of the ancient Roman walls of the city, as the law of that period forbade burial within the city limits.

A crypt is typically a form of tomb, which is usually located beneath the floor of a church, but also other buildings (Colman 1997). Within the crypt, the deceased were often buried in coffins or sarcophagi. In more modern usage, crypts are also found in cemeteries and under churches and chapels, but they can also be found on private estates below mausoleums or private chapel buildings.

Monumental Burials

There are a number of different types of monumental burial practices in Europe, many of which are used in conjunction with one another or are present within the same culture and time period. Monumental burial practices refer to burials involving a large construction or monument of some form, which can be made of earth and/or from wood and stone.

Tombs (Including *Mausoleums*, *Tholoi*, and *Dolmens*)

The term tomb is used here to refer to an enclosed interment space or burial chamber that has been constructed for the burial of the dead. These can be located above or below ground, within other burial structures, such as below churches (see Catacombs and Crypts above), and can include burials in coffins and sarcophagi. Forms of monumental tombs include passage tombs, mausoleums, tholoi, and dolmens.

A passage tomb typically consists of a narrow stone passage which leads to one or more burial chambers (Scarre and Laporte 2015). As they are typically covered with stone or earth, they are usually associated with burial mounds (see Burial Mounds below).

In contrast an external free-standing building which encloses the interment space or burial chamber of a deceased person or people is known as a mausoleum. A mausoleum can be considered a type of tomb, but often the tomb can be located within or beneath the mausoleum (Colman 1997). Mausoleums are a constructed monument to the deceased which can be found both in cemeteries and on private estates and are often a marker of the status of the buried individual or their family. Historically, mausoleums were used by leaders, such as is the case with the Mausoleum of Augustus, wherein the ashes of the Emperor and the imperial family were interred (Davies 2010). However, smaller mausoleums later became in fashion for the nobility and the gentry.

A tholos (plural tholoi) is a beehive-shaped burial tomb which typically contains more than

one burial, either in pits or in cists, with an entrance passage (Cunliffe 2001). These tombs are characterized by their domed roofs, which were commonly constructed of mudbrick or stone. After burial the entrance to the tomb would be covered over, leaving most of the tomb underground. In Europe, tholoi are commonly associated with Greece, and in particular the Mycenaean culture. The Lion Tholos Tomb at Mycenae was constructed between 1400 and 1300 BCE and was approximately 14 m in height, prior to the collapse of the domed roof (Cunliffe 2001).

A dolmen is a single chamber tomb usually consisting of vertical megaliths and a large flat capstone, which forms a table shape (Scarre and Laporte 2015). Dolmens predominately date to the early Neolithic period, around 4000–3000 BCE, and may have been covered by earth or stone tumuli which have subsequently eroded away over time (Scarre and Laporte 2015). Dolmens can also mark the entrance to a passage tomb.

Burial Mounds (Also known as *Tumuli*, *Kurgan*, *Barrows*, *Cairns*)

Monumental burial mounds are common across Europe (Cunliffe 2001). The term burial mound is used here to refer to those burials which are covered by a large constructed mound of earth or stones. They can be a variety of shapes from round and hill shaped to rectangular mounds (Fokkens and Harding 2013). Burial mounds are known by a plethora of names, including tumuli, kurgan, barrows, and cairns. The terms tumulus, kurgan, and barrow can often be used interchangeably and generally depend on the place in Europe the mound is located; tumulus is the Latin term, while kurgan is the standard term in Eastern European archaeology, and barrow is more commonly used in Anglo-Saxon contexts (Fokkens and Harding 2013). The term cairn however refers to a human-made pile of stones, and in this context it covers a burial. Cairns can be a marker of a grave site, cover the entirety of a passage grave, or cover a single burial chamber (Scarre and Laporte 2015). Burial mounds may also include tombs, passage graves, urn burials, single inhumation burials, ship burials, and mass graves, in any combination (Cunliffe 2001). The site of Sutton Hoo in Great Britain is one such site that contains burial mounds in connection with multiple other forms of burial (Carver and Evans 2005). In one mound at Sutton Hoo, there is a famous ship burial (see "Ship Burials" below), but in other contemporary burial mounds at the site, there are inhumations and cremation burials (Carver and Evans 2005).

Ship Burials

Ship burials are another form of monumental burials, commonly associated with Scandinavian and Anglo-Saxon culture and in particular the Vikings (Fokkens and Harding 2013). Smaller ship graves are also known as boat burials. This form of burial most commonly involves the burial of a ship as a grave good along with the body of the deceased. Typically, the ship or boat is used to hold the body or bodies of the deceased and any grave goods, but it can also be included within the burial alongside the body (Fokkens and Harding 2013). These burials are usually found within earthen burial mounds or are covered by stone cairns. Less commonly, ship burials can also take the form of ship without the physical boat being present in the grave, through boat-shaped mounds or through stone markers laid out in the characteristic shape of a ship (Fokkens and Harding 2013).

Urn Burials

Cremation Burials

As mentioned earlier, cremation burials are the burial or interment in a burial structure of the cremated remains of the deceased individual (s) (McKinley 2013). These may also be associated with monumental burials and burial mounds. The Urnfield culture from 1300 to 750 BCE central Europe is named thus due to its association with large cemeteries of urn cremation burials (Cunliffe 2001). Cremation was outlawed in parts of Europe during the Middle Ages because of the then prevailing Christian belief that it would hinder bodily resurrection, although it was used by the Church as a punishment for heretics

(Brennan 2014). The practice of cremation was later reinstated in the modern era in part due to concerns regarding space in urban environments and concerns regarding disease transmission.

Urn Inhumations

Urn inhumations refer to the burial of the deceased within an urn or another form of pottery, such as an amphora (Tarlow and Stutz 2013). These urns would then be buried, in a manner similar to sarcophagi or coffin burials. These were used in both ancient Greece and Rome for the burial of infants, where the urn would be altered and the remains of the child placed in the urn prior to it being resealed and buried (Grubbs et al. 2013). The Kylindra cemetery site on the island of Astypalaia in Greece is an example of this style of burial. Excavation of this cemetery, which dates to between 800 and 400 BCE, uncovered thousands of urn burials which when examined were found to be the burials of infants (Shepherd 2013). These burials generally do not contain any grave goods.

Aberrant Burials

"Vampire" Burials

The so-called vampire burials of Europe are a form of burial practice where the body of the deceased was treated in a particular way due to a fear of their corpse reanimating and causing harm to the living (Murphy 2008). It was not necessarily thought that the dead would drink the blood of the living, as is the modern vampire mythos of today, but that they might spread disease or generally cause harm to the living if they were able to escape their grave (Murphy 2008). Accordingly, the burial customs for individuals suspected of being able to reanimate include removing the head of the deceased and burying it at their feet, removing their lower limbs so they could not walk, placing bricks or stones in their mouths to prevent them from being able to bite, pinning them to the base of the grave so they could not rise with a metal rod through their chest or stones on top of their body, or by placing a bladed tool at their neck so they might decapitate themselves if they tried to sit up (Betsinger and Scott 2014). It is thought that these burials were a fear of a malignancy of some sort, be it that the individual was an outsider, had a physical abnormality, or had died of mysterious illness that could not be understood and that the community feared they would spread to the living (Betsinger and Scott 2014).

Bog Burials

Although not traditionally considered a burial, the deliberate placement of deceased individuals within peat bog can be seen as an act of burial. In bog burials, the deceased were placed in the peat bog, some with sticks or stones to hold their bodies down (Van Der Sanden 2013). Under the right conditions, the chemical composition of the peat bog acted as a preservative and would mummify the remains of the deceased. Most of the bog bodies that have been recovered from the bogs in Europe date from the Iron Age (Van Der Sanden 2013). Many bog bodies show signs of execution, in the form of stab wounds, beheading, signs of strangulation, or evidence of blunt trauma. It is widely thought that these burials were forms of human sacrifice and thus give evidence of a shared or similar spiritual belief across Iron Age Europe (Van Der Sanden 2013).

Future Directions

The various types of burials in Europe have been studied by many archaeologists from various schools of thought and subdisciplines. However, the burial record in Europe spans a long time period and many different cultural groups. While much of our information on burials during the historical period comes from contemporary sources, as is the case with Roman burials, there are no written records for burials from pre-history, and often even the records from the historical period are lacking. It would be interesting to see more reconsideration of previously excavated sites and material from different types of burials in light of the recent advances in archaeological science and technology, particularly in relation to monumental burial mounds.

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Burial Excavation, Anglo-Saxon
- ▶ Burial Mound Dissection in Sweden
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Tombs, Etruscan
- ▶ Tombs, Greek (Iron Age)

References

Betsinger, T.K., and A.B.. Scott. 2014. Governing from the grave: Vampire burials and social order in post-medieval Poland. *Cambridge Archaeological Journal* 24: 467–476.

Brennan, M.J. 2014. *The A–Z of death and dying: Social, medical, and cultural aspects: Social, medical, and cultural aspects*. Oxford: ABC-CLIO.

Carver, M.O.H., and A.C. Evans. 2005. *Sutton Hoo: A seventh-century princely burial ground and its context*, series no. 69. London: British Museum Press.

Colman, P. 1997. *Corpses, coffins, and crypts: A history of burial*. New York: Henry Holt and Company (BYR).

Conneller, C. 2013. Power and society: Mesolithic Europe. In *The Oxford handbook of the archaeology of death and burial*, ed. S. Tarlow and L.N. Stutz, 347–357. Oxford: Oxford University Press.

Cunliffe, B.W. 2001. *The Oxford illustrated history of prehistoric Europe*. Oxford: Oxford University Press.

Davies, P.J.E. 2010. *Death and the emperor: Roman imperial funerary monuments from Augustus to Marcus Aurelius*. Austin: University of Texas Press.

Fokkens, H., and A. Harding. 2013. *The Oxford handbook of the European bronze age*. Oxford: Oxford University Press.

Grubbs, J.E., T. Parkin, and R. Bell. 2013. *The Oxford handbook of childhood and education in the classical world*. New York: Oxford University Press.

Hope, V.M. 2000. Contempt and respect: The treatment of the corpse in ancient Rome. In *Death and disease in the ancient city*, ed. V.M. Hope and E. Marshall, 104–127. London: Routledge.

McKinley, J.I. 2013. Cremation: Excavation, analysis, and interpretation of material from cremation-related contexts. In *The Oxford handbook of the archaeology of death and burial*, ed. S. Tarlow and L.N. Stutz, 147–165. Oxford: Oxford University Press.

Murphy, E.M. 2008. *Deviant burial in the archaeological record*. Oxford: Oxbow Books.

Pearson, M.P. 2003. *The archaeology of death and burial*. Stroud: Sutton.

Riel-Salvatore, J., and C. Gravel-Miguel. 2013. Upper Paleolithic mortuary practices in Eurasia: A critical look at the burial record. In *The Oxford handbook of the archaeology of death and burial*, ed. S. Tarlow and L.N. Stutz, 303–337. Oxford: Oxford University Press.

Russell, M.D. 1987. Mortuary practices at the Krapina Neandertal site. *American Journal of Physical Anthropology* 72: 381–397.

Scarre, C., and L. Laporte. 2015. *The megalithic architectures of Europe*. Oxford: Oxbow Books.

Shepherd, G. 2013. Ancient identities: Age, gender, and ethnicity in ancient Greek burials. In *The Oxford handbook of the archaeology of death and burial*, ed. S. Tarlow and L.N. Stutz, 543–553. Oxford: Oxford University Press.

Tarlow, S., and L.N. Stutz. 2013. *The Oxford handbook of the archaeology of death and burial*. Oxford: Oxford University Press.

Toynbee, J.M.C. 1996. *Death and burial in the roman world*. Baltimore: Johns Hopkins University Press.

Van Der Sanden, W.A. 2013. Bog bodies: Underwater burials, sacrifices and executions. In *The Oxford handbook of wetland archaeology*, ed. F. Menotti and A. O'Sullivan. Oxford: Oxford University Press.

Further Readings

Brennan, M.J. 2014. *The A–Z of death and dying: Social, medical, and cultural aspects: Social, medical, and cultural aspects*. Oxford: ABC-CLIO.

Colman, P. 1997. *Corpses, coffins, and crypts: A history of burial*. New York: Henry Holt and Company (BYR).

Pearson, M.P. 2003. *The archaeology of death and burial*. Stroud: Sutton.

Tarlow, S., and L.N. Stutz. 2013. *The Oxford handbook of the archaeology of death and burial*. Oxford: Oxford University Press.

Burke, Heather

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Basic Biographical Information

Heather Burke (Fig. 1) is a Professor in archaeology at Flinders University, South Australia. She received her Bachelor of Arts with First Class Honours from the University of New England, Australia, in 1987. She studied for her Ph.D. under the supervision of Iain Davidson and Graham

Burke, Heather, Fig. 1 Heather Burke with a site visitor, 2015, Port Lincoln, South Australia. (Photo: Lynley Wallis)

Connah and was awarded the Doctor of Philosophy (Archaeology) from the University of New England in 1997.

Dr. Burke is an historical archaeologist with a wide range of research interests, including the construction of class and status through material culture, the archaeology of cross-cultural engagement, and the links between cultural heritage and contemporary social identity.

After gaining her first qualification, in 1988, Dr. Burke started her archaeological career as an Acting Archaeologist for the NSW National Parks and Wildlife Service. After that she became a tutor with the Department of Archaeology and Paleoanthropology at her alma mater, the University of New England, from 1988 to 1991. She worked throughout New South Wales, the Northern Territory, and Queensland, serving as an Assistant Regional Archaeologist for the NSW National Parks and Wildlife Service (1990–1991), a Private Archaeological Consultant (1991–2000), and a Senior Archaeologist for Gordon Grimwade & Associates, Yungaburra (2000–2002). Dr. Burke joined the Department of Archaeology at Flinders University in South Australia in 2002.

Many of Dr. Burke's projects are initiated by the communities with whom she works. Dr. Burke's professional and community engagement projects show her passion for these research interests and have included excavations at historical archaeological sites in Adelaide, Port Lincoln, and Mallala, South Australia, at Willow Court in the Royal Derwent Hospital Tasmania (Auld et al. 2019) and on Native Mounted Police sites in Queensland (Burke et al. 2018b). Her excavations have provided communities with valuable information about their local history and archaeology and numerous students with meaningful learning experiences.

Dr. Burke's commitment to her students and their future careers is renowned. Her dedication to her teaching profession has been recognized in several awards, most notably the Flinders University Vice Chancellor's Award for Teaching, Flinders University, Team Category, with Claire Smith, in 2003, and the national Carrick Award for Teaching Excellence, Team Teaching, in 2004.

Major Accomplishments

Dr. Burke's accomplishments in archaeology lie in three areas: in her research as a theoretically sophisticated and community-oriented historical archaeologist; in service to her profession through administrative roles, such as editing and conference convening, that have allowed peers and young scholars to flourish; and in her contributions as an outstanding teacher, who has developed world-leading graduate programs in professional archaeology (Fig. 2).

Dr. Burke's research publications on the links between style, class, and identity have made major theoretical contributions to underrepresented and under-theorized areas of historical archaeology. Her authored book *Meaning and Ideology in Historical Archaeology* (Burke 1999) undertook landmark investigations of the

Burke, Heather, Fig. 2 Heather Burke recording a Native Mounted Police camp site in southeastern Queensland (July 2019). (Photo: Lynley Wallis)

construction and maintenance of capitalist ideologies in rural Australia:

> The theoretical sophistication of the study is admirable, and it should serve as a model for research in other parts of the world . . . The study of capitalism challenges archaeologists and thus it is impressive when a scholar successfully rises to this challenge. *Meaning and Ideology in Historical Archaeology* meets this challenge and should be read by any scholar interested in understanding capitalism. (McGuire 2001: 172–173)

Dr. Burke has conducted significant research on identity and ethnicity in South Australia, most recently with her doctoral student, Susan Arthure (see Burke et al. 2018a). She also publishes in the areas of Indigenous contact and social archaeology (e.g. Burke et al. 1994; Smith and Burke 2006). The edited volume *Kennewick Man: Perspectives on the Ancient One* (Burke et al. 2008) redressed a lack of Indigenous views on one of the most contentious topics in modern archaeology in the United States. This book canvassed a range of responses from Indigenous and non-Indigenous archaeologists, judges, anthropologists, tribal elders, students, and specialists over the landmark legal struggle for control over one of the oldest skeletons in the US Pacific Northwest.

Dr Burke has made a major contribution to post-colonial archaeology (e.g. Smith and Burke 2010). She has been a Chief Investigator on ten grants awarded by the Australian Research Council. Her most recent major project is the ARC Discovery project "The Archaeology of the Queensland Native Mounted Police," a multi-institutional project between Flinders, the University of Southern QLD, and the University of Notre Dame Australia. This research focusses on the Australian colonial "frontier" and its social and material effects. In 2018 this project was profiled in "Making a Difference," the ARC's annual publication, and was one of only six projects invited by the ARC to present directly to ARC leadership and Federal Government ministers. A major outcome is an online database containing all of the archaeological and historical data collected during the project. This will be

Burke, Heather, Fig. 3 Heather Burke excavating with Mardi Reardon-Smith and Cherrie de Leiuen. Trench 16, Boralga, 2018. (Photo: Lynley Wallis)

launched as a public resource in December 2019. For archaeologists it contains complete data sets from five excavated sites, while the raw information has been developed into resources for secondary school teachers across QLD who are now required to teach elements of the Frontier Wars. The blog associated with this project (https://archaeologyonthefrontier.com) was selected by the National Library of Australia to be archived as part of the Pandora Archive, which itself was placed on the UNESCO Memory of the World Australian Register in August 2004 (Fig. 3).

Dr. Burke's contributions to her profession are evident in the administrative and organizational roles she has held within her career. These roles can be roughly divided into conference organization and editorship. Dr. Burke's conference organization includes being Program Chair for the Fifth World Archaeological Congress (WAC-5), held in Washington, DC, in 2003; the 1997 Fulbright Symposium ("Indigenous Cultures in an Interconnected World"), at the Museum and Art Gallery of the Northern Territory, Darwin, 1997; the "Women in Archaeology" conference at the University of New England, NSW, Australia; and the World Archaeological Congress symposium "Cultural Heritage and Intellectual Property Rights," held in 2006 in Burra, South Australia. Her service to the profession includes having been Co-editor of *Australian Archaeology*, the journal of the Australian Archaeological Association (2012–2015), and being Associate Editor (Australia and New Zealand) of *Historical Archaeology* (2016–present).

Dr. Burke's teaching is characterized by intelligent innovation. These include the development by undergraduate classes of online and community accessible databases that provide a unique source of primary information for the wider community that exists nowhere else and experiential learning through role-playing as archaeological theorists (see Smith and Burke 2005) and elegant Victorian era tea parties. Dr. Burke's major publication in relation to teaching innovation is the edited volume *Archaeology to Delight and Instruct* (Burke and Smith 2007). This volume took Horace's philosophy that the purpose of literature is to "delight and instruct" and applied it to the teaching of archaeology at a tertiary level. The contents explore ways to integrate the formal process of teaching archaeological theory with the potential to have fun in a university classroom.

Dr. Burke's commitment to ensuring standards of excellence in the field practice of archaeology has manifested in two ways. The first is through her publications, notably *The Archaeologist's Field Handbook* (Burke et al. 2017), which provided

the first comprehensive field manual for archaeologists in Australia in almost 20 years. As a discipline, archaeology has long been fractured by the idiosyncratic use of concepts, definitions, and methods between practitioners influenced by different training regimes, specific histories of practice, and the varied requirements of different state authorities. This book set out to establish minimum standards to address this problem while also maintaining flexibility in adapting such standards to the specific circumstances encountered in tackling large and small problems. It has been adopted by universities as a textbook nationally and internationally and by state agencies seeking to regulate the practice of consultants in the archaeological and cultural heritage industries and has been incorporated into the Australian version of the Skills Passport developed by the Australian National Committee for Archaeology Teaching and Learning. In 2005, the first edition of *The Archaeologist's Field Handbook* won the White Bequest Award from the Australian Academy of the Humanities. The success of this manual was furthered in an international context through regionally specific editions, published for the United States (Burke et al. 2009) and Spain (Domingo Sanz et al. 2007).

The second way in which Dr. Burke has engendered high standards in field archaeology has been in her role as former Head of the former Department of Archaeology at Flinders University in the development of a Master of Archaeology and a Master of Cultural Heritage Management. These programs are embedded with industry partners and have provided unprecedented industry-engaged training for cultural heritage practitioners. They have become the premier graduate training programs in Australia.

Dr. Burke is a community archaeologist with a serious commitment to engaging the academy with industry and community groups so that the advantages of a university system can also benefit wider society. Her success in archaeology, commitment to her students, and contributions to the field of archaeological education in Australia are inspiration to her students at Flinders University and of great benefit to the communities with whom she has worked during her archaeological career.

Cross-References

- ▶ Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)
- ▶ Binford, Lewis R. (Theory)
- ▶ Connah, Graham
- ▶ Davidson, Iain
- ▶ Smith, Claire
- ▶ World Archaeological Congress (WAC)
- ▶ Zimmerman, Larry J.

References

Auld, D., T. Ireland, and H.D. Burke. 2019. Affective aprons: Object biographies from the ladies' cottage, Royal Derwent Hospital, New Norfolk, Tasmania. *International Journal of Historical Archaeology* 23 (2): 361–379.

Burke, H. 1999. *Meaning and ideology in historical archaeology: Style, social identity and capitalism in an Australian town*. New York: Kluwer Academic/Plenum Press.

Burke, H., and C. Smith. 2007. *Archaeology to delight and instruct*. Walnut Creek: Left Coast Press.

Burke, H., C. Lovell-Jones, and C. Smith. 1994. Beyond the looking glass: some thoughts on sociopolitics and reflexivity in Australian archaeology. *Australian Archaeology* 38:13–22.

Burke, H., C. Smith, D. Lippert, J. Watkins, and L. Zimmerman, eds. 2008. *Kennewick: Perspectives on the ancient one*. Walnut Creek: Left Coast Press.

Burke, H., C. Smith, and L. Zimmerman. 2009. *The archaeologist's field handbook. North American edition*. Walnut Creek: AltaMira Press.

Burke, H., M. Morrison, and C. Smith. 2017. *The Archaeologist's Field Handbook*. 2nd edition. Sydney: Allen & Unwin.

Burke, H.D., S.A. Arthure, C. De Leiuen, J. McEgan, and A.C. Gorman. 2018a. In search of the hidden Irish: Historical archaeology, identity and "Irishness" in nineteenth century South Australia. *Historical Archaeology* 52 (4): 798–823.

Burke, H.D., B. Barker, N. Cole, L.A. Wallis, E. Hatte, I. Davidson, and K. Lowe. 2018b. The Queensland Native Police and strategies of recruitment on the Queensland Frontier 1849–1901. *Journal of Australian Studies* 42 (3): 1–17.

Domingo Sanz, I., H. Burke, and C. Smith. 2007. *Manual de campo para arqueologos*. Barcelona: Ariel Editorial.

McGuire, R. 2001. Review of H. Burke's Meaning and ideology in historical archaeology. *American Antiquity* 66 (1): 172–173.

Smith, C., and H. Burke. 2005. Becoming Binford: Fun ways of teaching archaeological theory and method. *Public Archaeology* 4 (1): 35–49.

Smith, C., and H. Burke. 2006. Glass ceilings, glass parasols and Australian academic archaeology. *Australian Archaeology* 62:13–25.
Smith, C., and H. Burke. 2010. Vestiges of colonialism. Manifestations of the culture/nature divide in Australian heritage management. In P. Messenger and G. Smith (eds) *Cultural Heritage Management, Policies, and Issues in Global Perspective*, pp. 21–37. Gainsville, FL: University Press of Florida.

Burned Remains in Forensic Contexts

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Introduction

Burned human remains may be found in a variety of contexts (Fairgrieve 2008, 2010; Schmidt and Symes 2008). Such remains recovered from a "forensic context" have relevance to a legal inquiry as do cases where a death is suspicious must be investigated. In many countries, legislation is in place which states that any death that is not attended by a physician must be investigated (e.g., in the Province of Ontario, Canada, see the Coroner's Act; RSO Coroner's Act 2002 c. C.37, s.31). Under such an investigation the investigative authorities attempt to answer the following five questions:

1. Who the deceased was?
2. How the deceased came to his or her death?
3. When the deceased came to his or her death?
4. Where the deceased came to his or her death?
5. By what means the deceased came to his or her death?

Burned skeletal remains may be difficult to locate, recover, analyze, and interpret. For example, remains associated with mass disasters, such as plane crashes, train derailments, domestic fires, and even automotive collisions, are often highly fragmentary, and commingled with other individuals and other items at the scene. The recovery, documentation, and identification of these remains may provide further evidence of the cause of death and have serious implications for the interpretation of the scene. A multidisciplinary approach to the processing of these scenes is without question the best practice.

Burned remains may be found in clandestine contexts. The use of fire to dispose of remains is not a new concept. It has been practiced in a variety of cultures over thousands of years (Fairgrieve 2008). Given enough fuel and time, a perpetrator may eliminate all of the soft tissue leaving only bones and teeth. This material may be intentionally broken and crushed in order to fragment the remains further. These remains may be subsequently moved to another location or buried.

The discovery and recognition of burned human bone is clearly a challenge, regardless of the context. There are many issues when it comes to processing such scenes. It is necessary for the forensic anthropologist to have a clear understanding of how bodies burn and how various soft and hard tissues are altered by fire. Hence, precautions regarding the recovery, documentation, and understanding the limits of an analysis are outlined below.

Key Issues

Burning of Soft and Hard Tissues

Fire consists of heat and light that is generated by an oxidation reaction (DeHaan 2002). This process, known as flaming combustion, is the gaseous combination of a fuel (tissues of the body) and an oxidizer (oxygen). Although the full mechanics of how fuel, heat, air (oxygen), and an uninhibited exothermic chemical chain reaction all combine to result in a sustained combustion reaction is beyond the scope of this entry, it is sufficient to note that there is a chemical breakdown (pyrolysis) of the molecular structures of a fuel that results in the production of vapor, gases, and a residual solid (char). The heat converts the mass of the fuel into a form that can be ignited and

a sustained combination may ensue if appropriate proportions of oxygen are present.

The combustion of a human body is not an even process. A body consists of soft tissues of varying thickness and densities over bone. Therefore, some areas with bones closer to the surface, such as the neurocranium, will have the soft tissue eliminated prior to that of the abdominopelvic cavity. In general, the tissues of a body pass through the clinically defined degrees of burning (e.g., 1st through to 5th degree burns). When the burning process has proceeded to the point at which bone is being burned directly, such burns are said to be either fourth degree or fifth degree (DeHaan 2002). Prior to this state the superficial layers of the skin initially blister (a separation of the epidermis from the underlying dermis). The layers of skin contract due to the dehydrating action of the fire. Large fissures open in the skin, exposing the fatty hypodermis. With the consumption of fat, muscle is then directly charred and burned. The heating of the muscle tissues causes a contraction, and the larger flexor muscles overpower the typically smaller extensor muscles resulting in the flexion of various joints of the body, particularly in the appendages and the posterior of the neck. The bending of the arms and the fingers of the hands are said to mimic the stance of a boxer, referred to as the "pugilistic pose."

The clinical scale for degrees of burning is not sufficient for describing the state of burned human remains in forensic contexts. The Crow-Glassman Scale (CGS) remedies this situation and reflects a systematic pattern of burning (Glassman and Crow 1996) (see Table 1 below for the full scale).

The differing levels of the CGS also serve to describe the inherent difficulties in processing scenes with burned human remains. These range from the recognition of the remains to the collection of bones and teeth when a body has reached CGS 5. The CGS also reflects the fact that the body does not burn evenly. The head and the appendages will burn and eventually fall away from the body after having assumed the pugilistic

Burned Remains in Forensic Contexts, Table 1 The Crow-Glassman Scale (CGS) of burn injury to human remains (Glassman and Crow 1996)

CGS level	Description
1	Burn injuries characteristic of typical smoke death. The body may exhibit blistering of the epidermis and singeing of the head and facial hair. Recovery of the body is similar to that for other victims not involving burn injury. The body is recognizable for identification at this level
2	The body may be recognizable, but most often it exhibits varying degrees of charring. Further destruction of the body is limited to the absence of elements of the hands and/or feet, and possibly, the genitalia and ears. Additional search near the body is warranted for recovery of the disarticulated elements. Identification is made, most often by the collaboration of the medical examiner and a forensic odontologist
3	Further destruction of the body is demonstrated by missing major portions of the arms and/or legs. The head is present at this level, although identity is not evident. The search area for associated disarticulated remains should be widened. A forensic anthropologist should be included to facilitate successful search and recovery procedures at the death scene. Identification is coordinated by a medical examiner, who may require the aid of a forensic odontologist. If needed, a forensic anthropologist may be called on to determine sex, age, race, etc., from the skeleton
4	The skull has fragmented and is absent from the body. Some portions of the arms and/or legs may still remain articulated to the charred body. Search and recovery should be aided by a forensic anthropologist, using systematic bioarchaeological methods, including screening procedures to locate small body fragments and dental elements. Identification is coordinated by a medical examiner using a forensic anthropologist and an odontologist as consultants as needed
5	The body has been cremated and little or no tissue is present. The remains are highly fragmentary, scattered, and incomplete. A forensic anthropologist should be an on-site consultant for the identification and recovery of cremains. Personal identification is most difficult at this level, and a forensic anthropologist may be best trained to interpret cremains for identifying physical attributes of the deceased. Recovery of dental elements will require the expertise of a forensic odontologist. As with all fire deaths, a medical examiner is, most likely, the designate to coordinate consultant activities

pose. Meanwhile, depending on the amount of subcutaneous fat, and the presence of clothing, the torso of the body will burn starting with the ribs and the spinous processes of the vertebrae. The body position and location, in relation to other objects, may hinder the burning of the body. This is why the context of the body is of such importance.

The time that it takes to burn a body to CGS 5 is variable. There is a distinct difference between a body burning in a confined space (a house) and an open space (an outdoor fire pit). House fires can easily expose a body to temperatures between 670 °C and 810 °C and after approximately 10 min and may exhibit the "pugilistic pose" (Bohnert et al. 1998). At 20 min, the vault of the skull is free of soft tissue and the outer table may have fissures. At 30 min, the body cavities are visible and a further 10 min of exposure results in shrunken internal organs. At approximately 50 min, the extremities have been rendered to bone and fallen away from the body and may be difficult to discern from the related debris around the body. Beyond this, the remaining torso of the body is further consumed down to calcined bone. The entire process, at the stated temperature range, may take 2–3 h.

Microstructural and Ultrastructural Alterations

Once the soft tissue is eliminated, the exposed bone will also undergo heat-induced alterations. Again, the burning process of bone dehydrates the bone tissue and consumes the organic portion of the bone and even alters the microstructure of the hard matrix. This can result in a color change, splitting, and warping. The color of burned bone may be interpreted in a variety of ways (Fairgrieve 2008: Table 3.5). However, a range of colors exhibited on the same burned bone may be the result of the fuel load, oxygen availability, and contact with other substances, such as metals. The range of color exhibited by burned bone will depend on the temperature reached by the bone, and the duration of time at that temperature. Initially, the bone is a light amber color. The organic components of the bone remain (Fairgrieve 2010). As the process continues, the bone will begin to blacken; the periosteum is burned away and the organic constituents of the bone, including the marrow begin to be consumed. The black color of the bone indicates that the bone has reached a temperature of approximately 300 °C and the lamellar microstructure of the bone persists (for a review see Holden et al. 1995).

A gray color is attained once the bone temperature reaches at least 600 °C. The organic portion of the bone has leached out at this stage. Microscopic spherical-type crystals are formed (Holden et al. 1995). With further exposure to the heat, these crystals change their shape and size. The organizational structure of lamellar bone is broken down. However, bone collagen has been found in bone reaching temperatures of 600 °C (Walker et al. 2008). With further heating, the bone will transition to a blue-gray appearance that may ultimately yield to a final white color. This occurs when the bone has attained a temperature of at least 800 °C. The crystals are now hexagonal, and there is no discernible lamellar pattern (Holden et al. 1995).

Along with these microstructural changes there are associated ultrastructural changes beyond the color changes. With the consumption of the organic portion of bone there is a concomitant reduction in the bone's dimensions (length and caliber). Such changes will affect any metrical analysis of skeletal elements. Therefore, it is generally not recommended to take metrics of burned bones if they are to be used in aging and sexing. However, in order to interpret the presence of any pre-incineration fractures, it is essential that heat-induced fractures be clearly understood.

Heat-induced fractures can be broken down into five general types. *Patina* fractures occur on the surface of a bone. The intersecting surface fractures do not penetrate to the medullary cavity. *Longitudinal* fractures follow the long axis of a long bone and may penetrate the medullary cavity. Such fractures follow the longitudinal orientation of the collagen fibers parallel to the cylindrical osteons. *Curvilinear (or curved transverse)* fractures extend around the bone from one side to the other. *Transverse* fractures are perpendicular to the longitudinal axis of the bone and tend to penetrate through the medullary cavity and may

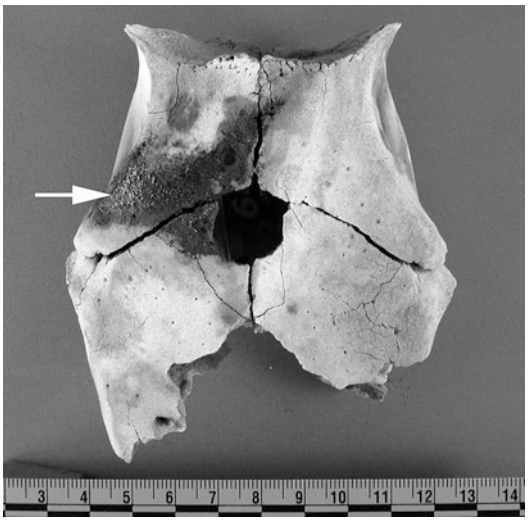

Burned Remains in Forensic Contexts, Fig. 1 The *arrow* indicates charred residue of material that is the result of venting at the time of burning of a pig (*Sus scrofa*) skull (posterior at *top*). In this case, the presence of venting is evidence of a pre-incineration opening in the skull. The pig was lying on its right side

even divide the bone into proximal and distal portions. *Delamination* fractures appear as a superficial peeling or flaking of bone from a deeper layer of cortical or cancellous bone.

To distinguish the aforementioned heat-induced fractures from peri-mortem trauma, it is necessary to reassemble the pieces and observe the overall fracture pattern. This way heat-induced fractures may be distinguished from tension, compression, and shearing fractures (Mayne 1990). The color of the fracture margins, relative to those that are heat-induced, may assist in the analysis. Additionally, pre-incineration, penetrating trauma, to the cranial vault, will result in the venting and burning of fluid that is forced out of the vault at that location. This discoloration also indicates the orientation of the head during the burning process (see Fig. 1).

Recovery Issues

In forensic contexts, the issues that pertain to burned human remains are similar to those found in archaeological contexts. These issues include the detection, recording, collection, analysis, and interpretation of the remains. Ultimately this process leads to producing a report that meets the needs of investigators and the courts.

The detection of burned remains may be quite simple. Burned human remains may be obvious as a darkened mass within the debris being observed. However, in cases that have remains buried under large amounts of debris, a systematic approach to searching the scene, such as superimposing a grid and proceeding square by square through each level of the debris, will yield the best results.

In certain instances, the use of alternate light sources may be used. Bones and teeth will fluoresce when exposed to light at the violet-blue-green region of the spectrum and viewed through an orange barrier filter (Craig and Vezaro 1998). Calcined bone is not likely to fluoresce with any combination of light and barrier filters, however, burned bones have been found to appear dark purple when exposed to a light of 450 nm (nm = nanometers) when viewed with a yellow barrier filter (Mavin 2001). This may be helpful as the body will burn unevenly and may be at intermediate stages depending on the duration of the burn. Other items in the debris may also fluoresce.

The use of human remains detection (cadaver) dogs is a common practice. Such dogs may be valuable in detecting burned human remains. However, the use of dogs is no substitute for a systematic search as dogs have been known to give false positive indications as to the presence of remains. In all cases, confirmation of positive indications is essential (Fairgrieve 2010).

The documentation of the location and position of burned bone will be more productive if one recalls that the bones of the victim will be found in relative anatomical order unless they have been moved. The position of the remains must be considered in both the vertical and horizontal planes. Remains found in direct contact with the basement floor with debris on top indicate that the victim was in the basement at the time of the burning. Whereas, a victim's remains positioned between debris indicate that their original position was on an upper floor of the house. It is ideal to use computerized survey equipment during the recovery of remains at most scenes. This evidence may refute or corroborate witness and suspect statements.

Burned remains that have been moved out of relative anatomical position may have been subjected to taphonomic forces (Haglund and Sorg 1997). Natural phenomena, such as gravity, can cause the remains to fall through the superstructure of the house, altering their position. However, a perpetrator may have dismembered a body and then burned the remains. Another artificially induced change may come from the recovery process itself. Careful examination of the remains to explain all marks is necessary for a successful analysis.

Analytical Issues

Analytical questions are no different than those of unburned remains. The obvious difficulty is with the fragmentary state of the remains and the friable nature of the bones. This means that the analysis has the potential to be highly limited. However, cataloging all identifiable skeletal elements can yield a minimum number of individuals, as can an overall weight of the remains recovered.

The repair and reconstruction of fragments is done to facilitate the analysis of fracture patterns. The margins of fractures may have been degraded to the point where a physical mend is not possible. However, all mended bones must be photographed both individually and collectively. An overall photograph of the mended bones in relative anatomical order can be a useful visual aid in court. This will also aid in the analysis of fracture patterns and burn patterns.

Age, sex, ancestry, and even stature may be possible to discern from burned remains. However, as fire alters the dimensions of a bone, this must be considered when applying metrics to an analysis (Thompson 2004). As a result, the reliability of analytical methodologies may be called into question.

The analytical goal is to lead to a positive identification of the victim. The remains may be complete enough to use in a comparison of antemortem and postmortem radiographs. DNA may be recovered from burned tissues, in order to arrive at an identity (e.g., Williams et al. 2004). Burned dental remains, such as tooth roots and crowns, may be very helpful in establishing a positive identification (Hardy 2007).

The identification of trauma is a central issue in the analysis of burned skeletal remains. As noted above, the analyst must differentiate heat-induced fractures from traumatic fractures that have occurred antemortem, perimortem, and even postmortem. Fractures without healing are usually classified as perimortem. However, when a non-burned bone is broken after the soft tissue has decomposed, and the bone is dry, there is a color difference between the break and the surface. This can be discerned in burned bone if it is broken after the fire, and the color of the inner bone tissue differs from the exterior. In the case of a bone exhibiting differential burning, the variation of the color of the bone must be considered carefully in order to interpret the nature of the fracture. Generally, fracture margins that are the same color as the adjacent surface usually indicate that the fracture was present at the time of burning. Bones burned to a calcined (white) state tend to be highly fragmented and uniform in color. Hence, determining the relative timing of the fracture may not be possible.

Future Directions

The recognition and analysis of burned human remains in forensic contexts pose various challenges. Knowledge of the uneven burning of a body can assist in the documentation, recovery, and interpretation of the remains. Standard osteobiographical analysis may be limited depending on the state of the burned remains. However, it may be possible to derive the age, sex, and ancestry with such remains. Additionally, a positive identification from the remains, including dental remains, may not be precluded in such cases. The successful outcome of an analysis is dependent upon the documentation and recovery at the scene. Understanding how a body burns is essential to the interpretation of the state of the remains.

Future research directions tend to be in the area defining criteria for the diagnosis of trauma from burned remains. Such new studies include attempts at examining the effects of fire on dental tissues. By defining criteria for the diagnosis of

trauma from burned skeletal remains, the analysis will conform to the standards that are currently being demanded by the courts.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Bone, Trauma in
- ▶ Cremation in Archaeological Contexts
- ▶ Dental Anthropology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Sex Assessment
- ▶ Stature Estimation
- ▶ Taphonomy in Bioarchaeology and Human Osteology

References

Bohnert, M., T. Rost, and S. Pollak. 1998. Degree of destruction of human bodies in relation to the duration of the fire. *Forensic Science International* 95: 11–21.

Coroner's Act. 2002. *RSO 1990 c. C.37, s.31*. Toronto: Queen's Printer for Ontario.

Craig, E.A., and N. Vezaro. 1998. Use of an alternate light source to locate bone and tooth fragments. *Journal of Forensic Identification* 48: 451–458.

DeHaan, J.D. 2002. *Kirk's fire investigation*. 5th ed. Upper Saddle River: Prentice Hall.

Fairgrieve, S.I. 2008. *Forensic cremation recovery and analysis*. Boca Raton: CRC Press.

Fairgrieve, S.I. 2010. Chapter 38D: Forensic cremation analysis: considerations for investigation of intentionally burned human remains. In *Forensic sciences, volume 4*, ed. C.H. Wecht. Lexis Nexis Mathew Bender: Newark.

Glassman, D.N., and R.M. Crow. 1996. Standardization model for describing the extent of burn injury to human remains. *Journal of Forensic Sciences* 41: 152–154.

Haglund, W.D., and M.H. Sorg, eds. 1997. *Forensic taphonomy: the postmortem fate of human remains*. Boca Raton: CRC Press.

Hardy, J.H. 2007. Odontology. In *Forensic human identification: an introduction*, ed. T. Thompson and S. Black, 177–198. Boca Raton: CRC Press.

Holden, J.L., P.P. Phaky, and J.G. Clement. 1995. Scanning electron microscope observations of incinerated human femoral bone: a case study. *Forensic Science International* 74: 17–28.

Mavin, T. 2001. Fluorescence of bone and teeth with ultraviolet and alternate light sources including cremated human bone. *Identification Canada* October/November/December 12–13.

Mayne, P. 1990. The identification of precremation trauma in cremated bone. Unpublished MA dissertation, Department of Anthropology, University of Alberta, Edmonton, Alberta.

Schmidt, C.W., and S.A. Symes, eds. 2008. *The analysis of burned human remains*. Boston: Elsevier Academic Press.

Thompson, T.J.U. 2004. Recent advances in the study of burned bone and their implications for forensic anthropology. *Forensic Science International* 146: 203–205.

Walker, P.L., K.W.P. Miller, and R. Richman. 2008. Time, temperature, and oxygen availability: an experimental student of the effects of environmental conditions on the color and organic content of cremated bone. In *The analysis of burned human remains*, ed. C.W. Schmidt and S.A. Symes, 129–135. Boston: Elsevier Academic Press.

Williams, D., M. Lewis, T. Franzen, V. Lissett, C. Adams, D. Whittaker, C. Tysoe, and R. Butler. 2004. Sex determination by PCR analysis of DNA extracted from incinerated, deciduous teeth. *Science and Justice* 44: 89–94.

Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)

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Introduction

The Australia ICOMOS *Burra Charter* was first adopted in 1979, in the historic mining town of Burra Burra in South Australia. Since then – with amendments – the Charter has provided guidelines for cultural heritage management in Australia to ICOMOS members, heritage agencies at all levels of government, and planning bodies. ICOMOS, the International Council on Monuments and Sites, is the international non-government professional organization primarily concerned with the philosophy, terminology, methodology, and techniques of conservation for

places of cultural significance. ICOMOS is also an advisor on the UNESCO World Heritage and Intangible Cultural Heritage Conventions and has 100 national committees and 27 specialist committees (see www.icomos.org). Australia ICOMOS is a national committee founded in 1976, now with some 500 members.

The *Burra Charter* reflects an Australian understanding of heritage place conservation practice, and amendments to the Charter over time have incorporated a widened and deepened professional understanding of heritage issues. Widely regarded as best practice, the Charter has been endorsed and accepted by all levels of government in Australia. The *Burra Charter* has also been adopted, adapted, and applied in other countries in all continents. This entry provides an outline of the Charter, its principles and processes, and changes to it over time.

Definition

The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance provides guidance for the conservation and management of places of cultural significance. The full text of the Charter is online at http://australia.icomos.org/wp-content/uploads/BURRA_CHARTER.pdf. The *Burra Charter* provides a series of principles and a conservation management process setting a standard for practice for those working in cultural heritage management – primarily heritage places – and related objects, with both tangible and intangible values.

The *Burra Charter* includes definitions, conservation principles and process, and practice (Articles). The Conservation Principles (Articles 2–13) form the basis for the process to be undertaken when making decisions about heritage places as shown in the chart below (Australia ICOMOS 2000: 10). A key principle in the Charter is that the cultural significance of a place is the basis for decisions on managing the place (Article 6.2). Cultural significance is interpreted as having key values for past, present, or future generations (Article 1: 2), namely, *aesthetic*, *historic*, *scientific*, and *social*, with *spiritual* added in 1999. These values are explained further in the guidelines to the Burra Charter: Cultural Significance (Australia ICOMOS 2000: 11–3). The Charter insists that such values may be held by different groups in societies and may conflict, yet should be recognized and respected (Article 13).

A core principle when making decisions about a place assessed as having cultural heritage significance is to take a cautious approach: "changing as much as necessary but as little as possible" (Article 3). Other key principles inherent to the *Burra Charter* are found in Articles 2–13, as summarized by Walker (1996):

- *There are places worth keeping because they enrich our lives – by helping us understand the past; by contributing to the richness of the present environment; and because we expect them to be of value to future generations.*
- *The cultural significance of a place is embodied in its physical material (fabric), its setting and its contents; in its use; in the associated documents; and in its meaning to people through their use and associations with the place.*
- *The cultural significance of a place, and other issues affecting its future, are best understood by a methodical process of collecting and analysing information before making decisions.*
- *Keeping accurate records about decisions and changes to the place helps in its care, management and interpretation.*

The Burra Charter's section on the conservation process (Articles 14–25) refers to more than physical conservation, but the entire range of decisions made including retention of reintroduction of use to reconstruction, adaptation, and interpretation (Article 14). Associations between people and place are to be respected, and opportunities taken for the meanings of place be not only maintained but revived where possible (Article 24). Following the Charter's conservation process in undertaking the relevant research and assessments can better guarantee that decisions about the heritage place are well informed and guided by heritage significance. The following

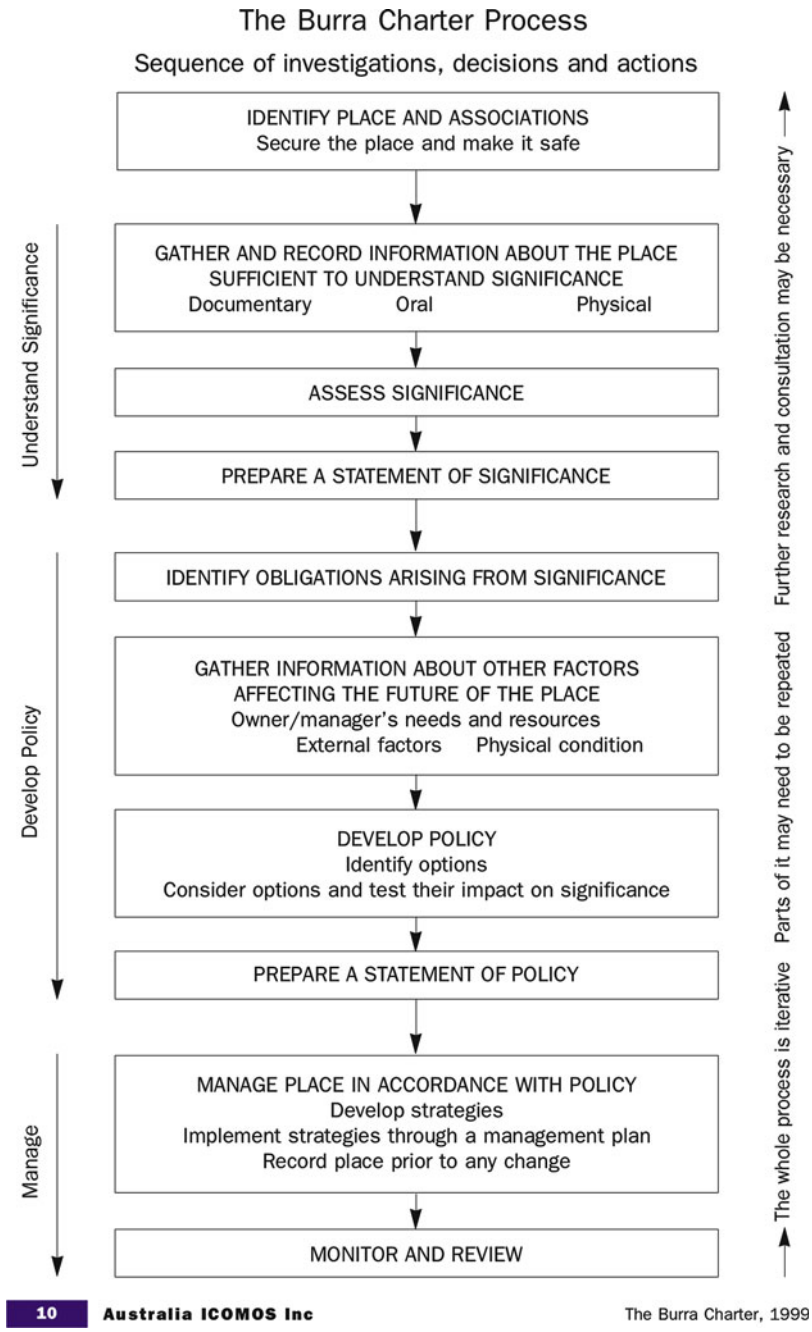

Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999), Fig. 1 The conservation process (Australia ICOMOS 2000: 10)

chart demonstrates the *Burra Charter* Conservation Process (Fig. 1):

The *Burra Charter's* section on conservation practice (Articles 26–34) provides some practical guidelines for the hands-on process once cultural significance is established, physical conservation issues identified, and external factors such as planning, zoning, and other statutory considerations. Matters such as dealing with disturbing or removing physical elements and recording all decisions and changes are important when affecting any change to a

heritage place. In doing so, key definitions in the Charter enhance understanding and decisions regarding what actions are appropriate for each individual heritage place, particularly in Article 1:

1.4*Conservation* means all the processes of looking after a place so as to retain its cultural significance.

1.5*Maintenance* means the continuous protective care of the fabric and setting of a place, and is to be distinguished from repair. Repair involves restoration or reconstruction.

1.6*Preservation* means maintaining the fabric of a place in its existing state and retarding deterioration.

1.7*Restoration* means returning the existing fabric of a place to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.

1.8*Reconstruction* means returning a place to a known earlier state and is distinguished from restoration by the introduction of new material into the fabric.

These definitions clarify the different decisions that can be made and when they are applicable given the potential impacts on the cultural significance on the place, depending on the nature of the heritage values found. Potentially a place where the fabric is of little significance compared to its use and association with the community may be rebuilt as a new structure yet maintain a continued use; whereas another place's significance may reside in its architectural style, therefore to be retained, yet possibly with a quite different use.

Exemplars of best cultural heritage conservation practice have been presented in *The Illustrated Burra Charter*, both in 1992 updated after the 1999 changes to the Charter (Marquis-Kyle and Walker 1992; Walker and Marquis-Kyle 2004). They provide a useful array of situations and issues in heritage management and how such can be resolved by applying the Burra Charter principles and processes. These publications are not available online, but can be purchased from Australia ICOMOS.

Current Debates and Future Directions

Conservation of Places of Cultural Significance, although generally referred to as the "Burra Charter." In 1999 not only were several amendments passed, but a name change was also adopted: *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*. This is not merely a semantic change but reflects a widened as well as deepened comprehension of heritage places, their values, and associated conservation management issues. While previous amendments in 1982, 1984, and1989 had been relatively minor (these can be found at http://australia.icomos.org/publications/charters/), those adopted in 1999 after five years of member consultation show a greater shift. The name change reflects a move from a focus on purely physical conservation to a broader engagement to sustaining cultural heritage places for all their values, whether expressed in their physical structure or intangibly.

The 1999 amendments resulted in the greatest shifts to its text. The key changes (beyond the change of title) related to the following (see Truscott and Young 2000 for more information):

- A broadening of the understanding of what is cultural significance, not only fabric of a place but its use, associations, and meanings, particularly to relevant community groups (Articles 1.2, 12, 26.3).
- The coexistence of values, particularly perhaps in a multicultural society such as Australia; this also reflects the Australia ICOMOS Code on the Ethics of Co-existence in Conserving Significant Places, adopted in 1998 (Australia ICOMOS 2000: 20–1).
- Reference to interpretation, that the previous Charter had been silent on; it was recognized that interpretation is important and also that restoration and reconstruction are acts of interpretation (Articles 1.17, 25)
- An expanded preamble to make the document more approachable, with a statement about a rationale about "why conserve?"
- Changes to Article 2 to provide an obligation to conserve and a recognition that conservation is an integral part of good management, arguing

that only when conservation is included in other aspects of managing a place will there be satisfactory outcomes.

The review of the Burra Charter that led to the 1999 amendments was in some ways fraught, showing up differences in perceptions of the charter. Some members and heritage practitioners tended to apply the Charter to the letter, in its literal content, others in terms of its intent or spirit. A major conflict occurred in the proposed adoption of the changes in 1997, and the working group went back to a greater consultative process that resulted in an almost unanimous adoption of the amendments at its meeting in 1999 (Truscott and Young 2000).

Australia ICOMOS has a commitment to ongoing review and update to reflect changes in heritage practice. This is unlike the ICOMOS *Venice Charter* (the International Charter for the Conservation and Restoration of Monuments and Sites, see www.international.icomos.org/charters/venice_e.pdf). The Venice Charter has not been changed and in 2004 ICOMOS decided to keep it as an original doctrinal text (see Pécs Declaration: www.icomos.org/venicecharter2004/pecsdeclaration.pdf).

Currently, the Burra Charter is again being reviewed, with proposed amendments expected to be submitted to the membership for comment later in 2013. The guidelines that were not updated in the 1999 amendments are also being updated (Australia ICOMOS 2000: 11–9). Over a decade after the 1999 *Burra Charter* was adopted, the amendments are expected again to reflect changes in perceptions of heritage and practice in its conservation. The amendments will hopefully provide guidance as to how to practice heritage conservation in a way to ensure those changes are incorporated. It is likely that they will include a greater inclusion of community interests and how to balance these with best physical conservation; an appreciation that "experts" and community members have different perceptions of what is important; and a more integrated approach to place, landscape, and the wider environment.

Cross-References

- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

References

Australia Icomos. 2000. The Burra Charter: The Australia ICOMOS charter for places of cultural significance 1999, with associated guidelines and code on the ethics of co-existence in conserving significant places. Australia ICOMOS Inc. Available at: http://australia.icomos.org/wp-content/uploads/BURRA_CHARTER.pdf.

Marquis-Kyle, P., and M. Walker. 1992. The illustrated Burra Charter: Making good decisions about the care of important places. Canberra: Australia ICOMOS Inc. with the assistance of the Australian Heritage Commission.

Truscott, M., and D. Young. 2000. Revising the Burra Charter: Australia ICOMOS updates its guidelines for conservation practice. *Conservation and Management of Archaeological Sites* 4 (2): 101–116.

Walker, M. 1996. *Understanding the Burra Charter*. Canberra: Australia ICOMOS.

Walker, M., and P. Marquis-Kyle. 2004. *The illustrated Burra Charter: Good practice for heritage places*. Australia ICOMOS Inc.

Burrup Peninsula

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Introduction

The Burrup is a region of Northwest Western Australia known for its petroglyphs, stone arrangements, stone quarries, shell middens, and other archaeological sites (Bird and Hallam 2006). In an area of about 100 km^2, it has been estimated that there are between 0.5 million and 1 million

Burrup Peninsula, Fig. 1 Four Ibis from Gum Tree Valley. (Photo: Iain Davidson)

petroglyphs, some of extraordinary beauty (e.g., Fig. 1), carved on natural blocks of hard granophyre and gabbro. The area is on the Australian National Heritage List (McDonald and Veth 2009), and the case has been made for World Heritage nomination.

Definition

The Burrup is the name given to that part of the Dampier Archipelago which was formerly called Dampier Island. Large concentrations of petroglyphs have been found in many islands of the archipelago. The name change was a consequence of the establishment of several heavy industries in the region (against growing opposition from rock art specialists). The establishment of a salt industry replaced the wetlands that had separated Dampier Island from the mainland and established it as a peninsula – the Burrup.

Key Issues/Current Debates/Future Directions/Examples

History of Industry Impacts on the Cultural Heritage

Aboriginal people generally avoid the peninsula because of the history of massacre in the nineteenth century, but historically, they continued to use it for ceremony, for sheep pastoral activities because of the good water, and as a base for collecting shells. During these activities, elders explained the images to their young people. As a result, present-day Aboriginal people of the Ngarluma (including the Wong-goo-tt-oo, the Coastal Ngarluma), Yindjibarndi, Mardudhunera, and Yaburara recognize the importance of the images which were made by the *Marga* ancestors (Palmer 1975), including ongoing connections to rock art traditions further inland.

Since the 1960s, Western Australian Governments (of all political leanings) have encouraged the development of heavy industry in the region. Before the Western Australian Government (W.A.Govt.) passed the Aboriginal Heritage Act 1974 (AHA) (which offers the possibility of slight protection for heritage), there was a search for a port site in the region for shipping iron ore. This survey suggested that Dampier Island was a better option than Depuch Island, 100 km east of Dampier where petroglyphs had been known since the visit of HMS Beagle in 1840 (Wickham 1842), because a cursory survey had concluded (erroneously) that the petroglyphs on Dampier Island "do not form such a rich display" (Ride et al. 1964). According to anecdotes, when the port was established, there was substantial destruction of petroglyphs without documentation. Further, recent scientific

studies of the threats from industry (Sinclair Knight Merz 2009) to the petroglyphs have shown that there is little threat, but the continuing presence of the port has left the petroglyphs vulnerable to ongoing damage from the presence of particulate iron ore dust in the atmosphere. Chemical concentrations in the atmosphere were all low, lower than those recorded in Karratha, where they are probably due to urban activities rather than the effects of industry.

In the late 1970s, approval was given for a Joint Venture, led by Woodside Energy Limited, to establish a plant for processing liquefied natural gas subject to certain conditions resulting from the application of the AHA. This led to detailed and prolonged field study of the petroglyphs by teams led by Patricia Vinnicombe, Ken Mulvaney and Jim Rhoads (Vinnicombe 2002). Most of this work did not include local Aboriginal participation, although Aboriginal staff from the Western Australian Museum did participate. Many petroglyphs were documented, some were salvaged with the intention of relocating them after the establishment of the gas plant, and others were documented before being destroyed. Those that were salvaged have not yet been relocated (Fig. 2), causing ongoing friction between Aboriginal and other stakeholders in rock art and government and industry. An audit of the petroglyphs on Joint Venture leases in 2007 showed that in many cases where approval had been given for removal or destruction, the petroglyphs are still present in the lease.

In 2003, in advance of a determination on Native Title, the W.A. Govt. established industrial zones on the Burrup and obtained Aboriginal consent through the Burrup and Maitland Industrial Estate Agreement (BMIEA). There is a perception that the W.A. Govt. did not deliver the agreed benefits in return. Approvals under the AHA subsequent to this have followed Aboriginal involvement in surveys, but industries (including another gas plant) have been established against Aboriginal wishes.

Results of Cultural Heritage Work on the Burrup

Attempts have been made, under existing legislation, to mitigate the direct impact of industry in some cases, but government deemed the cumulative impact on sites in the region, and the broader impact on the sites in the landscape less important than the development of industry.

A major conveyor carries salt through the rocky part of southwest Dampier Island (Virili 1977), and Michel Lorblanchet undertook archaeological work (funded by the Australian Institute of Aboriginal Studies, as it then was) in the adjacent Gum Tree Valley and Skew Valley from the early 1970s (Lorblanchet 1992). This work has produced the only secure dates for the production of petroglyphs. These dates come from excavation

Burrup Peninsula, Fig. 2 Outline kangaroo in Salvage Yard. (Photo: Iain Davidson)

Burrup Peninsula, Fig. 3 Turtles from Rosemary Island. (Photo: Iain Davidson)

of shell middens at the entrance of Skew Valley which revealed images produced more than 4,200 years ago. In addition, among the engraved blocks in Gum Tree Valley, Lorblanchet found a trumpet shell which was dated to about 22 thousand years ago. This shell does not definitely date the art but shows that people were present in the region at the period of maximum cold of the last glacial when sea levels were much lower: the shore was 100 km or more distant, and the islands of the archipelago were the tops of hills in the Dampier range. Radiocarbon dates from shell middens on Rosemary Island confirm that the island was used between 9.5 thousand and 7.2 thousand years ago, corresponding to the interval in which the rising sea reached the hill, and then isolated it (Bradshaw 1995). The petroglyphs on the island do not show the full range of images found on the mainland, suggesting that the older ones (including faces called "archaic") predate the earliest shell middens and the latest ones (including many turtles) (Fig. 3) could be later depending on when water crossings became possible.

Burrup Peninsula, Fig. 4 Line of dancing people, Dugong Heights. (Photo: Iain Davidson)

The petroglyphs were made by removing some of the weathered outer surfaces of the blocks, revealing a lighter-colored surface below (Donaldson 2009). Both Lorblanchet and more recently Ken Mulvaney (2013) have documented that there are several stages of weathering after the images were made, allowing the construction of a sequence of relative ages for the images. Some image classes show several stages of weathering. Considering only those that have only one stage, in the oldest class were very small images of birds and quadrupeds and in the next oldest some of the large tracks of birds and macropods as well as large outline images of them. In the second youngest class, there were lines of people dancing (Fig. 4), and, in general, images of fish, turtles (Gunn and Mulvaney 2008), and other marine

Burrup Peninsula, Fig. 5 "Archaic face" at Picnic Creek, showing Joint Venture Plant in background. (Photo: Iain Davidson)

species are the least weathered. Some of the "archaic faces," particularly those with concentric framing (Fig. 5), occurred in the oldest weathering stage (Dix 1977).

Finally, there are many images of the carnivore, *Thylacinus* (Wright 1972), which became extinct on mainland Australia about 3 thousand years ago. These animals were represented at many different times, including some in the oldest weathering stage. They are never in the youngest weathering stage.

Cross-References

- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Australian Paleoart
- ▶ Australia's Archaeological Heritage
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Dampier Archipelago Petroglyphs
- ▶ Heritage and Archaeology
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Landscapes
- ▶ Heritage Legislation, The Introduction of: Disciplining Through Law
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Rock Art, Forms of

References

Bird, C. F. M. and S. J. Hallam. 2006. A review of archaeology and rock art in the Dampier Archipelago. A report prepared for the National Trust of Australia (WA). Available at http://www.burrup.org.au/2006-10-20%20Technical%20Report%20Final%20draft%202.pdf. Accessed 14 Oct 2012.

Bradshaw, E. 1995. Dates from archaeological excavations on the Pilbara coastline and island of the Dampier Archipelago, Western Australia. *Australian Archaeology* 41: 37–38.

Dix, W. 1977. Facial representations in Pilbara rock engravings. In *Form in indigenous art. Schematisation in the art of Aboriginal Australia and prehistoric Europe*, ed. P.J. Ucko, 277–285. Canberra: Australian Institute of Aboriginal Studies.

Donaldson, M. 2009. *Burrup rock art. Ancient Aboriginal rock art of the Burrup Peninsula and Dampier Archipelago*. Mount Lawley: Wildrocks Publications.

Gunn, R.G., and K. Mulvaney. 2008. Of turtles in particular: A distributional study of an archaeological landscape in southern Murujuga. *Rock Art Research* 25: 147–164.

Lorblanchet, M. 1992. The rock engravings of Gum Tree Valley and Skew Valley, Dampier, Western Australia: Chronology and functions of the sites. In *State of the art: Regional rock art studies in Australia and Melanesia*, ed. J. McDonald and I.P. Haskovec, 39–59. Melbourne: Australian Rock Art Research Association.

McDonald, J.O., and P. Veth. 2009. Dampier Archipelago petroglyphs: Archaeology, scientific values and National Heritage Listing. *Archaeology in Oceania* 44 (S1): 49–69.

Mulvaney, K. 2013. Iconic imagery: Pleistocene rock art development across Northern Australia. *Quaternary International* 285: 99–110.

Palmer, K. 1975. Petroglyphs and associated Aboriginal sites in the north west of Western Australia. *Archaeology and Physical Anthropology in Oceania* 10: 152–160.

Ride, W.D.L., I.M. Crawford, G.M. Storr, R.M. Berndt, and R.D. Royce. 1964. *Report on the Aboriginal engravings and flora and fauna of Depuch Island, Western Australia*, Special Publication. Vol. 2. Perth: Western Australian Museum.

Sinclair Knight Merz. 2009. Burrup rock art monitoring program – Summary of reports. A report to the Burrup Rock Art monitoring management committee. Sinclair Knight Merz. Available at http://www.dec.wa.gov.au/content/view/6039/2137/. Accessed 14 Oct 2012.

Vinnicombe, P. 2002. Petroglyphs of the Dampier Archipelago. *Rock Art Research* 19: 3–27.

Virili, F.L. 1977. Aboriginal sites and rock art of the Dampier Archipelago, Western Australia: A preliminary report. In *Form in indigenous art. Schematisation in the art of Aboriginal Australia and prehistoric Europe*, ed. P.J. Ucko, 439–451. Canberra: Australian Institute of Aboriginal Studies.

Wickham, C. 1842. Notes on Depuch Island. *Journal of the Royal Geographical Society of London* 12: 79–83.

Wright, B.J. 1972. Rock engravings of striped mammals: The Pilbara region, Western Australia. *Archaeology and Physical Anthropology in Oceania* 7: 15–23.

Bushell, Robyn

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Basic Biographical Information

Robyn Bushell holds a doctorate from the University of Sydney. She is an Associate Professor in the School of Social Science & Psychology and Institute for Culture and Society at the University of Western Sydney. In addition to her interests in cultural heritage research, Professor Bushell has worked for many years with heritage, sustainable tourism planning, and community development across SE Asia in close partnership with UNESCO.

Major Accomplishments

Prof Bushell is an internationally recognized heritage studies scholar. Her research intersects heritage studies, tourism planning, and community wellbeing. She has worked in SE Asia over the past 20 years resulting in over 70 publications: edited books, book chapters, journal articles, commissioned reports, and contributions to international policy documents, including inputs to the CBD Documentation for Sustainable Tourism; UN WTO *Indicators for Sustainable Tourism*; the lead author for the World Health Organization and ASEAN *Healthy Tourism* frameworks; contributor to UNEP *Guidelines on Sustainable Tourism*; UNESCO *World Heritage & Sustainable Tourism Guidelines*, and the revised UNESCO *Hoi An Declaration*. She has worked with international and national natural and cultural heritage agencies for many years including Protected Area Board memberships and reviewing Plans of Management. She has an extensive network of contacts throughout heritage and development agencies involved in work relating to the UN Sustainable Development Goals in SE Asia.

In addition she has contributed to a number of international policy documents – for the IUCN, UNESCO-World Heritage Centre, UN-World Tourism Organization, and the World Health Organization. These include a report to the 34th meeting of the World Heritage Committee as part of the review of the Operational Guidelines for the World Heritage Convention with the development of Principles for World Heritage and Sustainable Tourism practices, which was a joint initiative of UNESCO-World Heritage Committee, IUCN, ICOMOS, and ICROM.

Prof. Bushell initiated and led the European Union – Australian Gov't funded: Post Graduate Training Scheme "*Sharing Our Heritage*": *Master Classes In Cultural & Natural Heritage Management* with in-kind support from UNESCO-WHC and Parks Australia, 2005–2007. The project involved four universities in Australia and four in Europe. She also supervises doctoral scholars engaged in research around a range of topics related to heritage management and community development issues.

Dr. Bushell works with a range of national and international heritage governance bodies and academic institutions. She is a member of Forum-UNESCO; the Australian Department of Environment and Heritage World Heritage Reference Group (2009–2012); IUCN representative on Steering Committee World Heritage and Tourism (2009–2011), Blue Mountains World Heritage Advisory Committee; ICOM-Australian chapter; Ministerial Appointment, Booderee National Park Board of Management, comanaged with the Wreck Bay Indigenous community (2003–2014); Ministerial Appointment to the NSW NPWS Regional Advisory Council for Blue Mountains National Park, Executive Ctee for the Oceania Regional Steering Committee of the World Commission for Protected Areas (WCPA) of the International Union for the Conservation of Nature, IUCN (1998–present); Vice

Chair, International Specialist group on Tourism, WCPA–IUCN (1998–2016); and IUCN "Healthy People Healthy Parks" Steering Committee (2011–). She was a member of the Expert Liaison Committee for Protected Areas to develop input to the SBSTTA 9 for the Convention on Biological Diversity (1998) and member of the UN-World Tourism Organization Expert Advisory Group on Indicators of Sustainable Tourism.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage Theory
- ▶ Heritage Tourism and the Marketplace
- ▶ Stakeholders and Community Participation
- ▶ Sustainability and Cultural Heritage
- ▶ Sustainable Cultural Tourism Policies: Overview

Butzer, Karl W.

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Basic Biographical Information

Karl W. Butzer (1934–) is an American geographer, geoarchaeologist, cultural ecologist, and environmental archaeologist. Much of his research has focused on the relationships between the environment and prehistoric people and more recent societies. He has collaborated with many paleoanthropologists and archaeologists, working at both larger, regional scales and at the site-specific microlevel.

He was born in Germany and emigrated to England and then Canada as a child. He attended McGill University, where he received a B.Sc. in Mathematics (1954) and an M.Sc. in Meteorology and Geography (1955). With the support of an Exchange Fellowship, he went on to the University of Bonn (Germany), where he received a Doctor of Science (Dr. rer. nat.) in Physical Geography and Ancient History (1957).

After 2 years as a research associate at the German Academy of Sciences and Literature, he was appointed Assistant and then Associate Professor at the University of Wisconsin-Madison (1959–1966). In 1966 he took a position as Professor of Anthropology and Geography at the University of Chicago and in 1980 was named the Henry Schultz Professor of Environmental Archaeology. During 1981–1982, he was Chair Professor of Human Geography at the ETH (Swiss Federal Institute of Technology), Zurich, but returned to Chicago. During his tenure at Chicago, he was elected to various sub-departmental units, including the Committee on African Studies, Committee on Evolutionary Biology, and Committee on Archaeological Studies (Humanities). He also served as Professor in the Oriental Institute.

In 1984 he joined the faculty of the Department of Geography and the Environment at the University of Texas, Austin, where he is today, and was named the Raymond Dickson Centennial Professor of Liberal Arts. In 1995 he was Cecil and Ida Green Visiting Professor at the University of British Columbia.

Major Accomplishments

During the early part of his career, his research focused on two general topics: the geomorphology, geoarchaeology, and Quaternary climates of Egypt (especially Nubia) and the paleoecology and geochronology of early hominins. His dissertation, *Quaternary Stratigraphy and Climate in the Near East*, was largely based on his field research in Egypt and was published in 1958 and

reprinted in 1969. As a member of the Yale Prehistoric Nubia Expedition of 1962–1963, he spent seven months in the field studying late Quaternary landscape evolution and the prehistoric archaeological record in Egypt's southern Nile Valley. His early research on Egypt was coalesced in two major works: *Desert and River in Nubia*: *Geomorphology and Prehistoric Environments at the Aswan Dam* (1968) and *Early Hydraulic Civilization in Egypt*: *A Study in Cultural Ecology* (1976). The latter was the first effective attempt to isolate, understand, and synthesize the critical factors involved in the rise of an "irrigation civilization."

In the late 1960s and early 1970s, he turned his attention to the paleoecology and geochronology of early hominins. He participated in the University of Chicago Omo Expedition in southwestern Ethiopia (1967–1969), which involved collaboration with Richard Leakey, and in 1971 and 1973 he worked independently at Axum, Ethiopia. He was especially interested in the paleoecology of the African australopithecines and *Homo erectus*, Neanderthal spatial behavior, and the first appearance of anatomically modern humans. His argument that both archaic and modern *Homo sapiens* coexisted 135,000–65,000 years ago is supported by the results of recent biomolecular research.

The early part of his career also included research in Spain and South Africa. He was involved with the University of Chicago's excavation of Acheulian sites at Torralba and Ambrona in central Spain (1961–1963, 1967, 1980–1981), and he directed the Sierra de Espadan Project in anthropology, historical archaeology, and environmental history (1980–1987). Also, he conducted independent research in Mallorca and Catalonia, Spain (1969–1971). Between 1969 and 1983, he spent 9 field seasons investigating the geoarchaeology of some 30 sites, including Taung and Swartkrans, in South Africa.

During the second half of his career, he focused on the more recent prehistoric and historic periods in order to obtain and interpret high-resolution records, including written accounts, of human impacts on the environment. The skills of his wife, Elisabeth Butzer, in archival research and interviewing have been key factors in facilitating this change of direction. For example, as director of the University of Texas Laguna Project (1995–2000), he considered the recent environmental history of northern Mexico. This project led to a series of papers with Elisabeth, all heavily based on archival sources, addressing the impact of livestock grazing on Colonial Mexico. In a similar study, he evaluated the environmental impact of livestock introduction to New South Wales, Australia (with David Helgren, 1999, 2003). He also has investigated the recent history of French coastal reclamation in Nova Scotia (1999), the environmental history and geoarchaeology of Cyprus (2004), and the geoarchaeology of Celtic hillforts in northern Portugal (2010–2011).

He is author or editor of 15 books and monographs and author or coauthor of some 275 refereed, scientific papers or book chapters. His seminal book, *Environment and Archeology*: *An Introduction to Pleistocene Geography*, was first published in 1964; a new and expanded edition, with the subtitle *An Ecological Approach to Prehistory*, appeared in 1971. This work served to shift "environmental archaeology" from a technical to a synthetic and processual overview of world prehistory. He characterized Pleistocene geography as "environmental reconstruction as applied to an understanding of ecological setting and prehistory" and took issue with Gordon Willey and Philip Phillips' (1958) acclamation that "archaeology is anthropology or it is nothing," pointing out that "Archaeology. . .has been equally dependent on geology, biology, and geography. . .during its development [and] is heavily dependent on the natural sciences."

His book *Archaeology as Human Ecology* (1982) represents another major contribution to the archaeological community. In that work he stressed the significance of "contextual archaeology," whereby archaeological sites are placed in their cultural, biological, climatic, and landscape context. This approach is now standard in archaeological investigations.

He has received many awards and honors in recognition of his contributions to archaeology, geoarchaeology, and geography, including a Guggenheim Fellowship (1976), the Royal Geographical Society's Busk Medal (1979), the Society for American Archaeology's Fryxell Award for Interdisciplinary Research (1981), the Geologists' Association of London's Henry Stopes Medal (1982), the Geological Society of America's Rip Rapp Archaeological Geology Award (1985), and the Archaeological Institute of America's Pomerance Medal (1991). He was elected a Fellow of the American Academy of Arts and Sciences in 1984 and a Fellow of the National Academy of Sciences in 1996.

During the course of his career, Karl Butzer has been at the forefront of geoarchaeology, cultural ecology, and environmental archaeology. He is often described as one of the "fathers" of geoarchaeology, and he remains deeply engaged with interdisciplinary environmental archaeology and history.

Cross-References

► Geoarchaeology

References

Butzer, K.W. 1958. *Quaternary stratigraphy and climate in the Near East*, Bonner Geographische Abhandlungen 24. (reprinted 1969). Bonn/New York: Johnson Reprint Corporation.

Butzer, K.W. 1964. *Environment and archeology: An introduction to Pleistocene geography*. Chicago: Aldine Publishing Company.

Butzer, K.W. 1971. *Environment and archeology: An ecological approach to prehistory*. 2nd ed. London: Methuen.

Butzer, K.W. 1976. *Early hydraulic civilization in Egypt: A study in cultural ecology*. Chicago/London: University of Chicago Press.

Butzer, K.W. 1982. *Archaeology as human ecology*. Cambridge: Cambridge University Press.

Butzer, K.W., and C.L. Hansen. 1968. *Desert and river in Nubia: Geomorphology and prehistoric environments at the Aswan Dam*. Madison: University of Wisconsin Press.

C

Cahokia

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Introduction

Cahokia is the largest and most complex archaeological site north of Mexico; indeed, it was probably one of the largest cities in the world at its peak around CE 1200 (Fig. 1). Because of its "outstanding universal value," it is recognized by UNESCO as a World Heritage Site. To the local community, Cahokia is known as "Cahokia Mounds" because of the many mounds located there. To the archaeological community, however, there is a much greater story hidden below the modern ground surface. While archaeologists have studied Cahokia for much of the past century, it was only with interstate highway construction beginning in the 1970s that serious attention was paid to the smaller sites that supported Cahokia. They too tell an important part of Cahokia's story. The "downtown" portion of Cahokia can be visited at Cahokia Mounds State Historic Site in Collinsville, Illinois.

Definition

Lying across the Mississippi River from modern day St. Louis, Cahokia in its heyday served as a cosmopolitan gateway (Kelly 1991) just as historic St. Louis did. As many as 20,000 people may have lived at Cahokia, but most visible to the casual visitor today are the mounds they built. At least 120 mounds have been recorded at Cahokia, the largest of which, Monks Mound (Fig. 2), is approximately 100 ft tall and has a footprint of approximately 17 acres (Fowler 1997; Dalan et al. 2003). Other monumental features of the site include a palisade and so-called woodhenges.

Key Issues/Current Debates/Future Directions/Examples

Cahokia is situated in the heart of the American Bottom, a vast and rich expanse of Mississippi River floodplain (Iseminger 2010). Mobile hunter-gatherers "camped" at Cahokia as early as the Late Archaic period (3500–1000 BCE), gathering nuts, hunting deer and other native fauna, and fishing in nearby Cahokia Creek and backwater lakes. However, even at this early date, inhabitants of the American Bottom probably experimented by growing native plants such as squash (*Cucurbita pepo*) and goosefoot (*Chenopodium berlandieri*). Cahokia was again occupied during the Late Woodland Patrick phase (CE 700–900). At this time, Cahokia was probably just one of a number of small horticultural villages dotting the American Bottom. Their inhabitants grew squash, goosefoot, and a host of

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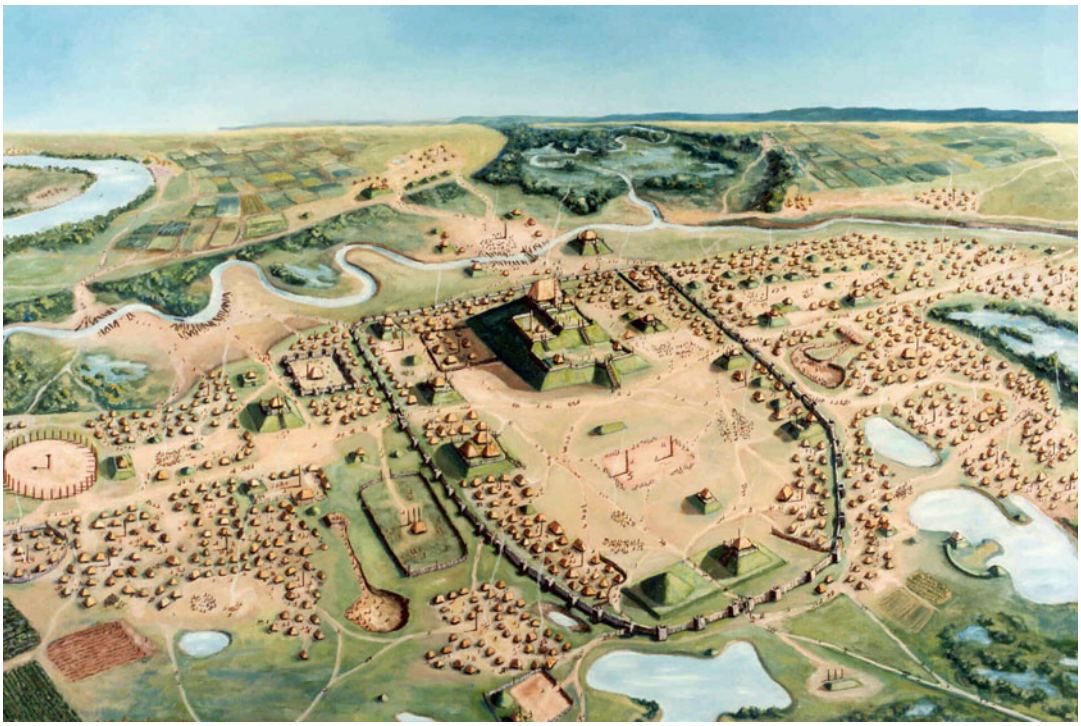

Cahokia, Fig. 1 Downtown Cahokia, c. CE 1200. (Courtesy of Cahokia Mounds State Historic Site. Painted by William R. Iseminger)

Cahokia, Fig. 2 Monks Mound, Cahokia. (Courtesy of Cahokia Mounds State Historic Site)

other native plants in their gardens. A newly introduced technology, the bow and arrow, would have improved the efficiency of hunting. After CE 900, maize was brought to the American Bottom and quickly became a staple, yet Cahokians and their neighbors continued to rely on native cultigens, nuts, and wild game. As the population of the American Bottom grew, fish, a resource more easily renewed than deer, was increasingly important in the diet. Despite the diversity of the subsistence base, however, there can be little doubt that the growth of Cahokia in the Mississippian period (CE 1050–1400) was fueled by maize agriculture.

Around CE 1050, Cahokia experienced its so-called "Big Bang" (Pauketat 2004, 2009), and it was no longer just another American Bottom farming village: most archaeologists would agree it became a city unlike any other north of Mexico. Whether Cahokia's seemingly meteoric rise was led by a single charismatic individual or a powerful family is unknown. However, it seems likely that Cahokian society, like any Native American society, would have been focused on kin networks, and kin support would have been necessary for the reorganization of society. The exact nature of Cahokia's new power structure is also debated. The dominant model since the highway archaeology of the 1970s, with its focus on rural sites, has been that Cahokia was the center of a chiefdom (Milner 1998). Despite the acceptance of this model, it is commonly acknowledged that by virtually any measure, Cahokia was something monumentally greater than any other Mississippian chiefdom. For example, although Moundville, Alabama, is often claimed to be the second largest Mississippian center, it had only around 25 mounds, and all of Moundville would have fit within the Grand Plaza of Cahokia (Dalan et al. 2003). By mound count alone, the second largest Mississippian site was actually the East St. Louis site, with approximately 50 mounds; St. Louis, known historically as "Mound City," featured another 25 mounds or so. If not for the Mississippi River and other water features, Cahokia and the sites at East St. Louis and St. Louis would likely have merged to form continuous suburban sprawl. Clearly, though, the center of power was at Monks Mound. The idea that Cahokia was the center of the "Ramey State" (O'Brien 1991) has recently been reevaluated, but rejecting a western notion in which the power of the state is based on coercive power (Holt 2009). Instead, Geertz's "theatre state" model (Geertz 1980) seems more appropriate: that is, Cahokia's power was based on theatrical rituals which drew people to Cahokia. People helped build Cahokia, helped feed Cahokia, and sometimes gave their lives for Cahokia, not because they were forced but because they wanted to take part in this dramatic and monumental social experiment.

Rural villages and isolated farmsteads in the American Bottom and adjacent uplands probably grew surpluses of maize to send to Cahokia (Lopinot 1997). They probably also gave tributes of venison to be served at Cahokian feasts (Kelly 2001). Like the residents of Cahokia, these rural farmers lived in small, single-family thatch houses, but they had access to fewer exotic goods than Cahokians did (Pauketat 2004). Still, given that they were part of the Cahokian social and ritual arena, those rural farmers were probably considered Cahokians. Their labor would have been necessary to build not only Cahokia's many mounds but also its multiple plazas, massive palisade, and woodhenges. The woodhenges, for example, were built at Cahokia's peak, west of Monks Mound. These monumental circles of large posts are believed to have served as sun calendars, but they might also have played a role in mourning and warfare rituals. The Grand Plaza in downtown Cahokia covered an area two or three times the foot print of Monks Mound, and leveling this area would have required as much effort as building Monks Mound (Dalan et al. 2003). Around CE 1200, a massive palisade was built to surround Monks Mound, the Grand Plaza, and other mounds at the heart of Cahokia. What residents might have been protecting themselves from is unclear. It seems unlikely that there was a group large or organized enough to offer serious threat to downtown Cahokia, although evidence of burning at the East St. Louis site might indicate competition from within the American Bottom.

Perhaps the strongest indicator of conflict or coercive power found at Cahokia is the evidence

of human sacrifice at Mound 72 (Fowler et al. 1999). The primary burial in this mound contained a middle-aged man laid upon a bed of marine shell beads in the shape of a hawk; a second man was buried face down beneath him, and abundant grave goods, many exotic, were buried nearby. Some 250 other people were also buried in Mound 72. These were buried in groups of up to 50 people, mostly young women. Another notable burial in the mound contained four headless, handless young men. Fowler, who excavated the mound, argued that the sacrificed individuals were retainers buried to accompany the high status man in the main burial. However, Hall (2006) suggests these were ritualized or "scheduled deaths," not simply retainer burials. Similarly, Brown (2003) suggests these deaths were part of a theatrical reenactment of the Red Horn myth. Thus, these deaths were likely part of a dramatic ritual, and participation was probably an honor. Evidence of mass human sacrifice at Cahokia therefore need not be interpreted as evidence of conflict or coercive power.

Given that it was the earliest and greatest Mississippian center, Cahokia's influence on contemporary and later societies might be seen through the spread of the so-called "Southeastern Ceremonial Complex" (Brown and Kelly 2000; Brown 2004). While Cahokians did not invent mound building nor did they necessarily invent the mythology and associated symbols that they surely exported, their city served as a model for others to imitate. Cahokians surely made ties with contemporary peoples through reciprocal exchanges of material goods and, in common Native American fashion, through adoption ceremonies and creation of fictive kinship ties (Hall 2006). Material evidence of these exchanges would include the presence at Cahokia of marine shell from the Gulf Coast and copper from the Great Lakes. Artifacts probably manufactured at and exported from Cahokia would include Ramey incised pottery found at sites such as Aztalan (in modern day Wisconsin) and flint clay sculptures found at sites including Spiro (in modern day Oklahoma). Given the clear material links between Cahokia and sites such as Aztalan and Spiro, these distant groups may also have seen themselves as Cahokian kin, at least adopted kin. Indeed, sites to the north such as Aztalan and Dickson Mounds (in Illinois) have been interpreted as colonies of Cahokia (O'Brien 1991). While the ceramic diversity at Cahokia and in the greater American Bottom can be seen as evidence that theirs was a multiethnic society, at the same time Native American notions of adoption and kinship suggest that Cahokians and at the very least other residents of the American Bottom saw themselves as a single people.

Although the hypothesized Big Bang that began Cahokia's ascendancy may be metaphorical, the city might have ended with a more literal bang. A multitude of environmental factors, some beyond human control and others directly caused by humans, probably reduced the desirability of Cahokian real estate over time. Cahokia seems to have reached its peak during a period of favorable climate; bountiful maize harvests during this time probably increased the carrying capacity of the American Bottom significantly and enabled Cahokia's rise. Later, a period of recurring drought (Benson et al. 2009), possibly associated with the cooling of the Little Ice Age, may have contributed to Cahokia's demise. Agricultural yields would have been diminished not only by drought but also by decreasing soil fertility caused by growing maize (which is nitrogen-depleting) without beans (which are nitrogen-fixing). Despite the episodes of drought, flooding of farm fields, not to mention homes, would have become an increasing problem, due to deforestation (Lopinot and Woods 1993). Deforestation would have occurred when clearing agricultural fields and also to provide wood for fuel and construction of houses, woodhenges, and the palisade, which was rebuilt several times. Deer herds were probably diminished, which meant not only a decrease of meat in the diet but also a loss of deer bones and antler for tools, and hides for clothing and coverings. The quality of the diet would have also been reduced by heavy reliance on maize without beans to balance protein content. The ultimate bang, however, might have come with an earthquake emanating from the New Madrid fault (Pauketat 2004; Holt 2009). The New Madrid earthquakes of 1811–12 devastated agricultural systems, flattened forests, and even reversed the course of the Mississippi River.

A bang such as this might have been the final straw for Cahokian society, which was already struggling with mounting environmental and presumably social challenges.

At Cahokia we can see the transition from a mobile hunting-gathering society, experimenting with horticulture, to a complex, sedentary agricultural society. It might be tempting to say that the experiment failed, or at least that the environment failed, in the end. However, it is important to stress that Cahokians did not simply disappear. While the Mississippian groups of the southeast encountered by the Spanish might be thought of as their cultural descendents, many archaeologists today think that Siouan groups such as the Omaha, Osage, and Ponca were the actual descendents of the Cahokians (Hall 2006). That is, Cahokians did not die out: they adapted to the dynamic world they lived in, moving on to make new lives elsewhere.

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Eastern North America: An Independent Center of Agricultural Origins
- ▶ Hall, Robert Leonard
- ▶ North America (USA and Canada): Museums
- ▶ Woodland and Mississippian Cultures of the North American Heartland
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

References

Benson, L.V., T.R. Pauketat, and E.R. Cook. 2009. Cahokia's boom and bust in the context of climate change. *American Antiquity* 74: 467–483.

Brown, J. 2003. The Cahokia Mound 72-Sub 1 burials as collective representation. *The Wisconsin Archeologist* 84: 83–99.

Brown, J. 2004. The Cahokian expression: Creating court and cult. In *Hero, hawk, and open hand*, ed. R.-F. Townsend, 105–123. Chicago: The Art Institute of Chicago.

Brown, J., and J.E. Kelly. 2000. Cahokia and the southeastern ceremonial complex. In *Mounds, Modoc, and Mesoamerica: Papers in honor of Melvin L. Fowler*, ed. S.R. Ahler, 469–510. Springfield: Illinois State Museum.

Dalan, R.A., G.R. Holley, W.I. Woods, H.W. Watters Jr., and J.A. Koepke. 2003. *Envisioning Cahokia: A landscape perspective*. Dekalb: Northern Illinois University Press.

Fowler, M.L. 1997. *The Cahokia atlas: A historical atlas of Cahokia archaeology*. Urbana: Illinois Transportation Archaeological Research Program, University of Illinois.

Fowler, M.L., J.C. Rose, B. Vander Leest, and S.R. Ahler. 1999. *The Mound 72 area: Dedicated and sacred space in early Cahokia*. Springfield: Illinois State Museum.

Geertz, C. 1980. *Negara: The theatre state in nineteenth-century Bali*. Princeton: Princeton University Press.

Hall, R.L. 2006. Exploring the Mississippian Big Bang at Cahokia. In *A pre-Columbian world*, ed. J. Quilter and M. Miller, 187–229. Washington, DC: Dumbarton Oaks.

Holt, J.Z. 2009. Rethinking the Ramey State: Was Cahokia the center of a theater state? *American Antiquity* 74: 231–254.

Iseminger, W. 2010. *Cahokia Mounds: America's first city*. Charleston: The History Press.

Kelly, J.E. 1991. Cahokia and its role as a gateway center in interregional exchange. In *Cahokia and the hinterlands*, ed. T.E. Emerson and R.B. Lewis, 61–80. Urbana: University of Illinois Press.

Kelly, L.S. 2001. A case of ritual feasting at the Cahokia site. In *Feasts: Archaeological and ethnographic perspectives on food, politics, and power*, ed. M. Dietler and B. Hayden, 334–367. Washington, DC: Smithsonian Institution Press.

Lopinot, N.H. 1997. Cahokian food production reconsidered. In *Cahokia: Domination and ideology in the Mississippian world*, ed. T.R. Pauketat and T.E. Emerson, 52–68. Lincoln: University of Nebraska Press.

Lopinot, N.H., and W.I. Woods. 1993. Wood overexploitation and the collapse of Cahokia. In *Foraging and farming in the eastern woodlands*, ed. C.M. Scarry, 206–231. Gainesville: University Press of Florida.

Milner, G.R. 1998. *The Cahokia chiefdom*. Washington, DC: Smithsonian Institution Press.

O'Brien, P.J. 1991. Early state economics: Cahokia, capital of the Ramey State. In *Early state economics*, ed. H.J.-M. Claessen and P. van de Velde, 143–175. New Brunswick: Transaction Publishers.

Pauketat, T.R. 2004. *Ancient Cahokia and the Mississippians*. Cambridge: Cambridge University Press.

Pauketat, T.R. 2009. *Cahokia: Ancient America's great city on the Mississippi*. New York: Viking Penguin.

Further Reading

Byers, A.M. 2006. *Cahokia: A world renewal cult heterarchy*. Gainesville: University Press of Florida.

Young, B.W., and M.L. Fowler. 2000. *Cahokia: The great Native American metropolis*. Urbana: University of Illinois Press.

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Basic Biographical Information

Halet Çambel was born in Berlin in 1916 where her father was a military attaché. She graduated from Arnavutköy American College for Girls in 1935, and went to Paris to study at the University of Sorbonne education in archaeology, Hittite, and ancient Hebrew. She completed her M.A. in 1938, and wanted to return to the university to start research for her Ph.D. dissertation, but World War II had just begun. Halet Çambel was the first Turkish woman to participate in the Olympic Games, competing in fencing with Suat Fetgeri Aşeni in 1936.

Major Accomplishments

Çambel attended excavations held by the French Archaeological Institute in Afyon Yazılıkaya/Midas City in 1939, and later, she continued to work with the excavation director, Dr. Emilie Haspels, in the archaeological museums of Istanbul. Later Prof. Dr. Bossert, from Istanbul University, invited her to be his assistant in 1943. She carried out a controlled excavation in Kırşehir Hashöyük on behalf of the Turkish Historical Society. With Prof. Dr. Bossert, she participated in numerous research trips all around Anatolia until 1946 when the site of Karatepe, which created a strong impact on Anatolian archaeology, was discovered.

While continuing to work in Karatepe, she carried out the excavations of Afyon Yazılıkaya/Midas City with the French Institute of Archaeology in 1948and 1949, and Istanbul Fikirtepe with Kurt Bittel in 1950 and 1951. As well as starting site restoration after 1952, she helped to organize Karatepe-Arslantaş National Park, the first open-air museum in Turkey.

Çambel became professor in 1960, and was a guest lecturer at the University of Saarbrücken in 1962 and 1963. When she returned to Istanbul University, she founded the Department of Prehistory at this university. Between 1965 and 1966, she documented archaeological values in Adana region for a study organized by the Bank of Provinces.

Çambel organized a comprehensive study of antiquities around Adana, Hatay, and İçel with a student team during 1966–1971 with the cooperation of State Planning Organization and the Çukurova Regional Directorate of Ministry of Development Planning Project.

In association with the Prehistoric Southeastern Anatolia Research Project, Çambel made a large scale survey in Siirt, Diyarbakır, and Şanlıurfa provinces which afterward led to excavations in Urfa Biris Cemetery and in Diyarbakir Girikihacıyan.

Her other significant study was the excavation of Çayönü which started in 1964.

She organized a team from İstanbul and Michigan Universities to screen the region which was going to be inundated after Keban Dam construction in 1966. This study led to projects by Middle East Technical University for Keban recovery and evaluation of historic monuments (1967) and Lower Euphrates (1974). She also accomplished salvage excavations in Kumkale and Domuztepe from 1981 to 1984.

Even after her retirement in 1984, she continued to carry out the studies in Karatepe and Çayönü as well as the development of projects in Karatepe open-air museum, and at the national park. Halet Çambel received numerous awards including the Kingdom of the Netherlands, Prince Claus Award (2005), awards from Republic of Turkey Ministry of Culture, Troy Culture and Arts, and the University of Tübingen (Germany) honorary doctorate (2004). She is the member of many scientific institutions such as The German Archaeological Institute, the American Philosophical Society for the Advancement of Knowledge, and the American Institute of Archaeology, Thracology Institute.

Cross-References

► Çayönü: Agriculture and Domestication
► Çayönü Tepesi: Bioarchaeology

Further Reading

Çambel, H. 1995. Hierapolis Kastabala – Bodrum Kalesi. *TarihİçindeBütünYönleriyleOsmaniye* (1. Sempozyum, 15–18 Kasım 1993), 114–122.

Çambel, H. 1996a. Ein spaethethitisches Relief aus Kilikien. *Istanbuler Mitteilungen* 46: 57–59.

Çambel, H. 1996b. Archaeology in Turkey: a cospectus of recent evidence on the prehistoric and early historic periods. Proceedings of the 29th International Symposium on Archaeometry, Ankara, 9–14 Mayıs, 1994. *Archaeometry* 29: 339–350.

Çambel, H. 1997. Kadirli'debiranıteser. Tarihi Roma Bazilikası Alacami. *Türkiyemiz* 27: 42–53.

Çambel, H. 1999. *Karatepe-Aslantaş, the inscriptions, corpus of hieroglyphic Luwian inscriptions II*. Berlin/New York: W. de Gruyter.

Çambel, H. 2001a. Karatepe-Aslantaş Öyküsü, *Boğazköy'den Karetepe'ye. Hititbilim ve Hitit Dünyasının Keşfi, Yapı Kredi Kültür Sanat Yayınları*. İstanbul.

Çambel, H. 2001b. Karatepe-Aslantaş a many-sided project. In *Istanbul University's contribution to archaeology in Turkey 1932–2000*, ed. O. Belli, 195–203. Istanbul: İstanbul Üniversitesi.

Çambel, H., and R.J. Braidwood. 1994. U istokovproizvodyaçavo v Yugo-VostoçnoyAnatolii. *Naukai Çeloveçestvo*: 66–77.

Çambel, H., and A. Özyar. 2003. *Karatepe-Aslantaş Azatiwataya. Die Bildwerke*. Mainz: Von Zabern.

Çambel, H., S. Kapur, C. Karaman, E. Akça, G. Kelling, M. Şenol, Z. Yeğingil, and S. Yaman. 1996. Source determination of the late Hittite basalt sculpture reliefs, orthostats and inscriptions at Karatepe-Aslantaş and Domuztepe, Çilicia - Southern Anatolia. Proceedings of the 29th International Symposium on Archaeometry, Ankara 9–14 May, 1994. *Archaeometry* 4: 575–584.

Cambodia: Cultural Heritage Management

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Introduction

Cambodia, in terms of cultural heritage, is one of the world's wealthiest countries, but the kingdom's economic poverty places this marvelous heritage in constant peril. Since the cessation of hostilities in the late 1990s, much effort has been expended in protecting Cambodian heritage sites with governmental agencies including the Ministry of Culture and Fine Arts, the APSARA Authority, and intergovernmental organizations such as UNESCO working to safeguard sites around the country. More recently, non-governmental organizations, such as Heritage Watch, have been founded to highlight the threat to prehistoric heritage in Cambodia. This entry briefly examines the efforts of these varied organizations and the changing threats to Cambodia's heritage.

Key Issues/Current Debates/Future Directions/Examples

Cambodia is home to a rich cultural heritage which stretches into the prehistoric period. The first Khmer polities, however, were established in the fourth to fifth centuries CE, with the rise of polities known as Funan and Chenla which grew powerful due to the burgeoning trade between the Indian subcontinent and China.

Over time, power became concentrated in Cambodia's North, culminating with the civilization of Angkor which reached its zenith in the twelfth to thirteenth centuries CE, which held hegemony over much of Southeast Asia. The Angkorian empire has left its mark on the region in the form of temples, reservoirs, and roadways, most concentrated within modern Cambodia.

Cambodia's heritage has been treasured and coveted for hundreds of years. Thai invaders carried off innumerable treasures (and many of the skills of the Royal court) in the fifteenth century, some of which now rest in Myanmar after the Thai themselves were invaded by the Burmese. Further depredations against Cambodia were seen under the French protectorate. The tale of André Malraux's attempts to pillage the magnificent temple of Banteay Srei is well known. The French, while they did carry off a good deal of the kingdom's treasures for Parisian museums, did make efforts to conserve much of Cambodia's heritage through the enactment of legislation. These laws, in fact, were cited in the arrest of Malraux.

There have been significant developments both positive and negative in the field of heritage management in Cambodia since the country's independence in 1953. The civil war in Cambodia represents the lowest ebb for Cambodia's heritage as countless statues and other treasures were spirited out of the country.

As Angkor continues to attract thousands of tourists, the pressure on Cambodia's heritage is of a different nature, one in which the masses of tourists are managed while the site retains its integrity. The international community has become involved in Cambodia in the form of the United Nations Educational, Scientific and Cultural Organization (UNESCO). The organization was established in Cambodia in the 1950s but closed in 1975 due to the conflict. In May 1989, UNESCO was able to complete an initial assessment of the safeguarding needs of Angkor, and an office was reestablished in 1991.

UNESCO has several goals in Cambodia:

1. Design and implement programs and projects contributing to strategic objective of UNESCO in the country.
2. Develop projects, raise funds, and implement the projects in the areas of the competence of the Office to reinforce program activities.
3. Promote and enhance partnerships and networks for disseminating and sharing information and ideas with the stakeholders in the country.
4. Enhance the capacity of the staff for strategic planning and management of the programs and projects for delivering results in the country.
5. Position the environment of the Office for efficient and effective delivery of programs and projects in the country.
6. Prospect and expand knowledge management of the Office to facilitate decision making and problem solving by the staff for the delivery of results (REF 2008 UNESCO Phnom Penh Office Annual report).

UNESCO's budgetary expenditures are indicative of the importance the organization places on culture. Twenty-five percent of the budget (in 2009–2010) is dedicated to culture vs. other priority areas (education, natural sciences, communication and information, and program support costs) (UNESCO 2010: 16). Further, many of the extra-budgetary expenses are focused on culture (87% in 2009–2010), mostly the conservation and restoration of temples around the country.

In 1993 the site of Angkor, comprising hundreds of monuments, was inscribed to the World Heritage List and the International Coordinating Committee for the Safeguarding and the Development of the Historic Site of Angkor (ICC-Angkor) was established, under the patronage of the Japanese and French governments. Annual meetings hosted in Siem Reap by the APSARA National Authority in charge of the management of the site, UNESCO, and the international community ensure proper management of the site. Independent experts in conservation, archaeology, and sustainable development oversee project quality and project management. In 2008 UNESCO's Phnom Penh Office in close cooperation with the World Heritage Centre negotiated a "Heritage Management Framework" project with the Australian Government and Cambodian authorities. The project is designed to strengthen the technical expertise and governance of APSARA, so that the benefits of tourism and development at Angkor can be shared fairly, as well as to ensure environmental protection.

The temple of Preah Vihear, situated in Cambodia's north, on the edge of the Dang Rek Mountain Range in Preah Vihear Province, was inscribed as a World Heritage site in 2008. The Cambodian government has established the National Authority for Preah Vihear (NAPV) to function much in the same way as the APSARA Authority does. The challenges to protecting the temple have, so far, been substantial as the nomination to World Heritage status has contributed to an escalation in armed conflict between Cambodia and Thailand. Thailand objected to the nomination and has never fully accepted the International Court of Justice's 1962 decision that found "that the Temple of Preah Vihear is situated in territory under the sovereignty of Cambodia." Internal political maneuvering within Thailand since 2009 has seen an escalation in tension at the site and conflict resulting in several civilian and

military deaths (National World Heritage Committee 2009).

Intangible Cambodian heritage has also been inscribed on the World Heritage List, including the Royal Ballet of Cambodia or Khmer Classical Dance. UNESCO proclaimed Khmer Classical Dance as a Masterpiece of Oral and Intangible Heritage in 2003 and inscribed it on the Representative List of the Intangible Cultural Heritage of Humanity in 2008. *Sbek Thom*, a form of shadow puppetry, was also recognized as a Masterpiece of the Oral and Intangible Heritage of Humanity in 2005, and in 2008 it was also inscribed on the Representative List of the Intangible Cultural Heritage of Humanity (National World Heritage Committee 2009).

In an effort to further support intangible heritage and the knowledge that is passed through the generations, the Spanish government supported the Creative Industries Support Programme (CISP). The project was designed not only to promote the preservation of heritage but also to provide sustainable income for the poor in remote parts of Cambodia, with a strong focus on Cambodian indigenous peoples. The project, which involved four UN agencies, aimed to select traditional crafts, art, and performances and promote them as commercially viable ventures. Efforts were also made to "improve the capacity of national institutions to preserve and develop Cambodia's cultural heritage and living arts, to improve employment opportunities and income generation in the creative industries, to improve the commercialisation of local cultural products and services, and to empower women and indigenous peoples" (UNESCO 2011).

Aside from UNESCO and multinational organizations, there have been other initiatives that have sought to promote heritage preservation in Cambodia. The NGO Heritage Watch was established in 2003 following the rise in looting of prehistoric sites in Cambodia. The illegal excavation and sale of prehistoric artefacts is, perhaps, the largest challenge facing Cambodia's heritage professionals. Where previously temples were targeted, now it is archaeological sites, usually cemeteries containing burials with semiprecious stones, metal, and ceramic artefacts, that are being destroyed.

With funding from the US Department of State, it launched a national public awareness campaign targeting both those who loot and those who buy antiquities. Heritage Watch attacked the supply end of the trade through radio and television commercials, educational comic books, and community workshops for villagers in heavily looted areas and the establishment of a telephone hotline. Tourists were informed about the negative consequences of buying looted antiquities through public exhibits, airport kiosks, and public lectures.

Early in 2006, Heritage Watch began rescue excavations at Wat Jas, an Iron Age cemetery in northwestern Cambodia that was increasingly targeted by looters. This project also involved the training of young Cambodian archaeologists in survey and excavation techniques. In addition to this, Heritage Watch documented threatened sites across the country, recording at-risk objects in case they are stolen in the future.

At the ancient temple complex of Koh Ker, Heritage Watch launched an innovative project combining preservation with sustainable tourism development. Small business training, language skills, craft production, and tourism activities were introduced at Koh Ker to provide the locals with an alternative to looting. Also, Heritage Watch furthered its educational efforts with the publication of a children's storybook promoting heritage preservation that was distributed for free in many Cambodian schools.

2007 saw the launch of the Heritage Friendly Tourism campaign in Cambodia. The aim of the campaign is to encourage responsible tourism, raise interest in remote heritage sites (improving their chances of protection), and encourage corporate Cambodia to support art, heritage, and development. The campaign involved a major advertising push encouraging visitors to Cambodia to support businesses that have been certified as Heritage Friendly (in that they actively supported the aforementioned sectors).

Other initiatives include the Database of Historical and Archaeological Regulations for the Management of Antiquities (DHARMA), the aim of which is to compile a resource of all laws that are applicable to Cambodian heritage issues

in one location. Heritage Watch has also been involved with the training of guides at the temple site of Banteay Chhmar in Cambodia's Northwest as part of an effort to boost tourism to the local community and reduce heritage destruction in the area, one of Cambodia's worst affected by looting. In 2011, Heritage Watch worked with the Australian government in the repatriation of antiquities smuggled into Australia and also assisted in establishing a bilateral agreement between the Australian and Cambodian government that will limit the illegal trade in antiquities.

The Phnom Kulen Archaeology and Sustainable Development Program is a project of the Archaeology and Development Foundation (ADF), a London-based nongovernmental organization. In this innovative program, archaeology and sustainable development go hand in hand. Working to the north of Siem Reap, this site-specific effort has four main components which aim to reduce poverty and strengthen civil society. The emphasis is on letting the local community at Kulen make their own decisions regarding food security, health center support, infrastructure and education, and income generation. This program provides an excellent model in the ways archaeological research, heritage preservation, sustainable development, and tourism can work together successfully.

The Ministry of Culture and Fine Arts (MoCFA) of Cambodia also has taken great steps in efforts to protect Cambodia's cultural heritage. Two bilateral agreements have been signed by the MoCFA with the United States that limits the export of antiquities from Cambodia. As the government ministry charged with protecting Cambodia's heritage, the MoCFA is an integral part of all efforts in heritage preservation and works closely with NGOs and UNESCO in these efforts.

Cambodia faces considerable challenges in protecting the vast heritage resources it is blessed with, ranging from the monuments of the Angkorian period to the subsurface remains of prehistoric sites and cemeteries, as well as its living heritage, that is under continual threat. There is, however, considerable support for Cambodian heritage, and it is a question of whether this support will balance the demand for Cambodia's antiquities. Past trends suggest not and the difficulty nongovernmental agencies working in heritage face in raising funds further suggests that the challenge to protect Cambodia's treasures will be an uphill battle.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Looting and Vandalism (Cultural Heritage Management)

References

National World Heritage Committee. 2009. Available at: http://www.nwhc.cambodia.gov.kh/node/74.

UNESCO. 2010. Bi-annual report December 2010. Phnom Penh: UNESCO.

UNESCO. 2011. Creative industries support programme. Available at: http://portal.unesco.org/es/ev.php-URL_=47975&URL_DO=DO_TOPIC&URL_SECTION=201.html.

Camels: Domestication

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Basic Species Information

Systematic Classification

- *Camelus ferus* wild two-humped camel
- *Camelus bactrianus* domesticated two-humped/Bactrian camel
- *Camelus dromedarius* domesticated one-humped/Arabian camel/dromedary

The genus *Camelus* contains the domestic species *Camelus bactrianus* and *Camelus dromedarius* (Walker 1964). In 1877 N. M. Przewalski discovered the wild two-humped camel (*Camelus ferus*) while on expedition in Eurasia (Przewalski 1879; Bannikov 1976; Hare 1997). Archeologists commonly assume the extant wild two-humped camel *C. ferus* to be the progenitor of the domestic two-humped camel *C. bactrianus* (Benecke 1994; Peters and von den Driesch 1997); however, recent paleogenetic studies show that *C. bactrianus* more likely originated from an as yet undetected wild camel species (Trinks et al. 2012).

Phylogeography of Old World Camels

The family *Camelidae* originated during the Eocene, about 40–45 Ma ago in North America (Gauthier-Pilters and Dagg 1981). Four to five million years ago, the ancestors of the modern New World camels dispersed from the North into the mountainous regions of South America, while *Paracamelus*, the progenitor of modern Old World camels, reached Eurasia about three million years ago via the Bering landbridge (Gauthier-Pilters and Dagg 1981; Koehler 1981; Peters 1997). The remaining camel forms in North America disappeared ~10,000 years ago due to climatic changes (Irwin-Williams 1967; Frison et al. 1978).

The earliest camel forms were well adapted to the open steppes and spread rapidly westward after migrating to Eurasia. By the middle Pleistocene, the habitat of the Old World camels ranged from Central Asia to the Arabian Peninsula, including parts of North Africa and Eastern Europe (Koehler 1981; Titov 2008). Fossil evidence has yet to substantiate whether the different number of humps is related to adaptation to diverse environments. Paleolithic cave paintings (Chojt-Zenker cave) in Eastern Mongolia suggest that the existence of a wild two-humped camel is certain at least for Central Asia (Nowgorodowa 1980; Benecke 1994).

By the end of the Pleistocene, a severe reduction in the range of wild camels occurred as a result of change towards a dryer climate (with the beginning of the Dnepr-Ice Age) and increased human hunting activities (Gauthier-Pilters and Dagg 1981; Kozhamkulova 1986; Titov 2008).

Over time, the wild camel species inhabiting the steppes and semidesert of the Old World became extinct, leaving only *C. ferus*. Today, the distribution of the remaining 900–1400 individuals is restricted to parts of the Chinese and Mongolian Gobi desert (Bannikov 1976; Hare 1997; Mix et al. 1997, 2002; Reading et al. 1999).

C. bactrianus, the domestic form, has spread throughout the dry steppes and semidesert zones in Central Asia and is now found from Northeast China, Mongolia and Siberia, in Kazakhstan, South Russia, and parts of Afghanistan, Pakistan, and Iran. In Asia Minor, its distribution overlaps with that of the one-humped camel *C. dromedarius* (Walker 1964).

Archaeology and Domestication of the Two-Humped Camel

The domestication of the two-humped camel, used as a pack, draft, or riding animal, but also for milk, meat, and wool production, built the basis for long-distance trade between the Central Asian steppes and Europe during the Bronze Age (Benecke 1994; Kuzmina 2008). Archeological evidence suggests that camel husbandry gained importance during the second millennium BCE, though where the domestication process began remains controversial.

Archeological records show evidence for a closer relationship between people and the two-humped camel during the late fourth and beginning third millennium BCE (Bulliet 1975; Benecke 1994). The earliest records of camel bones come from sites of the Kopet-Dagh foothills in the borderland between Turkmenistan and Iran dating to the second half of the fourth millennium (Kuzmina 2008). A similar situation appears at the northern edge of Kopet-Dagh mountains, where archeological layers at Shor- and Khapuz Depe produce finds of *C. bactrianus* dating to the early third millennium BCE (Compagnoni and Tosi 1978). Further, camel bones dating between 2500 and 2200 BCE originate at Turkmen settlements of Altyn Depe, Namazga Depe, and Kelleli (Peters and von den Driesch 1997; Kuzmina 2008). At the site of Shahr-i-Sokhta (Iran), camel bones and finds of hair and collected camel dung (which replaces the scarce firewood in the usually

treeless steppes) dating to the first half of the third millennium suggest the presence of animals that lived in close association with the site inhabitants and hence represent domesticates (Koehler 1981; Peters and von den Driesch 1997). Also clay figures of cart-drawing camels of the same period from Ulug Depe (Turkmenistan) imply a use of domesticated camels as draft animals (Kuzmina 2008).

Given the presence of camel bones in Bronze Age strata from sites in Iran and southern Turkmenistan, it has been hypothesized that the inhabitants of the Iranian Plateau and the Kopet-Dagh-foothills area played a major role in the domestication of the two-humped camel (Benecke 1994).

Some archeologists and zoologists, however, do not believe that paleontological and archeological evidence from southwestern Central Asia can be interpreted as evidence for an ongoing process of domestication because there is not yet evidence for the presence of the wild *C. ferus* during the early to middle Holocene in this area. The authors argue that the center of domestication must lie further east, in areas where people were acquainted with the wild form over an extended period of time, perhaps in southern Kazakhstan or northwestern Mongolia (Peters and von den Driesch 1997). The sudden appearance of camel bones in Turkmen and Iranian archeological layers dated to the Bronze Age as well as the absence of skeletal remains of wild camels in earlier Neolithic strata in these regions suggest that people from the Kopet-Dagh foothills acquired the fully domesticated two-humped camels from eastern Asia. However, differentiation between wild and domestic camel bone material is difficult and the earliest evidence of fully domesticated camels from southern Kazakhstan and northwestern Mongolia dates to the second millennium BCE (Köhler 1981; Peters and von den Driesch 1997; Mukhareva 2007).

A recent genetic study of Late Bronze and Early Iron Age skeletal remains of *C. bactrianus* from Western Siberia and Southern Uzbekistan revealed homogeneity between modern domesticated camels from China and Mongolia and Bronze and Iron Age camels from Siberia and Uzbekistan. These results suggest that a single population was domesticated, though where that process took place remains uncertain. Furthermore, sequences of the extant wild camel are phylogenetically extremely distant to domestic two-humped camels, pointing to a population split long before domestication (Trinks et al. 2012).

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

References

Bannikov, A.G. 1976. Wild camels of the Gobi. *Wildlife* 18: 398–403.

Benecke, N. 1994. *Der Mensch und seine Haustiere. Die Geschichte einer jahrtausendealten Beziehung*. Stuttgart: Theiss Verlag.

Bulliet, R.W. 1975. *The camel and the wheel*. New York: Columbia University Press.

Compagnoni, B., and M. Tosi. 1978. The camel: Its distribution and state of domestication during the third millenium B.C. in light of finds from Shahr-i-Soktha. In *Approaches to faunal analysis in the Middle East*, Peabody museum bulletin, ed. R. Meadow and M.A. Zeder, vol. 2, 91–103.

Frison, G.C., D.N. Walker, S.D. Webb, and G.M. Zeimens. 1978. Paleo-Indian procurement of camelops on the northwestern Plains. *Quaternary Research* 10.

Gauthier-Pilters, H., and A.I. Dagg. 1981. *The camel. Its evolution, ecology, behavior and relationship to man*. Chicago: University of Chicago Press.

Hare, J. 1997. The wild Bactrian camel Camelus bactrianus ferus in China: The need for urgent action. *Oryx* 31: 45–48.

Irwin-Williams, C. 1967. Associations of early man with horse, camel and mastodon at Hueyatlaco, Valsequillo (Puebla, Mexico). In *Pleistocene extinctions, the search for a cause*, ed. P.S. Martin and H.E. Wright, 337–347. New Haven: Yale University Press.

Koehler, I. 1981. Zur Domestikation des Kamels. PhD dissertation, Tieraerztliche Hochschule Hannover.

Kozhamkulova, B.S. 1986. The late Cenozoic two-humped (Bactrian) camels of Asia. *Quartärpaläontologie* 6: 93–97.

Kuzmina, E.E. 2008. *The prehistory of the Silk Road*. Philadelphia: University of Pennsylvania Press.

Mix, H., R.P. Reading, and B. Lhagvasuren. 1997. Zum Status des wilden Trampeltiers (Camelus bactrianus ferus) in der Mongolei. *Mitteilungen der Zoologischen Gesellschaft für Arten- und Populationsschutz* 13: 1–3.

Nowgorodowa, E. 1980. *Alte Kunst der Mongolei*. Leipzig: Seemann Verlag.
Peters, J. 1997. Das Dromedar: Herkunft, Domestikationsgeschichte und Krankheitsbehandlung in frühgeschichtlicher Zeit. *Tierärztliche Praxis* 25: 559–565.
Peters, J., and A. von den Driesch. 1997. The two-humped camel (Camelus bactrianus): New light on its distribution, management and medical treatment in the past. *Journal of Zoology* 242: 651–679.
Przewalski, N.M. 1879. *From Kulja across the Tian Shan to Lop Nur*. London: Sampson Low, Marston, Searle and Rivington.
Reading, R.P., H. Mix, B. Lhagvasuren, and E.S. Blumer. 1999. Status of wild Bactrian camels and other large ungulates in south-western Mongolia. *Oryx* 33: 247–255.
Titov, V.V. 2008. Habitat conditions for Camelus knoblochi and factors in its extinction. *Quaternary International* 179: 120–125.
Trinks, A., P.A. Burger, N. Benecke, and J. Burger. 2012. Ancient DNA reveals domestication process: The case of the two-humped camel. In *Camels in Asia and North Africa. Interdisciplinary perspectives on their significance in past and present*, ed. E.M. Knoll and P.A. Burger, 79–86. Vienna: Austrian Academy of Science Press.
Walker, E.P. 1964. *Walker's mammals of the world*. Balitimore: The John Hopkins University Press.

Further Reading

Mix, H., R.P. Reading, E.S. Blumer, and B. Lkhagvasuren. 2002. Status and distribution of wild Bactrian camels in Mongolia. In *Ecology and conservation of wild Bactrian camels (Camelus bactrianus ferus)*, ed. R.P. Reading, D. Enkhbileg, and T. Galbaatar, 39–48. Ulaanbaatar: Mongolian Conservation Coalition and ADMON Printing.
Mukhareva, A.N. 2007. Camel scenes in rock art of the Minussinsk Basin. *Archaeology, Ethnology and Anthropology of Eurasia* 32: 102–109.

Canada: Cultural Heritage Management

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Introduction

While cultural heritage encompasses tangible and intangible aspects of past and contemporary cultures, here we focus on the management of places and material items of archaeological and historical significance in Canada, conducted in compliance with preservation laws. In Canada, legislative protection for cultural heritage resources reflects the division of powers split between federal and provincial-territorial governments. Since the 1970s, cultural heritage resources on most public and private lands have received some form of protection, although significant gaps exist for lands under federal jurisdiction (Pokotylo and Mason 2010). "Compliance" or "contract" archaeology is the most common practice of cultural heritage resource management conducted throughout the country.

Historical Background

The concern with cultural heritage resource management in Canada can be traced back prior to confederation of the country in 1867. As early as the 1850s, discoveries of archaeological sites during colonial expansion and the rise of relic hunting in eastern Canada prompted individuals, such as Sir Daniel Wilson and Sir John W. Dawson, and natural history societies to collect information on sites and encourage collectors to donate artifacts to museums (Trigger 1966a, b; Killan 1998: 16–7). The recovery of artifacts from a Montréal construction site by John Dawson in 1860 (Trigger 1966a) marks the birth of Canadian archaeology, and the earliest documented case of "rescue" archaeology in Canada.

The earliest legislation that was concerned with cultural heritage protection – the Indian Graves Ordinance – was enacted by the Colony of British Columbia in 1865. While some legislation for the protection and management of cultural heritage resources was present in the first half of the twentieth century (e.g., Quebec's 1922 heritage act, *Loi relative à laconservation des monuments etdes objets d'art ayantun intérêt historique etartistique*; British Columbia's 1925 *Historic Objects Preservation Act*; the Northwest Territories' 1930 *Ordinance Respecting the Protectionand Care of EskimoRuins*; and, Canada's 1930 *National Parks Act*), major developments did not occur until

the 1960s and 1970s. Charles Borden's 1951–1952 survey and salvage of archaeological sites threatened by damming of the Nechako River in central British Columbia, constituted the first formal mitigation project in Canada, and was the catalyst for British Columbia's *Archaeological and Historic SitesProtection Act* (1960) that became a model for many other provinces developing similar legislation in the 1970s.

Key Issues

Legal Framework of Cultural Heritage Management

Each province and territory in Canada has cultural heritage protection legislation, and an administrative unit to implement and manage activities resulting from it (Table 1). The administrative units charged with regulating work under these acts are situated in a variety of ministries or departments that often have a broader scope beyond cultural heritage. The basic principle of most of this legislation is to provide blanket protection for all cultural heritage remains and sites, on private or public property, recorded or not, and the use of permits or licenses to control any alterations to those sites. Although these laws vary, they share many common elements regarding the nature and kind of heritage resources protected, special protection provisions, control over the conduct of work, ownership and stewardship, management of impacts, and civil remedies for contravention. Penalties, which may include fines and/or incarceration, vary across the country with differentiation between individual and corporate violators.

While some federal legislation is relevant to cultural heritage resource protection (e.g., *Canadian Environmental Assessment Act*, *Canada Shipping Act*, and *Cultural Property Export andImport Act*), Canada is the only G8-nations member lacking comprehensive federal cultural heritage resource management legislation (Lee 2002). The Heritage Branch of the Department of Canadian Heritage addresses questions of cultural heritage policy and legislation and, with the Archaeological Services Branch of the Parks Canada Agency, has developed directives governing cultural heritage under the control of either Parks Canada or the Department (Parks Canada 2005). The Archaeological Services Branch is responsible for cultural heritage within Parks Canada lands and also responds to requests for advice from other federal government departments.

In the early 1990s, the Government of Canada outlined its plan to pass legislation to protect archaeological resources on federal lands, including First Nations reserve lands, across Canada. However, this plan never reached fruition. A number of reasons have been cited to explain this failure (see Burley 1994: 77–8), including First Nations' objection to Crown ownership of archaeological resources (Dunn 1991a: 1, 1991b: 3) and proposed powers of the federal government to unilaterally impose policy on Aboriginal archaeological resources (Dunn 1991b: 3). In 1999, the Canadian government initiated the Historic Places Initiative that included provision for a proposed "historic places act" to protect federally owned historic places, including archaeological sites, but such legislation has yet to be realized.

Cultural Heritage Management Practice in Canada

These mandates have changed the practice of archaeology in Canada over the last four decades. Most of the archaeological work conducted in the country is initiated by legislation and is associated with proposed development projects. The compliance process, irrespective of the specific legislation, consists of the following general steps:

- A proposed development is reviewed by the responsible government agency/agencies.
- This review may identify requirements for cultural heritage assessment studies.
- A qualified heritage consultant (typically private sector) is retained by the proponent and investigation permits are sought from government.
- Cultural heritage resource assessment studies are undertaken, followed by agency review and

Canada: Cultural Heritage Management, Table 1 Canadian provincial-territorial statutory laws affecting cultural heritage and responsible ministries or departments

Jurisdiction	Statute	Date[a]	Responsible ministry or department[b]
British Columbia	Heritage Conservation Act	1996	Ministry of Forests, Lands and Natural Resource Operations
Alberta	Historic Resources Act	2006	Culture and Community Services
Saskatchewan	Heritage Property Act	2010	Tourism, Parks, Culture and Sport
Manitoba	Heritage Resources Act		Culture, Heritage and Tourism
Ontario	Ontario Heritage Act	2006	Tourism Culture and Sport
Québec	Cultural Heritage Act	2011	Department of Culture, Communications and the Status of Women
New Brunswick	Heritage Conservation Act	2010	Wellness, Culture and Sport
Nova Scotia	Special Places Protection Act	1995	Communities, Culture and Heritage
Prince Edward Island	Archaeology Act	2006	Department of Health and Wellness
Newfoundland-Labrador	Historic Resources Act	2005	Department of Tourism Culture and Recreation
Yukon	Historic Resources Act	2002	Department of Tourism and Culture
Northwest Territories	Archaeological Sites Regulations	2001	Department of Education, Culture and Employment
Nunavut	Archaeological and Palaeontological Sites Regulations	2001	Department of Culture, Language, Elders and Youth

Source: Data drawn from publicly available Canadian provincial and territorial government websites
[a]Date refers to the most recent amendment of the statute, which may not be the initial date of enactment
[b]Ministry-department responsible for administering cultural heritage legislation as of December, 2011

acceptance of the study recommendations. Depending on the nature of the results, additional studies may be required.

The organizational structure of cultural heritage management varies across the country and jurisdictions. While some government agencies (e.g., Parks Canada 2005) undertake some of their own work, a substantial private-sector industry of cultural heritage professionals has emerged to deal with the explosion of cultural heritage resource management work in Canada (estimated to be in the tens of millions of dollars). In effect, the private sector acts as an extension of government in that it undertakes investigations to fulfill the requirements of legislation. The development of the private-sector industry has also resulted in the creation of professional organizations, mainly at the provincial level (e.g., British Columbia Association of Professional Archaeologists, Alberta Association of Consulting Archaeologists), but also at the national level (e.g., Canadian Association of Heritage Professionals), to support and self-regulate practitioners as well as to develop statements of ethics and codes of conduct specific to the needs of management-related activity.

Over the past two decades, an emerging disconnect between academic research and cultural heritage management has lessened in Canada. An increasing number of Canadian universities now offer relevant courses and programs to train future cultural heritage management professionals. Some governments (such as British Columbia and Alberta) have taken proactive steps to make grey literature more widely available to the cultural heritage community. Nevertheless, the sheer volume of material from development-driven work continues to present challenges to some museums serving as repositories for the resulting collections.

This legislation and resulting activity has also raised the public profile of archaeology, and the involvement of a variety of stakeholders in decisions on cultural heritage management. There is acknowledgement that public outreach and access

is essential to effective cultural heritage management. This has resulted in the increased development of interpretive centers based around archaeological sites, by First Nations, as well as provincial and federal agencies.

First Nations in Canada are increasingly demanding more control over their cultural heritage (Ferris 2003) and changes are occurring at different levels throughout the country. While there are some commonalities, interpretations of what cultural heritage resources are, and their values, can vary considerably among First Nations across Canada, and often differ from current definitions provided by government statutes. For example, many First Nations groups do not differentiate between archaeological sites, traditional use sites, or sacred sites. For proposed development projects in Canada requiring government permits or approval, there is a common law "duty to consult" with Aboriginal peoples, based on judicial interpretation of the obligations of the Crown (i.e., federal, provincial, and territorial governments) with respect to potential, or established, Aboriginal or Treaty rights of Aboriginal peoples. Cultural heritage issues now figure prominently in these formal consultative processes. In some provinces and territories (e.g., British Columbia and Northwest Territories), First Nations have input into the licensing-permitting process, while other jurisdictions (e.g., Nova Scotia, Ontario) stipulate that First Nations must be involved once aboriginal cultural heritage resources are identified in assessment studies. In response to the desire for greater control over their cultural heritage, an increasing number of First Nations groups have developed their own heritage policies and permitting systems to assert influence within their traditional territories. While not legally binding, the professional community has largely respected this parallel management regime. A number of memoranda of understanding have been signed between Aboriginal peoples, government, and industry for the management of cultural heritage resources on traditional lands (Budhwa 2005; Nelles and Alcantara 2011). Addressing the above issues remains a challenge, and requires continued dialogue with First Nations to find common ground.

Cultural heritage management in Canada involves government, Aboriginal people, cultural heritage professionals, and academics. The successful implementation of cultural heritage management requires all of these groups to recognize and respect the validity of each other's values to achieve what is essentially the same common objective.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canada: Cultural Heritage Management Education
- ▶ Canadian Archaeological Association (CAA)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Heritage and Public Policy
- ▶ Heritage Legislation, The Introduction of: Disciplining Through Law
- ▶ Legislation in Archaeology: Overview and Introduction
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law

References

Budhwa, R. 2005. An alternate model for first nations involvement in resource management archaeology. *Canadian Journal of Archaeology* 29: 20–45.

Burley, D.V. 1994. A never ending story: Historical developments in Canadian archaeology and the quest for federal heritage legislation. *Canadian Journal of Archaeology* 18: 77–98.

Dunn, M. 1991a. My grandfather is not an artifact: A report on the Aboriginal archaeological heritage symposium, February 17–18, 1991. Hull, Quebec. Report prepared for The Department of Communications, Archaeology Heritage Branch, Ottawa.

Dunn, M. 1991b. A national overview of the department of communications consultation with Aboriginal peoples on Canadian archaeological heritage. Report on file at The Department of Communications, Archaeology Heritage Branch, Ottawa.

Ferris, N. 2003. Between colonial and indigenous archaeologies: Legal and extra-legal ownership of the archaeological past in North America. *Canadian Journal of Archaeology* 27: 154–190.

Killan, G. 1998. Toward a scientific archaeology: Daniel Wilson, David Boyle and the Canadian Institute 1852–96. In *Bringing back the past*, Archaeological

survey of Canada mercury series, ed. P.J. Smith and D. Mitchell, vol. 158, 15–24. Hull: Canadian Museum of Civilization.
Lee, E. 2002. Archaeology and the public cultural conscience in Canada – The federal story. *Revista de Arqueologia Americana (Journal of American Archaeology)* 21: 45–51.
Nelles, J., and C. Alcantara. 2011. Strengthening the ties that bind? An analysis of Aboriginal-municipal intergovernmental agreements in British Columbia. *Canadian Public Administration* 54: 315–334.
Parks Canada. 2005. *Parks Canada guidelines for the management of archaeological resources*. Ottawa: Parks Canada.
Pokotylo, D., and A.R. Mason. 2010. Archaeological heritage resource protection in Canada: The legislative basis. In *Cultural heritage management, policies, and issues in globalperspective*, ed. G. Smith and P. Messenger, 48–69. Gainsville: University Press of Florida.
Trigger, B.G. 1966a. Sir John Willam Dawson: A faithful anthropologist. *Anthropologia* 8: 351–359.
Trigger, B.G. 1966b. Sir Daniel Wilson: Canada's first anthropologist. *Anthropologia* 8: 3–28.

Canada: Cultural Heritage Management and First Nations

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Introduction

Canada is a large (9,984,670 sq. km) country with a population of approximately 34.5 million that includes 633 recognized First Nations; each of these aboriginal groups is distinctive with their specific cultural practices, language, and priorities. (Names are a problem and, in the case of Canadian Aboriginal people, have changed with the times. Although the Indian Act remains in force in Canada, the term "Indian" is widely disfavored by those whom the term is used to describe. "Native" (but not "Native Canadian") and "Aboriginal" are occasionally used in self-reference, but "First Nations" and "First Peoples" are more commonly accepted at present. As there is no universally accepted term or definition, these four terms are used interchangeably in this entry.) The present relationship between cultural heritage management (of which archaeology constitutes a major component, and is the main focus here) and First Nations in Canada is multifaceted. It is useful to review the historical background of its development to better understand the current context.

Historical Background

Archaeological evidence of aboriginal people's occupation of the lands now known as Canada extends back at least 12,500 years (and possibly to 28,000 years ago) (Goebel et al. 2008). Notwithstanding the eleventh century Norse settlement at L'Anse aux Meadows – the earliest evidence of European settlement in the New World – the French initiated colonization of the country in the sixteenth century. This was followed by British conquest and control in the mid-1700s, and then the confederation of several British North America colonies to form the country of Canada in 1867. The federal system of government that was established split many responsibilities of culture and heritage between federal and provincial-territorial governments that continues to the present. As the country expanded westward, the Canadian government continued the previous British colonial practice of military conquest and/or creating treaties with aboriginal people. Similar to other colonial countries, the federal government also attempted to assimilate aboriginal peoples through institutions such as Indian residential schools and legislation to systematically repress cultural expression (e.g., language, Potlatch and other ceremonial practices).

In the late 1800s, aboriginal lifeways throughout the country were viewed as disappearing in the face of territorial expansion. The Geological Survey of Canada's Anthropological Division was established in 1910, with a mandate to preserve information on aboriginal societies in Canada, and was housed in the newly established National Museum of Canada. While its focus was "salvage

ethnography," rather than archaeological sites (which were not considered endangered), Harlan I. Smith was appointed as the Survey's first archaeologist in 1911. Thus, Canada's first professional anthropologists and archaeologists were situated in federal government departments, rather than in universities in the country. While archaeologists such as Smith worked with aboriginal communities, aboriginal participation was usually limited to field assistance, such as finding sites and acting as informants about their contents. While this significantly contributed to the success of the fieldwork, aboriginal people had little if any input into the direct practice of the archaeological research, as well as actions affecting their cultural heritage (e.g., removal of totem poles, excavation of burials, building museum collections).

Up until the 1960s, archaeology in Canada continued in its infancy, with only a few people professionally involved in archaeological work in the country. The 1960s was a time of substantial growth and development, impacting cultural heritage resources across the country. Archaeologists in Canada faced the monumental task of establishing a baseline understanding of the country's archaeological record as it was being diminished by increasing land development. Prior to World War II, there was minimal provincial-territorial or federal legislation for archaeological protection (e.g., Quebec's 1922 heritage act, *Loi relative à la conservation des monuments et des objets d'art ayant un intérêt historique et artistique;* British Columbia's 1925 *Historic Objects Preservation Act*; the Northwest Territories' 1930 *Ordinance Respecting the Protection and Care of Eskimo Ruins*; and, Canada's 1930 *National Parks Act*). The federal *Indian Act*, dating back in various forms to 1927, provided some limited protection to some sites and objects (e.g., grave houses and poles, totem poles, petroglyphs) located on reserve lands, but aboriginal people had no direct involvement in establishing these protocols. Archaeological heritage protection legislation emerged in Canada in the 1960s in British Columbia, and then throughout the country in the 1970s. These laws and their policies focused on general mainstream societal values, and did not explicitly address concerns of the aboriginal communities whose ancestors were responsible for the majority of the archaeological record in the country. First Nations lacked authority to make, or provide input to, and exert control over the preservation and management of their heritage, although issuance of permits for archaeological work in the province of British Columbia and the Northwest Territories encouraged consultation with local First Nations communities, when applicable.

As cultural heritage legislation came into effect across the country, aboriginal people were mobilizing to press their case for self-determination and control over rights and representation, including traditional lands and cultural heritage. The initial catalyst was the federal government's 1969 *Statement of the Government on Indian Policy*, (Canada. Department of Indian Affairs and Northern Development (DIAND) 1969) that provoked aboriginal reaction and resistance that continues to the present. This has resulted in a series of landmark court cases that recognize inherent aboriginal rights in land and resources, the establishment of various kinds of aboriginal self-government, and negotiation of treaties in regions that previously lacked treaties. Of particular relevance to cultural heritage management is the Supreme Court of Canada's decision that the "Crown" (i.e., federal, provincial and territorial governments) has a duty to consult with First Nations and, where appropriate, accommodate their concerns when considering an action that may adversely impact potential or established aboriginal or treaty rights. In the context of such consultations, the prominence of cultural heritage matters is now reaching unprecedented levels and, for the first time, has the potential to significantly impact outcomes.

Key Issues

Milestone Events in Changing and Developing Relationships

Subsequent to the 1984 Declaration of Principles of World Indigenous Peoples (McGhee 1989: 15), First Nations in Canada have increasingly focused attention on their cultural heritage issues. Three

events have had a major impact on archaeology and museums in the country.

In 1988, the Lubicon Cree First Nation protest of *The Spirit Sings* exhibit of First Nations material culture at the Glenbow Museum in Calgary (during the Olympic Winter Games) had a profound impact on museums and First Nations relationships, particularly recognition that only aboriginal people can speak for themselves. The Lubicon Cree First Nation, and numerous other aboriginal groups, requested academics and museums to boycott the exhibit, claiming it fostered a colonial perspective of First Nations rather than presenting the contemporary context (see Harrison et al. 1988). At the same time, controversy arose at the Canadian Museum of Civilization in Hull, Quebec, during the planning of its First Nations Gallery. Numerous aboriginal organizations strongly protested the presentation of the Bering Land Bridge theory to account for the origins of First Nations peoples in Canada. This raised the issue of who "owns" prehistory, and the implications of archaeologists' research for First Nations communities (McGhee 1989). These events resulted in the establishment in 1990 of the joint Assembly of First Nations and Canadian Museums Association (AFN-CMA) Task Force on Museums and First Nations. The resulting *Task Force Report on Museums and First Peoples* recommendations included: equal partnerships to be forged between museums and aboriginal peoples, increased involvement of aboriginal people in museum work to improve representation and interpretation of their culture and history; improved access to museum collections for aboriginal people; and repatriation of artifacts and human ancestral remains (Hill and Nicks 1992). In a typically Canadian style, the Task Force elected not to recommend legislation to realize these recommendations (particularly repatriation) preferring to build partnerships, as legislation (such as the *Native American Graves Protection and Repatriation Act* (NAGPRA) enacted by the USA in 1990) was perceived as potentially obstructive to fostering positive relations.

The Royal Commission on Aboriginal Peoples (RCAP) report, resulting from a 1990 confrontation over a golf course development in Quebec that included a Mohawk cemetery, presented a series of recommendations on aboriginal self-government, health, education, treaties, heritage, lands, and resources (RCAP 1996). It included a reconfirmation of the significance of a "firm cultural base" in the general health and wellness of aboriginal communities and members (Royal Commission on Aboriginal Peoples 1996: vol. 3, 586–602), and considered aboriginal people to be "the owners of cultural sites" with "sole jurisdiction" over them (Royal Commission on Aboriginal Peoples 1996: vol. 2, 648–9).

In 1996, the Canadian Archaeological Association (CAA), the main national-level professional society in the country, formed a First Nations Archaeology Committee to review the relationship between First Nations and archaeologists and establish ethical guidelines and obligations for the profession. After extensive nation-wide consultation with the professional archaeological community and aboriginal people, the CAA prepared the *Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples* in 1996 (Canadian Archaeological Association 1997). These principles acknowledge aboriginal people's interest in protection and management of the archaeological record, its interpretation and presentation; recognize the need to consult with aboriginal communities to negotiate protocols of archaeological practice; and encourage partnerships with aboriginal communities in archaeological research, management, and education, based on respect and mutual sharing of knowledge and expertise. However, these principles do not explicitly define the relationship between First Nations and their heritage with respect to physical or intellectual ownership rights, and are not explicit on how to evaluate the appropriateness of protocols of practice. In May 2000, the CAA further broadened its archaeological code of principles by adopting *Principles of Ethical Conduct* for the profession that state compliance with the *Principles Pertaining to Aboriginal People*.

While they do not carry the weight of law, many cultural heritage institutions and archaeologists in Canada have adopted recommendations from both the AFN-CMA and CAA documents as

guidelines in structuring their relations with First Nations, and these principles are changing the practice of cultural heritage research and management in the country. There are an increasing number of examples of shifts from policy to practice, as well as evaluations of the success of collaborations with First Nations communities (Holm and Pokotylo 1997; Hanna 2005; Rowley and Hauser 2008).

Issues and Challenges

Nevertheless, there remains a legacy of mistrust and apprehension among First Nations toward government, academic institutions, and the professional cultural heritage community that needs to be addressed. Major continuing concerns include: repatriation of both ancestral human and cultural remains, representation of First Nations culture and history, dissatisfaction with existing cultural heritage protection legislation, authority in stewardship, and participation in the protection of cultural heritage and the care of collections (see Nicholas 2009).

Repatriation has now been a pressing issue for over three decades in Canada. It was first raised as an issue at The Canadian Museum Association consultations with the Assembly of First Nations at the 1988 "Preserving Our Heritage" conference (McGhee 1989: 15). In 1990, the CMA-AFN Taskforce concluded that it was better to handle repatriation efforts on a case-by-case basis. At present, there is no national repatriation legislation, although one exists at the provincial level: Alberta's *First Nations Sacred Ceremonial Objects Repatriation Act* was enacted in 2000. The recent CAA guidelines, in conjunction with provincial and territorial permitting requirements, have resulted in a decreased number of human remains coming into museum and repository collections. Successful repatriation efforts (see Hanna 2005; Rowley and Hauser 2008) have been carried out under the AFN-CMA general guidelines, and protocols established by individual "ad hoc" museum polices that vary across institutions.

Issues of representation have become a focal point in discussions between Canadian museums and First Nations. Historically, the representation of aboriginal people within a museum context was characterized by little meaningful collaboration and involvement by aboriginal people. There has been a significant shift in the nature and scope of collaboration for aboriginal people to be able to represent themselves and their own histories (see Holm and Pokotylo 1997), as well as efforts to increase dissemination of knowledge to aboriginal peoples to make more informed decisions about the management, research, and presentation of their past and culture (see Rowley et al. 2010).

First Nations have raised objections to existing cultural heritage protection legislation, as well as the absence of federal legislation – Canada is the only G8-nations member lacking comprehensive federal cultural heritage resource management legislation (Pokotylo and Mason 2010). In the absence of federal legislation, the Archaeological Services Branch of Parks Canada is responsible for cultural heritage within Parks Canada lands and responds to requests for advice from other federal government departments. Although, the Canadian government in 1999 took steps to establish a proposed "historic places act" that involved consultation with First Nations, legislation is not yet forthcoming. There are increasing demands by First Nations for control over their heritage, but present heritage preservation acts are still not explicit about Native ownership of their archaeological heritage. An initiative to pass federal legislation in the 1990s was unsuccessful, due in part to First Nations' objection to government ownership of archaeological resources (Dunn 1991: 3; Bell 1992: 482) and proposed federal powers that would unilaterally impose policy on aboriginal archaeological resources (Dunn 1991: 3). Given recent Canadian Supreme Court rulings that reaffirm the principle of fiduciary responsibility to protect the interests of aboriginal people, some archaeologists suggest there is a basis for arguing a case for a fiduciary obligation on the part of the Crown to care for aboriginal heritage sites and material (Ferris 2003).

Recent amendments to some provincial-territorial legislation provide greater direct aboriginal involvement and decision-making. In some provinces and territories (e.g., British Columbia and Northwest Territories), First Nations have

input into the licensing-permitting process, while other jurisdictions (e.g., Nova Scotia, Ontario) stipulate that First Nations must be involved once aboriginal cultural heritage resources are identified in assessment studies. Given the desire for greater control over their cultural heritage, an increasing number of First Nations groups are developing their own heritage policies and permitting systems to assert influence within their traditional territories (e.g., Nicholas 2009). While not legally binding, the professional community has largely respected this parallel management regime. As well, more First Nations groups are hiring their own heritage specialists to inventory, research, and manage their own cultural heritage resources. These initiatives are establishing First Nations as not just collaborators, but cultural heritage managers, in provincial-territorial management schemes. An increasing number of memoranda of understanding are also being signed between aboriginal peoples, government, and industry for the management of cultural heritage resources on traditional lands.

Interpretations of what cultural heritage resources are, and their values, can vary considerably among First Nations across Canada, and often differ from current definitions provided by government statutes. For example, many First Nations groups do not differentiate between archaeological sites, traditional use sites, or sacred sites and object to the narrowly defined scope of cultural heritage assessments, given adherence to legislation, that often exclude traditional use sites and sacred sites to provide a more representative perspective of past aboriginal land use. Assessing the significance of aboriginal cultural heritage sites is also a major concern – although First Nations values are on the list of significance evaluation criteria, there is often criticism that Western perspectives and scientific values weigh heavily in the evaluation process, particularly in cases where there is little material evidence. This is compounded by concern over the relative ranking of significance of heritage resources that contradicts aboriginal perspectives that all ancestral sites are significant. Both provincial-territorial and federal heritage policies are starting to address this, but aboriginal knowledge and value systems need to be incorporated to effectively remedy the problems.

Future Directions

Although we have identified above many issues in the relationships of First Nations and Canadian heritage institutions and professionals involved in the research and management of aboriginal cultural heritage in Canada, and challenges to be faced, we can also point to positive developments. Over the past two decades, there has been a slow but progressive shift toward partnership and collaboration based on mutual respect and shared responsibility. Some examples are noted here. Although the country still lacks comprehensive federal heritage legislation, the Canadian government has placed greater emphasis on commemorating aboriginal heritage sites nationally and internationally (as World Heritage Sites) to correct imbalance in representation of the pre- and post-contact heritage of the country, and a number of aboriginal sites are currently on Canada's World Heritage Site tentative list.

In British Columbia, few treaties were negotiated at the time of colonial settlement, and negotiation land claims remain a major political issue. Over the past two decades, archaeologists are increasingly working closely with First Nations, who have recognized the potential contribution of archaeology in presenting their court cases for continuous occupation of unceded traditional lands (see Nicholas 2006). Over this same time period, there have been a number of Treaties signed with British Columbia First Nations that include provisions for cultural heritage resources. For example, with the Nisga'a Nation, cultural resources are addressed in a comprehensive fashion. In Chapter 17, Protection of Heritage Sites (Sections 36 to 39), of the *Nisga'a Final Agreement* (Nisga'a Nation et al. 2000), the treaty allows the Nisga'a Nation to develop their own processes to manage cultural heritage sites on Nisga'a lands. Further, the treaty states that the government of British Columbia will develop or continue processes to manage heritage sites until the Nisga'a Government establishes their own

policies. In other words, the treaty allows the Nisga'a to develop their own heritage protection processes, and until such time that this has been implemented, the provincial status quo is maintained.

First Nations have more influence, power, and involvement in cultural heritage matters than they did just a few years ago, given recent court decisions on the "duty to consult" that brings First Nations to the negotiating table. They are taking on a major role in the management of heritage resources within their traditional territories. There is also an increasing level of day-to-day inclusion and involvement of aboriginal people on cultural heritage management projects (although this varies dramatically across the country); this can range from acting in the capacity of "site monitors" representing First Nations' interests, "field assistants" providing assistance with the field investigations up to the level of principal investigator. While things are getting better, there is still a considerable way to go for First Nations to assume a major participatory and authoritative role in the management process, and formal transfer of responsibility has just begun to be realized in cases of treaty settlement lands (Grier and Shaver 2008).

Increased educational opportunities for aboriginal peoples, particularly in post-secondary education, have now resulted in the emergence of Canadian-educated First Nations cultural heritage specialists who now hold positions ranging from heritage consultants working for First Nations and private industry to university faculty. This is having an impact on capacity-building within First Nations communities, provides a stronger aboriginal perspective in cultural heritage management practice, and, ultimately, contributes to methodological and theoretical developments within the discipline (e.g., Yellowhorn's 2002 "Internalist Archaeology",) as Indigenous Archaeology (Nicholas 2010) becomes a distinct recognized subdiscipline.

Looking to the future, we can expect a greater convergence of government legislation and policy that addresses First Nations' interests, values, and priorities, and greater participation and influence of First Nations in the cultural heritage resource management process. New treaties will likely follow the precedent of including provisions to transfer control of day-to-day management of cultural heritage sites on treaty settlement lands. Cultural heritage professionals and institutions will continue to be proactive in developing meaningful partnerships with First Nations communities that realize increased aboriginal power in the design, conduct of cultural heritage research and management. The rate of this change will be determined by attitudes of provincial-territorial and federal governments, First Nations' capacity-building, and their ability to take the time to address the question of cultural heritage resources in the face of other competing priorities such as health care, housing, and employment.

Cross-References

- ▶ Canada: Cultural Heritage Management
- ▶ Canadian Archaeological Association (CAA)
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Peoples, Working with and for
- ▶ Postcolonial Archaeologies
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Stakeholders and Community Participation

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References

Canada. Department of Indian Affairs and Northern Development (DIAND). 1969. Statement of the government on Indian policy. Ottawa.

Canadian Archaeological Association. 1997. Canadian archaeological association: Statement of principles for ethical conduct pertaining to Aboriginal peoples. *Canadian Journal of Archaeology* 21: 5–6.

Dunn, M. 1991. My grandfather is not an artifact: A report on the aboriginal archaeological heritage symposium,

February 17–18 1991, Hull, Québec. Report submitted to Department of Communication, Ottawa.

Ferris, N. 2003. Between colonial and indigenous archaeologies: Legal and extra-legal ownership of the archaeological past in North America. *Canadian Journal of Archaeology* 27: 154–178.

Goebel, T., M.R. Waters, and D.H. O'Rourke. 2008. The Late Pleistocene dispersal of modern humans in the Americas. *Science* 319: 1497–1502.

Grier, C., and L. Shaver. 2008. The role of archaeologists and first nations in sorting out some very old problems in British Columbia, Canada. *The SAA Archaeological Record* 8: 33–35.

Hanna, M. 2005. The changing legal and ethical context of archaeological practice in Canada, with special reference to the repatriation of human remains. *Journal of Museum Ethnography* 17: 141–151.

Harrison, J., B.G. Trigger, and M. Ames. 1988. Museums and politics: The spirit sings and the Lubicon boycott. *Muse* 6: 12–16.

Hill, T., and T. Nicks. 1992. Turning the page: Forging new partnerships between museums and first peoples. Task force report on museums and first peoples assembly of first nations and the Canadian Museums Association, Ottawa.

Holm, M., and D. Pokotylo. 1997. From policy to practice: A case study in collaborative exhibits with first nations. *Canadian Journal of Archaeology* 21: 33–43.

McGhee, R. 1989. Who owns prehistory? The Bering Land Bridge dilemma. *Canadian Journal of Archaeology* 13: 13–20.

Nisga'a Nation, British Columbia & Canada. 2000. *Nisga'a final agreement*. Electronic document. Available at: http://www.aadnc-aandc.gc.ca/eng/1100100031252. Accessed 20 Jan 2012.

Nicholas, G.P. 2006. Decolonizing the archaeological landscape: The practice and politics of archaeology in British Columbia. *American Indian Quarterly* 30: 350–380.

Nicholas, G.P. 2009. Policies and protocols for archaeological sites and associated cultural and intellectual property. In *Protection of first nations cultural heritage*, ed. C. Bell and R.K. Paterson, 203–220. Vancouver: UBC Press.

Nicholas, G.P. 2010. Seeking the end of indigenous archaeology. In *Bridging the divide: Indigenous communities and archaeology into the 21st century*, ed. C. Philips and H. Allen, 233–252. Walnut Creek: Left Coast Press.

Pokotylo, D., and A.R. Mason. 2010. Archaeological heritage resource protection in Canada: The legislative basis. In *Cultural heritage management, policies, and issues in global perspective*, ed. G. Smith and P. Messenger, 48–69. Gainsville: University Press of Florida.

Rowley, S., and K. Hauser. 2008. The journey home: A case study in proactive repatriation. In *Utimut: Past heritage – Future partnerships: Discussions on repatriation in the 21st century*, ed. M. Gabriel and J. Dahl, 202–212. Copenhagen: International Work Group for Indigenous Affairs.

Rowley, S., D. Schaepe, L. Sparrow, A. Sanborn, U. Radermacher, R. Wallace, N. Jakobsen, H. Turner, S. Sadofsky, and T. Gofman. 2010. Building an on-line research community: The reciprocal research network. Available at: http://www.museumsandtheweb.com/mw2010/papers/rowley/rowley.html. Accessed on 29 Dec 2011.

Royal Commission on Aboriginal Peoples. 1996. *Report of the royal commission on aboriginal peoples, volumes 1, 2, and 3*. Ottawa: Minister of Supply and Services.

Yellowhorn, E. 2002. Awakening internalist archaeology in the Aboriginal world. Unpublished Ph.D. dissertation, Department of Anthropology, McGill University, Montreal.

Further Reading

Ames, M.M. 2003. How to decorate a house: The renegotiation of cultural representations at the University of British Columbia Museum of Anthropology. In *Museums and source communities*, ed. L. Peers and A.K. Brown, 171–180. New York: Routledge.

Bell, C. 1992. Aboriginal claims to cultural property in Canada: A comparative legal analysis of the repatriation debate. *American Indian Law Review* 17: 457–521.

Budhwa, R. 2005. An alternate model for first nations involvement in resource management archaeology. *Canadian Journal of Archaeology* 29: 20–45.

Burley, D.V. 1994. A never ending story: Historical developments in Canadian archaeology. The quest for federal heritage legislation. *Canadian Journal of Archaeology* 18: 77–98.

Cole, D. 1985. *Captured heritage: The scramble for northwest coast artifacts*. Seattle: University of Washington Press.

De Paoli, M.L. 1999. Beyond tokenism: Aboriginal involvement in archaeological resource management in British Columbia. Unpublished MA dissertation, School of Community and Regional Planning, University of British Columbia.

Ferris, N. 2000. Current issues in the governance of archaeology in Canada. *Canadian Journal of Archaeology* 24: 164–170.

Government of Canada. 2011. *Aboriginal consultation and accommodation: Updated guidelines for federal officials to fulfill the duty to consult*. Ottawa: Minister of the Department of Indian Affairs and Northern Development.

Herle, A. 1994. Museums and first peoples in Canada. *Journal of Museum Ethnography* 6: 39–64.

Klimko, O., and M. Wright. 2000. Old rocks and hard places: Archaeology and land claims/treaty in British Columbia, Canada. In *Native title and the transformation of archaeology in the postcolonial world*, Oceania Monograph, ed. I. Lilley, vol. 50, 88–98. Sydney: University of Sydney Press.

Lee, E. 2002. Archaeology and the public cultural conscience in Canada: The federal story. *Revista de*

Arqueologia Americana (Journal of American Archaeology) 21: 45–51.
McLay, E., K. Bannister, L. Joe, B. Thom, and G. Nicholas. 2008. 'A'lhut ti test Sul'hweenst (Respecting the ancestors): Understanding Hul'qumi'num heritage laws and concerns for the protection of heritage. In *First nations cultural heritage and law*, ed. C. Bell and V. Napoleon, 150–202. Vancouver: UBC Press.
Nicholas, G., and T. Andrews, eds. 1997. *At a crossroads: Archaeology and first peoples in Canada*. Burnaby: Simon Fraser University Archaeology Press.
Nicholson, B., D. Pokotylo, and R. Williamson, ed. 1996. Statement of principles for ethical conduct pertaining to Aboriginal peoples: A report from the Aboriginal Heritage Committee. Canadian Archaeological Association.

Canada: Cultural Heritage Management Education

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State of Knowledge and Current Debates

Introduction: Canada

Canada is the northern nation in North America. People arrived in the territory now called Canada in waves. Archaeological evidence suggests this began perhaps 30,000 years ago with First Nations (Wright 1976). Europeans such as Scandinavians (about 1000 years ago), French, and finally British (from 500 to 100 years ago) colonized the land. Four British colonies joined and Canada became a nation in 1867. The nation has continued to develop to have ten provinces and three territories.

Introduction: Cultural Heritage Management in Canada

The large area and the history of the country fragmented cultural heritage management policy and practice across Canada. Heritage policies changed with the development of the nation. Now, stewardship of and education about Canada's archaeological heritage work to protect heritage and strengthen the diverse cultural identities of Canadians.

Initially, a federal system of government was adopted. This established that the federal government was responsible for cultural heritage on federal lands and on First Nations' lands as per treaties. The federal government was also responsible for the international trade in cultural heritage. Provincial (now 10) and territorial (now 3) governments had jurisdiction over education and culture otherwise.

Under the Canadian government's "National Policy" of economic development and territorial expansion in the late nineteenth century, the recording and display of (then) present and past lifeways of First Nations peoples were undertaken before their assumed assimilation. The National Museum of Canada was founded in 1911 and became the home for this work, undertaken by Canada's first archaeologist Harlan I. Smith and first anthropologists, Edward Sapir and Marius Barbeau (Dyck 1998, 116).

Barbeau's close work with American anthropologist Franz Boas began the influence of American anthropological theory on Canadian cultural heritage management both federally and in the developing provincial museums. Change would begin in the 1960s.

The first Canadian Archaeology department (not as part of Anthropology) was opened at the University of Calgary in 1964. Canada's first Canadian-trained PhD in Archaeology graduated in 1967 (Mackie 1995, 181–182). That year – 1967 – was the centenary of Canada's birth as a nation, and the focus on and funding for Canada's heritage expanded. Since then, numerous programs in Canadian universities and colleges are offered in archaeology and studies related to heritage management (see Tables 1 and 2).

Canadian archaeologists, mostly at the National Museum, organized themselves into the Canadian Archaeological Association (CAA) in 1969 (Simonsen 1996, 1) and began publishing the *Canadian Journal of Archaeology*. The Archaeological Survey of Canada (ASC) was created out of the archaeological staff of the National Museum of Canada to work on federal lands. First Nations did not have input into policies concerning their lands (Arawack 1986). Parks Canada had the mandate for archaeological work

Canada: Cultural Heritage Management Education, Table 1 Canadian universities with archaeology education

Province	University
Alberta	MacEwan University (Dept. of Anthropology, Economics and Political Science) Mount Royal University (Dept. of Sociology and Anthropology) University of Alberta (Dept. of Anthropology, Dept. of History and Classics) University of Calgary (Dept. of Archaeology) University of Lethbridge (Dept. of Geography)
British Columbia	Malaspina University-College (Dept. of Anthropology) Simon Fraser University (Dept. of Archaeology) University of British Columbia (Dept. of Anthropology) University of Northern British Columbia (Dept. of Anthropology) University of Victoria (Dept. of Anthropology)
Manitoba	Brandon University (Dept. of Anthropology) University of Manitoba (Dept. of Anthropology) University of Winnipeg (Dept. of Anthropology)
New Brunswick	Mount Allison University (Anthropology Dept.) University of New Brunswick (Dept. of Anthropology)
Newfoundland and Labrador	Memorial University of Newfoundland (Dept. of Archaeology)
Nova Scotia	Dalhousie University (Dept. of Sociology and Anthropology) St. Francis Xavier University (Dept. of Anthropology) St. Mary's University (Dept. of Anthropology)
Ontario	Brock University (Dept. of Classics) Carleton University (Dept. of Sociology and Anthropology) Lakehead University (Dept. of Anthropology) Laurentian University (Dept. of Anthropology) McMaster University (Dept. of Anthropology) Trent University (Anthropology Dept.) University of Guelph (Dept. of Sociology and Anthropology) University of Toronto (Dept. of Anthropology) University of Waterloo (Dept. of Anthropology) University of Western Ontario/Western University (Dept. of Anthropology) Wilfrid Laurier University (Dept. of Archaeology and Classical Studies) York University (Dept. of Anthropology)
Québec	Concordia University (Dept. of Sociology and Anthropology) L'Université de Montréal (Dépt. d'anthropologie) L'Université de Laval (Dépt. d'histoire) McGill University (Dept. of Anthropology)
Saskatchewan	University of Saskatchewan (Dept. of Archaeology and Anthropology)

at National Historic Sites and National Parks (Burley 1994, 83). There was therefore a de facto split, with the CAA and ASC focused on precontact (i.e., of First Nations with Europeans) and Parks Canada focused primarily on post-contact archaeology.

The federal government decentralized its offices from the capital of Ottawa to create regional centers in 1970. In 1971, funding and policy favored the establishment of museums across Canada, not just in major centers (Dixon et al. 1974, 2). Federal legislation was drafted to deal with international import and export of antiquities (*Import and Export Act* RSC 50.51 1974-75-76 Canada).

Also in this period after 1945, avocational or nonprofessional archaeological groups developed formally across the country (see Table 3). At about the same time, professional, contracted "cultural resource management" archaeology companies were also developing, mostly in urban areas to work with archaeological heritage threatened by building and development. This urban work, or work at historic sites, took place in the public eye, with increasing public interest and involvement.

Theoretically, Canada was pursuing a cultural-historical approach to archaeology with a focus on First Nations' cultures. In this environment, Canadian archaeologists sometimes avoided American

Canada: Cultural Heritage Management Education, Table 2 Canadian museum studies and related courses

Province	Program
Alberta	Athabasca University – Heritage Resources Management The Banff Centre for Management – Leadership development MacEwan University – Arts and Cultural Management University of Alberta – Museum Studies University of Calgary – Museum and Heritage Studies University of Lethbridge – Art History/Museum Studies
British Columbia	Simon Fraser University – Heritage Resource Management University of British Columbia – Museum Studies, Master of Museum Education University of Victoria – Museum Studies, Cultural Heritage
Ontario	Algonquin College of Applied Arts and Technology – Museum Studies Brock University – Cultural Management Georgian College – Museum and Gallery Studies Queen's University – Conservation Sir Sanford Fleming College – Museum Management and Curatorship, Collections Conservation and Management University of Guelph – Museum Studies minor School of Fine Arts University of Toronto – MA Museum Studies, Arts Management (Scarborough), MA Visual Studies Curatorial Studies (Faculty of Architecture, Landscape and Design)
Québec	Collège Montmorency – Museology Techniques Université du Québec à Montréal (UQAM) – Museology, Mediation and Heritage Université du Québec en Outaouais – Certificate in Museology and Heritage, BA Arts and Heritage, MA Museology and Arts Practice Université de Montréal – MA Museum Studies
Provincial Associations	Alberta Museums Association – Basic museum practices certificate Association of Manitoba Museums – Certificate in museum practice Museum Association of Newfoundland and Labrador – Certificate in museum studies Ontario Historical Society – Programmes and courses Community Museums Association of Prince Edward Island – Professional Development Seminar

theory to assert Canadian national identity, and some stated that fieldwork could be the same as theory (Kelley and Williamson 1996, 10).

Key Canadian archaeologists working on post-contact urban sites began to develop public programming to create a sense of stewardship and belonging in order to protect the archaeological heritage. However, they found neither a theoretical base nor professional acceptance for their work in Canada and so sought these outside the country.

For example, Paul Erickson of Nova Scotia, founder of the *Teaching Anthropology Newsletter*, worked through the American Anthropological Association (AAA); Québec archaeologists from Montréal and Québec City made contacts with other urban archaeologists at the Society for Historical Archaeology (SHA); Karolyn Smardz (now Smardz Frost) of Toronto and Heather Devine of Alberta joined the Society for American Archaeology (SAA) Public Education Committee. Smardz also worked closely with Stone and the World Archaeological Congress (see Stone and Mackenzie 1990, 293–307).

These archaeologists became the vanguards in Canada for American and British archaeological theory such as critical theory (see Leone and Potter 2003) or interpretive archaeologies (see Hodder 1991, 2000) and the practice that was becoming known as public archaeology. These pioneers of public archaeology in Canada established influential programs and resources such as Paul Erickson's *Teaching Anthropology Newsletter*, the Reseau Archéo-Québec, and the Pointe-à-Callière Museum. Devine authored teaching resources, and Smardz founded the Archaeological Resource Centre for the Toronto Board of Education and published widely for a broad audience. Pokotylo and Guppy (1999) and Pokotylo (2002) jointly authored and wrote

Canada: Cultural Heritage Management Education, Table 3 Federal, provincial, territorial governments, museums, societies/agencies, and programs for Canadian archaeology CHME

Government (search "archaeology" for relevant departments)	Museum	Society or agency	CHME programs and resources of note for archaeology
Government of Canada https://www.canada.ca	Canadian Museum of History www.historymuseum.ca Virtual Museum of Canada www.virtualmuseum.ca	Parks Canada Agency (Archaeology) www.pc.gc.ca Canadian Conservation Institute http://canada.pch.gc.ca/eng/1454704828075	Canadian Heritage Information Network (CHIN) www.chin.gc.ca Parks Canada – Fortress of Louisbourg www.fortressoflouisbourg.ca/ArchaeologyE/
Alberta https://alberta.ca	Royal Alberta Museum www.royalalbertamuseum.ca	Archaeological Society of Alberta www.arkyalberta.com	Glenbow Museum www.glenbow.org Glenbow Ranch Park Foundation www.grpf.ca Head-Smashed-In Buffalo Jump www.head-smashed-in.com
British Columbia www2.gov.bc.ca	Royal British Columbia Museum www.royalbcmuseum.bc.ca	Archaeology Society of British Columbia www.asbc.ca Underwater Archaeology Society of British Columbia (UASBC) www.uasbc.com	Museum of Anthropology at The University of British Columbia www.moa.ubc.ca Simon Fraser University Museum of Archaeology and Ethnology www.sfu.ca/archaeology/museum/exhibits/virtual-exhibits.html
Manitoba www.gov.mb.ca	The Manitoba Museum www.manitobamuseum.ca	Manitoba Archaeological Society www.manitobaarchaeologicalsociety.ca	Manitoba Heritage Network http://home.cc.umanitoba.ca/~anthrop/manarchnet
New Brunswick www.2.gnb.ca	New Brunswick Museum www.nbm-mnb.ca	New Brunswick Archaeological Society https://www.facebook.com/NBASASNB	Metepenagiag Heritage Park www.metpark.ca
Newfoundland and Labrador https://www.gov.nl.ca	The Rooms www.therooms.ca	Newfoundland and Labrador Archaeological Society https://nlarchsociety.ca	Cupids www.baccalieudigs.ca Ferryland www.heritage.nf.ca/avalon/arch
Northwest Territories www.gov.nt.ca	The Prince of Wales Northern Heritage Centre www.pwnhc.ca		
Nova Scotia https://novascotia.ca	Nova Scotia Museum www.museum.gov.ns.ca	Nova Scotia Archaeology Society www.novascotiaarchaeologysociety.com	Mi'kmawey Debert Cultural Centre www.mikmaweydebert.ca

(continued)

Canada: Cultural Heritage Management Education, Table 3 (continued)

Government (search "archaeology" for relevant departments)	Museum	Society or agency	CHME programs and resources of note for archaeology
Nunavut www.gov.nu.ca	Virtual Museum of Nunavut www.cley/gov.nu.ca/en/museum		Inuit Heritage Trust http://ihti.ca
Ontario https://www.ontario.ca	Royal Ontario Museum www.rom.on.ca	Ontario Archaeological Society www.ontarioarchaeology.on.ca	Museum of Ontario Archaeology www.uwo.ca/museum/ Ontario Heritage Trust www.heritagetrust.on.ca Toronto and Region Conservation Authority Boyd Archaeological Field School www.boydfieldschool.org
Prince Edward Island www.gov.pe.ca	Provincial Museum of PEI and Heritage Foundation www.gov.pe.ca/peimhf		
Québec www.gouv.qc.ca	Musée de la Civilisation www.mcq.org/index_en.html	Association des Archéologues du Québec http://www.archelogie.qc.ca Recherches Amérindiennes au Québec www.recherches-amerindiennes.qc.ca	McCord Museum www.musee-mccord.qc.ca Pointe-à-Callière www.pacmusee.qc.ca Reseau Archéo-Québec www.archeoquebec.com
Saskatchewan www.gov.sk.ca	Royal Saskatchewan Museum www.royalsaskmuseum.ca	Saskatchewan Archaeological Society http://thesas.ca	Wanuskewin Heritage Park www.wanuskewin.com
Yukon www.gov.yk.ca			Dawson City Museum www.dawsonmuseum.ca

studies about Canadian attitudes to archaeology, founded a graduate course in Public Archaeology at the University of British Columbia and, as joint chair of the CAA, worked to establish a statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples (see www.canadianarchaeology.com/caa/about/ethics).

From these efforts, the groundwork was laid that gained acceptance for public archaeology in Canada so that interpretation and education programming about archaeological heritage has become part of cultural management across Canada. Public archaeology programming was mandated at Parks Canada sites, under Parks' Guiding Principles (see Canada 1994) although dramatically affected by budgetary cuts to programs and recentralization of collections from regional centers in 2012. It is found at Canadian museums and as part of provincial policy for licensing and permitting of archaeological research. Some exemplary programs and resources that developed are listed in Table 3.

Definitions

The aspect of Cultural Heritage Management Education known as public archaeology, as practiced in Canada is multifaceted. It grew from the definition coined by McGimsey (1972, 5).

Under the umbrella term of "Archaeology Education," stemming from Smardz and Smith's *Archaeology Education Handbook* (2000), public archaeology is seen to include the following: teaching about archaeology in formal education systems, elementary, secondary, and post-secondary; undertaking archaeology programs in museums, at archaeological and historic sites; publishing and creating media productions for

wide public audiences; and lobbying politically for changes to heritage legislation.

As well, community archaeology programming is undertaken, following the model of an empowered public directing archaeological research (as per Pope and Mills 2004).

The public for public archaeology in Canada is also multifaceted and reflects McManamon's (1991, 121) use of the term "publics" to indicate various stakeholders in archaeological heritage. As an officially multicultural country (as per the Canadian Multiculturalism Act RS 1985 c. 24), Canada is incorporating the multivocal and inclusive approach of public archaeology. This includes the reclamation of identities by colonized peoples (see Cooper and Stoler 1997, 31), the foundation for a sense of belonging for immigrants, and the development of regional economies through sustainable tourism.

Debates and Future Directions

There remain areas to be addressed in Cultural Heritage Management Education (CHME) in Canada. There is the lack of a national forum for Cultural Heritage Management Education. There is no national professional body for CHME work, despite some CAA work. The Canadian Association of Heritage Professionals provides opportunities for professional colleagues to meet and pursue professional development. However, there is no national forum in which to link provincial or territorial and avocational groups, and there is no national heritage legislation. This has led to duplication of programming and services unknown to each other across the country and to uncertainty about federal oversight or protection of archaeological heritage that is not located on federal lands or on First Nations' territories.

With regard to First Nations' cultural heritage management, the Canadian Museums Association (CMA) only began consultation in 1988 with the Assembly of First Nations. Consultation continued at the 1991 Aboriginal Archaeology Symposium at the Canadian Museum of Civilization and at the CMA's Curatorship and Indigenous Perspectives in Postcolonial Societies Conference in 1996. That year also the CAA adopted its Principles for Ethical Conduct Pertaining to Aboriginal Peoples.

By 2006, the CAA hosted meetings on Evolving Discourses in Indigenous Archaeology in Canada and, by 2009, elected a member of a First Nation as CAA president.

The role of First Nations in protecting and interpreting their own archaeological heritage is a developing aspect of CHME. The *Calls to Action* report, released in 2015 by the Truth and Reconciliation Commission in Canada, and the United Nations Declaration on Rights of Indigenous Peoples (2008) increasingly inform legislation, policy, practice, and education regarding archaeology, cultural heritage, and heritage management.

While CHME has become a recognized aspect of archaeological research in Canada, there remain areas of political will and legislated change that are required to include all Canadians fully in the management of their archaeological heritage.

References

Arawack, J. 1986. Inuit perceptions of the past. In *Archaeological 'objectivity' in interpretation*, World Archaeological Congress. Vol. 3. London: Allen & Unwin.

Burley, David V. 1994. A never ending story: Historical developments in Canadian archaeology. The quest for federal heritage legislation. *Canadian Journal of Archaeology* 18: 77–98.

Canada. 1994. *Parks Canada guiding principles and operational policies*. Ottawa: Ministry of Supply and Services.

Cooper, Frederick, and Ann Laura Stoler, eds. 1997. *Tensions of empire: Colonial cultures in a bourgeois world*. Berkeley: University of California Press.

Dixon, Brian, Alice F. Courney, and Robert H. Bailey. 1974. *The museum and the Canadian public*. Toronto: Culturecan Publications.

Dyck, Ian. 1998. Toward a history of archaeology at the National Museum of Canada. In *Bringing back the past*, ed. Pamela Jane Smith and Donald Mitchell, 115–134. Hull: Canadian Museum of Civilization.

Hodder, Ian. 1991. Interpretive archaeology and its role. *American Antiquity* 56 (1): 7–18.

Hodder, Ian, ed. 2000. *Towards reflexive method in archaeology: The example of Çatal Höyük*, Monograph no. 28 McDonald Institute monographs. Cambridge: McDonald Institute for Archaeological Research.

Kelley, Jane H., and Ronald F. Williamson. 1996. The positioning of archaeology within anthropology: A Canadian historical perspective. *American Antiquity* 61 (1): 5–20.

Leone, Mark P., and Parker B. Potter. 2003. *The recovery of meaning*. Clinton Corners: Percheron Press.

Mackie, Quentin. 1995. Prehistory in a multicultural state. In *Theory in archaeology*, ed. Peter J. Ucko, 178–196. London/New York: Routledge.
McGimsey, Charles Robert. 1972. *Public archaeology*. New York: Seminar Press.
McManamon, F.P. 1991. The many publics for archaeology. *American Antiquity* 56 (1): 121–130.
Pokotylo, D. 2002. Public opinion and Canadian archaeological heritage: A national perspective. *Canadian Journal of Archaeology* 26: 88–129.
Pokotylo, D., and N. Guppy. 1999. Public opinion and archaeological heritage: Views from outside the profession. *American Antiquity* 64 (3): 400–416.
Pope, Peter E., and Stephen F. Mills. 2004. *Outport archaeology: Community archaeology in Newfoundland*. www.arts.mun.ca/nahop/OutPortArch.html. Accessed 26 Aug 2011.
Simonsen, Bjorn O. 1996. *The Canadian Archaeological Association and the development of archaeology in Canada*. Available at: http://www.canadianarchaeology.com/history/bjorn.lasso. Accessed 11 Mar 2005.
Smardz, K., and S. Smith. 2000. *The archaeology education handbook*. Walnut Creek: AltaMira Press.
Stone, P.G., and R. Mackenzie. 1990. *The excluded past: Archaeology and education*, One world archaeology series. Vol. 17. London: Routledge.
Truth and Reconciliation Commission of Canada. 2015. *Calls to action*. www.trc.ca/websites/trcinstitution/File/2015/Findings/Calls_to_Action_English2.pdf. Accessed 27 Apr 2016.
United Nations. 2008. *United Nations Declaration on the Rights of Indigenous Peoples*. www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf. Accessed 10 Aug 2017.
Wright, J.V. 1976. *Six chapters of Canada's prehistory*. Ottawa: National Museum of Man.

Canada: World Heritage

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Introduction

The Convention Concerning Protection of the World Cultural and Natural Heritage (the World Heritage Convention) was adopted by UNESCO Member States in 1972 and entered into force on December 17, 1975. The World Heritage Committee and World Heritage Fund became operational in 1976.

There are three official scientific advisory bodies to the UNESCO World Heritage Committee: (1) the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), an intergovernmental organization dedicated to the conservation of cultural heritage; (2) the International Council on Monuments and Sites (ICOMOS), a nongovernmental organization that provides expertise and evaluation of cultural properties nominated for inscription on the World Heritage List; and (3) the International Union for Conservation of Nature (IUCN), an organization comprised of member states and civil society organizations that provide expertise and evaluation of natural properties nominated for inscription on the World Heritage List (Cameron 1990).

Objectives of the World Heritage Convention include "…identification, protection, conservation, presentation and transmission to future generations of cultural and natural heritage of outstanding universal value" (UNESCO 2017a: 10). The core concept of "outstanding universal value" (OUV) is defined as "…cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity" (UNESCO 2017a: 19). The protection of heritage sites of such significance is the responsibility of the international community and by becoming a State Party to the World Heritage Convention, countries are obligated to fulfill this mandate (UNESCO 2017a).

Historical Background

In 1972, Canada sent federal government representatives, from Parks Canada, as delegates to the World Heritage Convention founding meetings in Paris, and on July 23, 1976, Canada became a State Party to the World Heritage Convention (Pinkerton 2010). Parks Canada was designated as the lead agency to implement the Convention in Canada – a role that continues to this day. This responsibility of Parks Canada is a logical extension of its original mandate defined in 1930, when Canada's parliament passed the *National Parks Act* that created Parks Canada to protect and develop areas of

national significance to Canada's natural and cultural heritage (Lothian 1976, 1977, 1979, 1981).

Canada has played a prominent role in the development and implementation of the World Heritage Convention from its origins to the present day. To date, at least three Canadians have served as Chair of the World Heritage Committee. Equally important is Canada's leadership in technical and advisory aspects of the World Heritage Convention for both natural heritage and cultural heritage. For example, Canadians have held prominent roles within ICCROM, ICOMOS, and the IUCN.

Canada's date of adhesion to ICCROM was July 11, 1978, and numerous Canadians and Canadian agencies have provided resources, leadership, and technical expertise to this organization. An example acknowledging the leadership role played by Canadian heritage professionals in ICCROM was UNESCO's nomination in 2011 of Carleton University Professor Herb Stovel for the prestigious ICCROM award. This award recognizes exceptional contributions to the conservation community and is given to individuals who have made significant contributions in the field of conservation, protection, and restoration of cultural heritage.

With respect to cultural heritage, Canadians have held the position of Secretary General and Director for the ICOMOS Secretariat in Paris, including the early years (1979–1983) following the implementation of the World Heritage Convention (see LeBlanc 1984). Other Canadians have served as ICOMOS World Heritage Advisors, chaired expert meetings, and played a crucial role in the development of doctrinal texts such as the Appleton Charter for the Protection and Enhancement of the Built Environment (1983).

With IUCN, Canadians have held several prominent roles (including Director General). In the early years of the World Heritage Convention, Parks Canada's Chief of Planning (Harold Eidsvik) was seconded to IUCN in Switzerland (1977–1980) and elected Chair of what is now the World Commission on National Parks – the unit of IUCN then responsible for the World Heritage Convention. Other Canadians have served as Executive Officer for IUCN's commission on National Parks and Protected Areas and Senior Advisor to IUCN's World Heritage Committee.

At the first meeting of the World Heritage Committee, where the initial sites were inscribed on the World Heritage List (1978), the Canadian government nominated two sites: Nahanni National Park Reserve in the Northwest Territories, based on natural criteria, and L'Anse aux Meadows National Historic Site in Newfoundland, based on cultural criteria. This latter site was actively being investigated at that time and is the earliest known European settlement in the New World, dating to ca. A.D. 1000.

As of June 2018, Canada has 18 World Heritage Sites (10 based on natural criteria, 8 based on cultural criteria) (Table 1). Of the eight cultural sites, six represent post-contact settler history (one French, two English, one Norse, one Acadian, and one Basque); the other two commemorate both pre- and post-contact Indigenous cultures (Haida and Blackfoot). Two of these sites, Waterton-Glacier International Peace Park and Kluane/Wrangell – St. Elias/Glacier Bay/Tatshenshini-Alsek, are examples of international cooperation where existing Canadian and American national parks were jointly proposed to the World Heritage Committee for World Heritage Site status (UNESCO 2016).

Canada's Tentative List was updated in 2017 (Table 2). Of the 14 sites, 2 are based on natural criteria, 7 on cultural criteria, and 5 on both cultural and natural ("mixed") criteria. Of the cultural sites, 11 represent Indigenous cultures.

Key Issues/Current Debates

At the time of writing, one inscribed site and one site on Canada's Tentative List are the subject of ongoing debate. The issues surrounding these two sites are discussed as follows.

Wood Buffalo National Park World Heritage Site

In 2014, the Mikisew Cree First Nation submitted a petition to the UNESCO World Heritage Committee asking for Wood Buffalo National Park World Heritage Site to be added to the List of World Heritage in Danger (Mikisew 2014). The petition cited a number of concerns related to the

Canada: World Heritage, Table 1 Canada's natural and cultural World Heritage Sites

Name	Type	Criteria	Date inscribed	Culture[a]
L'Anse aux Meadows National Historic Site (Newfoundland and Labrador)	Cultural	vi	1978	Norse
Nahanni National Park Reserve (Northwest Territories)	Natural	vii, viii	1978	
Dinosaur Provincial Park (Alberta)	Natural	vii, viii	1979	
Kluane/Wrangell – St. Elias/Glacier Bay/Tatshenshini-Alsek (Yukon and British Columbia)	Natural	vii, viii, ix, x	1979	
Head-Smashed-In Buffalo Jump (Alberta)	Cultural	vi	1981	Indigenous
SGang Gwaay (British Columbia)	Cultural	iii	1981	Indigenous
Wood Buffalo National Park (Alberta and Northwest Territories)	Natural	vii, ix, x	1983	
Canadian Rocky Mountain Parks (Alberta and British Columbia)	Natural	vii, viii	1984	
Historic District of Old Québec (Québec)	Cultural	iv, vi	1985	French
Gros Morne National Park (Newfoundland and Labrador)	Natural	vii, viii	1987	
Old Town Lunenburg (Nova Scotia)	Cultural	iv, v	1995	English
Waterton-Glacier International Peace Park (Alberta)	Natural	vii, ix	1995	
Miguasha National Park (Québec)	Natural	viii	1999	
The Rideau Canal (Ontario)	Cultural	i, iv	2007	English
Joggins Fossil Cliffs (Nova Scotia)	Natural	viii	2008	
Landscape of Grand Pré (Nova Scotia)	Cultural	v, vi	2012	Acadian
Red Bay Basque Whaling Station (Newfoundland and Labrador)	Cultural	iii, iv	2013	Basque
Mistaken Point (Newfoundland and Labrador)	Natural	viii	2016	

[a]Primary cultural/ethnic association

Canada: World Heritage, Table 2 Canada's tentative nomination list (2018) for natural and cultural World Heritage Sites

Name	Type	Criteria	Culture[a]
Áísínai'pi (Writing-on-Stone) (Alberta)	Cultural	i, iii, iv	Indigenous
Anticosti Island (Québec)	Natural	viii	
Gwaii Haanas (British Columbia)	Natural/cultural	iii, v, vi, ix, x	Indigenous
Heart's Content Cable Station Provincial Historic Site (Newfoundland and Labrador)	Cultural	ii, iv	English
Hecate Strait and Queen Charlotte Sound Glass Sponge Reefs (British Columbia)	Natural	viii, ix, x	
Ivvavik/Vuntut/Herschel Island (Qikiqtaruk) (Yukon)	Natural/cultural	iv, v, vii, viii, x	Indigenous
Pimachiowin Aki (Manitoba and Ontario)	Natural/cultural	iii, vi, ix	Indigenous
Qajartalik (Nunavik)	Cultural	iii	Indigenous
Quttinirpaaq (Nunavut)	Natural/cultural	iii, vii, x	Indigenous
Sirmilik National Park and the proposed Tallurutiup Imanga National Marine Conservation Area (Nunavut)	Natural/cultural	v, ix	Indigenous
Stein Valley (British Columbia)	Cultural	iii, vi	Indigenous
Tr'ondëk Klondike (Yukon)	Cultural	iv, vi	Indigenous/ English
Wanuskewin Heritage Park (Saskatchewan)	Cultural	iii	Indigenous
Yukon Ice Patches (Yukon)	Cultural	iii, v	Indigenous

[a]Primary cultural/ethnic association

impact of hydroelectric dams, oil sands development, and climate change that could adversely impact the site's OUV.

In 2015, the World Heritage Committee requested that Canada host a reactive monitoring mission and undertake a strategic environmental assessment (SEA) to assess the potential cumulative impacts of all developments on the site's world heritage values. Subsequently, in the fall of 2016, Parks Canada facilitated a joint World Heritage Centre and IUCN reactive monitoring mission that sought to understand and discuss the impacts of upstream developments on the park's world heritage values. The mission report, including 17 recommendations, was released in March 2017 (UNESCO and IUCN 2017).

For the SEA, Parks Canada retained a consortium of external consultants to undertake the study and set an April 2018 deadline. This assessment sought to examine activities and trends that may have adverse effects on the environmental condition of the World Heritage Site. Specifically, the study focuses on an assessment of the cumulative effects of development on the features and species integral to the park's OUV. The report was released in May 2018 and includes 44 recommendations to restore management objectives that are not being met and to address gaps in information. Data indicate that management objectives for the karst, salt plains, and Great Plains boreal grasslands are being met. With respect to the Peace-Athabasca Delta, changes in the hydrological regime have adversely affected the quantity and quality of habitat for waterfowl. The ability of Indigenous peoples to practice their traditional way of life is being adversely impacted, and desired outcomes for the world heritage values are not being met (IEC 2018).

Consistent with the World Heritage Committee's 2017 decision on the State of Conservation of Wood Buffalo National Park World Heritage Site (UNESCO 2017b), Canada is in the process of preparing an action plan for December 2018 that coordinates with other planning processes and involves affected Indigenous groups and stakeholders. The action plan will be informed by the recommendations of the reactive monitoring mission and by the findings of the SEA.

Pimachiowin Aki

For the site of Pimachiowin Aki, the World Heritage Committee deferred the initial bid in 2013 after two advisory groups said it was unclear what made the area unique and requested more information. Pimachiowin Aki was proposed again in 2016 and once more deferred. In this instance, one of five First Nations communities involved in the project – Pikangikum – pulled out. Pikangikum leaders were upset over the way their treaty rights were described. A third bid has now been submitted to UNESCO and is expected to be considered in the summer of 2018. Without Pikangikum's involvement, the proposed area has been reduced slightly from its original 33,400 km^2 (Lambert 2017).

As for the remainder of the tentative sites, the Canadian government is preparing nomination dossiers, and sites will be brought to the World Heritage Committee in due course. For existing World Heritage Sites in Canada, as in most other countries, funding and land use pressure are current and future issues that need to be addressed. The latter is particularly acute in the Canadian Rocky Mountain Parks World Heritage Site where there is a strong demand for visitor amenities, employee accommodation, and associated infrastructure. Limits on available funding and land use pressure can potentially erode the integrity of the listed sites. This is a common challenge for many World Heritage Sites throughout the world, although Canada's sparse population (37 million, largely concentrated along its southern border with the United States) and sheer size (9,984,670 km^2) exacerbate this problem.

Representativeness of Canada's World Heritage Sites is certainly a challenge for the country. Canada is a massive country with huge natural and cultural diversity. The French–English dichotomy of Canada is well known, but there also is the mosaic of cultures reflected in Canada's other immigrant population and the 633 recognized, distinct Indigenous groups in the country. While this diversity constitutes a great wealth, it also creates an obligation to guard against bias in selection of cultural sites for nomination (e.g., non-Indigenous/Indigenous or French/English) and the need to engage and

collaborate with these and other groups on nominations put forward for consideration (Pinkerton 2010). The province of Prince Edward Island is not represented in Canada's World Heritage Sites (existing or on the Tentative List).

Future Directions

Canada's existing and Tentative List of World Heritage Sites demonstrates there are sites in Canada with OUV warranting commemoration on the world stage. This includes natural and cultural heritage worth recognizing, rather than just emphasizing natural history which is a common Canadian stereotype. As reflected by the Tentative List, natural history, wildlife, and Indigenous and non-Indigenous cultures will be acknowledged. The Tentative List includes mixed nominations (cultural and natural criteria) as well as less common "types" of cultural heritage (e.g., cultural landscape). These are positive signs and reflect a certain maturity in Canada's approach to world heritage (see Pinkerton 2010: 29).

Although Parks Canada does not have an overarching strategic plan for the World Heritage Site nomination process, Canada updates its Tentative List every 10–15 years. There is no attempt to ensure a regional balance or ratio between cultural and natural sites. Day-to-day activities follow established world heritage policy and schedules (e.g., state of conservation reporting, annual committee meetings, clear processes and timelines for submission and review of nominations). In all likelihood, Canada will continue to work through its portfolio of tentative sites with new sites added as considered appropriate and resources allow. For its existing World Heritage Sites, Canada will continue to treat these sites with the respect they deserve and will address management challenges as they emerge to the best of its ability (see Pinkerton 2010: 25). Canadian heritage professionals will undoubtedly continue the legacy of providing expertise and leadership in the arena of world heritage for many years to come, either as private individuals or with organizations such as ICCROM, ICOMOS, and IUCN.

References

Cameron, Christina. 1990. Towards a cultural resource monitoring network. In *ICOMOS: A quarter of a century, achievements and future prospects*, 9th ICOMOS General Assembly and International Symposium. Symposium papers, 527–529. Bern: The Swiss National Committee of ICOMOS.

Independent Environmental Consultants (IEC). 2018. Milestone 3 – final SEA report: Strategic environmental assessment of Wood Buffalo National Park World Heritage Site. Executive summary. https://www.pc.gc.ca/en/pn-np/nt/woodbuffalo/info/SEA_EES/bulletin. Downloaded on June 17, 2018.

Lambert, Steve. 2017. Manitoba, Ontario enter third attempt in bid for UNESCO-recognized forest. The Toronto Star. https://www.thestar.com/business/2017/01/29/manitoba-ontario-enter-third-attempt-in-bid-for-unesco-recognized-forest.html. Downloaded on June 11, 2018.

LeBlanc, François. 1984. An inside view of the convention. In ICOMOS Canada Momentum, Special Issue, 17–32.

Lothian, W.F. 1976. *A history of Canada's national parks*. Vol. 1. Ottawa: Parks Canada.

Lothian, W.F. 1977. *A history of Canada's national parks*. Vol. 2. Ottawa: Parks Canada.

Lothian, W.F. 1979. *A history of Canada's national parks*. Vol. 3. Ottawa: Parks Canada.

Lothian, W.F. 1981. *A history of Canada's national parks*. Vol. 4. Ottawa: Parks Canada.

Mikisew Cree First Nation (Mikisew). 2014. Petition to the World Heritage Committee: Requesting the inclusion of Wood Buffalo National Park on the List of World Heritage in Danger. http://cpawsnab.org/uploads/Mikisew_Petition_respecting_UNESCO_Site_256_-_December_8,_2014.PDF. Downloaded on June 10, 2018.

Pinkerton, John. 2010. Canada and the world heritage convention: Developing relationships between parks Canada and aboriginal bands. In *Finding the Spirit of the place in world heritage sites: Aboriginal approaches in perspective*, ed. Daniel Arsenault, Fergus Maclaren, and James Molnar. Québec: Les Presses de l'Université Laval.

UNESCO. 2016. *World heritage sites: A complete guide to 1,031 UNESCO world heritage sites*. Firefly Books Ltd.

UNESCO. 2017a. *Operational guidelines for the implementation of the world heritage convention. UNESCO Intergovernmental Committee for the Protection of the World Cultural and Natural Heritage*. Paris: World Heritage Centre. https://whc.unesco.org/en/guidelines/. Downloaded on May 17, 2018.

UNESCO. 2017b. World Heritage Committee forty-first session, Krakow, Poland 2–12 July 2017. Item 7B of the Provisional Agenda: State of Conservation of Properties Inscribed on the World Heritage List. https://whc.unesco.org/en/sessions/41com/. Downloaded on June 11, 2018.

UNESCO World Heritage Centre and IUCN (UNESCO and IUCN). 2017. Reactive monitoring mission to Wood Buffalo National Park, Canada (25 September – 4 October 2016). https://whc.unesco.org/en/documents/156893. Downloaded on June 10, 2018.

Canadian Archaeological Association (CAA)

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Basic Information

Anthropologists, such as Franz Boas, once thought that grave robbing was an appropriate research method. While on a collecting expedition near Victoria, British Columbia, he regularly sought out Indian graves and collected any bones and artifacts he found (Cole 1999). Of course he was not alone in that endeavor as people had been looting Indian cemeteries long before Boas visited the northwest coast. During the Gold Rush days, in 1865, the Crown Colony of British Columbia enacted the *Indian GravesOrdinance; An Ordinance to Prevent the Violation of Indian Graves*, which prohibited the taking of property that the Crown claimed as part of the public domain. The penalty for breaking this law was a fine and imprisonment. Given its intent and what it reveals about research methods then in vogue, ethical practices could only evolve and improve.

Over a century later, in 1968, archaeologists reached a milestone when they created the Canadian Archaeological Association (CAA) to be their national voice. Prior to that, they had only organized on the provincial level. Such was its fledgling status that some years would pass before ethics became a subject in their profession's conversation, though the topic did simmer. At a symposium organized by the Royal Society of Canada, in 1976, ostensibly convened to discuss new perspectives in Canadian archaeology, any mention of ethics was notably absent. Only Basil Johnston, an Ojibway who worked as an ethnologist at the Royal Ontario Museum, directly addressed the issue of museums, human remains, and ethical research. He expressed his concern at a time when Native people were reacting to government policy and finding their own voice in the nation's politics (McKay 1976).

Major Impact

Native activists of the 1970s and 1980s advanced the cause more forcefully until their efforts began to elicit a dialogue with the archaeological community. They protested that the treatment of human remains inflicted harm on Aboriginal people by putting their ancestors on display as if they were mere specimens. They argued that their heritage should not be routinely exhumed with methods that represented an arrogant display of power. Moreover, judgments from the Supreme Court after 1982, when Aboriginal rights were included in the modern constitution, generally made Canadians aware that these rights had to be accommodated. Thus, by the beginning of the 1990s, the trajectories of archaeological research and Aboriginal rights discourse were finally intersecting. Changes in public policy began to affect matters within the profession too, though the dialogue showed more influence from legal precedents and public laws than ethical considerations. Negotiated settlements for comprehensive land claims in northern Canada shed more certainty on the rights of Aboriginal people to control their own heritage. Once passed through the parliament, they became legal documents with the full weight of federal law and subsequent agreements, all containing similar articles clarifying that process. Coeval with these developments, the Social Sciences and Humanities Research Council announced that it would put more emphasis on ethical research and would consider only research proposals that had passed ethical review.

Against this backdrop, the CAA acknowledged that it could no longer avoid issuing a statement to direct its members when communicating with Aboriginal peoples. In 1992, with a

grant from the federal government's Department of Communication, the CAA began a consultative effort to define guidelines for its membership. The executive created an ad hoc committee called the Aboriginal Heritage Committee, which had members from all regions of the country and Aboriginal communities. Its terms of reference were to organize regional meetings and to solicit input from as many stakeholders as possible. To this end, the members sought the advice of varied individuals and groups on the issues to be included in a draft statement that would be brought to the general membership. After 2 years, the draft, Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples, was completed and articulated 12 core principles organized around four themes. CAA members debated the draft statement at their annual meeting in 1994 and voted by a substantial margin to accept it. The full text was published in the Canadian Journal of Archaeology in 1997 (CAA 1997; see also Rosenswig 1997 and Wylie 1997).

The Canadian Archaeological Association's *Principles of Ethical Conduct* and the *Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples* can be consulted at the following stable hyperlinks:

- http://canadianarchaeology.com/caa/about/ethics/principles-ethical-conduct
- http://canadianarchaeology.com/caa/statement-principles-ethical-conduct-pertaining-aboriginal-peoples

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Ethics in Archaeology
- ▶ Yellowhorn, Eldon

References

Canadian Archaeological Association (CAA). 1997. Statement of principles for ethical conduct pertaining to Aboriginal peoples. *Canadian Journal of Archaeology* 21 (1): 5–8.

Cole, D. 1999. *Franz Boas: The early years, 1858–1906*. Vancouver: Douglas & McIntyre.

Rosenswig, R.M. 1997. Ethics in Canadian archaeology: An international comparative analysis. *Canadian Journal of Archaeology* 21 (2): 99–114.

Wylie, A. 1997. Contextualizing ethics: Comments on ethics in Canadian archaeology by Robert Rosenswig. *Canadian Journal of Archaeology* 21 (2): 115–120.

Further Reading

McKay, A.G., ed. 1976. *Symposium on new perspectives in Canadian archaeology*. Toronto: Royal Society of Canada.

McMillan, A.D., and E.C. Yellowhorn. 2004. *First peoples in Canada*. Vancouver: Douglas & McIntyre.

Canarian Indigenous People

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State of Knowledge and Current Debates

The Canarian Indigenous people is the name given to the early inhabitants of the Canary Islands, an archipelago located on the Atlantic ocean, just 100 km (62 miles) off the southern coast of Morocco, and integrated by eight islands (from West to East: El Hierro, La Palma, La Gomera, Tenerife, Gran Canaria, Fuerteventura, Lanzarote, and La Graciosa).

Regarding the origins of this population, and according to archaeological research, the Imazighen (Berbers) from North Africa settled in the Canarian Archipelago at the beginning of the 1st millennium BC (Atoche Peña 2011) and developed a culture on the islands that can be linked to native North African societies and magical-religious practices associated with the religions of the ancient Amazigh (singular word for Imazighen) (Hachid 2000).

The Canarian Indigenous people lived mainly in natural caves (and to a lesser extent in man-made caves cut into rocks), usually near the coast, 300–500 m above sea level. These caves were

sometimes isolated but more commonly formed settlements, with burial caves nearby. Gran Canaria is the only island where settlements with stone houses forming important urban concentrations can be found, although isolated houses have also been documented. In terms of subsistence, animal husbandry was the main means of support for Indigenous societies in the different islands, with the exception of Gran Canaria, where agriculture was more developed, including both dry and irrigated farming. The herds basically consisted of goats and sheep and, to a lesser extent, pigs. Gathering plants and fishing also provided significant food resources.

Ceramics are the utensils most commonly found in archaeological excavations, and also the most widely studied, due to the possibilities they offer, on the basis of a cultural-historical approach (which still prevails among Canarian archaeologists), for establishing timelines, food consumption patterns, stylistic trends, etc. In the Canary Islands, they are typically varied, with each island presenting both formal and decorative differences. The only common feature is that they were made without the use of a wheel, since Indigenous ceramics were handmade, by forming the base first and then gradually shaping the sides of the container using small cylinders of clay. Ceramic items were often decorated with indentations or incisions or polished, in particular in Gran Canaria, where painted decorations in shades of red, black, and white were also common. The La Palma ceramics are characterized by its rich relief (incised-impressed) decoration, very different to the ceramics from the other islands, and they provide the best stratigraphic sequence, which has four phases, although the Gran Canaria ceramics are undoubtedly the most complex, due to the variety of shapes, handles, and decorative features. They also reveal the clearest affinities with North African Amazigh ceramics. The shape of the Tenerife ceramics enables parallels to be drawn with those documented in Mauritania and in the central and southern Sahara regions.

The raw materials used in the lithic industry were obsidian and basalt, and the most common tools were burins, borers, and scrapers. The most typical polished stone items were millstones, used to grind cereals. In terms of the bone industry, which was based mainly on ovicaprine bones, grainers and awls for use in leatherwork were common, as well as fishhooks. Antlers were also used to make tools for plowing or were set in wood to be used as projectiles (spears). There was also an important wood industry, essentially represented by shepherd's crooks, combs, shields, containers, and doors for man-made caves and houses.

The majority of the plant fibers used by the Canarian Indigenous people for clothing and basketmaking came from rushes (*Holoschoenus vulgaris*), which were used to make mats, baskets, bags, and shrouds, as well as garments, which were also manufactured from goatskin.

In terms of social and political organization, there was a system of matrilineal descent in most of the islands, in which inheritance was passed on via the female line. Social status and wealth were hereditary and determined the individual's position in the social pyramid, which consisted of the king (known as the *Guanarteme* in Gran Canaria and *Mencey* in Tenerife), the relatives of the king, the lower "nobility," villeins, plebeians, and, finally, executioners, butchers, embalmers, and prisoners (Farrujia 2014).

With regard to faith, the Canarian Indigenous people, like the North African Imazighen groups, worshipped two celestial divinities, the sun and the moon, and sacred natural places such as particular mountains, rocks, and caves. Their religion revolved around the need for rainwater, on which the pasture land and crops, and therefore the food for Indigenous people and their livestock, depended. Religious offices were usually carried out by men, although in Gran Canaria and Fuerteventura, these duties were performed by women. Some Indigenous sites have been associated with this cult, such as the cave paintings in Gran Canaria whose interiors display painted geometric motifs, as it is the case of the Cave of Galdar (Tejera Gaspar et al. 2011); the cup and groove sites, consisting of small spherical depressions carved into the rock and linked by man-made channels which are related to the spilling of

liquids (libations); and the sacrificial altars, built in stone and varying in shape although mainly circular, used to burn animals sacrificed as offerings to the gods (Mederos Martín and Escribano Cobo 2002).

The world of death was also related to cultural practices. In the Canary Islands, burial sites are one of the most common finds, although they have been plundered continuously since the eighteenth century. The Indigenous Canarians believed that life continued in another form after death and therefore supplied the corpse with provisions (ceramics, food, awls, beads, rush bags, etc.). They laid the bodies to rest by placing them on beds of stone, vegetation, animal skins, etc. to avoid physical contact with the earth. The most common method of laying out corpses was to place them supine inside natural caves or shelters. In Gran Canaria, they were also placed in tombs (tumuli) or in excavated caves (Arco Aguilar 1992–1993).

Indigenous funeral rituals also included mummification, which was reserved for members of the "nobility" (as a prestige practice) and has been documented primarily in Tenerife and Gran Canaria. In this sense, and according to Abreu Galindo (1602), in the isle of Gran Canaria, nobles and gentry were mummified and then deposited in burial caves. Also, as Arco Aguilar (1992–1993) has argued, the mummified remains studied in the Canary Islands present a size above average and an important level of leptosomia, and they lived longer. These, in fact, are the main biological characteristics of the upper social strata. It is also relevant in the following aspect: mummification is represented by a small percentage compared to non-mummification, and this is indicative of the existence of social differences expressed at the time of burial.

Further evidence of the North African origins of the Indigenous Canary Island populations can be seen in the rock engravings, featuring a script classified as Libyco-Berber which shows clear affinities with scripts recorded in Libya and Algeria (Tejera Gaspar et al. 2011). Moreover, from a genetic point of view, the closest counterparts to 55% of the descendants of the Indigenous populations are found in the Maghreb (Fregel et al. 2009).

Regarding the early colonization of the islands, we are still far from being able to form a final opinion on the situation regarding the Archipelago as a whole, since the extent of the research differs widely from island to island. The present-day situation is unpromising since, although research in recent decades has consolidated the Canarian-African relationship, it is clear that there is still no consensus in terms of origins (How did the islands become populated and colonized? How did the first settlers arrive?). Nevertheless, an examination of the Libyco-Berber inscriptions and radiocarbon dates available from some sites on the islands indicate that the Canary Islands were divided into two geographically overlapping areas of Amazigh influence in different times:

(a) An archaic Amazigh culture in the sixth century BC, including El Hierro, Tenerife, Gran Canaria, La Palma, and La Gomera
(b) A Romanized Amazigh culture dating from the time of Augustus and Juba II, including Lanzarote, Fuerteventura, Gran Canaria, El Hierro, and Tenerife (Farrujia et al. 2010).

On the basis of current research, it is possible to refer to the existence of relations between some islands during the Indigenous period (Tenerife-La Gomera or Lanzarote-Fuerteventura-Gran Canaria), since certain aspects of the material culture would appear to indicate this. However, some cultural features in certain islands are not found in others since, despite the fact that they share the same base, the Indigenous island cultures developed in isolation, with very little contact with the exterior. Given this, the poor quality of the ceramics, except in the case of Gran Canaria, leads to the conclusion that later contributions were rare, indicating cultural isolation until the time when the islands were rediscovered and conquered by the Europeans in the fourteenth century (Tejera Gaspar 2006).

The entire Indigenous culture, which had existed in the Canary Islands since the beginning of the first millennium BC, began to disappear irreversibly following the conquest and colonization of the Archipelago which began in the Late Middle Ages. It should be noted that the Indigenous Canarian culture can only be explained by a continental-African ethnogenesis which is inseparable from the culture of certain ethnic Amazigh groups that lived approximately 2000 years ago. The culture developed in the Canarian Archipelago by Imazighen societies was clearly influenced by insular isolation and adaptation to the island environment under conditions which meant that they were virtually cut off from contact with the African continent and other ethnic Amazigh groups. This has made the Indigenous archaeology of the Canary Islands an extraordinary, marginal, and almost unclassifiable historical example of Amazigh or (North) African culture. In other words, the Indigenous Canarian universe was unarguably Amazigh, although from the point of view of "positive culture," it is a unique case and an extraordinary product of involution (due to isolation) and adaptation to an island environment. The archaeological evidence and findings (ceramics, rock inscriptions, etc.) and anthropological/genetical type (DNA) are indisputable. However, there are many gaps in our understanding of the circumstances in which the first settlers arrived in the Canary Islands. We still do not know how or why the North African Amazigh landed in the Canary Islands in the first millennium BC, although the early colonization of the islands has recently been related to Phoenician-Punic influence in the Atlantic (Farrujia 2014; Arco et al. 2017).

As a result of the rediscovery, conquest, and colonization of the Canary Islands, the legacy of the individual communities that inhabited the different islands in the Archipelago up to the time of the European colonization began to disappear irreversibly as a direct result of the gradual disappearance of the Indigenous Canarian societies. The main factors which explain this ethnocide are capture and sale of Canarian Indigenous peoples as slaves, in the Mediterranean markets; their massacre in the battles, during the conquest; and the "new" diseases introduced by the conquerors, such as the so-called modorra (drowsiness).

In the case of the Canary Islands, unlike the situation in the American continent or in Australia, there is no historical continuity between the Indigenous, pre-colonial, and postcolonial societies, since the conquest and subsequent colonization of the Canary Islands by the Crown of Castile led to the gradual physical destruction of almost the entire Indigenous society. In fact, the Canarian economy became characterized essentially by a model based on agricultural development, which, in turn, formed part of the Atlantic and international economy. This led to the development of a dependent and peripheral economy from the beginning of the sixteenth century and a colonial society composed of a ruling group (the aristocracy, clergy, and merchants, i.e., those who held political positions and controlled the economy) and the majority whom they ruled (laborers, those marginalized for religious reasons, and slaves, including the Canarian Indigenous people) (Macías Hernández 2010).

In the case of the Canary Islands therefore, the concept of "Indigenous" implies clear temporal connotations: it refers to the populations present on the islands since the time of the first settlements in the Archipelago (first millennium BC) until its rediscovery in the fourteenth century by Europeans. In fact, at the end of the seventeenth century, as a consequence of the gradual disappearance of the Indigenous Canarian people and their culture, their legacy began to be viewed from a more archaeological than ethnohistorical perspective. Earlier, in the fifteenth century, Indigenous Canarian populations were still thriving and, since they were not fossils, were not considered from a prescientific "archaeological" perspective (Farrujia 2014).

The rediscovery of the Canary Islands by the Europeans therefore led to the gradual disappearance of the Indigenous settlements; the elimination of material items from the Indigenous culture;

the appropriation of Indigenous areas, which were occupied by the new settlers and by the emerging colonial society; and the imposition of ways of life and systems of social organization and production governed by a western-style world view, values, and regulatory mechanisms that were alien to the Indigenous Canarian world. Over time, the arrival in the Archipelago of an imperialist archaeology, developed during the nineteenth century and a good part of the twentieth century, would help perpetuate the western European interpretation of the Indigenous Canarian past (Farrujia 2005). This scenario clearly contrasts with the North African context, in which the Imazighen, the Indigenous populations of the area, have maintained a constant presence since ancient times (Tilmatine 2008).

The imperialist archaeology in the Canary Islands involved the creation of specific versions of the past history of the Archipelago, all of which are completely different from each other and sometimes totally contradictory, while all tending to justify the social order established in the particular period in which they are produced. After the origins of archaeology in the Canary Islands (1868), and the development of the evolutionist theories, the Indigenous Canarian population was linked to European, specifically French, prehistory. According to Canarian researchers, who studied in France, the Canarian Indigenous people were the descendants of the Celts. From the racial point of view, the Indigenous skulls documented in the Canary Islands were related with the Cro-Magnon race (Farrujia 2014). Cro-Magnon race contributed toward defending French imperialist interests in Africa and the Canary Islands. Reflecting the ethnocentric world view of the time, the expansion of the Cro-Magnon race beyond French territory implied that all the areas occupied by the said Quaternary race would have been populated in ancient times by the ancestors of the Gallic nation. Also, in applying external criteria to the Canary Islands, Indigenous Canarian cultures were treated as if they shared the same evolutionary development as other parts of Europe. In this sense, the cultural evolutionist models simplified Indigenous Canarian societies, as they did to other past societies (Johnson 2010).

Later on, during Franco's dictatorship, the "Indigenous Canarian of European origins" from the end of the nineteenth century became the "Indigenous Canarian of Hispanic origins" with Ibero-Saharan and Ibero-Mauritanian roots during the Franco period. The relationship established between these substratums and the Spanish Sahara enabled to endorse the nationalist politics of the Franco regime since the first settlers in the Iberian Peninsula, the Canary Islands, and the Spanish colony in Africa would have shared the

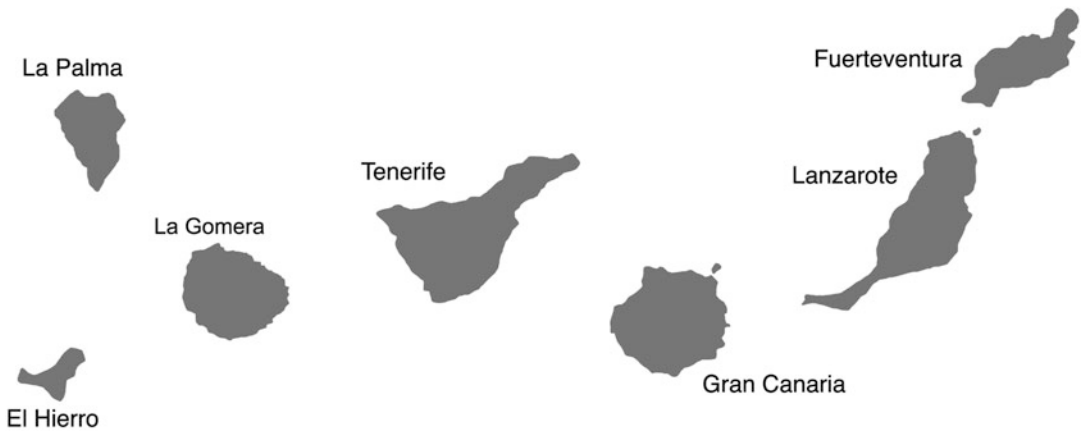

Canarian Indigenous People, Fig. 1 The Canary Islands

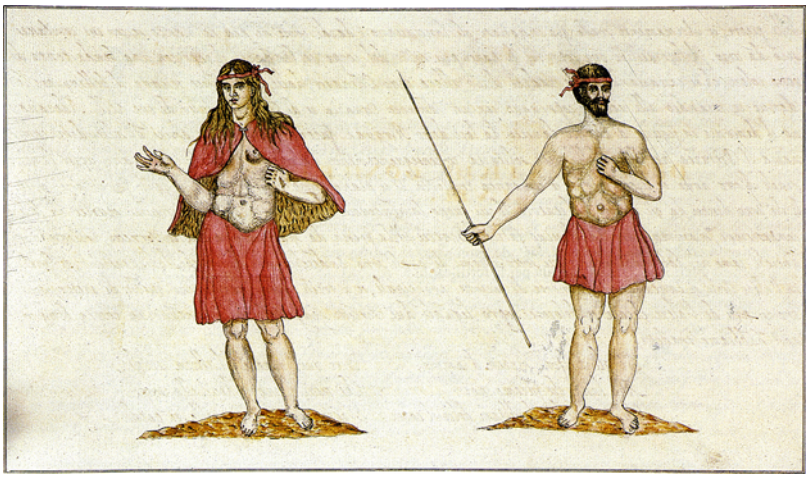

Canarian Indigenous People, Fig. 2 Canarian Indigenous people of La Gomera, according to the illustration of Leonardo Torriani (1592)

Canarian Indigenous People, Fig. 3 Cave of Belmaco (Mazo, La Palma)

same racial and cultural roots in ancient times (Farrujia 2014).

Parallel to this, archaeological heritage management underwent certain changes that nevertheless failed to improve the organization, understanding, protection, and dissemination of Indigenous heritage. The nineteenth-century private initiatives, represented by museums and offices run by bourgeois Canarian intellectuals, were replaced in the twentieth century by the intervention of the Franco government, involving a centralized management, the development of fieldwork, a greater number of

Canarian Indigenous People, Fig. 4 Painted pottery from Gran Canaria (El Museo Canario)

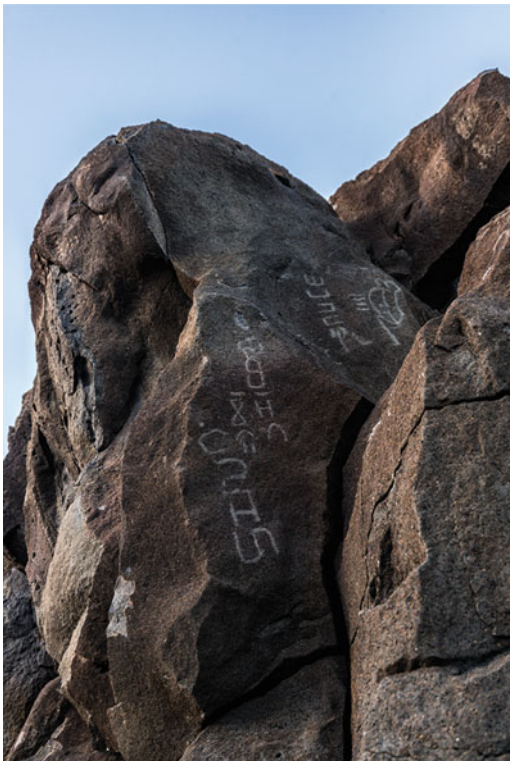

Canarian Indigenous People, Fig. 5 Libyco-Berber inscription from La Caleta (Valverde, El Hierro) (Photo by Tarek Ode)

excavations, and the reinforcement of a colonial discourse. Canarian archaeological evidence was analyzed on the basis of this colonialist discourse, and this knowledge was essentially disseminated via the museums. The mummies and Indigenous artifacts (basically ceramics and lithic and bone tools) displayed in glass cases and interpreted from this point of view helped reinforce a simplistic, "prehistoric" reading of Indigenous Canarian societies among the general public. In other words, the Spanish government imposed its particular vision of heritage, set up an institutional framework, and organized conservation practices in the Canary Islands. An unequal power relationship was therefore the starting point for any consideration of the Canarian heritage on the part of the Franco regime. The archaeology of the Canary Islands was perceived through the "filter" of the knowledge produced by the "new colonizers" (Farrujia 2014).

Nowadays, the archaeology of the Canary Islands shares three of the most common characteristics of social histories of archaeology worldwide, as defined by authors such as Hodder (2001), Trigger (2006), and Lozny (2011): (a) a culture-history approach as the key methodology and basis for locally generated theories (with a

Canarian Indigenous People, Fig. 6 Stone houses at Lomo de Los Gatos archaeological site (Mogán, Gran Canaria) (Photo by Tarek Ode)

Canarian Indigenous People, Fig. 7 Cultural site of Roque de la Abejera (Buzanada, Tenerife) (Photo by Tarek Ode)

Canarian Indigenous People, Fig. 8 Painted cave of Galdar (Gran Canaria) (Photo by Tarek Ode)

strong nationalistic flavor), (b) the use of archaeology for political (nationalistic) goals, and (c) a tendency to relate archaeological research topics to existing political conditions and demands. In this sense, the European colonial discourse that influenced archaeology in other Indigenous contexts (Australia, Canada, Africa, etc.) is also evident in the Canary Islands. As Ireland (2010) has pointed out, Indigenous and non-Indigenous communities are all engaged in the active "use" of the colonial archaeological heritage as much as any other forms of tangible or intangible heritage.

The social actors involved in Canarian archaeology are Spanish. It may be said that we now have new, postmodern empires without colonies, endowed with their own knowledge-power strategies. In this sense, according to Ireland (2010), the role of heritage has been closely linked to the construction and reinforcement of national and ethnic identities and, in the postcolonial world, to projects which still legitimize colonial occupation. The Canary Islands is not a Spanish colony but one of the autonomous communities that make up the country. At the same time, however,

Canarian Indigenous People, Fig. 9 Canarian Indigenous mummy from Tenerife (Archaeological Museum of Tenerife)

it is a geographical area politically controlled by a distant country, a vestige of a past empire, a national territory next to the African continent. In other words, they are an overseas territory like the French DOM (Guadeloupe, Guyana, Martinique, and Reunion) and are considered an outermost region (OMR) by the European Union. The actual geostrategic location of the Canarian Archipelago in the Atlantic has helped to historically reinforce the concept of the islands as a Spanish overseas possession and a strategic enclave in relation to the neighboring continent of Africa. These factors and the almost total lack of renewal of theory within Canarian archaeology help to explain, to a great extent, why the colonial discourse still lives on archaeology in the Canary Islands (Figs. 1, 2, 3, 4, 5, 6, 7, 8, and 9).

Cross-References

- ▶ Archaeology and Colonialism
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ North Africa: Historical Archaeology
- ▶ North American Rock Art
- ▶ North and Saharan Africa: Geography and Culture During the Lower Stone Age
- ▶ Tadrart Acacus Rock Art Sites

References

Abreu Galindo J. (1977 [1602]). *Historia de la conquista de las siete islas de Canaria*. Introducción y notas a cargo de Alejandro Cioranescu. Santa Cruz de Tenerife: Goya Ediciones.

Arco Aguilar, M. C. (1992–1993). De nuevo, el enterramiento canario prehispánico. *Tabona* VIII-I: 59–75.

Arco Aguilar, M.C., M. Arco Aguilar, C. Benito Mateo, and R. Rosario Adrián. 2017. *Un taller romano de púrpura en los límites de la Ecúmene*. Santa Cruz de Tenerife: Cabildo Insular de Tenerife.

Atoche Peña, P. 2011. Excavaciones arqueológicas en el sitio de Buenavista (Lanzarote): nuevos datos para el estudio de la colonización protohistórica del archipiélago canario. *Gerión* 29 (1): 59–82.

Farrujia de la Rosa, A.J. 2005. *Imperialist archaeology in the Canary Islands. French and German studies on prehistoric colonization at the end of the 19th century*, British Archaeological Reports. International Series, 1333. Oxford: Archaeopress.

Farrujia de la Rosa, A.J. 2014. *An archaeology of the margins. Colonialism, amazighity and heritage management in the Canary Islands*, Springer Briefs in Archaeology. New York: Springer.

Farrujia de la Rosa, A.J., W. Pichler, A. Rodrigue, and S. García Marín. 2010. The Libyco-Berber and Latino-Canarian scripts and the colonization of the Canary Islands. *African Archaeological Review* 27 (1): 13–41.

Fregel, R.; V. Gomes, L. Gusmão, A. M. González, V. M. Cabrera, A. Amorim, and J. M. Larruga (2009). Demographic history of Canary Islands male gene-pool: replacement of native lineages by European. *BMC Evolutionary Biology*. Retrieved February, 2, 2017 from www.biomedcentral.com/content/pdf/1471-2148-9-181.pdf

Hachid, M. 2000. *Les premiers berberes: entre Mediterranee, Tassili et Nil*. Aix-en-Provence: Edisud.

Hodder, I., ed. 2001. *Archaeological theory today*. Cambridge: Polity Press.
Ireland, T. (2010). Excavating globalization from the ruins of colonialism: Archaeological heritage management responses to cultural change. ICOMOS Scientific Symposium Changing World, Changing Views of Heritage: The Impact of Global Change on Cultural Heritage. Retrieved January, 15, 2017 from http://www.international.icomos.org/adcom/dublin2010/Paper_2.pdf
Johnson, M. 2010. *Archaeological theory. An introduction*. 2nd ed. London: Wiley-Blackwell.
Lozny, L.R., ed. 2011. *Comparative archaeologies: A sociological view of the science of the past*. Berlin: Springer.
Macías Hernández, A. 2010. Canarias, 800–2000. La singularidad de la historia económica isleña. *Historia Contemporánea* 42: 225–259.
Mederos Martín, A., and G. Escribano Cobo. 2002. *Los aborígenes y la prehistoria de Canarias*. Santa Cruz de Tenerife: Centro de la Cultura Popular Canaria.
Tejera Gaspar, A. 2006. Los libio-bereberes que poblaron las Islas Canarias en la Antigüedad. In *Canarias y el África Antigua*, ed. A. Tejera Gaspar, 81–105. Santa Cruz de Tenerife: Centro de la Cultura Popular Canaria.
Tejera Gaspar, A., J. Jiménez González, and J. Allen. 2011. *Las manifestaciones artísticas prehispánicas y su huella*, Historia Cultural del Arte en Canarias. Vol. I. Santa Cruz de Tenerife: Gobierno de Canarias.
Tilmatine, M. 2008. *Los estudios amaziges. Bibliografía temática*. Barcelona: Ediciones Bellaterra. UNED-Melilla.
Trigger, B. 2006. *A history of archaeological thought*. 2nd ed. Cambridge: Cambridge University Press.

Capdeville, Augusto

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Basic Biographical Information

Augusto Capdeville (1864–1932) was a Chilean archaeologist who discovered the archaeological sites of Taltal, in the north of Chile. This launched prehistorians' interest on this zone and contributed to national and international debates on the origins of the American Man.

Augusto Henri Capdeville Rojas was born in Santiago, on August 20, 1864. His father arrived from Avignon to Valparaiso in 1860, where he met Rafaela Rojas, with whom he had two children, Augusto and Ramón, and a very short marriage. At the age of 3, Augusto loses his mother as a result of tuberculosis, so they move to Talca, in the central Southern part of the country, where they form an extended family of ten brothers and sisters with their father's new wife, Clodomira Miranda. By then, his father had become a prominent business man in the tailoring and hat industry, so the family enjoyed a considerably comfortable life (Looser 1932; Mostny 1964; Núñez 2008).

He completed his studies in Humanities in the Lyceum of Talca and later in the National Institute of Santiago, where he graduated in 1883. Between 1884 and 1885, he studied Law and Medicine at the same time, a project he had to abandon after his father's death and lack of economic support. That is why he had to work as Chief of the Bulletin and then Archivist in the Ministry of Industries and Public Works of Chile; there he meets the President of the country, José Manuel Balmaceda. In 1895, he was transferred to Constitución seaport with the position of Warehouse Guard of the same ministry, where he wrote his first publication (Capdeville 1893).

In 1897, he is transferred to the saltpeter port of Taltal, even though he had asked to be sent to Chañaral, the nearest town to the South. There, he will stay for more than 27 years, together with his wife, Matilde Celis, with whom he has a big family. In Taltal, he starts working as a saltpeter weigher, then Customs Mayor, and finally becomes Chief of Security, a post he keeps till the rest of his stay at the port.

Even with the limited salary of a civil servant and being in charge of seven children, Capdeville devoted a large part of his income to the purchase of books and scientific journals, eventually setting up a huge library specialized in American archaeology and ethnology. Later he concentrates on his own studies and explorations: the first of his archaeological discoveries in Taltal is carried out in September 18, 1914; those go on ceaselessly for almost 10 years (Latcham 1939).

Capdeville collected surface material and excavated about 60 archaeological sites in Taltal, between Caleta Agua Dulce in the North and Caleta Esmeralda in the South, an extension of more than 190 km of coastline along the Atacama Desert coast. His works, with highly detailed field records and highly detailed and subtle drawings, showed the pre-Hispanic occupational intensity of this area and the craftsmanship, social, and cultural virtues of its fishermen. He shared his findings through letters with some of the most prestigious archaeologists, anthropologists, and historians of the beginning of the century, such as Max Uhle, who considered himself as his disciple, Aureliano Oyarzún, Carlos Porter, Jose Toribio Medina, Jacinto Jijón and Caamaño, Walter Looser, Ricardo Latcham, Eric Boman, Carlos Ameghino, Salvador Debenedetti, and Ramón Laval (Oyarzún 1916; Uhle 1916; Mostny 1964).

Capdeville, Augusto, Fig. 1 Augusto Capdeville Rojas

In 1916, Capdeville enters the Chilean Society of History and Geography as a member, and in 1920 he became a Corresponding Member of the Ecuadorian Society of Historical Studies. This membership was achieved thanks to Max Uhle, with whom, during these years, he kept a close communication. In addition, it is the same German scholar who encouraged him to publish his first archaeological works in Ecuador's Bulletin of the National Academy of History between 1921 and 1923. In 1924, he leaves Taltal for health problems to settle in San Antonio, a seaport he

Capdeville, Augusto, Fig. 2 Archaeological work in Morro Colorado Site, Taltal

would leave 2 years later after his retirement in Quillota City. He passes away in Viña del Mar, on September 21, 1932.

Augusto Capdeville's works placed the unknown town of Taltal in the map of the world archaeology, as well as the old inhabitants of the Atacama Desert littoral in the history of the South American inhabitants. All this took place, years ahead archaeology was consolidated in scientific societies and universities, during a phase of the founding of Americanist studies and pre-Columbian past concerns. This is the time when a passionate customs officer became a referent among some of the most prestigious scientists, naturalists, and historians devoted to the South Pacific.

Taltal attracted some prominent researchers; they wanted to personally visit these magnificent sites and make their own excavations, such as Max Uhle in 1916, Ricardo Latcham in 1924, or Junius Bird in 1941–1942. Today, almost a century after his explorations and discoveries, he is still the most important and remembered Taltal archaeology scholar, the foundation of later investigations, and the one who has probably best described the past life of the area's inhabitants. These days, the Taltal Museum bears his name and holds part of his archaeological collections and field notebooks, guarding his archive as a legacy (Figs. 1, and 2).

References

Capdeville, A. 1893. El Puerto de Constitución: ventajas que se obtendrán con su mejora (Estudio Estadístico). *Boletín de la Sociedad de Fomento Fabril*: 467–482.

Latcham, R. 1939. La edad de piedra en Taltal. *Boletín del Museo Nacional de Historia Natural* 17: 3–32.

Looser, G. 1932. El arqueólogo Don Augusto Capdeville. *Boletín de la Biblioteca Nacional* 3 (18): 244–246.

Mostny, G. 1964. *Arqueología de Taltal: epistolario de Augusto Capdeville con Max Uhle y otros*. Santiago: Fondo Histórico y Bibliográfico José Toribio Medina.

Núñez, P. 2008. Augusto Henri Capdeville Rojas. Tópicos de Chile y su época. *Taltalia* 1: 11–20.

Oyarzún, A. 1916. La estación paleolítica de Taltal. *Revista Chilena de Historia y Geografía* 19 (23): 48–59.

Uhle, M. 1916. Sobre la Estación Paleolítica de Taltal. *Revista Chilena de Historia y Geografía* 20 (24): 47–66.

Cape Gelidonya Shipwreck Excavation

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C

Introduction

Sometime in the late thirteenth or early twelfth century BC, a ship carrying a tinker's materials and tools of trade foundered in the straits off Cape Gelidonya (southwestern Turkey). The wreck, discovered by sponge-diver Kemal Aras in 1954, was excavated by George Bass in 1960. This excavation marked a major milestone in the history of the discipline of underwater archaeology, for Bass, an experienced terrestrial archaeologist before he learned to dive, demonstrated that it was possible to excavate and document as carefully and accurately on the seabed as on land. Additionally, Bass' analysis of the artifacts recovered from the seabed challenged scholars of "Mycenaean" trade to widen their frame of reference beyond an Aegean-centric focus to the larger context of the eastern Mediterranean.

Short visits to the site by a survey team in the 1980s and 1990s indicated that there was more to find at the site and provided a clearer picture of the ancient ship's points of impact and final crash. A second season of excavation in 2010 defined the larger area of wreckage and resulted in the recovery of many more items.

The recent discoveries on the seabed and results of increasingly sophisticated scientific analyses (Bass 2013) have and will continue to add nuance and detail to our understanding of the ship, its cargo, its purpose, and its crew. But Bass' original interpretation remains essentially intact: the ship that sank at Cape Gelidonya sometime in the late thirteenth/early twelfth century BC and its crew originated and sailed within the Canaanite/Syrian/Cypriot/southern Anatolian orbit, for the purpose of dealing in copper and tin and recycled bronze.

Definition

The ship carried mostly the ingredients for making new bronze and broken bronze implements intended for recycling. These included approximately 1 ton of copper in the form of 34 flat four-handled "oxhide" (a misnomer) ingots and about 20 smaller discoid "bun" ingots, another quarter-ton of copper ingot fragments, traces of tin ingots, the aforementioned scrap bronze, and items associated with bronze-working (sprue, a swage block, an anvil, a whetstone, and stone hammers and polishers). Bass concluded that the ship belonged to a tinker – a metal smith who, as he travels, fixes what he can and collects the rest to be dealt with later (Bass 1967, 163–164).

Lead isotope analyses of the ingots indicate that they were made from ore mined in northeastern Cyprus (Stos 2009), and typology and petrographic analyses of the ship's stone anchor and items being used by the crew or their personal possessions point to Cyprus and the Levant (Bass 2010, 802). The ship's orbit was confined to the coasts of southern Anatolia and Cyprus, and those on board came from the Near East (on the basis of their personal belongings and items of shipboard use, Bass 2010, 800–801).

Historical Background

There is the history of the discipline. The 1960 expedition was the first to excavate an ancient shipwreck in its entirety on the seabed. It was also the first time that a trained archaeologist participated as director *and* diver and thus had firsthand experience of the seabed situation. At a time when the only means of communicating about what had been found on the seafloor were discussions after a dive, drawings, or film that needed developing (i.e., before the advent of the easy and immediate availability of digital images or the extensive information rendered by 3D imaging), on-site familiarity was crucial to planning excavation tactics and to accurately understand and interpret a wreck site.

And there is the ancient historical background. When Bass went to Cape Gelidonya, it was generally believed that Mycenaeans held a monopoly on maritime commerce in the Eastern Mediterranean. This belief was based on the wide distribution of Mycenaean pottery throughout the Near East, including Cyprus (references in Bass 1967, 165–166 footnotes 16, 41). The shipwreck, however, preserved evidence for the active role of peoples from the eastern Mediterranean in the metal trade. The most compelling evidence for the identity of those on board is the three sets of stone pan-balance weights (ca. 60 total), which were based on Near Eastern standards (albeit carried in multiples that allow easy conversion to an Aegean standard, Pulak 1996, 255–285). Anthropologists have shown that merchants typically travel with their own sets of weights, with which they are familiar, and use them to convert to the weight standards of the lands in which they deal (Pulak 1996, 280–281; Monroe 2009, 39–56, 101). Furthermore, all the artifacts that may have been used on board or belonged to the ship's crew are Syrian or Cypriot in origin: two stone mortars, a terracotta oil lamp, a razor, the stone hammers, several Syro-Palestinian imitations of Egyptian scarabs, and a merchant's cylinder seal, probably an heirloom, carved centuries earlier in north Syria (Bass 1967, 164; 2010, 800–801). These indicators of people other than Mycenaeans on board the ship led Bass to look again at the Late Bronze Age metal trade as portrayed in Egyptian tomb paintings. Here he found confirmation of what he had found on the shipwreck: contemporary Egyptians associated copper and tin ingots with Syrians, not with Mycenaeans (Bass 1967, 62–67, 74). This turned the traditional theory on its head: the Mycenaean pottery found in quantity throughout Cyprus, the Levant, and Egypt, Bass argued, was best understood as return trade, brought back from the Aegean by people from the Near East in exchange for raw materials such as Cypriot copper (Bass 1967, 165–166).

Key Issues/Current Debates

Bass (1991) lays out the criticisms to his 1967 publication of the 1960 excavations and his rejoinders. First there is the "nationality" of the

ship. Bass' main point in 1967 was that the ship and crew were not Mycenaean, as prevailing scholarly tradition held at the time, but from the Near East; subsequently he refined the locality of likely origin to Cyprus. By dint of persistence and a measure of good fortune, two decades later he found proof that would silence any critics who still insisted on the "Mycenaean monopoly" paradigm. The excavation of the Uluburun shipwreck (1984–1994) provided incontrovertible evidence of an extensive trade in raw materials from the Near East to the Aegean, its cargo a physical example of the shipping ventures attested in the archives of the Late Bronze Age palatial centers at el-Amarna, Ugarit, and Bogazköy (Pulak 2008). The ship that sank at Cape Gelidonya, so different in scale and scope and kind from the Uluburun shipwreck, operated in a sphere of activity not likely to be attested in the records of royal exchange. The general theoretical question, whether it is even possible to define nationalities or assign home ports to ships wrecked in antiquity, remains a point of contention (e.g., Bachhuber 2006, 346, 351–355). But in the particular case of the Cape Gelidonya shipwreck, there is no reason to suggest affiliations beyond the Near East.

In 1967, Bass had to rely primarily on images in Egyptian tombs as evidence for Near Eastern participants in the Late Bronze Age metal trade. Those arguments are now bolstered by scientific analytical techniques: on the basis of lead isotope analysis, Stos (2009) has pinpointed the Solea region of Cyprus as the origin of the copper cargo.

Bass has consistently dated the wreck to the late thirteenth or very early twelfth century. Arguments for a later date in the twelfth century have gradually lost adherents as objects (e.g., scarabs) found in 1960 are re-evaluated in the light of new comparanda (Brandl 2003) or recent discoveries [e.g., transport stirrup jars on the wreck site (Bass and Hirschfeld 2013, 100), an ingot mold at Ras Ibn Hani (Lagarce et al. 1983, 277–290)] add weight to the earlier dating. It is possible that the current study of the assemblage of all the artifacts recovered from the wreck site, 1960–2010, may add something substantial to the discussion.

International Perspectives

Until Jacques Cousteau and Émile Gagnan's invention of self-contained underwater breathing apparatus at the end of World War II, the underwater world had been the exclusive realm of the few burly teams of salvagers and sponge-divers able to manage the cumbersome apparatus of helmet diving. SCUBA made the sea accessible to anyone who wished to jump in. The clear waters and warm temperatures of the Mediterranean first tempted amateur divers, among them photojournalist Peter Throckmorton. His documentation of the Mycenaean era shipwreck that Aras had first discovered at the southwestern tip of Turkey in 1954 (Throckmorton 1964, 101–110, 118–125) enticed George Bass, a terrestrially trained archaeologist, to learn to dive for the purpose of excavating a shipwreck to the same standards as those practiced on land. It was at Cape Gelidonya in 1960 that the underwater exploration of shipwrecks became a scientific discipline.

Future Directions

There is at present a concerted effort underway to re-evaluate the artifacts raised from the seabed in 1960 in conjunction with documentation of the several hundred additional artifacts recovered during the survey and excavation seasons of the 1980s, 1990s, and 2010 (summarized in Bass and Hirschfeld 2013). Because this cargo represents an assemblage deliberately collected in antiquity, it is fitting now to collate the discoveries of the past half century back into their original whole and study and publish the corpus in its entirety. The corpora of ingot fragments and ceramics listed in the 1967 report need substantive revision in light of the recent discoveries, and there are also significant additions to the collections of bronze objects and pan-balance weights. The results of many analytical studies undertaken subsequent to the original excavation and those currently in progress will also be collected or presented for the first time. In particular, building on the typological studies undertaken in the 1960s and lead isotope analyses of the 1980s, pXRF, ICP-MS,

and metallographic analyses of the copper's composition and its microscopic structure will provide further information about where the smith obtained his copper, the various means of metal production, and how and why it was broken up for circulation.

Cross-References

- ▶ Bass, George Fletcher
- ▶ Frost, Honor
- ▶ Institute of Nautical Archaeology (INA)
- ▶ Mediterranean Sea: Maritime Archaeology
- ▶ Throckmorton, Peter
- ▶ Underwater Archaeology

References

Bachhuber, Christoph. 2006. Aegean interest on the Uluburun ship. *American Journal of Archaeology* 110 (3): 345–363.

Bass, George F. 1967. *Cape Gelidonya: A Bronze Age shipwreck.* Transactions of the American philosophical society 57(8). Philadelphia: American Philosophical Society.

Bass, George F. 1991. Evidence of trade from Bronze Age shipwrecks. In *Bronze Age trade in the Mediterranean*, Studies in Mediterranean Archaeology, ed. N.H. Gale, vol. 90, 69–82. Jonsered: P. Astroms Forlag.

Bass, George F. 2010. Cape Gelidonya shipwreck. In *The Oxford handbook of the Bronze Age Aegean (ca. 3000–1000 BC)*, ed. Eric Cline, 797–802. Oxford: Oxford University Press.

Bass, George F. 2013. Cape Gelidonya redux. In *Cultures in contact: From Mesopotamia to the Mediterranean in the second millennium B.C.*, ed. Joan Aruz, Sarah B. Graff, and Yelena Rakic, 62–71. New York: Metropolitan Museum of Art.

Bass, George F., and Nicolle Hirschfeld. 2013. Return to Cape Gelidonya. In *Pasiphae: Revista di Filologia e Antichità Egee VII*, 99–104.

Brandl, Baruch. 2003. The Cape Gelidonya shipwreck scarabs reconsidered. In *The synchronisation of civilisations in the eastern Mediterranean in the second millennium B.C. II: Proceedings of the SCIEM 2000 – EuroConference, Haindorf, 2nd of May – 7th of May 2001*, ed. M. Bietak, 249–261. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.

Lagarce, J., E. Lagarce, A. Bounni, and N. Saliby. 1983. Les Fouilles à Ras Ibn Hani en Syrie (Campagnes de 1980, 1981, et 1982). *Comptes rendus des scéances de l'Académie des inscriptions et belles-lettres,* 249–290.

Monroe, Christopher. 2009. *Scales of Fate. Trade, tradition, and transformation in the eastern Mediterranean ca. 1350–1175 BCE.* Alter Orient und Altes Testament. Veröffentlichungen zur Kultur and Geschichte des Alten Orients und des Alten Testaments, Band 357. Münster: Ugarit-Verlag.

Pulak, Cemal. 1996. Analysis of the weight assemblages from the Late Bronze Age shipwrecks at Uluburun and Cape Gelidonya, Turkey. Ph.D. dissertation, Texas A&M University

Pulak, Cemal. 2008. The Uluburun shipwreck and Late Bronze Age trade. In *Beyond Babylon: Art, trade, and diplomacy in the second millennium B.C.*, ed. J. Aruz, K. Benzel, and J.M. Evans, 288–385. New York/New Haven: The Metropolitan Museum of Art and Yale University Press.

Stos, Z.A. 2009. Across the wine dark seas. . . sailor tinkers and royal cargoes in the Late Bronze Age eastern Mediterranean. In *From mine to microscope: Advances in the study of ancient technology*, ed. A.J. Shortland, I.C. Freestone, and T. Rehren, 163–180. Oxford: Oxbow Books.

Throckmorton, Peter. 1964. *The lost ships: An adventure in undersea archaeology.* Boston: Little, Brown and Company.

Cape Krusenstern Societies

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Introduction

Cape Krusenstern is one of the most extensively documented coastal archaeological sites in the North American Arctic. The site complex is located in northwest Alaska on the western shore of the Chukchi Sea and north shore of Kotzebue Sound; the beach ridge system is above the Arctic Circle and at the southeastern tip of Cape Krusenstern National Monument (Fig. 1). The site complex consists of more than 4,000 years of human occupation on a prograding beach ridge system that began forming shortly after sea level stabilized in the region approximately 5,500 years ago. The oldest beach ridges are found near the modern day lagoon, with the ridges successively

Cape Krusenstern Societies, Fig. 1 Location of Cape Krusenstern beach ridge complex in northwest Alaska

younger as one travels seaward (Fig. 2, Table 1). The older human occupation of the site complex is therefore found near Krusenstern lagoon, while the more recent occupations are located closer to the modern shoreline where people still camp, fish, and live today. Before the widespread use of radiocarbon dating, this horizontal stratigraphy played a key role in establishing the regional and Arctic-wide archaeological chronology for the last 4,000+ years. This sequence includes Denbigh (Arctic Small Tool tradition), Choris, the anomalous "Old Whaling" site, Norton-Near Ipiutak, Ipiutak, Western Thule, Kotzebue, and Historic Inupiat, including several type sites of the later archaeological cultures. The beach ridges themselves are a record of past coastal environment and landscape evolution. For these reasons, the Cape Krusenstern beach ridge site complex was designated a National Historic Landmark in 1973. It remains one of the most significant archaeological sites in the North American Arctic.

J. Louis Giddings led the earliest archaeological research at Cape Krusenstern. While carrying out dendrochronological and archaeological fieldwork throughout northwestern Alaska and the Seward Peninsula, Giddings struck upon the idea of "beach ridge archaeology" as a framework for chronologically ordering archaeological deposits as well as studying coastal formation processes and sea level change (Giddings and Anderson 1986). Giddings' field assistant and interpreter of two seasons, Almond Downey of Noatak, suggested Cape Krusenstern as a possible study site. Giddings' team subsequently worked at Krusenstern from 1958 to 1962. Giddings's student, Douglas Anderson, returned in 1965 to carry out additional excavation and also spent the 1973 season mapping unexcavated features. Several smaller-scale archaeological projects were carried out at the Cape and in the surrounding region in the intervening years (e.g., Anderson 1977; Zimmerman 1981; McClenahan 1993; Young

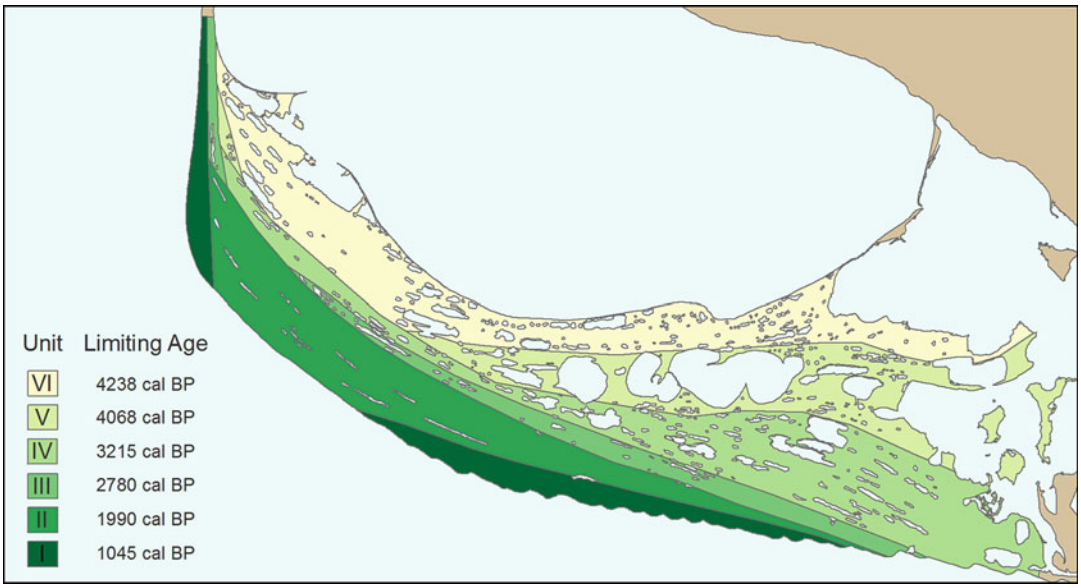

Cape Krusenstern Societies, Fig. 2 Cape Krusenstern beach ridge complex with archaeological limiting age for each depositional unit

Cape Krusenstern Societies, Table 1 Comparison of new limiting ages for beach occupations to prior age ranges and archaeological cultural designations (Giddings and Anderson 1986; Mason and Ludwig 1990; Mason and Jordan 1993; Darwent and Darwent 2005)

Beach segment (Mason and Jordan 1993)	New limiting date	Prior age range	Archaeological culture
I (VII)	1,045 cal BP	900 cal BP to present	Thule, Kotzebue, Historic Inupiat
II (VI)	1,990 cal BP	1,500–1,000 cal BP	Ipiutak, Birnirk, Thule
III (V)	2,780 cal BP	2,500–2,000 cal BP	Norton/Near Ipiutak
IV (IV/III)	3,215 cal BP	2,900–2,500 cal BP	Choris (including Old Whaling)
V (II/III)	4,068 cal BP	3,500–3,000 cal BP	Denbigh, early Choris
VI (I)	4,238 cal BP	4,200–3,500 cal BP	Early – classic Denbigh

2000; Darwent and Darwent 2005). Various projects (Mason and Ludwig 1990; Mason and Jordan 1993, 2002; Jordan and Mason 1999) expanded on initial work on coastal geological processes by Hopkins (Giddings and Anderson 1986) and furthered the coupled archaeological-paleoenvironmental research agenda initiated by Giddings at the Cape. Linked archaeological, geological, and environmental research continues in the region to this day. Research ongoing in 2012 focuses on study of human-environment interactions, with the broader goal of better understanding how people adapted to and altered their changing Arctic environment in the past (Anderson and Freeburg 2009).

Definition

The beach ridge landscape is characterized by low, undulating ridges that can be divided into geochronological sections in part through differences in beach ridge height, width, and composition; differences in these characteristics across sections reflect changes in the coastal environment over the last 5,000+ years (Mason and

Jordan 1993; Jordan and Mason 1999). The ages of the beach ridge sections are roughly defined based on archaeological dates (Fig. 2, Table 1), but current efforts to geologically date ridge formation are key to refining the local chronology of landscape evolution and coastal paleoenvironmental change. The Cape Krusenstern beach ridges, for the most part comprised of pebble and cobble-size rock rather than sand, were deposited during periods of fair weather and eroded over episodes of extended coastal storminess in the region. Correlated beach ridge complexes around the Chukchi Sea coast form a coastal storminess proxy for the region (Mason and Jordan 1993; Jordan and Mason 1999). Initially, the ridges at Krusenstern formed a series of spits that were connected to the mainland at the north end of the beach ridge complex. Over time, these spits grew eastward and eventually connected with the mainland at the east end of the beach ridge complex; this created the brackish lagoon that today serves as the northern boundary of the site and beach ridge system (James Jordan, personal communication, 2011).

The beach ridge system is punctuated by areas of marsh, tundra ponds, and small lakes (Fig. 2). The development of small ridge systems on the eastern and western ends of the largest lakes suggests that the lakes are fairly stable and are at least several centuries old. The lagoon is drained into Kotzebue Sound by the Tukrok River. A series of small seasonal streams and wetlands bound the eastern end of the beach ridge complex. Because of this diverse environment, past and present people living at the Cape have access to diverse marine, terrestrial, and riverine resources. Archaeological faunal deposits indicate that for at least the last 2,800 years, people here relied mainly on bearded and ringed seals as well as other small ice-associated seals and, to a lesser extent, other marine species such as walrus, beluga, and gray and bowhead whales. It is likely that in the past, as in the present, inhabitants of the Cape used the area for late spring/early summer seal hunting. Fish and bird bone preservation is generally poor, and terrestrial fauna are only minimally represented in archaeological deposits although caribou, musk ox, fox, and hare are present. Although the Cape is within the modern territory of the Western Arctic Caribou Herd, caribou do not typically move over the Cape in large numbers today. Presumably people in the past also relied on the plant resources at the Cape for food and other subsistence needs, although there is little direct evidence of this because of poor organic preservation.

Occupation of the beach ridges spans several significant mid- to late Holocene environmental shifts, specifically the Neoglacial and Little Ice Age (LIA). Periods of sustained storminess marked by beach ridge degradation at Krusenstern and other Chukchi Sea beach ridge systems are known from 3,300 to 1,700 ^{14}C yr BP and from 1,200 to 900 ^{14}C yr BP (Mason and Jordan 1993; Jordan and Mason 1999). The relationship, however, between local storminess, climate, and ice conditions is complex. From various regional paleoclimate proxies, it is apparent that the mid- to late Holocene environment throughout northwest Alaska was cooler and wetter than the early Holocene but also highly variable overall. Variability and, perhaps, unpredictability in environmental conditions increased after 1,500 years ago. A period of significant Neoglacial cooling from 4,000 to 1,000 years ago was followed by a period of warming – perhaps related to broader Medieval Climatic Optimum conditions – between 1,000 and 300 years ago. LIA cooling prevailed across the region between about 300 cal BP and the mid-1800s (see Anderson and Freeburg 2009 for summary).

The archaeological site complex encompasses components of the major Western Arctic archaeological cultures of the mid- to late Holocene: Denbigh, Choris, Norton-Near Ipiutak, Ipiutak, Thule, Kotzebue, and Historic Inupiat (Table 2). The oldest beach ridge sites, linked to the Denbigh complex, are small stone tool scatters and hearth features that represent the earliest evidence of seasonal or short-term coastal occupation in northern Alaska. The size and low density of these older sites at the Cape indicate that for more than 1,000 years, people continued to visit Krusenstern only seasonally; lack of faunal preservation makes it difficult to understand what time of year people visited the coast.

Beginning around 2,800 years ago, there is an increase in the number of sites at the Cape and a change in tool technology. Pottery is added to the toolkit, along with ground slate tools and labrets, and chipped tool styles shift as well; these changes suggest increased interaction across the Bering Strait during this period, known as the Choris culture. At Krusenstern, the small-size and limited archaeological deposits suggest continued seasonal or short-term visits to the beach ridge complex. More substantial contemporaneous sites on the Choris Peninsula and at Wales, however, indicate that after about 2,800 years ago, some people began to live on the coast for longer periods of time, building semisubterranean houses for winter use. These changes in technology, subsistence, and settlement patterns indicate increased reliance on marine resources, although caribou continued to be an important part of the diet as well. The potentially unique Old Whaling site at Cape Krusenstern dates to the Choris period as well. As far as is currently known, Choris is the oldest occupation in NW Alaska with a developed maritime adaptation, though it remains possible that evidence for earlier maritime lifestyles has been lost to rising sea level.

The relationship between Choris and subsequent Norton-Near Ipiutak, Norton, and Ipiutak cultures is unclear. Norton-Near Ipiutak culture may have developed out of Choris culture in northern Alaska around 2,500–2,000 years ago (Giddings and Anderson 1986) and can be considered a Bering Strait/northwest Alaskan variant of the broader Norton cultural tradition that extends across western Alaska. In northern Alaska, the limited evidence suggests that residence patterns shifted from large Choris settlements to isolated winter houses and people seem to have had a varied subsistence base during this period. Across northwest Alaska, there is a dramatic increase in settlement size, subsistence, and social complexity after about 1,500 years ago. This period is also marked by considerable technological and subsistence variability, as well as evidence of increased conflict and interaction. At Krusenstern, there is a marked increase in the number and type of sites at the Cape, with the presence of semisubterranean houses indicating permanent or semipermanent cold season occupation of the coast. The relationship between various chronologically overlapping archaeological cultures from this period including those identified at the Cape (Ipiutak, Birnirk, Thule) is not well understood (Table 2). The Ipiutak period occupation at Cape Krusenstern, dated to between about 2,000 and 1,050 years ago, is one of the largest in the region. More than 20 Ipiutak houses and multiple settlements were identified at the Cape through survey and excavation. Ipiutak archaeological culture is defined by the lack of key elements of earlier Norton-Near Ipiutak and Choris technology such as ground slate, lamps, and pottery and also by a distinct lithic technology and artistic tradition that includes intricately carved

Cape Krusenstern Societies, Table 2 Summary of northwest Alaska and Bering Strait archaeological cultures for the last 4,500 years (see Mason 2009 for additional information). Note the overlapping date ranges

Archaeological culture	Approximate age ranges (cal BP)	Geographic distribution
Denbigh	4,500–2,750	Kotzebue Sound, Brooks Range
Choris	2,750–2,250	Kotzebue Sound, Brooks Range, northern Yukon Territory
Norton (Norton-Near Ipiutak in northwest Alaska)	2,250–1,350	Southern AK Peninsula to Western Canada, unknown in Siberia and Chukotka
Ipiutak	1,750–1,150	Norton Sound to Point Barrow, interior of northwest Alaska and Brooks Range
Birnirk	1,350–750	Eastern and western shores of Chukchi Sea
Thule	1,000/950–550	Bering Strait to Greenland
Arctic Woodland	750–250	Inland areas of northwest Alaska
Kotzebue	550–250	Coastal areas of northwest Alaska

bone, antler, and ivory objects. Elaborate burial traditions indicating the development of social difference are less prevalent at Krusenstern compared to other Ipiutak settlements (e.g., Point Hope).

The Birnirk cultural component at Krusenstern is small, limited to two settlements, and lacks many characteristic Birnirk artifacts found at the type site near Barrow. This pattern may be due to differences in subsistence at Krusenstern where caribou and seal, rather than whale, were the primarily focus (Giddings and Anderson 1986: 94). It may be more accurate to describe these "Birnirk-like" sites at Krusenstern as part of a larger Neoeskimo archaeological culture that varies somewhat by region; these sites would then be considered older variants of the northwest Alaskan Thule archaeological culture. The size and abundance of Thule settlements at Krusenstern indicate that occupation of the Cape continued to increase during this period. House sizes are larger and differ in composition from prior periods. Beginning around 550 years ago, there was a shift in the settlement patterns at Krusenstern, with smaller and more dispersed settlements replacing the extensive Thule period settlements. The reason for this change across the region is the subject of much debate. Environmental factors, such as changing resource availability, are commonly cited as an explanation; sociopolitical change brought about by greater articulation with international exchange networks is also a possible factor. Over time, settlement and use of the Cape diminished, particularly after direct contact with Russians and Euro-Americans; across northwest Alaska, people became centralized in larger villages and towns. Today, some families still camp seasonally at the Cape, and many visit for shorter periods of time as part of subsistence activities.

Key Issues and Current Debates

The role of environmental change in the origins and migration of Neoeskimo culture is a topic of debate. Neoeskimo culture (approximately 1,450 cal BP to eighteenth century CE) is considered the antecedent to modern Yupik and Inupiat cultures in Alaska and across the Arctic. In the past, it was thought that Neoeskimo populations expanded into the eastern Arctic when climate warmed around 950 cal BP, about 100 years after the initial influx of Neoeskimo people into Alaska. New paleoenvironmental data and archaeological dates now indicate that this was not the case, and archaeologists are currently exploring new explanations for the rapid expansion of Neoeskimo culture across the eastern Arctic perhaps beginning around 700 years ago, 100–200 years later than previously thought. Cape Krusenstern is located north of the Bering Strait region and is part of a greater Beringian region of long-term human interaction and migration. This location, coupled with a long-term and near continuous archaeological and paleoenvironmental record, makes the Cape Krusenstern beach ridges a key research locale for better understanding the factors underlying the development and expansion of Neoeskimo groups across the Arctic. These efforts to better understand how people survived and thrived in past periods of environmental variability are increasingly important in the face of modern environmental change in northern regions.

A key issue in the archaeology of northwest Alaska concerns the origins of fully maritime adaptations, which is usually taken to mean significant dependence on the hunting of sea mammals such as the seals, walrus, and whales that still predominate in Inuit subsistence economies across the Arctic. While dwellers of the Pacific Asian coast south of the Sea of Okhotsk and in western North America south of the Bering Sea developed these adaptations in the early to mid-Holocene, available evidence suggests that maritime adaptations arrived or were innovated only around 3,000 BP by people living on the seasonally frozen subarctic and arctic coasts of the Okhotsk, Bering, and Chukchi Seas. Dumond and Bland (1995) suggest that this may have been a result of the movement of North Pacific Eskaleut marine mammal hunters into the Bering Strait and Chukchi Sea regions (see also Crockford 2008). Following Mason and Ludwig's (1990) reinterpretation of the beach ridge

sequence at Cape Krusenstern, Dumond and Bland suggest that the anomalous "Old Whaling" site at Cape Krusenstern represents this initial expansion. They then suggest that the better represented Choris phase assemblages at Krusenstern and elsewhere are descendants of Old Whaling. This interpretation makes sense of the available evidence, which is very sparse, and provides a hypothesis for continued research at Cape Krusenstern and elsewhere in the Bering and Chukchi Seas.

Another dimension of the question of maritime adaptations concerns the origins and antiquity of whale hunting itself. Despite its name, considerable debate surrounds the significance of the whale bones found at the Old Whaling site (see Ackerman 1998; Darwent and Darwent 2005). Although archaeologists have sought connections between Old Whaling and contemporary or earlier occupations on the Chukchi coast and northern islands of Siberia (Ackerman 1998), the origins of Old Whaling culture at Cape Krusenstern remain unclear. On the basis of the presence of long lance points and whale bones, Giddings and Anderson (1986) argued that the site represents an early manifestation of active whale hunting. Confounding this interpretation is the absence of harpoon technology there and the absence of any evidence of whale hunting for roughly 1,000 years afterward anywhere in the Bering Strait region. Other researchers suggest that the whale bones may have been scavenged from beached carcasses and the points used for hunting smaller sea mammals. If confirmed through additional research, the recent discovery of a 3,000-year-old carving of a whale hunting scene at the *Un'en'en* site on the south coast of the Chukchi Peninsula, in a site reportedly similar to Old Whaling at Cape Krusenstern (Dan Odess, personal communication, 2008), supports Giddings and Anderson's original interpretation of an actively whale hunting culture tracing back to the beginning of the record of committed maritime lifestyles. If and why whaling was then suspended until the emergence of Neoeskimo traditions 2,000 years ago remains a mystery.

Future Directions

Renewed research at Cape Krusenstern has revised the regional paleoenvironmental and archaeological chronology and settlement history established by Giddings and Anderson in the 1950s and 1960s. Ongoing analysis of systematically collected survey data from the Cape indicate that the settlement record from the last 2,000 years is more complex, and more extensive, than previously thought. Future research focused on human-environment interactions during this period will shed light on the question of Neoeskimo origins and migration, as well as the factors behind significant settlement and subsistence changes in the last 500 years. Research directed at testing hypotheses about the origins of whaling, and the development of maritime adaptations in general, would contribute key data to broader debate on these topics. Crucial to future efforts is connecting research at Krusenstern with current work in Russia; joint international research directed at addressing the research questions outlined here would result in a more comprehensive picture of the mid- to late Holocene human-environment record in the Arctic. Less research driven but more emergent is the rapid erosion of parts of the coast line at Krusenstern and across the Arctic, which is quickly destroying significant portions of the coastal archaeological record. This modern coastal erosion threatens to erase the archaeological record at Krusenstern; excavation aimed at mitigating this loss is as important as pursuing other research goals at the Cape.

Cross-References

► Arctic Ocean and Bering Sea: Maritime Archaeology

References

Ackerman, R.E. 1998. Early maritime traditions in the Bering, Chukchi, and East Siberian seas. *Arctic Anthropology* 35: 247–262.

Anderson, D.D. 1977. *Archaeological surveys of the proposed Cape Krusenstern and Kobuk National Monuments*. Report prepared for the National Park Service.
Anderson, S.L., and A. Freeburg. 2009. *Cape Krusenstern human-environmental dynamics project two hundred generations: On the beach of their time phase ii: Interim report*. Report prepared for the National Park Service.
Crockford, S. 2008. Be careful what you ask for: Archaeozoological evidence of mid-Holocene climate change in the Bering Sea and implications for the origins of Arctic Thule. In *Islands of inquiry: Colonisation, seafaring and the archaeology of maritime landscapes*, Terra Australis, ed. G. Clark, F. Leach, and S. O'Conner, vol. 29, 113–131. Canberra: Australia National University E Press.
Darwent, J., and C. Darwent. 2005. Occupational history of the Old Whaling site at Cape Krusenstern, Alaska. *Alaska Journal of Anthropology* 3: 135–154.
Dumond, D.E., and R.L. Bland. 1995. Holocene prehistory of the northernmost North Pacific. *Journal of World Prehistory* 9: 401–451.
Giddings, J.L., and D.D. Anderson. 1986. *Beach ridge archeology of Cape Krusenstern: Eskimo and pre Eskimo settlements around Kotzebue Sound, Alaska*, Publications in Archeology. Vol. 20. Washington, DC: National Park Service.
Jordan, J.W., and O.K. Mason. 1999. A 5000-year record of intertidal peat stratigraphy and sea level change from Northwest Alaska. *Quaternary International* 60: 37–47.
Mason, O.K. 2009. The multiplication of forms: Bering Strait harpoon heads as a demic and macroevolutionary proxy. In *Macroevolution in human prehistory*, ed. A.-M. Prentiss, 73–107. New York: Springer.
Mason, O.K., and J.W. Jordan. 1993. Heightened North Pacific storminess and synchronous late Holocene erosion of northwest Alaska beach ridge complexes. *Quaternary Research* 40: 55–69.
Mason, O.K., and J.W. Jordan. 2002. Minimal late Holocene sea level change in the Chukchi Sea: Arctic insensitivity to global change? *Global and Planetary Change* 32: 13–23.
Mason, O.K., and S.L. Ludwig. 1990. Resurrecting beach ridge archaeology: Parallel depositional records from St. Lawrence Island and Cape Krusenstern. *Geoarchaeology* 5: 349–373.
McClenahan, P.L. 1993. *An overview and assessment of archeological resources, Cape Krusenstern National Monument, Alaska*. Anchorage: National Park Service.
Young, C.E. 2000. *The archaeology of Agiagruat (49noa217), Cape Krusenstern National Monument, Northwest Alaska*. Unpublished M.A. dissertation, Washington State University.
Zimmerman, G. 1981. *Feature detection through the utilization of aerial photographs: Cape Krusenstern, Alaska*. Report prepared for the National Park Service.

Capitalism in Archaeological Theory

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C

Introduction

At the turn of the twenty-first century, discussions of capitalism permeate historical archaeology. Most of these works are by Marxist scholars, but archaeologists have used a variety of other theoretical perspectives to study capitalism. All of these discussions, however, emphasize everyday life and social relations as the keys to understanding capitalism. Archaeologists also live capitalism, and increasingly scholars are calling for an activist archaeology that challenges capitalism.

Definition

No consensus exists on a precise definition of capitalism or on the historical context of its making. This is because capitalism is not a thing that can be isolated, dissected, weighed, and measured. Rather, capitalism is a complex set of dynamic human relationships that are at the same moment economic, social, cultural, and ideological. People experience capitalism differently, depending upon their position in this web of relationships, and these differences in experience motivate people in their struggle to transform society and their positionality. Modern scholars cannot step away from capitalism to objectively view it because they live and work within the relations of capitalism. As an economic system, capitalism entails private ownership of the tools, resources, and raw materials necessary for production (the means of production) for the creation of goods and services to exchange for profit in a market. The social relationships of capitalism necessitate that workers sell their labor power to

the owners of the means of production in order to survive. In the capitalist wage labor relationship, the owners gain profit by paying workers less than the value that they add to the product. Capitalism promotes a subjectivity that leads individuals to see the self as existing before its cultural construction in relations of kin, community, race, belief, gender, or sexuality. When individuals use the market to distinguish themselves from others, capitalism validates the self. Capitalist ideologies present the autonomous self as human nature and the economic and social relationships of capitalism as either universal or inevitable. Archaeological studies have focused on the social, cultural, and ideological relations of capitalism.

Capitalism transformed labor from a self-affirming, community-building activity that was the source of property rights to a commodity sold in a labor market. This relationship defines social roles. Workers lack access to the means of production and must sell their labor power in the market. Capitalists control the means of production and buy labor power in the market. The capitalist owns the labor process and can sell the products to make profit. On the other hand, workers can only sell their creative energy and their liberty for a given period and are alienated from their own labor as well as its products. Thus, capitalism bases ownership rights to newly created value on ownership of the tools and raw materials used in the production of value, not the labor used to create value.

Alienation refers to the separation of aspects of the human condition that naturally belongs together or to antagonism between aspects that are properly in harmony. Workers lose control of the products of their labor. Capitalist workers do not determine the design, the manner of production, or the disposition of the objects that they create with their hands and minds. Capitalism alienates workers from the act of producing. Deskilling breaks the work down into a series of mindless and repetitive tasks (imagine an assembly line), and mechanization requires workers to serve machines rather than machines to serve people. Capitalism alienates workers from themselves. They become replaceable cogs in an abstract machine instead of human beings capable of defining their own value through direct, purposeful activity. Finally, capitalism alienates workers from other workers by reducing labor to a commodity instead of a social relationship between people involved in a common effort for survival or betterment. The competitive labor market serves to reduce labor costs and increase profits. Workers must compete with each other to sell their labor and to survive. Alienation "frees" individual workers from the social relations of kin, guild, union, or community to act in their own self-interest. This subjectivity of individualism treats relationships between people as if they were interchangeable, modular, and reproducible and fetishizes these relationships in things.

The labor market, the alienation of workers, and the concomitant rationality of capitalism enhance commodity fetishism. Commodity fetishism expresses, mediates, and transforms social relationships between people into objectified relationships between things. Commodities are things produced mainly for exchange. In production, workers make objects. However, capitalist production breaks down production into a chain of many steps so that the workers no longer recognize the input of their own labor. Instead, the finished thing turns into a mystical entity with a monetary market value, as if that latter value was no longer due to the workers' own labor. In capitalism, individuals must enter into the market to procure the things necessary for life. In the market, their only connection with other individuals may be limited to the economic transaction. In capitalist production and exchange, commodities and money express, negotiate, and meditate social relations so that things may come to dominate people. Commodity fetishism prods individuals to use the market and commodities to construct their identities of self.

Capitalist ideologies represent individualism as human nature and deny the historic construction of the economic and social relationships of capitalism in at least two ways. First, ideology naturalizes the culture by making capitalist cultural and historical values, attitudes, and beliefs seem entirely "natural," "normal," self-evident, timeless, and obvious "common sense" – and thus objective and "true" reflections of "the way

things must be." Second, ideology obscures masks or denies the inequalities and exploitation inherent in individualism and capitalist relations. Ideologies implicitly and explicitly invest meaning in material culture, and these meanings influence and are influenced by social behavior.

People live capitalism in their everyday lives. A wide variety of social relations affect that lived experience including class, race, gender, sexuality, and ethnicity. In this experience, people have embraced, negotiated, resisted, and fled capitalism. The realities and reach of capitalism have varied over time. Thus, capitalism has never been unchallenged or totally successful in reducing the social to the individual or every aspect of lived experience to a commodity. Scholars who confront capitalism find lessons for struggle and the means to engage capitalism in this contested experience.

Historical Background

Much about the history of capitalism is contested. Capitalist ideology claims that capitalism does not have a history but rather is an expression of human nature or the expansion of age-old practices of antiquity. Challengers to this ideology write the history of capitalism to show that it has a history, that this history was not inevitable or predestined, and that capitalism springs from a specific historical context. These critical scholars disagree on the epoch of capitalism's origins and on the historical processes that created capitalism. They can agree on two things concerning the history of capitalism. It is a phenomenon of the modern era (post-CE 1500), and it is the dominant form of social relations in the West and probably the world today.

At the broadest level, the debate over capitalism's origins breaks down into three positions (Appleby 2010). Exchange theorists link the origins of capitalism to the early sixteenth-century development of merchant capitalism, based on exchanges for profit, in a global market (Wallerstein 1974). Production theorists argue that the Industrial Revolution at the end of the eighteenth century establishes wage labor as the dominant social relationship of the European economy and marks the beginnings of capitalism (Wolf 1982: 296–298). More recently, these discussions have shifted to debates opposing theories that find capitalism's origin in European agrarian relationships to more global perspectives (Wood 2002).

Merchants profit results from buying goods in a location where they are common and then transporting them and selling them in a location where they are rare. As such, merchant profit has existed far back into antiquity. Exchange theorists argue that technological advances in late medieval/early modern Dutch and English agriculture increased production and freed more people and resources for trade. These agricultural advances coupled with the looting of the indigenous civilizations of the Western Hemisphere built up capital for investment in Europe. Unlike the merchants of antiquity who traded for themselves, Dutch and English merchants invested capital in the first joint-stock companies, such as the Dutch East India Company. These companies traded in exotic goods, enslaved humans, and increasingly in raw materials such as beaver pelts to make felt, deer hides, sugar, and cotton. The profits from these exchanges provided the capital necessary for industrial production and mass wage labor. By second half of the eighteenth century, merchant profit became linked to production and the extraction of profit via wage labor. Merchants brought raw materials from around the globe to Europe where waged workers converted them into finished goods, most of which merchants then sold abroad to meet the needs of the primary producers of the raw materials.

Production theorists find the beginnings of capitalism in the mass expansion of wage labor during the eighteenth century and the rise of industrial capitalism. The British "enclosure movement" encouraged this process as large landowners appropriated communal lands and displaced tenets that had grown food crops. Innovation in agricultural technology and the introduction of new crops, principally the potato, allowed fewer farmers to produce more food. Landowners replaced the tenets with sheep that they sheared for wool. Textile production shifted from craft work to factory production to weave greater

quantities of wool into cloth to meet growing demand in a global market. The factory systems of production entailed a complex division of labor between and within production processes and the routinization of work tasks. Increased mechanization, the division of labor and routinization allowed the first capitalists to replace skilled artisans with unskilled, disenfranchised tenets who had been displaced by enclosure and therefore had to work for a wage to survive. This shift to waged labor gave the capitalist more control over the production process and the ability to extract greater profit from that process. This increased production and generation of capital established the global domination of the capitalist mode of production.

The drive for greater profits in industrial capitalism generates economic cycles of 40–60 years in duration. Modern scholars refer to these cycles as Kondratieff Waves, named after the Russian economist Nikolai Kondratieff who defined them in the 1920s. Capitalists can increase profits by reorganizing the work place (which usually involves increasing mechanization and/or cutting wages) and by expanding markets. During the initial A phase of a Kondratieff Wave, the rate of profit increases, and in the second B phase of a Kondratieff Wave, the rate of profit decreases and economic depressions occur. Innovations in production and/or a shift in production to new commodities initiates the A phase of the wave. We can characterize each A phase by the products produced and the markets that it creates. As production swells, competition between capitalist firms increases saturating markets and the demand for the products. This saturation or realization crisis results in declining rate of profits (the B phase of the wave) until innovations in technology or the reorganization of the workplace creates new markets and demands to spur another A wave. Some scholars claim that increased competition over less profit in the B phase leads to major wars. Regional shifts in the centers of capitalism, transformations in the relations of production, and significant changes in markets occur at the transition between the B and A part of the wave.

The maturation of industrial capitalism initiated the first Kondratieff Wave toward the end of the eighteenth century, and the B phase of this wave hit bottom in the 1840s. During this wave, waged factory workers in Europe and, later, the United States produced consumer goods for rural populations in these centers and for primary producers in the rest of the world. These consumer goods included the factory-made ceramics, glass, smoking pipes, and buttons that archaeologists dig up, but the most important was cotton. Peasants in India and enslaved Africans in the southern United States grew cotton that merchants carried to Manchester, England, and Lowell, Massachusetts. Here, waged workers wove that cotton into cloth. These workers drank tea grown by Asian peasants and sweetened by sugar produced by enslaved Africans in the Caribbean as a stimulant that allowed them to stand longer at their looms. Capitalists sold the cloth primarily to the rural peasants and yeoman farmers of Europe and the United States and clothe the Asian peasants and enslaved Africans who produced the cotton, tea, and sugar. Thus, a small minority of the world's workers labored in capitalist relations of production (wage labor), but their production called into being and maintained noncapitalist relations of rural production and racialized slavery elsewhere in the world. Commonly capitalist seeks to maintain the growth of the A phase by opening new markets. Thus, in the early nineteenth century, the British sponsored and supported the liberation of Spanish America which removed Spanish restrictions on British trade to the region.

Steam power and railroads drove the next Kondratieff Wave that began in the 1840s and continued until the end of the nineteenth century. The expansion of transportation infrastructure (railroads) drove the A phase of this wave. Railroads increased the efficiency of transportation and lowered the cost of goods. Railroad construction also created demand for steel, wood, cloth, and glass to build the tracks and trains. Steam powered the locomotives and also larger factories that employed more waged laborers to produce consumer goods. Increasingly waged laborers took up more of the market for consumable goods in core industrial states, but outside of Europe and North America, the vast majority of people of the world labored in noncapitalist

relations of production. The completion of the railroad net in core states initiated the B phase of the wave. For the United States, this event occurred in 1877, and the immediate decrease in demand plunged the country into a deep depression. In the B phase, capitalists sought new markets and built railroads in South America, Asia, and Africa. In South America, the United States and European powers controlled economies and expanded both wage labor and debt peonage. European powers divided up Asia and Africa into colonies. Significant shifts also occurred between centers. For example, at the transition to the B phase in the mid-1870s, industrial production in the United States exceeded that of Great Britain and Japan industrialized.

During the first half of the twentieth century, the third Kondratieff Wave began, driven by steel production, chemicals, electric motors, and internal combustion engine. In this wave, wage laborers became the majority of workers in the core industrial states of Europe and North America but not in the rest of the world. Much of this production focused on durable goods primarily for consumption by the bourgeois class. In Europe, production for the colonies drove a great deal of the demand. In the United States, production of consumer goods still focused on rural populations with an increase in production of durable goods. At the end of the A phase of this wave, capitalists sought new markets by expanding the production of durable goods for wage laborers. The most famous example of this is Henry Ford who initially produced the Model T automobile for farmers but then shifted the market to industrial workers. This period witnessed the widespread reorganization of the work processed to assembly line production, which allowed capitalists to increase profits but still increase wages. The third wave ends with the Great Depression of the 1930s and World War II. In the B phase of the wave, state communism established itself first in Russia and later in Eastern Europe and China. During World War II, industrial production expanded in Latin America, especially in México and Brazil.

The automobile drove the fifth Kondratieff Wave from World War II to the 1990s. In the core areas, factories produced durable goods for waged laborers. Generally in this wave, capitalists increased profits through mechanization. Increases in wages allowed more workers to buy more stuff, especially durable goods, most notably the automobile. During this wave, the United States was unquestionably the dominant economic and political power in the world. In the B phase, capitalists sought to raise falling profits by lowering wages. They did this by increasingly shifting consumer goods production from the core industrial states to Asia and Latin America. In the A phase of this wave, independence movements swept the colonies of Europe, and during the B phase, communism collapsed in Europe and was transformed into a state capitalism in China.

It is difficult to study and understand a long wave when you are in the midst of it. Several clear shifts have occurred in contemporary capitalism. These would include the following: (1) the rise of information technology and computers which has increased the importance and volume of production of intellectual and creative commodities such as computer programs, entertainment, and apps; (2) capitalists increasing profits principally by lowering wages; (3) deindustrialization of core economies especially in Western Europe, Great Britain, and the United States; (4) production of consumer goods that primarily occurs in Asia (especially China) and Latin America; (5) global advances in communications and transportation that speed up the global processes of capitalism; and (6) the rise of China as capitalist economic power and the establishment of the European Union.

Some scholars and popular pundits argue that we now live in a postindustrial or postcapitalist world. We may be able to speak of Detroit, Michigan, as a postindustrial city or Great Britain as a postindustrial nation, but in no sense is the world postindustrial or postcapitalist. To the contrary, capitalism has intensified and extended its reach further than any other time in history. We live in an era of fast capitalism (Agger 2002).

We still live in a capitalist world where economic processes are based in the ownership of private property and waged labor. Modern capitalism, however, is an accelerated, hyped-up capitalism that holds a more profound sway over the

peoples of the earth than it ever has before. The world is, in fact, more capitalist today than it was when Marx wrote in the middle of the nineteenth century. At that time, private property and waged labor only dominated in Europe. For most of its existence, capitalists increased profits by incorporating noncapitalist regions of the world or by expanding wage labor into new geographic areas. Today, virtually no corner of the world lies outside of capitalism's control. Capitalists now increase profits by speeding up the processes of capitalism and by penetrating all aspects of social life. The globalization of the modern world is neither new nor unique. Capitalism began as a global phenomenon. What has changed is the speed of global capitalism. The rapid expansion of information technologies (including computers, software, satellites, fiber optics, and the Internet) has transformed the global economic landscape. These expansions accelerate capitalism both in terms of speed and reach. Advances in transportation, such as container ships, allow goods to be produced wherever in the world wage rates are lowest. The new information technologies allow technical, clerical, and even professional services to cross the globe seeking the lowest wage. To make a profit, firms must cut wages and overhead. Workers who do not accept less lose their jobs as whole industries hop around the world. The pressures to deliver all goods and services at the least possible cost create hypercompetitiveness. This process erodes worker's rights and benefits and proletarianizes professional occupations including archaeology. Fast capitalism expands by oozing into every nook and cranny of society to create new needs. Powerful capitalists in business, education, and government embrace hypercompetition to make market principles the dominant ethic for all social relations. They evaluate all social relations in terms of costs and benefits and by the bottom line of profit. Their success corrodes socially derived moral frameworks and political programs.

Key Issues

Archaeologists confront many issues in the study of and the living in capitalism. Scholars studied prehistory and ancient civilizations to demonstrate that the relations and ideology of capitalism are not simply human nature or universal. Archaeologists have asked how the temporality of the everyday is enmeshed within the broader developments of the capitalism. In particular, they have examined how people have challenged capitalism in the everyday. Archaeologists have paid particular attention to the development of capitalist ideologies and their manifestation in the material world. Finally, archaeologists work and live within capitalism. Some have examined how our work reinforces or challenges capitalism, and others have examined how capitalism shapes the practice of archaeology.

Archaeologists have demonstrated that capitalist class relations are but one of many different ways in human history that elites have appropriated labor and the products of labor from primary producers. Moreover, these scholars also seek to use a deep understanding of past societies to show that as a historical product, capitalism can be changed. Such studies begin with V. Gordon Childe (1951) who argued that scholars must take sweeping historical views to see past the immediate realities and beliefs of capitalism. Luis Lumbreras (2005) has followed in Childe's footsteps, asking questions about the origins of stratification and writing the history of stratification before capitalism in Latin America. Bruce Trigger (2003) did a comparative study of early civilizations to define similarities and differences with an eye to how such an understanding could better enable us to alter our capitalist world. Robert Chapman (2003) argues that to understand how inequality was created and maintained in the long sweep of human history is the basis for critique and action to transform the complex and unequal world of capitalism.

Numerous researchers have argued that archaeology provides a necessary approach to study the lived experience of capitalism and to subvert the ideological masking of this experience (Orser 1996; Leone and Potter 1999; Matthews 2010). The historical changes in production and the extraction of profit in capitalism are written upon the artifacts and feature that archaeologists study. Archaeologists find these things as the result of their use in daily life. More importantly,

material things are more than just the reflection or outcome of human hands and machines. They express the social relations that are the conditions for their existence. They are both the products of social relations and part of the structure of those relations. Through them, we can study how capitalism transforms and is transformed by daily life. Archaeology also gives us an access to daily life that avoids ideologically loaded written records.

In Great Britain, archaeologists have researched the transition from feudalism to capitalism, while US researchers have looked for the beginnings of industrial capitalism. Matthew Johnson's (1996) *An Archaeology of Capitalism* is the seminal work in this vein. Johnson finds the roots of capitalism in the movement from openness to closure in this landscape. Other archaeologists have excavated in tenant cottages abandoned due to enclosure. For example, Chris Dalglish's (2003) study of rural southern Scotland compares changes within the domestic space of the house with larger transformations of the landscape that were labeled "improvements." Both of these works emphasize the contradictions and conflicts between the domestic and the broader world and in the social relations that exist in each of these contexts. Sarah Tarlow (2007) shows how the archaeology of late eighteenth-century England manifests a widespread and crosscutting ethic of improvement in early capitalism. Thomas Cuddy (2008) examines archaeological sites in the Chesapeake region of Maryland to explore the origin of industrial capitalism in the United States. He charts the stages of production from household manufacturing to larger workshops to mechanized factories.

North American archaeologists have found new insights about rural, Native American and African-American experience by examining them as aspects of capitalism. Mark Grover (2003) studied a rural farmstead in eastern Tennessee that might be facilely dismissed as marginal hillbillies. He shows how the household was economically part of the larger experience of American capitalism. In the history of California, Native Americans often disappear after the missions are closed in 1840. They of course did not but instead became an ethnically distinct part of the California working class. Stephen Silliman (2004) reconstructs the everyday life of indigenous workers and the social relationships of labor that shaped that experience to show how they were a key component in the multiethnic labor force of mid-nineteenth-century California. Paul Mullins (1999) examines how African Americans in twentieth-century Annapolis used consumption to negotiate class and racial identities.

Many archaeologists have looked at capitalism in terms of the challenges and resistance that it engenders. Some of these studies have focused on working-class life, strikes, and how workers subverted the work disciplines of capitalism (Shackel 2009). Archaeologists have also sought to humanize and treat populations as active agents that capitalist ideology demonized. These studies include extensive research on enslaved Africans and indigenous peoples, investigations of urban slums and of prisons, and communities of deportees. Others write alternative histories that challenge capitalism by revealing life ways that existed at the edge of/or beyond capitalism. These life ways include utopian communities, cultural practices such as African-American hoodoo, cooperative housekeeping, and communities of escaped slaves or quilombos (Matthews 2010).

Much contemporary archaeological research work focuses on capitalist ideology. They find material culture to be an active component in the creation and negotiation of ideology. This work starts with Mark Leone's (2005) interpretation of the Georgian Order of the eighteenth-century Anglo world as the ideology of merchant capitalism. Heather Burke (1999) uses a study of the nineteenth-century Australian town of Armidale to explain variation in architectural style through relationships of ideology, capitalism, and identity. James A. Delle (1998) examines a nineteenth-century Jamaican coffee plantation as a cultural, ideological landscape that structures relations of race, gender, and the division of labor. Concerns with ideology have also expanded into broader, archaeological studies of capitalist cultural production.

Archaeology is a product of capitalism and practiced in capitalism. It originated in early nineteenth-century Europe as a practice that served the interest of bourgeois nationalism (Trigger 2006). Scholars have questioned

archaeology's history of advancing imperialist, colonialist, and racist objectives (Hamilakas and Duke 2007). These critics argue that archaeologists need to recognize that the discipline is about living individuals and communities whose lives and heritage suffer from the abuse of capitalist power relationships and to adopt a political ethic for the discipline. Fast capitalism has not been kind to archaeology (McGuire 2008). Fast capitalism attacks the values and social relations that created and sustained archaeology. Hypercompetition leaves slight place for the life of the mind that does not produce profits. The camaraderie and shared purpose of fieldwork do not generate earnings. Fast capitalism undermines the relationships of apprenticeship and mastery and grinds down the community of scholars that draws most people to the craft of archaeology. Capitalists' search for profit transforms archaeological knowledge, heritage, and education into commodities to be produced at the lowest cost for sale in a competitive market.

International Perspectives

Most scholars have viewed capitalism through a Eurocentric lens, as reflected in the historical summary in this entry. More recent analysis has focused more on capitalism as a global phenomenon not fully understandable in terms of its European/US core. Archaeologists have also expanded their studies beyond the core.

The development of dependency theory in the 1970s questioned both capitalist theories of modernization and a Eurocentric perspective on capitalism. Researchers from the Global South including Samir Amin of Egypt, Celso Monteiro Furtado of Brazil, and Raúl Prebisch of Argentina wrote the first drafts of this theory. They challenged the basic tenant of post-World War II modernization theory, to wit, that the Global South was poor because it was underdeveloped. Instead, they argued that the underdevelopment of the Global South was both a cause and a result of the development of capitalism. They noted that during the medieval period, Europe had been the poor backwater and the Islamic world the wealthy metropole. In a similar vein, they observed that México City and Lima, Peru, had been wealthy cities with great buildings and universities when New York and Philadelphia were provincial towns with muddy streets. Dependency theorists argued that the modern periphery of the world economic system (the Global South) became poor because core states coercively integrated the periphery into the European economic system. This integration reduced the periphery to producers of raw materials or served as repositories of cheap labor, and dominant states denied the periphery the opportunity to competitively market their resources. Eighteenth-century India provides an example of this process. Before the British conquest, India produced the greatest quantity of cotton cloth in the world. The British forbade the spinning and weaving of cotton in India and transported Indian cotton to Manchester, where British wage laborers wove it into cloth that British capitalists sold to India. The German-US economist Andre Gunder Frank and the US sociologist Immanuel Wallerstein picked up on these ideas and expanded them into world-systems analysis.

World-systems analysis expands the scope of capitalism and rejects the idea that scholars can understand the origins or the development of capitalism from a perspective of European history. It also calls into question those who see contemporary globalization as a new or unique feature of capitalism. Some authors have criticized this theory as still being top-down and as over emphasizing a functional view of economic relations while ignoring the importance of culture. Eric Wolf (1982) has criticized the approach because it leaves the active, creative force of history in Europe and focuses on how Europe created the periphery. For Wolf, this perspective does not capture the dialectical relationship whereby the periphery also created the core, and it trivializes the cultural diversity of the periphery.

Some archaeologists have expanded their considerations of capitalism beyond the core to the peripheries of the Global South. Many have followed the path of world-systems analysis, while others have focused more on the active and creative role of cultural and economic processes in the Global South. In South Africa, Gavin

Lucas (2006) examines the Dutch East India Company; free settlers and enslaved Africans used material culture to construct identities. He mobilizes archaeological evidence to show how these different groups were enmeshed within racial, sexual, and class ideologies in the broader context of capitalism and colonialism. Sarah Croucher (2011) works in Zanzibar. Here, in the nineteenth century, Omani Arab colonial rulers of the East African Coast established clove plantations that marketed the spice in the global capitalist market.

Future Directions

Archaeologies of capitalism have increasingly focused on the contemporary and political action. Traditionally, archaeologists studying capitalism have sought to better understand capitalism and engage a culture critique of capitalism. Following Bourdieu, archaeologists are increasingly trying to be scholars who help a little bit by providing tools for liberation.

Archaeologists find violence, destruction, and ruination in the contemporary. The authors in Pedro Funari and Andrés Zarankin's (2006) collected volume use archaeology to look at the repression that swept Latin America, particularly in Chile, Argentina, and Brazil, from 1960 to 1980. Alfredo González-Ruibal (2008) invokes a concept of supermodernity that parallels the notion of fast capitalism to examine the outstanding relevance of destruction in our times. Shannon Lee Dawdy (2010) uses the theory of Walter Benjamin to study the spatial and temporal dynamic s of capitalism's creative destruction in post-Katrina, New Orleans.

A major focus of contemporary archaeological practice has been on building public scholarship and activism that disputes capitalism. Barbara Little's (2007) book, *Historical Archaeology: Why the Past Matters*, builds on Marxist critical theory and feminist perspectives to address questions of ethics and public scholarship in capitalism. She encourages archaeologists to ask questions that go against the status quo and take action to make untold histories known. Little argues that the social relevance of historical archaeology lies in social capital, civic renewal, and transformative learning. She shows how historical archaeology is inextricably linked to public education, justice issues, and our collective understanding of the past. My own book, *Archaeology as Political Action* (McGuire 2008), builds a Marxist dialectical theory of praxis to show how archaeologists can use their craft to challenge capitalism. Praxis springs from the realization that people make the social world in their everyday lives and that they can also subvert and transform that world. Praxis entails a complex dialectic between knowing the world, critiquing the world, and taking action in the world. The vast majority of twenty-first-century North American archaeologists continue to do archaeology to learn about ancient pasts even as some of us embrace an archaeological study of the present. Today, however, the study of the past cannot be an escape from the present.

Cross-References

- ▶ Activism and Archaeology
- ▶ Annapolis: Historical Archaeology
- ▶ Childe, Vere Gordon (Theory)
- ▶ Consumption, Archaeology of
- ▶ Contemporary Past, Archaeology of the
- ▶ Critical Historical Archaeology
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Johnson, Matthew (Theory)
- ▶ Leone, Mark P.
- ▶ Marx, Karl
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Post-Medieval Archaeology

References

Appleby, J. 2010. *The relentless revolution: A history of capitalism*. New York: W.W. Norton & Company.

Burke, H. 1999. *Meaning and ideology in historical archaeology*. New York: Plenum Press.

Chapman, R. 2003. *Archaeologies of complexity*. London: Routledge.

Childe, V.G. 1951. *Man makes himself*. New York: New American Library.
Croucher, S.K. 2011. *An archaeology of plantation life in nineteenth century Zanzibar: Capitalism and cloves*. New York: Springer.
Cuddy, T.W. 2008. *Revolutionary economies: What archaeology reveals about the birth of American capitalism*. Lanham: Alta Mira Press.
Dalglish, C. 2003. *Rural society in the age of reason: An archaeology of the emergence of modern life in the southern Scottish Highlands*. New York: Kluwer Academic/Plenum.
Dawdy, S.L. 2010. Clockpunk anthropology and the ruins of modernity. *Current Anthropology* 51 (6): 761–793.
Delle, J.A. 1998. *An archaeology of social space: Analyzing a coffee plantation in Jamaica's blue mountains*. New York: Plenum.
Funari, P.P., and A. Zarankin. 2006. *Arqueologia de la represion y la resistencia en America Latina 1960–1980*. Catamarca: Ediciones Encuentro.
González-Ruibal, A. 2008. Time to destroy: An archaeology of supermodernity. *Current Anthropology* 49: 247–281.
Grover, M.D. 2003. *An archaeological study of rural capitalism and material life: The Gibbs farmstead in southern Appalachia*. New York: Plenum.
Johnson, M.H. 1996. *An archaeology of capitalism*. Oxford: Blackwell.
Leone, M.P. 2005. *The archaeology of liberty in an American capital: Excavations in Annapolis*. Berkeley: University of California Press.
Leone, M.P., and P.B. Potter. 1999. *Historical archaeologies of capitalism*. New York: Kluwer Academic.
Little, B.J. 2007. *Historical archaeology: Why the past matters*. Walnut Creek: Left Coast Press.
Lucas, G. 2006. *An archaeology of colonial identity: Power and material culture in the Dwars Valley, South Africa*. New York: Springer.
Lumbreras, L.G. 2005. *Arqueología y sociedad*. Lima: Instituto de Estudios Peruanos.
Mullins, P. 1999. *Race and affluence: An archaeology of African America and consumer culture*. New York: Plenum Press.
Orser, C.E. 1996. *A historical archaeology of the modern world*. New York: Plenum.
Silliman, S.W. 2004. *Lost laborers in colonial California: Native Americans and the archaeology of Rancho Petaluma*. Tucson: University of Arizona Press.
Tarlow, S. 2007. *The archaeology of improvement in Britain, 1750–1850*. Cambridge: University of Cambridge Press.
Trigger, B. 2003. *Understanding early civilizations: A comparative study*. Cambridge: Cambridge University Press.
Wood, E.M. 2002. *The origin of capitalism: A longer view*. 2nd ed. London: Verso.

Further Readings

Agger, B. 2002. *Speeding up fast capitalism: Cultures, jobs, families, schools, bodies*. Lanham: Rowman and Littlefield.
Croucher, S.K., and L. Weiss, eds. 2011. *The archaeology of capitalism in colonial contexts*. New York: Springer.
Hamilakas, Y., and P. Duke, eds. 2007. *Archaeology and capitalism: From ethics to politics*. Walnut Creek: Left Coast Press.
Marx, K. 1906. *Capital: A critique of political economy*. New York: The Modern Library.
Matthews, C.N. 2010. *Archaeology and American capitalism*. Gainsville: University of Florida.
McGuire, R.H. 2008. *Archaeology as political action*. Berkeley: University of California Press.
Shackel, P.A. 2009. *The archaeology of American labor and working-class life*. Gainsville: University Press of Florida.
Trigger, B. 2006. *A history of archaeological thought*. Cambridge: Cambridge University Press.
Wallerstein, I. 1974. *The modern world system I*. New York: Academic Press.
Wolf, E.R. 1982. *Europe and the people without history*. Berkeley: University of California Press.

Capitalism: Historical Archaeology

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Introduction

The development and persistence of capitalism is one of the big questions about the trajectory of humankind, equal in importance to the rise of agriculture and sedentism or the advent of the state. Though the time and place of its beginnings are a matter of debate, capitalism is a relatively recent phenomenon, falling squarely within the epoch of written history. For these reasons, capitalism is an anthropological subject and a historical one, and because it is a materialist scheme bound up in the production of commodities, the archaeological record holds crucial information about the ways in which the capitalist system has played out in peoples' lives. Many researchers, especially those in the capitalist core – the USA and Europe – argue that capitalism is the central subject of historical archaeology (e.g., Johnson 1996: 1–3; Leone and Potter 2003: 19; Matthews 2010; Orser 1996: 71–81). (It is worth noting here that though China today is also a capitalist force,

there is no available Chinese literature on the historical archaeology of capitalism.)

Today there is a burgeoning literature on the historical archaeology of capitalism. Much of this work has been carried out in the USA and Britain or by researchers from these countries who work in the so-called developing world; however, the scope is broadening, and new work from other regions, including Latin America, Scandinavia, and Africa, is beginning to appear (e.g., Leone and Knauf 2015). Nevertheless, beyond the capitalist core, the colonial world system brought into play diverse modes of production – European-imposed tribute, feudal systems, debt peonage, and indigenous practices (Wolf 1982; Stern 1993a, b); introduction of the full-fledged, wage labor-based capitalist mode of production has been variable across time and space and still does not prevail everywhere in the developing world. Thus, as Charles Orser (2010: 114) notes, insisting that capitalism is the true subject of historical archaeology is Eurocentric. For this reason, many historical archaeologists outside the "developed world" have explored a different set of issues rooted in the colonial/postcolonial condition, including domination and resistance and sociocultural identity (Funari et al. 1999).

Since the 1980s, when historical archaeology was in its infancy, two key approaches have dominated the literature in the USA; both, not surprisingly, are forms of neo-Marxism. Critical neo-Marxists (or "critical theorists") are concerned with how the dominant ideology masks social inequalities, how capitalists use this ideology to perpetuate the system, and how workers use it to negotiate the system's demands. World systems researchers "break the crust of Marxism" (Wallerstein 2007: 14) by examining the relations of production beyond the boundaries of the state; they examine local or regional data through the lens of global economic links in order to follow the broad, systemic processes of change that occur as regions integrate into the expanding capitalist world economy or undergo booms and busts that shift their position within the hierarchy of global economic interaction. Since the start of the new millennium, some archaeologists have taken a third approach, classical Marxist dialectical analysis, in which researchers look for the contradictions inherent in the capitalist system – the opposing elements that make up the whole (Orser 1996: 185–187).

Yet studying capitalism is problematic; archaeologists disagree on its definition and on when it began. The critical theorists generally begin with the eighteenth century. It is then, in the USA, that "putting-out" capitalism, in which surplus goods were produced in the household and sold to merchants for resale at profit, began to shift toward capitalist labor relations in the Marxist sense. Two interrelated factors facilitated this change. Laissez-faire capitalism overrode state regulations on trade, allowing merchants increasing wealth and control. Merchants at the top were able to purchase the means of production, and the resulting wealth allowed them to industrialize. The essential condition of industrial capitalism is the abstraction of labor. Labor is separated from the household context. Workers no longer own the means of production; instead, they must sell their labor – the only commodity they still possess – to the capitalists. This break with the past precipitated radical changes in the structures of everyday life, which are the main subject of the critical theorists' investigations.

Yet the central purpose of capitalism is to produce wealth from profits made through the sale of commodities at prices higher than the cost of making them (Matthews 2010: 16), and this kind of economic system has been functioning since well before industrialization. Thus some researchers take the sixteenth century as their point of departure. Though capitalism in this epoch usually did not involve the abstraction of labor (Wolf 1982: 86–87), Orser (1996: 27) lays out a set of intertwined "haunts" that he defines as the true subject of historical archaeology – "Eurocentrism, colonialism, capitalism, and modernity" – all of which are rooted in the age of European expansion.

Orser is not a world systems researcher, per se, but he is interested in the changes the growing capitalist world economy has wrought on disparate communities across the globe (e.g., 1996: 18–21) since the dawn of the sixteenth century. And as investigators directly linked to world systems theory, including historical sociologist Andre Gunder Frank (1979) and cultural

anthropologist Eric Wolf (1982) point out, multiple political-economic systems can participate in the same world system. Thus trade flourished between Europe's petty kingdoms and the Mongolian empire in the thirteenth century (Abu-Lughod 1989), and goods produced under various economic systems in Europe, Asia, and the New World flowed into the Europe-dominated global economy in the sixteenth century. Wallerstein, one of the chief formulators of world systems theory, wrote (1979: 6) that in the sixteenth century "we saw the full development and economic predominance of market trade. This was the system called capitalism. Capitalism and a world economy (that is, a single division of labor but multiple polities and cultures) are obverse sides of the same coin."

A world economy is built on what Annales historian Braudel (1986: II:582) called "the miracle of long-distance exchange" – the wider the circulation net, the more profitable it becomes. Wallerstein's single division of labor is the key characteristic of this widening exchange; with it comes interpenetrating accumulation, in which elites in one polity capture part of the surplus exacted by their counterparts in another (Gills and Frank 1991). Interpenetrating accumulation is systemic – it engages people from multiple social strata, creating a complex political economy that shifts some labor (formerly invested in domestic production) to surplus production for exchange. As more workers are tied up in production for long-distance trade, more surplus in essential domestic goods is needed to meet local and regional demands. Markets arise to distribute goods that supplement domestic economies, and monetarization emerges so that prices for commodities can be fixed.

Interpenetrating accumulation and markets are necessary but not sufficient conditions of incipient capitalism (Braudel 1986: II: 589–594; Blanton 1985) – the crucial factor is the appearance of economic forces unregulated by the state. Strong states control accumulation and dampen competition; under weaker political conditions (such as the petty kingdoms of medieval Europe), merchants can reach the top of the economic ladder, from which they can control surplus production and distribution. In some cases, the conditions for incipient capitalism were in place even before the sixteenth century. Historical sociologist Janet Abu-Lughod (1989) finds them associated with thirteenth-century textile industry in Flanders; Braudel (1986: II: 589–594) argues for their presence more generally in feudal Europe and in late feudal Japan. These studies are based on the written record, though the documents were sifted for material evidence. And there is archaeological evidence of pre-sixteenth-century capitalism in late pre-Hispanic Mesoamerica. Within the late pre-Hispanic Mesoamerican world system (Blanton and Feinman 1984; Smith and Berdan 2003), traders from the Aztec tributary empire exchanged goods with their counterparts from the small, politically decentralized polities of Yucatan, where Kepecs (2003, 2005) finds evidence for incipient capitalist conditions in both the material record and the native *Books of Chilam Balam*. (The *Books of Chilam Balam* are colonial period documents written in Yucatec but in European script, though the literate pre-Hispanic Maya wrote in glyphs. The books, which mixed prophecy and history, were kept throughout the colonial epoch, though they contain sections that clearly refer to the late pre-Hispanic past). What distinguishes incipient capitalism from its modern counterpart is core-periphery hierarchy, which refers to the so-called developed world and the developing world – a phenomenon that emerged as Europe became the core of the global economy in the sixteenth century (Kepecs and Kohl 2003).

Background and Development

The use of the critical neo-Marxist and world systems frameworks in archaeology began in the 1980s. Both appeared in response to processualism, a generalizing, positivist practice aimed at discovering general laws of human behavior (Binford 1968; also see Trigger 1989) that characterized the cutting edge of prehistoric archaeology during the 1970s and early 1980s. Processualism was also, as its name implies, about processes – it developed in response to the cultural-historical explanations of culture change

rooted in early-twentieth-century archaeological practice. The atheoretical culture historians explained change as the result of migration or diffusion, leading to notions such as the one that Mesoamerica's pre-Hispanic pyramids were built by ancient Egyptians. The processualists believed that social formations developed in situ, through similar general processes that could be found worldwide (i.e., population pressure on resources led to increased organizational complexity and sometimes to eventual collapse).

Critical neo-Marxism is one of numerous post-processualist approaches, which were forged in the crucible of European philosophy between the World Wars (Johnson 2006: 126). Post-processualism is a radical departure from processualism because it focuses on historical rather than general processes. Further, post-processualists are concerned with how the investigator, in the present, interprets the past. In this context the critical theorists are activists, engaged in a two-pronged pursuit: they aim "to produce the enlightenment necessary to overcome the coercive social forces that have facilitated the longterm success of capitalism" (Leone et al. 1987: 284) and also to clarify how specific political interests are served by archaeological interpretations made in the present (Leone 2010; Preucel 1995).

World systems theory, a branch of historical sociology, entered pre-Hispanic archaeology when some processualists, unable to explain certain diachronic changes in their archaeological data in regional terms, sought a way to examine macroregional shifts without resorting to simplistic claims of migration or diffusion (e.g., Blanton and Feinman 1984). World systems research is historical, in that its aim is to account for the rise and persistence of capitalism. But like processualism, it also is comparative – observed local or regional patterns are considered in the context of macroregional information and then, through appropriate middle-range assumptions, checked against the model. General world systems characteristics include core/periphery hierarchy, interpenetrating accumulation, and also a number of long- and short-term cycles in which the world economy rises and falls (Frank 1979; Wallerstein 1974; Modelski and Thompson 1996).

Orser (1996: 184–190, 2014: 66–69) calls for a dialectical approach, exhorting historical archaeologists to look for the contradictions inherent in the capitalist system. He notes that contradictions can arise within social units – households, settlements, and societies – but they also occur across the netlike connections of the world system, and thus the dialectical approach must be multiscalar. It also must be diachronic, because the social relations that exist in any given period are the result of earlier processes. Dialectical scholarship is inherently activist, using archaeological information to help clarify dynamic tensions in the material histories of present and past, bosses and labor, and race and class.

Critical Neo-Marxist Studies

Most investigations to date are informed by the critical neo-Marxist perspective. The roots of this research are found in James Deetz' *In Small Things Forgotten: The Archaeology of Early American Life* (1977). Deetz examined various material categories – houses, gravestones, foodways (faunal remains), ceramics, cutlery, and furniture – and found a consistent pattern: between 1760 and 1800, a profound shift in American material culture occurred. House forms, once vernacular, with corporately used, multipurpose space, gave way to formal, symmetrical structures with specialized spaces, based on English interpretation of Renaissance style. The Georgian style quickly was adopted in urban New England. With this transition came additional changes that underscored increasing social isolation. The colonists once ate from shared wooden vessels, called trenchers; in the Georgian epoch, individual place settings appeared. Foodways also shifted; ubiquitous stews gave way to meals in which meats, vegetables, and carbohydrates were served separately, as they commonly are today.

Deetz does not name capitalism as the specific cause of this new worldview, but Leone (1999: 196–198), taking the next step, spelled out the Marxist conditions of capitalism in detail. What Deetz had observed was the shift from corporate lifeways based largely on household or community-based production to the spatially and psychologically segregated lifeways created by

the isolation of individuals who compete to operate the means of production owned by capitalist bosses. People in the capitalist workforce are treated as interchangeable modules; when it originated, this practice gave rise to a cognitive pattern in which the individual, rather than the family or community, is the social actor. Moreover, while Deetz assumed uniformity in the transition that swept the American colonies in the latter half of the eighteenth century, Leone assumed that individuals would participate differently in the developing system.

For Leone and other critical neo-Marxists, the archaeological key is to understand commodities as highly symbolic social things that play an active role in capitalist society. To do this, the researcher must grasp the ideology behind the material record, a task accomplished in part by working backward from an acute consciousness of the researcher's own views. Through this process it is possible to understand how the switch from trenchers to ceramic place settings both reflects and reinforces the separation of individuals and their labor from the household context – a dual phenomenon that is imposed by the wage labor system and facilitates the capitalist mode of production.

Leone has applied this approach to a variety of cases including the William Paca Garden in Annapolis, Maryland (e.g., 2010: 67–84), a formal, planned landscape originally created in the 1760s and reconstructed in the 1970s. Paca, a signer of the Declaration of Independence, was both a supporter of liberty and a slave owner – an inherent conflict that provides another example of increasing social segmentation. Paca's garden, set beside his Georgian mansion, was laid out in a series of segmented spaces and emphasized Renaissance principles of perspective, creating an illusion of distance. Leone argues that formal gardens of this sort used natural elements – plants and trees – and references to the past (Renaissance references to classical antiquity) to "naturalize" the social order of the present in which they were built and thereby (Leone and Knauf 2015: 13) to naturalize the exploitation of labor that is a hallmark of capitalism.

Critical theorists also consider the ways in which disenfranchised individuals or groups – women, African-Americans, and religious offshoots – managed to resist the dominant ideology while still functioning within the capitalist system. For example, in his synthetic volume on the archaeology of American capitalism, Matthews (2010: 184–187) summarizes multiple studies of colonoware – simple, low-fired pots manufactured locally by slaves and often found in rivers near large plantations. Many of these pots bear African symbols, including a cross or "X" that is the basis of a cosmogram used by the Bakongo, a Bantu group from the West African coast. The Bakongo cosmograms represent crossing over, from living to dead or material to spiritual. Thus the presence of colonoware in plantation rivers may represent a ritual designed to transcend the boundary between land and water. Most researchers, Matthews notes, interpret the use of Bakongo symbolism by African slaves as an affirmation of their spiritual heritage; yet this reasoning fails to take the American context in which these pots are found into account. In addition to their role in African rituals of transcendence, Matthews maintains, these vessels crossed the line between their potential capitalist function – that is, market value – and their spiritual function. By imbuing their pots with ritual purpose, the slaves on American plantations symbolically challenged the capitalist order.

More recently, Leone and Pruitt (2015), dissatisfied with approaching the ways in which capitalists manipulated space or how disenfranchised groups resisted as separate phenomena, have turned their attention to how slaves and landowners, as two parts of the whole population at Wye House, a plantation house in Talbot County, Maryland – together by proximity if not volition – created a new gardening culture in the early nineteenth century. Pollen data recovered from a greenhouse on the plantation suggest that the plantation owners, interested in scientific gardening, used certain flowers that open and close at set times of day to prompt servants in their work of running the plantation properly; thus there would have been a certain notion of natural time shared among plantation bosses and African-American slaves. Further, pollen data indicate that the slaves, whose knowledge of ethnobotany was

adapted for the New World through contact with Native Americans, gardened alongside the British. Both groups were greatly skilled gardeners; because of proximity, their medicinal and spiritual uses of certain plants merged to some degree.

In Mesoamerica, anthropological historical archaeologists have taken a somewhat similar though more diachronic approach, considering how indigenous groups recombine their beliefs and customs through time in response to historical circumstances that are contingent on both native and European factors (Watanabe 1990). Among standout examples, Joel Palka (2018) lays out how ancient Maya landscape rituals and the sets of beliefs involved in these practices have been recombined and recontextualized to fit nineteenth-, twentieth-, and twenty-first-century conditions in the Lacandon region of Chiapas and Guatemala. And Judith Zeitlin (2018) discusses the incorporation of Catholic imagery into the persistent material culture of sacred landscapes and shrines in Oaxaca. She also shows how traces of indigenous practices are still evident in the Catholic fairs honoring town patron saints across the Mesoamerican macroregion.

World Systems Studies

While various archaeologists have applied the world systems framework to prehistoric cases, a number of studies based on historical time frames are few. Within that small set, some researchers simply have employed the notion of the world system without engaging the elements of world systems theory. Stanley South et al. (1988), for example, set out to show how the sixteenth-century Spanish colonial settlement of Santa Elena, South Carolina, was linked to the world system. South's meticulously quantitative analysis of artifact types – useful in itself – was tied to a series of assumptions about artifact variability and frequency, but in fact almost all of these were aimed at determining patterns not directly tied to the world system, such as public versus private structures or elite versus laborer dwellings. Only one very simple assumption – that certain artifact types would serve as indicators of the world trade network – was expressly related to the stated theme.

Thomas Charlton et al. (2005) similarly used pottery as an indicator of the Spanish-dominated world system. These researchers compared the ceramics of early colonial Mexico City/Tenochtitlán, the regional center of the externally imposed "Hispanic worldwide empire" (Charlton et al. 2005: 50), with pottery from Otumba, a rural settlement in the Basin of Mexico. In Mexico City/Tenochtitlán, ceramic change was rapid; Spanish and Oriental ceramics were introduced quickly, and locally made indigenous wares showed clear Spanish influence. At Otumba, on Mexico City's periphery, ceramic change was minimal, indicating weaker integration into the Spanish world system.

However, some investigators have considered the systemic effects of world systems processes, which they access by bringing some of the comparative elements of the world systems framework into play. Groover (2005) focuses on a single farmstead in southern Appalachia to show how this region, a subsistence farming backwater in the eighteenth century, became an internal periphery within the economic core in the 1800s. This shift occurred when the immense plantations of the deep south became so dedicated to monocropping cotton that they were no longer able to raise food for their slave labor forces. To fill the gap, Appalachian farmsteads began producing surplus for the plantation market. When the plantation economy declined, partly as the result of westward expansion, production at Groover's farmstead also dropped. Groover also links his work to that of the critical theorists, noting that when his farmstead became integrated into the capitalist market, household space became compartmentalized and ceramic inventories increased. Yet the social processes of urban capitalism were incomplete in this rural periphery since foodways retained their essential folk character.

Alexander's (1999) world systems-based analysis of central Yucatan, on the global periphery of the world system, provides another important point of comparison to core capitalism. She uses written and material evidence to show statistically variable degrees of capitalist market integration among small independent ranchos (small rural settlements), pueblos (small aggregated settlements),

cabeceras (administrative towns), and small cattle haciendas in the nineteenth century. Though market integration was low in all cases, most of the settlements in her study, regardless of size, yielded some evidence of nonlocal, usually foreign goods – evidence that local producers participated, to varying degrees, in the global market system and thus produced some surplus for exchange. Nevertheless, the degree of world systems integration in this peripheral region was insufficient to create the compartmentalized, disenfranchised labor force demanded by industrial capitalism in the core.

Kepecs (2003, 2005, 2018) applies a longue durée world systems approach to the northeast corner of Yucatan state, Mexico. She uses written and material evidence from the late pre-Hispanic era to reveal conditions of incipient capitalism: intensive surplus production, regional and macroregional markets, interpenetrating accumulation, visible macroregional ideology of trade and production, and competition among the Maya merchant kings of several small polities on the northeast coast. The systemic exchange in which these rulers engaged involved bulk goods – fine white Yucatecan salt was traded for cacao grown on the humid plains of the Gulfs of Mexico and Honduras. Specialized labor for the extraction of salt, a highly localized resource, was, in fact, separated from the household context; as in industrial capitalism, rulers or entrepreneurs controlled, to large degree, the means of production. In the early colonial epoch, indigenous workers here amassed great quantities of salt for the Spaniards' profit; yet at the same time, the Maya retained a separate, clandestine economy. In addition to salt harvested for Spanish enterprise, they produced enough surplus to supply their own long-distance exchange circuits. In return for salt they received cacao, incense, and ceramic incensarios produced by other Maya groups in the Guatemalan Petén.

Throughout the first century of Spanish rule, this region was the scene of bloody Maya uprisings; eventually the Spaniards retreated to their administrative centers elsewhere in Yucatan. By examining the trajectory of the northeast area from the late colonial era to the present through the temporal lens of Kondratieff waves – global boom and bust cycles that generally span 40–60 years (Modelski and Thompson 1996) – Kepecs (2018) shows how the region became a backwater in the dominant, Spanish-driven economy but was involved in the economic booms and busts of the world system through illegal exchange with pirates from non-Spanish Europe. Lack of Spanish infrastructure and administration in the northeast led to quasi-isolation; today infrastructure and administration remain weak, and the area is involved in new forms of piracy, including narcotraffic and illegal fishing for sea cucumbers, much desired in Asian markets.

Dialectical Studies

Orser (2011: 539) called for a dialectic approach to the interactions between economics, class, race, and power within both specific sociohistorical contexts and the capitalist world system. Although leaders in the field have advocated this approach for a long time (Leone and Knauf 2015: 4), it has been underutilized until recently. Among the most salient current examples are works by Wurst and Ridarsky (2014) and Dawdy (2010). Wurst and Ridarsky (2014) reveal the contradictions between government narratives and life lived by the poor, using an example from the Finger Lakes National Forest in New York. The region had been settled by small farmers in the nineteenth century. The archaeological record reveals capital investments in the 1870s, increasing diversification of crops, and substantial consumption of consumer goods, including automobiles, well into the 1930s. During the New Deal of the 1930s and 1940s – the government's response to the Great Depression – resettlement programs were created to move farmers off "submarginal lands." The farms Wurst and Ridarsky excavated were purchased by the government and replaced with forest; the displaced farmers were offered "better opportunities" in urban settings. Yet there is no material evidence that these lands were marginal. Instead, by reading the written record "against the grain," Wurst and Ridarsky reveal that the resettlement program was a tool of largely undocumented agricultural class warfare, aimed at appeasing wealthy new industrial agriculturalists who complained that the continuance of small farms would lead to flooded markets.

Dawdy (2010) is interested in the "ruins of modernity" – contemporary urban ruins such as abandoned factories and dying commercial districts, which hold a great deal of underutilized information about economic bust cycles. Considering these sites dialectically and focusing on her own observations of post-Katrina New Orleans, she argues that ruined urban sites are usually cast as negative spaces – but in fact, these sites, released from "the grip of private property relations" (2010: 776), become hotbeds of vibrant art, political activism, and informal economies that often involve illegal pursuits but provide an economic safety net for people who are marginalized in global bust cycles when legitimate jobs disappear (or move from the developed world to Asia, where labor is cheap).

Latin American Research on the Historical Archaeology of Capitalism

Writing from Colombia, Cristóbal Gnecco (2015) takes a critical theory approach to the commodification of heritage sites, aiming to decapitalize archaeology by granting indigenous people agency to interpret ancestral remains according to their own internal logic. In the modern, capitalist world, we separate the past from the present; yet indigenous people do not necessarily frame time in modern terms. Gnecco provides an example: indigenous people living on the Juan Tama reservation on southwest Colombia today see the archaeological remains there – stone sculptures and ceramic pots – as living historical beings who possess the territory and with whom contemporary residents commune. A critical anthropological archaeology of capitalism, Gnecco concludes, must be done from the bottom up – by native people with ties to the land whose non-Western, noncapitalist, nonmodern temporal perspectives must be recognized as fully legitimate archaeological interpretations.

Gnecco is a pioneer of this approach in Latin America; the great majority of Latin American historical archaeologists concerned with capitalism are modernists with Western educations who deal with the issue empirically, though their studies are tightly focused, in contrast to the culture history of the early twentieth century in the USA. For example, Andrews et al. (2006) (the lead author on this entry is a US citizen and teaches in the USA; however, he grew up in Yucatan and is part of a Yucatecan research team) lay out the archaeological record of El Real de Salinas, a late-nineteenth-century port on the coast of Campeche, Mexico, from which salt, dyewood, and other coastal resources were harvested in great quantities and shipped to other parts of Mexico and beyond. This is the only work to date that provides detailed descriptions of productive and shipping infrastructure built to facilitate the export of raw materials from the world systems periphery to the USA, which, by this time, had superseded Britain as the global economic core.

In Argentina, Schavelzon (2002) addresses some of the concerns of both critical neo-Marxism and the world systems framework in his detailed look at the rise of capitalism in Buenos Aires, but he does not address directly the theoretical positions of these approaches. Instead, he documents the rise of the bourgeoisie by focusing on the increasing material evidence of European goods from the sixteenth through nineteenth centuries. Schavelzon notes the incorporation of individual eating utensils following the rise of Britain's Industrial Revolution, but there is no accompanying consideration of whether this phenomenon was linked to a shift toward social isolation or whether that occurred later in the nineteenth century when production in Argentina was industrialized.

Sanoja and Vargas-Arenas (2007) provide a similar, implicitly Marxist reading of the economic culture history of Santo Tomé in Guyana, Venezuela, where Capuchin missionaries from Catalonia, Spain, used slavery and feudal peonage systems to organize indigenous and African labor for the intensive production of agricultural products, silver, and cotton cloth. These goods fed an import/export economy that underwrote capitalist development in Catalonia during the colonial epoch, and after Independence surpluses that had accumulated in mission warehouses were used to finance the development of the modern capitalist state centered at Caracas.

A number of young scholars putting out papers on the Internet also are starting to consider the

historical archaeology of capitalism. For example, Cuba's nineteenth-century wealth was built on slave labor, but the fruits of the island's plantations allowed Cuba's elite to accumulate wealth and abundant goods from the global capitalist market. Until now Cuban historical archaeologists working in Old Havana have not discussed overtly the links between these luxury goods and the capitalist system in Europe and the USA that produced them or addressed the class divisions that arose from this wealth on the island. But one young investigator, Darwin Arduengo-García (2011) points out that the written and material records of Old Havana will allow researchers to follow the steps of Havana's integration into the nineteenth-century world capitalist market.

Key Debates

There is no question that the study of capitalism is a major area of investigation in the field of historical archaeology, though debates about how best to approach the subject remain. Tightly focused empirical studies like those by Andrews et al., Schavelzon, and Sanoja and Vargas make important contributions to the literature without the baggage of explicit theory. This raises the issue of whether a theoretical perspective is always important. In fact, given the ongoing explosion of philosophy-derived, terminologically imprecise, post-processual approaches, some US archaeologists are returning to cultural-historical practice (see Pauketat 2001: 74), albeit with the kind of systematic focus that typifies the Latin American work.

Nevertheless, using theoretical frameworks as a way to organize empirical information and compare it with similar cases can facilitate important insights. The historical archaeology of capitalism has advanced through all three approaches discussed here, though all are subject to critique. There is a fine line between critical neo-Marxism, which takes the investigator's own political consciousness into account when interpreting the past (Leone 2010: 54–55), and phenomenology, a school of post-processual thought in which interpretations are based on the investigator's personal experience (Preucel 1995). Phenomenological research is inherently subjective; Matthews' argument about the colonoware pots, encapsulated above, is a case in point. While the pots, given their archaeological provenience, may well have been used ritually, Matthews offers no information supporting his claim that these rituals were designed to challenge the capitalist order. Rather, that is how Matthews himself, as a twenty-first-century archaeologist looking for ways to challenge the capitalist order, reads the evidence.

Another problem with critical theory is that it often fails to hook the structures of everyday life to the global political-economic forces that created them. Although critical theory and world systems approaches can function together, as the studies by Groover and Alexander, cited above, confirm, many historical archaeologists have yet to grasp how world systems theory actually works. Criticisms abound. To make the world systems approach viable, Orser (2010: 119–120) contends, archaeologists will have to find new ways to use it "that move beyond simply noting that similar artifacts occur in diverse places in the world." Other misunderstandings include the idea that world systems theory fails to provide ways to study indigenous cultures, is unable to deal with issues of resistance, offers no links between past and present, and has no mechanism to account for emotion or failure (Leone and Potter 2003: 4–5). It is indisputable that world systems theory does not account for emotion, though emotions are not artifacts – without direct support from the written record, any interpretation of potsherds that attributes feelings to the possessors of the original pots will be subjective. The rest of the criticisms, however, do not hold up. World systems studies account for failure by considering decline in the context of economic cycles, as Groover's above-cited study shows. Groover, Alexander, and Kepecs are among world systems archaeologists who go considerably beyond finding similar artifacts in diverse places – they deal with the systemic consequences of capitalism, and their studies variably involve indigenous groups, resistance, and change through time.

Future Directions

Leone and Knauf (2015: 8; also Roller 2015: 25) call for an archaeology of the present and the very recent past, and indeed, some of the most dramatic possibilities for relevance lie in material studies of the world in which we live. Dawdy's (2010) consideration of urban ruins of the late twentieth and early twenty-first century in the USA provides a template for a great deal of future work in this vein.

There is tremendous potential for research in the near past in Latin America as well. During the latter half of the twentieth century, for example, leftist rebellions across Latin America threatened US capitalist interests in the periphery. Yet much remains unknown about this clash. Patricia Fournier and Jorge Martínez Herrera (2009) provide a brave road map for a multidisciplinary study, yet to be implemented, of the Tlatelolco massacre that occurred in the Plaza de las Trés Culturas at the heart of Mexico City in October 1968. On the eve of the Olympic Games, slated for the stadium at the National Autonomous University of Mexico, the CIA put down a massive, largely student-led demonstration against Mexico's glaring political-economic injustices. In the name of core capitalism, untold numbers of demonstrators were murdered or disappeared. Almost all of the evidence was covered up by the Mexican government. Fournier and Martínez Herrera (2009: 169) call for forensic anthropologists, archaeologists, and historians to retrieve missing information, to recover historical memory through analysis of material culture, and to finally record the details of state terrorism carried out in the name of protecting US financial interests. Projects such as this have the potential to unmask late-stage capitalism in the periphery and to awaken the public at large to the crucial role of historical archaeology.

Yet recent events do not stand alone. Leone (2010: 7–11) and Alexander and Kepecs (2018) among others call for making the historical archaeology of capitalism socially relevant by connecting the present to the past. This is not always easy; as realized to date, much historical archaeology is not fully diachronic. Leone and Pruitt, in their 2015 study of Wye House cited above, want to link the African-American gardening practices they see in excavated pollen data to African-American gardens in eastern Maryland today. But to date they have only been able to observe these gardens from the outside, which allows nothing more than tentative hypotheses. Similarly, Roller (2015) examines the written and material records of consumerism in the twentieth century. Mass-produced goods are markers of the late-modern (twentieth-century) political economy, which, Roller notes, was successful because of humans' "natural selfish inclinations" (2015: 26). But by starting his analysis in 1917, which he argues is the beginning of mass consumerism, he fails to consider the great time depth of human selfish tendencies; industrially produced luxury and semi-luxury goods (such as British whitewares in the second half of the nineteenth century) were used as markers of competitive economic identity in the nineteenth century (Fournier 2018), and the use of similar (if not factory-made) status items harks back to much earlier periods.

The long-term (longue durée) development of capitalism is a key issue, and since the archaeological record is a palimpsest, studies that follow substantial diachronic trajectories also utilize the full power of archaeology. Schavelzon, and Sanoja and Vargas take a longue durée approach to their empirical investigations of capitalism in Latin America. And a new volume on anthropological historical archaeology in Mesoamerica (Alexander and Kepecs 2018) deals with change in economic, agricultural, and ideological systems – all ultimately aspects of capitalism – from the late pre-Hispanic past through the present. To fully understand the development and persistence of capitalism, more longue durée studies will be necessary.

Cross-References

- ▶ Critical Theory in Archaeology
- ▶ Fournier, Patricia
- ▶ Funari, Pedro Paulo A. (Historical Archaeology)

▶ Historical Archaeology
▶ Historical Archaeology in Latin America
▶ Landscape Archaeology
▶ Leone, Mark P.
▶ Mexico: Historical Archaeology
▶ North America (USA): Historical Archaeology
▶ Orser, Jr., Charles E.
▶ Phenomenology in Archaeology
▶ Postcolonial Archaeologies
▶ Schávelzon, Daniel
▶ Society for Historical Archaeology (SHA) (Modern World Archaeology)
▶ World-Systems Analysis

References

Abu-Lughod, J.L. 1989. *Before European hegemony: The world system AD 1250–1350*. New York: Oxford University Press.

Alexander, R.T. 1999. The emerging world system and Colonial Yucatan: The archaeology of core-periphery integration. *Journal of World-Systems Research* 2 (8): 1780–1847. http://jwsr.ucr.edu/archive/vol2/v2_n8.php.

Alexander, R.T., and S. Kepecs, eds. 2018. *Colonial and post-colonial change in Mesoamerica: Archaeology as historical anthropology.* Albuquerque: University of New Mexico Press.

Andrews, A.P., R. Burgos Villanueva, and L. Millet Cámara. 2006. The historic port of El real de Salinas in Campeche, and the role of coastal resources in the emergence of capitalism in Yucatán, México. *International Journal of Historical Archaeology* 10 (2): 179–205.

Arduengo-García, D. 2011. La Arqueología en la Habana Intramuros y la Arqueología Social Latinoamericana. Enfoque Dialéctico de su Relación y Perspectivas. Primer Taller Nacoinal sobre Problemas Contemporáneos de la Arqueología en Cuba. http://cubaarqueologica.org/document/tprobarq6.pdf (accessed 9 Jan., 2019).

Binford, L.R. 1968. Some comments on historical versus processual archaeology. *Southwestern Journal of Archaeology* 24: 267–275.

Blanton, R.E. 1985. A comparison of early market systems. In *Markets and marketing, monographs in economic anthropology no. 4*, ed. S. Plattner, 399–418. Lanham: Maryland University Press of America.

Blanton, R.E., and G.M. Feinman. 1984. The Mesoamerican world system: A comparative perspective. *American Anthropologist* 86 (3): 673–6682.

Braudel, F. 1986. *Civilization and capitalism 15th–18th century, The wheels of commerce*. Vol. II. New York: Perennial Library Edition, Harper and Row.

Charlton, T.H., C.L. Otis Charlton, and P. Fournier García. 2005. The basin of Mexico A.D. 1450–1620: Archaeological dimensions. In *The postclassic to Spanish-era transition in Mesoamerica: Archaeological perspectives*, ed. S. Kepecs and R.T. Alexander, 49–63. Albuquerque: University of New Mexico Press.

Dawdy, S.L. 2010. Clockpunk archaeology and the ruins of modernity. *Current Anthropology* 51 (6): 761–778.

Deetz, J. 1977. *In small things forgotten: The archaeology of early American life*. Garden City: Anchor Press/Doubleday.

Fournier, P. 2018. Material culture, status, and identity in Central Mexico: Urban and rural dimensions. In *Colonial and postcolonial change in Mesoamerica: Archaeology as historical anthropology*, ed. R.T. Alexander and S. Kepecs. Albuquerque: University of New Mexico Press. pp. 161–182

Fournier, P., and J. Martínez Herrera. 2009. Mexico, 1968: Among Olympic fanfares, government repression and genocide. In *Memories from darkness: Archaeology of repression and resistance in Latin America*, ed. P. Funari, A. Sarankin, and M. Salerno, 145–176. New York: Springer Science+Business Media, LLC.

Frank, A.G. 1979. *Dependent accumulation and underdevelopment*. New York: Monthly Review Press.

Funari, P., S. Jones, and M. Hall. 1999. Introduction: Archaeology in history. In *Historical archaeology: Back from the edge*, ed. P. Funari, M. Hall, and S. Jone, 1–20. London: Routledge.

Gills, B.K., and A.G. Frank. 1991. 5000 years of world system history: The cumulation of accumulation. In *Core/periphery relations in precapitalist worlds*, ed. C. Chase-Dunn and T. Hall, 67–112. Boulder: Westview Press.

Gnecco, C. 2015. Historical archaeology bottom-up: Notes from Colombia. In *Historical archaeologies of capitalism*, ed. M.P. Leone and J.E. Knauf, 2nd ed., 327–344. Switzerland: Springer International Publishing.

Groover, M. 2005. The Gibbs farmstead: Household archaeology in an internal periphery. *International Journal of Historical Archaeology* 9 (4): 229–289.

Johnson, M. 1996. *An archaeology of capitalism*. Oxford, UK: Blackwell Publishers.

Johnson, M. 2006. On the nature of theoretical archaeology and archaeological theory. *Archaeological Dialogues* 13 (2): 117–132. Cambridge University Press, UK.

Kepecs, S. 2003. Chikinchel. In *The postclassic Mesoamerican world*, ed. M.E. Smith and F.F. Berdan, 259–268. Salt Lake City: University of Utah Press.

Kepecs, S. 2005. Mayas, Spaniards, and salt: World systems shifts in 16th century Yucatán. In *The postclassic to Spanish-era transition in Mesoamerica: Archaeological perspectives*, ed. S. Kepecs and R.T. Alexander, 117–138. Albuquerque: University of New Mexico Press.

Kepecs, S. 2018. The longue durée, from salt to sea cucumbers: Kondratieff waves in Chikinchel, on the very far

periphery. In *Colonial and postcolonial change in Mesoamerica: Archaeology as historical anthropology*, ed. R.-T. Alexander and S. Kepecs, 283–333. Albuquerque: University of New Mexico Press.

Kepecs, S., and P. Kohl. 2003. Conceptualizing macroregional interaction: World-systems theory and the archaeological record. In *The postclassic Mesoamerican world*, ed. M.E. Smith and F.F. Berdan, 14–20. Salt Lake City: University of Utah Press.

Leone, M.P. 1999. Ceramics from Annapolis, Maryland: A measure of time routines and work disciplines. In *Historical archaeologies of capitalism*, ed. M.P. Leone and P.B. Potter Jr., 195–216. New York: Klewer Academic/Plenum Publishers.

Leone, M.P. 2010. *Critical historical archaeology*. Walnut Creek: Left Coast Press.

Leone, M.P., and J.E. Knauf. 2015. Introduction to historical archaeologies of capitalism. In *Historical archaeologies of capitalism*, ed. M.P. Leone and J.E. Knauf, 2nd ed., 3–24. Switzerland: Springer International Publishing.

Leone, M.P., and P.B. Potter Jr. 2003. Introduction: Issues in historical archaeology. In *The recovery of meaning: Historical archaeology in the eastern United States*, ed. M.-P. Leone and P.B. Potter Jr., 1–23. New York: Percheron Press.

Leone, M.P., and E.F. Pruitt. 2015. Archaeology of telling time: Plants and the greenhouse at Wye House Plantation. In *Historical archaeologies of capitalism*, ed. M.-P. Leone and J.E. Knauf, 2nd ed., 103–126. Switzerland: Springer International Publishing.

Leone, M.P., P.B. Potter, and P.A. Schackel. 1987. Toward a critical archaeology. *Current Anthropology* 28 (3): 283–292.

Matthews, C.N. 2010. *The archaeology of American capitalism*. Gainesville: University Press of Florida.

Modelski, G., and William R. Thompson. 1996. *Leading sectors and world powers: The coevolution of global economics and politics*. Columbia: University of South Carolina Press.

Orser, C.E., Jr. 1996. *A historical archaeology of the modern world*. New York: Plenum Press.

Orser, C.E., Jr. 2010. Twenty-first-century historical archaeology. *Journal of Archaeological Research* 18: 111–150.

Orser, C.E., Jr. 2011. The archaeology of poverty and the poverty of archaeology. *International Journal of Historical Archaeology* 15: 533–543.

Orser, C.E., Jr. 2014. *A primer on modern-world archaeology*. Clinton Corners: Eliot Werner Publications.

Palka, Joel. 2018. Cross-cultural interaction and Lacandon ethnogenesis in the southern lowland Maya frontier, 1750–2000. In *Colonial and postcolonial change in Mesoamerica: Archaeology as historical anthropology*, ed. R.T. Alexander and S. Kepecs, 227–253. Albuquerque: University of New Mexico Press.

Pauketat, T.R. 2001. Practice and history in archaeology: An emerging paradigm. *Anthropological Theory* 1 (1): 73–97. Sage Publications online, http://ant.sagepub.com/cgi/content/abstract/1/1/73.

Preucel, R.W. 1995. The postprocessual condition. *Journal of Archaeological Research* 3 (2): 147–175.

Roller, M. 2015. *Historical archaeologies of capitalism*. 2nd ed, 25–50. Switzerland: Springer International Press.

Sanoja, M., and I. Vargas-Arenas. 2007. La Experiencia Capitalista Misional en Guayana, Venezuela: 1700–1817. *Revista Atlántica-Mediterránea de Prehistoria y Arqueología Social* 9: 163.

Schavelzon, D. 2002. *The historical archaeology of Buenos Aires: A city at the end of the world*. New York: Klewer Academic Publishers.

Smith, M.E., and F.F. Berdan, eds. 2003. *The postclassic mesoamerican world*. Salt Lake: University of Utah Press.

South, S., R.K. Skowronek, and R.E. Johnson. 1988. *Spanish artifacts from Santa Elena, Anthropological studies #7*. Columbia: University of South Carolina Institute of Archaeology and Anthropology.

Stern, S.J. 1993a. Africa, Latin America, and the splintering of historical knowledge: From fragmentation to reverberation. In *Confronting historical paradigms*, ed. F. Cooper, A.F. Isaacman, F.E. Mallon, W. Roseberry, and S.J. Stern, 3–20. Madison: University of Wisconsin Press.

Stern, S.J. 1993b. Feudalism, capitalism, and the worldsystem in the perspective of Latin America and the Caribbean. In *Confronting historical paradigms*, ed. F. Cooper, A.F. Isaacman, F.E. Mallon, W. Roseberry, and S.J. Stern, 23–83. Madison: University of Wisconsin Press.

Trigger, B.G. 1989. *A history of archaeological thought*. Cambridge, UK: Cambridge University Press.

Wallerstein, Immanuel. 1974. *The modern world system*. New York: Academic.

Wallerstein, Immanuel. 1979. *The capitalist worldeconomy*. Cambridge, UK: Cambridge University Press.

Wallerstein, Immanuel. 2007. *World-systems analysis: An introduction*. Durham: Duke University Press.

Watanabe, John M. 1990. From saints to shibboleths: Image, structure, and identity in Maya religious syncretism. *American Ethnologist* 17: 131–150.

Wolf, E.R. 1982. *Europe and the people without history*. Berkeley: University of California Press.

Wurst, L., and C.L. Ridarsky. 2014. The second time as farce: Archaeological reflections on the new deal. *International Journal of Historical Archaeology* 18: 224–241.

Zeitlin, Judith. 2018. Indigenous communities, colonization, and interethnic interaction in Tehuantepec, 1450–2008. In *Colonial and postcolonial change in Mesoamerica: Archaeology as historical anthropology*, ed. R.-T. Alexander and S. Kepecs, 183–203. Albuquerque: University of New Mexico Press.

Capsicums/Chiles: Origins and Development

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Basic Species Information

Chile peppers are the fruits of Neotropical plants that are classified within the genus *Capsicum* (Fig. 1). At least five different species of chile peppers were brought into cultivation and were eventually domesticated by the indigenous peoples of the Neotropics. These five species are still in cultivation today around the globe, and the pungency of chiles, a result of the chemical capsaicin in the tissues of the fruit and seeds, can range from nearly nonexistent in sweet peppers to searingly spicy in other cultivars (Andrews 1984).

Capsicum annuum is very likely the most widely cultivated species, and common cultivars in the Americas are sweet bell, *poblano*, and *jalapeño* peppers. The species *Capsicum baccatum* includes the cultivar *aji amarillo*, a chile that is integral to Peruvian cooking. *Capsicum chinense* varieties include the *habanero* and Scotch bonnet peppers, both known for their intense heat. *Capsicum frutescens* is the species that includes the famous Tabasco pepper and is considered by some to be wild rather than domesticated. Varieties of peppers like the *rocoto* and *manzano* that thrive in higher elevations are classified in *Capsicum pubescens*, and differ from the other species of peppers in their seed color, a velvety black.

Capsicums/Chiles: Origins and Development, Fig. 1 Various modern cultivars of peppers (four species represented). (Photo by Linda Perry)

Major Domestication Traits

While it is generally agreed upon that the genus *Capsicum* arose in Bolivia, the regions in which each species was initially brought into cultivation and eventually domesticated are subject to debate. Prior to the arrival of humans in the Neotropics, the fruits and seeds of the wild ancestors of each domesticated species of pepper would have been dispersed by birds and other animals (Pickersgill 1984). Thus, the first humans to arrive would have encountered the small, brightly colored fruits over a broad, tropical landscape. A combination of various lines of evidence including archaeological data, phytogeography, and genetic analyses have led researchers to suggest that *Capsicum annuum* was initially domesticated in Mexico or northern Central America, *Capsicum frutescens* in the Caribbean, *Capsicum baccatum* in lowland Bolivia, *Capsicum chinense* in northern lowland Amazonia, and *Capsicum pubescens* in the mid-elevation southern Andes (Pickersgill 1971, 1984; Loaiza-Figueroa et al. 1989; Eshbaugh 1993).

The most solid evidence for the use of chiles by ancient humans is derived from archaeobotanical remains recovered from archaeological sites. Archaeobotanical remains of peppers are typically recovered as large fragments or entire fruits (macroremains) or as microscopic residues that include starch grains from the pericarp tissue of the fruit (microremains). Macroremains of chiles are usually reported from sites in unusual environments including those with arid or waterlogged conditions that allowed for exceptionally good preservation. Where preservation is less than

ideal, microscopic resides of starch grains can be recovered from sediments, ceramic sherds, and lithic processing tools (Perry et al. 2007).

The only sequence documenting the domestication of chiles comes from Mexico. The remains of wild chile peppers recovered from several levels at Coxcatlán Cave in the Tehuacán Valley are the earliest evidence for what would later become an important domesticate in this region (Smith 1967). The analysis of pepper remains from the entire cave records what is believed to be wild chile harvesting beginning about 8,000 years ago followed by the cultivation and eventual domestication of the pungent fruits of *Capsicum annuum* by about 6,000 years ago (Smith 1967). The sequence of cultivation documents changes in the fruit size from small, wild-type forms to larger, cultivated and domesticated landraces.

Microremains of chiles from sites in Ecuador, however, are derived from chiles that were already domesticated by 6,000 YBP (Perry et al. 2007). Because the wild ancestors of chiles do not occur in the local flora, the most likely scenario is that chiles were domesticated elsewhere, prior to this time and were brought into the area by trade or other human interaction. Because five distinct species of *Capsicum* were domesticated in five different areas, and there are few early sites that have yielded remains, there is a great deal more work that needs to be completed to locate the origins of these plants and track their trajectories through human use. Nonetheless, it is clear that chiles were an early domesticate in the Neotropics.

The remains of chile peppers have been recovered from New World archaeological sites ranging temporally from about 8,000 years before present to European contact, and geographically from what is today northern Mexico, to the Caribbean, to coastal South America (for a review, see Perry 2012). Thus, the use of chiles as a spice by human populations has great time depth and was geographically quite widespread prior to European contact.

Further, chiles have been found in sites where groups had different food procurement strategies and population sizes (Perry 2012). The remains of chiles appear first as wild-collected plant foods, then continue to occur in areas where cultivation took place in forest swidden plots, in complex drained field systems, and in both small and large agricultural fields, both nearby and far from settlements. They occur in sites that had a few, seasonal inhabitants, in medium-sized villages, in large permanent settlements, and in ceremonial feasting contexts. Chiles also occur in coastal sites, inland sites, cave sites, open air sites, highland sites, and lowland sites. Clearly, the popularity of chiles transcended time, space, and culture.

Because they are a spice plant, chiles do not occur in isolation in archaeological contexts. They appear in concert with maize, beans, and geophyte food plants, and in the case of microfossil analysis, they frequently occur together on the same tool (Perry 2012). The spice of chiles would undoubtedly be appealing to people who were subsisting on a relatively bland diet of maize, beans, roots, and tubers. These staple crops are plant foods that supply a significant portion of a person's daily calories. Chiles, in contrast, are not staple foods, but are commonly used as vegetables, as condiments, or as a spice.

The exploitation of chiles, a spice, during the earliest periods of occupation in the Americas provides solid evidence that sophisticated agriculture and complex cuisines arose very soon after initial colonization. The widespread geographic and temporal spread of archaeological remains indicates that, once chile peppers became incorporated into local cuisines, they persisted, and both ethnohistorical accounts and modern distributions indicate that humans have never lost their taste for these spicy foods.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview

▶ Genetics of Early Plant Domestication: DNA and aDNA
▶ Plant Domestication and Cultivation in Archaeology
▶ Plant Processing Technologies in Archaeology

References

Andrews, J. 1984. *Peppers: The domesticated capsicums*. Austin: University of Texas Press.
Eshbaugh, W.H. 1993. History and exploitation of a serendipitous new crop discovery. In *New crops*, ed. J. Janick and J.E. Simon, 132–139. New York: Wiley.
Loaiza-Figueroa, F., K. Ritland, J.A. LaBorde Cancino, and S.D. Tanksley. 1989. Patterns of genetic variation of the genus Capsicum (Solanaceae) in Mexico. *Plant Systematics and Evolution* 165: 159–188.
Perry, L. 2012. Ethnobotany. In *Peppers: Botany, production and uses*, ed. V.M. Russo, 1–13. London: CABI International.
Perry, L., R. Dickau, S. Zarrillo, I. Holst, D. Pearsall, D. Piperno, M. Berman, R. Cooke, K. Rademaker, A. Ranere, J. Raymond, D. Sandweiss, F. Scaramelli, K. Tarble, and J. Zeidler. 2007. Starch fossils and the domestication and dispersal of chili peppers (*Capsicum* spp. L.) in the Americas. *Science* 315: 986–988.
Pickersgill, B. 1971. Relationships between weedy and cultivated forms in some species of chili peppers (genus Capsicum). *Evolution* 25: 683–691.
Pickersgill, B. 1984. Migrations of Chili peppers, *Capsicum* spp., in the Americas. In *Pre-Columbian plant migration*, ed. D. Stone, 105–123. Cambridge: Harvard University Press.
Smith, C.E., Jr. 1967. Plant remains. In *Prehistory of the Tehuacan Valley*, ed. D.S. Byers, 220–255. Austin: University of Texas Press.

Caral: The Sacred City

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Introduction

The Sacred City of Caral-Supe was constructed by one of the oldest civilizations on the planet, created from the organized labor of its settlers, led by a dominant class, in a territory of contrasting geographic configurations.

Many know of Cusco as the capital of the Inca Empire and Machu Picchu as the estate of the last Incas, but few know, even now, that the Sacred City of Caral was built by the first political state to be formed in Peru, 4400 years before the Incas ruled.

The Caral-Supe civilization was forming in America almost simultaneously with those in Mesopotamia, Egypt, India, and China. The inhabitants of Peru were at least 1500 years ahead of those occupying Mesoamerica (where another cradle of civilization has been identified, of six that are acknowledged worldwide) and more than 3000 years ahead of the society that built the well-recognized Mayan cities.

Unlike other cradles of civilization, such as Mesopotamia, Egypt, and India, that interchanged knowledge and experiences, Caral-Supe attained advancement without any precedents, in complete isolation from its contemporaries either in America or the Old World.

In Peru, the forms of economic, social, and political organization of the Caral-Supe people had a strong impact on the history of the area; they transcended space and time, and laid the foundations for the sociopolitical system of much of the population of the Central Andes.

In the north-central zone of Peru, the organizational model designed and implemented by the Supe State determined the actions of individuals for several centuries, in different fields: economic, social, political, and religious.

Key Issues/Current Debates/Future Directions/Examples

The Supe Society at the Dawn of Civilization

Caral is the most significant settlement of the 20 that have been identified along 40 km of the lower middle Supe Valley; each one combines public buildings with a characteristic sunken circular court and groups of domestic units. Caral is not the most extensive, but shows a planned architectonic design and substantial investment in an extensive workforce to construct the pyramidal

buildings. From the size of the settlement, and from the amount of labor invested, it is obvious that they had a hierarchical command system and a unified social organization in the valley. This pattern extended to the valleys of Pativilca, Fortaleza, and Huaura which, alongside Supe, would have constituted the territorial foundations of the original state.

The city of Caral is situated at the entrance to the middle Supe Valley, Barranca Province, at kilometer 184 on the Pan-American North Highway, in the north-central region of Peru. Due to its size and architectonic complexity, it is the most outstanding urban settlement of all those identified in Peru as flourishing between 3000 and 2000 BCE.

Caral covers 66 ha, with distinct core and marginal zones. In the center, the buildings are distributed in two large segments: one high, where one can observe the most imposing pyramidal constructions, a sunken circular court, and two massive public meeting places, as well as the domestic units of the officials and an extensive residential neighborhood. The lower segment has smaller buildings, although they display the same architectonic complexity as the amphitheater, plus a similar residential group, but less extensive. The peripheral zone has many grouped dwellings distributed as an archipelago, in "islets" along the terrace that borders the valley.

Millions of stones were cut and transported to the city for the construction of the public buildings, to remodel their architectonic designs or to cyclically bury them and build anew.

Economic Conditions that Sustained the Life and Work of Supe Society

The technological advances achieved in the areas of agriculture and fishery, in the inter-Andean valleys and on the coast, respectively, influenced the development of a productive force within the societies of the coastal valleys of the north-central region, in particular the Supe. Production of cotton and the manufacture of fiber, destined for a clothing industry and, more importantly, for nets to capture massive amounts of fish, encouraged labor specialization and favored economic complementarities, by means of a permanent exchange of goods between the agricultural and fishing settlements. This enabled the accumulation of production and the social division of labor, specialization, and exchange of goods over short and long distances.

The Social Weave and State Formation

The surpluses derived from production, as much in agriculture as in fisheries, were unequally distributed, to the benefit of the aristocratic lineage and those in charge of the activities that were necessary to guarantee continuance of the system; in this way, north-central regional communities were formed, from farmers and fishermen, or "pachucas," supervised by authorities and "principals," with their respective public buildings for administration and ceremony, their residential enclaves, and their territory of economic production.

This productive surplus favored the populations of the middle Supe Valley, being better situated for the exchange of goods. The aggregated value from manufacturing the cotton fiber and processing the anchovies and sardines, destined for exchange, enriched and augmented the prestige of the "principals" in charge of interethnic commerce. Among the authorities, the "hunu" was chief, the lord of lords of the valley and coastal settlements, and above all these "hunus" would be the lord of the whole territory between the Valleys of Santa and Chancay. This model of political organization would continue for some time in pre-Hispanic Peru.

The original state of Supe managed to mobilize large quantities of labor and, through complex relationship networks, to garner the benefits of the production surplus from an extensive territory, which included, apart from the coastal region, the Huaylas Corridor, the Huallaga, and the Marañón (the Labarynth).

The majority of the population made up the lower social strata, dedicated to agricultural or fishing activities, and to all the jobs demanded of them by the State.

The Importance of Knowledge in Civilizing Development

Under these socioeconomic conditions, there developed the sciences, technology, and the arts.

Their knowledge of astronomy, geometry, arithmetic, biology, medicine, and so on was applied to climate forecasting, the development of a calendar, the construction of architectonic works, soil management through construction of irrigation and drainage channels and the fitting-out of small farms, the genetic improvement of plants, the treatment of some afflictions and diseases, to public administration, and to the manufacture of artifacts for ceremonial, commercial, and luxury purposes. These advances in knowledge, carried out by specialists, also gave them power and improved the lifestyles of the north-central people at the dawn of civilization.

Today we can marvel at the urban orderliness, the architectonic works, and the geoglyphs that predated, by over 3000 years, the famous Nasca lines; the wall ornamentation, the musical instruments, the manufactured textiles, and the personal adornments; and the genetic variety of their produce, as represented by over a hundred small statues of unbaked clay.

The Role of Religion

An elaborate system of beliefs, ceremony, and rituals pervaded the societies of the valleys situated between Santa and Chancay, and of the mountains and jungle on their borders, articulated by the primitive political State of Supe, or attracted by its prestige. Universal mythological and symbolic complexes arose.

In the absence of a military unit, religion became the force of social cohesion and control. Life and the daily routine of the population passed by, dedicated to subsistence production as well as support for the gods, the authorities, the officials, and the public servants; at the same time they carried out construction work and the interment and remodeling of temples, for which they were periodically summoned.

Caral and Social Self-Esteem

The primary contribution of Caral to present-day society is in the area of historical knowledge, to show how ancient this civilization is, in Peru and in America, and so to modify current conceptions of the human condition on this planet.

In the more concrete case of this, our country, research at Caral allows us to understand the responses to life developed by societies that inhabited this territory before we did; we can take full advantage of the positive experiences and cast aside the unsuccessful.

From a cultural perspective, Caral is destined to become one of the most important instruments for elevating the self-esteem of Peruvians and the most prominent symbol of national identity, due to its being the first civilization, the oldest in America, and the model of the sociopolitical organization that other societies would develop in later times, in the territory of Peru. It is clear to us the creative capacity of the inhabitants of this humble territory; that with effort and organization, they managed to become a civilized state, a millennium and a half before the other populations of the continent.

From the economic point of view, the value proposition of Caral comes via the activities of research, consolidation, and restoration of its imposing monumental structures; these will convert it into a first-class tourist destination on a national and international scale, and into a source of considerable income, which will improve the living conditions of the local population and of the country in general. Due to its historical, cultural, and economic value, allocating funds to Caral is not an expense but an investment which will contribute to the development of the whole nation. We are confident about the changes in attitude: the acknowledgement of the value of our millennial history that should make every Peruvian self-affirmed and able to forge on with confidence, centered in the same vision of development, to the benefit of all of us that make up this nation.

Cultural Heritage as the Basis for Promoting Socioeconomic Development

The Caral-Supe Archaeological Zone management believes that the valley's archaeological wealth can promote the socioeconomic development of the population in their diverse aspects. To achieve that, it has proposed a master plan

of organized development with projects in various fields: agrarian, systemization of the basin catchment area, reforestation, artisan and manufacturing production, environmental sanitation, and tourist services. It is believed that this important cultural resource can be valued in an adequate social context. Then the current population will be able to identify with it as the source from which it derives a better quality of life and will not convert into a mere spectator of the well-being of visitors. With this in viewpoint, we work to obtain the support of the diverse sectors of government: central, regional, and local, as well as secular society, so that by uniting this integrated vision of development can be made reality, to the benefit of the archaeological heritage and of the current population that lives alongside.

With this outlook, the Caral-Supe Archaeological Zone management carries out archaeological excavations at Caral and at other sites on the outskirts, and contemporary to this; it studies and analyzes the materials obtained; it develops a permanent monitoring and conservation program for the architectonic structures of the site; it publishes reports both scientific and informative; it designs tourist visitor circuits; it organizes events to adequately raise awareness of the historic and cultural importance of the place; and it promotes the integrated development of the local and national populations.

The Caral Archaeological Zone

The Caral Archaeological Zone (ZAC) is a Peruvian State institution which, for 18 years, has been working in many parallel endeavors: in the scientific study of the archaeological sites of the origins of civilization, namely, Caral, Chupacigarro, Miraya, Lurihuasi, Allpacoto, Pueblo Nuevo, El Molino Era de Pando (Supe, Barranca), Áspero (Supe Puerto, Barranca), and Vichama (Végueta, Huaura); in the physical preservation of the monuments; in the value proposition of these as tourist destinations; and in the search for ways to apply an integral program for fomenting the socioeconomic development of the surrounding population centers.

Our ultimate goal is to convert the rich cultural heritage of the Caral civilization, the most ancient in America, into the axis that drives development of better living conditions for present-day society. These activities were acknowledged on an international level when, at the 33rd Convention of the Committee of World Heritage of UNESCO, the Sacred City of Caral was named a Cultural Heritage of Humanity.

Cross-References

▶ Peru: Cultural Heritage Management and Education

Further Reading

Shady Solís, R., J. Haas, and W. Creamer. 2001. Dating caral, a preceramic site in the Supe Valley on the central coast of Peru. *Science* 292 (5517): 723–726.

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Basic Biographical Information

Mercedes Cárdenas is a Peruvian archaeologist who dedicated her career to the study of Andean pre-Hispanic cultures of the Peruvian central coast. She was born at Trujillo in 1932 and studied at the Pontifical Catholic University of Peru (PUCP) receiving her degree of Doctor in History and Archaeology. Later, she became an associated researcher of the *Instituto Riva-Agüero* of the PUCP and worked under the direction of Josefina Ramos de Cox, excavating at the site of *Tablada de Lurín*, near Lima. In 1974, she convened the archaeology seminar of the *Instituto Riva-Agüero* and continued her research project at *Tablada de Lurín* until 1989. She also undertook a research project on the use of maritime resources in ancient Peru under the sponsorship of the Volkswagen Foundation and conducted survey and

excavations at the Sechura Desert in Northern Peru. She was a professor at the Archaeology Program of the PUCP. She died in 2008.

Major Accomplishments

Dr. Cárdenas research has contributed to increasing our knowledge about coastal societies of the Andean region. Her work at the site of Tablada de Lurín has allowed the recovery of information on hundreds of burials from one of the largest cemeteries of the Central Coast (1980, 1986, 1989). Her work on maritime resources and their changes through time was a pioneer study of Andean biofauna that is still a major reference for researchers (1979). She also pioneered research on the arid region of Sechura (see Cardenas 1991).

References

Cardenas, M. 1979. *A chronology of the use of marine resources in ancient Perú*. Lima: Pontificia Universidad Católica del Perú.

Cardenas, M. 1980. *Tablada de Lurín : un sitio arqueológico en la Costa Central del Perú : informe general de trabajos desde 1958–1980*. Lima: Pontificia Universidad Católica del Perú.

Cardenas, M. 1986. *Tablada de Lurín : un sitio arqueológico en la Costa Central del Perú : informe general de trabajo No.2, años 1980–1985*. Lima: Pontificia Universidad Católica del Perú.

Cardenas, M. 1989. *Tablada de Lurín : un sitio arqueológico en la Costa Central del Perú : informe general de trabajos no.3, años 1958–1989*. Lima: Pontificia Universidad Católica del Perú.

Cardenas, M. 1991. *Arqueología del Macizo de Illescas, Sechura-Piura : excavaciones en Bayóvar, Nunura, Avic, Reventazón y Chorrillos*. Lima: Pontificia Universidad Católica del Perú.

Caribbean Historical Archaeology

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Introduction

Caribbean historical archaeology comprises the study of Amerindian, European, African, and Caribbean societies and cultures from fifteenth-century European exploration to the present day. Key areas of research include multi-scalar interpretations of (1) early Spanish and European colonialism and Amerindian responses to European emergence in the region; (2) transatlantic slavery and the African diaspora; (3) plantations and other settings of production, trade, control, terror, resistance, and community; (4) African cultural survivals; and (5) Creolization and ethnogenesis. More recently, researchers have focused attention on little-investigated peoples and circumstances, such as enslaved and enslavers living on relatively small plantations and properties; free populations of color; indentured servants; interactions within and between seemingly distinct groups; under-investigated spaces and places of rural, urban, inland, and coastal landscapes; and emancipation and post-slavery periods. The field also contributes to advancements in archaeological applications of digital modeling and spatial analysis. The methods, theories, and topics pursued by Caribbean historical archaeology have helped establish cultural resource management and historic preservation policies, as well as community-based collaborative outreach, that in turn inform islands' cultural, political, and economic identities across the region and around the world.

Definition

Caribbean historical archaeology encompasses archaeological and anthropological studies of Amerindian, European, African, Asian, and

Caribbean societies and cultures from before fifteenth-century European exploration to the present day. Studies routinely combine archaeological survey, excavation, and site and artifact analysis with interpretations of historic documents, ethnohistory, and oral history. The discipline of Caribbean historical archaeology derives in part from ties with Caribbean Amerindian archaeology of the protohistoric period, North American historical archaeology, and Caribbean sociocultural anthropology, all of which address some aspects of the research foci listed above. Historical archaeology in the Caribbean increasingly involves a mix of West Indian and non-West Indian nationals, including scholars, cultural resource managers, members of for-profit and not-for-profit organizations, descendant communities, students, and the general public.

Key Issues/Current Debates/Future Directions/Examples

Key issues or areas of research include topics that demonstrate the diversity of the Caribbean's past and present. Over the last two decades, the number of volumes and reviews showcasing Caribbean historical archaeology has grown. Works such as "A Sea of Diversity: Historical Archaeology in the Caribbean" (Armstrong and Hauser 2009), "New Directions in Caribbean Historical Archaeology" (Armstrong 2013), and *Archaeologies of Slavery and Freedom in the Caribbean: Exploring the Spaces in Between* (Bates et al. 2016) outline the Caribbean Basin's past and present research trends and developments in historical archaeology and cultural resource management. Though such comprehensive overviews are relatively recent, archaeological research in the area has existed for over a century, and today the multidisciplinary field exemplifies the region's rich historical complexity and current sociocultural diversity (Armstrong 2013: 527).

Projects have interpreted the remains of sites and material culture reflecting the emergence of and contact between peoples and cultures derived from the Americas, Europe, Africa, Asia, and the Caribbean in contexts of colonialism, trade, globalization, power, slavery, and freedom (Armstrong 2013: 527). Three of the discipline's longest-standing research foci concern (1) Amerindian sociocultural actions and identities in response to and manipulation of European contact; (2) European colonialism, control, and compromise of people and resources; and (3) the endurance of enslaved and free African-descent communities and their fights for liberty. These three areas of research developed out of studies evaluating pre-European contact Amerindian settlements and occupations in the Caribbean. By the early twentieth century, scholars of Amerindian Caribbean lifeways reconstructed the cultures and societies of Taínos and their predecessors by working back from historical period Amerindian sites and European documents containing ethnohistoric information (Curet and Hauser 2011). They connected this data to earlier occupation evidence to interpret change and continuity from the earliest periods of occupation to the post-European contact era. There next emerged by the mid-twentieth-century investigations of European, primarily Spanish, exploration, colonization, and adaptation to diverse environments in the region. Scholars have attempted to reconstruct landfalls and early settlements devised by Christopher Columbus, his envoys, and subsequent expeditions in Hispaniola (the island comprised of the Dominican Republic and Haiti) (Ewen 1991), Florida (Deagan 1988) and other locales.

Though not completely, European explorers and settlers documented their presence in the Caribbean through official and personal records (Armstrong and Hauser 2009: 588). Accounts from the likes of settlers, travelers, military and government personnel, clergy, property owners, and traders contain insight into daily life, unique events, and physical and social surroundings that remain useful to historical archaeology interpretations. Certain pieces, such as Jeremiah Murphy's 1859 description of Jamaica's Fort James, voiced the desire to preserve and restore historic buildings and landmarks (Armstrong and Hauser 2009: 588). About the same time, the Natural History Museum of the Jamaican Society (founded in 1830) and the Institute of Jamaica (founded 1879) increased efforts to document landscapes,

architecture, and settlements, most of which pertained to European military sites, plantations, trade networks, and places of religious worship (Armstrong and Hauser 2009: 588). Such efforts sparked early twentieth-century preservation attempts elsewhere in the region, such as at the colonial forts of El Morro in Puerto Rico, Brimstone Hill in St. Kitts, and the Citadel in Haiti (Armstrong and Hauser 2009: 588). Since such early efforts, increased numbers of diverse archaeological, cultural, and historical sites of interest are analyzed and protected, despite differences in the amounts of preservation and analysis carried out on each island (Siegel and Righter 2011). Without such long-standing interests in Caribbean cultural history, current understandings and preservation programs might not be as rich or as well supported.

By the 1960s and 1970s, historical archaeology and anthropology in the Caribbean gradually included research on enslaved and free communities of African descent. This was in part a product of many Caribbean islands gaining independence from their colonial administrators, as well as African-descent communities pushing for increased civil liberties. Research and academic institutions also intensified their work on local history and culture. Through these processes, island nations developed a focus on understanding and celebrating Creole and African-derived elements of local history, culture, and society (Armstrong and Hauser 2009: 591–593). By the 1980s and 1990s, increasing numbers of projects focused on the African diaspora in the Caribbean and investigated the sites and experiences of enslaved and free people of African descent, including material, spatial, and sociocultural impacts of plantation economies, African slave trade and slavery, emerging freedom and emancipation, and the arrival and influence of Asian laborers and migrants.

Today, research questions are numerous and encompass broad categories of investigation. These include material and industrial transformations in the production of the following: sugar cane and its by-products (i.e., sugar, molasses, rum, etc.); coffee, indigo, and cotton agriculture; imported ceramics and goods; and local craft and ceramic production (see Armstrong and Hauser 2009 for specific studies). As much of this research indicates, material studies of plantations and colonial industries are closely tied to a second category of research on socioeconomic and sociocultural shifts in free, enslaved, and emancipated societies from diverse backgrounds. For instance, the production of sugar, coffee, and ceramics placed free, enslaved, and emancipated peoples of European, African, Asian, and Caribbean descent in complex and fluctuating negotiations of power over personhood, community, labor, goods, behaviors, and interactions (see Armstrong and Hauser 2009; Armstrong 2013). In addition, James Delle, Mark Hauser, and Douglas Armstrong edited the volume, *Out of Many, One People: The Historical Archaeology of Colonial Jamaica* (Delle et al. 2011). This piece showcases projects from the last three decades that have addressed diversity, change, and continuity in Jamaica's politics, economies, and societies – enslaved, free, and emancipated.

Caribbean historical archaeology also interprets site remains of Maroon communities or groups who escaped slavery and created autonomous settlements. Kofi Agorsah and the Maroon Heritage Research Project work closely with current Maroon communities in Jamaica and Suriname to document their heritage, while other Maroon projects occur elsewhere in the region (Agorsah 2013). Furthermore, the discipline is informed by extensive underwater projects that seek to understand the relevance of submerged sites, ships, and material culture. One such project, organized by Donny Hamilton (2016), concerns work on Port Royal, Jamaica.

Within the research categories briefly outlined above, Caribbean historical archaeologists and other groups interpret fluctuating structures and identities of personhood, community, race/ethnicity, gender, age, class, and religion within Amerindian, European, African, Asian, and Caribbean contexts. They evaluate such topics from multiple vantage points encompassing at least one or several of the following: households, camps, villages, factories, plantations, workshops, port towns, cemeteries, places of religious worship, military posts, transportation networks, and sites of

resistance (Armstrong and Hauser 2009). In light of the diversity in peoples, places, and objects, scales of analysis in Caribbean historical archaeology are increasingly designed to interpret multivalent contexts, meanings, and relationships derived from local, regional, and global processes (see Armstrong 2013 for multi-scalar studies).

New Directions

Research is ongoing in many of the arenas described above and includes new trajectories that expand on current data sets, methods, and constituents involved. More recently, research and outreach programs have focused on previously untold or under-told stories of rural, urban, inland, and coastal spaces, their captive and free residents, and the economic, social, traumatic, and resistance activities that took place there. *Archaeologies of Slavery and Freedom in the Caribbean: Exploring the Spaces in Between* (Bates et al. 2016) highlights recent studies focusing on under-examined areas, the "spaces in between" (2016: 1), the "plantation core" (2016: 21), or common focal points of Caribbean historical archaeology. While popular research themes include European exploration and colonialism; enslaved life, suffering, and resistance on large plantations; landscapes of trade, community, and control; searches for African cultural "survivals"; and Creolization and ethnogenesis, projects from the last decade or so aim to build on and refine such themes while shedding new light on under-explored entities such as caves, fields, and provision grounds; diverse rural and urban slavery contexts including enslaved villages, foodways, and market activity; "poor white" and free black communities; interactions between different groups and communities; uses of religion and ritual especially in the context of burial; military settings; emancipation; and post-emancipation (Bates et al. 2016; see also Ahlman n.d.; Curet and Hauser 2011).

Projects of Caribbean historical archaeology also currently consider the importance of interpreting transformations in Caribbean city centers and towns and assessing the relationships between urban and rural contexts. Caribbean historical archaeology reveals that port and market towns acted as important loci for the exchange of goods, labor, and information for free, enslaved, and emancipated people. Towns such as Charlotte Amalie, St. Thomas; Road Town, Tortola; Port Royal, Jamaica; Havana, Cuba; and Bridgetown and Holetown on Barbados connected urban and rural residents and visitors to the same city markets (see Armstrong and Hauser 2009; Armstrong 2013 for specific studies). Urban centers and market towns provided terrestrial and maritime jobs and services often unavailable in plantation and rural contexts. Finally, local communities and resources directly and indirectly attached themselves to those in Europe, Africa, the Americas, and Asia through transatlantic trade, the success of which depended on the state of Caribbean ports and market towns.

Comparisons of diverse and changing Caribbean spaces benefit from digital modeling tools and spatial analysis (Reid 2008). Geographic Information System, or GIS, allows cultural resource managers, researchers, and the general public to effectively combine multidisciplinary and disparate evidence, such as maps, images, written records, and material evidence, into spatial and chronological databases from which they test inquiries, produce multifaceted maps, and expose creative thought on transformations in Caribbean environments, land use, and human interactions. The use of spatial analysis and modeling tools in Caribbean historical archaeology is gradually improving preservation collaborations, communications, and procedures across many islands for the benefit of local and visitor populations and stakeholders (see Ahlman n.d. for specific studies). In addition, Caribbean cultural resource management provides the region with invaluable training, jobs, economic boosts, and deeper understandings and connections to Caribbean pasts, presents, and futures (Siegel and Righter 2011).

Finally, a necessary part of Caribbean historical archaeology involves developing community-based and collaborative public programs informed from their beginning by broad-based local and descendant communities, members of whom may reside on or off the islands (Battle-Baptiste 2017). Since members of such contemporary groups are closely tied to Caribbean

history and archaeology through kinship, ethnicity, and culture, their central and direct inclusion is paramount for the benefit of local communities through the promotion of their own conceptualizations of the past, in particular stories of creating and pursuing personal and professional opportunities, as well as accounts of resisting and transforming legacies of adversity such as colonialism, enslavement, and discrimination (Haviser 2015). Providing detailed and numerous accounts of more recent history, then, increases access to and involvement in public outreach by advancing community-based efforts to build on and question regional, national, and international pasts and presents (Gonzalez-Tennant 2014). Such accounts, in some cases referred to by locals as "real history" because they or their contemporaries experienced it, fill in and complement information discovered and interpreted from primary and secondary historical and archaeological sources (Battle-Baptiste 2017). In this sense, community-based and collaborative oral histories, archive research, mapping projects, and archaeology can significantly inform broader Caribbean histories as well as identities, actions, and events in contemporary societies. In light of the aftermath of destructive hurricanes that occurred in the Caribbean in 2017, archaeology that brings together descendant and local communities with research and historic preservation teams, as well as government entities, has the potential to more broadly and efficiently assess and address damages to historical and cultural resources that increasingly occur due to gradual and rapid deterioration, including impacts of climate change and natural disasters such as tropical storms, hurricanes, earthquakes, and tsunamis. To conclude, Caribbean historical archaeology provides transformative and applied learning and professional opportunities in the region at local, regional, and global scales.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ African Diaspora Archaeology Network (ADAN)
- ▶ Archaeology and Colonialism
- ▶ Archaeology as Anthropology
- ▶ Atlantic World: Historical Archaeology
- ▶ Bass, George Fletcher
- ▶ Capitalism in Archaeological Theory
- ▶ Caribbean Maritime Archaeology
- ▶ Ceramics: Colonoware
- ▶ Colonial Encounters, Archaeology of
- ▶ Community Archaeology
- ▶ Critical Historical Archaeology
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Outreach
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Deagan, Kathleen A.
- ▶ Decolonization in Archaeological Theory
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Engendering Historical Archaeology
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Global Archaeology
- ▶ Heritage and Archaeology
- ▶ Historical Archaeology
- ▶ History and Archaeology: Relationship Over Time (US Perspective)
- ▶ Industrial Archaeology
- ▶ Interdisciplinarity and Archaeology
- ▶ International Journal of Historical Archaeology
- ▶ International Slavery Museum
- ▶ Local Populations and Global Heritage
- ▶ Maritime Archaeological Organizations
- ▶ Maritime History
- ▶ Multicultural Archaeology
- ▶ Multivocality and Archaeology
- ▶ Plantation Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Privatization, Public-Private Partnerships, and Innovative Financing for Archaeology and Heritage
- ▶ Race in Archaeology
- ▶ Society for Historical Archaeology (SHA) (Cultural Heritage Management)
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Society for Historical Archaeology (SHA) (Modern World Archaeology)

▶ Space, Place, and Architecture in Historical Archaeology
▶ West and Central Africa: Historical Archaeology
▶ Western Europe: Historical Archaeology
▶ World Archaeological Congress (WAC) and Cultural Heritage Management

References

Agorsah, Kofi. 2013. Transcending oppression: Contributions of maroon heritage to freedom in world history. In *The Oxford handbook of Caribbean archaeology*, ed. William F. Keegan, Corinne L. Hofman, and Reniel Rodriguez Ramos, 542–556. Oxford: Oxford University Press.

Ahlman, Todd. n.d. *Historical archaeologies in the Caribbean: On and beyond the plantation*. Tuscaloosa: University of Alabama Press.

Armstrong, Douglas. 2013. New directions in Caribbean historical archaeology. In *The Oxford handbook of Caribbean archaeology*, ed. William F. Keegan, Corinne L. Hofman, and Reniel Rodriguez Ramos, 525–541. Oxford: Oxford University Press.

Armstrong, Douglas, and Mark Hauser. 2009. A sea of diversity: Historical archaeology in the Caribbean. In *International handbook of historical archaeology*, ed. Teresita Majewski and David Gaimster, 583–612. New York: Springer Science + Business Media.

Bates, Lynsey, John Chenoweth, and James Delle, eds. 2016. *Archaeologies of slavery and freedom in the Caribbean: Exploring the spaces in between*. Gainesville: University of Florida Press.

Battle-Baptiste, Whitney. 2017. Cruise ships, community, and collective memory at Millars plantation, Eleuthera, Bahamas. *Historical Archaeology* 51 (1): 60–70.

Curet, L. Antonio, and Mark Hauser, eds. 2011. *Islands at the crossroads: Migration, seafaring, and interaction in the Caribbean*. Tuscaloosa: University of Alabama Press.

Deagan, Kathleen. 1988. The archaeology of the Spanish contact period in the Caribbean. *Journal of World Prehistory* 2: 187–233.

Delle, James, Mark Hauser, and Douglas Armstrong, eds. 2011. *Out of many, one people: The historical archaeology of colonial Jamaica*. Tuscaloosa: University of Alabama Press.

Ewen, Charles R. 1991. *From Spaniard to creole: The archaeology of cultural formation at Puerto Real, Haiti*. Tuscaloosa: University of Alabama Press.

Gonzalez-Tennant, Edward. 2014. The "Color" of heritage: Decolonizing collaborative archaeology in the Caribbean. *Journal of African Diaspora Archaeology and Heritage* 3 (1): 26–50.

Hamilton, Donny. 2016. Port royal, Jamaica: Archaeological past, present, and future. In *Underwater and maritime archaeology in Latin America and the Caribbean*, ed. Margaret E. Leshikar-Denton and Pilar Luna Erreguerena, 259–270. New York: Routledge.

Haviser, Jay. 2015. Truth and reconciliation: Transforming public archaeology with African descendant voices in the Dutch Caribbean. *Journal of African Diaspora Archaeology and Heritage* 4 (3): 243–259.

Reid, Basil. 2008. *Archaeology and geoinformatics: Case studies from the Caribbean*. Tuscaloosa: University of Alabama Press.

Siegel, Peter, and Elizabeth Righter, eds. 2011. *Protecting heritage in the Caribbean*. Tuscaloosa: University of Alabama Press.

Caribbean Maritime Archaeology

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Introduction and Definition

Maritime archaeology in the Caribbean Sea involves the study of past people and cultures through the study of objects and features discovered in the underwater and maritime landscapes of the region. It frequently involves archaeology practiced in underwater environments, such as oceans, seas, bays, lakes, rivers, springs, marshes, and cenotes; such submerged environments require the use of specialized tools, although the archaeological research objectives remain similar to those used on land (Leshikar-Denton and Luna Erreguerena 2008a, b; Leshikar-Denton 2011; Leshikar-Denton and Scott Ireton 2013).

Historical Background

In the Caribbean region, there are prehistoric and historical heritage sites that reveal a tapestry of intercultural experiences. From the sixteenth century forward, shifting waves of European explorers, conquerors, and settlers, indigenous and African-enslaved laborers, passing merchants, and colonial powers interacted

and influenced the development of the rich, multilingual cultures of today. Among Caribbean maritime heritage sites are settlements and defensive fortifications, fresh water procurement features, lighthouses and navigational aids, fishing areas, anchorages, careening places, ports, harbors, wharves, bridges, shipbuilding sites, shipwrecks, shipwreck salvage sites, and aircraft lost at sea. Sites range from cenotes and eroded coastal features to remains of catastrophic shipwrecks and earthquakes, at times with exceptional levels of preservation of cultural material (Smith 2000, 2018; Leshikar-Denton 2002, 2004, 2011, 2020; Echeverria 2004; Pateman 2004; UNESCO 2004; Grenier et al. 2006; Guibert et al. 2019; Keith 2006; Leshikar-Denton and Luna Erreguerena 2008a, b; Gray 2008; Hamilton 2008; Hanselmann 2019; Harris 2008; Leshikar-Denton and Scott-Ireton 2008, 2013; Nagelkerken and Hayes 2008; Nagelkerken et al. 2008; Sadler 2008).

The research potential for archaeological sites in the Caribbean is significant, but their heritage value can be overshadowed when commercial interests divert attention to the possibility of treasure on historical shipwrecks that they wish to exploit. The situation poses a constant threat to the archaeological heritage of the Caribbean region, and a challenge to its protection and management.

Key Issues and Current Debates

The Caribbean Sea encompasses English-, Spanish-, French-, and Dutch-speaking countries, some of which are independent and others that are in various levels of dependency, resulting in cultural, linguistic, and legislative differences among them. Yet they share elements of a common maritime heritage. In today's global world, these Caribbean countries are uniting and working toward establishing common goals in many areas, not the least of which is in attention paid to their underwater and maritime cultural heritage, especially for the benefit of Caribbean culture, education, and tourism (Leshikar-Denton 2002, 2011; UNESCO 2004; Leshikar-Denton and Luna Erreguerena 2008a, b; Leshikar-Denton and Scott-Ireton 2013).

In 1997, Caribbean countries formed a technical commission on underwater cultural heritage (UCH) known as the Latin American and Caribbean Group (GRULAC). GRULAC met in Santo Domingo, Dominican Republic, in 1998 and 1999, in preparation for a series of expert meetings held by UNESCO in Paris between 1998 and 2001. They united in support of the 1996 ICOMOS *International Charter on the Protection and Management of Underwater Cultural Heritage*, a charter defining best professional practice (International Council on Monuments and Sites 1996). At the Paris meetings, at which GRULAC was influential, 88 countries adopted the 2001 UNESCO *Convention on the Protection of the Underwater Cultural Heritage*, which establishes an international legal framework (United Nations Educational, Scientific, and Cultural Organization 2001). Since that time, worldwide regional UNESCO meetings have encouraged countries to ratify the 2001 Convention. Jamaica hosted two regional meetings in 2002 and 2011, and a capacity-building training course in 2012. Saint Lucia was the first Caribbean nation to ratify the 2001 UNESCO Convention; the country hosted subregional UNESCO meetings in 2003 and 2008 to assist and inform Eastern Caribbean countries about the benefits of this international legal instrument. Success in the area is due in part to the efforts of the Saint Lucia Archaeological and Historical Society, an organization with a long history of professionally addressing the island's terrestrial archaeological heritage, and a leader in advocacy for ethical underwater and maritime archaeology in the subregion.

Considerable information is available on the 2001 Convention on the UNESCO website (http://www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/2001-convention/), including its Text, Annex, States Parties, history and development, coming into force, worldwide educational efforts, capacity building strategies, and subsequent events. The 2001 Convention entered into force on 2 January 2009. There have been seven sessions of the Meeting of States Parties in Paris between 2009 and 2019, and ten

meetings of the Scientific and Technical Advisory Body appointed by the States Parties to assist in technical guidance.

Operational Guidelines for implementation of the Convention were adopted in 2013 and 2015. To ensure proper implementation, States Parties are to establish competent authorities, or reinforce existing ones. The UNESCO Secretariat works with a wide network of experts and institutions in Latin America and the Caribbean (LAC) and worldwide that assist member states in development of capacities at regional, national, and local levels. Mexico is a leader in this area, and works to provide workshops and training grounds to assist in further capacity building throughout the LAC region.

The 2001 Convention entered into force on 2 January 2009. At present GRULAC countries represent 20 of the 61 ratifications on record: Antigua and Barbuda, Argentina, Barbados, Bolivia, Costa Rica, Cuba, Ecuador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Panama, Paraguay, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago. The Caribbean countries are now discussing the benefit of establishing compatible national legislation, and have asked the ICOMOS International Committee on Underwater Cultural Heritage (ICUCH) and UNESCO for guidance. Clearly, the 1996 ICOMOS Charter and the 2001 UNESCO Convention are powerful international instruments that lay the foundation for protection and management of the world's UCH. Their endorsement by a growing number of Latin American and Caribbean countries sets a positive example for countries worldwide to take action to identify, protect, and manage it, regardless of their political and economic situations.

In previous publications, brief case studies have appeared by country for many Caribbean islands: the British Overseas Territories of Anguilla, the Cayman Islands, and the Turks and Caicos Islands; the French islands of Martinique and Guadeloupe; the Dutch islands of Saint Maarten, Saint Eustatius, Saba, Curacao, and Bonaire; the Commonwealth of Puerto Rico, a territory affiliated with the United States; independent countries in the Greater Antilles, including the Bahamas, Cuba, the Dominican Republic, Haiti, and Jamaica; and independent countries in the Lesser Antilles, including Barbados, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago (Leshikar-Denton 2002, 2004, 2011; UNESCO 2004; Leshikar-Denton and Luna Erreguerena 2008a, b; Leshikar-Denton and Scott-Ireton 2013).

Emerging Themes

Island nations are working to develop research and preservation programs to protect, manage, and interpret sites and to promote heritage tourism. They are exploring issues of proper uses of heritage and negotiating approaches from commercial salvors. Emerging themes in Caribbean maritime archaeology include heritage legislation, management, research, meaning to descendent communities, and international perspectives and future directions. Not all Caribbean countries have experience in research, protection, management, and interpretation of UCH, but there is a growing regional concern that commercial exploitation is not beneficial. Caribbean people are exploring and adopting principles like creativity in managing cultural resources and cooperation in sharing knowledge, technical skills, and professional expertise. Many recognize the value of asking for and accepting professional archaeological assistance from outside of the region, but there is a growing understanding that sustainability must come from within the Caribbean islands themselves (Leshikar-Denton and Luna Erreguerena 2008a, b; Leshikar-Denton 2011).

Heritage Legislation

Among Latin American and Caribbean countries, Mexico, Argentina, and the Cayman Islands are exemplary in not having granted permits to salvors in the past quarter-century, and Argentina has achieved specific national legislation to protect UCH. In the countries of Bermuda (often grouped with the Caribbean), the Turks and Caicos Islands, Jamaica, and the Dominican

Republic, where professional archaeological work has achieved success, the governments have also granted permits to salvors in the past. Bermuda, however, notably enacted the Bermuda Historic Wrecks Act (2001), compatible with the 1996 ICOMOS Charter and 2001 UNESCO Convention. More and more countries are waking up to the need to establish similar compatible legislation. A more comprehensive overview is available in Leshikar-Denton and Luna Erreguerena (2008a, b).

Heritage Management

Political, economic, and social factors in the Caribbean have meant that heritage management is less than ideal. Caribbean countries, nonetheless, are using traditional and creative means to achieve progress, whether through governmental or private means. In addition to using legislative approaches, efforts exist to: discourage treasure hunting; create site inventories; mitigate impact to endangered sites; protect and interpret sites in situ as a first option; excavate when scientific objectives justify it, and when there is adequate funding, professional staff, and provisions for documentation, conservation, curation, and reporting, and plans to share results of research with the public through museum exhibitions, the media, and publications. In the Caribbean, sustainable economic and tourism objectives go hand-in-hand with successful promotion to protect and manage heritage sites (Leshikar-Denton and Luna Erreguerena 2008a, b). In the Cayman Islands, for example, a Maritime Heritage Partnership launched a land-based Maritime Heritage Trail in 2003 that consists of 36 sites located around the coastlines of three islands, highlighting a range of themes (e.g., early explorers, maritime place-names, historic anchorages, shipwrecks, wrecking practices, lighthouses, seaside forts, shipbuilding, turtle-fishing, and hurricanes); plans are underway to create shipwreck preserves on robust Cayman Islands shipwreck sites. Similar land-based trails are being created in Jamaica and Anguilla, the wreck of the SS *Mediator* is being interpreted in situ in Curacao, while the Dominican Republic has created underwater museums featuring artifacts from shipwrecks that were replaced on the seabed and interpreted for divers and snorkelers.

Archaeological Research

Archaeological research is on-going in island countries bordering the Caribbean Sea, as well as in the coastal Caribbean countries of Mexico, Central America, and South America. Work by regional researchers, as well as teams from overseas academic institutions in the United States, Canada, Great Britain, France, the Netherlands, and Spain, among other countries, is contributing to a growing body of knowledge. The following summary provides a glimpse into archaeological work that has been accomplished (Smith 2000, 2018; UNESCO 2004; Leshikar-Denton 2002, 2004, 2011, 2020; Echeveria 2004; Pateman 2004; Grenier et al. 2006; Keegan and Hofman 2017; Keith 2006; Leshikar-Denton and Luna Erreguerena 2008a, b; Gray 2008; Hamilton 2008; Hanselmann 2019; Harris 2008; Leshikar-Denton and Scott-Ireton 2008, 2013; Nagelkerken and Hayes 2008; Nagelkerken et al. 2008; Sadler 2008).

With the probable exception of the Cayman Islands and Bermuda, aceramic- and/or ceramic-age peoples prehistorically occupied most Caribbean islands; current archaeological research is providing theories as to their origins and routes of migration into the region. One thing is certain, the settlers traveled to the islands using watercraft; by1492, when Columbus first sighted land, the people who came to meet him paddled out in dugout canoes. These Caribbean seafarers were adapted to aquatic navigation and coastal settlement and procured marine resources, as generations had done before them. In 1995, the University of South Carolina's Institute of Archaeology and Anthropology, at the request of the government of the Bahamas, recovered a ceremonial Lucayan canoe found in Stargate blue hole (a submerged cenote) of Andros Island. In 1996, researchers discovered a Lucayan paddle of about CE 1100 in North Creek, Grand Turk; they assessed its origin to be associated with a nearby outpost of the Taíno from Haiti. The Turks and Caicos National Museum displays this paddle, one of only two such paddles from the Bahamian

Archipelago. In the Dominican Republic, Indiana University and Pan-American Consultants investigated a prehistoric plaza and a cenote containing Taíno artifacts at Manantial de la Aleta. In 2008, the Puerto Rican *Instituto de Investigaciones Costaneras* (IIC), the Centre for Maritime Archaeology and Conservation (CMAC) at TAMU, and the Institute of Nautical Archaeology (INA) surveyed the northern coast of Puerto Rico between Loíza and San Juan Bay. The multi-organizational team located early sites in an area where pre-Columbian settlements existed and over 66 ships were lost.

During four Spanish voyages between 1492 and 1504, Columbus achieved the earliest recorded European explorations of the Caribbean. He lost ships during these journeys: the nao *Santa María* during the first voyage, and the caravels *Mariagalante, Gallega, San Juan*, and *Cardera* during the second, all off the north coast of Hispaniola; and during the fourth voyage, the caravels *Gallega* at Rio Belén and *Vizcaína* at Portobelo, Panama, as well as the caravels *Capitana* and *Santiago de Palos*, both run aground in 1503 in St. Ann's Bay, Jamaica. Since the early 1980s, INA has launched surveys and test-excavations to locate remains of Columbus' ships in Hispaniola, Jamaica, and Panama, while Ships of Discovery has searched for *Gallega* in Panama. Indiana University and Pan-American Consultants have worked cooperatively in a quest for Columbus' ships off Hispaniola.

In the Caribbean, investigators have discovered the unidentified remains of early sixteenth-century ships of exploration and discovery. INA teams investigated three wrecks in the 1980s, all providing clues to a ship-type known as the caravel: the Molasses Reef Wreck in the Turks and Caicos Islands; the Highborn Cay Wreck in the Bahamas; and cooperatively with the Mexican *Instituto Nacional de Antropología e Historia* (INAH), the Bahía Mujeres Wreck located off the northeast coast of the Yucatan Peninsula. The Molasses Reef Wreck, dating to the 1520s, is presently the earliest shipwreck discovered in the Western Hemisphere. Archaeologists excavated the vessel between 1982 and 1985, and initiated conservation treatments on the artifacts. From 1988 forward, Ships of Discovery took over conservation treatments and, working in cooperation with the Turks and Caicos National Museum, prepared an exhibition that today forms the central exhibition of the National Museum. In cooperation with INAH in the 1990s, they undertook additional excavation on the Bahía Mujeres Wreck. Meanwhile, other investigators discovered the sixteenth-century vessel known as the St. Johns Bahamas Wreck on the Little Bahama Bank. Early colonial shipwrecks are also known to exist in Cuban waters, such as the Cayo Ines de Soto Site, thought to have sunk in 1555–1556. Researchers from the abovementioned institutions have further investigated a number of the abovementioned sites in recent years.

Sixteenth-century European navigators learned that it was advantageous to follow prevailing winds and ocean currents when sailing to and from the New World. Ships entering the Caribbean through the Lesser Antilles could exit through the Windward, Mona, and Anegada Passages, or maintain a westward course to the Leeward Passage, by which ships would exit through the Yucatan Channel, enter the Gulf Stream, and follow the currents through the Straits of Florida out into the Atlantic for the return passage to Europe. European powers soon established colonies and seaborne trade networks in the West Indies. Until the latter-seventeenth century, Spain claimed a monopoly on all New World territories that were sighted during the Spanish voyages. The country depleted the supply of precious metals in the West Indies, and then exploited the gold and silver resources of Mexico, Bolivia, and Peru. Mexico City displaced Santo Domingo on Hispaniola as Spain's main administrative center in 1535, and Spain created a second center in 1544 in Lima, Peru, while Cuba, located adjacent to the Leeward Passage and Straits of Florida, remained strategically valuable.

Single armed merchantmen made the trans-Atlantic passage, but by 1537, Spain organized a convoy system so that merchant ships laden with cargos of gold, silver, and pearls would sail together under the protection of armed vessels to ensure a safe passage back to Spain. Still, treacherous reefs and hurricanes claimed many Spanish

treasure ships over the course of three centuries. Archaeologists have investigated Spanish merchantmen, including ships of the 1554 Fleet excavated by the Texas Antiquities Committee off Padre Island, Texas, the *Cayo Nuevo Wreck* documented by a joint INA/INAH project in the Gulf of Mexico, the 1559 Emanuel Point Shipwreck investigated by the Florida Bureau of Historical Research, Division of Historical Resources and University of West Florida off Pensacola (Smith 2018), the seventeenth-century Rincón Astrolabe Wreck in Puerto Rico, and the 1766 *Nuevo Constante*, investigated offshore by the State of Louisiana, but the majority of sites found have been salvaged by treasure hunters whose ethics regarding historical resources are not consistent with those of scientific archaeology. Among shipwrecks worked in cooperation with salvors are names such as *San Pedro* and *San Antonio* off Bermuda, *Nuestra Señora de Atocha* in the Florida Keys, *Nuestra Señora de la Pura y Limpia Concepción* (1641) on the Silver Bank of Hispaniola, and *Nuestra Señora de Guadalupe* and *Conde de Tolosa* (1724) off the northeast coast of Hispaniola.

Although treasure hunters compromised vessels of the 1715 Spanish Plate Fleet, discovered off the east coast of Florida, archaeologists investigated the *Urca de Lima*; in 1987, Florida designated the site as Florida's first Underwater Archaeological Preserve. Salvors also impacted the remains of the 1733 Spanish Plate Fleet that wrecked in the Florida Keys, although State of Florida archaeologists are undertaking scientific studies on a number of these vessels. In the Cayman Islands, archaeologists identified a site thought to be the remains of the inbound *San Miguel*, lost in 1730. In 1996, East Carolina University began a survey of the waters of Anguilla, which included assessment of two 1772 inbound Spanish merchantmen, *El Buen Consejo* and *Jesús, María y José*, at the invitation of the Historic Wrecks Advisory Committee; they produced a map and site analysis for the government. In Jamaica, INA assisted the government in the 1980s in surveys on the Pedro Banks for early shipwreck sites. Remoteness, complicated logistics, and nominal funding, however, discourage scientific work on these sites. In Puerto Rico, archaeologists have documented the Cerro Gordo sites in Vega Alta – a Spanish shipyard of the seventeenth to nineteenth centuries.

England, France, and the Netherlands challenged Spain's monopoly in the sixteenth and seventeenth centuries through official and entrepreneurial voyages; the Dutch created a wide commercial network, while the English and French began to settle the eastern Caribbean by the early 1600s. Meanwhile, Spanish colonies illicitly imported European products and African slaves from passing foreign merchant ships. In the Dominican Republic, the Pan-American Institute of Maritime Archaeology excavated a seventeenth-century interloper into the Spanish colonies. The investigators believe that the ship, known as the Monti Christi Shipwreck, was *en route* from Europe to North America, via the Caribbean when it wrecked. It appears to be an English-built merchantman carrying a Dutch cargo of clay tobacco pipes from Amsterdam. It wrecked between 1652 and1656, off the north coast of Hispaniola. French Louis XIV-period shipwrecks, lost during a 1677 battle with the Dutch in the Eastern Caribbean, were discovered during harbor-dredging activities in Tobago. In response, Trinidad and Tobago enacted legislation, based on the United Kingdom's Protection of Wrecks Act (1994), to safeguard these sites.

England and France established permanent settlements in the western Caribbean during the seventeenth century. In 1655, England seized Jamaica from Spain, while Spain eventually recognized the English claim in 1670, by the Treaty of Madrid. In 1655, France took Tortuga and progressively occupied all of St. Domingue (the western third of Hispaniola), but it was not until the 1697 Treaty of Ryswick that Spain recognized the French claim. It was an era of pirate and privateer exploits. In 1979, INA investigated the *Turtle Wreck*, an English turtle-fishing vessel likely burned in 1670 by Spanish privateer, Manuel Rivero Pardal in Little Cayman, and the Duck Pond Careenage used for overhauling vessels for at least three centuries in the Cayman Islands. In 2007, pirate Captain William Kidd's ship *Quedagh Merchant* was discovered in the Dominican Republic by a team from

Indiana University; lost in 1699, this shipwreck was scientifically investigated under direction of Frederick H. Hanselmann, and artifacts conserved in cooperation with Dominican Republic institutions; the site is now interpreted for the diving and snorkeling public, with plans underway to create a land-based exhibit (Hanselmann 2019). The Cayman Islands National Museum (CINM) test excavated a turtle-fishing encampment dating to about 1700 on the north coast of Grand Cayman, and excavated an early historic step-well on the island's western waterfront. They have found clues to HMS *Jamaica*, a British sloop on patrol for pirates when it wrecked in 1715 entering the great North Sound.

A catastrophic earthquake hit the thriving English colonial city of Port Royal, Jamaica, in 1692, causing much of it to subside into the liquefied sand of Kingston Harbour. Edwin Link and the National Geographic Society carried out underwater excavations in the 1950s, resulting in a pre-1692 map of Port Royal, while Robert Marx excavated caches of artifacts in the 1960s. Philip Mayes began terrestrial excavations in 1969. Texas A&M University and INA, under the direction of Donny Hamilton, and in association with the Jamaica National Heritage Trust (JNHT) conducted the first scientific underwater archaeological excavations. Hamilton led field schools from 1981 to 1990 in excavations of eight buildings and a ship that crashed into one building during the earthquake, training at the same time, Jamaica's first underwater archaeologist, Dorrick Gray, who subsequently served as Technical Director of Archaeology at the JNHT. Much of Port Royal remains in situ, and as such represents a time-capsule of seventeenth-century life. The Jamaican government is seeking World Heritage status for Port Royal; it is considering management options, and issues of preservation, research, conservation, and disposition of artifacts.

Britain and France dominated control of the Caribbean during the eighteenth century, protecting their colonies and lucrative sugar trade through naval power. They were opponents during a series of wars, with Spain and the Netherlands inconsistently allied with one or the other country: the War of Spanish Succession (1702–1713), the Seven Years War (1756–1763), the American War of Independence (1775–1783), the French Revolutionary Wars (1792–1802), and the Napoleonic Wars (1803–1815). Not surprisingly, a great number of merchantmen and warships were lost in the eighteenth-century Caribbean. Archaeologists discovered at least six eighteenth-century merchant ships in St. Ann's Bay, Jamaica; Greg Cook and a team from INA/JNHT investigated one British sloop, the Reader's Point Wreck, in the 1990s.

The French islands of Martinique and Guadeloupe compiled an online inventory of at least 73 UCH sites. Among the 19 identified sites are *Notre Dame De Bonne Espérance* (1687), HMS *Raisonable* (1762), and *Le Cygne* (1808). In 2019 Jean-Sébastien Guibert, Max Guérout, Marc Guillarme, and others published a very useful summary of colonial period (seventeenth to nineteenth century) maritime archaeological projects undertaken in the French Antilles between 1980 and the present, in the International Journal of Nautical Archaeology (Guilbert et al. 2019). Their overview includes coastal plantations, ports, and micro-islets, as well as shipwrecks related to commercial, naval, and cabotage use. They relate that the nature and distribution of sites provides information on maritime routes and traffic, trade, and conflicts, as well as environmental risks specific to the Antilles in the Colonial period. There is critical capacity building underway presently in Martinique and Guadeloupe.

In Saint Kitts and Nevis, the Nevis Maritime Archaeological Group, composed of local and international members, began conducting research in 2011 on HMS Solebay, lost on 25 January 1782 during the Battle of Frigate Bay. Established in 1979, the Dominican Republic's Comisión de Rescate Arqueológico Submarino conducted excavations in cooperation with commercial interests on the French warship *Scipión* (1782), and the French ships *Diómedes* and *Imperial* (1806); the *Museo de las Reales Atarazanas*, the *Museo de Arqueología Submarina del Faro a Colón*, and the *Museo de las Casas Reales* display artifacts from these shipwrecks.

In the 1990s, Margaret E. Leshikar-Denton, working with Texas A&M University and the

CINM, investigated the 1794 Wreck of the Ten Sail: HMS *Convert* and nine ships of her merchant convoy lost together on the East End reefs of Grand Cayman during the French Revolutionary Wars. The *Convert* was a captured French-built frigate, formerly called *l'Inconstante*, which retained her original French ordnance. The CINM's special two-hundredth anniversary exhibition commemorated the historical event in 1994, at which time Queen Elizabeth II visited the exhibition; it is being featured again in a new publication (Leshikar-Denton 2020). The Saint Maarten National Heritage Foundation, the Saint Maarten Department of Planning and Environment, and Maritime Archaeology and Research investigated HMS *Proselyte*, the captured Dutch frigate *Jason*, in 1994–95; the ship was lost in 1801. In the 1980s, the Archaeological and Anthropological Institute of the Netherlands Antilles (AAINA) investigated the Dutch frigate *Alphen* which exploded and sank in 1778 in Santa Anna Bay, Curacao; AAINA also recorded the SS *Mediator*, lost in 1884 in Willemstad Harbor. In cooperation with the Maritime Archaeological and Historical Society (MAHS), AAINA surveyed the historical anchorage adjacent to Fort Orange and Kralendijk, the population center in Bonaire, and identified the Dutch warship *Sirene*, lost in 1831. In Saint Vincent and the Grenadines, with the cooperation of the Government of Saint Vincent and the Organization of American States, a joint team of Florida State University and Institute of Maritime History researchers and students carried out a project in Kingstown Harbor on a late eighteenth-century shipwreck in 1997–1998. In Puerto Rico, archaeologists have recorded an eighteenth-century English warship wrecked on the Laurel Reefs of La Parguera, Lajas.

A significant part of Caribbean history is reflected in the search for the slave ship *Trouvadore*, a Spanish ship that was lost in 1841 with a human cargo of 193 people. Intended for slavery in Cuba, the Africans instead found freedom in the Turks and Caicos Islands and thereby influenced the cultural future of that country. In 2008, Ships of Discovery investigated remains of a vessel believed to be *Trouvadore* and also located remains of the US Navy brig *Chippewa*, lost in 1816 while patrolling the Caribbean on a mission to counter the African slave trade and piracy.

The nineteenth century brought the end of the Age of Sail and the flourishing of the Age of Steam. In Puerto Rico, the Underwater Archaeology Office of the *Consejo para la Conservación y Estudio de Sitios y Recursos Arqueológicos Subacuáticos* recorded the Spanish steamships *Alicante* wrecked in 1881 and *Antonio López* lost in 1898 during the Spanish-American War. Archaeologists have also assessed Buoy 4 in San Juan to investigate the *Manuela* and *Cristobal Colon*, also casualties during the Spanish-American War. In Anguilla, Lillian Azevedo and a team from the University of Southampton have recorded early historic wrecks and a nineteenth-century shipwreck.

Even twentieth-century wrecks are subjects of research and eco-tourism in the Caribbean. Bert Ho and a team from Florida State University assisted the CINM in documentation of the Norwegian-flagged *Glamis*, lost in 1913, providing the foundation to create a future shipwreck preserve on the robust shipwreck site in the Cayman Islands. *Glamis* had been built in Dundee, Scotland, in 1876. *Geneva Kathleen*, a three-masted schooner wrecked in 1930 loaded with lumber, was documented by Ball State University, also in the Cayman Islands. In Puerto Rico, archaeologists have documented World War II era vessels, including a PT boat in Desecheo Island, and two aircraft – a B-29 in Aguadilla and a PBY Catalina flying boat in La Parguera – for the US Navy.

Meaning to Descendent Communities

An important theme in the Caribbean is the meaning of maritime and underwater cultural heritage to descendant communities. In the Turks and Caicos Islands, the case study of a descendant African community whose ancestors escaped intended slavery in Cuba, through wrecking in the Spanish ship *Trouvadore*, is remarkable; it provides the opportunity for people to learn more about themselves, where they came from and how they have survived. Maritime themes like shipwrecks, historical shipbuilding of

schooners and catboats, place-names, and hurricane caves, among other topics, are important to the people of the Cayman Islands; thus, involving all levels of society in the Maritime Heritage Trail engages people in their heritage. In every country, there are unique examples that can link communities to their heritage and this communication provides value and self-esteem in return to living people.

International Perspectives and Future Directions

Since the mid-twentieth century, the world's underwater cultural heritage has become more and more accessible, and has become an easier target for exploitation. At the same time, professional underwater and maritime archaeological research has experienced a profound period of growth. It is also becoming clear that UCH has value not only to scientific research, but also has a role to play in cultural, educational, and economic terms. Countries, including those in the Caribbean, are discovering innovative ways to manage and preserve maritime and underwater cultural heritage sites, and to promote them locally, regionally, and internationally.

Today is a good day for maritime archaeology in the Caribbean – today we have tools in our kit that have been created through negotiations among countries of the world, including those from Latin America and the Caribbean. Using the 1996 ICOMOS Charter and the 2001 UNESCO Convention, we can speak the same language in attributing value to UCH and providing for its protection, management, interpretation, and public access and benefit – these documents can guide us in "best practice" and in establishing compatible national legislation. As a brilliant Argentinian lawyer put it during the Paris negotiations, the magic word is "cooperation" among stakeholders – and so, countries, governments, professionals, and the public who communicate and assist one another through local, regional, and international agreements and through sharing technical and professional resources can shape a positive future.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Caribbean Historical Archaeology
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Deep-Water Archaeology
- ▶ Ethics in Archaeology
- ▶ Heritage Values and Education
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ Public Archaeology, The Move Towards
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Ship Archaeology
- ▶ Submerged Indigenous Sites
- ▶ Underwater Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime
- ▶ Underwater Sites in Archaeological Conservation and Preservation
- ▶ World Archaeological Congress (WAC)

References

Echeveria, J. 2004. Cuba: The protection of underwater cultural heritage. In *Patrimonio cultural subacuático/ Underwater cultural heritage*, ed. V. Marín, 52–55, 118–21. Havana: UNESCO.

Gray, D.E. 2008. The Jamaican version: Public archaeology and the protection of underwater cultural heritage. In *Underwater and maritime archaeology in Latin America and the Caribbean*, ed. M.E. Leshikar-Denton and P. Luna Erreguerena, 245–257. Walnut Creek: Left Coast Press.

Grenier, R., D. Nutley, and I. Cochran, eds. 2006. *Underwater cultural heritage at risk: Managing natural and human impacts*. Paris: ICOMOS.

Guibert, J.-S., M. Guérout, M. Guillaume, et al. 2019. An overview of maritime archaeological research of the colonial period in the French Antilles. *IJNA* 48 (1): 123–150.

Hamilton, D.L. 2008. Port royal, Jamaica: Archaeological past, present, and future. In *Underwater and maritime archaeology in Latin America and the*

Caribbean, ed. M.E. Leshikar-Denton and P. Luna Erreguerena, 259–269. Walnut Creek: Left Coast Press.
Hanselmann, F.H. 2019. *Captain Kidd's lost ship*. Gainesville: University Press of Florida.
Harris, E.C. 2008. Bermuda's shipwreck heritage. In *Underwater and maritime archaeology in Latin America and the Caribbean*, ed. M.E. Leshikar-Denton and P. Luna Erreguerena, 201–207. Walnut Creek: Left Coast Press.
International Council on Monuments and Sites. 1996. *ICOMOS International charter on the protection and management of underwater cultural heritage*. Paris: ICOMOS. Available at: www.international.icomos.org/charters/underwater_e.pdf. Accessed 29 Sept 2019.
Keegan, W.F., and C.L. Hofman. 2017. *The Caribbean before Columbus*. New York: Oxford University Press.
Keith, D.H. 2006. The molasses reef wreck. In *Underwater cultural heritage at risk: Managing natural and human impacts*, ed. R. Grenier, D. Nutley, and I. Cochran, 82–84. Paris: ICOMOS.
Leshikar-Denton, M.E. 2002. Problems and progress in the Caribbean. In *International handbook of underwater archaeology*, ed. C. Ruppé and J. Barstad, 279–298. New York: Kluwer Academic/Plenum.
Leshikar-Denton, M.E. 2004. The situation in the Caribbean. In *Patrimonio cultural subacuático/Underwater cultural heritage*, ed. V. Marín, 10–15, 80–5. Havana: UNESCO.
Leshikar-Denton, M.E. 2011. Caribbean maritime archaeology. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 629–659. New York: Oxford University Press.
Leshikar-Denton, M.E. 2020. *Cayman's 1794 wreck of the ten sail: Peace, war, and peril in the Caribbean*. Tuscaloosa: The University of Alabama Press.
Leshikar-Denton, M.E., and P. Luna Erreguerena, eds. 2008a. *Underwater and maritime archaeology in Latin America and the Caribbean*. Walnut Creek: Left Coast Press.
Leshikar-Denton, M.E., and P. Luna Erreguerena. 2008b. The foundations of underwater and maritime archaeology in Latin America and the Caribbean. In *Underwater and maritime archaeology in Latin America and the Caribbean*, ed. M.E. Leshikar-Denton and P. Luna Erreguerena, 25–53. Walnut Creek: Left Coast Press.
Leshikar-Denton, M.E., and D.A. Scott-Ireton. 2008. The Cayman Islands' experience: Yesterday, today, and tomorrow. In *Underwater and maritime archaeology in Latin America and the Caribbean*, ed. M.E. Leshikar-Denton and P. Luna Erreguerena, 221–244. Walnut Creek: Left Coast Press.
Leshikar-Denton, M.E., and D.A. Scott-Ireton. 2013. Underwater archaeology. In *Encyclopedia of Caribbean archaeology*, ed. B.A. Reid and R.G. Gilmore III. Gainsville: University Press of Florida.
Nagelkerken, W., and R. Hayes. 2008. The historical anchorage of Kralendijk, Bonaire, Netherlands Antilles. In *Underwater and maritime archaeology in Latin America and the Caribbean*, ed. M.E. Leshikar-Denton and P. Luna Erreguerena, 293–301. Walnut Creek: Left Coast Press.
Nagelkerken, W., T. van der Giessen, R. Hayes, and D. Knepper. 2008. Development of maritime archaeological tourism using the wreck of the English SS *Mediator* in Curaçao. In *Underwater and maritime archaeology in Latin America and the Caribbean*, ed. M.E. Leshikar-Denton and P. Luna Erreguerena, 283–292. Walnut Creek: Left Coast Press.
Pateman, M. 2004. The evolution of the protection of underwater cultural heritage in the Bahamas. In *Patrimonio cultural subacuático/Underwater cultural heritage*, ed. V. Marín, 46–47, 112–3. Havana: UNESCO.
Sadler, N. 2008. The sinking of the slave ship *Trouvadore*: Linking the past to the present. In *Underwater and maritime archaeology in Latin America and the Caribbean*, ed. M.E. Leshikar-Denton and P. Luna Erreguerena, 209–220. Walnut Creek: Left Coast Press.
Smith, R.C. 2000. *The maritime heritage of the Cayman Islands*. Gainesville: University Press of Florida.
Smith, R.C., ed. 2018. *Florida's lost galleon: The Emanuel Point Shipwreck*. Gainesville: University Press of Florida.
UNESCO. 2001. Convention website. Available at: http://www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/2001-convention/. Accessed 29 Sept 2019.
UNESCO. 2004. *Patrimonio cultural subacuático (Underwater cultural heritage): América Latina y el Caribe*. Havana: UNESCO.
United Nations Educational, Scientific, and Cultural Organization. 2001. *UNESCO convention on the protection of the underwater cultural heritage*. Paris: UNESCO. Available at: http://portal.unesco.org/en/ev.phpURL_ID=13520&URL_DO=DO_TOPIC&URL_SECTION=201.html. Accessed 29 Sept 2019.

Caribbean Prehistoric Archaeology

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Introduction

Caribbean prehistoric research is characterized by:

- A history of robust amateur archaeological contributions to investigations and organizational (government, professional, cultural) structures.

- Increased explicit reference in the literature to theoretical approaches and use of formal methodologies, as well as expanding research fields (starch grain analysis, household studies) that nonetheless build upon a basis of discipline-wide accepted sound practices and concepts, in addition to regional inventive formulations and applications.
- A legacy of US, English, Dutch, Danish, French, and Spanish past and present administration that provides for both a positive and negative research environment. For instance, while diverse approaches and methods can stimulate methodological and theoretical advancement, they can also limit inter-region comparisons and higher-order theory building.
- Diverse laws and regulations regarding the preservation, access, and investigative platforms – amateur, academic, governmental, and private – of sites due to the mix of former-colonial-now-independent and still-associated-to-colonial-origin nations in the region.
- Variability in research results from surveys to excavations, to syntheses, as well as to their availability (different languages, publishing outlets, and institutional access protocols), leaving certain islands, sites, and research themes more studied than others.
- Growing utilization of modern communication forms including web sites, online materials, and digitized data, in addition to standard publication and conference venues to maximize the flow of information for the Caribbean and wider archaeological communities.
- The use of European accounts of native societies at or near contact and ethnographies of culturally cognate northern South American peoples along with archaeological materials to reconstruct the area's past lifeways.

Physical Setting

The following unfolding of Caribbean prehistory takes place within a geographically and culturally defined region that differs according to particular research objectives. The broad cultural delineation encompasses the Caribbean Sea islands, as well as the North, Central, and South American coastal zones (Fig. 1). The West Indian archipelago arcs broadly outward from the Venezuelan coast of South America to the southeast tip of North America and the Yucatan Peninsula of Mexico in Central America, extending over a lineal area of some 2500 km. These islands display a wide range of landforms, geologic processes, natural resources, and climatic regimes that are commonly differentiated into four physiographic subregions: the Greater Antilles and the Virgin Islands, the Lesser Antilles plus Trinidad and Tobago, the Bahamian grouping, and the southern Caribbean Islands off the coast of Venezuela (Keegan and Hofman 2017: 2–3; Hayward et al. 2009a: 3).

The Greater Antilles comprises Cuba, Jamaica, Hispaniola (modern states of Haiti and the Dominican Republic), and Puerto Rico, plus various smaller in size nearby islands. They account for 88% of the landmass with a topography dominated by mountains, valleys, and coastal plains derived from limestone, sedimentary, and metamorphic rocks of volcanic substrate. The Virgin Islands lie eastward of Puerto Rico combining a number of small islands under US (St. Croix, St. Thomas, St. John) and UK (Tortola, Virgin Gorda, Anegada) administrative jurisdictions. Volcanic rock predominates on the US Virgin Islands with hilly terrain, minimal-level portions, and rather thin coasts that rest on a shallow island shelf connected to Puerto Rico. Low limestone surfaces characterize the British islands, where the combined Virgins make up an additional 1% of the Caribbean landmass (Keegan and Hofman 2017: 5–6; Hayward et al. 2009a: 3, 5).

The islands of Sombrero and Anguilla in the north to Grenada off the coast of Venezuela plus Barbados comprise the Lesser Antilles. Originating from volcanic and limestone bases, the islands present a double arc configuration of inner high volcanic and outer lower limestone landforms with the distinction evident north of Dominica. The grouping is traditionally further divided into the northern Leeward Islands and the southern Windwards with the dividing line normally between Guadeloupe and Dominica. Island sizes

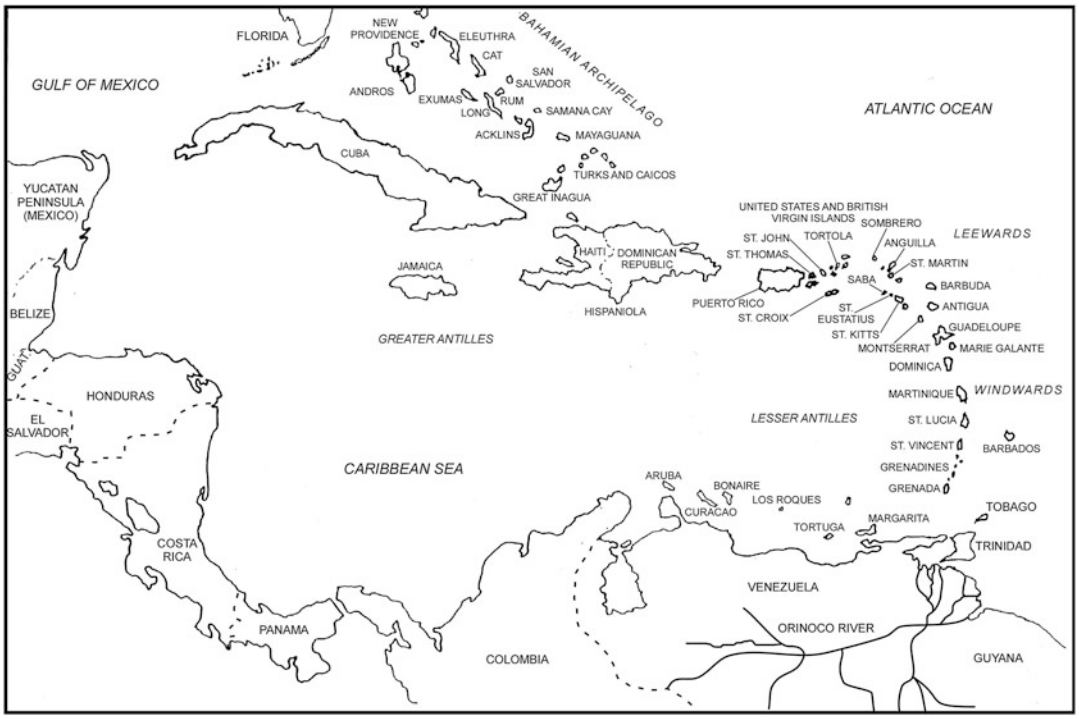

Caribbean Prehistoric Archaeology, Fig. 1 Map of the Caribbean (Hayward et al. 2009a: Fig. 1.1)

are notably less extensive than those of the Greater Antilles accounting for 3% of the total landmass (Bright 2011: 30–31; Keegan and Hofman 2017: 5, 197; Hayward et al. 2009a: 5).

Trinidad and Tobago, today just off the coast of Venezuela, broke off at different times from South America at the end of the Holocene around 7000 BC. Their continental origin is displayed in the islands' closer biological and physical relationships with northeastern South America than their insular neighbors to the north. Trinidad is distinguished by mountain ranges, low hills, poorly drained lowlands, and coasts atop sedimentary, limestone, and volcanic substrates. Most of Tobago consists of a central highland ridge of primarily metamorphic and volcanic rock origin, ringed by a shoreline. Both these islands make up 2% of the region's extent (Keegan and Hofman 2017: 5; Hayward et al. 2009a: 5).

The Bahamian archipelago encompasses 35 small coral limestone islands of low relief, normally less than 30 m high. They, along with some 3000 cays (islands) of even lesser landmass, extend over 1000 km from near the southeast coast of Florida to the north of Hispaniola and Cuba. Their 5% of the area is governed by the independent Commonwealth of the Bahamas and the British Oversees Territory of the Turks and Caicos Islands. Although these landforms are located in the southern North Atlantic, they are included in the area due to their similarities in history, climate, and biota with the rest of the Caribbean (Keegan and Hofman 2017: 6, 170; Hayward et al. 2009a: 5).

Roughly parallel to the Venezuelan coast, and generally within 50 km, lies a line of islands from Aruba to Margarita termed the Southern Caribbean Region. Aruba, Bonaire, and Curaçao being former Dutch colonies retain a political association with the Kingdom of the Netherlands, while Margarita and the remaining islands fall under Venezuelan authority. Accounting for less than 1% of the land extent, the islands derive from volcanic rocks yet with normally low-lying limestone surface forms. They all, like Trinidad and Tobago, reflect the flora and fauna, as well as

material culture of the mainland (Keegan and Hofman 2017: 4–5; Hayward et al. 2009a: 5–6).

Environmental Considerations

Early entrants into this physical setting would have been presented with certain challenges to settlement, balanced by inviting and sustainable resource opportunities. Regarding the physical layout (see Fig. 1), with limited exceptions, all the islands are visible from one another. Continental-to-island chain visibility gaps involve the Yucatan and Florida Straits where Cuba cannot be seen from the Yucatan Peninsula and neither the Greater Antilles nor the Bahamas can be seen from Florida over distances of 200, 185, and 100 km, respectively (Callaghan 2013: 285–286; Torres and Rodríguez Ramos 2008). Modeled extended or intervisibility ranges add two intraisland gaps: the 65 km Anegada passage between the northernmost Leeward and Virgin Islands as well as the waterways delineating Cuba and Hispaniola from the Bahamas ranging from some 100 to 200 km (Torres and Rodríguez Ramos 2008).

The Caribbean's pleasantly considered tropical regime encompasses sunny days and warm waters along with fairly dependable cooling trade winds. Seasonally, rainfall is divided into a rainy period from May to October and a dry one from November to April. Factors affecting annual precipitation include altitude and island topography. Rainfall on some of the low Bahamian islands registers less than 29 in. per year, while the mountainous rainforest on Puerto Rico receives 120 in. The interaction of the trade winds and island landforms results in greater rainfall on the windward or north and east sections and lesser amounts on the leeward or south and west portions. While the region's climatic may not have changed significantly from prehistoric times, alternating drier and wetter periods are indicated from core samples (Bright 2011: 33; Cooper 2013: 53; Keegan and Hofman 2017: 29; Wilson 2007: 11–13).

Sea levels, both relative and absolute, have also varied during the human occupation of the region. Climatic changes along with such factors as plate tectonics (subsidence or uplifting) combined to affect a lower sea level (figures vary in literature) than today's around 7000 BP or some thousand years before initial human entry. Such lower levels may have increased the total landmass by 15%. Subsequently, levels then rose to near the modern level by 5000 BP and have been slowly falling since. Trinidad becomes completely separated from the South American mainland by roughly 6200 BP and from Tobago even earlier at the beginning of the Holocene 10,000 years ago. To these longer-term climatic-related variations must be added, then as now, periodic occurrences of hurricanes and volcanic eruptions (Bright 2011: 33–35; Cooper 2013: 51–55; Cooper and Boothroyd 2011).

Shifts in duration of rainy and dry seasons, as well as changing island sizes, biotopes, and navigation routes, along with episodes of sudden high winds, heavy precipitation, storm surges, lava flows, fires, and toxic gases would have affected the region's availability of freshwater, food resources, and settlement integrity (via destruction, changing resource base, or submergence). All of these conditions would have distressed both agricultural and nonagricultural practicing societies. While systematic macro- to microscale human-environmental relationships remain underdeveloped, archaeological and ethnohistorical data provide evidence for these ecological instabilities and their cultural responses. Coastal and inland flooding (storms, hurricanes), draughts, storm-deposited bands of sterile sand, and volcanic deposit events are indicated, as are compensating measures including caves for temporary shelter, wind-resistant structures, settlement relocation on the same or different islands, modifying subsistence strategies, and posited changes in sociopolitical systems (Bright 2011: 33–36; Cooper 2013; Cooper and Boothroyd 2011).

Environmental unpredictability was offset in the region with a great diversity in edible and useable plant and animal resources that were, of critical import to their exploitation, unevenly distributed across the islands. Many of the biota would have been familiar having been derived from Central and South America though in contrast characterized by lower species diversity,

especially that of terrestrial animals, and the presence of abundant aquatic resources. Available terrestrial species included giant ground sloths, a giant flightless owl, the Greater Antillean spiny rat, the hutia (medium-sized rodent), tortoises, and shrew-like insectivores. Manatees, whale and dolphin species, and marine turtles as well as fishes like sharks and tuna accounted for deeper or open water resources. Freshwater turtles, iguanas, crocodiles, numerous fishes, crabs, and shellfish could be found in rivers, estuaries, shorelines, offshore banks, and reefs. Various birds were also present including ducks, parrots, pigeons, and frigates (Bright 2011: 31–33; Keegan and Hofman 2017: 29–30, 197).

A range of forest types from tropical rainforests to dry stands provided opportunities for the exploitation of fruit-bearing trees such as guava. The calabash, lignum vitae, and silk cotton trees were available for their gourds, wood, and bark/fiber, respectively. On land, suitable soils and landforms could be found on the well-drained high ground back from coastal embayments, as well as small to large river valleys. The latter were chiefly restricted to the Greater Antilles though counterbalanced in the Lesser Antilles by productive offshore shallow shelves and banks sometimes larger than their connected landmasses (Bright 2011: 33; Wilson 2007: 9, 14–15).

Once in the region, human occupation or domestication of the islandscape had profound environmental effects. Faunal groups quickly went extinct or nearly so, particularly the Pleistocene-ending mammalian species like the sloths, due to hunting, climatic changes, habitat destruction, or their combination. Plants and animals from the continent and within the region were introduced such as manioc, sweet potato, peppers, tobacco, monkeys, dogs, and guinea pigs from the mainland, while the hutia apparently native to Hispaniola was transported early on to Puerto Rico and the Virgin Islands. Intensive agricultural practices, added to large-scale forest clearing, led in many areas to replacement of primary by secondary vegetation, soil erosion, and increased sedimentation (Bright: 32, 36–37; Keegan and Hofman 2017: 29–30, 197–198, 172).

Terminology and Chronology

Caribbean prehistory involves a complex interplay between the physical environment of islandscapes, seaways, and continental zones with the social one of different groups, languages, and material cultures. A number of regional to local frameworks have been devised that relate population movements and cultural changes through time. The nomenclature for contact and classification of prehistoric societies is varied and overlapping and can be confusing. Commonly encountered terms and their understandings are detailed in Table 1. The Taíno, for instance, refer to diverse through culturally related groups in the northern Antilles that formerly were referred to as Arawaks. The term Taíno was adapted to distinguish Caribbean from northeast South American contact period groups, in addition to its reference as a language. Further both terms are also used for precontact societies as depicted in Figs. 2 and 3: Pre-Arawak for the Lithic/Archaic Age; Arawak and Pre-Taíno/Taíno for the Ceramic Period.

A considerable amount of research effort has been directed toward devising spatial-temporal frameworks for prehistoric populations that reflect diverse theoretical perspectives, as well as levels of inclusion from local to regional. The fundamental Caribbean-wide model is that of Irving Rouse who began developing his scheme early in the history of formal Caribbean research around the 1940s. He and other investigators have revised the framework over the years with the latest full version presented in his 1992 publication *The Taínos*. Four broad Ages are recognized: Lithic, Archaic, Ceramic, and Historic or Contact.

Rouse's model (under the cultural-historical paradigm) represents a hierarchical ordering of cultural integration at five levels of increasing inclusion and decreasing variability. The most inclusive and least variable level is that of the foregoing four ages followed by series, subseries, styles, and wares. A style represents a similar set of core attributes from multiple assemblages, while a ware may possess certain attributes that completely or partially characterize a style. For instance, zone-incised crosshatched wares are

Caribbean Prehistoric Archaeology, Table 1 Terminology for precontact Caribbean societies

Term	Description	Sources
Guanahatabey or Ciboney	Frequently refers to hunter-gatherer-collector populations in western Cuba and possibly Hispaniola (their survival to contact under investigation) – can also refer to specific and generalized such groups or later Taíno populations in central Cuba	Reid (2014a: 103–105), Rodríguez Ramos (2010: 51–52), and Wilson (2007: 33, 145–146)
Taíno(s)	Diverse (sociopolitical, linguistic, ethnic) though culturally related societies in the northern Antilles. Further subdivided based on geography and inferred level of cultural development: Classic Taíno in eastern Cuba, Hispaniola, and Puerto Rico; Western Taíno of central Cuba and Jamaica; Eastern Taíno the Virgin Islands and northern Lesser Antilles; Lucayan Taíno of the Bahamas; the later three category populations considered less developed – Taíno and Pre-Taíno also used to designate Ceramic Period precontact peoples	Keegan and Hofman (2017: 13–14), Peterson et al. (2004: 18–19), and Reid (2014b)
Arawak	Formerly used interchangeably with Taíno; Arawak also refers to contact period groups from northeast South America that were culturally distinct from those of the Antilles, with the word Taíno adopted to clarify the distinction; Arawak or now Lokono language distinct from Taíno and Island Carib speech but all within same language family – also use of the terms pre-Arawak and Arawak to label Lithic/Archaic and Ceramic Period prehistoric groups	Reid (2014b)
Island Carib or Carib	Groups who occupied the Lesser Antilles from around Guadeloupe to northern Trinidad at contact	Keegan and Hofman (2017: 14–15), Peterson et al. (2004: 19–20), and Reid (2014c)
Igneri	No consistent use of the term; frequently refers to specific groups or languages in the Lesser Antilles; also used to define certain other precontact groups	Granberry (2013: 64–67), Keegan and Hofman (2017: 14), and Peterson et al. (2004: 20)

found in Hacienda Grande styles, along with the more frequent white-on-red painted wares, but are exclusive to Huecan styles.

As elaborated over time, these styles have been dominated by ceramic attributes and secondarily with characteristics from other artifact classes like lithics and shell. Rouse has considered the ceramic styles to largely equate with the peoples that manufactured the pottery who occupy discrete temporal units and geographic locations. Series are groups of styles, also non-overlapping-in-time-and-space that derive from a common culture affiliation defined by basic or critical attributes. The subseries is intermediate between the style and series covering still more limited in extent related styles and inferred associated peoples.

Graphically, Rouse's classification categories are presented as a matrix with calendric dates along the vertical axis and geographic areas along the horizontal in Figs. 2 and 3. The time frame is derived from cross-dated assemblages and a still limited through growing corpus of radiocarbon dates. Relative positioning of the categories reflects stratigraphic sequencing, while areal extents cover individual islands and inter-island water passages. His 1992 matrices or Figs. 14 and 15 for the Greater and Lesser Antilles, plus adjacent northern South America, are redrawn, expanded in areal extent, and updated from other sources that simplify the visual presentation of his categories. Changes include grouping together islands with the same categorization and conflating the water passage distinctions. The latter remain relevant since at certain times and places in the precontact Caribbean, material cultures were more alike from island portions facing a common waterway than even from the same

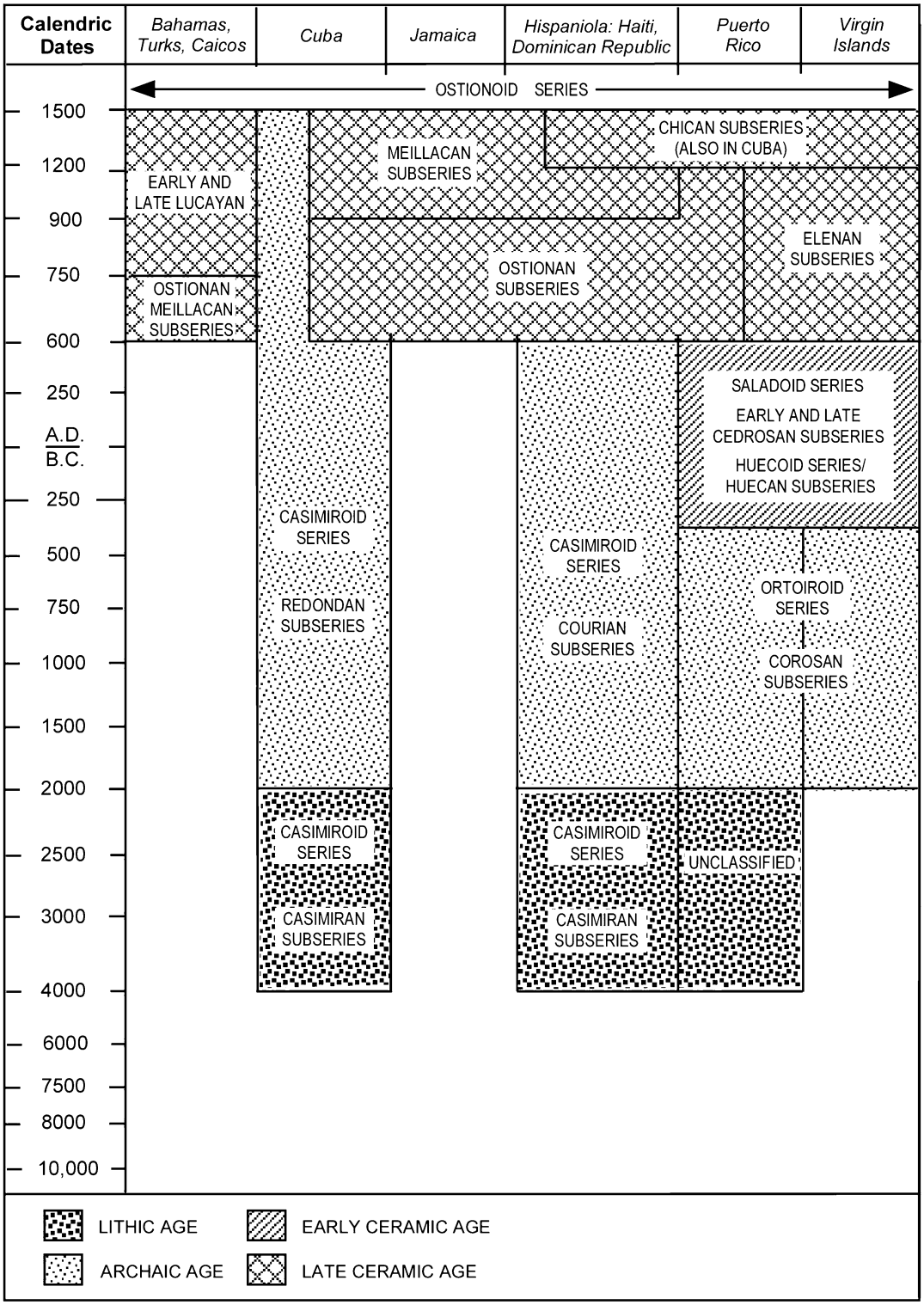

Caribbean Prehistoric Archaeology, Fig. 2 General cultural chronology of the Greater Antilles (Berman et al. 2013; Rodríguez Ramos 2010; Rouse 1992: 52 Fig. 14). (After Hayward et al. (2009a: Fig. 1.2))

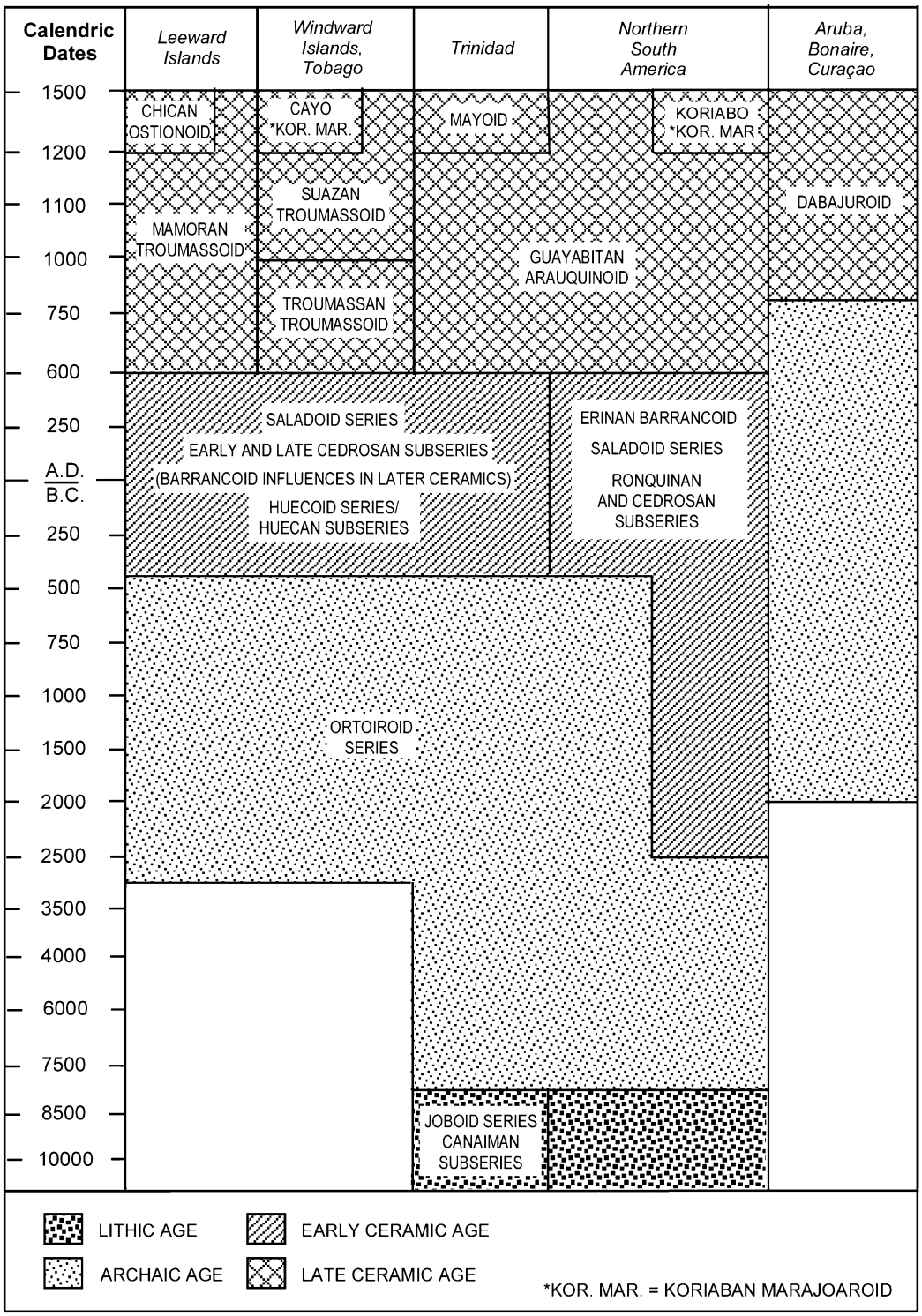

Caribbean Prehistoric Archaeology, Fig. 3 General cultural chronology of the Lesser Antilles (Boomert 2000;54, 128 Figs. 7 and 15, respectively, and personal communication 2007; Haviser 2001: 18; Newsom and Wing 2004: 61; Peterson et al. 2004:32 Fig. 1; Rouse 1992: 53 Fig. 15). (After Hayward et al. (2009a: Fig. 1.3))

island. Columns for the series and subseries are provided, with all such divisions detailed in Tables 2a, 2b, and 2c. By convention, the series labels end in "oid" and the subseries in "an," as in the Elenan subseries of the Ostionoid series.

The Lithic and Archaic Age Casimiroid peoples in the northern and Ortoiroid groups in the southern Antilles begin to settle the region as exploiters of raw materials, animal, plant, and marine resources around 6000 BC. Their material culture primarily consists of worked stone, shell, and bone artifacts with evidence of ceramic production, recurrent settlements, and plant management. Around 500 BC, new in-migrating societies bring with them such cultural traits as full-scale pottery production, settled village life, and horticulture. These Early Ceramic or Saladoid societies are found throughout the Lesser Antilles and the northeast Greater Antilles. Subsequent insular as well as insular-continental cultural dynamics

Caribbean Prehistoric Archaeology, Table 2a Rouse's (1992) classification of Lithic/Archaic Age Caribbean cultures updated

Subseries	Styles/complexes/peoples and cultures			Island/site location
	Early	Middle	Late	
Greater Antilles				
Casimiroid series 4000 BC–AD 1500				
Casimiran 4000–2000 BC	Seboruco			Cuba
	Cabaret			Haiti
	Barrera-Mordán			Dominican Republic
Redondan 2000 BC–AD 500/850 and to AD 1500	Guayabo Blanco		Cayo Redondo	Eastern Cuba
				Central Cuba
				Western Cuba (to AD 1500)
Courian 2000 BC–AD 600	Couri			Haiti
	El Porvenir			Dominican Republic
Ortoiroid series 4000 BC–AD 250				
Unclassified 4000–2000 BC				Puerto Rico
Corosan 2000–250 BC	Coroso			Vieques
	Cayo Cofresi			Puerto Rico
	Krum Bay			St. Thomas, US Virgin Islands
Lesser Antilles				
Ortoiroid series 7000/6000–300 BC				
Unclassified				Saba, Anguilla, Nevis, St. Martin, St. Kitts, Antigua, Barbuda, St. Eustatius, Guadeloupe, Marie-Galante, St. Vincent, Martinique, Barbados
Banwarian 7000/6000–2500 BC	Milford			Tobago
Ortoiran 1500–300 BC	Ortoire			Trinidad
Banwarian 7000/6000–2500 BC	Early Banwari	Late Banwari	Poonah Road	
Northern Lesser Antillean Alternate Archaic period				
	Early Archaic 3300–2600 BC	Middle 2600–800 BC	Late 800 BC–AD 100	Saba, Anguilla, Nevis, St. Martin, St. Kitts, Antigua, Barbuda, St. Eustatius, Guadeloupe, Marie-Galante
General Lithic/Archaic 2000 BC–AD 750				
				Aruba, Bonaire, Curaçao

Additional sources: Boomert (2000: 54 Fig. 7, 2013: 142) for Trinidad and Tobago, Keegan and Hofman (2017: 201) for Alternative Archaic Period, and Newsom and Wing (2004: 61) for Aruba, Bonaire, and Curaçao

Caribbean Prehistoric Archaeology, Table 2b Rouse's (1992) classification of Early Ceramic Caribbean cultures updated

Subseries	Styles Complexes Sites	Styles Complexes Sites	Styles Complexes Sites	Island/site location
Greater Antilles				
Casimiroid series 500 BC–AD 1500				
Redondan 500 BC–AD 500/850 and to AD 1500	Guayabo Blanco		Cayo Redondo	Eastern Cuba Central Cuba Western Cuba (to AD 1500)
Courian 500 BC–AD 600	Couri			Haiti
	El Porvenir			Dominican Republic
Saladoid series				
Cedrosan Early 500/250 BC–AD 600	Early 500/250 BC–AD 300/400		Late AD 300/400–600	
	Hacienda Grande		Cuevas	Puerto Rico Vieques
	Prosperity		Coral Bay-Longford	Virgin Islands
Huecoid series				
Huecan 500 BC–AD 600	No formal designations			Puerto Rico Vieques Virgin Islands
Lesser Antilles				
Saladoid series				
Leeward Islands				
Cedrosan 400 BC–AD 600/800	Early 400 BC–AD 300/400	Saladoid with Barrancoid influence AD 300–500	Late AD 300/400–600/800	
	Cayon	Sugar Factory 2		St. Kitts
	Indian Creek 1	Barrancoid influence weak	Indian Creek 2	Antigua
	Initial unnamed	Morel 1	Morel 2 Barrancoid influence weak	Guadeloupe
		Barrancoid influence weak	Present at sites: Sandy Ground, Rendezvous Bay, Fountain Cavern	Anguilla
		Barrancoid influence weak	Present at sites: Trants	Monserrate
			Present at sites: Golden Rock	St. Eustatius
			Present at sites: Spring Bay 1a, Kelbey's Ridge 1	Saba

(continued)

Caribbean Prehistoric Archaeology, Table 2b (continued)

Subseries	Styles Complexes Sites	Styles Complexes Sites	Styles Complexes Sites	Island/site location
	Present at sites: Hope Estate		Present at sites: Anse des Pères	St Martin
Windward Islands				
		Barrancoid influence strong		Dominica
	La Salle	Vivé	Diamant Barrancoid influence strong	Martinique
	Grande Anse		Troumassée Barrancoid influence strong	St Lucia
	Initial phase	Post Office	Arnos Vale Barrancoid influence strong	St. Vincent
		Barrancoid influence strong		Grenadines
	Initial phase	Pearls	Salt Pond Barrancoid influence strong	Grenada
	Possible phase AD 1–250		Chancery Lane Barrancoid influence strong	Barbados
	Courland and Mount Irvine		Mount Irvine Friendship Barrancoid influence strong	Tobago
	Cedros		Palo Seco with Barrancoid influence Erin complex a local Barrancoid Style	Trinidad
Lesser Antilles				
Huecoid series/Huecan Saladoid				
Huecan Overlaps Cedrosan	No formal designations			Guadeloupe, Marie-Galante, Montserrat, St. Martin, Martinique, St. Kitts, Dominica, Grenada
	General Lithic/Archaic			
				Aruba, Bonaire, Curaçao

Additional sources: Boomert (2000:128 Fig. 15) for Trinidad and Tobago; Keegan and Hofman (2017: 63–71, 209) and Newsom and Wing (2004: 32 Fig. 1) for Aruba, Bonaire, and Curaçao; Peterson et al. (2004: 24–25) on Huecoid and Lesser Antillean classifications and 32 Fig. 1; and Rouse and Morse (1995: 325, 332 Fig. 11) for Lesser Antilles.
Rouse (1992: 53 Fig. 15) classifies all Barrancoid-influenced pottery phases as latest Cedrosan Saladoid phase in Lesser Antilles
Styles fall within the indicated date ranges

Caribbean Prehistoric Archaeology, Table 2c Irving Rouse's (1992) classification of Late Ceramic Caribbean cultures updated

Subseries	Subseries	Subseries	
Styles/complexes	Styles/complexes	Styles/complexes	Island location
Greater Antilles			
Casimiroid 500 BC–AD 1500			
Redondan AD 300–1500			Western Cuba
Cayo Redondo			
Casimiroid and Ostionoid subseries or Ostionoid, Meillacoid, Chicoid series			
Early AD 600–900	Middle AD 900–1200	Late AD 1200–1500	
Redondan Casimiroid AD 300–850	Meillacan Ostionoid/ Meillacoid	Chican Ostionoid/Chicoid	Central Cuba
Cayo Redondo	Bani		
Ostionan Ostionoid	Meillacan Ostionoid/ Meillacoid	Chican Ostionoid/Chicoid	Eastern Cuba
Arroyo del Palo		Pueblo Viejo	
Ostionan Ostionoid	Meillacan Ostionoid		Jamaica
Little River	White Marl		
	Montego Bay		
	Port Morant		
Ostionan and Meillacan Ostionoid AD 700–1300	Early Lucayan	Late Lucayan	Bahamas
	Crooked Island Ware	Crooked Island Ware	
	Abaco Red Ware	Abaco Red Ware	
	Palmetto Ware	Palmetto Ware	
	AD 700/800–1100	AD 1100–1530+	
Ostionan Ostionoid	Meillacan Ostionoid/ Meillacoid	Chican Ostionoid/Chicoid	Haiti
Macady	Meillac	Carrier	
Ostionan Ostionoid	Meillacan Ostionoid/Meillacoid		Southwest Haiti
Unnamed	Finca		
Ostionan Ostionoid	Meillacan Ostionoid/ Meillacoid	Chican Ostionoid/Chicoid	Dominican Republic
Anadel			
	Meillac	Guayabal	
	Chican	Boca Chica	
	Atajadizo		
Ostionan Ostionoid	Ostionan Ostionoid	Chican Ostionoid/Chicoid	Western Puerto Rico
Pure Ostiones	Modified Ostiones	Capá	
		Boca Chica	
Elenan Ostionoid	Elenan Ostionoid	Chican Ostionoid/Chicoid	Eastern Puerto Rico
Monserrate	Santa Elena	Esperanza	
Elenan Ostionoid	Elenan Ostionoid	Chican Ostionoid/Chicoid	Virgin Islands
Magens Bay-Salt River I	Magens Bay-Salt River 2	Magens Bay-Salt River 3	
Lesser Antilles			
Leeward Islands			

(continued)

Caribbean Prehistoric Archaeology, Table 2c (continued)

Subseries	Subseries	Subseries	
Styles/complexes	Styles/complexes	Styles/complexes	Island location
Troumassoid and Ostionoid series			
Mamoran Troumassoid subseries			
Early AD 600/900–900	Middle AD 900/1200–1200	Late AD 1200–1500	
Mamoran Troumassoid			St Kitts
Sandy Bay			
	Mamoran Troumassoid		Barbuda
	Indian Town Trail		
Mamoran Troumassoid	Mamoran Troumassoid	Mamoran Troumassoid	Antigua
Mill Reef	Mamora Bay	Freeman's Bay	
Mamoran Troumassoid			Guadeloupe
Morel 3 and 4			
Also Suazan Troumassoid subseries complexes			
Also Cayo ceramics			
	Mamoran Troumassoid	Chican Ostionoid/Chicoid	Anguilla
	Sandy Hill		
Mamoran Troumassoid			Monserrate
Dagenham Beach			
Mamoran Troumassoid			St. Eustatius
Smoke Alley and			
Godet			
Mamoran Troumassoid		Chican Ostionoid/Chicoid	Saba
The Bottom		Kelbey's Ridge	
	Mamoran Troumassoid	Chican Ostionoid/Chicoid	St Martin
	Cupecoy Bay		
Windward Islands except Trinidad			
Troumassoid and Suazoid series with Cayo complex			
Troumassan Troumassoid Early AD 500/600–1000	Suazan Troumassoid	Suazan Troumassoid	
	Middle AD 1000–1200	Late AD 1200–1500 Cayo complex post-AD 1250 also present	
		Cayo present	Dominica
Initial-Esperance	Macabou 1	Macabou 2	Martinique
Later-		Isolated Cayo sherds	
Paquemar			
Initial	Faniss		St Lucia
Troumasse B	Isolated Cayo sherds		
Later			
Massacre			
Initial unnamed	Fitz-Hughes		St. Vincent
Later	Cayo present		
Indian Bay			
		Present	Grenadines
		Cayo present	

(continued)

Caribbean Prehistoric Archaeology, Table 2c (continued)

Subseries	Subseries	Subseries	
Styles/complexes	Styles/complexes	Styles/complexes	Island location
Initial unnamed	Suazey		Grenada
Later Caliviny	Cayo present		
	Peak Bay		Barbados
Golden Grove	Plymouth		Tobago
Trinidad			
Arauquinoid and Mayoid series			
Guayabitan Arauquinoid subseries		Mayoid series	
Bontour		Unnamed	Trinidad
Dabajuroid series AD 750–1500			
			Aruba, Bonaire, Curaçao

Additional information from Berman et al. (2013) for the Bahamas, Boomert (2000: 128 Fig. 15, 2013: 149–151) for Tobago and Trinidad, Keegan and Hofman (2017: 87–89, 103–105, 120–121, 165, 167–168, 189–190, 225, 234), and Peterson et al. (2004: 26–29, 32 Fig. 1) especially for Lesser Antilles
Discrepancies in dating of ceramic categories among the sources

are marked by the increasing differentiation of peoples into various Late Ceramic Ostionoid groups in the Greater Antilles and Troumassoid, Suazoid, Mayoid, and Cayo populations in the Lesser Antilles (Rouse 1992; for discussion of Rouse's model, see especially Curet 2005: 11–15, 57; Keegan and Hofman 2017: 16–17; Peterson et al. 2004: 21–22; Krause 2016).

Also developed over the years is the alternative classification system of (Chanlatte Baik and Narganes Storde 1983; Chanlatte Baik 2013) involving three developmental phases within the region (Fig. 4). Phase I comprises interacting Archaic and certain ceramic-producing groups in northern South America that serve as parent populations for in-migrating Archaic groups. They are followed by two separate groups of farmer-potters or Agroalfareros I from northwest and northeast South America. In Phase II these three groups adjust to their environment, interact, yet maintain their individual cultural identities now transformed from continental to insular Archaic, Huecoid Agroalfareros I and Saladoid Agroalfareros II. Phase III further interactions yield the distinct Ostionoids or Agroalfareros III around AD 600 that subdivide into the Elenan and other Late Ceramic Rouse-defined subseries terminating with the Agroalfareros IV or contact period Taíno groups.

Marxist theory has also served as an organizing framework for the definition and understanding of past Amerindian societies in the Caribbean. Cubans, for instance, have elaborated a varied taxonomy including two interrelated systems. One focuses on ceramic and agricultural differentiation – *pre-agroalfareros* (preagroceramicists), *protoagricola* (protoagriculuralists), and *agroalfarero* (agricultural-ceramicists). The second one emphasizes socioeconomic development where an economy of appropriation associated with hunting, fishing, and collecting societies, as well as protoagriculturalists, gives way to an economy of food production associated with horticulturalists (Cooper 2010: 86; Keegan and Hofman 2017: 152; Ulloa Hung and Valcárcel Rojas 2013; Wilson 2007: 21).

Regarding current conceptual frameworks, the following observations can be made:

- A mix of traditional – Marxism and Structuralism – and more recent theoretical approaches, cognitive and landscape archaeology.
- The incorporation of newer orientations and technologies – GIS and computer simulations – into research projects that nonetheless continue to focus on long-studied questions of migration, culture history, and societal developmental processes.
- The realization that an island-human dynamic differs from a continental one.

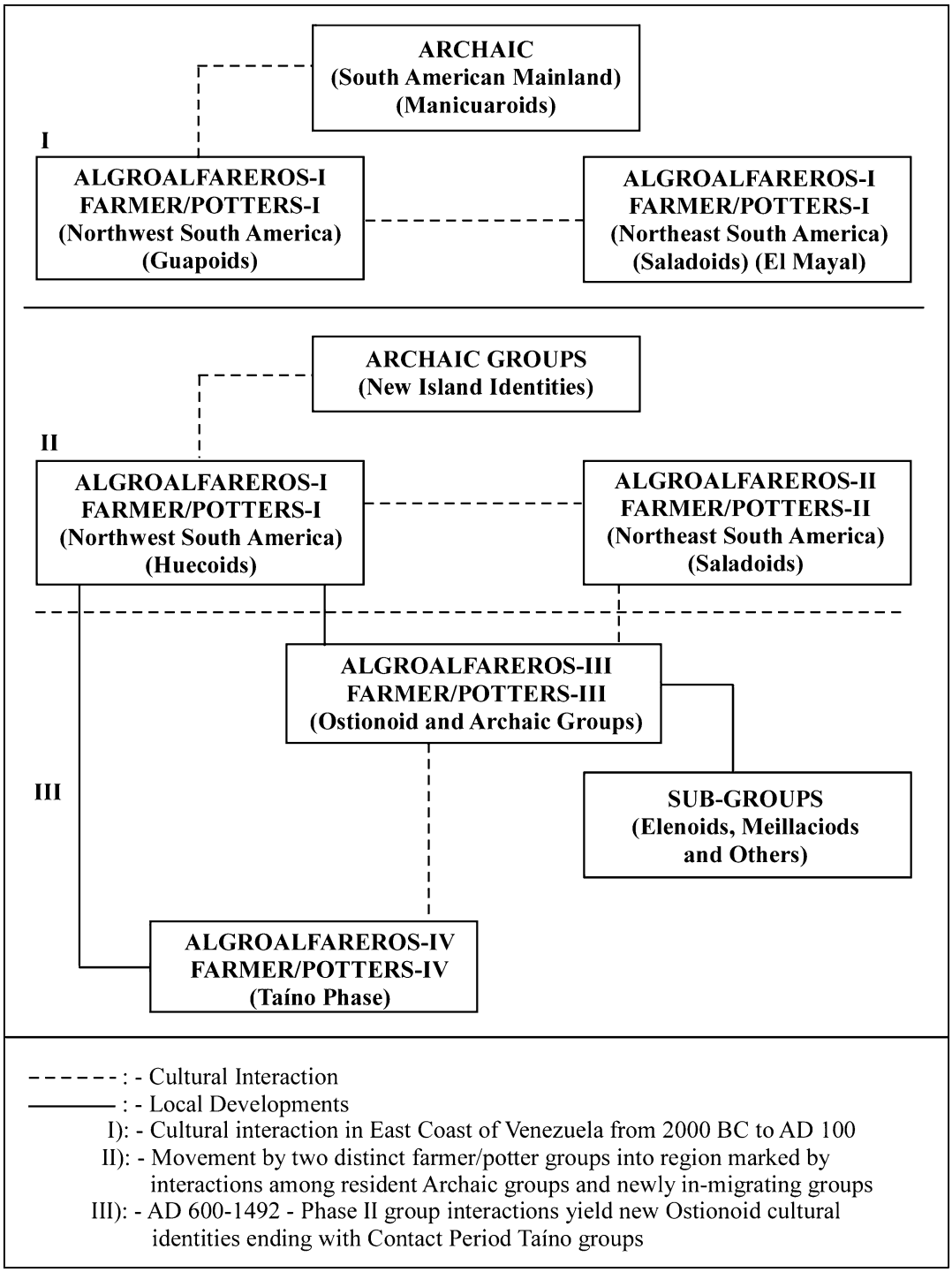

Caribbean Prehistoric Archaeology, Fig. 4 Alternative cultural chronology of the Caribbean: Agroalfarero or Famer/Potter Sequence. (After Chanlatte Batik and Narganes Storde (1983: Fig. 1))

- A focus regardless of any particular theoretical orientation on the diversity or plurality of societies, not their homogeneity.
- A related-to-the-diversity-focus involves the incorporation of cultural contact situations including transculturation, assimilation, and displacement.
- A renewed emphasis on anthropological archaeology where the archaeological record is seen as resulting from a series of complex negotiated social relationships at multiple levels of organization involving a range of items from material goods to ideas.

Early Occupation of the Caribbean

Initial entry into the area takes place against a backdrop of long-settled continental zones with reasons for movement into the expansive island environment remaining unclear. Motives look to have been more related to positive than negative factors such as resource depletion or major socio-political conflicts. The allure of water-oriented populations to an assumed similar-enough setting, in addition to the potential for valued plant, animal, and material resources, may have served as attractive reasons. At around the same time as the first peoples were entering into the region, 4000–3000 BC, mainland societies were engaged in long-distance interaction spheres involving various items and in particular lithic raw materials. The search for desired items would have led, for instance, to the discovery of the region's abundant and high-quality lithics providing for both inter-regional and eventually intra-regional trading prospects (Rodríguez Ramos 2010: 87, 2013: 131–132; Wilson 2007: 3–4).

Dates from select sites for this long Lithic/Archaic occupational phase are presented in Table 3. The earliest ones for the Greater Antilles involve several Cuban sites with BP ranges for five sites of from 5140 to 4000 with their calibrated BP dates (lower ranges) yielding older results 6300–4900. The two earliest sites are those of Cueva de la Lechuza with a calibrated BP variance of 6298–5746 and Levisa I with 6288–5584. Angostura in Puerto Rico registers an older BP assay of 5960 ± 250 with a calibrated BC date of 4900. The Vignier phases II and III in Haiti present comparable BP dates of 5580 ± 80 and 5270 ± 100, respectively. In the Lesser Antilles, Trinidad appears to have had a Paleo-Indian component based on the presence of a stemmed projectile point and a plano-convex scraper; however this possible occupation and the oldest sites occur when the island was still attached to northeast Venezuela or transitioning to island status. Banwari Trace dates involve the identification of three phases beginning with 7800–7900, 6900–7400, and finally 5500–6200, all cal. BP values. St. John has various reported dates including a seven-value range from cal. BC 5840–5720 to 3590–3370 with the corresponding cal. BP set from 7790–7670 to 5460–5300 (Boomert 2000: 49, 2013: 142; Pagán Jiménez et al. 2015: 233 Table 1; Tankersley et al. 2018: 693).

Despite these early dates, major settlement of the region likely begins later and especially between 4500 and 2500 BP. Earlier phase sites include Maruca and Paseo del Indio in Puerto Rico, Jolly Beach in Antigua, Sugar Factory Pier in St. Kitts, and Etang Rouge in St. Martin. Later period increases involve Canímar Abajo on Cuba, Barrera-Mordán on Hispaniola, Krum Bay on St. Thomas (US Virgin Islands), Plum Piece on Saba, the River Site on Barbuda, Whitehead's Bluff on Anguilla, Norman's Estate on St. Martin, Heywoods on Barbados, and Milford I on Tobago. It should be added that still older sites may be located along drowned shorelines due to rising sea levels, buried under volcanic ash or alluvial deposits, or in other archaeological contexts (Table 3; Cooper and Boothroyd 2011; Rodríguez Ramos 2013: 127–128).

Although Lithic/Archaic site distribution is widespread over the 1500 km island chain, it is uneven. The larger landforms of Jamaica and the Bahamian archipelago in the Greater Antilles were never permanently settled, as well as it seems most of the southern Lesser Antilles. Apart from Trinidad, Barbados and Tobago, and Le Godinot and Boutbois on Martinique (with questioned Lithic/Archaic status), plus evidence from core samples of possible human-related fires on Martinique and Grenada, no other such sites

Caribbean Prehistoric Archaeology, Table 3 Select Lithic/Archaic Age site characteristics (all dates as reported in the literature)

Site type, size, location, classification	Dating	Descriptions	Sources
Cuba			
Abra del Cacoyuguin I, II, IV	BP/cal. BP 1210 ± 60/1283–974 1640 ± 130/1866–1296 2780 ± 40/2964–2779 3720 ± 70/4256–3873 4180 ± 80/4867–4446 All dates calibrated at 2 sigma		Cooper (2010: 93 Table 4.1, 101 Table 4.2)
Cueva de la Lechuza	16 dates ranging from youngest to oldest BP/cal. BP 1470 ± 110/1568–1178 To 5270 ± 120/6298–5746 All dates calibrated to 2 sigma		Cooper (2010: 94 Table 4.1, 101 Table 4.2)
Canímar Abajo Rock shelter Río Canímar estuary north coast Two distinct cemeteries separated by a shell midden layer Overall site depth 2 m No direct evidence of habitation	Dating indicates two and possibly more phases during extended Archaic period 360–950 AD 1380–800 BC Possibly earlier Archaic phase as only limited site excavation 5480–5380 cal. BC date is under review	Material culture No ceramics Lithics Milling stones Shell tools Subsistence Most common faunal remains were molluscan shell and fish bones Most common mammals were hutia (small rodent) Starch gain analysis of lithic tools yielded maize, sweet potato, zamia, beach bean, common bean, cocoyam or yautía, and wild yam Diet of marine animals (fish and mollusks) and terrestrial mammals (hutia) complemented by wild and managed plants Continuity in dietary preferences between the two Archaic phases Mortuary 142 burials 213 individuals, 83 adults, and 130 subadults	Keegan and Hofman (2017: 25, 154) and Smith et al. (2018: 101–104)

Levisa I Rock shelter on Río Levisa, coast Likely habitation	Multiple dating BP/cal. BC 3460 ± 160/2030–1530 5050 ± 0/3980–3710 5140 ± 170/4250–3700 All dates calibrated to 1 sigma Wilson (2007:28–29 Table 2.1)	Material culture 8 stratified levels Steady increase in flake over blade tools from older to younger strata; not due to lack of abundant/quality raw material (cherts) Use of conch shells for tools higher in younger strata	Wilson (2007: 27–31, 34–37)
	BP/cal. BP 3460 ± 160/4150–3367 4240 ± 100/5041–4520 4420 ± 100/5318–4828 5140 ± 170/6288–5584 All dates calibrated at 2 sigma Cooper (2010:96 Table 4.1, 102 Table 4.2)	Subsistence Pre 2000 BC primarily reliance on land and sea animals (seals, manatee, sea turtles, hutia, large sloths) Pre 2000 BC minor reliance on shellfish; little or no fishing Post 2000 BC increase in fishing and shellfish collecting; possibly due to extinction of larger land and sea animals and greater experience with aquatic resources	
	3220 uncal. BC Keegan and Hofman (2017:25)		
Damajayabo	BP/cal. BC		Wilson (2007: 28–29 Table 2.1) and Cooper (2010: 95 Table 4.1)
	3250 ± 100/1670–1430		
Residuario Fuenche	BP/cal. BC 2070 ± 150/360 BC–AD 70 2510 ± 200/850–390 3110 ± 200/1650–1100 4000 ± 150/2900–2300 All dates calibrated to 1 sigma		Wilson 2007: 28–29 Table 2.1
	BP/cal. BP 2070 ± 150/2352–1702 2510 ± 200/3066–2112 3110 ± 200/3828–2785 4000 ± 150/4854–3994 All dates calibrated to 2 sigma		Cooper 2010: 95 Table 4.1, 102 Table 4.2
Jorajuria	BP/cal. BP 3760 ± 40/4241–3944 3870 ± 40/4419–4152 4110 ± 50/4827–4442 All dates calibrated to 2 sigma		Cooper (2010: 96 Table 4.1, 102 Table 4.2)

(continued)

Caribbean Prehistoric Archaeology, Table 3 (continued)

Site type, size, location, classification	Dating	Descriptions	Sources
Damajayabo	BP/cal. BC 3250 ± 100/1670–1430 Date calibrated to 1 sigma		Wilson (2007: 28–29 Table 2.1)
	BP/cal. BP 1120 ± 160/1332–697 3250 ± 100/3697–3262 Dates calibrated to 2 sigma		Cooper (2010: 95 Table 4.1, 102 Table 4.2)
Dominican Republic			
Barrera-Mordán 3 proximal sites (1) Barrera-Mordán (2) Casimira 100 m (3) Las Alejandrinas 75 m Lithic workshops	BP/cal. BC 4140 ± 130/2900–2580 4400 ± 170/3340–2900 4560 ± 80/3490–3100 All dates calibrated to 1 sigma Wilson 2007:28–29 Table 2.1	Material culture Blades decrease in frequency through time Pottery present	Keegan and Hofman (2017: 30–32)
	RC AD 625 ± 80 AD 1 ± 300 BP 2585 ± 80 or 2425 ± 170 or 2165 ± 130 (circa 500 BC) three values from same sample Keegan and Hofman (2017:31–32)		
El Porvenir	BP/cal. BC 2855 ± 90/1200–910 2980 ± 95/1390–1090 All dates calibrated to 1 sigma		Wilson (2007: 28–29 Table 2.1)
Haiti			
Caberet	BP/cal. BC 2280 ± 80/410–200 Date calibrated to 1 sigma		Wilson (2007: 28–29 Table 2.1)
Des Cahots	BP/cal. BC 4340 ± 80/3100–2900 Date calibrated to 1 sigma		Wilson (2007: 28–29 Table 2.1)

Matelas	BP/cal. BC 4370 ± 90/3300–2900 Date calibrated to 1 sigma		Wilson (2007: 28–29 Table 2.1)
Phaeton	BP/cal. BC 3260 ± 70/1630–1450 Date calibrated to 1 sigma		Wilson (2007: 28–29 Table 2.1)
Vignier II	BP/cal. BC 5270 ± 100/4249–3990 Date calibrated to 1 sigma		Wilson (2007: 28–29 Table 2.1)
Vignier III	BP/cal. BC 5580 ± 80/4510–4350 Date calibrated to 1 sigma		Wilson (2007: 28–29 Table 2.1)
Puerto Rico			
Angostura	5960 ± 250 BP 4900 cal. BC		Rodríguez Ramos (2013: 127); Rodríguez Ramos (2010: 54)
Paso del Indio	Cal. AD, BC ranges 660–450 BC–AD 90 2690–2670 BC		Rodríguez Ramos (2010: 44, 46)
	3500–3200 cal. BC		Wilson (2007: 54)
Puerto Ferro	2330–460 cal. BC 4200–2600 cal. BP		Rodríguez Ramos (2010: 44, 46) Pagán Jimenéz (2013: 395)
Maruca On terrace of Río Matilde, South Central Coast	Occupational phases from 2890–1945 cal. BC and until 395 cal. BC Wilson (2007: 54)	Material culture Obsidian present	Rodríguez Ramos (2013: 158) and Wilson (2007:54–55)
		Similar to lithics of Cuba, Haiti, and the Dominican Republic with large blades, blade cores, scrapers, and flake tools	
		Antiguan Long Island flint present Among ground stone tools many similar to those of Banwari Trace with mortars, conical pestles, and edge-battered/used implements	
		Conch shell tools comparable to Cuban examples like large projectile points, hand picks, and carved and drilled shell ornaments	
	4900–2700 cal. BP Pagán Jiménez (2013: 395)	Subsistence Heavy focus on coral reef resources, followed by shallow	

(continued)

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Caribbean Prehistoric Archaeology, Table 3 (continued)

Site type, size, location, classification	Dating	Descriptions	Sources
		in shore waters, with no freshwater/shore remains and minimal terrestrial ones	
Cueva Clara	3740 ± 30 BP 4000–3500 cal. BP		Rodríguez Ramos (2013: 128) Pagán Jiménez (2013: 395)
US Virgin Islands, St. Thomas			
Krum Bay On sheltered narrow bay Three small shell and artifact concentrations Estimate for one of a 35 m diameter Recurrent occupations over some 1000 years	Date ranges: 100–1000 cal. BC Wilson (2007: 48)	Material culture Stone tools similar to Banwari Trace assemblage with flaked tools for cutting and edge grinders, pebble hammerstones and grinders, mortars and pestles for pounding Stone axes, flaked celt-shaped biface, finely worked pendant, polished stone beads present Most made from local sources, but beads of different rock types probably imported No flint Coral files Subsistence Focused exploitation strategy involving certain mollusk species and reef fish plus adjoining pearl oyster beds	Wilson (2007: 47–48) and Keegan and Hofman (2017: 41, 206)
Ortoiroid series	3580 ± 270 BP	Ideology Quantity of red ochre	
Alternate Late Archaic	Late Archaic 800 BC–AD100 Keegan and Hofman (2017: 201–202)		

Saba			
Plum Piece 400 m above sea level in mountainous tropical forest Island 13 km^2 with surrounding bank one of largest and most productive fishing grounds in region Campsite Dense midden Surface 200 m^2	3430 ± 30 BP Rodríguez Ramos (2013: 128) 1875–1520 cal. BC range Calibrated to 2 sigma	Material culture Many ground stone tools for grinding and rubbing for plants and conch shell adzes for perhaps canoe manufacture High frequency of volcanic core and core fragments as at Norman's Estate on St. Martin Flint imported from Long Island site on Antigua 150 km distant likely arriving pre-worked Use-wear analysis of flint tools indicated used for cutting soft plant materials Large grinding boulder near midden indicates adzes polished at site Several caches of shell adzes suggest stored for recurrent use periods Subsistence Zamia (small, stocky, fernlike plant) probably imported from Puerto Rico or Hispaniola, plus other domesticates like maize and sweet potato present Processing and use of other plants such as wild ginger, arrowroot, and mountain cabbage High percentage of terrestrial faunal sources like black crab and birds plus open water and reef fish Mollusks, fish and shell fish low frequencies Remains suggest exploitation of seasonally abundant resources High incidence of crabs in contrast to minimal incidence at other coastal Archaic sites and with common percentages at Early Ceramic sites High incidence of conch shell adzes indicate use of meat as food	Keegan and Hofman (2017: 204–206)
Ortoiroid series	Middle Archaic 2600–800 BC Keegan and Hofman (2017: 201, 205)		
Alternate Middle Archaic			

(continued)

Caribbean Prehistoric Archaeology, Table 3 (continued)

Site type, size, location, classification	Dating	Descriptions	Sources
Anguilla			
Whitehead's Bluff 80 m inland from coast on northeast tip 14 m above mean sea level Karst region with sparse, low, wind-stunted vegetation Ortoiroid series Alternate Late Archaic	Late Archaic 800 BC–AD100	Material culture High frequency of celts and celt preforms from conch shells Ground stone tools include hammerstones, abraders, and a mortar fragment Flint flakes, no blades Subsistence Heavy reliance on mollusks	Keegan and Hofman (2017: 201, 203, 208)
St. Martin			
Etang Rouge On Peninsula Multiple occupations Repeated use as temporary campsite Ortoiroid series Alternate Early to Middle Archaic	Multiple phases all BC dates: 1550–800 2150–1550 2600–2150 3300–2600	Material culture Low incidence of shell and stone tools with flint artifacts Subsistence Hearths, cooking, and consuming areas documented Shellfish taxa include the Turkey Wing Arc clam, the Tiger Lucine bivalve, conch species, and lower frequencies of the West Indian Top Shell or sea snails	Keegan and Hofman (2017: 201, 203)
Baie Oriental 500 m^2 Camp site Alternate Late Archaic	Late Archaic phases: AD 100 800–400 BC	Material culture Shell and stone tools Settlement/subsistence Structural evidence for camp areas associated with different activities including shellfish cooking and consumption and tool production	Keegan and Hofman (2017: 206–207)

Norman's Estate Partially enclosed by hills in flat valley along coast Site with shell midden originally 30 m long and some 50 cm thick Ortoiroid series Alternate Middle Archaic	2362–1742 cal. BC Wilson (2007: 48) Middle Archaic 2600–800 BC Keegan and Hofman (2017: 201)	Material culture Less formal ground, pecked or battered stone tools than at other comparable-aged sites; ground or worn stone tools show edge wear from hammering or grinding Majority of chert artifacts from Long Island quarry on Antigua Flakes present, but no blades Celts made from conch shell present; also columella (internal structure of gastropods) shell tools Volcanic rock flakes and water-worn pebbles present through no volcanic cores or core fragments recovered Subsistence Primary reliance on shellfish and reef fish Shellfish from reefs and mud flats especially the Turkey Wing Ark clam Parrotfish and grunts from deep and shallow reefs common taxa Whelks/sea snails or West Indian Top Shell and land crabs not recovered Fish remains suggest use of fish traps	Wilson (2007: 48, 50–51) and Keegan and Hofman (2017: 203, 208)
St Kitts			
Sugar Factory Pier Ortoiroid series Alternate Early and Late Phase Archaic	2090–2210 cal. BC Wilson (2007: 48) 2175 ± 60 and 4100 ± 60 BP Keegan and Hofman (2017: 206–207)	Material culture Artifact assemblage similar to those on Trinidad and Krum Bay Edge grinders, conch shell tools, basalt pestles and simple flaked tools of Antigua chert some 85 km distant	Wilson (2007: 48) and Keegan and Hofman (2017: 201–202)
Barbuda			
River Site South coast shoreline 3800 m^2 or about an acre Ortoiroid series Alternate Middle Archaic	Middle Archaic 2600–800 BC Keegan and Hofman (2017: 201)	Subsistence Abundant West Indian Top Shells among mollusk remains Ideology Three-pointed object from conch shell	Keegan and Hofman (2017: 201, 203) and Rodríguez Ramos et al. (2013: 135)

(continued)

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Caribbean Prehistoric Archaeology, Table 3 (continued)

Site type, size, location, classification	Dating	Descriptions	Sources
Antigua			
Jolly Beach Ortoiroid series Alternate Early Archaic	1865–1685 cal. BC Wilson (2007: 52) Early Archaic 3320–2600 BC Keegan and Hofman (2017: 201)	Material culture Lithics of this and other comparable period sites suggest similarities with macroblade industry of Greater Antilles and Ortoiroid series Percussion flaking Site has both blades and ground stone tools but fewer ground stone ones relative to other Ortoiroid sites Other sites with similar flint blades are Upper Blake on Montserrat and The Level on Saba Nearby flint nodules Subsistence No recovery of whelks or West Indian Top Shell and land crabs that are present at other Ortoiroid sites Mollusk sample focused on eight major species Fish from shallow waters, some turtles, and manatees present Higher reliance on terrestrial fauna indicated relative to other coastal Antiguan sites	Wilson (2007: 52–54) and Keegan and Hofman (2017: 202–203)
Barbados			
Heywoods	3980 ± 100 BP 3280–1750 cal. BC 2-sigma Keegan and Hofman (2017: 37, note 1, 200)	Material culture Artifacts particular to island Conch shell adzes No ground stone artifacts Lacking in otherwise typical Archaic Age materials Pottery present Subsistence Evidence of anthropogenic fires from coring	Keegan and Hofman (2017: 37, note 1, 200–201) and Rodríguez Ramos et al. (2013: 134)
Tobago			
Milford I Shell midden Edge of limestone plateau 16 m diameter some 1 m deep Ortoiroid series Banwarian subseries	4315 and 4020 BP Boomert (2000: 77) 2950–2770 BC Fitzpatrick (2006: 395, Table 1)	Material culture Low frequency of materials including debitage, conical pestles, manos, hammerstones, quartz scrapper, shell beads Stone use local Pottery present Subsistence	Boomert (2000:54–55, 75–77) and Rodríguez Ramos et al. (2013: 134)

Milford Complex		Most shells were marine to brackish taxa like conch and clams along with non-shell crabs, fish, and seeds Oriented toward sea, shallow reefs, and mangroves	
Trinidad			
Banwari Trace On hill/alluvial terrace above river confluence Shell midden 30 m diameter with 2 m of deposits	Late phase: 6100–5500 BP or 5100–4350/4000 cal. BC Early phase: 7200–6100 BP or 6000–5100 cal. BC Boomert (2000: 57)	Material culture Stone and bone tools related to fishing, collecting, canoe building, plant processing, and general cutting and scraping Long history of ground stone use in Lesser Antilles Large and small pestles, mortars, manos, and grooved axes for suggested pounding and processing of fibrous materials Side or edge-ground tool diagnostic and common made by grinding or pounding on only the edges	Boomert (2000:54–55, 57); Keegan and Hofman (2017: 36–37); Wilson (2007: 39–43)
Ortoiroid series Banwarian subseries Banwari Trace Complex	5650 ± 100 BP 7180 ± 80 BP Rodríguez et al. (2013: 127) Phase/level 1 5500–6200 cal. BP Phase/level 2 6900–7400 cal. BP Phase/level 3 7800–7900 cal. BP All at 2 sigma Tankersley et al. (2018: 683 Table 1, 693)	Many stone tools produced by grinding through use Flaked stone tools from most of this period's sites less distinctive than ground stone artifacts Most small chert flakes or debitage via bipolar reduction method of striking small modules or fragments between a hammerstone and anvil yielding small and irregular flakes useful for a range of cutting and scraping purposes Stone use local Pottery present; 2 sherds one on surface other in upper site levels Large number of bone tools in particular sharpened tips for hunting or fishing spears Also bone presumed double-pointed fishhooks and needles Subsistence Little use of deep sea resources Shift over time from terrestrial animal focus to marine protein (shellfish, crabs, fishes) from environments including freshwater rivers, swamps, estuaries, mangroves, rocky coast, shallow and deep reefs, open waters partially reflecting separation from mainland	
St John Shell midden On hill top Originally 38 m diameter 1.2 m high	4000–6000 BC 6866 ± 48 BP Boomert (2000: 54–55, 57)	Material culture Stone and bone tools related to fishing, collecting, canoe building, plant processing, and general cutting and scraping	Boomert (2000: 54–55), Keegan and Hofman (2017: 200), Pagán Jiménez et al. (2015) and Wilson (2007: 40–43);

(continued)

C

Caribbean Prehistoric Archaeology, Table 3 (continued)

Site type, size, location, classification	Dating	Descriptions	Sources
Ortoiroid series Banwarian subseries Banwari Trace Complex	3590–3370 to 5840–5720 cal. 2 sigma BC range with seven dates 5460–5300 to 7790–7670 cal. 2 sigma BP (corresponding BP range of the seven BC dates) Pagán Jiménez et al. (2015: 232, 233 Table 1)	Long history of ground stone use in Lesser Antilles Large and small pestles, mortars, manos, and grooved axes for suggested pounding and processing of fibrous materials Side or edge-ground tool diagnostic and common made by grinding or pounding on only the edges Flaked stone tools from most of this period's sites less distinctive than ground stone artifacts Most small chert flakes or debitage via bipolar reduction method of striking small modules or fragments between a hammerstone and anvil yielding small and irregular flakes useful for a range of cutting and scraping purposes Large number of bone tools in particular sharpened tips for hunting or fishing spears Also bone needles and double-pointed artifacts presumably fishhooks Subsistence Little use of deep sea resources Commonly hunted mammals included collared peccary, armadillo, paca, and red brocket Shift over time from terrestrial animal focus to marine protein (shellfish, crabs, fishes) from environments including freshwater rivers, swamps, estuaries, mangroves, rocky coast, shallow and deep reefs, open waters Plant management seen in use of domesticated and wild cultigens including maize, sweet potatoes, chili peppers, wild yam and others Starch grain analysis from grinding stones yields earliest evidence to date for maize, sweet potato, zamia (native, stocky fern), canna, and chili pepper	

Sources for a site's multiple date sequences are either given under the dating column separated by lines or under the sources column

have been located. This lack of discovery may be due to site survey deficiencies, or their burial and erasure from the various environmental destabilization conditions already noted (Bright 2011: 38; Keegan and Hofman 2017: 37, 170, 189, 200–201, 207).

The distribution is also uneven with regard to site concentrations. Significantly higher site numbers are recorded for Cuba (some 2000), Hispaniola (240 for Haiti alone), Antigua (43), and Trinidad (28), heavily overshadowing site numbers of just a few for the remaining islands (Boomert 2000: 54–55; Keegan and Hofman 2017: 119, 152, 200–202; Wilson 2007: 51). A pattern of early and then later dating phases and wide though unequal site distributions indicates that movement into the region was not one of gradual island-by-island occupation, but one of rather rapid direct movements across open waters, a process that over time went from exploring and identifying desirable resources and suitable settlement locations by a limited number of groups to increasingly settler populations willing and able to move into and around the new islandscape (Keegan and Hofman 2017: 55; Rodríguez Ramos 2013: 127; Wilson 2007: 27, 46–47).

Although direct archaeological evidence is limited, the proposed open water routes, as well as later insular travel, were accomplished via canoes, apparently sailless. Recovered watercraft remains comprise dugout canoes and paddles, where complete enough mirror those of present Arawak-speaking groups of the Venezuelan Upper Orinoco region. Ethnohistoric sources provide comment on the size and speed of canoes – different sizes depending on near-shore or long-distance travel that could accommodate up to 100 paddlers and speeds of 6 knots per hour – but lack details on long-distance seafaring capabilities. Nonetheless the available evidence suggests frequent use of canoes for a variety of purposes across a clearly marked seascape (Callaghan 2013: 284, 288; Keegan and Hofman 2017: 54–56, 183–184).

Movements of peoples, materials, and ideas into, out of, and around the Caribbean during the entire precontact period reflect intersecting sets of multiple continental and island origins via different strategies. Several continental donor regions for initial Lithic/Archaic Age groups have been advanced – the Southeastern United States, Central America, the Isthmo-Colombian area, and northeast South America – that ongoing research may as yet confirm one, all, or even other areas.

The case for a Southeastern United States and Cuba link rests on particular similarities in material culture, site types, and agricultural traditions, including (1) correspondences between the early Cuban microlithic traditions and the North American Western Lithic Co-Tradition; (2) the presence of shell gouges, bannerstones, and fiber-tempered pottery in both areas (the microlithic technology and pottery could also reflect later exchanges); (3) shell mound structural commonalities; and (4) comparable agricultural tradition components with plants like maize and zamia (small, stocky, fernlike plant) that even suggests their transference from the Caribbean to the southeast due to their very early presence rather than via a mainland route. Even with these correspondences, it has been argued that the material cultures as a whole are substantially different calling into question this migration vector (Keegan and Hofman 2017: 26–27, 169; Rodríguez Ramos 2013: 130–131).

Resemblances between the macroblade assemblages of Cuba and Hispaniola and those of Belize in particular have been used to argue for the Yucatan to Honduras area of Central America for initial colonizing groups. Specific examples involve a dagger-shaped form in both the Greater Antilles and Belize and so-called bicycle seat bifaces from Cuba that closely resemble shoe-shaped constricted axes in Belize. Physical proximity coupled with the absence of Lesser Antillean sites at this time and the presence of similarly dated blade technologies in both areas lend support for this point of origin. However, like the posited Southeastern United States region, it can again be argued that the lithic industries are dissimilar enough to eliminate the Yucatan region from consideration (Callaghan 2003; Keegan and Hofman 2017: 25–27; Rodríguez Ramos 2013: 129; Wilson 2007: 27–33).

The Isthmo-Colombian area, especially from Panama to northwest Venezuela, may have served

as direct donors of peoples along with an established cultivation system. Greater Antillean sites dated to the earliest occupation phases from Puerto Rico, for instance, demonstrate marked correspondences between island and mainland plant arrays, along with an associated tool kit for their processing. The plant suite involves maize, sweet potato, manioc, beans, and avocado with characteristic edge-ground cobbles and milling stones for their processing. The circumscription of this plant suite-lithic processing complex to the Isthmo-Colombian area, plus its lack in Mesoamerica and the southeastern United States, as well as seemingly from early northeastern South American and the southern Lesser Antilles contexts strengthen this area as a migration vector (Rodríguez Ramos 2010: 83–87; Rodríguez Ramos 2013: 156–158; Pagán Jiménez 2013: 395–396). Yet the more recent identification of such plant remains including maize and sweet potato from one site each in Trinidad and French Guiana suggests a still-unfolding complex interaction of plants, peoples, culinary traditions, dispersal patterns, and points of origin (Pagán Jiménez et al. 2015).

Settlement of Trinidad, Tobago, and Barbados most likely derives from northeast Venezuela perhaps during the Paleo-Indian period associated with the Joboid mainland culture, but with well-grounded evidence around 6000 cal. BC (see Table 3). One possible donor culture is the Alaka complex represented by a series of shell middens in northeast Guyana (Orinoco Delta region). Dating to 6000–4000 cal. BC, the initial phase of the complex shares such traits as ground stone tools and an informal lithic industry with Trinidadian sites. Tobago was next colonized likely from Trinidad around 3000–1000 BC with Barbados occupied about the same time, but more probably via a separate Venezuelan migration since its material culture is so distinctive. North of these islands, occupation remains a question for the southern Lesser Antilles (see above), while the northern section was apparently not colonized until later suggesting either a direct route from the mainland or westward from the Greater Antilles (Boomert 2013: 142; Keegan and Hofman 2017: 37–38, 200–201, 207–208; Rodríguez Ramos 2013: 130; Wilson 2007: 38–39, 43–45).

Specialized studies directed at the migration issue include computer simulations of mainland-to-island routes that take into account wind and current data using sailless canoes. The results suggest that the unintended chances of reaching the Greater Antilles are highest from northern South America, in particular western Venezuela and eastern Columbia, and lowest from Florida and the Yucatan Peninsula. Intentional voyages from the three mainland areas all have a high degree of success; however the latter two regions require a greater degree of seafaring skill making northern South America again more likely (Callaghan 2013:290–291).

Lithic/Archaic Age

Classification

Just as the initial entry of Lithic/Archaic Age peoples into the region remains an unresolved and ongoing issue, so too does their characterization. The traditional view of continental-modeled hunter-gatherer bands differentiated into two succeeding ages based on different technologies, Lithic with flaked stone tools and then Archaic with ground stone and shell artifacts, as well as their differentiation from the Ceramic Age – lack of pottery and cultivation practices – no longer holds. The emerging picture is one of diverse societies employing a mix of technological, settlement, and subsistence strategies to exploit a varied resource base. While this 5000-year period presents opportunities for newly drawn internal distinctions, no formal region-wide framework has been developed to replace existing ones. Current discussions normally acknowledge the problem of attempting to place groups within existing model categories or treat the periods as one; the latter option is followed here (see Keegan and Hofman 2017: 23–24; Rodríguez Ramos 2010: 50–53, 2013: 132–133 for classification issues).

The Lithic-Archaic Age distinction, considered to reflect a separate arrival of ground stone-making communities from northeast South up to the island chain as far as Puerto Rico, is now viewed as an equally early and complementary introduction (Keegan and Hofman 2017: 34–39;

Rouse 1992: 49–51, 62, 67–69; Wilson 2007: 37–38). Ground stone, shell, and flaked stone tools are found together at a number of sites across the chronological and geographical spectrum, as indicated in Table 3 (Keegan and Hofman 2017: 33, 208; Rodríguez Ramos 2010: 62). The distinction, nevertheless, is still relevant since it touches on Rouse's classification of these societies.

The first division as outlined in Table 2a (see also Figs. 2 and 3) is between the Casimiroid cultures of Cuba, Haiti, and the Dominican Republic and the Ortoiroid groups of Puerto Rico, the Virgin Islands, northern Lesser Antilles, and the Trinidad area. Puerto Rico and the Virgin Islands are included with the Ortoiroids based on the aforementioned assumed similar mainland origin and correspondences with assemblages southward. However now the distinction is more likely between the Trinidad area and the rest of the Antilles.

The Casimiroid series comprises three subseries, the first being the Lithic Age Casimiran from around 4000 BC to 2000 BC with three cultures in Cuba, Haiti, and the Dominican Republic. The succeeding two Archaic subseries run from 2000 BC to variable ending dates, the Redondan to AD 500/800 for the two complexes of eastern and central Cuba and AD 1500 or contact for these complexes in western Cuba, while the Courian complexes on Hispaniola end at AD 500. Early sites on Puerto Rico have largely been identified after Rouse's classification effort so the Lithic phase remains unclassified. The following Archaic Corosan subseries comprises three complexes, one each for Vieques (island off the east coast of Puerto Rico), Puerto Rico, and Krum Bay on St. Thomas, US Virgin Islands.

Boomert (2000: 54–55) relaying on Rouse's approach has classified Trinidad and Tobago into two subseries. The Banwarian from 6000 to 2500 BC contains three complexes on Trinidad and one on Tobago followed by the Ortoiran 1500–300 BC with the single complex confined to Trinidad. Lesser Antillean sites were poorly known with Rouse declining to formally classify them; however considering his criteria they would all be considered Ortoiroid. Keegan and Hofman (2017: 201) have recently proposed an alternative northern Lesser Antillean combined Lithic/Archaic Age classification: Early Archaic 3300–2600 BC, Middle Archaic 2600–800 BC, and Late Archaic 800 BC–AD 100. The possible two sites on Martinique and Heywoods on Barbados retain unclear regional associations, although Rouse did consider Le Godinot and Boutbois to be Ortoiroids (Rouse 1992: 63, 65).

Material Culture

The Lithic/Archaic material culture includes an array of flaked, use-ground (ground from use not intentional manufacture), and ground stone tools, alongside those of shell, bone, and coral. Certain patterns in flaked stone assemblages have been identified including (1) a tendency to select on-island and locally available high-quality stone such as fine-grained cherts on Cuba, Hispaniola, and Puerto Rico and Antiguan flint especially the nearby Long Island deposit which was also distributed within the northeast region; (2) most flake extraction via hand-picking of nodules (no mining) occurs at workshops or the lithic sources followed by reduction at occupational sites; (3) an expedient industry focused on production of flakes as tools or useable implements requiring minor or no additional modification; and (4) a shift at certain locations in the production of macroblades to microblades and flakes (Keegan and Hofman 2017: 32; Rodríguez Ramos 2010: 56–57, 60).

Large unretouched blades (Fig. 5a) using freehand reduction techniques mark the macroblade tradition from which side-scrapers, end-scrapers, knife-scrapers, burins, leaf-shaped points, bifaces, and retouched flakes and blades, among other implements, were made. Analogies to other stone-working traditions and use-wear analyses suggest their employment for woodworking and the manufacture of items from perishable materials (e.g., baskets, nets, clothing). Other reduction methods involve the bipolar technique noted for Puerto Rico, the Lesser Antilles, and the Banwari Trace site on Trinidad. At this site small chert nodules were struck between a hammerstone and anvil yielding small, irregular, sharp-edged flakes useful for cutting and scraping purposes

Caribbean Prehistoric Archaeology, Fig. 5 (**a**) Lithic/Archaic Casimiroid microblade examples from sites (left to right): Barrera Mordan, Dominican Republic; Long Island, Antigua; Cueva Tembladera, Puerto Rico (Courtesy of Reniel Rodríguez Ramos). (**b**) Ground stone pestle and grooved axe, Trinidad. (Courtesy of Peter G. Roe)

(Keegan and Hofman 2017: 32; Rodríguez Ramos 2010: 58–62; Wilson 2007: 41).

Ground or use-ground tools comprise large and small pestles, mortars, conical manos, grooved axes (Fig. 5b), hammerstones, pebble tools used as percussors and grinders, notched cobbles or netweights, milling stones, bifacially worked celts, basalt axes, and a widespread Antillean as well as northern South America edge-ground tool modified by grinding or pounding on only the edges. Cuba has a particularly well-developed shell tool industry yielding gouges/hoes, plates, cups, and hammers. Conch shell adzes are also known from the northeast Antilles, while coral files, sharpened bone tips, fishhooks, and needles can be added to the list. The recovered implements reflect a range of inferred activities related to hunting, fishing, collecting, woodworking, canoe building, manufacture of other items, and processing of wild and even cultivated plants. The latter activity indicated, for instance, by the basalt axes that lack a sharp edge making them more useful for soil working/planting than other functions and the presence of wild and domesticated plant remains found on stone tools (see "Subsistence" section) (see Table 3; Keegan and Hofman 2017: 40–42, 48; Rodríguez Ramos 2010: 62–64, 69–72; Wilson 2007: 40–42).

Ground stone disks, bowls, and cups from Cuba, as well as shell and stone beads, disks, and a variety of pendants, are among the more personal wider distribution made artifacts. *Bobitos* or pendants with peripheral grinding to emphasize geometric decorative patterns, and more rarely manatee-bone pendants, and a mother-of-pearl serrated edged pendant have been documented for Puerto Rico (see Table 3; Keegan and Hofman 2017: 40–41; Rodríguez Ramos 2010: 64–68).

Settlements

Settlement system data for this period are limited. Most are open-air sites situated in coastal zones; caves for habitation, in addition to burial and inland riverine and mountain zone locations, are also recorded. The lithic workshops, shell middens, small-sized main occupations, temporary base camps, and special extraction sites are consistent with mobile groups exploiting seasonally available plant and animal resources in addition to permanently accessible raw material sources. There are also indications of the development of a sense of place and of social memory. Several sites display recurrent use and abandonment cycles over centuries such as Krum Bay in the Virgin Islands, Plum Piece on Saba, and Etang Rouge on St. Martin. The Canímar Abajo rock shelter area communities (Cuba) used the same location for two burial phases of roughly 600 years each: 1380–800 BC and AD 360–950. Multiple shell middens in a concentric pattern linked to recurrent if not extended visits are known from Angostura on Puerto Rico and Cayo Redondo on Cuba. Finally, an insular as opposed

to a continental scale of population-to-resource distance ratios, lack of migratory animals, plus areas with adjacent diversified and protein-rich exploitive zones may have provided opportunities for increased residential stability (see Table 3; Keegan and Hofman 2017: 28–29, 42–43, 199 Fig. 7.2, 206, 208; Smith et al. 2018; Rodríguez Ramos 2010: 75–79).

Subsistence

The emerging picture of Lithic/Archaic subsistence is one of flexible, resource-dependent strategies involving a wide range of plants and animals obtained through hunting, fishing, collecting, and for certain groups low-level cultivation. At entry a giant flightless owl, tortoises, the sloth, iguanas, the manatee, marine turtles, and a variety of rodents were present. While recovered faunal remains are minimal, the early blade tools indicate their hunting contributed to high rates of decline or extinction, as with the sloth. The reduction of especially larger land animals through time is compensated for by increased marine proteins from mollusks (conch, oyster, mussels, clams), fishes, and turtles. Coral reefs and seagrass beds appear to be the favored exploitation habitats based on stable carbon and nitrogen isotope ratios from Archaic skeletons. Resource variability or dependency is also observed among sites (see Table 3), reflecting a particular area's most abundant or easiest obtained species. For instance, at Maruca, Puerto Rico, the primary emphasis was on coral reefs, followed by minimal shallow inshore waters and terrestrial locales. At Krum Bay, US Virgin Islands, the emphasis was more evenly divided between terrestrial and shallow inshore waters followed somewhat less so but again equally by freshwater/shore and coral reefs (Keegan and Hofman 2017: 29–30, 33–34, 39–40, 42–43; Wilson 2007: 55).

Evidence for plant management comes directly from botanical remains identified through starch grain and stable isotope analyses and indirectly from the inferred use of soil working and plant processing tools (see foregoing "Material Culture" section), as well as fire or charcoal particulate spikes seen in several core samples from the region. Mexico, lower Central America, and northern South America beginning around 7500 BC onward are home to initial domestication and active exchange of several important subsistence crops including maize, chili peppers, squash, beans, and manioc that to judge by the recovered plant species in Table 4 also included the Caribbean. Mention was made under the "Early Occupation" section of the early 2500 BC plant suite (maize, sweet potato)-tool kit (edge-ground cobbles, milling stones) association in the northeast Antilles, while starch grains identified on grinding stones from St. John on Trinidad now yield the earliest dates in the region for maize, sweet potato, zamia, canna, and chili pepper, at 6000 BC (7790–7670 cal. BP) (see Table 3). Circulation of plants and associated cultivation and culinary knowledge among diverse groups on the mainland was likely via dispersal or exchange while within the Caribbean via maritime population movements and trade.

In addition to the taxa already mentioned, Lithic/Archaic period remains involve a number of fruit-bearing trees, root crops, edible seeds/grains, and other use plants. The spiny palm, West Indian cherry, mastic bully, wild avocado, and yellow sapote are among the edible fruit resources; wild yam, manioc, arrowroot, and yautía can be added to the root crop listing; the common bean and panicoid grass seeds are additional foods, while cossie balsam and wild lime, as well as certain root crops, were used for medicinal purposes. Many were introduced from surrounding mainland zones, but reliance was also placed on native plants once in the region, in particular zamia, a stocky, fernlike plant.

Mindful that presence does not necessarily indicate relative importance, it nonetheless appears that a variety of fruits – spiny palm, West Indian cherry, mastic bully, and yellow sapote – and wild to cultivated root/seed-bearing plants, canna, wild yam, sweet potato, manioc, arrowroot, trianthems (flowering plants), yautía, zamia, haba, the common bean, panicoid grasses, and maize, formed a critical part of the subsistence base throughout the precontact period. Mindful again that the current lack of remains may be due to factors other than actual absence, it also

Caribbean Prehistoric Archaeology, Table 4 Select Paleoethnobotanical Caribbean resources

Taxon	Origin status	Common name	Uses	Lithic/ Archaic	Early Ceramic	Late Ceramic
Fruits						
Acrocomia media		Corozo, spiny palm	Edible fruit, fiber, wild	X	X	X
Annona sp.	Introduced	Soursop, guanabana	Edible fruit		X(P)	X
Arecaceae		Palm family	Edible fruit	X		X
Carica papaya	Introduced	Papaya	Edible fruit			X
Capsicum sp. cf. *C. annuum*	Uncertain	Chili peppers	Edible fruit	X		X
Chrysophyllum anatomical group		Star apple and close relatives	Edible fruit		X	X
Coccoloba uvifera		Beach grape, uva de playa	Edible fruit	X		X
Guazuma ulmifolia		Guácima	Edible fruit			X
Hymenaea courbaril		Stinking toe, locust	Edible pulp			X
Inga sp.		Guaba	Edible fruit		X	X
Malpighia sp.		West Indian cherry	Edible fruit	X	X(P)	X
Manilkara sp. and/or *Sideroxylon* sp.		Bulletwood and/or mastic bully	Edible fruit	X	X	X
Manilkara sp. cf. *M. zapota*	Introduced	Níspero, sapodilla	Edible fruit	X		
Melicoccus bijugatus	Introduced	Quenepa	Edible fruit			X
Passiflora sp.		Passion flower	Edible fruit			X
Persea americana	Introduced	Wild avocado	Edible fruit	X		
Pouteria campechiana	Introduced	Yellow sapote	Edible fruit	X	X	X
Pouteria sp.	Uncertain	Bully-tree, Jácana	Edible fruit			X
Psidium guajava		Guava, guayaba	Edible fruit		X(P)	X
Spondias sp.	Introduced	Mombin, hog plum	Edible fruit			X
Sterculia sp. cf. *S. apetala*	Introduced	Panama tree	Edible fruit		X	X
Tubers, rhizomes, roots, tuberous stems						
Calathea allouia, *C. veitchiana*	Uncertain	Ileren, galatea	Edible root, medicinal		X	X
Canna sp.	Introduced	Canna, achira	Edible root, wild	X	X	X
Dioscorea/Rajania	Introduced	Ñame, wild and domesticated yam	Edible tuber, medicinal	X	X	X
Dioscorea sp. cf. *D. trifida*, *D. altissima*	Introduced	Ñame, yam	Edible tuber, medicinal		X	
Ipomoea sp. cf. *I. batatas*	Introduced	Sweet potatoes	Edible root	X	X	X
Manihot esculenta	Introduced	Manioc, yucca	Edible root crop	X	X	X
Maranta arundinacea	Introduced	Arrowroot	Edible root, medicinal	X	X	X
Renealmia cf. *R. alpinia*	Introduced	Bijao	Edible root, wild, medicinal	X		

(continued)

Caribbean Prehistoric Archaeology, Table 4 (continued)

Taxon	Origin status	Common name	Uses	Lithic/ Archaic	Early Ceramic	Late Ceramic
Sagittaria lancifolia	Introduced	Arrowhead	Edible tuber, medicinal, wild	X		
Trianthema sp.		Trianthems, verdolaga	All parts edible	X	X	X
Xanthosoma sp., *X. sagittifolium* *X. undipes*	Introduced	Yautía, cocoyam	Edible root	X	X	X
Zamia sp., *Z. portoricensis*, *Z. pumila*, *Z. amblyphyllidia*	Native	Zamia, marunguey, guáyiga	Edible stem, medicinal, wild	X	X	X
Arachis hypogaea	Introduced	Peanut	Edible ground nut			X
Seeds						
Canavalia		Haba	Edible seed	X	X	X
Fabaceae	Introduced	Bean, frijol	Edible seed, medicinal		X	X
Phaseolus vulgaris	Introduced	Common or domesticated bean, frijol	Edible seed	X	X	X
Poaceae			Unknown		X	X
Portulaca sp.		Verdolaga	Edible, medicinal plant			X
Setaria spp. and relatives	Weed flora	Panicoid grasses, e.g., foxtail millets	Edible grain	X	X	X
Zea mays	Introduced	Maize, corn	Edible grain	X	X	X
Other uses						
Bixa orellana	Introduced	Annatto, achiote	Red colorant			X
Genipa americana	Introduced	Jagua	Black dye from the fruit			X
Crescentia sp. cf. *C. cujete*		Calabash tree, higüera	Container, fruit, health care			X
Cucurbitaceae	Uncertain	Gourd/squash family	Edible fruit, container			X
Anadenanthera	Uncertain	Cojóbana, cojoba	Narcotic seeds		X	X
Nicotiana sp.	Introduced	Tobacco	Smoking, narcotic			X
Piscidia sp., cf. *P. carthagenensis*		Fish poison	Fish poison		X	X
Anredera vesicaria		Suelda consuelda	Medicinal		X	
Hypoxis sp.		Yerba coqui	Medicinal			X
Oenothera sp.	Uncertain	Evening primrose	All parts edible, medicinal, mild narcotic		X	X
Smilax domingensis		Bejuco de membrillo	Medicinal		X	
Siphonoglossa	Weed flora	Cossie balsam	Health care	X		
Zanthoxylum sp.		Wild lime	Health care	X	X	X

(continued)

Caribbean Prehistoric Archaeology, Table 4 (continued)

Taxon	Origin status	Common name	Uses	Lithic/ Archaic	Early Ceramic	Late Ceramic
Colubrina sp.		Mavi, snake-bark	Beverage from bark			X
Guazuma ulmifolia		Guácuna	Beverage from seeds			X
Gossypium sp.	Uncertain	Cotton	Seed fiber			X

Sources: Primarily Newsom 2008: 182–185 for Table 13.3, also 177 for Table 13.2, also 180; Pagán Jiménez 2011 especially 102–103 for Table 3, 2013: 396–397, 401; Keegan and Hofman 2017: 73 for primrose at Tibes in Saladoid, 198 for tobacco being introduced; Reid et al. 2018: 214–215 for cojoba at Tibes in Saladoid
X(P)=provisional identification; *sp.* species, *cf.* chiefly/prominently, Uncertain=introduced, naturalized or native

appears that temporal changes in taxa dependence and relative ranking occurred. For example, under the edible fruits category, sapodilla and wild avocado drop out at the end of Lithic/Archaic, while several new species are only added during the Late Ceramic including quenepa and hog plum. In Puerto Rico and the Dominican Republic, starch grain analysis indicated that zamia and maize changed highest ranking positions through time.

An integrated combination of plant management or procurement systems is suggested: tended fruit-bearing trees along with certain roots like sweet potato and arrowroot in partially forested plots or home gardens; deforested prepared agricultural fields for such plants as manioc, beans, and maize; and gathering or collecting of wild plants like zamia and yam. Deforestation was apparently accomplished via the slash-and-burn method judging from charcoal particulate spikes noted in core samples. This practice involves cutting trees and brush in an area, allowing the vegetation to dry then burning it just before planting to release the bound-up nutrients. Finally, support for the cultivation contribution of the four-source subsistence base should perhaps not be overstated. At the late Lithic/Archaic site of Canímar Abajo (AD 360–950), Cuba, several of the just listed plant species were identified using starch grain and stable isotope analyses (see Table 3). Yet three similarly dated nearby sites did not rely on cultivated plants (Keegan and Hofman 2017: 42–43; Pagán Jiménez 2011, 2013; Newsom 2008: 173, 179–185; Reid et al. 2018: 210–218; Smith et al. 2018).

Pottery

Pottery, like plant management practices, is no longer confined to the succeeding Ceramic Age. A number of sites from the region, in particular Cuba, the Dominican Republic, and Puerto Rico beginning around 2200 BC, have yielded small quantities of ceramics in association with Lithic/Archaic Age assemblages. Characteristics of this Pre-Arawak Pottery Horizon involve small- to medium-sized globular bowls and boat-shaped or navicular forms as the primary vessel types produced by coiling; sand, crushed rock, and quartz grit as the principal tempering agents; open-air firing techniques at low temperatures; and mostly undecorated sherds; decorated examples display painted (red, pink, white, black) and lineal/perpendicular/angular incised, punctate, and modeled designs. The manufacture and decoration variability stand in contrast to the formal structure of Early Ceramic Saladoid pottery outlined below. It is unclear if the adaption was due to surrounding mainland introduction that had an earlier established ceramic tradition or to independent invention. Regardless of origin, the Lithic/Archaic pottery conventions likely influenced and were influenced by succeeding Ceramic Age traditions (Atiles and López 2005; Keegan and Hofman 2017: 43–47; Rodríguez Ramos et al. 2008; Ulloa Hung 2005).

Ideology

Hints of the spiritual and ceremonial life of Lithic/Archaic communities come from worked items and rock art. Of particular note is the finding of three so-called three-pointed objects – two from

Puerto Ferro on Vieques and one from the River Site on Barbuda. The numerous succeeding Early Ceramic period examples are frequently made from the tips of conch shells, as is the case with these examples whose natural triangular shape emphasizes a large central point and encircling base; later versions also exhibit two opposing smaller base points (see Fig. 8). They have been interpreted as representing spiritual forces or *cemís*, based on ethnohistorical sources, an interpretation apparently representing considerable time depth (Keegan and Hofman 2017: 40–42; Rodríguez Ramos 2010: 68–69; Rodríguez Ramos 2013: 135–136).

Rock art also transitions the Lithic/Archaic to Ceramic Age periods with images from the near continental islands of Aruba, Bonaire, and Curaçao, a number of sites on Cuba, and one from the Dominican Republic; no images from Puerto Rico or the Lesser Antilles are currently known for this period. Pictographs largely of abstract and geometric designs predominate in Lithic/Archaic groupings, in contrast to Ceramic period assemblages of more equal numbers of petroglyphs and pictographs with an anthropomorphic focus. The correspondence in artistic representation and distribution pattern suggest another link to the Isthmo-Colombian region (Rodríguez Ramos 2010: 68–69; Roe 2009: 214–218).

Networks

The establishment of extensive inter- and intra-regional trading, exchange, and social networks that mark the Ceramic Age begins in this initial period. In addition to the insular-continental exchanges of subsistence plants discussed above, their inter-island dispersal is also indicated. For instance, the native zamia found at Plum Piece, Saba, was probably imported from Puerto Rico or Hispaniola. Similar networks are evident for raw materials where obsidian with the most likely sources at this time being Colombia and Mesoamerica has been recovered from Maruca, Puerto Rico. Flints, cherts, and volcanic materials were transported from sources to other on- and off-island locations particularly involving freehand flakes and pre-worked cores. Cherts from Puerto Rico are found on Vieques and Krum Bay over a distance of some 260 km, while Antiguan flint especially from the Long Island deposit can be found on Puerto Rico across the Anegada passage (no intervisibility) and distributed within the Antigua-Anguilla area. In sum, both long- and short-distance maritime networks were initiated and maintained within the region and between at least Central and South American areas involving the circulation of people, food stuffs, raw materials, information, and ideological components (see Table 3; Boomert 2013: 142–143; Keegan and Hofman 2017: 205; Rodríguez Ramos 2013: 158, 2013: 134–136).

As noted at the beginning of this section, the old picture of Lithic/Archaic societies is outdated, and a new one has yet to come into focus. Any new regional framework needs to articulate the observed cultural variance with influencing factors that resulted in the multifaceted human-environmental dynamic within interconnected insular and mainland zones. These societies may be described as forgers of a newfound island identity: one involving independent groups though linked through kinship, marriage, exchanges, friendship, and competition and sharing common enough ideologies, technologies, economies, settlement arrangements, and subsistence strategies (see also Keegan and Hofman 2017: 48–50, Rodríguez Ramos 2010: 79–83 for characterizations).

Early Ceramic 800 BC–AD 600

Origins

Questions of when, where, why, and how also dominate the next major in-migration of groups into Puerto Rico, the Virgin Islands, and Lesser Antilles. Like the Lithic/Archaic movement into the region, the Saladoid one should be viewed as a multilayered process involving initial exploration and ultimately permanent occupation phases. Unlike the Lithic/Archaic migrants Saladoid communities bring with them a well-established way of doing things which can be traced back to northern South American societies. Whether of northcentral Amazonian or Andean (Peru,

Ecuador, Columbia) origin, around 1000 BC to early AD, a number of Arawak-speaking populations rapidly expand across the northern inland and coastal continental region from the Guianas to the Orinoco River/delta system and into lower Central America.

Although diverse, these groups shared a common cultural character including interaction (marriage, coercion, and warfare) with Archaic communities, settled village life, intensive subsistence economies, ranking based on heredity and birth order, participation in regional exchange networks, placement of a high symbolic value on foreign items, and external community relations usually of accommodation and acculturation. All or many of these aspects as outlined below were transferred to and conditioned by the novel insular setting.

Among these diverse and interacting societies were those who manufactured a distinctive white-on-red painted pottery, termed Saladoid, named after the Saladero site on the lower Orinoco. While this ceramic style was shared among groups from the Orinoco River valley and coastal Venezuela and into the Antilles becoming the defining type (Table 2b), it should also be pointed out that Early Ceramic pottery exhibits additional influences from this widespread South and Central American Arawak cultural substrate negating a single-source scenario.

Between 800 and 200 BC, multiple integrated communities in multiple phases gradually colonize the region due, like Lithic/Archaic peoples did, to deciding in favor of island resources and sociopolitical contexts over mainland ones. Prospective migrants likely had at least a general idea of what islands were environmentally and socially suitable for colonization through contacts with resident Lithic/Archaic groups or prior Saladoid colonists. The earliest settled islands are in the north – Puerto Rico (Punta Candelario, Maisabel), Vieques (Sorcé/La Hueca), St. Martin (Hope Estate), Montserrat (Trants), Guadeloupe (Morel), Antigua (Indian Creek), and Martinique (Fond Brulé, Vivé) – excepting Trinidad (Cedros, Palo Seco) and possibly the Pearls site on Grenada. Settlement of the Virgin Islands and the southern Lesser Antilles likely from other island locations is later, although their prior exploration or casual exploitation is certainly possible. Direct occupation from northeast Venezuela is again likely for Trinidad and Tobago and perhaps further up the island chain. A pattern of early-north-then-later-south settlement, as was the case for Lithic/Archaic groups, is most consistent with direct voyages from northern South American coastal areas rather than as the island physical layout might suggest a stepping-stone or island-by-island south to north progression. Computer simulations indicate that it would have been faster and less risky via a direct route than island succession (for origin discussion Boomert 2013: 143–144; Callaghan 2013: 283–285, 290; Curet 2005: 27–61, 64–66; Fitzpatrick 2013; Keegan and Hofman 2017: 51–62, 136; Wilson 2007: 59–67, 70–72).

Classification

A migration model involving societies of diverse origins and time periods yet participating in a widely shared cultural ethos provides a context for the debate over the classification of their equally diverse material cultures. Rouse (1992) placed all of the Early Ceramic assemblages in one of three subseries of the Saladoid series – the Cedrosan with the other two (Ronquinan and Sombran) limited to the South American mainland. A fourth division at the subseries or even a new series level may be warranted (see Table 2b; Figs. 2 and 3). Among the shared Cedrosan Saladoid cultural traits is the manufacture of white-on-red or WOR painted pottery. A high percentage of painted and incised motifs occur in Cedrosan assemblages that normally contain a minor percentage of a particular type of decorative feature called ZIC or zoned incised crosshatched. Here incision is used to outline areas that are filled in with finer and lighter incised crosshatching.

Additionally, there are assemblages, termed Huecan after the type site of La Hueca on Vieques, that are instead characterized by unpainted pottery and the use of plastic decorative techniques notably ZIC ware and zoned punctation. Further cultural traits also distinguish the two groups including lithics, where, for example, plano-convex adzes (flat ventral and convex dorsal straight tending

sides diverging toward tapered ends) are lacking in Huecan contexts but present in Cedrosan deposits, a notable distinction since they are considered diagnostic indicators of Cedrosan occupations on Puerto Rico and Vieques.

Huecan and Cedrosan components are found in separate strata as at Hope Estate, St. Martin, and in companion settlements as at La Hueca (Huecan)/Sorcé (Cedrosan) and mixed in the same layer as at Morel, Guadeloupe, with considerable chronological and spatial overlap (apparently excepting Trinidad and the Venezuelan east coast). Inter-group relationships seem to be largely accommodating ranging from minimal to close interaction. The cultural trait and contextual differences have traditionally been related to specific migration trajectories: two separate but common movements from the South American northeast tropical lowlands or a single one from the same area with subsequent differentiation once in the region. At the series level, they would be considered the Saladoid and Huecoid traditions and at the subseries level Cedrosan and Huecan complexes within the Saladoid. At the series level, they would also correlate with the Agroalfarero scheme outlined in Fig. 4: Huecoid Agroalfareros I and Saladoid Agroalfareros II (Boomert 2013: 144; Chanlatte Baik 2013; Curet 2005: 63–65; Keegan and Hofman 2017: 67–71; Rodriguez Ramos 2010: 88–134, 145–146; Wilson 2007: 72–81).

The other major inter-group status in the region concerns the in-migrating Early Ceramic communities and resident Lithic/Archaic populations. Only the latter continued to occupy Cuba and Hispaniola throughout this time period (see Table 2b) along with coinciding settlements in the remaining Antilles, and again it seems excepting Trinidad and Tobago. Prior considerations held that the Lithic/Archaic groups were marginalized, eradicated, or absorbed into the newcomer societies, with little contribution to succeeding Caribbean culture formation, a view that is being challenged as discussed in the following "Late Ceramic" section. Relations are now viewed as likely more amicable. While strains and competition were probable, sustained violent confrontations are not indicated (for instance, lack of defensive structures and site locations). Instead exchanges of food items, processing methods, and stone tool technologies are implied, as well as inter-island trade where, for instance, amber and chert from Hispaniola have been found in Early Ceramic contexts at Punta Candelero, Puerto Rico (Boomert 2013: 143; Curet 2005: 70–72; Rodríguez Ramos 2010: 131–132, 149–155; Wilson 2007: 81–82).

Material Culture

The material culture of Early Ceramic communities displays varied technologies for the production of ceramic, lapidary, woven, wood, shell, bone, coral, and stone items for subsistence, personal adornment, and spiritual purposes. The artifacts were made from local and exotic materials and for home use, as well as inter-island/intercontinental exchange networks. Most households likely produced the majority of needed or desired items. However, the degree of skill as in canoe construction and the high variability in aesthetic expression as in ceramic painted and plastic designs point to a certain level of craft specialization (Keegan and Hofman 2017: 74).

Lithic production in the Early Ceramic both maintains and departs from Lithic/Archaic protocols. Flake tool production is again expedient where flakes and cores display a marked degree of morphological variation with two main reduction procedures. Freehand techniques are employed to yield generalized flakes with useable edges alongside bipolar reduction for microflakes. In the Ceramic context, it has been argued that microflakes and chips were placed in wooden boards to grate cultigens as one step in the food processing chain or for similar uses as the freehand produced ones.

Ground stone implements also tended to be unstandardized as observed in the variety of celts and adzes. Common types in the Puerto Rico/Virgin Islands area include the biconvex or petaloid celt (teardrop shape in plain view where the blade is designed with symmetrical convex surfaces) and the aforementioned plano-convex adze. Their implied use is for woodworking. Edge-ground cobbles, grinding slabs, pestles, and hammerstones, similar to Lithic/Archaic types, are also found in the tool kit (Bérard 2013:

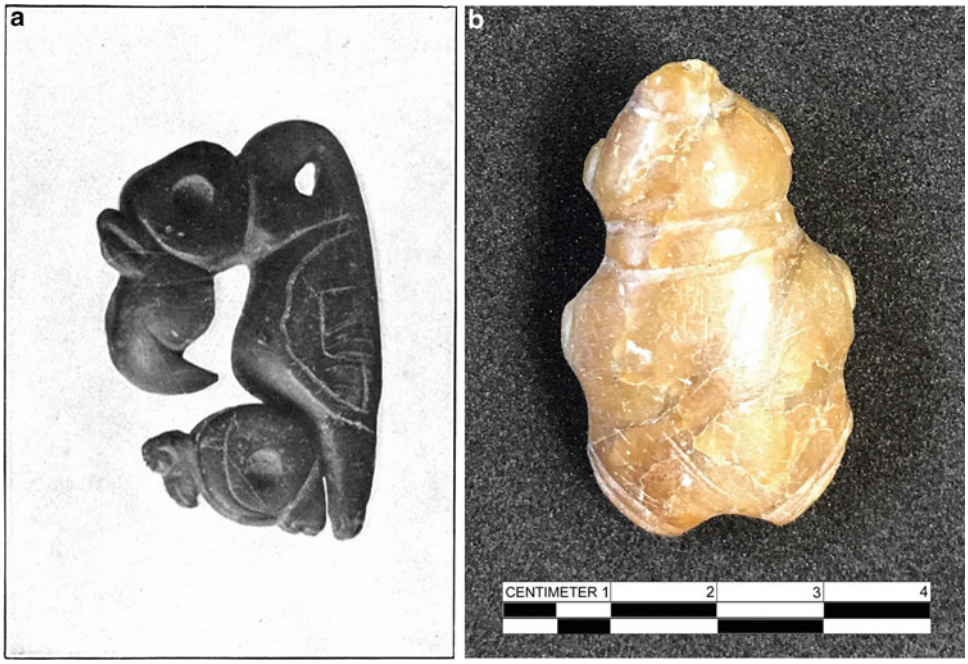

Caribbean Prehistoric Archaeology, Fig. 6 (**a**, **b**) Early Ceramic microlapidary ground stone pendants. (**a**) Vulture with human head in claws (Fewkes 1907: Plate LVI). (**b**) Stone frog shape. (Courtesy of Yvonne Narganes Storde/Centro de Investigaciones Arqueológicas, Universidad de Puerto Rico, Río Piedras)

187–188; Pagán Jiménez 2011: 100; Rodríguez Ramos 2010: 105–106, 114, 124, 130).

A significant departure involves the establishment of a sophisticated microlapidary industry involving the production of small, finely detailed polished beads, pendants, and amulets (Fig. 6a, b). Antillean sourced materials such as serpentine, amethyst, carnelian, quartz crystal, as well as continental jade (Antillean jade seemingly not in circulation at this time) and turquoise were utilized with specialized production centers indicated including La Hueca/Sorcé (Vieques), Morel (Guadeloupe), Pearls (Grenada), and Tobago. Iconographic or pictorial themes involve pendants of beak birds with trophy or human heads (Andean condor or king vulture), frog shapes, and those representing bats and reptiles (Boomert 2013: 148; Chanlatte Baik 2013: 179; Keegan and Hofman 2017: 64, 76, 211; Rodríguez Ramos 2010: 101–102, 2013: 159–160).

Varied purpose artifacts were made from additional materials. Conch shell axes and adzes; stingray-spine projectile points and shell atlatl spurs pointing to use of spears and arrows; bone needles for perhaps making clothing or fishing nets; shell and bone fishhooks, beads (discoidal, cylindrical, biconvex, olive shapes), and amulets; gourd containers and woven baskets; clamshell scrapers plus shell hammers, picks, and gouges/hoes; wooden canoe paddles, seats, and amulets (two from Morel, Guadeloupe, representing a dog and a jaguar); coral abraders and drills; conch shell and mother of pearl beads; and a jaguar tooth pendant from La Hueca (Vieques) that isotopic analysis indicates came from a northwest Venezuelan animal (Bérard 2013: 188; Keegan and Hofman 2017: 67, 70, 76).

Another significant departure from Lithic/Archaic Age material culture is the widespread production and use of ceramics. The superior quality and aesthetic appeal characterize a strongly shared or homogeneous tradition that stylistically draws from a common set of decorative modes, design arrangements, and shapes to create particular expressions. Cedrosan ceramics are thin, well-fired, and made via coiled clay strips

(Fig. 7a, b). Vessels tend to be straight sided and sharply angled whose forms include inverted bell outlines, jars, dishes, incense burners (decorated/undecorated cylindrical, bottomless forms with nearly closed tops), and open bowls in hemispherical, boat or kidney, and turtle shapes. Decorative modes involve a red-colored slip applied to all or part of a vessel and white-on-red (WOR), black-and-red, and polychrome (red, white, orange, black) often stylized geometric painted motifs, in addition to straight/curvilinear incised and zonal outlined designs. D-shaped, rounded, and perforated lugs or handles are present, as are rim projections like flanges and points.

Caribbean Prehistoric Archaeology, Fig. 7 (**a**–**e**) Early Ceramics. (**a**) Saladoid white-on-Red decorated external rim sherd. (**b**) Saladoid red, white and orange polychrome sherd. (**c**) Huecoid rim sherd with incisions, knob and rounded points. (**a**–**c**) (Courtesy of Yvonne Narganes Storde/Centro de Investigaciones Arqueológicas, Universidad de Puerto Rico, Río Piedras). (**d**) Saladoid white-on-red open bowl with modeled legs and zoomorphic face. (**e**) Saladoid modeled bird *adornos*. (**d**, **e** Courtesy of Peter G. Roe)

The lack of WOR and polychrome painting focusing instead on plastic decorative features including geometrical zoned incised lines and incised parallel punctations sometimes filled with white or red/pink paint defines Huecan pottery (Fig. 7c). Other incised designs comprise crisscrossing rectangular, triangular, and spiral elements over the entire vessel. Typical shapes again made from coiled clay strips comprise hemispherical bowls, jugs, bowls with and without pedestals, double-spouted globular vessels, and effigy bowls with zoomorphic modeled motifs (Fig. 7d). Common to both traditions are griddles or large round flat disks smooth on one side and usually rough on the other used for processing and cooking plant foods and breads and modeled zoomorphic and anthropomorphic forms or adornos on handles and rims in addition to the just noted effigy bowls (Fig. 7e). A range of stylized to naturalistic presentations are evident involving an equally impressive array of animals – armadillos, dogs, monkeys, manatees, bats, vultures, owls, pelicans, ducks, parrots, snakes, crocodiles, frogs, and turtles – referencing both a continental homeland and new insular environment with implied symbolic content (for ceramics see Chanlatte Baik 2013: 178, 181–182; Pagán Jiménez 2013: 399–401; Keegan and Hofman 2017: 64, 66–67, 69–70; Rodríguez Ramos 2010: 94–95; Rouse 1992; Waldron 2016; Wilson 2007: 67–70).

While there is great uniformity within the Early Ceramic tradition, variability is indicated by the number of styles presented in Table 2b. The ceramic assemblages have been grouped in the Rouse (1992) scheme into a twofold sequence of early 500/400 BC–AD 300/400 and late AD 300/400–600/800 phases, with the later phase lasting longer in the Lesser Antilles. Early to late phase distinctions in the Lesser Antilles include an increase in WOR design complexity, with polychrome painting, rim flanges, and incense burners not appearing until the end. In contrast the Hacienda Grande to Cuevas transition in Puerto Rico involves among other traits the eventual elimination of polychrome painting and a decrease in vessel forms (Peterson et al. 2004: 24–26).

Another factor in the region's ceramic development concerns the formal contact between Barrancoid communities of the lower Orinoco and Saladoid ones of Trinidad and Tobago. While the Barrancoid series has its mainland origins around 1500 BC from the Ronquinan Saladoid subseries, its influence on Cedrosan pottery is dated to AD 300–500. The interaction of the potters of the two series is particularly notable on Trinidad and Tobago suggesting these islands as transit points for, and on-island production of Barrancoid traits such as zoned painting, a particular form of *adorno* (modeled-incised hollow-backed), and rims frequently polished with a pinkish-buff color. The spread of these influencing traits was uneven, strong in the Windwards and less so in the Leewards, and it seems not at all for Puerto Rico and the Virgin Islands (Boomert 2013: 146–147; Peterson et al. 2004: 25; Rouse 1992: 75, 84–85; Wilson 2007: 65–67).

Settlement

While Early Ceramic settlement types include camps, farmsteads, procurement and workshop locations, and rock art sites, it is the large villages that distinguish the system. Large villages typify the Early Ceramic settlement system that also includes camps, farmsteads, and procurement and workshop locations, in addition to rock art sites. The norm was for continuous occupation over centuries with a tendency to be located in coastal over inland (on small islands a few kilometers from the sea) zones. On Puerto Rico, for instance, many of the earliest sites are coastal followed by expansion inward along river valleys. Hierarchical ordering is not apparent until the end of the period. The internal configuration presently documented commonly consists of large houses and from one to a few midden mounds (dense concentrations of high-quality artifacts like ceramics and lithics, food remains, and at times burials) arranged in a circular, oval, or horseshoe shape around an open, central plaza that frequently also contained burials. The central plaza is the assumed focal point for community-wide secular, ceremonial, and mortuary activities.

Golden Rock on St. Eustatius in particular exemplifies internal village structure. The site is

dated to AD 200–800/900 after the end of the Saladoid on other islands although the ceramics are clearly Cedrosan. Excavations of part of the site reveal a series of large and small structures fronting an open plaza with burials between 6 and 19 m in diameter. Six of the large circular or oval structures were interpreted as houses, some with windbreaks, with the remaining smaller post hole outlines identified as household support features including a men's hut. Eleven burials were excavated: one was a child with 81 quartz beads. The deep post mold foundations of the houses and associated possible windbreaks have been interpreted as evidence for hurricane protection measures and as analogs to South American lowland Amazonian large, tall conical shaped communal *maloca* houses. The Golden Rock large examples might have accommodated as many as 60 individuals (Bérard 2013: 191; Ensor 2013: 87–88; Keegan and Hofman 2017: 71–73, 93–95; Samson 2013: 367; Wilson 2007: 88–91).

Subsistence

Early Ceramic peoples engaged in hunting land animals, fishing, and mollusk collection but also engaged in full-scale, broad-spectrum cultivation. As outlined in Table 4, they also appear to have relied upon a mix of plants brought with them or obtained through continued mainland ties or local Lithic/Archaic group exchanges, in addition to native species. Root/seed crops are prominent and include all of those utilized by Lithic/Archaic peoples – canna, yam, sweet potatoes, manioc, arrowroot, yautia, zamia, haba, the common bean, panicoid grasses, and maize – plus new additions. Added fruits include the star apple and guaba, while the medicinal plant list is expanded.

The once-considered primary reliance on manioc during this and the Late Ceramic period, widely noted in the literature, has been amended. Recovered botanical remains including seed, wood, and starches from microflakes-as-graterboard teeth, ground stone tools, and the clay griddles or *burénes* involved in the production and processing of plant foods noted above instead suggest a more equitable and changing-preference/resource available reliance on the entire range of identified taxa. Cultivation practices mirror those outlined for Lithic/Archaic communities: maintenance of multipurpose home gardens, slash-and-burn procedures for larger cleared plots, and collection of wild plant resources. Intensification efforts at the end of this period are seen in the hillside terraces at Las Planás, Puerto Rico, designed for soil retention/water filtration (Keegan and Hofman 2017: 73, 135, 210; Pagán Jiménez 2011, 2013; Newsom 2008: 173, 179–185; Ortiz Aguilú et al. 1991; Reid et al. 2018: 212, 214, 216–218).

Exploited terrestrial animal resources comprise a number of small rodents like the hutias, birds, and reptiles such as iguanas, crocodiles, and turtles, in addition to land crabs and snails. Imported animals from South America include the agouti, armadillo, opossum, guinea pig, and dog. Their roles and significance within the social and economic systems were apparently variable. The guinea pig and dog were domesticated, while hutias, Muscovy ducks, and turtles may have been managed. Their consumption is certainly indicated, although the relatively low numbers of such remains in archaeological contexts suggest a minor contribution to the overall diet. Dog burials, normally alongside human interments, point to their use in hunting inferred from teeth modifications for possible mouth restraining devices and as pets; the later function may also be ascribed to other animals including the capuchin monkey and macaw bird.

Aquatic protein sources apparently accounted for a larger and increasing proportion of the diet. Stable isotope analysis indicates that initially terrestrial protein sources like the hutia, iguana, land crabs, and freshwater fish were targeted, shifting over time to marine taxa involving a diversity of fishes like parrotfish, groupers and snappers, sea turtles, mollusks in particular queen conch, and less importantly marine mammals. Studied skeletal remains point to generally healthy populations, but with a number of dental issues involving caries and extreme wear; the latter might reflect a starch and gritty diet. Wear along incisor interiors noted only in females could relate to this gender's role in processing vegetable fibers (Keegan and Hofman 2017: 73–74; Reid et al. 2018: 215–216).

Sociopolitical Structure

Ethnographic and ethnohistoric information form a basis for consideration of Early Ceramic sociopolitical structure. The widely spaced and largely non-differential nature of the villages suggests they were mainly autonomous, although the artifact commonalities and reconstructed extensive networks certainly indicate strong inter-village connections including marriage, kinship, social, and competitive ties.

These societies have long been considered tribal and unranked. An egalitarian nature is inferred via reference to South American lowland groups where leadership is ascribed but not inherited. Burial data tends to support this view as differential status indicators at death are minimal. The few grave goods can be considered primarily personal items comprising ceramics and foodstuffs, although the 81 beads of the child burial at Golden Rock noted under the settlement section suggests an unearned notable status.

While inter-village relationships were likely more or less equal or heterarchical, hierarchical intra-village relationships need not be discounted. Local community leaders, also referred to as "big men" in the literature, might have been able to exert influence over internal and external matters from labor organization to trading networks to raiding/warfare based on personal qualities that would have attracted adherents. Large villages would be consistent with lineages or other sub-village social segments having more prestige than others. The range in vessel forms, craftsmanship, and variety of designs suggest their use in ceremonial contexts (marriages, marking trading alliances) involving public displays of food and other items that might have expressed status differences or kinship ties (Boomert 2013: 146; Chanlatte Baik 2013: 180; Keegan and Hofman 2013: 76–79, 93–95, 212–214).

Ideology

The ideological system hinted at in the Lithic/Archaic Age becomes more fully envisioned for the Early Ceramic. Ethnologies of present South American lowland tribes and ethnohistoric accounts of Amerindians at contact indicate strong continuities in world view and religious principles of the two descendent mainland and Antillean cultures. Common core aspects likely introduced in the preceding age form a firm foundation in the Early Ceramic for succeeding developments in the Late Ceramic.

Reconstructed ideological aspects are outlined in Table 5 and are underlain with a belief in a three-tiered cosmos and a deep-seeded animistic world view. The cosmos consisted of an upper Sky World associated with benevolent spirits, a middle plain or human Earth World, and a watery Underworld also home to the dead all connected via an *axis mundi*. Vital forces or numinous powers enlivened humans, animals, the deceased, and a range of natural forces and objects including trees, smells, rivers, and hurricanes. These spiritual forces were codified or identified as *cemís* that were likely undifferentiated (informal identification of deities and associated relationships and powers) in the Early Ceramic. They could make themselves known, normally requiring a shaman to perceive their presence and if deemed necessary undertake their physical transformation into a range of objects such as wood, stone, perishable materials, and even rock art. *Cemís* were also associated with specific beneficial or harmful powers to humans like causing illness, producing rain, and favoring cultivation. Also associated with this cognitive outlook were notions of hidden and present realities, human/animal/spirit transformations, and drug-induced visions (see in particular Boomert 2000: 445–490; Hayward et al. 2014: 207–208; Oliver 2005, 2009; Roe et al. 2018: 180–183; Siegel 1997).

A low-level religious structure is indicated, largely in the hands of shamans charged with curing and healing affairs. In addition they helped ensure the wider community's health and well-being via contact with and supplication of spirits in the other realms along the axis mundi. They were aided in these endeavors by the taking of hallucinogenic drugs. Community to household burial ceremonies, rituals, and practices were likely important integrative mechanisms. The numerous inter-village economic, social, and political relations were also likely carried out within a ceremonial context.

Caribbean Prehistoric Archaeology, Table 5 Reconstructed ideological components of early and late ceramic precontact Caribbean culture

Category	Early Ceramic	Late Ceramic
Cognitive features		
	Belief in a three-tiered cosmos	Belief in a three-tiered cosmos
	A deep-seeded animistic world view	A deep-seeded animistic world view
	Codification of spiritual forces as cemís, largely undifferentiated or unranked	Development of systematic relationships among named cemís; definition and ranking of cemís as deities or departmental gods
	Beliefs involving hidden and present realities, human/animal/ spirit transformations, drug-induced visions	Beliefs involving hidden and present realities, human/animal/spirit transformations, drug-induced visions
	Strong common symbolic system	Diverse symbolic system
	Rich mythological tradition	Rich mythological tradition
Practices		
Rituals ceremonies	Private household, public village, limited inter-village public	Private household; private societal segments; public village, open inter-village, and inter-regional
Structural features		
Organization	Decentralized	Increasing centralization
Practitioners	Laypeople, shamans	Laypeople, shamans, chiefly elites
Belief system	Unenforced; varied interpretations	Increasing formal understandings
Material correlates		
Structures	Marked and unmarked landscape features, burial locations, village centers without enclosures	Marked and unmarked landscape features, burial locations, village centers with and without enclosures
Objects	Different scaled everyday items including ceramics (designs, shapes), microlapidary pendants/amulets, three-pointers, rock art	Certain ceramic designs; elaboration in size and design of three-pointers; introduction of ground stone religious/political objects (stone collars, elbow stones); increase in numbers, location, and image complexity of rock art
Substances	Particular foods, hallucinogenic ingredients	Particular foods, hallucinogenic ingredients

Material correlates of certain of these cosmological and religious beliefs and practices have been inferred. In common with present South American village layouts, the Early Ceramic roughly circular and concentric settlements are considered to replicate the three-level cosmic order. Horizontally the earthly level's village's central space is considered sacred, the household and mounded midden areas as every day or secular, and the surrounding forests and fields as the natural world of plants and animals. Vertically the earthly plain is bounded by the upper sky and lower underworlds with the axis mundi physically and symbolically located at the community's center.

The transformed objects containing the manifested cemí spirits were also termed cemís and are linked to three-pointers or the triangular shaped artifacts noted under the ideology discussion of the Lithic/Archaic Age. In the Early Ceramic, the range of materials – stone, bone, shell, and coral – increases, as does their numbers and distribution (Fig. 8). The majority are small (3–7 cm lengths) and undecorated; Later Ceramic examples include much larger ones (15–30 cm), often sculpted with anthropomorphic and zoomorphic motifs.

The belief in an animistic world view and in human-animal or mythic transformations may be seen in the plurality of modeled and incised human and zoomorphic forms. Suggested Shaman-related items include vessels with *adornos* exhibiting pictorial dualism or different human/animal forms depending on the viewing angle. One example has

Caribbean Prehistoric Archaeology, Fig. 8 (**a**–**c**) Large and small stone *cemís*. (**a**) Early Ceramic small (3–7 cm range) undecorated examples with basal incisions. (Courtesy of Peter G. Roe). (**b**) Late Ceramic large worked anthropomorphic design emphasizing a center and two opposing points. (**c**) Late Ceramic large worked anthropomorphic design in single triangular shape (**b**, **c** Fewkes 1907: Plates XXXII and XLVI, respectively)

a front-facing squid-like animal whose features at two other angles form another sea animal and a bulging-eyed fish. Such visual ambiguity might have facilitated contact with the spirit world, as would effigy vessels which could have temporarily held a shaman's guardian spirits during such intercommunications. The use of hallucinogenic substances involving tobacco, pepper, *cohoba*, or a mixture to induce ecstatic-visionary trances is partially documented at this period (see Table 5), but primarily inferred via incense burners, in particular decorated examples with *adornos* for the burning of or enhancement of such ingredients, double-spouted bowls for their inhaling through the nostrils, and small biomorphic dishes for snuffing.

In addition to the standardized images and design motifs found on the ceramics and microlapidary items pointing to a strongly shared symbolic system, modeled *adornos* have been linked to a rich mythology involving origin stories, culture heroes, and mythic personages. Visual imagery reflecting ideological/mythic linkages also involves another medium: the surfaces of relatively stationary rock formations. Petroglyph sites from St. Lucia and St. Vincent in the southern Lesser Antilles may date from the end of the Early Ceramic around AD 200–300. In contrast to the ceramic strongly *adorno* zoomorphic focus, the petroglyphs represent simple humanlike facial and facial/body images along with geometrical (circles, spirals, lines) and abstract (regular/irregular lines, dots) designs (Boomert 2013: 145–146; Hayward et al. 2009b; Hayward et al. 2014: 221, 224; Keegan and Hofman 2017: 79–80; Roe et al. 2018: 184–185; Siegel 1997; Reid et al. 2018: 214–215; Waldron 2016).

Networks

The circulation of material and nonmaterial cultural valuables established in the Lithic/Archaic period only intensifies in the Early Ceramic. Exchange patterns are multi-scalar – individual, artisan groups, sociopolitical segments, and communities – and multi-vector, intraisland, inter-island, and inter-island/continental. These organized trade and production networks operated at a pan-Caribbean level

or within more localized interaction spheres (higher degree of interaction within than without culturally bounded island/continental groups) involving such components as:

- The continued on- and off-island transport of fine-grain cherts and flints for flake tool manufacture; Antigua and St. Martin are particular insular sources.
- Inter-island movement of local and mainland sourced areas of preforms or unmodified cores for celt and adze production.
- Inter-island exchange of ceramic vessels especially between volcanic and limestone islands.
- Inter-island/continental trade centered on high valued items of marked aesthetic quality as in the microlapidary pendants, amulets, and beads; also pieces of *guanín* a gold-copper alloy imported most likely from the Isthmo-Colombian area to Puerto Rico.
- Inter-island/continental exchanges of plants and animals
- Local community leader organization of trading systems
- Circulation of social valuables like songs, myths, knowledge
- Wide range and homogenous nature of the materials suggest a strongly shared cultural aesthetic, symbolic system and ideology (Keegan and Hofman 2017: 75–76; Valcárcel Rojas and Martinón Torres 2013: 509, 510 with Table 34.1; Rodríguez Ramos 2010: 103–104, 2013: 159–166).

Being newcomers to the region, Saladoid and Huecoid communities can also be viewed as forgers of a new insular outlook. An identity that transitions from early colonization efforts involving the wholesale introduction and reliance on standardized settlement and subsistence strategies with a robust sense of shared cultural values to a more flexible, adaptive, and varied outlook beginning at the end of the fourth century AD. While a high level of continuity between the two phases is maintained, changes include occupation of new on-the-same-island, as well as different island locations, a decline in ceramic variety suggesting a lessening of social norms and an increasing reliance on local island resources at the expense of mainland ones. This developing diversity in cultural expressions related to local conditions or accommodations is magnified in the succeeding Late Ceramic period (Bérard 2013; Keegan and Hofman 2017: 80–83).

Late Ceramic AD 600–1500

Intensification, diversification, expansion, and regionalization mark Late Ceramic cultural dynamics. Intensification is seen in a two-tiered class system, chiefdoms, and increased exploitation of the available resource base. Diversification is reflected in the number of new ceramic types and lithic tradition changes, while population growth and movement into the interiors of already settled islands takes place along with the occupation of new ones that finally includes Jamaica and the Bahamas. These currents were not uniform across the region providing a mosaic of multiple, distinct, and integrated-at-different-scales societies operating within changing cultural and physical environments. The arc of cultural development shifts from initial entry and adjustment phases of two major migratory waves to developed Caribbean cultural identities on the eve of European contact.

Material Culture

Late Ceramic material culture, while demonstrating similarities and differences with previous periods, reflects an emphasis on more loosely structured localized production and a shift from insular and insular/mainland circulation of exotic raw materials and finished personal goods to high-quality/high aesthetic objects tied to social status, ethnicity, or both. Mainland area ties continue, but insular sources and exchanges take precedence.

For the well-studied lithic assemblages of Puerto Rico, continuity, change, and reemergence of traits, in addition to new technological excellence across various media, are evident. For instance, the two major production strategies of bipolar and freehand reduction that were observed in Lithic/Archaic and Early Ceramic contexts are not only present but vary in emphasis from site to site. While biconvex celt production in general is

maintained, that of the plano-convex adze decreases and is absent in assemblages by AD 800 matched by the increased use of petaloid celts (teardrop in outline where the blade is designed with symmetrical convex surfaces). Guatemalan jadeite for some celt production testifies to the continued movement of such celts and contacts with the Isthmo-Colombian area.

The differential reliance across sites on Lithic/Archaic and Early Ceramic lithic traditions is also noted in culinary practices: grating foodstuffs via microflakes-in-grater-boards (Early Ceramic) versus pounded and ground tubers and grains via such tools as edge-ground cobbles and metates or flat smooth-surfaced stones (Lithic/Archaic). Lithic/Archaic items like net sinkers or weights, conical manos, and stone spheres are again observed and the latter at other Greater Antillean non-Puerto Rican sites as well. The intensified use of local materials, the variety in plant processing tools, and co-occurrence of eight distinct lithic traditions derived from prior periods all point to increasing insular exchanges among different resident social and ethnic groups (Keegan and Hofman 2017: 85–86, 92, 103; Rodríguez Ramos 2010: 146, 161–192).

Long-distance regional-mainland contacts, focusing on a different class of materials – high-quality prestige objects – continue, particularly those of ground stone and wood (Fig. 9a–f).

Examples of exotic and sumptuary exchange items include:

- Tiny cherry jewel box clam beads (*Chama sarda*)
- Conch shell beads with notched edges
- Large quartz and diorite beads
- Carved greenstone and other exotic stone pendants
- Shell masks or *guaízas* (small pendants made from conch shell with detailed incised and unique humanlike faces often emphasizing the eyes and mouth; highly valued exchanged items likely in special contexts) (Fig. 9a)
- Shell and stone three-pointers or *cemís* (relatively abundant mid-hundreds; large 15–30-cm-wide undecorated and elaborately incised and sculpted examples that incorporate a prominent central point and opposing basil points; anthropomorphic and zoomorphic designs) (see Fig. 8b, c)
- Stone heads (sculpted anthropomorphic three-dimensional heads) (Fig. 9b)
- Stone collars (pecked and ground large – 45 by 31 cm – oval rings; all with minimal designs and many with elaborate zoomorphic and anthropomorphic images along with geometric motifs) (Fig. 9c)
- Elbow stones (considered a labor-saving shorthand version of stone collars with only part of the stone ring reproduced with remainder replaced by wood, basketry, or cloth; limited in number; most undecorated, rest with anthropomorphic images) (Fig. 9d)
- Monolithic or one-piece axes (Fig. 9e)
- Wooden statues (elaborately carved and up to a meter tall, anthropomorphic and zoomorphic depictions; considered to be cemí representations or as receptacles for preparation of hallucinogenic substances like *cohoba*)
- Wooden and stone seats or *duhos* (low, small, sometimes with a large curved back carved wooden or sculpted ground stone seats; overall design incorporates anthropomorphic and zoomorphic shapes with legs and heads detailed as supports or as integral terminal elements; others with complex incised designs) (Fig. 9f)
- Cold-hammered gold sheets from nuggets (of high value; ethnohistorically, sheets noted as used to adorn *guaízas*, snuff or *cohoba* inhalers, wooden statues, and other objects all with chiefly or religious linkages)
- Imported gold-copper alloy *guanín* (of high value; strong chiefly, religious associations; archaeologically gold and *guanín* recovered mostly as perforated sheets with other examples of a gold nose ring, a human figure, bell, sphere, bead, bird figure; almost all items from Late Ceramic or a native contact period burial)

Their limited numbers and superior aesthetic details likely reflect their high value to those involved in their production, circulation, and use. Distributions within the region vary. Shell masks or *guaízas* are scarce with a wide distribution from Cuba to the Windwards, whereas the

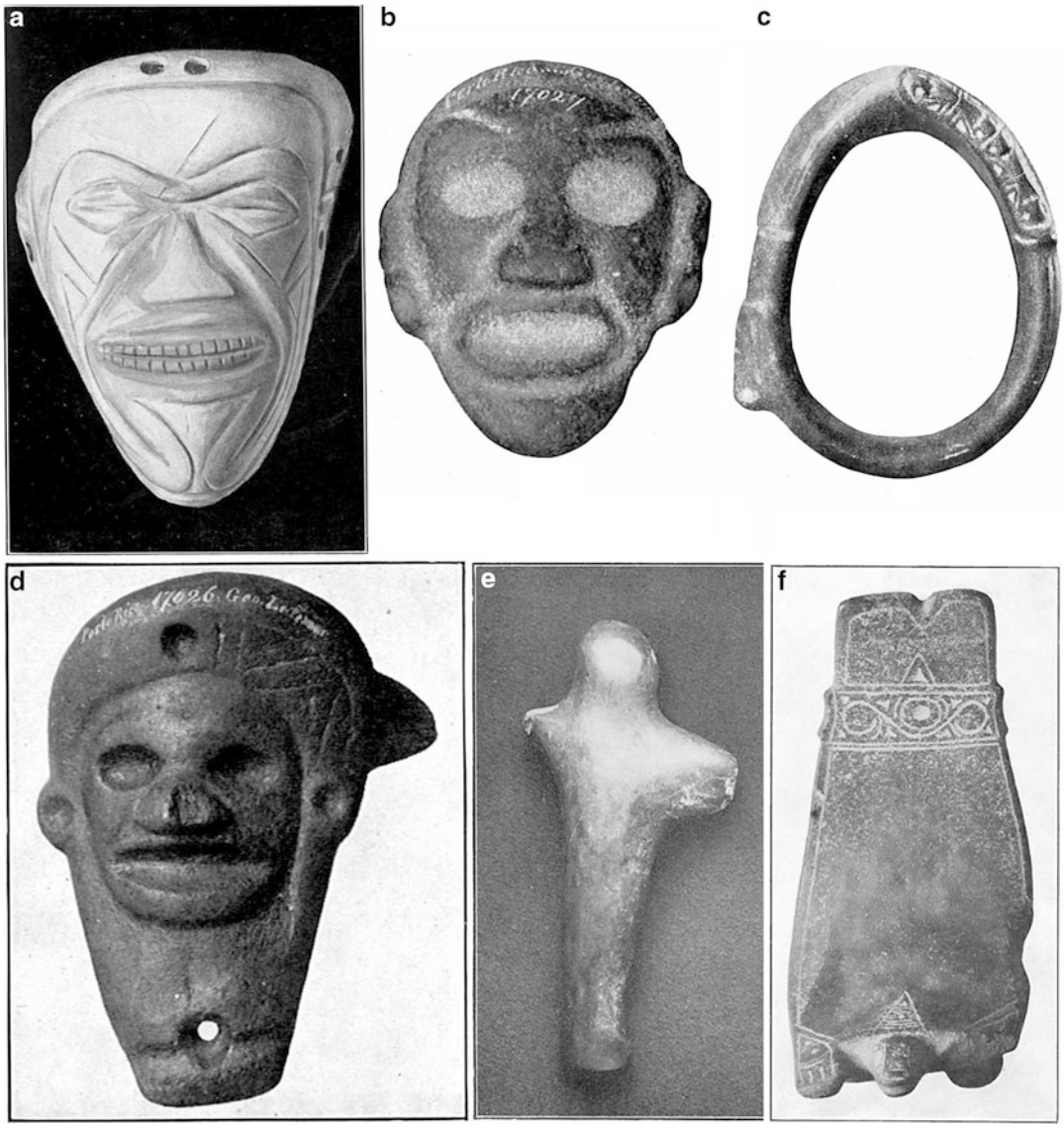

Caribbean Prehistoric Archaeology, Fig. 9 Late Ceramic sumptuary items: (**a**) *guaíza* or shell mask; (**b**) stone head with anthropomorphic face; (**c**) oval stone collar, plan view; (**d**) elbow stone with anthropomorphic face; (**e**) monolithic stone axe and (**f**) wood *duho* with anthropomorphic head and legs for support and incised elongated back. (Fewkes 1907: Plates LXXXVII, LIV, LXVII, LXIX, XIV. XCII, respectively)

more abundant large decorated three-pointers and stone belts are mostly limited to Hispaniola and Puerto Rico. The related elbow stones are concentrated in Puerto Rico. *Dujos* are most common on Hispaniola, Puerto Rico, and the Bahamas with limited examples elsewhere in the northern Caribbean. The gold sheets have sources on Hispaniola and Cuba, while *guanín* is likely a direct maritime import from the lower Central American-Colombia region. Most of the gold/gold alloy pieces are from Cuba followed by the remaining Greater Antilles area. The movement between, and common use *dujos* in, the Caribbean and Central America is suggested; for instance, an ethnohistoric reference by a Nicaraguan chief uses the word *dujo* for his bench (Keegan and

Hofman 2017: 143–144; Hayward et al. 2014: 222–225; Mol 2007; Rodríguez Ramos 2010: 196, 206–208; Valcárcel Rojas and Martinón Torres 2013).

Three dominant trends in Late Ceramic pottery production involve a significant expansion of pottery types, their overlapping and intermixing nature, and an emphasis on plastic rather than painted decorative designs. Seven to nine series are recognized frequently with multiple subseries and styles as listed in Table 2c. Rouse (see also Figs. 2 and 3) organized the ceramics of the Greater Antilles into one series: the Ostionoid with three subseries, the Ostionan, Meillacan, and Chican. Alternatively, the three subseries are classified at the series level: Ostionoid, Meillacoid, and Chicoid. Lesser Antillean pottery is grouped into the Troumassoid, Suazoid, Cayo complex, Arauquinoid, Mayoid, and Dabajuroid series, albeit with Chican Ostionoid/Chicoid ceramics found in the northern Lesser Antilles at the end of the period. With two exceptions, they are considered to represent localized insular developments although with varying degrees of insular and – in the case of Trinidad's Mayoid ceramics, South American – mainland influences. The two exceptions concern the Guayabitan Arauquinoid subseries on Trinidad and the Dabajuroid series of Aruba, Bonaire, and Curaçao that derive from northern South American ceramic traditions.

Two aspects of Rouse's model come into play regarding the distribution and timing of ceramic categories. The first concerns the statement that ceramic traditions tend to be more alike across certain passages than from the same island, a topic introduced under the "Terminology and Chronology" section. Those passages comprise eastern Puerto Rico and the Virgin Islands, western Puerto Rico and Dominican Republic across the Mona channel and Haiti across the windward passage with eastern Cuba (Rouse 1992: 52 Fig. 14). The second involves the empirical observation that the ceramic categories do not necessarily represent discrete units in time and space. For example, Cedrosan Saladoid traits and pottery are found for a few hundred years in Puerto Rico and the Lesser Antilles after the introduction of Late Ceramic types that when radiocarbon date ranges are considered for Puerto Rico exhibit considerable style overlap. Instances of different pottery types at the same or nearby sites are not uncommonly recorded. A similar situation is noted for Dominican Republic ceramics (Keegan and Hofman 2017: 85–87, 125–128, 215–216; Peterson et al. 2004: 27–28; Rodríguez Ramos 2010: 155–161, 192–193, 211–212).

The trend from the later Saladoid and Huecan styles (circa AD 400–600) to initial Late Ceramic styles has often been described in the literature as one of simplification. The highly diverse and well-executed poly- and bichrome painted designs and adorno modeling are replaced by an increasing importance on incised decorative features applied to less well-made vessels among other distinctions (Fig. 10a, b). Painting and slipping are still found among the pottery style description in Table 6, including Troumassan

Caribbean Prehistoric Archaeology, Fig. 10 Late Ceramic pottery: (**a**) Monserrate style plain open bowl with strap handles, (**b**) thick incisions, open punctates on rim handles. (Courtesy of Peter G. Roe)

Caribbean Prehistoric Archaeology, Table 6 Select descriptions of late ceramic pottery categories

Pottery descriptions	Source
Chicoid ceramics (AD 600–800) – thick, soft, and highly polished; wide range of vessel shapes, including effigies and white-slipped bottles. Jars (potizas) are common; paste is gray to brown. Flaring rims, some with punctations outward flaring. No applique. Lugs are large and modeled, and large strap handles are present. Incisions are broad-lined with smooth and rounded edges, shallower, and widely spaced and occur in circular, oval, and rectangular panels. Straight lines typically end in a dot	Keegan and Hofman (2017: 121)
Chican Ostionoid subseries (AD 1200–1400) – incisions on shoulders of incurving bowls, with some red-slipped vessels present; the absence of strap handles; biomorphic modeled-incised head lug adornos among the decorations	Peterson et al. (2004: 29)
Monserrate style (AD 600–900) – hemispherical or boat-shaped vessels with strap handles and tabular lugs; mainly plain (but red-slip or black exterior occur). Not incised	Keegan and Hofman (2017: 88)
Santa Elena style (AD 900–1200) – tends to be thick, coarse, and rough; well-rounded, shoulder-less bowls common, generally flat bases; unpolished surfaces; rim points, ovoid and rectangular lugs/handles, and strap handles present. Decorations are simple and executed in applique or molded. Incised and punctated designs dominant with red painting	Peterson et al. (2004: 27) and Keegan and Hofman (2017: 88)
Capá style (c. AD 1200–1500) – less well-made being heavily impregnated with sand; vessels (which are dominantly hemispherical) crumble easily. They are, however, frequently decorated, with anthropomorphic lugs. Modeled, incised, and punctate motifs predominate. Designs mimic the Boca Chica style, but are less elaborate and less well executed. Strap handles are absent	Keegan and Hofman (2017: 104)
Esperanza style (c. AD 1200–1500) – vessels are predominantly hemispherical with rounded bases, incurving sides, and a blunt, rounded keel. Paste is coarse, with an average thickness of 7 mm. Incised designs restricted to shoulders, with crude lugs/handles of anthropomorphic appearance. Painting and strap handles are absent	Rouse (1952: 352–354) and Keegan and Hofman (2017: 104–106)
Boca Chica style (c. AD 1200–1500) – characterized by thicker and sturdier vessels with fine, hard, smoothed, and occasionally polished surfaces. Vessels include round or boat-shaped with inturned rims and spherical bottles. Presence of incised lines beginning and ending with punctations (line-and-dot); flat and prismatic lugs/handles with anthropomorphic designs	Rouse (1952: 347–350) and Keegan and Hofman (2017: 104)
Pure Ostiones (AD 600–900) – traits carried over from Saladoid pottery include tabular lugs, strap handles, and red-painted and slipped surfaces. Distinctive traits are boat- and kidney-shaped vessels, with incurving bowls (cazuela); biomorphic (bat-head) handles; the presence of pink or lilac slips that entirely covered the vessels; designs in black paint	Peterson et al. (2004: 27)
Modified Ostiones (AD 900–1200) – traits carried over from Saladoid pottery include tabular lugs, strap handles, and red-painted and slipped surfaces. Distinctive traits are boat- and kidney-shaped vessels, with incurving bowls (cazuela); biomorphic (bat-head) handles; incised designs; the presence of pink or lilac slips that entirely covered the vessels; designs in black paint	Peterson et al. (2004: 27)
Mellacoid ceramics (AD 600–800) – vessel shapes include hemispherical bowls and boat shapes, with rounded rims that typically turn inward at the shoulder (*casuela*). Paste color varies from red to gray to black. Decorations are limited to the panel between the shoulder and the rim and include sigmoid and other appliqué, punctations on the body and lip, and adornos that rise above the rim on opposite sides of the vessel. Some lugs are anthropomorphic and are built of appliqué. Strap handles are present. Common incised lines include crosshatching, oblique parallel lines, and straight lines that do not end in dots	Keegan and Hofman (2017: 120–121)

(continued)

Caribbean Prehistoric Archaeology, Table 6 (continued)

Pottery descriptions	Source
Troumassoid series/Troumassan Troumassoid subseries (AD 500–600) – characterized by vessels that are boat- and kidney-shaped, round bottomless, double and hemispherical, and inverted bell-shaped bowls. Cylindrical pot stands, jars, and effigy bowls were common. Decorations include polychrome painting of white, red and black or red, and black combined with curvilinear incisions; painted scrolls on a buff surface	Peterson et al. (2004: 28)
Mamoran Troumassoid subseries – vessels are thick, with white-on-red painting and straight parallel designs, although curvilinear incision continued. First appearance of scratched pottery. Handles became vestigial	Peterson et al. (2004: 27)
Mamoran Bay style – red-slipped surfaces replaced bicolor and polychrome painting, with simplified patterns, broad-lined incisions, with curvilinear or parallel linear designs. Pottery was less well-finished. Rims were thickened by adding a coil of clay. Incised elements tended to be deeper, narrower, more irregular, and U-shaped	Peterson et al. (2004: 27)
Early Suazoid Troumassoid subseries (AD 1000–1200) – thick, coarse, and soft pottery with scratched or scraped surfaces; inward thickened rims; legged, pedestal, or annular bases; legged griddles; and triangular griddle rims. Decorations include broad-line incisions on red-slipped surface and modeled-incised zoomorphic head lug adornos. Monochrome red-painted surfaces typical. Vessel shapes are simple, unrestricted, or restricted bowls and necked jars	Peterson et al. (2004: 28)
Late Suazoid Troumassoid subseries (AD 1200–1500) – less-finished and crude, with scratched, finger-indented surfaces and legged vessels and griddles. Often undecorated, although some have red paint, linear or zoned painting, or parallel incisions, circles, or scrolls on the rims or walls. Flat human-head adornos with flaring pierced ears, figurines, and clay pestles were typical	Peterson et al. (2004: 28)
Cayo complex/style (c. AD 1250) – incisions on a flat rim, cone-shaped collars and bodies, and typical applique decoration in the form of adornos made of perforated clay balls. Multi-convex vessels with anthropomorphic faces in applique and *caraipe* (tree-bark) temper	Peterson et al. (2004: 28)
Bontour complex (AD 500–700) – shell-tempered pottery with minimal decorations, sparse punctate, and incised or gouged motifs; absence of head lugs	Boomert (2013: 149)
Mayoid (AD 1500–1700) – linked to Native-European contact; characterized by exclusive use of *caraipe* temper and strong similarity between typical Mayoid cooking jars and Arawakan groups in Guianas	Boomert (2013: 151)

Caliviny polychrome of the Lesser Antilles where normally vessels possess overall red paint with additional black-painted curvilinear (scroll) and linear (geometric and parallel designs) motifs. More common however are plain-tending ceramics like those of the Monserrate style – here an unpainted open bowl with strap handles (Fig. 10a) – and incised motifs like those of the Santa Elena style, here thick straight-dot-ending and curved lines, as well as open punctates on plain handles (Fig. 10b; both styles from Puerto Rico).

Subsistence

Major components of the subsistence base laid out under the Lithic/Archaic and Early Ceramic periods – hunting of land animals, fishing and mollusk collection, cultivation of root crops and grain-bearing plants, maintenance of fruit trees, multipurpose home gardens, and slash-and-burn techniques for larger cleared plots – are continued in the Late Ceramic with their intensification noted at least for certain areas in the Greater Antilles. Intensification has been related to changing climates, population expansion, and

sociopolitical pressures to which can be added increased demands for foods and special-purpose plants related to public feasting, ceremonies, and health/spiritual concerns.

The latter is indicated by the expanded "Other Uses" section of Table 4. Several health-related plants have been added, along with those producing red and black dyes and beverages. Ethnohistoric sources indicate that home gardens were used to cultivate a significant number of herbs, medicinal plants, and those for magico-ritual purposes. It has been suggested that shamans or other specialists oversaw the growing of such special-purpose plants in home gardens or otherwise specialized plots since they would have had the requisite knowledge regarding their use and purposes. Tobacco was used both for social smoking and, along with *cohoba*, ritual occasions. The latter compound was made from ground seeds from the genus *Anadenanthera* trees mixed with crushed shell or lime to form a psychotropic drug that was inhaled or snuffed through the nostrils. The resulting ecstatic-visionary trances allowed the shaman to interact with cemí spirits to affect desired social outcomes and healing states. The red and black dyes in addition to decorative functions may have been employed in magico-rituals and curative practices (Newsom 2008: 174–179, 188; Reid et al. 2018: 214–215, 217).

Agricultural intensification rested not on the significant addition of new wild or domesticated plants, but on practices to increase yields. Reconstructed practices included the construction of *montones*, semipermanent mounds used for the growing of especially manioc and sweet potatoes. A matrix or mounding of loose dirt concentrated organic materials providing for faster growth and larger tubers. They were constructed within or supplemental to swidden agricultural plots termed *conucos*, as well as along river flood plains. *Montones* measured 1 m high by 3 m in diameter with flat tops. Manioc is a particularly desirable root crop in that it can grow in all soil types, is draught resistant, has a high caloric content, matures in 10 months, and can be stored up to 3 years before harvesting. Terracing was noted at the end of the Early Ceramic for Puerto Rico, with more locations documented in the Late Ceramic. *Montone* and terracing construction has also been reported from Cuba and Hispaniola (Reid et al. 2018: 216–218).

Settlement

Settlement patterns of this period are marked by an increase in the number and type of sites, ranking or a differential ordering by size and location, diverse internal village and house arrangements, occupation of new areas, and the development at certain sites and areas of enclosures or formally demarcated spaces with earthen or stone alignments. A growing population is indicated, although this trend may not have been uniform across the region or time period. After around AD 1200, a leveling-off or even decrease is suggested for Puerto Rico, decrease and site abandonment for many of the northern Leewards, but the opposite in the Windwards with settlement density highest at the end of the prehistoric period (Bright 2011: 239–240; Hofman 2013: 208–212 Keegan and Hofman 2017: 96–97, 106–107, 215, 229, 238).

On Puerto Rico, the Early Ceramic pattern of large, relatively autonomous villages located in coastal settings transitions to settlements situated in the foothills and mountainous interior on agriculturally suitable river terraces. Whether derived from fissioned parent communities or unrelated populations, the settlements represent small villages (under three hectares) or hamlets composed of nuclear families judging from the extant limited number of excavated houses that average 8 m in diameter. This dispersed pattern of small settlements linked to others in clusters is allied to the establishment of some new large coastal villages, as well as the continued occupation of Early Ceramic ones. Midden arrangements are variable. Circular patterns continue at various sites, while sheet, hillside, and no directly associated middens are also recorded (Keegan and Hofman 2017: 89–91, 96–99, 107; Rodríguez Ramos 2010: 156–157, 159–160).

On Hispaniola which it should be remembered did not have prior Saladoid occupation, a wide range of settlements is reported including large and small villages, hamlets, homesteads, and special-purpose locations. Like Puerto Rico,

sites are distributed among coastal and interior areas to take advantage of available resources involving those near mangroves and rich marine environments and inland locations for arable lands. For the Dominican portion of the island, large houses of some 30–40 people likely sheltering extended families situated around a cleared central plaza with a ring-shaped midden totaling 500 individuals is reported for Juanpedro (AD 840–1300), while smaller houses arranged in six clusters of from 30 to 40 people per cluster possibly representing clan or lineage compounds is documented for El Cabo (AD 600–1500) making for approximately half the population of Juanpedro. Work huts, windbreaks and fences were also noted at El Cabo (Keegan and Hofman 2017: 122–128).

The site of El Flaco (AD 900–1500), also in the Dominican Republic, exemplifies a number of villages that in addition to house structures possess multi-use mounds and earthworks. The smaller-scale houses exhibit a double row of alternating large and small posts built on leveled platforms that are enclosed by several mounds and earthen walls. The mounds' involved stratigraphy reflects different uses from refuse deposits to burials. Special-purpose sites include Îl à Rat in Haiti (ca. AD 900–1500) that likely served as an exporter of fish and marine proteins, especially conch, to interior settlements. The site is located amid extensive coral reefs, seagrass beds, and a lagoon. Fish bones and conch shells far exceed the estimated needs of a small village. Special production sites involving a range of items (e.g., marine foodstuffs, cotton, salt) have also been noted for Puerto Rico, Cuba, the southern Bahamas, and the Lesser Antilles as outlined below (Keegan and Hofman 2017: 107, 128–134, 167).

The Ceramic period in Cuba, like that of Hispaniola, does not begin until Ostionoid, Meillacoid, and Chicoid pottery-producing groups arrive at different times and from multi-proposed Caribbean locations. These Late Ceramic farmers/fishermen primarily established communities in the eastern and central portion of the island; Meillacoid settlements predominate. Interactions among the new settlers and resident Archaic groups yielded what has been characterized as a series of distinct cultural identities marked by variable material traits, sociopolitical developments, economic relationships, and settlement arrangements.

A study of Meillacoid-identified occupations in southeast Cuba indicated three site types: coastal exploitation zones, small short-term farmsteads for agricultural or fishing pursuits, and different sized habitation locations, the majority encompassing 30–40 m. A high degree of stability in subsistence and material culture patterns is suggested even amid apparent population increase. Evidence for coastal-inland exchanges of food resources is also suggested.

Another investigation of Meillacoid settlements in the Maniabon Hills area of northeastern Cuba identified 190 sites or zones of which 97 possessed enough data for further analyses. Apart from 13 Archaic coastal shell deposits, settlements were classified into 2 village types: coastal fishing occupations of from 2 to 10 middens with largely shell remains and larger inland villages ($n = 74$) with regular habitation-related refuse. They were all located on nearby hilltops usually 4 km from, and overlooking the sea, apparently selected for access to arable land and freshwater resources. These inland settlements, like those of Jamaica (see below) and areas on Hispaniola, lined the hill sides averaging 2500 m^2 in size enclosing five to ten mounds. The variability observed in the numbers per site, shapes, and arrangements of these deep midden mounds again likely reflects a variety of functions from functional to ritual (Keegan and Hofman 2017: 155–159, 169).

In the previous Lithic/Archaic and Early Ceramic periods, the dominant migration issue concerned large-scale in-migration from continental zones. In the Late Ceramic, the dominant issue involves intra-regional settlement of already occupied islands by expanding on-island or new off-island populations as just noted, in addition to the permanent occupation of the remaining large Greater Antillean islands of the Bahamas and Jamaica. Multiple and partially overlapping settlement efforts are inferred for the Bahamas. The first effort begins around AD 700 by Ostionoid and Meillacoid groups from Hispaniola or Puerto

Rico that are ultimately unsuccessful. The sites are classified as recurrently occupied special extraction sites, camps, and villages strategically located to maximize the exploitation of marine resources and shell for bead making. These colony-like locations of the southern Bahamian Turks and Caicos area likely exported conch meat, fish, and finished shell beads to home communities.

The southern sites around AD 1300 are abandoned, in part perhaps due to the growing influence of northern groups that settled the center of the Bahamian archipelago in the AD 700/800s. These horticultural fisher-collectors or Early Lucayans probably came from northern Cuba and managed to establish permanent occupation and a local ceramic tradition – Palmetto. Although continuous occupation was achieved, sites are small with shallow middens and low artifact densities indicating frequent village relocations of probably extended families or lineage segments. The high degree of mobility observed for the Early Lucayan phase continues into the Late Phase AD 1100–1530+, albeit with longer-term residence suggested. Cave, burial, and special-purpose sites can be added as settlement types; all are located along the coasts with the open-air residential settlements usually situated atop sand dunes in a linear arrangement of structures. Occupation is noted throughout the archipelago, although it is unclear if settlement expansion is due to population increase, restructuring, or their combination. Trade in raw and finished goods that begun during the non-Lucayan period continues and expands with the importation of such goods as greenstone, petaloid axes, and copper from, and the export of items including salt, salted fish, cotton, and parrots to Cuba and Hispaniola (Berman et al. 2013: 264–269; Keegan and Hofman 2017: 181–186).

Jamaica, like the Bahamas, also experienced two separate successful colonization efforts. Limited excavations from the initial attempt or Little River phase (AD 550–950) demonstrate a preference for coastal settlements and a reliance on marine protein sources involving fishes, mollusks, and in particular sea turtles. Their shallow deposits point to short-term occupations as base camps for particular resource exploitation. These Ostionoid pottery-producing groups are shortly succeeded by those making Meillacoid ceramics. Settlements of the White Marl period exhibit deeper deposits suggesting long-term occupation with sites frequently located on hilltops/hillsides overlooking the coasts. Inland occupations are also recorded, as are large villages with midden mounds and central open spaces. All available environments were exploited, focusing on local resources and presenting a pattern of greater reliance on cultivated foodstuffs and freshwater taxa for inland sites compared to a greater reliance on marine species for coastal locations (Keegan and Hofman 2017: 189–195; Wesler 2013).

An increase in the number, size, variety, and ranking of settlements is also observed at the beginning of the Late Ceramic (AD 600–800) in the entire Lesser Antilles. Coastal locations continue along with new inland villages and hamlets situated near rivers, as elsewhere in the region to take advantage of arable land and freshwater/terrestrial resources. Previously uninhabited islands are now colonized or regularly visited for particular raw materials and food sources, as well as special activities and ceremonies including islets, cays, promontories, and open-air/cave sites with rock art. The observed internal arrangement of habitation sites includes a living area and open space/plaza encircled by a doughnut-shaped refuse midden.

Around AD 1200/1300, however, a significant decrease in the number and size of settlements is documented for the northern Lesser Antilles involving a shift from large permanent settlements to those in more strategic and defensive locations. This trend stands in contrast to continued high site densities for the southern or windward islands. The difference in trajectories has been linked to changing sociopolitical structures (see section below) where the northern defensive locations are viewed as ports-of-trade, new colonization efforts and lookout posts for societies that have become increasing integrated into the Greater Antillean complex sociopolitical sphere. This area, local Lesser Antillean communities and northern South American appear to be interconnected via material and ideological

Caribbean Prehistoric Archaeology, Fig. 11 (**a**) West alignment of main square enclosure at Caguana, Puerto Rico. (**b**) One of the alignment boulders with complex head petroglyph. (Courtesy of Michael A. Cinquino)

culture exchanges, within it appears a strong competitive context (Bright 2011: 239–240; Hofman 2013: 208–212; Keegan and Hofman 2017: 215, 229, 238).

Enclosures, variously termed *bateys*, precincts, ballcourts, and plazas, are first detected archaeologically at the beginning of the Late Ceramic with increasing numbers after AD 1000 in the Greater Antilles. They represent formally demarked level spaces wholly or partially outlined with stone or earthen structural elements that are fixed open places in the landscape. Precincts are important in their own right as research topics that is more than matched by their incorporation as one data point employed to reconstruct Late Ceramic social, political, religious, and economic life as the following sections demonstrate.

The structures differ in size, shape, location, construction details, presence of rock art, and iconography. Many are rectangular, with square, oval, circular, and other shapes recorded. Sizes range from under 100 m^2 up to 43,000 m^2 for the largest example in the region (Corral de los Indios in the Dominican Republic). Single lines of upright earth-embedded boulders, normally a meter or less in height, represent the most frequent alignment type, followed by earthen embankments, outlined depressions, and stone/earth combinations. Distribution is uneven within the region. Puerto Rico registers the highest number with some 200 single and multiple plazas; Hispaniola in the twenties and fewer still for Cuba, the Bahamas, and the Virgin Islands. They appear to be lacking in the remaining Antilles.

Puerto Rico possesses several multiple enclosures, most notably Caguana (Fig. 11a, b) in the west central highlands that registers the most precincts per site in the region with a total of 12 extant elements: one stone platform, nine rectangular and one oval boulder-lined courts, and the largest, central square plaza with a stone boulder and pavement arrangement. Most of the surviving petroglyphs are found on the interiors of the square plaza's west wall. The precinct construction has been dated to AD 1300–1450 enclosing some 5500 m^2. Jácana represents one of the island's single precinct sites with ae large 2000-m^2 stone-lined square plaza exhibiting boulders on all four sides with some 62 petroglyphs on at least three sides. The site is located in the southern foothills with the enclosure dating to AD 1300–1300. Minimal domestic activity is indicated for both sites.

In contrast, Hispaniola and Cuba exhibit lower location numbers but significantly larger enclosures. Corral de los Indios's central oval plaza in the northwest Dominican Republic demarcates with a single-wide, raised cobblestone platform some 43,000 m^2 in area. A single monolith with a

humanlike facial petroglyph was reported in the center that also had one or more causeways leading to a nearby river, with a substantial petroglyph assemblage. This plaza represents an enlarged village center that has been identified ethnohistorically with Caonabo, the most powerful chief on the island.

Enclosures occur as integral elements in habitation sites, in addition to inter-village non--habitation locations as single or multiple courts. In habitation sites they represent transformed Early Ceramic open public spaces into newly bounded ones; not all (and maybe a minority) settlements undertook such conversions or can necessarily be linked to particular non-village precinct sites. It seems they were multifunctional – secular, religious, theatrical, economic, social, and political – and multi-scalar, sub-village, small and large villages, inter-village, subregion, and regional. Communal social and ceremonial activities related to more local concerns like marriages, births, and age/sex passage rites involving limited audiences and participants likely played out at smaller village enclosures. Activities would have been amplified in terms of needed resources, impact, and participant/audience engagement at larger village and inter-community precincts.

Ethnohistoric sources concerning Greater Antillean groups indicate certain possibilities for the amplified category including playing a ball game with a solid rubber ball, complete with betting and ritual aspects, as well as *areytos* that entailed recitals and performances of chiefly, group, and religious histories. They were accompanied by drinking, feasting, and mock battles that probably differed according to specific occasions such as times of natural disasters and deaths of chiefs (Keegan and Hofman 2017: 99–103, 108, 141–143; Hayward and Cinquino 2012; Hayward et al. 2013; Oliver 2005; Wilson 2007: 114–136).

Sociopolitical Organization

The intensification of sociopolitical structures in the Late Ceramic involves transitioning from prior relatively unranked and autonomous communities to at least two-tiered stratified societies of elites and commoners incorporated into simple to complex chiefdoms by the time of European contact. These developments were not uniform within the region. Puerto Rico and Hispaniola present the clearest evidence for complex chiefdom development, less stratified and expansive structures for the rest of the northern Caribbean, and in contrast, a strong continuity with the previous sociopolitical landscape in the southern Lesser Antilles. Further a range of integration is indicated from still autonomous Lithic/Archaic societies argued for western Cuba (see Table 2c) to unincorporated groups and interaction spheres like the southern Lesser Antilles linked nonetheless via multilevel/multi-item exchange systems to full incorporation in complex polities via elite marriages/sponsored trade, political alliances, and direct control. Various formal models for these changes have been proposed, two of which are outlined here: competitive expansion and peer polity.

Siegel (1999) has advanced the competitive expansion model for specifically Puerto Rico that centers on the implications of the shift from the informal Early Ceramic public spaces to their formal delineation in the Late Ceramic outlined above. He sees the early period settlement centers as ritually changed spaces frequently serving as places for the burial of community members with shamans primarily in charge of associated rituals and more secular activities. Formal delineation suggests both a continuance with past ideology and settlement structure and significant departures including the emergence of certain individuals and kin groups – chiefs, related individuals or elites, and lineages – as the new directors of communal activities. These events increasingly focus on the chiefs and elites as mediators between the people and spirit world with the accompanying elevation of their ancestors as active participants in maintaining the public well-being. It was the elites who maintained control over ceremonial space activities directed at political affairs from the local village to supra-village level, relegating the shamans to presiding over religious affairs at the private lower community sphere. Siegel reasons that if enclosures reflect a continuum of influence consolidation from unrestrictive to selective groups and individuals, then their changes through time should correlate with

political developments. Employing precinct data from Puerto Rico, he concludes that the island registers between four and six relatively equal power centers by AD 1200.

Siegel's model envisions enclosures as places for contesting prestige and influence that are hierarchically ordered (polities with supporting centers). In the peer-polity model, proposed by several researchers (see Curet et al. 2004; Wilson 2007), Puerto Rico's increasing political complexity is seen as deriving from a number of different, though comparable, processes. These include local environmental conditions and resources, diverse historical contexts, and individual chiefly ideological and political strategies. The polities are small-scale and nearly equal that develop within networks of communication among different groups or peer-polity interactions. They tend to be short-lived, a condition noted for chiefdoms in general, since critical network relationships can be disrupted by the perceived loss of spiritual/*cemí* support or death of an influential chief leading to ready collapse.

Enclosures can also be seen as places of social activity and identity formation (Curet and Torres 2010; Torres 2010). The proposed activities suggested for enclosures and settlement centers would have promoted a sense of belonging and attachment. In this viewpoint, hierarchies and political power result from community consensus that validates group identity, as well as the creation of powerful individuals and social inequalities. Elites and commoners both gain from such arrangements where the acknowledged elevated influence and authority of the elite is returned to the community in the form of material, spiritual, and social well-being. This process of social formation and identity was continual, where relationships were negotiated and recreated through the variety of secular and religious events at enclosures and settlement centers.

Descriptions of Caribbean chiefdoms or *cacicazgos* rely heavily on ethnohistorial accounts of Greater Antillean Taíno groups at contact, particularly those of Hispaniola and Puerto Rico. Variability in structural organization is certainly indicated. Five major *cacicazgos* on Hispaniola are reported organized under a three-level system of paramount chiefs or *caciques*, regional chiefs controlling allied village, and individual village leaders. Puerto Rico, in contrast, is reported to have had 17 chiefs suggesting authority over smaller territories and a simpler arrangement of regional *caciques* supported by local village heads.

Chiefly control at any level rested on the ability to interact with the *cemí* spirits, to attract supporters, and to maintain the allegiance of the commoners who made up the majority of the population. Their roles included mobilization for agricultural labor and military service, redistribution of food and goods in life and death during *areitos*, organizing and composing new elements for *areito* performances, and directing the production and trade of sumptuary items, as well as esoteric knowledge. Chiefs were assisted in their responsibilities by other high-ranking peoples and relatives. Shamans or *behiques*, chiefs, and the elite ritually communicated with *cemís* with apparently divergent goals: individual physical-spiritual health versus guidance regarding public political concerns (Keegan and Hofman 2017: 112–113, 252–253; Oliver 2005: 237, 241–245; Sued-Badillo 2007: 259–274; Wilson 2007).

Elsewhere in the Caribbean sociopolitical structures represent a complex interplay of local to regional influences. For example, as already noted societies on Cuba have been characterized as exhibiting highly individualized expressions. Lithic/Archaic Age communities it seems accommodated in-migrating Ostionoid, Meillacoid, and Chicoid groups resulting in a variety of corresponding structural arrangements from tribal to chiefdoms. Chicoid sites are concentrated in northeast Cuba including four large plazas like those of the Dominican Republic, but instead bounded by earthen embankments not stone boulders or pavements. The presence of these plazas and their differences in construction point to populations organized at a chiefdom level derived from local developments and not direct control or integration into the complex chiefdoms of Hispaniola (Keegan and Hofman 2017: 165–167, 169; Wilson 2007: 130–133).

Parallel or different local factors are indicated in the emergence of regional-level integration

argued for the Banes region in the Maniabon Hills, discussed under the foregoing "Settlement" section. Further examination of the Meillacoid settlements begun around AD 1100 reveals that the hilltop locations are socially isolated from one another by large open spaces composed of larger centers with smaller surrounding satellite communities usually within 5 km. Four such clusters have been proposed with the settlement pattern demonstrating a high degree of cultural continuity up to and into the Colonial period. Ritual or high status objects such as wooden duhos and stone/shell beads and pendants characterized the centers. These stable interacting discrete center-satellite evenly spaced clusters have additionally been interpreted as two-tiered social and political hierarchies or simple chiefdoms (Keegan and Hofman 2017: 160–162).

In the Lesser Antilles, opposing sociopolitical trajectories are indicated. Initially a continuation of the Saladoid complex tribal arrangement based on individual personal abilities (Big Man model) or lineage-based hierarchies is indicated. Localized interaction spheres also continue involving control over the production and distribution of goods, along with the establishment of alliance networks, marriage agreements, and larger political units. In the northern section, the political centers might have operated as peer-polities linking multiple settlement or islands. At certain sites, highly valued items and complex mortuary practices point to social differentiation or stratification. The polities maintained local, micro- and macro-regional exchange networks with Caribbean and mainland areas.

After AD 1200/1300 significant settlement and sociopolitical reorientation is apparent. Greater Antillean complex chiefdoms incorporate or extend their influence into the northern Lesser Antilles, while northern South American influence increases in the southern Lesser Antilles. These influences appear to have been more negative in the north with population decline, displacement, and changed settlement types (see "Settlement" section above) documented versus the maintenance of internal social cohesion in the south (Hofman 2013: 206–207, 214–216; Keegan and Hofman 2017: 224–226, 238).

For the southern Lesser Antilles, local integration of largely autonomous self-sufficient communities comprises the political landscape with strong inter-island ties, as well as inter-regional ones, albeit in an apparent competitive atmosphere. An even or regular site distribution pattern is registered with locations in similar environments exploiting resources in similar ways. Settings include coastal fringes, mountains, reefs, freshwater sources (rivers, springs, rainwater), and inland for the exploitation of cultigens, wild plant materials, as well as marine and terrestrial animal protein resources (Boomert 2013; Bright 2011).

Ideology

Two aspects of Late Ceramic religious development are considered here: the significant increase in the numbers, location, and image complexity of rock art and the nature of religious organization (see Table 5). A substantial body of rock art sites is now distributed throughout the region. Petroglyphs or carved images and pictographs or painted designs are found on varied rock surfaces from the stones aligning enclosures, to boulders along waterways, to cave walls and inland formations. While zoomorphic (naturalistic and stylized fishes, birds, turtles), geometric (circles, spirals), and abstract (arrangements of straight, curvilinear lines and dots) motifs are recorded, a marked emphasis on anthropomorphic figures is evident. They include simple (outlined heads with eyes and mouths) to complex (addition of such elements as ears, headdresses, noses) humanlike faces that frequently lack even minimally depicted body forms (shoulder outline, stick figures) (see Fig. 11b). A minor number, like those at Caguana and Jàcana, are more fully rendered with complex heads, bodies, legs, arms, digits, and gender indications.

Spatial distributions are uneven. For instance, rock art is found on all the major islands of the Greater Antilles, while sites are normally only located on the larger islands of the Lesser Antilles. Image numbers in the region range from a few to the low hundreds for petroglyphs and into the low thousands for pictographs. Formal dating models have been proposed that suggest a

division into Lithic/Archaic, Ceramic, and early Historic periods with primary production in the Ceramic Age. Ethnohistoric and ethnographic sources form the basis for interpreting the meaning and function of the images. Interpretations range from simple identification of the forms and cross-site stylistic comparisons to detailed constructs involving cosmological and political aspects (Hayward et al. 2009b). For example, the petroglyphs at Caguana may represent the materialization of the cosmic order and are seen as stand-ins for chiefly ancestors or *cemí* substitutes and as visual referents that reinforce chiefly and elite influence and legitimacy (Oliver 2005).

Rock art has also been employed to argue for increasing formal religious structure. One expectation of a low level of religious organization should be a low degree of visual redundancy in associated material correlates, in this case rock art, and a higher degree in more centralized systems. A small sample of rock art assemblages indicated a low but shifting degree of visual redundancy suggesting that efforts to more formally structure the religious organization may have been taking place in concert with the increasing stratification just noted in the sociopolitical sphere. Evidence for the shift may be seen in the frequent and prominent use of at least one design layout, that of a circle with an internal dot flanked by triangles, that cross-cuts a number of media from rock art to the carved stone collars, large three-pointers, and elbow stones, as well as Chican ceramics. Increasing restructuring by the elite might have been complementary to existing ideologies, rather than displacement, since small three-pointers linked as far back as Lithic/Archaic times continue to be produced (see also Keegan and Hofman 2017 and Rodríguez Ramos 2010, among others for similar structural change assessments).

Final Considerations

The unfolding of Caribbean prehistory in this essay has traced a complex development once seen as relatively straightforward as indicated in the following flow chart:

. . . once seen as relatively straightforward. Groups from northeast South American diversify into Lithic/Archaic societies then Saladoid ones and finally the several Taino populations at contact in the northern Caribbean. In this model, Huecans are part of the Saladoid and Lithic/Archaic groups have died out or been absorbed. Mainland lies are minimized. A closer examination indicates a more involved history of migrating and interacting groups.

In this viewpoint groups derive from various mainland areas of at least northern South America and lower Central America that establish insular identities, interact with each other and the mainland that by the end of the prehistoric period are characterized by a plurality of societies that though they differ in localized expressions (settlement systems, sociopolitical structures, material culture, rock art) are nonetheless Caribbean cultures.

Cross-References

► Caribbean Rock Art

References

Atiles, G., and A. López. 2005. El sitio arqueológico "La Punta de Bayahibe": Primeros agricultores tempranos de las Antillas asentados en la costa sureste de la isla de Santo Domingo. Available at: http://bayahib.blogspot.com. Accessed 16 Jan 2019.

Bérard, B. 2013. The Saladoid. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 184–197. Oxford: Oxford University Press.

Berman, M.J., P.L. Gnivecki, and M.P. Pateman. 2013. The Bahama archipelago. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 264–280. Oxford: Oxford University Press.

Boomert, A. 2000. *Trinidad, Tobago and the lower Orinoco interaction sphere*. Alkmaar: Cairi Publications.

Boomert, A. 2013. Gateway to the mainland: Trinidad and Tobago. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 141–154. Oxford: Oxford University Press.

Bright, A.J. 2011. *Blood is thicker than water*. Leiden: Sidestone Press.

Callaghan, R.T. 2003. Comments on the mainland origins of the preceramic cultures of the greater Antilles. *Latin American Antiquity* 14 (3): 323–338.

Callaghan, R.T. 2013. Archaeological views of Caribbean seafaring. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 184–197. Oxford: Oxford University Press.

Chanlatte Baik, L.A. 2013. Huecoid culture and the Antillean Agroalfarero. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 171–183. Oxford: Oxford University Press.

Chanlatte Baik, L.A., and Y.M. Narganes Storde. 1983. *Vieques Puerto Rico: Asiento de una Nueva Cultura Aborigen Antillana*. Dominican Republic: Impresora Corporán, C. por A.

Cooper, J. 2010. Pre-Columbian archaeology of Cuba: A study of site distribution patterns and radiocarbon chronologies. In *Island shores, distant pasts*, ed. S.M. Fitzpatrick and A.H. Ross, 81–107. Gainesville: University Press of Florida.

Cooper, J. 2013. The climatic context for pre-Columbian archaeology in the Caribbean. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 47–58. Oxford: Oxford University Press.

Cooper J. and R. Boothroyd. 2011. Living islands of the Caribbean: A view of relative sea level change from the water's edge, In *Communities in contact: Essays in archaeology, ethnohistory and ethnography of the American Circum-Caribbean*, ed. C.L. Hofman and A. Duijvenbode, 393–406. Leiden: Sidestone Press.

Curet, L.A. 2005. *Caribbean paleodemography: Population, culture history, and sociopolitical processes in ancient Puerto Rico*. Tuscaloosa: The University of Alabama Press.

Curet, L.A., J.M. Torres, and M. Rodríguez. 2004. Political and social history of eastern Puerto Rico: The ceramic age. In *Late ceramic age societies in the eastern Caribbean*, ed. A. Delpuech and C.L. Hofman, 59–85. Oxford: Archaeopress BAR International Series 1273.

Ensor, B.E. 2013. Kinship and Social Organization in the Pre-Hispanic Caribbean. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman and R. Rodríguez Ramos, 84–96. Oxford: Oxford University Press.

Fewkes, J.W. 1907. *The Aborigines of Porto Rico and neighboring Islands*. Twenty-fifth Annual Report of the Bureau of American Ethnology 1903–1904:1–220 plus plates I–XCIII (1–93). Washington, DC: Government Printing Office.

Fitzpatrick, S.M. 2013. The southward route hypothesis. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 198–204. Oxford: Oxford University Press.

Granberry, J. 2013. Indigenous languages of the Caribbean. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 61–69. Oxford: Oxford University Press.

Haviser, J.B. 2001. New data for the archaic age on Curaçao. *Proceedings of the Congress of the International Association for Caribbean Archaeology* 19 (1): 110–121. Aruba.

Hayward, M.H., and M.A. Cinquino. 2012. Rock art and transformed landscapes in Puerto Rico. In *A companion to rock art*, ed. J. McDonald and P. Veth, 103–124. Oxford: Blackwell Publishing.

Hayward, M.H., Lesley-Gail Atkinson, and M.A. Cinquino. 2009a. Introduction. In *Rock art of the Caribbean*, ed. M.H. Hayward, Lesley-Gail Atkinson, and M.A. Cinquino, 1–12. Tuscaloosa: The University of Alabama Press.

Hayward, M.H., Lesley-Gail Atkinson, and M.A. Cinquino, eds. 2009b. *Rock art of the Caribbean*. Tuscaloosa: The University of Alabama Press.

Hayward, M.H., F.J. Schieppati, and M.A. Cinquino. 2013. Rock art, enclosures and political development in the late ceramic northern Caribbean. *Proceedings of the Congress of the International Association for Caribbean Archaeology* 25: 658–678. San Juan, Puerto Rico.

Hayward, M.H., F.J. Schieppati, and M.A. Cinquino. 2014. Religious Organization in the Late Ceramic Caribbean. In *Rock art and sacred landscapes*, ed. D.L. Gillette, M. Greer, M.H. Hayward, and W.B. Murray, 207–232. New York: Springer Science + Business Media.

Hofman, C.L. 2013. The post-Saladoid in the Lesser Antilles (A.D. 600/800–1492). In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 205–220. Oxford: Oxford University Press.

Keegan, W.F., and C.L. Hofman. 2017. *The Caribbean before Columbus*. New York/Tuscaloosa: Oxford University Press/The University of Alabama Press.

Krause, R.A. 2016. *A universal theory of pottery production: Irving Rouse, attributes, modes, and ethnography*. Tuscaloosa: The University of Alabama Press.

Mol, A.A.A. 2007. *Costly giving, giving Guaízas: Towards an organic model of the exchange of social valuables in the late ceramic age Caribbean*. Leiden: Sidestone Press.

Newsom, L.A. 2008. Caribbean paleoethnobotany: Present status and new horizons (Understanding the evolution of an indigenous ethnobotany). In *Crossing the borders: New methods and techniques in the study of archaeological materials from the Caribbean*, ed. C.L. Hofman, M.L.P. Hoogaland, and A.L. van Gijn, 173–194. Tuscaloosa: The University of Alabama Press.

Newsom, L.A., and E.S. Wing. 2004. *On land and sea: Native American uses of biological resources in the West Indies*. Tuscaloosa: The University of Alabama Press.

Oliver, J.R. 2005. The proto-Taíno monumental Cemís of Caguana: A political-religious "manifesto". In *Ancient Borinquen: Archaeology and Ethnohistory of native Puerto Rico*, ed. P.E. Siegel, 230–284. Tuscaloosa: The University of Alabama Press.

Oliver, J.R. 2009. *Caciques and cemí idols: The web spun by Taíno rules between Hispaniola and Puerto Rico*. Tuscaloosa: The University of Alabama Press.

Ortiz Aguilú, J.J., J. Rivera Meléndez, A. Principe Jácome, M. Meléndez Maiz, and M. Lavergne Colberg. 1991.

Intensive agriculture in pre-Columbian West Indies: The case for terraces. *Proceedings of the Congress of the International Association for Caribbean Archaeology* 14: 278–285. Bridgetown: Barbados Museum and Historical Society.

Pagán Jiménez, J.R. 2011. Early phytocultural processes in the pre-colonial Antilles. In *Communities in contact*, ed. C.L. Hofman and A. van Duijvenbode, 87–116. Leiden: Sidestone Press.

Pagán Jiménez, J.R. 2013. Human-plant dynamics in the precolonial Antilles: A synthetic update. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 391–406. Oxford: Oxford University Press.

Pagán Jiménez, J.R., R. Rodríguez Ramos, B.A. Reid, M. van den Bel, and C.L. Hofman. 2015. Early dispersals of maize and other food plants into the Southern Caribbean and northeastern South America. *Quaternary Science Reviews* 123: 231–246.

Peterson, J.B., C.L. Hofman, and L.A. Curet. 2004. Time and culture: Chronology and taxonomy in the eastern Caribbean and the Guianas. In *Late ceramic age societies in the eastern Caribbean*, (BAR) International Series 1273, ed. A. Delpuech and C.L. Hofman, 17–32. Oxford: British Archaeological Reports.

Reid, B.A. 2014a. Ciboney versus Guanahatabey. In *Encyclopedia of Caribbean archaeology*, ed. B.A. Reid and R.G. Gilmore III, 103–105. Gainesville: University Press of Florida.

Reid, B.A. 2014b. Arawak versus Taíno. In *Encyclopedia of Caribbean archaeology*, ed. B.A. Reid and R.G. Gilmore III, 41–44. Gainesville: University Press of Florida.

Reid, B.A. 2014c. Island Carib. In *Encyclopedia of Caribbean archaeology*, ed. B.A. Reid and R.G. Gilmore III, 196–198. Gainesville: University Press of Florida.

Reid, B.A., F.R. Thomas, and S.M. Fitzpatrick. 2018. A comparative study of pre-colonial farming in the Caribbean vis-à-vis the Pacific. In *The archaeology of Caribbean and Circum-Caribbean farmers 6000 BC–AD 1500*, ed. B.A. Reid, 207–234. New York: Routledge.

Roe. P.G. 2009. The mute stones speak: the past, present, and future of Caribbean rock art research. In *Rock Art of the Caribbean*, ed. M.H. Hayward, Lesley-Gail Atkinson, and M.A. Cinquino, 198–239. Tuscaloosa: The University of Alabama Press.

Rodríguez Ramos, R. 2010. *Rethinking Puerto Rican precolonial history.* Tuscaloosa: The University of Alabama Press.

Rodríguez Ramos, R. 2013. Isthmo-Antillean engagements. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 155–170. Oxford: Oxford University Press.

Rodríguez Ramos, R., E. Babilonia, L.A. Curet, and J. Ulloa. 2008. The pre-Arawak pottery horizon in the Antilles: A new approximation. *Latin American Antiquity* 19 (1): 47–63.

Rodríguez Ramos, R., J. Pagàn Jiménez, and C.L. Hofman. 2013. The humanization of the insular Caribbean. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 126–140. Oxford: Oxford University Press.

Roe, P.G., M.A. Hayward, and M.A. Cinquino. 2018. Rock art and horticulture in the Caribbean: Icons and symbols of humidity. In *The archaeology of Caribbean and Circum-Caribbean farmers 6000 BC–AD 1500*, ed. B.-A. Reid, 173–203. New York: Routledge.

Rouse, I. 1952. Porto Rican prehistory. Introduction: Excavations in the west and north. In *Scientific survey of Porto Rico and the Virgin Islands*. New York: New York Academy of Science 18: 307–460.

Rouse, I. 1992. *The Taínos: Rise and decline of the people who greeted Columbus*. New Haven: Yale University Press.

Rouse, I., and B.F. Morse. 1995. The mill reef period: A local development on the island of Antigua. *Proceedings of the Congress of the International Association for Caribbean Archaeology* 16: 322–332. Basse Terre, Guadeloupe.

Samson, A.V.M. 2013. Household Archaeology in the Pre-Columbian Caribbean, In *The Oxford Handbook of Caribbean Archaeology*, ed. W.F. Keegan, C.L. Hofman and R. Rodríguez Ramos, 363–377. Oxford: Oxford University Press.

Siegel, P.E. 1997. Ancestor worship and cosmology among the Taíno. In *Taíno: Pre-Columbian art and culture from the Caribbean*, ed. F. Bercht, E. Brodsky, J.A. Farmer, and D. Taylor, 106–111. New York: El Museo del Barrio and The Monacelli Press.

Siegel, P.E. 1999. Contested places and places of contest: The evolution of social power and ceremonial space in prehistoric Puerto Rico. *Latin American Antiquity* 10 (3): 209–238.

Smith, D.G., Y. Chinique de Armas, R. Rodríguez Suàrez, W.M. Buhay, I. Roksandic, M.C. Peros, and M. Roksandic. 2018. Straddling the subsistence divide: The case of Canímir Abajo and contemporaneous sites in Northwestern Cuba. In *The archaeology of Caribbean and Circum-Caribbean farmers 6000 BC–AD 1500*, ed. B.A. Reid, 98–112. New York: Routledge.

Sued-Badillo, J. 2007. The indigenous societies at the time of conquest. In *General history of the Caribbean*, Autochthonous Societies, ed. J. Sued-Badillo, vol. I, 259–291. New York: Palgrave Macmillan.

Tankersley, K.B., N.P. Dunning, L.A. Owen, and J. Sparks. 2018. Geochronology and Paleoenvironmental Framework for the oldest archaeological site (7800–7900 cal. BP) in the West Indies, Banwari trace, Trinidad. *Latin American Antiquity* 29 (4): 681–695.

Torres, J.M. 2010. Tibes and the social landscape: Integration, interaction, and the community. In *Tibes: People, power and ritual at the center of the cosmos*, ed. L.A. Curet and L.M. Stringer. Tuscaloosa: The University of Alabama Press.

Torres, J.M., and R. Rodríguez Ramos. 2008. The Caribbean: A continent divided by water. In *Archaeology and Geoinformatics*, ed. B.A. Reid, 13–29. Tuscaloosa: The University of Alabama Press.

Ulloa Hung, J. 2005. Approaches to early ceramics in the Caribbean: Between diversity and unilineality. In

Dialogues in Cuban archaeology, ed. L.A. Curet, S.L. Dawdy, and G. La Rosa Corzo. Tuscaloosa: The University of Alabama Press.

Ulloa Hung, J. and R. Valcárcel Rojas. 2013. Archaeological Practice, Archaic Presence, and Interaction in Indigenous societies in Cuba, In *The Oxford Handbook of Caribbean Archaeology*, ed. W.F. Keegan, C.L. Hofman and R. Rodríguez Ramos, 232–249. Oxford: Oxford University Press.

Valcárcel Rojas, R., and M.M. Torres. 2013. Metals in the indigenous societies of the insular Caribbean. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 250–263. Oxford: Oxford University Press.

Waldron, L. 2016. *Handbook of ceramic animal symbols in the ancient Lesser Antilles*. Gainesville: University of Florida Press.

Wesler, K.W. 2013. Jamaica. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 250–263. Oxford: Oxford University Press.

Wilson, S.M. 2007. *The archaeology of the Caribbean*. New York: Cambridge University Press.

Further Readings and Sources

Books and Articles

Alegría, R.E. 1979. *Ball courts and ceremonial plazas in the West Indies*, Yale University publications in anthropology no.79. New Haven: Yale University Press. (Though dated contains survey of region wide plaza characteristics).

Allsworth Jones, P. 2008. *Pre-Columbian Jamaica*. Tuscaloosa: The University of Alabama Press.

Arrom, J.J. 1975. *Mitología y Artes Prehispáncos de las Antillas*. Mexico: Siglo XXI Editores. (Interpretative study of prehistoric Caribbean religion).

Arrom, J.J. (ed.), and S.C. Griswold (trans.). 1999. *An Account of the Antiquities of the Indians* by Fray Ramón Pané. Durham: Duke University Press. (Baseline reference for study of prehistoric Caribbean religion).

Bercht, F., E. Brodsky, J.A. Farmer, and D. Taylor, eds. 1997. *Taíno: Pre-Columbian art and culture from the Caribbean*. New York: The Monacelli Press. (Excellent photographic collection of various Taíno artifacts with accompanying explanatory texts).

Curet, L.A., and L.M. Stringer, eds. 2010. *Tibes: People, power and ritual at the center of the cosmos*. Tuscaloosa: The University of Alabama Press. (Interdisciplinary research results for Tibes a multi-enclosure site on Puerto Rico).

Curet, L.A., S.L. Dawdy, and G. La Rosa Corzo, eds. 2005. *Dialogues in Cuban archaeology.* Tuscaloosa: The University of Alabama Press. (Articles on history of Cuban archaeology along with select research results).

Delpuech, A., and C.L. Hofman, eds. 2004. *The late ceramic age in the eastern Caribbean*, BAR International Series. Oxford: Archaeopress. (Comprehensive review of Late Ceramic cultures in Lesser Antilles and eastern Greater Antilles as of this date).

Dubelaar, C.N. 1995. *The petroglyphs of the Lesser Antilles, the Virgin Islands and Trinidad*. Amsterdam: Foundation for Scientific Research in the Caribbean Region. (One of the few sources of rock art data at a wide geographical level; basic descriptive information including sketches of images and photographs).

Fewkes, J.W. 1907. *The Aborigines of Porto Rico and neighboring Islands*. Twenty-fifth Annual Report of the Bureau of American Ethnology 1903–1904:1–220 plus plates I–XCIII (1–93). Washington, DC: Government Printing Office.

Fitzpatrick, S.M. 2006. A critical approach to 14C dating in the Caribbean: Using chronometric hygiene to evaluate chronological control and prehistoric settlement. *Latin American Antiquity* 17: 389–418. (Comprehensive collection and critique of radiocarbon dates for region-wide sites).

Hofman, C.L., and M.L.P. Hoogland. 2011. Unravelling the multi-scale networks of mobility and exchange in the pre-colonial Circum-Caribbean. In *Communities in contact: Essays in archaeology, ethnohistory and ethnography of the Amerindian Circum-Caribbean*, ed. C.L. Hofman and A. van Duijvenbode, 15–43. Leiden: Sidestone Press. (Systematic examination of inter-island and continental exchange networks and their social implications).

Kepecs, S., L.A. Curet, and G. La Rosa Gorzo, eds. 2010. *Beyond the blockade: New currents in Cuban archaeology.* Tuscaloosa: The University of Alabama Press. (Select research results for Cuban prehistoric and historic archaeology).

Newsom, L.A., and E.S. Wing. 2004. *On land and sea: Native American uses of biological resources in the West Indies*. Tuscaloosa: University of Alabama Press. (Comprehensive review at the time of plant and animal prehistoric archeological remains at the regional level).

Oliver, J. 1998. *El centro ceremonial Caguana, Puerto Rico*, BAR international series 727. Oxford: British Archaeological Reports. (Detailed interpretation of the sociopolitical and religious structure of the multi-enclosure site of Caguana from the site's archaeological remains and rock art).

Righter, E., ed. 2002. *The Tutu archaeological village site: A multidisciplinary case study in human adaptation*. London: Routledge. (Example of interdisciplinary investigation of the Tutu site on St. Thomas, US Virgin Islands).

Stevens-Arroyo, A.M. 1988. *Cave of the Jagua: The mythological world of the Taínos*. Albuquerque: University of New Mexico Press. (Still a standard reconstruction of the religion of the Late Ceramic/proto-Historic Taíno groups).

Sued-Badillo, J., ed. 2003. *General history of the Caribbean. volume 1: Autochthonous societies*. New York: Palgrave Macmillan. (Collection of articles on archaeology and ethnohistory of the region).

Versteeg, A.H., and K. Schinkel. 1992. *The archaeology of St. Eustatius: The golden rock site*. Publication of the St. Eustatius Historical Foundation, No. 2. (Example of interdisciplinary investigation of the site in Lesser Antilles).

Walker, J.B. 1993. Stone collars, elbow stones, and three pointers, and the nature of Taíno ritual and myth. Unpublished PhD dissertation, Washington State University, Pullman. (An in-depth study of the descriptive, functional and iconographic nature of these three stone artifact types).

Wilson, S.M., and L. Kozuch. 2006. *The prehistory of Nevis, a small island in the Lesser Antilles*. New Haven: Yale University Press. (Example of island-focused investigation).

Journals

General

Biannual. *Proceedings of the Congress of the International Association for Caribbean Archaeology* (volumes 1–21, 1961–2005, CD in searchable PDF format; 2007 Jamaica Proceedings print version; 2009 to present digital formats). For copies contact: Gérard Richard, Treasurer, I.A.C.A. Office, Impasse Majoute, 97100 BASSE TERRE, Guadeloupe, France (French West Indies).

Journal of Caribbean Archaeology by the Florida Museum. n.d.. http://www.floridamuseum.ufl.edu/jca

Localized

Bilan Scientifique Régional (BSR). edited by Direction des Affaires Culturelles de la Guadeloupe (DAC), Service Régional de l'Archéologie (SRA), Guadeloupe Region (Guadeloupe, St. Bartholomew, French St. Martin). n.d.

Boletín del Museo del Hombre Dominicano from the Dominican Republic. n.d.

Cuba Arqueológica. Revista digital de Arqueología de Cuba y el Caribe. n.d. ISSN 1852-0723. www.cubaarqueologica.org

El Caribe Arqueológico from Cuba. n.d.

Websites with News, Articles, and Researcher Contact Information

http://blogs.uoregon.edu/iaca/
http://www.cubaarqueologica.org

Caribbean Rock Art

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Introduction

Rock art was being produced by some of the earliest groups moving into the Caribbean island arc from either or both Central and South American coastal regions. For this discussion the region includes the Bahamian archipelago, Cuba, Hispaniola (modern nations of Haiti and Dominican Republic), Jamaica, Puerto Rico, and the Virgin Islands of the northern Greater Antilles; the southern Lesser Antilles extends from Sombrero and Anguilla in the north to Grenada in the south, as well as the Venezuela offshore islands of Trinidad, Tobago, Aruba, Bonaire, and Curaçao (Hayward et al. 2009a: 3–6).

The prehistoric population history of the area is witness to major and minor in-migrating groups from nearby mainlands, a settling-in period to new island environmental and cultural settings, and the development of exchange networks and interaction spheres within the region along with maintenance of ties with continental populations. The period ends with the arrival ca. 1500 of the Spanish that within decades results in the depopulation and displacement of the Amerindians with their largely subsequent replacement by different European and African slave groups.

Irving Rouse's 1992 chronological framework for Caribbean prehistory remains a standard one, albeit in the updated version employed herein. Three broad periods are recognized: the Preceramic, Ceramic, and Contact or Early Historic. The Preceramic encompasses two subperiods, the Lithic and Archaic ages from 7500/4000 to 400/250 B.C., characterized by the manufacture of flaked and ground stone tools; organization into small, mobile, and independent groups; varied subsistence practices incorporating hunting of land animals, exploitation of marine and riverine resources and manipulation of plant foods, in addition to minor production of pottery (Hayward et al. 2009a: 6–9).

The Ceramic Period is likewise divided into two subperiods: Early, 400/250 B. C to A.D. 600, and Late, A.D. 600–1500. This period is marked by increased sociopolitical complexity, widespread adaption of ceramic production, full-time horticulture, permanent village settlements, and population growth. In the Greater Antilles, early tribal political organization transforms into simple and complex chiefdoms by European

Contact with at least a two-tiered division of societies into elites and commoners. The Late Ceramic indigenous groups in the Greater Antilles are the direct ancestors of the contact or historic-period Taíno groups that Europeans encountered and reported on, producing valuable material on native cultural and religious systems (Hayward et al. 2009a: 9–12). Similarly, European-authored descriptions of culturally diverse Lesser Antillean indigenous groups are also extant.

Definitions

The overwhelming majority of the rock art is of precontact date; limited production of images by native groups and African populations into the historic period is apparent at several locations in the Greater Antilles (Gutiérrez Calvache et al. 2014; Hayward et al. 2009b; López Belando 2009: 17).

The region's rock art takes three forms. Petroglyphs refer to carved, pecked, ground, or other agency-produced designs; pictographs (rock paintings) represent painted or drawn images; and rock sculptures. The first two categories are found on immovable or relatively stationary natural rock art surfaces, while the third class covers portable items such as small to large triangular-shaped artifacts and small freestanding statues. Historically, the portable stone objects have not been analyzed as rock art but instead are considered with artifact classes of similar manufacture or function. For instance, the freestanding stone statues of largely anthropomorphic design are examined in conjunction with those made of wood, perishable materials, or specially preserved human skeletal remains. Geoglyphs and large-scale rock arrangements remain unreported from the area prehistorically; small-scale layouts for say astronomical observations may have been undertaken (Hayward et al. 2009a: 2, 11).

Two salient features of Caribbean precontact rock art involve an emphasis on human-like facial and facial/body forms and a high degree of site variability. Image-makers appear to have chosen design elements, motifs, and arrangement styles from a common repertoire to create rock art for specific times, places, and activities (Hayward et al. 2012).

Survey and Documentation Status

Characterizations of images and sites are ongoing since systematic site surveys and documentation efforts for the area remain incomplete. Substantial areas of the larger islands of the Greater Antilles have not been examined, while the survey status for the Lesser Antilles varies widely from island to island. Sites continue to be located on a continuing basis. Recording of site data varies from simple mention in the literature or institutional database, to well-documented individual and multiple-site locations, and to site registries at different subregional geographical or administrative levels. No regional database has been elaborated (Roe 2009: 199–204).

Image Classification and Distributions

The images are generally classified according to variants of a fourfold typology – anthropomorphs, zoomorphs, geometric designs, and abstract motifs – with petroglyphs and pictographs normally grouped together for such considerations. The majority of anthropomorphs consist of simple to complex faces (Fig. 1a, b); less frequent are facial images accompanied by different body designs Fig. 2). Groupings of two to three pits or dashes are considered to represent human-like faces that can have no, partial or fully enclosing shapes (round, ovoid, heart-shaped). Complex faces involve the addition of varied internal and external design elements such as eyebrows, noses, ears, and rays above and below the face, as well as a range of headdresses including tabular, linear, crowns, and projections. Double or multiple encircled facial motifs are present, as are interconnected facial arrangements. Attached body motifs range from upper body outlines to different forms (rectangular, ovoid) with varied internal layouts of pits, dashes, and lines. Lineal, outlined, or digited arms, hands, legs, and feet are infrequently added to anthropomorphs, as are

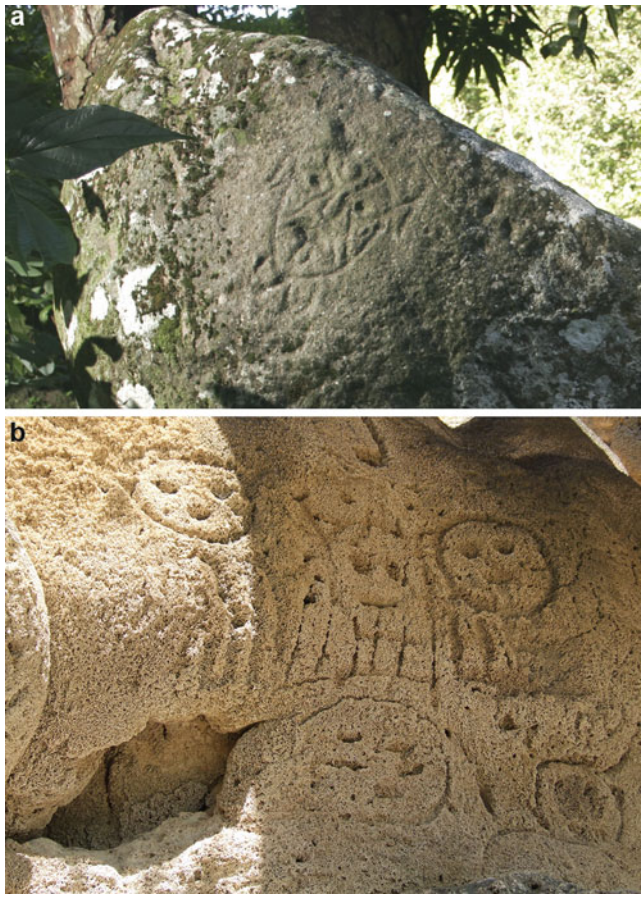

Caribbean Rock Art, Fig. 1 (**a**) Petroglyph of complex human-like facial image with rounded head and various internal and external elements inclucing eyes, mouth, nose, ears, and submedial projections. Du Plessis River, Saint Robert Commune de Baillif, Guadeloupe. (Courtesy of Gérard Richard 2011). (**b**) Series of simple human-like facial petroglyphs with rounded heads, eyes, and mouths. Las Caritas, Independencia, Dominican Republic. (Courtesy Glenis Tavarez María; photographer Renato Rimoli 2016)

gender indications. Handprints though executed are rare (Hayward et al. 2009b).

Readily identifiable zoomorphs include turtles, diverse birds and fishes, iguanas, bats, owls, spiders, and snakes (Fig. 3). They are often rendered realistically allowing for suggested specific taxa identifications. Spirals, crosses, and circles are among the geometric designs, while varied orders of curved and straight lines, pits, dashes, and other elements account for abstract or non-readily interpreted motifs to the modern Westerner (Fig. 4a, b; Hayward et al. 2009b).

Petroglyphs and pictographs were executed at four principal locations in the Caribbean: cave and rock shelter walls, ceilings, and speleothems; boulders along waterways or at other types of water resources such as pools and springs; rock formations at island interiors and coastal fringes; and ball courts/plazas or enclosures. The later represent level earthen surfaces bordered wholly or in part by earthen/rock embankments or upright slabs frequently with petroglyphs. They are interpreted as communal spaces for a range of intersecting activities from the sociopolitical to grand theater to religious. Image totals per site generally vary from one to the low hundreds for petroglyphs and up to the low thousands for pictographs (Roe 2009: 205, 207, 208–211).

Rock art spatial distributions are unequal. For example, petroglyphs and pictographs are found on all the major islands of the Greater Antilles and at all four principal locations where petroglyph sites outnumber pictograph ones except for Cuba. In contrast the larger Lesser Antillean islands tend to possess rock art, while the smaller ones do not. Petroglyphs are exclusive or nearly so throughout the Lesser Antilles, as well as the Greater Antillean Virgin Islands, with pictographs heavily predominating on Aruba, Bonaire, and Curaçao. Rock art outside of the Greater Antilles

Caribbean Rock Art, Fig. 2 Series of anthropomorphic petroglyphs illustrating simple faces and a simple face/lineal body form (center). La Piedra Letrada, Constanza, Dominican Republic. (Courtesy Glenis Tavarez María; photographer Odalis Rosado 2016)

Caribbean Rock Art, Fig. 3 Series of birds-in-profile and spider pictographs. Ferrocarril Cave, Parque Nacional Los Haitises, Dominican Republic. (Courtesy Glenis Tavarez María; photographer Divaldo Gutiérrez 2013)

occurs at only three of the four principal locations since rock/earthen lined enclosures have not been reliably reported from this region (Roe 2009: 200–205, 209, 211–213).

Dating

Chronological control of the region's rock art primarily rests on cross-datable associations with at-site materials, nearby archeological sites, and similarly rendered assemblages. A minor number of directly dated images from pictograph components, along with several proposed single to multiple island sequences, complement available data sources. Although this database is limited, certain statements concerning Caribbean rock art development are apparent: (1) rock art can be grouped into Preceramic, Ceramic, and Historic traditions; (2) the Ceramic is the principal period of production; (3) production may be discontinuous in several areas of the Lesser and Greater Antilles with an absence or time-lag suggested during most of the Early Ceramic; (4) particular rock art design and distributional patterns may well relate to sociopolitical and religious spatiotemporal trends; and (5) an increase over time is apparent in overall size, design element complexity, and compositional arrangements (Roe 2009; Hayward et al. 2014).

Interpretation

Researchers normally rely on three data sources to propose the meaning and functions of prehistoric Caribbean rock art: ethnohistoric narratives of native lifeways at or near the contact period,

Caribbean Rock Art, Fig. 4 (**a**) Spiral petroglyph. Anamuyita Site in Altagracia Province, Dominican Republic. (Courtesy Glenis Tavarez María; photographer Odalis Rosado 2009). (**b**) Abstract ordering of lines and pits petroglyph. Anamuyita Site in Altagracia Province, Dominican Republic. (Courtesy Glenis Tavarez María; photographer Odalis Rosado 2013)

ethnographic analogies from the culturally related lowland South American indigenous groups, and theoretical frameworks including structuralism, cognitive archaeology, and agency theory. The first two sources provide the foundation for the commonly viewed assumption that the rock art primarily functions in the religious realm where interpretations frequently tie images to particular reconstructed myth themes and personages, as well as general cosmological and religious principles. Alternative nonreligious or intersecting religious/other cultural subsystem functions have been advanced concerning use as territorial markers, as aides in astronomical observations, and as visual referents messaging political elite control or co-control with religious leaders over the supernatural world and forces.

Interpretive efforts encompass a single to few figures, the same category of images found in different locations, all the petroglyphs or pictographs at a single site or similar ones, and the region's rock art in general. The following two examples include an argument for the function of rock art in general and the interpretation of the Mural de Zamas petroglyph assemblage as representing the daily celestial round.

Drawing upon a structuralist approach, as well as ethnohistoric and ethnographic accounts, Petitjean Roget (2011) contends that the regulation of mythic or actual weather extremes is the general purpose of rock art. The location of the images determines which extremes are involved. South American oral traditions make mention of drought and floods, "burnt and drowned worlds," respectively. Petroglyphs found near water sources would be seen as guardians that protect humans from too much water (floods) and too little (droughts) water, droughts, a consideration of importance to precontact horticultural groups in the region. Ethnohistoric sources indicate caves

were sacred or symbolic places of contact between the tri-parte cosmos of the present earthly plane, the spirit-filled sky, and the underworld. They also had womb-like or life-giving connotations. Rock art located at the entrances would therefore be a focal point of multiple opposites including the male and dry exterior versus the feminine and humid interior. Petroglyphs at enclosures denote a boundary between the interior sacred space of the ball court/plaza and the surrounding profane village area. Images at island coastal zones separate the dry world of the earth from the wet world of the sea. One recorded myth, for instance, describes the sea being created by a deluge of water from a gourd; in this case the rock art guards against a repeat of waters that in the mythic past swamped the island world.

The Mural de Zamas rock art site is located in the mountains of west-central Puerto Rico, with some 49 petroglyphs carved into the rock shelter's opening. Key to Roe's (one of the authors) (2017) interpretation of the assemblage as a microcosmic representation of the macrocosmic diurnal-nocturnal cycle is the identification of certain images associated with day and night, as well as their relative positioning (Fig. 5). Amid an eastern grouping of largely simple to complex human-like faces indicated by roundish heads/pits or dashes for eyes/additional attached design elements (head projections, ears, and rays) are two completely rayed facial motifs and an encircled-eyed face with two pointy head projections. Roe considers the rayed images to represent sun symbols, a reasonable assumption for modern Westerners, yet he adds that various South American natives also configure the sun as a circle with radially arranged rayed eminences. The pointy head Roe identifies as the Puerto Rican screech owl, which normally calls at dawn. The middle grouping contains another sun image this time with six rounded internal-dot projections surrounding the pitted eye and enclosed mouth divided face. Two large complex faces with ears and elongated head crowns, along with two smaller similarly rendered faces, complete the grouping. A number of simple to complex faces make up the western grouping in addition to night-associated images of a coiled snake (Puerto Rican boas wait in trees at bat locations), prominent rays encircling a very small face suggesting a possible star, two snout-like faces with small mouths and

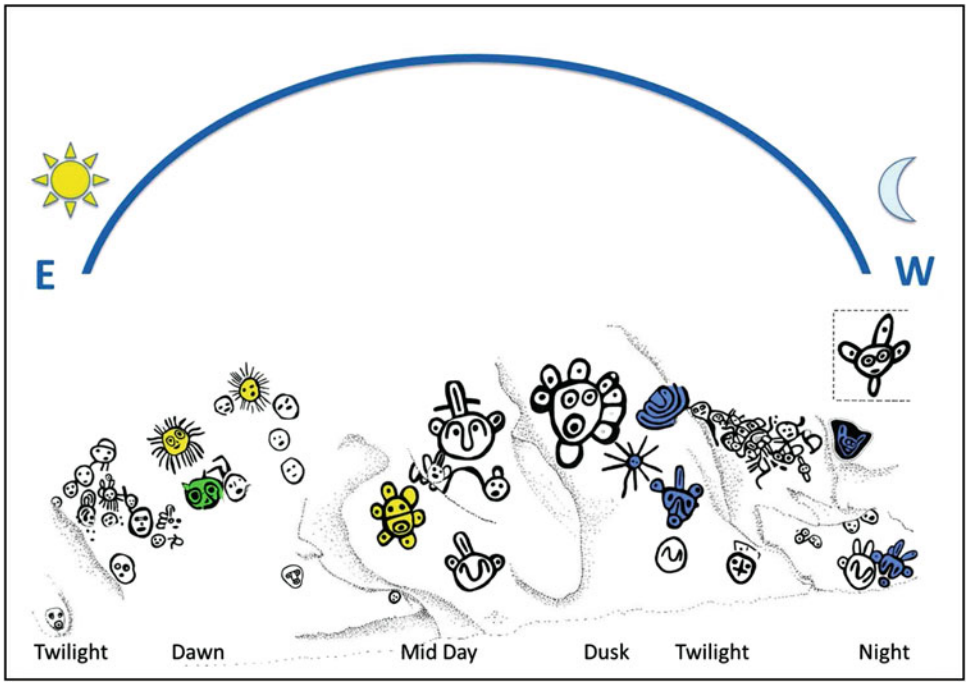

Caribbean Rock Art, Fig. 5 Proposed depiction of the daily celestial cycle with certain petroglyphs representing the day to night transition, Mural de Zamas, Puerto Rico (Hernández Llanes et al. 2017: Fig. 27)

ear/head projections that resemble island nighttime insectivores, and finally a probable bat motif with encircled eyes and prominent ears that rise above the head on either side. Roe argues that rock art assemblages should be considered in their entirety, as intersecting parts of a whole. At Mural de Zamas therefore the images can be seen as more than a disjoined collection of images; they form a narrative of the easterly daily sun rising and midday passage followed by its setting in the west and replacement by night.

Prehistoric rock art even continues to play a role in the religious practices, as well as the identity and economics of the region's present societies. Researchers have noted the incorporation of certain rock art sites and images as places and objects of devotion or as part of a yearly pilgrimage round, for instance in the Dominican Republic, for instance. Investigators have also explored the use of petroglyphs and pictographs to symbolically reinforce the commonly promoted tripartite native Amerindian alongside European- and African-derived cultural contributions to the modern populations of Puerto Rico and the Dominican Republic. The use of rock art motifs in public monuments, local handicrafts, and fine art is noteworthy in various locations in the Caribbean.

Cross-References

- ▶ North American Rock Art
- ▶ Rock Art, forms of
- ▶ Rock Art, Semiotics and Meaning of
- ▶ South American Rock Art

References

Gutiérrez Calvache, D., J.B. Gonzaléz Tendero, and R. Fernández Ortega. 2014. Arte rupestre africano en las cuevas de Cuba. La necesidad de un cambio en las herramientas metodológicas. Available at: http://www.rupestreweb.info/arterupestreafricano.html. Accessed 29 June 2017.

Hayward, M.H., Lesley-Gail Atkinson, and M.A. Cinquino. 2009a. Introduction. In *Rock art of the Caribbean*, ed. M.-H. Hayward, Lesley-Gail Atkinson, and M.A. Cinquino, 1–12. Tuscaloosa: The University of Alabama Press.

Hayward, M.H., Lesley-Gail Atkinson, and M.A. Cinquino, eds. 2009b. *Rock art of the Caribbean*. Tuscaloosa: The University of Alabama Press.

Hayward, M.H., M.A. Cinquino, and F. J. Schieppati. 2012. The nature of Caribbean rock art. Paper presented at the International Congress of Archaeology and Rock Art, 25 Years, SIARB, La Paz, Bolivia, 25–29 June 2012.

Hayward, M.H., F.J. Schieppati, and M.A. Cinquino. 2014. Examining the dating of rock art in Puerto Rico. In *Archéologie Caraïbe*, Taboui No. 2, Collection D' Archéologie Caraïbe, ed. B. Bérard and C. Losier, 279–302. Leiden: Sidestone Press.

Hernández Llanes, I., P.G. Roe, and S. Driver. 2017. Icon of a Nation: The Mural de Zamas Petroglyphs, Puerto Rico. *Proceedings of the Congress of the International Association for Caribbean Archaeology* 26: 1–42. Saint Martin and Anguilla. [CD version only; authors' pagination].

López Belando, A. 2009. El arte rupestre en el parque nacional los Haitises. Available at: http://www.rupestreweb.info/haitises2.html. Accessed 12 July 2017.

Petitjean-Roget, H. 2011. Contribution à l'étude de l'art rupestre des Antilles. Vers une tentative d'identification des représentations gravées. *Proceedings of the Congress of the International Association for Caribbean Archaeology* 23: 474–490. Antigua. [CD version only].

Roe, P.G. 2009. The mute stones speak: The past, present, and future of Caribbean rock art research. In *Rock art of the Caribbean*, ed. M.H. Hayward, Lesley-Gail Atkinson, and M.A. Cinquino, 198–239. Tuscaloosa: The University of Alabama Press.

Further Readings and Sources

Published Books

Dubelaar, C.N. 1995. *The petroglyphs of the lesser Antilles, the Virgin Islands and Trinidad*. Amsterdam: Publications of the Foundation for Scientific Research in the Caribbean, No. 135, Natuurwetenschappelijke Studiekring voor het Caraïbisch Gebied..

Haviser, J.B., and M. Strecker. 2006. Rock art of Latin America and the Caribbean. Zone 2, Caribbean Area and North-Coastal South America. In *ICOMOS (International Council on Monuments and Sites) Rock Art of Latin America,* 43–83. Paris: World Heritage Convention.

UNESCO. 2008. In *Rock art in the Caribbean: Towards a serial transnational nomination to the UNESCO World Heritage list*, World Heritage Papers, ed. N. Sanz, vol. 24. Paris: UNESCO.

Journals with Rock Art Articles

Primary

Biannual. 1961. *Proceedings of the Congress of the International Association for Caribbean Archaeology* (volumes 1–21, 1961–2005, CD in searchable PDF format; 2007 Jamaica Proceedings print version; post

2007 in digital formats). For copies contact: Gérard Richard, Treasurer, I.A.C.A. Office, Impasse Majoute, 97100 BASSE TERRE, Guadeloupe, France (French West Indies).

Localized

Boletín del Museo del Hombre Dominicano from the Dominican Republic. n.d.

Cuba Arqueológica n.d.. Revista digital de Arqueología de Cuba y el Caribe. ISSN 1852-0723. www.cubaarqueologica.org

Direction des Affaires Culturelles de la Guadeloupe (DAC). n.d. *Bilan Scientifique Régional (BSR)*. Service Régional de l'Archéologie (SRA), Guadeloupe Region (Guadeloupe, St. Bartholomew, French St. Martin).

El Caribe Arqueológico from Cuba. n.d.

Websites with Articles and Researcher Contact Information

Gutiérrez Calvache, D. 2014. Catastro Nacional del Arte Rupestre Cubano (National Registry of Cuban Rock Art). http://www.cubaarqueologica.org/document/gciar_catastro.pdf. Accessed 19 July 2017.

Gutiérrez Calvache, D., E. Jaimez Salgado, and J.B. González Tendero. 2010a. Fundamentos teóricos y methodológicos para el mapa del arte rupestre Cubano. Comentarios generales. *Cuba Arqueológica* 3 (1): 14–29. [On-line Journal]. http://www.cubaarqueologica.org. Accessed 20 July 2017.

Gutiérrez Calvache, D., R. Fernández Ortega, and J.B. González Tendero. 2010b. El arte rupestre Cubano. Estadisticas fundamentales, caracteristicas y distribution. http://www.rupestreweb.info/artecubano.html. Accessed 20 July 2017.

http://www.cubaarqueologica.org. n.d.

http://www.rupestreweb.info. n.d.

On-line available map of Cuban rock art sites with companion site registry. n.d.

Carman, John

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Basic Biographical Information

Dr. John Carman, known best for his work with historic battlefields, is among the prominent researchers who have focused on the notion of "value" within the context of heritage studies. Coming to heritage studies via archaeology and an early career in management, his earliest work explored value with particular references to English law (Carman 1996). In addition to his work with historic battlefields, he has a wide-ranging set of research interests within heritage which include public interpretation, the public, and ownership, and which are all anchored by his interest in value. This work has resulted in an extensive list of publications and his journal articles are to be found in subject areas including conflict studies, public archaeology, and museum studies.

John Carman's early training as an archaeologist began at the University of London and later continued his academic training in the Department of Archaeology, Cambridge University, where he received an M.Phil. (1989) and Ph.D. (1993) in heritage studies. Since then, his interest in value has been married to practical and theoretical explorations in public interpretation, commemoration, and the marking of heritage sites. These interests have been refined into a long-term investigation of landscape of battlefields. His *Bloody Meadow*s project undertaken with Patricia Carman (Carman and Carman 2006) represents more than a decade of focused research into the heritage of battlefields and explores these landscapes as heritage objects. Since 2005, he has held the post of University Fellow and Senior Lecturer in Heritage Valuation in the Institute of Archaeology and Antiquity, Birmingham University.

John Carman's career and his scholarship in heritage parallels the development of "Heritage Studies" as a distinct area of study within the humanities. Heritage Studies in the late 1980s and early 1990s was in a new field when John Carman graduated in 1989 as one of the earlier graduates of a dedicated Master's-level program in Heritage Studies within the Department of Archaeology at Cambridge University. After completing his Ph.D., he continued at Cambridge as a lecturer until he left for Birmingham University in 2005. Part of a small heritage-focused faculty at Cambridge, he was among the shaping influences in the development of the M.Phil. in Archaeological Heritage and Museums at

Cambridge University from a small program with a few dedicated students to a developed and dedicated cohort of Masters and Ph.D. students which has created a distinct group of heritage scholars in Europe, Africa, United Kingdom, and North America.

Major Accomplishments

During his tenure at Cambridge, the foundation for his current work was laid and his early explorations of the notion of value built on the foundational work by scholars such as Timothy Darville. His focus on value came at a time when many of the definitions and understandings of the notion of "heritage" and the approaches to cultural heritage management first were being explored. His dissertation published in 1996, *Valuing Ancient Things: Archaeology and Law* (Leicester University Press), was the beginning of important work in defining and interrogating how value is created with respect to heritage. Later work exploring cultural property and what he refers to as the "silent discourse" of ownership of heritage (Carman 2005) is a refinement of his earliest research interests and continues to be developed within the context of conflict studies, public interpretation, and in memory studies.

He was an early advocate for the recognition of heritage studies as a distinct field. His 2002 publication *Archaeology and Heritage: An Introduction* (Routledge) was in response to the critical lack at the time of an introductory volume/text for beginning scholars in archaeology, heritage, and museum studies. Moreover, like much of his work, the volume was notable for its interdisciplinary approach to heritage, acknowledging the essential and important relationship between archaeology and heritage, yet also recognizing the distinct qualities of these two means of investigating "the past." The 2009 volume, *Heritage Studies Methods and Approaches* (coedited with Marie Louise Stig Sørensen, Routledge 2009), which arose out of a conference organized by co-organized by John Carman, Marie Louis Sørensen, and their heritage graduate students, typifies his continuing concerns with developing a body of method and theories tailored to and evolving out of research within heritage studies.

A strong proponent of ensuring a continuing dialogue within the field, he has participated in and convened conferences, symposia, and research groups at the local, national, and international levels. Many of these are centered upon the exploration of historic battlefields as objects of heritage. Anchored by his interrogation of how heritage value arises and is assigned – and lately the ideas of ownership and property – he has pursued his wide-ranging research interests in historic battlefields, memory, public archaeology, and the notion of "the public" and museums in international contexts.

Cross-References

► Cultural Heritage and Communities
► Heritage Theory

References

Carman, J. 1996. *Valuing ancient things: Archaeology and law*. Leicester: Leicester University Press.
Carman, J. 2002. *Archaeology and heritage: An introduction*. London: Continuum Press.
Carman, J. 2005. *Against cultural property: Archaeology, heritage and ownership*. Duckworth: Debates in Archaeology.
Carman, J., and P. Carman. 2006. *Bloody meadows: Investigating cultural landscapes of battle*. Thrupp/Stroud: Sutton Publishing.
Sørensen, M.L.S., and J. Carman, eds. 2009. *Heritage studies: Methods and approaches*. London: Routledge.

Further Reading

Cooper, M.A., A. Firth, J. Carman, and D. Wheatley, eds. 1995. *Managing archaeology*. London: Routledge.
Skeates, R., C. McDavid, and J. Carman, eds. 2012. *The Oxford handbook of public archaeology*. Oxford: Oxford University Press.
White, R.H., and J. Carman, eds. 2007. *World heritage: Global challenges, local solutions. Proceedings of a conference at the Ironbridge Institute, May 2006* (BAR 1698) Oxford: Archaeopress.

Cartajena, Isabel

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Basic Biographical Information

Isabel Cartajena was born in Santiago de Chile in 1965. With a Chilean father and a German mother, she grew up in traditional environment together with his youngest brother. During her youth, she spent short stages in Germany where she could learn about both worlds. Her first link with Archaeology was in her teens during a family trip to Eastern Island where she saw an open-air like museum. Fascinated with the landscape as well as the culture later she would spend several summer periods in the Island.

She firstly was enrolled in Oceanography – claiming that Chile's future was linked to the ocean, however during 1986 she was accepted in the Archaeology program at the University of Chile. As part of the student curricula, she made her practical fieldwork at the Atacama Dessert. Since then, most of her professional career has been linked to the desert.

Today, Isabel is an Assistant Professor at University of Chile, where she has been a faculty member of the Department of Anthropology since 1995. She has been involved in the Zooarchaeological research line in the Department during the last decade, which includes several courses as well as supervising thesis and practical lectures.

Since 1993, Isabel has been engaged in many multidisciplinary research projects together with Lautaro Núñez and Martin Grosjean. With the support of several competitive-based public funded grants, they have developed a long-term research area linking archaeology, geoarchaeology, and zooarchaeology in studying human occupation and paleoenvironments in the western slope of the Atacama Desert. She has participated bringing along her knowledge and experience in the study of animal bone remains that became a relevant indicator about human activities in this area. As a result of this collaboration, the group has published several book chapters and papers worldwide (Núñez et al. 2002, 2005, 2010, Grosjean et al. 2003, 2005).

Recently, she has been fascinated by underwater archaeology. The study of extinct animal remains in a drowned terrestrial site in the Central Chile Pacific coast opens a new research agenda for her.

Above all, Isabel manages to combine her academic and teaching activities with her family duties.

Major Accomplishments

Since her undergraduate studies, she has been working on South American camelids in the Loa Basin and Salar de Atacama region, northern Chile. With the support of national grants as well as from the National Geography Society, she contributed to a multidisciplinary team in several dimensions, especially in the analysis of animal bones and problems addressed to the camelids domestication in the Southern Andes.

With this background, Isabel was enrolled in the Doctoral Program at Freie Universität Berlin and obtained a DAAD scholarship granted by the German government. As part of her doctoral study, she spent 2 years in München at the Institut für Paleoanatomie, Domestikationsforschung und Geschichte der Tiermedizin from the Ludwig Maximilians Universität where she closely worked with Prof. Dr. A. von den Driesch, a world known specialist in Archaeozoology.

Back in Chile, Isabel returned to University of Chile. She is a dedicated teacher and has been recognized among the best scholars of the Archaeology program at University of Chile. She still works in Quebrada Tulán, at the south of the Atacama Basin (Núñez et al. 2006a, b), and is currently researching Early Holocene sites located in the Salar de Imilac and Punta Negra further south.

During 2012, she was the head of the organizing committee of the Second Latin-American Meeting of Zooarchaeology (II ELAZ) held at the University of Chile in Santiago.

Cross-References

- ▶ Andes: Prehistoric Period
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Hunter-Gatherers, Archaeology of

References

Grosjean, M., I. Cartajena, M.A. Geyh, and L. Núñez. 2003. From proxy data to paleoclimate interpretation: The mid-Holocene paradox of the Atacama Desert, northern Chile. *Palaeogeography, Palaeoclimatology, Palaeoecology* 194: 247–258.

Grosjean, M., L. Núñez, and I. Cartajena. 2005. Paleoindian occupation of the Atacama Desert, northern Chile. *Journal of Quaternary Science* 20: 643–653.

Núñez, L., M. Grosjean, and I. Cartajena. 2002. Human occupations and climate change in the Puna de Atacama, Chile. *Science* 298 (5594): 821–824.

Núñez, L., M. Grosjean, and I. Cartajena. 2005. *Ocupaciones humanas y paleoambientes en la Puna de Atacama*. San Pedro de Atacama: Universidad Católica del Norte Taraxacum.

Núñez, L., I. Cartajena, C. Carrasco, P. de Souza, and M. Grosjean. 2006a. Emergencia de comunidades pastoralistas formativas en el sureste de la puna de Atacama. *Estudios Atacameños* 32: 93–117.

Núñez, L., I. Cartajena, C. Carrasco, P. de Souza, and M. Grosjean. 2006b. El templete de Tulán: complejidad ritual durante el Formativo Temprano de la Puna de Atacama. *Latin American Antiquity* 17 (4): 445–473.

Núñez, L., M. Grosjean, and I. Cartajena. 2010. Sequential analysis of human occupation patterns and resource use in the Atacama Desert. *Chungara* 42 (2): 363–391.

Further Reading

Cartajena, I. 2009. Explorando la variabilidad morfométrica del conjunto de camélidos pequeñosdurante el Arcaico Tardío y el Formativo Temprano en quebrada Tulán, norte de Chile. *Revista del Museo de Antropología* 2: 199–212.

Cartajena, I., L. Núñez, and M. Grosjean. 2007. Camelid domestication in the western slope of the Puna de Atacama, northern Chile. *Anthropozoologica* 42 (2): 155–173.

Cartajena, I., P. López, and I. Martínez. 2010. New camelid (Artiodactyla: Camelidae) record from the late Pleistocene of Calama (second region, Chile): A morphological and morphometric discussion. *Revista Mexicana de Ciencias Geológicas* 27 (2): 1997–1212.

Cartajena, I., M. Núñez, and L. Núñez. 2010. Phoenicopteridae exploitation in the Salar de Atacama Basin (3.000–2.200 BP), northern Chile. In *Birds in archaeology*, Groningen Archaeological Studies, ed. W. Prummel, J.T. Zeiler, and D.C. Brinkhuizen, vol. 12, 103–115. Eelde: Barkhuis.

Cartajena, I., P. López, D. Carabias, C. Morales, and G. Vargas. 2011. Arqueología subacuática y tafonomía: Recientes avances en el estudio de sitios finipleistocénicos sumergidos en la costa pacífico de Chile central. *Antípoda* 13: 203–225.

von den Driesch, A., I. Cartajena, and H. Manhart. 2004. The late PPNB site of Ba'ja, Jordan: The faunal remains (1997 season). In *Central settlements in Neolithic Jordan*, Studies in Early Near Eastern Production, Subsistence and Environment, ed. H.D. Bienert, H.G.K. Gebel, and R. Neef, vol. 5, 271–288. Berlin: ex oriente.

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Basic Biographical Information

Howard Carter was a British archaeologist and Egyptologist. He came from a noble family who lived in London, in the district of Kensington. He was born on the 9th of May 1874, his father Samuel John Carter (1835–1892) was a very talented painter and illustrator, and his mother was Martha Joyce Sands (1837–1920).

He spent his childhood in his parents' hometown, Swaffham in Norfolk. Over there he learnt to paint with watercolors, but he never became as talented as his father. Close to his home stood Didlington Hall, the large property of the Amherst's, this family proudly owned a large

collection of Egyptian antiquities. Thanks to this collection, Carter developed a passion toward Egyptian antiquities, and the friendship with the Amherst's led him to join his first expedition to Egypt.

In 1891, a 17-year-old Carter was recommended by the baroness Mary Cecil to Percy Newberry, a friend of the Amherst's, to depict burial paintings and artifacts in watercolors. The fundings for this expedition came from the Egypt Exploration Society (founded in 1882 under the name of Egypt Exploration Fund); the explorations lasted from 1890 to 1894. Once reached Cairo, Carter met Sir William Matthew Flinders Petrie, who recognized his talent and accepted him as a member of the expedition. Carter participated to the excavations of some important sites such as Beni Hasan, Hatnub, and Tell el-Amarna. Thanks to Flinders Petrie, Carter learnt the necessary techniques and procedures to conduct an accurate archaeological study.

From 1894 to 1899, Carter worked on the site of Deir el-Bahari, under the guide of the Swiss archaeologist Henri Édouard Naville. During this expedition, he studied the walls' bas-reliefs of Hatshepsut temple.

In 1899, when Carter was only 25 years old, he was nominated Chief Inspector of the Egyptian Antiquities Service, and he conducted important excavations in the Upper Egypt sites; among the others we can recall Karnak, Luxor, Thebes, Abu Simbel, and Aswan. The tombs of Pharaoh Seti I and Queen Nefertari, spouse of Ramesses II, were some of the most well-known sites that he worked on. During those years, Carter gained more and more knowledge, and he designed innovative techniques of excavation; he was also financed by the Supreme Council of Antiquities to conduct his own projects of excavation. As inspector for Upper Egypt, from 1902 to 1904 Carter worked in the name of Theodore M. Davis (1838–1915), who was a private sponsor for the Antiquity Service. Among the important discoveries of this period we can recall the Tomb of Pharaoh Thutmose IV, known as KV43, excavated in 1903 (See Carter, Newberry, Davis, 2001). In 1904, he was transferred to the Inspectorate of Lower Egypt.

In 1905 the so-called Affair of Saqqara had a negative impact on his career. A group of French tourists had an argument with Egyptian guards that turned into a violent fight. France pretended formal apologies from Carter in quality of supervisor but when the Egyptologist took the side of the guards by defending them, he was dismissed from his position and fired. Despite this unfortunate event, Carter decided to stay and to live in Egypt while making a living by selling his watercolors.

A few years later, a lucky coincidence led Carter back to his career as an archaeologist. In 1908, George Herbert, fifth count of Carnarvon, matured a strong passion for Egyptian antiques, and he went to Luxor with a permit to conduct excavations. He soon understood that he needed the help of an expert and asked Gaston Maspero, General Director of Egyptian Antiques, for advice. Maspero had nominated Carter Chief Inspector in 1899, and he didn't lose his admiration for him since, so he recommended him to Carnarvon. This was the beginning of 15 years of fruitful collaboration between Carter and Carnarvon; the latter financed several expeditions among which a relevant excavation in Thebes that brought a large number of pieces to his collection.

Carter's dream became true when during the excavations in the Valley of Kings, he discovered the tombs of two pharaohs of the XVIII dynasty: Akhenaten (Amenhotep IV) and Tutankhamun. The discovery of the tomb of Tutankhamun, known as KV62, in 1922 made both Howard Carter and Carnarvon famous to the world, and it is still considered one of the most sensational archaeological discovery of all times also thanks to the false rumors about the "curse of the pharaohs."

During 1924 Carter toured America to explain the details of his sensational discovery (Fig. 1) and until 1932 he dedicated his time to the study and cataloging of thousands of artifacts founded in Tutankhamun's tomb (Fig. 2); nowadays we can admire those findings at the Museum of Egyptian Antiquities in Cairo. Shortly after Carter stopped working as an archaeologist and became agent and collaborator of collectors and

museums, such as Cleveland Museum of Art and Detroit Institute of Arts.

He went back to his hometown, Kensington, and he died on the 2nd of March 1939 due to a lymphoma when he was 64 years old. He was buried at the Putney Vale Cemetery; on his tombstone there is a commemorative epitaph. The main source for the biographical information about Howard Carter here presented have been the work conducted by the english journalist Harry Victor Frederick Winstone (1926–2010), who collected a conspicuous amount of material related to Carter's life and especially the Tutankhamun's tomb discovery (see Winstone 1991).

Carter, Howard, Fig. 1 Howard Carter at the Library of Congress, Washington, 8 May 1924. National Photo Company Collection

Major Accomplishments

Carter's most important discovery has been, with no doubt, that of the tomb of the Pharaoh Tutankhamun. When Carnarvon and Carter decided to start the excavation in the Valley of Kings, the works had been under the direction of Theodore Davis since 1902. Lord Carnarvon easily obtained the excavation permit in 1914, but because of the First World War, the works could start just in 1917.

After several years of digging, the results were still very poor; just artifacts of minor importance were found. Because of the expenses, Carnarvon was about to declare the expedition concluded in the summer of 1922, but Carter was so sure that he could find the tomb of the pharaoh that Carnarvon extended the works for one more season. The systematic methodology applied by Carter implied

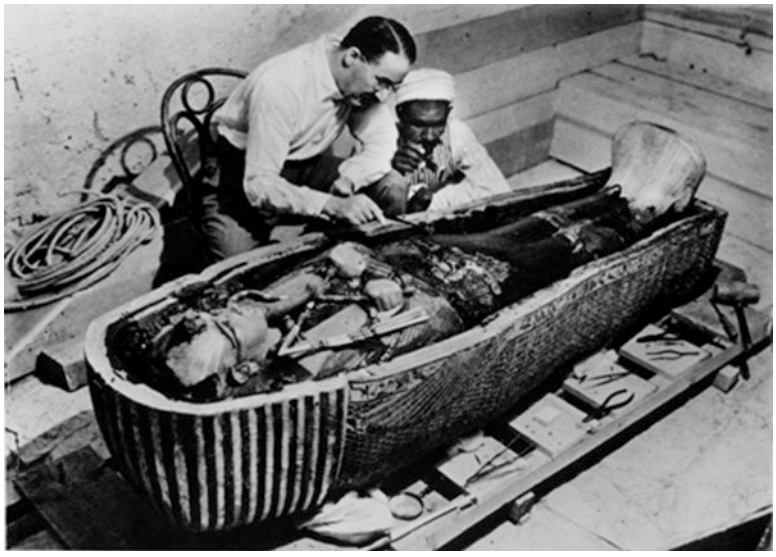

Carter, Howard, Fig. 2 Howard Carter working on the Tutankhamun's sarcophagus. Photo from The New York Times, 1922

to proceed sector by sector and the tomb was finally discovered in the very last section to be explored.

The excavations started again on the 3rd of November 1922; after a couple of days Carter found the entrance to a staircase that led downward, and nobody had walked on those steps since it was closed. Lord Carnarvon, who was in England at that time, was immediately called back to Egypt to see the opening of the tomb. He arrived in Alessandria on the 20th of November and on the 26th the tombstone was finally removed to open the tomb.

Carter didn't know yet that was Tutankhamun's tomb, but he understood that it was a magnificent discovery when he and Carnarvon saw the rich grave goods for the first time. The sarcophagus of Tutankhamun was not immediately opened, it was in fact handled in two stages, a year apart from the other. Unfortunately Lord Carnarvon died on the 5th of April 1923 and he couldn't assist to the opening; he died of sepsis and pneumonia caused by the infection of a mosquito bite that Carnarvon distractedly cut while he was shaving himself. His sudden death gave voice even on newspapers to rumors about the pharaoh's curse.

The discovery of Tutankhamun's tomb had a huge echo even because of those rumors and Carter became quite popular despite the lack of official information at that time; even nowadays many authors are inspired by those stories to write romances and mystery tales about the young pharaoh.

Cross-References

► Archaeology of Ancient Egypt
► Petrie, William Matthew Flinders

References

Carter, H., and Mace, A.C. 1923. *Tomb of Tutankhamen 1923*. Kessinger Publishing, 2003.

Carter H., and Mace, A.C. 2010. *The tomb of Tut-Ankh-Amen: Discovered by the Late Earl of Carnarvon and Howard Carter*, 3 vol. Cambridge: Cambridge University Press.

Carter, H., Newberry, P.E., and Davis, T.M. 1904. *The tomb of Thoutmosis IV with an essay on the king's life and monuments by Gaston Maspero, and a paper on the physical characters of the mummy of Thoutmosis IV by G. Elliot Smith*. London: Duckwoth, 2001.

Winstone, H.V.F. 1991. Howard Carter and the discovery of the tomb of Tutankhamun. London: Constable.

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Further Reading

Taylor, J.H. 1993. In *Howard Carter: Before Tutankhamun*, ed. H.N. Abrams. Bloomington: Indiana University.

James, T.G.H. 2001. *Howard Carter: The path to Tutankhamun*. Londra: Tauris Parke.

Castro Rojas, Victoria

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María Victoria Castro Rojas, her full name, began her academic career in 1969 as an archeological assistant in the Universidad de Chile's Anthropology Department. Her outstanding teaching skills developed from a profound vocation for archeology and were greatly enriched by her previous training as a philosophy instructor (1978, Universidad de Chile). Not long after obtaining that first position, she was promoted to instructor with the same Anthropology Department. In 1981 she graduated with a bachelor's degree in philosophy with a minor in prehistory and archaeology from the Universidad de Chile and then in 1982 was granted the professional title of Archaeologist. In 1998 she obtained her master's degree in ethnohistory from the University of Chile, producing a groundbreaking final dissertation on evangelization and Andean religion in the Southern Andes. In 2007, Castro Rojas was appointed professor emeritus at the University of Chile. She is currently a full professor at the Universidad de

Chile and the Universidad Alberto Hurtado in Santiago, Chile, and regularly lectures in other universities in and out of the country.

With more than 40 very active years of influential research and teaching, Castro Rojas has become a highly respected figure in Andean American archeology. Working with both Chilean and international experts (botanists, ecologists, marine biologists, and linguists), she has created and participated in numerous multidisciplinary projects that address emerging questions about the Andean history of Northern Chile's Atacama Desert. Castro Rojas' broad research interests range from early archaic societies to modern local communities. Her studies have focused on the social structures, ideology, and technologies of pre-Columbian and modern indigenous farming societies that have inhabited the Atacama Desert's valleys and oases in particular. She also has participated in the worldwide historical and theoretical discussion on the complex processes that shaped the cultural landscapes during the Inka State's expansion into the Atacama during the AD sixteenth century and its monumental legacy (Castro 2018).

Throughout her career, Professor Victoria Castro has demonstrated a deep concern for transferring knowledge to local communities and the general public and has encouraged community members to become active agents in defining and reconstructing their own ethnic identities and managing their cultural heritage. Both in writing and in person, she has tirelessly promoted Chile's pre-Hispanic past within the Latin American context at times when political, economic, educational, and cultural policies were informed by outdated views of this past. Few archeologists in the region have been as successful in bridging intellectual divides, including those imposed by discipline, geography, and time. We wish to focus precisely on that visionary practice, as it has enabled Castro Rojas to develop a rich approach that has shed new light not merely upon a particular locality or region but on the entire Andean world. In sum, we present an overview of the thematic versatility of her research interests and contributions.

Victoria Castro was one of the first Chilean archeologists to conduct research in what was later termed Andean history, a concept that has now been accepted by social scientific disciplines and the broader academic community (Hidalgo 2004). This approach maintains that the different peoples that first peopled and then inhabited the vast Andean environment shaped a rich, thousand-year-old cultural tradition marked by periods of intense political-religious cohesion and others of less integration (Castro et al. 2016). Victoria's educational background in history, philosophy, anthropology, and archeology and this confluence of approaches, disciplinary perspectives, and theoretical orientations enabled her to develop a uniquely American perspective on cultural processes, making her research a touchstone for the study of the indigenous past and present of the Andean America. In her work she has striven tirelessly to understand the lifeways of present-day communities in that zone – their beliefs and aspirations, their organization and local particularities, and their sense of belonging to the greater Andean world. In her own words:

> *My interest in studying the Andean world emerged for a host of reasons. Perhaps it came first from my long stretch in the field observing and living with the inhabitants of the Andean countryside during my first field assignment in northern Chile. Also influential were my lectures on the work of John Murra, and especially what I learned in our thought-provoking conversations. In that way I gradually began to develop an understanding of how Andean communities conceived of and lived in their world – it was a nonstop learning process that continued through my studies of Atacama highland communities that were originally undertaken to enhance my understanding of the archeological record*. (Castro 2009a:13)

John Murra's contributions were vital for understanding Andean perceptions and thinking. The radical paradigm shift that Murra proposed for the Andean World in the 1970s used new theoretical models to comprehend Andean social and political structures and cultural dynamics. Murra's (1970, 2002) model of sociocultural complementarity also highlighted the need to work with a variety of information sources, such as original colonial documents and ethnographic and archeological studies. This model presented

a powerful new view of the Andean World as a diverse, dynamic, and interconnected sphere with trade networks organized around decentralized sociopolitical centers grounded in harmonious pan-Andean relations. This view was explored, studied in depth, and applied to different regions by a variety of authors, encouraging the production of further knowledge that enriched archeological, ethnohistorical, and anthropological research (Salomon 1985; Platt 2010). Victoria Castro was among the Andean scholars who endorsed Murra's theoretical and methodological perspectives, which was publicly and privately recognized by the author. This created a deep and mutual intellectual relationship and personal friendship.

Victoria spent time with Murra on several occasions and the two carried on a rich correspondence (Castro 2009b). At one time he was invited to Zapallar on the central Chile coast, where she and Murra, along with Carlos Aldunate and Jorge Hidalgo, recorded a series of interviews with the renowned anthropologist that were later published as Nispa Ninchis (Castro et al. 2000) (Fig. 1). Years later, Victoria would attest to the strong support and unwavering commitment Murra gave to her (as well as other female scholars) at various stages of her intellectual and professional career when she wrote:

> *Murra solidified my holistic comprehension of the Andean world, and of history, and gave me the certainty that by combining the separate tactics of anthropology, archaeology, ethnohistory, and ethnography one could increase the enormous complexity of its unique cultural history.* (Lechtman et al. 2009: 77)

Victoria was the first in Chile to systematically employ an ethnoarcheological approach, in which stories and accounts collected from indigenous populations were used to interpret ancient material remains. It was a groundbreaking approach in the 1970s and 1980s, when Victoria and her team began to employ it in their fieldwork in the Norte Grande (Castro et al. 2013):

> *When I began working in the north, I realized that I couldn't divorce anthropology from archeology, as the people inspired me in my study of the past and what we studied of the past could have meaning for the future as well – that was the nexus. So I always engaged in ethnography, which is the study of traditional peoples. We worked with the interdisciplinary approach of ethnoarcheology, which is now in vogue but when we began was looked down upon.* (Castro 2015) (Fig. 2)

One of the first studies she participated undertook from this perspective focused on *chullpas*, towerlike stone structures, each with a portal halfway up the wall and often with an adobe or stone floor and base. These monumental burial towers are scattered around the Altiplano in Bolivia,

Castro Rojas, Victoria, Fig. 1 Launch of the book *Nispa Ninchis. Decimos Diciendo. Conversaciones con John Murra* at the Instituto de Estudios Peruanos (Lima, July 2000). From left to right Craig Morris†, Victoria Castro, John Murra†, Cecilia Blondet, and Carlos Iván Degregori†. (Photo courtesy of the Instituto de Estudios Andinos)

Castro Rojas, Victoria, Fig. 2 Victoria in Patillón-Toconce during fieldwork con Juana Copa (1975). (Photo courtesy of Departamento de Antropología, Universidad de Chile)

Peru, and Northern Chile. Early ethnohistoric testimonies from the Altiplano indicate that, at the time of contact with the Spanish, Aymara groups were using the towers that we now call *chullpas* as burial chambers for their dead. However, not all structures identified archeologically as *chullpas* are burial chambers; some of them served various other functions (as residences, silos, territorial markers, and offering sites). At the southernmost edge of the region, the function of Likán *chullpas* of Toconce, (Salado River in Northern Chile) dated to AD 850–1210, was addressed by Victoria Castro y Carlos Aldunate combining an ethnographic approach focused on the ritual practices associated with death in Toconce along with archeological and architectonic studies (Aldunate and Castro 1981; Aldunate et al. 1982). The investigators managed to establish significant relations between *chullpa* contexts and present-day chapels and other religious structures (Aldunate et al. 2003, 2016a). They concluded that the *chullpas* of Likan were used as shrines and that, in front of their portals facing the high "guardian" mountains that dominated the landscape, contemporary burning rituals formed part of a rich world of ideas stretching back to ancient times, as the archeological and ethnographic information obtained shows (Castro 2009c) (Fig. 3). The researchers delved deeper into the worship of mountains, using present-day ethnographic information from Toconce and nearby localities, as well as architectural records

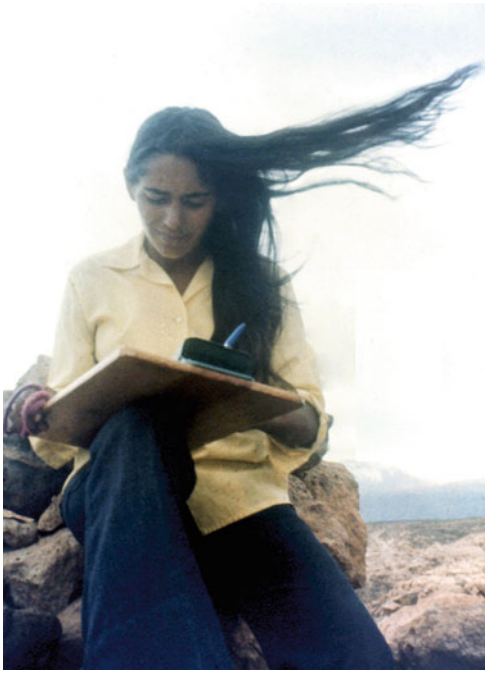

Castro Rojas, Victoria, Fig. 3 Victoria as student recording *chullpas* in Likán (1973). (Photo courtesy Carlos Carlos Urrejola)

of the portals and chapel entryways, which faced the principal summits in the surrounding landscape. They found that the natural and the supernatural were an indivisible unit, according to valuable testimonies that revealed a cosmovision in which humans and the natural world were linked by bonds of reciprocity (Aldunate et al.

2016b; Castro and Varela 2016). It has been shown that the ritual structures used by present-day locals throughout the region – such as chapel-cemeteries and ceremonial plazas – are oriented to these same summits. Through oral tradition the local inhabitants express their thanks, fears, and reverence for those guardian deities of the mountains, who provide humans with what they need for life reproduction (Martínez 1976, 2009; Bastien 1985). Her ethnoarcheological approach has been followed by several disciples (Varela 2002; Godoy 2010; Vega and Salazar 2010; Urrutia and Uribe 2015; Uribe et al. 2017).

In addition, Victoria introduced the study of ethnoscience or indigenous science, which entailed the recognition and eventual integration of the ancestral indigenous knowledge of contemporary communities (obtained through oral exchanges, observation of ceremonies, and definition of ethno categories) as a key to understanding the social and political structures, religion, ideologies, art, and technologies of the past. These approaches have relied upon pioneering interdisciplinary research as well as on long-term ethnographic studies, conducted in a cooperative, respectful relationship with traditional practitioners and knowledge holders.

Each society relates to its natural environment in a unique way, developing particular ways of knowing, managing, using, visualizing, and perceiving the natural world that differ from those used in Western science. On the other hand, following the classic subdivisions of the "natural sciences," the discipline of ethnoscience encompasses areas such as ethnobotany – focused on the plant world – and ethnozoology – concentrated on practices and representations inherent to the animal world – among many others:

> *I also began to see that, if I was studying a territory, I had to understand that territory. One of the things that was so important to the herders, for example, were the plants, and so we began doing ethnobotany. It was the same thing with animals, and so we worked with ethnozoology.* (Palma 2015)

Ethnobotany studies relations between human groups and the plant world: how plants are used and taken advantage of in different cultural spaces and times. Ethnozoology studies present and/or ancient relations between human groups and the fauna present in a given region, or a particular taxon of animals.

Indigenous groups have inherited a deep-rooted social tradition that dates back to hunter-gatherer times and is characterized by high altitudinal and longitudinal mobility among different ecosystems. Over time, most societies opted for an agropastoral, agromaritime, or agrolacustrine economy while maintaining hunting and gathering activities. It is not hardly surprising, therefore, that they have a deep understanding and knowledge of environments and resources, which is integrated into a cosmovision rooted in everyday experience (Castro and Romo 2008).

In consecutive studies conducted in Chile's Norte Grande, one of Castro Rojas' aims was to understand the ethno-classifications and uses of plants employed by different communities, in order to explore how different groups conceptualized landscapes (Romo et al. 1999; Villagrán and Castro 2004; Villagrán et al. 1998, 2003). The results produced a long thematic list of all recognized species with their vernacular and scientific names and the uses of these plants (Villagrán and Castro 2004). The names are mainly derived from the Spanish, Quechua, and Aymara languages. Several of the names recorded correspond to generic ethno-categories and to groups of related taxa, whether on the basis of morphological "kinship" or because they grow in a similar way. The local inhabitants recognize ethno-ecological units in which they have integrated the physiognomy of the vegetation, the altitudinal tiers, and the geomorphology into their belief system and their ecosystem management. Plant species are used for different purposes including forage, medicine, rituals, food, building materials, crafts, and others. Among the Andean peoples of northern Chile, the botanical vegetation units and ecological ethno-categories are analogous; indigenous categories also are part of their taxonomy of ecological tiers that defines usage-based landscape units such as "*campo,*" "*cerro,*" and "*chacra*" (countryside, mountainside, and garden, respectively) (Villagrán et al. 1998, 2003).

Because the descendants of the original Andean peoples view food plants in cosmological

terms, they must make offerings to demonstrate their respect and faith. Thus, in highland communities of the upper Salado River valley in northern Chile, the ceremonial calendar of economic activities uses potatoes explicitly as an offering and a food (Castro 2008).

For its part, knowledge of fauna in the Andean world is intimately linked with all levels of the landscape, with animals seen as other members of the environment, perceived in terms of the places they inhabit, the food they consume, and the practical benefits they bring to humans. Furthermore, underlying any "Andean" classification of environmental elements is a cosmological or natural order in which all elements have a "master," whether human, divine, or ancestral (Castro 1986; Castro and Romo 2008; Castro et al. 2014; Castro and Rottmann 2016).

Wildlife is a source of profound, detailed observation, and when they journey to their pasturelands, Andean herders are continuously noticing animal tracks and other signs on the ground and scrutinizing the skies and the horizon in search of the animals and birds that move through it. Animals are distinguished by their many attributes, including the habitat in which they live – whether a ravine, upland meadow, mountain, or pampa. Their morphology is also crucial for their identification; shape and coloring are decisively important, along with the animal's sounds and songs and the shape and location of their tracks and feces. They are also distinguished by their behaviors and habits, such as the time certain animals "come out" (their diurnal or nocturnal habits), the time of year they "arrive" (seasonal), or if they are there year-round, among other habits. Lastly, the relation between animals and humans is also important. Those that provide food or medicine and those that have a role in rituals or *pagos* (offerings) are viewed positively, while those that bite or sting or harm humans or their livelihoods (by preying on livestock or destroying gardens, or by being perceived of as "evil beings") are seen in a negative light (Romo 2001). Using the aforementioned elements, different species are identified by informal comparison, based on the local people's knowledge of Andean fauna (Castro and Romo 2008).

A major distinction is made between domestic and wild animals, the former being those that are owned and taken care of by humans and the latter those that live freely on the land and have no masters. In the remote past, mountain spirits (*mallku*) possessed all of the animals, and then the *mallku* gave some animals – namely, the llama and alpaca – to humans, "on permanent loan" for humans to domesticate. But the *mallku* reserved the right to take back, borrow, or provoke illness or death in the animals if the humans treated them poorly or failed to strictly perform the rites required to ensure their fertility and wellbeing. Thus, in the Andean world, the owners of livestock must perform *vilanchas* (offerings and sacrifices) to the mountain spirits. The *mallku* also have their own herds, but they are comprised of wild animals that only these deities can control (Castro 1986; Castro and Romo 2008). This arrangement helps maintain the unstable balance of forces through offerings between those who "own" the different elements, thereby upholding relations of reciprocity.

In addition to the insights described above, Victoria pioneered the study of topics related to the extirpation of idolatry in Chile's Andean region (Castro 1993, 2009a). She managed to gain access to an unpublished document dated to 1677 and housed in the Archive of Seville, corresponding to a *Probanza de Méritos* (Proof of Meritorious Deeds) penned by the priest Francisco de Otal, an extirpator of idolatry in "Atacama la Baja" (Lower Atacama) (Castro 2009a). It is one of the first documents on record that addresses the extirpation of idolatry in the Atacama region (Northern Chile) and allows to see the violent impact of that process in the localities of Chiuchiu, Caspana, Lasana, and Ayquina in the province of Loa.

One must recall that in the context of the Spanish conquest and the evangelization of the New World, conversion to Christianity and education in the Christian faith were promoted and supported by the Spanish crown. In addition to building churches to celebrate mass and perform religious education, a policy of destroying so-called "pagan" monuments and places of worship was introduced and encouraged in order to

eliminate "pagan idolatry." A strong aversion to "demonology" and witchcraft was instilled by the Spaniards, who equated idol worship with witchcraft and therefore viewed indigenous religious practices – the adoration of *huacas*, idols, and ancestors – as devil worship. Those beliefs resulted in the forced evangelization of local indigenous populations and the violent extirpation of ancient vernacular ideologies.

The 1677 document is an important source of information about the indigenous peoples inhabiting the coast and seaports (Iquique, Puerto Loa, Cobija, and Colupo) and the inland towns and villages of the Atacama (Calama, Chiuchiu, Caspana, Ayquina, and San Pedro de Atacama) during the seventeenth century. Its descriptions of particular circumstances and individuals convey the relations between the local inhabitants, the holders of *encomiendas* (tribute labor grants), and the civil and ecclesiastical colonial authorities in the highlands. Especially significant is the identification of ancient deities of different indigenous communities, descriptions of the rites and ceremonies they practiced, and the burning of their "idols" (Sotar Condi, deity of Atacama; Sutar Quenti, the hummingbird; Quma Quma, idol of Chiuchiu; Socomba, idol of Ayquina; and Sintalasna, idol of Caspana) and offerings (llamas, *cuys*, coca leaves, and the fermented beverage *chicha*, among other items).

Indigenous peoples resisted the extirpation of their religious traditions clandestinely by using zoomorphic icons representing the fertility of the land and by undertaking prayer ceremonies held to obtain good harvests. Victoria conducted an in-depth investigation of the relation between documentary sources and archeological records to analyze the cults of the monkey, the lizard, and the hummingbird Sotar Condi and its relation with water and sowing (Núñez and Castro 2011). She thus opened up a space for theorizing about the configuration of *Sutar/Quenti*, the hummingbird as a principal deity that potentially spanned the Southern Andes during Inca times and perhaps earlier and was reaffirmed under Inca rule. This deity was associated with the West compass point, with mountains and with the place of the dead, and since colonial times it has been characterized as the bird that is "reborn." Ancient indigenous priests invoked this bird when they required a mediator with the gods. It is said that hummingbirds disappear in winter and then return in springtime, referring to a seasonal hibernation during the southern winter (July to September). According to some authors, hummingbirds were considered divine ambassadors in that season when the buds open and the plants begin to germinate in a great show of fertility (Castro 2004).

Victoria strives to record and analyze religious continuities and transformations in the region, comparing the idolatry described in colonial documents with information from oral accounts, ceremonies, and rituals of the ethnographic present – part of a history that has not been written down but has been kept alive and represents an invaluable resource for understanding Andean thought and daily life. Through her analyses, Victoria has developed a novel conception of the way in which present-day Andean religiosity, as practiced by the descendants of the ancient Atacameño people, fuses Christian elements with a vernacular matrix.

This mode of analysis epitomizes Victoria's holistic viewpoint, in which she uses ethnohistory, archeology, philosophy, and linguistics to trace continuities and transformations from prehistoric times to the present, mapping the ways in which the Andean religion was intertwined with processes of evangelization. In 2009, the Sociedad Chilena de Arqueología honored Victoria for her outstanding contributions to archeology in Chile and South America at the launch of her book *De Ídolos a Santos* at the XVIII Congreso Nacional de Arqueología Chilena (National Archaeology Congress of Chile).

Victoria's decades-long, exceedingly fruitful labor has enabled a qualitative leap in our knowledge of the oldest history of different regions in northern Chile, connecting that past with the present-day local communities. And that perspective has enabled archeology to illuminate this history based on interpretations of the material remains of the American peoples, which is of vital importance in places where no written accounts exist. Anthropology, ethnography, and ethnolinguistic shed light upon surviving aspects of vernacular culture in the lives of present-day

Andean populations, weaving the continuing history of the Andes (Castro et al. 2016). Without a doubt, Victoria's work has profoundly shaped the study of Chile's pre-Hispanic history; the periods of contact, conquest, rebellion, and domination; and the emergence of intercultural relations and new indigenous identities. Contemporary understandings of these complex processes have been deeply enriched by Victoria's diligent efforts, both in her own research projects and through her mentorship of many other scholars. In sum, with its fertile and prodigal intelligence, she has managed to develop innovatively the knowledge referred to the history of pre-Hispanic and indigenous peoples and has fought combatively to position these themes and identities in the academic and political cultural field both nationally and internationally. For this lifetime academic achievements, Victoria has received several national and international distinctions. For her lucidity and commitment to public education, she receives the Universidad de Chile Amanda Labarca 2014 Award, given to prominent women that have influenced in the development of the country. Recently she was nominated to be recipient of the Society for American Archaeology Award for Excellence in Latin American and Caribbean Archaeology 2018 for her significant contribution to archeology and to the construction of archeological knowledge in Latin America or the Caribbean.

Cross-References

- ▶ Andes: Origins and Development of Agriculture
- ▶ Andes: Prehistoric Period
- ▶ Archaeology and Politics
- ▶ Chile's World Archaeological Heritage and Its Management
- ▶ Cultural Heritage and Communities
- ▶ Ethnoarchaeology

References

Aldunate, C., and V. Castro. 1981. *Las Chullpas de Toconce y su relación con el poblamiento altiplánico en el Loa Superior.* Santiago: Ediciones Kultrún.

Aldunate, C., J. Berenguer, and V. Castro. 1982. La función de las chullpas en Likán. In *Actas del VIII Congreso de Arqueología de Chile*, 129–174. Santiago: Ediciones Kultrún.

Aldunate, C., V. Castro, and V. Varela. 2003. Oralidad y arqueología: una línea de trabajo en las tierras altas de la región de Antofagasta. *Chungara Revista de Antropología Chilena* 35 (2): 305–314.

Aldunate, C., J. Berenguer, and V. Castro. 2016a. La función de las chullpas en Likán. In *Etnoarqueologias andinas*, ed. V. Castro, C. Aldunate, and J. Berenguer, 75–122. Santiago: Ediciones de la Universidad Alberto Hurtado.

Aldunate, C., J. Berenguer, and V. Castro. 2016b. Orientación orográfica de las chullpas en Likán: la importancia de los cerros en la Fase Toconce. In *Etnoarqueologias andinas*, ed. V. Castro, C. Aldunate, and J. Berenguer, 159–202. Santiago: Ediciones de la Universidad Alberto Hurtado.

Castro, V. 1986. An approach to the Andean ethnozoology: Toconce. In *Cultural attitudes to animals including birds, fish and invertebrates*, ed. T. Ingold and M. Maltby, vol. 2, 1–17. London: Allen & Unwin.

Castro, V. 2004. El picaflor de la gente (Sotar Condi). *Ornitologia Neotropical* 15: 409–417.

Castro, V. 2008. La papa (*Solanum* sp.) contexto social e ideológico en sus zonas de desarrollo originarias. *Revista del Jardín Botánico Chagual* 6 (6): 33–43.

Castro, V. 2009a. *De ídolos a santos. Evangelización y religión andina en los Andes del sur.* Santiago: Fondo de Publicaciones Americanistas Universidad de Chile, Centro de Investigaciones Diego Barros Arana. Colección Antropología, Dirección de Bibliotecas, Archivos y Museos (DIBAM).

Castro, V. 2009b. John Victor Murra, maestro por generaciones (1916–2006). *XAMA* 19–23: 11–23.

Castro, V. 2009c. La oralidad y su importancia en la transmisión de técnicas y valores. In *Artesanos de arquitectura de tierra en América Latina y el Caribe. La técnica, la tradición oral y formas de transmisión del oficio*, 49–65. México: UNESCO.

Castro, V. 2015. The Qhapaq Ñan and its landscapes. In *The great Inka road. Engineering and empire*, ed. R. Matos and J. Barreiro, 15–20. Washington, DC: Smithsonian Institution. National Museum of the American Indian.

Castro, V., and M. Romo. 2008. Tradiciones culturales y biodiversidad. In *Biodiversidad de Chile. Patrimonio y desafíos*, 468–492. Santiago: Comisión Nacional del Medio Ambiente, Segunda Edición.

Castro, V., and J. Rottmann. 2016. Aspectos de la etnoornitología de la provincia de El Loa, norte de Chile. *Revista Chilena de Ornitología* 22 (1): 64–78.

Castro, V., and V. Varela. 2016. Así sabían contar. In *Etnoarqueologias Andinas*, ed. V. Castro, C. Aldunate, and J. Berenguer, 303–326. Santiago: Ediciones de la Universidad Alberto Hurtado.

Castro, V., C. Aldunate, and J. Hidalgo. 2000. *Nispa ninchis. Decimos diciendo. Conversaciones con John Murra*. Lima: Instituto de Estudios Peruanos.

Castro, V., C. Aldunate, and V. Varela. 2014a. Experiencias en etnoarqueología. In *Actas del taller internacional de arqueología del noroeste argentino y Andes centro sur,*

las tierras altas del área Centro Sur Andina, entre el 1000 y el 1600 d.C. II, ed. B. Cremonte and M.E. Albeck, 193–204. Jujuy: Universidad Nacional de Jujuy, Centro Regional de Estudios Arqueológicos.

Castro, V., F. Massardo, and J.T. Ibarra. 2014b. Introduction to ethnoornithology in the sub-antartic forest of South America. In *Magellanic sub antartic ornithology. First decade of long-term studies at the Omora Ethnobotanical Park, Cape Horn Biosphere Reserve, Chile*, ed. R. Rozzi and J. Jimenez, 321–322. Punta Arenas: University of North Texas, Ediciones Universidad de Magallanes.

Castro, V., C. Aldunate, and J. Berenguer. 2016. *Etnoarqueologías andinas*. Santiago: Ediciones de la Universidad Alberto Hurtado.

Godoy, M. 2010. Usos del Bosque Templado en la Cuenca del Valdivia. Una aproximación etnográfica y etnoarqueológica. In *Actas del XVII Congreso Nacional de Arqueología Chilena*, vol. 1, 505–514. Valdivia: Ediciones Kultrún, Sociedad Chilena de Arqueología, Universidad Austral de Chile.

Hidalgo, J. 2004. *Historia andina en Chile*. Santiago: Editorial Universitaria.

Lechtman, H., F.Y. Wolf De Romero, P. Netherly, A.M. Lorandi, V. Castro, R. Adorno, I.M. Harman, and S. Palomeque. 2009. John Victor Murra: A mentor to women. *Andean Past* 9: 65–85.

Martínez, G. 1976. El sistema de los Uywiris en Isluga. In *Homenaje al Dr. Gustavo Le Paige, s. j*, ed. H. Niemeyer, 258–305. Antofagasta: Universidad del Norte.

Martínez, G. 2009. Humor y sacralidad en el mundo autóctono andino. *Chungara Revista de Antropología Chilena* 41 (2): 275–286.

Murra, J.V. 2002. *El Mundo Andino. Población, medio ambiente y economía*. Lima: Fondo Editorial Pontificia Universidad Católica del Perú e Instituto de Estudios Peruanos.

Núñez, L., and V. Castro. 2011. ¡Caitunar, caitunar! supervivencia de ritos de fertilidad prehispánica en la clandestinidad del Loa (Norte de Chile). *Estudios Atacameños* 42: 153–172.

Romo, M., V. Castro, C. Villagrán, and C. Latorre. 1999. La transición entre las tradiciones de los oasis del Desierto y de las quebradas altas del Loa Superior: etnobotánica del Valle del río Grande, 2ª Región, Chile. *Chungara Revista de Antropología Chilena* 31: 319–360.

Uribe, M., F. Urrutia, and F. Kalazich. 2017. Pukara y chullpas de Nama (Tarapacá): Diálogos arqueológicos, patrimoniales y políticos con una comunidad aymara del norte de Chile. *Revista Chilena de Antropología* 36: 362–384.

Urrutia, F., and M. Uribe. 2015. Identidad cultural, memoria social y archivos parroquiales (siglos XVIII–XIX): reflexiones etnológicas a partir de una experiencia en belén (Arica, norte de Chile). *Diálogo Andino* 46: 79–94.

Varela, V. 2002. Enseñanzas de alfareros toconceños: tradición y tecnología en la cerámica. *Chungara Revista de Antropología Chilena* 34 (2): 225–252.

Vega, G., and D. Salazar. 2010. Fenomenología del paisaje pastoril: hacia una etnoarqueología de la experiencia. In *Actas del XVII Congreso Nacional de Arqueología Chilena*, vol. 2, 657–670. Valdivia: Ediciones Kultrún, Sociedad Chilena de Arqueología, Universidad Austral de Chile.

Villagrán, C., and V. Castro. 2004. *Ciencia indígena en los Andes de Suramérica. Etnobotánica de las tierras altas del norte de Chile*. Santiago: Editorial Universitaria.

Villagrán, C., V. Castro, and G. Sánchez. 1998. Etnobotánica y percepción del paisaje en Caspana (provincia de El Loa, región de Antofagasta, Chile): ¿Una cuña atacameña en el Loa Superior? *Estudios Atacameños* 16: 107–170.

Villagrán, C., M. Romo, and V. Castro. 2003. Etnobotánica del Sur de los Andes de la Primera región de Chile: un enlace entre las culturas altiplánicas y las de quebradas altas del Loa Superior. *Chungara Revista de Antropología Chilena* 35 (1): 73–124.

Further Readings

Aldunate, C., V. Castro, and V. Varela. 2010. Los atacamas y el pescado de Cobija. En: Homenaje al maestro John Víctor Murra. *Chungara Revista de Antropología Chilena* 42 (1): 341–347.

Bastien, J. 1985. *Mountain of the condor: Metaphor and ritual in an andean ayllu*. Long Grove: Waveland Press.

Castro, V. 1993. Extirpación de idolatrías en Atacama, siglo XVII. In *Catolicismo y extirpación de idolatrías. Siglos XVI–XVIII*, 347–366. Cusco: Centro de Estudios Regionales Andinos Bartolomé de Las Casas.

Castro, V. 2000. Case study: Environmental perception and the sacred in the southern Andes, northern Chile. In *Forest in sustainable mountain development. A state of knowledge report for 2000*, ed. M. Price and N. Butt, 126–128. Oxford: CABI Publishing.

Castro, V. 2007. A propósito de raíces históricas de nuestra crisis ecológica: Cuarenta años después ¿qué hay de nuevo? *Revista Ambiente y Desarrollo* 23 (1): 95–97.

Castro, V. 2010. Sabores Ancestrales en el norte prehispánico. In *Historia y cultura de la alimentación en Chile. Miradas y saberes de nuestra culinaria*, ed. C. Sciolla. Santiago: Catalonia.

Castro, V., and C. Aldunate. 2004. La dieta andina en América Latina. In *Dietas mediterráneas. La evidencia científica*, ed. F. Leighton and I. Urquiaga, 202–210. Santiago: Ediciones de la Pontificia Universidad Católica de Chile.

Castro, V., and V. Varela. 1994. *Ceremonias de tierra y agua. Ritos milenarios Andinos*. Santiago: FONDART, Ministerio de Educación y Fundación Andes.

Martínez, J.L. 2004. Reseña bibliográfica historia andina en Chile. *Chungara Revista de Antropología Chilena* 36 (2): 525–530.

Murra, J.V. 1970. Current research and prospect in Andean ethnohistory. *Latin American Research Review* 5: 3–36.

Palma, F. 2015. Profesora Victoria Castro. *Premio Amanda Labarca* 2014 http://uchile.cl/s108779.

Platt, T. 2010. Desde la perspectiva de la isla. Guerra y transformación en un archipiélago vertical andino: Macha (norte de Potosí, Bolivia). *Chungara Revista de Antropología Chilena* 42 (1): 297–324.

Platt, T., V. Castro, F. Salomon, J. Hidalgo, L. Núñez, C. Aldunate, V. Standen, and C. Santoro. 2010. Al Dr. John Victor Murra, cosmopolita veterano de luchas intelectuales y políticas del siglo XX. *Chungara Revista de Antropología Chilena* 42 (1): 3–6.

Romo, M. 2001. Pastores del Sur Andino. Percepción y representación del Ambiente. *Estudios Atacameños* 16: 209–232.

Salomon, F. 1985. The dynamic potential of the complementarity concept. In *Andean ecology and civilization. An interdisciplinary perspective on Andean ecological complementarity*, ed. S. Masuda, I. Shimada, and C. Morris, 511–531. Tokyo: University of Tokyo Press.

Cat: Domestication

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Basic Species Information

Based on numerous representations of cats in Egyptian art, it has been widely accepted that Egypt was the place where the intensification of the relationship between cats and humans first began. More specifically, several wall paintings dated to the sixteenth century BCE (18th Dynasty, Middle Empire) dedicated to the cat goddess Bastet make clear that hunters of the Nile Valley used cats to threaten wild birds and chase them from reeds (Zeuner 1963). In the tomb of Baket III, a local administrator at Beni Hasan during the 12th Dynasty (c. 1950 BCE), a painting with a cat associated with a human faces a rat suggests that cats were also considered efficient companions for fighting pest rodents (Malek 1993). Additional evidence comes from a tomb in the Abydos cemetery (1980–1801 BCE) that contained 17 complete cat skeletons associated with offering pots.

It is not clear, however, if the cats of the Middle Empire can be considered domestic animals (controlled and biologically modified by the interaction with humans) or if they were only captive wild animals used by people. Juliette Clutton-Brock (1981) suggested that even modern cats are "intermediate between domestic and domesticated," and she excluded it from the "man-made animals" or even from the "exploited captives" and instead created a specific designation of "exploiting captive." Except for the sophisticated breeds which have been selected during the twentieth century, the behavior and morphology of domestic cats are the least modified by domestication. This is especially true for the skeleton and it is nearly impossible to differentiate archaeological bones of wild cats from those of domestic cats, except the brain case for the latter is slightly smaller. This is why Frederich E. Zeuner (1963: 389) wrote that "Domestication [of cat] is (. . .) often more easily established by the archaeological circumstances of a find than by its osteological investigations." This is also why many scholars who investigated the origins of cats in Ancient Egypt agreed on the fact that the process of domestication of cat could have been initiated earlier than the Middle Empire as suggested by High Empire (5th and 6th Dynasties; Malek 1993) hieroglyphs.

In 1984, a cat mandible was found in the Pre-Pottery Neolithic Cypriot village of Khirokitia (c. 6500 BCE) (Davis 1987). Since there was no wild ancestor of cats on the island during the Pleistocene, this find indicated that the Neolithic people intentionally introduced cats to the island more than 4000 years before the earliest evidence of incipient cat domestication in Egypt. Even though this discovery has been followed by additional cat bones in other sites of the same period, it was not clear if cats were transported to Cyprus as wild animals and released in the wild, since there was no archaeological evidence in either Eastern Anatolia or the Levant for an intensification of the relationship between cats and humans prior to their introduction. Though the controversial presence of a cat on the arms of one of the woman statuettes of Hacılar (Turkey, 6th millennium BCE) suggests cats may have been domesticated earlier, the earliest reliable archaeozoological evidence of domestic cats in the Levant that dates to 3300–3000 BCE (Tell Sheikh Hassan, Huruck phase; Vila 1998) is later. However, it still precedes the evidence in Egypt.

The discovery which definitely made clear that cats were domesticated during the Early Neolithic in the Near East came from a Pre-Pottery Neolithic human grave in Cyprus at the site of Shillourokambos dated to 7500–7000 BCE (Vigne et al. 2004). In this grave the skeleton of a young adult human was tightly associated with an eight-month-old cat which was probably sacrified for the burial ceremony then buried without any skinning or disarticulation. Contrary to other animal deposits in the Neolithic human burial that are composed of parts of animals considered to be provisions for the hereafter, the deposit of a complete cat emphasizes the animal as an individual and implies a strong association between a human and a cat. This means the relationship was not "restricted to material benefit of humans, but also involved spiritual links" (Vigne et al. 2004). Of course, the Shillourokambos cat skeleton does not possess any evidence of morphological modification as a result of the domestication process, nor do the bones of several additional cats found in the same village with clear marks of meat consumption.

More recently, cat remains have been found in much earlier deposits in Cyprus dated to 8300–8600 BCE, a date which precedes the earliest domesticated ungulates in the Near East but commensurate with the cultivation of cereals and legumes on the mainland and in Cyprus (Vigne et al. 2011, 2012). The grey mouse, which rapidly infested cereal stocks, was also introduced to Cyprus about this time (Vigne et al. 2011). Based on these observations, it is possible that humans used cats as efficient agents for fighting rodent pests. In this scenario, which possibly occurred independently 5–6 millennia later in Egypt (Malek 1993), the process of cat domestication could be understood as a kind of auto-domestication: early cereal stocks would have attracted mice to the Neolithic villages, which would have in turn attracted cats (and other small carnivores). Humans may then have encouraged cats to settle in villages to control mice, creating a tighter bond which led to domestication (Vigne et al. 2004).

Elsewhere in the world the domestic cat appears much later. They were introduced to Western Europe just before 0 CE and increased in frequency only during the Late Medieval times (Bobis 1991). In China, domestic cats were present during the Han Dynasty (206 BCE–220 CE) but only become popular several centuries later (Pasquet 1993).

Recent population genetic analyses have excluded all other subspecies as potential ancestors of modern domestic cats except the Near-Eastern and North African *F. s. lybica*. This study demonstrated that modern domestic cats "derive from at least five founders from across this region, whose descendents were subsequently transported across the world by human assistance" (Driscoll et al. 2007).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

References

Bobis, L. 1991. *Les neuf vies du chat*. Paris: Gallimard.

Clutton-Brock, J. 1981. *Domesticated animals*. London: British Museum of Natural History.

Davis, S.J.M. 1987. *The archaeology of animals*. London: Batsford.

Driscoll, C.A., M. Menotti-Raymond, A.L. Roca, K. Hupe, W.E. Johnson, E. Geffen, E. Harley, M. Delibes, D. Pontier, A.C. Kitchener, N. Yamaguchi, S.J. O'Brien, and D. Macdonald. 2007. The Near Eastern origin of cat domestication. *Science* 317 (5837): 519–523.

Malek, J. 1993. *The cat in ancient Egypt*. London: British Museum of Natural History.

Pasquet, S. 1993. Un lettré « naturaliste » du XIXe siècle, Huang Han et son encyclopédie des chats. *Anthropozoologica* 18: 67–78.

Vigne, J.-D., J. Guilaine, K. Debue, L. Haye, and P. Gérard. 2004. Early taming of the cat in Cyprus. *Science* 304: 259.

Vigne, J.-D., I. Carrère, F. Briois, and J. Guilaine. 2011. The early process of the mammal domestication in the Near East: New evidence from the pre-Neolithic and pre-pottery Neolithic in Cyprus. *Current Anthropology* S52 (4): S255–S271.

Vigne, J.-D., F. Briois, A. Zazzo, G. Willcox, T. Cucchi, S. Thiébault, I. Carrère, Y. Franel, R. Touquet, C. Martin, C. Moreau, C. Comby, and J. Guilaine. 2012. The first wave of cultivators spread to Cyprus earlier than 10,600 years ago. *Proceedings of the National Academy of Science U S A* 109 (22): 8445–8449.

Vila, E. 1998. *L'exploitation des animaux en Mésopotamie au IVème et IIIème millénaires avant J.- C.* Paris: CNRS.

Zeuner, F.E. 1963. *A history of domestic animals*. New York: Harper & Row.

Çatalhöyük Archaeological Site

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Introduction

The 9,000-year-old archaeological site of Çatalhöyük (pronunciation cha-tal-hoo-yuk) is located in central Anatolia, Turkey, 40 km from the modern regional capital of Konya. The site represents two mounds divided by dried-up river channels that today sit in a flat agricultural landscape. The name of Çatalhöyük means "fork mound" which probably refers to the fact that the road from the nearby town of Çumra divides here in multiple directions.

The East Neolithic mound of Çatalhöyük was a settlement inhabited for over 1,400 years between 7,400 and 6,000 BCE cal. Up to 18 stratifications of occupation have been identified as people abandoned old houses, filled them in, and built new ones on top as well as extending outward. Through centuries of this repeated practice, an artificial mound of about 21 m at its highest point was produced from virgin soil, which by the end of the period extended over 13.5 ha (33.5 acres). An estimated population of between 3,000 and 8,000 people is given for any one time (Cessford 2005a).

Today's irregular topography of the mound implies that perhaps a number of discreet districts evolved into mini centers, which through the centuries of occupation developed into one mound. At the end of the occupation on the East mound, or likely overlapping the end, the focus of settlement moved to the West mound attributed to the Late Neolithic and following Chalcolithic period, which continued in use until 5,500 BCE. The West mound is defined as 5.41 ha but continues beyond the fenced limits of the site under the surrounding fields and therefore likely larger in area than currently mapped. It also appears as a low-lying mound in comparison to the East mound but perhaps was a more sprawling settlement. The transition from Neolithic to Chalcolithic appears to have been seamless, continuing from the last activity at the top of the East mound to the West mound. The definition of this later period is based on technological changes distinguished primarily through pottery production. After the Chalcolithic period, both mounds of the site were used intermittently as a burial ground. These burials span the Classical, Late Byzantine, and Early Islamic periods, but there was no major occupation that disturbed the Neolithic or Chalcolithic sequences.

The site is famous for its great size and duration at this early period in history when people started to settle down in permanent settlements and began herding livestock and planting crops. It is also well known for its dense concentration of "art" and symbolism in the form of wall paintings, wall reliefs, sculptures, and installations.

The flat environs of today owe much to the fact that some twenty-five thousand years ago, during the Pleistocene period, the Konya plain was a lake. By the end of this period, about 13,000–11,500 BCE, the lake was drying out, leaving smaller lakes dotted around the landscape, but the Konya plain was still cold, dry, and inhospitable. It was not until Anatolia experienced a rise in humidity in the early Holocene, the period around 10,000 BCE after the Pleistocene or Ice Age, when alluvial fans began to be formed by the increased flow of rivers into many parts of the plain, which led to soil development and vegetation growth (Hodder 2006).

At the time of the earliest occupation at Çatalhöyük, the landscape may be interpreted as

largely treeless grassy steppe on the drier Anatolian plateau, giving way to open oak-grass parkland with some juniper, pistachio/terebinth, and birch on the foothills and to oak-pine-cedar woodland in the better-watered Taurus mountains. Vegetation would have included a patchwork of grassy steppe around marshlands, sedges, and common reeds within the marshy areas, shrubs on the better-drained soils, and trees along the river margins (Asouti 2005).

Within this richly diverse environment, the site was bordered to the south and east by the mountain ranges of Karadağ, Karacadağ, and Hasan Dağ, the latter only visible on clear days.

Excavations and research have clearly shown that the diversity of resources exploited was from a very different landscape as seen today, one that can be best described as a mosaic of different environments and types of vegetation with marshy areas and perhaps small shallow lakes as suggested by some of the bird and fish bones.

The story of Çatalhöyük began beside a river, today only witnessed by a line of trees that grow along the ancient river course. It was here that the Neolithic site was located near a network of pools joined by small channels, in which the water was relatively slow moving. These pools would have provided clean drinking water, although they may well have dried down considerably in the hot summers, and these pools would have supported small fish, freshwater shellfish, waterfowl, and amphibians (Christopher Doherty, personal communication). The proximity of the river also provided other excellent water resources; there were reeds for matting and roofing, and the river may have provided a means of transport for large juniper and oak timbers used in construction. Çatalhöyük's location in the middle of a marsh allowed abundant wild plants, as well as water birds and eggs, to be exploited. Through drier periods, rich alluvial clays, sand, and lake marl clay used as building material could be collected from the settlements edges. It seems quite clear that from here, the people of Çatalhöyük were able to exploit a range of resources, domestic and wild, wet and dry, upland and lowland, and animal and plant (Hodder 2006).

Definition

A survey of the surrounding region (Baird 2002, 2005) suggests that the settlement developed from small local communities, perhaps to centralize resources that led to the development of longer-term and larger-scale social relations. Little is known about the earliest occupation at the site (restricted by the logistics of excavation); it is possible that the first settlers built stand-alone houses which by the mid sequence (where most of the excavation work has been conducted) flourished as an agglomeration of densely packed mudbrick houses.

Each house was constructed with its own set of four walls built side by side against neighboring structures, creating tightly clustered buildings. There were no ground level access points and no streets or alleyways have yet been identified between houses. People moved around at roof level, which may have been at differing heights and traversed by a series of steps and small ladders. Thus, the roof scape may well have been a focus of daily life along with regular activities that took place inside the buildings. Access into the house was by ladder from an opening through the roof located against the south wall.

Between groups of houses were open areas where domestic waste accumulated. It is from these deposits that the wealth of the daily lives of the Neolithic population is learned through their refuse.

The internal configuration of houses displays remarkable conformity across the site. Houses were typically one or two roomed, although more roomed buildings are found, and access between rooms was through small access holes built in the walls. Size, shape, and orientation of the houses, however, varied. Inside, wooden posts set in small pits against the walls were generally positioned symmetrically that supported crossbeams for the roof made of mud plaster and reeds. Through time, the wooden posts were increasingly replaced as clay pillars, at which stage their function is not currently fully understood.

Internal demarcations created zones for different activities indicating a strong sense of social

organization. The smaller of the rooms generally represented the storage area of the house where clay bins were housed and sometimes other food preparation fittings in the form of shallow plaster-lined basins. The larger of the rooms were furnished with shallow platforms made of an earth core that lined much of the walls, which may have been used for sleeping but also other functions. It was the edges of these platforms that formed the kerbs that defined the internal demarcation for designated zones for food preparation and cooking and crafts such as bead making from stone and bone, basketry, and crafting tools such as obsidian knives and blades.

Some houses were also furnished with a bench extending lengthways into the room. A large domed oven was regularly positioned against the south wall, over which the access hole from the roof was located with a ladder and nearby were small circular hearths for a different type of cooking. Other house "furnishing" would include shallow basins and small plinths. Shallow pits near the cooking area were used as storage pits for stocks of obsidian – a volcanic glass worked into cutting tools, or clay balls (baked balls of clay used in heating and cooking as pot boilers). Changes and variations in the layout of the internal features took place during the life of the buildings. New ovens and hearths were built or storage bins and basins were added or removed.

The walls of the house were repeatedly plastered with white clay that was also used to render the house furniture. Different parts of houses were replastered more regularly than others with some areas having been replastered up to 450 times. In some houses, sections of wall plaster were elaborated with paintings, incised decoration, and relief moldings.

The wall paintings and relief sculpture possibly reflect an insight into belief and rituals of the Neolithic people. This "art" is unique, and even today, after the exciting discovery of parallel sites in southeastern Anatolia with elaborate art, the Çatalhöyük material remains the densest concentration of symbolism found so far in the eastern Mediterranean dating from this time. The wall paintings are generally red and/or black on the white background of the plastered walls. The red is ochre based, and black is generally carbon black. All colors identified at Çatalhöyük to date are mineral based. Some of the wall paintings are abstract compositions of geometric designs or composite handprints; others depict hunting scenes with figures and wild animals. One unusual depiction interpreted as a vulture-type bird hovers over a headless figure that may relate in someway to the headless burials and also a depiction with parallels at the site of Göbekli Tepe in SE Turkey (Schmidt 2001).

Çatalhöyük is well known for the dramatic animal symbolism in the relief moldings and the incorporation of animal parts into installations and architecture, such as leopards' and bulls' heads with large protruding horns set into wall niches and rows of bulls horns set along the edge of benches.

One of the most striking characteristics of the Neolithic houses is that the dead were buried below the floors and platforms. Some houses had up to 65 burials as in one house, others as few as 2 or 3, and some with none at all, suggestive of "kinship" houses where most of a kin-group may have been buried.

The majority of the human burials were primary interments in tightly crouched positions, and there is evidence that they were bound by reed rope or matting. Babies were often buried in baskets made of reeds. Many burials were disturbed due to the repeated use of the same burial location; each time a grave was cut, it disturbed the previously buried body, parts of which were moved aside to make room for the recently dead.

Grave goods are not ubiquitous; many burials contain none. Most are ornaments or components of clothing such as beads, pendants, rings, and belt hooks. Occasionally, burials include tools such as bone points and spatulas and obsidian projectile points or shells containing pigment of red from ochre or cinnabar, green from malachite, and blue from azurite. All of these burial goods represent personal items; but not necessarily exclusive to items that were owned by the dead, some may have been "gifted" to the dead from the living, especially those found with babies and infants.

Some skeletons have been found with removed skulls, which can be linked to the skull cult that is

widespread in Anatolia and the Levant in the Pre-pottery Neolithic periods. When found in the excavations, the contextual location of the skulls varies; some are discarded at the end of the use of the building, and some are placed in post pits at the beginning of the house history. One of the more unique finds was that of a plastered and painted plaster skull found in the arms of a skeleton. On close inspection, it was clear that the skull had been repeatedly plastered and painted over time, a clear indication that this particular head was kept and used in a later ritual. At Çatalhöyük, more emphasis seems to be placed on the individual and particular people and their skulls as seen in this example in contrast to other sites such as 'Ain Ghazal in Jordan where plastered human figures are buried under plastered floors of houses and later dug up for the heads that are then found reburied in caches in pits, and similar examples found on Syrian sites such as Tell Aswad in northern Syria. In eastern Turkey at the Neolithic site of Çayönü, the skull cult is represented in the "skull building" in multiples, and the slightly later site of Köşk Höyük in central Anatolia, skulls are found in cashes (Hodder 2006).

In general, the health of the Neolithic population can be determined by different methods. The limb bone length represents body size from which preliminary results suggest that the Çatalhöyük people were slightly smaller on average than other Neolithic groups in Europe and the Near East at about 1.55–1.85 m. The state of dentitions reflects the diet and the other uses to which teeth were put. The teeth were worn rapidly, as would be expected for early agriculturalists in view of the grit added to food by grinding stones. In adults and younger adults, however, there is very little dental decay. This disease became much more common from middle age onward, so in older people, it is common to see very heavily worn and markedly decayed teeth. This pattern suggests that a good deal of carbohydrate was consumed but that it was largely in the form of starches rather than sugars (Simon Hillson, personal communication). Life expectancy was as much as 55 in a few cases, and baby and infant mortality was high.

Research of the human remains through the analysis of their bones, teeth, and isotopic traces, thus far indicates little difference between men and women. They ate both farmed (domesticated) and wild (non-domesticated) plants and animals and worked hard to grow, collect, and hunt their food (Richards and Pearson 2005). Many of the adult skeletons of both sexes have pronounced arthritis. Osteoarthritis results from a high degree of physical activity, which at Çatalhöyük would include climbing up and down ladders, hunting, plant food collection, and raising and tending crops and animals.

Typically, each house was occupied for between 45 and 90 years, after which they were generally emptied of portable items and the floors cleaned. The roof was collapsed in and posts and beams removed. The tops of the walls were dismantled, broken up and crushed, and used to fill the lower portion of the house. Only when the infill had reached the top of the razed walls were the walls for the new house built, mostly directly on top of the walls of the old house. This "infilling" provided a level and firm foundation over which a new house was built. More importantly, the lower half of each building with its internal furnishings was preserved for archaeologists to discover 9,000 years later. The closure and rebuilding was done on a house-by-house basis possibly with several years between each new construction. This means that houses had to be constructed on the exact footprint of the demolished house, as there was no way to expand in either direction because of other extant houses. Therefore, the plan of the settlement stays very much the same through its accumulation. In this way, the settlement grew as a steady development without any serious breaks or disturbances. Despite being a highly organized settlement, there is as yet no evidence of central administration or any large or "different" structures that may have been the foci of a social hierarchy.

Historical Background

The site was first excavated between 1961 and 65 by James Mellaart. It was in 1952 that James

Mellaart first spotted and noted the site of Çatalhöyük from a distance as he was conducting a survey of the Anatolian Plateau mapping archaeological sites of all periods. This was during his time as a visiting scholar at the British Institute of Archaeology at Ankara (Balter 2005). But it was not until 1958 that he and colleagues reached the site and recognized it as of immense importance (Mellaart 1967). Millennia of erosion had scoured clean the outlines of mudbrick houses with plastered internal walls, while scattered artifacts indicated that the site was wholly Neolithic (Todd 1976). At the time, however, Mellaart was conducting excavations at the Chacolithic site of Hacilar, and so it was not until the 1960s that Mellaart began excavations at Çatalhöyük, and the Neolithic site became widely recognized as of unique international significance.

At the time little was known about the Neolithic outside of the Fertile Crescent, where food-producing societies first emerged as herding livestock, planting crops, and building permanent houses. Indeed, it was generally accepted that there was no evidence of the Neolithic in Anatolia due to the cold climate conditions (Hodder 2006). Mellaart's excavations therefore shifted the boundaries of the Neolithic profile westward, which included the identification of crop cultivation and domesticated sheep, goat, and cattle.

Mellaart's excavations came to an abrupt halt in 1965, and it was not until 1993 that Ian Hodder reopened excavations with permission from the Turkish Ministry of Culture and Tourism and under the auspices of the British Institute at Ankara. Also with Mellaart's blessing.

The Turkish authorities granted Ian Hodder a 25-year-long project by which they were investing in Hodder not only long-term commitment to excavation and research but his commitment to develop Çatalhöyük as a heritage site. The Turkish authorities are keen to realize the long-term benefits of regional tourism and overall, to promote Turkeys rich archaeological heritage. Hodder had committed to develop the site as a major tourist attraction with an on-site visitor center, public display of the Neolithic houses, and dissemination of information, all within the boundaries of due care for preservation and conservation issues of the site.

Hodder had progressed through academia to become a lecturer at the University of Cambridge at the time when he initiated the new project in the early 1990s. Today Ian Hodder is Dunlevie Family Professor in the Department of Anthropology at Stanford University from where he directs the project via its head office at the Institute of Archaeology, University College London. The project is a British-led international project with up to 250 team members from across the globe. Today, the project can boast up to 20 different nationalities in a team of up to 170 team members in any one summer campaign. Hodder's vision of the project was to restart excavations within a theoretical approach using modern archaeological methods. By utilizing the latest techniques, the project is able to conduct intensive and detailed studies to enhance the large-scale results that Mellaart had collected. A large array of scientific techniques and analytical tools are put into practice within a robust excavation and sampling framework.

As well as the full-scale modern archaeological excavation and research, Hodders aim has been to address global heritage needs of conservation and public presentation within a site management plan (Site Management Plan 2004). The ultimate aim is to provide the Turkish Ministry of Culture and Tourism with a well-planned heritage site. Since the start of current excavations in 1993, the project has conducted a detailed program of presentation and public engagement as well as local community projects to enhance local awareness of the site, the Neolithic and archaeology in general. Teams have been involved with the conservation and restoration of parts of the excavated areas. These have been covered with custom-built shelters so that visitors can see the Neolithic houses within their neighborhood setting and also within the temporal sequence. The first of a series of planned replica Neolithic houses has been built for visitor entry, and an on-site visitor center provides small temporary exhibits that allow the project to test visitor responses and tailor displays to changing interests and populations. By providing a range of visitor experiences, the full heritage potential of the site can begin to be exploited.

One of the foundations of the project is the team's acknowledgement that it is the combined

skills of different types of archaeological practices and other perspectives that enhance and help to understand the complexities of a site like Çatalhöyük and the understanding of this period in history. All this is reflected in the makeup of the Çatalhöyük Research Project team.

Key Issues/Current Debates

Material Culture

The excavations and research have clearly demonstrated that a diversity of resources was exploited. Through source analysis and environmental reconstructions, much can be learned about procurement activities and distances people covered for these resources.

Obsidian was one of the most important raw materials that was used, a black volcanic glass that by careful crafting is transformed into razor-sharp tools. Each natural source for obsidian is unique, and artifacts found at Çatalhöyük have been sourced to the mountainous region of Cappadocia, to Göllü Dağ-East and Nenezi Dağ, 190 km away from the site in a direct line. Reaching the obsidian source would have taken several days journeying as the route taken would probably have been circuitous in order to have regular access to water supplies. Through the obsidian route, we may address issues of trading with other people on route or at source. Once the obsidian "supplies" were brought back to site, they were placed as caches in shallow storage pits cut through the floor of the houses and accessed when needed (Carter 2011).

The site is also famous for its many representations of the female form modeled from clay or carved from stone as robust representations of fecundity and interpreted as symbols of fertility and matriarchy. Such iconography attracts groups from the Goddess Community from around the world to visit the site as a place of homage. Other clay figurines include small representations of animals and genderless figures. Male symbols are also represented but much less discussed and perhaps fewer in numbers. These appear as seated stone figures and phallic-shaped natural stones. Male symbolism is also present in the form of bull representations in the wall art and installations.

Different styles of cooking and food preparation were indicated by the presence of both ovens and hearths as well as baked clay balls found in large quantities that were used as "potboilers" in cooking (Atalay 2005). Pottery vessels appear not to have been used for cooking until midway through the sequence when a gradual change in technology created a stronger fabric that was then followed by an increase in the use of pottery. In the early sequence, the absence of pottery has defined the beginning of Çatalhöyük as aceramic (Last 2005), but this is based on small area excavations and may simply indicate that pottery was rare. Nonetheless, the change in pottery technology can be traced through the sequence. Other vessels were made of wood and basketry. Food preparation is studied through the assemblage of ground stone artifacts used for grinding and milling and by investigating the contextual relationships between the ground stone and other materials and cooking facilities. The charred botanical remains provide invaluable information on aspects of the human diet as well as of animal feeding and the management of animals. Through bone chemistry – the study of nitrogen and carbon and the study of microscopic wear on the chewing surfaces of teeth from the human skeletal data – it is clear that meat was eaten but also that domesticated plants were a central part of the Çatalhöyük diet. Analysis also centers on wild versus domesticated plants as sources of food, fodder, matting and basketry, building material, and so on; basically, all plant remains that are used in everyday routines in and around the house and the scope and nature of associated activities across the surrounding landscape.

Çatalhöyük has long been known as a center of cattle domestication, but analysis of the animal bones from the recent excavations shows that the cattle are in fact wild. Moreover, the animal bone data is numerically dominated not by cattle, as previously thought, but by sheep and goat. The vast majority of these sheep and goats are domestic, and their meat supplied most of the protein in the diet. The culling pattern, with most animals slaughtered as juveniles or subadults, indicates that they were raised primarily for meat, with wool (these early sheep are unlikely to have been woolly) and dairy products of little

importance. The ratio of sheep to goats among the specimens determined to species is 7:1, making sheep the main herd animal at the site. The only other domestic animal present is dog. But while sheep provide the staple meat source, wild animals, particularly cattle, appear to hold much greater symbolic significance (Russell and Düring 2006).

By studying the minutiae of the Neolithic settlement, house by house, we build up a picture of a household economy through which, when placed into the larger neighborhood context, allows us to explore the wider issues of settlement, economics, and organization. Were individual households self-sufficient in food preparation and craft production or do we see evidence of communal activities? How big were these communal groups and were they based on kinship and lineage? With a noticeable absence of central administrative organization at Çatalhöyük, these questions are central to our research.

The aims of the current international project at Çatalhöyük involve full-scale modern archaeological excavation and conservation and promotion of the site for visitor access.

The main research direction is to place the paintings and symbolism within a full environmental, economic, and social context. Central questions concern the origins of the site and its early development, social and economic organization, and variation within the community, the reasons for the adoption and intensification of agriculture, the social context for temporal trends in the life of the community, trade, and relations with other sites in the region.

Since the 1960s, much has changed in archaeology. It is simply not enough to present what is found by excavation and how people lived in the past. Most questions posed today are why? What led to changes and developments in our past? How does one Neolithic site relate to another? To this end current research is looking at how Çatalhöyük fits into the overall picture of the spread of farming and community lifestyle after the first appearance of agriculture in the Levant at least two thousand years earlier than the dates for the founding of Çatalhöyük. Since the 1960s, many other important Neolithic sites have been excavated in Turkey, and many more are being discovered. These help to fill the chronological sequence as, as it appears, the Neolithic spread from east to west.

The research at Çatalhöyük therefore looks inward and outward and back and forth. To help us understand why this particular location was settled, we are reconstructing the ancient environment around Çatalhöyük, including the climate through pollen analyses. We can reconstruct the nature of the landscape through the carbonized plant remains and piece together from bone remains the animals native to the region. By studying what the Neolithic people were utilizing around them and bringing into their homes, we should be closer to understanding what is was about this location that attracted these people to settle, why they stayed and what brought about the end.

International Perspectives

While today Çatalhöyük is still one of the best known Neolithic sites in Anatolia and the Near East, roughly contemporary with later Pre-Pottery and the following Pottery Neolithic in the Levant, much has changed in our knowledge of the Neolithic in Anatolia today, and in some ways, Çatalhöyük is no longer unique. We know that there are many earlier settled sites in eastern and central Anatolia and in the Levant that compare in size and complexity. We also know that domestication of plants and animals was well underway in these areas thousands of years before Çatalhöyük. There are local sequences, which lead up to and predate Çatalhöyük, such as nearby Boncuklu Höyük and Pinarbaşı (Baird et al. 2011). In southeast Turkey, the earlier sites of Çayönü (Özdoğan and Özdoğan 1998) and Göbekli Tepe (Schmidt 2001) already show substantial agglomeration and elaborate symbolism while in central Anatolia; Aşıklı Höyük (Esin and Harmankaya 1999) has dense packed housing through the millennium prior to Çatalhöyük. There are many other sites contemporary, or partly contemporary with Çatalhöyük that are known in central Anatolia and the adjacent Burdur-Lakes (Duru 1999;

Gérard and Thissen 2002) region, yet Çatalhöyük retains a special significance because of the concentration of aspects of all of these sites in one place.

Future Directions

The aim for future work remains as before: to situate the elaborate symbolic production at the site within its full environmental, economic, and social context. Another direction is to understand the temporal structure of the stratigraphy at the site. Why is it that some columns of houses made up of several rebuilds endure through time and others don't? Could this stability and "ancestry" be linked to success in production?

Another aspect of the research is the role of religion in the emergence of complex societies (Hodder 2010). The premise is that archaeologists can identify religious behavior in the early Middle East and that changes in such behavior were tied to the emergence of large settled agricultural towns. Current research is addressing who the controllers of such societies were and was control of religion linked to social and economic dominance or a collective involvement in ritual and its relationship to a single place.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Animal Paleopathology
- ▶ Archaeobotany
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Cattle: Domestication and Development
- ▶ Çayönü: Agriculture and Domestication
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management: Project Management
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Göbekli Tepe: Agriculture and Domestication
- ▶ Hodder, Ian (Modern World)
- ▶ Hodder, Ian (Theory)
- ▶ Mobiliary Art, Paleolithic
- ▶ Multivocality and Archaeology
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Pigment Analysis in Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Turkey: Domestication

C

References

Asouti, E. 2005. Woodland vegetation and the exploitation of fuel and timber at Neolithic Çatalhöyük: Report on the wood charcoal macro-remains. In *Inhabiting Çatalhöyük: Reports from the 1995–1999 seasons*, ed. I. Hodder. Cambridge: McDonald Institute of Archaeology at Ankara.

Atalay, S. 2005. Domesticating clay: The role of clay balls, mini balls, and geometric objects in daily life at Çatalhöyük. In *Changing materialities at Çatalhöyük: Reports from the 1995–99 seasons*, ed. I. Hodder, 139–168. Cambridge/London: McDonald Institute for Archaeological Research/British Institute of Archaeology at Ankara.

Baird, D. 2002. Early Holocene settlement in Central Anatolia: Problems and prospects as seen from the Konya Plain. In *The neolithic of Central Anatolia. Internal developments and external relations during the 9th–6th millennia cal BC. Proceedings of the International CANeW Round Table, Istanbul 23–24 November 2001*, ed. F. Gérard and L. Thissen, 139–152. Istanbul: Ege Yayınları.

Baird, D. 2005. The history of settlement and social landscapes in the early Holocene in the Çatalhöyük area. In *Çatalhöyük perspectives: Themes from the 1995–1999 seasons*, ed. I. Hodder, 55–74. Cambridge/London: McDonald Institute for Archaeological Research/British Institute of Archaeology at Ankara.

Baird, D., D. Carruthers, A. Fairbairn, and J. Pearson. 2011. Ritual in the landscape: Evidence from Pınarbaşı in the seventh-millennium cal BC Konya Plain. *Antiquity* 85: 380–394.

Balter, M. 2005. *The goddess and the bull. Catalhoyuk: An archaeological journey to the dawn of civilization*. New York: Free Press.

Carter, T. 2011. A true gift of mother earth': The use and significance of obsidian at Çatalhöyük. *Anatolian Studies* 61: 1–19.

Duru, R. 1999. The Neolithic of the Lake District. In *Neolithic in Turkey: The cradle of civilization, new discoveries*, ed. M. Özdoğan and N. Başgelen, 165–192. Ankara: Arkeoloji ve Sanat Yayınları.

Esin, U., and S. Harmanakaya. 1999. Aşıklı in the frame of central Anatolian Neolithic. In *Neolithic in Turkey: The cradle of civilization*, ed. M. Özdoğan and N. Başgelen, 115–132. Ankara: Arkeoloji ve Sanat Yayinlari.

Gérard, F., and L. Thissen. 2002. The Neolithic of Central Anatolia. In *Internal developments and external relations during the 9th–6th millenia CAL BC*. Istanbul: Ege Yayınları.

Hodder, I. 2006. *Çatalhöyük: The leopard's tale, revealing the mysteries of Turkey's ancient 'town'*. London: Thames and Hudson.

Hodder, I. 2010. *Religion in the emergence of civilization: Çatalhöyük as a case study*. Cambridge/New York: Cambridge University Press.

Last, J. 2005. Pottery from the East Mound. In *Changing materialities at Çatalhöyük: Reports from the 1995–99 seasons*, ed. I. Hodder, 101–138. Cambridge/London: McDonald Institute/British Institute of Archaeology at Ankara.

Mellaart, J. 1967. *Çatal Hüyük: A Neolithic town in Anatolia*. London: Thames and Hudson.

Özdoğan, M., and A. Özdoğan. 1998. Buildings of cult and the cult of buildings. In *Light on top of the Black Hill (Studies Presented to Halet Cambel)*, ed. G. Arsebük, M. Mellink, and W. Schirmer, 581–593. Istanbul: Ege Yayinlari.

Richards, M.P., and J.A. Pearson. 2005. Stable isotope evidence of diet at Çatalhöyük. In *Inhabiting Çatalhöyük: Reports from the 1995–1999 seasons*, ed. I. Hodder. Cambridge: McDonald Institute of Archaeology at Ankara.

Russell, N., and B.S. Düring. 2006. Worthy is the lamb: A double burial at Neolithic Çatalhöyük (Turkey). *Paléorient* 32 (1): 73–84.

Schmidt, K. 2001. Göbekli Tepe, southeastern Turkey: A preliminary report on the 1995–1999 excavations. *Paléorient* 26: 45–54.

Site Management Plan. 2004. Available at: http://www.catalhoyuk.com/pdfs/Catal_SMP.doc

Todd, I. 1976. *Çatal Hüyük in perspective*. Menlo Park: Cummings Publishing Company.

Further Reading

Catalhoyuk Research Project. n.d. Available at: http://www.catalhoyuk.com/bibliography.html (Full Çatalhöyük bibliography) and http://www.catalhoyuk.com/archive_reports/ (Annual reports).

Hodder, I., ed. 1996. *On the surface Çatalhöyük 1993–95*, British Institute of Archaeology at Ankara Monograph. Vol. 22. Cambridge/Ankara: McDonald Institute for Archaeological Research/British Institute of Archaeology.

Hodder, I. 2000. *Towards reflexive method in archaeology: The example at Çatalhöyük*, British Institute of Archaeology at Ankara Monograph. Vol. 28. Cambridge/Ankara: McDonald Institute for Archaeological Research/British Institute of Archaeology.

Hodder, I. 2005a. *Inhabiting Çatalhöyük: Reports from the 1995–99 seasons*, British Institute of Archaeology at Ankara Monograph. Vol. 38. Cambridge/Ankara: McDonald Institute for Archaeological Research/British Institute of Archaeology.

Hodder, I. 2005b. *Changing materialities at Çatalhöyük: Reports from the 1995–99 seasons*, British Institute of Archaeology at Ankara Monograph. Vol. 39. Cambridge/Ankara: McDonald Institute for Archaeological Research; British Institute of Archaeology.

Hodder, I. 2005c. *Çatalhöyük perspectives: Themes from the 1995–99 seasons*, British Institute of Archaeology at Ankara Monograph. Vol. 40. Cambridge/Ankara: McDonald Institute for Archaeological Research/British Institute of Archaeology.

Hodder, I. 2007. *Excavating Çatalhöyük: South, North and KOPAL Area reports from the 1995–99 seasons*, British Institute of Archaeology at Ankara Monograph. Cambridge/Ankara: McDonald Institute for Archaeological Research/British Institute of Archaeology.

Hodder, I. Forthcoming. *Çatalhöyük excavations: The 2000–2008 seasons*. Los Angeles: Cotsen Institute of Archaeology Press.

Hodder, I. Forthcoming. *Humans and landscapes of Çatalhöyük: Reports from the 2000–2008 seasons*. Los Angeles: Cotsen Institute of Archaeology Press.

Hodder, I. Forthcoming. *Substantive technologies at Çatalhöyük: Reports from the 2000–2008 seasons*. Los Angeles: Cotsen Institute of Archaeology Press.

Hodder, I. Forthcoming. *Integrating Çatalhöyük: Themes from the 2000–2008 seasons*. Los Angeles: Cotsen Institute of Archaeology Press.

Cattle: Domestication and Development

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Cattle are a major source of milk, meat, hide, and draught power. In addition, they fulfill roles in religious rituals, festivals, and fighting games.

Several species of cattle were domesticated independently. Around 8500 BC, well after the domestication of sheep and goat, taurine cattle (*Bos taurus*) were domesticated in the Fertile Crescent by taming the now extinct aurochs (*Bos primigenius*, Van Vuure 2001; Teasdale and Bradley 2012). This is consistent with the high diversity of mitochondrial DNA (mtDNA) in

Southwest Asia cattle with haplogroups T, T1, T2, T3, and T5. Independent taurine domestications have been postulated to have occurred in East Asia and Africa, but were not consistent with complete mtDNA sequences, which show that the African T1 and East-Asian T4 haplotypes are closely related to mtDNA variants from Southwest Asia (Lenstra et al. 2014).

The ancestral aurochs was recorded to be a large and fierce animal and to prefer a forest habitat within its broad distribution range in Eurasia and North Africa (Van Vuure 2001). As in other bovine species (see below), domestication reduced sexual dimorphism. Cattle further adapted to the habitat of pastoral society by becoming docile, while ~4000 years after domestication, taurine cattle became predominantly short-horned. Domestication of cattle resulted in a decrease in size, which continued until the Middle Ages and was in Europe largely reversed since the Renaissance. The development of a large variety of coat color patterns and morphological phenotypes and milk or beef production traits continues today (Felius 1995; Felius et al. 2014; Buchanan and Lenstra 2015).

Around 6000 BC, zebu (*Bos indicus*) emerged in the Indus Valley by domestication of *Bos primigenius namadicus* (Teasdale and Bradley 2012), but acquired its characteristic hump only after domestication. Further to the east other bovine species were domesticated (Felius 1995). About 2500 BC on the Tibetan plateau, domestic yak (*Bos grunniens*) diverged from the ancestral wild yak (*Bos mutus*, q.v.). In Assam and Myanmar, the semi-feral gayal (*Bos frontalis*) has been derived from the wild gaur (*Bos gaurus*). In Indonesia and Indochina, domestication of banteng (*Bos javanicus*) resulted in Bali cattle. Other domestic banteng populations in Indochina and Indonesia became introgressed by zebu (see below). Yak, gayal, and Bali cattle are adapted to local conditions and did not spread far from their original wild and domestic range. In contrast, both taurine and zebu cattle spread over most continents (Felius et al. 2014).

Taurine cattle now occupy a large variety of habitats, ranging from tropical Africa to the more temperate Mediterranean, Central and Northern Europe, and the cold of northern Siberia. Remains of Neolithic farms revealed that cattle and other livestock migrated into Europe following two routes, along the Mediterranean coasts and along the Danube, respectively, and arrived 3000 years BC at the North Sea coast (Teasdale and Bradley 2012). North Asia may have been populated via the Caucasus or via Europe. From 4000 to 5000 years BC long-horned cattle migrated into Africa and were followed by short-horned taurines (Felius et al. 2014).

MtDNA haplotypes have revealed several introgressions and transcontinental migrations. Various taurine mtDNA haplogroups are found in Southwest Asia, but the T1 and T3 types dominate in Africa and Europe, respectively. European aurochs carried P haplotypes, which also have been found in European domestic cattle at a frequency of ca. 1/1000. A relatively high frequency of T1 in Iberian and South-Italian cattle indicates prehistoric or medieval immigration of cattle from Africa. Because many Central- and South-American cattle were imported from Portugal, Spain, and Africa, T1 is also found frequently in Criollo cattle (Teasdale and Bradley 2012; Lenstra et al. 2014).

From the Indus Valley, zebu moved to the tropical zones of all continents (Teasdale and Bradley 2012; Felius et al. 2014). Going eastward, zebu reached China, Indochina, and Indonesia, which led to crossing with taurine cattle from the north or indigenous Bibos (banteng, gayal) cattle (Payne and Hodges 1997). Banteng mtDNA in Indonesian zebu populations testifies that domestic banteng cows were incorporated in the zebu breeds (Mohamad et al. 2009).

A westward movement from 2000 BC brought zebu to the Southwest-Asian region of taurine domestication and Africa. In the last millennium BC, indicine introgression into African taurine cattle gave rise to the hybrid Sanga cattle. A second wave of zebu immigration in Africa was prompted by the Islamic invasions after 700 AD. At the end of the nineteenth century, a rinderpest epidemic, to which zebu is more resistant than taurine and Sanga cattle, made zebu dominant in Central Africa. The exclusive finding in African zebu breeds of taurine mtDNA demonstrated that all the time zebu expanded via male-mediated introgression. From the nineteenth century, zebu was in the same way introduced in North and South America (Felius et al. 2014).

The industrial revolution in the eighteenth century initiated the development of specialized breeds, which had a profound influence on the exterior, productivity, and genetic constitution of the taurine cattle. Systematic breeding and genetic isolation eventually led to the development of hundreds of specialized breeds. However, crossbreeding has been common, and genetic surveys demonstrated that breeds still contain a large part of the total variety of the species (Felius et al. 2014).

For comparison of breeds, nuclear genetic markers are more informative than mtDNA (Teasdale and Bradley 2012). Y-chromosomal haplotypes as indicators of paternal lineages revealed sharp genetic east-to-west boundaries that divide the taurine cattle in both France and Germany (Edwards et al. 2011). This reflects the contrast of specialized dairy cattle from the northwestern continental lowland dairy with the central-European beef or dual-purpose cattle (Felius 1995; Buchanan and Lenstra 2015), but also coincides with traditional cultural differences between Northern and Southern Europe (Edwards et al. 2011).

As in human genetics, our account of the history of cattle is now being rewritten by analysis of ancient DNA (Lenstra et al. 2014). A whole-genome sequence of a British aurochs specimen indicated gene flow into British domestic cattle (Park et al. 2015).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Goat: Domestication
- ▶ Nabta Playa: Agriculture and Domestication
- ▶ Sheep: Domestication
- ▶ Water Buffalo: Domestication
- ▶ Yak: Domestication

References

Buchanan, D.S., and J.A. Lenstra. 2015. Breeds of cattle. In *The genetics of cattle*, ed. D. Garrick and A. Ruvinsky, 2nd ed., 33–66. Wallingford: CAB Int.

Edwards, C.J., C. Ginja, J. Kantanen, L. Pérez-Pardal, A. Tresset, F. Stock, L.T. Gama, M.C.T. Penedo, D.G. Bradley, J.A. Lenstra, I.J. Nijman, and European Cattle Genetic Diversity Consortium. 2011. Dual origins of dairy cattle farming – evidence from a comprehensive survey of European Y-chromosomal variation. *PLoS One* 6: e15922.

Felius, M. 1995. *Cattle breeds, an encyclopedia*. Doetinchem: Misset Uitgeverij.

Felius, M., M.-L. Beerling, D.S. Buchanan, B. Theunissen, P.A. Koolmees, and J.A. Lenstra. 2014. On the history of cattle genetic resources. *Diversity* 6: 705–750. http://www.mdpi.com/1424-2818/6/4/705.

Lenstra, J.A., P. Ajmone-Marsan, A. Beja-Pereira, R. Bollongino, D.G. Bradley, L. Colli, A. De Gaetano, C.J. Edwards, N. Felius, L. Ferretti, C. Ginja, P. Hristov, J. Kantanen, J.P. Lirón, D.A. Magee, R. Negrini, and G.A. Radoslavov. 2014. Meta-analysis of mitochondrial DNA reveals several population bottlenecks during worldwide migrations of cattle. *Diversity* 6: 178–187. http://www.mdpi.com/1424-2818/6/1/178/htm.

Mohamad, K., M. Olsson, H.T. Van Tol, S. Mikko, B.H. Vlamings, G. Andersson, H. Rodriguez-Martinez, B. Purwantara, R.W. Paling, B. Colenbrander, and J.A. Lenstra. 2009. On the origin of Indonesian cattle. *PLoS One* 4: e5490.

Park, S.D., D.A. Magee, P.A. Mcgettigan, M.D. Teasdale, C.J. Edwards, A.J. Lohan, A. Murphy, M. Braud, M.T. Donoghue, Y. Liu, A.T. Chamberlain, K. Rue-Albrecht, S. Schroeder, C. Spillane, S. Tai, D.G. Bradley, T.S. Sonstegard, B.J. Loftus, and D.E. Machugh. 2015. Genome sequencing of the extinct Eurasian wild aurochs, *Bos primigenius*, illuminates the phylogeography and evolution of cattle. *Genome Biology* 16: 234.

Payne, W.J.A., and J. Hodges. 1997. *Tropical cattle: Origin, breeding and breeding policies*. Oxford: Blackwell Science.

Teasdale, M.D., and D.G. Bradley. 2012. The origin of cattle. In *Bovine genomics*, ed. J. Womack, 1–10. Oxford: Wiley.

Van Vuure, C. 2001. *Retracing the aurochs*. Höxter: Universität Paderborn.

Çayönü Tepesi: Bioarchaeology

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Introduction

Çayönü Tepesi is a mound site located on the Ergani Plain, about 40 km northwest of Diyarbakır,

southeastern Turkey. The site is situated near a tributary of the Tigris in the ecologically transitional zone of the Taurus foothills at an elevation of about 830 m. The research at Çayönü was part of the Joint Prehistoric Project of the Oriental Institute of the University of Chicago that included expeditions in Iraq, Iran, and Turkey beginning in 1947. Excavations at Çayönü were initiated by H. Çambel and R. J. Braidwood as the Joint Istanbul-Chicago Universities' Prehistoric Project of Southeast Anatolia and continued from 1964 to 1991 with some intervals (see Braidwood and Braidwood (1982) and Erim-Özdoğan (2011) for summary and current status of research at Çayönü). From 1985 the excavation continued under the direction of M. Özdoğan, and various studies of excavated material are ongoing under the leadership of A. E. Özdoğan. The site covers an area of 2–3 ha, and by the end of the field season in 1991, the total area exposed was 6,000 m^2, making it one of the most extensively excavated Neolithic sites in West Asia. With about 3,000 years of archaeological sequence (c. 10,000–6,500 cal. BCE), the site also provides important material for investigating economic and social development through the Prepottery Neolithic (PPN) into the beginning of Pottery Neolithic (PN). The PPN at Çayönü is divided into six subphases as listed in Table 1. This Prepottery sequence is immediately followed by early PN (Erim-Özdoğan 2011).

Definition

The major research focus of the Çayönü project was "the recovery and interpretation of evidence of the cultural and palaeoenvironmental conditions within which effective food production was achieved in southwestern Asia" (Braidwood et al. 1974). The project included the pioneering use of interdisciplinary studies in archaeology, with staff members from the fields of physical anthropology, botany, and zoology. As the origins of agriculture and animal husbandry were some of the main questions to be investigated, bioarchaeology constituted the core of the research project.

Key Issues/Current Debates/Future Directions/Examples

Zooarchaeology

Faunal remains collected in the 1978 and 1980 seasons were studied and reported by B. Lawrence (Lawrence 1980, 1982). Although the understanding of stratigraphy of the site at the time was still preliminary, Lawrence observed a shift from the hunting of large game such as aurochs and red deer to the use of domestic sheep and goats by the "uppermost" levels at the site. As fieldwork progressed, these "uppermost" levels came to be understood to correspond to the final two of the six building subphases of the PPN, namely, the Cell and Large Room subphases. The observed changes in the faunal assemblage that were suggestive of domestication include a smaller average size for the sheep and goats, changes in their body proportions, the existence of hornless sheep, and higher proportions of young animals. Equid bones were studied and published by Meadow (1986), who determined that they were most likely from the wild *Equus hemionus* (onager).

Zooarchaeological studies of materials collected between 1985 and 1991 have been

Çayönü Tepesi: Bioarchaeology, Table 1 Chronology of Prepottery Neolithic at Çayönü Tepesi (Erim-Özdoğan 2011)

Subphase	Abbreviation	Date (uncal. BP)	Period
Round building	r	10,200–9,400	PPNA
Grill building (early)	g	9,400–9,200	PPNA
Grill building (late)	g	9,200–9,100?	Early PPNB
Channeled building	ch	9,100–9,000	Early PPNB
Cobble paved building	cp	9,000–8,600?	Middle PPNB
Cell building	c	8,600–8,300	Late PPNB
Large room building	lr	8,200–8,000?	PPNC, transitional phase between PPN and PN

conducted since 1996 (Hongo and Meadow 1998; Hongo et al. 2004). As the understanding of the stratigraphic sequence became clearer and since large amounts of faunal remains had been added to the collection after the initial study by Lawrence, the major goal of the new study has been to document the change of animal exploitation through time. Especially of interest is the timing of the appearance of domestic forms of ungulates and the process of the development of pastoralism. In addition to identification of body parts and taxa, measurement data as well as data on age, sex, and modification of bones have been recorded in the study. Targeted studies of cattle and red deer remains were carried out as they also were for pigs (see below).

Through the 3,000 years of occupation at Çayönü, decreasing exploitation of wild mammals, probably due to continuous human impact on the environment around the site, was coupled with increasing dependence on domestic animals. Through the beginning of the Early PPNB, animal exploitation at Çayönü was based on intensive hunting of wild boar combined with broad-spectrum exploitation of other wild animals. Pigs are the single most abundantly represented taxon through subphase c, their bones comprising more than 30% of the identified specimens. Cattle, sheep, goats, and a wide range of wild taxa, including red deer, gazelle, roe deer, onager, bear, leopard, red fox, hare, and a few other small mammal species as well as some birds, tortoise, and a few fish were also exploited. The proportions of miscellaneous wild taxa (excluding cattle, sheep, goats, and pigs) began to decrease in the cp subphase, dropping to less than 10% in the lr subphase and early PN. Instead, remains from the animal taxa that were to become domestic at some point in Neolithic – pigs, sheep, goats, and cattle – gradually increase in frequency through time and by the lr subphase comprise close to 90% of the identified bone specimens. The main contributors to this trend were the increasing numbers of sheep and goat represented, especially sheep, which were rather scarce in the PPNA levels where they comprised only 10% of the identified specimens. Several lines of evidence (relative abundance of taxa, body size, kill-off patterns, isotope studies of cattle bones) suggest that domestic sheep and goats, as well as pigs and cattle, start to appear as early as in the ch subphase (or even earlier in the case of pigs, see below) (Hongo et al. 2009). Appearance of domestic forms of cattle, sheep, and goat at the end of Early PPNB or beginning of Middle PPNB corresponds with what is happening at contemporary sites in southeastern Anatolia and northern Syria. It seems, however, that the role of domestic ungulates was as merely an additional subsistence option in a broad-spectrum subsistence strategy that lasted for about 1,000 years after their initial appearance. Increased reliance on domestic animals can be seen in the c subphase, contemporary with the clear shift from a broad-spectrum animal exploitation strategy to a strategy concentrating on sheep and goats that was taking place throughout southeastern Anatolia by the Late PPNB.

An important focus of the recent analysis of faunal remains from Çayönü has been pigs, the remains of which represent the most intensively studied part of the site's bone assemblage. Pig remains are the most abundantly represented fraction of the assemblage until sheep and goat remains became the majority in the final PPN phase (c. 7,000 cal. BCE). Whether there is evidence for pig domestication at Çayönü is of particular interest primarily because southeastern Anatolia has been considered as a likely region for early pig domestication, based on the determination of "cultural control" of those animals in the 10th milllennium cal. BCE at the site of Hallan Çemi located near Batman (Rosenberg et al. 1998). In the beginning years of the Çayönü project, Stampfli (1983, in ms. 1966) had already observed that the ratio of domestic to wild pigs at Çayönü was about one to one. Kuşatman (1991) reviewed the evidence for pig domestication using the material excavated in 1978, 1980, 1981 and 1984 and suggested the possibility of the existence of domestic pigs at Çayönü as early as the Middle PPNB. Kuşatman, however, in her analysis did not study trends through time but grouped into one analytical unit the pig remains from all the aceramic levels. Consequently, any

change there might have been over time in the Çayönü sequence remained unclear. The new study beginning in 1996 revealed diachronic trends in the pig data through the course of the PPN toward features that can be considered characteristic of domestic populations, namely, smaller body size and teeth, younger kill-off, and increasing frequency of dental defects (Linear Enamel Hypoplasia) (Hongo and Meadow 1998; Ervynck et al. 2001). Some smaller individuals comparable in size to domestic pigs are found already in the g subphase, and a shift toward smaller-sized animals is clear in the later c and lr subphases. Length measurements of the pig mandibular third molars show that most specimens from PPN Çayönü fall in the size range for modern wild pigs, but increasing numbers of smaller teeth appear in later subphases. Teeth that fall in the size range of overlap for wild and domestic pigs begin to appear in the c and lr subphases. In the PN period, there is an overall shift toward smaller length measurements, with the appearance of teeth that are smaller than the smallest documented for modern wild pigs in the region. Overall, a gradual intensification of human-pig relationships is suggested rather than a sudden domestication event or an introduction of domestic pigs from elsewhere.

Carbon isotope analysis of fatty acid residues on pottery point to the significant use of pork/pig fats at Çayönü (Evershed et al. 2008). There is scarce evidence of ruminant dairy fats, suggesting that the use of milk was later in southeastern Anatolia than in the northwestern regions.

Shells

A few hundred shells were identified by D. Mayer Bar-Yosef (unpublished report). Both marine shells and freshwater mollusks were found. Some, especially marine shells had been holed and were probably used as ornaments. A *Murex trunculus* has traces of malachite inlay. All of the freshwater mollusks are available from the local river system. Marine shells were brought from the Mediterranean, or possibly from the Red Sea, implying the existence of a long-distance trade network.

Ethnoarchaeobotany

The archaeobotanical data at Çayönü is rather limited, as plant remains were not always collected in every field season. Flotation of soil samples was initiated during 1968 season by R.B. Stewart, but no identifiable botanical remains were obtained. Archaeobotanical studies were carried out by W. van Zeist in 1970 and by R. Stewart in 1972 (Stewart 1976). In the 1985, 1986, 1987 and 1988 seasons, van Zeist and G.J. de Roller studied the plant remains in reference to a newly clarified stratigraphic sequence (van Zeist and de Roller 1994). The results of these studies suggest that the habitat of Çayönü in the Neolithic did not differ greatly from the present. The site was situated in a steppe-forest (or savannah) environment of an ecologically transitional zone. The identification of charred wood remains revealed the area to be an open forest of oak, pistachio, ash, almond, and tamarisk. Overall, archaeobotanical studies showed that the mode of subsistence in the environmentally rich eastern Taurus zone was different from that of the Levant. There is no firm evidence of plant cultivation in the earliest r subphase. Wild lentil and wild vetch were intensively gathered. Although morphologically still wild, einkorn and emmer wheat were probably cultivated as early as the ch subphase. Pulses were more abundant than cereals. Field pea, lentil, and bitter vetch were also cultivated. It has not yet been determined whether grass pea and chickpea remains are of the domestic forms. An important point was made in the study of the material from the 1972 season, which is that domesticated plants apparently appeared earlier than did animal domesticates. Fat-rich nuts such as pistachio and almond were, however, widely gathered and, together with wild lentil and wild vetch, continued to play an important role in subsistence even after the cultivation of einkorn, emmer, and pulses had begun. Linseed was also collected. A textile fragment made of flax wrapped around an antler sickle was found in 1988 from the level of the end of c subphase. Small amounts of wild barley were recovered, but barley was probably neither cultivated nor purposely gathered. The abundance of grinding tools and sickles also suggests that cereals became increasingly important during the c subphase.

Anthropology

Human skeletal remains of a total of about 600 individuals have been found at Çayönü. In the earliest r subphase, pit burials were dug in the open areas or under the floors, and the dead were generally placed in flexed positions on their right side in a north–south alignment. These burials and those of the following g subphase were primary and often accompanied by red ochre, stone artifacts, or sometimes beads. A skull with a trace of trepanation was also found from g subphase. The remains of more than 300 individuals were discovered from the so-called Skull Building, a special public building used mainly for secondary inhumations, which was in continuous use from ch subphase up until the end of cp subphase. Most of the skeletons found in the Skull Building are secondary burials, such as those found in a pit filled mainly with skulls and a crypt containing long bones (Yilmaz 2010). An example of their distinctive mortuary practices can be seen in the rows of skulls arranged carefully to face in different directions and separated from each other by piles of long bones. Primary burials lacking their skulls have also often been found in association with the Skull Building. The Skull Building fell out of use in c subphase, and in this period, primary burials are found under the floors of buildings. Burials are absent in the lr subphase, so that the dead might have been buried outside of the settlement.

General demographic studies of the skeletons, such as age, sex, and fertility, as well as their pathology and modifications before and after death, were carried out by Özbek (1988, 1995). Among the pathological conditions in the adults are cribra orbitalia, porotic hyperostosis, osteoarthritis, ankylosing spondylitis, and also osteomyelitis. About 4% of the permanent teeth had dental caries, which signify the consumption of carbohydrates as dietary staples. Studies of the burial practice and taphonomy of burnt human skeletons found from the Skull Building were also conducted (Le Mort et al. 2001). Some of the human bones bear cut marks, suggesting that some skeletons were defleshed before being placed in the Skull Building. Both animal and human blood have been identified by analysis of blood residues (hemoglobin crystals) (Loy and Wood 1989) recovered from the skeletons in the Skull Building, suggesting that mortuary rituals involving animal sacrifice took place. However, these results are open to debate, especially concerning the identification of the species of origin (Smith and Wilson 1992).

Analyses of stable carbon and nitrogen isotopes of the human remains were also carried out in recent years (Pearson et al. 2010, 2013). Samples for analysis were collected from all subphases of the Prepottery Neolithic. The study focused on whether diet was different between the primary inhumation skeletons buried under the houses and those from the secondary burials in the Skull Building. Animal bones were also analyzed to see if there were any fluctuations in isotope ratios resulting from environmental change. The results showed that both animals and humans had a C3-based terrestrial diet. The nitrogen isotope ratios in human, however, revealed a wide range of variation, which meant that there was differential access to food among the inhabitants. The meat of wild and domestic pigs had contributed significantly as an animal protein source. Individuals buried under houses exhibited lower nitrogen isotope ratios, suggesting that legumes and small games were main parts of their diet. Individuals in the secondary inhumations in the Skull Building had higher nitrogen isotope ratios, implying a higher intake of meat (and perhaps more bovid meat, which has a higher nitrogen isotope ratio) and cereals. Analysis of sexed skeletons from c subphase showed that males had more access to meat in general, or to food with higher nitrogen isotope ratios (bovid meat and cereals), than females. Thus, it is surmised that differential access to food resources was dependent on social rank and sex. In addition, analysis of nitrogen isotopes of infant and juvenile skeletons recovered from the burials under houses in c subphase points to the possibility that weaning at Çayönü was done at a time later than that of other contemporary sites in Central Anatolia. At Çayönü, juveniles were weaned between 2 and 3 and a half years of age, about a year later than at other sites. A demographic study of these same skeletons suggests that infant mortality at around

3–4 years of age is much higher at Çayönü and that this might have been an outcome of their weaning practices.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone, Trauma in
- ▶ Braidwood, Robert John
- ▶ Çambel, Halet
- ▶ Cattle: Domestication and Development
- ▶ Çayönü: Agriculture and Domestication
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Goat: Domestication
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Özdoğan, Mehmet
- ▶ Paleoethnobotany
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Pig: Domestication
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Sheep: Domestication
- ▶ Zooarchaeology

References

Braidwood, L.S., and R.J. Braidwood, eds. 1982. *Prehistoric village archaeology in south-eastern Turkey*, BAR international series. Vol. 138. Oxford: Archaeopress.

Braidwood, R.J., H. Çambel, B. Lawrence, C. Redman, and R. Stewart. 1974. Beginnings of village-farming communities in southeastern Turkey-1972. *Proceedings of National Academy of Science, U S A* 71 (2): 568–572.

Erim-Özdoğan, A. 2011. Çayönü. In *The Neolithic in Turkey, volume 1*, ed. M. Özdoğan and N. Başgelen, 185–269. Istanbul: Archaeology and Art Publication.

Ervynck, A., K. Dobney, H. Hongo, and R.H. Meadow. 2001. Born free? New evidence for the status of *Sus scrofa* at Neolithic Çayönü Tepesi (southeastern Anatolia, Turkey). *Paléorient* 27 (2): 47–73.

Evershed, R.P., S. Payne, A.G. Sherratt, et al. 2008. Earliest date for milk use in the Near East and southeastern Europe linked to cattle herding. *Nature* 455: 528–531.

Hongo, H., and R.H. Meadow. 1998. Pig exploitation at Neolithic Çayönü Tepesi (southeastern Anatolia). In *Ancestors for the pigs: Pigs in prehistory*, MASCA research papers in science and archaeology, ed. S.-M. Nelson, vol. 15, 77–98. Philadelphia: University of Pennsylvania, Museum of Archaeology and Anthropology.

Hongo, H., R.H. Meadow, B. Öksüz, and G. Ilgezdi. 2004. Animal exploitation at Çayönü Tepesi, southeastern Anatolia (Featuring complex societies in prehistory: Studies in memoriam of the Braidwoods). *TÜBA-AR (Turkish Academy of Sciences Journal of Archaeology)* 7: 107–119.

Hongo, H., J. Pearson, B. Öksüz, and G. Ilgezdi. 2009. The process of ungulate domestication at Çayönü, southeastern Turkey: A multidisciplinary approach focusing on Bos sp. and Cervus elaphus. *Anthropozoologica* 44 (1): 63–78.

Kuşatman, B. 1991. The origins of pig domestication with particular reference to the Near East. Unpublished PhD dissertation, Institute of Archaeology, University College London.

Lawrence, B. 1982. Principal food animals at Çayönü. In *Prehistoric village archaeology in south-eastern Turkey*, BAR international series, ed. L.S. Braidwood and R.J. Braidwood, vol. 138, 175–199. Oxford: Archaeopress.

Le Mort, F., A. Erim-Özdoğan, M. Özbek, and Y. Yilmaz. 2001. Feu et archéoanthropologie au Proche Orient (épipaléolithique-néolithique): le lien avec les pratiques funéraires. Données nouvelles de Çayönü ('Turquie). *Paléorient* 26 (2): 37–50.

Loy, T.H., and A.R. Wood. 1989. Blood residue analysis at Çayonu Tepesi, Turkey. *Journal of Field Archaeology* 16 (4): 451–460.

Meadow, R.H. 1986. Some equid remains from Çayönü, southeastern Turkey. In *Equids in the ancient world*, Beihefte zum Tübinger Atlas des Vorderen Orients, Reihe A, 19(1), ed. R.H. Meadow and H.-P. Uerpmann, 266–301. Wiesbaden: Dr. Ludwig Reichert.

Özbek, M. 1988. Culte des craines humains a Çayönü. *Anatolica* 15: 127–138.

Özbek, M. 1995. Dental pathology of the prepottery Neolithic residents of Çayönü, Turkey. *Annual Review of Anthropology* 73: 99–122.

Pearson, J.A., R.E.M. Hedges, T.I. Molleson, and M. Özbek. 2010. Exploring the relationship between weaning and infant mortality: An isotope case study from Aşıklı Höyük and Çayönü Tepesi. *American Journal of Physical Anthropology* 143: 448–457.

Pearson, J.A., M. Grove, M. Özbek, and H. Hongo. 2013. Food and social complexity at Çayönü Tepesi, southeastern Anatolia: Stable isotope evidence of differentiation in diet according to burial practice and sex in the early Neolithic. *Journal of Anthropological Archaeology* 32: 180–189.

Rosenberg, M., R.M.A. Nesbitt, R.W. Redding, and B.-L. Peasnall. 1998. Hallan Çemi, pig husbandry, and post-Pleistocene adaptations along the Taurus-Zagros arc (Turkey). *Paléorient* 24 (1): 25–41.

Smith, P.R., and M.T. Wilson. 1992. Blood residues on ancient tool surfaces: A cautionary note. *Journal of Archaeological Science* 19 (3): 237–241.

Stampfli, H.R. 1983. The fauna of Jarmo with notes on animal bones from Matarrah, the 'Amuq, and Karim Shahir. In *Prehistoric archaeology along the Zagros Flanks*, Oriental institute publications, ed. L.-S. Braidwood, R.J. Braidwood, B. Howe, C.A. Reed, and P.J. Watson, vol. 105, 431–483. Chicago: The Oriental Institute of the University of Chicago.

Stewart, R.B. 1976. Paleoethnobotanical report – Çayönü 1972. *Economic Botany* 30: 219–225.

Van Zeist, W., and G.J. de Roller. 1994. Plant remains from aceramic Çaynü, SE Turkey. *Palaeohistoria* 33/34 (1991/1992): 65–96.

Further Reading

Hongo, H., R.H. Meadow, B. Öksüz, and G. Ilgezdi. 2005. Sheep and goat remains from Çayönü Tepesi, southeastern Anatolia. In *Archaeozoology of the Near East VI*, ARC-Publicaties 123; Proceedings of the sixth international symposium on the archaeozoology of southwestern Asia and adjacent areas, ed. H. Buitenhuis, A.M. Choyke, L. Martin, L. Bartosiewicz, and M. Mashkour, 113–124. Groningen: ARC Publications.

Ilgezdi, G. 2000. Zooarchaeology at çayönü: A preliminary assessment of the red deer bones. In *Archaeozoology of the Near East IVA*, ed. H. Buitenhuis, M. Mashkour, and A.L. Choyke, 141–153. Groningen: ARC-Publications.

Lawrence, B. 1980. Evidences of animal domestication at Çayönü. In *The joint Istanbul, Chicago Universities' prehistoric research in southeastern Anatolia I*, ed. H. Çambel and R.J. Braidwood, 257–283 (Turkish), 285–308 (English). Istanbul: Edebiyat Fakültesi Basimevi, Istanbul University.

Öksüz, B. 2000. Analysis of the cattle bones of the prepottery Neolithic settlement of Çayönü. In *Archaeozoology of the Near East IVA*, ed. H. Buitenhuis, M. Mashkour, and A.L. Choyke, 154–163. Groningen: ARC-Publications.

Özdoğan, M., and A. Özdoğan. 1990. Çayönü: A conspectus of recent work. In *Préhistoire de Levant II*, ed. O. Aurenche and M.-C. Cauvin, 65–74. Lyon: Maison de l'Orient.

Stewart, R.B. 1976b. Paleoethnobotanical report- Çayönü 1972. *Economic Botany* 30: 219–225.

Van Zeist, W. 1972. Palaeobotanical results of the 1970 season at Çayönü, Turkey. *Helinium* 12 (1): 3–19.

Yilmaz, Y. 2010. Burial practices in Anatolia in the Neolithic period: Examples from Çayönü. (Neolitik Dönem'de Anadolu'da Gömüt Uygulamaları). Unpublished PhD dissertation, Istanbul University (In Turkish with English summary).

Çayönü: Agriculture and Domestication

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Introduction

The Neolithic site of Çayönü is a flat mound, situated at the southern flanks of the East Taurus range in the plain of Ergani, 60 km north of the province center of Diyarbakır in southeastern Turkey. The site is located at an elevation of about 800 m within the catchment area of Tigris River, extending 200 m along a small perennial stream; the exact dimensions of the site are difficult to estimate; as 120 m in from the stream, archaeological deposit dips under the cover of the present level of the plain.

The site was discovered in 1963 during surveys of the Istanbul-Chicago joint project under Halet Çambel and Robert J. Braidwood. Excavations at Çayönü took place firstly under H. Çambel and R. J. Braidwood in 1964, 1968, 1970, 1972, and 1978–1984 (Braidwood and Çambel 1982) and from 1985 to 1991 by Özdoğan and Özdoğan (1990) uncovering an area of over 4000 m^2, being one of the largest exposures of the Pre-Pottery Period in the Near East (Fig. 1).

Key Issues

Even though Çayönü covers almost the entire span of the Neolithic Period from the early Pre-Pottery Neolithic up to the end of the Pottery Neolithic Period, the site owes its reputation to its long sequence of the Pre-Pottery occupation. The Pre-Pottery deposits have been categorized

Çayönü: Agriculture and Domestication, Fig. 1 Çayönü, the eastern exposure from the air

Çayönü: Agriculture and Domestication, Table 1 Pre-Pottery Phases

Pottery Neolithic	PN (c. 7000–6400)
Large Room Building Sub-phase	PPNC (c. 7200–7000 BCE)
Cell Building Sub-phase	PPNB Late (c. 7200–7500 BCE)
Cobble-Paved Building	Early PPNB (c. 7900–7600 BCE)
Channelled Building Sub-phase	Early PPNB (c. 8000–7900 BCE)
Grill Building Sub-phase	PPNA-early PPNB transition (c. 8400–8000 BCE)
Round Building Sub-phase	PPNA (c. 9500–8400 BCE)

into six phases according to the distinct building plan types that characterize evolutionary stages in the architecture of the Neolithic Period, each phase being denominated accordingly by the ground plan type of the buildings. Even though each sub-phase comprises several building layers, the main sequence runs as (Erim-Özdoğan 2012) follows (Table 1):

Çayönü has revealed an uninterrupted cultural sequence covering the formative stages of the Neolithic Period, providing the missing links between various evolutionary stages that have been more extensively documented at other sites. The earliest occupation at Çayönü presents a unique model of a complex sedentary hunter-gatherer community, evidencing in its later stages cultivation of cereals and certain pluses and introduction of domestic animals, finally developing the principle components of a farming village. A significant contribution of Çayönü has been to the history of architectural practices, beginning with round-planned hut-like structures of wattle and daub, developing in time to rectangular buildings with stone foundations. The excellent state of preservation of its architectural remains has made it possible to evince the transformation of simple dwellings to structurally developed houses attaining new functions. Grill Sub-phase phase marks the initial stages of transition to tripartite rectangular plan type with raised living floors and vault-like roofing of light materials such as reeds and/or twigs (Fig. 2). Architectural practices have developed through later stages of the Pre-Pottery occupation, by the Cell Sub-phase becoming two-story flat-roofed buildings with solid stone foundations and walls of mudbrick.

From the Grill Sub-phase on, the settlement presents a pre-planned layout with a special communal building being located at the eastern end of the site. By the Cobble-Paved Sub-phase, special buildings were aligned around a large and well-kept plaza that was adorned with standing stones. The plaza persisted until the end of the Pre-Pottery Period. By the Pottery Neolithic Phase, the orderly layout of the settlement was no longer maintained. Special buildings have strong stone

Çayönü: Agriculture and Domestication, Fig. 2 Çayönü, a Grill building

walls reinforced with buttresses, framing a large rectangular space with benches along the sidewalls. The floors of earlier ones are either paved with flagstones or covered with sand, while the latest one corresponding to the Cell Sub-phase has a pink terrazzo flooring decorated with lines of white stones set into the cement-like flooring of burned limestone. One of the special buildings, the so-called Skull Building, signifies the death cult, as the skeletal remains of over 400 individuals were interred in the building (Fig. 3). The Skull Building has several rebuilding phases; the earlier ones consisted of a large round space, while the later had a large rectangular court and adjoining cell-like crypts. While the earlier building phases housed secondary burials, caches of leftover bones, and articulated skeletal parts, the final phase consisted mainly of skulls and long bones. Most of the Cell Sub-phase buildings have single or multiple burials beneath the floors, some adorned with burial gifts (Le Mort et al. 2000).

The Pre-Pottery Phase has revealed a rich and varied assemblage. There is a relatively high percentage of obsidian among the chipped stone assemblage; the ratio between obsidian and flint is almost equal by the end of the period. Along with conventional tools of its time period, there

Çayönü: Agriculture and Domestication, Fig. 3 Çayönü, the "Skull Building" showing two phases: the (round)

were also long obsidian blades – known as "Çayönü blades" – that sometimes exceeded 20 cm in length, with steep-sided retouch and heavy traces of abrasion on ventral surfaces; these artifacts have become the markers of the PPNB horizon at the site (Caneva et al. 2001). Çayönü has revealed some of the most outstanding specimens of ornamental objects of various rocks and minerals; a workshop specialized in bead manufacturing has been recovered in the Cell Sub-phase, revealing the entire process from blanks to finished products. The recovery of artifacts made of native copper and malachite has been an astounding discovery, because in strong contrast to the conventional view, the use of metal was earlier than pottery. The native copper was heat treated and hammered to shape simple tools such as hooks, pins, and inlays (Özdoğan and Özdoğan 1999).

In the earliest stage, Çayönü was dependent on hunting, fishing, and gathering of plants. Wild boar, wild cattle, deer, sheep, and goat are among the most hunted species, and among plants, pulses and wild lentils were important (van Zeist and de Roller 1994). There is some controversy on the date of the earliest domestic pig at Çayönü; however, they appear as the first domestic species at the site during the Channelled Building Sub-phase followed by sheep, goat, and cattle (Hongo and Meadow 2000). Even though pulses continued as the main component in subsistence, wild emmer (*Triticum dicoccoides*) and einkorn (*Triticum boeoticum*) are also present in the Channelled Buildings Sub-phase (van Zeist and de Roller 1994). During the PPNB stage, fully cultivated emmer wheat, domestic sheep, and goat take over from hunting-gathering.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeology and Anthropology
- ▶ Braidwood, Robert John
- ▶ Breasted, James Henry
- ▶ Çambel, Halet
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Pig: Domestication
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Wheats: Origins and Development
- ▶ Zooarchaeology

References

Braidwood, R.J., and H. Çambel, eds. 1982. *Prehistoric village archaeology in south-eastern Turkey*, BAR international series. Vol. 138. Oxford: Archaeopress.

Caneva, I., M.R. Iovino, C. Lemorini, A. Özdoğan, and D. Zambetti. 2001. A combined analysis of lithic assemblages from Çayönü. In *Beyond the tools. Redefining the PPN lithic assemblages of the Levant*, ed. I. Caneva et al., 165–181. Berlin: ex oriente.

Erim-Özdoğan, A. 2012. Çayönü. In *The Neolithic in Turkey: New excavations & new research. volume 1: The Tigris Basin*, ed. M. Özdoğan, N. Başgelen, and P. Kuniholm, 185–269. Istanbul: Archaeology & Art Publications.

Hongo, H., and R.H. Meadow. 2000. Faunal remains from prepottery Neolithic levels at Çayönü, southeastern Turkey: A preliminary report focusing on pigs (*Sus* sp.). In *Archaeozoology of the Near East IV*, ed. M. Mashkour et al., 122–140. Groningen: ARC Publications.

Le Mort, F., A. Erim-Özdoğan, M. Özbek, and Y. Yilmaz. 2000. Feu et archéoanthropologie au Proche-Orient (Épipaléolithique et Néolithique). Le lien avec les pratiques funéraires. Données nouvelles de Çayönü (Turquie). *Paléorient* 26 (2): 37–50.

Özdoğan, M., and A. Özdoğan. 1990. Çayönü. A conspectus of recent work. In *Préhistoire du Levant II*, ed. O. Aurenche and M.-C. Cauvin, 65–74. Lyon: Maison de l'Orient.

Özdoğan, M., and A. Özdoğan. 1999. Archaeological evidence on the early metallurgy at Çayönü Tepesi. *The Beginning of Metallurgy, der Anschnitt* 9: 13–22.

van Zeist, W., and G.J. de Roller. 1994. Plant remains from aceramic Çayönü, SE Turkey. *Palaeohistoria* 33/34 (1991/1992): 65–96.

Celtic Art

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Introduction

When looking at Celtic art, we must consider two things: who were the Celts, and how do we define

art? The *Oxford Dictionary* defines art as the expression or application of human creative skill as painting or sculpture, producing works to be appreciated primarily for their beauty or emotional power. While this definition certainly encompasses some aspects of Celtic art, where does it leave the everyday items such as jewelry, weapons, tools, and pottery, which serve a functional purpose but also bear some form of decoration or ornamentation (Harding 2007: 6)?

It was not until the sixteenth and seventeenth centuries AD that the Welsh antiquarian, Edward Lhwyd, made the connection between descriptions and names given to ancient Celts and the surviving languages of Western Europe. While the term "Celt" was never used by the early populations of the British Isles and Ireland to describe themselves, linguistic analysis traces the oldest form of spoken Celtic to present-day Ireland (Megaw and Megaw 2001: 10). Celtic culture was never static; throughout the archaeological record, we can see evidence of constant adaptation, evolution, and development in material, style, and manufacture, as well as geographic location (Megaw and Megaw 2001: 10). This entry discusses the origin of the Celts, the various styles of Celtic art, and their location in the archaeological record.

Definition

By trying to use the modern application of the term "art," we run the risk of misinterpreting the significance of Celtic art to its originators (Koch 2006: 89); instead we must analyze the styles and motifs used to draw ourselves a picture of a culture that has little to no written history. The term "Celtic art" is most commonly used to describe the material culture of the group historically referred to as "The Celts": a dominant culture throughout the Late Bronze Age, into the Iron Age, until they were overrun by the Romans during their expansion in the first century BC (Green 1997: 12). As many pieces considered to be Celtic art were clearly made to serve a practical purpose, I use the term "Celtic art," following the Megaws, to encompass elements of decoration beyond those necessary for functional utility, perhaps with an underlying, communicative purpose (Megaw and Megaw 1994: 29, 2001: 19).

Historical Background

The first written records which make direct reference to the "Celts" as a cultural group come from the fifth century BC, in the writings of the Greek historians Herodotus and Hecataeus. Hecataeus makes mention of a population of Celts residing in the Greek colony of Massalia (Marseilles) as well as in ancient Noricum (Austria). Herodotus, in books II and IV of his fifth-century BC *History*, writes of the Celts, referred to as "*Κελτοί*," peopling the region of Danube and the areas beyond the Pillars of Hercules (Straits of Gibraltar) (Powell 1958: 15; James 1993: 7; Green 1997: 11; Cunliffe 2003: 8; Megaw and Megaw 2005: 7; Harding 2007: 3). Here, I use the term "Celts" to refer to groups of people that shared a common identity through their language and religious beliefs, rather than a specific ethnicity (Moscati et al. 1991: 25; Koch 2006: 89). There are three main sources available when looking for evidence of the ancient Celts: written accounts from classical observers, second- or thirdhand accounts that often refer to the Celts as "barbaric"; Celtic written sources, Irish and Welsh hero tales or codes of law written during the Christian period in the seventh century AD; and the archaeological record which, if we are lucky, provides us with artifacts sans context, leaving us to infer the representativeness of any discoveries. Archaeological evidence of Celtic culture has been dated to around 750BC at the site of *Hallstatt*, a salt mine located in what is now central Austria, and the namesake of the first Celtic art style (Jacobsthal 1944: 154; Green 1997: 15).

Celtic Art Styles

The site of Hallstatt contains 1000 graves, most containing extravagant grave goods, and was first unearthed in upper Austria during the early nineteenth century. The arts of the earlier, Hallstatt, Iron Age (c. 750–500BC) has been called lifeless and boring in comparison with that of the later

styles of Celtic art; however, we can see from the patterns used that the Hallstatt style was very much a blueprint for the basis of Celtic design and form (Finaly 1973: 32), identified by the predominant use of geometric and non-representational designs.

La Tène culture takes its name from its geographic origins, a lakeside settlement on Lake Neuchâtel in western Switzerland. The products of the earliest manifestations of this art were designated by Paul Jacobsthal in his magnum opus *Early Celtic Art* (1944). The stylistic divisions used in this chapter largely follow those established by Jacobsthal. The styles mentioned above were first defined by Paul Jacobsthal, and though others have made attempts to re-categorize these over the years, Jacobsthal's terminology is still the widely accepted method.

It is difficult to locate the exact genesis of this "Early style," but archaeological evidence places it at around 500BC, intersecting with the geometric formality of the earlier Iron Age and contrasting to it with the addition of floral, non-contiguous patterns and curvilinear features (James 1993: 15; Megaw and Megaw 2001b, 2005; Garrow et al. 2009). The use here of "La Tène" as a descriptor for this period of Celtic art is merely a generalization covering a set of burial traditions, both inhumation and cremation, in which individuals are interred in a single grave, usually with personal items, in a cemetery (Cunliffe 2003: 66). In the Early style we also see what is referred to as the "orientalizing" of Celtic art wherein Celtic craftsmen begin to incorporate Greek and Italian motifs with the linear and geometric designs of the Hallstatt style with the occasional use of imported coral and amber.

Anthropomorphic faces are ubiquitous in La Tène art and are often present on finger rings; neck and arm rings; foliage designs of Middle Rhine gold leaf; the bases of flagon handles; belt plaques; sword scabbards and chariot fittings; and safety-pin brooches. Though there are many forms of variation, it is apparent that there are two main prototypes for faces in Celtic art, both largely adapted from Etruscan forms, as seen on contemporary metal work imported into the Celtic world. These are the bearded silen and the clean-shaven face featuring hair with a straight-cut fringe. Another feature of some Celtic heads from this period is the reduction of the face to a series of simplified protuberances in a cartoon-like abstraction, a precursor to the later "Plastic" style. Also commonly occurring throughout this period are zoomorphic figures, often in the form of brooches. The predominant zoomorphic representations are bird's heads but other animals, such as sheep and boar, while mythical creatures, like the Griffon, are also present. The meaning these images carried is almost impossible to determine, although we can assume it went beyond a simple fastening of one's garments (Megaw and Megaw 2001b). Certain characteristics of La Tène art also became fundamental features of the following style: previously known as Waldalgesheim, after a rich early La Tène woman's gown, but now more commonly referred to as the Vegetal style.

Vegetal style begins around 350BC, during a period of cultural expansion, and overlaps with the Early, La Tène, style. This expansion heralded a change in Celtic society; the centralized nature of the western Celtic zone gave way to the growth of rural centers, demonstrable by the wider distribution of grave goods in flat cemeteries rather than the rich barrow burials, and suggests the emergence of an oligarchic warrior society in place of a ruling dynasty (Megaw and Megaw 2001b: 107). Following the cultural shift came a shift in artistic innovation, reflecting the societal restructure.

The type site of this phase is the "princess" grave of Waldalgesheim, near Bonn in the Middle Rhine, from which the style took its original name. This chariot burial was that of a woman, indicated by the presence of jewelry and lack of weaponry or other characteristically male grave goods. The golden torque and arm bands, found among other burial items, have little resemblance to other artistic wares from the Middle Rhine region but do feature similar forms of ambiguous anthropomorphic representation found in the earlier styles of Celtic art, demonstrating the overlap between the different stylistic changes (Green 1997: 26; Megaw and Megaw 2001b: 113). Figure 1 is a close-up of one of the Waldalgesheim arm bands; note the human faces peering out from

Celtic Art, Fig. 1 Waldalgesheim "princess" burial arm band. Rheinisches Landes Museum, Bonn. (Photo: JVS Megaw)

within the tendrils. One of the prominent features of Vegetal style is the ambiguous representations and obvious affinities to stylized classical plant or vine tendrils (Megaw & Megaw 2005: 11). Anthropomorphic and zoomorphic forms move from the foreground to the background, now appearing from behind the more dominant Vegetal themes in a so-called "Cheshire cat" (Jacobsthal 1944: 162) style of ambiguity, a prevalent theme across all variations of Vegetal art. Contrasting to the chieftaincy period, the Vegetal style shows a broad distribution and an extraordinarily rapid spread, including its adaptation to regional forms in the east and west (Megaw and Megaw 2001b).

Sword style, deemed by Jacobsthal to be one part of the third phase of early Celtic art, is a substyle of Waldalgesheim beginning around 250BC. More properly to be regarded as a number of regional variants stretching from France to the Balkans (Megaw and Megaw 2005: 11), during this phase longswords were common, worn slung over the back rather than hung from the hip (Green 1997: 95). Motifs and symbols on the swords, notably pairs of dragon-like creatures, are possibly representative of social status, identity, or battle prowess, perhaps also serving an apotropaic purpose. The ritual significance of the

Celtic Art, Fig. 2 Gold finger ring, Waterton collection, Victoria and Albert Museum, London. (Crown copyright reserved)

sword is demonstrated by its frequent presence in graves and offering places, the scabbards bent or "killed" before deposition, following a pattern of ritual destruction which extends back into the early La Tène period (Megaw and Megaw 2019: 12).

Overlapping with the Sword style around the late third century BC, the "Plastic" three-dimensional style was coined as the "Disney style" by Megaw and Megaw (2005: 11). The term "plastic," as used by Jacobsthal, refers to the three-dimensional aspects of this art. This style contains the largest variety of imagery in the form of ambiguous faces, both animal and human, with the use of curvilinear geometric forms that are similar to a cartoonist's art. A fine example of this anthropomorphic abstraction using plant-derived motif is found on a gold finger ring (Fig. 2), possibly from Sardinia, dated around the first half of the third century BC. The most well-known definition of "Plastic" style comes from Jacobsthal's *Early Celtic Art* where he relates the vagueness of the human and animal depictions to that of Alice in Wonderland's Cheshire cat; now you see it, now you don't (Jacobsthal 1944; Megaw and Megaw 2001a: 211, 212).

A pre-Roman art form that is not classified specifically by any one of the styles mentioned above is that of the Celtic coin: first introduced into Celtic society in the third and fourth centuries BC through interactions with their Greek neighbors. The Greeks used coins as a form of tribute and to pay taxes and to pay mercenaries, a

majority of whom were Celts and are believed to have initiated the presence of coinage in the greater Celtic society (Nash 1987: 16; Megaw and Megaw 2001b: 177). The initial adoption of coinage by the Celts followed along the same line as the Greeks, in terms of form and function; though variations in model and material vary depending on location. As the use of coinage grew throughout the Celtic world, the predilection for non-representational art and abstraction saw alterations and adaptations of the classical designs to suit their new Celtic origins (Jersey 1996:6), or, as Robert D. Van Arsdell so eloquently puts it, "Celtic coins look the way they do because that's exactly the way the Celts wanted them to look" (Van Arsdell 1989: 33). Zoomorphic representation, an ever-present theme throughout Celtic history, is certainly not excluded from the manufacture of Celtic coin. The "Horse-and-rider" combination is one motif seen across many variants of Celtic coinage in a plethora of stylistic representations, shown here (Fig. 3) on a silver coin from Boii, near Bratislava, Czechoslovakia.

Romano-Celtic Art

After surveying five centuries of pre-Roman Celtic art, we must now turn to Celtic art of the Roman and post-Roman era. Having conquered Gaul, the Romans spent another 100 years engaging in battles and skirmishes to secure Germany, in AD 15, and Britain, in AD 43 (Bogucki and Crabtree 2003: 142). The Celts who survived this Roman onslaught were assimilated into the Roman Empire over the following 300 years, their culture completely reorganized by the Roman occupation. This is demonstrated in the presence, or lack thereof, of Celtic material culture, particularly metalwork, having survived from this time (Koch 2006: 98). Of the residual items, enamelling seems to have become a more prevalent form of ornamentation, replacing the Early style preference for amber or coral inlay, and we see an increase in the Roman art of die-stamping as well as a stronger presence of linear motif, as opposed to the curvilinear style favored in earlier Celtic art. Though the Roman presence dominated many aspects of Celtic culture, designs and motifs of Celtic origin persevered in items such as the "dragonesque" brooches. This shows a clear amalgamation of Roman technology, present in the use of colored enamels and Celtic motifs. The curved "S" shape and decoration of the brooches hearken back to the La Tène "dragon pairs" (Megaw and Megaw 2005: 69–75). Another change in Celtic art, engendered by the Roman occupation, was an increase in anthropomorphic representation and the presence of religious Celtic imagery (Rankin 1996: 259). Celtic deities now took on anthropomorphic forms, for example, the Celtic horse goddess, Epona. With little to no representation in Celtic iconography before the Roman period, Epona became so popular throughout Roman-Celtic Europe that her image is found across the Celtic world and beyond; in fact, she was the only Celtic deity to be granted a festival day in the Roman Calendar: the 18th of December (Green 1997: 147, 148). The amalgamation of the swirling, ambiguous, and curvilinear art

Celtic Art, Fig. 3 "Biatec" coin featuring horse-and-rider motif. Magyar Nemzeti Múzeum, Budapest. Matissek [Public domain]

of Celtic culture with the rigid, four-square, naturalistic world of Roman expression provided Celtic art with a new source of inspiration, indeed; in Roman Britain, Celtic craftsmen choose to adapt new techniques and motifs to suit old beliefs and ways of representing the tangible and intangible world (Megaw and Megaw 2005: 243).

Christianity and Celtic Art

Another large-scale event that left its mark on Celtic culture was the emergence of a new, Mediterranean-based religion, Christianity. Evidence suggests this new belief had reached the Roman province of Britannia in the early years of the third century AD, and between AD 400 and 600, the Brythonic kingdoms, now called Scotland, were also converted to Christianity (Koch 2006: 98). Travelling missionaries played a pivotal role in the development of Christian-Celtic art; not only spreading the Christian message from Ireland across the continent of Europe but also spreading Celtic religious practices, returning with foreign artistic styles. These were then adapted and combined into Celtic designs (Green 1997: 156). For the first time in the archaeological record, we begin to see Celtic language, artistry, and religious ideals preserved and recorded in illuminated manuscripts (Allen 1904: 232; Finaly 1973: 105). Almost exclusively associated with the Church, the illuminated manuscripts portray Mediterranean and Germanic elements while maintaining the design and motifs of Celtic art (Koch 2006: 103). The images in these manuscripts were not intended as individual illustrations but rather as an iconographic representation of religious scripture. A single illuminated book could contain over 100 paintings, all intimately connected to specific Gospel writings (Backhouse 1979: 7). One such manuscript, *The Cathach* (or battler) *of Colum Cille*, dating to the early seventh century AD, is an incomplete Christian manuscript that takes its name from being carried as a talisman at the front of the O'Donnell army in AD 1497 (Megaw and Megaw 2005: 250). In the *Cathach* the only form of decoration is the enlarged initial letter of each psalm, which is illuminated. In contrast, the *Book of Kells*, perhaps the most ornate of all the illuminated manuscripts, dating to the year c. AD 800 (Simms 1961: 23; Brown 1980: 7; Bioletti et al. 2009: 1043), features exquisite detail. It exhibits the fundamentally Celtic inclination of reducing natural forms to stylized pattern with the addition of bird, animal, and human forms, which are depicted not just as minor parts of the fully decorated or "carpet" pages but as additions to the text itself (Koch 2006: 105). Evidence of this new artistic trend is present throughout the *Book of Kells*. One such example is the "Chi-Rho" page, 34r (plates X, XI Simms 1961) (Fig. 4), which are decorated with various types of interlace, some rectilinear and some zoomorphic (Megaw and Megaw 2001b: 255) and bearing the Greek letters "X," "P," and "I", an abbreviation of Christ, or *Χρίστος*, used throughout the illuminated manuscripts. This method of abbreviation is seen throughout the *Book of Kells*. Other examples include the letters "IHS" for Jesus and "SPS SCS" representing the *Spiritus Sanctus* (Meehan 2018). The "Chi-Rho" page also

Celtic Art, Fig. 4 "Chi-Rho" page from the Book of Kells, folio 34r. Trinity College, Dublin. Public domain; faithful reproduction of a 1200 year old piece of art

features one of the most popular scenes among the illuminated manuscripts: that of two cats playing with two mice who are nibbling away at what can be presumed to be a representation of the host (Brown 1980: 89; Megaw and Megaw 2001a: 209; Meehan 2018). Creating these manuscripts was a costly exercise; pages were most often made of vellum, usually from a calf or a sheep; inks were created using a variety of animal, vegetable, and mineral components; and gold was applied to the pages either as a fine powder or as sheets of gold leaf (Backhouse 1979: 8). While the illuminated manuscripts provided Celtic craftsmen with a new medium for artistic expression, the presence of Early Celtic motifs throughout these works demonstrates the resurgence of Celtic culture and its ability to inform the growing Christian society (Megaw and Megaw 2001b, 2005).

With the development of Christianity came an artistic shift toward that of monumental stone carving, namely, that of the Celtic cross, which date from the period of Celtic conversion to Christianity to the Norman conquest (Seabourne 1989: 5). Found across Ireland, Scotland, Wales, the Isle of Man, and Cornwall (Koch 2006: 915), the crosses were often placed at significant religious sites, either as decoration or an educational tool, but were occasionally used to signify the holdings of the founder of a community as a place marker for a historical event or as a grave marker (Seabourne 1989: 5; Joyce 1998: 75). Initially pillar stones decorated with only a simple cross and perhaps an inscription (Koch 2006: 105), the form of the Celtic cross evolved into large and free-standing monuments, the most well-known of which are the ringed head and high-cross designs, often carved on all four sides with anthropomorphic iconography, animal and plant motifs, and abstract or geometric designs (Werner 1990: 98; Koch 2006: 915). The Celtic crosses located in Ireland are predominantly Christian, featuring iconography relating to the Old and New Testament, as well as hunting scenes that were perhaps significant to the communities in which they were built. There are two main themes of animal ornament: mythical and fantastic beasts; and interlaced animals, such as lions or snakes, birds, and people, woven together to form complex patterns (Koch 2006: 917). Often carved from fine-grained sandstone, the Celtic cross was mounted on a rectangular or pyramidal base, sometimes stepped, and was either carved from a single stone slab or constructed of separate pieces using a mortise and tenon joint (Allen 1904: 234; Werner 1990: 98; Maier 1997: 147). Muiredach's cross (Fig. 5), located at the monastery of Monasterboice, Ireland, is an excellent example of the craftsmanship and iconography of the Celtic high cross. Detailed carvings feature biblical motifs such as Eve handing Adam the forbidden fruit while standing under the apple tree and Cain slaying Abel. There is a depiction of Christ standing in judgment placed at the top of the cross above a scene depicting the weighing of the souls. This is presided over by the Archangel Michael. The Muiredach cross features a capstone in the form of a house or a reliquary and an inscription at the base, as well as two cats, possibly with mice, an echo of the

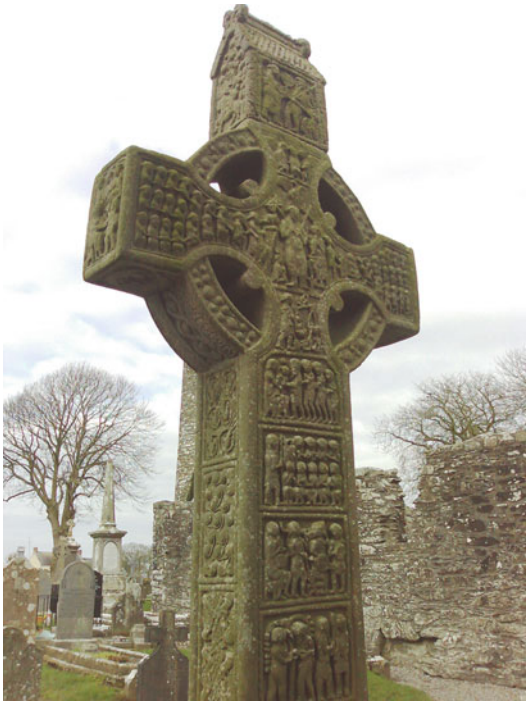

Celtic Art, Fig. 5 Muiredach's Cross, Monasterboice, Ireland. (Photo: Adriao [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)])

imagery used in the "Chi-Rho" page of the *Book of Kells* (Harbison et al. 1978: 62). Though the construction, design, and motifs were particular to the high cross, the message remained the same – power, protection, patronage, and piety (Koch 2006: 915). The Celtic cross was testimony to the power of the Christian faith in post-Roman Celtic culture.

Metalwork continued to be a principal means of artistic expression in Christian times, evidenced by the so-called hanging bowls. These are ornate bowls often made of thin bronze, either beaten or spun into a crescent shape and shouldered at the top, complete with rings from which they were suspended (Megaw and Megaw 2005: 247). Below the shoulder, on the outside surface, the suspension rings are secured by decorative escutcheons. These were often reused on other hanging bowls or sometimes kept individually. Some have been found pierced and in non-funerary contexts which suggests they had some sort of individual value or importance. It has been suggested that the Celtic hanging bowls are variants of a Roman design which were adopted by the Celts for use as lamps, handbasins, fine tableware, and/or religious ornaments (Laing 1987: 23), though the real purpose of these artifacts remains unknown. The context in which they have been found suggests that almost all were quite old at the time of their deposition. The largest preserved hanging bowl comes from the great ship burial found at Sutton Hoo (Fig. 6), near Woodbridge in Suffolk, and features decorative enamelled plaques on the internal and external bases of the bowl (Megaw 2005: 247–248).

Post-Roman art heralded an expansion in societal structure and cultural beliefs in Celtic society and is mirrored in the art dating from this period. The Celts devotion to their culture did not diminish under Roman rule (Shirokova 2015: 206). Rather, the Celtic penchant for adapting and incorporating new artistic styles enabled the art to endure. Making use of Roman techniques and materials allowed Celtic art to grow and evolve to suit its changing environs while maintaining its originality. Contrarily, the conversion to Christianity saw Celtic artistic expression expand yet further by incorporating elements of early Celtic art with those of the Christian faith to produce some of the most awe-inspiring works of the period. Though the motifs and designs retained their Celtic identity, the context in which they were used altered to match the new, Christian beliefs. Given fresh media for expression and a new, Christian-inspired purpose, Celtic art was no longer used to display social status, but instead was used for the decoration of sacred pieces whose function was the glorification of God and the teaching of religious scripture.

Celtic Art, Fig. 6 Sutton Hoo hanging bowl. British Museum, London

Key Issues/Current Debates

The main debate surrounding Celtic art is focused around the question of whether "the Celts" can be regarded as a cultural group. While there are a great many similarities between artistic styles and languages, as well as historical references to "Celts" dating back to classical times, some scholars, such as John Collis (2003), question whether material culture and linguistics are enough to categorize a singular "Celtic culture." This question cannot be answered definitively, and this chapter will not attempt to try. However, it is a subject that requires more research and will surely be debated for years to come.

Currently, tracking the changes in decoration and form between artifacts and connecting this to an item with an absolute date have been used to establish chronology (Garrow et al. 2009: 79), and while Jacobsthal's framework is that which is still most commonly used, it cannot provide definitive results. Unfortunately, for the moment at least, the function and significance of early Celtic art remains as ambiguous as its design.

Cross-References

- ▶ Archaeology and Art
- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman
- ▶ Battlefield Archaeology
- ▶ Bioarchaeology in the Roman Empire
- ▶ Ceramics, Roman Imperial
- ▶ Christian Archaeology in Spain
- ▶ Christian Topographies During Late Antiquity and the Early Middle Ages
- ▶ Christianity: Survival and Reemergence
- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Dating methods (Absolute and Relative) in Archaeology of Art
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Ethnoarchaeology of Salt in Romania
- ▶ Iconography in the Roman World
- ▶ Irish Post-Medieval Archaeology Group (IPMAG)
- ▶ Maps, Cartography, and Worldview in the Roman World
- ▶ Megaw, Vincent
- ▶ Metallurgy
- ▶ Metals: Preservation and Conservation
- ▶ "Motif" in the Archaeology of Art
- ▶ Nuragic Culture and Architecture (Bronze Age to Iron Age)
- ▶ Portable Art recording methods
- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Romanization
- ▶ Survey Archaeology in the Roman World

References

Allen, J.R. 1904. *Celtic art in Pagan and Christian times*. Philadelphia: Jacobs.

Backhouse, J. 1979. *The illuminated manuscript*. New York: Phaidon Press.

Bioletti, S., R. Leah, J. Fields, B. Meehan, and W. Blau. 2009. The examination of the book of Kells using micro-Raman spectroscopy. *Journal of Raman Spectroscopy* 40 (8): 1043–1049.

Bogucki, P., and P.J. Crabtree. 2003. *Ancient Europe, 8000 B. C. to A. D. 1000: An encyclopedia of the barbarian world.* Farmington Hills: Cengage Gale.

Brown, P. 1980. *The Book of Kells*. Dublin: Thames & Hudson.

Collis, J.R. 2003 *The Celts: Origins, myths & inventions* (reprinted with corrections 2010). Stroud: Tempus.

Cunliffe, B. 2003. *The Celts: A very short introduction*. New York: Oxford University Press.

Finaly, I. 1973. *Celtic art: An introduction*. London: Faber & Faber.

Garrow, D., C. Gosden, J.D. Hill, and C. Bronk Ramsey. 2009. Dating Celtic art: A major radiocarbon dating program of Iron Age and Early Roman metal work in Britain. *The Archaeological Journal* 166 (1): 79–123.

Green, M. 1997. *Celtic art: Symbols and imagery.* New York: Sterling Publishing Company.

Harbison, P., J. Sherman, and H. Potterton. 1978. *Irish art and architecture: From prehistory to the present*. London: Thames & Hudson.

Harding, D.W. 2007. *The archaeology of Celtic art*. Oxon: Routledge.

Jacobsthal, P. 1944. *Early Celtic art*. Oxford: Clarendon Press.

James, S. 1993. *Exploring the world of the Celts*. London: Thames & Hudson.

Jersey, P.D. 1996. *Celtic coinage in Britain*. Buckinghamshire: Shire Publications.

Joyce, T. 1998. *Celtic Christianity: A sacred tradition, a vision of hope*. Maryknoll: Orbis Books.

Koch, J.T., ed. 2006. *Celtic culture: A historical encyclopedia*. Santa Barbara: ABC-CLIO.

Laing, L. 1987. *Later Celtic art in Britain and Ireland*. Bucks: Shire Publications.

Maier, B. 1997. *Dictionary of Celtic religion and culture*. Woodbridge: The Boydell Press.

Meehan, B. 2018. *The Book of Kells. Official guide*. Revised 2nd ed. London: Thames and Hudson.

Megaw, R., and J.V.S. Megaw. 1994. Through a window on the European Iron Age, darkly: Fifty years of reading Early Celtic art. *World Archaeology* 25 (3): 287–303.

Megaw, R. and J,V.S. Megaw. 2019. forthcoming *Early Celtic Art: A Supplement*. Oxford: Oxford University Press.

Megaw, J.V.S., and R. Megaw. 2001a. *A cat-and-mouse game: Tracing Iron Age elements in the Book of Kells*. Rahden/Westf.: M. Leidorf.

Megaw, R., and V. Megaw. 2001b. *Celtic art: From its beginning to the Book of Kells*. London: Thames & Hudson.

Megaw, R., and V. Megaw. 2005. *Early Celtic art in Britain and Ireland*. Buckinghamshire: Shire Publications.

Moscati, S., O.H. Frey, V. Kruta, B. Raftery, M. Szabò, E. Arslan, and D. Vitali, eds. 1991. *The Celts*. New York: Rizzoli International Publications.
Nash, D. 1987. *Coinage in the Celtic world*. London: Seaby.
Powell, T.G.E. 1958. *The Celts*. London: Thames & Hudson.
Rankin, D. 1996. *Celts and the classical world*. 2nd ed. London: Routledge.
Seabourne, M. 1989. *Celtic crosses of Britain and Ireland*. Bucks: Shire Publications.
Shirokova, N.S. 2015. The art of the British Celts: A critical review. *Studia Antiqua et Archaeologica* 21 (2): 189–208.
Simms, G.O. 1961. *The book of Kells*. Dublin: The Dolmen Press.
Van Arsdell, R.D. 1989. *Celtic coinage of Britain*. London: Spink.
Werner, M. 1990. On the origin and form of the Irish high cross. *Gesta* 29 (1): 98–110.

Further Reading

Cunliffe, B. 1999. *The ancient Celts*. London: Penguin Books.
Eluère, C. 1992. *The Celts: First masters of Europe*. London: Thames & Hudson.
Frey, O.H., and F. Schwappach. 1973. Studies in early Celtic design. *World Archaeology* 4 (3): 339–356.
Haywood, J. 1956. *The Celts: Bronze age to new age*. Oxfordshire: Routledge.
James, S. 1999. *The Atlantic Celts: Ancient people or modern invention?* London: British Museum Press.
Megaw, J.V.S, & R. Megaw 1990 The Basse-Yutz (1927) find: Masterpieces of Celtic art. *Society of Antiquaries Research Report* 23.
Megaw, J.V.S., and M.R. Megaw. 1996. Ancient Celts and modern ethnicity. *Antiquity* 70: 175–181.
Megaw, R., and V. Megaw. 2001. Expressiveness and communication: insular Celtic art through six centuries. *Antiquity* 75 (288): 433–436.
Newell, A.N. 1934. Gallo-Roman religious scripture. *Greece and Rome* 3 (8): 74–84.

Central America: Historical Archaeology of Early Colonial Urbanism

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Introduction

Central America as a cultural and geopolitical area comprises the modern nation-states of Guatemala, Belize, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama.

Definition

Historical archaeology in Central America developed as an outgrowth of anthropological archaeology and ethnohistory focused on pre-Columbian indigenous peoples and the investigation of their history and culture based on postconquest historical data (e.g., Fowler 1989). One of the primary topics of research in Central American historical archaeology has been the study of early colonial urbanism.

Historical Background

The development of the field has also benefitted from shared interests with architecture, art history, historical demography, historical geography, and social history focusing on the native peoples of Central America during the conquest and the colonial period. Some key reference works from these allied fields for Central America are cited in Further Reading.

Key Issues

The forces of the modern world, referred to as "haunts" by Orser (1996), crosscut through a number of key issues: power, status, domination, race, ethnicity, gender, identity, hybridity, and resistance. These issues form the "effective scales" (slices of space and time, like a geographer's "level of resolution") in multiscalar, dialectic analysis of archaeological landscapes or material culture (Orser 1996: 184–190). In the present case, these issues came into play as distinct social and biological groups – Spanish conquistadors, indigenous Mexican allies, and conquered local indigenous populations – made efforts to preserve their own history and ways of life as they lived alongside each other and entered into social relations in new communities. Unequal relations of power and status led to dialectical

contradictory relationships such as domination and resistance. Attempts to assert, protect, and maintain identities succeeded partially or failed completely, leading to a hybridity derived from an intersection of biological and sociocultural practices which was, in turn, a product of close proximity and permeable social boundaries between groups. Rather than discuss the haunts and issues individually, one may focus on how they relate and intersect in the nexus of everyday practice as seen through a multiscalar, dialectical analysis (Orser 1996: 184–190) of one major theme of recent research, early Spanish colonial urbanism.

The theme of early Spanish colonial urbanism interrogates the forces of colonialism, Eurocentrism, capitalism, and modernity while contextualizing scales of power, gender, hybridity, and so on. A focus on urbanism stems from the trope of the Spanish colonial grid-plan city: a systematic implantation of Eurocentric spatial concepts and values as a strategic element in colonization throughout the Americas. Examination of this theme shows the dialectic between the big forces (Orser's haunts) and issues such as domination and resistance, identity, race, hybridity, and others.

Early Spanish colonial cities in America played a crucial part in the radical transformation of the landscapes of Spanish America. Conquistadors endeavored to found cities in the New World almost immediately after entering a region – in some cases even before violently subduing local native societies. These towns, with few exceptions, were built on a grid plan for reasons of both practicality and cultural tradition.

Henri Lefebvre (1991: 151), taking a Marxian perspective, points out that the grid-plan town was "an instrument of production: a superstructure [serving] a political means of introducing a social and economic structure in such a way that it may gain a foothold and indeed establish its 'base' in a particular locality." Other scholars emphasize that the grid-plan town represented an ideological statement by conquistadors acting on behalf of the Crown to impose moral, legal, and religious order or *policía* (Kagan 2000: 26–28) on indigenous populations. As the embodiment of policía, the grid-plan city symbolized Hispanic civilization itself and evoked a propagandistic statement concerning the power of the empire that translated into very specific notions of spatial patterning derived from the social structure of the conquest. The symbolism of the siting of the government buildings and church on the central plaza underscored the power of the sword and the cross in imposing the Spanish imperial will locally. Thus, in a very real spatial sense, the conquest emanated outward from the plaza and the grid to the surrounding countryside. "The main point to be noted, therefore, is the production of a social space by political power – that is, by violence in the service of economic goals" (Lefebvre 1991: 151–152).

Caribbean Antecedents

The first Spanish settlement in the New World was La Isabela, built in 1494 in Taino territory, on the north coast of the island of Hispaniola, by members of Cristobal Colón's second voyage to America and abandoned in 1498. La Isabela was a fortified town not built on a grid plan. Santo Domingo in 1502 and 14 other cities quickly followed suit on the island, built by Governor Nicolás de Ovando who had been instructed by the Crown to use town foundations as an instrument of colonization. Ovando is often credited with implementing the grid plan in these new towns, but there is some ambiguity on the point of the form of the grid plan employed. The plan of Santo Domingo, while indeed built on a grid, is not rigid; the streets are straight but not parallel, and the polygonal blocks vary in size. Similarly, the main plaza is polygonal and off-center (Tejeira-Davis 1996: 33). Puerto Real, another of Ovando's towns, was laid out in a regular, rectangular format, aligned to a common orientation, and was probably built on a grid plan.

The first two decades of the sixteenth century witnessed the first wave of Spanish urban expansion on the islands of Hispaniola, Puerto Rico, Jamaica, and Cuba, followed by an extension to the mainland in the Isthmus of Panama in 1502 and to Mexico by 1519. Spanish American urbanism then spread from Panama and Mexico to

Central America beginning in the 1520s. By the end of the sixteenth century, approximately 44 Spanish towns and cities had been founded during the sixteenth century in Central America (Meléndez Chaverri 1977). Roughly half of these failed to survive more than 10 years; they probably had little formal architecture and were probably not laid out on a grid plan.

Panama

The first permanently established Spanish town on the American mainland was in the eastern extreme of the Isthmus of Panama; the *villa* of Santa María la Antigua del Darién was founded in the Darién region on the west side of the Gulf of Urabá in 1510 by Vasco Nuñez de Balboa (Sauer 1966: 174). The initial population consisted of about 200 Spaniards, refugees from a failed earlier expedition, who elected Nuñez de Balboa and Martín Samudio as *alcaldes mayores* (chief magistrates). The founding of the town and the election of municipal officials were an act of resistance since these actions took place without legal authority granted by the Crown, yet these were actions structured by Spanish historical traditions of municipal power.

In 1514 Governor Pedrarias Dávila arrived in Santa María la Antigua del Darién, dispatched by the Crown to take over the government and resolve personal disputes in the colony (Fernández de Oviedo 1959: bk. 29, Chap. 8, p. 232). Pedrarias was armed with a series of formal instructions from the Crown to found Spanish conquest towns. This order effectively marked a change in Spanish overseas strategic policy from discovery to colonization. The founding of towns represented a strategy to establish a Spanish military and political presence so that, within the framework of Castilian law, their founders could legally appropriate indigenous labor and goods and enslave local populations.

We know virtually nothing of the townscape of Santa María la Antigua. Archaeological research conducted since 1956 has shown that the ruins of Santa María are located on the Tanela River near the modern village of Tanela, approximately 10 km inland from the coast of the Gulf of Urabá, in the department of Chocó, Colombia (Arcila Vélez 1986; Alzate Gallego 2006). Excavations of the Tanela site conducted by Graciliano Arcila Vélez (1986) indicate habitation by a mixed Spanish and indigenous population but provide few clues as to the plan of Santa María. The zone of occupation appears in seven discrete clusters on a series of low hills ("lometas") rising above the surrounding lowlands. While each individual cluster may have had its own internal arrangement, a formal grid plan is not suggested by Arcila Vélez's data. The core of the town seems to have been located on Lometa A where Spanish ceramics, bricks, nails, glass, mosaic fragments, and other objects were recovered in test excavations placed in an area of 1.9 ha. In this and excavations on the other lometas, these relatively scant items of Spanish material culture were accompanied by a large number of ceramic fragments of indigenous tradition, figurines, roller stamp seals, lithics, grinding stones, and other artifacts. Stratigraphic counts indicate that Spanish material is minimal early on and increases in frequency in uppermost levels. The increase in upper levels could correspond to the arrival of Pedrarias Dávila and the increase in population in 1514. The co-occurrence of Spanish and indigenous materials in all excavation units throughout the site shows that Spaniards and Indians lived and worked together ("convivencia") in Santa María, but there are no indications of technological or stylistic hybridity in material culture (Arcila Vélez 1986: 168). A more recent archaeological project directed by Alberto Sarcina in 2013 identified two distinct zones of occupation at Santa María, the first corresponding to the Cueva village of Darién in which Fernández de Enciso and Balboa established the first Spanish settlement and the other pertaining to the town founded by Pedrarias in 1514 (Cozzolino et al. 2015).

Pedrarias founded six conquest towns in Panama, but the only ones known and available for study today are Panamá Viejo (1519) and Natá (1522). Eduardo Tejeira-Davis (1996) compared the plans of these two cities and found an irregular and polycentric layout for Panamá, a port city, with the plaza being off-center, the house lots

long and narrow, and the streets skewed. The layout of Panamá appears to be closer to the medieval conception of urbanism than to the novel conquest-period grid-plan city (Tejeira-Davis 1996: 43). On the other hand, Natá, an inland site located 15 km up the Río Chico from the Gulf of Parita, near the populous sixteenth-century chiefdom center of the same name, was laid out on a spacious, orthogonal grid with a central plaza (probably) square lots and four-lot blocks enclosed by parallel streets (Tejeira-Davis 1996: 45). Natá represents the first example of a large-scale, orthogonal, grid-plan city in Spanish America. Tejeira-Davis (1996: 52) suggested that it served as the model for similar plans of later cities built in Central America and Mexico, especially Granada (1524), León (1524), Santiago de los Caballeros, Guatemala (in Almolonga) (1527), San Salvador (1528), and Antequera de Oaxaca (1529).

Nicaragua

Some limited archaeological work has been conducted at León Viejo. Most of this work has been aimed at revealing specific buildings: the *convento* of La Merced, the church of La Merced, the Mercedarian chapter house, the cathedral of Santa María las Gracias, the convento of Santo Domingo, and the Fortress. Argüello Argüello (1969: 136–142) presents a detailed description of the cathedral, its dimensions, and building materials. The site was buried by the eruption of Momotombo volcano in 1610, and it has been difficult to reconstruct its plan, but scholars assume that it was built on a grid plan. The total area of the town is estimated at 40 ha.

Honduras

Six separate and independent conquistador companies operating in Honduras-Higueras from 1524 to 1539 launched *entradas* (armed incursions), struggled against one another for jurisdiction, founded towns, relocated towns, assigned *encomiendas* (formal grants of labor and commodity tribute), and started slaving and mining operations. All of these actions took a heavy toll on the indigenous populations. Not surprisingly, a series of indigenous rebellions also occurred in the regions of Spanish intrusion from 1524 to 1544, especially during the great revolt of 1537–1539 (Chamberlain 1953). With regard to the critical role of urbanism and the deployment of the sword and the cross in the wars of conquest, an especially interesting episode concerns the resiting by Montejo of Gracias a Dios in 1539 from the site originally chosen by Gonzalo de Alvarado in 1536 which was said to be too low, too unhealthful, too weak militarily, and too far from centers of indigenous population for the service that *vecinos* (resident heads of households) of the city required. Montejo appointed his brother, Juan de Montejo, and an ally, Bishop Cristóbal de Pedraza, as co-administrators to transfer the town to the new site (Chamberlain 1953: 108). The plan of the new city was traced, and Pedraza erected a cross at the main plaza. Pedraza described the transfer and the ceremony of the reestablishment of the town which involved the construction of a shrine at the place where the church was to be built, the singing of a hymn, the ringing of bells, and the saying of a mass (Chamberlain 1953: 109).

Guatemala

The first Spanish foothold in Guatemala was established during the first invasion of Guatemala in 1524 at the Kaqchikel city of Iximche (Guillemín 1965; Luján Muñoz 1994). Although it was not much more than a military encampment, it is regarded historically as the first capital of Santiago de los Caballeros. After its location at Iximche, Santiago became a peripatetic capital for 3 years, with sequential locations in Olintepeque and Comalapa. The Hungarian historian Janós de Szécsy identified the first permanent location of Santiago de los Caballeros, occupied from 1527 to 1541, beneath the modern village of San Miguel Escobar, in the valley of Almolonga. This conquest town had about 100–150 Spanish *vecinos* with indigenous slaves and servants. As this was a time of warfare and instability, however, it is doubtful that many of the *vecinos* lived a settled urban existence. It is assumed that the layout was a typical grid plan, but this assumption has not

been confirmed archaeologically. An indigenous town of several hundred resettled Mexican auxiliaries and their families was located in the village of Almolonga or "Ciudad Vieja," about 2 km to the west. Destroyed by an earthquake and lahar (mudflow) in 1541, Santiago was relocated and rebuilt in the valley of Panchoy on the site known today as Antigua, Guatemala, beginning in 1543. Early colonial Antigua is known only through textual descriptions. Most archaeological excavations conducted in Antigua have been salvage operations on the remains of colonial churches and monasteries (under the stewardship of the Consejo Nacional Para La Protección de la Antigua Guatemala [www.cnpag.com]).

El Salvador

The best preserved example of a conquest-period grid-plan town in Central America is Ciudad Vieja, El Salvador, the ruins of the first *villa* of San Salvador, located in a rural area 10 km south of the modern town of Suchitoto (Fig. 1). Dispatched from Santiago in Olintepeque, Guatemala, under the command of Gonzalo de Alvarado, a small group of Spaniards, accompanied by Mexican auxiliaries, founded the first villa of San Salvador in April 1525, probably on the same site as the later 1528 settlement. The first European town of El Salvador was built in the valley of La Bermuda, a small pocket to the north of Cuscatlan Pipil territory that had little or no indigenous settlement at the time of the conquest (Fowler and Earnest 1985), but it was still prone to attack, especially from the west and the south. The Pipils rebelled and drove out the Spaniards sometime in 1526 (Barón Castro 1996: 39–44), forcing them back to their base in Guatemala. Pipil resistance waned by early 1528, however, allowing the Spaniards to return and found a permanent settlement, which resulted in the second founding of the villa of San Salvador on 1 April 1528 by

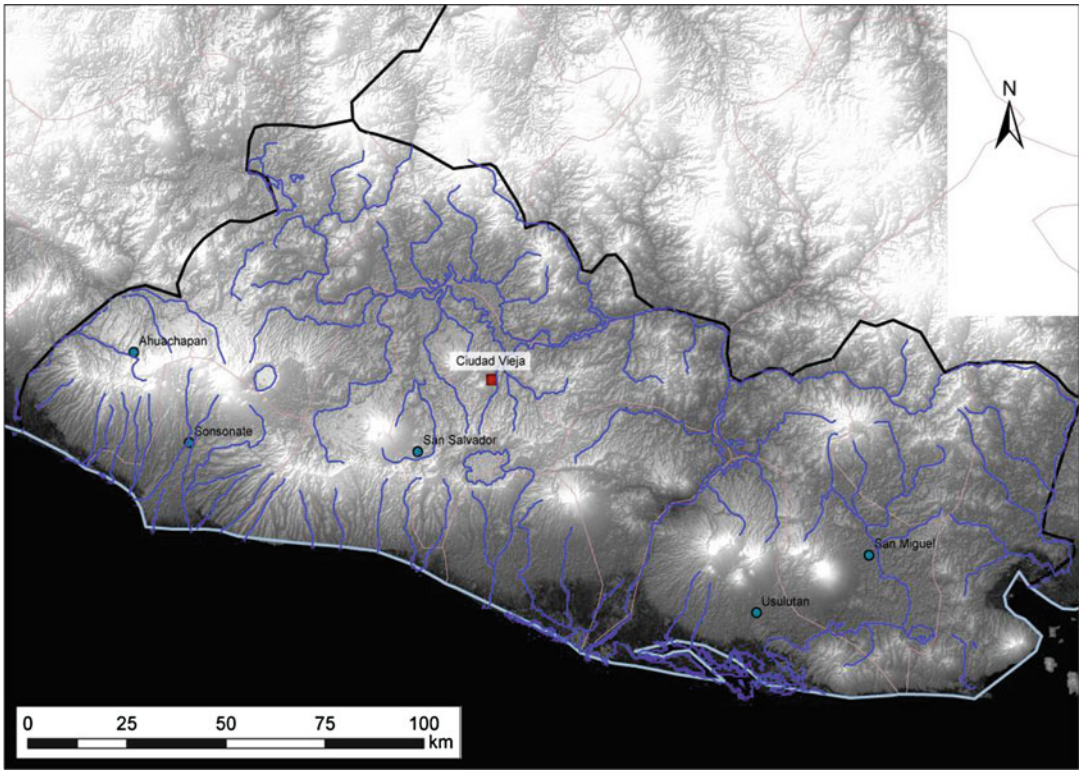

Central America: Historical Archaeology of Early Colonial Urbanism, Fig. 1 Location of Ciudad Vieja within the modern republic of El Salvador. (Map by Lauren Kohut, Vanderbilt University Spatial Analysis Research Laboratory)

73 conquistadors and their Mexican allies under the command of Diego de Alvarado. All of the Spaniards declared themselves residents of the town; many of the Mexican allies remained as well (Barón Castro 1996: 87–91, 197–202; Fowler 2011). The town was abandoned 15 years later and moved to the modern location of San Salvador in 1545 (Fig. 1).

Archaeological research at Ciudad Vieja conducted from 1996 to 2005 (Fowler 2011) has established that the town was built on a grid plan on a site with no previous occupation covering a core area of 45 ha (Fig. 2), virtually all of which was artificially leveled and filled with various types of constructions making it an urban landscape of truly impressive proportions. Like the urban plan of Natá, described above, the plan of San Salvador is strictly orthogonal, a paragon of the conquest-period Spanish American grid-plan city. Visitors to the city, Spanish and Indian alike, in its prime of occupation and expansion, say about 1535, surely would have been impressed with the strict, orderly layout of the townscape with the spacious plaza at the center, the church to the east of the plaza, the *cabildo* (town hall) and other municipal buildings on the north, stores and shops on the west, and a tavern and blacksmith's shop on the south. Long, straight streets run from (or into) the four corners of the plaza in the cardinal directions. The one exception to the straightness of the streets is the street running south from the church (and the southeast corner of the plaza) which curves around a natural spring, probably an important water source during the period of the town's occupation. Other streets run parallel and perpendicular to the main streets, bisecting each other to form large lots, most of which were probably subdivided into quadrants for the purpose of assigning them to residents. The plaza measures approximately 100 m on a side including the spaces around the interior streets along the edges of all four sides. The square city blocks measure approximately 80 m (roughly 100 Spanish *varas*) (1 vara = 83.5 cm) on a side, bounded by streets about 8 m in width. Most of the blocks were probably subdivided into four *solares* or house lots of approximately 40 × 40 m (50 × 50 varas) as shown on the projected grid in Fig. 2.

The town displays a great deal of internal functional variability. Among the 18 structures and activity areas that have been excavated, Spanish and indigenous or mestizo residences, ritual spaces, civic/administrative buildings, food preparation areas, commercial and industrial buildings, warehouses and storage areas, terraces, ramps, and defensive features have all been identified. The latter consist of guardhouses, sentry stations, and a steep defensible cliff sloping away from the south and east sides of the site. While the overall town plan shows strong adherence to the grid-plan layout, excavations and remote sensing data show that there was no prevailing norm governing the locations of structures within solares or the size, shape, and internal arrangement of rooms within structures. There is even significant variation in orientation of structures or units of structures. Spanish buildings are distinguished by multiroom floor plans, substantial stone foundations measuring 83–84 cm (1 *vara*) in width, brick tile floors, ceramic roof tiles, and the use of iron nails and other hardware to secure structural elements. They are generally oriented to the overall site alignment of 12°, but exceptions do occur. Buildings assumed to be indigenous or mestizo related tend to be one-room structures with narrow foundations, packed earth floors, and no evidence for roof tiles (indicating thatched roofs). Their orientation does not follow the overall site grid. Thus, while the overall urban layout appears quite rigid at first glance, there is actually a great deal of flexibility and variability in internal distribution and use of space.

While Spanish presence is clearly indicated by the townscape, the architecture, and certain industries and classes of material culture such as iron, brick, and glass, we also see a strong indigenous presence at San Salvador reflected in the material culture of Ciudad Vieja. Indigenous residents of the town would have included indigenous Pipils as well as Mexican (Nahua and Mixtec) and Kaqchikel groups allied with the Spaniards during the conquest. Excavations and surface collection recovered more than 60,000 sherds, and project ceramicist Jeb Card (2007) analyzed more than 10,000 sherds. Aside from a very small number of

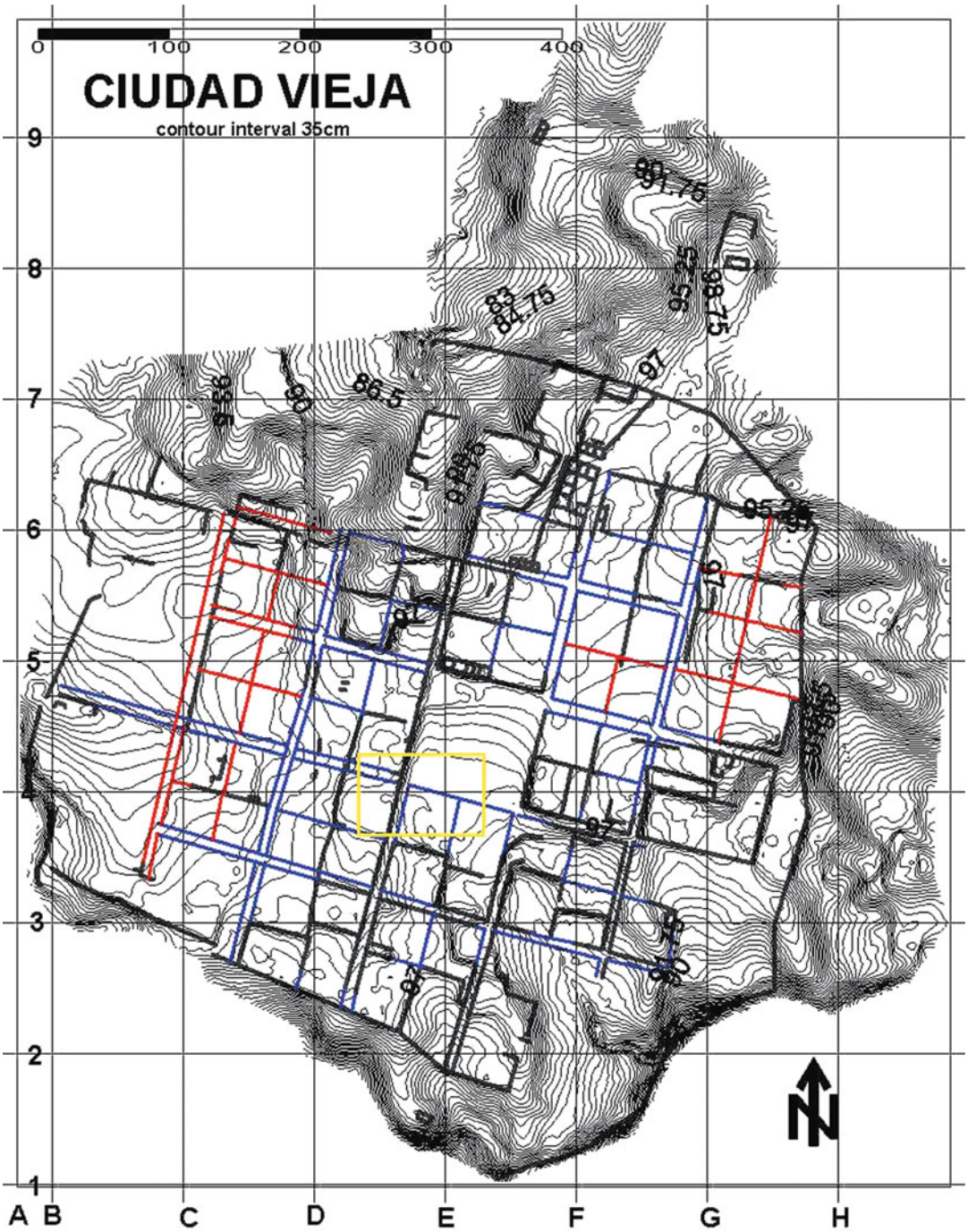

Central America: Historical Archaeology of Early Colonial Urbanism, Fig. 2 Plan of Ciudad Vieja, El Salvador, showing natural topographic and cultural features. (Map by Conard Hamilton, Ciudad Vieja Archaeological Project)

Spanish imports, the ceramic complex is eminently indigenous displaying many forms and decorative modes representing continuities with Late Postclassic materials as well as hybrid forms and motifs developed during the conquest period. In addition to the highly visible concentrations of ceramics, obsidian artifacts occur in great numbers on the surface and were recovered in excavations in all excavated loci. *Manos* and *metates* (grinding stones) for maize processing occur in domestic contexts and on the surface. Ceramic spindle whorls for spinning thread, found in association with indigenous residences, suggest gendered production practices. Polished ceramic ear flares and jade objects – elite bodily adornment – are significant in the inventory of indigenous-associated items and maintenance of indigenous identity. In sum, the archaeological evidence indicates that this Spanish American town had a native Mesoamerican population of significant proportion and that at least some members of this population were engaged in maintenance or construction of indigenous identity. Nevertheless, others entered into relationships and engaged in activities that led to hybridization.

Jeb Card (2007) analyzed the ceramics from eight excavated contexts and structures at Ciudad Vieja and from an extensive surface collection of the site. The most striking aspect of the collection is a class of serving plates produced with native Mesoamerican techniques and painted designs but with forms copied from European majolica. Card refers to these vessels as "hybrid plates." Card seriated the forms of published European majolica plates and found that the hybrid plates of Ciudad Vieja could be dated very precisely with this method. Application of this method confirmed the historically documented occupation span of the site (1525/1528–1545), with a slightly later abandonment than documentary sources indicate, possibly to as late as around 1560. The heavy use of hybrid plates in Spanish and indigenous or mestizo households invites comparisons with other cases of forced indigenous displacement in early colonial Spanish America (Card 2007: 276–299). Analysis of vessel form and function from eight excavated contexts of Ciudad Vieja shows similar activities in Spanish and indigenous households, as well as the identification of a tavern or other commercial food and beverage vendor in the center of town. Three microstyles crosscut other classificatory categories suggesting localized or household distribution and likely local production of ceramics in the town. These microstyles disappear during the later years of the occupation of the villa of San Salvador, and Card suggested that this development indicates the formation of new community cultural practices that tended to swamp the initial microstyle variability. Card used these analyses to evaluate models of colonial societies, suggesting that a model of creolization and ethnogenesis would be useful for understanding other interactions in early colonial Mesoamerica.

Subsistence production taking place in or near the town would have included local cultivation, hunting, and fishing – male activities – but the majority of food consumed in the town probably was obtained from tribute rendered by conquered Pipil and Lenca towns in the surrounding region and the hinterlands. Tribute payments to San Salvador are enumerated in the 1532 *Relación Marroquín* (Fowler 1989: 25–26, 155–186). This extraordinary document from the Archivo General de Indias in Seville (Audiencia de Guatemala, legajo 52) contains rich economic and demographic data on approximately 90 indigenous settlements that had been assigned in *encomienda* to the Spanish *vecinos* of San Salvador. The document shows that maize, beans, chili peppers, turkeys, venison, salt, dried fish, honey, beeswax, firewood, and a variety of woven cotton cloth and clothing were paid in tribute by Pipil- and Lenca-conquered communities. Tribute was delivered to San Salvador by male porters from the communities. Failure to pay tribute was met by violent force.

Encomienda labor was virtual slavery, and labor tribute was rendered by almost all Pipil communities, taking the form of male agricultural, construction, mining, or trade labor (in addition to burden bearing) and female domestic service such as cooking, cleaning, and child-rearing. Many if not most Spanish households would have had numerous servants from *encomienda* communities as well as indigenous slaves obtained as war

captives or through barter. During the great Indian revolt of 1537–1539, Governor Francisco de Montejo of Honduras appealed to the *vecinos* of San Salvador for support and war materiel. They responded by sending a Spanish captain with 100 native auxiliaries and 1000 indigenous (probably Pipil) porters carrying gunpowder, harquebuses and balls, crossbows and bolts, swords, lances, shields, armor, and iron bars from which to manufacture points for crossbow bolts. They also sent livestock. The porters delivered their loads to Honduras and remained for an unstated period to serve the Spaniards at their destination (Chamberlain 1953: 87).

A significant but poorly known aspect of the economy of San Salvador, and early colonial Central American cities in general, was slaving and slave trafficking. Until the passage of the New Laws in 1542, the enslavement of indigenous people was legal as long as their captors claimed that the natives resisted colonial domination. Even after the enactment of the laws, slaving was still rampant until the implementation of the laws with the arrival of Alonso López de Cerrato from Santo Domingo in 1548 as president of the new *audiencia* in Gracias a Dios (Sherman 1979: 132–136). Slaving operations began in Guatemala and Cuscatlan during the first Spanish invasion led by Pedro de Alvarado in 1525 (Sherman 1979: 27). Alvarado himself is credited with being the largest slaver in Guatemala and one of the largest slaveholders in Central America, but Diego de Holguín, the first *alcalde* of San Salvador in 1525, claimed that his 50 slaves had been taken away from him when the New Laws were enforced in 1548 liberating the slaves (Sherman 1979: 71). The construction and maintenance of San Salvador would not have been feasible without a large slave labor force. Wealthy *vecinos* of Santiago and San Salvador had trained gangs of slaves working in gold and silver extraction operations in Honduras. During Alvarado's time in Honduras-Higueras, there were 20 or more of these gangs each with an average number of slaves of 15–25 (Chamberlain 1953: 112). Slaving was the most important economic activity in Nicaragua in the 1530s; slaves taken in Nicaragua were shipped to Panama and Peru. Spanish *encomenderos* of San Salvador participated in the same activity, although on a relatively smaller scale, taking slaves in the eastern Lenca territory of Chaparrastique or Popocatepetl, until slaving was curtailed by native population collapse in the 1540s and the implementation of the New Laws in 1548 (Barón Castro 1996: 136, 166–167). Cerrato liberated 500 Indian slaves from about 40 *vecinos* of San Salvador in 1548 (Sherman 1979: 148).

International Perspectives

The people and politicians of the Central American republics regard early Spanish colonial towns as the places of origin of their national identities. Yet, Central American conquest towns are few in number, and even for those that are reasonably well known and accessible, such as Ciudad Vieja in El Salvador, León Viejo, Nicaragua, and Panamá Viejo, research and cultural heritage management has been underfunded. These sites, with the possible exception of Panamá Viejo (Arroyo 2010), remain underdeveloped as places of educational tourism.

Historically, the Spanish perspective has tended to regard these towns as sui generis accomplishments of Spanish civilization, seldom taking into account that in many cases the majority population of the towns was indigenous. Interpretations have emphasized the rapid spread of the grid-plan layout in the Caribbean and on the American mainland and the accompanying implantation of structural (institutional) frameworks. This perspective is beginning to change as Spanish scholarship on early Spanish American conquest towns adopts a practice-based rather than an institutional-based approach in research.

In 2012 an international organization, the Red Iberoamericana de Investigación del Urbanismo Colonial (RIIUC – Iberoamerican Network for Research on Colonial Urbanism), was founded by a group of scholars based in Spain, Argentina, and Peru (Vela Cossío 2014). The core group soon expanded to include specialists from El Salvador, Panama, and the United States. Since 2012 the network has sponsored five international, multidisciplinary seminars which brought together

archaeologists, architects, architectural historians, geographers, historians, museologists, conservators, and cultural heritage specialists from Spain, Portugal, France, Argentina, Brazil, Chile, Costa Rica, El Salvador, Guatemala, Mexico, Nicaragua, Panama, and Peru. The proceedings of four of these conferences have been published recently (Calvo and Cocco 2016; Fowler and Escalante Arce 2017; Vargas Pacheco 2016; Vela Cossío and García Hermida 2014), and the volume for the fifth meeting is in press. The wide range of topics and spatial coverage of these volumes demonstrate the robust character of current research on early Iberoamerican colonial urbanism.

Future Directions

Future research at early Spanish American colonial urban sites will profit from research designs that combine meticulous fieldwork methodologies with dialectical, multiscalar analysis. The discussion here is less a rigorous application of multiscalar analysis than a demonstration that such analysis is feasible and productive.

A promising direction for future research could be the development of a focus on archaeological studies on the scale of resistance and perhaps even studies of overt rebellion rather than everyday resistance to Spanish political and cultural domination in sixteenth-century indigenous settlements, contemporaneous with Spanish conquest towns. The realization of this goal will involve stepping outside the grid plan and devising research on rebellious communities in the surrounding catchment regions. Another underdeveloped scale of analysis in Central American historical archaeology has been sexuality and intimacy. A trendsetting example may be found in the recent research of Russell N. Sheptak et al. (2011, 2012) on the pre-Hispanic and colonial town of Ticamaya, Honduras, an important settlement in native military and political strategies of resistance in the early sixteenth century. These authors present an intriguing practice-theory approach to Ticamaya dealing with sexuality mediating race, class, and warrior status and the transcendence from this scale to that of resistance to colonial domination.

Cross-References

- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Deagan, Kathleen A.
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Historical Archaeology
- ▶ Landscape Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Practice Theory in Archaeology
- ▶ Urban Landscapes: Environmental Archaeology

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References

Alzate Gallego, L.A. 2006. *Santa María de la Antigua del Darién. Cerámica española con texto y contexto en el Darién colombiano*. Barcelona: Grup d'Estudis Precolombins.

Arcila Vélez, G. 1986. *Santa María de la Antigua del Darién*. Bogota: Santa María de la Antigua del Darién.

Argüello Argüello, A. 1969. *Historia de León Viejo*. León: Editorial Antorcha.

Arroyo, S.I. 2010. El plan maestro del conjunto monumental de Panamá Viejo: Diez años después. *Canto Rodado: Revista especializada en patrimonio* 5: 185–212. Available at: http://www.panamaviejo.org/patronato/Canto.asp. Accessed 16 Oct 2012.

Barón Castro, R. 1996. *Reseña histórica de la villa de San Salvador desde su fundación en 1525, hasta que recibe el título de ciudad en 1546*. 2nd ed. San Salvador: Consejo Nacional para la Cultura y el Arte.

Calvo, L.M., and G. Cocco. 2016. *Primeros asentamientos españoles y portugueses en la Améerica central y meridional*. Santa Fe: Universidad de Santa Fe.

Card, J.J. 2007. The ceramics of colonial Ciudad Vieja, El Salvador: Culture contact and social change in Mesoamerica. PhD dissertation, Tulane University.

Chamberlain, R.S. 1953. *The conquest and colonization of Honduras, 1502–1550 (Publication 598)*. Washington, DC: Carnegie Institution of Washington.

Cozzolino, M., J.A. Gallego, V. Gentile, and A. Sarcina. 2015. Santa Maria de la Antigua del Darién (Colombia), the first Spanish city in Tierra Firme: A systematic archaeological and geophysical prospection. Paper presented at 1st International Conference on Metrology for Archaeology, Benevento, Italy, 22–23 Oct 2015.

Fernández de Oviedo y Valdés, G. 1959. *Historia general y natural de las Indias*, 5 vols. Madrid: Ediciones Atlas.

Fowler, W.R. 1989. *The cultural evolution of ancient Nahua civilizations: The Pipil-Nicarao of Central America*. Norman: University of Oklahoma Press.

Fowler, W.R., ed. 2011. *Ciudad Vieja: excavaciones, arquitectura y paisaje cultural de la primera villa de San Salvador*. San Salvador: Editorial Universitaria/Secretaría de Cultura de la Presidencia.

Fowler, W.R., and H.H. Earnest Jr. 1985. Settlement patterns and prehistory of the Paraíso Basin of El Salvador. *Journal of Field Archaeology* 12: 19–32.

Fowler, W.R., and P. Escalante Arce, eds. 2017. *Génesis y desarrollo de la ciudad iberoamericana*. San Salvador: Editorial Universitaria and Academia Salvadoreña de la Historia.

Guillemín, J.F. 1965. *Iximché: Capital del antiguo reino cakchiquel*. Guatemala City: Instituto de Antropología e Historia.

Kagan, R.L. 2000. *Urban images of the Hispanic world, 1493–1793*. New Haven: Yale University Press.

Lefebvre, H. 1991. *The production of space*. Trans. D. Nicholson-Smith. Malden: Blackwell Publishers.

Luján Muñoz, J. 1994. Política fundacional en los siglos XVI y XVII. In *Historia general de Guatemala, vol 2: Dominación española, desde la Conquista hasta 1700*, ed. J. Luján Muñoz, 131–142. Guatemala City: Asociación de Amigos del País, Fundación para la Cultura y el Desarrollo.

Meléndez Chaverri, C. 1977. Ciudades fundadas en la América Central en el siglo XVI. *Anuario de Estudios Centroamericanos* 3: 57–79.

Orser, C.E., Jr. 1996. *A historical archaeology of the modern world*. New York: Plenum Press.

Sauer, C.O. 1966. *The early Spanish main*. Berkeley: University of California Press.

Sheptak, R.N., R.A. Joyce, and K. Blaisdell-Sloan. 2011. Pragmatic choices, colonial lives: Resistance, ambivalence, and appropriation in northern Honduras. In *Enduring conquests: Rethinking the archaeology of resistance to Spanish colonialism in the Americas*, ed. M. Liebman and M.S. Murphy, 149–172. Santa Fe: School for Advanced Research Press.

Sheptak, R.N., K. Blaisdell-Sloan, and R.A. Joyce. 2012. In-between people in colonial Honduras: Reworking sexualities at Ticamaya. In *The archaeology of colonialism: Intimate encounters and sexual effects*, ed. B.-L. Voss and E.C. Casella, 156–172. New York: Cambridge University Press.

Sherman, W.L. 1979. *Forced native labor in sixteenth-century Central America*. Lincoln: University of Nebraska Press.

Tejeira-Davis, E. 1996. Pedrarias Dávila and his cities in Panama, 1513–1522: New facts on early Spanish settlements in America. *Jahrbuch für Geschichte von Staat Wirtschaft und Gesellschaft Lateinamerikas* 33: 27–61.

Vargas Pacheco, C., ed. 2016. *Primeros asentamientos urbanos en Iberoaméerica (ss. XVI y XVII): investigación y gestión*. Piura: Universidad de Piura.

Vela Cossío, F. 2014. Arqueología de la ciudad iberoamericana: notas para un seminario. In *Arqueología de los primeros asentamientos urbanos españoles en la América central y meridional*, ed. F. Vela Cossío and A. García Hermida. Madrid: Mairea Libros/Escuela Técnica Superior de Arquitectura de Madrid.

Vela Cossío, F., and A. García Hermida, eds. 2014. *Arqueología de los primeros asentamientos urbanos españoles en la América Central y Meridional*. Madrid: Mairea Libros/Escuela Técnica Superior de Arquitectura de Madrid.

Further Reading

Aguilera Rojas, J. 1994. *Fundación de ciudades hispanoamericanas*. Madrid: Editorial MAPFRE.

Alzate Gallego, A. 2010. Santa María de la Antigua del Darién: Un enclave español en el Darién colombiano del siglo XVI. *Estrat Crític* 5 (1): 352–358. Available at: http://www.estratjove.com/estratcritic.html. Accessed 11 July 2012.

Arellano, J.E. 2002. *León de Nicaragua: tradiciones y valores de la Atenas centroamericana*. Managua: Fondo Editorial CIRA.

Bancroft, H.H. 1883. *The works of Hubert Howe Bancroft*, volume 6: History of Central America, volume 1, 1501–1530. San Francisco: A. L. Bancroft.

Blaisdell-Sloan, K. 1999. A view from the Pacific: Archaeological analysis of materials from Nicaragua's sixteenth century Spanish town of León Viejo. MA dissertation, Louisiana State University.

Bundschuh, J., M. Winograd, M. Day, and G.E. Alvarado. 2007. Geographical, social, economic, and environmental framework and developments. In *Central America: Geology, resources and hazards*, ed. J. Bundschuh and G.E. Alvarado, 2–52. London: Taylor & Francis.

Cabezas Carache, H. 1994. El descubrimiento y las exploraciones iniciales. In *Historia general de Guatemala, vol 2: dominación española, desde la conquista hasta 1700*, ed. J. Luján Muñoz, 39–46. Guatemala City: Asociación de Amigos del País, Fundación para la Cultura y el Desarrollo.

Cardenal, R. 2008. *Manual de historia de Centroamérica*. San Salvador: UCA Editores.

Carruthers, C. 2003. Spanish "Botijas" or olive jars from the Santo Domingo Monastery, La Antigua Guatemala. *Historical Archaeology* 37 (4): 40–55.

Centro de Estudios Históricos de Obras Públicas y Urbanismo(CEHOPU). 1989. *La ciudad hispanoamericana: el sueño de un orden*. Madrid: Ministerio de Obras Públicas y Urbanismo.

Cruz Castillo, O.N. 2006. Un ejemplo de arqueología histórica en Honduras: la catedral de Comayagua. Asociación para el Fomento de los Estudios Históricos en Centroamérica, *Boletín AFEHC*. Available at: http://www.afehc-historia-centroamericana.org/. Accessed 16 Oct 2012.

De Altolaguirre y Duvale, A. 1914. *Vasco Nuñez de Balboa*. Madrid: Real Academia de la Historia.

De Remesal, A. 1964–66. *Historia general de las Indias Occidentales y particular de la gobernación de Chiapa y Guatemala*, 2 vols. Madrid: Ediciones Atlas.

Deagan, K.A. 1995. After Columbus: The sixteenth-century Spanish-Caribbean frontier. In *Puerto Real: The archaeology of a sixteenth-century Spanish town in Hispaniola*, ed. K. Deagan, 419–456. Gainesville: University Press of Florida.

Deagan, K.A., and J.M. Cruxent. 2002a. *Archaeology at La Isabela: America's first European town*. New Haven: Yale University Press.

Deagan, K.A., and J.M. Cruxent. 2002b. *Columbus's outpost among the Taínos: Spain and America at La Isabela, 1493–1498*. New Haven: Yale University Press.

Deetz, J. 1991. Introduction: Archaeological evidence of sixteenth- and seventeenth-century encounters. In *Historical archaeology in global perspective*, ed. L. Falk, 1–9. Washington, DC: Smithsonian Institution Press.

Domínguez Compañy, F. 1984. *Política de poblamiento de España en América: la fundación de ciudades*. Madrid: Instituto de Estudios de Administración Local.

Escalante Arce, P.A. 2001. *Los tlaxcaltecas en Centro América*. San Salvador: Consejo Nacional para la Cultura y el Arte.

Fonseca Corrales, E. 1998. *Centroamérica: su historia*. San José: Editorial Universitaria Centroamericana.

Fowler, W.R. 2009. Historical archaeology in Yucatan and Central America. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 429–447. New York: Springer.

Gallardo, R. 2011. Excavaciones y arquitectura de la Estructura 6F1. In *Ciudad Vieja: excavaciones, arquitectura y paisaje cultural de la primera villa de San Salvador*, ed. W.R. Fowler, 85–115. San Salvador: Editorial Universitaria/Secretaría de Cultura de la Presidencia.

Graham, E.A. 1991. Archaeological insights into colonial period Maya life at Tipu, Belize. In *Columbian consequences, volume III: Spanish borderlands in Pan-American perspective*, ed. D.H. Thomas, 319–335. Washington, DC: Smithsonian Institution Press.

Hamilton, C.C. 2009. *Intrasite variation among household assemblages at Ciudad Vieja, El Salvador. Unpublished PhD dissertation*. Tulane University.

Kramer, W. 1994. *Encomienda politics in early colonial Guatemala, 1524–1544: Dividing the spoils*. Boulder: Westview Press.

Kramer, W., W.G. Lovell, and C.H. Lutz. 1993. La conquista española de Centroamérica. In *Historia general de Centroamérica, volume 2: el régimen colonial (1524–1750)*, ed. J.C. Pinto Soria, 21–93. Madrid: Sociedad Estatal Quinto Centenario, Facultad Latinoamericana de Ciencias Sociales.

Lara Pinto, G. 1996. Centroamérica desde la perspectiva indígena, siglos XVI y XVII. In *Los indios de Centroamérica*, ed. G. Hasemann, G. Lara Pinto, and F. Cruz Sandoval, 101–277. Madrid: Editorial MAPFRE.

Lawrence, J.W. 2009. Archaeology and ethnohistory on the Spanish colonial periphery. Excavations at the Templo Colonial in Nicoya, Guanacaste, Costa Rica. *Historical Archaeology* 43 (1): 65–80.

Lutz, C.H. 1994. *Santiago de Guatemala, 1541–1773: City, caste, and the colonial experience*. Norman: University of Oklahoma Press.

MacLeod, M.J. 1973. *Spanish Central America: A socioeconomic history, 1520–1720*. Berkeley: University of California Press.

Markman, S.D. 1966. Colonial architecture of Antigua Guatemala. *Memoirs of the American Philosophical Society* 64: 102–103.

Martín Rincón, J.G. 2003. Panamá La Vieja. La recuperación de su traza urbana. *Revista de Arqueología Americana* 22: 165–183.

Martínez Lemoine, R. 1977. *El modelo clásico de ciudad colonial hispanoamericana: ensayo sobre los orígenes del urbanismo en América*. Santiago: Facultad de Arquitectura y Urbanismo, Universidad de Chile.

Matthew, L. 2007. Whose conquest: Nahua, Zapoteca, and Mixteca allies in the conquest of Central America. In *Indian conquistadors: Indigenous allies in the conquest of Mesoamerica*, ed. L.E. Matthew and M.R. Oudijk, 102–126. Norman: University of Oklahoma Press.

Matthew, L. 2012. *Memories of conquest: Becoming Mexicano in colonial Guatemala*. Chapel Hill: University of North Carolina Press.

McKillop, H. 1992. Central America. In *Encyclopedia of historical archaeology*, ed. C.E. Orser Jr., 103–106. London: Routledge.

Mena García, M.C. 1992. *La ciudad en un cruce de caminos: Panamá y sus orígenes urbanos*. Seville: Escuela de Estudios Hispano-Americanos, Universidad de Sevilla.

Mena García, M.C. 1998. *Sevilla y las flotas de Indias: La gran armada de Castilla del Oro (1513–1514)*. Seville: Universidad de Sevilla, Fundación El Monte.

Morse, R.M. 1984. The urban development of colonial Spanish America. In *The Cambridge history of Latin America, volume 2: Colonial Latin America*, ed. L. Bethell, 67–104. Cambridge: Cambridge University Press.

Newson, L. 1986. *The cost of conquest: Indian decline in Honduras under Spanish rule*. Boulder: Westview Press.

Newson, L. 1987. *Indian survival in colonial Nicaragua*. Norman: University of Oklahoma Press.

Romoli, K. 1987. *Los de la lengua de Cueva: los grupos indígenas del istmo oriental en la época de la conquista española*. Bogotá: Instituto Colombiano de Antropología.

Rovira, B.E., and F. Gaitán. 2010. Los búcaros: De las Indias para el mundo. *Canto Rodado: Revista especializada en patrimonio* 5: 39–78. Available at: http://www.panamaviejo.org/patronato/Canto.asp. Accessed 16 Oct 2012.

Schreg, R. 2010. Panamanian coarse handmade earthenware – a melting pot of African, American and European traditions? *Post-Medieval Archaeology* 44: 135–164.

Szécsy, J.D. 1953. *Santiago de los Caballeros de Goathemala, en Almolonga: investigaciones del año 1950*. Guatemala City: Editorial del Ministerio de Educación Pública.

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Central and West African Middle Stone Age: Geography and Culture

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State of Knowledge and Current Debates

Introduction

The Middle Stone Age (MSA) of sub-Saharan Africa is defined by the appearance in the archaeological record of stone tools struck from carefully prepared Levallois cores. Currently dated to around 300,000 years ago, this innovation in toolmaking is associated with the rapid emergence of distinctive regional artifact styles and the effective abandonment of the large handheld hand axes and cleavers that were the hallmark of preceding Acheulean lithic industries (Clark 1988). This technological change reflects a fundamental shift from the use of handheld tools to the attachment (hafting) of stone implements to organic handles for use. In the last three decades, knowledge of this transition and of the MSA cultures that followed has taken center stage in the study of human evolution (Barham and Mitchell 2008). New scientific dating techniques accurate beyond the 40,000 year limit of the radiocarbon method have revealed the time span of the MSA to be approximately 300 to 45 thousand years ago, a period now known from genetics and the fossil record to encompass the anatomical evolution of our species, *Homo sapiens*, in Africa. Archaeologists have thus focused on the African MSA as the probable source of the distinctively modern behavior and cognition (thought processes) that makes us human.

The question of exactly when, where, and how the brains of MSA hominins (humanlike ancestors) evolved into recognizably human minds has led researchers to focus on a range of key archaeological indicators that are generally considered to reflect "modern" behavior and cognition. In addition to the use of hafted technologies and artifacts made of organic materials, these behavioral markers include (but are not limited to) the manufacture of blade and deliberately blunted ("backed") blade stone tools; the dedicated and cooperative hunting of large, dangerous animals; dispersal into new, challenging environments (e.g., forests, highlands, deserts); extended mobility and intensive, seasonal resource exploitation; and symbolic activities including self-adornment, image representation, and burial (McBrearty and Brooks 2000). Paleoanthropologists continue to debate whether these behaviors emerged gradually among archaic *Homo sapiens*/*Homo heidelbergensis* populations before the anatomical evolution of *Homo sapiens* 200,000 years ago or appeared only later, after *Homo sapiens*' anatomy. Interpretations of the archaeological record and of the criteria used to identify "modernity" remain contentious; however, it is increasingly clear that the cognitive and behavioral adaptations that evolved in the African Middle Stone Age played a critical role in the subsequent global dispersal of our species out of Africa sometime after 100,000 years ago.

Knowledge of the MSA and its potential evolutionary significance has not developed evenly across all geographical regions of the African continent. Current understanding has primarily been advanced through archaeological fieldwork exploring long, datable sites and sequences found in Southern and East Africa and North and Saharan Africa. Far from leading this debate, the Middle Stone Age in Central and West Africa remains critically understudied and very poorly understood, a fact perhaps made more surprising when the scale of these two regions is considered. As defined by modern political boundaries, Central and West Africa exceed 6.1 and 2.6 million km^2 respectively, and in combination cover some 28% of the African landmass. The location and geographical size of these regions is shown in Fig. 1, along with the key archaeological sites referred to in this entry. The legacy of colonialism means that both regions today include French- and English-speaking nations and peoples. Central Africa stretches from the volcanic highlands and vast lakes of the Rift Valley in the East to the Atlantic Ocean Coast in the West and from the Okavango

Delta and Zambezi Rivers in the South to Lake Chad in the North, where it borders West Africa. Geographically, Central Africa is dominated by the massive lowland basin formed by the circuitous route of the powerful Congo River and its tributaries, including both the Kasai and Ubangi rivers, but also takes in several smaller river basins to the northwest (e.g., the Ogooué River of Gabon). Lake Chad and the Bight of Biafra mark the eastern extremity of sub-Saharan West Africa, which stretches westward to the Atlantic Coast of Senegal, and north from the Guinea Coast to the edge of the Sahara Desert. This is a region characterized by low-lying plateaux, through which the Niger River takes a meandering route northeast from Guinea, before turning

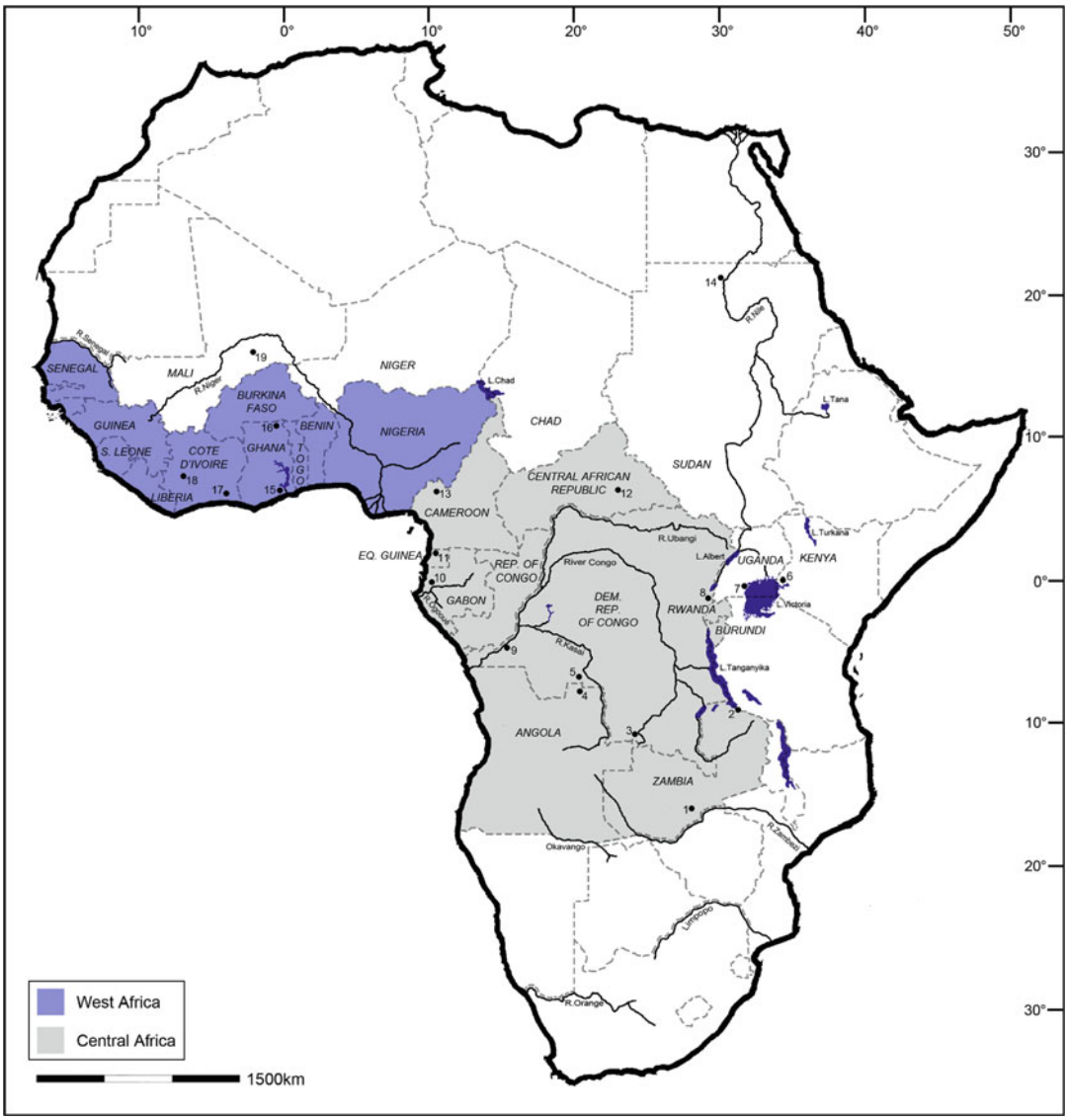

Central and West African Middle Stone Age: Geography and Culture, Fig. 1 Africa showing major river and lake systems and the locations of central and West Africa, as based on political boundaries. Sites discussed in the text include *1* Twin Rivers, *2* Kalambo Falls, *3* Kamoa, *4* Lunda Province, *5* Lupemba, *6* Muguruk, *7* Sango Bay and Nsongezi, *8* Katanda, *9* Gombe Point, *10* Okala, *11* Mosumu, *12* Nzako, *13* Shum Laka, *14* Sai Island, *15* Asokrochona and Tema West, *16* Birimi, *17* Anyama, *18* Bété I, and *19* Ounjougou

southeast and finally draining into the Atlantic Ocean in Nigeria.

Serious archaeological interest in the deep prehistory of Central and West Africa began in earnest in the earlier part of the twentieth century; however, a combination of human, ecological, and geomorphological (land form) obstacles has conspired against their continuous and systematic archaeological survey. Limited transport infrastructure, dense rainforest and woodland vegetation, and periodic political upheaval present barriers to most fieldwork projects designed to address specific research questions. Instead, archaeological enquiry and knowledge of prehistoric human presence is generally restricted to locations where modern developments (e.g., roads, settlements, mining operations) enable access. These logistical impediments are made even more severe by tropical African soil conditions and climate. Acidic soils typically cause the rapid decay of plant, animal, and human remains, while monsoon rains remove artifacts from their depositional contexts and in some areas create erosional hiatuses (gaps) in buried cultural sequences. Very little human skeletal material has yet been recovered from Middle Stone Age contexts in Central or West Africa, the archaic *Homo sapiens/Homo heidelbergensis* crania and postcranial fossils from Broken Hill (Zambia) on the margins of Central Africa being one of very few relevant specimens. Additionally, insects and tree roots cause subsurface disturbances, moving artifacts and other materials (e.g., charcoal) up and down in soil profiles (van Noten 1982). Discussed in detail below, these severe post-depositional processes mean archaeologists are still struggling to reconstruct the basic Stone Age cultural sequences, chronologies, and past environments needed to understand prehistoric human activities in time and space. It is only in the last decade that very tentative steps have been taken to start addressing long-standing questions surrounding the behavioral adaptations of MSA hominins in Central and West Africa.

In spite of these problems, important new data on the MSA is still slowly emerging from the central and western parts of sub-Saharan Africa. Since the 1990s, both newly discovered and re-excavated sites have revealed some startling insights into the early technological sophistications of *Homo sapiens*. Finds including 80,000-year-old carved fishing harpoons from the site of Katanda (Yellen et al. 1995) in the eastern Democratic Republic of Congo (DRC) and 270,000-year-old advanced blade tools and modified pigments at Twin Rivers (Zambia) (Barham 2000) are of continent-wide – and arguably also global – significance. The importance attributed to these discoveries stems from their great age, rather than their inherent character alone. Indeed, perhaps more important than any individual discovery has been the fresh chronological context given to Central and West African MSA technologies by very old dates from the sites of Twin Rivers, Kapthurin, Sai Island, and Bété I (Fig. 1). These dated sequences indicate the emergence of distinctive MSA toolkits across these regions by at least 180,000 years ago – and probably earlier than 250–300 thousand years ago – well before the anatomical appearance of *Homo sapiens*.

Dense archaeological literatures exist in both French and English respectively for the Stone Age records of the Francophone and Anglophone countries making up Central and West Africa. Authoritative historical accounts of the archaeological work conducted have been presented by de Maret (1990), Kense (1990) and de Barros (1990) in Robertshaw's *A History of African Archaeology*, however, there has been no truly complete synthesis of work conducted on the MSA for many years. Relatively recent overviews of the state of research have been provided by Barham (2000), Casey (2002), and Cornelissen (2002), while the most up-to-date contribution is that offered by Taylor (2011). This entry aims to outline the current state of archaeological knowledge on the MSA in Central Africa and West Africa. It is structured thematically, according to the principal questions that continue to occupy the attention of researchers.

Identifying Key Issues

Knowledge of the Middle Stone Age in both Central and West Africa remains immature, with current debates still troubled by a lack of intact archaeological sequences and by fundamental

uncertainties over the composition, sequencing, and age of the prehistoric cultures that have been previously recognized and reported. Indeed, as Barham (2001:67) has stated, after 90 years of scientific work, researchers working in these regions are "still in the process of sequence building." While many critical facts remain open to debate, Table 1 provides a generalized scheme of the Stone Age cultures so far identified in Central and West Africa, along with some of their key

Central and West African Middle Stone Age: Geography and Culture, Table 1 Key features of the principal cultures present in the Stone Age archaeological record of Central and West Africa. Note that taphonomic problems mean this generalized scheme remains open to question and, with the exception of new dates, unchanged since the late 1960s. (?) symbol denotes unresolved question, considered likely. (??) symbol denotes unresolved question, considered unlikely

Sequence			Age		Toolkit	Issues
			Previous (^{14}C)	Revised		
YOUNGER ← OLDER	ESA	Final Acheulean	50,000	400,000	Refined: Handaxes Cleavers Small scrapers	Well defined Hand-held technology Present in forested C. & W. Africa??
		Sangoan	Older than 40,000	Older than 250,000	Heavy-duty: Picks Large core axes Choppers Core scrapers	Very poorly defined. Very poorly dated. Hafted?? Forest-adapted?? Present in W. Africa?
	MSA	Lupemban	40.000–15.000	300,000-150,000	Distinctive: Large foliate points Core axes Small points (backed) Blades	Most sites poorly dated. Hafted technology? Hunting? Forest-adapted? Present in W. Africa??
		Lupembo-Tshitolian (SW Central Africa only)	Younger than 25,000	Undated	Small: Foliate points Core axes Backed pieces Tranchets	Very poorly defined Result of mixing? Very poorly dated Woodland adapted? Unknown in W. Africa
	LSA	Local variants; e.g., Tshitolian	Younger than 10,000	Younger than 40,000?	Microlithic, sometimes with: Small points Small core axes Tranchets	Complex halted toolkit Hunting & Gathering Better dated Gradual post-MSA change?

features, as currently known. Tellingly, with the exception of revised dates, this information has remained fundamentally unchanged since the late 1960s.

The 1950s, 1960s, and 1970s witnessed a period of intensive and seemingly productive research that in hindsight can be considered the "golden age" of scientific investigation into the Stone Age archaeology of Central and West Africa. At this time, some of the most preeminent Africanist archaeologists of the twentieth century, including Desmond Clark, Louis Leakey, Georges Mortelmans, and Oliver Davies, undertook excavations and comparative studies on vast scales unknown in more recent decades. At locations across Central and West Africa – for example, in the Dundo region of northeast Angola, on the Kinshasa Plain in the DRC, and at the sites of Kalambo Falls, Zambia, and Asokrochona, Ghana (Fig. 1) – the exposed sections of massive excavated trenches revealed broadly similar successions of post-Acheulean Stone Age industries that formed the basis of an emerging regional cultural sequence for the MSA (de Maret 1990). From older to younger, these cultures were respectively named the Sangoan and the Lupemban and are discussed at length in this entry, while the stone tool types characteristic of these MSA industries are detailed below and shown in Fig. 2. Towards the end of the MSA, the Lupemban was considered to change slowly into a variety of Later Stone Age (LSA) cultures typified by microlithic technologies. The Tshitolian industry is a local variant of the LSA found in the southwestern part of Central Africa and may have developed from an intermediate "Lupembo-Tshitolian" culture containing elements of both late MSA and early LSA technologies (Table 1). The Sangoan, Lupemban, and Tshitolian were, respectively, named after type sites at Sango Bay (Uganda), Lupemba (DRC), and Bena Tshitolo (DRC) where they were first found and defined (Clark 1971).

Since the 1970s, there has been a precipitous decline in fieldwork intensity across Central and West Africa due to the effects of postcolonial political and socioeconomic instability. Of equal, or perhaps even greater, influence has been the recognition of several seemingly insurmountable obstacles that make studying the Stone Age archaeological records of these regions extremely challenging. Discussed in detail below, these brakes on data collection and the progress of research mean that the key questions about the MSA of Central and West Africa that emerged in the mid-twentieth century have remained unresolved for more than 50 years and are still current. These long-standing and unsettled issues provide the essential structure of the remainder of this entry. Issues focusing on the nature of the Central and West African Stone Age records, their characteristic MSA industries, and chronology are discussed first. Following this, key theoretical issues centering on the possible adaptations represented by these cultures are outlined. The issues addressed can be summarized as follows:

- What is the general sequence of MSA cultures in Central Africa and West Africa, and how can Sangoan and Lupemban lithic industries be defined?
- How old is the MSA in Central and West Africa, and for how long did it last?
- Were Sangoan and Lupemban stone tools routinely hafted for use?
- Were Sangoan and Lupemban technologies adapted for hunting and gathering in woodland and rainforest environments?

Central and West African MSA Sequences: Defining the Sangoan and Lupemban

Archaeological fieldwork projects of the 1950s and 1960s attempted to make real progress towards the construction of a reliable Stone Age sequence for Central and West Africa. The Sangoan industry was found to overlie the Acheulean at the sites of Nsongezi (Uganda), Asokochona (Ghana), and Kalambo Falls (Zambia). In a remarkable departure from the refined symmetry of late Acheulean hand axes, the Sangoan was characterized as a rugged toolkit dominated by thick and heavy biface tools, including core axes, picks, choppers, and core scrapers, which were shaped roughly by striking a few flakes from large cobbles of tool stone. An

example of a Sangoan pick is shown in Fig. 2: 1. The Lupemban was found to sit above the Sangoan at Kalambo Falls (Zambia), and was said to include refined bifacial lanceolate points, core axes, Levallois points, and blade tools. A range of implements typical of the Lupemban are shown in Fig. 2: 2–6; 8–9. At sites across Central Africa, LSA assemblages were found to lie above MSA industries and were identified as informal quartz-based industries, or as "Tshitolian" toolkits based on the continuation of bifaces in smaller, more delicate forms, as well as segments, *petit tranchets*, backed pieces, and points finely retouched by pressure technique. The absence of undisturbed archaeological sequences spanning the period between the Lupemban and the LSA led to speculation that over time Lupemban technologies in South West Central Africa gradually phased into the Tshitolian, a change in which Lupemban tools became smaller and more refined, with toolkits featuring an increased number of Tshitolian-type *petit tranchet* (Fig. 2: 7) and microlithic elements. By the close of the 1960s, researchers might reasonably have concluded that they were close to resolving the essential makeup of Sangoan and Lupemban industries and to defining their place in space and time (Table 1). Subsequent research developments have shown such a view to be overly optimistic.

The work conducted across Central Africa during this period built on the fieldwork undertaken in the 1920s by Jean Colette, at a site today known as Gombe Point. This site, located on the banks of the Congo River in modern-day Kinshasa (DRC), revealed a succession of cultures that formed the basis for the first detailed framework for the Stone Age in Central Africa (Clark 1971). At the base of the excavated sediments was a culture Colette called the Kalinian that was dominated by large, minimally worked Acheulean-like bifacial implements, along with some flake tools. Above this, a

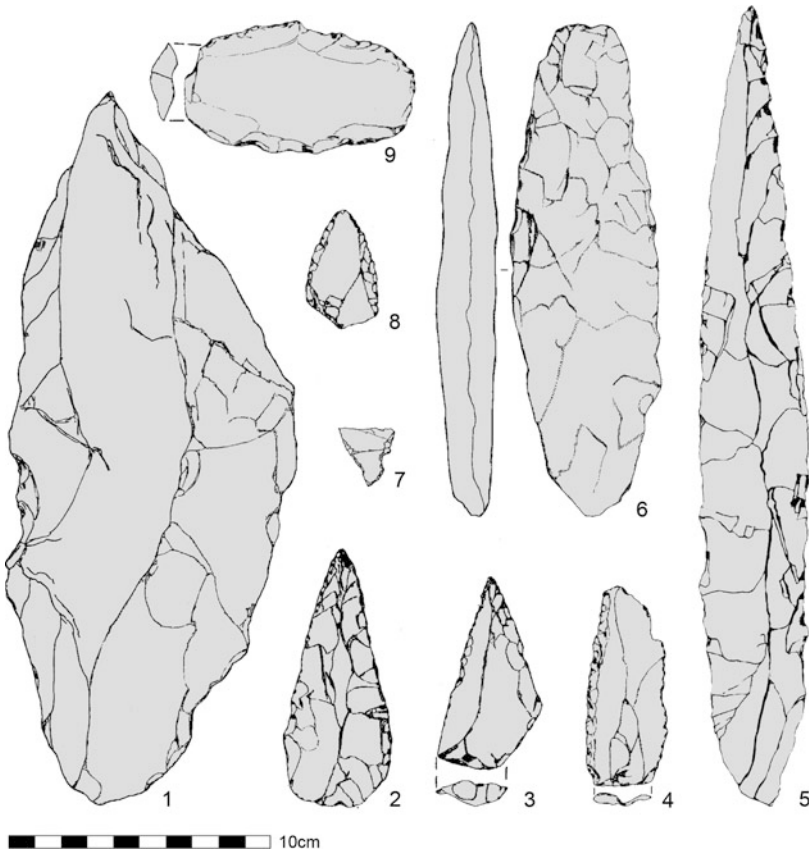

Central and West African Middle Stone Age: Geography and Culture, Fig. 2 Lithic artifacts of the Central and West African Middle Stone Age: *1*large, Sangoan-type pick, Camafufo, Angola; *2* prepared core (PCT) point, *3* convergent PCT point with facetted platform, *4* blade with lateral retouch ("backing"), *5*double-ended bifacial lanceolate point of Lupemban-type, *6* bifacial core axe of Lupemban-type, *7* tranchet point, *8* small PCT point, and *9* prepared core suitable for Levallois flake removals. No *1* from Camafufo, Angola; Nos *2–4* and *8–9* from Kalambo Falls, Zambia; No *5* from Gombe Point, DRC; No *7* from Twin Rivers, Zambia

culture characterized by a smaller, flake-based technology consistent with the Middle Stone Age was recovered alongside refined, daggerlike bifaces, to which the name Djokocian was applied. Higher up in the sediments, an assemblage containing microlithic artifacts of Later Stone Age type was named the Ndolian. Despite the different names given to them at that earlier time, these stone tool assemblages remain roughly equivalent to the Sangoan, Lupemban, and Tshitolian industries, as known since the 1950s (Barham 2001). Re-excavation of this important sequence by Daniel Cahen in the mid-1970s, however, identified a range of critical problems that call into question the vast majority of work conducted across Central and West Africa in preceding decades. The impact of this research is still felt today by archaeologists who continue to research the MSA in these regions.

Jean Colette accurately reported that the stone tool industries at Gombe Point rest beneath the modern soil surface in a single, approximately 7 m thick layer of sediment. Like Colette, Cahen's work (1978) identified multiple stone tool horizons in this soil layer but, crucially, he found that refitting stone tools (which must have been produced at the same time, during a single prehistoric stone tool knapping event) were vertically separated by up to 1.5 m in the sequence. This observation showed that severe subsurface soil movements resulting from bioturbation – the mixing of sediments by tree roots and insects – had moved artifacts up and down in the sequence since their ancient deposition, blending tools of different ages together into what *appear* to be distinct cultures in different stratigraphic positions (Cahen and Moeyersons 1977). The importance of this finding cannot be overstated; rather than accurately reflecting a series of changes in technologies over time whose study could reveal insights into prehistoric human behaviors, the Stone Age "industries" at Gombe Point instead result from the mixing of once discrete cultures into artificial levels of Stone Age material. Called "stone lines," these accumulations of mixed archaeological material have very low stratigraphic and cultural integrity and prevent the reliable definition and comparison of prehistoric stone tool industries over time and space (Moeyersons 1978). Similar processes also move other materials – including charcoal and pollen – that are useful both for dating and for reconstructing prehistoric environments, such that their association with particular stone tool assemblages cannot be determined reliably. This has implications for understanding the age and environmental context of MSA industries, issues that are explored later in this entry.

Revision of the Gombe Point sequence showed that the time-depth relationships that underpin the principle of stratification (in which the more deeply buried layers in a sequence are relatively older, and those nearer the surface are relatively younger) are confounded at this site. This understanding led Cahen to conclude that the integrity of the archaeological record across Central and West Africa may be so poor that only two broad cultures can be firmly distinguished in these regions – the Acheulean and a subsequent "Post-Acheulean Industrial Complex." According to this view, distinct Sangoan and Lupemban industries, as previously identified and described within the Congo basin, are erroneous and do not reflect prehistoric reality. More recently, "stone lines" have been seen to characterize the archaeological sequences of a large number of Central and West African sites, including Asokrochona, Chaminade, Kamoa, Mosumu, Nsongezi, and several sites located on the Kinshasa Plain (Fig. 1). Identifying the exact processes that cause buried lithic artifacts and other materials to disperse and reform as stone lines has proven difficult. Shifting sandy soils, in combination with tree-root activity (Moeyersons 1978), erosion (Schwartz 1996), and burrowing termites (McBrearty 1990), have been the principle explanatory factors forwarded, but should not be considered as mutually exclusive (Mercader et al. 2002).

Knowledge of the Sangoan and Lupemban MSA is now widely recognized to be extremely poor. Numerous MSA sites exposed by diamond mining in the Dundo region of Angola, including Musolexi, Camafufo, and Catongula (Clark 1963), provide much-needed information about the Stone Age in the southern part of the Congo

basin, but here Sangoan and Lupemban artifacts are found mixed together in a gravel layer and cannot be reliably separated based on stratigraphy. Knowledge of the MSA on the northern edge of the Congo basin is particularly poor, with a few disturbed sites studied by Bayle des Hermens (1975) providing essential data. Similar mixed aggregates also typify the MSA recovered from the "N" and "O" horizons at Nsongezi while, despite being in better stratigraphic context, McBrearty (1988) could not be completely confident in separating Sangoan- and Lupemban-like assemblages at Muguruk, preferring instead to describe them using the compound name "Sangoan–Lupemban." At the site of Kamoa, no Sangoan material is present at all – rather, an occupation gap or erosional phase is indicated in which the Acheulean is followed by a small, probable Lupemban assemblage in insecure context (Cahen 1975). In contrast to these mixed gravel and surface accumulations, a series of sites on the Kinshasa Plain (near to Gombe Point) have revealed deep sequences of poorly stratified sandy soils, in which van Moorsel (1968) observed subtle changes in Sangoan and Lupemban technologies over time. Based on an apparent trend towards smaller and more refined biface tool forms, Clark (2001) and Mortelmans (1957) both argued for the existence of discrete Lower (older) and Upper (younger) phases within the Sangoan and Lupemban. Even at the well-stratified site of Kalambo Falls (see below), however, the stratigraphic record for the Central African MSA is simply too coarse-grained to allow the secure identification of subtle technological changes over time. Until a more intact, high-resolution sequence of Sangoan and/or Lupemban material is found, the existence and nature of change within these cultures will remain speculative.

In spite of these very significant problems, several researchers continue to see meaningful similarities between the more heavily disturbed Middle Stone Age sites found in the tropical, forested interior of lowland Central and West Africa and a handful of less-disturbed archaeological sequences excavated on their woodland margins. Located on the periphery of Central Africa, sites including Muguruk, Twin Rivers, and Kalambo Falls provide evidence that the general regional sequence of Acheulean–Sangoan–Lupemban grading into LSA is essentially accurate. At the southern end of Lake Tanganyika in northeastern Zambia, the site of Kalambo Falls in particular provides a key sequence for the Central African MSA. Here, overlying a series of stratified Acheulean layers with abundant hand axes, cleavers, and rarely preserved organic materials, archaeological horizons representing the Sangoan and Lupemban are identifiable. Critically, these are separated from the Acheulean, and from one another, by sandy horizons that ensure only extremely limited mixing has occurred between the industries (Clark 2001). That the essential integrity of this sequence has been retained is also supported by technological differences between the two excavated technologies. Low numbers of characteristic MSA artifacts such as Levallois points and blade tools are found in the Sangoan horizons, which are contrasted in the Lupemban levels by an abundance of MSA tools made by Levallois methods, alongside bifacial, blade, and backed blade tools. Better, but still imperfect, stratigraphic control at these peripheral sites indicates that, although heavily disturbed, difficult to define or date, and poorly understood across most of Central and West Africa, Sangoan and Lupemban MSA technologies *are* valid prehistoric cultures.

Since the mid-1990s, new excavations at several sites located across Central and West Africa, including Twin Rivers, Sai Island, Mosumu, Birimi, Ounjougou, and Bété I, have provided new insights and a more positive foundation upon which future MSA research might build. At the collapsed cave of Twin Rivers, the Lupemban is capped above and below by layers of limestone that isolate the industry from any older or younger cultures and includes advanced backed blade technologies (Barham 2002a) that are the subject of detailed discussion later in this entry. This site, along with Sai Island, has also proven vital as a datable sequence enabling the construction of a more accurate chronology for the central African MSA, as discussed below. Sai Island is located far outside the geographical zone

typically associated with the Central and West African MSA but has revealed a deep stratigraphic sequence that incorporates lithic assemblages, separated by sterile sands, that bear surprising affinities to the Sangoan and Lupemban (van Peer et al. 2004). When more fully understood, this site promises to clarify the nature and degree of any connection between the MSA in Central and West Africa, and that of North and Saharan Africa, especially in terms of hominin migrations and or social and cultural links. Work at Mosumu has provided important new information about the MSA in Atlantic Central Africa. Here, a problematic stone-line context includes an MSA–LSA assemblage with small bifacial foliate points that may reflect a late expression of the Lupemban. The Birimi site (Ghana) fills an important geographical gap between Central and West Africa. As reported to date, this site includes a small series of generic Levallois-type tools that is complemented by a few Lupemban-like lanceolate artifacts, and may form an important point of comparison between the two regions. Further to the West, Ounjougou and Bété I have yielded precious, datable sequences for the MSA in West Africa and are discussed below.

Dating the MSA in Central and West Africa

Middle Stone Age industries across sub-Saharan Africa were historically considered to be around 40–12 thousand years old, based on radiocarbon (^{14}C) dates taken on buried charcoal samples. Developed in the 1950s, this scientific dating tool was applied widely to date Acheulean and MSA industries throughout the 1960s, 1970s, and 1980s and indicated that MSA technologies were a relatively recent and short-lived technological interlude (perhaps lasting for less than 40,000 years) prior to the appearance of microlithic LSA cultures around 10,000 years ago. Once considered beyond doubt, this carbon-based time span for the MSA has, however, been comprehensively reassessed in the last 30 years. It is now recognized that even modern AMS^{14}C dating methods are incapable of accurately ageing carbon samples if the charcoal has a true age greater than about 45,000 years; the application of^{14}C dating methods to materials older than this results only in dates that agree with this technical limit. The development and refinement during the 1980s, 1990s, and 2000s of a range of new scientific dating techniques with greater time depth has since yielded much earlier dates for the emergence of MSA technologies across sub-Saharan Africa. These generally agree that MSA toolkits appeared during the period 400–200 thousand years ago and show that they continued in use until roughly 45 thousand years ago (McBrearty and Brooks 2000). Sangoan and Lupemban MSA industries of Central and West Africa are now associated with an emerging chronology within this date range and, in this context, can be considered directly relevant to understanding the changes in hominin brains and behaviors that underpin the evolution of *Homo sapiens*.

The stratigraphic inadequacies of the Central and West African Stone Age records (as discussed above) create major problems for constructing cultural and technological sequences but also for building absolute chronologies based on scientific dating methods; most sites thus remain undated. For some researchers, particularly those working in the forested interior of these regions, the difficulty of applying dating techniques other than radiocarbon means the^{14}C database still forms the only chronological framework (e.g., Cornelissen 2002). However, in addition to the technical limits associated with these dates, the vertical movement of artifacts and charcoal samples in stratigraphic sequences means the association of dated samples with particular tool horizons is frequently unreliable. This problem is particularly acute in the lowland interior of Central Africa, where several sites, including Gombe Point, Mosumu, and Dimba, exhibit profiles in which dates do not consistently increase in age with depth, showing significant vertical movement has occurred (Cahen et al. 1983). For all these reasons, and in light of a growing body of much older dates from the margins of Central and West Africa and from Southern and East Africa, most researchers now consider the radiocarbon dating record for the MSA to be essentially redundant and that sites to which only this technique has been applied remain effectively undated (Barham 2001). In spite of this understanding, the

continued use of radiocarbon dates in some current research on the Central and West African MSA warrants their presentation here.

The radiocarbon record takes in sites and sequences found across most parts of Central and West Africa, from within the Congo basin, on its southern and eastern margins, as well as many West African sites. In addition to the problematic dates from Gombe Point, dated MSA materials attributed to the Sangoan and Lupemban at the sites of Basoko, Belgika and Lemba on the Kinshasa Plain (van Moorsel 1968) are also found in similarly disturbed "stone-line" contexts. Radiocarbon dates for the Sangoan here range from >26,000 to >30,000 years BP (before present), while estimates for the age of the Lupemban vary between 12,230 ± 250, 15,080 ± 480, and >30,000 years BP. The Gabonese site of Okala (Clist 1997) stands out in Atlantic West Central Africa as a site with a more intact, dated stratigraphy. Here, a horizon of charcoal resting on clay has recently been radiocarbon dated to 39,690 ± 670 BP and >40,000 years BP, indicating a minimum age for the small collection of generic and probably relatively late MSA artifacts found in association. In West Africa, absolute dates for the MSA, even by radiocarbon, are extremely rare, but estimates based on stratigraphic grounds have often registered more recent age estimates than those from Central Africa. At the two nearby sites of Asokrochona and Tema II (Ghana), Sangoan occurrences are present at the base and upper part of a laterite gravel layer considered by Nygaard and Talbot (1984) to have formed around 20,000 years ago, the relative ages of the assemblages being estimated as 13–20 thousand years old and 20–25 thousand years old, respectively. At Anyama (Ivory Coast), a Sangoan assemblage with both heavy-duty and Levallois elements remains undated.

On the southern margin of the Congo basin, radiocarbon dates for the Sangoan and Lupemban are similarly problematic, but some sites are now revealing markedly earlier dates for these MSA industries. In northern Angola, a series of dates have provided age estimates of 38,000 ± 2500, >34, and >40 thousand years BP for the earliest "Sangoan/Lower Lupemban" industry and 14,503 ± 560 years BP for the "Upper Lupemban/Lupembo-Tshitolian" industry, but based on comparisons with other sites, dates for the earlier part of this record are certainly far too young. Twin Rivers (Zambia) is the only site across Central or West Africa to which both old and new dating techniques have been applied to the same MSA sequence and provide a case study for their effects on resulting chronologies. A Lupemban assemblage, here incorporated in limestone breccias, was twice dated in the 1960s by radiocarbon technique, yielding results of 22,800 ± 1,000 BP and >33,200 years BP. However, the redating of the stratigraphic profile by uranium-series technique in the 1990s established a secure time span of 265–170 thousand years BP for these same layers, highlighting both the potential difference in dating estimates between radiocarbon and longer-ranged techniques and the true antiquity of the Lupemban MSA on the southern margin of Central Africa (Barham 2001). Kalambo Falls, with its far larger yet technologically similar Lupemban MSA assemblage, probably represents an MSA record of comparable age to that at Twin Rivers but has yet to be dated reliably using methods other than radiocarbon. The existing Kalambo Falls radiocarbon chronology compares well with ^{14}C dates from elsewhere on the margins of Central Africa (e.g., northern Angola), the Sangoan levels ranging between >40 and 43 thousand years BP, and the Lupemban rubble horizons falling in the range 27–31 thousand years BP. These estimates are also best treated as far too young, however, particularly given that amino acid racemization dates on Acheulean age wood from the same sequence, have yielded an age of approximately 190 thousand years BP for the latest Acheulean (Clark 2001). At Mumbwa Caves (Zambia), a sequence extending back 170 thousand years includes generic MSA assemblages but lacks any elements distinctive of the Sangoan or Lupemban, further supporting an early time span for these industries in south-central Africa (Barham 2000).

Relevant dated sites exist elsewhere on and beyond the margins of Central Africa. Sai Island (Sudan) is located far outside Central Africa (Fig. 1) but includes in stratified sands

assemblages showing affinities to the Sangoan and Lupemban (van Peer et al. 2004). Provisional optically stimulated luminescence (OSL) dating estimates of 182 ± 20 thousand years BP for sands immediately above the Sangoan assemblage provide a minimum age for this industry which, in combination with a date of 152 ± 10 thousand years BP from sands above the overlying Lupemban-like assemblage, provides an effective time span of >180–150 thousand years for the MSA at this site. While it remains unclear how representative these assemblages are of the MSA in Central and West Africa, they share certain technological features, including the occurrence of distinctive core axes. The Kapthurin Formation (Kenya) provides a key sequence for the Acheulean–MSA transition, since it shows the repeated appearance and disappearance of bifacial, Levallois, and blade-based technologies over time, indicating that a simple model in which toolmaking traditions are sequentially replaced over time may not apply here. Within the excavated sequence, assemblages with Sangoan-like heavy-duty picks predate 285,000 years ago (Tryon and McBrearty 2002), and are broadly coincident with dates for the origins of the Central African MSA in south-central Africa.

In West Africa, very few MSA sites have yet been dated using modern techniques capable of accurately resolving chronologies beyond 40,000 years. Bété I (Ivory Coast) records a series of Sangoan assemblages made up of characteristic picks, core axes, and bifaces that have been dated by thermoluminescence (TL) technique to 254 ± 51 thousand years BP (Liubin and Guédé 2000). Though associated with a large range of error, this date demonstrates the early emergence of MSA technologies in West Africa. Conversely, other dated West African sites have so far revealed more recent dates for the emergence of the MSA here. Currently one of the more intriguing MSA sites in West Africa is Oungoujou (Mali), which actually consists of an exposed landscape incorporating numerous profiles. The post-Acheulean sequence here includes an industry in Unit 2 that is typified by bifacial tools dated between 60 and 80 thousand years ago, followed by the development of blade technology at 60,000 years ago, and, only later, between 50 and 55 thousand years ago, the appearance of Levallois flaking strategies (Robert et al. 2003). Distinctive Sangoan and Lupemban toolkits do not feature here, while the sequencing of different technologies and their relatively late appearance in comparison to emerging dates for the MSA in Central Africa is difficult to account for at present. At Birimi (Ghana), surprisingly late dates of 23.6 ± 2.9 thousand years BP and 40.8 ± 11.8 thousand years BP for sediments encapsulating an MSA assemblage with possible, yet unconfirmed, similarities to the Lupemban industry might be explained as relating to a very late expression of the MSA but alternatively perhaps hint at the persistence of these technologies over time (Casey 2002). The overlap of these dates with problematic ^{14}C dates for the Sangoan and Lupemban MSA elsewhere in Central and West Africa might reflect the genuine later appearance of the MSA in this part of West Africa, but any interpretation should be drawn cautiously, given the wide error range associated with the lower date.

Currently available dates for the MSA in Central and West Africa are sparse and highly variable, reflecting technical differences in the dating methods applied and the difficulties involved in applying techniques other than radiocarbon. A growing body of data is, however, beginning to highlight that MSA industries across these regions appeared far earlier than was previously understood on the basis of the radiocarbon dating record. It is notable, however, that with the possible exception of Bété I, all of the very old estimates (Twin Rivers, Sai Island, Kapthurin) relate to sequences found on the fringes of these regions, and it is therefore possible that the numerous Sangoan and Lupemban sites known from the interior of the Congo basin are in fact far more recent in age. The absence of well-dated sites bridging the gap between these old chronologies and those derived through radiocarbon technique makes it particularly difficult to pin down when Central and West African MSA technologies began to transition into LSA industries or for how long the MSA lasted in these regions. On

the balance of present evidence, Sangoan and Lupemban MSA technologies, when taken as a whole, seem to have first appeared sometime around 400,000 years ago and to have continued in use perhaps until around 40–50 thousand years ago. Although certainly in need of verification through the dating of many more sites from across the vast geographic range of Central and West Africa, this time span fits well with the known age of the MSA across Southern and East Africa.

Complexity in Tool Manufacture and Use

Middle Stone Age technologies from across sub-Saharan Africa have long been considered to reflect the hafting of stone tools into handles, as composite implements used for hunting and gathering (e.g., Clark 1959). The stone-tipped hunting spear is perhaps the most familiar example of such an implement and may have its earliest origins in the distinctive stone "points" that characterize regional MSA industries (Fig. 2: 2–3 and 8). In terms of their size, shape, and method of manufacture, points and other artifacts made by the Levallois technique mark a departure from preceding Acheulean biface tools. Alongside observations drawn from contemporary and historical stone tool-using hunter-gatherer societies, modern replication experiments back up the concept that MSA-type artifacts can be usefully deployed as a range of hafted foraging implements. Other tool types, including blades and deliberately blunted ("backed") blades (Fig. 2: 4), can be similarly hafted but moreover have traditionally been considered by archaeologists to be advanced LSA technologies made only by *Homo sapiens*. The identification of these artifact types in many MSA industries – including some Lupemban assemblages predating the appearance of anatomical *Homo sapiens* at 200,000 years ago – suggests the early evolution of technologically and behaviorally complex adaptations by MSA Central African hominins.

The advent of specialist projectile weapons, handled axes and adzes, and other complex technologies including nets, traps, and fishing equipment marks a fundamental change in human interactions with the environment. They confer an array of advantages to hunter-gatherers: providing a more effective and safe way to exploit existing sources of food (e.g., the more successful hunting of large, dangerous animals from a distance) and enabling the extraction of a wide range of otherwise inaccessible resources (e.g., hard woods, buried roots and tubers, tree-dwelling animals, fish), thus presenting a means to settle long term in environments previously inhospitable for human foragers, including highlands, deserts, and rainforests. Stone Age researchers have recently refocused attention on the implications that multi-component tool construction and utilization have for the evolution of hominin intelligence. This is based on the understanding that crafting a composite implement requires a well-developed imaginative ability (visualization of completed tool designed for a specific task), detailed environmental knowledge (selection of multiple organic materials that can be combined), sophisticated forward planning skills (preparation of each collected material to alter its individual properties), and technical expertise (assembly of materials to create tool form appropriate to task). The design and manufacture of complicated multi-element implements for an anticipated, specialized future use is now commonly recognized as indicating "modern" foraging behavior and mental abilities synonymous with *Homo sapiens*.

Except in extremely rare circumstances, the organic parts of composite implements degrade rapidly and are not seen in the archaeological record, and it has thus proven very difficult to provide definitive evidence of complex hafted tool manufacture and use in the MSA. Because they are typically used in remote locations and made only of soft organic materials, traps are virtually invisible in the archaeological record but, given the right soil conditions, the more durable organic parts of fishing gear can be preserved. Direct evidence of the use of bespoke, intricate organic implements in the Central African MSA comes from the site of Katanda on the western edge of the Great Rift Valley. In the late 1980s, an international team of archaeologists uncovered two carefully shaped, carved bone points with barbs in double rows (Yellen et al. 1995) in association with a generic MSA lithic assemblage lacking any clear affinities to the Sangoan or

Lupemban. On first sight, the complexity of these unmistakable fishing harpoons might be assumed to reflect a very late MSA, or even a more recent LSA technology, but dating by optically stimulated luminescence (OSL) has confirmed that they are at least 80,000 years old. Unique across sub-Saharan Africa, these ornate MSA fishing tools highlight that complex toolmaking abilities and foraging strategies were likely well established across much of Central Africa by this time, and probably much earlier.

At most MSA sites, the analysis of stone artifacts offers the only method to identify complex tool use, and in recent years this field of study has been revolutionized by developments in the practices of lithic use-wear analysis and residue analysis. These techniques employ microscopes to examine stone artifact edges for traces of damage and adhering organic particles resulting from prehistoric tool use, including contact with handles (Barham and Mitchell 2008: 277–8). In Southern and East Africa, some well-preserved sites (e.g., Sibudu Cave in KwaZulu Natal, South Africa) have revealed numerous MSA points and backed pieces with distinctive edge damage, showing where they were routinely attached to handles (which have themselves long since perished) for use as hunting weapons. While many LSA and MSA cultures from sub-Saharan Africa are now well understood to include intricate, multi-component technologies that were employed to hunt and gather, the evidence from Central and West Africa is still mostly circumstantial. In the Congo basin, Tshitolian LSA toolkits reflect an established hunting, gathering, and fishing culture based on composite tools; but the absence of any well-preserved MSA sites with intact stratigraphies across Central and West Africa places limits on the identification of complex hafted technologies and foraging behaviors in the Sangoan and Lupemban.

The large, roughly made bifacial tools characteristic of the earliest Central and West African MSA – the Sangoan – have been considered likely candidates for hafting since the 1950s (Clark 1959), but compelling evidence has only recently been reported. At Sai Island, use-wear analysis has shown that 27 Sangoan-type core axes were inserted into handles before being used in digging activities (van Peer et al. 2004). Given its location in northeast Africa and the vast area across which the Sangoan was made and used (Fig. 1), it remains unclear how representative this assemblage is of the industry. Larger Sangoan assemblages recovered from other sites, including Kalambo Falls and Bété I, lack clear evidence of stone tools made by the Levallois technique and cast doubt on the concept that Sangoan stone tools were made with the intention of hafting. In contrast, the wide range of stone artifact types present in the Lupemban toolkit may have provided a suitable basis for the manufacture and deployment of composite hunting and gathering implements. Finely crafted lanceolate points are the defining feature of the Lupemban toolkit (Fig. 3) and have often been theorized to have been hafted as the tips of hunting spears. Composite projectile functions have also been proposed for other tools such as small Levallois points and deliberately backed blades, while well-made Lupemban core axes have frequently been hypothesized to be the working ends of axes and adzes for working wood. However, the only systematic use-wear analysis of confirmed Lupemban tools (Taylor 2011) has

Central and West African Middle Stone Age: Geography and Culture, Fig. 3 Three views of a bifacially flaked lanceolate point excavated from Kalambo Falls, Zambia. These tools have been repeatedly been hypothesized to have functioned as the stone tips of composite hunting spears as part of a rainforest-adapted toolkit

so far found only limited evidence supporting the use of core axes as hafted heavy-duty woodworking implements.

At present, direct evidence linking the Sangoan and Lupemban to sophisticated hunting and gathering subsistence strategies is limited, but the balance of available data supports the concept that, rather than the Sangoan, the Lupemban MSA may reflect the first widespread adoption of composite hunting and gathering technologies. Some types of heavy-duty biface present in the Sangoan were probably hafted, but the industry lacks a broader range of stone tools suitable as part of a diverse composite toolkit incorporating projectile armatures. In contrast, the Lupemban includes heavy-duty and light-duty stone tools apparently designed for composite use, from which a specialist composite toolkit might be created. Taken alongside early dates for the Lupemban derived from Twin Rivers (see above), this stone tool industry may represent one of the earliest hafted technologies, anywhere. In addition, the occurrence of small numbers of advanced backed blades (Barham 2002a), alongside large quantities of yellow, red, and brown ochreous pigment that does not occur locally (Barham 2002b), indicates that the Stone Age people who occupied the Twin Rivers cave between 265 and 170 thousand years ago were undertaking cognitively complex and symbolic activities, including the construction of advanced LSA-like composite armatures and perhaps body decoration, well before the emergence of anatomically modern *Homo sapiens*.

Environmental Adaptations

Sangoan and Lupemban industries of the Central and West African MSA have been persistently thought of as prehistoric adaptations for foraging in dense jungle and woodland environments, which are today widespread across these regions. This concept originated with Desmond Clark (1959) and matured during the 1960s as researchers began to investigate seriously the patterning of MSA cultures in time and space and tried to explain the distinctive features of their toolkits. The similarity of heavy-duty biface tools in Sangoan and Lupemban assemblages to implements used for woodworking by modern stone tool-using hunter-gatherer societies partly inspired this hypothesis. The main observation upholding it is the apparent correlation between the location of Sangoan and Lupemban sites, and the modern distribution of rainforest and thick woodland ecosystems, as shown in Fig. 4. Both industries are well represented in the lowland rainforests and river basins of Central and West Africa, even in spite of the fact that survey and fieldwork has been carried out patchily. Acheulean hand axes and cleavers are effectively absent from these same areas but are present across Southern and East Africa, and in North and Saharan Africa, suggesting that MSA technologies (e.g., specialized hunting weapons, traps) and sophisticated hunting and gathering behaviors (e.g., cooperative hunting) played a vital role in the successful settlement of these environments (Barham 2001).

The colonization of new landscapes and environments such as remote highlands and islands, sparse deserts, and densely vegetated woodlands and rainforests signifies an enhanced ability to exploit nature. In comparison to savanna grasslands and light woodlands, access to the resources and foods needed by mobile hunter-gatherers (e.g., fresh water, protein, carbohydrates, minerals) is recognized to be extremely challenging in these ecological settings. Critical resources are generally either rare or occur in limited amounts but, moreover, are restricted to specific locations, unevenly distributed, and unpredictable, making them very difficult to obtain. Long-term survival in such resource-poor conditions is only possible by harnessing specialized extractive hunting and gathering technologies (a variety of dedicated projectile weapons, animal traps, etc.), putting into practice detailed ecological knowledge (e.g., the systematic seasonal exploitation of scattered foods and materials), and by establishing social networks (i.e., contact with other foraging groups to maintain food security) and cooperative behaviors (e.g., organized group hunting). The ability of hunter-gatherers to disperse into, and permanently settle, very challenging landscapes and environments – including rainforests – requires a degree of sophistication in foraging behaviors and mental capabilities matching those of *Homo sapiens*.

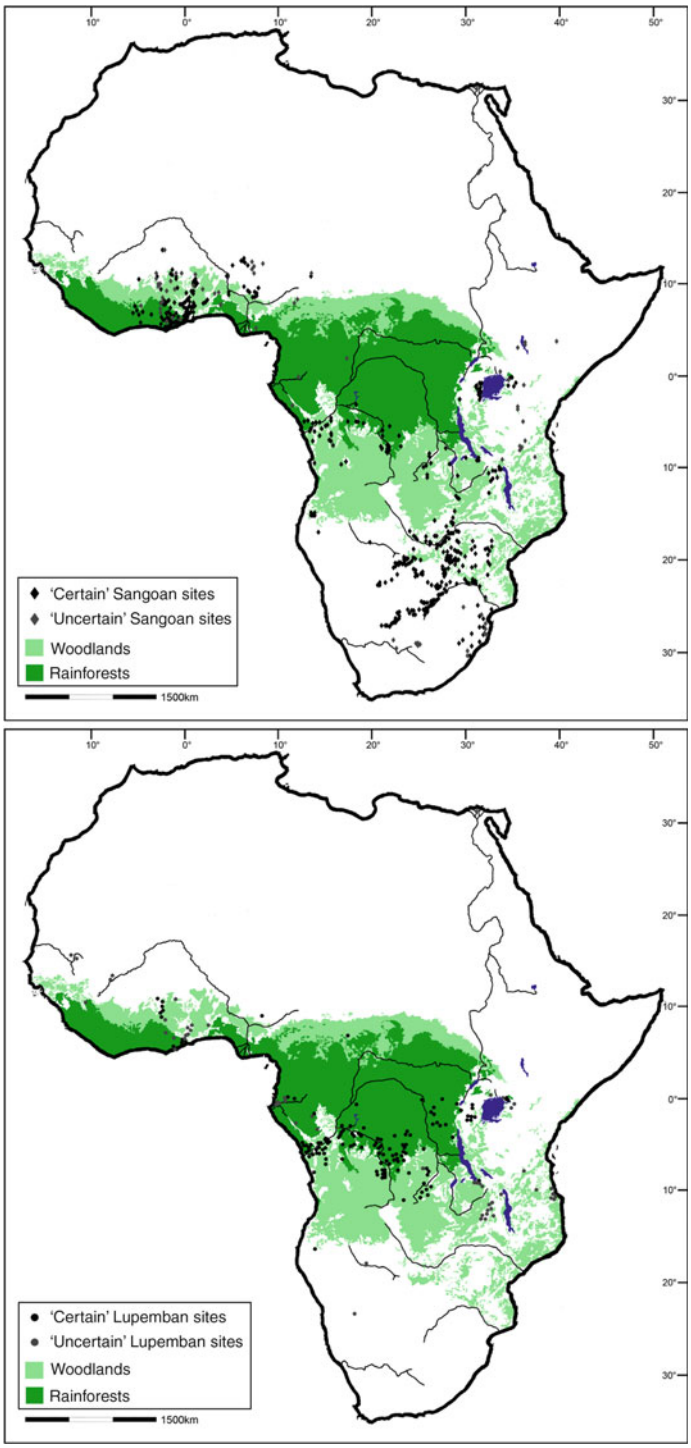

Central and West African Middle Stone Age: Geography and Culture, Fig. 4 The distribution of certain and uncertain Sangoan and Lupemban MSA sites in central and West Africa, as recognized in the 1960s. Shown with major river and lake systems of Africa and the contemporary extent of rainforest and woodland ecosystems

Although often thought to be lush places rich in large animals, edible plants, fruits and nuts, dense rainforests, and woodland environments in fact present natural barriers to hunter-gatherers. Barham (2001) has stressed that forest animals including tree-dwelling primates, duikers, and forest elephant can be hunted or captured only using specialized projectile technologies, traps, and nets in organized cooperative activities. Nutritious plant matter is surprisingly sparse, meaning humans must compete with other animals for access to tall fruiting trees and underground roots and tubers. Indeed, Headland and Bailey (1991), in their study of contemporary hunter-gatherers living in Central African rainforests, argued that energy-rich carbohydrates occur so rarely that even in modern times human foragers can live in jungles only by supplementing their hunter-gatherer diet with yams traded from local farming communities. Their analysis completely excludes the possibility that Stone Age foragers could have subsisted within the Central African rainforest belt; however, more recent anthropological and archaeological research has cast doubt on this extreme view. Excavations in the Ituri rainforest in the eastern part of the Congo basin (DRC) show this area was occupied by LSA hunters and gatherers 18,000 years ago, well before the emergence of farming (Mercader et al. 2000). Similarly flexible and sophisticated composite Sangoan and Lupemban technologies (see above) may reflect an earlier MSA origin for the presence of mobile human foragers in Central and West African rainforests.

Evidence for rainforest and woodland foraging in the MSA of Central and West Africa is problematic and still largely circumstantial. Although Sangoan and Lupemban cultures are seemingly associated with these vegetation zones today (Fig. 4), this same correlation did not necessarily hold true during the Stone Age. Central and West African environments are known from polar ice cores in the past to have undergone dramatic shifts in size and position as global climate has cycled between cool, dry glacial phases ("ice ages") and warm, wet interglacial phases in which conditions were broadly similar to today. Lasting for approximately 100,000 years, these periods are known as marine isotope stages (MIS). Supplementing this global climatic record, long pollen sequences cored from the Atlantic Ocean floor and deep lake sediments provide a record of regional vegetation change in Central and West Africa. Typically, interglacial stage vegetation consisted of a rainforest and woodland belt similar to that recorded for the last 10,000 years (the Holocene), while the dry climate of global glacial stages caused the severe contraction and breakup of these environments into localized pockets, separated by expansive savanna grasslands (Dupont et al. 2000). Modelling past vegetation cover in coastal West Africa is a particular challenge, since fluctuating aridity is known to have caused major and rapid spatial rearrangements to environments not only during the last interglacial–glacial–interglacial cycle centering on the extremely dry conditions of the Last Glacial Maximum (LGM) but also during the Holocene. These regional records of climate and vegetation are also not currently refined enough to allow the distribution of African environments in high resolution before about 25,000 years ago which, in combination with the poor dating record available for Sangoan and Lupemban industries (discussed above), prevents the definitive association of archaeological sites with particular ecologies.

In addition to these global and regional climate and environment records, site sequences preserving animal bones and/or pollen alongside horizons of stone artifacts have sometimes provided local detail of Sangoan and Lupemban flora and fauna. As highlighted earlier in this entry, however, faunal remains are extremely rare at Central and West African MSA sites; indeed, only two examples are currently known: Simbi in western Kenya and Twin Rivers in Zambia. The position of these sites on Central Africa's periphery perhaps begs the question of how well they represent Sangoan or Lupemban industries as a whole. Charcoal and pollen are more frequently preserved; however, acute subsurface disturbance to the record means the stratigraphic position of buried materials and their relationship with particular stone industries is seldom reliable (van Noten 1982).

Very few Sangoan sites have revealed environmental evidence of any kind, with the key sites in

this regard being Simbi and Kalambo Falls, on Central Africa's margins. The large Sangoan-type bifaces and flake tools from Simbi are associated with a substantial bone assemblage consisting of various grazing herbivore species reflecting an open savanna or lightly wooded habitat (McBrearty 1992). At Kalambo Falls, a reliable pollen sequence shows the persistence of deciduous woodlands during the site's use by late Acheulean and Sangoan toolmakers (Clark 2001). Less secure evidence comes from several sites in lowland Central and West Africa. Both Asokrochona and Tema (Ghana) have revealed Sangoan-like assemblages in "stone lines" that, although today found within areas of mosaic rainforest, woodlands, and grasslands, were likely located in dense woodland environments (though not rainforests) during the MSA. A possible Sangoan component in the basal layers at Njuinye (Cameroon) may have been made and used in a forest setting, given that a pollen core from 50 km distant Lake Barombi Mbo records the presence of forest species in the local area throughout the last 28,000 years (Mercader 2002). The apparent persistence of this vegetation through the extreme dry of the LGM suggests forests may have been a consistent feature here during earlier arid phases.

Environmental evidence derived from Lupemban site sequences is similarly meager and problematic. The small and fragmentary bone assemblage at Twin Rivers suggests Lupemban occupation of the southern part of Central Africa coincided with open woodland or grassland conditions (Barham 2000), while 850 km to the northeast, Kalambo Falls bears witness to a massive Lupemban assemblage dominated by bifaces, Levallois and blade tools, and a solid pollen sequence showing the endurance of woodlands throughout the late Acheulean and MSA. At Mufo in northeastern Angola, reworked gravels containing a later Lupemban or Lupembo-Tshitolian assemblage incorporates sparse grass pollen and charcoal hinting at open savanna conditions. In lowland Central Africa, pollen from within the "stone lines" at Mosumu and Ndjole provides some limited evidence for the use of Lupemban technology in humid rainforest habitats, but these sites have clearly suffered extensive subsurface disturbance.

The poverty of faunal and pollen records for the Central and West African MSA underscores just how little is definitively known about environmental adaptations. Current evidence suggests Sangoan and Lupemban industries may relate to a range of environments, including open grasslands, dense woodlands, and forests, but with few exceptions this evidence must be treated with great caution owing to stratigraphic disturbances. Perhaps the strongest indication of a specialized woodland and jungle adaptation remains the apparent general correlation of MSA sites with the regions of Africa prone to the growth of dense vegetation (Fig. 4). The Lupemban in particular seems to offer a range of stone artifact types suitable for the construction of composite tools such as woodworking and projectile weapons that might have enabled the settlement of these environments. If the early dates for the industry at Twin Rivers are representative of the age of the MSA Lupemban across Central and West Africa, then the first settlement of the rainforest belt may have been undertaken by pre-*sapiens* hominins, with important implications for understanding the evolution of human intelligence and social behaviors in sub-Saharan Africa.

Future Directions

This entry highlights that the MSA record of Central and West Africa remains very poorly known in comparison to the Stone Age records of Southern and East Africa and North and Saharan Africa. These regions are beset by a range of stratigraphic problems that have inhibited the construction of reliable Stone Age sequences and a high-resolution chronological database. Significant questions remain regarding the technological complexity and environmental adaptations signified by the Sangoan and Lupemban, but also more fundamentally, about the precise content of these industries and their variation across time and space. At present, concepts of the Sangoan and Lupemban as early composite technologies used to hunt and gather in woodland environments are broadly supported by a range of evidence, but much work remains to be undertaken in order to demonstrate this beyond doubt. The

archaeological record on the margins of these regions, especially south-central Africa (Zambia), has provided a critical new framework for understanding these issues, but may not be representative of these industries across their entire geographic ranges. New dates from sites on the margins of Central and West Africa may yet clarify the true age and time span of these technologies, but there is a desperate need for at least one intact, datable sequence that samples the Sangoan and Lupemban from the lowland interior of Central Africa.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Archaeological Record
- ▶ Archaic *Homo sapiens*
- ▶ Behavioral Archaeology
- ▶ Charcoal: Preservation and Conservation
- ▶ Clark, John Desmond
- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ Dating Techniques in Archaeological Science
- ▶ Fossil Records of Early Modern Humans
- ▶ Handaxes and Biface Technology
- ▶ *Homo heidelbergensis*
- ▶ *Homo sapiens*
- ▶ North and Saharan Africa: Geography and Chronology
- ▶ Radiocarbon Dating in Archaeology
- ▶ Southern and East African Middle Stone Age: Geography and Culture
- ▶ Taphonomy: Definition

References

Barham, L.S. 2000. *The Middle Stone Age of Zambia, south central Africa*. Bristol: Western Academic and Specialist Press.

Barham, L.S. 2001. Central Africa and the emergence of regional identity in the Middle Pleistocene. In *Human roots: Africa and Asia in the Middle Pleistocene*, ed. L.-S. Barham and K. Robson-Brown, 65–80. Bristol: Western Academic and Specialist Press.

Barham, L.S. 2002a. Backed tools in the Middle Pleistocene central Africa and their evolutionary significance. *Journal of Human Evolution* 43: 585–603.

Barham, L.S. 2002b. Systematic pigment use in south-central Africa. *Current Anthropology* 39: 703–710.

Barham, L.S., and P. Mitchell. 2008. *The first Africans: African archaeology from the earliest toolmakers to most recent foragers*. Cambridge: Cambridge University Press.

Cahen, D. 1975. *Le site archéologique de la Kamoa (Région du Shaba, République du Zaïre) de l'Age de la Pierre Ancien a l'Age du Fer*. Tervuren: Musèe Royal de l'Afrique Centrale.

Cahen, D. 1978. Vers une révision de la nomenclature des industries préhistoriques de l'Afrique Centrale. *l'Anthropologie* 82 (1): 5–36.

Cahen, D., and J. Moeyersons. 1977. Subsurface movements of stone artefacts and their implications for the prehistory of Central Africa. *Nature* 266: 812–815.

Cahen, D., J. Moeyersons, and W.G. Mook. 1983. Radiocarbon dates from Gombe Point (Kinshasa, Zaire) and their implications. *PACT* 85: 441–452.

Casey, J. 2002. The archaeology of West Africa from the Pleistocene to the Mid-Holocene. In *Under the canopy*, ed. J. Mercader, 35–63. New York: Rutgers University Press.

Clark, J.D. 1959. *The prehistory of southern Africa*. New York: Plenum Press.

Clark, J.D. 1963. *Prehistoric cultures of northeast Angola and their significance in tropical Africa*. Companhis de Diamantes de Angola (DIAMANG): Lisbon.

Clark, J.D. 1971. Problems of archaeological nomenclature and definition in the Congo basin. *South African Archaeological Bulletin* 26: 67–78.

Clark, J.D. 1988. The Middle Stone Age of East Africa and the beginnings of regional identity. *Journal of World Prehistory* 2 (3): 235–305.

Clark, J.D. 2001. *Kalambo Falls prehistoric site, Volume III. The earlier cultures: Middle and Earlier Stone Age*. Cambridge: Cambridge University Press.

Clist, B. 1997. Le site d'Okala, province de l'estuaire, Gabon, et son importance pour la comprehension du passage à la sédentarisation en Afrique centrale. *Earth and Planetary Science* 325: 151–156.

Cornelissen, E. 2002. Human responses to changing environments in Central Africa between 40,000 and 12,000 BP. *Journal of World Prehistory* 16 (3): 197–235.

De Barros, P. 1990. Changing paradigms, goals and methods in the archaeology of Francophone West Africa. In *The history of African archaeology*, ed. P. Robertshaw, 155–172. London: John Currey.

De Bayle des Hermens, R. 1975. *Recherches préhistoriques en République Centrafricaine*. Paris: Labethno.

De Maret, P. 1990. Phases and facies in the archaeology of central Africa. In *The history of African archaeology*, ed. P. Robertshaw, 109–134. London: John Currey.

Dupont, L.M., S. Jahns, F. Marret, and S. Ning. 2000. Vegetation change in equatorial West Africa: time-slices for the last 150 ka. *Palaeogeography, Palaeoclimatology, Palaeoecology* 155: 95–122.

Headland, T.N., and R.C. Bailey. 1991. Have hunter-gatherers ever lived in tropical rain forest independently of agriculture? *Human Ecology* 19 (2): 115–122.

Kense, F.J. 1990. Archaeology in Anglophone Africa. In *The history of African archaeology*, ed. P. Robertshaw, 135–154. London: John Currey.

Liubin, V.P., and F.Y. Guédé. 2000. *Paleolit Respubliki Kot d'Ivvuar (Zapadnaya Afrika) [The Palaeolithic of the Republic of Cote d'Ivoire (West Africa)]*. Vol. 3. St. Petersburg: Russian Academy of Sciences, Institute of the History of Material Culture Proceedings.

McBrearty, S. 1988. The Sangoan-Lupemban and Middle Stone Age sequence at the Muguruk Site, western Kenya. *World Archaeology* 19 (3): 388–420.

McBrearty, S. 1990. Consider the humble termite: termites as agents of post-depositional disturbance at African archaeological sites. *Journal of Archaeological Science* 17: 111–143.

McBrearty, S. 1992. Sangoan technology and habitat at Simbi. *Nyame Akuma* 38: 34–40.

McBrearty, S., and A.S. Brooks. 2000. The revolution that wasn't: a new interpretation of the origin of modern human behaviour. *Journal of Human Evolution* 39: 453–563.

Mercader, J. 2002. Forest people: the role of African rainforests in human evolution and dispersal. *Evolutionary Anthropology* 11: 117–124.

Mercader, J., F. Runge, L. Vrydaghs, H. Doutrelpont, C.E.N. Ewango, and J. Juan-Tresseras. 2000. Phytoliths from archaeological sites in the tropical forest of Ituri, Democratic Republic of Congo. *Quaternary Research* 54: 102–112.

Mercader, J., R. Marti, J.L. Martinez, and A.S. Brooks. 2002. The nature of 'stone lines' in the African quaternary record: archaeological resolution at the rainforest site of Mosumu, Equatorial Guinea. *Quaternary International* 89: 71–96.

Moeyersons, J. 1978. The behaviour of stones and stone implements buried in consolidating and creeping Kalahari sands. *Earth Surface Processes* 3: 115–128.

Mortelmans, G. 1957. La préhistoire du Congo Belge. *Revue de l'Université de Bruxelles* 9 (2–3): 119–171.

Nygaard, S., and M. Talbot. 1984. Stone Age archaeology and environment on the southern Accra plains, Ghana. *Norwegian Archaeological Review* 17: 19–38.

Robert, A., S. Soriano, M. Rasse, S. Stokes, and E. Huysecom. 2003. First chrono-cultural reference framework for the West African Paleolithic: new data from Ounjougou, Dogon Country, Mali. *Journal of African Archaeology* 1 (2): 151–169.

Schwartz, D. 1996. Archeologie Prehistorique et processus de formation des stone-lines en Afrique Centrale (Congo-Brazzaville et zones periphiques). *Geo-Eco-Trop* 10 (1–4): 15–38.

Taylor, N.J. 2011. The origins of hunting and gathering in the Congo basin: a perspective on the Middle Stone Age Lupemban industry. *Before Farming* 2011 (1): article 6.

Tryon, C.A., and S. McBrearty. 2002. Tephrostratigraphy and the Acheulian to Middle Stone Age transition in the Kapthurin Formation, Kenya. *Journal of Human Evolution* 42: 211–235.

Van Moorsel, H. 1968. *Atlas de Préhistoire de la Plaine de Kinshasa*. Kinshasa: Université Lovanium.

Van Noten, F. 1982. *The archaeology of Central Africa*. Graz: Akademische Druck und Verlagsanstalt.

Van Peer, P., V. Rots, and J.-M. Vroomans. 2004. A story of colourful diggers and grinders: the Sangoan and Lupemban at site 8-B-11, Sai Island, northern Sudan. *Before Farming* 2004 (3): article 1.

Yellen, J.E., A.S. Brooks, E. Cornelissen, M.J. Mehlman, and K. Stewart. 1995. A Middle Stone Age worked bone industry from Katanda, Upper Semliki Valley, Zaire. *Science* 268: 553–556.

Further Reading

Allsworth-Jones, P. 1987. The earliest human settlement in West Africa and the Sahara. *West African Journal of Archaeology* 9: 87–128.

Barham, L.S., A.C. Pinto Liona, and C.B. Stringer. 2002. Bone tools from Broken Hill (Kabwe) cave, Zambia, and their evolutionary significance. *Before Farming* 2002 (2): article 3.

Brooks, A.S., J.E. Yellen, L. Nevell, and G. Hartman. 2006. Projectile technologies of the African MSA: implications for modern human origins. In *Transitions before the transition: evolution and stability in the Middle Palaeolithic and Middle Stone Age*, ed. E. Hovers and S.L. Kuhn, 233–256. New York: Springer.

Clark, J.D. 1969. *Kalambo Falls prehistoric site, Volume I: the geology, palaeoecology and detailed stratigraphy of the excavations*. Cambridge: Cambridge University Press.

Clark, J.D. 1964. The Sangoan culture of Equatoria: the implications of its stone equipment. In *Miscellanea en honenaje al Abate Henri Breuil*, ed. E. Ripoll-Perello, vol. 1, 309–321.

Clark, J.D., and K.S. Brown. 2001. The Twin Rivers Kopje, Zambia: stratigraphy, fauna, and artefact assemblages from the 1954 and 1956 excavations. *Journal of Archaeological Science* 28 (3): 305–330.

Davies, O. 1967. *West Africa before the Europeans: archaeology and prehistory.* London: Methuen.

Jahns, S., M. Hills, and M. Sarnthein. 1998. Vegetation and climate history of west equatorial Africa based on a marine pollen record off Liberia (site GIK 16776) covering the last 400,000 years. *Review of Palaeobotany and Palynology* 102: 277–288.

Mellars, P., K. Boyle, O. Bar-Yosef, and C. Stringer, eds. 2007. *Rethinking the human revolution, new behavioural and biological perspectives on the origin and dispersal of modern humans*. Cambridge: University of Cambridge.

Nenquin, J. 1967. *Contributions to the study of the prehistoric cultures of Rwanda and Burundi (Annales 80)*. Tervuren: Musèe Royal de l'Afrique Centrale.

Phillipson, D. 2005. *African archaeology.* Cambridge: Cambridge University Press.

Rots, V., and P. van Peer. 2006. Early evidence of complexity in lithic economy: production and maintenance of hafted core axes at late Middle Pleistocene site 8-B-11, Sai Island (Sudan). *Journal of Archaeological Science* 33: 360–371.
Rots, V., P. van Peer, and P.M. Vermeersch. 2011. Aspects of tool production, use and hafting in Palaeolithic assemblages from Northeast Africa. *Journal of Human Evolution* 60: 637–664.
Turnbull, C. 1961. *The forest people*. New York: Simon & Schuster.
Wai-Ogosu, B. 1973. Was there a Sangoan industry in West Africa? *West African Journal of Archaeology* 3: 191–196.
Willoughby, P.R. 2007. *The evolution of modern humans in Africa*. Lanham: Altamira Press.

Central Andes: Prehispanic Hunter-Gatherers

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State of Knowledge and Current Debates

Introduction

Hunter-gatherers' study in Central Andes has been the focus of attention of Peruvian, American, and European researchers for nearly a century. Its Golden Age began in 1958 with the pioneering excavations of Peruvian archaeologists: first in Huánuco highlands, initial work led by Augusto Cardich (1958, 1964) in Uchcumachay and Lauricocha caves at high Marañón valley and then by Rogger Ravines (1965) in Perjaypata and Jatunushco caves at high Huallaga valley, and second, the research led by Ramiro Matos (1975) in Junín highlands. Simultaneously, since 1958 there was a long-term research done by the *Riva-Agüero Institute* of the *Pontifical Catholic University of Peru* (IRA-PUCP), initially led by Josefina Ramos de Cox (1969) and then by Mercedes Cárdenas (1981).

Such research was followed in the 1960s and 1970s by the work of American anthropologists in Peruvian central coast (Lanning 1963; Patterson 1966), on the coast of Casma (Malpass 1986), in the Callejón de Huaylas (Lynch 1970, 1980), and in the Ayacucho highlands (MacNeish et al. 1980, 1981). Also in the 1970s, several field projects were implemented in Junín highlands, in charge of several foreign researchers: the German Peter Kaulicke (1980, 2000), the French Danièle Lavallée and Michèle Julien, and the American Jane Wheeler (Lavallée et al. 1995), John Rick, Barbara Bocek, and Katherine Moore (Rick 1980; Rick and Moore 2000); those were promoted by R. Matos as part of the interdisciplinary and international effort of its "Punas Junín Project" of the *National University of San Marcos* (Kaulicke 2000: 307).

Besides the work led by the Swiss Fréderic-André Engel (1966) on the coast of Ancash, Lima, and Ica, deserving a special mention is his passage through the Chilca valley (southern Lima), where he conducted surveys and excavations at several sites since the mid-1960s (Engel 1988). His diggings in the emblematic La Paloma preceramic village began in 1966 and resumed in 1973 by his American collaborators including the following: Christopher Donnan in 1973–1975, John W. Greer in 1976, Terry Stocker in 1979, and Robert Benfer, Jr., in 1976–1982 and 1990, with participation of Jeffrey Quilter (burial patterns) in the 1980s, Eric White (lithics) and Joseph Vradenburg (bioanthropology) in the 1990s, the Peruvian Bernardino Ojeda in 1975–1982, and the team of *Arid Zone Research Center* of the *La Molina National Agricultural University* (CIZA-UNALM) (Benfer 2000; Engel 1988; Quilter 1989).

Terrorist violence that occurred in Peru between 1980 and 1992 made it almost impossible to develop archaeological field research, especially in the highlands. Among the few exceptions, we have the work of the Peruvian Mercedes Cárdenas (1981) in Tablada de Lurín in 1980–1988 (see also Salcedo Camacho 2014) and Santiago Uceda (1992) in the lower Casma valley in 1980–1983; the American Michael Malpass (1986) in the lower Casma valley and the Cordillera Negra of Ancash in 1980–1981;

the Croatian naturalized Peruvian Duccio Bonavia, who repeatedly visited the site of Pozo Santo, near Paracas, Ica, in 1980–1983 (Bonavia and Chauchat 1990); and the work of the American John Rick in Panaulauca in 1983–1986 (e.g., Rick and Moore 2000) and Robert Benfer, Jr., in La Paloma, southern Lima, in 1980–1982 and 1990 (Benfer 2000).

However, the 1980s saw a boom in terms of publications, mostly monographs, of the fieldwork and laboratory conducted between 1965 and 1980 (Bonavia 1982; Engel 1988; Kaulicke 1980; Lavallée et al. 1995; Lynch 1970, 1980; MacNeish et al. 1980, 1981; Malpass 1986; Quilter 1989; Rick 1980), although some original publications (e.g., Rick and Moore 2000) or translations from French and German to Spanish (Lavallée et al. 1995; Kaulicke 2000) do not saw the light until the next decade. By the mid-1990s, the fieldwork resumed, albeit limited to the central coast in Lima, basically in the Lomas de Atocongo of the lower Lurín valley (León 1999; Salcedo Camacho 2012a) and further south in the Cruz de Hueso gorge (Ugarte 2008). In parallel, the analysis of lithic material collected by Bonavia in 1977 at Tres Piedras quarry site, in lower Huarmey valley, was performed (León 2002).

In the first-half of the 2000s, several sites on the south coast were investigated during the construction of a gas pipeline, with line passing near the cities of Pisco, Chincha, Cañete, Chilca, and Lurín (Salcedo Camacho in press; see also Salcedo Camacho 2012b, 2014). In the second-half of the 2000s, research was carried out in the Orcón-Pacaybamba gorge in the middle Chancay valley, northern Lima (Goldhausen et al. 2008), as well as in the lower Río Grande valley, Nazca, Ica (Ferrando 2011). In the first-half of the 2010s, a research shortage on the central coast occurred again, being limited to the evaluation and monitoring of development projects, with results mostly remaining unpublished, but where is remarkable the discovery of a new lithic complex near the Marcona town, southern Nazca, Ica (Salcedo Camacho 2015). In addition, it should be mentioned the reassessment of the proto-Paleoindian lithic industry of the Ayacucho Complex from Pikimachay Cave, which revealed the existence of a point preform, and a pentagonal projectile point (Yataco 2013). In the second-half of the 2010s, a reanalysis of the Paleoindian lithic materials excavated by Lynch in the 1970s was performed at the National Museum of Archaeology, Anthropology and History of Peru (Ortiz 2017); and a recent research, performed at the Paleoindian site of Pampa Lechuza, Pisco valley, Ica, yielded evidences of occupation along with huge amount of lithic artifacts, including projectile points (Dulanto et al. 2018).

Geographic and Climatic Context of the Central Andes

Central Andes' physical area has been defined in very different ways, so here is a geographical and cultural criterion: the north is limited by the Santa, Tablachaca, and Pampas river basins (Ancash); the south by the imaginary line linking the towns of Marcona (Ica), Andamarca (Ayacucho), and Sondor (Apurímac); the east on the border between the mountains and the jungle; and the west by the Pacific Ocean, being framed between the following geographical coordinates: 8°12′–15°26′ Lat.S and 73°13′–78°39′ Long.W. In administrative terms, it covers the current departments of Lima, Ancash, the western part of Huánuco, Pasco and Junín, northwest Apurimac, northern and central Ayacucho, as well as Huancavelica and Ica (Fig. 1).

Such region has a large geographic and climatic diversity, and its detailed description is beyond the scope of this paper. However, generally speaking, one can say that the region is divided into mountains and coast and, in turn, is subdivided into the mountains *puna* (over 3800 masl [meters above sea level]) and intermontane valleys, while the coast is divided between the coastal valleys, the fog oasis locally known as *lomas* (below 800 masl), and the sandbanks. Basically, there are two seasons being complementary between the highlands and the coast: from November to April, wet season in the mountains is given, while on the coast, the dry season occurs; consequently, from May to October, dry season occurs in the mountains, while on the coast the wet season occurs.

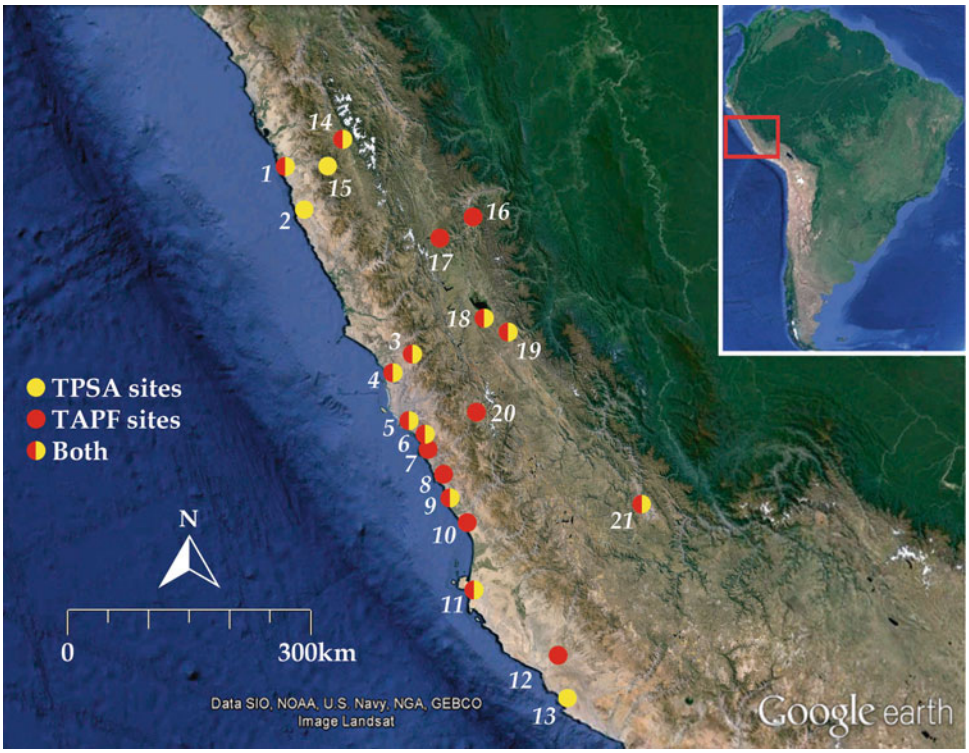

Central Andes: Prehispanic Hunter-Gatherers, Fig. 1 Central Andes, Peru. Location of main sites mentioned in the text. (Adapted from *Google Earth* satellite image). Coastal sites: *1* – Casma: Sites 9, 17, 27, 29 (TPSA), Mongoncillo, El Calvario, and Cerro Negro (TAPF); *2* – Huarmey: Tres Piedras (TPSA); *3* – Huaral: Piedra Roja, Quebrada Huachoc, Quebrada Silla (TPSA), and Huaynacoto (TAPF); *4* – Chillón: Cerro de los Chivateros, Pampa de Piedras Gordas, Cerro Cruxent, Cerro Monturita, Estancia Luz (TPSA), Cerro Arenal, Pampa del Canario, and Cerro Corvina (TAPF); *5* – Lurín: Tablada de Lurín and Cerro Tres Marías (TPSA/TAPF); *6* – Punta Negra: Quebrada Cruz de Hueso 1–4 (TPSA/TAPF); *7* – Chilca: Cerro Pucusana, Chilca 1, 5, 20, 50, 304, 921, 2017, Lapa Lapa 2, La Paloma, and Cerro Calcarí 6 (TAPF); *8* – Omas (Asia): F2-E133 and F2-E136 (TAPF); *9* – Cañete: Las Gaviotas, F3-E023d (TPSA), Cerro Grande 1–4, and Hacienda La Merced 1–2 (TAPF); *10* – Pampa del Vituco 1–3 (TAPF); *11* – Paracas: Pozo Santo (TPSA), Pampas de Santo Domingo (TPSA/TAPF), Paracas 3, Visitantes and Cabezas Largas (TAPF); *12* – Nazca: La Esmeralda and Las Brujas (TAPF); *13* – Marcona: Pampa Choclón 1–2 and San Nicolás 3, 4, 6–12, 15–25, and EA-1 to 63 (TPSA); Highland sites: *14* – Callejón de Huaylas: Quishqui Puncu, Cueva del Guitarrero (TPSA/TAPF); *15* – Cordillera Negra: Tecliomachay and Huachamanmachay (TPSA); *16* – Alto Huallaga: Jatunushco and Perjaypata (TAPF); *17* – Alto Marañón: Uchcumachay 1–2 and Lauricocha 1–2 (TAPF); *18* – Junín Lake: Pachamachay (TPSA/TAPF); *19* – Puna of Junín: Telarmachay (TPSA/TAPF), Acomachay, Cuchimachay, Panaulauca, and Uchkumachay-Tilarnioc (TAPF); *20* – Alto Chilca: Quiqché and Tres Ventanas 1–2 (TAPF); and *21* – Ayacucho: Jaywamachay, Pikimachay (TPSA/TAPF), Ayamachay, Rosamachay, and Puente (TAPF)

The puna has the most rigorous and seasonal climate, with dry air and daily temperature ranging up to 50 °C, with an average annual rainfall of 60–100 cm, which limits the growth of trees and shrubs, such as molle and other plants (genera *Inga*, *Schinus*, *Polylepis*), and simultaneously it supports steppe vegetation of grasses such as ichu (genera *Poa*, *Festuca*, *Eragrostis*, *Calamagrostis*, and *Stipa*) on which some padded cactus (genus *Opuntia*) spread (Lynch 1980]). In the open puna growing tubers, bulbs, and roots, vegetables such as potatoes (*Ullucus tuberosus*), oca (*Oxalis tuberosa*), olluco (*Ollucus tuberosus*), lupine or tarwi (*Lupinus mutabilis*), and quinoa (*Chenopodium quinoa*) grow, while in humid areas, wetland vegetation known as bofedales

grows, and on the lakeshores the cane fields (bofedales) of rushes (juncos) and cattails (totoras) grow (Lavallée et al. 1995; Lynch 1980).

Likewise, the valleys show a stratified ecology depending on the altitude and the differential distribution of rainfall, and its seasonality is pronounced for its dry condition, being less productive annually, particularly in their lower parts, where the vegetation is very productive but dispersed; the lack of permanent pasture causes a low density in greater fauna with respect to the puna (Rick 1988). Meanwhile, in few coastal valleys that have permanent rivers and, although the variation in annual temperature allows a double harvest, seasonal fluctuation in river flow causes only a fraction of the land that can be irrigated for a second crop; moreover, the lomas vegetation is mostly herbaceous, heavily dependent on weather and other environmental conditions to produce considerable amounts of food (Cohen 1978).

Among the fauna, we can consider basically mammals, following in importance birds, fish, and amphibians. Undoubtedly, the most important mammals are larger ungulates such as deer, including the Andean deer (known as taruca or huemul) inhabiting the highlands, and white-tailed deer (*Odocoileus virginianus peruvianus*) living in the intermontane valleys and on grounds below the highlands and visiting the coastal lomas; in addition, there are South American camelids, including two wild species, vicuña (*Vicugna vicugna*) inhabiting the highlands and guanaco (*Lama guanicoe*) which are distributed across the highlands, the valleys, and the coastal lomas, and two domestic species, alpaca (*Lama pacos*) which lives on 4000 masl and feeds bogs and llama (*Lama glama*) which inhabits grasslands on 3000 masl (Lavallée et al. 1995; Wheeler 2000).

There are also medium-sized mammals, basically carnivores of two families: the canids are represented by Andean fox (*Dusicyon culpaeus andinus*), skunk or zorrino (*Conepatus rex rex*), and domestic dog (*Canis familiaris*), while the felids include cougar or puma (*Puma concolor*) and two species of wild cat (*Felis colocolo* and *F. jacobita*) (Lavallée et al. 1995). Additionally, there is a mustelid carnivore, common opossum or zarigüeya, who lives around the 3500 masl (Lynch 1980; Rick 1980). Also, small mammals include several species of rodents, with wild guinea pig or cuy silvestre (*Cavia aperea*) and northern viscacha or vizcacha (*Lagidium peruanun inca*) that lives between 3000 and 5000 masl being remarkable (Lavallée et al. 1995; Lynch 1980).

Although in open puna birds scarce, they abound in the valleys. Typical highland birds include two species of partridge (*Nothoprocta ornata* and *Tinamotis pentlandi*) and a bird of prey: American vulture or condor (*Vultur gryphus*). Additionally, the puna includes birds such as duck, goose, ibex, heron, flamingo, etc., while the intermontane valleys have huacha, duck, coot, and parihuana (Lavallée et al. 1995; Lynch 1980). Among the fish are small species that inhabit the lakes or streams, such as gudgeon and catfish (genera *Orestias* and *Pygidium*), while among the amphibians stands the Junín's giant frog (*Batrachophrynus macrostomus*), which inhabits the streams and lagoons (Lavallée et al. 1995; Rick 1980).

Hunter-Gatherer Settlement Systems

For decades, researchers tried to understand how populations of hunter-gatherers adapted to their environment, managing scarcity or dispersion of natural resources; the temporal abyss that separates us from those preliterate populations largely exceeds the collective memory, which hinders any attempt to reconstruct the history of human groups settled in a region where the landscape and climate varied throughout the year, causing the resources to be relatively abundant in part of the year and scarce in the other; so, there were no ideal places to settle, nothing like an "Andean Eden"; therefore people should move from one place to another within its territory, sometimes the whole group, but often split into subgroups (Salcedo Camacho 2012b: xiii). Unfortunately, the study of past societies cannot be done directly, as artifacts, bones, and hearths do not speak for themselves, nor its distribution produces anthropological information per se if we disregard ethnographic comparison, although the application of actualism can also lead to erroneous conclusions, because modern behavioral patterns do not necessarily fit with the old ones (Salcedo Camacho 2012b: xvi).

Binford (1980) proposed two opposite and complementary categories of mobility for hunter-gatherers: (a) *residential mobility* (displacement of the entire group from one camp to another) and (b) *logistic mobility* (movements in search of food or raw material made by individuals or small groups who return to the same base camp); both types of mobility are related to a couple of strategies:

Foragers produce residential camps and locations, making frequent residential movements and short logistic movements to bring resources from locations to camp; archaeologically, their activities are barely visible as resources are little processed at locations, nor store them in the camps, leaving its remains scattered in the landscape more than focused on recognizable sites.

Collectors produce base camps, logistical camps, locations, stations, and deposits, making infrequent residential movements toward key locations and long logistic movements to bring resources to the base camp and store food; archaeologically, its activities are highly visible because of processing resources, while the size and density of their sites vary according to the season they are used.

The adaptation of the Binford's model to the Andean case was applied in specific regions, such as the coastal hills of the valleys of the Chillón (Lanning 1963; Patterson 1966) and Lurín (Salcedo Camacho 2012a), in Lima; the intermontane valley of Callejón de Huaylas, in Ancash (Lynch 1967, 1980); and the puna of Junín (Lavallée et al. 1995; Wheeler 2000). However, it was Salcedo Camacho (2012b, 2014) who since 1997 widely applied the model to the Central Andes, linking the regions of puna and intermontane valleys, with the regions of coastal valleys and lomas establishing interactions between different cultural complexes.

Updated Chronological Frame

Central Andes were not inhabited exclusively by a single cultural complex but by several complexes belonging to two different traditions (Salcedo Camacho 2014). In such cultural context, the use of a new chronology based on calibrated radiocarbon dates was required, taking as reference the new *carbon isotope stages* (climatic stages deduced from cyclical variation in the atmospheric carbon-14 recognizable in the calibration curves and where deep valleys and plateaus correspond to times of dimmed solar activity, known as the *Great Solar Minima*, which in turn would have influenced the development patterns of past societies) (Salcedo Camacho 2011).

All radiocarbon dates mentioned in the text, as well as in Table 1, were calibrated using the OxCal v.3.10r program, developed at *Oxford Radiocarbon Accelerator Unit* by C. Bronk Ramsey (2005) (available at https://c14.arch.ox.ac.uk/embed.php?File=oxcal.html), which was updated to use the IntCal13 calibration curve (Reimer et al. 2013); the program was configured to use two standard deviations (95.4%) and 100 k MCMC iterations, using dates included in the references cited in this text and those included in Salcedo Camacho (2014).

During the Holocene, human populations adapt to a more benign, less frigid climate, where the increase in global temperature led to the domestication of plants and animals (Salcedo Camacho 2012b). In cultural terms, this climate period can be divided up into five cultural stages grouped in two epochs (Salcedo Camacho 2012b, 2014):

Protoarchaic epoch (13,400–7400 years Cal. BC), which corresponds to the initial stage of settlement and dissemination of human populations across the Americas and transition between the Late Pleistocene and Early Holocene. It is subdivided into two cultural stages: (a) *Early Protoarchaic* (13,400–11,000 years Cal. BC), which corresponds coarsely to climate setback known as the *Younger Dryas*, and (b) *Late Protoarchaic* (11,000–7,400 years Cal. BC), which corresponds to the Preboreal.

Archaic epoch (7400–1700 years Cal. BC), which corresponds to the development and regionalization of cultures without pottery, the processes of sedentarism and domestication of plants and animals, and the beginning of use of marine resources. It is subdivided into three cultural stages:

Central Andes: Prehispanic Hunter-Gatherers, Table 1 Inventory of radiocarbon dates published for central Andean complexes belonging to the *South American Paleoindian Tradition* (TPSA) and the *Andean Foliated Point Tradition* (TAPF), calibrated with OxCal v.3.10r program using the IntCal13 calibration curve (Reimer et al. 2013), except where is indicated with an asterisk (*), corresponding to IntCal09 calibration curve (Reimer et al. 2009). (Modified after Salcedo Camacho 2014: 336–337, 441–443, and 448). Calibrated dates are expressed in "years Cal. BC," except where indicated with "AD" (*Anno Domini*). Laboratory codes marked with an asterisk are considered inconsistent with site's stratigraphy

Site (code)	Level (phase)	Excavation unit/context	Lab, code	Age BP			Age Cal. BC			p (2σ)
(a) *South American Paleoindian Tradition* (TPSA) sites										
Paiján Complex										
Cerro de los Chivateros	2	?	UCLA-683	10.430	±	160	10.750	–	9800	95,4%
Estancia Luz (PV45–84)	2	2	Y-1303	7380	±	120	6450	–	6020	95,4%
		Hearth	UCLA-202	7140	±	100	6230	–	5800	95,4%
		2	Y-1304	6520	±	120	5670	–	5280	93,2%
Pampa de Piedras Gordas	?	?	UCLA-201	7300	±	100	6390	–	6000	95,4%
Cerro Tres Marías	E?	B-I	PUCP-101	9510	±	100	9250	–	8600	95,4%
Tablada de Lurín	E?	A/burial	GaK-1599	9150	±	200	9200	–	7700	95,4%
Santo Domingo complex										
Pampas Sto. Domingo 96	?	Burial 1	I–1311	8830	±	190	8450	–	7500	95,4%
Huaylas Complex										
Cueva del Guitarrero	162? (I)	C6	OxA-109*	9860	±	200	10.100	–	8700	95,4%
	159 (IIa)	C6	GX-1780	10.475	±	300	11.000	–	9300	95,4%
		C6	OxA-197	10.340	±	130	10.650	–	9650	95,4%
		C6	SI-1502	10.240	±	110	10.500	–	9400	95,4%
	150 (IIc-d?)	C6	OxA-195	10.180	±	130	10.500	–	9300	95,4%
	146 (IIe)	C6	GX-1861*	7680	±	280	7400	–	6000	95,4%
	122 (IV)	C6	OxA-196*	9980	±	120	10.050	–	9250	95,4%
Junín Complex										
Pachamachay	32	7	UCLA-2118A*	11.800	±	930	15.000	–	9000	95,4%
	31	7	UCR-554	9010	±	285	9200	–	7500	95,4%
Panaulauca	40	?	?	9650	±	145	9400	–	8600	95,4%
Telarmachay	VIIb	C6	PUCP-1825*	12.040	±	120	12.300	–	11.550	95,4%
		C11	Lv-1279	8810	±	65	8250	–	7650	95,4%

Ayacucho Complex										
Pikimachay (Ac 100)	h	S19-21E5	UCLA-1464	14.150	±	180	15.800	–	14.850	95,4%
Mantaro Complex										
Jaywamachay (Ac 335)	J3	S5E6	I-5699	10.280	±	170	10.700	–	9400	95,4%
	J2	S5E6	I-5683	9890	±	310	10.600	–	8500	95,4%
(b) *Andean Foliated Point Tradition* (TAPF) sites										
Mongoncillo Complex										
El Calvario (PV32-1)	5	U1	Gif-6772	6070	±	70	5210	–	4800	95,4%
Cerro Negro (PV32-2)	?	U5	Gif-6773	6050	±	70	5210	–	4790	95,4%
Lauricocha Complex										
Pumaurco	III	Hearth	Gif-1530	7400	±	170	6600	–	5900	95,4%
Cueva del Guitarrero	28 (I)	B1/A2	GX-1779	9790	±	240	10.200	–	8500	95,4%
	26 (I)	B1/A2	SI-1498	9960	±	150	10.150	–	9150	95,4%
		B1/A2	OxA-181	9520	±	150	9300	–	8450	95,4%
	22 (IIa)	B1/A2	GX-1778*	10.535	±	290	11.100	–	9400	95,4%
		B1/A2	SI-1499	9580	±	135	9300	–	8600	95,4%
		B1/A2	OxA-194	9430	±	150	9200	–	8300	95,4%
	21 (IIb)	B1/A2	OxA-104*	9930	±	300	10.600	–	8600	95,4%
	20 (IIc)	B1/A2	SI-1500	8910	±	90	8300	–	7750	95,4%
	18 (IIe)	B1/A2	OxA-193*	9600	±	130	9300	–	8600	95,4%
		B1/A2	SI-1501	8175	±	95	7500	–	6800	95,4%
		B1/A2	GX-1860	7575	±	220	7100	–	6000	95,4%
	64 (I)	B2 N1/2 (?)	OxA-185	9350	±	150	9150	–	8250	95,4%
	63 (I)	B2 N1/2 (?)	GX-1859*	12.560	±	360	14.500	–	11.800	95,4%
		B2 N1/2 (?)	OxA-184	9400	±	150	9200	–	8300	95,4%
	62 (I)	B2 N1/2 (?)	SI-1496	9475	±	130	9250	–	8450	95,4%
		B2 N1/2 (?)	OxA-183	9340	±	150	9150	–	8250	95,4%
	59 (I)	B2 N1/2 (?)	SI-1497	9140	±	90	8620	–	8220	95,4%
	47–48 (IV)	B2 N1/2	SI-1503*	8225	±	90	7490	–	7050	95,4%
	47 (IV)	B2 N1/2	SI-1504*	2315	±	125	800	–	50	95,4%
	Surficial	?	OxA-182	9280	±	150	9150	–	8200	95,4%
	? (III)	?	OxA-108*	10.000	±	200	10.500	–	8900	95,4%
	82 (III)	B3	RL-112	7730	±	150	7050	–	6250	95,4%

(continued)

Central Andes: Prehispanic Hunter-Gatherers, Table 1 (continued)

Site (code)	Level (phase)	Excavation unit/context	Lab, code	Age BP			Age Cal. BC			p (2σ)
Pampa de Lampas	?	?	GX-1893*	11.640	±	360	12.600	–	10.700	95,4%
Lauricocha L-2	R (I)	14B	I-107	9525	±	250	9700	–	8200	95,4%
	Q (II)	?	GrN-5673	5830	±	120	5000	–	4400	95,4%
		?	GrN-5677	5720	±	110	4800	–	4340	95,4%
		?	GrN-5518	5170	±	140	4350	–	3650	95,4%
		?	GrN-5589	4660	±	90	3650	–	3100	95,4%
	O (II)	?	GrN-5519	4650	±	130	3700	–	3000	95,4%
	M (II)	?	GrN-5559	4620	±	350	4300	–	2400	95,4%
	LL (III)	?	GrN-5516*	28.350	±	440	32.100	–	29.500	95,4%
		?	GrN-5493	4260	±	250	3700	–	2200	95,4%
Huargo	8 (non-cultural)	I	BVA-?*	13.460	±	700	16.100	–	12.000	95,4%
	5	?	BVA-?	3560	±	230	2600	–	1300	95,4%
Cuchimachay	III (A)	?	Ny-237	5580	±	80	4610	–	4310	92,4%
Chupacancha	55 (I)	Hearth	WSU-2937	8030	±	130	7350	–	6600	95,4%
	47 (II)	Hearth	WSU-2936	5670	±	120	4800	–	4250	95,4%
Pachamachay	28 (II)	7	UCR-555	8125	±	280	7800	–	6400	95,4%
	25 (III)	6	UCR-557	6580	±	255	6000	–	4900	95,4%
	23 (III)	6	UCLA-2118D	5080	±	60	3990	–	3710	95,4%
	19 (IV)	6	UCR-556*	6100	±	250	5600	–	4400	95,4%
	17 (V)	6	UCLA-2118B	3800	±	60	2460	–	2120	88,7%
	21 (VI)	1	LJ-3286	3660	±	60	2210	–	1880	95,4%
	13 (VI)	4	UCLA-2118C	3640	±	60	2200	–	1870	95,4%
Panaulauca	39 (2a)	?	?	8360	±	?	?	–	?	–
	34 (2b)	?	WSU-2939	7650	±	95	6690	–	6350	93,1%
	30 (3)	?	WSU-3002	5990	±	90	5250	–	4650	95,4%
	21 (4)	?	WSU-2938	5135	±	75	4250	–	3700	95,4%
	18 (5)	?	WSU-3001	4040	±	60	2780	–	2450	85,2%
	16 (5)	?	WSU-3000	3630	±	90	2300	–	1700	95,4%

Telarmachay	VIIa (VIIA)	C8	Lv-1193	7620	±	60	6600	–	6380	95,4%
		C11	Gif-5389	7250	±	140	6450	–	5800	95,4%
		C9	Lv-1278	7140	±	60	6110	–	5880	92,3%
	VI (VI)	D10	Lv-1277	7150	±	90	6230	–	5840	95,4%
		D7	Gif-5388*	5580	±	120	4750	–	4050	95,4%
		C11	Gif-5394*	5320	±	110	4400	–	3800	95,4%
		B8	Gif-5390*	4220	±	110	3100	–	2450	95,4%
	Vc ($V^{inf.}$)	E8	Gif-5392	6780	±	130	5920	–	5480	94,0%
		E9	Lv-1192	6110	±	80	5230	–	4830	94,1%
		A6-7	Lv-1276*	5000	±	80	3960	–	3650	95,4%
	Vb-c ($V^{inf.}$)	A7	Gif-5391	5320	±	120	4450	–	3800	95,4%
	Vb ($V^{inf.}$)	D9	Lv-1134	5700	±	65	4710	–	4440	90,0%
	Va-b ($V^{sup.}$)	B6	Lv-1191*	4910	±	80	3950	–	3620	85,6%
		B6	Gif-5393*	4430	±	70	3340	–	2910	95,4%
	Va ($V^{sup.}$)	E10	Gif-5046	5370	±	110	4400	–	3960	93,9%
	? ($V^{sup.}$)	TP-A	Lv-1133	5440	±	60	4450	–	4220	81,6%
		C6	Gif-5047	5190	±	110	4350	–	3700	95,4%
	110–130 cm (IV)	TP-A	Gif-3482	4400	±	200	3700	–	2400	95,4%
	? (IV)	TP-A	Lv-1275	4510	±	45	3370	–	3080	93,6%
	IVc (IV)	E9	Gif-5045	4420	±	110	3400	–	2850	94,4%
	IVa (IV)	C6	Gif-4837	4470	±	110	3500	–	2850	95,4%
		C11	Gif-4834	3910	±	110	2750	–	2000	93,8%
		C8	Gif-4836	3700	±	100	2500	–	1750	95,4%
		B7	Gif-4835	3680	±	100	2450	–	1750	95,4%
Uchkumachay (Tilarnioc)	5	E5	OxA-510	6670	±	120	5800	–	5370	95,4%
Yanamachay (10C-XII-1)	VI (A)	?	Ny-235	7500	±	110	6570	–	6090	95,4%
Ayamachay (Ac 102)	VII (Jaywa)	S22W22	I-5694	7560	±	125	6650	–	6100	95,4%

(continued)

Central Andes: Prehispanic Hunter-Gatherers, Table 1 (continued)

Site (code)	Level (phase)	Excavation unit/context	Lab, code	Age BP			Age Cal. BC			p (2σ)
Jaywamachay (Ac 335)	J1 (Puente)	S6E7	I-5275	9460	±	145	9250	–	8300	95,4%
	J-J1 (Puente)	S5E6	I-5276*	8645	±	140	8250	–	7450	95,4%
	I (Puente)	S3E3	I-5695	9560	±	170	9350	–	8350	95,4%
	H (Puente)	S5E6	I-5247	8980	±	140	8550	–	7650	95,4%
	F (Jaywa)	S2E3	I-5686	8500	±	125	7950	–	7150	95,4%
		S3E3	I-5278*	7105	±	130	6230	–	5720	95,4%
	D (Jaywa)	S2E1	I-4501	8360	±	125	7600	–	7050	95,4%
	C (Jaywa)	S2E1	I-4500	8250	±	135	7600	–	6800	95,4%
Puente (Ac 158)	XIIA (Puente)	S7 (hearth)	I-5057	8860	±	125	8300	–	7600	95,4%
	X (Jaywa)	S6W2	I-5056	7420	±	125	6480	–	6020	95,4%
	VIII (Jaywa)	S7	I-5054	7160	±	125	6350	–	5700	95,4%
	VI (Piki)	S6W2	I-5132	6670	±	120	5800	–	5370	95,4%
	IV (Piki)	W1	I-5128	6560	±	120	5710	–	5300	95,4%
	IIB (Piki)	S6W2	I-5129	6615	±	120	5730	–	5330	95,4%
	IIA (Piki)	S6W2	I-5130	6630	±	120	5750	–	5340	95,4%
	II (Piki)	W1	I-4502	6360	±	110	5530	–	5050	95,4%
	IJ (Piki)	S3W3	I-5274	6470	±	125	5700	–	5200	95,4%
	IH (Piki)	S10W2	I-5273	6030	±	120	5300	–	4600	95,4%
	IC (Cachi)	S9W2	I-5055	4040	±	105	2900	–	2250	95,4%
		S7	I-5131	3995	±	105	2900	–	2200	95,4%
Pikimachay (Ac 100)	f (Cachi)	Profile A-B	I-4154	3850	±	120	2650	–	1900	95,4%
Rosamachay (Ac 117)	D1 (Chihua)	N2E4	I-5685	5470	±	110	4540	–	4040	95,4%
	D (Chihua)	S2E3	I-5688	5250	±	105	4350	–	3800	95,4%
Quiqche Lm5-1 (12B-VI-470)	900	?	I-3160	9940	±	200	10.200	–	8800	95,4%
	400 (I)	?	I-2440	8030	±	150	7450	–	6550	95,4%
Tres Ventanas 1 (12B-VI-450)	1000 (I)	?	I-3091	10.030	±	170	10.500	–	9200	95,4%
		?	I-3106	8140	±	130	7500	–	6700	95,4%
	800–500? (II)	?	OxA-1582	6830	±	90	5910	–	5560	95,4%
		?	OxA-1581	6750	±	90	5810	–	5490	95,4%
	300 (II)	?	I-3161*	4810	±	125	3950	–	3300	95,4%
	200 (II)	T1	I-3092	6290	±	120	5500	–	4950	95,4%

Tres Ventanas 2 (12B-VI-450)	400 (I)	T1	I-3108	8030	±	120	7350	–	6600	95,4%
Lino (11b-XI-81)	2	F	Ly-1036	8560	±	170	8300	–	7100	95,4%
	2	B	Ly-1035	7750	±	160	7100	–	6250	95,4%
	2	K	Ly-1034	6010	±	260	5500	–	4300	95,4%
Pampa Los Perros	200	?	Birm-517b	7150	±	140	6400	–	5700	95,4%
	200	?	Birm-517a	6810	±	140	5930	–	5480	91,6%
	200	?	Birm-518	6080	±	130	5350	–	4700	95,4%
	?	?	Birm-510b	5470	±	100	4500	–	4040	95,4%
	?	?	Birm-510a	5330	±	120	4450	–	3800	95,4%
Cerro Arenal (PV45–34)	? (Arenal)	?	?	7140	±	100	6230	–	5800	95,4%
Pampa del Canario (PV45–31)	IV (Canario)	?	UCLA-203	6700	±	100	5790	–	5470	95,4%
Cerro Tres Marías	D (Arenal)	Area A/burial 214	GaK-2470	7830	±	180	7250	–	6350	95,4%
Tablada de Lurín	D (Arenal)	3 (sector 1)/Shell midden	PUCP-14	6950	±	90	6000	–	5670	95,4%
		?	GaK-1859	6450	±	140	5650	–	5050	95,4%
	D (Corvina)	20/burial T1	GaK-2353	3740	±	80	2500	–	1900	95,4%
La Esmeralda Complex										
La Esmeralda (CAH 88) Pir.2	150 cm	Q2-N7	Gd-4394	5400	±	150	4550	–	3800	95,4%
	150 cm	Q2-N7/burial T1	Gd-4393	5430	±	130	4550	–	3950	95,4%
	150 cm	Q2-N7/post W	GrN-16593	5555	±	45	4490	–	4330	95,4%
	150 cm	Q2-N7/burial T1	Gd-2996	5440	±	90	4460	–	4040	95,4%
	150 cm	Q2-N7/HW	Gd-3441	5535	±	30	4450	–	4330	95,4%
	7/150 cm	Q2-N7/post	Gd-2994	5280	±	90	4340	–	3950	95,4%
	150 cm	Q2-N7/post W	Gif A-89171	5130	±	140	4300	–	3600	95,4%
	150 cm	Q2-N7/post	Gif-8128	5190	±	70	4240	–	3900	82,9%
Las Brujas	5 (Décapage 16)	Trench 1/east profile hearth	Erl-13246	4494	±	47	3360	–	3080	89,0%
	5 (Décapage 13)	Trench 1/east profile hearth	Erl-13245	4183	±	46	2900	–	2620	95,4%
Chilca Complex										
Cerro Pucusana (12B-VII-908)	?	?	Gif-1296	6080	±	150	5400	–	4600	95,4%
	?	?	GrN-5545	6265	±	55	5360	–	5050	95,4%

(continued)

C

Central Andes: Prehispanic Hunter-Gatherers, Table 1 (continued)

Site (code)	Level (phase)	Excavation unit/context	Lab, code	Age BP			Age Cal. BC			p (2σ)
Chilca 1 (12B-VII-1)	?	?	NZ-1053	5700	±	136	4900	–	4250	95,4%
	6 (1000)	105–87	V-750	5688	±	?	?	–	?	–
	4 (900–800)	105–87	V-796*	4937	±	?	?	–	?	–
	3B (700)	105–87	V-795*	5237	±	220	4550	–	3500	95,4%
	3A (600)	105–87	V-799	4487	±	?	?	–	?	–
	26 (300)	105–87	V-794	5637	±	?	?	–	?	–
	2C (300)	105–87	V-806	5637	±	200	4950	–	4000	95,4%
	?	?	I-813	5650	±	190	4950	–	4050	95,4%
	?	?	I-892	5410	±	275	4900	–	3600	95,4%
	?	?	I-817	5250	±	220	4550	–	3600	95,4%
	?	?	UCLA-664	5370	±	120	4450	–	3960	95,4%
	2	126–63	V-793	5012	±	?	?	–	?	–
	?	?	I-814	4950	±	220	4400	–	3100	95,4%
	?	105–87	V-778	4837	±	?	?	–	?	–
	?	?	I-815	5025	±	200	4350	–	3350	95,4%
	?	?	I-745	4975	±	160	4250	–	3350	95,4%
	?	105–87	V-798	4512	±	?	?	–	?	–
	?	?	I-816	4500	±	190	3650	–	2650	95,4%
Chilca 5 (12B-VII-5)	2 (400)	105–87	V-800	5237	±	220	4550	–	3500	95,4%
	?	Burial 49	V-777	4962	±	?	?	–	?	–
Chilca 20 (12B-VII-20)	?	?	I-1192	6970	±	300	6500	–	5300	95,4%
		?	I-1387	5100	±	150	4350	–	3600	95,4%
Chilca 50 (12B-VII-50)	3–4	?	GrN-5547	5130	±	110	4250	–	3650	95,4%
Chilca 304 (12B-VII-304)	?	Dwelling	Gif-864	9700	±	200	9900	–	8400	95,4%
	100	?	I-2441	8900	±	120	8300	–	7650	95,4%
Chilca 921 (12B-VII-921)	300	?	I-2253	6930	±	130	6.060	–	5610	95,4%
Chilca 2017 (12B-VII-2017)	1	Dwelling	GrN-5520	4220	±	65	2930	–	2580	95,4%
Lapa Lapa 2 (12B-VII-93)	?	?	I-1124	4515	±	220	3800	–	2500	95,4%

La Paloma (12B-VII-613)	600	U1/N105-E115/H103	UGa-3892	7735	±	100	7050	–	6350	95,4%
	500	U1/N?-E?/H?-T11	Ny-243	6510	±	180	5800	–	5000	95,4%
	400	U1/N90-E45/T1	I-3126	6310	±	340	5900	–	4400	95,4%
		U1/N80-E115/H13	UGa-4211	6000	±	150	5300	–	4500	95,4%
		U1?/N85-E120/H136	UGa-4117	5535	±	95	4650	–	4050	95,4%
		U1/N75-E95/H42	UGa-4208	5435	±	110	4490	–	3990	95,4%
		U1/N80-E115/H13	UGa-4120	5020	±	85	3970	–	3650	95,4%
	300	U2/N?-E?/H?-T159	UGa-4212*	9895	±	4380	19.600	–	400 AD	95,4%
		U1/N50-E115/H22	Birm-516	6410	±	240	5800	–	4750	95,4%
		U1/N100-E115/H29-T12	Ny-242	6030	±	180	5350	–	4500	95,4%
		U1/N75-E120/?	UGa-4119	5210	±	85	4260	–	3790	95,4%
		U1/N95-E130/H?-T83	UGa-4210	5110	±	125	4250	–	3650	95,4%
	230	U2/N105-E65/H101	UGa-4121*	5635	±	360	5400	–	3700	95,4%
		U1/N180-E5/H?	UGa-4118*	5000	±	200	4350	–	3350	95,4%
		U3/N215-W10/H?	UGa-4205	5055	±	85	4000	–	3650	95,4%
	220	U1/N80-E120/H137	UGa-4206	4780	±	100	3780	–	3350	95,4%
	200	U2/N105-E65/H101	Beta-60864	5010	±	60	3960	–	3660	95,4%
		U2/N105-E65/H129	Beta-60865	5010	±	89	3970	–	3640	95,4%
		U1/N?-E?/H?	Birm-515	4900	±	130	4000	–	3350	95,4%
		U1/N?-E?/H?	Gif-708	4120	±	200	3400	–	2100	95,4%
Loma Huarangal (12B-VII 9160)	?	?	Ny-231	5630	±	70	4620	–	4330	95,4%
Bahía San Nicolás (PV72)	?	?	P-1844	5560	±	80	4560	–	4240	95,4%
	?	?	Gif-1535*	3700	±	100	2500	–	1750	95,4%
Boca del Río Ica (PV62–25)	?	?	Birm-511	7520	±	300	7100	–	5700	95,4%
	400	?	I-3560	6150	±	120	5400	–	4750	95,4%
	?	?	Birm-513	5430	±	140	4550	–	3950	95,4%
Cabezas Largas (PV59–1)	?	?	NZ-609	5020	±	120	4150	–	3500	95,4%
Pampas Sto. Domingo 96	?	Burial	Gif-772	5175	±	200	4450	–	3500	95,4%
Pampas Sto. Domingo 519	?	Burial 2	GX-218	5890	±	145	5250	–	4450	95,4%
Paracas 514	?	Burial	GX-352	7740	±	185	7100	–	6200	95,4%

(a) *Early Archaic* (7400–5900 years Cal. BC) coincides with the proliferation of cervids and camelids after the extinction of Pleistocene megafauna, causing a radical change in diet and resource utilization strategies, resulting in a generalized and indiscriminate hunting of animals.
(b) *Middle Archaic* (5900–2800 years Cal. BC) is the time when hunters learn the behavior and distribution of new species, using a more profitable and rational selective hunting strategy and improving their lithic technology (changes in the shape and relative frequency of certain types of artifacts, making them increasingly efficient), which in turn leads to the implementation of a control strategy and management of semi-domesticated camelids in the highlands; in parallel, other groups experimented with the domestication of plants in the intermontane and coastal valleys, used the resources obtained in the lomas, and set in the first villages of fishermen and horticulturists in a littoral zone.
(c) *Late Archaic* (2800–1700 years Cal. BC), in the highlands, is the time when control over camelids evolves from a simple intervention in breeding herds to the implementation and dissemination of pastoralism; in parallel, in the valleys the domestication of several plant species, which begin to be brought to the coast, occurs, while in the villages of fishermen and horticulturists, the basis of what later became known as agriculture develops.

Early Cultural Traditions

All preceramic sites in Central Andes can be sorted in two of the five early cultural traditions of South America, namely, the *South American Paleoindian Tradition* ("TPSA" in Spanish) and the *Andean Foliated Point Tradition* ("TAPF" in Spanish) (Salcedo Camacho 2014).

TPSA populations are highly adaptable at both biological and cultural levels, being organized in small family groups (micro-bands) which split or merge depending on the environmental conditions, using their artifactual diversity to tame the variety of ecosystems they colonized; as example, their spear points were originally used to hunt Pleistocene mega-mammals, but then were used as harpoons for fishing or as knives to process minor prey's carcasses during Early and Middle Holocene; their stone tools include bifacial preforms, lanceolate points, plain-convex scrapers (*limaces*), choppers, and other coarse unifacial artifacts (Salcedo Camacho 2014: 201). TPSA cultural complexes in Central Andes are the following (Salcedo Camacho 2014: 279–299):

Paiján Complex (formerly "Chivateros Complex" on the central coast) (11,000–5100 years Cal. BC): Sites 9, 17, 27, and 29 (Uceda 1992) (Casma, Ancash); Tres Piedras PV35-3 (León 2002) (Huarmey, Ancash); Piedra Roja PV44-Q/01, Quebrada Huachoc PV44-H/01, and Quebrada Silla PV44P/39 (Goldhausen et al. 2008); Cerro de los Chivateros PV46-27, Pampa de Piedras Gordas PV45-28 and 29B, Cerro Cruxent PV45-45, 48, 49, 50, and 51, Cerro Monturita PV45-66, 67, and 70, and Estancia Luz PV45-72, 83, 84, and 85 (Lanning 1963; Patterson 1966; cf. Bonavia 1982) (northern Lima); and early occupations at Tablada de Lurín (Cárdenas 1981; León 1999; Ramos de Cox 1969) and Cerro Tres Marías (Cárdenas 1981) and Quebrada Cruz de Hueso 1–2 (Ugarte 2008) (southern Lima)

Santo Domingo Complex (8100–7400 years Cal. BC): Las Gaviotas and Evidence F3-E023d at Cerro Grande (Salcedo Camacho 2014, in press) (Cañete, Lima); Pozo Santo (Bonavia and Chauchat 1990), Paracas 14a VI-3, Visitantes 14a VI-96, and Pampas de Santo Domingo 14a VI-514 (Engel 1966) (Paracas, Ica); and San Nicolás SN3-4, 6-12, 15-25, EA-1 to 63 and Pampa Choclón PC1-2 (Salcedo Camacho 2015) (Marcona, Ica)

Huaylas Complex (11,000–9000 years Cal. BC): Quishqui Puncu (Lynch 1967), Cueva del Guitarrero (disturbed Levels III–IV) (Lynch 1980), and Tecliomachay and Huachamanmachay (Malpass 1986) (Ancash)

Junín Complex (9000–7400 years Cal. BC): Pachamachay (Levels 31–32) (Rick 1980) and Telarmachay (Level VIIb) (Lavallée et al. 1995) (Junín)

Mantaro Complex (11,000–8100 years Cal. BC): Jaywamachay (Levels J and G) (MacNeish et al. 1980, 1981) (Ayacucho)

Ayacucho Complex (16,300–13,400 years Cal. BC): Pikimachay Ac 100 (Levels h, h1, and h2) (MacNeish et al. 1980, 1981; Yataco 2013) (Ayacucho)

Otherwise, the TAPF presents a pan-Andean distribution, although their sites are more frequent in the central highlands of Peru and semiarid northern Chile; it emerges as a tradition of hunter-gatherers fully nomadic adapted to the highlands, the intermontane and coastal valleys, and the lomas; but then they turn into a gradual sedentarism, leaving their generalized strategies by another, more selective ones, with the subsequent domestication of plants (especially squash and beans) and animals (camelids, guinea pig), with the consequent adoption of pastoralism and incipient horticulture; their stone tools are characterized by the widespread presence of small willow leaf ("foliated") points along the entire sequence, along with a handful of *fossil index* artifacts (very diagnostic, but scarce items of brief permanence in the archaeological record) that change from one period to another (e.g., points with ailerons and eventually serrated margins in early phases were replaced by geometric shapes, first triangular and then rhomboidal in later phases), facilitating their chronological ordering (Salcedo Camacho 2012b, 2014: 367, 370, 372–393).

It should be noted the Chilca Complex sites produced the first semisedentary settlements in the region, consisting of semicircular dwelling structures held by poles, and covered by vegetable fibers or possibly animal leather, defining living spaces with diaphanous activity areas (cooking, burial, etc.), while its lithic industry is characterized by elongated leaf points and the necessary equipment for fishing and harvesting of marine resources (such as shell hooks, harpoon barbs, plus strings, and textiles elaborated on vegetable fiber); finally, the dead were carefully buried in mats, inside or near their huts (which were abandoned and demolished after the funeral), accompanying them with various offerings (Salcedo Camacho 2014: 423–427). TAPF cultural complexes in Central Andes are the following (Salcedo Camacho 2014: 372–393, 423–427):

Mongoncillo Complex (5100–4600 years Cal. BC): Mongoncillo 1251 IV-15S-1b, El Calvario PV32-1, and Cerro Negro PV32-2 (Malpass 1986) (Casma, Ancash)

Lauricocha Complex (10,500–1700 years Cal. BC): *On the coast:* Huaynacoto PV44-P/20 (Goldhausen et al. 2008), Cerro Arenal PV45-71 and 72A, Pampa del Canario PV45-31–35, 37–39, 58, and 89–93, and Cerro Corvina PV45-20, 30, and 65 (Lanning 1963; Patterson 1966) (northern Lima); Tablada de Lurín (Cárdenas 1981; León 1999; Ramos de Cox 1969), Cerro Tres Marías (Cárdenas 1981; Salcedo Camacho 2012a), Evidences F2-E133a,b and F2-E136a,b (Asia); and Cerro Grande 1–4, Hacienda La Merced 1–2, and Pampa del Vituco 1–3 (Salcedo Camacho 2012b, 2014, in press) (southern Lima). *On the intermontane valleys:* Quishqui Puncu (Lynch 1970), Cueva del Guitarrero PAn 14–102 (Complex II), and Callejón de Huaylas PAn 8–126, 12–51, 12–53, 12–57, and 12–58 (Lynch 1980) (Ancash); Jatunushco and Perjaypata (Ravines 1965) (Huánuco); and Ayamachay Ac 102 (Stratum VII), Jaywamachay Ac 335 (Strata J–C), Pikimachay Ac 100 (Levels h–f), Rosamachay Ac 117 (Level D), and Puente Ac 158 (Levels XIIA–IC) (MacNeish et al. 1980, 1981) (Ayacucho). *On the highlands:* Uchcumachay 1–2 and Lauricocha 1–2 (Phases I–III) (Cardich 1958, 1964) (Huánuco); Quiqché and Tres Ventanas 1–2 (Engel 1988) (Lima); and Pachamachay (Phases II–IV) (Rick 1980), Acomachay, Cuchimachay, Telarmachay (Phases VIIa–IV) (Lavallée et al. 1995; Wheeler 2000), Panaulauca (Rick and Moore 2000), and Uchkumachay-Tilarnioc (Strata 4–6) (Kaulicke 1980, 2000) (Junín)

La Esmeralda Complex (4600–2800 years Cal. BC): La Esmeralda CAH 88 (Isla 1990) and Las Brujas (Ferrando 2011) (Nazca–Ica)

Chilca Complex (9900–1700 years Cal. BC): Quebrada Cruz de Hueso 3–4 (Salcedo Camacho in press), Cerro Pucusana 12B-VII-908, Chilca 1 12B-VII-1, Chilca 20 12B-VII-20,

Lapa Lapa 2 12B-VII-93, La Paloma 12B-VII-613 (Benfer 2000; Engel 1988; Quilter 1989), and Cerro Calcarí 6 (Salcedo Camacho 2012b, 2014, in press) (Chilca, Lima) and Cabezas Largas 14A-VI-I and Pampas de Santo Domingo 14A-VI-514 (Engel 1966) (Paracas, Ica)

Classical Research

Here, the better known research are briefly explored, organized according to both cultural traditions previously mentioned (TPSA and TAPF), and listed from north to south, starting from the coast and continuing through the highland.

For TPSA in Central Andes, the coastal sites are distributed between two complexes. First, the widely distributed Paiján Complex, which in the Casma valley (Ancash) includes six sites: 1251 IV-8V-1, a small basalt workshop (250 m^2), where two Chivateros-type preforms and numerous flakes were found; and Campanario 1252 III-27M-2b, which includes a fairly large area (4800 m^2), divided into three units that were used as workshops for white sandstone, finding numerous Chivateros-type preforms, plus bifacial pieces in retouching process for obtaining Paiján-type spear points (Malpass 1986); there are also Sites 9, 27, 29, and specially Site 17, Unit 2, where an area of 60 m^2 was excavated finding a lot of unifacial artifacts (retouched flakes, knives, and denticulates) associated with Paiján-type points (Uceda 1992). In the Chillón valley (northern Lima), there are two major sites: Cerro de los Chivateros PV46-27, a quarry located on the north bank of the river basin, where two strata with numerous bifacial blanks and Chivateros-type preforms were found (Lanning 1963; Patterson 1966), an occupation that was dated in 10,750–9800 years Cal. BC; also at Estancia Luz PV45-84, a small excavation was conducted, finding some food remains, besides lithic artifacts, including two lanceolate points (Lanning 1963), an occupation that was dated in 6450–5280 years Cal. BC. Second, for Santo Domingo Complex, there is Pozo Santo 14b IV-45, not far from the Paracas Bay (northern Ica), a quarry which produced several Chivateros-type preforms at different stages of reduction, although neither associated points were found nor datable organic material (Bonavia and Chauchat 1990); also, there are excavations in the open-air sites of Paracas 14a VI-3, Visitantes 14a VI-96, and Pampa de Santo Domingo 14a VI-514, where various lanceolate points were recorded (Engel 1966), one of these occupations being dated in 8450–7500 years Cal. BC.

Meanwhile, highland sites of this tradition are divided into three originally unnamed complexes, recently named by Salcedo Camacho (2014: 294–297). First, Huaylas Complex consists of a handful of settlements in the Cordillera Negra (Ancash) including Quishqui Puncu (3040 masl) open-air site, excavated by 2 × 2 m units until covering 370 m^2, and recovering two fragments of Fishtail-type point from the Unit L and several basal fragments of lanceolate points from other units (Lynch 1970); Cueva del Guitarrero (2580 masl) shows a partially disturbed stratigraphy (Lynch 1980); Huachanmanmachay (4500 masl) and Tecliomachay (4500 masl) caves are characterized by the presence of stemmed points of triangular blade and rough manufacture, along with several utilized flakes, notches, burins, and so on (Malpass 1986). Second, the Junín Complex includes Pachamachay Cave (near San Blas, Junín), Phase I, which produced some triangular projectile points with slightly concave base (Rick 1980), associated to a date of 9400–7500 years Cal. BC, while Telarmachay rock-shelter (near San Pedro de Cajas, Junín), Level VIIb, produced few artifacts, standing out a pentagonal projectile point with notched base (Lavallée et al. 1995), associated with a date of 8250–7650 years Cal. BC. Third, the Mantaro Complex is represented by the Jaywamachay Ac 335 cave (Ayacucho valley, a tributary of the Upper Mantaro River, Ayacucho), whose Levels J3 and J2 produced three incomplete obsidian points (which seem to correspond to the Lake Madden [Panama] and Fishtail types), as well as a pentagonal point made of basalt from Level G (MacNeish et al. 1980, 1981), dated in 10,700–8500 years Cal. BC.

For TAPF in Central Andes, sites are divided into four complexes, three of them purely coastal,

while the latter is both highland and coastal one (from the puna to the lomas). First, the Mongoncillo Complex consists of 38 sites (including Mongoncillo 1251 IV-15S-1b) arranged on a long knoll in the Casma coast (Ancash), where the existence of foliated points was reported (Malpass 1986); additionally, there are El Calvario PV32-1 and Cerro Negro PV32-2 sites, dated in 5210–4790 years Cal. BC (see Salcedo Camacho 2014). Second, La Esmeralda Complex is represented by La Esmeralda CAH 88 site, which produced domestic contexts of two superimposed structures formed by walls of *quincha* (canes covered with mud mortar), and in one of them, there was the burial of an adult woman associated to shell (*Argopecten purpuratus*) offerings, basketry, and some lithic artifacts, including three foliated points (Isla 1990). Eight dates obtained correspond to 4550–3600 years Cal. BC.

Third, Chilca Complex is composed of several settlements recorded along the coast and the lomas south of Lima, including two sites in the lower Chilca valley: La Paloma site (12B-VII-613) is arranged on the homonymous loma and consists of a series of mounds and household waste midden covering, 15 ha; excavations revealed more than 40 semicircular dwelling structures – raised with willow posts (*Salix* sp.), tied with vegetable fibers, and covered by herbs – within which there were 251 human burials associated to foliated projectile points, fishing artifacts (shell and cactus spine harpoons, nets, ropes, lithic counterweights, buoys made from pumpkins, etc.), diverse baskets, as well reed (*Cyperus* sp.) and totora (*Typha angustifolia*) mats (Benfer 2000; Quilter 1989). Twenty dates obtained span 7050–2100 years Cal. BC. Also, Chilca 1 (12B-VII-1) site covers about 2 ha, showing an unbroken succession of 16 cultural layers (1,5 m deep), with the presence of semicircular dwelling structures associated with human burials, domestic refuse of both marine and lomas origins, incipient agriculture products such as beans (*Phaseolus vulgaris*), numerous artifacts both lithic and vegetable fiber (basketry, cordage, and mats), bone tools, etc. (Engel 1988). Ten dates from East Sector span 4950–2650 years Cal. BC.

Fourth, Lauricocha Complex comprises sites of different types located from the highlands to the lomas, related to the process of domestication of plants and animals, with a lithic technology that is distinguished by small foliated points, accompanied by cores, flakes and various artifacts on flake, as well as occasional grinding tools and the development of the rock art (anthropomorphic and animal figures) and individual burials in shallow graves; 124 dates of this complex span 10,500–1700 years Cal. BC (Salcedo Camacho 2012b, 2014). Among the most important sites can be mentioned two highland sites:

Telarmachay rock-shelter (4420 masl), near San Pedro de Cajas (Junín), is the preceramic locality most systematically excavated in Central Andes; French Archaeological Mission – led by Danièle Lavallée – began explorations at the site in 1974 with a small 0.6 × 0.5 m test pit, revealing the existence of at least five stratigraphic units; then, between 1975 and 1980, an area of 35 m^2 was excavated showing eight cultural layers, of which the lower five were preceramic, where a large amount of food waste was found, basically skeletal remains of cervids and camelids associated to lithic artifacts (Lavallée et al. 1995). Shelter occupation was intensifying over time increasing the usable area: presence of traces of postholes surrounded by rocks advancing down the slope along the phases of occupation; in addition, the hearths are in marginal positions within the sheltered area, perhaps to avoid the smoke concentrating on the center of the rock-shelter; hide processing evidence was also found, as well as maintenance activities (food preparation, tool manufacture, etc.) (Lavallée et al. 1995).

Pachamachay Cave (4300 masl), near San Blas (Junín), was first excavated by Ramiro Matos in 1969–1970 by a 12 × 1 m trench arranged on the slope of the cave, recognizing 16 strata (3–13 were preceramic) containing lithic artifacts and great amount of bones (Matos 1975); diggings extended in 1973 by the German Peter Kaulicke, finding evidence of hearths, workshops, etc. (Kaulicke 2000). Later excavations were performed by American John Rick in 1974–1975, consisting in two areas of 3 × 3 m and 1 × 1 m, respectively (10 m^2), identifying

33 and 27 layers, respectively; from the resulting 7 phases, the first 5 were preceramic (Rick 1980).

Lauricocha Complex was redefined in terms of calibrated radiocarbon chronology, the identification of four fossil index foliated points (with ailerons, triangular, or rhomboidal), and the definition of cultural traits for each stage (from Salcedo Camacho 2012b, 2014: 379):

Proto-Lauricocha Phase (10,500–7400 years Cal. BC): Presence of foliated points with small ailerons located in the lower third of the piece, setting a pseudo-peduncle; in the highlands low-density settlements in caves and rock-shelters appear, with evidence of little selective hunting of Holocene fauna (e.g., guanacos, white-tailed deer, and taruca or huemul), while in the coast small subgroups of hunters will eventually visit the lomas in search of preys (guanacos and white-tailed deer).

Lauricocha I Phase (7400–5900 years Cal. BC): Presents points with ailerons located in the middle third of the piece, with straight-converging sides apex, possibly serrated and pseudo-peduncle; in the highlands, the rational exploitation of the Holocene fauna (guanacos and white-tailed deer) is given, while on the coast, hunter subgroups visit more frequently the coastal valleys and lomas.

Lauricocha II Phase (5900–2800 years Cal. BC): Includes triangular points ranging from equilateral to isosceles, with straight-converging sides or amygdaloidal contour; domestication of South American camelids begins in the highlands, as well as experimenting with crops, both in the intermontane and the coastal valleys, where more stable base camps appear in the middle valleys, while during the coastal wet season, there is a regular use of the lower valleys and lomas, as well as the sandy beaches, with the consequent consumption of a limited variety of shellfish.

Lauricocha III Phase (2800–1700 years Cal. BC): Consists of short or elongated rhomboidal points, with straight or slightly convex sides and slightly rounded base; in the highlands, the domestication of camelids is well advanced, and there is an incipient horticulture, while on the coast, retreat of the Lauricocha Complex groups occurs (showing an abrupt drop in the consumption of marine mollusks), being displaced by the semisedentary Chilca Complex populations who settled on the littoral and presumably control access to seashore.

In sum, the hunter-gatherers of the Lauricocha Complex practiced the Binford's collectors strategy, performing rotating movements between base camps located in the higher puna and logistics camps set in the lower puna and high valleys, while other groups established their base camps in the intermontane and coastal valleys, maintaining logistical camps in the lower valleys, with the consequent exploitation of lomas resources by the coastal groups (Salcedo Camacho 2012b). This coastal Lauricochean strategy was followed by his peers of Mongoncillo and La Esmeralda Complexes; and, on the other hand, the semisedentary populations of the Chilca Complex practiced the Binford's foragers' strategy, settling at the foot of the lomas, mostly exploiting marine resources, supplemented with some lomas resources.

Recent Research

In this section, the most recent works of the last two decades are exposed, and, usually, those do not appear are cited in the synthesis; this is partly due to the fact that such publications were made by young researchers and partly because the elapsed time has not allowed its widespread dissemination in academic circles, but also because at that time there were few events where information about Central Andes hunter-gatherers could be exchanged. All authors mentioned in this section are Peruvian, except where otherwise indicated.

Tablada de Lurín and Cerro Tres Marías

Tablada de Lurín is a plain within the Lomas de Atocongo, between Villa Maria del Triunfo and Villa El Salvador, south-central Lima (Salcedo Camacho 2012a). Previous research in the area between 1958 and 1988 by Josefina Ramos de Cox and Mercedes Cárdenas of the Riva-Agüero

Institute (IRA-PUCP) reported three open-air sites with preceramic evidence, including both Paleoindian and foliated projectile points (Cardenas 1981; Ramos Cox 1969).

First site (originally "Area A" or "First Area") is located at an elevation that dominates the center of the plain (290 masl; 12°11,2′ Lat.S; 76°54,9′ Long.W) and yielded lithic material with bifacial knapping of Chivateros type, along with the burial of a 10-year-old individual covered with red ocher, being dated in 9200–7700 years Cal. BC (GaK-1599); a sample from the shell midden of Sector 1 (Area 3) was dated in 6000–5670 years Cal. BC (PUCP-14), likewise, a sample of unknown exact origin, was dated in 5650–5050 years Cal. BC (GaK-1859), while the Grave 1 (Area 20), including a headless corpse associated to a puma or cougar jaw (*Felis concolor*), was dated in 2500–1900 years Cal. BC (GaK-2353) (Cárdenas 1981; see also Salcedo Camacho 2012a, 2014).

Since late 1991, work on this site (renamed "Sector SE-A") was led by Polish archaeologist-naturalized Peruvian Krzysztof Makowski (PUCP), who in 1993 assigned Elmo León to conduct a thorough analysis of the lithic material recovered until 1994 (Salcedo Camacho 2012a), revealing two lines of the *chaîne opératoire* (operational chain of technical processes involved in step-by-step production, use, and disposal of artifacts), based in andesite-sandstone and chalcedony, although other possible lines include pebbles and silicified hematite (León 1999). In parallel, Makowski commissioned the excavation six 5 × 5 m units (150 m^2) in a dense area within the Archaic occupation, which by then was estimated to cover at least 1,5 ha (15,000 m^2) (Salcedo Camacho 2014). Initial three units were excavated by Hernán Carrillo in 1994–1995 and 1998, while the fourth was excavated by Elmo León in 1994, being the last two excavated by Polish Karol Karasiewicz and Katarzyna Barska-Piotrowska between 1995 and 1996 (Salcedo Camacho 2012a, b, 2014).

The interpretation of site stratigraphy is problematic due to soil formation processes in lomas and numerous intrusions caused by burials of the first millennium AD, but mostly because of the diversity of criteria used in its denomination (Salcedo Camacho 2014). Ramos de Cox's lower occupations (Makowski's Layer E) turned out to be "ghosts" caused by vertical migration of archaeological material (from overlying Makowski's Layer D) through the numerous desiccation cracks crossing the strata (Salcedo Camacho 2012a, 2014). Layer D is a humic horizon of more than 1 m thick developed in the presence of lomas vegetation, which presents a number of overlapping ephemeral occupations, with activity areas (mollusk shell removal, consumption, or lithic reduction) structured around combustion areas (Makowski 1996 [cited in Salcedo Camacho 2012a: 35, 2014: 387]).

Second site (originally "Area B1," now "Cerro Tres Marías" [CTM]) is located at the foot of Las Tres Marias hill (310 masl; 12°11,0′ Lat.S; 76°55,2′ Long.W), where Ramos de Cox commissioned Jaime Deza the excavation of two 10 × 10 m units (200 m^2) in 1976–1977, recovering a lanceolate stemmed spear point of Luz type, associated with lithic *débitage* (waste by-products resulting from stone tool manufacture), hearths, and shell middens (Cardenas 1981); associated organic remains were dated in 9250–8600 years Cal. BC (PUCP-101) (Salcedo Camacho 2012b, 2014).

In 1995, following Deza's visit to Makowski's project, the latter commissioned Giancarlo Marcone digging a segmented trench of 50 m^2 ("Sector NW-E"), located to the east of Deza's area, which turned out to be sterile, so Makowski decided to intervene a new area ("Sector NW-D") located closer and north of the original excavation of Deza and where Carrillo made a surface collection; finally, the excavation was commissioned to Luis Salcedo, using as a guide a profile exposed by heavy machinery work done months ago by the mayor authority (Salcedo Camacho 2012a, b, 2014).

Between December 1995 and April 1996, the excavation of Salcedo covered 23 m^2 of approximately 40 m^2 remaining site, revealing a sequence of 3 archaic phases embedded in a practically unaltered sediment matrix (due to better geomorphological conditions than those observed in the plain), making a total of nine ephemeral

occupations (Fig. 2a), a sort of logistic camps, with the presence of various activity areas: lithic reduction and processing and discard of bones and mollusk shell remains, associated to combustion areas (well-defined hearths, but without stone structure) and dwelling areas (in Phase 3) constituted by small, semicircular compartments or "windbreaks" of very short use, made with small accumulation of common stones forming arcs, with equidistant gaps for the location of thin posts; within them or in direct association, some lithic artifacts were found: foliated points (Fig. 2b), plain cores, endscrapers, a sidescraper, and modified flakes, along with a significant amount of food waste (Salcedo Camacho 2012a).

Lithic material recovered in this site consists of 1432 items, of which 1420 (99.16%) are chipped, belonging mostly to *débitage* (by-products of the knapping process) (1380; 96.37%) and being segregated in cores (9; 0.63%), unmodified flakes (86; 6.01%), and core or flake fragments (*cassons*/*debris*, respectively) (1285; 89.73%), while only 40 (2.79%) are tools (6 point preforms, 4 projectile points, 5 endscrapers, 2 knives, 1 sidescraper, 16 modified flakes, and 6 *cassons*/*debris* retouched a posteriori); it also has 12 (0.84%) non-chipped items, including hammerstones (11; 0.77%), and grinding stone (1; 0.07%) (Salcedo Camacho 2012a: 223–224, Appendix C).

It was possible to determine five lines of the *chaîne opératoire*: volcanic, meta-volcanic (andesitic tuffs and meta-andesites), silicified hematite, and to a lesser frequency sandstone and quartz. From rock types used for making artifacts, it becomes clear that raw material procurement radius is limited to the area of Tablada de Lurín, ruling out the possibility for long-distance transport, with the exception of a projectile point made of jasper, probably from the central highlands (Salcedo Camacho 2012a: Appendix D).

Among the organic remains exist macrobotanical remains and pollen samples that determine the presence of Cactaceae (cacti), Poaceae (grasses), and Solanaceae, among others (Salcedo Camacho 2012a: Appendices B and G). The 2528 malacological remains correspond to a minimum number of individuals equal to 1379, of which 1349 are the bivalve known as macha (*Mesodesma donacium*), with only 16 individuals of different species of clams and mussels, along with just 14 gastropods known as chanque (*Concholepas concholepas*) and little plates of a polyplacophoran known as chitón (Salcedo Camacho 2012a: 357, 362, Appendix F). Alto exist 2093 bone fragments of animals, including camelids like guanaco (*Lama guanicoe*), along with cervids like white-tailed deer (*Odocoileus virginianus*), plus some remains of lomas rodents and birds mostly charred, as well as both river and sea fish remains (Salcedo Camacho 2012a: 311, Appendix E).

Finally, a third site was accidentally discovered in the early 1970s, during works with heavy machinery, where Gonzáles del Río exposed an occupation that includes a burial of a dolichocephalic individual partially cremated (Burial 214), dated in 7250–6350 years Cal. BC (GaK-2470) (Salcedo Camacho 2014).

Quebrada Cruz de Hueso 1–4

Between 1996 and 2001, work was carried out in two open-air sites of the Quebrada Cruz de Hueso (440 masl; 12°19,7′ Lat.S; 76°40,1′ Long.W), located on an alluvial terrace at the foot of the Vigía hill, north of Lomas de Caringa, in Pampas de San Bartolo, Punta Negra (Lima, Lima). Both components are separated 0.5 km: a workshop of 500 m^2 (with lithic material and some mollusk shells) and a camp of about 1000 m^2 (a shell midden associated to grinding artifacts) (Ugarte 2008: 39, 41, 44). The workshop (Site 1) has four lithic concentrations (A: 23 × 7 m, B: 9 × 6 m, C: 7 × 6 m, and D: small, no data), being white quartz the predominant raw material, although in Concentration C brown quartz preforms were recorded. This area was divided into 500 units of 1 m^2, with 29 being collected and 43 excavated to 10 cm depth (Ugarte 2008: 44–46). Moreover, in the camp (Site 2), four 1 m^2 units (4 m^2 in total) were excavated, reaching only 12 cm deep due to the presence of a caliche level (Ugarte 2008: 47).

In total, lithic material recovered in the site includes 19,584 chipped items, belonging mostly to *débitage* (19,548; 99.82%), being sorted in cores (10; 0.05%), flakes (1425; 7.28%),

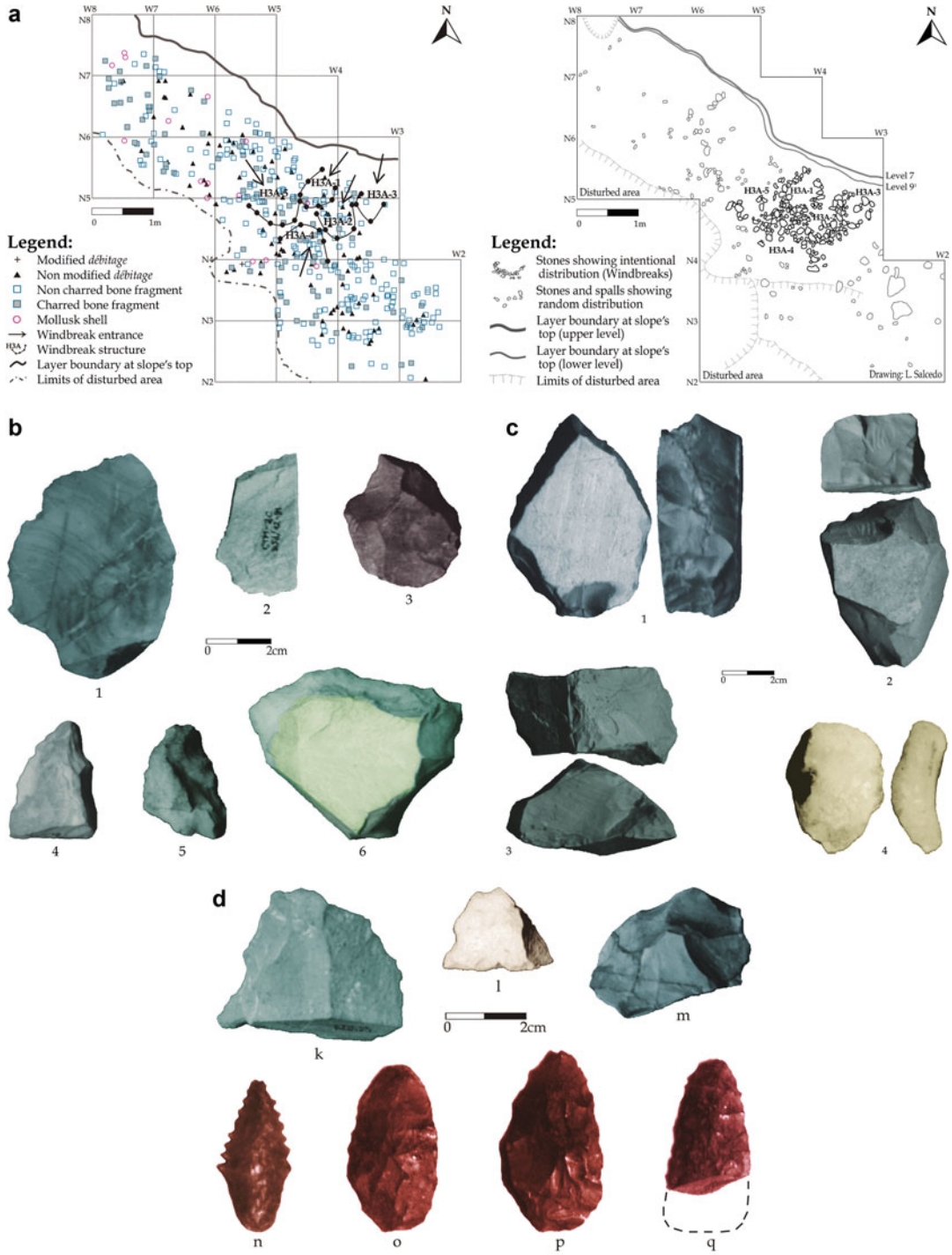

Central Andes: Prehispanic Hunter-Gatherers, Fig. 2 Cerro Tres Marías (CTM) open-air site. Field record and lithic artifacts. (**a**) Plan of the occupation surface of Subphase 3A (Layer D, Levels 7, 8, and 9[1]), at the beginning of Late Archaic: *1* – Spatial distribution of lithic and organic remains regarding the windbreaks (Modified after Salcedo Camacho 2012a: Fig. 75); *2* – Record of improvised structures H3A-1–5 and other stones over the *décapage* surfaces (Modified after Salcedo Camacho 2012a: Fig. 88). (**b**) Unifacial artifacts of abrupt edge (on tabular block or flake): *1* – Double endscraper (Subphase 1B, Level 15); *2* – Simple frontal endscraper

microflakes (13,039; 66.58%), and chips (5074; 25.91%), while only 36 (0.18%) are tools: point preforms (4; 0.02%), Paiján-type points on flake (27; 0.14%; 25 of them were incomplete, two were complete, and one of them appeared outside the grid area), sidescraper (1; 0.01%), and retouched flakes (4; 0.02%) (Ugarte 2008: 47–48).

In early 2003, during the construction of the Camisea Pipeline Project, Luis Salcedo and his team recorded two new open-air sites in the area (Salcedo Camacho in press): Quebrada Cruz de Hueso 3 (QCH3) (150 masl; 12°20,8′ Lat.S; 76°46,8′ Long.W) is a huge preceramic dwelling site covering an area of 1.2 km^2, consisting of a series of shell middens (Fig. 3a) – where chanque (*Concholepas concholepas*) and a barnacle known as pico de loro (*Megabalanus psittacus*) predominate – as well as hearths and fullers on surface, associated with lithic workshops of basalt, quartz, etc., with the presence of hammerstones, *débitage*, and quartz foliated points (one of them was collected at 12°20,54′ Lat.S; 76°46,72′ Long.W) (Fig. 3b) and a possible burial area at the foot of a hill in southeastern quarter of the site; this site is better preserved than others in the area, because is flanked east and west by two small dry ravines, and its southern half is covered by tillandsias, which would have prevented erosion and the passage of all-terrain vehicles. Meanwhile, Cruz Quebrada West 4 (QCH4) (150 masl; 12°20,7′ Lat.S; 76°46,6′ Long.W) comprises two surface concentrations of malacological remains about 30 × 15 m each, separated by 20 m, with the presence of lithic material; the site was disturbed by Peruvian army artillery practices decades ago (Salcedo Camacho in press).

Tres Piedras

Tres Piedras PV35-3 quarry site (70 masl; 10°02,6′ Lat.S; 78°08,8′ Long.W) is a small outcrop of meta-volcanic andesite (originally described as "red porphyry") of 20 m in diameter, located less than 1 km northeast of Huarmey town, on the Pampa Tres Piedras of Huarmey valley, the same that was recognized and collected by Bonavia in 1977, yielding 237 lithic pieces (León 2002: 331–332). Two decades later, this assemblage was analyzed by Elmo León (2002: 334), who determined the presence of 32 point preforms, 204 flakes, and a hammerstone. León (2002: 329) indicates the recorded preforms are largely "failed trials (…) which (…) do not directly reflect the Paijanean operational chain," but were identified as "two successive knapping stages, compatible with minimum retouch pieces and the Chivateros–type preforms. Under a biface thinning criterion, it has been verified the knapper's attempts of lithic reduction, leaving typical debitage for each stage."

Las Gaviotas, Cerro Grande 1–4, Hacienda La Merced 1–2, and Pampa Del Vituco 1–3

In early 2003, during a survey for the coastal stretch of the Camisea Pipeline Project, several open-air sites with early evidence were located in San Vicente de Cañete (Cañete, Lima) (Salcedo Camacho 2014):

Central Andes: Prehispanic Hunter-Gatherers, Fig. 2 (continued) (Subphase 2B, Level 13); *3* – Snout endscraper or chopper (Subphase 3C, Level 2); *4* – Simple lateral endscraper (Subphase 3B, Level 6) (Modified after Salcedo Camacho 2012a: Fig. 124). (**c**) Unifacial artifacts of sharp edge (on flake): *1*, *2*, *3* – Modified *débitage* (Subphase 2A, Level 14; Subphase 2C, *Level* 12; and Subphase 3B, Level 5); *4*, *5* – Backed knife (Subphase 1B, Level 16; and Subphase 2B, Level 13); *6* – Simple convex sidescraper (Subphase 2D, Level 11) (Modified after Salcedo Camacho 2012a: Fig. 125). (**d**) Projectile point preforms (on block) and foliated points (on flake): *1*, *3* – Preforms fragments elaborated in andesitic tuff (Subphase 1A, Level 17; and Subphase 2C, Level 12); *2* – Preforms fragments elaborated in volcanic tuff (Subphase 2A, Level 14) (Modified after Salcedo Camacho 2012a: Fig. 128); *4* – Foliated point with ailerons in its middle third and serrated edges elaborated in red jasper, Lauricocha I/Arenal type (Subphase 1B, Level 15); *5*, *6* – Simple foliated points elaborated in silicified hematite (Subphase 2C, Level 12; and Subphase 2D, Level 10); 7 – Incomplete foliated point elaborated in silicified hematite, probable Lauricocha II/Canario type (Subphase 2D, Level 10). (Modified after Salcedo Camacho 2012a: Fig. 131) (All images: Archive of the CTM/PATL Archaeological Project 1995–1996)

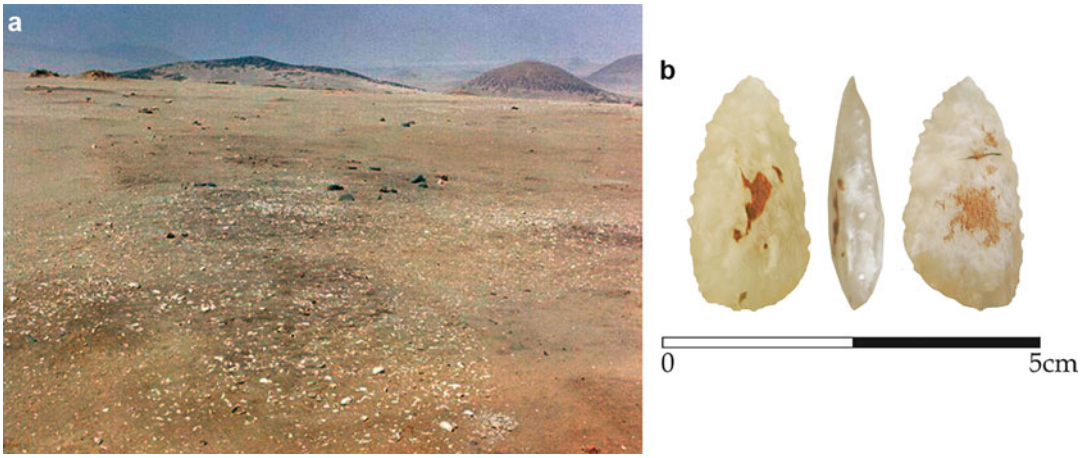

Central Andes: Prehispanic Hunter-Gatherers, Fig. 3 Quebrada Cruz de Hueso 3 (QCH3) open-air site. The site and its artifacts. (**a**) General view of the surface of the site, showing the areas of shell midden, ash, and grinding tools. (**b**) Foliated point elaborated in quartz, probable Lauricocha II/Canario type; surface find. (Courtesy of TGP Exhibition Hall) (All images: Archive of the TGP Camisea Gas Pipeline Archaeological Project – Coast 2003–2004)

Las Gaviotas (LGav) site (95 masl; 12°57,7′ Lat.S; 76°29,7′ Long.W) is located in an area of dunes between hills above the (north) right bank of the valley of Cañete, halfway between the towns of Asia and San Luis de Cañete; it consists of two malacological concentrations associated to lithic material, being the largest and densest located east of the site (Salcedo Camacho in press); a small stemmed point of triangular blade, made of obsidian (Fig. 4), was recovered on the site's surface (12°57,72′ Lat.S; 76°29,77′ Long.W) (Salcedo Camacho in press).

Cerro Grande 1 (CG1) site (150 masl; 12°59,5′ Lat.S; 76°27,8′ Long.W) is located on the (north) right bank of the Cañete valley, in a currently desert area, where a huge elongated dune was lying through the site splitting it into two sectors; the site is a wide dispersion of malacological material with the presence of high-density lithic material and where an area of 21,606 m^2 was excavated (Salcedo Camacho 2014, in press). In Surficial and A layers, some projectile points of Lauricocha III/Corvina type (cf. Cardich 1958, 1964; Lanning 1963) were recorded, and between Layers B and D, several points of Lauricocha II/Canario type (cf. Cardich 1958, 1964; Lanning 1963) appeared, while in Layer G – a compacted ash matrix – typical points of the Proto-Lauricocha and Lauricocha I/Arenal type

Central Andes: Prehispanic Hunter-Gatherers, Fig. 4 Las Gaviotas (LGav) open-air site. Lithic artifact. Miniature lanceolate point of triangular blade, with serrated edges, asymmetrical shoulders, and small peduncle, prepared in obsidian; surface find. (Courtesy of TGP Exhibition Hall; Archive of the TGP Camisea Gas Pipeline Archaeological Project – Coast 2003–2004)

(cf. Cardich 1958, 1964; Lanning 1963) were recovered; this is the only known coastal site which presents the complete sequence of Lauricocha Complex's four stages (Salcedo Camacho 2014, in press) (Fig. 5a).

Lithic material recovered at the CG1 site comprises 32,629 items. In Sector A (CG1A), there are 20,501 items (62.83% of the overall total), of which 19,714 are chipped (96.16% of sector's total), belonging mostly to *débitage* (19,661;

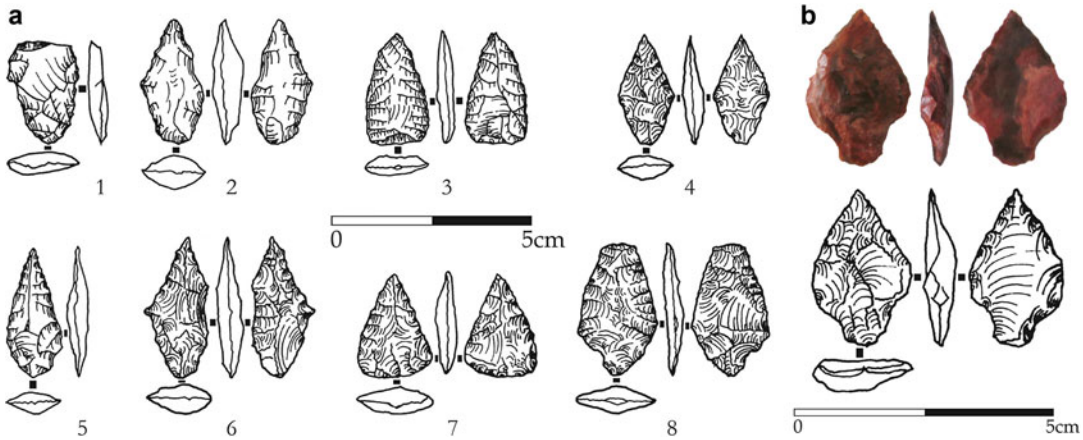

Central Andes: Prehispanic Hunter-Gatherers, Fig. 5 Cerro Grande 1 and 3 (CG1 and CG3) open-air sites. Lithic artifacts. (**a**) Foliated points: *1* – Incomplete foliated point with ailerons in its lower third, Proto-Lauricocha type (CG1B, U7BC/Capa G); *2*, *6* – Foliated point with ailerons, Lauricocha I/Arenal type (CG1B, U7 BC/Layer G, and CG3B/surface find, respectively); *3*, *7* – Foliated triangular points of convex base (Lauricocha II/Canario type; CG1A, U3A/Layer A, and Evidence F3-E023a/surface find, respectively); *4*, *8* – Foliated rhomboid points, Lauricocha III/Corvina type (reference lost and CG3B/surface find, respectively); *5* – Foliated points with the maximum width in its lower third (CG1B, U7BC/Layer G). (Modified after Salcedo Camacho 2012b: Fig. 6, 2014: Fig. 154). (**b**) Miniature Fishtail-type point, crafted in red jasper, collected on the surface as Evidence F3-E023d. (Modified after Salcedo Camacho 2014: Fig. 109a; Photo: Courtesy of TGP Exhibition Hall) (All images: Archive of the TGP Camisea Gas Pipeline Archaeological Project – Coast 2003–2004)

95.90%) being sorted in cores (49; 0.24%), unmodified flakes (642; 3.13%), *cassons* (1465; 7.15%), and *debris* (17,505; 85.39%), while only 53 (0.26%) are tools (including 18 point preforms, 21 projectile points, 9 endscraper preforms, 18 sidescraper preforms, and 5 sidescrapers); it also has 787 (3.84%) non-chipped items, including manuports (710; 3.46%), blanks (16; 0.08%), hammerstones (16; 0.08%), spherical projectiles (9; 0.04%), polishers (22; 0.11%), grinding stones (3; 0.01%), straightener (1; 0.005%), and miscellaneous (10; 0.05%) (Salcedo Camacho in press).

Meanwhile, in Sector B (CG1B), there are 12,128 items (62.83% of the overall total), of which 11,950 are chipped (98.53% of sector's total), belonging mostly to *débitage* (11,911; 98.21%) being sorted in cores (22; 0.18%), unmodified flakes (676; 5.57%), *cassons* (445; 3.67%), and *debris* (10,768; 88.79%), while only 39 (0.32%) are tools (including 16 projectile points, 11 endscraper preforms, 7 sidescraper preforms, and 5 sidescrapers); it also has 178 (1.47%) non-chipped items, including manuports (155; 1.28%), blanks (11; 0.09%), hammerstones (5; 0.04%), spherical projectiles (5; 0.04%), polishers (1; 0.01%), and miscellaneous (1; 0.01%) (Salcedo Camacho in press).

Cerro Grande 2 (CG2) site (95 masl; 12°59,4′ Lat.S; 76°28,3′ Long.W) corresponds to a dispersion of malacological and lithic material on a flat area at the bottom of a ravine partially covered by dunes, being very disturbed by the passage of vehicles (Salcedo Camacho in press).

Cerro Grande 3 (CG3) site (165 masl; 12°59,5′ Lat.S; 76°28,0′ Long.W) is a dispersion of lithic material on the side of a hill partially covered by dunes, defining two sectors very similar to each other in material and density; a surface collection yielded two leaf points (Fig. 5a) and a lithic debris (Salcedo Camacho 2014, in press).

Moreover, Cerro Grande 4 (CG4) site (70 masl; 12°59,4′ Lat.S; 76°28,5′ Long.W) is also a dispersion of lithic material on the side of a hill partially covered by dunes, defining two sectors very similar to each other, also being very disturbed by the passage of vehicles (Salcedo Camacho in press).

A few meters north of the CG4 site, Evidence F3-E023d (80 masl; 12°59,34′ Lat.S; 76°28,4′ Long.W) was recorded lying on surface: a miniature Fishtail-type point (Fig. 5b) of about 3 cm length, crafted in red jasper (Salcedo Camacho 2014, in press).

About 3 km south of Cerro Grande sites, in the former Hacienda La Merced area, lies a huge jasper outcrop, a quarry which was exploited by the ancient inhabitants of the area as well as the Cerro Grande; surface erosion has caused the surrounding hills to be covered with reddish detritus, which gives a burgundy color to the entire surface of that part of the valley (Salcedo Camacho in press). Registered sites are as follows:

Hacienda La Merced 1 (HLM1) quarry (70 masl; 13°01,3′ Lat.S; 76°26,0′ Long.W) is on low hills, with soft slopes being covered with lithic material – basically high-density debitage – although Sectors A, D, and E appear to be preceramic, the site was reoccupied during ceramic epoch, given the presence of simple terraces (Sector B), some late windbreaks (Sector C), and the occasional occurrence of fragments of pottery and textiles (Salcedo Camacho in press). Lithic material recovered in HLM1 site consists of 4432 items, of which 4398 (99.23%) are chipped, belonging mostly to *débitage* (4373; 98.67%) being segregated into cores (623; 14.06%), unmodified flakes (866; 19.54%), *cassons* (1566; 35.33%), and *debris* (1318; 29.74%), while only 25 (0.56%) are tools (23 endscraper preforms and 2 sidescraper preforms); it also has 34 (0.77%) non-chipped items, including manuports (10; 0.23%), blanks (19; 0.43%), grinding stone (1; 0.02%), and miscellaneous (4; 0.09%) (Salcedo Camacho in press).

Moreover, Hacienda La Merced 2 (HLM2) quarry-workshop (55 masl; 13°01,2′ Lat.S; 76°26,9′ Long.W) is arranged on a plain which shows concentrations of high-density lithic material (Fig. 6), where different stages of the production process of lithic artifacts (quarry and workshop) are appreciated, while at the hilltops surrounding the plains, possibly contemporary windbreaks were found (Salcedo Camacho in press).

Finally, there are Pampa de Vituco 1, 2, and 3 sites: PV1 (160 masl; 13°14,2′ Lat.S; 76°16,9′ Long.W), PV2 (170 masl; 13°13,9′ Lat.S; 76°17,1′ Long.W), and PV3 (190 masl; 13°12,6′ Lat.S; 76°18,7′ Long.W); sites PV1 and PV2 are located on an plain, while the PV3 site is located in the northern and southern slopes of a hill; these are concentrations of lithic material located 35 km south of Hacienda La Merced, which include some nuclei, but mostly flakes and debitage made of jasper, being associated to malacological material (except at the PV2 site) (Salcedo Camacho in press).

Central Andes: Prehispanic Hunter-Gatherers, Fig. 6 Hacienda La Merced 2 (HLM2) open-air and quarry site. Lithic artifacts registered in situ. (**a**) Sidescraper crafted in andesite; (**b**) Two artifacts produced in silex: *1* – Modified *debris*; *2* – Blade. (All images: Archive of the TGP Camisea Gas Pipeline Archaeological Project – Coast 2003–2004)

Cerro Calcarí 6

In mid-2003, during rescue excavations carried out in the coastal stretch of the Camisea Pipeline Project, an area of 3321 m^2 was dug at Cerro Calcarí 6 (CC6) open-air site (145 masl; 12°27,2′ Lat.S; 76°43,7′ Long.W), a village-cemetery located at the bottom of the Calcarí dry ravine, Chilca (Cañete, Lima) (Salcedo Camacho 2014). This new site is not very visible on the surface, being located 3 km southeast of La Paloma site (Benfer 2000; Engel 1988; Quilter 1989) and about 5 km north-northeast of the Chilca Pueblo 1 site (Engel 1988), and accordingly it presents similar evidences registering its four cultural layers (named A–D) (Fig. 7a): semi-subterranean, round to oval dwellings raised by thin wooden posts and covered with vegetable fiber, associated to 25 human burials wrapped in mats crafted of plant fibers (Fig. 7b), presence of activity areas associated to hearths and ash dispersions, charred remains of animals and plants, and, in addition to plant material, malacological remains and lithic material (Fig. 7c) (Salcedo Camacho 2014, in press).

Lithic material recovered in CC6 site includes 1868 items, of which 1294 (69.27%) are chipped, belonging mostly to *débitage* (1265 items; 67.72%) being segregated into cores (5; 0.27%), unmodified flakes (285; 15.26%), *cassons* (274; 14.67%), and *debris* (701; 37.53%), while only 29 (1.55%) are tools (18 finished and 11 preforms, of which 20 are points, 4 are endscrapers, 4 are sidescrapers, and 1 is indeterminate); it also has 574 (30.73%) non-chipped items, including manuports (476; 25.48%), blanks (27; 1.45%), bludgeon or *porra* (1; 0.05%), fullers or *batanes* (4; 0.21%), mortar (1; 0.05%), grinding stones or *manos* (2; 0.11%), hammerstones (8; 0.43%), spherical projectiles (3; 0.16%), polishers (19; 1.02%), and miscellaneous (33; 1.77%), being the most used raw material basalt (31.0%), followed by quartz (10.3%) and quartzite (10.3%), with few obsidian (6.9%), diorite (6.9%), andesite (3.5%), and conglomerate (3.5%) (Salcedo Camacho in press). Although the site was not radiocarbon dated, lithic material is comparable to that of Chilca Pueblo 1 and La Paloma, about 6300–2500 years Cal. BC (Salcedo Camacho 2014).

Isolated Evidences at Lower Valley of Asia

In early 2004, during a survey for the coastal stretch of the Camisea Pipeline Project, near the Asia 2 site, located in the lower Omas valley, Asia (Cañete, Lima), four foliated projectile points (two triangular and two rhomboid) were discovered as isolated surface finds, registered as Evidences F2-E133a,b (Fig. 8a) and F2-E136a,b (Fig. 8b) (23 masl; 12°46′ Lat.S; 76°35′ Long.W), while cotton (*Gossypium barbadense*) fiber residues were recorded nearby (Salcedo Camacho 2014, in press).

Piedra Roja, Quebrada Huachoc, Quebrada Silla, and Huaynacoto 1

At least four preceramic open-air sites, of camp-workshop type, were identified from successive surveys conducted in 2003–2009 in hills and ravines at the left bank of Chancay middle valley, 25–40 km east-northeast of Chancay City (Huaral, Lima) (Goldhausen et al. 2008. 139–149):

Piedra Roja PV44-Q/01 site (1050 masl; 11°36,6′ Lat.S; 76°57,4′ Long.W) is located on a colluvial terrace, near a dry riverbed, at the southern foot of the Huachoc hills; lithic material collected includes debris, several tools, as well as bifacial preforms and stemmed points, one of them having a heart-shaped apex (Goldhausen et al. 2008: 142).

Quebrada Huachoc PV44-H/01 site (1080 masl; 11°33,9′ Lat.S; 76°57,8′ Long.W) is located on a colluvial terrace, over the northern slope of Huachoc hills; lithic material collected consists of debris, flakes, sidescrapers, and a stemmed point of triangular blade made of crystalline quartz (Goldhausen et al. 2008: 142).

Quebrada Silla PV44P/39 site (1650 masl; 11°26,1′ Lat.S; 76°52,6′ Long.W) is arranged on the top of a flat, low hill, extending to the adjacent plains; lithic material collected is more varied than the other sites, including amorphous cores, flakes, denticulates, plain cores, sidescrapers, some perforators, heavy grindstones, a bifacial preform, and a stemmed point (Goldhausen et al. 2008: 143–144), noting that some of the plain cores are similar to the "discoidal scrapers" of Lanning (1963).

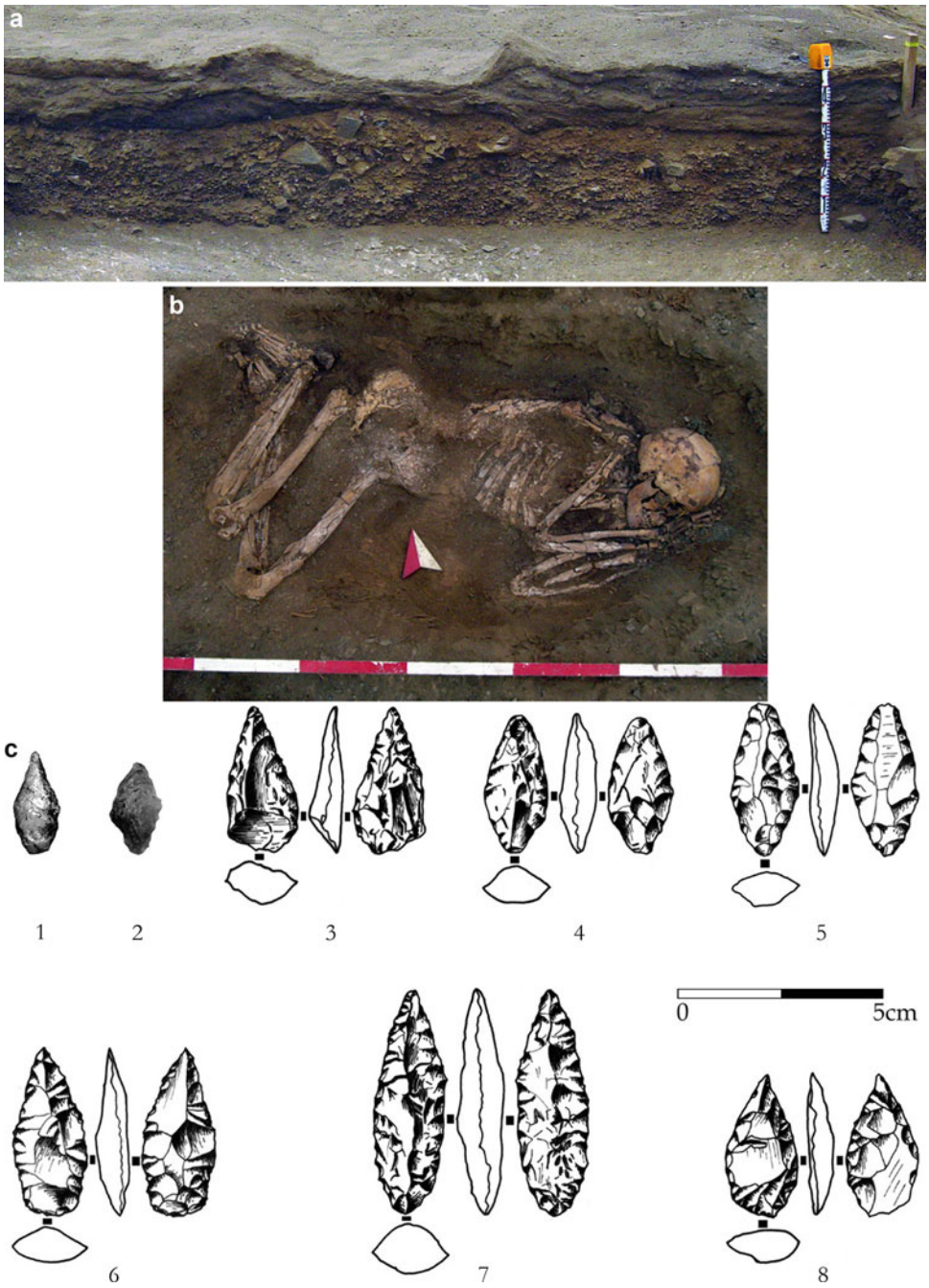

Central Andes: Prehispanic Hunter-Gatherers, Fig. 7 Cerro Calcarí 6 (CC6) open-air site. Contexts and lithic artifacts. (**a**) North profile of unit U22; (**b**) Burial 4, adult male individual registered in unit U24 (Modified after Salcedo Camacho 2014: Fig. 172); (**c**) Foliated projectile points: *1*, *2* – Points with ailerons (U26F/Layer D and U58B/Layer C, respectively); *3* – Triangular point (U32F/Layer B1); *4*, *5* – Rhomboid point (U31B/Layer A and U1/Surficial, respectively); *6* – Point preform (U46/Layer C); *7* – Long foliated point (U39A/Layer C); *8* – Short foliated point (U31F/Layer B3). (Modified after Salcedo Camacho 2014: Fig. 173) (All images: Archive of the TGP Camisea Gas Pipeline Archaeological Project – Coast 2003–2004)

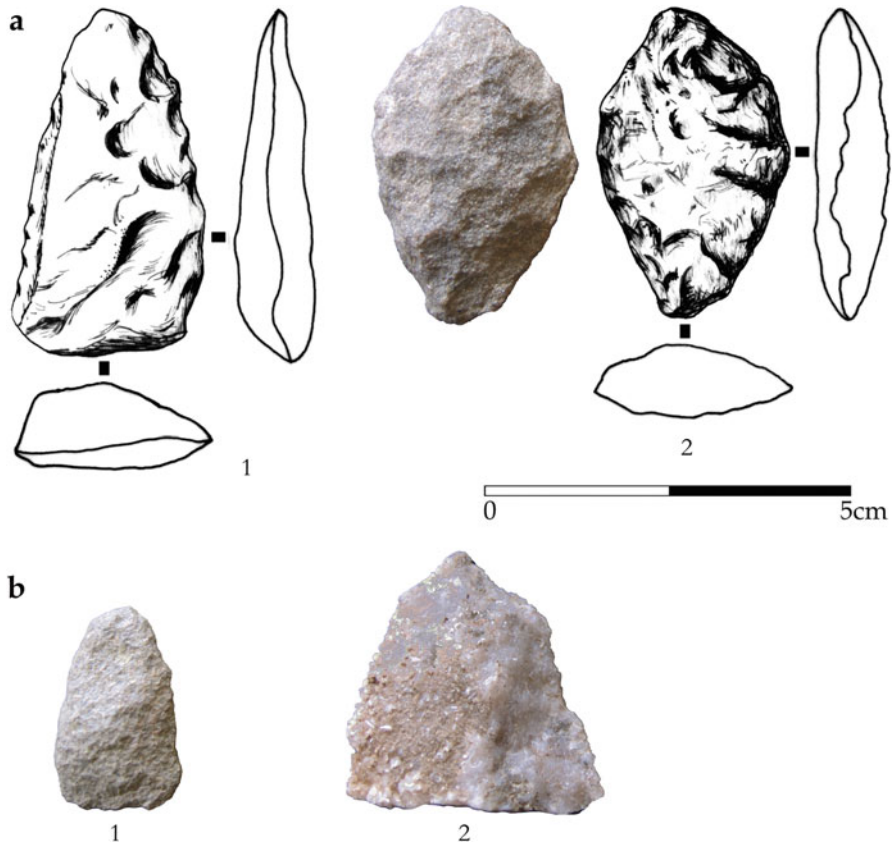

Central Andes: Prehispanic Hunter-Gatherers, Fig. 8 Surface finds in the Asia lower valley. Lithic artifacts. (**a**) Evidence F2-E133. *1* – Foliated triangular point, Lauricocha II/Canario type (F2-E133a; Modified after Salcedo Camacho 2012b: Fig. 5a, 2014: Fig. 153a); *2* – Foliated rhomboid point, Lauricocha III/Corvina type (F2-E133b; Modified after Salcedo Camacho 2012b: Fig. 5b, 2014: Fig. 153b [Drawing]). (**b**) Evidence F2-E136. *1* – Foliated triangular point, Lauricocha II/Canario type (F2-E136b); *2* – Incomplete foliated rhomboid point, Lauricocha III/Corvina type (F2-E136a). (All images: Archive of the TGP Camisea Gas Pipeline Archaeological Project – Coast 2003–2004; Photographs: Courtesy of Municipal Museum of Huaca Malena)

Finally, Huaynacoto 1 PV44-P/20 site (~1000 masl; 11°27,3′ Lat.S; 76°54,0′ Long.W) is located on the right bank of the Pacaybamba ravine, over a colluvial terrace placed at the foot of Viejo hill, which gives natural protection; the settlement consists of a set of small, semicircular residential structures of unworked stones and without mortar, arranged on terraces around a larger structure, although some of them were reused in ceramic epoch (Goldhausen et al. 2008: 149). Lithics were collected both inside and outside the structures and consist of cores (with or without platform), flakes (some retouched, other laminar), debris, choppers, thick endscrapers, plain cores, sidescrapers, knives, denticulates, a perforator, and some pounders, all made with a dark blue, medium-fine grain local rock (andesite?); also, there were preforms and finished points (including a triangular specimen of Lauricocha II type) made from blackish and whitish, fine-grained rocks (basalt and quartz?); in addition, some grinding stones were recovered (Goldhausen et al. 2008: 147, 149).

Las Brujas

Las Brujas rock-shelter (100 masl; 14°49,9′ Lat.S; 75°21,2′ Long.W) is located in the lower Río

Grande valley (Nazca, Ica), being excavated in 2007 and 2010 by Gabriela Ferrando by two 12 × 2 m trenches, yielding in layers 3–5 several occupation surfaces associated to hearths, botanical and shrimp remains, mollusk shells such as macha (*Mesodesma donacium*), and scarce lithic material, basically debitage, along with some nuclei, manuports, and polishers on quartzite and basalt, totaling 166 pieces (Ferrando 2011). The two dates obtained (Erl-13246 and Erl-13245) cover the range of 3360–2620 years Cal. BC.

Pampa Choclón 1–2; San Nicolás 3–4, 6–12, and 15–25; and EA-01 to 63

In 1963, the American Gary Vescelius reported three foliated points, and a coarse endscraper, associated to a large shell midden located in the beach of San Nicolas Bay, Marcona (Nazca, Ica) (Salcedo Camacho 2014: 427). During an initial evaluation of the area, Fernando Fujita, Juan Paredes, and their team recorded several open-air sites over the adjacent plains of San Nicolás (SN1–5) and Pampa Choclón (PC1–16), some of which are preceramic (e.g., PC1 and 2, SN3 and 4, although PC1 and SN3 were reoccupied in late ceramic period) (Salcedo Camacho 2015).

In mid-2014, Luis Salcedo and his team recorded new areas with lithic material in the plain adjacent to the San Nicolás Bay (SN6–12, 15–25, of which SN6, 10–12 have preceramic occupations, as well as potsherds associated with late windbreaks made of unworked stones, while SN7–9, 15–25 are clearly preceramic) and also in the nearby plain of Pampa del Choclón (PC17–23, of which only the small workshop PC19 is preceramic) (Salcedo Camacho 2015). Additionally, new lithic areas within the sites previously reported were found, particularly in SN3–4 and PC1–2; the PC1E Sector (130 masl; 15°15,6′ Lat. S; 75°10,7′ Long.W) (Fig. 9a) is remarkable, where several items produced from different raw materials were recorded, but especially of quartzite, as a chopping tool (Fig. 9b), large quartzite flakes and blades – some made out of the *outrepassé* technique (Fig. 9c, d) – and a Chivateros-type preform (Fig. 10a-1) (Salcedo Camacho 2014: 291).

Given the need to make viable the expansion work of Marcona Mining Project and considering all the evidence recorded were laying on surface (30–435 masl; 15°13,3′–15°14,2’ Lat.S; 75°10,9′–75°12,7′ Long.W), the three-dimensional and photographic record and consequent systematic collection of lithic material (areas with potsherds and malacological remains were avoided according to the mitigation plan) in those portions of the San Nicolás landscape where the various mining facilities (for processing and transportation of iron ore) will be built are proceeded; for such goal, only medium- to low-density areas were selected – called each one “archaeological evidence” (or EA’s in Spanish), followed by a sequential numbering – separating them from other, high-density areas (which were defined as “sites”: SN6, SN7, etc.); it has been estimated that the different surface concentrations and dispersions of lithic material in San Nicolás cover about 21 km^2 (Salcedo Camacho 2015, in press).

Such collection resulted in obtaining 17,362 chipped lithic items, each weighed and cataloged individually, of which a sample of 6537 items (37.65%) was thoroughly analyzed, belonging mostly to *débitage* (6470; 98,98% of the sample), being segregated into blade cores (11; 0.17%), flake cores (626; 9.58%), blades (59; 0.90%), flakes (4566; 69.85%), *debris* (671; 10.26%), and *cassons* (293; 4.48%); among the tools, sidescrapers (57; 0.87%) are relatively frequent, but endscrapers (16; 0.24%) and denticulates (3; 0.05%) are scarce, with the presence of various phases of point preforms (44; 0.67%), with some of them being quite large (Fig. 10a-2), being remarkable, while more advanced items in the reduction process seem to correspond to Fishtail point type (Fig. 10b-1) or to Paiján point type (Fig. 10b-2) (Salcedo Camacho 2015: 148–150). The large average size of the point preforms from Marcona even surpasses that recorded in Cerro Chivateros, which until then held the record, regarding the size of Casma specimens and those of the original Paiján area of the north coast (cf. León 2002: 331).

Polished material is too scarce, limited to a broken hoe and a cylinder (totaling 0,05%);

Central Andes: Prehispanic Hunter-Gatherers, Fig. 9 Pampa Choclón 1 – Sector E (PC1E) site. The site and its artifacts. (**a**) General view of the site's surface, showing the areas of secondary quarry of quartzite, basalt, and jasper. (**b**) *1*, *2* – Front and side views of a chopping tool crafted on quartzite. (**c**) *1*, *2* – Front and side views of a quartzite flake obtained with the technique of *outrepassé*. (**d**) *1*, *2* – Front and side views of a basaltic rock blade obtained with the technique of *outrepassé*. (All images: Modified after Salcedo Camacho 2015; Archive of the SHP Marcona Mine Expansion Archaeological Project 2014–2015)

all mentioned lithic material comes from San Nicolás area, except a point preform and a chopping tool from Sector PC1E (Salcedo Camacho 2015: 148).

The most common raw material is by far quartzite and its variants (totaling 82.57%), while among the siliceous rocks, varieties of jasper (8.03%) are included, with silex (1.51%) and chert (0.21%) being scarce; among siliceous materials, there are chalcedony (0.52%) and milky quartz (0.03%), being both scarce, while among volcanic rocks, andesite predominate (4.74%), followed by basalt (1.82%), rhyolite (0.32%), and dacite and its variants (0.16%), with diorite (0.02%), granodiorite (0.02%), and granite (0.02%) being very few; additionally, there has been a piece of magnetite ore (0.02%) as well as two pieces of unidentified raw materials (0.03%) (Salcedo Camacho 2015: 148).

San Nicolas lithic industries are mostly primary, carrying out the initial work of reducing the blanks (quarry *facies*), which in vast majority are regular- to large-sized pebbles, with large pebbles of basalt and quartzite being used as hammerstones, as well as green or yellow jasper nodules, some of which show traces of percussion like extremely large flake negatives; thus, the existence of two clearly defined lines of the *chaîne opératoire* was determined: those that produce flakes and those that produce blades (Salcedo Camacho 2015: 148).

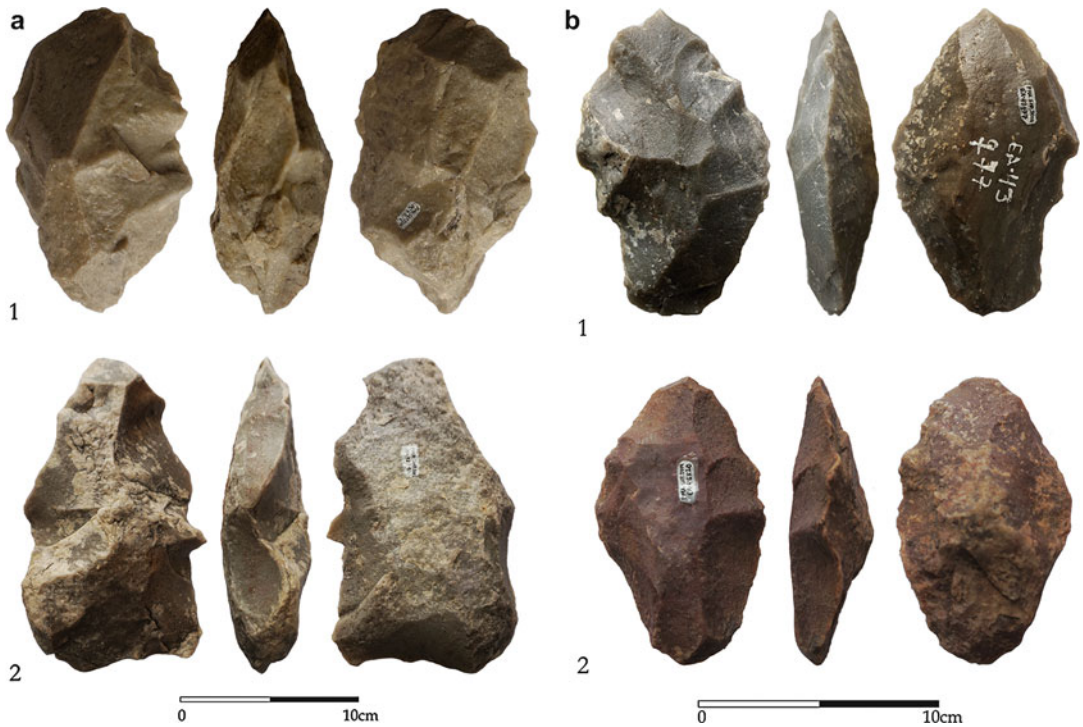

Central Andes: Prehispanic Hunter-Gatherers, Fig. 10 Secondary quarry sites of Pampa Choclón PC1E, San Nicolás SN12B, and Evidences EA-43 and 46 of San Nicolás. Spear point preforms at different stages of knapping, all produced in different varieties of quartzite; surface finds. (**a**) Pieces in early stages of reduction. *1* – Chivateros-type preform (PC1E, Finding 1) (cf. Salcedo Camacho 2014: Fig. 109c); *2* – Early stage preform (SN12B, Finding 1). (**b**) Pieces in late stages of reduction: *1* – Probable Fishtail-type preform (Evidence EA-43q77); *2* – Probable Paiján-type preform (Evidence EA-46a20). (All images: Modified after Salcedo Camacho 2015; Archive of the SHP Marcona Mine Expansion Archaeological Project 2014–2015)

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Andes: Origins and Development of Agriculture
- ▶ Andes: Prehistoric Art
- ▶ Andes: Prehistoric Period
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ South America: Lithic Industries

References

Benfer, R. 2000. Proyecto de excavaciones en Paloma, valle de Chilca, Perú. *Boletín de Arqueología PUCP* 3: 213–238.

Binford, L.R. 1980. Willow smoke and dog's tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45 (1): 4–20.

Bonavia, D. 1982. El complejo Chivateros: Una aproximación tecnológica. *Revista del Museo Nacional* 46: 19–37.

Bonavia, D., and C. Chauchat. 1990. Presencia del Paijanense en el desierto de Ica. *Bulletin de l'Institut Français d'Études Andines* 19 (2): 399–412.

Cárdenas, M. 1981. *Tablada de Lurín: Primer informe general de trabajo, años 1958–1980*. Lima: Seminario de Arqueología del Instituto Riva-Agüero, Pontificia Universidad Católica del Perú.

Cardich, A. 1958. Los yacimientos de Lauricocha: Nuevas interpretaciones de la prehistoria humana. *Studia Praehistorica* 1: 1–64.

Cardich, A. 1964. Lauricocha: Fundamentos para una prehistoria de los Andes Centrales. *Studia Praehistorica* 3: 1–171.

Cohen, M.N. 1978. Archaeological plant remains from the Central coast of Peru. *Ñawpa Pacha* 16: 23–50.

Dulanto, J.A., J. Cruz and I. Aguirre 2018. Resultados Preliminares de la Primera Temporada de Trabajos de

Campo en Pampa Lechuza, Sitio del Holoceno Temprano en la Costa Sur del Perú. En: Román, K. (ed.) I Coloquio de Arqueología realizado en el Museo de Sitio Julio C. Tello de Paracas, Paracas (Pisco, Ica), del 13 al 14 de abril de 2018. Lima: Ministerio de Cultura, p. 131. http://repositorio.cultura.gob.pe/handle/CULTURA/652.

Engel, F.A. 1966. *Paracas: Cien siglos de cultura peruana*. Lima: Mejía Baca, 228 p.

Engel, F.A 1988. *Ecología prehistórica andina: El hombre, su establecimiento y el ambiente de los Andes – La vida en tierras áridas y semiáridas. Volume I, part 1: Chilca, Pueblo 1; volume II, part 1: Otras lomas del sur medio: De Pisco a los alrededores de Lima; volume II, part 2: Las cuevas de Chilca.* Lima: Centro de Investigación de Zonas Áridas, Universidad Nacional Agraria La Molina., 2 volumes.

Ferrando, G. 2011. Secuencia de ocupación, actividades y subsistencia en el abrigo rocoso "Las Brujas", valle bajo Río Grande, Palpa, Ica. Unpublished Licenciature dissertation. Pontificia Universidad Católica del Perú. 285 p.

Goldhausen, M., C. Viviano, J. Abanto, P. Espinoza, and R. Loli. 2008. La ocupación precerámica en la quebrada Orcón-Pacaybamba, valle medio de Chancay, Lima. *Boletín de Arqueología PUCP* 10: 137–166.

Isla, J. 1990. La Esmeralda: Una ocupación del período arcaico en Cahuachi, Nasca. *Gaceta Arqueológica Andina* 5 (20): 67–80.

Kaulicke, P.C. 1980. Der abri Uchcumachay and seine zeitliche stellung innerhalb der lithischen perioden Perus. *Allgemeine und Vergleichende Archäologie* 2: 429–458.

Kaulicke, P.C. 2000. Contribuciones hacia la cronología del período arcaico en las punas de Junín. *Boletín de Arqueología PUCP* 3: 307–325.

Lanning, E.P. 1963. A pre-agricultural occupation on the central coast of Peru. *American Antiquity* 28 (3): 360–371.

Lavallée, D., M. Julien, J. Wheeler, and C. Karlin. (trans. 1995) 1985. *Telarmachay: Cazadores y pastores prehistóricos de los Andes*. Trans. D. Pozzi-Escot (Travaux de l'Institut Français d'Études Andines 88). Lima: Institute Français d'Études Andines. 2 volumes.

León, E.A. 1999. Lithic technological analysis: Preceramic period in Tablada de Lurín (ca. 5500 B.C.), Lima, Peru. In *L'Amérique du Sud: Des Chasseurs-Cueilleurs à l'Empire Inca*, British Archaeological Reports International Series 746, ed. A. Chevalier, L. Velarde, and I. Chenal-Velarde, 31–42. Oxford: Archaeopress.

León, E.A. 2002. Preformas tipo Chivateros del yacimiento PV35-3, Tres Piedras (valle de Huarmey, Perú). *Bulletin de l'Institut Français d'Etudes Andines* 31 (2): 329–371.

Lynch, T.F. 1967. Quishqui Puncu: A preceramic site in highland Peru. *Science* 158 (3802): 780–783.

Lynch, T.F. 1970. Excavations at Quishqui Puncu in the Callejón de Huaylas, Peru. *Occasional Papers of the Idaho State University Museum* 26: 1–105p. Porcatello.

Lynch, T.F. 1980. *Guitarrero cave: Early man in the Andes*, Studies in Archaeology 39. New York: Academic, 320 p.

MacNeish, R.S., R.K. Vierra, A. Nelken-Terner, and C.J. Phagan. 1980. *Prehistory of the Ayacucho basin 3: Non ceramic artifacts*. Ann Arbor: The University of Michigan Press, 344 p.

MacNeish, R.S., A. García-Cook, L.G. Lumbreras, R.K. Vierra, and A. Nelken-Terner. 1981. *Prehistory of the Ayacucho basin 2: Excavations and chronology.* Ann Arbor: The University of Michigan Press, 279 p.

Makowski, K. 1996. *Tablada de Lurín: Informe de las Temporadas de Trabajo 1993/1994 y 1994/1995*. Report prepared for National Institute of Culture. Lima: Tablada de Lurín Archaeological Project – PUCP.

Malpass, M. 1986. The Paijan occupation of the Casma Valley, Peru. *Ñawpa Pacha* 24: 99–105.

Matos, R. 1975. Prehistoria y ecología humana en las punas de Junín. *Revista del Museo Nacional* 41: 37–80.

Ortiz, C.V. 2017. La Investigación del Periodo Precerámico Temprano en el Perú: Su Historia y Perspectivas. In: Vega-Centeno, R. (ed.) Repensar el Antiguo Perú: Aportes desde la Arqueología. Lima: Pontificia Universidad Católica del Perú - Instituto de Estudios Peruanos, pp. 17–47.

Patterson, T.C. 1966. Early cultural remains on the central coast of Peru. *Ñawpa Pacha* 4: 145–153.

Quilter, J. 1989. *Life and death in Paloma: Society and mortuary practices in a preceramic Peruvian village*. Iowa: University of Iowa Press, 185 p.

Ramos de Cox, J. 1969. Aldea pre-ceramica en Tablada de Lurín. *Boletín del Seminario de Arqueología del Instituto Riva-Agüero* 3: 55–68.

Ravines, R. 1965. Ambo: A new preceramic site in Peru. *American Antiquity* 31 (1): 104–105.

Reimer, P.J., M.G.L. Baillie, E. Bard, A. Bayliss, J. Warren-Beck, P.G. Blackwell, C. Bronk-Ramsey, C.E. Buck, G.S. Burr, R.L. Edwards, M. Friedrich, P.M. Grootes, T.P Guilderson, I. Hajdas, T.J. Heaton, A.G. Hogg, K.A. Hughen, K.F. Kaiser, B. Kromer, G. McCormac, S.W. Manning, R.W. Reimer, D.A. Richards, J.R. Southon, S.Talamo, C.S.M. Turney, J. Van der Plicht & C.E. Weyhenmeyer 2009. IntCal09 and Marine09 Radiocarbon Age Calibration Curves, 0–50,000 Years Cal BP. Radiocarbon 51 (4): 1111–1150.

Reimer, P.J., E. Bard, A. Bayliss, J.W. Beck, P.G. Blackwell, C. Bronk-Ramsey, P.M. Grootes, T.P. Guilderson, H. Haflidason, I. Hajdas, C. Hatté, T.J. Heaton, D.L. Hoffmann, A.G. Hogg, K.A. Hughen, K.F. Kaiser, B. Kromer, S.W. Manning, M. Niu, R.W. Reimer, D.A. Richards, E.M. Scott, J.R. Southon, R.A. Staff, C.S.M. Turney, and J. Van der Plicht. 2013. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years Cal BP. *Radiocarbon* 55 (4): 1869–1887.

Rick, J.W. 1980. *Prehistoric hunters of high Andes*. New York: Academic, 360 p.

Rick, J.W. 1988. The Character and Context of Highland Preceramic Society. In *Peruvian Prehistory: An Overview of Pre-Inca and Inca Society*, ed. R. Keatinge 3–40. Cambridge: Cambridge University Press.

Rick, J.W., and K.M. Moore. 2000. El Precerámico de las punas de Junín: El punto de vista desde Panaulauca. *Boletín de Arqueología PUCP* 3: 263–296.

Salcedo Camacho, L.E. 2011. *Tempus Solaris: Algunas nociones sobre la actividad solar, las variaciones seculares del Carbono–14 atmosférico y los estadios del isótopo de carbono*. Lima: Intersur Concesiones – Rodríguez Paredes, 190 p.

Salcedo Camacho, L.E. 2012a. *Præhistoria Andina III: Excavaciones en el sitio arcaico de Cerro Tres Marías, un campamento logístico del complejo Lauricocha en las lomas de Atocongo*. Lima: Rodríguez Paredes, 405 p.

Salcedo Camacho, L.E. 2012b. *Præhistoria Andina I: El complejo Lauricocha y el estadio arcaico en los Andes Centrales*. Lima: Rodríguez Paredes, 98 p.

Salcedo Camacho, L.E. 2014. *Præhistoria Sudameris: Sobre las múltiples migraciones humanas que poblaron Sudamérica al final del Pleistoceno en el contexto cronológico de la calibración radiocarbónica*. Lima: Dicalus & Ingenieros – Rodríguez Paredes, 774 p.

Salcedo Camacho, L.E. 2015. Informe final del proyecto de monitoreo arqueológico "Ampliación de mina y planta de beneficio Marcona – Shougang Hierro Perú". Report prepared for Ministry of Culture. Marcona: GMI Ingenieros Consultores. 955 p.

Salcedo Camacho, L.E. In press. *Præhistoria Andina IV: Sitios del Protoarcaico y Arcaico registrados en los valles de Lurín, Chilca, Asia y Cañete (Lima), y en el desierto de Marcona (Ica), durante 1995–2015*. Lima: Rodríguez Paredes, 70 p.

Uceda, S. 1992. Industrias líticas precerámicas en Casma. In *Estudios de arqueología peruana*, ed. D. Bonavia, 45–67. Lima: Fomciencias.

Ugarte, J. 2008. En medio del desierto: Tradición paijanense en el sur de Lima. In *Arqueología de la costa centro sur peruana*, ed. O. Pinedo and H. Tantaleán, 39–61. Lima: Avqi.

Wheeler, J.C. 2000. Patrones prehistóricos de utilización de los camélidos sudamericanos. *Boletín de Arqueología PUCP* 3: 297–306.

Yataco, J.J. 2013. Revisión de las evidencias de Pikimachay, Ayacucho, ocupación del Pleistoceno final en los Andes centrales. *Boletín de Arqueología PUCP* 15: 247–274.

Further Readings

Blackwell, P.G., and C.E. Buck. 2008. Estimating radiocarbon calibration curves. *Bayesian Analysis* 3 (2): 225–248.

Kelly, R.L. 2013. *The lifeways of hunter-gatherers: The foraging spectrum*. Cambridge, UK: Cambridge University Press, 375 p.

Central Asia: Paleolithic

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C

Introduction

Abundant evidence demonstrates the existence of Lower Paleolithic occupations in Tadjikistan and Kazakhstan more than a million years ago (Ranov 1965, 1972; Derevianko 2004), like those discovered in China. However, the Zagros region contains different cobble industries similar to the Oldowan (Otte et al. 2004). Cultural contact thus occurred between Central Africa and Southern Asia from at least 2 million years ago (Figs. 1 and 2). This dual interference, from Eastern Asia and Eastern Africa, affected this key region: Asia in its northern area and Africa in these southern areas. This fundamental setting describes all later populations and civilizations intermediate between Africa and Asia. Like elsewhere in the world, these technological trends fused and were standardized to form the Middle Paleolithic, with a shift to lighter tools. At this time, around 200,000 years ago, investment shifted from blocks of raw material (cobbles and bifaces) to the production of retouched flakes that were much smaller and adaptable and that could be used for a broader range of tasks. Nonetheless, persistence in some aspects took place despite this strong pattern. The northern plains developed Levallois

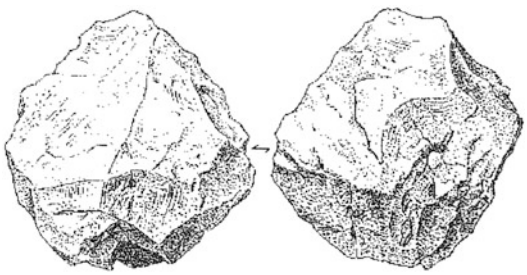

Central Asia: Paleolithic, Fig. 1 Iranian Azerbaijan, polyhedral (Otte et al. 2004)

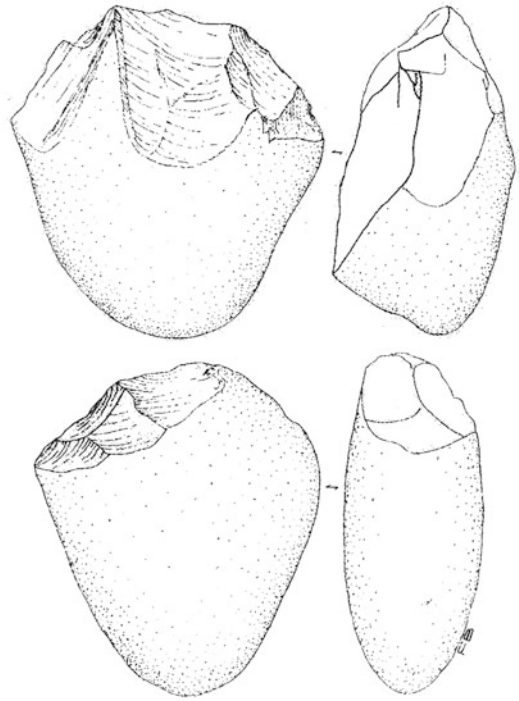

Central Asia: Paleolithic, Fig. 2 Qazialiad, chopping tools, Iran (Otte et al. 2004)

technology, which is based on the careful preparation of cores to produce predetermined flake forms that were then retouched and used. Conversely, the mountainous areas of the south show intense reduction due to intense reuse of tools, retouching, and hafting, resulting in short tools. This pattern makes the "Zagros Mousterian" found in Turkey, Iraq, and Iran similar to the European Mousterian "Quina" facies (Otte et al. 2006). This industry is the basis for subsequent innovations leading to the Upper Paleolithic. Archaic modern humans are associated with this Mousterian facies, found at Shanidar (Iraq), Denisova (Altaï), Teshik-Tash (Uzbekistan), anatomically equivalent to the European Neandertals (Solecki 1998). The associated burials confirm as well their spiritual capacities.

Key Issues/Current Debates/Future Directions/Examples

The dichotomy observed during the Middle Paleolithic between the Zagros Mousterian and the northern Levallois blade industry continues until the onset of the Upper Paleolithic. In the mountainous areas, the trend toward bladelet (very small blades) production on thick flakes led to the Aurignacian in the west, via the Baradostian cultures in the Zagros region (Otte et al. 2009) (Figs. 3, 4 and 5). With thrown weapons (in which bladelets were the points of small projectiles), techniques became oriented toward the processing of bone with all of the associated symbolism: ritual death of the animal, killing at a distance, and using animal products themselves to kill other animals (Fig. 6). This revolution, reflected in simply technological domains, thus corresponds more profoundly to a new attitude of humans with respect to their existence and place in nature. It also implies the occasional mounting of animals (e.g., horses) and the use of dogs for transport using the travois (Germonprez et al. 2009).

This new attitude, as much as such modes of transport, explains both the demographic explosion in Central Asia and population expansion to east and west, where they would be called Aurignacian. This tripartite relationship established between techniques, religion, and transport is seen, for example, in the creation and spread of pendants, a sort of trophy from a successfully vanquished animal. These decorative elements come from the natural defenses of the animal, canine teeth, and ivory, and thus embody their formidable and dangerous qualities. By their display, they designate the rank of the wearer both in the environment and in human society. The continuity of these processes in Central Asia appears natural and fundamental and contrasts logically with the abrupt movements that external migrations to the far southwest of Europe accentuated.

In parallel, the northern plains also underwent a lightening of tool size with techniques shifting from the production of Levallois blades to thinner blades and bladelets: Obi-Rakhmat in Uzbekistan (Derevianko 2004) and Kara-Born in the Altaï. Ultimately, this different demographic pressure spread to the west for reasons similar to the spread of the Baradostian, but on the northern plains and somewhat later, under the general term Gravettian.

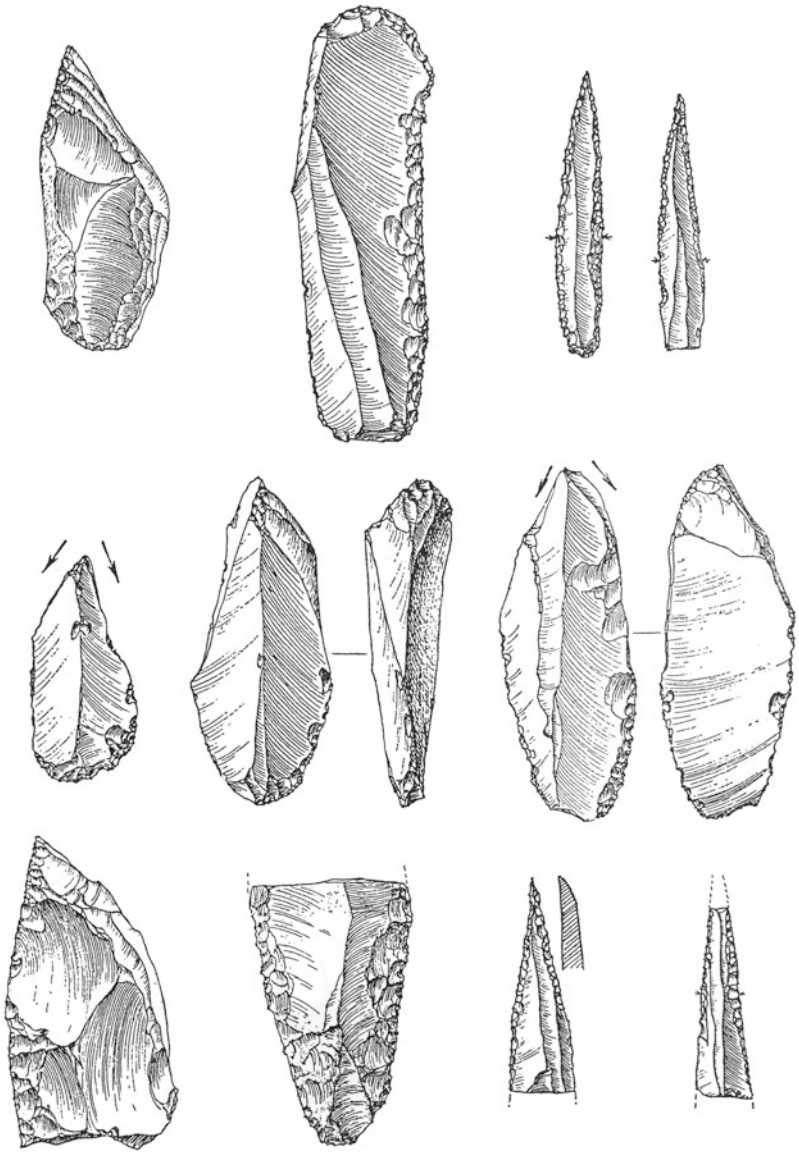

Central Asia: Paleolithic, Fig. 3 Jabrud, Aurignacian (Syria). (After Rust, in Otte and Kozlowski 2007)

The evolutionary sequence in Central Asia was oriented toward the production of thinner, even microlithic, blanks, called the Zarzian in Iran. These microlithic armatures demonstrate the extreme development of small projectile points and indicate the widespread use of the bow and arrow, and thus the particular relationship of man with nature. The precision, rapidity, and long distance left little chance to the animal, which had become a dietary resource rather than mythical inspiration. In this form, 10,000 years later, the European Mesolithic and the Jomon culture in Japan are identical (Otte 2010). The Neolithic is very early in the Zagros Mountains with animal herding and permanent houses built of solid materials (Braidwood 1960). Due to its location and demographic density, Central Asia is an active center affecting its neighboring regions. We see here the development of modern anatomical morphology for this part of the world. The

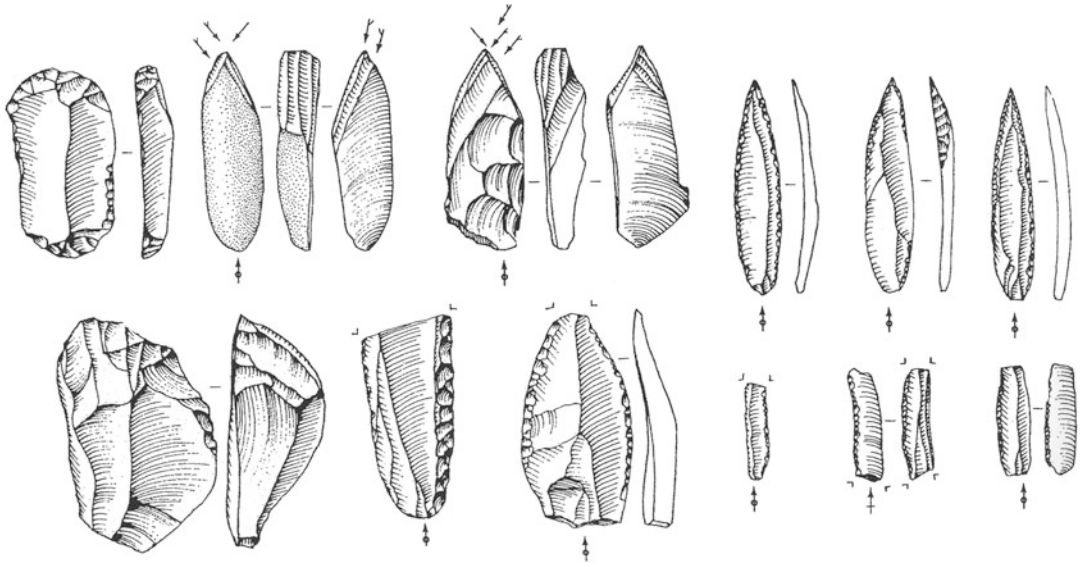

Central Asia: Paleolithic, Fig. 4 Shanidar, Aurignacian (Iraq) (Otte and Kozlowski 2011)

origin of techniques for throwing weapons and conquering mythologies also find their regional source here.

In all prehistoric periods, Central Asia functioned as a reservoir for populations and cultural experiences, seasoned by clear but sporadic external influences. The original population may have come from southern Asia (Meganthropus) or East Africa (*Homo ergaster*). However, the best comparisons for the first known industries (made on cobbles) are clearly from Africa (Oldowan culture). The bifacial tool tradition on massive blocks (Acheulean culture) also comes from East Africa. This long history is supported by evidence for the occasion closing of the straits: Bal-el-Mandep and Ormuz. This entire southern Asian zone seems to have formed a geographic and cultural unit extending from the African lakes to the Siwalik Mountains in Pakistan, India, and Nepal, for which the Zagros Mountains form the center of gravity. With the smaller tools of the Middle Paleolithic, regional diversification and technical solutions increase. In the southern regions, caves served as refuges and stone materials were transported to them in already reduced form. Everything was in place for a shift to exploitation of hard animal materials (bone, antler, ivory) and to the microlithization of stone armatures. The Aurignacian solution resulted from this combination. Demographic increase was a consequence of this trend and led to migrations as far as Western Europe. Conversely, the northern plains, with abundant materials of good quality, saw continuity but based on Levallois principles. The entire western Gravettian still shows traces of this. Central Asia then underwent evolution toward microlithization and then Neolithization, both particularly early. Technological innovations, renewal of religious systems, and anatomically evolved populations spread rapidly along a longitudinal axis, largely open via the steppe landscapes and the temporary drying of interior seas. Central Asia determined a good part of European prehistory and apparently also that of the Punjab region in northwest India. To understand this immense region also enables explanation of many events observed along its borders, in the Near East and Europe.

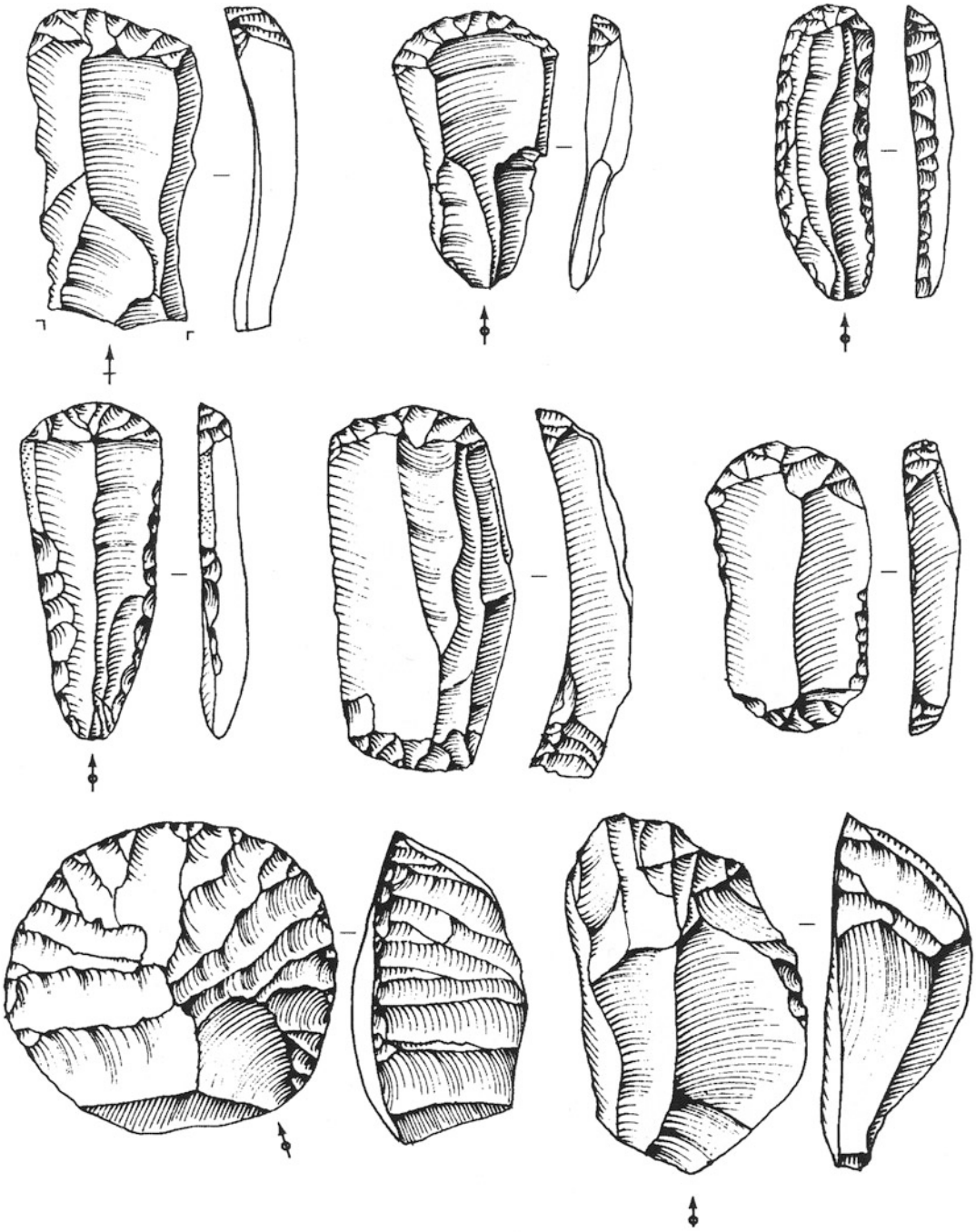

Central Asia: Paleolithic, Fig. 5 Yafteh, Aurignacian (Iran) (Otte and Kozlowski 2009)

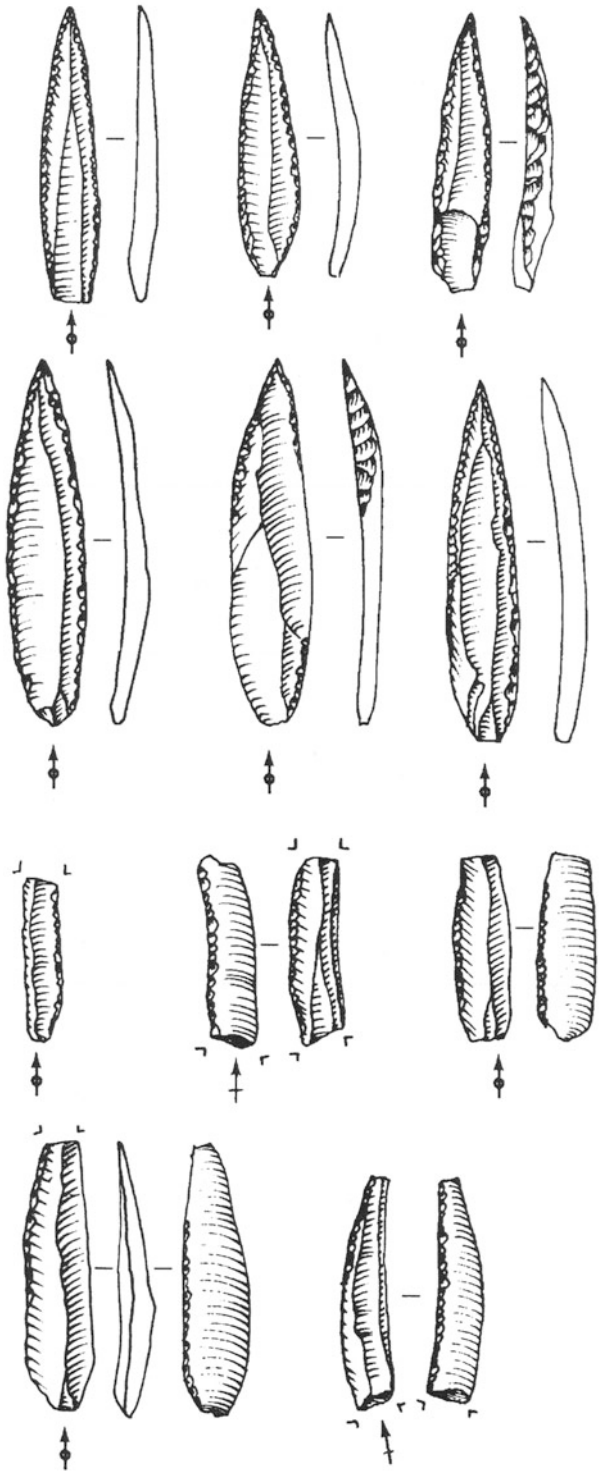

Central Asia: Paleolithic, Fig. 6 Yafteh cave, light armatures of the Iranian Aurignacian (Otte and Kozlowski 2009)

Cross-References

- ▶ Iran: Heritage Preservation and Tourism
- ▶ Iraq: Archaeological Heritage
- ▶ Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic
- ▶ Northern and Central Asia: Culture During the Lower Paleolithic Era

References

Braidwood, R.J. 1960. The agricultural revolution. *Scientific American* 203: 130–148.

Derevianko, A.P., ed. 2004. *Grot Obi-Rakhmat*. Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences: Novosibirsk.

Germonpré, M., M.V. Sablin, R.E. Stevens, R.E.M. Hedges, M. Hofreiter, M. Stiller, and V.R. Després. 2009. Fossil dogs and wolves from Palaeolithic sites in Belgium, the Ukraine and Russia: Osteometry, ancient DNA and stable isotopes. *Journal of Archaeological Science* 36: 473–490.

Otte, M. 2010. Préhistoire de la Chine. Actes Sud.

Otte, M., and J. Kozlowski. 2007. *L'Aurignacien du Zagros (ERAUL 118)*. Liège: Université de Liège.

Otte, M., and J.K.K. Kozlowski. 2009. Origines du Paléolithique supérieur en Asie occidentale. In M. Otte, F. Biglari, and J. Jaubert (ed.) *Le Paléolithique d'Iran,* BAR International series 1968, 57–72. Oxford: Archaeopress.

Otte, M., and J.K.K. Kozlowski. 2011. La transition du moustérien à l'Aurignacien au Zagros. In J.-M. Le Tensorer, R. Jagher, and M. Otte (ed.) *The Lower and Middle Palaeolithic in the Middle East and neighbouring regions* (ERAUL 126), 183–195. Liège: Université de Liège.

Otte, M., F. Biglari, S. Alipour, R. Naderi, and J. Hosseini. 2004. Earliest human occupations in Central Asia: An Iranian look. In *Arkheologiya I Paleoekologiya Evrazii*, ed. A. Derevianko and R. Nokrina, 279–282. Novosibirsk: Rossijskaya Akademiya Nauk, Sibirskoe Otdenie, Institut Arkheologii i Etnografii.

Otte, M., F. Biglari, and J. Jaubert. 2006. Iran Palaeolithic, Le Paléolithique d'Iran, Introduction. In *Le Paléolithique d'Iran, volume 28, Session C15. Actes du XV congre's mondial de l'UISPP, Lisbonne 4–9 septembre 2006,* BAR International series 1968. Oxford: Archaeopress.

Otte, M., F. Biglari, and J. Jaubert. (ed.) 2009. *Le Paléolithique d'Iran, volume 28, Session C15, Actes du XV congrès mondial de l'UISPP, Lisbonne 4–9 septembre 2006*, BAR International series 1968. Oxford: Archaeopress.

Ranov, V. 1965. *L'âge de la pierre au Tadjikistan*. Dushanbe: Academy of Sciences.

Ranov, V. 1972. Le peuplement préhistorique de la Haute-Asie. *L'Anthropologie* 76: 5–20.

Solecki, R. 1998. The Shanidar Cave Neanderthals: A reconstruction of their lifeways. Preliminary report. In *Man and the animal world*, 515–529. Budapest: Archaeolingua Alapítvány.

Further Reading

Baumler, M., and J. Speth. 1993. A Middle Paleolithic assemblage from Kunji Cave, Iran. In *The Paleolithic prehistory of the Zagros-Taurus*(University Museum Monograph 83 (5)), ed. D. Olszewski and H. Dibble, 1–71. Philadelphia: The University Museum University of Pennsylvania.

Davis, R.S. 1978. The Palaeolithic. In *The archaeology of Afghanistan*, ed. F.R. Allchin and N. Hammond. London: Academic Press.

Davis, R.S., and V.A. Ranov. 1999. Recent work on the Paleolithic of Central Asia. *Evolutionary Anthropology* 5: 186–193.

Derevianko, A.R., and T.I. Nochrina. 2004. *Archéologie et Paléontologie en Eurasie*. Novosibirsk: Institute of Archaeology and Ethnography. (in Russian).

Derevianko, A.P., V.T. Petrin, and Z.K. Taimagambetov. 1997. *Early Paleolithic assemblages in Travertine, southern Kazakhstan*. Novosibirsk: Institute of Archaeology and Ethnography.

Ferret, C. 2009. *Une civilisation du cheval. Les usages de l'équidé, de la steppe à la taïga*. Paris: Belin.

Jagher, R. 2011. Nadaouiyeh Aïn Askar, Acheulean variability in the Central Syrian Desert. In *The Lower and Middle Palaeolithic in the Middle East and neighbouring regions (ERAUL 126)*, ed. J.-M. Le Tensorer, R. Jagher, and M. Otte, 209–224. Liège: Université de Liège.

Le Tensorer, J.-M., R. Jagher, and M. Otte. 2011. *The Lower and Middle Palaeolithic in the Middle East and neighbouring regions (ERAUL 126)*. Liège: Université de Liège.

Lioubine, V., and E. Beliaeva. 2004. Données sur le Paléolithique ancien. In *Archéologie et Paléontologie en Eurasie*, ed. A.R. Derevianko and T.I. Nokrina. Institute of Archaeology and Ethnography: Novosibirsk.

Olszewski, D.I. 1993. The Zarzian occupation at Warwasi rockshelter, Iran. In *The Paleolithic prehistory of the Zagros-Taurus*. (University Museum Monograph 83-(5)), ed. D.I. Olszewski and H.L. Dibble, 207–236. Philadelphia: The University Museum University of Pennsylvania.

Olszewski, D.I., and H.L. Dibble, eds. 1993. *The Paleolithic prehistory of the Zagros-Taurus (University Museum Monograph 83(5))*. Philadelphia: The University Museum University of Pennsylvania.

Otte, M., F. Biglari, D. Flas, S. Shidrang, N. Zwyns, M. Mashkour, R. Naderi, A. Mohaseb, N. Hashemi, J. Darvish, and V. Radu. 2007. The Aurignacian in the Zagros region: New research at Yafteh Cave, Lorestan, Iran. *Antiquity* 81: 82–96.

Vinogradov, A. 2004. La question de Kara-Kamar. In *Archéologie et Paléontologie en Eurasie*, ed. A. Derevianko and T. Nokrina, 58–79. Novosibirsk: Institute of Archaeology and Ethnography.

Central Italy: Etrusco-Italic Sanctuaries

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Introduction

Sanctuaries had many functions in the societies of ancient Italy. As places of worship of one or more deities, they provided gathering places for individuals and groups and therefore attracted human endeavors such as trade and production of goods. While there is little evidence for how individuals expressed their own private religious beliefs, they definitely displayed their public practices of sacrifices, offerings, and other rituals.

Although Rome rose to become the politically most powerful city of ancient Italy and the Mediterranean, the ancient Roman historians were the first to acknowledge her debt to the neighboring peoples in Central Italy. As early as the Iron Age (ca. 1000–700 BCE), each community shared many features with its neighbors in terms of buildings (mostly huts), burials (mostly cremation), and production of pottery (impasto), but there were also distinct differences in their daily lives. Although we do not have direct evidence of the languages spoken in Central Italy before the development of writing, continuity of other traditions suggests that forms of Latin and related languages (Faliscan, Osco-Umbrian) as well as the non-Indo-European Etruscan language were in use. Evidence for religious practices in Central Italy varies greatly depending on the archaeological remains and on written sources, whether local inscriptions or general historical accounts.

Definition

In terms of defining sacred spaces and sanctuaries, the common denominator seems to be the importance of choice of location and, depending on historical circumstances, continuity of cult. Offerings of pottery and other objects occur in close connection with the natural setting of mountains, caves, rivers, or springs as well as within communities and at burial grounds (Edlund 1987). If buildings were erected at such locations during the Iron Age, they can be identified as sacred by their location and use, rather than by the architectural form, and it is not until the Orientalizing (700–600 BCE) and Archaic (600–475 BCE) periods that sacred buildings, including temples, can be documented. During the early Roman Republican (475–300 BCE) and mid- to late Roman Republican (300–31 BCE) periods, creation and expansion of sanctuaries were part of the political and historical changes caused by the expansion of Rome while at the same time providing continuity of cult in communities and in the countryside.

For the purposes of this discussion, the area included covers the territory of Rome and her immediate neighbors, the Etruscans to the north as far as the Arno; the Faliscans, Sabines, and Umbrians to the north and east; and the Latins and Samnites to the south (Fig. 1). As can be expected, our written sources for Rome overshadow those of the neighboring peoples, and if we were to believe the Roman historians, both political and cultural initiatives began in Rome and were imposed on their neighbors in a one-way direction.

In viewing the archaeological remains of sanctuaries throughout Central Italy, it will, however, be clear that the historical development is quite complex and that Rome was part of a broad cultural context of exchange and interdependence in many fields, including forms of religion and their expression in sanctuaries. A key issue is to identify the common factors in the creation of sanctuaries and to follow the development of forms that spread throughout the Mediterranean and also inspired much of later European architecture.

Although Central Italy represents only a small area of the peninsula and the Mediterranean as a whole, the study of its sanctuaries provides an example of balancing written and archaeological sources with the understanding that both have to be interpreted with caution. In particular, for the study of architectural form, we are dependent on the account of the Roman architect Vitruvius, whose important work *On Architecture* (Rowland and

Central Italy: Etrusco-Italic Sanctuaries, Fig. 1 Map of Etruria and Central Italy (Created by Beth Chichester and Ingrid Edlund-Berry)

Howe 1999) provides valuable information on Roman temples that, however, cannot automatically be applied to time periods other than his own, the time of Augustus. Likewise, archaeological remains of temples built in communities that came under Roman authority are often regarded as Roman *Capitolia*, created at the time when the Roman or Latin colonies were founded, but may in fact reflect a combination of cultural and political interests (Edlund-Berry 2017).

Sanctuaries and Temples

Within the broader topic of sanctuaries in Central Italy, textual and archaeological evidence provides information on location and relation to settlements, historical context, layout, architectural features of temples and other buildings, areas for offerings and sacrifices, and continuity of cults. While temples tend to stand out because of their size and decoration, they are part of the larger context of the sanctuary and its historical and religious importance (ThesCRA 2005).

Sanctuary Sites and Their Locations

The type of cult and the needs of its worshippers determined the location of sanctuaries. Cults for the living were linked to places of habitation, travel, or trade, whereas funerary cults were practiced at burial sites outside the boundaries of inhabited areas. As indicated by ancient authors such as Vitruvius, certain deities had specific requirements for the location of their sanctuaries, that is, for Jupiter, Juno, and Minerva as protectors of a city a high vantage point; Isis and Serapis in the marketplace; Apollo and Liber (Bacchus) next to the theater; Hercules by gymnasia, amphitheaters, or the circus; Venus by the harbor; and Vulcan (as well as Venus and Mars) outside the city (*De arch*. 1.7.1). By analyzing the location of sanctuaries, their relation to nature and human habitations, and the evidence for cults and rituals, patterns emerge as to what determined the original choice of spaces and later modifications (Colonna 1985; Edlund 1987).

Access

Depending on the natural features of the landscape, a sanctuary would most likely be visible from afar and aligned with other sacred places along the roads and paths (e.g., the site of Brolio in Val di Chiana and the temple at Castiglion Fiorentino). The orientation of sanctuaries and their point of access were most likely determined by the cults practiced and natural features such as the sea (e.g., temples at Pyrgi). Since temples and altars seem to have been oriented in the directions prescribed according to the divisions of the sky, often independently of each other (Prayon 1997), visitors and worshippers could not necessarily expect to approach these structures by the most convenient or easiest route.

Boundaries and Precincts

The boundaries of a sanctuary could be determined by natural features (streams, mountain tops, woods) or by man-made features such as roads or boundary stones (Edlund-Berry 2006). Within a sanctuary precinct (known as *sacellum* or *locus consaeptus*), smaller units, usually centered around an altar, provided further distinctions of space and the transitions from one area to the next (Colonna 2006; Stek 2009). Because of find circumstances, the full extent of a sanctuary precinct may be difficult to determine (e.g., Orvieto, Campo della Fiera [Stopponi 2011, 2014]).

Sanctuaries in Nature

The connection between sanctuary sites and their geographical setting in nature is best documented by observation of context. Visibility, access, connection with paths, and roads for travel and transhumance are all relevant factors, in addition to the perceived notion of identifying deities with features of nature.

Finds of pottery, bronze, or stone and habitation of caves from the Bronze Age provide evidence of continuity into the Iron Age. Although it may be difficult to identify ritual activities, continuity of use suggests that certain places have been perceived as sacred throughout the early history of ancient Italy. Many of these remained open-air places for sacrifices and offerings, while others were incorporated into settlements or created to satisfy changing demands. As clearly defined spaces, *templa*, the function could thus dominate over the original location in nature.

Urban Sanctuaries

According to Servius, the late Roman commentator to Vergil's *Aeneid*, an Etruscan city should include three temples as well as three gates and streets (*Ad*

Aen. 1.422), and, as can be expected, the location of urban sanctuaries took into account both the nature of the settlement (such as hills and access to water) and the demands of the cults and their practitioners. It is therefore not surprising to find Rome's most important temple to Jupiter, Juno, and Minerva located on the Capitoline Hill, visible from the public area, the Roman Forum below, from the neighboring hills, and from the river Tiber. Depending on the layout of the settlement, temples occur on hills, within the areas of habitation or separated from them (Rome, Marzabotto, Veii, Orvieto [Fig. 2], Civita Castellana, Tarquinia, Fiesole) or as part of the public spaces such as fora (Rome, Pompeii, Roman and Latin colonies).

While sanctuaries may have begun as open-air sanctuaries within a future urban space, urban sanctuaries proper are likely to include temples and altars as their key features. Depending on their origin and function, the access to the temples was tied to roads, but the orientation was governed by the cults practiced.

Extramural Sanctuaries

Many sanctuaries are placed immediately inside or outside city boundaries, including city walls. As such they protected the city inside while at the same time marking the transition from inside to outside and identifying the type of boundary, whether or not marked visually.

Depending on the landscape, extramural sanctuaries could be placed at the foot of a hill (Veii, Portonaccio temple) or at city gates (Vulci), whereas in cities built on spread-out hills such as Rome, there existed two if not three kinds of boundaries: first, the confines of each hill; second, the outline of the political-religious boundary known as *pomerium*; and third, the man-made city walls (Servian and Aurelian walls) that determined the territory of the city as a whole (Richardson 1992).

Extra-Urban Sanctuaries

Depending on the size and political structure of towns in Central Italy, their territory could be protected by sanctuaries serving as outposts but also as points of contact with neighboring communities. Inland cities such as Caere or Tarquinia were connected with the Tyrrhenian Sea, thanks to their ports at Pyrgi and Gravisca, and sanctuaries there provided important links for trade as well as cults.

Central Italy: Etrusco-Italic Sanctuaries, Fig. 2 Orvieto, Belvedere temple (Photo: Ingrid Edlund-Berry)

Rural Sanctuaries

Sanctuaries in the countryside reflect both cults of rural residents and of travelers between communities. Examples include votive deposits along roads, in the fields, and at river crossings (Colonna 1985; Edlund 1987). As indicated by ongoing surveys and excavations, our knowledge of the countryside is expanding greatly, and as contexts are becoming better known, the term rural sanctuaries should be redefined to apply to those that are specifically related to the farms and the fields, previously perhaps thought to have been isolated. It is also possible to link some seemingly rural sanctuaries to a major central sanctuary (e.g., Pietrabbondante [Stek 2009]) for which they served as boundary sanctuaries.

Federal or "Political" Sanctuaries

According to Roman historians such as Livy and other sources, the Etruscans held meetings for a coalition of their major 12 (or 15) cities at a sanctuary of Voltumna (Edlund 1987). Neither the exact location nor the appearance of this sanctuary is defined in the texts, but the area of Orvieto has been suggested as a likely spot (Fig. 3), and recent excavations at a site just to the south of the city, known as Campo della Fiera, may well meet the criteria for this important gathering point (Stopponi 2011). Features in favor of the identification include the large size of the sanctuary, the number of altars, and the evidence of offerings, as well as the long tradition that this site was used for gatherings (hence the name Fiera or "market"). Remains of a temple have been uncovered, but to date there has been no definite identification of the deity honored there.

Throughout Italy, sanctuaries have been identified in the written sources as political centers under divine protection, ranging from urban temples (e.g., temple of Diana on the Aventine in Rome) to mountain sanctuaries (*Mons Albanus*, south of Rome; temple of Diana Tifatina at Capua), groves, and markets (Lucus Feroniae), but without historical texts or inscriptions, it is often difficult to identify such sites based solely on the archaeological evidence (Edlund 1987; Stek 2009).

Viewed from the point of view of the architectural form, monumental buildings consisting of rooms on three or more sides of an open courtyard such as those at Poggio Civitate (Murlo), Montetosto (near Caere), Acquarossa (near Viterbo), and Satricum illustrate spaces suited for residence as well as for gatherings of large numbers of people (Edlund 1987). Although lacking obvious evidence of sacred rituals (temple, altar), such

Central Italy: Etrusco-Italic Sanctuaries, Fig. 3 Orvieto, view (Photo: Ingrid Edlund-Berry)

structures may well have had many functions, including gatherings for a political and religious purpose under divine protection.

Historical Background

The historical context of sanctuaries is tied to the communities to which they belonged, and, understandably, the best textual evidence comes from Rome. Here, in addition to the actual remains of temples, the records of temple foundations and dedications allow us to follow the long history of early cult places (e.g., the area of Vesta) to the first temples (S. Omobono) and the most monumental temple ever built in Central Italy, the Capitoline Temple, which stood as the symbol of the city's divine protection well into the imperial period. Other temples were erected as the result of Roman military victories (temple of Castor in the Roman Forum, Republican temples in the Forum Holitorium and Campus Martius) or in recognition of new deities introduced to Rome (temple of Apollo Medicus, temple of Asclepius) (Richardson 1992). Construction of temples is sometimes tied to the important patronage of individuals or families (e.g., the Tarquins for the Capitoline Temple in the sixth century BCE), whereas inscriptions record other activities in sanctuaries, including vows and offerings.

Outside Rome, the creation of new sanctuaries and temples is often linked to the political and historical process in which Rome expanded within the Italian Peninsula and ultimately throughout the Mediterranean. As part of this process, new cities were laid out, with public spaces, including temples honoring the chief Roman deities, Jupiter, Juno, and Minerva. In the Roman provinces outside Italy, these temples, commonly referred to as Capitolia, usually located in connection with a forum, are easily recognizable by their tall podium, front porch with columns, and three rooms in the back for the cult statues (ThesCRA 2005). Within Italy, new temples were often built in connection with the establishment of Roman or Latin colonies, but it is not given that they were intended to reflect a connection with the Capitoline Temple in Rome, in spite of having the characteristic three-cella plan. At Cosa (Ansedonia), founded as a Latin colony in 273 BCE, a major temple was built at least 100 years later, and while usually considered modeled on the Capitoline Temple in Rome, its function has recently been doubted (Bispham 2006). Similarly, temples built in the Latin colonies of Sora (Liris valley) (Fig. 4), founded in 303 BCE, and Isernia, founded in 263 BCE, are often categorized as Capitolia and may illustrate a close dependence on Rome but may also be part of a broader Etrusco-Italic tradition (Edlund-Berry 2008). It can therefore be misleading to use the term Capitolium for any temple built outside Rome, even if inspired by Roman temple planning and cult practices, and the chronology of such temples cannot be tied directly to the foundation dates of colonies. Regardless of the historical umbrella under which a temple was created, the term Capitolium should be used with caution and the temple building be evaluated within its geographic and cultural context (Bispham 2006).

Central Italy: Etrusco-Italic Sanctuaries, Fig. 4 Sora, church and temple (Photo: Ingrid Edlund-Berry)

C

Key Issues/Current Debates

Layout of Sanctuaries

Sanctuaries represent sacred spaces that may include a number of buildings and other monuments as well as spaces for performing rituals.

Architectural Features of Temples and Other Buildings

The buildings associated with sanctuaries include temples, defined as structures holding the cult statue, and small shrines (*sacellum*, *naiskos*) used for a variety of cult activities. In addition, permanent or temporary structures may have been needed for the priests and assemblies of worshippers to provide lodging, dining areas, and other facilities. Pools or basins provided means of ritual cleansing if required as part of the activities at the sanctuary (Veii, Portonaccio). Natural slopes or man-made theaters (Pietrabbondante [Fig. 5]) could be used for gatherings or ritual activities. Production of votive offerings of clay or metal further required workshops and kilns, in addition to raw materials and fuel.

Temples

In Latin terminology, the word *templum* indicates a defined space used for ritual purposes such as the observation of signs sent by the deities. As a building, a temple was considered the home of the deity, where a cult statue or other objects would occupy the main room (*cella*). If the temple was dedicated to more than one deity, then two or more cult rooms were included in the building (ThesCRA 2005).

Location

The location of a temple was determined by the other features of the sanctuary, and it is likely that the boundaries of the sanctuary were defined before a temple was constructed. Although the sanctuary precinct cannot be identified for all

Central Italy: Etrusco-Italic Sanctuaries, Fig. 5 Pietrabbondante, temple and theater (Photo: Ingrid Edlund-Berry)

sanctuaries, the location and orientation of the temple seem to be independent of other structures, with the possible exception of a main altar.

Orientation

According to Vitruvius (*De arch*. 4.5), the orientation of temples was based on several factors, related to both the cults and the surrounding areas. Ideally, a temple should face west so that the worshippers will view the cult statue within the temple with the rising sun in the east as a backdrop. Other considerations were to place the temples in such a way that the city walls were clearly visible, or to line them up near public roads to facilitate access.

Other criteria for the orientation are based on the division of the sky and the earth as documented on the Etruscan bronze model of a sheep's liver, the so-called Piacenza liver, and the text by the late Roman author Martianus Capella (Prayon 1997). Depending on the deity to whom the temple was dedicated, during the Archaic period, the favored orientation for the Etrusco-Italic temple was toward the south and unrelated to the layout of the urban context. After the Archaic period, new and restructured temples were more likely to be coordinated with the city plan and surrounding structures.

Plan and Proportions of Temples

In addition to describing the ideal location for temples (*De arch*. 1.7.1), Vitruvius classifies temples by their plan, based on the positioning of columns (3.2). Of the seven types mentioned ("*in antis*," prostyle, amphiprostyle, peripteral, pseudodipteral, dipteral, and hypaethral), Vitruvius is careful to include examples from Rome when these could be found, that is, for the "*in antis*" plan, the temple of Fortune; for the prostyle, the temple of Jupiter and Faunus on the Tiber Island; for the peripteral, the temple of Jupiter Stator and the temple of Honor and Virtus; and for the dipteral, the temple of Quirinus.

Likewise, Vitruvius discusses the number of columns and their relation to each other and the temple proper (*De arch*. 3.3). The categories (*species*) include pycnostyle, systyle, diastyle, araeostyle, and eustyle, of which the last is considered ideal. The examples included for Rome are for the pycnostyle the temple of Deified Julius and the temple of Venus in the Forum of Caesar, for the systyle the temple of Equestrian Fortune, for the diastyle the temple of Apollo and Diana, and for the araeostyle the temple of Ceres near the Circus Maximus and the Capitoline Temple.

Proportions

While the preserved temples represent different sets of proportions, the theoretical model is presented by Vitruvius who defined different categories of temple architecture, based on what he perceived as perfect numbers and proportions (*De arch*. 3.1–2). This principle is parallel to his definition of the ideal proportions of the human body, in which the foot is one component. Measured in numbers, the Roman foot equals about 29.5 cm., whereas the Oscan foot is slightly shorter, c. 27.5 cm. Of these, the Oscan foot is used, for example, at the Orientalizing and Archaic buildings at Poggio Civitate (Murlo) (Nielsen and Tuck 2001: 39), whereas the Roman foot is recorded at the sanctuary at Campo della Fiera (Orvieto) (Stopponi 2011: 26–7, n. 31).

The Tuscan Temple Design

The terminology for much of Greek and Roman architecture is based on Vitruvius, whose descriptions of the three main types (*genera*), Doric, Ionic, and Corinthian, have influenced architectural theory as well as practice since antiquity. Following his analysis of these types, he presents the Tuscan design, according to which the plan centered on certain proportions (six parts in length, five parts in width), arranged with a front porch with columns and a rear part with three rooms or one room with wings on the sides (Fig. 6) (*De arch*. 4.7.1–5). The columns and superstructure were also to be planned with a fixed ratio of height and diameter in relation to the base, the shaft, and the capital. Vitruvius further prescribes that the types can be mixed so that Tuscan and Corinthian or Ionic features are combined (*De arch*. 4.8.5).

In applying Vitruvius' analysis of the "Tuscan" temple design, it is important to realize that his

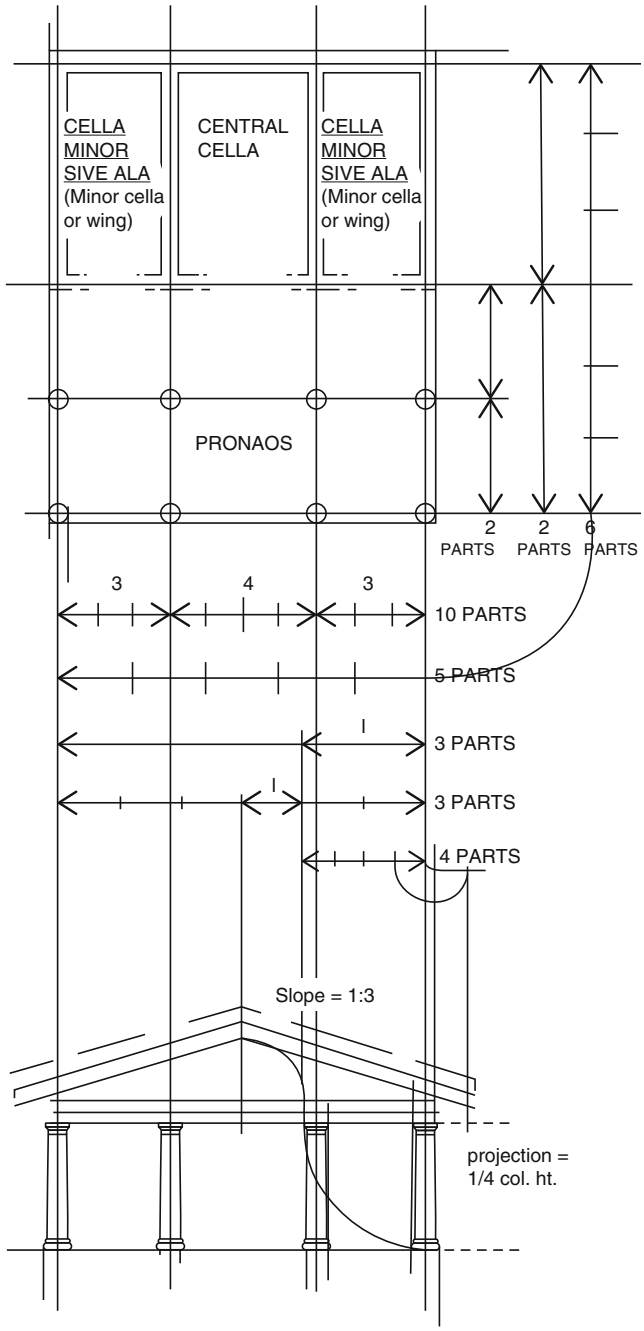

Central Italy: Etrusco-Italic Sanctuaries, Fig. 6 The Tuscan temple (with permission from Rowland and Howe 1999)

terminology is different from other references to the Italy of his day where he uses the common Latin vocabulary for Etruria, Etruscan, or Tuscan (*Etruria*, *Etruscus*, *Tuscus*). Instead, the temple architecture is referred to as "*tuscanicus*," a word that implies something Tuscan-like or Tuscan-inspired rather than a description of the early Etruscan architectural styles of the Archaic period (Edlund-Berry 1997).

Archaeological Evidence

Vitruvius' description is often quoted as the norm for Etrusco-Italic temples, but the archaeological evidence provides a much more varied picture.

While examples of his "Tuscan temple" with a squarish plan, three cellae, and a colonnaded front porch indeed exist, at other times evidence is lacking for the features he prescribes, including the meaning of the Latin word *ala*, usually translated as "wing" (Lake 1935).

The classic example of the Tuscan temple is the Capitoline Temple in Rome, constructed during the reign of the Etruscan kings of the Tarquin dynasty but inaugurated in the first year of the Roman Republic, 509 BCE, by M. Horatius. In spite of the incomplete remains, the foundation of the temple, elements of the superstructure, and coin images allow for a reconstruction of the temple with three cellae and a colonnaded front porch. The dimensions of the temple as reconstructed are, however, so massive (54 × 74 m.) that it dwarfs all other temples from Central Italy and instead shows links with Greek monumental temples (Davies 2006).

Although Vitruvius' description of the "Tuscan temple" is applicable to a number of temples in Central Italy, it is prudent to separate the political function of the Capitoline Temple in Rome from any temple with a similar plan. Rather, by following the development of early cult buildings in the shape of huts and simple one-room roofed structures (Satricum, Tarquinia, Veii, Pyrgi), we see that temple buildings were created to serve the local tastes, whether in the form of peripteral temples (Pyrgi, temple B; Vulci, Tempio grande; Marzabotto; Satricum) or temples with one or more cellae and a colonnaded porch (Rome, S. Omobono; Veii, Portonaccio; Pyrgi, temple A; Rome, temple of Castor; Ardea; Orvieto, Belvedere temple; Fiesole).

Archaeological Remains of Temples

Because of the perishable materials used in constructing Etrusco-Italic temples (and other buildings), every element of the preserved remains can be used to evaluate the plan and function of the building.

The foundation of the temples usually consists of local fieldstones or of cut blocks of volcanic or other rock. Vitruvius describes the necessary steps for securing a proper foundation course, above which the podium provides the visible support for the temple building proper (*De arch*. 3.4). The podium varies in height and decoration, with key elements consisting, from the bottom up, of a plinth (*quadra*), base molding (*spira*), dado (*truncus*), cornice (*corona*), and top molding (? cavetto; *lysis*) (Rowland and Howe 1999: Fig. 45).

As can be expected, the preserved temples display a variety of types of foundations, with or without a podium defined with moldings. Although in all likelihood the Roman temples Vitruvius would have seen in his lifetime had podia with top and base moldings, each city or area seems to have followed its own traditions. The earliest preserved examples of podium moldings (Rome, S. Omobono, Pyrgi, Satricum) seem to have a small Etruscan round marking the top row of the podium, whereas later podia include two rows of Etruscan rounds of equal size, or with one large and small round, sometimes separated by vertical plain blocks (Rome, S. Omobono, Ardea). At other times, there is no evidence of a molding, which may or may not have existed (Rome, Capitoline Temple). The Etruscan round continues to be in use throughout the time of the Roman Republic and is found at sites such as Pietrabbondante (temple A). It was also used in temples built in towns where Roman or Latin colonies were founded (Sora, Isernia, Cosa) or in areas under Roman dominance (Villa S. Silvestro near Cascia) and may indicate a sense of continuity of architectural traditions even as Rome herself began to explore the cyma reversa molding which was adapted from Greek forms mixed with variations of the curved Etruscan round (Rome, Largo Argentina, temple C) (Edlund-Berry 2008). As the cyma reversa molding becomes dominant, most temples in Central Italy displayed it as a top and base molding, at times in combination with or replaced by the cyma recta molding toward the end of the Roman Republic.

Walls of early temples were usually built of clay, reinforced with wood and occasionally of tuff blocks. Postholes may indicate the place for wooden columns that supported the walls and the roof.

While remains of foundation walls and other features on the ground provide evidence for the

reconstruction of temples and other sacred buildings, models of buildings, usually in the form of urns for cremation burials, suggest different types of roofs. In the models that resemble Iron Age rounded or oval huts, the roof is shown as thatched with wooden crossing beams for stability. Later rectangular models indicate tiled roofs and sometimes ornamental akroteria along the ridgepole or at the ends.

In addition to such models, Vitruvius' statement about araeostyle temple roofs suggests that they made the building look top-heavy and low (*De arch*. 3.3.5). It is, however, roof tiles that provide the best source for estimating the superstructure and for reconstructing temples for which even the foundations are no longer preserved. The basic roofing system consists of flat rectangular pan tiles, curved cover tiles, and large curved ridgepole tiles. Analysis of the clay composition and firing can provide clues for the production sources, and the local differences in size of the elements suggest chronological sequences of roofing systems, including new construction and replacements (Winter 2009). Estimates of the total weight of a roof also facilitate reconstructions of walls and supporting columns, with or without preserved foundation courses (Turfa and Steinmeyer 1996).

In addition to the actual roof covering, terracotta plaques provide information about the roofing elements, including horizontal beams and rafters, and indicate the methods used for drainage (Fig. 7). Most of these types of architectural revetments are mold-made, and a study of the clay components, mold sequences, and size of the individual plaques (e.g., the use of the Oscan foot) provides evidence for the number of roofs, estimated size of the buildings to which they pertained, and technical details such as the slope of the pediment or size of the eaves. These terracotta revetments were often decorated with painted or relief designs or mold-made features such as human or animal heads, which further assist in documenting workshops or trade exchange between different towns and communities in Central Italy (Winter 2009).

In addition to the terracotta revetments, many temple roofs were decorated with statues of deities or human figures, animals, or floral elements, placed along the ridgepole or at the end of the roof as akroteria. As with the scenes depicted on the revetments, the motifs of the akroteria illustrate myths that usually are not related to the deity or deities to which the temple was dedicated. Although terracotta decoration, including akroteria, is common on sacred buildings such as temples, it occurs also on buildings used for other purposes, whether public or private (Winter 2009).

Places of Gathering and Residence

All sanctuaries, regardless of function, relied on a central location and good access, but those that served many different communities would by necessity include spaces for gathering of people as well as quarters for priests and other officials. A particularly good example is the important Samnite sanctuary at Pietrabbondante that houses not only temples and a theater complex but also a structure identified as a *domus publica* for the priests, similar to that in Rome and Pompeii (La Regina 2010).

Altars

Altars for sacrifice and prayers are present at most sanctuaries and occur in many different forms. The primary example with altars ranging from irregular mounds of small stones to squares or rectangles built of tuff blocks comes from the important sanctuary at Pyrgi (Colonna 2006). In addition to the different forms of these altars, the variety of votive offerings, many of which include imported objects, and remains of sacrifices provide evidence of the cultic activity at the sanctuary. Other types of altars consist of freestanding blocks, often with double round Etruscan moldings, found within the Etruscan and Latial territories (Orvieto, Fiesole, Lavinium, Rome, Ardea, Pieve Socana [Fig. 8]) throughout the Archaic and Republican Roman periods (ThesCRA 2005).

Areas for Sacrifices, Offerings, and Other Ritual Activities

Offerings to the dead were made at the gravesites, but there is also evidence of small shrines (Tuscania, Ara del Tufo; Blera, Grotta Porcina) or monumental steps leading up to a platform

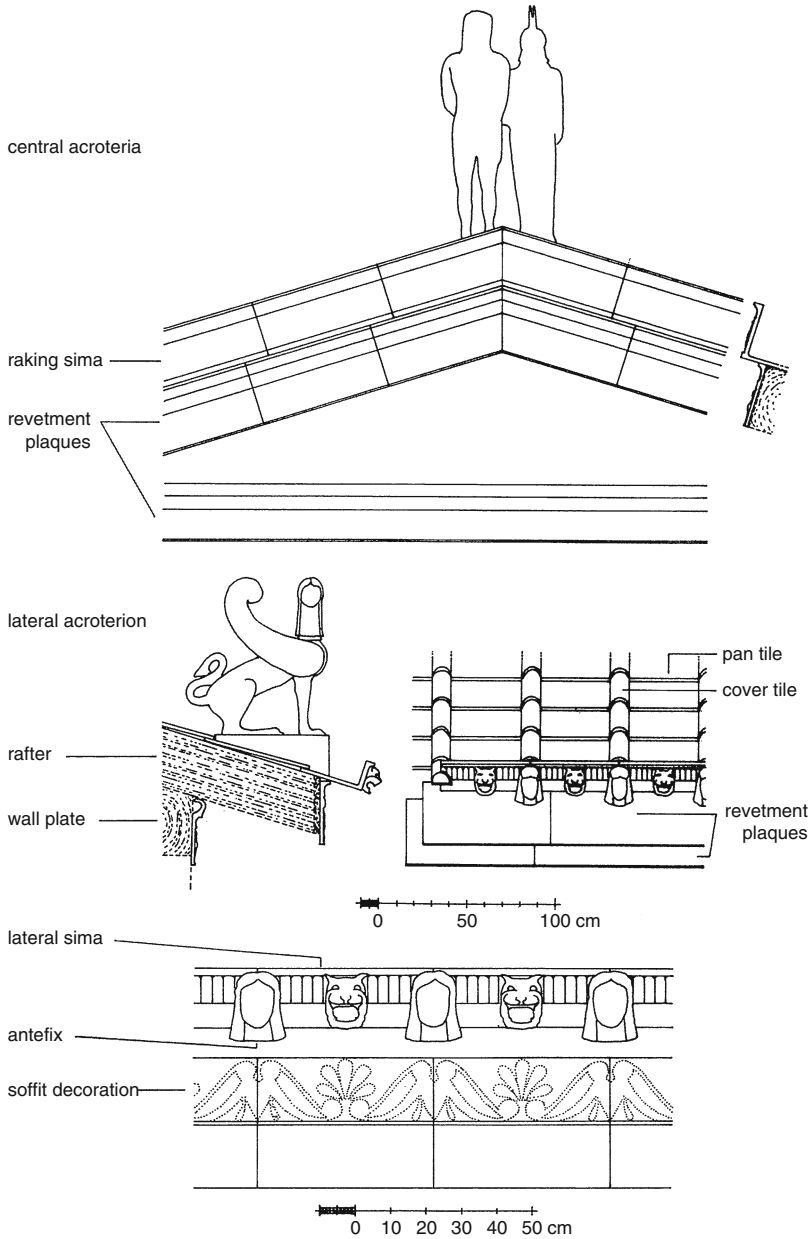

Central Italy: Etrusco-Italic Sanctuaries, Fig. 7 Architectural revetments (with permission from Winter 2009)

adjoining a tumulus grave (Cortona, Il Sodo) (Colonna 2006). Funerary cults may have required sources of water (Orvieto, Cannicella) or altars for sacrifices. On occasion burials are found in non-funerary contexts, perhaps suggesting human sacrifice and ritual burials (Tarquinia, Civita [Bonghi Jovino 2010]).

In addition to burnt animal sacrifices, common forms of offerings include miniature vessels probably containing food and liquids, bronze or terracotta statuettes of deities and worshippers, pottery, jewelry, coins, and other objects. While many of the objects were locally made or traded, others were imported from afar. Offerings can be found in dug pits ("votive deposits") or distributed over large areas of the sanctuary.

Rituals at sanctuaries required defined spaces, including areas for sacrifice, usually in connection

Central Italy: Etrusco-Italic Sanctuaries, Fig. 8 Pieve Socana, altar (Photo: Ingrid Edlund-Berry)

with altars, and inspection of the sacrificed animals (hepatoscopy). Spaces were also set aside, for observation of signs in the sky (including haruspicy and brontoscopy) and for prayers and other rituals presented by priests, perhaps in conjunction with the altar in front of a temple and the steps leading up to the cult statue inside the temple.

In addition to sacrificial meals, evidence of dining rooms with couches and pottery for eating and drinking would suggest that meals were taken in the sanctuary by participants and spectators. Depending on the distribution of local sanctuaries within an area, visitors to a sanctuary would also need lodging and places to conduct business.

Continuity

What remains today of ancient sanctuaries, including temples, seems to be the result of chance as well as intentional preservation. Some sites that were completely covered over by earth or sand (Ardea, Fosso dell'Incastro) have been rediscovered, whereas others have been visible continuously because of temple foundations built into churches and other buildings (Rome, Sora). At times the historical evidence confirms conversion of sanctuary sites to other uses (Pietrabbondante after the Social War [La Regina 2009]), whereas accounts of disruption such as the "calling out" (*evocatio*) of Juno from Veii after the Roman conquest of 396 BCE may be exaggerated (Stek 2009).

International Perspectives

The continued study of Etrusco-Italic sanctuaries has added to our appreciation of the form and function of sacred spaces. Although monumental temple structures were important throughout the ancient Mediterranean, different traditions, including the use of perishable building materials, have at times skewed our understanding of ancient cultures and their religious expressions. It is therefore important to incorporate the temples and sanctuaries of Central Italy into a broader geographical and chronological framework as evidence for human activity documented primarily through archaeological evidence.

Future Directions

The most concrete result of a thorough study of Etrusco-Italic sanctuaries will be to reevaluate the history and development of architectural traditions in Rome and surrounding areas. Whether we define "Roman" as a chronological or cultural term, buildings, including temples, were part of life in the city of Rome proper, and Roman architecture is therefore as ancient as the city herself, with a modest beginning in the Iron Age. It is, however, important to try to separate the political advancement of Rome from her assumed role as innovator of art and culture and to explore the interaction of all the peoples of Central Italy that gradually resulted in a uniform Italo-Roman culture, spearheaded by Rome.

Cross-References

- ▶ Architecture, Roman
- ▶ Iconography, Etruscan
- ▶ Religion, Italo-Roman, Archaeology of

References

Bispham, E. 2006. *Coloniam deducere*: How Roman was Roman colonization during the Middle Republic? In *Greek and Roman colonization. Origins, ideologies and interactions*, ed. G. Bradley and J.-P. Wilson, 73–160. Swansea: The Classical Press of Wales.

Bonghi Jovino, M. 2010. The Tarquinia project: A summary of 25 years of excavation. *American Journal of Archaeology* 114: 161–180.

Colonna, G., ed. 1985. *Santuari d'Etruria*. Milan: Electa.

Colonna, G. 2006. Sacred architecture and the religion of the Etruscans. In *The religion of the Etruscans*, ed. N.-T. de Grummond and E. Simon, 132–168. Austin: The University of Texas Press.

Davies, P.J.E. 2006. Exploring the international arena: The Tarquins' aspirations for the Temple of Jupiter Optimus Maximus. In *Proceedings of the XVIth international congress of classical archaeology. Boston August 23–26, 2003. Common ground: Archeology, art, science, and humanities*, ed. C.C. Mattusch, A.A. Donohue, and A. Brauer, 186–189. Oxford: Oxbow Books.

Edlund, I.E.M. 1987. *The gods and the place: Location and function of sanctuaries in the countryside of Etruria and Magna Graecia (700–400 B.C.)*. Stockholm: Paul Åströms förlag.

Edlund-Berry, I.E.M. 1997. "Etruscheria" in Vitruvius and Strabo. In *Ultra Terminum Vagari. Scritti in onore di Carl Nylander*, ed. B. Magnusson et al., 77–79. Rome: Quasar.

Edlund-Berry, I.E.M. 2006. Ritual space and boundaries in Etruscan religion. In *The religion of the Etruscans*, ed. N.T. de Grummond and E. Simon, 116–131. Austin: The University of Texas Press.

Edlund-Berry, I.E.M. 2008. The language of Etrusco-Italic architecture: New perspectives on Tuscan temples. *American Journal of Archaeology* 112: 441–447.

Edlund-Berry, I.E.M. 2017. Greek, Western Greek, Etruscan, and Roman architectural mouldings: A question of cultural and regional identity. In *"Kithon Lydos" Studi di storia e archeologia con Giovanna Greco*, ed. L. Cicala and B. Ferrara, 759–767. Naples: Naus Editoria.

La Regina, A. 2009. Pietrabbondante 1959–2009. Mezzo secolo di ricerche archeologiche. Available at: http://www.inasa-roma.it/pdf/LaReginaPietrabbondante19592009.pdf. Accessed 1 Dec 2011.

La Regina, A. 2010. La *Domus Publica* di Pietrabbondante. *ArcheoMolise* 2 (4): 32–43. Available at: http://bibliotheek.eldoc.ub.rug.nl/FILES/root/UB/2010/ArcheoMolise042010/2010-04-ArcheoMolise.pdf. Accessed 8 Dec 2011.

Lake, A.K. 1935. The archaeological evidence for the "Tuscan Temple". *Memoirs of the American Academy in Rome* 12: 89–149.

Nielsen, E.O., and A.S. Tuck. 2001. An orientalizing period complex at Poggio Civitate (Murlo): A preliminary view. *Etruscan Studies* 8: 35–63.

Prayon, F. 1997. Sur l'orientation des édifices cultuels. In *Les Étrusques. Les plus religieux des hommes*, ed. F. Gaultier and D. Briquel, 357–371. Paris: La Documentation Française.

Richardson, L., Jr. 1992. *A new topographical dictionary of ancient Rome*. Baltimore/London: The Johns Hopkins University Press.

Rowland, I.D., and T.N. Howe. 1999. *Vitruvius. Ten books on architecture*. Cambridge: Cambridge University Press.

Stek, T. 2009. *Cult places and cultural change in republican Italy*. Amsterdam: Amsterdam University Press.

Stopponi, S. 2011. Campo della Fiera at Orvieto: New discoveries. In *The archaeology of sanctuaries and ritual in Etruria*, ed. N.T. de Grummond and I. Edlund-Berry, 16–44. Portsmouth: Journal of Roman Archaeology.

Stopponi, S. 2014. Un santuario e i suoi artisti. In *Artisti, committenti e fruitori in Etruria tra VIII e V secolo a.C. Atti del XXI Convegno Internazionale di Studi sulla Storia e l'Archeologia dell'Etruria*, ed. G.M. della Fina, 75–104. Quasar: Orvieto.

ThesCRA. 2005. *Thesaurus Cultus et Rituum Antiquorum (ThesCRA)*. Vol. IV. Los Angeles: J. Paul Getty Museum.

Turfa, J.M., and A. Steinmeyer. 1996. The comparative structure of Greek and Etruscan monumental buildings. *Papers of the British School at Rome* 64: 1–39.

Winter, N.A. 2009. *Symbols of wealth and power. Architectural terracotta decoration in Etruria & Central Italy, 640–510 B.C.* Ann Arbor: The American Academy in Rome and the University of Michigan Press.

Central Italy: Pre-Roman and Archaic Ceramics

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Introduction

The study of pre-Roman ceramics covers the field that deals with ceramics produced and used in the central part of Italy (Etruria, Latium, Campania)

between the eleventh and the late fifth/early fourth century BCE. The area is considered to have a more or less similar material culture during this time span, and pottery research is usually carried out within shared thematic frameworks. The field is firmly grounded in typological analysis of grave goods, as (especially Etruscan) funerary archaeology has played an important role in the study of pre-Roman ceramics. In the past decades, interest has risen significantly in pottery coming from settlement excavations, and typological research of necropoleis is now complemented with a variety of sherd-based approaches such as technological analysis and statistics. As in the case of typological studies, these are often presented as part of a one-site study. General overviews or syntheses on pre-Roman pottery are therefore mostly found in original research publications, in exhibition catalogues, or in conference volumes that have become iconic over time.

The period of pre-Roman ceramics can be roughly subdivided into the Iron Age (eleventh to late eighth century BCE), the Orientalizing period (late eighth century BCE to late seventh/early sixth century BCE), the Archaic period (late seventh/early sixth century BCE to late sixth century BCE), and the Late Archaic period (late sixth/early fifth century BCE). The manufacturing of pottery in the Iron Age is done in households, but this slowly evolves into a workshop production from the Orientalizing period onwards, when the lifestyles of emerging local elites go hand in hand with craft specialization and the use of new pottery technologies. Mass production and distribution of both kitchen/storage wares and table wares only starts in the later Orientalizing and Archaic periods within the context of the emergence of urban environments in Central Italy.

Definition

Pre-Roman ceramics concern kitchen/storage wares such as impasto and coarse ware and table wares such as fine impasto, bucchero, and the painted wares (Italo-Geometric and Etrusco-Corinthian). Other functional categories of fired clay include small architectural ceramics such as building blocks, roof tiles, and architectural terracottas; weaving tools such as spools, spindle whorls, and loom weights; figurative objects such as small clay figurines; cooking stands and stoves; and pottery stands. Most ceramic categories are not decorated and contain only a slipped, smoothened, or burnished surface. The table wares, however, are known for their decorations which can be painted, incised, impressed, or attached.

Historical Background

From the eleventh century BCE onwards, small hut villages slowly developed into proto-urban centers in Etruria, followed shortly by Latium and Campania. The proto-urban centers would become the monumental city-states of the seventh and sixth centuries BCE (Bietti Sestieri 1992). These developments occurred in tandem with a change from egalitarian communities to hierarchical societies. An "aristocratic ideology" emerges from the ninth/eighth century BCE onwards. Elites practice this ideology through the use and display of luxury items imported from the Near East and of new lifestyles including hero cults, gift exchange, and a Greek-inspired wine drinking ritual, the symposion (Bartoloni 2003; also Riva 2010). Women might have played some role in these activities as well: pottery that can be associated with the drinking and banqueting rituals as well as remains of wooden chariots have been found in burials of both sexes (Rathje 2000; Bartoloni 2003).

Whereas the aristocratic ideology is mainly expressed through funerary rituals in the Iron Age and Orientalizing period, there is a shift in the manner of expression from the later Orientalizing period onwards. The "heroic" cremations and "princely" burial mounds and chamber tombs with their large sets of grave goods give way to the embellishment of monumental sanctuaries and their rich votive deposits and to the construction of large private houses with stone foundations and tile roofs (Colonna 1988). This shift in expression is associated with a consolidation of power by elites but at the same time seems

to be reinforced by an emerging middle class that promotes the mass production of formerly high value or elitist goods (Colonna 1979; Bartoloni 2003).

The mass production of goods is the result of a gradual craft specialization. In the later Iron Age and the Orientalizing period, local elites start controlling production and distribution of certain goods, often in so-called temple economies, and favor a specialized (mass) production of votive and funerary goods. The arrival of Greek and Phoenician traders in western Mediterranean waters from the ninth/eighth century onwards played an important role in this intensification of production. Greek traders, or even migrating Greek potters, can be held partly responsible for the introduction of new ceramic technologies such as the use of depurated clays, the potter's wheel, and a more efficient and controllable firing technique. Although the importation of Greek pottery (and of overseas trade in general) diminishes in the later Orientalizing period, the new technologies are now applied on a large scale in local pottery production. This forms the basis for the emergence of specialized workshops in the Archaic and Late Archaic periods (Nijboer 1998).

Key Issues

Impasto

Impasto is the most common pottery ware throughout Italy from the Early Iron Age until the Archaic period (eleventh to early sixth century BCE). At the same time, it is the pottery category with the loosest of definitions. Generally said, impasto concerns locally made pottery of non-depurated clay with a smoothed to burnished surface. Although impasto as a term is in use since the sixteenth century for the act of mixing water with clays and inclusions (Camporeale 2001), it is introduced as an archaeological term only in the late nineteenth century for handmade pottery made of non-depurated clay (Cuomo di Caprio 2007). In literature on ancient technologies, impasto can also refer to the actual mixture of clays used for pottery production (Cuomo di Caprio 2007). The term can also be used to describe burnished coarse wares used until Roman times.

A division is made between impasto of the Iron Age and impasto of the Orientalizing period. Impasto of the Iron Age concerns handmade pottery that is built up of coils or slabs of heterogeneous clays. The surface color varies due to the use of an open-air firing process at low temperatures, and it ranges therefore from red to very dark brown and black. Decorations can be incised (geometric motifs), plastic (cords or knobs), pressed (ribs or ripples), or cut (channels or grooves). The most common shapes are small storage jars and cooking jars, lids, bowls, cups, plates, spindle whorls and spools, cooking stands, pottery stands, and shapes used in funerary rituals such as biconical vases and (hut) urns. Although a utilitarian ware, impasto can be found in all kinds of contexts – including funereal, votive, and domestic (Camporeale 2001; Bartoloni 2002) (Fig. 1).

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 1 Iron Age "dinner service" found in a dwelling on the site of ancient Satricum (modern Le Ferriere, Latina). (Courtesy and copyright Groningen Institute of Archaeology)

At the end of the Iron Age, technology and taste start to change: clays become partly depurated, surface colors are more homogeneous due to better firing control, and narrative decorations appear alongside geometric motifs. The shape repertoire continues within the traditions of the Iron Age, but some shapes are inspired on metallic prototypes of the Near East (Camporeale 2001) and on Greek and Phoenician pottery styles (Bartoloni 2003). During the Orientalizing period, shapes become more and more standardized. This is the result of the emergence of craft specialization and the beginnings of a workshop mode of production (Nijboer 1998). The main table wares of the Orientalizing period are brown burnished impasto (impasto bruno) and red burnished – sometimes slipped or even painted – impasto (impasto rosso). Other less frequent categories include buccheroid impasto and the painted wares red-on-white (Fig. 2) and white-on-red (or "sub-geometric"; see further below) and a coarser version of impasto with a burnished surface (impasto grezzo) (De Lucia Brolli and Benedettini 2000). The various shapes of these categories are associated with the diffusion of wine drinking, either as a practice of seated drinking or as a practice of recumbent banqueting. Although evidence of local wine drinking practices seems to exist for the Early Iron Age – while banqueting practices surely existed – the intensification of both wine drinking and banqueting is usually associated with the dissemination of Greek and Phoenician elite customs in Italy. An example of impasto pottery associated with wine drinking is, for instance, the Aegean-inspired pottery stand that can carry a large (mixing) crater or the two-handled kantharos that serves as a drinking cup, but also more indigenous impasto shapes are considered to have been part of such a ceremony, examples being the spiral amphora that might have served for drinking and the biforate handle cup that was probably used to transfer wine from crater to cup (Bartoloni 2003). A famous example of a complete banqueting set in a domestic context has been found in Ficana (Latium), among which was found an oversized impasto rosso pottery stand accompanied by a large wine mixing basin (Fig. 3).

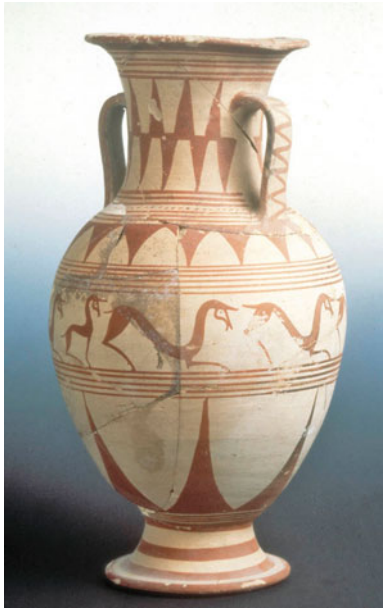

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 2 Red-on-white pottery stand and dinos with painted decoration of geometric motives. (APM14344; courtesy and copyright Allard Pierson Museum, Amsterdam)

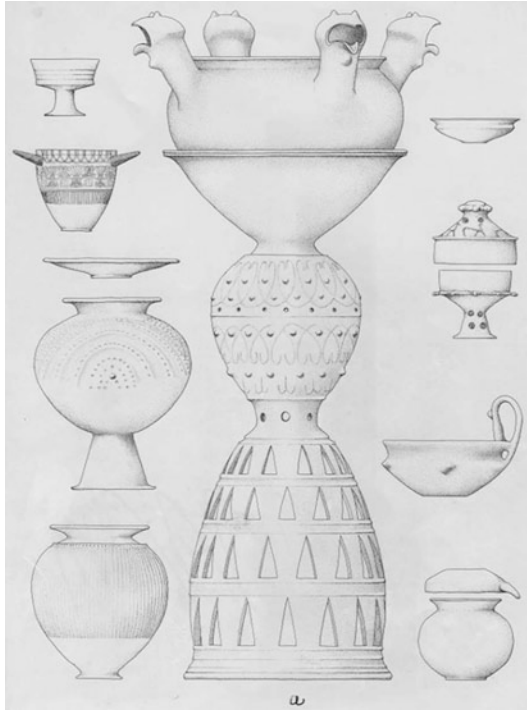

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 3 A banquet service from a domestic context from Ficana (Latium). (Drawing copyright Thora Fisker, University of Copenhagen)

In the later seventh century BCE, standardized pottery makes its appearance. Clays are tempered, a wheel is used, firing is done under controlled conditions in a closed oven, and surfaces are more often slipped or smoothed instead of burnished. The Archaic coarse ceramics of the sixth century make their first appearance and for the most part replace impasto as the main common-ware pottery (see further below).

Bucchero

Bucchero is the primary table ware of Central Italy in the seventh, sixth, and fifth centuries BCE. It is known for its distinct black surface color with high sheen and its specific shape repertoire. The first use of the term dates back to the years around the turn of the eighteenth century when Portuguese imitations of pre-Columbian ceramics labeled "pocaro" or "búcaro" were exported to Italy, and their resemblance to the newly discovered Etruscan pottery style gave bucchero its name (Camporeale 2001). Although bucchero has often been labeled as the national pottery of Etruria, it is clear now that it was also produced in non-Etruscan areas of Central Italy.

Bucchero is usually subdivided into bucchero sottile, bucchero pesante, and grayish bucchero. Bucchero sottile stands for very thin-walled handmade bucchero that has been mostly found within tombs in southern Etruria of the second and third quarters of the seventh century BCE. It is characterized by a shiny black surface color and a very dark core. The color of bucchero, the decorative motives, and the productive technologies have often been considered as indicative of imitations of oriental-style metal wares (Hirschland Ramage 1970), but the later date of metal wares makes it very likely that bucchero might have been a prototype itself (Camporeale 2001). Most probably diverse branches of craftsmen worked closely together on high-quality goods such as metals, ivory, and pottery and meanwhile mutually influenced one another in the production process (Gran-Aymerich 1995). The distinctive surface and core color of bucchero are (arguably) established by reducing the atmosphere during the firing process which turn iron oxides from red into black, while the surface sheen is achieved through intense polishing before firing (Cuomo di Caprio 2007; Perkins 2007). The shape repertoire has clearly evolved out of eight-century impasto shapes, and it might well be that bucchero was produced alongside other kinds of pottery such as impasto. Examples of this continuation are the spiral amphora (Fig. 4) and the very popular and widespread kantharos, kalyx, and kyathos. On the other hand, shapes such as the kotyle, the olpe (Fig. 5) and the skyphos are clearly derived from the Corinthian pottery repertoire (Camporeale 2001).

The south Etruscan city of Caere is considered as the first production center of bucchero sottile and starts to produce and export bucchero in the early seventh century BCE. Other production centers soon follow in south Etruria and Campania,

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 4 Spiral amphorae made in bucchero (*left*) and impasto (*right*). (APM11327a-b; courtesy and copyright Allard Pierson Museum, Amsterdam)

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 5 Olpe of bucchero sottile used for pouring out wine (or other fluids). (APM10734; courtesy and copyright Allard Pierson Museum, Amsterdam)

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 6 Amphora and kalyx of bucchero pesante showing the technique of making decoration in relief. (APM03503; courtesy and copyright Allard Pierson Museum, Amsterdam)

and in the later seventh century, bucchero is produced throughout the major part of Italy. Potters might have travelled between cities, especially in the case of Campanian bucchero: its strong resemblance to Caeretan bucchero indicates that either the bucchero or the potters might have been originally from Caere. In this period bucchero is considered a luxury table ware associated with wine drinking. Initially it is only used by elites, who display it in tombs as drinking services, offer it in sanctuaries, or use it in their aristocratic houses as ordinary ware for personal use or for special occasions such as a drinking party in symposion style. The value attached to the ware is made clear through the many vases showing ownership inscriptions (Camporeale 2001).

After a transitional phase (Hirschland Ramage 1970), bucchero evolves into bucchero pesante, the thick-walled bucchero of the late seventh and the first half of the sixth century. Bucchero pesante has a slightly coarser clay and a more dull sheen than bucchero sottile and shows signs of standardization of shape and decoration when compared to the earlier bucchero. Decorations are now mostly in relief by using tools such as roller seals to make impressions (Fig. 6), by attaching plastic decorations or by pressing the clay; these can consist of floral or animal motives and narrative scenes. Initially, bucchero pesante is produced in large quantities and exported abroad to regions such as Greece, the Levant, the north African coast, the Iberian peninsula, and southern France. However, in the sixth century, bucchero is distributed more closely to its production center and is possibly in use by an emerging urban middle class which tries to imitate the customs of the elites (Camporeale 2001).

From the middle of the sixth century onwards, bucchero loses its distinct black sheen and grayish bucchero makes its appearance. Grayish bucchero is often not considered as proper bucchero, due to its gray surface color and light core. Surface treatments can vary from low burnished to slipped, and

shapes are limited to predominantly low-footed bowls, jugs, and table amphorae. Despite a decline in quality, it remains a popular ware in tombs, sanctuaries, and domestic contexts throughout Central Italy.

Painted Wares

Italo-Geometric and Etrusco-Corinthian pottery are the main painted wares between the eighth and the sixth centuries BCE. Although both are inspired by Greek prototypes, they differ in style and date. Italo-Geometric pottery is inspired on the Euboean Geometric pottery of the middle of the eighth century and ignores the rise of Corinthian styles from the late eighth century, whereas Etrusco-Corinthian pottery is exactly an imitation of Corinthian styles, although only from the later seventh century onwards.

Italo-Geometric (or Etrusco-Geometric) can be executed in both a depurated and an impasto (as in non-depurated and burnished) version. Although the clays and most shapes are local, the decoration motives such as concentric circles, triangles, meanders, series of parallel or wavy lines, and checkerboards are clearly derived from Greek examples. This Greek connection has led to the idea of the first workshops of Italo-Geometric pottery being run by Greek craftsmen (De Lucia Brolli and Benedettini 2000; Gaultier 2001).

The oldest Italo-Geometric pottery is made in southern Etruria from the middle of the eighth century onwards alongside local impasto, and it closely follows Euboean examples (Bartoloni 2003). Despite the influx of new objects and styles from the Near East in the later eighth century BCE, the Italo-Geometric potters continue to stick to the Euboean Geometric motives. Even Corinthian objects that start to appear from the late eighth century onwards do not change their mind, although hybrid shapes or Greek-style shapes used for wine drinking and banqueting rituals are now made as well. This later phase of Italo-Geometric pottery is labeled sub-geometric and continues to be produced in only specific areas of Central Italy (Gaultier 2001).

A very recognizable subgroup of the sub-geometric pottery carries a characteristic decoration of metope friezes with geometric motives. These geometric schemes are here and there replaced by a more free figurative painting style which appears on vessels of depurated clay but also on burnished red impasto (the so-called white-on-red ware) (De Lucia Brolli and Benedettini 2000) (Fig. 7). This is one of the last geometric styles to be found in Central Italy. At the end of the seventh century, the influence of Corinthian pottery starts to play its decisive role, and the Etrusco-Corinthian pushes the Geometric off the stage of table wares (Gaultier 2001).

Etrusco-Corinthian (or Italo-Corinthian) pottery is a table ware inspired by the large influx of Corinthian pottery from the later seventh century onwards. Etrusco-Corinthian pottery is made of a depurated clay and has a painted decoration in which the Greek black-figured technique figures prominently. It can be difficult to distinguish Etrusco-Corinthian pottery from its prototype, especially when it is found in a fragmentary state in settlement contexts. Fortunately much has become known about the hands of various

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 7 Storage jar in white-on-red ware from southern Etruria with a lid in the shape of a drinking cup. The red burnished surface shows a painted decoration of two panthers sharing a head (at the back side two facing lions). (APM15400; courtesy and copyright Allard Pierson Museum, Amsterdam)

painters which can be used to distinguish between local workshops (Szilagyi 1992).

Initially, Etrusco-Corinthian pottery follows Corinthian models closely, and pouring vessels such as oinochoai and olpai, the alabastron perfume flask, and amphorae become highly popular in elite lifestyles. As in the case of Etrusco-Geometric and bucchero pottery, most Etrusco-Corinthian shapes probably serve in an elitist wine drinking or banqueting setting, although they are found in domestic contexts, sanctuaries, and tombs alike. However, from the beginning of the sixth century, Etrusco-Corinthian pottery becomes mass-produced. This mass production is probably to be associated with the needs of an emerging middle class that tries to imitate the elites, as in the case of thick-walled bucchero. The mass production is short lived, as around the middle of the sixth century, production shifts from large vases to small luxury items such as perfume flasks (alabastra and aryballoi; Fig. 8) and pyxides. Three easily recognizable main motif groups can be distinguished in this period: a group of human masks, a group of birds, and a group of facing roosters. These are the last testimonies of local pottery inspired by Corinthian models, as from the middle of the sixth century onwards, Etrusco-Corinthian pottery is gradually replaced by imported and imitation Attic black-figured pottery (Gaultier 2001).

Coarse Ceramics

Coarse ware or "ceramica grezza" (in Italian) is one of many names given to the wheel-made and mostly undecorated pottery of coarse fabric which is found in large amounts in settlement contexts from the early sixth century BCE onwards. For this reason it is also called domestic ware or ordinary ware, in Italian literature referred to as "ceramica comune" or "ceramica di uso domestico," but other names occur like utilitarian ware or kitchen ware, referring to the everyday function of the pottery. Other terms used are red-brown impasto, impasto grezzo, Archaic impasto, or wheel-made impasto in order to distinguish the ware from the earlier handmade, coarse impasto.

The term coarse ware was introduced by Einar Gjerstad in his publications on Early Rome of the 1960s. Giovanni Colonna used the term to indicate a distinct group of pottery within the larger class of impasto coming from the excavations of the area of the S. Omobono sanctuary in Rome (Colonna 1963–1964), whereas Murray-Threipland used the term for the development of this class of pottery during the fifth century in her studies on the pottery from Veii (Murray-Threipland 1963). Recent publications on excavations in Rome and Satricum (Carafa 1995; Bouma 1996; Gnade 2002) also use the term coarse ware and provide detailed typologies based on size and form/morphological aspects (Steures 1992; Carafa 1995; Bouma 1996).

The clay of this pottery is easily distinguished from that of the Iron Age impasto as it is characterized by a clearly visible presence of inclusions consisting of a wide array of mineral particles (mica, augite, biotite, olivine) as well as pieces of crushed pottery, small stones, and large amounts of fine sand. There appears to be a marked resemblance between the fabrics of the large vessels and those of the architectural elements, above all the roof tiles. This has been

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 8 Etrusco-Corinthian aryballos used for perfume. (APM10559; courtesy and copyright Allard Pierson Museum, Amsterdam)

noted in Satricum (Latium) where the fabric of the earliest dark-red Archaic roof tiles, characterized by the natural presence of ferromanganese (FeMn) nodules, can be paralleled in the large storage jars (dolia); a similar correspondence can be noted for the later Archaic products where the clay of the roof tiles like that of the large basins is characterized by identical mineral elements among which rather large and irregularly shaped particles of augite. Given the mutual resemblance in fabrics, it may be suggested that architectural elements were produced in the same workshop as the larger vessels (Angelelli 2001; Gnade 2002). Another observation regards the color of the coarse ceramics which through time changes from dark to light, reflecting some chronological development within the Archaic red-firing and the Late Archaic pale-firing clays. For the fifth and fourth centuries, a predominance of orange fabric is observed probably due to higher firing temperatures.

In general the surface of the coarse ceramics must have been covered with a thin slip, the color of which matched that of the fabric. Often only slight traces have remained due to the course surface of the pots. Painted decoration is known from a clearly defined group of coarse white ceramics which occurs in many Central Italian settlements from the beginning of the sixth century and is variously defined as Late Italo-Geometric, referring to the painted bands (Gjerstad 1953); as cream coarse ware (Torelli and Treipland 1970) and as "ceramica sabbiata chiara" or "impasto chiaro sabbioso" (Angelelli 2001), referring to an obviously sandy quality of the clay; and as "impasto chiaro augitico," referring to the abundant presence of augite particles in the clay (Clementini and Rossi Diana 1988).

The repertoire of coarse ceramics shapes is rather limited and consists of four or five basic forms which show a considerable degree of uniformity per individual shape, suggesting a limited series of production centers that served large areas. The few basic shapes show continuity throughout the sixth, fifth, and fourth centuries BCE which makes it awkward, at the present stage of study, to make clear chronological distinctions in the individual shapes. Small differences in the forms of lips, rims, and bases have been used to establish detailed typologies of the individual shapes, but as it appears, this morphological approach seems of rather limited value to establish detailed chronologies for this material (Slej and Cullhed 2008).

The most common shape is the globular-ovoid, flat-based storage and/or cooking jar of medium size, also called neckless jar ("olletta" in Italian), which often displays traces of secondary burning on the bottom and lower half of the pot (Fig. 9). This particular shape is produced in enormous quantities in the fifth and fourth centuries BCE and continues until the Imperial period, be it in a different type of fabric. In the fourth century, the high-rimmed jar makes its appearance, though a few earlier specimens dated to the fifth century are known, often with a characteristic almond-shaped thickening on the outside of the lip and notably thin-walled. At the same time, the bodies of the later jars start to display plastic decorations like one or two encircling thin plastic cords, either plain or with finger impressions (Bouma 1996).

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 9 Coarse ware neckless jar or olletta used for cooking. (Photo by Anneke Dekker, copyright Satricum Project/University of Amsterdam)

A much larger variant of the storage jar is the dolium, characterized by its thick outcurving rim often profiled with encircling grooves. This jar is sometimes provided with heavy grips or lugs placed on the shoulder. The fabric of this shape changes through time, from a rather friable quality in the Early Archaic period, probably due to low firing temperatures, to a more consistent, hard-fired quality. The early dolia often display a dark-red burnished surface. A smaller version of the storage jar shows large ring handles horizontally attached on the shoulder.

The shape associated with the neckless jar is the conical lid/bowl with wide spreading walls which served two functions. It is characterized by a proper knob which may be solid or ring-shaped, sometimes with upturned edges ("a becco a civetta") or edges decorated with impressions produced by the fingertip or a small stick. It occurs in many different sizes, suggesting that the shape was made independently from the jar. Flattened, disk-shaped lids without knobs can be attributed to the dolia.

Among the other open shapes within the repertoire are the basin-like vessels, either with high, spreading walls (trays) or with curved walls (basins). The first shape, also known under the Italian names "bacino" or "teglia," shows four lugs attached to the bottom. These are rounded, triangular, or tongue-shaped and often show fingertip impressions. A few "teglie" have an encircling finger-impressed cord decoration below the rim. The lugged tray becomes en vogue from the late seventh century BCE onwards and continues to be produced with some minor formal changes until the late fourth to early third centuries BCE (Colonna 1963–1964; Bouma 1996). With regard to the function of this shape, it has been suggested that it may have served as a "testum," a kind of cover placed over a hearth through which a small oven was created. The bottom of the "teglia" could then serve as a baking plate (Zifferero 2004). A variation of the teglia type, which may be considered a later development, shows curving walls and a T-shaped rim. It often displays an encircling plastic ridge, with or without fingertip impressions, and is sometimes provided with two heavy, vertical loop handles attached on top of the rim (Gnade 2002; Argento 2006). When produced in light-colored clay, the vessel may be painted with red-brown or black encircling bands whereas the rim may show diagonal painted stripes.

The second shape, a wide and rather shallow basin of hemispherical shape (called mortaio in Italian), occurs from the second half of the sixth century BCE and has as its main characteristic a lip with band-shape thickening on the outside of various thickness and profile (Gnade 2002). It is sometimes provided with a spout. The clay of these basins is mainly light-colored containing many inclusions; many basins display encircling painted bands on the interior as well as the exterior of the vessel.

During the fifth and fourth centuries BCE, the production of coarse ware pottery continues with a larger range of shapes, more thin-walled and hard-fired.

Fine Wares

Fine wares continue to be produced alongside the coarse ceramics of the sixth and fifth centuries BCE, though their presence is less conspicuous than that of the latter category. Grayish bucchero of a poor quality is known from various sites. It often shows a flaking surface or slip which at times may also be red. In fact there exists a category of pottery that was produced alongside the gray bucchero and which is characterized by a very recognizable red slip for which it has tentatively been defined as reddish bucchero (Steures 1992). Its first occurrence is attested in the late sixth century, and it continues to be produced during the fifth and fourth centuries when the quality of the product seems to dwindle (Gnade 2002). A common ware for Satricum and known also from the Faliscan area, it occurs only sporadically in other Latial sites. The shape repertoire is limited to bowls and jars (Fig. 10).

The fifth century also witnesses the first appearance of black-gloss or black-glazed pottery (Italian: *vernice nera*), fine textured table ware with a characteristic shiny black-slipped surface. This pottery will soon become the main fine ware product in Central Italy and entire Mediterranean region.

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 10 Red slipped bowl, also called red bucchero. (Photo by Anneke Dekker, copyright Satricum Project/ University of Amsterdam)

Future Directions

Pre-Roman pottery represents many different ceramic classes which, apart from the traditional typological studies, encompass also other possibilities for research, the results of which can be mobilized to tackle issues such as the technology of pottery production and its organization, the mechanisms and intensity of pottery distribution, and patterns of consumption and use of pottery. To this end, a systematically executed and integrated approach of geological sampling and technological analysis of the various ceramic classes, i.e., a combined mineralogical and chemical analysis, is opportune. This approach should not be limited to individual ware classes in individual sites and in particular periods but ideally should cover much longer periods and larger areas. Through the acquired data, a better understanding can be reached of the mechanisms underlying production and consumption processes and related commercial activities.

Different initiatives in this particular field of research have already been undertaken, especially with regard to Roman pottery from the middle/late Republican periods (Olcese 2006). However, a similar, large-scale, and integrated research is still lacking for the earlier, pre-Roman ceramics in the geographical regions of Central Italy. An abundance of ceramic material excavated in the nineteenth and twentieth centuries is stored in dusty storerooms and has not been looked at after an initial processing. Usually, only a very small proportion of the excavated ceramic material, the so-called diagnostics, is published in excavation reports or in typological studies. A situation which is regrettable considering the time and effort put into the collection of the material and considering the fact that much of the so-called non-diagnostic ceramics is not as non-diagnostic as it seems. It could tell us a lot more when more attention will be paid to those features that have been previously neglected in processing the ceramics.

Cross-References

- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Latium Vetus, Latium Adjectum
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Tombs, Etruscan

References

Angelelli, C. 2001. Ceramica d'impasto sabbioso. In *Scavi del Palatino, Volume I: l'area sud-occidentale del Palatino tra l'età protostorica e il IV secolo. a C. Scavi e materiali della struttura ipogea sotto la cella del tempio della Vittoria (Studi Miscellanei 32)*, ed. P. Pensabene and S. Falzone, 219–241. Rome.

Argento, A. 2006. La ceramica d'impasto sabbioso. In *La fattoria e la villa dell'auditorium, Bulletino della commissione archeologica comunale di Roma, suppl. 14*, ed. A. Carandini, M.T. D'Alessio, and H. Di Giuseppe. Rome: "L'Erma" di Bretschneider.

Bartoloni, G. 2002. *La cultura villanoviana: all'inizio della storia etrusca*. Rome: Carocci.

Bartoloni, G. 2003. *Le società dell'Italia primitiva: lo studio delle necropoli e la nascità delle aristocrazie*. Rome: Carocci.

Bietti Sestieri, A.M. 1992. *The Iron Age community of Osteria dell'Osa. A study of socio-political development of Central Tyrrhenian Italy*. Cambridge: Cambridge University Press.

Bouma, J.W. 1996. *Religio votiva. The archaeology of Latial votive religion. The 5th-3rd c.B.C. votive deposit south west of the main temple at 'Satricum' Borgo Le Ferriere, Volumes I-III*. Groningen: University of Groningen.

Camporeale, G. 2001. Archaic pottery: Impasto and Bucchero wares. In *The Etruscans: Catalogue to the exhibition at Palazzo Grassi, Rome, 2000*, ed. M. Torelli, 405–420. London: Thames & Hudson.

Carafa, P. 1995. *Officine Ceramiche di Età Regia. Produzione di ceramica di impasto a Roma dalla fine dell'VIII ala fine del VI secolo a.C*. Rome: "L'Erma" di Bretschneider.

Clementini, M., and D. Rossi Diana. 1988. Nuove considerazioni sul tipo del bacino d'impasto augitico. *Atti della Accademia Nazionale dei Lincei* 8 (43): 39–72.

Colonna, G. 1963–64. Area Sacra di S. Omobono. La ceramica di impasto posteriore agli inizi dell'età del ferro. *Bullettino della Commissione Archeologica Comunale di Roma* 79: 3–33.

Colonna, G. 1979. The Later Orientalizing period in Rome. In *Italy before the Romans: The Iron Age, Orientalizing and Etruscan Periods*, ed. D. Ridgway, 223–235. London: Academic Press.

Colonna, G. 1988. La produzione artiginale, in *Storia di Roma I*. In *Roma in Italia*, 291–316. Turin: Einaudi.

Cuomo Di Caprio, N. 2007. *La ceramica in archeologia, 2: antiche tecniche di lavorazione e moderni metodi di indagine*. Rome: "L'Erma" di Bretschneider.

De Lucia Brolli, M.A., and M.G. Benedettini. 2000. Le produzioni degli impasti orientalizzanti in area mediotirrenica. In *Ceramiche d'impasto dell'età orientalizzante in Italia. Dizionario terminologico*, ed. F.P. Badoni, 27–34. Rome: Palombi.

Gaultier, F. 2001. Painted pottery of the Archaic period. In *The Etruscans. Catalogue to the exhibition at Palazzo Grassi, Rome, 2000*, ed. M. Torelli, 405–420. London: Thames & Hudson.

Gjerstad, E. 1953. *Early Rome, volume 1: Stratigraphical researches in the Forum Romanum and along the Sacra Via*. Lund: Gleerup.

Gnade, M. 2002. *Satricum in the post-Archaic period. A case study of the interpretation of archaeological remains as indicators of ethno-cultural identity*. Leuven: Peeters.

Gran-Aymerich, J. 1995. Le Bucchero et les vases metalliques. *Revue des Études Anciennes* 97 (1): 45–76.

Hirschland-Ramage, N. 1970. Studies in early Etruscan Bucchero. *Papers of the British School at Rome* 38: 1–61.

Murray-Threipland, L. 1963. Excavations beside the North-West Gate at Veii 1957–58. *Part II the pottery. Papers of the British School at Rome* 31: 33–73.

Murray Threipland, L., and M. Torelli. 1970. A semi-subterranean Etruscan building in the Casale Pian Roseto (Veii) area. *Papers of the British School at Rome* 38: 62–121.

Nijboer, A.J. 1998. From household production to workshops: Archaeological evidence for economic transformations, pre-monetary exchange and urbanisation in central Italy from 800 to 400 BCE. Ph.D. dissertation, University of Groningen.

Olcese, G. 2006. Ricerche archeologiche e archeometriche sulla ceramica romana: alcune considerazioni e proposte di ricerca. In *Old pottery in a new century. Innovating perspectives on Roman studies. Atti del Convegno Internazionale di Studi. Catania, 22–24 Aprile 2004 (Monografie dell'Istituto per i Beni Archeologici e Monumentali – C.N.R. 1)*, ed. D. Malfitana et al., 523–535. Catania.

Rathje, A. 2000. 'Princesses' in Etruria and Latium Vetus. In *Ancient Italy in its Mediterranean setting: Studies in honour of Ellen Macnamara (Specialist Studies in the Mediterranean 4)*, ed. D. Ridgway et al., 295–300. London: Accordia.

Riva, C. 2010. *The urbanisation of Etruria: Funerary practices and social change, 700–600 BCE*. Cambridge: Cambridge University Press.

Slej, K., and M. Cullhed. 2008. *The temple of Castor and Pollux, Volume II,2: The finds and trenches*. Rome: "L'Erma" di Bretschneider.

Steures, D.C. 1992. Bowls an jars. In *The Southwest Necropolis of Satricum*, ed. M. Gnade. Amsterdam: Thesis Publishers.

Szilagyi, J.G. 1992. *Ceramica Etrusco-Corinzia figurata 1–2*. Florence: Olschki.

Zifferero, A. 2004. Ceramica pre-romana e sistemi alimentary: elementi per una ricerca. In *Bridging the Tiber. Approaches to regional archaeology in the Middle Tiber Valley (Archaeological Monographs of the British School at Rome 13)*, ed. H. Patterson, 255–268. London: British School at Rome.

Further Reading

Bonghi Jovino, M., ed. 1993. *Produzione artigianale ed esportazione nel mondo antico il bucchero etrusco: atti del colloquio internazionale, Milano 10–11 maggio 1990*. Milan: Edizioni ET.

Gran-Aymerich, J. 2009. Le bucchero: reflexions sur la diffusion regionale et les exportations. In *Etruria e Italia preromana. Studi in onore di Giovannangelo Camporeale*, ed. S. Bruni. Pisa/Rome: Fabrizio Serra.

Leach, S. 1987. *Subgeometric pottery from Southern Etruria*. Göteborg: Åströms Förlag.

Martelli, M., ed. 1987. *La ceramica degli Etruschi. La pittura vascolare*. Rome: De Agostini.

Micozzi, M. 1994. White-on-red. In *Una produzione vascolare dell'orientalizzante etrusco*. Rome: Gruppo Editoriale Int.

Naso, A., ed. 2004. *Appunti sul bucchero: atti delle giornate di studio*. Florence: All'insegna del giglio.

Neri, S. 2010. *Il tornio e il pennello: ceramica depurata di tradizione geometrica di epoca orientalizzante in Etruria meridionale (Veio, Cerveteri, Tarquinia e Vulci) (Officina Etruscologia 2)*. Rome: Officina Edizioni.
Perkins, P. 2007. *Etruscan Bucchero in the British Museum*. London: British Museum.
Rasmussen, T. 1979. *Bucchero pottery from Southern Etruria*. Cambridge: Cambridge University Press.
Ridgway, D., and F.R. Ridgway Serra, eds. 1979. *Italy before the Romans: The Iron Age, Orientalizing and Etruscan periods*. London: Academic Press.
Ten Kortenaar, S. 2011. *Il colore e la materia: tra tradizione e innovazione nella produzione dell'impasto rosso nell'Italia medio-tirrenica (Cerveteri, Veio e il Latium Vetus) (Officina Etruscologia 4)*. Rome: Officina Edizioni.

Central Pacific Islands: Sea-Level Change and Sites

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Introduction

Archaeological and paleo-landscape records from the Pacific Islands offer material examples of how people have sustained themselves through several centuries or millennia of fluctuating sea level affecting their island habitats, access to freshwater sources, resource ecology, and capacity to sustain growing populations. The lessons from the past bear relevance for understanding future management challenges around sustainable livelihoods in the face of unprecedentedly rapid climate change. The factual records have revealed what was successful or unsuccessful about how people in the past responded to the changing sea-level conditions over a long time span. These records invariably transcend periods of different sea levels and climates that affected the entire Pacific region, and therefore they are suitable for identifying cross-regional correlations between specifically attested natural processes and cultural behavioral responses.

At a global scale, sea level has changed according to the world's average temperature affecting the amount of water trapped in glaciers and ice sheets, as well as the expansion or contraction of ocean surface water. Periods of colder temperature have resulted in lower sea level, most conspicuously during the world's ice ages or glacial periods. Conversely during interglacial periods, such as the Holocene Epoch in which we are now living, large amounts of ice melted and thus flooded the world's oceans. In addition to these impressive events that affected sea level by more than 120 m in some cases, more frequent minor fluctuations of sea level have occurred on the order of a few meters, commonly as a result of temperature variations even of just a few degrees C.

The Pacific Islands present ideal settings for measuring the elevations of current versus ancient tidal notches, coral reefs, and lagoon facies that are directly datable by radiocarbon and other techniques. In other regions, observations of tidal notches by themselves have not always enabled the same confidence in their dating without the related occurrences of coral reefs or other associations that have retained datable contents abundantly along the coasts of tropical Pacific Islands. Furthermore, evidence from multiple islands all across the Pacific has allowed the identification and isolation of localized anomalies such as from tectonic movements to be separated from the region-wide picture.

Archaeological excavations have demonstrated a cultural presence in the Pacific Islands primarily within the last 4000 years, encompassing a number of fluctuations in the regionally documented sea-level history (Fig. 1). Owing to the major ice melting that was triggered at the beginning of the Holocene about 10,000 B.C., sea level over several centuries approached modern conditions and in fact peaked across the entire Pacific region at 1.5–2 m higher during the mid-Holocene highstand at approximately 3000–1000 B.C. (Mitrovica and Peltier 1991). After the highstand, sea level began a period of drawdown over the next several centuries. A slight sea-level rise occurred during the Little Climatic Optimum (LCO) at A.D. 750–1250

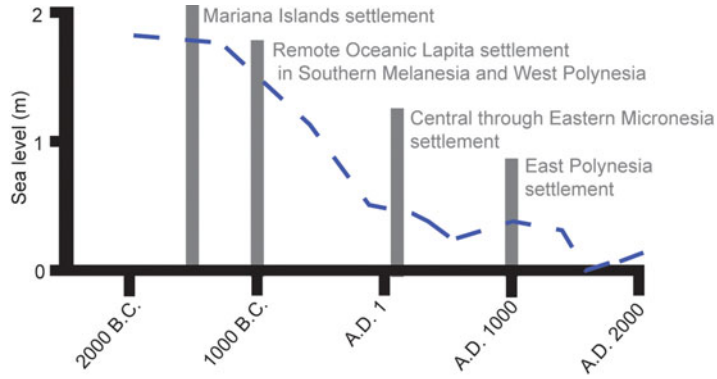

Central Pacific Islands: Sea-Level Change and Sites, Fig. 1 Pacific regional sea-level history, relative to major cultural periods and events

(also known as the Medieval Warm Period or the Medieval Climate Anomaly), followed by a transition of the "A.D. 1300 Event" at A.D. 1250–1350, leading into a lowering of sea level during the Little Ice Age (LIA) at A.D. 1350–1800 (Nunn 2007). Currently, sea level has been rising for some decades in parallel with global warming, threatening coastal landforms, water resources, food productivity, and human populations worldwide. The current conditions may be viewed as the most recent part of continual sea-level rise since A.D. 1800, accelerated as a result of anthropogenic climate change.

From this long-term and material-based perspective of how people have coped with changing sea level, practical lessons can be leveraged into preparing for the effects of currently rising sea levels globally. The Pacific Islands have been at the forefront of these concerns, given the fact that many island environments and ecosystems are especially sensitive to minor changes in sea level. In the past as at present, island communities have been among the first in the world to be affected by changing conditions of coastal ecosystems, water tables, and other dynamics of their inhabited environments.

Key Issues/Current Debates/Future Directions/Examples

The demonstrated Pacific regional sea-level history supplies a baseline for assessing possible correlations with the cultural behaviors as chronicled in archaeological records. For instance, how did the mid-Holocene highstand influence the choice of where people first settled in the remote-distance Pacific Islands at 1500–1000 B.C., and then how did the subsequent sea-level drawdown affect life in the Pacific thereafter? Similar questions can be asked about the effects of higher and lower sea level during other time periods, such as the LCO and the transition to the LIA.

How Did Sea Level Affect First Island Settlement at 1500–1000 B.C.?

When people first moved to live in the remote-distance islands of the Pacific, about 1500–1000 B.C., sea level and coastal ecologies were generally stable and productive. This stability was due to the prevalence of the mid-Holocene sea-level highstand since 3000 B.C., wherein coral reefs and other coastal habitats had become well established for several successive centuries. In this scenario, the first settlers found truly pristine coastal ecosystems that had been healthy and productive for a millennium or longer.

Among the many favorable coastal settings at 1500–1000 B.C., people selected only certain of those paleo-seashore niches for their initial habitations (Carson 2016:133–168; Nunn and Heorake 2009). Residential sites have been documented directly at the ancient shorelines cross-regionally, for instance, as illustrated in the Mariana Islands and Fiji (Fig. 2). The settlers targeted the places where they could harvest abundant *Anadara* sp. shellfish that lived in mangroves, seagrass beds, or similar shallow-water habitats. They recruited other shellfish taxa from

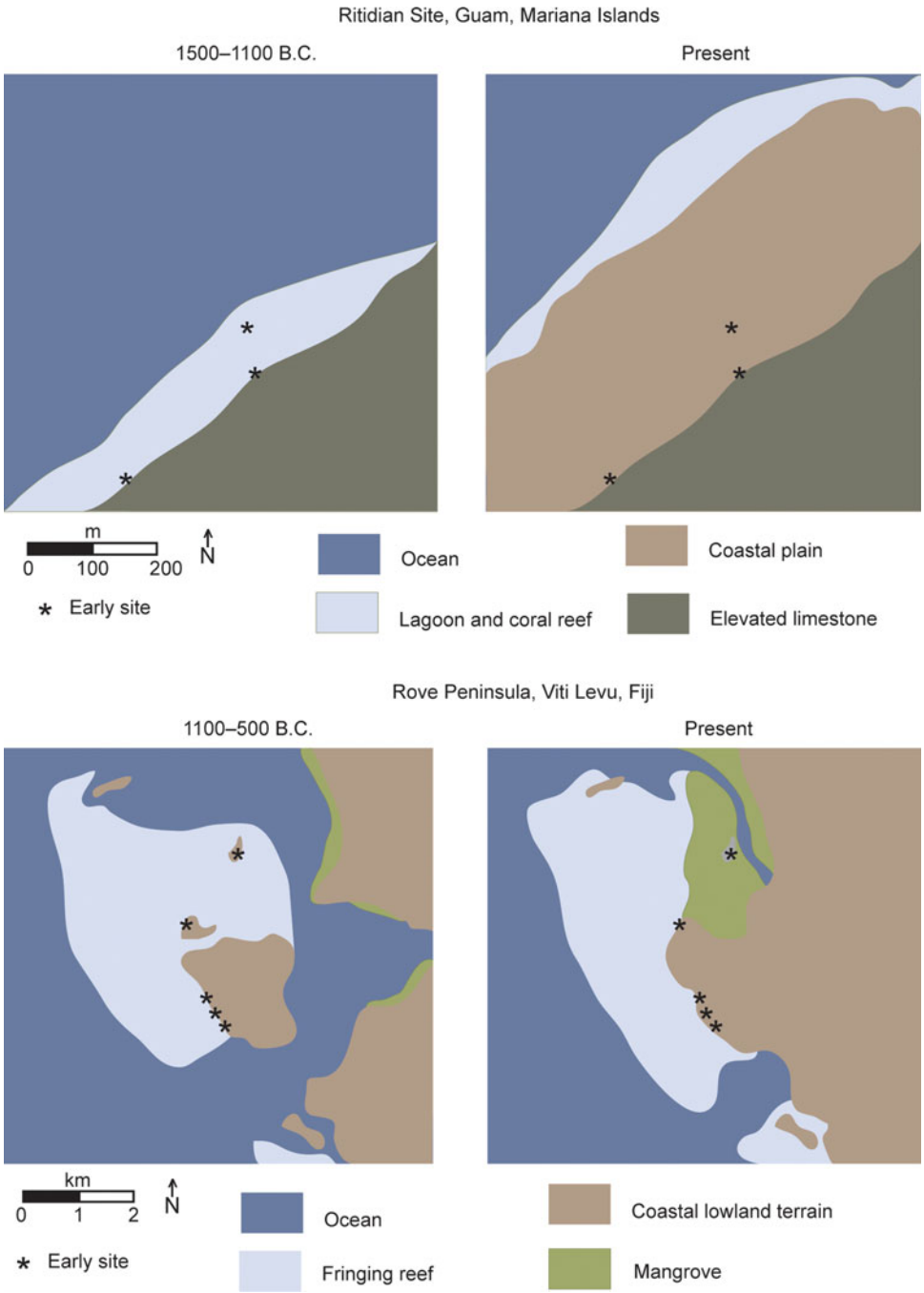

Central Pacific Islands: Sea-Level Change and Sites, Fig. 2 Examples of the paleo-seashore settings of initial Remote Oceanic habitations of 1500–1000 B.C., as compared to modern conditions, shown in cases of the Mariana Islands (based on Carson 2016) and Fiji (based on Nunn and Heorake 2009)

nearby habitats, for example, seeking giant clams in nearshore zones and gathering varied limpets, sea urchins, and chitons in intertidal rocky exposures. Access to freshwater supplies would have been a priority as well, ideally from streams but sometimes found in coastal seeps just above sea level.

The selections of near-shoreline zones, access to shallow-water shellfish habitats, and freshwater sources all had depended on the position of mid-Holocene sea level at 1.5–2 m higher than today's conditions. In this way, sea level influenced how people first inhabited Remote Oceania, in a highly visible manner when considering the intrinsic roles of coastlines in small and remote islands. Similarly, any change in sea level could alter the ability of people to inhabit their preferred founding sites.

How Did Communities Respond to Sea-Level Drawdown After 1000 B.C.?

With the drawdown of sea level proceeding after the mid-Holocene highstand, many of the inhabited paleo-shoreline niches were reconfigured physically, thus forcing people to abandon these areas, as a critical threshold of sustainability was breached about 500 B.C. across the tropical Pacific. The falling sea level directly resulted in the decline or even total loss of the landforms, coral reefs, shellfish habitats, and other resources that had sustained the first island inhabitants. Sea-level drawdown was responsible for the loss of nearshore habitats supporting certain shellfish such as *Anadara* sp. clams, yet those effects were compounded by human-caused impacts of shellfish harvesting, in total creating nearshore resource depression (Carson 2016: 97–99). Further harvesting or overharvesting impacts have been documented in the case of the extirpation of one variety of giant clam (*Hippopus hippopus*) within the first few centuries of cultural settlement in Fiji (Seeto et al. 2012), as well as in the localized depopulations of rock-clinging taxa (limpets, sea urchins, and chitons) within the first few generations of coastal residence in the Mariana Islands (Carson 2016: 97–99).

While the paleo-seashore niches of the mid-Holocene highstand were disappearing, people needed to shift their focus to live in other landform contexts and to use different resource habitats. The sea-level drawdown thus introduced a degree of instability in fundamental subsistence supplies of coastal zones, forcing people to rely more on land-based resources from forests and domesticated foods that could overcome the new conditions of coastal instability. Options became available to inhabit elongate beach ridges and berms that had emerged in stranded positions above the lowered sea level, but the associated coral reefs and shellfish habitats could not offer the same prospects of productivity that had underwritten the sustainability of previous centuries of coastal settlement.

The records of nearshore resource depression, a shift in settlement location, and adjustment of subsistence economy coincided with the termination of cultural traditions of the most distinctive artifacts that had defined the earliest settlement sites. Most visible was the demise of dentate-stamped and other finely decorated potteries by 500 B.C., while certain forms of shell beads, bands, discs, circlets, and pendants disappeared as well in some island groups (Nunn and Carson 2015).

Given the simultaneous cross-regional correlation of so many aspects of changing physical environment and cultural behavior around 500 B.C., a principal cross-regional driving mechanism must be acknowledged as having affected all of the different areas of the inhabited Pacific. Depending on the perspective of analysis, the key factor could be viewed as the change in climate that triggered sea-level drawdown, as the lowering of sea level itself, as the transforming coastal ecology caused by sea-level change, or even as the social cognition of the changing environment. In any case, profound restructuring occurred in social and ecological contexts across much of the western Pacific by 500 B.C.

How Did Sea Level Influence the Habitability of Low-Lying Atolls After A.D. 100?

After the mid-Holocene highstand, sea-level drawdown exposed ever more low-lying coastal landforms, and eventually many small atolls such as in Micronesia became habitable during the first

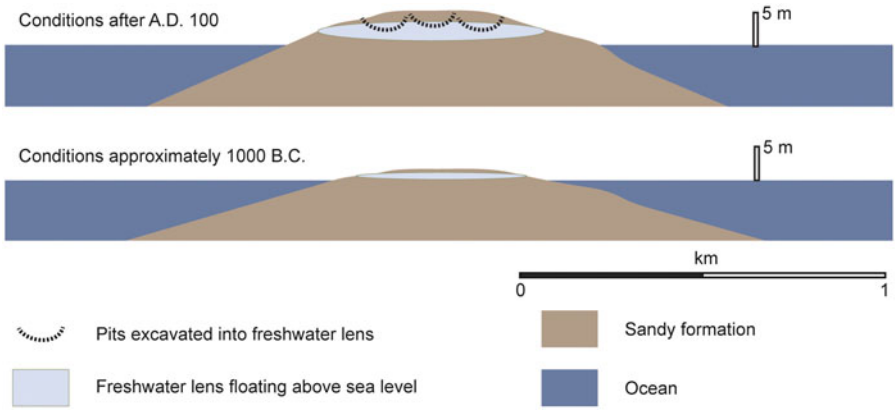

Central Pacific Islands: Sea-Level Change and Sites, Fig. 3 Habitability of the atolls of Micronesia, A.D. 1–500

few centuries A.D. (Fig. 3). In practical terms, the physical land of the atoll (reef) islands had emerged sufficiently above sea level to sustain land-based livelihoods and to support settlements. Equally importantly, the sea level had dropped to a position that allowed freshwater lenses to form within the land masses of these islands, specifically at absolute elevations where people could access non-saline pockets of brackish groundwater through shallow pits.

Most of the atoll landforms had emerged above sea level as early as A.D. 100, but cultural habitation was delayed until perhaps A.D. 500 in many cases, due to at least two factors (Dickinson 2003; Nunn 2016; Yamaguchi et al. 2009). First, the sea level in some cases still needed to fall further to create accessible freshwater lenses. Second, people did not necessarily seek to migrate to inhabit all available atolls immediately.

The initial habitability of the Micronesian atolls underscores the role of sea level in affecting life in the Pacific and generally in coastal areas of the world. A small degree of changed sea level in this case made an enormous part of the globe habitable for the first time, with long-lasting ramifications for larger social and ecological history.

How Did Sea Level Affect Island Cultures at A.D. 750–1250?

Compared to earlier centuries, the Little Climatic Optimum (LCO) of A.D. 750–1250 can be defined by up to 1 °C warmer global temperature and overall increased annual rainfall, but it also culminated in a slightly higher sea level by as much as 1 m in the Pacific. In terms of understanding cultural response, the conditions of the LCO were steady and predictable interannually, thus allowing many communities to develop in greater densities and with more formalized land-use practice, permanency of residential patterns, and increasingly complex economic and political systems.

During the LCO in the Pacific, a slightly higher sea level generated both positive and negative effects on different coastal landforms and ecosystems (Nunn 2007), yet societies cross-regionally benefitted overall from the interannual predictability of warmer and wetter conditions (Fig. 4). Throughout all of the inhabited islands of Pacific Oceania after A.D. 1000, groups developed highly formalized settlement structures, permanency of land-use patterns, at-house burial traditions linking lineages with defined units of land, and monumental expressions often literally fixed in stone. These formalized expressions emerged in locally specific signatures cross-regionally, additionally impressive when considering that the centuries of A.D. 1000–1300 witnessed the creation of a fully inhabited sea of islands, filling the tropical and subtropical Pacific at that time.

The records of the LCO in the Pacific illustrate the role of interannual predictability in allowing societies to flourish, regardless of how their coastal landforms and ecologies were altered

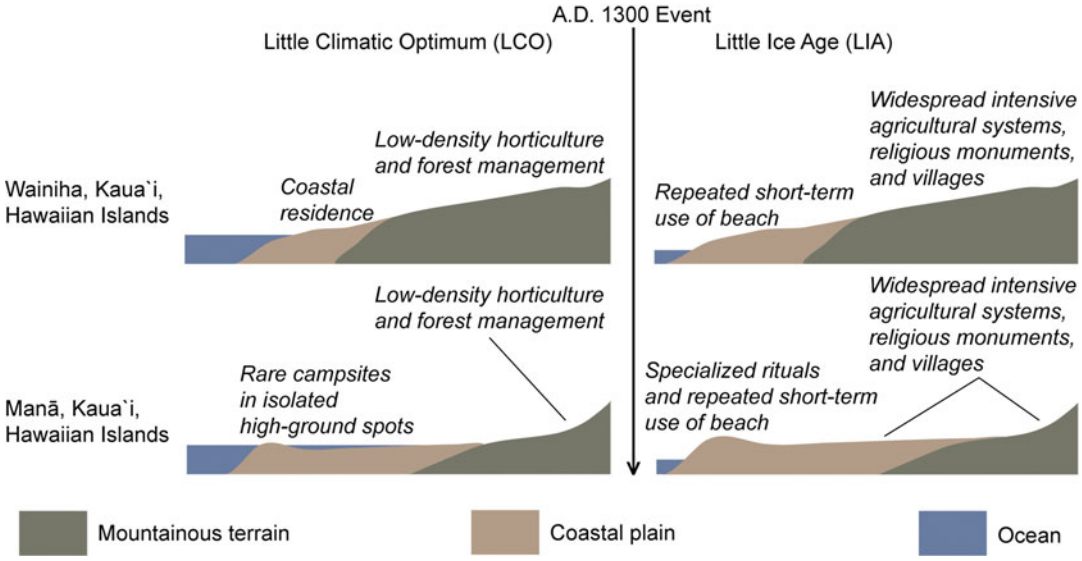

Central Pacific Islands: Sea-Level Change and Sites, Fig. 4 Examples of settlement and land-use patterns before and after A.D. 1300 in Kaua‘i, Hawaiian Islands (following Nunn et al. 2007)

through a slightly higher sea level during those centuries. Near the end of the LCO, higher sea level potentially rendered some of the lowest elevations of coastal zones uninhabitable or unsuitable for large groups, because of flooding, erosion, and salinization. The same change in sea level meanwhile made other higher-elevation coastal zones more favorable for settlement. In all cases, island societies developed the formalized expressions and permanency of landscape relationships that characterized the region after A.D. 1000 and grew even more strongly established after A.D. 1300.

How Did the Sea Level Affect Island Cultures at A.D. 1350–1800?

Following the interannual predictability of the LCO, markedly unpredictable and volatile conditions came to characterize the Little Ice Age (LIA) at A.D. 1350–1800 in ways that threatened the previously established social systems (Nunn 2007), especially in the places where population densities had approached maximum carrying capacities (see Fig. 4). Changing sea level and coastal ecology were perhaps minor concerns during the LIA, while the more obvious concerns were cooler global temperatures and an increased frequency of punctuated events of storminess and drought. The LIA involved a lowering of sea level as compared to the prior case during the LCO, with direct effects on coastal communities of the Pacific, further complicated by tidal surges during storm events.

The LIA in itself was not an impossible situation, but rather the change from LCO to LIA conditions posed a challenge for many societies, dislodging them from their traditional lifeways and often leading to increased intergroup hostility or other forms of societal collapse (Nunn 2000). Particularly distressing was the inability of many island communities to maintain a sufficiently high level of food productivity in densely populated lands, for example, as documented in many Polynesian groups that had approached the limits of what the island ecosystems could provide. Especially visible in East Polynesia, populations expanded into marginal dry and upland environments by A.D. 1400. Intensive irrigation systems, dryland mound complexes, and artificial fishponds characterized most East Polynesian landscapes of A.D. 1400–1600, along with increased frequency of warfare, the use of refuge and fortification sites, and overall intergroup competition.

The LIA was a stressful time in the Pacific as elsewhere in the world, but it was managed without disastrous outcomes by most island societies. In the places where land-use systems were more generalized with forest management and informal horticulture, for instance, in most of Micronesia, people were equipped to withstand repeated storminess, drought, and other stressful events. These groups did not invest in the specialized and high-density food production systems that were seen most prominently in East Polynesia, but rather they continued to engage in low-density and generalized systems that already had proven useful for long-term survival in "typhoon alley." By comparison, the high-density systems such as in East Polynesia were overspecialized and therefore unsustainable for dense populations during stressful periods as occurred during the LIA.

What Are the Implications for Sea Level Affecting Environments and Societies in the Pacific and Globally?

This research has revealed cross-regional consistencies in how people coped successfully or unsuccessfully with changing sea level. The most long-term sustainable livelihood systems have tended to involve less formalized and instead generalized strategies of subsistence and land-use patterns, thus allowing the ability to withstand a degree of change in the inhabited environment both socially and ecologically. Whenever people relied on maximum usage of narrowly defined resource niches to support their growing populations, inevitably their descendant generations faced a crisis of not being able to sustain those strategies. At least a few instances have been chronicled in the cross-regional archaeological records, as seen with the post-highstand sea-level drawdown after 1000 B.C. and again with the transition from LCO to LIA conditions after A.D. 1300.

The exigency of a crisis in each case depended on the extent to which a community relied on the specific conditions of landforms or resource habitats that underwent substantive transformation. For example, cultural traditions based on narrowly defined paleo-seashore niches began to weaken after 1000 B.C. and could no longer be sustained by 500 B.C., such that the surviving generations of communities needed to develop significantly different material cultures, land-use patterns, and ways of interacting with their inhabited environments. Another radical change occurred for the societies that had developed highly formalized settlements, permanency of land-use patterns, and vastly increased population densities during optimal conditions of A.D. 1000–1300, eventually forced to transform or else to collapse when faced with the extended stress of less favorable climates of A.D. 1300–1850.

Lessons about coping with changing sea level are instructive while the world is facing a new challenge of global warming, rising sea level, and myriad attendant effects (Nunn 2013). These concerns are especially serious in areas of high-density populations, often situated in coastal areas that are most vulnerable to the erosion of seashores and salinization of water tables. Already, some Pacific atolls are losing their ability to support their populations, forcing their inhabitants to develop different subsistence practices, resource-use systems, and ways of living in their changing world.

Cross-References

- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Pacific Islands: Finding the Earliest Sites

References

Carson, M.T. 2016. *Archaeological landscape evolution: The Mariana Islands in the Asia-Pacific region*. Cham: Springer International.

Dickinson, W.R. 2003. Impact of mid-Holocene hydro-isostatic highstand in regional sea level on habitability of islands in Pacific Oceania. *Journal of Coastal Research* 19: 489–502.

Mitrovica, J.X., and W.R. Peltier. 1991. On postglacial geoid subsidence over the equatorial oceans. *Journal of Geophysical Research* 96 (B12): 20053–20071.

Nunn, P.D. 2000. Environmental catastrophe in the Pacific Islands around A.D. 1300. *Geoarchaeology* 15: 715–740.

Nunn, P.D. 2007. *Climate, environment, and society in the Pacific during the last millennium*, Developments in

Earth & environmental sciences. Vol. 6. Amsterdam: Elsevier.
Nunn, P.D. 2013. The end of the Pacific? Effects of sea-level rise on Pacific Island livelihoods. *Singapore Journal of Tropical Geography* 34: 143–171.
Nunn, P.D. 2016. Sea levels, shorelines and settlements on Pacific reef islands. *Archaeology in Oceania* 51: 91–98.
Nunn, P.D., and M.T. Carson. 2015. Sea-level fall implicated in profound societal change around 2570 cal yr BP (620 BC) in western Pacific Island groups. *Geo: Geography and Environment* 2: 17–32.
Nunn, P.D., and T.A. Heorake. 2009. Understanding the place properly: Palaeogeography of selected Lapita sites in the western tropical Pacific Islands and its implications. In *Lapita: Ancestors and descendants*, Monograph, ed. P.J. Sheppard, T. Thomas, and G. Summerhayes, vol. 28, 235–254. Auckland: New Zealand Archaeological Association.
Nunn, P.D., R.L. Hunter-Anderson, M.T. Carson, F. Thomas, S. Ulm, and M.J. Rowland. 2007. Times of plenty, times of less: Last-millennium societal disruption in the Pacific Basin. *Human Ecology* 35: 385–401.
Seeto, J., P.D. Nunn, and S. Sanjana. 2012. Human-mediated prehistoric marine extinction in the tropical Pacific? Understanding the presence of *Hippopus hippopus* (Linn. 1758) in ancient shell middens on the Rove Peninsula, southwest Viti Levu Island, Fiji. *Geoarchaeology* 27: 2–17.
Yamaguchi, T., H. Kayanne, and H. Yamano. 2009. Archaeological investigation of the landscape history of an Oceanic atoll: Majuro, Marshall Islands. *Pacific Science* 63: 537–565.

Central–Eastern Europe: Historical Archaeology

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Introduction

This entry deals with the historical archaeology of the Eastern fringe of the Western Christian cultural area from the early Middle Ages onward, covering especially the three kingdoms of Bohemia, Poland, and Hungary and their dependencies. In general, the historical archaeology of Central–Eastern Europe (CEE) follows the current direction of Western European research with respect to methods and conceptualization. There are, however, some dissimilarities. These mainly relate to the historical geopolitical situation of CEE which gave rise to specific discontinuities and interferences by different cultural, religious, and ideological forces and which often left distinct archaeological evidence.

Definition

In CEE, historical archaeology is perceived as the part of general archaeology that studies society on the basis of material remains from the periods for which numerous written sources are available. In principle, it therefore includes the archaeology of the medieval and modern periods. In individual national archaeologies, however, periodization varies depending on specific historical developments. Accordingly, this entry has a wide overall chronological span, but for individual areas the range is quite variable. Thus, for Hungary historical archaeology covers the period from c. CE 1000 to 1800, whereas for the Czech Republic and Slovakia, the perspective is narrower, spanning only the late medieval and modern periods (CE 1450–1950). In Poland, although some scholars have begun to argue that historical archaeology spans roughly the same date range as used by their Hungarian colleagues (Kajzer 1996: 16–23), practically speaking, both in research agendas and academic study programs, the term "historical archaeology" is commonly attributed to the late medieval and modern periods (c. CE 1250–1945), which is why this narrower range is the one adopted here for this territory.

The concept of "historical archaeology," because it encompasses the traditional periods of historical and archaeological concern, is ideally suited to research the transitional periods between them, namely, between the early and high/late medieval (see Piekalski 2001; Klápště 2012,

2016), medieval and modern (e.g., Piekalski and Wachowski 2009), and early modern (preindustrial) and present (modern) periods. Moreover, the concept and concerns of historical archaeology in CEE overlap with both socioeconomic history and cultural anthropology (ethnology), as well as those of other disciplinary fields including historical anthropology, history of art and architecture, historical geography, history of science and technology, and legal studies (in connection with both forensic archaeology and the archaeology of material remains of past jurisdiction). The survey and documentary techniques used in historical archaeology are also closely related to those used in various branches of geography and biology (Krajíc 2007). The need for multidisciplinarity in historical archaeology is thus beyond doubt. The main methodological question is, however, how to combine the diverse information provided by different yet complementary groups of sources in order to gain new insights into the past society, rather than simply using archaeology to illustrate or repeat the narratives elaborated by historians.

In terms of the dissemination of research results, there are several journals and periodicals devoted to the archaeology of the Late Middle Ages and the (early) modern period covering CEE. For the Czech Republic and Slovakia, the key ones are as follows: *Studies in Post-Medieval Archaeology* (in English, a new series, published every 2 years since 2007), the journal *Archaeologia Historica* (published since 1976), and *Studia Archaeologica Slovaca Mediaevalia* (published irregularly since 1998). In Poland, the most important serial publication is *Archaeologia Historica Polona*; papers of likely relevance to CEE historical archaeology also appear frequently in *Kwartalnik Historii Kultury Materialnej* and in periodicals or serial editions devoted either to particular cities and regions (while popularizing approaches may be also found in *Z Otchrizing appr* and *Archeologia app*). In this regard, *Wratislavia Antiqua*, edited in Wrocław, is especially worth mentioning, while articles on the Hanseatic towns on the Baltic coast may be found either in local periodicals, printed in Elbląg, Gdańsk, and Kołobrzeg, or, in German, in *Lübecker Kolloquien zur Stadtarchäologie im Hanseraum*. Other publications concern particular themes or problems (e.g., *Funeralia Lednickie*, focusing on burial customs). In Hungary, there is a lack of journals dedicated specifically to the Late Middle Ages and the early modern period, but many articles and shorter reports can be found in several well-known and long-established journals like *Archaeologiai Értesítő* (Archaeological Bulletin published continuously since 1968) or *Acta Archaeologica Academiae Scientiarum Hungaricae* (published since 1950).

Historical Background

Through a large part of its medieval and early modern history, CEE was a contact zone between Western (Roman Catholic and Protestant) Christendom and the Orthodox and Muslim worlds. It developed in the cultural framework of Western Christian culture but against a strong local background (which leads to a variety of local attempts to adopt – and adapt – Western standards), owing to a very close contact with its Eastern and Southern neighbors where either Orthodox Christianity or Islam typically prevailed. Economically, the Northern part was linked to the Baltic sphere, and along with that it was gradually integrated into the strongly interconnected European economy and long-distance trade networks (1200–1800).

In the later Middle Ages, CEE encompassed the territories of three kingdoms (Bohemia, Poland, and Hungary) and the state of the Teutonic Order (Fig. 1). In the fifteenth to sixteenth centuries, Poland merged with the Grand Duchy of Lithuania into a unique Commonwealth (which also included the Ruthenian territories of present-day Belarus and Ukraine), whereas Bohemia and Hungary were integrated into the Habsburg Monarchy, facing the expansive Ottoman Empire. Central parts of Hungary were also conquered by the Ottomans, and the Eastern third of the medieval Hungarian monarchy, called Transylvania, became a duchy with a special vassal status within

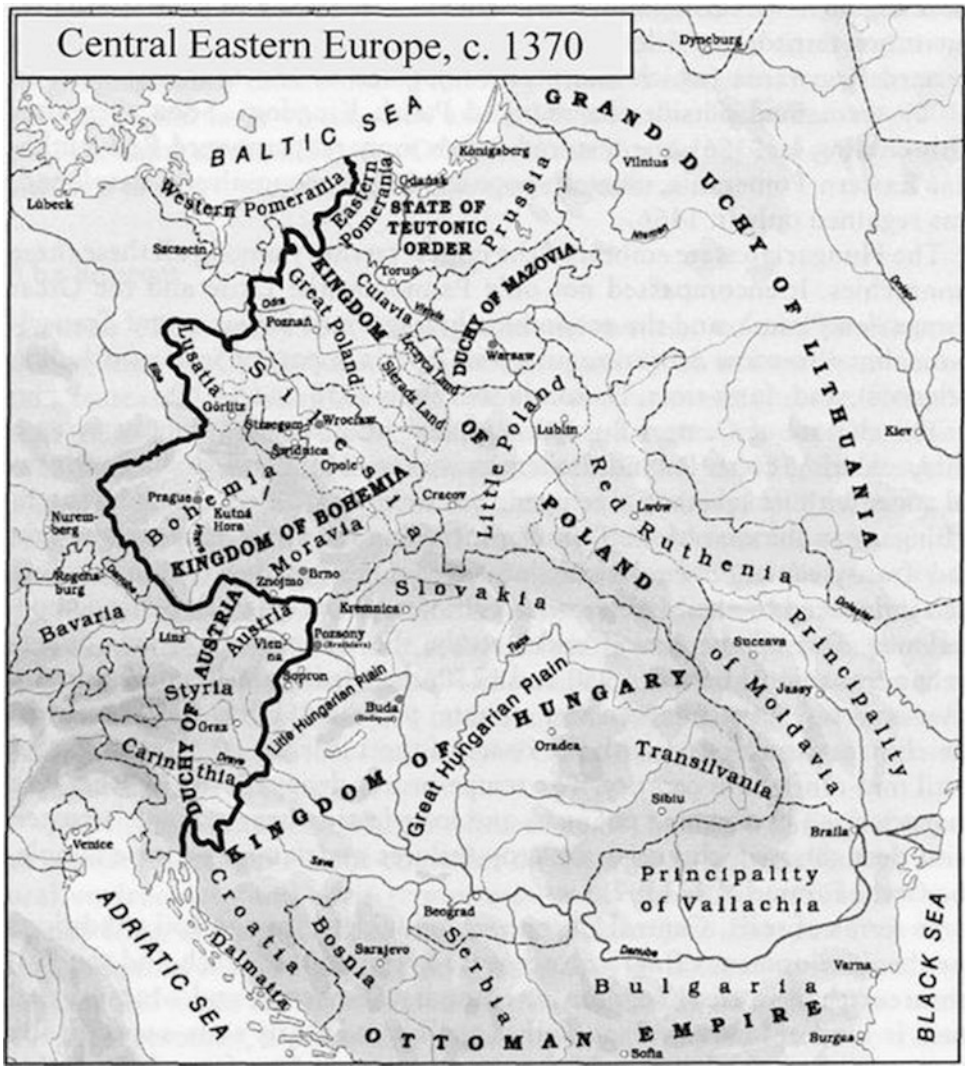

Central–Eastern Europe: Historical Archaeology, Fig. 1 Central–Eastern Europe in the Late Middle Ages. The thick line highlights the conventional (academic) border between Central–Eastern and Central–Western Europe. Today, CEE is perceived as the area encompassing Poland, the Czech Republic, Hungary, and the Slovak Republic. On the other hand, Central–Western Europe then consists of Germany, Austria, and Switzerland. Fluid borders remain between Southeastern (North Balkans) and Eastern Europe. (After Myśliwsky 2012, Fig. 8.1, slightly modified)

the Ottoman Empire. The state of the Teutonic Order was partly incorporated into Poland, whereas the rest of it developed into the Duchy and later Kingdom of Prussia. In the eighteenth and nineteenth centuries, CEE was dominated by the expansion of the Habsburg Monarchy, Prussia, and Russia. In the twentieth century, the region was subject to strong pressure and cultural influence from both Germany and the Soviet Union.

Key Issues/Current Debates

Historical archaeology in CEE has expanded in the last 25 years, although its first foundations were laid much earlier (Smetánka and Žegklitz 1990). This growth is largely a consequence of the gradual and ever-growing acceptance – both among relevant authorities and archaeologists themselves – of late medieval and modern

material relics as subjects of legitimate research and of equal merit to pre- and protohistoric archaeological sites and artifacts. Historical archaeology is especially gaining in importance in the field of impact assessment surveys and rescue excavations accompanying new building development (which have been in all respective states legally integrated into the processes of acquiring building permissions). There are also research-driven studies in such fields as rural settlement (at least in Bohemia, Slovakia, and Hungary), battlefield archaeology, forensic and legal archaeology (especially in Poland), and scholarly elaboration of some aspects of the material culture of these periods, rather than simply salvage exercises. Nonetheless, this close interdependence between historical archaeology and rescue excavations causes discrepancies in certain research areas. For example, because historical archaeology is so closely associated with predevelopment impact assessment and mitigation, the densest concentration of field research has been in the historical core areas of cities where architectural and archaeological heritage has been threatened by new building development (notably Brno, Elbląg, Gdańsk, Prague, and Wrocław). The same level of research into the historical archaeology outside the major cities has not been attained, however, and only in the last 25 years have attempts been made to improve the legal and practical status of late medieval and modern archaeological sites in the countryside so as to accord them the same level of protection as given to monuments from earlier periods. This has mostly been accomplished by including archaeological surveys and excavations in the more general structure of heritage protection and by creating heritage protection areas, as has been attempted in Poland and the Czech Republic.

The broad spectrum of topics potentially reflected in the archaeological materials from historical periods allows for a variety of possible narratives to describe them. To accommodate this, in the following sections, current key research questions concerning the historical archaeology of CEE are also related to the grand concepts of European historiography and presented in chronological order.

The Medieval Transformation (1100–1350)

Archaeology has substantially contributed to the creation of the dominant historical narrative of the medieval transformation of CEE (Klápště 2012, 2016). This model explains the historical processes of the eleventh to fourteenth centuries as a gradual cultural, social, and economic integration of Central–Eastern Europe into a wider Latin Europe. In the study of the transformation processes, which included, e.g., the commercialization of the economy and the structures of power, both the idea of a development convergent with Western European phenomena and the hypothesis of cultural diffusion of technologies and social patterns figure highly. In this regard, the contribution of archaeological research has mainly concerned the spatial spread of the changes, their relations to previous socioeconomic and cultural patterns, the diversity of local histories, and various local solutions to regionally common challenges (e.g., Piekalski 2001).

Late Medieval Archaeology: The Transition from the Medieval to the Postmedieval World (1350–1550)

For this time period, archaeological interest has focused on researching continuities and changes in the urban milieu, rural settlement patterns, landscape, and technologies (cf. Scholkmann 2009; Carver and Klápště 2011; Klápště 2016). CEE development in the fifteenth to sixteenth centuries is typically portrayed as a gradual accumulation of diverse changes and responses prompted by developments in the previous period. However, the rate and intensity of the development were not the same across all parts of CEE, which emerged from this period as one subdivided into numerous differently functioning but interconnected socioeconomic regions. Some of these headed toward proto-industrialization and commercialization, while in others it was as if time stood still. In the fifteenth to sixteenth centuries, the development of Hungary, as a borderland on the margins of the Ottoman Empire, with large parts occupied by the Ottomans, was again special, characterized by the emergence of market towns involved in cross-border trade with their Islamic neighbors.

Postmedieval Archaeology: Differentiation in the Early Modern Period (1500–1800)

In the early modern period, the individual parts of CEE underwent very diverse developments. The historical processes in the Western and Northern parts of CEE are traditionally conceptualized within the "grand historical narratives" of the early modern periods, such as the origin of modern society, industrialization, and commercialization. However, archaeological research along with micro-history and cultural anthropology creates parallel and less universalizing views of this period. Most parts of the Polish–Lithuanian Commonwealth, for example, did not head toward proto-industrialization. On the contrary, the demand for grain in Western Europe in the fifteenth to sixteenth centuries led to the development hereof extensive agrarian production and specialized long-distance trade. In the Southeast of CEE, the trajectory of change was influenced by the long-term expansion of the Ottoman Empire (c. 1300–1700). This area was characterized by military conflicts and instability in the cultural, ethnic–religious, and socioeconomic spheres. The process of early industrialization in Hungary was significantly affected by this unfavorable situation. The long-lasting Ottoman occupation of the Southern parts and the constant fear of the threat of invasion by the Ottoman Empire, combined with frequent clashes between the nobles and the monarchs, also meant that the area of present-day Slovakia and a large part of Hungary were focused almost exclusively on agriculture, with the exception of prosperous mining towns and settlements.

Modern Industrial Era (1750–Present)

The archaeological database for this period is enormously extensive and very rich in potential (Matoušek 2011, 2015; Vařeka 2013). Nevertheless, historical archaeology of the industrial era in CEE continues to be regarded as a peripheral concern and often has been left to historical geographers, historians of science and technology, and cultural anthropologists to research. This is now changing, however, with emerging interests in the historical archaeology of this era from the perspective of (1) forensic archaeology and the archaeology of conflict, (2) the archaeology of totalitarian regimes and political crimes, (3) the archaeology of leisure (Vařeka and Symonds 2012), and (4) the archaeology of abandoned landscapes and depopulated frontier zones, such as along the Iron Curtain separating the Soviet Union sphere in Europe until 1989.

Thematic Approaches

Another way of approaching the historical archaeology of CEE, which is popular with many researchers especially those working on late medieval and modern materials, tries to dispense with the grand historical narratives and focuses instead on traditional, "anthropologically oriented" classification of finds and their functional contexts while also relating these schemes to local ethnography and the history of material culture (Smetánka and Žegklitz 1990; Krajíc 2007; Klápště 2016; Matoušek 2015; special issue of the journal *Archaeologia Historica 2017*). The following paragraphs outline a selection of these.

Material Culture Studies

The amount of archaeological evidence concerning the last few centuries has recently increased exponentially. However, there are fundamental differences in terms of their information potential between the assemblages of artifacts concerning late medieval and modern society, and only some of them can be associated with a particular social context. In some cases, the artifacts both in their place of production and in their place of consumption can be studied simultaneously, as best illustrated by a recent study of the pottery workshop of Adam Špaček in Prague (1532–1571) and the distribution of its tile production in different social milieus (Žegklitz et al. 2009). This exposed the ambivalent character of some artifact types such as relief stove tiles and connected archaeology and art history. The former helps provide information on both the provenance and the social context of the users of these tiles, while their meaning and aesthetic significance are amenable to interpretation using the methods and analytical frameworks of art history (Fig. 2; Žegklitz 2012), including questions of symbolic

Central–Eastern Europe: Historical Archaeology, Fig. 2 Artifacts between archaeology and art history. Images of the priest John Hus (Jan Hus, ca 1369–1415) burnt at the stake for heresy against the doctrines of the Catholic Church, after which he was considered by Luther and other early modern church reformers as one of their predecessors. (**a**) A stove tile, Prague Castle. (**b**) A semifinished stove tile, Prague, the pottery workshop of Adam Špaček (1532–1571). (**c**) A 1530s medal by Hieronymus Dietrich. (**d**) A woodcut by Erhard Schoen, c. 1530. (After Žegklitz 2012, Fig. 57)

culture and heraldry (e.g., stove tiles from the Wawel Castle in Cracow).

The enormous quantity of ceramic and glass evidence has also been studied by archaeologists, historians, and cultural anthropologists, and their complementary research frameworks often intermingle. Thus, some researchers have tend to use this material to explore the beginnings of modern consumer society with an emphasis on changes in well-being and easier access to goods; others have focused more on the impacts of technological innovations and the beginnings of new patterns of production, distribution, and consumption; and others still have explored changes in the direction, scale, and extent of long-distance trade and town-market exchange circles (Fig. 3; cf. Gaimster 2009). Only latterly have the transformations in the local ceramic wares become a topic of research and publication, with analyses focusing on the investigation of local craftsmen (Benkö and Kovács 2010). In Hungary, the first phase of research of this kind was marked by the investigation of prestigious ceramic wares, to a large part produced by Anabaptists (Fig. 4; with the local name Habans), and by the analysis of multicolored Majolica ware,

Central–Eastern Europe: Historical Archaeology, Fig. 3 Lump of lead (size 88.7 × 81 × 19 cm, weight 11 cwt = ca 570 kg) excavated in 2006 near to the remains of the Great Scales in the main Market Square, Cracow, with imprints of official seals from the fourteenth century, the only existing find of this sort in the world. (After Buśko et al. 2009, Fig. 4)

e.g., Iznik ware, derived from the Ottoman Empire. Anabaptists (Habans) were a radical religious sect within the reform Christian movement who lived under the protection of the Protestant lords in South Moravia and Hungary. Their closed communities excelled in various branches of specialized agriculture as well as craft production. At the end of the sixteenth century, Anabaptist potters in Moravia and Hungary introduced modern Italian or Western European production technologies, such as tin-glazed pottery (faience).

Religious Culture as Reflected in Archaeological Evidence

Important research areas between the Late Middle Ages and the early modern period are the ideology and religiosity of these periods, in particular the

Central–Eastern Europe: Historical Archaeology, Fig. 4 The motifs of Anabaptist ceramics in Moravia (ca 1600) and the excavated foundations of a pottery kiln (Strachotín, Ostrožská Nová Ves). (After Pajer 2001, book cover, příl. VIII–IX; Pajer 2007, Fig. 3)

diversity of popular responses to changes in everyday life driven by religious movements and phenomena such as Hussitism and the Reformation. In general, the research deals with the artifacts as the means of maintaining and representing social, ideological, and religious identity in internally ambivalent societies. Unique insight into the religious culture of the Late Middle Ages and the early modern period may be obtained through studying artifacts of private devotion, such as the miniature crosses found in graves or pilgrim utensils, including badges, ampoules, and water flasks (e.g., the find of 25 late medieval ceramic pilgrim flasks from Trzebnica, related to the local saint, Princess of Silesia, Jadwiga/Hedwig). As a specific case of studying religious life, research on particular monastic communities is important, especially as this offers insight into their everyday life, economic situation, and the standards of living of their members (e.g., Łekno or Strzelno in Poland, the Capuchin monastery on Republic Square in Prague).

The influence of prevailing religious culture may be approached by archaeologists with special precision through research on cemeteries. There are unique opportunities for comparing religious customs and beliefs in the centers with a high degree of social stratification and confessional diversity (e.g., the cities of Wrocław, Brno, and Prague, where Catholic [including those of monastic communities], Protestant, and Jewish cemeteries have been excavated). An example offering considerable scope for the analysis of religious self-determination as well as of the

social stratification is provided by the remains of late medieval and early modern clothes recovered from excavations at the former monastery of Boldva in Hungary which was also used by Protestant lords. Micro-historical insights can also been gleaned from uniconfessional village cemeteries, such as that in Maniowy in Lesser Poland, as the data recovered tends to concern the influence of more localized beliefs and customs of past societies. A special case of inhumations is those of "alienates," the men isolated from the "normal" majority of the buried populace because of their unusual physical or psychic characteristics (Unger 2006; Duma 2010, 2015).

As far as the development of Christian burial rite in the thirteenth to eighteenth centuries is concerned, the archaeologically studied differences cannot be directly related to such religious changes as the Reformation in the sixteenth century. The influence of general cultural innovations, including the introduction and rise of Baroque religiousness, was stronger, essentially affecting the grave furnishings in both the Protestant and Catholic areas (Králíková 2007; Scholkmann et al. 2009).

Castles, Residences, and Manors

The problems of royal and noble seats – both fortified and purely residential – and castles are being studied not only within all three pre-industrial periods of the four periods discussed above but also between them, showing long-term changes and developments. Thanks to methodical excavations of noble residences of the Late Middle Ages (such as Plemięta and Siedlątków in Poland, the late medieval Rokštejn and Lelekovice in Moravia, and the late medieval layers of the castles of Nagykanizsa, Salgó, and Fűzér in Hungary), extremely interesting assemblages of artifacts have become known (which has made it possible, e.g., to reconstruct personal armories of that period – for an overview of such sites in Poland, see Marciniak-Kajzer 2011, concerning Hungary, Benkö and Kovács 2010) (Fig. 5). Thanks to some excavations of noble seats (e.g., Nowe Miasto and Zduny in Major Poland), such long-term developments, including the changes in the building techniques and architectural forms as well as the mobile inventories, are traceable from the thirteenth/fourteenth to the seventeenth centuries.

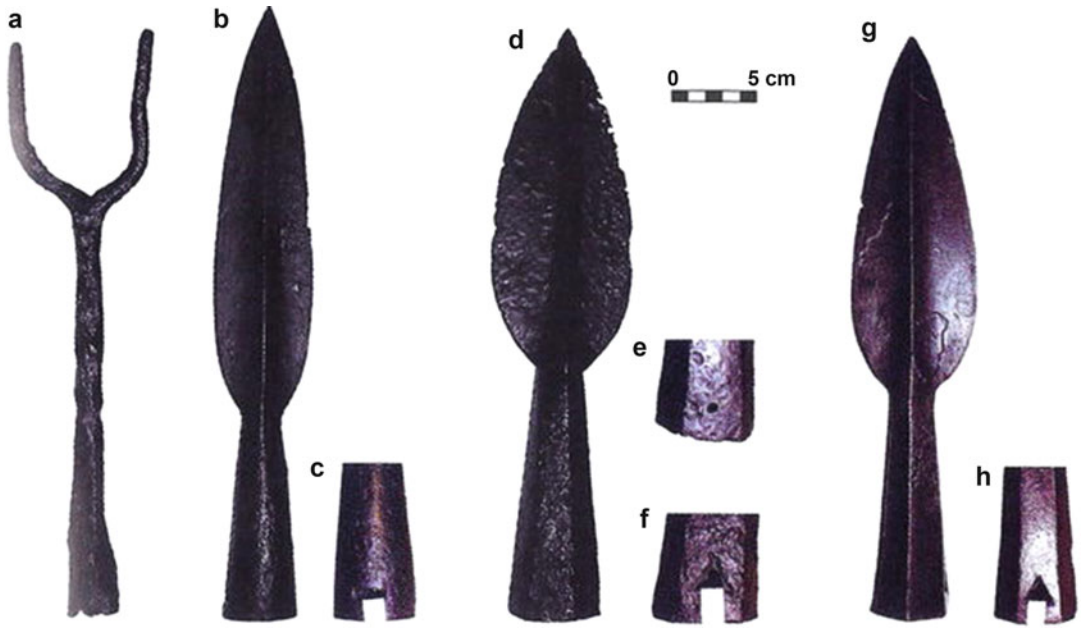

Central–Eastern Europe: Historical Archaeology, Fig. 5 Metal parts of hunting weapons discovered in the well at Castle Chojnik, Lower Silesia, Poland, sixteenth to seventeenth centuries. (After Marek 2008, Fig. 2)

Castles are also being studied by archaeologists along with historians and architects in terms of their various functions (see generally Kajzer 1996: 113–155). As the castles reflected social and cultural changes, some of them were developing (e.g., being provided with modern fortifications), while others were abandoned or replaced with newly built palaces and other forms of elite residences. Royal residences such as Prague Castle in Bohemia, Buda Castle in Hungary, Bratislava Castle in Slovakia, and the Wawel Castle in Cracow in Poland, as well as other defensive and residential structures of special significance (e.g., monastic castles of the Teutonic Order), have been the focus of much long-term research owing to the great interest among both researchers and the broader public in such spaces.

The Standards of Living in the Late Medieval and Modern Periods

Archaeological research has provided numerous testimonies of positive changes in the home comfort of late medieval and early modern townsmen, noblemen, and peasants depending on their social status and economic situation. Progress in the well-being of communities is mirrored in the technical infrastructure of urban and rural settlements (wells, paved roads, water and sewage management devices, water mills, etc.). However, the topics for discussion are (1) the chronology, geography, and detailed topography of such changes and (2) whether the development was general or reflected an increase of internal socioeconomic inequality. In this regard, urban and graveyard archaeology thus far has provided the best opportunities for studying subsistence change and the impacts of epidemics. Archaeology even makes it possible to study people's prophylactic activities (e.g., through finds of bottles in which mineral water was carried).

Landscape Archaeology

For the Western parts of CEE, there has been systematic research on the changes and continuity of settlement patterns and land use strategies, rural settlement abandonment, and the rise of small towns. Much of this has tended to support the notion of a late medieval crisis, although current research projects are also exploring the late medieval origin of the drivers of change. Increasingly, landscape archaeology of the early modern period is focused on the growing socioeconomic diversity at regional and macro-regional scales. The landscape evidence includes specific proof of both the early modern industrialization of mountainous regions (Klír 2011) and the complementary agrarian change in the lowlands and the commercialization of agriculture. In cooperation with cultural anthropologists, landscape archaeologists have begun to study human activities and social groups that are poorly represented in written sources, such as the activities of groups like charcoal burners in the forest areas. Nondestructive methods and GIS applications are also gaining in importance as is the degree of integration of various types of sources (huge inflow of new data has been recently provided by ALS). Considerable scope for new research is also offered by those areas (frontier zones, former military areas, so-called interior periphery areas) which were populated and often intensively used for agriculture until the middle of the twentieth century but are currently depopulated and forested (Fig. 6).

The Archaeology of War and Warfare

A very attractive part of the archaeological evidence of the Late Middle Ages and the early modern period is the novel information it can provide concerning the various wars and conflicts connected with the rise of modern nation-states in the region (Fig. 7; cf. Matoušek 2006). In particular, because CEE was a buffer zone, these data offer considerable scope to compare different (especially Western and Eastern) combat equipment and battle strategies. Both particular battlefields (e.g., the battlefields of Beresteczko in Ukraine, Třebel in Bohemia, and Mohács in Hungary) and their associated burial sites (e.g., on the field of the Battle of Grunwald in 1410) are being researched. Both provide insight into the techniques of warfare. The archaeology of warfare is not limited to campaigns led on land, and research is also being undertaken on sea-battle sites (e.g., underwater research of the wreck of the Swedish

Central–Eastern Europe: Historical Archaeology, Fig. 6 Example of the archaeology of an abandoned landscape in the CEE – Rozpakov, Central Bohemia, 2011: (**a**) a still-standing Baroque mill, (**b**) the perimeter wall of a defunct millrace, (**c**) dilapidated outbuildings. (Photos by D. Vodáková)

flagship Solen in Gdańsk Bay, Poland). In Hungary, a special branch of investigation focuses on the early modern (sixteenth to seventeenth century) fortifications on the Hungarian–Ottoman border with a special accent on newly erected forts. Work at one of them, Bajcsa/Weitschawar in the vicinity of the modern town of Nagykanizsa, built with finances from Steiermark, has become something of a benchmark, not only because of the large scale of excavations carried out but also because the fort is especially well preserved having been abandoned shortly after its erection (Benkö and Kovács 2010).

The Documentation of Politically Motivated Nazi and Soviet Crimes

A very specific branch of the archaeology of CEE is the research and documentation focused on the sites related to totalitarian political crimes. These are, namely, the remains of Nazi and Soviet concentration, forced-labor and prisoner-of-war camps, as well as places where the people

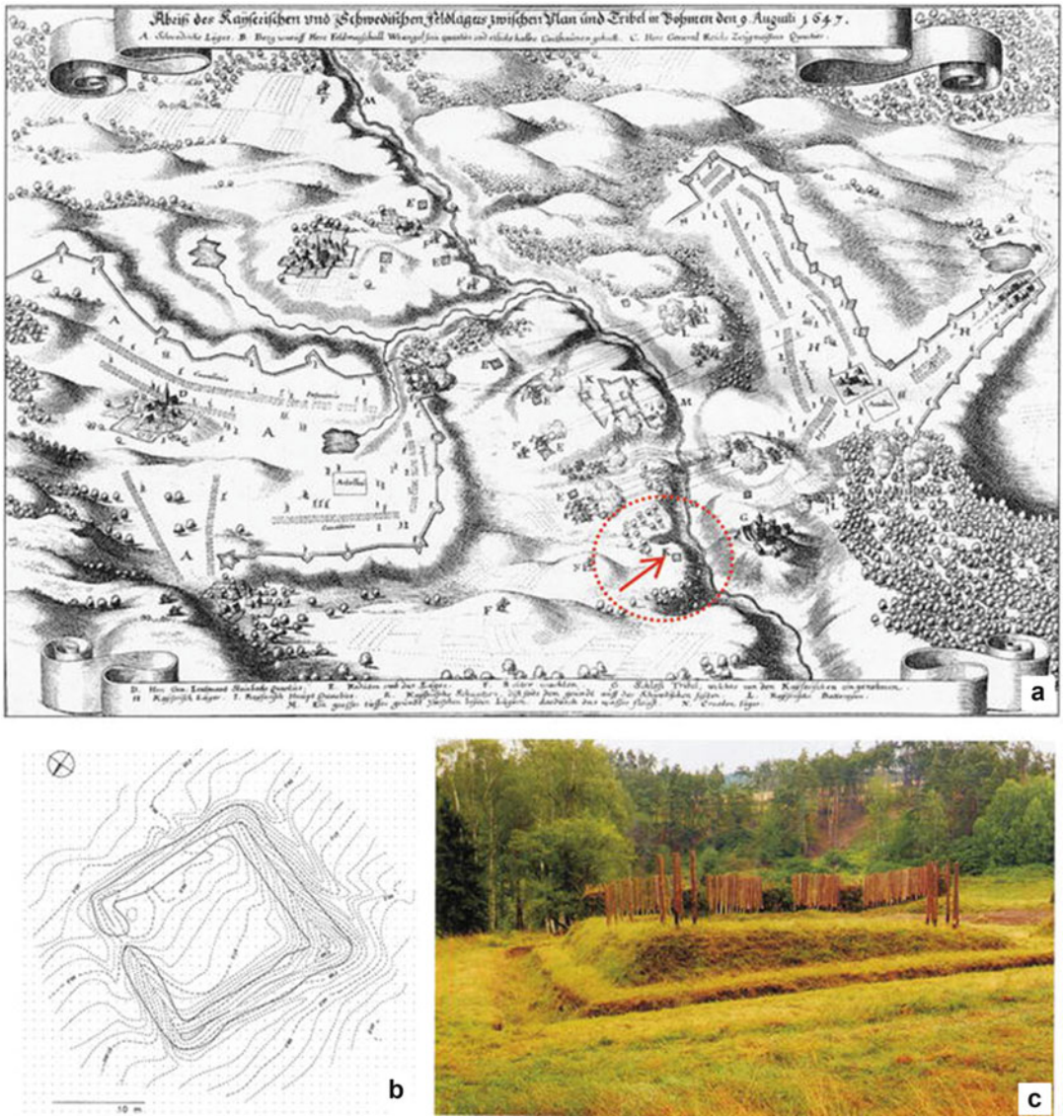

Central–Eastern Europe: Historical Archaeology, Fig. 7 The battlefield of the 30 Years' War beneath Třebel, Western Bohemia: (**a**) engraving in the Theatrum Europaeum VI depicting the battlefield on 19th of August 1647 showing the Swedish position to the left (*West*) and the Imperial Army's position on the right (*East*), (**b**) relicts of an archaeologically examined redoubt built by the Imperial Army (marked by the *arrow* on **a**), (**c**) an experimental reconstruction of the same redoubt. (After Matoušek 2006, obr. 4, 38, tab. 6)

prosecuted by these regimes were executed or buried. This branch of research is especially developed in Poland, where it fits well into the institutional framework of the respective state offices (ROPWiM and IPN) and meets the expectations of the society – especially the relatives of the murdered persons, as archaeological excavation of mass graves often makes it possible to identify the victims (Figs. 8 and 9; e.g., Charków and Bykownia, Ukraine, or Bełżec camp, Poland; see Kola 2000, 2005). In Hungary, only one branch of these excavations has been executed as yet: the exhumation of the victims of the terror after the Revolution in 1956, with a

Central–Eastern Europe: Historical Archaeology, Fig. 8 Set of wooden chess figures discovered in a mass grave of Polish officers and officials executed by the Soviets, in Charków/Kharkiv (Ukraine), grave no. 7. (After Kola 2005, Fig. 88)

Central–Eastern Europe: Historical Archaeology, Fig. 9 Some metal finds from test-excavation trenches in the area of the former Nazi camp at Bełżec. (After Kola 2000, Figs. 100–102)

special regard to the excavation of Imre Nagy and other leaders of this anti-Soviet movement.

Historical Medieval Archaeology in Southeastern Europe

Aims

The term "historical archaeology" has a separate and wider meaning in Southeastern Europe (SEE), especially as archaeological research on the Late Middle Ages and early modern period has been virtually nonexistent apart from a few studies in Bulgaria. Only excavations within churches are carried out frequently, and generally such work has been treated as being part of art history not archaeology. This is because in all of the SEE countries, the period of Ottoman rule is still seen as one of total decline and contrasted with the "glorious" Middle Ages. Hence in this part of Europe, the term "historical archaeology" is really a synonym for "medieval archaeology" and also the "nationalist archaeologies" established in the nineteenth century. These typically used the analysis of the medieval material culture of given contemporary ethnic groups to underline the glory of their medieval past thereby lending support to arguments for the achievement of modern political goals.

SEE before 1918 was inhabited by numerous ethnic groups lacking formal affiliation with specific independent states. Because of this, "historical archaeology" was used to outline the territorial borders favored by a given nationalist movement. In this sense, "historical archaeology" shared the same role in "proving" the prior existence of a national identity as historiography, often taking over its nationalist narrative, vocabulary, and delimitation of appropriate research questions. The Christian clergy also played a crucial role in the formation of nationalist archaeology in the region especially within groups of the Orthodox faith: Serbs, Romanians, and Bulgarians. This was because a significant proportion of the medieval written records for Central and Eastern Hungary, Croatia, Bosnia, Serbia, Bulgaria, Wallachia, Moldova, and the SEE territories of the Byzantine Empire were destroyed following the Ottoman conquest of the region in the fourteenth to fifteenth century and the clergy need to find other sources that might confirm their view of pre-Ottoman history.

The events of the twentieth century only partially changed the direction of research in the region. After World War I, archaeologist in the victorious countries (especially Serbia and Romania) exerted great efforts toward justifying their new borders with reference to the archaeological record. At the same time, countries on the losing side (e.g., Bulgaria) also used historical archaeology to create arguments in favor of the revision of these borders! After World War II, the Communist takeover in almost all of SEE resulted in the introduction of a new vocabulary aimed at undermining older narratives of national glory. However, the new narratives that were developed still emphasized national identities rather than those more characteristic of historical materialism (such as the rise of the proletariat). Even in Albania, the country with the most rigid Communist regime, after 1945 archaeologists continued to interpret their evidence in terms of a prevailing nationalist ideology.

New approaches eventually appeared in the last third of the twentieth century, shortly before the end of Soviet influence. These changes were marked by the development of interest in research questions dealing with everyday life and mentalities in the Middle Ages and the era of the Ottoman conquest. Historical archaeology could still be politically motivated, however, especially in the former Yugoslavia where multiple historical narratives were reformulated prior to the interethnic war of 1991–1994, with the goal of creating a climate for war. As part of this, numerous World War II mass graves were excavated, especially by Serbian authorities, in order to "prove" the genocidal tendencies of their opponents.

Chronological Framework

Today, the temporal range of what is considered to be "historical archaeology" still varies widely across SEE. In Albania and Romania, the concept has its greatest temporal depth largely because archaeology in these nations is still directed toward proving that Albanian and Romanian

ethnicities have formed the majority population since the Iron Age. The concept of continuity forms the central part of the historical narratives of these countries, regardless of the fact that until the Later Middle Ages, there is no firm evidence to support such a suggestion. The shortest time scale is used in Macedonia (=FYROM), where the rule of Tsar Samuil at the turn of the eleventh century is misinterpreted as the predecessor of the modern nation and state. In Slovenia, historical archaeology was tied to the period of the Duchy of Carantania in the eighth century especially prior to the 1970s, but nowadays also the later parts of the Middle Ages are analyzed. In Croatia, the period analyzed is that of the royal Trpimirović dynasty (eighth to eleventh century). In Bosnia, the main focus is placed on the period of the Kotromanić dynasty (thirteenth to fifteenth century), and in Serbia and Montenegro, it is the period of the Nemanjić dynasty (thirteenth to fifteenth century) that marks the start of historical archaeology. In Albania, the time scale for medieval archaeology is formed, aside from analysis of the Illyrians, by the short rule of Gjergj Kastrioti Skënderbeu (1444–1468). Generally, the nationally interpreted historical archaeology in this region is a style of scholarship that selectively focuses only on those shorter periods of the Middle Ages that are of national interest. Only in Bulgaria is historical archaeology treated more broadly, covering the periods of the two medieval Bulgarian states (seventh to tenth century and fifteenth to fourteenth century), although there is still a lack of interest in the intervening period of Byzantine rule.

Major Projects

The level of the transformation of a national archaeology into a "standard" medieval archaeology of the continental type can be measured by the level of attention devoted to themes and sites associated with low prestige, such as rural settlements and their inhabitants. This has yet to occur in SEE, and given the strong nationalist tendencies outlined above, it is perhaps inevitable that the main focus of historical archaeology in SEE has been on sites that could be interpreted as reflecting earlier national achievements and glory. These include early medieval cemeteries with rich grave goods, royal residencies, forts, and various church buildings. In the field of early medieval funerary archaeology, the main projects have been in Slovenia, Croatia, and Bulgaria (such as on the sites of Kranj and Ptuj in Slovenia, Knin–Biskupija and Nin in Croatia, and Novi Pazar in Bulgaria). The results from these have been integral to interpretations of the Köttlach culture and the cultures of the old Croats and of the old Bulgarians. Concerning early medieval residencies, large-scale excavations have been carried out mainly in Bulgaria – at Pliska and Veliki Preslav. Large-scale excavations of medieval forts have been conducted in almost all countries in the region and regularly at strongholds serving as royal or noble residences. These sites include Bled and Ljubljana (Slovenia), Medvedgrad and Bribir (Croatia), Bobovac and Kraljeva Sutjeska (Bulgaria/Hungary), Ras (Serbia), Prilep (FYROM), Veliko Tărnovo (Bulgaria), and Krujë (Albania). Finally, many medieval churches in SEE have been identified as sites of national interest and have been excavated. In these projects, the importance of the excavated remains was often overestimated so as to support a national narrative. Of broader interest is the early medieval sacral architecture of Croatia and Bulgaria, as well as the thirteenth- to fifteenth-century churches of Serbia, Kosovo, Macedonia, and Greece.

International Perspectives

From the viewpoint of an insider, CEE must be conceived simultaneously as a region in itself and as a transitional, buffer zone. It was not only an area which passed Western traditions eastward but also a very specific region which accepted cultural stimuli from the East (e.g., Oriental customs in clothing and military equipment). In one sense, CEE is very much a frontier zone, a place where Western trends and patterns end (and it is a matter of constant discussion where exactly and how they were adapted to local contexts) and where the Eastern ones did not yet begin. On the other hand, for each subperiod CEE must be conceived as responsive to

different networks of external relations. Thus, for instance, in the Late Middle Ages, CEE was part of the peripheral zone of the West-European core, along with other "fringe" areas (e.g., Germania Slavica, Scandinavia, the British Isles). In the industrial era, on the other hand, CEE was part of a different periphery along with other areas on the Northern and Eastern edges of Western civilization, such as the Baltic and Danubian areas.

Future Directions

Historical archaeology in CEE is a young and rapidly expanding subdiscipline. In terms of its theoretical framework, objectives, research topics, and publications, late medieval and post-medieval archaeology (1450–1800) is already relatively well established and is widely taught at university level. In contrast, the archaeology of the later modern and recent past (1800–present) is still evolving. Currently it is fragmented into a myriad of component topics, more often inspired by topical issues in cultural and social anthropology and history than by archaeological concerns. However, the level of popular interest in the archaeology of the more recent past has grown enormously, largely thanks to a general shift of interest away from earlier history (the Middle Ages, the early modern period) to the region's most recent history, and it is no mere coincidence that the archaeology of the modern period has developed chiefly at newly established universities and other centers of higher education. This shift in popular interest toward modern history, especially World War II, forces both archaeologists and heritage management authorities to cooperate with amateur groups attempting to explore the material remains of the recent past. The development of a suitable legal and practical framework for such cooperation is certainly one of the most important tasks for the future. South-eastern Europe is specific also in terms of this problem. As at the turn of the 1990s, various "historical arguments" were produced concerning the territory of the former Yugoslavia that created a climate of war and revenge. Special effort is now needed to reveal the untruthful nature of these narratives, especially those elements connected with nationalist-inspired interpretations of the region's historical archaeology.

Cross-References

- ▶ Buildings Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Churchyard Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Hanse Archaeology
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Landscape Archaeology
- ▶ Medieval Russia (Rus'), Archaeology of
- ▶ Medieval Urbanism
- ▶ Modern World: Historical Archaeology
- ▶ Multicultural Archaeology
- ▶ Ottoman Empire: Historical Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Post-Medieval Archaeology (Europe)

References

Benkö, E., and G. Kovács, eds. 2010. *A Középkor és kora újkor régészete Magyarországon. I–II. Archaeology of the Middle Ages and the early modern period in Hungary*. Vol. 1–2. Budapest: MTA Régészeti Intézete.

Buśko, C., M. Dereń, and A. Garbacz-Klempka. 2009. Konfekcjonowanie ołowiu i miedzi w krakowskiej Wielkiej Wadze. *Archaeologia Historica Polona* 18: 7–20.

Carver, M., and J. Klápště, eds. 2011. *The archaeology of medieval Europe. volume 2: Twelfth to sixteenth centuries*. Aarhus: Aarhus University Press.

Duma P. 2010. *Grób alienata – pochówki dzieci nieochrzczonych, samobójców i skazańców w późnym średniowieczu i dobie wczesnonowożytnej* [Grave of an alienate: Burials of unbaptized children, suicides and convicts in the Late Middle Ages and early modern times (in Polish)]. Kraków: Avalon.

Duma, P. 2015. *Śmierć nieczysta na Śląsku. Studia nad obrządkiem pogrzebowym społeczeństwa przedindustrialnego [Profane death in Silesia. A study on funeral practices of the preindustrial society (in Polish)]*. Wrocław: Instytut Archeologii UWr.

Gaimster, D. 2009. An embarrassment of riches? Post-medieval archaeology in northern and central Europe. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 525–547. New York: Springer.

Kajzer, L. 1996. *Wstęp do archeologii historycznej w Polsce [An introduction to historical archaeology in Poland, (in Polish)]*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

Klápště, J. 2012. *The Czech lands in medieval transformation*, East central and eastern Europe in the Middle Ages, 450–1450 2. Leiden: Brill.

Klápště, J. 2016. *The archaeology of Prague and the Medieval Czech Lands, 1100–1600*, Studies in the archaeology of Medieval Europe. Sheffield: Equinox.

Klír, T. 2011. The rural settlement in Bohemia in the 'age of transition' (14th–16th century): Research concept and preliminary report. *Medieval Settlement Research* 25: 52–61.

Kola, A. 2000. *Bełżec: The Nazi camp for Jews in the light of archaeological sources. Excavations 1997–1999*. Warsaw: The Council for the Protection of Memory of Combat and Martyrdom and the United States Holocaust Memorial Museum.

Kola, A. 2005. *Archeologia Zbrodni. Oficerowie polscy na cmentarzu ofiar NKWD w Charkowie [Archaeology of crime: Polish officers at the cemetery of NKVD victims in Charków/Kharkiv]*. Toruń: Uniwersytet Mikołaja Kopernika.

Krajíc, R. 2007. Archaeology of the post-medieval period. The current state of research and research perspectives in southern Bohemia. In *Studies in post-medieval archaeology*, ed. J. Žegklitz, vol. 2, 57–96. Prague: Archaia.

Králíková, M. 2007. *Pohřební ritus 16–18. století na území střední Evropy [Burial rite of the 16th–18th century in the central European area]*. Brno: CERM.

Marciniak-Kajzer, A. 2011. *Średniowieczny dwór rycerski w Polsce. Wizerunek archeologiczny [The medieval noble seat in Poland: An archaeological view]*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

Matoušek, V. 2006. *Třebel – Obraz krajiny s bitvou [Třebel – Das Landschaftsbild mit der Schlacht]*. Praha: Academia.

Matoušek, V. 2011. Archeologický výzkum novověku a moderní doby v České republice. Několik poznámek k historii, současnému stavu a perspektivám [Archaeology of new age and modern period in the Czech Republic. Some remarks on history, the actual state and perspectives]. *Historická Sociologie* 2011: 37–58.

Matoušek, V. 2015. Archeologie novověku – univerzální disciplína pro studium třicetileté války, průmyslové revoluce i současné konzumní společnosti?: (několik poznámek k přesahování zájmu archeologie za hranice středověku) [Archaeology of modern times – a universal discipline for the study of the Thirty Years War, Industrial Revolution and contemporary consumer society? (Some remarks on the interest in archaeology overlapping the Middle Ages)]. *Hospodářské dějiny = Economic History* 28 (2013): 67–86.

Pajer, J. 2001. *Novokřtěnské fajánse ze Strachotína [Anabaptist faiences from Strachotin]*. Mikulov: Regionální muzeum Mikulov.

Pajer, J. 2007. Archaeological excavations of Anabaptist ceramics in Moravia. In *Studies in post-medieval archaeology*, ed. J. Žegklitz, vol. 2, 227–250. Prague: Archaia.

Piekalski, J. 2001. *Von Köln nach Krakau: der topographische Wandel früher Städte*, Zeitschrift für Archäologie des Mittelalters, Beiheft 13. Bonn: Verlag Dr. Rudolf Habelt.

Piekalski, J., and K. Wachowski. 2009. Die Wende des 15. und 16. Jahrhunderts in den Städten Schlesiens. In *Zwischen Tradition und Wandel. Archäologie des 15. und 16. Jahrhunderts, Tübinger Forschungen zur historischen Archäologie*, ed. B. Scholkmann et al., vol. 3, 409–420. Büchenbach: Dr. Faustus Verlag.

Smetánka, Z., and J. Žegklitz. 1990. Post-medieval archaeology in Bohemia and its problems. In *Studies in post-medieval archaeology*, ed. Z. Smetánka and J. Žegklitz, vol. 1, 7–21. Prague: Archaeological Institute of the Czechoslovak Academy of Sciences.

Unger, J. 2006. *Pohřební ritus 1. až 20. století v Evropě z antropologicko-archeologické perspektivy [The burial rite of the 1st–20th centuries in Europe from the anthropological-archaeological perspective]*. Brno: CERM – Masarykova univerzita – Nauma.

Vařeka, P., ed. 2013. *Archeologie 19. a 20. stolet olet 9. a – metody – tetody*. Plzeň: Západočeská univerzita v Plzni.

Vařeka, P., and J. Symonds. 2012. The archaeology of tramping. The field research of the "Duck Valley" campsite near Jezerce in the Stříbro region (The Pilsen district). In *Spare time: Utopias on the verge of commonness*, 69–80. Prague: Národní galerie v Praze.

Žegklitz, J. 2012. Prints and other artwork models for motifs on stove tiles from the Czech lands. Renaissance stove tiles as a means for disseminating ideas and culture during the age of reformation. In *Studies in post-medieval archaeology*, ed. J. Žegklitz, vol. 4, 25–112. Prague: Archaia.

Žegklitz, J., M. Vitanovský, and J. Zavřel. 2009. An assemblage of stove tile moulds from the Prague pottery workshop of Adam Špaček and its tile production in the years 1531–72. In *Studies in post-medieval archaeology*, ed. J. Žegklitz, vol. 3, 207–272. Prague: Archaia.

Further Reading

Bejko, L., and R. Hodges, eds. 2006. *New directions in the Albanian archaeology: Studies presented to Muzafer Korkuti*, International Centre for Albanian archaeology, monograph series 1. Tirana: International Centre for Albanian Archaeology.

Fiedler, U. 2008. Bulgars in the Lower Danube region. A survey of the archaeological evidence and the state of research. In *The other Europe in the Middle Ages: Avars, Bulgars, Khazars and Cumans*, East central and eastern Europe in the Middle Ages, 450–1450 2, ed. F. Curta and R. Kovalev, 151–234. Leiden: Brill.

Galeran, P., and P. Allegretti, eds. 2001. *Bizanti, Croati, Carolingi. Alba e tramontano di regni e imperi*. Skira: Ginevra-Milano.

Marek, L. 2008. Żeleźce nowożytnej broni myśliwskiej ze studni zamkowej na Chojniku [Post-medieval spearheads from hunting weapons discovered in Castle

Chojnik]. *Śląskie Sprawozdania Archeologiczne* 50: 323–331.
Myśliwsky, G. 2012. Central Europe. In *Agrarian change and crisis in Europe, 1200–1500*, Routledge research in medieval studies 1, ed. H. Kitsikopoulos, 250–291. New York: Routledge.
Petrinec, M. 2009. *Groblja od 8. do 11. stoljeća na području ranosrednjovjekovne hrvatske države*, Monumenta medii aevi Croatiae 3. Split: Muzej Hrvatskih Arheoloških spomenika.
Stan i potrzeby badań archeologicznych nad późnym średniowieczem i okresem nowożytnym w Polsce [The state and requirements of the archaeological research on the late Middle Ages and the modern period in Poland] (Prace i Materiały Muzeum Archeologicznego i Etnograficznego w Łodzi 36). Łódź: Muzeum Archeologiczne i Etnograficzne.

Centre for Archaeological Sciences (Katholieke Universiteit Leuven)

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Basic Information

The Katholieke Universiteit Leuven (K.U. Leuven, Belgium, http://www.kuleuven.be/english), founded in 1425, has a rich tradition of learning and research of almost six centuries. Among its most famous researchers are Vesalius, Rega, Erasmus, and Mercator. Fundamental research at the university is specifically profiled through the virtual disappearance of interdisciplinary boundaries. An example of this strategy in the past decades has been the cooperation between archaeological projects and several disciplines from the exact sciences. Especially the research unit on Eastern Mediterranean Archaeology, with the excavations at Turkish Sagalassos, had established an interdisciplinary approach, spanning more than 30 years. In the light of the increasing importance of such interdisciplinary research in all fields and areas of archaeology, it was decided in 2005 to create the *Centre for Archaeological Sciences* (*CAS*), 1 of only 12 excellence poles at the K.U. Leuven selected after international peer review. The main goal of this interdisciplinary center of excellence was to support K.U. Leuven and international archaeological research projects with an extensive and in-depth experience built up in the faculties of exact sciences, biomedical sciences, and engineering in Leuven. In 2010, it was decided to continue *CAS* as a center of excellence under the "program financing" scheme of the university. In this way, the center will certainly remain funded until 2017. A shift in focus was made from site-driven research to a more methodological approach to archaeological science. While the center was founded by Professor Marc Waelkens (2005–2010), the current director (as of 2010) is Professor Patrick Degryse.

Major Impact

CAS currently acts as a focal point for archaeological science research, to be made available to the international community, comprising several different specialities. In particular, prime research areas are palynology and paleobotany (including carpology), vertebrate and invertebrate archaeozoology, paleolandscape and climate reconstruction, remote sensing, human-environment interactions (integrating all of the aforementioned), physical anthropology (using stable isotopes, CT, and aDNA), organic (using residue and lipid analysis and aDNA) and inorganic (soil, clay, stone, etc.) raw material research and archaeological materials science, and archaeometry (ceramic, glass, metal, mortar, stone, etc. characterization through mineralogy, petrography, and geochemistry, including radiogenic isotopes). The center is composed of over 20 international postdocs and doctoral researchers in several disciplines of bio-, geo-, and medical sciences, supported by senior researchers from all the aforementioned faculties (www.archscience.be).

Cross-References

▶ Archaeometry: Definition
▶ Geoarchaeology
▶ Provenance Studies in Archaeology

C

Further Reading

Abu-Jaber, N., E. Bloxam, P. Degryse, and T. Heldal. 2009. *QuarryScapes: Ancient stone quarry landscapes in the eastern Mediterranean*. Trondheim: Geological Survey of Norway.

Degryse, P., and M. Waelkens. 2008. *Sagalassos VI: Geo- and bio-archaeology at Sagalassos and in its territory*. Leuven: Leuven University Press.

Degryse, P., J. Henderson, and G. Hodgins. 2009. Isotopes in vitreous materials, a state-of-the-art and perspectives. In *Isotopes in vitreous materials*, 15–30. Leuven: Leuven University Press.

Centuriation and Roman Land Surveying (Republic Through Empire)

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Introduction

Centuriatio or *limitatio* was a Roman method of land delimitation and division by means of orthogonal and equidistant *limites* (literally, borders). Depending on the local geomorphology, these were roads and/or ditches and defined mostly square, less frequently rectangular, areas of fixed dimensions named *centuriae*; in many cases, each *centuria* was 200 *iugera* (50.4 ha) wide.

Centuriation accompanied Roman colonization and provided the new settlement with productive soil, proper infrastructure (roads, ditches, if necessary bridges), and a cadastral frame for allocating land to colonists (Fig. 1).

Centuriatio and land surveying are documented by Roman, late Roman, and medieval texts and also by archaeological evidence. The study is based on Roman, late Roman, and medieval texts and inscriptions; historical maps and scientific cartography; local geomorphology and paleogeography; archaeological survey and excavation; ancient surveying instruments; toponyms; remote sensing; geophysical surveys; computer-based analysis; and increasingly by GIS (geographic information systems).

The fundamental textual source is the *Corpus Agrimensorum Romanorum* (*CAR*), a collection of texts by different authors on several aspects of land surveying. The original compilation is dated to the fifth century CE, while other writings were added afterward (Campbell 2000: xxii; Toneatto 2010).

In the Mediterranean and Near Eastern worlds, the main principles of land division and allocation have very ancient origins, but the instruments, terminology, and peculiarities of Roman land surveying highlight the specific autonomy of the Roman procedure (Lewis 2001: 123).

Centuriatio/limitatio was applied from the late fourth century BCE, when Rome took over the Latin League and started founding colonies. It accompanied the whole history of Roman colonization, which consisted both of the foundation of new towns (*coloniae*) and the settling of individual colonists (*ager viritim divisus*: viritane settlement or viritane colony). In some areas, the territories of *municipia* or even smaller places came to be centuriated (Dilke 1971: 88, 221; Campbell 2000: 321–322). The *centuriatio* was constructed by land surveyors who first carefully explored the territory in order to choose the proper orientation of the centurial grid. Then, using their instruments (mainly the *groma*), they traced orthogonal *rigores* (straight lines) which were contextually fixed on the soil by stones or sticks and subsequently converted into *limites* (roads or ditches) by the colonists who worked under the supervision of the land surveyors and the magistrates appointed as commissioners for the new urban foundation. The two orthogonal *limites* intersecting at the central point of the centuriated area were named *kardo maximus* and *decumanus maximus*, according to their orientation: the former often ran north–south, the latter east–west. The other *limites* were then traced parallel to the first ones; they were called *kardines*/*cardines* and *decumani*/*decimani*.

In the final phase of the colonial foundation, colonists were assigned their plots by drawing

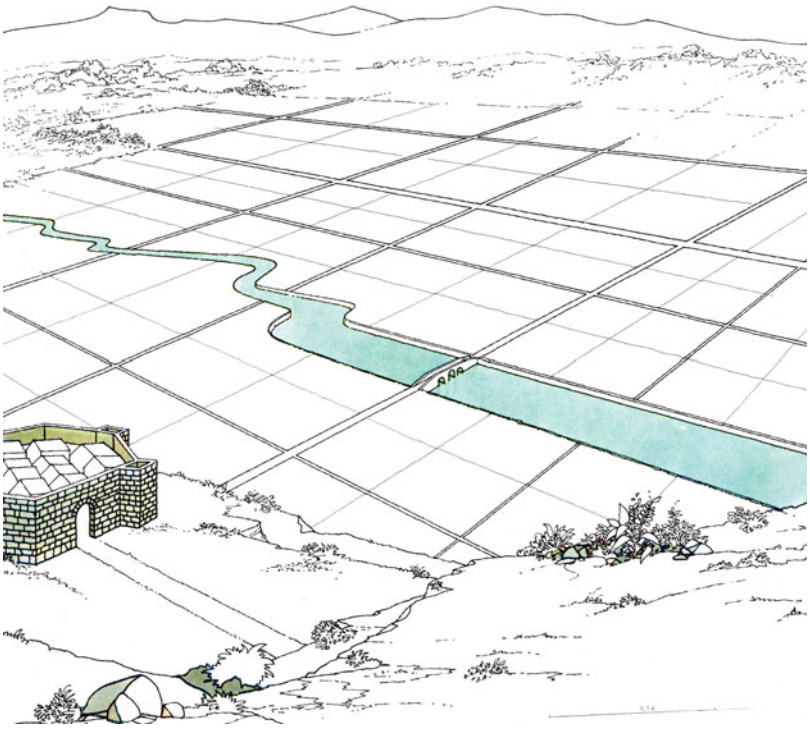

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 1 A colony and its centuriated landscape

lots. The surveyors initially registered the results on temporary tablets and finally on bronze or marble tablets which were carefully prepared and displayed to the public in the local archives. Copies were kept in the urban archives, showing that the procedure was centralized and strictly controlled by Rome and at the same time a relevant matter of public solicitude in local communities (Campbell 1996: 90). The operations described here usually required at least 3 years to complete (Dilke 1971: 35). Centuriation had a relevant role in enhancing the rural economy and defining the rural property.

Since centuriation conformed to the local geomorphology and hydrography, in most areas of the Roman world these land divisions persisted through Late Antiquity and the Middle Ages and still persist in many landscapes of the Roman world; it is very evident in southern Europe and North Africa (Campbell 1996: 75) (Fig. 2). In some countries, the surviving evidence is protected by local cultural heritage agencies as specific and fundamental historical/cultural landscapes.

Definition

The term *centuriatio* derives from *centuria* and this from *centum* (one hundred) since, according to ancient sources, its size originally corresponded to one hundred *heredia*. *Heredium* (hereditary parcel) was the amount of land allocated by Romulus to each Roman citizen, according to an anachronistic tradition of the late Republican (Gabba 1978). The term *limitatio* derives from *limes* (boundary, in agriculture a path or baulk; Dilke 1971: 87). The roads and/or ditches (*limites*) forming the centurial grid were called *kardines* or *cardines* (often oriented north–south) and *decumani* (later *decimani*, often oriented east–west).

The main ones, intersecting at right angles in the center of the centuriated area, were the *kardo maximus* and the *decumanus maximus*, abbreviated as KM and DM. *Kardo* (hinge) was used also of any pivot, axis, or pole (Dilke 1971: 87, 231). *Decumanus* derives from *decimus* (tenth): according to the sources (Siculus Flaccus 153 and 136 L; *Hyginus* 115 L), the term derived from the

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 2 Centuriated landscape of Modena (*Mutina*): an aerial view

number 10, since 10 *actus* of length were the sides of the squares forming an early land division called *agri quaestorii* (Dilke 1971: 88, 231–232).

Historical Background and Key Issues

Roman surveying theory and practice were closely intertwined with the Etruscan ones, on account of geographical proximity, as well as historical and cultural connections. They largely derived from the Greek experiences, which in turn descended from Egyptian, Mesopotamian (mainly Babylonian), and possibly Persian ones (Lewis 2001: 13–18, 115).

Although ancient traditions trace the main principles of land division and allocation to the origins of Rome, on the ground of evidence, centuriation originated in Italy at least in the late fourth century BCE (Lewis 2001: 122), when Rome took over the Latin League, becoming the main power in central Italy (338 BCE) and winning wars that ushered in a massive program of colonization. Since the Roman colonization involved land distribution to colonists, the *centuriatio* was certainly carried out since the earliest colonization and evolved in step with it.

At the conclusion of successful military campaigns, part of the territory belonging to the defeated communities was usually confiscated and annexed to the Roman state domain (*ager publicus populi Romani*). Part of it could be used to settle a colony: military motives were decisive in choosing the site and the type of the colony (Campbell 1996: 82).

In many cases, the colony consisted of a new town and a dependent territory partly centuriated and assigned to the colonists (*colonia*); in other cases, the territory was centuriated and distributed to individual settlers (*assignatio, ager viritim divisus*: viritane settlement or viritane colony) and no town was built; these communities were essentially rural ones, administered directly from Rome and eventually connected to a local administrative or market center (*conciliabulum* or *forum*) (Broadhead 2007: 154).

Prior to 200 BCE, the responsibility for foundations lay with the Roman Senate and in the second century with plebeian tribunes. The plebeian assembly (*concilium plebis*) was determined by law (*lex coloniae*), the location where a new colony was to be settled, the number and legal status (Latin or Roman) of the colonists, funds, and size of allotments, etc. (Broadhead 2007). Founding commissioners were appointed for the various aspects of the foundation. They were of senatorial rank and usually three in number (*tresviri coloniae deducendae [agroque dividundo]*: Campbell 2000: xlix;

triumviri agris iudicandis adsignandis). They enrolled the colonists and directed them while marching and settling in the assigned area; their staff included land surveyors and related assistants.

The colony's territorial boundaries were laid out; the urban and the rural or, in case of viritane colonization, just the rural areas were defined; and part of the territory was centuriated and assigned.

In the Latin colonies (founded up until 180 BCE), allotments were rather large and distributed according to rank. In the Roman colonies, allotments were small in the earlier phase, but then became larger from the early second century BCE.

From the late second century BCE until the age of Augustus, colonization increasingly concerned land obtained through means other than traditional conquest and confiscation: Roman communities were often mulcted of their land in order to satisfy the economically disadvantaged or reward discharged army veterans (Roselaar 2010). From Sulla's dictatorship until the end of the Republic, colonies were founded and land was distributed in Italy by the military dynasts without deferring to the senate (Campbell 1996: 81; Broadhead 2007: 158–162).

Augustus played a crucial role in land distributions to veterans: after the ravages of civil war, he applied procedures which raised confident expectations that the object of government was to preserve property rights and the population would no longer be deprived of their property (Campbell 1996: 98–99). Following his principate, the foundation of military colonies continued until the time of Hadrian, but more soldiers received cash handouts than were settled in military colonies (Campbell 1996: 81).

In the Imperial period, emperors themselves founded colonies. They usually delegated the various tasks connected with the foundation to an agent (Campbell 1995: 541, 1996: 94).

The foundation of a colony was formally started by the founder (a magistrate in the Republican period, the emperor or a member of the imperial family under the Empire) and an *augur*, since the religious and technical aspects were intertwined. The *augur* would take the auspices; in case they were favorable, the founder would duly approve the beginning of the land surveyors' work (Dilke 1971: 89).

The surveyors planned and constructed the centuriation, assigned the plots by drawing lots, and settled possible (and frequent) legal quarrels, as documented by sources including the technical writings in the *CAR*. They were originally called *finitores*, then *metatores*, *mensores*, *agrimensores*, sometimes *decempedatores*, later *gromatici* after the names of their most typical tasks or instruments (Lewis 2001: 3, 21 n 32, 122, 323; Toneatto 2010: 53). The technical aspects of their profession were certainly in progress (Hyginus, *The Establishment of limites*, in Campbell 2000: 135–135, 23) from the earliest times through the Empire and Late Antiquity, but on evidentiary grounds, it is very hard to follow this development in detail. It is clear that the land surveyors had specific professional expertise and training.

In the Imperial period, the nonmilitary surveyors were freedmen, slaves, and possibly free citizens as well (none of these appear to be of senatorial or equestrian rank). The practitioners of surveying remained men of low rank. In the army, surveyors seem usually to be ordinary soldiers ranking among the *immunes* and attached to legions, praetorian *cohors*, and auxiliary units. Military surveyors could be involved in civilian projects both in Italy and in the provinces. In all cases, they executed decisions made by persons of higher status (Campbell 2000: xlvii–lii, l–li and n 150).

When large-scale foundations ended in the second century CE, the surveyors still had important tasks, which included overseeing or enlarging existing settlements, contributing to settle quarrels, and surveying land for the government for taxation, boundary demarcation, or other reasons (Campbell 1996: 98). They maintained an important role in the late empire as well (Campbell 2000: lii: Cassiodorus *Variae* 3.52).

The land surveyors explored the area first; observed the hydrography, slopes, and soil characteristics; and chose the proper orientation of the *centuriatio* in order to provide the territory with adequate drainage. Then they traced a grid of lines (*rigores*) using their instruments, marked them temporarily by means of stones or sticks, and directed the colonists in constructing the infrastructure (roads and ditches/channels) which converted

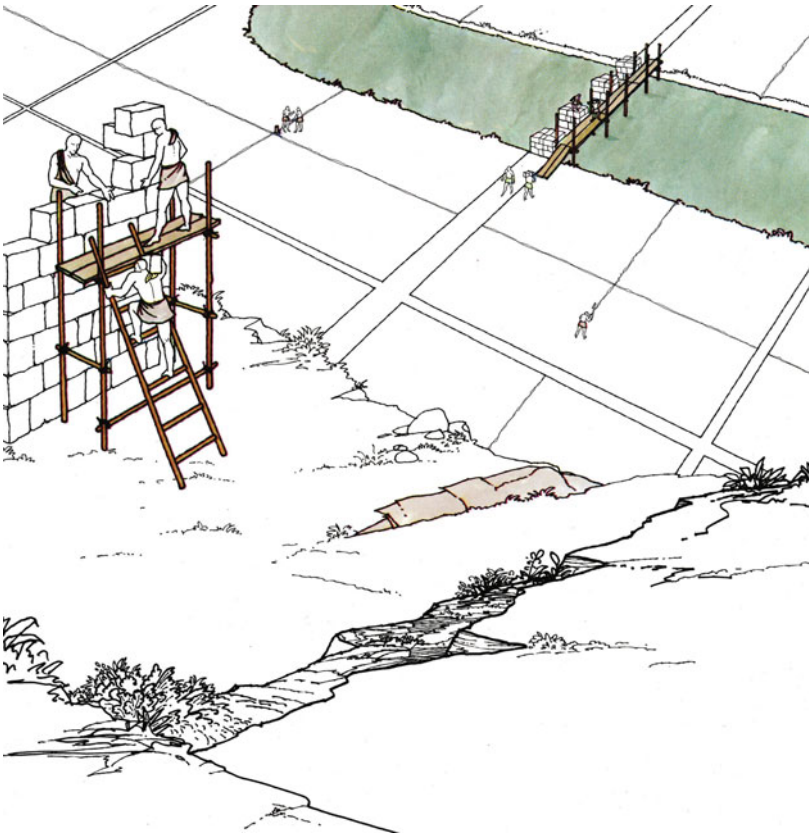

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 3 Construction of a centuriated landscape

the *rigores* into a grid of *limites*; eventually other infrastructure was built (e.g., bridges) (Fig. 3).

The standard surveying equipment was unsophisticated: it included the *groma*, measuring tools, plumb-line level, portable sundial, and writing and drawing aids, as documented by written sources (mainly the *CAR*) and archaeological evidence (Dilke 1971: 66–81; Moatti 1993: 31). As for the latter, in 1912 in Pompeii, Della Corte excavated the workshop (*Regio* I.6.3) used by the blacksmith (*faber aerarius*) Verus, who repaired and/or resold objects of various sorts. Among them, those related to the surveying equipment were a *groma* (see below), folding ruler, two bronze compasses, the bronze parts of wooden chests and a key, pincers, a conical ferrule, end pieces of a measuring rod, thin iron tools, an ink bottle and a stylus (evidence of wax tablets for notes and papyrus for writing), pieces of a measuring rod, and a portable sundial, in the form of an ivory box. The gnomon which was used with it was not discovered. On the lid, thirteen converging lines are incised, which showed the daylight hours from first to twelfth without seasonal correction; on two sides, the box has lines with marks indicating measurements (digit, inch??) (Dilke 1971: 70–73).

The principal surveyor's device was the *groma* (*gruma* and the verb *grumare/degrumare* in Republican Latin sources, *groma*/*croma* under the Empire: Lewis 2001: 125). The name derived via Etruscan from Greek *gnoma*, a by-form of *gnomon*. The term is usually applied to a sundial pointer, but could mean any indicator or mark (Dilke 1971: 66, 1974: 569–573; Schiöler 1994; Lewis 2001: 125). The *groma* is most probably the same instrument mentioned as *ferramentum* (iron instrument) by the authors in the *CAR* and was used in military and civilian surveying mainly to establish the orthogonal patterns of land divisions, town streets, and military forts and camps (Lewis 2001: 120–133). The understanding of the *groma* and related operations is

based on archaeological and written sources, but some aspects remain unclear (Lewis 2001: 4, 124). Reconstructions have been proposed on the basis of *CAR* and archaeological evidence.

On the basis of the metallic portions of the device interpreted as a *groma*, found in Pompeii (*Regio* I.6.3), Della Corte (1922) reconstructed the tool (Fig. 4) by adding the wooden parts and the plumb cords, which had perished, in the shape of a vertical wooden staff with a fluted iron shoe. At its top, a horizontal bracket made of wood and iron was fixed by a bronze pivot. At the opposite extremity of the bracket, a wooden cross (*stella*) with four arms (*corniculi*) and iron sheeting was pivoted. Near the end of each arm, a plumb line hung through a hole; a fifth one must have been fixed in the center of the *stella* (Dilke 1971: 69–71, 1974: 569). In Pompeii (*Regio* I.6.3: *Verus*' workshop), four plumb bobs were found, identical in two pairs (Adam 1982; Schiöler 1994: Lewis 2001: 126–129; Figs. 5.1–5.2). Evidence of the *groma* is also provided by low-relief carvings on the tombstones of the surveyor Lucius Aebutius Faustus (from *Eporedia*/Ivrea: *CIL* 5.6786) and of Popidius Nicostratus (from Pompeii, Porta Nocera) dated to the first century CE, both showing parts of a dismantled *groma*.

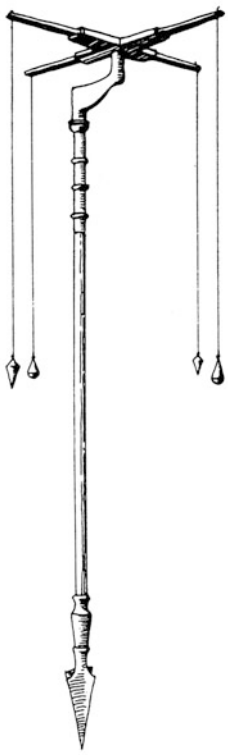

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 4 Groma according to Della Corte (1922)

Another fundamental device used in land surveying was the *decempeda* or *pertica*, a 10-foot-long wooden shaft; it was equipped at the end with a bronze ferrule marked in digits or inches for small measurements and flanged so as to abut neatly against its neighbor. Examples were found at Enns (Austria) and Pompeii. The Roman surveyors seem to have used ten-foot shafts in pairs, while there is hardly any evidence that they used cords for measuring long distances (Lewis 2001: 21).

The metal portions of a rigid iron cross, possibly a Roman surveying instrument, were found at Pfünz, on the Roman frontier near Eichstatt (Bavaria, Germany) before 1901 (Dilke 1971: 69, 1974: 569; Lewis 2001: 129).

The surveyors started (Campbell 1996: 82) at a point chosen as the main intersection (*tetrans*) of the orthogonal *limites* which were traced first, the *kardo maximus* and *decumanus maximus*: the intersection could be located at or near the central point of a settlement, on an existing road in a settlement, at a point not far outside an existing or planned new town, and at a distant point from this (Dilke 1971: 88–89). The starting point of any centuriation was called *locus gromae* evidently from the tool (in military camps Campbell 2000; li).

In order to construct the *centuriatio* in line with the chosen orientation, the compass points were preliminarily identified. South was precisely individuated by a sundial or a portable sundial following an established methodology (Hyginus Gromaticus, *Establishment*, 152.4-22; Vitruvius, *Arch*. 1.6.6-7): the surveyor drew a circle on flat soil and put a vertical sundial gnomon in its center. The shadow would at times fall in the circle, at times outside; when the shadow reached the circumference, the point was marked, the same when the shadow left the circle (i.e., before and after noon). A straight line was drawn through the two points and bisected: it identified south. A more complex method, certainly deriving from Alexandrian scholarship, was based on the use of a gnomon, the marking and measuring of three shadows (Dilke 1971: 56–58, 86; Lewis 2001: 22–23, 123).

The surveyor planted vertically the *groma* in the ground, the bracket length away from the chosen center of survey, which was fixed on the soil by a stone or stake and plumbed the *groma* vertical. The horizontal bracket was twirled until its free extremity pivoting the center of the cross (*umbilicus soli*) was vertically above the marker, as checked by plumb lines. The cross was then swung until its arms and cords matched with the chosen alignment (Fig. 5).

Across opposite plumb cords, the surveyor sighted at shafts set by collaborators in order to mark a straight line and across another pair to delineate the orthogonal one. The linear measures chosen for the *centuriae* (mostly 20 × 20 *actus*, 2400 × 2400 Roman feet, 709.68 m, producing an area of 200 *iugera*, 50.4 ha) were progressively marked off in both directions starting from the main intersection (Dilke 1971: 89; Campbell 1996: 84). The operation was repeated until the entire area was surveyed (Lewis 2001: 124, 127). The sighted lines (*rigores*) had no width, were made evident by placing stones or wooden stakes at definite distances, and marked the alignments of the *limites* which, according to the local geomorphology, took the form of roads and/or ditches or channels (Campbell 1996: 84).

The *groma* only enabled straight lines, squares, and rectangles to be surveyed. The Roman surveyors, like the Greek ones, worked with simple Euclidean geometry, notably in the form of similar triangles in the horizontal or roughly horizontal plane (Fig. 6). For arithmetical calculations, they no doubt used the *abacus*, which was well known throughout the ancient world (Lewis 2001: 22).

Whenever the surveyor encountered a steep-sided valley, he carried out the operation known as *cultellatio*. He held a ten-foot rod horizontal with one end resting on the ground at the start of the slope. From the other end, he dropped a plumb line and marked the point where it hit the ground. He moved the rod, still horizontal, so that its uphill end rested on this point; dropped the plumb line again; and so proceeded down one side of the valley and up the other, counting horizontal ten-foot steps but ignoring the vertical

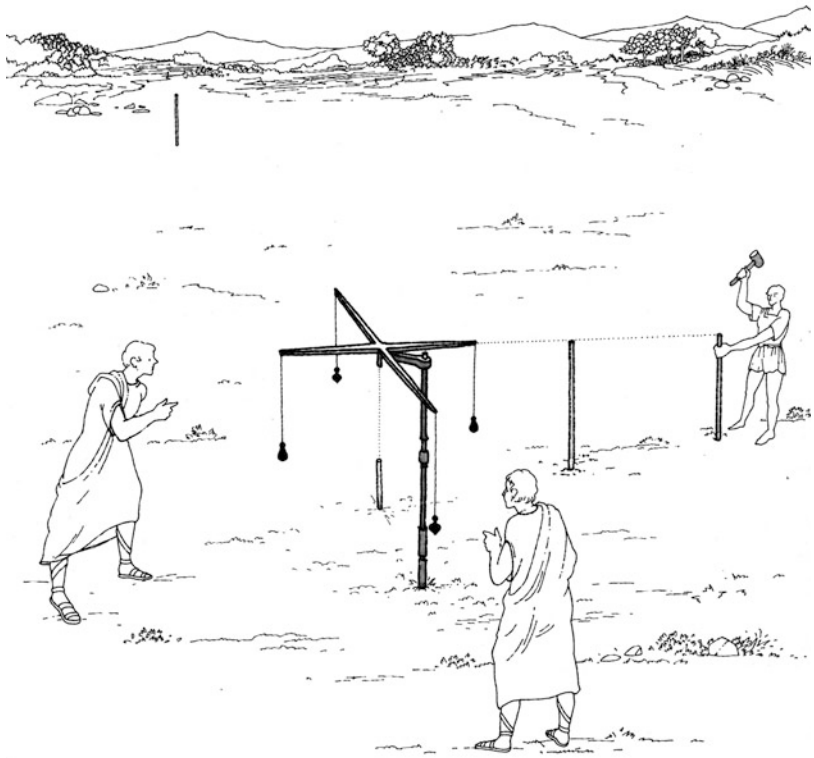

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 5 Surveyors at work

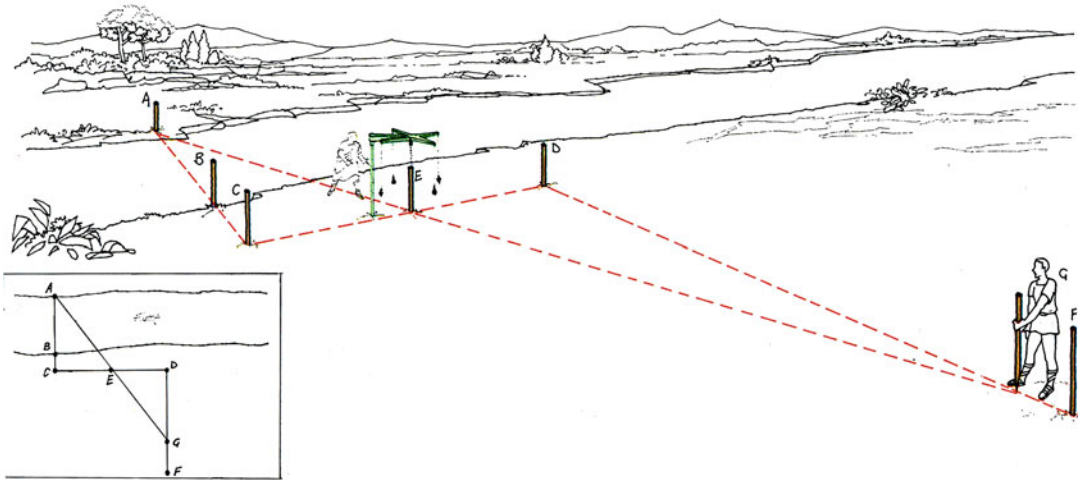

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 6 Surveyors at work: the *fluminis varatio*

difference (Frontinus, *Surv.* 18.12-16; Nipsus, *Resighting*, 51–76 seems also to take account of slopes) (Lewis 2001: 6, 124ff). Cross-checks were taken to ensure accuracy of angle measurements (Dilke 1971: 89).

The *decumani* and *kardines* parallel to the *decumanus* and the *kardo maximus* were progressively and respectively traced and labeled DII and KII, then DIII and KIII, and so on. They were called *subruncivi* (weeded, i.e., kept clear) and minimum 8 Roman feet wide, in order to allow two vehicles to pass.

The DM and the KM were, respectively, 40 feet and 20 feet wide in the case of Augustan colonies for veterans, but in some areas, the KM, too, was 40 feet wide (Dilke 1971: 89, 93; Campbell 1996: 84). The *quintarius* was the most important *limes* after the DM and the KM; it closed the fifth *centuria* in both directions, hence its name. It was wider than the *decumani* and *kardines*, had a recommended width of 12 Roman feet, and was identified by stone markers (Campbell 1996: 85).

Within the *centuriae* were usually traced the *limites intercisivi* ("balks which cut inside": Dilke 1971: 93): a *centuria* could be divided by two orthogonal *limites intercisivi* into four equal parts (each of them measuring 50 *iugera* in size), by two parallel equidistant *limites intercisivi* into three equal parts, and by three parallel equidistant *limites intercisivi* into four rectangular areas (Campbell 1996: 85). Access to fields was safeguarded by law (Dilke 1971: 104–105, 124; Campbell 1996: 84).

Each *centuria* was identified by two coordinates related to its location to the right or left of the DM and on the near side of or beyond the KM, conforming to the following nomenclature:

DD (*dextra decumani* or *decumanum*), to the right of DM
SD (*sinistra* decumani or *decumanum*), to the left of DM
UK (*ultra kardinem*, in early times *pars antica*), beyond KM
CK (less correct KK, *citra kardinem*, in early times *pars postica*), near side of KM.

Based on the surveyor standing at the DM and KM intersection and facing the original orientation, the *centuria* in front of him on his right was DDI UKI, the one in front of him on his left was SDI UKI, the one behind him on his right was DDI CKI, and so on. The other *centuriae* were numbered referring to the *limites* progressive number as far as the centuriation went (Fig. 7) (Dilke 1971: 90–93; Campbell 1995: 541–542, 1996: 86–87). The coordinates were inscribed on

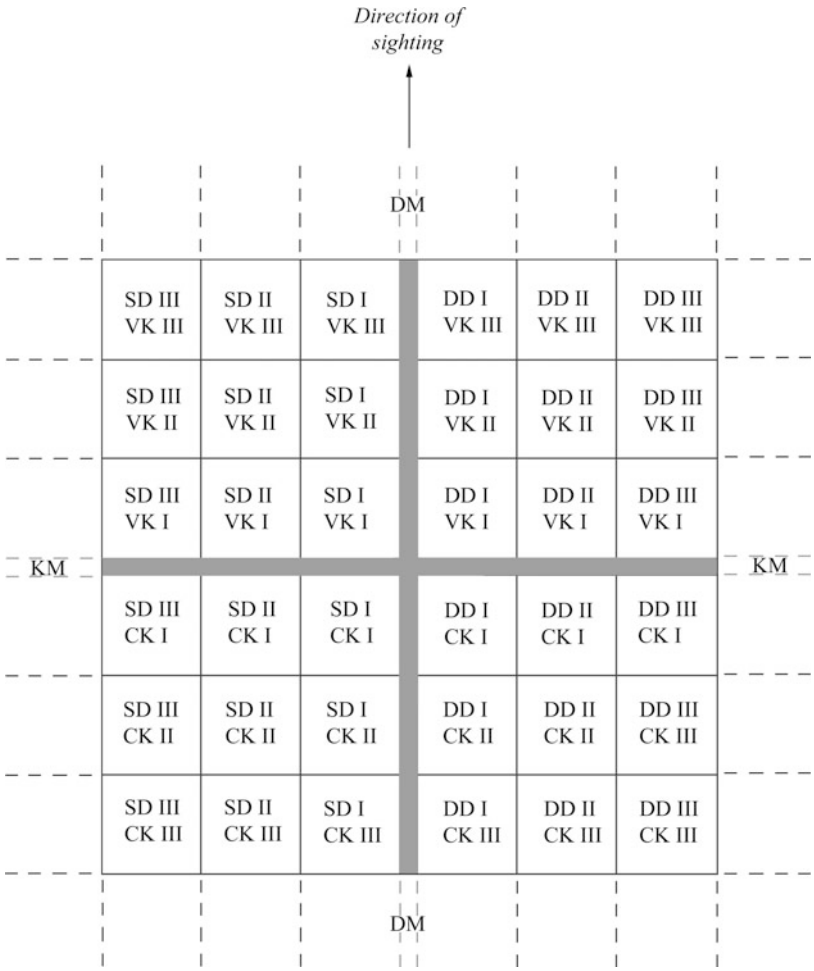

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 7 Each *centuria* was identified by two coordinates

centuriation markers set up at the crossroads and in the surveyor's documents: within this system, the single plots were allocated and precisely recorded (Campbell 2005: 174). Other data could be inscribed, e.g., the specific commission data were added to the coordinates on stones set up by the Gracchan land commissioners (Dilke 1971: 92).

Centuriation stones were either cylindrical or parallelepiped. They have been found in many sites, but the total number appears small if compared with estimates based on the orthodox procedure, according to which markers were to be set up at every crossroad. Even assuming a high casualty rate, this modest number suggests that only a selection was set up in most centuriations. No doubt some crossroads were given wooden markers, as documented by writings in the *CAR* (Dilke 1971: 89, 103–105; Campbell 1995: 541).

While centuriation stones had no religious implication (Dilke 1971: 98), the boundary stones, on the other hand, either single or in groups, were set up with proper ceremonies; removing or changing their position without authorization (*terminus motus*) was deemed a religious and civic offence and punished (Dilke 1971: 98–99): defining and marking the boundaries was a very relevant task of the surveyors (Dilke 1971: 98–108).

A large variety of boundary stones is described and illustrated in the *CAR*. According to the late treatise *De terminibus*, specific boundary stones had to be erected in correspondence of a three- or four-way boundary or of specific components of a

property like wells, water tanks, springs, and streams (Dilke 1971: 103). Natural boundaries were selected too, including groups of trees and isolated trees, which might be thought to be too fallible (Dilke 1971: 103; Campbell 2005: 179–180).

The next steps were parceling and allocating land and sorting the plots (Moatti 1993: 23–26). The specific organization of sortition (*sortitio*) was left to the land surveyors; it is a relevant topic in their writings. In order to allocate the land fairly and prevent disputes, the order of tenure of land plots (*sortes*) was decided by lottery, for which the surveyor used an urn (*urna* or *sitella*) (Dilke 1971: 96–97; Moatti 1993: 27–30; Campbell 1995: 541–542, 545). This practice is documented at least from 133 BCE onward.

The number of *iugera* of each holding was found in one, sometimes two, exceptionally in three, or more *centuriae* (Dilke 1971: 92; Figs. 27, 96, 114). During the lottery procedure, the surveyor recorded the data in preliminary sketches on wax tablets, papyrus, or parchment which formed his ledger. In order to achieve equity, landholdings were routinely assigned by group lottery applying a very complicated system (Dilke 1971: 96, 97, 114; Moatti 1993: 27; Campbell 1995: 542–544, 545). The practice is described in two passages (Hyginus 1, T 14.3-5 and Hyginus 2, T 162.12-164.5). Evidently the aim was being fair to all the settlers and respecting their equal status. The procedure implied a certain amount of literacy and consciousness by the colonists (Campbell 1996: 87–88).

The founder entirely disposed of the land that exceeded the original needs of the colony: he could retain it for himself, give it to friends, endow the colony with it as common pasture or woodland for profit, or restore it or part of it to its previous owners (Campbell 1996: 93).

The next duty of the surveyor(s) was accompanying the colonists in person to their plots in order to prevent any mistake concerning location, size, and boundaries of the allotted properties. When the allocation was concluded, he provided the final official written documents ((a) *libri aeris*, *tabulae*, *commentarii*, *libelli*; *scriptura, instrumentum mensorum*; (b) *libri subsecivorum*, (c) *libri beneficiorum*) and the mapping (*forma*, *forma agrorum*) (Dilke 1971: 97, 112–125; Moatti 1993: 49–62).

One copy of the *forma* and related written documents was usually in bronze. This was estimated as the most reliable material, although wood and parchment were used, too (Campbell 1996: 88–89). The documents were signed by the founder and kept in the colony (Moatti 1993: 73–75; Campbell 1995: 546), while copies of all that evidence, most likely on cloth, parchment, and papyrus, also signed by the founder, were saved in Rome in the imperial records office (Moatti 1993: 49–50, 62, 66–73; Campbell 1996: 88, 90).

The map of the colony (*forma*) was a cartographic, legal, and administrative document normally for public display. Originally, it recorded the *centuriae* and the assigned plots; under Trajan, the size and perimeter of the holdings were added, at least in some cases.

As specified in the *CAR*, on the *forma*, and in the land registers, the surveyor recorded all legal data (*data assignata*, *concessa*, *excepta*) including the various categories of land, e.g., *ager divisus et adsignatus* (divided and allocated), *quaestorius* (given to the *quaestores* for sale in blocks of 50 *iugera*), *arcifinius* or *occupatorius* (land without formal boundary), *ager relictus*, *ager extraclusus* (not encompassed in the land divided by *limites*; Campbell 1996: 79, 2000: 321, 2005: 176–179), and *subseciva*. The last, literally "land cut off by a line" (from verb *subsecare*), was applied to areas located between the *centuriae* and the outer boundary line of centuriated lands or to areas between the exterior boundary and the right-angled lines of other layouts or to areas either included in the *centuriae* but inappropriate for distribution or unallocated because of unavailability of landholders (Moatti 1993: 54; Campbell 2000: 320–321, 2005: 176–177).

Evidently the surveyor was to be well acquainted with land law in force, in order to provide each holding with its precise legal status on the map (Dilke 1971: 114). The word *forma* ("shape") is documented since the mid-second century BCE (Moatti 1993: 88–89): in the sense

we are concerned with, it appears first in the agrarian law of 111 BCE and persists to the end of the empire and beyond (Dilke 1971: 112). Other words for the same document were *aes*, *scarifus*, *typum*, *mappa*, *pertica*, *cancellatio* (Moatti 1993: 32).

We can get a plausible idea of the working maps and the final *formae* produced by the surveyors from the *CAR* and its illustrations, and a few tablets (see below).

On these maps, some geographical features (main rivers, islands, mountains) and the *limites* were drawn; river names and sometimes their width, holdings extension and holders' names, and land status were added (belonging to the Roman people or religious bodies, land given and assigned or excluded from allocation or returned to the previous owners, granted, excepted, restored, and exchanged for own property, *subseciva*, etc.); adjoining territories, public pasture, and woods were entered. Words were written in full but also sometimes abbreviated (Campbell 1996: 89). Such maps had large dimensions and a copy was made for public display in the colony (Campbell 1996: 89).

A bronze fragmentary tablet from SW Spain (area of *Augusta Emerita*) is interpreted as part of a *forma*. It depicts some *centuriae* and their size, the course of the river *Ana* (present Guadiana), and the adjacent territory of the *Lacimurgenses* (Sáez Fernández 1990; Moatti 1993: 33; Campbell 1996: 89). A fragment of a bronze *forma* depicting part of the Verona *centuriatio* was discovered in the Verona *Capitolium* (Cavalieri Manasse 2000) (Fig. 8).

The "Orange tablets," often named "cadasters," are fiscal documents engraved on marble slabs and record a survey made for taxation purposes under the Flavian emperors. Although not properly *formae*, they document Roman surveying procedures (Moatti 1993: 76–77, 91; Campbell 1996: 89, n.60). The tablets (labeled conventionally as A, B, C) were found in fragments in Orange, France (ancient *Arausio*), both in the theater and in a nearby building interpreted as a local *tabularium*. They are engraved with some topographical features (rivers, streams, islands, and roads), the *centuriae* (identified by their coordinates), the number of *iugera* withdrawn from the obligation of *tributum* (*ex tributario*), the number left in possession of the *colonia*, those handed back to the local people *Tricastini* (cadaster B), those belonging to the state (cadaster A), and *subseciva*. Annual rents and names of principal lease holders are specified (Piganiol 1962; Dilke 1974: 573–574).

Centuriatio was applied in some areas (see below) and periods. In other cases, land was parceled applying other systems influenced by local traditions, soil and climate characteristics, and agriculture. Three systems are most frequently identified: allocation by *decumani*, by *laciniae* (narrow strips), by *strigae* and *scamna*. The last were long rectangles of land, the former bounded lengthwise as viewed with the orientation chosen, the latter breadthwise (Dilke 1971: 95). This strip system was pre-Roman but continued under the empire, in some areas alongside centuriation (Dilke 1971: 139–141).

The land surveyors had to be well acquainted with the legislation concerning boundaries and boundary disputes, as they were often charged to resolve or arbitrate boundary quarrels (Dilke 1971: 99, 105–108) arising among private individuals, local authorities, and the state. Fifteen sorts of disputes are distinguished in Frontinus' treatise *de controversiis* (Campbell 2000: 5–49). The surveyors would operate as legal counsellors on arising disputes or as arbitrators or judges in establishing where the boundary line lay and defining the legal position of land within 5 feet of it (Dilke 1971: 99, 105–108) but were not lawyers and did not make the final decision in land disputes (Campbell 2000: xlv–liii, 475–477, 2005: 174).

The grid of centurial *limites* enhanced the local road network and could provide long-distance roads with a relevant framework, when they were constructed contextually or after the *centuriatio*. In fact, in some centuriated territories, the long-distance roads corresponded to *kardines* or *decumani* or to the diagonals of some *centuriae*, while in other cases, they had no connection with the centurial grid and run straight across the territory.

Place-names related with c *enturiatio* mostly derive from technical terms (*pertica, limes, fines,*

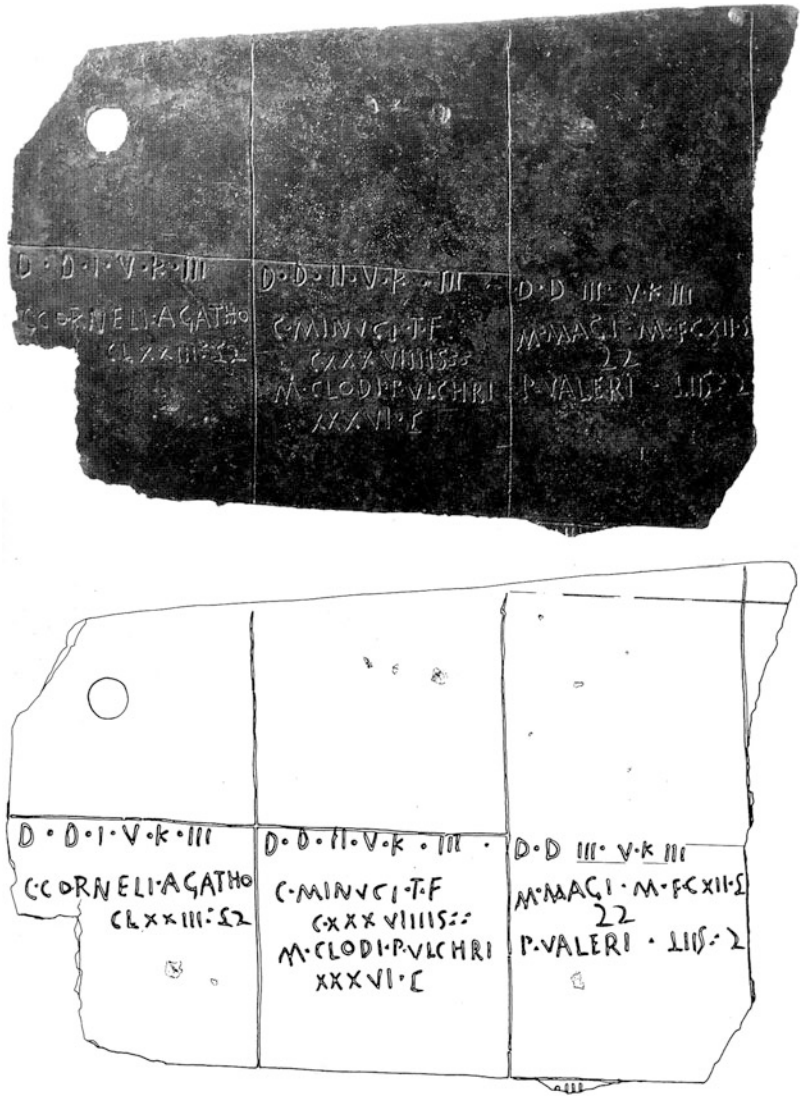

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 8 Bronze fragment of a *forma* from the Verona *Capitolium*

cardo, centuria, possibly *decumanus/decimanus*), from cardinal or ordinal numerals, or from property owner's names (Dilke 1971: 137–138).

The primary written source on *centuriatio* is the *Corpus Agrimensorum Romanorum* (*CAR*): the earliest manuscript probably dates from the sixth century CE. The *CAR* assembles texts written by different authors of broadly differing dates, the main ones dated in the late first-early second to the fifth centuries CE (Campbell 1996: 74–79, 2000: XX).

The writings manifest a relevant diversity of interests and approaches; since they were edited and excerpted in transmission, we cannot identify the criteria applied in making the compilation.

On the whole, they were presumably produced with didactic aims for practicing and/or apprentice surveyors. Specific examples from Italy and the provinces are provided, often derived from vast personal experience; relevant test cases and hypothetical problems are tackled; the complexity of the surveyor's job is evident (Campbell 1996: 79–80).

Moreover, some manuscripts of the *CAR* preserve illustrations aimed at illustrating issues in the technical texts and/or teaching assumptions. They are of several kinds and include maps of

divided land, scheme, and layout of *limites*, boundary marking and boundary stones, astronomy, and geometry (Dilke 1971: 115–125; Campbell 1996: 99, 2000: xxiii–xxvi). We cannot date such illustrations with certitude, but their significance to the subject is indubitable.

After the early Middle Ages (Toneatto 1994–1995; Del Lungo 2004), the origins and characteristics of *centuriatio* were gradually forgotten, although in many areas of the Roman world, more or less evident traces of such land division remained throughout centuries.

Thanks to the *CAR* and other ancient texts, *centuriatio* was rediscovered after centuries. By the Renaissance, the scholars of Roman metrology had calculated the equivalent of a normal *centuria* (200 *iugera*) based on written sources, while evidence of *centuriatio* in the landscape was rediscovered in 1833, when Captain C. T. Falbe, Danish consul in Tunis, surveyed the Carthage territory using a pocket sextant, identified square areas 708 × 708 m average, and interpreted them as *centuriae* based on Appian (*Bella civilia* 1.3.24). He reported the results of his investigations to the Académie des Inscriptions et Belles-Lettres (Falbe 1833).

In the 1840s–1860s, E. N. Legnazzi, P. Kandler, E. Lombardini, and others made alike observations in the territories of North East Italy and Pola (Settis 1983: 170–173).

In the meantime, in 1848–1852, most of the technical texts in the *Corpus Agrimensorum Romanorum* were edited in Berlin by F. Blume, K. Lachmann, and A. Rudorff. The publication stimulated surveys and archaeological research.

In the 1890s, Beloch studied the Campanian centuriation and Schulten provided systematic comparisons between land evidence and Latin sources; in 1912, he also proposed the reconstruction of the *groma* on the basis of the *CAR*. In 1911, Barthel published a study of North African centuriations and observed the extensive remains in many areas of Tunisia and the limited evidence in other districts of North Africa.

C. Thulin published the *Corpus Agrimensorum Romanorum* (Leipzig 1913; reprinted 1971); in 1912, Della Corte found elements of the Pompeii *groma* and proposed a reconstruction based on the Pompeii fragments in 1922. Further studies in Italy provided evidence of *limitationes* in the Po valley and other areas (Fraccaro 1957, esp. years 1937–1956; Castagnoli 1943–1964). Later on, the study of *centuriatio* has identified many centuriated landscapes (Dilke 1971: 141–158) in Italy, southern France, Spain and Portugal, the Netherlands (?), Belgium, Switzerland, Dalmatia, Greece, and North Africa (mainly Tunisia). The literature on this subject is enormous (Dilke 1974: 585–592; *Agri Centuriati*; etc.).

Traces of Roman field systems in Britain, Germany, and adjacent areas, where land patterns do not conform to the orthodox *centuriatio* scheme, are receiving increasing attention (Dilke 1971: 158, 188, 191, 1974: 565; Peterson 2009; and http://www.uea.ac.uk/~jwmp/). Recently, scholars' interest returned to the *CAR*: Campbell (2000) has selected a certain number of writings and omitted a few others, while individual texts (notably Frontinus, Siculus Flaccus, and Hyginus) were edited by several authors in the frame of an European COST G2 project under the direction of M. Clavel-Lévêque (1993, 1996).

Future Directions

Centuriation is a key subject in Roman history, archaeology and law, in landscape and settlement archaeology, history of science and technology, and Roman social and economic history. It is very complex topic closely linked with the study of unorthodox field systems and with earlier and later orthogonal land divisions (Dilke 1971: 201–211).

The current debate is and should be increasingly focused on investigating centuriations applying a long-term diachronic perspective and an interdisciplinary approach: the systematic integration of palaeogeographic and environmental studies, written and archaeological sources *in* the historical background, is fundamental, as well as the application of computer-assisted analysis and, in particular, of GIS (geographic information systems).

Updated research methodology integrates landscape-based methodologies and approaches (Orengo and Palet Martínez 2009), remote sensing, geophysical and archaeological surveys, and

historical research in a long-term perspective. Some research directions that remain to be developed are:

Define efficient strategies finalized to identifying the *limites* and testing the *centuriatio* proposal (Orengo and Palet Martínez 2009: 179–180).
Establish closer links between geomorphology, paleogeography, and centuriations, in order to link hydrography and subsoil architecture with local landscape evolution and centuriations (planning, continuity, or discontinuity).
Provide systematic paleobotanical analysis in order to assess the *centuriatio* impact on local vegetation (agriculture, deforestation).
Origins and development of *centuriatio* (chronology, metrology, technical aspects).
Methods of dating centurial grids and other field systems.
Define the paleogeographic or historical explanations of entirely or partially overlapping centuriations.
The dynamics of continuity or change of centurial systems or part of them and the related causes.
The pre-Roman field systems and their possible influence on the Roman ones both in Italy and in the provinces.
The "unorthodox" field systems and their complexity.
The rural settlements (villages, villas, farmsteads, kilns, tombs) in the centuriations, in a long-term diachronic perspective.
The impact of centuriations on the local rural economy and social history.
Conservation and management strategies of centuriated areas as cultural landscapes.
Development of digital technologies applied to the study of *centuriatio* and other field systems of the Roman world.
Visualize the results of research properly.
The textual, philological, historical, and archaeological studies should proceed applying an interdisciplinary approach.

Cross-References

- ▶ Infrastructure in the Roman World: Roads and Aqueducts
- ▶ North Africa, Roman
- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Romanization
- ▶ Topography of Rome
- ▶ Urban Planning in the Greek World
- ▶ Urban Planning, Roman
- ▶ Vicus
- ▶ Villas and Farms in the Mediterranean World
- ▶ Western Roman Provinces, Archaeology of the

C

References

Broadhead, W. 2007. Colonization, land distribution, and veteran settlement. In *A companion to the Roman army*, ed. P. Erdkamp, 148–163. Malden/Oxford/Carlton: Blackwell Publishing Ltd.

Campbell, B. 1996. Shaping the rural environment: Surveyors in ancient Rome. *Journal of Roman Studies* 86: 74–99.

Campbell, B. 2000. *The writings of the Roman land surveyors. Introduction, text, translation and commentary*, Journal of Roman studies monograph 9. London: Society for the Promotion of Roman Studies.

Dilke, O.A.W. 1971. *The Roman land surveyors. An introduction to the Agrimensores*. Newton Abbot: David and Charles.

Dilke, O.A.W. 1974. Archaeological and epigraphic evidence of Roman land surveys. In *Aufstieg und Niedergang der römischen Welt (2 Principat 1)*, ed. H. Temporini, 564–592. Berlin/New York: W. De Gruyter.

Lewis, M.J.T. 2001. *Surveying instruments of Greece and Rome*. Cambridge: Cambridge University Press.

Moatti, C. 1993. *Archives et partage de la terre dans le monde romain (IIe siècle avant- Ier siècle après J.-C)*, Collection de l'École Française de Rome 173. Rome: École Française de Rome.

Orengo, H.A., and J.M. Palet Martínez. 2009 [2010]. Methodological insights into the study of centuriated field systems: A landscape archaeology perspective. *Agricenturiati. An International Journal of Landscape Archaeology* 6: 171–185.

Sáez Fernández, P. 1990. Estudio sobre una inscripción catastral colindante con Lacimurga. *Habis* 21: 205–227.

Thulin, C. 1913. *Corpus Agrimensorum Romanorum I,1: Opuscula agrimensorum veterum*. Leipzig: Teubner. (reprinted 1971, Stuttgart: Teubner).

Further Readings

Adam, J.-P. 1982. Groma et chorobate. Exercices de topographie antique. *Mélanges de l'Ecole française de Rome, Antiquité* 94: 1003–1029.

Behrendes, O., and L. Capogrossi Colognesi, eds. 1992. *Die römische Feldmeßkunst. Interdisziplinäre Beiträge zu ihrer Bedeutung für die Zivilisationsgeschichte Roms*, Abhandlungen der Akademie der

Wissenschaften in Göttingen, Philologisch-Historische Klasse 3, 193. Göttingen: Vandenhoeck & Ruprecht.

Blume, F., K. Lachmann, A. Rudorff, and T. Mommsen. 1848–1852. *Die Schriften der römischen Feldmesser*. Berlin: G. Reimer. (reprinted 1967, Hildesheim: G. Olms).

Campbell, J.B. 1995. Sharing out land: Two passages in the Corpus Agrimensorum Romanorum. *The Classical Quarterly* 45: 540–546.

Campbell, J.B. 2005. Surveyors, topography, and definition of landholding in ancient Rome. In *Les vocabulaires techniques des arpenteurs romains. Actes du Colloque International (Besançon 2002)*, ed. D. Conso, A. Gonzales, and J.Y. Guillaumin, 540–546. Besançon: Presses universitaires de Franche-Comté, Institut des Sciences et Techniques de l'Antiquité.

Castagnoli, F. 1984. Sulle più antiche divisioni agrarie romane. *Accademia Nazionale Lincei, Rendiconti classe scienze morali, storiche e filologiche* 39: 7–17. (= Castagnoli, F. 1993. *Topografia antica. Un metodo di studio*. *volume 2, Italia*: 805–21. Rome: Istituto poligrafico e Zecca dello Stato).

Cavalieri Manasse, G. 2000. Un documento catastale dell'agro centuriato veronese. *Athenaeum* 88: 5–48.

Chouquer, G., F. Favory, and A. Roth Congès. 2001. *L'arpentage romain. Histoire des textes, droit, techniques*. Paris: Errance.

Clavel-Leveque, M., D. Conso, and F. Favory. 1993. *Siculus Flaccus. Les conditions des terres*. Naples: Jovene.

Clavel-Leveque, M., D. Conso, and A. Gonzales. 1996. *Hygin l' arpenteur. L' établissement des limites*. Naples: Jovene.

Clavel-Lévêque, M., and A. Orejas Saco del Valle, eds. 2002. *Atlas historique des cadastres d'Europe. 2. Action COST G2 "Paysages anciens et structures rurales", volume 2*. Luxembourg: Offices des publications officielles des Communautés européennes.

Conso, D., A. Gonzales, and J.-Y. Guillaumin, eds. 2005. *Les vocabulaires techniques des arpenteurs romains. Actes du Colloque International (Besançon 2002)*. Besançon: Presses universitaires de Franche-Comté, Institut des Sciences et Techniques de l'Antiquité.

Del Lungo, S. 2004. *La pratica agrimensoria nella tarda antichità e nell'alto Medioevo*, Testi, Studi, Strumenti 17. Spoleto: Centro Italiano Studi sull'Alto Medioevo.

Della Corte, M. 1922. Groma. *Monumenti Antichi della Reale Accademia dei Lincei* 28: 5–100.

Dilke, O.A.W. 1992. Insights in the Corpus Agrimensorum into surveying methods and mapping. In *Die römische Feldmeßkunst. Interdisziplinäre Beiträge zu ihrer Bedeutung für die Zivilisationsgeschichte Roms*, Abhandlungen der Akademie der Wissenschaften in Göttingen, Philologisch-historische Klasse 3, 193, ed. O. Behrends and L. Capogrossi Colognesi, 337–347. Göttingen: Vandenhoeck & Ruprecht.

Falbe, C.T. 1833. *Recherches sur l' emplacement de Carthage*. Paris: Imprimerie Royale.

Fraccaro, P. 1957. *Opuscula, Volume III: Scritti di Topografia e di Epigrafia*. Pavia: Athenaeum.

Gabba, E. 1978. Per la tradizione dell' *heredium* romuleo. *Rendiconti Istituto Lombardo* 112: 250–258.

Gabba, E. 1985. Per un'interpretazione storica della centuriazione romana. *Athenaeum* 63: 265–284.

Gabba, E. 1989. Sistemi catastali romani in Italia. *Athenaeum* 77: 576–570. (= Gabba, E. 1994. *Italia romana*: 197–201. Como: Edizioni New Press).

Gorges, J.-G. 1993. Nouvelle lecture du fragment de Forma d'un territoire voisin de Lacimurga. *Mélanges Casa Velázquez, Antiquité et Moyen-Age* 29 (1): 7–23.

Hinrichs, F.T. 1974. *Die Geschichte der gromatischen Institutionen. Untersuchungen zu Landverteilung, Landvermessung, Bodenverwaltung und Bodenrecht im römischen Reich*. Wiesbaden: F. Steiner.

Leveau, P. 2010 [2011]. Centuriations et territoire en Basse Provence (cités d' Arles et d' Aix). Une contribution critique. *Agri centuriati. An International Journal of Landscape Archaeology* 7: 55–74.

Mayer, M., and O. Olesti. 2001. La sortitio de Ilici. Del documento epigráfico al paisaje histórico. *Dialogues d' histoire ancienne* 27 (1): 109–130.

Peterson, J. 2009 [2010]. Development of calculations and concepts in the context of South Norfolk over 20 years. *Agri centuriati. An International Journal of Landscape Archaeology* 6: 159–169.

Piganiol, A. 1962. *Les documents cadastraux de la colonie romaine d'Orange*, *Gallia* Suppl. 16. Paris: Centre National de la Recherche Scientifique.

Rosada, G., ed. 2006. *Agri centuriati. An international journal of landscape archaeology 2*. Pisa/Roma: Istituti Editoriali e Poligrafici Internazionali.

Roselaar, S.T. 2010. *Public land in the Roman republic: A social and economic history of ager publicus in Italy, 396–89 BC*, Oxford studies in Roman society and law. Oxford: Oxford University Press.

Schiöler, T. 1994. The Pompeii- *groma* in new light. *Analecta Romana Instituti Danici* 22: 45–60.

Settis, S., ed. 1983. *Misurare la terra: centuriazione e coloni nel mondo romano*. Modena: Panini.

Toneatto, L. 1994–1995. *Codices artis mensoriae. I manoscritti degli antichi opuscoli latini d'agrimensura (V-XIX sec)*, Centro Italiano di Studi sull'Alto Medioevo, Testi, studi, strumenti, 5. Spoleto: Fondazione Centro Italiano di Studi sull'Alto Medioevo.

Toneatto, L. 2010. Agrimensori e testi di agrimensura. In *Dizionario delle scienze e delle tecniche di Grecia e Roma*, ed. P. Colace Radici, S.M. Medaglia, L. Rossetti, and S. Sconocchia, 47–58. Pisa/Rome: Fabrizio Serra.

Tozzi, P. 1983. La riscoperta del passato nell'Ottocento. Ricerche sulle divisioni agrarie romane nell'Italia Settentrionale. In *Misurare la terra: centuriazione e coloni nel mondo romano*, ed. S. Settis, 33–38. Modena: Panini.

Trousset, P. 1978. Les bornes du Bled Segui: nouveaux aperçus sur la centuriation romaine du sud Tunisien. *Antiquités Africaines* 12: 125–177.

Vermeulen, F., and M. Antrop, eds. 2001. *Ancient lines in the landscape. A geo-archaeological study of protohistoric and Roman roads and field systems in northwestern Gaul*. Leuven/Paris/Sterling: Peeters.

Ceramic Ecology

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Introduction

The concept of ceramic ecology forms a basis of the investigations reported by archaeologists, ethnographers, and others in which emphasis is placed upon the technological and socioeconomic aspects of ceramic materials regardless of chronology or geography. The initial framework was proposed by Frederick R. Matson (1912–2007) in "Ceramic ecology: an approach to the study of the early cultures in the Near East" in his edited volume, *Ceramics and Man* (Matson 1965b). Matson – a ceramic engineer, archeometrician, ceramic ethnoarchaeologist, and ethnographer – stated as a basic premise that "unless ceramic studies lead to a better understanding of the cultural context in which ceramic materials were made and used, they form a sterile record of limited worth" (Matson 1965a: 202). His students and colleagues have employed, modified, and expanded the concept.

This article focuses on the concept, its historical background, evolution into mid-range theory, methodological adaptations, critiques, misconceptions, and international perspectives. The formation of the Ceramic Studies Interest Group and annual Ceramic Ecology Symposia is also documented.

Definition

Ceramic ecology as a methodological and mid-range theoretical approach has as its paramount goal a better understanding of the peoples who made and used pottery and seeks to redefine our comprehension about the significance of these materials in human societies. The concept is contextual, multi- and interdisciplinary, and analytical. On the one hand, it seeks to evaluate data derived from the application of physiochemical methods and other techniques borrowed from the physical sciences within ecological and sociocultural frames of reference. Its holistic considerations seek to relate environmental parameters, raw materials, technological choices and abilities, and sociocultural variables to procurement of resources (clay, temper, and fuels), the manufacture, decoration, distribution, and use of pottery vessels and other ceramic artifacts. Hence, it spans the cycle of "birth" (fabrication) through "death" (ultimate use or discard). On the other hand, interpretation of these data and explanations of the ceramic materials and products utilizes methods and paradigms derived from the social sciences, humanities, and the arts. Ceramic ecology approaches fundamental anthropological questions, such as the socioeconomic context of production, social systems of learning, communities of practice, the formation of identity, and the effects of economic development. It also demonstrates the value of the cross fertilization which results when investigators ranging from art historians and professional potters to ethnoarchaeologists and archaeometricians come together in a forum devoted to a topical consideration: ceramics. Ceramic ecology provides an open and supportive venue for the presentation of research and insight on *all aspects* of ceramic production, consumption, trade and their economic, political, social, aesthetic, cosmological, and phenomenological implications. It concerns the relationships of ceramics, society, and the environment; it is not solely about the ceramics themselves (Arnold 2011: 63). Hence, it is analogous to the *châine opératoire* in lithic analysis suggested in 1964 by Leroi-Gourhan but goes well beyond production, and ceramic ecology also combines the theoretical perspectives of systems theory and cybernetics with cultural ecology (Kolb 2011; Roux 2017; Duistermaat 2017: 115–116). The paramount issue is for the investigator to be knowledgeable about the variables and their interactions and account for these in the research design and subsequent enquiry whether it is archaeological

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ethnoarchaeological, ethnographic, social anthropological, and/or archaeometric materials science.

Historical Background

Ceramics are one of the tangible products of human culture and are relatively widespread among cultures of the world. Pottery making is one of the oldest crafts known to humankind and was innovated independently in different parts of the world at different times in extremely diverse social, economic, and ecological settings. Ceramics constitute an important source of information for archaeologists, art historians, and scholars of social and cultural phenomena (historians, social scientists, and humanities scholars), among others, because, being created by human beings, these artifacts encapsulate a wide variety of human behaviors and have become an essential tool for archaeologists who study past human lifeways. Ceramic products, therefore, may be studied from a variety of humanistic and social and natural scientific perspectives: artistic, art historical, aesthetic, archaeological, historical, typological, classificatory, stylistic, mineralogical, physicochemical, mechanical, and thermal, to name only a few. Scholars have an interest in the history of pottery manufacture, especially regarding the roles of the innovation and diffusion of technologies. Archaeologists pay particular attention to the types and sources of the raw materials used in pottery fabrication, including clays, inclusions, impurities, liquids, and fuels for firing. Materials science specialists and archaeologists concerned with physicochemical analyses are interested in documenting and understanding the properties of clays (plasticity, drying, shrinking, and physical and chemical changes during processing and firing), the manufacturing techniques, processes, and tools (forming, finishing, and decorating, including styles and stylistic analyses), and the drying and firing of the products. Socioeconomic and behavioral parameters of production (location, organization, scale, and mode) and mechanisms of distribution or exchange are of interest to investigators. Vessel function and classification systems (folk or derived), uses, reuses, and ultimate disposition or discard are growing areas of research (Kolb 1989c, 2001, 2011, 2017a).

Scholars have developed a multitude of procedures for quantifying and classifying archaeological and ethnographic ceramic materials, many of which focus on establishing the loci of manufacture (provenance) and production processes and ascertaining the time of manufacture, i.e., absolute or relative chronology. The methodologies employed include ethnoarchaeology ("Further Reading": Kramer 1985; Longacre 1992), behavioral archaeology and life histories, attribute analysis, ethnotaxonomies, devised and formal classifications, and a variety of physicochemical techniques ranging from basic macroscopic assessments, petrographic thin-section studies, and micromorphology to geoarchaeology and NAA (Vandiver 2000; Maschner and Chippindale 2005; Rice 2015; Kolb 2017b).

Investigators have also postulated a number of theoretical approaches to the study and analysis of material culture including ceramics, among these are evolutionary theory, ecological anthropology, processualism (stimulated by ecology, physics, and cultural anthropology), postprocessualism, gender archaeology, ethnoarchaeology, systems theory, formation theory, complexity theory, engagement theory, agency theory, materiality, and technological style, among others. The coalescence of ecological anthropology and the "New Archaeology," championed by Louis Binford, contended that ethnoarchaeology and other middle-range approaches, both theory and research, were fundamental to making an intellectual leap (Hodder 1985; Schiffer 1976; Bentley et al. 2009).

Cultural Ecology and Ceramic Ecology

In *Theory of Culture Change*, Julian Steward (1955) sought to demonstrate that social systems arise out of patterns of resource exploitation which, in turn, are conditioned by the technological adaptation of a people to their natural environment. He delineated "multilinear evolutionism," which

"is like unilinear evolution in dealing with developmental sequences, but is distinctive in searching for parallels of limited occurrence instead of universals" (1955: 14–15). Although there may be cross-cultural similarities of social change, the constraints of different physical and historical settings produce different social manifestations in each case, resulting in to develop a methodology for determining regularities of form, function, and process which occur cross-culturally. Some scholars argue that "pluralistic" evolution is a more appropriate term for Steward's scheme.

Steward (1955: 30–42) also defined cultural ecology as "a heuristic device for understanding the effect of environment upon culture" and perceives culture as evolutionary – that cultural adaptations have come as the result of a changing environment. It combines ideas and approaches of both the natural and social sciences and seeks to explain the social sciences by the means of the natural sciences. The concept is interdisciplinary where anthropology and ecology overlap in the study of human adaptations to physical and social environments or how people interact with each other within their environmental context. Human adaptation refers to both biological and cultural processes that enable a population to survive and reproduce within a given or changing environment.

By 1959, half of the anthropology faculty (three of six) at The Pennsylvania State University, who had received their doctorates at Harvard University after World War Two, had embraced Steward's concepts of human adaptation, especially cultural ecology. Biological anthropologist Paul T. Baker and Mesoamerican archaeologist William T. Sanders became exemplars of these concepts and would influence dozens of graduate students over the next three four decades and other faculty members (Baker 1962; Baker and Sanders 1972; Sanders et al. 1979).

One of the senior faculty members in the department who was intrigued with cultural ecology was Professor of Ceramics and Professor of Archaeology as well as Assistant Dean for Research in The College of the Liberal Arts – Frederick R. Matson, who obtained his doctorate in Ceramic Archaeology at the University of Michigan in 1939. In 1961 Matson organized and chaired a symposium, "Ceramics and Man," sponsored by the Wenner-Gren Foundation held at Burg Wartenstein castle in Austria, September 2–12, 1961. The symposiasts included seventeen archaeologists and ethnologists who had international reputations as experts on pottery to assess ceramic contributions to archaeological and ethnological research. Matson's contribution was "Ceramic ecology: an approach to the study of the early cultures in the Near East" in the published symposium contributions which he edited: *Ceramics and Man* (Matson 1965b). He observed that ceramic studies needed to become holistic, observing that ceramic ecology was but one facet of cultural ecology "that which attempt to relate the materials and technologies that the local potter has available" in his/her culture of the products being fashioned (Matson 1965a: 216). Matson's secretary, Cathy Rusnak, typed the book's manuscript on an IBM Selectric typewriter and the contents were fact checked by his teaching and research graduate student assistant, Charles C. Kolb. Matson would go on to fine tune the method ("Further Reading": Matson 1995). For additional details see Kolb (1988a).

Later History and Modifications

Many of Sanders' Mesoamerican archaeology students and colleagues were also influenced by Matson's perceptions about ceramic ecology, and this was evident especially in the Teotihuacan Valley Project in central Mexico and subsequently in the Copan Project in Honduras. Among them were Charles Kolb, Louana Lackey (1926–2005), Prudence and Don Rice, Robert Santley (1948–2006), and James Sheehy. Other scholars were also drawn to the method and theory, especially Dean Arnold, Marilyn Beaudry Corbett, Elizabeth Chilton, Michael Deal, E. Christian Wells, Eduardo Williams, and Ezra Zubrow. Their colleagues and students, notably Philip Arnold III, Marilyn Beaudry Corbett, George Bey III, Anabel Ford, Michael Galaty, Amy Hirshman, Sandra López Varela, Kostalena Michelaki, Christopher Pool, and Marcia Selsor, also employed aspects of ceramic ecology.

Santley's students George Bey and Christopher Pool (1992; Pool and Bey 2007) and Philip Arnold (2003) employed the concept in their Mexican Gulf Coast archaeological research and teaching.

Dean Arnold's classic monograph, *Ceramic theory and cultural process* (1985), employed principles of ceramic ecology, as did his research Peru (2003) and four decades of intensive study in the pottery-making village of Ticul, Yucatan (2008, 2015, 2017). His reevaluation of the 1985 volume in *Ethnoarchaeology* (2011) reflects his perceptions conditioned by 25 years of ceramic ecological studies. (The texts of more than 70 of Arnold's publications are online at https://fieldmuseum.academia.edu/DeanArnold.) Ethnoarchaeologist and professional potter Louana Lackey's work in Acatlán, Puebla (1991) and archaeologist James Sheehy's detailed assessment of pottery-making at the archaeological site of Tlajinga 33 in the Teotihuacan Valley (1992) were likewise grounded in ceramic ecology. Matson's best-known student, Prudence Rice, published widely on ceramics and Maya archaeology; four of her 11 books focus on pottery, including *Pottery analysis: a sourcebook* published in 1987, now in a second edition (2015). Charles Kolb employed ceramic ecology as the primary methodological approach in his research on archaeological ceramics from Classic period Teotihuacan, Mexico: Thin Orange Wares (1986), Granular Wares (1988b), and Copoid Wares (1988c). He also used the method and theory in an assessment of Kushano-Sasanian ceramics from Central Asia (1989a) and white clay tobacco pipe studies in the Lake Erie Basin ("Clay Tobacco Pipes," *Encyclopedia of Global Archaeology*, 2nd ed., in press).

Arnold (1975: 183) noted that Kolb (1976) had redefined ceramic ecology in his review of the literature on South American ceramic technology from an ecological perspective and perceived a significant relationship in mending systems theory, cybernetics, and ceramic ecology (Arnold 1985: 9–10). Rice (2015: 210) remarked that ceramic ecology has been criticized along the same lines as cultural ecology was decades earlier – as narrow determinism or possibilism. However, ceramic ecology does not posit that "the physical environment controls pottery-making but establishes circumstances within which potters' decisions may be supported or constrained as they practice their technologies." Albero (2014: 142–145) erred in stating that ceramic ecology is "deterministic" and incorrectly stated that it "excludes explanations which involve the significant cultural variability documented in the way raw materials are exploited." He opined that "relevant social, cultural, symbolic, ideological or political parameters" are neglected. His statements rested primarily on the work of ethnographers grounded in social anthropology (particularly Africa by Gosselain and Livingstone Smith), and he does not consider any of Arnold's book-length ethnographic treatments on Ticul, Yucatan potters (2008, 2015, and 2017) or his relevant articles or book chapters. The literature employing ceramic ecology in archaeological, ethnohistoric, and ethnographic studies in Mesoamerica, North America, and Asia (Afghanistan, India, and China) has not been adequately examined by Albero, for example, see "Further Reading": Góes Neves (2008), Manibabu Singh (2001), Osband (2014), and Wallis et al. (2015).

Galaty (2017: 147), in reviewing the Type-Variety System of pottery classification, recommended that archaeologists working with pottery from North America and the Mediterranean region pottery would benefit by adopting ceramic ecology as an analytical procedure. Williams (1992, 2017: 18–19) remarked that ceramic ecology has become established as an analytical approach to ceramic materials with contextual, multi-, and interdisciplinary perspectives through which researchers seek to place physical and scientific data in an ecological and sociocultural framework by relating the technological properties of raw materials to the manufacture, distribution, and use of ceramic products within social contexts. Ceramic ecology he commented (2017: 19) perceives cultural systems holistically, observing that Kolb (1989b: 315, 320, 324–327) developed a model that allows us to obtain a clear grasp of "holistic ceramic ecology." This model is a combination of ceramic ecology (the ecological components of the physical environment, the biological environment, human biology, and culture) and General Systems Theory (Pool and Bey 2007: 17–20). Ceramic production and distribution

focus on a ceramic complex that consists of a cultural system and an environmental system, each one with subsystems necessary for the operation of the complex. The cultural system includes the following subsystems: economic, social, religious, psychological, and the ceramic production subsystem itself. The environmental system consists of physical, biological, and environmental-cultural subsystems. The pottery production system links the economic subsystem (efficiency and skills, resources/raw materials, manufacturing stages, distribution and exchange, and subsistence activities) and the social subsystem (including social organization as well as sociocultural and sociocultural components). These systems and their respective subsystems are mutually linked by feedback mechanisms. The key component of the ceramic complex is the ceramic production subsystem, which contains the main variables that affect the production of a clay object: from raw material procurement to the use and discard of the vessel at the end of its functional life. However, Kolb's model fell short in detailing the nature of interrelationships among the variables.

The factors that distinguish a specifically ceramic ecological approach are its explicit integration of the natural and social environments as components of the ecological system in which humans participate and its concern with subsystem interactions. These allow ceramic ecology to "[provide] a broader perspective on the role of pottery in a culture from archaeological, technological, and ethnographic viewpoints" (Rice 1987: 317). Political economy offers insights into the relation of craft production and exchange to the social realm, dynamics of sociopolitical systems, and emphasizes the social, political, and environmental contexts of the economy dovetailing with the interests of cultural (and ceramic) ecology (Kosakowsky et al. 2013; Pool 1992; Pool and Bey 2007: 20).

International Perspectives

"Ceramic Ecology Revisited: A Pot for All Reasons" was the title of a volunteered symposium held during the annual meeting of the American Anthropological Association (AAA) in Philadelphia, Pennsylvania, in December 1986. The session had eight presentations and was co-organized by Charles Kolb and Louana Lackey (1926–2005) and chaired by Kolb. The organizers had attended previous AAA meetings and observed that papers on ceramics were scattered throughout the meeting and that there was no central forum for presentations on the subject. Hence, the Ceramic Ecology Symposium was organized and Frederick R. Matson, who served on Kolb and Lackey's doctoral committees as well as the committees of several other participants, was the honored guest, and volunteered to be the discussant. The presenters included Canadian Michael Deal, professional potters, physical scientists, and archaeologists as well as ethnoarchaeologists. Fewer than half of the symposiasts were Mesoamericanists, while others presented their research on ceramics from Maine-New Brunswick, the Central Andes, Spain, Morocco, Greece, and Japan. The organizers, symposiasts, and Matson went to dinner together afterwards and continued to discuss the presentations in terms of methods, results, and theories. From the stimulating conversations, it became quite clear that researchers who were working in different areas of the world were learning from one another. Matson suggested that the group be expanded to include anyone who worked with ceramic materials, and the "Ceramic Studies Interest Group" was created and it was determined that a follow-up meeting be held at the subsequent AAA meeting. In addition, the opportunity to publish the presentations as a paperback book came from Muriel Kirkpatrick at Temple University. Hence, *A pot for all reasons: Ceramic Ecology revisited* (Kolb and Lackey eds. 1988) was published and the volume was dedicated to Matson. The monograph contained a "Preface" that included additional details about the symposium and several chapters authored by Kolb, among them "Frederick R. Matson: A Professional and Personal View" (1988a) and a bibliography of Matson's publications.

A tradition had been established and a Ceramic Ecology (CE) Symposium was volunteered for inclusion in subsequent AAA annual programs. The Interest Group also expanded from its original Mesoamerican base and increased its

international membership. As of the Fall of 2017, there have been 31 symposia and five volumes of published papers ("Further Reading": Kolb (ed.) 1988 & 1989; and López Varela (ed.) 2014 & 2017). The Interest Group currently has more than 400 members; 266 authors and co-authors have presented 354 papers. North Americans (USA) dominate the number of presenters, but 39 other colleagues from 15 nations have given presentations; Mexicans and Canadians are well represented, but symposiasts have also come from Australia, Belgium, PR China, Ecuador, Germany, Greece, India, Israel, Japan, Poland, Spain, the United Kingdom, and Uganda. Participants have included three sets of husband and wife teams, a mother and son, and a family (Arlen, Diane, and 17-year-old son Aubrey Chase). Known ages of presenters spans 17–84 years. Eight symposiasts or discussants have received the Society for American Archaeology's "Award for Excellence in Ceramic Studies," including William A. Longacre, Frederick R. Matson, Prudence M. Rice, Dean E. Arnold, Ronald L. Bishop, Robert Rands, Warren R. DeBoer, Carol Kramer, and Hector Neff.

The symposia were co-organized by Kolb and Lackey (until her death in 2005) through the 25th CE symposium in 2011 at which time Sandra López Varela (originally at the Universidad Autónoma del Estado de Morelos and currently teaching at Universidad Nacional Autónoma de México) and Kostalena Michelaki (originally from McMaster University, Hamilton, Ontario, and now at Arizona State University) assumed the roles of co-organizers and alternate annually as chairperson. The symposia are volunteered sessions at the American Anthropological Association annual meetings, in the main, because of the holistic, inclusive orientation of the group and the numbers of nonarchaeologists, professional potters, art historians, and others who attend. The vast majority of ethnoarchaeologists and archaeometricians belong the both the AAA and SAA. The sessions adhere to the goal of including undergraduate or graduate students among the annual presenters. The meetings also offer the opportunity for young investigators to give presentations to a friendly peer group and to get feedback from ceramic scholars in a mentoring relationship. It has also been a mechanism whereby authors present versions of papers or book chapters for review prior to publication – Dean Arnold is, perhaps, the best example with a dozen presentations (Arnold 2003, 2008, 2015, 2017).

Future Directions

As Matson wrote 50 years ago "unless ceramic studies lead to a better understanding of the cultural context in which ceramic materials were made and used, they form a sterile record of limited worth" (Matson 1965a: 202). Materials scientist Vandiver (2000: 373) echoed that statement "to learn about our history and the human condition is not just to analyze and preserve the objects but also to investigate and understand the knowledge and skills used to produce and use them." Ceramic ecology will continue to make strides in understanding the who, what, when, where, why, and how of pottery.

Cross-References

- ▶ Archaeometry: Definition
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Conservation and Preservation
- ▶ Ceramics: Scientific Analysis
- ▶ Clay Tobacco Pipes
- ▶ Cultural Ecology in Archaeology
- ▶ Dating Techniques in Archaeological Science
- ▶ Experimental Maritime Archaeology
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ Isotope Geochemistry in Archaeology
- ▶ Organic Residue Analysis in Archaeology

References

Albero Santacreu, D. 2014. *Materiality, techniques and society in pottery production. the technological study of archaeological ceramics through paste analysis*. Warsaw/Berlin: De Gruyter.

Arnold, D.E. 1975. Ceramic ecology of the Ayacucho Basin, Peru: Implications for prehistory. *Current Anthropology* 16 (2): 183–203.

Arnold, D.E. 1985. *Ceramic theory and cultural process*. New York: Cambridge University Press.

Arnold, D.E. 2008. *Social change and the evolution of ceramic production and distribution in a Maya community*. Boulder: University Press of Colorado.

Arnold, D.E. 2011. Ceramic theory and cultural process after 25 years. *Ethnoarchaeology* 3: 63–98.

Arnold, D.E. 2015. *The evolution of ceramic production organization in a Maya community*. Boulder: University Press of Colorado.

Arnold, D.E. 2017. *Maya potters' indigenous knowledge, cognition, engagement, and practice*. Boulder: University Press of Colorado.

Arnold, P.J. 2003. *Domestic ceramic production and spatial organization: A Mexican case study*. New York: Cambridge University Press.

Baker, P.T. 1962. The application of ecological theory to anthropology. *American Anthropologist* 62: 15–22.

Baker, P.T., and W.T. Sanders. 1972. Demographic studies in anthropology. *Annual Review of Anthropology* 1: 151–178.

Bentley, R.A., H.D.G. Maschner, and C. Chippindale, eds. 2009. *Handbook of archaeological theories*. Lanham/New York: AltaMira Press.

Duistermaat, K. 2017. The organization of pottery production: Toward a relational approach. In *The Oxford handbook of archaeological ceramic analysis*, ed. A. Hunt, 114–147. Oxford: Oxford University Press.

Galaty, M.L. 2017. Mycenaean cooking pots: A North American perspective. In *From cooking vessels to cultural practices in the Late Bronze Age Aegean*, ed. J. Hruby and D. Trusty, 146–150. Oxford: Oxbow Books.

Hodder, I. 1985. Postprocessual archaeology. *Advances in Archaeological Method and Theory* 8: 1–28.

Kolb, C.C. 1976. The methodology of Latin American ceramic ecology. *El Dorado: Bulletin of South American Archaeology* 1 (3): 44–82.

Kolb, C.C. 1986. Commercial aspects of classic Teotihuacán period "thin Orange" wares. In *Research in economic anthropology: Economic aspects of Prehispanic, highland Mexico*, ed. B.L. Isaac, 155–205. Greenwich: JAI Press.

Kolb, C.C. 1988a. Frederick R. Matson: A professional and personal view. In *A pot for all reasons: Ceramic ecology revisited*, ed. C.C. Kolb and L.M. Lackey, 1–21. Philadelphia: Temple University, Laboratory of Anthropology.

Kolb, C.C. 1988b. Classic Teotihuacán granular wares: Ceramic ecological interpretations. In *Ceramic ecology revisited, 1987: The technology and socioeconomics of pottery*, BAR international series, ed. C.C. Kolb, vol. 436, 227–344. Oxford: British Archaeological Reports.

Kolb, C.C. 1988c. Classic Teotihuacán copoid wares: Ceramic ecological interpretations. In *Ceramic ecology revisited, 1987:Tthe technology and socioeconomics of pottery*, BAR international series, ed. C.C. Kolb, vol. 436, 345–448. Oxford: British Archaeological Reports.

Kolb, C.C. 1989a. Kushano-Sasanian storage jars from Central Asia: A study in ceramic ecology and ethnoarchaeology. In *Ceramic ecology, 1988: Current research on ceramic materials*, BAR international series, ed. C.C. Kolb, vol. 513, 175–259. Oxford: British Archaeological Reports.

Kolb, C.C. 1989b. Ceramic ecology in retrospect: A critical review of methodology and results. In *Ceramic ecology, 1988: Current research on ceramic materials*, BAR international series, ed. C.C. Kolb, vol. 513, 261–375. Oxford: British Archaeological Reports.

Kolb, C.C. 1989c. The current status of ceramic studies. In *Ceramic ecology, 1988: Current research on ceramic materials*, BAR international series, ed. C.C. Kolb, vol. 513, 377–420. Oxford: British Archaeological Reports.

Kolb, C.C. 2001. Technological choices in ceramic production – Perspectives from ceramic ecology, archaeology and ethnoarchaeology. *Archaeometry* 43: 273–277.

Kolb, C.C. 2011. *Chaîne opératoir*e and ceramics: Classification and typology, scientific analysis and archaeometry, experimental archaeology, and ceramic ethnoarchaeology. In *Archaeological ceramics:Aa review of current research*, BAR international series, ed. S. Scarcella, vol. 2193, 5–19. Oxford: Archaeopress.

Kolb, C.C. 2017a. Ceramics. In *Encyclopedia of geoarchaeology*, ed. A.S. Gilbert et al., 118–128. New York: Springer.

Kolb, C.C. 2017b. Provenance studies in archaeology: Ceramics, lithics/stone, metals, glass, and textiles. In *Encyclopedia of global archaeology*, ed. C. Smith, 2nd ed. New York: Springer. In press.

Kolb, C.C., and L.M. Lackey, eds. 1988. *A pot for all reasons: Ceramic ecology revisited*. Philadelphia: Temple University, Laboratory of Anthropology.

Lackey, L.M. 1991. *The pottery of Acatlán: A changing Mexican tradition*. Norman: University of Oklahoma Press.

Maschner, H.D.G., and C. Chippindale, eds. 2005. *Handbook of archaeological methods*. Walnut Creek: AltaMira Press.

Matson, F.R. 1965a. Ceramic ecology: An approach to the study of the early cultures in the near east. In *Ceramics and man*, ed. F.R. Matson, 202–217. Chicago: Aldine.

Matson, F.R., ed. 1965b. *Ceramics and man*, Viking fund publications in anthropology. Vol. 41. Chicago/London: Aldine/Methuen.

Pool, C.A. 1992. Integrating ceramic production and distribution. In *Ceramic production and distribution: An integrated approach*, ed. G.J. Bey and C.A. Pool, 275–313. Boulder: Westview Press.

Pool, C.A., and G.J. Bey. 2007. Conceptual issues in Mesoamerican pottery economics. In *Pottery*

economics in Mesoamerica, ed. C.A. Pool and G.J. Bey, 1–38. Tucson: University of Arizona Press.

Rice, P.M. 2015. *Pottery analysis: A sourcebook*. 2nd ed. Chicago: University of Chicago Press.

Roux, V. 2017. Ceramic manufacture: The *chaîne opératoire* approach. In *The Oxford handbook of archaeological ceramic analysis*, ed. A. Hunt, 101–113. Oxford: Oxford University Press.

Sanders, W.T., J.R. Parsons, and R.S. Santley. 1979. *The Basin of Mexico: Ecological processes in the evolution of a civilization*. New York: Academic Press.

Schiffer, M.B. 1976. *Behavioral archaeology: First principles*. Salt Lake City: University of Utah Press.

Sheehy, J.J. 1992. *Ceramic production in ancient Teotihuacan, Mexico: A case study of Tlajinga 33*, 2 vols. Unpublished Ph.D. dissertation. University Park: The Pennsylvania State University.

Steward, J.H. 1955. *Theory of culture change: The methodology of multilinear evolution*. Urbana: University of Illinois Press.

Vandiver, P.B. 2000. The role of materials research in ceramics and archaeology. *Annual Review of Materials Research* 31: 373–385.

Williams, E. 1992. Pots, pans, and people: Ceramic ecology in West Mexico. *Papers from the Institute of Archaeology* 3: 44. London: Institute of Archaeology, University College London.

Williams, E. 2017. *Tarascan pottery production in Michoacán, Mexico: An ethnoarchaeological perspective*. Oxford: Archaeopress.

Further Reading

Arnold, D.E. 1991. Ethnoarchaeology and investigations of ceramic production and exchange: Can we go beyond cautionary tales? In *The ceramic legacy of Anna O. Shepard*, ed. R.L. Bishop and F.W. Lange, 321–344. Niwot: University Press of Colorado.

Arnold, D.E. 1998. Andean ceramic technology: An ethnoarchaeological perspective. In *Andean ceramics: Technology, organization, and approaches*, MASCA research papers in science & archaeology, ed. I. Shimada, 353–367. Philadelphia: University of Pennsylvania.

Arnold, D.E., H. Neff, and R.L. Bishop. 1991. Compositional analysis and sources of pottery: An ethnoarchaeological approach. *American Anthropologist* 93: 70–90.

Bey, G.J., and C.A. Pool, eds. 1992. *Ceramic production and distribution: An integrated approach*. Boulder: Westview Press.

Espenshade, C.T. 1983. *Ceramic ecology and aboriginal household pottery production at the Gauthier site, Florida*. Unpublished M.A. thesis. Gainesville: University of Florida.

Galaty, M.L., G.J. Bey, and T.J. Ward. 2014. Cross-cultural ceramic analysis: Albania and Yucatán in the Keck Lab at Millsaps College. In *Social dynamics of ceramic analysis: New techniques and interpretations: Papers in honour of Charles C. Kolb*, BAR international series, ed. S.L. López Varela, vol. 2683, 13–21. Oxford: Archaeopress.

Góes Neves, E. 2008. Ecology, ceramic chronology and distribution, long-term history, and political change in the Amazon floodplain. In *Handbook of South American archaeology*, ed. H. Silverman and W. Isbell, 359–379. New York: Springer.

Gosselain, O.P. 1998. Social and technical identity in a clay crystal ball. In *The archaeology of social boundaries*, ed. M.T. Stark, 78–106. Washington, DC: Smithsonian Institution Press.

Johnson, M. 2010. *Archaeological theory: An introduction*. 2nd ed. New York: Wiley-Blackwell.

Kolb, C.C. 1997. Analyses of archaeological ceramics from classic period Teotihuacán Mexico, A.D. 150-750. In *Materials research in art and archaeology V*, Materials research society, symposium proceedings, ed. P.B. Vandiver et al., vol. 462, 247–262. PA: Pittsburgh.

Kolb, C.C. 2008. Petrographic analysis of Afghanistan ceramics: Neolithic through the Iron Age. In *Materials research in art and archaeology VIII*, Materials research society, symposium proceedings, ed. P.B. Vandiver et al., vol. 1047, 147–174. Pittsburgh: Materials Research Society.

Kolb, C.C., ed. 1988. *Ceramic ecology revisited, 1987: The technology and socioeconomics of pottery*, BAR international series. Vol. 436. Oxford: British Archaeological Reports.

Kolb, C.C., ed. 1989. *Ceramic ecology, 1988: Current research on ceramic materials*, BAR international series. Vol. 513. Oxford: British Archaeological Reports.

Kosakowsky, L.J., J.C. Lohse, N.C. Little, and R.J. Speakman. 2013. Pots and politics: Classic Maya ceramic production, exchange, and political ecology in northwestern Belize. In *Classic Maya political ecology: Resource management, class histories, and political change in northwestern Belize*, ed. J.C. Lohse, 127–148. Los Angeles: Cotsen Institute of Archaeology Press, UCLA.

Kramer, C. 1985. Ceramic ethnoarchaeology. *Annual Review of Anthropology* 14: 77–102.

Kramer, C. 1997. *Pottery in Rajasthan: Ethnoarchaeology in two Indian cities*. Washington, DC: Smithsonian Institution Press.

Livingstone Smith, A. 2000. Processing clay for pottery in northern Cameroon: Social and technical requirements. *Archaeometry* 42: 21–42.

Longacre, W.A., ed. 1992. *Ceramic ethnoarchaeology*. Tucson: University of Arizona Press.

López Varela, S.L., ed. 2014. *Social dynamics of ceramic analysis: New techniques and interpretations: Papers in honour of Charles C. Kolb*, BAR international series. Vol. 2683. Oxford: Archaeopress.

López Varela, S.L., ed. 2017. *Inventive approaches and explorations in ceramic studies: Papers in honour of Charles C. Kolb*, BAR international series. Oxford: Archaeopress In press.

Manibabu Singh, M. 2001. A cybernetic study on the Andro [India] ceramic ecology. *Journal of Human Ecology* 12 (5): 329–336.
Matson, F.R. 1995. Science in archaeology, a review: Ceramic ecology. *American Journal of Archaeology* 99: 108–111.
Osband, M. 2014. *Ceramic ecology of the Golan in Roman and Early Byzantine periods*. Unpublished MA. thesis. Ramat Gan, Israel: Bar-Ilan University.
Pool, C.A., and G.J. Bey, eds. 2007. *Pottery economics in Mesoamerica*. Tucson: University of Arizona Press.
Rice, P.M. 1987. *Pottery analysis: A sourcebook*. Chicago: University of Chicago Press.
Wallis, N.J., et al. 2015. The ceramic ecology of Florida: Compositional baselines for pottery provenance studies. The 40th international symposium on Archaeometry. *STAR: Science & Technology of Archaeological Research* 1 (2): 30–49.

Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD)

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State of Knowledge and Current Debates

Introduction

The use of clay for producing figurines is known from late Upper Paleolithic sites in Europe and northern Africa (from 26,000 years ago), while the first production of pottery vessels is well known in Eastern Asia (Eastern Siberia, China, and northern Japan) from the end of the Pleistocene (Jordan and Zvelebil 2009). Hunter-gatherer groups of northern Africa, the Sahara, sub-Saharan Africa, and the Sudan, according to the present evidence, started producing pottery at the beginning of the Holocene at about 10,000 years ago (Huysecom et al. 2009). Since its introduction, pottery has been one of the major cultural markers of the successive civilizations who settled the Nile River banks of the Sudan (Fig. 1). Following its evolution is thus a way to approach the complex history of this area where various populations moved, exchanged goods and ideas, and influenced each other's development. But as part of a complex system, pottery is only one of the features that define a culture and some other material studies might soon allow to precise and correct the words written below.

The Mesolithic Context of the Sudan

Early Holocene pottery-using hunter-gatherer-fishers in Sudan were first identified by Antony John Arkell in 1944–1945 with the excavation of the Khartoum Hospital site (Arkell 1949). Since then, a number of sites of this period have been excavated in central Sudan, the Wadi Howar and the Bayuda (see Salvatori 2012 Appendix 1 and bibliography therein). Evidence of pottery-using hunter-gatherers was brought to light in the Lower Nubian western desert (Nabta Playa) by the Combined Prehistoric Expedition (Wendorf et al. 2001; Nelson et al. 2002), and this work provided the first comprehensive archaeological sequence of the area for the early and middle Holocene cultural phases (Fig. 2). More recently, the Swiss archaeological mission at Kerma has provided a cultural sequence for Upper Nubia that can be compared to the Nabta-Kiseiba one. In southern central Sudan, the Italian Archaeological Mission has established a Mesolithic local sequence from the late eighth to mid-sixth millennium BC (Salvatori 2012).

Mesolithic Pottery in Lower and Upper Nubia (Fig. 3A)

The Mesolithic pottery and cultural sequence of western Egyptian desert and Upper Nubia are divided in four phases:

Mesolithic I: The few potsherds dating to this very early period (8300–7800 BC) are decorated with a Rocker stamp dots packed motif (Fig. 3A.a), possibly done by mean of a clay "roulette," and alternating pivoting stamp (APS) motifs. All the Mesolithic pottery both in Upper Nubia and central Sudan is made using the coil technique. The vessels are sand

Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD), Fig. 1 Map of the Sudan with main sites quoted in the contribution (© R. David)

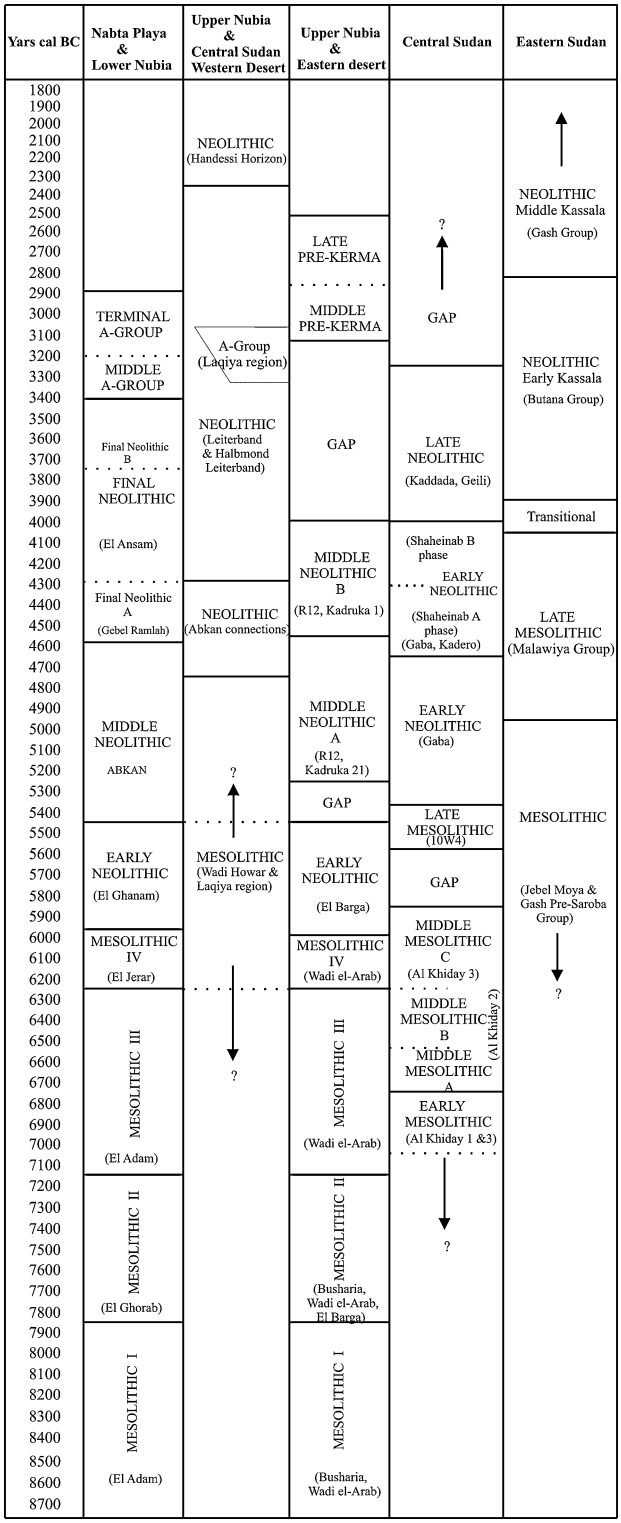

Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD), Fig. 2 Chronology of Mesolithic and Neolithic Sudan (© S. Salvatori)

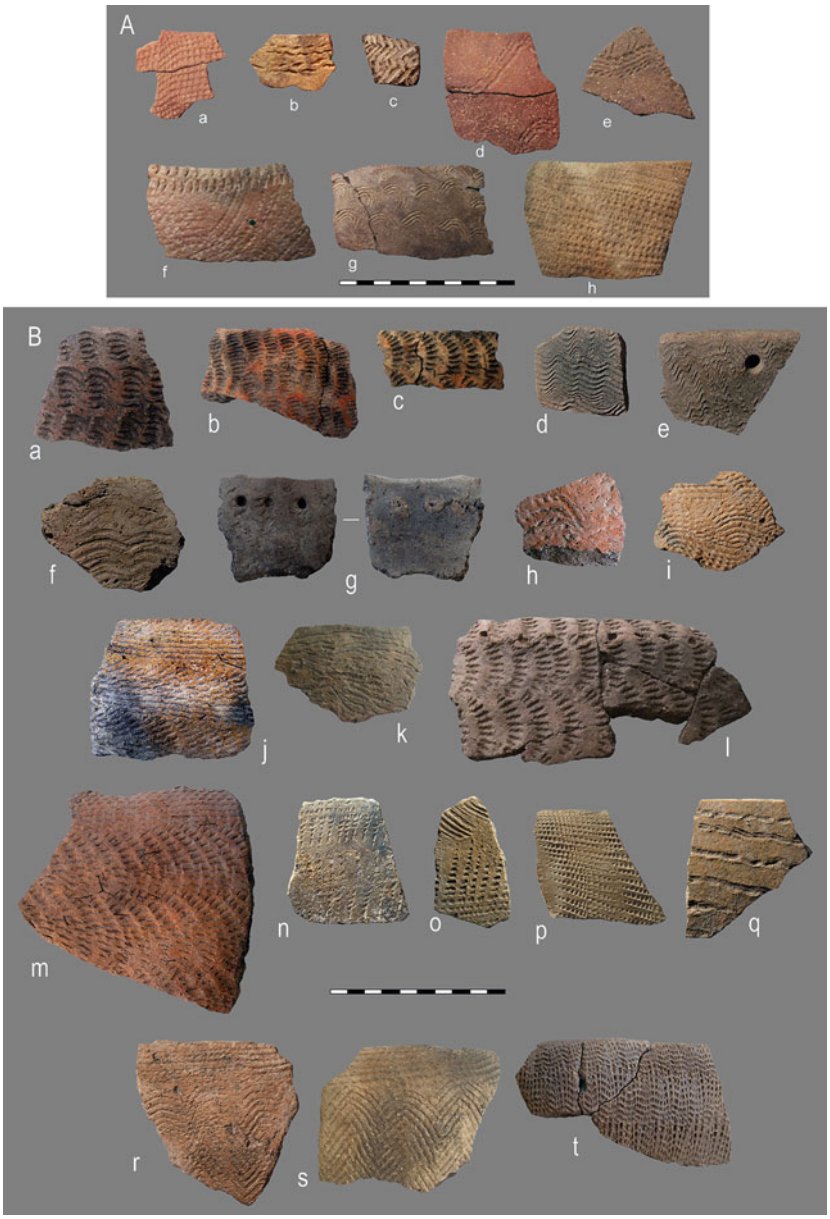

Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD), Fig. 3 (A) Selection of diagnostic pottery decoration motifs from Upper Nubia Mesolithic periods (by courtesy of D. Usai). (B) Selection of diagnostic pottery decoration motifs from central Sudan Mesolithic periods (a–i, Early Mesolithic; j–p, Middle Mesolithic A and B; q–s, Middle Mesolithic C; t, Late Mesolithic) (By courtesy of the CSSS)

tempered with rare vegetal elements. This early pottery is present in the El Adam phase in Nabta Playa as well as in the Kerma area at Busharia Sites 44 and 45, Wadi el Arab Site 41, and Site 84 south of El Barga. In the Kerma area, potsherds are decorated with Rocker stamp dotted zigzag packed (Fig. 3A.h) or spaced and different patterns of APS. Possibly contemporary is the pottery from Wadi el Akhdar 83/33 (8310–8248 BC).

Mesolithic II: Stem and leaf motifs (Fig. 3A.b) together with early APS seem to be the most typical decoration on the pottery of this period in the Kerma area (Busharia Site 44, El Barga I and Wadi el Arab II dating ca. 7800–7200 BC). It is also well represented in the El Ghorab sub-phase of Nabta Playa as well as in the first phase of the so-called Khartoum Variant horizon, with sites distributed along the Nile from Wadi Halfa to Sai Island and to the Fourth Cataract area. Analogous motifs are present in Upper Nubia at Sai, to the Fourth Cataract dam basin (Mograt Island, Umm Klait Site 3-Q-73) and the Nubian Eastern Desert.

Mesolithic III: This phase (ca. 7200–6300 BC) is characterized by Rocker stamp and APS techniques using combs and cord-wrapped and double-pronged tools to obtain decoration motifs such as zoned dotted wavy line (DWL) patterns (Fig. 3A.d–e), Rocker stamp dotted spaced zigzag (Fig. 3A.f), wolf-tooth or herringbone patterns (Fig. 3A.c), and possibly slightly different stem and leaf motifs and other types of impression. Many of these decorative motifs are known at Wadi el Arab III–IV as well as in the El Nabta third sub-phase of Nabta Playa. Similar motifs are documented in the Nubia Eastern Desert, at Sai and in the Fourth Cataract (Wadi Abu Dom, Mograt Island, Bonny Island, and Shemkhiya site UCSB 03–22).

Mesolithic IV: This phase (ca. 6300–6000 BC) is known at Wadi el Arab V and is characterized by Rocker stamp dots packed sometimes associated with DWL and Scraping on the external surface. It possibly corresponds to a late Al Jerar sub-phase of the Early Neolithic of Nabta Playa. Rocker stamp impressions are widespread all over the area from Nabta Playa to the Fourth Cataract.

Immediately to the south of a line from Debba to Korti (Multaga area), a survey conducted by the Southern Methodist University in the winter of 1966–1967 located Mesolithic sites with pottery apparently correlated with the Early Khartoum horizon (or Khartoum Mesolithic) but mostly with vegetal temper. This was named the Karmakol group. In 2002–2003 a new survey of the area was conducted by the Section française de la direction des antiquités du Soudan (SFDAS), locating seven Mesolithic sites and collecting the same type of pottery which could be directly dated to ca. 6400–6200 BC (Gatto 2006). Two different groups are present: vegetal-tempered and mineral-tempered pottery. The vegetal-tempered pottery assemblage is characterized by globular jars and bowl of both open and restricted forms. Decoration is mainly Rocker stamp dotted zigzag impressions and DWL on both temper type groups, while Incised Wavy Line (IWL) seems to be confined to the vegetal-tempered group. Whether the two productions are contemporaneous is not clear as the abovementioned dates are from the vegetal-tempered sherds only. Karmakol-group pottery is also known in the Letti Basin, north of Hambukol. Sherds pertaining to this distinctive type of pottery have been found sporadically in the Fourth Cataract area. In spite of general similarities with the Early Khartoum Horizon and with Holocene Nubian pottery, the Karmakol-group pottery production seems to denote a discrete human group with its own traditions and identity both in pottery and in lithic production.

Central Sudan Mesolithic (Fig. 3B)

After the publication of the Khartoum Hospital excavation, in which, unfortunately, no stratigraphy was recognized (Arkell 1949: 4), further Mesolithic sites have been investigated in the area of the Atbara junction with the Nile (Aneibis, Abu Darbein, El Damer), in the Butana (Shaqadud), and in central Sudan, along the eastern bank of the Nile to the north of Khartoum (Saggai), as well as along the western bank of the Nile (Umm Marrahi and Sarourab) and next to the Sixth Cataract (Sabaloka). A Spanish expedition surveying an area southwest of Khartoum, on the east of the Blue Nile, located at least 26 Mesolithic sites and made test excavations at the most promising of them (El Mahalab and Sheikh Mustafa).

In the last 17 years, an Italian Mission intensively investigated the western bank of the White Nile from Khartoum to the Jebel Aulia Dam, conducting excavations at a number of Mesolithic

sites mainly in the Al Khiday area (Salvatori 2012 and Appendix 1 and bibliography therein).

Further south, 110 km from Khartoum, a Mesolithic site (Shabona) was investigated by J. Desmond Clark in 1973. Mesolithic pottery related to the Khartoum Mesolithic horizon was also found at Jebel Moya, in the Gezira, 245 km south of Khartoum. To the west of the Nile, an important Mesolithic site (Rahib 80/87) was excavated, in the area of the Middle Wadi Howar.

In spite of the relatively large number of Mesolithic sites excavated or simply tested in central Sudan, a reliable archaeological sequence for the period is far from being established. Almost all of the excavated and tested sites were badly destroyed by postdepositional disturbances (see Salvatori 2012: Appendix 1), and the many radiometric determinations from charcoal, shell, and other materials are never associated with discrete pottery assemblages. This is especially regrettable because some of the C14 dates from sites such as Sarourab 2 and Umm Marrahi cover most of the ninth millennium BC.

A Mesolithic sequence for southern central Sudan, based on stratigraphic excavations and radiometric determinations, comes from sites of the Al Khiday area. It covers the period from the late eighth to mid-sixth millennium BC and allows us to recognize changes in the decorative motifs.

The oldest period (Early Mesolithic: >7000–6750 BC) is documented by basal layers at the sites16-D-5 and 16-D-3, and it is characterized by IWL decoration (Fig. 3B.d–e) on pottery tempered with feldspar grains with angular edges; a small quantity of IWL with flat ridges (Fig. 3B.f) is sand tempered; pottery with incised "Lunula" motifs (Fig. 3B.a) is tempered with sand often associated with calcareous and ochre grains and vegetal temper, as well as deep dots or drops and Rocker stamp deep fanlike motifs (Fig. 3B.b–c). Rare DWL (Fig. 3B.h–i), Rocker stamp plain and dotted zigzag spaced, and Scraped sherds are also present, always mainly sand tempered with the addition of other elements. It is interesting to note that Lunula-type decoration is known only at the Khartoum Hospital site (Arkell 1949: Pl. 77: 2). Most of the potsherds and especially those decorated with the Lunula and the Rocker stamp deep fan-like motifs are covered with a red-ochre slip.

Later (Middle Mesolithic A: 6750–6500 BC) an important change occurred with the abandonment of light huts and possibly residential mobility in favor of mud-walled houses and reduced residential mobility. Lunula-type decoration, as well as a pottery type decorated with punctuations below the rim (Fig. 3B.g) (Salvatori 2012: Fig. 22–23), and IWL with flat ridges disappear, while unpatterned deep drop motifs continue to be applied, but to a lesser extent. Rocker stamp fan-like decoration increases in occurrence, while the execution is less deep than previously (Fig. 3B.l–m). No substantial difference can be noticed in the presence of other decoration types such as DWL, Rocker stamp plain and dotted zigzag spaced, and Scraped sherds.

A further phase (Middle Mesolithic B: 6500–6200 BC), while present at the 16-D-5 site, is better known from the close functional areas named 16-D-4 and 16-D-4B, where more than 150 large and deep pits of varied use, mostly filled with cultural remains (*Pila* sp. shells, fish and mammal bones, lithic and bone tools, and pottery sherds), have been excavated.

This phase shows a consistent decrease in the presence of IWL and a parallel increase in Rocker stamp dotted zigzag packed decoration (Fig. 3B.o–p) on a ware tempered, like the IWL, with angular feldspar grains. The more frequent decoration type is now the Rocker stamp fan-like and Rocker stamp drops with shallower impressions (Fig. 3B.j). No substantial difference can be noticed in the quantitative recurrence of other decoration types such as DWL, Rocker stamp plain and dotted zigzag spaced, and Scraping, while APS decoration appears more rarely (Fig. 3B.q), but always tempered with angular feldspar grains.

Finally, a Middle Mesolithic C phase (6200–6000/5900 BC) is well known from the upper undisturbed layer of the 16-D-3 site at Al Khiday. Pottery sherds are mostly decorated with Rocker stamp fan-like motifs, similar to the Middle Mesolithic B exemplars, and often are red-ochre slipped or in some cases painted. Several

unpatterned Rocker stamp decorations are also attested, as well as more rare DWL, Rocker stamp plain and dotted zigzag spaced, Scraped, and a growing number of APS. IWL is still present but in a reduced number of exemplars. The most interesting pottery type presents a complex decoration made of dotted arches generating a thick vertical pattern of dotted zigzag lines (Fig. 3B.r–s) that can be convincingly compared with the early Laqiya pottery known in the Wadi Howar (Rahib site 80/87, Djabarona 84/13–6 and Conical Hill 84/24), in the Ennedi Erg sites, and in the Sudanese western desert in the Laqiya region (Wadi Shaw: Jesse 2003: 189, Fig. 38). A single fragment possibly of the early Laqiya type was found at El Mahalab in the Wadi Soba (Fernández et al. 2003: Fig. 40: 16). Most of the rims of the Laqiya pottery at Al Khiday are decorated with cord impressions, and the walls are usually covered with a red-ochre slip.

At Shabona (Clark 1989), further to the south, two types of pottery were collected, one grass tempered (Naima ware) that is considered to replace a sand- and feldspar-tempered ware (Shabona ware). Unfortunately the only C14 date (on *Pila* sp. shell: 6028–5798 1σ cal BC) available from the main site cannot be linked to either of the two ware types. The other C14 determination (6566–6071 1σ cal BC) from the site is from a human bone (SH/South/G1). Judging from the limited number of illustrated sherds, the decorative motifs on the Naima grass-tempered ware cannot be compared with the grass-tempered ware from the Southern Dongola Reach and the Multaga area (Karmakol group), and both the groups (Naima and Shabona ware) can only be vaguely assimilated with the Khartoum Horizon.

After a gap in the local sequence, a Late Mesolithic phase (5500–5400 BC) was identified at the site 10-W-4 (Salvatori 2012). Potsherds are mainly decorated with Rocker stamp drops, Rocker stamp dotted zigzag packed (Fig. 3B.t) (as usually feldspar tempered), and Rocker stamp dotted zigzag spaced motifs. IWL is there much less common, as is to be expected considering the trend we observed during the previous Mesolithic phases. APS decoration is well represented and as before it is tempered with crushed feldspar grains. Less frequent are Rocker stamp plain zigzag, incised lines, and Scraped decoration. DWL is present, but it is done in a very compact pattern of a type described as "small waves" by Friederike Jesse (2010: 231).

The sequence described above cannot be applied as such to the entire central Sudan area because, due to the lack of stratigraphy at most if not all of the excavated Mesolithic sites, it is impossible to compare discrete and well-dated pottery assemblages. Contacts were surely actively maintained among hunter-gatherers of the central Sudan, but the decorative system was possibly used as an identity marker and thus indicates the degree of dissimilarity among different groups.

The Neolithic Context

From Foraging to Food Production: The Early and Middle Neolithic of Upper Nubia (Fig. 4)

In the last 25 years, new archaeological excavations and the publication of Neolithic cemeteries and settlements both in Egypt and Sudan have greatly increased our understanding of the neolithization process in northeastern Africa. New data from the Early Neolithic cemetery of El Barga (Honegger 2005) coupled with the data from Tree Shelter and Sodmein Cave (Vermeersch et al. 2015) in the Eastern Egyptian Desert, and from the so-called Middle Neolithic of Nabta Playa and Bir Kiseiba areas in the Egyptian southwestern desert, help to fix a transition from foraging to food production in this core region. Evidence for the introduction of domestic animals (cattle, goat, and sheep) at about 6000 BC comes from the above-quoted sites, while recently analyzed residues from a grave in the R12 cemetery (Ryan et al. 2016), dating to the last centuries of the sixth millennium BC, suggest that together with domestic animals, domestic cereals (wheat and barley) were brought to the area by people coming from southern Levant.

At the Early Neolithic cemetery of El Barga, dated to the first half of the sixth millennium BC, only four vessels have been found in the graves. They are of interest because one is decorated with a Rocker stamp dotted packed pattern of Late

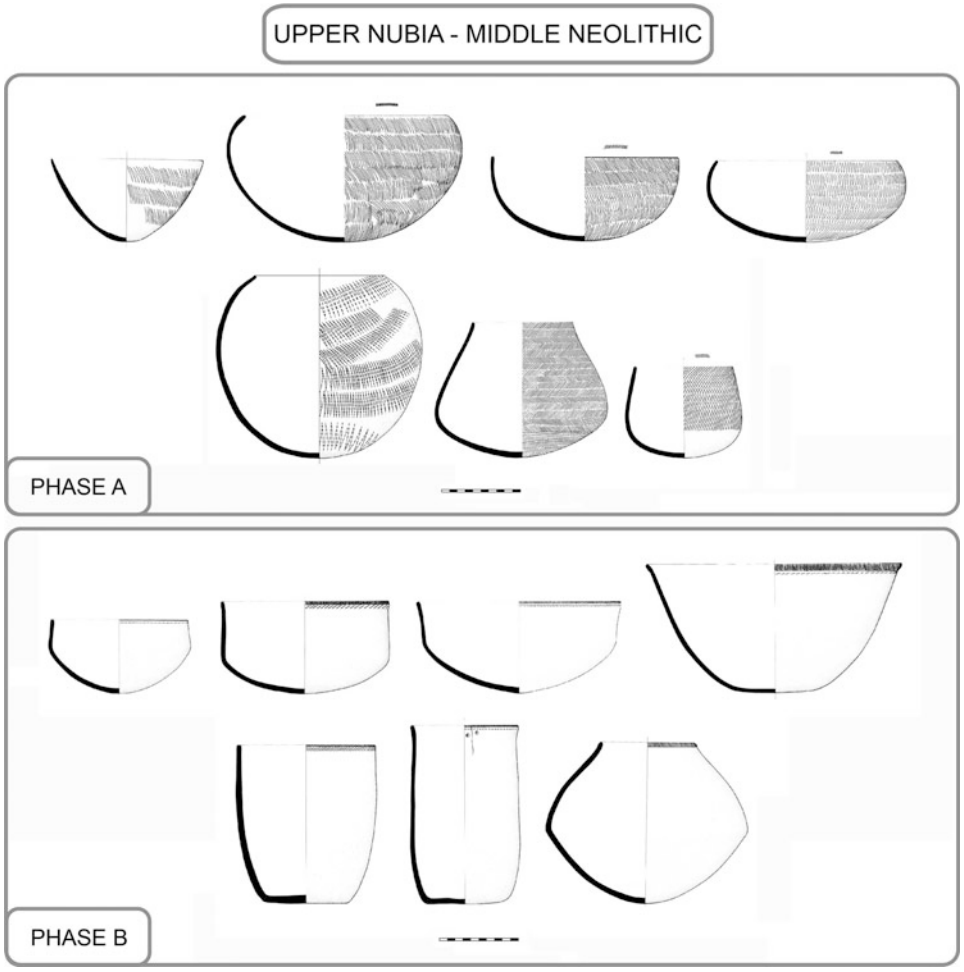

Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD), Fig. 4 Selection of diagnostic pottery shapes and decorations from Upper Nubia Middle Neolithic phases (Redrawn from Salvatori and Usai 2008)

Mesolithic tradition that is also present in the almost-contemporary first phase of the Nabta Playa "Middle Neolithic." Among the other vessels found at El Barga, three are a sub-cylindrical undecorated beaker, an open undecorated bowl, and a slightly restricted hemispherical bowl apparently decorated with an uneven herringbone pattern. This limited number of pots from the cemetery cannot help much in understanding local production but gives information on an ongoing process of change from the previous Mesolithic tradition. Early Neolithic grave goods from the El Barga cemetery show the presence of new tools and items of personal decoration in the material assemblage (bone bracelets, small stone axes, necklaces of various kinds of beads, stone lip-plugs, Nile *Chambardia* sp., and red sea shells) that anticipate the more common grave goods present in the fifth millennium BC cemeteries of the Kerma area and the northern Dongola Reach (Reinold 2001; Salvatori and Usai 2008).

Unfortunately, a gap of few centuries ca. 5500 to 5200 BC limits our perception of the evolution of Neolithic societies of Upper Nubia, but, from the end of the sixth and throughout the fifth millennium BC, we can observe pottery production in Upper Nubia through the lens of cemetery data.

The greatest transformation in pottery production is visible during the first half of the fifth

millennium BC (Middle Neolithic A: Fig. 4). Pottery is characterized by a range of vessel shapes, from simple hemispherical unrestricted and restricted bowls to hole-mouth globular and ovoid jars and from biconical composite bowls to a number of caliciform beakers usually found in funerary contexts. Decorative variability is impressive while based on simple technical means (Rocker stamp dotted and plain zigzag, bands of evenly distributed dotted zigzag lines, incised bands hatched with dotted lines). Ripple ware is present in the oldest period of the R12 and the Kadruka 13 cemeteries. This surface treatment is known later at the mid-fifth millennium Gebel Ramlah cemetery, 25 km north of Nabta Playa, and in the so-called Late Neolithic of Nabta at Site E-00-1, as well as, sporadically, in the Abkan Neolithic. Pots are still made by coiling and in some cases possibly thinned using a paddle and anvil technique. Most of the pots from the R12 cemetery are externally and, in cases of open bowls, internally very well smoothed and in many cases polished after decoration. Temper is mostly fine sand, while mica, almost always visible, possibly came from the local Nile clay. More rarely, other materials such as vegetal elements, limestone splinters, and shell fragments were added. Firing was accomplished in earthen kilns to judge from the frequent occurrence of black or red spots produced by an inadequate control of the airflow.

The Middle Neolithic A phase is known in Upper Nubia from the site of Sedeinga to the north, and the Letti Basin and the Fourth Cataract area to the south. Connections with the so-called Abkan Neolithic (Nordström 1972: 12–17) have been highlighted, concerning both pottery and lithic production. As for the oldest period at the R12 cemetery and for the Abkan Neolithic, we now have radiocarbon determinations from Sai Island, pointing to at least the second half of the sixth millennium BC. Abkan pottery is sand tempered, sometimes burnished and decorated with parallel rows of impressed dots in zigzag patterns. Herringbone-incised patterns are also present. While the Abkan is mostly concentrated along the Nile from Faras, north of the Second Cataract, to Sai Island, south of same cataract, connections have been suggested with western desert sites (Wadi Shaw and Wadi Sahal in the Laqiya region). Moreover, it is possible that this culture was present much further to the south, if it can be equated with the so-called Karat group of the southern Dongola Reach.

The lack of systematic publication of contemporary excavated cemeteries in the Kerma area does not allow meaningful tracing of variability in pottery production in the region and thus the identification of specific identity markers for each local community.

At about 4500 BC, a new pottery assemblage (Middle Neolithic B: Fig. 4) appeared and spread all over Upper Nubia from the Kerma area and the northern Dongola Reach (Kadruka 1 and R12 cemeteries) to the Fourth Cataract area (Multaga). This new pottery tradition can denote a period of integration marking the building of a regional identity. This assemblage seems to be limited to a restricted number of shapes, mainly well-polished to burnished subcylindrical jars, slightly flattened small jars, large open bowls with flattened bottoms, unrestricted composite subcylindrical bowls, restricted biconical bowls, and large hemispherical bowls. Decoration is limited to a narrow horizontal band on the exterior of the rim decorated with a Rocker stamp plain zigzag or oblique dotted strokes (Salvatori and Usai 2008: Fig. 13.1b, types 56–64). Caliciform beakers, known in several, apparently local, variants both in Egypt and Sudan and also in the desert areas to the west and east of the Nile (Jesse 2007), are still present in the graves of this period (Salvatori and Usai 2008).

At present only one Neolithic settlement has been excavated in Upper Nubia and published. It was located in the area of the eastern cemetery of Kerma and albeit very eroded a number of aligned postholes where there detected. Radiometric determinations place the site between 4600 and 4300 BC (Honegger 2004: Fig. 1) or within Middle Neolithic B. Indeed, most of the pottery seems to fit the typology of this phase with the addition of some rippled vessel. Suggested connections between the Kerma Neolithic and the A-Group (mainly Classic and Terminal) are at the moment very problematic because of the chronological distance between them.

The Upper Nubian Late Neolithic and the Pre-Kerma (the Fourth Millennium)

At the beginning of the fourth millennium BC at about 3750 BC, an apparently new cultural group (called the A-Group) appeared around the First Cataract and later expanded to the south along the Nile (Nordström 1972). It seems to be present also in the western Nubian desert. The first phase, the Early A-Group (3750–3400 BC), is known at a restricted number of cemeteries around the First Cataract, and the associated materials are mainly of Egyptian origin (Nordström 1972). This phase recently underwent a serious revision and now is understood as part of a Naqada settlement system. The Nubian component can be equated to the Terminal Abkan. Proper Nubian pottery of the period is barely described, but its main component is burnished red-slipped and black-mouthed wares. Less common are incised and impressed geometric patterns on deep bowls.

Black-topped and rippled pottery together with pots decorated with incised and impressed geometric patterns is the most characteristic traits of the Classic or Middle A-Group (ca. 3400–3200 BC). The occurrence of pots with milled rim decoration is noteworthy. A-Group sites and cemeteries are now distributed along the Nile from north of the First Cataract to the Batn el-Hagar south of the Second Cataract. Moreover, sites with A-Group pottery were located in the Wadi Shaw and Wadi Sahal in the Laqiya region (northwestern desert of the Sudan). The local assemblage is made of "rippled sherds, red polished black mouthed sherds and sherds with decorations of zigzag and herring-bone patterns" (Lange 2003: 106, and Figs. 3–5, 7–9).

During the Late or Terminal A-Group (ca. 3200–2900 BC), the core area of this culture did not change. Contacts were still present with Predynastic sites to the north, while more elusive, though present, were contacts with the Middle Pre-Kerma culture (Honegger 2006). Sites and cemeteries are unknown in Upper Nubia during the fourth millennium BC, while a cultural phase named in the area as Pre-Kerma is known at Kerma (Sites 1, 27 and 21), covering a period from 3100 to 2500 BC (Honegger 2004: Fig. 5 Middle Pre-Kerma, and Fig. 6 Late Pre-Kerma). Pre-Kerma pottery is also known from sites north of the Third Cataract, at Sai Island, at the Arduan Islands, and in the area of the Fourth Cataract.

The Late A-Group pottery is strongly characterized by thin eggshell wares with geometric-painted decoration, ripple wares, red polished wares, black-topped bowls, coarse wares with Rocker stamp dotted zigzag decoration, and open bowls with complex incised decoration (Nordström 1972).

From Foraging to Food Production: The Early Neolithic of the Central Sudan (Fig. 5)

The first Neolithic settlement excavated in the central Sudan (Shaheinab: Arkell 1953) has been until recently considered the type site of the Early Neolithic of the region. After Arkell's excavation, archaeological research was focused on cemetery sites (Kadero, Ghaba, Kadada, Es Sour, Al Khiday 4). The few Neolithic settlements tested (Geili, Kadero middens, Sheikh el Amin, Haj Yusif) turned out to be heavily destroyed by later human and natural post-depositional disturbances.

The recent publication of the Ghaba (Salvatori et al. 2016) and Kadero (Chłodnicki et al. 2011) cemeteries allows the development of a new and more complex picture of the Early Neolithic of the central Sudan. The Ghaba cemetery, where 265 Neolithic graves were excavated in one fourth of the estimated archaeological area, revealed the presence of a Neolithic phase older than the Shaheinab one. Seriation of the Ghaba cemetery and radiometric determinations allow the dating of the first phase that we call the Ghaba phase (5300 and 4650 BC), followed by Shaheinab phase A (4650 to 4300 BC) and Shaheinab phase B (4300 to 4000 BC).

At present the Ghaba period seems to be present only in the Shendi area (northern central Sudan), while the later Shaheinab phases spread all over central Sudan from Shaqadud in the Butana to the south along the Blue and the White Nile. These different periods are characterized by distinctive pottery assemblages. The main pottery types of the oldest period are red-slipped black-rimmed biconical jars, hemispherical restricted undecorated boat-shaped bowls, sub-cylindrical decorated beakers, undecorated

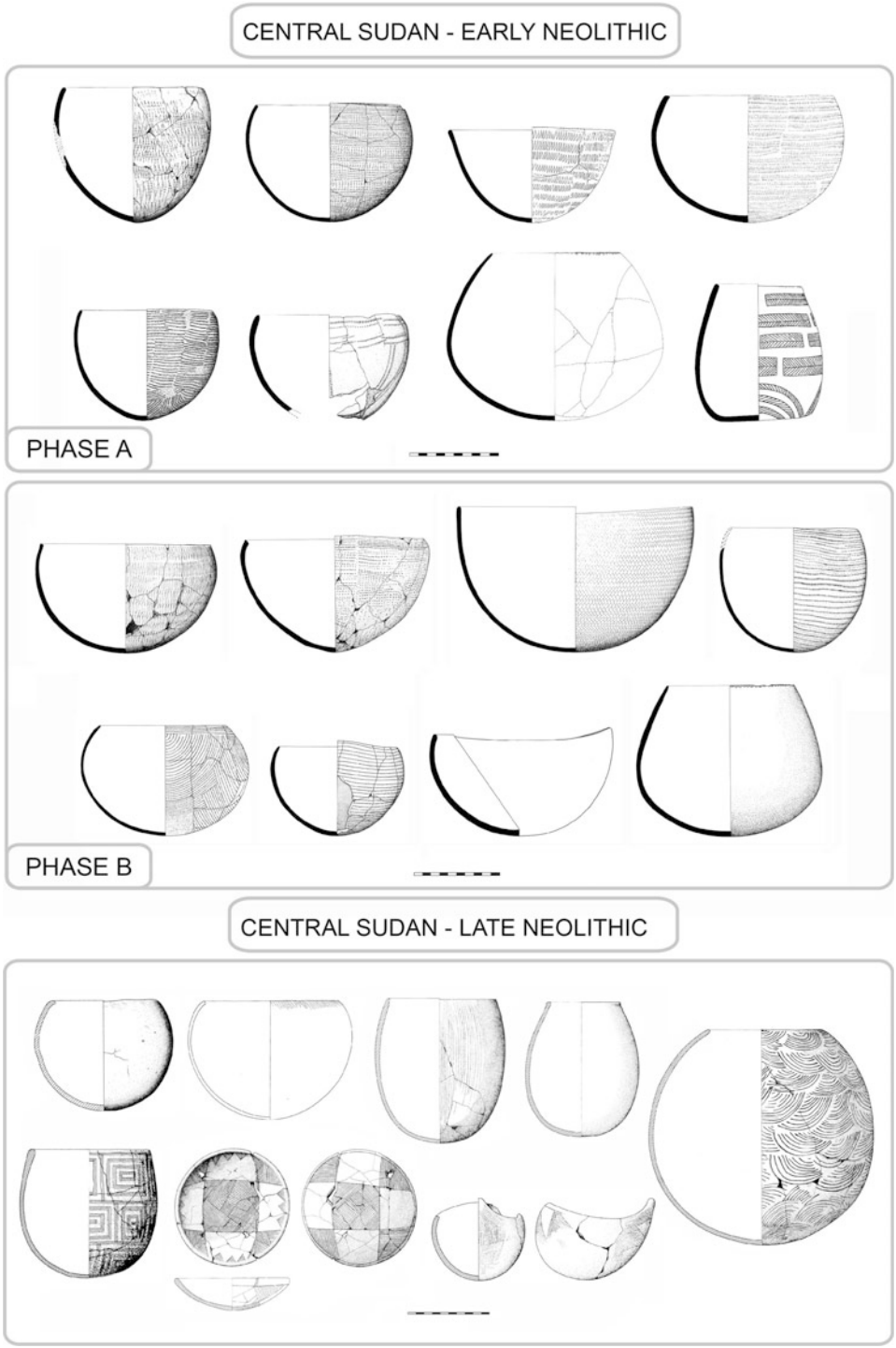

Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD), Fig. 5 Selection of diagnostic pottery shapes and decorations from central Sudan. Early Neolithic A and B (redrawn from Salvatori et al. 2016); Late Neolithic (redrawn from Reinold 2007)

bowls, bowls decorated with rocker stamp dotted and plain zigzag motifs, wolf-tooth patterns and with impressed semicircles realized with a double-pronged tool, and caliciform beakers, among others (Fig. 5 Phase A). Some of the pottery types and decorations are known in the contemporary Middle Neolithic A of Upper Nubia, suggesting a colonization of the Shendi area by people coming from the north from the last centuries of the sixth millennium BC (Salvatori et al. 2016). The Neolithic pottery of the central Sudan is still made by coiling and thinned using a paddle and anvil technique.

The later Shaheinab period pottery is characterized, in the Ghaba and Kadero cemeteries as well as at Shaqadud, Shaheinab, Geili, Gereif East, Haj Yusif, and Sheikh al Amin settlements among others, by red-coated, very well-polished to burnished bowls, red-burnished biconical jars, unrestricted and restricted globular and hemispherical bowls with rocker stamp unevenly spaced dots (more often occurring in settlement deposits than among grave goods), mainly well-polished to burnished red globular bowls decorated with hanging dotted concentric semicircles arranged in four symmetrical panels, and black-rimmed red-burnished bowls (Fig. 5, Phase B). Shaheinab period represents, like the Middle Neolithic B phase in the north, a consolidation and expansionist period of the communities of the central Sudan. The end of the Shaheinab period presents few but interesting differences with the appearance of bowls decorated with concentric incised semicircular lines hanging from the rim which abruptly replace the similarly arranged dotted decoration type.

The Late Neolithic of the Central Sudan (Fig. 5)

At the beginning of the fourth millennium BC, the Shaheinab final phase disappeared being replaced almost everywhere by new types of pottery and lithic production. Vessel shapes are mainly ovoid and globular jars (e.g., Reinold 2007: Figs. 211–273) and various types of black burnished bowls from open to restricted forms. Decoration is stippled impressed or incised, sometimes producing very complex designs (e.g., Reinold 2007: Figs. 180–210; Caneva 1988: Fig. 10), and is mostly rippled. The typical Shaheinab gouges (rhyolite stone tools possibly used in wood working) are now replaced by polished axes.

This Late Neolithic phase can be dated on the base of radiometric determinations from Kadada to about 4000 to 3300 BC. Its distribution is known from the Shendi area to Khartoum and possibly to the south as is suggested by the graves excavated at Goz Kabbaro in the Gezira, along the western side of the Blue Nile (Balfour Paul 1952).

In the western desert and mainly in the western part of the lower Wadi Howar, Neolithic settlements and camp sites, C14-dated to the fourth and early third millennium BC, have been located by the University of Cologne (Jesse 2010: Fig. 6). Pottery from several sites, and mainly from the Abu Tabari area, is characterized by a decorative style named Leiterband that is well known also in the middle Wadi Howar. Another distinctive decoration associated with the Leiterband motif is the herringbone-incised pattern (Jesse 2010: Figs. 9 and 11) which has been compared to Late Pre-Kerma samples dating to the beginning of the third millennium BC. From a different perspective, the Leiterband decoration and more specifically its oldest phase at Djabarona 84/13 have been compared with the Rocker stamp unevenly spaced dot decoration typical of the Shaheinab phase of the Early Neolithic of the central Sudan. This very strong similarity suggests a date for this decoration type in the second half of the fourth millennium BC.

The Protohistoric Context in Nubia (ca. 2400–1500 BC)

The third millennium BC is mainly known from Nubian contexts, the central area of Sudan being archaeologically silent for this period. Two distinct groups of peoples, namely, the C-Group in Lower Nubia and Kerma in Upper Nubia, follow on from the ceramic tradition of the previous A-Group and Pre-Kerma inhabitants of the Middle Nile valley.

The C-Group of Lower Nubia (2400–1500 BC)

The C-Group people is considered to be related to the A-Group in Lower Nubia. The latter withdrew

to the oases of the western desert for four centuries before again coming close to the Nile, probably pushed back by the final drying up of the Sahara. The connection between both ceramic industries is obvious: black-topped and incised or impressed ceramics continued to be the most identifiable production of the C-Group potters (Williams 1983: 25–63). Some differences or developments can nevertheless be noticed: C-Group potters favored the use of a dung temper probably taken from their cattle, while A-Group ceramics used various materials including ash temper. Shapes, still handmade, became more rounded even if there is no radical change within the typology.

The C-Group culture has been divided in four phases established from documentation mainly collected in cemeteries such as Aniba, Qurta, Dakka, Faras, Adindan, and Serra. Criteria such as the variety of burial customs, the Egyptian imports, and the evolution of incised decorative patterns on ceramics were taken into account (Hafsaas 2005). Indeed, the study of the structure of the incised designs shows various combinations evolving throughout the end of the third millennium and the first half of the second millennium BC. During the first phase (phase1/a, ca. 2400–2160 BC), the plaited pattern, the half-moon pattern, and the quadrates pattern were incised on black bowls (Fig. 6a–c). Wavy lines incised on the rim appear to be restricted to this period. The quadrilateral structure of the patterns is diagnostic of the second phase (phase 1/b, ca. 2160–1985 BC). The division of the decoration allows various combinations of simple geometric forms such as rectangles, lozenges, and triangles that have been named the quadrilateral plaited pattern, the quadrilateral quadrates pattern, and the chevron pattern (Fig. 6d–f). The third phase (phase 2/a, ca. 1985–1650 BC) is marked by the first appearance of figurative-incised decoration. Other motives such as zigzag patterns, herringbone patterns, and chessboard patterns seem to be characteristic of this phase (Fig. 6g–h). The last sequence (phase 2/b,

Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD), Fig. 6 C-Group main designs incised on ceramics (Redrawn from Hafsaas 2005)

ca. 1650–1500 BC) is characterized by a diamond structure in the incised designs on pottery (Fig. 6i). The filling of the incisions with red and yellow pigment appears to be confined to this phase. We lose track of the C-Group people when their Egyptian neighbors conquered Nubia. They are thought to have blended into the new Egypto-Kushite society which emerged from that colonization.

Kerma Pottery in Upper Nubia (2450–1450 BC)

Named Kush in the Egyptian sources, the kingdom of Kerma settled the area south of the Second Cataract as far as south of the Fifth Cataract at the culmination of its power. Descendents of the Pre-Kerma people and probably also related to the C-Group, the Kerma potters produced a pottery that one can think of as one of the most remarkable accomplishments of Nubian culture.

The excavations conducted at Kerma and Sai have considerably improved our knowledge of Kerma culture and allowed scholars to define four phases (ancient, middle, classic, and recent) on the basis of ceramic evolution (Gratien 1978). Ancient Kerma (ca. 2450–2050 BC) is probably connected to the A-Group and corresponds in various ways to the C-Group early assemblages. As for the C-Group ceramics, Nile silt and dung temper are the basic recipes of all the pots produced. Black-topped and red- or black-incised bowls are fairly common. The typology consists of bowls with a pointed base and decorated with an incised line on the rim. During Middle Kerma (ca. 2050–1750 BC), ceramic production tends to separate gradually from that of the C-Group. Black-topped bowls are more finely executed, but the previous red- or black-incised bowls, sometimes associated with large crude bowls decorated with incised triangles below the rim and wide jars with a restricted neck and flaring rim, are still attested. Classic Kerma (ca. 1750–1550 BC) is known for the famous "tulip beakers" (Fig. 7, right) which mark the final evolution of the black-topped pottery tradition. The thickness of the wall of the ceramics that does not exceed 3 mm, as well as the quality of the finish with the surface brightened to a metallic sheen, is evidence of the high level of craftsmanship of the Kerma potters. This peculiar production was well diffused within Kerma territory and also in Egypt: a few of these beakers have been found as far away as the Egyptian Delta. The potters were also able to create new fashions of painted wares and plastic decoration. The disparity between Kerma and C-Group ceramic industries is in this phase obvious, notably from a technical point of view: even if the typology is quite similar, the pots are better fired, better finished, and thus correspond to a finer version of C-Group pottery. Nevertheless, the incised designs that are so frequent in C-Group pottery are less common in the Kerma ceramics. The complexity of the patterns executed and described above has no parallels further south. The final phase of Kerma (ca. 1550–1450 BC) is hardly known. It corresponds to the period after the Egyptian conquest of Nubia, and the local ceramics appear to be marked by the influence of Egyptian pottery production.

Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD), Fig. 7 Kerma Pottery (© J.-F. Gout)

The Egyptian Conquest and Its Influence on Nubian Pottery (ca. 1550–270 BC)

The Egyptian conquest of Nubia and the long-term settlement of Egyptians (administrative, military, etc.) in new-built towns and fortresses deeply marked the indigenous Nubian pottery craft. The first evidence of such influence is the introduction of the potters' wheel to fashion the ceramics.

Nubia Under the Egyptian Power (ca. 1550–1000 BC)

As an introduction, we have to warn the reader that our knowledge of this period almost exclusively results from the excavations of Egyptian towns, temples, and fortresses built in Nubia. The consequence for the broad picture of ceramic industries of this phase is that we miss data from indigenous contexts which likely coexisted with the Egyptian conquerors. As a matter of fact, the handmade ceramic tradition inherited from C-Group and Kerma populations survived during this period. Nubian cooking pots were still produced, and Nubian potters, despite the introduction of the wheel, continued to follow the Egyptian fashion with their own know-how.

Many of the ceramics from all the sites (see Holthoer 1977) dating to the Egyptian domination of Nubia show a great similarity to Egyptian vessel types. To this extent, Egyptian chronology is followed to assign a date to productions, and the Egyptian ceramic classification system, the "Vienna System," is commonly adopted to describe wares that were obviously made in Nubia (Arnold and Bourriau 1993). Wheel-made dishes, deep carinated bowls, beer jars, and large storage jars or *zîrs* as well as handmade bread plates are common and remarkably similar to their Egyptian counterparts. Most of them are made in Nile clay, a raw material of course available both in Nubia and in Egypt. Petrographic analyses have been undertaken to distinguish genuine Egyptian Nile silt imports from their Nubian imitations. The clay matrix being the same, only few details like grain-size, proportion of non-plastic inclusions and organic remains suggest a technical variability that might be significant (D'Ercole et al. 2017). Other features such as surface treatment (burnishing) or decoration (incision) can help to define a local style even if the shape is of an Egyptian type. A small proportion of ceramics made with marl clay, which is only found in Egypt, is likely evidence of imports. They illustrate the role of the Egyptian state in providing commodities to its southern colonies.

The other mode of production to consider is the indigenous Nubian. In the earliest levels of Egyptian sites built in Nubia, cooking pots and Classic Kerma beakers are still attested but were soon replaced by ceramics better adapted to Egyptian taste. This does not mean that the Nubian handmade pottery tradition disappeared totally, as it is revitalized during the subsequent Napatan and Meroitic periods, but the Nubian craftsmen had to adapt their skills to fashion Egyptian types of ceramics. They were probably trained by Egyptian potters in the use of the wheel, and then they passed down this new technology to the next generations.

The Napatan Period and Its Pottery Production (ca. 1000–270 BC) (Fig. 8)

The withdrawal of the Egyptians from Lower Nubia toward the beginning of the first millennium BC is contemporary of the emergence of a new Nubian elite who chose Napata, close to the Fourth Cataract, as a capital city. The first phase of the sequence is insufficiently known, since only few contexts dated from tenth to eighth centuries BC have been discovered (e.g., Vincentelli 2006). The influence of Egyptian production appears to remain important, with a large number of wheel-made bowls with red-painted rims, imported "pilgrim flasks," and amphorae. Some handmade Nubian products, notably red-burnished bowls, black-topped goblets, and globular jars, testify to the continuity of the traditional Nubian pottery craft. We can however notice that incised and impressed designs are very simple, with some rare lines and very simple geometrical forms.

The eighth century BC is marked by the Nubian conquest of Egypt, and the noticeable influence of Theban pottery on the typology of Nubian wares. In addition to a large quantity of imports from Egypt, the local repertoire shows attempts to follow Egyptian models. In the earliest Napatan levels of Kerma (Mohamed Ahmed 1992) dated to the second half of the eighth century BC, some handmade local productions correspond to Egyptian shapes. This trend goes on during the following century with local wheel-made jars with rounded to more sophisticated rims, ribbed bodies, and ovoid shape, sometimes painted in white that correspond to

Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD), Fig. 8 Examples of Napatan pottery, WT 1 Cs 09 and II T 105 Cd 01 (© Sedeinga mission, Juliette Laroye, Vincent Francigny)

the natural color and form of the imitated marl production.

From the second half of the sixth century and during the fifth century BC, Egyptian influence on Nubian pottery seems to become less important. The study of a potter's workshop dated to this period (Mohamed Ahmed 1992) illustrates this evolution. The wheel is still widely used to shape ceramics, but the typology evolves differently from that of contemporary Egypt. The jars are less elaborated, rims are simple, and bodies move from ovoid to more globular in shape. Handmade vertically red-burnished bowls of different sizes characterize this period in Nubia. The imprint of Egypt is nonetheless visible in cultic contexts where bread cones and other platters of an Egyptian origin were still produced.

The end of the Napatan period is not well known except from rare royal or elite funerary contexts at Nuri and Meroe. These demonstrate a certain taste for luxurious imported commodities (Dunham 1957). In parallel, the daily local production consists mainly of the handmade red-burnished deep bowls previously described, and a variety of wheel-made or handmade simple jars carelessly executed. The transition to the Meroitic period is far from understood. No contexts dated from the fourth to the beginning of the third century BC allow a description of the evolution of the ceramic industries.

Nubian Pottery and the Mediterranean World (ca. 270 BC–1500 AD)

The Meroitic Productions (ca. 270 BC–340 AD)

The earliest levels of the Meroitic period contain black handmade ceramics that are completely different from their late Napatan counterparts (Fig. 9a). The various types of ceramics, characterized by their black color and impressed decoration, fit clearly within the sub-Saharan tradition and represent a clear continuity from some Kerma and C-Group ceramics that had been absent from Nubia for more than a 1000 years (Adams 1986, 411–420). On the other hand, the omnipresence of handmade production reveals the cessation of use of the potter's wheel in Sudan between the late Napatan and the early Meroitic periods. Such disruptions in the ceramic tradition likely demonstrate a migration into Nubia of a population that preserved the sub-Saharan ceramic tradition.

The handmade ceramics are associated with wheel-shaped pots from the second century BC, but as mentioned above, the typology does not show continuity from the Napatan period but are adapted from the local handmade repertoire or are

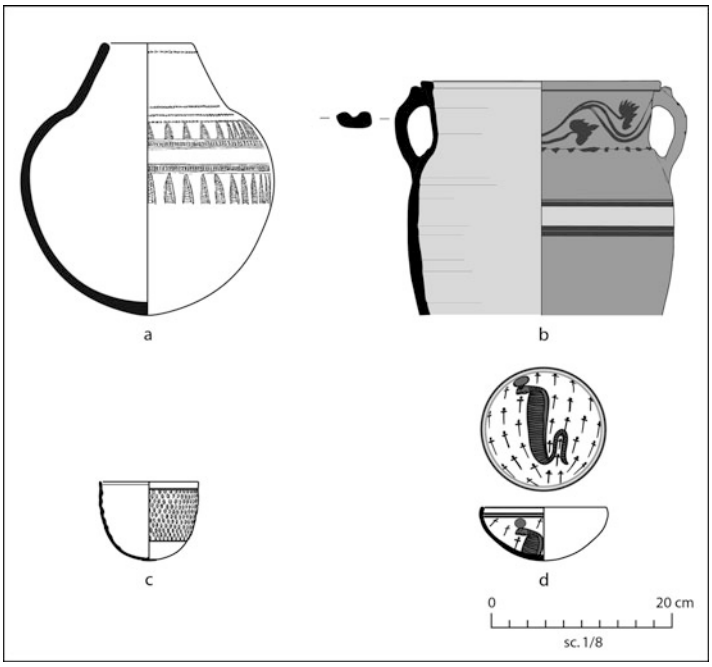

Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD), Fig. 9 Examples of Meroitic pottery. (**a**) handmade jar from Sedeinga, I T 027 Cs 06 (© Sedeinga mission, Romain David); (**b**) painted crater from Muweis, Mws11-A-F11.Cer1 (©Musée du Louvre-Mission archéologique de Mouweis-Marie Evina); (**c**) stamped bowl from Sedeinga, I T 087 Cc 01 (© Sedeinga mission, Romain David); (**d**) painted bowl from Berber, B-1-6 (©Berber mission, Romain David)

directly inspired by Hellenistic forms such as craters (Fig. 9b) and tablewares. The adoption of these new forms and techniques was followed by the introduction of painted decoration following Hellenistic models, such as wavy lines, vine scrolls, and other floral motives that demonstrate the growth of influence of Ptolemaic Egypt on Meroitic ceramic production until the change of the era.

The first decades of the first c. AD are marked by the introduction of *fine ware* ceramics (Adams 1986, 435–439). For the first time, this type of production made use of kaolinitic clay. Potters used all the potential of the wheel to shape new forms borrowed from Roman ceramics, bronze, and glass vessels, and Hellenistic techniques were employed for stamped decoration (Fig. 9c). The *fine ware* production appears as the result of a transfer of knowledge from the Roman Empire to the Meroitic kingdom: potters integrated several techniques and shapes into their own repertoire while immediately adapting the stamped decoration method to their own iconography. The light-colored surface of the vessels became a major medium to develop religious themes, influenced by Pharaonic, Ptolemaic, and Romano-Egyptian iconography as well as local features (Fig. 9d). The beginning of our era witnessed the important development of the wheel-made ceramic industry. Its significance is particularly noticeable in funerary contexts, particularly in Nubia and in the Meroe region, where they totally supplanted handmade vessels by the end the first c. AD.

After two flourishing centuries, the unity of the Meroitic kingdom weakened during the third c., to finally fall apart by the fourth c. AD when it was replaced by smaller political entities. The ceramic industries, like other economic activities, were heavily impacted by this change. The first evidence is the impoverishment of the ceramic repertoire, both its typology and its iconography. First, the *fine ware* industry was gradually replaced by cheaper imitations, fashioned with alluvial or mixed clay and poorly decorated. In the Meroe region, the genuine *fine wares* disappeared during the third c. AD, replaced by their semi-fine counterparts. Simultaneously, the decoration of Meroitic ceramics, both painted and stamped, became gradually simpler and completely disappeared during the course of the third c. AD. The decline that characterizes the painted decoration on Meroitic ceramics during the third c. AD is most probably related to the

disappearance of some *fine ware* workshops, which hosted both the painting skills and the iconographic knowledge.

Regionalization of ceramic production, a process initiated few centuries before, seems to be finalized during the third c. AD. In Nubia, the regional repertoire of shapes lost the common traits it previously shared with the southern regions. In the south, new shapes such as cylindrical jars that were widely distributed at Meroe during this period are specific to the region and are not represented in Nubia. These features presage the dichotomy highlighted during the post-Meroitic period.

The historical decline of the Meroitic kingdom appears rather clearly in ceramic production, which industry evolved radically during the fourth c. AD. Often imprecise, the archaeological documentation shows nonetheless that a short ceramic transition took place at the very end of the Meroitic period, announcing the general patterns of the post-Meroitic assemblage.

The Post-Meroitic Dichotomy of the Sudanese Industry (ca. 340–550 AD) (Fig. 10)

As early as the third century AD, some discreet evidence demonstrates the gradual withdrawal of a cultural group coming from the south to the region of Meroe. It is distinguishable by some handmade black bottles and the so-called *Alwa wares* mainly found in funerary contexts (Lenoble 1992). This group is likely the one who gave the final deathblow to Meroitic power weakened by the war against the kingdom of Axum. At the beginning of the fourth century AD, the assemblages in the former southern area of the Meroitic kingdom show on the one hand continuity with the practices and the typology inherited from the third century AD, with elongated wheel-made jars and ledge-rimmed bowls made in Nile silt, and, on the other hand, the appearance of new handmade standardized jars with surface treatment consisting of mat impressions. The type is so distinctive of the period in the regions south of Nubia that it has become the chronological as well as the cultural marker of the post-Meroitic period (Lenoble 1992). The diversity encountered in size, in shape, and in surface treatment probably evidences chronological evolution as well as various centers first settled in the Shendi area and later in the Fourth Cataract region (El-Tayeb 2012).

Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD), Fig. 10 Examples of post-Meroitic pottery from Dangeil (©Dangeil mission, British Museum, Romain David)

Indeed, the material from the Fourth Cataract region and up to the Third Cataract shows the same profile as observed in the region of Meroe, with the same more limited range of forms and decoration than during the Meroitic period. What was originally named the "Tanqasi culture" shares common features with the heartlands of the former Meroitic kingdom (El-Tayeb 2012). The handmade jars with mat-impressed surfaces are also frequent in funerary contexts where they are associated with red-slipped wheel-made goblets. A new type of wheel-made bowl with incised lines below the rim appears during the fourth century AD and enters into the usual funerary material of this region where it forms a long-term component of the funerary assemblage.

This particular design is probably due to the influence of Nubian post-Meroitic production that

evolved differently. From the Third to the First Cataract, a complete shift of ceramic production is obvious: clay coming either from the Nile or from the desert is more finely levigated, typology is more influenced by contemporaneous Egyptian prototypes than inherited from the Meroitic shapes, and occasional painting of vertical stripes and festoons following Egyptian trends applied on a red ground is the main decorative scheme (Adams 1986, 458). The extreme standardization of wheel-made production in Lower and Middle Nubia suggests a limited numbers of workshops supplying the region. The kilns located at Debeira East (Adams 1986, 34–36) are large-scale enough to ensure mass production able to supply a wide area. Concerning the local handmade production, besides the continuity of some cooking wares, new forms of red-slipped vessels associated with new painted decoration illustrate the development of this industry.

The main features of the ceramic productions established during the post-Meroitic period – the dichotomy of the former Meroitic kingdom with a gradual rise of the handmade tradition in the south, while the north promotes wheel-made mass production – lay the foundations for the situation of the subsequent medieval period.

Medieval Pottery (ca. 550–1500 AD)

The political division of the Meroitic kingdom illustrated by the ceramics was formalized during the sixth century AD. Three, soon to become two, Christian kingdoms, Nobatia and Makuria in the north and Alodia or *Alwa* in the south, whose border was likely located in the area of the Fifth Cataract, represent the achievement of a cultural process initiated during the Meroitic period.

Thanks to the UNESCO salvage campaign in the early 1960s and to the work of W.Y. Adams in Lower Nubia, the chronological evolution of the pottery production in the Makurian territory is quite well defined (Adams 1986, 47–55). Medieval or "Christian" pottery has been divided into five phases (Early, Classic, post-Classic, Late, and Terminal) by means of the evolution of the ceramic features.

The Early Christian phase (ca. 550–850 AD) is characterized by a slow transition from post-Meroitic types. No particular trends seemed to occur in handmade production, and the wheel-made wares were gradually shaped according to Egyptian Late Roman sigillata models produced at Aswan. As a consequence, the clay mixture was as fine as possible to produce open shapes that were then covered with a highly polished red or orange or white slip. Painted decoration was limited to few painted bands, while stamped designs of religious motives were frequent. Debeira East and Faras are known to provide such Nubian sigillata wares that were distributed as far as the Fourth Cataract region.

The Classic Christian phase (ca. 850–1100 AD) is marked by the noticeable evolution of wheel-made production that shows a revival of the painting tradition on red-, white-, and yellow-slipped ceramics, the typology of which continues to be linked to the styles observed at Aswan. The motives were likely inspired by religious themes previously used in manuscripts and church frescoes. The factory of Faras was at the peak of its production in Lower Nubia, while Old Dongola and Ghazali workshops were still in development in Upper Nubia. At the end of this phase (ca. 1000 AD), Faras was abandoned as a major production center, while the two other sites were reaching their apogee. Generally speaking, the decrease of local products caused by the collapse of the factory of Faras was offset by a considerable rise of Aswan imports in Lower Nubia.

A short post-Classic phase (ca. 1100–1150 AD) clearly shows continuity with previous productions. The absence of evidences of major factories in Lower Nubia during this period while we know that the workshops of Old Dongola and Ghazali were still in use might explain the slight evolution demonstrated by the increase of the red-slipped wares and the introduction of orange-slipped vessels clearly distinct from yellow- or white-slipped Classic ceramics.

The Late Christian phase (ca. 1150–1350 AD) shows a progressive standardization of wheel-made production that might represent a shift from few to only one manufacturing center furnishing the whole Nubian region. A slow

transition in terms of decoration toward more simple linear designs used on a freshened set of forms is the main feature of this period.

In contrast to the previous period, the rare ceramic material dated to the Terminal Christian phase (1350–1500 AD) seems to demonstrate a significant increase of workshops illustrated by the introduction of new wheel-made wares. Fine table wares or utility vessels were produced in low quantities in new local centers that disappeared at the very end of the period and were totally supplanted by a range of handmade productions.

By comparison, the development of ceramic production in the kingdom of Alodia is far from understood (see Welsby 1998). As observed in the post-Meroitic period, handmade burnished black and red pottery continues to form the main ceramic corpus available in the south. The evolution of the typology remains unknown and difficult to trace as the types tend to maintain the same characteristics over a long time span. A distinctive wheel-made production called "Soba ware," named after the capital of the kingdom of Alodia, seems to be confined to the early medieval period and is limited to a few types of open shape including some borrowed from northern sigillata. However, their painted polychrome decoration over a dark slip is distinctive.

Conclusion

The study of long-lasting pottery traditions in the middle Nile valley provides the main tool with which to establish the chronological sequence of the archaeology of the Sudan. From the Mesolithic to Medieval times, the evolution of ceramic production has highlighted major changes in cultural and, to a lesser extent, political terms. However, only the visible modifications such as typology, decoration, and the way of shaping the pots can be taken into account. Research concerning the subtle changes of the *chaîne opératoire* that might be significant in considering the complexity of the potter's network, to distinguish various workshops and technological know-how in the same region, are still ongoing. Petrographic and chemical analyses are thus playing a major role in defining persistent features in clay preparation (D'Ercole et al. 2017). Other aspects, particularly the precise definition of fashioning methods, are currently underexploited in Nubian studies but can be expected to reveal essential information about the transmission of skills among potters. Archaeological investigations of more production centers will also bring useful data. Up to now, only a few pottery workshops (Faras, Argin, Debeira, Ghazali, Musawwarat es-Sufra) of a late date have been studied.

Finally, another promising field is research conducted on the margins of the Nile valley, in the western and eastern desert and in the south (e.g., Barnard 2008). The role of nomads in preserving and influencing pottery practices of the Nile valley has not yet received the attention it deserves. Many current archaeological issues would find here a useful source for consideration.

Cross-References

► Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries

References

Adams, W.Y. 1986. *Ceramic industries of medieval nubia*. Lexington: University Press of Kentucky.

Arkell, A.J. 1949. *Early Khartoum. An account of the excavation of an early occupation site carried out by the Sudan government antiquities service in 1944–5*. Oxford: Oxford University Press.

Arkell, A.J. 1953. *Shaheinab. An account of the excavation of a Neolithic occupation site carried out for the Sudan antiquities service in 1949–1950*. Oxford: Oxford University Press.

Arnold, D., and J. Bourriau. 1993. *An introduction to ancient Egyptian pottery*, SDAIK 17. Mainz am Rhein: von Zabern.

Balfour Paul, H.G. 1952. Early cultures on the northern Blue Nile. *Sudan Notes and Records* 33: 202–215.

Barnard, H. 2008. *Eastern Desert ware: Traces of the inhabitants of the eastern deserts in Egypt and Sudan during the 4th–6th centuries CE*, BAR international series. Vol. 1824. Oxford: Archaeopress.

Caneva, I., ed. 1988. *El Geili. The history of a middle nile environment 7000 B.C. – A.D. 1500*, BAR international series. Vol. 424. Oxford: Archaeopress.

Chłodnicki, M., M. Kobusiewicz, and K. Kroeper, eds. 2011. *The Lech Krzyżaniak excavations in the Sudan. Kadero*. Poznań: Poznań Archaeological Museum.

Clark, J.D. 1989. Shabona: An early Khartoum settlement on the White Nile. In *Late prehistory of the Nile Basin and the Sahara*, ed. L. Krzyżaniak and M. Kobusiewicz, 387–410. Poznań: Poznań Archaeological Museum.

D'Ercole, G., et al. 2017. The successful 'recipe' for a long-lasting tradition: Nubian ceramic assemblages from Sai Island (northern Sudan) from prehistory to the new kingdom. *Antiquity* 91 (355): 24–42.

Dunham, D. 1957. *Royal Tombs at Barkal and Meroe*, Royal Cemeteries of Kush. Vol. 4. Boston: Museum of Fine Arts.

El-Tayeb, M. 2012. *Funerary traditions in Nubian early Makuria, Gdańsk archaeological museum African reports 9*. Gdańsk: Gdaésk Archaeological Museum.

Fernández, V.M., A. Jimeno, and M. Menéndez. 2003. Archaeological excavations in prehistoric sites of the Blue Nile area, Central Sudan. *Complutum* 14: 273–344.

Gatto, M.C. 2006. The most ancient pottery from the Dongola reach (Northern Sudan): New data from the SFDAS survey related to the construction of the Merowe Dam. *Archéologie du Nil Moyen* 10: 73–86.

Gratien, B. 1978. *Les cultures Kerma. Essai de classification*. Lille: Lille University Press.

Hafsaas, H. 2005. *Cattle Pastoralists in a Multicultural Setting. The C-Group People in Lower Nubia 2500–1500 BCE*. Ramallah: Birzeit University.

Holthoer, R. 1977. *New Kingdom Pharaonic Sites. The Pottery*, Scandinavian Joint Expedition. Vol. 5.1. Uppsala: Almqvist & Wiksell.

Honegger, M. 2004. The pre-Kerma: A cultural group from upper Nubia prior to the Kerma civilization. *Sudan & Nubia* 8: 38–46.

Honegger, M. 2005. El-Barga: un site clé pour la compréhension du Mésolithique et du début du Néolithique en Nubie. *Revue de Paléobiologie* 10: 95–104.

Honegger, M. 2006. La culture du Pré-Kerma de Haute Nubie. *Archéonil* 16: 77–84.

Huysecom, E., et al. 2009. The emergence of pottery in Africa during the tenth millennium cal BC: New evidence from Ounjougou (Mali). *Antiquity* 83 (322): 905–917.

Jesse, F. 2003. *Rahib 80/87. Ein wavy-line-fundplatz im Wadi Howar und die früheste Keramik in Nordafrika*, Africa Praehistorica. Vol. 16. Köln: Heinrich-Barth-Institut.

Jesse, F. 2007. Un nouvel aspect du Néolithique au Wadi Howar (Nord du Soudan) – des vases caliciformes. *Cahiers de Recherches de l'Institut de Papyrologie et d'égyptologie de Lille* 26: 187–196.

Jesse, F. 2010. Time of experimentation? The 4th and 3rd Millennia BC in lower Wadi Howar, Northwestern Sudan. In *Between the cataracts*, PAM supplement series, ed. W. Godlewski and A. Łajtar, vol. 2.1, 33–48. Warsaw: Polish Centre of Mediterranean Archaeology.

Jordan, P., and M. Zvelebil, eds. 2009. *Ceramics before farming. The Dispersal of Pottery Among Prehistoric Eurasian Hunter-Gatherers*. Walnut Creek: Left Coast Press.

Lange, M. 2003. A-group settlement sites from the Laqiya region (Eastern Sahara, Northwest Sudan). In *Cultural markers in the later prehistory of northeastern Africa and recent research*, ed. L. Krzyżaniak, K. Kroeper, and M. Kobusiewicz, 105–127. Poznań: Poznań Archaeological Museum.

Lenoble, P. 1992. Documentation tumulaire et céramique entre les 5e et 6e cataractes. Un exemple de "prospection orientée" visant à renseigner la "Fin de Méroé" dans la région de Méroé. In *Études nubiennes I*, ed. C. Bonnet, 79–97. Genève: Satigny.

Mohamed Ahmed, S.E.-D. 1992. *L'agglomération napatéenne de Kerma: enquête archéologique et ethnographique en milieu urbain*. Paris: Recherche sur les Civilisations.

Nelson K and Associates, ed. 2002. *Holocene settlement of the Egyptian Sahara Vol. 2: The Pottery of Nabta Playa*. New York: Kluwer Academic.

Nordström, H.-Å. 1972. *Neolithic and A-Group Sites. Scandinavian Joint Expedition*. Vol. 3.1. Uppsala: Almqvist & Wiksell.

Reinold, J. 2001. Kadruka and the Neolithic in the northern Dongola reach. *Sudan & Nubia* 5: 2–10.

Reinold, J. 2007. *La nécropole néolithique d'el-Kadada au Soudan central. Volume I. Les cimetières A et B (NE-36-O/3-V-2 et NE-36-O/3-V-3) du kôm principal*. Paris: CNRS Editions.

Ryan, P., et al. 2016. Plant microremains from the white deposits and dental Calculus from Ghaba and R12 cemeteries. Identification and implications. In *Ghaba. An early neolithic cemetery in Central Sudan*, ed. S. Salvatori, D. Usai, and Y. Lecointe, 109–120. Frankfurt a. M.: Africa Magna Verlag.

Salvatori, S. 2012. Disclosing archaeological complexity of the Khartoum Mesolithic: New data at the site and regional level. *African Archaeological Review* 29: 399–472.

Salvatori, S., and D. Usai, eds. 2008. *A Neolithic cemetery in the northern Dongola reach (Sudan): Excavation at site R12*. Oxford: Archaeopress.

Salvatori, S., et al., eds. 2016. *Ghaba: An early Neolithic cemetery in Central Sudan*. Frankfurt a. M.: Africa Magna Verlag.

Vermeersch, P., et al. 2015. Early and middle Holocene human occupation of the Egyptian Eastern Desert: Sodmein cave. *African Archaeological Review* 32: 465–503.

Vincentelli, I. 2006. *Hillat el-Arab. The joint sudanese-Italian expedition in the Napatan Region, Sudan*, BAR international series. Vol. 1570. Oxford: Archaeopress.

Welsby, D.A. 1998. *Soba II. Renewed excavations within the Metropolis of the Kingdom of Alwa in Central Sudan*. London: British Museum Press.

Wendorf, F., et al., eds. 2001. *Holocene settlement of the Egyptian Sahara*. Vol. 1. The Archaeology of Nabta Playa. New York: Kluwer Academic.

Williams, B.B. 1983. *C-Group, Pan Grave, and Kerma Remains at Adindan Cemetery T, K, U, and J*, Oriential Institute Nubian Expedition. Vol. 5. Chicago: University of Chicago Press.

Ceramics as Dating Tool in Historical Archaeology

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Brief Definition of the Topic

Historical archaeologists have learned that excavated ceramics can be used to date the sites they study. The most useful ceramics for dating are the glazed, relatively highly fired, fine -bodied earthenwares common since the late eighteenth century.

By around 1750, European ceramic manufacturers had begun a concerted effort to mass-produce fine-bodied, durable earthenwares for the world market. Their overall plan imitated the Chinese, who had already developed porcelain factories for the production of vessels explicitly designed for export. The Europeans also attempted to mimic the porcelain itself by initially producing white-bodied earthenwares with blue decorations similar to those found on the Asian wares. European potters viewed their glaze formulas, decorative motifs, and production techniques as company-owned trade secrets, and because they worked within a competitive commercial environment, they usually kept meticulous records of their patterns, styles, and methods of manufacture. Historical archaeologists can use extant potters' records to date the creation and production of certain ceramic styles. Even where written records do not exist, historical archaeologists can use ceramic collections from several archaeological sites to chart the general trends of adoption, use, and eventual rejection of ceramic styles and patterns over time.

By the mid-nineteenth century, many potters had begun to put their company names – as well as symbols and even pattern names – on the bottoms of their pieces as marks of identification. Historical archaeologists can use these makers' (or bottom) marks – embossed, stamped, inscribed, or applied – to date specific pieces by referring to the ceramic historians' published catalogues of marks.

The use of makers' marks are relative dating tools because they provide a range of dates or perhaps only a beginning date for a certain style of ceramic. For example, a potter working in Staffordshire, England – the nineteenth-century's most prolific region – might be known to have used the mark of a crown set over the letters "EM" starting in 1813. The available records may not indicate precisely when the potter ceased using this mark. Upon finding a ceramic shard with this mark, however, an archaeologist would know that the specimen dates after 1813; he or she might even be able to date its end use by reference to other information.

In the 1970s, an archaeologist named Stanley South invented a more absolute way of dating collections of mass-produced, English ceramics. Using ceramic information mostly collected by another archaeologist, Ivor Noël Hume, South created a statistical formula that archaeologists could use to provide the mean date for an entire ceramic collection. Using his calculation, a ceramic collection from an archaeological site might yield a mean ceramic date (or MDC) of 1835. With this date in hand, archaeologists can apply another statistical tool, called the standard deviation (SD), to improve the reliability of this date. A collection with a mean date of 1835 might be found to have a standard deviation of 10. This would mean, with a greater degree of certainty that the mean ceramic date actually falls within the 1825–1845 era (± 1 SD). Mean Ceramic Dating, though not without problem, still finds application in historical archaeology. In some cases, however, archaeologists using the formula must account for time lags in shipping and marketing.

Cross-References

- ▶ Ceramics: Colonoware
- ▶ Ceramics: European Cream to Whitewares in the USA
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Ceramics: Scientific Analysis
- ▶ Ceramics: Stonewares
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Colonial Encounters, Archaeology of
- ▶ Consumption, Archaeology of
- ▶ Dating Methods in Historical Archaeology
- ▶ Modern Material Culture, Archaeology of
- ▶ Portuguese Faience and Historical Archaeology
- ▶ Portuguese Redwares and Coarse Wares in Historical Archaeology

Further Reading

Orser, C.E., Jr. 2004. *Historical archaeology*. Upper Saddle River: Pearson Prentice-Hall.

South, S. 1977. *Method and theory in historical archaeology*. New York: Academic.

Ceramics, Ancient Greek

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Introduction

For scholars and the general public alike, ancient Greek ceramics are iconic images of ancient Greek culture and occupy a prominent place in the history of Western art. Because of their indestructibility, variety, and wide distribution, ancient Greek ceramics form a major field of research for Classical and Mediterranean archaeologies. It is mostly the exceptionally complex figural scenes rendered on these artifacts that have fascinated modern audiences and attracted research by specialists. Figured but also plain pottery provides information about ancient Greek society, daily life, economy, and ideology. Furthermore, Greek pottery, like all archaeological ceramics, helps to identify and date sites and deposits, distinguish between activities in different places and document contact between people, Greeks and non-Greeks.

Definition

The term "ancient Greek ceramics" can be taken to refer to vessels produced from baked clay in all lands of the Mediterranean and the Black Sea inhabited by Greeks during a period which ranges from the eleventh century BCE, which stands for the conventional end of prehistory, to the first century BCE, by which time the Romans conquered the entire Greek world. Not all scholars have perceived the term in a similar fashion (Oakley 2009: 599). Up to the mid-eighteenth century CE, this pottery was not even considered Greek, but Italian, and was attributed to the Etruscans because of major discoveries made in Etruria. Recently, some scholars consider that Greek pottery covers the varied output of potters/painters not only of Classical but also of Prehistoric Greece. Conversely, others limit the use of the term to the pottery produced in the central and southern Aegean from the eighth to the fourth century BCE, often focusing on Attic pottery from the sixth and fifth centuries BCE.

Historical Background

Ceramic production was introduced in Greece from the Near East in the seventh millennium BCE, during the Neolithic period, and intensified in the course of the Bronze Age, not least because of the introduction of the fast-rotating wheel (traditionally dated c. 2000 BCE). Wheel throwing was the most widespread technique for much of the first millennium BCE, but other techniques (such as coiling) are also amply documented, especially for coarse and cooking wares. Ancient

ceramics are nearly as durable and versatile as modern day plastic. Clay was not the only raw material which was used for the manufacture of containers in Greek antiquity, but the one which was most widely used and survives best. Vessels made in other materials survive only rarely, though their impact is sometimes reflected on the pottery itself (skeuomorphism): basketry and wickerwork influenced the styles of early Greek pottery, while an influential debate has focused on whether Attic Late Archaic and later pottery copies expensive metal vessels, particularly silverware (Sparkes 1996: 145–51).

Ceramic production (on the modes of which, see Cook 1997: 259–62; Boardman 2001: 139–52; Mannack 2002: 23–32; Stissi 2002: 10–179) involves the basic elements of earth (clay), water, and fire. Ancient Greek potters worked in isolated facilities or in potter's quarters, which were within or – mostly – outside the settlement, preferably along major communication routes facilitating transactions. Outside the cities, pottery making was probably run in families and was a seasonal, part-time profession. For Athens, Corinth, and other centers of the Archaic and Classical periods, we assume a more intensive mode of production, involving personnel of several hundreds at any one time. Inscriptions rendered on vases indicate that some of the potters/painters in Athens had some degree of literacy and suggest that some were slaves or immigrants (Boardman 2001: 143–9; Wachter 2001; Stissi 2002: 111–21). Marks on mid-sixth to mid-fifth century BCE Attic vases further entail a communication code between potters/painters and traders and demonstrate that the origins of the traders were not necessarily similar to the provenance of the pots, that is, Attic pottery was occasionally exported by foreign traders (Boardman 2001: 153–67; Johnston 2006: 16, 28). The marks sometimes indicate prices, which are low, but rise in the case of long-distance transport (Sparkes 1996: 140–5; Stissi 2002: 189–210; Johnston 2006: 19–23).

Pottery was essential for a wide range of daily activities in ancient Greece (on use see Sparkes 1996: 64–89; Cook 1997: 207–29; Boardman 2001: 244–68; Stissi 2002: 211–87). A broad repertory of shapes accommodated the varying needs of storing and transport, cooking and food processing, and eating and drinking. People used pottery in public games, festivals, symposia (drinking parties) and religious rituals or dedicated it to sanctuaries. Ceramics were also essential in funerals, in containing oils for anointing the dead and wine for libations, providing for the funerary meals or serving as gifts. Vases were customarily buried with the dead and large pieces (pithoi and amphorae) were also used as coffins and urns or even as grave markers. Pottery carrying offerings was also used and/or placed at the graveside on later occasions, as an act of remembrance. In certain times and places, particular shapes/types and decorative scenes were considered appropriate for particular occasions or social groups. Women are usually associated with vessels like pyxides, lekanides, and alabastra, men with kraters and aryballoi. Such gender differentiations are also often reflected on the iconography of the pottery (Sparkes 1996: 68–89; Smith and Plantzos 2012: 17–25).

The stylistic development of ancient Greek ceramics is quite complex, much more than the following overview suggests: (Cf: Sparkes 1996: 3–27; Cook 1997: 5–205; Boardman 2001: 11–127; Mannack 2002: 65–167; and Smith and Plantzos 2012: 39–104. For Protogeometric to Archaic, see Boardman 1998 and Coldstream 2008. For Late Archaic and Classical, see Sparkes and Talcott 1970. For Hellenistic, see Rotroff 2006). The collapse of the palatial sociopolitical system of the Greek Bronze Age (c. 1200 BCE) brought about a demise in the production and circulation of Greek pottery. The eleventh century BCE is characterized by a ceramic repertory with a reduced number of shapes featuring simple decorative ornaments and an increase in the production of handmade (as opposed to wheel thrown) pottery. The ceramic style which emerged is a debased version of earlier styles and is therefore known as sub-Mycenaean (sub-Minoan in Crete). There is a sharp contrast between the varied, curvilinear ornaments on Greek pottery of the late second millennium BCE, which are drawn freehand, and the relatively limited repertory of stylized ornaments (particularly circles and semicircles) normally drawn by multiple brush, which are introduced just before 1000 BCE. The

impression of geometry conveyed by the shape and decoration of Greek pottery of the early first millennium is reflected in the stylistic terms Protogeometric and Geometric, applied to fine wares of the late eleventh to tenth and the nineteenth to eighth centuries, respectively. The Protogeometric style (Fig. 1: the vase represents the persistence of this style in later times, during which it is known as sub-Protogeometric) involves the application of a gloss of lustrous quality (which first appeared in Athens and slowly spread to other areas) over a large part of the vessel's surface and a narrow range of ornaments in reserved areas. The Geometric style (Fig. 2) is characterized by several new shapes and a much wider range of largely rectilinear ornaments, most notably the meander. From the second quarter of the eighth century BCE, figural decoration, which was extremely rare on Greek pottery after Prehistory, reappears. Funerals, battles, and other themes are rendered on the pots with figures in silhouette. For the first time, Greek ceramics carry alphabetic inscriptions, including potter's/painter's signatures (Cook 1997: 241–48; Wachter 2001; Denoyelle and Iozzo 2009: 37–8). From this period, Greek vessels, including the newly introduced transport amphorae (Whitbread 1995), were exported and occasionally imitated in quantity over much of the Mediterranean (Denoyelle and Iozzo 2009: 33–65; Coldstream 2008: 302–27), formulating a pattern which persisted for the rest of antiquity.

Ceramics of the seventh century BCE are often called Orientalizing because of the Near Eastern influences seen on their iconography of flora, fauna, and humans (Fig. 3). Orientalizing influences are, however, only seen on a fraction of the overall ceramic output, with simpler styles predominating. Silhouette drawing gives way to outline drawing, polychromy, and the black-figure technique, which involves incision and accessory colors (purple red and white) (Fig. 4). These technical developments suited the drawing of complex scenes from Greek mythology. The black-figure technique, which was developed in Corinth in the early seventh century, spread over much of the Greek world between 620 and 480 BCE. Black-figure enabled more naturalism and finer detail than ever before and was perfected by Attic painters (Fig. 5), whose work was appreciated over much of the Mediterranean, particularly in Etruria. Several Attic (but hardly any other) potters and painters signed their works, on the basis of which we know that sometimes the potter was also the painter (Sophilos, Exekias), or the two could be different individuals (Lydos was a painter, Amasis a potter). Inscriptions and details of

Ceramics, Ancient Greek, Fig. 1 Euboean pendent semicircle skyphos, 825–750 BCE (APM 13102). (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Ceramics, Ancient Greek, Fig. 2 Attic mug, 750–735 BCE (APM 1932). (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Ceramics, Ancient Greek, Fig. 3 East Greek jug, 675–650 BCE (APM 955). (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Ceramics, Ancient Greek, Fig. 4 Corinthian alabastron, 575–550 BCE (APM 2962). (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Ceramics, Ancient Greek, Fig. 5 Attic black-figure hydria, around 525 BCE (APM 15765). (Courtesy of the Allard Pierson Museum, University of Amsterdam)

drawing in clothing and the human anatomy help distinguish the hands of individual painters of Attic black-figure and also red-figure. The latter technique (Fig. 6), which is the visual contrast of the former, was invented c. 525–520 BCE, at a time of experimentation in Attic vase painting (another technique introduced at the time and used throughout the fifth century BCE involved polychrome decoration on a white ground: Fig. 7). Red-figure was more demanding for vase painters but offered new possibilities. Previously, figures were necessarily depicted mostly isolated and in profile; the new technique, which involves dark relief lines and drawing in dilute, translucent clays, enabled the rendering of spatial depth and of complex poses. Production in both black- and red-figures persisted until 450 BCE, but thereafter black-figure is hardly seen. The first painters to use the red-figure technique, also known as the "Pioneers," were innovative in many ways and are known to have consciously rivaled each other (Euphronios and Euthymides were two of the best). Red-figure vase painting reached its highest artistic level early in the fifth century BCE and in

Ceramics, Ancient Greek, Fig. 6 Attic red-figure krater, 425–400 BCE (APM 6262). (Courtesy of the Allard Pierson Museum, University of Amsterdam)

this century this craft often echoes monumental art (architecture, sculpture, and painting). From the fourth century, the repertory of Attic vessel shapes made in red-figure shrinks, but the best vases show elaboration with crowded, multilevel scenes, the use of added colors, and the application of relief figures. Attic red-figure pottery, which was widely exported in the Mediterranean, ceased to be produced around 330–320 BCE, but by that time it had stimulated local production in a few regions of the Greek mainland and most notably in South Italy and Sicily (Trendall 1989; Denoyelle and Iozzo 2009: 97–202). Greek pottery was being made there since the time of Greek colonization in the eighth century, but red-figure production became particularly widespread and developed into regional variants, extending from the advanced fifth to the early third century BCE (Fig. 8).

Decorated pottery formed a relatively small fraction of the overall ceramic production in the

Ceramics, Ancient Greek, Fig. 7 Attic white-ground lekythos, 450–425 BCE (APM 627). (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Ceramics, Ancient Greek, Fig. 8 South Italian (Lucanian) nestoris, 425–375 BCE (APM 1842). (Courtesy of the Allard Pierson Museum, University of Amsterdam)

ancient Greek world. Much pottery used in daily life involved less labor input and was only covered in black gloss or remained plain (Sparkes and Talcott 1970; Rotroff 2006). Black gloss pottery was very widespread in the Classical and Hellenistic periods and was often manufactured by workshops which also produced painted wares. Any decoration on this pottery is limited to bands in added colors, ribbing, and incised and stamped patterns or appliqués (Fig. 9). Plain pottery involves a wide repertory of shapes, including some used for cooking and food processing, storage, and transport, which only rarely have any decorated equivalents. Black gloss and plain wares dominate the repertory of Greek ceramics in the Hellenistic period, with a gradual shift to red gloss in the second century BCE. Painted pottery is much rarer than before. West Slope and Gnathia, two popular wares, were produced from the third to the first centuries BCE and involved simple patterns rendered in tan-colored clay and white slip against a black gloss background. Dark-on-light decoration is restricted to a few ceramic centers and is best exemplified by the Hadra hydriae, while polychrome decoration occurs in South Italian pottery, particularly on the third century BCE vases from Centuripe, the figural compositions of which recall the earlier red-figure. Another novelty of the period, which is far more widespread, is the large-scale use of molds, particularly for the production of hemispherical relief bowls with floral and figural decorations (Fig. 10) (Cook 1997: 193–200; Boardman 2001: 122–7; Denoyelle and Iozzo 2009: 203–14).

Ceramic production in Greece obviously outlasted the Roman conquest but thereafter basically conformed to styles current over much of the Roman world. The Romans appreciated Greek art, but apparently did not show any interest in Greek pottery and this lack of interest would persist for more than one millennium and a half (Sparkes 1996: 36–63; Cook 1997: 275–311). Greek vases found their way to the cabinets of curiosities of the Renaissance but were not highly prized by the elites or the artists of the time. From the seventeenth century CE, these vases began to be collected more widely, a trend which became more prominent in the eighteenth century. By the mid- to late eighteenth century, this pottery, previously widely considered to be Etruscan, was correctly identified as Greek on the basis of pre-firing inscriptions rendered on some vases. Slightly later, the first major work on Greek pottery appeared; it is a four-volume, richly illustrated sale catalogue of the sizeable collection of vases amassed by Sir William Hamilton, a British envoy to Italy. Hamilton's purchases, the costly acquisition of his collection by the British Parliament and its subsequent exhibition in the British Museum brought about a serious rise in the appreciation of and demand for Greek vases. From this time onwards, Greek ceramics became a status symbol for the upper class and influenced the work of Western European artists. Scholarship on Greek pottery also flourished and in 1854

Ceramics, Ancient Greek, Fig. 9 Attic kantharos, 300–250 BCE (APM 7553). (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Ceramics, Ancient Greek, Fig. 10 Relief bowl (production area unknown), 200–100 BCE (APM 1539). (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Otto Jahn published the vase collection in Munich in what came to be considered the first proper study of Greek pottery (*Beschreibung der Vasensammlung König Ludwigs in der Pinakothek zu München*, München: J. Lindauer).

Key Issues/Current Debates

Provenance and chronology have remained key issues in the study of Greek ceramics and pervade current debates. Other key issues include the development of manufacturing techniques and of styles of decoration, the identification of figural scenes and the attribution of vases to individual potters and painters, as well as the social and economic contexts of pottery production and consumption. These issues are treated in a growing number of publications, including excavation reports, museum catalogues, conference volumes, and other studies. All work is collected and summarized biannually in the "Bulletin Archéologique: Céramique" found in the journal *Revue des Études Grecques*.

The chronology of Greek ceramics (Cook 1997: 249–58; Mannack 2002: 53–61) relies (a) on relative sequences built on the basis of excavation data, particularly stratigraphy, and by the attribution of vases to painters and estimates over the development and overlap of their styles, and (b) on the pegging of these sequences to fixed points, whose calendar dates are known from historical sources. Because fixed points are uncommon in the pre-Classical period, the chronology is less and less accurate as one goes back in time. Major challenges to the traditional chronology were put forward some 20–25 years ago (around 1990). These suggestions have found little support but have raised awareness over some weaknesses in the existing chronology (Oakley 2009: 608–609). Arguments for adjusting parts of the traditional chronology by a couple of decades keep being proposed and are often accepted (i.e., the recently proposed slight down dating of the beginning of red-figure: Oakley 2009: 609), but there is widespread confidence in the precision obtained by the traditional chronology of Greek pottery among archaeologists working in the Mediterranean. Nonetheless, it is essential to check this chronology against scientific dating techniques, like radiocarbon dating and dendrochronology. This issue has not really been taken up, even though the relevant techniques are commonly used by prehistorians working in the Aegean and by specialists of the first millennium BCE elsewhere in the Mediterranean. There are currently two major problems with this line of inquiry; C14 determinations are not precise for much of the first millennium BCE and the dendrochronological data for the Aegean remain very selective. Radiocarbon dates obtained in the Eastern and Central Mediterranean suggest a readjustment of the ceramic sequence of the Greek Early Iron Age, but are not uncontroversial on their own (Smith and Plantzos 2012: 17–25).

Provenance has been a major issue in the study of Greek pottery ever since this was properly identified as Greek. In the last century, research has concentrated on the localization of production of particular vessels, types and wares in specific sites or regions (Oakley 2009: 611), often on the basis of different techniques of chemical analysis. Neutron activation analysis (NAA) has been the technique of choice and has offered invaluable information on the provenance of many Archaic Greek fine wares, most notably those previously grouped under the collective heading "East Greek" (Jones 1986, Fig. 3). Nowadays, NAA gradually gives way to X-ray fluorescence (XRF) spectrometry and inductively coupled plasma emission spectroscopy (ICP-ES), and this makes imperative the comparability of results obtained by different laboratories by the use of different techniques. In recent years, the increasing interest in the circulation of semifine to coarse ceramics brought about the increasing application of petrography, with the first projects appearing in the 1990s (Whitbread 1995). The advantage of petrography lies in its focus on the rocks and minerals found in the fabric (rather than on the clay matrix) of nonfine wares; these inclusions point to a certain geological background which can be traced in the field and thus reveal the specific areas exploited by ancient potters.

Analytical techniques have also been used in research on the manufacturing technology of

Greek pottery (Boardman 2001: 282–93; Oakley 2009: 611–12). Such work commenced in the 1920s and centered on the reproduction of the lustrous Attic black gloss. Thereafter, Attic and, to a lesser extent, other Greek pottery has been the subject of many scientific, experimental, and ethnoarchaeological projects focusing on clays, slips, colors and pigments, forming techniques, drawing tools, firing techniques, and repairs (e.g., Schreiber 1999). Scanning electron microscopy with energy-dispersive X-ray (SEM-EDX) analysis is currently the technique most widely used in technological investigation. This enables a microanalysis of clay and decoration and allows for an estimate of firing temperatures, two subjects which can also be studied by the use of X-ray diffraction (XRD). Likewise, computerized tomography (CT) scans shed light on the method used by the potter for building the pot. The techniques in question have largely overshadowed others previously used in analytical studies of Greek pottery, including optical emission spectroscopy (OES) and Mössbauer spectroscopy.

Applications of archaeological science to Greek pottery of the first millennium BCE remains limited in comparison to applications to earlier pottery from the same area. Even rarer is research on the contents of Greek vases through the study of residue, particularly gas chromatography (GC) and mass spectrometry (MS) or DNA analysis. There are, however, few current projects that employ these techniques, and future work on the production, distribution, and consumption of Greek pottery should increasingly involve integrated, interdisciplinary methodologies, combining traditional approaches with targeted applications of archaeological science.

Issues of provenance and vessel content are important for understanding the role of Greek pottery in trade and the economy (Sparkes 1996: 164–7; Cook 1997: 264; Boardman 2001: 153–67; Mannack 2002: 33–6; Stissi 2002: 288–332; Johnston 2006: 28–33; Oakley 2009: 612–13). The known exports of Greek ceramics, which are quite rich from the eighth century BCE onwards, only represent the tip of an iceberg, given that the surviving amount of Greek pottery is estimated to be less than 1% of the original output (this estimate relies on the surviving record of a special class of Attic vases, the Panathenaic amphorae, the production rate of which can be reconstructed with some accuracy (Stissi 2002: 27–30)). Trade in two ceramic categories has attracted most attention: painted fine wares and transport amphorae. In the last few decades the importance of trade in painted fine wares has been strongly debated. This material, previously considered a serious trade item, has been called "spacefiller" and "saleable ballast." Most scholars now hold that although fine pottery was not the main cargo of ships and was traded along other, more essential commodities, it still was widely exported and yielded considerable profit. Current research is aimed at understanding trade by comparing the distribution patterns of specific shapes and types or the output of different workshops and the popularity of certain scenes over different regions and/or over time; statistics and quantitative analysis are instrumental in this respect (Boardman 2001: 293–96; Stissi 2002: 325–32). Transport amphorae have received less attention, but they offer more reliable evidence for trade and the economy than fine wares in that they were not traded per se but for their content, which involved a broad range of foodstuffs, particularly wine and oil (Whitbread 1995). Shipwrecks found around the Western Mediterranean and the Black Sea are essential for understanding trade in Greek pottery.

Greek-painted pottery carries an amazingly rich array of scenes from mythology and everyday life but rarely shows specific historical figures and events (Sparkes 1996: 114–39; Boardman 2001: 168–243; Lissarrague 2001; Mannack 2002: 37–52; Oakley 2009: 613–17. See especially Figs. 5, 6, 7, and 8). Customarily, vessel shape/use shows no one-to-one link with the decoration, with few exceptions evidenced particularly in Attic pottery. Traditionally, scholarship has focused on iconography, that is, on identifying the individual figures shown and the entire composition through reference to literary texts (e.g., the gods on the wedding scene on the belly of the hydria of Fig. 5 or Herakles and the lion on the vase's shoulder). Lately, however, the distinction between images and texts has been emphasized and there are arguments suggesting that the

images are mostly based on stories which circulated orally, rather than on literary texts. Iconographic studies often chart the ebb and flow in the popularity of a subject, the changes in emphasis, and the external prompting which may have stimulated them. These stimuli may include theatrical plays (e.g., the scene on Fig. 8 is inspired by Aeschylus's play *The Libation Bearers*), monumental art, and even politics. For several decades, iconographic studies have been supplemented by iconological ones. According to iconology, the many scenes from everyday life rendered on Greek pots (e.g., in Figs. 6–7) are not photographic documents. These scenes, together with mythological ones, are social statements and constructs conveying ancient ideas and practices. The meaning, function, and cultural relevance of images on Greek pottery are therefore to be tackled by different approaches informed by anthropology (structuralism, poststructuralism) and literary studies (narratology, semantics).

Instrumental to this key issue, but also to the understanding of the social role of Greek pottery in general, is the historical, cultural, and functional contexts of the pottery (Sparkes 1996: 155–64; Oakley 2009: 599–601). Contextual information enables scholars to pose varied questions on the identity and the motivation of the users and to understand the different modes of ceramic consumption in sanctuaries, cemeteries, households, and marketplaces. This necessarily involves a fair treatment of the processes that formed an assemblage, the range of activities manifested, and the different wares represented. Past scholarship primarily focused on decorated pottery, while plain and cooking wares were heavily discarded, often before any sorting. In the last decades, excavation pottery is normally preserved (almost) in its entirety (with resulting problems in storage space), plain and cooking wares receive increasing attention, quantitative approaches gain ground, stratigraphy and associated finds are integrated in relevant research, and these developments allow for a deeper and broader understanding of ancient Greek ceramics.

Another line of inquiry, known as connoisseurship, regards the stylistic affinities of individual vases and their attribution to specific potters/painters (Sparkes 1996: 90–113, 153–55; Boardman 2001: 128–38; Oakley 2009: 605–7). This topic was first researched in the nineteenth century CE but came to be associated with the seminal work of Sir John Davidson Beazley on Attic pottery. Scholars first considered vases signed in the format "X drew/made me," but Beazley devoted his life to attributing thousands of unsigned Attic vases (such as those on Figs. 5, 6, and 7) to individual hands on the basis of the style of drawing. This exercise brought about a much deeper understanding of the Attic pottery industry and the development of Attic black-figure and red-figure. Beazley's method has provoked much debate in the last two decades. Critics stress the lack of an explicit methodology in Beazley's work and the subjectivity involved in attribution studies. Supporters have sought to define the inspiration for and the technicalities of Beazley's method, emphasizing that his attributions do not rely on few or random details, but on systems of rendering human anatomy and secondary ornaments (the debate is summarized in Oakley 2009: 605–7). This line of inquiry remains popular with scholars working on pottery from Attica and, to a lesser extent, Corinthia, Laconia, and South Italy, mostly dating from the late eighth to the fourth century BCE. Comparable research is centered on ceramic shape and the identification of potters through the study of the fine details of the profile of vessels.

Much research on Greek ceramics is dedicated to the compilation of catalogues and databases or relies on them (Oakley 2009: 601–4). Catalogues are part of a long and persisting tradition in the study of Greek pottery, going back to the days of Sir William Hamilton and the work of Otto Jahn (see above). Catalogues of excavation and particularly museum pottery form a particularly prolific type of scholarship, which is dominated by the monumental series *Corpus Vasorum Antiquorum* (CVA). This long-term project (ongoing since 1922) currently encompasses 350 volumes publishing tens of thousands of vases, most of which are Greek, particularly Attic black- and red-figure. This material can also be researched through the on-line database of the Beazley Archive in Oxford. Originally based on the work of Beazley,

the archive has steadily grown to include more than a quarter of a million photographs. A similar project for South Italian figured vases, the Trendall Archive (named after Arthur Dale Trendall, an expert on the subject), is housed at La Trobe University in Melbourne.

During the last two decades the reception of Greek vases has emerged as another key issue (Nørskov 2002; Oakley 2009: 617–9). This development is related to the growing attention devoted to the history of archaeology, the high prices paid for Greek vases in the art market (occasionally exceeding one million dollars), and the culmination of the problem of illicit antiquities. Scholarly attention has focused on the history of collecting Greek vases, the impact of these vases on modern and contemporary art, the ethics and practice of trade in antiquities, and their repatriation.

Future Directions

On-line publication of data and research, computer vision and pattern recognition, and digital applications in general are in the forefront of current developments in Greek archaeology. The potential of these tools for facilitating accessibility and cutting down cost are increasingly being appreciated by scholars working with Greek pottery, most notably by curators of vase collections. On-line databases, particularly the Beazley Archive in Oxford (www.beazley.ox.ac.uk/index.htm), have proved very useful for pottery studies. Before long, existing databases on ceramic fabrics will also appear on-line to facilitate discussions over provenance. Also, studies of provenance will increasingly make use of the range of analytical techniques outlined above, the application of which to Greek pottery of the first millennium BCE currently remains limited. Likewise, some of those techniques will be used to explore further the technology of ancient Greek pottery and fully document, for example, that wheel throwing was only one of several production techniques used widely.

Another direction, currently underexplored, but particularly promising regards the coverage of the full ceramic record of excavated assemblages, which is normally not limited to fine painted wares, but includes coarse and plain wares. Making the most out of the vast amount of pottery collected in excavations and surface surveys, and generally considered as undiagnostic, remains a major direction for future research. Likewise, there is an urgent need for balancing the Atheno-centric character of Greek pottery studies by further analysis of regional variation as well as for traditional and interdisciplinary research on the modes of stylistic dissemination.

Lastly, potentially revolutionary for the chronology of Greek (and other) ceramics is the novel dating technique of rehydroxylation (RHX). The technique relies on the fact that fired clay immediately begins to chemically react with moisture from the environment and thus increases in weight. Estimating the rate at which any ceramic piece absorbs moisture is the key for establishing its date of production. By 2011, experiments conducted on late antique to modern pottery had shown the potential of the technique, which remain to be explored with reference to ancient Greek pottery as well.

In conclusion, ancient Greek ceramics remain a major field of research for Classical and Mediterranean archaeology and an invaluable source of information for the study of the ancient world. The centuries-old fascination of scholars, collectors, and the wider public with Greek vases remains strong.

Cross-References

- ▶ Beazley, Sir John Davidson
- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cultural Property, Trade, and Trafficking: Introduction

- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Epigraphy, Greek
- ▶ Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Neutron Activation Analysis (NAA): Applications in Archaeology
- ▶ Organic Residue Analysis in Archaeology
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Radiocarbon Dating in Archaeology
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Scanning Electron Microscopy (SEM): Applications in Archaeology
- ▶ Survey Archaeology in the Greek Aegean World
- ▶ Symposion
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Beazley Archive. n.d.. Available at: http://www.beazley.ox.ac.uk/index.htm.

Boardman, J. 1998. *Early Greek vase painting: 11th–6th centuries BC*. London: Thames and Hudson.

Boardman, J. 2001. *The history of Greek vases*. London: Thames & Hudson.

Coldstream, J.N. 2008. *Greek geometric pottery: A survey of local styles and their chronology*. 2nd ed. Exeter: Bristol Phoenix Press.

Cook, R.M. 1997. *Greek painted pottery*. 3rd ed. London/New York: Routledge.

Denoyelle, M., and M. Iozzo. 2009. *La céramique grecque d'Italie méridionale et de Sicile: Productions coloniales et apparentées du VIII au IIIe siècle av. J.-C. Manuels d'Art et d'Archéologie antiques*. Paris: Picard.

Johnston, A.W. 2006. *Trademarks on Greek vases: Addenda*. Oxford: Oxbow Books.

Jones, R.E., ed. 1986. *Greek and Cypriot pottery: A review of scientific studies*, British School at Athens Fitch Laboratory Occasional Paper. Vol. 1. Athens: British School at Athens.

Lissarrague, F. 2001. *Greek vases: The Athenians and their images*. New York: Riverside Book Company.

Mannack, T. 2002. *Griechische Vasenmalerei: Eine Einführung*. Stuttgart: Theiss.

Nørskov, V. 2002. *Greek vases in new contexts: The collecting and trading of Greek vases. An aspect of the modern reception of antiquity*. Aarhus: Aarhus University Press.

Oakley, J.H. 2009. Greek vase painting. *American Journal of Archaeology* 113: 599–627.

Rotroff, S.I. 2006. *The Athenian Agora, Volume XXXIII: Hellenistic pottery: The plain wares*. The American School of Classical Studies at Athens: Princeton.

Schreiber, T. 1999. *Athenian vase construction: A potter's analysis*. Malibu: The J. Paul Getty Museum.

Smith, T.J., and D. Plantzos, eds. 2012. *A companion to Greek art*. Malden: Wiley-Blackwell.

Sparkes, B.A. 1996. *The red and the black: Studies in Greek pottery*. London/New York: Routledge.

Sparkes, B.A., and L. Talcott. 1970. *The Athenian Agora, Volume XII: Black and plain pottery of the 6th, 5th, and 4th centuries B.C*. The American School of Classical Studies at Athens: Princeton.

Stissi, V. 2002. Pottery to the people: The production, distribution and consumption of decorated pottery in the Greek world in the Archaic period (650–480 BC). Unpublished PhD dissertation, University of Amsterdam. Available at: http://dare.uva.nl/record/108078. Accessed 16 Jan 2011.

Trendall, A.D. 1989. *Red figure vases of South Italy and Sicily: A handbook*. New York: Thames & Hudson.

Wachter, R. 2001. *Non-Attic vase inscriptions*. Oxford: Oxford University Press.

Whitbread, I.K. 1995. *Greek transport amphorae: A petrological and archaeological study*, The British School at Athens, Fitch Laboratory Occasional Paper. Vol. 4. Athens: British School at Athens.

Further Reading

Cohen, B., ed. 2006. *The colors of clay: Special techniques in Athenian vases*. Los Angeles: J. Paul Getty Museum.

Corpus Vasorum Antiquorum project. n.d.. Available at: http://www.cvaonline.org/cva/ProjectPages/CVA1.htm.

Kurtz, D., ed. 1985. *Beazley and Oxford. Lectures delivered at Wolfson College, Oxford on 28 June 1985*, Oxford University committee for archaeology monograph. Vol. 10. Oxford: Oxford University Committee for Archaeology.

Lynch, K.M. 2011. *The symposium in context: Pottery from a Late Archaic house near the Athenian Agora*, Hesperia supplement. Vol. 46. The American School of Classical Studies at Athens: Princeton.

Osborne, R. 1996. Pots, trade and the archaic Greek economy. *Antiquity* 70: 31–44.

Papadopoulos, J.K. 2003. *Ceramicus Redivivus: The early iron age potter's field in the area of the classical Athenian Agora*, Hesperia supplement. Vol. 31. The American School of Classical Studies at Athens: Princeton.

Rotroff, S.I. 1997. *The Athenian Agora volume XXIX: Hellenistic pottery: Athenian and imported wheel made table ware and related material*. The American School of Classical Studies at Athens: Princeton.

Rouillard, P., and A. Verbanck-Piérard. 2003. *Le vase grec et ses destins*. München: Biering & Brinkmann.
ΤΙΒΕΡΙΟΣ, Μ. 1996. *Ελληνική Τέχνη: Αρχαία Αγγεία*. Αθήνα: Εκδοτική Αθηνών.
Vickers, M., and D. Gill. 1994. *Artful crafts: Ancient Greek silverware and pottery*. Oxford: Clarendon Press.

Ceramics, Roman Imperial

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Introduction

For an introduction to Roman ceramics, see the entry on "▶ Ceramics: Roman Republican and Early Principate" in this encyclopedia.

This entry covers Imperial Roman ceramics, which are generally considered to date from the last quarter of the first century BCE to the fifth century CE. As with Republican ceramics, there are subcategories of coarse wares and fine wares. What changed in the Imperial Period, however, was that Roman ceramic production experienced a degree of pan-Mediterranean standardization and production that had not been seen in the Republican period, especially with regard to *terra sigillata* (Fig. 1). It was in the Imperial period that Rome reached its greatest geographic extent and controlled all of the shores of the Mediterranean basin. The widespread distribution of ceramic wares speaks to the near universality of Roman material culture, while more local types highlight the local traditions that developed prior to or as a result of Rome's conquests.

Definition

Due to the widespread nature of imperial ceramics and the fact that they are studied by scholars from the many modern countries which composed the Roman diaspora, each type tends to have at least one alternate name, if not more. The English name is used here whenever possible for the sake of consistency. Alternate names are also listed. Unless otherwise specified, each of the following wares was produced throughout the Empire.

Ceramics, Roman Imperial, Fig. 1 Terra Sigillata at Museo della Città, Monte Porzio Catone. (Photo taken by author)

Coarse wares are defined as having a relatively rough fabric, with many inclusions and little to no decoration or surface treatment. These wares were durable and, for the most part, utilitarian. The fabric of fine wares generally was levigated to a greater degree and thus had fewer inclusions. These wares were often slipped or decorated and tended to be used as table vessels rather than cooking, transport, or storage vessels.

Coarse Wares

While fine wares tended to have finite production locations and periods of production, coarse wares were produced throughout the Roman Empire, both geographically and temporally. Since specific forms are not discussed, specific dates and production locations are not indicated underneath each type. For more detailed discussions of common wares, see the entry on "▶ Ceramics: Roman Republican and Early Principate" in this encyclopedia.

Cookware: Ceramica Comune, Ceramica Da Fuoco, Cerámica De Cocina, and Ceramique Commune

This is the name given to ceramics that were for use on the fire. They were typically produced and distributed locally, although some cookwares,

such as African cookware, were distributed throughout the Mediterranean beginning during or before the first century BCE. Cookware tends to have more and larger inclusions, which served to temper the ceramic and prevent it from exploding when heated. Common forms are pots, casserole dishes, lids, and pans. Cookware shapes did not vary significantly over time and are, therefore, somewhat difficult to date. Unfortunately, this difficulty has led many scholars to avoid studying them altogether. Typologies have been created, but ceramicists debate the precision with which the wares can be dated.

Tableware: Ceramica Comune and Ceramica Da Mensa

Tableware is a controversial category, since fine wares are often considered to be tablewares. Here tableware is taken to mean coarse or common wares used on the table. Fine wares are treated separately. Tableware often appears similar to cookware, but is made in different shapes and with slightly less temper. It was primarily intended as a utilitarian serving ware. As with cookware, it was largely produced and distributed locally. Forms include jugs, plates, bowls, basins, and cups. The same dating problems that plague cookware also make it difficult to date tablewares.

Amphorae

These transport vessels were primarily intended for sea transport. Their shapes and sizes varied depending on their cargo. Common cargoes include wine, olive oil, and fish sauce (*garum*). Less common cargoes were fruits and alum.

The production areas of some types of amphorae have been identified either through *tituli picti*, kiln excavations, or analysis of the locations of increased amphora type densities. *Tituli picti* – labels that are painted on the neck or shoulder of the vessel – typically recorded the weight of contents, the official in charge of weighing, and the geographical area of the amphora content's production. At first glance, *tituli picti* would seem extremely reliable for identifying production sites, but not all amphorae retain their *tituli picti*, not all amphorae had *tituli picti*, and *tituli picti* only indicate the production site of the amphora's contents, not the amphora itself. Kiln excavation is the most accurate method for determining amphora production centers, but for many types of amphorae, no kilns have been excavated. Finally, by mapping the densities of particular amphora types, scholars have postulated sources for particular types of amphorae. This method is less reliable than the preceding two primarily because density maps can be more indicative of where a particular area's amphorae were distributed rather than produced.

Nevertheless, by identifying amphora production sites and examining density maps, it has become possible to reconstruct trading patterns across the Mediterranean. While Greco-Italic amphorae were very common during the fourth to second centuries BCE, Baetican, North African, and Eastern amphorae became more common in the first four centuries CE. Amphorae are regularly found at sites on land, but they are also quite commonly discovered at the sites of ancient shipwrecks. These shipwrecks have contributed substantially to our knowledge of trade routes and practices. Following their primary use, amphorae were often reused for shipping, construction, as funnels, and as children's sarcophagi, among other things (Peña 2007).

The largest singular context of amphorae discovered thus far is Monte Testaccio in Rome. This site was a refuse dump for transport ships unloading on the Tiber River from the late first century BCE until the 260s CE (Peña 2007). The hill consists primarily of Dressel 20 amphorae, which were used to transport oil from Baetica, but North African amphorae have also been found there. Archaeologists regularly find *tituli picti* and amphora stamps on the amphorae, thereby allowing for a better understanding of the organization of both the government-run *annona* system and the commercial oil trade.

Several different amphora designations exist: Dressel (primarily from the Iberian Peninsula), Lamboglia, LRA (Late Roman amphorae), and Keay, to name a few. Some series are named for the scholar who studied them, others are named for their type sites, and still others are named descriptively (carrot amphora, micaceous water jar, etc.).

Dolia

Dolia (sg. *dolium*) were massive vessels used for storage or agricultural processing (e.g., fermentation). These pots, typically between 4 and 5 ft tall and equally wide, were handmade with coils or slabs. They were typically sunk into the ground, to prevent damage and to limit environmental effects on the contents of the *dolium*. It is clear from the prevalence of mends to these pots that they were expensive and difficult to replace. Nevertheless, when they did break, they could be reused either as basins or ovens. For a brief period of time, *dolia* were used in so-called cistern boats, but this transport method was discontinued shortly after its inception, perhaps because it was much riskier than transporting amphorae. Notable cistern-boat wrecks are La Giraglia, Petit Conglué, Ile Rousse, and Diano Marina (Marlier and Sibella 2002).

Mortaria

Mortaria were basin-type bowls that were used for grinding food. These vessels were wheel-made and had large, hard inclusions that would allow for more effective tearing and grinding. Typically the fabric of the interior surface of these vessels is worn away, leaving a rough surface of inclusions. There is often a pouring spout at some point along the rim of the vessel.

Lamps

Used for lighting and/or decoration, lamps range in size from that of one's palm to larger and more ornate pieces with multiple spouts for wicks (Fig. 2). These objects were typically made from molds and often featured decorative motifs in the discus. Common subjects were plants and animals, games and races, gods, or erotic scenes. While olive oil would have been the primary lamp fuel, other vegetable oils were also used. Loeschke, Broneer, and Bailey established the standard forms for lamps in the early twentieth century (Bailey 1980).

Ceramics, Roman Imperial, Fig. 2 Roman lamp with figural relief in discus, Museo Archeologico di Pithecusae. (Photo taken by author)

Fine Wares

Fine wares are the ceramics that Roman archaeological excavations tend to rely on for stratigraphic dating. The evolution of most types and forms has been meticulously studied, particularly for *terra sigillata* throughout the Empire. Specific dates and production sites are available for these wares, which rarely had the consistent forms or temporal span of coarse wares.

Terra sigillata – Samian ware, Arretine ware
Produced: 50 BCE–180 CE
Location: Empire wide, especially Gaul, Hispania, and Italia

Terra sigillata is also commonly referred to as Samian or Arretine ware. The ware is easily identifiable by its glossy red, orange, or brownish slipped surface. The fabric is very fine, with few and minute inclusions. The slip was rich in iron and fired in an oxidizing atmosphere, which created the characteristic bright gloss. The successor to black gloss, *sigillata* evolved from pre-sigillata, which utilized black gloss forms and a duller, less even red slip. Some argue that *terra sigillata* also evolved from Italo-Megarian ware, which was molded but was unslipped. As with black gloss, similarities have been drawn that connect *terra sigillata* forms and decorations with forms and decorations seen on more expensive metal vessels.

For standardization and efficiency's sake, *terra sigillata* was made within a mold on a wheel. The molds were decorated beforehand with stamps and/or makers' marks. Not all pieces were decorated, however, and not all decorations were molded. In some instances, rouletting was used along the rims of the vessels, and in other instances, barbotine was applied to the vessels' sides or rims prior to firing. Decorative stamps were floral or figural in nature. Makers' marks applied to the vessels have been noted as belonging to the workshop owner, the mold maker, or the potter. Some vessels have been found with multiple marks on them. Oftentimes a mark integrated into the mold is taken to be the mold makers, while a stamp on the base or tondo of the pot probably indicated the workshop owner.

Forms were primarily for use on the table – cups, bowls, and plates – with occasional *terra sigillata* lamps.

The production of *terra sigillata* began in Italy toward the end of the first century BCE. A major production site was first identified in the area around Arrezzo, hence "Arretine ware." This, however, is misleading since there were many areas of *terra sigillata* production all across the Mediterranean. In addition to Arrezzo, some major production sites were Pisa, Ostia, and Pozzuoli in Italy, La Graufesenque and Montans in France, Rheinzabern in Germany, and Tricio in Spain. While each production center experienced different periods of popularity, all *terra sigillata* had largely stopped being produced by the third century CE, when African red slip had replaced it.

Terra sigillata africana is classified as African red slip, since it is not technically produced in the same manner as *terra sigillata*.

Eastern sigillata – Cypriot sigillata, Çandarli ware
Produced: 150 BCE–300 CE
Location: Asia Minor

Eastern *sigillata* A was produced in North Syria during the late Republican and early Imperial periods. Like *terra sigillata*, it has a red slip, but the fabric of the vessel is much lighter than that of terra sigillata. Later forms of ESA were similar to those of Italian *terra sigillata*.

Eastern *sigillata* C, or Çandarli ware, was produced around Bergama and Çandarli during the first and second centuries CE. Some examples have been found in fourth century deposits, but it is not clear whether they were produced in the fourth century or are residual. The fabric was pale brown to light red with an orangey slip.

Thin-walled ware – pareti sottili, paretes fines, parois fines, and paredes finas
Produced: 200 BCE–300 CE
Location: Began in Italy, spread to the provinces

This ware is easily recognizable by its refined fabric and very thin walls. It is hypothesized that this tableware was a ceramic imitation of metal and glasswares. Thin-walled ware was made both on wheels and in molds. Its shapes are typically cups and mugs, either plain or decorated (Fig. 3). Beginning in the Augustan period, decorations included barbotine, sabbiatura (sand applied to the vessel's surface prior to firing and before slipping), rouletting, or incision. Also beginning in this period was the application of slip to the inner and/or outer surfaces of the ware, perhaps in order to increase its impermeability. Prominent workshops were in Chiusi, Aquilea, Sutri, Torrita di Siena, Syracuse, and Cremona in Italy, and Lyon and Lezoux in Gaul.

By the second half of the first century CE, the number of vessel forms had diminished. The vessels' fabric gradually became less refined, its walls thicker, and eventually it was very close in form and fabric to common ware (Guerrini and Mancini 2007).

African Red Slip – Terra sigillata africana
Produced: 80 CE–750 CE
Location: Modern Tunisia

Also known as *terra sigillata africana*, this ware originally imitated the forms and decorations of terra sigillata from Europe. By the second century, however, African red slip shapes began to be made broader and shorter, perhaps allowing for easier stacking and transport. Major production

Ceramics, Roman Imperial, Fig. 3 Thin-walled ware, Museo Archeologico Nazionale di Cosa. (Photo taken by author)

sites were located in Tunisia at el-Djem, Carthage, and Raqqada. While most African red slip forms were moldmade in the same manner as *terra sigillata*, some larger vessels were thrown onto upside down molds beginning in the fifth century CE. Hayes proposes this method allowed for application of feet to the vessels while they were still on the mold. He also points out that internal stamped decoration would have been part of the mold.

Fabric colors vary from orange-red to brick-red, and similarly colored, but slightly darker slip. The slip of African red slip is not as bright or shiny as that of *terra sigillata*. Decorations were typically stamped, appliqued, or rouletted.

African red slip ware is taken as the prime indicator of late Roman occupation in both archaeological surveys and excavations.

Historical Background

Beginning in the fifteenth century, *terra sigillata* caught the eye of antiquarians and researchers. Its durable nature, figural designs, and bright sheen ensured that it was easily spotted whenever earth was moved. Early finds were often only briefly mentioned in journals and were usually not illustrated (Tyers 1997).

The modern study of Roman imperial ceramics began with Hans Dragendorff's 1895 publication "Terra Sigillata: Ein Beitrag zur Geschichte der griechischen und römischen Keramik" in *Bonner Jahrbüchen*. In this article, he systematically described and drew Roman ceramic forms from continental Europe. His work is still used for identifying and dating *terra sigillata* forms across the Mediterranean. After Dragendorff's work was published, other scholars became more systematic in their identification and illustration of Roman wares. Among these scholars were Howard Comfort and August Oxé, who, during the course of the early twentieth century, published extensively on *terra sigillata* stamps and vessel forms. Their detailed study of stamps furthered the understanding of workshop organization. While these early studies were focused on forms and decorative motifs, more recent studies have come to focus on the organization of ceramic production, questions of supply and distribution, and the role of fine and coarse ceramics in Mediterranean trade.

Unlike fine wares, amphorae have few aesthetic qualities to distract from their functional aspects. Thus, amphora studies have traditionally concentrated on the vessels' chronologies, production centers, distribution, and economic significance. Heinrich Dressel was the first to create a typology for amphorae. His 1899 effort, which appeared in the *Corpus Inscriptionum Latinarum*, was followed by Siegfried Loeschke (*Keramische Funde in Haltern: ein Beitrag zur Geschichte der augusteischen Kultur in Deutschland*, 1909), and some decades later by M. H. Callendar (*Roman Amphorae with an Index of Stamps*, 1965), M. Beltrán Lloris (Spanish amphorae, 1970), Riley (Benghazi ceramics, 1979), Laubenheimer (Gaulish amphorae, 1990, 1991, and 1992), Panella (1992), and others. Broader compendia on amphorae and their economic significance were penned by Peacock and Williams (1982) and Keay (1984).

Late Roman pottery was not extensively published until 1972 in John Hayes' aptly named *Late Roman Pottery*. This publication covers African, eastern, Egyptian, Gaulish, and assorted other wares known from later deposits.

Since computers and databases became easily accessible and common in the 1980s and 1990s, statistical analysis of ceramic quantities has blossomed. This has allowed for more detailed intra- and inter-site analyses of assemblages. Now, with the availability of Geographic Information Systems (GIS) software, it is possible to study ceramics not only quantitatively but also spatially.

Key Issues/Current Debates

For centuries archaeologists have looked to historical texts to explain ancient life. This often leads scholars to shape their material culture data to fit the literary sources. In the past two to three decades, there has been a distinct movement away from texts and toward the use of material culture to inform us about the past. The study of cultural interaction has benefited greatly from this new approach. While "Romanization" was previously thought to be a one-way process of cultural imposition, ceramic studies by Willis, Roth, and others have been used to show the opposite and draw conclusions about social and economic conditions of the Roman conquest (Millett 1992; Willis 1996; Roth 2007).

Following the rise of survey archaeology, archaeologists began to question the manner in which ceramic data collected from surveys could be interpreted. In survey archaeology's early years, the ceramics that appeared on the surface were taken at face value. All surveyors were presumed to have the same recovery rate, the extent of a ceramic spread was used to identify the size of a site, fine wares were recorded more frequently than coarse wares because of their greater visibility, and quantification (e.g., density and weight) was minimal. As survey archaeology became more methodologically refined and more intensive, the veracity of conclusions drawn from collected ceramics came under question.

One way in which scholars are tackling concerns about ceramic interpretations is by publishing not only their methodology but also the specific finds that were either recorded or collected. Such a transparent approach allows for other scholars to draw their own conclusions, but also makes it possible to compare sites that have been similarly documented. Such publications are ideal, but are by no means widespread as yet.

International Perspectives

In the United States, there is currently a lack of Roman ceramic courses for students who wish to specialize in the field, as well as a dearth of jobs for Roman ceramicists. This is likely a result both of limited interest in the field and of restricted opportunity for first-hand study. While schools in Europe often have access to collections that they can easily study, very few schools in the North America can say the same. Often the collections that they do have are fragmentary or poorly documented. University courses in North America tend to focus on Greek ceramics for their art historical value and spend little to no time on Roman ceramics or the role of ceramics in archaeological interpretation. From a researcher's standpoint, the most useful publications tend to be in Italian, French, Spanish, or German, although detailed English publications are becoming increasingly available.

Future Directions

Important to the furtherance of Imperial Roman ceramics studies, and Roman ceramics studies more generally, is the integration of Roman ceramics courses at the university level outside of Europe and increased publication in English by scholars. In order for this to happen, there need to be positive relationships between schools and European governments so that collections can be temporarily held and studied in the United States and elsewhere. To this point, European nations have been hesitant to allow material culture to leave their borders, perhaps out of a post-colonial fear that the objects will never be returned. In this age of accountability and mass media, however, it is unlikely that any foreign institution could hold another country's ceramic

collection indefinitely without massive outcry and the attendant legal ramifications.

In the field of survey archaeology, better publication of ceramic finds will not only back up archaeologists' conclusions but will also allow for contextual analyses and spatial distribution studies to be performed. The more information that is published, the easier it will be to draw meaningful comparisons between disparate geographical regions.

Additionally, increased comparison of survey finds to excavate material needs to occur on a more regular basis. Such comparisons may provide lead to more accurate interpretations of surface scatters.

Finally, ceramic data must be published and made available in order to make pan-Mediterranean site analysis and comparison possible. In addition to catalogs of relevant finds being published, syntheses of those ceramics should also be attempted. Publications such as Roth's show that ceramic data are useful not only for dating strata but also for understanding Roman identity and cultural change.

Cross-References

- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Economy, Roman
- ▶ Survey Archaeology in the Roman World
- ▶ Trade and Transport in the Ancient Mediterranean

References

Bailey, D.M. 1980. *A catalogue of lamps in the British Museum*. London: The Trustees of the British Museum.

Guerrini, Cl, and L. Mancini. 2007. La ceramica di età romana. In *Introduzione allo studio della ceramica in archeologia*, 197–234. Siena: Università degli Studi di Siena.

Hayes, J.W. 1972. *Late Roman pottery*. London: The British School at Rome.

Keay, S. 1984. *Late Roman amphorae in the Western Mediterranean: A typology and economic study. The Catalan evidence*. Oxford: Archaeopress.

Marlier, S., and P. Sibella. 2002. La Giraglia, a dolia wreck of the 1st century BC from Corsica, France: study of its hull remains. *The International Journal of Nautical Archaeology* 31 (2): 161–171.

Millett, M. 1992. *The Romanization of Britain: An essay in archaeological interpretation*. Cambridge: Cambridge University Press.

Panella, C. 1992. Mercato di Roma e anfore galliche nella prima età imperiale. In *Les amphores en Gaule: production et circulation*, ed. F. Laubenheimer, 185–206. Besançon: Université de Besançon.

Peacock, D.P.S., and D.F. Williams. 1982. *Amphorae and the Roman economy: An introductory guide*. London: Longman.

Peña, J.T. 2007. *Roman pottery in the archaeological record*. New York: Cambridge University Press.

Roth, R. 2007. *Styling Romanisation: Pottery and society in central Italy*. Cambridge: Cambridge University Press.

Tyers, P. 1997. *Pottery in Roman Britain*. London: Routledge.

Willis, S. 1996. The Romanization of pottery assemblages in the east and north-east of England during the first century A.D.: A comparative analysis. *Britannia* 27: 179–221.

Further Reading

Blázquez Martínez, J.M., and J. Remesal Rodríguez, eds. 2003. *Estudios sobre el Monte Testaccio (Roma) III*, Collecció Instrumenta. Vol. 14. Barcelona: Universitat de Barcelona.

Bonifay, M. 2004. *Études sur la céramique romaine tardive d'Afrique*, British Archaeological Reports International series 1301. Oxford: Archaeopress.

Broneer, O. 1930. *Corinth IV, ii: Terracotta lamps*. Cambridge, MA: Harvard University Press.

Peacock, D.P.S. 1982. *Pottery in the Roman world: An ethnoarchaeological approach*. London: Longman.

Ceramics, Southeast Asian and Chinese Trade

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Introduction

Ceramics have been in Southeast Asia since the early Holocene. The earliest, best-dated examples

in Mainland Southeast Asia are cord-marked, net-marked, burnished, appliquéd, and incised Hoabinhian earthenware pottery sherds found at the Spirit Cave in north-western Thailand, dated to approximately 8,400 years old. In comparison, the earliest known earthenware ceramics found in the Malay Archipelago consist of plain and burnished pottery recovered in East Timor dating to a horizon of 4,500–3,700 years ago (Solheim 2003).

The use of paddle impressions with basket- or cord-marked patterns, carved paddle impressions, cord marking, incising, burnishing, and slipping are among the oldest pottery decorative techniques found in Southeast Asia (Solheim 2003). This early decorative pottery tradition is thought to be distributed across Southeast Asia by the "Neolithic Nusantao Maritime Trading Network" (Solheim 2006). Lapita pottery, as well as Solheim's Sa-Huynh-Kalanay and Bau-Malay pottery are thought to be derived from this Neolithic tradition, with Sa-Huynh-Kalanay ceramics believed to be gradually replaced by those of the Bau-Malay tradition during the first millennium CE in island Southeast Asia (Solheim 1990).

The Bau-Malay pottery rubric claims that all carved paddle impressed earthenware in the southern Philippines, west Borneo, western Indonesian islands, and the Malay Peninsula were produced from 700 CE onward. "Tanjong Kubor" ware is the only other proposed precolonial (700–1500 CE) major pottery style in the Malay Archipelago which affiliates earthenware ceramics from sites in Brunei, south Philippines, Sarawak, and Johor Lama. Bellwood and Omar (1980: 173) have argued that "the distribution pattern [of Tanjong Kubor ware] is related to the development of the Malay language as a trading language in those areas where it is most commonly spoken today."

Unlike their low-fired earthenware cousins, high-fired stoneware, and porcelaneous ceramics have had a relatively shorter life span in Southeast Asia. The Vietnamese, having had a long history of political and cultural interactions with the Chinese beginning as early as 111 BCE, started to produce stoneware ceramics approximately 2,000 years ago. However, it was not until the ninth century CE that the technique of producing high-fired pottery was first developed indigenously by the Khmers in Southeast Asia (Miksic 2009a). "Khmer ware," as these first Southeast Asian stoneware ceramics are now called, is believed to be a result of the diffusion of Chinese pottery manufacturing technology. It has been observed that Khmer ceramics share many similarities with contemporaneous products from the Xicun (西村 Xī Cūn) and Chao-an (潮安 Cháo Ān) kilns in the southern Chinese province of Guangdong (广东 Guǎng Dōng) (Rooney 1984; Brown 1989). Southeast Asian potters did not achieve the required temperatures to produce true porcelain, an accomplishment solely achieved by the Chinese during the Tang dynasty (618–906 CE). The Chinese held a monopoly on porcelain until the Japanese and Germans discovered the technique in the seventeenth and eighteenth centuries (Yeo and Martin 1978). Nonetheless, Thai and Vietnamese potters were able to produce high-fired, glazed ceramics resembling Chinese porcelain – such as Thai celadon and Vietnamese underglaze cobalt blue – and exported them across the region between the fourteenth and sixteenth centuries.

Definition

Precolonial Southeast Asians acquired Chinese stoneware and porcelain ceramics through a long established maritime trading network with China, commonly referred to as the Nanhai (南海 Nán Hǎi or "South Sea") trade (Wang 2007). Chinese ceramics from the Western Han period have been found in south Thailand (Miksic 2009b), thereby suggesting the existence of a well-established trading network between both regions as early as the first to second centuries CE. However, Chinese porcelain was first recorded as a maritime trade item only during the Song dynasty, a period where foreign trade flourished under the incentive to secure additional revenue, especially after their defeat by the Khitan nomads in 1126 CE (Miksic 2009a).

The export of Chinese stoneware and porcelain ceramics into Southeast Asia generally occurred at two levels. Firstly, lower quality high-fired ceramics were produced and exported from the southern "provincial" or "folk" kilns (民窑 Mín

Yáo) of Guangzhou (广州 Guǎng Zhōu) in Guangdong (广东 Guǎng Dōng) province and Quanzhou (泉州Quán Zhōu) in Fujian (福建 Fú Jiàn) province. Secondly, "national" or "imperial" kilns (官窑 Guān Yáo) at Jingdezhen (景德镇 Jǐng Dé Zhèn) and Jizhou (吉州 Jí Zhōu) in Jiangxi (江西 Jiāng Xī) province, Longquan (龙泉 Lóng Quán) in Zhejiang (浙江 Zhè Jiāng) province, and Dehua (德化 Dé Huà) in Fujian province produced ceramics of higher quality and value (Heng 2009).

Evidence of this early maritime trade is illustrated by numerous shipwrecks found in Southeast Asian waters. The Belitung shipwreck, found off the coast of Java, held a large cargo of Chinese Changsha ceramics dating to the ninth century (Flecker 2011), a period when Chinese ceramics were believed to be exported at a voluminous level for the first time. The Turiang, a fourteenth century (c. 1305–1370) shipwreck located off the eastern coast of the Malay Peninsula, was found to have set sail from Guangdong with a cargo containing monochrome, brown- and green-glazed stoneware vessels made in the provincial kilns of Guangdong as well as green-ware vessels from the imperial kilns in Zhejiang. High-fired Thai (Sukhothai, Sawankhalok and Suphanburi) and Vietnamese ceramics, the bulk of the ship's cargo, were recovered as well. Other shipwrecks such as the Nanyang (c. 1380), Longquan (c. 1400), Royal Nanhai (c. 1460), Xuande (c. 1540), and Singtai (c. 1550) also held an assortment of high-fired Chinese, Thai, and Vietnamese ceramics (Brown 2009), thereby depicting an intricate level of inter- and intra-regional trade.

Chinese ceramics were not only simply imported commodities, but also functioned as media of exchange between Chinese and local merchants in the conduct of trade in precolonial Southeast Asia. Southeast Asian societies adopted monetary standards based on "a directly measurable quantity" of highly valued substances or commodities (Wicks 1992: 301). When the Song court banned the export of precious metals such as gold and silver as well as copper cash in 1127, 1133, 1175, and 1219, porcelain ceramics became a commodity-substitute in overseas maritime trade and transactions. Ceramics were specifically named as one of the products to be used in place of gold and silver during the 1219 ban (Heng 2009). In exchange, Chinese traders received from Southeast Asian merchants various aromatic products, spices, and precious items such as pearls, ivory, rhinoceros horns, and other tropical produce needed to satisfy the Chinese market.

Key Issues/Current Debates/Future Directions/Examples

Ceramic artifacts are ubiquitous throughout Southeast Asian archaeological sites, but as a field of study, ceramic analysis in Southeast Asia remains in its infancy and is confined mostly to the realms of ethnography and art history. The importance of ceramics in understanding ancient cultures, long established by generations of archaeologists in other parts of the world, has been overshadowed in Southeast Asian archaeological studies by the structural and monumental remains found across the region, and the pervasiveness of historical narratives reconstructed from epigraphic and textual sources. Consequently, archaeological research in this region remains largely oriented toward the study of major orthogenetic precolonial urban centers largely defined by the presence of architectural, statuary, and epigraphic remains (Miksic 2000). Conversely, there are relatively few archaeological studies of household architecture and status goods which might reveal "evolving wealth differentials and social stratification in prehistoric and early historic period societies" have been conducted (Junker 1999: 151).

Nonetheless, the efforts of archaeologists over the last few decades have produced considerable, albeit disparate, data and literature that have advanced the knowledge of socioeconomic, trade, and settlement patterns of precolonial societies in both mainland and island Southeast Asia. In particular, research on ceramics has demonstrated that greater socioeconomic and political complexity in precolonial Southeast Asian

societies is typically accompanied by the development of a "political economy" where certain goods function as a "material fund of power" which is used to "reinforce social inequality and political authority," with hereditary "elites" controlling the specialized production and exchange of such goods (Junker 1994: 3). Ceramics were often used in precolonial Southeast Asia as a measure and indicator of social rank distinction. Stylistic, technological, and distribution analyses of decorative earthenware pottery found in the Philippines have also suggested that some decorative styles could have been iconographic representations of inter-chiefly elite alliances or shared identity in the late prehistoric and protohistoric period (Bacus 2003). As trade routes were established between Southeast Asian and Chinese markets over the centuries, Southeast Asian elites found a new source of high-quality and beautiful ceramics that they did not have the technology to produce (Heng 2009). Imported Chinese ceramics, such as small vessels with lids, came to be considered a luxury suitable for use only by the Khmer nobility in the eleventh century (Miksic 2009b). Chinese porcelain, among other exotic luxury goods, also became "key symbols of social status and political power" together with indigenously manufactured prestige goods for the Philippine chiefly elite (Junker 1999: 183).

Ceramics can also be used for stratigraphic dating in most Southeast Asian archaeological sites. It is possible to use thermoluminescence (TL) dating to determine the absolute date when the ceramics were fired, but its results will contain a range of error usually between ±90 and 110 years. This range of error is too great for TL dating to be of much use for most precolonial Southeast Asian sites which normally have a narrow life span between one to three centuries. Relative dating through established Chinese ceramic typologies, in particular, is a more accurate alternative. The stylistic features of these ceramics – such as the type of decorations, motifs, and glaze patterns – are distinctly associated with specific dynastic periods in Chinese history. The recovery of Chinese ceramics in situ not only allows for the successful dating of other material cultural remains in the same stratigraphic layer, but also reconstruction of the entire occupational sequence at a well-excavated site.

The precise provenance for each ceramic sherd in terms of the exact region, kiln site of origin as well as period of manufacture, is dependent on comparisons with other ceramics. However, the existing knowledge of ceramic production and distribution is still far from complete; research on ceramic kiln sites in Southeast Asia is relatively underdeveloped, and despite a documented history of Chinese ceramic connoisseurship, there is a paucity of reliable information that can be gleaned from Chinese literary sources on the ceramic industry. Consequently, a detailed chronology for the majority of Chinese and Southeast Asian trade ceramics has not been established (Brown and Sjostrand 2004). Regional studies that compare the physical characteristics, forms, decorative styles as well as archaeological and historical contexts of ceramics have the potential to provide conclusive evidence in the identification of ceramics recovered in the region.

The study of Southeast Asian earthenware ceramics in particular has largely been overshadowed by that of its more aesthetically attractive high-fired ceramic cousins. Although earthenware sherds make up the majority of artifacts recovered from archaeological sites in the region, they still remain "neglected in reported finds, analyses, and published references" (Rooney 1987: 1). The lack of publication in Southeast Asian earthenware studies was still endemic in the region as late as 2003 (Miksic 2003). In an effort to remedy the situation and create a regional archaeological framework of earthenware analysis, Miksic (2003) seminal study *Earthenware in Southeast Asia* encompassed the latest earthenware research across the major Southeast Asian nations. To date, it remains the only publication which focuses solely on earthenware ceramics in Southeast Asia. At the same time, ethnographic records of traditional or rural earthenware potters remain few because research is narrowly concentrated on selected Southeast Asian ceramics which are

"recognized as having great cultural and monetary value, such as the famous prehistoric Ban Chiang pottery and the high-fired celadon wares of Sukhothai and Sawankhalok" (Shippen 2005: 11). Consequently, any identification and analysis of earthenware ceramics can only rely on comparisons with the few existing published catalogs and be informed by the existing archaeological record and historical context that surrounds these artifacts.

Cross-References

- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Ceramics: Stonewares
- ▶ South and Southeast Asia: Historical Archaeology

References

Bacus, E.A. 2003. Styles of alliance?: Decorated earthenwares in late prehistoric and protohistoric Philippines polities. In *Earthenware in Southeast Asia*, ed. J.N. Miksic, 39–51. Singapore: Singapore University Press.

Bellwood, P., and M. Omar. 1980. Trade patterns and political developments in Brunei and adjacent areas, A.D. 700–1500. *Brunei Museum Journal* 4 (4): 155–179.

Brown, R.M. 1989. Guangdong. A missing link to Southeast Asia. In *Guangdong ceramics from Butuan and other Philippine sites*, ed. R.M. Brown, 81–85. Manila: The Oriental Ceramic Society of the Philippines.

Brown, R.M. 2009. *The Ming gap and shipwreck ceramics of Southeast Asia. Towards a chronology of Thai trade ware*. Bangkok: The Siam Society under Royal Patronage.

Brown, R.M., and S. Sjostrand. 2004. *Maritime archaeology and shipwreck ceramics in Malaysia*. Kuala Lumpur: Department of Museums & Antiquities.

Flecker, M. 2011. A ninth-century AD Arab or Indian shipwreck in Indonesia: First evidence for direct trade with China. *World Archaeology* 32 (3): 335–354.

Guy, John S. 1990. *Oriental trade ceramics in South-East Asia ninth to sixteenth centuries. With a catalogue of Chinese, Vietnamese and Thai wares in Australian collections*. Singapore: Oxford University Press.

Heng, T.S.D. 2009. *Sino-Malay trade and diplomacy from the tenth through the fourteenth century*. Athens: Ohio University Press.

Junker, L.L. 1994. The development of centralized craft production systems in A.D. 500–1600 Philippine chiefdoms. *Journal of Southeast Asian Studies* 25 (1): 1–30.

Junker, L.L. 1999. *Raiding, trading and feasting. The political economy of Philippine chiefdoms*. Honolulu: University of Hawai'i Press.

Miksic, J.N. 2000. Heterogenetic cities in premodern Southeast Asia. *World Archaeology* 32 (1): 106–119.

Miksic, J.N. 2003. Preface. In *Earthenware in Southeast Asia. Proceedings of the Singapore Symposium on Premodern Southeast Asian Earthenwares*, ed. J.N. Miksic, xvii. Singapore: Singapore University Press.

Miksic, J.N. 2009a. Kilns of Southeast Asia. In *Southeast Asian ceramics. New light on old pottery*, ed. J.N. Miksic, 48–69. Singapore: Southeast Asian Ceramic Society.

Miksic, J.N. 2009b. Research on ceramic trade within Southeast Asia and between Southeast Asia and China. In *Southeast Asian ceramics. New light on old pottery*, ed. J.N. Miksic, 69–99. Singapore: Southeast Asian Ceramic Society.

Rooney, D.F. 1984. *Khmer ceramics*. Singapore: Oxford University Press.

Rooney, D.F. 1987. *Folk pottery in South-East Asia*. Singapore: Oxford University Press.

Shippen, M. 2005. *The traditional ceramics of Southeast Asia*. Honolulu: University of Hawai'i Press.

Solheim, W.G., II. 1990. Earthenware pottery, the T'ai and the Malay. *Asian Perspectives* 29 (1): 25–36.

Solheim, W.G., II. 2003. Southeast Asian earthenware pottery and its spread. In *Earthenware in Southeast Asia*, ed. J.N. Miksic, 1–21. Singapore: Singapore University Press.

Solheim, W.G., II. 2006. *Archaeology and culture in Southeast Asia: Unraveling the Nusantao*. Quezon City: The University of the Philippines Press, Diliman.

Wang, G. 2007. The Nanhai trade: A study of the early history of Chinese trade in the South China Sea. In *Southeast Asia-China interactions*, ed. G. Wade, 51–166. Kuala Lumpur: MBRAS.

Wicks, R.S. 1992. Money, markets, and trade in early Southeast Asia. In *The development of indigenous monetary systems to AD 1400*. Ithaca: Cornell Southeast Asia Program.

Yeo, S.T., and J. Martin. 1978. Chinese blue and white ceramics – A brief introduction. In *Chinese blue & white ceramics*, ed. S.T. Yeo and J. Martin, 14–42. Singapore: Arts Orientalis.

Further Reading

Harrisson, B. 2007. The ceramic trade across the South China Sea. In *Southeast Asia-China interactions*, ed. G. Wade, 489–505. Kuala Lumpur: The Malaysian Branch of the Royal Asiatic Society (MBRAS).

Miksic, J.N., ed. 2009. *Southeast Asian ceramics. New light on old pottery*. Singapore: Southeast Asian Ceramic Society.

Ceramics: Colonoware

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State of Knowledge and Current Debates

Description

Colonoware is not a formal ceramic type and epitomizes cottage-level fabrication. Idiosyncratic in the execution of production, methods, marketing, and techniques for surface embellishment make generalizations impractical. No definition of colonoware exists that applies to this ceramic in all places and at all times. That being understood, the following description provides a suitable introduction to this dynamic, interpretively rich ceramic.

Colonoware [also colono ware, colono, Colono-Indian ware, Afro-Caribbean ware] was a locally produced, low-fired, unglazed coarse earthenware ceramic found in European colonial contexts that was hand-formed either by coiling, pinching, or the slab technique (Figs. 1 and 2). It was rarely wheel thrown. Early, definitional examples of the ware exhibited Old World vessel forms, including (but not limited to) chamber pots, teapots, candlesticks, porringers, pipkins, and mugs. However such manifestations were atypical, and bowls, jars, and smoking pipes were more commonly recovered forms. The term has also been employed to refer to locally produced, handmade beads. Its local level of production places the field of historical archaeology in a crucial position to identify this ware and to produce the data essential to understanding the sociopolitical environments of its construction and use. If a ceramic could be chosen as the emblem of historical archaeology, it would be colonoware.

The New World production of Old World vessel forms and colonial migrant use of colonoware represented the material embodiment of international, multicultural contact. Colonoware manifested elements of multiple, competing cultural traditions and reflected the challenges that colonization presented and imposed upon the communities involved. For this reason it is sometimes referred to as a "creole" or "hybrid" ware, because it blends elements of what were conventionally thought of as culturally distinctive attributes.

Analyzing colonoware is as engaging as it is challenging. Determining how this ware reflects the social lives of its creators and consumers is not only a goal of historical archaeology but speaks to the discipline of anthropology. How are identity, culture, and society reproduced in material ways – and at different scales – and how do political and social practices act to promote or constrain material production and consumption?

In the United States, colonoware has been discovered from the Chesapeake region southward into Florida and westward into Tennessee and Kentucky (Ferguson 1992: 35–37). The Spanish colonial southwest region of the United States and the Caribbean each preserve an independent tradition of colonoware (Deagan 1987, 2013; Dyer 2010, Hauser 2013; Peelo 2011). In British colonial North America, the ware is often found in contexts associated with enslaved laborers, but this pattern is by no means universal. Its spatial distribution across North America is not uniform: archaeological investigations have recovered large proportions of colonoware in ceramic assemblages on plantations in South Carolina and Florida, but much lower quantities characterize the assemblages of the Middle Atlantic region and Georgia (Espenshade and Kennedy 2002: 212, 216, 224; Ferguson 1992: 7–9, 35–37; Galke 2009: 306–307).

Colonial law and cultural practices imposed upon New World inhabitants varied between European powers. Depending upon the time period and region under study, these policies sometimes directly, sometimes incidentally, influenced New World manufacturing, proselytizing, and social relationships in general. Despite these rules, multiethnic households were formed and in some environments even thrived (Loren 2000). The vagaries of these rules placed constraints or created opportunities for colonoware production that vary from colony to colony and

Ceramics: Colonoware, Fig. 1 Colonoware bowl fragment from the first quarter of the eighteenth century. (Courtesy The George Washington Foundation)

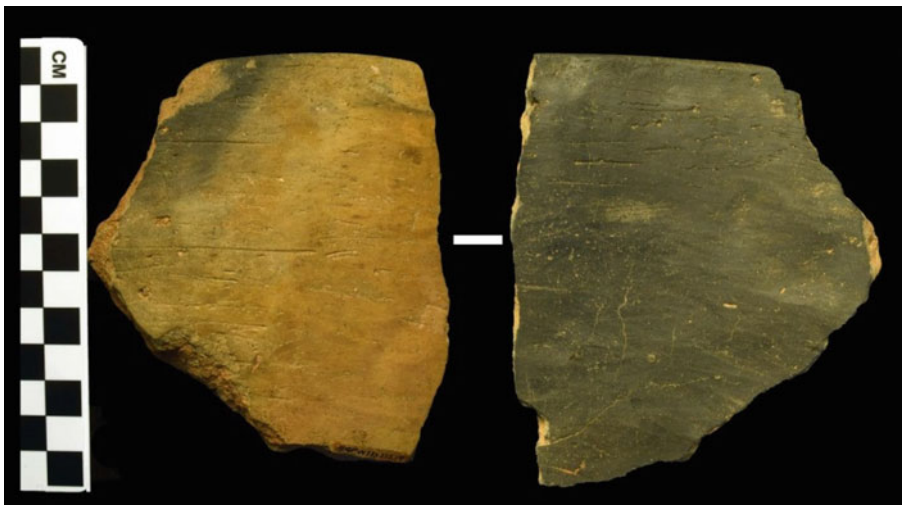

Ceramics: Colonoware, Fig. 2 Colonoware bowl rim fragment from Pohoke, Manassas National Battlefield Park, Virginia [Photograph by Laura Galke. Used with permission from the National Park Service, National Capital Region. Permission Pending]

from time period to time period. The degree to which colonoware represents any given ethnic identity in form, manufacture, and decoration was determined by the evolving, dynamic socio-political environment in which it was produced.

Archaeological data indicates that the earliest colonoware can be found in early-sixteenth-century Spanish settlements in the Caribbean, Mexico, the Southwestern United States, and Florida. These areas developed a colonoware

tradition independent from the seventeenth-century Chesapeake region and eighteenth-century American South (Chodoronek 2013: 57, 65; Cobb and DePratter 2012: 447, 452–453; Deagan 1987: 103–104, 270; Dyer 2010; Ferguson 1992: 18–22, 44–47; Noël Hume 1962; Pogue 2017: 15). In the Middle Atlantic region, it appears that colonoware manufacture and use continued at least until the turn of the nineteenth century. In some communities, it appears to be produced until the conclusion of the American Civil War (Galke 2009). In portions of the Caribbean, colonoware production continues.

The culturally pliant nature of colonoware was reflected in Noël Hume's initial encounter with this ware. In his 1962 publication, he introduced it to the field as "Colono-Indian ware." Noël Hume intended the term to be limited to burnished wares that were explicitly *produced* by Native American Indians, that *exhibited* European vessel form, and that were *used* by enslaved Africans (Noël Hume 1962: 5, 7, 13, emphasis mine). In the Virginia Tidewater region where it was first recognized, this pottery exhibited traditional, American Indian temper including shell and red ochre (Noël Hume 1962: 3). In the same year, Charles Fairbanks (1962) also described his encounter with colonoware. Like Noël Hume, Fairbanks credited its production to local American Indians and emphasized the ware's European-inspired vessel forms.

When considered across its full continental range, colonoware temper varies considerably (Fig. 3). Since Noël Hume's publication, colonoware has been encountered in a variety of contexts across time and space. Its description remains varied and has broadened. Noël Hume's article is worth reviewing, if only to appreciate how much the colonoware designation has drifted from his original analysis. Decades later, Deagan (1987: 103–104) broadened this coarse earthenware's definition to describe colonoware as New World-produced pottery that was used within colonial households.

Regardless of the broad geographical region under consideration, it seems that especially during the earliest decades of contact in any given area – whether it was the sixteenth-century Caribbean or the seventeenth-century Chesapeake – locally made colonoware in part fulfilled an urgent need for pottery that was created when shipments of household wares from Europe were insufficient. In these contexts, Native American influence on colonoware production and use is evident and often the focus of research (Deagan 1987: 103, 1996, 2013; Noël Hume 1962). Later, enslaved African communities grew and contributed to evolving traditions of local pottery manufacture and use. Colonoware studies of these eighteenth- and nineteenth-century assemblages were inspired by the nature of colonial and/or plantation economies and their expressions of African American cultural traditions in a variety of media (Ferguson 1992; Loren 2000; Singleton

Ceramics: Colonoware, Fig. 3 Colonoware body sherds from the Henry House, Manassas National Battlefield Park Virginia, showing a variety of paste and temper [Photographs by Laura Galke. Used with permission from the National Park Service, National Capital Region. Pending]

and Bograd 2000; see also Cobb and DePratter 2012: 450).

Recent analysis of locally produced earthenware ceramics demonstrates that these finely potted tablewares became fashionable among consumers of a variety of ethnic backgrounds and even with elite households at Ciudad Vieja, El Salvador (Deagan 2013: 264–165). Decades of colonoware analysis and research suggest that the ability for potters to materially express ethnicity and class is constrained by broader social and political contexts. The study of colonoware has the potential to address dimensions of gender, class, economics, ethnicity, politics, and marketing at the local level.

Colonoware vessels incorporate features that analysts have attempted to attribute to specific ethnic groups with varying degrees of success. For example, the presence of a flat bottom was an attribute presumed to be European in derivation. Vessel forms such as bowls were deemed as having Native American or African origins, especially if the vessel lacked a foot ring (more commonly encountered in European or Asian vessels). Many of these assumptions remain problematic, as many identified "ethnic" characteristics could be found within the historical traditions of each of the groups under consideration. However, forms such as candlesticks, chamber pots, milk pitchers, and teapots, while not common, lack New World antecedents and could be confidently attributed to European and/or Asian influence.

As more data are accumulated, generalizations about colonoware use and distribution seem contingent, and the complex effects of material culture, class, gender, status, production, distribution, and use become increasingly apparent. The ware's cottage-level production and varying consumer base across time and space present analytical challenges that frustrate traditional explanatory paradigms. The degree to which this reflects the entangled meanings and use of this particular ware, or material culture in general, is worth considering. Context is crucial toward understanding this complex ware. Colonoware is best understood at the community level, and in discrete temporal units.

Colonoware Fabrication

The vast majority of colonoware vessels were slab- or coil-built, and not typically wheel thrown nor mold-made. They were usually fired at low temperatures (Espenshade and Kennedy 2002: 210; Ferguson 1992: 19, 27; Hauser and DeCorse 2003). Mold-made smoking pipes (Monroe and Mallios 2004: 69–70) and even wheel-thrown vessels (Deagan 1987: 103–104, 2013) provide rare exceptions to this hand-manufactured rule. Vessels are often described as having little or no temper, but this, too, is not consistent across broad geographic and temporal scales of analysis. Surfaces were often smoothed and burnished, and common forms include bowls and smoking pipes (Ferguson 1992). Table 1 provides online URL links to three-dimensional, scanned colonoware sherds from Virginia. Vessel forms such as bowls were conducive to a diet based upon soups and stews, which some scholars suggest reflected African food ways (Ferguson 1992: 90). Stews were also a clever choice for enslaved people who labored long hours and whose cooking methods and ingredients favored recipes that could simmer for a long period without a great deal of supervision.

The earliest published references to this ware credit Indigenous Americans for its manufacture (Fairbanks 1962; Noël Hume 1962: 3–4, 12). As the field of historical archaeology grew, its research goals expanded to include the examination of the lives of subaltern groups about whom little was written or known. As a result, site areas were excavated that produced more colonoware from a variety of contexts and time periods. The opportunity to study colonoware's variability across time and space was possible as never before. The assumption that the final users of colonoware were necessarily the producers of the ware was questioned by some.

In Eastern North America, the correlation of increased colonoware use with the expansion of the enslaved of labor (both American Indian and African laborers) led some scholars to argue that enslaved Africans were the primary producers – not just consumers – of colonoware (Chodoronek 2013: 64–66; Deetz 1988: 362, 1993, 1996;

Ceramics: Colonoware, Table 1 Three-dimensional scanned colonoware from archaeological sites in Virinia. (Courtesy of The Virtual Curation Laboratory, Virginia Commonwealth University)

3D scan no.	Item	URL	Repository	Site
VCU_3D_347	Pipe bowl	https://skfb.ly/IXGR	Montpelier	James Madison's Montpelier
VCU_3D_517	Vessel rim	https://skfb.ly/IXRX	George Washington's Mount Vernon	George Washington's Mount Vernon
VCU_3D_713	Body sherd	https://skfb.ly/JFzF	Montpelier	James Madison's Montpelier
VCU_3D_739	Rim sherd	https://skfb.ly/JHPP	Fairfax County	Lydham Hall
VCU_3D_1883	Pipe	https://skfb.ly/JBx6	Manassas National Battlefield Park	Folly Castle
VCU_3D_1885	Pipe bowl	https://skfb.ly/IVWF	Manassas National Battlefield Park	Folly Castle
VCU_3D_1887	Vessel rim	https://skfb.ly/IXNZ	Manassas National Battlefield Park	Pohoke Quarter
VCU_3D_1889	Pipe bowl	https://skfb.ly/IXNF	Manassas National Battlefield Park	Pohoke Quarter
VCU_3D_1899	Vessel rim	https://skfb.ly/IXJr	Manassas National Battlefield Park	Brawner Farm
VCU_3D_1900	Vessel base	https://skfb.ly/IXHD	Manassas National Battlefield Park	Brownsville
VCU_3D_1901	Pipe bowl	https://skfb.ly/IXIv	Manassas National Battlefield Park	Brownsville
VCU_3D_1902	Vessel rim	https://skfb.ly/IXOA	Manassas National Battlefield Park	Brownsville
VCU_3D_2885	Vessel rim	https://skfb.lv/6tnGs	Gunston Hall	Gunston Hall

Ferguson 1992: 9, 18). Furthermore, the fact that colonoware pottery increased just as population of Native Americans in any given area decreased provided circumstantial evidence that supported the association between enslaved labor and the manufacture of colonoware (Chodoronek 2013: 62–63; Deetz 1988: 365–366; Fennell 2011: 19–22, 25 Ferguson 1992: 35–37; Galke 2009: 303–304, 306–307, 316–318, 320–321). Furthermore, the greatest concentrations of colonoware tended to be recovered from sites and contexts associated with enslaved laborers, especially once the domestic spaces of planter and servant formally diverged after the 1660s (Deetz 1988: 365–366).

The spatial separation of the living spaces of free people from servants was a crucial development in the evolution of distinctive material signatures of status, a pattern routinely seen by archaeologists in housing, ceramics, and faunal remains. This began with indentured servitude and continued to develop with the establishment of slavery in the United States. The evolving distinction of living space began in the Chesapeake during the final decades of the seventeenth century, as slavery became institutionalized and an increasingly larger proportion of the laboring class was derived from enslaved Africans rather than indentured servants (Fennell 2011: 20).

Deeper in the American south, the paradigm for dissociating the living spaces of free planters from servants was well established by the time that plantation culture was imposed. In these areas, the enslaved made and used their pottery in forms and using methods that were influenced more by African traditions than European or Indigenous practices. These traditions were reinforced by the sustained contact between

members of these substantial diasporic communities of enslaved Africans on these comparatively immense work camps (Deetz 1988: 366; Ferguson 1992: 16–17, 84–92).

The people who produced colonoware vessels are not necessarily the ones who used them. Focusing upon nineteenth-century production in South Carolina, Espenshade and Kennedy (2002: 235) demonstrated that within the plantations they studied, a single colonoware potter could manufacture sufficient vessels for their entire community.

Hauser and DeCorse (2003: 71) claim colonoware is best understood as a ware that is associated with communities scattered by the African diaspora, but Galke's (2009) analysis of one postcolonial Virginia community is more nuanced. She suggested that at Manassas the ware was associated with Americans in bondage, since free families in the community rejected colonoware, whether of African or European descent. In that particular antebellum locality, ethnicity was not associated with colonoware as directly as enslavement.

Chesapeake Pipes

Smoking pipes were used to ingest herbal substances – most popularly tobacco – which were intended to be enjoyed through inhalation or swallowing. In the New World, smoking pipes, made from stone or fired clay, predate European contact by thousands of years. After contact, local production of these pipes became a minor industry, and the degree to which these pipes represented colonoware or the continuation of existing American Indian pipe production is debated.

Some locally produced pipes were hand built while others were molded. American Indians, Europeans, and Africans all produced these useful forms, sometimes for their own use but also for sale to other communities. In the Middle Atlantic, early scholarship suggested that pipe production appeared to correlate with interruptions in global shipping, a consequence of Old World political strife (Deetz 1993, 1996; Henry 1979: 15–18). More recently, Monroe and Mallios (2004) document a thriving Jamestown-based production of both molded and handmade colonoware pipes in the seventeenth century. While locally made pipes were often temporally associated with the contact era, locally produced, reed stem colonoware pipe manufacture continued in some communities at least through the antebellum period (Galke 2009).

Decorated and Marked Colonoware

Vessels were rarely decorated, but, when embellished, incising, punctuating, or everted rim treatments were most popular. In Spanish colonial contexts, they were occasionally painted. The motifs employed on these vessels reflect the hybridity of the communities they served (Deagan 2013).

One motif that has inspired considerable debate resides in the form of a two intersecting lines (one horizontal, one vertical) that cross at a 90° angle in the middle of their respective segment lengths. Occasionally these two crossed lines are framed within a circle or square. These particular marks were noted on the base of some colonoware vessels. These symbols were often incised, but stamped versions were also identified (Agha and Isenbarger 2011: 185–186; Joseph 2016). The similarity between this symbol and the Kongo Cosmogram (*dikenga*) inspired some scholars to suggest that such marked vessels possessed spiritual, ritual, or medicinal use, especially when they were found within waterways (Ferguson 1992; Ogata 1995). The presence of these marks on contemporary Ghananian vessels added support to the notion of an American connection to an Old World popular tradition (Ferguson 1992: 10; Gundaker 2011: 178–180). Others argue that the "X" symbols represent maker's marks (Joseph 2007: 2, 7).

Colonoware Use

The use of colonoware has traditionally diverged into two primary, but not necessarily mutually exclusive, paradigms. One approach claims that its use was associated with specific ethnic groups. The other explanatory scheme suggested that a status of bonded labor was a better predictor of the presence of colonoware at any given site. Noël Hume's (1962: 5, 12) initial identification and

assessment of Colono-Indian ware argued that, at least in the Virginia Tidewater, the ware was produced by the Pamunkey Indians for use by enslaved labor, beginning late in the seventeenth century.

Decades of archaeological investigations revealed that there were regional differences in the proportion and amount of colonoware recovered at any given site. Influenced by data recovered from the archaeology of large plantations, preliminary investigations suggested that colonoware was reliably employed in situations characterized by large populations of enslaved laborers who lived some distance from the planter's home. It was argued that the isolation of such diasporic African communities fostered the retention of Old World traditions as well as the development of new material expressions of African American praxis.

Recent archaeological investigations conducted at sites characterized by small populations of enslaved workers, including middling plantations and small farmsteads, have also recovered colonoware, though in smaller proportions of their associated ceramic assemblage. In the Upper South in general, colonoware typically formed a small portion of those ceramic assemblages of which it is a part. Noël Hume (1962: 5) found that no more than 5% of the domestic assemblages which he studied were comprised of colonoware (See also Galke 2009: 306–307). In contrast, work in South Carolina during the 1970s demonstrated that colonoware vastly outnumbered European- and Asian-derived ceramics on some colonial sites (Ferguson 1992: 7–10, 36–37).

While broad conclusions over space and time are not warranted, a persistent association between laborers and coarse earthenwares of brown, red, or orange paste – such as colonoware – has been noted in a number of Chesapeake regional studies. Beginning in the eighteenth century, a culture developed that increasingly associated "whiteness" with order, freedom, refinement, power, and privilege (Andrews and Fenton 2001: 123–131; Heneghan 2003: 130–131, 133; Loren 2000; Yentsch 1991: 214–219). Coarse earthenwares and red-pasted ceramic objects were relegated to lower classes and to the enslaved.

This pattern of coarse, earth-toned ceramics associated with lower-status and lower-class people has been documented both in smoking pipe forms (Henry 1979: 32–33; Galke 2009: 305, 310, 311, 312, 313, 20–321; Monroe and Mallios 2004: 70, 80) and for vessels throughout the colonial and antebellum periods especially in British North America (Yentsch 1991). Additional studies that explore variables in economics, environmental conditions, ethnicity, class, status, and other cultural influences are needed. Scholars must always bear in mind that conclusions are likely to be most confidently applied locally or regionally, but not globally.

Conclusion

Colonoware represents a hybridization of cultures representing the interaction of Indigenous Americans with Old World migrants in the New World. Avenues of research include the degree to which colonoware use was influenced by food ways, ethnic expression, medicinal preparation, gender, economic status, or the sale of materials for which the colonoware vessels merely served as a containers. Though colonoware is still made and used in parts of the Caribbean today, in North America it appears that the use of this ware dropped sharply at the turn of the nineteenth century. In this era of mass-produced, readily available, and inexpensive household ceramics, it seems that there was a little need for an inexpensive, locally made pottery. Colonoware provides material culture specialists a dynamic, multivocal artifact that reflects a local, community-level moment of hybridity and transformation in any given culture.

Discerning who used this ware within these respective, and often multiethnic, contexts requires conscientious study along dimensions of class, status, and ethnicity. Colonoware has been recovered from homes occupied by enslaved laborers, Indigenous Americans, and even – in some rare contexts – upon the tables of the elite. Some material culture analysts suggest that colonoware represented an ethnic marker, reflecting consumers of African descent who used the ware in deliberate resistance to

mainstream consumer taste. Others suggest that labor class determined the use of colonoware at the household level. The hybridity of this ware reflects local constraints and opportunities. Efforts to dissemble the inspiration for its creation, use, and attributes present both challenges and opportunities for rich interpretations of past social, economic, and political environments. Any effort to comprehensively understand colonoware – or, more broadly, ethnicity, class, and identity in general – must consider the rich archaeological data that have been generated at sites of other major colonial powers: British colonial, Spanish colonial, and French colonial sites. Comparing the chronological appearance, use, distribution, attributes, and form between different colonies reveals how different approaches to colonization influenced material culture.

Colonoware encapsulates the hybridity of early international contact, reflecting the shared histories of Indigenous Americans, Africans, Europeans, and Asians. Multiple dimensions of identity and culture were preserved in this ware, but discerning those intricate relationships from any given sherd or vessel defies simplistic explanations. The complex sociocultural interactions of the contact era, and the conditions under which colonoware was created, consumed, and distributed, foster engaging analysis, but broad generalizations will always remain impractical.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Consumption, Archaeology of
- ▶ Deagan, Kathleen A.
- ▶ Ferguson, T. J.
- ▶ Historical Archaeology
- ▶ Noël Hume, Ivor
- ▶ North America During the European Contact Period
- ▶ Orser, Jr., Charles E.
- ▶ Plantation Archaeology

References

Agha, A., and N.M. Isenbarger. 2011. Recently discovered marked colonoware from Dean Hall plantation, Berkeley county, South Carolina. *Historical Archaeology* 45 (2): 184–187.

Andrews, S.C., and J.P. Fenton. 2001. Archaeology and the invisible man: The role of slavery in the production of wealth and social class in the bluegrass region of Kentucky, 1810–1870. *World Archaeology* 33: 115–136.

Chodoronek, M. 2013. Colonoware and culture: The changing interpretation of 17th-century ceramic traditions in the south eastern United States: An overview of current thought and history. *Nebraska Anthropologist* 28: 57–70.

Cobb, C.R., and C.B. Depratter. 2012. Multisited research on colonowares and the paradox of globalization. *American Anthropologist* 114 (3): 446–461.

Deagan, K. 1987. *Artifacts of the Spanish colonies of Florida and the Caribbean, 1500–1800*. Washington, DC: Smithsonian Institution Press.

Deagan, K. 1996. Colonial transformation: Euro-American cultural genesis in the early Spanish-American colonies. *Journal of Archaeological Research* 52 (2): 135–160.

Deagan, K. 2013. Hybridity, identity, and archaeological practice. In *The archaeology of hybrid material culture*, ed. Jeb J. Card, 160–176. Carbondale: Southern Illinois University Press.

Deetz, J. 1988. Historical archaeology: Methods and results. *Science New Series* 239 (4838): 362–367.

Deetz, J. 1993. *Flowerdew hundred: The archaeology of a Virginia plantation, 1619–1864*. Charlottesville: University Press of Virginia.

Deetz, J. 1996. *In small things forgotten: An archaeology of early American life*. New York: Anchor Books.

Dyer, J. B. 2010. Colono wares in the western Spanish borderlands: A ceramic technological study. Ph. D. Dissertation, The University of New Mexico.

Espenshade, C.T., and L. Kennedy. 2002. Recognizing individual potters in nineteenth-century colonoware. *North American Archaeologist* 23 (3): 209–240.

Fairbanks, C. 1962. A colono-Indian ware milk pitcher. *Florida Anthropologist* 15: 103–106.

Fennell, C. 2011. Early African America: Archaeological studies of significance and diversity. *Journal of Archaeological Research* 19 (1): 1–49.

Ferguson, L. 1992. *Uncommon ground: Archaeology and early America, 1650–1800*. Washington, DC: Smithsonian Institution Press.

Galke, L.J. 2009. Colonowhen, colonowho, colonowhere, colonowhy: Exploring the meaning behind the use of colonoware ceramics in nineteenth-century Manassas, Virginia. *International Journal of Historical Archaeology* 13 (3): 303–326.

Gundaker, G. 2011. The Kongo cosmogram in historical archaeology and the moral compass of Dave the potter. *Historical Archaeology* 45 (2): 176–183.

Hauser, M.W. 2013. Of earth and clay: Caribbean ceramics in the African Atlantic. In *The archaeology of hybrid material culture*, ed. Jeb J. Card, 79. Carbondale: Southern Illinois University Press.

Hauser, M.W., and C.R. Decorse. 2003. Low-fired earthenwares in the African diaspora: Problems and prospects. *International Journal of Historical Archaeology* 7 (1): 67–98.

Heneghan, B. 2003. *Whitewashing America: Material culture and race in the antebellum imagination*. Jackson: University Press of Mississippi.

Henry, Susan L. 1979. Terra-cotta tobacco pipes in seventeenth-century Maryland and Virginia: A preliminary study. *Historical Archaeology* 13: 14–37.

Joseph, J. 2007. One more look into the water – Colonoware in South Carolina rivers and Charleston's market economy. *African Diaspora Archaeology Newsletter June*. Accessed 1 Sept 2017.

Joseph, J. 2016. Marks from the past, signs of the future – The Dikenga of historical archaeology. *Historical Archaeology* 50 (3): 5–23.

Loren, Diana Dipaolo. 2000. The intersections of colonial policy and colonial practice: Creolization on the eighteenth-century Louisiana/Texas frontier. *Historical Archaeology* 34 (3): 85–98.

Monroe, J. Cameron, and Seth Mallios. 2004. A seventeenth-century colonial cottage industry: New evidence and a dating formula for colono tobacco pipes in the Chesapeake. *Historical Archaeology* 38 (2): 68–82.

Noël Hume, I. 1962. An Indian ware of the colonial period. *Quarterly Bulletin Archeological Society of Virginia* 17 (1): 2–14.

Ogata, K. L. 1995. African American women and medicine: Expanding interpretations of colono ware. Unpublished masters thesis. Department of Anthropology, University of South Carolina, Columbia.

Peelo, Sarah. 2011. Pottery-making in Spanish California: Creating multi-scalar social identity through daily practice. *American Antiquity* 76 (4): 642–666.

Pogue, D.J. 2017. The archaeology of Virginia's long 17th century, 1550–1720: Previous research and future directions. In *The historical archaeology of Virginia from initial settlement to the present: Overview and new directions*, ed. Clarence R. Geier, 5–30. Richmond: The Archeological Society of Virginia.

Singleton, T.A., and M. Bograd. 2000. Breaking Typological Barriers: Looking for the Colono in Colonoware. In Lines that Divide: Historical *Archaeologies of Race, Class, and Gender*, edited by James A. Delle, Stephen A. Mrozowski, and Robert Paynter. Knoxville: The University of Tennessee Press, 3–21.

Yentsch, A. 1991. The symbolic division of pottery: Sex-related attributes of English and Anglo-American household pots. In *The archaeology of inequality*, ed. Randall Mcguire and Robert Paynter, 192–230. Oxford/Basil: Blackwell.

Further Reading

Agbe-Davies, A.S. 2015. *Tobacco, pipes, and race in colonial Virginia*. Walnut Creek: Left Coast Press.

Brian, T. 2002. Struggling with the past: Some views of African-American identity. *International Journal of Historical Archaeology* 6 (2): 143–151.

Chodoronek, M. 2013b. Colonoware and culture: The changing interpretation of 17th-century ceramic traditions in the south eastern United States: An overview of current thought and history. *Nebraska Anthropologist* 28: 57–70.

Dillian, C. 2011. Colonoware bead production and African American tradition at 38GE560, Georgetown county, South Carolina. *Archaeology of Eastern North America* 39: 53–65.

Fennell, C. 2003. Group identity, individual creativity, and symbolic generalization in Abakongo diaspora. *International Journal of Historical Archaeology* 7 (1): 1–31.

Fennell, C. 2007. *Crossroads and cosmologies: Diasporas and ethnogenesis in the new world*. Gainesville: University Press of Florida.

Ferguson, L. 1980. Looking for the "Afro" in colono-Indian pottery. In *Archaeological perspectives on ethnicity in America: Afro-American and Asian American culture history*, ed. Robert L. Schuyler, 14–28. Farmingdale: Baywood Publishing Company.

Joseph, J.W. 1993. White columns and black hands: Class and classification in the plantation ideology of the Georgia and South Carolina lowcountry. *Historical Archaeology* 27 (3): 57–73.

Joseph, J.W. 2016a. Marks from the past, signs of the future – The Dikenga of historical archaeology. *Historical Archaeology* 50 (3): 5–23.

Joseph, J.W. 2016b. Meeting at market: The intersection of African American culture, craft, and economy and the landscape of Charleston, South Carolina. *Historical Archaeology* 50 (1): 94–113.

Orser, C.E. 1988. The archaeology of the African diaspora. *Annual Review of Anthropology* 27: 63–82.

Otto, J.S. 1977. Artifacts and status differences – A comparison of ceramics from planter, overseer, and slave sites on an antebellum plantation. In *Research strategies in historical archaeology*, ed. S. South, 91–118. New York: Academic.

Reeves, M.B. 2003. Reinterpreting Manassas: The nineteenth-century African American community at Manassas National Battlefield Park. *Historical Archaeology* 37 (3): 124–137.

Riggs, B.H. 2010. Temporal trends in native ceramic traditions of the lower Catawba River Valley. *Southeastern Archaeology* 29 (1): 31–43.

Rubertone, P.E. 2000. The historical archaeology of native Americans. *Annual Review of Anthropology* 29: 425–446.

Samford, P. 1996. The archaeology of African-American slavery and material culture. *The William and Mary Quarterly, 3rd Series* 53 (1): 87–114.

Singleton, T.A. 1995. The archaeology of slavery in North America. *Annual Review of Anthropology* 24: 119–140.
Steen, C. 1999. Stirring the ethnic stew in the South Carolina backcountry: John de la Howe and Lethe Farm. In *Historical archaeology, identity formation, and the interpretation of ethnicity*. 93–120. Richmond: Colonial Williamsburg Publications, Colonial Williamsburg Foundation, Dietz Press.
Steen, C. 2015. *Marks and decorations at the John Landrum pottery site (38AK497)*. Columbia: Diachronic Research Foundation.
Veech, A.S. 1997. Considering colonoware from the barnes plantation: A proposed colonoware typology for northern Virginia colonial sites. *Northeast Historical Archaeology* 26 (1): 73–86.
Weik, T. 1997. The archaeology of maroon societies in the Americas: Resistance, cultural continuity, and transformation in the African diaspora. *Historical Archaeology* 31 (2): 81–92.
Wheaton, T.R., and P.H. Garrow. 1985. Acculturation and the archaeological record in the Carolina lowcountry. In *The archaeology of slavery and plantation life*, Studies in Historical Archaeology, ed. S. South, ed. T.A. Singleton, 239–259. Orlando: Academic.

Ceramics: Conservation and Preservation

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Introduction

The study of ceramic manufacture, embellishment, trade, and permanence is only possible if examples are preserved. Ceramics are perhaps the first synthetic materials made by people, and they continue to contribute much to the study of human culture. By uniting earth, water, air, and fire, a type of artificial stone is created that can endure thousands of years. While often considered indestructible, ceramics include a wide range of physical properties that can also make them fragile and fragmentary. An ever-increasing use of analytical technology to derive chemical and physical details has required the conservation and preservation of ceramics to move well beyond mere washing and reassembly of sherds.

Definition

The word ceramic is from the Greek word *keramikos*. Ceramic objects include pottery which is a broad term referring to wares or vessels made from lower fired clays. Pottery types may include utilitarian or decorative vessels, tiles, sculpture, and figures. Damage may be the result of fire, frost, impact, plant roots, soluble salts, thermal shock, water, and human use.

Conservation is the profession devoted to the preservation and protection of cultural property for the future. Activities include examination, documentation, treatment, and preventive care.

Key Issues/Current Debates/Future Directions/Examples

Natural clays are formed by long-term mechanical weathering of rocks and are found at the earth's surface throughout the world. The varying mineral composition of clays produces a range of desired properties or visual effects when fired to form ceramics. Archaeological ceramics are commonly made from iron-rich clay that becomes red or black ceramic after firing at a relatively low temperature (below 900 °C or 1650 °F). A slip or thin layer of dilute clay material applied to the surface may create a different surface color and texture. Less common in archaeological examples, but important, is the use of a glaze which is a glossy thin glass-like layer fired onto the ceramic surface. Many artisans experimented with available materials and techniques to create different finishes, designs, or colors. While the range of ceramic types is wide, it is the lower-fired ceramics that deteriorate more readily through mechanical and chemical degradation (Buys and Oakley 1993).

Lower-fired ceramics, sometimes identified as terracotta or earthenware pottery, tend to be porous and will absorb water easily. This makes them more sensitive to deformation, erosion, and salt damage. Exposure to water may be from the ground or deposition location, use as a storage container/cooking pot, or high humidity.

Highly alkaline or acidic conditions are damaging to ceramics through chemical deterioration. Acids are known to attack glazes or calcareous fillers in the clay body. Alkaline conditions more often affect glazes through breakdown of the silica component, resulting in iridescence or surface exfoliation.

Salts that are dissolved in water enter porous pottery and crystallize when dry. Recrystallization may become a cyclic process, and because the reformed crystals can continue to grow in size they occupy more space, and they force the pottery to break up or flake. Different soluble salts such as carbonates, sulfates, nitrates, and chlorides have different properties and mechanisms.

If used as cooking vessels, serving bowls, or water jars, ceramic surfaces are more easily abraded, cracked, and damaged by repeated charring, residue depositions, and the mechanical action of ladles and stirrers. Pottery objects that are softened through burial moisture may have plant root damage especially if there is nutrient-rich material inside. If humidity is high, mold and bacteria growth may be problem.

When ceramics are heated beyond their original firing temperature, they are likely to distort and melt. If there are glazes, these may become fluid and change color. Also, existing cracks may become sprung. Dating ceramics under these conditions is compromised. Conversely, when ceramics are exposed to long periods of very low temperatures, ice may form in the pores and cause spalling due to mechanical pressure.

The main hazard to ceramic objects is poor handling. Their brittle nature causes them to break, crack, and chip if they are dropped and suffer an impact. However, durable a ceramic may appear, it should be considered fragile. Ceramics often have weak joins between the handles and body. Never lift a ceramic by the handle, knob, or rim. Always check the weight and balance before you lift a ceramic object. It is important to use both hands and support ceramic pieces from the base when lifting. Use clean hands to avoid fingerprints on the surface and wear nonslip gloves with glazed wares to prevent accidents during handling.

Years ago, full restoration was the norm because the study of archaeological ceramics was limited to shape, style, volume, technique of production, and decoration. As the methods for chemical and physical analysis improved, ceramics came to be studied as evidence of human behavior and technological achievement as well. The earlier criteria for conservation offered techniques for full cleaning with acids and detergents and restoration techniques involving adhesives, splints, fills, and the inpainting of missing designs (Plenderleith and Werner 1971). Modern trends involve thorough consideration of cleaning (to avoid loss of residues, coatings, and temper) and the use of reversible adhesives for assembly of only original and vessel-specific sherds and parts. The conservation of archaeological ceramic items seeks to preserve all evidence that may yield insights to the date and temperature of the kiln fire, the temper, and any residues that illustrate aspects of function and use. Future researchers need to know if they are working with original or modified ceramics (Tennent 1999).

Routine cleaning presents risks. If residues are to be studied, a soft brush may be used (one hand holds the brush and the other steadies the object). Brushes should not be used to scrub or agitate the surface with friction, and care should be taken around painted, decorated, or damaged areas. Wet cleaning is typically necessary for initial sorting, but the water should be tested for pH (close to neutral) and soluble salts (low) prior to use. Pottery that is unevenly fired or simply baked will dissolve. Wet objects should be kept damp until they can be fully examined in a laboratory. Acid cleaning typically causes irreversible damage and should be carefully considered based on

specific goals and protocols based on tested procedures. Professional conservators may use water and chemicals to clean but will take great care to test all surfaces, use purified water, and provide for even drying to avoid the development of unsightly tide lines or other surface deposits. Detergents and soaps are never recommended for most archaeological pottery.

Pieces that have been previously mended or restored often become weak or fail completely as the adhesive ages. A wide range of mending materials and techniques have been tried through the ages. In fact, ancient mends, including drill holes to hold breaks together with ties and natural adhesives such as pine resins, animal glues, bitumen, or lac, are important evidences to preserve. The mending, stabilization, or restoration of valuable ceramics is not appropriate for amateurs. It is easy to damage and misalign the edges of sherds, to select and apply an inappropriate adhesive, and to create an unstable or misleading object. Conservators have the skills and knowledge to carefully select modern (easily distinguished from original) materials to best match the ceramic material and its technology while considering the type of damage present (Acton and Smith 2003). Knowledge of the ceramic traditions, the chemistry of materials, and practiced dexterity enable conservators to execute successful treatments. Also, conservators always include documentation with their treatments.

Closed display cabinets provide the best protection from dust, lint, insects, and vibration. Use care to provide adequate space between pieces so that they do not touch each other and avoid stacking. Metal spring-type plate hangers should not be used on the majority of archaeological ceramics as these are designed for high-fired porcelain or stoneware ceramics. The exaggerated stress of the spring may open and extend cracks or chip fragile edges. If a piece is cracked, do not lean it to support its own weight.

The preservation of archaeological ceramics has a long tradition that is linked to the very long history of archaeology, but the origins of professional conservation may be more closely linked to the mid-twentieth century. The guiding principles for any conservation action are reversibility and documentation.

Cross-References

- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Ceramics: Scientific Analysis

References

Acton, L. and N. Smith. 2003. Practical ceramic conservation. Ramsbury: Crowood Press.

Buys, S. and B. Oakley. 1993. The conservation and restoration of ceramics. London: Butterworth Heinemann.

Plenderleith, H.J. and A.E.A Werner. 1971. The conservation of antiquities and works of art: treatment, repair, and restoration. London: Oxford University Press.

Tennent, N.H. 1999. The conservation of glass and ceramics. London: James & James.

Ceramics: European Cream to Whitewares in the USA

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Introduction and Definition

A growing market demand for white-bodied wares led to the development of "creamware" in Britain in the 1740s. The Staffordshire ceramic industry had been transformed during the 1720s–1740s, with changes in scale, organization, and manufacturing methods that set the tone for pottery production elsewhere in Britain and beyond. The production of white-bodied earthenwares in tableware, teaware, tiles, and decorative forms in Staffordshire required white-firing clays from Devon and Dorset and flint used in clay bodies and lead glazes from the south and east coasts of England (Barker and Majewski 2006: 214). Josiah Wedgwood has often been credited with the invention of creamware, but it is now evident that he was one of a number of Staffordshire ceramic producers also making the ware (e.g., William Greatbatch and Josiah Spode).

Creamware was often undecorated or minimally embellished through molded detail and simple enameled or painted decoration but also was made in various rococo and neoclassical styles using elaborate molding, colored glazes, over- and underglaze enameled and painted decoration, and various forms of printing as well as engine turning. By the early 1760s, creamware and other Staffordshire ceramic products were being exported in vast quantities to the British colonies in America and the West Indies as well as to almost every port in Europe (Barker 2001: 81).

Creamware was produced into the nineteenth century, but pearlware became the earthenware body of the early nineteenth century, and it was nearly always decorated. The ware was introduced by the mid-1770s and appears in archaeological contexts in America soon thereafter. Early on, decoration was a blue-tinted glaze over a white body with underglaze blue Chinese-style painted decoration in imitation of Chinese porcelain. Molded and painted "shell-edge" was used on less-expensive tablewares, and painted floral decoration was common on table- and teawares. By c. 1800, higher-end tea- and tablewares were transfer printed. In the 1780s, transfer printing using images transferred from engraved copper plates was introduced to earthenware manufacture and allowed for mass production of identically decorated wares. Printed wares were initially mainly in blue but from the late 1820s appeared in a range of colors, and color and style of print are useful for dating purposes. Although creamware manufacturers rarely marked their wares (except for some exceptions, such as Wedgwood and some of his contemporaries), with pearlwares, the practice became increasingly common, particularly on printed wares. Makers' marks can contain a wealth of useful information, including identity of manufacturer (which can be linked to company histories and dates) and occasionally the importer.

While archaeologists define white-bodied earthenwares as creamware, pearlware, or from c. 1830 as "whiteware," nineteenth-century manufacturers defined and marketed their products by type of decoration, e.g., printed, painted, dipped, and edged. The popularity of decorated ceramics, particularly transfer-printed earthenwares, increased throughout the nineteenth century, greatly changing the composition of excavated ceramic deposits and allowing for more interpretive analysis using the cost of wares (known from documentary evidence) to construct socioeconomic profiles of ceramic users, following George Miller's seminal work.

Beginning in the 1850s, the popularity of transfer-printed wares declined in the Americas, although a resurgence occurred in the last quarter of the nineteenth century that lasted until early in the twentieth century. Creamware, pearlware, and whiteware are all nonvitreous, white-bodied earthenwares, but by the mid-nineteenth century, the British were producing and exporting large quantities of molded "ironstone china" or "white granite," a heavy-duty semivitreous, white-bodied earthenware not to be confused with either the patent ironstone wares of the earlier nineteenth century or with porcelain and bone china of any period. White granite wares were durable, withstood shipment to the frontier regions of North America, and emulated the then-stylish and expensive French porcelains that were being exported to America (Barker and Majewski 2006: 216).

Key Issues/Current Debates/Future Directions/Examples

The sheer quantities of British white-bodied earthenwares recovered from excavations at Staffordshire factories known for their export business as well as from archaeological contexts in the USA and in the Americas undoubtedly attest to the British ceramic industry's superior capabilities for mass production of "useful" wares that could be effectively transported and distributed to American markets at a reasonable cost to the consumer. During the period beginning in the late eighteenth century and continuing almost to the end of the nineteenth, these markets included the Caribbean, South America, Central America, Mexico, Canada, Alaska, and everywhere in what was to become the continental USA. Among the consumers of British-made ceramics were urban

dwellers purchasing from local shops; rural populations being supplied by country stores and traveling salesmen; early settlers, miners, ranchers, and the military on the frontier; and Native Americans. Sophisticated trading relationships have been documented between importers in major American cities and manufacturers in Britain. Trading companies also played a role in the ceramic export-import process. For example, in the mid-1830s, the Spode/Copeland pottery of Staffordshire became the supplier of tableware and toiletware to the Hudson's Bay Company, continuing in this capacity until the 1850s in the USA and until the early twentieth century in Canada.

The American ceramic industry for many years could not compete with British-manufactured white-bodied wares, even though American-produced (and American-consumed) redwares, yellowwares, and stonewares had a long and successful history. Many Staffordshire potters immigrated to America, bringing their knowledge and experience with them. By later in the nineteenth century, American potteries in the clay-rich Ohio Valley and the Northeast were gainfully making nonvitreous whitewares as well as white granite wares, with the latter laying the foundation for the successful American hotelware industry. Ceramic assemblages dating to the turn of the twentieth century and after come to be dominated by American-made ceramics. Trade tariffs, changing consumer profiles, and increasingly reliable and more cost-effective transportation made it possible for other pottery- and porcelain-producing countries to gain a foothold in the American market, although British white-bodied earthenwares continued to be exported to the USA in lesser quantities after 1900.

This discussion of European creamwares to whitewares in the USA has emphasized the British (particularly Staffordshire) ceramic industry, rather than that of Continental Europe. This is because British products are the ones that appear most frequently in American archaeological contexts and because unfortunately less is known about the white-bodied earthenwares produced on the continent and whether they were exported in quantity to other markets (or primarily manufactured for home markets), although work is beginning in this area. Interestingly, the majority of Staffordshire ceramic exports went to European destinations until 1835, after which date the USA became the primary market (Barker 2001: 81).

Despite variable global economic and political factors, the Staffordshire potters succeeded in the international market because their products appealed to the mass-consuming lower, lower-middle, and middle sectors of the market who were interested as much in the price of their ceramics as they were in quality. Ewins (1997) charts the development of the Staffordshire trade with North America, demonstrating how the potters gained access to the American market and how they were able to respond rapidly to changing American tastes.

Barker and Majewski (2006: 215) note that "The success of Staffordshire ceramics during the later eighteenth century led to the establishment of factories making Staffordshire-type wares in many parts of Britain, in [Continental] Europe. . ., and in North America. . . ." Standardized production developed not only because potters were moving to other areas but because the Staffordshire-based infrastructure supplied everything other producers would need to make white-bodied wares. To date, most scholars of continental ceramics have either focused on earlier time periods or on high-end ceramics such as the hard-paste porcelains produced by factories benefitting from royal patronage (e.g., Meissen in Germany or Sèvres in France). Some significant exceptions include documentation of the British-type whitewares made by Petrus Regout of Maastricht in the Netherlands that were produced for European and overseas markets for much of the nineteenth and twentieth centuries, of British-made creamware (in Canada), of British and French white-bodied earthenwares exported to the French West Indies, and of the *faiences fines* industry in France. Unfortunately, more foundational and synthetic work on ceramic bodies and forms using documentary and archaeological evidence remains to be done on the European white-bodied-earthenware industry before historical archaeologists will be able to accurately identify

and fully assess the contribution of other ceramic-exporting countries to the ceramics found in the archaeological record in the USA.

Cross-References

- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Consumption, Archaeology of
- ▶ Hispanic South America: Historical Archaeology
- ▶ Mexico: Historical Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ North America (USA): Historical Archaeology

References

Barker, D. 2001. "The usual classes of useful articles": Staffordshire ceramics reconsidered. In *Ceramics in America*, ed. R. Hunter, 73–93. Milwaukee: Chipstone Foundation.

Barker, D., and T. Majewski. 2006. Ceramic studies in historical archaeology. In *Cambridge companion to historical archaeology*, ed. D. Hicks and M.C. Beaudry, 205–231. Cambridge: Cambridge University Press.

Ewins, N. 1997. "Supplying the present wants of our Yankee cousins. . .": Staffordshire ceramics and the American market 1775–1880. *Journal of Ceramic History* 15: 1–154.

Further Readings

Arcangeli, M. 2015. *Sherds of history: Domestic life in colonial Guadeloupe*. Gainesville: University Press of Florida.

Barker, D. 1990. *William Greatbatch: A Staffordshire potter*. London: Jonathan Horne.

Barker, D. 1999. The ceramic revolution 1650–1850. In *Old and new worlds: Historical/post medieval archaeology papers from the societies' joint conferences at Williamsburg and London 1997 to mark 30 years of work and achievement*, ed. G. Egan and R.L. Michael, 226–234. Oxford: Oxbow Books.

Barker, D. 2004. The industrialization of the Staffordshire potteries. In *The archaeology of industrialization*, ed. D. Barker and D. Cranstone, 203–221. Leeds: Maney (Society for Post-Medieval Archaeology).

Bartels, M. 1999. *Steden in Scherven, Vondsten uit beerputten in Deventer, Dordrecht, Nijmegen en Tiel (1250–1900)*. Zwolle: Stichting Promotie Archeologie.

Campbell, A. (compiler). 1996. *Le creamware de Place-Royale*, Collection Patrimoines Dossiers 57. Québec: Gouvernement du Québec, Ministère de la Culture et des Communications.

Collard, E. 1984. *Nineteenth-century pottery and porcelain in Canada*. 2nd ed. Kingston: McGill-Queen's University Press.

Goodby, M. 2003. "Our home in the west": Staffordshire potters and their emigration to America in the 1840s. In *Ceramics in America*, ed. R. Hunter, 1–25. Milwaukee: Chipstone Foundation.

Kybalová, J. 1989. *European creamware*. London: Hamlyn.

Maire, C. 2008. *Histoire de la faïence fine française, 1743–1843: Le triomphe des terres blanches*. Tours: Éditions de la Reinette.

Majewski, T. 2002. Makers' marks. In *Encyclopedia of historical archaeology*, ed. C. Orser Jr., 323–325. London: Routledge.

Majewski, T., and M.J. O'Brien. 1987. The use and misuse of nineteenth-century English and American ceramics in archaeological analysis. In *Advances in archaeological method and theory*, ed. M.B. Schiffer, vol. 11, 98–209. New York: Academic.

Majewski, T., and M.B. Schiffer. 2001. Beyond consumption: Toward an archaeology of consumerism. In *Archaeologies of the contemporary past*, ed. V. Buchli and G. Lucas, 26–50. London: Routledge.

Miller, G.L. 1980. Classification and economic scaling of 19th century ceramics. *Historical Archaeology* 14: 1–40.

Miller, G.L. 1987. Origin of Josiah Wedgwood's pearlware. *Northeast Historical Archaeology* 16: 80–92.

Miller, G.L. 1991. A revised set of CC index values for classification and economic scaling of English ceramics from 1787 to 1880. *Historical Archaeology* 25: 1–25.

Miller, G.L., and A.C. Earls. 2008. War and pots: The impact of economics and politics on ceramic consumption patterns. In *Ceramics in America*, ed. R. Hunter, 67–108. Milwaukee: Chipstone Foundation.

Miller, G.L., A.S. Martin, and N.S. Dickinson. 1994. Changing consumption patterns: English ceramics and the American market from 1770 to 1840. In *Everyday life in the early republic*, ed. C.E. Hutchins, 219–248. Winterthur: Winterthur Museum.

Seidel, J.L. 1990. "China glaze" wares on sites from the American revolution: Pearlware before Wedgwood? *Historical Archaeology* 24(1): 82–95.

South, S. 1993. *The search for John Bartlam at Cain Hoy: America's first creamware potter*, South Carolina Institute of Archaeology and Anthropology Research Manuscript series 219. Columbia: University of South Carolina.

Sussman, L. 1979. *Spode/Copeland transfer-printed patterns found at 20 Hudson's Bay Company sites*, Canadian Historic Sites, Occasional Papers in Archaeology and History 22. Ottawa: Parks Canada.

Towner, D. 1978. *Creamware*. London: Faber & Faber.

Ceramics: Majolica in Colonial Latin America

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Introduction

Majolica, often called tin-glazed earthenware today, can be found in colonial archaeological sites stretching from Canada to Argentina. During the sixteenth century, production acquired significant importance in Europe where it was known as *maiolica* in Italy, *faience* in France, *faiança* in Portugal, *Delft* in the Netherlands, *Delftware* in England, and *loza blanca* in the Spanish Empire. It was exported from those countries to the New World where, eventually, in a number of colonies it was replaced by local production.

Definition

In Latin American colonial sites, the study of excavated European and locally made majolicas, such as tableware and utilitarian vessels, decorative and architectural elements, can lead to an understanding of internal and external trade patterns, the level of reliance on contraband trade, and the degree of local consumerism.

Key Issues

The progressive Spanish conquest of the New World in the sixteenth century held great potential for Old World ceramics merchants – that of supplying the needs of settlers and government officials with simple majolica tableware, popular with those who could afford it, and for the more expensive, ever-changing, highly decorative Iberian and Italian majolicas popular with the elite. Spanish archival records from that time show that both were exported with each sailing of the fleet to New Spain/Honduras and to Panama. Archaeological evidence confirms their presence in varying degrees in almost all Spanish settlements that date to that period.

However, archival records originating in the interior of mainland colonies such as Guatemala indicate early complaints about the high cost of imported goods and later complaints about the irregular to almost nonexistent schedule of fleet sailings to their ports. With no Crown prohibitions against the local manufacture of ceramics, a lower-cost majolica production began on the New World mainland in the 1550s in Mexico City and gradually spread to Puebla de los Angeles, Oaxaca, Santiago de Guatemala, Panama la Vieja, and Cuzco well before the 1600s (e.g., Goggin 1968; Deagan 1987; Lister and Lister 1987; Jamieson 2001). The archaeological evidence from the first four sites tends to indicate that as local production quantity and quality increased, the amount of imported Iberian and Italian majolicas decreased, to the point that by the mid-seventeenth century, there is little to no evidence of them. This contrasts sharply with Brazil, Uruguay, and Argentina, for example, where there were no local industries and where the majority of archaeological majolicas are European.

Majolica made in Mexico City and Puebla has been found in archaeological deposits in New Spain, the northern frontier towns and mission settlements stretching from present-day California to Florida and into the Carolinas, the Kingdom of Guatemala, Cuba, and to lesser degrees in a number of southern colonial Latin American sites. Majolica from Panama reached at least as far north as Guatemala and as far south as Argentina and Chile. Fragments of vessels produced in Oaxaca and Santiago de Guatemala, however, are seldom found outside of the area of their immediate control, sphere of influence, or local trade routes (Figs. 1 and 2).

Ceramics: Majolica in Colonial Latin America, Fig. 1 Mexican majolica. Puebla Polychrome, soup plate c. 1650–1725

Ceramics: Majolica in Colonial Latin America, Fig. 2 Guatemalan majolica. Chacra Tetrachrome, wash basin c. 1750

The widespread distribution of majolica from Mexico City and Puebla in the northern part of the Spanish New World was a direct result of supplying the vast area under the control of the Viceroyalty of New Spain and the lack of restrictions on trade with Guatemala. With the exception of Cuba, prohibitions on commerce between colonies in different administrative areas severely limited the possibility of a much broader and more significant geographic distribution.

Panama was at the hub of the trade route between Spain and the Viceroyalty of Peru, and at the hub of trade, prohibited or not, between the Pacific ports of present-day Mexico, Guatemala, El Salvador, Nicaragua, Ecuador, and Peru. During the time in which it functioned, the majolica industry in Panama was a major supplier of fine majolica to the southern Viceroyalty, but no more than a minor player in northern areas along the Pacific coast competing with the workshops of New Spain. The Panama industry came to an abrupt end following the destruction of Panama la Vieja by pirates in 1671.

Majolica industries in early centers such as Oaxaca, Santiago de Guatemala, Cuzco and in later centers such as Lima, Quito, Cuenca, Cartagena de Indias, and Popoyán played an important role in providing vessels for the table and for decoration that, in spite of differences in quality between them and "foreign" counterparts, appear to have suited the tastes of the local population at prices that were more affordable in their respective areas than imports. The added cost of transporting low-grade majolica over great distances may account for the lack of a broader distribution of these products. An exception was the majolica industry founded in Guanajuato in the late 1700s; it supplied consumers in the greater part of northwestern Mexico.

Majolica from Portugal is seldom found in the towns of the Caribbean Basin and Pacific coast, but is present in Brazil, Uruguay, and Argentina (Fig. 3). French and Dutch examples related to open and contraband trade can appear in archaeological deposits of the Caribbean and surrounding mainland, and the southern Atlantic coast. British majolica has been reported in Argentina.

To date, the published evidence of majolicas in colonial Latin American tends to show that there were people or groups that could afford fine-grade majolica from Europe and from other administrative areas of the New World, and that the founding of a local industry could obviate the need for imports in meaningful quantities. Thus, archaeological deposits can present significant differences from colony to colony and from site to site within

Ceramics: Majolica in Colonial Latin America, Fig. 3 Portuguese faience. Polychrome plate, mid-eighteenth century

a colony, which need to be understood by referencing archival data and by interpreting the evidence in the framework of social theories and historical issues. In addition, majolica provides a valuable tool for dating colonial sites based on the development of thorough typological schemes, especially in the case of European, Mexican, and Panamanian examples, and in all cases for recording the tastes, customs, and diet of the local population.

Future Directions

Ongoing research to determine the provenience of specific types supported by compositional chemical studies, for example, instrumental neutron activation analyzes, has been key to understanding where the vessels represented in archaeological collections were produced and thus to infer changes in trade and consumption trends through time (e.g., Fournier et al. 2009).

Refined typologies are still required for Guatemala and for several South American areas. In many regions, there are scant archaeological studies and in some cases, traditions recorded in documentary sources have not been studied in detail. In addition, few studies have been made of the historical records of prices to compare market costs of different ceramics and to gain a better understanding of consumerism in colonial Latin America.

Cross-References

- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Charlton, Thomas H.
- ▶ Deagan, Kathleen A.
- ▶ Fournier, Patricia
- ▶ Goggin, John M.
- ▶ Hispanic South America: Historical Archaeology
- ▶ Mexico: Historical Archaeology
- ▶ Portuguese Faience and Historical Archaeology

References

Deagan, K. 1987. *Artifacts of the Spanish colonies of Florida and the Caribbean, 1500–1800. Volume I: ceramics, glassware, and beads*. Washington, DC/London: Smithsonian Institution Press.

Fournier, P., M.J. Blackman, and R.L. Bishop. 2009. Empleo de análisis instrumentales de activación neutrónica (INAA) en el estudio del origen de la mayólica en México. *Arqueología* 42: 151–165.

Goggin, J.M. 1968. *Spanish Majolica in the New World: Types of the 16th to 18th centuries*, Yale publications in anthropology, vol. 72. New Haven: Department of Anthropology, Yale University.

Jamieson, R.W. 2001. Majolica in the early colonial Andes: the role of Panamanian wares. *Latin American Antiquity* 12: 45–58.

Lister, F.C., and R.H. Lister. 1987. *Andalusian ceramics in Spain and New Spain*. Tucson: The University of Arizona Press.

Further Reading

Albuquerque, P.T. de Souza. 2008. A faiança portuguesa: demarcador cronológico na arqueologia brasileira. In *Actas das 4as Jornadas de Cerâmica Medieval e Pós-Medieval*, ed. J.M. Diogo, 221–270. Portugal: Câmara Municipal de Tondela.

Barnes, M.R., and R.V. May. 1972. *Mexican majolica in northern New Spain*, Pacific coast archaeological society occasional papers, vol. 2. Ramona: Acoma Books.

Farwell Gavin, R., D. Pierce, and A. Pleguezuelo, eds. 2003. *Cerámica y Cultura. The story of Spanish and Mexican mayólica*. Albuquerque: University of New Mexico Press.

Fournier, P. 1997. Tendencias de consumo en México durante los periodos colonial e independiente. In *Approaches to historical archaeology of Middle and South America*, ed. J. Gasco, G.C. Smith, and P. Fournier, 49–58. Los Angeles: Institute of Archaeology, University of California.

Fusco-Zambetogliris, N. 2003. Un diálogo con la cerámica portuguesa de la Colonia del Sacramento. *Revista de Arqueología Americana* 22: 43–62.

Gómez, P., T. Pasinski, and P. Fournier. 2001. Transferencia tecnológica y filiación étnica: el caso de los loceros novohispanos del siglo XVI. *Amerística* 7: 33–66. Available at: http://www.gratis-boeken.eu/doc/782950/ameristica-2001. Accessed 16 Apr 2012.

Gómez Serafin, S., and E. Fernández Dávila. 2007. *Las cerá-micas coloniales del ex convento de Santo Domingo de Oaxaca. Pasado y presente de una tradición*. México: Instituto Nacional de Antropología e Historia.

Hernández de Lara, O., and B. Rodríguez Tápanes. 2009. Anotaciones acerca de la presencia de mayólicas en el Castillo de San Severino (Matanzas, Cuba). *Cuba Arqueológica* 2: 65–77. Available at: http://www.cubaarqueologica.org/document/ra2n2-08.pdf. Accessed 4 Apr 2012.

Hume, I.N. 1977. *Early English delftware from London and Virginia*. Virginia: Colonial Williamsburg Foundation.

Jamieson, R.W., and R.G.V. Hancock. 2004. Neutron activation analysis of colonial ceramics from southern highland Ecuador. *Archaeometry* 46: 569–583.

Martín, J.G., A.S. Caicedo, B. Etayo, A. Garcés, and P. Sanabria. 2007. Producción y comercialización de cerámicas coloniales en los Andes: el caso de las mayólicas de Popayán. *Gabinete de Arqueología* 6: 28–39.

Quevedo Herrero, A., and I. Rodríguez Gil. n.d. Mayólicas de Alcora en la Habana del siglo XVIII. Available at: http://www.icom.ohc.cu/capacitacion/articulos-y-publicaciones/mayolicas-de-alcora-en-la-habana-del-siglo-xviii/. Accessed 4 Apr 2012.

Rice, P.M. 1997. Tin-enameled wares of Moquegua, Peru. In *Approaches to historical archaeology of Middle and South America*, ed. J. Gasco, G.C. Smith, and P. Fournier, 173–180. Los Angeles: Institute of Archaeology, University of California.

Rovira, B. 2001. Presencia de mayólicas panameñas en el mundo colonial: algunas consideraciones acerca de su distribución y cronología. *Latin American Antiquity* 12: 291–303.

Therrien, M., E. Uprimny, J. Lobo Guerrero, M.F. Salamanca, F. Gaitán, and M. Fandiño. 2002. *Catálogo de cerámica colonial y republicana de la Nueva Granada: producción local y materiales foráneos (Costa Caribe, Altiplano Cundiboyancense-Colombia)*. Bogotá: Fundación de Investigaciones Arqueológicos Nacionales, Banco de la República.

Schavelzon, D., and M. Silveira. 1998. *Excavaciones en Michelángelo. Arqueología histórica de Buenos Aires*. Buenos Aires: Ediciones Corregidor.

Skowronek, R.K., R.J. Johnson, and S. South. 1988. The sixteenth century Spanish imported ceramics at Santa Elena: A formal analysis. In *Spanish artifacts from Santa Elena*, Occasional papers of the South Carolina Institute of Archaeology and Anthropology, ed. S. South, R.K. Skowronek, and R.J. Johnson, 205–304. South Carolina: The University of South Carolina.

Verhagen, I.L. 1997. *Caluca*. El Salvador: The archaeology of a colonial town in comparative perspective. Unpublished PhD dissertation, Vanderbilt University.

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Ceramics: Roman Republican and Early Principate

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Introduction

Roman ceramics served domestic and commercial purposes; they appear as lamps and perfume containers, as well as vessels for the preparation, cooking, service, storage, and transportation of foodstuffs. In archaeological sites in the Roman world, pottery is the most frequently found material. It is found in burials and ritual foundation deposits; fragments were frequently used to level floors for construction, to fill in negative features such as drains and cisterns, and reused whole, and in part, as part of wall construction material.

This entry covers material produced in Italy and the Roman provinces around the Mediterranean

from about 500 BCE until the late first century BCE. In this period the definition of what it meant to be "Roman" was in its early stages of development. In the fifth and fourth centuries BCE, the city of Rome was only beginning to expand its reach outside the city limits, and the multiple entities of the Italian peninsula interacted with it and each other in constantly changing ways. By the end of the third century, Rome controlled the Italian peninsula, by the end of the second century, the whole of Greece and western Asia Minor, and by the end of the first century, Egypt and the Levant. As a result of this continued expansion, this entry covers material produced in various areas of the

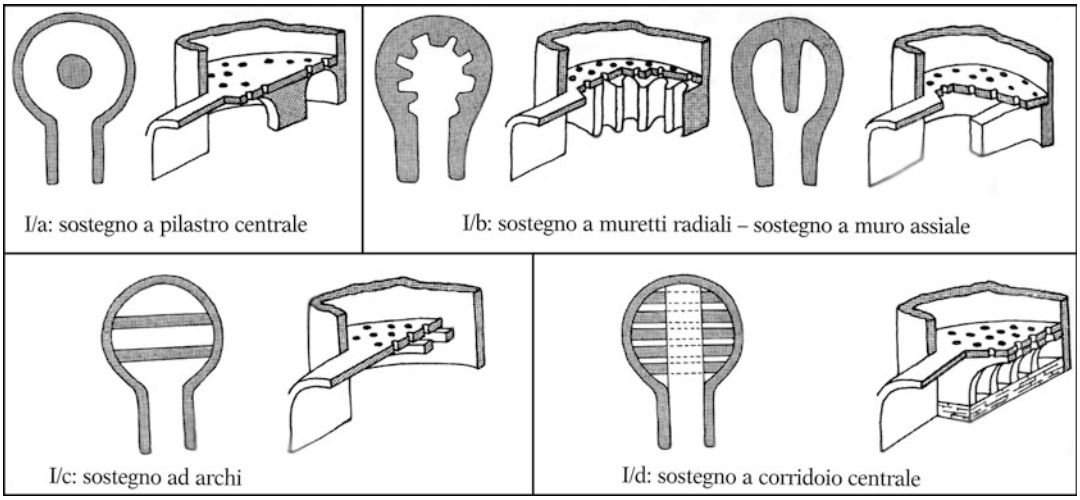

Ceramics: Roman Republican and Early Principate, Fig. 1 Roman kilns of circular design. (Cuomo di Caprio 2007: Fig. 168).

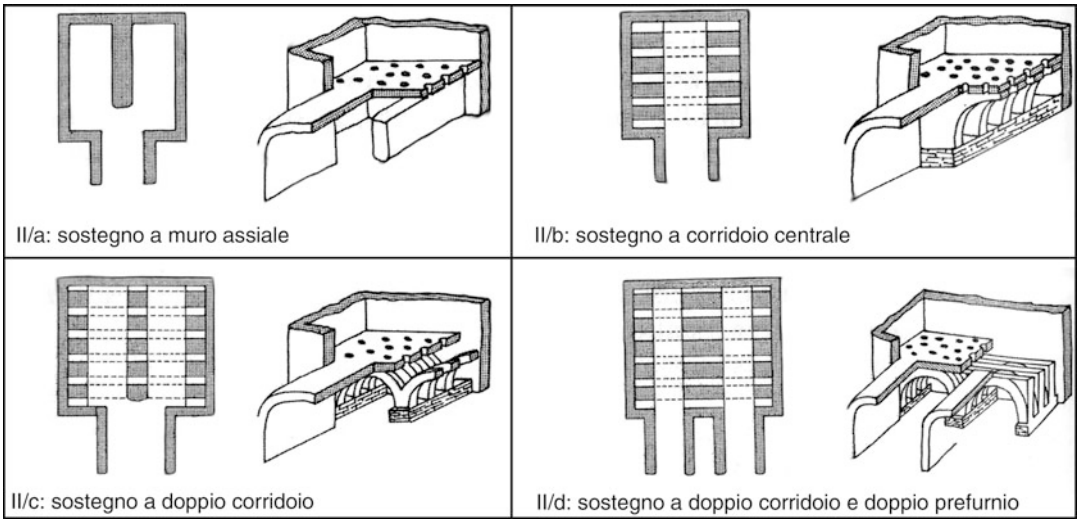

Ceramics: Roman Republican and Early Principate, Fig. 2 Roman kilns of rectangular design. (Cuomo di Caprio 2007: Fig. 169)

Mediterranean when they were under Roman control – reflecting the ever-expanding empire. The material discussed here is frequently found on archaeological sites in Italy and the wider Mediterranean together with material exported from outside areas of Roman control – together with ceramic and metal vessels which were Greek-made, Etruscan-made, or from the Near East or Egypt. The multitude of influences and interaction and the increasingly dynamic and mobile Roman world of artisans and consumers mean that ceramics which are "Roman" are difficult to discuss in a cultural vacuum.

Definition

Production

The majority of pottery in the Roman Republican period was made on a fast wheel or in a mold which was probably mounted on a wheel. The exceptions to this are *dolia*, large storage vessels which would have been made by coiling or hand building. Roman wheels were probably flywheels, or kick wheels, and usually made of wood; very few stone examples survive. Vessels were stacked in updraught kilns of quadrangular or circular design and fired at varying temperatures depending on the clay type and the desired effect. Typically, however, firing temperature for Roman pottery is between 850 °C and 1000 °C (Cuomo di Caprio 2007: 497, 508–17).

This wheel-made pottery was produced in workshops throughout Italy and the Roman Mediterranean. Simultaneously, however, there was likely a small-scale handmade pottery industry in areas throughout the Mediterranean which also engaged in active trading (Peacock 1982: 75–113) (Figs. 1 and 2).

Common Roman Ceramic Types of the Republic

Roman ceramic typologies have been created based on a combination of different attributes which have developed haphazardly over the centuries as groupings of artifacts have been recognized. The attributes governing the identification and naming of different ceramic types are not standardized. Some ceramic types are distinguished by a combination of their clay fabric composition, their form, and their surface treatment; some mainly by their fabric and surface treatment; or some mainly by their understood function.

Black Gloss

Produced: 400 BCE to 50 BCE.

Location of Production: Black gloss vessels were produced in workshops throughout Italy. Early in the study of black gloss, scholars hypothesized main production centers near the Bay of Naples (called Campana A production), in southern Etruria in what is now northern Lazio, and southern Tuscany (originally called Campana B), and in Sicily (originally called Campana C) (Lamboglia 1952). Scholars have now acknowledged the role of smaller-scale local workshops in towns throughout the Italian peninsula which became especially active in the later history of the ware's production. There were workshops in Taranto, Cales, Volterra, Tarquinia, Falerii Veteres, Cosa, and Aleria, to name but a few (Cibecchini and Principal 2004: 159).

Identification: This pottery is also called *vernice nera* or black glaze; however, modern English-language publications increasingly refer to it as "black gloss" in recognition of its surface sheen being due not to glaze, but to a fine layer of slip made with the same clay as the ceramic body. The vessel would have been made on a wheel, then typically left to dry until it was leather hard. Then the vessel was either immersed in a bucket of slip or, particularly in higher quality examples, painted with slip.

Black gloss vessels were finished by firing them in a kiln between 900 and 1000 °C sintering the slip to create its solid sheen (Mirti and Davit 2001: 21; Cuomo di Caprio 2007: 295, 314–7). Their external black color is achieved by firing the vessels in a reducing, or oxygen-poor, atmosphere. Ancient consumers desired vessels with this black sheen probably because it was a less-expensive way to have vessels which looked like bronze and silver.

The production of these vessels began as an imitation of vessels made in Attica, in Greece. The

earliest examples from Italy emulate the Greek pieces in their red-orange matrix and their thickly applied iridescent surface slip. Throughout the fourth century BCE, workshops in southern Italy produced variations of this type with varying levels of quality (Stanco 2009a: 21).

The fourth century is also when black gloss painted over with linear and foliage designs was produced in southern Etruria and probably also east in Faliscan territory. This ware, often referred to as "overpainted ware" or "*sovradipinta*," is found in Greek-inspired shapes like *skyphos* cups and jugs with cutout necks. Vessels were covered in black gloss and then painted with fine lines of clay-based paint in white, pale yellow, orange, brown, or pink (Pianu 1982).

In the late fourth century BCE, a particular variant of black gloss vessels began being produced at workshops in the countryside around Rome in what is now northern Lazio and southern Tuscany and later also in southern Italy. This class of pottery is referred to by modern scholars as "*petites estampilles*" or "*piccoli stampigli*" because of the "small stamps" decorating the vessels' interiors. Vessels with these stamps appear in a handful of limited forms – typically, they are all variations of a small bowl with a defined ring foot (Stanco 2009a: 22). The stamps, about half a centimeter in diameter and most often palmettes and rosettes, are distributed around the central interior of the bowl. At the beginning of their manufacture, the stamps appear in fours or fives and are typically symmetrically arranged. Over the course of the development of the style into the late third century BCE, multiple stamps are gradually replaced by a single, larger central stamp (up to 2 cm in width) surrounded by incised concentric rings or rouletting (Stanco 2009b: 158 and Fig. 6a).

Ceramics: Roman Republican and Early Principate, Fig. 3 Jug with overpainted decoration. (Pianu 1982, pl. XXIX, n. 47c). (Courtesy of the Soprintendenza per i Beni Archeologici dell'Etruria Meridionale)

The third century BCE saw an expansion of the black gloss repertoire with the introduction of many closed-form pouring vessels in addition to bowls of various scales. Workshops at the cities of Volterra and Arezzo produced vessels with added clay décor on their exterior with forms very reminiscent of embossed metal vessels. Demand for Volterran production seems to have been widespread in the Po river valley (Stanco 2009a: 26–31).

By the middle of the second century, the shape repertoire of black gloss had changed significantly. The forms of what were once curved vessels with rounded edges became increasingly toreutic or reminiscent of metal (Morel 1981: 524–8; Cibecchini and Principal 2004). The open form shapes are more angular and have sharper rims and carination. Flat platters are increasingly common. These are the forms that become part of later Roman red gloss pottery such as *terra sigillata*. Stamps often appear decorating the central interior of the vessels; however, these are more rectilinear with palmette leaves appearing more angular and an increased use of rectangular stamps (Stanco 2009a: 32–3) (Figs. 3 and 4).

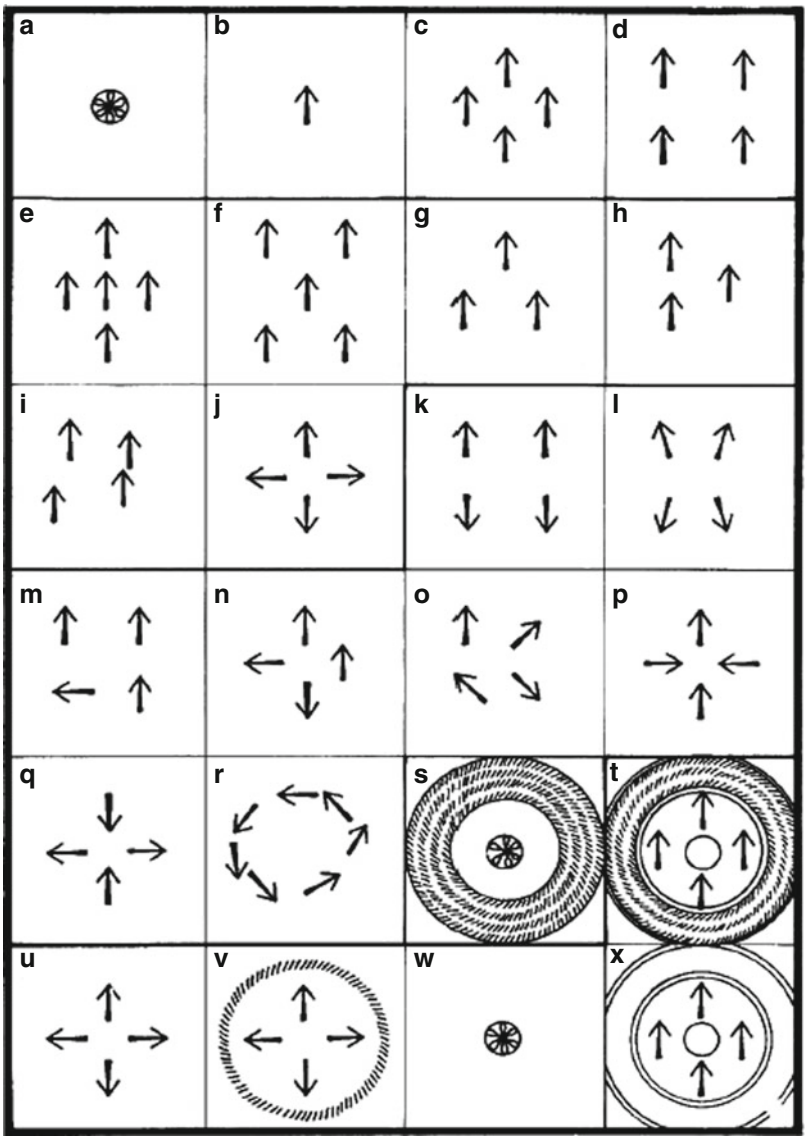

Ceramics: Roman Republican and Early Principate, Fig. 4 Typical arrangements of stamps in *petites estampilles* vessels. (Morel 1969: Fig. 3)

Eastern Sigillata

(Eastern Sigillata A, Cypriot Sigillata, Eastern Sigillata B, Çandarli Ware)

Produced: 150 BCE to 300 CE.

Location of Production: Various styles of what has generally been termed "eastern sigillata" were produced in particular locations throughout the eastern Mediterranean. In the Roman Republican period, the major producer of eastern sigillata A was probably located in what is now modern Syria (Lund 2005: 237).

Identification: The earliest type of this ware, and the one which appeared in the Republican period, has been termed eastern sigillata A (ESA). The interior clay matrix varies from yellow to orange and can be of a granular or smooth powdery consistency. It is very well levigated with few to no inclusions visible to the naked eye. Given how highly standardized the forms of ESA are, scholars have posited that it was made with the aid of molds (Hayes 1997: 20–1; Lund 2005: 238).

The slip, in contrast, is red-orange to red-brown in color. It was thickly applied by dipping the leather-hard vessel in slip before it was fired. This resulted in many extant vessels having a "double dipping streak" where the slip overlaps because one side of the vessel was dipped, the vessel was turned, and then the other side of the vessel was dipped (Hayes 1985: 9).

The earliest forms of ESA were several types of deep plates with both incurved or flaring rims and small bowls. Around the last quarter of the second century BCE, several new plate and bowl forms were added to this repertoire along with large krater (a large bowl for mixing water and wine) and jug forms (Lund 2005: 234).

A very similar red slipped ware, termed Cypriot sigillata, began to be produced in the early first century BCE. Cypriot sigillata was produced in western Cyprus, and the distribution of archaeological finds of this ware suggests that the island of Cyprus was its main market, with the West Coast of Turkey and Israel being secondary areas of consumption. Despite this rival production, ESA remained the dominant fine ware in the eastern Mediterranean in the first century BCE (Malfitana 2002: 155). Cypriot sigillata had very similar forms to ESA, but its different area of origin means that it has a different quality clay. Its clay matrix is more commonly brick red to purple brown in color with sometimes visible calcium inclusions. It too was dipped in slip and can have a "double dipping streak," but its slip tends to be applied more thinly and can be quite glossy and metallic (Hayes 1985: 79–80).

Gradually, the production of the other eastern sigillata wares and the introduction of red slipped fine ware produced in Italy, *terra sigillata*, took over the market in the east (Malfitana 2002, Fig. 3).

Italo-Megarian Bowls

Produced: Early second century BCE to end of first century BCE.

Location of Production: Central and/or Northern Italy.

Identification: These are hemispherical bowls or cups of around 13 cm in diameter which have intricate relief decoration on their exterior which most often appears in the form of foliage but can also include bands of meander, wave patterns, and sometimes faces. The vessels are made by placing a lump of clay in a mold on a wheel. They have a pale red-brown or grey fabric and are unslipped. No chemical or petrographic analysis has yet been done to associate specific clays or fine inclusions with production locations (Figs. 5 and 6).

Many of the cups have molded inscriptions naming their potters or workshop owners, and their study has therefore been focused on both establishing a chronology of their relief decoration and on attributing unstamped vessels to known artisans. The Italian version of this vessel appeared a few decades after they started to be made in the Greek East in the late third century BCE. The Greek examples are distinguished from

Ceramics: Roman Republican and Early Principate, Fig. 5 Photograph of Italo-Megarian bowl from the site of Cosa. (Courtesy of the American Academy in Rome)

Ceramics: Roman Republican and Early Principate, Fig. 6 Silver bowl of similar design to Italo-Megarian bowls, found in Naples. (Strong 1966: Fig. 31a)

the Italian ones because they bear a metallic-colored slip, have less sharply concaved rims, and are not so strictly hemispherical (Rotroff 1996: 316). The design and decoration of both the Italian and the Greek productions seem to owe a lot to the design of metal vessels from the same period (Marabini Moevs 1980: 185).

See also some excellent examples at the Metropolitan Museum of Art in New York City:

http://www.mfa.org/collections/object/early-relief-ware-bowl-154495

http://www.mfa.org/collections/object/early-relief-ware-cup-with-two-handles-scyphus-154496

http://www.mfa.org/collections/object/body-of-a-pitcher-lagynos-154501

http://www.mfa.org/collections/object/early-relief-ware-bowl-154498

Thin-Wall Pottery

Produced: 200 BCE to CE 300.

Production Location: In central and northern Italy, probably in the Po Valley, at Aquileia, and near Ravenna.

Identification: These are small cup or bowl forms which have walls as thin as 0.5 mm. They often have two handles. Their clay is well levigated and usually red-brown to grey-yellow. Sometimes they have a thin black-brown or red-brown slip which had been applied with a brush, but this is not a consistent feature. Often their exterior is left without further ornament, but it is also common to have rouletting or barbotine (added bits of clay) patterned around their central exterior. In general, in the Republican period thin-walled vessels are usually plain or have barbotine design, and then the applied decoration gets progressively more complex and more formal (leaves, crescents, animals) into the first century CE.

These vessels, like many fine ware forms in the period, are often explained as deriving from or referring to metal prototypes (Marabini Moevs 1973: 36). The repertoire of forms in the Republican period is very varied, and scholars have generally interpreted their forms as deriving from two cultural predecessors: the Golasecca civilization, or more generally Iron Age peoples of north Italy, and the Hellenistic world, namely, the Greek East (Marabini Moevs 1973: 36–8; Gervasini 2005: 285). Forms stemming from Iron Age Italy are taller than they are wide and have a slightly more restricted opening and no slip, whereas forms which are similar to Hellenistic shapes are low, wide cups with handles molded like metal (Figs. 7, 8 and 9).

Common Ware

Produced: 700 BCE to today.

Location: Throughout the Mediterranean.

Identification: Termed *Ceramica comune* in Italian, common ware is a vast ceramic category including vessels meant for the preparation, serving, small-scale storage, and cooking of food. There is a great deal of inconsistency in the scholarly literature regarding this category of material; some scholars suggest that it is a category where material that does not fit in any other category is placed, while others see the unifying theme of "common ware" as being the daily preparation of food and a focus on function over aesthetic. This category is also referred to as "utilitarian ware" and as "coarse ware" in English-language publications and in reference to material which was produced in the late archaic period.

MOTIFS DECORATIFS		FRANÇAIS	PORTUGAIS [2]	ESPAGNOL	ITALIEN	ANGLAIS	ALLEMAND
1		décor clouté	*Festões de pérolas*	*decoración puntillada*[6]	*motivi punterellati*[7] *festoni di punti*[12]	*dotted decoration*[16]	*Pünktchendekor*[23]
2		semis d'épines	*espinhos*	*decoración de espinas*[6]	*squame in rilievo*[12] *decorazione a spine*[11] *spine ravvicinate*[11]	*thorn decoration*[14] *pine scale decoration*[16]	*Grätendekor*[23]
3		décor cordé	*nervuras segmentadas*	*decoración cordada*[6]	*fasce oblique applicate e segmentate a rotella*[9]	*cord decoration*[16]	*Rippendekor*[23]
4		dépressions	*depressões*	*hoyitos*[3]	*depressioni*[24]	*thumb decoration*[16]	*Faltenbecher*[19]
5		guillochis	*guilhoché*	*decoración de ruedecilla*[4]	*vasi striati*[7] *incisioni a rotella*[10] *decorazione a rotella*[11]	*rouletting*[15] *rouletted decoration*[14, 16]	*Rädchenmuster*[20, 21]
6		incisions	*incisões*	*decoración incisa*[6]	*decorazione incisa*[11]	*incisions*[16]	*Federndem Blättchenverziert*[22]
7		incisions au peigne	*penteado vertical*	*Haces de lineas incisas*[4]	*decorazione a fasci*[7] *decorazione a pettine*[10]	*comb incised lines*[16]	*Vertikalrillen-verziert*[23]
8		décor sablé	*granitado arenoso*	*decoración arenosa*[4]	*decorazione arenosa*[7, 11]	*sanded bowls*[13] *roughcast sand*[15]	*Griesbewurf*[19]
9		crépi sablé	*crespos*	*reticulado*[6] *paredes rugosas*[25]	*pareti increspate*[24]	*webbed sand*[16] *rustic ware*[17]	*Grobes Netzwerk*[20]
10		écailles de pomme de pin	*escamas de pinha*	*pedúnculos*[6] *hojas de piña*[5]	*foglie di spigna*[11] *scaglie di pigna*[10, 24]	*pine scales*[15, 16] *pine cone decoration*[13]	*Schuppenmuster*[21]
11		réticulé de losanges	*rede de losangos*	*rombos*[6]	*puntellature*[7]	*diamond shaped rouletting*[16] *small squares in diagonal rows*[15] *lozange-grill*[13]	*Vertikaler Rhomben*[23] *Quadratische Pünktchen*[21]
12		perles	*pérolas*	*perlitas*[6]	*puntini*[8]	*dots*[14, 15, 16]	*mit Buckeln verziert*[19] *Pünkten*[22] *Perlreihe*[21]
13		mamelons	*mamilos*	*besantes*[3] *decoración mamilar*[5]	*decorazione mammillare*[7] *piccole mammillature*[11]	*pointed spines*[15]	*Warzenreihen*[21]
14		festons	*recortes*		*festoni*[12]	*scales*[15]	
15		lunules	*lúnulas*	*medias lunas*[6] *semi-circulos*[5] *crescientes*[5]	*motivo curvilineo rivolto in giù*[11]	*crescents*[13] *scales*[15]	*Deckelfalz*[19] *Bogenmuster*[21] *Runden Schuppen*[20]
16		bâtonnets	*bastonetes*	*tallos*[6]	*aghi*[7]	*ridges*[13, 15]	
17		godrons	*linguetas*	*hojas lanceoladas*[5]	*elementi oblunghi*[11]	*godroons*[13]	*lange Spitzblätter*[21]
18		feuille d'eau[1]	*folhagem de plantas aquáticas*	*hojas de agua*[6]	*foglie lanceolate*[8] *foglie d'acqua*[8] *tralci d'edera*[11]	*flat leaves*[13] *oval leaves*[18]	*Wasserblätter*[21] *Lanzettblätter*[22]
19		feuille de fougère	*palmetas*	*palmas*[6]	*palmette*[7]	*fern leaf*[13, 15]	*Palmenzweig*[21]

Ceramics: Roman Republican and Early Principate, Fig. 7 Table of decoration on thin-wall pottery. (Mayet 1975: 8) (Courtesy of F. Mayet)

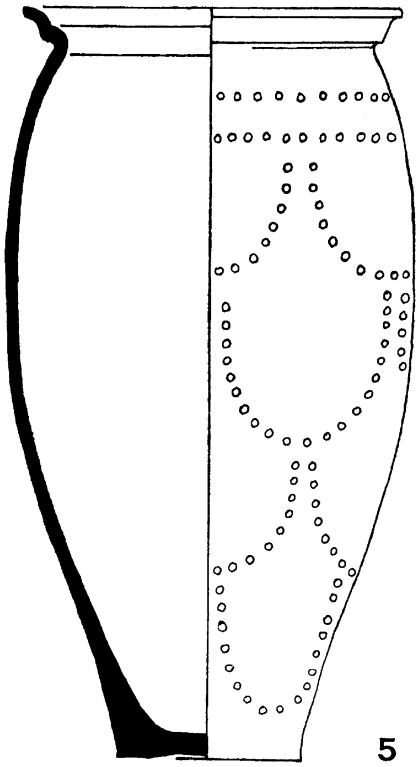

Ceramics: Roman Republican and Early Principate, Fig. 8 Thin-wall cup, Italian-inspired, type Mayet I. (Mayet 1975: pl. 1, n. 5) (Courtesy of F. Mayet)

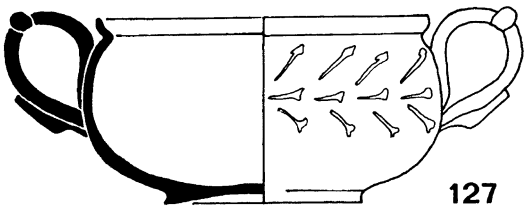

Ceramics: Roman Republican and Early Principate, Fig. 9 Thin-wall cup, Greek-inspired, type Mayet X. (Mayet 1975: pl. XVI, n. 127) (Courtesy of F. Mayet)

It is useful to subdivide this category in two ways: there are vessels used for cooking (in Italian, *ceramica comune da fuoco*, "for the fire") and those used for preparation, serving, and storage (*per la preparazione, da mensa, da dispensa*). These vessels have fundamentally different clay characteristics and forms. Most generally, cooking vessels in the Roman world are made with noncalcareous clays and are coarse-bodied, that is, they have a tendency to have more temper (either naturally occurring in the clay or added by the potter). These technological choices make them resistant to thermal shock. Roman cooking wares in the Republican period generally have an open form for easy access to the food. They appear in both deep pots ideal to contain liquids and soft foods as well as low-walled flat pans for roasting and grilling vegetables and meats.

Vessels suited for the preparation, serving, and storage of food, conversely, need to be relatively resistant to mechanical shock, that is, damage due to bumping or knocking. They tend to be made with calcareous clays which have a much lower concentration of inclusions when compared to cooking wares. The most common preparation and serving vessels made in central Italy in the second and first centuries BCE were fired between 900 °C and 1000 °C in a reducing atmosphere and then cooled in an oxygen-rich atmosphere. The affect is that they are typically light beige to pink-yellow in color.

While the production of common ware is generally thought of as more locally oriented, it is increasingly clear that common wares both for cooking and for preparing and serving which were made in central Italy were exported around the Mediterranean beginning as early as the late

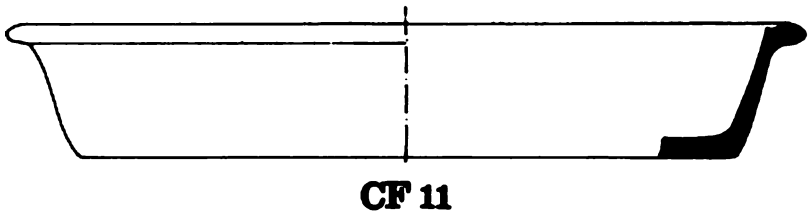

Ceramics: Roman Republican and Early Principate, Fig. 10 Flat pan for cooking (*tegame*, in Italian). (Dyson 1976: Fig. 1, CF 11)

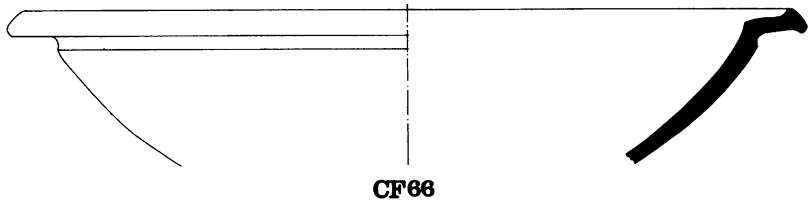

Ceramics: Roman Republican and Early Principate, Fig. 11 Deep pot for cooking (*pentola*). (Dyson 1976: Fig. 42, 22II-2)

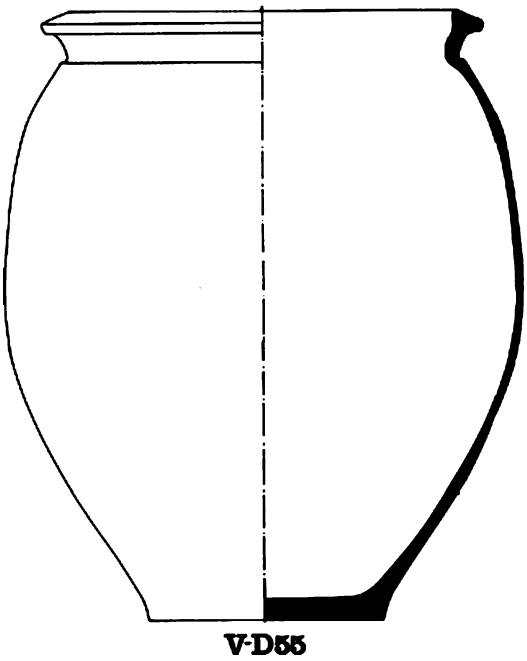

Ceramics: Roman Republican and Early Principate, Fig. 12 Deep jar for cooking (*olla*). (Dyson 1976: Fig. 22, V-D 55)

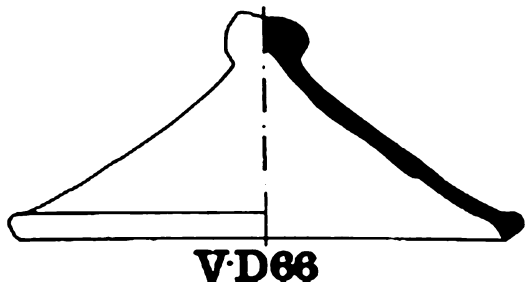

Ceramics: Roman Republican and Early Principate, Fig. 13 Lid for a cooking pot. (Dyson 1976: Fig. 23, V-D 66)

third century BCE and especially by the late first century BCE (Olcese 2003: 21–3) (Figs. 10, 11, 12, 13 ,14 and 15).

Transport Amphorae

Produced: From the third century BCE to end of first century BCE.

Location of Production: Italy and the West Mediterranean basin.

Identification: The shape of Roman amphorae, with their ovoid body, typically narrow neck and base (often ending in a point), and double handles comes out of a long tradition of similar storage and transport containers produced and circulated around the Mediterranean by Phoenicians and Greeks since the eight century BCE (Caravale and Toffoletti 1997: 52–89). Amphorae contained most often wine or olive oil but also fish sauce (*garum*) and possibly dry goods like wheat and nuts (Peacock and Williams 1986: 90). Scholars have determined the primary contents of different amphorae types from the painted labels on their exterior and from chemical analysis of residues from their interior.

Different amphora shapes can be attributed to the contents they were intended to hold, characteristics of the local clay, form precedents in their region of production, and transport concerns like how far they needed to be transported until they reached a harbor yard and the kind of ship in which they were to travel (Fig. 16).

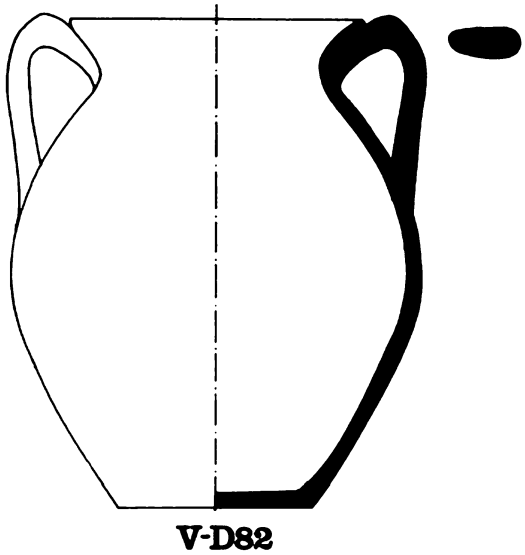

Ceramics: Roman Republican and Early Principate, Fig. 14 Pouring or storage jug (*brocca*). (Dyson 1976: Fig. 25, V-D 82)

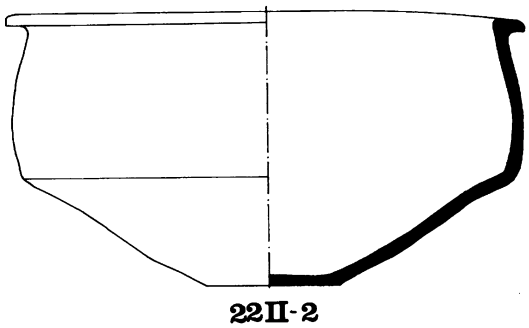

Ceramics: Roman Republican and Early Principate, Fig. 15 Bowl for preparing food (*ciotola*). (Dyson 1976: Fig. 5, CF 66) (Courtesy of the American Academy in Rome)

There are several prominent amphora types in the Roman Republican period. *Greco-Italic* amphorae were produced in central Italy and the western Mediterranean from the third century BCE to the mid-second century BCE and are most obviously identified by the triangular profile of their rim. This triangle becomes progressively more elongated toward the end of their production date. The body of this amphora is ovoid, with a pointed base, a cylindrical neck, and two flat vertical handles. The typical height of a complete amphora is 80–90 cm (Caravale and Toffoletti 1997: 97). The fabric color varies, but in general it is buff-yellow to pink, and the exterior is slightly white. Greco-Italic amphorae held primarily wine.

Dressel 1 amphorae are similar to Greco-Italic in design features but have a narrower body and are generally more elongated. Dressel 1A and 1B also have quite a pronounced shoulder carination. Their overall height is 100–120 cm (Caravale and Toffoletti 1997: 98). Production of this type ran from the middle of the second century BCE to the late first century BCE in west-central Italy. These amphorae also began to be imitated by potters in southern France and Spain. Examples of Dressel 1 are found concentrated in Italy but also throughout the Mediterranean basin and in Britain. These vessels primarily transported wine, but perhaps also olive oil (Peacock and Williams 1986: 87, 90, 92).

For photographs and drawings:
http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/details.cfm?id=324&CFID=5196568&CFTOKEN=46649964

Another wine-carrying amphora from this period comes from around the Adriatic coast (Caravale and Toffoletti 1997: 104; Sondi and Slovenec 2003: 252). Amphorae of Lamboglia 2 type are very similar in style to Greco-Italic amphorae but with a shorter base point. Overall, they are typically 80–95 cm in height. These amphorae were produced from the late second century to the late first century BCE and are found primarily in the eastern Mediterranean.

For photographs and drawings:
http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/details.cfm?id=229&CFID=5196568&CFTOKEN=46649964

Finally, *Brindisi-type* amphorae from southern Italy are much more squat and wider than the

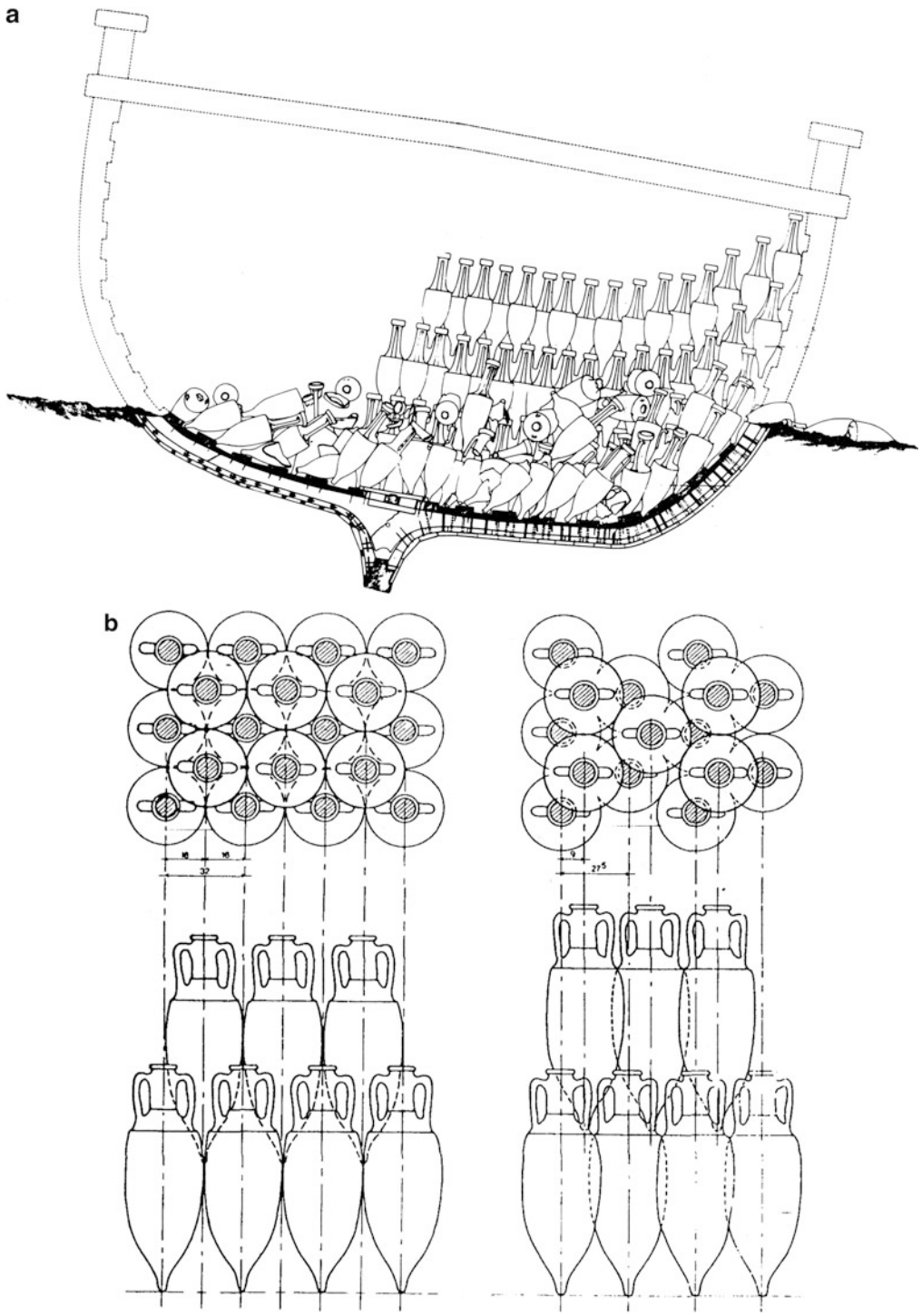

Ceramics: Roman Republican and Early Principate, Fig. 16 Schematic of how amphora are stacked inside the holds of ships. (Caravale and Toffoletti 1997: 40)

above examples and have handles which are round in section instead of flattened ovoid. They were produced from the late second to the mid-first century BCE and probably held olive oil (Peacock and Williams 1986: 83).

For photographs and drawings:

http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/details.cfm?id=51&CFID=5196568&CFTOKEN=46649964

"Presigillata"

This was a term first coined by N. Lamboglia in 1951 to refer to what he interpreted as a transitional ware between black gloss pottery and pottery of similar manufacture which had a red slip. It has since come to be used to refer instead to any vessels with a red gloss which predate the manufacture of *terra sigillata* in the mid-first century BCE, and most problematically, it is often used when the ceramicist is unsure of the class or origin of the slipped material. It is generally agreed that because of the term's lack of precision, its continued use is problematic and unhelpful (Wells 1990).

Historical Background

The study of Roman ceramics, like many fields of classical archaeology, has its roots in art history. The methods of connoisseurship used in the study of Greek vase painting were similarly applied to the study of Roman fine wares by scholars like H.B. Walters, who condemned the barbarity of Roman art when compared to the more refined products of the Greeks (Greene 2005: 37). The focus on the aesthetic aspect of Roman ceramics is a large part of the reason that the study of Roman common wares began so much later the systematic study of finer wares.

In 1879 G. F. Gamurrini published the first study of black gloss vessels found in the western Mediterranean and named them "Etrusco-Campanian" in type. Following this, black gloss received very little attention until Nino Lamboglia's 1952*classificazione preliminare*. Lamboglia identified three fabrics and posited production locations near Naples (Campana A), Etruria (Campana B), and Sicily (Campana C). He also made a simple typological system to delineate the forms found in each fabric. J. P. Morel (1981) complicated this system with an open typology which allowed further types to be added to his categories. His classes are more focussed on the details of design (open versus closed form, rim shape), rather than on function. The groupings are based on the idea that the potters of a particular series were all aiming to make an "ideal type" and the variations they produced were as close as they could get to that ideal.

When it comes to non-fine wares, the focus of study has taken two different tracks. First, the systematic study of transport amphorae began in the late nineteenth century, spurred largely by epigraphers interested in the appearance of the painted inscriptions on amphorae. R. Schöne (1871), A. Mau (1898), and H. Dressel (1891) established the first typologies of amphorae produced in the Roman Mediterranean (Peacock 1982: 3).

On the other hand, it was only in the mid-twentieth century that attempts were first made to treat domestic common wares as a category worthy of careful study. Nino Lamboglia's 1950 publication of the utilitarian pottery from Albintimilium is an excellent early example which is still often referenced. Part of the difficulty in the study of common wares is the fact that they are often locally produced. Therefore, typologies based on forms may only be relevant for small regions. More recent studies have attempted to organize these wares by broad functional type or by fabric. The introduction of petrological analysis to Roman pottery studies in the 1970s driven by the work of David Peacock began a quiet revolution in the study of coarse-bodied ceramics including amphorae (Peacock 1977; Peacock and Williams 1986).

In 2003, Gloria Olcese and her collaborators created broad regional "type guides" for common ware produced in Italy from fourth to the first BCE (Olcese 2003). Her typology takes fabric into account and allows for significant variation within the form of each vessel. This study is also the first to combine large-scale XRF (energy dispersive X-ray fluorescence) and petrological analysis

with traditional morphological analysis. The intention behind such work is to be a starting point to examine the presence of Italian coarse wares outside of Italy. This could not be done without first a clearer understanding of what was being produced in central Italy itself.

Key Issues/Current Debates

Several interrelated issues in Roman ceramic analysis have been raised recently in the scholarly literature. The primary purpose of initially creating ceramic typologies was to date archaeological stratigraphy. This purpose remains; however, the concern now is that although our understanding of typological development may be correct, our absolute and even relative dates for whole classes of material may be seriously flawed. For material in the Republican period, this could be especially true for black gloss ware. The increasing recognition of the complexity of black gloss production and the growing house of cards of sites dated using black gloss and sites dated using the dates of other sites mean that the revision of black gloss chronology would have significant consequences for Republican archaeology. Furthermore, as our understanding of the use-life of ceramic material and the formation processes of Roman archaeological sites develops, we discover that the production date of ceramic material differs greatly from the date of the use and deposition of various ceramic classes.

Related to this issue of redating is the issue of cost, value, and reuse of ceramics. The interrelationship between ceramic vessels and vessels made of other materials – glass and especially metal – is something which we can only estimate. It was in the middle Republican period that widespread experimentation with different raw materials and form began. Since so few metal and glass vessels are attested in the archaeological record when compared to pottery, our understanding of the economic and cultural value of ceramic vessels might be quite skewed. We wonder who the customers were for fine ceramics – the wealthy upper class? The second-tier moneyed class who could not afford metal wares? Recent scholars have used a combination of ancient literature and quantitative and qualitative material studies to consider this question (Lund et al. 2006; Roth 2007). The study of ceramic repair (pot-mends), use-life, and reuse can help illuminate some sense of the value of ceramic vessels. The work of J. T. Peña highlighting reuse (especially in the case of Roman amphorae) and modeling the ceramic cycle has been quite important to the increased consideration of the multifunctionality and use-life of Roman ceramics of various classes (Peña 2007). These types of studies are being taken into consideration for the redating and better understanding of the complexities of typological change and influence, and indeed site chronology.

The application of archaeometric study to Roman ceramics has also been adopted in the last 25 years. Determining ceramic provenance of coarse-bodied wares (common wares and amphorae) through petrology and XRF and of fine wares through neutron activation analysis (NAA) and chemical testing has both confirmed earlier assumptions about provenance and trade and greatly altered how we understand the movement of raw clay and completed vessels in the Roman world. The employment of archaeometry has allowed for the increasingly systematic study of common wares as well as the expansion and refinement of pottery's role in the Roman economy (Greene 2005). Residue analysis has also been applied to Roman ceramics, especially in Roman Britain, in order to better understand food production, storage, and consumption as well as to examine the reliability of textual sources in our study of ceramic function (Cramp 2008).

The interrelatedness of these issues and the increasing collaboration of material scientists, archaeologists, and classicists have also meant ceramology has become both an increasingly specialized and interdisciplinary field.

Future Directions

Future directions for the study of Roman ceramics in the Republican period relate to the concerns of current research both in their increased specificity

and in their broad syntheses. Firstly, archaeometry will continue to play an important role. Defined most simply as the application of scientific methods (including mathematical, physical, and biological sciences) to archaeological materials, the effect of archaeometry on the questions and concerns of Roman archaeology is only just beginning to be felt. The examination of clay composition and provenance with methods like petrology, XRF, and NAA means an increased understanding of the details of natural resource economy (clay and fuel acquisition, movement, contacts and cooperation between regions), potting technology (clay processing, kiln technology), and human capital (workshop organization and output, training methods, potter individuality and identity), not to mention revealing even more about trade connections, market consumption, and consumer interests.

Residue analysis on archaeological ceramics (gas chromatography/mass spectrometry and liquid chromatography/mass spectrometry being two popular methods) has been used only tentatively by Roman archaeologists thus far because of the limitations of its results; however, these methods are being continually expanded and refined by archaeochemists. Furthermore, the increased accessibility and affordability of this technology means it will become a more popular tool to contribute to the study of vessel use. Research questions regarding foodways and subsistence are very much connected to issues of environmental economy, changing landscapes and urbanization, and cultural contact and identity – themes which are key in the Roman Republican period.

The use of archaeometric methods has run parallel to increasingly detailed study of coarse-bodied ceramics – ceramics for everyday use and used by every class of Roman society. In the future, there should be the continued study of these common wares and an increased recognition of typological series and vessel function. This brings us to our second area of future development: full data reporting and contextual analysis. Many past publications of Roman sites have divided artifacts up by type with the ceramics subdivided and separately studied and published by class. Difficulties of funding, time, and loss of interest have often meant that the overall interpretation and synthesis of the site happens before artifact study is finished, with no reference to ceramic artifacts, or not at all. In contrast, interest in the 1980s and 1990s in the quantitative analysis of Roman ceramics stressed the need to consider in detail all the artifacts in assemblages and to select quantitative methods which minimize recovery and fragmentation bias and allow for inter-site comparison. Many of these early studies used clunky project-commissioned computer programs which were not commercially available. Today, the increased use of digital applications in Roman archaeology including increasingly user-friendly statistical software, sophisticated database programs, GIS, and digital publishing means that we can harness technology in order to perform data organization, processing, storage, and dissemination which has been a slow and daunting process in the past. The coalescence of all of these factors (the equal study of all ceramic classes, the use of quantitative methods, digital applications) allows for the simplest development in Roman ceramic study: complete and explicit data reporting and broad site syntheses which are closely tied to the material record. With thorough ceramic study, ceramics can illuminate the archaeological formation processes at work in creating archaeological sites and excavation conditions and contribute to broad contextual concerns like the function of ancient spaces, status, access, discard practices, and the interconnections between individuals, households, sites, and regions.

Cross-References

- ▶ Archaeometry: Definition
- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics, Roman Imperial
- ▶ Economy, Roman
- ▶ Organic Residue Analysis in Archaeology
- ▶ Site Formation Processes

References

Caravale, A., and I. Toffoletti. 1997. *Anfore Antiche: Conoscerle e identificarle*. Formello: Istituto di Ricerche Ecologiche ed Economiche.

Cibecchini, F., and J. Principal. 2004. Per chi suona la Campana B? In *Metodi e approcci archeologici: l'industria e il commercio nell'Italia antica archaeological methods and approaches: Industry and commerce in ancient Italy (British Archaeological Reports 1262)*, 159–172. Oxford: Archaeopress.

Cramp, L. 2008. *Foodways and identity: Organic residue analysis of Roman mortaria and other pottery.* University of Reading: Unpublished PhD dissertation.

Cuomo di Caprio, N. 2007. *La ceramica in archeologia, volume 2: Antiche tecniche di lavorazione e moderni metodi di indagine (Studia archaeological 144)*. Rome: L'Erma di Bretschneider.

Dyson, S.L. 1976. Cosa: The utilitarian pottery. *Memoirs of the American Academy in Rome* 33: 3–175.

Greene, K. 2005. Roman pottery: Models, proxies and economic interpretation. *Journal of Roman Archaeology* 18: 34–56.

Hayes, J.W. 1985. *Sigillate Orientali (Enciclopedia dell'arte antica, classica e orientale, atlante delle forme ceramiche II)*, 1–96. Roma: Istituto della Enciclopedia Italiana.

Hayes, J.W. 1997. *Handbook of Mediterranean Roman pottery.* London: British Museum Press.

Lamboglia, N. 1952. Per una classificazione preliminare della ceramica campana. In *Congreso Internazionale di Studi Liguri*, ed. Atti del Io, 139–206. Bordighera: Istituto Internazionale di Studi Liguri.

Lund, J. 2005. An economy of consumption: The eastern Sigillata A industry in the late Hellenistic period. In *Making, moving and managing: The new world of ancient economies 323–31 BC*, ed. Z.H. Archibald, J.K. Davies, and V. Gabrielsen, 233–252. Oxford: Oxbow Books.

Lund, J., D. Malfitana, and J. Poblome. 2006. Rhosica vasa mandavi (Cic., Att. 6.1.13) towards the identification of a major ceramic tableware industry of the eastern Mediterranean: Eastern Sigillata A. *Archeologia Classica* 57: 491–507.

Malfitana, D. 2002. Eastern terra sigillata wares in the eastern Mediterranean. Notes on an initial quantitative analysis. In *Céramiques Hellénistiques et Romaines: Productions et diffusion en Méditerranée Orientale (Cypre, Egypte et Côtesyro-Palestinienne) (Travaux de la Maison de l'Orient méditerranéen 35)*, ed. F. Blondé, P. Ballet, and J.-F. Salles, 133–157. Maison de l'Orient méditerranéen-Jean Pouilloux: Lyon.

Marabini Moevs, M.T. 1973. *The Roman thin walled pottery from Cosa (1948–1954)*. Rome: American Academy in Rome.

Marabini Moevs, M.T. 1980. Italo-Megarian ware at Cosa. *Memoirs of the American Academy in Rome* 34: 158–227.

Mayet, F. 1975. *Les céramiques a parois fines dans la Péninsule Ibérique*. Paris: E. de Boccard.

Mirti, P., and P. Davit. 2001. Technological characterization of Campanian pottery of Type A, B and C and of regional products from ancient Calabria (southern Italy). *Archaeometry* 43: 19–33.

Morel, J.-P. 1969. Etudes de céramique campanienne, I: L'atelier des petites estampilles. *Mélanges d'archéologie et d'histoire* 81: 59–117.

Morel, J.-P. 1981. *Céramique campanienne: Les formes (Bibliothèque des Écoles Françaises d'Athènes et de Rome 244)*. Rome: École Française de Rome.

Olcese, G. 2003. *Ceramiche comuni a Roma e in area romana: Produzione, circolazione e tecnologia (tarda età repubblicana-prima età imperiale 28)*. Mantua: SAP.

Peacock, D.P.S. 1977. *Pottery and early commerce: Characterization and trade in Roman and later ceramics*. New York: Academic Press.

Pianu, G. 1982. *Ceramiche etrusche sovradipinte. Materiali del museo archeologico nazionale di Tarquinia*. Rome: G. Bretschneider.

Roth, R. 2007. *Styling Romanisation: Pottery and society in central Italy.* Cambridge: Cambridge University Press.

Rotroff, S.I. 1996. Megarian bowls in Italy and Sicily. *Journal of Roman Archaeology* 9: 316–320.

Sondi, I., and D. Slovenec. 2003. The mineralogical characteristics of the Lamboglia 2 Roman-Age Amphorae from the Central Adriatic (Croatia). *Archaeometry* 45 (2): 251–262.

Strong, D.E. 1966. *Greek and Roman gold and silver plate*. London: Methuen & Co.

Stanco, E. 2009a. Ceramica a vernice nera, in *Ceramica Romana: Guida allo studio*. In *Il catalogo; l'argilla; ceramica a vernice nera; ceramica a vernice rossa di priodo repubblicano; terra sigillata italica e nord italica; Terra sigillata sud gallica e centro gallica; terra sigillata ispanica*, 19–97. Rome: Gruppo Archeologico Romano.

Stanco, E. 2009b. La seriazione cronologica della ceramica a vernice nera etrusco-laziale nell'ambito del III secolo a. C. In *Suburbium II. Il suburbio di Roma dalla fine dell'età monarchica alla nascita del sistema delle ville (V-II secolo a. C.)(Collection de l'École Française de Rome 419)*, ed. V. Jolivet, 157–193. Rome: École Française de Rome.

Wells, C. 1990. A note on the term 'pre-sigillata'. In *Conspectus formarum terrae sigillata italico modo confectae*, ed. E. Ettlinger. Habelt: Bonn.

Further Readings

Gervasini, L. 2005. La ceramica a pareti sottili, in A. Gandolfini (a cura di) *La ceramica ei materiali di età romana. Classi, produzioni, commerci e consumi*: 279–310. Bordighera: Istituto Internazionale di Studi Liguri.

Peacock, D.P.S. 1982. *Pottery in the Roman world: An ethnoarchaeological approach*. New York: Longman.
Peacock, D.P.S., and D.F. Williams. 1986. *Amphorae and the Roman economy: An introductory guide*. New York: Longman.
Pavolini, C. 2000. *Scavi di Ostia 13, la ceramica comune: Le forme in argilla depurata dell'Antiquarium*. Roma: Istituto Poligrafico e Zecca della Stato.
Peña, J.T. 2007. *Roman pottery in the archaeological record*. Cambridge: Cambridge University Press.
Tomber, R. 1990. Roman pottery studies in the Mediterranean: Past research and future prospects. *Journal of Roman Archaeology* 3: 217–224.

Ceramics: Scientific Analysis

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Introduction

Scientific investigations on archaeological ceramics are carried out with three different purposes:

- Reconstruction of ceramic processing technology, which includes the definition of the type of raw material used, the possible corrections of the raw clay, the shaping technique, the firing system used, the cooking atmosphere and the maximum temperature reached, and the presence of coatings and decorations
- Identification of the production area of artifacts (the study of provenance), which often requires the analysis of possible local clays, with the main aim of contributing to the reconstruction of the routes of trade between different settlements and cultural contexts
- Definition of the conservation state, in order to better address the works of restoration and conservation

Only the analyses applied in the first two cases are dealt with specifically here because the information obtained is strictly relevant to archaeology.

Definition and Key Issues

Analysis of the Microstructure

The microstructure is defined by observation in polarized and transmitted (instead of reflected) light microscopy, using the so-called mineralogical microscope, with enlargements for the most part between 40 and 100 times. To do this, the sample is prepared in section thin enough (about 30 μm) to pass the light.

The observation allows to highlight many microstructural aspects, including:

- Degree of isotropy/anisotropy of the clayey matrix
- Homogeneity/heterogeneity of the clay matrix, such as the presence of argillaceous rock fragments (ARFs)
- Presence of grains larger than a minimum of about 30 μm
- Size distribution of these granules, which can be concentrated in a limited range or fairly evenly dispersed in the range from about 30 μm to maximum size present
- Nature (including any grog) and shape of these granules
- Presence, abundance, and form of any macropores, that is, voids larger than about 30 μm
- Presence, nature (clayey or vitreous), and thickness of coatings, if any
- Microstructure of the coatings, particularly the glazes (gradations of composition, crystalline inclusions, bubbles)
- Presence of cracks or fractures
- Any filling of pores and fractures with material deposited during the burial of the shards

Such information helps to make various deductions, such as the possible use of plastic material to correct the clay, the origin of the ceramic

material (especially for coarse ceramics), and an evaluation of the firing temperature (Montana et al. 2007).

Chemical Analysis

The chemical analysis serves to determine the chemical composition, expressed by the percentage content of chemical elements that constitute the analyzed material: ceramic body, coating, or decoration.

This type of analysis can be performed with different analytical techniques, among which today the most common are:

- Wavelength dispersion-X-ray fluorescence (WDS-XRF)
- Inductively coupled plasma-atomic emission spectrometry (ICP-AES)
- Energy dispersion spectroscopy coupled with scanning electron microscopy (SEM-EDS)

The elements typically analyzed for ceramic bodies and argillaceous coatings are 10 and are generally reported as oxides in the following order: SiO_2, Al_2O_3, TiO_2, Fe_2O_3, MnO, MgO, CaO, Na_2O, K_2O, P_2O_5. For the analysis of the glazes, PbO and SnO_2 are added to these elements. Finally, for the decorations you can add different coloring oxides, such as CuO, CoO, Cr_2O_3, and As_2O_3, as well as Fe_2O_3 and MnO.

The chemical investigation is very important for the provenance studies, especially for ceramics with fine paste (Maggetti et al. 2011).

Mineralogical Analysis

The mineralogical analysis is performed through the X-ray diffraction (XRD) and serves to qualify and semi-quantify the crystalline phases, among which the main ones are quartz, feldspar, calcite, illite, gehlenite, pyroxene, and amphibole. But the list could go on with minerals less frequent or present in small quantities, for example, dolomite, kaolinite, smectite, chlorite, hematite, and rutile.

Some of these minerals are already found in the clays, while others (new-formation phases) are formed during firing. These phases are generated mainly as a result of the destruction of clay minerals and calcite and the subsequent reaction between the remnants of these components, with the formation of different compounds according to the thermal level reached during the ceramic firing. Therefore, knowledge of the crystalline phases present in ceramic bodies is essential for the evaluation of the firing temperature (Fiori et al. 2011) and can also provide useful information in studies of provenance.

Thermal Analyses

The compounds present in the ceramic material, when subjected to heat treatment, may undergo chemical changes. The thermal analyses record any loss of weight (thermogravimetric analysis, TGA) and the absorption or release of heat (differential-thermal analysis, DTA) caused by these reactions. Since the reactions occur in well-defined temperature ranges, the thermal analyses allow recognizing the original compounds.

The information obtained can be used to confirm the results of the mineralogical analysis and the evaluation of the firing temperature. The minerals that are modified or destroyed at a given temperature indicate, in fact, that this temperature was not reached during the ceramic firing (Fiori et al. 2011).

Examples

Sampling

The analytical techniques mentioned above require the availability of a sample taken from the object to be analyzed and brought to the laboratory to perform the different analyses. Therefore, it deals with invasive analyses but also destructive because a variable amount of material is destroyed during sample preparation or during the analysis. When you plan to run some analysis, it is imperative to take this into account (Artioli 2010).

The amount of material to be taken depends on the type of analytical technique used. For example, the preparation of a thin section for observation under a mineralogical microscope requires a fragment of at least 1 cm, indicatively corresponding to 1 g, while the thermal analyses consume only a few tens of milligrams of material.

The amount of sample depends also on the characteristics of the same ceramics that you want to analyze, because the sample for analysis must always be representative of the material under examination. Therefore, the sample to be taken for coarse-grained ceramic pastes should be much larger than that of fine ceramics, regardless of the type of analysis to be performed.

Finally, it is worth clarifying that there are also noninvasive analytical techniques and that often the analyses in this case can be made in situ (Fabbri 2012). Unfortunately, these techniques are not suitable or are not the most suitable for the analysis of ceramic materials aimed at obtaining information useful in archaeological terms.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Artioli, G. 2010. *Scientific methods and cultural heritage: An introduction to the application of materials science to archaeometry and conservation science*. Oxford: Oxford University Press.

Fabbri, B., ed. 2012. *Science and conservation for museum collections*. Florence: Nardini Editore.

Fiori, C., D. Vitali, E. Camurri, B. Fabbri, and S. Gualtieri. 2011. Archaeometrical study of Celtic ceramics from Monte Bibele (Bologna, Italy). *Applied Clay Science* 53: 454–465.

Maggetti, M., C. Neururer, and D. Ramseyer. 2011. Temperature evolution inside a pot during experimental surface (bonfire) firing. *Applied Clay Science* 53: 500–508.

Montana, G., B. Fabbri, S. Santoro, S. Gualtieri, I. Iliopoulos, G. Guiducci, and S. Mini. 2007. Pantellerian ware: A comprehensive archaeometric review. *Archaeometry* 49: 455–481.

Ceramics: Stonewares

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C

Brief Definition of the Topic

It could be argued that stoneware was one of the first western European commodities to have a truly global cultural impact. Archaeologically, it is virtually ubiquitous on first contact sites and European colonial settlements and shipwrecks around the world throughout the post-Columbian epoch, particularly those that have a western or northern European connection. Deriving from heaving industrial production, it could be made in large quantities and its robust body made it suited to long-distance trade. A fully fused true stoneware, with a highly vitrified body (porosity of 0.4%) with firing temperature of 1300–1400 °C, emerged as a commercial product in the Rhineland around CE 1300 following over 100 years of proto- and near-stoneware evolution and successful business development. It is no coincidence this development not only coincided with the spread and growth of towns in northern Europe, and hence new markets from c. CE 1200. The colonization of the Baltic rim by western European Crusaders, clergy, merchants, and artisans required the transfer of western European lifestyles and all its physical attributes. Stoneware enabled the Hanseatic trading community to continue to enjoy their accustomed drinking and table customs and other domestic habits overseas. Stoneware was ideally suited to mercantile urban housing with tiles flagged floors, timber furniture, and with defined living space and service quarters.

Stoneware was a robust but lightweight, nonporous, stainless, and odor-free ceramic body that revolutionized domestic life, from the parlor and dining room to the kitchen, cellar, and latrine. According to the archaeological record, German stoneware penetrated the households of rich and poor across the continent of Europe from the

thirteenth century and forms a primary component of the European colonial toolkit from the late fifteenth century onward. Radical refinements in design and technology from the mid-fifteenth century, notably in the introduction of molded relief forms, transformed the status and function of domestic ceramics in western and northern Europe from essentially utilitarian commodities into symbolic artifacts in their own right. The fusion of mold technology and printed propaganda in the sixteenth century further revolutionized the medium though which topical religious and temporal concerns entered the home. These innovations gave the medium a radically new dimension: relief ornament enabled stoneware to compete for the first time in terms of visual impact as well as function in the dining sphere, particularly with metal vessels and decorated glassware. Stoneware manufacturers drew on a wide range of contemporary popular graphic design sources, which could be reproduced at a minimal cost through mold technology on an almost limitless number of vessels. The wide variety of decorative subject matter, ranging from purely ornamental motifs to biblical, mythological, allegorical, armorial to political and religious imagery, transformed stoneware from a primarily domestic commodity into a minor art form. The fusion of graphical reproduction and molded technology enabled German stoneware producers to respond immediately to rapidly changing political and religious loyalties in the development of a new iconographic repertoire during the course of the sixteenth century.

Unlike, say, Italian or Netherlandish maiolica, which is characterized by individually hand-painted ornament, stoneware potters could replicate complex products in bulk – the only investment required at the mold-manufacturing stage. Stoneware rose rapidly in status. A further technological innovation which amplified the effect of the relief-molded decoration was the deliberate introduction of salt into the glazing process during the course of the early sixteenth century. Analysis of wasters from Rhenish kiln sites suggests that this innovation coincided with the increasing use of applied relief ornament at this time. The combined result radically enhanced the symbolic status of stoneware still further. By the end of the sixteenth century, stoneware relief designs were embellished with the use of cobalt paint.

Although fired on a truly industrial scale from the thirteenth century, German stoneware remained an artisanal, workshop-based craft product until the introduction of machine mass-production in mid-eighteenth-century England. Rhenish stoneware potters attempted to replicate Staffordshire tea ware forms but to no avail and, bar a few specialist products, their presence in the international export market ceased abruptly. However, the instrumental role of the historic Rhenish stoneware production in establishing the British and North American stoneware industries of the eighteenth to twentieth centuries is undisputed. Today, German stoneware is regarded as a key artifact type for the archaeology of late medieval and early modern society, and in particular for the study of domestic life, table culture and for trade and long-distance cultural transfer. It is a type-fossil of European settlement archaeology around the globe.

Cross-References

- ▶ Consumption, Archaeology of
- ▶ Hanse Archaeology
- ▶ Medieval Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Scandinavia and the Baltic Sea Region: Medieval Archaeology
- ▶ Western Europe: Historical Archaeology

Further Reading

Gaimster, D. 1997. *German stoneware 1200–1900. Archaeology and cultural history*. London: British Museum Press.

Gaimster, D. 1997. Stoneware production in medieval and early modern Germany. In *Pottery in the making: World ceramic traditions*, ed. I.F. Freestone and D. Gaimster, 122–127. London: British Museum Press.

Gaimster, D. 1997. Rhenish stonewares from shipwrecks: The study of ceramic function and lifespan. In *Artefacts from wrecks*, ed. M. Redknap, 121–128. Oxford: Oxbow.

Gaimster, D. 2003. Pots, prints and propaganda: Changing mentalities in the domestic sphere 1480–1580. In *The archaeology of reformation 1480–1580*, Society for post-medieval archaeology monograph, vol. 1, ed. D. Gaimster and R. Gilchrist, 122–144. Leeds; Maney: Society for Post-Medieval Archaeology.

Gaimster, D. 2005. Hanseatic table culture in northern Europe 1200–1600: The archaeology of cultural transfer and resistance. In *Consuming passions. Dining from antiquity to the eighteenth century*, ed. M. Carroll, D.M. Hadley, and H. Willmott, 67–86. Stroud: Tempus.

Ceramics: The Ibero-American Shipping Container

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Introduction

Many goods from Europe were once packed and shipped around the world in a seemingly endless variety of ceramic containers. Today, they can be found at the bottom of almost every body of water that ships crossed and in almost every land on which European explorers, settlers, missionaries, and merchants set foot. To date, the only containers that have received serious study are those that John Goggin (1960) called "Spanish Olive Jars," a term that seems to have caused more problems than it has resolved. He limited his discussion to two varieties: one that is globular and one that has been referred to as "amphora-like," "egg-shaped," "carrot-like," "elongated," and "conical," among others (Fig. 1).

This entry presents the key definitional points and debates that have been published, usually under the English heading "Spanish Olive Jar," the Spanish heading "*botija*," the Portuguese heading "*anforeta/botijuela*" (depending on the shape), and under a variety of different headings by other investigators.

Definition

The earthenware vessels referred to here as "shipping containers" are part of a ceramic tradition dating back thousands of years, which was based on the need to find a low-cost method of safely packing and effectively stowing perishable food stuffs for maritime commerce.

For its colonial, transatlantic commerce, Spain adopted two principal ceramic container forms: one that was globular and one that was conical. Over time, the two handles of the original, globular vessel were eliminated, and the vessel's method of production changed from the suggested preparation of two halves that were joined together to a

Ceramics: The Ibero-American Shipping Container, Fig. 1 Plain *botija* found in excavations at the historic district of Mexico City, probably dating to the 1600s; green-glazed *botija*, private collection

single throwing on a potter's wheel. The conical vessel, always wheel-thrown, experienced significant changes in its size (Fig. 2). The neck rim was always added in the last stage of production, but studies show that its profile, on both varieties, changed significantly over time (Fig. 3). In terms of surface treatments, both varieties have examples with no treatment and examples covered with a lead-based glaze. To date, only some examples of the globular vessel show the application of a tin-based, lead glaze to the interior.

Spanish contracts for the production of ceramic shipping containers used a variety of names to indicate the specific vessel being requested, with no particular description that would indicate their shape (e.g., Gestoso y Pérez 1995). Ship registers, prepared by a large number of notaries, also used a variety of terms when listing the ceramic shipping containers in which goods were packed, again with no indication of the shape (see *Archivo General de Indias*, Section *Contratación*). No clear definition has been made that would establish an exact correspondence of contents to vessel type in terms of elements such as shape, size, name, and glazed/unglazed.

Spanish varieties often have stamped, impressed, embossed, in relief, incised, engraved, scratched, or filed marks on the neck rim or impressed marks on the shoulder (Fig. 4). They may also have "painted" marks on the vessel body. The wide distribution of the same rim mark across a number of disparate archaeological sites in the Americas raises more questions than it answers regarding the significance, if there is one, of these marks, considering their absence on any part of the visible surface of other Spanish earthenwares.

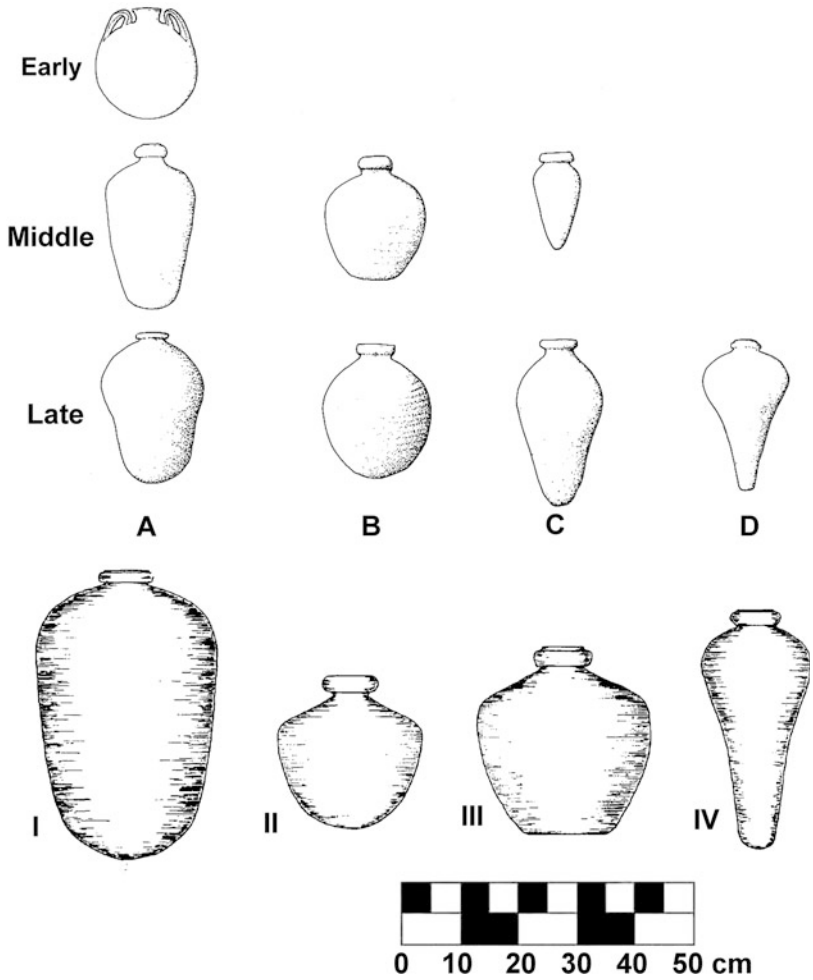

Ceramics: The Ibero-American Shipping Container, Fig. 2 Olive jar styles according to Goggin (*upper* rows, not to scale) and form types as proposed by James (*lower* row). (Adapted from Goggin (1960: 28) and James (1988: 48))

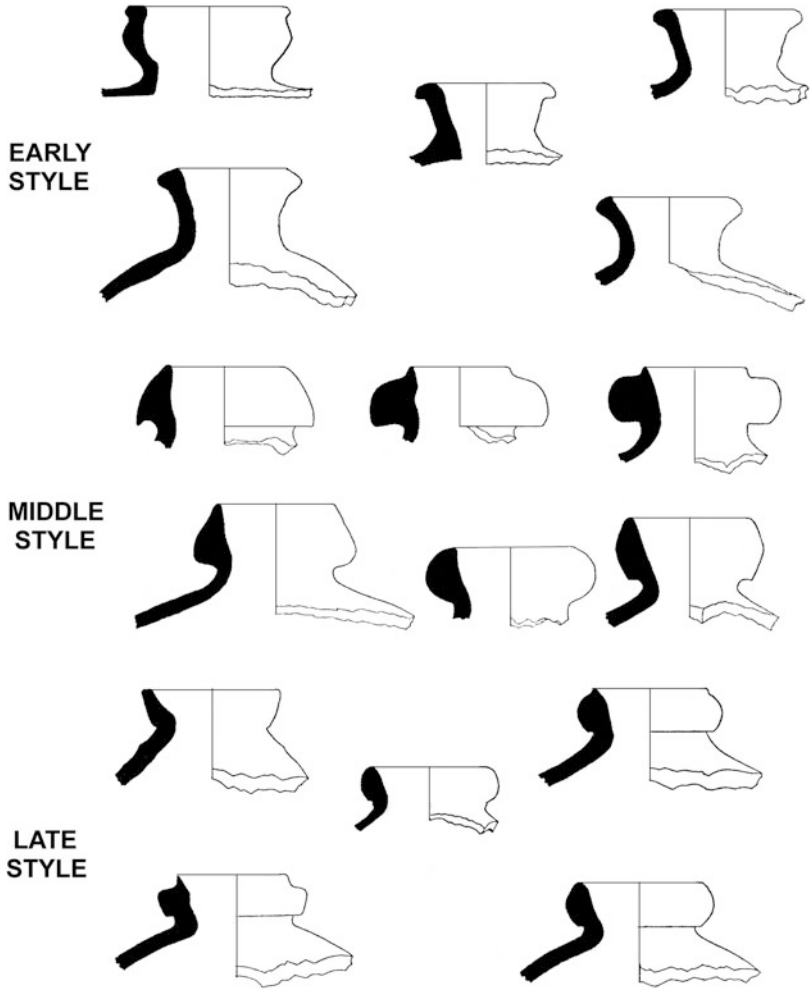

Ceramics: The Ibero-American Shipping Container, Fig. 3 *Botija* rim profiles and styles as proposed by Goggin. (Adapted from Goggin (1960: 10, 13, 19))

Documentary evidence (e.g., Zunzunegui 1965) indicates that both vessel varieties were wrapped in a protective matting of woven bands of esparto grass to which two handles were attached, using the same material.

Data from ship registers indicate that wine and olive oil were always a cargo item on each ship. The two products were packed, but not exclusively, in the globular or conical ceramic containers. They also indicate that the following list of products could, from time to time, be packed in the same kind of containers: vinegar, honey, olives, almonds, capers, chickpeas, hazelnuts, rice, tuna, myrrh, various types of fragrant oils, raisins, figs, eggplant, flour, pitch, soap, brandy, lard, gunpowder, and the accompanying, round, lead shot for firearms (e.g., James 1988; Velasquez and Fournier in press). However, register entries mentioning these products also indicate that they were shipped in barrels (a preferred method for some items) or in other types of ceramic containers for which there are no descriptions.

Spanish ceramic shipping containers were recycled both in Spain and in its colonies. In Spain they were used as filler material in walls and as structural support in the construction of vaulted ceilings, and they were sometimes buried below floors to prevent ground moisture from seeping up (Amores Carredano and Chisvert Jiménez 1993). In the colonies they served the same purpose but were also used in domestic contexts for storing water, beer, and certain dry goods, such as flour, corn, and beans, and in military contexts for storing water. They may also have served to pack New World exports, such as pearls

Ceramics: The Ibero-American Shipping Container, Fig. 4 *Botija* rim marks from archaeological samples found in the former monastery of Santo Domingo, Guatemala (*upper* rows), and in different excavations at the historic district of Mexico City (*lower* two rows)

Ceramics: The Ibero-American Shipping Container, Fig. 5 Example of a small Peruvian *botija* from monastery of Santo Domingo (Guatemala). The mouth rim was reworked in the recycling process to make it larger

from Venezuela and *bálsamo* (balm) from Central America, for shipment to Spain.

Portugal, on the other hand, adopted and tended to maintain a wheel-thrown, globular, two-handled vessel for its oceanic commerce. However, archaeological evidence from the wreck of a Portuguese vessel off the coast of Mombasa, Kenya, appears to indicate the introduction of an elongated, two-handled version not previously mentioned (Sassoon 1981). To date, none of the vessels show indications of glazing. There is no evidence that these vessels were known locally as other than *anforetas/botijuelas* that they had rim or shoulder marks or that they were wrapped in matting. No studies have indicated changes over time to the triangular-profile, neck rims. The only products known to have been shipped in them were wine and olive oil, destined for merchants in northern Europe, in Newfoundland, in present-day Canada, and probably African or Asian Portuguese settlements. There is no evidence of recycling; in fact, they are reported as having been thrown away when empty (Newstead 2008). The "amphora-like" vessel called *anforeta* appears to be of Spanish origin.

The introduction of wine industries in some of the Spanish-American colonies appears to have created the need for the local production of ceramic containers in which wine could be distributed. Evidence has been published recently that shows that *botijas* were definitely produced in at least Peru's Moquegua wine region (e.g., Rice 2010: 44, Fig. 9) (Fig. 5), in the Mendoza region of Argentina (Ceruti 2005), but only possibly in present-day Chile (e.g., Lacoste 2007).

Peruvian wine appears to have had a wide distribution. *Botijas* from that colony have been found in Panama (Rovira 1983: 24) and in Guatemala. One example has been located on an island in the South Pacific, believed to have been brought on a ship that set sail from Peru to explore that part of the world (Bedford et al. 2009: 82, Fig. 2).

Published photographs indicate that the conical vessels were long and wide, had no neck rims, and were stoppered with something other than cork. Unpublished physical evidence from Guatemala shows that there were two sizes. The smaller

vessel had a length of at least 51.5 cm and a diameter of 29.3 cm. The larger vessel had a length of at least 91.2 cm and a diameter of 40.8 cm. Both vessels had wall thicknesses ranging from 2.5 to 3.0 cm. The interior of the wall was covered with pitch. Like Spanish *botijas*, they were recycled, but to do so it appears that the recycler reworked the mouth opening to make it larger. Oral tradition in Guatemala suggests that these reworked Peruvian *botijas* were set into the ground and used for fermenting clandestine liquor. Their sheer weight probably precluded them from being used in vaulted roof construction.

The early planting of olive trees in Peru seems to have resulted in a high level of local olive oil production prior to 1650 and the need for *botijas* in which to pack and distribute the oil. If those *botijas* have been found, they have not been identified as non-Iberian.

Current Debates

The current debates on ceramic shipping containers can be framed in terms of four perspectives: (1) defining the types of vessels that represent the full range of ceramic shipping containers; (2) finding an agreed-upon nomenclature for this group of vessels, which could be translated and understood easily from one language to another; (3) discovering the centers of production and determining the ceramics ecology involved in the production process of each vessel type; and (4) determining the processes followed to fill them and to transport them to ports for maritime shipment or to commercial centers for overland transport within a specific region. The level of these debates varies by investigative area.

Spanish America

The Spanish "ceramic shipping container" has undergone considerable archaeological debate within the realm of Spanish-American archaeological studies since 1960, when John M. Goggin (1960) gave it a ceramic-type name "the Olive Jar" and provided a definition, a description, and a dating chronology. However, he made four things clear: (1) his work was "an initial contribution"; (2) he found fragments of "extremely large vessels" with olive jar paste and neck rims similar to those of his studied vessels, but that he excluded them; (3) "olive jars... are a useful time marker for... a primary Colonial situation or in an aboriginal contact situation... Other Spanish ceramics, such as majolica, are more precise time markers"; and (4) they are sturdy vessels that can be seen still – used for multiple domestic purposes in Latin America.

In summary, through his investigations in Spanish colonial sites in and around the Caribbean, he divided his olive jar findings into three datable styles: Early (CE 1500–1580), Middle (CE 1580–1800), and Late (post CE 1800); and into four vessel shapes: A, B, C, and D (Fig. 2). Within each style/shape combination, he noted that the profile of the vessel's rim changed (Fig. 3). He made no attempt to date those changes nor suggested that there might be some significance associated with those changes.

It was through subsequent investigations that debates were opened regarding Goggin's findings. They began with Zunzunegui (1965), who expanded upon Goggin; were continued by James (1988), Marken (1994), and Avery (1997), who questioned some of his findings; and have been kept ongoing by many others (e.g., Carruthers 2003; Velasquez and Fournier in press).

There appears to be no consensus on the definition of a colonial, ceramic shipping container. If, in Greco-Roman times, it was defined by the "carrot-shaped" amphora, Goggin accepted that in his study but was forced to include the globular vessels also used in Spanish colonial, maritime commerce. Subsequent writers have brought into the discussion flat-bottomed containers, with their myriad of shapes and sizes (e.g., James 1988; Marken 1994).

There is still some question about the manufacturing process for the earliest globular vessels (two sections or a single wheel throwing) and for the large conical vessels, as well as the process followed to "add" the neck rims of both varieties (e.g., Avery 1997).

There is no consensus on a name for the vessels. Goggin established "olive jar" as his translation of the Spanish term *botijuela*, which appears in colonial Spanish documents. Therein lies the problem. *Botijuela* is the name of the container,

without reference to its use or future contents. Perhaps for this reason, as time passes, English speakers seem to be coming more comfortable with using the Spanish term *botija* when discussing ceramic shipping containers made in Spain and Latin America.

From the number of proposals presented, a seemingly endless list can be made of the products that may have been packed into Spanish ceramic shipping containers. For many of the proposals, arguments have been put forward clearly refuting them, resulting in no clear definition. Only Avery (1997) appears to have attempted to analyze changes over time – from the use of ceramic containers to non-ceramic and vice versa.

Suggestions have been put forward, but an agreement has yet to be reached on the significance, if any, of the marks placed on the rim or shoulder and/or "painted" on the body of Spanish vessels, something that has not been noted on vessels produced in other countries.

Spain

Goggin knew that the manufacturing center for the ceramic shipping containers he discussed was Spain, in particular the area in and around Seville. Spanish archeologists do not disagree, but they claim that they have problems applying his work in their country. From evidence found in datable architecture, Amores Carredano and Chisvert Jiménez (1993: 306–11, Figs. 39–88), for example, eliminate the Early Style round vessel from Goggin's list, saying that it is a *cantimplora* (canteen) not a *botija* (Amores Carredano and Chisvert Jiménez 1993: 281). They eliminate the Middle and Late Style designations for the conical vessel, saying that the two existed simultaneously (Amores Carredano and Chisvert Jiménez 1993: 284). They add to Goggin's list the flat-bottomed vessels discussed in James (1988: Fig. 4) (Fig. 2) and add two more with the same basic form but with handles (Amores Carredano and Chisvert Jiménez 1993: Figs. 84–88).

Portugal and Its Trade Routes

Goggin did not investigate or consider Portuguese examples of ceramic shipping containers. Thus, his work is of little use to investigators working in Canadian sites that traded with Portugal or in West African sites that were on Portugal's trade route to the Orient. Portuguese shipping containers have been found in both areas. They may be present in Japan. Surprisingly, they are reportedly absent from Portugal's own archaeological sites. Current debates are of an investigative nature, using the *anforeta/botijuela* as an element in defining the extent of Portuguese colonial trade networks.

Peru, Argentina, and Chile

As with Portugal, the debates in Peru, Argentina, and Chile are investigative, focusing on finding the production centers, defining the forms, and understanding the extent of their respective distribution networks.

Future Directions

Olives, olive oil, and wine were characteristic of Mediterranean cuisine. As a result vines and olive trees were brought to the Iberian colonies in the New World, and wine and olive oil industries developed in several regions of the Americas in the 1500s. However, most were either unsuccessful or banned by Crown policies protecting domestic production and exports to the colonies. Notable exceptions were the wineries in South America, for example, in the Peruvian Moquegua Valley (e.g., Rice 2010), supplying consumers at mining towns such as Potosí in modern Bolivia.

In Spanish-American colonies, the incorporation of indigenous material culture was partial, and Old World food and drink as commodities remained as signifiers of group culture and identity. The so-called olive jars as containers were mainly used for storage and for transporting goods by sea from the Iberian Peninsula to the Americas, Africa, and Asia, where they were reused as containers or for architectural purposes, where they were used to lighten the weight of vaults and as fill in floors.

They represent, to a certain extent, evidence of consumption trends among colonists of European descent who replicated foodways from the homeland, as well as colonialism processes and the rise of the modern world system.

Additional research is needed on samples from the Iberian Peninsula and sites all over the world

where fragments of the ubiquitous shipping containers have been found, especially compositional studies by means of neutron activation analysis. Petrography may also be used but, so far, the results have not proven to be accurate enough to determine production locales. Future studies may provide direct evidence for site-specific production, identifying manufacturing centers with more precision, as well as the ancillary industries such as those producing the matting used to protect the vessels during transportation, thus furthering our knowledge of trade networks largely controlled by the Iberian monarchies from the late fifteenth to the early nineteenth century.

Cross-References

- ▶ Argentina: Maritime Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Caribbean Maritime Archaeology
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Ceramics: Scientific Analysis
- ▶ Colonial Encounters, Archaeology of
- ▶ Colony of Avalon Archaeological Site
- ▶ Consumption, Archaeology of
- ▶ Goggin, John M.
- ▶ Hispanic South America: Historical Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Mexico: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Portuguese Redwares and Coarse Wares in Historical Archaeology
- ▶ Post-Medieval Archaeology (Europe)

References

Avery, G. 1997. *Pots as packaging: The Spanish olive jar and Andalusian transatlantic commercial activity: 16th–18th centuries*. Unpublished Ph.D. dissertation, University of Florida. Available at: http://archive.org/details/potsaspackagings00aver. Accessed 23 Oct 2012.

Bedford, S., W.R. Dickinson, R.C. Green, and G.K. Ward. 2009. Detritus of Empire: Seventeenth century Spanish pottery from Taumako, southeast Solomon Islands, and Mota, northern Vanuatu. *The Journal of the Polynesian Society* 118: 69–89.

Carruthers, C. 2003. Spanish *botijas* or olive jars from the Santo Domingo monastery, La Antigua Guatemala. *Historical Archaeology* 37 (4): 40–45.

Ceruti, C.N. 2005. Evidencias del contacto hispano-indígena en la cerámica de Santa Fe la Vieja (Cayastá). *Revista América* 17. Available at: http://www.cehsf.ceride.gov.ar/america_17/03-ceruti_ceramica.html. Accessed 18 Oct 2012.

de Amores Carredano, F., and N. Chisvert Jiménez. 1993. Tipología de la cerámica común bajomedieval y moderna sevillanas (siglos XV–XVIII): I, la loza quebrada de rellenos de bóveda. *SPAL* 2: 269–325. Available at: dialnet.unirioja.es/descarga/articulo/176593.pdf. Accessed 23 Oct 2012.

Gestoso y Pérez, J. 1995. *Historia de los barros vidriados sevillanos desde sus orígenes hasta nuestros días*. Facsimile of the 1903 edition. Sevilla: Excelentísimo Ayuntamiento de Sevilla.

Goggin, J.M. 1960. *The Spanish olive jar. An introductory study*, Yale University Publications in Anthropology 62. New Haven: Yale University.

James, S.R., Jr. 1988. A reassessment of the chronological and typological framework of the Spanish olive jar. *Historical Archaeology* 22 (1): 43–63.

Lacoste, P. 2007. La hacienda vitinícola (Mendoza y San Juan, siglo XVIII). *Universum* 22 (1): 152–185.

Marken, M.W. 1994. *Pottery from Spanish shipwrecks*. Gainesville: University Press of Florida.

Newstead, S. 2008. *Merida no more: Portuguese redware in Newfoundland*. Master's dissertation, Memorial University of Newfoundland.

Rice, P.M. 2010. La industria vitivinícola colonial de Moquegua, Perú. *Estudios Avanzados* 14: 29–62.

Rovira, B. 1983. *Cerámica histórica en el istmo de Panamá*. Panamá: Instituto Nacional de Cultura.

Sassoon, H. 1981. Ceramics from the wreck of a Portuguese ship at Mombasa, Azania. *Archaeological Research in Africa* 16: 97–130.

Velasquez, V., and P. Fournier. in press. Cultura material, identidad y botijas en Nueva España. In *Homenaje a Thomas H. Charlton. Enfoques en torno a la Arqueología Histórica Mesoamericana*, ed. P. Fournier and W. Wiesheu. México: Instituto Nacional de Antropología e Historia.

Zunzunegui, A.P. 1965. Recipientes cerámicos utilizados en el comercio de Indias. *Boletín Americanista* 19–27: 21–38. Available at: http://www.raco.cat/index.php/BoletinAmericanista/article/view/98371/164467. Accessed 21 Oct 2012.

Further Reading

Allan, J.P. 1999. Producers, distributors and redistributors: The role of the south western ports in the 17th century

ceramics trade. In *Old and new worlds*, ed. G. Egan and R.L. Michael, 278–288. Oxford: Oxbow Books.

Arduengo García, D.A. 2008. *Las botijas (olive jars). Su reutilización en tres construcciones coloniales habaneras*. Paper presented at the VII Congreso Internacional Patrimonio Cultural: Contexto y Conservación, Centro Nacional de Conservación, Restauración y Museología. Available at: http://www.cubaarqueologica.org/document/darwin.pdf. Accessed 3 Oct 2012.

Brizuela Casimir, A.M. 2002. Las peruleras del pozo de Casas Terrin (Panamá la Vieja). Propuesta tipológica inicial de las botijas. *Arqueología de Panamá La Vieja* 134–154.

Bruseth, J.E., J.J. Durst, T. Osburn, K. Gilmore, K. Hindes, N. Reese, B. Meissner, and M. Davis. 2004. A clash of two cultures: Presidio La Bahía on the Texas coast as a deterrent to French incursion. *Historical Archaeology* 38 (3): 78–93.

Carter, J. 1982. Spanish olive jars from Fermeuse harbour, Newfoundland. *Material History Bulletin, National Museum of Canada* 16: 99–108.

de Mello, U.P. 1979. The shipwreck of the galleon Sacramento-1668 off Brazil. *The International Journal of Nautical Archaeology and Underwater Exploration* 8: 211–223.

Deagan, K. 1987. *Artifacts of the Spanish colonies: Florida and the Caribbean, 1500–1800. Volume I: ceramics, glassware, and beads*. Washington, DC: Smithsonian Institution Press.

Escribano Cobo, G., and A. Mederos Martín. 1999. Distribución y cronología de las botijas en yacimientos arqueológicos subacuáticos de la Península Ibérica, Baleares y Canarias. *Cuadernos de Arqueología Marítima* 5: 177–201.

Fitzhugh, W.W., A. Herzog, S. Perdikaris, and B. McLeod. 2011. Ship to shore: Inuit, early Europeans, and maritime landscapes in the northern Gulf of St. Lawrence. In *The archaeology of maritime landscapes*, ed. B. Ford, 99–128. New York: Springer.

Fournier, P., and M.J. Blackman. 2008. *Production, exchange and consumption of glazed wares in New Spain: Formation of a database of elemental composition through INAA*. Florida: Foundation for the Advancement of Mesoamerican Studies. Available at: http://www.famsi.org/reports/06014/index.html. Accessed 23 Oct 2012.

García Fuentes, L. 1980. *El Comercio Español con América (1650–1700)*, Sevilla, Excma. Diputación Provincial de Sevilla and Escuela de Estudios Hispanos-Americanos de Sevilla.

Gums, B.L. 2002. Earthfast (Pieux en Terre) structures at Old Mobile. *Historical Archaeology* 36 (1): 13–25.

Gutiérrez, A. 2007. Portuguese coarsewares in early modern England: Reflections on an exceptional pottery assemblage from Southampton. *Post Medieval Archaeology* 41: 64–79.

Halpin, E. 1996. Excavations at St. Mary d'Urso, Drogheda, County Louth. *Journal of the County Louth Archaeological and Historical Society* 23: 452–509.

Hurst, J.G., D.S. Neal, and H. van Beuningen. 1986. *Pottery produced and traded in north west Europe 1350–1650*, Rotterdam papers 4. Rotterdam: Museum Boymans-van Beuningen.

Iglesias Gómez, L.M. 2007. *La transferencia de tecnología agronómica de España a América de 1492 a 1598*. Madrid: Ministerio de Industria, Turismo y Comercio.

Jamieson, R.W., and R.G.V. Hancock. 2004. Neutron activation analysis of colonial ceramics from southern highland Ecuador. *Archaeometry* 46: 569–583.

Kawaguchi, Y. 2011. The newly found olive jars in Japan and their historical significance. *Sokendai Review of Cultural and Social Studies* 7: 123–129.

L'Hour, M. 1993. The wreck of a Danish merchant ship, the *Sainte Dorothea* (1693). *The International Journal of Nautical Archaeology* 22: 305–322.

Lister, F.C., and R.H. Lister. 1976. *A descriptive dictionary for 500 years of Spanish-tradition ceramics, 13th through 18th centuries*, Special Publications series 1. Columbia: The Society for Historical Archaeology.

Lister, F.C., and R.H. Lister. 1981. The recycled pots and potsherds of Spain. *Historical Archaeology* 15 (1): 66–78.

Lister, F.C., and R.H. Lister. 1987. *Andalusian ceramics in Spain and New Spain*. Tucson: The University of Arizona Press.

Martin, C.J.M. 1979. Spanish Armada pottery. *International Journal of Nautical Archaeology and Underwater Exploration* 8: 279–302.

Mena García, C. 2004. Nuevos datos sobre bastimentos y envases en armadas y flotas de la Carrera. *Revista de Indias* 64: 447–484.

Mintz, J.J., and T. Beaman Jr. 1997. Invaded or traded? Olive jars and oil jars from Brunswick Town. *North Carolina Archaeology* 46: 35–50.

Ortiz-Troncoso, O.R. 1992. Un alcance al tema de la cerámica hispana en Patagonia Austral. *Journal de la Société des Américanistes* 78: 73–85.

Pleguezuelo, A., A. Librero, M. Espinosa, and P. Mora. 1999. "Loza quebrada" procedente del colegio-universidad de Santa María de Jesús (Sevilla). *SPAL* 8: 263–292.

Sánchez, J.M. 1996. La cerámica exportada en el siglo XVI a través de la documentación del Archivo General de Indias (I). *Laboratorio de Arte* 9: 125–142 Available at: dialnet.unirioja.es/descarga/articulo/1343175.pdf. Accessed 23 Oct 2012.

Skowronek, R.K. 1987. Ceramics and commerce: The 1554 *flota* revisited. *Historical Archaeology* 21: 101–111.

Skowronek, R.K. 1998. The Spanish Philippines: Archaeological perspectives on colonial economics and society. *International Journal of Historical Archaeology* 2: 45–71.

Soldi, A.M. 2006. La vid y el vino en la costa central del Perú, siglos XVI y XVII. *Universum* 21: 42–61.

Walthall, J.A. 1991. An analysis of late eighteenth century ceramics from Arkansas Post Atecores. *Southeastern Archaeology* 10: 98–113.

Chaco Canyon, Archaeology of

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Introduction/Definition

Chaco Culture National Historical Park, in northwestern New Mexico, USA, preserves the ruins of eight major and many smaller "Great Houses" (Lekson 1986) – large, impressive masonry buildings which represent a critical, eleventh-century-CE episode in the prehistory of the Pueblo Indian tribes and other native groups in the US Southwest (Fig. 1). The largest Great House, Pueblo Bonito, was a giant "D"-shaped building with carefully crafted sandstone walls standing five stories tall. Its 600-plus rooms and enclosed plaza cover almost one hectare. The Great Houses were built with an investment of labor and a precision of form seldom seen at other Southwestern sites. Tens of thousands of wood beams for roofs were carried into Chaco from distant forests; many hundreds of laborers marshaled for construction events. The Great Houses were planned as defined geometric forms, skillfully aligned to the sun, moon, and cardinals (Fig. 2). Excavations produced extraordinary assemblages of artifacts, of Southwestern and Mesoamerican origins. Impressive numbers of pots, lithic materials, foodstuffs, and so forth were brought to Chaco from substantial distances. (This essay is based on data summarized in Lekson 2006, 2007, 2009; see also Vivian 1990; Mills 2002; Noble 2004; Van Dyke 2007; Chaco Research Archives 2012).

Chaco Canyon, as a UNESCO World Heritage Site, is a major tourism destination within the US Southwest. In part, Chaco's attraction is its improbability, an unlikely setting for such impressive ruins (Fig. 1). Chaco Canyon is a remote, unremarkable, sandstone canyon with few resources. Water is scarce, wood for construction and fuel is (and was) almost nonexistent, and the canyon is a poor place for corn (maize) farming – the key crop of Chaco's times. Yet, Chaco's ruins are the largest, most famous monuments in the US Southwest. Great Houses at Chaco represent something of a "mystery" – a mystery polished by the popular press, by local heritage tourism industries and New Age communities, and – to some extent – by archaeology.

Key Issues/Current Debates

Archaeological research began at Chaco in the late nineteenth century and continued, with occasional pauses, to the present (Lister and Lister 1981; Frazier 2005). The ruins were originally interpreted as "Pueblos" – independent, egalitarian farming villages, much like those of modern Pueblo Indians in New Mexico – curiously jammed into an improbable canyon. By the 1950s, the "Pueblo" view was no longer tenable (Vivian and Mathews 1965): Chaco was not a canyon of "Pueblos"; rather, Chaco was a complex settlement of many differing structures and edifices. Great Houses contrasted sharply with far more numerous, normal family houses (six rooms and a "kiva"). The total floor space of a normal house was about equal to a single room at Pueblo Bonito. Chaco Canyon, while dominated by Great House ruins, was home to hundreds of normal families. Based on burial data, the Great House residents were of markedly higher status (Akins 2003; Plog and Heitman 2010). The variety of structures suggests a polyglot, multiethnic population (Vivian and Mathews 1965). Moreover, tree-ring dating (developed in part at Chaco in the 1920s) demonstrated that Chaco was alarmingly early, dating to the eleventh and early twelfth centuries CE, compared to the thirteenth-century-CE cliff dwellings of Mesa Verde and later iconic ruins.

Research in the 1970s revealed Chaco as a regional center, its hinterlands defined by 150 smaller Chaco-style Great Houses scattered over an area the size of Ireland, densely dotted with thousands of normal homes. Normal homes housed 95% of Chaco's people; less than 5% lived in Great Houses. Chaco's region was held together, symbolically and materially, by an unprecedented network of "roads" (yet Chaco

Chaco Canyon, Archaeology of, Fig. 1 Chetro Ketl, the second largest Great House at Chaco Canyon. Constructed 1000–1125

lacked wheels and beasts of burden) and by an extensive line-of-sight signaling systems. The roads and signaling systems, radiating out from Chaco Canyon, linked distant Great Houses back to the center. Chaco's region is gratifyingly clear, and Chaco Canyon was clearly its center. Pueblo Bonito, it seems, was but one element of a 10-km diameter aggregation of Great Houses and normal homes, platform mounds, and other monuments, built to an urban plan that almost certainly reflected Chaco cosmology, on monumental scales (Van Dyke 2007).

Chaco's archaeology far exceeded anything archaeologists expected to see in the Pueblo Southwest. Chaco became a "phenomenon" or, more recently, a "mystery." Archaeology, to some extent, fosters that "mystery": Chaco scholars offer a bewildering range of interpretations, leading many to conclude that Chaco must remain unsolvable – and, therefore, mysterious.

Current interpretations form three themes: Chaco as Pueblo, Chaco as Uniquity, and Chaco as Polity. "Chaco as Pueblo" maintains that Chaco – whatever it was – will best be understood through the lens of Pueblo ethnology and traditions (e.g., essays in Ware 2001; Mills 2004; Noble 2004; Fagan 2005). Ethnographies and Pueblo traditions both provide significant insights, but Pueblo ethnographies and Pueblo traditions have no place for a predominant regional center – each Pueblo is independent and owes nothing to other Pueblos save benign ties of kinship and ceremony. Pueblo life revolves around ritual and ceremony, to the exclusion of centralized power. Pueblos are famously egalitarian; Chaco was not.

"Chaco as Uniquity" recognizes several interesting, if slightly outré, interpretations which see Chaco as something previously unknown in the Southwest – but still congruent with Puebloan emphasis on ritual and ceremony. For example, Chaco as a pilgrimage center: an empty valley periodically thronged by pilgrims, much like Mecca (Malville and Malville 2001). That

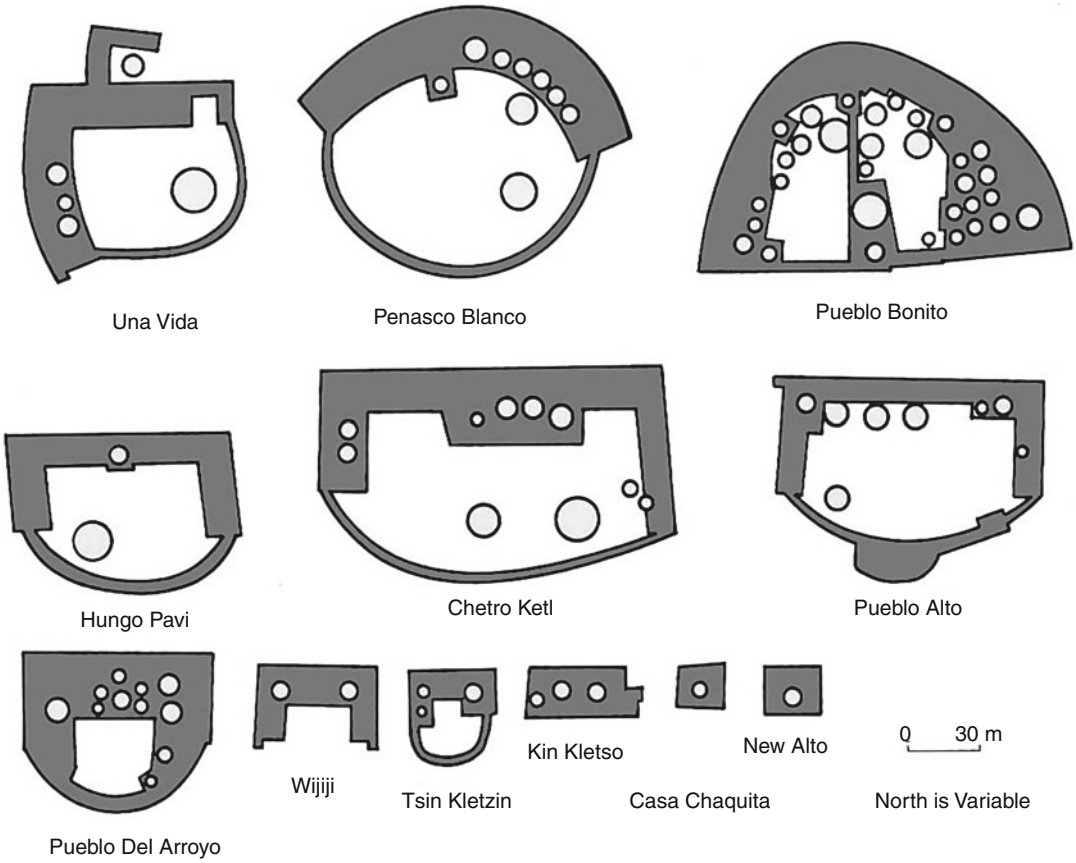

Chaco Canyon, Archaeology of, Fig. 2 Ground plans of major Chaco Canyon Great Houses

interpretation is widely accepted. Mecca, however, and most New World pilgrimage centers were bustling cities, for example, Cholula, the preeminent pilgrimage center in ancient Mesoamerica. Chaco may have served as a focus for pilgrimage but probably not as an empty ceremonial center – in short, a uniquity.

Before accepting unique interpretations, consider a better grounded alternative: "Chaco as Polity." North America in Chaco's time was awash with "chiefdoms," city-states, and empires; that was Chaco's world, the context in which Chaco rose and fell. And Chaco has all the hallmarks of a political capital, a seat of power. Great Houses are quite obviously elite housing (and more, of course). Chaco's control of labor and materials (quotidian and prestigious) would be notable in a (small) Mesoamerican capital. Indeed, that is what Chaco was: "Chaco as Polity" – or, rather, "Chaco as [Mesoamerican] Polity." Not a polity created by Mesoamericans but a local manifestation of a Mesoamerican ideal. The typical Mesoamerican polity was a small city-state or (in Nahua) *altepetl*: an association of a half-dozen or more noble families, each with its own palace ("noble house") in the central capital – which could be surprisingly small, Chaco-sized (Hirth 2003; Smith 2008). The noble families were equal; they elected from their ranks a king who ruled for life and later elected his replacement. City-states typically had from 10,000 to 40,000 commoners (Hodges 1997: 218; Smith 2008: 90), and each commoner family was tributary to a particular noble family or lineage. Indeed, the relationships of nobles and commoner defined the *altepetl*.

That model fits Chaco like a glove: a small city of perhaps 2500 people (about one-third of documented *altepetl* capitals were under 3000; Smith 2008: 152), dominated by eight Great Houses and many lesser monuments, with roads radiating out into pie-chart hinterlands encompassing – at a guess – around 50,000 commoners (a guess, but a good guess). The basic model and the demographic scales are consistent with *altepetl* organization; the major difference was regional scale. Most Mesoamerican polities were small, perhaps 50 km in diameter. Chaco reached ten times that far, with outermost Great Houses 250 km from the center. The difference lies, almost certainly, in the productive challenges of the desert Southwest compared to the tropical luxuriance of Mexico. In Mesoamerica, lots of food could be grown in relatively small areas; in the Southwest, arable lands were limited, patchy, and scattered. Chaco invented or adopted technologies to adapt *altepetl* organization to its deserts: roads and signaling systems overcame distances.

This is not to say that Mesoamerican nobles created Chaco. Rather, Chaco nobles-manqué adopted Mesoamerican forms. To legitimize their status, they probably visited southern (see Helms 1988). Chaco elites employed Mesoamerican objects and ideas (for example, macaw feathers, copper bells, and colonnades); they drank cacao (Crown and Hurst 2009). It is useful to imagine that Chaco elites considered themselves "Mesoamerican" (or whatever the appropriate term for Chaco's time) – that was, after all, their world, their frame of reference. In any event, Chaco elites adopted or coevolved a ubiquitous Mesoamerican form for their local polity: Chaco was an *altepetl* city-state.

Questions of this sort are often framed as discrete Mesoamerican "influences" in a conceptually distinct Southwestern region; but surely, it is more realistic to consider the US southwest as a northwestern frontier of Mesoamerica. Current archaeological frameworks perpetuate the separation of US and Mexican prehistories by a colonial border created by a war waged in 1846–1847. That border did not exist in Chaco's time. Accepting a more realistic framework for the question renders Chaco far less mysterious but no less interesting.

Construction at Chaco Canyon ended around 1125 CE. Not coincidently, a new capital rose at Aztec Ruins, about 60 km due north of Chaco about 1110 CE. That capital flourished for a generation; a major drought from 1130 to 1150 started a chain of events that culminated in warfare and the collapse of Aztec Ruins and the abandonment of its region, which included the cliff dwellings and towns of Mesa Verde.

Chaco Canyon (as "White House" and other names) figures in many Pueblo traditional histories, and Pueblos claim it as an ancestral site. The Navajo Nation includes several clans with strong claims to Chaco. Chaco has other constituencies; it was a major site of the New Age "Harmonic Convergence" of 1987, and it appears prominently in current chatter about the "Maya calendrical cycle" of 2012. With a remarkable flurry of publications and videos in the early 2000s (e.g., Fagan 2005), Chaco has probably supplanted Mesa Verde as the most famous site in the US Southwest.

Cross-References

► Pueblo Bonito
► Tenochtitlan (Aztec): Geography and Culture

References

Akins, N.J. 2003. The burials of Pueblo Bonito. In *Pueblo Bonito: Center of the Chacoan world*, ed. J.E. Neitzel, 94–106. Washington (DC): Smithsonian Books.

Chaco Research Archive. 2012. Available at: www.chacoarchive.org/. Accessed 21 Nov 2011

Crown, P.L., and W.J. Hurst. 2009. Evidence of cacao use in the Prehispanic American Southwest. *Proceedings of the National Academy of Science* 106: 2110–2113.

Fagan, B. 2005. *Chaco Canyon*. Oxford: Oxford University Press.

Frazier, K. 2005. *People of Chaco*. New York: W.W. Norton.

Helms, M.W. 1988. *Ulysses' sail: An ethnographic odyssey of power, knowledge, and geographical distance*. Princeton: Princeton University Press.

Hirth, K.G. 2003. The altepetl and urban structure in Prehispanic Mesoamerica. In *El urbanismo en mesoamérica/Urbanism in Mesoamerica, volume 1*, ed. A.G. Mastache, R.H. Cobean, Á.G. Cook, and K.G. Hirth, 57–84. Mexico: Instituto Nacional de Antropología e Historia.

Hodges, M.G. 1997. When is a city-state? Archaeological measure of Aztec city-states and Aztec city-state systems. In *The archaeology of city-states: Cross-cultural approaches*, ed. D.L. Nichols and T.H. Charlton, 209–227. Washington (DC): Smithsonian Institution Press.

Lekson, S.H. 1986. *Great pueblo architecture of Chaco Canyon*. Albuquerque: University of New Mexico Press.

Lekson, S.H., ed. 2006. *The archaeology of Chaco Canyon: An eleventh-century Pueblo Regional Center*. Santa Fe: School of American Research Press.

Lekson, S.H., ed. 2007. *The architecture of Chaco Canyon, New Mexico*. Salt Lake City: University of Utah Press.

Lekson, S.H. 2009. *A history of the ancient Southwest*. Santa Fe: SAR Press.

Lister, R.H., and F.C. Lister. 1981. *Chaco Canyon; archaeology and archaeologists*. Albuquerque: University of New Mexico Press.

Malville, J.M.C.K., and N.J. Malville. 2001. Pilgrimages and periodic festivals as processes of social integration in Chaco Canyon. *Kiva* 66: 327–344.

Mills, B.J. 2002. Recent research on Chaco: Changing views on economy, ritual and society. *Journal of Archaeological Research* 10: 65–117.

Mills, B.J. 2004. The establishment and defeat of hierarchy: Inalienable possessions and the history of collective prestige structures in the Pueblo Southwest. *American Anthropologist* 106: 238–251.

Noble, D.G., ed. 2004. *In search of Chaco: New approaches to an archaeological enigma*. Santa Fe: SAR Press.

Plog, S., and C. Heitman. 2010. Hierarchy and social inequality in the American Southwest, A.D. 800–1200. *Proceedings of the National Academy of Science* 107: 19619–19626.

Smith, M.E. 2008. *Aztec city-state capitals*. Gainesville: University Press of Florida.

Van Dyke, R.M. 2007. *The Chaco experience: Landscape and ideology at the center place*. Santa Fe: SAR Press.

Vivian, R.G. 1990. *The Chacoan prehistory of the San Juan Basin*. San Diego: Academic Press.

Vivian, R.G., and T.W. Mathews. 1965. *Kin Kletso: A Pueblo III community in Chaco Canyon, New Mexico (Technical Series 6(1))*. Tucson: Southwest Parks and Monuments Association.

Ware, J.A. 2001. Chaco social organization: A peripheral view. In *Chaco society and polity: Papers from the 1999 conference (Special Publication 4)*, ed. L.-S. Cordell, W.J. Judge, and J. Piper, 79–93. Albuquerque: New Mexico Archaeological Council.

Chaloupka, George

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Basic Biographical Information

George Jiri Chaloupka (1932–2011) was the Northern Territory's leading rock art specialist who advocated the critical need to preserve what he called the largest and most important rock art assemblage in the world. He grew up in the small town of Týniště nad Orlicí in Bohemia Czechoslovakia, shortly before its Nazi occupation between 1938 and 1945. Three years after this, Czechoslovakia's fledgling democracy was destroyed by a communist coup d'état that George desperately wanted to escape. So he and his brother Milo fled separately and were eventually reunited in Perth, Western Australia, after George arrived in 1950 as an assisted refugee. In Perth, George met Indigenous members of the Coolbaroo League and soon married Janet Davey whose sister Maureen married Milo. In 1956 they all set out to see the Melbourne Olympic Games, taking a circuitous road trip via Darwin in the Northern Territory. George instantly fell in love with the tropical climate and the vibrant multicultural society of this remote capital along with Janet, who felt her Noongar Indigenous

heritage could be accepted here for the first time. Darwin subsequently became the couple's lifelong home along with their children Roman, Evelyn, and Pearl.

George's first job in 1956 was working as a government hydrologist for the Water Resources Branch, investigating remote rivers and watercourses like the East Alligator River system where he saw his first Aboriginal rock painting. It was an epiphany for George who recalls, "I stood spellbound by their magic, captivated by their unique form and the brilliance of their execution" (Chaloupka, George, 1993. Journey In Time, p. 8).

Although he had no formal qualifications, George started locating rock art galleries in his spare time and, given his growing reputation, was later employed in 1973 as a Field Researcher then Curator of Rock Art at the Museum and Art Gallery of the Northern Territory (MAGNT). From then on he dedicated his life to recording the region's rich rock art heritage and after his retirement in 1997 continued on as the Museum's Emeritus Curator of Rock Art. When he passed away in 2011, he was honored with a state funeral in the Anglican Church where he designed the contemporary stained glass window after Cyclone Tracy.

Major Accomplishments

George Chaloupka made a significant contribution to the study of Australian Aboriginal rock art that was still in its developmental stage before he arrived in Australia. As one of the first researchers to continuously engage in one art region over a long period of time, he established the distribution, diversity, and richness of a regional corpus of rock art by recording close to 3500 art sites in western Arnhem Land. These were often in rugged, remote parts of the escarpment only accessible by helicopter or on foot.

He also researched the art's continuing sociocultural significance for the various resident Bininj groups of the Arnhem Land Plateau and formed enduring friendships with traditional owners such as Nipper Kapirigi, Namingum, Bill Neidjie, and Bardayal Nadjamerrek among many others. In 1996 he honored his friend Nadjamerrek, with an interactive CD "Angkung Kunred, Wild Honey Country" documenting the artist's deep cultural knowledge of his clan lands.

George also recorded the rock art in other regions in the Northern Territory, including in Wardaman country near Katherine that is featured in the 1987 film "Land of the Lightning Brothers." This followed his film "Images of Man" on the rock art of Arnhem Land. He also produced a series of important research papers, lavishly illustrated reports, as well as his most significant publication on western Arnhem Land rock art, "Journey in Time." Throughout much of his professional career at MAGNT, George was aided by rock art assistant Pina Giuliani, who later became his second wife.

In films and publications, he promoted the beauty and significance of rock art and fought passionately for its conservation. Over the course of several decades of fieldwork, he built up a nationally important archive of images and their location, field notes, and uniquely important Indigenous accounts of the rock art, now held by MAGNT. He's probably best known for his proposed sequence of phases and changing art styles over a 50,000-year period, arguing for the deep antiquity of Kakadu rock art. He set out the first version of his rock art sequence at an Australian Institute of Aboriginal Studies conference in Canberra in 1974 at a time when detailed regional studies of style and sequence were unusual and before Lesley Maynard's seminal work put rock art studies on a new footing. Although George's strict linear chronology of stylistic sequences has since been critically revised by researchers such as Darrel Lewis and Michael Morwood, it exemplified his artistic approach to rock art which he declared could not be reduced to quantified analysis. This was quintessential George, with his irrepressible artistic temperament also expressed through his love of painting which he pursued in his home studio whenever he had time.

Throughout his life, George was also an outspoken advocate for Indigenous rights, and his opposition to uranium mining in the west Arnhem region was one of the factors that stalled Pan continental's plans to develop the Jabiluka mine. In 1978, he nominated the Djawumbu massif for

the Register of the National Estate and provided important anthropological information to the Aboriginal Land Claim that culminated in declaration of Kakadu National Park (Stage 1) in 1979. In this way he repaid his considerable debt to his Indigenous friends.

Awards

George was recognized during his lifetime for his considerable contribution to rock art research. He was the Inaugural President of the Australian Rock Art Research Association, won a Churchill Fellowship in 1983, was a recipient in 1986 of a research grant from the Australian Institute of Aboriginal and Torres Strait Islander Studies of which he was a member, and was a visiting fellow at the Department of Prehistory in the Research School of Pacific Studies at the Australian National University. He received an Order of Australia in 1990, was elected an Honorary Fellow of the Australian Academy of Sciences in 1997, received a Doctor of Letters from NTU (now Charles Darwin University) in 1998, and was awarded a Centenary Medal in 2001. In 2008 the MAGNT Foundation established the George Chaloupka Fellowship in his honor to promote and support the ongoing research and conservation of Aboriginal rock art. He would have approved of this initiative, having once commented, "I'd sell my soul to the devil for another lifetime. There are thousands of sites still out there that I will never see" (Smith, Mike, 2012, p. 134).

Cross-References

► Australian Rock Art
► Kakadu National Park: Rock Art

References

Chaloupka, G. 1984. *From palaeoart to casual paintings: The chronological sequence of Arnhem Land Plateau rock art*. Darwin: Northern Territory Museum of Arts and Sciences.

Chaloupka, G. 1985. Chronological sequence of Arnhem Land Plateau rock art. In *Archaeological research in Kakadu National Park*, ed. R. Jones, 269–280. Canberra: Australian National Parks and Wildlife Service.

Chaloupka, G. 1988. Rock art of the Northern Territory. In *The inspired dream: Life as art in Aboriginal Australia*, ed. M. West, 12–19. Darwin: Museums and Art Galleries of the Northern Territory, 110.

Chaloupka, G. 1992. Retouch events. In *Retouch: Maintenance and conservation of Aboriginal rock imagery*, ed. G.K. Ward, 12–16. Melbourne: Archaeological Publications.

Chaloupka, G. 1993. *Journey in time: The world's longest continuing art tradition: The 50,000 year story of the Australian Aboriginal rock art of Arnhem land*. Chatswood: Reed.

Gillespie, D., and G. Chaloupka. 1983. *The rock art sites of Kakadu National Park: Some preliminary research findings for their conservation and management*. Canberra: Australian National Parks and Wildlife Service.

Smith, M.A. 2012. Remembering George. *[Obituary for George Chaloupka] Rock Art Research* 29: 132–134.

C

Chami, Felix Arkard

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Basic Biographical Information

Felix Chami (1958–) a third child of coffee farmers, Arkardi and Rosalia Chami, was born in the Hai area of the Kilimanjaro Region of Northern Tanzania, an area occupied by the Chagga community. His parents being staunch Catholics, Chami professes the same faith. Felix is married to Evalista Chami, and they have three children.

Felix attended Ulali Primary School and later Maua Franciscan Seminary both in the Kilimanjaro Region before proceeding to Ilboru High School in the Arusha Region for his advanced secondary education. Thereafter he joined the University of Dar-es-Salaam where he graduated with a BA degree in sociology. After Dar-es-Salaam, between 1986 and 1988, he proceeded to Brown University in the USA for his MA Anthropology. It is at Brown that Chami first came into contact with archaeology, a discipline he liked and majored in. His major interest was in

the Iron Age of East Africa, and his dissertation was on the Early Iron Age of Limbo district on the Tanzania Coast. Between 1989 and 1988, Chami attended Uppsala University in Sweden for his PhD. This is where he refined his arguments on the East African Iron Age, and in his PhD thesis, he revolutionized the thinking that was then prevalent in the region regarding the Early Iron Age. He, for instance, showed that Kwale ware, which hitherto had been shown to be restricted to the coastal areas alone, was not so, that indeed it would be found even on the East African hinterland, and also that it was not homogenous as other scholars had previously argued. Chami also was instrumental in showing that the seventh-century local pottery previously known as Tana Ware and ascribed to the pastoralists was indeed associated with farming communities, and he argued that since incised triangles were the dominant motif and technique on these ceramics, the ware should be renamed Triangular-Incised Ware (TIW), a name that is used currently (Chami 2008a).

Felix started his working career as a tutorial assistant at the university of Dar-es-Salaam in 1986 before moving up the ladder and becoming a full professor of archaeology in 2003. Chami has also held visiting professorship in a number of universities that include the universities of Zimbabwe (2000); Bristol, UK (2002); Ulster (Coleraine) (2003); Legon, Ghana (2009); Comoro (2009); and INALCO, Paris (2010). He was also a visiting fellow at the Indian Archaeological Association Delhi/Allahabad Museum in 2004.

Other than his teaching responsibilities, Chami was, between 2003 and 2012, the general coordinator of the African Archaeology Network (AAN), a group of African archaeology scholars, and was in 2011 elected as a member of the UNESCO International Scientific Committee of the Slave Route. Chami is a member of several professional organizations that include the British Institute in Eastern Africa, Tanzania Association of Archaeologist and Paleoanthropologist, Historical Association of Tanzania, Society for Arabian Studies, African Archaeology Network, and Society of Africanist Archaeologists (SAFA).

Major Accomplishments

Chami can be said to be one of the new crops of African archaeologists who started questioning the paradigm that had existed in African archaeology for a long time; that, for instance, there was no connection between the coastal communities and those in the hinterland because the coastal communities were outward looking and therefore foreign (Chami 1992, 1994–1995). In his Masters and PhD dissertations, Chami, for instance, showed that the pottery type known as Kwale ware and ascribed to the Early Iron Age using communities was not only a coastal phenomenon but also was to be found in the interior (Chami 1994). Chami critically analyzed the mid-first-millennium CE pottery type known as Tana Ware and concluded that, unlike what was previously argued, this ware did not belong to the coastal pastoral group but was a development out of Kwale ware and because of the predominance of incised triangles, he renamed it Triangular-Incised Ware (TIW), a designation that is now widely used.

Chami also argued and backed with evidence the existence of the earliest settlements on the islands of East Africa dating back from the Earlier Stone Age through the Neolithic period (Chami 2009a, 2009b). He has examined issues of slave trade and excavated Bagamoyo, one of the slave-trading towns of Eastern Africa. He has also demonstrated the existence of Egypto-Greaco-Roman trade with the eastern African Indian Ocean settlements (Chami 2011b, 2017). Chami has also looked at the issue of equifinality and its application to African archaeology and argues that archaeology is archaeology and nothing else; borrowing from other disciplines does not change what archaeology is (Chami 2007, 2008b, 2011a). He has published a number of books, the most recent ones being *Zanzibar and the Swahili Coast from 30,000 Years Ago (2009)* and *The Unity of African Ancient History (2006)*. His work contributes to a better knowledge of the slave trade in this region through archaeological evidence (Chami 2008b).

References

Chami, F.A. 1992. Limbo: Early Iron-working in South-Eastern Tanzania. *Azania* 27: 45–52.
Chami, F.A. 1994. *The coast of Tanzania in the first millennium AD: A study of the Iron working (farming) communities*, SAA 7. Uppsala: Societas Archaeologica Upsaliensis.
Chami, F.A. 1994–1995. The first millennium AD on the east African coast: A new look at cultural sequences and interactions. *Azania* 29–30: 232–237.
Chami, F. 2007. Evidence of ancient African beliefs in celestial bodies. *Astrophysics and Space Science Proceedings* 30: 119–128.
Chami, F. 2008a. The Great Lakes: A complexity of cultural wellsprings. In *Art in eastern Africa*, ed. M. Arnold, 47–64. Dar es Salaam: Mkuki na Nyota.
Chami, F. 2008b. The atomic model view of society: Application in the studies of the African past. In *Postcolonial archaeologies in Africa*, ed. P. Schmidt, 39–56. Santa Fe/Oxford: SAR Press/James Currey.
Chami, F., ed. 2009a. *Zanzibar and the Swahili coast from 30,000 years ago*. Delhi: E&D Publishers.
Chami, F. 2009b. Kilwa and the Swahili towns: Reflections from an archaeological perspective. In *Knowledge, renewal and religion*, ed. K. Larsen, 38–56. Uppsala: Nordiska Africakainstitutet.
Chami, F. 2011a. The problem of equifinality in archaeology. *Studies in the African Past* 9: 5–21.
Chami, F. 2011b. Archeological research in Comores between 2007 to 2009. In *Civilisations desmonds Insulaires*, ed. C. Allibert. Paris: Kartala.
Chami, F. 2017. Ancient seafaring in east African Indian Ocean waters. In *The sea in history: Antiquity*, ed. C.ed. Buchet, 523–536. London: The Boydel Press.
Chami, F. 2018. Advent of domestication in eastern and southern Africa. In *General history of Africa*, ed. A. Holl et al., vol. 9. Paris: UNESCO.

Champollion, Jean-François

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Basic Biographical Information

Jean-François Champollion was born in 1790 in Figeac, Midi-Pyrénées, France. He spent his early years in the family house surrounded by books hidden for the time of the French Revolution by his father, a former bookseller. However, the most important for the education and later Champollion's career was his older brother, Jacques-Joseph Champollion-Figeac (as he signed his works in contrast to the younger Champollion *le jeune*), who became his first teacher, counselor, and guardian and even the editor of Champollion's texts after his premature death.

Champollion was a genially talented linguist and historian and a pioneering archaeologist, who – apart from his works – left many private letters illustrating his ideas, passions, and difficult character: straightforward, proud, self-confident, and even impertinent. He studied Latin, Greek, Hebrew, Arabic, Ethiopian, Chaldean, Coptic, Chinese, Zend, Pahlavi, Farsi, etc., but his extraordinary talents manifested already around the age of 6, when Champollion taught himself to read. At a high school in Grenoble, he demonstrated genial results in the fields of ancient history, geography, and languages, especially in Coptic, the language that became his second preferable. On the other hand, young Champollion completely disregarded sciences, feeling almost physical pain being forced to study subjects like math. To continue his studies, he moved to Paris in 1807, where at the School of Oriental Languages he met Silvestre de Sacy. Around this time Champollion made his first attempt to decipher the Rosetta Stone but stacked adopting wrong hypotheses and left the idea in 1809 (the year he was appointed an auxiliary professor of ancient history in Grenoble) to finally return to it in 1814. The work had to be postponed when Champollion engaged into the Napoleon's Hundred Days, what resulted in an 18-month exile to Figeac, a difficult period of family tensions and political repressions that – paradoxically – gave the essential rest before the final progress on decipherment of the Egyptian hieroglyphs.

From 1817 to 1821, Champollion lived in Grenoble again, where facing many difficulties he only found a post of a teacher. It was also the time when he decided to marry Rosine Blanc (the couple had only one daughter, Zoraïde, born

in 1824). And once again Champollion's rebellious heart and politics forced him to change his life and move back to Paris in 1821. Without any outcome, dependent on financial support of his generous brother, Champollion had finally time to fully dedicate to the hieroglyphs. The breakthrough came in 1822 and then the milestone in 1824. Searching for comparative materials crucial for his main interest, Champollion went to Italy, where in contrast to his complicated situation in France, he was warmly welcomed. In Livorno he met *Ippolito Rosellini* – his follower, friend, and companion in the journey to Egypt they planned together and finally executed in 1828. Within 18 months of his stay in Egypt, Champollion visited numerous sites from Alexandria, in the Nile Delta, to Nubian Wadi Halfa. In every historical place he saw, he made notes, sketches, plans of monuments, and copies of hieroglyphic inscriptions, often fighting severe attacks of arthritis.

In 1830 Champollion was elected a member of the most prestigious *Académie des Inscriptions et Belles-Lettres*, and the following year, he took up a newly founded chair of Egyptology at *Collège de France*, becoming the first professor of the subject in the history. Unfortunately, he was only able to give a few lectures before he died after a stroke in Paris in 1832.

In 1986, the town of Figeac commemorated its famous fellow countryman by opening the Museum of Champollion.

Major Accomplishments

Champollion is the best known from cracking the code of Egyptian hieroglyphs. It was the task that consumed most of his time and energy with the crucial period concentrated between 1821 and 1828. During his work, Champollion came through various excluding ideas, such as the conviction that Egyptian signs were of purely alphabetical character and belief in relation of Chinese and Egyptian writings; for a long time, he accepted the opinion of classic writers that hieroglyphs have only symbolic meaning, to finally state that the system is not homogenous and had to be complemented by signs of additional character.

The starting point of this long process was the famous Rosetta Stone, discovered in 1799 and soon identified as covered with a text of Ptolemaic

Champollion, Jean-François, Fig. 1 Portrait of Champollion by Léon Cogniet, 1831, presently at Louvre, INV 3294, public domain

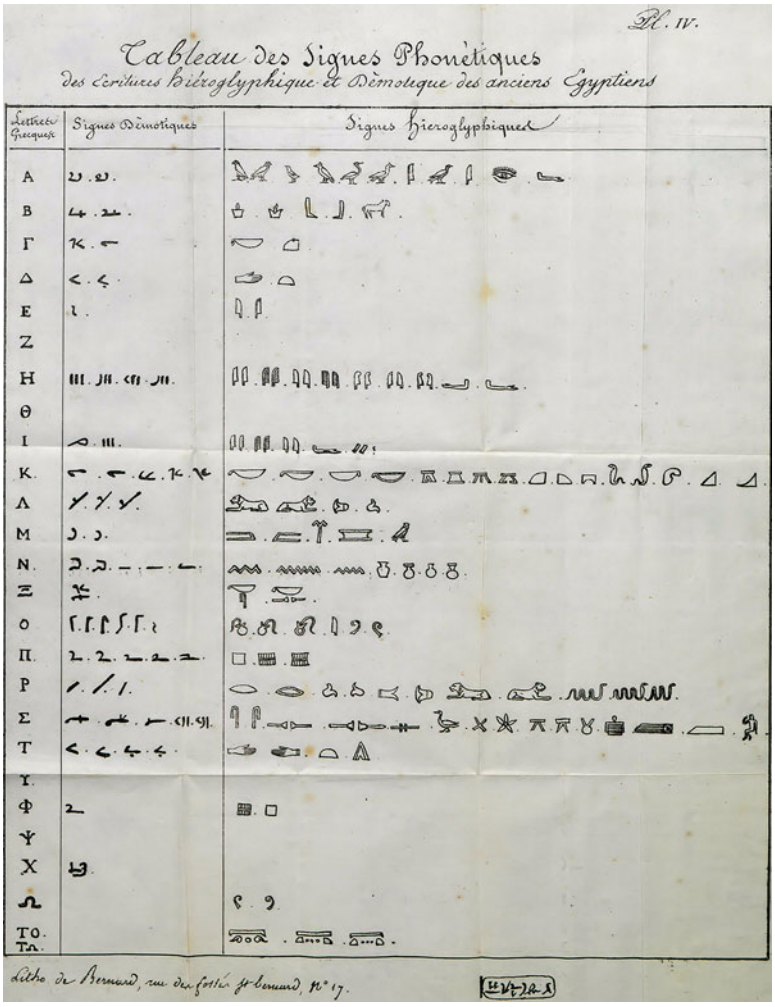

Champollion, Jean-François, Fig. 2 Plate IV from *Lettre à M. Dacier* (Champollion 1822) with the famous hieroglyphic alphabet

period decree written in three versions: hieroglyphic, demotic, and Greek. The text mentions two royal names: Ptolemaios and Berenice that were written in a ring, known as cartouche. Champollion accepted that in the special case of foreign names, hieroglyphs were used phonetically, and it was the assumption that formed the base for the famous hieroglyphic alphabet (Champollion 1822). Soon, after decoding further royal names of Egyptian origin, Champollion stated that there had to be a general phonetic component in the hieroglyphic script, to finally note that the writing system was based on a group of ca. 20 phonetic values, each represented by a few sings, a couple of semiphonetic sings, and hundreds of figurative and symbolic ones. This observation was presented in his *Précis du système* (Champollion 1824), republished with major corrections in 1828.

Between 1814 and 1819, a British scholar, Thomas Young, also focused his attention on the inscription from the Rosetta Stone. Although he did not solve the Egyptian riddle, he made some crucial observations on the character of the ancient Egyptian script, in some parts analogous to those published in 1822 by Champollion. There is still an open discussion on the priority of discoveries in the field, which may never be satisfactory closed. However, it seems that Champollion could indeed have been inspired by Young's article published in *Encyclopedia Britannica*, but his later work that actually cracked the Egyptian code was fully original and based on his own methodology.

Apart from sheer decipherment, Champollion was also vividly interested in the ancient Egyptian language. Even at his deathbed, he continued work on grammar and dictionary, which were then published (Champollion 1836, 1841–1843), edited by his devoted brother. The fluency in language and interest in culture (Champollion 1823–1825) put the basis for a new field of knowledge, which is Egyptology. Equally important are also tones of notes and drawings made in Egypt (Champollion 1835–1845), which enlarged the catalogue of original Egyptian works of art crucial for further analyses of the culture but also are the only preserved documentation of many monuments that did not survive our times.

When in 1826 Champollion was nominated a curator in the Louvre, he used his Italian contacts to bring the magnificent collection of Henry Salt to Paris. His ideas and expertise formed one of the world's largest collections of Egyptian art and still – in a way – influence the contact of our culture with the ancient one (Figs. 1 and 2).

Cross-References

► Ippolito Rosellini

References

Champollion, J.-F. 1822. *Lettre à M. Dacier, relative à l'alphabet des hieroglyphs phonétiques*. Paris: Firmin Didot.

Champollion, J.-F. 1823–1825. *Panthéon égyptien: Collection des personages mythologiques de l'ancienne Égypte*. Paris: Firmin Didot.

Champollion, J.-F. 1824. *Précis du système hiéroglyphique des anciens Égyptiens*. Paris: Treuttel & Würtz.

Champollion, J.-F., 1835–1845. *Monuments de l'Égypte et de la Nubie d'après les dessins executes sur les lieux sous la direction de Champollion le jeune et les descriptions autographes qu'il a laissées*, ed. J.-J. Champollion-Figeac, vols. 1–4. Paris: Firmin Didot.

Champollion, J.-F. 1836. In *Grammaire égyptienne, ou Principes généraux de la langue sacrée égyptienne appliqué à la representation de la langue parlée*, ed. J.-J. Champollion-Figeac. Paris: Firmin Didot.

Champollion, J.-F. 1841–1843. *Dictionnaire égyptien en écriture hiéroglyphique*, ed. J.-J. Champollion-Figeac. Paris: Firmin Didot.

Further Readings

Hartleben, H. 1906. *Champollion: Sein Leben und Sein Werk*. Berlin: Weidmannsche Buchhandlung (the first Champollion's biography, mostly outdated and full of romantic, unreferenced stories).

Lacouture, J. 1988. *Champollion: Une vie de lumière*. Paris: Grasset (paints a vivid picture of the Champollion's personality).

Robinson, A. 2012. *Cracking the Egyptian code: The revolutionary life of Jean-Francois Champollion*. Oxford: Oxford University Press (the most recent and the most objective book focused on Champollion).

Solé, R., and D. Valbelle. 1999. *La Pierre de Rosette*. Paris: Le Seuil (an easy to read book on a wider subject with an extensive part on Champollion's work seen from a French perspective).

Chan: A Tropical Rain Forest Site in Belize

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Introduction

Nestled in Belize's lush tropical rain forest, the Chan site was long known to local farmers who still farm the area around the archaeological site. The area was noted by archaeologists in 1994 who were working on a regional settlement survey. The Chan project, a collaborative, international, multidisciplinary research project, began in 2002, bringing together a team of over 120 foreign and local archaeologists, botanists, geologists, geographers, chemists, computer scientists, artists, students, workers, volunteers, and local community residents from Belize, the USA, England, Canada, and China (Robin 2012).

Key Issues/Current Debates/Future Directions/Examples

Chan was occupied by a farming community with a 2000-year history (c. 800 BCE–CE 1200) spanning the major chronological periods of ancient Maya society: the Preclassic, Classic, and Postclassic

periods. Unremarkable in terms of community size or architectural elaboration, Chan nonetheless flourished while the fortunes of nearby major Maya civic centers waxed and waned. Research at Chan was aimed at investigating the everyday lives of Maya farmers and the impact farmers had on Maya society. Given that 2000 years is a long period of time, what did Chan's residents do to facilitate the longevity of their community?

To address these questions, a three-staged research design was developed for the Chan project. Stage 1 involved a full coverage rain forest survey that utilized *Total Station* mapping and a *Geographical Information System* to digitally map the 3.2 km^2 area of the community and record the 274 households and 1223 agricultural terraces that surround Chan's community center (Fig. 1). In Stage 2, extensive *coring* (using a post-hole digger) and full scale *area excavations* were conducted at all buildings in Chan's community center, along with a 10% sample of households (26 households) and associated outdoor activity and work spaces that represent the temporal, socioeconomic, and vocational variability within the community (Fig. 2). Excavation in this terrain involves careful clearance of vegetation and roots to reveal the archaeological features without damaging the stone structures or the trees. Stage 3 research, which was conducted in the field in conjunction with stage 1 and 2 research to facilitate research collaboration, involved the analysis of roughly half a million objects of everyday life, one of the largest archaeological samples from a Maya farming community, and additionally incorporated scientific techniques of soil chemistry, paleoethnobotany, human bone, animal bone, obsidian sourcing, radiocarbon dating, and micro-artifact studies.

The structures and assemblages were classified and analyzed to produce a dated sequence of material practice at Chan over the two millennia. The terraced agricultural landscape was constructed by cooperating farming families, and the agricultural system developed and expanded through time. It avoided soil erosion and maximized water retention, incorporating complex small-scale irrigation and water storage systems. A forest management strategy maintained a diverse mature, closed-canopy, tropical forest even as the population expanded during the Classic period (BCE 250–900), and farmers had a growing need for fuel, construction material, and agricultural land. Extremes of wealth and power were avoided within the community, as all residents from the humblest farmer to the community leaders had access to a similar range of exotic items and lived in perishable houses with similar

Chan: A Tropical Rain Forest Site in Belize, Fig. 1 Undergraduate students Alex Miller, Shelley Khan, and Yasmine Baktash (left to right) set up a Topcon GTS 605 laser theodolite to digitally map Chan's settlement. (Photograph by James Meierhoff)

Chan: A Tropical Rain Forest Site in Belize, Fig. 2 Archaeological illustrators Merle Alfaro (seated) and Nasario Puc (standing) illustrate a terminal deposit of broken ceramic on Chan's central ritual structure. Excavators Lazaro Martinez, Everaldo Chi, and Ismael Chan (left to right) are in the background. (Photograph by James Meierhoff)

outward appearances. Ritual and political practices within the community incorporated all residents and focused on the community as a whole rather than individual community leaders.

This long-term stability contrasts with that of the opulent Maya civic centers with their towering temple pyramids that form the usual focus of Maya archaeological research. Avoidance of extremes of wealth and power, more equitable distribution of goods, consistency in health, and communal focus of ritual and politics are some of the socially effective strategies established by Chan residents. The sustainable forest management practiced at Chan is distinct from the more extractive practices seen at the larger Maya civic centers where royals culled the mature forest across the Classic period. The consistent presence of a low degree of biological stress in the Chan skeletal population indicates persistent good health at Chan. This contrasts with that seen at larger Maya civic centers where residents' health declined by the end of the Classic period as indicated by increasing degrees of biological stress.

These studies, drawn from systematic fieldwork at a seemingly unremarkable place such as Chan, thus offer important lessons about human societies, particularly in the matter of social and economic sustainability.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Field Method in Archaeology: Overview
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Sustainability and Cultural Heritage

References

Robin, C. 2012. *Chan: an ancient Maya farming community*. Gainesville: University Press of Florida.

Chang, K.C.

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Basic Biographical Information

Kwang-chih Chang (1931–2001), or K.C. Chang, was born in Beijing in 1931 and moved with his

family to Taiwan in 1946. He attended the National Taiwan University in 1950 and was among the first class of undergraduates in the Department of Archaeology and Anthropology. He was taught by Li Chi [Li Ji] and other key archaeologists such as Dong Zuobin [Tung Tso-pin 董作賓], Gao Quxun [Kao Chu-hsun 高去寻], and Shi Zhangru [Shih Chang-ju 石璋如]. From 1955 to 1960, Chang pursued a doctorate in anthropology at Harvard University, studying under Hallam L. Movius Jr., Clyde Kluckohn, Lauriston Ward, and Gordon R. Willey. After graduation, he taught at Harvard (1960–1961) and Yale (1961–1977) and returned to Harvard again from 1977 until his retirement in 1996. At Harvard, he was named the John E. Hudson Professor of Archaeology in 1984 and served also as curator at the Peabody Museum.

Though teaching in the USA, Chang remained active in developing the archaeological field in Taiwan. In 1961, he initiated projects on the prehistory of Taiwan and conducted excavations in 1964–1965 at the sites of Tapenkeng 大坌坑in Taipei 台北and Fengpitou 凤鼻头 in Kaohsiung 高雄. In 1972–1974, with the support from the National Science Council (Taipei), the National Science Foundation, and Yale University, he led the project "Anthropological and Environmental Investigations in the Choshui and Tatu River Valleys of Central Taiwan," an interdisciplinary research dedicated to investigate changes in the cultural ecology of the region. In 1986, he began the "Field Research Project on Taiwan History" at Academia Sinica, facilitating the collaboration between scholars from multiple fields. Such a project eventually led to the establishment of the Institute of Taiwan History at Academia Sinica in 1993. In 1994, Chang became the vice president of the Academia Sinica.

Chang, on the other hand, was devoted to promoting exchanges between the West and China. In 1975, he visited China as a member of the American Paleoanthropological Delegation, opening door to the significant intellectual exchanges and conferences in the next decades. In 1984, he gave six important lectures at Peking University and a lecture series in Shandong University, Jilin University, and Xiamen University. Working on his interdisciplinary project "Investigations into Early Shang Civilization," Chang collaborated with scholars from the Institute of Archaeology of the Chinese Academy of Social Sciences in Beijing. In the 1990s, he was able to conduct surveys and excavations at the site believed to be the Great City Shang near present-day Shangqiu商丘, Henan.

Major Accomplishments

K.C. Chang contributed profoundly to the development of archaeological theory, particularly that in the USA. Active in the theoretical movement of his time, he advocated the social aspects of the artifacts and the need to understand processes of cultural change. Moving beyond analyzing the artifacts as closed entities, Chang introduced new methodologies and terminologies to classify artifacts for the purpose of reflecting social relations and cultural activities. For example, in *Rethinking Archaeology* (1967), he identifies and critiques the basic issues in archaeology, such as the role of artifacts in cultural and collective transformation and the analysis and articulation of data in determining regular social patterns.

Focusing on the Shang period, Chang deepened the understanding of the livelihood, social structure, and material culture of the Shang communities. In *Shang Civilization* (1980), he pulls together the previous and newly emerged archaeological evidences such as bronzes and oracle bones, as well as revisits transmitted texts. Chang draws important conclusions on larger and broader subjects concerning the Shang communities, for example, the political organization of the Shang regime, its symbols of authority and rule, the importance and function of lineage, etc. He also considers the possibility of establishing an absolute chronology of the Shang dynasty. In *Art, Myth, and Ritual: The Path to Political Authority in Ancient China* (1983), Chang focuses on major archaeological sources and opens up new directions to understand ancient China, including the Shang regime. One of the main themes he explores is the presence of shamanism and its role in consolidating religious and political authority.

Chang's interdisciplinary approaches and focus on international collaboration helped shape the course of modern Chinese archaeology, both in the USA and China. He initiated English translations of the Chinese archaeological reports and abstracts on pre-Imperial excavations. In *The archaeology of Ancient China*, first published in 1963 and subsequently in 1968, 1977, and 1986 with substantial revisions and addition of new data, Chang provides a detailed account of a wealth of archaeological evidences from China. He also interprets the artifacts within the framework of anthropological approaches. On the other hand, besides giving lectures in China, he also published frequent brief papers comparing and contemplating on issues in Chinese and Western archaeology. As many of his publications were made available in Chinese, he brought in new approaches for the Chinese-speaking audience to interpret archaeological data.

Chang's extensive research and fieldwork on Taiwan prehistory also advanced the field of modern archaeology in Taiwan. He published his excavation findings in *Fengpitou, Tapenkeng, and the Prehistory of Taiwan* (1969), the first book on Taiwan prehistory. His anthropological and environmental fieldwork in the 1970s provided the training for next generations of archaeologists and anthropologists in Taiwan and created a model for subsequent academic programs. As vice president of the Academic Sinica, he promoted international and multidisciplinary collaborations.

Cross-References

► Li Ji [Li Chi]

References

Chang, K.C. 1963. *The archaeology of ancient China*. New Haven: Yale University Press (2nd edition, 1968, 3rd edition, 1977; 4th edition, 1986).

Chang, K.C. 1967. *Rethinking archaeology*. New York: Random House.

Chang, K.C. 1969. *Fengpitou, Tapenkeng and the prehistory of Taiwan*, Yale University Publications in Anthropology, no. 73. New Haven: Department of Anthropology, Yale University.

Chang, K.C. 1980. *Shang civilization*. New Haven: Yale University Press.

Chang, K.C. 1983. *Art, myth, and ritual: The path to political authority in ancient China*. Cambridge, MA: Harvard University Press.

Ferrie, Helke. 1995. A conversation with K.C. Chang. *Current Anthropology* 36 (2): 307–325.

Murowchick, Robert E., Lothar von Falkenhausen, and Cheng-Hwa Tsang. 2003. Kwang-Chih (K.C.) Chang (1931–2001). *American Anthropologist* 105 (2): 481–484.

Further Readings

Chang, K.C. 1960. *Prehistoric settlements in China: A study in archaeological method and theory*. Cambridge, MA: Department of Anthropology, Harvard University.

Chang, Kwang-chih

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Basic Biographical Information

Over the course of his 40-year career, Kwang-chih (K.C.) Chang (1931–2001) (Fig. 1) integrated traditional Chinese historiography with American anthropological archaeology to help fundamentally transform our understanding of cultural developments in early China and Southeast Asia. Born in Beijing in 1931, K. C. and his family returned to their native Taiwan in 1946. As an undergraduate from 1950 to 1954 in the newly established Department of Archaeology and Anthropology at National Taiwan University (NTU), K. C. studied under many of the most eminent scholars of early East Asia, including archaeologists Li Chi (1896–1979) and Shih Chang-ju (1902–2004), ethnographer Ling Shun-sheng (1902–1981), and historical linguist Tung T'ung-ho (1911–1963).

Following the advice of his mentor Li Chi (who had earned his Ph.D. in Anthropology at Harvard in 1923), K. C. undertook graduate studies in that department from 1955 to 1960, working closely with key Harvard faculty who would

Chang, Kwang-chih, Fig. 1 Kwang-chih Chang

further shape his career, including cultural anthropologists Evon Vogt and Douglas Oliver, archaeologists John Otis Brew and Gordon Willey, and ethnologist Clyde Kluckhohn. Chang's primary faculty advisor was Hallam Movius Jr., with whom he worked at the Upper Paleolithic site of Abri Pataud near Les Eyzies, France, instilling in Chang a lifelong interest in Paleolithic foundations.

Hired as a lecturer in anthropology at Harvard during 1960–1961, K. C. was a quickly rising star in the field, invited to participate with much more senior scholars at the seminal 1960 Wenner-Gren Foundation symposium *From 15,000 BC to the thresholds of civilizations* at Burg Wartenstein, Austria. He joined the Anthropology faculty at Yale from 1961 to 1977, where he taught a range of courses on Chinese, East Asian, and Southeast Asian archaeology, and also served as departmental chair from 1970 to 1973. His enthusiasm for Chinese archaeology was enhanced by the steady flow of new discoveries from China slowly opening up after a decade of seclusion during the Cultural Revolution, sites that K. C. saw firsthand as a member of the American Paleoanthropology Delegation to China in 1975, his first trip there since leaving as a young boy three decades earlier.

In 1977, after considerable deliberation, Chang left Yale to return to his beloved Harvard as professor of anthropology and curator of Asiatic archaeology at the Peabody Museum. He was appointed as the John E. Hudson Professor of Archaeology in 1984 and taught courses tailored to his specific archaeological interests, including Chinese archaeology and Shang civilization, innovative courses in the college's evolving core curriculum, and, his favorite, the Harvard Freshman Seminars. He retired in June 1996 due to the debilitating effects of Parkinson's disease. "I consider it the highest honor," Chang would write to Harvard's president, "for any academic to retire as a Harvard professor – at least in the hearts of some diehard Harvard partisans and I confess to be one of them." K. C. Chang died in Boston on January 3, 2001.

Major Accomplishments

Chang's archaeological career, reflected in his more than 350 publications that cover an exceptionally broad range of topics, spanned a particularly critical time in the development of the field both in the West and in East Asia. His undergraduate and graduate teachers very much influenced his work on archaeological theory. In particular, Gordon Willey's research on settlement patterns in Peru's Viru Valley and discussion of concepts such as "traditions" and "horizons" helped to shape Chang's 1960 Harvard doctoral dissertation that explored settlement patterns in Neolithic and Bronze Age China. In his subsequent edited volume (Chang 1968), the importance of settlement data in understanding human organization was examined through an array of enlightening case studies and theoretical excursions. Chang quickly became an important player in the often contentious debate about the "New Archaeology" that dominated Western scholarship during the turbulent 1960s and early 1970s, and he brought these debates to bear on the archaeological data increasingly coming to light from China. His book *Rethinking Archaeology* (Chang 1967a) reflected his desire to introduce concepts and terminology that would allow material remains to be more

culturally meaningful. That same year, his major essay on the importance of ethnographic analogy in archaeology (Chang 1967b) elicited strong disagreements from Lewis Binford and others. In these works, Chang also stressed the importance of recognizing that archaeology was a tool that could be transformed to meet the needs of society, an awareness that would serve him well in understanding the changing role of archaeology in an evolving post-revolution China.

Chang sought to bring interdisciplinary archaeology to Taiwan, leading a collaborative Yale-NTU field project from 1964 to 1965 at the prehistoric sites of Tapenkeng and Fengpitou that examined early horticulture within a framework of comprehensive environmental reconstruction (Chang 1969). This was followed in 1972–1974 by his intensive study of subsistence, settlement patterns, and human-ecosystem interaction in central Taiwan, a project marked both by its broad interdisciplinary nature and its long-term impact as a training ground for a new generation of Taiwan archaeologists. He was a key consultant to the establishment of Taiwan's National Museum of Prehistory and also pressed for support for the study of Taiwan history and historical archaeology.

K. C. Chang's name is synonymous in the West with Chinese archaeology. His four editions of *The Archaeology of Ancient China* (e.g., Chang 1986) brought to Western readers an authoritative presentation and interpretation of the steadily increasing archaeological data coming out of China, each edition thoroughly updated to reflect the latest finds. His comprehensive work on China's early Bronze Age (17th–11th C. BCE), no doubt inspired by his teachers who represented the very first generation of Shang archaeologists in the 1930s, carefully integrated Western anthropological theory with a mastery of field data and early Chinese textual sources (Chang 1980, 1983).

International conferences on Chinese archaeology during the late 1970s and 1980s, many of them organized by Chang, helped to open up Chinese archaeology to foreign scholars and students and to expose Chinese scholars to world archaeological method and theory. When China's laws were changed in the early 1990s to allow Sino-foreign collaborative field projects, Chang was among the first to be invited, and the Peabody Museum-Chinese Institute of Archaeology project *Investigations into Early Shang Civilization*, based in the North China Plain at Shangqiu, Henan province, brought together Chinese and American scholars in an extended effort to locate and understand the predynastic phase of Shang culture (Murowchick and Cohen 2001). This helped to foster a collaborative atmosphere that today is represented by an array of international projects across China.

Recognition of Chang's accomplished career included his research appointments at Academia Sinica (Taipei), election to the US National Academy of Sciences (1979), American Academy of Arts and Sciences (1980), and the Society of Antiquaries of London. The Association of Asian Studies honored his "Distinguished Contributions to Asian Studies" (1986), and he won the University of Pennsylvania's Lucy Wharton Drexel Medal (1987), among many other honors. He was a transformative figure in the field of East Asian archaeology, a bridge between East and West, and a catalyst for the international collaborations that thrive today.

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)
- ▶ Movius, Jr., Hallam L.
- ▶ Nationalism and Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Willey, Gordon Randolph

References

Chang, K.C. 1967a. *Rethinking archaeology*. New York: Random House.

Chang, K.C. 1967b. Major aspects of the interrelationship of archaeology and ethnology. *Current Anthropology* 8 (3): 227–243.

Chang, K.C., ed. 1968. *Settlement archaeology*. Palo Alto: National Press.

Chang, K.C. 1969. *Fengpitou, Tapenkeng, and the prehistory of Taiwan*, Yale University Publications in Anthropology 73. New Haven: Yale University Press.

Chang, K.C. 1980. *Shang civilization*. New Haven/London: Yale University Press.

Chang, K.C. 1983. *Art, myth, and ritual: The path to political authority in ancient China*. Cambridge, MA: Harvard University Press.
Chang, K. C. 1986. *The archaeology of ancient China*, 4th edn., revised and enlarged. New Haven: Yale University Press.
Murowchick, R.E., and D.J. Cohen. 2001. Searching for Shang's beginnings – Great City Shang, City Song, and collaborative archaeology in Shangqiu. *Review of Archaeology* 22 (2): 47–61.

Further Reading

Chang, K.C. 1998. *Fan shu ren de gu shi: Zhang Guangzhi zao nian sheng huo zi shu* 番薯人的故事:张光直早年生活自述 *[Stories of a sweet potato boy: reminiscences of the early life of Chang Kwang-Chih]*. Taibei: Lianjing Publishers (in Chinese).
Evasdottir, E.E.S. 2000. Rereading *Rethinking archaeology:* What the present can learn from the past. *Journal of East Asian Archaeology* 2 (1–2): 343–362.
Falkenhausen, L. 2001. Kwang-chih Chang, 15 April 1931–3 January 2001. *Artibus Asiae* 61 (1): 120–138.
Ferrie, H. 1995. A conversation with K. C. Chang. *Current Anthropology* 36 (2): 307–325.
Li, L. 李力., ed. 2002. *Remembering Kwang-chih Chang, archaeologist and anthropologist* [*Si hai wei jia – zhui nian kao gu xue jia Zhang Guangzhi* 四海为家—追念考古学家张光直]. Beijing: Sanlian Shudian (in Chinese).
Murowchick, R.E. 2012. *Kwang-chih Chang, 1931–2001: A biographical memoir*. Washington, DC: The National Academy of Sciences.
Murowchick, R. E., et al. 1999. Bibliography of works by Kwang-chih Chang. *Journal of East Asian Archaeology* 1 (1–4): 1–42, and 3(1–2): 349–371.

Charcoal: Preservation and Conservation

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Introduction

Charcoal (carbonized wood) is of great importance in archaeology. In archaeological sites, charcoal is interpreted as evidence of the use of fire by past populations for various purposes and is a source for the absolute dating of contexts, for conducting paleoenvironmental reconstructions, and for discussing past relationships between human groups and their environment. In order to reach the great potential existent in the study of archaeological charcoal, it is necessary to take into account the processes which affect preservation up to their moment of collecting, as well as the methods necessary for their conservation.

Definition

Archaeological charcoal preservation and archaeological charcoal conservation are somewhat distinct, although correlated, terms. Charcoal preservation refers to aspects both before and after charcoal is collected from an archaeological context, encompassing the moment it was first produced in the past, the natural and cultural processes it underwent through time, up to present day when it is collected and studied. Charcoal conservation, on the other hand, refers to efforts taken during and after charcoal is collected, such as the proper maintenance of its physical integrity during excavation, transportation, analysis, and storage.

Key Issues/Current Debates/Future Directions/Examples

Archaeological charcoal can be studied in a variety of ways. One way in which charcoal is regularly used in archaeology is as evidence of past human activity, such as in pre-modern human sites where charcoal remains are frequently interpreted as evidence of the past use of fire by hominins.

After the discovery of radiocarbon dating, researchers became even more aware of charcoal found in archaeological contexts (Heizer 1963). Charcoal is frequently used as material for absolute dating of archaeological contexts, especially in the time spanning the last 50,000 years.

Archaeological charcoal may furnish even more information about the past if certain methods and techniques are applied to its study. The quantification of charcoal fragments in archaeological units and profiles, for example, can furnish information on past human activities such as the clearing of areas through time for the establishment of settlements and the preparing of fields and gardens for cultivation.

Other types of information may also be gathered if an effort is taken in identifying which plants did charcoal fragments originate from. Through microscopic observation and comparison with reference collections from modern plants, it is possible to conduct charcoal analysis by taxonomically identifying charcoal fragments. By knowing which plants were used in the past, one can interpret what past environments may have looked like, the relationships that past human groups had with their surrounding environment, and for what sorts of purpose different plants were used, not only for everyday use as firewood but for other specific purposes, from the production of artifacts to mortuary practices.

It is important to take into account the fact that archaeological charcoal is a fraction of the total amount of wood that was used in past contexts. In order to better understand the relevance of archaeological charcoal in furnishing information on the past, it is imperative to try to understand the processes which, in one hand, allow charcoal preservation until present day and, on the other hand, destroy or alter charcoal material, thereby furnishing us with a partial view of the past.

The burning of wooden material results in the production of ashes, when there is a total combustion of the organic matter, or of charcoal, when there is incomplete combustion of the material (Huisman et al. 2012). If charcoal is produced by burning with a limited supply of air, it is considered the result of "charring," while if it is produced by burning without oxygen, it is considered the result of "carbonization" (Braadbaart and Poole 2008; Théry-Parisot et al. 2010). The term "charcoalification" may be used to define the processes which result in the production of charcoal, regardless if the process was by charring or by carbonization (Braadbaart and Poole 2008). Charcoal may be a by-product of an activity (such as resultant from an extinct hearth), or it may be the desired end in itself (such as charcoal intentionally produced in charcoal kilns).

Archaeological charcoal assemblages are the result of human practices and natural phenomena. Wood collecting, management of hearth structures including wood arrangement, combustion characteristics such as temperature of burning and oxygenation, and wood features such as anatomy, density, and chemical composition are all factors which influence charcoal fragmentation and loss of mass material, which in turn affect charcoal preservation. After production and use, charcoal fragments are subject to further events through time, such as physical impact by humans and other animals and environmental factors such as wind, rainfall, and changes in temperature, processes which result in horizontal and vertical dispersion as well as fragmentation and disappearance of charcoal material (Théry-Parisot et al. 2010).

Charcoalified material is less subject to physical and chemical decomposition in soils, being the most common mode of survival of plant material in archaeological sites (Braadbaart and Poole 2008). It has been traditionally stated that through the process of burning, water and fugitive compounds are expelled from wooden material and the remaining structure would be a chemically stable mineral state not subject to organic decomposition (Dincauze 2000:334). Recent research has shown, however, that charcoal is not composed of pure carbon but in fact of aromatic compounds (benzenoids), making them unstable in alkaline conditions (Braadbaart and Poole 2008; Huisman et al. 2012).

The identification of various postdepositional processes affecting charcoal preservation, alongside recent demonstration that charcoal is not as stable as previously thought, has resulted in the increase concern that charcoal absence in certain archaeological contexts might, in fact, be due to processes of fragmentation and destruction of previously existent charcoal fragments. The absence of charcoal in many contexts might, for example,

be the result of charcoal disintegration in alkaline soils (Braadbaart et al. 2009; Théry-Parisot et al. 2010). What's more, wood and plant ashes are alkaline, meaning that, in many contexts, charcoal fragments buried alongside ashes (as in fireplaces) might have disintegrated (Huisman et al. 2012). Charcoal taphonomy is an important issue to field archaeology (Scott and Damblon 2010).

Despite its shortcomings, charcoalification may be considered as a very fortunate event to the study of the past. A great number of studies have shown that, although charcoalification produces some changes in wood structure, most anatomical characteristics remain, including those of microstructural elements so important for taxonomic determination (Rossen and Olson 1985; Braadbaart and Poole 2008; Théry-Parisot et al. 2010). In fact, even structures produced in wood due to attack by microorganisms may be preserved after burning (Moskal-del Hoyo et al. 2010). Although charcoal is subject to various processes which affect their preservation, it is still identifiable as well as datable, proving itself a valuable study material for archaeology.

An important factor in charcoal preservation consists in the methods and techniques chosen for recovery during excavation. Frequent scraping by trowel or other instruments has a destructive effect on charcoal fragments. Charcoal samples should preferentially be collected by removal of soil matrixes in small blocks, respecting the limits of archaeological layers and structures (Scheel-Ybert et al. 2006).

Collecting of charcoal concentrations in situ and dry-screening, wet-screening, and flotation of soil samples are the main methods used by archaeologists in the field, and each of these methods has its own advantages and disadvantages, as well as consequences on the physical preservation of charcoal. If done without caution and with too much force, dry-screening and wet-screening can destroy charcoal fragments.

Flotation, which consists in the separation of material from the sediment matrix by immersion in water or a chemical agent, is an important technique for the recovery of botanical macroremains, but it also affects preservation (Arranz-Otaegui 2016). Flotation results in charcoal fragmentation and loss due to mechanical stress of two types, physical impact with the water and later internal stress as charcoal fragments dry out (Arista 2013). Flotation can cause a possible underrepresentation of charcoal from plants subject to rotting of fungi and termite attack, as well as a possible overrepresentation of charcoal which became vitrified during burning (Arranz-Otaegui 2016). In order to maintain charcoal damage to a minimum, soil samples must be dried before flotation and treated gently, not packed tightly into bags or subject to heavy weights, being preferable to store them in sturdy plastic containers before flotation (Pearsall 2000:13–76). After flotation, charcoal fragments must be dried in a shaded location before being handled due to their great fragility when wet (Scheel-Ybert et al. 2006).

All archaeological samples containing botanical material, be them soil samples for future screening or flotation procedures or charcoal fragments themselves, must be properly identified at the site in adequate containers so as to be handled with care during transportation and storage, maximizing their preservation and conservation.

Conservation issues also possess great importance in certain contexts where charcoalified structures and artifacts are present, requiring adequate techniques for the maintenance of their physical integrity. Despite this, the conservation of charcoalified wood recovered from dry or waterlogged contexts is not a frequent practice, and few studies have been published on the subject (Caple and Murray 1994; Cobb 2005; Pizzo et al. 2011; Arista 2013). The techniques applied to the conservation of charcoal found in waterlogged conditions are not directly applicable to material found in dry conditions (Pizzo et al. 2011), the same being true for techniques traditionally used for non-burnt wooden artifacts (Caple and Murray 1994).

An important aspect of research on charcoal conservation refers to the comparison of different consolidants for maintaining their structure, being already a subject matter over seven decades ago regarding charcoal conservation for dendrochronology (Hall 1946).

Current studies on conservation of waterlogged charcoalified material with the application of polyethylene glycol demonstrated that, although at

times visual characteristics were preserved, the methods and material used were not successful in sufficiently strengthening charcoal structures (Triantafyllou et al. 2010) or large pieces of charcoalified artifacts (Caple and Murray 1994). Regarding the conservation of dry charcoalified material, tests have demonstrated differences between consolidants. Comparative tests of thermoplastic resins have been successfully conducted for charred wood structures (Stromberg 1999; apud Arista 2013). Other tests with experimentally charred wood have, however, pointed to possible risks to the structural integrity of charcoal when using thermoplastic resins (Cobb 2005). Acceptable results to charcoal conservation have also been demonstrated when water-soluble resins were applied on a partially charred artifact (Pizzo et al. 2011).

Experiments on charcoal consolidants have also been conducted on dry charcoalified material recovered using flotation techniques. Consolidation of archaeological charcoal would preferably occur before flotation and its effects on charcoal preservation, but since that is not possible, efforts have been made to understand if consolidation after flotation can still help strengthen charcoal for transporting as well as preserve anatomical structures for wood identification (Arista 2013). In general, regarding charcoal conservation researchers advocate the need for further experimentation in order to better define consolidants and techniques adequate for the conservation of both waterlogged and dry charcoalified archaeological vestiges.

Another aspect related to charcoal preservation and conservation refers to its application in absolute dating. The process of dating charcoal includes steps in which contaminants are removed by a method known as the acid-base-acid pretreatment, a method which has shown to result in structural and chemical changes to charcoal (Rebollo et al. 2008).

Charcoal from archaeological contexts is material proof of past intentional or unintentional fire events and provides archaeological information regarding multiple dimensions of the human and environmental past. Attention to charcoal preservation and conservation issues is, therefore, imperative in order to access all the potential information that might be extracted from them.

Cross-References

- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Paleoethnobotany
- ▶ Radiocarbon Dating in Archaeology
- ▶ Seeds: Conservation and Preservation
- ▶ Wood: Conservation and Preservation

References

Arista, j. 2013. The effect of consolidation on the anatomical structure of floated charcoal remains at Kaman-Kalehöyük. *Anatolian Archaeological Studies* XVIII: 67–72.

Arranz-Otaegui, A. 2016. Evaluating the impact of water flotation and the state of the wood in archaeological wood charcoal remains: Implications for the reconstruction of past vegetation and identification of firewood gathering strategies at Tell Qarassa North (South Syria). *Quaternary International* 457: 60–73.

Braadbaart, F., and I. Poole. 2008. Morphological, chemical and physical changes during charcoalification of wood and its relevance to archaeological contexts. *Journal of Archaeological Science* 35: 2434–2445.

Braadbaart, F., I. Poole, and A.A. van Brussel. 2009. Preservation potential of charcoal in alkaline environments: An experimental approach and implications for the archaeological record. *Journal of Archaeological Science* 36: 1672–1679.

Caple, Chris, and W. Murray. 1994. Characterization of a waterlogged charred wood and development of a conservation treatment. *Studies in Conservation* 39 (1): 28–38.

Cobb, K.C. 2005. Charred wood consolidated with thermoplastic resins. Annual Student Papers of the Association of North American Graduate Programs in the Conservation of Cultural Property 1–20. Available at: http://www.ischool.utexas.edu/~anagpic/pdfs/Cobb.pdf. Accessed 25 Sept 2012.

Dincauze, D.F. 2000. *Environmental archaeology. Principles and practice*. Cambridge: Cambridge University Press.

Hall, E.T. 1946. preserving and surfacing rotted wood and charcoal. *Tree-Ring Bulletin* 12 (4): 26–27.

Heizer, R.F. 1963. Domestic fuel in primitive society. *The Journal of the Royal Anthropological Institute of Great Britain and Ireland* 93 (2): 186–194.

Huisman, D.J., F. Braadbaart, I.M. van Wijk, and B.J.H. van Os. 2012. Ashes to ashes, charcoal to dust: Micromorphological evidence for ash induced disintegration of charcoal in Early Neolithic (LBK) soil features in Elsloo (The Netherlands). *Journal of Archaeological Science* 39: 994–1004.

Moskal-del Hoyo, M., M. Wachowiak, and R.A. Lanchette. 2010. Preservation of fungi in archaeological charcoal. *Journal of Archaeological Science* 37 (9): 2106–2116.

Pearsall, D.M. 2000. *Paleoethnobotany: A handbook of procedures*. San Diego: Academic Press.
Pizzo, B., G. Garabelli, M. Varetto, L.E. Brancati, M. Locandieri, E. Pecoraro, and N. Macchioni. 2011. On site consolidation of burnt and partially charred wood in dry conditions. *Journal of Cultural Heritage* 12: 19–27.
Rebollo, N.R., I. Cohen-Ofri, R. Popovitz-Biro, O. Bar-Yosef, L. Meignen, P. Goldberg, S. Weiner, and E. Boaretto. 2008. Structural characterization of charcoal exposed to high and low pH: Implications for 14C sample preparation and charcoal preservation. *Radiocarbon* 50 (2): 289–307.
Rossen, J., and J. Olson. 1985. The controlled carbonization and archaeological analysis of SE U. *S. Wood Charcoals. Journal of Field Archaeology* 12 (4): 445–456.
Scheel-Ybert, R., D. Klökler, M.D. Gaspar, and L. Figuti. 2006. Proposta de amostragem padronizada para microvestígios bioarqueológicos: Antracologia, arqueobotânica, zooarqueologia. *Revista do Museu de Arqueologia e Etnologia* 15–16: 139–163.
Scott, A.C., and F. Damblon. 2010. Charcoal: Taphonomy and significance in geology, botany and archaeology. *Palaeogeography, Palaeoclimatology, Palaeoecology* 291 (1–2): 1–10.
Stromberg, C. 1999. After the fire at the Church of La Compañia de Jesús, Quito, Ecuador. *Objects Specialty Group Postprints (AIC)* 6:112–113.
Théry-Parisot, I., L. Chabal, and J. Chrzavzez. 2010. Anthracology and taphonomy, from wood gathering to charcoal analysis. A review of the taphonomic processes modifying charcoal assemblages, in archaeological contexts. *Palaeogeography, Palaeoclimatology, Palaeoecology* 291: 142–153.
Triantafyllou, M., P. Papachristodoulou, and A. Pournou. 2010. Wet charred wood: A preliminary study of the material and its conservation treatments. *Journal of Archaeological Science* 37: 2277–2283.

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Basic Biographical Information

Thomas H. Charlton was born in Scarborough, Ontario, Canada, on August 17, 1938. He obtained a doctorate in Anthropology from Tulane University in 1966 with a dissertation in the vanguard of studies dealing with archaeological settlement patterns in central Mexico. His academic career as a faculty member in the Department of Anthropology at the University of Iowa began in 1967, where he became a senior archaeologist as a Mesoamericanist and New World specialist.

Charlton's research included studies of the Historical Archaeology of Plum Grove in Iowa City, the nineteenth century home of the first territorial governor of Iowa, a site included in the US National Register of Historic Places. At the site, he undertook collaborative investigations beginning in 1974 and directed an annual summer field school from 1995 to 2010. For almost four decades he was active in teaching and research and served in multiple academic activities in the anthropology department of the University of Iowa. He trained undergraduate and graduate students in the USA and in Mexico with research in the fields of Mesoamerican and Historical Archaeology until his untimely demise in June 2, 2010.

Charlton's investigations were characterized by careful fieldwork in surveys and excavations, thoroughness in laboratory analyses, and detailed archival research. He was a man of three nations: born in Canada, residing in the USA, and with deep connections with Mexico, its history and its people. He was an outstanding, prolific, and generous scholar passionate about archaeology, ethnohistorical sources and ceramics, who had a soft spot for cats.

Major Accomplishments

Thomas H. Charlton was the first scholar whose research in central Mexico explicitly applied scientific approaches and historical anthropological insights to the understanding of cultural continuities and change after the Spanish conquest in CE 1521. Since the 1960s his main interest was in understanding the development of pre-Columbian social complexity, mostly in central Mesoamerica, and particularly in the Basin of Mexico as a symbiotic region. He focused his research on the Classic period of urban and rural contrasts in the Teotihuacan Valley and the Late Post-Classic

city-state of Otumba (e.g., Charlton 1972, 1973, 1986). He noted that in Mexico archaeologists traditionally had failed to venture into post-conquest studies (Charlton 1972: 107); therefore, Charlton advocated for a holistic approach to anthropological investigations, integrating ethnographic, ethnohistorical, and archaeological data, generating a combined approach to provide a better understanding of Colonial Mesoamerica (Charlton 1969: 286). He emphasized that analogy is a major approach by which ethnographic and ethnohistorical data contribute to an understanding of the past, constituting a zone of transfer and contact between disciplines. Moreover, he set the bases for the use of historical records to interpret archaeological data as a mode of direct historical analogy, and thus to strengthen inferences using relevant empirical data (Charlton 1981: 130, 154, 158) (Fig. 1).

Charlton developed the methodological foundations on which to conduct major studies of the historical archaeology of cultural transformations and dynamics during the Colonial and Republican periods (CE 1521–1910) in Mexico (Charlton 1986). His insights were based on hard empirical data, employing an elaborated culture history model to comprehend acculturative processes and cultural change from the Early Colonial period (CE 1521–1620) onto the twentieth century (e.g., Charlton 1975; Charlton and Fournier 1993: 214; Charlton et al. 2005).

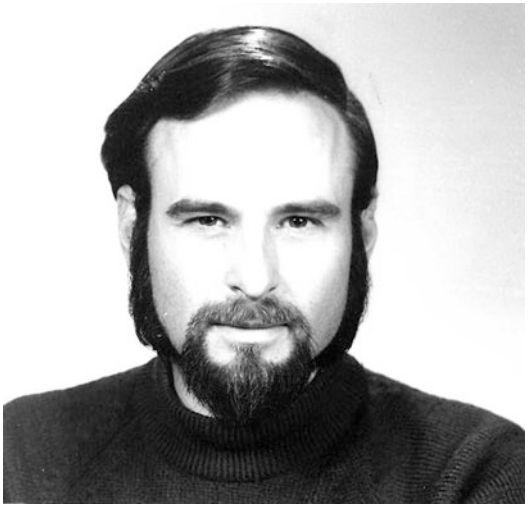

Charlton, Thomas H., Fig. 1 Thomas H. Charlton in 1970

His publications show explicitly how descriptive information may be framed to infer major social processes in historical archaeology, including acculturation, pre-Columbian to Colonial demography, changes in settlement patterns and land use, continuities and deterioration of indigenous ceramic traditions and styles after the Spanish conquest, craft specialization, transformations in trade and exchange patterns from the Post-Classic to the Colonial period, consumption trends, the development of ranchos and haciendas in rural areas, and other important topics.

Charlton was remarkably influential in promoting post-conquest archaeology in Mexico as legitimate and noteworthy anthropological research. His methodology is applicable to almost any area for which there exists documentation (Charlton 1969: 292) and even for the understanding of cultural processes in regions or sites where historical records are scant or nonexistent but are suitable for broader comparisons with better documented areas.

His book, *Post-conquest Developments in the Teotihuacan Valley* (1973), constitutes a seminal and major contribution to the historical archaeology of the Basin of Mexico. Many American scholars specializing in historical archaeology have drawn on his perspectives and work. Moreover, since Charlton undertook collaborative research with several Mexican archaeologists, they and their students are and will continue to keep his methodological legacy alive to contribute to the field of historical archaeology.

Cross-References

- ► African Diaspora Archaeology
- ► Agrarian Landscapes of the Historic Period
- ► Archival Research and Historical Archaeology
- ► Atlantic World: Historical Archaeology

▶ Ceramics as Dating Tool in Historical Archaeology
▶ Ceramics: Majolica in Colonial Latin America
▶ Ceramics: Scientific Analysis
▶ Cultural Heritage and the Public
▶ Dating Methods in Historical Archaeology
▶ Ethnoarchaeology
▶ European Contact and Global Expansion (post-CE 1500): Historical Archaeology
▶ Fournier, Patricia
▶ History and Archaeology: Relationship Over Time (US Perspective)
▶ Mexico: Historical Archaeology
▶ North America (USA): Historical Archaeology
▶ Plantation Archaeology
▶ Provenance Studies in Archaeology
▶ Tenochtitlan (Aztec): Geography and Culture
▶ Teotihuacan: Geography and Culture

References

Charlton, T.H. 1969. Ethnohistory and archaeology: Post-conquest Aztec sites. *American Antiquity* 34: 286–294.

Charlton, T.H. 1972. Population trends in the Teotihuacan valley, A.D. 1400–1969. *World Archaeology* 4: 106–123.

Charlton, T.H. 1973. *Post-conquest developments in the Teotihuacan valley, Mexico. Part I: Excavations* (Report 5). Iowa City: Office of the State Archaeologist.

Charlton, T.H. 1975. Archaeology and history: 1519–1969, the emerging picture in the Teotihuacan valley. In *Actas del XLI Congreso Internacional de Americanistas*, Tomo I: 219–229. México.

Charlton, T.H. 1981. Archaeology, ethnohistory, and ethnology: Interpretive interfaces. In *Advances in archaeological method and theory, volume 4*, ed. M.B. Schiffer, 129–176. New York: Academic Press.

Charlton, T.H. 1986. Socioeconomic dimensions of urban-rural relations in the colonial period basin of Mexico. In *Supplement of the handbook of Middle American Indians, volume 4: Ethnohistory*, ed. R. Spores, 122–133. Austin: University of Texas Press.

Charlton, T.H., and P. Fournier. 1993. Urban and rural dimensions of the contact period: Central Mexico, 1521–1620. In *Perspectives on change: Ethnohistorical and archaeological approaches*, ed. J.D. Rogers and S.M. Wilson, 201–220. New York: Plenum Publishing Corp.

Charlton, T.H., C.L. Otis Charlton, and P. Fournier. 2005. The basin of Mexico A.D. 1450–1620. In *The postclassic to Spanish-eratransition in Mesoamerica: Archaeological perspectives*, ed. S. Kepecs and R.T. Alexander, 49–65. Albuquerque: University of New Mexico Press.

Further Reading

Charlton, T.H. 1991. Land tenure and agricultural production in the Otumba region 1785–1803: Lands of the indigenous communities. In *Land and politics in the valley of Mexico, a two thousand year perspective*, ed. H.R. Harvey, 223–263. Albuquerque: University of New Mexico Press.

Charlton, T.H. 2003. On agrarian landholdings in post-conquest rural Mesoamerica. *Ethnohistory* 50: 221–230.

Charlton, T.H., and P. Fournier. 2011. Pots and plots: the multiple roles of early colonial red wares in the basin of Mexico. In *Enduring conquests. Rethinking the archaeology of resistance to Spanish colonialism in the Americas*, ed. M. Liebmann and M.S. Murphy, 127–148. New Mexico: School for Advanced Research.

Charlton, T.H., P. Fournier, and J. Cervantes. 1995. La cerámica del periodo colonial temprano en Tlatelolco: El caso de la loza roja bruñida, in *Presencias y encuentros*. In *Investigacionesarqueológicas de salvamento*, 135–155. México: Instituto Nacional de Antropología e Historia.

Charlton, T.H., P. Fournier, and C.L. Otis Charlton. 2007. La cerámica del periodo Colonial Temprano en la Cuenca de México: Permanencia y cambio en la cultura material. In *La producción Alfarera enel México Antiguo V*, ed. B. Merino Carrión and A. García Cook, 429–496. México: Instituto Nacional de Antropología e Historia.

Charlton, T.H., and D.L. Nichols. 1992. Late post-classic and colonial period elites at Otumba, Mexico: The archaeological dimensions. In *Mesoamerican elites: An archaeological assessment*, ed. D. Chase and A. Chase, 242–258. Norman: University of Oklahoma Press.

Charlton, T.H., and D.L. Nichols. 1997. Diachronic studies of city-states: Permutations on a theme, Central Mexico from 1700 B.C. to A.D. 1600. In *The archaeology of city-states: Cross-cultural approaches*, ed. D.L. Nichols and T.H. Charlton, 169–207. Washington, DC: Smithsonian Institution Press.

Charlton, T.H., C.L. Otis Charlton, S.C. Lensink, and J.A. Sartain. 1988. Historical archaeology at Plum Grove. *Journal of the Iowa Archaeological Society* 35: 40–69.

Charlton, T.H., C.L. Otis Charlton, D.L. Nichols, and H. Neff. 2007. Aztec Otumba A.D. 1200–1600: Patterns of production, distribution, and consumption of ceramic products. In *Pottery economics in Mesoamerica: Integrated approaches*, ed. C.A. Pool and G.J. Bay III, 237–266. Tucson: University of Arizona Press.

Fournier, P., and T.H. Charlton. 1998. La Tradición de Mayólica en México (Siglos XVI al XIX). In *Memoria*

C

del Primer Congreso Nacional de Arqueología Histórica, ed. E. Fernández Dávila and S. Gómez Serafín, 419–426. México: Consejo Nacional para la Cultura y las Artes-Instituto Nacional de Antropología e Historia.

Fournier, P., and T.H. Charlton. 2008. Negritos y pardos: hacia una arqueología histórica de la población de origen africano en la Nueva España. In *Perspectivas de la investigaciónarqueológica, Volume III*, ed. F. López Aguilar, W. Wiesheu, and P. Fournier, 201–234. México: Programa para el Mejoramiento del Profesorado-Consejo Nacional para la Cultura y las Artes-Escuela Nacional de Antropología e Historia.

Fournier, P., and T.H. Charlton. 2011. Arqueología histórica de Cuauhnahuac-Cuernavaca. In *Perspectivas de la investigaciónarqueológica, volume 5*, ed. P. Fournier and W. Wiesheu, 129–164. México: Escuela Nacional de Antropología e Historia-Instituto Nacional de Antropología e Historia.

Fournier, P., and W. Wiesheu, eds. In press. *Homenaje a Thomas H. Charlton. Enfoques en tornoa la arqueología histórica Mesoamericana*. México: Instituto Nacional de Antropología e Historia.

Kolb, C.C. 2010. In memoriam: "Tom, we hardly knew ye" – Thomas H. Charlton, 1938–2010. *Ancient Mesoamerica* 21: 201–207.

Nichols, D.L., and J.R. Parsons. 2011. Thomas H. Charlton (1938–2010). *American Anthropologist* 113: 695–698.

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Basic Biographical Information

Pisit Charoenwongsa is a prominent Thai professional archaeologist and a pioneer scholar in cultural resource management who has been active in these fields for a number of decades. He was born in 1941 and grew up in the eastern province of Chachoengsao, obtaining his B.A. in archaeology from Silpakorn University in 1964. He attended the nondegree postgraduate program in archaeology at the University of London in the UK from 1968 to 1971. He went on to pursue his graduate studies at the University of Pennsylvania, USA, where he received an M.S. in anthropology in 1972. In 2000, he was awarded an honorary Ph.D. (Prehistoric Archaeology) from Silpakorn University.

Pisit Charoenwongsa began his career as a full-time lecturer of archaeology in 1967 at the Silpakorn University Faculty of Archaeology, where he taught and conducted research on the prehistory of Thailand and neighboring countries for seven years (1967–1973) before transferring to the Fine Arts Department (FAD) in 1974. He served in the FAD for 16 years (1974–1990). In 1990, Pisit resigned from the FAD to assume a position as senior specialist and later was promoted to serve as director-general of the SEAMEO Regional Center for Archaeology and Fine Arts (SPAFA), an international organization with members from 11 Southeast Asian countries, until his retirement in 2000. In addition, Pisit has served in various capacities in a number of nonprofit, private, and public educational and cultural organizations, and has played a variety of significant roles in the study, development, and preservation of cultural heritage. To name a few, he served as the president of the Indo-Pacific Prehistory Association (1996–2000), executive member of the International Council on Monuments and Sites (ICOMOS), editorial board member for Southeast Asia of the Journal of Conservation and Management of Archaeological Sites, and member of the International Coordinating Committee for Safeguarding and Development of the Historic Site of Angkor. Currently, he serves as chair of the Committee for Preparation of the Thai-Language Encyclopedic Dictionary of Global Archaeology, which is hosted and funded by Thailand's Royal Institute. The dictionary will be the first Thai-language dictionary of world archaeology and will serve as a major reference for teachers, students, archaeologists, and those who are interested in archaeology, history, history of art, and cultural resource management.

Major Accomplishments

Throughout his career as lecturer, archaeologist, academic advisor, writer, administrator, committee member, peer-reviewer, and so on, Pisit Charoenwongsa has contributed tremendously to the better understanding, promotion, development, and preservation of archaeological and cultural resources in Thailand in particular and in Southeast Asia in general. Pisit has been actively engaged at

both national and international level in the research, study, protection, development, and management of cultural resources projects. He has been invited to share his expertise and insight on the subject throughout Thailand and other countries.

Cross-References

► Indo-Pacific Prehistory Association (IPPA)
► Thailand: Cultural Heritage Management

Further Reading

Bayard, D., and P. Charoenwongsa. 1983. Non Chai: New data on metal working and trade from northeast Thailand. *Current Anthropology* 24.

Charoenwongsa, P. 1983. The identity of Thailand: Tracing back the past. *SPAFA Digest* 4 (1).

Charoenwongsa, P. 1987. *The legacy of Ban Chiang*. Bangkok: Fine Arts Department.

Charoenwongsa, P. 1988. The Phanomrung Lintel controversy: A report to the world public. Whitepaper distributed by the Fine Arts Department.

Charoenwongsa, P. 1990. Observations on cultural resource management in the United States. In *Epilogue of the final report of Taos Working Conference on Preventing Archaeological Looting and Vandalism*. Washington, DC: Society for American Archaeology.

Charoenwongsa, P. 1993. *Managing Thailand's archaeological resources. Paper presented at the 5th International Conference on Thai Studies*. London: School of Oriental and African Studies, University of London.

Charoenwongsa, P. 1994. Authenticity: Does it really matter? Paper presented at the Nara Conference on Authenticity in Relation to the World Heritage Convention. 1–6 Nov 1994, Nara.

Charoenwongsa, P. 1998. *Rock art in Thailand*. Bangkok: Office of National Identity Board (in Thai).

Charoenwongsa, P. 2001. *The personality of Thailand*. Bangkok: Tourism Authority of Thailand.

Charoenwongsa, P. 2005. His Majesty the King and cultural resource management. *Proceedings of the international conference on cultural environment conservation*. Bangkok: Ministry of National Resources and Environment's Office of Natural Resource and Environment Policy and Planning.

Charoenwongsa, P. 2008. Prehistoric communities. In *Aspects of Thai: background*, ed. N. Snitwongse, 3rd ed. Bangkok: Bangkok Bank Public Company Ltd. (in Thai).

Charoenwongsa, P., and M.C. Subhadaradis Diskul. 1978. *Archaeologi Mundi: Thailand*. Geneva: Nagel Publishers (in English, German, French, and Italian).

Gorman, C.F., and P. Charoenwongsa. 1976. Ban Chiang: a mosaic of impression from the first two years. *Expedition* 18 (4): 14–26.

Charter for the Conservation of Historic Towns and Urban Areas (Washington 1987)

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C

Brief Definition of the Topic

Introduction

In 1964, the Second International Congress of Architects and Technicians of Historical Monuments, organized in Venice under the auspices of UNESCO, adopted 13 resolutions, the International Charter for the Conservation and Restoration of Monuments and Sites, better known as the Venice Charter, among them. The second resolution was the act establishing an international non-governmental organization for the protection of monuments and sites, the International Council on Monuments and Sites (ICOMOS). Lastly, the eighth resolution was a request for the protection and revival of historical centers. This entry has constituted the starting point of the efforts made by ICOMOS for the adoption of a policy for the protection and restructuring of historical towns.

ICOMOS elaborated the views expressed in the Charter in the 20 years' period following the Venice Congress, according to the developments in the debate and practice for the protection and conservation of monuments and sites. After the first papers were collected by CIVVIH (*Comité International des Villes et Villages Historiques* [International Committee on Historic Towns and Villages]) following a debate with ICOMOS National and Scientific Committees, the *Charter for the Conservation of Historic Towns* was adopted in 1987 by the General Assembly of ICOMOS in Washington, DC. The Charter has remained loyal to the objectives of the *"Recommendation Concerning the Safeguarding and Contemporary Role of Historic Areas"*(*Warsaw – Nairobi, 1976) of UNESCO*. However, without being a sole repetition of the Declaration, its Articles contain both its philosophical view and its practical objectives.

Definition and Scope

This Charter is intended for specialists (especially architects, urban planners, and spatial planning engineers, geographers and ecologists, and infrastructure engineers) and those involved in planning in general or making decisions regarding the urban development process. The Charter makes an appeal to the younger generations and to the wider society to mobilize themselves to protect historical towns. The Charter supports the development approach to conservation and restoration by adopting, as a basic principle, that conservation should be integrally connected to economic and social development. Moreover, its notion of historical town conservation comprises all necessary measures, not only for their protection but also for their development and adaptation to modern life.

The Charter consists of three parts: (1) preamble and definitions, (2) principles and objectives, and (3) methods and instruments.

The first part lays down the scope of the Charter, which includes historical settlements and towns (both small and large); historical centers and districts, as well as their greater environment (both natural and built); and the risks of degradation, de-structuring, and destruction thereof due to the modern urban development.

The second part lays down that the effective preservation of historical towns and districts must be related to economic and social development policy and be taken into account by the urban and spatial plans implementing it within the space. The primordial value of the town's historical character must be preserved. In fact, disciplined and careful intervention is recommended, as is the participation of residents.

The third part underlines the need for plans of the conservation of historic towns and districts to be preceded by multidisciplinary studies. A conservation plan must thoroughly break down the data available (archaeological, historical, architectural, technical, social, and economic) and suggest directions and actions at the legislative, administrative, and financial levels with the consent and participation of the residents.

Current Interpretations

Today, disciplinary views have converged as to acknowledge that the town is a global phenomenon created through historic and material processes and that it evolves to the extent that human societies evolve as well. To that end, it has been pursued that the Charter constitutes a framework document that is specified and adapted to the particularities of the urban phenomenon in each geographical area.

Cross-References

- ► International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ► Urban Archaeology
- ► Urban Heritage
- ► Urban Landscapes: Environmental Archaeology

Further Reading

International Committee on Historic Towns and Villages. n.d. Available at: http://civvih.icomos.org/.

International Council on Monuments and Sites (ICOMOS). n.d. Available at: http://www.icomos.org/fr/.

International Council on Monuments and Sites (ICOMOS). 1987. Charter for the conservation of historic towns and urban areas. Washington (DC). Available at: http://civvih.icomos.org/?q=node/6.

Charter for the Protection and Management of the Archaeological Heritage (1990)

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Brief Definition of the Topic

In the field of heritage management, international charters are important documents that establish

guidelines and principles for best practices. Although essentially hortatory, in the sense that they lack the force of law embodied in the international cultural heritage conventions, heritage charters are an important source of guidance for governments, institutions, preservation practitioners, and the general public. The best-known and most influential example of a heritage charter is the 1966 Venice Charter (*International Charter for the Conservation and Restoration of Monuments and Sites*), drafted and adopted by ICOMOS, the International Council on Monuments and Sites.

ICOMOS is an international, nongovernmental organization dedicated to the preservation of the world's cultural heritage. Organized into national committees (there are currently 95) with numerous specialized scientific subcommittees, to date, ICOMOS has adopted 14 charters relating to heritage preservation, including archaeology, historic gardens and landscapes, historic towns and urban areas, and cultural tourism, to name just a few (ICOMOS n.d.). In 1990, ICOMOS adopted the *Charter for the Protection and Management of the Archaeological Heritage* in response to concerns about increasing threats to archaeological heritage from development, looting, and other activities (Elia 1993). It is the first comprehensive statement to express the need for effective policies relating to archaeological heritage management on the international, national, regional, and local levels. Although some of its provisions seem a bit outdated or lacking today (e.g., the limited role devoted to participation by indigenous and local peoples), the Charter remains an important articulation of the need for advance planning and rational decision-making in the realm of cultural heritage management. A later charter, adopted by ICOMOS in 1996, deals specifically with the challenges of managing underwater cultural heritage (ICOMOS n.d.).

The organization of the 1990 Charter reflects its effort to reach out to diverse interests (Table 1). Following an introduction that defines archaeological heritage very broadly as "all vestiges of human existence" (Article 1), the Charter addresses issues of primary concern to planners (Article 2) and lawmakers (Article 3), professional archaeologists and heritage managers (Articles 4–7), and academics (Article 8) and ends with an appeal for international cooperation (Article 9).

Charter for the Protection and Management of the Archaeological Heritage (1990), Table 1 Structure of the 1990 *Charter for the Protection and Management of the Archaeological Heritage*

Introduction
Article 1. Definition and Introduction
Article 2. Integrated Protection Policies
Article 3. Legislation and Economy
Article 4. Survey
Article 5. Investigation
Article 6. Maintenance and Conservation
Article 7. Presentation, Information, and Reconstruction
Article 8. Professional Qualifications
Article 9. International Cooperation

Recognizing that archaeological heritage is "a fragile and non-renewable resource," Article 2 of the Charter emphasizes the need for archaeological heritage management to be fully integrated into policies for land-use, development, environment, culture, and education, including meaningful involvement of the general public and indigenous peoples. Article 3 terms the protection of archaeological heritage "a moral obligation upon all human beings" and a "collective public responsibility." This responsibility requires protection for the sake of all humanity, not just for national or local interests. Consonant with this perspective, Article 3 calls for legislation to protect archaeological heritage from unauthorized destruction or alteration; to require investigation and documentation in cases where destruction or alteration is permitted; and to provide for proper maintenance, management, and conservation. These provisions are especially relevant for development projects in order to minimize their potential adverse effect on archaeological heritage.

The next two articles of the Charter focus on professional practice. Article 4 stresses the importance of archaeological survey data to help

planners make effective decisions relating to development. Article 5 emphasizes the need for nondestructive techniques and partial excavation in preference to total excavation and, significantly, gives a priority to the excavation of threatened sites over nonthreatened sites. The latter, according to the Charter, may be excavated "in exceptional cases . . . to elucidate research problems or to interpret them to the public." Here, the Charter seems to be urging a move by archaeologists away from their traditional, research-oriented excavations of sites purely for scientific purposes to the perhaps less glamorous, but more urgent, excavations of a diminishing heritage resource base. It certainly reflects a broad shift in many nations away from academic archaeology to public archaeologists engaged in what has been called compliance, or contract, archaeology.

Article 6 states that "the overall objective of archaeological heritage management should be the preservation of monuments and sites in situ, including proper long-term conservation and curation of all related records and collections etc." Post-excavation maintenance and conservation is necessary, as is participation by local and indigenous peoples. In Article 7, the Charter highlights the importance of public access to sites, monuments, and heritage information but urges caution in the use of reconstructions.

In several respects, the *Charter for the Protection and Management of the Archaeological Heritage* envisions a field that is much larger than that of traditional academic or research archaeology. In its engagement with legislation, development, interpretation, and various stakeholders, archaeological heritage management requires different skill sets from what traditional academic archaeology has provided. The last two articles of the Charter address the needs of the developing profession of archaeological heritage management. Article 8 calls for academic training to "take account of the shift in conservation policies from excavation to in situ preservation." Article 9 stresses the importance of international cooperation in developing and exchanging expertise in archaeological heritage management.

More than two decades after the adoption of the ICOMOS *Charter for the Protection and Management of the Archaeological Heritage*, its essential principles remain valid, and the *Charter* remains an important aspirational document. While more and more nations have adopted, at least in principle, the conservation ethic that is embodied in the notion of archaeological heritage management and while greater numbers of archaeologists and other professionals are engaged in its practice than ever before, the need for more effective legislation, policies, and protection remains a pressing issue in most parts of the world today.

Cross-References

► International Council on Monuments and Sites (ICOMOS) (Ethics)
► Underwater Cultural Heritage: International Law Regime

References

Elia, R.J. 1993. ICOMOS adopts archaeological heritage charter: Text and commentary. *Journal of Field Archaeology* 20: 97–104.
ICOMOS. n.d. Website of the International Council on Monuments and Sites, Charters and other doctrinal texts. Available at: http://www.icomos.org/index.php/en/charters-and-texts.

Charter for the Protection and Management of the Underwater Cultural Heritage (1996)

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Introduction

At its 11th General Assembly held in Sofia in October 1996, the International Council on Monuments and Sites (ICOMOS) ratified its Charter

on the Protection and Management of the Underwater Cultural Heritage (see http://www.international.icomos.org/under_e.htm). The 1996 Charter was developed by the International Committee on the Underwater Cultural Heritage (ICUCH), comprised of 24 international experts in underwater cultural heritage (UCH) who assist ICOMOS and UNESCO in promoting the protection and management of submerged cultural resources in inland and inshore waters, shallow seas, and deep oceans. A guide to best practices in UCH management and protection in territorial and international waters, the 1996 Charter was later largely adopted as the Annex to the UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001), which provides an international legal regime for activities directed at submerged heritage (see Forrest 2010: 286–361). The guidelines established by the 1996 Charter serve to guard UCH from threats presented by commercial salvage and to harmonize the framework for protection of submerged sites with that already afforded to cultural heritage on land; as such, the 1996 Charter may be seen as a supplement to the ICOMOS Charter for the Protection and Management of the Archaeological Heritage (1990).

Definition

The 1996 Charter begins by defining UCH as "the archaeological heritage which is in, or has been removed from, an underwater environment," including submerged sites and structures, shipwreck sites, and their archaeological and natural contexts. UCH is further described as an international resource in character and often location, a finite and nonrenewable resource, a public interest, and a vehicle for knowledge about the human past.

The body of the 1996 Charter consists largely of 15 articles designed to ensure transparency and uniformly high standards in the aims, methodologies, and expected results of all investigations of UCH. Article 1 lists the fundamental principles for the protection and management of UCH, including a mandate to consider in situ preservation as a first option, alongside a preference where practical for nondestructive techniques of investigation over intrusive excavation. All projects that may encounter UCH should consider how to mitigate their impact on that UCH, avoid disturbance of human remains or venerated sites, and include adequate documentation. Public access to UCH is viewed as a primary aim of management and therefore encouraged. The remaining 13 articles provide detailed guidelines for responsible management and investigation of UCH when excavation or other intervention in a site is determined to be the best option. These guidelines consider: project design (Article 2); funding for all stages of the project, including conservation and dissemination (Article 3); timelines (Article 4); statement of research objectives, methodologies and techniques (Article 5); qualifications of investigating team, with direction by a qualified and experienced underwater archaeologist for all intrusive investigations (Article 6); site assessment for vulnerability, significance, and potential (Article 7); comprehensive documentation (Article 8); material conservation at all stages (Article 9); site management and protection including public information, stabilization, and monitoring (Article 10); health and safety of investigating team (Article 11); reporting of objectives, methodology, results, and recommendations for future research (Article 12); curation and scientific integrity of project archives (Article 13); dissemination of research for public awareness through presentations and reports, cooperation with local communities and interest groups, and research collaborations (Article 14); and international collaboration to promote high standards of investigation and research (Article 15).

These guidelines for protection, intervention, and research aimed at UCH seek to provide practical rules and professional guidance for archaeologists and national authorities in research, management, and the institution of policy. Because it addresses in situ preservation, site investigation, management, maintenance, dissemination, and public outreach, the 1996 Charter has implications not only for heritage professionals involved directly with underwater sites and finds, but also for those whose work engages with or otherwise has an impact on UCH, including tourism and

museum professionals as well as the public (Maarleveld in Couratier 2008: 50–62).

Key Issues and Current Debates

While the 2001 Convention functions primarily as a juridical document, its Annex, based on the 1996 Charter, aims to offer practical guidelines and best practices deemed by some to be the "heart and soul" of the 2001 Convention (See Petzet in Grenier et al. 2006: vii-ix). To facilitate its application, the Scientific and Technical Advisory Board to the 2001 Convention serves primarily to advise state authorities and to promote and define best practice; (Guérin and Egger 2010: 102). ICUCH acts on a practical level, offering technical expertise for the protection and management of resources underwater (Grenier et al. 2006: x-xv). The tenets of the 1996 Charter may serve to guide public policy on UCH by numerous agencies in states that, for various reasons, have not become signatories to the 2001 Convention.

The 2001 Convention entered into force for signatory states in January 2009; for non-signatory states as well, the principles expressed in its Annex and the 1996 Charter have been successfully enacted in various ways. Innovative approaches to in situ preservation of UCH have been undertaken by a variety of states, including the pioneering project at Red Bay, Labrador, Canada and the *William Salthouse* wreck in Victoria, Australia; trails at the Florida Keys National Marine Sanctuary; Ustica off Sicily and Baiae in Campania, Italy; Sebastos in Caesarea, Israel; and Ampurias in Catalonia, Spain. Metal cages above identified shipwrecks in Croatia and the video camera monitoring of wrecks in Sicily, for example, aim to allow diving access while preserving the integrity of sites; so too does the establishment of maritime parks for individual wrecks as at the site of the *Kronprins Gustav Adolf* off Helsinki (Finland) or the *Wellington* in New Zealand (Manders et al. 2008; Alves in Couratier 2008: 81–90. See also: http://www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/about-the-heritage/dive-trail-in-situ-presentation/). Initiatives toward submerged and partly underwater museums such as the Baiheliang Museum at the Three Gorges in China, the half-submerged Guangdong Maritime Silk Road Museum in China, and the Alexandria Underwater Museum Project also hold potential to expand the range of possibilities for in situ preservation and display (Koschtial in Couratier 2008: 63–9; see also contributions by Xiurun (309–340), Fuchs (372–80) and Amin (381–89) in Shuguang 2011). Continued archaeological investigations of sites provide a basis for new research not only on seafaring practices, ship construction technology, and trade goods, but also innovative education outreach through their display in museums of maritime history and underwater archaeology that hold broad appeal for tourism (examples include the Mary Rose Museum (UK); the Vasa Museum (Sweden); the Viking Ship Museum in Roskilde (Denmark), the Bodrum Museum of Underwater Archaeology (Turkey), the Vancouver Maritime Museum (Canada), and the Western Australia Maritime Museum).

While it sets in situ preservation as a first option to be considered for the preservation and protection of UCH, the 1996 Charter neither prevents nor inhibits archaeological investigation (Manders in Couratier 2008: 31–41; Guérin and Egger 2011). The first principle requires investigators to consider the relative merits of in situ preservation versus intrusive excavation according to the individual circumstances of the site and any perceived threats. Such a principle does not deny the possibility of excavation if it serves as the better means of achieving research and mitigation objectives that fit within the parameters stipulated elsewhere in the 1996 Charter.

Perhaps, the most critical aspect of the 1996 Charter is its explicit prohibition against the disturbance of sites for commercial exploitation aimed at trade or speculation. Such activity, "intended to profit a few at the expense of many," is considered "fundamentally incompatible with the protection and management of the heritage" (Introduction). Article 6 stipulates, "All intrusive investigations of underwater cultural heritage will only be undertaken under the

direction and control of a named underwater archaeologist with recognized qualifications and experience appropriate to the investigation." This article places control over decisions regarding UCH in the hands of trained professionals engaged with the methodology and standards of working in the underwater environment, the research questions appropriate to the project, and the long-term stewardship and management of cultural heritage. As part of a broader scientific discipline, underwater archaeology means more than the retrieval of objects from the marine environment; the field is defined by investigative techniques, theoretical grounding, and a shared set of ethical principles (Maarleveld 2011). As a final protection against commercial exploitation of UCH, the 1996 Charter includes the important provision (Article 13): "The scientific integrity of the project archive must be assured; deposition in a number of institutions must not preclude reassembly to allow further research. Underwater cultural heritage is not to be traded as items of commercial value." These guidelines ensure that materials are not made inaccessible for future research or public appreciation through dispersal into private holdings. The 1996 Charter's provisions for qualified archaeologists and its restrictions against the sale or dispersal of objects do not explicitly restrict private for-profit contract services for site protection and mitigation by professionals provided that proper principles are observed and the heritage remains in the public domain. Rather, they establish a dichotomy between research and preservation objectives and commercial goals; intrusive excavation should not set the sale of artifacts as an end unto itself.

The ethical and practical framework established by the 1996 Charter also raises significant questions regarding the treatment of UCH that has been previously recovered by salvors as commercial goods. Recent salvage, display, and sale of objects from the *Titanic*, lying at a depth of 3,700 m on the Canadian outer continental shelf, or the Belitung shipwreck discovered off the coast of Indonesia with its cargo of ninth-century ceramics, have brought this controversy to the forefront of discussion (see Green 2011: 449–52; Dromgoole 2006). Both the *Titanic* and the Belitung wreck were salvaged according to contemporary national and international law, but such commercial salvage does not match the principles expressed in the 1996 Charter. From an ethical perspective, under what circumstances should this or similar material be published in academic journals or displayed in scientific or educational institutions, and how can research interests be balanced with site mitigation and public access? (Johnston 1993). Can archaeological and ethical standards of acquisition and display be compatible with commercial salvage operations and the financial challenges of research in the deep sea? (Greene et al. 2011; cf. Kingsley 2011).

For states that have not become signatories to the legal framework of the 2001 Convention, such ethical questions about protection, excavation, and the deposition of artifacts recovered from shipwrecks may be answered in part through the 1996 Charter. More detailed regulatory provisions and mitigation strategies might be useful and necessary in the future to address the growing dangers presented by certain modern practices of marine construction, mineral recovery, and trawl fishing, yet these threats do not detract from an overall framework of protection that sees commercialization of UCH as unacceptable. As a guideline for best practices – nonintrusive site assessment, effective protection and management, and archaeological excavation as necessary – the 1996 Charter aims to offer a coherent set of strategies for the preservation and presentation of UCH for states, professional researchers, as well as private interests and the public at large.

Cross-References

- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)

▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
▶ International Council on Monuments and Sites (ICOMOS) (Museums)

References

Couratier, M., ed. 2008. Underwater cultural heritage. *Museum International* 240 (60): 4.

Dromgoole, S. 2006. The international agreement for the protection of the *Titanic*: Problems and prospects. *Ocean Development & International Law* 37: 1–31.

Forrest, C. 2010. *International law and the protection of cultural heritage*. London/New York: Routledge.

Green, J. 2011. Review of Shipwrecked: Tang treasures and monsoon winds. *International Journal of Nautical Archaeology* 40: 449–452.

Greene, E.S., J. Leidwanger, R. Leventhal, and B. Daniels. 2011. Mare nostrum? Ethics and archaeology in Mediterranean waters. *American Journal of Archaeology* 115: 311–319.

Grenier, R., D. Nutley, and I. Cochran, ed. 2006. *Underwater cultural heritage at risk: Managing natural and human impacts*. Heritage at Risk Special Edition. Paris: ICOMOS.

Guérin, U., and B. Egger. 2010. Guaranteeing the protection of submerged archaeological sites regardless of their location: The UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001). *Journal of Maritime Archaeology* 5: 97–103.

Guérin, U., and B. Egger, ed. 2011. *UNESCO manual for activities directed at underwater cultural heritage*. Paris: UNESCO. Available at: http://www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/unesco-manual-for-activities-directed-at-underwater-cultural-heritage/unesco-manual/ . Accessed 1 Mar 2012.

Johnston, P. 1993. Treasure salvage, archaeological ethics and maritime museums. *International Journal of Nautical Archaeology* 22: 53–60.

Kingsley, S. 2011. Challenges of maritime archaeology: In too deep. In *A companion to cultural resource management*, ed. T.F. King, 223–244. Malden: Wiley-Blackwell.

Maarleveld, T.J. 2011. Ethics, underwater cultural heritage, and international law. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 917–941. Oxford: Oxford University Press.

Manders, M., D. Gregory, and V. Richards. 2008. The in situ preservation of archaeological sites underwater: An evaluation of some techniques. In *Proceedings of the 2nd heritage, microbiology and science conference, 28 June – 1 July 2005, Portsmouth*, ed. E. May, M. Jones, and J. Mitchell, 179–203. Cambridge: RSC Publishing.

Shuguang, L., ed. 2011. *2010 international meeting on protection, presentation and valorisation of underwater cultural heritage, Chongqing, China: Proceedings*. Beijing: Cultural Relics Press.

Chemical Survey of Archaeological Sites

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State of Knowledge and Current Debates

Soils and sediments are altered by human activity. These alterations can be direct and/or indirect, physical and/or chemical, and can both result from the deliberate behavior of people or be caused inadvertently. Chemical alterations of soils and sediments are often subtle and complex to study since laboratory methods must be employed (Holliday 2004). Their study is based on the premise that repeated human activities generate specific chemical compounds. Like a magnet, the negative charge of soil particles attracts positively charged compounds and forms a strong bond. This bond is relatively resistant to horizontal and vertical movement and, therefore, very stable over time (Wells 2006). Studying chemical alteration of soils and sediments has been used for archaeological prospection (locating and/or delineating sites) as well as interpretation of spatial use and function. Chemical analysis is best used in combination with other methods, and it is a particularly effective approach to interpreting spaces that contain little to no material culture.

Human-induced chemical alteration of archaeological soils and sediments can include an increase in phosphorus (P) levels due to the deposition of refuse and waste. The work of Arrhenius, a Swedish chemist, is regarded as pioneering in its interpretation of soil chemical properties in terms of archaeological significance. While working for the Swedish Sugar Manufacturing Company and generating soil maps, Arrhenius (1929) observed that areas on which medieval occupation occurred had higher levels of P when compared with those which were unoccupied. Arrhenius (1963) later continued with archaeological soil studies, while other researchers – especially Eidt (1977, 1985),

who contributed important methodological developments from soil chemistry – aided in the development and application of field and laboratory techniques to detect archaeological sites based on soil P levels. Subsequently, P analysis has been used for various archaeological purposes throughout the world. For example, in Queensland, Australia, Mulvaney and Joyce (1965) used this method to show relative occupation intensity over time. In North Wilshire, England, Smith and Simpson (1966) utilized P analysis to determine the presence of perishable artifacts in burials. At the site of Roders Shelter, Missouri, Ahler (1973) examined activity intensity and demonstrated the correlation between levels of P and lithic debris density. Davidson (1973) reconstructed the evolution of a tell site and investigated population growth at the site of Sitagroi in northeastern Greece using P analysis. Also in Greece, Cavanagh et al. (1988) used P analysis to identify human occupation sites and their boundaries. In Mesoamerica, Parnell et al. (2002) examined the relationship between P and refuse disposal at Piedras Negras, Guatemala. Their research concluded that there was a positive correlation between ceramic density and P concentration and showed that in-the-field P testing can be used to identify middens and guide excavations. In South America and in Europe, research into settlement-related anthropogenic dark earths has examined links between high P concentrations and the presence of well-preserved, P-rich microscopic inclusions, especially bone (Arroyo-Kalin et al. 2008; Devos et al. 2009).

Investigations of chemically altered archaeological soils and sediments have expanded to include a variety of elements other than P. Multielemental analyses have allowed for the exploration of connections between specific human activities and the elements that they deposit. Along with P, archaeological investigations have considered calcium (Ca), magnesium (Mg), and potassium (K). Additionally, carbon (C) and nitrogen (N) are commonly examined in association with human activities and to a lesser extent sulfur (S), copper (Cu), and zinc (Zn) (Fernández et al. 2002; Woods 2003; Holliday 2004). Much of what we know about the relationship between these elements and human activities comes from various ethnoarchaeological and experimental studies on contemporary occupation floors. For example, Luis Barba and colleagues have worked with indigenous people in small, rural villages throughout Mexico to investigate the deposition of elements due to various household activities (Barba 1986, 1990; Barba and Bello 1978; Barba and Denise 1984; Barba and Ortiz Butrón 1992, Barba et al. 1995). Other ethnoarchaeological studies have focused on different parts of Mesoamerica including, Oaxaca, Mexico (Middleton and Price 1996), Guatemala (Fernández et al. 2002; Terry et al. 2004), and Honduras (Wells and Urban 2002). These studies have found connections between specific domestic activities, such as cooking, storage, and craft manufacture, and certain chemical elements, compounds, and soil properties. Information from studies of this kind can be used as tools to interpret chemical signatures on archaeological floors and thus interpret ancient activity patterns. For instance, areas near ovens, fireplaces, and hearths tend to have high pH values and low P concentrations while also maintaining high levels of Ca and carbonates. The presence of wood ash, possibly from a hearth or kiln, is associated with high levels of K, sodium (Na), and Mg. The deposition of extremely high levels of P can be associated with food and beverage consumption and preparation, with low pH indicating food consumption. Ca and strontium (Sr) have been associated with the preparation of corn, whereas iron (Fe) has been associated with areas used for processing agave leaves. The elements barium (Ba), manganese (Mn), and P have been shown to indicate organic refuse disposal, while mercury (Hg) and lead (Pb) have been demonstrated to be associated with craft production. Additionally, the deposition of iron oxide and mercuric sulfide suggests the use of certain pigments, such as hematite and cinnabar, which were used in ceremonial settings including burials and caches throughout Mesoamerica (Holliday 2004; Wells 2004; Wells et al. 2007). Elemental concentrations are often quantitatively measured in parts

per million (ppm) using inductively coupled plasma-mass spectrometry (ICP-MS) or inductively coupled plasma-atomic emission spectroscopy (ICP-AES). Results are interpreted using spatial geostatistics and quantitative assessment. Multielemental analysis has been applied to the interpretation of a multitude of archaeological contexts, including plazas, middens, marketplaces, palaces, underwater archaeological sites, and houselots, among other contexts (e.g., Anderson et al. 2012; Aston et al. 1998; Bintliff et al. 1990; Canuto et al. 2010; Cap 2015; Cook et al. 2006; Dahlin et al. 2007; Eberl et al. 2012; Entwistle and Abrahams 1997; Fernández et al. 2002; Fulton et al. 2017; Hutson and Terry 2006; LeCount et al. 2016; Lewis et al. 1993; Linderholm and Lundberg 1994; Luzzadder-Beach et al. 2011; Parnell et al. 2002; Rothenberg 2014; Sills et al. 2016; Wells 2004; Wells et al. 2007).

When interpreting concentrations of elements for archaeological purposes, it is not the absolute concentrations that are of interest, but rather the relative concentrations and spatial patterns of elements (see also Wells et al. 2000). By mapping concentrations of elements across archaeological surfaces, researchers can examine differences in spatial use as well as sometimes define areas where specific activities likely occurred. Paired with observations of traditional archaeological artifacts, important insights can be achieved into past activity patterns and human practices. It is thus unsurprising that chemical surveying of archaeological sites has become a popular technique in contemporary archaeological investigations.

Cross-References

- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Chemistry: Definition
- ▶ Ash: Geoarchaeology
- ▶ Geoarchaeology
- ▶ Urban Dark Earth

References

Ahler, S.A. 1973. Chemical analysis of deposits at Rodgers Shelter, Missouri. *Plains Anthropologist* 18: 116–131.

Anderson, D., D. Bair, and R. Terry. 2012. Soil geochemical analyses at the preclassic site of Xtobo Yucatan. *Ancient Mesoamerica* 23: 365–377.

Arrhenius, O. 1929. Die Phosphatfrage. *Zeitschrift für Pflanzenernährung Düngung und Bodenkunde* 10: 185–194.

Arrhenius, O. 1963. Investigation of soil from old Indian sites. *Ethnos* 2: 122–136.

Arroyo-Kalin, M., E.G. Neves, and W.I. Woods. 2008. Anthropogenic dark earths of the Central Amazon region: Remarks on their evolution and polygenetic composition. In *Amazonian dark earths: Wim Sombroek's vision*, ed. W.I. Woods, W.G. Teixeira, J. Lehmann, C. Steiner, A. WinklerPrins, and L. Rebellato, 99–125. Dordrecht: Kluwer Academic Publishers.

Aston, M.A., M.H. Martin, and A.W. Jackson. 1998. The Potential for Heavy Metal Soil Analysis on Low Status Archaeological Sites at Shapwick, Somerset. *Antiquity* 72: 838–847.

Barba, L. 1986. La Química en el Estudio de Áreas de Actividad. In *Análisis de Unidades Habitacionales Mesoamericanas y Sus Áreas de Actividad*, ed. L. Manzanilla, 21–39. Ciudad Universitaria, Mexico, DF: Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México.

Barba, L. 1990. El Análisis Químico de Pisos de Unidades Habitacionales para Determinar Sus Áreas de Actividad. In *Etnoarqueología Coloquio Bosch Gimpera 1988*, ed. M.C. Serra Puche, 177–200. Ciudad Universitaria, Mexico, DF: Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México.

Barba, L., and G. Bello. 1978. Análisis de Fosfatos en el Piso de Una Casa Habitada Actualmente. *Notas Antropológicas* 1: 188–193.

Barba, L., and P. Denise. 1984. Actividades Humanas y Análisis Químico de Los Suelos: El Caso de Osumacinta Viejo, Chiapas. *Memorias de la XVII Mesa Redonda de la Sociedad Mexicana de Antropología* 2: 263–277.

Barba, L., and A. Ortiz Butrón. 1992. Análisis químico de pisos de ocupación: Un caso etnográfico en Tlaxcala, México. *Latin American Antiquity* 3: 63–82.

Barba, L., D. Pierrebourg, C. Trejo, A. Ortiz Butrón, and K. Link. 1995. Activites Humaines Refletees dans Les Sols S'unites D'habitation Contemporaine et Prehispanique de Yucatán (Mexique): Etudes Chimiques, Ethnoarchéologiques et Archéologiques. *Revue D'Archéométrie* 19: 79–95.

Bintliff, J.L., C. Gaffney, A. Waters, B. Davis, and A. Snodgrass. 1990. Trace element accumulation in soils in and around ancient settlements in Greece. In *Man's role in the shaping of the Eastern Mediterranean Landscape*, ed. S. Bottema, G. Entijes-Nieborg, and W. van Zeist, 159–172. Rotterdam: Balkema.

Canuto, M., J. Charlton, and E. Bell. 2010. Let no space go to waste: Comparing the uses of space between two late classic centers in the El Paraíso Valley, Copán, Honduras. *Journal of Archaeological Science* 37: 30–41.

Cap, B. 2015. How to know it when we see it: Marketplace identification at the classic Maya site of Buenavista del Cayo, Belize. In *Ancient Maya marketplaces: The archaeology of transient space*, ed. E. King, 111–137. Tucson: The University of Arizona Press.

Cavanagh, W.G., S. Hirst, and C.D. Litton. 1988. Soil phosphate, site boundaries, and change point analysis. *Journal of Field Archaeology* 15: 67–83.

Cook, D., B. Kovacevich, T. Beach, and R. Bishop. 2006. Deciphering the inorganic chemical record of ancient human activity using ICP-MS: A reconnaissance study of late classic soil floors at Cancuén, Guatemala. *Journal of Archaeological Science* 33: 628–640.

Dahlin, B., C. Jensen, R. Terry, D. Wright, T. Beach, and A. Magnoni. 2007. In search of an ancient Maya Market. *Latin American Antiquity* 18: 363–384.

Davidson, D.A. 1973. Particle size and phosphate analysis – Evidence for the evolution of a tell. *Archaeometry* 15: 143–152.

Devos, Y., L. Vrydaghs, A. Degraeve, and K. Fechner. 2009. An archaeopedological and phytolitarian study of the "Dark earth" on the site of Rue de Dinant (Brussels, Belgium). *Catena* 78: 270–284.

Eberl, M., M. Álvarez, and R. Terry. 2012. Chemical signatures of middens at a Late Classic Maya Residential Complex Guatemala. *Geoarchaeology* 27: 426–440.

Eidt, R.C. 1977. Detection and examination of anthrosols by phosphate analysis. *Science* 197: 1327–1333.

Eidt, R.C. 1985. Theoretical and practical considerations in the analysis of anthrosols, in J.A. Gifford (ed.) *Archaeological geology*: 155–90. New Haven: Yale University Press.

Entwistle, J.A., and P.W. Abrahams. 1997. Multi-element analysis of soils and sediments from scottish historical sites: The potential of inductively coupled plasma – Mass spectrometry for rapid site investigation. *Journal of Archaeological Science* 24: 407–416.

Fernández, F.G., R.E. Terry, T. Inomata, and M. Eberl. 2002. An ethnoarchaeological study of chemical residues in the floors and soils of Q'eqchi Maya houses at Las Pozas Guatemala. *Geoarchaeology* 17: 487–519.

Fulton, K.A., E.C. Wells, and D.A. Storer. 2017. Ritual or residential? An integrated approach to geochemical prospection for understanding the use of plaza spaces at Palmarejo Honduras. *Archaeological and Anthropological Sciences* 9 (6): 1059–1076. https://doi.org/10.1007/s12520-013-0170-3.

Holliday, V.T. 2004. *Soils in archaeological research*. Oxford: Oxford University Press.

Hutson, S., and R. Terry. 2006. Recovering social and cultural dynamics from plaster floors: Chemical analyses at ancient chunchucmil, Yucatán, Mexico. *Journal of Archaeological Science* 33: 391–404.

LeCount, L.J., E.C. Wells, T. Jamison, and D.W. Mixter. 2016. Geochemical characterization of inorganic residues on plaster floors from a Maya palace complex at Actuncan, Belize. *Journal of Archaeological Science: Reports* 5: 453–464.

Lewis, R.J., J.E. Foss, M.W. Morris, M.E. Timpson, and C.A. Stiles. 1993. Trace element analysis in pedoarchaeology studies. In *Proceedings of the 1st International Conference on Pedo-archaeology, Special Publication 93–03*, ed. J.E. Foss, M.E. Timpson, and M.W. Morris, 81–88. Knoxville: University of Tennessee Agricultural Experiment Station.

Linderholm, J., and E. Lundberg. 1994. Characterization of various archaeological soil samples using main and trace elements determined by inductively coupled plasma atomic emission spectrometry. *Journal of Archaeological Science* 21: 303–314.

Luzzadder-Beach, S., T. Beach, R. Terry, and K. Doctor. 2011. Elemental prospecting and geoarchaeology in Turkey and Mexico. *Catena* 85: 119–129.

Middleton, W.D., and T.D. Price. 1996. Identification of activity areas by multi-elemental characterization of sediments from modern and archaeological house floors using inductively coupled plasma-atomic emission spectroscopy. *Journal of Archaeological Science* 23: 673–687.

Mulvaney, D.J., and E.B. Joyce. 1965. Archaeological and geomorphological investigations on Mt. Moffatt Station, Queensland, Australia. *Proceedings of the Prehistoric Society* 31: 147–212.

Parnell, J.J., R.E. Terry, and P.D. Sheets. 2002. Soil chemical analysis of ancient activities in Ceren, El Salvador: a case study of a rapidly abandoned site. *Latin American Antiquity* 13: 331–342.

Rothenberg (Fulton), K. 2014. The built environment, social relations, and soil chemistry: The view from honduras. In *Mesoamerican plazas: Arenas of community building and power negotiation*, ed. T. Inomata and K. Tsukamoto, 121–129. Tucson: University of Arizona Press.

Sills, E.C., H. McKillop, and E.C. Wells. 2016. Chemical signatures of ancient activities at Chan b'i. *Journal of Archaeological Science: Reports* 9: 654–662.

Smith, I.F., and D.D.A. Simpson. 1966. Excavation of a round barrow at Overton Hill, North Wiltshire, England. *Proceedings of the Prehistoric Society* 32: 122–155.

Terry, R.E., F.G. Fernández, J.J. Parnell, and T. Inomata. 2004. The story in the floors: Chemical signatures of ancient and modern Maya activities at Aguateca, Guatemala. *Journal of Archaeological Science* 31: 1237–1250.

Wells, E.C. 2004. Investigating activity patterns in prehispanic plazas: Weak acid-extraction ICP-AES analysis of anthrosols at classic period El Coyote, Northwestern Honduras. *Archaeometry* 46: 67–84.

Wells, E.C. 2006. Cultural soilscapes. In *Function of soils for human societies and the environment*, ed. E. Frossard, W.E.H. Blum, and B.P. Warkentin, 125–132. London: Geological Society.

Wells, E.C., and P.A. Urban. 2002. An ethnoarchaeological perspective on the material and chemical residues of communal feasting at El Coyote, Northwest Honduras. In *Materials issues in art and archaeology*

C

VI, ed. P. Vandiver, M. Goodway, and J. Mass, 193–198. Warrendale: Materials Research Society.
Wells, E.C., R.E. Terry, J.J. Parnell, P.J. Hardin, M.W. Jackson, and S.D. Houston. 2000. Chemical analyses of ancient anthrosols in residential areas at Piedras Negras, Guatemala. *Journal of Archaeological Science* 27: 449–462.
Wells, E.C., C. Novotny, and J.R. Hawken. 2007. Quantitative modeling of soil chemical data from inductively coupled plasma-optical emission spectroscopy reveals evidence for cooking and eating in ancient Mesoamerican plazas. In *Archaelogical chemistry: Analytical techniques and archaeological interpretation*, A.C.-S. symposium series, ed. M.D. Glascock, R.J. Speakman, and R.S. Popelka- Filcoff, vol. 968, 210–230. New York: Oxford University Press.
Woods, W.I. 2003. Development of anthrosol research. In *Amazonian dark earths: Origin, properties, management*, ed. J. Lehmann, D. Kern, B. Glaser, and W.I. Woods, 3–14. Dordrecht: Kluwer Academic Publishers.

Chicken: Domestication

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Basic Species Information

The wild or red junglefowl *Gallus gallus* (Linnaeus, 1758) is the primary ancestor of domestic poultry. In areas where the distributions of the two species come into contact, red junglefowl is known to hybridize with grey junglefowl, *Gallus sonneratii* Temminck, 1813 (McGowan 1994). This happened in the past as well since domestic poultry acquired a gene responsible for yellow legs while retaining most of its genome from *G. gallus* (Eriksson et al. 2008). *G. sonneratii* is confined to Peninsular India except for NE India, where it is replaced by the much more widely distributed *G. gallus* occurring from India to S China and south across Thailand, Laos, Myanmar, Vietnam, Sumatra, Java, and Bali (McGowan 1994).

Major Domestication Traits

Red junglefowl are small-medium phasianids exhibiting a bright, colorful plumage in mature males. The species is characterized by a marked sexual size dimorphism (♀♀: 500–1050 g, ♂♂: 700–1450 g) (McGowan 1994). Domestic forms show a high variation in plumage color and may attain weights >5 kg. In all domestic breeds a clear sexual size dimorphism is observed. Like their wild ancestor, domestic chicken are opportunistic, omnivorous feeders. Their diet comprises a diverse spectrum of plant species as well as invertebrates. *G. gallus* breeds seasonally and can have up to three clutches of five to six, eventually up to nine eggs (McGowan 1994). Kept under natural conditions, *G. domesticus* can reproduce most of the year, except during winter when egg production ceases. Full clutches of domestic hens usually number about 12 eggs.

Genetic studies of modern wild and domestic *Gallus* indicate multiple maternal origins with possible domestication in the Indian subcontinent, SE China, and southern China and neighboring countries (Liu et al. 2006). However, this picture must be verified applying ancient DNA analysis because modern breeds may not be descended from local wild populations due to the introduction into Southeast Asia of more prolific, indigenous lineages during the last 200 years. Hybridization between wild, feral, and domestic *Gallus* has occurred as well, and fully wild red junglefowl is on the decline everywhere, if not already largely extinct.

Timing and Tracking Domestication

Written sources, iconography, and osseous remains of *Gallus* collected in archeological sites located beyond the natural distribution range of red junglefowl are indicative of domestic status. The earliest chicken finds come from sites along the Neolithic Yellow River and the Middle Yangtze (West and Zhou 1988). These findings would imply that domestication took place prior to 6000 BCE. This hypothesis must be verified based on a (re)evaluation of securely dated avifaunal assemblages. More than 3000 years later,

clay figurines and depictions of *Gallus* on ceramics illustrate the presence of domestic fowl in the Harappan sites (c. 2600–1900 BCE) of the Indo-Gangetic Plain. Trading contacts between the Indus Civilization and Mesopotamia initiated the westward diffusion of *Gallus* during the 2nd millennium BCE. From here, domestic chickens spread northward to the Caucasus region and westward to the Levantine coast. The fact that southern Mesopotamia was tributary to the Egyptian rulers explains why in the annals of Thutmose III (1479–1425 BCE) it was noted that the king received "birds which lay every day." Obviously, laying performance in chicken had already been improved considerably by human selection.

Since poultry can serve as living provisions on journeys, it is not surprising that seafaring people often carried chickens. Thus, early in the first millennium BCE, the Phoenicians introduced poultry keeping into their newly founded colonies located in coastal northern Africa and southern Spain, whereas the Greeks did the same in coastal and insular Mediterranean Europe. The need for provisions on sea journeys also explains the spreading of *Gallus* in Oceania since *c*. 3000–2800 BP and across Micronesia one millennium later (Storey et al. 2007).

If in the seventh–sixth centuries BCE domestic chicken made its appearance in temperate western and central Europe, poultry breeding only became popular under Roman cultural influence (27 BCE–478 CE). This trend is also observed elsewhere in the *Imperium Romanum*, e.g., in coastal N Africa and Egypt. Based upon currently available evidence, the diffusion of chicken husbandry into sub-Saharan Africa was a comparably late phenomenon starting in the fifth century CE.

While it is clear that European chickens were introduced into the Americas by Spanish or Portuguese explorers that arrived on the East Coast around 1500 CE, the presence of domestic fowl prior to this date remains a matter of dispute. An ancient DNA sequence and radiocarbon date from a single chicken bone excavated in coastal Chile has been interpreted as a Polynesian introduction in pre-Columbian times (Storey et al. 2007), but definite proof requires further analyses of ancient DNA sequences and radiocarbon and stable isotope data from archeological excavations within both Chile and Polynesia (Gongora et al. 2008).

A most remarkable aspect of domestic fowl is its role in symbolism and offerings in first millennium BCE Eurasia. Examples of this are the sacrifices in honor of Mercury, in the frame of the cult of Isis, and in Mithraism as well as its use in divination rites and as offerings with burials. Whether religious motifs initiated *Gallus* domestication or – as often stated in literature (Garrigus 2007) – if it were for the purpose of cockfighting, a pastime in the Indian subcontinent known since the first millennium BCE cannot be decided for the moment. Because neither the outcome of the domestication process nor the future needs of a society can be predicted by the domesticator, postulating intentional domestication is a critical issue because it is usually based on hindsight.

Interestingly, gut contents of 37 wild birds in India were noted containing seeds of 30 plant species including a single cultivar, i.e., rice (*Oryza*) (McGowan 1994). First domesticated in the Yangtze River valley 8000–6000 BCE, rice agriculture diffused to South China around 3000 BCE, whereas in the Indus Valley Civilization, rice cultivation can be dated to the 1st half of the third millennium BCE (Glover and Higham 1996), which is broadly contemporaneous to the appearance of domestic chicken in the local faunal record. It can therefore be questioned if innovative agricultural practice in Southeast Asia did not create a new feeding niche for *Gallus gallus*, thereby paving the way for a closer relationship between humans and red junglefowl.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

References

Eriksson, J., G. Larson, U. Gunnarsson, B. Bed'hom, M. Tixier-Boichard, L. Strömstedt, D. Wright, A. Jungerius, A. Vereijken, E. Randi, P. Jensen, and L. Andersson. 2008. Identification of the yellow skin gene reveals a hybrid origin of the domestic chicken.

PLoS Genetics 4 (2): e1000010. https://doi.org/10.1371/journal.pgen.1000010.
Garrigus, W.P. 2007. Poultry farming. *Encyclopædia Britannica*. Available at: http://www.brittanica.com/EBchecked/topic/135735/poultry-farming. Accessed 15 Feb 2012).
Glover, I.C., and C.F.W. Higham. 1996. New evidence for early rice cultivation in South, Southeast and East Asia. In *The origins and spread of agriculture and pastoralism in Eurasia*, ed. D.R. Harris, 413–441. London: University College London Press.
Gongora, J., N.J. Rawlence, V.A. Mobegi, H. Jianlin, J.A. Alcalde, J.T. Matus, O. Hanotte, C. Moran, J.J. Austin, S. Ulm, A.J. Anderson, G. Larson, and G. Cooper. 2008. Indo-European and Asian origins for Chilean and Pacific chickens revealed by mtDNA. *Proceedings of the National Academy of Sciences U S A* 105: 10308–10313.
Liu, Y.-P., G.-S. Wu, Y.-G. Yao, Y.-W. Miao, G. Luikhart, M. Baig, A. Beja-Perreira, Z.-L. Ding, M.G. Palanichamy, and Y.-P. Zhang. 2006. Multiple maternal origins of chickens: out of the Asian jungles. *Molecular Phylogenetics and Evolution* 38: 12–19.
McGowan, P.J.K. 1994. Family Phasianidae (pheasants and partridges). In *Handbook of the birds of the world*, New World vultures to guineafowl, ed. J. del Hoyo, A. Elliot, and J. Sargatal, vol. 2, 434–553. Bellaterra: Lynx Editions.
Storey, A.A., J.M. Ramírez, D. Quiroz, D.V. Burley, D.J. Addison, R. Walter, A.J. Anderson, T.L. Hunt, J.S. Athens, L. Huynen, and E.A. Matisoo-Smith. 2007. Radiocarbon and DNA evidence for a pre-Columbian introduction of Polynesian chickens to Chile. *Proceedings of the National Academy of Sciences U S A* 104: 10335–10339.
West, B., and B.-X. Zhou. 1988. Did chickens go north? New evidence for domestication. *Journal of Archaeological Science* 15: 515–533.

Chickpea: Origins and Development

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Basic Species Information

Chickpea is the cultivated legume, *Cicer arietinum* (L.). It is the only cultivated pulse from the tribe Cicereae (Family Fabaceae). Other names for this crop of Neolithic southwest Asian origin include garbanzo bean in the Americas, hamaz in Arabic countries, nohud or lablabi in Turkey, shimbra in Ethiopia, and bengal gram or chana in India (Redden and Berger 2007: 9). Chickpea ranks third in the world's production of seed legumes, after soybean (*Glycine max* L.) and pea (*Pisum sativum*). It is cultivated on nearly every continent, but major traditional production is in India, Pakistan, Turkey, Myanmar, and Ethiopia. Chickpea can be consumed cooked, baked, roasted, popped (like popcorn), stewed, or ground into flour (gram flour). The success of chickpea on a global scale is due to its high seed-protein content (nearly 20%) and, as a result, its potential as a valuable meat substitute. The high protein content makes it a perfect addition to cereals, as cereals are high in starch, and the combination of both of these provides a nutritional balance (Zohary et al. 2012). Kerem et al. (2007) have highlighted that chickpeas are especially rich in the rare amino acid, tryptophan, which may have made these of particular interest over other food plants. In addition to dietary benefits, pulses are useful when grown in fields together with cereal crops or when fields are rotated between the two. This is because pulses are able to fix atmospheric nitrogen in the soil, thereby replenishing nitrogen in soils depleted as a result of cereal cultivation (Zohary et al. 2012).

Major Domestication Traits

The seeds of chickpea are the most common plant part identified in archaeological contexts. The seeds of chickpea are dicotyledons, which can be divided into symmetrical halves. The morphology of chickpea seeds can be described as angular with wrinkly surfaces, with a defining characteristic, i.e., a protruding beak and a hilum under the beak (Fig. 1). Identification can be difficult due to fragmentation during charring and the specimens are then most likely to be identified to the family level (Tanno and Willcox 2006).

There are four primary changes in the evolution of chickpea under domestication. The first is

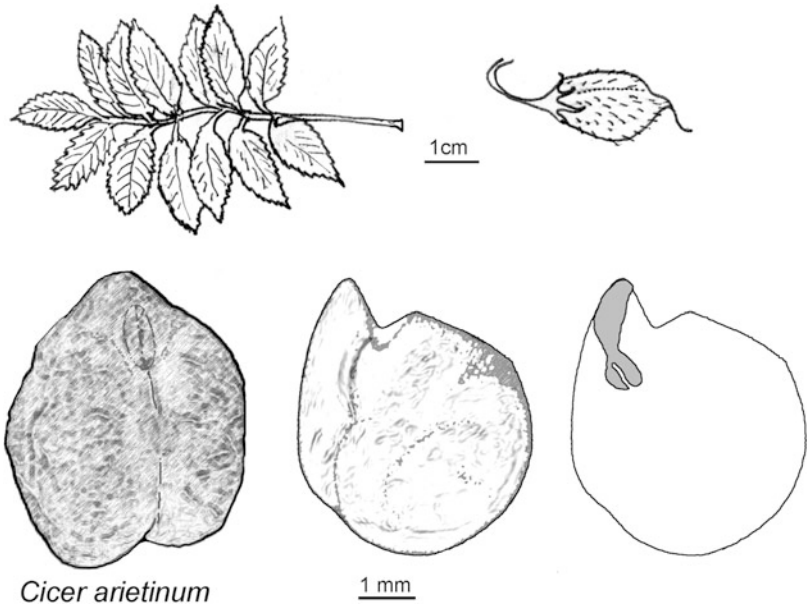

Chickpea: Origins and Development, Fig. 1 Sketch of the chickpea, including leaf and pod above and seed below. The seed is shown in basal view (with hilum), lateral view, and cross section showing the short embryo

an increase in seed size, which is most often the only surviving indicator for domestication in the archaeobotanical record. The second is the breakdown of the mechanism that retains the pod and seed on the plant. This allows the seeds to remain on the plant until the crop can be harvested as opposed to when the plant is ripe, as is the case for wild varieties. The third trait is a reduction of seed-coat thickness, which makes the seed coat more water absorbent and thus likely to germinate in the same year they are sown. This is in opposition to the wild types which have less permeable seed coats and as a consequence germinate over the course of several years. The fourth trait involves a change from autumn- to spring-sowing, which may be a result of the interaction between the pathogen *Digymella rabiei* and the fact that lengthened summer daylight enhances seed maturation (Zohary et al. 2012: 75–89, with references; Tanno and Willcox 2006: 197).

Timing and Tracking Domestication

The chickpea (*C. arietinum*) appears to have been domesticated from the wild *C. reticulatum* (Ladizinsky and Adler 1976; Zohary et al. 2012). The natural distribution of *C. reticulatum* is restricted to southeast Turkey, which provides the location of chickpea domestication and an area from which the crop spread (Fig. 2). The dispersal of domestic chickpea out of southeast Turkey resulted in the development of two crop types, the Kabuli and Desi, associated with the western and eastern dispersal, respectively. The Kabuli type (var. *macrocarpa*) is common in the Mediterranean countries and the Near East and has large, light colored owl-head-shaped seeds. The earliest well-preserved archaeobotanical evidence of chickpea outside of its wild progenitor's natural distribution area comes from a site located 260 km south of this region, in northwestern Syria. Charred remains from the early Pre-Pottery Neolithic B (c. 8400 BCE) site of Tell el-Kerkh provide evidence for an "intermediate" stage between the wild and domestic type morphologies (Tanno and Willcox 2006). There are specimens from Çayönü in southeastern Turkey that date to the same time and were found near the wild range of distribution, with likely later finds an indication of its spread to the southern Levant (Fig. 2). In general, finds of chickpea are rare compared to other

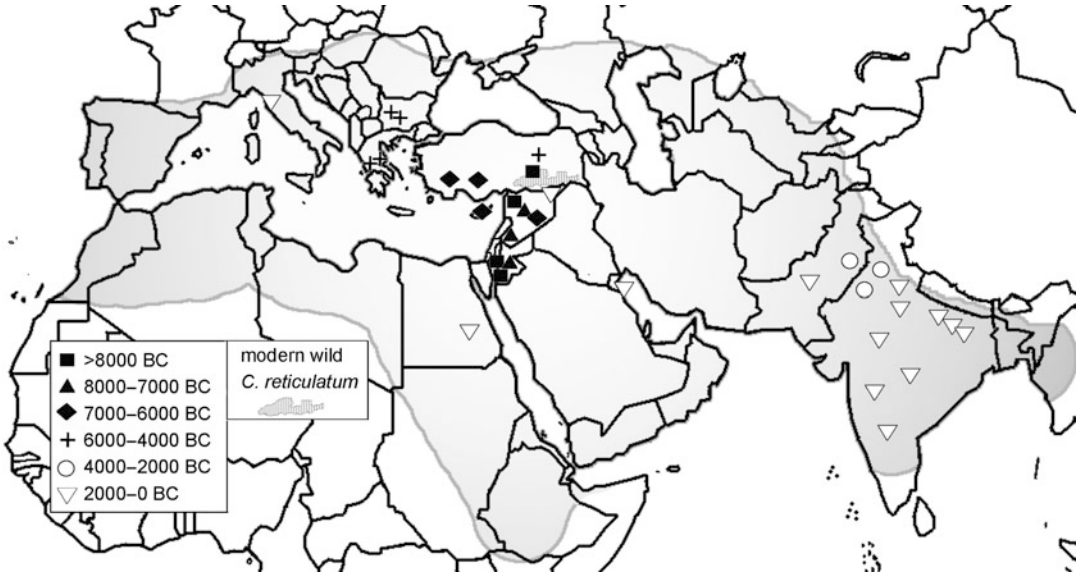

Chickpea: Origins and Development, Fig. 2 Map indicating the wild range of *Cicer reticulatum*, the general maximal extent of early/traditional chickpea cultivation and the distribution of representative early archaeobotanical finds (Based on data in Tanno and Willcox 2006; Fuller and Harvey 2006; Lippi et al. 2009; Zohary et al. 2012)

legumes, such as lentils or peas, which may indicate preservation biases against chickpeas. Nevertheless, the few finds indicate an early dispersal to the southern Levant and central Anatolia before 6000 BCE. Additional evidence for the westward spread include data from late Aceramic Neolithic Cyprus (c. 6500 BCE from Dhali-Agridhi), and finds from Greece just after 6000 BCE, with evidence from the Balkans by 5500 BCE.

The Desi variety (var. *microcarpa*) is associated with the eastern dispersal of chickpea and is common in India, Afghanistan, Ethiopia, and some parts of the Near East. This type is smaller and darker in color and has ram-head-shaped seeds (Ladizinsky 1995; Zohary et al. 2012). Evidence from the eastern margins of the Middle East is, so far, lacking of a comparable age to the evidence for the westward dispersal. So too is early evidence from the western Mediterranean. Nevertheless, finds from the Indus Valley, including specimens from Harappa, put cultivation in Pakistan by c. 2500 BCE, with further spread into India at c. 2000–1500 BCE (Fuller and Harvey 2006). In Egypt, chickpeas are known from the New Kingdom, e.g., the Tomb of Tutankhamun (Zohary et al. 2012). The earliest report thus far from Italy is of a Middle Bronze Age date (Lippi et al. 2009).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Lentil: Origins and Development
- ▶ Pigeon Pea: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Fuller, D.Q., and E.L. Harvey. 2006. The archaeobotany of Indian pulses: Identification, processing and evidence for cultivation. *Environmental Archaeology* 11 (2): 219–246.

Kerem, Z., S. Lev-Yadun, A. Gopher, P. Weinberg, and S. Abbo. 2007. Chickpea domestication in the Neolithic Levant through the nutritional perspective. *Journal of Archaeological Science* 34: 1289–1293.

Ladizinsky, G. 1995. Chickpea, Cicer arietinum. In *Evolution of crop plants*, ed. J. Smartt and N.W. Simmonds, 2nd ed., 258–261. London: Longman Scientific & Technical.

Ladizinsky, G., and A. Adler. 1976. The origin of chickpea Cicer arietinum L. *Euphytica* 25: 211–217.

Lippi, M.M., C. Bellini, M. Morisecci, and T. Gonelli. 2009. Comparing seeds/fruits and pollen from a Middle Bronze Age pit in Florence (Italy). *Journal of Archaeological Science* 36: 1135–1141.

Redden, R.J., and J.D. Berger. 2007. History and origin of chickpea. In *Chickpea breeding and management*, ed. S.S. Yadav, R.J. Redden, W. Chen, and B. Sharma, 1–13. Trowbridge: Cromwell Press.

Tanno, K.-I., and G. Willcox. 2006. The origins of cultivation of Cicer arietinum L. and Vicia faba L.: Early finds from Tell el-Kerkh, north-west Syria, late 10th millennium B.P. *Vegetation History and Archaeobotany* 15: 197–204.

Zohary, D., M. Hopf, and E. Weiss. 2012. *Domestication of plants in the Old World*. 4th ed. Oxford: Oxford University Press.

Childe, Vere Gordon (Political and Social Archaeology)

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Basic Biographical Information

Vere Gordon Childe (1892–1957) was arguably the most read and cited archaeologist of the twentieth century (McNairn 1980; Trigger 1980; Green 1981; Harris 1994). He produced broadly synthetic works that addressed fundamental questions relating to the pasts of Europe and the Near East, cultural evolution, and the nature of knowledge. He wrote in a clear way that appealed to popular audiences and to scholars outside of archaeology. Childe was an avid socialist and Marxist. In the 1930s, he recognized the role of prehistory in supporting the rise of Fascism in Germany. He asked and answered the question "Is Prehistory Practical" to challenge Fascism. After the Second World War, he confronted the Soviet perversion of Marxism and built an approach to knowledge to contest it.

Childe was born on April 14, 1892, in Sydney, Australia. He attended Oxford University in England, and in 1916, he earned a Ph.D. in classical philology. He returned to Australia where he became involved in leftist politics, and in 1921, the Australian Labor Party sent him to London as a correspondent. When the party suffered defeat the following year, Childe lost his employment and returned to an academic life in Great Britain. In 1927, Edinburgh University appointed him a full professor and granted him the Abercromby Chair of Prehistoric Archaeology. Childe was never an avid fieldworker, but between 1927 and 1954, he did excavations at seven archaeological sites in Scotland and Ireland. In 1946, the Institute of Archaeology in London appointed him Director and Professor of European Prehistory. He held this post until his retirement in 1956 when he returned to Australia where he died on October 19, 1957.

Childe's (1925, 1926, 1928, 1929) earliest research focused on the prehistory of Europe, the definition of archaeological cultures, and the diffusion of ideas in order to challenge nationalist and racist interpretations of European prehistory. Childe took his initial concept of an archaeological culture from the German archaeologist, Gustaf Kossinna. In his book *The Danube in Prehistory*, Childe defined an archaeological culture as a complex of types of remains including artifacts, house forms, and burial forms that consistently reoccurred together (Childe 1929: v–vi). Kossinna equated archaeological cultures with races, and he sought to trace the migration of the German race. Childe tried to counter this racist notion by demonstrating that archaeological cultures primarily changed due to diffusion and thus did not differ in terms of creativity, intelligence, or accomplishments.

In the late 1930s, Childe formulated his approach to cultural evolution. Childe (1934) first discussed agricultural and urban revolutions in his book *New Light on the Most Ancient East*, and he elaborated these ideas in his major popular work, *Man Makes Himself* (Childe 1936). He discussed cultural evolution in substantive terms to account for historical developments in the Near East and Europe. He did not engage in polemic nor did he develop a universal evolutionary theory.

Childe argued that archaeology should be a historical, human science. He recognized that archaeologists could learn a great deal from the natural sciences, but he rejected the idea that the methods or concepts of the natural sciences could be applied directly to the study of prehistory. For Childe, evolutionary laws did not transcend time and space. Universal laws or truths could only exist if human nature and/or society were fixed and immutable. Childe began with the Marxist principle that both human nature and society are constantly changing. Childe defined evolution as what happened in history. From a dialectical perspective, he saw no dichotomy between history and evolution, and he linked diffusion and evolution in his substantive studies.

After World War II, when the failings of the Bolshevism of the Soviet state became apparent to scholars in the West, Childe wrote about the nature of knowledge and its relationship to society. Childe (1989: 15–17) would later call Stalinism "the Marxist perversion of Marxism." With this critique, Childe became very concerned with epistemology, that is, with the nature of knowledge and how scholars create it. He rejected notions of laws that determined social change. He saw knowledge as complexly created and always subject to revision. His discussion of the nature of knowledge presaged current debates in Anglophone archaeology by a generation.

In Society and Knowledge, Childe (1956) argued that the function, structure, and content of knowledge are social and relate to action. Knowledge functions to provide rules for cooperative social action. The content of knowledge provides a working model of the "real world" that must be accurate enough for society to act. But, a society's knowledge is not always progressive, and scholarly critique reveals its conservatism. For Childe, the convergence between knowledge as a model of the "real world" and society's means of production provides the measure of a society's fitness to survive. Individual delusions or social illusions could hamper a society's knowledge or ability to act and progress (Childe 1956: 115). Such delusions may serve the particular interests of classes or specific groups and, at the same time, be a buttress to the authority of the ruling class. These delusions transform knowledge and science into ideology, and this ideology becomes a brake upon the progress of knowledge. Childe saw the development of knowledge as a dialectic in which people achieved understanding through the negation of error.

Major Accomplishments

Archaeologists continue to read, analyze, and discuss Childe (McNairn 1980; Trigger 1980; Green 1981; Harris 1994). The advent of radiocarbon dating in the 1950s revealed many of Childe's substantive interpretations of European prehistory to be false. His work, however, continues to be the starting point for questions of cultural evolution and domestication. Regrettably, Childe's discussions of epistemology have not received the attention of his other work. His observations, however, remain relevant and insightful as archaeology moves away from the sterile late twentieth-century debate between objectivist and relativist approaches to knowledge. Childe' ideas contributed to the three main archaeological movements of the twentieth century, culture-history, processual archaeology, and post-processual archaeology. Until archaeology transcends the issues raised in these movements, archaeologists will keep returning to Childe's work.

Cross-References

► European Mesolithic: Geography and Culture
► Marx, Karl

References

Childe, V.G. 1925. *The dawn of European civilization*. London: Keagan Paul, Trench, Trueban, and Co.
Childe, V.G. 1926. *The Aryans: A study of Indo-European origins*. London: Keagan Paul, Trench, Trueban, and Co.
Childe, V.G. 1928. *The most ancient East: The oriental prelude to European prehistory*. London: Keagan Paul, Trench, Trueban, and Co.
Childe, V.G. 1929. *The Danube in prehistory*. London: Claredon Press.
Childe, V.G. 1934. *New light on the most ancient East: The oriental prelude to European prehistory*. London: Keagan Paul, Trench, Trueban, and Co.
Childe, V.G. 1936. *Man makes himself*. New York: The New American Library.
Childe, V.G. 1956. *Society and knowledge*. New York: Harper and Brothers.
Childe, V.G. 1989. Retrospective. In *The pastmasters: Eleven modern pioneers of archaeology*, ed. G. Daniels and C. Chippendale, 10–19. London: Thames and Hudson.

Further Reading

Green, S. 1981. *Prehistorian: A biography of V. Gordon Childe*. Wiltshire: Moonraker Press.
Harris, D.R., ed. 1994. *Archaeology of V. Gordon Childe: Contemporary perspectives*. Chicago: University of Chicago Press.
McNairn, B. 1980. *Method and theory of V. Gordon Childe*. Edinburgh: Edinburgh University Press.
Trigger, B.G. 1980. *Gordon Childe: Revolutions in archaeology*. New York: Columbia University Press.

Childe, Vere Gordon (Theory)

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Basic Biographical Information

Socialist, antiwar activist, and social theorist V. Gordon Childe was probably read by more people than any other archaeologist of the twentieth century. Childe was born in North Sydney, Australia, on April 14, 1892, and, fearing ill-health and being a burden on society, committed suicide on October 19, 1957, near Sydney. He graduated from the University of Sydney in 1913 with honors in classical studies and received a scholarship to attend Oxford University from 1914 to 1916, where studies of classical archaeology aroused his curiosity about what happened before written records. Returning to Australia, he spent the next 6 years engaged in antiwar and progressive politics, serving as a secretary to the prime minister and later as a research and publicity officer in London. When the Labor government of New South Wales was ousted in 1922, Childe found himself without a job and with poor prospects of finding one in his home country and resumed his studies of prehistoric archaeology. For the next 5 years, he supported himself translating archaeology books into English and working as the librarian at the Royal Anthropological Institute. In 1927, he joined the faculty at Edinburgh University; in 1946, he became professor and director of the Institute of Archaeology at the University of London until his retirement a decade later.

Major Accomplishments

Childe's (e.g., 1925, 1926, 1929) studies in the late 1920s were concerned with cross-dating local cultural sequences from the Near East and Europe in order to explore changing relationships between the various cultures of this vast region. These studies heralded the replacement of nineteenth-century evolutionary schemes with culture-historical ones. Cultures, from his perspective at the time, were composed of objects and associations that repeatedly occurred together. He equated these with peoples and typically explained changes in terms of diffusion.

By the late 1920s, Childe had already begun to search the archaeological record for broader trends. In *The Most Ancient East* (1928), he argued that the development of agriculture (the Neolithic Revolution) marked a major change in human history. He adopted a version of the "oasis hypothesis" which argued that people domesticated the plants and animals that concentrated around water sources as the climate dried out at the end of the last ice age. In contrast to some advocates of this view, Childe argued that some

groups may have developed agriculture or animal husbandry, while others did not. In other words, these historical contingencies accounted both for the diversity of cultures with different economic bases and for the different trajectories of sociohistorical development that are evident in the archaeological record. They implied an ongoing dialectical relationship between human beings and how they perceived and used the environments in which they lived. Thus from his perspective, these contingencies and interactions precluded explanations of change that were based on either environmental determinism or unilinear evolution (Childe 1951).

From 1930 onward, Childe (e.g., 1930, 1934, 1936, 1942, 1946a, 1950, 1958) published a series of studies of the prehistoric past that focused less on culture-historical sequences and increasingly on economic relations. These ranged from the rise of craft specialization to the role of states, class formation, exploitation, and written records in the rise of civilization (the Urban Revolution). Many of the studies were simultaneously comparative and functionalist. His thesis of combined and uneven development was the first sustained socioeconomic analysis of the rise of civilization. He argued that (1) agriculture facilitated surplus production over subsistence needs and underwrote both technical and social divisions of labor; (2) the ruling classes in the Mesopotamian lowlands used part of the surplus they appropriated from direct producers to support full-time craft specialists, notably metalsmiths, who relied on ores obtained from the periphery; and (3) different trajectories of sociohistorical development emerged on the peripheries of the lowland Mesopotamian states.

From the mid-1930s onward, Childe framed his functionalist, socioeconomic analyses in increasingly Marxist terms (e.g., 1936, 1942, 1946b, 1950). He understood cultural change as a consequence of the contradictions that appeared between the forces and relations of production and that were manifested in the social organization, class conflicts, and world views of a society. These contradictions were the dynamic force of history – the motor that underwrote the dissolution of existing social relations and world views and the emergence of new ones in the larger totality we call society. This, of course, is the mode of production concept that Marx (1859) sketched in the preface of *A Contribution to the Critique of Political Economy.* During this time, Childe (e.g., 1954, 1956a) was one of the few archaeologists to point out that the rise of civilization had a dark side: exploitation, repression, and conquest, all of which impeded the growth of knowledge and progress by erecting ideologies (false consciousness) and practices that served the interests of ruling groups as exploitative social relations hardened.

Childe (e.g., 1946b, 1947a, b, 1956b) viewed archaeology as an historical science similar to paleontology or history as well as a social science, like anthropology, that attempted to understand ancient societies in the context of their historically constituted social relations and paths of development. From his standpoint, archaeological research was indispensable for providing information not only about past societies but also about long-term processes of cultural and societal change. Throughout his career, he increasingly saw change as a consequence of endogenous factors (the resolution of contradictions) rather a product of the migration of peoples, war, or conquest. His theoretically informed discussions of archaeology and past societies repeatedly challenged the hegemonic historical accounts and understandings of how humankind developed that were held by the ruling classes. As a result, he was continually aware of the difference between the evidentiary base that archaeologists use to discuss the historical development of human society, the methods they employ to accumulate evidence and bring these accounts to life, and the social and cultural milieus in which they present their findings and the discourses that these presentations engender.

Cross-References

▶ Archaeology and Politics
▶ Braidwood, Robert John

▶ Childe, Vere Gordon (Political and Social Archaeology)
▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
▶ Near East (Including Anatolia): Origins and Development of Agriculture

References

Childe, V.G. 1925. *The dawn of European civilization*. London: Kegan Paul.
Childe, V.G. 1926. *The Aryans: A study of Indo-European origins*. London: Kegan Paul.
Childe, V.G. 1928. *The most ancient East: A study of Indo-European origins*. London: Kegan Paul.
Childe, V.G. 1929. *The Danube in prehistory*. Oxford: Oxford University Press.
Childe, V.G. 1930. *The Bronze Age*. Cambridge: Cambridge University Press.
Childe, V.G. 1934. *New light on the most ancient East: The oriental prelude to European prehistory*. London: K. Paul, Trench, Trubner & Co.
Childe, V.G. 1936. *Man makes himself*. London: Watts.
Childe, V.G. 1942. *What happened in history*. Harmondsworth: Penguin Books.
Childe, V.G. 1946a. *Scotland before the Scots, being the Rhind lectures for 1944*. London: Methuen.
Childe, V.G. 1946b. Archaeology and anthropology. *Southwestern Journal of Anthropology* 2: 243–251.
Childe, V.G. 1947a. *History*. London: Cobbett.
Childe, V. G. 1947b. Archaeology as a social science. In *University of London, Institute of Archaeology, Third Annual Report,* 49–60.
Childe, V.G. 1950. The urban revolution. *The Town Planning Review* 21: 3–17.
Childe, V.G. 1951. *Social evolution*. London: Watts.
Childe, V.G. 1954. Early forms of society. In *A history of technology*, ed. C. Singer et al., 38–54. Oxford: Oxford University Press.
Childe, V.G. 1956a. *Society and knowledge*. London: George Allen & Unwin.
Childe, V.G. 1956b. *Piecing together the past: The interpretation of archaeological data*. London: Routledge and Kegan Paul.
Childe, V.G. 1958. *The prehistory of European society*. Harmondsworth: Penguin Books.

Further Reading

Patterson, T.C., and C.E. Orser Jr., eds. 2004. *Foundations of social archaeology: Selected writings of V. Gordon Childe*. Walnut Creek: AltaMira Press.
Trigger, B.G. 1980. *Gordon Childe: Revolutions in archaeology*. New York: Columbia University Press.
Trigger, B.G. 1999. Vere Gordon Childe (1892–1957). In *Encyclopedia of archaeology: The great archaeologists*, ed. T. Murray, vol. 1, 385–400. Santa Barbara: ABC-CLIO.
Wailes, B. 1996. V. Gordon Childe and the relations of production. In *Craft specialization and social evolution: In memory of V. Gordon Childe*, University Museum Symposium series, ed. B. Wailes, vol. 6, 1–14. Philadelphia: University of Pennsylvania Museum.

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Children in Bioarchaeology and Forensic Anthropology

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Introduction

The bioarchaeology of childhood has gained traction in the past two decades, with a proliferation of research papers and new methods for investigating this subset of past populations (Halcrow and Tayles 2008; Lewis 2007; Mays et al. 2017). It is now accepted that children are so-called "canaries in the coal mine" for population stress as a whole because their developing immune system and the energy requirements of normal growth make them more susceptible to the effects of stress (Lewis 2007). It is well established that children are sensitive barometers of population fertility, mortality, stress, and infectious disease, and their study also provides insights into identity and childcare practices in archaeological populations (Larsen 2015). Similarly, research on children in the forensic context is crucial given that infants and children are often the victims of homicide and genocide (Lewis 2007). For example, in 2012, children younger than the age of 20 comprised 95,000 or one-fifth of all homicides worldwide (UNICEF 2014). This entry introduces the bioarchaeological and forensic anthropological study of children and discusses key theoretical and methodological approaches and their limitations.

Definition

Bioarchaeology refers to the study of human skeletal remains from archaeological sites. This term was coined in the 1970s to refer to human skeletal analyses investigating the lifeways of past peoples, including diet, disease, migration, and habitual activities (Buikstra 1977). Child bioarchaeology therefore refers to the investigation of this age group from the archaeological context. The biological age categories that are used in bioarchaeology align somewhat with the medical literature. However, their use varies and Lewis (2007) and Halcrow and Tayles (2008) provide discussions of the different terminology used within bioarchaeology. Infants and children are often divided into the categories of fetus (younger than 37 weeks of gestation), infants (from the newborn period of older than 37 weeks to less than 1 year of age), and children (from about 1–17 years of age). Forensic anthropology refers to the investigation of human skeletal biology within the legal and/or criminal context. In the forensic literature, biological age at death for estimating chronological age is the primary identifier of children. Because of this, a major focus in childhood forensic research is the accurate estimation of age of infants and children using dental and skeletal methods (Lewis and Rutty 2003).

Historical Background

Early bioarchaeological research was focused on the description and typological classification of physical characteristics of humans based on adult skeletal (mainly cranial) remains. Although the concept of developmental plasticity and child growth was introduced in anthropology in the early twentieth century by Franz Boas, it was not until after the mid-twentieth century that infants and children were investigated in bioarchaeology, and until the 2000s that its study became more commonplace. Child forensic anthropology also has a relatively short historical background with the first forensic case studies occurring near the middle of the twentieth century (Lewis and Rutty 2003).

Key Issues/Current Debates

Bioarchaeological Theory: Stress, Developmental Origins and the Social Life Course

Bioarchaeologists traditionally employ a biocultural approach, where skeletal remains are interpreted within the context of the interplay between biology and culture (Larsen 2015). Physiological stress from an external (environmental) stressor is the central basis of this biocultural model (Goodman et al. 1984). Recently there is a growing interest in the Developmental Origins of Health and Disease (DOHaD) hypothesis in bioarchaeology, where it is recognized that maternal and early life stress has pressing implications for adult life and the health experience of their own offspring (Gowland 2015). Other approaches pertinent to child bioarchaeology are social life course theory and plasticity theory. The life course approach interprets aspects of human growth and health in the context of the different biological processes and social aspects that vary across the life course (Agarwal 2016). Plasticity theory views variability in development as a response to stress and investigates adaptive capacity across the life course. There is an increasing amount of literature drawing on social theory, focused on investigating the social identity of children, and the study of infant and child death and burial from archaeological contexts (e.g., Murphy and Le Roy 2017). Bioarchaeologists working with infants and children acknowledge that they are dealing with the nonsurvivors, and therefore, they may not be representative of the health experiences of survivors of the populations.

Methodological Approaches

The fields of bioarchaeology and forensic anthropology are similarly interested in building biological profiles of individuals, including age and any other identifying features such as disease and evidence for trauma. As such, many of the methods employed for this purpose are similar between these fields. There are several central methods for investigating children in the archaeological and forensic anthropological contexts, and we outline these below.

Preservation and Recovery

Although it is often assumed that there are issues with preservation of infants and children in the archaeological context, there are many examples of excellent preservation of children from diverse environmental contexts (Lewis 2007, p. 20). However, there is the potential for small developing bones from infants and children to be missed or damaged during excavation.

Age at Death Estimation

Age at death estimation is a first step in bioarchaeological analyses and forensic anthropology identification. Human age has social, biological, and chronological facets. The estimation of age at death in bioarchaeology relies primarily on the assessment of biological age using standards for dental and skeletal development. Accepted age at death methods include the use of long bone lengths (Cunningham et al. 2016), dental development and eruption (Ubelaker 1989), and the appearance and fusion of secondary ossification centers (Lewis 2007). As mortality is the ultimate expression of physiological stress, age at death profiles provide insight into population adaptation to the biocultural environment (Lewis 2007). Social age may be assessed with archaeological analyses of grave goods, mortuary practices and historical documents. These data may be informative of the place and role of children in society, cultural beliefs around care, and may also provide insight into social organization. A key issue surrounding age at death estimation is individual and population level variation in biological development. Methodological development in forensic anthropology is focused on increasing the efficiency and reliability of existing aging techniques in forensics (Schaefer et al. 2017).

Mortality and Demography

Although the death of an older adult may be expected, the death of an infant or child is generally the outcome of poor health or an accident. Just as the World Health Organisation uses mortality rates to gage overall population stress and disease, bioarchaeologists also use mortality rates as an indicator of population adaptation. The study of demography focuses on past population composition (e.g., age and sex), to infer aspects of population dynamics such as population growth and decline and fertility rates. Counterintuitively, fertility can be assessed by looking at the amount of infant and child death in a cemetery sample, as the more babies that are born the more are expected to be represented in the cemetery sample. However, unfortunately infants and young child are often excluded from many fertility statistics on the assumption that they will be under-represented in archaeological samples (Halcrow et al. 2017).

Nonspecific Indicators of Stress

As children are growing there is an opportunity to assess their experience of stress through an assessment of physiological disruptions in growth. Because the etiology of these indicators of stress is often not known in the archaeological context, these are termed "nonspecific." Common types of nonspecific indicators of stress include developmental defects of the dentition (Hillson 1996). The rate of dental development and formation is less affected by environmental stressors than bone growth. Therefore, comparing the lag in long bone growth with dental development can give insight into the experience of stress (Humphrey 2000). Newer methods for assessing infant and childhood growth include the measurement of vertebral dimensions (Newman and Gowland 2015). There has also been a focus in research on the timing of adolescence as a measure of stress (e.g., Lewis et al. 2016). We can also look at evidence for bony responses to inflammation (subperiosteal new bone formation) or nonspecific bone infection (osteomyelitis) (Lewis 2018). Although the assessment of physiological disruption is not always useful in some forensic contexts, the application of these types of techniques may prove useful in assessing forensic cases involving child abuse and neglect, although these methods are not definitive (Ross and Abel 2011).

Specific Infectious Disease and Trauma

There are many pathological conditions that can be found in infant and child remains (Lewis 2018). Some diseases may leave diagnostic indicators on the skeleton, and these may be studied in

conjunction with detailed age, sex, and contextual information to identify specific diseases and provide insight into aspects of the environment such as subsistence and diet, level of sedentism, and social identity (Lewis 2007, 2018). Examples of specific diseases investigated in children include smallpox, tuberculosis, and treponemal disease (Lewis 2018).

Increasingly, trauma analyses are being incorporated into childhood bioarchaeological studies. When investigated within a life course theory framework, trauma analysis can reveal information on violence towards children, caregiving, childhood occupation, and personhood in childhood (Lewis 2007, 2014, 2018).

A key issue in the paleopathological and forensic anthropology analyses of children is the difficultly differentiating pathological and normal bone growth, and the removal of skeletal evidence of trauma and disease through the rapid remodeling of bone (Lewis 2014). Care must be taken in child trauma analyses, as the high cartilage content and other properties of infant and child cortical bone influence the fracture types observed, their distribution in the skeleton, and the duration of healing.

Weaning and Diet

Weaning is the process of introducing solid foods into an infant's diet and moving away from an exclusively breastfed diet. The start of this process is significant as it increases the risks of mortality and morbidity in infants, as they are exposed to more pathogens through food and water and the possibility of nutrient-poor weaning foods (Katzenberg et al. 1996). Estimating the age of onset of weaning provides information on cultural beliefs about infant and childhood diet, subsistence and availability of suitable supplementary foods, and duration of breastfeeding can have a bearing on fertility. The pattern of weaning and diet may be assessed through analyses of the skeleton, including chemical signatures (isotopes) in teeth and bone (and sometimes in hair if preserved), and macroscopic and microscopic investigation of developmental dental defects and dental wear (Halcrow et al. 2018). Recent developments in chemical studies of infant human remains are also allowing identification of physiological stress events during childhood (Beaumont and Montgomery 2016).

Forensic Anthropology Identification of Infants and Children

As mentioned, children are subject to high rates of homicide and violence and are often found in skeletonized states due to their rapid decomposition (Lewis and Rutty 2003; Lewis 2007). Skeletal indicators of sex and ancestry are often used in conjunction with age estimates and trauma and pathology analyses to build profiles for their identification. Although it is relatively easy to estimate a biological age of infants and children compared with adults in the forensic context, the methods for identification of infants and children including the estimation of ancestry and sex are problematic (Lewis and Rutty 2003).

Morphologically based methods for sex estimation of infants and children are problematic as there is little sexual dimorphism present prior to puberty (Lewis and Rutty 2003; Lewis 2007). Ancestry is identified through analysis of metric and nonmetric dental traits in deciduous and permanent teeth, body proportions, and skeletal nonmetric traits. In addition, isotopic analysis of tooth and bone may be useful for revealing the geographic origin of the deceased. Traumatic injuries may be used in forensic contexts to identify cause of death or factors relating to death, and patterns of trauma on the skeleton can be used for personal identification (Lewis 2007). Ancient DNA methods are increasing in reliability and applicability and are decreasing in cost. These techniques may be useful for investigating sex, ancestry, and identifying familial relationships.

Cross-References

- ▶ Age Estimation
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments

References

Agarwal, Sabrina C. 2016. Bone morphologies and histories: Life course approaches in bioarchaeology. *American Journal of Physical Anthropology* 159 (S61): 130–149.

Beaumont, Julia, and Janet Montgomery. 2016. The Great Irish Famine: Identifying starvation in the tissues of victims using stable isotope analysis of bone and incremental dentine collagen. *PLoS One* 11 (8): e0160065.

Buikstra, Jane E. 1977. Biocultural dimensions of archaeological study: A regional perspective. In *Biocultural adaptation in prehistoric America*, ed. Robert L. Blakely, 67–84. Athens: University of Georgia Press.

Cunningham, Craig, Louise Scheuer, and Sue Black. 2016. *Developmental juvenile osteology*. 2nd ed. London: Academic Press.

Goodman, Alan H., Debra L. Martin, George J. Armelagos, and George Clark. 1984. Indicators of stress from bones and teeth. In *Paleopathology at the origins of agriculture*, eds. Mark N. Cohen and George J. Armelagos, 13–49. New York: Academic Press.

Gowland, Rebecca L. 2015. Entangled lives: Implications of the developmental origins of health and disease hypothesis for bioarchaeology and the life course. *American Journal of Physical Anthropology* 158 (4): 530–540.

Halcrow, Siân E., and Nancy Tayles. 2008. The bioarchaeological investigation of childhood and social age: Problems and prospects. *Journal of Archaeological Method and Theory* 15 (2): 190–215.

Halcrow, Siân E., N. Tayles, and Gail E. Elliot. 2017. The bioarchaeology of fetuses. In *The anthropology of the fetus: Biology, culture, and society*, eds. Sallie Han, Tracy K. Betsinger, and Amy B. Scott, 83–111. New York: Berghahn Books.

Halcrow, Siân E., Charlotte L. King, Andrew R. Millard, Anne Marie E. Snoddy, Rachel M. Scott, Gail E. Elliot, Darren R. Gröcke, Hallie R. Buckley, Vivien G. Standen, and Bernardo T. Arriaza. 2018. Out of the mouth of babes and sucklings: Breastfeeding and weaning in the past. In *Breastfeeding: New anthropological approaches*, eds. Cecilia Tomori, Aunchalee Palmquist, and Elizabeth Quinn, 155–169. Abingdon: Routledge.

Hillson, Simon. 1996. *Dental anthropology*. Cambridge: Cambridge University Press.

Humphrey, Louise. 2000. Growth studies of past populations: An overview and an example. In *Human osteology in archaeology and forensic science*, eds. Margaret Cox and Simon Mays, 23–38. Cambridge: Cambridge University Press.

Katzenberg, M. Anne, D. Ann Herring, and Shelley R. Saunders. 1996. Weaning and infant mortality: Evaluating the skeletal evidence. *American Journal of Physical Anthropology* 101 (S23): 177–199.

Larsen, Clark S. 2015. *Bioarchaeology: Interpreting behaviour from the human skeleton*. 2nd ed. Cambridge: Cambridge University Press.

Lewis, Mary E. 2007. *The bioarchaeology of children: Perspectives from biological and forensic anthropology*. Cambridge, UK: Cambridge University Press.

Lewis, Mary E. 2014. Sticks and stones: Exploring the nature and significance of child trauma in the past. In *The Routledge handbook of the bioarchaeology of conflict*, eds. Chistopher Knüsel and Martin J. Smith, 39–64. London: Routledge.

Lewis, Mary E. 2018. *Paleopathology of children: Identification of pathological conditions in the human skeletal remains of non-adults*. London: Academic Press.

Lewis, Mary E., and Guy N. Rutty. 2003. The endangered child: The personal identification of children in forensic anthropology. *Science & Justice* 43 (4): 201–209.

Lewis, Mary E., Fiona Shapland, and Rebecca Watts. 2016. The influence of chronic conditions and the environment on pubertal development. An example from medieval England. *International Journal of Paleopathology* 12: 1–10.

Mays, Simon, Rebecca L. Gowland, Siân E. Halcrow, and Eileen Murphy. 2017. Child bioarchaeology: Perspectives on the last ten years. *Childhood in the Past: An international journal* 10 (1): 38–56.

Murphy, Eileen, and Mélie Le Roy, eds. 2017. *Children, death and burial: Archaeological discourses*, Childhood in the past. Vol. 5. Oxford: Oxbow Books.

Newman, Sophie L., and Rebecca L. Gowland. 2015. The use of non-adult vertebral dimensions as indicators of growth disruption and non-specific health stress in skeletal populations. *American Journal of Physical Anthropology* 158 (1): 155–164.

Ross, Ann H., and Suzanne M. Abel, eds. 2011. *The juvenile skeleton in forensic abuse investigations*. New York: Humana Press.

Schaefer, Maureen, Nicole Geske, and Craig Cunnigham. 2017. A decade of development in juvenile aging. In *New perspectives in forensic human skeletal identification*, ed. Krista Latham, Eric J. Bartelink, and Michael Finnegan, 45–60. London: Elsevier Academic Press.

Ubelaker, D.H. 1989. *Human skeletal remains: Excavation, analysis, interpretation*, Manuals on archaeology. Washington, DC: Taraxacum. Original edition, 1978.

UNICEF. 2014. *Hidden in plain sight: A statistical analysis of violence against children*. New York: United Nations Children's Fund.

Further Reading

Ardren, Traci, and Scott R. Hutson, eds. 2006. *The social experience of childhood in ancient Mesoamerica*. Boulder: University Press of Colorado.

Baker, Brenda J., Tosha L. Dupras, Matthew W. Tocheri, and Sandra M. Wheeler. 2005. *The osteology of infants and children*. College Station: Texas A&M University Press.

Baxter, Jane E. 2005. *The archaeology of childhood: Children, gender, and material culture*. Walnut Creek: AltaMira Press.
Beauchesne, Patrick, and Sabrina Agarwal, eds. 2018. *Children and childhood in bioarchaeology*. Gainesville: University of Florida Press.
Cosçkunsu, Güner, ed. 2015. *The archaeology of childhood: Interdisciplinary perspectives on an archaeological enigma*. New York: State University of New York Press.
DeWitte, Sharon N., and Chistopher M. Stojanowski. 2015. The osteological paradox 20 years later: Past perspectives, future directions. *Journal of Archaeological Research* 23 (4): 397–450.
Halcrow, Siân E., and Nancy Tayles. 2011. The bioarchaeological investigation of children and childhood. In *Social bioarchaeology*, eds. S.C. Agarwal and B.A. Glencross, 333–360. Chichester: Wiley-Blackwell.
Halcrow, Siân E., and Stacey M. Ward. 2017. Bioarchaeology of childhood. In *Oxford bibliographies: Childhood studies*, ed. Heather Montgomery. New York: Oxford University Press. https://doi.org/10.1093/obo/9780199791231-0178.
Kamp, Kathryn A. 2015. Children and their childhoods: Retrospectives and prospectives. *Childhood in the Past: An international journal* 8 (2): 161–169.
Robbins Schug, Gwen. 2011. *Bioarchaeology and climate change: A view from South Asian prehistory*. Gainesville: University Press of Florida.
Saunders, Shelley R. 2008. Juvenile skeletons and growth-related studies. In *Biological anthropology of the human skeleton*, eds. M. Anne Katzenberg and Shelley R. Saunders, 117–148. Chichester: Wiley-Liss.
Thompson, Jennifer L., Marta P. Alfonso-Durruty, and John J. Crandall, eds. 2014. *Tracing childhood: Bioarchaeological investigations of early lives in antiquity*. Gainesville: University Press of Florida.
Tsutaya, Takumi, and Minoru Yoneda. 2015. Reconstruction of breastfeeding and weaning practices using stable isotope and trace element analyses: A review. *American Journal of Physical Anthropology* 156 (S59): 2–21.

Children in the Central and Western Mediterranean, Archaeology of

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Introduction

In the central and western Mediterranean, childhood was considered a distinct phase of life; the age at which children ceased to be children was likely fluid and may have varied depending on factors such as socioeconomic status and gender. Archaeologists have focused their research on the identification of children's material culture, the differences in the treatment of dead children, and the portrayal of children in iconography. Within the discipline of archaeology for this region, the term "subadult" is used to refer to the physical remains of individuals under the age of 18 years; it is not equivalent to the term "child," which refers to a sociocultural construct.

Definition

The term "child" in archaeology is generally regarded to imply an individual who is considered a child by his or her respective society. That is, to say, the concept of "a child" is regarded as a cultural construct involving individuals that are physically and socially dependent due to their physical age and cognitive state. Among the cultures of the central and western Mediterranean, childhood seems to have been regarded as a distinct life stage, though the precise nature of the age and social distinctions is one area of scholarly inquiry.

Though one of the key issues (see below) in the study of children in the central and western Mediterranean is the definition and identification of children's material culture, there are certain types of artifacts that archaeologists have determined that share an association with children. Archaeologists have focused specifically on games, toys, and infant feeders, all of which conform to modern notions of what constitutes children's objects, as the material culture of ancient childhood. In particular, there have been a number of studies and exhibitions of these artifacts in the past two decades (e.g., Ricotti 1994; *Jouer dans l'Antiquité* 2001). Dolls have attracted some of the most attention; the majority of research has focused on the form and possible intended functions of dolls themselves (Elderkin 1930; Mason and Simeoni 1987).

Iconography and burial evidence provide some tangible evidence of the association between children and particular types of artifacts, an association which in some cases is also bolstered by the

historical record. Transition periods are particularly visible; the early and mid-teens, around the onset of puberty, seem to have been a critical point in the lives of children. Items, such as amulets and dolls, mentioned in historical sources associated with childhood and coming of age ceremonies, are found in association with children as associated grave goods and in iconography. For instance, a study of grave goods found with young girls between the ages of 8 and 14 years posited that dolls deposited with them symbolized that the girls never achieved marriage in life (Martin-Kilcher 2000). According to historical sources, young girls would have dedicated their dolls to the goddess Venus just before they married (Persius *Sat*. 2.70). Figurines that were possibly dolls have been found at temples of Venus (Elderkin 1930). Other artifacts associated with children were protective amulets. Votive terracottas in the image of infants depict them wearing such objects (Coulon 1994; Ammerman 2007), and boys on Roman children's sarcophagi are portrayed wearing amulets known as *bullae* (Huskinson 2007: 331).

Burial evidence has also attested to the social distinctiveness of children. Subadults, in particular neonates and infants, are often underrepresented in cemeteries; they were often interred in separate locations. Some infant cemeteries have been excavated, such as the late Roman infant cemetery at Poggio Gramignano in Italy (Soren and Soren 1999) and the Yasmina cemetery at Carthage in North Africa (Norman 2003). The phenomenon of separate burial sites for subadults has been seen in mortuary sites throughout the world, though reasons for this may vary depending on culture and location (Becker 2007). They have been even found beneath the floors of houses in some of the western Roman provinces. Overall within different regions within the central and western Mediterranean, there were variations in the treatment of subadult remains.

In addition to determining relationships between children and material culture, the study of the iconography has yielded evidence of ideological and symbolic associations with children. For instance, circus scenes were frequently found on children's sarcophagi in Roman Italy. The circus, as a liminal place where supernatural forces played a heavy hand in fate, represented the connection between magic and children, liminal beings whose graves were sources of power for magicians. The spirits of children themselves could affect the outcomes of races and the well-being of the competitors (D'Ambra 2007). Funerary images and sculptures have also revealed a strong symbolic link between children and animals. Lizards, for example, which were frequently depicted in funerary art with the image of a sleeping child, may have symbolically represented the protectors of children (Sorabella 2007).

Key Issues/Current Debates/Future Directions/Examples

The issue of definition and identification of children's material culture is a key issue in the archaeology of the central and western Mediterranean. In all likelihood, children in this region lacked a distinctive material culture. For instance, human figurines may have served either as dolls or as votives (Shumka 1999: 617), as could other types of miniatures, such as pots (Kiernan 2009). Graffiti of alphabets can be associated with adult learners as well as children; both individuals of all ages would have made use of dice and gaming pieces.

Also of concern in the archaeology of children in the central and western Mediterranean regards their underrepresentation in cemeteries. Debate over whether this is actual underrepresentation due to sociocultural traditions or only the appearance of underrepresentation due to differential archaeological preservation concerning the survival of infant bones in the archaeological record continues to be debated (Blaizot et al. 2003). Some scholars have speculated that this is due to the relative fragility of children's small bones (Bourbou 2000: 187). Acidic soils can affect skeletal survival, and shallow graves of infants are more vulnerable to damage from plowing (Evison 1987: 146). Furthermore, imperfect excavation techniques can affect the recovery of the remains of infants and young children (Bello 2004).

Another key issue is the study of children's lives and activities (as opposed to sociocultural

constructions) in the central and western Mediterranean. The goals of such studies have been to understand children as active social agents. Little is known of the archaeology of children's day-to-day lives, including the activities they participated in, the places they inhabited, the people with whom they interacted, and their contributions to their communities. The lack of a recognizably distinctive material culture makes identification of their presence difficult in contexts where either the image or the physical remains of a child is absent. There seems to have been no space within a Roman house designated specifically for children, as one might expect in an Anglo-American home (Wallace-Hadrill 1994: 42). With the exception of a child's bed from Herculaneum (Wallace-Hadrill 1994: 113), both Pompeii and Herculaneum lack anything readily identifiable as children's objects: a study of artifact assemblages from 30 Pompeian houses did not yield a single identifiable "child's object" (Allison 2004: 155). As a result, there has been little work done on analyzing domestic artifact assemblages in the Mediterranean to look for evidence of children's activities (for an exception, see Johnson 2007 on the site of Karanis, Egypt). A study of children's graffiti in Pompeii and Herculaneum has shown that children had preferred smaller and obscured spaces within houses for more leisurely activities (Huntley 2010).

Cross-References

- ▶ Bioarchaeology in the Roman Empire
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Tombs, Greek (Iron Age)

References

Allison, P.M. 2004. *Pompeian households: An analysis of the material culture*, Monograph. Vol. 42. Los Angeles: Cotsen Institute of Archaeology.

Ammerman, R.M. 2007. Children at risk: Votive terracottas and the welfare of infants at Paestum. In *Constructions of childhood in ancient Greece and Rome*, Hesperia Supplement, ed. A. Cohen and J.B. Rutter, vol. 41, 131–153. Princeton: ASCSA.

Becker, M.J. 2007. Childhood among the Etruscans: Mortuary programs at Tarquinia as indicators of the transition to adult status. In *Constructions of childhood in ancient Greece and Italy*, Hesperia Supplement, ed. A. Cohen and J.B. Rutter, vol. 41, 281–292. Princeton: ASCSA.

Bello, S.M. 2004. Taphonomy, selective preservation, and robusticity in human skeletal samples: The osteometric paradox. *American Journal of Physical Anthropology* Suppl. 38: 61–62.

Blaizot, F., G. Alix, and E. Ferber. 2003. Le traitement funéraire des enfants décédés avant un an dans l'Antiquité: etudes de cas. *Bulletins et mémoires de la Société d'Anthropologie de Paris* 15 (1–2): 49–77.

Bourbou, C. 2000. Infant mortality: The complexity of it all! *Eulimene* 2: 187–202.

Coulon, G. 1994. *L'enfant en Gaule Romaine*. Paris: Editions Errance.

D'Ambra, E. 2007. Racing with death: Circus sarcophagi and the commemoration of children in Roman Italy. In *Constructions of childhood in ancient Greece and Italy*, Hesperia Supplement, ed. A. Cohen and J.B. Rutter, vol. 41, 339–352. Princeton: ASCSA.

Elderkin, K. 1930. Jointed dolls in antiquity. *American Journal of Archaeology* 34 (4): 455–479.

Evison, V.I. 1987. *Dover, the Buckland Anglo-Saxon cemetery*, Historic Buildings and Monuments Commission Report 3. London: Historic Buildings and Monuments Commission.

Huntley, K.V. 2010. Identifying children's graffiti in Roman Campania: A developmental psychological approach. In *Ancient graffiti in context*, ed. J.A. Baird and C. Taylor, 69–89. London: Routledge.

Huskinson, J. 2007. Constructing childhood on Roman funerary memorials. In *Constructions of childhood in ancient Greece and Italy*, Hesperia Supplement, ed. A. Cohen and J.B. Rutter, vol. 41, 323–338. Princeton: ASCSA.

Johnson, K.J. 2007. *Materializing childhood: An historical archaeology of children in Roman Egypt*. Ph.D. dissertation, University of Michigan.

Jouer dans l'Antiquité: Musée d'Archéologie Méditerranéenne – Centre de la Vieille Charité 22 novembre 1991 – 16 février 1992. Marseille: Musée de Marseille.

Kiernan, P. 2009. *Miniature votive offerings in the northwest provinces of the Roman empire*. Wiesbaden/Rühpolding: Franz Philipp Rutzen Verlag.

Martin-Kilcher, S. 2000. Mors immatura in the Roman world – A mirror of society and tradition. In *Burial, society and context in the Roman world*, ed. J. Pearce, M. Millett, and M. Struck, 63–77. Oxford: Oxbow.

Mason, M., and E. Simeoni. 1987. Le bambole romane antiche. *La Ricerca Folklorica* 16: 15–26.

Norman, N.J. 2003. Death and burial of Roman children: The case of the Yasmina cemetery at Carthage-Part II, the archaeological evidence. *Mortality* 8 (1): 36–47.

Ricotti, E.S.P. 1994. *Giochi e Giocattoli (Vita e costumi dei romani antichi). Museo della civiltà romana*. Rome: Edizioni Quasar.

Shumka, L. 1999. A bone doll from the infant cemetery at Poggio Gramignano. In *A Roman villa and late Roman infant cemetery*, ed. D. Soren and N. Soren, 615–618. Rome: L'Erma di Bretschneider.

Sorabella, J. 2007. Eros and the lizard: Children, animals, and Roman funerary sculpture. In *Constructions of childhood in ancient Greece and Italy*, Hesperia Supplement, ed. A. Cohen and J.B. Rutter, vol. 41, 353–372. Princeton: ASCSA.

Soren, D., and N. Soren, eds. 1999. *A Roman villa and a late Roman infant cemetery: Excavation at Poggio Gramignano, Lugnano in Teverina*. Rome: L'Erma di Bretschneider.

Wallace-Hadrill, A. 1994. *Houses and society in Pompeii and Herculaneum*. Princeton: Princeton University Press.

Further Reading

Cohen, A., and J.B. Rutter, eds. 2007. *Constructions of childhood in ancient Greece and Italy*, Hesperia Supplement. Vol. 41. Princeton: ASCSA.

Chile, Archaeology and Indigenous Communities of

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State of Knowledge and Current Debates

Introduction

After a long history of the denial and assimilation of indigenous peoples in Chile, the existence of ethnic groups in this country was recognized with the enactment of the Indigenous Law in 1993. Consequently, the Chilean State was assumed to be multicultural. This process was undoubtedly framed within a global context of the emergence of indigenous movements of the late twentieth century, in which indigenous leaders and intellectuals, as well as governmental and non-governmental institutions and organizations, and scholars from different disciplines were mobilized in Chile. This scenario implied a new ideological, legal, and institutional context in which the relations of the Chilean State with indigenous peoples changed, since the state moved from an assimilationist and integration policy to one of recognition and promotion of cultural differences. From a position of power different from that of previous years, Indigenous people emerged as agents of a multicultural patrimonialization, postulating a series of demands and leading struggles around the significance and power of their cultural rights and the resources existing in their territories. In this scenario, Indigenous peoples claimed their rights over Indigenous cultural heritage and their right to participate in the bestowing of meaning, production, and control over this heritage, as agents interested in archaeological heritage and discourses of the past. In a north-south view of the native territories of the indigenous populations in Chile, the currently recognized ethnic groups are Aymara, Quechua, Atacameño, Kolla, Diaguita, Mapuche, Kawésqar, and Yagán, as well as the Rapa Nui that inhabit the Easter Island in Polynesia. Although a significant number continue to live on their original lands, there has historically been a significant migration to nearby cities and even to the capital of the country: Santiago. According to the 2002 census, 692,192 people declared themselves to be indigenous in Chile, corresponding to 4.58% of the total Chilean population.

This essay analyzes the connections between archaeologists and indigenous people in Chile, addressing the Aymara, Atacameño, Mapuche, and Rapa Nui cases in particular, since more information about their heritage claims is available. In order to contextualize the development of archaeology, I discuss relationships between the state and the indigenous peoples and the legislation related to cultural heritage, as well as the dominant theoretical paradigms in the archaeological field. It also reflects on the articulations of this discipline with colonialism, nationalism, and multiculturalism. We analyze the different approaches from which indigenous peoples have been integrated into the archaeological field, concluding the existence of archaeologies committed to these societies. Finally, this essay addresses cases of reburial and repatriation in the multicultural era.

Colonialist and Nationalist Archaeology

In Chile, the first attempts to analyze the archaeological record occurred during the nineteenth century. Naturalists integrated ethnographic and archaeological studies in their research; they created a taxonomic system of nature ordering that was transferred and included the past and present of indigenous populations (Salazar et al. 2012). Although the contribution of the Chilean State was initially indirect, this changed in the late nineteenth century with the publication of José Toribio Medina's book: *The Aborigines of Chile* in 1882. This book analyzes the first settlements of the country and the Mapuche culture. To this growing interest and the state control of the indigenous past and the archaeological remains, the founding of the Museum of Ethnology and Anthropology in 1912 was added, as well as the law 651 enactment in 1925. Thanks to this law, the Council of National Monuments was created, the institution in charge of the national archaeological heritage up to the present.

From the beginning of the twentieth century, the Chilean State began to support and finance archaeological research in troubled territories. On the one hand, in the north of the country, there was a process of "Chileanization" after the War of the Pacific (1879–1884), a war with Peru and Bolivia, when Chile took control of the northern region of its present territory and embarked on the nationalization of Aymara and Atacameño populations. On the other hand, in the south, it continued with the "Pacificación de la Araucanía," a process through which the country continued taking over the Mapuche territory. From an assimilationist ideology, the indigenous populations were denied and considered in the process of disappearance or extinction. However, the nationalization project required a history that covered the pre-Hispanic origins of the inhabitants of those territories. In this way, an important scientific activity was developed with the arrival of foreign teams such as the French Scientific Mission, which carried out archaeological and ethnographic research in the north. Besides, in 1911, the government hired German archaeologist and ethnologist Max Uhle, who carried archaeological investigations and historical reconstructions in this part of the country. Due to Uhle's ethnic and culturalist interpretations and his definition of the Atacameño for pre-Hispanic times, these indigenous populations were conceived of as territorialized and to remain in the past. This contributed to the construction of a culturally homogenous nation-state of white-European matrix. Later, Ricardo Latcham contributed to the chronological, spatial, and cultural ordering of the Chilean prehistory and the indigenous groups that inhabited the national territory, highlighting his contribution to the Mapuche archaeology (Salazar et al. 2012).

In the case of Easter Island, which was annexed to Chilean territory in 1888, the earliest archaeological expedition in the twentieth century was carried out by English archaeologist Katherine Routledge (1914–1915). However, according to Vilches (2015) unlike other cases where the political manipulation of knowledge had a sound state control, archaeology on this island was an opportunity for the Chilean nation to take advantage without state planning. Most of the archaeological restoration projects have been at least co-financed with foreign funds, and Chile had the vision to support an activity that did not mean large investments. For other researchers, the early development of archaeology in Easter Island made it possible to know a past almost forgotten by the Rapa Nui population, which was considered to be in a process of cultural disintegration and depopulation since the sixteenth century, increasing from the eighteenth century with the island's discovery by the Western world (Cristino 2011).

From the perspective of the anthropology and archaeology of these times, indigenous populations were considered as objects of study, reminiscent of a past that it was important to know before it disappeared. Although the interests of the scholars of those times were eminently scientific, their interpretations were incorporated into political agendas and justified the national policy of denial, integration, and assimilation of indigenous peoples. In the north of the country, Gundermann and González (2009) argue that the anthropological balance of the situation of the Northern natives indicated their complete integration, in

the case of the *Changos*, or the presence of few survivors who were in a clear process of assimilation, in case of the Aymaras and Atacameños. Furthermore, Seelenfreud (2008) states that in the Easter Island case the ethnological works focused on the study of the megalithic constructions from a rescue point of view, considering the Indigenous subjects as living vestiges of a glorious and mysterious past, a society on the verge of disappearing or extinguishing, without giving much relevance to the social and political contexts in which the Rapa Nui people were inserted or of the westernization processes they were undergoing.

Archaeology at that time was characterized by a markedly asymmetrical power relationship between archaeologist and Indigenous populations, who from a position of structural subordination fulfilled a role of workers and/or "informants." The archaeologists were connected with state and/or private interests and were foreigners or professionals from Santiago City associated with the ruling class. In these circumstances, Chilean archaeology reproduced a colonial rationality, which not only pressurized and territorialized native societies but attempted to impose a Western knowledge and value to history, the past, and archaeological remains. Reproducing what has happened in other contexts worldwide, some of the archaeological practices that continued the logic of colonialism in Chile are the denial of the other as subject, the exile of Indigenous people to a remote past, and the rupture of their historical continuity: the digging, study, and exhibition of Indigenous ancestors and collecting, musealization, monumentality, and patrimonialization of the Indigenous past. Through its interpretations and legitimation of the state ownership of archaeological heritage, nationalist archaeology contributed to the construction of an imagined national community. In this case, directly or indirectly, archaeological knowledge and practice were used to shape the Chilean national identity and validate its power and authority in the definition and control of the past and Indigenous heritage. Archaeology contributed to the myth of origin of the Chilean nation-state, naturalizing and legitimizing its presence in indigenous ancestral territories, while the latter were assimilated or integrated into a monocultural society.

Archaeology as a discipline began its institutionalization in the 1940s and 1950s, mostly through studies carried out by the Natural History Museum, La Serena Archaeological Museum, and San Pedro de Atacama Archaeological Museum, whose investigators had different trajectories influenced by empiricism and cultural history. In 1959, the Regional Museum was inaugurated in the city of Arica, highlighting the work of foreign archaeologists based in the country such as Percy Dauelsberg, Oscar Espoueys, and Guillermo Focacci, pioneers in the development of Arica's archaeology. According to Romero (2003), the growing emphasis on the study of archaeological burial sites, in particular the Chinchorro mummies, generated wide expectations among the general public, in addition to promoting an external view of archaeology as a study of remote societies that have little or nothing in common with the present indigenous peoples. At the same time, the Museum of Arica worked with a group of Indigenous people of Aymara origin who helped as labor force during the excavations and in the conservation of materials and especially in passing of vernacular knowledge (Espinosa et al. 1998; Romero 2003). During the same period, Belgian priest Gustavo Le Paige developed his investigations in San Pedro de Atacama (Ayala 2008). The relevance of his work lies in the fact that he managed to establish, early and permanently, the scientific power represented by the museum he founded in the main Atacameño settlement. Even though Le Paige defended the idea of Atacameño cultural continuity, he conceived the idea of a population in the process of vanishing and reproduced colonial relations of denial by not considering the Atacameño beliefs in the "grandfathers or gentiles" and their opposition to excavating archaeological burial sites and displaying human remains in the museum. From the Atacameño perspective, the "grandfathers or gentiles" are entities from long bygone time, from a pre-Christian time, and the interruption of their rest and negligence in the performance of ritual offerings impels them to provoke diseases in the living; this is why they are respected and feared.

In spite of this, the archaeological work of Le Paige was supported by some members of the local community, whose expertise in archaeology and museology has been recognized at local and national spheres.

In Southern Chile, many of the sites studied in Mapuche territory were cemeteries excavated by foreign archaeologists, including those worked by Schneider in the Bío-Bío region (Paredes 2015). Although in the 1950s Menghin established a more detailed pre-Hispanic chronology and smaller-scale excavations, it was Gordon who worked with burial sites in a more systematic way since the late 1960s and early 1970s. In addition, like Le Paige, self-taught archaeologist Maya Calvo de Guzman lived in her study field and developed funerary archaeology. According to Adán et al. (2001), this researcher established a relationship with Mapuche communities that was far from being horizontal, because it was mediated by her position in local power relations as she was the owner of an important property in Calafquén.

As in the north and south of the country, in Easter Island, archaeological remains were used as exchange assets in national and international standards. As a result of the great scientific expedition (1934–1935) led by the French archaeologist Alfred Métraux, together with the Belgian archaeologist Henri Lavachery, two "moai" (large stone statue) were removed from the country. One "moai" was sent to the Royal Museum of Art and History in Brussels and another to the Louvre in Paris, in addition to many smaller artifacts (Seelenfreud 2008; Vilches 2015). Prior to this, this colonialist practice was reproduced by Routledge (1915) by taking a "moai" to the Pitt Rivers Museum in Oxford. The departure of these objects provoked an immediate reaction on the part of the Chilean State, which sought to exercise sovereignty over the island by early appointing Easter Island as a National Monument in 1935. Although archaeologists had so far assumed that the Rapa Nui people did not have any relationship to archaeological sites, Norwegian Thor Heyerdahl's stay (1955–1956) marked a major turning point in the relationship between researchers and Indigenous people, who were involved in the research process for the first time (Seelenfreud 2008).

During the 1960s and 1970s, the teaching of archaeology was institutionalized in several state universities, and its scientific authority was reaffirmed, shortly before the National Congresses of Chilean Archaeology began and the Chilean Society of Archaeology (1963) was formed. Since then, archaeology in Chile has been characterized by research teams mainly directed and integrated by national archaeologists and a limited presence of foreign professionals, except for Easter Island. At the same time, the New National Monuments Law was enacted (1970), and with this the state began to intervene directly in the control of archaeological heritage, declaring all sites National Monuments, not only imposing state ownership over them but also nationalizing them. That same year, the socialist government of Salvador Allende (1970–1973) took on political power. During his government the first Indigenous Law (17,729) of the country was passed, recognizing the existence of culturally differentiated communities, admitting a historical debt, and acknowledging their political participation (Bolados 2010).

During this government, the Latin American Social Archaeology emerged arguing that archaeologists as social agents should not only reflect on society but may even prompt social change (Salazar et al. 2012). The main centers of development for this form of archaeology were located at the south and the north of the country, following conferences given by Peruvian archaeologist Luis Guillermo Lumbreras in Conception in 1974. From this perspective, the prevailing cultural historical approach was criticized, and new ways of practicing the discipline were explored beyond the diagnosis of cultural phenomenon. In the north, some archaeologists developed research projects in which they dialogued and collaborated with indigenous communities, while others focused on the continuity of the Andean culture and its role in the transition to socialism. An example of this was the ethnoarchaeological investigations led by the "Grupo Toconce" in the north of Atacameño territory (Aldunate and Castro 1981). This research team led by Victoria Castro, Carlos Aldunate, and José Berenguer influenced later generations of archaeologists who created different lines of collaborative work

with indigenous people (Adán et al. 2001; Carrasco et al. 2003; Jofré 2003; Ayala et al. 2003; Ayala 2008, 2014). The research of this group was pioneering in the development of ethnoarchaeology in Chile, although its links with the trajectory of this subdiscipline in the Latin American context (Politis 2015) remain to be studied. In this case, the local perceptions of archaeological practice were considered when choosing the topics and study methodologies, since along the investigation process apprehensions of some inhabitants of Toconce were identified on the archaeological excavations. For Ayala (2008) these politically committed academic agendas can be framed in a nationalist archaeology that contributed in the construction and imagination of a national community in transit to socialism. However, it was also practiced in a cultural historical archaeology that did not consider the indigenous populations as valid interlocutors and with rights to have an opinion on the archaeological heritage. This is the case of San Pedro de Atacama where Le Paige continued excavating burial sites and spreading the "Atacameño Culture."

The socialist government was interrupted by the military regime in 1973, and Augusto Pinochet governed the country until the beginning of 1990. During these years, the "war" had a central role in shaping national identity, and military heroes became important symbols of the nation. The Chilean nationality was imagined as a homogeneous entity composed of a mixture of the best European values and the most heroic Mapuche warriors, who were valued for their arts for war and not for their cultural particularities. The authoritarian government was not interested in the figure of the Indian, except to denying it. Ethnicity was banished to the past, to folklore, and to museums; it was specified as a cultural heritage that should be represented and documented in writing but which had no present or future meaning. During this period, the previous advances made by the socialist government regarding the state's relations with the indigenous populations were disarticulated. According to Bolados (2010), during the dictatorship two decrees accelerated the process of division and liquidation of the communities from legal standards in 1979, since any state or private organism was allowed to tax the lands as they were not recognized as indigenous and their owners were not considered indigenous either.

The Pinochet dictatorship abruptly disrupted Marxist thought, interrupted the development of social archaeology, and closed archaeology majors in different universities. It also cancelled national congresses and controlled the theoretical reflection in the discipline. Despite the persistence of the historical cultural approach in different sectors of the country, New Archaeology gradually became the dominant paradigm. From this perspective research focused on problems related to the natural sciences, archaeological discourse was depoliticized, and new lines of study were opened. In part, this was the result of the concentration of political relations between Chile and the United States and the implementation of neoliberalism, which will keep Chilean archaeology away from the Latin American and, to some extent, European theoretical discussion (Salazar et al. 2012). It was during the dictatorship that archaeology was legitimated as a science, not only due to the influence of New Archaeology but also to the standards imposed to get research grants from the National Fund for Scientific and Technological Development, which followed the guidelines of north American capitalism.

In the north of the country, particularly in San Pedro de Atacama, archaeologists dissociated themselves from the social contexts in which they developed their research, assuming the neutrality of scientific discourse and ignoring the social and political impact of the discipline (Ayala 2008, 2014). As part of the disarticulations produced by the military coup, several professionals of archaeology from the university in Antofagasta were sent to the Museum in San Pedro de Atacama, which in 1984 was transformed into the Archaeological Research Institute and Museum Gustavo Le Paige. From a depoliticized approach to archaeology, the exhibition of this institution was renewed without breaking the preterizing device of exhibiting human bodies, and excavating archaeological burial sites continued. The relations between archaeologists and Atacameño people continued reproducing colonial logics of denial, although

some activities of diffusion and collaboration were conducted by archaeologists of the Institute.

In the south, from a perspective that combined archaeological, ethnohistorical, ethnographic, and linguistic information, North American archaeologist Tom Dillehay (2007) began his studies of settlement and subsistence patterns in the Purén and Lumaco valleys in the 1970s. He focused on the ethnoarchaeology of ceremonial complexes and burial mounds, his main source of ethnographic information being the "machis" (spiritual authorities) of some Mapuche communities. On the other hand, in the context of an incipient contract archaeology, a road project was carried out in the 1980s that sought to improve the connection to the south of the country, whose original design crossed Mapuche territory. This project was temporarily withheld, but the same people who put up the project at the beginning, a decade later, will raise the road modernization megaproject under the new label of Bypass Temuco. The Mapuche communities affected by this project were the WichanMapu1 of XufXufy Koyawe, who organized themselves to try to stop or modify the place where the new road intended to cross (Paredes 2015).

In Easter Island, from the 1960s to 1970s, the Chilean State began to invest in restoration work on monumental sites. This became a main source of paid labor for the local indigenous population. During these years, UNESCO specialists and the World Monuments Fund also visited the island to lay the foundations for a development plan based on the quality of its archaeological resources and the fragility of its environment. According to Seelenfreud (2008), each of these projects employed between 20 and 30 people for periods of between 6 months and a year. This situation marked the island's conception of archaeology: stable work well paid for a large number of people. However, since the 1980s, archaeology has been developed to solve problems and test hypotheses at the expense of mega-restoration projects. In this context, foreign professionals arrived who did not need the local labor force and did not have financing from the Chilean State or international organizations. The results of this change were felt in the relations between archaeologists and natives, who entered a conflicting arena with this new scenario.

Archaeology in the Multicultural Era

At the beginning of the 1990s all through the country, there were a series of social mobilizations claiming for the return of democracy after 17 years of dictatorship. Among the indigenous populations, the Mapuche movement played a prominent role, although it did not participate as a fundamental force of the opposition, but as an autonomous force working in coalition with others, but maintaining its own political identity. In the north, educated urban youths of indigenous origin in Arica, Calama, and Iquique organized themselves in protest movements, together with the political and social struggle against the military dictatorship. Participation, including the indigenous one, became one of the main emblems of the struggle against the military regime in the official discourse used by the coalition of democratic parties. However, discontinuity and discursive rupture in the political field consolidated in the opposition repression-dictatorship/participation-democracy. This did not mean challenging the neoliberal economic system instituted during Pinochet government but rather implied its continuity and partial measures that strengthened its development and consolidation in the years after the dictatorship (Bolados 2010).

The reconfiguration of the Chilean State in the democratic period goes hand in hand with the installation of neoliberal multiculturalism, which generates a new ideological, legal, and institutional scenario oriented toward indigenous peoples. With the participation and recognition of cultural difference as a new art of government, culture began to occupy a central place in public debate and in the identity construction of indigenous populations and the new Chilean nation. Since the state had previously disseminated a nationalist discourse of rupture between the indigenous past and present, the multicultural political discourse changed the relation of these populations with their past, when the Indigenous Law 19.253 suggested that the ethnic groups are

descendants of pre-Hispanic societies. This law also integrated Indigenous people to the national history, and this led Chilean people to reimagine themselves as a multiethnic nation and to reinvent themselves through a long-standing linear temporality, which places the pre-Hispanic past at the origins of the multicultural Chilean nation. On the other hand, the re-elaboration of the past of the ethnic groups in Chile has been a process of readjustment, tensions, and contradictions between the preexisting notions of identity, ancestrality, and temporality and those imposed by the multicultural state (Ayala 2014). In this context, we identify different sets of identities and temporalities operating within each indigenous group, which in turn have had different historical and political trajectories with the Chilean State. Along with this, their connections with the past, the archaeological heritage, and archaeologists differ from each other, since these are heterogeneous indigenous communities with their own political differences and internal struggles.

One of the first times archaeologists publicly faced indigenous questions was at the National Congress of Chilean Archaeology in Temuco in 1992, when two or three Mapuches burst into the Chilean Society of Archaeology meeting and confronted archaeologists about indigenous participation and authorization in their researches (Ayala 2008). Subsequently, representatives of indigenous populations expressed their demands and claims to the state and archaeology at public events, meetings, congresses, institutional documents, and publications. In the north, cultural heritage was approached as an Andean legacy that should form part of the Aymara and Quechua nations, including archaeological sites within some indigenous communities in the area, bringing to consideration the ethical aspects of the tangible and intangible heritage (Jofré 2014). On the other hand, in different contexts the Atacameño expressed their demands for the ownership and administration of the archaeological heritage, information on investigations, community permit to work, and indigenous participation in the disciplinary work, as well as not exhibiting human bodies or excavating archaeological burial places. Moreover, they sought to manage the Archaeological Museum of San Pedro de Atacama (Cárdenas 2001; Ayala 2008). In the south, Paillalef (1998) posed the problems observed in the conservation and protection of indigenous heritage and criticized the excavation of burial sites in Mapuche territory, highlighting archaeology's lack of consideration toward the interests of local communities. In Easter Island, Rapa Nui leaders criticized archaeological excavations, the study of burial sites, the lack of information on research, and the absence of community-based permits (Seelenfreud 2008).

Although the implementation of multiculturalism generated pressure to democratize access to the past and to the control of archaeological sites, the response of Chilean archaeology was delayed. In the academic field, the impact of this process was observed only in the late 1990s. In 1998, the book *Patrimonio Arqueológico Indígena en Chile: reflexiones y propuestas de manejo* was published as a result of reflection sessions held in Temuco in 1996 and 1997, which were attended by representatives of indigenous communities and government institutions, as well as researchers from different sectors of the country (Navarro 1998). At the end of the 1990s, articles on indigenous issues were published, in which a call was made to confront their problems and ask what archaeology has done in favor of the country's cultural minorities, as well as highlighting the need to establish more fluid connections between both parties and to take into consideration ethnic apprehensions about the excavation of archaeological burial sites (Cfr. Ayala 2003).

The initial response of the state to the indigenous demands was the execution of land registry projects and the preservation, conservation, valorization, and administration of archaeological sites for tourist use. This process involved the National Monuments Council, the National Indigenous Development Corporation, and the National Forestry Corporation, as well as regional museums and archaeologists. In the north a series of experiences of this type were carried out, especially the Atacameño case which was pioneer involving the village of Tulor, the Pukara de Quitor and Lasana, and the rock art of Peine (Ayala 2014). In Aymara territory, different

projects of land management and protection of pre-Hispanic sites were also carried out, highlighting those done in the Provinces of Arica and Parinacota due to the involvement of the *Pacha-Aru* Indigenous Association (Espinosa et al. 1998). According to Romero (2003), the National Corporation for Indigenous Development financed these projects within its development policy with identity, integrating these archaeological sites to the tourist and cultural market of the area.

In San Pedro de Atacama, in a scenario of disputes over the power of representation of the indigenous past and for the control, ownership, and significance of archaeological heritage, discourses were radicalized, and conflicts occurred in the execution of these heritage projects (Ayala 2008). Added to this was the destruction of archaeological sites in the construction of the Bypass San Pedro-Jama and the Gas Atacama pipeline. On the one hand, the archaeologists' response was to lock themselves in their academic bubble, not to get involved with the ethnic process, and to insist on a scientistic line of work that excludes, neutralizes, or invisibilizes the influence of the social context in the production of scientific knowledge. On the other, indigenous leaders contested archaeology by publicly criticizing archaeological practices and discourse. In addition, they banned access to the sites for some archaeologists and demanded the validation of their own professionals. Confronted by this loss of control, some archaeologists reacted by saying that they do not need community permission, that the property is owned by the state, and that the Atacameño do not understand scientific work. It was, then, a stage of disputes and conflicts in the multicultural heritage process, in which essentialisms prevailed and the relations of denial from archaeology were strengthened.

Meanwhile, in the south of the country, the Bypass Temuco environmental impact study was carried out by Geotécnica Consultants and the Institute of Indigenous Studies of the Universidad de la Frontera. It obtained a favorable resolution in 1999 despite the innumerable problems identified and evidenced by the Mapuche communities involved. Once the construction and execution of this highway was approved, the project affected 10 communities within the direct influence area and to 29 as part of the indirect influence area. In 2001, during the full development of the project, two pre-Hispanic burial sites were found, the human remains and archaeological objects were sent to Santiago, and this caused the Mapuche community mobilization who demanded their return. This materialized 3 months later, leaving the archaeological remains in the Regional Museum of Araucanía (Paredes 2015).

In Easter Island, there were conflicts between archaeologists and Indigenous people, although in this case the demand was to include the local community in the research projects. There are reports indicating that a team of foreign archaeologists was assaulted by a Rapa Nui group. This was difficult for team leader, an American archaeologist, to explain, who said they had done everything to establish a fluid relationship with the community, had all the National Monument Council permits, had incorporated a local researcher into the field work, and had a Chilean institution as an institutional counterpart. For Selenfreud (2008) these conflicts were directly related to the incorporation of tourists who pay to participate in scientific expeditions and a subsequent failure to call on local labor, over which in the past monumental restoration projects depended on.

In the year 2000, there was a significant change in national indigenous politics, consistent with a participatory multicultural discourse (Bolados 2010) and coinciding with a transformation in heritage management, which was assumed as state policy (Ayala 2014). This process involved the creation of new institutions, the discussion of renewed laws, greater and diverse access to economic resources, as well as the promotion of a discourse of "citizen participation" in the National Monuments Council. In addition, the Area of Indigenous Heritage in this institution has been created, in charge of promoting ethnodevelopment projects and ethnic professionalization. In the beginning, this area focused its actions in the north and south of the country, specifically in Atacameño and Mapuche territories, although it also executed some projects in Santiago with urban indigenous people and in

other regions as Arica and Chiloé. Unlike the heritage projects in Atacameño territory mainly oriented to archaeological sites, in Mapuche territory religious and ceremonial complexes of historical and ethnographic use were considered for their declaration as National Monuments. At the same time, the indigenous and intercultural policies that begun in the 1990s were deepened with the opening of the "Program Origins," financed by the government and the Inter-American Development Bank, whose implementation is directly connected with the aim of demobilizing and appeasing the Mapuche conflict that had again intensified at the end of this decade (Bolados 2010).

Chilean archaeology in the twenty-first century shows a more dialogic approach and search for common understanding, coinciding with the participatory multicultural discourse of democratic governments (Bolados 2010). As it will be seen in the following subtitle, this has materialized in the experiences of construction of a new type of relationship, in the integration of the indigenous voice, in the assessment of local histories and perspectives, and in the diversification of the spaces of diffusion of archaeological discourse. In this context, meetings for discussion were organized by indigenous groups, state agencies, universities, and/or archaeologists, such as the "Dialogue Discussion Boards" of the Archaeological Museum of San Pedro de Atacama (2000–2002) and the meetings held in Temuco (1998), Cupo (2000), Ollagüe (2001), Lasana (2003), and Caspana-San Pedro (2005). On the other hand, forums and discussion groups or symposiums were held in national and international congresses. This is the case of the symposium "Indigenous Peoples and Archaeology" of the 51st International Congress of Americanists (2003), the forum "Indigenous Communities and Archaeological and Anthropological Research" of the XVII National Congress of Chilean Archeology of Valdivia (2006), the symposium "Towards a Public Archaeology" of the XIX National Congress of Chilean Archeology of Arica (2012), and the symposium "Theory and archaeological practice and its relation with the indigenous communities in Contemporary Chile" of the XX National Congress of Chilean Archeology in Concepción (2015). In addition to the 2nd Archaeological Theory Workshop in Chile held in San Pedro de Atacama, and the VII Meeting of Archaeological Theory in South America (2014) based in San Felipe, archaeological work related to this subject was presented.

However, despite this participatory archaeological discourse and the deepening of multicultural politics, conflicts continue between archaeologists, indigenous peoples, the state, and/or private companies. This is the case, for example, of the UNESCO-JAPON Project for the conservation of archaeological sites in Rapa Nui (2005), which involved a majority participation of islanders in restoration and preventive maintenance work. However, the fact that this did not become a permanent program with the support of the state revived the distrust of the Rapa Nui population regarding Chile's lack of commitment to the island and the rejection of archaeologists who do not integrate members of their communities in their research (Seelenfreud 2008). In Atacameño territory, the accidental discovery of an infant and its offerings in the framework of an environmental impact project generated a series of disputes over the power of decision on indigenous archaeological heritage, despite the participation of community visitors in the work done in the field site (Rodríguez and Villaseca 2015).

Toward a Collaborative Archaeology

Though more recent advances in the relations between archaeologists and indigenous communities in Chile are fundamentally visible in congress presentations, project reports, and pre- and postgraduate theses, there are still few publications on this matter. This may be due to this discussion is still marginal in Chilean archaeology or because those in charge of initiatives of this type choose do not to publish their results in mainstream journals, either because they do not consider it necessary or because they oppose the academy as legitimating instance of scientific discourse. In addition, the fact that the author of this paper lives outside the country limited her access

to a greater amount of information. However, there are a number of works that, although they do not constitute a unified body of experiences of public, social, collaborative, indigenous, or decolonized archaeology, show the presence of these theoretical-methodological perspectives in Chile, at least in Aymara, Quechua, Atacameño, Mapuche, and Rapa Nui.

As has been discussed by Castañeda (2008) for other contexts, in Chile there has also been an ethnographic turn in archaeology as a way to facilitate relations between archaeologists and indigenous peoples, mitigate the effects of research, address ethnic demands, include other voices, and enrich the archaeological interpretations. Within this context, archaeological projects are identified in which anthropologists were involved to undertake – exclusively or partially – building or maintaining relations with the indigenous communities involved. This is the case of a project developed in the town of Ollagüe, in Quechua territory, in which an exercise related to the contingency was chosen, carrying out a series of actions aimed at closing the gap between archaeologists and indigenous communities (Ayala et al. 2003). From a social archaeology perspective and using ethnographic tools, bonds were built with the Quechua community to later train, renovate the local museum, and hold a meeting of reflection among ethnic representatives, archaeologists, and state agents. Besides, in the framework of an archaeological investigation of the recent past focused on the period of capitalist expansion in San Pedro de Atacama, the study of material culture was accompanied by an ethnographic research that contributed both to the collection and interpretation of information and to the construction and strengthening of community relations (Vilches et al. 2015). In the south of the country, the creation of a space of communication between scientists and Mapuche communities within research projects was made possible by the application of an ethnographic methodology that extended the field work and its results to the surrounding communities, favoring instances of dialogue in which archaeologists and anthropologists benefited as well as community members (Adán et al. 2001).

This ethnographic shift is also observed in projects in which the archaeologists themselves performed the ethnographic research. This is the case of Jofré (2003), who from an ethnoarchaeological approach carried out a project aimed at assessing the valuation and ethnic identification with the archaeological heritage of Belén. In her most recent research, she conducted an ethnographic research on Aymara indigeneity policies and property rights in the Lauca Biosphere Reserve (Jofré 2014). On the other hand, by applying ethnoarchaeology and recognizing the rights of the original populations as heirs or depositories of archaeological heritage, in the upper and lower basins of the Loa River and the oasis of San Pedro de Atacama, "low impact" archaeological investigations were conducted. This implied validating the opinion of indigenous populations emphasizing the study of collections and the excavation of settlements, as well as developing diffusion, documentation, and organization of storage spaces in local museums (Adán et al. 2001; Carrasco et al. 2003). From an approach that gathers the contributions of collaborative and decolonial archaeology and discussions of ethics in archaeology, Kalazich (2013) carried out a participative action research with the Atacameño community of Peine. In this investigation the main techniques of collecting information were applied ethnography and interviews.

Ethnography has also been used by archaeologists to study archaeology itself. This is the case of Cárdenas (2001), an Atacameño archaeologist who analyzed the perceptions of his community on the treatment of cultural heritage in San Pedro de Atacama. He concluded that there is discontent on the part of the Atacameño people regarding archaeological work and that there is lack of consideration for their communities, as well as for their disagreement with the excavation of archaeological sites and the exhibition of human remains in the local museum. In addition, in the field of ethnographic archaeologies, Ayala (2008) studied the history of the relationships among archaeologists, indigenous people, and the state in San Pedro de Atacama. She systematized Atacameño criticisms and patrimonial demands and

characterized different types of relationships between these three actors, concluding that it is the colonial bonds of denial that have produced conflicts between them. Subsequently, broadening and deepening this research, Ayala (2014) researched the ethnography of the practices and discourses through which the Chilean State is represented as multicultural and as a multiethnic nation. She also undertook an ethnographic archaeology that focused on the power devices of Atacameño archaeology and its connections with colonialism, nationalism, and multiculturalism. In the south, Paredes (2015) studied the relationship between the state, physical anthropology, archaeology, and members of the Mapuche Lafkenche people, specifically regarding the heritage management of human remains. She concluded that there is a general disapproval of the anthropological and archaeological practice among her interviewees and that in the case of some approval assessments, these are subjected to the need for informed consent from the communities. According to Paredes, the indigenous perception of researchers' abuse responds to their ancestral connection with human remains, given mainly by the cohabitation of the territory and the extensive family configuration of the Mapuche people, as well as by a very complex symbolic framework. This connection is also claimed by Mapuche people who migrated to the VII region of the Maule, where the Folil Mapu community demands their participation in the future of the archaeological site of Tutuquén. This community considers this place as part and representative of originary people they believe they have the mission and the responsibility to protect the territory where their ancestors are resting (Campos and Vergara 2015). On the other hand, placed within an intersubjective ethnography, Arthur (2014) carried out an investigation on the repatriation process in Easter Island. She argued that the Rapa Nui's understanding of their ancestors comes in conflict with the scientific view, since they have their own ontology, different from that influenced by Western society, in which the "ivi tupuna" are ancestors with whom they are related genealogically. According to Arthur, scholars have frequently ignored this distinctive ontology by promoting an academic tradition that objectifies the Rapa Nui system of knowing and relating.

There are also publications on the relations between archaeologists and natives based on a reflective analysis of the history of archaeology rather than on ethnographic data. This is the case of Romero (2003), who concluded that historically there has been little development of bonds between archaeologists and indigenous populations from the Provinces of Arica and Parinacota. He argues that archaeological research has not considered the original peoples either as recipients of their knowledge or as sources of research that could be incorporated by ethnoarchaeology. Besides, Seelenfreud (2008) evaluated the impact of the history of archaeology in the way the Rapa Nui population conceives archaeologists today. According to Seelenfreud, what were constant throughout the history of Easter Island have been the transgressions to the informed consent of the local community, as well as to the respect for the intellectual property and to the bioanthropological and archaeological resources.

The experiences of education, diffusion, and management of archaeological heritage are also present in projects with indigenous communities in Chile, forming a public archaeology characterized by a more practical than critical or multivocal orientation (Merriman 2004), although there are some exceptions (Marcos 2010; Alvares and Godoy 2001; Godoy et al. 2003; Vilches et al. 2015). In this context, projects for the valorization, protection, conservation, and administration of archaeological sites for tourism use throughout the country have increased (Espinosa et al. 1998; Bravo 2003; Jofré 2003; Ayala 2008; Urrutia 2014). This is generally associated with programs of indigenous professionalization (Ayala 2014). At the same time, the application form for the National Fund for Scientific and Technological Development includes a section devoted to diffusion to society, which should describe an extension activity for the nonspecialized public. In indigenous territories, the diffusion has varied from briefings on the activities and scope of the research to educational talks or training courses on local archaeology. A process that, in certain

cases, has exclusively involved indigenous leaders and in others students or people interested in heritage. In some contexts this diffusion has been carried out in association with museum institutions, such as the Archaeological Museum of San Pedro de Atacama where the Andean School heritage educational program (2001–2010) was developed for the Atacameño and Quechua population (Ayala 2008; Marcos 2010). Throughout 9 months a year, this school taught cultural management, ecology, tourism, archaeology, history, anthropology, indigenous legislation, conservation, and project formulation. In her analysis of the Andean School, Marcos (2010) concluded that despite its achievements in the dissemination of archaeological discourse, this initiative continues to reproduce colonial relations between archaeologists and Atacameños, since it legitimizes the discourse and authority of archaeology in a dynamics of unidirectional communication derived from the reproduction of its place of enunciation. Moreover, in the south of Chile, experiences of heritage education with Mapuche Huilliches communities were conducted, integrating oral history, material culture, anthropology, and pedagogy (Alvares and Godoy 2001). Some of these activities were carried out in museums under the Museum Direction of the Universidad Austral de Chile, while others were undertaken in local schools or in the archaeological field. According to these investigators, unlike ethnoarchaeology, these are experiences of social intervention where the theoretical and methodological corpus of anthropology is put at the service of the community. Its purpose is to contribute to community development by strengthening its identity through the enhancement of its local cultural assets and knowledge. For this team, heritage education presupposes a political positioning, in circumstances where educators not only fulfill the role of facilitators, but their mission extends to the consolidation of a meeting space and social dialogue whose purpose is to contribute to the legitimate exercise of cultural citizenship. To the contrary, these actions must motivate the exercise of cultural citizenship, that is, that Chilean society manifests itself in its multicultural essence (Godoy et al. 2003).

The integration of members of indigenous populations into archaeological research and environmental impact projects lies in the broad spectrum of Colwell-Chanthaphonh and Ferguson's (2008) *collaborative continuum*, whose three stages of development are resistance, participation, and collaboration. The dynamic character of the *collaborative continuum*, with its different degrees of involvement and upward commitment, makes it possible to understand the bonds between archaeologists and indigenous peoples in recent years as a process under construction. Throughout this paper, several examples of the resistance phase were described, so the specific phases of participation and collaboration will be discussed below. For some work teams, indigenous participation has taken place exclusively in information meetings or diffusion activities; other archaeologists also consider the application for community permits and the selection of problems and methods of study taking into account the criticisms and ethnic demands, which in some cases is associated with indigenous participation in different stages of the research process (Alvares and Godoy 2001; Adán et al. 2001, 2003; Godoy et al. 2003; Carrasco et al. 2003; Seelenfreud 2008; Ayala 2008; Marcos 2010; Kalazich 2013; Vilches et al. 2015). In contract archaeology projects, some members of the communities have participated in surveys, excavations, and laboratory work, as well as diffusion activities and informational meetings. Certain investment projects have had community observers or visitors in the field, as well as visits by indigenous leaders (Salazar 2010; Rodríguez and Villaseca 2015).

When analyzing the spaces of indigenous participation open by archaeology in the multicultural era, the educational, public relations and management of archaeology aspects stand out, which has been installed as the new disciplinary format and the "must be" for many professionals. This tendency conforms to what Ayala (2014) defines as multicultural archaeology, an approach which recognizes the other, opens archaeology to his/her participation, or accepts the indigenous property of heritage. However, this ends up being mere formalisms to continue practicing an archaeology rather than questioning its power and

place of enunciation. It is a traditional archaeology that conforms to the mandates of multiculturalism, a waist adjustment characterized by talks and diffusion courses that promote "restricted and controlled indigenous participation" (Bolados 2010). Eventually, this is followed by the participation of community members as labor in the excavations and the cleaning of materials, without having a voice in the design, formulation, development, interpretation, and/or results of the project itself or in the taking of decisions on recovered collections. However, it is also true that multicultural archaeology has opened up spaces of indigenous participation that did not exist previously, as well as debate on the social and political consequences of archaeology and has highlighted the difficulties of articulating theory and practice in building new relations with communities.

Next, experiences that distinguish a greater degree of indigenous involvement are discussed and are situated in what Colwell-Chanthaphonh and Ferguson (2008) describe in the range of collaboration. These are projects that also promote greater reflexivity and point to restructuring or decolonizing the discipline and its power relation transformation. This line includes Jofré's (2012) work with the Aymara communities of the Arica and Parinacota high plateau, who had to agree on their interests with archaeologists, government agencies, and private companies in order to achieve the community administration of historical monuments (Jofré 2012), as well as the "Abra Project" in Atacameño territory, whose long period of development in the framework of an environmental impact experience had affected the ensembled work and mutual benefits among members of this ethnic group, archaeologists, and mining officials (Salazar 2010). In addition, the research of historical archaeology developed by Vilches and collaborators (2015) in San Pedro de Atacama, in which the local relevance of concepts and theoretical approaches originated from public, decolonial, indigenous, and collaborative archaeologies, was discussed. In this project, entirely proposed from the academy, the local participation was achieved in the field work, laboratory, compilation, analysis, and/or integration of the information, as well as in informative meetings and request of community permission. Then again, there is the participatory action research carried out by Kalazich (2013) in the Atacameño community of Peine. From this perspective, the research problem and objectives were defined jointly with members of the local indigenous community and approved in a community assembly, as well as the results and the manuscript of this thesis. As participatory action research is one of the approaches used as part of the decolonizing of archaeology in the last decade (see Atalay 2006; Silliman 2008), Kalazich's work involved sharing power in decision-making, moving away from traditional methods of archaeology, and moving its place of enunciation, choosing the construction of collaborative and horizontal relationships.

Moreover, archaeological projects have been developed by indigenous communities themselves. This is the case of the experiences described by Urrutia (2014) for the Aymara communities of Camiña and Nama, the first of which requested an anthropological study that allowed defining its ancestral territory and the second a project to protect archaeological sites located in their territory. Through a process of dialogue in which the expectations of all members were coordinated, archaeologists, anthropologists, conservators, and architects worked together with members of the communities involved. They considered participatory strategies in all the activities of the project. Another group, the Atacameño communities of Coyo and Quitor requested professional advice to the Archaeological Museum of San Pedro de Atacama for the opening of site museums (Ayala 2008). Community assemblies discussed, defined, and approved what to exhibit and inform in these museum spaces, in addition to participating in workshops of archaeology and conservation. Another type of consultancy is related to the evaluation of environmental impact projects, in which archaeologists of this museum presented arguments to support community claims for hotel, tourist, road, mining, or energy investments. There is also the archaeological contribution in the legal recognition of Atacameño communities before the state (Ayala 2008; Salazar 2010). The Aymara community of Quillagua also

managed a project of valorization and heritage rescue to mitigate the intervention and looting of an archaeological burial site (García et al. 2012). From the articulated work of community active members, professionals, and state agencies, it was possible to generate an important collection of heritage material that was submitted to basic procedures of conservation. As the final stage of this project, a part of the human remains rescued was reburied. In the south of Chile, Mapuche communities of Chilcoco, Huenteldén, and Tirúa requested the collaboration of archaeologists in territorial claims. For Hermosilla (2015) there are cultural heritage valuations made from an archaeology enriched with participatory action research, involving interest groups and carrying out archaeology of the recent and contemporary past. On Easter Island, members of the Rapa Nui community asked for professional support for their repatriation project, care, and reburial of human remains, a process in which Arthur (2014) has collaborated from his expertise in oral tradition, history, and Rapa Nui land and heritage.

Repatriation and Reburial

One of the results of multiculturalism and indigenous claims in Chile has been requests for repatriation and reburial of human remains and archaeological objects. In this process of patrimonialization, the state has exercised its power through governing the bodies of their ancestors, since it is still in their power of naming that the procedures are regulated and it is decided who is authorized and legitimated to reclaim the bodies and rebury them, as well as who is their rightful owner (Ayala 2014). Although Chile does not have a law in this respect, from 2009, the Council of National Monuments has an "Instructive guide for the re-burial of human remains coming from archeological contexts, at the request of communities and organizations" (Gonzales 2008; Arthur 2014).

The first repatriation process occurred in the 1980s long before the enactment of the Indigenous Law in 1993 and the impact of the NAGPRA Act of the United States, enacted in 1990. In this case, members of the Atacameño communities requested the return of an archaeological collection sent to the National Museum of Natural History in Santiago (Ayala 2008). Something similar happened in 2001 when Mapuche communities demanded the return of human remains found in the archaeological excavations of Bypass Temuco that were transferred to the same city (Paredes 2015). These experiences served as antecedents to the later repatriation and reburial of human remains culturally linked with Aymara and Atacameño populations. Its execution was subject to an agreement signed between the Council of National Monuments and the National Museum of the American Indian of the Smithsonian Institute, as well as an agreement between the Council and the communities involved (González 2008). In 2010, the University of Zurich in Switzerland repatriated the remains of five Kawésqar individuals to their home community in Tierra del Fuego, in Chile's extreme south. In 2011, the Museum of Ethnography in Geneva, also in Switzerland, repatriated four mummies to the Miguel de Azapa Museum in Arica. A recent case of reburial is within the Aymara community of Quillagua, which worked together with archaeologists, curators, and state agents to value, protect, and preserve a funerary archaeological collection that later remained under the protection of their community. As a final step of this project, part of the rescued human remains was reburied in the cemetery at a ceremony organized and presided over by the local indigenous community (García et al. 2012). Another reburial that had state approval is that of the Atacameño community of Taira, which was carried out as part of an environmental impact study financed by the mining company CODELCO (Rodríguez and Villaseca 2015). Negotiations and the search for consensus between this company, government agencies, and the Atacameño community of Taira lasted for several months, as indigenous leaders established a series of demands regarding the treatment of the human remains and their funeral context, trying to achieve the maximum of return and the minimum possible intervention, in view of the final act of reburial.

In contrast to these experiences regulated and controlled by the Council of National Monuments, in the late 1980s, a reburial led by members of the Atacameño community of Chiu Chiu, without the authorization of this institution, was carried out (Ayala 2008). Something similar began to happen in the south of Chile, where due to the perception of some Mapuche community leaders that the patrimonial legislation does not protect them like the rest of the Chileans, actions have been carried out for self-protection of property without the Council's permission (Paredes 2015). On the one hand, this has resulted in the refusal to report the discovery of human remains and archaeological artifacts to the authorities, opting for their conservation "in situ." On the other hand, if the removal has been carried out, they could opt for the conservation of the pieces in the localities where they were found, and they would be administered by the communities, a situation that is only applicable to material remains and not to human remains, as they prefer not to disturb them. Besides, since 2013 the Rapa Nui have an independent and autonomous program of repatriation, care, and reburial of "Ivi-Tupuna" or human remains. It is an experience created and managed by members of the Rapa Nui community, working in collaboration with the Anthropological Museum Padre Sebastián Englert and researchers (Arthur 2014). Their more advanced repatriation case shows a series of difficulties with the Council of National Monuments, which seeks to regulate the procedures and reaffirm the national ownership of human remains and validate the scientific vision. For the Rapa Nui people, these human remains must be returned directly to the community without conditions or imposed regulations, since they are not the property of the nation-state but are the ancestors of Rapa Nui people. These cases show the unexpected effects of multiculturalism, as indigenous leaders take advantage of the open spaces of multicultural politics to raise their own demands, boost their processes of historical construction and identity, and dispute their patrimonial rights before the state and science.

Final Words

This article has discussed the relations between archaeologists and indigenous peoples in Chile within the changing contexts of colonialism, nationalism, and multiculturalism. The history of archaeology shows that the reproduction of colonial denial of indigenous rights has been a central factor in conflicts between archaeologists and indigenous peoples. However, there has been a significant advance in the last two decades in the participation of indigenous people in archaeological work and different approaches to this. On one hand, an ethnographic turn in archaeology is identified as well as the development of public or heritage archaeology; then again there are experiences with different degrees of indigenous involvement. While some projects materialize indigenous participation mainly in activities of diffusion, public relations, and the management of archaeology, others are associated with collaborative proposals that promote a greater reflexivity and disciplinary decolonization. Although archaeologies committed to decolonization are still marginal in Chilean archaeology, the experiences discussed in this essay highlight alternative paths for archaeology with, by, and for indigenous peoples.

Finally, although the internal heterogeneity of the Aymara, Atacameño, Mapuche, and Rapa Nui communities was not addressed in this study, future research is expected to account for intra- and intercommunity social and political complexity; this will undoubtedly affect an understanding of its bonds with archaeology. This will also be enriched and made more complex with the analysis of Quechua, Kolla, Diaguita, Kawésqar, and Yagán cases.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Archaeology and Politics
- ▶ Archaeology as Anthropology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America

▶ Community and Archaeology
▶ Community Engagement in Archaeology
▶ Cultural Heritage and Communities
▶ Decolonization in Archaeological Theory
▶ Heritage and Archaeology
▶ Historical Archaeology: Indigenous Perspectives and Approaches
▶ Histories of the Archaeological Discipline: Issues to Consider
▶ Indigenous Archaeologies
▶ Latin American Social Archaeology
▶ Multicultural Archaeology
▶ Museo Chileno de Arte Precolombino, Chile
▶ Nationalism and Archaeology
▶ Nationalism and Archaeology: Overview
▶ Public Archaeology, The Move Towards
▶ "Public" and Archaeology
▶ Social Archaeology
▶ South American Archaeology: Postcolonial Perspectives

References

Adán L., M. Uribe, M. Godoy, C. Jiménez, and D. Salazar. 2001. Uso del patrimonio cultural en la construcción de memorias e identidades históricas nacionales. In *Actas del IV Congreso de Antropología*. Volumen I, 619–629. Santiago: Colegio de Antropólogos.

Aldunate, C., and V. Castro. 1981. *Las chullpas de Toconce y su relación con el poblamiento altiplánico en el Loa Superior, Período Tardío*. Santiago: Ediciones Kultrun.

Alvares, R., and M. Godoy. 2001. Experiencias rurales de educación patrimonial en la X Región. Comunidades Mapuche Huilliche de Huiro, Astilleros y Rauco. *Revista Austral de Ciencias Sociales* 5: 29–38.

Arthur, J. 2014. Reclaiming Mana. Repatriation in Rapa Nui. Unpublished PhD dissertation, University of California.

Atalay, S. 2006. Indigenous archaeology as decolonizing practice. *American Indian Quarterly* 30 (3 y 4): 280–310.

Ayala, P. 2003. Arqueología y sociedad: El caso de las comunidades indígenas en Chile. *Werkén* 4: 59–73.

Ayala, P. 2008. *Políticas del pasado: indígenas, arqueólogos y Estado en Atacama*. Santiago: Línea Editorial IIAM/Universidad Católica del Norte.

Ayala, P. 2014. Patrimonialización y Arqueología Multicultural en San Pedro de Atacama (Norte de Chile). *Estudios Atacameños* 49: 69–94.

Ayala, P., S. Avendaño, and U. Cárdenas. 2003. Vinculaciones entre una arqueología social y la comunidad indígena de Ollagüe, II Región. *Chungará Revista de Antropología Chilena* 35 (2): 275–285.

Bolados, P. 2010. Neoliberalismo multicultural en el Chile democrático: gubernamentalizando la salud atacameña a través de la participación y el etnodesarrollo. San Pedro de Atacama. Unpublished PhD dissertation, Universidad Católica del Norte – Universidad de Tarapacá.

Bravo, A. 2003. Arqueología aplicada al desarrollo de comunidades atacameñas. *Chungará Revista de Antropología Chilena* 35 (2): 287–293.

Campos, J., and F. Vergara. 2015. El porvenir del Cementerio Indígena de Tutuquén: la perspectiva de la comunidad Mapuche Folli Mapu de Sarmiento, Curicó, VII Región del Maule. Paper presented at the XX Congreso Nacional de Arqueología Chilena, Concepción, 5–9 de Octubre 2015.

Cárdenas, U. 2001. Percepciones de las comunidades Atacameñas sobre el tratamiento del patrimonio cultural de la zona.

Carrasco, C., C. Agüero, M. Uribe, and P. Ayala. 2003. Proyectos de investigación en Quillagua: Difusión del conocimiento arqueológico y protección del patrimonio cultural. *Chungará Revista de Antropología Chilena* 35 (2): 321–326.

Castañeda, Q. 2008. The "ethnographic turn" in archaeology: Research positioning and reflexivity in ethnographic archaeologies. In *Ethnographic archaeologies: Reflections on stakeholders and archaeological practices*, ed. Q. Castañeda and C.H. Matthews, 25–62. Lanham: Altamira Press.

Colwell-Chanthaphonh, C., and T. Ferguson, eds. 2008. *Collaboration in archaeological practice: Engaging descendant communities*. Lanham: Altamira.

Cristino, C. 2011. Colonialismo y Neocolonialismo en Rapa Nui: Una reseña histórica. In *La Compañ̃ia Explotadora de Isla de Pascua – Patrimonio, Memoria e Identidad en Rapa Nui*, ed. C. Cristino and M. Fuentes, 19–52. Concepción: Escaparate Ediciones.

Dillehay, T. 2007. *Monuments, empires and resistance. The Araucanian polity and ritual narratives*. New York: Cambridge University Press.

Espinosa G., W. Quispe, C. Santoro, H. González, and J. Córdova. 1998. Participación de la Comunidad Aymara en la conservación y manejo del patrimonio arqueológico de las Provincias de Arica y Parinacota. In *Patrimonio arqueológico indígena en Chile, reflexiones y propuestas de gestión,* X. Navarro (comp.), 113–124. Santiago: Instituto de Estudios Indígenas, Universidad de la Frontera, UNESCO.

García, M., E. Vidal, C. Lemp, E. Shaeffer, F. Santana, and Tamara Pardo. 2012. Rescate y puesta en valor del cementerio Rinconada de Quillagua. In *Actas del XVIII Congreso Nacional de Arqueología Chilena*, 131–139. Santiago: Sociedad Chilena de Arqueología.

Godoy, M., J. Hernández, and L. Adán. 2003. Educación patrimonial desde el museo: iniciativas de promoción y puesta en valor del patrimonio cultural en la X Región. *Conserva* 7: 23–36.

González, P. 2008. Tratamiento jurídico de los restos óseos indígenas en Chile: su implicancia para la investigación

científica. In *Bioética en Investigación en Ciencias Sociales. III Taller Organizado por el Comité Asesor de Bioética*, ed. E. Lira Kornfeld, 141–172. Santiago: Fondecyt-CONICYT.

Gundermann, H. y H. González. 2009. Sociedades indígenas y conocimiento antropológico. Aymaras y atacameños de los siglos XIX y XX. Chungará Revista de Antropología Chilena 41 (1): 113–164.

Hermosilla, N. 2015. Informe Peritaje Cultural Patrimonial, Concepción.

Jofré, D. 2003. Una Propuesta de acercamiento al patrimonio arqueológico de la comunidad de Belén (Región de Tarapacá, Chile). *Chungará Revista de Antropología Chilena* 35 (2): 327–335.

Jofré, D. 2012. Arqueología, monumentos y comunidades en la Biosfera Lauca: posibilidades de la práctica de la Arqueología Social en el Norte de Chile. In *Arqueología Social Latinoamericana: de la teoría hacia la praxis,* H. Tantaleán, and M. Aguilar (comp.), 415–432. Bogotá: Universidad de los Andes.

Jofré, D. 2014. Guallatire: Negotiating Aymara indigeneity and rights of ownership in the Lauca Biosphere Reserve, Northern Chile. Unpublished PhD dissertation, University of Toronto.

Kalazich, F. 2013 Cultural meanings and values of the past. A participatory approach to archaeology in the Atacameño community of Peine, Chile. Unpublished PhD dissertation, UCL.

Marcos, S. 2010. La arqueología bajo la perspectiva de la comunicación: estudio de caso en San Pedro de Atacama. Unpublished Master dissertation, Universidad Católica del Norte- Universidad de Tarapacá.

Merriman, N. 2004. Introduction: Diversity and dissonance in public archaeology. In *Public archaeology*, ed. N. Merriman, 1–17. London: Routledge.

Navarro, X. (comp.) 1998. *Patrimonio arqueológico indígena en Chile, reflexiones y propuestas de gestión*. Santiago: Instituto de Estudios Indígenas, Universidad de la Frontera, UNESCO.

Paillalef, J., 1998. Una Mujer Indígena frente al Patrimonio. In *Patrimonio arqueológico indígena en Chile, reflexiones y propuestas de gestión*, X. Navarro (comp.), 77–82. Santiago: Instituto de Estudios Indígenas, Universidad de la Frontera, UNESCO.

Paredes, B., 2015. ¡No estamos muertos! Voces Mapuche Lafkenche del Bío-Bío: Valoración y efectos de la práctica arqueológica y antropológica física. Unpublished Under Degree dissertation, Universidad de Concepción.

Politis, G. 2015. Reflections on contemporary ethnoarchaeology. *Pyrenae* 46 (1): 41–83.

Rodríguez, M., and M.A. Villaseca. 2015. Reentierro de un perinato en Alto Loa. Investigación interdisciplinaria y ética bioantropológica en una excavación de impacto ambiental. Paper presented at the XX Congreso Nacional de Arqueología Chilena, Concepción, 5–9 de Octubre 2015.

Romero, A. 2003. Arqueología y pueblos indígenas en el extremo norte de Chile. *Chungará Revista de Antropología Chilena* 35 (2): 337–346.

Salazar, D. 2010. Comunidades indígenas, arqueología y mineras en el norte de Chile: ¿hacia un diálogo posible? In *Pueblos Indígenas y Arqueología en América Latina*, ed. C. Gnecco and P. Ayala, 221–250. Bogotá: Universidad de los Andes.

Salazar, D., D. Jackson, and A. Troncoso. 2012. Entre dos tierras: reflexiones sobre la arqueología chilena en el siglo veintiuno. In *Teoría Arqueológica en Chile: reflexionando en torno a nuestro quehacer disciplinario*, ed. P. Ayala and F. Vilches, 41–71. Santiago: Línea Editorial IIAM-Universidad Católica del Norte.

Seelenfreud, A. 2008. La investigación arqueológica antropología médica en Rapa Nui: Cuestiones éticas y la comunidad. In *Bioética en investigación en Ciencias Sociales. III taller organizado por el Comité Asesor de Bioética*, ed. E. Lira Kornfeld, 99–116. Santiago: FONDECYT-CONICYT.

Silliman, S.W. 2008. Collaborative indigenous archaeology: Troweling at the edges, eyeing the center. In *Collaborating at the trowel's edge: Teaching and learning in indigenous archaeology*, ed. S.W. Silliman, 1–21. Tucson: University of Arizona Press.

Urrutia, F. 2014. Cuando son las comunidades quienes demandan investigaciones antropológicas: Reflexionando a partir de experiencias en Camiña y Nama (Tarapacá, norte de Chile). Paper presented at the VII Reunión de Teoría Arqueológica de américa del Sur, San Felipe-Almendral, 6–10 de Octubre 2014.

Vilches, F. 2015. Sobre pircas y otras piedras: topografía material para un contexto (neo) colonial Rapa Nui. In *Rapa Nui y la Compañia Explotadora,* ed. M. Fuentes, 10–29. Santiago: Rapa Nui Press.

Vilches, F., C. Garrido, P. Ayala, and U. Cárdenas. 2015. The contemporary past of San Pedro de Atacama, Northern Chile: Public archeology? *Archaeologies* 11 (3): 372–399.

Chile, Historical Archaeology of

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Introduction

Historical archaeology in Chile is substantially less developed than archaeology that studies the pre-Hispanic past, as it is also the case in the rest of South America (Funari 1997; Jamieson 2005). Since the last decade of the twentieth century, however, studies have multiplied leading to a

diversification of the topics under discussion, often times accompanied by more structured theoretical frameworks (Funari et al. 2009).

The VII National Congress of Chilean Archaeology, held in 1977, is recognized to be the first moment when ethnohistorians, archaeologists of the historical period, and physical anthropologists came together to present the results of their lines of work. This first symposium on historical archaeology, focusing on colonial ethnohistory and archaeology, emerged as part of a series of symposia devoted to a range of topics set within the prehistory of Chile (Bittman 1977). It was organized in response to an appeal by historians like Casassas (1976), who had drawn attention to the need for interdisciplinary work between archaeologists and historians. However, the works published in the symposium were no more than the results of independent disciplinary studies and lacked collaborative discussion and/or methodology between the disciplines, which in the best of cases was restricted to a declaration of intent. This has been the tonic of the sporadic and, to a large degree, fortuitous or circumstantial studies carried out up and down the country since the early 1970s, which have continued to proliferate in the twenty-first century (Gomez 2013).

In parallel with the course of archaeological research, legislation has also done little to promote the study – or even the mere protection – of the vestiges of the more recent past. The law on national monuments, dating from 1970, clearly indicates that both "places, ruins, constructions or objects of a historical or artistic character" and "the burials, cemeteries or other remains of aboriginal peoples" are national monuments under the guardianship and protection of the state (Title I, Art. 1, Law 17.288 1970). However it also distinguishes between an archaeological monument and an historical monument, while the former is state property "by the sole action of the law" (Title V, Art. 21, Law 17.288 1970), the latter must be declared as such "by supreme decree" and as a function of its historical quality and interest (Title III, Art. 9, Law 17.288 1970). Consequently, historical remains exist in a gray space, and the lack of a clear definition increases their fragility, putting them at permanent risk. This situation became even more pronounced with the introduction of the Law on the General Bases of the Environment, in the mid-1990s (Law 19.300 1994), which paved the way for the development of contract archaeology.

The development of infrastructure in urban and rural contexts has uncovered large numbers of historical data, which have demanded the ever-growing specification of methodologies and conceptual (including legal) definitions by archaeologists. Given the high demand and urgency of contract archaeology, the study of the historic material involved has resulted in sporadic specific studies, with little follow-up into more structured themes, let alone archaeological problems. In addition, the majority of the studies carried out in the framework of contract archaeology do not get published. They remain as technical reports or manuscripts with little circulation, thus weakening the possibility of their involvement in local disciplinary debate, let alone in global discussion. Other contributions not framed within contract archaeology, such as undergraduate or graduate theses, are also left unpublished (e.g., Botto 1989; Cáceres 2011; Pinto 1976). It must be noted, however, that in the last 15 years, the writing of undergraduate theses on diverse topics within historical archaeology has increased. This trend might be due to the fact that some anthropology departments have also included historical archaeology as a subject in their curricula, sparking the interest of younger generations in the post-Hispanic past.

Substantive Themes/Current Debates

Although there are no major archaeological research programs for the historical period in Chile, certain topics can be distinguished as problematic themes, which have taken shape and developed **over time**.

1. The *colonial period*. One topic that has emerged following the emergence of historical archaeology in Chile is the colonial era, which spans the three centuries from the first Spanish contact with the indigenous peoples through

to the formation of the Republic (sixteenth to nineteenth centuries). This era has mainly been treated descriptively and as a strictly chronological slot, rather than as a complex cultural process involving social, economic, and political issues. In general, studies revolve around particular architectural structures (e.g., churches, towns, fortifications), exploitable resources (ores and minerals), conspicuous objects (earthenware, glazed ceramics), and bioanthropological remains, with scant efforts to link them. This phenomenon is observed equally in the north of the country (e.g., Chacón 1969; Alcaide 1983; Núñez 1984; Hidalgo and Focacci 1986; Sanhueza 1991; Chacama 2010; Vilches and Sanhueza 2010), the central zone (e.g., Reyes et al. 1998; Sanhueza et al. 2004b; Prado and Barrientos 2011; Prado et al. 2015), the southern zone (e.g., Gordon 1978; Mera et al. 2004), the Juan Fernández archipelago (Orellana 1975), the extreme south (e. g, Massone 1978; Ortiz 1970, 1971; Reyes et al. 2004), and in Antarctica (Stehberg and Cabeza 1987; Stehberg 2003). In recent years, efforts have aimed to integrate the colonial era into diachronic regional studies extending forward from pre-Hispanic times to the Republic. This has led archaeologists to formulate more profound questions about sociohistorical processes, with emphasis on the continuity and change of cultural practices. There are two particularly interesting examples that we will refer to.

In the Tarapacá Region in the north, systematic ethnohistorical work has enabled a better and more complete understanding of the archaeological record of the fifteenth to eighteenth centuries and especially of the Spanish contact with the indigenous peoples in the area (Urbina 2018; Urbina and Uribe 2016). This synthetic work has been fed by more specific archaeological studies based on architectural patterns (Urbina et al. 2018) and metalworking technology (Zori and Tropper 2010) from the formative period to the early colonial. Also in Tarapacá, the work of Santoro and his team seeks to further understand the region from when it was first peopled until the present, with emphasis on socio-environmental changes (Núñez et al. 2010; Santoro et al. 2017).

In the south, in the Los Ríos Region, we find a unique example of a fully-fledged research program, centered on the city of Valdivia and its jurisdiction between the sixteenth and nineteenth centuries. The ample territorial perspective of this research has helped to understand the variability of settlements as well as the interconnections between them and thereby the richness and nuances of an intercultural context. Different types of settlements such as residential, administrative, defensive, and missionary have been studied, including ceramic types and architectural traits belonging to both indigenous and European traditions (Brooks et al. 2019; Mera et al. 2018; Urbina et al. 2012; Urbina and Adán 2014) (Fig. 1). There are also a few works that extend the chronological interpretation of material culture from the city of Valdivia up to the twentieth century (Munita and Mera 2016).

A further example is the colonial fortress known as Castillo de Niebla, today a state-funded site museum, and its strategic location within a complex exchange system set up at the mouth of the Valdivia River (Lema 2017; Urbina 2018). Of particular interest have been systematic surveys, including underwater archaeology in 2009 (Hermosilla and Bahamondes 2010), which revealed a great quantity of socially significant materials such as Mapuche and Hispanic pottery. Its architectural restoration contributed to study contact materials from 1544, between the first Spanish settlement and the Ainil population that dwelled along the Huayrona stream. Currently, the museum has engaged the local community of Niebla to disseminate material collections within its historical landscape and cultural heritage.

Other research examples of overarching studies that span along pre-Hispanic and post-Hispanic periods of time and across different territories have focused on the Mapuche from

Chile, Historical Archaeology of, Fig. 1 Excavation at San Pedro de Alcántara Castle, Mancera Island. (Photographic Archive, Dirección Museológica, Universidad Austral de Chile. Photo: © Simón Urbina A., ECOMUSEO Proyect Mancera, 2014)

the Bío Bío and Araucanía regions, mainly in terms of environmental change and traditional mound construction, as well as cultural contact and resistance strategies (e.g., Dillehay and Saavedra 2017; Gordon 2011; Sauer 2015).

This new form of problematizing the colonial period implies the use of theoretical frameworks that question the presence and *modus operandi* of the colonial power and the modes of resistance to it, as well as the nuances of interethnic relationships. Methodologically, it achieves better interaction between ethnohistorical and archaeological work, allowing for more integrated and creative readings of the phenomena under study.

2. *Urbanism*. Various development projects in the capital city of Santiago, in the Metropolitan region, have helped to understand its distinctive urbanization process, with archaeological projects in iconic locations such as Santa Lucía, Casa Colorada, Teatro Municipal, Plaza de la Ciudadanía, Palacio de la Real Aduana, ex-Hotel City, Palacio Pereira, Casas de lo Matta, and ex-Congreso Nacional, among others. Particularly relevant has been the ongoing project of the subway construction that started in 1969 and, since 2003, has added several metro lines to interconnect the city. This project has helped to map Santiago since its original foundation by the Spaniard Pedro de Valdivia in 1541, complementing it with historical documentation for public works such as roads, sewers, canals, and bridges (e.g., Morel and Pinto 1975; Reyes et al. 1998; Sanhueza et al. 2004b) (Fig. 2).

Restoration projects at the heart of Santiago have also contributed to such an endeavor by uncovering pre-Hispanic occupations and colonial construction techniques along with elite burials in the Metropolitan Cathedral and the Santo Domingo and the San Francisco temples, versus non-elite burials in the cemeteries of La Pampilla from the San Juan de Dios Hospital (e.g., Jorquera and Soto 2016;

Chile, Historical Archaeology of, Fig. 2 Pique Acceso Arturo Prat, Line 3 subway construction, Santiago. (Republican "huevillo" or pebble floor in the intersection of Arturo Prat and Avenida Libertador Bernardo O'Higgins. Photo: Verónica Reyes, Archaeological Compensation Stage Excavation for Metro, 2015)

Medina and Pinto 1980; Prado et al. 2000; Rozas et al. 2014; Westfall and Cáceres 2011). Other works focusing on human remains and funerary practices from colonial and Republican times were undertaken in parishes and churches within the Metropolitan region, specifically in Colina, and in Rancagua, located south in the O'Higgins region (Rodríguez et al. 2004; Sanhueza et al. 2004b).

At the Valparaíso seaport, despite the urban context of development, research has not been systematic in understanding the original configuration and has been forced to respond "on demand" to contract archaeology, resulting in an eclectic methodology that integrates historical documents and unique techniques to classify a range of materials. For instance, the excavation of an underground parking space below Plaza Sotomayor partially uncovered the Stock Exchange building as well as part of the original pier which reused wood from The Esmeralda, an iconic national ship captured by Lord Cochrane in 1825 (Didier and Riveros 2004). Other findings derived from ship wreckages in the Valparaíso bay, such as the Wager from 1855 and the Potsdam in 1891, as well as underwater surveys for new pier development which have helped to interpret the complexities of the maritime exchange system (Carabias 2015a, b).

3. *Mining and technology*. Study of the mining of metal and other minerals is another recurrent issue in the practice of historical archaeology in Chile. In general, it has been carried out in the north of the country, covering a broad time spectrum with studies that range from completely descriptive to the inquiry of more profound questions (Salazar and Vilches 2014). It is perhaps in the Republican period (nineteenth and twentieth centuries) that we can discern a clear intention to pursue a proper topic of research, that is, industrial capitalism

as a global phenomenon and its local manifestations.

The majority of works focus on the social organization of single settlements devoted to the exploitation of diverse ores, mainly metals (e.g., Arancibia et al. 2012; García-Albarido et al. 2010; Rivera and Lorca 2007) but also guano and nitrate (e.g., Alcaide 1983; Méndez-Quirós and Sánchez 2012; Bittman and Alcaide 1984). Unlike the aforementioned studies, the work on the nitrate industry has also been approached from a regional perspective in order to understand the settlement patterns and more nuanced social internal logics of the nitrate cycle (e.g., Rees et al. 2010; Vilches et al. 2008, 2013; Kalazich 2018) (Fig. 3). The same studies have given rise to investigations into subsidiary industries dependent on major industrial exploitations, such as cattle trafficking and salt or sulfur mining, which help to explain the wider capitalist context supported by large-scale mining and local adaptations to a global phenomenon (e.g., Vilches et al. 2014; Vilches and Morales 2017). Sulfur mining, however, was recently studied in its own right in the region of Arica and Parinacota. Interestingly, this study puts mining into perspective within the context of nation building in a frontier area (Angelo 2018).

Although not directly related to mining, we must mention the work led by Miguel Fuentes in Rapa Nui, which deals with the sheep industry as another form of extractive industrialization (Fuentes 2013; Fuentes and Cristino 2010; Cristino and Fuentes 2011; Fuentes 2013; Fuentes and Cristino 2010). Aside from the interest in understanding the varied facets of industrial capitalism, this work shares its methodological component with those on mining. While all of them combine the use of historical documents, oral history, and material culture, only some succeed in a real imbrication of these three sources and not a mere juxtaposition of them. Interestingly, most of these works have also discussed issues relating to the "heritagization" processes that have affected the historical materiality of industrial capitalism. They demonstrate the presence of tensions between the state, local communities, and

Chile, Historical Archaeology of, Fig. 3 Luisis 1 Camp, located at the outskirts of the Luisis Nitrate Ofiice, Cantón Central, Antofagasta Region. (Photo: Flora Vilches, FONDECYT Project 1080542)

foreign capital as to the definition of heritage and who owns it (e.g., Fuentes 2013; Rivera and Lorca 2010; Vilches et al. 2015).

Cultural change has also been studied through the lens of technologies other than mining, in terms of what artifacts can say about the society that produced them. European adaptations to native technologies have been looked at in the local production of indigenous boats, rafts, dugouts, and canoes (e.g., Carabias et al. 2010; Hajduk 1987; Legoupil et al. 2011; Lira et al. 2015; Lira 2018), as well as in traditional fishing techniques such as the corrals (Álvarez et al. 2008). In this regard, new approaches have studied continuities and discontinuities between precontact and postcontact materials, as well as the use of different technologies in both Mapuche and Hispanic assemblages (Munita et al. 2018).

4. *Political Violence and Local Communities*. Despite the difficulties in analyzing Chile's dictatorial past, the repressive and violent practices of the military regime have not been left out of archaeological research and scope (Fuenzalida 2017) (Fig. 4). With the return of democracy, and of community participation, its technical expertise has helped to complement testimonies, documents, and material findings into a coherent narrative of the past, primarily centered in the metropolitan area of Chile. In this sense, interdisciplinary research has also contributed to the critical construction of the recent past, especially with physical anthropology and conservation within human rights' legislation, for the recuperation of remains coming from human rights violation that are involved in judicial cases (e.g., Cáceres and Jensen 2007; Carrasco et al. 2003, 2004; San Francisco et al. 2010).

Chile, Historical Archaeology of, Fig. 4 Archaeological works undertaken at the Londres 38 mezzanine, a clandestine torture and disappearance centre which has been claimed by a community network as a site of memory. (Photo: Nicole Fuenzalida & Andrea Martínez, Archaeological and Forensic Study in Londres 38 for Mazo Arquitectos Ltda, 2019)

This new line of work has gradually contributed toward restoring a general sense of justice, allowing for the emergence of a recently formed network of sites of memory that collectively developed general guidelines (CARCH and CNCR 2017). The social, technical, and even legal role that archaeology has played for "sites of memory" has helped to reconstruct, at some level, the micro-history of both urban and rural areas, making space for "new social archaeologies" engaged with different publics as people get more exposed to and involved with the material findings (Carrión et al. 2015). The impact of this line of applied archaeology in local communities can be quite decisive (e. g., Jofré 2012). An example is the information drawn from the seasonal occupations and historical cemeteries in indigenous territories excavated for the construction of the Ralco Hydroelectric Plant in 1999 (Westfall 1998) and of the Temuco Bypass in 2001 (Paredes 2015). Note that the 1998 Congress of Anthropology in Temuco was the first time that issues about restitution, repatriation, and reburial on native grounds were publicly expressed by Mapuche representatives to the academic community (Ayala 2018), an issue that has continued to echo historical demands. In this sense, the Chilean state has also operated as a violent agent by denying indigenous interpretations of the past and refusing to recognize their rights over traditional native territories, material culture, and even aboriginal bodies, some of which continue to be displayed at museums' exhibits.

5. *The contemporary world*. This topic covers studies of archaeology in and of the present, that is, of contemporary society in and of itself, moving the discipline away from only which is ruined and has ceased to function (Harrison 2011). Although there has been little theoretical discussion among Chilean archaeologists about this "subdiscipline" of archaeology, in strictly chronological terms, it falls within the realm of the post-Hispanic era and can thus be considered historical archaeology.

A couple of works can be grouped under this subject, despite the fact that they come from different directions. On the one hand, Angelo (2017) explicitly engages in the current academic global discussion while studying a partially ruined house from the late nineteenth century to the early twentieth century in the city of Arica. The understanding of the production of social space throughout time in that settlement includes the processes of gentrification and of heritage-making that are affecting the area today. Additionally, a handful of studies on industrial mining (Theme 2) also delve into the life of archaeological materiality once it enters contemporary contexts of exhibition and heritage management (Rivera et al. 2015; Vilches et al. 2015).

On the other hand, a number of works produced by Gallardo back in the 1990s (Gallardo 2018) address varied objects such as a museum exhibition of pre-Columbian artifacts, the artwork of a contemporary visual artist, and a shopping mall. Gallardo's practice stems from theoretical discussion on postmodernism in general but which is also indebted to the archaeology of modern material culture that arose in the 1970s (e.g., Gould and Schiffer 1981). In that respect, many of his observations seem to anticipate the more complex discussion on the archaeology of present times that will fully develop in the twenty-first century (e.g., Harrison 2011).

Final Remarks/Future Directions

The practice of historical archaeology in Chile has developed rapidly in the last couple of decades, to a great extent, due to the rise of contract archaeology. The abundance of newly revealed historic contexts and materials, however, has not been necessarily coupled with a more acute definition of substantive themes of study. The topics that can be identified are uneven in terms of depth and continuity over time since only a few studies aim to purposefully understand the social processes underlying the material findings. This situation appears to be changing as the very accumulation

of historical data is prompting archaeologists to pose new questions by piecing together previously sporadic information. Additionally, the development of specific methodologies to analyze various kinds of materials (e.g., glass, high-temperature earthenware) has reached a level of maturity that may facilitate pursuing certain lines of inquiry. It is worth noting a systematic effort for cataloguing and contextualizing the production of ceramics and other objects uncovered in different development projects from Santiago and Rancagua, which has recently published two volumes (Brooks et al. 2019; Henríquez et al. 2013, 2016). Likewise, the better imbrication between documentary sources and archaeological materials proves to be a growing trend among archaeologists who either manage both sources on their own or work closely with experts from other fields.

A need for a firmer theoretical discussion on the very definition, objects, limits, and other issues that concern historical archaeology is also a must in the years to come. This may or may not follow international trends but should be able to engage critically in global discussion. Something to look at is the fact that the last decade has witnessed an interesting shift in the way archaeologists have chosen to frame their work on historical material as part of national archaeology conferences. From the 1970s to the first decade of the twenty-first century, symposia on historical archaeology were limited to one session at each conference defined strictly on chronological terms (postconquest), and they grouped studies from a wide range of topics. Since 2012, nonetheless, we can observe a broader selection of sessions in which archaeologists present papers dealing with the more recent past, sometimes sharing themes with studies on prehistoric materials and some others on their own. That is the case of sessions on "archaeology and politics" or "public archaeology" that unite works on both prehistoric and historic archaeology, while we also find sessions devoted solely to the archaeology of "political violence" or "capitalism in the southern cone" (Actas 2012, 2015; Resúmenes 2018). This marks a timid yet powerful statement of national historical archaeology that proves to be evolving into dealing with proper problems and themes rather than remaining trapped by chronology.

C

Cross-References

- ▶ Chile, Archaeology and Indigenous Communities of
- ▶ Contemporary Past, Archaeology of the
- ▶ Hispanic South America: Historical Archaeology
- ▶ Public Archaeology and Education: Present Relevance to the Past
- ▶ Underwater Archaeology

References

Actas. 2012. *XIX Congreso Nacional de Arqueología Chilena (Arica)*. Santiago: Sociedad Chilena de Arqueología.

Actas. 2015. *XX Congreso Nacional de Arqueología Chilena (Concepción)*. Concepción: Sociedad Chilena de Arqueología.

Alcaide, G. 1983. Arqueología histórica en una oficina salitrera abandonada. II Región. Antofagasta, Chile. Estudio experimental. *Chungara* 10: 57–75.

Álvarez, R., D. Munita, J. Fredes, and R. Mera. 2008. *Corrales de Pesca en Chiloé*. Valdivia: Fondart.

Angelo, D. 2017. Histories of abBurnt house: An archaeology of negative spaces and dispossession. *American Anthropologist* 119 (2): 253–268. https://doi.org/10.1111/aman.12868.

Angelo, D. 2018. Monumentalidad y paisaje en la producción de fronteras: explorando paisajes nacionales/istas del extremo norte de Chile. *Chungara* 50 (2): 289–306. https://doi.org/10.4067/S0717-73562017005000108.

Arancibia, L., M.J. Fernández, and E. Palacios. 2012. Asentamientos mineros históricos en el valle de Copiapó: una aproximación a la organización de la producción minera y el rol del trabajador en el ámbito socio económico de inicios del siglo XIX. In *Actas del XVIII Congreso Nacional de Arqueología Chilena (Valparaíso),* Valparaíso: Sociedad Chilena de Arqueología, Universidad de Chile y Museo de Historia Natural de Valparaíso, 63–72.

Ayala, P. 2018. Chile, archaeology and indigenous communities of. In *Encyclopedia of global archaeology*,

ed. C. Smith. Cham: Springer. https://doi.org/10.1007/978-3-319-51726-1_2567-2.

Bittman, B. 1977. Simposio de Etnohistoria y Arqueología Colonial. In *Actas del VII Congreso Nacional de Arqueología Chilena (Altos de Vilches),* Sociedad Chilena de Arqueología y Ediciones Kultrún, Vol. II, 23–324.

Bittmann, B, and G. Alcaide. 1984. Historical Archaeology in Abandoned Nitrate "Oficinas" in Northern Chile: A Preliminary Report. *Historical Archaeology* 18(1): 52–75. Springer

Botto, C. 1989. *Palacio de la Real Audiencia: un metro de cinco siglos.* Santiago: Memoria para optar al Título de Arqueóloga, Departamento de Antropología, Universidad de Chile.

Brooks, A., S. Urbina, L. Adán, D. Carabias, V. Sepulveda, H. Chiavazza, and V. Zorrilla. 2019. The nineteenth-century British Ceramics trade to Southwestern South America: An initial characterization of the archaeological evidence from Chile. In *Archaeologies of the British in Latin America. Contributions to Global Historical Archaeology*, ed. C. Orser, 55–71. Cham: Springer. https://doi.org/10.1007/978-3-319-95426-4_4.

Cáceres, I. 2011. *Detenidos desaparecidos en Chile: arqueología de la muerte negada.* Memoria para optar al Título de arqueólogo, Departamento de Antropología, Universidad de Chile.

Cáceres, I., and K. Jensen. 2007. Problemas con la conservación de sitios arqueológicos vinculados a violaciones a los Derechos Humanos. In *Actas III Congreso Chileno de Conservación y Restauración,* 102–111. Santiago.

Carabias, D. 2015a. Valparaíso: El patrimonio bajo la cota cero del puerto principal. In *Cultura y Desarrollo*, vol. 13, 34–39. Havana: UNESCO.

Carabias, D. 2015b. The Spanish attempt Salvage. revisiting the place of disaster: Salvage operations, missionary Voyages and Exploration Expeditions to Wager Island. In *The wager disaster. Mayhem, Mutiny and Murder in the South Seas*, ed. C.H. Layman, 272–280. London: Uniform Press.

Carabias, D., N. Lira, and L. Adán. 2010. Reflexiones en torno al uso de embarcaciones monóxilas en ambientes boscosos lacustres precordilleranos andinos, zona centro-sur de chile. *Magallania* 38 (1): 87–108. https://doi.org/10.4067/S0718-22442010000100006.

Carrasco, C., I. Cáceres, J. Berenguer, and K. Jensen. 2003. Excavaciones arqueológicas en el Fuerte Arteaga, Comuna de Colina: exhumación de un caso de detenido-desaparecido. In *Actas del IV Congreso de Antropología Chilena*, Tomo I, 630–632. Santiago: Colegio de Antropólogos de Chile A.G.

Carrasco, C., K. Jensen, and I. Cáceres. 2004. El uso de métodos cualitativos en la investigación arqueológica aplicada: Reconstrucción e interpretación de eventos en casos de procesos judiciales. In *Actas del V Congreso de Antropología Chilena*, Tomo II, 946–950. San Felipe: Colegio de Antropólogos de Chile A.G.

Carrión, H., C. Dávila, A. Delgado, N. Fuenzalida, P. Kelly, F. Moya, S. Rebolledo, S. Sierralta, J. Sepúlveda, and C. González. 2015. Evaluación de la Arqueología Social en Chile: desarrollo histórico y revisión crítica del proyecto disciplinar. *Boletín de la Sociedad Chilena de Arqueología* 45: 95–114.

Cassasas, J. 1976. La arqueología histórica en el Norte Grande Chileno. In *Homenaje al R.P. Gustavo Le Paige, S.J.*, ed. H. Niemeyer, 219–244. Antofagasta: Universidad del Norte.

Chacama, J. 2010. Evangelización en el norte de chile. Una mirada desde textos escritos y pictóricos. In *Actas del XVII Congreso Nacional de Arqueología Chilena (Valdivia),* Valdivia: Sociedad Chilena de Arqueología y Universidad Austral, 967–976.

Chacón, S. 1969. Elementos hispanos en ajuares indígenas de la zona de Arica. In *Actas del V Congreso Nacional de Arqueología Chilena (La Serena)*, 33–46. Museo Arqueológico de La Serena, Sociedad Chilena de Arqueología.

Colegio De Arqueólogos De Chile (CARCH) & Centro Nacional De Restauración Y Conservación (CNCR). 2017. *Sitios de Memorias, Arqueología y Conservación. Propuesta conceptual de orientación y directrices de trabajo*, Elaborado por la Mesa de Trabajo de Sitios de Memorias. García, M., ed. Santiago. Available at www.colegiodearqueologos.cl

Cristino, C., and M. Fuentes. 2011. *La Compañía Explotadora de Isla de Pascua. Patrimonio, Memoria e identidad en Rapa Nui*. Concepción: Escaparate ediciones.

Didier, A., and A. Riveros. 2004. Arqueología histórica en la plaza Sotomayor de Valparaíso: el primer muelle del puerto principal. *Chungara* 36, Volumen Especial: 151–159. https://doi.org/10.4067/S0717-73562004000300018

Dillehay, T., and J. Saavedra. 2017. Interacción Humana y Ambiente: el desarrollo de Kuel en Puren-Lumaco (Región de la Araucanía). *Revista Austral de Ciencias Sociales* 7: 17–28.

Fuentes, M., ed. 2013. *Rapa Nui y la Compañía Explotadora*. Santiago: FONDART, Rapa Nui Press.

Fuentes, M., and C. Cristino, eds. 2010. *La Compañía Explotadora de Isla de Pascua. Patrimonio, memoria e identidad en Rapa Nui*, Consejo Nacional de la Cultura y las Artes, Centro de Estudios de Isla de Pascua y Oceanía, FACSO. Santiago: Ediciones Escaparate.

Fuenzalida, N. 2017. Apuntes para una arqueología de la dictadura chilena. *Revista Chilena de Antropología* 35: 131–147. https://doi.org/10.5354/0719-1472.2017.46205.

Funari, P. 1997. Archaeology, history, and historical archaeology in South America. *International Journal of Historical Archaeology* 1: 189–206.

Funari, P., A. Zarankin, and M. Salerno. 2009. Historical archaeology in South America. In *International handbook on historical archaeology*, ed. T. Majewsky and D. Gaimster, 399–408. New York: Springer. https://doi.org/10.1007/978-0-387-72071-5_23.

Gallardo, F. 2018. *Nuestra humilde posmodernidad. Arqueología del pasado reciente (años 90 y poco después)*, Santiago: DIBAM, Ediciones del Servicio Nacional del Patrimonio Cultural Santiago.

García-Albarido, F., R. LORCA, and F. RIVERA. 2010. Arqueología Histórica en el Mineral de Caracoles, Región de Antofagasta, Chile (1870–1989). *Revista de Arqueología Histórica Argentina y Latinoamericana* 4: 169–194.

Gómez, A. 2013. Arqueología histórica en Chile. Un modelo de construcción del pasado histórico mediante la empiria arqueológica. *SudHistoria* 6 (enero-junio): 21–50.

Gordon, A. 1978. Urna y canoa funerarias. Una sepultura doble excavada en Padre Las Casas, Provincia de Cautín, IX Región, Chile. *Revista Chilena de Antropología* 1: 61–80. https://doi.org/10.5354/0719-1472.2012.17792.

Gordon, A. 2011. *Excavación de la residencia fortificada de un encomendero español Casa-Fuerte Santa Sylvia, Villa San Pedro, Pucón*. Nashville: Vanderbilt University Publications in Anthropology. 54.

Gould, R., and M. Schiffer, eds. 1981. *Modern material culture: The archaeology of us*. New York: Academic.

Hajduk, A. 1987. Cuentas vítreas de sección estrellada, provenientes de Rey Don Felipe, antigua fundación hispana de fines del siglo XVI (Patagonia austral chilena). *Anales del Instituto de la Patagonia* 17: 41–46.

Harrison, R. 2011. Surface assemblages. Towards an archaeology in and of the present. *Archaeological Dialogues* 18 (02): 141–161. https://doi.org/10.1017/S1380203811000195.

Henríquez, M., V. Reyes, V. Popovic, and I. Alamos. 2013. *Cerámicas y vidrios: Colección Museo Regional de Rancagua*. Vol. 1. Santiago: Andros Impresores.

Henríquez, M., C. Prado, G. Lazzari, I. Álamos, and V. Reyes. 2016. *Cerámicas y vidrios: Colección Museo Regional de Rancagua*. Vol. 2. Santiago: Andros Impresores.

Hermosilla, N., and F. Bahamondes, eds. 2010. *Informe de Arqueología Etapa II: Análisis de Materiales*, Estudio Restauración Castillo de Niebla, Comuna de Valdivia, Región de Los Ríos. Niebla: Museo de Sitio Castillo de Niebla.

Hidalgo, J., and G. Focacci. 1986. Multietnicidad en Arica, s. XVI. Evidencias etnohistóricas y arqueológicas. *Chungara* 16–17: 137–147.

Jamieson, R.W. 2005. Colonialism, social archaeology and lo Andino: Historical archaeology in the Andes. *World Archaeology* 37: 352–372. https://doi.org/10.1080/00438240500168.

Jofré, D. 2012. Arqueología, monumentos y comunidades en la Biósfera Lauca: posibilidades de la práctica de la arqueología social en el norte de Chile. In *La Arqueología Social Latinoamericana: de la teoría a la praxis*, ed. H. Tantaleán and M. Aguilar, 383–401. Bogotá: Editorial Uniandes.

Jorquera, N., and C. Soto. 2016. El subsuelo de la iglesia San Francisco: ¿Una cimentación sismorresistente sobre un estrato prehispánico? *ARQ (Santiago),* 93 (agosto): 107–117. https://doi.org/10.4067/S0717-69962016000200013.

Kalazich, F. 2018. Para estudiar la prostitución en las pampas salitreras. Apuntes desde los estudios subalternos y la arqueología industrial. *Revista Chilena de Antropología,* (37): 131–142. https://doi.org/10.5354/0719-1472.2018.49487.

Law 17.288. 1970. *Ley de Monumentos Nacionales y de Normas Relacionadas*. Ministerio República de Chile: de Educación y Consejo de Monumentos Nacionales.

Law 19.300. 1994. *Ley Sobre Bases del Medio Ambiente*. República de Chile: Ministerio del Medio Ambiente.

Legoupil, D., M. Christensen, and F. Morello. 2011. Una encrucijada de caminos: el poblamiento de la Isla Dawson (Estrecho de Magallanes). *Magallania* 39 (2): 137–152. https://doi.org/10.4067/S0718-22442011000200010.

Lema, C. 2017. *Aproximación histórica al conjunto de lozas del Museo de Sitio Castillo de Niebla*. Niebla: Colecciones Digitales, Subdirección de Investigación Dibam.

Lira, N. 2018. Embarcaciones de tradición indígena en Patagonia Septentrional: Arqueología, Historia y Etnografía. *Revista de Arqueología Histórica Argentina y Latinoamericana* 12 (1): 7–36.

Lira, N., V. Figueroa, and R. Braicovich. 2015. Informe sobre los restos de dalca del museo etnográfico de Achao, Chiloé. *Magallania* 43 (1): 309–320. https://doi.org/10.4067/S0718-22442015000100017.

Massone, M. 1978. Presencia hispánica del siglo XVI en los yacimientos arqueológicos de Punta Dungeness. *Anales del Instituto de la Patagonia* 9: 77–90.

Medina, A., and A. Pinto. 1980. La iglesia de San Diego la nueva. Arqueología histórica en la casa central de la Universidad de Chile. Revista Chilena de Antropología 3: 11–24. https://doi.org/10.5354/0719-1472.2011.17708.

Méndez-Quirós, P., and T. Sánchez. 2012. El ciclo del guano en el Pacífico Sur, una epopeya olvidada (1860–1960). In *Actas del XVIII Congreso Nacional de Arqueología Chilena (Valparaíso).* Valparaíso: Sociedad Chilena de Arqueología, Universidad de Chile y Museo de Historia Natural de Valparaíso, 141–152.

Mera, R., V. Lucero, L. Vásquez, L. Harcha, and V. Reyes. 2004. Sitios históricos tempranos de carácter defensivo. Sector oriental de la Villa Rica (1550–1602). *Chungara* 36, Volumen Especial: 175–186. https://doi.org/10.4067/S0717-73562004000300020.

Mera, R., D. Munita, and S. Urbina. 2018. El sitio Contraloría Regional de Valdivia. Del varadero al muelle y a la patrimonialización de un contexto urbano. *Revista de Arqueología Histórica Argentina y Latinoamericana* 12 (36): 875–902.

Morel, P., and A. Pinto. 1975. Obras de la época colonial descubiertas en las excavaciones del metro. *Revista AUCA* 27: 45–48.

Munita, D., and R. Mera. 2016. Por aquellos olvidados... Niñas y niños en la Arqueología Histórica Industrial de

C

Valdivia. *Revista Austral de Ciencias Sociales* 31: 131–144.

Munita, D., R. Mera, and C. Stern. 2018. Hacia una lítica posthispánica para el área de Valdivia. *Revista de Arqueología Histórica Argentina y Latinoamericana* 12: 83–115.

Núñez, P. 1984. La antigua aldea San Lorenzo de Tarapacá. *Chungara* 13: 53–66.

Núñez, L., M. Grosjean, and I. Cartajena. 2010. Sequential analysis of human occupation patterns and resource use in the Atacama Desert. *Chungara* 42 (2): 363–391.

Orellana, M. 1975. *Las Islas de Juan Fernández: historia, arqueología y antropología de la isla Robinson Crusoe*, Universidad de Chile, Departamento de Ciencias Antropológicas y Arqueológicas. Santiago: Imprenta Los Andes.

Ortiz, O. 1970. Excavación arqueológica de la iglesia del poblado hispánico Rey Don Felipe (Patagonia Austral Chilena). *Anales del Instituto de la Patagonia* 2: 5–13.

Ortiz, O. 1971. Arqueología de los poblados hispánicos de la Patagonia Austral. Segunda etapa de excavaciones en Rey Don Felipe y nuevos antecedentes sobre Nombre de Jesús. *Anales del Instituto de la Patagonia* 2: 3–19.

Paredes, B. 2015. ¡No estamos muertos! Voces Mapuche Lafkenche del Bío-Bío: Valoración y efectos de la práctica arqueológica y antropológica física. Unpublished undergraduate thesis. Concepción: Universidad de Concepción.

Pinto, A. 1976 *Arqueología Colonial en la Cuenca de Santiago. Un Sitio de Encomienda Tardía.* Tesis para optar al Grado de Licenciado en Arqueología. Facultad de Ciencias Humanas. Santiago: Universidad de Chile.

Prado, C., and M. Barrientos. 2011. Aporte de la arqueología al estudio urbano de la ciudad de Santiago de Chile. El caso de "la manzana de la catedral". *Canto Rodado* 6: 1–32.

Prado, C., M. Henríquez, J. Sanhueza, and V. Reyes. 2000. *Ocupaciones históricas en "La Pampilla". Antecedentes arqueológicos y documentales* (Santiago, Región Metropolitana). Contribución Arqueológica. Museo Regional de Atacama, Copiapó.

Prado, C., R. Stehberg, R. Labarca, and E. Calás. 2015. Excavaciones arqueológicas en el cuartel general del Cuerpo de Bomberos de Santiago, Chile. *Boletín del Museo Nacional de Historia Natural* 64: 243–284.

Rees, C.H., C. Silva, and F. Vilches. 2010. Haciendo visible lo invisible: asentamientos salitreros en la periferia del cantón El Toco, II Región. In *Actas del XVII Congreso de Arqueología Chilena (Valdivia), Sociedad Chilena de Arqueología y Universidad Austral,* Valdivia: Tomo II, 947–956.

Resúmenes. 2018. *XXI Congreso Nacional de Arqueología (Santiago).* Santiago: Sociedad Chilena de Arqueología y Universidad Alberto Hurtado.

Reyes, V., M. Henríquez, C. Prado, and J. Sanhueza. 1998. Identificación de Sitios Arqueológicos en Santiago-Urbano: Las Excavaciones en la Extensión de la Línea 5 del Metro de Santiago. In *III Congreso Chileno de Antropología*. Temuco: Colegio de Antropólogos de Chile A. G.

Reyes, O., F. Mena, H. Velásquez, and V. Trejo. 2004. Arqueología del siglo XX: el caso de Isla de los Muertos, Patagonia Occidental, Aisén. *Chungara* 36, Volumen Especial: 131–139. https://doi.org/10.4067/S0717-73562004000300016

Rivera, F., and R. Lorca. 2007. Complejidad, interacción y visibilidad en la arquitectura y organización espacial de la mina histórica de Capote, provincia del Huasco, III Región de Atacama. *Revista Werken*, 11: 51–68.

Rivera, F., and R. Lorca. 2010. Uso social de una Arqueología Histórica del Capitalismo y los dilemas de su patrimonialización: El Caso del Mineral de Capote. *Revista Chilena de Antropología* 22: 33–56. https://doi.org/10.5354/0719-1472.2011.13848.

Rivera, F., R. Lorca, and F. Rojas Toro. 2015. La materialidad de ficción y el tercer tiempo del objeto arqueológico-histórico (Siglos XIX–XX). *Revista Chilena de Antropología* 31 (1): 81–94. https://doi.org/10.5354/0719-1472.2016.40609.

Rodríguez, R., C. González, and M. Henríquez. 2004. Arqueología histórica en la parroquia la Purísima Concepción de Colina. Región Metropolitana. *Chungara* 36, Volumen Especial: 117–129. https://doi.org/10.4067/S0717-73562004000300015

Rozas, C., C. González, and A. Briceño. 2014. Proyecto Puesta en Valor de los hallazgos culturales del sector de la futura estación Hospitales de la línea 3 del metro de Santiago, Notas Históricas. *Revista Chilena de Salud Pública* 18 (2): 220–222.

Salazar, D., and F. Vilches. 2014. La arqueología de la minería en el centro-sur andino: balance y perspectivas. *Estudios Atacameños* 48: 5–21. https://doi.org/10.4067/S0718-10432014000200003.

San Francisco, A., M. Fuentes, and J. Sepúlveda. 2010. Hacia una arqueología del Estadio Víctor Jara: campo de detención y tortura masiva de la Dictadura en Chile (1973–1974). *Revista de Arqueología Histórica Argentina y Latinoamericana* 4: 91–116.

Sanhueza, J. 1991. Evidencias culturales y etnobiológicas de cementerios históricos en Iquique. I Región, Chile: Una introducción. In *Actas del XI Congreso Nacional de Arqueología Chilena,* Tomo II, 89–100. Santiago: Museo de Historia Natural. Sociedad Chilena de Arqueología.

Sanhueza, J., M. Henríquez, C. Prado, V. Reyes, and P. Núñez. 2004a. Presentación y comentario al Simposio Estado Actual de la Arqueología Histórica en Chile: Teoría y Métodos. *Chungara* 36, Volumen Especial: 107–108. https://doi.org/10.4067/S0717-73562004000300013

Julio T Sanhueza, V.A. Reyes, C.B. Prado, and M.U. Henríquez 2004b. Evaluación teórico-metodológica del trabajo de arqueología histórica en la extensión de la línea cinco del metro de Santiago. *Chungara* 36, Volumen Especial: 109–116. https://doi.org/10.4067/S0717-73562004000300014

Santoro, C., J. Capriles, E. Gayo, M.E. De Porras, A. Maldonado, V. Standen, C. Latorre, V. Castro, D. Angelo, V. Mcrostie, M. Uribe, D. Valenzuela, P. Ugalde, and P. Marquet. 2017. Continuities and discontinuities in the socio-environmental systems of the Atacama Desert during the last 13,000 years. *Journal of Anthropological Archaeology* 46: 28–39. https://doi.org/10.1016/j.jaa.2016.08.006.

Sauer, J. 2015. *The archaeology and ethnohistory of Araucanian resilience*. Cham: Springer.

Stehberg, R. 2003. *Arqueología histórica antártica: aborígenes sudamericanos en los mares subantárticos en el siglo XIX*. Santiago: Centro de Investigaciones Diego Barros Arana.

Stehberg, R., and A. Cabeza. 1987. Comienzos de la arqueología histórica antártica en el sitio Cuatro Pircas. *Revista Chilena de Antropología* 6: 83–111. https://doi.org/10.5354/0719-1472.2011.17627.

Urbina, S. 2018. *Vida cotidiana en el Castillo de Niebla a través de las colecciones cerámicas y cartografías históricas*. Niebla: Colecciones Digitales, Subdirección de Investigación, Servicio Nacional del Patrimonio Cultural.

Urbina, S., and L. Adán. 2014. Avances en la Arqueología de Valdivia. *Boletín de la Sociedad Chilena de Arqueología* 43 (44): 35–60.

Urbina, S., and M. Uribe. 2016. Tarapacá: aportes a la historia andina desde una perspectiva regional (s. XV–XVI). *Boletín de Arqueología PUCP* 20: 167–185. https://doi.org/10.18800/boletindearqueologiapucp.201601.009.

Urbina, S., L. Adán, D. Munita, and R. Mera. 2012. Arquitectura arqueológica y sitios patrimoniales sin arquitectura en el perímetro urbano de Valdivia: cartografía descriptiva actualizada y comentarios sobre su valor científico integral. *Revista AUS* 12: 4–9. https://doi.org/10.4206/aus.2012.n12-02.

Urbina, S., L. Adán, C. Pellegrino, and R. Izaurieta. 2018. Historia arquitectónica de Tarapacá: estrategias residenciales y formación de asentamientos, Siglos X AC a XVII DC (Andes Centro Sur). *Estudios Atacameños* 58: 125–149. https://doi.org/10.4067/S0718-10432018005000802.

Vilches, F., and H. Morales. 2017. From herders to wage laborers and back again: Engaging with capitalism in the Puna region of northern Chile. *International Journal of Historical Archaeology* 21 (2): 369–388. https://doi.org/10.1007/s10761-016-0386-x.

Vilches, F., C.H. Rees, and C. Silva. 2008. Arqueología de asentamientos salitreros en la Región de Antofagasta (1880–1930): síntesis y perspectivas. *Chungara* 40 (1): 19–30. https://doi.org/10.4067/S0717-73562008000100003.

Vilches, F., C. Rees, C. Silva, F. Rovano, and Y. Araneda. 2013. La arqueología del salitre: reflexiones desde la materialidad en el Cantón Central, Región de Antofagasta. In *La sociedad del salitre. Protagonistas, migraciones, cultura urbana y espacios públicos*, ed. S. González, 527–549. Santiago: RIL Editores.

Vilches, F., L. Sanhueza, C. Garrido, C. Sanhueza, and U. Cárdenas. 2014. La minería de la sal durante el siglo XX en San Pedro de Atacama, Chile (II Región): Entre la explotación artesanal y la industrialización. *Estudios Atacameños* 48: 209–228.

Vilches, F., C. Garrido, P. Ayala, and U. Cárdenas. 2015. The contemporary past in San Pedro de Atacama: Public archaeology? *Archaeologies* 11 (3): 372–399. https://doi.org/10.1007/s11759-015-9283-x.

Westfall, K. 1998. ¿Sólo indio muerto es indio bueno? Arqueólogos, pehuenches y Ralco. *Boletín de la Sociedad Chilena de Arqueología* 26: 35.

Westfall, C., and I. Cáceres. 2011. Vidas Mínimas y Muertes Anónimas. Arqueología de la Salud Pública de Chile. La Epidemia de Cólera de Santiago. Siglo diecinueve. *Revista Canto Rodado* 6: 167–192.

Zori, C., and P. Tropper. 2010. Late Pre-Hispanic and Early Colonial Silver Production in the Quebrada de Tarapacá, Northern Chile. *Boletín del Museo Chileno de Arte Precolombino* 15 (2): 65–87. https://doi.org/10.4067/S0718-68942010000200005.

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Chile's World Archaeological Heritage and Its Management

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Introduction

Chile's archaeological heritage as we envision it today is based mainly on the existence of aboriginal communities within the national territory; the significance, since the sixteenth century, of the occurrence of these societies and native cultures; and their historic importance in the development of the national society as well as its identity. The emphasis in the national character that played the increasing interest in rescuing the sources and antiquities that were part of the national heritage was crucial as it was the cultural and scientific European influence, especially from France and Germany that arrived in Chile during the nineteenth century.

Chile's National Council of Monuments by means of Legislative Act 17288, article 21, considers as archaeological monuments all the ruins,

sites, and anthro-archaeological artifacts that are located in the surface and below of the land covers by the national territory. Officially, NCM recognizes in its web page a total of 21 main archaeological sites as of October 2008. However, the richness of archaeological material in Chile is far more numerous. In fact, only in Northern Chile, the landscape that is characterized by the dryness of the Atacama Desert, archaeologists have recorded thousands of sites with excellent conditions of preservation, due to the environmental conditions of the desert. This fact has allowed archaeologists to obtain a relatively complete 10,000-year chronological sequence that encompasses sites containing remains of hunters and gathering cultures, the Chinchorro cultural complex notable for the mortuary treatment that involves the world earliest mummies, and the typical Andean cultures during formative and later stages, where Tiwanaku and Inka influences are most typical. The oases of the Atacama Desert also played an important role in preserving past human occupations. Remarkable are the two examples of these oases, Pica and San Pedro Atacama, where, preceded by early hunting stages, relicts of Andean cultural development are found. Here the most typical pre-Hispanic features are the Tiwanaku and Inka influences that acted upon the regional San Pedro culture. Here, the late periods are characterized by the emergence of defensive settlements called pukaras stretching a line stretching from east to west. Additionally, this area also views the emergence of village life during formative times.

To the south, the semiarid mid-north of Chile, ancient hunting societies yielded to formative developments around the time of Christ. To the classic site of Quereo, newly discovered paleo-American hunters sites include Quebrada Santa Julia and Membrillo (Jackson and Mendez 2008). Archaic developments are represented by Huentelauquen complex characterized by cogged stones or lithics with geometric shape. Formative developments begin with El Molle complex followed by Las Animas phase of the Diaguita culture that permeates the regional development all the way up to the Inka incursion in the area.

Within Central Chile further south, important paleo-American sites were recorded at Tagua Tagua and Monte Verde. Thereafter, archaic and formative developments occurred in close connection with Chile's mid-north region. Later, the Araucanian regional cultures developed from the Andean Formative ceramic traditions.

Further south, two different types of adaptation occurred in the Patagonian settings. In the continental area, hunter societies developed, while in the coastal environments of the Pacific, the main adaptive mechanism was fishing and sea hunting. Prehistoric development started with paleo-American sites from about 10,000 years ago up to present-day aboriginal people surviving in the area.

Definition

The Archaeological Patrimony

If we are to list Chile's most important archaeological patrimony, the following could be the most representative.

In Northern Chile, perhaps the most outstanding corresponds to the Chinchorro culture. Although it extends from about coastal Ilo in Southern Peru to nearby Antofagasta in Chile, the main archaeological sites are located in the vicinity of Arica city, at Chinchorro type site, Camarones valley, and around Iquique. Burial sites containing the world earliest mummies dated from about 6000–1100 BC were located at Morro 1 and Playa Miller 8 in Arica. To the south, other important sites are Camarones 15 and Patillos.

Human embalmed bodies that represent the Chinchorro culture have an inner reinforcement structure of bones, reeds, sticks, and clay and an external surface of skin and manganese paint. Facial features were reconstructed or insinuated, with a short wig added to the head. Additionally, some bodies were also stuffed, and incisions were made to the body removing internal organs. Then, grasses and feathers were used to fill in the thoracic cavity in order to recover the lost volume. Once reshape, the bodies were painted bright red, green, or black (Figs. 1 and 2). Wigs and teeth

Chile's World Archaeological Heritage and Its Management, Fig. 1 Mummified body from Morro-1, Chinchorro complex (© Mario A. Rivera)

Chile's World Archaeological Heritage and Its Management, Fig. 2 Chinchorro mummified head from Patillos site (© Mario A. Rivera)

implants were used to ornament the head, and facial features were modeled (Arriaza 1995; Rivera 1995).

Further south, it is important to mention the early village complex that developed in the midst of the Atacama Desert during formative times. Among these are important to mention Guatacondo and Ramaditas, in the Guatacondo Valley; Tulor (Fig. 3), Calar, Tulan, Solor, and Vilama in the San Pedro area; and Chiu Chiu in the confluence of the Salado and Loa rivers. There, cluster types of settlements represent a good testimony of how man was coping with the harsh environment. In San Pedro Atacama, two later sites are also of importance, Pukara Quitor (Fig. 4) and the Inka site of Catarpe. Additionally, it has been recently reported the site of San Ramon in the coastal area of Taltal, south of Antofagasta. There, it has been claimed the 12,000-year-old iron oxide mine is believed to be the oldest mine in America (Salazar et al. 2009).

Vast areas covering designs visible from long distance and known as geoglyphs are important to mention. Thousands of them are distributed throughout the desert perhaps as indicators of ancient routes. The most important concentration is located around Pintados (Fig. 5 and 6) and further south in the Quillagua area.

In Chile semiarid zone, the impressive paleo-American sites of Quereo and Quebrada Santa Julia contain excellent stratigraphic and contextual data on the issue of early man in America. Other sites that provided a complete sequence from about 7000 years to present time is the rockshelter of San Pedro Viejo de Pichasca, located inland from Ovalle city. El Encanto, also near Ovalle, is a well-preserved site with hundreds of petroglyphs and archaeological remains from El Molle culture. In the vicinity of Copiapo, two important Inka sites are La Puerta and the metallurgical center of Vina del Cerro that has undergone an extensive conservation program. Further north, at the mining city of El Salvador, there are the remains of a turquoise mine of Inka origin still in place under the care of Museo Regional.

Stretching from north to south is the old Qapaq Nan or Inka Road. Sections of it have been subject of thoroughly investigations, and it is now part of a major cooperative Andean program sponsored by UNESCO (Niemeyer and Rivera 1983; Santoro 1983; Berenguer and Caceres 2008).

Central Chile, particularly Santiago, and its vicinity contain mainly late sites of which the

Chile's World Archaeological Heritage and Its Management, Fig. 3 Tulor village site located in San Pedro Atacama area (© Mario A. Rivera)

Chile's World Archaeological Heritage and Its Management, Fig. 4 Pukara Quitor, San Pedro Atacama area (© Mario A. Rivera)

fortified outposts of Cerro Chena and La Compania are significant. The former an Inka site while the latter, of an earlier development probably belonging to Promaucae origin later occupied by the Inkas. An outstanding feature is the mummy of Cerro El Plomo. This is a child body, probably 8–9 years old that was sacrificed by the Inkas at the summit of Cerro El Plomo inland from Santiago at 5,430-m altitude. There, the Inka sanctuary kept the body frozen until it was discovered in 1954. It is in perfect shape with all garments and dresses still intact on display at the Museo Nacional Historia Natural in Santiago (Fig. 7).

Chile's World Archaeological Heritage and Its Management, Fig. 5 Geoglyphs of Pintados, Atacama Desert (© Mario A. Rivera)

Chile's World Archaeological Heritage and Its Management, Fig. 6 Geoglyphs of Tiliviche, Pampa del Tamarugal (© Mario A. Rivera)

South of Santiago, Tagua Tagua is the best recorded paleo-American site with clear evidence of mastodon remains associated to human activities. Further south, the Araucanian area is still poorly investigated, despite the fact that living groups of Mapuche people play a crucial role even today. Perhaps the most important sites are Los Catalanes Cave and Pucon, mainly because of their stratigraphy records. Puerto Montt is the site of Monte Verde where evidence of Pleistocene fauna had been linked to human activities at least by 11,000 BCE, if not earlier (Dillehay and Collins 1988).

In Patagonia as well as all the extreme south of Chile, a widely spread rock art known as Patagonian Style is found from General Carrera Lake in Chile Chico to Magellan Strait. It is believed is the oldest in South America as it is characterized by designs of red or black hands done its negative painting. Other motifs are guanaco figures and highly complex geometric designs. Due to the isolation of this southern land, the style remained

Chile's World Archaeological Heritage and Its Management, Fig. 7 Frozen body of child, Inka sanctuary of Cerro El Plomo, Santiago area (©Adriana Goni)

unknown until recently and in excellent conditions. At Los Toldos rockshelter in Argentinean Patagonia, they have been dated at 10,000 years. Also in Patagonia, cave sites such as Fell, Palli Aike, and Eberhardt related to early hunters and gatherers, associated to Pleistocene fauna, have been found in connection with human activity. They are outstanding examples that have been in the literature since the 1890s, with important research done by renowned figures such as Junius Bird and the New York American Museum of Natural History and Joseph and Annette Emperaire and the French Archaeological Mission to Patagonia.

Key Issues/Current Debates/Future Directions/Examples

Management of the Archaeological Patrimony

Generally speaking, conservation and management of archaeological sites in Chile are poor. Corporacion Nacional Forestal, the equivalent to National Park Service, is the official institution responsible for the management of sites. However, only a handful sites are actually under their supervision, most notably the geoglyphs of Pintados and the site of Tulor, in arrangement with the local Atacameno community of Coyo.

Responsibility of the archaeological patrimony is also a problem because of a lack of clear definition on accountability for managing, storing, and preservation both of archaeological sites and collections. Several institutions, from Chile's Departments of Education and Cultural Affairs to Chile's Departments of Agriculture and Land, are all concerned with issues related to archaeological patrimony. Aside from these facts, there is a suite of instances for managing archaeological collections. Museums' responsibility is varied, whether they are state or municipal museums, private or university ones.

Two other factors are against archaeological patrimony. Contract archaeology programs are done in response to contracting companies' goals that plan to intervene the landscape. A second situation that destroyed hundreds of archaeological sites in the Atacama Desert was the recent versions of the Dakar International Rally, originally the Paris-Dakar rally with participation of hundreds of vehicles and enterprises from all over the world. In the last three years, several stages took place in the Atacama Desert leaving a somber panorama of destruction in the sandy pristine landscape. A recent report from Consejo Monumentos Nacionales reveals that 283 of the 556 sites were affected by the rally with an almost 50% of deterioration.

San Pedro Atacama is probably the only place in Chile where native organizations have claimed their right to manage archaeological sites. However, internal disputes do not allow a clear-cut outcome up to date. In any event, Museo Arqueologico Gustavo Le Paige in San Pedro has done an excellent job in conserving and managing the archaeological collections from the area. Corporacion Nacional Forestal manages the site of San Pedro Viejo Pichasca mainly because the archaeological site is part of the national paleontological reserve.

In Arica, conservation and display, as well as research of Chinchorro, is in care of Universidad Tarapaca and its Azapa Museum of Archaeology. Recently, they have added a new building containing excellent displays and storage facilities, especially designed for the Chinchorro remains. A new site museum located in downtown Arica on Colon street displays burials of the Chinchorro culture in situ.

In some instances, local institutions also manage archaeological sites. This is the case of cities like Iquique, Tocopilla, Taltal, and Ovalle, among others. In this last city, the city has taken control of El Encanto archaeological area transforming it in a city park.

There are several museums in Santiago where archaeological collections from Chilean territory are stored. The oldest and most important museum is Museo Nacional Historia Natural where reference collections from the entire country are kept. Additionally, the museum also stores collections from the most relevant field works done in Chile at least until 1980s. Museo Historico Nacional also contains some archaeological collections. Both museums are part of the Direccion de Bibliotecas, Archivos y Museos, an administrative organization that is under the Secretary of Education. Additionally, state museums are located in all the major cities along the country being those in La Serena, Antofagasta, and Valparaiso the most important. Private museums in Santiago are also important. The best known is perhaps Museo Chileno Arte Precolombino. It was founded in 1981, and it functions as a joint venture between Fundacion Familia Larrain Echenique and the city of Santiago. Other private museums managing archaeological collections are Museo Arqueologico de Santiago, founded in 1994 by Fundacion Cultural Plaza Mulato Gil. In addition, two museums belonging to private organizations are located nearby Santiago, Museo Andino founded by Fundacion Claro Vial in 2006 and Museo de Colchagua that opened in 1995 by Fundacion Cardoen.

In Valdivia, Universidad Austral de Chile takes care of Museo Historico y Antropologico Mauricio Van de Maele. In Patagonia and extreme Southern Chile, managing archaeological sites and collections has been in the hands of a couple of museums, namely, Museo de la Patagonia and Museo Salesiano. A third institution, Universidad de Magallanes, and its Museo del Recuerdo managed by Instituto de la Patagonia have being pursuing intense lab work as well as research. Ultimately, conservation efforts as well as display of collections are all regulated by National Council of Monuments and the National Restoration Center.

Cross-References

- ▶ Altitude Environments in Archaeology
- ▶ Bird, Junius
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Geoglyphs
- ▶ Heritage and Archaeology
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Inca State and Empire Formation
- ▶ Peopling of the Americas

References

Arriaza, B. 1995. *Beyond death. The Chinchorro mummies of ancient Chile*. Washington, DC: Smithsonian Institution Press.

Berenguer, J., and I. Caceres. 2008. Los Inkas en el altiplano sur de Tarapaca: El Tojo revisitado. *Chungará* 40: 121–143.

Dillehay, T., and M. Collins. 1988. Early cultural evidence from Monte Verde in Chile. *Nature* 332: 150–152.

Jackson, D., and C. Mendez. 2008. Paleoamericans in Chile: The evidence from Quebrada Santa Julia. *The Mammoth Trumpet* 23: 10–13.

Niemeyer, H., and M.A. Rivera. 1983. El Camino del Inca en el Despoblado de Atacama. *Boletín de Prehistoria* 9: 91–193.

Rivera, M.A. 1995. The Preceramic Chinchorro mummy complex of northern Chile: Context, style, and purpose. In *Tombs for the living*, ed. T. Dillehay, 43–77. Washington, DC: Dumbarton Oaks Research Library and Collection.

Salazar, D., V. Castro, H. Salinas, J. Michelow, and V. Varela. 2009. *Minería y metalurgia en la costa de la región de Antofagasta, extremo norte de Chile, 53 international congress of Americanists*. Mexico City: Universidad Iberoamericana.

Santoro, C. 1983. Camino del Inca en la Sierra de Arica. *Chungará* 10: 39–46.

China: Cultural Heritage Management

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Introduction

China owns a rich variety of cultural heritage, including not only tangible monuments, historic buildings, and artifacts but also various intangible traditional cultures. Nowadays China plays a significant role in the world in nominating, applying for, and protecting World Heritage and Intangible Cultural Heritage (hereafter as ICH) within the UNESCO program. Domestically, China recognizes the crucial role of cultural heritage in its national political, cultural, economic, and social constructions. It is therefore an important issue to understand how cultural heritage is conceptualized, managed, protected, and used in China as it strives to promote its economic modernization as well as cultural rejuvenation.

This entry aims to illustrate characteristics, issues, and reforms of the cultural heritage management system in China. Section "Discourses and Concepts" provides background and historical context of Chinese cultural heritage management. This section specifically illustrates how the concept of cultural relic evolved into present cultural heritage and, consequently, how the official discourse of cultural heritage developed accordingly. Section "The Management System: Characteristics" delineates the characteristics of Chinese cultural heritage management system. In China, the majority of cultural heritage is administrated as a nonprofit enterprise by the government with a hierarchical localized management measure. As this system was formed during a unique historical, economic, and cultural situation in China, several issues emerged which are related to the practical management problems in present China, such as the institutional causes and managerial deficiencies. These issues, as well as the practical management problems, are investigated in section "The Management System: Issues". Afterward, the reforms that Chinese heritage authorities have taken in heritage management are described in section "The Management System: Reforms". Along with the advancement of Chinese economic and social reform, this section uses cases to display how different heritage sectors experiment reforms in both marketization and non-marketization ways with participation of the social actors. Finally, section "The Management of Intangible Cultural Heritage" illustrates a new component of Chinese cultural heritage management system, the management of ICH, so as to complete the comprehensive system of Chinese cultural heritage management.

Discourses and Concepts

Heritage is currently regarded as not only a discourse (Hall 2001) but also a cultural practice (Smith 2006). The official discourse of heritage in China is central to the official cultural practice in China. This section provides a historical background of the transformation of Chinese heritage discourse, as well as the related concepts, which will also form the context to understand the practice of Chinese cultural heritage management in late sections.

Concept of Cultural Relic in Ancient China

The term cultural relic, or "Wen Wu" (文物) in Chinese, is the most significant concept underlying the discourse of cultural heritage in China. The term cultural relic firstly appeared in book *Zuo zhuan* (the Commentary of Zuo) in the early Warring States Period (B.C. 475–B.C. 221) and the meaning concerns sacrificial vessels (such as bronzes and steles) used in the imperial ritual, etiquettes, and rules (Li 2002, 1). The emergence of epigraphy in the Song Dynasty (A.D. 960–A.D. 1279) and textology and the collection of antiques in the Ming (A.D. 1368–A.D. 1644) and Qing (A.D. 1644–A.D.1912) Dynasties extended the concept of cultural relic to include not only

imperial utensils but also many kinds of valuable antiques and ancient artworks in private collections (2). At that time, however, only a small amount of moveable cultural heritage was included in the concept of cultural relic.

Management of Cultural Relics Before 1949

The connotation and extension of cultural relic was transformed along with the establishment of the first group of museums in China (e.g., in Shanghai in 1868 and in Nantong, Jiangsu, in 1905) and the inaugural archaeological excavations in Henan Province and Beijing in the 1920s (Gu and Yuan 2005). The concept of cultural relic was extended to a larger scope to incorporate immoveable archaeological sites, monuments, and historic buildings.

Government management of cultural relics was initiated in this period. The first cultural heritage regulation in China, *Antiques Preservation Law*, was issued by the Republican Government in 1930. As a result, in addition to moveable cultural relics, cultural heritage in the form of historic buildings and archaeological sites were included in governmental administration.

Management of Cultural Relics from 1949 to 1985

While the term cultural relic has been well maintained in government management system since the founding of the People's Republic of China in 1949, the connotation and extension of this concept has underwent expansion. The official stipulation of cultural relics was narrated first in *Provisional Regulations on the Protection and Administration of Cultural Relics* (full text see http://www.china.com.cn/cpc/2011-04/15/content_22370386.htm, retrieved on 8 December 2017) in 1961 and then written in the first cultural heritage law in China, *Law of the People's Republic of China on Protection of Cultural Relics* (full text see http://www.sach.gov.cn/art/2015/6/1/art_1034_121351.html, retrieved on 8 December 2017) (the LPCR hereafter). The LPCR was initially issued in 1982 and then revised in 1991, 2002, 2007, 2013, 2015, and 2017. Although the definition of cultural relic is not articulated in the LPCR, the extension of it remains more or less constant from the *Provisional Regulations* in 1961 to the LPCR in 2017.

Several characteristics of the concept cultural relic can be discerned by reviewing these governmental documents. First of all, cultural relic emphasizes the materiality of heritage. Cultural relics concern two categories: the first is immovable cultural relics, such as sites and monuments; buildings, structures, and murals; and historic towns or villages. The second is moveable cultural relics, such as artworks and crafts; documents, manuscripts, and books and objects. Another characteristic of the concept cultural relic is that the historical, artistic, and scientific values are underscored in the official authentication process. Based on the assessment of these values, immovable cultural relics are classified as national key protection units, provincial protection units, and municipal/county protection units. Similarly, moveable cultural relics are classified as valuable cultural relics (further classified as grade one, grade two, and grade three) and ordinary cultural relics (Li 2002).

Management of Cultural Heritage After 1985

Chinese government's protection of cultural relics was severely interrupted during the Cultural Revolution from 1966 to 1976. (This is a social-political movement activated by then Chinese Chairman Mao Zedong to strengthen the communist ideology by purging remnants of capitalist and many traditional Chinese cultures and cultural relics, denouncing them as "bad cultures.") After the Open Policy reform initiated by Deng Xiaoping in 1978, China's national agenda shifted from ideological struggle to economic modernization. As a result, cultural heritage is reconsidered as beneficial to China's nationalism, socialism, and modernization (Sofield and Li 1998). Along with China's Open Policy, international heritage discourses were introduced into China. The most significant event is China's ratification of the *World Heritage Convention* in 1985, while the concept of "cultural heritage" was imported into China. Nevertheless, the term cultural heritage has not been as common as cultural relics until 2005 when the term cultural

heritage was written in Chinese governmental documents for the first time.

2005 is a crucial year as two important concepts, namely, cultural heritage and ICH, formally appeared in the governmental documents for the first time. In the *Notification of the State Council on Strengthening the Protection of Cultural Heritage* (full text see http://www.gov.cn/gongbao/content/2006/content_185117.htm, retrieved on 8 December 2017) issued in 2005, the government proclaims that cultural heritage includes tangible and intangible cultural heritage. While the concept of tangible cultural heritage follows the concept of cultural relics as stipulated in the LPCR, the concept of ICH largely adopts the definition in Article 2 of UNESCO's 2003 *Convention for the Safeguarding of the Intangible Cultural Heritage*. The Chinese government ratified the *ICH Convention* in 2004 and quickly issued the *Opinions of the General Office of the State Council on Strengthening the Protection of Intangible Cultural Heritage of China* (full text see http://www.gov.cn/zwgk/2005-08/15/content_21681.htm, retrieved on 8 December 2017) in 2005.

As delineated in above sections, the notion of cultural heritage in China developed from object-oriented cultural relics to an inclusive concept of cultural heritage. Recently, new cultural heritage elements are added into the scope of cultural heritage, such as cultural landscape, cultural routes, and industrial heritage. As the concept of cultural heritage in China has been dramatically extended in spacial and temporal dimensions, new issues emerged in Chinese cultural heritage management system.

The Management System: Characteristics

As described in the previous sections, China has established a relatively complete epistemological system of cultural heritage in its official heritage discourse in the 2000s. However, China's cultural heritage management in practice develops more slowly than the evolution of the heritage discourse. To a large extent, this management system is still primarily based on the tangible-oriented management system which emphasizes cultural relics, a similar situation which is also found in other countries (Smith 2006). Influenced by the deep-rooted administrative system developed in the times of the planned economy, Chinese cultural heritage management system has its own characteristics: public ownership, nonprofit administration, and hierarchical localized management (Liu et al. 2008). In this and the following sections, the management system is analyzed from the aspects of the system (actors), the regime (organizations), and the mechanism (operations).

Public Ownership

The principal status of the socialist public ownership is stipulated in Article 6 of *China's Constitution* (full translation is on http://www.cpd.com.cn/gb/flfg/2003-04/11/content_1821.htm, retrieved on 8 December 2017). Accordingly, the management system of cultural relics in China was established as a nonprofit enterprise of China's public welfare undertakings. The ownership of cultural heritage, according to the LPCR, concerns state's ownership, collective ownership, and private ownership. In general, the majority of Chinese cultural heritage is owned by the state. Article 5 of the LPCR stipulates:

> All cultural relics remaining underground or in the inland waters or territorial seas within the boundaries of the People's Republic of China re owned by the State. (. . .) Such immovable cultural relics such as (. . .) except where otherwise provided for by regulations of the State, are owned by the State. The ownership of State-owned immovable cultural relics shall remain unchanged when ownership or the right to use of the land to which such relics are attached changes (Full official translation is on http://www.sach.gov.cn/art/2007/10/29/art_1034_6944.html, retrieved on 8 December 2017).

It has to be pointed out that emerging non-governmental social actors, such as companies and organizations, began to participate in the ownership reform of Chinese cultural heritage after the 1980s, such as in the fields of heritage tourism and museums. However, the public ownership still dominates the current cultural heritage management system in China.

Nonprofit Administration

The principal status of public ownership in China leads to a nonprofit management system which can be examined from the aspects of the subject of administration, the system of administration, financial resources, income distribution, and public shareability.

Generally speaking, the subject of administration of Chinese cultural heritage concerns the public institutions funded by the government or a heritage sector of the government. Public institution is a unique sector in China as it functions across the sectors of government, company, and nonprofit organization. At every administrative level of China (from national, provincial, municipal to county), the government establishes, funds, and regulates a series of public institutions to provide nonprofit social undertakings, such as heritage, education, health undertakings, and so on (Zhang 2006). This means that cultural heritage is directly managed by a public institution or a heritage sector which are affiliated to the government at a certain level. Because of this administrative structure, the authority and function of the subject of administration ultimately belong to the government at an according level. This administrative system also means that the incomings and outgoings of the management are regulated by the according government. In general, all the expenses of management are financed by the government; meanwhile, the majority of the operating revenues, such as the admission fee or social donations, are usually turned over to the according government. In China, this financial system is called "separation between revenue and expenditure." Here, it is easy to see that the management and operation of cultural heritage is not for profit making but for the public benefit. In later sections, the drawbacks of this administrative system will be examined in terms of hierarchical administration and financial scheme.

Hierarchical Localized Management

In line with China's national administrative system born in the era of the planned economy, the macrostructure of Chinese cultural heritage management system can be described as the one which is "combined with Tiao and Kuai while dominated by Kuai," which means cultural heritage is managed, horizontally, by multiple sectors at the same administrative level and, vertically, by hierarchical public institutions and/or heritage sectors (Lu 2004; Wang and Zhu 2006; Liu et al. 2008).

Chinese word Kuai (块) describes the segmented governmental sectors at a certain level of government which manages different aspects of cultural heritage, according to the attributes of the heritage. The State Administration of Cultural Heritage (SACH hereafter), as a major subject of cultural heritage management at the national level, is responsible for the protection, administration, and supervision of most cultural heritage in China. (The duties of the SACH are available on http://www.sach.gov.cn/col/col1020/index.html, retrieved on 8 December 2017.) In addition to the system of the SACH, nevertheless, cultural heritage can also be managed within the systems of the Ministry of Housing and Urban-Rural Development (e.g., National Scenic Spots), the Ministry of Culture (e.g., ICH), the China National Tourism Administration (e.g., some heritage tourist attractions), the State Archives Administration of China (e.g., some historic archives), and the administrations concerning ethnic affairs, religious affairs, education, and military. Clearly, this Kuai segmented administration inevitably leads to an intersecting management where cultural heritage is actually managed by multiple government sectors.

Chinese word Tiao (条), in the vertical dimension, describes the hierarchical administration from the national level to the county level. As stipulated in Article 8 of the LPCR, local governments are responsible for the management of cultural heritage which is located in its administrative region. Consequently, cultural heritage is hierarchically managed by local governments at different levels, according to the grade of heritage. At a certain governmental level, the public institution or heritage sector functions under the administration of its upper-level counterpart. At the same time, this vertical hierarchical administration can also be described as a principal-agent system. As a principal of Chinese cultural heritage, the Central Government (and its heritage-related sectors) entrusts the ownership and management rights of cultural

heritage to the lower/local governments (and their heritage-related sectors), who, then, entrust the ownership and rights to their heritage-related public institutions at the according level. Consequently, local heritage-related public institutions, such as cultural heritage protection units (for most immovable cultural relics) and museums (for most moveable cultural relics), are the ultimate agents who exert management rights in reality.

In conclusion, the macro management of Chinese cultural heritage is characterized by the combination of Tiao and Kuai, the hierarchical principal-agent system, and an intersecting management which is attributed to the Kuai segmentation. While such a system benefits China's cultural heritage in the times of the planned economy, drawbacks of this system emerged in times of transformation after the Open Policy reform (Fig. 1).

The Management System: Issues

After the Open Policy reform, modernization is regarded by the Chinese government as both a material and spiritual enterprise (Shepherd and Yu 2013). Thus, current cultural heritage management in China is entangled with the political situation, economic development, and cultural policies (Zan 2014). After comprehensive surveys, Chinese scholar pointed out several noticeable issues in relation to the protection and use of cultural heritage in China: insufficient protection, irrational use, and a flawed management system (Lu 2004). These practical problems can be classified as inner institutional causes of the management system and managerial deficiencies of the system in practice (Liu et al. 2008).

Institutional Causes

Liu et al. (2008) argue that, from the most fundamental one to the most visible one, there are three inner causes resulting in the management system: the most fundamental cause is the deviation in the management idea, an important cause is dissymmetry between the revenue authority and expenditure liability, and the most direct cause is the unsound supervisory mechanism.

It can be seen from the previous section that the Chinese government emphasizes the materiality of heritage, as well as the intrinsic and static historical, artistic, and scientific values of tangible heritage. This official heritage discourse leads to a result that cultural heritage is usually regarded as an object for scholars or experts for their academic studies. This can be clearly seen from, for example, official's statements that cultural heritage, either tangible or intangible, is a "witness of historical development of human society" (Li 2002, 1; Xin and Huang 2011, 193). Since the reform of the market economy system in the late 1980s, nevertheless, the economic value of cultural heritage has been gradually privileged by the government, especially the local governments. It is common to find in many cases that the use of heritage for economic functions, such as in heritage tourism, tends to overtake the public benefit. International scholars even argue that economic development is the principal problem of China's tangible cultural heritage (Blumenfield and Silverman 2013). Government's imbalanced understanding of the values and function of cultural heritage therefore lies at the center of the flawed management system.

As illustrated before, cultural heritage management in China follows a hierarchical principal-agent measure. While this method activates local governments to manage cultural heritage on behalf of the central government, it also results in a series of practical issues, in particular the imbalanced protection and use of cultural heritage. On the one hand, the grade of the values of cultural heritage does not correspond with the hierarchy of the government. For instance, a national key protected cultural heritage is likely to be directly managed by a county government sector. On the other hand, restricted to the revenue authority, as well as staff and other administrative resources, lower-level governments and affiliated heritage institutions have to burden disproportionate management of the heritage, many of which are of great values. Consequently, the local government is likely to try rent-seeking in the market, with the results that the economic value is privileged, the public benefits is neglected, and the social function of heritage is restricted.

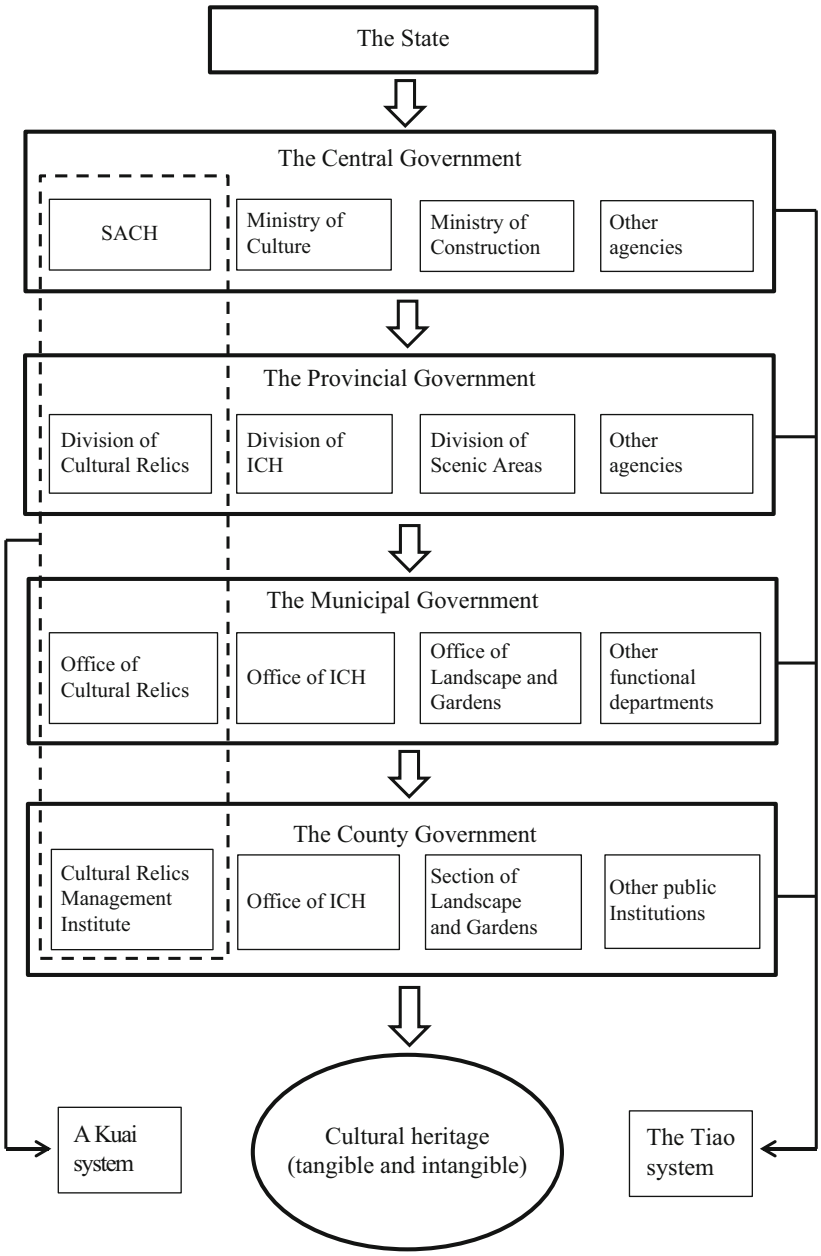

China: Cultural Heritage Management, Fig. 1 The Tiao and Kuai Systems in Chinese heritage management

Deviation in the management idea and dissymmetry between the revenue authority and expenditure liability contribute to the third institutional cause - weak supervisory mechanism-the most direct reason behind the tension between protection and economic use of heritage. This cause can be examined from two aspects. The first concern the weak restrictive and supervisory mechanisms in Chinese cultural heritage management system (Lu 2004). Among these, the lack of legal restrictive mechanism is important. While economic development is widely emphasized by local governments, the position of heritage-related government sectors and institutions is usually weakened.

This situation becomes severe as there is no stipulation of responsibility-tracking system in current cultural heritage-related laws. Thus, it is common to find in China that cultural heritage protection inevitably gave way to real estate, commercial, and tourism development projects.

The second concerns the public supervision. Considering Laurajane Smith's argument of Authorised Heritage Discourse (Smith 2006), it can be seen that the discourse and managerial practice of cultural heritage in China are largely dominated by an Authorised Heritage Discourse (Wu and Qin 2016). While the Chinese Authorised Heritage Discourse is a top-down operation, the general public rarely take initiatives to participate (Harrell 2013). Although the public benefit is gradually facilitated by the government, general public's cultural rights to cultural heritage are still not fully stipulated in heritage-related laws.

Managerial Deficiencies

Generally speaking, the level of Chinese cultural heritage management needs to be improved. As concluded by Liu et al. (2008), there are at least three reasons behind the managerial deficiencies: lack of administrative resources, unbalanced allocation of administrative resources, and imperfect implementation of the macro national policies.

One of the most significant restrictions on management, as indicated before, is that local heritage institutions lack revenue authority and sufficient administrative resources, such as staff and equipment. Meanwhile, the operation of management largely depends on a single and insufficient financial investment from the according government. The distribution of national administrative resources is not even across the country. As illustrated before, local governments are the agents who are responsible for the cost of management. Nationally speaking, the distribution of cultural heritage resources across different provinces and regions is not even, as well as the fiscal revenues. Therefore, provinces or regions with abundant heritage recourses may face severer funding problems than other places. According to a national survey of the management of national key protected cultural heritage units, for instance, scholars (Liu et al. 2008) found that Xinjiang, Gansu, Ningxia, Hubei, Jiangsu, and Fujian are the provinces which own generally high level of cultural heritage values but lack management effectiveness and governmental investments. Accompanied with this issue is the drawback of current decision-making mechanism in local government. Having limited understanding of the macro picture of regional cultural heritage resources and lacking scientific planning and decision-making methods, local leaders usually obey their personal ideas or follow the opinions of certain experts or stakeholders.

The management of cultural heritage in China has always been influenced by the macro national policies. In the new century, the central government issued several beneficial policies for economic and social development. Given the fact that the development and administrative resources are not even across the country, it is common to notice the gaps between policies and implementations, as well as between cities and countryside. For example, the central government initiated the Construction of New Socialist Countryside in 2005 to improve the economic, political, cultural, and social constructions, as well as cultural heritage protection, in Chinese countryside. While this national policy activates local governments to "modernize" and "beautify" the countryside, it is unfortunate that some cultural heritage, both tangible and intangible, are harmed in the campaign when a gap exists between the comprehension and the implementation of the national policy. China has experienced an unprecedented urbanization when many heritages in cities were destructed. However, there is still a danger that the authorities in countryside regard the Construction of New Socialist Countryside as another "new village construction" or "urbanization" (Yuan 2006). In some cases, as a result, standardized concrete buildings replaced the unique vernacular buildings, and modern lifestyle tempted the villagers to give up their traditional lifestyle. In this way, divergences are likely to emerge between the original proposition of the national macro policy and the implementation in the local area.

Major Practical Problems in the Management

Scholars have observed a series of practical problems of cultural heritage management (e.g., Lu 2004; Liu et al. 2008, 2009; Shepherd and Yu 2013; Blumenfield and Silverman 2013). A central goal of Chinese cultural heritage management is to well balance the relationship between protection and use of cultural heritage. In general, institutional causes and managerial deficiencies of the management system are accountable to most of the current practical problems. The majority of these problems can be classified into two aspects: weak public benefit function and irrational economic function.

In the first place, cultural heritage should be regarded as a public resource that every community member can benefit from. However, public benefit of heritage is not well delivered to the public. The deep-rooted institutional cause that Chinese heritage management idea emphasizes the materiality of heritage results in a fact that the public has not been centered in the whole heritage undertaking. Therefore, there is still a noticeable gap between the cultural products and services provided by the heritage institutions and general public's burgeoning cultural needs. This issue is reflected in museums and immoveable cultural relics. In the field of museum, generally, the quality of exhibition is relatively low, the content and interpretation is tedious, and the art derivative products are not well-developed. For example, during the making of a "City of Museums" in Shanghai in the 2000s, around 80% of the newly launched museums are industry museums. Nevertheless, except those established in the industries of tobacco and bank, the majority of the industry museums are unable to normally operate in the long term. Nationally, according to Lu's report (Lu 2004), less than 1% of the moveable cultural relics collected in Chinese museums were displayed to the public. This figure, in the Palace Museum for example, was still 0.5% in 2015 (Liu 2015). As far as immoveable cultural heritage is concerned, except the famous scenic spots, the majority of them are not fully opened to the public (Lu 2004). This issue can be seen in the fact that, among 4296 national key protected cultural heritage units, over 50% of them were not opened to the public in 2015 (Yang 2016). Unless heritage sites can reward with noticeable economic or social benefit, as a vanity project, the local government usually is reluctant to invest in the protection and management.

Conversely to the under-function of public benefit, irrational economic development of cultural heritage becomes a central concern in the management. In general, this problem relates centrally to the tension between protection and use of cultural heritage. Furthermore, this tension can be analyzed in two aspects: the first is irrational economic development of heritage tourism or heritage commodification, and the second concerns the conflicts between heritage administrators and other non-heritage-related stakeholders.

Irrational economic development is often found in the tourism commodification of immoveable cultural relics. Because of its high cultural values, most immoveable heritage is regarded by local government as tourism attractions. Unfortunately, the existence of the institutional causes means that local government tends to privilege the short-term economic reward, with the result that cultural heritage is commodified in the tourism market as a local asset. In some cases, the ownership and operational right are detached so that the former is retained in the heritage institution and the latter is operated by a company. Thus, the heritage managed in this mixed method is usually over-commodified and overused, and the protection is inevitably overlooked. For example, the Shaanxi Tourism Group was established in 1998, and it took the operational rights from the government of five national key protected cultural heritage sites in Shaanxi, including the Mausoleum of the First Qin Emperor and the terra-cotta Warriors and Horses. However, soon the managerial problems appeared, and meanwhile, "destructive protection" of the site and harm to material authenticity are noticed (CYN 2002).

The conflicts between heritage-related sectors or heritage institutions and other non-heritage-related stakeholders become increasingly serious along with China's fast economic modernization. This problem is usually found in the conflicts between heritage protection and infrastructure construction projects and/or urbanization. One of

these serious cases can be found in the site of Great Wall in Hohhot, Inner Mongolia. A section of 100 meters of the Great Wall dated back in the Qin and Han period (B.C. 221–A.D. 220) was severely damaged during a drilling project by a local mining company in 2009 (Zhang 2009). This lawless destruction was so rude that the local heritage sector had tried many times until they can finally stop this ruthless behavior. In addition, urbanization and fast city infrastructure construction, which is common in nowadays China, is another major threat to heritage management. For example, in the name of "reconstruction of the old town," the majority of the old buildings and the old block of the Old Town of Dinghai in Zhoushan City, the only island historic town of China, was ruthlessly destroyed from 1997 to 2000. Local government's decision to dismantle the old town was so strong that the heritage institutions' dissuasion, the local citizens' lawsuit, and the media's supervision didn't stop this heritage catastrophe (Guangming 2000). In China, this government behavior is ironically described as "destroying authentic cultural relics and fabricating inauthentic antiques."

The Management System: Reforms

As revealed in the previous sections, China's political and economic system and administrative resources, as well as the government's perception on the values and functions of cultural heritage, shaped the current management system of cultural heritage. Under the background of national macro political and economic reform since the Open Policy in 1978, in particular the market economy system reform, many practical marketization reform approaches have been proposed in the field of public welfare. In order to adjust the tension between the economic development and reform of the society and the stereotyped heritage management system, local government, as well as the heritage administrative sectors, began to experiment on the management reform in order to address two major issues: insufficient revenue and inefficient management. The management reform was firstly experimented in the field of immovable heritage sites. Depending on the management objectives, there are generally two kinds of management system reform: the first is marketization reform, and the second is non-marketization reform.

Marketization Reform

Liu et al. (2008) concluded that there have been generally two forms of market-oriented reforms of cultural heritage management in China in the past two decades: the first is a profit-oriented marketization reform (including listed company-oriented reconstruction, tourism resources integration, and joint-stock reconstruction), and the second is a nonprofit marketization reform.

All three types of reform in the form of profit-oriented marketization inevitably concern the reconstruction of ownership and operational rights. The first type of profit-oriented marketization, listed company-oriented reconstruction, began in World Cultural and Natural Heritage Mount Huangshan in An'hui Province. The reform in Huangshan was triggered by Deng Xiaoping's historical visit in 1979 so that it can also be regarded as the initiative of Chinese tourism (Wu et al. 2016). Huangshan was listed as a World Heritage in 1990 and a reconstruction plan for a listed company plan was initiated in 1996 when the first Chinese tourism concept stock, Huangshan Tourism, was listed in the stock market. The institutional reform resulted in one institution with two functions: the one is Huangshan Tourism Group, and the other is Huangshan Management Committee. (In Chinese this situation is called "Yige Jigou Liangkuai Paizi" (一个机构, 两块牌子).) With the obtained operational and exploitation rights, the former runs all business in Huangshan, while the latter only has the ownership and protection rights. The positive result of this reform is that the reconstructed institution can better deploy the administrative recourses and operate tourism business. However, the most significant negative effect is the lack of administrative supervision for heritage protection.

The second type of profit-oriented marketization reform, tourism resources integration, can be best exemplified in the case of Shaanxi Tourism Group. Under the arrangement of the provincial

government, the operational rights of five national key protected cultural heritage sites, including the Mausoleum of the First Qin Emperor and the terra-cotta Warriors and Horses, were integrated and transformed to the newly established Shaanxi Tourism Group in 1998. However, many severe managerial problems emerged when these high-value heritage sites are managed and operated by the company alone. For instance, the appearance and historic environment of the Mausoleum was altered for tourism; in addition, the admission revenues of the terra-cotta Warriors and Horses were collected as business profits (HSD 2002). This reform was later suspended and the managerial rights of all cultural heritage sites were finally returned to the provincial cultural heritage administration in 2007.

The third type of profit-oriented marketization reform refers to a reconstruction in which, profit-making organizations, such as state-owned capital and private capital, participate in the management in a joint-stock method. This reform is exemplified in the case of Sankong cultural heritage (including the Confucian Mansion, the Confucian Temple, and the Cemetery of Confucius) in Qufu, Shandong Province. In 2000, Confucius International Tourism Company, a joint-stock company, was established to manage and operate Sankong, while the previous administrator, Qufu Cultural Relics Management Committee, was only able to supervise the cultural heritage. However, the supervision was so weak that a serious damage was done to cultural heritage in Sankong in 2000: the company used running water to wash the historic wooden structures, which damaged most of the surfaces of the buildings, as well as the collected moveable cultural relics and steles (Baidu Baike 2017). One year later after the incident, under the request of the higher-level government and the condemn of the media, the joint-stock company handed over the managerial rights to Qufu Cultural Relics Management Committee.

Nonprofit marketization reform indicates an approach that companies participate in the management with their capital or resources. Different from the previous profit-oriented marketization reforms, the company cooperates with governmental heritage sectors without asking for economic reward. This reform is relatively new in China, and one of the experiments can be found in the management of the Nanyue Kingdom Sluice Museum in Guangzhou, Guangdong Province. In 2000, the sluice site was found accidently in a construction project of a commercial complex by the Guangming Company. Then this site was excavated, protected, and turned into a free-of-admission museum after a negotiation between Guangzhou cultural heritage sector, construction sector, and the company. The museum is finally situated on the ground floor of the commercial complex, and the company has to cover the construction and everyday maintenance of the museum. This approach is generally praised as a win-win method with which the financial shortage of government is compensated, cultural heritage protection and commercial development are well balanced, and the public benefit of heritage is secured. Nevertheless, problems in its management still emerged in recent years: the company is suffering from the protection and maintenance expenses, and a sound communication mechanism between the company and the heritage sector is needed (Huang 2017).

Non-marketization Reform

Compared with the abovementioned marketization reform where profit-oriented companies are involved, nonprofit or nongovernmental organizations are not active in the management in China. In contrast to Western countries, the power of nonprofit or nongovernmental organizations in China is weak and underdeveloped. There are at least three major reasons (Zhang 2011). The first is the basic institutional cause that the ownership of the majority of cultural heritage belongs to the state so that it is difficult for nongovernmental organizations to intervene in this bureaucratic administrative system. The second institutional cause concerns the underdevelopment of relevant laws or regulations for, and the difficult application process of, a nongovernmental organization. The third reason is that a supporting tax exemption system is yet to be established so that there are only a few nongovernmental organizations in China (35 organizations as of 2008) who are qualified for preferential tax policies.

Although nongovernmental organizations' engagement in heritage management experiences difficulties, they are encouraged by the government to participate in the field of cultural industry, in particular in the field of museum. This is mainly because, compared with immoveable heritage sites which are predominately owned by the government, moveable cultural relics can be owned by individuals, legal persons, or organizations. In the 2005 *Several Decisions of the State Council on the Entry of Non-public Capital into the Cultural Industry* (full text is on http://www.gov.cn/zhengce/content/2008-03/28/content_5680.htm, retrieved on 8 December 2017), the structure of Chinese cultural industry is descried as the one where public ownership remains the mainstay and multiple forms of ownership develop side by side. Specially, nonpublic capital is encouraged in the field of museums and galleries. This policy is further detailed in the *Ordinances on Museum* (full text is on http://www.gov.cn/zhengce/2015-03/02/content_2823823.htm, retrieved on 8 December 2017) in 2015. In Article 4, it is stipulated that companies, social organizations, citizens, and other social actors are encouraged to establish museums. Meanwhile, these non-state-owned museums are equally considered as state-owned museums in management, including fiscal and tax supporting policies. According to a statistics (Xinhua 2015), there were 982 non-state-owned museums in China as of 2014, accounting 21.8% of Chinese museums.

In general there are three operating mechanisms of Chinese non-state-owned museums (Zheng 2010). The first form of museums is operated by a foundation and/or a council. The best case is Guanfu Museum (official website of Guanfu Museum is http://www.guanfumuseum.org.cn/, retrieved on 8 December 2017), the first private museum in China which was established by the famous Chinese collector Ma Weidu in 1996. In its early years, Guanfu Museum experienced financial difficulties. Later, Ma introduced the council system and established a foundation which is benefited from successful Western models such as the Guggenheim Foundation. Now Mr. Ma is quite confident about the future of his museum, and he has launched branch museums in Shanghai and Xiamen, following the Guggenheim model. The second form of museum is operated and sustained by a company. This form can be exemplified by China Red Sandalwood Museum (official website of China Red Sandalwood Museum is http://www.redsandalwood.com/en/, retrieved on 8 December 2017) which was established by Chen Lihua, Chairwoman of the board of Fuwah International Group in 1999. The third form combines the benefits of the first and the second forms. Today Art Museum (official website of Today Art Museum is http://www.todayartmuseum.com/enexhibitons.aspx?type=currentexh, retrieved on 8 December 2017) is an art museum which was initially funded by a company but later underwent a joint-stock reform of its ownership. The curator of Today Art Museum, Zhang Baoquan, who is also the Chairman of the board of Antaeus Group, regards it is not sustainable to fund the museum with only one company. Therefore, he invited several other companies to subscribe the shares of the ownership. In addition, a council is established to act as the highest managerial body of the museum.

As these non-marketization reforms firstly appeared in most of non-state-owned museums in China in the late 1990s, the SACH introduced the council system to reform the management of public museums in an official document in 2010. Recently in September 2017, seven central ministries issued *The Implementation Plan of a Thorough Advancement of the Corporate Legal Person Governance Structure Reform in Public Cultural Institutions* (full text is available on http://www.sdwht.gov.cn/html/2017/whb_0912/42778.html, retrieved on 8 December 2017) which requires public museums to advance the establishment of the council system. This reform is within a broad context of the reform of state-owned enterprises and public institutions in China. Specifically, the goals of this reform are to establish a corporate legal person governance structure of council system so as to transform the government functions, to activate the agencies of museums, and to promote the participation of social actors in the cultural field.

The first group of experiments were carried out in provincial museums in Yunnan (in 2014), Guangdong (in 2014), Hunan (in 2015), and Henan (in 2015) Provinces. In an interview of Director Dai Zongpin from Yunnan Provincial Museum (Sina 2016), for example, the council is consisted of 15 members equally selected on the basis of a negotiation from three sources: the museum, the government, and the local society. In regard to the structure of the management system, for instance, Director Duan Xiaoming from Hunan Provincial Museum introduced that they constructed a three-level mode: the supervision and management rights held by the Provincial Department of Culture, the decision-making rights held by the museum council, and the management and implementation rights held by the management team of the museum (Sina 2016). During this reform there exists, however, a tension in the relationship between the governmental heritage sectors and the museum council, as pointed out by these two directors. As a result, the museum mediates this tension by adopting relevant heritage officials as members or even the president of the council. The same as other heritage institutions in China, the conventional management system of Chinese museum blends the characteristics of both corporation and social organization. Therefore, the aim of cultural reform in the museum field is to separate governments and institutions, as well as to separate supervision and operation. However, as noted in the experiment, the tension between the government and the council still exists as long as the current administrative and personnel management system remain.

It can be seen from above illustration that Chinese cultural heritage management system needs to be reformed from both the inside and the outside. The inside reform concerns the institutional causes and managerial deficiencies of the administration, while the outside reform means the participation of social actors in the heritage management. Reforms were first seen in the management of immovable heritage and recently in the field of museums. As observed by Chinese scholars recently (Su et al. 2016), however, reforms of the management system and the managerial ability of the heritage sectors and public institutions still have a long way to go.

The Management of Intangible Cultural Heritage

As introduced in section "Management of Cultural Heritage After 1985", the concept of cultural heritage in China is a newly conceptualized one which incorporated the concept of ICH into its long-existing concept of cultural relic, the synonym of tangible cultural heritage. Chinese cultural heritage management system, as discussed in the previous sections, is therefore predominately built on the management of immovable and movable heritage. As the concept of ICH has been introduced into Chinese heritage discourse in 2004, however, a comprehensive and unified cultural heritage management system which comprises that of ICH has not been established. In particular, ICH is managed by another system under the jurisdiction of the Ministry of Culture.

China is an active player in UNESCO's ICH undertaking. As soon as China ratified the ICH Convention in 2004, the State Council issued an official document to advance the protection of ICH in China in 2005, and later in 2011, the *Law on Intangible Cultural Heritage of the People's Republic of China* was enacted. Within 7 years, the Chinese government strongly advanced the protection of ICH and has established a relatively complete management system of ICH in China. In general, this government-led management system comprises of three parts: the leading agency is the Joint Meeting of the Inter-ministerial Working Conference System; the managerial agency is the Ministry of Culture and its subordinate cultural administrative agencies in local governments; and the executing agency is the ICH Protection Center (Han 2011).

Realizing the comprehensiveness of the categories of ICH, as well as the segmentation of the administrative rights across different sectors (the segmentation of Kuai), the State Council established the inter-ministerial joint meeting system as the top decision-making organ. This

system is led by the Ministry of Culture and is attended by delegates from other eight national ministries/agencies such as the SACH, the Ministry of Education, the State Ethnic Affaires Commission, and so on. Directed by this joint system, practical administration is coordinated by the Department of ICH at the Ministry of Culture which was established in 2009. This is the highest administrative agency in China to deal with the ICH policies and national issues. Following this organizational adjustment, the majority of Chinese provinces established their own Divisions or Sections of ICH within the provincial Department of Culture. Consequently, similar Sections or Offices of ICH are established by local governments at municipal and county levels (the hierarchy of Tiao). Thus, a hierarchical administrative system within the Ministry of Culture is structured at national, provincial, municipal, and county levels accordingly, in the same way as that of tangible cultural heritage within the SACH system.

While cultural heritage protection units and museums are the two ultimate agents who exert management rights in the tangible heritage field, the ICH Protection Centre is the executing agency in the ICH field. At the national level, in accordance with the adjustment of the Ministry of Culture, the Chinese National Center for Safeguarding Ethnic Culture and Folklore, a national public institution launched in the Chinese National Academy of Arts in 2003, was renamed as the China ICH Protection Centre in 2006. Following this "top-down" manner, the majority of Chinese provinces have established their ICH Protections Centers at provincial, municipal, and county levels. At each of the governmental level, the ICH Protection undertakes the practical ICH protection works, such as investigation, documentation, and the operation of transmission, under the administration of the Division/Office of ICH at the according level.

Compared with the tangible heritage management system, a characteristic of the ICH management system is that experts and/or scholars in relevant fields are greatly encouraged to particulate in the implementation of national ICH policies in practice. The role of experts in Chinese ICH management is pointed out in the State Council's opinions in 2005 and the Ministry of Culture's notification in 2006. In the latter, specifically, the Ministry of Culture requires a national Committee of Experts established as a national consulting institute under the direction of the office of the Joint Meeting of the Interministerial Working Conference System. This Committee of Experts, however, is not only comprised of scholars/experts but also officials working in the ICH related government sectors. They are convened regularly by the government to form the committee to recommend, authenticate, and review the listing of ICH candidate elements and representative inheritors at the national level. Following this structure, the subordinate Committee of Experts has been established at provincial, municipal, and county levels. In particular, the local Committee of Experts is convened and directed by the ICH Protection Centre at the according levels. Thus, the experts and scholars in relevant fields are incorporated into the governmental management system of ICH at the according levels. This close relationship between the government and the experts/scholars can also be termed as the symbiotic government-scholar network (Maags and Holbig 2016).

This section delineated the general characteristics of the ICH management system in China. By comparison, this system is similar to the tangible heritage one which is characterized by the horizontal Kuai segmentation and the vertical Tiao principal-agent system. Looking from a broad picture of Chinese cultural heritage management system, the existence of this relatively independent ICH system reflects another Kuai segmentation between the tangible and the intangible heritage sectors. This divergence remains an issue to be considered in the future reform in China.

Conclusion

Chinese cultural heritage management is a complex one which is characterized by political, cultural, and economic features. As illustrated in this entry, the concept of cultural heritage in China initially is derived from the tangible-centered concept of cultural relic in the ancient times. Afterward, it incorporated international heritage concepts after the 1980s and developed into the current concept of cultural heritage. In general, the

government dominates the discourse of cultural heritage, forming an Authorised Heritage Discourse which is similar in many other countries in the world (Smith 2006). Consequently, this official discourse directs the heritage management in practice. As demonstrated in this entry, the perception of the government on the nature and values of heritage therefore leads to the formation of the management idea. In addition, as part of a macro administrative system born in the times of the planned economy, the management system of cultural heritage is characterized with several institutional features and managerial deficiencies. The most noticeable feature is the hierarchical localized heritage management system characterized by the Kuai segmentation and the Tiao principal-agent system. These characteristics, however, are challenged after the Open Policy reform in the late 1970s. On the one hand, China began to reform its economic and political system for modernization; on the other hand, China tried to internationalize its heritage management on the world stage. Although reforms are seen in the fields of immovable heritage sites and museums, Chinese cultural heritage management system still needs further reform and improvement. This situation is complicated by the emerging conflicts between the economic development, urbanization, and industrialization, cultural protection, and general public's cultural needs. These are the issues that Chinese government will have to address with the participation of the emerging social actors in the long term.

References

Baidu Baike. 2017. *The incident of washing sankong*. https://baike.baidu.com/item/水洗三孔事件/17520884?fr=aladdin, retrieved on 8 December, 2017

Blumenfield, T., and H. Silverman. 2013. *Cultural heritage politics in China*. New York: Springer.

CYN. 2002. The lawsuit of the mausoleum of the emperor Qinshihuang: The China cultural relics news became defendant because of its supervision on cultural relics. *China Youth News*. http://www.people.com.cn/GB/news/8410/20020904/815103.html

Gu, J., and L. Yuan. 2005. *Cultural heritage report*. Beijing: Social Sciences Academic Press.

Guangming. 2000. On the symposium of protection of historic cities, experts are asking to investigate the legal liabilities of relevant persons in the incident of the destruction of Dinghai Ancient City. *City Planning News* 7, p. 10.

Hall, S. 2001. Foucault: Power, knowledge and discourse. In *Discourse theory and practice : A reader*, ed. M. Wetherell, S. Taylor, and S.J. Yates. London: Sage.

Han, X.B. 2011. *Studies on the basic legal protection issues on Chinese ethnic minorities' intangible cultural heritage*. Beijing: China Minzu University Press.

Harrell, S. 2013. China's tangled web of heritage. In *Cultural heritage politics in China*, ed. T. Blumenfield and H. Silverman, 285–294. New York: Springer.

HSD. 2002. Why is it hard for the Terra-cotta warriors and horses in Shaanxi to be listed in the stock market? *Hua Shang Daily*. http://finance.sina.com.cn/t/20020115/164224.html

Huang, Z.H. 2017. Guangzhou City paid 2 million RMB to protect the Nanyue kingdom sluice site. *Netease*. http://www.naic.org.cn/html/2017/yjh_0903/20072.html

Li, X.D. 2002. *General of the law of the People's Republic of China on protection of cultural relics*. Beijing: Academy Press.

Liu, H. 2015. Shanjixiang: Only 0.5% of the collections in the palace museum are on display to the public. *China Youth News*.

Liu, S.J., J.B. Lin, and Y. Su. 2008. *Annual report on the development of China's cultural heritage management system*. Beijing: Social Sciences Academic Press.

Liu, S.J., J.B. Lin, and Y. Su. 2009. *Annual report on the development of China's cultural heritage management system*. Beijing: Social Sciences Academic Press.

Lu, J.S. 2004. *Cultural heritage protection in China: Current status, issues and rethinking of the policies*. Shanghai: Fudan University.

Maags, Christina, and Heike Holbig. 2016. Replicating elite dominance in intangible cultural heritage safeguarding: The role of local government–scholar networks in China. *International Journal of Cultural Property* 23 (01): 71–97.

Shepherd, R.J., and L. Yu. 2013. *Heritage management, tourism, and governance in China: Managing the past to serve the present*, Springer briefs in archaeology 2. New York: Springer.

Sina. 2016. China museum council: Sharing the experience and suggestion of the reform. *Sina Sichuan City*. http://sc.sina.com.cn/city/csgz/2016-08-29/151924951.html

Smith, L. 2006. *Uses of heritage*. New York: Routledge.

Sofield, Trevor H.B., and Fung Mei Sarah Li. 1998. Tourism development and cultural policies in China. *Annals of Tourism Research* 25 (2): 362–392.

Su, Y., Y.L. Zhang, and Y.F. Wang. 2016. *Annual report on the development of China's cultural heritage management system (2015–2016)*. Beijing: Social Sciences Academic Press.

Wang, X.M., and H.X. Zhu. 2006. A study on comparison and analysis of Chinese and foreign cultural heritage management system. *Journal of Xi'an Jiaotong University (Social Sciences)* 26 (77): 39–43.

Wu, Z.J., and B.L. Qin. 2016. Zhao mu: The presence of the past in the meaning(s) of space in confucius' graveyard. *International Journal of Intangible Heritage* 11: 18–34.

Wu, J.H, M.Q. Chen, and C.H. Wu. 2016. Huangshan tourism has been listed in the stock market for 20 years. *China Net*. http://www.china.com.cn/travel/txt/2016-11/18/content_39733794.htm

Xin, C.Y., and W. Huang. 2011. *Illustrated intangible cultural heritage law of the People's Republic of China,* ed. C.Y. Xin and W. Huang. Beijing: China Legal Publishing House.

Xinhua. 2015. There are 4510 museums in China and 982 of them are non-state-owned museums. *Beijing Daily*. http://culture.people.com.cn/n/2015/0519/c22219-27022027.html

Yang, X.Y. 2016. Cultural relics and sites should be seen by the public. *China Youth News*. http://views.ce.cn/view/ent/201609/07/t20160907_15674216.shtml

Yuan, Y. 2006. Cultural heritage should be protected well in the New Village construction. *Zhejiang Daily*. http://news.sina.com.cn/c/2006-09-18/052510042045s.shtml

Zan, Luca. 2014. Cultural heritage in China: Between policies, development, professional discourse, and the issue of managing. *Public Archaeology* 13 (1/3): 99–112.

Zhang, X. 2006. The public properties of natural & cultural heritage resources versus separating the related administrative affairs or institutions from their business operations. In *Enhancing social regulation: Conserving administration and use of natural & cultural heritage in China*, ed. X. Zhang. Beijing: Social Sciences Academic Press.

Zhang, C. 2009. The Great Wall of Qin-Han dynasties was severely destructed by the mining company in Hohhot. *China National Radio Net*. http://news.sohu.com/20091103/n267930698.shtml

Zhang, G.C. 2011. Problems and approaches in the engagement of non-profit organizations in Chinese cultural heritage undertaking. *Journal of Jianghan University (Humanities Sciences Edition)* 30 (3): 19–22.

Zheng, X.F. 2010. The boom of private museums: Exploring the Chinese living pattern of private museums. *Beijing Business Today*. http://news.artron.net/20100719/n113780.html

China: Cultural Heritage Management Education

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Introduction

After the founding of New China, the Communist Party of China begins to devote more attention to the preservation of cultural heritage and carries out the preservation measures effectively.

Key Issues/Current Debates/Future Directions/Examples

Legislation and Preservation

The legislation of the cultural relics preservation is a long and gradual process. In 1961, the State Council enacted "the Temporary Rules of the Preservation and Administration of Cultural Relics" which set up the class-rate system of cultural relics. In November 1982, as the Law of the Preservation of the Cultural Relics was promulgated, the preservation of the cultural relics became institutionalized. At the end of 2005, "the Notice on Enhancing the Cultural Heritage Preservation" was announced by the State Council, which used the word "cultured heritage" as the key word for the first time. From the publication of the First List of the National Level Cultural Relics Sites to the Sixth List, the concept "cultural relics" has been deepened and widened; the preservation focus has shifted from the single site to the setting of the site and to its historical space even the historical district and the town. The connotation and denotation of cultural heritage is developing constantly.

Furtherance of the Concept Preservation

The concept preservation of cultural relics is updating continuously. In the early period, the display and utilization of cultural heritage has been excluded from the range of the "preservation" which is a kind of negative and isolated preservation. In 1992, the National Cultural Relic Work Meeting came up with the working principle "Preserve firstly, save primarily." In 2002, in order to solve the problem between the economic development and cultural relic preservation in the market economy, the Law of Protection of Cultural Relics puts forward the basic principle "Preserve primarily, save firstly, utilize reasonably, and manage intensively." This principle requires rational, proper, and scientific

utilization in the preservation of cultural relics; helps to resolve the argument about the relationship between preservation and utilization; and makes our preservation policy more complete, definite, and practical.

School Education

The cultural heritage education in China can be divided into two parts: school education and public education. Universities play an important and creative role in the heritage conservation, research, and training. Since the establishment of the archaeology major in Beijing University in 1952, archaeology has attracted more and more attention and great achievements have been made. Now archaeology and museology have become two major subjects in many universities, such as Northwest University, Zhengzhou University, Jilin University, Nanjing University, Shandong University, and Sichuan University. Beijing University has been the pioneer to start the course "World Heritage" and built a professional research organization – the World Heritage Research Center which has been regarded as the symbol of the new stage of Chinese World Heritage Research. After that, a number of research institutions have founded Cultural Heritage Research Organizations in succession. The Conservation and Plan Center set up in 2004 by Northwest University and the Cultural Relics Bureau of Shaanxi Province will perform a leading role in the preservation of cultural relics in Northwest China. Just two years later, the two organizations built a Cultural Heritage School which features two majors: Archaeology (including the Management of Cultural Heritage Direction) and Restoration and Protection of Cultural Relics. To our joy, in 2007, the Ministry of Education established the Cultural Heritage Research and Conservation Key Lab which focuses on relevant research on cultural heritage, conservation plan, and preservation technology. What is more, it promotes professional training and development of the cultural heritage conservation in Shaanxi Province. Thus, three major subjects come into being in the field of Chinese cultural heritage. They are, respectively, the Archaeology, the Museology, and the Cultural Heritage Research.

Public Education

Cultural heritage concerns not only the professionals but also every average people in the society. Therefore, the public education of cultural heritage by no means cannot be ignored.

Since 2006, the Chinese government has set up Chinese Cultural Heritage Day on which the government will organize various and abundant relevant activities to arouse public's consciousness of cultural relics preservation, encourage public participation, and help the public to deepen their understanding of the preservation of cultural relics.

Museums are the major places and propagating platforms for cultural heritage conservation. During the 11th Five-Year Plan Period, there are 1743 museums and bases for patriotism education, and memorial museums open to public for free. With these efforts, the number of spectators is increasing. As a result, more and more people have the chances to visit these museums and extend their knowledge in archaeology and its preservation. Consequently, a growing number of the public begin to appreciate and experience Chinese brilliant cultural heritage in this way.

In our daily life, through media like books, newspapers, and films, we can easily narrow the distance between cultural heritage conservation and the public. With the purpose of improving the public's conversation consciousness and attracting public attention and participating, we utilize media like the Internet, television, newspaper, exhibition, and lecture to promulgate sustainable developments of cultural heritage, to publicize the relevant knowledge of laws and conventions on cultural heritage conservation, and to arouse public's awareness of preservation. Since the year 2000, a series of popular reading, academic books, and symposiums have been published gradually. As to the Internet, the nonprofit Internet sites about historic cultural heritage and world heritage have been set one after another. These sites offer the public the general knowledge in heritage exhibition and inspection and help to exchange ideas between the professionals and the amateurs. And the national academic forum has been held every year. What is more, the China Cultural Relics Research Institution has grown rapidly and been renamed the

Chinese Academy of Cultural Heritage, a national level institution of cultural heritage. Accordingly, cultural heritage education enters a brand-new stage.

Cross-References

- ▶ China: Cultural Heritage Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ China: Managing Cultural Heritage and the World Heritage List
- ▶ China: New Approaches to Heritage Administration
- ▶ Conservation and Management of Archaeological Sites
- ▶ World Heritage Education, Training, and Capacity Building

China: Cultural Heritage Preservation and World Heritage

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Introduction

The earliest written records of Chinese civilization date back to the Shang dynasty in 1600–1046 BC. Prior to that time, there is evidence to indicate that human societies emanated from the Yangtze River's Yangtze civilization millennia ago in the Neolithic era (Boltz 1986). This construct of physical and written evidence is often viewed as a proud lineage of China being one of the world's "cradles of civilization." Since those origins, the rise and fall of dynasties and ongoing reshaping of the concept and borders of China have provided a substantial cultural and natural heritage foundation that has been demarcated and recorded, now serve a range of purposes as part of the national patrimony. One of the primary mechanisms that China has applied to promote and highlight safeguards for its extensive cultural and natural historical resources is through the nomination of many of these significant locations and venues as World Heritage Sites. Since China's ratification of the World Heritage Convention on December 12, 1985, it has embraced the nomination process to now hold the second highest number of designations in the world, after Italy (UNESCO 2017a).

Historical Background

These objectives' purposes have become more evident after the establishment of the People's Republic of China in 1949. This process was accelerated in the post-Cultural Revolution era with the introduction of the Convention Concerning the Protection of the World Cultural and Natural Heritage in 1972, the increase of citizens' personal incomes and discretionary income spending capabilities, and the use of cultural heritage as a tool to promote soft power within China and internationally.

Following the establishment of the People's Republic, the Chinese government overhauled its administration of archaeology and museums. The principal administrative body overseeing archaeology and antiquities was the Ministry of Culture's State Bureau of Cultural Relics. Its responsibilities included a network of 31 provincial-level offices, a publishing house, and academic and professional journals and newsletters. The Institute of Archaeology was established in 1950 within the Chinese Academy of Sciences to oversee archaeological excavation and research (later transferred in 1977 to the newly established Chinese Academy of Social Sciences). Research centers and administrative units were established at the provincial and local levels. Formal training programs in archaeology, conservation, and museum studies were established at Peking University and the Institute of Archaeology in 1952, eventually seeing other

similar departments established at major academic institutions across the country. The Chinese government also established a network of national, provincial, and local museums for archaeology, art, and history, numbering over 2200 as of 2013 (Murochick 2013).

The State Bureau of Cultural Relics (SBCR) is an administrative organ under the Ministry of Culture in charge of relics and museum work in China. The China Cultural Relics Research Institute (CCRRI), founded in 1949, is a research institution under the State Bureau of Cultural Relics, with the task of protecting and conducting research on key national relics, such as ancient buildings, grottoes, temples, unearthed relics, and museum-stored relics. The State Administration of Cultural Heritage (SACH) was established in 2003 and is responsible for the development and management of museums as well as the protection of cultural relics of national importance to protect, regulate, and supervise world cultural heritage and organize applications and examination related to world cultural heritage status (State Council 2014).

In 1982, the National People's Congress promulgated the *Law of the People's Republic of China on the Protection of Cultural Relics* as well as interrelated laws and regulations while delineating the roles and responsibilities of individual levels of government. That same year, SBCR initiated an assessment of the country's cultural heritage resources. By the 1990s, rapid ongoing development had warranted the formalization of a coherent set of national heritage conservation practice and management guidelines.

In 2002, ICOMOS China, with later final approval from SACH, drew up the *Principles for the Conservation of Heritage Sites in China*. These principles drew upon the International Charter for the Conservation and Restoration of Monuments and Sites (the Venice Charter – 1964). According to Article 9, there were six key steps for conservation to be undertaken in the following order: (1) identification and investigation; (2) assessment; (3) formal proclamation as an officially protected site and determination of its classification; (4) preparation of a conservation master plan; (5) implementation of the conservation master plan; and (6) periodic review of the master plan (ICOMOS China 2004). The accompanying *Commentary on the Principles for the Conservation of Heritage Sites in China* has section 15 give specific reference "On Conserving Archaeological Sites, Ruins, and Ancient Tombs." The two key recommended conservation measures are to both ensure treatment of a site's setting by removing elements that could seriously threaten its safety and protection and strengthening of the remains (ICOMOS China 2004).

Further direction was provided through the Central Conference on Urbanization in 2004. Archaeologists were provided guidance principles of giving priority to protection, rescue first, reasonable use, and strengthening the management. In essence, archaeologists were tasked with the responsibility of ensuring the special nature, integrity, the authenticity of ancient cities were preserved and applying a people-oriented approach to relic protection (Ministry of Culture 2015).

To be included on the World Heritage List, sites must be of outstanding universal value and meet at least one out of ten selection criteria. The protection, management, authenticity, and integrity of properties are also important considerations for site management. The World Heritage nomination approach was augmented by the *Global Strategy* introduced in 1994. This Strategy was intended to establish a new vision that expands the narrow definitions of built and cultural heritage and strove to recognize and protect sites that are outstanding demonstrations of human coexistence with the land, as well as human interactions, cultural coexistence, spirituality, and creative expression (UNESCO 2016).

Six locations were nominated as World Heritage Sites in 1987, the first year of China's site submissions to the World Heritage List. These include the five cultural sites of the Great Wall, the Imperial Palace of the Ming and Qing Dynasties, the Forbidden City, "Peking Man" site at Zhoukoudian, the Mogao Grottoes at Dunhuang, Qin Shi Huang Mausoleum, and the Qin Terracotta Warriors and Horses, along with the mixed cultural and natural site, Mount Taishan. This original number has increased almost

ninefold over 30 years. As of September 2017, China has 52 World Heritage Sites (36 cultural, 12 natural, and 4 mixed). There are also 60 properties on their national Tentative World Heritage List, which is viewed as a useful and important planning tool by UNESCO, providing an indication of future nominations (UNESCO 2017a, b).

Key Issues

The sustainability and resiliency of Chinese cultural heritage sites and their archaeological resources are affected primarily by four factors: large-scale development pressures, tourism, natural disasters, and looting.

Development Pressures

Between 1995 and 2015, the urban population in China increased from 352 million to 771 million, mostly in the densely populated eastern seaboard (National Bureau of Statistics 2017). As China's population and economy expand, development pressures are arising in and around cultural sites. Large-scale developments have displaced or removed cultural landscapes and built heritage resources. By 2009, SACH had surveyed and registered 776,200 historical sites including ancient tombs, temples, and historical structures. This recorded total was up by 30%, from the previous 550,300 sites registered in 2007 (Brannigan 2009). It is notable, however, that 23,600 registered cultural sites disappeared from list during that same time, due to major infrastructure projects involving highway, railroad, bridge, and dam construction (Xie 2009).

One of the China's largest infrastructure projects was the construction of the Three Gorges Dam. Beginning in 1994, the dam is a massive structure, 1.2 miles wide and 607 ft high, creating a 370-mile-long reservoir, completed in 2009. The area is also home to cultures that date back to 5000 BC, including the Daxi (ca. 5000–3200 BC), which was the earliest Neolithic culture in the Three Gorges area, the Chujialing (ca. 3200–2300 BC), the Shijiahe (ca. 2300–1800 BC), and Ba (ca. 2000–220 BC) cultures (Childs-Johnson 1996). It was estimated that the area flooded by the dam contained at least 1282 cultural heritage places, which, like the remnants of the cultures that resided there, are unlikely to be recovered (Shen 2000). Other prominent sites were more fortunate. The Zhangfei Temple constructed in the Song dynasty (960–1279 AD) was rebuilt in the same location in 1870 after serious flooding in the region. Its cultural and historical significance was acknowledged with the temple's relocation 2 miles away in 2000, at a cost of US$12 million, during the construction of the dam (Xie 2009).

The Chinese government has reinforced key areas of the Great Wall. Juyongguan, Badaling, and Mutianyu are the closest in proximity to Beijing and have been restored and hardened for tourism purposes. This classical, restored image of the Great Wall is not, however, reflective of the conditions along its length. The Wall has been razed in Inner Mongolia and Hebei provinces to accommodate new road construction. Illegal mining of coal, copper, iron, molybdenum, and nickel has seen portions of the Wall disappear due to explosion impacts on fragile areas and mining equipment removing or displacing wall sections and the underlying archaeological layers (Moore 2011).

Through UNESCO's International Centre on Space Technologies for Natural and Cultural Heritage (UNESCO-HIST) office in Beijing, mapping has been initiated to establish a baseline and monitor physical changes within and along the edges of 40 of China's 52 World Heritage Sites. These selected venues are delineated as groups of buildings, monuments (including rock carving and grotto-based), historical relics, cultural landscape heritage, mixed heritage, and natural heritage (Guo 2013).

Tourism

Over a 20-year period, domestic tourist person-times (each time of traveling is counted as one person-time) surged on an annual basis more than fivefold from 640 million people in 1996 to 4 billion in 2015 (National Bureau of Statistics 2017). There are three busy domestic travel periods during the year: Chinese New Year Period in January/February; Labor Day week, May 1–7; and National Day (Golden) week, October 1–7. Each of these places significant pressure on individual sites, with an estimated 700 million traveling during Golden Week in 2017. Beijing, with its

Tiananmen Square, the Forbidden City, and the Great Wall, tops the list of destinations, according to China's National Tourism Administration (Du Juan 2017).

Many cities in China have the ambition of having a heritage site nominated as a World Heritage Site. The driving factors are increased national and international prestige and crosscutting economic benefits of tourism and associated industries development, alongside the strong competition between Chinese provinces and cities. Since 2004, China has made the first large-scale renovations on six world cultural heritage sites in Beijing – the Ming Tombs, the Great Wall, the Forbidden City, the Temple of Heaven, the Summer Palace, and the "Peking Man" site at Zhoukoudian. All of which were completed prior to 2008, in advance of the higher media profile and international visitor increase during the Summer Olympics.

Cultural sites that were previously very remote and did not receive many tourists are now seeing enormous numbers of domestic arrivals as Chinese citizens now have the means and opportunity to travel. Poor, rural areas bypassed by China's recent economic boom are those most enthusiastic to have sites granted World Heritage status. Local officials often secure significant loans to build infrastructure to support bid preparation, and local residents, at least initially, welcome the opportunity to generate higher incomes, finding work outside farming, and as an alternative to migration.

The Mogao Grottoes is located in a remote northwest corner of Gansu Province. The site comprises nearly 500 Buddhist grottoes cut into a cliff face, containing paintings, painted statues, historical documents, and artifacts, dating from the fourth to the fourteenth centuries. In 1979, prior to nomination, when the grottoes were opened for tourism, there were over 26,000 visitors. Thirty-five years later, in 2013, there were over 800,000 mostly domestic visitors (Getty 2013). Over time, moisture from visitors' breath and sweat was harming the centuries-old cave paintings and Buddhist sculptures, and local traditional communities were being affected by increasing large-scale visitor numbers (Hunt 2012). There are subsequent plans to restrict site visitation to 6000 people per day, down from the current 11,000 daily rate.

Natural Disasters

National disasters, particularly earthquakes and floods, have demolished or diminished World Heritage Sites' cultural heritage integrity in China. Sichuan Province has experienced two major earthquakes in 2008 and 2017 causing destruction and loss of lives. This has also impacted large and significant World Heritage Sites. The Jiuzhaigou Valley Scenic and Historic Interest Area World Heritage Site was nominated for its unique natural and cultural landscapes and traditional Tibetan villages that are representative of the site's cultural heritage. In 2016, more than 7.2 million people visited the county – with 5 million of them going to the site – generating over 9 billion yuan (USD$1.3 billion) in revenue (Leng 2017). Local tour operators are concerned as to how much their businesses will be affected by future natural disasters. The Mount Qingcheng and the Dujiangyan Irrigation System World Heritage Site contains the 2000-year-old Erwang Temple complex which suffered structural damage to its entrance gate, shrines, halls, and artifacts. Restoration efforts have stabilized the site and maintained its representative cultural heritage elements. There are, however, ongoing concerns about the sites experiencing more frequent and severe earthquakes.

Looting

Cultural heritage resources in China, particularly remote areas, are often at risk. This is due to the over hundreds of thousands of monuments, temples, tombs, relics, and artifacts across China, their significant intrinsic value within and outside of the country, and varying degree of control and management. In 2003, more than 220,000 Chinese tombs were broken into and looted, with much of the content being smuggled out of China for sale on the international market (Beech 2003). Taking soil or bricks from the Great Wall – for use in home-building or sale on the black market – has contributed to its deterioration. As a result, whole sections of the World Heritage Site have large gaping holes and are crumbling. The State Council issued a regulation in September 2006 banning vandalism and driving on the Great Wall, and

SACH announced that regular inspections and random checks would be carried out (Moore 2011). The emptying and cleaning of a Henan Province section of the 1,240 mile Grand Canal in 2016, though necessary for health and sanitary reasons, exposed the canal bed. Relics and coins dating back thousands of years quickly disappeared as residents dug up and pocketed ancient treasures (Williams 2016).

Future Directions

China is ranked as the leading country in the world when it comes to having the economy that most values its cultural resources, according to the World Economic Forum's *Travel and Tourism Competitiveness Report 2017* (World Economic Forum 2017). Chinese officials have responded to domestic concerns about the loss of its cultural heritage, particularly in large urban centers affected by development. The Chinese government is also consolidating its World Heritage ambitions to better align with its internal and external economic development policies.

In Beijing, the preparation and convening of international events such as the 2008 Summer Olympics witnessed the removal of traditional hutong communities and displacement of residents. Responding to concerns about continuous loss of the city's historic fabric, on September 2017, the Central Committee of the Communist Party of China and the State Council approved the general city plan for Beijing 2016–2035. The intent is to create a world-class harmonious and livable city, capping the population at 23 million by 2020 (Deng and Jie 2017). There was also a pledge to reinforce that the historic city should not be further demolished and enforce protection of the "Three Hills and Five Gardens" section of the city in Haidian District, where imperial palaces and gardens (incorporating the Summer Palace World Heritage Site) are located (Central Committee of the Communist Party of China 2017). To consolidate the sites in the city's historic core, the Chinese government does have the Central Axis of Beijing (including Beihai) listed on its Tentative World Heritage site list. The 7.8-km-long Central Axis is viewed as a unique historical tableau, ingeniously organizing the imperial places and city, temples and altars, markets, and streets from feudal times to the Tiananmen Square complex built after the founding of the People's Republic of China in 1949 (UNESCO 2017a).

On a national scale, the Chinese government considers new listings on the World Heritage List as an important application of "soft power" to reinforce the country's international stature (Wang and Zan 2011). One of the country's principal economic development drivers being developed is its Belt and Road Initiative (BRI). Chinese leader Xi Jinping advocated in 2013 for the contiguous economic integration of Central and Southeast Asia through the construction of infrastructure, increasing cultural exchanges, and expanding trade (Wang and Lu 2016). There is an intent to consolidate the components of the Silk Road and the Maritime Silk Route on a World Heritage basis. The Qin Terracotta Warriors and Horses in Xi'an, the land route's eastern nexus, and the more recent Silk Roads: The Routes Network of Chang'an-Tianshan Corridor in 2014 are the current main route components on the World Heritage List. The Chinese section of the Silk Road is on the Tentative List and links 63 sites in the land and maritime routes, stretching between Xinjiang and Fujian provinces. This route will eventually be connected with other proposed Silk Route World Heritage projects coursing through Bhutan, India, Iran, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Tajikistan, Turkey, Turkmenistan, and Uzbekistan (UNESCO 2015). These Silk Road corridors may eventually combine 500 sites across the region under the World Heritage and BRI banners, resulting in the most ambitious and expansive international cooperation program for heritage preservation and archaeology ever undertaken (Winter 2016).

References

Beech, Hannah. 2003. Spirited away. Time. Available via http://content.time.com/time/world/article/0,8599,2056101,00.html. Accessed 21 August 2018.

Boltz, William G. 1986. Early Chinese writing. *World Archaeology* 17 (3): 420–436 (436). Early Writing Systems.

Branigan, Tanya. 2009. China loses thousands of historic sites. *The Guardian*.

Central Committee of the Communist Party of China and the State Council. 2017. *Beijing Urban Master Plan approved*. CTGN.com, Beijing. https://news.cgtn.com/news/79636a4d78597a6333566d54/share_p.html

Childs-Johnson, Elizabeth, Joan L. Cohen, and Lawrence R. Sullivan. 1996. Race against time. *Archaeology* 49 (6): 39–45.

Deng Xiaoci and, Shan Jie. 2017. China sets 23 million population limit for Beijing. *Global Times*.

Du Juan. 2017. Over 700 million trips expected during holiday season, China Daily. Available via: http://www.chinadaily.com.cn/china/2017-09/21/content_32279749.htm?bsh_bid=1828339305. Accessed 25 Sept 2017.

Getty Foundation. 2013. Visitor management and carrying capacity at world heritage sites in China. Available via https://www.getty.edu/conservation/publications_resources/pdf_publications/pdf/visitor_management_china.pdf. Accessed 21 August 2018.

Guo, Hadong. 2013. *Atlas of remote sensing for world heritage: China*. Beijing: Springer.

Hunt, Katie. 2012. Tourism boom threatens China's heritage sites. CNN. Available via: www.cnn.com/2012/08/14/world/asia/china-heritage-tourism/index.html. Accessed 25 Sept 2017.

ICOMOS China. 2004 Principles for the conservation of heritage sites in China. Available via: https://www.getty.edu/conservation/publications_resources/pdf_publications/pdf/china_prin_heritage_sites.pdf. Accessed 25 Sept 2017.

Leng, Sidney. 2017. Jiuzhaigou's tourism industry ponders its future after quake, South China Morning Post. Available via: http://www.scmp.com/news/china/society/article/2106540/jiuzhaigous-tourism-industry-ponders-its-future-after-quake. Accessed 25 Sept 2017.

Ministry of Culture (MoC) of the People's Republic of China and DG Education and Culture (EAC) of the European Commission. 2015. Mapping the Eu-China cultural and creative landscape. Available via: http://ec.europa.eu/assets/eac/culture/library/studies/eu-china-cultural-mapping-2015.pdf. Accessed 25 Sept 2017.

Moore, Michael. 2011 The Great Wall of China is falling down, the telegraph. Available via: http://www.telegraph.co.uk/news/worldnews/asia/china/8824330/The-Great-Wall-of-China-is-falling-down.html

Murochick, Robert E. 2013. Despoiled of the garments of her civilization: Problems and progress in archaeological heritage Management in China. In *A companion to Chinese archaeology*, ed. Anne P. Underhill. London: John Wiley/Blackwell Publishing.

National Bureau of Statistics. 2017. National data. Available via: http://data.stats.gov.cn/english/easyquery.htm?cn=C01. Accessed 25 Sept 2017.

Shen, Chen. 2000. Mission impossible: Archaeology of the three gorges reservoir, China. In *Dams and cultural heritage management*, ed. Steven A. Brandt and Fekri Hassan. Cape Town: World Commission on Dams.

State Council of the People's Republic of China. 2014. State administration of culture heritage. Available via: http://english.gov.cn/state_council/2014/10/06/content_281474992893400.htm. Accessed 25 Sept 2017.

Tao Wang, Luca Zan. 2011. Management and presentation of Chinese sites for UNESCO World Heritage List (UWHL), Facilities, Vol. 29 Issue: 7/8, pp. 313–325. Available via https://doi.org/10.1108/02632771111130924.

UNESCO. 2015. Almaty agreement. Available via: http://whc.unesco.org/en/news/1415/. Accessed 25 Sept 2017.

UNESCO. 2016. Operational guidelines for the implementation of the world heritage convention. Available via: http://whc.unesco.org/en/guidelines. Accessed 25 Sept 2017.

UNESCO 2017a. Tentative list – China. Available via: http://whc.unesco.org/en/tentativelists/state=cn. Accessed 25 Sept 2017.

UNESCO. 2017b. World heritage: The criteria for selection. Available via: http://whc.unesco.org/en/criteria/. Accessed 25 Sept 2017.

Wang, Huiyao, and Miao Lu. 2016. *China goes global*. Berlin: Springer.

Williams, Sophie. 2016. Chinese villagers start massive treasure hunt as a 1,800-year-old canal is drained for cleaning. MailOnline. Available via: http://www.dailymail.co.uk/news/peoplesdaily/article-3518932/Chinese-villagers-flock-loot-sunken-relics-1-800-year-old-Grand-Canal-UNESCO-world-heritage-site-drained-maintenance.html. Accessed 25 Sept 2017.

Winter, Tim. 2016. One belt, one road, one heritage: Cultural diplomacy and the silk road. The diplomat. Available via: http://thediplomat.com/2016/03/one-belt-one-road-one-heritage-cultural-diplomacy-and-the-silk-road/. Accessed 25 Sept 2017.

World Economic Forum. 2017. The travel & tourism competitiveness report 2017. Available via: http://www3.weforum.org/docs/WEF_TTCR_2017_web_0401.pdf. Accessed 25 Sept 2017.

Xie Yu. 2009. 'Missing' cultural sites number 23,600. *China Daily*. Available via: http://www.chinadaily.com.cn/china/2009-12/01/content_9081953.htm. Accessed 25 Sept 2017.

China: Domestic Archaeological Heritage Management Law

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Introduction

China is commonly referred to as a source country, meaning it is rich in cultural art and

property, but poor in terms of economic resources. Many source countries face intense demand for their cultural relics, resulting in increased illicit excavation. Unfortunately, the impact of illicit excavation on archaeology can be devastating. When items are excavated without regard for the integrity of the original site, much information about the item, its use, and its historical context can be lost (He Shuzhong 2001). With more than 7000 years of cultural history, the People's Republic of China has an immense number of important archaeological sites and a growing need for help preserving those sites.

Illicit excavation is not the only archaeological problem China faces. Interest in China's history fuels tourism demands, as well. In the past, it was not uncommon for local towns or provinces to move archaeological sites or structures in their entirety to places more easily accessible by tourists (He Shuzhong 2001). When not done properly, this resulted in a loss of the integrity of the original archaeological sites.

Culturally significant items protected by law are referred to as "cultural relics" in China's legislation. In order to protect these cultural relics, China has promulgated several important domestic laws including the Regulations of the People's Republic of China Concerning the Administration of the Work for the Protection of Underwater Cultural Relics (Regulations on Underwater Cultural Relics), Measures of the People's Republic of China for the Administration of the Foreign-related Archaeological Activities (Measures for Archaeological Activities), and the Law of the People's Republic of China on Protection of Cultural Relics (the Cultural Relics Law). China has also become a signatory to several international agreements, including the 1970 United Nations Educational, Scientific, and Cultural Organization ("UNESCO") Convention to Prohibit the Illicit Import and Export of Cultural Property and the 1995 International Institute for the Unification of Private Law ("UNIDROIT") Convention on Stolen or Illegally Exported Cultural Objects. This entry focuses exclusively on China's domestic legislative regime.

Definitions

China's legal framework and its legislation protecting cultural relics are protective and nationalistic. Its strict rules are reflective of the overall goal of all of China's domestic policies: legitimization of the communist regime (Murphy 2009). By comprehensively limiting the cultural relic activities within its borders, the communist government is able to showcase both its dominance to outsiders and its willingness to protect the country's treasures to its citizens. China's status as a source nation may also contribute to its instinct to foster greater protection for its cultural relics (Maus 2009).

This protectionist theme is especially evident in the Cultural Relics Law's definition of "cultural relics." According to the Cultural Relics Law, these include a broad spectrum of things:

1. Sites of ancient culture, ancient tombs, ancient architectural structures, cave temples, stone carvings, and murals that are of historical, artistic, or scientific value
2. Important modern and contemporary historic sites, material objects, and typical buildings that are related to major historical events, revolutionary movements, or famous personalities that are highly memorable or are of great significance for education or for the preservation of historical data
3. Valuable works of art and handicraft articles dating from various historical periods
4. Important documents dating from various historical periods and manuscripts, books and materials, etc. that are of historical, artistic, or scientific value
5. Typical material objects reflecting the social system, social production, or the life of various nationalities in different historical periods

Paleovertebrate and Paleoanthropoid fossils are also protected in the same way as cultural relics.

The Cultural Relics Law distinguishes between "movable" and "immovable" cultural relics. "Immovable" cultural relics include sites of ancient culture, tombs, cave temples, and stone

carvings. These cultural relics are designated for protection at either the national, provincial, city, or county level. "Movable" cultural relics include material objects, art, and documents. These are divided into two categories: valuable cultural relics and ordinary cultural relics. Valuable cultural relics are further subdivided into grade-one, grade-two, and grade-three cultural relics. These classifications are used for various reporting, export, and import requirements.

The Measures for Archaeological Activities, promulgated in 1991, provides definitions of "archaeological investigations," "explorations," "excavation," and "recording." These definitions are also extremely broad. Archaeological investigations include activities conducted for the purpose of obtaining archaeological materials and information, such as the recording of ancient cultural sites, ancient tombs, ancient architectures, cave temples, and underground or underwater cultural relics and collecting cultural relics and natural specimens. Archaeological explorations include activities aimed at obtaining information about the nature, structure, and range of underground or underwater historical cultural remains. Archaeological excavations include activities conducted to obtain archaeological materials and information, archaeological recordings, and cultural relics and natural specimens. Finally, archaeological records are systematic activities such as writing descriptions, surveying, cartographing, rubbing, photographing, cinematographing, and videotaping.

Historical Background

Traditionally, cultural heritage and archaeological sites were widely respected by the Chinese people because they were thought of as the "soul of the ancestor" (He Shuzhong 2001). In 1950, China adopted rules on the export of cultural heritage objects, and in 1961, it adopted regulations on the protection of those objects (He Shuzhong 2001). But, during the "Cultural Revolution" from 1966 to 1976, loyalty to authority and respect for the past were branded foolish concepts, and many Chinese adopted this attitude (He Shuzhong 2001).

In 1978, China adopted a "Reform and Opening" policy where the country was opened up to foreign investment and travel. As a result of the influx of foreign money and tourists, the market for Chinese cultural relics boomed. Widespread poverty and a general lack of reverence for national cultural heritage following the "Cultural Revolution" prompted many Chinese citizens to take advantage of the valuable cultural relics that were, literally, in their own backyards. Relics in homes, yards, museums, and archaeological sites were pillaged and sold to eager foreigners, who often were able to resell the objects at a much higher price abroad.

Recognizing that its cultural relics needed additional protections, China promulgated the Law on the Protection of Cultural Relics in 1982 ("1982 Law"). This law was the first authoritative source of protection for Chinese cultural relics. Although of great general benefit, one of the law's weaknesses was that it did not clearly delegate responsibility between the national government and the regional municipalities because such responsibility was based on the rarity and value of the relic under consideration (Maus 2009). In addition, all cultural relics were deemed owned by China. The law did not allow citizens to acquire private ownership of any cultural relics, including those inherited from family members or purchased from stores and at auction (Maus 2009). As a result, there was little incentive for Chinese citizens to comply with the law if the benefit of ownership of relics held or discovered went only to the government. The 1982 Law was amended in 1988 and 1991 and eventually repealed with the passage of the Cultural Relics Law in 2002.

Key Issues/Current Debates

Current Laws Protecting Cultural Relics

The Cultural Relics Law (as amended in 2007, 2013, and 2015) provides broad rules for the protection of both moveable and immovable cultural relics. Although it does require that many immovable cultural relics and all relics remaining underground or in China's waters belong to China, it also provides some mechanisms for individuals to obtain legal ownership of cultural

relics. Although individuals may not own illegally obtained cultural relics, the Cultural Relics Law provides "moral encouragement or material awards" to be provided to those who are diligent in implementing the law, fighting criminal acts under the law, donating important cultural relics, reporting discovered cultural relics, contributing to archaeological investigations or the science of protection techniques, rescuing cultural relics, or making outstanding achievements in work concerning cultural relics. The Cultural Relics Law also allows for the establishment of cultural relic stores and auction houses to be opened, subject to approval by the administrative department for cultural relics under the State Council. Private owners of cultural relics are still subject to the protection requirements of the Cultural Relics Law.

The national government body responsible for overseeing cultural relic protection is the administrative department for cultural relics under the State Council, China's national government. Additionally, local governments are responsible for the administration of the Cultural Relics Law at their respective levels.

Immovable cultural relics must be verified and announced by the respective national, provincial, county, or city government responsible for them. Cities, towns, neighborhoods, and villages with an unusual wealth of cultural relics may be designated for their protection in their entirety. The local governments are then responsible for implementing plans to protect the historical relics, put up signs and notices recognizing the relics, establish records and files about the protected relics, and assign organs or individuals to be responsible for the relics. Construction plans that will affect cultural relics must include protective measures in consultation with the departments for urban and rural construction planning and the administrative departments for cultural relics. Deformation and pollution of protected sites is prohibited. And, while no construction is allowed within a protected area generally, approval for exceptions can be obtained from the governmental entity responsible for the area's protection. Similarly, where it is impossible to protect the relic's original site or the relic needs to be moved to avoid damage, approval is required. Expenses incurred in complying with these rules are borne by the entity in charge of construction.

Any necessary repairs to immovable cultural relics are subject to approval. Immovable cultural relics owned by the State may not be transferred or mortgaged to anyone. If the immovable cultural relic is owned by an individual, it may not be transferred or mortgaged to foreigners. Furthermore, any transfers or mortgages to citizens must be reported to the appropriate government level.

Museums, libraries, and other institutions with cultural relics must classify the relics in their possession according to grade, compile files for the relics, establish a strict system of control, and submit this information to the appropriate administrative department of cultural relics. These institutions are also required to enhance publicity and education of China's cultural heritage by holding exhibitions and conducting scientific research regarding the relics in their possession. They must install mechanisms to protect all relics against fire, robbery, and natural disasters. Institutions are prohibited from donating, leasing, or selling relics in their collections to other entities or individuals. When relics in a collection are damaged, stolen, or missing, such matters must be reported to the appropriate administrative department for cultural relics.

Generally, no state-owned cultural relics or privately-owned valuable cultural relics may leave China, although special approval may be granted by the State Council. All relics that are removed from China are subject to examination and will be issued an exit permit.

Despite these protections, the Cultural Relics Law has two weaknesses. First, it does not adequately incentivize citizens to return relics that are obtained illegally (Maus 2009). Although, the "moral encouragement or material rewards" may be issued to an individual who discloses illicit excavation, such a vague and unpredictable reward, when compared to the choice of keeping the object for oneself or selling it to an antiquities dealer for a profit, does not encourage citizens to follow the Cultural Relics Law (Maus 2009). Also, although the Cultural Relics Law requires entities and individuals in possession of cultural

relics to perform specific duties, it does not provide specific funding for such activities (Maus 2009). The law vaguely requires that the governments incorporate cultural relic protection into their budgets and that revenue from museums and other cultural sites be directed to relic protection (Maus 2009). But, it does not guarantee any funds for cultural relic protection.

In 2003, the State Council adopted regulations for the implementation of the Cultural Relics Law. These Regulations, revised in 2013 and 2016, supplement the Cultural Relics Law, explaining how funds for the protection of cultural relics can be spent, the content of signs and notices for immovable cultural relics, the required content of records and files kept on cultural relics, and how a person becomes qualified to repair cultural relics. It also provides details for cultural institutions regarding how cultural relics should be recorded and tracked; how to gain approval for repairs, duplication, rubbings, and photographs of cultural relics; what to do if cultural relics are stolen or go missing; and legal liabilities for those involved with cultural relics. The Regulations provide specific instructions for individuals who own cultural relics, as well as information for how an entity can apply to become a cultural relic store or a cultural relic auction house. Finally, the Regulations provide detailed instructions about the entry and exit of cultural relics to and from China.

China's Ministry of Culture has also established regulations and rules related to cultural relic protection. In 2005, it promulgated the Provisional Regulations on the Procedures for Cultural Heritage Administrative Penalties. These regulations name the Cultural Heritage Administrative Department of the State Council as the national body in charge of administrative penalty cases, establish procedures and fines for different infractions, and set forth a hierarchy of penalty administration within the different levels of government (Bell 2016). In 2009, the Ministry of Culture also issued Provisional Measures on the Recognition and Administration of Cultural Relics. These measures provide guidance about the recognition and rating of cultural relics by the government.

Finally, in 2013 the Ministry of Finance and the State Administration of Cultural Heritage promulgated the Measures for the Administration of Special Subsidy Funds to the Protection of Key National Cultural Relics. The purpose of these measures is to regulate and strengthen the management and use efficiency of special subsidy funds designated for the protection of cultural relics.

Underwater cultural relics are specifically protected since 1989 by the Regulations on Underwater Cultural Relics, which was revised in 2011. The regulations define underwater cultural relics as human cultural heritage that has historic, artistic, and scientific values and remain in the Chinese inland waters, Chinese territorial waters, waters under Chinese jurisdiction, and in the high seas. But, the regulations do not protect relics that are not associated with important historical events, revolutionary movements, or renowned personages and have remained underwater since 1911.

Similar to the Cultural Relics Law, the Regulations on Underwater Cultural Relics designate the State Administration for Protection of Cultural Relics as the competent authority in charge of the registration of underwater cultural relics, the administration of their protection, and examination and approval of archaeological activities concerning such relics. Also similar to the Cultural Relics Law, activities that may jeopardize the safety of underwater cultural relics are prohibited, discovery of underwater cultural relics must be reported and handed over to the State promptly, and approval is needed to conduct archaeological exploration and excavation activities.

Current Laws Regarding Archaeological Investigations

In 1991, the State Bureau of Cultural Relics promulgated the Measures for Archaeological Activities. Under these measures, any archaeological investigations by a foreign group must be undertaken in collaboration with a Chinese team, and the Chinese team members must be in charge. The State Bureau of Cultural Relics is in charge of the administration of all foreign-related archaeological investigations. Parties wishing to conduct an investigation must submit a written application to the Bureau, and the investigation must satisfy certain conditions described in the measures.

Any data obtained must be collected in a report, and the Chinese experts in the group have first priority for publication of the findings. Any relics or specimens obtained are owned by China but can be transported out of China with permission. Approval is needed for students and others visiting archaeological sites, and investigations are subject to inspection by the Bureau. Warnings or other penalties may result for violations of these measures.

The Cultural Relics Law provides several additional rules about archaeological activities. Many of the measures described above are incorporated into the Cultural Relics Law, but the law focuses on excavations as a result of construction or impromptu excavations when relics are found. It also allows for a small amount of relics to be kept for scientific study.

Current Penalties for Illicit Excavation

There are strict penalties for those who illegally excavate cultural relics and violate the current laws regulating cultural relics. Both Chapter 7 of the Cultural Relics Law and the 1997 Criminal Law ("Criminal Law") provide such penalties.

Under the Cultural Relics Law, anyone caught illegally excavating relics, intentionally or negligently damaging or destroying valuable relics, selling or giving away relics without authorization, smuggling relics, robbing, plundering or privately dividing relics, or hindering the State's control over relics will be criminally investigated. Civil penalties will be imposed on individuals who cause a relic to go missing or damage a relic. Individuals who act against the security administration or smuggle relics will be subject to the relevant laws and administrative rules and regulations of the security administration or customs. Fines may be assessed for less serious violations of the law. Serious violations, such as conducting construction projects within a protected area, removing or dismantling immovable cultural relics, or repairing cultural relics without approval, may result in the entity or individual losing any certificate issued to perform such work.

There are also penalties for polluting a cultural relic site. Where the layout, environment, or historical features of a town, neighborhood, or village of cultural value are undermined, the State council will revoke that municipality's special designation as a city of cultural importance.

Cultural relic stores, auction enterprises, and cultural relic institutions that engage in prohibited activities may have their licenses revoked, depending on the severity of the circumstances. Failures to comply with various reporting requirements in the Cultural Relics Law will require the offending individual or entity to make the omission right by complying with the provisions violated.

Finally, individuals working for the administrative department for cultural relics, an institution for the collection of cultural relics, a cultural relic store, or a cultural relic auction enterprise and who violate the Cultural Relics Law will be assessed an administrative penalty and may also face termination, depending on the severity of their offense.

Like the Cultural Relics Law, the Criminal Law provides various punishments, ranging in severity from fines to prison sentences, for individuals who vandalize, destroy, steal, or illegally export, sell, or excavate cultural relics (Maus 2009). The Supreme People's Court and the Supreme People's Procuratorate issued an Interpretation on Several Issues Concerning the Application of Law in the Handling of Criminal Cases Concerning Hampering the Administration of Cultural Relics, which became effective in January 2016. The interpretation states that individuals convicted of cultural relic crimes will be prosecuted and sentenced based upon the grade of the cultural relics at issue and provides specific guidance for each grade of relic.

In recent years, China has sent a clear message to violators of the law by forcefully prosecuting violators. For example, in 2015 the government convicted 30 defendants of stealing cultural relics from the Hongshan cultural relic protection region, with sentences ranging from 3 years to life imprisonment (China Daily 2016). When originally promulgated, some violations of the Cultural Relics Law were punishable by death, and in 2002, China sentenced four individuals to death for using explosives and heavy machinery to plunder 2500-year-old tombs (CBS News 2010). But, in 2011, China revised the criminal

law to reduce the number of crimes punishable by death, cultural relic offenses being among those (China Daily 2011).

International Perspectives

Opinions about China's legislative protection of cultural relics are mixed in the United States. Criticisms of China's measures were openly and widely discussed, while the United States was considering whether to adopt an international agreement with China under the UNESCO Convention. In 2004, China requested that the United States sign an agreement to restrict the importation of all ethnological and cultural artifacts dated before 1911, in order to discourage smugglers from transporting such items into the United States (Maus 2009). The agreement was adopted with modification in 2009 (Marton 2009). The Memorandum of Understanding (MOU) adopted by the United States and China restricts the US import of Chinese antiquities dating from the Paleolithic Period to the end of the Tang Dynasty and monumental Chinese sculpture and wall art that is at least 250 years old (Marton 2009). In 2014, the agreement was extended for an additional 5 years (Huo 2015).

The United States' delay in responding to China's initial request was unusual (Maus 2009). Suspected reasons for the delay include China's failure to adequately control its domestic illicit relic trade, as well as its perceived failure to enforce its current laws, such as the Cultural Relics Law or the Criminal Law (Maus 2009). Additionally, although illicit excavation is a serious problem in China, many more relics are unearthed as a result of building and road construction (Marton 2009). Many scholars in the United States believe that China values its economic growth and industrialization over its commitment to protecting cultural relics (Murphy 2009). Finally, funding of cultural relic protection is a major issue in China. It is generally understood that all cultural protection activities are underfunded and that the lack of funding negatively impacts enforcement of the laws currently in place (Marton 2009). Many in the international community believe that China must commit additional funding to its protection efforts before illicit excavation can be meaningfully curbed (Maus 2009; Huo 2015).

Future Directions

China's cultural relic legislation is admirable and sends a strong message both domestically and abroad that the State values its cultural heritage and wants to protect it. However, going forward, China will have to square this policy with its sometimes antithetical policy of development. Some scholars believe that the Chinese government at all levels largely looks the other way when commercial development construction projects threaten to violate the cultural relics laws (Murphy 2009; Maus 2009; Baskin 2009). Additionally, in recent years, the import of cultural property into China has allowed China to grow into the world's second largest market country, meaning it is not simply a source nation (Huo 2015). Because the Cultural Relics Law does not provide any import restrictions, some scholars believe that reform of the law to address imports is necessary (Huo 2015). Essentially, if China wants the international community to respect its domestic legislation and requests for repatriation of cultural relics, it must show that its relics garner the same level of respect within its own boarders.

There is no doubt that China takes its responsibility to protect its cultural relics very seriously and is taking actions toward a more stringent protection regime. In September 2017, the State Council issued a guideline acknowledging that there has been frequent illegal dealing, storing, and auctioning of cultural relics in recent years, displaying a lack of supervision and loopholes in protection work (China Legal Information Center 2017). The guideline reiterated that all levels of government should strengthen law enforcement protection of cultural relics and fulfill their respective duties in the management and security of cultural relics (China Legal Information Center 2017).

On a more positive note, China may be opening to educational and archaeological studies by

foreigners. Although the Cultural Relics Law and the Measures for Foreign-related Archaeological Activities greatly restrict archaeological and educational opportunities for foreigners in China, the MOU signed with the United States may relieve some of red tape faced by foreigners. In the MOU, China agreed to two important provisions. First, it agreed to promote the exchange of students and professionals in such fields as archaeology, art history, conservation, museum curatorial practices, and cultural heritage management between appropriate Chinese and US institutions (Hoffman 2010). Additionally, it agreed to facilitate the granting of permits to conduct archaeological research in China (Hoffman 2010). For students and scholars in the field of archaeology and related disciplines, this may mean greater access to the treasures of China's past.

Cross-References

- ▶ China: Cultural Heritage Management
- ▶ China: New Approaches to Heritage Administration

References

Baskin, Bernard I.W. 2009. Historical heist: An economic argument against embargoing Chinese cultural property. *Washington University Global Studies Law Review* 8: 107–138.

Bell, Jonathan S. 2016. Introduction to the cultural heritage issue. *Chinese Law and Government* 48: 179–183.

CBS News. China sentences to death ancient tomb robbers, 14 May 2010. Available at http://www.cbsnews.com/2102-202_162-6483492.html. Accessed 11 Jan 2012.

China Daily. China exempts 13 crimes from death penalty, 25 February 2011. Available at http://www.chinadaily.com.cn/china/2011-02/25/content_12081299.htm. Accessed 7 Oct 2017.

China Daily. 30 sentenced in record relics theft case in Liaoning, 5 January 2016. Available at https://www.chinadaily.com.cn/china/2016-01/05/content_22935488.htm. Accessed 7 Oct 2017.

China Legal Information Center. China to better protect cultural relics, 25 September 2017. Available at http://www.chinadaily.com.cn/m/chinalic/2017-09/25/content_32468518.htm. Accessed 4 Oct 2017.

He Shuzhong. 2001. Trade in illicit antiquities: The destruction of the world's archaeological heritage. In *Illicit excavation in contemporary China*, ed. N. Brodie, J. Doole, and C. Renfrew, 19–24. Cambridge: McDonald Institute for Archaeological Research.

Hoffman, Matthew R. 2010. Cultural pragmatism: A new approach to the international movement of antiquities. *Iowa Law Review* 95: 665–694.

Huo, Zhengxin. 2015. Legal protection of cultural heritage in China: A challenge to keep history alive. *International Journal of Cultural Policy* 22: 497.

Marton, Autumn L. 2009. On rabbits, rats and low-hanging fruit: Rethinking the impact of international agreements on Chan's domestic cultural property protection. *Columbia Journal of Asian Law* 23: 217–239.

Maus, Amanda K. 2009. Safeguarding China's cultural history: Proposed amendments to the cultural relics law on the protection of cultural relics. *Pacific Rim Law & Policy Journal* 18: 405–431.

Murphy, N. 2009. Establishing the mandate of heaven through the protection of cultural relics. *Orientations* 40: 129–130.

China: Managing Cultural Heritage and the World Heritage List

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Introduction and Definition

The World Heritage Convention was adopted by the General Conference of UNESCO at its 17th session in Paris on November 16, 1972. It concerns the protection of the World Cultural and Natural Heritage. China ratified the World Heritage Convention on December 12, 1985. As of 2012, there are 30 cultural sites, 9 natural sites, and 4 mixed sites in China that were inscribed on the World Heritage List (Fig. 1).

China established its own cultural and natural heritage classification and management system before it signed the UNESCO World Heritage Convention. There are eight major categories in China's classificatory scheme, including historic structures and other non-movable relics, movable cultural relics, historic cities, historic towns, historic villages, national parks, intangible cultural

China
International boundary
Province-level boundary
National capital
Province-level capital
Railroad
Road
500 Kilometers
500 Miles
Lambert Conformal Conic Projection, SP 23N/45N
Boundary representation is not necessarily authoritative.
RUSSIA
MONGOLIA
KAZAKSTAN
KYRGYZSTAN
XINJIANG
XIZANG
QINGHAI
GANSU
NEI MONGOL
HEILONGJIANG
JILIN
LIAONING
SHANXI
SHAANXI
HENAN
SICHUAN
HUBEI
HUNAN
JIANGXI
ZHEJIANG
JIANGSU
SHANGHAI
GUIZHOU
YUNNAN
GUANGXI
GUANGDONG
FUJIAN
HAINAN
NINGXIA
INDIA
NEPAL
BHUTAN
BANGLADESH
BURMA
LAOS
VIETNAM
THAILAND
CAMBODIA
PHILIPPINES
TAIWAN
Yellow Sea
East China Sea
South China Sea
Taiwan
Luzon
Hainan Dao
Aqmola
Barnaul
Bratsk
Lake Baikal
Irkutsk
Ulan-Ude
Semey
Lake Balkhash
Burqin
Ulaanbaatar
Almaty
Bishkek
Ürümqi
Korla
Kashi
Hailar
Harbin
Changchun
Shenyang
Khabarovsk
Vladivostok
P'yongyang
Seoul
Pusan
Dalian
Qingdao
Hohhot
Baotou
Tianjin
Beijing
Taiyuan
Yinchuan
Xining
Golmud
Lanzhou
Xi'an
Lianyungang
Hefei
Wuhan
Shanghai
Hangzhou
Chengdu
Chongqing
Changsha
Nanchang
Fuzhou
Taipei
Guiyang
Kunming
Guangzhou
Hong Kong (U.K.)
Kao-hsiung
Nanning
Hanoi
Zhanjiang
Haikou
Vientiane
Chiang Mai
Rangoon
Mandalay
Myitkyina
Hue
Bangkok
Manila
New Delhi
Agra
Kathmandu
Thimphu
Lhasa
Ledo
Tropic of Cancer
Indian claim
Chinese line of control
Demarcation Line
Brahmaputra
Ganges
Mekong
Chang Jiang
Huang He
Xi Jiang
Yellow River
Yangtze River
Pearl River
Red River
Salween River
Mekong River
Irrawaddy River
Indus River
Tarim River
Amur River
Ussuri River
Sungari River
Liao River
Hai River
Huai River
Min River
Gan River
Xiang River
Wei River

then to the departments. However, the so-called organizations and administrations and bureaus are between the levels of ministry and department, yet have different administrative independence. The administrations and bureaus, even though they are directly under the State Council and operate independently, are managed by the corresponding ministries. Therefore, they are not as independent as the offices under the category of "organizations," nor do they have the same power; the heads of these offices, therefore, might have a slightly lower official ranking than the ones in charge of the "organizations." For example, the State Administration of Cultural Heritage and the State Administration of Grain belong to "administrations and bureaus," while the National Tourism Administration and the State Forestry Administration are categorized as "organizations."

For the administrative hierarchy of local governments, the provincial level is the one directly beneath the central government. The following levels (discussed in this study) are county, town, and village. "City" itself does not represent an administrative hierarchy, since cities could be categorized into multiple levels. It could be in the provincial level, such as Beijing and Shanghai; it could be in the regional level (in between the provincial and county levels), such as Chengde and Suzhou mentioned in the World Heritage List; it also could be in the county level, such as Dujiangyan and Dunhuang (importantly, this is where the World Heritage Site of Mogao Caves is located).

Historical Background

Heritage Management

The State Administration of Cultural Heritage is directly under the State Council and is managed by the Ministry of Culture. It is legally in charge of the administration of historic structures and other non-movable relics, as well as movable cultural relics. Note that *relic* is the word used in China for ancient remains. There are seven subcategories under the rubric of historic structures and non-movable relics: archaeological sites, ancient tombs, historic buildings, religious grottos, stone carvings, frescos, and sites and buildings that are related to historical events and revolutions in modern (since 1840) and contemporary Chinese history. There are three classes of relics: national cultural relics, provincial cultural relics, and city or county cultural relics, which represent various levels of importance. Movable cultural relics include artifacts, artworks, documents, manuscripts, and books. These are classified as either valuable cultural relics or ordinary cultural relics. Valuable cultural relics are further divided into grade-one, grade-two, and grade-three cultural relics. For the purpose of this entry, only the historic structures and non-movable relics that are classified as national cultural relics are included.

The State Council announced the first group of national cultural relics in 1961, after the completion of the first nationwide investigation and assessment of cultural relics by the State Administration of Cultural Heritage in the late 1950s. There are a total of 180 sites, which include 77 historic buildings, 33 revolutionary monuments and memorials, 26 archaeological sites, 19 ancient tombs, 14 religious grottos, and 11 stone carvings. More sites were subsequently added: 62 sites in 1982, 258 sites in 1988, 250 in 1996, 518 in 2001, and 1080 in 2006. Currently, there are a total of 2,351 national cultural relics. (Two sites in the first group were combined into one in 2001; three sites were later added into the 2001 list; one site was later added into the 2006 list. "National Cultural Relics," *Baidu*, accessed on December 4, 2010, http://baike.baidu.com/view/163959.html). In general, the buildings and sites listed in the earlier dates might have higher cultural, historical, or artistic value than those added later, except for the potential new discovery of exceptional archaeological sites. Additionally, it is important to note that there is an increasing attention to vernacular architecture and its built environments.

In April 2007, the State Council announced the beginning of the third nationwide investigation and assessment of cultural relics, which was scheduled to be complete in December 2011. The question, then, is how many more sites will be added to the already very long list – an issue

relevant to UNESCO's World Heritage List, which itself is nearing 1,000 inscriptions.

The Department of Urban–rural Planning, directly under the Ministry of Housing and Urban–rural Development, is responsible for the assessment, preservation, supervision, and management of the historic cities. Twenty-four historic cities were included in the first group announced by the State Council in 1982; 36 were added in 1986; 37 were added in 1994; another 12 cities were added between 2001 and 2010. This makes a total of 112 historic cities in China. Historic towns and historic neighborhoods are managed by provincial offices.

Another department under the Ministry of Housing and Urban–rural Development is the Department of City Development, which manages the National Park of China (also referred to as National Tourist Scenic Spots on earlier application dossiers for World Heritage Sites). The National Park of China includes sites with both natural beauty and historic built environments. It was created in 1982 with 44 sites and amended six times in the following years: 40 additional sites were added in 1988, 35 in 1994, 32 in 2002, 26 in 2004, 10 in 2005, and 21 in 2009. Currently, there are 208 national parks recognized by the state.

Since 2003, the Department of Urban–rural Planning, under the Ministry of Housing and Urban–rural Development, with the assistance of the State Administration of Cultural Heritage, started two new programs to evaluate historic towns and villages that have historical importance or that represent the traditional culture or character of a local ethnic group. Ten towns and 12 villages received the title of National Historic Towns and National Historic Villages in 2003, an additional 34 towns and 24 villages in 2005, 41 towns and 36 villages in 2007, 58 towns and 36 villages in 2008 and 2009, and 38 towns and 61 villages in 2010. Currently, there are 181 national historic towns and 169 national historic villages.

Obviously, buildings or structures can be part of a cultural relic, historic city, historic town, historic village, or national park. Therefore, they could be subject to the administration of three different offices. However, in terms of their approaches to cultural heritage, the essential difference between the State Administration of Cultural Heritage and the Ministry of Housing and Urban–rural Development is clear. The former handles only singular buildings or building groups in isolation, while the latter extends its focus to large built environments and landscapes.

The first group of national cultural relics was announced in 1961, while the initial lists of national historic cities and national parks were created 21 years later in 1982. The concept of protecting an entire historic city (meaning that it has been continuously occupied) is a new approach in preserving cultural relics. The idea was generated by three scholars: Renzhi Hou (historical geographer), Xiaoxie Zheng (urban planner), and Shiyuan Shan (architect in historic preservation). It is difficult to judge how much of their idea was influenced by preservation theory and practice worldwide, inasmuch as China's economic reform started in 1978, a couple of years before the rise of this new concept.

The division between the singular building in isolation and the overall consideration of the built environment has the potential to create many problems during the process of preservation. The fact that these two types of heritage are managed by three different offices, under two different ministries, can cause difficulties in terms of administration and management. This division becomes more complicated following China's signing of the UNESCO World Heritage Convention. Currently, the State Administration of Cultural Heritage is responsible for nominating and managing the cultural World Heritage Sites; the Department of City Development (the office that also manages the National Parks of China), under the Ministry of Housing and Urban–rural Development, is in charge of nominating and managing the natural and mixed World Heritage Sites. The Department of Urban–rural Planning (which manages the Historic Cities), under the Ministry of Housing and Urban–rural Development, and the State Forestry Administration (which manages the National Natural Reserves) are left alone in this process.

The process of assessing and then nominating sites (by means of the Tentative List) to the World Heritage List should involve discussion with other departments, since the process of enlisting the

National Parks of China usually includes eight departments. However, the department holding the ultimate responsibility is the one that takes the lead in organizing the procedure, as well as making the final decision. This might explain why the first 17 and the last 4 of the 53 sites on the Tentative List, arranged chronologically, are either natural sites or mixed sites, which are in relation to the National Natural Reserves and National Parks of China, respectively. In the meantime, out of the other 32 sites, all listed in the year of 2008, there is only 1 mixed site as an extension project of an existing mixed World Heritage Site; the remaining 31 sites are all cultural sites, including the Hani Terraces (the stepped rice terrace) that might be better described as a cultural landscape. For the World Heritage Sites, all four mixed sites and the first four listed natural sites hold the title of National Parks of China. It seems that these two offices have taken the lead in nominating World Heritage Sites in turns. It might not be their intention to only nominate the sites under their own administration, but they might simply not have enough information about other sites managed by other departments. Therefore, the fact that the department managing the historic cities has not been directly involved in nominating and assessing sites for the World Heritage List has a huge impact on the components of this list. Xi'an, which is one of the four most important historic cities of China – the others are Beijing, Nanjing, and Luoyang – (and surely should be inscribed on the World Heritage List) and which received the title of Historic City in 1982, does not even appear on the long Tentative List. Furthermore, only 2 out of the 32 World Heritage Sites (cultural and mixed sites) in China are historic cities or districts in mainland China (The Historic Centre of Macao, inscribed in 2005, may be managed by a different office and through a special procedure since Macao is officially designated as a "special administrative region").

Administrative Independence and Responsibility of the State Administration of Cultural Heritage

The State Administration of Cultural Heritage is the office that directly supervises 28 of the 32 nonnatural World Heritage Sites in China and also enforces China's heritage law. (The law can be read at this website: http://www.sach.gov.cn/tabid/311/InfoID/383/Default.aspx [this is the official address under the State Administration of Cultural Heritage]). Therefore, only this office, as well as its administrative independence and responsibility, is considered here.

The hierarchical relationship (impacting the level of administrative independence and responsibility) between the Ministry of Culture and the State Administration of Cultural Heritage has been changed and constantly redefined many times since being founded in 1949. The predecessor of the State Administration of Cultural Heritage is the Department of Cultural Heritage, which was founded in 1949. In the following 17 years until the Cultural Revolution started in 1966, the responsibility of the Department of Cultural Heritage changed many times; it was once in charge not only of cultural heritage and museums but also libraries, cultural centers, and long-distance education. In 1973, the Department of Cultural Heritage became the State Administration of Cultural Heritage, directly under the State Council. In 1982, it, along with four other departments, formed the new Ministry of Culture in 1982. In 1988, 3 years after China signed the World Heritage Convention, the same department with the same responsibilities once more became the State Administration of Cultural Heritage and started to report directly to the State Council. Its administrative independence appears to have remained the same since then. This department is directly under the State Council but is being managed by the Ministry of Culture. It operates independently and has its own schedules, budgets, and supplies.

The major responsibility of the State Administration of Cultural Heritage can be briefly summarized into the following categories, which include implementing cultural heritage law and enacting detailed regulations, managing the national cultural heritage, providing assistance to corresponding offices in case of heritage-related crime, assisting and supervising all the museums in serving the general public and sharing information, arranging and assessing related research projects, administrating training and professional

development, and organizing information and cultural exchange with entities outside China. More specifically, there are detailed responsibilities in managing the cultural heritage. The State Administration of Cultural Heritage is required to establish the standards and procedures for assessing cultural heritage, manage and supervise the World Heritage Cultural Sites, assist the corresponding offices in assessing the World Heritage Natural and Mixed Sites and in managing and preserving the historic cities, organize the nationwide investigation and assessment of cultural relics, inspect and approve preservation plans and new constructions within the protected area of national cultural relics, assess and approve archaeological excavation, and approve the transfer and lending of certain national cultural relics within or outside the country.

Heritage Law: The Primary Law

The *Law of the Peoples Republic of China on Protection of Cultural Relics* is China's primary heritage law. It was initially adopted in 1982; Article 30 and Article 31 were revised in 1991. A revision of the heritage law was finalized on October 28, 2002. The current version was approved by the Standing Committee of the Seventh National People's Congress and signed by the president.

The law has seven chapters. These include general provisions, immovable cultural relics, archaeological excavations, cultural relics in state collections, cultural relics in private collections, transporting cultural relics across the national border, legal liabilities, and supplementary provisions. Here I consider critical points of the law within each chapter.

Chapter One

Chapter one lays out the general provisions. It first states the purpose of establishing this law and the kinds of cultural heritage that are protected by the state and the law. Importantly, one of the purposes of this law is to promote the tradition of patriotism; therefore, one of the five categories of cultural heritage that receives protection by the state is dedicated to sites, objects, and buildings associated with historical events, revolutions, and noted individuals in modern and contemporary Chinese history. It is also notable that the law places emphasis on protecting cultural heritage from all time periods in history. Besides grand architecture and beautiful art works, the law also encompasses preservation of typical objects representing the daily life of all ethnic groups throughout China's history. The law then regulates the classification of cultural heritage (discussed earlier in this entry).

Chapter one also explains the ownership of cultural heritage. The state owns everything within the national border, either buried in the ground or in the water; the state owns all the archaeological sites and most of the historic building except privately owned buildings, which, in most cases, are houses. The law does protect privately owned heritage, but owners are obligated to obey all the heritage law and regulations.

Article 10 not only requires that all local governments that are higher than the county level have dedicated budgets for heritage preservation but also states that the central government will increase the national level budget for heritage preservation according to income.

Article 10 also states that the institutional income of state-owned museums, memorials, and cultural heritage sites shall be exclusively used for the protection of cultural heritage. Article 3 of the *Regulations for the Implementation of the Law of the Peoples Republic of China on Protection of Cultural Relics* further lists how the institutional income can be used. It can be used to store, display, preserve, and collect cultural relics; to renovate and construct the state-owned museums, memorials, and preservation facilities; to safeguard cultural relics; to support archaeological research and excavations; and to support related scientific research and education. The question is what kinds of income are considered institutional income and, therefore, subject to this regulation. It is important to note that the salary and the benefits of the staff are not mentioned here, which could come from the governmental budget, income generated by the institutions themselves, or the combination of these two. As nonprofit organizations, museums, memorials, and cultural heritage sites could have operational

income upon approval. This includes income from collecting entrance fees, as well as gifts shops, restaurants, or lodging facilities. The operational income usually covers the cost for daily maintenance, including salary and benefits for the staff. In some cases, the operational income needs to be turned in to the appropriate governmental office in charge. Clearly, the use and distribution of the operational income is not subject to heritage law or regulation; the amount of money visitors pay is not necessarily used to protect the heritage. When the operational income of a heritage site is directly associated with the staff members' salary and benefits, this nonprofit institution would be no different than a commercial enterprise. This is when the heritage status might be threatened due to neglect, a situation well known around the world.

Chapter Two

Chapter two focuses on managing and protecting immovable cultural heritage, either state-owned or private-owned, which includes detailed regulations and procedures to follow in heritage preservation. Even though the State Administration of Cultural Heritage is in charge of managing the national level heritage, most of the work and the decisions are carried out by provincial offices, such as archiving, setting up an extended protected area, approving appropriate new construction within the protected area, and assessing restoration. However, the State Administration of Cultural Heritage will make the decision when an immovable national cultural relic needs to be relocated or rebuilt on the original site. When demolishing an element of cultural heritage due to unavoidable new construction, approval is required from the cultural heritage management office at a higher level. For example, only the State Administration of Cultural Heritage can make a decision regarding whether to demolish a cultural heritage of provincial level; the immovable national cultural relics cannot be demolished, except as a special case approved directly by the State Council.

Article 21 is dedicated to the preservation and renovation of immovable cultural heritage. In particular, it states that the owner of the private-owned immovable cultural heritage is obligated for such responsibility. However, the local government at the county level and above shall provide financial help to those who are not financially capable of doing so. The local government shall impose the task of renovation when the heritage is in danger and pursue payment from the owner afterwards, if the owner is financially capable.

Articles 23 and 24 regulate usage of state-owned cultural heritage. State-owned immovable cultural heritage of all levels shall only be used as museums, preservation institutes, or tourist spots. For such a heritage to be used for another purpose, one must obtain approval from the heritage management office at a higher level, as well as approval from the same-level government to which the building is managed by the heritage office to which it belongs. Only the State Council has the right to approve alternative usage of national cultural relics. The law states that state-owned immovable cultural heritage of all levels shall not be transferred or mortgaged or used as assets for business operation.

Article 25 regulates the usage of private-owned cultural heritage. Private-owned immovable cultural heritage of all levels shall not be transferred or mortgaged to foreigners. When transferring, mortgaging, or changing the function of the heritage property, the owner needs to report to the appropriate heritage management office and document the change. The owner needs to get approval in this office only when the local government helped to renovate the heritage previously. This means a private owner of a house that is a national cultural relic can make his house a restaurant, a hotel, or a factory without being assessed and approved by any heritage management office.

When the law was initially written in 1982, there was not a single residential structure listed as a national cultural relic; it seems that being a museum or a tourist spot is the only way for the imperial palaces and tombs to show their historical importance to the general public. It was not until 1988 that the first few empty houses (expropriated by the government during the Cultural Revolution) and the first few living vernacular built environments were listed as national

cultural relics. In recent years, there are more dwellings and built environments being added to the list. Since property ownership is complicated in China, a private dwelling does not necessarily mean a privately owned property, not to mention the different levels of ownership and the separation between ownership of the land and the property itself (there is no privately owned land in China). Therefore, the exact consequences of Article 25 cannot be fully understood without a detailed study.

Chapter Three

Chapter three handles the issues related to archaeological excavation. Only the State Administration of Cultural Heritage has the right to accredit the institutes participating in archaeological excavations and approve any archaeological excavations. An excavation within the protected area of an immovable national cultural relic needs to be approved by the State Council. The institutions that participate in the excavation shall turn over the discoveries to the appropriate museums, libraries, or other institution after archiving the relics. Only with exceptions approved by appropriate heritage management offices or the State Administration of Cultural Heritage can such institutions keep a few specimens for research purposes.

Chapters Four, Five, and Six

Chapters four, five, and six are dedicated to issues related to cultural relics in state collections, cultural relics in private collections, and transporting cultural relics across the national border, respectively. The articles focus on movable cultural relics, which are beyond the scope of this entry.

Chapter Seven

Chapter seven concerns legal liabilities. It lists different kinds of behaviors – either violating the heritage law or harming the cultural heritage – and categorizes them into criminal cases, civil cases, or noncriminal cases. It gives detailed information about what kind of administrative sanction or civil penalty each behavior will receive; the criminal case will be charged with the appropriate criminal law.

Chapter Eight

Chapter eight contains the supplementary provisions, which simply state that this law becomes effective on the date of its promulgation.

More Heritage Laws

In support of the *Law of the Peoples Republic of China on Protection of Cultural Relics*, the State Council promulgated the *Regulations for the Implementation of the Law of the Peoples Republic of China on Protection of Cultural Relics* on May 18, 2003, to be effective on July 1, 2003, which was signed by the prime minister. (All the dates listed here are the dates that each regulation was approved; the effective date of each regulation is usually months later than the approval date.)

Other than the fundamental heritage law and regulations, there are numerous ordinances and regulations promulgated by the central government or local governments. Regulations promulgated by the State Council also include the *Ordinance of Preservation of the Great Wall* (September 20, 2006), the *Ordinance of National Parks of China* (September 6, 2006), the *Ordinance of National Reserves* (September 2, 1994), and the *Regulations for Preserving the Historic Cities, Historic Towns, and Historic Villages* (April 2, 2008). There are 43 regulations promulgated by the Ministry of Culture that are listed under the webpage run by the State Administration of Cultural Heritage, such as *Regulations for the Management of the World Cultural Heritage* (November 14, 2006), the *Interim Regulations for Preserving and Managing the National Intangible Cultural Heritage* (October 25, 2006), and the *Regulations for Museum Management* (December 22, 2005).

Key Issues

Bundling Sites: A New Strategy to Achieve Inscription in the World Heritage List

One of the new phenomena of newly listed World Heritage Sites in China is that one World Heritage Site consists of more than one site and the sites can be quite distant from each other. There are two

reasons for this phenomenon. First, the notion of promoting a site to become a World Heritage Site is a very attractive and popular idea for many people: the *government* who wants to establish a new image of the country with both economic strength and a rich culture; *local officials* who want to use this opportunity to build their resume and to improve the local economy by increasing tourists; the *local people* who are proud of having a World Heritage Site in their hometowns; and the *general public* who enjoy the convenience of traveling to World Heritage Sites without spending a lot of money and time to go outside the country, which is a dream that will never be realized by most Chinese people. Under this general social and cultural background, China is preparing 200 individual projects (not sites) for the World Heritage Tentative List. (See, e.g., State Administration of Cultural Heritage 2010). Considering that one country can only send one project per year, it will take hundreds of years for these 200 projects to become World Heritage Sites. Combining similar ones seems the only feasible approach that can expedite this process. Besides this obvious reason, there is another benefit to bundling sites together: it allows sites that are valuable, yet without exceptional value and quality, to become World Heritage Sites.

There are various kinds of approaches concerning *how* and *what* to bundle together. The first example is the Temple and Cemetery of Confucius and the Kong Family Mansion in Qufu (which should actually be documented as the Temple of Confucius and Cemetery and the Kong Family Mansion in Qufu), listed in 1994. Although the Temple of Confucius and the Kong Family's Mansion are separated in time by over 1,300 years, they are located right next to each other and received the recognition of National Cultural Relic as one site in 1961. The Kong Family's Cemetery is far away; it is where Confucius was buried, as were over 100,000 of his descendants. Therefore, this bundling is reasonable and necessary to understand the value and meaning of the heritage site.

The Classical Gardens of Suzhou, listed in 1997, is another example. There are nine sites composing this World Heritage Site. At the time of application, only four of these nine gardens were honored as National Cultural Relics. Two more gardens were honored in 2001; the three remaining gardens received the title as one of the 1,080 sites in 2006. At that time, there were 34 structures or sites within the city of Suzhou with the title of National Cultural Relic. This is a clear case in which the somewhat valuable, yet not exceptional, sites benefit from being bundled together with the exceptional ones.

The Case of Dengfeng

The most manipulated and constructed nomination is "The Historic Monuments of Dengfeng in 'The Center of Heaven and Earth'," which was honored as a World Heritage Site on August 1, 2010 (State Administration of Cultural Heritage 2010). This "site" includes eight sites or 11 structures and building complexes. These 11 structures and building complexes were built in a time frame covering almost 2,000 years of history, including buildings for ritual, religious, educational, and scientific purposes. The title, "The Center of Heaven and Earth," is a constructed concept that bundles these various buildings and sites together.

Importantly, the same "site" went for the nomination of World Heritage Sites in 2009 and did not achieve its goal. In that nomination, the "site" was named "The Historic Monuments of Mount Song Area." After this experience, the regional heritage management office reflected upon the reasons for the loss, and they perceived a few main reasons. The following are mentioned: in general, the evaluation process of World Heritage Sites is getting more rigorous, especially for a country like China, which already has more than 30 sites listed. Furthermore, Mount Song is one of the mountains included in the project of the Four Sacred Mountains as an Extension of Mt. Taishan, which made UNESCO question the repetition. In the meantime, Mount Wutai was adjusted from a mixed World Heritage Site to a cultural landscape during the final decision-making process of UNESCO convention in 2009, because the aspect of its natural value did not get approved; the project of Mount Song has the potential of encountering a similar problem if it follows the path of Mount Wutai. More importantly, the

concept of using Mount Song as central sacred mountain to connect all the sites is difficult for the World Heritage Committee professionals from different cultural backgrounds to understand and appreciate.

Based on these assessments, the regional management office decided to change the name of this application to "The Historic Monuments of Dengfeng in 'The Center of Heaven and Earth.'" Two major implications can be observed in this change. First, Mount Song is out of the equation, even though all these sites are still located with the area of Mount Song; the change places a clear emphasis on the cultural aspect of the site and leaves its natural value aside. Second, the new name also suggests that the implication and influence of this site covers a much larger area, therefore, as a heritage site, its cultural significance increases.

More importantly, the new application introduced the concept of "The Center of Heaven and Earth": the Chinese counterpart is "天地之中," which means "sky, earth, of, and center," respectfully. The Chinese name suggests a connection with an existing Chinese concept; however, it is manipulated and has a different meaning. The Chinese concept of the "Center of the Earth" (地中) or the "Center of the World" (天下之中) was well developed in ancient China in the beginning of the Western Zhou period (1046–771 BCE) as a political strategy to relocate the new capital of the Western Zhou period to the region previously occupied by another ethnic group (Wang 1990; Gong 1994). The ancient Chinese perceive "天" (sky) as everything above "地" (earth) (Wang 1999). Therefore, the phrase "天下" (literally means under the sky) and the word "地" (earth) are synonymous spatially and conceptually. "天下" also refers to the world, a 2-dimensional earth radiating from the "center."

Although there are debates among scholars regarding where exactly the "Center of the World" was perceived by the ancient Chinese, it is generally acknowledged that Mount Song is located in the region considered as the "Center of the World" by the people of the Western Zhou period and many dynasties afterwards. In the case of renaming a World Heritage nomination, by changing the Chinese from "天下之中" to "天地之中," "天" (sky) becomes an independent concept, instead of something closely associated with the "地" (earth). The English translation, "The Center of Heaven and Earth," pulls them further apart both spatially and conceptually as the "heaven" and the "earth." As a result, the concept of the "center" here can be understood in two ways. It suggests a vertical axis, as the *axis mundi*, that connects the heaven and the earth; it can also be perceived as the space between the heaven and the earth, which is similar to the Western philosophical and religious ideas that put human beings at the center between heaven and earth. Both interpretations are manipulations of a classical Chinese concept; it is an adjustment tailored for the Western perspective, in order to make the World Heritage Committee professionals who evaluate the project easily appreciate this already heavily constructed cultural heritage site.

The following list gives a brief description of each of the 11 structures and groups of buildings that are covered under the umbrella of the "Center of Heaven and Earth." (The number indicates the year it was listed as National Cultural Relic when applicable.)

- Taishi Que (1961), a pair of large stone tablets with engravings, was built in 118 CE and marks the ritual path in front of the Zhongyue Temple.
- Zhongyue Temple (2001) was originally built in 110 BCE and has been rebuilt and enlarged many times throughout history. Its current layout and major buildings are based on the reconstruction during the Qing Dynasty (1644–1912 CE). It was a religious temple holding the imperial sacrificial altar for Mount Song.
- Shaoshi Que (1961) was built between 118 and 123 CE and used to be located in front of the Shaoshi-Shan Temple (destroyed), marking the ritual path.
- Qimu Que (1961), a pair of large stone tablets with engravings, was built in 124 CE used to be located in front of the Qimu Temple (destroyed).

- The 40-m-high Songyue Temple Pagoda (1961) was originally built between 520 and 525 CE, the oldest surviving brick tower in China.
- The Shaolin Temple, a Buddhist temple renowned for its martial arts, was originally found in 495 CE. It has three groups of structures, not all adjacent to each other, included in the World Heritage Site: the Kernel Compound (1963, provincial level only), the Pagoda Forest (1996), and the Chuzu Temple (1996, as one site with the Pagoda Forest).
- Huishan Temple (2001) is a Buddhist temple first built between 471 and 499 CE.
- Songyang Academy of Classical Learning (2001) was originally built between 934 and 936 CE and became one of the four largest study centers in the Song Dynasty (960–1279 CE).
- The Observatory (1961) was originally built between 1276 and 1279, as one of the oldest surviving observatories in China.

There is no doubt that all these structures and buildings have their unique historic and artistic values; the fact that 5 of them were part of the list of the first 180 national cultural relics supported this. However, there is no obvious theme shared by all the sites, since they not only represent different kinds of structures – from stone tablets, to towers, and to buildings – but also serve different functions – from ceremonial structures, to religious structures, to scientific structures, and to cemeteries. The concept of the "Center of Heaven and Earth" was clearly a constructed idea that was superimposed on all these sites so they could be bundled together as one World Heritage Site.

In the meantime, there are 16 sites in the City of Dengfeng that were registered as National Cultural Relics by 2006, the most recent date when the list was modified. The question is why the other seven sites were not included. If a site can become a World Heritage Site first, and then a National Heritage Relic 9 years later (in the case of Classical Gardens of Suzhou), there are definitely significant values for any of these seven sites. Perhaps lacking UNESCO's criterion of OUV (Outstanding Universal Value), we can see the benefit of bundling the sites together, according to the argument made by the regional heritage management office. If a cemetery for monks can be associated with the idea of the "Center of Heaven and Earth," those leftover temples, towers, and religious stone carving sites can as well. If the potential tourist income is one of the driving forces in selecting the sites, which is proven by many precedents, some of these leftover sites should be included as well. The entrance fee to enter the individual Fujian Tulou was increased between 40% and 300% of the original price after being inscribed as a World Heritage Site in 2008. The overall income from the entrance fee of the Ancient City of Ping Yao has increased 40 times since its promotion in 1997. However, according to ctrip.com, the leading website providing tourist service in China, out of the 22 sites recommended for the Mount Song area, Fawang Temple, a national cultural relic, is ranked as the 5th favorite site by the tourists, a much higher position than some of the sites included for the World Heritage Site, especially Huishan Temple, ranked as the 21st site.

Other Cases

The case of the Mount Qingcheng and the Dujiangyan Irrigation System, listed in 2000, had a very different approach. Mount Qingcheng is one of the birthplaces of Taoism with many Taoist temples, while Dujiangyan is an irrigation system built in the third century BCE and still in use. The two sites are in proximity to each other; however, I would argue that their difference should decouple them from being one World Heritage Site.

Another case is the Imperial Tombs of the Ming and Qing Dynasties, which eventually includes eight sites in five provincial jurisdictions. When the site was first listed in 2000, it included two clusters of tombs of the Qing Dynasty in Hebei Province and one tomb of the Ming Dynasty (the Xian Tomb in Hubei Province); the Qing tombs and the Ming tomb received the title of National Cultural Heritage in 1961 and 1988,

respectively. As the only Ming tomb included, the Xian Tomb is not the most famous one in China. There are 13 Ming tombs scattered in the mountain area of Beijing and the Xiao Tomb of Ming, the burial land for the very first emperor of the Ming Dynasty, located in Nanjing, Jiangsu Province; both were honored as National Cultural Relics in 1961. The obvious questions are the following: who organized the application process? Who decided which tombs to include? What were the reasons for the exclusion of the majority of the Ming tombs even though the name of this World Heritage Site suggests collective tombs from the Ming Dynasty? However, this is not the end of the story. The Ming tombs of both Beijing and Jiangsu Province were added as an expansion to the existing World Heritage Site in 2003. Three additional Qing tombs in Liaoning Province were added in 2004. They are the Ancestral Tomb and the tombs for two earlier emperors of the Qing Dynasty, which became the National Cultural Relic sites in 1982 and 1988. I ask whether this World Heritage Site will one day be expanded to include all the imperial tombs in China. (Comparably, will a similar inscription named "Tuscan Hill Towns" be created and include all the hill towns in central Italy?)

Future Directions

China's vast territory, extraordinary history, and exceptional built environment facilitate a large numbers of sites to be nominated to UNESCO's World Heritage List. China's success in bundling sites for evaluation by the World Heritage Committee will inevitably set up a new precedent for the application and packaging of future World Heritage Sites in China. Its potential impact on heritage policy, heritage management, the general public's attitude towards heritage sites, and the tourists' evaluation and preference of heritage sites are yet to be discovered. In the meantime, the direct outcomes of bundling to the sites, their local stakeholders, the Chinese public, and the tourism industry deserve monitoring and studying in the coming years.

Cross-References

- ▶ China: Cultural Heritage Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ China: New Approaches to Heritage Administration

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References

Gong, S. 1994. Shilun Woguo 'Tianxia Zhi Zhong' de Lishi Yuanliu [The historical origin of the Chinese concept of 'The center of the world']. *Huazhong Shifan Daxue Xuebao (Journal of Huazhong Teacher's University)* 1: 93–97.

Wang, K. 1990. Xizhou Shiqi 'Tianxia Zhi Zhong' de Zeding yu 'Wang Tu' Kance [The selection of 'the center of the world' and the measuring of 'King's Land']. *Hubei Daxue Xuebao (Journal of Hubei University)* 2: 46–52.

Wang, H. 1999. Lun Zhoudai Tianshen Xingzhi yu Shanyue Chongbai [The nature of gods in Zhou Period and the mountain wordship]. *Beijng Shifan Daxue Xuebao (Journal of Beijing Teacher's University)* 151: 43–51.

Further Reading

Central People's Government of the People's Republic of China. n.d.-a The announcement from the state council: to start the third nationwide investigation and assessment of cultural relics. Available at: http://www.gov.cn/zwgk/2007-04/10/content_577444.htm. Accessed 4 Dec 2010.

Central People's Government of the People's Republic of China. n.d.-b The state council. Available at: http://english.gov.cn/2008-03/16/content_921792.htm. Accessed 3 Dec 2010.

CTRIP. n.d. Tourist sites in Mount Song Area. Available at: http://destguides.ctrip.com/attractions-d178-songshan.html. Accessed 8 Dec 2010.

Guan, Z. 1998. Dengfeng Guanxing Tai yu Guo Shoujing Dui Chuantong Ligan Cejing de Gaijin [The observatory in Dengfeng and the way in which Shoujing Guo improved the traditional method of time measurement]. *Journal of Zhengzhou University* 31: 63–67.

Ministry of Housing and Urban-rural. n.d. Structure of the departments. Available at: http://www.mohurd.gov.cn/gyjsb/jgsz/. Accessed 4 Dec 2010.

State Administration of Cultural Heritage. 1961. The first group of national cultural relics. Available at: http://www.sach.gov.cn/tabid/96/InfoID/16/frtid/96/Default.aspx. Accessed 4 Dec 2010.

State Administration of Cultural Heritage. 1982. The second group of national cultural relics. Available at: http://www.sach.gov.cn/tabid/96/InfoID/17/frtid/96/Default.aspx. Accessed 4 Dec 2010.
State Administration of Cultural Heritage. 1988. The third group of national cultural relics. Available at: http://www.sach.gov.cn/tabid/96/InfoID/21/frtid/96/Default.aspx. Accessed 4 Dec 2010.
State Administration of Cultural Heritage. 1996. The fourth group of national cultural relics. Available at: http://www.sach.gov.cn/tabid/96/InfoID/22/frtid/96/Default.aspx. Accessed 4 Dec 2010.
State Administration of Cultural Heritage. 2001. The fifth group of national cultural relics. Available at: http://www.sach.gov.cn/tabid/96/InfoID/23/frtid/96/Default.aspx. Accessed 4 Dec 2010.
State Administration of Cultural Heritage. 2006. The sixth group of national cultural relics. Available at: http://www.sach.gov.cn/tabid/96/InfoID/60/frtid/134/Default.aspx. Accessed 4 Dec 2010.
State Administration of Cultural Heritage. 2007a. Law of the Peoples Republic of China on protection of cultural relics. Available at: http://www.sach.gov.cn/tabid/311/InfoID/383/Default.aspx. Accessed 26 Nov 2010.
State Administration of Cultural Heritage. 2007b. Regulations for the implementation of the law of the Peoples Republic of China on protection of cultural relics. Available at: http://www.sach.gov.cn/tabid/311/InfoID/384/Default.aspx. Accessed 26 Nov 2010.
State Administration of Cultural Heritage. 2010. The Center of Heaven and Earth in Dengfeng: The path to become a world heritage site. Available at: http://www.sach.gov.cn/tabid/1197/InfoID/25569/Default.aspx. Accessed 6 Dec 2010.
State Administration of Cultural Heritage. n.d.-a Laws and regulations. Available at: http://www.sach.gov.cn/tabid/81/Default.aspx. Accessed 7 Dec 2010.
State Administration of Cultural Heritage. n.d.-b The right sites of the Center of Heaven and Earth in Dengfeng. Available at: http://www.sach.gov.cn/tabid/1201/Default.aspx. Accessed 7 Dec 2010.
State Administration of Cultural Heritage. n.d.-c National historic cities. Available at: http://www.sach.gov.cn/tabid/97/InfoID/82/frtid/97/Default.aspx (group 1), http://www.sach.gov.cn/tabid/97/InfoID/83/frtid/97/Default.aspx (group 2), http://www.sach.gov.cn/tabid/97/InfoID/84/frtid/97/Default.aspx (group 3). Accessed 4 Dec 2010.
State Administration of Cultural Heritage. n.d.-d National historic towns and villages. Available at: http://www.sach.gov.cn/tabid/97/InfoID/82/frtid/97/Default.aspx (group 1), http://www.sach.gov.cn/tabid/97/InfoID/83/frtid/97/Default.aspx (group 2), http://www.sach.gov.cn/tabid/97/InfoID/84/frtid/97/Default.aspx (group 3), http://www.sach.gov.cn/tabid/98/InfoID/27269/frtid/98/Default.aspx (group 4). Accessed 4 Dec 2010.
State Administration of Cultural Heritage. n.d.-e National historic towns and villages. Available at: http://www.sach.gov.cn/tabid/98/InfoID/27270/frtid/98/Default.aspx (group 5). Accessed 23 Mar 2011.
State Administration of Cultural Heritage. n.d.-f The responsibility and the structure of the state administration of cultural heritage. Available at: http://www.sach.gov.cn/tabid/312/InfoID/17237/Default.aspx. Accessed 2 Dec 2010.
Wang, B. 2005. Luozhou Wu Ying and Tianxia Zhi Zhon' ['No shadow in Luo region' and 'the center of the world']. *Journal of Sichuan University.* (Social Science Edition) 139: 94–100.

China: Museums

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Introduction and Definition

Compared to the long written history in China, the word "museum 博物馆 博物馆 (bo-wu-guan)" is quite new: it was introduced to China by the Japanese in the late nineteenth century. In ancient Chinese, "bo-wu" means natural science or a person in command of broad or extensive matters; "guan" refers to places where cultural relics were kept or managed and where knowledge was taught.

Over the past 100 years, the concept of the museum in China has changed from a purely educational organization into one that collects and curates cultural relics and specimens and engages in propaganda and education, and scientific research. The role of museums in China needs to be considered in relation to the definition of the museum adopted by the International Council of Museums (ICOM) at the 21st General Conference in Vienna, Austria, in 2007:

> A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment. (ICOM 2012)

In practice, the concept of museum in China is a little different from ICOM's definition. The

main functions of Chinese museums are to inherit and disseminate knowledge of Chinese culture, integrate social and ethnic memories, represent the historical attitudes of the government, and reflect on visual representations of China. Throughout China, governments at various levels invest heavily in museums, not only as a tool for propaganda and public education and for reflection on history but also as a physical symbol of the status and wealth of a particular city or region.

Key Issues

Key issues in Chinese culture can be understood through the lens of the museum, and through an understanding of the changing concept of the museum through time.

Brief History of Chinese Museums

It can be argued that collecting is one of the instincts of human beings, especially the collection of those objects of special significance to individuals, groups, and states in human society. Throughout the world, treasures, relics, and books are kept or buried together in secret places. That's why we now know a lot about the unwritten histories through archaeological excavations, such as the oracles inscribed on bones or tortoise shells of Shang Dynasty in China, because those bones and shells were buried together intentionally after divinations by the Imperial Family.

Traditionally, antiquities were held in the private homes of aristocrats and the Imperial Family. Ordinary people could not view them and there was no thought of these objects being used for scholarly research or public education.

The notion of the modern museum was introduced to China by people from other countries. For instance, the earliest recognized museum, Xu Jia Hui (徐家汇) Museum, was a natural history museum which exhibited specimens of animals and plants. It was founded by a French Jesuit priest in 1868. The first modern museums in China were set up in the late 1870s. Important examples include the Imperial Tung Wen College (京师同文馆), established in 1876, and the Great Iron-House Museum (铁嵌玻璃房), established in 1877 by the Polytechnic Institution Shanghai (上海格致书院). In 1905, another major step in the development of museums in China was taken with establishment of the Nantong Museum (南通博物院), in Nantong, Jiangsu Province, by the famous industrialist and educator Zhangjian (张謇). The overthrow of the feudal imperial court during the Xinhai Revolution in 1911 facilitated the development of modern museums in China by removing social and cultural barriers to the public exhibition of treasured antiquities.

Chinese Museums of Note

The National Museum of China (NMC)

The National Museum of China is located on the east side of the Tian'anmen Square in Beijing. It was founded in 2003 after the merger of the former National Museum of Chinese History and the National Museum of the Chinese Revolution. NMC, an integrated national museum under the Ministry of Culture of the People's Republic of China, focuses on both history and art and is dedicated to its collection, exhibitions, research, archaeology, public education, and cultural communication.

The predecessor of the National Museum of Chinese History is the Preparatory Office of the National Museum of History, which was founded on July 9, 1912. Upon the founding of the People's Republic of China on October 1, 1949, the museum was renamed the Beijing Museum of History. In 1959, it was renamed the National Museum of Chinese History. The predecessor of the National Museum of the Chinese Revolution was the Preparatory Office of the National Museum of Revolution founded in March 1950 and renamed 10 years later. In August 1959, the construction of the new building on the east side of the Tian'anmen Square that housed both museums was completed. The building was regarded one of the "Ten Great Constructions" built to celebrate the tenth anniversary of the People's Republic of China. On October 1 of that same year, the two museums opened to the public.

The main aim of the National Museum of China is to be a leader within China and a first-class museum internationally. Its ethos is to put people first and for its development to be based on staff, collections, business, and academic research. This museum aims to protect Chinese cultural heritage, to display the time-honored history of China, to provide public education on history and culture, especially for young people, and to promote cultural exchange with other countries and regions. Through these efforts, the museum aims to create a classroom for lifelong learning and a palace for culture.

Palace Museum: Forbidden City in Beijing

The Palace Museum, China's largest museum, is situated in the center of Beijing. It was established on October 10, 1925. In Chinese, it is also known as the "Purple" Forbidden City, and in English as the Forbidden City. This museum covers 720,000 m^2 and was the imperial palace for a succession of 24 emperors and their dynasties during the Ming and Qing periods of Chinese history. The museum is China's largest and most complete architectural grouping of ancient halls. The construction of the Palace began in 1420, the eighteenth year of Yongle, so it is almost 600 years old.

More than 70 halls of various sizes, containing more than 9,000 rooms, comprise the Forbidden City. These halls are aligned along a north–south axis and extend out on either side in an east–west symmetry. The central axis not only passes through the Purple Forbidden City but extends south to Yongding Gate and north to the Bell and Drum Towers, for a length of some 8 km. This passage through the entire city of Beijing symbolizes the centrality of the imperial power: the imperial seat is at the very center of this line. The architecture is designed so that the buildings are lined up neatly and with imposing scale. In a concentrated form, this assemblage expresses China's artistic traditions in the setting of China's unique architectural style.

Shanghai Museum

The scope, depth, and quality of the Shanghai Museum's collections, and its striking architecture, make this museum one of the most famous, if not the most famous, in China. It covers an area of 38,000 m^2, with a scale that greatly surpasses its predecessor museum. The exterior of the museum is inspired by the shape of an ancient bronze *ding* (cooking vessel) of the Chen Dynasty, with its rather archaic flavor. The structure and materials of the entire building, however, are an accomplishment of the most modern technology.

The Shanghai Museum focuses mainly on ancient arts. At present, it is divided into 10 sections, which are ancient Chinese bronzes, sculpture, ceramics, jades, seals, calligraphy, coin and currency, paintings, Ming and Qing Dynasty furniture, and crafts of China's national minorities. In addition to these 10 permanent exhibitions, the museum holds small-scale exhibitions and hosts visiting exhibitions. The museum also lends to other museums, both within China and abroad.

Chinese Silk Museum

The Chinese Silk Museum is not only the first national silk museum but also the biggest silk museum in the world. It is located on the bank of West Lake, Hangzhou, Zhejiang Province. It was opened on February 26, 1992 "to spread the ancient silk culture and develop a new Silk Road," according to former Chairman Jiang Zemin. The main hall of the museum tells the origin and development of silk, the categories of silk, the Silk Road, and the role of silk in the ancient social life. The hall of dyeing and weaving and the hall of achievements in modern times exhibit separately the progress of ancient weaving machines and the great success in production, research, and foreign trade after the Liberation of the New China.

Chinese Tea Museum

The Chinese Tea Museum is a national theme museum, located in the Shuangfeng Village, southwest of Longjing Road, Hangzhou City, Zhejiang Province, the area where Longjing Tea originates. This museum opened in October 1990. The museum consists of independent but interrelated halls that cover the history of tea, collections relevant to tea service, and customs, and explains the tea culture from various angles.

Hu Tsing Yu House: Chinese Medicine Museum

Hu Tsing Yu House: Chinese Medicine Museum is China's first Chinese pharmacopoeia museum.

In 1874, a successful businessman named Hu Xueyan invested large sums in a handsome building of southern Chinese architectural style, which was the location of this museum. The exhibition halls display a wide variety of ancient implements and artifacts used in the conduct of the herbal medicine business. Hu Tsing Yu House is located in Hangzhou and enjoys the reputation of being a "magical science hall, brilliant medicine culture."

Cooking Culture Museum in Sichuan Cooking College

The Cooking Culture Museum is affiliated to Sichuan Cooking College. It focuses on the history, customs, and art of cooking and on relevant research, such as the relations between cooking and painting and calligraphy, cooking and celebrities, cooking and health.

Museum of the Terra-cotta Warriors and Horses of Qin ShiHuang

The Museum of the Terra-cotta Warriors and Horses of Qin ShiHuang was opened in 1979 to show the "Eighth Wonder of the World" in full scale. The museum was constructed on the site of the excavations. The main exhibits are three exposed pits with clay warriors and horses and more than 10,000 bronze weapons. In a sense, this museum is a treasure house of Qin's military affairs, science and technology, art, and culture. It is listed as a UNESCO World Heritage Site.

Zhoukoudian Site Museum

Zhoukoudian Site Museum is situated some 50 km to the southwest of the urban district of Beijing, where the world-famous Peking Man lived more than half million years ago. In 1987, UNESCO listed this site on the World Heritage List. More than 20 significant archaeological sites have been found at Zhoukoudian, including the Peking Man Cave, and the Upper Cave and New Cave. The discoveries of human and other animal fossils, human-made stone tools, and the evidence of fire use astonished the world when the discoveries were made in the 1920s. The Peking Man Site is not only a treasure house of human fossils but also the research base for paleoanthropology, prehistoric archaeology, paleontology, stratigraphy, chronology, and petrology.

Tonglvshan Ancient Copper Mine Museum

The Tonglvshan Ancient Copper Mine Museum was the first museum in China to focus on the history of ancient mining technology. The museum includes the copper mine's vertical shaft, heading, blind well, and inclined shaft. This ancient copper mining spot is thought to be the oldest in history. It is the largest in scale and the best-preserved mining museum in China.

Beijing Opera Museum

The Beijing Opera Museum is the 100th museum in Beijing. It is located in the Huguang Guild Hall, Xuanwu District, Beijing City, and has been open since 1997. The main hall was built in 1807 and includes the Grant Theatrical Stage, Ancestral Hall, and Wenchang Pavillion. During the period 1920 to 1940s, some of the most famous Peking Opera masters performed here, including Tan Xinpei, Yu Shuyan, and Mei Lanfang, making this one of the most attractive showplaces of that time. In 1912, Sun Yat-sen, the great revolutionary pioneer, visited the Huguang Guild Hall five times and used this location to host the founding conference of the Kuomintang. The masters from Beijing Peking Opera Theater perform operas here every night.

It is important to recognize that the Peking/Beijing opera is a member of a wider Chinese opera family. Many local opera museums have been set up all over the country, such as China's Kunqu Opera Museum in Suzhou, Tianjin Drama Museum in Tianjin, Cantonese Opera Museum in Guangdong, and the Shadow Puppet Museum in Xi'an.

Future Directions

Though China has a long history and abundant cultural heritage, it is a relative latecomer to museum ventures. In recent decades, the sector has undergone rapid development as social reform and opening up ushered in a wave of museum construction throughout the country. At present, about 80 large- and medium-sized museums are newly built, renovated, or expanded per year throughout China. So far, there are more than 2,500 museums in the country, 2,100 of which are state-run, with the other 400 being privately

owned. These museums specialize in history, politics, economics, culture, education, nature, science, astronomy, geography, ecology, and many other categories. Together, they house over 20 million artifacts. Every year, around 10 thousand exhibitions are presented to the public and these exhibitions draw more than 150 million visitors. As a result, a network of museums in cities has been formed; moreover, it is gradually expanding into rural areas. The future of China's museum undertakings has never been more promising.

Cross-References

- ▶ Heritage Museums and the Public
- ▶ International Council of Museums (ICOM)
- ▶ Regional/Site Museums

References

International Council of Museums (ICOM). 2012. Museum definition. Available at: http://icom.museum/the-vision/museum-definition/

Further Reading

China's Museums. n.d. Available at: http://www.chinamuseums.com/index.html

Mausoleum of the First Qin Emperor. n.d. Available at: http://whc.unesco.org/en/list/441

China: New Approaches to Heritage Administration

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Introduction

Cultural Heritage and Heritage Administration

Why should one give attention to administration in the field of heritage, with so many fascinating aspects of material culture and archaeological finds? The problem is that heritage works and professions do not happen in a vacuum but rather within organizations, and most of the time, they take place within the public sector (the USA appears to be the exception more than the rule). If one wants to compare the changes that occurred in the last few years in, say, Machu Picchu, Pompeii, and the Qin Mausoleum, for sure a good part of these changes are explained by the evolution of professional discourse at the global level, including the increasing role played by international agencies (UNESCO, ICOMOS, ICCROM, etc.). Nonetheless, a good part of the differences is likely to be explained by internal dynamics of public sector in Peru, Italy, and China.

Key Issues/Current Debates/Future Directions/Examples

China: One of the Most Decentralized Countries

China has experienced an exceptional process of transformation in the last 30 years. From the initial situation of totally planned economy–with economic failures experienced over time, from the Great Leap Forward to the Cultural Revolution – since 1978, the "gradual revolution" (Wang 1994) began with the open door policy in both political and economic terms, which will transform China in the second world economy, with growth rates rarely seen before and elsewhere.

This also had an enormous impact in the transformation of the public sector (Zan and Xue 2011). A dramatic decentralization process took place, transforming China in one of the most decentralized countries in the world, a sort of "de facto federal state," as it has been observed (OECD 2005). Central organism has been relocated from the center to the province level or lower, public expenditures has been moved from the central government to the local level, with huge transfer of resources from the center to the periphery (Straussman and Zhang 2001).

Decentralization in Heritage Management

This general trend has serious impacts on heritage as well. About 90% of expenditures for the

cultural sector are decentralized, not even at the province level but rather taking place at the municipal and town level (OECD 2005). In terms of employees, out of the 77,000 people working in the sector, only few hundreds work in the central offices in Beijing.

Decentralization emerges also in terms of institutional settings within public administration. At the local level (prefecture, municipality, town), there is often a Cultural Relics Bureau which reports directly to the local level (usually to the Cultural department which reports to the mayor), with a mere professional relationships with higher levels of the same functional department. For instance, the CRB of Luoyang reports directly to the municipality, while the relationship with higher level of the professional body – the CRB at the Province level and the SACH (State Administration for Cultural Heritage) – is involved only in case of special projects, extraordinary events, or within a mere supervisory roles.

Such an institutional design is largely responsible of heritage destruction related to building and infrastructure constructions in the booming economy. Suppose the local administration is sensitive to economic development initiatives that have negative impacts on heritage preservation: in this case the professionals in charge of heritage protection have very little possibility to resist such project. They can try to stop it, simply on the basis of discussion and persuasion. In the end, the decision power is in the hand of the mayor, as well as their career and work assessment. The same situation would be different in Italy: the Superintendents – representatives of the Ministry of Culture at the local level – could easily express their negative opinion to the Ministry, in ways that are less subject to local dynamic and the pressure of vested interests at the local level. Though the term "centralization" tends to be seen as outdated, one of the serious problems in China preservation of heritage is indeed the excess of decentralization.

Economic Booming and Salvage Excavation

The general context of transformation of the country has other important impacts on approaches to heritage management in China. The extraordinary rates of economic growth and the associated rate of urbanization imply unprecedented levels of building and construction activities all over the country. And, consequently, there are extraordinary levels of new archaeological finds. The heritage chain – the chain of activities from excavation to conservation, research, and museum activities (Zan and Bonini-Baraldi 2012) – compared to other countries is here concentrated on early steps, on excavation, and on new finds, which have tended to completely revisit the taken-for-granted view of Chinese history, with very interesting controversies between archaeology and text historiography (von Falkenhausen 1993; Bagley 1999).

This huge archaeological activity however is once again related to administrative issues, with the explosion of salvage archaeology activities, which are responsible of most of the finds in recent years. According to the 2002 law on heritage protection (Law of the People's Republic of China on Protection of Cultural Relics, No.76, October 28, 2002: http://www.gov.cn/english/laws/2005-10/09/content_75322.htm, art. 30–32), before any construction can start, a preliminary archaeological inspection has to be run by the local administration (by the excavation team of the CRB at the local level). In case some sign emerges of archaeological finds, more extensive archaeological excavation is then run, funded – and this is the relevant peculiarity – by the construction company (see Article 31: "The expenses needed for the archaeological investigations, prospecting and excavations which have to be carried out because of capital construction or construction for productive purposes shall be included in the project budget of the construction entity"). Should the finds present high value, the building activity would be definitively halted.

Such an administrative mechanism could be seen as a very positive solution for China archaeology: the "business model" is that building and development activities "pay" for archaeological excavations (which mean huge amounts of money in a booming economy). Unfortunately, there are several shortcomings in such a situation (Guo et al. 2008): in the lack of clear definitions of

principal and related activities, the archaeological teams at the local levels have strong incentive mechanism to simply "dig": no budgets are devoted to research or to conservation of the finds. Indeed the archaeological teams in archaeologically intense areas – such as Luoyang, for instance – are unusually rich departments. The situation is worsened by institutional fragmentation, which does not address the collaboration between different entities: for instance, in Luoyang there are two archaeological teams of the local CRB doing almost only salvage excavation, with little, if any, coordination with four archaeological teams of the Institute of Archaeology of the China Academy of Social Science with excavation stations in the area, including Erlitou, a crucial excavation for the debate on early dynasties. Even when norms are defined by laws, not always are they followed. For instance, extensive reports on excavation should be presented within 3 years; finds should be transferred to the local museum's depot after this period. Actually, the lack of excavation reports is a serious problem undermining the possibility of knowledge diffusion; excavation teams sometimes are accused of not transferring the finds to museums.

National Identity Building and Museum Development: Administrative Issues

The general administrative transformation of the country has also direct implications for the ways in which museums are run, both in terms of design and development. From a formal point of view, museums (the same applies for archaeological sites) are defined as *shiye danwei*, as public sector units (PSUs), as this term is usually translated in English (Pilichowski 2005). They are, in a sense, "entities" established as operative arms of the respective governmental level, with their own collections and often building, financial statement, personnel, in a word their administrative identity.

There are very few national museums (directly reporting to the SACH); some important ones are provincial museums (they refer to the Cultural Relics Bureau at the province level); most are district, municipal, or town museum (i.e., reporting to the CRB of these levels). In any case, the process of decentralization is to be intended as devolution more than anything similar to the Anglo-American mechanism of the arm's length principle. The transfer of power is from the central government to the provincial level, and for the most part at lower levels, more than from each governmental level to autonomous operating entities. In other words, at each governmental level, there is a strict control over museums reporting to this level, and there is not an issue of autonomy of the entity in itself.

An important distinction made by the Chinese regulation was between museums that were totally funded, partially funded, and financially self-funded, in relation to different kinds of economy of each entity. This was likely to pose different issues in the day-to-day running of museums and in development terms. Self-funded museums tended to be very powerful centers: with interesting collections, good appeal to visitors and good location, with Western prices and Eastern costs, they could be profit-seeking entities as it is rarely in the West. They were often able to contribute to determining future developments, always in strict accordance with the governmental level to which they refer to. On the contrary, for museums that were not totally self-funded, resources for functioning were provided at the local level; developmental ones, link to special projects, were provided by the SACH in accordance with the CRB at the provincial level (and may be involving CRB of lower levels as well).

In any case, for day-to-day life, museums have to use administrative rules and the table of accounts that are common to the other (almost one million) *shiye danwei* in the country. This is raising serious problems for activities that are so crucial for museums but for whom it is even impossible to find an entry in the national table of accounts (e.g., conservation, maintenance). Indeed maintenance and conservation are some of the most problematic issues for Chinese museums (Li 2005), as it has been explicitly acknowledged even in formal documents (see, for instance, the 11th Five-Year Plan).

In terms of development, there is a strong policy at the central level to build new archaeological sites (about a hundred, in the 11th Five-Year Plan) and museums. According to the new 12th Five-Year Plan for Cultural Heritage, there should be one museum in each of the 333 prefectural levels, with a goal of passing from 3,020 to 3,500 museums in the five years). This is partly explained by the increase of tourism in the recent years (especially domestic), but it is also linked to a more general politics of national identity building, if not nationalism (a well-known issue in the international debate: see Vickers 2007). For such a developmental program, the center had already defined a sort of development plan during the previous Five-Year Plan horizon, offering a huge amount of money to gain the consensus at lower governmental levels' plans (for instance, for the archaeological parks, the initial assumptions – later further expanded – were about 36 billion RMB for 2006–2010, where 53% was provided by central government). However, running costs were not identified nor budgeted and much less so funded, which is likely to pose serious problems in the future, once the investment phase for new museums and parks will be over and the issue of "running costs" will emerge. Maybe some of the new entities will be self-funding; for the rest, serious problems of sustainability will take place, also in connection to the decision – taken by center – to generalize the free entrance to museums already started with a few exceptions since 2008. As always, the issue of sustainability appears as a problem at later stages if it is not being addressed as an issue in earlier stages. This happens very often in the arts and heritage sector: what is peculiar of the Chinese situation is however the scale of the phenomenon.

Between Centralization and Decentralization

Indeed administration matters. Both longer term administrative traditions and recent transformations have an impact on the ways in which heritage is managed in China, from excavation, to research, to museum opening. Curiously enough– and quite counterintuitively if one does not know the Chinese administration – the excess of decentralization explains to some extent the destruction of heritage often referred to (professionals in charge of protection are "hostages" to the local administration; incentive mechanisms toward digging activities; institutional fragmentation and jealously; lack of respect of norms).

However, there are also positive aspects related to the explosion of salvage archaeology and its intrinsic anarchist nature in pluralizing the past (the impossibility to plan and direct it in systematic ways). Similarly, potential influences refer to the following steps of the heritage chain (research, conservation), and particularly museum development, as narratives about the material culture and archaeological finds are unlikely to resist similar debates in the middle run. From this point of view, salvage excavation appears as a strong antidote to ideological uses of heritage from any central (and centralist) views. The variety of empirical evidence that characterizes China archaeology in the last few decades, largely based on salvage archaeology, has questioned to a serious extent traditional views of linear developments of China over millennia, with the emergence of a very interesting – and unusual elsewhere – conflict between archaeology and historiography in China, between empirical evidence and text-driven explanations. Moreover, the controversy about the very existence of the first dynasty is perhaps the best example of the dialectic between different forms of archaeology, where research archaeology was explicitly aimed at giving evidence to the 5,000 years of Chinese history within a nationalist frame (the Xia-Shang-Zhou Chronology Project. For a reconstruction, see Lee 2002: 16–17). These aspects have been extensively addressed by archaeologists in their substantive elements, sometime Western archaeologists (von Falkenhausen 1993; Bagley 1999) and sometimes Chinese archaeologists outside China (Lee 2002; Li and Xu 2007). Here the administrative foundations of this revolution have been addressed.

More difficult is to foresee how the dialectic between centralization and decentralization will have an impact in terms of museums and archaeological parks. On the one hand, a tension

between different policy preferences can be found, with the central government pushing a policy of national identity building and free entrance, while often the periphery would be more seduced by profit-maximizing museum projects, related to tourism development (the over-commoditization of Lijiang is the best example in this sense: see, for instance, McKhann 2001, 2010). Heritage professionals and their values (archaeologists, museologists, and historians) sometimes find themselves in conflict with both the extremes of this kind of policy tension. On the other hand, it is the administrative mechanism that makes the overall result of similar tensions more uncertain than usual: the separation between investment and running conditions – a recurrent problem in the heritage field – is here associated with a separation between governmental levels in funding extraordinary projects and their running costs at a later stage.

Cross-References

- ▶ Archaeological Resource Management: The Changing Role of the State
- ▶ China: Cultural Heritage Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ China: Managing Cultural Heritage and the World Heritage List
- ▶ China: Museums
- ▶ Cultural Heritage Management: Project Management

References

Bagley, R. 1999. Shang archaeology. In *The Cambridge history of ancient China. From the origins of civilization to 221 B.C.*, ed. M. Loewe and E.L. Shaughnessy, 124–131. Cambridge: Cambridge University Press.

Guo, Y., L. Zan, and S. Liu. 2008. *The management of cultural heritage in China. General trends and micro focus on Luoyang municipality.* Milan: Egea.

Lee, Y.K. 2002. Building the chronology of early Chinese history. *Asian Perspectives* 41: 15–42.

Li, L., and H. Xu. 2007. Rethinking Erlitou: Legend, history and Chinese archaeology. *Antiquity* 81: 886–901.

Li, X. 2005. China exclusive: why Chinese museums on edge of survival? *China Daily*, 19 May 2005. Available at: http://www.chinadaily.com.cn/english/doc/2005-05/20/content_444126.htm (Accessed on 16 Nov 2012).

McKhann, C.F. 2001. The good, the bad and the ugly: observations and reflections on tourism development in Lijiang, China. In *Tourism, anthology and China*, ed. C.B. Tan, C.H. Cheung, and H. Yang, 147–165. Bangkok: White Lotus Press.

McKhann, C.F. 2010. Naxi religion in the age of tourism: persistance and (re)creation. In *Faiths on display*, ed. T. Oakes and D.S. Sutton, 183–210. Lanham: Rowman & Littlefield Publisher.

OECD. 2005. *Governance in China*. Paris: OECD Publishing.

Pilichowski, E. 2005. The reform of public service units: challenges and perspectives. OECD, Directorate for Public Governance and Territorial Development, JT00176426.

Straussman, J.D., and M. Zhang. 2001. Chinese administrative reforms in international perspective. *The International Journal of Public Sector Management* 14: 411–422.

Vickers, E. 2007. Museums and nationalism in contemporary China. *Compare* 37: 365–382.

von Falkenhausen, L. 1993. On the historiographical orientation of Chinese archaeology. *Antiquity* 67: 839–849.

Wang, H. 1994. *The gradual revolution: China's economic reform movement*. New Brunswick: Transaction Publishers.

Zan, L., and S. Bonini Baraldi. 2012. Managing cultural heritage in China. A view from the outside. *China Quarterly* 210: 456–481.

Zan, L., and Q. Xue. 2011. Budgeting China: macro policies and micro practices in public sector changes. *Accounting, Auditing & Accountability Journal* 24: 38–62.

Further Reading

Du Cros, H., and Y.S.F. Lee. 2007. *Cultural heritage management in China: preserving the cities of the Pearl River Delta*. London: Routledge.

Chinese Archaeology in the Twenty-First Century

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Chinese archaeology, after the devastating Cultural Revolution (1966–1976), finally embarked on a normal track of development. In the era of the

"Reform and Open Door (改革开放)," the Marxist paradigm faded away from the academic sphere, whereas the regionalist paradigm arose to become the new beacon for Chinese archaeology (von Falkenhausen 1996). This paradigm, juxtaposed with the rejuvenated historiographical and antiquarianist orientations, however, continued to hamper Chinese archaeology from playing out its full potential (Falkenhausen 1993: 847; 2015: 148). Since the late 1990s, while these forces remain omnipotent, a number of new developments have gradually mitigated their power. As a result of the rocket-like rise of economy, the entire country plunged into an unprecedented period of feverish modernization of infrastructure and urbanization. The grand construction projects and the rapidly growing state funding for research projects have injected vitality, perhaps too much and too fast, into the long-sluggish discipline. In the meantime, the influx of international expeditions and Western theories gradually transformed Chinese archaeology and triggered a thorough overhaul of the outdated fieldwork manual in 2009. The new manual, which was rigorously implemented by the State Administration of Cultural Heritage (hereafter SACH) to the entire country, has revolutionized the paradigm, methodology, and technological equipment of Chinese archaeology, which in turn has empowered it to reorient their research agenda, dispatch expeditions to foreign countries, and develop underwater archaeology.

Mega Infrastructure Modernization Projects

The Three Gorges Dam was designated to build up a dam in the middle of the Yangtze River; planned ever since the 1910s, it was put into execution in 1994. Within the affected area of 1074 km^2, archaeological work had been sporadically done since the 1950s, and a number of important sites, including Longgupo in Wushan County, where an ape of 2 million years ago was found, had been uncovered; after the start of the project, an extensive archaeological survey was carried out which recorded 1074 sites, including 723 underground ones. These sites, however, had to be taken care of within a mere 15 years, i.e., 1994–2009; thus, although over 30 universities and archaeological institutes from all over the country poured their manpower into this area, only a small fraction of them was subject to proper rescue excavation. The most extraordinary discovery was the salt production site at Zhongba in Zhong county, where 6 years of excavation exposed nearly 100 tombs, 300 house foundations, and 600 trash pits within an area of 6600 m^2 (Liu et al. 2003: 65). The cultural deposits, altogether 12.5 m thick, comprised strata of the Neolithic Age through the Qing dynasty (Liu et al. 2003: 65). The discovery of a stratum of the Daxi culture at Liujiaba in Wushan county advanced the record of the earliest human activity in this area to as early as 5000BC. These sites, together with the historic site of Baidicheng in Fengjie county, whether or not completely excavated, were all submerged under water after 2009 (Liu et al. 2003: 64).

This ushered in a succession of grand projects. The South-North Canals Project, which was meant to deliver water from the Yangtze River to alleviate the draught that has long stricken northern China, consists of three lines, among which the Eastern and Middle Lines have been implemented. The Eastern Line, which links the Lower Yangtze River to the city of Tianjin, passes through Jiangsu, Shandong, and Hebei Provinces. Utilizing the historical Grand Canal, rivers, and lakes along the way as well as building dozens of pumping stations, this line was started in 2002 and completed in 2014. Over 50 institutions from all over the country participated in the survey and excavation in the affected area within Jiangsu province alone, discovering a number of important sites, including the Han dynasty city of Liangwangcheng, the Han dynasty lineage cemetery of Shantou, and a cluster of tombs of the Yuan, Ming, and Qing dynasties pertaining to the active operation of the Grand Canal (Lü 2013). The Middle Line is used to draw water from the Danjiangkou Reservoir in Hubei province and transmit it through newly built canals in Henan and Hebei provinces and finally reach the cities of Tianjin and Beijing. Within the affected territory, over 600 sites had to be excavated within 9 years (2004–2013). About 24 institutions were

involved in the excavation campaign, and by 2009 a half of them were excavated. Among them, the Yangshao culture settlement of Longshangang in Xichuan county, the late Shang settlement of Guandimiao in Yingyang city, the Eastern Zhou Chu cemetery of Xujialing in Xichuan county, and the royal cemetery of the Northern Dynasties in Yecheng are all important sites (Zhang and Liang 2010).

Preservation of Important Sites

All of the above projects, plus the West-East Gas Pipelines, the high-speed railway and freeway networks, as well as the rapid urbanization all over the country, put ancient urban centers, settlements, and cemeteries, especially those located within or adjacent to modern cities, at risk of destruction. Although the Chinese Cultural Relic Protection Law (中华人民共和国文物保护法) was issued in 1982 and amended several times thereafter (http://www.npc.gov.cn/npc/xinwen/2017-11/28/content_2032718.htm), it is up to the discretion of the all-powerful governments of the Central and Provincial levels whether to respect it or not. The state and provincial administrations of cultural heritage could not challenge but usually bend to the desire of, or sometimes collaborate with, the governments. Many of the affected sites had been designated as National Cultural Heritage, but they were either perceived as peripheral matters or as annoying obstacles to economic development, or overexploited as tourist attractions (Lu 2005: 121).

Alarmed by the escalating destruction to the archaeological sites, particularly those of national significance, such as the late Shang capital at Anyang, and the Sui and Tang dynasties capital at Xi'an, SACH figured out two strategies. One is to increase the number of applications for adding sites to the World Cultural Heritage List. China joined the *Convention Concerning the Protection of the World Cultural and Natural Heritage* in 1985, and by 2002, it had put 23 major sites, i.e. the Paleolithic site of Zhoukoudian, the Dunhuang Grottoes, the Terracotta Army, the Longmen Grottoes, and the Yun'gang Grottoes, on the list. This helped to implement protection programs, to change the attitude of the local governments and populations, and to bring tourist revenues. Since 2001, SACH became more active in organizing these applications, even setting up a department specifically handling them, and overseeing the protection of the World Heritage sites (Li 2004). To date, 17 more archaeological sites, including the late Shang capital at Anyang, the city and mausoleums of the Koguryo kingdom in Ji'an, the Silk Road, the Grand Canal, the Yuan dynasty city of Shangdu, and the Ming and Qing dynasties complexes of Tusi, have been named as World Heritage sites (available at http://whc.unesco.org/zh/list/).

The other strategy is to focus on the "Great Sites (大遗址)," that is, large and significant sites. Since 2002, SACH has integrated programs of investigation, protection, and display of these sites into the national Five-Year Plans of development, which the local governments have to execute faithfully. In the beginning, 50 sites were included in the Eleventh Five-Year Plan (2006–2010), then 100 in the Twelfth Five-Year Plan (2011–2015), and 150 in the Thirteenth Five-Year Plan (2016–2020). These programs entail the freezing of the territory of the site from any major developments, very much to the distress of the local governments, who lose valuable land for social and economic development. As a practical way of easing the tension between their interests and the programs, site parks were advanced as a solution for sites within or adjacent to modern cities. This solution turns a site into a recreation area or tourist attraction, and allows the local government to use the surrounding land for development. Such solution had been tried at the site of the Qujiang Pond (1996–2007), the imperial garden of the Tang dynasty capital of Chang'an. Once exalted as "the Qujiang model (曲江模式)," the project has invited much critique, because it destroyed any cultural deposits in the surrounding area. Nevertheless, the same solution is now being implemented at other "Great Sites" (Wang 2008).

Archaeologists have participated in the planning and execution of both the World Heritage application and the "Great Sites" protection projects; for both objectives, they have carried out a

great deal of fieldwork for the sake of understanding the dimensions, cultural value, and preservation strategy of the target sites. Among them, Liangzhu figures very prominently. In the 1980s, the site was discovered to have one large walled settlement and three aristocratic cemeteries, whose tombs were furnished lavishly with jade objects. But as it is located near the economically vibrant city of Hangzhou, it became increasingly entangled with the expansion of the city. In 2001, the provincial government of Zhejiang set up a protection zone for the Liangzhu site, in which a park was planned and urban development was barred, whereas the surrounding zone was urbanized. Since 2006, Liangzhu has been exalted as a model site, included in the protection program of SACH and placed on the list of application for World Cultural Heritage. Thanks to both programs, large-scale excavation was resumed, leading to the discovery of the water-diverting canals outside the complex and rice paddies near the large walled settlement (Renfrew and Liu 2018).

The Origin of Chinese Civilizations Project

In 1996, a grand research project, "the Xia-Shang-Zhou Chronology (夏商周断代工程)," was initiated by Song Jian (宋健), then head of the National Science Committee (now Ministry of Science and Technology), to refine the chronologies of the Xia, Shang, and Zhou dynasties, the earliest dynasties recorded in Chinese historical accounts. The chronology of the three dynasties had in fact been tackled by generations of scholars, both Chinese and international, in various fields. The existence of the Xia dynasty has been and is still doubted by some scholars; however, as Song and other top leaders of China were upset by the fact that the "Chinese civilization" is not as old as those of the Near East and Egypt, a project should be undertaken. Specialists from various research institutions were mobilized to work out a finer chronology, a modest yet difficult objective. Nine teams were organized to deal with nine subjects: historians (headed by Li Xueqin 李学勤) were to collect records of datable events in received texts; archaeologists (headed by Li Boqian李伯谦) were to excavate at key sites such as Erlitou, Yanshi Shangcheng, Anyang, and Fengxi, to find diagnostic cultural strata for dating Xia, Early Shang, and Late Shang; astronomers (headed by Zhang Peiyu 张培瑜) were to search oracle bone and bronze inscriptions for astronomical events that anchor the date of King Wu's conquest of the Shang dynasty and the reign dates of all the kings of the Western Zhou; dating scientists (headed by Qiu Shihua 仇士华) were to provide a fine-grained chronological series of radiocarbon dates. Marred by internal disagreement, the project was concluded in 2000 without producing the wished-for results (Xia-Shang-Zhou Duandai Gongcheng Zhuanjiazu 2000).

The project nevertheless provided an ideal precedent for other large multiyear projects to come. In 2001, the grand project, "The Origin of Chinese Civilizations (中华文明探源工程)," was launched to further fulfill the aspiration of Song Jian. It was tailored to prove the long-held claim of the existence of "Five Thousand Years of Chinese Civilizations," which would make the Chinese civilizations equal with Near Eastern and Egyptian Civilizations. Some scholars, international and Chinese, are doubtful of this claim, which would require the Chinese civilization to have risen before 3000BC, in archaeological terms, within the Neolithic Age. The Ministry of Science and Technology was nevertheless fully supportive of the project. Under the leadership of two archaeologists Wang Wei (王巍) and Zhao Hui (赵辉), a multi-institutional and multidisciplinary team was organized in the same manner as for the Xia-Shang-Zhou Chronology Project.

After 2 years of preparatory work, the project was officially activated. During its first official stage (2004–2005), the project was set to focus on the region of the Central Plain and the period of 2500–1500BC, or the Longshan, Erlitou, and Early Shang periods, addressing five subjects: (1) a fine-grained radiocarbon chronology of the archaeological cultures in the region; (2) the natural environment; (3) settlement pattern and social structure; (4) economy and technology; and (5) the formation of Chinese civilization. When it came to the second stage (2006–2008), the same

set of questions was posted to address the period of 3500–2500 BC, or the late Yangshao and the early Longshan periods; it was also extended to include the important sites of Shimao in the Ordos Plateau, Taosi in the middle Yellow River, Shijiahe in the middle Yangtze River, Liangzhu in the Lower Yangtze River, and Niuheliang in the Liao River Valley. A third stage (2009–2015) was undertaken to wrap up the project (Wang and Zhao 2012), although no official reports have been published to date.

Based on the data it had acquired, the project proposed a new set of material indicators of civilization: the development of agriculture and craft production; the building of monumental settlements and public structures that demand a large great deal of labor investment; the building of palaces and temples that display royal power; the use of ritual objects that manifest sophisticated craftsmanship and high status. The Neolithic sites of Niuheliang in Liaoning province and Lingjiatan in Anhui province, dated to 3500 BC and featuring large tombs furnished lavishly with jade objects and grand ritual structures, thus arrive at the threshold of civilization; the sites of Liangzhu and Taosi, dated to 3000–2000 BC and featuring grand settlements, massive palaces, and large tombs, have passed the threshold toward state-level society and civilization. During the next period, the imposing palaces, ritual bronzes, and bronze and turquoise workshops lift the Erlitou culture to the stage of "royal state (王国)," a home-grown term that designates the Shang and Zhou dynasties. The project thus inferred that civilization emerged in the Neolithic Age in several of the outlying regions, but all these civilizations disappeared to give way to the single "royal state" in the Central Plain in the Bronze Age (1750–500 BC, Wang and Zhao 2012).

After the completion of the project, SACH funded another project "Discovering China (考古中国)." With an ambiguous yet trendy title, the project follows the spirit of the previous one to investigate the formation of civilizations in the Central Plain and the outlying regions, including the Ordos Plateau, the middle and the lower Yangtze River, highlighting the star sites of Shimao, Shijiahe, Liangzhu, and significant, newly discovered sites. Unlike the previous two, the project is directed by SACH and executed by provincial institutes of archaeology; without any temporal and spatial constraint, it is flexible enough to incorporate any new discoveries of any period which bear on the origin of Chinese civilization, the origin of human beings in China, and the formation of the multiethnic unity of China: that is, grand walled settlements, monumental structures, rich cemeteries, even the imperial mausoleum of the Liao dynasty. Designated as a priority project of SACH during the Thirteenth Five-Year Plan period, it is yet in progress; as such, only some discoveries have been reported (Li 2018).

International Fieldwork Projects in China

After the rise to power of the Chinese Party, political circumstances forced Chinese archaeologists to cut connections with the West in the 1950s, then with the Soviet Union in the 1960s, and thus with all the major archaeological communities of the world. By the late 1970s, only a few top Chinese scholars were sporadically in touch with foreign archaeologists. There were no foreign research projects in China, nor Chinese field projects in foreign countries, with but one exception. In the early 1960s, upon the request of North Korea, a joint Sino-Korean expedition was organized to investigate sites of the Neolithic and Bronze Ages, Koguryo, and Bohai periods in northeastern China. But the subsequent territorial conflict between the two countries caused the Chinese government to shut the door to international collaborative projects. It was only in the 1990s that China was reopened (Zhang 2019).

The first international collaborative project on Chinese soil was that of Harvard University, led by Kwang-chih Chang (1931–2001), who had strenuously sought for such a project since the late 1970s. In 1990, his project of searching for the proto-Shang capital in the Shangqiu City was finally landed on the ground (Zhang 2019). This project was followed by other ones from the USA, France, and Japan. These international

expeditions brought not only funds that China was badly lacking, but also new research agendas and methods. Among them, the teams of the Andover Foundation for Archaeological Research Foundation and Harvard University came to Jiangxi and Hunan Provinces to study the origin of rice agriculture (Zhang 2019). The teams of Yale University, Minnesota University, and University of Pittsburg introduced the approach of regional survey to the Liangcheng zhen site in Shandong Province, the Huan River valley in Henan Province, and the Chifeng region in Inner Mongolia (Zhang 2019). The team of the University of California, Los Angeles (UCLA), investigated the salt production site of Zhongba in the Three Gorges area before it was drowned. Among the French and Japanese teams, those from the National Scientific Research Center of France and the Buddhist University of Japan investigated a few ancient Buddhist monasteries deep in the Tarim Desert (Zhang 2019). Thanks to these field projects, the study of Chinese archaeology in the West and Japan has grown significantly (Zhang 2019).

New Archaeological Fieldwork Manual

The "Xia-Shang-Zhou Chronology" and the "Origin of Chinese Civilization" projects as well as the international field projects brought new theoretical paradigms and new research strategies to Chinese archaeology, which prompted a thorough overhaul of the outdated *Archaeological Fieldwork Manual*. First issued in 1984, the manual was modeled upon the regionalist paradigm. The typological method was introduced to China and adapted to Chinese data by Su Bingqi (苏秉琦, 1909–1997) (Hein 2016). In the frenzied development of the "Marxist Chinese archaeological system (马克思主义中国考古学体系)" in the 1950s, typology was attacked as "bourgeois." Su nevertheless kept pondering over the regional cultural distinction of the Yangshao (5000–2800 BC) and Longshan (2800–1800 BC) periods. After examining archaeological cultures in more regions in the 1970s, he began to develop the theory of "regional cultural genealogy and variation (区系类型)," which sought to establish the cultural sequences of individual regions. In a time when most archaeologists, Chinese and international, held on to the traditional outlook that the only civilized part of China was the Central Plain, the theory gave due respect to the multilineal development of regional cultures, and gave rise to the notion of "multiple origins of Chinese civilizations (满天星斗)" (Zhang 2013).

This theory, which constituted the backbone of what some call the "Chinese school" of archaeology, was the mother of the 1984 manual, a collective work compiled by Yin Weizhang (殷玮璋). The establishment of regional cultural sequences was thus taken to be the primary objective of Chinese archaeology. Since the 1990s, however, new theories and fieldwork methods streamed in from other countries, and the constraints of the 1984 manual appeared acute. Thus in 2005, SACH commissioned Peking University to conduct a major revision of the manual. From manuals of Britain and Japan, a whole set of survey, excavation, recording, storage, and conservation guidelines are borrowed (Zhang 2014). A broad spectrum of subjects of settlement pattern, subsistence economy, craft production, and social organization are adopted. A full-coverage survey is instituted to investigate the distribution of artifacts, the natural environment, and local resources of a site. During excavation, attention is given to the spatial organization and the formation process of the site. Sifting and flotation are implemented to collect animal bones and plant seeds for further archaeobotanical and zooarchaeological studies. An excavation project is no longer aimed at narrow subjects such as the definition, chronology, and ethnic association of a culture, but at wider range of subjects and multidisciplinary research. Much attention is paid to issues of conservation. Understanding that cultural artifacts are most vulnerable to damage at the moment when they are exposed to air, it stipulates that conservation personnel and apparatus be ready on site so that fragile artifacts can be taken care of instantly (Zhang 2014). Delicate artifacts are given instant consolidating treatment instead of being left to turn into powder; particularly small artifacts are transported in their original block of earth to

laboratories to be excavated there under minute documentation rather than being taken out quickly in the field (Zhang 2014).

Before implementing the manual on all field projects in the country, SACH commissioned several trial applications so as to demonstrate its advantages to the field archaeologists as well as to collect feedback for improvement. For instance, in 2011, a group of archaeologists of Shaanxi Province undertook a systematic survey of the walled settlement of Shimao. An old-fashioned survey and a test excavation had been conducted there in the past, but the site remained poorly understood. This time the team carried out a full-coverage survey of a 20-m-wide transect, recorded GPS data and architectural features, and gathered all pottery shards within the sampling zones. As a result, the knowledge of the settlement was augmented dramatically. The two circles of walls of the settlement were discovered and its dimension was accurately worked out as 425 ha (Zhao 2016).

Chinese Field Projects in Foreign Countries

The new manual, vigorously promulgated by the SACH through field training programs and inspection of on-going fieldwork, leads not only to the improvement of fieldwork and research standards, but also to the upgrade of research facilities, including fieldwork equipment, conservation and research laboratories, as well as university curriculum to catch up with the progress in the field. The annual "Top Ten National Discoveries" Award, started by China's Cultural Relics Weekly (中国文物报) in 1990, and the "Six National Great Discoveries" Award, started by the Institute of Archaeology of Chinese Academy of Social Sciences (中国社会科学院考古研究所) in 2010, compel archaeologists to refine their fieldwork and research. Among all the archaeological discoveries of the year all over the country, ten or six are selected for the awards. As time goes on, the awards ascribe increasing value to the fieldwork and research methodology of archaeologists as well as the scholarly significance of the discoveries. Highly visible in national media such as CCTV and Xinhua News, the award ceremonies of the two awards have become occasions of pompous gala like the "Oscar Award." Archaeological institutions and local governments scramble to use state-of-the-art technologies and conduct multidisciplinary research, and conjure up nationalism and the Party ideology of multi-ethnic unity of Chinese civilization, to win them. As a result, they have charged archaeological institutions with plentiful energy to update their fieldwork and research capacities, which quickly reach the threshold of excess. It is now not only possible but also necessary for them to export these capacities to foreign countries.

Chinese institutions began to send expedition to foreign land in 1998, when the Ministry of Commerce, upon the request of UNESCO, funded the Chinese Institute of Cultural Heritage to conserve the ancient city of Angkor Wat in Cambodia, which included archaeological investigation. In 2005, it funded another project in Mongolia, organized by the Inner Mongolian Institute of Cultural Relics and Archaeology, to investigate Xiongnu, Uighur, and Turkic cemeteries. After President Xi Jinping announced the "One-Belt-One-Road" Initiative in 2013, the number of teams dispatched to foreign countries has increased significantly (Zhang 2019). Most institutions, however, have to secure their own sources of funding, which are much less bountiful and sustainable; SACH, quite surprisingly, cannot help much. The first teams sent by the Heilongjiang and Jilin Province Institutes of Cultural Relics and Archaeology, as well as Jilin University, to the Far East of Russia in the early 2000s turned out to be ephemeral (Zhang 2019). The project of Northwest University in Uzbekistan and Tajikistan was in a better situation, because it received a sizeable fund from the provincial government of Shaanxi (Zhang 2019).

In a time of economic recession in many countries throughout the world, the Chinese teams provide not only much-needed funding for archaeological research, but also bring refined expertise and technical equipment to the target countries (Wang 2017). After several decades of

fieldwork, Chinese archaeologists have developed an extraordinary expertise in field survey and excavation; in most regions of China, houses, ash pits, and tombs are built of earth materials, without using stone or mud-brick, and in most cases, they are hardly distinct. But Chinese archaeologists have mastered the skills and tools needed to discern them. The expedition of the Institute of Archaeology of the Chinese Academy of Social Sciences, to Uzbekistan, which was started in 2012, brought both of them to the site of Ming Tepa. The site was known to have one round of wall (500 × 800 m) only, but after systematic application of the so-called Luoyang drill, a handy and efficient tool for survey work originally developed by grave robbers, it was found to have an outer wall, which effectively expanded its size to 2100 × 1300 m. It was also found, again with the tool, to possess two roads, and a cemetery outside the eastern wall. The Chinese drill was also brought by a team of Nanjing University to Iran to define the boundary of Tepe Naderi in Northern Khorasan Province. The area around the Tepe has been buried under multiple layers of silt and washout from the Tepe; the use of the drill in 2016 enabled the Sino-Iranian Joint Expedition to define the original ground and boundary of the Tepe (Zhang 2019).

By the end of 2017, Chinese institutions have sent 22 expeditions to 13 countries over the globe. Most of them work in countries along the "Belt and Road," including Kazakhstan, Bangladesh, as far as Kenya. The rapid development of international projects in the last 18 years, however, has not been well prepared for. Most of the Chinese directors do not master the language and archaeology of the target countries. What's worse, no archaeological program at Chinese universities offers any training in the archaeology of any foreign country. Because of the lack of trained personnel, the excavation materials are published only in Chinese and the language of the target countries, thus inaccessible to most scholars of the international archaeological communities. To make the field projects in the foreign countries sustainable, such archaeological programs are urgently needed (Zhang 2019).

Underwater Archaeology

Owing to the growing economy of China, underwater archaeology has been rapidly developed as well. Underwater cultural heritage, i.e., shipwrecks, caught the attention of Chinese archaeologists in 1987, when an Australian company excavated 239,000 items of Chinese porcelains from a wrecked ship in the South China Sea and sold them on the international antiquities market. The Center for Underwater Archaeology was thus founded at the National History Museum; in the 1990s, young personnel were sent to Japan, USA, and the Netherlands, to learn underwater excavation techniques. In the meantime, the center began to survey Chinese waters, and discovered a number of shipwrecks in subsequent decades (Wu 2007). A prominent discovery was made of an ancient commercial boat, "Nanhai I." Loaded with celadon wares of the Southern Song dynasty, the boat was entirely salvaged and delivered to a museum specifically built for it in 2007 (Zhang 2019). Since 2014, the boat "China Archaeology 01," especially designed for underwater archaeology, and three research bases have been put into use, which augment the capacities of the center (Zhang 2019).

Along with the growing number of field projects in foreign countries, the center, renamed the National Center for the Protection of Underwater Cultural Heritage and placed under SACH in 2009, sent a team to Kenya. The well-known Chinese fleet dispatched by the early Ming Court in 1405–1433 reportedly reached East Africa, which seems to be well attested by abundant Ming dynasty ceramics found there (Zhang 2019). A report of local descendants of Chinese sailors, who survived the capsizing of a ship, by *The New York Times*, caught the attention of the Chinese government. Suspecting that Zheng He (郑和), the commander of the fleet, actually landed there, SACH sent specialists to investigate the site in 2005, and after 5 years of pilot survey, dispatched underwater archaeologists to the seabed of the Lamu Archipelago and Marindi Bay (Zheng 2019). Although it failed to find substantial evidence for the landing of Zheng He, the

team made a number of important discoveries, including a shipwreck dating to the sixteenth/seventeenth centuries and coming from Portugal found in Ngomeni Ras, which is filled with elephant tusks, copper ingots, mercury, copper molds, and glazed pottery (Zhang 2019).

Conclusion

The development of Chinese archaeology in the twenty-first century, as the above review suggests, is phenomenal. Due to the limitation of space, this brief glosses over a few concurrent events, i.e., the rampant occurrence of tomb-robbing and the mushrooming of new museums, but it presents the major ones. Following the economic boom of China, the large-scale infrastructure projects, such as the Three Gorges Dam, the South-North Canals, plus the West-East Gas Pipelines, the high-speed railway and freeway networks, and rampant urbanization have brought long-dormant archaeological institutions a flood of rescue excavation and funding. On top of that, the state-funded preservation projects of the "Great Sites" and the research projects such as "The Origin of Chinese Civilizations" and "Discovering China" have further enhanced their vitality. On the one hand, the amount of fieldwork and data may have been too much and too fast for archaeological institutions to absorb. On the other hand, the lavish amount of funding and influx of new theories and methods have significantly boosted their capabilities, the momentum of which SACH quickly picked up and disseminated to the entire country through the revised *Archaeological Fieldwork Manual*. The improved capacities have even enabled Chinese institutions to send expeditions to foreign countries and develop underwater archaeology. As a result, Chinese archaeologists have been able not only to free themselves from the prolonged yokes of the regionalist paradigm, the historiographic and antiquarianist orientations, but also to interact more actively with the international archaeological communities, by engaging themselves in more intense exchange of scholarship and fieldwork in foreign countries.

References

Hein, Anke. 2016. The problem of typology in Chinese archaeology. *Early China* 39(2016): 21–52.

Li, Rang 李让. 2004. 中国世界文化遗产保护事业步入新阶段 Zhongguo shijie wenhua yichan baohu shiye buru xinjieduan. 中国文化遗产 *Zhongguo Wenhua Yichan* 2(2004): 64–67.

Li, Yun 李韵. 2018. "考古中国"项目取得重要进展 "Kaogu Zhongguo" xiangmu qude zhongyao jinzhan. 光明日报 *Guangming* Daily 24 December, p. 9.

Liu, Yuchuan, Guangji Xu, and Hua Sun. 2003. 三峡考古大会战 Sanxia kaogu dahuizhan. 文明 *Civilization* 3(2003): 63–69.

Lu, Jiansong 陆建松. 2005. 中国大遗址保护的现状、问题及政策思考 Zhongguo dayizhi baohu de xianzhuang, wenti ji zhengce sikao. 复旦学报 *Fudan Xuebao* (Social Sciences Edition) 6(2005): 120–126.

Lü, Chunhua 吕春华. 2013. 南水北调工程江苏段考古发掘工作的成果及特点 Nanshui beidiao gongcheng Jiangsu duan kaogu fajue gongzuo de chengguo ji tedian. 中国文物报 *China's Cultural Relics Weekly*, 19 July 2013, p. 7.

Renfrew, Colin, and Bin Liu. 2018. The emergence of complex society in China: The case of Liangzhu. *Antiquity* 92/364 (2018): 975–990.

Von Falkenhausen, Lothar. 1993. On the historiographical orientation of Chinese archaeology. *Antiquity* 67 (1993): 839–849.

Von Falkenhausen, Lothar. 1996. The regionalist paradigm in Chinese archaeology. In *Nationalism, politics and the practice of archaeology*, ed. Philip L. Kohl and Clare Fawcett, 198–217. Cambridge, UK: Cambridge University Press.

Von Falkenhausen, Lothar. 2015. Antiquarianism in China and Europe: Reflections on Momigliano. In *Cross-cultural studies: China and the world: A festschrift in honor of professor Zhang Longxi*, ed. Qian Suoqiao, 127–151. Leiden: Brill.

Wang, Xuerong 王学荣. 2008. "中国大遗址保护研讨会"纪要 "Zhongguo dayizhi baohu yantaohui" jiyao. 考古 *Kaogu* 1(2008): 38–45.

Wang, Wei 王巍. 2017. 中国考古学国际化的历程与展望 Zhongguo kaoguxue guojihua de licheng yu zhanwang. 考古 *Kaogu* 9(2017): 3–13.

Wang, Wei 王巍, and Hui Zhao 赵辉. 2012. 关于中华文明探源工程 Guanyu Zhonghua wenming tanyuan gongcheng, 中国文物报 *China' Cultural Relics Weekly,* 23 July 2012, p. 5.

Wu, Chunming 吴春明. 2007.中国水下考古 20 载 Zhongguo shuixia kaogu 20 zai. 海洋世界 *Ocean World* 8(2007): 26–30.

Xia-Shang-Zhou Duandai Gongcheng Zhuanjiazu 夏商周断代工程专家组. 2000. 夏商周断代工程 1996–2000年阶段成果 *Xia Shang Zhou Duandai Gongcheng 1996–2000 nian Jieduan Chengguo*. Beijing: Shijie Tushu.

Zhang, Liangren. 2013. Chinese archaeological school. *Antiquity* 87 (2013): 896–904.

Zhang, Liangren. 2014. New developments in Chinese archaeology, *Antiquity* 88/339 (2014): The Project Gallery.
Zhang, Liangren. 2019. 我国国际考古合作的现状和问题 Woguo guoji kaogu hezuo de xianzhuang he wenti. In 孟凡人先生八十华诞祝寿文集 *Meng Fanren Xiansheng Bashi Huadan Zhushou Wenji*, ed. Xin Hua 新华. Beijing: Zhonghua Shuju.
Zhang, Zhiqing 张志清, and Fawei Liang 梁法伟. 2010. "南水北调中线工程考古发现与研究学术研讨会"纪要 "Nanshuibeidiao zhongxian gongcheng kaogu faxian yu yanjiu xueshu yantaohui" jiyao. 华夏考古 *Huaxia Kaogu* 3(2010): 44–48.
Zhao, Hui赵辉. 2016. 陕西神木石峁遗址考古发掘研究的进展及其意义 Shaanxi Shenmu Shimao yizhi kaogu fajue yanjiu de jinzhan jiqi yiyi, 中国文物报 *China's Cultural Relics Weekly*, 23 Aug 2016, p. 3.

Chinese Association for Quaternary Research (CHIQUA)

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Basic Information

The Chinese Association for Quaternary Research (CHIQUA) was established in February 1957 in Beijing, China. Geologist Siguang Li was elected as the first president and Chung-Chien Young and Defeng Hou the first deputy presidents (Liu 1957). From then on, CHIQUA has been dedicated to the organization and coordination of domestic and international academic communication and making great contributions to Chinese Quaternary Science. The Secretariat office is in Beijing and affiliated to the Institute of Geology and Geophysics in the Chinese Academy of Sciences.

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Major Impact

Quaternary is the latest period in the geological history, which refers to the origin and evolution of human beings and dramatic climatic fluctuation. The impact of human activities to natural environment has been hotly debated for a long time by researchers from different working areas, and vice versa; the influence of geological and geographical contexts on human beings is also pursued in broad extent. With these research issues, quaternary research borrows modern technologies, with the help of the geological record, and aims at the reconstruction of geological history of our earth during past millions of years, pursues the motivation and mechanism of all the changes and the fluctuations, interprets the correlation of human beings and natural environment, and estimates the future changes of earth and the associated regulations.

With such goals, CHIQUA refers to multiple subjects including earth science, biological science, physical science, and even social sciences. One of the main responsibilities of CHIQUA is to integrate these disciplines and organize the researchers from all these fields for addressing the related issues. In this case, until now, 15 professional committees have been set up in CHIQUA, which cover all the research fields of quaternary science. These subjects are stratigraphy, high resolution, loess, paleoanthropology and paleolithic archaeology, coastal zone and ocean science, environmental archaeology, environmental change, education and science popularization, chronology, Holocene science, tropic and subtropic research, coral reef science, neotectonic movement, and applied quaternary science.

In 1982, the International Union for Quaternary Research (INQUA) admitted China to its national membership. From then on, CHIQUA involved the associated affairs on behalf of China and has made great contributions to international earth science.

Chinese Association for Quaternary Research (CHIQUA), Table 1 Annual meetings of the Chinese Association for Quaternary Research

Annual meeting	City	Time	Year
1st annual meeting	Beijing	February 11–15	1957
2nd annual meeting	Xi'an, Shaanxi	October 30–November 3	1964
3rd annual meeting	Beijing	June 10–16	1979
4th annual meeting	Beijing	April 10–15	1987
5th annual meeting	Beijing	August 2–9	1991
6th annual meeting	Guangzhou, Guangdong	November 15–22	1993
7th annual meeting	Beijing	November 2–6	1997
8th annual meeting	Dujiangyan, Sichuan	August 20–24	2002
9th annual meeting	Nanjing, Jiangsu	October 9–11	2006
10th annual meeting	Lanzhou, Gansu	August 18–20	2010
11th annual meeting	Guiyang, Guizhou	August 15–18	2014

For promoting the research of quaternary science, especially the Cenozoic paleontology and Qinghai-Tibetan Plateau environment and geology, and encouraging young scholars in these fields, CHIQUA set up the Liu Tungsheng Earth Science Foundation and established the awards of the Liu Tungsheng Prize for Young Earth Scientists and the Liu Tungsheng Scholarship for Earth Sciences. Every two years, not more than three awardees are selected.

Until now, 11annual meetings have been held in different cities of China (Xia et al. 2010), during which researchers have presented their latest achievements and progress. The details can be found in Table 1.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Environmental Reconstruction in Archaeological Science

References

Liu, T. 1957. The foundation of Chinese Association for Quaternary Research and its first annual meeting (in Chinese). *Geological Review* 17: 273–275.

Xia, D., X. Meng, Y. Zhao, J. Zhang, and X. Liu. 2010. The tenth annual meeting of Chinese Association of Quaternary Research was held in Lanzhou (in Chinese). *Quaternary Sciences* 30: 1068.

Chinese Ceramics in Southeast Asia

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Introduction

The trade and export of Chinese ceramics to Southeast Asia have a long history that stretches back into its prehistoric past. To date, the earliest Chinese ceramics found in the region were recovered at Iron Age coastal sites (c. 500 BC–AD 500) in present-day Vietnam and Thailand. Comprising of various lead-glazed and unglazed earthenware sherds, these early Chinese ceramics produced by potters of the Han Dynasty represented the incipient development of a vast "globalized" maritime trading network that connected the late prehistoric region to cultures and polities in South Asia, China, and the Mediterranean world (Carter and Kim 2017). Despite the fall of the Han dynasty and subsequent sociopolitical turmoil that plagued China from the third century AD, maritime trade between China and Southeast Asia – the Nanhai (南海 Nán Hǎi or "South Sea")

trade – continued in the ensuing three centuries, albeit on an intermittent pace and limited scale (Crick 2010c:14–18; Wang 2007 (1958):78–112).

However, only a few sporadic examples of Chinese ceramics of the Yue (越 Yuè) green-glazed typology dating to the Eastern Jin dynasty (AD 317–450) as well as stoneware and white porcelain from the short-lived Sui dynasty (AD 581–618) have been recovered at sites in Sumatra, Java, and Bali (Crick 2010c:18). The reunification and resurgence of China as an imperial power under the Tang dynasty (AD 618–907) however saw the revival of long-distance international maritime trade and exchange akin to that established during the Han dynasty (Crick 2010c:18; Wang 2007 (1958):115). Commonly referred to by historians as the "Maritime Silk Road," the Nanhai trade in this period not only saw regular tributary relations and missions between the Tang court and the polities of Southeast Asia, but also the reestablishment of official relations and missions with the polities on the Indian subcontinent as well as trade with the Persians and Arabs in the Middle East (Crick 2010c; Wang 2007 (1958):115).

Definition

For heuristic purposes, "Chinese ceramics" refer to any form of ceramic artefacts – predominantly vessels – produced by potters and artisans within the geographical boundaries of the present People's Republic of China. Similarly, this entry refers to the geographical region occupied by the ten member states of the Association of Southeast Asian Nations (ASEAN) as "Southeast Asia." Generally speaking, earthenware ceramics refer to any clay artefact fired between 800–1000 °C, stoneware around 1200–1300 °C whereupon clay minerals melt and fuse into a glass-like matrix in a process known as vitrification and porcelain which is achieved through the firing of a mixture of kaolin clay (高岭土, Gāo Lǐng Tǔ) and a non-plastic feldspathic material commonly called "China stone" (白墩子, Bái Dūn Zǐ) at temperatures above 1200 °C (Medley 1976a; Rice 2015:3–6). However, it is worth noting that Chinese potters only distinguish between low-fired earthenware or "Tao" (陶, Táo) and high-fired stoneware and porcelain ceramics which are collectively called "Ci" (瓷, Cí) (Medley 1976a:13–14).

C

Historical Background

Han Ceramics: Third Century BC to Third Century AD

Chinese ceramics stylistically-dated (i.e., distinctive stamped motifs) to the Han Dynasty (Western: 206 BC–AD 220, Eastern: AD 220–280) have been recovered at the site of Suoi Chinh on Ly Son Island off the central coast of Vietnam. Recovered from the Sa Huynh cultural phase (c. fifth century BC to first century AD) at the site, these sherds highlighted the late prehistoric development of maritime trade and exchange along the coast of Vietnam (Pham 2005:136–137). This trade also extended from the coast 115 km to the inland site of Tien Lan, where an imported Chinese bronze bowl was found accompanying a burial (Higham 2014:214). It has since been suggested that Southeast Asian exports such as ivory, rhinoceros horn, feathers, and aromatic wood were traded for Chinese exports including bronze mirrors, bronze bowls, and ceramics (Higham 2014:213–214). Sherds of imported Han dynasty Chinese earthenware were also identified at the coastal site of Khao Sam Kaeo on the eastern shore of the Isthmus of Kra, where maritime trade is thought to have commenced during the early Iron Age (c. fourth to second centuries BC) (Bouvet 2011; Favereau and Bellina 2016:222–225; Glover and Bellina 2011; Higham 2014:231–232).

Fragments of Han earthenware ceramics have also been recovered across various sites in Island Southeast Asia including Sumatra, Java, Borneo, Sulawesi, and Bali (Adhyatman 1990:13; Crick 2010c:14). These vessels are usually lead-glazed or white-slipped with designs painted in "pale shades of black, red or green," and included shapes such as vases, jars, lidded vases with tripod legs, "perfume burners," "ear-cups," lamps, boxes, bowls with handles, as well as spoons

(Crick 2010c:14). As Han earthenware were found in much fewer quantities at these sites as compared to contemporaneous mainland sites in Vietnam and Thailand, it is generally thought that Chinese ceramics were not a significant or regular commodity of trade and exchange in Island Southeast Asia at this time (Adhyatman 1990:18; Crick 2010c:14; Miksic 2009a:71).

Tang Ceramics: Seventh to Ninth Centuries AD

The Nanhai trade between the seventh and tenth centuries AD also saw the large-scale export of Chinese ceramics for the first time in history (Miksic 2009a:72) as well as the transition from the export of earthenware to that of predominantly higher-fired and glazed stoneware ceramics. Three main types of stoneware ceramics were predominantly exported from China in this period: "Changsha" (长沙 Cháng Shā), Yue, and Xing (邢 Xíng) ceramics (Li 2010a:231). Changsha ceramics – eponymously named after the ancient city in the southern Chinese province of Hunan (湖南 Hú Nán) – have been found across various sites in both Mainland and Island Southeast Asia, especially at southern Thailand, the Malay Peninsula and central Java (Miksic 2009a:72). Changsha ceramics were produced at several major kiln complexes about 25–30 km north of the city (Liu 2010:146), and characteristically incorporated a wide variety of forms that included bowls, plates, bottles, vases, handled ewers, rounded bowls, boxes, jars, lamps, and basins (Li 2010a:231); Changsha ceramics in the form of kendis were also reportedly produced and found at various central Javanese sites (Miksic 2009a:72). Also characteristic to Changsha ceramics are the polychrome iron brown and copper green colors typically applied as stylized, pictorial, or calligraphic painted decorations as well as in combination with a variety of appliqué, impressed and stamped motifs (Li 2010a:232). The quantity of Changsha ceramics exported from China in this period was so large that their fragments still "litter the beach" at the site of Laem Pho on the eastern side of the Isthmus of Kra (Miksic 2009a:72).

Yue ceramics are green-glazed ceramics that were produced by kiln complexes located in the Yue Prefecture of the Tang court in the north of present-day Zhejiang (浙江 Zhè Jiāng) province in southern China (Li 2010a:220). Early Yue ceramics (seventh to eighth centuries AD) were produced at varying levels of quality which often results in glazes that were thinly-applied and yellowish green in color (Li 2010a:220). Also characteristic of Yue ceramics are incised decorations of various floral motifs (Krahl 2010b), as well as rings of unglazed spurmarks on both the exterior and interior base surfaces which indicate the use of multiple clay nodules as furniture in the stacking of Yue ceramics for kiln firing (Ho 1994b). Yue ceramic vessels included forms such as bowls, plates, cups, bottles, vases, jar, and handled ewers (Li 2010a:220). Yue ceramics are similarly distributed across various archaeological sites in Southeast Asia, especially in southern China, the Philippines and Indonesia (Ho 1994a).

Xing ceramics typically refers to ceramics which either has a white slip applied over a greyish white body or made entirely out of a pure white paste and, in both cases, bears a layer of translucent glaze (Li 2010a:239). In the former, the vessel color appears white "that was suffused or tinged with yellow," whereas the latter appears in a "glossy" white color that has been noted by Lu Yu (陸羽, Lù Yǔ) in his treatise on tea (茶经 Chá Jīng, c. AD 760–762) lend a "silver and snow" effect in stark contrast to "jade and ice" Yue ceramics (Li 2010a:239). Produced by kilns in the southwestern parts of present-day Hebei province (河北, Hé Běi), Xing ceramic vessels included forms such as bowls, cups, plates, small cups, cup stands, boxes, bottles, vases, handled ewers, jars, pots, tripod platters, and even spouted Buddhist water and ablution kendis and kundikas (Li 2010a:239). Other contemporaneous northern Chinese kiln complexes, notably the Ding (定, Dìng) kilns in the same province and Gongxian (巩县, Gǒng Xiàn) kilns in present-day Henan (河南, Hé Nán) province, also produced "white" ceramics as well (Krahl 2010d).

Other types of Tang ceramics such as the polychromatic Sancai (三彩, Sān Cǎi) and "Dusun" vessels have been recovered from the site of Barus on the west coast of Sumatra (Miksic 2009a:73). Sancai ceramics are lead

glazed earthenware that were produced by a variety of kiln complexes in present-day Henan, Hebei, Shaanxi (陕西 Shǎn Xī), and Sichuan provinces, some of which produced Xing and Gongxian ceramics as well (Li 2010a:249). The intermixing of the four basic glaze colors – white, green, amber, or "reddish yellow" and blue – as they run down the ceramic surfaces during firing (Li 2010a:249–250) resulted in the characteristically colorful appearance of Sancai ceramics. "Dusun" ceramics refers specifically to large green-glazed jars with lugs eponymously named after the ethnolinguistic group in the present-day Malaysian state of Sabah in north Borneo (Kalimantan) where the vessels were first recorded in Southeast Asia (Hsieh 2010a:138). The large Yue green-glazed jars used to store Changsha bowls aboard the Belitung wreck have also been described as "Dusun-type" (Hsieh 2010a:138), and both terms may very well be two separate labels for the same vessel typology.

Song Ceramics: Tenth to Thirteenth Centuries AD

The production and export of Chinese ceramics rose to greater heights during the Song dynasty (c. AD 960–1276) as a direct consequence of the imperial emphasis on maritime trade and exchange as a source of state revenue in the face of threats to the northern frontier and overland Silk Road from the Khitans, Jurchens, and Mongols (Crick 2010c:26; Miksic 2009a:73). Significantly, Chinese historical records on this period such as the Song Shi (宋史, Sòng Shǐ) and the Song Huiyao Jigao (宋会要辑稿, Sòng Huì Yào Jí Gǎo) documents that ceramic goods had become one of the most important maritime exports by the eleventh century AD (Heng 2009:172). Chinese trade ceramics were being shipped overseas *en masse* from the international ports of Guangzhou (广州, Guǎng Zhōu) in Guangdong province, Quanzhou (泉州, Quán Zhōu) and Fuzhou (福州, Fú Zhōu) in Fujian province, as well as Mingzhou/Ningbo (明州/宁波 Míng Zhōu/Níng Bō) and Linan/Hangzhou (临安/杭州 Lín Ān/Háng Zhōu) in Zhejiang province (Heng 2009:19–36). The export of Song ceramics into Southeast Asia appears to have occurred at two levels during this period (Heng 2009:179). The first level involves the production and export of lower quality stoneware ceramics from the southern kilns of Guangzhou and Quanzhou. The second level occurred at kilns that produced higher-quality stoneware ceramics not only for export but also for the imperial court at Jingdezhen (景德镇, Jǐng Dé Zhèn) and Jizhou (吉州, Jí Zhōu) in Jiangxi (江西, Jiāng Xī) province, Longquan (龙泉, Lóng Quán) in Zhejiang province, and Dehua (德化, Dé Huà) in Fujian province (Heng 2009:179).

The mass production of both low- and high-quality Song ceramics at these kiln sites saw the unprecedented distribution and consumption of Chinese ceramics across contemporaneous Southeast Asian archaeological sites (Crick 2010c:32–36; Miksic 2009a:73–78). The quintessential Song ceramic recovered from these sites are green-glazed stoneware ceramics from the kiln complex of Longquan as well as its peers in the present-day provinces of Guangdong and Fujian. Popularly referred to in French as "*céladon*" by art historians, the popularity of Longquan green-glazed ceramics in overseas markets is archaeologically proven. More than 60% of total excavated artefacts between AD 1213 and 1274 at the port of Ningbo consisted of Longquan green-glazed ceramics which became the main export ceramic of Zhejiang province up to the mid-Yuan dynasty (c. AD 1323) (Lin 1994:151–154). Longquan greenware ceramics recovered from the Southeast Asian archaeological context are typically dated to this period (Ho 1994b:191–192), although some relatively "coarser quality" of "Longquan"-type sherds – gritty surface, imperfect glazing and partially or unglazed foot – appears to suggest production and export during the early Ming dynasty in the fifteenth century as well (Kwan and Lam 1985b:123–124).

The Longquan kiln complex is known to have produced numerous green-glazed bowls, large dishes, jarlets, vases, and many other vessel forms between the eleventh and sixteenth centuries AD (Kwan and Martin 1985:77). Early Northern Song Longquan ceramics had thin-walled, white bodies with light green glaze and bore

intricate incised decorations, compared to the thicker, slightly greyish bodies with a yellowish-green glaze that are sometimes crackled and "bold and fluid" incised decorations of the middle and late North Song period (He 2010:298). Decorations on Longquan ceramics are also known to be generally restrained until the middle of the thirteenth century, where they "became more elaborate in technique and frequently more florid in style" (Medley and Pierson 1997:9–10). With the fall of northern China and its capital of Bianjing (Biàn Jīng, 汴京, present-day Kaifeng, 开封 Kāi Fēng) and the relocation of the Song court to the south in Linan in Zhejiang province in AD 1129, the Longquan kilns began to produce high-quality ceramics on par with those produced by the kilns commissioned to produce ceramics for the imperial court (He 2010:301). The adoption of "advanced techniques" of the official kilns also saw the change in clay and glaze recipes that saw the production of high quality, thin-bodied and "deep, limpid" glazed green-glazed ceramics which became popular amongst the southern Song nobility (He 2010:301). Longquan green-glazed ceramics also have a darker green glaze color than its contemporaries from Guangdong and Fujian which has been attributed to the use of coal as kiln fuel in the north (Zhejiang) and wood in the south (Guangdong and Fujian) (Lu 1979:15, 26). The glaze is also thicker and much more opaque due to the application of two or more glaze layers on ceramic body (Kerr 2004:92; Medley and Pierson 1997:9).

Equally popular exports to Southeast Asia are green-glazed stoneware ceramics from the other south Chinese kilns as well (Crick 2010c:33). Green-glazed Guangdong bowls and dishes manufactured between the eleventh and fourteenth centuries AD usually bear a thinly applied light green to green glaze on the body but none on the base or foot of the vessel (Lam 1985:1, 5, 18). Similar green-glazed bowls with combed, incised, and impressed decorations are also produced by many contemporaneous coastal and interior kiln complexes such as Minqing (闽清, Mǐn Qīng), Anxi (安溪, Ān Xī), and Tong'an (同安, Tóng Ān) kilns (Ye 1994:122, 125–126). Kilns in the Quanzhou vicinity reportedly produced "close imitations of Longquan-type glazes, shapes and decoration" specifically for export to overseas markets as well (Ye 1994:122, 125–126), but they can nonetheless be distinguished from Longquan *celadons* through a number of characteristics. Fujian green-glazed ceramics typically bear unglazed stacking rings on their interior bases, a feature not commonly found on Longquan ceramics as most vessels were placed in individual compartments or "saggars" instead of being stacked on top of each other for firing by the thirteenth century AD (Li 1994:89, 95). Fujian vessel forms are also primarily utilitarian – bowls, plates, etc. – and unlike Longquan ceramics, none were ever made for purely art's sake. Just like Guangdong green-glazed ceramics, the glaze on Fujian imitations is quite different from that of Longquan as well. The glaze is generally of a "greyish tone" ranging from yellowish-green to greyish-green in color and not "as neatly and evenly applied" as that of Longquan *celadons* (Ye 1994:123–124). Green-glazed ceramics were also produced at various kilns in present-day Jiangxi, Shaanxi, Henan, Hubei (湖北 Hú Běi), and Hunan (湖南 Hú Nán) provinces as well (Ho 1994c). Nonetheless, they would probably still be transported to the ports designated by the Chinese imperial government for foreign trade and export in Guangdong, Fujian, and Zhejiang (Heng 2009:39, 42–43, 48, 55, 65).

Song ceramics bearing a bluish to greenish white or "Qingbai" (青白, Qīng Bái or, also known as Yingqing, 影青, Yǐng Qīng or "shadowy blue to green") glaze color were also exported to various parts of Southeast Asia as well, albeit at a smaller scale than the popular green-glazed ceramics (Crick 2010c:33–35). Qingbai stoneware ceramics were produced at "forty-four counties of nine Chinese provinces" including Fujian and Guangdong, with those at the Jingdezhen kiln complex of produced Qingbai ceramics of the finest quality and in the greatest number (He 2010:302; Scott 2002:6). Comprising of 136 primary kiln sites, the Jingdezhen kiln complex had access to both high-quality kaolin clay as well as felspathic "China stone" (白墩子,

Bái Dūn Zǐ) that allowed for the production of Qingbai ceramics that resembled "the same colour and texture as jade" (He 2010:302). Early Song Qingbai ceramics were observed to be "mostly plain and undecorated," with only some bowls bearing faint incised or carved decorations of various floral or abstract motifs, as well as the application of dark brown or black iron oxide spots or "splashes" on the exterior surfaces (He 2010:303). Middle Song Qingbai ceramics appeared to have similar forms of decorations, but with thinner bodies, wider rims and smaller feet, as well as glazes that appeared whiter due to a greater control over the kiln firing atmosphere in this period (He 2010:304). Larger quantities of bluish white (as opposed to the greenish white variant) Qingbai ceramics were produced during the late Song period, some of which bear an unglazed rim edge due to the upside-down stacking method of ceramics during kiln firing in order to increase production volume (He 2010:305).

Another famous southern Chinese ceramic production center, the Dehua kiln complex, not only produced Qingbai ceramics but also white stoneware ceramics with a "creamy offwhite tending to yellow or beige" (Guy 1990:71) glaze (also known in French as *blanc de chine*) for export into Southeast Asia as well (Crick 2010d:196–199). Located at Dehua county, the complex had access to rich kaolin clay deposits which were mined and used for ceramic production since the beginning of the Song dynasty (Crick 2010d:196; He 2010:311). With the growing emphasis on maritime trade after retreat of the Song court to the south, the Dehua kiln complex became a major production center for export ceramics into Southeast Asia, producing a wide range of vessel forms including the kundika, ewers, dishes, bowls, and covered boxes (Crick 2010b:196; He 2010:311). Both white and Qingbai Dehua covered boxes decorated with mold-impressed "stylized foliage scrolls" with "rectangular panels with marked ridges and scrolling frieze" (Crick 2010d:196–197, 198–207) in particular are often encountered across various contemporaneous Southeast Asian archaeological sites.

Yuan Ceramics: Thirteenth to Fourteenth Century AD

After the establishment of the Yuan Dynasty (c. AD 1271–1368) in northern China by Kublai Khan in AD 1271, the Mongol emperor embarked on an expansionist policy into the south that eventually saw the demise of the Song dynasty on their last stand at the Battle of Yamen in AD 1279. The cultural and economic importance of Chinese ceramics was not lost to Kublai as he moved to secure and establish his own imperial kiln complex at Jingdezhen in AD 1278 even before he defeated the remnant Song forces in southern China (Barnes 2010:331). The dynasty, however, was short-lived in China and lasted only 97 years before a resurgent Han Chinese dynasty, the Ming, defeated and pushed the Yuan court back north into the Mongolian steppes.

Consequently, most of the Chinese ceramics produced under the Yuan dynasty are represented by the continuation of Song ceramic traditions (Crick 2010c:33). Following the patterns of maritime ceramic trade established in the preceding dynasty, green glazed, Qingbai and white stoneware ceramics alongside brown glazed stoneware storage jars from the southern Chinese kilns in Zhejiang, Fujian, and Guangdong kilns continued to be exported into Southeast Asia (Crick 2010c:33–35). Yuan Longquan green– glazed jars, dishes, and bowls are also observed to be commonly recovered across sites in the Philippines and Indonesia and were specifically used as part of the mortuary assemblage during burial rituals in Sulawesi (Barnes 2010:336). In addition, "iron-spotted" decoration became a popular surface treatment during the Yuan dynasty and was applied to a variety of vessel forms such as small jars and ewers, a number of which were exported to various markets in Southeast Asia (Barnes 2002:130) especially in the Philippine and Indonesian Archipelagos (Crick 2010d:190–193). First developed during the early Song Dynasty, the decorative technique of iron oxide spotting on ceramic vessels was revived during the thirteenth to fourteenth centuries AD and applied on green glazed (also known in Japanese as "*Tobi Senji*"), white and Qingbai

ceramics of various vessel forms (Medley 1976a:152). It has been suggested that the production and export of iron-spotted Qingbai eventually replaced that of plain Qingbai ceramics during the fourteenth century AD (Gotuaco 1997:62, 74).

A new type of white glaze – Luanbai (卵白, Luǎn Bái) – was also developed by the Hutian (湖田, Hú Tián) kiln about 4 km southeast of Jingdezhen (Crick 2010d:153); a relatively "coarser" variant of this glaze is termed Danbai (蛋白, Dàn Dái) (Barnes 2010:367). Both Danbai and Luanbai glaze are "thick, semi opaque and milky" in nature (Barnes 2010:367) which lends a "matt unctuous effect" (Crick 2010d:153) to the white glaze. A number of Danbai and Luanbai white ceramics bear the dual characters of "Shu" (枢, Shū) and "Fu" (府, Fǔ) impressed on the interior wall surfaces together with the decorative motifs, leading them to be commonly called "Shufu" ceramics. It is generally agreed that "Shufu" refers to the Shumi Yuan (樞密院, Shū Mì Yuàn) (Barnes 2010:367; Crick 2010d:153), the Chinese term for the "Bureau of Military Affairs" since its inception during the Five Dynasties Period (AD 907–960). Another set of characters, "Tai" (太, Tài) and "Xi" (禧, Xǐ), which respectively means "great" and "joy" or "happiness" may also be associated with the Taixi Zongyin Yuan (太禧宗禋院, Tài Xǐ Zōng Yīn Yuàn), the bureau in charge of ancestral and ceremonial rites in the Yuan court (Barnes 2010:366; Crick 2010d:153). Despite their strong association with the imperial court, "Shufu" ceramics were found to be exported out of China as Mongol law allowed craftsmen to engage in private trade once quotas have been met (Barnes 2010:366). Commercial "Shufu" ceramics exported into Southeast Asia no longer bore these characters after restrictions on their trade was lifted in 1324 AD and are reportedly "widely distributed" across both the Philippine and Indonesian Archipelagos (Crick 2010d:153).

The spectacular Sinan wreck off the coasts of the southwestern Sinan county islands of the Korean Peninsula provides a rare glimpse into Chinese maritime ceramic trade during the Yuan dynasty. The ship departed from the Zhejiang port of Ningbo (宁波, Níng Bō) around AD 1323 carrying 20,661 pieces of Chinese ceramics, most of which were Longquan green-glazed ceramics and the remaining comprising of Qingbai ceramics from Jingdezhen, black-glazed Jian ceramics, Ding white dishes, and an assortment of ceramics from other kiln sites in Jiangxi, Hebei, Guangdong, and Jiangsu provinces (Barnes 2010:360–362; Lee 2016:223).

Noticeably absent from the Sinan wreck, however, are the renowned blue-and-white stoneware and porcelain ceramics. First produced in China by potters through the import of cobalt from Persia during the Tang dynasty (Krahl 2010c:209), the production of blue-and-white ceramics was revived by the Yuan court sometime between AD 1328 and 1339 a few years after the Sinan wreck occurred (Barnes 2010:369; Crick 2010a:219). Production of Yuan blue-and-white ceramics centered around the Jingdezhen kiln sites of Hutian, Luomaqiao (落马桥, Luò Mǎ Qiáo), and Zhushan (珠山, Zhū Shān), with those produced at the Zhushan kilns reserved for imperial use (Crick 2010a:218). Hutian kilns appear to specialized in the production of large and richly decorated blue-and-white dishes, bowls, vases, bottles, and jars, as well as small dishes, stem cups, and bowls primarily for export, whereas the Luomaqiao kilns appear to produce smaller ceramics with "less sophisticated" decoration for both domestic consumption and export (Crick 2010a:219). Yuan blue-and-white ceramics typically have "rich" but "neat" underglaze painted motifs (裝飾繁縟工整, Zhuāng Shì Fán Rù Gōng Zhěng) of "thick" cobalt blue (青料濃厚, Qīng Liào Nóng Hòu) which is sometimes "uneven" in shade (青花色調濃淡不均, Qīng Huā Sè Diào Nóng Dàn Bù Jūn), as opposed to the "unrestrained" and "lively" brushstrokes (飾紋的用筆奔放、活潑 Shì Wén De Yòng Bǐ Bēn Fàng、Huó Pō) of the Ming period (Yáng and Mǎ 1978:80). The motifs themselves consist mainly of compositions that included floral and faunal designs such as flowers, plants, and animals, as well as traditional Chinese imagery such as dragons, phoenixes, and other mythical animals (Crick 2010a:219–220).

Blue-and-white ceramics exported into Southeast Asian markets are likely to have been

produced at the Hutian and Luomaqiao kilns (Crick 2010a:219). The Daoyi Zhilue (岛夷志略, Dǎo Yí Zhì Lüe) provides the earliest documentary evidence of the export and trade of Chinese blue-and-white ceramics in Southeast Asia. According to its author Wang Dayuan (汪大淵, Wāng Dà Yüan), a Quanzhou traveller in the mid-14th century, blue-and-white ceramics were imported by 15 localities in the region by the mid-fourteenth century AD (Barnes 2010:369) including places on the Malay Peninsula, Singapore, Sumatra, Java, and the Philippines (Miksic 2009a:80–81). Large quantities of Yuan blue-and-white jars, vases, bottles, and large dishes in particular were reportedly found at Majapahit sites in Java, as well as the Philippine islands of Mindanao, Mindoro, Palawan, Cebu, Leyte, and Samar (Crick 2010a:220). Found in much lesser quantities in Southeast Asia – and seemingly mostly in the Philippines (Crick 2010b:212–215; Gotuaco 1997:52, 69) – are "red-and-white" ceramics bearing underglaze copper-red painted decorations similarly produced by the Jingdezhen kiln complex (Barnes 2010:368–369).

Ming and Qing Ceramics: Fourteenth to Nineteenth Centuries AD

With the restoration of ethnic Han Chinese rule under the Ming dynasty in AD 1368, maritime trade was restricted to tributary exchange between the Ming court and foreign diplomatic missions that recognized China's suzerainty (Crick 2010c:37). Private trade with foreigners was limited to the ports of Guangzhou, Ningbo, and Quanzhou, with Ming port officials at Guangzhou and Quanzhou supervising trade with polities in the Philippines, Indonesia, and Indochina (Crick 2010c:37). While a variety of Chinese ceramics continued to be manufactured by Chinese kilns during the Ming dynasty, the overwhelming majority of Chinese ceramics exported into Southeast Asia came to be blue-and-white stoneware and porcelain ceramics (Yoh et al. 2010:556) by the sixteenth century AD.

Restrictions on private maritime trade throughout the fifteenth century AD led to a concomitant shortage of Chinese ceramics in Southeast Asia commonly referred to as the "Ming Gap" (Brown 2009). Based on the ceramic cargo evidence from various Southeast Asian shipwrecks, the proportion of Chinese ceramics fell from 100% to around 30–40% between AD 1368 and 1430 (Brown 2009:69). Proportions fell even further in the ensuing decades to less than 5% by 1487 before Chinese ceramics returned to the Southeast Asian markets during the reign of the Hongzhi emperor (弘治, Hóng Zhì, AD 1487–1505) (Brown 2009:70). A series of sociopolitical disorders and natural disasters that plagued the Ming court between AD 1436 and 1464 that resulted in the disruption of ceramic production is likely to have contributed to the Ming Gap as well (Li 2010b:426–427). A severe shortage of specifically blue-and-white ceramics also occurred between AD 1352 and 1487, where only three examples were found in total aboard a collection of seven shipwrecks (Brown 2009:70). The ban on the production of "colored" wares issued in AD 1437 and 1443 by the Zhengtong Emperor (Zhèngtǒng, 正統) is also a likely cause of the blue-and-white shortage as well (Tan 1997:84). In place of Chinese ceramics, large quantities of Southeast Asian high-fired, glazed ceramics from Vietnamese, Thai, Cham, and Burmese kilns filled most of the ceramic cargo to meet the demand during most of the fifteenth century AD (Brown 1988, 2009).

Consequently, there are very few examples of early to middle Ming (fourteenth to fifteenth century AD) ceramics recovered from Southeast Asia (Crick 2010a:223; Miksic 2009a:84). Nonetheless, a number of early Ming blue-and-white ceramics have been recovered from sites in Indonesia and the Philippines in a variety of forms such as bowls, ewers, kendis, covered boxes, vases, and dishes (Crick 2010a:222, 240–269; Tan 1997:111–156). Painted decorative motifs including landscapes, flora and fauna, Sanskrit characters and Buddhist symbols (i.e., double "*vajra*" and "*makara*"), as well as mythical creatures and human figures are often found on vessels of this period (Crick 2010a:222–223). By the sixteenth century AD, exported blue-and-white ceramics comprised of "robust, thick, utilitarian" vessels that were mainly dishes, but also small platters, cups, bowls, boxes, and jars (Crick

2010a:224). A number of blue-and-white ceramics exported to Southeast Asia during the sixteenth century AD were designs influenced by the emerging Islamic world within the region including "crescent-shaped" kendis and "pear-shaped" ewers (Crick 2010a:224). In addition, the painted decorations of early Ming blue-and-white ceramics are often applied with thick layers of cobalt, causing them to penetrate the glaze and resulting in an uneven surface termed the "heaped and piled" effect (Tan 1997:87).

During the Middle Ming period (fifteenth to sixteenth century AD), the restrictions on foreign trade implemented by the first Ming Emperor Hongwu (洪武, Hóngwǔ) was rescinded in AD 1567 (Crick 2010a:228) and Chinese ceramics returned *en-masse* to the Southeast Asian markets, resulting in the concomitant decline in the trade and export of Southeast Asian ceramics (Miksic 2009a:85). Painted decorations are generally observed to be densely painted motifs that covers the entire vessel surface (Crick 2010a:89, 224). Taoists motifs such as cranes, peaches, Eight Trigrams, and Taoist sages are also commonly found on blue-and-white vessels produced in this time (Tan 1997:92). Underglaze "reign marks" listing the reign of the Ming emperors in cobalt blue are also found on the exterior base surfaces of a number of blue-and-white vessels exported into the region from the sixteenth century AD onwards (Crick 2010a:226; Tan 1997:90; Yoh et al. 2010:560).

Towards the late Ming and early Qing period (sixteenth to seventeenth century AD), Jingdezhen blue-and-white ceramics dominated the production of Chinese ceramics for export whereas Longquan green-glazed ceramics went into decline, leaving white ceramics from the Dehua kilns as the only other major export Chinese ceramic in the market (Yoh et al. 2010:560). The number of kilns also increased drastically – from 20 to 300 by the end of the sixteenth century AD (Crick 2010a:226). Due to a shortage of cobalt oxide from West Asia, during this period, local cobalt pigment was sourced and mined from the eastern and southern provinces of Jiangxi, Anhui (安徽, Ān Huī), Zhejiang, Fujian, and Guangxi (广西, Guǎngxī) (Crick 2010a:228). A new group of blue-and-white stoneware ceramics – popularly known as "*kraak*" – was produced specifically for export to the European markets via the Dutch port-colonies in Southeast Asia during this period (Crick 2010a:229–231). "*Kraak*" ceramics are characterized by decorative motifs composed of "panels radiating from a central circular motif" which are in turn separated by stylized designs such as ribbons and tassels (Tan 1997:95).

In spite of the collapse of the Ming court and the establishment of the Qing dynasty by Manchu forces in AD 1644, blue-and-white stoneware and porcelain remained popular and continued to be produced and exported into Southeast Asia. Blue-and-white ceramics produced by the Pinghe (Pínghé, 平和) kilns near Zhangzhou (Zhāngzhōu, 漳州) city in Fujian Province, in particular, produced blue-and-white ceramics specifically for export (Miksic 2009a:85). Formerly termed "Swatow" ware – after the port of "Swatow" or Shantou (Shàntóu, 汕头) – where they were thought to be exported from (Miksic 2009a:85), Zhangzhou ceramics are typically large plates but also include a range of shapes including bowls, stemcups, jars, vases, and covered boxes that are characterized by large sandy grains adhering to their exterior base surfaces (Miksic 2009a:85). Large quantities of blue-and-white ceramics were also produced by the southern kilns of Dehua, Anxi and Yongchun and exported into Southeast Asia up to the nineteenth century AD (Miksic 2009a:86). Aside from blue-and-white ceramics, the Pinghe kilns also produced many ceramics adorned with overglaze enamel polychromatic decorations most notably in the form of dishes but also bowls, covered boxes, and jarlets (Harrisson 1979, 1995).

Key Issues

Outside the "Pot": Chinese-Style Earthenware Roof Tiles and Kiln Technology

A lesser-known ceramic derivative of cultural contact through trade and exchange between Southeast Asia and China is that of Chinese-style earthenware roof tiles at various late Iron

Age sites along the northern and central coasts of Vietnam (Yamagata and Nguyễn 2010). The centuries following the conquest and reorganization of North Vietnam into imperial prefectures of the Western Han Dynasty around 111 BC (Taylor 2013:17) oversaw a "marked increase" in the production and adoption of "Han-style" artefacts and architecture in the region (Carter and Kim 2017:733). These tiles were produced through using forming techniques that involved molding or coiling with paddle and anvil, both of which being components of *chaînes opératoires* similar to contemporaneous roof tiles that were being produced in China (Yamagata and Nguyễn 2010:195–197). Molded motifs used by the Chinese during the Qin (221–206 BC) and Han Dynasties such as "rolling clouds," lotus patterns, anthropomorphic faces, and Chinese characters were also found adorning eaves tiles on the roofs of northern and central Vietnam. The influence of Chinese culture on ceramic architectural fittings in northern and central Vietnam bears a stark contrast to those found at the Indianized Óc Eo cultural sites on the Mekong Delta in south Vietnam (Yamagata and Nguyễn 2010:196–197).

Both Chinese-style earthenware roof tiles as well as stamped pottery were found to be produced at the kiln complex of Tam Tho in the present-day province of Thanh Hóa in north Vietnam (Hein 2008:13–14; Yamagata and Nguyễn 2010:197). The kiln complex itself is a significant milestone in the history of Southeast Asian ceramic technology, as it represents the earliest datable high-temperature ceramic production site in the region (Hein 2008:13). The establishment of the Tam Tho kiln complex sometime during the second century AD appears to indicate the extension of Chinese commercial interests into late prehistoric Southeast Asia by the Han Dynasty during their occupation of north Vietnam (Hein 2008:13).

Ceramic Time Capsules: The Belitung and Other Shipwrecks in Southeast Asia

The maritime trade and export of Chinese ceramics during the Tang dynasty is perhaps no better represented than the Belitung shipwreck (also known as "Batu Hitam," after the reef about 150 m north of the wreck) recovered off the coast of the main town and port of Tanjung Pandan on Belitung Island in Indonesia (Flecker 2010:101). Approximately 70,000 Chinese ceramic vessels are estimated to have formed the bulk of the cargo of the ship that was identified and dated to be a ninth century Arab sewn-plank dhow (Flecker 2010:101, 107–111). Around 57,000 underglaze copper and iron decorated Changsha ceramics were recovered and comprises of mostly bowls that were packed neatly onboard in both straw containers and large green-glazed storage jars possibly from the Yue kilns (Flecker 2010:109–110; Krahl 2010a:52); Changsha ewers, jarlets, as well as other vessel forms were also found in the cargo (Flecker 2010:107). Yue green-glazed round and square dishes, vases, lug handled basins, bowls were also recovered, as well as medium to large-sized jars which aside from being used as storage for Changsha bowls, were also found to contain lead ingots and star anise as well (Flecker 2010:110). The remaining Chinese ceramic cargo included white Xing and Gongxian ceramics, white ceramics with green-splashed decorations hypothesized to be also produced by the Xing and Gongxian kilns (Hsieh 2010b:167–171) as well as the earliest blue-and-white ceramics produced by the Chinese (Flecker 2010:110).

The discovery of the three Tang blue-and-white ceramics in the Belitung cargo is significant not only because they represent the earliest production of this Chinese ceramic typology but also because they are the first complete examples of Tang blue-and-white ceramics to have been recovered (Krahl 2010c:210). Surviving Tang blue-and-white ceramics in China are rare and fragmentary, with only a small amount of sherds recovered from disparate Tang-period sites such as Yangzhou (扬州, Yáng Zhōu) city in present-day Jiangsu (江苏, Jiāng Sū) province and the Baihe (白河, Bái Hé) kiln site of the Gongxian kiln complex in Henan province (Krahl 2010c:210). Compositional analysis of the cobalt pigment used in the painted decorations suggest an external, west Asian source than local Chinese cobalt sources used in the later blue-and-white ceramics of the Ming (AD 1368–1644) and Qing

(AD 1644–1912) dynasties (Krahl 2010c:210). Aside from the dishes recovered from the Belitung, Tang blue-and-white ceramics incorporated various other forms such as bowls, ewers, boxes, and even pillows (Krahl 2010c:210). A layer of white slip was applied over the "off-white" bodies of Tang blue-and-white ceramics, followed by the painting of cobalt blue decorations that included abstract shapes and floral motifs such as "lozenges" and various foliage similar to those found on West Asian ceramics (Krahl 2010c:210). This decorative similarity, coupled with the absence of Tang blue-and-white ceramics across contemporary land archaeological sites in Southeast Asia, suggests that they were made specifically for West Asian markets (Crick 2010c:24) to which the ship was most likely sailing before it sank (Hsieh 2010a).

Two other wrecks laden with Tang ceramics have also been recovered off the coasts of Indonesia. The first, the Intan wreck, is a Southeast Asian vessel that bore close to 8000 ceramic vessels when it sank south of the Bangka Strait sometime to the tenth century AD (Flecker 2009:38). Almost half of its ceramic cargo consisted of small brown-glazed pots, jars, and basins that are thought to be fired by kilns in the southern Chinese provinces of Fujian (福建 Fú Jiàn) and Guangdong (广东 Guǎng Dōng) (Flecker 2009:38). Around a dozen white jarlets, dishes, and vases likely to be produced by the northern Chinese Xing and Ding kilns, as well as a number of green-glazed bowls, covered boxes and lobed ewers resembling those produced by the Yue kilns accompanied the brown-glazed southern Chinese ceramics (Flecker 2009:38). The remainder of the ceramic cargo comprises of hundreds of fine-paste earthenware bottles and kendis possibly produced by early Southeast Asian kilns located in present-day southern Thailand, as well as a few turquoise-glazed West Asian jars (Flecker 2010:38). The second wreck – also of a Southeast Asian lashed-lugged construction – was discovered off the coast of Cirebon in the Java Sea with more than 150,000 individual ceramic vessels. The vast majority of the ceramic cargo comprised of Yue green-glazed ceramics of a variety of forms including bowls, ewers, covered boxes, jarlets, bottles, cups, vases, and kendis (Liebner 2014). The remaining ceramics included a number of Guangdong brown-glazed jars, Xing or Ding white ceramic bowls, plates, jarlets, as well as earthenware jars and kendis (Liebner 2014) that are likely to have a Southeast Asian provenance.

A number of shipwrecks bearing Chinese ceramics and dating to the southern Song dynasty (c. twelfth to thirteenth centuries AD) have also been located off the coasts of Indonesia and the Philippines (Brown 2009:171). The Java Sea wreck, for instance, bore at least 100,000 individual pieces of ceramics when it sunk off the coast between the Java and Bangka islands (Flecker 2009:39; Niziolek et al. 2018). The vast majority of the ceramic goods consisted of green-glazed bowls and dishes from the southern Chinese kilns in Fujian province, some of which were packed and stored within large brown glaze jars in the manner seen in the Belitung wreck (Flecker 2009:39). Accompanying the green-glazed ceramics are "several hundred" Dehua Qingbai covered boxes, as well as "limited numbers" of Qingbai ewers, bottles, dishes, and lids thought to be produced by the Jingdezhen kilns (Flecker 2009:39). Other Chinese ceramics onboard included black-glazed "*Tenmoku*" – Japanese for iron-glazed tea bowls used by Zen Buddhist temples at Tianmu (天目, Tiān mù) Mountain in Zhejiang – tea bowls possibly produced by the famous Jian (建, Jiàn) kilns as well as a group of bright green lead glazed ewers, bowls, dishes, lids, vases, bottles, and covered boxes thought to be produced by the Chayang (茶洋, Chá Yáng) kilns, both of which are located in Fujian (Flecker 2009:39–40).

Xiaokouping, a Song–Yuan Storage Vessel in Southeast Asia

A distinct Chinese stoneware vessel commonly found across various archaeological sites in Southeast Asia during the Song and Yuan dynasties is the Xiaokouping (小口瓶, Xiǎo Kǒu Píng), popularly called "mercury jar" (Kwan and Martin 1985:74; Wong 2016). The Xiaokouping has a distinctive form: it is a restrictive vessel with a very small rim (c. 1.5–2.5 cm in diameter) set

upon a very short upper body that is only slightly inclined from the horizontal axis, followed by a relatively tall lower body that tapers sharply towards a thick and heavy but also small and flat base (Miksic 1985:68; Wong 2016). The vessel walls bear rilling marks – indicating a wheel-thrown *chaîne opératoire* – that are usually very pronounced on the interior surfaces (Wong 2016). The bodies of Xiaokouping vessel are typically grey in color and contain visible black and white inclusions that results in a rough texture (Kwan and Lam 1985a), but they can sometimes be light brown in color with a smoother surface texture as well. It has previously been suggested that Xiaokouping vessels were produced by the Cengzhushan (曾竹山, Céng Zhú Shān) kilns in Quanzhou (Kwan and Lam 1985a:113; Kwan and Martin 1985:74), but recent research have determined their origin to the Cizao (磁灶, cí zào) kiln complex in the same province (Wong 2016).

The form of Xiaokouping vessels are thought to be "highly suited for carrying mercury," a dense metal in liquid form at room temperature but 13.6 times heavier than water (Treloar 1972:382–383). The thick but small bases allow the jars to support its "great density" as well as divert the "pressure of mercury on diagonally sloping sides of the vessel," respectively, and their relatively tall height coupled with a small orifice would have reduced the amount of spillage during a long land or sea voyage (Treloar 1972:382–383). Moreover, the unglazed surface of mercury jars suit the storage of mercury as it, unlike other forms of liquids, "will not penetrate the most porous vessel" (Treloar 1972:382–383). It was also conjectured that liquid mercury was used in Tantric religious ceremonies, as medicine and a means of extracting gold from its ore or purifying it (Miksic 1985:69). It has also been suggested that Xiaokouping vessels could have been used to store wine and sauces (Kwan and Martin 1985:74; Treloar 1972:378, 383), some of which may have been used to store southern Fujian rice wine in particular (Heng 2009:189; Wong 2016). The widespread use of these jars in Southeast Asia is testified by their recovery not just in Singapore (Miksic 1985:68; Wong 2016), but also in Kedah, Sarawak, and Cambodia at archaeological sites dating between the eleventh and fourteenth centuries AD (McKinnon 1975–1977:76; Treloar 1972:377–378). Xiaokouping vessels were reportedly still used by the Jakun tribe of Orang Asli in Padang Siam, Kuala Seria, and Pahang as late as the twentieth century AD (Kwan and Martin 1985:74).

Chinese Ceramics: Media of Southeast Asian Exchange

Chinese ceramics were not only simply imported commodities but also functioned as media of exchange between Chinese and local merchants in the conduct of trade in precolonial Southeast Asia. Southeast Asian societies adopted monetary standards based on "a directly measurable quantity" of highly valued substances or commodities (Wicks 1992:301). When the Song court banned the export of precious metals such as gold and silver as well as copper cash in AD 1127, 1133, 1175, and 1219, high-fired glazed stoneware ceramics became a commodity-substitute in overseas maritime trade and transactions (Heng 2009:152–172). Ceramics were specifically named as one of the products to be used in place of gold and silver during the 1219 ban (Heng 2009:173).

According to the Zhu Fan Zhi (诸蕃志, Zhū Fān Zhì), a Song record written by the Quanzhou customs inspector Zhao Rugua (Zhào Rǔ Guā, 赵汝适) that described foreign cultures and customs encountered by the Chinese during the thirteenth century AD a century earlier, some Southeast Asian markets appear to have localized preferences towards specific types of Chinese ceramics (Crick 2010c:32). White and green-glazed ceramics were supposedly favored in Borneo, Qingbai ceramics in Java, whereas markets in Sumatra imported a wide range of ceramics without any specific preferences (Crick 2010c:32). In exchange, Chinese traders received from Southeast Asian merchants various aromatic products, spices, and precious items such as pearls, ivory, rhinoceros horns, and other tropical produce needed to satisfy the Chinese market (Heng 2009:191–210). The Daoyi Zhilue compiled by Wang in the mid-fourteenth century, documented demand and consumption patterns of various

Chinese ceramic goods by Southeast Asian markets that were similar to that recorded in the Zhu Fan Zhi (Miksic 2009a:79). During the reigns of the Yongle (永乐, Yǒng Lè, AD 1402–1424), Hongxi (洪熙, Hóng Xī, AD 1424–1425) and Xuande (宣德, Xuān Dé AD 1425–1435) emperors, the Eunuch Zheng He (郑和, Zhèng Hé) led seven naval expeditions through Southeast Asia into the Indian Ocean to establish tributary relations with the polities of these regions (Crick 2010c:37) and was specifically instructed to buy Chinese ceramics to serve as commodities of tributary exchange (Li 2010b:389).

International Perspectives

While the focus on the trade and exchange of Chinese ceramics in Southeast Asia have largely been centered in the core of the region, research on their distribution have also highlighted their demand and consumption in the peripheral parts of Southeast Asia. Chinese glazed ceramics have been found as far as sites in Timor (Glover 1986; Lape and Chao 2008; O'Connor et al. 2012) and even on the northern coast of Australia (Macknight 1976, 2013). Chinese ceramics from "southern China," in particular, were reportedly found and identified "on many sites" in Arnhem Land as part of the trepang trade between the Chinese, Macassan, and Australian Aboriginal groups during the eighteenth century AD (Macknight 2013:25–26). Research on the distribution of Chinese ceramics on the Southeast Asian periphery, however, remains in its infancy.

Future Directions

Chinese Ceramics and Social Organization in Southeast Asia

Presently, the focus of historical and archaeological analyses of Chinese ceramics from both land and maritime archaeological contexts in Southeast Asia remains overwhelmingly on their utility as evidence of trade and exchange between China and various Southeast Asian polities over the last millennia. The significance of Chinese ceramics in the social organization and political economies of Southeast Asian societies (see Junker 1999), however, remains relatively understudied in both history and archaeology. As trade routes were established between Southeast Asian and Chinese markets over the centuries, Southeast Asian elites found a new source of high-quality and beautiful glazed and unglazed stoneware as well as porcelain ceramics that they did not have the technology to produce. Imported Chinese ceramics, such as small vessels with lids, came to be considered a luxury suitable for use only by the Khmer nobility in the eleventh century (Miksic 2009a:78). Chinese porcelain, among other exotic luxury goods, also became "key symbols of social status and political power" together with indigenously manufactured prestige goods for the chiefly elite in the Philippines (Junker 1999:183). The symbolic significance of Chinese ceramics can also be seen at the two-level hilltop fortified site of Macapainara in Timor, where a "Chinese blue and white tradeware bowl" was found to be placed on the surface of a large stone structure on the lower level of the site, and identified by local inhabitants as the "double grave containing the remains of the former ruler of Ili Vali/Macapainara and his close political ally" (O'Connor et al. 2012:204–205).

Cross-References

► Southeast Asian Ceramics

References

Adhyatman, S. 1990. *Antique ceramics found in Indonesia, various uses and origins*. 2nd ed. Jakarta: Ceramic Society of Indonesia.

Barnes, A. 2002. Catalogue entries. In *Qingbai ware: Chinese porcelain of the song and yuan dynasties*, ed. S. Pierson, 27–233. London: Percival David Foundation of Chinese Art.

Barnes, L.E. 2010. Yuan dynasty ceramics. In *Chinese ceramics. From the Palaeolithic Period through the Qing dynasty*, ed. Z.Y. Li, V.L. Bower, and L. He, 330–332. New Haven/London: Yale University Press.

Bouvet, P. 2011. Preliminary study of Indian and Indian style wares from Khao Sam Kaeo (Chumphon, Peninsular Thailand), fourth-second centuries BCE. In *Early interactions between South and Southeast Asia. Reflections on cross-cultural exchange*, ed. P.-Y. Manguin, A. Mani, and W. Geoff, 47–81. Singapore: Institute of Southeast Asian Studies, Singapore.

Brown, R.M. 1988. *The ceramics of South-East Asia. Their dating and identification*. 2nd ed. Singapore: Oxford University Press.

Brown, R.M. 2009. *The Ming Gap and Shipwreck ceramics in Southeast Asia. Towards a chronology of Thai trade ware*. Bangkok: The Siam Society under Royal Patronage.

Carter, A.K., and N.C. Kim. 2017. Globalization at the dawn of history. The emergence of global cultures in the Mekong and Red River Deltas. In *The Routledge handbook of archaeology and globalization*, ed. T. Hodos, 730–750. Oxon: Routledge.

Crick, M. 2010a. Blue-and-white qinghua porcelain in South-East Asia. In *Chinese trade ceramics for South-East Asia from the 1st to the 17th century. Collection of ambassador and Mrs Charles Müller*, ed. M. Crick, 216–317. Genève: Fondation Baur.

Crick, M. 2010b. Copper-red porcelain ware in South-East Asia. In *Chinese trade ceramics for South-East Asia from the 1st to the 17th century. Collection of ambassador and Mrs Charles Müller*, ed. M. Crick, 208–215. Genève: Fondation Baur.

Crick, M. 2010c. Great ocean highways. The Nanhai ceramics trade routes. In *Chinese trade ceramics for South-East Asia from the 1st to the 17th century. Collection of ambassador and Mrs Charles Müller*, ed. M. Crick, 10–57. Genève: Fondation Baur.

Crick, M. 2010d. White porcelain ware in South-East Asia from the Song to the Yuan dynasties. In *Chinese trade ceramics for South-East Asia from the 1st to the 17th century. Collection of ambassador and Mrs Charles Müller*, ed. M. Crick, 148–207. Genève: Fondation Baur.

Favereau, A., and B. Bellina. 2016. Thai-Malay Peninsula and South China Sea networks (500 BC–AD 200), based on a reappraisal of "Sa Huynh-Kalanay"-related ceramics. *Quaternary International* 416: 219–227.

Flecker, M. 2009. Maritime archaeology in Southeast Asia. In *Southeast Asian ceramics. New light on old pottery*, ed. J.N. Miksic, 34–47. Singapore: Southeast Asian Ceramic Society.

Flecker, M. 2010. A ninth-century Arab shipwreck in Indonesia. The first archaeological evidence of direct trade with China. In *Shipwrecked. Tang treasures and monsoon winds*, ed. R. Krahl, J.S. Guy, J.K. Wilson, and J. Raby, 100–119. Singapore: Arthur M. Sackler Gallery, Smithsonian Institution/The National Heritage Board, Singapore/Singapore Tourism Board.

Glover, I.C. 1986. *Archaeology in Eastern Timor, 1966–67*. Canberra: Department of Prehistory, Research School of Pacific Studies, The Australian National University.

Glover, I.C., and B. Bellina. 2011. Ban Don Ta Phet and Khao Sam Kaeo: The earliest Indian contacts re-assessed. In *Early interactions between South and Southeast Asia. Reflections on cross-cultural exchange*, ed. P.-Y. Manguin, A. Mani, and W. Geoff, 17–46. Singapore: Institute of Southeast Asian Studies, Singapore.

Gotuaco, L. 1997. Yuan blue and white in the Philippines. In *Chinese and Vietnamese blue and white wares found in the Philippines*, ed. L. Gotuaco, R.C. Tan, and A.I. Diem, 3–74. Makati City: Bookmark, Inc.

Guy, J.S. 1990. *Oriental trade ceramics in South-East Asia. Ninth to sixteenth centuries. With a catalogue of Chinese, Vietnamese and Thai wares in Australian collections*. Singapore: Oxford University Press.

Harrisson, B. 1979. *Swatow in Het Princessehof. The analysis of a museum collection of Chinese trade wares from Indonesia with 31 colour plates and 274 black and white illustrations*. Leeuwarden: Gemeentelijk Museum Het Princessehof.

Harrisson, B. 1995. *Later ceramics in South-East Asia. Sixteenth to twentieth centuries*. Kuala Lumpur: Oxford University Press.

He, L. 2010. Ceramics of the Song, Liao, Western Xia, and Jin dynasties. In *Chinese ceramics. From the Palaeolithic Period through the Qing dynasty*, ed. Z.Y. Li, V.L. Bower, and L. He, 264–329. New Haven/London: Yale University Press.

Hein, D. 2008 Ceramic kiln lineages in Mainland Southeast Asia. Smithsonian Institution: Ceramics in Mainland Southeast Asia: Collections in the Freer Gallery of Art and Arthur M. Sackler Gallery, 1–38.

Heng, D.T.S. 2009. *Sino-Malay trade and diplomacy from the tenth through the fourteenth century.* Athens: Ohio University Press.

Higham, C.F.W. 2014. *Early Mainland Southeast Asia: From first humans to Angkor*. Bangkok: River Books.

Ho, C.M. 1994a. *New light on Chinese Yue and Longquan wares. Archaeological ceramics found in Eastern and Southern Asia, A.D. 800–1400*. Hong Kong: Centre of Asian Studies, The University of Hong Kong.

Ho, C.M. 1994b. Problems in the study of Zhejiang Green glazed wares with special reference to Ko Kho Khao and Laem Pho-Payang, Southern Thailand. In *New light on chinese Yue and Longquan wares. Archaeological ceramics found in Eastern and Southern Asia, A.-D. 800–1400*, ed. C.M. Ho, 187–212. Hong Kong: Centre of Asian Studies, The University of Hong Kong.

Ho, C.M. 1994c. Yue-type and Longquan-type green glazed wares made outside Zhejiang Province. In *New light on Chinese Yue and Longquan wares. Archaeological ceramics found in Eastern and Southern Asia, A.D. 800–1400*, ed. C.M. Ho, 103–119. Hong Kong: Centre of Asian Studies, The University of Hong Kong.

Hsieh, M.L. 2010a. The navigational route of the Belitung Wreck and the late Tang ceramic trade. In *Shipwrecked. Tang treasures and monsoon winds*, ed. R. Krahl,

C

J.S. Guy, J.K. Wilson, and J. Raby, 136–143. Singapore: Arthur M. Sackler Gallery, Smithsonian Institution/The National Heritage Board, Singapore/Singapore Tourism Board.

Hsieh, M.L. 2010b. White ware with green décor. In *Shipwrecked. Tang treasures and monsoon winds*, ed. R. Krahl, J.S. Guy, J.K. Wilson, and J. Raby, 160–175. Singapore: Arthur M. Sackler Gallery, Smithsonian Institution/The National Heritage Board, Singapore/Singapore Tourism Board.

Junker, L.L. 1999. *Raiding, trading and feasting. The political economy of Philippine chiefdoms*. Honolulu: University of Hawai'i Press.

Kerr, R. 2004. *Song dynasty ceramics*. London: V&A Publications.

Krahl, R. 2010a. Chinese ceramics in the late Tang dynasty. In *Shipwrecked. Tang treasures and monsoon winds*, ed. R. Krahl, J.S. Guy, J.K. Wilson, and J. Raby, 44–73. Singapore: Arthur M. Sackler Gallery, Smithsonian Institution/The National Heritage Board, Singapore/Singapore Tourism Board.

Krahl, R. 2010b. Green wares of Southern China. In *Shipwrecked. Tang treasures and monsoon winds*, ed. R. Krahl, J.S. Guy, J.K. Wilson, and J. Raby, 184–199. Singapore: Arthur M. Sackler Gallery, Smithsonian Institution/The National Heritage Board, Singapore/Singapore Tourism Board.

Krahl, R. 2010c. Tang blue-and-white. In *Shipwrecked. Tang treasures and monsoon winds*, ed. R. Krahl, J.S. Guy, J.K. Wilson, and J. Raby, 208–211. Singapore: Arthur M. Sackler Gallery, Smithsonian Institution/The National Heritage Board, Singapore/Singapore Tourism Board.

Krahl, R. 2010d. White wares of Northern China. In *Shipwrecked. Tang treasures and monsoon winds*, ed. R. Krahl, J.S. Guy, J.K. Wilson, and J. Raby, 200–207. Singapore: Arthur M. Sackler Gallery, Smithsonian Institution/The National Heritage Board, Singapore/Singapore Tourism Board.

Kwan, K.K. and P.Y.K. Lam. 1985a. Guangdong wares. Song dynasty 11th–12th century. In *A ceramic* legacy *of Asia's maritime trade. Song dynasty Guangdong wares and other 11th to 19th century trade* ceramics *found on Tioman Island, Malaysia*, ed. W.M.C. Southeast Asian Ceramic Society, 83–107. Petaling Jaya: Southeast Asian Ceramic Society, West Malaysia Chapter.

Kwan, K.K. and P.Y.K. Lam. 1985b. Zhejiang wares. Song and Yuan dynasties 11th–14th century. In *A ceramic legacy of Asia's maritime trade. Song dynasty Guangdong wares and other 11th to 19th century trade ceramics found on Tioman Island, Malaysia*, ed. W.M.C. Southeast Asian Ceramic Society, 121–124. Petaling Jaya: Southeast Asian Ceramic Society, West Malaysia Chapter.

Kwan, K.K. and J. Martin. 1985. Introduction to the finds from Pulau Tioman. In *A ceramic* legacy *of Asia's maritime trade. Song dynasty Guangdong wares and other 11th to 19th century trade* ceramics *found on Tioman Island, Malaysia*, ed. W.M.C. Southeast Asian Ceramic Society, 69–82. Petaling Jaya: Southeast Asian Ceramic Society, West Malaysia Chapter.

Lam, P.Y.K. 1985. Northern Song Guangdong wares. In *A ceramic* legacy *of Asia's maritime trade. Song dynasty Guangdong wares and other 11th to 19th century trade* ceramics *found on Tioman Island, Malaysia*, ed. W.M.C. Southeast Asian Ceramic Society, pp. 1–29. Petaling Jaya: Southeast Asian Ceramic Society, West Malaysia Chapter.

Lape, P.V., and C.-Y. Chao. 2008. Fortification as a human response to late Holocene climate change in East Timor. *Archaeology in Oceania* 43 (1): 11–21.

Lee, M.O. 2016. Discoveries from the Sinan shipwreck. *The Silk Road* 14: 223–225.

Li, D. 1994. Technology of Longquan ware manufacturing. In *New light on Chinese Yue and Longquan wares. Archaeological ceramics found in Eastern and Southern Asia, A.D. 800–1400*, ed. C.M. Ho, 85–99. Hong Kong: Centre of Asian Studies, The University of Hong Kong.

Li, Z.Y. 2010a. Ceramics of the Sui, Tang, and five dynasties. In *Chinese ceramics. From the Palaeolithic Period through the Qing dynasty*, ed. Z.Y. Li, V.L. Bower, and L. He, 196–263. New Haven/London: Yale University Press.

Li, Z.Y. 2010b. Ming dynasty ceramics. In *Chinese ceramics. From the Palaeolithic Period through the Qing dynasty*, ed. Z.Y. Li, V.L. Bower, and L. He, 386–457. New Haven/London: Yale University Press.

Liebner, H.H. 2014. The Siren of Cirebon. A tenth-century trading vessel lost in the Java Sea, thesis submitted in accordance with the requirements for the degree of Doctor of Philiosophy at the School of Modern Languages and Cultures, University of Leeds, Leeds.

Lin, S. 1994. Zhejiang export green glazed wares: Ningbo data. In *New light on Chinese Yue and Longquan wares. Archaeological ceramics found in Eastern and Southern Asia, A.D. 800–1400*, ed. C.M. Ho, 85–99. Hong Kong: The University of Hong Kong.

Liu, Y. 2010. Tang dynasty Changsha ceramics. In *Shipwrecked. Tang treasures and monsoon winds*, ed. R. Krahl, J.S. Guy, J.K. Wilson, and J. Raby, 144–159. Singapore: Arthur M. Sackler Gallery, Smithsonian Institution/The National Heritage Board, Singapore/Singapore Tourism Board.

Lu, Y. 1979. Introduction. In *Chinese celadons and other related wares in Southeast Asia*, ed. S. Southeast Asian Ceramic Society, 13–31. Singapore: Arts Orientalis.

Macknight, C.C. 1976. *The voyage to Marege: Macassan trepangers in northern Australia*. Carlton: Melbourne University Press.

Macknight, C.C. 2013. Studying trepangers. In *Macassan history and heritage. Journeys, encounters and influences*, ed. M. Clark and S.K. May, 19–39. Canberra: ANU E Press.

McKinnon, E.P.E. 1975–1977. Oriental ceramics excavated in North Sumatra. *Transactions of the Oriental Ceramic Society* 41:58–118.

Medley, M. 1976a. *The Chinese potter. A practical history of Chinese ceramics*. New York: Phaidon Press Ltd.

Medley, M., and S. Pierson. 1997. *Illustrated catalogue of celadon wares in the Percival David Foundation of Chinese art*. London: University of London, School of Oriental and African Studies.

Miksic, J.N. 1985. *Archaeological research on the "forbidden hill" of Singapore: Excavations at Fort Canning, 1984*. Singapore: National Museum Singapore.

Miksic, J.N. 2009a. Research on ceramic trade, within Southeast Asia and between Southeast Asia and China. In *Southeast Asian ceramics. New light on old pottery*, ed. J.N. Miksic, 70–99. Singapore: Southeast Asian Ceramic Society.

Niziolek, L.C., G.M. Feinman, J. Kimura, A. Respess, and L. Zhang. 2018. Revisiting the date of the Java Sea shipwreck from Indonesia. *Journal of Archaeological Science: Reports* 19: 781–790.

O'Connor, S., A. McWilliam, J.N. Fenner, and S. Brockwell. 2012. Examining the origin of fortifications in East Timor: Social and environmental factors. *The Journal of Island and Coastal Archaeology* 7 (2): 200–218.

Pham, T.N. 2005. A report on recent excavations on Ly Son Island (Central Vietnam). *Bulletin of the Indo-Pacific Prehistory Association* 25: 133–137.

Rice, P.M. 2015. *Pottery analysis. A sourcebook*. 2nd ed. Chicago: The University of Chicago Press.

Scott, R. 2002. Introduction: *Qingbai* porcelain and its place in Chinese ceramic history. In *Qingbai ware: Chinese porcelain of the Song and Yuan dynasties*, ed. S. Pierson, 6–12. London: Percival David Foundation of Chinese Art.

Tan, R.C. 1997. Development of Ming *Minyao* blue and white ware with reference to Philippine finds. In *Chinese and Vietnamese blue and white wares found in the Philippines*, ed. L. Gotuaco, R.C. Tan, and A.I. Diem, 79–179. Makati City: Bookmark, Inc.

Taylor, K.W. 2013. *A history of the Vietnamese*. Cambridge: Cambridge University Press.

Treloar, F.E. 1972. Stoneware bottles in the Sarawak museum: Vessels for mercury trade? *The Sarawak Museum Journal* 20 (40–41): 377–384.

Wang, G.W. 2007 (1958). The Nanhai trade: A study of the early history of Chinese trade in the South China Sea. In *Southeast Asia-China interactions*, ed. G. Wade, 51–166. Kuala Lumpur: Malaysian Branch of the Royal Asiatic Society.

Wicks, R.S. 1992. *Money, markets, and trade in early Southeast Asia. The development of indigenous monetary systems to AD 1400*. Ithaca: Southeast Asia Program, Cornell University.

Wong, S.W.-y. 2016. A case report on the function(s)of the 'mercury jar': Fort Canning, Singapore, in the 14th century. *Archaeological Research in Asia* 7: 10–17.

Yamagata, M., and K.D. Nguyễn. 2010. Ancient roof tiles found in central Vietnam. In *50 years of archaeology in Southeast Asia. Essays in honour of Ian Glover*, ed. B. Bellina, E.A. Bacus, T.O. Pryce, and J.W. Christie, 194–205. Bangkok: River Books.

Yáng, S.D.楊, and J.Ē.馬. Mǎ. 1978. 中國的青花瓷 (Zhōng Guó De Qīng Huā Cí or blue-and-white ceramics of China). In *Chinese blue & white ceramics*, ed. S.T. Yeo and J. Martin, 76–83. Singapore: Arts Orientalis.

Ye, W. 1994. A preliminary discussion of Fujian wares made in imitation of Zhejiang green glazed wares. In *New light on Chinese Yue and Longquan wares. Archaeological ceramics found in Eastern and Southern Asia, A.D. 800–1400*, ed. C. Ho, 120–128. Hong Kong: The University of Hong Kong.

Yoh, K., L. He, and W.R. Sargent. 2010. The export and trade of Chinese ceramics. In *Chinese ceramics. From the Palaeolithic Period through the Qing dynasty*, ed. Z.Y. Li, V.L. Bower, and L. He, 534–601. New Haven/London: Yale University Press.

Further Readings

Harrisson, B. 2007. The ceramic trade across the South China Sea. In *Southeast Asia-China interactions*, ed. G. Wade, 489–505. Kuala Lumpur: The Malaysian Branch of the Royal Asiatic Society.

Medley, M. 1976b. *The Chinese potter. A practical history of chinese ceramics*. New York: Phaidon Press Ltd.

Miksic, J.N., ed. 2009b. *Southeast Asian ceramics. New light on old pottery*. Singapore: Southeast Asian Ceramic Society.

Chinese Field Methods

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Introduction

Although the study of ancient artifacts has a long history in China, the modern science of archaeology was brought to China only in the late nineteenth century by foreign explorers and archaeologists. Since the 1920s, however, as the Nationalist government curbed foreigners' field activities in its land, native archaeologists, mostly Western-trained, from a few institutions (the Cenozoic Research Laboratory of the Geological Survey of China, the Institute of History and Philology of Academic Sinica, and the Society for Historical Studies of National Beiping Academy) began to play the major role (Chen 1997: 87). The political fragility and economic feebleness of the time, however, did not allow the science to

develop significantly. Although much progress was made in excavation techniques, including the division of strata and typological analysis of artifacts (Chen 1997: 145–162, 227–249, 310–329), only a modest number of sites had been excavated and a small group of archaeologists had been trained by 1949, the year when the Communist Party took over the mainland China.

Dramatic changes came about after 1949. Having unified the country, the communist government set out to modernize its industry, science, and education. And having decided to dissect its relations with the West and sided with the Soviet Union, it urged the academic community to learn the "advanced experience" of the Soviet science. The archaeologists and their students, who were trained in the West or educated in the pro-West Nationalist Era, had little choice but to study Soviet theories and methods (Zhang 2011: 1052). Archaeology, which now received lavish state support, continued to be cast as a subdiscipline of history as in the Nationalist Era, but upon it was already imposed a new paradigm: Marxist dialectical materialism and historical materialism. While dialectical materialism introduces the concept of social evolution, historical materialism brings the subjects of social relations, economy, and technology to archaeology (Xia 1952: 81–84). The Soviet archaeology also demands that archaeologists devote themselves to the life of the subject and downtrodden people, as a counterforce to their natural instinct, that is, to excavate tombs and monuments of the social elites. It does not follow, however, that Chinese archaeologists give priority to settlements and tombs of the common people. In fact, apart from a few exemplary Neolithic settlements that were dug to fulfill the Marxist mandate, they continue to favor large urban centers, such as Erlitou, Anyang, Luoyang, and Chang'an, and monumental tombs for the purpose of uncovering treasures and wonders to illustrate the grandeur of Chinese history and civilizations (Zhang 2011: 1052).

Key Issues/Current Debates/Future Directions/Examples

Chinese archaeologists translated many Soviet publications to avail themselves not only of ready-made models of integrating the Marxist theories into archaeological interpretation but also of "advanced" fieldwork methodologies. As a result, they began their fieldwork with systematic survey, thereby acquiring the basic information of the location, chronology, and cultural definition of a single site as well as informing questions such as the geographic distribution and the ecological environment of a culture (Xia 1958: 2). In addition, Chinese archaeologists innovatively adopted the "Luoyang Spade," a coring device which local treasure hunters had developed to discover tombs, as a prospecting tool. Skilled hands were trained to identify various types of features (tombs, architectural foundations, trash pits, riverbeds) from the soil samples taken from underground. Thanks to its efficiency and low cost, the tool is still popular today; one can often use it to get a good idea of the layout as well as stratigraphy of a site without excavation.

When Chinese archaeologists excavate a settlement, they usually lay out box pits of 2×2 m, which they replicate to expose large areas (Fig. 1). This method is very helpful because many settlements in China feature long habitation history and multi-period cultural deposit. Although it had also been used in the West, they were obliged by the ideology of the time to attribute the credit of inspiration to the Soviet archaeologist T. S. Passek (1903–1968). While earlier excavators were unable to discover houses at the Tripoly'e settlement because they had only opened narrow trenches and small areas, in the 1930s, Passek successfully discovered structures of 100–120 m^2 in dimension with the box excavation. In a country blessed with long history and thick cultural deposit, this method appears to be very useful, as it provides a better stratigraphic control and a better understanding of a settlement: division of space and episodes of reconstruction

Chinese Field Methods, Fig. 1 The "small unit/large exposure" (box system) in action on an excavation in advance of road building at Baotou, Inner Mongolia in 2006 (China, State Administration 2009)

(Yan 1994: 252). Dubbed by Chinese archaeologists as "small excavation units but large-scale exposure," it was put to good use at the model Neolithic settlement of Banpo near Xi'an and Jiangzhai (Zhongguo Kexueyuan KaoguYanjiusuo 1963: 6; Banpo Museum, Shaanxi Institute of Archaeology, and Lintong County Museum 1988: 3–5). While the size of the unit is often adjusted to the specific circumstances and objectives of an excavation (it is now usually 5 × 5 m or 10 × 10 m), the box pit excavation remains the standard operational method today (Shi 1982: 18–19).

Ancient cities, especially those of the protohistoric and historical periods, demand a different approach. Following the Soviet guidelines, Chinese archaeologists first study historical documents to address questions about material production, social relations, and the spiritual life of the population. They can then turn to other questions such as spatial division, public amenities, and external economic connections. Since cities are much larger and more sophisticated than Neolithic settlements, it is unrealistic to implement the full-coverage excavation; small excavation units are instead deployed at particular loci to address particular questions, such as layout and chronology. Three phases of deposit are generally investigated to define their chronology: those formed during construction, those formed during occupation, and those after abandonment. This set of methods was effectively applied to the excavation of Chang'an, a capital of the Western Han Dynasty (206 BCE–9 CE), near the present-day city of Xi'an. Together with the method of dividing cultural strata by soil content and color, it is still cherished as a working principle today (Zhang 1983: 62).

Regional Genealogy and Variations

The intense learning of the Soviet archaeology came to a halt after the breakup of the Sino-Soviet brotherhood in the 1960s. Having turned away from the West in 1949, Chinese archaeologists were now secluded from the development of archaeological theories and methods over the world. Without external inspiration, they were left to move forward from what they had inherited from the Nationalist Era and learned from the Soviet. In the volatile political atmosphere that lingered from the 1950s through to the 1980s, however, theoretical thinking, even in the name of Marxist theories, was a life-threatening venture. Hence, no middle-range theories and methodologies were developed to extrapolate the Marxist subjects of social relations, economy, and technology; discussion of these subjects was little more than filling fresh data into the old pigeonholes of Marxist theories. It was the typology and cultural-historical paradigm inherited from the Nationalist Era, safeguarded by the sustained nationalism, that had the chance of further development in the subsequent decades.

It was Su Bingqi (1909–1997), a courageous thinker for his time, who held the beacon for theoretical development in China. He began his theoretical venture in the 1930s when he attempted to work out a chronology for the Bronze Age cemetery at Doujitai in Baoji, Shaanxi Province. Employing Montelius' typology but tempering it with his own interpretation, he selected the diagnostic ceramic ware li-tripods as the subjects of typological analysis, divided them into four types, and traced each type's evolutionary path (Su 1948 [1984]). Since the 1950s, the division of xing (type) and shi, which stands for the chronological subtype, became the standard method in Chinese typology (Su 1959 [1984], 1965). This method was further refined to fit the ever-growing excavation materials by Su Bingqi himself and his disciples. In his endeavor to set up chronologies for the Shang urban centers of Zhengzhou and Anyang, Zou Heng (1956, 1964) innovatively correlated stratigraphic and typological sequences of ceramic wares from these sites.

Su Bingqi's creativity did not end up at the typological analysis. He further developed a theory, namely, the "regional genealogy and variations (quxileixing)," that offers a handy framework for organizing and explaining them (Su and Yin 1981; Su 1982). In this general and flexible formulation, the archaeological cultures that had been discovered by the 1970s were grouped into six macroscopic cultural-historical regions; each region comprises of a few micro-regions, whose cultures are lined up from the Paleolithic Age through to the Bronze Age. Rejecting the conventional assumption that Central China was the cradle of Chinese civilizations lifting the outlying regions from backwardness, he emphasized instead that it was the outlying regions that outshined and enlightened Central China in the Prehistoric periods. Believing in the historicity of traditional texts, he further linked some of the regional cultures with early ethnic groups recorded in these texts (Su and Yin 1981; Su 1982).

New Development

The typological analysis and the "regional genealogy and variations" theory were imbued into a national fieldwork manual issued in 1984 (Ministry of Culture 1984). Su Bingqi and his disciplines, all prominent figures in Chinese archaeology, frequently traveled across the nation to deliver them to their fellow colleagues and urged them to mend up the gaps of the cultural lineages of their regions. Blessed by the growing excavations since the 1970s, each province was able to write its cultural history, more or less complete, from the Paleolithic Age well into the historical periods (Wenwu Editorial Committee 1979, 1991). They nevertheless brought much harm to Chinese archaeology in the meantime. Emphasizing on the importance of stratigraphy and cultural sequence, they ignored many of other questions, such as settlement pattern, and subsistence economy, as well as many types of data, such as soil, food residue, and botanical and faunal remains.

Since the late 1970s, however, China reopened itself to the World and once again appreciated foreign archaeological theories and methods, mostly of the West and Japan. In 2005, the State Administration of Cultural Heritage (SACH) commissioned the Archaeology Department of Beijing University, the leading institution in China, a major revision of the 1984 manual to catch up with the current development in archaeology over the globe. From manuals of Britain and Japan, the new manual, which was issued in 2009, adopts the social archaeology of the West and the research subjects of settlement pattern, subsistence economy, craft production, and social organization. It asks excavators to pay attention not only to stratigraphy but also to spatial organization and formation process of a site. It inserts sifting and flotation facilities into the excavation process so as to gather tiny animal bones, plant seeds, and artifacts for future analysis. In addition, it demands on-site conservation for the purpose of protecting fragile artifacts and features (SACH 2009). In line with the new standards, an excavation project is no longer targeted at narrow subjects such as chronology and cultural definition, but becomes a platform for multidisciplinary cooperation; it is no longer a closed domain for the excavators alone, but an open territory for many specialists who examine various types of

materials. In this way, Chinese archaeology will surely interact with the world communities more actively in the future.

Cross-References

- ▶ Banpocun, Archaeology of
- ▶ Field Method in Archaeology: Overview
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Multicultural Archaeology
- ▶ Nationalism and Archaeology

References

Banpo Museum, Shaanxi Institute Of Archaeology, Lintong County Museum. 1988. *Jiangzhai-a report on the excavation of a Neolithic site*. Beijing: Wenwu.

Chen, X. 1997. *Zhongguo Shiqian Kaoguxueshi Yanjiu 1895–1949*. Beijing: Sanlian Shudian.

China, Ministry Of Culture. 1984. Manual of archaeological fieldwork. (Reprinted by the Experimental Teaching Center of Archaeology and Anthropology of Xiamen University, 2007).

China, State Administration Of Cultural Heritage. 2009. *Manual of archaeological fieldwork*. Tianye Kaogu Gongzuo Guicheng. Beijing: Wenwu.

Shi, X. 1982. Tianye kaogu fangfa – diaocha, faju eyu zhengli. In *Kaogu Gongzuo Shouce*, ed. W. Yin, 1–92. Beijing: Wenwu.

Su, B. 1948[1984]. Doujitai goudongqu muzang (excerpt). In *Su Bingqi Kaoguxue Lunshu Xuanji*, 3–58. Beijing: Wenwu.

Su, B. 1959[1984]. Jieyu. In *Luoyang Zhongzhoulu (xigongduan)*, ed. Zhongguo Kexueyuan Kaogu Yanjiusuo. Reprinted in *Su Bingqi Kaoguxue Lunshu Xuanji*, 65–87. Beijing: Wenwu.

Su, B. 1965. Guanyu Yangshao wenhua de ruogan wenti. *Kaogu Xuebao* 1: 51–82.

Su, B. 1982. Dicengxue yu qiwuxingtaixue. *Wenwu* 4: 1–7.

Su, B., and W. Yin. 1981. Guanyu kaoguxue wenhua de quxi leixing wenti. *Wenwu* 5: 10–17.

Wenwu Editorial Committee. 1979. *Wenwu Kaogu Gongzuo Sanshinian*. Beijing: Wenwu.

Wenwu Editorial Committee. 1991. *Wenwu Kaogu Gongzuo Shinian*. Beijing: Wenwu.

Xia, N. 1952. Tianye kaogu xulun. *Wenwu Cankao Ziliao* 4: 81–90.

Xia, N. 1958. Kaogu gongzuo de jinxi–liangtiao luxian de duibi. *Kaogu Tongxun* 2: 1–4.

Yan, W. 1994. Kaogu yizhi de fajue fangfa. In *Kaoguxue Yanjiu*, vol. 2, 249–266. Beijing: Beijing Daxue.

Zhang, Z. 1983. Dicengxue yu leixingxue de ruogan wenti. *Wenwu* 5: 60–69.

Zhang, L. 2011. Soviet inspiration in Chinese archaeology. *Antiquity* 85 (329): 1049–1059.

Zhongguo Kexueyuan Kaogu Yanjiusuo. 1963. *Xi'an Banpo*. Beijing: Wenwu.

Zou, H. 1956. Shilun Zhengzhou xin faxian de Yin Shang wenhua yizhi. *Kaogu Xuebao* 3: 77–103.

Zou, H. 1964. Shilun Yinxu wenhua fenqi. *Beijing Daxue Xuebao*. *Renwen kexue ban* 4: 77–103; 5: 63–90.

C

Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties

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Brief Definition of the Topic

In the late Ming dynasty, porcelain was manufactured in the city of Jingdezhen, the largest and most important kiln complex in China, situated in the northeast of Jiangxi province. Porcelain was already being manufactured in the city in the Song dynasty (960–1279), but it was not until the thirteenth century during the Yuan dynasty (1279–1368) that the imperial or official kilns (*guanyao*) were established to manufacture porcelain of the finest quality and most advanced technology exclusively for use by the Emperor and the court at the capital in Nanjing. The Emperors of the succeeding Ming dynasty (1368–1644), who after 1420 ruled from the new capital situated further to the north in Beijing, required annual orders of hundreds of thousands of porcelain pieces made in a wide range of shapes, which were often beyond the production capacity of the kilns under imperial supervision. Consequently, a number of privately owned kilns (*minyao*) located in and around Jingdezhen had to fulfill some of the porcelain orders for the court, as well as to manufacture porcelain for both the domestic and export markets. The porcelain made in the early Ming dynasty was mostly decorated in underglaze cobalt blue using high-quality cobalt imported from Iran (Harrison-Hall 2001).

By the late Ming dynasty, when the Emperors Jiajing (r.1522–1566), Longqing (r.1567–1572), and Wanli (r.1573–1620) ruled China, the imperial kilns had entered into decline due to a lack of financial resources and corruption and after repeated riots had to be closed in 1608. As a result, the best porcelain potters and painters went to work at the private kilns, bringing with them the technical expertise formerly monopolized by the imperial kilns. They were now free from strict official constrains, and thus innovation followed (Canepa and Van der Pijl-Ketel 2008). Although the majority of the porcelain was decorated in underglaze cobalt blue, using a mixture of the high-quality cobalt from Iran and the cobalt that was being sourced from western China since the early fifteenth century, the kilns also manufactured porcelain decorated in polychrome overglaze enamels in the sophisticated techniques of *doucai* and *wucai* (five colors), as well as *kinrande* (gold brocade) (Canepa 2016).

China had been exporting a variety of ceramics to Southeast Asia, the Middle East, and Africa since the ninth century. A small number arrived to Europe in the fourteenth century, but it was not until the mid-sixteenth century that the Portuguese began importing large quantities of porcelain into Europe via their newly established long-distance sea trade routes to Asia. This is attested by the porcelain cargo yielded from homeward-bound Portuguese shipwrecks, which consisted predominantly of blue-and-white porcelain made for export at private kilns in Jingdezhen ranging from high to medium quality, all with purely Chinese forms and decorative motifs derived from nature with Buddhist, Daoist, or Confucian connotations and a variety of flowers, fruits, and scroll borders, as well as a small quantity of porcelain decorated in overglaze enamels. These archaeological finds reflect the significant increase in porcelain production at Jingdezhen during the 44-year reign of the Jiajing Emperor, not only for the imperial court and domestic market but also for the export market, which led to a far greater variety of new shapes and decorative motifs and techniques (Canepa 2014, 2016).

By the late sixteenth century, a new style of Jingdezhen blue-and-white porcelain known as *kraak* was being manufactured in vast quantities at several private kilns in Jingdezhen almost exclusively for export. It seems likely that the development of this new export porcelain was prompted by the lifting of the Ming maritime trade ban by Emperor Longqing when he ascended to the throne in 1567. *Kraak* porcelain was thinly potted and densely decorated in a free and spontaneous style with traditional Chinese auspicious animals and Buddhist, Daoist, and Confucian motifs or narrative scenes taken from novels or other literary works. This porcelain, made throughout the reigns of Emperors Wanli, Tianqi (r.1621–1627), and Chongzhen (r.1628–1644), was adapted to the taste and specific demands of its overseas customers in Japan, Southeast Asia, the Middle East, and Europe. This led to the introduction of a wide variety of new shapes and decorative styles, some of which were made after European models and designs (Rinaldi 1989; Cao and Yi Fei 2006; Canepa and Van dep Pijl-Ketel 2008; Canepa 2012, 2016; Ströber 2013). Although the decorative styles of *kraak* porcelain changed over time, its characteristic decoration arranged into panels remained popular for several decades and thus was imitated at the private kilns of Zhangzhou in the southern province of Fujian (Canepa 2010). By the late 1570s, *kraak* and other fine late Ming porcelain from Jingdezhen, as well as the somewhat coarser Zhangzhou porcelain, were exported throughout the world. This was possible first through the sea routes of the Iberian kingdoms of Portugal and Spain and then also by the trading companies formed by the Northern Netherlands/Dutch Republic and England that connected Asia with both Europe and the New World (Kuyamama 1997; Canepa and Van der Pijl-Ketel 2008; Canepa 2012, 2014, 2016; Van der Pijl-Ketel 1982; Kerr et al. 2011; Ströber 2013).

A variety of blue-and-white porcelain pieces decorated in a new painting style, the so-called transitional, began to be manufactured at the private kilns of Jingdezhen in the reign of Emperor Tianqi and continued into the subsequent reign of Chongzhen, during the unstable and politically chaotic transition period, which occurred at the end of the Ming dynasty and the rise of the Qing dynasty (1644–1911). This high-quality porcelain

was intended for both the domestic and export markets (Butler et al. 1990; Butler and Qinzheng 2006; Huang 2009/2010). By the late 1630s, it was imported, alongside *kraak* and small quantities of Jingdezhen porcelain decorated with overglaze enamels and *kinrande*, as well as the pure white porcelain, known by the French name *blanc de chine*, manufactured since the mid-Ming dynasty at the private kilns of Dehua in Fujian province, into both Europe and the New World (Kerr et al. 2011; Canepa 2016).

After the imperial kilns were reestablished in the early Qing dynasty, a variety of new decorative techniques and schemes were developed. A large quantity of the porcelain manufactured in or around Jingdezhen during the reigns of Emperors Kangxi (r.1662–1722), Yongzheng (r.1723–1735), and Qianlong (r.1736–1795), when the East India Companies (Dutch, British, French, and Swedish) dominated the sea trade with China, was delicately painted in underglaze cobalt blue. But there was also porcelain that combined the use of underglaze cobalt blue with overglaze enamels and porcelain decorated in *famille verte*, *grisaille*, Chinese Imari (imitating the decorative style of Japanese Imari), and *famille rose*. As the quantities of the porcelain orders increased, the enameling work moved from Jingdezhen to Canton (present-day Guangzhou) in Guangdong province, where low-temperature muffle kilns fused the overglaze enamels onto already fired pieces. This *chine de commande* porcelain was decorated with elaborate European designs that were based on prints and drawings sent by European traders. The Americans, who arrived in Canton in 1784, put an end to the trade dominance of the East India Companies. The European trade in *chine de commande* porcelain continued in the reign of Emperor Jiaqing (r.1796–1820), but exports to the West started to decline by the 1830s, during the subsequent reign of Emperor Daoguang (r.1821–1850) (Staniforth 1996; Leath 1999; Kerr et al. 2011; Lucas 2006). The late Ming and Qing porcelains discussed above bear witness to the continuous commercial, cultural, and artistic exchanges that occurred between the East and West, which lasted three centuries (from the sixteenth to the nineteenth century).

Cross-References

▶ Colonial Encounters, Archaeology of
▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology

C

References

Butler, M., and W. Qingzheng. 2006. *Seventeenth century Jingdezhen porcelain from the Shanghai museum and the Butler collections*. Shanghai/London: Shanghai Museum/Scala.

Butler, M., M. Medley, and S. Little. 1990. *Seventeenth century Chinese porcelain from the Butler family collection*. Alexandria: Art Services International.

Canepa, T. 2010. The Portuguese, Spanish and Dutch trade in Zhangzhou. *Wenbo* 4: 58–66. Journal of the Fujian Provincial Museum, Fujian, China. (in Chinese).

Canepa, T. 2012. The Portuguese and Spanish trade in Kraak porcelain in the late 16th and early 17th centuries. In *Proceedings of the international symposium: Chinese export ceramics in the late 16th and 17th centuries and the spread of material civilization*, 257–285. Hong Kong: Chinese Civilization Centre, City University of Hong Kong and Civic and Municipal Affairs Bureau, Macao Museum of Art.

Canepa, T. 2014. The Iberian royal courts of Lisbon and Madrid, and their role in spreading a taste for Chinese porcelain in 16th-century Europe'. In *Chinese and Japanese porcelain for the Dutch Golden Age*, 17–36. Zwolle: Waanders.

Canepa, T. 2016. *Silk, porcelain and lacquer: China and Japan and their trade with Western Europe and the New World, 1500–1644*. London: Paul Hoberton.

Canepa, T., and C. Van Der Pijl-Ketel. 2008. *Kraak porcelain: The rise of global trade in the late 16th and early 17th centuries*. London/Lisbon: Jorge Welsh.

Cao, J., and L. Yi Fei. 2006. Kraak porcelain discovered at some Kiln sites in Jingdezhen city in recent years. *Oriental Art* 50: 16–24.

Harrison-Hall, J. 2001. *Ming ceramics in the British Museum*. London: British Museum Press.

Huang, M. 2009/2010. New finds from transitional Kiln sites at Jingdezhen and two related issues. *Transactions of the Oriental Ceramic Society* 74: 89–101.

Kerr, R., L.E. Mengoni, and M. Wilson. 2011. *Chinese export ceramics*. London: V & A Publishing.

Kuwayama, G. 1997. *Chinese ceramics in colonial Mexico*. Los Angeles: Los Angeles County Museum of Art.

Leath, R.A. 1999. "After the Chinese taste": Chinese export porcelain and chinoiserie design in eighteen-century Charleston. *Historical Archaeology* 33: 48–61.

Lucas, G. 2006. *An archaeology of colonial identity: Power and material culture in the Dwars Valley, South Africa*. New York: Springer.

Rinaldi, M. 1989. *Kraak porcelain. A moment in the history of trade*. London: Bamboo Publishing Ltd.
Staniforth, M. 1996. Tracing artefact trajectories – Following Chinese export porcelain. *Bulletin of the Australian Institute for Maritime Archaeology* 20: 13–18.
Ströber, E. 2013. *Ming porcelain for a globalised trade*. Stuttgart: ARNOLDSCHE Art Publishers.
Van Der Pijl-Ketel, C.L., ed. 1982. *The ceramic load of the "Witte Leeuw" (1613)*. Amsterdam: Rijksmuseum.

Chiripa and the Emergence of Social Complexity in the Lake Titicaca Basin

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Introduction

Chiripa is an archaeological site that has been fundamental for discussing key processes of cultural change in the New World and particularly in the Lake Titicaca basin of the south central Andes (Hastorf 2008; Mohr-Chávez 1988; Ponce 1970; Stanish 2003). Contemporary to Qaluyo and predating other important developments such as Pukara in Peru and Tiwanaku in Bolivia, research in Chiripa has been key for discussing a wide range of topics including early village life, plant domestication and agricultural intensification, human responses to climate change, social complexity, and primary state formation. The site exemplifies the "Formative Period" of the Lake Titicaca basin, associated with the adoption of ceramics, sedentism, and agriculture, and has been systematically investigated by successive generations of archaeologists applying innovative documentation and recovery protocols for their time. Although there are still many unresolved questions surrounding the people who inhabited it, Chiripa is arguably one of the best investigated sites in the Andes.

Definition

Similarly to other archaeological sites, the term Chiripa has been used to refer to a ceramic style, a series of cultural phases, and a cultural complex in addition to its modern use which refers to a hacienda or plantation that was dissolved into a presently exiting Aymara community following the Bolivian agrarian reform of 1953. Nevertheless, Chiripa basically refers to an archaeological site situated in the southeastern shore of Lake Titicaca in the department of La Paz of modern-day Bolivia. More precisely Chiripa is located on the northern shore of the Taraco Peninsula, lays over a colluvial terrace, and sits between a series of small seasonally activated streams. The entire landscape is occupied by small and parceled cultivated or fallowed fields of potatoes, quinoa, fava beans, barley, maize, and other annually rotating crops (Bruno 2014).

The site of Chiripa covers approximately 25 ha (−16.4332, −68.8308, 3860 m above sea level). Its center consists of a roughly rectangular raised platform mound (locally known as montículo), which measures approximately 60 × 55 × 4 m, oriented geographically north-south, and which contains a sunken court temple surrounded by a series of rectangular buildings (Browman 1998). The walls of the sunken court measure approximately 24 × 26 m and consist of cut sandstone and limestone pillars or standing stones filled-in between them with smaller uncut and partially cut stone blocks (Fig. 1). The sunken court temple is trapezoidal and was remodeled several times throughout its life use. One of its latest iterations is exposed and was reconstructed in 2006. Behind the four walls of the sunken court, there are between 14 and 16 rectangular structures with double walls, bins, and (sliding) doors oriented toward the court and organized in an octagonal pattern. One of these structures was partially exposed in 2006 and is currently covered by a glass structure. The entrance to the court was possibly situated in the northern wall, accessed from the lake. In addition to the stone pillars, a number of stone monoliths have been unearthed at the site. The sculptural style of the monoliths features iconographic representation of snakes,

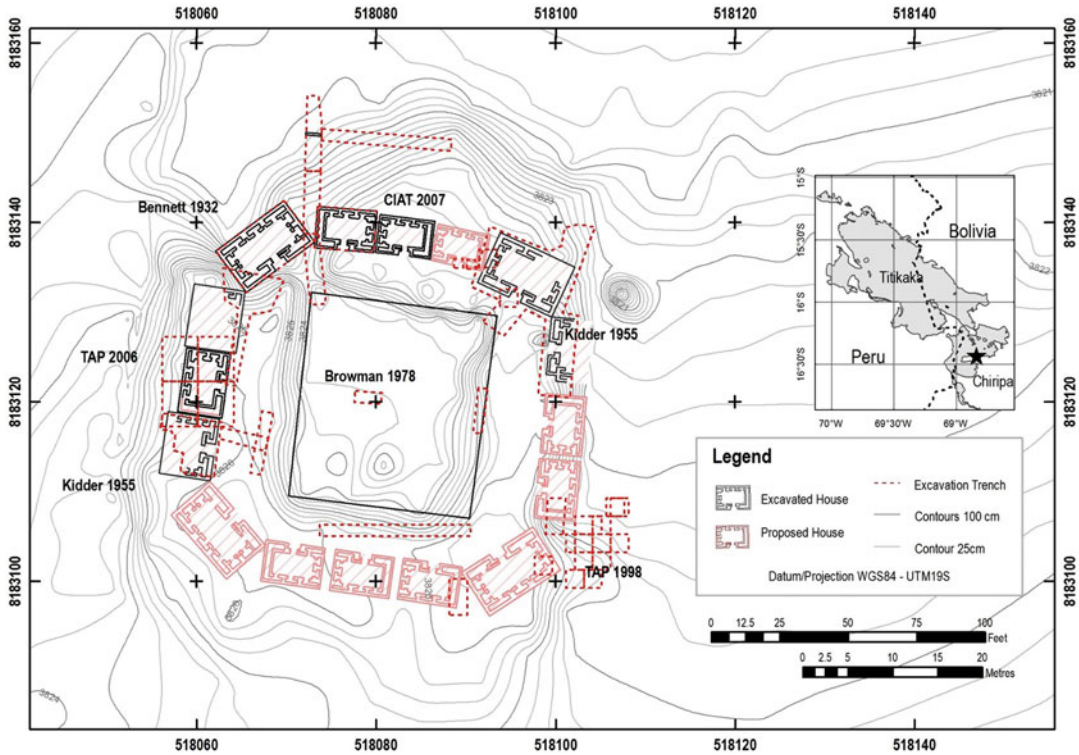

Chiripa and the Emergence of Social Complexity in the Lake Titicaca Basin, Fig. 1 Topographic map of Chiripa showing its raised platform mound (montículo) overlaid by its sunken court with surrounding structures and the different archaeological excavation operations carried out at the site. (Courtesy of Eduardo Machicado)

toads, lizards, spirals, camelids, crosses, and anthropomorphic figures with exaggerated appendixes suggesting fecundity.

Research History

Wendell C. Bennett carried out the first archaeological excavations at the site in 1934 and identified the salient features of the site including the sunken court and the surrounding rectangular buildings (that he interpreted as "houses"). The buildings were composed of adobe and stone cobbles, as each included a central sliding door oriented toward the court (Bennett 1936). These structures included inner and outer walls, which contained a series of separated peripheral compartments or bins accessible to the central room by small window niches neatly decorated with stepped motives and lintels. Bennett partially exposed the northwestern corner of the court and the two buildings that lay to its sides in a long trench. The buildings he encountered included remarkably well-preserved adobe, quinoa grains, and *chuño* (freeze-dried potatoes) in these bins. Beneath the buildings, he encountered a series of cist tombs, some of which contained small gold plaques and other smaller offerings. Bennett also documented a "pre-house" cultural level that anteceded the construction of these structures. Interestingly, Bennett (1936) initially described Chiripa ceramics occurring after Tiwanaku, a mistake he subsequently corrected.

Shortly after Bennett's work, Maks Portugal Zamora and María Luisa Sánchez Bustamante complemented excavations at the mound including exposing other similar buildings and burial features. Alfred Kidder II directed excavations at Chiripa in 1955 following his extensive research at the site of Pukara in the northwestern side of Lake Titicaca. Unfortunately, a synthetic report of this work was never published (Kidder 1956;

Mohr-Chávez 1988). Perhaps the most important result of this project was the collection of charcoal samples for radiocarbon dating, which verified the temporal precedence of Chiripa before Tiwanaku. Based on this accumulating evidence, Chiripa and Wankarani (another Formative development mostly situated in the Oruro department of Bolivia) have been described as the village phase that preceded the development of the Tiwanaku state (Ponce 1970).

In the 1970s, David L. Browman carried out large-scale research in Chiripa. Most excavations were focused on the sunken court temple, but additional areas were also tested (Browman 1998). The results of his findings helped to improve the chronology of the site, discuss the role of exchange of foreign resources, and propose a series of hypotheses regarding the Formative Period's economic, social, and political organization. This project involved the implementation of fine-recovery protocols including the recently developed water flotation system for recovering macro-botanical and microfaunal remains. From his excavations, we learned much about the central court.

Since 1992, Christine A. Hastorf has directed the Taraco Archaeological Project (TAP), which involved several excavations seasons at Chiripa, including ongoing research focused on expanding the understanding of the site and the daily life of its inhabitants. TAP's excavations at the site itself included work on the mound as well as testing and exposing large operations in new complexes including Llusco, Choquehuanca, Santiago, and Quispe (Hastorf 1999, 2003, 2008, 2012). Interdisciplinary analysis of the recovered materials complemented by numerous radiocarbon dates has helped to improve the chronological and socio-cultural framework of the site. In addition, a systematic survey of the entire Taraco Peninsula was carried out including the systematic collection of artifacts from the main Formative Period sites (Bandy 2004). In addition to TAP's work, between 2005 and 2007, the Bolivian government carried out an excavation and restoration project at Chiripa (PACH), which involved reconstructing the sunken court and exposing and protecting one of its surrounding structures (Fig. 2).

Because of its gentle topography, the Taraco Peninsula lacks the impressive terraces found elsewhere in the lake, yet the entire landscape has been transformed by successive generations of farmers who have slowly transformed it into an

Chiripa and the Emergence of Social Complexity in the Lake Titicaca Basin, Fig. 2 The Chiripa sunken court viewed from the southeast in November 2013. The steel and glass structure visible behind the north wall protects one of the surrounding rectangular buildings

agrarian landscape (Bruno 2014). How were these activities related to the settlement is part of ongoing research. The study of contemporary community practices including ethnobotany, land use management strategies, and resource utilization sustainability are the focus of TAP's recent work in collaboration with the local community and Bolivian research institutions.

Chiripa During the Formative Period

During the Early Formative Period (1500–800 B.C.E.) Chiripa was initially founded as a small village of farmers, herders, and fishermen. The beginnings of the site coincided with increased regional humidity and the transgression of the smaller portion of Lake Titicaca, following an arid period that persisted during much of the middle Holocene (Baker and Fritz 2015). Throughout the subsequent centuries, regional climate fluctuated producing important consequences on the economy of the societies settled around Lake Titicaca (Capriles et al. 2014). Chiripa grew progressively and extensively, and economic, religious, and political activities left a complex record of architectural features, feasting trash deposits, and funerary tombs of various styles. During the Middle Formative Period (800–100 B.C.E.), the raised platform mound was built including the sunken court and its surrounding structures (Hastorf 2003). During this time, the site acquired its largest expanse, and yet it hardly exceeded seven hectares of extension (Bandy 2004). The site, however, grew in internal complexity and most of the central portion of the site was built and rebuilt several times adding a series of sunken enclosures.

During the Late Formative Period (100 B.C.E.–500 C.E.) and subsequent Tiwanaku Period (500–1100 C.E.), the site waned in regional importance, initially depending on Kala Uyuni (a site roughly situated 10 km west of Chiripa) and eventually to Tiwanaku, but the remodeling episodes associated with its sunken court persisted until the site was abandoned altogether.

The Chiripa ceramic style includes a diversity of mostly fiber-tempered wares mostly represented in bowls and ollas with various rim and neck types. The finest vessels (including some unique ceramic trumpets) are finely burnished, include cream- over red-painted stepped designs, and occasionally bear plastic decoration of feline motives. The economic base was diversified and consisted of mixed quinoa and potato farming with llama and alpaca pastoralism, fishing, hunting fowl and other small fauna, and the collection of aquatic and terrestrial plants. Paleoethnobotanical research has allowed to identify increased selection of quinoa seeds with thinner testa as an attribute directly associated with artificial selection in the context of plant domestication but also agricultural intensification (Bruno 2014; Hastorf 2012).

Beyond the raised platform mound, Chiripa comprises a series of additional rectangular and trapezoidal buildings, burials, middens, and other domestic and ritual features (Hastorf 1999, 2003, 2008, 2012). Archaeological survey and excavations in nearby sites suggest that the sequence observed in Chiripa is a good reflection of the trends that occurred regionally in terms of demographic, environmental, and sociopolitical change (Bandy 2004). Dozens of contemporary sites with similar, albeit slightly different features, are distributed along the shores of Lake Titicaca and include Achachi Coacollo, Alkamari, Alto Pukara, Ch'issi, and Pajchiri (see Stanish 2003). Before the emergence of chiefdoms or "multi-community" polities in the Late Formative Period, most of these sites including Chiripa were part of economically and politically autonomous communities (Bandy 2004).

Key Issues and Current Debates

The data produced in the context of investigating Chiripa and contemporary Formative Period sites in the Titicaca basin has been used to discuss a number of important research topics including the emergence of social complexity, early village life, household organization, plant and animal domestication, fishing, and the impact of humans in the Lake Titicaca ecosystem, among many others (see Hastorf 2008; Stanish 2003). Relevant to all of

these themes is how the site itself evolved and changed in relation to intrinsic (demography, agricultural intensification, craft specialization, political centralization, religiosity) and extrinsic (migration, climatic and environmental change) factors. For instance, it is not entirely clear if Chiripa and other contemporary agricultural villages evolved from previous hunter-gatherer communities or if they were part of a broader migratory process by emergent agriculturalists. Given that no Archaic Period hunter-gatherer sites have been discovered in the Taraco Peninsula, it remains to be determined if their absence is a product of sampling intensity, taphonomy, low hunter-gatherer population densities, or environmental factors that made the region unattractive to foragers before the late Holocene but subsequently quite attractive to early agro-pastoralists.

A related question is how the demographic growth trend observed in the following millennia was related to environmental change, agricultural intensification, or an increasingly sophisticated institutional framework. In other words, was population growth a consequence of improved climatic conditions, cascading effects of technological innovations, or the enforcement of specific social sanctions? Moreover, we know that the shores of Lake Titicaca have fluctuated considerably over time, in part due to complex climatological and environmental processes, but the precise interconnection between climate, demography, and human adaptive strategies is still under discussion (e.g., Capriles et al. 2014). Ongoing paleolimnological work to improve the resolution and precision of the currently available lake level reconstructions will aid considerably in resolving this debate (Baker and Fritz 2015).

In the Lake Titicaca basin, the persistence and transformation of sunken courts and surrounding structures such as those featured at Chiripa have been used to support the evolution of a long-term tradition of corporate monumental architecture (Mohr-Chávez 1988). For instance, stone monoliths and sunken courts similar to those at Chiripa are present in contemporaneous sites on the Copacabana and Santiago de Huata peninsulas and later Late Formative sites such as Khonkho Wankane, Pukara, and then Tiwanaku. Therefore, the "Yaya-Mama Religious Tradition," defined by the presence of temples with storage features, stone sculptures of supernatural beings, ritual paraphernalia including ceremonial burners and trumpets, and iconography featuring rayed appendixes and divided eyes, has been proposed to characterize the similarities shared among these Formative sites (Mohr-Chávez 1988). Nevertheless, the existence of a religious tradition does not in itself explain the differential trajectories of change observed between different settlements. Inter-societal competition, violence, exchange, and cooperation in a context of demographic growth should also be accounted for in explaining the emergence of social complexity in the Lake Titicaca basin (Stanish 2003). Regional investigations have discarded that strong sociopolitical integration occurred during the Early and Middle Formative periods, but differential investment in monumental corporate architecture occurred in various sites. In fact, the Tiwanaku state (which consolidated some of these processes) emerged fundamentally based on the religious, institutional, and economic integration developed from earlier times.

In this debate, archaeological questions such as the specific function of the complex structures that surround the Chiripa sunken court (and similar ones across the region) become gradually relevant. Initially these buildings were interpreted as houses; however their location, form, appearance, and content also supported a non-domestic, more communal role (Bennett 1936; Kidder 1956; Ponce 1970). It was later proposed that these structures were part of a ritual complex that involved agricultural rites and storage of offerings in the context of the Yaya-Mama Religious Tradition (Mohr-Chávez 1988). On the other hand, considering that under the floors of many of these structures, a series of human burials with offerings have been documented, the compartments might have served as niches to house burials similarly to the better known Late Intermediate Period burial towers known as *chullpas* (Hastorf 2003). This proposition implies that the entire complex might have been related to an ancestor cult that legitimatize land tenure, use of the landscape, and fostered social cohesion on the peninsula. Nevertheless, the association between

these burials and the surrounding structures is not supported by robust contextual evidence as no tombs were found inside the actual bins or niches. Moreover, the shape and volume of these features makes them inadequate to contain human bodies (Machicado 2009). Finally, these structures could have also been used to store agricultural surplus and any other significant items and tribute or even hold captives, underscoring the importance that taxation and coercion had in the economic and social reproduction for the Middle Formative Period communities.

Interestingly enough, well-preserved domestic houses associated with unambiguously domestic activities have been notoriously difficult to document at Chiripa and other contemporary sites (Hastorf 2017). Various factors contribute to obscuring the household evidence at Chiripa, including the absence of clear domestic vs. ritual contexts, and taphonomic factors affecting the site's conservation, most likely due to the intensive work by the hacienda phase of occupation. Some of these problems will be eventually overcome by carrying out additional excavations and improving the methodological approaches involved in studying the recovered cultural materials contexts.

Cross-References

► Hastorf, Christine
► Tiwanaku, Geography and Culture of

References

Baker, P.A., and S.C. Fritz. 2015. Nature and causes of Quaternary climate variation of tropical South America. *Quaternary Science Reviews* 124: 31–47.

Bandy, M.S. 2004. Fissioning, scalar stress, and social evolution in early village societies. *American Anthropologist* 106: 322–333.

Bennett, W.C. 1936. Excavations in Bolivia. *Anthropological Papers of the American Museum of Natural History* 35: 329–507.

Browman, D.L. 1998. Lithic provenience analysis and emerging material complexity at formative period Chiripa, Bolivia. *Andean Past* 5: 301–324.

Bruno, M.C. 2014. Beyond raised fields: Exploring farming practices and processes of agricultural change in the ancient Lake Titicaca Basin of the Andes. *American Anthropologist* 116: 130–145.

Capriles, J.M., K.M. Moore, A.I. Domic, and C.A. Hastorf. 2014. Fishing and environmental change during the emergence of social complexity in the Lake Titicaca Basin. *Journal of Anthropological Archaeology* 34: 66–77.

Hastorf, C.A., ed. 1999. *Early settlement at Chiripa, Bolivia: Research of the Taraco Archaeological Project*, Contributions of the Archaeological Research Facility No. 57. Berkeley: University of California.

Hastorf, C.A. 2003. Community with the ancestors: Ceremonies and social memory in the Middle Formative at Chiripa, Bolivia. *Journal of Anthropological Archaeology* 22: 305–332.

Hastorf, C.A. 2008. The formative period in the Titicaca Basin. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 545–561. New York: Springer.

Hastorf, C.A. 2012. Steamed or boiled: Identity and value in food preparation. In *Between feasts and daily meals towards as archaeology of commensal spaces*, ed. S. Pollack, 243–276. Berlin: Topoi.

Hastorf, C.A. 2017. The actions and meanings of visible and hidden spaces at Formative Chiripa. *Ñawpa Pacha* 37: 133–154.

Kidder, A.I. 1956. Digging in the Titicaca Basin. *University of Pennsylvania Museum Bulletin* 20: 16–29.

Machicado Murillo, E.P. 2009. *Las Tumbas de la Península de Taraco: Trayectorías de cambio en practicas funerarias durante la transición entre el Formativo Medio y el Formativo Tardío.* Unpublished Licenciatura thesis, Carrera de Arqueología, Universidad Mayor de San Andrés.

Mohr-Chávez, K.L. 1988. The significance of Chiripa in Lake Titicaca basin developments. *Expedition* 30: 17–26.

Ponce Sanginés, C. 1970. *Las culturas Wankarani y Chiripa y su relación con Tiwanaku*. La Paz: Academia Nacional de Ciencias de Bolivia.

Stanish, C. 2003. *Ancient Titicaca: The evolution of complex society in southern Peru and northern Bolivia*. Berkeley: University of California Press.

Further Reading

Abbott, M.B., M.W. Binford, M. Brenner, and K.R. Kelts. 1997. A 3500 ^{14}C yr high-resolution record of water-level changes in Lake Titicaca, Bolivia/Peru. *Quaternary Research* 47: 169–180.

Bandy, M.S. 2001. *Population and history in the ancient Titicaca Basin*. Unpublished PhD dissertation, University of California, Berkeley.

Browman, D.L. 1989. Chenopod cultivation, lacustrine resources, and fuel use at Chiripa, Bolivia. *The Missouri Archaeologist* 47: 137–172.

Bruno, M.C., and W.T. Whitehead. 2003. *Chenopodium* cultivation and formative period agriculture at Chiripa, Bolivia. *Latin American Antiquity* 14: 339–355.

Flores Blanco, L., and H. Tantaleán, eds. 2012. *Arqueología de la Cuenca del Titicaca, Perú*. Lima: Instituto Francés de Estudios Andinos.
Roddick, A.P., and C.A. Hastorf. 2010. Tradition brought to the surface: Continuity, innovation and change in the Late Formative period, Taraco Peninsula, Bolivia. *Cambridge Archaeological Journal* 20: 157–178.
Stanish, C., and A. Levine. 2011. War and early state formation in the northern Titicaca Basin, Peru. *Proceedings of the National Academy of Sciences USA* 108: 13901–13906.

Chongoni Rock Art Area

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Introduction

The Chongoni Rock Art Area was declared a UNESCO World Heritage Site in 2006. The area lies at the southernmost tip of Malaŵi's central plain, an area also known as the Ngoni Highlands. It contains 127 declared rock painting sites, about one site per km^2, making it one of the richest concentrations of rock art in Central Africa. The Highlands are scattered with hills, many having gneiss rock outcrops with natural shelters and overhangs as well as large boulders with protected surfaces. It is on these rocks that the painting sites are found (Figs. 1, 2, 3, 4, and 5).

Key Issues/Current Debates/Future Directions/Examples

Early Studies

The existence of paintings in this area has been known since the 1920s when Margaret Metcalfe (1956) reported sites on Mphunzi, Chigwenembe, and Mlanda mountains. Further details were reported by Desmond Clark in 1959 as part of his general synthesis of Zambian and Malaŵian rock art. In 1978 N. E. Lindgren and Matthew Schoffeleers published an inventory of 61 rock art sites, the total then known in Malaŵi. Of these sites, 35 lay within the Chongoni Rock Art Area. This brought about a broad recognition that Chongoni was the most important rock art region within Malaŵi. Lindgren and Schoffeleers set out a basic sequence for the art, dividing it into an earlier phase of geometric designs made by hunter-gatherers and a later phase of white finger paintings made by Chewa-speaking farmers. Emmanuel Anati worked in the area in 1986, evaluating the area on behalf of UNESCO for potential World Heritage Site listing. As part of this work, an updated inventory of known rock art sites was produced, and a substantial number of sites were visited. This inventory listed 117 known painting sites, 61 of which were within the Chongoni Rock Art Area. Yusuf Juwayeyi subsequently published more detailed information on a selection of sites and helped to confirm the stylistic sequence (Juwayeyi and Phiri 1992).

The Chongoni Rock Art Area was comprehensively surveyed in 1995 as part of a doctoral research project by Benjamin Smith. It was at this time that the total number of sites in the area was raised to 127, as listed in the UNESCO nomination. Some areas on the larger mountains are densely vegetated and proved hard to survey, so the actual number of rock art sites in the area could be as many as 150. Smith confirmed the findings of early researchers that the art separated into distinctive hunter-gatherer and farmer traditions (Smith 1997). He identified four traditions of rock art from these two periods (Smith 1997, 2005a, b, 2006): the red animal tradition, red geometric tradition, white spread-eagled tradition, and white zoomorphic tradition. The exact chronology of each tradition remains unknown, but their approximate age ranges can be determined from their cultural associations. Hunter-gatherers survived in this part of Malaŵi into the 1800s (Crader 1984), and it seems likely that the hunter-gatherer traditions continued up until this time. The cool, misty climate of the area is not conducive to long-term rock art preservation, and so while rock art has undoubtedly been painted in Chongoni over many millennia, most of the surviving art will be

Chongoni Rock Art Area, Fig. 1 View of Mphunzi mountain, one of the major public rock art areas within Chongoni Rock Art World Heritage Site

Chongoni Rock Art Area, Fig. 2 Red geometric tradition art: made by hunter-gatherers; note the fine *white dots* over the *red finger lines*

centuries rather than millennia old. The farmer rock art is linked by its distribution and ritual associations to Chewa-speaking groups who have only inhabited this area during the last 1000 years. The making of farmer rock art continued as recently as the 1950s (Zubieta 2006).

Current Understandings of Chongoni Rock Art

The hunter-gatherer art of this area is dominated by finger-painted geometric designs typical of the red geometric tradition (Smith 1997). Geometric tradition art was originally termed "schematic art" by Desmond Clark, and it is spread across most of Central Africa. Typical designs include concentric circles, rayed circles, sausage shapes, and internally linear divided stretched circle forms. These designs are almost always in red, and where well preserved, there is sometimes a white fill and/or white microdots between and over the red lines. Alongside these geometric tradition images is a small scatter of sites with finger dots and highly styled animal paintings, usually quadrupeds with vastly inflated bellies. The animal tradition images are generally found separated from the geometric art, either in neighboring sites or in separated parts of the same site. Within Central Africa there is a ratio of about ten geometric

Chongoni Rock Art Area, Fig. 3 White zoomorphic tradition art: made as part of Nyau secret society rituals by Chewa language speakers

Chongoni Rock Art Area, Fig. 4 White spread-eagled tradition images from Chentcherere 2 rock-shelter. This image was taken in the early 1990s before a series of tragic graffiti incidents

tradition sites for each animal tradition site, but in Chongoni the proportion of animal sites is even lower. The existence of two hunter-gatherer rock art traditions is explained in terms of a gender division, with the animal tradition being the art of men and the geometric tradition being the art of women (Smith 1997).

The former hunter-gatherers of Chongoni are remembered in a range of historically recorded oral traditions by the names BaTwa and Akafula (Rangeley 1963). While there are many traditions of their coming into conflict with farmer groups, archaeological evidence from Chongoni also points to localized symbiotic relationships with farmers (Crader 1984). The Malawian BaTwa are argued to have been closely related to modern-day Pygmy groups in terms of their culture and traditions (Smith 2005b, 2006; and see Namono 2010). Studies that have interpreted this art in terms of ongoing intangible heritage values associated with the sites combined with the application of Pygmy ethnographies have suggested that, while the ritual context and production of each of the two art traditions was separated, the symbolism underlying both traditions revolves around rainmaking, fertility, and social

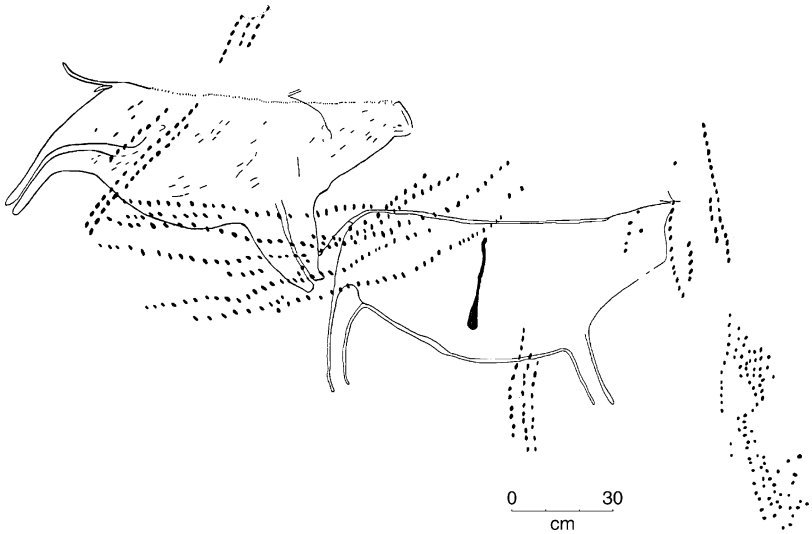

Chongoni Rock Art Area, Fig. 5 Red animal tradition images from Chentcherere 1 rock-shelter

well-being (Prins and Hall 1994; Smith 1997, 2005b; Namono 2011, 2012).

The two more recent farmer traditions are of special importance because they comprise of one of the major concentrations of farmer rock art in sub-Saharan Africa. These traditions only occur in Chongoni and a small section of adjoining parts of Mozambique and Zambia. The farmer arts, as typical of all sub-Saharan African farmer arts, are finger painted and dominantly in white. The white spread-eagled tradition has been linked to a Chewa ritual ceremony called *chinamwali* (Smith 1997, 2005a; Zubieta 2006). *Chinamwali* is a girls' group initiation ceremony held at puberty. The art played a mnemonic role in the teaching of the young girl initiates (Smith 2005a; Zubieta 2012). While the art is no longer made today, some of its symbolism is still understood and still utilized, away from the rock-shelters, by women in modern-day ceremonies (Zubieta 2006, 2012). The other farmer rock art tradition, the white zoomorphic tradition, depicts spirit characters from the Chewamen's secret society: *Nyau* (Lindgren and Schoffeleers 1978; Smith 1997, 2005a). *Nyau* art was made during the time that the society was suppressed during the Ngoni wars, the early missions, and the colonial government (Smith 2001). The art served to train *Nyau* initiates in the secret *Nyau* terms and in the meanings of the large *Nyau* spirit characters that dance at almost all major Chewa social occasions. Today the art is no longer made; indeed, it is no longer needed because the suppression of *Nyau* has ended, and so *Nyau* teaching now happens in its original context (usually the graveyard).

Current Management of Chongoni

The Chongoni World Heritage Site is managed by the Malawian National Department of Antiquities. Many of the sites are within the Chongoni Forest Reserve, and so they also enjoy protection from forestry staff. Some sites are preserved in their original forest setting although much of the area is now under nonindigenous commercial pine plantation. A rock art tourism welcome center is located near Chentcherere hill. This center houses displays and offices for dedicated Antiquities management staff. The major sites open to the public include Chentcherere (excavated by Desmond Clark), Nthulu, Mphunzi, and Namzeze. In the absence of on-site management until 2013, there have been serious conservation problems, with dozens of sites severely damaged by fires and graffiti during the 2000s. In 2012, a US-based professional conservator, Claire Dean, worked at the major public sites removing graffiti. Chentcherere was returned to something close to its original glory. It is hoped that the new government management framework for the area will be able to ensure that the sites are more actively protected and conserved in the decades to come.

Cross-References

- ▶ Clark, John Desmond
- ▶ Rock Art Sites: Management and Conservation
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts

References

Crader, D.C. 1984. Faunal remains from Chencherere 2 rock shelter, Malawi. *South African Archaeological Bulletin* 39: 37–52.

Juwayeyi, Y.M., and M.Z. Phiri. 1992. The state of rock art research in Malaŵi. *Occasional Papers of the Malaŵi Department of Antiquities* 1: 53–66.

Lindgren, N.E., and J.M. Schoffeleers. 1978. *Rock art and nyau symbolism in Malaŵi*, Department of Antiquities publication 18. Zomba: Malawi Government Printers.

Metcalfe, M. 1956. Some rock paintings in Nyasaland. *Nyasaland Journal* 9 (1): 59–70.

Namono, C. 2010. Resolving the authorship of the geometric rock art of Uganda. *Journal of African Archaeology* 8 (2): 239–257.

Namono, C. 2011. Pongo symbolism in the geometric rock art of Uganda. *Antiquity* 85: 1209–1224.

Namono, C. 2012. Dumbbells and circles: Symbolism of pygmy rock art of Uganda. *Journal of Social Archaeology* 12 (3): 404–425.

Prins, F.E., and S. Hall. 1994. Expressions of fertility in the rock art of Bantu-speaking agriculturists. *African Archaeological Review* 12: 171–203.

Rangeley, W.H. 1963. The earliest inhabitants of Nyasaland. *Nyasaland Journal* 162: 35–42.

Smith, B.W. 1997. *Zambia's ancient rock art: The paintings of Kasama*. Livingstone: Zambian National Heritage Conservation Commission.

Smith, B.W. 2001. Forbidden images: Rock paintings and the *nyau* secret society of central Malaŵi and eastern Zambia. *African Archaeological Review* 18 (4): 187–211.

Smith, B.W. 2005a. Rock art – Chewa (Central Africa). In *The encyclopedia of religion and nature*, ed. B.R. Taylor, 1393–1394. London: Thoemmes Continuum.

Smith, B.W. 2005b. Rock art – BaTwa/pygmies (Central Africa). In *The encyclopedia of religion and nature*, ed. B.R. Taylor, 1392–1393. London: Thoemmes Continuum.

Smith, B.W. 2006. Reading rock art and writing genetic history: Regionalism, ethnicity and the rock art of southern Africa. In *The prehistory of Africa*, ed. H. Soodyal, 76–96. Cape Town: Jonathan Ball. 176–81.

Zubieta, L. 2006. *The rock art of Mwana wa Chentcherere II rock shelter, Malaŵi: A site-specific study of girls' initiation rock art*. Leiden: African Studies Centre.

Zubieta, L. 2012. Animals and humans: Metaphors of representation in south-central African rock art. In *Working with rock art: Recording, presenting and understanding rock art using indigenous knowledge*, ed. B.W. Smith, K. Helskog, and D. Morris, 169–177. Johannesburg: Wits University Press.

Christian Archaeology in Spain

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Introduction

As in much of the late Roman Empire, we may consider the search for holy bodies (*inventiones*) as a sort of Prehistory of Hispanic Christian Archaeology. Between the years 380 and 392, for instance, Asturius, Bishop of Toledo, led the *inventio* of the saintly corpses of Justus and Pastor in *Complutum* (Alcalá de Henares); around the year 619 Agapius of Córdoba successfully recovered the body of Saint Zoilus. Such primitive *inventiones* led to the construction, or else reconsecration, of a number of basilicas in which these bodies were guarded or rehoused – which in turn generated a range of new structures to be studied by Christian Archaeology at a later date. In the northern Iberian Peninsula, and also in other areas under Saracen control, a number of saintly graves were uncovered after the Muslim occupation. These efforts were driven by local and Carolingian political and religious elites who, in the midst of the *Reconquista*, wished to secure their legitimacy in newly conquered territories. Three well-known examples are those of Saint Eulalia in Barcelona (878), Saint James the Great in Santiago de Compostela (825–829), and Saint Vincent in Valencia (855). The practice continued throughout the Middle Ages – a period of considerable growth in ecclesiastic initiatives tasked with locating new relics or broader sites of martyrdom, now solely for religious purposes.

Definition

Either as a key topic or a branch of the historical science, Christian Archaeology focuses its attention on the identification of the material manifestations of Christianity of the first centuries, especially those of the Roman Empire and Late Antiquity. In Hispania (current Spain and Portugal), the time frame of its range of study ends with the Muslim occupation (711 AD).

Key Issues/Current Debates/Future Directions/Examples

Fifteenth-century Italy witnessed the birth of a movement tasked with reconnecting with its classical past. By the sixteenth century it had spread to Spain, with sources mentioning early attempts at establishing a tentative archaeological science. As far as the Christian past is concerned, a number of excavations were undertaken in Alcázar de Arjona (Jaén) in search of third-century martyrs, and in the church of Saints Justus and Pastor in Barcelona (1590), where attempts were made to find Pacianus, one of their earliest known bishops. By the seventeenth century, bones found during the excavation of the Baeza wall were readily attributed to Roman-era martyrs. The discovery and excavation of the great basilica of *Segobriga* (Cuenca) during the eighteenth century is the first such news concerning the identification of a Late Antiquity basilica in Hispania (Capistrano de Moya 1792).

The monumental *España Sagrada* of father Enrique Flórez, published after 1747, is the starting point of scientific works in Christian archaeology in Spain. Still widely consulted and cited, it gathers all known facts at the time concerning not only ecclesiastic history but also Christian monuments in the Iberian Peninsula. In many cases, it is the sole witness to churches and buildings long disappeared. The discovery in 1858 of the Guarrazar treasure in Toledo (a range of crosses and golden votive crowns with encrusted jewels) led to yet another early location of Late Antiquity religious architecture in the Iberian Peninsula (Ríos Serrano 1861). Another such ecclesiastical treasure from Visigothic times was discovered, out of context, in Torredonjimeno (Jaen) in 1926. In the nineteenth century, the work of J. de Manjarrés (1867) is particularly noteworthy as the first Spanish lay author to deal in a broad manner with Christian archaeology, heavily inspired by French handbooks that flourished at the time.

In the twentieth century, J. Gudiol i Cunill published *Nocions d'arqueologia sagrada catalana* (1902), while J. Puig i Cadafalch of the Institut d'Estudis Catalans began a systematic excavation of a number of Hispanic churches and Paleochristian archaeological sites (Puig i Cadafalch 1961). In the years prior to the Civil War (1936–1939) and the early postwar years, the so-called "early core of a Christian archaeological school in Catalonia" (and indeed for the rest of Spain) began to take shape. Soon afterward, a towering figure in Spanish Christian archaeology arises: Pere de Palol i Salellas (1923–2005), who pioneered a truly modern, scientific, and systematic approach to the archaeology of the Hispanic Christian world of the pre-Middle Ages. His efforts were made possible by his chair in Christian Archaeology at the Universitat de Barcelona, the only such position in Spain which is currently headed by J.M. Gurt. Palol's works are substantial, but his *Arqueología cristiana de la España romana -siglos IV al VI-* (1967) is the definitive starting point for the consolidation of this science in the Iberian Peninsula. In 1964, Palol started the *Reuniones de Arqueología Cristiana Hispánica*, a fundamental meeting place in which to share news and summaries of Christian archaeology in Spain and Portugal. Its seventh edition will take place in 2018 (Fig. 1).

Just as Palol and his disciples undertook their enormous amount of excavation and investigation, the German Archaeological Institute of Madrid, headed by T. Hauschild, H. Schlunk, and T. Ulbert, developed a far-reaching research program that led to the volume *Die Denkmaler der frühchristlichen und westgotischen Zeit* (1978). A. Arbeiter has taken over this project and is currently updating the volume. After the

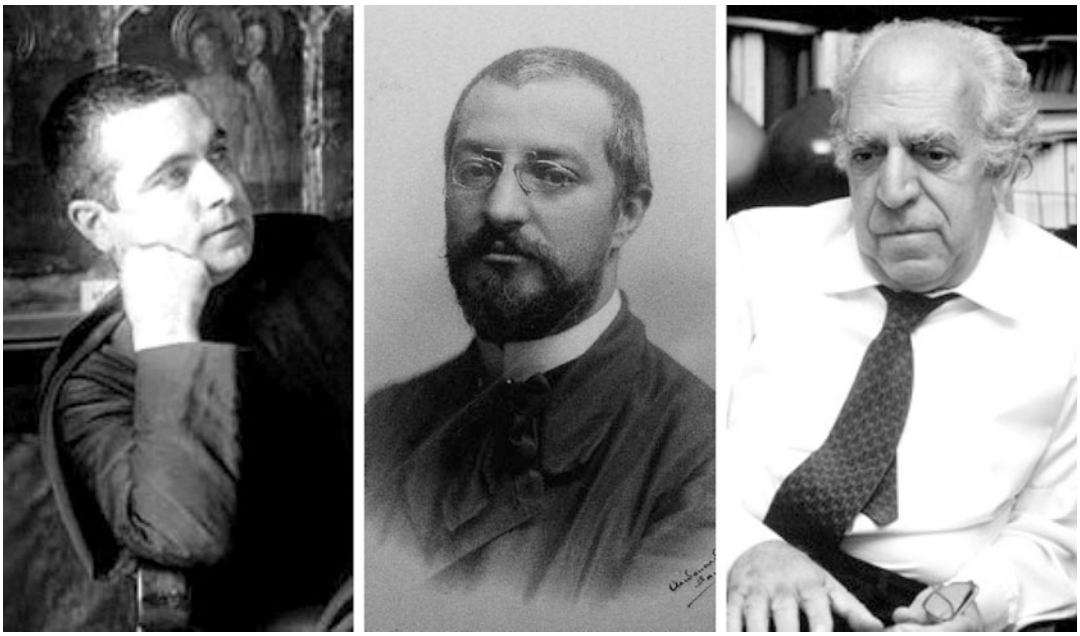

Christian Archaeology in Spain, Fig. 1 The pioneers of Christian Archaeology in Spain: Josep Gudiol i Cunill, Josep Puig i Cadafalch, and Pere de Palol i Salelles. (From Buenacasa Pérez and Sales-Carbonell 2015, p. 102)

publication of a critical and essential synthesis on architecture and liturgy (Godoy Fernández 1995) and the recent appearance of a few regional inventories of Christian archaeology (e.g., Palol i Salellas, ed. 1999; Mateos Cruz and Caballero Zoreda 2003; Sastre de Diego 2011; Sales-Carbonell 2012; Sánchez-Pardo 2012; Sánchez Ramos et al. 2015), a comprehensive inventory of Late Antiquity and Early Medieval Christian architecture is being coordinated by G. Ripoll as part of the international project *Corpus Architecturae Religiosae Europae (saec. IV–X)* directed by M. Jurkovic and G.P. Brogiolo.

In the meantime, the basics of architectural archaeology applied to Paleochristian monuments have been established and developed by the works of L. Caballero-Zoreda, beginning in the last two decades of the twentieth and the early twenty-first century. Christian Archaeology in Portugal, which is part and parcel of the Hispanic frame, has emerged during the second half of the twentieth century following the summary work of F. De Almeida (1962) and has led to underground investigations in Mértola, Troya, Viseu, and Dume.

In an urban context, the increasingly well-known Christian skyline from the Late Antiquity era stands as some of the most emblematic archaeological traces of ancient Christian Hispania. Their overall span is considerable, as is the number of publications concerning archaeological activities and investigations undertaken in the last few decades in episcopal cities such as Barcelona, Mérida, Valencia, Córdoba, or Empúries. In Tarragona, the extensive Paleochristian necropolis has been subjected to a number of revisions. In recent years, an entire floor of a new basilica has been excavated (the northern or "Septentrional Basilica") and the amphitheater, with its own sixth-century basilica erected inside the arena to commemorate the martyrdom of bishop Fructuosus, stands as a towering example of a Christianized Roman spectacle building. In Córdoba, the so-called palacio de Cercadilla corresponds to a colossal structure from the tetrarchic era which in the ensuing centuries adapted its spaces to host Christian constructions. In minor episcopal sees, such as *Ilici* (La Alcudia de Elche), a so-called synagogue-basilica was discovered over a century ago – an interesting structure

which, not without some controversy, has been interpreted as a synagogue at some point turned into a place of Christian worship. In Portugal, the Paleochristian basilica of Mértola is home to a series of underground tombs which contained in situ a significant collection of explicit funerary epigraphs, including details of those buried there and their links with the local church.

In Dume, the large basilica of the former episcopal see has also been identified: it arose from its namesake monastery founded by Martin of Braga in the mid-sixth century. Such vestiges of ancient episcopal sees have been unearthed within a current urban landscape, for these are towns and cities that have survived and evolved into our modern times. This is not the case for towns like El Tolmo de Minateda (the episcopal see of *Elo*, Albacete), which was already abandoned in the Middle Ages; the same can be said for *Recopolis* (Zorita de los Canes, Guadalajara), which was founded by the Visigothic king Reccared I. Both locations were rediscovered only a few decades ago.

At a rural level, a number of basilicas are noteworthy, such as those in El Gatillo de Arriba, Santa Lucía del Trampal, Alconétar (Cáceres), El Germo (Córdoba), Valdecebar, Casa Herrera, San Pedro de Alcántara (Badajoz), Vega del Mar (Málaga), Cabezo de Griego (Cuenca), Santa Comba de Bande (Orense), Quintanilla de las Viñas (Burgos), San Juan de Baños (Palencia), San Pedro de la Nave (Zamora), Marialba (León), Villa Fortunatus (Huesca), Santa Margarida de Martorell, Sant Mena (Barcelona), El Bovalar (Lleida), and Torre de Palma (Monforte, Portugal). Many of these rural churches, some of them born out of prior Roman *villae*, would in time develop into parishes which are currently densely populated urban centers, leaving little trace of their original rustic character. On the other hand, an increasing number of Late Antiquity *villae* with apsidal chambers is being linked to the spread of Christianity in the countryside, despite a lack of archaeological data which could properly contextualize this process and provide a clear outline of its stages – a process, one should add, that likely varied from one region to the other. Also worth mentioning is the outstanding archaeological site and monument of Centcelles: a spectacular Christian mausoleum from the fourth century linked to the Constantinian dynasty and which preserves its entire structure along with parts of the dome's mosaic.

In recent decades, the archaeological context of the legendary tomb of the apostle James (in Santiago de Compostela, Galicia) along with its relation to written sources from the late fourth century have given rise to the theory that it actually belongs to bishop Priscillian of Avila, the real owner of this holy tomb. If we include the Balearic Islands, one must mention the rural sites headed by the basilicas of Son Peretó, Son Fadrinet, Sa Carroja (Mallorca), Cap des Port, Es Fornás de Torelló, Son Bou, Illa del Rei (Menorca), and the large place of worship in Sanisera (Sa Nitja, Menorca), consisting of at least two basilicas, seven necropolis, as well as both urban and productive areas along with necessary facilities to accommodate the needs of housing and economic output.

One of the main problems of Christian archaeology in Spain remains the location (or, more precisely, the archaeological identification) of its earliest monasteries, from the fifth to seventh centuries. After the Muslim invasion, traces of monasteries are easily identifiable, if anything because of the significant amount of written sources that point to their exact location, as well as the increasing use of recognizable architectural models. This is not the case for Late Antiquity, with a dire lack of written sources and a set of archaeological remains which can be easily confused with lay villages and other such settlements. So much was said in 2006, when it was stated that "it is impossible or it seems impossible to find any trace of the earliest monasteries in Hispania" (Caballero Zoreda 2006: 121). Nevertheless, a number of archaeological remains which can be linked to monasteries have been uncovered in sites in Santa María de Melque (Toledo), El Monastil (Alicante), Ercávica (Cuenca), Els Altimiris (Lleida), Islote de Cabrera (Baleares), or Sanitja (Menorca). Likewise, the site of El Bovalar (Lleida) has been reinterpreted as a monastery which specialized in parchment production – excavated in the 1980s and initially classified as

a lay village with a basilica from the sixth to seventh century, there remained the thorny issue of its significant liturgical furniture. A rich sixth-century monastery was sadly destroyed in the 1960s construction frenzy in La Punta de l'Illa de Cullera, in the Valencian coast – a monastery likely to have been founded by the bishop Justinian of Valencia within a fortified island, according to an inscription on his tomb. The aforementioned place of worship in Sanisera (Menorca) was likely been run by a monastic community, and as such, parts of its "urban zone" would be better understood within the context of a monastery.

Cross-References

► Archaeology: Definition

References

Azkarate Garai-Olaun, A. 1988. *Arqueología Cristiana de la Antigüedad Tardía en Álava, Guipúzcoa y Vizcaya*. Vitoria-Gasteiz: Diputación Foral de Álava.

Caballero Zoreda, L. 2006. El conjunto monástico de Santa María de Melque (Toledo). Siglos VII–IX (criterios seguidos para identificar monasterios hispánicos tardoantiguos). In *Monjes y monasterios hispanos en la Alta Edad Media*, ed. J.A. García de Cortázar and R. Teja, 99–144. Aguilar de Campoo: Fundación Santa María la Real.

Capistrano de Moya, J. 1792. *Noticia de las excavaciones de La Cabeza de Griego*. Alcalá de Henares: Oficina de la Real Universidad.

De Almeida e Silva, F.A. 1962. *Arte visigótica em Portugal*. Lisboa: Casa Portuguesa.

de Palol Salellas, P. 1967. *Arqueología cristiana de la España romana. Siglos IV–VI*. Madrid-Valladolid: Consejo Superior de Investigaciones Científicas-Instituto Enrique Flórez.

de Palol Salellas, P. 1969. *Arte paleocristiano en España*. Barcelona: Ediciones Polígrafa.

de Palol Salellas, P., ed. 1999. *Del Romà al Romànic. Història, art i cultura de la Tarraconense mediterrània entre els segles IV i X*. Barcelona: Enciclopèdia Catalana.

Godoy Fernández, C. 1995. *Arqueología y liturgia. Iglesias hispánicas (siglos IV al VIII)*. Barcelona: Universitat de Barcelona.

Hauschild, T., H. Schlunk, and T. Ulbert. 1978. *Hispania Antiqua. Die Denkmäler der frühchristlichen und westgotischen Zeit*. Mainz am Rhein: Verlag Philipp von Zabern.

López Quiroga, J., J. Morín de Pablos, and A.M. Martínez Tejera, eds. 2007. *Monasteria et Territoria. Elites, edilicia i territorio en el Mediterráneo medieval*, Bar international series 1720. Oxford: John and Erica Hedges.

Mateos Cruz, P., and L. Caballero Zoreda, eds. 2003. *Repertorio de Arquitectura Cristiana en Extremadura. Época Tardoantigua y Altomedieval*. Mérida: Instituto de Arqueología de Mérida.

Puig i Cadafalch, J. 1961. *L'art wisigothique et ses survivances ; Recherches sur les Origines et le Développement de l'Art en France et en Espagne du 4e au 12e Siècle*. Paris: F de Nobele.

Ripoll López, G. 2009. Corpus Architecturae Religiosae Europeae, saec. IV–X (CARE-Hispania). *Mainake* 31: 229–242.

Sales-Carbonell, J. 2012. *Las Construcciones cristianas de la Tarraconensis durante la Antigüedad Tardía: topografía, arqueología e historia*. Barcelona: Publicacions i Edicions de la Universitat de Barcelona, Barcelona.

Sánchez Ramos, I., R. Barroso Cabrera, J. Morín de Pablos, and I. Velázquez Soriano. 2015. Topografía eclesiástica de la Bética en la Antigüedad Tardía a través del corpus epigráfico. *Romvla* 14: 221–265.

Sánchez-Pardo, J.C. 2012. Arqueología de las iglesias tardoantiguas en Galicia (ss. V–VIII). Una valoración de conjunto. *Hortus Artium Medievalium* 18 (2): 395–414.

Sastre de Diego, I. 2011. *Los primeros edificios cristianos de Extremadura. Sus espacios y elementos litúrgicos*. Mérida: Instituto de Arqueología de Mérida.

Utrero Agudo, M.A. 2006. *Iglesias tardoantiguas y altomedievales en la Península Ibérica. Análisis arqueológico y sistemas de abovedamiento*. Madrid: CSIC.

Further Reading

Arbeiter, A. (in progress). *Hispania novissima christiana*.

Ayarzagüena Sanz, M., and G. Mora Rodíguez. 2004. *Pioneros de la arqueología en España (del siglo XVI a 1912)*. Madrid: Museo Arqueológico Regional/ Comunidad Autónoma de Madrid.

Barenas Alonso, R. 2015. *La articulación eclesiástica del Valle Medio del Ebro y su área de influencia (ss. III–VIII)*. Logroño: Universidad de la Rioja.

Beltrán de Heredia, J., and C. Godoy Fernández, eds. 2017. *La dualitat de baptisteris en les ciutats episcopals del cristianisme tardoantic*. Barcelona: Ateneu Universitari Sant Pacià.

Buenacasa Pérez, C., and Sales Carbonell. 2015. *In nomine Domini ecclesia consecrata est. Els nous espais cristians dins la ciutat clàssica (segles III–VII dC)*. Barcelona: Societat Catalana d'Arqueologia.

Chavarría Arnau, A. 2015. Tumbas e iglesias en la Hispania tardoantigua. In *Arqueologia medieval: els espais*

sagrats, ed. F. Sabaté and J. Brufal, 13–45. Lleida: Universitat de Lleida.
Chavarría Arnau, A. 2018. *A la sombra de un imperio. Iglesias, obispos y reyes en la Hispania tardoantigua (siglos V–VII)*. Bari: Edipuglia.
Diarte Blasco, P. 2012. *La configuración urbana de la Hispania tardoantigua. Transformaciones y pervivencias de los espacios públicos romanos (s. III–VI d.C.)*. Oxford: B.A.R.
Fontes, L.O. 2006. *A basílica sueva de Dume e o túmulo dito de São Martinho*. Braga e Dume: Núcleo de Arqueologia da Universidade do Minho/Junta de Freguesia de Dume.
Gudiol Conill, J. 1902. *Nocions d'arqueologia sagrada catalana*. Vol. 2. Vic: Viuda de R. Anglada.
Gurt Esparraguera, J.M., and I. Sánchez Ramos. 2011. Topografía funeraria de las ciudades hispanas en los siglos IV–VII. *Madrider Mitteilungen* 52: 457–513.
Lopes, V. 2015. A Antiguidade Tardia em Mértola, balanço das novas descobertas arqueológicas. In: Medina N (coord.) *VII Encuentro de Arqueología del Suroeste Peninsular*. Ayuntamiento de Aroche, Aroche-Serpa, pp. 832–839.
López Quiroga, J. 2004. *El final de la Antigüedad en la Gallaecia. La transformación de las estructuras de poblamiento entre Miño y Duero (siglos V al X)*. Coruña: Fundación Pedro Barrié de la Maza.
Macias Solé, J M and Muñoz Melgar, A (coords.) 2013. *Tarraco christiana civitas*. ICAC, Tarragona.
Manjarrés, J. 1867. *Nociones de arqueología cristiana para uso de los seminarios conciliares: guía de párrocos y juntas de obra y fábrica de las iglesias*. Barcelona: Imprenta del Heredero de D. Pablo Riera.
Moreno Martín, F.J. 2011. *La arquitectura monástica hispana entre la Tardoantiguedad y la Alta Edad Media*. Oxford: Hadrian Books Ltd.
Nolla Brufau, J.M., and J. Tremoleda, eds. 2014. *Empúries a l'Antiguitat Tardana*. Museu d'Arqueologia de Catalunya-Empúries.
Ribera Lacomba, A. (coord.) 2000. *Los orígenes del Cristianismo en Valencia y su entorno*. Ajuntament de València, València.
Riera Rullan, M. 2017. *El monacat insular de la Mediterrània occidental. El monestir de Cabrera (Balears, segles V–VIII)*. Barcelona: Ateneu Universitari Sant Pacià.
Ríos Serrano, J.A. 1861. *El arte latino-bizantino en España y las coronas visigodas de Guarrazar*. Madrid: Imprenta Nacional.
Sales-Carbonell, J. 2011. *Arqueologia de les seus episcopals tardoantigues al territori català (259–713)*. Barcelona: Societat Catalana d'Arqueologia.
Sánchez Velasco, J. 2017. Vetera Christiana Monumenta in Baetica. Hacia una sistematización de la arquitectura de época tardoantigua en la parte occidental de la provincia. In *Arqueologia da transição: entre o mundo romano e a Idade Média*, ed. C. Teixeira and A. Carneiro, 255–298. Coimbra: Imprensa da Universidade da Coimbra.
Sastre de Diego, I. 2010. La arqueología cristiana española en Roma. In *Repensar la Escuela del CSIC en Roma, cien años de memoria*, ed. R. Olmos, T. Tortosa, and J.P. Bellón, 461–478. Roma: CSIC.
Suárez Otero, J. 2014. The cult of St. James at Compostela: From antiquity to the middle ages. A short essay dedicated to John Williams. *Boletín Avriense* 44: 165–182.
Vives Gatell, J. 1969. *Inscripciones cristianas de la España romana y visigoda*. Barcelona: CSIC – Instituto Jenónimo Zurita.

Christian Topographies During Late Antiquity and the Early Middle Ages

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Christian topography represents a branch of Late Antiquity and Early Medieval's archaeology. Its main objective is the study and comprehension of the material and monumental dynamics of affirmation of Christianity in urban, suburban, and rural contexts. More precisely, Christian topography studies – through a transversal approach of the written, epigraphic, archaeological, and architectonical sources – dynamics and modalities of the development of the network of Christian buildings' structures, which became characteristic of the urban skyline and of the Mediterranean countryside and, more globally, of the Roman world (often way beyond the limits of Late Antiquity) since the fourth–fifth century A.D.

Now more than ever, Christian topography has to be considered as a global discipline.

Because of the reduction of Christian archaeology's chairs in universities, especially within those European countries where its *status* had always been most developed (such as Italy, France, Germany or Spain), it is fundamental to revalue a methodology that has proven itself essential in order to understand the complex stages that lead from the classical *civitas* to the early medieval urbanism and to the transformation of the rural landscapes, with a form of global

archaeology, precursor for the understanding of the urban, rural, and social dynamics of Late Antiquity. As recently stated by N. Gauthier, "*la lente conquête de l'espace urbain par les édifices chrétiens est la vraie révolution urbaine de ces siècles de transition entre Antiquité et Moyen Age"* (Gauthier 2014) .

The 16 volumes of the *Topographie chrétienne des cités de la Gaule des origines au milieu du VIII*^{ème} *siècle*, which have been completed a few years ago (Prévot 2014), can be considered the first milestone of "modern" Christian topography. It is also worth mentioning *Le développement urbain en Provence, de l'époque romaine au XIV*^{ème} *siècle,* the innovative volume written by Paul-Albert Février in 1964a. This method was developed at the University of La Sorbonne in Paris in the 1960s thanks to scholars like Noël Duval, Paul-Albert Février, and Charles Pietri. The method was characterized by a rigorous approach since the start. In fact, it required to fill up a complete and concise dossier about the cities of *Galliae*, starting from the classical era, that had to analyze the topographic evolutions resulted from the impact of Christianity in a long term perspective. No hierarchical preeminence was given to the available sources, such as horizontal and vertical stratigraphies, epigraphy, history of art, written sources, burial studies. The innovative aspect of this methodology is that "while Christian archaeology has limited its analysis to issues related to Christian worship spaces and to the most eye-catching aspects of private and public Christianity, the discipline has been able to embrace data from all historical periods linked to the birth and development of the *civitas christiana* thanks to Christian topography" (Pergola 2003, p. 342; for recent methodological updates see Pergola 2014 and Castiglia in press). According to this global approach, a research of Christian topography has to refer, at first, to the historical origins of dioceses.

It is a fundamental stage in which the researcher must apply philological rigor, since it is often possible to come across forgeries. In fact, especially during (and immediately after) the Middle Age, numerous sources intentionally used forgery to attribute "apostolic" origins to dioceses in order to establish the authority of a city (or a territory) over another. As a consequence, historical documents such as, *in primis*, the acts of councils allow us to go back to official statements of bishops from various areas of the ancient world with a philologically orthodox methodology. An essential point of reference that collects all the councils is represented by the monumental work of J.D. Mansi, which was published in several volumes in the eighth century (*Sacrorum Conciliorum nova et amplissima collectio*, Firenze-Venezia 1759–1798). It is worth mentioning other two prosopographical works (mainly relevant to the Italian panorama): *Le diocesi d'Italia, dalle origini al principio del secolo VII*, published by F. Lanzoni in Faenza in 1927 and the *Prosopographie Chrétienne du Bas-Empire 1–2. Prosopographie de l'Italie Chrétienne (313–604)*, published by Charles and Luce Pietri in Rome, in 1999. The first work, published in 1927, despite being dated, still represents a very important critical instrument to start from, while the second one is a very rich source with plenty of references to the original sources.

The "new phenomena" of church architecture started to impose itself from the Constantinian age, except for the catacombs that were present in Rome and Carthage from the end of the second century A.D. – beginning of the third century A.D. (Fiocchi Nicolai 2001; Pergola 1997). Church architecture first appeared in suburban contexts, such as in the *extra moenia* perimeter of the Constantinian Rome, where several martyrial and funerary churches were built together with catacombs (Fiocchi Nicolai 2015, 2016; Spera 2014) (Fig. 1). On the other hand, the monumental affirmation of Christianity *intra muros* started in the Theodosian age: archaeological evidence reveals the incidence of Christian topography over the patterns of settlement from the end of the fourth century A.D. The development of this tendency reached the peak from the end of the fourth century A.D., till the end of the sixth century A.D. (Cantino Wataghin et al. 1996). In this complex panorama, the *ecclesiae episcopales* (the term "cathedral" was introduced in the Middle Ages) represent a symbol of the new Christian topography. They are, evidently, the most important and clear expression of the new

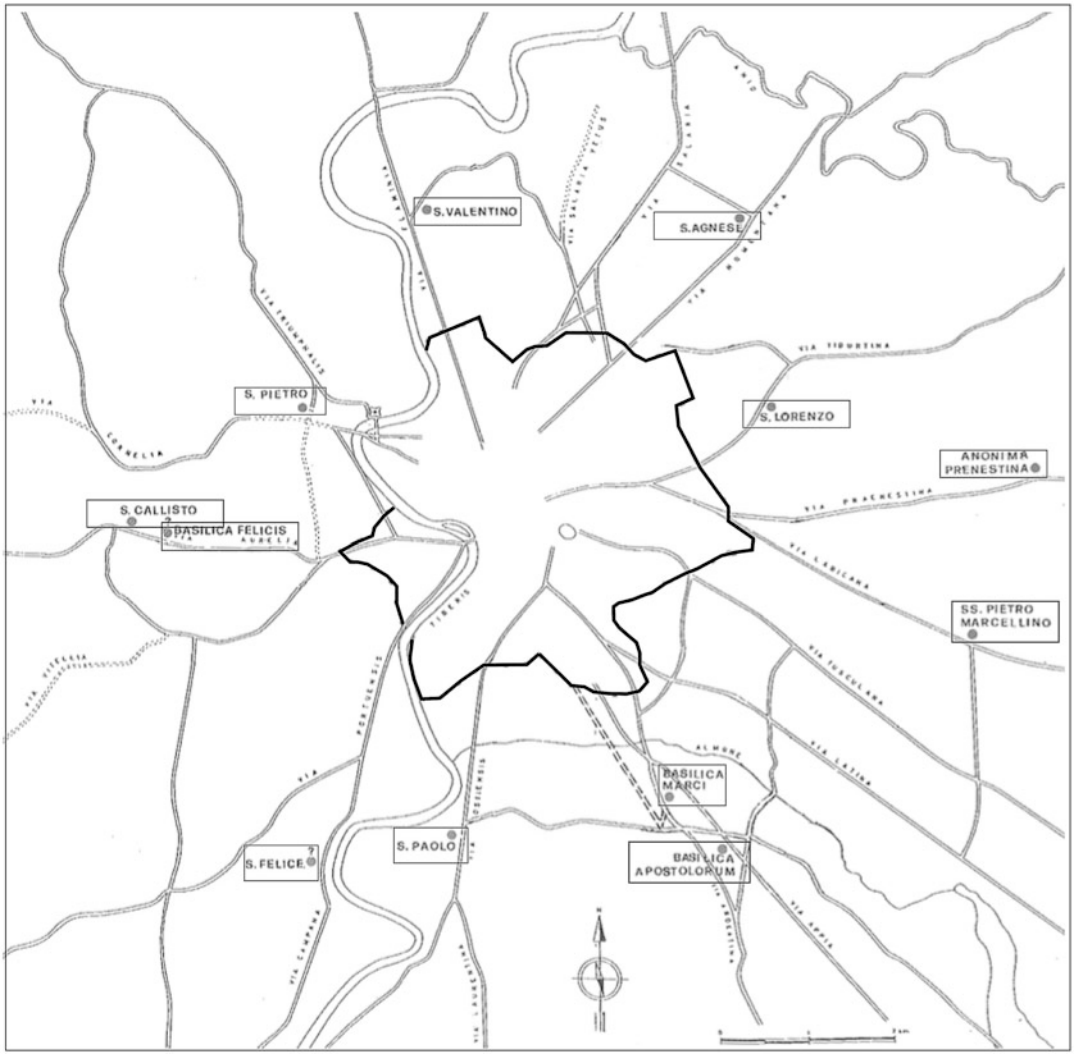

Christian Topographies During Late Antiquity and the Early Middle Ages, Fig. 1 The suburban churches in 4th century Rome, before year 358 AD (after Fiocchi Nicolai 2016)

actores of power within the late-antique towns, evidently the bishops. The *episcopi*, in fact, were not only the emissaries of the word of God on Earth but gained a growing control over the political, economic, and topographical issues of towns and their territories during Late Antiquity and the Early Middle Ages. We have many examples, but one of the most notorious is with no doubt St. Ambrose (337–397 AD) who, as a bishop of Milan, fully re-shaped the topography and image of the town in the late fourth century AD (see Lusuardi Siena et al. 2015 and relative bibliography); another important figure of "bishop-manager" has been that of *Sabinus* from Canosa, in southern Italy who, in the sixth century, not only gave a fundamental contribution in the re-launch of the town, by promoting important buildings and activities, but was also a real businessman, producing tiles with his own monogram (Volpe 2007, 2008).

Compared to the criteria of centrality of the *civitates* of the classical period, the *ecclesiae episcopales* were built in marginal areas within the city (Testini et al. 1989; Cantino Wataghin

2015). There are several exceptions of course, Pisa among the others. In Pisa, evidence of the baptistery of the first *ecclesia episcopalis* dates back to the sixth century (Pani Ermini and Stiaffini 1985) and it was apparently located in the area where we can find the *Campo dei Miracoli* today (see Alberti and Paribeni 2011), but due to limited information about the city in the Roman period and Late Antiquity, we are not able to confirm its precise location. In *Cornus* the *ecclesia episcopalis* was built in a funerary area, but its location is still debated, especially the relationship between the settlements of the Late Antiquity and the Christian topography, such as the dichotomy of the two poles of *Senafer-Cornus* (see Pergola et al. 2010, pp. 393–402). *Concordia* is also an important case study, and its *Basilica Apostolorum* is considered the first *ecclesia episcopalis.* It was built just outside of the city's walls, close to one of the city's doors at east, commissioned by Cromazio di Aquileia at the end of the fourth century to guard the relics of the Apostles Andrea and Tommaso, Saint John the Baptist, Luca and Saint John the Evangelist (Bovini 1973). Christian urban topography presented a variety of religious buildings besides the *ecclesiae episcopales*. By the end of the sixth century A.D., almost all urban areas had religious buildings with several functions. Ph. Pergola has recently highlighted how the systematic Christianization of all classes was completed by the late fifth century. The author also points out how correspondent to this phenomenon was the construction of monumental Christian complexes in all residential and public areas, along with the first cases of reuse and abandonment of structures that had lost their original functions (Pergola 2003, pp. 151–152). By the half of the fifth century A.D., urban chapels called *tituli* proliferated in Rome (Spera 2014; Pietri 1976; Pietri 1989; Guidobaldi 2000). The *tituli* were ceremonial places of worship located within not religious buildings, they were self-financed structures, and they probably even contributed to finance the hierarchical summit of the church (Guidobaldi 2000, pp. 124–125) (Fig. 2). The definition of Christian topography is not limited to the *intra moenia* spaces, but it also includes the *suburbia* as the main location of burial areas before the inclusion of graveyards within the urban spaces in the sixth century A.D. (see *infra*). The most important funeral areas were catacombs complexes and basilicas. Catacombs often became a crucial meeting point for Christian communities before the Constantinian turn; they were in fact not just funeral sites, but also devotional places and destinations of pilgrimages. The suburban basilicas can often be considered as cemeteries as, for example, the ambulatory churches of the Roman *suburbium* (all dated to the Constantinian period and also known as "*circiformi*"), which were often linked to important martyrs. The suburban churches became polyfunctional places where funerals and devotional activities took place according to the weekly canonical liturgy. The martyrs and their memories played a fundamental role, as exemplified by the case of the suburb of *Arles*-Arelate in the south of France: in this area two different funeral areas developed around the cult of St. Genesio, one of them being the site of the martyrdom of the Saint and the other its sepulcher (this is where the *Basilica Beati Genesii* is attested in the middle of the fifth century A.D.) (see Heijmans 2014).

The progressive introduction of funerary areas within the walls of the cities is considered an element of extraordinary influence over the morphogenetic capacity of urban areas: several interpretations of this phenomenon have been given by researchers, often linked to a sign of decadence of the sense of *decorum* of the city and of a widespread crisis. The complexity of this issue has been discussed by U.M. Fasola e V. Fiocchi Nicolai at the 11th International Congress of Archaeology in 1986, where their report and the rich debate that followed are still a fundamental reference point regarding the Italian and European context (Fasola, Fiocchi Nicolai 1989). This stimulating contribution was followed by an important study day organized as part of the *Seminars of Christian Archaeology* in Rome (12th March 1987) (Pergola 1987). An updated summary of the situation in the peninsula was presented at the conference *Sepolture tra IV e VIII secolo,* (Burials between the fourth and the eighth century A.D.) (Brogiolo and Cantino Wataghin 1998).

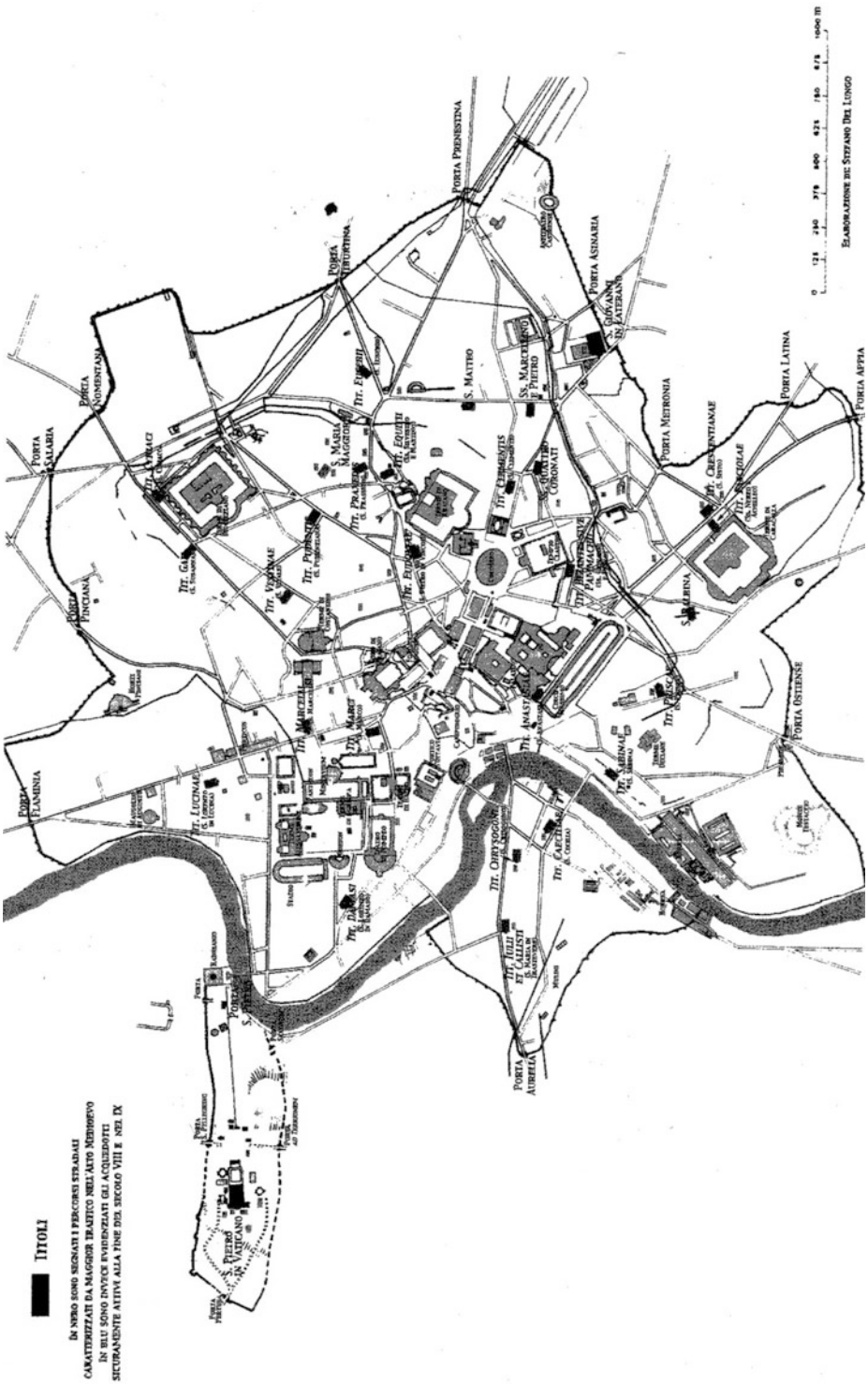

Christian Topographies During Late Antiquity and the Early Middle Ages, Fig. 2 The Roman *tituli* (by Stefano del Lungo)

C

The issue had also been discussed by V. Fiocchi Nicolai during the 50th study week at the *Centro Italiano di Studi sull'Alto Medioevo* (CISAM) in Spoleto in 2002; modalities and time span of the appropriation of urban spaces by burials were part of the debate. One of the most critical issues detected by V. Fiocchi Nicolai was the precise chronological definition of the initial stages of the phenomenon, an issue that it is still debated nowadays, even though the data coming from various areas of the *Orbis christianus antiques* warn not to fall into generalizations. For what concerns North Africa, P. A. Février has proven how the relocation of urban burials was already happening there in the second half of the fourth century A.D. (Février 1964b), as attested by the case of *Sétif* (Février 1964b, 1965). The practice continued in the fifth century A.D., as proven by the burial of Bishop *Jucundus*, found in an appendix of Sbeitla-*Sufetula*'s "*Basilica I*" and dated around the third-fourth decade of the fifth century A.D. (Duval 1971) (Fig. 3).

Generally speaking, the African data do not seem to mirror the situation of other areas, such as Italy and the East, again with some exceptions. V. Fiocchi Nicolai points out evidence of the practice in Constantinople in 381 A.D.: Theodosius, in fact, imposed fines to whom who would bury *intra moenia*, indirectly attesting the presence of burials within the walls of the city at the end of the fourth century A.D. (Fiocchi Nicolai 2003, pp. 948–949; *Codex Theodosianus*, IX, 17, 6 = Th. Mommsen (ed.), *Theodosiani libri XVI* cum *constitutionibus sirmondianis et leges novellae ad Theodosianum pertinentes*, I/2, p. 495). Despite the similar chronological span, we can easily detect a difference between the practice in North Africa and the one Constantinople: in the first case we have an *episcopus'* burial within a church that proves the support of the religious authorities, while in Constantinople the introduction of a fine clearly attests the intention of the authorities to limit the tendency to move the burials within the walls of the city. The spreading of this practice has heterogeneous reasons, such as the desegregation of the urban walls, the urgency, the intention of a burial *ad sanctos* (Fiocchi Nicolai 2003, p. 951), but the most important and official role was played by the religious buildings where Christian ceremonies were celebrated, which constituted the vectors of urban and suburban transformations in Late Antiquity and Early Middle Age (Pani Ermini 1998; 2001).

In the Early Middle Ages, urban spaces were characterized more and more by an emerging Christian topography, a phenomenon that in many cities (such as Rome) had already begun in the Late Antiquity. The coexistence of centers of ecclesiastical and temporal power is evident under the Kingdom of the Lombards (in Italy) and the Carolingian domain. In some of the most important European urban centers *curtes*, *palatia*, and mints replaced the spaces of classical *civitates*. Even when located in outlying areas, these structures became districts of power that went to complement the Episcopal centers.

We can find an example of the newborn tight connection between ecclesiastical and temporal power by analyzing the origins of the bishops of Lucca between the 8th and the ninth century A.D., being them all part of the local aristocracy, as brilliantly highlighted by A. Mailloux (Mailloux 1999). The ecclesiastic body acquired managerial responsibilities that previously belonged to state and temporal institutions: this extension of the Episcopal control over the civic jurisdiction has been recently well documented in Rome in the eighth century A.D. (Spera 2016).

In the same way, we find most notaries among the ecclesiastics, while the latter – bishops *in primis* – acquire public powers (Mailloux 1999, p. 710). The city of Pistoia exemplifies well these dynamics through its topography: the new road axis built during the Lombard era was symbolically called via *regis* and along this route we could find the *ecclesia episcopalis*, the *curtis*, the *Palatium*, and, probably, even a mint.

In rural areas, even more than within the cities, the spreading of Christianity and its characteristic topography followed a heterogeneous development, depending on the various geographical areas (Cantino Wataghin 2013a, b; Monfrin 2002). Despite being dated, a relevant contribution in this sense is still the lesson given by C. Violante at the seminar organized by CISAM in 1980 and published in 1982 (Violante 1082).

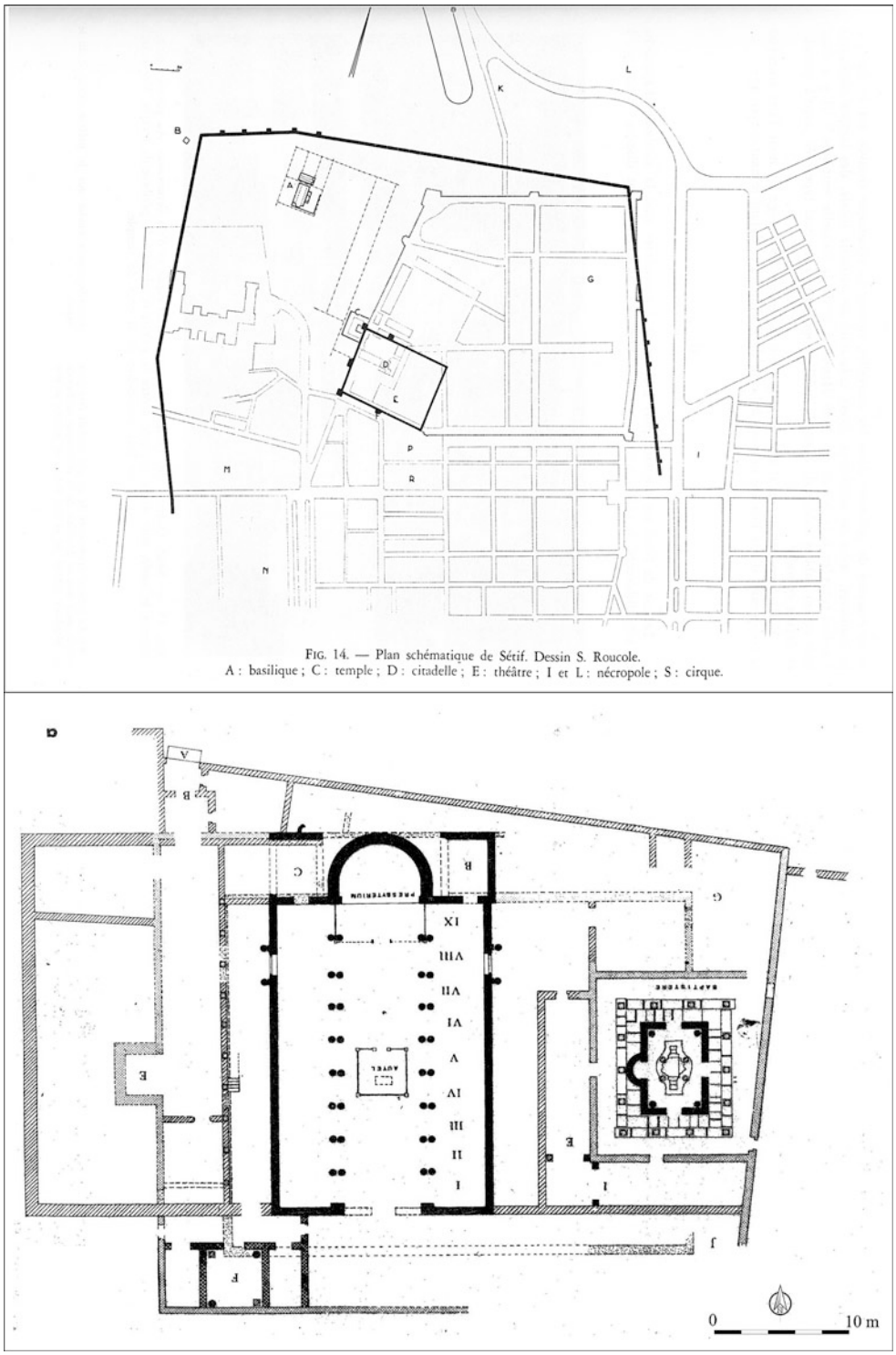

Christian Topographies During Late Antiquity and the Early Middle Ages, Fig. 3 Top: The topography of Sétif (after Février 1964b). Bottom: The Basilica I in Sbeitla (after Duval 1971)

During his lesson, the researcher provided a wide overview of the development of rural ecclesiastic infrastructures in the *post* Roman and Early Medieval countryside. His study was based almost exclusively on the exegesis of written sources and presented a few fundamental points. First, the necessity to leave behind the "principle of territoriality." In fact, in order to determine to what diocese a new oratory belonged to, people had to verify to whom the devotees referred to for the sacraments (Violante 1982, pp. 972–974). Second, with the gradual conversion of the Lombards to Christianity, the number of baptismal churches increased exponentially and developed into a structured network. Documents start to report the term *plebs*-, referring to the relevant territory of a baptismal church together with the *ecclesia* itself, which had a baptistery for the pastoral care of the population (Violante 1982, pp. 1015–1016). Another essential role of the *plebes* was of being in charge of collecting the *decimae* (tithes). This was a Carolingian institution that contributed to reinforce the rural ecclesiastic network as the center of the economic and fiscal life of the Early Medieval countryside (Violante 1982, pp. 1072–1084).

C. Violante's work is still relevant nowadays and his conclusions are partially confirmed by archaeological data, even if we must take into account specific geographical differentiations. The case of Tuscany, for instance, well highlights how a non-structured Christian topography was already present during Late Antiquity and how it became more systematized and widespread from the eighth century A.D. onwards, when the previous system fell apart (regarding the gradual introduction of the parish system in the countryside see Pergola 1999; *L'edificio battesimale in Italia*; Delaplace 2005; regarding the case of Tuscany see Castiglia 2017 and Castiglia 2018).

One of the most important and debated topics for the Late Antiquity refers to the occupation of premises (villas and "secondary settlements" *in primis*) located in rural areas in the Roman period by churches. It is not clear in fact if there was continuity or not between the structures: were the churches created within the inhabited villas or they went to occupy destructured or even abandoned buildings? What was the role of the lay aristocracies and of the bishops? It is very hard to give a clear answer to these questions since we rarely have at our disposal articulate stratigraphic sequences that allow us to ponder these phenomena in their entirety. There are two opposite sides of the debate. A. Chavarría Arnau depicts a scenario where the spreading of the rural ecclesiastic network would have been managed since the beginning by the ecclesiastic authorities in close connection with the evangelization process of the urban areas (Chavarría Arnau 2010a, b). On the other hand, K. Bowes claims that lay *élites* only had been in charge of the rootedness of Christianity in the countryside through material structures with no intervention from church authorities nor from their delegates (Bowes 2008). When researching the chronology of the Christianization of "secondary settlements," it is also complicated to find clear patterns. Despite the peculiarities of every single case, an important role has been played by the *mansiones*, probably thanks to their proximity to the major traffic routes of the *cursus publicus* (regarding the Christianization of the "secondary settlements" see Cantino Wataghin et al. 2007; regarding the relationship between Christian buildings and *mansiones*, see Corsi 2000, 2016).

Private intervention does not seem to have played a role in the evangelization, but it has been functional to the material spread of the ecclesiastic network. As pointed out by C. Violante, this aspect had created frictions: the popes in fact were concerned (Gelasio, Pelagio, Gregorio Magno) about the autonomous initiatives of the *élites* (Violante 1982, p. 1012). From the letters of the popes, we can infer the existence of cases in which private citizens would build baptisteries within their estates without the *imprimatur* of the *episcopi* or at times, just with their initial approval. At the same time, those letters indicate how the delocalization of the baptismal rite was already happening at this stage, even if not in a systematic way, an aspect that had been highlighted by V. Fiocchi Nicolai and S. Gelichi at the 8th National Congress of Christian Archaeology (Fiocchi Nicolai and Gelichi 2001, pp. 304–307). The two researchers quote a particularly interesting passage from Saint

Girolamo, *Dialogo con i Luciferiani* (ca. 382 d.C.) (Hier., *C. Lucif.*, 9, coll. 164–165). In this passage, the Father of the Church referred to the "*ecclesiarum consuetudeo*" to have the people who lived far away *a maioribus urbibus in villulis, aut in castellis aut in remotioribus locis* baptized by presbyters and deacons (*per presbyteros et diaconos*); the bishop was still in charge of the *consignatio* of the neophytes that was given to the worshippers during a later pastoral visit in those places (Fiocchi Nicolai and Gelichi 2001, p. 305). The mentioning of an *ecclesiarum consuetudo* (complied or not) leads us to the conclusion that giving the baptism in rural churches was initially under the direct pertinence of the ecclesiastic hierarchies and that as such it had to be recognized by the county and, as mentioned by V. Saxer, we should also be aware of the various regional contexts especially at these stages (Saxer 1988, p. 107).

Specific characteristics at a regional and microregional level represent one of the most relevant aspects to consider when it comes to the means by which Christianity materially spread into the rural areas, especially in Late Antiquity and Early Middle Ages. In the urban areas, we can draw some generalizations of the development of a Christian topography while the countryside presents a more heterogeneous progress.

We can observe an example of macroregional diversification by comparing the Italian and the Gallic countrysides: in fact, the two territories present different evolutions of the formation of the ecclesiastic network from Late Antiquity. In 1982, C. Violante stated that in Late Antiquity the pastoral care of the faithful was not influenced by principles of territoriality (Violante 1982, pp. 972–973; Cantino Wataghin 2013b). The same thesis was supported also by G. Fournier who claimed that the rural ecclesiastic network adjusted itself into previous infrastructures (Fournier 1982): the scholar also defined those churches as "*centres liturgiques de caractère public"* (Fournier 1982, p. 499) since their area of influence did not seem clearly defined. As a consequence, it seems too early to talk about "parish" for what seemed more the emergence of a "pre-parish" (Pergola 1999; Delaplace 2002, p. 12). While analyzing this phenomenon, as mentioned before, it is important to take into account specific regional features: on this matter in 1999 Ph. Pergola stated that "there doesn't seem to be any rule [. . .] beyond the regional borders" (Pergola 1999, p. 634). A. Castagnetti is the author of one of the most influential studies about Italian rural churches. In 1982, the researcher stated several times that the transition from the Roman *pagus*, with its strong principle of territoriality, to the rural churches in Late Antiquity and in the Early Middle Ages, represented a breaking point characterized by discontinuities (Castagnetti 1982, pp. 25–27). Referring to the *lectio* of Violante, Castagnetti stated that regarding the administrative organization of *pagi*, the new term *paroecia* had no territorial value, but it indicated just a community of worshippers (Castagnetti 1982, p. 27). This statement has also been confirmed by a famous quote by Pope *Gelasius*: "*territorium etiam non facere diocesim*" (Thiel 1868, fr. 17, pp. 492–493). This quote has been included in a paper by M. Lauwers': according to this author the popes had replaced the concept of "territoriality of power" with the idea of "bonds of personal dependency" (Lauwers 2008, p. 30). On the other hand, L. Pietri highlights that this phenomena was not present at that time in *Gallia*. It seems in fact that on the other side of the Alps the situation was different since the pope did not apply the same level of authority and control over those territories and as a consequence the directives issued by Episcopal councils referred to pertinences specifically linked to the *territorium*, in order to solve the conflicts of the bishops over territorial jurisdiction (Pietri 2005, p. 237).

Ecclesiastic structures proliferated in the cities as well as in the countryside during the Early Middle Ages (especially in the late 8th and in the ninth century A.D.). During Lombard Era religious infrastructures where mainly in the cities, while starting from the Carolingian Era we assist to a trend reversal and the countryside witnesses the multiplication of new churches. This phenomenon is the result of the spreading of the economic and religious control from the cities to the rural areas: in the early Lombard Era (at least until the first decades

of the seventh century A.D.) in fact, the aristocracy lived mainly *intra moenia* while controlling productive activities in the countryside. Recent studies have confirmed how the Episcopal control over the rural areas grew stronger during the Carolingian Era, mainly in the ninth century A.D. (Bührer-Thierry 2007; Stoffella 2016, p. 101). M. Stoffella researched the strategies of control implemented at that time and stated: "*several strategies were implemented by the bishops to take control of power: their consecration, the pressure wielded by bishops on the founding families for their demise, the translation of relics, the strengthening of religious cults within those centres already widely under the control of the episcopal see in the localities through the rectors of the numerous baptismal churches*" (Stoffella 2016, p. 102; on the same topic see Stoffella 2008 and Stoffella 2011). Together with these religious practices, the spreading of an ecclesiastic network was strictly linked to the collection of tithes (*decimae*) (taxes paid by tenants in the rural areas, equal to one tenth of their income and to be paid to the church, which owned most of the lands at that time). The tithes were paid at rural baptismal churches as clearly stated in a *capitolatus* in 813 A.D.: *familiae vero ibi dent decimas suas ubi infantes eorum baptizantur, et ubi per totum anni circulum missas audiunt* (*MGH, Concilia Aevi Karolini*, p. 277). S. Wood defined the church at that time as a *proprietary church* (Wood 2006).

Dioceses in rural areas are also an interesting phenomenon that has been studied by researchers in the last 20 years (as a general reference see De Fino 2005, 2015; regarding the islands see Istria and Pergola 2009). According to the most recent studies, we can count around 30 rural dioceses mainly located in the center and in the south of the peninsula, while not many were present in the northern part (De Fino 2015) (Fig. 4).

All those dioceses seemed to have some common traits: they were all located by the main routes (roads and rivers *in primis*) and far away from the cities, they were located within administrative centers owned by the empire and they also had a limited lifespan (De Fino 2005, p. 699). A perfect example is San Giusto, a compound located in the plains of the Tavoliere delle Puglie, close to Lucera and to the area of *saltus Carminianensis*, as mentioned in the *Notitia Dignitatum Occidentis* (*Not. Dign.* XII-8). The *saltus Carminianensis* was an important center of imperial administration: it was in charge of the management of agricultural and pastoral activities in that territory and, thanks to its influence, a very important rural diocese started to grow in that area (De Fino 2005, p. 695). The site had been identified at the end of the Nineties by G. Volpe and his team, and they were conducting an archaeological survey close to Celone river where a dam was going to be built (Volpe 1998). The excavations revealed a large site that had been populated since the Republican Era, where a rural villa was built between the first and the second century A.D. During the fifth century A.D., a large basilica with a semicircular apse was built, with a vestibule, three naves, and a baptistery. The worship area (known as "Chiesa A") had a rich mosaic pavement that covered around 70% of the surface. A circular baptistery was located close to this structure and it was quite peculiar for a Christian complex of the fifth century, since it was very large (16 meters of diameter). A new basilica (known as "Chiesa B") was built in the sixth century a few meters west of the previous one: this basilica was mainly used for funerary purposes, as confirmed by the several burials that have been found disposed in parallel lines within its walls. According to G. Volpe, the compound of San Giusto, with its two large basilicas and the big baptistery, was the center of a rural diocese (sources from the Roman synods of 501 and 502 A.D. attested the presence of *Probus, episcopus ecclesiae Carminianensis* – J. D. Mansi 1759–1798, Vol. VIII, p. 308 and p. 317). To confirm his statement, researchers have found bricks, probably produced in loco, with the monogram of *Iohannis* (Volpe 2002), who was probably a local bishop, and this monogram symbolizes his responsibilities over production and productivity besides the *cura animarum* (Fig. 5).

In this part of the paper, I am going to present an urban case study. *Νέα Αγχίαλος*, in Greece, is an emblematic case of evolution of a Christian topography as transformative and innovative element in the development of a city in the Late Antiquity and High Middle Ages.

Christian Topographies During Late Antiquity and the Early Middle Ages, Fig. 4 The rural dioceses in the Italian Peninsula and in Corsica (after De Fino 2015)

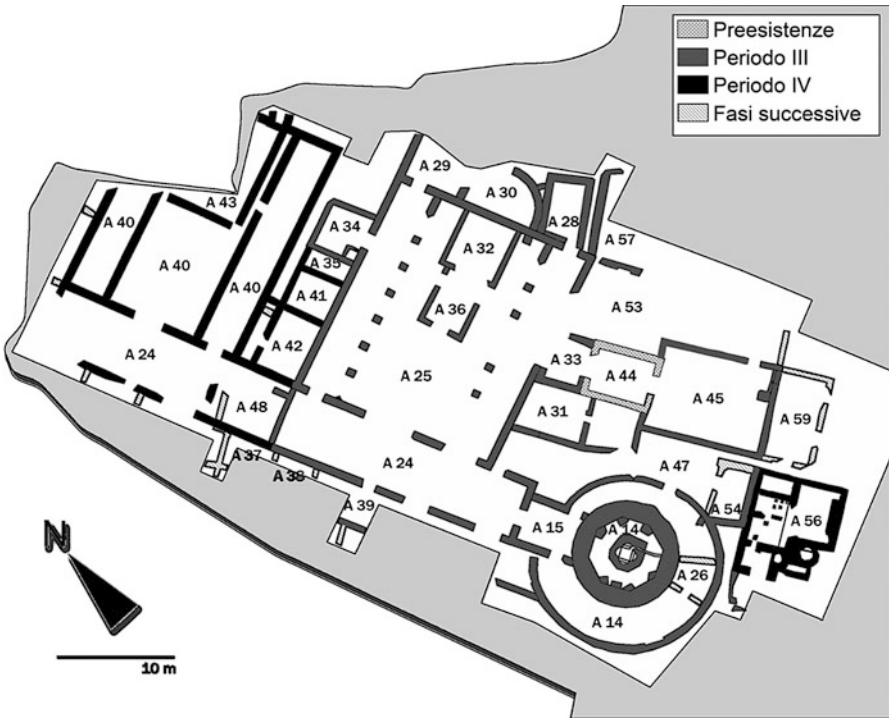

Christian Topographies During Late Antiquity and the Early Middle Ages, Fig. 5 The site of San Giusto (after Volpe 1998)

Νέα Αγχίαλος, called *Θῆβαι Φθία* in the past (regarding the context see Sotiriou 1931; Pallas 1977; Karagiorgu 2001, 2013), took its name from a fairly recent event. In 1906, due to the Greek- Bulgarian conflict in the Ottoman Macedonia, Greek exiles moved to this area from *Αγχίαλος*, a small city by the Black Sea which is called *Pomorie* nowadays. The exiles once arrived there founded the "New Anchialos" on the site where the ancient center of *Πύρασος* once was. *Πύρασος* had also been mentioned in the Iliade (Omero, *Iliade*, B. 695) and by *Strabo*, who said that this center was once a port town and originally located 20 *stadia* from *Θῆβαι Φθία* (Στράβων, *geogr.*, IX, 435): the two settlements were unified around the fourth century B.C.

From a geographical point of view, the area where the exiles decided to settle is located in the south-eastern Tessaglia at the end of a large flat, not far from Mount *Όθρυς*: the acropolis was erected on a small hill facing the Pagasitic Gulf, a strategic location since it could control both the hinterland and the coast. *Θῆβαι Φθία* was located eighteen kilometers west of the important city of *Δημητριάδα* (founded in 293 B.C.) and a conflict soon emerged between the two centers. During the war, the Macedonian king, Philip V (238–179 B.C.) sided with *Δημητριάδα* and defeated *Θῆβαι Φθία*, so that the city started to slowly regain its strength around the first century B.C.

The walls of the ancient city (mentioned as one of the most important cities in *Tessaglia* in the *Συνέκδημος*, a geographical work of the sixth century A.D. by *Ἱεροκλῆς*) were mainly located around the acropolis and their irregular profile followed the valley towards west. The most ancient part was built in the fourth century B.C., at the time of the union of the two centers of *Θῆβαι Φθία* and *Πύρασος* and reinforced around the fourth–fifth century B.C. by adding several rectangular towers.

At the foot of the acropolis, there was the *forum*. Built in Late Antiquity, the *forum* was object of

several structural changes and it became a multi-functional area, mainly devoted to commercial activities (this is why it was also called "Market"). It had rooms to store food, kitchens, laundries and also hosted a production of ceramics and bricks, the latter with the words *ΕΚΚΛ(ησίας) Θ*Η*Β(ῶν)* written on; bricks marked with the same words were found in the "Basilica A" (see below). Within the walls, there was also large *thermae* that had been used from the fourth to the sixth century A.D., as confirmed by the style of the last mosaic pavements.

Thanks to a reference to *Κλεόνικος Θηβῶν* at the council of Nicea, we know about the presence of an *episcopus* in 325 A.D., so that we can trace the emergency of Christianity in the city. The most ancient church of *Θῆβαι* was erected in the south western corner of the city at the end of the fourth century A.D. Referring to its first phase, the basilica is known as "Basilica H": it was built on a preexisting structure whose walls and mosaic pavement suggest that it probably was originally a *domus;* in the second phase, in the fifth century A.D., it is called "Basilica G," and it grew towards east and a large apse was added. The third and last phase is dated to the sixth century A.D.: in this phase the basilica is known as "Basilica C" or *"Basilica of Bishop Peter."* At that time the basilica was further extended towards west: its large floor plan was divided in three naves and two colonnades, and it was 88,50 m long and 26,80 m wide (including the *atrium* and two narthexes); the church was also embellished by mosaic pavements, marble plates, and frescoes. This basilica has never been explicitly mentioned as *ecclesia episcopalis*, but besides its monumental size there are other elements that indicate its role such as the two baptisteries known as *Little baptistery* and *Big baptistery*: the first baptistery is characterized by its small size (2,10 m each side) and it is located in the Northern part of the basilica, close to the two narthexes.

The second baptistery, located in the southern part of the large basilica, represents one of the grandest examples of baptistery in Greece. The baptistery was surrounded by other rooms that appeared to be the residency of the bishop. Later interventions are dated to the sixth century A.D., such as the inscription with the name of Bishop Peter that gave the name to the basilica.

Another important structure in the city was the so-called "Basilica A" or "Basilica of San Demetrios." Similar to the previous one in terms of size, this church was built in the fifth century A.D. and it has a floor plan of 60 x 34 m with three naves: the western side presents a large *atrium* as several other churches in *Νέα Αγχίαλος*, several "back rooms," and the third baptistery of the city. "Basilica A" was also provided with a protective wall that transformed it into a sort of fortified citadel within the larger *Νέα Αγχίαλος*. Bricks that can be dated to the fifth century A.D. have been found in the basilica and they carry the inscriptions *ΕΚΚΛ(ησίας) Θ*Η*Β(ῶν)*: they have probably been produced at the *Market* and they indicate the presence of yards dedicated mainly to religious structures. An *intra muros* cemetery is located in the north-western part of "Basilica A," whose construction started between the fifth century and the beginning of the sixth century A.D.

It is also worth mentioning another basilica *intra muros*, the "Basilica B" or *Basilica of bishop Elpidius* (so-called because of an inscription carrying the name of the *episcopus*). It dates back to the fifth century A.D. and it also had a baptistery (this is the fourth baptistery in the city, dated between the end of the fourth and the beginning of the sixth century A.D.), whose size was slightly smaller than other similar religious buildings (22 x 17 m). On the western side it had a small square room with a hemicycle side, a column in the middle, and evidence of a fireplace: this last element leads to the conclusion that this space was probably where the food for the poor was cooked and distributed.

One more example of urban churches is "Basilica I," located in the north-west of *Θῆβαι Φθία*, much smaller than the others. Emergency excavations have revealed part of the naves and the apse.

In suburban areas, we attest the presence of a well-articulated religious network along the main roads from and to the city. The most important poles of this network are the "Basilica F" or "Basilica Martyrios" and the "Basilica D" or "*Basilica cemetery.*" The first basilica is located south-west of *Θῆβαι Φθία* and is dated to the fifth century A.D. based on an inscription that carries

that date, while on the other hand the mosaics seemed to be dated to the sixth century A.D. According to the *lectio* of O. Karagiorgu, there might have been a mistake in the interpretation of the inscription or the building may have had two phases of construction. The structure was erected on a not well-identified complex of suburban buildings (a villa? a farm?) that fell into disuse at the end of the fourth century A.D. The basilica counted three naves, spaced out by two colonnades, and it was embellished by mosaic pavements and a narthex at the entrance. It also had several "service rooms" as all the other *intra muros* basilicas. The "Basilica D" is the second largest suburban complex and it is situated in the north-western *suburbium* of the city and it was built during the second half of the fifth century A.D. close to one of the most extensive burial areas of *Θῆβαι Φθία*. In terms of stylistic features, the building has a similar architecture to the other *intra* and *extra muros* churches: it is in fact divided into three naves and it presents a narthex at the entrance. The first necropolis attested at *Νέα Αγχίαλος* was located on a side of the hill where the acropolis stood and it was in use until the late fourth century A.D.: after that the burial areas were transferred to the north-western side of the city (by looking at the grave goods those burials can be dated around the 5th–sixth century A.D.) and, as a result, we can also find in this area two of the most important funerary churches of the periphery. The decision to move the site and the inscription *+ΥΠΕΡ ΕΥΧΕΣ ΜΑΡΤΥΡΙΟΥ* founded in the "Basilica Martyrios" seem to point to a topographic memory linked to a martyrial cult.

Νέα Αγχίαλος provides us with an extraordinary variety of Christian monuments of Late Antiquity (Fig. 6), but it also raises a lot of questions mainly related to how the religious structures created space for themselves and developed. A common trait is the presence of annexes around the basilicas, elements that seem to be autonomous from each other (surprising is also the number of baptisteries in relation to the limited size of the urban area). This autonomy cannot be generalized, since in presence of a bishop the management was always centralized, but it

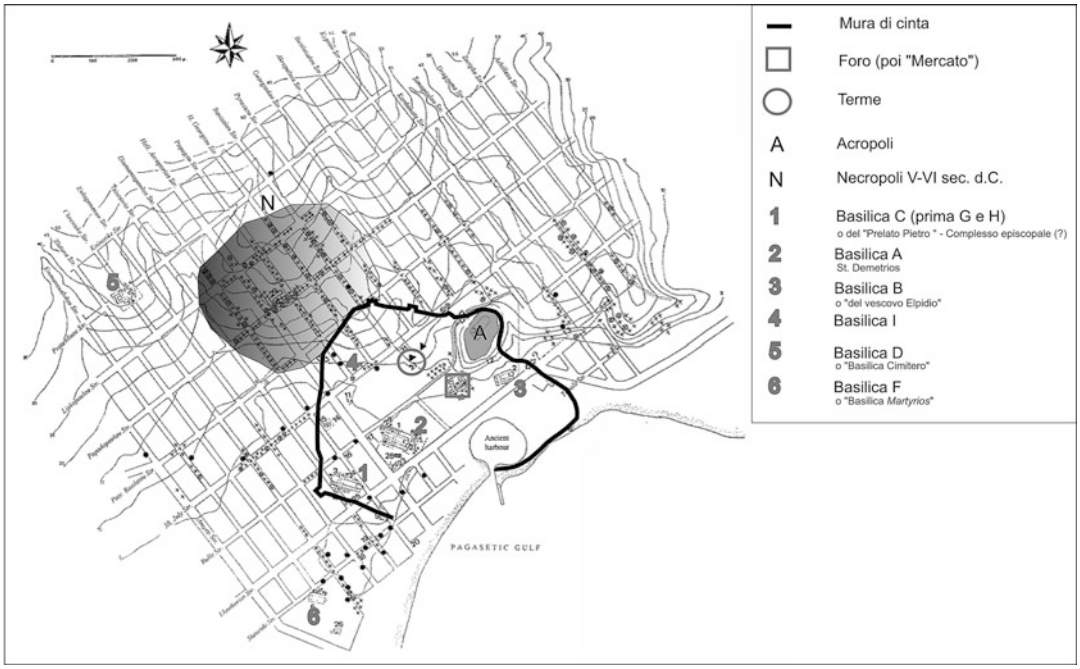

Christian Topographies During Late Antiquity and the Early Middle Ages, Fig. 6 The topography of *Νέα Αγχίαλος* (redrawn after Karagiorgu 2013)

seems also to be confirmed by the location of the center for the production of bricks for the construction of the churches that was situated in the topographic basin of the previous site.

On this matter, it is interesting to note how the epigraphic *corpus* of *Νέα Αγχίαλος* indicates the presence of a very heterogeneous community, characterized by various levels of ecclesiastic hierarchy along with several categories of workers (soldiers, blacksmiths, tailors, farmers, merchants, teachers, mosaicists, etc.). This social structure mirrors a city that, despite its limited size, was fully integrated in the large trade flows of the Aegean Sea (as proved by the relevant number of amphoras of eastern production founded: among those the *Late Roman* 1, 2, 3, 4, confirm fruitful trades with Syria, Cyprus, Cilicia, Gaza, etc.).

In such a vibrant community, the presence of so many religious buildings (and baptisteries) may have filled the need of the various social groups for a worship place to refer to as communities with their own specific characteristics. Besides that, *Νέα Αγχίαλος* was also an important destination of pilgrimage as attested by the relevant amount of phials, called by the diggers "pilgrimage phials," dated between the fifth and the seventh century A.D.

Νέα Αγχίαλος – Θῆβαι Φθία can be then defined as a successful city, even if, as we have seen, the ancient center had been abandoned in the Early Middle Ages and just later on, at the beginning of the twentieth century A.D., was repopulated. The old city, despite the scarcity of sources, represents an extraordinary example of the transformational power of Christian topography. This transformational pattern is characteristic of the late Roman period because of its monumental and precious structures, that is, when the archeological-monumental data explodes in the topography of a site that would have otherwise been fairly modest.

References

Alberti, A., and E. Paribeni, eds. 2011. *Archeologia in Piazza dei Miracoli. Gli scavi 2003–2009*. Pisa: Felici Editori.

Bovini, G. 1973. *Concordia paleocristiana*. Bologna: Patron.

Bowes, K. 2008. *Private worship, public values and religious change in late antiquity.* New York: Cambridge University Press.

Brogiolo, G.P., and G. Cantino Wataghin, eds. 1998. *Sepolture tra IV e VIII secolo. VII seminario sul tardo antico e l'alto medioevo in Italia centro settentrionale (Gardone Riviera 24–26 ottobre 1996)*. Mantova: S.A.P.

Bührer-Thierry, G. 2007. Entre implantation familiale et patrimoine ecclésiastique: les lieux de pouvoir des évêques de Freising au IXe siècle. In *Les élites et leurs espaces: mobilité, rayonnement, domination du VIe au XIe siècle (Actes de la rencontre de Göttingen des 3, 4 et 5 mars 2005)*, ed. Ph. Depreux, F. Bougard, and R. Le Jan, 299–318. Turnhout: Brepols.

Cantino Wataghin, G. 2013a. Le fondazioni ecclesiastiche nelle vicende delle aree rurali: spunti di riflessione per l'occidente tardo antico (IV–V secolo). *Antiquité Tardive* 2: 189–204.

Cantino Wataghin, G. 2013b. Vescovi e territorio: l'Occidente tra IV e VI secolo. In *Acta XV Congressus Internationalis Archaeologiae Christiane – Toleti (8–12.9.2008). Episcopus, civitas, territorium*, ed. O. Brandt, S. Cresci, J. López Quiroga, and C. Pappalardo, 431–461. Città del Vaticano: Pontificio Istituto di Archeologia Cristiana.

Cantino Wataghin, G. 2015. Ecclesiae aedificantur, dedicantur, implentur (Agost., serm. CCCXXXVI, 3) La "cattedrale" paleocristiana: costanti e variabili tra IV e VI secolo, tra isole e terraferma. In *Isole e terraferma nel primo cristianesimo. Identità locale ed interscambi culturali, religiosi e produttivi. XI Congresso Nazionale di Archeologia Cristiana*, ed. R. Martorelli, A. Piras, and P.G. Spanu, 317–340. Cagliari: University Press.

Cantino Wataghin, G., J.M. Gurt Esparraguerra, and J. Guyon. 1996. Topografia della civitas christiana tra IV e VI secolo. In *Early medieval towns in the Western Mediterranean (Ravello, 22–24 September 1994)*, ed. G.P. Brogiolo, 17–41. Mantova: SAP.

Cantino Wataghin, G., V. Fiocchi Nicolai, and G. Volpe. 2007. Aspetti della cristianizzazione degli agglomerati secondari. In *La cristianizzazione in Italia fra tardoantico ed altomedioevo: aspetti e problemi (Atti del IX Congresso nazionale di archeologia cristiana, Agrigento 20–25 novembre 2004)*, ed. R.M. Bonacasa Carra, 85–134. Palermo: Saladino editore.

Castagnetti, A. 1982. *L'organizzazione del territorio rurale nel medioevo. Circoscrizioni ecclesiastiche e civili nella Langobardia e nella Romania*. Bologna: Paron.

Castiglia, G. 2017. La rete ecclesiastica in Toscana settentrionale (IV–X secolo). Dati e riflessioni alla luce del progetto CARE. *Hortus Artium Medievalium* 23: 729–749.

Castiglia, G. 2018. Topografia cristiana della Tuscia Annonaria e della Tuscia Langobardorum (IV–VIII sec. d.C.). *Papers of the British School at Rome* 86: 1–42.

Castiglia, G. 2018. La topografia cristiana: temi, metodi, casi di studio. In *Archeologia in Biblioteca. Atti del*

Convegno (Ferrara 10 dicembre 2015). Ferrara: Deputazione provinciale Ferrarese di storia patria.

Chavarría Arnau, A. 2010a. Changes in scale in the Italian countryside from late antiquity to the early middle ages. In *Scale and scale change in the early middle ages. Exploring landscape, local society and the world beyond*, ed. J. Escalona and A. Reynolds, 121–132. Turnhout: Brepols.

Chavarría Arnau, A. 2010b. Churches and villas in the 5th century: Reflections on Italian archeological data. In *Le trasformazioni del V secolo. L'Italia, i barbari e l'Occidente romano*, ed. P. Delogu and S. Gasparri, 639–662. Turnhout: Brepols.

Corsi, C. 2000. *Le strutture di servizio del cursus publicus in Italia: ricerche topografiche ed evidenze archeologiche*. Oxford: B.A.R.

Corsi, C. 2016. Luoghi di strada e stazioni stradali in Italia tra età tardoantica e alto Medioevo. In *Statio Amoena. Sostare e vivere lungo le strade romane*, ed. P. Basso and E. Zanini, 53–67. Oxford: Archaeopress.

De Fino, M.G. 2005. Proprietà imperiali e diocesi rurali paleocristiane dell'Italia tardoantica. In *Paesaggi e insediamenti rurali in Italia meridionale fra tardoantico e altomedioevo – Atti del primo seminario sul tardoantico e l'altomedioevo in Italia Meridionale (Foggia 12–14 febbraio 2004)*, ed. G. Volpe and M. Turchiano, 691–702. Bari: Edipuglia.

De Fino, M.G. 2015. Le diocesi rurali dell'Italia tardoantica tra IV e VII secolo. *Rendiconti della Pontificia Accademia di Archeologia* 87: 391–411.

Delaplace, Ch. 2002. Les origines des églises rurales (Ve-VIe siècles). À propos d'une formule de Grégoire de Tours. *Histoire et Sociétés Rurales* 18 (2): 11–40.

Delaplace, Ch., ed. 2005. *Aux origines de la paroisse rurale en Gaule méridionale (IVe–IXe siècles) (Toulouse, 21–23 Mars 2003)*. Paris: Editions Errance.

Duval, N. 1971. *Recherches archéologiques à Sbeitla, I. Les basiliques de Sbeitla à deux sanctuaires opposés (basiliques I, II et IV)*. Paris: De Boccard.

Ermini, L. Pani. 2001. Forma urbis: lo spazio urbano tra VI e IX secolo. In *Roma nell'alto medioevo, XLVIII Settimana di studio del Centro Italiano di Studi sull'Alto Medioevo*, 211–255. Spoleto: CISAM.

Fasola, U.M., and V. Fiocchi Nicolai. 1989. Le necropoli durante la formazione della città cristiana. In *Actes du XI CIAC, Rome (=Lyon, Vienne, Grenoble, Genève, Aoste)*, 1153–1205. Rome: Ecole Française de Rome. per la discussione si veda alle pp. 1206–1213.

Février, P.-A. 1964a. *Le développement urbain en Provence, de l'époque romaine ai XIVe siècle*. Paris: De Boccard.

Février, P.-A. 1964b. Notes sur le développement urbain en Afrique du Nord – Les exemples comparés de Djémila et de Sètif. *Cahiers Archéologiques* 14: 1–47.

Février, P.-A. 1965. *Fouilles de Setif. Les basiliques chrétiennes du quartier nord-ouest*. Paris: Editions du CNRS.

Fiocchi Nicolai, V. 2001. *Strutture funerarie ed edifici di culto paleocristiani di Roma dal IV al VI secolo*. Città del Vaticano: Pontificia Commissione di Archeologia Sacra.

Fiocchi Nicolai, V. 2003. Elementi di trasformazione dello spazio funerario tra tarda antichità ed alto medioevo. In *Uomo e spazio nell'alto medioevo – L settimana di studio del Centro Italiano di Studi sull'Alto Medioevo*, 921–969. Spoleto: CISAM.

Fiocchi Nicolai, V. 2015. Le catacombe romane. In *Lezioni di Archeologia Cristiana*, ed. F. Bisconti and O. Brandt, 273–360. Città del Vaticano: Pontificio Istituto di Archeologia Cristiana.

Fiocchi Nicolai, V. 2016. Le aree funerarie cristiane di età costantiniana e la nascita delle chiese con funzione sepolcrale. In *Acta XVI Congressvs Internationalis Archaeologiae Christianae. Romae (22–28.9.2013). Costantino e i Costantinidi. L'innovazione costantiniana, le sue radici e i suoi sviluppi*, ed. O. Brandt, V. Fiocchi Nicolai, and G. Castiglia, 619–670. Città del Vaticano: Pontificio Istituto di Archeologia Cristiana.

Fiocchi Nicolai, V., and S. Gelichi. 2001. Battisteri e chiese rurali (IV–VII secolo). In *L'edificio battesimale in Italia. Aspetti e problemi (Atti dell'VIII congresso nazionale di archeologia cristiana: Genova, Sarzana, Albenga, Finale Ligure, Ventimiglia, 21–26 settembre 1998)*, 303–384. Bordighera: ISL.

Fournier, G. 1982. La *mise* en *place* du *cadre* paroissial et l'évolution du peuplement. In *Cristianizzazione e organizzazione ecclesiastica delle campagne nell'Alto Medioevo: espansione e resistenze, XXVIII Settimana di Studio del CISAM (Spoleto, 10–16 aprile 1980)*, 495–475. Spoleto: CISAM.

Gauthier, N (avec la collaboration de B. Beaujard, J. Guyon, F. Prévot, G. Cantino Wataghin), 2014. Christianisation et espace urbain. In *Topographie chrétienne des cités de la Gaule des origines au milieu du VIIIe siècle*, XVI, 1–2, eds. F. Prévot, M. Gaillard, und N. Gauthier, 359–399. Paris: De Boccard.

Guidobaldi, F. 2000. L'organizzazione dei tituli nello spazio urbano. In *Christiana Loca. Lo spazio cristiano nella Roma del primo millennio*, ed. L. Pani Ermini, 123–129. Roma: Fratelli Palombi.

Heijmans, M. 2014. À propos de la mise à jour de la topographie chrétienne des cités de la Gaule. Réflexions sur le cas d'Arles. In *L'empreinte Chrétienne en Gaule du IVe au IXe siècle*, ed. M. Gaillard, 151–171. Turnhout: Brepols.

Istria, D., and Ph. Pergola. 2009. Les sièges épiscopaux de Corse et de Sardaigne durant l'Antiquité tardive et le haut Moyen Age. In *Archéologie dans rivages méditerranées: 50 ans de recherche. Actes du colloque d'Arles (Bouches-du-Rhône). 28–29-30 octobre 2009*, ed. X. Delestre and H. Marchesi, 495–502. Arles: Editions Errance.

Karagiorgu, O. 2001. Demethrias and Thebes: The fortunes and misfortunes of two Thessalian port cities in late antiquity. In *Recent research in late antique urbanism*, ed. L. Lavan, 183–215. Portsmouth: Journal of Roman Archaeology Supplement.

Karagiorgu, O. 2013. "Christian" or "Thessalian" Thebes: The port city of late antique Thessaly. In *Heaven and earth. Cities and countryside in Byzantine Greece*, ed. J. Albani and E. Chalkia, 157–167. Athens: Hellenic Ministry of Culture and Sports.

Lauwers, M. 2008. Territorium non facere diocesim. Conflits, limites, et répresentation territoriale du diocése V^{e} – XIIIe siecle. In *L'espace du diocèse. Genèse d'un territoire dans l'Occident médiéval (Ve–XIIIe siècle)*, ed. F. Mazel, 23–65. Rennes: Presses Universitaires de Rennes.

Lusuardi Siena, S., E. Neri, and P. Greppi. 2015. Le chiese di Ambrogio e Milano. Ambito topografico ed evoluzione costruttiva dal punto di vista archeologico. In *La memoria di Ambrogio di Milano: usi politici di una autorità patristica in Italia, secc V–XVIII*, ed. P. Boucheron and S. Gioanni, 31–86. Roma: École française de Rome.

Mailloux, A. 1999. Modalités de constitution du patrimoine épiscopal de Lucques, VIIIe–X^{e} siecle. *MEFRM* 111 (2): 701–723.

Monfrin, F. 2002. L'insediamento materiale della Chiesa nel V e VI secolo. In *Storia del Cristianesimo. Religione, politica, cultura. 3. Le Chiese d'Oriente e d'Occidente (432–610)*, ed. L. Pietri, 881–932. Roma: Città Nuova.

Pallas, D. 1977. *Les monuments paléochrétiens de Grèce découverts de 1959 à 1973*. Città del Vaticano: Pontificio Istituto di Archeologia Cristiana.

Pani Ermini, L. 1998. La "città di pietra": forma, spazi e strutture. In *Morfologie sociali e culturali in Europa fra tarda antichità e alto Medioevo, XLV Settimana di studio del Centro Italiano di Studi sull'Alto Medioevo*, 211–255. Spoleto: CISAM.

Pani Ermini, L., and D. Stiaffini, eds. 1985. *Il battistero e la zona episcopale di Pisa nell'altomedioevo*. Ospedaletto: Pacini.

Pergola, Ph. 1987. Seminari di archeologia cristiana. *Rivista di Archeologia Cristiana* 63: 377–387.

Pergola, Ph. 1997. *Le catacombe romane. Storia e topografia*. Roma: La Nuova Italia Scientifica.

Pergola, Ph., ed. 1999. *Alle origini della parrocchia rurale. Atti della giornata tematica dei Seminari di Archeologia Cristiana (École Française de Rome – 19 marzo 1998)*. Città del Vaticano: Pontificio Istituto di Archeologia Cristiana.

Pergola, Ph. 2003. Dalla civitas classica alla città sede di diocesi cristiana: teorie e metodi della topografia cristiana. In *EYKOSMIA. Studi miscellanei per il 75° di Vincenzo Poggi S.J*, ed. V. Ruggieri and E.L. Pieralli, 341–375. Roma: Rubbettino.

Pergola, Ph. 2014. Dalla città classica alla città cristiana in Occidente – Le mutazioni della civitas nella christiana Respublica. In *Lezioni di archeologia cristiana*, ed. F. Bisconti and O. Brandt, 137–206. Città del Vaticano.

Pergola, Ph., et al. 2010. Le sedi episcopali della Sardegna paleocristiana. *Rivista di Archeologia Cristiana* 86: 353–410.

Pietri, Ch. 1989. Régions ecclésiatiques et paroisses romaines. In *Actes du XI CIAC, Rome (=Lyon, Vienne, Grenoble, Genève, Aoste)*, 1035–1067. Rome: École Française de Rome.

Pietri, L., ed. 2005. Les oratoria in agro proprio dans la Gaule de l'Antiquité tardive: un aspect des rapports entre potentes et évêques. In *Aux origines de la paroisse rurale en Gaule méridionale (IVe–IXe siècles)*, ed. Ch. Delaplace, 235–242. Parigi: Errance.

Pietri, Ch., and Roma Christiana. 1976. *Recherches sur l'Eglise de Rome, son organisation, sa politique, son idéologie de Miltiade à Sixte III (311–440)*. Roma: École Française de Rome.

Prévot, Gaillard. 2014. In *Topographie chrétienne des cités de la Gaule des origines au milieu du VIIIe siècle, XVI, 1–2*, ed. F. Prévot, M. Gaillard, and N. Gauthier. Paris: De Boccard.

Saxer, V. 1988. *Les rites de l'initiation chrétienne du IIe au VIe siècle: esquisse historique et signification d'après leurs principaux témoins*. CISAM: Spoleto.

Sotiriou, G. 1931. *Hai christianikai Thēbai tēs Thessalias kai hai palaiochristianikai basilikai tes Hellados*. Atene: Archaioloikē Hetaireia.

Spera, L. 2014. La cristianizzazione di Roma: forme e tempi. In *Lezioni di Archeologia Cristiana*, ed. F. Bisconti and O. Brandt, 207–272. Città del Vaticano: Pontificio Istituto di Archeologia Cristiana.

Spera, L. 2016. Il papato a Roma nell'VIII secolo. Rileggere la svolta istituzionale attraverso la documentazione archeologica. *Rivista di Archeologia Cristiana* 92: 393–430.

Stoffella, M. 2008. Aristocracy and rural churches in the territory of Lucca between Lombards and Carolingians. In *774. Ipotesi su una transizione, Atti del seminario di Poggibonsi, 16–18 febbraio 2006*, ed. S. Gasparri, 289–311. Turnhout: Breopols.

Stoffella, M. 2011. Per una categorizzazione delle elites nellaToscana altomedievale nei secoli VIII–X. In *Théorie et pratiques des élites au Haut Moyen Âge: conception, perception et réalisation sociale*, ed. F. Bougard, H.-W. Goetz, and R. Le Jan, 325–350. Turnhout: Brepols.

Stoffella, M. 2016. Local Priests in Early Medieval rural Tuscany. In *Men in the Middle: Local Priests in Early Medieval Europe*, ed. S. Patzold and C. Rhijn, 98–124. Berlin: De Grujiter.

Testini, P., G. Cantino Wataghin, and L. Pani Ermini. 1989. *La cattedrale in Italia, in Actes du XI CIAC, Rome (=Lyon, Vienne, Grenoble, Genève, Aoste)*, 5–89. Ecole Française de Rome: Rome.

Thiel, A. 1868. *Epistolae romanorum pontificum genuinae et quae ad eos scriptae sunt a S. Hilaro usque ad Pelagium II*. Brunsbergae: E. Peter.

Violante, C. 1982. Le strutture organizzative della cura d'anime nelle campagne dell'Italia centrosettentrionale (secoli V–X). In *Cristianizzazione e organizzazione ecclesiastica delle campagne nell'Alto Medioevo: espansione e resistenze, XXVIII Settimana di Studio*

C

del CISAM (Spoleto, 10–16 aprile 1980), 963–1158. CISAM: Spoleto.
Volpe, G. 1998. *San Giusto. La villa, le ecclesiae. Primi risultati dagli scavi nel sito rurale di San Giusto (Lucera): 1995–1997*. Bari: Edipuglia.
Volpe, G. 2002. Il mattone di Iohannis. San Giusto (Lucera, Puglia). In *Humana sapit, Etudes d'Antiquité tardive offertes à Lellia Cracco Ruggini*, ed. J.-M. Carrié and R. Lizzi Testa, 79–93. Turnhout: Brepols.
Volpe, G. 2007. Il ruolo dei vescovi nei processi di trasformazione del paesaggio urbano e rurale. In *Archeologia e società tra Tardo Antico e Alto Medioevo, Atti del 12° Seminario sul Tardo Antico e l'Alto Medioevo (Padova 29 settembre-1 ottobre 2005)*, ed. G.P. Brogiolo and A. Chavarría Arnau, 85–106. Mantova.
Volpe, G. 2008. Spectabilis vir restaurator ecclesiarum. In *Canosa, Ricerche storiche 2007. Atti del Convegno (Canosa 16–18.2.2007)*, ed. L. Bertoldi Lenoci, 23–52. Martina Franca: Edizioni Pugliesi.
Wood, S. 2006. *The proprietary church in the medieval west*. Oxford: Oxford University Press.

Christianity: Survival and Reemergence

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Introduction

The spread of Christianity across Europe was a process that took the best part of a thousand years, from the very start of the Middle Ages when traces of Roman Christianity still remained, to the fourteenth century when Christianity was introduced in Lithuania.

Definition

The study of this complex process involves the two key terms of conversion and Christianization. Conversion relates to the personal acceptance of Christianity, while Christianization is used to describe the long-term transformation of a non-Christian society into a Christian one.

Historical Background

The Christianization usually forms an important part of a country's grand, national narrative. Such accounts tend to be rather condensed versions of events, based on medieval written sources. This can be problematic, mainly since these sources do not provide any insight into the experiences of the people being converted. The sources also frequently focus on what can be termed the official conversion, i.e. the baptism of a ruler who created a Christian kingdom and spread the religion to the larger population, via the elite members of society. Well-known examples include the conversions of the Frankish king Clovis I by Bishop Remigius in 496, King Æthelberht of the Anglo-Saxon kingdom of Kent by the Roman missionary Augustine in 597, as well as the baptisms of King Mieszko I of Poland and King Olaf Haraldson of Norway around the turn of the first millennium. There is no doubt that royal conversions were significant moments in history, but in order to get a fuller picture of the Christianization they must be viewed together with the large body of archaeological evidence.

This material shows that medieval Christianization was an extended process, which not only continued after royal baptisms, but which also started long before the first documented missions. At this time, pagan peoples were in frequent contact with the Christian world and in this way gradually built up their knowledge of the religion and its practices. It must be assumed that individuals converted to Christianity at this early stage, and over time, the number of practicing Christians gradually increased, although this was not a linear development. It was this phase, which in many cases lasted several hundred years and is referred to as the infiltration phase, that led up to the royal conversions described in the written sources. Earlier missionary activity is at times mentioned in the accounts, but these sources do not provide detailed insights into cultural contact and exchange between peoples or the acceptance of Christianity by the wider population.

The archaeological evidence of Christianization cannot be treated as a simple reflection of

religious affiliation, but each piece must be considered and examined within its own context. This type of evidence can, however, be seen to express variations of a Christian identity. The manifestation of Christianity through material culture is not uniform, as the religion forms but one part of a person's identity, together with other identities, such as age, gender, and status, with further variation added by political affiliation and local expression. Despite this, three main types of archaeological evidence can be used to examine the spread of Christianity on a general level. These are: ecclesiastical buildings, burial practices, and artifacts with Christian symbols.

Early churches are traced in the archaeological evidence via cruciform, equal-armed, apsidal, narrow-ended, or at times simple rectangular buildings, all east-west aligned. These structures were made of wood or stone, depending on the geographical area, with stone buildings generally becoming more common as Christianization moved on. Rectangular buildings found underneath later churches, are often interpreted as churches too, but these identifications are less certain.

Burial evidence has formed an important core of evidence for the study of Christianization. Christian influence has been traced, for example, in the disappearance of grave-goods and the shift from traditional burial grounds to Christian cemeteries. The foundation for this approach has been the assumption that burial is always a religious act. This does not necessarily follow, especially not in the early Middle Ages, when the church did not require any certain modes of burial. At this time, Christian burial was instead a privilege open to the elite members of society. Grave-goods were fully compatible with Christian burial, as evidenced in churches and church yards across the Middle Ages and variations in the amount of grave-goods have now been linked to social, rather than religious change. It was not until the High Middle Ages that Christian burial started to become a legal requirement and even then it was generally just stated that the dead should be buried in church yards. Despite these differences over time, across Europe the shift from traditional burial grounds to church yard burial was a rather protracted process. Traditional burial practices were important for ancestral reasons and expressions of power, and many people most likely wished to hold on these. The burial record is therefore unlikely to provide a direct reflection of religious change.

Artifacts that carry Christian symbolism, e.g., stone crosses and memorial stones with Christian symbols and text, and portable items, such as crucifixes, chalices, croziers, can be seen to show a growing local Christian identity, as well as contacts with the wider Christian world.

History of Research

In this entry, the spread of Christianity is examined through four case studies, each of which represents a version of the different types of Christianization that took place across medieval Europe. Two of the areas, Merovingian Frankia and Anglo-Saxon England, were part of Roman territory until the fifth century. In Frankia, after the decline of the Empire, Christianity remained in a relatively strong position, while in Anglo-Saxon England the religion seems to have more or less disappeared. Despite the shared Roman legacy, clear differences in early Christian practices developed. The other two areas, Scandinavia and most of Saxony, were never Romanized, and there was therefore no Christian legacy to make use of in the creation of churches and holy sites. Saxony, in particular, stands out as this area was violently Christianized by Charlemagne's conquest in the late eighth century, whereas in the other areas people were actively acquiring the religion from early on, albeit often with external aid or pressure. Scandinavia, on the other hand, was one of the last areas of Europe to be Christianized and here the effects of long standing contacts with the Christian world are particularly clear.

Frankia: In the late Roman period, Christianity was above all practiced in the urban areas. At this time, the fortified cities were equipped with churches and bishops, as seen in Tours and Trier where cathedrals were constructed in the fourth century. After the decline of the Empire, the

religion remained strong in the cities, and even continued to grow, especially in southern and central Gaul. Archaeological evidence demonstrates that Christianity was spreading on a wider scale from the sixth century, perhaps given a boost by the conversion of King Clovis I. At this time, some of the Roman churches within the city walls were still standing and were taken back into use, as, for example, at Tours where both the cathedral and episcopal residence had survived, together with the Basilica of St Martin, which was refurbished in the 550 s. Roman secular buildings were also converted for ecclesiastical use, famously seen at St Pierre-aux-Nonnains in Metz and the monastery of Oeren in Trier. In addition, suburban churches were erected near the city walls, in Lyon and Trier, for example, several such churches appeared during the Merovingian period.

Another common development took place outside the city walls, in the traditional Roman burial grounds. *Ad sanctos* burial, i.e., burial in proximity to holy relics, was an important concept in this period and churches were therefore constructed on top of tombs of Roman saints and martyrs. Clovis I was buried in such a church, above the tomb of St Geneviève, in a cemetery outside Paris. Sites of this kind became popular foci for early Christian burials, as seen at Arles, Lyon, Tours, and Vienne, and these cemeteries at times held thousands of graves.

From the sixth to the eighth century, Christianity spread from the cities to rural areas, where churches were founded by aristocrats on their private estates. The nature of the early churches varies: some were funerary chapels built in traditional cemeteries, others were converted Roman villas and others still were family monasteries. Many of these churches had "founder graves," prominent burials in a central position of the building. Over time, some of these propriety churches gained in status and became parish churches serving the wider community.

From the sixth century, the Roman ban on intramural burial was starting to break up with the new tradition of furnished elite burials in churches, e.g., in the cathedrals of St. Denis, Arlons, and St. Germain-des Près. Other well-known examples are the sixth-century burials in Cologne Cathedral. Here a grave chamber was found, with a coffin containing a woman's body with an elaborate headband made with gold thread, dress fasteners, and an amulet container. Vessels of glass, pottery, and bronze had been deposited next to the coffin. Another burial contained a boy equipped with a helmet, various weapons, a wooden object interpreted as a scepter, as well as a bed and a chair.

In society as a whole, from the fifth and sixth centuries, burial practices were also changing, as traditional burial grounds were gradually abandoned in favor of *ad sanctos* burial, although this did not become the norm until the eighth century. It is, however, possible that wooden churches were erected in some traditional cemeteries, as has been suggested after the excavations at Sézegnin and Grobbendonk. In northern Gaul, circumstances were slightly different as the traditional "row-grave" (*Reihengräber*) cemeteries continued as the main form of burial into the seventh century (Halsall 2010).

The great variation in Frankish early medieval burial practices is illustrated by Hordain (northern France), which is a cemetery with over 400 burials dating from the late fifth to the end of the seventh century. The northern part, where the earliest burials are located, has been interpreted as the pagan zone. Here, graves were on a north-west alignment and two graves contained horses. The next identifiable phase, seen as the Christian one, started in the mid-sixth century, when east-west aligned burials appeared in a different area, and around the year 600, a church, an east-west aligned building with an altar, window glass, and a wealthy founder grave, was erected. At this site, no transition between different types of burial was seen, but instead throughout the lifespan of the site, burial continued in the two areas, keeping their respective orientations.

Until the middle of the seventh century, items with Christian symbolism were rare in Frankia. From this time, cross-shaped brooches on female dress started appearing in burials, and occasionally settlements, among the East Franks between the rivers Rhine and Mosel. This tradition seems to be connected to late Roman Christian practices in northern Italy, which were still present in the fifth and sixth centuries. Among the western Franks, there is no evidence that cross-shaped brooches were worn.

Anglo-Saxon England: In the Roman period, Christianity does not seem to have been a major religion in England. The strongholds were in the urban centers and their hinterlands, while in rural areas, Christianity was more mixed with pagan religion. After the decline of *Romanitas*, the British Church, which had developed from Romano-British Christianity, was pushed westward to Wales and Cornwall by invading pagan Anglo-Saxon tribes. As a result, very little Christianity remained in England.

Material culture and burial practices demonstrate that the newly settled Anglo-Saxon tribes identified with pagan Germanic traditions and peoples of the north, but towards the end of the sixth century, their attention shifted to the Christian world and Frankia in particular. From this time, mainly Frankish, but also Roman and Byzantine, artifacts started appearing in England. In the light of this, King Æthelberht's invitation of Roman missionaries seems logical, and Augustine, who was to become the first bishop, arrived in 597 (Morris 1997).

The Anglo-Saxon fascination with Frankia and Roman Christianity led to some similar developments in terms of early Christian foci. One of the clearest examples is the old Roman town of Canterbury, reawakened as the first Anglo-Saxon episcopal seat. In the sixth century, a cathedral was constructed inside the walls, reusing an old Roman building, possibly a church. Outside the walls, in the Roman inhumation cemetery, a new Christian focus, which was to become the largest Christian cemetery of Canterbury, emerged. In the sixth and seventh centuries, the Church of St. Martin was created here from a remodelled Romano-British structure, together with the monastery of SS Peter and Paul and St. Augustine's Abbey. No other Anglo-Saxon examples of towns following the Roman tradition of extramural burial are known. In other towns of Roman origin, such as Leicester, York, Rochester, and London (the area around St Paul's Cathedral), however, the model with churches erected within the center was followed (Morris 1997).

In rural areas, churches started to appear from the seventh century. From this time and throughout the early Anglo-Saxon period, the term minster (from Old English *mynster*) was used for any type of religious community, from churches with priests to monastic houses and any other ecclesiastical settlement. The minsters were aristocratic foundations, which quickly became important Christian centers, of which some survived as parochial mother-churches in the later Anglo-Saxon period. They made a strong visible impact on the early Christian landscape in England and were located in carefully chosen spots, with hills, peninsulas, and confluences being particularly common. The material culture from eighth and early ninth-century minsters, including Jarrow and Barking, is distinctive, with finds such as book and shrine mounts, styli, imported pottery and glass vessels (Blair 2005).

The reuse of Roman buildings and masonry was frequently occurring. Roman forts were popular choices, e.g., Bradwell-on-Sea and Reculver (Kent), where churches were erected in the seventh century. The reuse of forts was presumably driven by the desire for Roman remains together with the practical need for an enclosure around the church. A combination of written sources and excavations have shown that within the enclosure space was rather tight, at times with subsidiary chapels, oratories, and domestic buildings. Other major types of Roman remains adapted as churches were large villa complexes (e.g., Castor, Northamptonshire and Cheddar, Somerset) and martyria. Early medieval churches constructed on top of martyria include those at Wells (Somerset) and Stoneby-Faversham (Kent). St. Alban's Abbey (Hertfordshire) may be the only known example of Christian continuity from Roman to Anglo-Saxon times. Outside Roman Verulamium, a Roman basilica erected over the grave of St. Alban continued in use through the early Anglo-Saxon period (Morris 1997).

Prehistoric sites and monuments became foci for early churches too. The most significant types include earthwork forts (e.g., Hanbury in Worcestershire and Breedon-on-the-Hill in Leicestershire) and mounds (e.g., Taplow in Buckinghamshire). Some of these monuments may have functioned as pagan Anglo-Saxon cult sites, although in most cases this is very difficult to prove. The most certain case is Bampton in Oxfordshire, a minster dating from the tenth century or earlier, constructed in relation to a cultic complex including Bronze Age barrows and a

pagan or conversion-period cemetery dating from c. AD 700. In contrast to Frankia, however, there is an almost complete lack of evidence of Anglo-Saxon churches erected in traditional cemeteries (Semple 2013).

Anglo-Saxon burial practices were gradually changing at this time. In some cases, for example, Shudy Camps (Cambridgeshire) new areas were added to existing burial grounds. More commonly though new, rather small, cemeteries without churches were created, as seen at Lewknor (Oxfordshire) and Bromfield (Shropshire). As in Frankia, the allure of *ad sanctos* burial seems to have led to a voluntary shift of burials to minster sites. Some of the earliest minster burials took place shortly after 700 at Minster-in Thanet (Kent), Winchester (Wessex), and Waltham (Essex). By the middle of the ninth century churchyard burial was becoming the norm, and some of the minster cemeteries grew were very large, capturing the population from the surrounding areas (Blair 2005).

The lack of a consistent expression of Christianity in the seventh and early eighth centuries is further demonstrated by the female burials with Mediterranean style jewelry and cross pendants. Despite their different characteristics, these graves are all seen as Christian; from the richly furnished grave at Swallowcliffe Down (Wiltshire) inserted into a Bronze Age barrow to the more sparsely furnished examples, such as the one found in a traditional cemetery in Lechlade (Gloucestershire), and the burials at Ixworth (Suffolk) and Desborough (Northamptonshire). These burials represent the transitional stage to elite minster burial, and in terms of grave-goods, the most appropriate parallel is the seventh-century burial of St. Cuthbert with a pectoral cross. The pieces of jewelry from these graves are some of the most striking, early Anglo-Saxon examples of artifacts with Christian symbols (Blair 2005).

Saxony: Charlemagne's conquest and Christianization of Saxony lasted between 772 and 805. The neighboring areas in the south and west had already been recently Christianized by the Franks, and although less violent, some similar strategies can be identified. One of the main schemes was the speedy establishment of bishoprics, as seen in Utrecht, Büraburg, Würzburg, and Erfurt. These episcopal sees were in carefully chosen locations, often reusing established strongholds. Excavations have demonstrated that both Büraburg and Würzburg were erected close to, or on top of, hilltop fortifications with important political and religious functions. In the Christian era, these bishoprics became important centers for administration, manufacture, trade, and not least for missionary and military activity. In Saxony, during the reign of Charlemagne, bishoprics were founded in, e.g., Verden, Osnabrück, Minden, and Bremen, with, e.g., Hamburg and Hildesheim added during the reign of his successor, Louis the Pious. Excavations have revealed that Hamburg was erected on top of an older Saxon fort and that the Church of Christ the Savior at Paderborn, constructed as part of the royal palace, was erected above the remains of an extensive wooden structure. Many of these early episcopal seats, such as Paderborn and also Münster, were surrounded by fortifications (Stiegemann and Wemhoff 1999; Stiegemann, Kroker and Walter 2013).

Excavations have shown that the earliest churches in Saxony were rather simple rectangular structures with a rectangular choir. One such example is the first church at Paderborn which consisted of a 25-meter long nave, a chancel in the east and an atrium in the west, and with a cemetery inside and outside the atrium. This and other palaces with churches attached were erected with conscious style references to Roman antiquity, perhaps making up for the lack of Roman remains to reclaim as part of the Christianization. In addition, altar relics for the new churches were brought to Saxony already from the late eighth century. The body of St. Liborius was translated to Paderborn in 836, and as revealed by modern excavations, was buried in a ring-shaped crypt in the western transept of the cathedral.

Not all churches founded in the late eighth and the ninth centuries were cathedrals, but some were presumably proprietary churches built by Frankish and Saxon nobles in their own settlements. At this time, both stone and wooden churches were erected. A particularly early example is Oldenstadt, Stadt Uelzen, Niedersachsen where the first phase of the wooden church dates from around 800. Other such examples of wooden churches are Tostedt, Niedersachsen, originating

in the early ninth, and the St. Amandus Church in Aschendorf, which was built a few decades later.

As part of his violent conquest Charlemagne introduced an extremely harsh law known as the *First Saxon Capitulary* in which practices regarded as pagan, such as cremations and mound burial, were outlawed. According to this law, people should instead be buried in "church cemeteries." Despite this piece of legislation, the changes in burial practices in Saxony are rather similar to those seen other areas. The most common solution was to use specific areas of the traditional burial grounds, as seen at Ketzendorf, Maschen, and Oldendorf. Churchyards were few and far between at this time, although some examples are known: at the church in Oldenstadt, burial started around 800, while at the St. Amandus Church and the St. Firminius Church, Dötlingen Oldenburg, Niedersachsen, the first burials date from the middle of the ninth century, and the ninth or tenth century, respectively (Stiegemann and Wemhoff 1999; Stiegemann, Kroker and Walter 2013).

Various types of artifacts with Christian symbolism are found in the wake of the Carolingian conquest and missionary work. Variants of the Carolingian cross-shaped brooches (*Kreuzfibel*) appeared in Saxony for the first time at the end of the eighth century, for example, in the cemeteries of Paderborn and Drantum near Oldenburg. During the ninth century, square, rectangular, and disc-shaped brooches with cross motifs appeared in graves and settlements, together with other types of brooches with Christian symbols. The cross motif is found on other objects too, such as the Tating ware jugs retrieved from excavations in Paderborn (Carver 2003).

Scandinavia: The three Scandinavian countries of Denmark, Norway, and Sweden were officially Christianized by their respective kings around the turn of the first millennium, but archaeological evidence shows that the area had long-standing contacts with the Roman Empire and the wider European Christian culture. Examples include the Migration-period book-shaped pendant from Hög Edsten, Bohuslän, Sweden, the sixth-century Coptic ladle and the eighth-century Irish Crozier found on the island of Helgö, Uppland, Sweden (Carver 2003).

The archaeological evidence of the process of Christianization is varied. Late Viking-age runestones from across Scandinavia are among the most important pieces of evidence. These monuments are generally interpreted as Christian as they almost exclusively have a Christian message in the inscription and/or the iconography. One of the most famous examples is the runestone from Jelling in Denmark where King Harald Gormson "Bluetooth" claimed to have Christianized the Danes. The decorations on this stone include an image of Christ (Nilsson 1996).

The first major phase of church building in Scandinavia took place in the eleventh century. Most of the earliest churches in Scandinavia were presumably built of wood, which in Denmark and Sweden were replaced by stone churches, above all in the twelfth and thirteenth centuries. Many of the early wooden churches are difficult to find archaeologically as they are located underneath the later stone churches. Excavated examples include Jelling and Snoldelev in Denmark. In Sweden, the presence of a particular type of eleventh-century grave monument found in connection with stone churches often indicates the existence of an earlier wooden church (Nilsson 1996).

The first stone churches in Denmark date from the first half eleventh century, e.g., Roskilde cathedral and St. Jørgensbjerg church, while in Sweden, one of the earliest stone churches was built in Sigtuna at the end of the eleventh century. Other early stone churches in Sweden, such as those in Herrestad, Örberga (Östergötland), and Sigtuna (Uppland), all date from the first half of the twelfth century. In Norway, wooden churches continued to be the norm for several centuries after the introduction of Christianity, with some famous stave churches still standing, e.g., Lom (Oppland) and Heddal (Telemark). Bø in Telemark is a rare Norwegian example of a twelfth-century stone church with remains of a wooden predecessor underneath. Across Scandinavia, early churches were often erected on farms and may therefore have been proprietary churches, of which some later became parish churches.

At least some churches were erected in the immediate vicinity of prehistoric monuments. One clear example is Hørning in Denmark, where an eleventh-century wooden church was

erected on top of a levelled burial mound, below which there was a chamber grave, dating from c. 1000 and containing a woman and large amounts of grave-goods. The closeness in time between the burial and the building of the church strongly suggests that the church was deliberately placed on top of the flattened mound. Another striking example is Frösö Church (Jämtland, Sweden). Underneath the high altar, large amounts of animal bones and the charred remains of a tree was found, which has been interpreted as evidence of a Viking-age cult site. Another interesting example comes from Mære (Trøndelag, Norway), where a twelfth-century church was built on top of a rectangular Viking-age building, which most likely had cultic functions. The establishment of the first Swedish episcopal see at the former cult site of Gamla Uppsala, Sweden, is also significant, although there is no direct archaeological link between Christian and pagan activities. This is, however, a clear example of the church taking over a site with important functions in the former pagan cult (Nilsson 1996).

As seen elsewhere, burial practices were changing rather slowly. It is likely that in eleventh and twelfth-century Scandinavia, church yard burial was required by law, but this was clearly not enforced, presumably as churchyards were too few and far between. Instead, as was the case elsewhere, traditional burial grounds continued to be used for burial. A Norwegian example is Haug, Hadelsøya, Nordland. An example of a particularly long-lived cemetery in Sweden was Valsta (Uppland, Sweden) which was used into the twelfth century. In some cases, such as Stav and Hässelby (Uppland, Sweden), possible Christian zones have been identified in the outskirts of the cemeteries. These areas contain graves marked by rectangular stone-settings and represent the last phase of burial on the sites (Nilsson 1996).

Delimited Christian cemeteries without churches also occurred from the tenth century, as seen at Birka (Uppland), Såntorp (Västergötland), and in the outskirts of Sigtuna, Sweden. Another example comes from Grødby on the Danish island of Bornholm, where a cemetery has been coin-dated to the reign of Sven Estridsen, i.e., 1047–1076.

Another development was the erection of churches in existing Christian cemeteries, as, for example, seen in Norway, where several churches from the second half of the eleventh century are located in Christian graveyards which date from the first half of the eleventh century, or even the tenth century (Nilsson 1996).

Church-yard burial became the most common form of burial during the twelfth century, although some church yards, such as St Stefan's and Löddeköpinge (Skåne, Sweden), Peter's Church in Tønsberg (Vestfold, Norway), and Gamlebyen in Oslo came into use during the tenth and the first half of the eleventh century. Remarkably, early are the graves from the churchyard around Ribe Cathedral, Denmark, where the earliest phase of burials date from the ninth century to the middle of the eleventh century.

Graves containing artifacts with Christian symbols appeared above all from the late eighth to the eleventh century. Examples include Tating ware jugs, croziers, crosses, and crucifix pendants, as well as reliquaries, some of which had been reused as fibulae. Many of these objects come from female burials suggesting that Christianity played an important role for certain groups of elite women. One particular example comes from Birka, Sweden, where eight of nine pendant crosses were found in female graves dating from the first half of the tenth century. Several of these crosses are of "simple, almost poor" craftsmanship. This is not usual for Viking Age jewelry, and it therefore seems that the symbolic value of the crosses was greater than their value as pieces of jewelry, although the purpose of these grave-goods is of course unknown (Nilsson 1996).

Future Directions

This survey of the spread of Christianity in Europe, examined via four case studies, clearly demonstrates that the process of Christianization, despite the different features and characteristics, on the whole share a number of traits, visible in the archaeological material. One clear observable difference is that in the areas that had not been Romanized the official acceptance of Christianity took place at a later stage, demonstrating the significance of the infiltration phase for this process. Overall archaeological evidence is crucial for the

study of Christianization as it provides insight into the pagan peoples that are being converted, as well as numerous groups of people at different levels of the new, Christian societies. On a more individual level, great differences are naturally found between the different geographical areas, and future research is likely further to emphasize the variability in the processes of Christianization and Christian practices across Europe.

References

Blair, J. 2005. *The Church in Anglo-Saxon Society*. Oxford: Oxford University Press.

Carver, M. 2003. *The Cross goes north: Processes of conversion in Northern Europe, AD 300–1300*. Woodbridge, Suffolk: York Medieval Press.

Halsall, G. 2010. *Cemeteries and society in Merovingian Gaul: Selected studies in history and archaeology, 1992–2009*. Leiden: Brill.

Morris, R. 1997. *Churches in the landscape*. London: Phoenix Giant.

Nilsson, B. 1996. *Kristnandet i Sverige. Gamla källor och nya perspektiv = The Christianization in Sweden: Old sources and new perspectives*, Vol. 5. Projektet Sveriges kristnande. Uppsala: Lunne böcker.

Semple, S. 2013. *Perceptions of the prehistoric in Anglo-691 Saxon England. Ritual, religion and rulership*. Oxford: Oxford University Press.

Stiegemann, C., and M. Wemhoff. 1999. *799 – Kunst und Kultur der Karolingerzeit. Karl der Grosse und Papst Leo III in Paderborn. Katalog der Ausstellung Paderborn 1999*. Mainz: von Zabern.

Stiegemann, C., M. Kroker and W. Walter. 2013. Credo: Christianisierung Europas im Mittelalter. Band 1, Essays. Petersberg: Michael Imhof Verlag

Chronological Systems, Establishment of

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Introduction

Today's students of archaeology might find it difficult to imagine an era when modern chronometric dating methods – radiocarbon and luminescence, for example – were unavailable. How, the students might ask, were archaeologists working, say, in the first half of the twentieth century able to place objects and sites in a chronological sequence? Given the important roles that chronometric methods play in modern archaeology, together with the precision they often seem to impart, it is little wonder that students of today might view earlier efforts to establish temporal control as rather crude and outdated. Such a view, however, overlooks the fact that early archaeologists devised a battery of clever methods to determine the ages of archaeological phenomena with considerable precision. This kind of chronological control is often referred to as *relative dating*.

Definition

Relative dating can be defined as the production of a sequence of events for which no fixed or calendrical dates exist. Instead of knowing that a certain kind of pottery was made between, say, CE 200 and CE 400 and that another kind was made between CE 400 and CE 600, all we know is that the latter kind is of more recent origin than the former. The latter kind could postdate the earlier one by several hundred years or by a thousand years, but we do not know this. All we know is that it is more recent. Similarly, we might know, perhaps through historical evidence, the terminal calendrical date of manufacture and use of the later kind of pottery, but we might not know when on a calendrical scale that kind of pottery was first made and thus when it began replacing the earlier kind. In contrast, *absolute-dating* methods – sometimes referred to as *chronometric* methods – yield the amount of time, within the limits of sampling error, that elapsed between each pair of events as well as a calendrical date indicating when each event occurred and perhaps each event's duration as well.

Absolute-dating methods thus provide more than a simple chronological sequence, but they in no sense render relative-dating methods obsolete. There are situations where the latter are preferable, especially when large areal chronologies are desired. Relative-dating methods are inexpensive, as opposed to methods such as accelerator

mass spectrometry radiocarbon dating, which may cost as much as $1,000 per sample. Unfortunately, few modern archaeologists have more than a passing acquaintance with the origins of relative-dating methods and as a result have by-passed some of the most innovative work ever undertaken in archaeology. That research is as relevant today as it was a century ago.

Historical Background

Numerous methods for working out relative chronological orderings have been devised in archaeology, one of which, stratigraphic excavation, has its roots in geological observations of the eighteenth century. *Stratigraphic excavation* is perhaps the best known of the various relative-dating methods used by prehistorians, no doubt because the majority of the archaeological record has a geological mode of occurrence (O'Brien and Lyman 1999). There are also two other methods – *seriation* and *cross dating* – that likewise deserve attention. All of them, however, depend on *artifact types*, especially those that pass the *historical significance test*. This means that a type comprises specimens that were made during a single, relatively short interval of time and that the frequency distribution through time of the specimens approximates a unimodal curve (Fig. 1). Such a curve reflects the introduction of a type, its growth in popularity, and its decline and eventual disappearance. Any type that passes the test is referred to as a *historical type*, the gold standard of relative-dating methods.

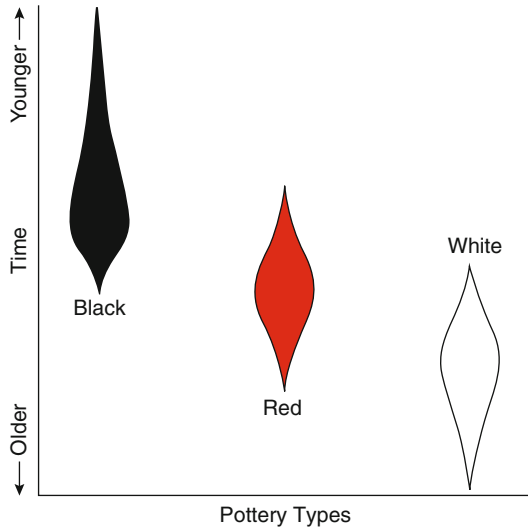

Chronological Systems, Establishment of, Fig. 1 Diagram showing temporal alignment of three hypothetical pottery types from latest (black) to earliest (white) (From O'Brien and Lyman 1999)

Key Issues

Stratigraphic Excavation

Stratigraphic excavation is defined as removing artifacts and sediments from vertically discrete three-dimensional units of deposition (strata) and keeping those artifacts in sets based on their distinct vertical recovery proveniences for the purpose of measuring time (Lyman and O'Brien 1999). Vertical boundaries of spatial units from which artifacts are collected can be based on geological criteria, such as sediment texture, or on metric criteria, such as elevation. Stratigraphic excavation is based on the commonsense assumption that in a sedimentary column, strata stacked one on another represent the passage of time. More specifically, the assumption is that strata at the bottom of a column were deposited before those above. This is known as the *law of superposition*. Unfortunately, archaeologists often fail to realize that depositional history does not necessarily represent the *age* of the sediments themselves. This includes objects in those sediments. Although artifacts in one stratum were *deposited* before those in a higher stratum, it cannot be assumed that artifacts in the lower stratum are *older* than those in the higher stratum. It could be the case, for example, that artifacts from one period were eroded from one locality and deposited downslope on top of artifacts from a later period.

Thus, superposition is an indirect dating technique when applied to artifacts within strata. It is indirect because the ages of the artifacts are *inferred* from their vertical positions relative to

one another. Another way of saying this is that the target event is the age of an artifact's creation whereas the dated event is the age of the depositional event. The work of the archaeologist, like that of the geologist, is to analyze the superposed sediments and to determine when strata were deposited as well as when the sediments were formed. Archaeologists are interested in culturally derived sediments – artifacts – but they realize that the artifacts usually occur within noncultural (natural) sediments. The nature of the latter often is an important source of information relative to the nature of the former.

The problem of identifying the first stratigraphic excavation may never be solved, but historians of archaeology often point to Thomas Jefferson's 1784 excavation of a trench through one of the earthen mounds on his property in Virginia. He subsequently made notes on the stratigraphic relation of layers of earth and human bones in the mound and remarked on the chronological implications of the layering (Jefferson 1801). Jefferson's work was later said to have anticipated modern archaeological methods by a century, but it had no particular impact on Americanist archaeology. As the British archaeologist Mortimer Wheeler (1956: 59) later observed, "Unfortunately, this seed of a new scientific skill fell upon infertile soil. For a century after Jefferson, mass-excavation remained the rule of the day." It was 75 years later, and then in Great Britain, that Jefferson's approach was reinvented with effect. There, on the Devonshire Coast, the excavation of Brixham Cave of England by prominent British geologists and paleontologists in 1858 focused explicitly on stratigraphic context.

In North America, stratigraphic excavation became an art form during the second decade of the twentieth century through the efforts of two prehistorians working in New Mexico, Nels Nelson of the American Museum of Natural History in New York and Alfred V. Kidder of the Robert S. Peabody Museum in Andover, Massachusetts. Nelson started working at San Cristobal, an abandoned pueblo in the Galisteo Basin south of Santa Fe, New Mexico, to test a suspected local sequence of pottery types. In his report, Nelson (1916) stated that by the beginning of the 1914 field season, he suspected he knew the chronological order of five types of pottery, two of which exhibited painted designs and three of which contained glazed designs. One of the painted types was suspected of being the earliest of the five because it occurred primarily on small pre-Puebloan sites. The other painted type was known to be the latest of the five types because it occurred in abundance on sites historically documented as postdating the Pueblo Revolt of 1680. Nelson viewed one of the three glazed types as being from the early historical period (1540–1680), given that it was found consistently with bones of horses and other historically introduced domestic animals. The other two glazed types were slid in between the early painted type and the historical-period glazed type. Despite his intuitions regarding the chronological arrangement of the types, Nelson (1916: 162) noted that "tangible proof was still wanting." He found that proof at San Cristobal.

Nelson excavated San Cristobal in arbitrary 1-foot-thick levels rather than in natural stratigraphic units, and he kept sherds from each level separate. This is the feature of his work that has received attention in histories of Americanist archaeology (O'Brien 2003). Nelson had visited the stratigraphic excavations of European prehistorians Otto Obermaier and Henri Breuil in Spain in 1913 and had seen levels marked off on the walls of the excavations, and he had participated in excavating Castillo Cave – an experience that, according to Nelson, served as inspiration for his excavation method at San Cristobal. His technique of excavating in arbitrary levels might have come from Europe, but certainly not the notion that superposed collections marked the passage of time. Everyone knew that. The innovative aspect of Nelson's work was his demonstration that pottery types altered in absolute frequency through time in a pattern that he characterized as "very nearly normal frequency curves [that reflected the fact that] a style of pottery…came slowly into vogue, attained a maximum and began a gradual decline" (Nelson 1916: 167).

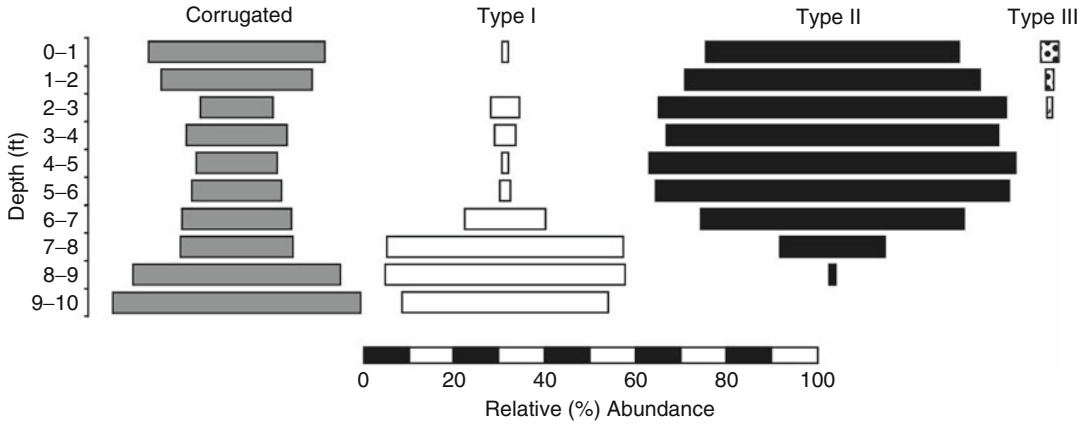

Chronological Systems, Establishment of, Fig. 2 Nels C. Nelson's pottery data from Pueblo San Cristobal, New Mexico, showing the waxing and waning popularity of types. Note that Nelson believed, correctly, that the frequency of corrugated ware was not a good indicator of age. Note also the essentially monotonic frequency distribution of his types I–III (After Nelson 1916)

Figure 2 shows Nelson's data graphically as percentages of four pottery types by excavation level. Three of his types – I–III – are of particular chronological usefulness in that they have continuous distributions in time: they come into being and they gain in popularity until they reach their zenith, at which point they begin to fade in popularity until they finally disappear [AR1]. In short, they are good historical types, useful for marking the passage of time. Corrugated ware does not follow this pattern and thus is not a good historical type.

Kidder, who was working at Pecos Pueblo, just to the east of the Galisteo Basin, took notice of Nelson's chronological ordering of pottery types. Kidder had chosen Pecos as his focus of study because historical documents indicated it had been occupied from 1540 until 1840, and preliminary surface reconnaissance had suggested that it had practically all the prehistoric pottery types identified up to that point in the Rio Grande drainage of northern New Mexico:

> [I] hoped that remains [at Pecos] would there be found so stratified as to make clear the development of the various Pueblo arts and to enable students to place in their proper chronological order numerous New Mexican ruins whose culture has long been known but whose relation to one another has been entirely problematical. This hope was strengthened by the fact that Mr. N. C. Nelson . . . had recently discovered very important stratified remains at San Cristobal a few miles to the west (Kidder 1916: 120).

Similar deposits at Pecos would allow comparative analyses and the extension of Nelson's chronology, which ended at 1680 when San Cristobal was abandoned, into the middle of the nineteenth century.

Early in his excavations, Kidder (1916: 122) recognized that pottery types in the lower levels of his trenches were "markedly different from [those] at the top and that there were several distinct types between." Not all excavations at Pecos Pueblo were undertaken with close attention to superpositional relations. Rather, such relations were observed by "tests made at different points as the [excavation] advanced. The tests consisted of the collection of all the sherds in a given column of débris, the fragments from each layer being placed in a separate paper bag" (Kidder 1916: 122). During the first year's field season – the summer of 1915 – those tests employed arbitrary levels that were 1–1.5-ft thick, but when it was apparent that the arbitrary levels split visible strata, "a new bag was started," which apparently meant that Kidder paid attention to the stratigraphic provenience of the artifacts found within his arbitrary levels (Lyman and O'Brien 1999).

After the first field season, Kidder excavated Pecos Pueblo strictly in visible stratigraphic layers. He not only listed the absolute frequencies

of pottery types against their vertical provenience in tabular form, as Nelson had done, but he also graphed the changes in relative frequencies of pottery types against his excavation levels (Kidder and Kidder 1917). This analytical technique was later referred to variously as "ceramic stratigraphy" or "percentage stratigraphy" (Willey 1939; Ford 1962). One of his graphs is shown in Fig. 3. Upon inspection of the graphs, Kidder and Kidder (1917: 341) noted that many, but not all, types displayed "approximately normal frequency curves," echoing Nelson in interpreting such curves as "indicating that each [type] had a natural rise, vogue, and decline" (Kidder and Kidder 1917: 349) – the popularity principle (Lyman and O'Brien 1999). In other words, they were good historical types.

Seriation

More than perhaps any other archaeological method, seriation has had a complex history. Textbooks often credit British archaeologists for introducing seriation into the United States, but in reality only one seriation technique – *evolutionary seriation* – was in use in nineteenth-century Britain, and although that technique was eventually introduced to American archaeologists, it differs significantly from the kind of seriation invented by Americanists in the second decade of the twentieth century. That distinctly American kind of seriation is known as *frequency seriation*, and it eventually led to the Americanist development of what is known as *occurrence seriation*.

Regardless of specific technique, seriation is a descriptive method that orders things – here, artifact assemblages – in a column. Seriation creates a linear order, but that order tells us only that the odds are good that two adjacent things are more alike than either is to things farther up or down the order. Seriation is used in archaeology for chronological purposes, but whether or not an order reflects the passage of time is an inference; it is not axiomatic. The term "seriation" is sometimes used as a synonym for "percentage stratigraphy," but this conflates two entirely different procedures. John Rowe (1961: 326) specifically excluded the use of superposed strata in his definition of seriation:

> [T]he arrangement of archaeological materials in a presumed chronological order on the basis of some logical principle other than superposition. . .. The logical order on which the seriation is based is

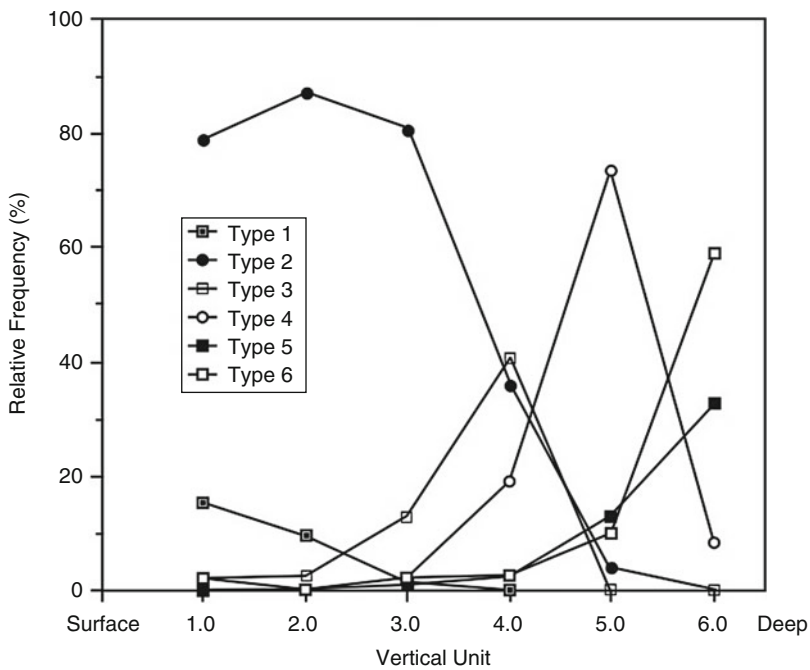

Chronological Systems, Establishment of, Fig. 3 A broken-stick graph of data from Pecos Pueblo, New Mexico, showing the fluctuating frequencies of pottery types over vertical space (time) (From O'Brien and Lyman 1999; redrawn from Kidder and Kidder 1917)

> found in the combinations of features of style or inventory which characterize the units, rather than in the external relationships of the units themselves.

This definition underscores that an ordering is based on formal attributes of the materials used in the seriation. That is, seriation is based on intrinsic properties of artifacts and not on their relative vertical positions in a column of sediments, which are an extrinsic property. Another way of saying this is that seriation is a direct-dating method whereas superposition is an indirect-dating method.

Evolutionary seriation is virtually identical to the technique of paleontologists, who arrange fossils of similar form in an order such that change in character states of the fossils is gradual and continuous. Perhaps the earliest use of evolutionary seriation was by John Evans, who seriated gold coins from Great Britain that were minted prior to and after the Roman invasion of Britain in 54 BCE. Evans (1850) used changes in two characters or dimensions of variation to seriate the coins – weight and design. A third dimension, die size, did not produce particularly useful results. Not visible in Evans's seriation (Fig. 4) is the decrease through time in coin weight. For example, Type 2 coins on average weighed 103.5 grains, Type 3 coins 91.5 grains, and Type 4 coins 87.25 grains. Highly visible, though, is the change in design on both sides of the coins. The sequence begins with the natural-looking laureated bust of Phillip II of Macedon on the obverse and a horse-drawn chariot on the reverse. Through time, the designs on both sides became successively more stylized until a point was reached at which they again became naturalistic.

Thus far I may observe at present that the coins generally recede farther from the prototype as the places of their discovery recede from the southern coast – as, for instance, the Yorkshire and Norfolk types Nos. 24 and 16 – and that in the southwestern counties the workmanship of the coins appears continually to have deteriorated; while in the southeastern and eastern, after declining for a time, it again improves, probably through the introduction of foreign artists, till, under Cunobeline, it attains its highest perfection (Evans 1850: 137).

Similarly, British archaeologist Sir William Matthews Flinders Petrie used evolutionary seriation, together with a novel grouping procedure akin to occurrence seriation, to make chronological sense out of some 4,000 predynastic burials from several localities along the Nile River north of the Valley of the Kings in Egypt. The key to Petrie's analysis was finding an attribute that changed states through time and then using that attribute to construct a temporal sequence of pottery forms. This attribute, as it turned out, was vessel handles. Petrie suspected that handles were functional on earlier jars, which tended to be large and bulky, but that through time they had become less functional and more decorative, such that by late in the sequence they were simply adornments: "The most clear series of derived forms is that of the wavy handled vases. . .. Beginning almost globular, with pronounced ledge-handles. . .they next become more upright, then narrower with degraded handles, then the handle becomes a mere wavy line, and lastly an upright cylinder with an arched pattern or a mere cord line around it" (Petrie 1901: 5). This is evolutionary seriation. Once Petrie had the vase sequence worked out, it then became a matter of ordering grave lots based on the vase forms associated with them. Further, vessel types that co-occurred with particular handled-vase types then became markers in their own right and could be used to place correctly other grave lots that did not contain handled vases.

As opposed to evolutionary seriation, frequency seriation is strictly an American innovation. A.L. Kroeber, a student of Franz Boas and the founder of the anthropology department at the University of California, gets the credit, based on analysis of pottery sherds he collected from the surfaces of some 15 sites in the countryside around Zuni Pueblo, New Mexico, in 1915. He noticed that some collections tended to be dominated by "red, black, and patterned potsherds," whereas other collections were dominated by white sherds (Kroeber 1916: 8). He concluded that "There could be no doubt that here, within a half hour's radius of the largest inhabited pueblo [Zuni], were prehistoric remains of two types and two periods, as distinct as oil and water. The

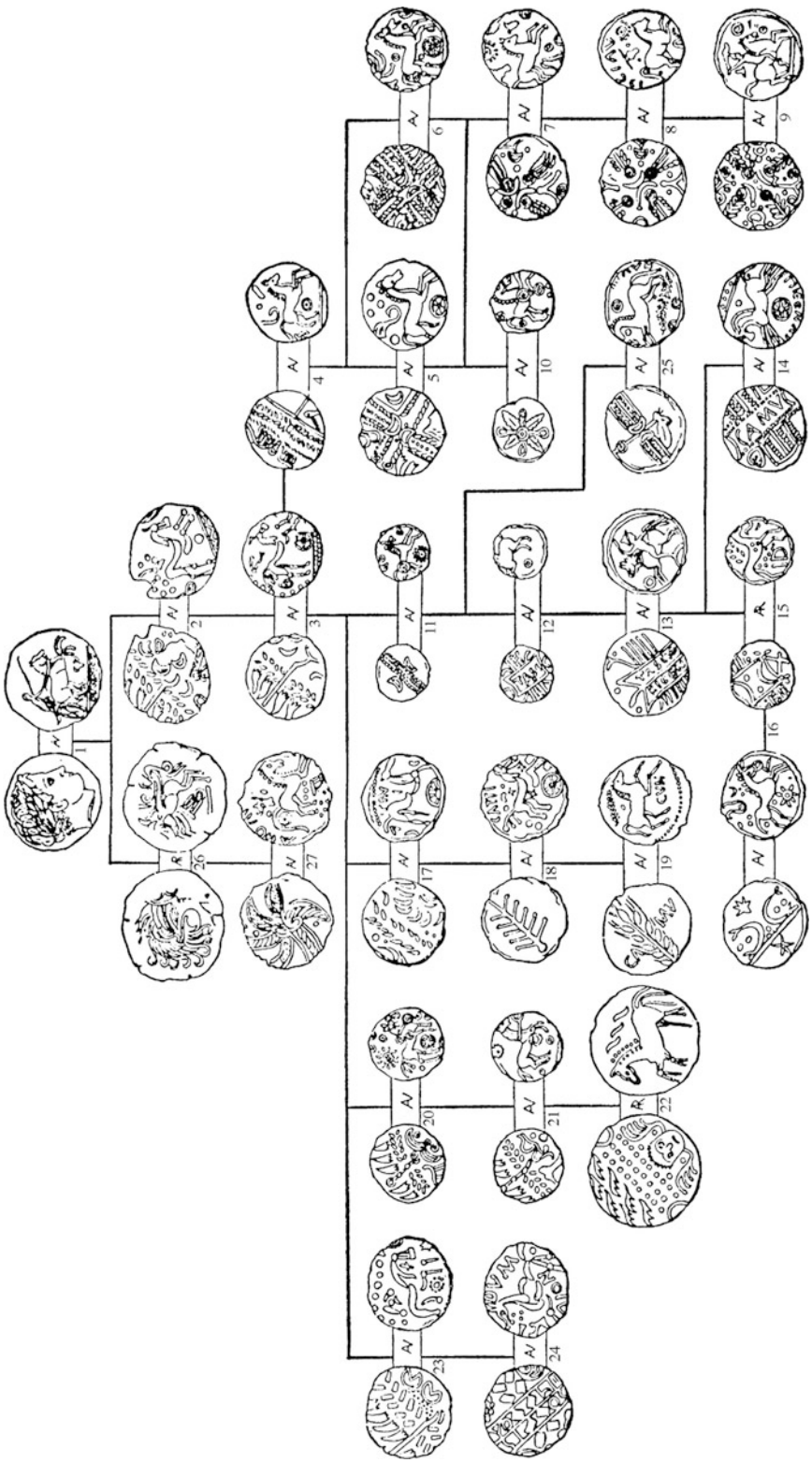

Chronological Systems, Establishment of, Fig. 4 Stylistic changes in British coins proposed by John Evans. The sequence begins with the natural-looking laureated bust of Phillip II of Macedon on the obverse and a horse-drawn chariot on the reverse. Through time, the designs on both sides became successively more stylized until a point was reached at which they again became naturalistic (After Evans 1850)

condition of the sites indicated the black and red ware ruins as the more recent" (Kroeber 1916: 9). Based on historical evidence and on the condition of the sites, Kroeber (1916: 9–10) concluded that concerning "the type and period of white ware and the type and period of black and of red ware, the latter is the more recent [belonging] in part to the time of early American history; the former is wholly prehistoric."

Kroeber's ordering of sites based on relative frequencies of pottery types can best be seen by using an imaginary case, as is shown in Table 1, which lists five historical types – in Kroeber's case, pottery types – across the top and six artifact assemblages (A–F) down the left-hand margin. The numbers in the rows indicate the percentage of a particular pottery type in a particular assemblage. For example, assemblage A contains 10% pottery-type 1, 30% pottery-type 3, and so on. Percentages add to 100% for each assemblage. Table 1 begins with the assemblages in no particular order. The seriation procedure would be to sort the assemblages such that each column of percentages approximates a unimodal frequency distribution, such as is shown in the ordered part of Table 1. Note that it makes no difference if the ordering from top to bottom is "E, C, A, B, D, F" or "F, D, B, A, C, E"; knowledge of the direction taken by time's arrow must come from data independent of the seriation.

Chronological Systems, Establishment of, Table 1 An example of a frequency-seriation procedure

	Historical type				
Assemblage	1	2	3	4	5
Unordered					
A	10		30	10	50
B			50	30	20
C	20		15		65
D			40	60	
E	30	25			45
F			20	80	
Ordered					
E	30	25			45
C	20		15		65
A	10		30	10	50
B			50	30	20
D			40	60	
F			20	80	

Before computing power was available, archaeologists performed frequency seriations by hand. James Ford (1962) suggested using long strips of paper containing bars of length proportionate to the percentage of a particular pottery type in a particular assemblage. Each strip shown in Fig. 5 is a separate assemblage, with bars showing the percentage of each type of pottery contained in that collection. Eleven pottery types are shown on the graph, although no assemblage contains sherds of all 11 types. Once each collection is graphed in terms of type percentages, the strips are moved up and down until a best fit is found, meaning that there are as few violations of the unimodal distribution as possible. That is, the resulting type frequency curves – what Ford (1952: 344) referred to as "'battleship' frequency curves" – are as close as possible to those shown in Fig. 1.

Occurrence seriation, which is based on the presence/absence of historical types instead of on their percentages, was suggested as an alternative to frequency seriation in the late 1950s and early 1960s by Rowe (1959) and Paul Dempsey and Martin Baumhoff (1963). Rowe argued that frequency seriation was subject to sampling problems, and Dempsey and Baumhoff pointed out that low-frequency types may be among the best time indicators and that even the presence of single specimens of certain types could be significant in establishing chronologies. As in frequency seriation, the procedure is to sort the unordered rows – the assemblages – so that each historical type, each column, displays a continuous distribution. We can take the same data shown in Table 1 and reduce it to presence/absence data, as shown in Table 2. The order resulting from meeting the expectations of the seriation model is given in the lower half of Table 2. As in Table 1, the direction of time's arrow is unknown, so the ordering from top to bottom could be either "E, C, A, B, D/F" or "D/F, B, A, C, E." Note that in Table 2 assemblages D and F are identical in terms of the types they contain. They cannot be sorted and must, in this example, be considered contemporaneous.

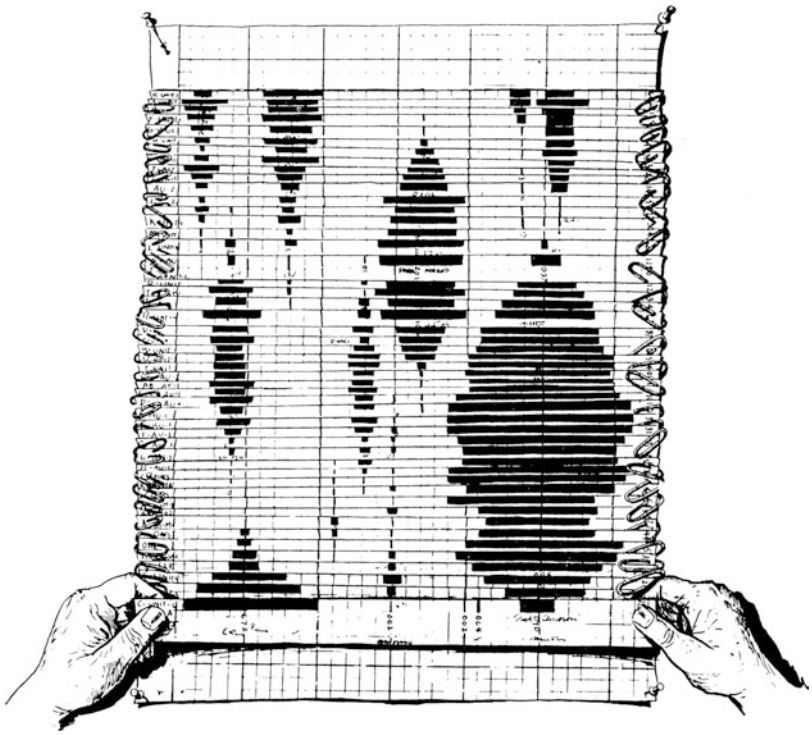

Chronological Systems, Establishment of, Fig. 5 James A. Ford's thumbs-and-paper-clips method of seriating collections. Each strip of paper represents a surface collection or excavation level; on each strip bars have been drawn to indicate the percentage of each pottery type. The strips are then moved around until the best fit is attained (From Ford 1962)

Chronological Systems, Establishment of, Table 2 An example of an occurrence-seriation procedure

	Historical type				
Assemblage	1	2	3	4	5
Unordered					
A	+		+	+	+
B			+	+	+
C	+		+		+
D			+	+	
E	+	+			+
F			+	+	
Ordered					
E	+	+			+
C	+		+		+
A	+		+	+	+
B			+	+	+
D/F			+	+	

Cross Dating

Geologists have long used fossils included in units of deposition to correlate those layers across space, often vast amounts of space, and archaeologists have done the same, using *marker types*. The usefulness of marker types is tied to their geographic range – we might desire types that appear over a wide area – but also to their life span (we want types with limited chronological ranges). Not all archaeological types meet these criteria, and in fact, few do. Sidestepping the many complex issues that surround how types are created in the first place (O'Brien and Lyman 1999), suffice it to say that many types have too much variation built into them to serve as much more than gross chronological markers. All too often, when a sherd of a particular pottery type is found in one area, and the finder tries to match it up against a published type description of that type, the match is left than perfect, and the person is left wondering, "Is this or is this not a specimen of that type?"

Once in a while, though, artifact types do fit the bill and become excellent marker types that can be used for cross dating. In North America, one such type is the Folsom point (Fig. 6), which was used to tip spears between about 8950 BCE and 8500 BCE. In the early decades of the twentieth century, purported finds of early tools in North

Chronological Systems, Establishment of, Fig. 6 Three views of a Folsom point made from chert. Specimen is approximately 11 cm long

America were invalidated on various grounds, but the breakthrough came in 1927 when workers from the Colorado Museum of Natural History recovered several small, fluted points in association with the remains of extinct bison (*Bison antiquus*) in an arroyo near Folsom, New Mexico. The stratigraphic association was in a geological context that lay near the temporal border between the late Pleistocene and the early Holocene epochs, or about 11,700 years ago. Even in the 1920s, stratigraphers knew what the glacial-age boundary in the western United States looked like in terms of sediments and strata, and thus the age assessment of the bison kill site was not a shot in the dark (Meltzer 1991). The 19 projectile points unearthed at Folsom were easily recognizable because of the fine flaking and the presence of channel scars, or flutes, on both faces that resulted from the removal of long flakes. It was impossible to confuse this kind of point with more recent kinds, and it instantly became a chronological marker eventually referred to as the Folsom type. Whenever a Folsom point is discovered in the western United States, it is clear that early bison hunters were responsible for its manufacture.

Future Directions

There is a tendency in archaeology, like in many disciplines, to dismiss the work of decades earlier on the grounds that it is outdated and unsophisticated, and nowhere is that more prevalent than in discussions of chronological methods. One might suppose that the work of prehistorians such as Nelson, Kidder, and Petrie does not particularly matter anymore because radiometric dating has alleviated our chronological problems, thus rendering any consideration of seriation, stratigraphy, and marker types moot. Alternatively, one might argue that there are two reasons why knowledge of relative dating is key to successful archaeological research. First, absolute radiometric methods do not solve all chronological problems. One needs to evaluate and test the results obtained from the application of these methods, and relative-dating methods provide one source of test implications. Second, radiometric methods may not always be applicable, given the vagaries of the processes that formed and continue to form the archaeological record.

The chronological work that began in Europe in the nineteenth century, based on the principle of artifacts being used to mark the passage of time, reached a zenith in the American Southwest during the second decade of the twentieth century. Archaeologists can still take much away from the reports that emanated from that work.

Cross-References

► Dating Techniques in Archaeological Science
► Stratigraphy in Archaeology: A Brief History

References

Dempsey, P., and M. Baumhoff. 1963. The statistical use of artifact distributions to establish chronological sequence. *American Antiquity* 28: 496–509.

Evans, J. 1850. On the date of British coins. *The Numismatic Chronicle and Journal of the Numismatic Society* 12: 127–137.

Ford, J.A. 1952. Measurements of some prehistoric design developments in the southeastern states. *American*

Museum of Natural History, Anthropological Papers 43: 313–384.
Ford, J.A. 1962. *A quantitative method for deriving cultural chronology (Technical bulletin 1)*. Washington, DC: Pan American Union.
Jefferson, T. 1801. *Notes on the state of Virginia*. New York: Furman and Loudan.
Kidder, A.V. 1916. Archeological explorations at Pecos, New Mexico. *National Academy of Sciences, Proceedings* 2: 119–123.
Kidder, M.A., and A.V. Kidder. 1917. Notes on the pottery of Pecos. *American Anthropologist* 19: 325–360.
Kroeber, A.L. 1916. Zuñi potsherds. *American Museum of Natural History, Anthropological Papers* 18: 1–37.
Lyman, R.L., and M.J. O'Brien. 1999. Americanist stratigraphic excavation and the measurement of culture change. *Journal of Archaeological Method and Theory* 6: 55–108.
Meltzer, D.J. 1991. On "paradigms" and "paradigm bias" in controversies over human antiquity in America. In *The first Americans: Search and research*, ed. T.-D. Dillehay and D.J. Meltzer, 13–49. Boca Raton: CRC Press.
Nelson, N.C. 1916. Chronology of the Tano ruins, New Mexico. *American Anthropologist* 18: 159–180.
O'Brien, M.J. 2003. Nels Nelson and the measure of time. In *Picking the lock of time: Developing chronology in American archaeology*, ed. J. Truncer, 64–87. Gainesville: University Press of Florida.
O'Brien, M.J., and R.L. Lyman. 1999. *Seriation, stratigraphy, and index fossils: The backbone of archaeological dating*. New York: Kluwer/Plenum.
Petrie, W.M.F. 1901. *Diospolis Parva (Memoir 20)*. London: Egypt Exploration Society.
Rowe, J.H. 1959. Archaeological dating and cultural process. *Southwestern Journal of Anthropology* 15: 317–324.
Rowe, J.H. 1961. Stratigraphy and seriation. *American Antiquity* 26: 324–330.
Wheeler, M. 1956. *Archaeology from the earth*. Baltimore: Penguin.
Willey, G.R. 1939. Ceramic stratigraphy in a Georgia village site. *American Antiquity* 5: 140–147.

Further Reading

Browman, D.L., and D.R. Givens. 1996. Stratigraphic excavation: The first 'new archaeology. *American Anthropologist* 98: 80–95.
Lyman, R.L. 2011. A historical sketch on the concepts of archaeological association, context, and provenience. *Journal of Archaeological Method and Theory* 19: 207–240.
Lyman, R.L., and M.J. O'Brien. 2006. *Measuring time with artifacts: A history of methods in American archaeology*. Lincoln: University of Nebraska Press.
Lyman, R.L., S. Wolverton, and M.J. O'Brien. 1998. Seriation, superposition, and interdigitation: A history of Americanist graphic depictions of culture change. *American Antiquity* 63: 239–261.
Meltzer, D.J. 1983. The antiquity of man and the development of American archaeology. In *Advances in archaeological method and theory*, ed. M.B. Schiffer, vol. 6, 1–51. New York: Academic.
Michels, J.W. 1973. *Dating methods in archaeology*. New York: Seminar Press.
Nash, S.E., ed. 2000. *It's about time: A history of archaeological dating in North America*. Salt Lake City: University of Utah Press.
Pitt-Rivers, A.L.-F. 1875. On the principles of classification adopted in the arrangement of his anthropological collection, now exhibited in the Bethnal green museum. *Anthropological Institute of Great Britain and Ireland, Journal* 4: 293–308.

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Chronopolitics and Archaeology

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Introduction and Definition

C*hronopolitics* designate several fields of interest and endeavor that intersect with the pragmatics, production, and perpetual maintenance of particular temporalities. Because these fields oscillate paradoxically, and somewhat precariously, between those pasts that are remembered (ostensibly for present and future generations) and those pasts that are condemned to Lethe (the river of forgetfulness in Hades), they ignite an array of interests and passions, controversies, and disputes, which are negotiated through debate and destruction, regulation, and compromise. Here are not considered the chronopolitics of Paul Virilio (2000) that arise at the end of geography, where the geopolitics of three-dimensional space and the reality of distances are canceled out in a revolutionary shift to the politics of compressed time seen in the quasi-instantaneous exchanges of images and sounds, exemplified in the amplification of optical surveillance and advertising across the electronic ether (though the chronopolitics behind the assumption of a wholesale revolution are discussed below). Nor is this topic addressed

in a way that would suggest that those pasts that are remembered are the by-products of human-centered groups enacting their conscious and willful powers of selection. Before further elucidating and exemplifying these chronopolitics, it is important to bring to the reader's attention the old Greek meanings for the constituent words of chronopolitics, *chronos* and *politics*.

Chronos is, in its fullest sense, often translated as "time," and this is the conventional meaning associated with terms such as "chronometer" or "chronology." However, *chronos*, in a more specific sense, is the periodic, ordered, or arranged time; it is the time of classification and metrology. *Chronos* is time as separate from events. It is time as a kind of external parameter. *Chronos* as the ordering is often contrasted with what the Greeks term *kairos*, the time that is more contingent, even chaotic and weather like (Witmore 2007).

As with *chronos*, politics is also considered here in a double sense. Politics centers upon issues raised in a public forum. Here one encounters the old Greek meaning of *ta politika*, which denotes "public matters" or "civic affairs." In a second sense, politics is connected to a kind of curious and probing attitude (Shanks 2004). Taking direction from critical theory (e.g., Leone et al. 1987; also Wilkie and Bartoy 2000), this is politics as a spirit of caution and concern set to expose assumptions and the taken-for-granted myths perpetuated to facilitate control and to extend power and, thereby, its inequities. Politics is not only a matter of worrying over what is best; it is also a matter of crafting "new weapons" (Deleuze 1995). As such, politics is tied to a sustained commitment to effect positive social change as a component of humanistic and scientific responsibility (McGuire 2008).

So, if politics turn around controversies, then chronopolitics follow such controversies through to their realization as temporalities. For want of white space, this article can only touch lightly on many concerns related to *heritage politics* (Harrison 2010); rather, here, chronopolitics are further defined with respect to a particular historicism and its ontological grounds. Admittedly, these *realpolitiks* will leave much of relevance to this field of interest to fall through the cracks.

Key Issues/Current Debates/Future Directions/Examples

The history of modernity centers on the common belief in an arrow of time whose line of flight advances continually from the past to future, thus leaving in its wake an irreversible succession of discrete moments, a line of instants. As a common component of this temporal machinery, the timeline has served as a supposedly external parameter for sorting eras, periods, or epochs and thus ordering time with respect to a series of dates. Therefore, the timeline provides ground for the measure of the past. Consider, for example, the definition of "antiquity" in the 1922 *Palestine Mandate of the League of Nations* as "any construction or any product of human activity earlier than the year A.D. 1700," or take the proposal by the Department of Arts, Heritage, and the Gaeltacht to delist post-1700 CE monuments in Ireland. Routinely measured with respect to the distance from the present, such dates provide hooks from which to hang hierarchies of value. These dates also mask an underlying historicity – something reflected in historic quality, intensity, and prejudice. The Palestine Mandate excludes Late Ottoman Era monuments in Palestine. The proposed delisting of post-1700 monuments rests upon the hard ground of economic bottom line – the burden of the past is just too expensive depending on the economic climate.

There is, of course, considerable nuance to the *chronopolitics* associated with the production and maintenance of the arrow of time. Nietzsche, insofar as it was possible to draw a distinction between species of history, gave us three modalities or uses (1997). The *monumental* celebrated great achievements of the past as exemplary and worthy of imitation. The *antiquarian* sought out every scrap of the past as something to be preserved and revered. And the *critica*l regarded the past is oppressive and condemned it to oblivion. Let us consider Nietzsche's uses in light of a more detailed example.

On December 28, 2006, bulldozers plowed through several mud-brick houses in Gurna, Egypt. This was the last of a series of efforts by the Egyptian government and the Luxor City

Council (backed at various times by myriad politicians, archaeologists, heritage organizations, and development agencies) to relocate the residents of Old Gurna and demolish the group of hamlets set amidst the rock-cut tombs and funerary temples known as the "Theban Necropolis" (Meskell 2005). Now, following Nietzsche, critical history underwrites the destruction of what government officials described as the "ramshackle" houses of a "shantytown" (it should be noted that the demolition of Old Gurna was tied to its "unsanitary" conditions and this has provided a broad rationale for the redevelopment of Egyptian villages since the *gambiae* malaria epidemic of the 1930s and 1940s (Mitchell 2002: 188)). Monumental history (read "heritage") resuscitates voids as tombs from the golden age of the Eighteenth Dynasty (1550 BCE). Locals, for their part, countered the arguments of government officials with an antiquarian history, which emphasized how Old Gurna's vernacular architecture of simple mud-brick houses, decorated with brightly painted scenes of daily life, animals, and Qur'anic verse, constituted their own unique forms of heritage. Drawing a line between the archaeological and non-archaeological, between one past and another taken to be a present intrusion, injects a historical partiality (which, in this case, is itself subservient to an economic agenda) that has no basis in the realities of the past. Each modality also enacts a very different kind of temporality, and, thus, each is implicated in a different set of chronopolitics (consider Hamilakis and Anagnostopoulos 2009).

With monumental history one encounters a cyclical temporality seen in the rise and fall of great civilizations and a hierarchy of value impacted by distance measured in dates, relevance, and, ultimately, tourism. With antiquarian history, one witnesses the cultivation of a continuous temporality (for Nietzsche the laws of fidelity blocked creativity (also Foucault 1984)). With critical history the fabric of time is torn through disjuncture and revolution. Still, no matter which species of history and its associated temporality one embraces, for Nietzsche, all were in service of a peculiar affliction; namely, because moderns believe themselves to have definitively broken with the past, they attempt to preserve and date everything (Latour 1993).

These *chronopolitics* feed into a notion of time as linear, as unidirectional, with man at center, for causality is rooted in historical events and those living in the present never cease to be on the cutting edge (Serres with Latour 1995; also Olivier 2011). Thus the notion that time passes results in a complacent attitude toward the abolition of the past. This is evidenced, for example, in the dynamics of archaeological production. Gestures of elimination and revolution occur when scholars consign other intellectual platforms to the realm of the outmoded, the outdated. Thus a time of transcendence and progression is achieved through contradiction. Such a passage temporality conflates vanities and quarrels (politics) with time.

This obstinate belief that the past is closed and finalized and therefore stands apart from the conditions through which it comes to be defined in the present provides a rationale for its organization; this organizing of the past relies on the removal of subsequent impurities, that is, the destruction of other pasts. Thus one past advances at the expense of others. The destruction of Old Gurna, for example, relegates vernacular architectures to oblivion and once Lethe lays complete claim to those things that hold the memory of these pasts they are, as Laurent Olivier, puts it "capped." Their very existence becomes unimaginable, and "archaeology, whose fundamental practice is that of producing "material facts," finds itself directly involved in this perversion of history and [is] contaminated by it" (Olivier 2011: 22–23) and thus runs the basis for modernist chronopolitics, which hinge on this discrepancy between self-representation and practice seen in the substitution of involvements with detachments.

There is, of course, another, less dramatic side to chronopolitics, which turns around questions of memory practice – what is remembered and how it is remembered – and which is tied to the intimacies and experiences of archaeology. Museum exhibitions, artifact displays, site reports, archives, catalogues, and site preservation; all these technologies and modes of

engagement with the artifacts and vestiges of the past involve choices that are made about what matters, and this is of consequence in terms of what and how we remember. Such choices are always located and never neutral. This question of emphasis is of central concern for many archaeologists, so too are the stories we tell, both big and small. Michael Shanks and Chris Tilley, for example, saw that process of placing past societies within predefined typological sequences for the purpose of comparison as the politicization of time (1992: 53–54). This was because the time of the past was homogenized to facilitate interchangeability in cultural evolutionary terms.

Another species of *chronopolitics* locates archaeological materials in a flattened time of event and subsumes archaeology to history. The "positivist fallacy" is the label given by Anthony Snodgrass to the act of equating what is archaeologically observable with what is historically significant, to the confusion of what becomes of the past with what was of importance to history (1987). The "Pompeii premise" was the name given by Lewis Binford to the assumption that material vestiges speak to the moment of their deposition (1981). Ontologically speaking, archaeology actually deals less with what ancient times were like than with what becomes of what was (Olsen et al. 2012; Shanks 2012), which is always caught in a perpetual process of transformation. Formational and taphonomic processes (Schiffer 1987), nonlinear dynamics (McGlade 1999), and time perspectivism (the latter refers to Geoff Bailey's (2007) notion that different timescales relate to different features of behavior); all have played a role in a shift from the past as it was to a past ongoing in its transformations, transformations which played to the tune of disparate temporal rhythms (Lucas 2005). While all these debates were of consequence for how archaeology conceived of time, a less acknowledged aspect, to be sure, was how they revealed, whether directly or indirectly, the processes of selection, sorting, and serialization of things to be constitutive of particular temporalities. What is more, because much archaeological work privileges *chronos* by placing emphasis upon particular episodes, the pluritemporal mixture loses out.

Entropy and endurance are the bedfellows of time, witnessed in the intertwining of ephemerality and repetition, of perpetual perishing and incessant novelty, and of never-ending accumulation and duration. Thus, pasts endure as much as they transform. These are time's two arrows. To regard the past as gone, as irrecoverably behind us, not only denies the ways in which the past is still with us now, it also blinds us to those other pasts (things) that are rendered to oblivion (Olsen 2010). If there is no thing, then there can be no issue, no controversy, no politics, and no past. If there is no thing, then there are no grounds for the further production of time. Thus we continue to forget to serve particular interests. These acts are repeated time and again, from Gurna to Ayodhya and from Bamyan to Tara to Israel and Palestine.

Equally, accumulation and gathering lead to mixture and intertwining. Walk south along Via Appia through the Porta San Sebastiano in Rome, and you will dodge buses, lorries, and cars whose movements are modified by a third century AD gate and a road laid out in 312 BC. Every square meter of the eternal city is a polychronic ensemble, drawing simultaneously from various times. As such, it can be argued on ontological grounds that the past is not behind us, but it both gathers and co-emerges with us in the present, for we are wrapped up with it. Here we now encounter a broad movement from a time as successive, as a series of replacements to time as simultaneous, and as coextensive (this argument concerns the spatialization of time, which is the exact inverse of Virilio's (2000) temporalization of space). Seen from this angle, time is not an external parameter; the past is not a separate domain of reality. Time is a potency within and between things (Witmore 2015); the past is held as memories within things and is an outcome of their myriad interactions. Let us now consider chronopolitics in light of a wholesale reorientation of the temporal machinery so central to modernity.

To assume the past is gone accords the things of archaeology the position of intermediaries rather than full-blown mediators (Olsen et al. 2012). Chronopolitics, to reiterate, should not be seen as the exclusive domain of human *being*;

there is a self-realization in the ontogenesis of artifacts, monuments, remnants, vestiges, ruins, antiquities, and anything regarded as the material past. These things play just as much a role in their own formation as they contain human reality – indeed, these chronopolitics are more akin to what Bjørnar Olsen has described as unpredictable material trajectories that are "unrelated to human control and intervention" (2010: 110). Sites, monuments, artifacts, craft, and artworks, the things of the past, are either weakened or strengthened depending on a diverse array of interests – legislation, labels of World Heritage, hydraulic cement, walls around sites, neglect, or admission costs. When drawn into assemblages with archaeologists, community stakeholders, government or nongovernmental agencies, etc., things too can be said to have politics.

Controversies revolve around things, but these things are not always indifferent to those vested in their lives. Returning to the example from Gurna, one might ask, are the rock-cut voids tombs or the basements of contemporary houses? One cannot know in advance what the solid, indisputable, unquestionable reality *really is* like. And yet, this is precisely what the Egyptian government and the Luxor City Council did; they embraced the New Kingdom "tombs" as the indisputable common world. Cavalier in conflating the past, reality, and certainty, Gurna is realized as tombs, not as the basement of houses, which have now been removed. These practices confuse the outcomes with the starting points in order to serve exclusive interests. Reality is damned through a ruse, and time is controlled by powers that eradicate long-term memory and thousand-year-old traditions in the name of national heritage, scientific knowledge, and economic gain.

Even under the best conditions, the excavations of Old Gurna, as with anywhere, put forth one past to be experienced, felt, engaged in its presence, and others to be visualized, circulated, and read. And despite all the arduous care and meticulous detail, these things are evacuated of so much of their specificity. This is the tradeoff, which archaeologists readily accept. And yet for any material past to live on and to endure, it must be constantly worked at. Historical memory is a struggle. So which pasts are carried forward? Once again we turn on a question that was at the root of Nietzsche's essay on history. How do we know what should be remembered? This has always been a moving target in archaeology. No matter how neutral or democratic the aspirations, the constitution of things, sites, and the stories around them will always have a political life of their own (Casteñeda 1996).

For Nietzsche, history was always in service to life – so too is archaeology. Whereas the archaeologist was formerly a cultivator and curator of a detached past, she now enters onto the public stage as more of an active brewer of pasts coextensive within the present (Witmore 2013). This iterative, immanent, and kinetic experience is a remedy to living in the short term on the back of immediate reckonings by politics, economics, and mass media. Those things regarded as of the past are now pooled into an ever-present reservoir from which fresh alternatives may be crafted in the face of present dangers or perceived risks (Dawdy 2009; Gonzalez-Ruibal 2008; Shanks and Witmore 2010), from which new weapons may be fashioned against inequities and falsehoods. Thus we confront politics, following Randy McGuire (2008), as intervention and political action, from past struggles over labor rights in Colorado to exposing genocide in Argentina and Spain, Serbia, and Iraq. With Yosef Yerushalmi (1996: 117), we continue to wander whether or not the opposite of forgetting is justice. How much more rewarding and refreshing would it be to reopen *with* the material past rather than *against* it in defining a shared time – this is *chronopolitics* in the sense of living together peacefully with the pluritemporal; this is to draw from what has become of the past in another way, a way that remains in service to life.

References

Bailey, G. 2007. Time perspectives, palimpsests and the archaeology of time. *Journal of Anthropological Archaeology* 26: 198–223.

Binford, L. 1981. Behavioural archaeology and the Pompeii premise. *Journal of Anthropological Research* 37: 195–208.

Casteñeda, Q. 1996. *In the museum of Maya culture: Touring Chichen Itza*. Minneapolis: University of Minnesota Press.
Dawdy, S. 2009. Millennial archaeology: Locating the discipline in the age of insecurity. *Archaeological Dialogues* 16 (2): 131–142.
Deleuze, G. 1995. *Negotiations 1972–1990*. New York: Columbia University Press.
Foucault, M. 1984. Nietzsche, genealogy, history. In *The Foucault reader*, ed. P. Rabinow, 76–100. New York: Pantheon Books.
González-Ruibal, A. 2008. Time to destroy. An archaeology of supermodernity. *Current Anthropology* 49 (2): 247–279.
Hamilakis, Y., and A. Anagnostopoulos. 2009. What is archaeological ethnography? *Public Archaeology* 8 (2–3): 65–87.
Harrison, R. 2010. The politics of heritage. In *Understanding the politics of heritage*, ed. R. Harrison, 154–196. Manchester: Manchester University Press.
Latour, B. 1993. *We have never been modern* (trans. Porter, C.). Cambridge, MA: Harvard University Press.
Leone, M., P.B. Potter, and P.A. Shackel. 1987. Towards a critical archaeology. *Current Anthropology* 28 (3): 283–302.
Lucas, G. 2005. *The archaeology of time*. London: Routledge.
McGlade, J. 1999. The times of history: Archaeology, narrative and non-linear causality. In *Time and archaeology*, ed. T. Murray, 139–163. London: Routledge.
McGuire, R. 2008. *Archaeology as political action*. Berkeley: University of California Press.
Meskell, L. 2005. Sites of violence: Terrorism, tourism, and heritage in the archaeological present. In *Embedding ethics*, ed. L. Meskell and P. Pels, 123–146. Oxford: Berg.
Mitchell, T. 2002. *Rule of experts: Egypt, techno-politics, modernity*. Berkeley: University of California Press.
Neitzsche, F. 1997. *Untimely meditations* (edited: Breazeale, D., trans: Hollingdale, R.J.). Cambridge: Cambridge University Press.
Olivier, L. 2011. *The dark abyss of time: Memory and archaeology* (trans: Greenspan, A.). Lanham: AltaMira Press.
Olsen, B. 2010. *Defense of things: Archaeology and the ontology of objects*. Lanham: AltaMira Press.
Olsen, B., M. Shanks, T. Webmoor, and C. Witmore. 2012. *Archaeology: The discipline of things*. Berkeley: The University of California Press.
Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Santa Fe: University of New Mexico Press.
Serres, M. with B. Latour. 1995. *Conversations on science, culture, and time* (trans: Lapidus, R.). Ann Arbor: University of Michigan Press.
Shanks, M. 2004. Archaeology and politics. In *A companion to archaeology*, ed. J.L. Bintliff, 490–508. Oxford: Blackwell Publishers.
Shanks, M. 2012. *The archaeological imagination*. Walnut Creek: Left Coast Press.
Shanks, M., and C. Tilley. 1992. *Reconstructing archaeology*. London: Routledge.
Shanks, M., and C.L. Witmore. 2010. Memory practices and the archaeological imagination in risk society: Design and long-term community. In *Unquiet pasts: Theoretical perspectives on archaeology and cultural heritage*, ed. I. Russell and S. Koerner, 269–290. Farnham: Ashgate.
Snodgrass, A. 1987. *An archaeology of Greece: The present state and future scope of a discipline*. Berkeley: University of California Press.
Virilio, P. 2000. *The information bomb*. New York: Verso.
Wilkie, L.A., and K.M. Bartoy. 2000. A critical archaeology revisited. *Current Anthropology* 41 (5): 747–777.
Witmore, C.L. 2007. Landscape, time, topology. In *Envisioning landscape: Situations and standpoints in archaeology and heritage*, ed. D. Hicks, G. Fairclough, and L. McAtackney, 194–225. Walnut Creek: Left Coast Press.
Witmore, C.L. 2013. Which archaeology? A question of chronopolitics. In *Reclaiming archaeology: Beyond the tropes of modernity*, ed. A. González-Ruibal, 130–144. London: Routledge.
Witmore, C.L. 2015. No past but within things: A cave and archaeology in the form of a dialogue. In *The allegory of the cave painting reader*, ed. M. Mircan and V.W.J. van Gerven Oei, 375–394. Antwerp: Mousse Publishing.
Yerushalmi, Y.H. 1996. *Zakhor: Jewish history and Jewish memory*. Seattle: University of Washington Press.

Church Monuments Society

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Basic Information

The Church Monuments Society is a charity founded in 1979 as a focus for all those interested in the "appreciation, study and conservation" of church monuments in the UK and abroad "of all types and periods." The Society organises biennial symposia, study tours and excursions for its members. Its website (www.churchmonumentssociety.org) includes a series of useful resources for scholars and enthusiasts, including a brief history of monument types, county-by-county guides, an

illustrated glossary of forms, guide to symbolism and geology, and a bibliography. It also includes a section on newly-published works which are also reviewed regularly in its journal. The society can also be contacted c/o The Society of Antiquaries, Burlington House, Piccadilly, London W1V 0HS.

Major Impact

The Church Monuments Society is one of most well-respected, scholarly societies in the UK, with strong links to The Society for Medieval Archaeology, The British Archaeological Association and The Society of Antiquaries. Its major impact as a Society is evidenced by scholarly contributions its annual publication, *The Journal of The Church Monuments Society*. Since its first volume published in 1985, the journal has featured scholarly, peer-reviewed articles by the leading historians, art historians and archaeologists in the discipline, focused largely on the UK, and the period from the tenth to the nineteenth century. Articles include major overviews of the monumental brass and alabaster industries and workshops (Badham 1990), surveys of particular monument types, such as incised and cross slabs and burial vaults, particular iconographies, such as the Cadaver tomb (Oosterwijk 2005). Studies of individual monuments in both cathedrals (Harris 2010) and parish churches (Matich and Alexander 2010) provide important insights into the changing methodologies of monument studies. These often set individual studies in the much wider context of commemorative practice and Antiquarian scholarship.

In recent years, the journal has increasingly included international contributions from France, Germany, Italy, Spain, the Netherlands, Malta and Belize. It has also included a smaller number of studies of conservation works (Gittos et al. 1997), which feature more regularly in the twice-yearly Society newsletter and as the subject of its regional study tours. Abstracts of all papers in back issues are published online, whilst the website also features a useful searchable index of journal content.

Cross-References

- ▶ Churchyard Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Society for Medieval Archaeology

C

References

Badham, S.F. 1990. London standardisation and provincial idiosyncrasy: The organisation and working practices of brass-engraving workshops in pre-reformation England. *Journal of the Church Monuments Society* 5: 3–25.

Gittos, B., M. Gittos, and L. Butler. 1997. The conservation of the Goldsborough effigies. *Journal of the Church Monuments Society* 12: 5–13.

Harris, O.D. 2010. 'Une tresriche sepulture'. The tomb and chantry of John of Gaunt and Blanche of Lancaster in Old St Paul's Cathedral, London. *Journal of the Church Monuments Society* 25: 7–35.

Matich, S., and J.S. Alexander. 2010. Creating and recreating the Yorkist tombs in Fotheringhay Church (Northamptonshire). *Journal of the Church Monuments Society* 26: 82–103.

Oosterwijk, S. 2005. Food for worms – food for thought: The appearance and interpretation of the 'Verminous' cadavers in Britain and Europe. *Journal of the Church Monuments Society* 20: 40–80.

Further Reading

Key Books on Monuments. n. d. Availaible at: http://www.churchmonumentssociety.org/Key_books_on_Monuments.html.

Churchyard Archaeology

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Brief Definition of the Topic

Churchyards, the external burial grounds associated with Christian places of worship, can

inform a wide range of social, economic, religious, and demographic issues which are fundamental to historical archaeology. Historic churchyards are explored through three primary methods: churchyard survey, excavation of the burials themselves, and recording the monuments that mark burials (Rodwell 2005: 161).

Churchyard survey and planning often stand on their own as methods, revealing complex relationships between the burial ground, monuments, buildings, topographic features, and the wider landscape (Mytum 2000: 137). Planning is also the first stage of excavation or monument recording, and geophysical survey can either help target excavation or serve as an alternative (Kerns-Nocerito 2002). Due to the complex stratigraphy and the ethical considerations of disturbing comparatively recent graves, churchyard excavations are generally limited to redundant churches or rescue situations (e.g., Brickley 2006; Mays et al. 2007), underscoring the importance of nondestructive survey as a research tool.

Monument recording provides essential information about memorial production and consumption, burial location, churchyard development, and local populations. However, it is also a vital tool of preservation, as historic graveyards lack statutory protection, and monuments are under constant threat of decay, movement, and loss. The recording, classification, and interpretation of churchyard monuments was pioneered in North American historical archaeology (e.g., Deetz and Dethlefson 1972), but the field has recently advanced substantially in both method and theory, such as in innovating and standardizing recording benchmarks (Mytum 2000, 2004), and in developing interpretations beyond status and economy, considering emotion, identity, and audience (Tarlow 1999).

Increasingly, projects integrating above- and below-ground archaeology have delivered the most noteworthy advancements in understanding historic burial practice (e.g., Mytum 2007; Tarlow 2011). Comprehensive non-destructive recording and survey is the standard methodology in modern churchyard archaeology, but where judicious excavation is feasible and ethically justifiable, or previously excavated data can be reassessed, a combination of the three approaches offers considerable potential.

Cross-References

- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Mytum, Harold
- ▶ Social Identity in Historical Archaeology
- ▶ Tarlow, Sarah

References

Brickley, M. 2006. *St Martin's uncovered: investigations in the churchyard of St Martin's-in-the-Bullring, Birmingham, 2001*. Oxford: Oxbow.

Deetz, J., and E. Dethlefson. 1972. Death's head, cherub, urn and willow. In *Contemporary archaeology: a guide to theory and contributions*, ed. M. Leone, 402–410. Carbondale: Southern Illinois University Press.

Kerns-Nocerito, M. 2002. Stories dead men tell: geophysical survey in the All Hallows graveyard, Anne Arundel County, Maryland. *Maryland Archaeology* 38: 13–18.

Mays, S., C. Harding, and C. Heighway. 2007. *Wharram, a study of settlement on the Yorkshire Wolds, volume 12: the churchyard*. York: Department of Archaeology, University of York.

Mytum, H. 2000. *Recording and analysing graveyards*. York: Council for British Archaeology.

Mytum, H. 2004. *Mortuary monuments and burial grounds of the historic period*. New York: Kluwer Academic/Plenum.

Mytum, H. 2007. Beyond famous men and women: interpreting historic burial grounds and cemeteries. In *Past meets present: archaeologists partnering with museum curators, teachers, and community*, ed. J.-H. Jameson and S. Baugher, 411–426. New York: Springer.

Rodwell, W. 2005. *The archaeology of churches*. Stroud: Tempus.

Tarlow, S. 1999. *Bereavement and commemoration*. Oxford: Blackwell.

Tarlow, S. 2011. *Ritual, belief and the dead in early modern Britain and Ireland*. Cambridge: Cambridge University Press.

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Basic Biographical Information

Altan Çilingiroğlu was born in Sürmene, Trabzon, in 1944. He studied archaeology at Istanbul University and received a state grant to complete his M.A. and Ph.D. at Manchester Victoria University in 1972. Following his return to Turkey in 1976, Dr. Çilingiroğlu assisted at Erzurum Atatürk University before he was promoted as assistant professor at Aegean University in 1982 and professor in 1988.

Major Accomplishments

As an undergraduate, Çilingiroğlu gained experience in significant excavations such as Can Hasan and Çavuştepe. After he was employed in the Aegean University, with the Division of Archaeology as a separate department in the faculty, he established the Protohistory and Near Eastern Archaeology Department. Together with management of excavations, he organized a series of symposiums, accredited internationally, in Iron Age content. In addition to this, he served on advisory committees of numerous institutions.

His expertise is mostly in ancient and prehistoric cultures of South Anatolia, Persia, Caucasus, and Urartian Kingdom. He conducted numerous seminars in Japan, Australia, Uzbekistan, and Germany and other countries. Çilingiroğlu has published more than 70 articles and 14 books about the Urartian Kingdom and its history, art, foreign policy, war, economics, beliefs, and Ulucak Hoyuk in İzmir.

Çilingiroğlu served as assistant dean from 1985 to 1989 and dean of the Faculty of Literature from 2000 to 2003. He is the former vice president and the member of the Turkish-American Association of Izmir, the principal member of the Turkish Institute of Archaeology, lifetime member of Archaeological Institute of the USA. Çilingiroğlu was the invited speaker for Australia's the University of Melbourne in 1989, Germany's University of Tubingen in 1991, Israel's Tel Aviv University in 1992, and University of Florence, Italy, in 1994. He was given an award by the Aydın Doğan Foundation for his contributions to archaeology in Turkey. Çilingiroğlu is still busy conducting excavations in settlements at Ayanis (Van) and Ulucak Mound (Izmir).

Cross-References

► Urartu, Archaeology of
► Urbanism in the Ancient Near East

Further Reading

Çilingiroğlu, A. 1984. The second millennium painted pottery tradition in the Van Basin. *Anatolian Studies* 34: 129–139.

Çilingiroğlu, A. 1998. *The history of the kingdom of Van*. İzmir: Urartu.

Çilingiroğlu, A. 1999. Migration in the Lake Van Basin: East Anatolia in the late second millennium B.C., and founding a kingdom. *Migration und Kulturtransfer, Akten des Internationalen Kolloquiums 23–26 November 1999, 2001*, 371–381. Berlin.

Çilingiroğlu, A. 2000. Ayanis Kalesi Kazıları 1998, (Z. Derinile), XXI. *KazıSonuçları Toplantısı* 1: 397–408.

Çilingiroğlu, A. 2004. Excavations at Ulucak Höyük: *1995–2002*. *Ancient Near Eastern Studies*. Supplement 18. Louvain: Peeters.

Çilingiroğlu, A. 2005a. Ritual ceremonies in the temple area of Ayanis. In *Anatolian Iron Ages 5: Proceedings of the Fifth Anatolian Iron Ages Colloquium Held at Van, 6–10 August*, ed. A. Çilingiroğlu and G. Darbyshire, 31–38. London: British Institute of Archaeology at Ankara.

Çilingiroğlu, A. 2005b. Bronze arrowheads of Ayanis (RusahiniliEiduru-kai): Indicate ethnic identity? *Metal III, Der Anschnitt Zeitschrift für Kunst und Kultur im Bergbau* 18: 63–66.

Çilingiroğlu, A. 2006. An Urartian fortress in front of Mound Eiduru: Ayanis. *Aramazd* I: 135–142.

Çilingiroğlu, A. 2008. *Ayanis excavation and Urartian culture*. Ankara: TÜBA.

Çilingiroğlu, A., M. Salvin, et al. 1999. When was the Castle of Ayanis built and what is the meaning of the word 'şuri'? (iile). *Anatolian Iron Ages 4*. *Anatolian Studies* 49: 55–60.

Çilingiroğlu, A., E. Angelini, et al. 2007. Cultural heritage protection with low plasma treatments. *Vacuum International* 2: 27–32.

Citrus Fruits: Origins and Development

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Basic Species Information

Citrus fruits (*Citrus* spp. Rutaceae) are subtropical to tropical perennial fruit trees, producing juicy segmented fruits with thick rinds (Fig. 1). There are numerous named cultigens, with perhaps at least nine widely recognized, including mandarin or tangerine (*C. reticulata* Blanco), orange (*C. x sinensis* L. Osbeck), Seville, bitter or sour orange (*C. x aurantium* L.), the pomelo or shaddock (*C. maxima* Burm.), citron (*Citrus medica* Ferr), lime (*C. aurantifolia* Christm. Swingle), lemon (*C. x limon* L. Burm. F.), and grapefruit (*C. paradisi* Macfad.). In addition, makrut lime and leech lime or papeda are of widespread local importance in tropical Asia. However, as many as 300 species have been described, and this group presents taxonomic challenges due to the fact that these species readily hybridize, self-pollinate, and produce parthenocarpic fruit (asexually, with cloned seeds or no seeds). In addition, individual trees can present mutations on particular branches, which can then be reproduced readily by grafting. Many of the well-known, as well as lesser known, cultivar varieties are the result of a complex history of reticulate evolution. The main commercial citrus are derived from three basic species: *C medica* (citron, limes, and lemons), *C. reticulata* (oranges), and *C. maxima* (pomelo) (Scora 1975; Roose et al. 1995), in addition to *C. hystrix*. The complex taxonomic situation in citrus fruits warrants caution in interpreting historical, linguistic, or archaeological evidence.

Linnaeus first combined *Aurantium* (orange), *Citreum* (citron), and *Limon* (lemon) under the name *Citrus*. While Romans knew citrons and probably lemons, other taxa came to the Mediterranean only later. The name orange comes from a possible Dravic or Tamil root (*nraga*) via Sanskrit *nāranga* and Persian *Nārang* to Arabic *nārandj* to the fourteenth-century Spanish *naranja* and Portuguese *Laranjab* (Mabberly 2004). In English, "an naranj" turned into orange, and became associated with the color. Many of the common names for citrus cultivars are derived from Arabic reflecting the role the Muslims played in their introduction to Europe, following earlier diversification in India and tropical Asia (Ramon-Laca 2003).

Both the flowers and the fruit have economic value. The edible segments or carpels contain vesicles full of juice and are widely eaten or juiced. The flowers and seeds are the sources of neroli and petitgrain oils, the base of many perfumes. The skin or zest contains oils that have insecticidal value, and these have numerous medicinal applications. Citrus fruits are produced on large shrubs or small trees. They are susceptible to frost and sweetness cannot be achieved in cool areas. The color of the skin is dependent on the climate. In diurnal climates with a cool winter, the color changes, but in the tropics, the skin stays green.

Timing and Tracking Domestication

All these fruits are thought to have been domesticated somewhere in the area spanning from north eastern India to South China and Southeast Asia (Roose et al. 1995), but there is no firm evidence for precisely where or when (Fig. 2). Tanaka (1954) suggested a demarcation from the eastern Himalayas through Yunnan and north of Burma ending south of Hainan island, south of which he located the origins of the major citrus fruits, while minor related genera (*Poncirus* and *Fortunella*) might have had their origins to the north of this line, especially in southeast China. The origins of the citron (*C. medica*) may lie further west in South Asia, probably in the central Himalayan foothills, and the orange/mandarin (*C. aurantium*) group in Southernmost China/northern Indo-China. The pomelo is perhaps a later addition to the repertoire once sedentary cultivation and specialized arboriculture were established in mainland Southeast

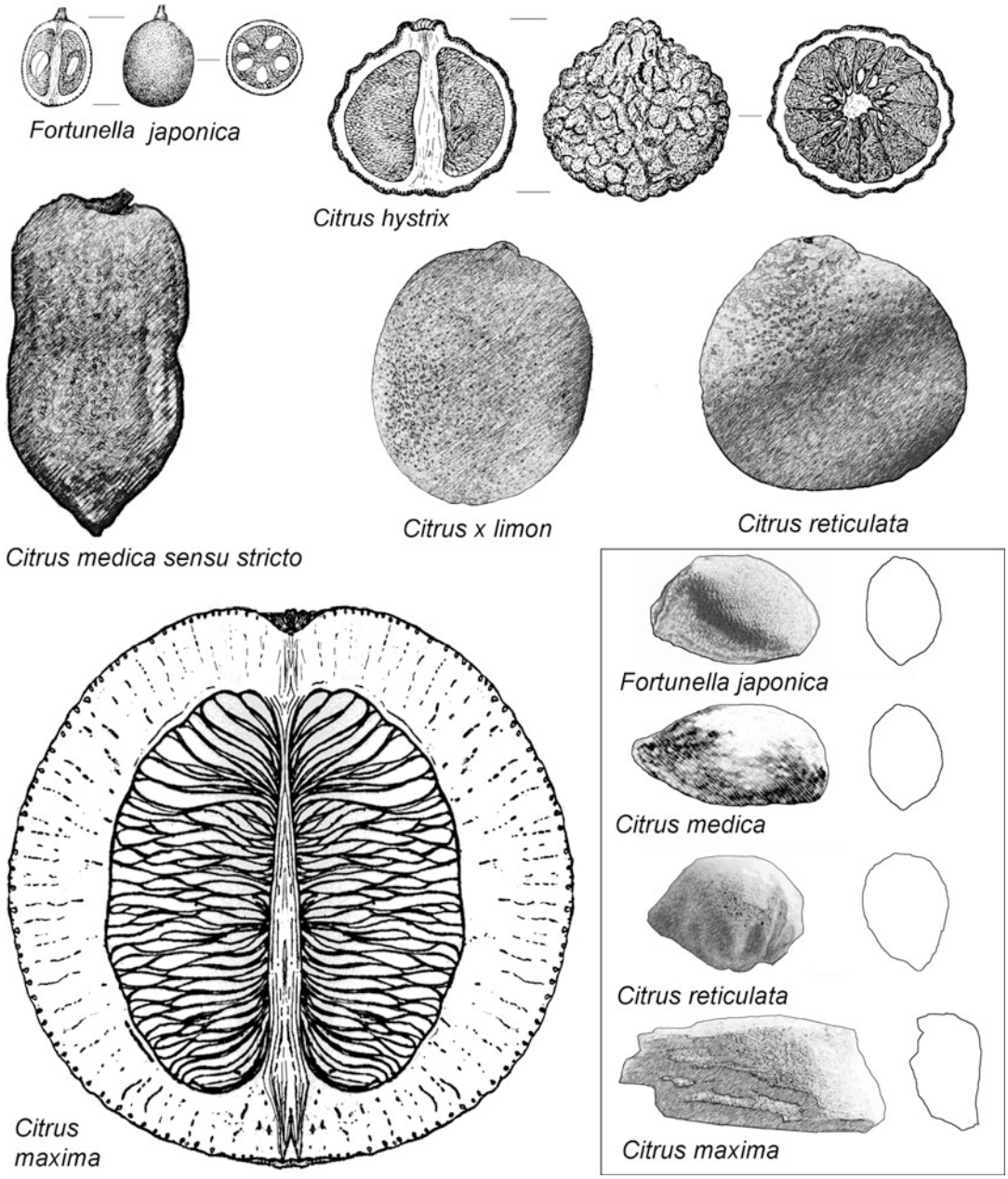

Citrus Fruits: Origins and Development, Fig. 1 Representative fruits of *Citrus* cultivars representing the three main superspecies as well as *Citrus hystrix* and the kumquat *Fortunella japonica. Inset* shows typical seeds

Asia. The leech lime (*C. hystrix*) must be native to the Island Southeast Asia, but probably also the Malay Peninsula, and is suggested to have been translocated with early Austronesian expansions (Blench 2005).

Citrus fruits are poorly represented in the available archaeobotanical record. One challenge is in distinguishing the main superspecies or cultivars from seed morphology. It is also the case that seed finds are exceedingly rare in archaeobotanical

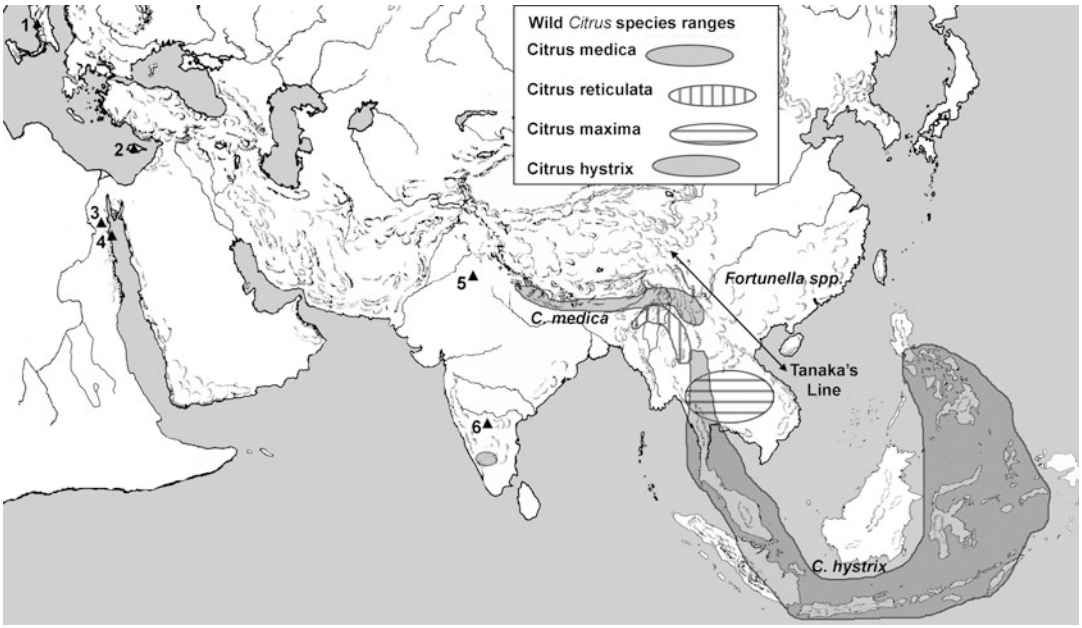

Citrus Fruits: Origins and Development, Fig. 2 Map of plausible centers of domestication of the original *Citrus* cultivars and the distribution of archaeobotanical evidence, sites numbered: *1*. Pompeii, *2*. Hala Sultan Tekke, *3*. Mon Claudianus and Mons Porphyrites, *4*. Quseir al-Qadim, *5*. Sanghol, *6*. Sanganakallu

assemblages. Citron cultivation is likely to have begun in the second millennium BC and perhaps began in the Gangetic basin or Himalayan foothills in the western portion of its range. The only early archaeobotanical seed evidence for *Citrus* fruits in South Asia comes from the Late Harappan (Baran Phase) site of Sanghol in Punjab, in the early second millennium BCE (Saraswat and Chanchala 1997). Wood charcoal may track its arrival in South India in the late second millennium BCE. Although reported as lemon, this level of identification is not clearly established from the reported seed material. Citron is more likely, as this is the closest to wild forms and was the first of the *Citrus* fruits to reach the west, where it is described in Hellenistic sources and presumably by the Persians, based on historical references. The early literary references are found in Sanskrit literature, which probably refer to citrons and/or lemons as well as some oranges in the early first millennium BCE (Asouti and Fuller 2008). Citrons are also known from Chinese sources, including Chi Han's flora of Southeast Asia from the fourth century CE (Simoons 1991: 201).

The arrival of citrus fruits in the Mediterranean and Europe is still poorly documented. A single archaeological report for citron comes from Late Bronze Age Cyprus, c. 1200 BCE, but has not been confirmed by direct dating (Zohary et al. 2012). Citrus seeds are said to have been found at the Sumerian ruins in Nippur by Kellerman in 1916, although their identification and date are uncertain (Webber et al. 1967). In addition to the citron (*Citrus medica*), lemons (*C. limon*) may also have been available during the Roman period in the Mediterranean. A single mineralized seed (possibly of lemon) was found at Pompeii dating to the early second century CE along with some pollen grains (Coubray et al. 2010). Paintings depicting Citrus trees in fruit have also been found at Pompeii and on Roman mosaics (Mabberly 2004). In Roman Egypt, desiccated citron seeds were found at Mons Porphyrites and Mons Claudianus dating to first and second centuries CE and seeds and rind at Roman period Quseir al-Qadim (Van der Veen 2011). Other Citrus cultivars probably did not arrive in the west until Islamic times (Watson 1983; Zohary et al. 2012). Rind from lime (*C.* cf. *aurantifolia*) has

been recovered from Islamic (eleventh–thirteenth century) Quseir al-Qadim (Van der Veen 2011). Citrus was brought to the New World by Columbus on his second voyage in 1493 (Scora 1975), and somewhere in the Caribbean, grapefruits evolved from a cross between a pomelo and an orange (Barret and Rodes 1976).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Asouti, E., and D. Fuller. 2008. *Trees and woodlands in South India: Archaeological perspectives*. Walnut Creek: Left Coast Press.

Barret, H.C., and A.M. Rodes. 1976. A numerical taxonomic study of affinity relationships in cultivated *Citrus* and its close relatives. *Systematic Botany* 1: 105–136.

Blench, R.M. 2005. Fruits and arboriculture in the Indo Pacific region. *Bulletin of the Indo-Pacific Prehistory Association* 24: 31–50.

Coubray, S., V. Zech-Matterne, and A. Mazurier. 2010. The earliest remains of a citrus fruit from a western Mediterranean archaeological context? A microtomoaraphic-based reassessment. *Comptes Rendus Palevol* 9: 277–282.

Mabberley, D.J. 2004. Citrus (Rutaceae): A review of recent advantages in etymology, systematics and medical applications. *Blumea* 49: 481–498.

Ramon-Laca, L. 2003. The introduction of cultivated citrus to Europe via northern Africa and the Iberian Peninsula. *Economic Botany* 57 (4): 502–514.

Roose, M.L., R.K. Soost, and J.W. Cameron. 1995. Citrus. In *Evolution of crop plants*, ed. J. Smartt and N.W. Simmonds, 443–448. Harlow: Longman.

Saraswat, K.S., and S. Chanchala. 1997. Palaeobotanical and pollen analytical investigations. *Indian Archaeology 1992–93 – A Review*: 123–4.

Scora, R.W. 1975. On the history and origin of citrus. *Bulletin of the Torrey Botanical Club* 102 (6): 369–375.

Simoons, F.J. 1991. *Food in China: A cultural and historical inquiry*. Boca Raton/Ann Arbor/Boston: CRC Press.

Tanaka, T. 1954. *Species problem in citrus: A critical study of wild and cultivated units of citrus based upon field studies in their native homes (Revisio Aurantiacearum IX)*. Tokyo: Japanese Society for Promotion of Science.

Van der Veen, M. 2011. *Consumption, trade and innovation: Exploring the botanical remains from the Roman and Islamic ports at Quseir al-Qadim, Egypt*. *Journal of African Archaeology*, Monograph series. Vol. 6. Frankfurt am Main: Africa Magna Verlag.

Watson, A.M. 1983. *Agricultural innovation in the early Islamic world*. Cambridge: Cambridge University Press.

Webber, H.J., W. Reuther, and H.W. Lawton. 1967. History and development of the citrus industry. In *The citrus industry 1. History, distribution, botany, and varieties*, ed. W. Reuther, H.J. Webber, and L.D. Batchelor, 1–39. Berkeley: University of California.

Zohary, D., M. Hopf, and E. Weiss. 2012. *Domestication of plants in the Old World*. Oxford: Oxford University Press.

Further Reading

Saraswat, K.S. 1997. Plant economy of Barans at ancient Sanghol (ca. 1900–1400 BC), Punjab. *Praghara* 7: 97–114.

Clark, John Desmond

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John Desmond Clark was born in London on 10 April 1916 and died on 14 February 2002 in Oakland, California. He was educated at Monkton Combe School and at the University of Cambridge, whence he graduated with First Class Honours in Archaeology and Anthropology in 1937. In 1938 he married Betty Cable Baume, whom he had met when she was studying modern languages at Cambridge. He was Curator and later Director of the Rhodes-Livingstone Museum in Northern Rhodesia (now Zambia) from 1937 until 1961 and built it into one of the finest museums of African ethnography and archaeology on the continent. During this time, he became well acquainted with all the leading figures in African archaeology and was instrumental in encouraging

regular professional interactions across Africa through the Pan-African Congresses on Prehistory held every four years in different countries in Africa, the third of which he organized in Livingstone in 1955 (Clark and Cole 1957).

During 1941–1946, he served in the British Army, initially as sergeant in the Seventh East African Field Ambulance Corps in Ethiopia, Somalia, and Madagascar. Even while on active service, his passion for prehistoric archaeology remained undiminished, and he collected artefacts wherever the vagaries of war conducted him, often under perilous conditions. Several pioneering papers were soon to appear in the South African Archaeological Bulletin describing various Late Stone Ages sites in Ethiopia.

During the war years, his wife Betty looked after the Museum in Livingstone, and she played a major personal and professional role throughout his life, helping with running the expeditions and commissariat, drawing artifacts, and assisting with the preparation of his scholarly manuscripts.

After officer training he became Civil Affairs Officer in the British Military Administration in Somalia until 1946, during which time he also seized every opportunity to carry out archaeological research. In 1948, he took a year's leave to be based at the University of Cambridge and was awarded a PhD degree in 1951 for his research on the prehistoric cultures of the Zambezi Valley, Ethiopia, and Somalia. Part of this material was incorporated into his first book on the *Prehistoric Cultures of the Horn of Africa* (Clark 1954). The Zambezi Valley work was to continue for many years and was published as three substantial volumes on *The Kalambo Falls Prehistoric Site* (Clark 1969, 1974, 2001).

In 1961 he became Professor of Anthropology at the University of California, Berkeley, where for 25 years he taught, spent up to three months each year excavating in Africa (Clark 1967, 1970, 1975, 1980; Clark and Bishop 1967) (and later in India and China), researched and published major monographs and scholarly papers until his notional retirement as Professor Emeritus in 1986. While at Berkeley, he developed a highly respected and very popular graduate program in African prehistory and paleoanthropology, assisted in later years by Glynn Isaac, who shared his profound love of Africa (Clark 2002). Many of the graduates from this program went on to occupy distinguished University positions throughout North America and were instrumental in deepening and extending Desmond Clark's pioneering work on African prehistory (Cooke et al. 1987).

Major Accomplishments

Professor Desmond Clark was by far the most eminent and productive scholar of African prehistory in the 20th century and had an unrivalled knowledge of African ethnography, archaeology and paleo-anthropology derived from 60 years of sustained fieldwork throughout that continent. He was author of over 300 research articles and author/editor of some 30 books and monographs. He carried out major excavations in Northern Rhodesia/Zambia (Kalambo Falls) (Clark 1969, 1974, 2001), Ethiopia (Gadeb, Middle Awash) (Clark et al. 1984), Somalia, South Africa (Clark 1959), Angola, Malawi, Tanzania, Niger (Adrar Bous) and Sudan (White Nile Valley) (Clark 1980), as well as Syria (Latamne), India (Son Valley), and China (Nihewan Basin). This work spanned some of the earliest evidence of human butchery practices and use of fire through the increasingly complex development of stone tools and associated hunting and foraging strategies to the causes and consequences of early food production. A measure of the esteem in which he was held by his peers was the invitation to dig for two seasons in central India with Professor G.R.Sharma and for several seasons in the Nihewan Basin in China with Professor Jia Lanpo.

An enduring attribute of all his work was the strong emphasis he placed upon interdisciplinary teamwork (Clark et al. 1984; Cooke et al. 1987; Clark 2002) and upon placing archaeological data into an ecological and landscape context (Clark 1967; Clark and Brandt 1984). He always took great pains to place his own research into a

wider environmental framework and was a past master at producing a scholarly synthesis (Clark 1970, 1975, 1980, 1982, 2001). One outstanding outcome arising from his network of professional friends and colleagues across Africa was the *Atlas of African Prehistory* (Clark 1967), which not only provided in easily accessible form distribution maps of all known prehistoric and fossil sites in Africa but had the added advantage that they could be superimposed upon maps showing geology, vegetation, and climate. Although superseded by new discoveries and easy access to satellite imagery, this atlas remains a useful introduction to African paleogeography.

His profound knowledge of African ethnography, much of it gained during long trips on foot across many parts of Africa, enabled him to weave his ethnographic insights into his interpretation of prehistoric practices and lifestyles (Clark 1980; Clark and Harris 1985). Desmond Clark also possessed a detailed knowledge of the entire temporal range of African prehistory, ranging from the Early Stone Age through to Iron Age. Another of his strengths was his willingness to make use of the latest technological breakthroughs in archaeological science, including new dating techniques and new methods of geochemical or paleoecologic analysis. Despite his formidable academic accomplishments and the many honors showered upon him, he remained humble, approachable, and helpful throughout his life. Many young archaeologists throughout the world have benefited from his encouragement and wise counsel.

Among the honors bestowed upon him were Commander of the Order of the British Empire (1960), Commandeur de l'Ordre national de Sénégal (1967), the Huxley Medal of the Royal Anthropological Institute, London (1974), the Gold Medal of the Society of Antiquaries, London (1985), the Berkeley Citation from the University of California (1985), the Gold Medal of the Archaeological Institute of America (1989), and Honorary Doctor of Science degrees from the University of Witwatersrand, Johannesburg (1985) and the University of Cape Town, South Africa (1985).

References

Clark, J.D. 1954. *The Prehistoric Cultures of the Horn of Africa*. Cambridge: Cambridge University Press.

Clark, J.D. 1959. *The Prehistory of Southern Africa*. London: Penguin.

Clark, J.D. (compiler). 1967. *The Atlas of African Prehistory*. Chicago: University of Chicago Press.

Clark, J.D., and W.W. Bishop, eds. 1967. *Background to Evolution in Africa*. Chicago: University of Chicago Press.

Clark, J.D. 1970. *The Prehistory of Africa*. London: Thames and Hiudson.

Clark, J.D., ed. 1982. *Cambridge History of Africa. Volume I. From Earliest Times to ca. 500 BC*. Cambridge: Cambridge University Press.

Clark, J.D., and S.A. Brandt, eds. 1984. *From Hunters to Farmers: The Causes and Consequences of Food Production in Africa*. Berkeley: University of California Press.

Clark, J.D. 1969. *The Kalambo Falls Prehistoric Site*. Vol. 1. Cambridge: Cambridge University Press.

Clark, J.D. 1974. *The Kalambo Falls Prehistoric Site*. Vol. 2. Cambridge: Cambridge University Press.

Clark, J.D. 2001. *The Kalambo Falls Prehistoric Site*. Vol. 3. Cambridge: Cambridge University Press.

Further Reading

Clark, J.D., and S. Cole, eds. 1957. *Third Pan-African Congress on Prehistory, Livingstone 1955*. London: Chatto & Windus.

Clark, J.D. 1975. Africa in Prehistory: Peripheral or Paramount? *Man* 10: 175–198.

Clark, J.D. 1980. Human populations and cultural adaptations in the Sahara and Nile during prehistoric times. In *The Sahara and The Nile: Quaternary Environments and Prehistoric Occupation In Northern Africa*, ed. M.A.J. Williams and H. Faure, 527–582. Rotterdam: A.A. Balkema.

Clark, J.D., B. Asfaw, G. Assefa, J.W.K. Harris, H. Kurashina, R.C. Walter, T.D. White, and M.A.J. Williams. 1984. Palaeoanthropological discoveries in the Middle Awash Valley, Ethiopia. *Nature* 307: 423–428.

Clark, J.D., and J.W.K. Harris. 1985. Fire and its roles in early hominid lifeways. *African Archaeological Review* 3: 3–27.

Cooke, H.B.S., J.W.K. Harris, and K. Harris. 1987. J. Desmond Clark: his career and contributions to prehistory. *Journal of Human Evolution* 16: 549–581.

Clark, J.D. 2002. An Archaeologist at Work in African History and Early Human Studies: Teamwork and Insight, an oral history conducted in 2000–2001 by Timothy Troy. Regional Oral History Office, The Bancroft Library, University of California, Berkeley.

Clark, John Grahame Douglas

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Basic Biographical Information

Professor Sir John Grahame Douglas Clark, C.B.E., F.B.A., M.A., Sc.D., Ph.D. (28 July 1907–12 September 1995), was an eminent British archaeologist. He was arguably one of the most influential prehistorians of the twentieth century, particularly within the economic and ecological fields of Mesolithic archaeology. He was born in Bromley, then part of the English county of Kent, and attended Marlborough College in the early years of his education. He arrived at Cambridge University in 1926 where he read history, archaeology, and anthropology at Peterhouse College. He completed his dissertation on the British Mesolithic in 1930 and was awarded his Ph.D. in 1933 (Rowley-Conwy 2001).

Clark received a 3-year Hugo de Balsham research fellowship in 1930. Two years later, he was awarded a Bye-Fellowship, elected a Fellow of the Society of Antiquaries of London (SAL), and became a founding member of the Fenland Research Committee (FRC), an organization that investigated the evolution of Quaternary geology at Fenland in Cambridgeshire, England. He was appointed Faculty Assistant Lecturer at Cambridge and Honorary Editor of the Proceedings of the Prehistoric Society in 1935. He was also the society's President between 1958 and 1962 (Rowley-Conwy 1999).

During the Second World War, Clark assisted the Royal Air Force in interpreting aerial photographs. He helped establish the Council for British Archaeology in 1944. He was made a Lecturer at Cambridge in 1946 and Disney Professor of Archaeology in 1952. He was a member of the Ancient Monuments Board from 1954 to 1977 and the Royal Commission on Historic Monuments from 1957 to 1969. He also held office as Vice-President of the Society of Antiquaries of London from 1959 to 1962 and served as a trustee of the British Museum from 1975 to 1980. He retired from the Disney Chair in 1974 but remained in Cambridge as the Master of Peterhouse from 1973 to 1980.

Major Accomplishments

With an extraordinary career spanning seven decades, Clark was an early pioneer of a more scientific and anthropological form of archaeological theory and research. His work foreshadowed some of the central ideas and aspects of the New Archaeology movement during the 1960s, and his influence left a profound impact on generations of archaeologists across the world.

At the age of 25, Clark published his Ph.D. dissertation as *The Mesolithic Age in Britain* (1932), in which he identified and defined distinct Mesolithic artifactual assemblages through the detailed study of their spatial and chronological distributions in Britain (Clark 1932). Between 1933 and 1940, he published eight articles and site reports for the FRC which combined archaeological stratigraphy and typology with palynology and environmental reconstruction, thereby redefining archaeology from a parochial study of typologies and surface finds towards excavations and a stratigraphic-geological approach that archaeologists hold as convention today (Smith 1994). His partnership with botanist Sir Harry Godwin in particular allowed him to correlate ecological data derived from pollen analyses with variations between assemblages and prehistoric periods.

Clark also extended the study of the extinct Mesolithic landscape into the European mainland with *The Mesolithic Settlement of Northern Europe* (1936). His insights into the cultural adaptation of prehistoric humans to their environment were further developed in *Archaeology and Society* (1939) and *Prehistoric England* (1940). This, in turn, led him to analyze the intertwining relationships between climatic and environmental variables and prehistoric economies in *Prehistoric Europe: The Economic Basis* (1952).

Clark is most renowned for his work at the Maglemosian lakeside settlement site of Star

Carr in Yorkshire, England. Published as *Excavations at Star Carr* (1954), it is still regarded as a seminal study of material culture and economy of a Mesolithic settlement within an ecological context. His work at Star Carr also produced a paper entitled *The Economic Approach to Prehistory* (1953), which contained a classic systems diagram depicting the complex interdependence of human culture with its environment that predated those of the New Archaeology by some 15 years (Rowley-Conwy 2002).

Clark's most important legacy lies perhaps with his students and protégés, many of whom became prominent scholars and archaeologists in their own rights, including Charles Higham, a leading authority of prehistoric Southeast Asia, and John Mulvaney, the "father of Australian archaeology." As Disney Professor, Clark was also responsible for employing Eric Higgs, the founder of the Cambridge Palaeoeconomy School, and David Clarke, who would become one of the principal proponents of the New Archaeology, thereby creating an exciting and vibrant learning environment for students at Cambridge University.

In recognition of his work and contributions in archaeology and prehistory, Clark was elected Fellow of the British Academy in 1951, appointed Commander of the Most Excellent Order of the British Empire in 1971, and knighted in 1992. He also received the SAL Gold Medal in 1978 and the Erasmus Prize of the Netherland's Praemium Erasmianum Foundation in 1990.

Cross-References

► Cultural Ecology in Archaeology
► European Mesolithic: Geography and Culture
► Mulvaney, John

References

Rowley-Conwy, P. 1999. Sir Grahame Clark (1907–1995). In *Encyclopedia of archaeology. The great archaeologists*, ed. T. Murray, vol. II, 507–529. Santa Barbara: ABC-CLIO.

Rowley-Conwy, P. 2001. Clark, Sir Grahame (1907–1995). In *Encyclopedia of archaeology. History and discoveries*, ed. T. Murray, vol. I, 333–334. Santa Barbara: ABC-CLIO.

Rowley-Conwy, P. 2002. Obituaries: Sir Grahame Clark (1907–95). *American Anthropologist* 104 (3): 1009–1012.

Smith, P.J. 1994. *Grahame Clark, the Fenland Research Committee and prehistory at Cambridge*. MPhil. dissertation, University of Cambridge. Available at: http://www.arch.cam.ac.uk/~pjs1011/grahame-clark+fenland-research-committee.pdf. Accessed 2 Oct 2012.

Further Reading

Addyman, P. 1995. Obituary. Grahame Clark. *British Archaeology* 8. Available at: http://www.archaeologyuk.org/ba/ba8/BA8OBIT.HTML. Accessed 2 Oct 2012.

Clark, J.G.D. 1932. *The Mesolithic Age in Britain*. Cambridge: Cambridge University Press.

Clark, J.G.D. 1936. *The Mesolithic settlement of northern Europe: A study of food-gathering peoples of northern Europe during the early post-glacial period*. Cambridge: Cambridge University Press.

Clark, J.G.D. 1939. *Archaeology and society*. 1st ed. London: Methuen.

Clark, J.G.D. 1940. *Prehistoric England*. London: Batsford.

Clark, J.G.D. 1952. *Prehistoric Europe. The economic basis*. Cambridge: Cambridge University Press.

Clark, J.G.D. 1953. The economic approach to prehistory: Albert Reckitt archaeological lecture. *Proceedings of the British Academy* 39: 215–238.

Clark, J.G.D. 1954. *Excavations at Star Carr*. Cambridge: Cambridge University Press.

Fagan, B.M. 2001. *Grahame Clark: An intellectual biography of an archaeologist*. Boulder: Westview Press.

Marciniak, A., and J. Coles, eds. 2010. *Grahame Clark and his legacy*. Newcastle upon Tyne: Cambridge Scholars Publishing.

Mulvaney, D.J. 1996. Obituary. Grahame Clark (1907–1995). *Australian Archaeology* 42: 54–55.

Classic Maya Collapse: An Alternative View

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Introduction to the Maya Collapse

The standard narrative of the Maya civilization is that they overpopulated their landscape and, to feed their populace, they had to expand their

agricultural fields, causing deforestation, erosion, and their demise. It is proposed that the land use practices of the Maya brought them over the tipping point, undermining their prosperity and resulting in the breakdown of their civilization (Diamond 2005; Webster 2002). Related conditions that are proposed to have exacerbated the inevitability of collapse prominently include drought in addition to epidemics, interruption of trade, and invasions that overtaxed the population's relationship to their landscape (Webster 2002). It is a popular notion that they disappeared.

Not until the nineteenth century was there general notice of the ancient remains of past glory, beginning with Stephens and Catherwood's masterful account and folios telling of towering temples and remarkable carvings deep in the Central American forest (Stephens 1963). Since the living population of the Maya area were deemed unsophisticated, they were disassociated from the extraordinary relics encountered in the forests. Subsequent adventurers and photographers trekked over the area and propagated the myth of discovery. By the time these travelers were encountering the ancient Maya civic centers (Fig. 1), the radical social impacts of the conquest, colonialism, and degradation had nearly completely divorced the indigenous Maya from their own past. Ecological imperialism has consigned their land use adaptations as inappropriate and primitive.

As in other parts of the world, ethnographic analogy is a key to the past: the historical land use recognized in the area relates to contemporary land use. Yet the sophistication of the Maya milpa forest garden that cycles from forest to field and transforms fields to forests is too often ignored by scholars of the ancient Maya. The fact that the Maya forest is replete with useful plants (Balick and Arvigo 2015) that serve for food, spice, fiber, medicine, construction, ornamentation, and other needs for daily life has been disregarded. As a result, the Maya understanding of the cyclical quality of the landscape and the seasonal qualities of the land use, knowledge of the forest products, comprehension of medicinal qualities of plants, and skill in maneuvering and managing in the Maya forest have barely been chronicled. Maya ecological appreciation reaches back millennia into the deep past of the Maya and underpins the development of the ancient Maya (Ford and Nigh 2015).

Flourishing at the time of the vicious Spanish conquest, the fields of the Maya were pillaged, construction materials plundered, and lives abused, all without consideration for the importance of Maya understandings of how to live with and manage large populations in the forest (Jones 1998). Life across the past millennia of the Maya civilization underwent changes in the context of the forest. With the conquest, all this would be disregarded despite it having served the Maya well.

Prejudices That Underpin the Narrative

At the crux of the problem, understanding the nature of the ancient Maya is the imposition of the Eurocentric view where arable means cultivable when it actually means plowable. Yet, the Maya used no plow. The cultivable landscape of the Maya flourished in the shallow friable soils of the limestone uplands, avoiding deep clayey soils that the conventional Western agricultural systems deem cultivable. Maya development depended on hand cultivation using labor, knowledge, and skill to increase the productive yield. It was not more fields, but more skill and labor in the field that produced greater yields (Ford and Clarke 2019). For the civilization to thrive, the Maya had to cultivate their landscape not only for crops but for all the necessities of daily life, including materials for construction and utensils, fibers and spices, resources for food production, and habitat for hunted animals. The Maya landscape was a cycle of varied forest habitats and productive fields that sustained everyday life. This tradition was unfamiliar to the Western eye and was literally overlooked.

The collapse comes to us based on the "discovery" of ancient monuments in the jungles of the Maya forests of lowland southern Mesoamerica. Despite the remarkable historic reports of the Maya at the time of the conquest of the 1500s

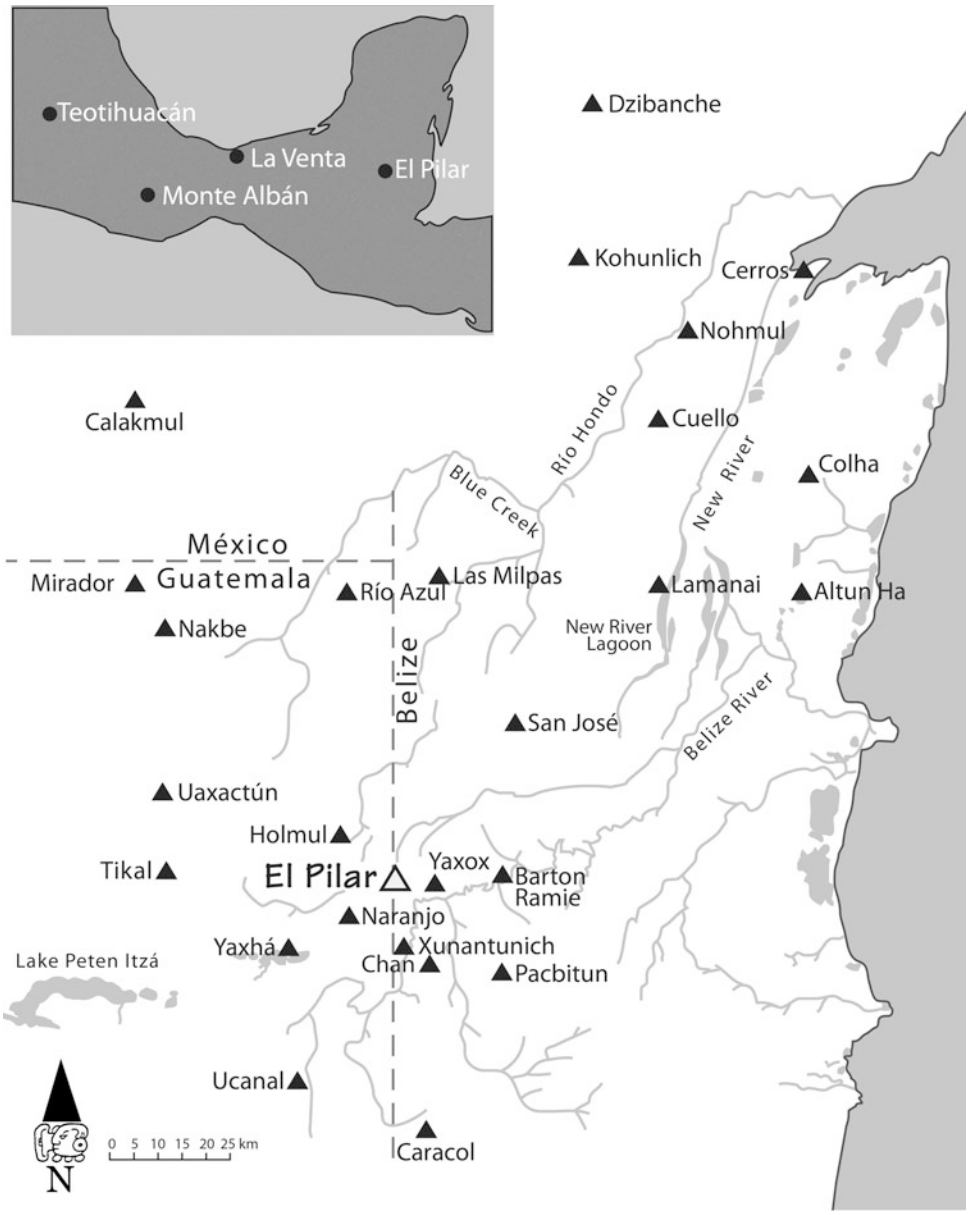

Classic Maya Collapse: An Alternative View, Fig. 1 Maya area with important centers noted

(see Jones 1998), there was the impression that the Maya were following untenable agricultural traditions that could not support but a few people. Evidence shows that the Maya continued to build and maintain centers, albeit smaller than the Classic predecessors, into the Postclassic after 1000CE and up to the brutal conquest. We know from historic records that they had astronomers who tracked the visible celestial bodies, that they wrote books of literature and science, and that they supported their populations with a cyclical agricultural system based on a multitude of crops dominated by maize (Terán and Rasmussen 1995).

From the Spanish documents, we learn that there was a great effort to consolidate populations, the standard economic policy of "reducción," to bring together settlements dispersed in their agricultural fields and orchards in far-flung locations around civic centers (Farriss 1984; Schwartz 1990). Huge efforts were made to impose Spanish standards on the Maya. In fact, Medel, the first governor of the Yucatan, misunderstanding the critical value of Maya land use, felt so uncomfortable with the way the Maya interacted with their landscape; he issued an ordinance in 1552 banning trees and field crops in the towns (Roys 1931: 157), ordering that "...they should not sow any milpas [fields] within the town that they construct houses close to one another [as the Spanish], that all shall be clean, without sown land or groves; and if there were any, *they should be burned*" (after Roys 1931, emphasis mine).

The Spanish did not comprehend the Maya landscape and did not see the forests as managed for their own utility. This fundamental miscalculation of the importance of Maya interaction with their landscape has persisted to this day. Permanent infields were part of homes in the principal urban locations as revealed in Medel's ordinance, while secondary houses were dispersed out of reach in diverse field areas as part of the traditional annual land use cycle (Ford and Nigh 2015). These are likely areas to which they escaped when hard pressed, as in the time of the collapse or under colonial rule. Because the sophistication of Maya land use has been ignored, misconceptions concerning the foundations of the Maya collapse have persisted.

Spanish avarice was at the foreground and relied on the prosperity encountered at the time of the conquest. Local landscapes were despoiled, ransacked, and ill-treated without recognition of the importance of local time-honored customs. The Spaniards were concerned with support in the short term; there was no concern for the long term, a strategy upon which the Maya civilization had depended. While the Maya civilization underwent transformations based on climate changes and on political-economic shifts, the cities and towns that the Spanish encountered in the beginning of the sixteenth century were based on the same principles of agriculture that sustained the Classic period before 1000CE (Terán and Rasmussen 1995).

The Exalted and Invisible Maya

The accounts of towering temples lost in the forest of Central America by the nineteenth-century explorers drew attention to the ancient civilization that once ruled over the tropical lands. But even with this attention, the indigenous peoples who lived around these centers and were speaking a local tongue were positioned as imposters, devolved relics that could not have built these impressive architectural wonders. The Maya had disappeared and no one acknowledged that they were talking to them. At the same time, their association with the ancient centers was eschewed, while their language, botany, and ways of life were the subject of much attention. Links were finally acknowledged as the hieroglyphic texts were studied and found to relate to the modern Mayan language (Coe 2005), but somehow, this link did not extend to incorporate their knowledge of the landscape and agriculture.

Even though the historical Maya land use must share common ground with contemporary Maya land use, this evident connection has been set aside. This is hard to conceptualize when one understands the fact that the Maya forest is replete with useful plants (Balick and Arvigo 2015). We now know that Maya ecological knowledge has roots back generations, centuries, and millennia as successful adaptations accounting for its existence today. The ecological thesis of complete agricultural failure that dominates scholarship on the Classic Maya collapse cannot be easily reconciled with the resilient skill and knowledge of existing traditional Maya forest gardeners.

Historical Perspectives of the Maya

From the outset, the Spanish conquerors were confounded by the floral diversity faced in the

Maya forest. By their own accounts, they focused on what appeared familiar: any field with crops, houses with rooms, water for transport, and resources for accounting. Their thirst for precious metals drove their expeditions, and their needs to feed horses and provision armies propelled short-term objectives.

The first Spanish incursions into the Maya heartland, initiated by Hernan Cortes in 1524 (Jones 1998), culminated with Ursua's conquest of the last Maya kingdom 1697. The expeditions followed indigenous maps, but the Europeans were confused by the narrow trails and frustrated with the lack of roads, unable to secure guides, and unconscious of the fear they spread (Farriss 1992; Jones 1998).

Unfamiliar with the Maya forest landscape and surroundings, and not appreciating the value in all they passed, they attempted to follow trails intended to be traversed on foot (Hassig 1985). Hardly known for their cultural relativism (see Roys 1931), the Spaniards perceived the landscape of the Maya forests as inhospitable and uninhabitable. Based on Cortes' Fifth Letter and Bernal Diaz's account, they struggled in this new world, adequately, not generously, provisioned by communities whose residents regularly fled at the army's approach. Terrorizing the countryside, the Spaniards were oblivious to the value of the cacao orchards they noted or the foods they garnered from the complex poly-cropped milpa infields and outfields as well as the significance of directed regrowth of economically important plants. The impression given in these early accounts misrepresented the presence of the Maya, and the later explorers reinforced this impression with the romantic descriptions of lost cities with no thought given to how they once thrived in these areas.

A Look at Population Size and Distribution

Population density and distribution are a critical component of the collapse equation. Estimates of densities of 500–1,000 persons/km^2 are exceedingly high, matching densities found in Taiwan and Bangladesh today. A revision of population estimates is critical to understanding land use of the Maya civilization. We have developed population densities for the representative El Pilar area based on grounded settlement surveys and a predictive model (Ford et al. 2009; Ford and Clarke 2019). These estimates for the El Pilar area of 140 persons/km^2 are in line with geographers' views of the Late Classic potentials (Turner 1990).

Far from a seething sea of humanity, at the height of the Classic period, settlements were concentrated in the well-drained uplands, avoiding the wetlands that make up an estimated 40% of the region (Dunning et al. 2002). Settlement impacts on the landscape varied according to settlement densities, as can be seen in the El Pilar example (Ford and Clarke 2019: 169). The greater the settlement and population, the greater the impacts. Estimated population density has an average of 140 persons/km^2 and varies up to 390 persons/km^2, with 38% of the area in unoccupied wetlands.

How do the estimates for the Maya of El Pilar compare with estimates in the ancient world? Boserup, for example, estimates that the Ming Dynasty China in 1500CE had an estimated population of only 64 persons/km^2 (1981: 11). This estimate is for a civilization supporting a standing army and navy, the ability to consolidate the Great Wall, and with major firepower and far-reaching tribute relations in a region substantially larger than that of the Maya. Pre-modern Edo Japan in 1750CE, under the centralized rule of the Tokugawa shoguns, in Boserup's estimates, had a population density of 128 persons/km^2. The average densities offered by Boserup are for a similar patchwork landscape of full, empty, and medium-intensity occupation for the preindustrial agrarian civilization.

The population estimates for El Pilar (Table 1) are somewhat greater than Boserup's examples of civilizations but are in line with geographic projections for the Maya area (Turner 1990). Recent research with Lidar for the central Maya lowlands (Canuto et al. 2018) found similar settlement densities for their large regional coverage in the Petén of Guatemala. Analyses of

Classic Maya Collapse: An Alternative View, Table 1 El Pilar landscape and estimated population distribution based on Late Classic settlement data

Geographic landscape	Area (km^2)	Late Classic residential unit estimate	Population density	Percent population (%)	Percent area (%)
Wetlands	485	0	0	0	38
Transitional	319	7,156	125	22	25
Uplands	225	7,643	190	23	18
Well-drained uplands	256	17,808	390	55	20
Total	1,284	32,607	142	100	100

these coverages produce reasonable estimates of 80–120 people/km^2, which extrapolate to population estimates of 7–11 million people across the 95,000 km^2 of the central Maya lowlands (Canuto et al. 2018).

Whatever the estimates, large or small, the impact of human settlement and population distribution is significant and cannot be underestimated. Humans are capable of making their mark, even when minimal infrastructure is used; and the Maya had significant infrastructure. For the Maya, we have foundations of small perishable structures and large temples and plazas. Land use would be most intensive where settlements and population densities were the highest. With 55% of the population in 20% of the area (Table 1), there would be little land to exploit for agriculture and forest products. Land would be more available where lower settlement densities and more extensive land were available for agriculture and forest products. Land use, however, had to provide for all the household needs: vegetables and meat, spices and fruit, fiber and utensils, as well as building materials and roofing. We know they were successful; evidence is found in major centers covering many hectares and numerous domestic sites near and far from the centers (Canuto et al. 2018; Ford and Clarke 2019). How they accomplished that success bears on our understanding of the nature of the Classic Maya collapse.

It is true that a higher population will exert greater demands on the landscape. This is the basis of the hypothesized overshoot that assumes there is a fixed carrying capacity for production in the Maya forest. This is, however, based on the assumption that intensifying land use and cultivation lowers agricultural yields and leads to environmental degradation (Webster 2002: 328–329). This would be the case in a Malthusian world where fields reduce the forest, but the Maya relied on the forest just as much as the fields. Both were part of the same cultivation process for the Maya in the milpa forest garden cycle (Ford and Nigh 2015). Any open field is eventually cycled into a utilitarian forest. Since the forest and fields are merely different phases of the same cycle, it is greater skill, knowledge, and labor invested that will increase agricultural yields (Ford and Nigh 2015: 41–76). Yields increased with labor and skill will not be compromising the extent of forested land cover (see Ford and Clarke 2019); the milpa forest garden cycle provides for horizontal and vertical diversity that ensures that land resources are adequately managed for maintaining fertility, conserving water, inhibiting erosion, sustaining biodiversity, and nurturing people.

Land Cover Interpretations

The narrative of the collapse positions the Maya need for agricultural crops as the basis of deforestation. This narrow view of the landscape's potential for food production does not take into account the varied needs of the Maya for materials derived from both forests and fields nor does the position have an appreciation for the cyclical nature of land use embedded in the milpa forest garden cycle. Simplistic views of forest and field do not account for the nature of the cycle where humans intervene, interact, and encourage natural processes (Conklin 1957).

The ancient Maya were an agrarian civilization. Their success was built upon care and manipulation of their landscape to fulfill basic needs for food and shelter for the few elite managers and multitude of farmers. Thus, to understand the collapse, we need to understand the conditions that led to the rise of the Maya civilization. It is the uncertainties of ecological change that propelled the development of the Maya, and it was stability that generated the vigorous growth of the political economy.

The ebbs and flows of the development of the Maya civilization across time provide the broad setting from which to understand changes in the landscape and climate. Climate changes in the present Holocene epoch were marked by significant temperature and precipitation events reflected in the paleoecological data (Fig. 2). A major change around 8,000 years ago was that from cool arid to warm humid, initializing the tropical characteristics of the lowlands today.

The following 4,000 years represented a relatively stable warm wet period in lowland Mesoamerican, known worldwide as the Holocene Thermal Maximum from 8,000 to 4,000 years ago. This period gave rise to the Archaic mobile horticulturalists in Mesoamerica and the Maya area. The developments that would evolve to support the agrarian Maya civilization were predicated on the early mobile horticulturalists' adaptation to the relatively high precipitation conditions of the tropical rainforest.

The end of the Holocene Thermal Maximum was registered around the world by significant climatic disruptions, and in the Maya area, this led to an extended 2,000-year period of climate chaos. When the mobile horticulturalists were challenged with the advent of inconsistent precipitation that began about 4,000 years ago, permanent settlements emerged in the well-drained areas across the Maya region. The trajectory of centralization coincides with some of the greatest and most chaotic extremes in precipitation (Fig. 2). The early formative or Preclassic developments portend the rise of the Maya civilization.

It is the uncertainties of ecological change in the Early and Middle Preclassic periods that appear to have propelled the development of the

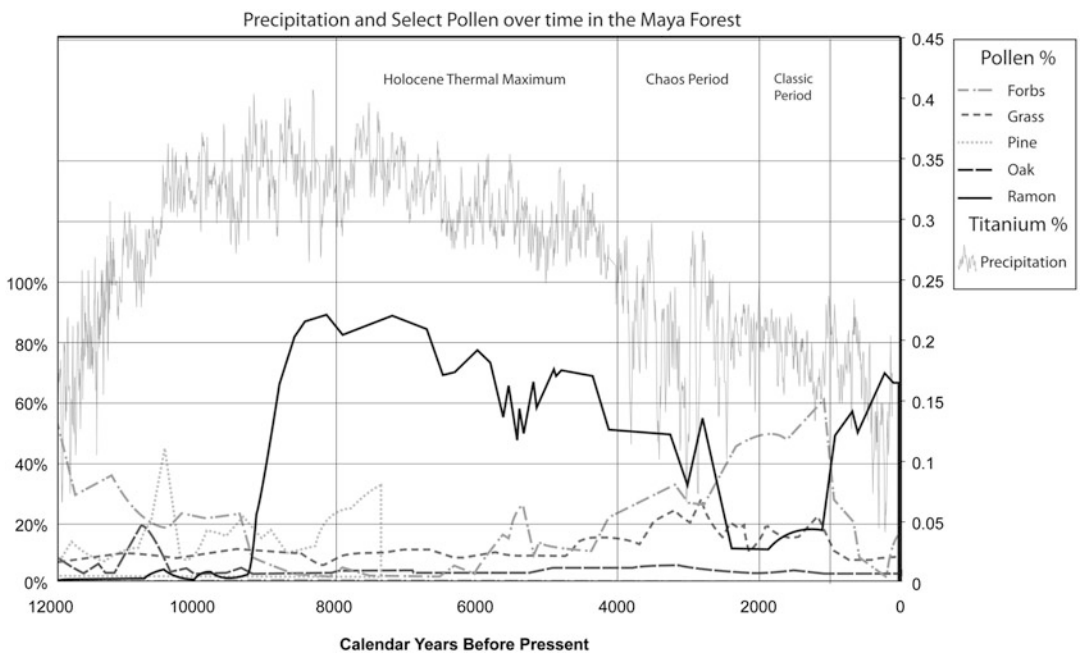

Classic Maya Collapse: An Alternative View, Fig. 2 Summary of reported pollen proportions and precipitation as measured by trace titanium for the Maya area over 12,000 Years

Maya civilization with the buildings that were constructed to impress. Paleoclimatic data gathered from lakes of the Petén in the local Maya area, and connected with regional data from the Cariaco north of Venezuela, synchronize the emergent civic centers of the Maya to the time of unpredictable precipitation, rising and falling in rapid succession within the lifespan of a generation and across many centuries (Fig. 2).

As the volatile period of climate chaos attenuated around 2,000 years ago, precipitation trends became more predictable, if not drier. Precipitation stability in the Maya area by the end of the Late Preclassic marks the dawn of Classic Maya civilization. The Classic period, dating 250–900 CE, was a time of relative climate stability that persisted across the first millennia of our current era. This period corresponds to the rise of the trademarks of the Maya civilization with the erection of carved and dated stela commemorating of leadership and referring to regional alliances. All this was to come to an end by 1000CE. What does rainfall have to do with it?

Farmers in ancient Mesoamerica and specifically the Maya area relied on rainfall for their farming. Annual precipitations in the central Maya lowlands are relatively high, averaging c. 2,000 mm per year. Consequently, there has been a focus on annual changes in precipitation, on droughts, and on the role of rain in the productive yields of the ancient Maya. Rainfall will always present problems for the farmer, but it is not the annual rainfall that is an issue; it is the delivery across the year. Too little rain, or drought, when planting and too much rain, or deluge, near harvests have equally devastating results. It is the timeframe around the delivery of the rain that matters most for Maya farmers. So, yearly rainfall will not reflect the challenges on the landscape.

Collective water management would have been a major concern and a natural source of community centralization in times of scarcity, typically over the annual dry season, the *Yax K'in*, that today is traditionally predicted for March and April. This is a major reason for conserving land cover and shade that helps to retain humidity in dry periods. We need to remember, as well, that there are two wet seasons: the Chaak Ik' beginning in May to June and the Ik'al Ixpelon beginning in October to November. Thus, there are several planting periods over an annual cycle that can be impacted by rainfall. The rains of Chaak Ik' come from the east with thunder and hurricanes, and the rains of Ik'al Ixpelon come from the north associated with the winter storms of North America. No simple drought can account for all these dimensions, and even in a year of low rainfall, if it comes predictably, yields will be maintained.

As rainfall changes brought challenges for the of the earliest Maya, their development in the context of the tropical forested woodlands influenced their adaptations to growth. A study of the paleoecological chronology has been a significant source of support for the proposition of environmental impacts of the Maya. This is substantiated by the pollen data (Fig. 2) that feature the proportional abundance of wind pollen in lake core sediments. Wind pollination strategies, or syndromes, typically ones that make you sneeze, are a minority of plant pollen strategies that are dominated by animal pollination, e.g., birds, bees, and bats. This is especially true for tropical forest where only 2% of the plants rely on wind. Forests present many obstacles for wind movement and to successfully pollinate its designated object. Yet wind pollen dominates the record of lakes; we must balance the important, but restricted, environmental indicators that are provided by these data.

The assessment of the pollen data has been relied upon to back the proposal of Maya deforestation. The proof rests on evidence of the windborne pollen, a minority of pollen of the forest, that makes it to the water bodies. Dramatic changes in pollen are legitimately taken as valid and significant environmental indicators. Climate change from cool dry to warm wet c. 8,000 years ago marks a worldwide warming trend recognized from the Pleistocene to the Holocene. Human presence, though evident, was not yet strong. Later, after c. 4,000 years, changes are taken as the impact of Maya land use. This relies on the focus on the *Brosimum*-type pollen, referred to as Ramon and used as an indicator, or proxy, of

forest cover; but what does this proxy for forest actually tell us?

Using the rise of the tropical warm wet conditions of the Holocene Thermal Maximum, the record of the proportional dominance of *Brosimum*-type tree pollen has been relied upon to track the emergence of the forest. Since the rise of *Brosimum* is accepted to signal the expansion of the tropical forest, it has been used as *the proxy* for the forest per se. Its rise and fall have been assumed to reflect the expansion and contraction of the forest. Thus, the decrease of *Brosimum*-type pollen is the basis of the argument for deforestation. How is this justified?

When *Brosimum*-type pollen was depressed, there is an increase of "disturbance" pollen supporting an interpretation that the landscape changed from one of forest to one of human interference, with a negative connotation. This change has been interpreted as a shift from forest to "savanna" (Webster 2002: 255–257). This implies that the early dominance of forests gave way to grasses. Yet a careful examination of the data shows that the situation is far more complex. At the drop in *Brosimum*-type pollen, it is *not* grasses that are dominant, but forbs, leafy wind-pollinated annuals and perennials (Fig. 2) that proliferate in the open and secondary succession areas. These forbs are exactly what one would expect with a vibrant milpa forest garden cycle of open fields, directed stage of building perennials, and closed canopy mature utilitarian forest. Far from grassland savanna with few trees, the landscape evident in the pollen chronology is not one of deforestation but of much variety and diversity in land cover. This is exactly what the contemporary Maya use to curb erosion, moderate evaporation, conserve soil, and maintain a healthy environment.

The ethnographic data on the agroforestry practices of traditional Maya suggests that they managed the natural cycle to meet the agricultural and product needs (Terán and Rasmussen 1995; see Conklin 1957), and instead of "shifting" fields, they were building perennial forest gardens based on a patchwork of fields. Open fields, gaps in the forest, would increase the opportunity of "disturbance" plants that include many intentional and useful varieties represented on the landscape (Ford and Clarke 2019: 173–174; Ford and Nigh 2015: 148–149). In a hypothesized 20-year cycle, 15% of the landscape would be in milpa fields, and 18% would be in building perennials. Both fields and early perennials would have sufficient sun to contribute to annual and perennial shrubs that are defined as "disturbance" pollen. To complete the cycle, the field transforms into shaded mature perennials covering another 18% of the landscape. The total land use involved with the field to forest cycle would account for half the total available land area, leaving the remaining half in managed mature forests.

Revisiting the rise and fall of *Brosimum* in the forest, a multifaceted set of conditions emerge. The early rise of *Brosimum* in the region 8,000 years ago was a climate signal of the aggressive pioneering *Brosimum*, registered by its pollen, as it gained presence in the new warm tropical world. Its initial drop is likely another climate signal related to the stresses of coincident precipitation chaos around 4,000 years ago (Ford and Nigh 2014). At its nadir, corresponding to the rise and growth of the Classic Maya civilization, Ramon's proportional representation is clearly related to the impact of the Maya on the forest. But this is not likely deforestation; rather it is the opening field gaps that encourage the proliferation of wind-pollinated forbs and the preference for a diversity of useful trees known in the Maya forest today (Ford and Nigh 2015, p. 57), including *Brosimum*. In fact, carbonized remains in Classic Maya middens show plant diversity comparable to the modern Maya forest (Thompson et al. 2015), where the woods are dominated by fruiting and hardwood trees pollinated by birds, bats, and bees not evident in the general pollen records of the lakes.

Brosimum as the proxy for the forest is not justified. First, this is only one genus of a very biodiverse forest (Mittermeier et al. 2000). Further, as one of the 20 dominant plants of the Maya forest, it is the only one that is wind pollinated (Ford and Nigh 2015: 86–93). Second, the period of depressed *Brosimum* pollen shows much diversity in plant species, predominantly among forbs, the annual and perennial shrubs

that have been classed as disturbance species that are a significant part of forest succession and are important in Maya ethnobotany (Balick and Arvigo 2015). Third, succession of annual and perennial forbs is known from forest gaps and perennial building phases of the landscape, characteristic of land use consistent with the milpa forest garden cycle. Fourth, the rise of *Brosimum* pollen after 1,000 years ago, used to argue the return of the forest, is best explained as the expansion of the vanguard pioneer *Brosimum* into the neglected infrastructure of the Maya centers, consistent with *Brosimum* species preference of well-drained broken limestone habitats (Lambert and Arnarson 1982). Finally, the presence of forbs in the pollen record persists until 500 years ago, corresponding to the Spanish conquest when the real collapse of the Maya population occurred.

Redefining the Maya Collapse

The Classic Maya collapse rests on the assumption of a mismatch between population and resources (Diamond 2005: 176). Settlements and populations will, certainly, impact the landscape, but in the case of the Classic Maya civilization, growth and development over 1,000 years should be acknowledged as a notable success. With revised population estimates within the range of 100–200 persons/km^2 (relatively high on a world scale), such as developed for the El Pilar area and put forward by Turner (1990), along with the use of Maya ethnographic analogy for land use, so well relied upon for persistence of language and the cosmology, we can envision a different story.

Deforestation, critical to the abandonment hypothesis of the collapse, is based on a misunderstanding of pollen signatures of the milpa cycle, its productivity, and a prejudiced interpretation of the botanical record. Archaeologists have misread the settlement patterns and discounted the value of ethnographic analogy. Agroecologists have demonstrated the value of traditional Maya land use strategies to conserve water, build fertility, inhibit erosion, manage land cover, and support the needs of people (Ford and Nigh 2015). Yet this has been ignored in favor of placing the milpa in the role of destructive, indiscriminate primitive farming and the relegation of traditional swidden to the pejorative of slash-and-burn. This misconception is founded on uncompromising ecological imperialism founded in colonial views of land use limited by Western conventions (Said 1993).

The fundamental common theme of the Maya collapse is the "abandonment" of the major civic centers and the desertion of the population. Yet abandonment is only one possibility. People were living in the region at the Spanish conquest. Something did change, and what we *do know* is that upkeep of major centers of the lowlands, particularly in the greater region around Tikal (Fig. 1), decreased and, ultimately with neglect, the infrastructure became unusable, giving rise to new and smaller centers that were encountered by the Spanish in the 1500s.

Based on archaeological chronology, this collapse took some centuries to play out, founded on the last of the dated monuments and the estimated end of the Terminal Classic after 1000CE. Some propose a more attenuated time frame (Webster 2002), accounting for social and political consequences. Such upheavals are not unique and can be seen in historic times when the Roman capital was moved to Constantinople and more modern times with the demise of Detroit infrastructure while other US cities continue to prosper. These are examples where political and economic decisions play a major role in the transformations.

There is an undeniable steady growth and development of settlements and civic centers over several millennia prior to 1000CE. This reflects significant and consistent investments in major constructions and the concomitant administration of the necessary maintenance. Maintenance is the key and the evidence of "collapse" of Classic Maya centers. This reflects mainly on the interruption of continuity; abandonment is only assumed, not proven. The Spanish found an educated administration and complex civic centers, books written to document celestial movements and political relations, and a populace hierarchically organized by elite administrators, analogous to the structure of the Classic period.

Centralization, the hallmark of the Maya civilization, with the temples, plazas, and palaces, emerges early on in the context of climatic chaos. Rather than provoking environmental havoc, political dimensions take precedence. When the chaotic precipitation prevailed, it was critical to secure and manage water; this condition called for control, but stability would ultimately challenge this control. In the time of precipitation stability, growth can be measured by the increasing size and complexity of Maya civic centers. Yet land use of the Maya civilization was centrifugal, depending on farmers spread out to farmlands around the centers.

The Maya collapse is more likely a process that was part of the art of not being governed. The settlement of the Maya historically involved a complex pattern of residences to meet the demands of the annual agriculture cycle. Primary houses were based in a centralized infield location and the secondary houses in peripheral outfield locations. These patterns impacted the landscape by developing a mosaic of accessible fields and stages of forest that has made the Maya forest a garden and among the most biodiverse places in the world today. This would mean that secondary residences were part of the surrounding area providing an alternative living space.

Around 900–1000CE, Maya society underwent significant change after an astonishing millennium of growth. Reasoning that neglect of architecture implies complete abandonment is a logical leap. There is little question that the major civic buildings became "white elephants" and that their upkeep was increasingly compromised. Maintenance requires dedicated labor, and this was clearly a major source of the collapse. Knowledge of the civic management in the Classic period (250–1000CE) is not clearly understood. The burden of work obligations, nevertheless, would certainly fall to the general population. It would seem that the elite overdrew on the capacity of the populace to meet their exuberant expectations. It is not ecological demise that initiated the so-called collapse, but a political one. The farmers continued to be involved in the milpa cycle wherever they could.

Hinged on caring for infrastructure, by 1000CE, the political elite were unable to meet their maintenance obligations, and the administration of labor toward public ends broke down. Faced with the political crises, the population at large did not meet demanding commitments. Ultimately, life was simplified, and populations continued to manage their forest gardens, slowly leaving the large public structures of the civic centers to the elements. After all, the Maya were thriving at the time of the Spanish conquest.

References

Balick, M.J., and R. Arvigo. 2015. *Messages from the gods: A guide to the useful plants of Belize*. New York: Oxford University Press.

Boserup, E. 1981. *Population and technological change: A study of long-term trends*. Chicago: University of Chicago Press.

Canuto, M.A., F. Estrada-Belli, T.G. Garrison, S.D. Houston, M.J. Acuña, M. Kováč, D. Marken, P. Nondédéo, L. Auld-Thomas, C. Castanet, D. Chatelain, C.R. Chiriboga, T. Drápela, T. Lieskovský, A. Tokovinine, A. Velasquez, J.C. Fernández-Díaz, and R. Shrestha. 2018. Ancient lowland Maya complexity as revealed by airborne laser scanning of northern Guatemala. *Science* 361: 1355.

Coe, M.D. 2005. *Reading the Maya glyphs*. New York: Thames and Hudson.

Conklin, H.C. 1957. *Hanunóo agriculture: A report on an integral system of shifting cultivation in the Philippines*. Rome: FAO Food and Agriculture Organization of the United Nations.

Diamond, J. 2005. *Collapse: How societies choose to fail or succeed*. New York: The Penguin Group.

Farriss, N.M. 1984. *Maya society under colonial rule: The collective enterprise of survival*. Princeton: Princeton University Press.

Ford, A., and K.C. Clarke. 2019. Linking the past and present of the ancient Maya: Lowland use, population distribution, and density in the Late Classic. In *Handbook of historical ecology and applied archaeology*, ed. C. Isendahl and D. Stump, 156–183. Oxford: Oxford University Press.

Ford, A., and R. Nigh. 2015. *The Maya forest garden: Eight millennia of sustainable cultivation in the tropical woodlands*. Santa Rosa: Left Coast Press.

Hassig, R. 1985. *Trade, tribute, and transportation: The sixteenth-century political economy of the valley of Mexico*. Norman: University of Oklahoma.

Jones, G.D. 1998. *The conquest of the last Maya kingdom*. Stanford: University of Stanford Press.

Lambert, J.D.H., and J.T. Arnarson. 1982. Ramon and Maya ruins: An ecological not an economic relation. *Science* 216 (4543): 298–299.

Mittermeier, R.A., N. Myers, and C.G. Mittermeier. 2000. *Hotspots: Earth's biologically richest and most endangered terrestrial ecoregions*. México: CEMEX.
Rice, D.S. 1996. Paleolimnological analysis in the central Petén, Guatemala. In *The managed Mosaic: Ancient Maya agriculture and resource use*, ed. S.L. Fedick, 193–206. Salt Lake City: University of Utah Press.
Said, E. 1993. *Culture and imperialism*. New York: Random House.
Schwartz, N.B. 1990. *Forest society: A social history of Petén*. Philadelphia: University of Pennsylvania Press.
Terán, S., and C.H. Rasmussen. 1995. Genetic diversity and agricultural strategy in 16th century and present-day Yucatecan milpa agriculture. *Biodiversity and Conservation* 4 (4): 363–381.
Thompson, K.P., A. Hood, D. Cavallaro, and D.L. Lentz. 2015. Connecting contemporary ecology and ethnobotany to ancient plant use practices of the Maya at Tikal. In *Tikal: Paleoecology of an ancient Maya city*, ed. D.L. Lentz, N.P. Dunning, and V.L. Scarborough, 124–151. New York: Cambridge University Press.
Turner, B.L., II. 1990. Population reconstruction of the central Maya lowlands: 1000 B.C. to A.D. 1500. In *Precolumbian population history in the Maya lowlands*, ed. T.P. Culbert and D.S. Rice, 301–324. Albuquerque: University of New Mexico Press.
Webster, D.L. 2002. *The fall of the ancient Maya: Solving the mystery of the Maya collapse*. London: Thames & Hudson.

Recommended Reading

Atran, S. 1993. Itza Maya tropical agro-forestry. *Current Anthropology* 34 (5): 633–700.
Binford, M.W., M. Brenner, T.J. Whitmore, A. Higuera-Gundy, E.S. Deevey, and B. Leyden. 1987. Ecosystems, paleoecology and human disturbance in subtropical and tropical America. *Quaternary Science Reviews* 6 (2): 115–128.
Chase, A.F., D.Z. Chase, J.F. Weishampe, J.B. Drake, R.L. Shrestha, K.C. Slatton, J.J. Awe, and W.E. Carter. 2011. Airborne LiDAR, archaeology, and the ancient Maya landscape at Caracol, Belize. *Journal of Archaeological Science* 38: 387–398.
Coe, M.D. 1992. *Breaking the Maya code*. New York: Thames and Hudson.
Cortes, H. 1971. *Hernan cortes: Letters from Mexico*. New York: Grossman Publishers.
Diaz del Castillo, C.B. 1927. *The true history of the conquest of Mexico, written in the year 1568*. New York: National Travel Club.
Dunning, N.P., S. Luzzadder-Beach, T. Beach, J.G. Jones, V. Scarborough, and T.P. Culbert. 2002. Arising from the Bajos: The evolution of a neotropical landscape and the rise of Maya civilization. *Annals of the Association of American Geographers* 92 (2): 267–283.
Ford, A., K.C. Clarke, and G. Raines. 2009. Modeling settlement patterns of the Late Classic Maya with Bayesian methods and GIS. *Annals of the Association of American Geographers* 99 (3): 496–520.
Ford, A., and R. Nigh. 2014. Climate change in the ancient Maya forest: Resilience and adaptive management across millennia. In *The great Maya droughts cultural context: Case studies in resilience and vulnerability*, ed. G. Iannone, 87–106. Boulder: University Press of Colorado.
Healy, P.F., C.G.B. Helmke, J.J. Awe, and K.S. Sunahara. 2007. Survey, settlement, and population history at the ancient Maya site of Pacbitun, Belize. *Journal of Field Archaeology* 32 (1): 17–39.
Houston, S.D. 1989. *Maya glyphs*. Berkeley: University of California Press and British Museum.
de Landa, D. 1990. *Yucatan before and after the conquest*. New York: Dover Publications.
McAnany, P.A. 1995. *Living with the ancestors: Kinship and kingship in ancient Maya society*. Austin: University of Texas Press.
Roys, R.L. 1931. *The ethno-botany of the Maya*. New Orleans: The Department of Middle American Research, Tulane University.
Stephens, J.L. 1963. *Incidents of travel in Yucatán II*. New York: Dover Publications.
WIkipedia. 2019. Arable. *Wikipedia*. Retrieved March 2019, from https://en.wikipedia.org/wiki/Arable_land
Zetina Gutiérrez, María de Guadalupe, and B.B. Faust. 2011. De la Agroecología a la Arqueología Demográfica: ¿Cuántas Casas por Familia? *Estudios de Cultura Maya* 38: 97–120.

Classical (Greek) Archaeology

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Introduction and Definition

Classical archaeology is often considered an archaeology apart. It is an archaeological tradition that has quite different priorities and interests than those of European prehistory of American "anthropological" archaeology. There are reasons for this sense of difference, that relate to classical archaeology's peculiar history (Alcock and Osborne 2007: 1–29).

Historical Background

The Beginnings of Classical (Greek) Archaeology

Classical Greek archaeology begins not in Greece but in Rome. From the Renaissance onward, rich Roman families such as the Borghese, Farnese,

and Medici began to investigate the numerous Roman-era ruins of the city of Rome and its environs. They did this with a view to collecting art, particularly sculpture. Earlier Roman writers, in particular the elder Pliny, had listed many of the sculptures to be found around Rome, often referred to as "ars" (art or craft in Latin). Sculptures so classified however, though found in Rome, were often the work of Greek artists/craftsmen, and sometimes had Greek inscriptions to go with them. Indeed, one can argue that the peculiarity of the Latin term "ars" is that it refers almost exclusively to sculpture and painting made not by Romans but by Greeks, and refers to work produced within a relatively narrow chronological range (circa 500–250 BCE). This local tradition of classical antiquarianism continued throughout the seventeenth century, by which time aristocrats from other European countries (such as the Earl of Arundel, whose collection of Greek sculpture forms the core collection of the Ashmolean museum in Oxford) had begun to join the game.

Classical archaeology proper, as a form of systematic study of antiquity, is however usually held to begin with J.J. Winckelmann, whose *Geschichte der Kunst der Altertums* [History of Art in Antiquity, 1764] is the first attempt to deal comprehensively with the material remains of Greece, Etruria, and Rome. Winckelmann's study remains primarily a study of objects, not contexts, and remained firmly centered in Rome. In addition to sculpture and painting, it involved the systematic treatment of architecture, gems, mosaics, coins, and "vases" (as painted pots with Greek inscriptions came to be called). It devised a pre-Darwinian evolutionary scheme for the development of Greek art, one where a style that is "straight and hard" is succeeded by another that is "grand and square"; this is turn is followed by a "beautiful and flowing" style that eventually falls from grace, and becomes imitative and decadent.

Winckelmman's evolutionary scheme, with is rhythm of rise and fall, is more influential than some archaeologists working in other traditions might acknowledge. I doubt, for example, if Mesoamerican archaeologists would have coined their threefold scheme of "Formative/pre-Classic," "Classic" and "Post-Classic" for the Maya civilization without the (possibly unconscious and unacknowledged) influence of classical archaeology in general and Winckelmann in particular. And Winckelmann's scheme (though not his terms) have proved remarkably tenacious. When western Europeans began collecting sculptures, not only from Italy but from Greece, at the beginning of the nineteenth century (with the acquisitions of the Parthenon Marbles/Elgin Marbles and the Bassai frieze by the British Museum and the Aphaia pediments by Munich's Glyptothek [sculpture museum]), they fitted their finds into Winckelmann's scheme. And when, from 1830, Greeks won their independence from the Ottoman Empire, they turned to German scholars (such as Ludwig Ross), who was steeped in Winckelmann, to organize their fledgling state archaeological service. Conscious of recent losses, the Greeks were determined that no more works of art (sculpture, vase painting) were to leave Greece for Western Europe. So, when in 1874, the newly founded German Archaeological Institute in Athens requested permission to excavate at the major panhellenic sanctuary site of Olympia (where the original Olympic Games were held), the Greek authorities accepted, on one condition: All the finds were to stay in Olympia itself (Marchand 1996).

Just as Winckelmann's is the first systematic exploration of Greek art, so the excavations at Olympia were the first major systematic excavation of a Greek site. As well as major works of sculpture (such as the Nike of Paionios of Mende, and the pedimental sculptures from the temple of Zeus), the German excavators (Adolf Furtwängler and Wilhelm Dörpfeld) also recorded, studied, and cataloged hundreds of minor finds. Though the excavators paid some attention to context, the finds were published by material and type (all bronze figurines, for example). Other foreign and Greek archaeologists were spurred on by the German example, the French beginning their "grand fouille" at the equally important panhellenic sanctuary of Delphi in 1892. Finds were now pouring in from numerous excavations. By 1889, the Greeks had constructed their own neoclassical National Archaeological Museum to house these new discoveries. But the museum is (or was until recently) adorned with copies of "Greek"

sculptures (the Apollo Belvedere, the Doryphoros of Polykleitos) that were not, in fact, to be found at all in Greece, but in Rome. It is a National museum that deferred to foreigner's ideas of what "Greek," "classical," and "art" should be. A nation-building project, deeply entangled with archaeological practice (Hamilakis 2007), and dedicated to restoring the glories of ancient Greece was equally indebted to a Roman concept that is not to be found at all in the literature of Homer, or in any of the Attic tragedians, comedians, or philosophers – namely art.

This German-inspired archaeology of objects is not however the only intellectual tradition within the archaeology of classical Greece. There is another, focused on topography, ethnography, and landscape, that has its origins in the tradition of travel writers, particularly active from 1800 to 1830. Figures such as William Gell, Edmund Dodwell, E.D. Clarke, and Captain William Martin Leake traveled around Greece, collecting finds, making observations about the identity of classical sites (compare Dodwell and Leake at the Argive Heraion) and often with an engraver or watercolorist in tow (Whitley 2001: 44–7). Observations about the Greek past were juxtaposed with observations about the then state of what is now Greece (then part of the Ottoman Empire). Some of these observations are simply derogatory; others had considerable ethnographic insight. After the British lost out in the late-nineteenth century scramble for classical sites to excavate, this tradition was renewed in the early twentieth century. The principal excavators of the Archaic and classical sanctuary site of Artemis Orthia, near Sparta, A.J.B. Wace and R.M. Dawkins, produced a site report that dealt with thousands of votive objects, after the example of Olympia. But they also had wider interests: Dawkins in the modern Greek language and Cretan prehistory, Wace in ancient topography, prehistory, and the ethnography of the nomads of Northern Greece. This practice of seeing ancient Greece through the lens of modern Greece continued in the work of J.D.S. Pendlebury on Crete, and later in the archaeological surveys that began in the 1960s. These large, multi-period fieldwalking surveys (such as the Boeotia survey led by Anthony Snodgrass and John Bintliff, or the Kythera Island Project led by Cyprian Broodbank and Vangelio Kiriatzi) owe much of their practice to the influence of Anglo-American "processual" archaeology in the 1960s and 1970s. But they also continue a tradition that goes back to the travelers of the early nineteenth century.

Classical archaeology in Greece has then not one, but two distinct intellectual traditions, with distinct affiliations. The older, German one is an archaeology of objects, and concentrates its attention on major sanctuary sites, where objects are still published by material and type. It focuses on periods that are clearly classical (that is the Archaic, classical, and Hellenistic periods, circa 800–30 BCE). The alternative, largely Anglophone tradition is not so much focused on objects and on the Greek landscape. It takes a more diachronic approach to the archaeology of Greece, and its interpretations are informed by quasi-ethnographic observations of contemporary Greece. Of course, one can find exceptions to this neat scheme: Dörpfeld famously trenched the whole of the southern plain of Lefkada in a vain search for Odysseus' palace, resulting in an exemplary piece of landscape study (see Snodgrass 1987: 18–24), and perhaps the most celebrated artifact specialist of all time was J.D. Beazley, who attributed thousands of Athenian black- and red-figure vases to particular painters (or hands). But Beazley (as he acknowledged) was working within a field dominated by German scholars; Dörpfeld's work was not followed up by any German scholar for at least half a century.

Key Issues and Current Debates

The Scope and Practice of Classical Greek Archaeology

What are the boundaries of the classical archaeology of Greece? Chronologically, classical archaeology is held to begin with the inception of the Iron Age around 1100 BCE, continuing through the Archaic (800–480), classical (479–323 BCE), and Hellenistic (322–30 BCE) periods. Once upon a time, Aegean Prehistory (or at least the Bronze Age) was considered a part of classical

Archaeology, but nowadays, most scholars draw a thick line at the fall of the Mycenaean palaces around 1200 BCE (the line being the one where Aegean prehistory ends and classical archaeology begins). The status of the Roman period in Greece is ambiguous – the Greek Archaeological Service defines "classical" as ending with the accession of the Roman Emperor Constantine, everything after that being considered "Byzantine." Geographically, classical Greek archaeology comprises everything within these chronological boundaries found within the modern Greek state; finds from "Greek colonies" in Sicily, Southern Italy, the Black Sea, Libya, and Egypt; finds from cities that once lay within the boundaries of the major Hellenistic kingdoms in Anatolia (e.g., Pergamon), Syria, Jordan, Israel/Palestine, Egypt, Iraq, Iran, Afghanistan (e.g., Ai Khanoum), and parts of Pakistan; and (more ambiguous this) finds which look Greek (such as Apulian red-figure pottery) but which have nothing, in an ethnic sense, to do with Greek speakers as such (see Carpenter 2009). Conversely, areas of the ancient world which, while full of Greek speakers, but which did not (before Hellenistic times) make much use of the Greek alphabet or have an obviously classical material culture, such as Cyprus, are also in an ambiguous position. In practice, the criteria usually applied are simply whether an item looks "Greek" in the eyes of museum professionals; and, from their point of view, red-figure (even if Apulian) is Greek, whereas Cypro-Geometric pottery from Kourion or Salamis on Cyprus is somehow slightly Oriental.

These ambiguous boundaries affect archaeological practice. Within Greece itself, the state Greek Archaeological Service is responsible for local museums, but concerns itself primarily with rescue (or salvage) excavations made in advance of development. So, for example, the widening of the railway line to the North of the city of Thebes has resulted in a full exploration of that city's North Cemetery. A perennial problem remains that of storing, let alone publishing, all the finds that turn up from such excavations. Summary reports from such studies appear annually in the *Archaiologikon Deltion*. Greek universities (seven of which have archaeology departments) also engage in research excavations. Foreign archaeologists are represented by the so-called archaeological schools (in order of foundation, French, German, American, British, Austrian, Italian, Swedish, Swiss, Belgian, Australian, Canadian, Dutch, Danish, Norwegian, Finnish, and Irish), which are allowed a maximum of three field projects (survey or excavation) per year, and three joint projects with the archaeological service (*synergasies)*. The vast amounts of information all these activities produce is summarized annually in "Archaeological Reports" (published by the British School) and "Chroniques des Fouilles en Grèce" (published by the French). Both of these publications are now (jointly) available online.

Outside Greece, Greek "classical" archaeology is practiced in museums and university departments. The (once) Great Powers of nineteenth- and twentieth-century Europe and America have built up great, imperial museums, such as the Louvre in Paris, the British Museum in London, the Pergamon museum in Berlin, and the Metropolitan Museum of Art in New York. At the heart of these museums, at their core, are collections of Greek and Roman material, in particular objects referred to as "Greek art," chiefly sculpture and painted pottery. Indeed, it is often in these museums that the major pieces of sculptural ornament of major Greek temples are to be found. Sometimes a particular museum manages to preserve the sculpture in its entirety, as at the Pergamon museum in Berlin; at others, various museums hold varying amounts of sculptural ornament. So the pediments, metopes, and frieze of the Parthenon are divided unequally between museums in London, Athens, Rome (Vatican), Paris, Palermo, and Copenhagen. But these museums also contain vast stores of unexhibited finds (which may not count as 'art') from earlier archaeological projects. Often, restudy of these finds yields new insights. So, for example, the finds from Flinders Petrie's excavations at the Greek "emporion" (trading town) of Naukratis in Egypt are now being comprehensively restudied by a team from the British Museum led by Alexandra Villing. The aim is not simply to

produce a database, but to reinterpret in the light of new questions and theoretical concerns, using new methods (such as the advances in ceramic petrology achieved at the Fitch Laboratory of the British School at Athens). Restudying Naukratis can tell us much about interactions between Greeks and Egyptians in the Iron Age, about ethnicity, and about the "connectivity" of the Mediterranean world in the Iron Age.

Equally, the actions of great museums are sometimes determined by their founding values. The Metropolitan Museum of Art in New York is pre-eminently an art museum. Unlike its neighbor, the American Museum of Natural History, on the other side of Central Park, objects in the museum are treated primarily as "works of art," that is, objects whose aesthetic value exists independent of any cultural, social, or historical context or interest, and are displayed as such (see Price 1989). The "object biography" of a Greek vase acquired by the museum in 1972 illustrates the point. This object was a late Archaic Athenian red-figured calyx krater potted by Euxitheos and painted by Euphronios, whose principal scene was two winged figures (Sleep and Death) taking away the body of the Trojan/Lykian hero Sarpedon (see *Iliad* 16. 476–507), killed by Patroklos. The justification for the acquisition of (and the price paid for) this vase was that it was a "work of art," in every sense comparable to woodcuts by Dürer or the painter of the Book of Hours (Watson and Todeschini 2006: x–xi). The seller was rather coy about its provenance, though there was a suggestion it might have been found in Beirut. Other scholars, who knew that other kraters painted by Euphronios had generally been found in Italy, with a large number coming from the Etruscan city of Caere (Cerveteri), were more suspicious. It later transpired that this vase too did indeed come from Cerverteri. It had been looted from an Etruscan tomb by *tombaroli* (tomb robbers), and broken in the process. It was moved via Switzerland and London to New York when (after being repaired) it appeared on the art market, and was then acquired by the Metropolitan Museum. After these facts came to light, it was subsequently returned to Italy, and is now to be found in the Villa Giulia in Rome.

There are two possible reactions to this story. One is, with James Cuno (2008) to lament that another of the prize specimens of one of the world's "universal" museums has been lost to the nationalist pressure of the Italian state, aided and abetted by UNESCO. This attitude was shared by a former Director of the Metropolitan Museum, who is on record as saying that all that is really significant about the Euphronios krater is "on the vase." I beg to differ. If we knew the precise context of this krater, if we knew what objects and persons were buried with it, and if we could determine their "object biographies," we would know a lot more about the Iron Age/Archaic Mediterranean world. We could begin to address such questions as: Why were the Etruscans so interested in Greek (particularly Athenian) painted pottery? Did they appreciate and understand the whole cycle of tales told about the Trojan War (especially relevant to the neighboring city of Caere, with its origin myth of Aineas, namely Rome)? Was this vase made for Italian consumers, or did it come to Caere "second hand"? This object, no less than the finds from Naukratis, is highly relevant to our understanding of Mediterranean connectivity (sensu Horden and Purcell 2000), and it is a pity that many museum curators and directors still do not seem to appreciate this simple point.

The point is perhaps easier to appreciate from a university's perspective. Archaeologists attached to universities, whether they are in departments of classics or art history (as is generally the case in the United States) or in departments of archaeology proper (as is the case in the United Kingdom), usually want to be involved in field projects, the only way in which to recover new information. Whether these projects are survey projects (involving fieldwalking) or excavation, the importance of locating finds in time and space, that is, in context, becomes second nature. It is also in universities that most of the debates about the nature of classical archaeology have taken place. Is classical archaeology just the archaeology of certain regions of the Mediterranean, whose methods and theories should differ little if at all from archaeology in general? What distinguishes classical archaeology from other archaeologies that deal

with historical periods (such as medieval archaeology, or that species of historical archaeology that deals with the colonial period in the Eastern United States)? There are several possible answers to these questions. As long ago as 1943, the distinguished (if classically educated) European prehistorian V. Gordon Childe argued strongly for the unity of archaeology, and suggested that the excavation and interpretation of classical houses at Olynthos in Northern Greece was no different in principle from the excavation and interpretation of the houses of the prehistoric (or "Pictish") village of Skara Brae in the Orkney islands (Childe 1943; see also Whitley 2001: 12–16). Both involved a considered approach to understanding domestic space, to defining the activities that took place in parts of the dwelling, and the importance of gender divisions within the household. Archaeologists who take a different view tend to emphasize one of two things: the unique standing of the classical Greek achievement, or the unique significance of its art.

These questions have gathered force and urgency as classical Greek archaeology has been affected by developments in other archaeologies. "New" or processual archaeology, as developed by anthropological archaeologists in North America or by prehistorians in Britain in the 1960s and 1970s, initially had little effect on the practice of classical archaeology. In the 1980s, however, a more scientific and quantitative classical archaeology began to emerge. Finds from sanctuaries that were once cataloged were now also counted, to reveal trends in depositional practices. These trends could be understood as processes, processes integral to the emergence of states [or at least *poleis*] in Archaic Greece (Snodgrass 1980). This processual and quantitative spirit informed the development of field survey during the 1980s, most especially in the Boeotia survey (see above). At about the same time, a number of French and German classical archaeologists had been applying structuralist approaches to the interpretation of images on sculpture and vases. These streams of thought come together in Francois de Polignac's *La Naissance de la cité grecque* (1984), which in some ways anticipated the "phenemenological" approaches that were to become fashionable in European prehistory after 1994. Social and contextual studies of Greek mortuary practices, and of the painted pottery found in graves, came to the fore by the end of the 1980s (Morris 1987; see also Whitley 2001: 55–7). This led to the expectation in some quarters (notably Shanks 1995) that classical archaeology would follow British prehistory in developing from a "traditional" through a "processual" and finally to a "post-processual" stage. This has not come to pass – traditional classical archaeologists have not been supplanted, but supplemented by other scholars with a range of theoretical interests, expressed with varying degrees of explicitness.

Classical Archaeology in Greece: Current Issues and Debates

The key practical debate relates to museums. Should the bulk of classical Greek material culture (and art) be held in "universal" museums (such as the British Museum), museums whose mission is to hold a representative part of the material remains of all civilizations? The argument for this is that greater intellectual and aesthetic insights will be gained through juxtaposing Greek and Roman with Assyrian and Phoenician (or even with ethnographic material from Polynesia) than will be gained if all material is simply held in the museums of nation states. Universal museums celebrate civilization as a whole, and act as an antidote for various nationalisms (in this case, Greek nationalism). Directors of these museums have certainly begun to make use of the rhetoric of object biography and of agency. But it has to be admitted that, as far as the Greek collections of the British Museum are concerned, the promise of the universal museum that makes arresting *comparisons* across time and space has yet to be realized. Trophies of captured Greek armor have not been juxtaposed with Congo nail fetishes, as "visible knot[s] which ties together an invisible skein of relations, fanning out into social space and social time" (Gell 1998: 62; cf. Whitley 2011). Moreover, the rhetoric of the "universal museum" glosses over the fact that such museums were, in origin, imperial museums. As one early twentieth-century British politician noted, the

British Museum's acquisition of major parts of the Mausoleum at Halikarnassos (one of the seven wonders of the ancient world) was aided by "a Company of Royal Engineers and Sappers, and a British man-of-war lying at a handy distance in a convenient bay" (Asquith 1900: 136–7).

The recent completion of the new Acropolis museum in Athens has brought these issues to the fore. This museum is explicitly designed to house, and reunite, all the fragments of the Parthenon now held in several parts of the world. As such, it is designed to advance the argument that the architectural decoration of the Parthenon must, first and foremost, be seen in *context* – and it is this, and not nationalism, that is the issue. But it has to be said that it makes this argument very poorly. For the new museum, pre-eminently, represents the ideology of the Greek political class. And, like the Greek political class, the museum is ultramodern on the outside, and ultraconservative on the inside. The plaster casts of the Parthenon frieze (taken from originals in the British Museum and the Louvre) are not painted, to give some idea of how the polychrome originals might have looked. In deference to an outdated neoclassical sensibility, they remain white – indeed, ultra-white, like teeth in advertisements for toothpaste. The Archaic votive sculptures from the Athenian Acropolis are not placed in context, or explained or displayed as votives, and linked to their inscriptions. They are not linked to debates about Archaic Athenian society. Instead, they are treated as individual works of art, that is, objects whose intrinsic aesthetic worth requires no contextualization (see again Price 1989).

Museums remain places where the impact of new ideas can often be seen. The new displays of Greek material at the Ashmolean museum in Oxford reflect, to some degree, the new interest in Mediterranean "connectivity" (Horden and Purcell 2000), and new debates about identity. "Greek" is no longer a self-evident category. The key debate in museums however remains the status of the objects displayed. Should Greek vases be seen as "artworks"? The new displays at the Ashmolean suggest not.

The debate on "Greek art" remains a lively one. On the one hand are scholars (such as myself) who, following Gell's (1998) recommendation of "methodological philistinism," see no reason to give sculpture and vase-painting special status. What is of interest is the agency of objects and the way they are entangled within social practices. So the importance of a *kore* with an inscribed base from the Athenian Acropolis is how its study contributes to debates about Athenian society, and whether that society was "aristocratic" (Duplouy 2006). Equally, the significance of the Nike of Paionios of Mende is not its aesthetic effect, but the way it negotiates the Scylla of *nike* and the Charybdis of *hybris* (Whitley 2011). On the other side are scholars such as Richard Neer, who insist that Greek sculpture can be understood in *aesthetic* terms, terms moreover which would have made sense to an ancient Greek (Neer 2010). This debate will run and run, as it goes to the heart of what classical archaeology is.

There are of course other major debates. One relates to identity and acculturation, and how processes such as the "Orientalizing" should be understood (Morris 2003). Another concerns the relationship between the various intellectual traditions that make up classical Archaeology – in particular, the German (Marchand 1996). There are developing connections between research themes. Both field survey and the debate about Mediterranean connectivity, for example, build on the work of the French historian Fernand Braudel, whose concept of the *longue durée* underpins the practice of diachronic, regional survey.

And yet, the skeptical prehistorian may ask, has classical archaeology in all this actually undergone anything like a paradigm shift? What has it contributed to archaeology as a whole? Some have answered the first of these questions in the affirmative (e.g., Snodgrass 1987, 2006: 78–104). As to the second, one could point to advances in field survey. But, in my view, the best example of a paradigm shift having taken place within classical archaeology, and of its wider (and beneficial) effects in the field of archaeology as a whole, is to be seen in the field of ceramic petrology. The establishment of the Fitch Laboratory at the British School at Athens in 1974 provided a place where scientists, trained

in the natural sciences, could work closely with archaeologists, whose background lay in the humanities. Through the vision of Hector Catling, and successive Fitch directors (Richard Jones, Ian Whitbread, and Vangelio Kiriatzi), C.P. Snow's "two cultures" could be bridged. Early expectations that the origin of painted pots could be determined by simple chemical tests proved only partially successful. It gradually became apparent that the production, distribution, and consumption of pottery, painted or coarse, involved a whole range of social as well as technological issues. Scientific advances (in the description of pottery fabrics, by Ian Whitbread) went hand-in-hand with discussion of the cultural dimensions of pottery production. The Fitch's methods combined field survey, ethnoarchaeological research into modern potters, archaeological experiments in replication of fabrics and various kinds of chemical and petrographic (thin section) analyses. The overall result is that archaeologists in Greece now approach pottery looking as much as the fabric (what it is made of, and how) as the surface decoration or shape. This is a genuine paradigm shift in the way we see pottery, and one which is having profound effects on other archaeologies.

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Urban Planning in the Greek World
- ▶ Winckelmann, Johann Joachim

References

Alcock, S.E., and R. Osborne, eds. 2007. *Classical archaeology*, Blackwell studies in global archaeology. Oxford: Blackwell.

Asquith, H.H. 1900. Address to the annual meeting of subscribers. *Annual of the British School at Athens* 6 (1899–1900): 135–137.

Carpenter, T.H. 2009. Prolegomenon to the study of Apulian red-figure pottery. *American Journal of Archaeology* 113 (1): 27–38.

Childe, V.G. 1943. The unity of archaeology. In *Conference on the future of archaeology*, Institute of archaeology occasional paper, vol. 5, 20–25. London: Institute of Archaeology, University of London.

Cuno, J. 2008. *Who owns antiquity? Museums and the battle over our ancient heritage*. Princeton/Oxford: Princeton University Press.

De Polignac, F. 1984. *La naissance de la cité grecque: Cultes, espaces et société VIIIe – VIIe siècles avant J.C*. Paris: Éditions de la Découverte.

Duplouy, A. 2006. *Le prestige des elites: Recherches sur les modes de reconnaisance sociale en Grèce entre les Xe et Ve siècles avant J.-C*. Paris: Les Belles Lettres.

Gell, A. 1998. *Art and agency: An anthropological theory*. Oxford: Oxford University Press.

Hamilakis, Y. 2007. *The nation and its ruins: Antiquity, archaeology and national imagination in Greece*. Oxford: Oxford University Press.

Horden, P., and N. Purcell. 2000. *The corrupting sea: A study of Mediterranean history*. Oxford: Blackwell.

Marchand, S.P. 1996. *Down from Olympus: Archaeology and Philhellenism in Germany 1750–1970*. Princeton: Princeton University Press.

Morris, I. 1987. *Burial and ancient society: The rise of the Greek city state*. Cambridge: Cambridge University Press.

Morris, I. 2003. Mediterraneanization. *Mediterranean Historical Review* 18 (2): 30–55.

Neer, R. 2010. *The emergence of the classical style in Greek sculpture*. Chicago/London: University of Chicago Press.

Price, S. 1989. *Primitive art in civilized places*. Chicago: Chicago University Press.

Shanks, M. 1995. *Classical archaeology of Greece: Experiences of the discipline*. London: Routledge.

Snodgrass, A.M. 1980. *Archaic Greece: The age of experiment*. Berkeley/Los Angeles: University of California Press.

Snodgrass, A.M. 1987. *An archaeology of Greece: The present state and future scope of a discipline*. Berkeley/Los Angeles: University of California Press.

Snodgrass, A.M. 2006. *Archaeology and the emergence of Greece: Collected papers on early Greece and related topics (1965–2002)*. Edinburgh: Edinburgh University Press.

Watson, P., and C. Todeschini. 2006. *The Medici conspiracy: The illicit journey of looted antiquities from Italy's tomb raiders to the world's greatest museums*. New York: Public Affairs.

Whitley, J. 2001. *The archaeology of ancient Greece*. Cambridge: Cambridge University Press.

Whitley, J. 2011. *Hybris* and *Nike*: Agency, victory and commemoration in panhellenic sanctuaries. In *Sociable man: Essays on ancient Greek social behaviour in honour of Nick Fisher*, ed. S.D. Lambert, 161–191. Swansea: Classical Press of Wales.

Classical Greece, Archaeology of (c. 490–323 BCE)

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Introduction

The Classical period in Greece spans most of the fifth and fourth centuries BCE, an age that witnessed both the Persian and Peloponnesian wars, followed by the rise of Macedon and the conquest of Western and Central Asia by Alexander the Great. Athens is represented disproportionately in the scholarship on this era, particularly in studies of the fifth century. This situation is due in part to the reputation of fifth-century Athens as a cultural zenith in the ancient world, although the survival of important monumental architecture in Athens and the surrounding countryside – and particularly the buildings from the Periclean building program on the city's acropolis – has also contributed to the focus on that region. Classical Athens is thus sometimes treated as representative of most or all of Greece in this period, although this perception probably does not reflect the reality of the ancient situation. Some Greek states are known to have differed markedly from Athens in customs and material culture; the most dramatic example is Sparta, Athens' major political and cultural rival. Unfortunately, the material remains from Classical Sparta are relatively scant, and they seem not to reflect the importance of this state in antiquity (cf. *Thuc*. 1.10.2).

Definition

Scholars traditionally define the Greek Classical period as the years between the first Persian invasion in 490 BCE and the death of Alexander III of Macedon, or Alexander the Great, in 323 BCE. Because of the importance of these dates in political and military history, they provide convenient chronological bookends for the period, although it is important to recognize that they do not necessarily reflect the state of material culture at individual archaeological sites, which often show significant continuities with the Archaic or Hellenistic periods. Geographically, "Classical Greece" encompasses the mainland and surrounding islands, as well as the colonies in southern Italy and western Asia Minor. Despite certain differences in culture and political structures, Macedonia is often considered in conjunction with Greece in this period; this is especially true for the latter part of the fourth century, when Philip II brought the Greek *poleis* (city-states) under the control of Macedon, and indeed, the remains from Macedonian sites such as Pella and Vergina attest to familiarity with the religion, mythology, and language of the Greeks.

From its beginning, the archaeological study of Classical Greece has been closely tied to the study of its architecture and art (although it is important to note that the Greek language had no word that corresponds to our definition of "art"); consequently, these topics loom larger in the archaeological scholarship of this period and region than in scholarship focused on many other times and places. Painting (primarily on pottery) and sculpture (in both stone and bronze) constitute the majority of the art historical evidence from this period, and architectural evidence ranges from large public buildings in sanctuaries to the remains of houses at sites such as Olynthos. Epigraphy and numismatics, while subdisciplines of Classical studies in their own right, have contributed much to the archaeological study of the Classical Greek world; faunal, archaeobotanical, and osteological remains also add to our understanding of this period, although they have traditionally played a smaller role in the archaeology of Greece than in that of other reasons, in part because many important Greek sites were excavated before the use of scientific techniques in archaeological studies became common.

Historical Background

The beginning of the Classical period is marked by the invasion of Greece by Darius I in 490 BCE;

his army was repelled that summer in the famous battle of Marathon, but 10 years later, the Persians invaded again, this time under the command of Darius' son Xerxes. The Greek forces again managed to defeat the invaders, but not before the Athenian acropolis was sacked and burned, an event that would be memorialized in the midcentury rebuilding of the sanctuary there. Following the Persian invasions, the Greek states began contributing funds to the "Delian League," the modern name given to the coalition led by Athens to defend against future invasions. As a result of Athens' management of the treasury, the middle and later decades of the fifth century saw mounting tensions among the Greek states, which culminated in the so-called Peloponnesian War of 431–404 BCE. During this long and bloody conflict, two coalitions of city-states faced off under the leadership of Athens and Sparta; although Sparta proved victorious, historians and archaeologists know far less about that state than about Athens, which remained highly visible in the material and literary record despite never returning to its former strength. The early fourth century saw Sparta, Athens, and Thebes jockeying for power in the Aegean; by the middle of the century, Macedon, under the leadership of Philip II, had also become an important player, and in 338 Philip's forces defeated the Greeks at the battle of Chaeronea, bringing the Greek cities under Macedonian control. Upon Philip's assassination in 336, his son Alexander III (Alexander the Great) assumed command, and he quickly moved into Asia, conquering large parts of the continent before dying in Babylon in 323. His death traditionally marks the end of the Classical period, and the years that followed were characterized by fragmentation of his empire and struggles for political and cultural supremacy among his successors.

The major archaeological sites of the Classical period include sanctuaries, towns, cemeteries, city centers, houses, and the industrial district of Thorikos in Attica. The sanctuary site that has attracted the most attention from scholars is the acropolis in Athens (Hurwit 1999), which included a sanctuary of Athena, as well as smaller ones devoted to other gods. The Athenian acropolis had already been an important site for centuries when the Persians sacked it in the early fifth century BCE, and the midcentury Periclean rebuilding program there contributed temples such as the Parthenon and the Erechtheion that are considered iconic even today. On the slopes of the acropolis sat the theater of Dionysus, where many of the ancient Greek comedies and tragedies that survive today were originally performed.

Temples and theaters were both frequently associated with Greek sanctuaries, although neither was required; in fact, the only necessary features of a sanctuary were the *temenos* (the plot of land reserved for the god) and altar, and some could be quite simple. Two of the most important sanctuaries, those at Delphi and Olympia, continued to be developed in the Classical period, although both had their origins in earlier periods. Both sanctuaries were Panhellenic (open to all Greeks) and were sites of athletic competitions as well as other sacred activities; Delphi was also known as an important oracular site. Other sanctuaries that were embellished during the Classical period include those at Eleusis, Brauron, and Epidaurus; this last site was home to the cult of the healing god Asklepios, and excavations there have recovered surgical tools, sleeping quarters for the sick, inscriptions detailing divine cures, and a variety of votive offerings left by pilgrims.

In addition to the public, sacred architecture of sanctuaries, archaeologists have excavated a number of houses that offer insights into facets of Classical domestic life (Nevett 1999, 2010). The so-called "Vari house" in the Attic countryside preserved a threshing floor and terracotta beehives, although most evidence for domestic life in the Classical periods comes from more urban areas, most notably the town of Olynthos on the Chalcidice peninsula in northeastern Greece. This city, which was destroyed by Philip II in 348 BCE, was excavated by an American team in the 1930s and remains one of the most important sites for the study of Greek domestic architecture. Its orthogonal plan was typical of cities built in the Classical period, and it includes blocks of modest houses with somewhat repetitive – if not entirely uniform – floor plans. Unfortunately, Philip's forces destroyed all but the foundations of most of the

houses, so crucial information about the upper stories that are known to have existed has been lost. Nevertheless, the site has yielded some important finds, including hundreds of terracotta loom weights; several houses also preserve pebble mosaic decorations on the floors of the *androne*s, men's dining rooms where drinking parties called symposia were held.

The central square of a Greek city was called an *agora*, several of which have been found throughout the Greek world. The *agora* that has received the most attention in modern times is the one in Athens, which is still undergoing excavation and which received several embellishments in the Classical period (Camp 1986). Athens is also known in modern times for its large extramural cemetery, the Kerameikos, where burials date back to Submycenaean times. By the Classical period, many of the private funerary monuments were stelae marking burials that were organized in plots, although one area of the Kerameikos, the Demosion Sema (Public Tomb), held burials of those who had died in war (Camp 2001).

A good deal of sculpture and painting survives from Classical Greece, and this along with the evidence just discussed forms the bulk of the material traditionally studied by archaeologists focused on this period (Stewart 1990; Boardman 2001), although the overwhelming focus on these types of evidence has been justly criticized (Lapatin 2003). Both sculpture and painting present scholars with a variety of difficulties, which in many cases result from the circumstances under which each type of material has been preserved. Most freestanding sculpture of the period was cast in bronze or constructed of other perishable materials (such as gold and ivory) and was thereafter melted down or otherwise destroyed (Mattusch 1988, 1996). Consequently, most Classical bronze sculptures are known only from literary accounts and the so-called Roman "copies," both of which present problems that are discussed below. Those that do survive – such as the Piraeus bronzes or the famous Riace warriors – tend to come to us from shipwrecks or warehouses, so scholars are unable to study them in the physical contexts for which they were intended.

Most of the sculpture that survives from the fifth and fourth centuries is stone architectural sculpture, frequently from temples; sanctuaries at Athens, Olympia, Bassae, and elsewhere have been especially useful to scholars concerned with sculptural trends in this period (Stewart 1990). To the extent that it is possible to generalize about sculptural styles of the Classical period, one can detect a move away from the rigid forms of the Archaic period, as well as an increasing interest in volume and movement rather than linear detail, although it is important to note that stylistic development was not completely uniform throughout the Greek world.

As with sculpture, the study of Greek painting is hampered by loss of important material; in fact, with a few exceptions, Classical Greek monumental painting is known mainly from literary accounts. We do, however, have thousands of pieces of painted pottery from Greece in this period, the bulk of which was produced in Athens in the fifth century and South Italy in the fourth (Boardman 2001). These objects, which were created for activities ranging from the symposium to the funeral, have furnished scholars with a tremendous amount of information about the mythology of the Greeks; there are also many scenes that have traditionally been thought to show daily life in Athens in elsewhere, although this interpretation is increasingly acknowledged as suspect (Ferrari 2003).

A few monumental paintings survive from this period; the earliest are the frescoes in the Tomb of the Diver at Paestum in Italy, which seem to date to c. 480–470 BCE. These paintings, which show a symposium and a diver, are consistent both stylistically and iconographically with the vase paintings that were being produced in Athens at the time; such similarities lend some credibility to scholarly efforts to understand lost monumental paintings from the evidence of painted pottery (Holloway 2006). Fourth-century Macedonia has also yielded a handful of monumental paintings; several tombs in a late-century royal tumulus at Vergina bear painted decoration, and the themes (a mythological abduction and a hunt) have parallels in art from Athens and elsewhere (Andronikos 1984).

Key Issues/Current Debates

A number of current debates in Classical Greek archaeology involve questions about how to interpret the surviving visual evidence, although these questions have implications that extend well beyond art historical concerns. As noted above, most of the bronze sculpture from this period has been lost, and for many years scholars relied on a combination of literary texts (such as the *Natural History* of Pliny the Elder) and Roman statuary to reconstruct famous lost pieces; it was believed that Roman sculptors were interested in producing faithful stone replicas of earlier Greek bronzes. It is now understood that Roman sculptures cannot be reduced to a series of copies of earlier works (Ridgway 1984), but since the foundational histories of Greek sculpture were written at a time when the old assumptions were believed to be valid, the generally accepted history of sculptural styles and chronologies for the period will need to be updated. Closely tied to this issue is the question of how literary sources should be brought to bear on the interpretation of visual and other material evidence; although these sources frequently furnish archaeologists with indispensable information about the past, they also contain important nuances to which we have not always been sensitive.

How to interpret visual evidence is also a matter of concern for scholars who focus on painted pottery, particularly when it comes to images that have been traditionally classified as "scenes of daily life." These images have frequently been used to fill in gaps left by other forms of evidence, and our understanding of the ways in which Greek people in the Classical period ate, drank, worshipped, practiced athletics, had sex, and buried their dead depends to no small degree on the evidence of the painted pottery (Boardman 2001). Scholars have begun to recognize, however, that many of these images may actually depict subjects that have nothing to do with life in Classical Greece and thus that their status as evidence for life in this period needs to be reevaluated (Ferrari 2003).

International Perspectives

The territories that were part of the Greek world in the Classical period cover portions of modern Italy and Turkey as well as Greece, but several other nations in Europe and elsewhere have long histories of engagement with Greek archaeology; these include (but are not limited to) England, Germany, France, and the United States. In addition to establishing archaeological schools and conducting excavations in Greece, these countries hold many objects from the Classical world in their collections. The conditions under which those objects left their countries of origin are not always in line with modern ideas about ethical collecting practices, and calls for the return of objects to the countries in which they were excavated are becoming increasingly frequent. Perhaps the best-known case is that of the Parthenon sculptures (sometimes called the "Elgin Marbles") that reside in the British Museum; in addition to repeatedly requesting their return, Greece has gone so far as to build a new Athenian acropolis museum to hold the sculptures. Less glamorous artifacts have also been the focus of discussions about repatriation, however, and recent years have seen the return of pottery and other objects from museums such as the Metropolitan Museum of Art in New York and the J. Paul Getty Museum in Malibu, California. At the heart of all of these discussions is the question of who "owns" the Classical past and how it can best be displayed and preserved, and at this time there is no scholarly consensus on either question (Neils 2001; Cuno 2008).

Future Directions

This article has already noted a few of the questions and challenges that face archaeologists of Classical Greece, but there are a number of others. One question that has occupied scholars for some time is how to understand the experiences of those members of society whose presence in the archaeological record is fleeting. For instance, fifth- and fourth-century Greek women are known to have

spent much of their time spinning, weaving, and engaging in other tasks relating to the production of textiles, but much of the physical evidence related to these activities is extraordinarily difficult to detect and interpret. With rare exceptions, the textiles themselves have perished, and items such as the loom weights that were found in the houses at Olynthos can tell us only so much about who engaged in weaving, and where, and when. Although Classical texts sometimes refer to women's quarters in Greek houses (Lysias 1), such spaces have been difficult to detect in the archaeological record, and comparative evidence from sites such as Pompeii and Herculaneum suggests that such issues would be highly complex even if Greek domestic sites had been better preserved. Slaves are another group that is often difficult to detect in the archaeological record, although scholars are becoming increasingly aware of the need to attempt to do so (DuBois 2003).

A second challenge that archaeologists of the Classical period face is that of dealing with objects that do not have well-understood excavation histories, of which there are unfortunately far too many. The problem is especially acute for the study of Athenian pottery, much of which was exported to Etruria in antiquity, eventually to be buried in tombs at Vulci and other Etruscan sites (Boardman 2001). Although some of these objects were recovered in controlled excavations, many were excavated illegally before finding their way to the eighteenth-century European art market. Scholars who have attempted to understand both the pottery itself and the Etruscan tombs in which it was once buried are at a large disadvantage as a result of this lack of provenance, so one of the major challenges facing those who study such material is that of reconstructing, to the extent possible, the contexts in which the pottery would have been used and deposited in antiquity.

A third important task archaeologists have begun to undertake is that of reconstructing the ways in which people interacted with built spaces in Classical Greece. Sanctuaries such as those at Delphi and Olympia (Scott 2010), the sanctuary of the Great Gods at Samothrace (Samothrace 2012), and the acropolis at Athens (Ferrari 2002) have all lent themselves to this sort of investigation, and it is to be expected that such studies will become both more common and more refined as technologies for three-dimensional modeling continue to develop.

Cross-References

- ▶ Agora in the Greek World
- ▶ Ceramics, Ancient Greek
- ▶ Classical (Greek) Archaeology
- ▶ Numismatics, Ancient Greek
- ▶ Religion, Greek, Archaeology of

References

Andronikos, M. 1984. *Vergina: The royal tombs and the ancient city*. Athens: Ekdokite Athenon.

Boardman, J. 2001. *The history of Greek vases: Potters, painters, and pictures*. London: Thames and Hudson.

Camp, J. McK. 1986. *The Athenian Agora: Excavations in the heart of classical Athens*. New York: Thames and Hudson.

Camp, J. McK. 2001. *The archaeology of Athens*. New Haven: Yale University Press.

Cuno, J.B. 2008. *Who owns antiquity? Museums and the battle over our ancient heritage*. Princeton: Princeton University Press.

DuBois, P. 2003. *Slaves and other objects*. Chicago: University of Chicago Press.

Ferrari, G. 2002. The ancient temple on the Acropolis at Athens. *American Journal of Archaeology* 106 (1): 11–35.

Ferrari, G. 2003. Myth and genre on Athenian vases. *Classical Antiquity* 22 (1): 37–54.

Holloway, R.R. 2006. The tomb of the diver. *American Journal of Archaeology* 110 (3): 365–388.

Hurwit, J.M. 1999. *The Athenian Acropolis: History, mythology, and archaeology from the Neolithic era to the present*. Cambridge: Cambridge University Press.

Lapatin, K. 2003. The fate of plate and other precious metals: Toward a historiography of ancient Greek minor (?) arts. In *Ancient art and its historiography*, ed. A.A. Donohue and M.D. Fullerton, 66–91. Cambridge: Cambridge University Press.

Mattusch, C.C. 1988. *Greek bronze statuary: From the beginnings through the fifth century B.C.* Ithaca: Cornell University Press.

Mattusch, C.C. 1996. *Classical bronzes: The art and craft of Greek and Roman statuary*. Ithaca: Cornell University Press.

Neils, J. 2001. *The Parthenon frieze*. Cambridge: Cambridge University Press.
Nevett, L.C. 1999. *House and society in the ancient Greek world*. Cambridge: Cambridge University Press.
Nevett, L.C. 2010. *Domestic space in classical antiquity*. New York: Cambridge University Press.
Ridgway, B.S. 1984. *Roman copies of Greek sculpture: The problem of the originals*. Ann Arbor: University of Michigan Press.
Samothrace: Framing the Mysteries in the Sanctuary of the Great Gods. 2012. Atlanta: Emory. Available at: http://samothrace.emory.edu
Scott, M. 2010. *Delphi and Olympia: The spatial politics of Panhellenism in the archaic and classical periods*. Cambridge: Cambridge University Press.
Stewart, A.F. 1990. *Greek sculpture: An exploration*. New Haven: Yale University Press.

Further Reading

Biers, W.R. 1992. *Art, artefacts, and chronology in classical archaeology*. London: Routledge.
Biers, W.R. 1996. *The archaeology of Greece: An introduction*. Ithaca: Cornell University Press.
Donohue, A.A. 2005. *Greek sculpture and the problem of description*. Cambridge: Cambridge University Press.
Pedley, J.G. 2005. *Sanctuaries and the sacred in the ancient Greek world*. Cambridge: Cambridge University Press.
Pedley, J.G. 2011. *Greek art and archaeology*. 5th ed. Upper Saddle River: Prentice Hall.

Clay Pipes in Historical Archaeology

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Introduction

In the late sixteenth century, a new class of artifact began to appear within the archaeological record. This was a specially designed receptacle for smoking tobacco which consisted of a bowl in which the tobacco burned and a perforated tube through which the smoke was inhaled. To begin with, in England, clay pipes were made in iron-free, white-firing clays, made in one piece, in two-part molds and fired in specially designed kilns. This technology quickly spread through western Europe and to European overseas colonies, including those in north America from whence, arguably, the idea – though not the technology – had originally come.

By the early seventeenth century, a parallel development occurred within the Ottoman Empire where the earliest pipes – the *chibouk* – were mold-made in red-firing clays but consisted solely of bowls to which were added smoking stems made of wood or reed. They are often described as "stub-stemmed."

Both of these traditions were adopted in different parts of the world, often as the result of trading contacts with European countries. For example, in northern and western Africa, variations of the stub-stemmed tradition were developed. While in Japan, following contact with Dutch merchants, a local form – the *kiseru* – evolved, along with complex patterns of social interaction.

The Archaeological Record

Clay tobacco pipes have been regarded as essential elements in the study of postmedieval excavated assemblages since the 1960s. This is for four main reasons. Firstly, they were mass produced, are brittle and short-lived, have no resale value, and survive well in archaeological deposits. Secondly, they are ubiquitous from the early seventeenth until the late nineteenth centuries. Thirdly, they show chronological and spacial variation making them an ideal type fossil, and finally, they can frequently be identified to maker.

Initially, with their rapidly changing forms and short lives, pipes were valued by archaeologists as a means of dating. In many cases, especially in the period up to 1800, individual forms can be dated to within 20 or 30 years. Although a number of elaborate but still unconvincing statistical dating systems have been evolved, the majority of specialists rely more on formal and decorative detail, together with evidence provided by the marks and stamps of individual makers carried on the pipes.

Wider Interpretative Possibilities

More recently the pipe evidence from excavations has been used for a number of additional avenues of site interpretation. First, given the large numbers often recovered, their chronological range can indicate the degrees of residuality or intrusion for individual contexts. Secondly, as patterns of regional production become more clearly defined, marketing networks on a local, regional, or international scale can be defined. Thirdly, as the contemporary value of pipes was determined by the amount of skill and labor involved in their production, it is possible to compare the socioeconomic status of individual sites by assessing the quality and complexity of the molds used in conjunction with the amount of care and time involved in finishing the pipes once they had been formed. Finally, pipe studies have increasingly focused on the decorative messages carried on them. Possession of a particular style of pipe represented a statement of individual identity. They carry a wide range of symbols of contemporary popular culture, from political slogans to popular song.

Research Issues

While the detail of regional and chronological development is well understood in countries such as the British Isles, the Netherlands, and the USA, for much of the world, the state of knowledge is very patchy (Davey 2009). Regional studies such as the detailed account of Bavaria (Mehler 2010) are essential for the establishment of patterns of trade and influence. The information that they provide can then be brought to bear on the study of patterns of trade at specific sites such as Stade in Germany (Leenen 2013), Eger Castle in Hungary (Varga 2014), or Stari Bar in Montenegro (Gelichi and Sabbionesi 2015).

In the past decade, the availability of digital resources for pipe research has increased almost exponentially. For example, the major archive of published and unpublished material and the world-class collection of smoking-related artifacts held by the Amsterdam Pipe Museum is now accessible online (www.pipemuseum.nl/). Similarly, access to detailed information on the holdings of the National Pipe Archive in Liverpool which is particularly important as a resource for field archaeologists has recently been placed on the internet (www.pipearchive.co.uk). These and similar resources are providing a stimulus for interdisciplinary and multicultural study of the history and effects of tobacco consumption throughout the world.

Cross-References

- ▶ Académie Internationale de la Pipe
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Chronological Systems, Establishment of
- ▶ Consumption, Archaeology of
- ▶ Dating Methods in Historical Archaeology
- ▶ Historical Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Post-Medieval Archaeology
- ▶ Site Formation Processes

References

Davey, P.J., ed. 2009. National clay pipe summaries. *Journal of the Académie Internationale de la Pipe* 2: 1–148.

Gellichi, S., and L. Sabbionesi. 2015. Turkish pipes from Stari Bar, Montenegro. *Journal of the Académie Internationale de la Pipe* 8: 21–50.

Leenen, S. 2013. Pfeifenfragmente aus der Hafengrabung in Stade. *Journal of the Académie Internationale de la Pipe* 6: 169–201.

Mehler, N. 2010. *Tonpfeifen in Bayern(ca. 1600–1745),* Zeitschrift fűr Archäologie des Mittelalters, 22. Bonn: Rudolf Habelt GMBH.

Varga, E. 2014. Seventeenth to eighteenth-century Turkish pipes at Eger Castle. *Journal of the Académie Internationale de la Pipe* 7: 1–13.

Further Reading

Jahshan, P. 2011. The changing representations of tobacco and pipe smoking in the old and new worlds between the seventeenth and nineteenth centuries. *Journal of the Académie Internationale de la Pipe* 4: 1–14.

Oswald, A. 1975. *Clay pipes for the archaeologist*, British Archaeological Reports 14. Oxford. *The archaeology of the clay tobacco pipe,* 1–19. Oxford: British Archaeological Reports.

The Following Periodicals

Journal of Historical Archaeology.
Journal of the Académie Internationale de la Pipe.
Knasterkopf.
Pijpelogische Kring Nederland.
Post-medieval Archaeology.

Clay Tobacco Pipes

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Introduction

Smoking is the practice of tasting or inhaling smoke which is absorbed into the bloodstream, or smoke was blown into or onto individual's healing, ceremonial, or sacrificial rituals. The smoke was produced by burning a substance such as sacred herbs or grasses. The English word "tobacco" originates from the Spanish and Portuguese word *tabaco* which is derived, at least in part, from Taino, a language of the Caribbean Arawak people. Tobacco is a product prepared from the dried or cured leaves of the tobacco plant which is part of the genus *Nicotiana* and of the Solanaceae (nightshade) family. The more potent variant *N. rustica* is native to parts of the tropical New World; today more than 70 species of tobacco are known. Reliable archaeological evidence is scant, but it is believed that tobacco growing began in the New World in the Caribbean and adjacent southern Mesoamerica (what is today southern Mexico and parts of Central America) ca. 6000 BC and by 4000 BC was used in shamanistic rituals (Gately 2007). About 1000 BC, people in the Maya region of Mesoamerica chewed and smoked the leaves of the tobacco plant and mixed the leaves with herbs apparently for medicinal purposes. Tobacco was smoked as rolled leaves – a cigar – or as bits of tobacco leaf burned in a container, censers and pipes. Subsequently, tobacco plants were dispersed by human migration into South America; the Eastern United States received imported tobacco and cultivated native plants. In the Old World, Herodotus described the Scythians of eastern Eurasia as inhaling the fumes of burning leaves, perhaps incense, in ca. 500 BC. The use of handheld devices for burning tobacco has a complex antiquity in both the Old and New World. The most widespread prehistoric distribution of the clay and stone pipes is in the Americas (Gately 2007; Goodman 2005).

Historical Background of Tobacco Smoking

Native American cultures have pipe-smoking traditions, particularly using tobacco, which have been part of their cultures long before Europeans arrived during the Age of Exploration. Early tobacco pipes were drilled hollow tubes of stone, wood, bone, or fired clay, often in the form of a large cigar holder, perhaps replicating the shape from that of a tube of cane. This type is found almost exclusively in the Mississippi River Basin and further west and in northern South America where it was employed to blow out the smoke rather than for drawing it into the mouth. In Midwestern North America, ceremonial pipes were carved from catlinite, a distinctive reddish-colored mineral that was soft, easily excavated, and carved, hardening on exposure to air (West 1934).

In Eastern North America, the prehistoric pipe was modified considerably from the original tube by acquiring a stone or fired clay bowl affixed to a straight or bent stem. Other varieties included the monitor pipe with a bowl set on a flat base perforated as a stem, hourglass pipes, and biconical pipes.

Columbus was likely the first European to see tobacco leaves, although he did not smoke them himself, but one of his crew, Rodrigo de Jerez, observed natives on the island of San Salvador smoking tobacco leaves. He became the first European to partake in the act of smoking and

Charles C. Kolb has retired.

took some tobacco back to Spain where it became popular by 1500. European colonists in the Caribbean had established large tobacco plantations and exported tobacco to Europe by 1530. Apparently Sir Francis Drake brought a consignment of tobacco to England in 1573. In 1586 Sir Walter Raleigh was introduced to smoking tobacco in a clay pipe by the Governor of Virginia, Ralph Lane. Raleigh introduced tobacco smoking at the court of Queen Elizabeth I, and colonists returning from the Americas further introduced it to Tudor English society. This entry focuses on tobacco smoking and varieties of clay pipes produced since the sixteenth century.

Definition of Tobacco Pipes

Tobacco pipes, also simply pipes, are devices for smoking tobacco. The anatomy of a pipe comprises a cup-like chamber, the bowl, for tobacco which is handheld while packing, holding, and smoking the pipe, and a thin hollow stem ending with or without a mouthpiece or bit. The inner chamber of the bowl has a draft hole leading to the hollow stem. Stems were fabricated as a part of the bowl or separately. Bowls of tobacco pipes have been made from briarwood or other dense-grained woods such as cherry, olive, maple, mesquite, oak, and bogwood. Corncob, meerschaum, catlinite, and soapstone were also used. Stems and bits of these types of tobacco pipes were usually made of reed, bamboo, or hollowed-out pieces of wood; more recent stems and bits are made of moldable materials such as vulcanite, Lucite, Bakelite, and soft plastic. Fired clay smoking pipes in the New World were handmade and often decorated by incision, punctuation, or applique, while Old World clay pipes were fabricated in molds which had simple decoration within the mold which would transfer to the bowl and sometimes the stem. Some stems also had markers' marks and occasionally a date of manufacture. One-piece molded clay pipes also had flat heels later replaced by spurs (Fig. 1; Ayto 2002).

The fundamental function of the pipe is to provide a relatively safe, manipulable volume in which to incompletely combust tobacco (and/or other smokable substances) while allowing the smoke drawn from this combustion to cool sufficiently for inhalation by the smoker. Typically this is accomplished by connecting a refractory bowl to a stem which extends and cools the smoke mixture drawn through the combusting organic mass and delivers the smoke from the bowl to the user's mouth. The stem needs a long channel of constant position and diameter running through it for a proper draw.

Manufacturing Clay Smoking Pipes

Clay Selection

There are four main groups of clays: kaolinite, montmorillonite-smectite, illite, and chlorite. Different types of clay, mineral additives, and firing conditions will produce earthenware, stoneware, and porcelain (This section is based on Kolb 1997). In North America, many clay pipes were historically made from more terracotta-colored clays which were also used to fashion pottery vessels. Pipes of terracotta clays were initially introduced into the Old World, but the preferred material was pipe clay or "tobacco pipe clay" which has exceptional bonding properties and plasticity and fires to a white color. European and Colonial American pipe manufacturers selected ball clays, which are kaolinitic sedimentary clays composed of 20–80% kaolinite, 10–25% mica, and 6–65% quartz. A single deposit had variations in composition, including the quantity of major minerals, accessory minerals, and carbonaceous matter. Many authors use the term "kaolin" generically to describe clays that fire white. Finished pipes were not very strong and frequently broke, but replacements were inexpensive.

Fabrication

A bench vice or gin press and simple hand tools were used in the forming process, including knives with specially shaped blades for trimming mold flashing, handstoppers for forming the hole, various smoothing tools, and thin piercing rods of brass or steel (called "wires") for creating the bore

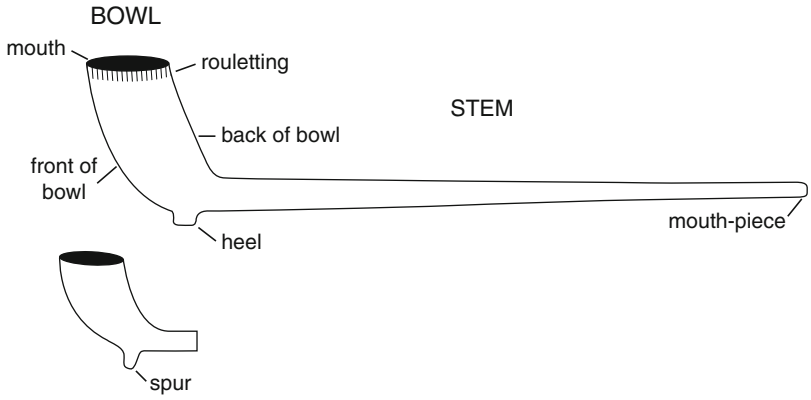

Clay Tobacco Pipes, Fig. 1 Configuration and components of a typical clay smoking pipe (Author's drawing)

in the stem. The gin press was a simple vice with an overhead lever (a "gin handle") which activated a perpendicular rod which terminated with a plunger or "stopper" which was used to punch out and form the bowl interior while the pipe was still inside the two-piece mold; some lever rods had screw mechanisms. A gin press was mounted on a simple bench, similar to a cobbler's bench, and was straddled by the pipe maker. An analogy is the basic mechanism of a hand-operated "juicer" for extracting fruit juice from halved citrus (although the concave and convex surfaces are reversed). The gin handle is used to lower the plunger into the mold to fabricate the bowl interior by pressing the clay into the mold halves, thereby impressing the molded decoration into the bowl exterior and simultaneously creating the bowl interior. However, this procedure was applicable only to forming upright bowls, e.g., those that were perpendicular to the stem, rather than bowls that were attached an acute angle to the stem (Fig. 2). Gang pipe molds made of cast iron are reported for the nineteenth century from Eastern North America.

The piercing rod and mold halves were lightly greased, usually with lard or a light oil, to facilitate the creation of the borehole and removal of the formed pipe. The molder would take the roll of clay, lay it on a work bench, pierce it lengthwise with a rod, and then place the roll into one of the mold halves. The other mold piece was positioned, and clamped with a quick threaded handle, the entire assembly was pressed in either the bench vice or gin press, the latter fashioning the

Clay Tobacco Pipes, Fig. 2 Dutch single pipe brass mold (Author's collection)

bowl interior. The assembly was then removed from the vice, and the rod was rotated so that the stem bore "married" the bowl interior. The hand manipulation of the piercing rod (rotation and back-and-forth movements) and the configuration of the rod itself are significant elements in critiquing the "pipe stem dating" techniques (discussed subsequently in this entry). The pipe maker's initials or name, the name of the towns or production location, cartouches, or rebus might be incorporated into the mold or, less frequently, be separately stamped into the plastic clay bowl or stem. Rectangular stamps with the maker's names were generally confined to one side of the stem. Cartouche marks were stamped on the sides or rear of the bowls beginning in the late seventeenth century and included the initials or name of the maker and the name of the town; dates were also

included. English pipe makers began to discontinue the use of cartouches beginning about 1860.

The treatment of mold lines is a potential indicator of mass production and the relative cost of a pipe. The two halves of the mold employed to form the exterior of the pipe rarely match perfectly, so that a ridge of clay remains along the centerline of the pipe as the mold halves are squeezed in the vice and excess clay is extruded. During the early years of pipe making by hand, this ridge was scraped or trimmed but, in the mass production of less expensive varieties of pipes – where the quantity of pipes produced replaces the quality of the finished product – demonstrates that there was little or no attempt to scrape the mold centerline flat or otherwise to finish the bowl completely. This saving in hand-finishing time is also one possible reason for the development of fluted pipes. In addition to a better finger-grip on the bowl by the smoker when filling the bowl with tobacco (thereby reducing stem breakage), the flutes create an additional technique for centerline mold finishing whereby it was quicker to flatten the mold-line seam along a flute or a vertical noded area than to spend valuable time smoothing the bowl joint on an unfluted pipe.

The stem rod remained in place during the trimming phase of production was removed prior to baking. Excess clay would be trimmed from the bowl top and mold joins with a specialized knife (the "cutter off"), the piercing rod was removed, and the assembly was left to air-dry on a rack or second bench called a "bunch board," each of which held a dozen pipes. Once the clay was leather hard, the mold was removed, and the pipe was allowed to dry further. A thin wire was often passed through the bore to prevent distortion during the shrinking process and facilitate the bending of stems for curved-stem pipes. Skilled artisans were able to fabricate twisted stems; some pipe stems were looped into knots not unlike a pretzel, or stems with spring-like coils were also fashioned. Trimmers and finishers used specialized knives ("trimmers") and burnishing tools to remove rough edges on the more expensive pipes, and the pipe would be inspected for flaws prior to saggar firing. Burnishing tools were made from copper, bronze, iron, horn, or wood. Decorative bowls were retouched with a bodkin. If a simple clamp or bench vice rather than a gin press was used, the bowl top would have to be trimmed with a knife. This was normally done following the long axis of the pipe. The superfluous clay was recycled. Men molded the pipe and fashioned the borehole. Generally, women and girls performed the trimming operations.

"Firing"

Technically, the appropriate term is "baking" rather than "firing" products made from clay. By 1771, three types of kilns for firing clay tobacco pipes were in use and recorded by Oswald (1975) who lamented that few studies of pipe kilns and kiln furniture had thus far been conducted; this condition has since been addressed by Walker (1977) and Peacey (1996) who detail this process. The three kiln types noted by Oswald were (1) small, circular (ca. 4 1/2 ft in diameter) kilns in which pipes were fired in a muffle (a large saggar) or crucible (most authors refer to these as "muffle kilns"), (2) large square kilns (ca. 12 1/2 ft per side) in which saggars were used, and (3) large circular kilns (16–17 ft in diameter), developed by the Dutch, which also used saggars.

Several thousand pipes were baked at one firing in updraft kilns fired with charcoal or wood, and, in more recent times, coal or coke; oak was used as a fuel in the United States (Walker 1977). Small saggars or muffles (large saggars) have been used since the mid-eighteenth century and extensively employed since the early nineteenth century. Pipes were loaded in a vertical position with bowls lowermost in the saggar, or the pipes were stacked directly on kiln shelves. Saggars were of two types, enclosed and open-bottomed; small muffle kilns accommodated at least a dozen saggars.

Bannerman's Eagle Tobacco Pipe Manufactory located at Rouses Point, New York, near Lake Champlain used circular kilns from 1875 to 1884 which could accommodate 500 "baking pots," each holding 280 pipes (Sudbury 1980). One hundred gross of pipes (140,000 pipes) were fired at one time, and a new firing took place every 8 days. A firing schedule at the

McDougall clay pipe factory in Glasgow is reported for 1967 (Walker and Walker 1969). McDougall's had four kilns each capable of taking approximately 300 saggars stacked 10 or 11 high.

Kiln temperatures were raised in increments to ca. 900–950 °C, a "white heat," for between 15 and 20 h, and the subsequent cooling period required up to 3 days. The pipes had changed from "... a dull blue color and very limp and soft, have become perfectly white and hard" (Zorn 1892:37). Walker (1977) estimated an 8–10 h firing at 960 °C. Wasters were rarely salvaged for reuse, often ending as walkway or road fill or rubbish heaps, or thrown in rivers such as the Thames.

Final Finishing

For better-quality pipes, the final stage of manufacture was to dip an inch or more of the mouthpiece or bit into a mixture of soap, gum, and wax, or resin, or sealing wax so that the clay bit would not adhere to the smoker's lips. Noël Hume (1970: 302) believes that the wax coating was introduced only during the eighteenth century. Lesser-quality pipes had their mouthpieces dipped into the same white clay in solution (self-slipping) for the same purpose. Slipping the pipes after a bisque or biscuit firing was practiced in France and, therefore, required a second baking. The more elaborate and expensive pipes were polished with flint nodules; flint blades were used to remove any flashing from the stem hole-bowl junction. Finished pipes were packed in nailed wooden boxes or hooped barrels using wood shavings, sawdust, chaff, or straw for cushioning. The expensive pipes produced by hand were wrapped in tissue paper, in the same manner as high-quality produce is treated today. In England during the seventeenth and eighteenth centuries, a gross was 180, but the standard wooden box during the nineteenth century held 144 pipes. At the McDougall factory in Glasgow, Walker and Walker (1969: 145) report that "... a pipe-maker's gross was the standard 144, but in early parts of the process 192 – sixteen dozen – was a pipe-maker's gross to allow for breakage and rejects." American producers packed 100 pipes per container, but a review of merchants' records suggests that 30, 60, or 75 items per box were not unusual (Akron Smoking Pipe Company 1895).

Clay Tobacco Pipes from England

After the introduction of tobacco from the American colonies and Caribbean in the 1530s, the manufacture of clay tobacco pipes in England began in 1558 (Barber 1879; Higgins 1999; Cambridge 2012; Fox 2015). The earliest written description of smoking was in 1573 and described a pipe derived from native North American types. Alexander (1967), Noël Hume (1970), Oswald (1975), and Walker (1977) discuss typologies based upon English pipe bowl changed through time. Typologies based upon heels and spurs, stem thickness, stem curvature, and stem decorations are reviewed by Walker (1977). The characteristics of bowl decoration are most frequently used to discern types and establish relative chronologies. By 1580 the pipe bowl was barrel-shaped with a flat heel and 1/4″ (6 mm) inside diameter. The bowl and rim were inclined at an obtuse angle to the stem. Stems were 4–6″ (100–150 mm) in length with a borehole of approximately 8/64″ (3 mm) bore down their length. Tudor molds were made initially of carved wood; metals such as lead, brass, bronze, and iron were subsequently used. By 1640 the bowl inside diameter had increased to about 3/8″ (9.5 mm) as tobacco prices continued to fall, although stem lengths remained basically the same. After this date the bowl grew larger, and the stem increased to 10–14″ (250–350 mm). A pointed spur replaced the flat heel, and this design became the standard for the next 60 years. Milled or plain round the rim and occasionally a maker's mark appeared, although generally seventeenth-century pipes were plain. Bowl styles varied from region to region, and by 1680, nearly every town in England had a pipe maker, and clay pipes were the smoking pipe of choice. Production peaked about 1700 and declined thereafter due to snuff taking which became more fashionable but would peak again in the 1850s. The Worshipful Company of Tobacco Pipe Makers & Tobacco Blenders was founded in London in 1619 as a

trade association tasked with regulating the manufacture of clay pipes. Oswald (1975) remarks that there were at least 7200 pipe makers in Britain. Makers' marks appear in a variety of locations on the bowl including on the back, front, and sides, on the base, and on the sides of the spur or heel, as well as on the pipe stems for London ca. 1580–1710 (Pearce and Grey 2009). Oswald (1975) notes that most pipes were unmarked, including 99 percent of pipes manufactured in the early seventeenth century, diminishing to about 40% in the nineteenth century. Higgins has, to date, cataloged 32,000 different pipe stamps (Higgins and White 2017). A primary resource on typologies and chronologies is Davey (1979–2004).

By 1700 the bowl had become more elongated with an inside diameter of about 1/2″ (13 mm), and the stem had a bore of from 3/32 to 1/8″ (2.4–3.0 mm). The size of the bowl gradually doubled in size to hold more tobacco which had become very affordable. Early-eighteenth-century pipes often had flat-bottomed (pedestal) spurs or no spurs at all. By the mid-eighteenth century, very long pipes – called alderman or straws – were introduced which were 18–24″ (450–600 mm) long and with a bore diameter averaging 3/32″ (2.4 mm). These were made for leisure smoking. Some London pipe makers produced rare decorated bowls incorporating heraldic art at this time, and leaf or barley patterns were commonly used to cover seams on the bowl. By 1750 pipes with masonic arms, public house symbols, and military regimental badges were all being made. After 1850 the "yard of clay" or churchwarden pipes up to 36″ (900 mm) in length appeared. Working men, however, preferred a short-stem pipe (called cuttys or "nose warmers") that could be gripped between the teeth while they carried on working. Decorated pipes greatly increased in number and were often used for advertising or commemorative purposes. They were called "fancy pipes" or "fancies," and bore size was reduced to a low of 4/64″ (1.6 mm). In the nineteenth century, three- or four-part molds were used for more complicated designs such as portrait pipes. This was the peak of clay pipe variety and design, when use was at its highest (Higgins 1999). However, clay pipes came under increasing pressure during the late nineteenth century from cigars, briar pipes, and cigarettes.

The National Pipe Archive (NPA) was founded to collect and preserve documentary and archaeological evidence relating to the history and culture of pipe smoking. A publicly available display highlighting the NPA's holdings and research can be seen in the Victoria Gallery and Museum at the University of Liverpool, http://www.pipearchive.co.uk/. The archive has three principal aims:

1. To collect, conserve, and maintain a national archive of the tobacco pipe industry and related matters for the benefit of the public
2. To promote and encourage the general education of the public in the study of the tobacco pipe industry and related matters
3. To encourage archaeological, historical, sociological, and economic research into the subject, by making its collections as widely accessible as possible

The archive's co-curators are archaeologists, Drs. David Higgins and Susie White (Higgins and White (2017); they are also the current editors of the *Society for Clay Pipe Research Newsletter*. This important global resource (1984–2016, 89 vols., 1480 articles) (http://scpr.co/) is being reformatted for the Internet.

The annual English output during the eighteenth century was 750,000 gross – e.g., 108 million pipes per year (Chalkley 1955). The French firm Fiolet at Pas-de-Calais is reported to have 1200 different designs available by the late 1800s, while Gambier, another French firm, offered 2039 shapes. Fiolet had 850 workers who fabricated 200,000 gross of pipes in 1 year, a production of 28.8 million pipes per annum. Clay pipe production became a significant industry in medieval England until the early twentieth century. Major production centers were in and around significant clay and coal fuel sources: London, Manchester, Bristol, Cambridgeshire, Staffordshire, Broseley in Shropshire, Surrey, Southampton, and Stockton-on-Tees, as well as Wales; Glasgow, Scotland; and Dublin, Shannon, and Knockcroghery (County Roscommon), Ireland, where they were called dúidíns. Pipes were also

made in Australia and Canada, France (including painted porcelain forms), the Netherlands (especially at Gouda), Belgium, Germany (Westerwald, Brandenburg, and Prussia), and Austria. Smaller production centers were located in Scandinavia (Denmark, Sweden, and Norway); Iberia (Spain and Portugal); Chioggia near Venice, Italy; the Balkans; and the Turkish Ottoman Empire.

Clay Tobacco Pipes from the Americas

In the Eastern United States ca. 1740, individual pipe makers produced a widely distributed pipe made from a distinctive high-quality, deep red, local clay with large bowl with a short stem into which a longer reed stem was inserted. Pamplin, Virginia, was one of the manufacturing sites, and from 1878 to 1951, the Pamplin Smoking Pipe and Manufacturing Company produced clay smoking pipes which have been studied and a bowl typology of 39 forms published (Hamilton and Hamilton 1972).

Some Bristol makers migrated to New Brunswick Canada, and Scottish pipe makers came to Montreal and Toronto (Walker 1977). The great majority of clay tobacco pipes found in New World contexts were imported from England, with fewer examples from Continental manufacturers.

Dating Pipes: Pipe Stem Dating and Bore Measurements

The technique of seriation, developed by archaeologist James A. Ford for ceramics, is based upon the proposition that artifacts exhibit certain patterns of popularity in a temporal framework. Four dating techniques are available to archaeologists studying seventeenth- and eighteenth-century English clay tobacco pipe stems: Harrington's (1954) histogram of time periods, Binford's (1962) linear formula, Hanson's formulas (1971), and the Heighton and Deagan formula (1972). Harrington's histogram of five basic time periods proved useful to archaeologists, and they critiqued and expanded on the idea. Binford converted the progression to an easily understood mathematical straight-line regression formula (Table 1) that became popular and currently still in use when applied to most pre-1800 British colonial and federal sites. However, Noël Hume and Walker provided examples of Binford's formula that yielded dates that were inconsistent with other dating methods. By 1971, Hanson proposed ten straight-line regression formulas to replace Binford's single formula, but these were still based on Harrington's original study. Heighton and Deagan proposed a curvilinear regression formula in 1972 based on their own bore size research. Despite the passing of four decades, there has been insufficient data generated to adequately test the latter two formulae, likely because they seem "complicated" in contrast to the "simplistic" Binford formula. McMillan (2010) suggests that all the three need to be used in conjunction.

Kolb (1983, 1997) faulted the method itself using data from Barcelona Harbor, Chautauqua County, New York. Among the historic materials excavated from a 1 square meter context in the harbor was an assemblage of 280 fragments of white clay smoking pipes (78 fluted bowls and 202 stems and bits) (Fig. 3.). Apparently packed in a wooden box or crate, this assemblage represents one of the largest unique and homogeneous collections fabricated during a brief period in a single manufactory from only a few molds. Assuming British provenance, stem bore diameters suggest that the specimens dated 1710–1750 CE, while bowl shape and angle of attachment predicated 1780–1820, but descriptive data postulated the period from 1800 to 1860. Borehole diameters are affected by the wire or rod that maker employs to create the bore, so that the occurrence of stems with two different bore

Clay Tobacco Pipes, Table 1 Binford's linear regression

1590–1620: 9/64″ (0.141″) = 3.6 mm
1620–1650: 8/64″ (0.125″) = 3.2 mm
1650–1680: 7/64″ (0.109″) = 2.8 mm
1680–1720: 6/64″ (0.094″) = 2.4 mm
1720–1750: 5/64″ (0.078″) = 2.0 mm
1750–1800: 4/64″ (0.062″) = 1.6 mm

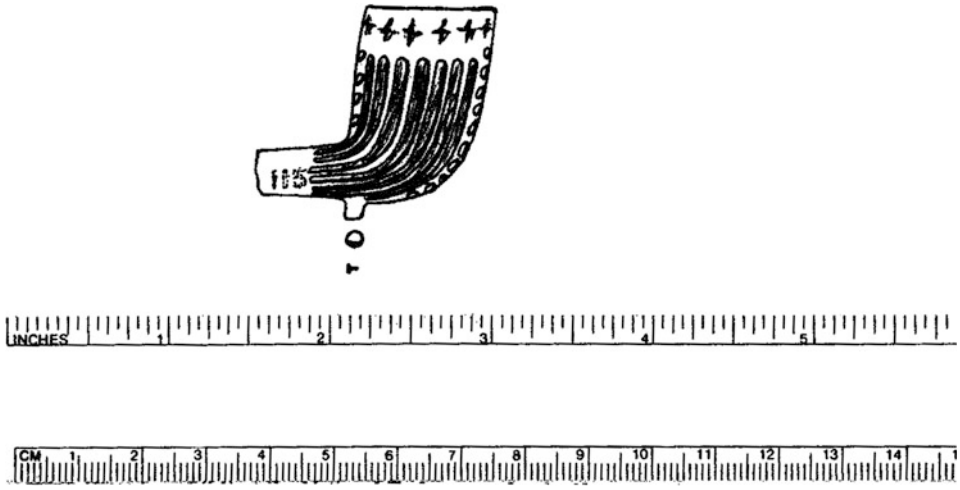

Clay Tobacco Pipes, Fig. 3 Pipe bowl from Barcelona Harbor, New York, USA (Author's drawing)

diameters is not unusual. This can be attributed to the "wiggling" of the wire during insertion and the effect of the displaced clay as it is pushed down the bore. An assessment of a non-English origin is enhanced by the apparent use of a trimming knife on the bowl, suggesting that a simple clamp or bench vice was used to secure the mold halves, rather than the rim having been finished in a gin press. English molds were formed with a slot at the top, into which a knife could be inserted to trim the bowl. This results in trimming lines following the long axis of the pipe. In the Barcelona specimens, the trimming lines run across the top of the pipe and suggest the use of an open-topped mold used in Continental Europe and North America rather than in England. This distinction may be due to the molds themselves or the manner in which the knife was employed. The handedness of the cutter and the orientation of the mold – the bowl versus the stem facing the cutter – may also play a role in this variation.

Future Directions

In spite of research accomplished to date, more specimens from datable contexts and the excavation of pipe kilns are needed. Additional studies of makers' marks, pipe distributions, and related issues are also necessary as is the expansion of research in Continental Europe. A new generation of young scholars should be recruited to follow Peter Davey, David Higgins, Susie White, "Smoke" Pfeiffer, and Byron Sudbury.

Cross-References

- ▶ Binford, Lewis R. (Theory)
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Clay Pipes in Historical Archaeology
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Dating Methods in Historical Archaeology
- ▶ Dating Techniques in Archaeological Science
- ▶ Deetz, James (Theory)
- ▶ Geoarchaeology
- ▶ Organic Residue Analysis in Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Post-Medieval Archaeology

References

Akron Smoking Pipe Company. 1895. *Illustrated catalogue*. Akron: Akron Smoking Pipe Company.

Alexander, L.T. 1967. English clay tobacco pipes. *Archeological Society of Virginia Quarterly Bulletin* 21 (3): 58–66.

Ayto, E.G. 2002. *Clay tobacco pipes*. 3rd ed. Princes Risborough: Shire Books.
Barber, E.A. 1879. Antiquity of the tobacco pipe in Europe. *The American Antiquarian* 2 (1): 1–8, 117–122.
Binford, L.R. 1962. A new method of calculating dates from kaolin pipe stems fragments. *Southeastern Archaeological Conference Newsletter* 9 (1): 19–21.
Cambridge. 2012. Evolution of clay tobacco pipes in England. Cambridge Archaeology Field Group http://www.cafg.net/docs/articles/claypipes.pdf.
Chalkley, J.F. 1955. Tobacco pipe stem hole dating-factors of proof & certitude. *Bulletin of the Archaeological Society of Delaware* 7 (1): 3–10.
Davey, P.J., ed. 1979–2004. *The archaeology of the clay tobacco pipe*, 19 vols. British Series 63, 78, 97, 100, 146(i–ii), 178, 192, 239, 246, 352, 374, 809; International Series 60, 92, 160(i–ii), 175, 566, 1042, 1590; Oxford: British Archaeological Reports/Archaeopress. [124 articles].
Fox, G.L. 2015. *The archaeology of smoking and tobacco*. Gainesville: University Press of Florida.
Gately, I. 2007. *Tobacco: A cultural history of how an exotic plant seduced civilization*. New York: Grove.
Goodman, J. 2005. *Tobacco in history and culture: An encyclopedia*. Detroit: Thomson Gale.
Hamilton, H., and J. Hamilton. 1972. Clay pipes from Pamplin. *Missouri archaeologist* 34: 1–47.
Hanson, L.H., Jr. 1971. Kaolin pipe stems: Boring in on a fallacy. *Conference on Historic Sites Archaeology Papers* 1969 (4): 2–15.
Harrington, J.C. 1954. Dating stem fragments of seventeenth and eighteenth century clay tobacco pipes. *Archeological Society of Virginia Quarterly Bulletin* 9 (1): 10–14.
Heighton, Robert F., and Kathleen A. Deagan. 1972. A new formula for dating kaolin clay pipestems. *Conference on Historic Site Archaeology Papers* 1971 (6): 220–229.
Higgins, D. 1999. Little tubes of mighty power: A review of British clay tobacco pipe studies. In *Old and new worlds: Historical/post medieval archaeology papers from the societies' joint conferences at Williamsburg and London, 1997*, ed. G. Egan and R.L. Michael, 310–321. Oxford: Oxbow Books.
Higgins, D., and S. White. 2017. *National Pipe Archive*. Liverpool: University of Liverpool. http://www.pipearchive.co.uk/index.html.
Kolb, C.C. 1983. The Monroe collection from Barcelona Harbor, New York: An archaeological evaluation. *Pennsylvania Archaeologist* 53: 32–45.
Kolb, C.C. 1997. A collection of homogeneous white clay smoking pipes from Barcelona, New York: an examination of typology, chronology, provenance, and manufacture. Paper presented at the American Anthropological Association annual meeting, Washington, DC, in the symposium "Ceramic Ecology '97: Recent Research on Ceramics." Mss. 51 pp.
McMillan, L.K. 2010. *Put this in your pipe and smoke it: An evaluation of tobacco pipe stem dating methods. Unpublished masters' thesis*. Greenville: East Carolina University. http://thescholarship.ecu.edu/bitstream/handle/10342/2903/McMillan_ecu_0600M_10211.pdf.
Noël Hume, I. 1970. *A guide to artifacts of colonial America*. New York: Knopf.
Oswald, A. 1975. *Clay pipes for the archaeologist*, British Archaeological Reports 14. Oxford: British Archaeological Reports.
Peacey, A. 1996. *The development of the clay tobacco pipe kiln in the British Isles*. Internet Archaeology 1. http://intarch.york.ac.uk/journal/issue1/peacey_index.html.
Pearce, J., and T. Grey. 2009. Clay tobacco pipe makers' marks from London: c 1580–1710. National Archives [UK]. http://webarchive.nationalarchives.gov.uk/20090418194800/http://www.museumoflondon.org.uk/claypipes/.
Sudbury, J.B. 1980. A preliminary report on the R. Bannerman eagle tobacco pipe manufactory, rouses point, New York. *Historic Clay Tobacco Pipe Studies* 1: 3–22.
Walker, I.C. 1977. *Clay tobacco-pipes, with particular reference to the Bristol industry*, History and Archaeology 11. Vol. 4. Ottawa: National Historic Parks and Sites Branch, Parks Canada.
Walker, I.C., and L. de S. Walker. 1969. McDougall's clay pipe factory, Glasgow. *Industrial Archaeology* 6: 132–146.
West, G.A. 1934. *Tobacco pipes and smoking customs of the North American Indians*, Bulletin 17. Vol. 2. Milwaukee: Museum of the City of Milwaukee.
Zorn, G. 1892. *Pipes and smokers articles*. 5th ed. Philadelphia: Zorn & Company.

Cleere, Henry

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Basic Biographical Information

Professor Henry Cleere was born in December 1926 in Croydon, UK. After military service in Italy, Egypt, and Palestine, he pursued a career in the iron and steel industry before becoming involved with archaeology in 1974, as director of the Council for British Archaeology. By then, he had also obtained his Ph.D. for a thesis on the iron industry of Roman Britain. The 1970s was

the heyday of rescue archaeology in Europe, and he became involved in addressing some of the consequences for the profession. One development in the UK was the formation – formally started in 1979 – of what is currently the Institute for Archaeologists (IfA), a professional organization with a code of conduct. Cleere was one of those involved and who developed an interest in archaeological heritage management, from its principles and legal foundations to its organizational and practical applications.

Major Accomplishments

In 1979, he was awarded a Churchill Fellowship that enabled him to study the systems in a number of European countries and build a network in Europe. That led to a book he edited in 1984 called *Approaches to the Archaeological Heritage* (Cambridge), which became very influential. It presented for the first time the management of archaeological resources in a comparative international context. The book was instrumental in discussions in the heritage sector in Europe in the 1980s that in turn led to a decision by the Council of Europe to revise the existing rather obscure treaty on archaeological heritage into what became the Convention of Malta in 1992. By then, Cleere had already published a second important book, extending to many more countries, *Archaeological Heritage Management in the Modern World* (London 1989).

Between 1981 and 1990, Henry Cleere was a member of the Board of ICOMOS, the International Council on Monuments and Sites, and in 1984 established that organization's International Committee on Archaeological Heritage Management (ICAHM). He was a prime mover in the drafting of the 1990 ICOMOS Charter on Archaeological Heritage Management. This was the first time the aims and responsibilities of archaeological heritage management, which were later also echoed in the Malta Convention, were defined internationally.

After his retirement from the CBA in 1991, Cleere started a third career as World Heritage coordinator for ICOMOS in Paris. ICOMOS is the advisor on cultural heritage to the UNESCO World Heritage Committee, and for 10 years, he carried out evaluation and monitoring missions to many sites now on the World Heritage List. Given his experience in international organization and legislation, he was also asked to become involved in the founding committee of the European Association of Archaeologists (EAA) and in 1994 became its first secretary. He also led the working party that brought into being the "EAA Code of Practice" in 1997 and was editor of the newsletter *The European Archaeologist* until 2002.

In 1998 Henry Cleere became honorary professor at the Institute of Archaeology at UCL, and in 2002 he received the fourth European Heritage Prize in recognition of his work.

Cross-References

- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Legislation, The Introduction of: Disciplining Through Law
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO's World Heritage List Process

References

Cleere, H., ed. 1984. *Approaches to the archaeological heritage*. Cambridge: Cambridge University Press.

Cleere, H., ed. 1989. *Archaeological heritage management in the modern world*. London: Unwin Hyman Ltd.

Further Reading

Cleere, H. 1970. *Iron smelting in a reconstructed Roman furnace*. London: The Iron and Steel Institute.

Cleere, H. 1993. British archaeology in a wider context. In *Archaeological resource management in the UK. An*

introduction, ed. J. Hunter and I. Ralston, 115–124. Phoenix Mill: Alex Sutton Publishing Ltd.
Cleere, H. 1995. Cultural landscapes as world heritage. *Conservation and Management of Archaeological Sites* 1: 63–68.
Cleere, H. 1996. The concept of 'outstanding universal value' in the World Heritage Convention. *Conservation and Management of Archaeological Sites* 4: 227–233.
Cleere, H. 2000. The World Heritage Convention in the Third World. In *Cultural resource management in contemporary society. Perspectives on managing and presenting the heritage*, ed. F.P. Mcmanomon and A. Hatton, 99–106. London: Routledge.
Cleere, H., and D. Crossley, eds. 1985. *The iron industry of the Weald*. Vol. 1995. 2nd ed. Leicester: Leicester University Press.
Cleere, H., and J. du Plat Taylor, eds. 1978. *Roman shipping and trade: Britain and the Rhine Provinces*. (Council for British Archaeology Research Report 25). London: Council for British Archaeology.
Cleere, H., J.G. Evans, and S. Limbrey, eds. 1975. *The effect of man on the landscape: the Highland Zone*. (Council for British Archaeology Research Report 11). London: Council for British Archaeology.

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Basic Biographical Information

John Clegg was born on January 11, 1935, in Nottingham, UK. He died in Sydney on March 11, 2015, following a long illness.

John Clegg grew up in Cambridge, England, where his mother was an academic. During World War II (aged 5–8), John and his sister were evacuated to stay with an aunt in Vancouver, Canada. During these early years, his lifelong interest in sculpture began. Upon his return John attended The Leys School in Cambridge. He graduated from Magdalene College, Cambridge, with a BA Honours and Certificate in Education in 1959. He received a MA Honours in 1962 from the same University. He had read Geography for 2 years before changing to Archaeology through which he went on several excavations and was influenced by both Eric Higgs and Charles McBurney. After working as a school teacher between 1963 and 1964, he worked as a contract archaeologist, excavating Coygan Cave in South Wales. In 1964 he moved to the University of Queensland in Brisbane to take up an Archaeology tutoring post in the Psychology Department. He soon moved to Sydney University, where he held various positions at the Department of Anthropology and Prehistory, later called Classics and Archaeology. At this time he also studied sculpture at what was later to become the National Art School. Over a 25-year period at Sydney University, he taught hundreds of students how to see, look at, and analyze rock art.

Major Accomplishments

John's Master's Thesis (*Mathesis Words, Mathesis Pictures* 1978) analyzed the Bare Hill rock art body located west of Cairns. This research earned him the University Medal and was among the first in Australia to explore rock art motifs as archaeological artefacts. He was the supervisor to Lesley Maynard (nee McMah) – whose Honours and Masters theses were similarly formative to the way that Australian scholars perceived and analyzed rock art, especially in the absence of a relevant ethnographic context (McMah 1965; Maynard 1979).

In the 1980s and 1990s, John was instrumental in training and fostering the development of a number of rock art scholars and academics at Sydney University (Natalie Franklin, Tania Konecny, Jo McDonald, Laurajane Smith, Meredith Wilson) most of whom went on to undertake doctoral research in Australia, and many of whom are at the forefront of rock art research and/or heritage management today. His Sturts Meadows work in western NSW provided a fertile training ground for many other researchers (including Ben (Robert) Gunn), who were stimulated by John's enthusiasm and quirky theoretical rigor.

John was responsible for introducing the fabulous rock art of the Sydney region to the public with his very popular *Field Guide* (Stanbury and Clegg 1990) which provided information about Aboriginal rock engraving sites around the Sydney region. Produced at a time when there was no public management strategy for this region's amazing rock art sites, *The Guide* provided much needed interpretation and guidance to visitors and subsequent researchers. He produced approximately 60 monographs, reports, academic papers, and book chapters throughout his career, with a focus on methodology and theory in the teaching of rock art. His collaborations with Thomas Heyd on aesthetics have been formative in the development of this theoretical area of rock art discourse.

Clegg, John K., Fig. 1 John Clegg recording engravings at Little Devils Rock (1970). John pioneered the use of polythene and monopods to record large horizontal engravings in the Sydney region. (Photo Kate Sullivan)

John has also had major successes as a sculptor, having been exhibited regularly in the annual Hunter Valley *Sculpture in the Vineyards* and in the Blake Prize in 2010. His fascination for this medium, begun as a child in Canada, has inspired him to produce sculptures throughout his academic career. His interest in the techniques and technologies of rock art influenced the insights which he

Clegg, John K., Fig. 2 John Clegg recording rock art on large horizontal platforms with his monopod, Callan Park (2005). (Photo Kate Sullivan)

Clegg, John K., Fig. 3 John Clegg seated with one of his sculptures at Cedar Creek winery, Wollombi NSW, during Sculpture in the Vineyards Exhibition 2006. (Photo Kate Sullivan)

brought to his analysis of rock art. He undertook experimental work on sandstone in the Sydney region to determine likely time frames required to produce the large engravings on the open horizontal platforms. He conducted similar experiments with Dr. Dan Witter, exploring the making of Panaramitee style engravings in Western NSW (Figs. 1, 2, and 3).

At his memorial service held at the University of Sydney, there was an exhibition of his artworks, curated by his wife of 40 years Dr. Kate Sullivan and his sons Dr. Jack Clegg and Harry Clegg Esq.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Archaeology and Art
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art, Types of
- ▶ Australian Rock Art
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art, Forms of
- ▶ Rock Art, Semiotics and Meaning of

References

Clegg, J. 1978. Mathesis words, mathesis pictures. Volumes 1 and 2. MA (Hons) thesis, University of Sydney (Later published as Clegg, J. 1981 Notes Towards Mathesis Art, 1981 Clegg Calendars, Balmain NSW).

Maynard, L. 1979. The archaeology of Australian Aboriginal art. In *Exploring the visual art of Oceania*, ed. S.M. Mead, 83–110. Honolulu: University Press of Hawaii.

McMah, L. 1965. *A quantitative analysis of the Aboriginal rock carvings in the district of Sydney and the Hawkesbury River*. Unpublished BA Honours thesis, University of Sydney.

Stanbury, P., and J. Clegg. 1990. *A field guide to aboriginal rock engravings*. Sydney: Sydney University Press.

Further Reading

Clegg, J.K. 1987. Style and tradition at Sturt's meadows. *World Archaeology* 19 (2): 236–255.

Clegg, J.K. 2000. Callan Point engravings and landscape. In *World perspectives in landscape and rock art*, ed. George Nash. Oxford: BAR.

Clegg, J.K. 2001. Rock art studies: Theory. In *Theoretical perspectives in rock art research the Institute for Comparative Research in Human Culture*, ed. Knut Helskog, 40–67. Oslo: Novus Forlag.

Clegg, J.K. 2010. Towards a philosophy of rock art study: What, why, and how? *Aura Newsletter* 27(1). June 2010.

Clegg, J.K. 2012. Life drawing and the chauvet lions. In Clottes, J. (dir) L'Art Pléistocène Dans le Monde. Actes du Congrès IFRAO, Tarascon-sur-Ariège, September 2010. N^0 special de Préhistoire, Art et Sociétés. Bulletin de la Société Préhistorique Ariége_Pyrénées, LXV-LXV1, 2010–2011. p 76–77, Article integral sue CD, p 459–464, 7 fig.

Clegg, J., and Shiv Jamwal. 2008. Aesthetics, function and fashion in rock art: Reactions to 'Aesthetics and Rock Art'. In *Aesthetics and rock art*, Proceedings of the XV World Congress, Lisbonne BAR International Series 1818, ed. Thomas Heyd and John Clegg. Oxford: Archaeopress.

Heyd, T., and J. Clegg. 2005a. Aesthetics, rock art, and changing states of consciousness. In *Aesthetics and rock art*, ed. Thomas Heyd and John Clegg. London: Ashgate.

Heyd, T., and J. Clegg, eds. 2005b. *Aesthetics and rock art*. London: Ashgate.

Heyd, T., and J. Clegg, eds. 2008. *Aesthetics and rock art*, Proceedings of the XV World Congress, Lisbonne BAR International Series 1818. Oxford: Archaeopress.

Clermont, Norman

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Basic Biographical Information

Norman Clermont (Fig. 1) (born 16 October 1940 [Grand-Mère, QC, Canada]) is a Canadian Amerindianist who pioneered the development of field archaeology, ethnohistory, and paleoanthropology in the province of Québec and Northeastern North America more broadly. His publications have explored various topics, methodologies, and culture groups including the history of anthropological thought (Clermont 1978a, b, 1984), field

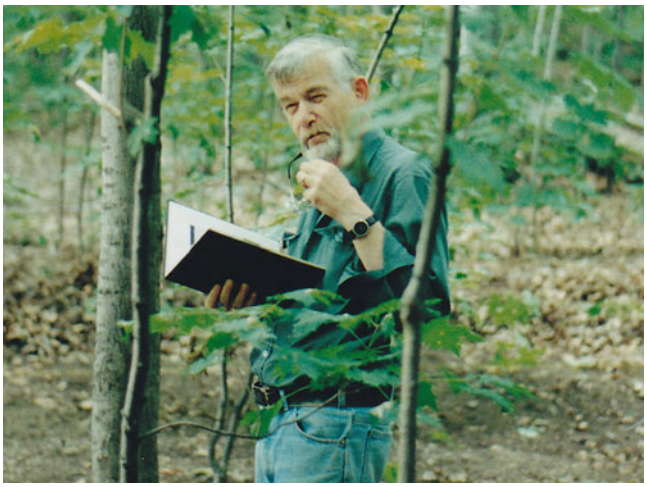

Clermont, Norman, Fig. 1 Norman Clermont at the André-Napoléon Montpetit site of the Pointe-du-Buisson (1999). (Credit: David Chicoine)

archaeology (Clermont 1982, 1990a), ethnography (Clermont 1977), the Atikamekw (Clermont 1974, 1978c), and the Iroquoians (Clermont 1990b, 1996). Gifted speaker and inspirational intellectual, Clermont occupies a privileged place among the pioneer minds of Québec scientific history.

After studying Classics at the Séminaire Sainte-Marie in Shawinigan and influenced by Marcellin Boule's *Les Hommes fossiles*, Clermont announced during the graduation ceremony his career objective of becoming a paleoanthropologist. He moved to France in 1961 and studied at La Sorbonne under Jean Piveteau (1899–1991), a distinguished French vertebrate paleontologist and member of the French Academy of Sciences at the time. Without an academic scholarship, Clermont worked as a handyman on a cargo ship on his way to France. While in Europe, he participated in archaeological excavations at Paleolithic cave sites in France under the guidance of Eugène Bonifay. In 1962, he obtained a Diplôme d'Études Supérieures en Sciences Naturelles (DES).

Clermont returned to Canada in the summer of 1963 and settled in Montréal where he enrolled in a master's degree program in anthropology at the Université de Montréal. Upon obtaining a MS in 1965 (thesis entitled "Étude comparative de trois mandibules"), Clermont began instructing in undergraduate classes in various departments including anthropology and medicine while working on his PhD dissertation. He completed his dissertation on the "Paléoanthropologie des Anasazis" in 1973. Clermont instructed the first course in Québec prehistory in 1972 and was hired as assistant professor of anthropology in 1973. Under the influence of Gilles Boulet, with whom he had been introduced to the prehistory of his home region of Mauricie in 1959, Clermont pioneered the birth and development of Québec anthropological archaeology and prehistory. He is credited with the creation of the first university program in archaeology in Québec.

While never really abandoning his research in paleoanthropology (Clermont 1979), Clermont taught archaeology and Native American prehistory, as well as developing the first generation of field archaeologists in Québec. Methodologically, he also explored ethnohistory and ethnography (Clermont 1977) and supervised many graduate theses and dissertations on a variety of anthropological topics and approaches. Among the doctoral students supervised by Clermont are Christian Gates St-Pierre, Claude Gélinas, Marie-France Archambault, Évelyne Cossette, Roland Viau, Gérard Gagné, and Claude Chapdelaine (Fig. 2). More than 45 master's theses were also completed under his guidance at the Université de Montréal.

In 1977, Clermont initiated the first field school in Québec at the archaeological complex of Pointe-du-Buisson in Melocheville. The field school, held every August until 2000, would become the main training ground for Québec prehistoric field archaeologists. In the classroom,

Clermont, Norman, Fig. 2 Norman Clermont (right) and Claude Chapdelaine (left) at the Laboratoire d'archéologie du Département d'anthropologie de l'Université de Montréal (circa 1979). (Credit: Pierre Corbeil)

Clermont was famous for his expressive and inspirational lectures, especially the always well-attended introductory course on human evolution and prehistory entitled "Éléments de Préhistoire." He retired from the Université de Montréal in 2002 after 29 years of teaching, research, and service.

Major Accomplishments

Clermont's contributions to archaeology are multiple and durable, as he almost single-handedly built the first academic program of Québec anthropological archaeology, as well as helped train the first generation of field excavators. In addition to his pioneering role as a lecturer, field supervisor, and graduate mentor, he popularized and standardized the production and publication of archaeological research in French. Clermont's service as associate editor for the *Journal Canadien d'Archéologie* demonstrates his commitment to the francophone production of archaeological knowledge. In addition, he served as vice-president of the Canadian Archaeological Association.

As an intellectual, Clermont's publications stand the test of time and exemplify the breadth and depth of his anthropological interests. His contributions explore various topics including paleoanthropology, prehistoric archaeology, ethnohistory, ethnography, and the history of anthropological ideas. Prolific, yet concise, Clermont's prose is famous for its clarity (e.g., Clermont 1999). As such, his 150+ published works are addressed to both specialized and lay audiences. Clermont authored 9 books and edited 8 volumes, in addition to writing 44 articles on prehistory, 21 on ethnohistory, 9 on the history of anthropology, 5 on paleoanthropology, and 26 on various other topics (see Chapdelaine and Corbeil 2004).

In the field (Fig. 3), Clermont was famous for his extreme rigor, attention to methodological details, as well as indefatigable enthusiasm, good humor, and intellectual generosity. Leading by example, he systematically and diligently organized his thoughts, research questions, and reading notes into index cards, a technique that inspired many of his students.

Clermont's pioneering role in Canadian archaeology has been recognized and honored through a series of well-deserved awards including the Prix de reconnaissance from the Association des archéologues professionnels du Québec (1994), the Prix ICOMOS Canada for his exceptional contribution to the cultural heritage of Québec (1996), the Prix Gérard-Morisset (Québec) (2002), and the Prix Smith-Wintemberg (Canada) (2002). As eloquently pointed out by his colleague Charles Martijn (1934–2016) in 2002 when Clermont received the Prix Smith-Wintemberg, Norman was the "Principal architect

Clermont, Norman, Fig. 3 Norman Clermont at the station 3 site of the Pointe-du-Buisson (1999). (Credit: David Chicoine)

of the professionalization process which Québec prehistory research underwent in the second half of the 20th century."

References

Clermont, Norman. 1974. Qui étaient les Attikamègues? *Anthropologica* 16 (1): 59–74.

Clermont, Norman. 1977. *Ma femme, ma hache et mon couteau croche*, Collection Civilisation du Québec 18, série Cultures Amérindiennes. Québec: Ministère des Affaires Culturelles.

Clermont, Norman. 1978a. Les concepts de culture et de système en archéologie. *L'Anthropologie* 82 (3): 373–383.

Clermont, Norman. 1978b. Un chapitre marginal dans l'histoire de l'anthropologie: l'origine européenne des Inuit. *Études Inuit Studies* 2 (2): 49–57.

Clermont, Norman. 1978c. Les Kokotchés à Weymontachie. *Recherches amérindiennes au Québec* 8 (2): 139–146.

Clermont, Norman 1979. La paléontologie, l'anthropologie physique et le monde des relations créatrices. In *Perspectives anthropologiques. Un collectif d'anthropologues québécois*, 59–69. Montréal: Les Éditions du Renouveau Pédagogique.

Clermont, Norman. 1982. Québec prehistory goes marching in. *Canadian Journal of Archaeology* 6: 195–200.

Clermont, Norman. 1984. La conceptualisation des sociétés anté-historiques par les philosophes du XVIIIe siècle. *Anthropologie et Societes* 8 (1): 5–20.

Clermont, Norman. 1990a. Le Sylvicole inférieur au Québec. *Recherches amérindiennes au Québec* 20 (1): 5–19.

Clermont, Norman. 1990b. Why did the Saint Lawrence Iroquoians became horticulturalists? *Man in the Northeast* 40: 75–79.

Clermont, Norman. 1996. The origins of the Iroquoians. *The Review of Archaeology* 17 (1): 59–62.

Clermont, Norman. 1999. L'archéologue, la culture matérielle et les problèmes de l'ethnicité. *Recherches amérindiennes au Québec* 29 (1): 71–73.

Further Readings

Chapdelaine, Claude, and Pierre Corbeil, eds. 2004. *Un traducteur du passé: Mélange en hommage á Norman Clermont*, Collections PaléoQuébec. Vol. 31. Montréal: Recherches Amérindiennes au Québec.

Closet Chickens

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Introduction

The history of the "Closet Chickens" has been recounted by Atalay (2006: 269–271) and Echo-Hawk (2010a: 95–96) and will only be briefly described here primarily as a means of creating a shared context for the group. There is no single origin of the group, but there are shared remembrances that seem to correlate with an agreed-upon history.

Definition

The nucleus of the "Closet Chickens" developed out of a conference held at Dartmouth College in May 2001 titled "On the Threshold: Native American-Archaeologist Relations in the Twenty-first Century." The conference, funded by the Wenner-Gren Anthropological Foundation with support from Dartmouth College and led by co-organizers Deborah Nichols and Joe Watkins, brought together a large number of archaeologists of Native American heritage in an attempt to evaluate the relationships between archaeologists and Native American communities. Holding the conference at Dartmouth seemed especially appropriate as the history of the College in broad respects shares with the history of Native American-archaeology relations. Founded in 1769 to educate "youth of Indian tribes," few actually graduated from the College until it reaffirmed its commitment in the 1960s, nearly 200 years later. In addition to the organizers, participants came from universities, museums, and tribal and federal agencies across North America and included Richard Begay (Navajo, Navajo Nation), Robert Begay (Navajo, Navajo Nation), Janine Bowechop, now Ledford (Makah, Makah Cultural and Research Center), Colin Calloway (Dartmouth), Roger Echo-Hawk (Pawnee Nation of Oklahoma, Denver Art Museum), Dorothy Lippert (Choctaw, Smithsonian Institution), Desiree Renee Martinez (Gabrielino, Harvard), Deborah Nichols (Dartmouth), John Norder (Spirit Lake Dakota, Michigan State), Dean Suagee (Cherokee, Vermont Law School), and Dale Turner (Teme-Augama Anishnabai, Dartmouth). We hoped the conference would be a springboard for continuing dialogue, which it has in ways we could not have imagined. Continuing discussion of the issues raised at the conference on emails led to the establishment of a more formal group that began as a nameless Listserv aimed at expanding not only the discussion but also the parties involved in it.

The name "Closet Chickens" arose during email exchanges as the group sought a name for itself. The word "Chicken" was associated with a movie watched in the evening by conference participants in their hotel. "Closet" was subsequently added after an email exchange where one member offered the room in a closet of a small apartment to others attending a professional meeting (Atalay 2006). The Closet Chickens are "birds of a feather" who do tend to flock together. Many of its members are of American Indian or other Indigenous descent who practice archaeology, but there are non-Indian members as well. In general, it is an online support group that discusses various issues as they arise. Often comments relate to contemporary issues that impact the practice of archaeology by Indigenous group, but as often other threads of discussion relating to repatriation, ethics, decolonizing the discipline, Indigenous Archaeology, and many other issues arise. Many of the established archaeologists on the Listserv are mentors to the professionally younger archaeologists who participate.

Future Directions

The list serves as an email discussion forum where topics are often subjected to scrutiny. Occasionally discussions become heated, but more often than not such discussions end when the participants have seemingly discussed the issues to completion. It is a support system that has helped young archaeologists who often feel to be on the outside of a general archaeological trajectory. In addition, the Closet Chickens is important in terms of contemporary American archaeology in that it provides a semi-protected forum for archaeological practitioners whose perspectives tend to mesh with Indigenous ideas concerning the colonialist practices of anthropology and archaeology and who work closely with tribes and First Nations and Indigenous communities. This forum allows members to openly discuss ideas and issues that might be too sensitive for discussion in a truly "public" forum. It also permits younger members to speak candidly about issues they have or are encountering in their readings, study, and early careers and discuss strategies to address them.

Secondly, and somewhat importantly, the Listserv allows for ease of mentoring between those who have been "in the business" for longer periods to help others who are in the early stages of their careers or education tenure. Professional

advice, open reading of materials, sometimes controversial discussion on topics, and even internal disagreements help us to understand not only what our own perspectives and viewpoints are but also to understand how our ideas have grown and continue to grow. It also provides a protected space within which to relax.

The primary focus of the Closet Chickens is on continuing the conversation about the impact of archaeology globally on the heritage of Indigenous populations. Archaeology, once known as the handmaiden of colonialism, is continually challenged by Indigenous people to become accountable to the cultural groups whose heritage is under scrutiny. The Chicken network allows a safe area for discussion outside of the academic processes, where students can gamble with ideas and points and where established professionals also can openly discuss ideas without fear of retribution or ridicule.

The group has expanded each year since its inception, and we hope that over the course of the next decade, a larger group of younger archaeologists who are attentive to Indigenous concepts of culture will be able to contribute to a more rounded practice of anthropology and archaeology. Members "nominate" others who they feel would contribute to the discussions on the Listserv. We have non-Natives, Natives, Australians, Maori, and a generous mix of non-described individuals who contribute to the discussion in numerous ways. The group is not all-inclusive and has had some in-depth discussions about individuals who were precluded from the "flock" after some intense and often heated deliberations. More established archaeologists try to stay outside of discussions as much as possible (perhaps too much on occasion) as we generally believe the Closet Chickens is a place for younger people to test their wings, but we do chime in as necessary, especially to encourage debate and discussion.

Many of the members of the Closet Chickens may be what Roger Echo-Hawk decries as "stakeholding Indians—self-identified adherents to racial Indianhood . . . wielding Ph.D.s and trowels as they circle the archaeological meta-narrative" (Echo-Hawk 2010b: 21). While it is true that many are on the cutting edge of attempting to increase the reach of Indigenous Archaeology as it hopes to "decolonize" the practice of archaeology, it is not a political group (although many of its members do have political perspectives relating to the practice of archaeology as a social science). It is not a racialist group but allows that people with a base in American Indian cultural life create a shared understanding of the impact of archaeology on cultural groups worldwide. The group has grown quiet recently, perhaps signaling an end to its utility. Only time will tell.

Cross-References

- ▶ Atalay, Sonya
- ▶ Cultural Heritage Management and Native Americans
- ▶ Echo-Hawk, Roger C.
- ▶ Hall, Robert Leonard
- ▶ Indigenous Archaeological Organizations
- ▶ Indigenous Archaeologies
- ▶ Indigenous Peoples, Working with and for
- ▶ Lippert, Dorothy T.
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Watkins, Joe (Indigenous Archaeology)

References

Atalay, S. 2006. Guest editor remarks: Decolonizing archaeology. *American Indian Quarterly* 30: 269–279.

Echo-Hawk, R. 2010a. *The magic children: Racial identity at the end of the age of race*. Walnut Creek: Left Coast Press.

Echo-Hawk, R. 2010b. Working together on race. *The SAA Archaeological Record* 10: 6–9.

Clovis and Folsom, Indigenous Occupation Prior to

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Introduction

The first modern human migrations to the Western Hemisphere (the Americas) are now discussed as being much earlier than previously

thought. The historical Clovis First hypothesis of initial human migrations to the Western Hemisphere (the Americas) was postulated on an entry route across the exposed land mass of Beringa no earlier than 11,000–12,000 years before present (ybp), an inland migration route through a narrow treeless ice-free corridor, and dating of Clovis tools found in association with extinct mammals near Clovis, New Mexico, in the 1920s (Adovasio and Page 2002). Archaeologists argued that the first people to enter the Western Hemisphere brought the Clovis tool technology with them when they walked across the Bering Land Bridge from the Eastern Hemisphere area we know today as Asia.

However, the tenets of the Clovis First hypothesis of initial migrations to the Western Hemisphere (the Americas) have been critiqued as unsubstantiated (Cann 2001). Archaeologists are uncertain about the dates for initial modern human migrations and the possible migration routes into the Western Hemisphere. Today many archaeologists agree that the Clovis First hypothesis is not supported by archaeological, genetic, or linguistic evidence (Cann 2001; Nichols 1990). The question now is how much earlier were people present in the Western Hemisphere? There are hundreds of archaeological sites distributed throughout North and South America which suggest a minimum possible date of 40,000 years before present (ybp) for initial migrations (Steeves 2015a, b). The number of sites that date between 40,000 to over 200,000 is much smaller, yet peer reviewed articles by respected archaeologists report on sites within this date range. Therefore, we must remain open-minded to the possibilities of much earlier initial human migrations into areas of the Western Hemisphere, during the Pleistocene.

Definition

Pre-Clovis Sites: Archaeology sites in the Western Hemisphere (the Americas) which date to earlier than the known dates for Clovis or Folsom lithic technologies, or that date earlier than 11,200 ybp.

Key Issues

To say the debate over the timing of initial migrations to the Western Hemisphere has been a contentious issue in American archaeology would be an obvious understatement. A small group of archaeological authorities commonly known as the Clovis Police defended the unproven Clovis First hypothesis of initial migrations for many years. This very vocal group of archaeologists denied a human presence in the Western Hemisphere prior to 12,000 years ago, and their opposition blocked funding and research into earlier initial migrations, for decades. In recent years, it has become clear to archaeologists that there has never been any solid archaeological evidence to support the tenets of Clovis First hypothesis of initial late entry migrations to the Western Hemisphere. However, there have been numerous archaeology sites published on in both North and South America which pre-date 13,000 ybp (Steeves 2015a, b). There are hundreds of reported pre-Clovis sites many of which have met or exceeded rigorous archaeological criteria for site legitimacy, and others which have provided evidence which warrants further investigations and testing of sites. Archaeologists have begun to reevaluate previously reported pre-Clovis sites in both North and South America and to publish multidisciplinary research which discusses the possibilities for and evidence of earlier initial migrations to and habitations of both North and South America.

Archaeological criteria for site legitimacy have been met by many earlier sites including Coats Hinds with a date of 12,869 ybp (Deter-Wolf et al. 2011) a mammoth kill site in Tennessee which was nominated and accepted to the United States National Register of Historic Places (NRHP) in 2011. Monte Verde, an open-air site in Chile excavated by Tom Dillehay and dated to 13,525 ± 250 ybp has produced a vast body of evidence for earlier migrations. Monte Verde also produced a date of 33,370 ± 530 in a lower level (Dillehay 1997).

Recently, new testing and excavations of sites, such as Blue Fish Caves (Alaska) 24,000 ybp (Bourgeon et al. 2017), and Page Ladsen

(Florida) 14,550 ybp (Halligan et al. 2016), have supported earlier archaeological reports of pre-Clovis dates at the sites. All pre-Clovis sites were previously denied by many in the archaeological community. The new research and dating supporting earlier than Clovis archaeology sites reflects a changing view among a select group of North American archaeologists.

Research from other fields such as linguistics and genetics has also produced evidence for earlier initial migrations. The great linguistic diversity of Indigenous peoples of the Western Hemisphere (the Americas) suggests that minimally, 20,000–50,000 years would have been required for such a high number of language families to have developed (Nichols 1990). Molecular research has suggested time frames for initial migrations as early as 40,000 ybp and as late as 22,000 ybp (Mann 2005). There are records of physiological and cultural diversity across the expanse of both North and South America at the end of the last glacial maximum. Therefore, to allow for such diversity to have developed across such distant areas, scientists must consider the time required for geographical distance, environmental adaptations, and cultural developments across time and space prior to the end of the last glacial maximum.

Important to discussions on initial human migrations to the Western Hemisphere (the Americas) is the history of global intercontinental human and mammalian migrations. The Bering Land area was dry and above water many times throughout the Pleistocene, and an inland corridor was open as early as 75,000 years ago (Adovasio and Page 2002). Early humans had adapted to ecological niches in all areas of Africa, Asia, Europe, and Australia and reached islands such as Java and Crete thousands of years prior to 12,000 ybp, which is evidence that suggests early humans had the tools and technology to travel and to adapt to all environments for hundreds of thousands of years prior to the end of the last glacial maximum. Mammals that arose in the Western Hemisphere such as horses, camels, and sabertooth cats all had to walk across a land mass to reach the Eastern Hemisphere. The biotic exchange between the Eastern and Western Hemispheres has taken place for millions of years. Where four-legged mammals walk and migrate so too then can two-legged. *Homo erectus* and archaic *Homo sapiens* sites dating to over 1.8 million years ago have been found in the Eastern Hemisphere. Thus, we know that *H. sapiens* were present in Asia during times when the northern latitudes were being accessed by mammals migrating between the two hemispheres. We must then remain open to the possibilities of earlier human migrations as well.

Current Debates

Current debates on initial migrations to the Western Hemisphere (the Americas) include competing hypothesis of possible migration routes and times. Kurt Fladmark (1979) and Erlandson et al. (2007) have both discussed the possibilities of an ice-free coastal migration route along the Pacific. A North Atlantic ice edge corridor migration route has been discussed by Dennis Stanford and Bruce Bradley (2004) who suggest that Clovis technology may have descended from the Solutrean technology found in areas of present day France. Recent research on lithic technologies has also highlighted the possibilities of earlier than Clovis lithic technologies in the Western Hemisphere (the Americas) (Beck and Jones 2010), and the fact that lithic tools which are not definitively Clovis are often found in the same stratigraphic levels as Clovis technologies.

Another much earlier site reported in a peer reviewed publication is the Cerutti Mastodon site formerly known as the State Route 54 Mastodon Site, located in southwestern California just a few miles north of San Diego. The Cerutti Mastodon Site was recorded and analyzed by

archaeologists and Paleontologists who were very familiar with the geology of the area. The materials they collected are in impeccable order and curated to allow for study without disturbing the samples. Many of the fossils were completely coated in a caliche shell, which was left intact or removed and retained (Holen et al. 2017). Casts of large tusks were made allowing fossil specimens to remain in the soils in which they were deposited. Human presence at the Hwy 54 site was suspected due to the assembledge at the Mastodon Quarry collection area (non-fluvial), which contained a large deposit of spirally fractured bone around mid-size boulders, and the in situ placement of a mastodon tusk. Given the denial of early humans in the Western Hemisphere, the archaeologists and scientists (Holen et al. 2017) took years to complete studies and testing of the site materials before they published on the site. However, the Cerutti Mastodon Site has recently been dated to minimally 130,000 years before present (Figs. 1 and 2). It is very interesting that in this area between southern California and central Mexico there are at least eight other sites that date to over 100,000 years. This is the only area of the Western Hemisphere with a group of sites that have reported possible dates of over 100,000 ybp.

Future Directions

Future directions in the study of initial human migrations to the Western Hemisphere (the Americas) include the reevaluations of hundreds of sites. It is now accepted by most archaeologists that humans entered the Western Hemisphere (the Americas) earlier than 13,000 ybp. Research to locate areas of potential earlier habitation may expand to include testing of new areas of high probability or regional areas of earlier habitation sites (Figs. 3 and 4).

The understanding of possibly earlier than Clovis technologies has been the focus of recent publications such as the work of Charlotte Beck and George Jones (2010) who have argued that Western Stemmed points are earlier than Clovis points in the inter-mountain west. Research on lithic technologies, cave painting, petroglyphs, molecular studies, residue analysis, geological studies, and linguistics are building a multi-dimensional understanding of the possibilities and evidence for initial migrations to the Western Hemisphere. Future directions in archaeological studies of the first people of the Western Hemisphere (the Americas) include gaining new insights from old collections and renewed excavations of previously recorded Pleistocene sites and areas.

Clovis and Folsom, Indigenous Occupation Prior to, Fig. 1 Spirally fractured mastodon bone, 130,000 ybp Ceretti Mastodon Site (P. Steeves 2012)

Clovis and Folsom, Indigenous Occupation Prior to, Fig. 2 Impact point on mastodon bone, 130,000 ybp Ceretti Mastodon Site (P. Steeves 2012)

Clovis and Folsom, Indigenous Occupation Prior to, Fig. 3 Paulette Steeves and Kathy Holen 2012, Nebraska Archaeological Survey (Photo: Steve Holen)

Clovis and Folsom, Indigenous Occupation Prior to, Fig. 4 Camel mandible recovered during archaeological survey, Nebraska (Photo: Paulette Steeves)

Clovis and Folsom, Indigenous Occupation Prior to, Fig. 5 Fort Rock site area. Gary Halverson, Oregon State Archives 2009

Examples

There are hundreds of published reports of Pre-Clovis sites (Figs. 5 and 6) in both North and South America. The following list is a sample of some of the most discussed sites. Some of the sites included in this list are pre-12,000 ybp sites which are recognized as national or global heritage treasures and are listed in the United States National Register of Historic Places (NRHP) and the United Nations Educational Scientific and Cultural Organization (UNESCO). Many pre-12,000 ybp sites in North and South America have been excavated, dated, and published by more than one archaeologist or group of archaeologists at different times.

This list will provide the name and date of a main or recent publication on a site. However, there may be numerous site reports, critiques, and responses for each site mentioned which are not listed in the following chart (Table 1). Where a range of dates or more than one date is listed this usually represents numerous cultural levels within site in a stratigraphic sequence, the following chart does not necessarily list every date, earliest or latest for each site (Fig. 6).

Clovis and Folsom, Indigenous Occupation Prior to, Table 1 Sample only pre-12,000 ybp archaeology sites North and South America

Site name	Dates reported	Site location	Site publication authors
Ceretti Mastodon Site	130,000 ybp	Southwestern California	Holen et al. (2017)
Pedra Furada	50,000 ybp	Brazil	Guidon and Delibrias (1986)
Pendejo Cave	55,000 ybp	New Mexico	MacNeish and Liddy (2003)
Woolly Mammoth	40,000 ybp	California	Berger (1980)
Burnham	32,000 ybp	Oklahoma	Wyckoff (1999)
El Cederal	37,694 ± 1,963 ybp	Mexico	Lorenzo and Mirambell (1999)
El Bosque	35,000 ybp	Nicaragua	Espinoza (1976)
Monte Verde	33,370 ± 530 12,500 ybp	Chile	Dillehay (1997)
Rancho La Ampola- San Louis San Luis Potosi	33,000 ybp	Mexico	Lorenzo and Mirambell (1986)
Jack Wade Creek	30,000 ybp	Alaska	Morlan and Cinq-Mars (1982)
Tequendama J II	28,890 ybp	Colombia	Urrego and Van der Hammer (1977)
Tlapacoya	28,000 ybp	Mexico	Lorenzo and Mirambell (1999)
Blue Fish Caves	24,000 ybp	Yukon Territories	Bourgeon et al. (2017)
Lapa Vermelha IV	24,000 ybp	Brazil	Prous (1980)
Gruta Del Indio	22,250 ybp	Argentina	González and Lagiglia (1973)
Pikimachay	20,000 ybp	Peru	MacNeish (1980)
Cactus Hill	23,349 calbp	Virginia	McAvoy and McAvoy (1997)
Toca da Tira Peia	22,000 ± 1,500 OSL	Brazil	Lahaye et al. (2013)
Alice Boer Site	14,200 ± 1,150 ybp	Brazil	Bryan and Beltrao (1978)
Meadowcroft Rock Shelter	31,400 ± 1,200 12,800 ± 870 ybp	Pennsylvania	Adovasio et al. (1990)
La Sena	18,440 ± 145 ybp	Nebraska	Holen (2006)
Lovewell II	18,250 ± 90 ybp	Kansas	Holen (2006)
Penas De Las Trampas	19,610 ybp	Argentina	MacNeish (1971)
Toca do Sito do Meio	14,300 ybp	Brazil	Guidon and Arnaud (1991)
Debra Friedkin Site	15,500 ybp	Texas	Waters et al. (2011)
Schaefer	15,150–14,030 ybp	Wisconsin	Adovasio and Peddler (2016)
Wenas Creek Mammoth	15,547–17,097 calBP	Washington	Lubinski et al. (2009)
Paisley Caves	14,150 ybp	Oregon	Gilbert et al. (2008)
Wadsen Site-Owl Cave	12,654 ± 589	Idaho	Miller (1989)
Manis Mammoth Site	14,010 ± 45 ybp	Washington	Waters et al. (2011)

Steeves 2017

Clovis and Folsom, Indigenous Occupation Prior to, Fig. 6 La Sena site area Nebraska (P. Steeves 2012)

References

Adovasio, J.M., and J. Page. 2002. *The first Americans: In pursuit of archaeology's greatest mystery*. New York: Modern Library.

Adovasio, J.M., and Pedler, D. 2016. *Strangers in a New Land: What archaeology reveals about the First Americans*. Buffalo: Firefly Books.

Adovasio, J.M., J. Donahue, and R. Stuckenrath. 1990. The Meadowcroft rockshelter radiocarbon chronology 1975–1990. *American Antiquity* 55(2): 348–354.

Beck, C., and G.T. Jones. 2010. Clovis and Western Stemmed: Population migration and the meeting of two technologies in the intermountain west. *American Antiquity* 75 (1): 81–116.

Berger, R. 1980. Early man on Santa Rosa Island. In *The California Islands: Proceedings of a Multidisciplinary Symposium. Santa Barbara Museum of Natural History, Santa Barbara, CA*, 73–78.

Bird, Myrisa K. 2002. Migration and population models of North America and the implications they hold for Clovis. *Lambda Alpha Journal* 32: 8–17.

Bourgeon, L., A. Burke, and T. Higham. 2017. Earliest human presence in North America dated to the last glacial maximum: New radiocarbon dates from Bluefish Caves, Canada. *PLoS One* 12 (1): e0169486.

Bryan, A.L., and M.C. Beltrao. 1978. An early stratified sequence near rio Claro, East Central São Paulo State, Brazil. *Early Man in America from a Circum - Pacific Perspective*, 303–305. Edmonton: University of Alberta.

Cann, R.L. 2001. Genetic clues to dispersal in human populations: Retracing the past from the present. *Science* 291: 1742–1748.

Deter-Wolf, A., J.W. Tune, and J.B. Broster. 2011. Excavations and dating of late Pleistocene and Paleoindian deposits at the Coats-Hines site, Williamson County, Tennessee. *Tennessee Archaeology* 5 (2): 142–156.

Dillehay, T. 1997. *Monte Verde: A Late Pleistocene settlement in Chile: The archaeological context*, vol. II. Washington: Smithsonian Institution Press.

Dillehay, T.D. 2000. *The settlement of the Americas: A new prehistory*. New York: Basic Books.

Erlandson, Jon M., Michael H. Graham, Bruce J. Bourque, Debra Corbett, James A. Estes, and Robert S. Steneck. 2007. The kelp highway hypothesis: Marine ecology, the coastal migration theory, and the peopling of the Americas. *Journal of Island and Coastal Archaeology* 2: 161–174.

Espinoza, J. 1976. Evaluaciones arqueológicas en "El Bosque", Instituto Geográfico Nacional, Managua. *Ministerio de Obras publicas* 1: 22–45.

Fladmark, K.R. 1979. Alternate migration corridors for early man in North America. *American Antiquity* 44 (1): 55–69.

Gilbert, M.T.P., D.L. Jenkins, A. Götherstrom, N. Naveran, J.J. Sanchez, M. Hofreiter, . . ., and R. Parr. 2008. DNA from pre-Clovis human coprolites in Oregon, North America. *Science* 320(5877): 786–789.

Guidon, N., and B. Arnaud. 1991. The chronology of the New World: Two faces of one reality. *World Archaeology* 23(2): 167–178.

Guidon, N., and G. Delibrias. 1986. Carbon-14 dates point to man in the Americas 32,000 years ago. *Nature* 321 (6072): 769–771.

Halligan, J.J., Waters, M.R., Perrotti, A., Owens, I.J., Feinberg, J.M., Bourne, M.D., . . ., and Stafford, T.W. 2016. Pre-Clovis occupation 14,550 years ago at the Page-Ladson site, Florida, and the peopling of the Americas. *Science Advances* 2(5): e1600375.

Holen, S.R. 2006. Taphonomy of two last glacial maximum mammoth sites in the central Great Plains of North America: A preliminary report on La Sena and Lovewell. *Quaternary International* 142: 30–43.

Holen, S.R., Deméré, T.A., Fisher, D.C., Fullagar, R., Paces, J.B., Jefferson, G.T., . . ., and Holen, K.A. 2017. A 130,000-year-old archaeological site in southern California, USA. *Nature* 544(7651): 479–483.

Lahaye, C., M. Hernandez, E. Boëda, G.D. Felice, N. Guidon, S. Hoeltz, . . ., and S. Viana. 2013. Human occupation in South America by 20,000 BC: The Toca da Tira Peia site, Piauí, Brazil. *Journal of Archaeological Science* 40(6): 2840–2847.

Lorenzo, J.L., and L. Mirambell. 1986. Preliminary report on archeological and paleoenvironmental studies in the area of El Cedral, San Luis Potosí, México. In *New evidence for the Pleistocene peopling of the Americas: Orono, Maine, Center for the Study of the Early Man, University of Maine, Peopling of the Americas, Symposia Series*, 107–113.

Lorenzo, J.L., and L. Mirambell. 1999. The inhabitants of Mexico during the upper pleistocene. In *Ice Age People of North America. Environments, origins, and adaptations*, ed. Bonnichsen, R., and K.L. Turnmire, 482–496. Corvallis: Center for the Study of the First Americans, Oregon State University Press.

Lubinski, P.M., P.T. McCutcheon, K. Lillquist, M. Uebelacker, B.R. Barton, and J.T. Shapley. 2009. Possible Lithic artifacts from 2005–07 excavations at the Wenas Creek Mammoth Site. *Current Research in the Pleistocene* 26: 85–86.

MacNeish, R. S., and J.G. Liddy, ed. 2003. *Pendejo Cave*. UNM Press.

MacNeish, R.S. 1971. Early man in the Andes. *Scientific American* 224(4): 36–47.

MacNeish, R.S. 1980. The Prehistory of the *Ayacucho Basin*, Peru: *Nonceramic artifacts*, vol. 3. University of Michigan Press.

McAvoy, J.M., and L.D. McAvoy. 1997. *Archaeological Investigations of Site 44SX202, Cactus Hill, Sussex County, Virginia* (No. 2). Department of Historic Resources.

Miller, S.J. 1989. Characteristics of mammoth bone reduction at Owl Cave, the Wasden site, Idaho. *Bone Modification*, 381–393.

Morlan, R.E., and J. Cinq-Mars. 1982. Ancient Beringians: human occupation in the late Pleistocene of Alaska and the Yukon Territory. *Paleoecology of Beringia*, 353–381.

Mann, Charles. 2005. *Ancient Americans: Rewriting the history of the New World*. London: Granta Publications.

Nichols, Johanna. 1990. Linguistic diversity and the first settlement of the New World. *Language* 66 (3): 475–521.

Prous, A. 1980. Fouilles Du Grand Abri de Santana de Riacho (Minas Gerais), Brésil. *Journal de la Société des Américanistes*, 163–183.

Rex González, A., and H. Lagiglia. 1973. Registro nacional de fechados radiocarbónicos. *Relaciones de la Sociedad Argentina de Antropología*, 7.

Stanford, D.J., and Bruce A. Bradley. 2004. The North Atlantic ice edge corridor: A possible Paleolithic route to the New World. *World Archaeology* 36 (4): 459–478.

Steeves, P.F. 2015a. *Decolonizing Indigenous histories, Pleistocene archaeology sites of the Western Hemisphere*. Binghamton: State University of New York.

Steeves, P.F. 2015b. Decolonizing the past and present of the Western Hemisphere (The Americas). *Archaeologies* 11(1): 42–69.

Urrego, G.C., and T. Van der Hammen. 1977. *Investigaciones arqueológicas en los abrigos rocosos del Tequendama: 12.000 años de historia del hombre y su medio ambiente en la altiplanicie de Bogot´: With an extensive English abstract, Archaeological investigations in the Tequendama roch shelters: 12,000 years of history of man and his environment on the high plain of Bogot´*. Fondo de Promoción de la Cultura del Banco Popular.

Waters, M.R., S.L. Forman, T.A. Jennings, L.C. Nordt, S. G. Driese, J.M. Feinberg, . . . C.T. Hallmark. 2011. The Buttermilk Creek complex and the origins of Clovis at the Debra L. Friedkin site, Texas. *Science* 331(6024): 1599–1603.

Wyckoff, D.G. 1999. The Burnham site and Pleistocene human occupation of the southern Plains of the United States. *Ice-Age Peoples of North America: Environments, Origins, and Adaptations, Center for the Study of the First Americans, Corvallis*, 340–361.

Further Reading

Adovasio, J.M., and J. Page. 2009. *The first Americans: In pursuit of archaeology's greatest mystery*. Modern Library.

Adovasio, J.M., and D. Pedler. 2016. *Strangers in a New Land: What archaeology reveals about the First Americans*. Buffalo: Firefly Books.

Blackburn, T.C. 1985. *Woman, poet, scientist: Essays in New World anthropology honoring Dr. Emma Louise Davis* (No. 29). Ballena Pr.

Bryan, A.L., ed. 1986. *New evidence for the Pleistocene peopling of the Americas*. Orono: Center for the Study of the First Americans.

Cremo, M.A., R.L. Thompson, M.A. Кремо, and Р.Л. Томпсон. 1993. *Forbidden archeology*. San Diego.

Mann, C.C. 2005. 1491: *New revelations of the Americas before Columbus*. Alfred a Knopf Incorporated.

Clubs and Societies Promoting Archaeology (National and Local)

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Introduction

There are opportunities to become involved in archaeology as an unpaid volunteer in numerous projects across the world. For example, high-profile excavations such as Çatalhöyük in Turkey (Çatal News 2010) and Quseir in Egypt (Tully 2007) involve local community participation.

Other projects have involvement from international initiatives such as Earthwatch (www.earthwatch.org) that encourage volunteers to join different "expeditions," including archaeological and paleontological research projects, at a variety of locations across the world.

However, as well as projects led by paid archaeologists and trainers, there is also a wealth of voluntary groups, clubs, and societies, sometimes referred to as "amateur" or "avocational" organizations, many of whom carry out work independent of other projects. This section defines and discusses the range of activities, locations, and people that represent these groups.

Definition and Historical Background

Club, groups, and societies that promote archaeology, at both national and local levels, are primarily membership organizations, where an annual fee is usually required to join. In some rare cases, membership can be via invitation only, for example, if membership to the society in question, for example, the Society of Antiquaries of London (for which members are entitled to list the abbreviation "FSA" – Fellow of the Society of Antiquaries – after their name), is seen as an esteem indicator. However, the vast majority of groups do not have restrictions to their membership in this respect, and some offer concessionary fees, for example, for students, unemployed, or retired. In all cases, the groups consist of voluntary members (in other words unpaid), although a small number have some paid staff funded, for example, paid secretaries funded through membership fees to ensure administration takes place or project officers for specific grant-supported activities. This does not preclude people who work professionally as archaeologists from joining such groups (and indeed many archaeologists are members of local groups – e.g., the author of this entry was, at the time of writing, on the Committee for the Yorkshire Architectural and York Archaeological Society) along with members who may not have training in archaeology but nonetheless are interested in the subject. However, the key element of membership is that it is voluntary, rather than paid.

Groups, clubs, and societies vary in terms of their areas of interest, size of membership, and even level of activity. Hence, the organized groups which voluntarily interact with archaeology in the early twenty-first century are both vibrant and diverse. This is particularly the case in the United Kingdom, which has often been credited with having a particularly strong tradition of amateur and independent archaeology (e.g., Fry 2007: 21). Recent research shows that these groups seem to have grown in number in recent years, with there being more than 2,100 voluntary groups across the UK alone, compared to possibly just over 400 such groups in the 1980s (Thomas 2010: 12). Yet the origins of some of these groups go back to the nineteenth and eighteenth centuries, while others have formed in much more recent times. It is not only the age of groups that varies, as there is also a vast range of interests and also types of activities enjoyed by clubs and societies.

The oldest of groups involved with archaeology and related disciplines are often the Antiquary Societies, which formed as learned antiquarian groups, often with an element of exclusivity maintained, for example, through restricted membership. The two biggest in the UK today are the Society of Antiquaries of London (founded in 1707) and the Society of Antiquaries of Scotland (founded in 1780). Both of these groups have nationwide interests (UK-wide in the case of the former, Scotland-wide for the latter) and take in disciplines beyond archaeology alone. Other antiquarian groups, such as the Society of Antiquaries of Newcastle-upon-Tyne (founded in 1813), have more of a regional focus to their interests. One of the oldest local antiquarian groups still in existence in the UK is the Spalding Gentleman's Society in Lincolnshire, which was founded in 1710. This group, until very recently, was exclusively male only in its membership. Activities vary in these groups, but lectures are a key component, as are publications and schemes for support for current scholarly research. In the case of the Spalding Gentleman's Society, there is also a private museum featuring an eclectic collection of antiquities and curios that are cared for by the society members (all volunteers), reflecting the antiquarian roots of the group.

County archaeological societies can be almost as old as the antiquarian groups, such as Berkshire Archaeological Society which was founded in 1871 or London and Middlesex Archaeological Society, founded in 1855. They can be found across the UK – reflecting in their areas of interest history, archaeology, and even architectural history connected with their chosen geographic area. County archaeological societies often have a standard range of activities that are offered, such as an annual lecture series, excursions, and a newsletter and/or journal. However, it is wrong to assume that these groups are not necessarily more active than this in their archaeological investigations, as several also carry out regular archaeological fieldwork or partner with other archaeological organizations, such as universities or archaeological contractors depending on the project, providing volunteers and other support. This can be seen, for example, with the Architectural and Archaeological Society of Durham and Northumberland, which is a partner alongside Durham University, Stanford University, and Durham County Council for excavations at the Roman site of Binchester in County Durham (see www.durham.gov.uk/pages/Service.aspx?ServiceId=6915).

There are other societies which cover more than just archaeology in their remit of interest that nonetheless get involved in archaeological work, such as field walking, excavation, or recording or graveyards, the last of which is often connected with family history research. Examples include natural history societies, such as the Belfast Natural History and Philosophical Society, that support "research and publications about Ireland and Ulster's cultural and material environment," including archaeology (http://belfastsociety.com/index.html). Similarly, La Societé Guernesiaise on Guernsey, a UK Crown Dependency in the Channel Islands, comprises several "sections," including botany, literature, and archaeology. Due to the lack of an archaeological contractor on the island, with just three archaeologists employed at the island's museum, Archaeology Section members have ample opportunity to participate in any archaeological fieldwork taking place. Therefore, local history societies, natural history societies, and even civic societies can cover archaeological research and activities in their range of interest. This is in part due to the holistic nature of archaeology, taking in as it does standing buildings, graveyards, field walking, archival research, as well as what are sometimes perceived as more "typical" activities such as excavation and geophysical survey. It is also a reflection on the diversity of interests that many voluntary groups have, for example, a civic society concerned with improving their local neighborhood may well take an interest in conserving the more historic aspects of their surroundings.

Some archaeological and heritage societies act as umbrella societies for smaller groups. In some ways this is the case with the Council for British Archaeology (CBA), as it has both individual membership and affiliate membership – with affiliates including both professional organizations such as university departments and archaeological contractors but also voluntary groups. Furthermore, there are regional groups of the CBA – one covering Wales and 11 across England, all of which interact with and have membership from local groups within their regional coverage. There are also umbrella organizations that work on a regional level, such as the Federation of Ulster Local History Societies (Northern Ireland), Community Landscape Archaeology and Survey Project (comprising individual members and 12 local heritage groups in Northamptonshire), and less formal community heritage forums such as the recently established West Yorkshire Community Heritage Forum, through which local groups, practitioners, and other stakeholders share ideas and experiences and meet regularly to update each other on their recent activities.

One category of group that can cause controversy in the archaeological community, even though they frequently interact with archaeological material, is artifact hunting. Often also known as "treasure hunters," these are most often metal-detecting clubs and societies in the UK, a hobby that in previous decades has also been known as "coin spotting" or "coin shooting." Other forms of artifact hunting include pot hunting, as is common, but not always necessarily legal, in the USA (Hicks 2006: 140). There is often perceived to be a "grey area" between legal treasure hunting and illicit activity, such as nighthawking (as illegal metal detecting is known in the UK) or the activities of

looters in countries such as Italy (known as *tombaroli* – Brodie 2006: 5) and Peru (known as *huaqeros* – Watson 1999; Skeates 2000: 56). However, as has been shown by the outreach work of organizations such as the Portable Antiquities Scheme (www.finds.org.uk), metal-detector users can and do make a meaningful contribution to archaeological knowledge when they share their finds information with the archaeological sector and follow good practice advice and guidance. Hence, while there are still some issues of discourse between the metal-detecting community and other groups that engage with archaeological heritage, it is important to maintain dialogue.

Self-identified community archaeology groups form another category of groups and societies promoting archaeology, while there is overlap with other voluntary groups, in the sense that they are generally made up of members of the local community wishing to engage with archaeological heritage in different ways. However, increasingly, groups are forming that deliberately self-identify as "community archaeology groups" (rather than, e.g., archaeological societies or local history/heritage groups). Many of these have formed only in recent years, in the case of the UK often triggered by the availability of funding from major voluntary sector grant streams such as the Heritage Lottery Fund (www.hlf.org.uk), which funds specific projects around different types of heritage activities, designed to engage with local audiences. As a result, many groups formed in order to access a grant for a project but then continued following the end of the grant. "Community archaeology" can also be seen as a term going beyond those already active in local groups, with many projects (not necessarily led by communities themselves but often led by heritage professionals such as museum archaeologists or archaeological contractors) designed specifically to attract new audiences to archaeology that may not become involved otherwise.

Key Issues and Current Debates

There are a number of issues connected currently with groups and societies involved with archaeology. A key issue in various countries is that of access and legality. For example, in most countries some or all sites of archaeological significance are legally protected from any invasive investigation without permission. This of course protects the sites in question (although it does not necessarily stop illegal excavations, illicit metal detecting or other activities), but it also provides a barrier to independent investigation by voluntary groups. For example, while many areas are open to archaeological investigation in England and Wales, provided that there is permission from the landowner and the site is not a Scheduled Monument or other protected area, in Northern Ireland all excavation is strictly prohibited without the procurement of a license from the Northern Ireland Environment Agency. In practice, this is usually only granted to professional archaeological organizations, and as a result in recent years, there has seemingly been only one voluntary group that has managed to carry out its own excavations, which had to take place with the assistance of a professional archaeological contractor. In Europe, some 46 countries are signatories to the European Convention on the Protection of the Archaeological Heritage (revised) 1992, commonly known as the Valletta Convention (Council of Europe 2011). This convention emphasizes the professional side of archaeologists but has also led to concern by some that there is a risk of excluding public participation depending on how the convention is interpreted (e.g., The Archaeology Forum 2006). Hence, this may have an impact on the extent to which "amateur" archaeologists and others are able to engage with archaeological heritage independent of professional supervision.

Another important issue that causes concern not only to paid archaeologists but also to members of local groups and societies is that of training and standards. This has had two effects in particular. On the one hand, there is a perception among some paid archaeologists that work carried out by voluntary groups will be substandard, with poor and out-of-date methods used for archaeological fieldwork.

This has led to some from the voluntary sector accusing professional archaeologists of elitism and exclusivity in their attitudes towards

archaeological heritage (e.g., Selkirk 1997: 9). Research into participation in archaeology in 2003 by the CBA suggested that some of the project's respondents "spoke of professional elitism and a closed shop; there was a feeling that archaeology is 'done by professionals for professionals' and that professionals are no longer willing to admit or impart a sense of excitement" (Farley 2003). This is also reflected in the concerns that members of the local community are rarely involved in commercial archaeological work, certainly in the UK, with few notable exceptions such as the Hungate excavation in York City Centre (Connelly 2011). There are often reasons why volunteers cannot be involved in commercial projects, such as health and safety restrictions, time limitations (it generally takes longer to carry out fieldwork when volunteers are involved due to the extra supervision and training needed), and even client confidentiality clauses. However, the emergence in England of the *Planning Policy Statement 5* in England (see www.communities.gov.uk/publications/planningandbuilding/pps5) suggests opportunities for greater community involvement in all aspects of archaeological heritage management in the planning process, from decision-making to active hands-on participation. This has been noted recently in recommendations to the archaeology sector in the UK (Southport Group 2011: 8, 10–13).

However, there are also genuine issues with regard to the activities of some voluntary groups in the negative effects that their work can have on the archaeological heritage. Perhaps one of the most obvious examples of this comes from the activities of artifact-hunting groups, such as metal-detector users and pot hunters, as their search for specific artifact types can lead to the destruction of the archaeological *context* surrounding that artifact, without the recording of associated artifacts and materials, and causes irreversible damage and loss of knowledge. However, this is also true of intrusive investigations such as field walking or excavation, which are, by definition, destructive. Some groups have acknowledged this, and there is a demand for training opportunities which is not always met due to the impact of the current global economic downturn and changes in priorities. For example, there are now significantly less continuing and adult education courses available through English universities than even a few years ago, courses which traditionally were a key source of training for voluntary groups (Lee 2009: 10). This lack of training is often compounded by the failure of many groups to inform local and national record keepers, such as (in England) the Historic Environment Record Officer in their local authority area of work they have carried out and the results of that work. However, in some areas there are community archaeologists: paid archaeologists who facilitate, train, and support the voluntary sector in archaeology. In some cases, such as in Shropshire, Surrey, and Herefordshire, a community archaeologist has been in the employment of the Local Authority – although these positions have decreased in the past few years in the UK due to local government reductions. In other cases, independent charitable trusts such as York Archaeological Trust employ community archaeologists, demonstrating the need for archaeologists with an outward-facing, inclusive, and informative role within an organization. Recognizing the need for archaeologists with the so-called soft skills necessary to engage with a wide range of different people from diverse backgrounds and with varying abilities, the CBA recently started a three-year training program for future community archaeologists – the Community Archaeology Bursaries Project – with funding from the Heritage Lottery Fund, English Heritage, Cadw, and Historic Scotland (see www.britarch.ac.uk/community/bursaries). These trainees, 39 in total over the project's duration, will learn how to interact with the voluntary sector in archaeology, including gaining experience of organizing, delivering, and evaluating bespoke training sessions.

Another factor that may have an impact on archaeological activity at a global level is the effect of the economic downturn faced by many countries. Certainly in the UK, this has contributed to the loss of many archaeological jobs, with an estimated fall of 7.6% from July 2010 to January 2011 (Aitchison 2011: 2). It is certainly feasible that over the next few years, there will be an increase in the activity of local groups and societies, as the activity of paid

archaeologists recedes. Furthermore, many of these groups work for a long period on the same site or related sites, often in areas where commercial archaeology would be unlikely to operate, for example, in an area where no development is planned. The increased activity of voluntary groups and societies will depend too on the extent to which the countries in which groups are based have legal constraints affecting the access to archaeological sites and projects by volunteers.

Cross-References

- ▶ Community Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Volunteers in Archaeology

References

This encyclopedia includes no entries beginning with Cm or Cn.

Aitchison, K. 2011. Job losses in archaeology – October 2010, January 2011. Landward Research Ltd. Available at: http://www.landward.eu/Job%20Losses%20in%20Archaeology%20-%20January%202011.pdf. Accessed 26 Aug 2011.

Brodie, N. 2006. Introduction: Transforming values. In *Archaeology, cultural heritage, and the antiquities trade*, ed. N. Brodie, M. Kersel, C. Luke, and K.W. Tubb, 1–24. Gainesville: University Press of Florida.

Çatal News. 2010. Çatal News 17. Available at: http://www.catalhoyuk.com/downloads/Catal_News_2010.pdf. Accessed 27 July 2011.

Connelly, P.A. 2011. Hungate: Digging in the heart of York. *The Archaeologist* 80: 34–35.

Council of Europe. 2011. European convention on the protection of the archaeological heritage (revised). Available at: http://www.conventions.coe.int/Treaty/Commun/ChercheSig.asp?NT=143&CM=7%26;DF=22/08/2011%26;CL=ENG. Accessed 26 Aug 2011.

Farley, M. 2003. Participating in the past. Available at: http://www.britarch.ac.uk/participation. Accessed 22 Aug 2011.

Fry, B. 2007. Reaching out to the bureaucracy and beyond: Archaeology at Louisbourg and Parks Canada. In *Past meets present: Archaeologists partnering with schools, museum curators, teachers and community groups*, ed. J. Jameson and S. Baugher, 19–33. New York: Springer.

Hicks, D. 2006. A model investigative protocol for looting and anti-looting educational program. In *Archaeology, cultural heritage, and the antiquities trade*, ed. N. Brodie, M. Kersel, C. Luke, and K. Walker Tubb. Tampa: University Press of Florida.

Lee, R. 2009. Engaging with the historic environment: continuing education. Available at: http://www.britarch.ac.uk/sites/festival.britarch.ac.uk/files/node-files/EHE%20CE%20Report%202009_Draft%2010.pdf. Accessed 26 Aug 2011.

Selkirk, A. 1997. *Who owns the past? A grassroots critique of heritage policy*. London: Adam Smith Institute.

Skeates, R. 2000. *Debating the archaeological heritage*. London: Duckworth.

Southport Group. 2011. Realising the benefits of planning-led investigation in the historic environment: A framework for delivery. Available at: http://www.archaeologists.net/sites/default/files/node-files/SouthportreportA4.pdf. Accessed 26 Aug 2011.

The Archaeology Forum. 2006. Memorandum submitted by The Archaeology Forum. Available at: http://www.publications.parliament.uk/pa/cm200506/cmselect/cmcumeds/912/912we05.htm. Accessed 22 Aug 2011.

Thomas, S. 2010. *Community archaeology in the UK: Recent findings*. York: Council for British Archaeology. Available at: http://www.britarch.ac.uk/sites/www.britarch.ac.uk/files/node-files/CBA%20Community%20Report%202010.pdf. Accessed 22 Aug 2011.

Tully, G. 2007. Community archaeology: General methods and standards of practice. *Public Archaeology* 6: 155–187.

Watson, P. 1999. The lessons of Sipán: Archaeologists and *huaqeros*. Available at: http://www.mcdonald.cam.ac.uk/projects/iarc/culturewithoutcontext/issue4/watson.htm. Accessed 26 Aug 2011.

Further Reading

British Archaeology. 2011. 7 archaeological societies. *British Archaeology* 120: 42–45.

Faulkner, N. 2000. Archaeology from below. *Public Archaeology* 1: 21–33.

Faulkner, N. 2009. The sedgeford crisis. *Public Archaeology* 8: 51–61.

Henson, D. 2010. The academy and the public. In *Unquiet pasts: Risk society, lived cultural heritage, re-designing reflexivity*, ed. I. Russell and S. Koerner, 209–222. Farnham: Ashgate.

Isherwood, R. A. 2009. Community archaeology: a study of the conceptual, political and practical issues surrounding community archaeology in the United Kingdom today. Doctoral dissertation, Manchester: University of Manchester.

Moshenska, G., and S. Dhanjal, eds. 2011. *Community archaeology: Themes, methods, practices*. Oxford: Oxbow.

Skeates, R., C. McDavid, and J. Carman, eds. 2011. *The Oxford handbook of public archaeology*. Oxford: Oxford University Press.

Thomas, S., and P.G. Stone, eds. 2009. *Metal detecting and archaeology*. Woodbridge: The Boydell Press.

Waterton, E., and S. Watson, eds. 2011. *Heritage and community engagement: Collaboration or contestation?* London/New York: Routledge.

Côa Valley Rock Art Sites

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Introduction

The first engravings (Chalcolithic/Iron Age) were found in 1982 at Vale da Casa, a Douro terrace near the Côa River's mouth (Baptista 1983), the first site of the rock art complex of the Côa/Portuguese High Douro. The site was later submerged by the Pocinho dam.

In late 1994, during the construction of a new dam in lower Côa River, the first Paleolithic engravings were found at Canada do Inferno, which resulted in a political debate throughout 1995 that resulted in the abdication of the Côa dam.

In 1996, the Parque Arqueológico do Vale do Côa (Côa Valley Archaeological Park) was created to preserve the rock art complex, with an area of *c*. 49,500 acres. In December 1998, the complex was enlisted in UNESCO's World Heritage list, having its statute changed in 2010 through its extension to the Siega Verde complex. In the same year, the Côa Museum was opened.

The establishment of the Centro Nacional de Arte Rupestre (Rock Art National Centre) in 1997 allowed the continuous survey and study of regional rock art. Nowadays there are 72 known sites with 1032 decorated rocks, of which 487 have Paleolithic art (45 sites), 50 have holocenic art (20 sites), 352 have Iron Age art (37 sites), 197 from historic periods (39 sites), and 113 rocks of undetermined chronology (23 sites). Of these, Paleolithic and Iron Age rock art have greater importance being the first world open-air rock art ensemble of the Paleolithic.

Key Issues/Current Debates/Future Directions/Examples

The Côa Valley rock art is mainly engraved (though some is painted) in vertical panels of outcropped schist in the margins of the Côa river and other tributaries until the Douro. The Paleolithic rock art spreads from the Gravettian to late Magdalenian (±26,000 to ± 12,000 BP). The earliest period features a profusion of deep engravings, some of them of great size, and generally superimposed. In the latest period pecking is generally absent, replaced by the almost exclusive use of simple or multiple incisions.

The theme (zoomorphism) is common to both periods, portraying common regional herbivores distributed by four species: Equidae (Fig. 1), Bovidae, Caprinae (Fig. 2), and Cervidae. Rare fish complete this bestiary, to which are added 17 anthropomorphic figures in three rocks, where the ithyphallic anthropomorph of Rock 2 of Piscos is the most known. All these anthropomorphic figures are Magdalenian (Baptista 2009).

The spacial arrangement of the engravings in these two periods differs. The five major sites of the earlier period (Penascosa, Quinta da Barca, Foz de Piscos, Fariseu, Canada do Inferno) are located in the wider areas of the last beaches in the Côa river, whereas the engravings of the later period are concentrated around the Côa river mouth in panels without the abundance of superimposition of the earlier period.

At Fariseu, a great panel (Rock 1) only with engravings of the earliest period (96) was covered with sediments whose deposition started *circa* 20,000 years ago. Absolute chronology demonstrates that the lower part of the panel was already covered *c*. 18,400 years, and a detached piece of the panel was found in this lower layer (Aubry 2009). This dating presents a *post quem* chronology to the engravings of the earliest period, which are stylistically Gravettian. Meanwhile, in this excavation were also discovered 60 schist fragments with linear incision (portable art) (Fig. 3). These incised plaques with small-sized animals and multiple incisions contribute to establish the chronology of stylistically similar engravings found in panels along the Côa valley, since the plaques were found in deposition, most of them in Upper Magdalenian levels (Aubry 2009).

The Second Iron Age is another period of intense engraving, most of them on the Côa river's mouth. The typology of the engravings implies the presence of a hierarchical society, with an almost manorialist caste of warriors. The warriors

Côa Valley Rock Art Sites, Fig. 1 A horse pecked from rock n° 1 of Canada do Inferno (Hell's Canyon). Gravettian period

Côa Valley Rock Art Sites, Fig. 2 Male ibex (capra pyrenaica) with two heads from Quinta da Barca, rock n° 3

are depicted on foot or in horseback, always with their metallic weaponry, spears and javelins, falcatas, and small round shields like those described by Strabo in Geografia da Lusitânia (Lusitania Geography).

There is still plenty of seventeenth- to twentieth-century rock art in the Côa Valley, last remains of an engraving tradition that started at least two hundred fifty centuries ago.

Côa Valley Rock Art Sites, Fig. 3 Portable art from the site of Fariseu, in Côa Valley, with late Magdalenian incisions of little animals

Cross-References

► Art, Paleolithic
► Rock Art Sites: Management and Conservation

References

Aubry, T., ed. 2009. *200 séculos da história do Vale do Côa: incursões na vida quotidiana dos caçadores-artistas do Paleolítico*, Trabalhos de Arqueologia, vol. 52. Lisboa: IGESPAR, IP.

Baptista, A.M. 1983. O complexo de gravuras rupestres do Vale do Casa (Vila Nova de Foz Côa). *Arqueologia* 8: 57–69.

Baptista, A.M. 2009. *Paradigm lost. Côa Valley and the open-air palaeolithic art in Portugal*. Porto: Edições Afrontamento/PAVC.

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Brief Biographical Information

Coben has a B.A. in Economics from Yale University, a J.D. from Harvard Law School, and a Ph.D. in Anthropology (Archaeology) from the University of Pennsylvania. He is a University of Pennsylvania–affiliated archaeologist. He is also a member of the Board of Directors of the Bolivian-American Chamber of Commerce and a former golf captain of the Saint Andrew's Golf Club. He served as president of the Board of Directors of New York Stage and Film, a not-for-profit theater company from 1995 to 2003.

Major Accomplishments

Coben's most recent archaeological work focuses on Inca imperial expansion and the role of spectacles, rituals, and theatricality in ancient societies. He coedited the seminal volume *Archaeology of Performance: Theaters of Power, Community, and Politics*, a study of the importance and use of theatrical performance at public events, rituals, and spectacles in ancient societies to create and govern states and empires. He has also written numerous articles on the Inka, sustainable preservation, empires, performance, and complex societies. He has directed or participated in projects in Bolivia, Peru, Guatemala, Ecuador, and Jordan.

Dr. Coben is the founder and executive director of the Sustainable Preservation Initiative ("SPI"). SPI seeks to preserve the world's cultural heritage by providing sustainable economic opportunities to poor communities where endangered archaeological sites are located. SPI believes the best way to preserve cultural heritage is creating or supporting locally owned businesses whose success is tied to that preservation. SPI's grants provide a "two for the price of one" benefit: They create transformative economic opportunities for the local residents while saving archaeological sites for future generations to study and enjoy. SPI is active throughout Latin America, particularly Peru, as well as in Jordan and other countries.

Coben is chairman of ICAHM's Nomination Assistance Committee and vice chairman of its Standards Committee. He was a member of the Governing Board of the Archaeological Institute of America and the first chairman of its Site Preservation Committee. Coben is also a member of the University of Pennsylvania Museum's Director's Council.

Cross-References

▶ Archaeological Stewardship
▶ Cultural Heritage in Times of Economic Crisis
▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
▶ Stakeholders and Community Participation
▶ Sustainability and Cultural Heritage

Further Reading

Coben, L. 2006a. The museums' objects. In *Archaeological site museums in Latin America*, ed. H. Silverman, 249–255. Gainesville: University of Florida Press.

Coben, L. 2006b. Other Cuzcos: Replicated theaters of Inka power. In *Archaeology of performance: Theaters of power, community and politics*, ed. T. Inomata and L.S. Coben, 223–259. Lanham: AltaMira Press.

Coben, L. 2010. Some roads do lead to Incallajta: The double road from Vacas. *Ñawpa Pacha* 30: 53–64.

Coben, L. in press-a. If all the world's a stage then what's an usnu? In *Inca Ushnus: Landscape, site and symbol in the Andes*, ed. F. Meddens, C. McEwan, and N. Branch. British Museum Press.

Coben, L. in press-b. Sustainable preservation: Creating entrepreneurs, opportunities and measurable results. In *Archaeology and economic development*, ed. P. Gould and P. Burtenshaw.

Coben, L., and C. Stanish. 2005. Archaeological reconnaissance in the Carabaya region, Peru. In *Advances in the archaeology of the Titicaca Basin*, ed. C. Stanish, A. Cohen, and M. Aldenderfer, 243–266. Los Angeles: Cotsen Institute of Archaeology Press.

Coben, L., and P.J. Boulifard. 2006. Incallajta, performance center of the Inkas: A digital reconstruction and virtual reality analysis. In *From space to place:*

2nd International Conference on Remote Sensing in Archaeology. Proceedings of the 2nd International Workshop, CNR, Rome, Italy, December 4–7, 2006, ed. S. Campana and M. Forte.
Inomata, T., and L.S. Coben, eds. 2006. *Archaeology of performance: Theaters of power, community and politics*. Lanham: AltaMira Press.
Isbell, W.H., and H. Silverman, eds. 2002a. *Andean archaeology I: Variations in sociopolitical organization*. New York: Kluwer/Plenum.
Isbell, W.H., and H. Silverman, eds. 2002b. *Andean archaeology II: Art, landscape and society.* New York: Kluwer/Plenum.
Isbell, W.H., and H. Silverman, eds. 2006. *Andean archaeology III: North and South*. New York: Springer.
Larry Coben Archaeology Webpage. n.d. Available at: http://www.larrycoben.com
Silverman, H., ed. 2004. *Andean archaeology.* Malden: Blackwell.
Sustainable Preservation Initiative (SPI) website. n.d. Available at: http://www.sustainablepreservation.org

Cognitive Archaeology

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Introduction and Definition

Cognitive archaeology, or the archaeology of mind, has been broadly defined by Colin Renfrew as the study of past *ways of thinking* through the material remains that have been unearthed (Renfrew 1982, 1993, 1994). Important to note at the outset is that cognitive archaeology does not attempt to identify *what* people thought, but rather *how* they carried out their thinking in interaction with others and the material world. In other words, the archaeology of mind is primarily interested in learning about the different situated processes of human thought as they emerge and take shape in the different cultural trajectories of our species.

The spectrum of abilities that archaeologists have delved into has been wide. Given the position of tools at the starting point of the archaeological record, the technological capacities that were required to manufacture and use them were among the first to be examined. However, it is later-emerging cognitive properties that have received most of the scholarly attention. Symbolism, generally defined as the uniquely human ability to create and manipulate representations, holds a highly prominent place in this context. Language, which is closely tied to symbolism, is yet another ability whose emergence is of the utmost importance for the epitome of the human species and has thus been especially investigated. Despite symbolism and language taking center stage, other capacities, such as abstract reasoning, theory of mind, and self-awareness, have also drawn considerable attention.

The cognitive archaeologist attempts to illuminate the cognitive functions of our ancestors through the construction of inferential frameworks on the basis of present-day evidence. The development of solid inferential steps is often founded on an interdisciplinary approach, within which archaeology plays a vital role. As aptly put by Mithen (1996: 259): "if you wish to know about the mind, do not ask only psychologists and philosophers: make sure you also ask an archaeologist." Given that soft neural tissue does not fossilize, material evidence proves imperative in understanding our cognitive becoming, as it provides the "grounding" upon which the cross-disciplinary narrative can be built. Trying to reconstruct the prehistory of the mind, however, has proved a challenging task, due to the difficulty of establishing testable, empirical, but also culturally sensitive, and philosophically informed links between brain structure, cognitive function, and archaeologically observable behaviors.

Historical Background

In 1956, Vere Gordon Childe argued that an archaeologist must progress from the archaeological material record to behaviors, to thoughts. However, the proponents of the New Archaeology movement that emerged in the 1960s considered the ideational realm inaccessible. This tenet of archaeological thought, also known as "functional–processual archaeology," was characterized by the preoccupation with the *functional* variability of artifacts, rather than the possible

thought processes and categories associated with them (e.g. Binford 1965). Accordingly, prominent figures of the processualist movement, like Lewis Binford (1965: 204), dismissed any exploration beyond the material, into the psyche of past peoples, as unproductive "paleo-psychology."

Despite the initial skepticism, however, the first explicit steps towards the cognitive direction were made during the following decade. Colin Renfrew's study of the role of the "symbolic and projective" subsystems in the emergence of the Aegean civilization (1972) marks possibly the formation of cognitive archaeology (Renfrew 1993: 250). Meanwhile, other scholars had started to accentuate the cognitive capacities required for archaeological artifacts (e.g., Marshak 1972). In fact, according to Kent Flannery and Joyce Marcus (1993: 260), by the early 1970s, archaeologists such as John Fritz and Robert Hall had already listed "cognitive archaeology" among their research interests, in the American Anthropological Association's guide to anthropology departments. Thomas Wynn was the first to adopt a systematically cognitive methodology in studying stone tool use, drawing upon the work of developmental psychologist Jean Piaget. Focusing upon stone artifacts from the Isimila Prehistoric Site, Tanzania, he concluded that Acheulian hominids exhibited organizational abilities characteristic of operational intelligence similar to ours (Wynn 1979). In his 1982 inaugural lecture in Cambridge, entitled *Towards an Archaeology of Mind*, Colin Renfrew outlined the potential of a cognitive approach to the study of the archaeological material record. He argued that questions pertaining to human intelligence are key in describing and explaining the growth and diversity of human societies, which can be recognized as the central goal of archaeology (Renfrew 1982: 2).

In spite of such promising first steps, dubiousness still loomed over the field. As Ian Hodder (1993: 253) informs us, "The term 'cognitive archaeology' or 'the coggies' was used disparagingly in the late 1970s and early 1980s to refer to trends in the discipline which came to be called symbolic, structural, contextual, hermeneutic or interpretive." The tepid standpoint of the functional–processualists seems to have been mainly grounded on their perception that cognitive archaeology deals with the intangible and is preoccupied with mere epiphenomena, such as religion and ideology (Flannery and Marcus 1993: 260). Regardless of such reservations, however, cognitive archaeology continued to develop during the 1980s, admittedly lacking a collectively agreed upon identity and direction, veering off in a number of pathways.

One such line of research, contemporaneous to Anglo-American discourse, arose in France during the latter half of the 1980s, when prehistorians started employing the *chaîne opératoire* approach of André Leroi-Gourhan for the purpose of studying the lithic assemblage. They aimed to illuminate the technology and practical skills (i.e., technique) of the knapper, by methodically interconnecting the lithic assemblage. On this premise, the approach had been used for both technoeconomic studies, which are concerned with the spatiotemporal dynamics of the lithic reduction process, and technopsychological studies, which are focused on conceptual and procedural dynamics. It is the second type of studies that was widely considered to have granted access to the knapper's mind (Bar-Yosef and Van Peer 2009).

In an attempt to establish some common ground, the first conference devoted exclusively to the discipline was organized by Colin Renfrew and Ezra Zubrow in April 1990 at Cambridge. According to Renfrew (1994: 3), the conference marked the passage from "functional–processual" to "cognitive–processual" archaeology; however, it did not appear to yield much consensus, as becomes apparent in the 1993 feature of the *Cambridge Archaeological Journal*, entitled What is cognitive archaeology?. The conference did, nonetheless, spark an increased interest in the cognitive that boomed during the 1990s, as reflected by the number of symposia held in the subsequent years.

The blossoming of the field proved particularly beneficial in attracting the interest of scholars from other disciplines, who drew upon the archaeological record. A beginning was made by cognitive neuroscientist Merlin Donald (1991), who suggested that the mind emerged in three stages: a mimetic skill allowed the transition from the

"episodic" stage of the early hominids to the "mimetic" stage, a linguistic capacity subsequently permitted the transition into the "mythic" stage, and, lastly, writing conferred the transition into the "theoretic" stage. In this last stage, Donald identified a new way of "external symbolic storage." Whereas, up until that point, neural engrams had been relied upon for the purpose of storing memories, novel material media provided humans with the ability to store information that could be retrieved at a later date, thus instigating a radical change, not only in the capacity, but also in the operationalization of memory. The increasingly expanding list of such exograms has ranged from hieroglyphs and writing systems to diagrams and decorations. In this light, biologically molded human beings had been coupled with material culture in order to transition into a biocultural hybrid phase. Another noteworthy work by a scholar external to the field was authored by biological anthropologist Terrence Deacon (1997), who used a triptych of signification proposed by semiotician Charles Sanders Peirce (i.e., icons, indexes, and symbols) as a cornerstone, in order to put forth an account of the emergence of linguistic symboling. By constructing a nested hierarchy, with icons at the bottom and symbols at the top, he associated each level of reference with its own degree of consciousness and underlined that humans are the sole species possessing symbolic consciousness, for they moved from indexes, which are characterized by associative learning, to symbolism, based upon "a change in mnemonic strategy, a recoding" (Deacon 1997: 89).

The 1990s also saw the first cross-disciplinary collaborations, such as that between psychologist William Noble and archaeologist Iain Davidson, who advocated that it was the emergence of language that yielded the "modern" mind, for as they put it "'the mental' equates to language in human life" (1996: 226). Their view, in brief, is that pointing gestures would occasionally be captured in plastic media, such as mud, becoming thus signs vulnerable to further manipulation and open to arbitrariness, as any vocal accompaniments of the gestures would be transformed into linguistic symbols, therefore birthing a "modern" type of language.

The prospering of cognitive archaeology continued well into the new millennium, with a number of agendas, purporting to account for the emergence of "modernity," sprouting into existence.

For one of these schools of thought, the unearthed material evidence was the outcome of a genetic mutation. Paleoanthropologist Richard Klein (2009) has famously advocated in support of a fortuitous mutation in the executive brain, which he suggested granted humans a qualitative neural advance. He claims that prior to 50 kya, morphology and behavior appeared to have evolved relatively slowly, whereas after this time, behavioral change accelerated rapidly, while morphology remained relatively stable (Klein 2009: 745). Along similar lines, anthropologist Thomas Wynn and psychologist Frederick Coolidge (2011) have identified an additive genetic mutation that enhanced our working memory capacity, as one of the final components of the "modern" mind. An increased ability to retain and process information in active attention is beneficial for a wide range of essential cognitive capacities, such as fluid and general intelligence, and linguistic comprehension, acquisition, and expression. Based on their interpretation of the archaeological record, they determine the mutation to have certainly been in place by 30 kya and perhaps as early as 77 kya.

In another account of mental evolution, Iain Davidson (2010) has supported a modular mental model based on a concept put forth by neuroscientist Philip Barnard, according to which information flows through a number of interacting cognitive subsystems. The framework purports that humans have evolved from species with fewer subsystems to possess a nine-subsystem model of cognitive function, with each system specialized in a specific type of representation.

Archaeologist Miriam Haidle (2012) attempted to delve into the cognitive lives of past peoples by developing and employing yet another distinct investigative technique. The essence of her approach rests in identifying the thought-and-action processes required for the manufacture and use of tools. This is done by

coding the physical actions required for tool construction into a sequence of operational units depicted in a "cognigram."

A final contemporary doctrine was fathered by Colin Renfrew, who switched gears in 2001, by imbuing material culture with a more "active" role, at the expense of its, until that point, reduction to an epiphenomenal product of the mind. By highlighting the implications of human *engagement* with the material world, he set the foundations for a cardinal transition that transformed the discipline. He dismissed the mind/matter dichotomy, adopting a *hypostatic* approach, according to which the mind's symbolic capacity emerged via praxis in the material world (Renfrew 2001: 128–29). It is in the light of such a process of "substantialization" that symbolic concepts and their material manifestations arose in unison. Adopting these theoretical underpinnings, cognitive archaeologist Lambros Malafouris (2004) drew extensively from philosophy of mind, in order to illuminate the pitfalls of the commonly adopted Cartesian methodological individualism, and identified the cognitive system as embodied, mediated, distributed, and extended. Archaeologist Carl Knappett (2005) shared this notion of the mind and contextualized its realization in non-anthropocentric interactive networks whose nodes are constituted by inextricably tied brains, bodies, and artifacts. Bidirectionality of agency between the nodes is a pivotal principle characterizing the networks, for while it is action that creates and reshapes material forms, it is also action that is exerted by them. It is in precisely such a cognitive landscape that humans act and think through material culture (Knappett 2005), as well as create and reproduce their identities (Gamble 2007). In moving away from the exclusive preoccupation with the representational, what emerged is the ability of humans to self-engineer themselves through the physicality of their agency-bearing material worlds (Boivin 2008). However, one's cognitive and existential manifestation is shaped not only by material culture but also by neighboring embodied brains. Hence, to refer to this network-born entity, archaeologist Chris Gosden (2008: 2003) advanced the "notion of a social ontology, which holds that human life unfolds through an equal input from materials and from people."

But how does this discussion on the cognitive translate into biological terms? What is the relationship between the human neural apparatus and the unearthed material culture? In seeking answers to such questions, archaeologists turned for enlightenment to neuroscience – a field with visual access into the functioning brain, permitted by recent advances in neuroimaging technology, such as functional magnetic resonance imaging (fMRI). Recognizing the benefits of incorporating such knowledge into the study of the past, Lambros Malafouris and Colin Renfrew (2008) were among the first to systematically bridge the fields of neuroscience and archaeology, yielding an integrated theoretical platform they termed "neuroarchaeology." It is encouraging to note that, at this time, cognitive archaeologists also started harvesting the potential of imaging techniques more directly by conducting neuroarchaeological experiments. For example, positron emission tomography (PET) was used to monitor the functional brain activation during the experimental manufacture of Oldowan and Acheulian tools by experts (Stout et al. 2008). Interestingly, the observed patterns of activation overlapped with the neural circuits employed by language, possibly suggesting mutually reinforcing coevolution.

In concluding this brief historical overview, it should be acknowledged that the cognitive capacities possessed by the Neanderthals have also received a moderate amount of attention in the past decade or so. For instance, Thomas Wynn and Frederick Coolidge (2004) argued that their working memory capacity was lower than that of their anatomically modern counterparts, granting them with a smaller phonological store, or a reduced attention capacity. While symbolic reference does not depend on working memory, the authors purported that the reduced capacity of the Neanderthals would have constrained the number of symbols they would have been able to process and that their language must thus have been more laconic compared to the richer version used by anatomically modern humans.

Key Issues/Current Debates

Questions concerning the origins of "modernity" have been at the forefront of paleoanthropology and cognitive archaeology ever since the publication, in 1989, of *The Human Revolution*, a volume edited by archaeologist Paul Mellars and anthropologist Chris Stringer. "Modern human behavior" is an ambiguous and much contested term (Shea 2011), which has nevertheless been widely established as referring to a "package" of behaviors considered to characterize the uniqueness of the "modern" human condition. Not surprisingly, symbolism and language are unambiguously considered the most important elements of this bundle. Nevertheless, despite agreement upon the behaviors of primary importance, the spatiotemporal scenarios that have been purported to explain the crossing of the Rubicon towards "behavioral modernity" remain much contested (for a good review, see McBrearty and Brooks 2000; d'Errico and Stringer 2011).

Similarly, a variety of mechanisms have thus far been considered as the instigators of the transition towards "modern human behavior." An overview of the literature will reveal that scholars are roughly divided into two broad and heterogeneous schools of thought. Some emphasize sociodemographic factors, such as the increasing population density, as the prime mover of behavioral change, due to its indubitable effect on chances of innovation. Others see the emergence of a "modern" mind as the prime mover of increasingly complex behavior. Their preoccupation with our cognitive evolution has indeed contributed much in demonstrating the primacy of the mind in explaining the origins of "behavioral modernity."

Dissonance among these scholars in their conceptualization of the directionality between human mind–material culture interactions requires a further dichotomization of agendas into representationalism and interactionism. Pondering along the lines of "the chicken or the egg" causality dilemma, did the brain mold the unearthed artifacts, did the latter mold the former, or is the relationship between them best seen as bidirectional? Answering this question primarily rests on an archaeologist's disposition of *where* the mental resides and *how* it unfolds – issues that dwell well within the territory of philosophy of mind.

According to the representational or internalist idiom, preexisting concepts were initially formed within the mind, before being materialized in objects through action. This dualistic disposition is still much alive today with many scholars implicitly or explicitly subscribing to the computational view of a mind receiving and processing external sensory stimuli "trapped" within the cranial cavity.

A rejection of the representational view can perhaps be traced back to the mid-1990s, when William Noble and Iain Davidson (1996) argued in favor of what they termed a "social construct" model of the mind, which posits a conception of the mind as socially distributed. An implication of such view is that universal conclusions about past minds cannot be drawn, for as has been suggested by prominent post-processualist Ian Hodder (1993), if all aspects of cognition are partly social, then interpreting social meanings and contexts is the only way to study cognition with respect to particular societies. However, this emphasis on contextual interpretation was not entirely without problems. For instance, cognitive archaeologists, such as Kent Flannery and Joyce Marcus (1993) and Colin Renfrew (1993, 1994, 1998), failed to recognize the multi-faceted nature of cognition, largely equating the "cognitive" with the "symbolic" and therefore placing symbolic material culture at the forefront of the discipline. Such an extensive preoccupation with the symbolic, however, has been critiqued by Carl Knappett (2005) for disregarding non-symbolic forms of embodied intelligence, which should also be taken into consideration. Moreover, early studies in cognitive and symbolic archaeology failed to appropriately define symbolism (Knappett 2005; Preucel 2006). While acknowledging the fundamental role of symbolism for signification, they omitted recognizing that, along with symbolic action, it also required pragmatic action. Hence, although communication and signification can overlap, early scholars failed to comprehend that they are not required to do so.

At the turn of the millennium, however, cognitive archaeology apparently came of age with a variety of theoretical advances which challenged the consensus' view of the mind as an internal processor, by introducing an externalist perspective that highlighted the "active" role of material culture in bringing forth the mental (e.g., Renfrew 2001; Malafouris 2004, 2013; Knappett 2005; Boivin 2008; Gosden 2008). This enactive relational stance required the radical rethinking of both the material and the neural ends of the interaction – the plasticity of which allowed them to be concomitantly molded via a constitutive intertwining of brains, bodies, and things that enabled the cognitive to unfold, in real time and space, unhindered by cranium- or skin-delineated boundaries (see esp. Malafouris 2013). For cultural neuroscience has proved beyond doubt that cultural phenomena can lead to an extended structural and functional reorganization of our brain's architecture permitted by its extremely plastic nature. Thus, the cognizing neural apparatus of our anatomically modern human ancestors appears to have been in fact sculpted into a "modern" mind upon engagement with material culture – a conclusion which appears to account for what Colin Renfrew termed the "sapient paradox": "if the biological basis of our species has been established perhaps for as much as 200,000 years, then why have the novel behavioural aspects of our 'sapient' status taken so long to emerge?" (Renfrew et al. 2008: 1935).

Future Directions

Despite the fact that our cultural trajectories have been solidly described and are constantly enriched by additional discoveries, there is still much to be learned about the origins of our cognitive ontology. Hence, the emergent, at this point, question is: How should the cognitive sphere of past peoples be approached?

It must be recognized that the feasibility of the field's aspirations has much to gain from interdisciplinarity. Cognitive archaeology has been demonstrating remarkable progress, mainly due to transgressing the traditional borders that isolated it from other disciplines and incorporating their sagacity, yielding thus an interdisciplinary research program that aims at answering broader questions on the emergence of the human mind. As would be expected, the synergistic fusion of the composing disciplines required a point of intersection that fell beyond archaeology itself, maintaining, in the meanwhile, the general analytic objective of cognitive–processual archaeology – namely, using archaeological material remains in order to understand past ways of thinking as they emerge and take shape in different evolutionary and cultural trajectories. Neuroarchaeology is a fine example of a collaborative synthesis whose yield has thus far been particularly fruitful, despite still being at an early stage. While it can offer invaluable insight for the pre-sapiens period of the evolutionary trajectory, its analytic potential can mainly be harvested by scholars examining the period following the so-called speciation phase, due to its implementation of findings made by disciplines focused on anatomically modern humans. Archaeologists have indeed learned much about the biological, social, and cultural foundations of the human mind by working with anthropologists, philosophers, neuroscientists, and social and cognitive scientists. Reciprocally, cognitive archaeology, probably more than any other field of cognitive research, has granted the material world with laudable value for its essential role in impelling and shaping the mental.

On this note, it is time we overcome, once and for all, the "representational fallacy" pervading much contemporary work, for material culture is much more than a mere epiphenomenal product of a brain-residing "ghost in the machine." Our Cartesian spectacles should be left behind, opting instead for a fluid view of a sapient mind emerging from the bidirectional coalitions between brains, bodies, and things (Malafouris and Renfrew 2010; Malafouris 2013). For as has been stated by Chris Gosden (2008: 2010): "The complex actions and interactions of brains, bodies and worlds are what make us human and historical." The introduction of such a radical, for the consensus, outlook in our attempt to trace our cognitive becoming will allow us to better comprehend the concomitant molding

of both the neural and material components of this symbiotic triad. It is hence of paramount significance that we fully appreciate the process of redesigning ourselves through our embodied engagement with the scaffolding provided by material culture. By being committed to such a relational, rather than reductionist, view of the mind, we evade falling into the trap of neurocentrism and thus avoid mistaking the properties of the sociocultural system for the properties of the individual or the brain (Hutchins 1995). For we should constantly remind ourselves that disregarding the "active" role of material culture is a rather inexcusable error by the discipline that prides itself on studying things from the past.

Cross-References

- ▶ Behavioral Archaeology
- ▶ Practice Theory in Archaeology
- ▶ Pragmatism in Archaeological Theory
- ▶ Processualism in Archaeological Theory
- ▶ Renfrew, Colin

References

Bar-Yosef, O., and P. Van Peer. 2009. The *chaîne opératoire* approach in Middle Palaeolithic archaeology. *Current Anthropology* 50: 103–131.

Binford, L.R. 1965. Archaeological systematics and the study of cultural process. *American Antiquity* 31: 203–210.

Boivin, N. 2008. *Material cultures, material minds: The role of things in human thought, society and evolution*. Cambridge: Cambridge University Press.

Childe, V.G. 1956. *Piecing together the past: The interpretation of archaeological data*. New York: Frederick A. Praeger.

Davidson, I. 2010. The archaeology of cognitive evolution. *Wiley Interdisciplinary Reviews: Cognitive Science* 1: 214–229.

Deacon, T.W. 1997. *The symbolic species: The co-evolution of language and the brain*. New York: W.W. Norton.

d'Errico, F., and C.B. Stringer. 2011. Evolution, revolution or saltation scenario for the emergence of modern cultures? *Philosophical Transactions of the Royal Society of London B* 366: 1060–1069.

Donald, M. 1991. *Origins of the modern mind: Three stages in the evolution of culture and cognition*. Cambridge, MA: Harvard University Press.

Flannery, K.V., and J. Marcus. 1993. What is cognitive archaeology? *Cambridge Archaeological Journal* 3: 260–267.

Gamble, C. 2007. *Origins and revolutions: Human identity in earliest prehistory*. Cambridge: Cambridge University Press.

Gosden, C. 2008. Social ontologies. *Philosophical Transactions of the Royal Society of London B* 363: 2003–2010.

Haidle, M.N. 2012. *How to think tools? A comparison of cognitive aspects in tool behavior of animals and during human evolution*, Cognitive Perspectives in Tool Behaviour. Vol. 1. Tübingen: Universitätsbibliothek Tübingen.

Hodder, I. 1993. What is cognitive archaeology? *Cambridge Archaeological Journal* 3: 253–257.

Hutchins, E. 1995. *Cognition in the wild*. Cambridge, MA: MIT Press.

Klein, R.G. 2009. *The human career*. 3rd ed. Chicago: Chicago University Press.

Knappett, C. 2005. *Thinking through material culture: An interdisciplinary perspective*. Philadelphia: University of Pennsylvania Press.

Malafouris, L. 2004. The cognitive basis of material engagement: Where brain, body and culture conflate. In *Rethinking materiality: The engagement of mind with the material world*, ed. E. DeMarrais, C. Gosden, and C. Renfrew, 53–62. Cambridge: McDonald Institute for Archaeological Research.

Malafouris, L. 2013. *How things shape the mind: A theory of material engagement*. Cambridge, MA: MIT Press.

Malafouris, L., and C. Renfrew. 2008. Steps to a 'neuroarchaeology' of mind: An introduction. *Cambridge Archaeological Journal* 18: 381–385.

Malafouris, L., and C. Renfrew, eds. 2010. *The cognitive life of things: Recasting the boundaries of the mind*. Cambridge: McDonald Institute for Archaeological Research.

Marshak, A. 1972. Cognitive aspects of Upper Palaeolithic engraving. *Current Anthropology* 13: 445–477.

McBrearty, S., and A.S. Brooks. 2000. The revolution that wasn't: A new interpretation of the origin of modern human behaviour. *Journal of Human Evolution* 39: 453–563.

Mellars, P.A., and C.B. Stringer, eds. 1989. *The human revolution: Behavioural and biological perspectives on the origins of modern humans*. Edinburgh: Edinburgh University Press.

Mithen, S. 1996. *The prehistory of the mind: The cognitive origins of art, religion and science*. London: Thames and Hudson.

Noble, W., and I. Davidson. 1996. *Human evolution, language and mind: A psychological and archaeological inquiry*. Cambridge: Cambridge University Press.

Preucel, R.W. 2006. *Archaeological semiotics*. Oxford: Blackwell Press.

Renfrew, C. 1972. *The emergence of civilisation: The Cyclades and the Aegean in the third millennium BC*. London: Methuen.

Renfrew, C. 1982. *Towards an archaeology of mind*. Cambridge: Cambridge University Press.
Renfrew, C. 1993. What is cognitive archaeology? *Cambridge Archaeological Journal* 3: 248–250.
Renfrew, C. 1994. Towards a cognitive archaeology. In *The ancient mind: Elements of cognitive archaeology*, ed. C. Renfrew and E.B.W. Zubrow, 3–12. Cambridge: Cambridge University Press.
Renfrew, C. 1998. Mind and matter: Cognitive archaeology and external symbolic storage. In *Cognition and material culture: The archaeology of symbolic storage*, ed. C. Renfrew and C. Scarre, 1–6. Cambridge: McDonald Institute for Archaeological Research.
Renfrew, C. 2001. Symbol before concept: Material engagement in the early development. In *Archaeological theory today*, ed. I. Hodder, 122–140. Cambridge: Polity Press.
Renfrew, C., C. Frith, and L. Malafouris. 2008. Introduction. The sapient mind: Archaeology meets neuroscience. *Philosophical Transactions of the Royal Society of London B* 363: 1935–1938.
Shea, J. 2011. *Homo sapiens* is as *Homo sapiens* was. *Current Anthropology* 52: 1–35.
Stout, D., N. Toth, K.D. Schick, and T. Chaminade. 2008. Neural correlates of early Stone Age tool-making: Technology, language and cognition in human evolution. *Philosophical Transactions of the Royal Society of London B* 363: 1939–1949.
Wynn, T. 1979. The intelligence of later Acheulean hominids. *Man* 14: 371–391.
Wynn, T., and F.L. Coolidge. 2004. The skilled Neanderthal mind. *Journal of Human Evolution* 46: 467–487.
Wynn, T., and F.L. Coolidge. 2011. The implications of the working memory model for the evolution of modern cognition. *International Journal of Evolutionary Biology*. https://doi.org/10.4061/2011/741357.

Further Reading

Botha, R., and C. Knight, eds. 2009a. *The cradle of language*. Oxford: Oxford University Press.
Botha, R., and C. Knight, eds. 2009b. *The prehistory of language*. Oxford: Oxford University Press.
De Beaune, S., F. Coolidge, and T. Wynn, eds. 2009. *Cognitive archaeology and human evolution*. New York: Cambridge University Press.
Fowler, C. 2003. *The archaeology of personhood: An anthropological approach*. London: Routledge.
Henshilwood, C.S., and B. Dubreuil. 2011. The Still Bay and Howiesons Poort, 77–59 ka: Symbolic material culture and the evolution of the mind during the African Middle Stone Age. *Current Anthropology* 52: 361–400.
Malafouris, L. 2008a. Beads for a plastic mind: The 'Blind Man's Stick' (BMS) hypothesis and the active nature of material culture. *Cambridge Archaeological Journal* 18: 401–414.
Malafouris, L. 2008b. Between brains, bodies and things: Tectonoetic awareness and the extended self. *Philosophical Transactions of the Royal Society of London B* 363: 1993–2002.
Malafouris, L. 2009. "Neuroarchaeology": Exploring the links between neural and cultural plasticity. *Progress in Brain Research* 178: 253–261.
Malafouris, L. 2010. Metaplasticity and the human becoming: Principles of neuroarchaeology. *Journal of Anthropological Sciences* 88: 49–72.
Mellars, P.A., K. Boyle, O. Bar-Yosef, and C.B. Stringer, eds. 2007. *Rethinking the human revolution: New behavioural and biological perspectives on the origin and dispersal of modern humans*. Cambridge: McDonald Institute for Archaeological Research.
Renfrew, C., C. Frith, and L. Malafouris, eds. 2009. *The sapient mind: Archaeology meets neuroscience*. Oxford: Oxford University Press.
Wynn, T. 2002. Archaeology and cognitive evolution. *Behavioral and Brain Sciences* 25: 389–438.
Wynn, T., and F.L. Coolidge. 2012. *How to think like a Neanderthal*. Oxford: Oxford University Press.

Cognitive Evolution and Origins of Language and Speech

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Introduction

The archaeological study of cognitive evolution is closely related to the study of the origins of speech and language. The two issues are related as a result of (1) the general nature of any form of communication and (2) the special nature of human communication. First, in general, all communication has an emitter, a receiver, and a message. In most cases, the emitter and the receiver are tuned to each other's communications, and there is little problem in sending or receiving the message. In all organisms other than humans, there are questions about the intentional control of the messages that can be sent. Intentional communications require different cognition from

those that arise without thought. Second, in the special case of humans, we have a peculiarly complex form of emitting sounds and an auditory system well tuned to hear those sounds. In almost all circumstances, humans are capable of controlling the information they communicate to another person, which can be called the meaning of the message. Control of such meanings is a cognitive difference between humans and most (if not all) other animals. The problem for the study of both issues is to relate them to the material record available to archaeology.

To those of us used to reading the written or printed version of such sounds, it seems straightforward that someone speaks words and that we hear them, but recognizing this message requires an unconscious separation of the sound stream into smaller units (corresponding to the gaps between words when written on the page). Such words can have different meanings for different people because they are determined among communities of speakers by convention and generally bear little relation to the things they refer to. Because of this property of "arbitrariness restricted by convention," all words are symbols.

This complex system is very different from the relatively restricted range of utterances by apes and the apparently limited range of things that they can communicate. The evolutionary emergence of these differences involved changes in the system for production of sounds, in the auditory complex that hears those sounds, and in cognition that relates sounds to meanings. In addition, uniquely among humans, the meanings that can be conveyed in speech can also be conveyed in sign languages based on manual gestures and, as you see, in the written word. Several scholars have argued that symbolic communication using manual gestures may have preceded spoken language.

Finally, humans appear to be unique in the capacity to combine individual utterances into combinations according to sets of rules, known as syntax, such that they can utter an infinite number of sentences composed of a smaller number of words. Except in circumstances of serious pathology (including deafness), or of extraordinary deprivation of exposure to language during the early years of life, the expectation is that humans are able to learn language and use it to communicate with others. Among deaf people, language can be transmitted using Sign Languages (which differ from community to community as spoken languages do).

These complexities mean that there are many false pathways for investigating the evolution of cognition and the origins of language and relating to the relative importance of the different elements of speech, syntax, or the cognitive apparatus that supports them. These false pathways seem to offer understanding, but actually cause confusion.

Definition

Evolution

Evolution is a process by which the characteristics of populations change through the operation of natural selection on the inherited variable characteristics of individuals. It is important to remember that most of the variation arises by chance from one generation to the next, and most of the selection operates to eliminate variations. The logic of this formulation is that new characters within the variation should appear at low frequency within a population and subsequently become important due to selection.

The discussion of evolution is often undertaken with misleading metaphors that allow people to believe that there is either a direction to evolution or a force driving it. There is no direction (except seen from the present position) and no forces driving evolution.

Cognition

By a classic definition (Miller 1956), the aim of cognitive science is to: "discover the representational and computational capacities of the human mind and their structural and functional realization in the human brain." The evolution of cognition, therefore, must be studied through the evidence of changes in such representational and computational capacities and the limited evidence of the workings of the mind, first from the evidence of behavior (as is the practice of psychologists of the living) and second from the shadowy

traces of the brains of human ancestors (for a summary of this process, see Davidson 2010a). Such evolutionary studies necessarily require the interpretation of the evidence of behavior from archaeological remains. Any inferences about cognition require well-constructed theory about the relationships between elements within the neurological system, the mental system, and the behavioral system as well as theory about the relationships between these different systems (Barnard 2010). Inferences about the evolution of cognition require all of these together with a clear argument about the relations between these elements and the archaeological record (see, e.g., Botha 2010).

The Brain of Humans and Their Ancestors

There are three relevant issues about the brain: (1) size, (2) localization of specific functions to specific areas of the brain, and (3) evidence from genomics about the genetics of brain function and its history.

The easiest is the size of the brain. Among modern humans, the size range is 1,000–1,700 ml (Lieberman 2011: 192–195). The fossil record shows that the cranial capacity (only an approximation for brain size) of the last common ancestor of about 400 ml was much closer to that of modern apes than to that of modern humans. There are substantial data on the increases in cranial capacity in two steps: one at about two million years ago to a maximum around 1,000 ml, accompanied by a change in body size, and the other between 0.4 and 0.2 million years that was not accompanied by significant change in body size. Each of these changes was followed by the extinction of the creatures with the lowest range of cranial capacity, first those below 700 ml and then those below 1,000 ml (see, e.g., Davidson 2007). The estimates of cranial capacity of fossils are rarely precise, and the relevant fossils often have uncertain dating. It has been argued that brain size is closely related to group size as a means of solving the problem of living in large, complex groupings (Dunbar and Shultz 2007), but some of the key elements of the argument have been shown to be unreliable (Davidson 1999).

As regards the specific functions of regions of the brain (there is an accessible discussion of the main features of this in Coolidge and Wynn 2009), language deficits caused by traumatic damage were the original source of understanding that Broca's area is associated with language production. Subsequent work showed similar associations with specific language features (e.g., Wernicke's area with language comprehension) or aspects of cognition (such as the loss of executive function following catastrophic injury to the frontal lobes). There is no doubt that in ordinary circumstances, particular regions of the brain are associated with particular functions, but the advent of brain imaging of various sorts has shown that functions are distributed more widely in the brain (see, e.g., many PET scan results in Deacon 1997: Chap 10). In addition, recovery of function following stroke or some other massive insult to the brain suggests that the brain is more plastic than sometimes suggested (e.g., Cramer 2008).

Other work has described changes in the morphology of the interior cavity of the skull as represented by the endocasts of the brain or by computed tomography (Bruner 2008). Notably, differences between the endocasts of Australopithecines and early *Homo* have been interpreted as indicating the earliest appearance of Broca's area (Falk 1983), but more recent comparisons with other primates make the interpretation of this more difficult (Schenker et al. 2009). A case can be made that there has been selection for regions such as the basal ganglia and the cerebellum, which are associated with procedural learning, and for hierarchization of the different regions of the brain (Gibson and Jessee 1999).

Language

Because in normal circumstances humans use language, it is easy to avoid definition of the concept – we know what we are doing when we use it, the argument goes. This is another cause of confusion in discussions of its evolution because people have different informal understandings of what is involved. When examining the archaeological record, the definition needs to be one that can be operationalized with nothing more than the

fragmentary things found there. Without a definition of this kind, it is impossible to choose between hypotheses that are products of different theories about the nature of modern language. Nevertheless, most definitions recognize that the basic elements of language are symbols (see, e.g., the discussion in Crystal 1987: Sect. 64).

Some others restrict the definition of language by requiring rules about the combination of such symbols using syntax or grammar. For the purposes of archaeology, it is convenient to define language as communication using symbols (Noble and Davidson 1996) and consider as a separate issue how such symbolic communication came to have rules about combinations.

Speech

At the very beginning of serious study of linguistics, Saussure recognized that the relationship between speech and language was complex, since, in the ordinary course of events, speech does not exist separately from language, yet conceptually the two aspects of the single phenomenon are different (Saussure 1986). Speech can be defined as: "A set of audible sounds produced by disturbing the air through the integrated movements of certain groups of anatomical structures. Humans attach symbolic values to these sounds for communication" (http://www.answers.com/topic/speech downloaded 23 November 2012 10.35 am). Much of the bodily apparatus for producing these streams of air consists of soft tissue and is therefore difficult, but not impossible, to study through skeletal remains. Many examples have been shown not to reveal as much as was hoped about the emergence of speech production (summarized in Davidson 2003: Table 8.1), but more recent studies have claimed that skeletal evidence dated to about 0.5 Ma ago from Atapuerca, in Spain, demonstrates that the bones of the outer and middle ears allowed them sound power transmission into frequency ranges higher than those available to chimpanzees, but with upper limits lower than those of present-day people (Martínez et al. 2012).

The separateness of speech and language is important in the study of both cognitive evolution and language origins. First, as with other vocal utterances by primates, it is possible for hominins to have produced sounds without symbolic meanings attaching to them. Selection could have operated on variations in the anatomy for production of sounds and the concomitant anatomy for hearing without the meanings associated with those sounds being symbolic. Second, if we go by ape sound production, there were substantial cognitive changes required to go from what Burling (1993) called relatively involuntary "gesture calls" to the state where the hominin making the sounds had human-like control of the subtle ranges of sounds humans can make. Third, Saussure recognized that speech and language were inseparable in practice and that the study of linguistics involved the study of the signs involved in the meanings conveyed by language. While those meanings require a social community of speakers, they must also have been a novel product of the cognition of the individual speakers.

Semiotics

The study of signs is called semiotics. A sign was defined by Peirce (1986) as "something which stand[s] to somebody for something in some respect of capacity." To put Peirce's analysis simply, three classes of sign are fundamental: indexical signs, iconic signs, and symbolic signs. According to Peirce "an *Index* is a sign which refers to an Object that it denotes by virtue of being really affected by that Object." The standard example is smoke as an indexical sign of fire, but a less ephemeral example is the footprint left by a person walking on volcanic ash or mud (as at Laetoli or Lake Mungo). All pieces of archaeological evidence are indexical signs of past behavior. Indexical signs are overwhelmingly abundant, but interpreting them is not always obvious (or archaeologists would not need to be trained). Indexical sounds that may be related to the production of vocal communication are grunts in young children or "exclamatory words of high emotion" (Jackendoff 1999), although these are generally not as spontaneous as they seem (Davidson 2005).

Peirce's (1986) definition of iconic signs is: "A sign may be iconic, that is, may represent its object mainly by its similarity. . .." The concept

is familiar through the generalized resemblance between the images in religious icons and a human figure; though this example illustrates that the similarity between icon and object may take many forms – the religious icon represents a generalized human being, but an iconic representation of recognizable individuals is a different sort of achievement. In vocal communication, onomatopoeic utterances are generally iconic, but, as with indexical utterance, they also are constrained by the conventions of the speaker's language. Iconic gestures are not unknown among apes. Burling (1999) has gone further and suggested that the sequential structuring of syntax has elements of iconicity to it. In sign languages, many utterances become conventionalized from iconic gestures and hence are symbols, but such utterances may also be indexical signs (Stokoe 2000).

Peirce discussed symbols in several different ways, but that which is formulated in a manner most similar to the standard "signs that are both arbitrary and conventional" seems to be that symbols are signs that "represent their objects, independently alike of any resemblance or any real connection, because dispositions or factitious habits of their interpreters insure their being so understood" (quoted in Nöth 2010). The importance of symbols for the archaeological study of language origins (and hence cognitive evolution) is that there is some chance that material objects may be identified as symbolic in the archaeological record, but care must be taken with the way in which that is done.

Learning

Language learning is social and there is absolutely no parallel in nonhumans. In all cases, language is the usual means of communication among humans and only present among other free-living animal species by stretching the definitions of language (see, e.g., extensive discussions in Davidson 1999).

Language is learned by very young infants at their mothers' breasts. In particular, small babies, carried in their mothers' arms in front of them, learn to attend to those things their mothers notice (see the argument in Noble and Davidson 1996). This provides the circumstances for selection for learning. The key trigger for infant carrying and hence the joint attention that promoted infant learning was the emergence of obligatory bipedal walking – present by 3.5 Ma ago, as shown by the Laetoli footprints – and hence front carrying.

The emergence of prolonged infant dependency and the life history pattern of modern humans were essential for humans to go through all of the stages of learning (for a general summary of life history variables and their relevance to archaeology, see Nowell in press). When compared with other primates, human infants have a much longer period after birth during which their brains continue to grow at the fetal rate, and they have to be carried for most of their first year of life. Learning and symbol use are not simply a product of brain changes, but of the social context (Noble and Davidson 1996).

Historical Background

Arguments about cognitive evolution and the origins of language and speech have historically depended on a few consistent lines of inquiry. Five such approaches derive from (1) knowledge of modern languages, (2) understanding communication among nonhumans, (3) the anatomical basis of speech production and reception, (4) archaeological evidence for symbol use, (5) and the recognition that language and human cognition can be understood in the context of evolutionary argument.

First, discussion about the origins of language depended on speculations about modern languages, to the extent that the Linguistics Society of Paris famously banned such discussions in 1866. More recently, Chomsky claimed that language was too complex to be explained by evolution. Much recent work has returned to the examination of languages, initially by looking at pidgins as examples of protolanguage (Bickerton 2007) (although pidgins only exist when full modern languages are in contact). More recently, progress has been made by considering meaning making in an evolutionary framework by careful assessment of the differences between human and

animal conceptualization (Hurford 2007). Arguments based on modern languages are unlikely to reveal much about the initial conditions of language production except through such cognitive analysis.

Second, research has been undertaken into the communication of nonhumans, especially landmark studies of the so-called alarm calls of vervet monkeys in the wild (Cheney and Seyfarth 1990), extending to attempts to devise methods for two-way communication between humans and captive apes (Savage-Rumbaugh et al. 1998). The monkey work showed that the communications were relatively unlike language in the limited nature of the utterances and the very specific contexts in which they were used. The ape work showed that comprehension might exceed production, that learning might best be done spontaneously without instruction in a social context, and that language might best be considered not as something that the apes learned as individuals, but that language-like communication came to exist in specific ape-human interactions. Language was shown to be a property of the relationship not of the individuals involved. The most important conclusion from the study of nonhuman primates is that there are such cognitive differences between modern apes and humans that their last common ancestor seems likely to have been cognitively different from modern humans.

Third, in the hope of finding real evidence from the past, attention shifted to the anatomical correlates of speech production either in the throat (for a recent reassessment of work going back to the 1970s, see Lieberman 2007) or in the brain (for a similar reflective history, see Holloway 2008). The investigation of speech drew attention to the need to consider carefully the relationship between speech and language, as well as the question of what speech abilities might have been a necessity for adequate use of language. New discoveries allowed the analysis of breathing control among extinct hominins (Maclarnon and Hewitt 2004) and of their hearing (Martinez et al. 2004). The brain studies led to a more careful consideration of the relations between speech production as a motor function (control of musculature) and as a mental phenomenon. Such studies show that there has been biological evolution of anatomical structures that make modern speech possible, and some of what those evolutionary changes were.

Fourth, archaeologists began to realize that they might have something to say on the matter (Dibble 1989), particularly when the emphasis in defining language shifted to symbols rather than syntax (Davidson and Noble 1989) and the recognition that the claims for early symbol use were less secure than it had seemed (Chase and Dibble 1987). Collaboration of archaeologists with psychologists and cognitive scientists demonstrated that much more subtle inferences were possible if appropriate theory was developed (Noble and Davidson 1996; Coolidge and Wynn 2005; Barnard et al. 2007). Archaeology remains one of the few sources of information about the past which can tie past behavior to particular times and places. Making inferences about cognition or language from such behavioral evidence requires the specification of theoretical links.

Finally, a key paper by psychologists argued strongly that language could be analyzed in an evolutionary framework, allowing linguists to contemplate its origins (Pinker and Bloom 1990). This ultimately led to Chomsky being involved in an attempt to look at evolutionary aspects of language and the claim that the most significant novelty of language was the capacity for recursion (Hauser et al. 2002). Depending how recursion is defined, there is some potential, largely unrealized, for the identification of recursion in the archaeological record (Coolidge et al. 2010).

The outcome has been an outpouring of research on language origins since 1989 taking advantage of all of these developments (for a wide ranging review of the literature see Johansson 2005). In addition, through the multidisciplinary interaction, there emerged a consensus that some of the avenues of inquiry did not relate closely to the concerns of linguists, except insofar as both required the emergence of particular cognitive abilities. In this way, evolution of cognition and origins of language became closely related in research programs.

Key Issues/Current Debates

There were two relatively early attempts to look at the archaeological evidence for cognitive evolution. The first (Holloway 1969) was a logical extension of the author's interest in brain processes and considered the content of knapping actions both in terms of their semiotic significance and in relation to the possibility that sequential actions in the production of finished artifacts had some parallel with syntax. The second was a sustained, and pioneering, effort by Wynn to apply to artifacts of the early stages of hominin evolution the spatial concepts Piaget discerned as defining the cognitive abilities emerging at different stages of human ontogeny (summarized in Wynn 1999). Wynn has subsequently moved beyond this analysis and, particularly, has worked with cognitive scientist, Coolidge, to show the role of Working Memory in Neandertals and modern humans (an accessible work that summarizes many papers and a book is Wynn and Coolidge 2012).

In addition, Wynn has revisited a comparison between the behaviors of chimpanzees and early hominins to conclude that chimpanzees seem more similar to a human ancestor, but at the same time, those human ancestors seem more like apes (Wynn et al. 2011). These coauthors identified that both apes and the earliest hominins lacked "curated tools intended for repeated future use; shape imposition and shared standards for shape; semiotic load, or the use of tools to communicate information about the tool user to other tool users; linguistic instruction for tool fabrication." All knapping produced indexical signs of the act (the flakes not removed from the site) and these undoubtedly provided the opportunity for other hominins to notice novel signs of activity (Davidson and McGrew 2005). It is an unsolved question when hominins first identified that semiotic novelty. Such an argument is related to, but different from, suggestions that interaction between humans and external material culture was an important element of the expansion of human cognition (Donald 1991; Schiffer 1999).

The problem with both the use of Piaget and of Working Memory theory is that the viability of the interpretation depends on the way in which you interpret the archaeological record, and these cognitive theories do not offer much guidance. No one has seen a Working Memory, and whether it has a location in the brain is a matter of controversy. It is, rather, identified by a number of more fundamental behavioral features said to characterize it. In one analysis relating to the first colonization of Australia (which has only ever been populated by modern people), it proved far from straightforward that even basic markers of Working Memory could be identified (Davidson 2010d). More work will be needed to deal with this issue and to specify how the Working Memory model might need to be modified to be useful in describing the behavior of non-modern people.

Cognitive Novelties of Humans

Byrne (2004) compared the abilities of apes with those required to make early stone tools. He pointed out that to make stone tools requires "accurate aiming of powerful blows. . .bimanual role differentiation. . .regular and sequential plan. . .hierarchical organization. . .corrective guidance by anticipatory schema. . .high individual manual laterality and population right handedness." His conclusion was that, among the African apes, hierarchical organization had been observed among gorillas, but not unequivocally among chimpanzees (though this may be a problem of the research). Corrective guidance by a schema has not been observed in either species, and population right handedness has been observed in gorillas but not in chimpanzees (but individual handedness has). All other features can be identified in all species of African ape. On the other hand, cutting appears to be absent from apes in the wild but must have been a principal motivation for the deliberate production of stone flakes from the very beginning (Davidson and McGrew 2005).

Amati and Shallice (2007) listed a variety of cognitive capacities of modern humans that contrast with those of animals. These were the following: (1) language; (2) tools and instruments that go beyond those used by other primates; (3) signs, signals, and other homomorphic representations; (4) dynamic concepts; (5) aesthetic

sense; (6) metarepresentation; (7) algorithmic capacity; (8) categorization and organization; (9) theory of mind; and (10) anticipatory planning. There are three important points about such a list. First, not all of the capacities are completely independent of each other: several probably depend on the prior emergence of language. Second, animal ethologists, particularly primatologists, would argue that there are hints of several of these capacities in one or other species of nonhuman or that there has just not been enough research on particular species to be definitive about the absence of such capacity (Boesch 2012). Third, expressed in these terms, some of these capacities are difficult to identify either in the archaeological record or by any other form of evidence or argument.

An earlier attempt to define the cognitive properties of modern human behavior identified complex information exchange, planning depth, and symbolic conceptualization (Noble and Davidson 1991) which could be operationalized in terms of a relatively small number of traits manifest in the archaeological record. Those traits, somewhat divorced from their cognitive context, were expanded and codified to show that cognitive change probably happened gradually and not exclusively in Europe (McBrearty and Brooks 2000). Further investigation has shown that not all of the elements of that list of traits need be present to identify the presence of modern human behavior (Davidson 2010d): the true mark of modern human cognition is flexibility.

Barnard and Byrne developed a theoretical model that could account for the evolutionary changes in cognition. Barnard originally produced a model of present-day human cognition that has 9 subsystems as an elaboration to overcome deficiencies in the Working Memory model of human cognition (Barnard 1998). Capitalizing on Byrne's familiarity with ape cognition (e.g., Byrne 1995) and Barnard's model, it has been shown that ape cognition can be modelled with six of the nine subsystems, making it likely that there are or were creatures with seven and eight subsystems (Barnard et al. 2007), in all likelihood represented only by extinct hominins.

Among the six subsystems required to account for the known technical abilities of apes, complex hand-eye coordination evolved early in the sequence as a difference from the common ancestor with (5-subsystem cognition) monkeys. In keeping with the observations of Wynn and colleagues and of Byrne, this level of complexity probably characterized the earliest stone tool makers. Complex coordination of vocal utterances in response to visual stimuli would have emerged in the 8-subsystem framework. Language, involving reflective awareness and the expression of thoughts unrelated to external stimuli, emerged only with the emergence of the ninth subsystem.

One element of the argument is an appeal to linguistic theory about semantic roles as a way forward to identify the similarities and differences among humans, hominins, and apes (Byrne et al. 2004; Davidson and McGrew 2005). In this analysis, it is suggested that the statistical regularities of roles that are made salient by the persistence of the stone artifacts as material remains could have enhanced the perception of the semanticity of the actions of hominins. Something similar may apply in the case of mark making that became pictures, with the important difference that several of the supposed semantic roles require some mental processing which could only be done with the ninth subsystem in the Barnard model (Davidson 2012a) (see Table 1).

One implication of this model is that it may be that premodern people were able to communicate with speech that did not use symbols but was nevertheless structured in complex ways similar to syntax. Under these circumstances, adults could have assisted the learning of their offspring by spoken utterances that were not yet language (Davidson 2009). The further implication is that the nature of the interactions involved in the production of symbolic objects implies the appearance of the ninth subsystem in the Barnard model – i.e., fully modern cognition. One of the future challenges for the study of cognitive evolution is to relate the 7- and 8-subsystem models to the evidence from the archaeological record.

Related to the question of semantic roles is the whole question of whether the primitive elements

Cognitive Evolution and Origins of Language and Speech, Table 1 Semantic roles implied by chimpanzee behavior, stone tool making and by picture making

Semantic role	Chimpanzee semantic roles (from Byrne et al. 2004)	Stone tool making (Davidson and McGrew 2005)	Picture-making (Davidson in press)
Agent	Chimpanzee Mike climbs a tree	Lucy fetched the stone	Pablo fetched the ochre
Counter-agent	A chimpanzee strikes a fruit against a stone to open it	Lucy hit the stone with a rock	Pablo rubbed the ochre on a rock
Object	Chimpanzee Figan is now an alpha male	The stone breaks	The ochre marks the rock
Result	Chimpanzee makes a fishing probe	Lucy made a flake	Pablo made a mark
Instrument	Spherical stone used as a hammer to crack nuts	The flake cut the carcase	*The mark made me think of a camel*
Dative	Female chimpanzee Flora is being groomed	*I gave the meat to Lucy*	*Pablo told a story about a camel to me*
Experiencer	*Waa* barks show that Frodo is angry	*Lucy felt well-fed*	*Pablo and I knew some things about camels*
Locative	A group of chimpanzees goes to the group's periphery to look for intruders	Lucy walked away from the flake scatter	*Pablo remembered this as the place of the story of the picture of the camel*

of language were individual words or were more holistic (Wray 2002), an argument that is more persuasive given the abundant evidence from the earliest written language that the dominant process of language change has been simplification and trimming (Deutscher 2005). Even if the earliest elements of language were not individual words but holistic phrases, they would still have had symbolic meaning by convention and been arbitrarily related to their referents. So the issue remains: how can we identify the symbolic content of the archaeological record as a guide to cognition and language?

Symbols and Other Signs

Cultural artifacts acquired meaning first as indexical signs – they were consistently associated with particular situations or conditions. Thus, the debris left from flaking episodes could be seen by the knapper or by other hominins as a sign that knapping had taken place there previously (Davidson and McGrew 2005). Most artifacts have forms that resulted from the requirements of their production (Moore 2012) or their use. It is arguable that it has not been demonstrated that nonhumans even comprehend indexes they created and we do not know when hominins began to comprehend them.

Most early artifacts were constrained in their forms by the utilitarian mechanics of production or use. At some stage, people acquired the skill to vary the form of the artifacts to their perceptions of how an artifact should be – Mellars (1989) referred to this as "imposed form" without ever defining what that meant or how it could be recognized – such that by freeing the artifact from its utilitarian constraints, the form became arbitrary, but could be constrained by the convention associated with those perceptions. Thus, one possible definition is that "the form of an artefact can be seen to be imposed if their shape did not depend on any aspect of the mechanics of production or use, if the modified edge was not that used, and if the forms were standardized within a very narrow range of possible forms" (modified from Davidson 2002). Such artifacts could be seen to fit within the broad definition of symbols, given both arbitrariness and convention. But this definition is not straightforward since some archaeologists would see a deliberate intention to produce "handaxes" and so include early bifacially flaked cores from the Acheulean, and others would not (Davidson 2002).

One productive way to think of the cognitive complexity of artifact production is to document fully the steps required to produce them (Haidle

2010; Lombard and Haidle 2012). Moore (2010) stressed the importance of hierarchical sequences of knapping, while Davidson (2010c) emphasized that cognitive complexity could be identified from episodes of knapping that were unrelated to the target artifacts on the core. This displacement is reminiscent of the distraction tasks that are central to experiments in establishing Working Memory capacity (Conway et al. 2005). The event that is both the most indisputable example of modern human behavior and demonstrates this property of displacement unequivocally is the seafaring habits that must have underlain the several voyages between islands that took modern people to Australia around 50 thousand years ago (Davidson 2012b). It seems likely that further analyses along these lines will be productive in understanding cognitive evolution.

One example which seems to demonstrate early cognitive sophistication is the claim for heat treatment of stone prior to knapping at the site of Pinnacle Point in South Africa (Brown et al. 2009). If the dating is reliable, this example dates back to 162 ka, much earlier than anywhere else in the world.

Future Directions

Phylogenetic Theory

One of the confounding factors in studying the evolution of cognition and the origins of language has been the apparent importance given to studies of the Neandertals, who were quite limited in their distribution (Europe and parts of western Asia), when many of the important evolutionary events took place in Africa and most of the modern people outside Africa are derived principally from movement out of Africa relatively shortly before Neandertals became extinct (Sankararaman et al. 2012). Models that do not acknowledge the branching nature of evolutionary trees are likely to be erroneous (Langbroek 2012). But, that said, there is a growing body of publications that claim increasingly complex behavior among Neandertals, such as hafting stone tools (Mazza et al. 2006), the use of feathers (Morin and Laroulandie 2012), the use of pigments (Roebroeks et al. 2012), and symbolic objects (Zilhão et al. 2010). All such claims need to be scrutinized carefully.

Similar claims, generally replicated at several sites, are also made for the most southern parts of Africa including the use of ochre in hafting (Wadley et al. 2009), use of pigments (Watts 2009), shells used in turning ochre into paint (Henshilwood et al. 2011), designs on ochre pieces (Mackay and Welz 2008), and shell beads (d'Errico et al. 2005), all earlier than the presence of modern humans in Europe, provided the chronology can be relied on. Given that the people who made these convincing markers of modernity were about as distant from Europe and Neandertals as it was possible to be, there is a puzzle that has not yet been solved to account for the apparent convergence on sometimes remarkably similar behaviors that seem to imply aspects of modern cognition. There are several possibilities: (1) evolution is actually directional and that hominins would all have evolved modern cognition given enough time; (2) some of the evidence in Europe has been over-interpreted, at least in part because of a desire by archaeologists to emulate findings outside Europe; (3) some of the evidence from one or other place was a response to contingencies that had little to do with modern cognition; (4) some of the evidence claimed to have been the product of Neandertal behavior was actually produced by modern humans; and (5) the hardware for cognitive modernity emerged before Neandertals separated from other hominins and took a long time to be expressed. All of these possibilities are very uncomfortable, but will need to be confronted in future research.

Genetics

In addition to the several suggestions made earlier, it is clear that the future will produce huge changes in our understanding of the past from the analysis of genetic sequences from modern people and from ancient DNA. But it cannot be stressed strongly enough that those inferences will only be as good as the theoretical framework in which they are conducted. Early hopes that the genes labelled FOXP2, or HAR1, or MCHP1, or ASPM might provide clear insight into the

evolution of modern cognition or language have proved problematic (see reviews in Davidson 2010a, b). Apparently random claims that modern cognition resulted from an unspecified genetic change (e.g., Klein 2000) will presumably be a thing of the past and will be replaced by evidence-based studies of the genetics that affect brains or behavior.

Other areas in which future studies of molecular biology will enhance understanding of the evolution of cognition will be in understanding developmental plasticity (Moczek et al. 2011), but such studies will only be relevant in the context of well-constructed arguments about the role of learning in cognition more generally and in particular about language acquisition.

Cross-References

- ▶ African Stone Age
- ▶ Art, Paleolithic
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Bone Tools, Paleolithic
- ▶ Cognitive Archaeology
- ▶ Demographic Transitions
- ▶ Handaxes and Biface Technology
- ▶ Semiotics in Archaeological Theory

References

Amati, D., and T. Shallice. 2007. On the emergence of modern humans. *Cognition* 103 (3): 358–385.

Barnard, P.J. 1998. Interacting cognitive subsystems: Modelling working memory phenomena within a multi-processor architecture. In *Models of working memory: Mechanisms of active maintenance and executive control*, ed. A. Miyake and P. Shah, 298–339. New York: Cambridge University Press.

Barnard, P.J. 2010. Current developments in inferring cognitive capabilities from the archaeological traces left by stone tools: Caught between a rock and a hard inference. In *Stone tools and the evolution of human cognition*, ed. A. Nowell and I. Davidson, 207–226. Boulder: University Press of Colorado.

Barnard, P.J., D.J. Duke, R.W. Byrne, and I. Davidson. 2007. Differentiation in cognitive and emotional meanings: An evolutionary analysis. *Cognition & Emotion* 21 (6): 1155–1183. https://doi.org/10.1080/02699930701437477.

Bickerton, D. 2007. Language evolution: A brief guide for linguists. *Lingua* 117 (3): 510–526.

Boesch, C. 2012. *Wild cultures. A comparison between chimpanzee and human cultures*. Cambridge, UK: Cambridge University Press.

Botha, R.P. 2010. On the soundness of inferring modern language from symbolic behaviour. *Cambridge Archaeological Journal* 20 (3): 345–356. https://doi.org/10.1017/S0959774310000454.

Brown, K.S., C.W. Marean, A.I.R. Herries, Z. Jacobs, C. Tribolo, D. Braun, and J. Bernatchez. 2009. Fire as an engineering tool of early modern humans. *Science* 325 (5942): 859–862. https://doi.org/10.1126/science.1175028.

Bruner, E. 2008. Comparing endocranial form and shape differences in modern humans and Neandertals: A geometric approach. *PaleoAnthropology* 2008: 93–106.

Burling, R. 1993. Primate calls, human language, and nonverbal communication. *Current Anthropology* 34 (1): 25–53.

Burling, R. 1999. Motivation, conventionalization, and arbitrariness in the origin of language. In *The origins of language. What nonhuman primates can tell us*, ed. B.J. King, 307–350. Santa Fe: School of American Research Press.

Byrne, R.W. 1995. *The thinking ape. Evolutionary origins of intelligence*. Oxford: Oxford University Press.

Byrne, R.W. 2004. The manual skills and cognition that lie behind hominid tool use. In *The evolution of thought: Evolutionary origins of great ape intelligence*, ed. A.E. Russon and D.R. Begun, 31–44. Cambridge, UK: Cambridge University Press.

Byrne, R.W., P.J. Barnard, I. Davidson, V.M. Janik, W.C. McGrew, Á. Miklósi, and P. Wiessner. 2004. Understanding culture across species. *Trends in Cognitive Sciences* 8 (8): 341–346.

Chase, P.G., and H.L. Dibble. 1987. Middle Palaeolithic symbolism: A review of current evidence and interpretations. *Journal of Anthropological Archaeology* 6: 263–296.

Cheney, D.L., and R.M. Seyfarth. 1990. *How monkeys see the world*. Chicago: The University of Chicago Press.

Conway, A.R.A., M.J. Kane, M.F. Bunting, D.Z. Hambrick, O. Wilhelm, and R.W. Engle. 2005. Working memory span tasks: A methodological review and user's guide. *Psychonomic Bulletin & Review* 12 (5): 769–786. https://doi.org/10.3758/bf03196772.

Coolidge, F.L., and T. Wynn. 2005. Working memory, its executive functions, and the emergence of modern thinking. *Cambridge Archaeological Journal* 15 (1): 5–26.

Coolidge, F.L., and T. Wynn. 2009. *The rise of Homo sapiens. The evolution of modern thinking*. Oxford: Blackwell.

Coolidge, F.L., K.A. Overmann, and T. Wynn. 2010. Recursion: What is it, who has it, and how did it evolve? *Wiley Interdisciplinary Reviews: Cognitive Science* n/a-n/a. https://doi.org/10.1002/wcs.131

Cramer, S.C. 2008. Repairing the human brain after stroke: I. mechanisms of spontaneous recovery. *Annals of Neurology* 63 (3): 272–287. https://doi.org/10.1002/ana.21393.

Crystal, D. 1987. *The Cambridge encyclopedia of language*. Cambridge, UK: Cambridge University Press.

d'Errico, F., C. Henshilwood, M. Vanhaeren, and K.V. Niekerk. 2005. *Nassarius kraussianus* shell beads from Blombos Cave: Evidence for symbolic behaviour in the Middle Stone Age. *Journal of Human Evolution* 48: 3–24.

Davidson, I. 1999. The game of the name: Continuity and discontinuity in language origins. In *The origins of language. What nonhuman primates can tell us*, ed. B.J. King, 229–268. Santa Fe: School of American Research.

Davidson, I. 2002. The "finished artefact fallacy": Acheulean handaxes and language origins. In *Transitions to language*, ed. A. Wray, 180–203. Oxford: Oxford University Press.

Davidson, I. 2003. The archaeological evidence of language origins: States of art. In *Language evolution*, ed. M.H. Christiansen and S. Kirby, 140–157. Oxford: Oxford University Press.

Davidson, I. 2005. Beyond mysticism? Review of Jackendoff, Ray 2002. *Foundations of language. Brain, meaning, grammar, evolution*. Oxford: Oxford University Press; *Linguistics and the Human Sciences* 1(2): 337–46.

Davidson, I. 2007. 'As large as you need and as small as you can'– Implications of the brain size of *Homo floresiensis*. In *Mental states: Evolution, function, nature*, ed. A. Schalley and D. Khlentzos, 35–42. Amsterdam: John Benjamins.

Davidson, I. 2009. Comment on Bar-Yosef and Van Peer. *Current Anthropology* 50 (1): 119–120.

Davidson, I. 2010a. The archaeology of cognitive evolution. *Wiley Interdisciplinary Reviews: Cognitive Science* 1 (2): 214–229. https://doi.org/10.1002/wcs.040.

Davidson, I. 2010b. Australian archaeology as a historical science. *Journal of Australian Studies* 34 (3): 377–398.

Davidson, I. 2010c. Stone tools and the evolution of hominin and human cognition. In *Stone tools and the evolution of human cognition*, ed. A. Nowell and I. Davidson, 185–205. Boulder: University Press of Colorado.

Davidson, I. 2010d. The colonization of Australia and its adjacent islands and the evolution of modern cognition. *Current Anthropology* 51 (s1): s177–s189. https://doi.org/10.1086/650694.

Davidson, I. 2012a. Origins of pictures: An argument for transformation of signs. In *Origins of pictures. Anthropological discourses in image science*, ed. K. Sachs-Hombach and J.R.J. Schirra. Cologne: Halem.

Davidson, I. 2012b. Peopling the last new worlds: The first colonisation of Sahul and the Americas. *Quaternary International* 285. https://doi.org/10.1016/j.quaint.2012.1009.1023

Davidson, I., and W.C. McGrew. 2005. Stone tools and the uniqueness of human culture. *Journal of the Royal Anthropological Institute* 11 (4): 793–817.

Davidson, I., and W. Noble. 1989. The archaeology of perception: Traces of depiction and language. *Current Anthropology* 30 (2): 125–155.

De Saussure, F. 1986. The linguistic sign. In *Semiotics. An introductory anthology*, ed. R.E. Innis, 28–46. London: Hutchinson.

Deacon, T.W. 1997. *The symbolic species*. New York: W.W. Norton.

Deutscher, G. 2005. *The unfolding of language. The evolution of mankind's greatest invention*. London: Arrow Books.

Dibble, H.L. 1989. The implications of stone tool types for the presence of language during the Lower and Middle Paleolithic. In *The human revolution: Behavioural and biological perspectives on the origins of modern humans*, ed. P.A. Mellars and C.B. Stringer, 415–431. Princeton: Princeton University Press.

Donald, M. 1991. *Origins of the modern mind. Three stages in the evolution of culture and cognition*. Cambridge, MA: Harvard University Press.

Dunbar, R.I.M., and S. Shultz. 2007. Evolution in the social brain. *Science* 317 (5843): 1344–1347. https://doi.org/10.1126/science.1145463.

Falk, D. 1983. Cerebral cortices of East African early hominids. *Science* 221: 1072–1074.

Gibson, K.R., and S. Jessee. 1999. Language evolution and expansions of multiple neurological processing areas. In *The origins of language. What nonhuman primates can tell us*, ed. B.J. King, 189–227. Santa Fe: School of American Research Press.

Haidle, M.N. 2010. Working memory capacity and the evolution of modern cognitive potential: Implications from animal and early human tool use. *Current Anthropology* 51 (s1): S149–S166. https://doi.org/10.1086/650295.

Hauser, M.D., N. Chomsky, and W.T. Fitch. 2002. The faculty of language: What is it, who has it, and how did it evolve? *Science* 298 (5598): 1569–1579.

Henshilwood, C.S., F. d'Errico, K.L. van Niekerk, Y. Coquinot, Z. Jacobs, S.-E. Lauritzen, and R. García-Moreno. 2011. A 100,000-year-old ochre-processing workshop at Blombos Cave, South Africa. *Science* 334: 219–222.

Holloway, R.L. 1969. Culture: A human domain. *Current Anthropology* 10: 395–413.

Holloway, R.L. 2008. The human brain evolving: A personal retrospective. *Annual Review of Anthropology* 37: 1–19. https://doi.org/10.2307/20622610.

Hurford, J.R. 2007. *The origins of meaning*. Oxford: Oxford University Press.

Jackendoff, R. 1999. Possible stages in the evolution of the language capacity. *Trends in Cognitive Sciences* 3: 272–279.

Johansson, S. 2005. *Origins of language. Constraints on hypotheses*. Amsterdam: John Benjamins Publishing Company.

Klein, R.G. 2000. Archeology and the evolution of human behavior. *Evolutionary Anthropology* 9 (1): 17–36.

Langbroek, M. 2012. Trees and ladders: A critique of the theory of human cognitive and behavioural evolution in Palaeolithic archaeology. *Quaternary International* 270: 4–14. https://doi.org/10.1016/j.quaint.2011.03.007.

Lieberman, D.E. 2011. *The evolution of the human head*. Cambridge, MA: The Belknap Press of Harvard University Press.

Lieberman, P. 2007. The evolution of human speech. Its anatomical and neural bases. *Current Anthropology* 48 (1): 39–66.

Lombard, M., and M.N. Haidle. 2012. Thinking a bow-and-arrow set: Cognitive implications of Middle Stone Age bow and stone-tipped arrow technology. *Cambridge Archaeological Journal* 22 (2): 237–264.

Mackay, A., and A. Welz. 2008. Engraved ochre from a Middle Stone Age context at Klein Kliphuis in the Western Cape of South Africa. *Journal of Archaeological Science* 35: 1521–1532.

Maclarnon, A., and G. Hewitt. 2004. Increased breathing control: Another factor in the evolution of human language. *Evolutionary Anthropology* 13 (5): 181–197.

Martinez, I., M. Rosa, J.-L. Arsuaga, P. Jarabo, R. Quam, C. Lorenzo, and E. Carbonell. 2004. Auditory capacities in Middle Pleistocene humans from the Sierra de Atapuerca in Spain. *Proceedings of the National Academy of Sciences* 101 (27): 9976–9981.

Martínez, I., M. Rosa, R. Quam, P. Jarabo, C. Lorenzo, A. Bonmatí, and J. Arsuaga. 2012. Communicative capacities in Middle Pleistocene humans from the Sierra de Atapuerca in Spain. *Quaternary International*.

Mazza, P.P.A., F. Martini, B. Sala, M. Magi, M.P. Colombini, G. Giachi, and E. Ribechini. 2006. A new Palaeolithic discovery: Tar-hafted stone tools in a European Mid-Pleistocene bone-bearing bed. *Journal of Archaeological Science*, 1–9.

McBrearty, S., and A.S. Brooks. 2000. The revolution that wasn't: A new interpretation of the origin of modern human behavior. *Journal of Human Evolution* 39 (5): 453–563. https://doi.org/10.1006/jhev.2000.0435.

Mellars, P.A. 1989. Technological changes across the Middle-Upper Palaeolithic transition: Economic, social and cognitive perspectives. In *The human revolution: Behavioural and biological perspectives on the origin of modern humans*, ed. P.A. Mellars and C.B. Stringer, 338–365. Princeton: Princeton University Press.

Miller, G.A. 1956. The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review* 63 (2): 81–97.

Moczek, A.P., S. Sultan, S. Foster, C. Ledón-Rettig, I. Dworkin, H.F. Nijhout, and D.W. Pfennig. 2011. The role of developmental plasticity in evolutionary innovation. *Proceedings of the Royal Society B: Biological Sciences*. https://doi.org/10.1098/rspb.2011.0971

Moore, M.W. 2010. 'Grammars of action' and stone flaking design space. In *Stone tools and the evolution of human cognition*, ed. A. Nowell and I. Davidson, 13–43. Boulder: University Press of Colorado.

Moore, M.W. 2012. Simple stone flaking in Australasia: Patterns and implications. *Quaternary International*. https://doi.org/10.1016/j.quaint.2011.1009.1030, https://doi.org/10.1016/j.quaint.2011.09.030

Morin, E., and V. Laroulandie. 2012. Presumed symbolic use of diurnal raptors by Neanderthals. *PLoS ONE* 7 (3): e32856. https://doi.org/10.1371/journal.pone.0032856.

Noble, W., and I. Davidson. 1991. The evolutionary emergence of modern human behaviour: Language and its archaeology. *Man: Journal of the Royal Anthropological Institute* 26: 223–253.

Noble, W., and I. Davidson. 1996. *Human evolution, language and mind*. Cambridge, UK: Cambridge University Press.

Nöth, W. 2010. The criterion of habit in Peirce's definitions of the symbol. *Transactions of the Charles S. Peirce Society* 46 (1): 82–93.

Nowell, A. in press. Childhood, play and the evolution of cultural capacity in Neandertals and modern humans. In *The nature of culture*, ed. M.N. Haidle and N.J. Conard. New York: Springer.

Peirce, C.S. 1986. Logic as semiotic: The theory of signs. In *Semiotics. An introductory anthology*, ed. R.E. Innis, 1–23. London: Hutchinson.

Pinker, S., and P. Bloom. 1990. Natural language and natural selection. *Behavioral and Brain Sciences* 13: 707–784.

Roebroeks, W., M.J. Sier, T.K. Nielsen, D. De Loecker, J.M. Parés, C.E.S. Arps, and H.J. Mücher. 2012. Use of red ochre by early Neandertals. *Proceedings of the National Academy of Sciences* 109 (6): 1889–1894. https://doi.org/10.1073/pnas.1112261109.

Sankararaman, S., N. Patterson, H. Li, S. Pääbo, and D. Reich. 2012. The date of interbreeding between Neandertals and modern humans. *PLoS Genetics* 8 (10): e1002947. https://doi.org/10.1371/journal.pgen.1002947.

Savage-Rumbaugh, E.S., S. Shanker, and T.J. Taylor. 1998. *Apes, language and the human mind*. New York: Oxford University Press.

Schenker, N.M., W.D. Hopkins, M.A. Spocter, A.R. Garrison, C.D. Stimpson, J.M. Erwin, and C. Sherwood. 2009. Broca's Area homologue in chimpanzees (*Pan troglodytes*): Probabilistic mapping, asymmetry, and comparison to humans. *Cerebral Cortex* bhp138. https://doi.org/10.1093/cercor/bhp138

Schiffer, M.B. 1999. *The material life of human beings: Artifacts, behavior, and communication*. London: Routledge.

Stokoe, W.C. 2000. Gesture to sign (language). In *Language and gesture*, ed. D. McNeill, 388–399. Cambridge, UK: Cambridge University Press.

Wadley, L., T. Hodgskiss, and M. Grant. 2009. From the cover: Implications for complex cognition from the hafting of tools with compound adhesives in the Middle Stone Age, South Africa. *Proceedings of the National Academy of Sciences* 106 (24): 9590–9594. https://doi.org/10.1073/pnas.0900957106.

C

Watts, I. 2009. Red ochre, body painting, and language: Interpreting the Blombos ochre. In *The cradle of language*, ed. R. Botha and C. Knight, 62–92. Oxford: Oxford University Press.
Wray, A. 2002. Dual processing in protolanguage. Performance without competence. In *The transition to language*, ed. A. Wray, 113–137. Oxford: Oxford University Press.
Wynn, T. 1999. The evolution of tools and symbolic behaviour. In *Handbook of human symbolic evolution*, ed. A. Lock and C.R. Peters, 263–287. Oxford: Blackwell.
Wynn, T., and F. Coolidge. 2012. *How to think like a Neandertal*. Oxford: Oxford University Press.
Wynn, T., R.A. Hernandez-Aguilar, L.F. Marchant, and W.C. McGrew. 2011. "An ape's view of the Oldowan" revisited. *Evolutionary Anthropology: Issues, News, and Reviews* 20 (5): 181–197. https://doi.org/10.1002/evan.20323.
Zilhão, J., D.E. Angelucci, E. Badal-García, F. d'Errico, F. Daniel, L. Dayet, and J. Zapata. 2010. Symbolic use of marine shells and mineral pigments by Iberian Neandertals. *Proceedings of the National Academy of Sciences, early edition*. https://doi.org/10.1073/pnas.0914088107

Further Reading

Barnard, P.J. 2010. From executive mechanisms underlying perception and action to the parallel processing of meaning. *Current Anthropology* 51 (s1): S39–S54. https://doi.org/10.1086/650695.
Botha, R.P. 2003. *Unravelling the evolution of language*. Amsterdam: Elsevier.
Botha, R.P., and C. Knight, eds. 2009a. *The cradle of language*. Oxford: Oxford University Press.
Botha, R.P., and C. Knight, eds. 2009b. *The prehistory of language*. Oxford: Oxford University Press.
Burling, R. 2005. *The talking ape. How language evolved*. Oxford: Oxford University Press.
Calvin, W.H., and D. Bickerton. 2000. *Lingua ex Machina. Reconciling Darwin and Chomsky with the human brain*. Cambridge, MA: MIT Press.
Christiansen, M., and S. Kirby. 2003. Language evolution: The hardest problem in science? In *Language evolution*, ed. M.H. Christiansen and S. Kirby, 1–15. Oxford: Oxford University Press.
Gibson, K.R., and T. Ingold, eds. 1993. *Tools, language and cognition in human evolution*. Cambridge, UK: Cambridge University Press.
Lieberman, P. 2006. *Toward an evolutionary biology of language*. Cambridge, MA: Harvard University Press.
Lock, A., and C.R. Peters, eds. 1999. *Handbook of human symbolic evolution*. Oxford: Blackwell.
Nowell, A., and I. Davidson, eds. 2010. *Stone tools and the evolution of human cognition*. Boulder: University Press of Colorado.

Coimbra, Fernando Augusto

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Centro Português de Geo-história e Pré-História, Lisboa, Portugal

Basic Biographical Information

Fernando Augusto Coimbra is a Portuguese archaeologist, born in Lisbon in 1956. At the age of 10, he moved, with his parents and sister, to Oporto, where he finished high school and graduated in Archaeology in 1985. After that, he began to collaborate with older archaeologists in several fieldwork projects and to participate intensively in international conferences. He started to direct his own archaeological excavations in 1991 in an Iron Age Hillfort in the north of Portugal. His interest regarding rock art started in 1994, after discovering new engravings, very eroded, on a previously published rock in the 1950s. In 1997 he was invited to work at the Museum and Archaeological Site of Conimbriga, and 1 year later he became a collaborator of Dipartimento Valcamonica of Centro Camuno di Studi Preistorici (Italy). In 2003 he was invited to be a member of the Scientific Committee of the Hellenic Rock Art Centre (Philippi, Greece). He completed his Ph.D. in Prehistory and Archaeology, with the highest classification and an extraordinary prize, at the University of Salamanca, in Spain (2007). After this, he was invited to teach in the Master in Prehistoric Archaeology and Rock Art, organized by the Polytechnic Institute of Tomar, and to be an integrated researcher of the Quaternary and Prehistory Group of the Geosciences Centre of the University of Coimbra. Since then he has supervised several Ph.D. and Master theses, being also a member of the jury of several of those dissertations. In 2010 he completed postdoctoral research about Bronze Age

Coimbra, Fernando Augusto, Fig. 1 Fernando Coimbra lecturing about rock art

and Iron Age Rock Art in the Portuguese Middle Tagus Basin. In 2011 he started to collaborate with Portuguese Centre of Geohistory and Prehistory, being now one of the two vice-presidents. From 1991 to the present, he has given frequent lectures, by invitation, about archaeology and rock art, in countries such as Portugal, Spain, France, Italy, and Greece (Fig. 1). Besides Portuguese, he speaks English, French, Italian, and Spanish. He loves music, traveling (Fig. 2), and going to the beach. Scientific interests are cognitive archaeology, rock art, Metal Ages, sound archaeology, and archaeoastronomy.

Major Accomplishments

Fernando Coimbra has been a member of several international projects regarding archaeology and rock art. He directed several fieldworks in rock art in Portugal, namely, within the project *RUPTEJO – Rock Art of the Tagus Basin* (Fig. 3), and co-directed similar projects in Greece (2005, 2006, and 2010) and in Liguria, Italy (2008). He coordinated sessions at the UISPP/

Coimbra, Fernando Augusto, Fig. 2 Fernando Coimbra at Maison Carrée (Nimes, France)

IUPPS Conferences in Lisbon (2006),

Coimbra, Fernando Augusto, Fig. 3 F. Coimbra tracing post-Paleolithic incised rock art

Florianopolis (2011), and Burgos (2014), and he is organizing two sessions for Paris (2018). He is the author and scientific editor of several books, some of them in collaboration with archaeologists such as Umberto Sansoni, Rafaella Poggiani-Keller, and Davide Delfino, among others (Coimbra and Delfino 2016; Coimbra and Sansoni 2016), and published more than 80 scientific articles, in English, Portuguese, and Italian, collaborating with a large number of different colleagues (Coimbra 2015a, b).

In 2013 he was the director of the Organizing Committee of the International Conference – *The Horse and the Bull in prehistory and in History* (Coimbra 2016a). Since February of 2014, he become interested in archaeoacoustics (sound archaeology) (Coimbra 2016b, c), participating in the *The Hal Saflieni Hypogeum Acoustic Project* (Malta) (Debertolis et al. 2015). In 2015 he wrote the prologue of the proceedings of Archaeoacoustics II (Istanbul), and he's a member of the Organizing Committee and of the Scientific Committee of the Conference Archaeoacoustics III (Tomar, Portugal, 2017).

He was the scientific coordinator of the itinerant exhibition about rock art – *Arte Rupestre do Pinhal Interior* – and of the exhibition at the Museum of Conimbriga (*The Swastika, Since Its Origins till the Roman Period* (1999)). In 2010, after formal invitation, he edited the Portuguese version of the Rock Art Glossary, published by the International Federation of Rock Art Organizations. In 2012 he participated in the exhibition *Prehistoric and Contemporary Interventions in the Landscape. Rock Art & Land Art*, organized in the Folklife and Ethnological Museum of Macedonia, Thrace (Thessaloniki, Greece), presenting, in collaboration with Ivo Oosterbeek, a video entitled *Protohistoric Horse Riders beyond the Pillars of Heracles.* He is a referee of several scientific journals, such as *ARNAVA* (New Delhi) and *British Journal of Interdisciplinary Studies* (UK), among others.

Presently, F. Coimbra is coordinating a team of archaeologists regarding the archaeological inventory of the municipality of Chamusca, Santarém, Portugal.

Cross-References

- ▶ Cognitive Archaeology
- ▶ Heritage and Higher Education
- ▶ Rock Art, Forms of
- ▶ Valcamonica Rock Art

References

Coimbra, F.A. 2015a. Lunar representations in Portugal during Late Prehistory. Arnava, IV, n 1. New Delhi: 20–35.

Coimbra, F.A. 2015b. Some considerations about the Protohistoric Rock Art in the Iberian Peninsula and recent findings in the eastern Mediterranean. Quaderns de Prehistòria i Arqueologia de Castelló, 33. Servei d'Investigacions Arqueològiques i Prehistòriques, Castelló: 81–95.

Coimbra, F.A 2016a. *The horse and the bull in prehistory and in history*. Genoa: Cordero Editore, 366p.

Coimbra, F.A. 2016b. Neolithic art, archaeoacoustics and neuroscience. In *Archaeoacoustics II: The archaeology of sound*, ed. L. Eneix, 15–24. Myakka City: OTSF.

Coimbra, F.A. 2016c. Archaeology, rock art, archaeoacoustics and neuroscience: What kind of relation? In *The intellectual and spiritual expressions of non-literate peoples*, ed. E. Anati, 121–131. Oxford: Archaeopress.

Coimbra, F.A; Delfino, D.. 2016. *The emergence of warrior societies and its economic, social and environmental consequences*. Oxford: Archaeopress, 221 p.

Coimbra, F.A., and U. Sansoni, eds. 2016. *Post-palaeolithic filiform rock art in Western Europe*. Oxford: Archaeopress. (no prelo).

Debertolis, P., F.A. Coimbra, and L. Eneix. 2015. Archaeoacoustic analysis of the Ħal Saflieni hypogeum in Malta. *Journal of Anthropology and Archaeology.* 3 (1): 59–79. https://doi.org/10.15640/jaa.v3n1a4.

Colani, Madeleine

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Basic Biographical Information

Madeleine Colani (Fig. 1) was a geologist and an archaeologist born in 1866 (Encyclopædia Universalis) in Alsace (Northeast France) to

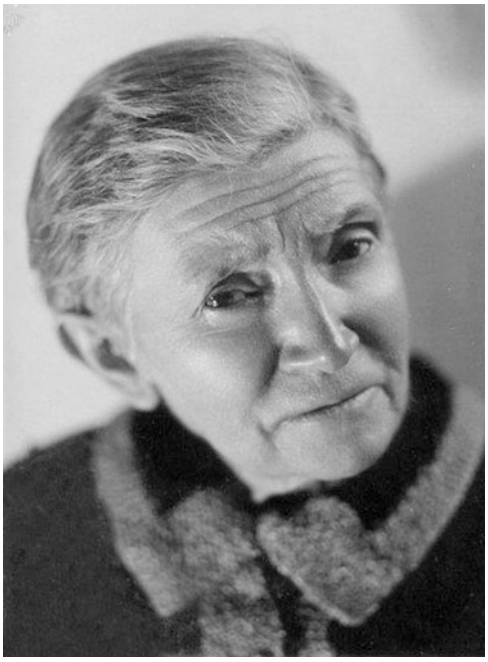

Colani, Madeleine, Fig. 1 Madeleine Colani. Photographie EFEO, Fonds Cambodge, Ref. 20001

Timothée Colani, a French Protestant pastor, and Josephe Marie Gauthey, a Spanish shopkeeper's daughter. The Franco-Prussian War (August 1870) led to the annexation of Alsace when Strasbourg raised the white flag (September 1870). To preserve their French identity, the Colanis relocated first to Royan (Fig. 2), on the French Atlantic coast, and then to Paris, where Madeleine qualified as a primary school teacher (1884).

Timothée's death in 1888 left behind a housewife widow, as well as 22-year-old Madeleine and three minors aged 11, 13, and 17. Exhibiting the industrious streak often associated with a Calvinist upbringing, Madeleine assumed the breadwinner's mantle, supplementing her teacher's salary with private tuition classes in drawing.

Colani was accepted for a position in French Indochina (1898), where she taught at primary schools from 1899, while pursuing distance learning for a geology degree through the University of Paris (Colani 1914). The Hanoi-based Geological Survey of Indochina (GSI) invited her to join their ranks, where she was the only female geologist (1914–1928). Her fieldwork to Indochina and Yunnan (1916–1919) formed the basis for a PhD at the University of Paris, with a thesis on fusulinids (Colani 1920) examined by Gaston Bonnier, Professor of Botanics at the Sorbonne University.

She critiqued some of the work by the GSI geologist Jacques Deprat (Colani 1924), suspected of scientific fraud (Genovese 2011). The discovery of a large deposit of Neolithic skulls and stone artifacts at Lang Cuom, in Vietnam's Bac Son mountains (Mansuy and Colani 1925), enhanced her standing as a prehistorian.

Reaching the statutory retirement age of 60, Colani sought to remain in active service (Genovese 2015) but was forced to retire (1926). She successfully negotiated terms similar to other retired GSI male geologists, namely, paid contract work (1926–1928). In 1929, the Hanoi-based École Française d'Extrême-Orient (EFEO) invited her to join their ranks (EFEO biographies) as a corresponding member (Genovese 2018). She continued with prehistoric surveys (1929–1930), leading missions to the Plain of Jars of Laos (Fig. 3) in 1931–1933 (Genovese 2016) and to the burial urns of Sa Huynh in Central Vietnam (Colani 1937).

Her participation at the first Far-Eastern Prehistory Association (FEPA) conference in Hanoi (1932) and the publication of her monograph on the Laotian megaliths (Colani 1935) enhanced her international reputation. Leading further missions to Vietnam (1935–1936), she discovered large deposits of polished stone and axes. She represented the EFEO at prehistorians' conferences in Manila (1935) and Singapore (1938).

In Vietnam, she surveyed more rockshelters (1937) and explored prehistoric caves in Halong Bay (1938) together with Johan G. Andersson (Fig. 4), founder of Stockholm's Museum of Far Eastern Antiquities, followed by an expedition to the Bronze Age site of Samrong Sen in Cambodia (1938).

Colani made her final field trip to the stone jars of Laos (1940) and continued to publish and lecture until her death on 2 June 1943 in Hanoi.

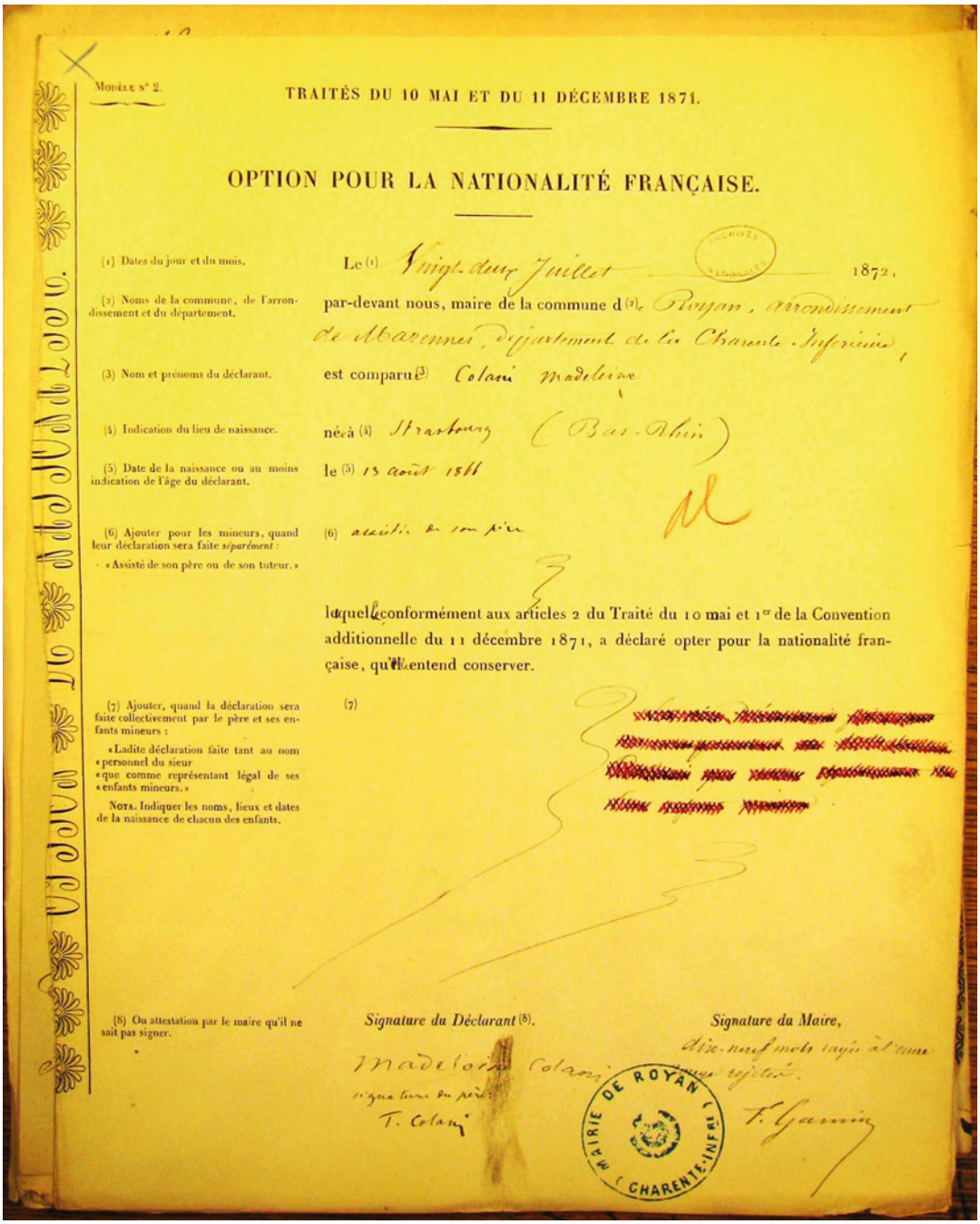

Modèle n° 2.

TRAITÉS DU 10 MAI ET DU 11 DÉCEMBRE 1871.

OPTION POUR LA NATIONALITÉ FRANÇAISE.

(1) Dates du jour et du mois. — Le (1) Vingt-deux Juillet 1872,

(2) Noms de la commune, de l'arrondissement et du département. — par-devant nous, maire de la commune de (2) Royan, arrondissement de Marennes, département de la Charente-Inférieure,

(3) Nom et prénoms du déclarant. — est comparu(e) (3) Colani Madeleine

(4) Indication du lieu de naissance. — née à (4) Strasbourg (Bas-Rhin)

(5) Date de la naissance ou au moins indication de l'âge du déclarant. — le (5) 13 août 1844

(6) Ajouter pour les mineurs, quand leur déclaration sera faite *séparément* : « Assisté de son père ou de son tuteur. » — (6) assistée de son père

lequel, conformément aux articles 2 du Traité du 10 mai et 1er de la Convention additionnelle du 11 décembre 1871, a déclaré opter pour la nationalité française, qu'il entend conserver.

(7) Ajouter, quand la déclaration sera faite collectivement par le père et ses enfants mineurs : « Ladite déclaration faite tant au nom « personnel du sieur « que comme représentant légal de ses « enfants mineurs. »

Nota. Indiquer les noms, lieux et dates de la naissance de chacun des enfants. — (7)

(8) Ou attestation par le maire qu'il ne sait pas signer.

Signature du Déclarant (8). — Madeleine Colani

signature du père : T. Colani

Signature du Maire, — dix-neuf mots rayés nuls, trois rejetés. — T. Garnier

Mairie de Royan (Charente-Inférieure)

Colani, Madeleine, Fig. 2 Madeleine Colani's declaration, signed in Royan on 22 July 1872, to retain her French nationality, after Prussia annexed Alsace in May 1871. (City Archives, Royan, France)

Colani, Madeleine, Fig. 3 Sandstone jars at Phu Da Phor, Luang Prabang province, Laos. Phu Da Phor is one of the remotest sites at the Plain of Jars and was surveyed by Colani in April–May 1933. (Photo: Lia Genovese)

Colani, Madeleine, Fig. 4 March 1938. Madeleine Colani, with Nguyen Ngoc Tran and Johan G. Andersson, on fieldwork in Dong Mau, an excavation site in the Bay of Tonkin. (Copyright: École Française d'Extrême-Orient)

Major Accomplishments

Colani coined the term Hoabinhian (Colani 1929) for stone artifacts (Hoabinhien, *Industrie Paléolithique*) dated to 10,000–5,000 BCE. She surveyed over 40 caves in Laos and Vietnam (Fig. 5), to inform the world about Indochina's prehistory.

Until the late 1920s, the lion's share of the EFEO's budget was devoted to the study of Asia's languages, religions, and architecture, particularly Cambodia's temples. Colani's field experience was critical when the EFEO widened its research remit with the inclusion of Laos and Indochinese prehistory.

At the Plain of Jars, Colani collected a rich haul of objects, including gold and bronze. Her monograph provides an inventory of all artifacts (Fig. 6), allowing for analysis while they remain

Colani, Madeleine, Fig. 5 Lang Vanh Cave in Hoa Binh, Vietnam, surveyed by Colani in 1929. (Photo: Lia Genovese)

in storage at the National Museum of Vietnamese History in Hanoi, beyond the reach of researchers.

To develop a regional perspective, Colani forged links with scholars in South and Southeast Asia. When research was being curtailed by budgetary constraints, she secured funding from Johan G. Andersson, who relinquished to her his excavation budget (1938) to advance the study of Indochina's prehistory.

A century ago, Colani surveyed remote corners of Indochina, frequently sleeping on a hastily made bed of leaves, surviving on daily rations of sticky rice and bananas. She battled malaria and dengue fever and was undefeated by superstition and the occult, which occasionally instigated desertion among her porters.

Colani is the only archaeologist to have documented all three megalithic expressions in Laos: stone jars, menhirs, and funerary stones. With close to 100 titles to her name, she was one of the most prolific scientific writers of her generation. In addition to French and German, she was fluent in English and reviewed books in this language (Colani 1930). Her descriptions are the only reference for the stone artifacts which have since disappeared from the Plain of Jars, as a result of urbanization, exposure to the elements, or human neglect.

She was a lifetime member of the French Prehistoric Society and received France's order of merit, the Légion d'Honneur (1937), together with a substantial grant from the French National Centre for Scientific Research (CNRS). She is listed in the International Directory of Anthropologists (Research Council of the USA, 1938) and in the French National Archives (Fontainebleau, dossier 19800035/742/84252).

Six months after Colani's death, her role in shaping our knowledge of Indochina's prehistory was commemorated by the EFEO with a conference in Hanoi on 6 December 1943 (Lévy 1944).

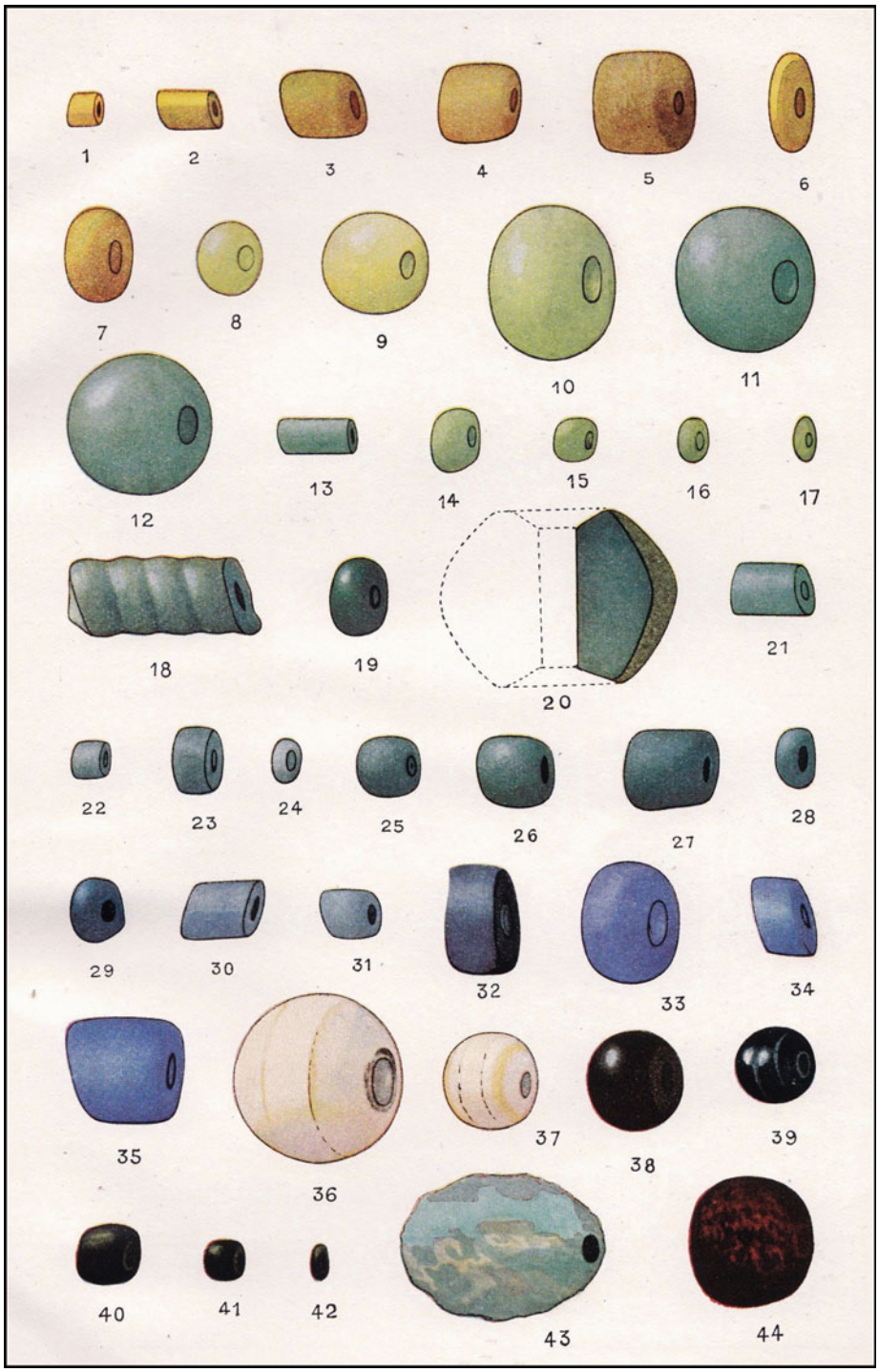

Colani, Madeleine, Fig. 6 Beads collected by Colani in Laos in 1931–33. M. Colani. 1935. *Mégalithes du Haut-Laos*, vol. 2. Copyright: École Française d'Extrême-Orient

References

Colani, M. 1914. *Recherches sur les premières phases du développement de quelques Combrétacées et Barringtoniées*. Paris: L. Maretheux.

Colani, M. 1920. *Étude sur les flores tertiaires de quelques gisements de lignite de l'Indochine et du Yunnan*. PhD thesis. University of Paris: Faculty of Science.

Colani, M. 1924. *Nouvelle contribution à l'étude des Fusulinidés de l'Extrême-Orient*. Hanoi: Imprimerie d'Extrême-Orient.

Colani, M. 1929. Quelques stations hoabinhiennes. *Bulletin of the EFEO* 29 (1): 261–272.

Colani, M. 1930. Sadahiko Shimada: Studies on the Prehistoric Site of Okamoto, Suku, in the Province of Chikuzen Suyeti Umehara. *Bulletin of the EFEO* 30/1: 173–176.

Colani, M. 1935. *Mégalithes du Haut-Laos (Hua Pan, Tran Ninh)*. Paris: EFEO.

Colani, M. 1937. Nécropole de Sa-huỳnh. *Cahiers de l'EFEO* 13/Qtr 4: 8–12.

Colani, M. (1866–1943). *Encyclopædia Universalis*. https://www.universalis.fr/encyclopedie/madeleine-colani/

EFEO biographies. https://www.efeo.fr/biographies/notices/colani.htm

Genovese, L. 2011. Madeleine Colani and the Deprat Scandal at the Geological Survey of Indochina. *Journal of the Siam Society* 99: 269–290.

Genovese, L. 2015. *The Plain of Jars of Laos – Beyond Madeleine Colani*. PhD thesis. London: SOAS University of London. http://eprints.soas.ac.uk/id/eprint/20397

Genovese, L. 2016. The Plain of Jars in the Context of South and Southeast Asian Archaeology. In *Interpretative Studies on Southeast Asian Culture*, ed. W. Sucharithanarugse, 83–134. Bangkok: Institute of Thai Studies, Chulalongkorn University.

Genovese, L. 2018. The Birth of French Research into the Prehistory of Laos. In Engaging Asia – Essays on *Laos and Beyond in Honour of Martin Stuart-Fox* ed. D. Goldston, 91–122. Copenhagen, Denmark: NIAS.

Hoabinhien, Industrie Paléolithique. Encyclopædia Universalis. https://www.universalis.fr/encyclopedie/hoabinhien-industrie-paleolithique/

Lévy, P. 1944. Madeleine Colani (1866–1943) et la Préhistoire indochinoise (Conférence, Musée Louis Finot, Hanoi, 6 December 1943). Extrait des *Cahiers de l'EFEO* 37: 2–7.

Mansuy, H., and M. Colani. 1925. *Néolithique inférieur (bacsonien) et néolithique supérieur dans le Haut-Tonkin (dernières recherches) avec la description des crânes du gisement de Lang-Cuom*. Hanoi: Imprimerie d'Extrême-Orient.

Further Reading

Clémentin-Ojha, C. and P-Y. Manguin. 2007. *A century in Asia: The history of the École Française d'Extrême-Orient 1898–2006*. Trans. H. Reid. Singapore: Editions Didier Millet.

Sonnet, M. 2004. Combien de femmes au CNRS depuis 1939? In *Les femmes dans l'histoire du CNRS*, 39–67. Paris: CNRS (Centre National de la Recherche Scientifique).

Cold War

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Introduction

The study of the physical legacies of the Cold War is self-evidently a new topic. It is also a specialized area within the broader field of contemporary archaeology. In common with the early development of other period studies, investigations of its military monuments have dominated over the last two decades. As memories fade of the East–West standoff between the end of the Second World War and 1990, the archaeological study of its physical traces is able to bring new perspectives on the era. An extraordinary amount of documentation survives for the period, and more official material is likely to be released. Conversely, there is a steady loss of the physical traces of the Cold War and the generations with firsthand knowledge of the confrontation. In contrast to archaeological studies of the two world wars, which are generally encapsulated under the term "conflict archaeology," in the West, research into the Cold War is the investigation of the might have been. It was the world of the spy novel and films, such as *Dr. Strangelove* and *On the Beach*, and the BBC TV drama *The War Game* that tried to imagine the unimaginable. Elsewhere, bloody proxy wars were all too real. The Cold War was also more than a military standoff, and to understand this multidimensional theme, archaeological methods will rarely be used alone.

Definition

The Cold War may be defined as the standoff between the opposed economic systems of capitalism and communism, and their principal protagonists the United States and the Soviet Union. Chronologically, the seeds of the confrontation were sown in revolutionary Russia in the early twentieth century and came to a head in the redrawn European boundaries that followed the

Second World War. Similarly, there was no neat end to this confrontation that started with economic strains in Eastern Europe in the 1980s, exacerbated by increased arms spending by the West, a mixed message that resulted in the opening of the Berlin Wall in November 1989, and finally the breakup of the Soviet Union in December 1991. In its wake followed the bloody civil war in former Yugoslavia and massive political, social, and economic realignments.

The political and economic divisions of the Cold War were accompanied by a massive arms race. The militarism this stand-off engendered quickly spread into the civilian world and was reflected in state-funded science and technology programs, utopian visions that were played out in public housing schemes, and many other aspects of culture, including architecture, art, film, and literature. Although, "Cold War" may be a useful shorthand term to describe the period of East–West confrontation between about 1947 and 1990, the period may be defined by other criteria. In Eastern Europe, the material culture of this period might be more readily defined as "socialist" or "communist" (Buchli 1999). Elsewhere in Africa, South America, and parts of Asia, the effects of the Cold War took far longer to manifest themselves. In the West, and particularly among cultural commentators and architectural historians, the period is more usually referred to as "post-war."

Historical Background

The years following the end of the Second World War were characterized by many privations on either side of the Iron Curtain. In Britain, rationing continued, and new domestic goods and clothing were produced to "utility" standards, designed to use the minimum amount of materials and labor in their production. In post-war Germany, people were largely reliant on salvaged goods, swords were beaten into plowshares as helmets, and gas mask canisters were fashioned into enameled domestic utensils and containers.

In considering the material culture of the period, the picture we might reconstruct from purely archaeological sources might be seen to lag behind actual historical events. In the late 1940s, both sides were armed effectively with wartime equipment, but as new national identities and allegiances strengthened, the arms and uniforms of military and paramilitary forces often began to reflect those of the dominant superpower. Similarly, there were huge numbers of surplus military and other state facilities, and there was little need for new military building projects. Slowly either side began to design the equipment and facilities they required to compete in an increasingly technological standoff, a confrontation that was dominated by newly emerging technologies, the atomic bomb, jet engines, long-range missiles, and radar, all supported by increasingly sophisticated electronics. The technical artifacts of this era often betray complex genealogies, for example, rocket and missile projects in East and West often incorporated captured German technology with existing indigenous programs. Original objects, which may be recovered from archaeological contexts, can provide important information on variations in build qualities, differences in metallurgical competence, and contrasting national engineering styles.

In the United Kingdom, it was not until after the outbreak of the Korean War in 1950 that distinctive military facilities built to meet changed defense needs can be recognized. Nor was it not until the end of the decade that the country was fully equipped to meet the perceived threats of the Cold War, with airfields for jet fights and bombers, atomic bomb stores, new radar systems, and surface to air missile sites.

Elsewhere, different construction chronologies are found. In former East Germany, a legacy of heavily constructed wartime bunkers was available for adaptation by Soviet and later East German forces. Across Europe, in the aftermath of the Second World War, the physical expression of the agreed political demarcation line between western and eastern areas of influence was often no more than a barbed wire fence. Initially, its wooden watchtowers appeared more medieval than a product of the atomic age. As the political divide hardened, differences between the two blocs became manifest in messages displayed on billboards among the ruined cities.

Key Issues/Current Debates

The study of the aspects of the Cold War by the use of archaeological methods is part of the wider debate about the contribution that archaeology can make to our understanding of the recent past. Although the Cold War is still well within living memory, detailed information on specific places may be lost, destroyed, or inaccessible. In Eastern Europe, the early excesses of many of the post-war communist governments are poorly documented. Excavations at the former Nazi concentration camp at Sachsenhausen, Berlin, have revealed its post-war victims and associated artifacts. In situations such as this, the scientific archaeological records may be the only evidence to document these events (Theune 2010). In many countries overrun by the Soviet Union, armed resistance to their occupation continued for up to a decade after the end of the Second World War. In Estonia, the Forest Brothers waged a guerrilla war from small, often wooden forest hideaways (Rasmussen 2010: 34–35). Investigations, such as these that reveal lost places and objects, can create a powerful stimulus for the local community to recount little known or suppressed episodes of national history.

In the West, dissent to the Cold War system was most evident in the peace movements and in particular their opposition to nuclear weapons. Archaeologically, their presence is almost invisible. The most common artifact is the pin badge decorated with a now internationally recognized peace symbol or other slogan, but without supporting oral testimony, it is an essentially context-less object. At a number of locations in Europe and North America, campaigners established semipermanent protest camps outside or close to military installations. Conditions in the camps were primitive, and accommodation was usually in commercial tents or as at Greenham Common, England, in "benders" created from a frame of withies covered in plastic sheeting. In form they resembled a type of crude temporary shelter constructed by hunter-gatherers. In the desert adjacent to the Nevada Test Site, North America, are the traces of a huge peace camp covering about 240 ha. Features within this area include cleared tent sites, hearths, gardens created by arrangements of stones around plants, and geoglyphs, symbols made from stones (Fig. 1). The techniques to document and interpret such sites are identical to the skills used by a prehistorian to understand the more distant past. It is possible to analyze the spatial relationships in the camp and also consider the symbolic relationships between these groups and the landscape. The investigation of such sites provides many opportunities for engagement with peace campaigners, artists, and, in the case of the Nevada peace camp, members of the Western Shoshone tribe (Beck et al. 2007: 297–320; Schofield 2009: 99–111).

Building Archaeology

Rapidly evolving military technology led to new types of military architecture and facilities, some were built to resist (as far as they were able) the effects of nuclear weapons and others to accommodate complex electronic equipment and weapon systems. From the perspective of the early twenty-first century, the military structures of the Cold War appear to represent the swan song for heavily built defensive installations. Their design and construction techniques are of interest to building historians. In some instances, excellent documentation will survive, including detailed drawings. More commonly, documentation is partial. In these instances, the sites and structures provide a valuable record of past activity. Where no original documentation survives, routine architectural recording skills may be needed to produce drawings. In the United States, the Historic American Engineering Record has produced exemplary record drawings of some Cold War facilities. An archaeological approach to such work brings with it questions about construction phases and subsequent modifications, building techniques, the character of functional areas, and about how buildings and sites operated as social spaces.

On closure, most military sites are usually stripped to remove valuable equipment and, if left unsecured, fall prey to metal thieves and

Cold War, Fig. 1 Nevada Test Site, the United States, outside the test site, extensive and fragile remains of the 1980s peace camp may be traced. They include traces of shelters constructed from withies secured by small piles of stones. (© W.D. Cocroft.)

Cold War, Fig. 2 The Teufelsberg, Field Station Berlin, a mural in the crew room of the security police unit. Later graffiti is a record of the many urban explorers who have visited the site since its abandonment. (© W.D. Cocroft.)

vandals. These may be seen as early taphonomic processes that lead to the creation of the archaeological remains we encounter. Within these now often empty spaces, official painted signs may offer clues to former uses. Also encountered are wall paintings and murals that can offer insights into the cultures of the different armed forces, units, and sections within them (Cocroft et al.

Cold War, Fig. 3 Bernauer Strasse, Berlin, part of the "Contemporary History Information Mile" to the left is a surviving section of the Berlin Wall and steel bars marking a lost section. To the right are steel posts that indicate the line of the hinterland wall and a typical East German lamppost. (© W.D. Cocroft.)

2006). On many Soviet bases, rooms were set aside for the political education of the forces, decorated with slogans and collages of images from newspapers and magazines. On western bases, large renditions of unit insignia are found, and in less frequented areas and semiprivate spaces, artwork may be used to personalize otherwise anonymous interiors (Fig. 2).

To date, where archaeological methods have been applied to the study of the physical remains of the Cold War, it has often been in the context of cultural resource management, in mitigation against loss, to assess monuments for legal protection or to provide the necessary knowledge base prior to public display (Cocroft and Thomas 2003). In 2002–2003, Klausmeier and Schmidt (2004) produced an archaeological record of one of the most iconic Cold War structures, the city section of the Berlin Wall (Fig. 3). Although, in most sections of the city, the wall facing onto the West was removed in the early 1990s, a considerable amount of the in-depth border defenses to the East were still present. This survey added considerably to the understanding of how this familiar structure had developed, incorporated existing urban features into the barrier, and the operation of the linear border landscape. As the border was approached from the rear, painted red and white marks on walls delineated the border area, and closer still a knee-high fence left a would-be escapee with no defense that they had inadvertently strayed into the restricted area. The routines of the watchers were equally proscribed, and painted stripes on lampposts marked the limits of the border troops' patrol paths (Fig. 4).

In many instances, archaeologists employed in cultural resource management will be required to investigate Cold War sites where there is imperfect documentation. The overall context of a site may be well understood from historical studies, but detailed site drawings and information about the modifications carried out at individual sites are often lacking. One characteristic of the Cold War was the stationing of foreign forces, usually of the dominant superpower, in allied or friendly countries. On withdrawal, documentation was often destroyed or lost or has become effectively inaccessible. In these instances, although the historical

Cold War, Fig. 4 Bernauer Strasse, Berlin, painted stripes on a numbered lamppost marked the patrol limit for a border guard unit. (© W.D. Cocroft.)

context of the site is known, the details of a site's development, use, and functions may be essentially ahistorical. In such a situation, archaeological methods of site and building analysis may be the only source of evidence. Beyond furthering academic knowledge, such studies may be a crucial part of wider environmental studies to determine past land use and present-day land quality. This lack of knowledge is particularly evident in many former Soviet bases in Eastern Europe that operated as closed entities and where contacting past personnel is fraught with difficulties.

The deployment of archaeological methods to investigate complex modern technology is an issue that goes beyond military weapon systems. Generally, many of the earlier systems that were based on electromechanical technology have left a more robust archaeological footprint than the later systems (Fig. 5), which through the increasing use of microprocessors have shrunk in size, become more mobile, and are based around anonymous black box technologies. As discussed, although this is an incredibly well-documented period, detailed information on individual facilities may be lost through changes in ownership, the withdrawal of foreign forces, or destruction of obsolete documentation. In doing so, people, places, and technology can become historically invisible. Through the investigation of their physical remains, they may be restored to the historical record.

Archaeology is also able to bring people into direct contact with the places directly associated with some of the most dramatic events of the Cold War. In 1962, the deployment of missiles by the Soviet Union in Cuba precipitated one of the most dangerous confrontations of the era. Aerial images of these sites are well known from contemporary USs' reconnaissance photographs. Recent fieldwork by a group of Swedish and Cuban archaeologists has located a number of the missile sites. The project also illustrates the communal value of such work: Local people were involved in the search for the sites and recalled their memories of the arrival of the Russians and the subsequent stripping of the sites for reusable materials (Burström et al. 2009, 2011). The work on Cuba also illustrates the global nature of the study of the archaeological remains of the Cold War. From Langelands Fort, Denmark, now preserved and open to the public, the passage of the ships carrying the missiles was monitored. In England, two of the Thor intermediate-range ballistic missile sites that were raised to alert during the October 1962 Missile Crisis are listed for their historic significance (Fig. 6). Archaeological studies may be able to answer questions about the fate of the contemporary US missile sites in Italy and Turkey that were quietly dismantled after the resolution of the crisis.

Many techniques of documentation and remote sensing employed by archaeologists have their origins in methods used by military forces to depict terrain or gather information on their opponents. Aerial photography that was developed in the First World War was quickly applied to discovery of archaeological sites and is an important source for the Cold War archaeologist. From the 1960s, imagery obtained from satellites was an increasingly important source for military intelligence. Since the end of the Cold War, growing

Cold War, Fig. 5 North Coates, Lincolnshire, England, the horizontal stratigraphy of this surface to air Bloodhound missile pad shows a cable channel for a later system that cuts the line of the original 1950s' cable conduit. (© W.D. Cocroft.)

Cold War, Fig. 6 North Luffenham, Rutland, England, mounting bolts for a Thor missile launch mounting. American-supplied Thor intermediate-range ballistic missiles were operated by personnel from the British Royal Air Force and were raised to alert status throughout the Cuban Missile Crisis in October 1962. (© W.D. Cocroft.)

amounts of satellite photography have been made publicly available. It is an important source of information for archaeologists, especially for more remote areas of the world. Using techniques analogous to the military analyst, it has been used to study the development of otherwise inaccessible Soviet missile sites (Fowler 2008, 2010). The Cold War's technological rivalries have also created an extraterrestrial legacy. Circling the earth are redundant spy satellites and their components and on the moon traces of man's first visits. These sites have been remotely mapped and measures to ensure their survival promoted (Darrin and O'Leary 2009).

Just as artifacts reveal information about the past to archaeologists, they too are of interest to the military intelligence officer. Equipment of the opposing forces was eagerly sought after on the proxy battlefields of the Cold War. More akin to techniques of archaeology, western military missions in East Germany collected discarded documents and objects from Soviet rubbish tips (Geraghty 1997: 208–11). Some were even subject to scientific analysis to reveal their composition. It has taken nearly a century for the material culture of the First World War to be studied. Dumps such as these, and ones associated with Cold War's battlefields, may in the future yield valuable information about various camp economies and the everyday life of the Cold War warrior. Military intelligence and archaeology also bear similarities in their limitations: Both are effective at locating and describing activities, but less successful in understanding motivations.

Another characteristic of twentieth-century warfare was its insatiable appetite for land. The application of industrial methods to armament production produced devastation on previously unknown scale. The military required large areas for training, testing new weapons, accommodation, munitions production sites, airfields, and border regions that became increasingly militarized and inaccessible to most civilians. Many of the areas already under military control continued in occupation during the Cold War. Airfields were remodeled to accept new jet aircraft and commonly cover a few hundred hectares. Weapon testing has created some of the most distinctive landscapes. At the Nevada Test Site, North America, its pockmarked surface attests to the awesome power of nuclear weapons, and many of the associated facilities have been documented by the Desert Research Institute, Las Vegas. In Albania, the communist regime headed by Enver Hoxha broke with its communist neighbors. The ensuing national paranoia about attack from the West and East is reflected by hundreds of thousand mushroom-shaped bunkers, or pillboxes, dotted across the country, roughly equating to one for every four or five citizens (Galaty et al. 1999: 201). Since the 1990s, they have been appropriated for storage and beach bars and modeled as tourist trinkets that have become a national icon.

International Perspectives

The Cold War was a global phenomenon. Archaeologically, the political and military allegiance and patronage was marked by the distribution of material goods from the two trading blocks. Allegiances were most visible in the supply of military equipment and the design of associated facilities. To date, the study of Cold War installations has been primarily motivated by cultural resource management studies. Over the last 20 years, these have vastly increased our understanding of places that a generation earlier were off-limits. Many Cold War era facilities are still in military hands and are at present unavailable for direct study. In the states of Eastern Europe that were formerly under Soviet dominance, it is often sites that commemorate political repression that have been studied, given official recognition and opened to the public. Their military bases may remain in use, or the Soviet bases may represent a past, which people wish to forget and sweep away.

As each side consolidated their grip on Europe, globally they sought to extend their influence through the use of proxies. In its most cynical form, it appeared to be based on the policy that my enemy's enemy is my friend. The allegiance of these friendly states became readily recognizable as they were supplied with arms of western and eastern origin, although occasionally they would provide captured arms to disguise their true origin.

As the post-war divide in Europe hardened, in the Pacific region that had already witnessed the operational use of two atomic bombs, the United States prepared to test the effect of atomic weapons on an obsolete fleet of American vessels, a German battle cruiser, and captured Japanese battleships. The July 1946 Bikini Atoll tests in part represented the symbolic end of the enemy's naval power, but they were also a demonstration of the USs' supreme military might. The remains of these tests have been subject to archaeological analysis, including the underwater investigation of ships deliberately sunk as part of the experiments (Delgado 1996, 2009). These tests marked the beginning of numerous tests across the Pacific Micronesian islands by the United States, Great Britain, and France. They have left a physical legacy of damaged landscapes, in places the infrastructure built for the trials, but more disturbingly displaced communities, radioactive deposits, and uncertain health risks (Smith 2007: 51–72).

The needs of Cold War scientists and military forces also resulted in the creation of new places. Research establishments were often built in places now valued for their natural beauty or remoteness. In sparsely populated areas, new settlements were created. Some facilities were utilitarian bases for military personnel, while new settlements for research communities often followed contemporary urban planning considerations. At Woomera, Australia, a new town was created with chalet-style bungalows and large communal facilities to serve the new long-range weapon project (Garnaut and Freestone 2007). In the West, the need to attract high-grade research staff often resulted in high-quality settlements. Behind the Iron Curtain settlements, serving large military facilities and research establishments became closed towns, but were nevertheless often provided with lavish cultural facilities (Fig. 7).

Future Directions

In most countries, the study of the physical legacy of the Cold War is still in its infancy. For the development of cultural resource management policies toward this heritage, inventories have yet to be compiled. Ironically, such information may survive within the classified archives of the Cold War targeteers who planned to destroy the places people may now seek to study and preserve.

Since the end of the Cold War, abandoned military sites have undergone a variety of taphonomic processes that are creating the archaeological record of the Cold War. In its most extreme form, this might be demolition to comply with

Cold War, Fig. 7 Falkenhagen, Brandenburg, Germany, raised rendition of the Kremlin in the cultural center of a Soviet military establishment. (© W.D. Cocroft.)

treaty obligations or to free land for new uses. Where sites do survive, on closure, they have been subject to official stripping out, looting of saleable materials, and vandalism that has hastened their decay. Nature has also quickly weathered their exteriors and reclaimed deserted buildings. Some have had an afterlife inhabited by squatters or occupied by businesses that often operate on the margins of society, such as vehicle breaking and recycling centers.

Over the next decades, oral testimony has great potential to provide multiple narratives of places and artifacts, from people who worked within the system. Among civil communities who lived close to military, their experiences will differ greatly; some valued the direct and indirect employment opportunities brought to an area, while elsewhere there was resentment of the noise, social tensions, and access restrictions brought by a military presence. A feature of the Cold War was the stationing of foreign military personnel in the countries of their allies. The division of cultures represented by the military installation and foreign personnel, with the local, is likely to have left particularly strong memories.

Within this area a particular urgency is to investigate places, events, and artifacts associated with the early phases of the Cold War. With the passage of time, communities, military and civil, will disperse, and it is increasingly difficult to find people associated with a particular place or event. Of particular significance are social aspects of the Cold War that may be absent from official histories and documentation. In Eastern Europe, this may include stories of resistance to communist rule. Across Europe, the opening years of the Cold War were also characterized by mass migration and the gradual restoration of civilian domestic life, albeit against the developing background of increasing East–West tensions. Investigations of immediate post-war adaptations to army camps, and perhaps associated rubbish tips, could reveal more of this history: as might the study of prison camps that housed many millions of captured German soldiers.

Each country has a unique assemblage of sites and artifacts reflecting its experience of the Cold War. The availability of primary documentation will also vary between countries and individual sites and in many instances may not answer the questions we wish to ask. Different national, regional, and personal experiences and local heritage cultures will also frame the questions that might be asked of this material. In the West, to date, these have mainly been concerned with the physical legacy of former defense sites. Elsewhere, questions concerning occupation, resistance, and liberation are at the fore. In other parts of the world, the study of the contemporary past using archaeological methods is either in its infancy or at present little accepted. In all countries, researchers will also find restricted access to sites and documentation relating to the Cold War, though, as discussed, new technology is able to remove some of these barriers. The complexity and multidimensional nature of the Cold War will require a multidisciplinary approach, archaeological methods will rarely be used alone, and most projects will combine elements of historical geography, building analysis, documentary research, and oral testimony.

Cross-References

- ▶ Berlin Wall
- ▶ Contemporary Past, Archaeology of the
- ▶ Nevada Test Site
- ▶ Space Archaeology

References

Beck, C., H. Drollinger, and J. Schofield. 2007. Archaeology and dissent: Landscape and symbolism at the Nevada Peace Camp. In *A fearsome heritage: Diverse legacies of the Cold War*, ed. J. Schofield and W.D. Cocroft, 297–320. Walnut Creek: Left Coast Press.

Buchli, V. 1999. *An archaeology of socialism*. Oxford: Berg.

Burström, M., A. Gustafsson, and H. Karlsson. 2009. The archaeology of a former Soviet missile site in Cuba. *Journal of Social Archaeology* 9 (3): 295–318.

Burström, M., A. Gustafsson, and H. Karlsson. 2011. *World crisis in ruin: The archaeology of the former Soviet nuclear missile sites in Cuba*. Lindome: Bricoleur Press.

Cocroft, W.D., and R.J.C. Thomas. 2003. *Cold War building for nuclear confrontation 1946–1989*. Swindon: English Heritage.

Cocroft, W.D., D. Devlin, J. Schofield, and R.J.C. Thomas. 2006. *War art: Murals and graffiti – military life, power and subversion*. York: Council for British Archaeology.

Darrin, A.G., and B.L. O'Leary, eds. 2009. *Handbook of space engineering, archaeology, and heritage*. Boca Raton: CRC Press.

Delgado, J.P. 1996. *Ghost fleet: The sunken ships of Bikini Atoll*. Honolulu: University of Hawai'i Press.

Delgado, J.P. 2009. *Nuclear dawn: The atomic bomb from the Manhattan project to the Cold War*. Oxford: Osprey.

Fowler, M.J.F. 2008. The application of declassified KH-7 GAMBIT satellite photographs to studies of Cold War material culture: A case study from the former Soviet Union. *Antiquity* 82: 714–731.

Fowler, M.J.F. 2010. The Skunda Hen Houses: A case study in Cold War satellite archaeology. In *Landscapes through the lens aerial photographs and historic environment*, ed. D.C. Cowley, R.A. Standring, and M.J. Abicht, 287–293. Oxford: Oxbow.

Galaty, M., S.R. Stocker, and C. Watkinson. 1999. Beyond bunkers: Dominance, resistance and change in an Albanian regional landscape. *Journal of Mediterranean Archaeology* 12 (2): 197–214.

Garnaut, C., and R. Freestone, eds. 2007. *Cultural heritage in the sustainability of remote planned communities. Woomera symposium papers 2007*. Adelaide: University of South Australia.

Geraghty, T. 1997. *Brixmis: The untold exploits of Britain's most daring Cold War spy mission*. London: Harpers Collins.

Klausmeier, A., and L. Schmidt. 2004. *Wall remnants – walls traces*. Berlin/Bonn: Westkreuz-Verlag.

Rasmussen, J.B. 2010. *Travel g uide: Traces of the Cold War period. The countries around the Baltic Sea*. Denmark: Norden.

Schofield, J. 2009. *Aftermath: Readings in the archaeology of recent conflict*. New York: Springer.

Smith, A. 2007. Colonialism and the bomb in the Pacific. In *A fearsome heritage: Diverse legacies of the Cold War*, ed. J. Schofield and W.D. Cocroft, 51–72. Walnut Creek: Left Coast Press.

Theune, C. 2010. Historical archaeology in national socialist concentration camps in central Europe. *Historische Archäologie* 2: 1–13.

Further Reading

Baker, F. 1993. The Berlin Wall: Production, preservation and consumption of a 20th century monument. *Antiquity* 67: 709–733.

Boeger, P. 2009. Kleinmachnow, die geschleifte Festung zur Geschichte der Grenzübergangsstelle Drewitz/Dreilinden. *Brandenburgische Denkmalpflege* 18: 15–28.

Center for Air Force History. 1994. *Coming in from the cold: military heritage in the Cold War: Report on the Department of Defense Legacy Cold War project*. Washington, DC: Center for Air Force History.

Cramer, J. 2009. Potsdam, Grenzübergangsstelle Nedlitz – Spuren der Schiffsübergangsstelle am Jungfernsee. *Brandenburgische Denkmalpflege* 18: 29–38.

Hanson, T.A. 2016. *The Archaeology of the Cold War*, The American Experience in Archaeological Perspective. Gainesville: University Press of Florida.

Klausmeier, A., and L. Schmidt. 2009. Das "System Grenze" in Brandenburg: Vom Kontext zerstörter baulicher Strukturen und ihrer kulturellen und historischen Bedeutung. *Brandenburgische Denkmalpflege* 18: 4–14.

Schofield, J., and W.D. Cocroft, eds. 2007. *A fearsome heritage: Diverse legacies of the Cold War*. Walnut Creek: Left Coast Press.

Stenak, M., T.T. Pedersen, P.H. Hansen, and M. Jespersen. 2013. *Kold Krig*. Denmark: Copenhagen.

Collaborative for Cultural Heritage Management and Policy (CHAMP)

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Basic Information

CHAMP (Collaborative for Cultural Heritage Management and Policy) is a strategic research center at the University of Illinois at Urbana–Champaign that is dedicated to the critical study of cultural heritage and museum practices on a worldwide scale in the context of globalization.

CHAMP's goals are to:

- Promote faculty research and dialogue across disciplines
- Train students in heritage and museum theory and practice
- Advocate sustainable and ethical cultural policies that are sensitive to competing stakeholder claims at heritage sites and museums
- Offer public dissemination of ideas generated through CHAMP's activities

CHAMP's interests are international and comparative in scope, especially in terms of the intersections among often conflicting local, regional, national, and international agendas in which cultural heritage issues intervene. CHAMP's integrative approach links critical inquiry to

opportunities for problem-solving in the field. CHAMP's premise is that there must be engagement between theorists and heritage managers so as to achieve state-of-the-art practice.

CHAMP interrogates museums as heritage sites and as dynamic engines for economic development in their regions. Museums take many forms – from object collections contained within buildings to open-air historic sites to world's fairs and theme parks to reenactments and other kinds of performances. All of these are venues for the articulation of cultural identity – sites for cultural production, formation of social consciousness, and construction of history.

CHAMP recognizes "landscape" as the most visible locus where displays and contestations of identity, ownership, and ideology are inscribed and mediation takes place. This built environment necessarily includes its inhabitants. While heritage is an important component in the articulation of identity, unfortunately it is also a basis for conflict of various sorts. Out of this complicated situation arises an important opportunity for study and mitigation.

As countries develop, their cultural heritage sites often become prominent in national economic agendas. Under pressure from tourism, their integrity and sustainability may be endangered as are their associated living populations. CHAMP is necessarily interested in tourism as this is a major factor in cultural heritage promotion, cultural change, and economic development around the world – at sites (archaeological, historic, cultural), at museums, and among "traditional peoples" when these are scripted and commercialized as major travel destinations. CHAMP recognizes the manifold problems and challenges of multiple constituencies voicing heritage claims and investigates the kinds of policies that can play a positive role in social, political, and economic terms.

Major Impact

More than two dozen University of Illinois faculty from multiple academic departments housed in various colleges participate in CHAMP. They offer a broad range of courses and conduct projects around the world. Several CHAMP scholar-practitioners consult for governmental, intergovernmental, and nongovernmental agencies at various levels on issues such as historic preservation, sustainable tourism, economic development, and human rights. Graduate students pursue interdisciplinary minors in Heritage Studies and in Museum Studies en route toward their doctorates in particular academic fields. Through coursework and practicums, CHAMP faculty are training a new generation of heritage scholars, heritage managers, and museum professionals capable of dealing with complex realities and of articulating sound progressive policies to local and national governments and other agencies.

CHAMP's most important impact has been through its conferences and, especially, the edited volumes that have resulted from these. Thus far the conferences have yielded five edited volumes: *Cultural Heritage and Human Rights* (2007), *Intangible Heritage Embodied* (2009), *Contested Cultural Heritage* (2011), *On Location: Heritage Sites and Cities* (2012), and *Cultural Heritage Politics in China* (in press) – all with Springer Publishers. The volumes have attracted wide attention and stimulated productive dialogue.

Cross-References

- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ World Heritage Education, Training, and Capacity Building

Further Reading

CHAMP website. n.d. Available at: http://www.champ.anthro.illinois.edu

Ruggles, D.F., ed. 2012. *On location: Heritage cities and sites*. New York: Springer.

Ruggles, D.F., and H. Silverman, eds. 2009. *Intangible heritage embodied*. New York: Springer.

Silverman, H., ed. 2011. *Contested cultural heritage: Religion, nationalism, erasure and exclusion in a global world*. New York: Springer.

Silverman, H., and T. Blumefield. in press. *Cultural heritage politics in China: Tourism, museums and collections*. New York: Springer.

Silverman, H., and D.F. Ruggles, eds. 2007. *Cultural heritage and human rights*. New York: Springer.

The Collapse of Complex Societies

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State of Knowledge

For at least the last few decades, the question of the "collapse of civilizations" has been the focus of academic study and the subject of popularizing books (e.g., Tainter 1988; Diamond 2005). Books continue to appear about this, looking to educate interested readers about what it means for a society to collapse and what is involved (e.g., Johnson 2017; Middleton 2017). Interest in this subject, at least in the complex societies of what is commonly called Western Civilization, appears to be insatiable. Although widely used only recently, terms such as "sustainability," "resilience," and "transition" have also become part of this study, providing the counter terms to collapse. Archaeologists are part of this focus, inasmuch as the discipline's greater time depth across a wider range of societies allows systematic exploration of the past, although usually it cannot provide fine temporal control to explore all problems in great detail. So, scholars are looking for societal examples of the kinds of social transformations indicated by the above terms. Above all, they seek some guidance as to why these changes occur, and archaeology can provide evidence of these.

Three important texts on collapse for archaeologists in the last 30 years are Joseph Tainter's (1988) *The Collapse of Complex Societies*, the edited volume of Norman Yoffee and George L. Cowgill (1988) *The Collapse of Ancient States and Civilizations*, and Jared Diamond's (2005) *Collapse: How Societies Choose to Fail or Succeed*. Of these three, Tainter's volume had the most influence on the profession of archaeologists, while Diamond's has had the most influence in the popular realm (although academics use the text often in courses). Yoffee and Cowgill's edited volume is interesting in that it highlighted how Roman scholars (as exemplified by the participating Romanist, G. W. Bowersock) were turning away from the belief that the Roman Empire had collapsed. Now, some investigators of regions represented in the volume also appear to recently reject collapse as not a useful concept. In terms of explanatory power, Tainter's setting out of the problem of declining marginal returns in the evolution of complexity probably has had the most impact. Diamond highlighted the challenges facing the world today by featuring some notable examples of societal collapses of the past, in a very much didactic fashion. That resonated with a large audience. The weaknesses in Diamond's contribution will be touched on subsequently.

There are two basic approaches to the question of the collapse of complex cultures. The first is the traditional, older approach that regards the collapse of cultures as something that took place reasonably frequently in the ancient world. That approach regarded collapse as an ending of the *floruit* of an ancient culture. The newer, more recent approach to collapse, in its most extreme form, denies that collapse really takes place at all. In its less extreme form, that approach acknowledges that some degree of collapse takes place but maintains that the most important feature of the process is that there is cultural resilience and that the culture reconstitutes or regenerates itself into a different, somewhat related, form. So, rather than being focused on an ending, the newer approach is focused on beginnings – or the continuation of the culture in an altered form.

What is common to both approaches is the recognition that the culture in question has ceased to function in the same manner as during its *floruit*. And, although the newer approach does not emphasize it so much, both approaches also recognize that a prime feature of the entire process is a loss of population, demographic decrease on a large scale. Even in its most extreme form, the new approach acknowledges that essential feature of severe demographic decline while claiming that cultural collapse is a concept that should be abandoned because, with the admission of demographic decline, collapse is analogically likened

to biological extinction. But, as almost all students of past cultures know, virtually no known complex society has ever gone completely extinct – that is, every member of a culture died off. Although the Teotihuacanos of the famous Precolumbian city no longer form a coherent society, those people did not all die off at once but contributed both genetically and culturally to the continuance of Mexican cultures. Collapse researchers recognize that and generally acknowledge survivors, so an extreme interpretation of the concept of cultural collapse as extinction, is not warranted.

Regarding the traditional approach, the reason why the interest in collapse is so common in complex societies is explained by Tainter (2016). People in complex societies have a natural bias towards complexity because they have internalized a "progressivist view of human evolution" (Tainter 2016: 31). We humans believe that our complex society is the highest achievement of humans as an example of civilization, and it is the best, we think, because it represents the height of inventiveness and provides such a wealth of possibilities in life. It follows then that to lose this complexity must be a bad thing. When a culture collapses and loses this complexity, it is a form of failure. As will be discussed, there have been cases of human culture that fit this description of loss of complexity and richness of life. Tainter laments, however, that even professionals (ourselves included) are guilty of furthering this biased view by use of progressivist terminology, repeating terms such as *rise, decline, dark ages, florescence, classic, and postclassic* (Tainter 2016).

The newer approach has declared that commonly used progressivist terms should be thrown out, advocating the use of preferred terms such as "change," "transition," "transformation" or "resilience." That is accompanied by the assertion that "decline," "fall," or "collapse" are biased and full of preconception, and so no longer acceptable. As much as we wish there were alternatives to the terms used, there are none, so each investigator must define clearly what he or she means by their use of the terms (Tainter 2016: 33).

The study of collapse, however, is contentious precisely because there is so much to disagree about. For one, change in human societies is ubiquitous and as environmental historian J.R. McNeill has written, "only with the most flexible of definitions could one say that any of the cultures in existence 1,500 years ago exist today" (2010: 362). So do all societies eventually collapse? We shall take up that theme again at the close of this article. Most researchers have very definite ideas of what kinds of societies collapse or are prone to it. Also, most researchers, as will be detailed below, recognize that the process is not simple, or attributable to one cause. In fact, a new book on collapse indicates that collapse could be studied at various levels and types of human collectives from individual communities to empires, as well as finding no great overarching grand theory to explain all possible cases (Middleton 2017). Another recent contribution (Johnston 2017) agrees that any explanation for societal collapse must be multi-causal maintaining that "social hubris" of the society's leaders was a most important factor in most cases of collapse. We have recently argued (Storey and Storey 2017) that collapse is multi-causal but generally slow.

Definitions

Before discussing collapse and resilience, sustainability, and other issues, these terms should be defined, although there will be disagreement, because so much is subjective, without widely accepted measures to back the definitions. Various definitions have been given for collapse, but most researchers agree that the term is best used in relation to complex societies and civilizations. Archaeologists quote Renfrew's definition (1984: 367–369) which is a sudden decline in sociopolitical complexity marked by disappearance of central administrative organization. Furthermore, traditional elites disappear, the centralized economy fails, and settlement and population decline (quoted in Faulseit 2016 for example). Those aspects of collapse are marked archaeologically by such evidence as the

abandonment of palaces and large public works. Many large nucleated settlements shifted to dispersed smaller settlements with lower population density and less internal and long-distance trade, among other indicators.

Also influential is Tainter's definition (1988: 4–5) which defines collapse as a loss of complexity in the sociopolitical sphere – a process of simplification. Societies use complexity, more integrated parts, and hierarchical organization to solve problems and adapt. Adding complexity, however, eventually yields declining marginal returns and ends up being too costly to maintain. Collapse for Tainter can be seen then as adaptive (Middleton 2017). Diamond's definition of collapse (2005: 4) has drastic loss of population and sociopolitical complexity over a significant geographical area for a significant period of time. Schwartz's definition is notable (2006: 5–6), because he provided it in a context of focus on resilience as exemplified in regeneration: "Regeneration presupposes collapse. In the archaeological literature, collapse usually entails some or all of the following: the fragmentation of states into smaller political entities; the partial abandonment or complete desertion of urban centers, along with the loss or depletion of their centralizing functions; the breakdown of regional economic systems; and the failure of civilizational ideologies." All these definitions have similarities, but based on research on the Classic Maya and the Western Roman Empire, two of the most famous collapses, and often a focus of many discussions about collapse (Middleton 2017), Storey and Storey (2017: 11–12) include the new concept of *slow collapse*:

> We define collapse as a major disjuncture in the trajectory of a complex culture (those commonly called "civilizations"); the political integration completely fails, and the Great Tradition (the assemblage of material culture and reflected ideologies unique to that culture) similarly comes to an end. That process also entails human suffering on a large scale, largely through diminution of population, which almost never does mean total disappearance of a population; but there is significant loss of life and a smaller population left behind. The people (in most cases) survive, persist, and regenerate into another complex society; usually there is a gap (large or small) before re-establishment or re-integration of complexity into a new political system with a new Great Tradition, which is partly derivative of the old but also distinct.

Collapse is not necessarily abrupt or quick because it can take several centuries for the depopulation and loss of elite Great Traditions to occur. All cultures possess Great Traditions, but complex societies incorporate various institutions that reproduce a mass of the material and cognitive elements in sufficiently numerous quantities to make it easy to recognize the elements of the Great Tradition unique to that culture. Webster further noted that, loosely, one can speak of a variety of cultures as "civilizations." "It is only fair to say that we are still most likely to label as civilizations those complex societies (they must be state-level and urban societies also) that manifest such qualitative elements in complex, durable, and grandiose ways." He also adds that ". . .things collectively comprise what we call Great Traditions, which were heavily associated with the elites of ancient civilizations" (both quotes Webster 2002: 67). How a Great Tradition changes after a collapse is relatively easy to discern, as well as how successive Great Traditions evolve in a related fashion in one place. Figure 1 shows deities and "divine" emperors from the Greco-Roman tradition and how there is both continuity within the discontinuity of civilizations giving way, especially after the collapse of the heavily Hellenized Roman Empire.

In a rejection of the progressivist framework, it can be asserted that, contrary to the sometimes unintentional tenor of prevailing opinion, collapses are morally neutral. Collapse has occurred when, for a variety of reasons, a state-level institutional infrastructure has been weakened so irreparably that it ceases to exist. Weaknesses are identified in two major kinds of evidence. The first is human socio-cultural behavior in institutional settings (entailing human error and mistakes) that weakens cultural integration. The second is diminished human-ecological equilibrium (usually challenges to the extractive efficiency of human agricultural practices, possibly due to natural and anthropogenic climatic and environmental degradation). Both result in a net loss of energy that had been previously directed to the fulfillment of human societal ends.

The Collapse of Complex Societies, Fig. 1 Four images from Greco-Roman antiquity that show the progression of a Great Tradition; far left, the statue of Zeus in the Temple of Zeus at Olympia (virtual reconstruction by Dave Martenson); second from left, the Emperor Tiberius, a relief from Nijmegen, the Netherlands (Photo: Rob Mols): Roman emperors were often worshipped as deities in the provinces so this is like an image of a god; second from right, the statue of the 4 tetrarchs from S. Marks, Venice, originally from Constantinople: Roman emperors had long adopted quasi-divine representation (Photo: G. Storey); far right, the Christ Pantokrator from the cathedral of Monreale in Palermo, Sicily, showing strong links with eastern Greek iconographic traditions, but clearly inspired by the image of Zeus more than 1500 years earlier (Photo: G. Storey)

There are other terms in this discussion that require definitions: *resilience*, *sustainability*, *vulnerability*, *transformation*, *transition, and continuance*. Resilience has been defined as "the capacity of a system to experience a disturbance, and then return to its original state" (Jacques 2015: 50), while vulnerability is susceptibility to disturbance, affected by the "exposure and sensitivity to a particular threat" (Jacques 2015: 213). For anthropologists and archaeologists, resilience is not necessarily a return to original state; it is capacity to survive in altered form by adapting and transforming when faced with significant stresses (Faulseit 2016). Social transformation, transition, and continuance, which all suppose surviving a crisis and having to regroup in some fashion, are all really evidence of resilience but definitely do not indicate a "return to original state." Notable contemporary interest around collapse has been focused on sustainability, which involves maintaining present social systems and its benefits for future generations, and reflects worry about collapse and our hopes to survive it. All terms mentioned could refer to a wide range of social systems. Jacques (2015: 44), for example, defines sustainable societies as those with ecological accountability and restraint, justice for its own and other peoples, and foresight to avoid vulnerabilities. Jacques' definition indicates that attaining sustainability is not easy, furthermore suggesting that, in the end, the study of collapse does not provide much comfort.

Resilience and its opposite, vulnerability, have been integrated into a theory about the so-called adaptive cycles that societies (treated as ecologies) tend to follow. Those cycles resemble a reworking of the patterns of ups and downs that many archaeologists and historians have described for past societies (original cycle from Gunderson and Holling 2002). It begins with an *r-phase*, the period of initiation and initial development followed by a *k-phase*, which sees the maturation of a socioecological system and its attendant cultural traditions. It is a time of "intensification of production; increased management over, and investment in, a smaller number of key productive strategies; and hypercoherence, which means there is a high level of integration" (Iannone 2014: 10). We then see a time of rapid disturbance, destruction, and abandonment, called appropriately enough the omega-phase (ending), which leads to an alpha phase (beginning), characterized by rapid changes and restructuring. Vulnerabilities appear and build up during the k-phase, morphing into fully-fledged perturbations (often environmental but human as well;

Johnson's "social hubris," (2017) for example) which cause societies to either start again (if the response is resilience), entering a new r-phase, or they fail to cope and collapse, short-circuiting the cycle. That entire process provides a framework for understanding how societies make or avoid "mistakes," which can be applied not only to study of the past but also for critiquing current situations, all in the service of helping to "chart a better future for those who will follow us" (Iannone 2014: 11; see also Costanza et al. 2007).

Many traditional views of societal collapse clearly require revision in light of better information that has been gathered on the post-collapse periods of some of the most notable cases of societal collapse. Schwartz and Nichols (2006) provide cases. Cultural resilience is a useful and newly appreciated aspect of the question of societal collapse – our examples of the Maya and the Romans are good examples of such resilience and regeneration. The adaptive cycle of resilience theory (Redman 2005; Costanza et al. 2007; Faulseit 2016; Middleton 2017) has become a prominent paradigm in collapse studies. Figure 2 shows how it can work for the Romans and Fig. 3 shows the same for the Maya.

Societies Cannot "Choose"

One critique of collapse studies must be discussed here, especially in regard to Diamond's influential study (2005). Critics pointed out a problem even in Diamond's title: *How Ancient Societies Choose to Fail or Succeed;* societies are not the kind of entities that "do" things. Johnson (2017: 8) also anthropomorphizes "society": "the theme running throughout the book: the society that acknowledges and adapts to a changing world is the society that survives"; and of the Maya: "societies are generally conservative and seek to maintain a basic status quo…" (Johnson 2017: 63). Diamond's critics were right: societies cannot do these things and they should not even loosely be said to do them. Only people can do these things. Clearly, the people in charge are the ones that are responsible. But, as with Diamond's and Johnson's analysis we can ask: what is the message? Leaders mess up and do the wrong things, so do not take leaders too seriously? Given the nature of powerful governance and behavior of world leaders in state-level societies, that message is not particularly comforting.

Consequently, careful consideration must be accorded the concept of *agency* (a favorite issue

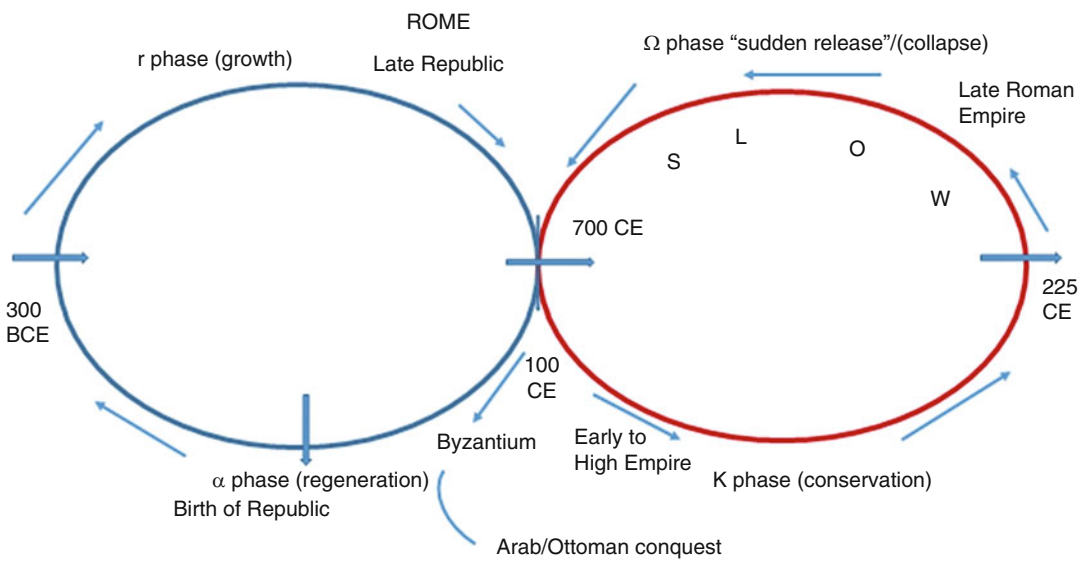

The Collapse of Complex Societies, Fig. 2 The Roman Empire in the resilience analysis model. (Drawn by G. Storey)

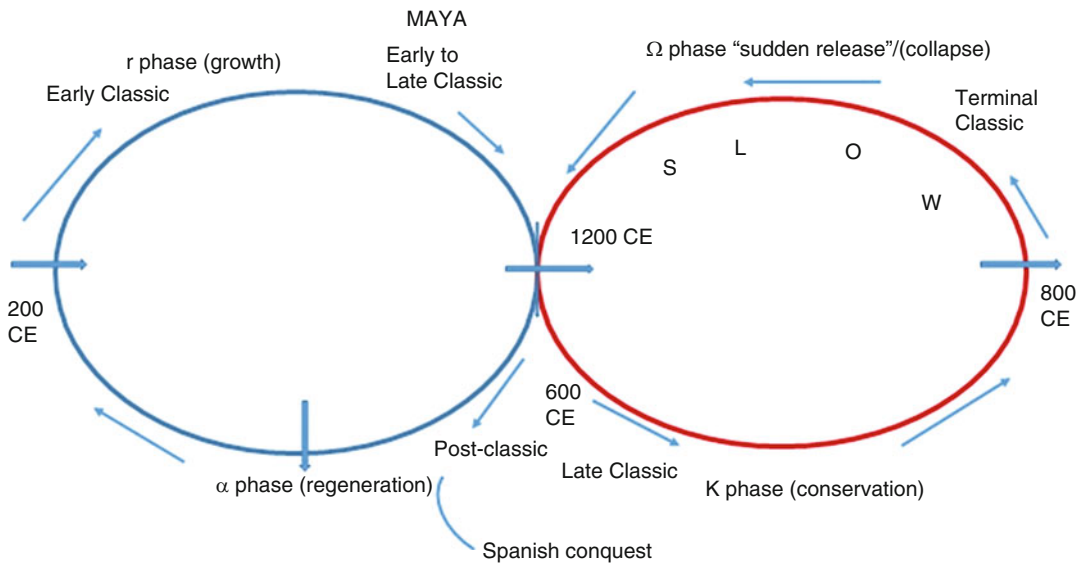

The Collapse of Complex Societies, Fig. 3 The Classic Maya in the resilience analysis model. (Drawn by G. Storey)

in archaeology currently), which must be taken up in terms of the distinctions of who has the power to do what, between elites and commoners. However, the current formulation of blaming the elites smacks of something that William T. Sanders complained of incessantly in writings about antiquity: treating the past as if it were subject to "the Great Man Theory of History." Although historians never really formulated such a theory, it has been easy to acknowledge that a great deal of history has been written that sounds suspiciously as if Great Men *were* the key. At any rate, giving individuals too much credit may be a real problem, given how archaeologists focus as much on the evolution of complex societies as a process, as on individual actions. On the other hand, in our own recital of the role of individual rulers (Storey and Storey 2017: 108–133), compared to Johnson's (2017) setting out of the features of social hubris, one has to admit, yes, much of the "blame" can be laid at the feet of the elites in control.

A distinct problem with trying to promote a general theory of collapse is that those who do that are doing what used to be called "universal history" which puts them at a distinct disadvantage. Many do not really approve of that kind of work in academia: "in recent years – largely due to the postprocessual critique – comparative diachronic studies of the sort we are attempting, with a focus on developmental issues, have frequently been avoided in favor of synchronic analyses of individual societies and their historical specificities. But a total abandonment of the comparative diachronic would be misguided" (Schwartz 2006: 5). One reason for that is because, once one specializes in the cultural residues of one region, one is expected to master a staggering amount of detail and then be able to quote it chapter and verse when called upon to do so. However, anthropologists should be more tolerant of this kind of approach than they sometimes demonstrate. After all, anthropologists have considered it perfectly acceptable to study Chinese civilization and culture and draw conclusions about the overall trajectory of human endeavor as represented in Chinese culture. It is freely admitted that the anthropologist who does so can never be as knowledgeable about China as a full-blown Sinologist, but that is precisely the point. The Sinologist sees only the trees of China, while the anthropologist sees the forest of all human complex cultures and can thus accord China its proper sphere as a comparative exemplar of how a single human culture can be configured.

The consensus of collapse researchers for some time has been that collapses are not caused by one

single cause, but by conjunctions of vulnerabilities in politics, social organization, economics, and resources (e.g., Webster 2002; Middleton 2017). The effects of environmental degradation caused by human intensification of use, plus large effects from climate change, have become more prominent as important underlying vulnerabilities. There are already published works where archaeologists and paleoenvironmental scientists have collaborated to study how socio-natural systems respond to perturbations. The list includes *Which Way the Wind Blows* (McIntosh et al. 2000), *The Archaeology of Global Change* (Redman et al. 2004), *El Niño, Catastrophism, and Culture Change in Ancient America* (Sandweiss and Quilter 2008), *Sustainability or Collapse? An Integrated History and Future of People on Earth* (Costanza et al. 2007), and *The Archaeology of Environmental Change: Socio-natural Legacies of Degradation and Resilience* (Fisher et al. 2009). Thus, this is a very dynamic area of research, offering the prospective researcher an opportunity to be part of interdisciplinary discussions and cooperation.

Jared Diamond (2005) has successfully combined academic and popular writing, through "big picture" human history, tackling the subject of ends or collapses in his book (he also calls some of them "vanishing" societies). He uses some of these cases as "lessons" that might apply to the modern situation, even though he is careful to clarify how modern societies are different from past societies, in ways that both decrease and increase risk of collapse (2005: 8). Environmental damage is paramount in all of Diamond's examples, and climate change looms large in most as well. Diamond applies a comparative method investigating how societies collapse and what influence particular "input" variables had on the process. He defined five factors that appear to be generally implicated in his examples of past collapses: negative human impacts on environment, adverse climate change, presence of hostile neighbors, lack of trade partners, and the trajectories of decisions taken impacting on how the societies adapted or failed.

Thus, exactly what does Diamond mean by "collapse"? The underlying similarity among all his examples is that when things are good, populations grow and expand their use of the environment. Above all, that means people "choose" to bring less favorable lands into agricultural production. These lands are less favorable because of their lower productivity and greater vulnerability to erosion and overuse than prime lands. As these lands are damaged, they are abandoned, and the society can no longer support the large numbers of people that have come into that society. A great deal of conflict and violence ensues, leading to a demographic crash, but in most cases, remnants of the population survive along with much of their culture. What seem to have been lost were those elites/rulers who were more interested in consumption and prestige, and who were unwilling to give up some privileges in the face of mounting scarcity. The culture and the peoples continued on, sometimes in smaller territory, sometimes in the same place with smaller populations, but always with less highly developed political institutions and less economic specialization/integration.

Even before Diamond, anthropologists/archaeologists and climatologists had started to try to answer climate change worries by showing how humans have already responded to changes in their environment, including climate change (McIntosh et al. 2000). These authors criticize the short-sightedness of contemporary views, as if the past cannot teach us anything, and the lack of social science understanding of how humans perceive and adjust to climate and environmental problems. Humans have perceptions of nature and act according to these; the importance of social memory of how to react, especially on local scales, must be respected (McIntosh et al. 2000). Using what anthropologists and archaeologists already know, instead of just simplistically attributing catastrophic effects to past climate changes, can help us today understand our human capacity to adapt. McIntosh et al. (2000) were trying to bridge the climatology/social sciences divide, but Diamond (2005) did not reference it.

Robert Dunbar (2000), a paleoclimatologist, pointed out that known climatic events have different geographic and time-periodic scales, and Jeffrey Dean, an archaeologist, also noted this

different periodicity in the prehistoric Southwestern USA (2000: Fig. 2.2). In both cases, they pointed out that more common events can be adapted to by human societies, although Dean also cited population size and societal complexity as influencing adaptability. Dean noted that once large populations and hierarchical societies developed, many areas were abandoned during periods of climatic stress. Rare stressful climatic conditions can make it difficult for humans to adapt. These two authors provided general conditions that can be useful in correlating climate change and collapse: these include the rarity of a climatic situation and the large size and complexity of the society trying to adapt.

Caldararo (2004), a biological and medical anthropologist, wanted to use the past to discuss the future of humans and hoped that his book would be of use to non-anthropologists. His *Sustainability, Human Ecology, and the Collapse of Complex Societies* focused on complex societies: how they put so much pressure on resources and the environment, make irrational economic decisions, and thereby cause human institutions to fail to adapt. Humans should always be aware of the historical and ecological problems of the past and should try for sustainability. Like Diamond, Caldararo used Japan as a positive example but like Diamond, underestimated how global connections might have provided mitigating outlets for the problems faced, as wealth allowed the contemporary Japanese to displace environmental limitations by importing needed resources. Also, the earthquake and tsunami of 2011 in Japan have revealed how vulnerable modern societies are to extreme natural disasters, despite extensive global assistance networks. Caldararo used Tainter (1988) as a guide for explaining that the costs that cause the collapse of complex societies can improve life for the survivors. Caldararo tries to cover too many subjects to formulate a coherent argument, such that a variety of different economic lessons can be learned from the Roman Republic and Roman Empire, in our opinion. At the end of Caldararo's book, it is a smaller population and reduced consumption that seems to be the most important factors for avoiding collapse. Achieving sustainability is something he believes humans can do, but he also fears that collapse will happen.

Sustainability and human-environmental relations are also the subjects of *The Archaeology of Global Change* by archaeologists (Redman et al. 2004). In their introduction, the editors discussed how archaeology can shed light on how humans impact their environments and thus affect the sustainability or collapse of their society. It is common for societies to be sustainable for some time and then go to collapse. Redman et al. (2004) stress that human actions have significant effects. It is not just climate change that causes problems, and complex societies and large populations can be sustainable for centuries or millennia. However, deforestation and the ensuing soil erosion, plus the pressure to produce more food and get other resources needed for such societies to continue, can eventually lead to "overutilization" of the environment in many cases. Environments can regenerate, but if the degradation is too severe, it may take too long for the environment to recover for human purposes, as we think happened in much of the Maya region.

Brian Fagan (2004) is an archaeologist who writes books for a wider audience and is interested in how environment and climate change have influenced human history. In *The Long Summer* (2004), Fagan studied how the vagaries of climate change have affected civilizations, focusing on fluctuations of warming, cooling, rainfall, and drought over the last 15,000 years. Over this period, there has actually been a fairly stable period of prolonged warming (the most stable in the last 400,000 years), which has benefited humans and made possible the ever larger and more complex societies that characterize human history since circa 10,000 years ago. As the contemporary pattern of global warming continues, the problems facing humans are increasing because we have become more vulnerable to climate change. Fagan's larger point is that as societies become larger and more complex, they also become more vulnerable to disruption and collapse, echoing Tainter (1988).

Focusing on El Niño weather as a catalyst for producing catastrophic events to which humans must adapt, the collection by Sandweiss and

Quilter in *El Niño, Catastrophism, and Culture Change in Ancient America* (2008) features paleoclimatologists and archaeologists discussing the interaction of natural events with human change in the Americas. Sandweiss and Quilter are interested in large-scale changes, where it appears that natural forces were important. Humans have varied reactions to sudden events, and archaeology is good at showing and tracking such responses, but it is nevertheless difficult to understand the human agency involved. Humans are neither purely victims of nor totally immune to disruptions from natural forces. The key to positive outcomes seems to be flexibility to adapt, perhaps an echo of Diamond's "choice," and a more optimistic outlook. Sheets (2008) provided illustrative case studies in the volume, in which he showed that, in the face of explosive volcanic eruptions, some societies are resilient while others are not. While people certainly do learn from these catastrophes, Sheets, like Fagan, concludes that in general the more complex the society, the less resilient it proved to be.

Fisher and colleagues Niño (*The Archaeology of Environmental Change: Socionatural Legacies of Degradation and Resilience*, 2009) agreed with Diamond that the past has many episodes of natural perturbations with human factors that caused social decline. However, to them, Diamond is too fatalistic in his approach, as such declines have complex and varying explanations. Socionatural archaeology, as they term it, involves landscape, land use patterns, and the history of those anthropogenic environments, providing useful information for current crises. Success or failure is due to more than just demographic or climatic change. Degradation of land can occur just as much from failure to keep up expensive modifications, such as terraces and irrigation systems, as from overuse, for example. In their conclusion to this volume, Hill et al. (2009: 256) point out that "the unpredictable, unintended consequences of human action loom large in causing past environmental problems." This is a response to Diamond's contention that societies "choose" to fail. And there are no simple cause-and-effect factors. The past presents many useful examples of the outcomes of the myriad connections between humans and environments that can inform present policy. That volume chooses to stress the general resilience of humans.

While there have been such environmental explanations since the dawn of collapse studies, these recent studies illustrate the change in knowledge supporting this trend, as it is only recently that it has become possible to successfully integrate paleoenvironmental global changes with human history (Costanza et al. 2007), due to improvements in dating of paleoenvironmental events. There is recent interdisciplinary cooperation between social scientists, including archaeologists, and environmental scientists, to study the history of human societies. It is the interaction of environmental adaptation and human societies, including the effects of climate change, which are being investigated. Such an approach illustrates a stronger understanding that human societies, and especially complex ones like civilizations, are extensively affected by ecological and climatic factors. One cannot separate human institutions and cultural understandings from the environmental/ecological systems with which they are intertwined. The terms "socioecological systems" or "socio-natural systems" are the focus of study. The concern is obviously with how societies adapt to change and avoid collapse, a relevant concern today. The temperature regime of the last 2,000 years (Fig. 4) shows some major climatic shifts that can be correlated with notable cases of collapse. Although not a sole cause of collapse, the environmental factors are relevant and highly contributory to cultural trajectory downturns.

Also, archaeologists are able to work at various levels by integrating adaptive cycles from household to region, allowing the investigation of the integration and vulnerabilities at those different levels. Concerned with the vulnerability that leads to collapse, archaeologists are interested in discovering what socioecological system characteristics might lead to problems, such as increasing complexity or intensifying production, in reaction to climate change or other perturbations. As Tainter (1988) demonstrated, the problem-solving which helps at one point may become one of the vulnerabilities later, as the institutions

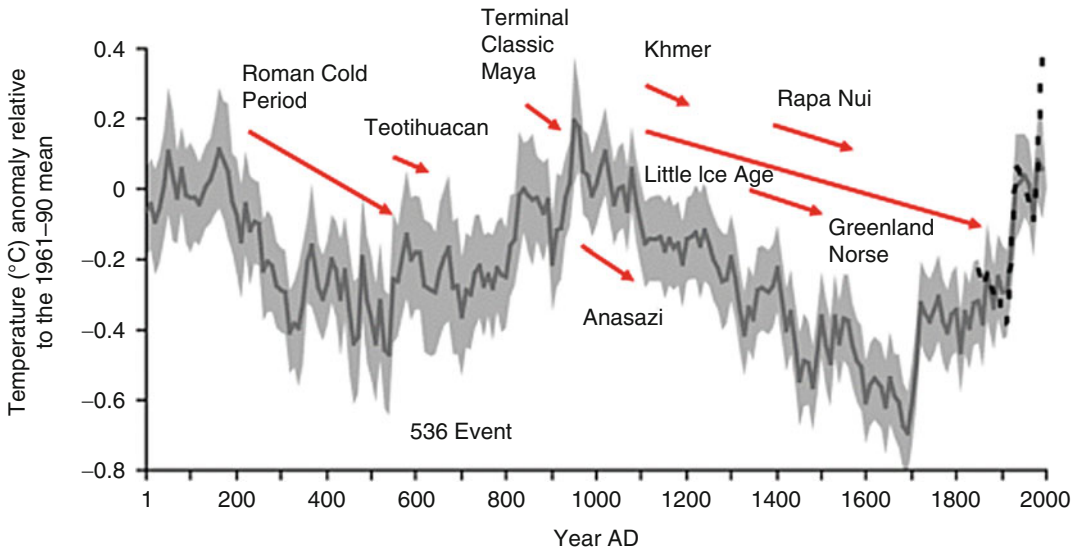

The Collapse of Complex Societies, Fig. 4 Multi-source record of temperature for the last two thousand years, showing distinct cooling of temperatures and the slow collapses of several complex societies. (Adapted from Ljungqvist 2010: 345, Fig. 3)

and practices become more costly and less flexible. Then a major disturbance, such as environmental/climatic change, may combine with the less flexible, or more rigid, system and bring on reorganization or collapse. Societies will vary in their capacity to respond to change, but the determination of the resilience of problem-solving behaviors and institutions, again linked to the various levels of the adaptive cycles, will allow the discovery of the regularities present in those that survive versus those that collapse. For resilience theorists, there is no simple reaction of a society to climate change; instead, there are particular decisions and historical trajectories, but the search should be for the sources of resilience and vulnerability.

The Roman Empire and the Classic Maya

Among many Roman scholars, especially, there is a turning away from the terms such as "decline" and "fall" because they are too "loaded" and prejudicial to the conclusions to be drawn about the character of the late Roman world. Terms such as *transformation*, *transition*, and *continuance* are preferred. Those terms are usually not formally defined, because their advocates seem to believe they are self-explanatory. To some, there is so much conceptual baggage and preconception associated with the concept of decline that it really is a hindrance to further study of the Roman Empire and thus is "no longer needed" (Whittow 2001: 243). Cameron argues forcefully for characterizing what happened during the later Rome Empire as something as simple as "change" rather than "decline" or "collapse," or even serves as an example of "transformation" (Cameron 2011: 211, 210, 212). Some Romanists clearly mean to depict the events of late antiquity in as neutral a light as possible.

Peter Brown, credited with turning the interpretation of the end of the Roman Empire as one of a transition rather than a decline and fall (Brown 1971), has reiterated arguments for transition: "The western empire was not so much destroyed as *eroded*. . ." and "It is quite possible for a society to *unravel*." He also tempered his arguments with the admission that things were bad in the transition: "It would be unwise to ignore many of these catastrophes." However, his tone is that the end of the Roman Empire was not a catastrophic change. It was a "silent change" without "catastrophic drop in the standard of living. . ." (quotes Brown 2013: xxvi–xxvii, xxxii, xxx, xxiii, italics ours). The denial

of a drop in the standard of living is quite debatable (see Ward-Perkins 2005).

One British Roman archaeologist, in the context of late Roman towns in Britain, used terms such as "vitality" and "creative and vibrant" (Rogers 2011: 163, 165, 177, 176) to describe post-Roman urban activity. Such terms are as emotive, controversial, and perhaps as biased as "decline" – how does one define "vitality," and might not its definition be as much in the eye of the beholder as "decline"? Middleton (2012: 264) correctly regarded that "these [terms] can be equally controversial and value laden." However, it is still a fair reading of the evidence to conclude that there was a major "Things Fall Apart" (to borrow the title of Chinua Achebe's novel) character from fifth- to seventh-century CE life in the Roman world. Numerous archaeological studies of late antiquity (Storey and Storey 2017: 42–28, Table 3.2) have demonstrated that the economy remained prosperous in several places in the Roman Empire, but that after the fifth, sixth, or seventh centuries CE – depending on the region – that economic prosperity was lost over the majority of the territory that had once been the Roman Empire. Romanists themsevles cannot avoid characterizations for this period that use the otherwise objectionable terms such as "decline," "erosion," or "unraveling."

Only a couple of illustrations of the impossibility of avoiding the objectionable terms are in order. Speaking of the west coast of Italy, we are told, "a clear *decline* in material wealth can be seen from at least the sixth century." Regarding the Eastern empire: "it has been deduced from a study of settlement patterns in the region that while settlement density reached an unprecedented peak from the fourth to the sixth centuries, from the seventh century there was a *dramatic fall* in occupation." And: "If we put together the evidence from archaeological investigation of sites very widely scattered round the Mediterranean, *a general picture seems to emerge of contraction*. . ." That is followed by the statement that "the west, where urban life seems to have been *in decline* already by the late fifth century" (Cameron 2011: 156, 158, 151 two quotes, italics ours). The general archaeological picture of the Roman Empire, both west and east, is of eventual contraction. It seems reasonable to conclude that "general contraction" is not that different from a "decline," that certainly entails demographic loss.

So, it does not seem entirely reasonable that the concept of "decline" or "collapse" must be abandoned; they are both far too well-established as concepts to simply discard because people think they are too "negative." The two approaches under discussion here have been labeled *catastrophist* and *continuist* (Cameron 2011: 209; roughly equivalent to our initial setting out of traditional and new approaches to collapse). Even those who abjure the dichotomy, generally argue more in line with the continuist approach: "Much too much emphasis is still placed on the 'collapse' of the Roman Empire and the 'transformation' of the classical world, and too little on the long-term continuities" (Cameron 2011: 212). But, one need not treat "decline" as an entirely negative term. In purely neutral terms, it simply indicates a loss of energy and integration in a cultural system, even when used by those, like us, who may be arguing the catastrophist approach more.

A great deal of research into late antiquity in the last half-century has aptly demonstrated that the post-Roman world was definitely not a "dark age" and showed much elaboration and complexity. That emerging picture has urged its researchers to argue that the terms "decline," "fall," and "collapse" should be de-emphasized, if not abandoned outright. It would seem more reasonable to suggest that all terms in the debate need to be refined to where they are useful and that when one term is used by one investigator, he or she must make clear what is meant by its use: "The onus is on writers to indicate clearly what they mean by collapse and not to confuse or abandon the concept" (Middleton 2012: 268). Usefully defined, "collapse" must mean a loss of complex integration on a macro-scale. If you have a regional (world-system size) empire, and it is replaced by a host of unintegrated kingdoms (as happened to the Western Roman Empire) that is a clear case of loss of complexity that can correctly be described as a "collapse."

Consideration of one explicit change in terminology, promoted by those who do not like the

terms decline or collapse, allows us to observe that the suggested changes bring little benefit. Horden and Purcell (2000: 263–270) recommended the terms "intensification" and "abatement," adapted from LaBianca (1989). The former refers to periods when agricultural exploitation is increased and energy inputs and returns are high, while the latter refers to periods when exploitation recedes and less energy is put into production with consequent decrease in returns.

It is useful, however, to consider how these terms were developed for a different context, an early Iron Age context in which subsistence lifestyles were still in flux. LaBianca explicitly stated: "sedentarization is specifically linked to intensification and involves households becoming increasingly oriented toward crop production. . .nomadization is typically linked to abatement and involves households converting to more pastoral, more nomadic modes of existence" (1989: 171). Those advocating this model should consider whether they mean actually to advocate a major turn to pastoralism in the wake of the fall of the Roman Empire (or the collapse of the Classic Maya, or most other cases of collapse). Regarding the later Roman Empire and later antiquity, however, there is no question that sedentary occupation and agriculture had been the rule for more than two and a half millennia, and continued as the dominant subsistence pattern. Thus the original conception of the term abatement seems much more compatible with collapse than it does with continuity or transformation. After all, what *does* happen in major abatements? It is likely that large numbers of small farmers at best struggle and at worst starve, leading to demographic decline. LaBianca cited the problems associated with food shortages and epidemics (1989).

Advocates of the new terminology argue that intensification is not a process that occurs only in times of prosperity and that abatement is a normal part of agricultural exploitation, comparable to letting land sit fallow in slash-and-burn agriculture. The point is that LaBianca's description of abatement (1989) is not at all as benign as the equivalent of merely letting some land lie fallow. Some also further argue that the "declines" in urban and rural residential patterns in late antiquity should be understood as the normal ins and outs, and ups and downs of the cycles of intensification and abatement of agricultural exploitation (Horden and Purcell 2000: 263–266). But in the same way that the term "economic downturn" is a euphemistic characterization of those times when many people get really hurt, this whole argument about whether or not terms are too negative or not seems misguided.

One lesson to be drawn about using intensification and abatement as the preferred terms is that most complex societies have gone through cycles during their periods of *floruit*. A friendly amendment to the resilience theory dynamic is presented in Fig. 5 (for the Romans) and Fig. 6 for the Maya. Instead of the round and smooth ovals of the original in Figs. 2 and 3, the revised figures show a circular profile with many jagged edges. The trajectories of complex civilizations are messy. Differing and random-shaped "perturbations" can interfere with a smooth transition from one state to the next. Civilizations are full of ups and downs, and ins and outs; their trajectories are a mosaic of micro- and macro-variations that indicate that at any one time, one part of the system may be prospering while another part is struggling with challenges, or caught in stasis.

One can accept that the terms intensification and abatement can be used to describe this mosaic, or bumpy pattern. However, there comes a time when the situation does not return to an equilibrium that is on the steady course of the oval of the resilience cycle – the socio-political system in place is not confirmed. It is better to call it a collapse, when basically there is no reversal of the abatement. The original use of intensification intended to describe a revolutionary transformation of major subsistence patterns – agriculture is adopted (intensification) and then there is a return to nomadism (abatement). Perhaps the major transformation does not have to be as radical as the abandonment of agriculture (that did not happen with the collapse of the Roman Empire or the Maya), but the key is that change is radical and the existing system is "abated" out of existence. Regeneration may be rapid and produce a culture

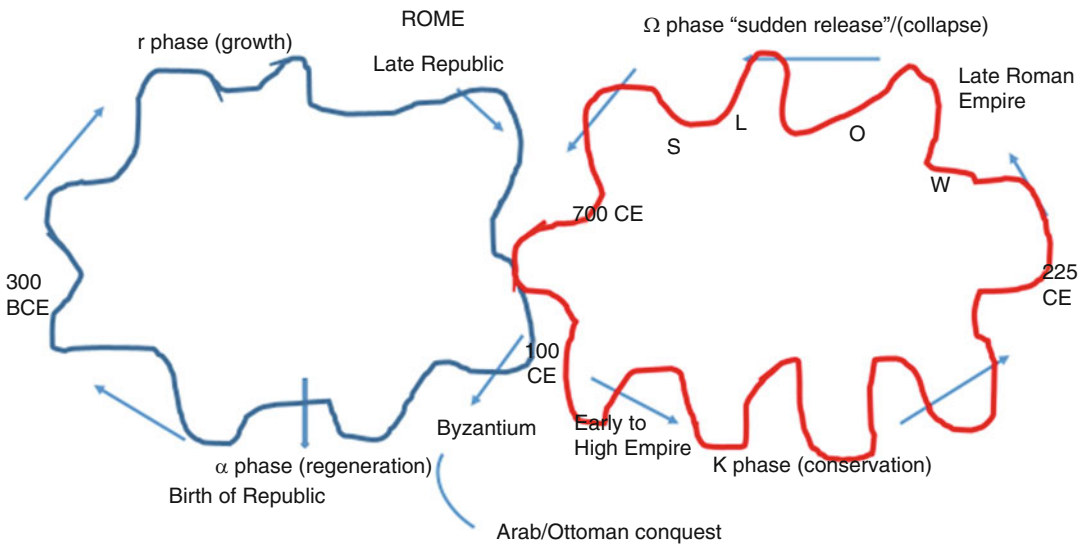

The Collapse of Complex Societies, Fig. 5 Revised resilience cycle for the Roman Empire. (Drawing by G. Storey)

similar to its predecessor (resilience), but there has been a major ending with a new beginning. A collapse has taken place. If one defines intensification and abatement as analogous to the bumps in Figs. 5 and 6, that may be acceptable. But the attempt to provide a replacement to the terms generally employed is like chasing the proverbial chimaera. People simply must explain what they mean by their use of terms clarifying the positive and negative implications.

Perhaps due to the common Romanist rejection of the previously accepted decline and fall from Edward Gibbon, a new hostility towards collapse has begun to appear in archaeology (see especially *Questioning Collapse*, McAnany and Yoffee editors, 2010a). Many scholars focus on human resilience, especially as illustrated by the survivorship of peoples, and the fact that people and cultures do not completely disappear (something acknowledged by virtually all collapse investigators). Some argue that there is too much focus on successes or failures of past societies (a much-expressed criticism of Diamond 2005). Furthermore, in accordance with modern anthropological post-colonial criticism, many correctly point out that the effects of colonialism have been underestimated in some cases of collapse. Lastly, cases of collapse have involved peoples who have been subjected to glaring inequalities, due to racism and prejudice. It has also been suggested that collapse is a bankrupt concept because it suggests the total disappearance of peoples and cultures, in a manner inappropriately analogous to biological extinction (McAnany and Yoffee 2010b). However, virtually no collapse specialist, not even Diamond (2005), can be fairly accused of advocating that version of collapse. Some investigators are also hostile to explanations that blame rulers and societies for ecological problems. That is a reasonable view, except that, as previously noted, it must be acknowledged that elites have played major roles in exacerbating the "perturbations" that affect complex societies, weakening a society's ability to cope with problems when they arise.

Our review of terminology brought up many of the issues related to collapse that have influenced the debate on the case of the collapse of the Roman Empire. It is appropriate to examine another famous case, the Classic Maya Collapse, which is still a focus of research and discussion. Perhaps the best thing that may have come out of all the hype over the ending of the Long Count calendar in December 2012 was that probably more members of the general public have become aware that the Maya did not disappear

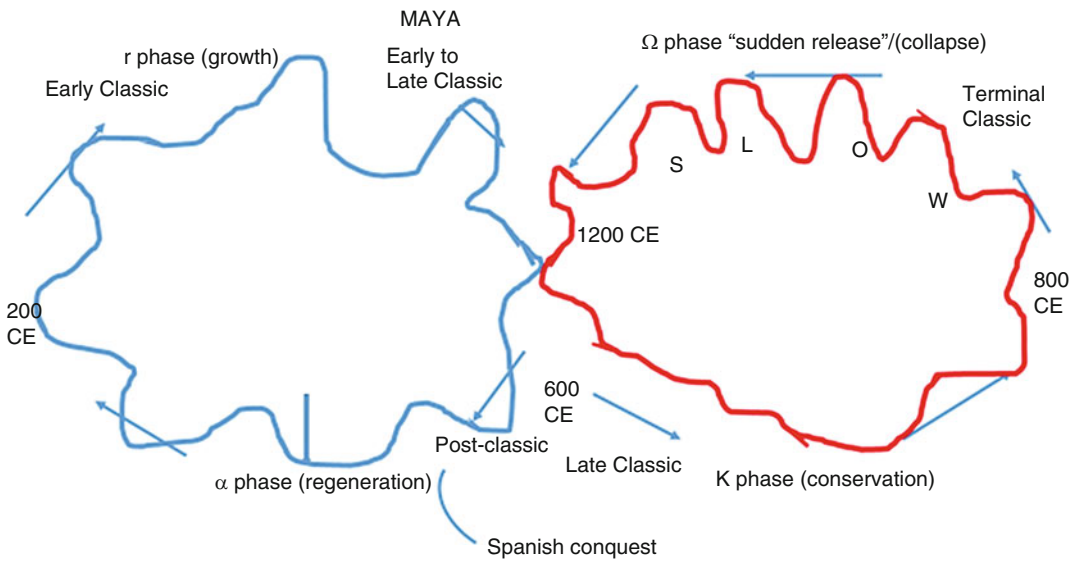

The Collapse of Complex Societies, Fig. 6 Revised resilience cycle for the Classic Maya. (Drawing by G. Storey)

with the Collapse, as seemed to have been a widely held misapprehension. Nevertheless, the "mystique of the Maya" has been driven by their failure to maintain their civilization, which has left some of the most atmospheric ruins known from the ancient world (Fig. 7). The Late Preclassic and Classic Maya are the ones that left the most impressive remains, while the Postclassic remains are not as well-appreciated because those sites were relatively smaller or had been largely swallowed up by the Spanish during the Colonial Period.

As we enter the second decade of the twenty-first century, however, certain aspects of the Collapse – especially that is now frequently placed in quotes as "Collapse," to flag that it might not have really happened – seem to have become clearer. Most importantly, it "presents a very complicated, messy problem, rather than a nice, neat, sudden, and uniform cultural catastrophe" (Webster 2002: 216). In order to make the Maya Collapse clearer, it is useful to briefly review what features define the Classic Maya. Maya civilization had both a lowland and a highland component. The lowland component, the focus here and in most discussions of the Collapse, covers the Petén region of Guatemala, the Yucatan Peninsula, Belize, western Honduras, and parts of El Salvador, constituting the central core during the Classic Period (circa 250–1000 CE). The largest and most elaborate centers and densest populations were found here and these were the polities that collapsed.

The apogee of Classic Maya civilization occurred during the Late Classic period (circa 600–900 CE). The territory of the Maya was covered with numerous centers; some were very large and imposing, and there were many smaller centers close to the larger ones, resulting in a dense population of house mounds and plazas for the residences of the farmers in between the centers. Divine kings or their appointed governors and allied nobles ruled the centers, dominating a large population of farmers and retainers. The latter constituted probably no less than 80% of the entire population, much like other agrarian civilizations of the ancient world (Webster 2002). The elites commissioned sculpture and inscriptions, decorating the centers with dynastic lists, important life events, rituals, and war exploits of rulers. They used the Long Count Calendar to correlate their cosmological concepts and the rulers themselves to human affairs. The Long Count counted days since a mythical creation date (known to be a day in August of the third millennium BCE), inasmuch as the Long Count Dates have long been translatable into the month,

The Collapse of Complex Societies, Fig. 7 Partial view of the Great Plaza of Tikal, one of the largest of the Classic Maya centers. Temple 2 is in the center with the stelas and North Acropolis buildings to the left. (Photo by R. Storey)

day, and year of the Gregorian calendar (Morley 1915). The Long Count was one of the most distinctive features of the Classic Maya. The imagery of royal and courtly life, with its associated elaboration of temples, palaces, fine pottery, and ornaments in exotic materials, such as jade and marine shell, constituted the Maya "Great Tradition" that is so admired today. Despite possessing large population centers, Classic Maya society was never politically unified. Similarly to the Greek city-states, each center and its ruling dynasty had autonomy and its own history in its immediate territory (Nichols and Charlton 1997).

In the eighth century CE, the number of dated monuments reached its maximum and then stopped abruptly at various Maya centers, a process that took place in the ninth and continued into the tenth century. This cessation of the centers was very discontinuous; some centers disappeared early while others hung on for a couple of centuries more (Webster 2002). So variable and drawn out was this process that the entire period is now called the Terminal Classic (circa 800–1050 CE), varying in length depending on which parts of the lowlands were involved. The basic pattern entailed a beginning in the western lowlands and from there diffusing into the southern, central, and eastern lowlands of Mexico, Guatemala, Belize, and Honduras; some sites in each area survived for a time, bucking the overall pattern. In the end, many sites of the inland northern Yucatan peninsula were the last to become prominent and then, in their turn, were abandoned in the tenth and eleventh centuries (Storey and Storey 2017). There is evidence of population movement into surviving areas, but as yet, those indications are insufficient to account for the population of several million, now known to be present during the Late Classic, as mostly moving into new areas (Storey and Storey 2017). The main casualties of the collapse were the population, which decreased dramatically, and the type of rulership, "the Holy Lords," and the way it had been represented on buildings, monuments, and on other media during the Classic Period.

The Maya did not disappear completely, and there were rulers and a noble class of elites when the Spanish arrived; there were even a few sites remaining in what had been the Classic period "heartland." However, no longer were those sites festooned with stelae detailing the history of the dominant rulers and their ritual concerns and other art forms commissioned by them. The Long Count was all but gone, and calendrical information was much shorter with a shallow time depth. Generic depictions of deities and warfare, plus less personalized records of power holders (even possibly some forms of corporate governance) seem to have become the rule. The abandonment of both major and minor centers, including their supporting commoner populations, proceeded in tandem with this cultural shift. The region remained mostly vacant until only the past couple of hundred years. The Postclassic Maya (twelfth to sixteenth centuries) occupied mostly the Yucatan and Belize coasts and along a couple of major rivers, in seemingly smaller and more compact settlements than what had been in the "heartland" of the Classic Maya.

Of course, the modern Maya are still with us, and they represent a vital regeneration of Maya lifeways, but their recent lifeways are distinct from those of the ancient Classic Maya. Among Mayanists, there is some focus on the peoples who are alive today who survived the supposed collapse of their ancient forbears. Some Mayanists come close to asserting that use of the concept of collapse is ethnocentric, prejudicial, and detrimental to the living remnant peoples of the cultures in question. Somehow, it hurts a people's self-esteem to accuse their ancestors of having "collapsed." That argument is very unsatisfactory, and there is one counter-example that should put it to rest: the Romans. For peoples who have faced racism and exploitation by Europeans, such as the Maya, their descendants must be defended from the charge of a collapse – as if such a charge demeans them. No such argument is made for the Italians, probably because they too became a colonial people, long after their Roman Empire collapsed. There is no need to defend Italians from the negative connotations of the collapse of the Roman Empire. The message is unpleasantly clear: the Romans were first world exploiters for their time, as were their descendants in their time, and therefore not worthy of defense as a people who should be cherished and protected, and as victims of colonialism. There is something of a double-standard at work here.

In agreement with numerous other scholars, we think that neither the end of the Roman Empire nor the end of the Classic Maya polities were a "transition," nor that the question is about optimistic or pessimistic views of cultural evolution, as many in the debate claim (Storey and Storey 2017 *passim*). Change is the most basic fact of evolution, both biological and cultural, and all changes can be considered "transitions." However, transitions in cultural evolution are rarely neutral; many are quite dramatic, even destructive, and it is the ones sufficiently destructive so as to disrupt established lifeways to the point of diminishing the number of humans in the group – it is these changes that are often characterized as collapses. McNeill (2010) points out that there is often an element of arbitrariness in the choice of examples of societal collapse. It is reasonable to summarize that one is dealing with a collapse when lifeways change extensively and many people die.

Anthropologists who accept that critical cultural relativism is relevant to the study of ancient civilization must face the reality of massive loss of human life that collapses seem to have entailed. Collapse per se is not a moral issue. An institutional edifice collapses and loses energy production and consumption. It is not a moral failure; it is not a "bad thing," with the members of a culture being culpably responsible. But it is possible to assign blame for the mistakes made by individual agents, usually elites and rulers in control. Their mistakes are highlighted because their errors weakened the structure, not because they themselves were evil or perverted. It should be pointed out that current study of many collapses have found that environmental/climatological issues are of greater significance than may have been appreciated in the past (Storey and Storey 2017: 167–203; Johnson 2017: 189–210), thus diminishing the responsibility of agents, except to lament that their responses to the crises were

inadequate – an obvious lesson from which modern policy makers might well profit.

As a final illustration, long-term research programs in Precolumbian Mesoamerica, on societies that, in essence, collapsed, are relevant. One program involves the earliest mega-city in Mexico, Teotihuacan, the home of the pyramids just north of Mexico City, which probably had a population of 80,000–150,000 at its peak (Middleton 2017). Teotihuacan was the most powerful state during its heyday (circa AD 1-600/650), whose influence was felt all the way to the Maya area of the Yucatan Peninsula and Guatemala. The typical residence was an apartment compound of 60–100 people. Only a few of the probable 2,000 that were present have been excavated. Widmer and Storey (2017) excavated the apartment compound Tlajinga 33, a lower-status residence of full-time craft specialists. Consideration of the integration of this residence into the market economy of the city plus the health and diet available to these individuals within the urban environment have been major features of that research program (Widmer and Storey 2017). The status and health of these residents, although not their diet, seem to have deteriorated during the 300-year occupation of the compound. That stark reality indicates that Teotihuacan society was almost certainly on a downward trend, with increasing competition from nearby societies, when it became a probable victim of what is called the 536 AD event (Dull et al. 2010). This was probably the eruption of the volcano Ilopango in El Salvador, which affected global climate and many other civilizations (including Rome and China). Around that time, the ceremonial/political center of the city was burned, and the area abandoned soon after. However, by then Tlajinga 33 had probably already been abandoned for 30–50 years (Storey 2006). A recent survey has found the multiple probable causes, including climate change, environmental limits to food produced, the competition from rising nearby centers, and political conflict and revolt within the city (Middleton 2017).What happened and why it was not sustainable is the big question. That this was a collapse and not a mere transition seems undeniable, although the area continued to be a large settlement without the earlier urban character until the time of the Spanish Conquest.

In the end, the study of cultural collapse functions as a proxy for the evaluation of the anthropological concept of the state. The state is as old as the first primary civilizations, and then there were secondary and tertiary civilizations and states, virtually all of which have passed on as noted previously. Most early states were city-states, but neither city-states nor ancient nor subsequent modern nation states have been permanent. So, the continuation of modern nation-states is not an assured fact. Almost all ancient civilizations have long ago transformed themselves into entirely new entities, if generally continuing as state-level societies. That impermanence alone may account for the continued interest in the question of cultural collapse. The debate continues because nearly all state-level power holders must wonder how long state-level societies can last. Is collapse the fate of all complex cultures? That is the real question facing all state-level societies, which are the only alternatives in the modern world. To summarize: the current consensus is that collapse is a complex phenomenon, involving a variety of factors and reflecting particular historical circumstances. A recent book by archaeologist Guy Middleton (2017: 365) reiterates that there is a complexity of causes but also that there is loss of material and non-material culture, especially that related to rulers and elites, and that people and cultures do continue. Thus, power-holders might worry, but current consensus is that collapse is real – but there is life beyond collapse.

References

Brown, Peter. 1971. *The World of Late Antiquity: From Marcus Aurelius to Muhammed*. London: Thames and Hudson.

Brown, Peter. 2013. *The rise of Western Christendom: Triumph and diversity, A.D. 200–1000*. Tenth Anniversary Revised Edition. Malden: Wiley-Blackwell.

Caldararo, Niccolo. 2004. *Sustainability, human ecology, and the collapse of complex societies: Economic anthropology and a 21st century adaptation*. Lewistown: The Edwin Mellen Press.

Cameron, Averil. 2011. *The Mediterranean world in late antiquity: AD 395–700*. 2nd ed. New York: Routledge.

Costanza, Robert, Lisa J. Graumlich, and Will Steffen. 2007. Sustainability or collapse: Lessons from integrating the history of humans and the rest of nature. In *Sustainability or collapse? An integrated history and future of people on earth*, ed. R. Costanza, L. Graumlich, and W. Steffen, 3–17. Cambridge, MA: MIT Press.

Dean, Jeffrey S. 2000. Complexity theory and sociocultural change in the American Southwest. In *The way the wind blows: Climate, history, and human action*, ed. Roderick J. McIntosh, Joseph A. Tainter, and Susan Keech McIntosh, 89–118. New York: Columbia University Press.

Diamond, Jared. 2005. *Collapse: How societies choose to fail or succeed*. New York: Penguin Books.

Dull, R., J.R. Southron, S. Kutterolf, A. Freundt, D. Wahl, and P. Sheets. 2010. Did the TBJ Ilopango eruption cause the A.D. 536 event? *American Geophysical Union Fall Meeting* 2010, Abstract # V13C-2370. http://adsabs.harvard.edu/abs/2010AGUFM.V13C2370D. Accessed 26 May 2011.

Dunbar, Robert B. 2000. Climate variability during the Holocene: An update. In *The way the wind blows: Climate, history, and human action*, ed. Roderick J. McIntosh, Joseph A. Tainter, and Susan Keech McIntosh, 45–88. New York: Columbia University Press.

Fagan, Brian M. 2004. *The long summer: How climate changed civilization*. New York: Basic Books.

Faulseit, Ronald K. 2016. Collapse, resilience, and transformation in complex societies: Modeling trends and understanding diversity. In *Beyond collapse*, Center for archaeological investigations, occasional paper no. 24, ed. Ronald K. Faulseit, 3–26. Carbondale: Southern Illinois University Press.

Fisher, Christopher T., J. Brett Hill, and Gary M. Feinman. 2009. *The archaeology of environmental change: Socionatural legacies of degradation and resilience*. Tucson: University of Arizona Press.

Gunderson, L.H., and C.S. Holling. 2002. *Panarchy: Understanding transformations in human and natural systems*. Washington, DC: Island Press.

Hill, J. Brett, Christopher T. Fisher, and Gary M. Feinman. 2009. The socionatural connection: Closing comments. In *The archaeology of environmental change: Socionatural legacies of degradation and resilience*, ed. Christopher T. Fisher, J. Brett Hill, and Gary M. Feinman, 249–258. Tucson: The University of Arizona Press.

Horden, P. and N. Purcell. 2000. *The corrupting sea: A study of Mediterranean history*. Malden: Blackwell Publishing.

Iannone, Gyles. 2014. Introduction: Resilience, vulnerability, and the study of socioecological dynamics. In *The great Maya droughts in cultural context*, ed. Gyles Iannone, 1–19. Boulder: The University of Colorado Press.

Jacques, Peter. 2015. *Sustainability: The basics*. New York: Routledge.

Johnson, Scott A.J. 2017. *Why did ancient civilizations fail?* New York: Routledge.

LaBianca, Øystein Sakala. 1989. Intensification of the food system in central Transjordan during the Ammonite period. *Andrews University Seminary Studies* 27: 169–178.

Ljungqvist, F. C. 2010. A new reconstruction of temperature variability in the extra-tropical Northern Hemisphere during the last two millennia. *Geografiska Annaler: Physical Geography* 92A:339–351.

McAnany, Patricia A., and Norman Yoffee. 2010a. *Questioning collapse: Human resilience, ecological vulnerability and the aftermath of empire*. New York: Cambridge University Press.

McAnany, Patricia A., and Norman Yoffee. 2010b. Questioning how different societies respond to crises. *Nature* 464: 977.

McIntosh, Roderick J., Joseph A. Tainter, and Susan Keech McIntosh, eds. 2000. *The way the wind blows: Climate, history, and human action*. New York: Columbia University Press.

McNeill, J.R. 2010. Sustainable survival. In *Questioning collapse: Human resilience, ecological vulnerability and the aftermath of empire*, ed. Patricia A. McAnany and Norman Yoffee, 355–366. New York: Cambridge University Press.

Middleton, Guy D. 2012. Nothing lasts forever: Environmental discourses on the collapse of past societies. *Journal of Archaeological Research* 20: 257–307.

Middleton, Guy D. 2017. *Understanding collapse: Ancient history and modern myths*. Cambridge: Cambridge University Press.

Morley, Sylvanus G. 1915. *An introduction to the study of Maya hieroglyphs*, Bulletin 57, Bureau of American Ethnology, Smithsonian Institution. Washington, DC: Government Printing Office.

Nichols, Deborah L., and Thomas H. Charlton, eds. 1997. *The archaeology of city-states: Cross-cultural approaches*. Washington, DC: Smithsonian Institution Press.

Redman, Charles L. 2005. Resilience theory in archaeology. *American Anthropologist* 107: 70–77.

Redman, Charles L., Steven R. James, Paul R. Fish, and J. Daniel Rogers. 2004. *The archaeology of global change: The impact of humans on their environment*. Washington, DC: Smithsonian Books.

Renfrew, Colin. 1984. *Social archaeology*. Cambridge: Harvard University Press.

Rogers, Adam. 2011. *Late Roman towns in Britain: Rethinking change and decline*. New York: Cambridge University Press.

Sandweiss, Daniel H., and Jeffrey Quilter. 2008. *El Niño, catastrophism, and culture change in ancient America*. Washington, DC: Dumbarton Oaks Research Library.

Schwartz, Glenn. 2006. From collapse to regeneration. In *After collapse: The regeneration of complex societies*, ed. Glenn M. Schwartz and John J. Nichols, 3–17. Tucson: University of Arizona Press.

Schwartz, Glenn, and John J. Nichols. 2006. *After collapse: The regeneration of complex societies*. Tucson: University of Arizona Press.

Sheets, Payson. 2008. Armageddon to the Garden of Eden: Explosive volcanic eruptions and societal resilience in ancient Middle America. In *El Niño, catastrophism, and culture change in ancient*

America, ed. Daniel H. Sandweiss and Jeffrey Quilter, 167–186. Washington, DC: Dumbarton Oaks Research Library.
Storey, Rebecca. 2006. Mortality through time in an impoverished residence of the Precolumbian city of Teotihuacan: A paleodemographic view. In *Urbanism in the preindustrial world*, ed. G.R. Storey, 277–294. Tuscaloosa: The University of Alabama Press.
Storey, Rebecca, and Glenn R. Storey. 2017. *Rome and the classic Maya: Comparing the slow collapse of civilizations*. New York: Routledge.
Tainter, Joseph A. 1988. *The collapse of complex societies*. Cambridge: Cambridge University Press.
Tainter, Joseph A. 2016. Why collapse is so difficult to understand. In *Beyond collapse*, Center for archaeological investigations, occasional paper no. 24, ed. Ronald K. Faulseit, 27–39. Carbondale: Southern Illinois University Press.
Ward-Perkins, Bryan. 2005. *The fall of Rome and the end of civilization*. Oxford: Oxford University Press.
Webster, David. 2002. *Fall of the ancient Maya: Solving the mystery of the Maya collapse*. London: Thames and Hudson.
Whittow, Mark. 2001. Was gibbon politically incorrect, or just wrong? in recent research in late antique Urbanism, edited by Luke Lavan, Journal of Roman Archaeology Supplementary Series Number 42. Portsmouth: Journal of Roman Archaeology pp. 241–243.
Widmer, Randolph J., and Rebecca Storey. 2017. Skeletal health and patterns of animal food consumption at S3W1:33 (Tlajinga 33), Teotihuacan. In *Feeding Teotihuacan*, ed. Nawa Sugiyama and Andrew Somerville. *Journal of Archaeological and Anthropological Sciences* 9: 51–60.
Yoffee, Norman, and George L. Cowgill, eds. 1988. *The collapse of ancient states and civilizations*. Tucson: University of Arizona Press.

Colombia, Historical Archaeology of

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State of Knowledge and Current Debates

In Colombia, the history of historical archaeology cannot be understood without the relationships of this branch of archaeology with traditional archaeology. Obviously, defining what is "traditional" is not an easy task, but for the argumentative purposes of this essay, we can understand by "traditional" a practice of archaeology focused on the archaeological record of pre-Hispanic societies; such descriptions, as has been documented extensively (see Gnecco 1999), were made from the perspective of a historical-cultural archaeology, as was the case for most Latin American archaeologies. Though this may be surprising for many academics, unlike Central or Western Europe, archaeology in Latin America was always configured as a science that worked with the other, with alterity. As it has been described by various academics (Gnecco 1999), this made Colombian archaeology build an ideal other, an ecological and artistic indigenous, who was colonized and buried by the cannibals that were found by the Spaniards.

As in many Latin American countries, archaeology in Colombia was part of a process of institutional development that had to do with dynamics such as the regulation of pre-Columbian trafficking, the updates in educational reforms of a liberal nature, as well as the need to generate national narratives where indigenous people could be connected with a collective story (Gnecco and Ayala 2016). Thus, starting in the 1940s, which is the moment when the first archaeological excavations began to be financed by the Colombian State, archaeology is considered to be, solely and exclusively, an exercise in the registration and exhibition of pre-Hispanic materialities (Gnecco 1999). Under this premise, an account of the pre-Hispanic history of Colombian territory began to be considered, which implied fitting the stories of the conquistadores and chroniclers with archaeological materialities. From this equation there emerged the pre-Hispanic cultural map that until now is used by some archaeologists and is a basic piece in teaching History in Colombian schools. Likewise, this cultural map has allowed the construction of the network of gold museums of the Banco de la República, which indicates the power of this imaginary. As a result of these determinations, during most of the late nineteenth and early twentieth centuries, hundreds of

colonial sites were simply destroyed or ignored, because it was thought that their scientific value was null. That implied that the architectural reforms carried out after the end of WWII, an era in which great changes occurred in Latin America as a result of the integration policies of the region to the project of economic expansion of the United States in the 1950s, aimed to construct modern buildings on colonial buildings. It was under this policy that many historic centers were intervened, destroying large infrastructure works whose scientific and cultural value was inestimable. Of that policy of colonial footprints' eradication, which was not made to strengthen an anti-colonial or Creole identity, but was made to give way to architectural modernism, few colonial buildings were saved, and others, after conservation policies were applied after from the 1980s, managed to preserve their facades (see Campo and Padilla 2014).

In the same way, Colombia's first schools of archaeology, affiliated to the projects of ethnological institutes, sought to provide students with tools to find the vestiges of the tribes that had been described by the Spaniards as powerful and numerous. The consequence of this educational policy was that archaeologists trained themselves only to look for large infrastructure works such as villages and roads or great manifestations of wealth such as the search for sites with high precious metalsmithing contents. Even the famous French anthropologist Paul Rivet, who came to collaborate with the foundation of the National Ethnological Institute in 1941, complained several times that in Colombia only what was pre-Columbian was considered and that the authorities did not see anything relevant in the ethnological findings that were made, as the verification of the existence of linguistic horizons that related the indigenous communities of Colombia, with similar ones of Ecuador, Venezuela, Panama, and Costa Rica. In any case, what Rivet pointed out in his correspondence with other academics in Europe was that for the Colombian government only the monumental archaeological findings mattered (cf. Laurière 2008: 495).

This predilection for the pre-Hispanic made that, once and without applying hypothetical models to be evaluated by means of the archaeological record, Colombian archaeologists saw manifestations of social complexity with only a few scattered features such as certain funerary trousseaux with goldsmithing or village systems interconnected by road networks (Gnecco 1996). In fact, this predisposition toward the pre-Hispanic caused archaeologists to locate colonial findings as anomalies or alterations of original pre-Hispanic sites. What did that mean? That if the archaeologist found European pottery or pottery made around, or bathed in pewter, he would immediately think that it was necessary to decontaminate these sites in order to record only the pre-Hispanic occupation. This policy of handling the archaeological record that we could call the policy of archaeological purification generated, consequently, apathy for colonial material culture. This recurrent situation led to the period of the conquest being thought of as a process of population change where the Iberian culture replaced the indigenous culture and where archaeology was unnecessary because of the amount of written documentation that allowed, diaphanously, making a portrait of colonial and republican history at the present. Due to this policy, Colombian archaeologists were shielded from the possibility of understanding the dynamics of the conquest and the colony as a stage of negotiations, resistance, and exchanges susceptible to being evaluated through the archaeological record.

Regarding the predisposition to review only the pre-Hispanic sites, there are several cases that deserve a comment. In the 1950s, archaeologist Julio Cesar Cubillos (1959) excavated a site located in the urban area of Popayán, a city with important colonial remains located in a valley between the Andes and the Pacific Coast, in southwestern Colombia (Londoño 2011). In his report, Cubillos focused on the pre-Hispanic aspects of the site in such a way that the article he published in the famous Colombian Journal of Anthropology was entitled "*El Morro de Tulcán* (Pre-Hispanic Pyramid)." Analyzing that report, Cubillos states that it is an investigation requested by Popayán local council because the rains exposed the adobe structures that make up the pyramid. When making the classification of pre-Hispanic ceramics, using as features the shapes and decorations, Julio Cesar Cubillos culminates the ceramic typology he

presents with a list of "miscellaneous" where he describes some colonial earthenware and a colonial coin (Cubillos 1959: 279). At the end of his article, he presents a photograph of a colonial *botija* (earthenware pitcher), an artifact of Mediterranean origin common in America where olive oil and wine were packed, which was imported into America; these artifacts began to be manufactured in America in several places at those times (Rice 2010), but there is no clear consensus on the first places of origin up to the present. Without paying much attention to what kind of object it was, Julio Cesar Cubillos fulfilled the task of reporting it by means of a photo with the simple title of "fusiform amphora" (Cubillos 1959: Plate XVIII). Subsequent investigations carried out by Wilhelm Londoño (2011) made it clear that it was a *botija* eventually produced in the valleys of Moquegua in the eighteenth century and it was probably used to transport wine or grape brandy (*pisco*) to Popayán along the route that connected the ports of Callao (present Perú) with Buenaventura (on the current Colombian Pacific coast) (Londoño 2011). A peculiar fact is that the current cities of Popayán, in the Colombian Andes, and Lima, current capital of Peru, were connected by sea and not by land, and the connection was achieved because people in Popayán needed to import supplies to celebrate the Catholic Mass. It should not be surprising that the main and most needed product was wine (Londoño 2011).

In general terms, Colombian archaeology, in its beginnings, was a historical-cultural practice (Trigger 1989) that sought to rescue and exhibit vestiges, especially goldsmith objects of the powerful tribes that inhabited the territory of Colombia before the arrival of the Spaniards. As it has been diagnosed by different archaeologists, archaeology in Colombia was, until the 1990s, a practice of recollecting artifacts to enrich the showcases of institutions such as the Banco de la República and its museum network or the National Museum, ignoring completely what the native communities had to say about those materialities (Londoño 2012).

From its institutionalization from the 1940s to the 1990s, the practice of archaeology in Colombia was predominantly acritical, based on the premise that archaeologists should collect whatever data was at hand and then make a synthesis. In this sense, Colombian archaeology was captive of the prison of induction, a characteristic of cultural historical archaeology (Clarke 2014). The 1990s mark a rupture with this model because a series of reforms in the practice of archaeology began in the country, due to the initiative of several academics, including two Colombian archaeologists of great importance: Carl Langebaek and Cristóbal Gnecco. In the case of Langebaek, his contribution to Colombian archaeology was through the application of processual models to understand the resources' dynamics of centralization and redistribution in Bogotá savannah's chiefdoms (Langebaek 1995). For the first time, the idea of a given social complexity was questioned, and models were constructed to evaluate phenomena such as the relationships between settlement patterns and control of fertile lands. In the case of Gnecco, his work consisted in understanding the population dynamics related to the early settlement of southwestern Colombia (Gnecco 2000). Gnecco, applying processual theories of early settlement, succeeded in identifying patterns of consumption that showed communities that were not mere hunter gatherers but were active agents in the construction of orchards or gardens that supplied these populations certain nourishment. For Langebaek, it was clear that political power did not reside in the control of resources, and Gnecco showed evidence that the bands that early occupied southwestern Colombia were not only collectors but had vegetable management. Since the evidence that Gnecco provided were not meant to speak of agricultural systems but of manipulation of the environment, these communities were understood as being located in the middle between collectors and farmers. What is interesting here is that these two archaeologists were responsible for training a generation, in the 1990s, who could not simply ignore certain materialities such as colonial ceramics. Gnecco located in Popayán and Langebaek in Bogotá were responsible for the courses taken by much of the Colombian archaeology that led, for the first time for more than half a century, to lecture ceramic classification or

ceramic typologies in Colombian universities. Within this context, some ideas emerged that were soon taken seriously by Colombian archaeologists. One author who had a special emphasis on sensitizing scholars to the complexities of classification was Robert Dunnell (2002). As specified in Dunnell's work, typologies are the result of the choice of attributes that define the types. Consequently, classifying was not to fit ceramic types with ethnic groups; on the contrary, it involved conscious operations of choosing attributes that had temporal, spatial, or cultural senses that would allow archaeological inferences to be made. Dunnell's ideas were quickly accepted by various archaeologists (i.e., Londoño 2011) who quickly began to notice that certain pre-Hispanic techniques prevailed in the colony, in certain objects whose elaboration was the result of the fusion of peninsular with indigenous techniques.

Within this atmosphere of academic criticism, archaeology began to be questioned. In fact, despite the fact that in the United States in the 1960s the need for the establishment of the hypothetical deductive model had been discussed (Watson et al. 1971), it was only in the 1990s, in Colombia, that archaeologists began to discuss the need to abandon the descriptive paradigms to start thinking about the complexity of archaeological data construction.

In reviewing the information provided above, it is clear that the beginnings of historical archaeology in Colombia are related to epistemological changes that made the need to investigate colonial dynamics from the point of view of the archaeological record visible to various scholars. In this sense, the beginnings of historical archaeology are not directly related to the need to evaluate the complexities of the conquest and the colony but as the result of understanding materialities that repeatedly emerged in the excavations and were rejected or ignored by academics.

Within this epistemological effervescence, several researchers began to think very seriously about the ceramic classifications of the archaeological sites. It was in this way that it was possible to appreciate that the first archaeologists did not account for the ceramics that were purely colonial, because this would not make their site be considered pre-Hispanic. In addition to Julio Cubillos' anecdote mentioned before, in the 1960s the famous archaeologist John Goggin (1968) reported that the Colombian nationalized archaeologist, Gerardo Reichel-Dolmatoff, had offered him fragments of colonial pottery that he recognized as coming from an archaeological site in the center of Cartagena de Indias. The strange thing about Reichel-Dolmatoff is that, being one of the archaeologists that excavated most of the sites in Colombia, at that time, he did not officially register any colonial site.

This emphasis in thinking the dynamics of artifact classification in archaeology was the cause that, in the mid-1990s, many archaeologists began to look at certain types of ceramics that could be clearly classified as colonial. Within this awakening of historical archaeology, there were, at least, three main tendencies that can be distinguished for the Colombian case: (1) A trend of archaeology that focused on the investigation of the indigenous practices' permanence in colonial towns (Therrien 1996), as well as resistance practices in Afro-descendant communities (Mantilla 2007). Within this line of work, practices were registered through which the new pottery techniques brought by the Spaniards were used to manufacture objects with pre-Hispanic forms (Loboguerrero 2001). (2) Likewise, a large amount of imported materials was detected, and ceramic consumption patterns could be observed that indicated strategies of distinction between the colonial elites (Uprimny 2001) and republican elites (Gaitán 2001; Gaitán and Loboguerrero 2015). (3) Finally, a large amount of work emerged on old houses that were being remodeled in the framework of the gentrification processes that took place in cities such as Popayán, Bogotá, Villa de Leyva, Santa Marta, and Cartagena (Therrien 1999a; Therrien 1999b; Ome 2006; Campo and Padilla 2014).

In reviewing the consolidation of an archaeological agenda that investigates the colonial archaeological record, it is clear that its constitution was due to the internal debate of epistemological order, that is, by the review of disciplinary procedures such as the classification of materials, also by the pressure exerted by the laws of patrimony that exhorted to make archaeological management plans in the colonial buildings that were remodeled

within the intervention policies framework of historical centers.

At the beginning of the 2000s, the practice of historical archaeology was consolidated through the appearance of catalogues of colonial ceramics such as the one published by the Banco de la República in 2002 (Therrien et al. 2002), made to facilitate the identification of colonial materials in the Altiplano Cundiboyacense (high plateau) and the Colombian Caribbean. It is interesting to note that this exercise in the generation of catalogues has not occurred with pre-Hispanic ceramics, perhaps for one reason: the colonial and republican artifacts that began to be imported came from factories that were already standardizing production processes. This did not happen with the pre-Hispanic ceramics that were not elaborated following the rigor of the exact replica, since to a certain extent each object was unique.

Within this historical archaeology boom in Colombia, which occurs between the 1990s and 2000s, the contribution of Colombian researchers to understanding the complexities of the colony is clear and evident. The colonial process, as indicated by the archaeological record analyzed, was not a process of population replacement but, on the contrary, involved negotiation processes that occurred within the framework of the native populations' subordination to the colonial regime. In addition to this conclusion, which seems more a statement of a programmatic agenda, another great conclusion that can be drawn is that historical archaeology, in Colombia, emerged without clear connections with the processes of historical research that had been speaking of the indigenous situation since the ethnohistorical data. In this sense, historical archaeology in Colombia can be understood more as an accident, as the result of a demand, rather than as an agenda that tried to solve key problems such as the processes of miscegenation and the configuration of republican societies. As inferred from a premise put forward by the Colombian archaeologist Carlo Piazzini (2011), in the Colombian academy, the separation between history and prehistory, based on the separation between the written word and orality, made archaeology concentrate on the agraphical past of indigenous societies and history on the written language periods. According to Piazzini, this has meant that archaeology does not turn its eyes to spatialities, others, to the landscapes of alterity, which were named by Michel Foucault as heterotopies (Foucault and Miskowiec 1986).

The end of the 2000s and the beginning of the 2010s mark a rupture with the academic agenda that was set in the 1990s. The implementation of a neoliberal agenda in South America increased investment in infrastructure in such a way that large infrastructure projects arose that demanded preventive archaeology programs (Gnecco and Dias 2017). This has made the practice of archaeology no longer an academic project and, in this critical sense, has become an instrument of capital. Although this seems to be a minor detail, the data produced about the colonial periods are done on demand due to the obligation to form teams that would prevent any type of damage to the archaeological record mainly at the time when real estate assets are intervened. This pressure has led the State to demand preventive archaeology studies in works that affect areas such as seabeds; in this way the pressure for regulatory compliance has made archaeologists in Colombia specialize in registration techniques of underwater archaeology, without using or thinking underwater archaeology to expand the spectrum of possibilities to understand the past. When looking at what Colombian archaeologists write about submerged sites (García and Cairo 2003), there is a clear tendency toward technical and conservation procedures, but little is said about how the submerged record, in this colonial case, could help to understand the dynamics of the conquest and the colony from the point of view of archaeology.

Current Debates

In 2014, the Colombian philosopher Santiago Castro-Gómez published a historical work that investigated the processes of conformation of colonial society in the former Viceroyalty of New Granada, whose capital was the current Bogotá, capital

of Colombia (Castro-Gómez 2004). In that investigation, it was clear that the conformation of the Creole identity had to occur in a double process that united two things or two problems. The first problem was the problem of identity, which was addressed in the academy, in politics, and in religion, and that was resolved by pointing out that America was a new extension of the known world, especially by the people and societies responsible for making explorations from the Mediterranean to the West. The sailors, of course, did not travel alone, and the planning of the routes and the financing were related to the closeness to powerful families, and the proximity of these families to the clergy determined the success of the investments on many levels. It has been well documented how the continental exploration implied an imaginary that allowed the conquest through its ideologies and practices; in this sense the ideological projection of a Western Europe in America, supposed that it was catalogued as new but not unknown. In fact, it was an ancient world too that was not prepared to respond to unknown forces.

As America is a replica of Europe, but new, with the positive and negative things that can be recognized from this adjudication, it was necessary to solve the problem of coexistence with the others, with the existing native populations; that is the second problem. Castro-Gómez explains it clearly: the native populations were analyzed in a system in which these communities remained as the antipode of civilization that, understood as a concept, was that set of principles that allowed defining and justifying the ideological framework of colonial society, and likewise to every identity component, there is an opposite part. In that sense, the segregation of indigenous and Afro-descendant communities in the education systems was justified, so as to mention an example. This generated a characteristic feature of Colombian and Latin American society: the socioeconomic differentiation is equivalent to racial differentiation.

As identity is defined, and as policies of segregation and domination are generated, the spatialities and materialities that gave meaning to social differentiations were shaped. The import of buttons, glasses, jugs, fabrics, lace, wood, and spices supposed a consumption of artifacts that allowed pointing out the differences with the lower classes that in general were indigenous or peasant. However, this segregation never implied the abandonment of indigenous and peasant artifacts and cooking that were considered as regional identity markers (Londoño 2011).

As it can be seen from Castro-Gómez's work, it is clear that the colonial discourse built a negative image of the indigenous that served to exclude indigenous communities from the colonial educational system; under this equation the usurpation of land and the payment of taxes were acts justified as a necessity, and in exchange the colonial state and its agents ensured the indigenous people's evangelization.

Something that must be clarified here is that these forces, these contradictions, these intersections, which allowed the configuration of not only artifacts but also spaces, cities, connections, and infinity of elements susceptible to be analyzed by archaeology.

Walter Mignolo (2016) has described with great clarity how that construction of the other caused the denial of indigenous communities' ontologies and how, through an ideological system in which alterity justified colonization, the colonial society was moving toward the consolidation of a Creole identity. Mignolo explains that Creole identity finally led to what this author calls "the colonial wound." In his opinion, this phenomenon occurs because of the double negation that occurs within the set of ideas that give meaning to the Creole identity. At a first level, the fact that America is not Europe is denied (and the argument that the difference with Europe is simply geographical is configured); on another level, contemporaneity with indigenous communities is denied (and the argument that supposes indigenous communities as things of the past is configured). In addition to this idea and related to the "colonial wound," Mignolo explains that there is another phenomenon: coloniality, understood as the ideology that subordinates others, that is, at the same time that one depends on the other, and the other is needed, the other is invisibilized, oppressed, and exploited. One of the advantages of the concept of coloniality is that it allows us to understand that the subordination and coexistence had generated the colonial landscapes,

understanding with that all the spatiality and materiality that made visible and available the social differences theorized in philosophical, political, academic, and religious discourse.

Although this panorama presented by cultural studies is detailed and opens ways to understand the forms of submission, the emphasis on texts, said by the academic of the colony, what is said in the colonial document, prevents seeing those spaces, those intersections where it is possible to see the crossing, and the detours, the unpredictable situations that are constitutive of a colonial identity in Latin America and the Caribbean (Trouillot 1992). Although it seems unprecedented, some archaeologists have begun to discuss these issues pointing out, from the archaeological record, the limitations of the generalizations that are made from areas such as cultural studies (Londoño 2010). While it is true that from the legal point of view there was segregation, a gentrification, there were areas crossing spaces where other forms of *mestizo* identity were formed that it would be absurd to strictly link to Creole identity models. Colombian sociologist Edgar Rey Sinning has shown (Rey 2000) that the carnival, in the Colombian Caribbean, is the ideological set that expresses, par excellence, the regional values. The carnival, according to his extensive research, which has its roots in the colony, is a *mestizo* expression displayed through allegories and ironies made up of characters that can be distinguished from the colonial amalgam as Spaniards, Indigenous, and Afros. Rey Sinning's work make it possible for historical archaeology to consider analysis pathways such as carnival archaeology, since in these populations there are elements of colonial material culture that are still used by the communities. In this way, it would be possible to evaluate cultural continuities of several centuries combining archaeology, history, and ethnography and showing how the processes of identity construction took other paths in these regions.

Due to this debate, some anthropologists have made significant contributions in the understanding of these heterotopic zones, to use the expression popularized by Foucault (Foucault and Miskowiec 1986). In the case of the city of Popayán, as it was said before, a colonial city of southwestern Colombia, anthropologist Hernán Torres (1999) described how the rituals of Holy Week, which are very popular in the southern Andean region of Colombia, are reversal rites that exalt, only once in the year, the role of the others who usually were and are part of wealthy families' serving staff. Hernán Torres's work complemented North American anthropologist Andrew Hunter Whiteford's observations (Whiteford 1963). In his ethnography of Popayán, he described how in the city center, in families of upper middle class, the residence of the serving staff was on the ground floors, which in the end meant a coexistence of racialized social classes where, despite coexistence, the wealthy classes segregated indigenous and peasants from political and economic, but not cultural spaces.

This strange interaction undoubtedly explains that it is in the Popayán region where one of the most solid indigenous movements in northern South America persists. It would be very risky to say that this relationship is positive or that it shows forms of equality and balance. Under no circumstances, this interaction occurs in the face of a process of territorial dispute in which some indigenous communities have obtained their land's restitution that were inappropriately seized during the colony and the republic.

This cartography of the history of the interactions that take place within the framework of the Creole society could be considered one of the most important debates that have been established in the historical archaeology practiced in Colombia. In this debate, it is clear that archaeology, as a discipline that studies material culture and the archaeological record, can facilitate the understanding of subtle forms of human interaction within the dynamics of colonial regimes that indicate interstices that allow understanding the ideological framework. What is deeply underlined in this argument is the idea that archaeology, with its methods and theories, can help understand how space and material culture are elements of a wider network that allows human beings to perceive the world in certain ways; obviously, this perception is not a consequence of a given reality but the result of an interaction with materialities and spatialities that allow us to experience the differences

as real. In this way, the material world is possible because of the ideological dimensions that give horizons of meaning to societies, and these horizons of meaning are possible because of the materialities that underlie them and give them dimension and depth.

In some senses, Mark Leone (1995) had already suggested something similar by arguing that anthropology, archaeology, and history, by focusing on the understanding of the conformation of capitalism, would probably erase their disciplinary boundaries given the fact that the world capitalism is not only shaped by ideologies but is shaped by ideologies that have spaces, shapes, and dimensions, which are given by materialities and spatialities.

As it can be seen from what has been said here, historical archaeology in Colombia is still a recent practice that is not, up to the present (2018), three decades old. The contributions of the archaeologists who have crossed these paths are relatively few, circumscribed to specific cases and without debates that enable a reflection where it would be possible to develop conceptual or political innovations.

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Contemporary Past, Archaeology of the
- ▶ Industrial Archaeology

References

Campo, Enrique, and Wilfredo Padilla. 2014. *Historia del hospital San Juan de Dios dentro de la dinámica colonial de Santa Marta*. Santa Marta: Colección Autores del Magdalena, Gobernación del Magdalena.

Castro-Gómez, Santiago. 2004. *La Hybris del Punto Cero. Ciencia, Raza e Ilustración en la Nueva Granada (1750–1816)*. Bogotá: Pontificia Universidad Javeriana; Instituto Pensar.

Clarke, David. 2014. *Analytical archaeology*. London: Routledge.

Cubillos, Julio César. 1959. El Morro de Tulcán (pirámide prehispánica). Arqueología de Popayán, Cauca, Colombia. *Revista Colombiana de Antropología* 8 (2): 216–357.

Dunnell, Robert C. 2002. Systematics in prehistory. New Jersey: Blackburn Press.

Foucault, Michel, and Jay Miskowiec. 1986. Of other spaces. *Diacritics* 16 (1): 22–27.

Gaitán, Felipe. 2001. Recordando a los Uribe. Memorias de higiene y de templanza en la Bogotá del Olimpo Radical (1870–1880). *Revista de Antropología y Arqueología* 13, 2001/2002:125–146, Universidad de los Andes.

Gaitán, Felipe, and Jimena Loboguerrero. 2015. Aguas van: casas, cuerpos y modernidad en la Bogotá republicana. *Revista Latino-Americana de Arqueología Histórica* 9 (1): 195–225.

García, María, and Carlos del Cairo. 2003. Patrimonio cultural sumergido en Colombia. In *Patrimonio cultural subacuático*, ed. Víctor Marín, 48–51. La Habana: UNESCO.

Gnecco, Cristóbal. 1996. Reconsideración de la complejidad social del suroccidente colombiano. In *Dos lecturas críticas. Arqueología en Colombia*, ed. Cristóbal Gnecco and Carl Langebaek, 43–74. Bogotá: Banco Popular

Gnecco, Cristóbal. 1999. Sobre el discurso arqueológico en Colombia. *Boletín de antropología.* 13 (30): 147–165.

Gnecco, Cristóbal. 2000. *Ocupación temprana de bosques tropicales de montaña*. Popayán: Universidad del Cauca.

Gnecco, Cristóbal, and Patricia Ayala, eds. 2016. *Indigenous peoples and archaeology in Latin America*. London and New York: Routledge.

Gnecco, Cristóbal, and DIAS, Adriana Schmidt, ed. 2017. Crítica de la razón arqueológica: arqueología de contrato y capitalismo. Instituto Colombiano de Antropología e Historia, Bogotá.

Goggin, John. 1968. *Spanish majolica in the new world: Types of the sixteenth to eighteenth centuries*. New Haven: University of Yale.

Langebaek, Carl Henrik. 1995. *Arqueología regional en el territorio Muisca*. Vol. 9. Pittsburgh: University of Pittsburgh.

Laurière, Christine. 2008. Paul Rivet: hombre político y fundador del Museo del Hombre. *Revista Colombiana de antropología* 44 (2): 481–507.

Leone, Mark P. 1995. A historical archaeology of capitalism. *American Anthropologist* 97 (2): 251–268.

Loboguerrero, Jimena. 2001. Objetos cotidianos en la historia de la resistencia indígena en Colombia. Del documento de archivo al material arqueológico. *Revista de Antropología y Arqueología* 13: 26–48.

Londoño, Wilhelm. 2010. Dicciones y contra-dicciones de los Estudios poscoloniales: Una revisión desde el registro arqueológico de la Popayán colonial. In *Arqueologías Históricas, Patrimonios Diversos*, ed. Diógnes Patiño, 113–128. Popayán: Universidad del Cauca.

C

Londoño, Wilhelm. 2011. Arqueología histórica de Popayán y la visibilización de su cultura tradicional. *Revista Colombiana de Antropología* 47 (1): 91–112.
Londoño, Wilhelm. 2012. Espíritus en prisión: una etnografía del Museo Nacional de Colombia. *Chungará* 44 (4): 733–745.
Mantilla, Caterina. 2007. Historias locales, historias de resistencia: Una aproximación a la cultura material de San Basilio de Palenque, siglos XVIII–XX. *Memorias, revista digital de historia y arqueología desde el caribe* 4 (7): 76–92.
Mignolo, Walter. 2016. *El lado más oscuro del renacimiento. Alfabetización, territorialidad y colonización*. Popayán: Universidad del Cauca.
Ome, Tatiana. 2006. *De la ritualidad a la domesticidad en la cultura material*. Bogotá: Universidad de los Andes.
Piazzini, Carlo Emilio. 2011. *La arqueología entre la historia y la prehistoria: estudio de una frontera conceptual*. Bogotá: Universidad de los Andes.
Rey Sinning, Edgar. 2000. *El carnaval: la segunda vida del pueblo*. Bogotá: Plaza y Janés.
Rice, Prudence. 2010. La industria vitivinícola colonial de Moquegua, Perú. *Estudios Avanzados* 1 (14): 29–62.
Therrien, Monika. 1996. Persistencia de Prácticas Indígenas durante la Colonia en el Altiplano Cundiboyacense. *Boletín Museo del Oro* (40): 89–99.
Therrien, Monika. 1999a. *Estudio Arqueológico Casa de Nariño, Villa de Leyva*. Bogotá: Ministerio de Cultura, Dirección de Patrimonio.
Therrien, Monika. 1999b. *Estudio Arqueológico de la Iglesia de la Candelaria*. Bogotá: Ministerio de Cultura, Dirección de Patrimonio.
Therrien, Monika, Elena Uprimny, Jimena Lobo-Guerrero, María Salamanca, Felipe Gaitán, and Marta Fandiño. 2002. *Catálogo de cerámica colonial y republicana de la Nueva Granada: producción local y materiales foráneos (Costa Caribe, Altiplano Cundiboyacense-Colombia)*. Fundación de Investigaciones Arqueológicas Nacionales – Banco de la República, Bogotá.
Torres, Hernán. 1999. *Alegorías, metáforas y textos etnográficos. La Torre del Reloj de Popayán*, Cuadernos de Antropología y Poética. Popayán: Casa Valencia.
Trigger, Bruce G.A. 1989. *History of archaeological thought*. London: Cambridge University Press.
Trouillot, Michel-Rolph. 1992. The Caribbean region: An open frontier in anthropological theory. *Annual Review of Anthropology* 21 (1): 19–42.
Uprimny, Elena. 2001. La arqueología histórica como historia de vida. *Revista de Antropología y Arqueología* 13, 2001/2002:73–88, Universidad de los Andes.
Watson, Patty Jo, Steven A. LeBlanc, and Charles L. Redman. 1971. *Explanation in archaeology: An explicitly scientific approach*. New York: Columbia University Press.
Whiteford, Andrew. 1963. *Popayán y Queretaro. Comparación de sus clases sociales*. Bogotá: Universidad Nacional.

Colonial Encounters, Archaeology of

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Introduction

This chapter provides an overview of the archaeology of colonial encounters. From the perspective of considering archaeological approaches to date, the vast majority of studies considered in this review highlight encounters between various European-descent societies and non-European indigenous "others." Here definitions of colonial contexts from the perspective of archaeology are considered initially. Key locations around the globe are described in terms of the form of encounters, the state of archaeological work, and the key studies. This contribution reviews the various explanatory approaches in archaeology and concludes with a consideration of the significant opportunities for archaeology to inform on the numerous one-on-one individual cross-cultural encounters and interactions within colonial settings that increasingly defined the last millennium of human history.

Definition and Historical Background

Colonialism has meant various things to archaeologists over time. Colonialism has characterized (1) places where the abrupt arrival of Europeans suggests a clear fault line in the historical sequence, (2) other locations where colonial relationships have longer and thus more complicated histories, (3) and historical settings that did not involve Europeans but other cultures in forms of colonial relationships.

1. When we consider the modern world, we think in global terms. Everywhere is somehow connected to elsewhere. Our economies are

enmeshed in global systems of finance, objects and resources move around the planet, and the diffusion of domesticated plant and animal species has blurred the biological regionalism and comparative isolation that characterized the world of our earlier ancestors. Even the human species itself has – in many places – shifted to a more "global" animal, where long-separated ethnicities have shared their pathogens, DNA, and cultural practices. The global nature of the modern world is a subject of inquiry for many disciplines from economics to anthropology. Archaeologists have studied the multiple individual examples of how this world came about – some through local/regional studies such as the arrival of, say, European societies in various locations around the world (as explored below). Others have conducted ambitious comparative studies of colonialism. For example, historical archaeologist Charles Orser compared colonialism in Ireland, Brazil, and North America in attempt to define a "historical archaeology of the modern world" (Orser 1996). Comparative studies of colonial contexts follow in a comparative tradition in archaeology, as used to understand other periods of human change such as the shift toward farming, urban life, and forms of social complexity.

Whatever the scale, for many archaeologists, the arrival of migrant colonists in a new region is a convenient definition of colonialism. The study of colonization has in the past been sometimes largely uninterested in the forms of cultural encounters that characterized these contexts. However, this has changed over time, as seen by the way in which James Deetz's early definition of historical archaeology as "the archaeology of the spread of European cultures throughout the world from the fifteenth century" was amended by him to add: "and their impact on and interaction with the cultures of indigenous peoples" (Deetz 1977: 5). The study of arrival of Europeans saw the development of the subdiscipline of historical archaeology, first in North America, then Australasia, and elsewhere. In Europe the fields of medieval, postmedieval, and industrial archaeology covered aspects of this time period. As such, the study of encounters in colonial settings by archaeologists occurs within and beyond the field of historical archaeology. In fact, the focus of historical archaeologists on time periods for which documentary evidence existed limited their ability to appropriately analyze those "people without history" (see Deagan 1988; Lightfoot 1995; Colley and Bickford 1996).

Outside of the Old World core, the tempo of colonization episodes by European societies increased dramatically across the second millennium CE. Some key *early* events include the colonization of the northern Atlantic islands by the Norse, arriving in North America by 1000 CE; the later discovery by various fishing experts, such as the Basque, of fish-rich waters off the North American Atlantic seaboard; the colonization of the western (Azores, Madeira, Canary, Cape Verde islands from the 1300s) and then the eastern Atlantic (beginning with the Caribbean archipelago in 1492 and followed by Mexico and South and North America); the exploration and colonization of Africa (key dates being the Portuguese capture of Cueta, Morocco, in 1415, then the successful navigation of the tip of Southern Africa by Vasco da Gama in 1498); the arrival of European merchants in East and South Asia following Vasco da Gama's entry into the Indian Ocean in direct competition to prevailing Islamic, African, and Asian trade systems; and the exploration of the Pacific and Australasia. These events were driven by different agendas; however, common to many was the demand for better access to known resources – notably the Asian goods moving through the "Spice Roads" arriving in Medieval Europe through intermediaries. This required the establishment of colonial outposts at key nodes to control and provision trade. In time some successful nodes grew from merchant outposts to more extensive forms of colonialism – such as seen in India, West Africa, Southern Africa, and Indonesia. In

other locations, such as China, coastal outposts never successfully translated into more extensive permanent forms of colonialism at the level of the state. The discovery of new resources, such as the South American silver or Caribbean islands suited for plantations, also fueled colonial projects. Other colonies existed for geopolitical ambitions or to remove unwanted populace (as in the case of penal colonies such as Australia and Bermuda). Whatever the reason for their existence, colonies inevitably invoked competition with existing indigenous populations.

Key work detailing these events at a global level includes Immanuel Wallerstein's work in the Annales School on world systems particularly *The Modern World-System* volumes (e.g., Wallerstein 1974), Eric Wolf's (1982) *Europe and the People Without History*, Phillip Curtin's (1984) *Cross-Cultural Trade in World History*, and Alfred Crosby's (2003) *The Columbian Exchange: Biological and Cultural Consequences of 1492*. For archaeologists and historians, these studies track their intellectual efforts back to earlier work in the historical sciences such as Gordon Childe's (1943) *What Happened in History.*

Necessarily, the arrival of European outsiders and their entourage (such as African slaves in the Americas) marked a distinct change. One culture's "colonization" was often another's "invasion," especially where a form of "conquest" was required. In locations where there was no indigenous written tradition, colonization has been perceived as the beginning of the "historic" period, before which there was a "prehistoric" period. Additionally, in North America the idea of a "protohistoric" period was popularly conceived, describing the period after the arrival of Europeans in 1492 before any local expression of permanent colonization (Rogers and Wilson 1993). More recently the concept of "historical" and "prehistoric" periods has been critiqued in some countries – such as Australia – as privileging European societies and their literate traditions over others (Deagan 1988; Lightfoot 1995; Colley and Bickford 1996; McNiven and Russell 2005). Put simply, prehistory is felt to imply "without history" rather than "before written sources." In many nonliterate societies, oral traditions maintained deep histories as counterpoints to European dominant histories. Kent Lightfoot argues that "the current separation of prehistoric and historical archaeology detracts greatly from the study of long-term culture change, especially in multiethnic contexts" (1995: 200).

Historically, narratives of colonial encounters have focused on the perceived abrupt shock that marked the arrival of outsiders in indigenous worlds. Sometimes initial encounters may have been truly unexpected. For the Maori of New Zealand, for example, new categories to describe outsiders (*pakeha*) and indeed themselves (Maori) were required. In only rare instances were societies truly isolated from others, for example, the Tasmanians' isolation from Australia had lasted at least 8,000 years following the creation of Bass Strait by rising seas. Most societies, however, were aware of the presence of new colonists in advance of their arrival as information circulated through social networks. For example, in Arnhem Land in the Northern Territory, Aboriginal people had been informed of the arrival of Europeans in island Southeast Asia during their seasonal encounters with Asian fishermen who maintained camps across the northern Australian coast. Thus, when the British arrived in (for them) remote and isolated Arnhem Land, they were recognizable as "Balanda" (from "Hollander"), an ethnic category acquired through preexisting cross-cultural encounters (Paterson 2011). Today white Australians in Arnhem Land are still called Balanda. In another example, in the Great Plains of North America, for over a century in advance of the direct presence of European colonists, Native American societies underwent dramatic changes that resulted from the introduction of horses and their ability to trade for guns.

2. The concept of modern or recent colonialism as discussed above is specific to the last millennium and the foundation of the so-called

settler societies (such as the USA, Australia, Canada, New Zealand, and Argentina), in which the indigenous population is eventually outnumbered by the migrant-descent population. Thinking more broadly, others have demonstrated how more ancient forms of colonial relationships existed. The various colonial enterprises of the Greeks, Romans, Phoenicians, and other ancient states are well known (Lyons and Papadopoulos 2002). Christopher Gosden (2004) in *Archaeology and Colonialism: Cultural Contact from 5000 B.C. to the Present* takes a 7,000-year perspective on forms of colonialism – as defined by the establishment of colonies outside of one's own country and the various differential power relationships that may arise – beginning with ancient Mesopotamian city states of Uruk and the Aztecs in Mesoamerica. His approach highlights the important ways that material culture can reflect ancient power relationships that resemble colonialism. Importantly these too required forms of cross-cultural encounter and entanglement and were not confined to the involvement of Europeans.

3. When considering the fulcrum of Europe, Africa, and Asia over the length of time adopted by Gosden, the idea of relatively abrupt and bicultural encounters, such as that implied in James Deetz's definition (above) of historical archaeology, is replaced by a broader recognition of "encounter" within colonial realms and one not requiring the presence of Europeans. While these have to date been less the focus of archaeological attention, one imagines that future work will explore these places and histories in detail. In Asia, the history of state societies and their influence over others through trade, religion, and warfare has often been the privilege of historians over archaeologists, at least for the various literate Asian states – in the Americas and for sub-Saharan Africa, the reverse has been true. Whether these always result in "colonial" relationships depends on ones' definition of colonialism – which ranges from Gosden's wide definition to a specific focus on modern (last 500 years) instances. What is clear is that a European-defined approach is restricted. To take an example, when the Portuguese finally entered the Indian Ocean in the late 1400s, it marked the end of over 2,000 years during which Europe was only able to access commodities from Asia (such as spices) through middlemen – via the ancient Silk Roads (one route across Central Asia, the other by sea). Islamic trade networks dominated the Indian Ocean, although other powers had been critical. The Chinese experiments with maritime colonial enterprises in the Indian Ocean at least had already ended by this time, as Admiral Zheng He's fleet had explored South Asia and East Africa in the early 1400s.

What is clear from the three characterizations of colonial contexts is that it is almost impossible to consider colonial contexts without taking into account culture contact. Stephen Silliman (2005) argues this effectively in his exploration of the usages of "culture contact" and "colonialism" in North American archaeology. The core issues are of power and the way power structures' relationships between different peoples in colonial circumstances. A key characteristic of colonial domains is the unequal relationship that underpinned dominant colonial actors over less powerful indigenous people. The provision of cheap food, labor, and knowledge by indigenous peoples made many colonial societies sustainable and economically rewarding for colonial powers. In materialist thinking, objects and built places (including the organization of colonial landscapes) provide direct evidence for colonial-era behaviors, not just of colonists but potentially of indigenous peoples too, and the ways that they interpreted, accepted, and resisted colonial behaviors.

Key Issues/Current Debates

Approaches to Encounters

A recent global review of the study of cross-cultural encounters globally over the last 1,000 years in the various regions reveals different archaeological concerns (Paterson 2011).

Regardless, the study of colonial encounters wherever these occurred is essentially a study of *culture contact*. Historically, the term described the moments of "first contact"; however, increasingly within archaeological practice, the study of culture contact focuses on the processes of cultural entanglement following colonization and within colonial settings. Several distinctly different colonial settings have been defined and include, as illustrated by historian Phillip Curtin, (1) merchant diasporas, (2) territorial empires, (3) settlement empires, and (4) plantation complexes (Curtin 1984). Curtin was interested in the economic aspect of trade-driven European settlement. Each of the four types required different forms of colonization, settlement history, and use of power and capital – but all involved cross-cultural contact and various forms of unequal access to indigenous labor and land. The results have been described by archaeologists as requiring diffusion, invasion and conquest, contact and exchange, acculturation, and genocide.

Cultures in contact invoke change on each other – this is termed *acculturation*. This understanding is ancient: Plato argued in 348 BCE that contact should be minimized as the "intercourse of cities with one another is apt to create a confusion of manners." The potential influence of foreigners concerned states, for example, the rulers of Japan and China when encountering Europeans along their coasts and waterways sought to keep them restricted to state-controlled ports, such as Canton. Not all societies were successful in their efforts, as demonstrated by Moctezuma's failure to control the destabilizing efforts of the Spanish conquistadors who allied with other Mesoamericans, which caused the collapse of the Aztec state in 1521. For non-state-level societies around the world, the ability to repel new colonists was inevitably doomed. Technology often played a critical role – in many settings European colonists tended to have superior military technology fueled by infantry with munitions, although older practices such as mounted cavalry underpinned Spanish warfare in the Americas against unmounted street fighters.

Another key element heralded by the arrival of colonists was demographic change. Various scholars have explored the scale of disease and resulting mortality that arose from the movement of pathogens around the world following the various European diasporas (Paterson 2011). Crosby (2003) described this as "The Columbian Exchange," although it also applied in various settings around the world and not just in the Americas. Certain diseases were particularly catastrophic, such as smallpox. There are debates about the size of indigenous populations prior to contact, something which archaeology attempts to address by studying past settlements. As diseases moved in advance of Europeans, the usefulness of historical accounts to determine precontact demography is often questionable. In many settings, significant demographic decline at first contact through disease and war is evident. Other contact-era processes acted upon societies, particularly in Africa where the demand for slaves for Islamic markets and then increasingly for the trans-Atlantic slave trade saw intercommunity warfare and population decline in areas well beyond the presence of colonial powers. Such dramatic processes probably fueled racist ideas of "fatal impact" whereby native peoples would inevitably decline following contact with superior whites and others.

There have been various theoretical models used to explain culture contact, with many key developments occurring in North American anthropology. The idea of acculturation has the longest pedigree, becoming popular in the nineteenth century. In the 1880s J. W. Powell, working for the Bureau of American Ethnology, used acculturation to describe psychological changes experienced during cross-cultural imitation, followed by colleague W. J. McGee, who like many of his time thought in social evolutionary terms and thus saw culture contact as a means for savage or barbaric societies to become civilized and enlightened. Such concepts underpinned many colonial endeavors of this era. In the 1930s acculturation was increasingly used as a tool to measure cultural change and thus became essential to social scientists in

North America. In 1936 "A Memorandum for the Study of Acculturation" was published in *American Antiquity* (Redfield et al. 1936). While the definition described how change could occur to both cultures in contact, in reality the focus of most researchers was on Native American responses and not forms of European acculturation. Edward Spicer, working in Mexico and the Southwest, defined types of acculturation including incorporation, assimilation, fusion, and compartmentalization (Spicer 1961). He was interested in why certain societies maintained their cultural practices and compared these to Basque, Irish, and Welsh reactions to past oppressors. Acculturation theory tended to focus on "donor" and "recipient" groups whereby change tended to be experienced by the weaker recipients. The use of such approaches was based on the assumption that archaeologists could use changes in material culture as a proxy for social change. However, the potential nuances of how material culture may be used in colonial contexts were largely absent from these discussions.

By the 1970s, new explanatory models were being proposed to explain forms of cultural engagement. In North America, the five-hundredth anniversary of Columbus's voyage of 1492 inspired new research into the topic, as seen in the three *Columbian Consequences* volumes (edited by David Hurst Thomas [e.g., Thomas 1989]). The new thinking stressed that "Culture [is] change. . .neither one-sided nor solely governed by European intentions and strategies. Rather it is evident. . ..that [indigenous peoples'] attitudes and actions. . .played a large part in determining the impact of contact" (Wilson and Rogers 1993: 3). To take one example, in the 1680s, Pueblo people of New Mexico revolted against the colonial Spaniards, successfully repelling them. Colonial settlements were abandoned, churches destroyed, and in the archaeological record people abandoned the once ubiquitous pre-Hispanic "Jemez Black-on-white" decorated ceramics as it had become associated with the Spanish, with Franciscan missionaries producing objects like candlesticks. The ware no longer just represented indigenous material practices, but also Spanish dominance (Liebmann 2008). A simple acculturation index would fail to detect the nuances of resistance and innovation and the shifting meanings of material culture in contested colonial settings.

As a result, various useful models exist, including theories related to acculturation and assimilation, resistance and dominance, forms of cultural accommodation, hybridity, subaltern practices, and agency. Others return to existing models, for example, exploring whether optimal foraging theory is useful for explaining how indigenous people dealt with new resources in colonial landscapes (Birmingham 2000). Another aspect of explanation concerns how instances relate to wider processes, notably frontier theory and core and periphery models. In colonial settings this is important as both, in part, explore how colonial centers related to colonial worlds.

In colonial settings, then, cultures have been long seen to be in flux. Conservatism, innovation, and creation are critical aspects of daily life for both colonists and various indigenous others. Sometimes concepts of "indigenous" become more blurred, as new forms of society developed. Key concepts such as ethnogenesis and creolization are used by archaeologists to document new forms of cultural practice that arose from the mixing pot of colonialism. A key archaeological proponent of creolization has been historical archaeologist Kathleen Deagan whose work has explored Spanish and American colonial communities in both Florida and the Caribbean archipelago (Deagan 1988; also Paterson 2011 for detail).

Future Directions

Long-Term Studies of Colonial Complexity

Some more successful archaeological studies have taken on the challenging potential of archaeological analyses and seen shifts from simple two-way cross-cultural processes to more complex explanatory models.

Colonial settings were not just simple binary contexts, but constituted of more complex

relationships. Kent Lightfoot heralded a shift toward models that highlighted the complexity of ethnic interactions in colonial settings – his study (Lightfoot 1995) of the various ethnic communities at the early nineteenth-century Russian Fort Ross in northern California was described as pluralistic and marked a shift from an indigenous/colonizer paradigm to a more subtle focus on the material record of shifting ethnic behavior in a colonial outpost located in traditional lands of the Kashaya Pomo.

Archaeology provides a long-term approach within which to locate the colonial period. In the study of Guale life at St. Catherines Island off Georgia, which in the 1570s became a Spanish outpost of the La Florida colony, the American Museum of Natural History has documented 5,000 years of indigenous lifeways. Through a long-term approach, the ways in which the colonial period was reflected in indigenous practices were measured in the archaeological record, as indicated in chiefly power structures, gendered behavior, use of material culture, settlement patterns, health and mortality, work, trade networks, burial, and religiosity.

Colonial "frontiers" suggest to us regions that existed well beyond the formal presence of Europeans where however the impacts of change were still felt. This is perhaps best understood in Africa, where for centuries foreign outposts (such as in West Africa) and coastal communities (such as the medieval Swahili states in East Africa) had far reaching impacts on the interior of the continent through demand for traded commodities and slaves. In West Africa, the work of Ann Stahl in west central Ghana of the Banda is similar to that described for St. Catherines Island, by situating processes of cultural entanglement in a longer time frame. Banda sites were well inland from European-African encounters along the coast, yet in this chieftaincy during the seventeenth and eighteenth centuries, preexisting power structures long associated with Saharan and Sudanic trade networks were disrupted by the shift toward Atlantic slave trading. In this "colonial frontier zone," the African Asante became dominant; then in the 1870s, British colonization occurred. Stahl's excavations reveal the continuities and shifts in communities and their practices over these centuries of change at the shifting edges of the colonial world.

The Materiality of Colonial Encounters

The archaeological study of colonial settings uses material evidence in addition to evidence from environmental and landscape records, historical sources, oral histories, and pictorial sources. The focus on material evidence poses serious challenges and opportunities. In colonial settings, the archaeological concept that objects and the way that they were used are equated with social identity is less solid. Instead, objects appear to shift in meaning depending on the user. The work of Nicholas Thomas (1991) highlights that in colonial contexts objects were used by colonized people to reject, embrace, and manipulate the intentions of colonizers. This suggests that simple material measures may miss nuances of the colonial world and indigenous processes of conservatism, experimentation, change, and even ethnogenesis where entirely new societies arise from colonial-era dynamics (i.e., the Metis in Canada).

Politics of the Past

The withdrawal of colonial powers in the twentieth century provides another set of historical "fault lines" that continue to reflect processes of cultural entanglement. Postcolonial settings have developed a set of political actions, literature, and theory. In archaeology, material culture has been used in novel ways to explore postcolonial historical cross-cultural processes, such as in Africa where the postcolonial settings are numerous and present legacies of direct relevance to Africans today (see Reid and Lane 2004 for African studies). The descendants of colonialism often claim rights to traditional lands (such as in Australia and North America), practices (such as hunting or social and religious practices), and material and ancestral remains held in colonial-era collections and for the right to actively participate and regulate the investigations of their past. These are shifting archaeological practice and the ethics of exploring the past in the present,

be it postcolonial or not, and are likely to be key threads of future research on colonial encounters in "historical archaeology."

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Atlantic World: Historical Archaeology
- ▶ Australasian Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Greek Colonialism, Archaeology of
- ▶ Lightfoot, Kent G.
- ▶ Mission Archaeology in North America
- ▶ Missionization and Mission Archaeology in New Zealand and Australia
- ▶ Orser, Jr., Charles E.
- ▶ Postcolonial Archaeologies
- ▶ West and Central Africa: Historical Archaeology

References

Birmingham, J. 2000. Resistance, creolization or optimal foraging at Killalpaninna Mission, South Australia. In *The archaeology of difference. Negotiating cross-cultural engagements in Oceania*, ed. R. Torrence and A. Clarke, 360–405. London: Routledge.

Childe, V.G. 1943. *What happened in history.* Harmondsworth: Penguin Books.

Colley, S.M., and A. Bickford. 1996. 'Real' Aborigines and 'real' archaeology: Aboriginal places and Australian historical archaeology. *World Archaeological Bulletin* 7: 5–21.

Crosby, A.W. 2003. *The Columbian exchange: Biological and cultural consequences of 1492*. 30th anniversary ed. Westport/London: Praeger.

Curtin, P.D. 1984. *Cross-cultural trade in world history, studies in comparative world history.* Cambridge/New York: Cambridge University Press.

Deagan, K. 1988. Neither history nor prehistory: The questions that count in historical archaeology. *Historical Archaeology* 22: 7–12.

Deetz, J. 1977. *In small things forgotten: The archaeology of early American life*. 1st ed. Garden City: Anchor Press/Doubleday.

Gosden, C. 2004. *Archaeology and colonialism: Cultural contact from 5000 B.C. to the present, topics in contemporary archaeology.* Cambridge: Cambridge University Press.

Liebmann, M. 2008. The innovative materiality of revitalization movements: Lessons from the Pueblo revolt of 1680. *American Anthropologist* 110: 360–372.

Lightfoot, K.G. 1995. Culture contact studies: Redefining the relationship between prehistoric and historical archaeology. *American Antiquity* 60 (2): 199–217.

Lyons, C.L., and J.K. Papadopoulos, eds. 2002. *The archaeology of colonialism*. Los Angeles: Getty Research Institute.

McNiven, I.J., and L. Russell. 2005. *Appropriated pasts: Indigenous peoples and the colonial culture of archaeology.* Walnut Creek: AltaMira Press.

Orser, C.E., Jr. 1996. *A historical archaeology of the modern world*. New York: Plenum Press.

Paterson, A.G. 2011. *A millennium of cultural contact*. Walnut Creek: Left Coast Press.

Redfield, R., R. Linton, and M.J. Herskovits. 1936. Memorandum for the study of acculturation. *American Anthropologist* 38: 149–152.

Reid, A., and P.J. Lane, eds. 2004. *African historical archaeologies*. London: Kluwer Academic/Plenum.

Rogers, J.D., and S.M. Wilson, eds. 1993. *Ethnohistory and archaeology: Approaches to postcontact change in the Americas*. New York: Plenum Press.

Silliman, S. 2005. Culture contact or colonialism? Challenges in the archaeology of Native North America. *American Antiquity* 70: 55–74.

Spicer, E.H. 1961. *Perspectives in American Indian culture change*. Chicago: University of Chicago Press.

Thomas, D.H., ed. 1989. *Columbian consequences, volume 1: Archaeological and historical perspectives on the Spanish Borderlands West*. Washington, DC: Smithsonian Institution Press.

Thomas, N. 1991. *Entangled objects: Exchange, material culture, and colonialism in the Pacific*. Cambridge, MA: Harvard University Press.

Wallerstein, I. 1974. *The modern world system. Capitalist agriculture and the origins of the European world-economy in the sixteenth century.* New York: Academic.

Wilson, S.M., and J.D. Rogers. 1993. Historical dynamics in the contact era. In *Ethnohistory and archaeology: Approaches to postcontact change in the Americas*, ed. J.D. Rogers and S.M. Wilson, 3–15. New York: Plenum Press.

Wolf, E.R. 1982. *Europe and the people without history.* Berkeley: University of California Press.

Further Reading

Thomas, D.H., ed. 1990. *Columbian consequences, volume 2: Archaeological and historical perspectives on the Spanish Borderlands East*. Washington, DC: Smithsonian Institution Press.

Thomas, D.H., ed. 1991. *Columbian consequences, volume 3: The Spanish Borderlands in Pan-American perspective*. Washington, DC: Smithsonian Institution Press.

Wallerstein, I. 1980. *The modern world system, Volume II: Mercantilism and the consolidation of the European world-economy, 1600–1750*. Bingley: Esmerald Group.

Colonial Expansion and Nation-State Building: Influences on Archaeology

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Introduction

After World War II, when European powers lost control over large areas of Africa and Asia, ownership of the past became a key, explicitly relevant issue, and new nations were created. Precolonial history became often used to justify resistance against domination and even as the basis for constructing new nations. Even as the study of the past enjoyed the status of a clearly legitimate "science," for some in ways comparable to the natural sciences, who owned the past, how it is used to justify colonialism as well as nationalist movements, and how it works to justify conquests – or "wars of liberation" – became legitimate objects of interest for many archaeologists and historians. The times when the study of the past was considered as being free from the social context are completely over. Texts on the history of disciplines like history and anthropology, including some introductory textbooks, refer to the debate and include a rich biography on the subject.

The imperial crises in the first decades of the twentieth century caused these concerns to thrive. In the 1920s and 1930s, some of the most obvious ways that the past had been manipulated in the name of political movements and totalitarian ideologies became clear. The obsession with the past and racialized history in National Socialist Germany, Italian fascists' fondness for the glories of the Roman Empire, as well as ideas about Italian's right to govern Africa, and even the Soviet policy of erasing any evidence of non-Slavic history in Russia or Eastern Europe are all examples of how the past was not neutral. Furthermore, the consequences of manipulation that led to the inhalation of millions of people in Europe became evident.

However, the weakening of the European empires after the war made it clear that these extreme cases are part of a long tradition of using the past for political means, which was used to justify the creation of empires throughout the nineteenth century. Several people had, at this time, questioned the relationship between archaeology and power relations, but perhaps, for many, it was history, in charge of creating broader narratives, that had been manipulated to produce images about the past that were clearly distorted by imperial and colonial perspectives. Conversely, archaeology, which focused on studying objects and curiosities, was perceived as less involved in these processes (Díaz-Andreu 2007). Today, it is clear that archaeology is not a value-free or neutral science and that its relation to the politics of domination is not limited to the extreme cases that were so evident after the war. The political manipulation that archaeology can offer, and that it certainly has offered throughout history, is only one way in which power has manipulated the past. Any political project that encounters evidence from the past needs to confront it: either by including it and pursuing its own interests or by ignoring it and pursuing its own interests.

Historical Background

Ever since the 1980s and 1990s, particularly in Europe but also in the United States, a deep discontent began with a decontextualized disciplinary practice that did not take into consideration society, economics, and politics. The history of archaeology, which is well-known through texts such as Glyn Daniel's (Daniel 1981; Daniel and Renfrew 1988), was strongly criticized for offering only an "internalist" discourse of the practice. They reduced archaeological developments to an inner evolution of increasingly accurate and definite scientific knowledge about the past, completely ignoring the context in which such knowledge was produced (Moro-Abadía 2006). Instead, a great deal of effort was focused on trying to understand how external factors explained how archaeology was practiced as

well as the complex interplay between accounts of the past and social contexts (Trigger 1980, 1989; Schnapp 1993).

Postcolonial studies began to develop during the 1980s and 1990s. This was part of a wider context within which archaeology began to ask itself about the way that it had understood social relations, gender, and key issues such as race and nationalism. A large part of the studies specifically concentrated on the relationship between archaeology and nationalism (Díaz-Andreu and Champion 1996 Kohl and Fawcett 1995; Alexandri 2002) and on gaining a better understanding of the colonial processes themselves (Lyons and Papadopoulos 2002; Dietler 2010). Other studies focused on how archaeology related to colonial processes (Evans and Meggers 1973; Bray and Glover 1987; Sheppard 1990), and some took inspiration from Said's (2002) *Orientalism*, which exposed how imperialism as a discourse makes statements about colonized regions and then expresses authoritative views on them (Bernal 1994; Schlanger 2002; Shaw 1990). Efforts were also made to understand how colonial discourse confirmed that the backwardness in colonized regions was deeply rooted in the past and even how colonial powers presented themselves as the guardians of local traditions (Díaz-Andreu 2007: 210) and how colonial discourses interacted with local interests and politics, which led to hybridity (Bhabha 1994). Other studies focused on the general social structure of the colonizing and colonized society, including gender relations (Gero 1985).

Not only were postcolonial studies diverse in scope, they were also varied in terms of their intellectual background. They were influenced by the likes of Gramsci, Foucault, Said, and Bhabha, and as Moro-Abadía (2006) notes, they used a set of terms such as "colonialism," "imperialism," "neocolonialism," and "globalization," with a limited time scale that can be contrasted with their broad aims in terms of social critique. In political terms, postcolonial studies aimed at nurturing a political project that challenged colonial domination and exposed the legacies of colonialism. Its range of study was generally limited to the time when archaeology emerged as a science, which was more or less the time of the European imperial expansion in the latter half of the nineteenth century. To a certain extent, its emphasis has been limited to the development of the important evolutionary discourses that are based on the works of authors such as Lubbock and Morgan who, for many, positioned European societies at the apex of humanity and nurtured the idea that the history of the Old World subsumed the history of all civilization. Studies have focused on this model of "civilization," which archaeology helped to create, and the rest of the world could be understood using these parameters (Lydon and Rizvi 2010).

There are, indeed, some points at which the postcolonial vision is incomplete: the critique of asymmetric relations of power and, specifically, of colonialism came far earlier than postcolonial critique. Marx and Engels, for example, envisaged a critique that was based on not only an economic perspective but also a political and ideological one. Postcolonial studies have often focused on the ideological: the creation of new identities, hybridity, agency, and consumption. They have often forgotten parallels in the material world: the asymmetry of powers, wars, impoverishment, and disease (Lydon and Rizvi 2010). Another problem is that their critique focuses on what is identified as the innate values of Western colonial expansion and domination (Gosden 2004). To provide examples, most studies do not take into consideration forms of expansion that have characterized Islam (Alexander 2001) or those that have worked internally in Latin American countries that have justified systems that exclude socially but are hostile to evolutionism (Langebaek 2009).

Similarly, these studies do not usually provide a long-term perspective of the complex relationship between power and the view of the past or of the bids for power and local expansionist projects. Its critique has been more useful to demystify the idea of a neutral science than to unravel the relationships between scientific ideas, dominant ideologies, and asymmetric power bases: including the bases of exploitation, on a broader historical and cultural scale. The chronological scope is, indeed, very limited as postcolonial studies frequently limited analysis to the last 100 or

150 years at most. Although there was a legitimate basis for this, since they wanted to focus on phenomena specifically related to the European expansion and its subsequent decline at the end of the twentieth century, the truth is that much of the complexity regarding the relations of domination had biases in terms of the Anglosphere and, to a lesser extent, to the Francosphere. The Spanish and German spheres have not been as extensively researched, not to mention the relations of power issue and the expansion of non-European empires that are also legitimate spaces for reflection and critique. To some extent colonial studies are, paradoxically, Eurocentric.

The History of the Past: Archaeology's Past

Political domination and ownership of the past have run together long before European expansion. Old States, both in the Old World and the New World, had to contend with the monuments that they themselves had destroyed or that were symbols of other powers existing and prospering in ancient times (Gosden 2004). State powers based on the premise that ruling lineages were eternal and that centered their powers on old traditions tried, conveniently for them, to include the history of the regions that they dominated claiming, for example, a historical continuity that was doubtful at best. An example is the Mongolian Yuan dynasty in China, which incorporated some local traditions, including Confucianism; another is the successive powers in central Mexico after the fall of Teotihuacan that persistently claimed to be the successors of the governing lineages of this city-state. The so-called pre--Columbian Andean emperors are also important: each of them claimed to have roots in the States that proceeded them.

In another context that predates the relatively recent European expansion, the profound narratives that are characteristic of the monotheistic religions, especially Christianity and Islam, are also based on arguments that support the consolidation of power and a keen alignment with the past. Christianity and Islam, initially reactions against the great powers, ended up fueling political expansion and considering the past of the societies under their realm as impure in terms of their respective beliefs and basis for political authority. Both ordered history linearly, with one single narrative that has a series of unquestionable landmarks and a supposed universal value. The structured a "past" and a "future" in terms of the negation of the validity of other beliefs. The concept of unbelievers who need to be converted to the "true" faith provided, and still provides in some contexts, important tools for the expansion and domination by earthly powers, especially when they claim to have a special relationship with prophets such as Jesus or Mohammed. The expansion of European Christian powers at the expense of the infidels from the north of Europe and the enslavement of Africans by Arab powers in Africa are the expressions of expansionist ideologies that justify the conversion of infidels. Some of the most important empires after the year 1000 are monotheistic empires, for example, the ancient Persian empire or the sixteenth-century Spanish empire. In both cases, although they are supported by religion, they are not fully explained by it. The Atlantic States' power, particularly Spain and Portugal, was consolidated in the fifteenth century, and a type of expansion was strengthened that had never before been seen in which religion initially played an important role. It was, however, later replaced or complemented with other notions that better served imperialist objectives such as "civilization" and "race," which are ultimately more useful for more recent expressions of imperialism, specifically English as well as French (Stocking 1987).

Latin America is an interesting case as it sums up many of the relations between colonialism and manipulation of the past over centuries. As already stated, before the arrival of the Europeans, the ruling Aztec lineages – although recently arrived to Central Mexico from the north – traced their legitimacy back to old powers who had previously governed in the region. And they were not the first: throughout the centuries, successive powers in Mesoamerica appropriated the past of extinct societies. Teotihuacan was a source of inspiration for the Toltec and Aztec

societies in which the elites claimed to have links and ancestral relationships with the ancient founders of the biggest city that had been built before the arrival of the Spaniards. They also appropriated this past to differentiate themselves from the "barbarians" who were excluded from a long regional history. Moreover, ancient Mexican rulers proudly exhibited objects from afar that were obtained from exotic societies and claimed to have legitimacy and control over locals and foreigners due to a long history and sacred powers (Helms 1988).

The European invasion brought with it a new chapter in the appropriation of the past. With the Spanish conquest, notions of the past were developed that fulfilled their interests. A large part of this control was based on the expansionist principles of the monotheistic religions, in this case Christianity (Ricard 1986; Gruzinski 2012). The Indians were considered to be humans with a soul, thanks to the grace of God, but they did not know the word of God. One justification for the Spanish expansion was the task of turning the Indians over to the Crown and the Church. However, they found remains, such as hands or feet drawn in stone, that suggested they had previously been visited by Christian missionaries. This demonstrated their evil: they had known of the divine word but were determined to follow their own gods. In this way, the conquistadors, not infrequently, compared the Indians to the Jews of the Old World. Some of the Mexican monuments were important in the eyes of the conquistadors who helped to make Spain an empire capable of conquering glorious empires. As such, the Spaniards frequently considered the Mexican monuments to be comparable to Roman ruins and spoke of the glories of the places that were now under Spanish rule (Lupher 2006). Some conquistadors even developed the idea that the first inhabitants of the New World were the decedents of old inhabitants from the Iberian Peninsula, and thus the conquest was no more than a meeting of brothers.

The expansion of the Iberian empires began to decline throughout the eighteenth century, and it was replaced by other powers, notably France, England, and, to a lesser extent, Holland. Close to 80% of the globe was either directly or indirectly under European control. This process concurred with Enlightenment and the decline of religion as the center of European thought. While the religious component continued to be important to understand the colonies' past and legitimate colonial power, new concepts were replacing the justification that centered on God, which more frequently looked to reason. All around the globe, many of the peoples found by the Europeans in areas that were inhabited by societies with relatively low densities and that did not have an important political hierarchy were enslaved or wiped out, depending on the importance of the workforce and if there were special interests in the land itself. In other cases, the Europeans found large societies with a history that could be seen through important monuments, which forced the colonizers to interpret the past of the societies they had colonized.

These new forms of domination, to a large extent, gave rise to what would turn archaeology into a science. The discipline is not the result of colonial European expansion in its first phase, but clearly Enlightenment and need for ownership of the past helped to create scientific disciplines in charge of "explaining" the past. Archaeology and colonialism arose under the auspices of modernity (Thomas 2004). The common foundations of political justification or colonialism ever since come from enlightened thought based on reason. The enlightened thinkers in the second half of the eighteenth century questioned why some European countries had become civilized, manifested by the development of science, for example, and why others had not. This position led to the proposal of different explanations based on the natural sciences. Buffon, for example, suggested that the American peoples (the indigenous peoples) had recently arrived on the continent and, due to the prevalent humidity and heat, progress had been impeded. Other thinkers from the time, such as Pauw and Robertson, looked at the youth of the non-European peoples to explain their backwardness (Langebaek 2009). Civilization was an ascending scale, and it took time to reach the apex when there were natural obstacles that could make process either slow or impossible.

Sure enough, these ideas led to the immediate questioning of ruins in old civilizations in parts of Africa, Asia, and particularly the New World, and with this came a new interest in the nascent discipline of archaeology.

In the New World, the first archaeological expeditions were sponsored by the Spanish government, which was interested in demonstrating to the enlightened French and English that the Americas had given rise to real civilizations and that there was nothing in the nature of the continent that condemned its inhabitants (by now largely in some regions, the descendants of Spaniards) to perpetually remain in ignorance. They concentrated their efforts on excavating ancient monumental sites and analyzing accidental discoveries that demonstrated that the indigenous peoples had deep understandings of architecture, mathematics, and astronomy. Paradoxically, these same elements led to the descendants of Spaniards beginning to consider the Indians their "ancestors" and arousing their curiosity in pre-Hispanic monuments. They simultaneously highlighted the striking civilization before the arrival of the Europeans and how they had ruthlessly been destroyed (Cañizares-Esguerra 2002). Although the Latin American Creole elites were aware of the European discourses of the American peoples, they did not always copy the same dynamic. These elites created, popularized, and promoted structured discourses on the indigenous peoples that had once occupied the lands that were now theirs. They did this by deliberately ignoring certain uncomfortable aspects about the past and by glorifying others (Gnecco and Hernández 2008; Langebaek 2009; Tantaleán 2014).

In Europe, the rise of enlightened archaeology turned the cabinets containing ethnographic and archaeological curiosities that had been around for a long time into museums in which the European nations showed the complex relations empires had with ancient civilizations. A well-known example at the end of the eighteenth and beginning of the nineteenth century was the Napoleonic expedition to Egypt that brought antiquities to Europe, initiating interest in Near East societies at the same time colonizing them (Jeffreys 2003). Over time, the museums turned into national museums, and when there became significant interest in European races, new pan-Latin, pan-Slav, pan-Germanic outlooks of history developed. It very naturally occurred that there was more curiosity for the exotic: what came from the near East, far Asia, or Africa (Ballart 1997). This was the exact moment in which the African and Asian peoples began to be colonized by the European powers who were competing to gain access to raw materials and a workforce that was ever increasingly under the growing influence of the industrial revolution and the entrenchment of capitalism.

The New World, which was previously dominated by Spain but had been liberated by the Creole elites in the first decades of the nineteenth century, swiftly examined the "return to the past" that had functioned as an ideology to expel the Spaniards (Langebaek 2009). To begin with, the struggles against the discourses that had justified colonialism were also justified in terms of "recovering the past." Moreover, some leaders such as Simón Bolívar defined the Creole independence struggle as the assertion of native American societies despite the fact that in his private writings, there is unquestionable contempt toward the Indians (Favre 1986). Moreover, just after independence, Bolívar led a campaign to assimilate indigenous populations, which was even more successful than the Spanish regime's.

Several years after independence from Spain, the Latin American elites created a discourse that was completely detached from the pre-Hispanic tradition, which was more Europeanized. It was not until the end of the nineteenth century and the beginning of the twentieth that some members of these elites created "indigenist" narratives as a foundation to create nations that they defined as Indo-American or Mestizo, and this took place within a context of the racial debates. *Indigenism* per se arose in the first three decades of the twentieth century, and although it was based on an anti-colonial and profoundly national narrative, it did imply the reproduction of colonial values. Although it was particularly strong in Mexico, Bolivia, and Peru, its influence was felt throughout Latin America. It was manifested in art; it influenced a great deal of archaeological work and political movements of the time. *Indigenism*,

however, was deeply rooted in colonial traditions: it was a discourse about the Indians, but not produced by them (Ramos 1988; Favre 1998; De la Cadena 2000; Coronado 2009).

Developments in Latin America predated broader events around the globe due to colonial expansion in the late nineteenth century. In a context of nineteenth-century European powers, an important part of imperial supremacy was shown in the museums, which proudly displayed objects that had been brought from excavations in their colonies. The big empires, especially France, England, Germany, Russia, and Spain, sponsored scientific expeditions and obtained archaeological relics that were displayed in museums as evidence of not only their overseas power but also the prestige of archaeological science that was generously sponsored by kings and nobles. Objects brought from abroad, and sometimes even the "primitives" themselves, were exhibited, and they supported the thesis about different races that imperial nostalgia recognized as a vast field of exploration (Bendix 1997; Zimmerman 2001; Qureshi 2011). Some versions of evolutionism helped to justify European domination in large portions of the world in which the old civilizations were seen as failed attempts to make progress or showed evidence that colonized societies had not achieved a degree of civilization.

Archaeology and Colonialism Today

After World War II, the past transformed into something greatly controversial in which nationalism, sectarianism, and exclusion had frequently been the protagonists. The imperial rhetoric that had justified European expansion during the nineteenth century and the North American expansion during the twentieth century had not disappeared (Thomas 2000; Willems 2009) although they had in some cases transformed into elite local discourses rather than direct foreign intervention (Gnecco and Hernández 2008). A great deal was replaced by a renewed and complex narrative that reclaimed native societies and uncovered the harm caused by new colonial practices. The legacy of Western colonialism is complex and diverse: it implies new nationalisms and also new colonial projects which belong to neither Europe nor North America. Subtle forms of cultural dominance, such as those who maintain that the Indians from the New World are actually of Chinese origin or that they were "discovered" by Chinese expeditions, are examples. Local powers that have filled the European imperial vacuum with their own desires for dominance are all phenomena that need to be studied to give critical archaeology a relevant position in the world today.

In Africa, the existence of ancient kingdoms has been a source of inspiration for recently liberated nations in response to a mythical unity and resistance to the change with which the Europeans characterized precolonial societies (Shepherd 2002; Schmidt and Waltz 2007). Within both developed and non-developed countries, globalization has encouraged minority ethnic groups to defend their identities using the remote past, which has generated new relationships not only with State agencies but also with archaeologists. As a case in point, in Colombia, the Political Constitution of 1991 has promoted the development of new "native" identities and the *re-indigenization* of societies that were considered until recently as *campesino* (Gnecco and Hernández 2008). Even in urban contexts, communities have emerged that claim to be native: decedents of the sixteenth-century inhabitants. These indigenous groups frequently endeavor to reconstruct territorial, "ancestral," domains of the past, and they also engage in campaigns to recover their native language, ritual, and information about distant origins. These stories are repeated throughout the Americas, Africa, and Asia as States recognize ethnic diversity and leave ownership of the past to more regional groups (Glover 2010). In the Middle East, archaeology serves the purposes of Zionism to justify the Israeli occupation of Palestinian territories, but it also serves the purposes of those that held political power in Egypt, Syria (particularly the Alawites), Iraq, and Iran (Abu-El-Haj 1998; Guillot 2010). After independence, all these countries nationalized archaeology, and, especially when secular societies were in place, archaeology played an important role in creating narratives of power.

Future Directions

Interest in confronting archaeology's past and present in terms of the political agenda that it has served has implications for any practicing archaeologist. In its most extreme form, postcolonialism has led to a divide between archaeological fieldwork, which is focused on answering questions about the past, and the historical and sociological reflection on the political content of the practice. The reflection on the political dimensions of colonialism and its relationship with archaeology was born, in part, due to the same debate between relativism and scientific optimism: the latter being related by some with colonialism and the former with its criticism (Shanks and Tilley 1987). Some archaeologists have been able to actively engage in political issues while continuing to gain a better understanding of the past, for example, V. Gordon Childe and Bruce Trigger. There have been various in-between spaces that have opened after the debate on the relationship between archaeology and colonialism, which have been very productive, for example, the effort to work with natives in certain regions and programs that are orientated toward training local archaeologists who can work on equal terms with archaeologists from Western countries and explicit exercises to make archaeology politically engaged. Indeed, many more solid and interesting "histories of archaeology" have been written (Schnapp 1996; Beck 1998). It is true that one area of academia has disclaimed the scientific pretentiousness of the discipline and has concentrated its efforts solely on establishing the way in which archaeology has converted into a hegemonic power that should be exposed. Some frequently totally renounce the legitimacy of having an understanding of the past from a point of view different to what the "natives" have constructed. And, there are also those who maintain that the past can be examined by archaeologists who are upholding political neutrality. However, political use of any archaeologist's work is completely out of their hands; it enters the public domain and, therefore, acquires a significance that is not neutral and that cannot be controlled.

Many have not lost the hope that being able to understand the past is a legitimate aspiration; they want that "knowing what really happened" in the past has the potential to be enormously politically liberating (Trigger 1994). Ultimately, "what really happened" or, at least, what was most likely to have happened should not be a cause for worry for those who want to critique what they consider to have happened to the detriment of the whole of humanity and especially to humanities' weakest members.

References

Abu-El-Haj, Nadia. 1998. Translating truths: Nationalism, the practice of archaeology, and the remarking of past and present in contemporary Jerusalem. *American Ethnologist* 25 (2): 166–188.

Alexander, J. 2001. Islam, archaeology in Africa. *World Archaeology* 33 (1): 44–60.

Alexandri, A. 2002. Names and emblems. Greek archaeology, regional identities and national narratives at the turn of the 20th century. *Antiquity* 76 (291): 191–199.

Ballart, Josep. 1997. *El patrimonio histórico y arqueológico*. Madrid: Ariel.

Beck, Alice. 1998. *The land of prehistory: A critical history of American archaeology.* New York: Routledge.

Bernal, M. 1994. The image of ancient Greece as a tool for colonialism and European hegemony. In *Social construction of the past-representation as power*, ed. G.C. Bond and Angela Gilliam, 119–128. London: Routledge.

Bendix, Regina. 1997. *In search of authenticity: The formation of folklore studies*. Madison: The University of Wisconsin Press.

Bhabha, H.K. 1994. *The location of culture*. London/New York: Routledge.

Bray, W., and I.C. Glover. 1987. Scientific investigation or cultural imperialism: British archaeology in the third world. *Bulletin of the Institute of Archaeology* 24: 109–125.

Cañizares-Esguerra, Jorge. 2002. *How to write the history of the new world. Histories, epistemologies in the eighteenth century Atlantic world*. Stanford: Stanford University Press.

Coronado, Jorge. 2009. *The Andes imagined: Indigenismo, society, and modernity.* Pittsburgh: University of Pittsburgh Press.

Daniel, Glyn. 1981. *A short history of archaeology.* London: Thames & Hudson.

Daniel, Glyn, and Colin Renfrew. 1988. *The idea of prehistory.* Edinburgh: Edinburgh University Press.

De la Cadena, Marisol. 2000. *Indigenous mestizos: The politics of race and culture in Cuzco, Peru 1919–1991*. Durham: Duke University Press.

Dietler, Michael. 2010. *Archaeologies of colonialism: Consumption, entanglement, and violence in ancient Mediterranean France*. Berkeley: University of California Press.

Díaz-Andreu, Margarita. 2007. *A world history of nineteenth century archaeology: Nationalism, colonialism and the past*. Oxford: Oxford University Press.

Díaz-Andreu, M., and T. Champion, eds. 1996. *Nationalism and archaeology in Europe*. Westview Press: Colorado.

Evans, C., and B.J. Meggers. 1973. United States 'imperialism' and Latin American archaeology. *American Antiquity* 38 (3): 257–258.

Favre, Henri. 1986. Bolívar y los indios. *Revista Histórica* 10 (1): 1–18.

Favre, Henri. 1998. *El indigenismo*. Mexico: Fondo de Cultura Económica.

Gero, J. 1985. Socio-politics of archaeology and the woman-at-home ideology. *American Antiquity* 50 (2): 342–350.

Gosden, Chris. 2004. *Archaeology and colonialism: Cultural contact from 500 bc to the present*. New York: Cambridge University Press.

Guillot, Laurence. 2010. Towards a socio-political history of archaeology in the Middle East: The development of archaeological practice and its impacts on local communities in Syria. *Bulletin of the History of Archaeology* 20 (1): 4–16.

Glover, Ian. 2010. National and political uses of archaeology in South-East Asia. *Indonesia and the Malay World* 31 (89): 16–30.

Gnecco, Cristóbal, and Carolina Hernández. 2008. History and its discontents. Stone statues, native histories, and archaeologists. *Current Anthropology* 49 (3): 439–466.

Gruzinski, Serge. 2012. *La Guerra de las imagenes. De Cristóbal Colón a Blade Runner (1492–2019)*. México: Fondo de Cultura Económica.

Helms, Mary. 1988. *Ulysses'Sail. An ethnographic odyssey of power, knowledge, and geographial distance*. Princeton: Princeton University Press.

Jeffreys, D., ed. 2003. *Views of ancient Egypt since Napoleon Bonaparte: Imperialism, colonialism and modern appropriations. Encounters with ancient Egypt*. London: University College London.

Kohl, P.L., and C. Fawcett. 1995. Archaeology in the Service of the State: Theoretical considerations. In *Nationalism, politics, and the practice of archaeology*, ed. P.L. Kohl and C. Fawcett, 3–18. Cambridge: Cambridge University Press.

Langebaek, Carl Henrik. 2009. *Los Herederos del Pasado. Indígenas y pensamiento criollo en Colombia y Venezuela*. 2 vols. Bogotá: Universidad de los Andes.

Lupher, David A. 2006. *Romans in a new world. Classical models in sixteenth century Spanish America*. Ann Arbor: University of Michigan Press.

Lydon, Jane, and Uzma Rizvi. 2010. *Handbook of postcolonial archaeology.* Walnut Creek: Left Coast Press.

Lyons, Claire L., and John K. Papadopoulos. 2002. *The archaeology of colonialism*. Los Angeles: The Getty Research Institute.

Moro-Abadía, O. 2006. The history of archaeology as a "colonial discourse". *Bulletin of the history of Archaeology* 16 (2): 4–17.

Qureshi, Sadiah. 2011. *Peoples on parade. Exhibitions, empire, and anthropology in nineteenth-century Britain*. Chicago: The University of Chicago Press.

Ramos, Alcida Rita. 1988. *Indigenism: Ethnic politics in Brazil*. Madison: University of Wisconsin Press.

Ricard, Robert. 2005. *La conquista espíritual de México*. México: Fondo de Cultura Económica.

Said, Edward. 2002. *Orientalismo*. Barcelona: Random House.

Schlanger, N. 2002. Making the past for South Africa's future: The prehistory of field-marshal smuts (1920–1940s). *Antiquity* 76 (291): 200–209.

Schmidt, Peter, and Jonathan R. Waltz. 2007. Representing African pasts through historical archaeology. *American Antiquity* 72 (1): 53–70.

Schnapp, Alain. 1996. *Discovery of the past-the origins of archaeology.* London: British Museum Press.

Shanks, Michael, and Christopher Tilley. 1987. *Social theory and archaeology.* Albuquerque: University of New Mexico Press.

Shaw, T. 1990. West African archaeology. Colonialism and nationalism. In *A history of African archaeology*, ed. P. Robertshaw, 205–220. London: James Currey.

Shepherd, Nick. 2002. The politics of archaeology in Africa. *Annual Review of Anthropology* 31 (31): 189–209.

Stocking, George. 1987. *Victorian anthropology.* New York: The Free Press.

Tantaleán, Henry. 2014. *Peruvian archaeology: A critical history.* Walnut Creek: Left Coast Press.

Thomas, David Hurst. 2000. *Skull Warfs. Kennewick man, archaeology, and the battle for native American identity.* New York: Basic Books.

Thomas, Julian. 2004. *Archaeology and modernity.* New York: Routledge.

Trigger, Bruce G. 1980. Archaeology of the image of the American Indian. *American Antiquity* 45 (1): 662–676.

Trigger, Bruce G. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.

Trigger, Bruce G. 1994. Paradigms in Sudan archaeology. *The International Journal of African Historical Studies* 27 (2): 323–345.

Willems, Willem. 2009. European and world archaeologies. *World Archaeology* 41 (4): 649–658.

Zimmerman, Andrew. 2001. *Anthropology and Antihumanism in imperial Germany.* Chicago: The University of Chicago Press.

Further Readings

Arnold, B. 1990. The past as propaganda: Totalitarian archaeology in Nazi Germany. *Antiquity* 64: 464–478.

Bond, George ad Angela Gilliam, ed. 1994. *Social construction of the past. Representation as power.* London: Routledge.

Campbell, F., and J. Hansson, eds. 2000. *Archaeological Sensibilities*. Gothenburg: Gothenburg University.

Hodder, I. 1986. *Reading the past*. Cambridge: Cambridge University Press.

Hudson, Kenneth. 1981. *A social history of archaeology.* London: Macmillan.

Jones, S. 1997. *The archaeology of ethnicity: Constructing identities in the past and present*. London: Routledge.

Kohl, T., and C. Fawcett. 1995. *Nationalism, politics and the practice of archaeology*. Cambridge: Cambridge University Press.
Mc Guire, Randall. 1992. *A Marxist Archaeology*. San Diego: Academic Press.
Navarrete, Rodrigo. 2004. *El Pasado con Intensión. Hacia una Reconstrucción Crítica del Pensamiento Arqueológico en Venezuela*. Caracas: Universidad Central de Venezuela- Fondo Editorial Tropykos.
Patterson, Thomas C. 1995. *Toward a social history of archaeology in the United States*. Forth Worth: Harcourt Press.
Schmidt, Peter, and Thomas Patterson, eds. 1995. *Making alternative histories. The practice of archaeology and history in non-western setting*. Santa Fe: School of American Research Press.
Shanks, M., and Christopher Tilley. 1989. Archaeology into the 1990's. *Norwegian Archaeological Review* 22: 1–54.
Tripp, R. 2004. *Romancing the Maya. Mexican antiquity on the American imagination 1820–1915*. Austin: University of Texas Press.
Ucko, Peter, ed. 1995. *Theory in archaeology: A world perspective*. London: Routledge.

Colonial Williamsburg Foundation (CWF): Historical Archaeology

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Basic Information

The Colonial Williamsburg Foundation (CWF) is a not-for-profit educational organization dedicated to the preservation, interpretation, and presentation of Williamsburg, the restored eighteenth-century capital of Virginia. This town-sized (301-acre) living history museum tells the story of becoming American by way of historic house tours, trades demonstrations, and through Revolutionary City, an interactive street theater program that depicts life during the revolution as told by the residents of eighteenth-century Williamsburg. The Art Museums of Colonial Williamsburg and the DeWitt Wallace Decorative Arts Museum feature British and American furniture and art from 1670 to 1830, while the Abby Aldrich Rockefeller Folk Art Museum is home to the nation's premier collection of nineteenth- through twenty-first-century American folk art. Colonial Williamsburg is committed to expanding its thought-provoking programming through education outreach on-site and online.

Williamsburg is located in Virginia's Tidewater region within an hour's drive of Richmond and Norfolk and 150 miles south of Washington, DC (website: www.history.org).

Major Impact

Colonial Williamsburg has been central to the development of North American historical archaeology since the late 1920s. Starting with an inventory of 88 standing eighteenth-century structures, workmen and architects began the process of reconstruction by carefully uncovering belowground footings and foundations and recovering associated architectural elements with the purpose of re-creating, as closely as possible, Virginia's second colonial capital. An extensive campaign of architecturally focused excavations was continued through the 1950s by Colonial Williamsburg's Architecture Department. Whole blocks were "cross-trenched," a process involving regularly spaced, foot-wide trenches dug diagonally to the north–south Baroque grid pattern of the city. When a building footing or foundation was encountered, it was exposed, mapped, and photographed. By the late 1950s, an estimated 75% of Williamsburg's historic area had been cross-trenched, and more than 300 buildings were ultimately reconstructed based on physical evidence found through that cross-trenching. While quite successful in locating structures for

potential reconstruction, this type of architecturally based excavation shed little light on the lives of Williamsburg's residents.

In 1957 British archaeologist Ivor Noël Hume was hired as the foundation's first full-time historical archaeologist. Under his leadership, excavation was separated from the Resident Architect's Office and evolved into one of North America's first and most renowned programs in the emerging discipline of historical archaeology. Noël Hume was also very influential in the establishment of the Society for Historical Archaeology and hosted its first meeting in Williamsburg in 1968. In addition to expanding the scope of archaeological research beyond the hunt for architectural remains, Noël Hume instituted two crucial changes to the excavation program: open-area excavation and the systematic retrieval of portable archaeological evidence including artifacts, faunal remains, and botanical material. Ivor Noël Hume and his wife Audrey skillfully combined the evidence recovered from the ground with the plethora of historical documentation surrounding Williamsburg, to create meaningful portrayals of life in the eighteenth-century capital.

In 1982 Dr. Marley R. Brown III followed Noël Hume as Colonial Williamsburg's Director of Archaeological Research. Under his leadership, CWF archaeology adopted a more anthropological approach and expanded its research to include a diachronic perspective to changes in the landscape. Research involving the creation of Williamsburg's urban environment, seventeenth-century settlement patterning, colonial foodways, the role of African Americans, intra-site spatial patterning, an international outlook toward comparative colonialism, and multidisciplinary approach to geophysical, faunal, and environmental analysis expanded the role of archaeological research considerably.

By the 1980s, the National Historic Preservation Act stimulated a wave of compliance-oriented investigations that both influenced and complemented the existing CWF program of research-based investigations. Important sites investigated included the Peyton Randolph Outbuilding Project, Shields Tavern, the Everard House, the St. George Tucker Garden, the Douglass Theater, the James Wray carpentry yard, the John Page manor house, and the seventeenth- and eighteenth-century components of Rich Neck Plantation to name a few. Excavations at seventeenth-century sites at Martin's Hundred were also continued shedding new light on the scale and scope of colonial settlements beyond Jamestown Island including indentured servitude and the early adoption of enslaved African labor on small colonial farms such as Atkinson site.

Another significant hallmark of this period was the partnership between Colonial Williamsburg and other heritage and academic institutions, both domestic and foreign, to explore the interrelationships between disparate British colonies. In particular, a cooperative agreement in the early 1990s with the National Park Service led to the Jamestown Archaeological Assessment culminating in a seven-volume report encompassing the archaeology, environment, history, geology, and the potential of the National Park Service's 60-year archaeological program on Jamestown Island as well as two important doctoral dissertations (Horning 1994; Wehner 2006). The CWF/NPS cooperative agreement also led to archaeological surveys and evaluations at George Washington Birthplace National Monument, Yorktown (Colonial National Historical Park), Appomattox Court House National Historical Park, City Point (Petersburg National Battlefield), and Shenandoah National Park.

Meanwhile, CWF archaeologists, working in partnership with the Bermuda National Trust and the Bermuda Maritime Museum, conducted excavations and documentary research at various sites in Bermuda. Also in the 1990s, archaeologists from CWF carried out work in Bridgetown, Barbados, in conjunction with the National Trust of Barbados. Architectural research in Bermuda and Jamaica has continued under the direction of architectural historian Edward A. Chappell (Chappell 2009).

A particularly enduring legacy of the archaeological program in the late twentieth century was the establishment of the annual field school in historical archaeology held in conjunction with the Department of Anthropology at the nearby College of William and Mary. Since 1984

thousands of undergraduate and graduate students, including some of today's best-known scholars, received their formative training in archaeological fieldwork while working alongside Colonial Williamsburg's professional staff.

In 2008, Colonial Williamsburg's archaeological research staff and the foundation's Architectural Research Department became a single department under the leadership of architectural historian Edward A. Chappell. The consolidation reflected the increasingly interdisciplinary nature of archaeological work in the twenty-first century and the changing nature of CWF's public programming. The staff also works closely with archivists, curators, conservators, as well as media education specialists, digital historians, and cultural anthropologists (Fig. 1).

Colonial Williamsburg Foundation (CWF): Historical Archaeology, Fig. 1 Archaeology of a late eighteenth-century dairy at Charlton's Coffeehouse

A detailed and updated description of recent archaeological projects can be found on the Colonial Williamsburg website: http://research.history.org/Archaeological_Research.cfm.

Current research areas:

- Colonial Williamsburg is committed to a program of public outreach that promotes a preservation ethic and conveys what archaeology is and what we have learned from its practice. Programs that communicate the stewardship of archaeological sites as "cultural heritage resources" and ones that focus on the central work of archaeologists as a multifaceted process of learning about the past are key models used in CWF public archaeology curricula. The foundation has developed hands-on "Discovering the Past" programs, aimed at school-aged groups that uses volunteers and regular staff to help children and young adults begin to think as archaeologists do about the past and their own surroundings. All programs have a central theme that attempts to accurately describe the work of archaeologists while maintaining the value of archaeological sites by avoiding the suggestion that anyone can dig without extensive training. Training of that nature is provided through the accredited field school in historical archaeology.
- Colonial Williamsburg's archaeological projects and resources on African Americans, generated from the excavations of mixed-racial and entirely African-American sites, are central to historical interpretation and reconstruction. From the late 1970s, research on eighteenth-century plantations like nearby Carter's Grove, Rich Neck, and Palace Lands (Fig. 2) and sites of later dates such as the Quarterpath Road and the Polly Valentine House have generated a wealth of information contributing to a firm database of resources to help the comprehensive study of the social, political, and economic diversity of Virginia during the colonial and even early modern periods. Work at multiracial sites in the historic area including the Ravenscroft lot and the Public Armory has sought to understand "cultural differences" relating to African Americans that

Colonial Williamsburg Foundation (CWF): Historical Archaeology, Fig. 2 Archaeological field school at an African-American slave quarter on the Palace Lands in Williamsburg

can be addressed archaeologically. With a number of substantial, accredited studies, the archaeological program prioritizes research on key topics including slave living and working areas, faunal and botanical studies of foodways and medicine, master–slave relations, as well as factors that affected the acquisition, use, and disposal of certain material items (Edwards-Ingram 2005).

- Colonial Williamsburg and the College of William and Mary have collaborated on the Historical Archaeology of Native Americans. The College of William and Mary's intent to renovate the eighteenth-century Brafferton building, a structure used to house the college's eighteenth-century Indian school, led to an archaeological investigation of the site through the joint CWF/W&M archaeological field school in the summer of 2011. Significantly, the Brafferton represents the only documented location within the limits of eighteenth-century Williamsburg where Native Americans were the primary inhabitants, and the site's 2011 investigation indeed recovered intriguing material evidence on Native Americans living at the college. Also notable was the fact that the Brafferton represented a new level of community engagement for CWF's archaeological research staff, again reflecting recent trends within the broader discipline to engage stakeholders beyond the professional archaeological community. Building upon both community-based and indigenous archaeology models developed over the last decade, the Brafferton Legacy Group, an advisory body made up of William and Mary Native American alumni, offered guidance on how the excavations might provide an opportunity to reforge connections between the college and contemporary Native American tribes.
- Using multiple analytical scales, environmental archaeology draws on faunal remains, phytoliths, pollen, macrobotanicals, and parasites to reconstruct the colonial town's biotic and cultural landscape. CWF zooarchaeological researchers have amassed a large database of urban and rural sites from which they have reconstructed the provisioning system that fed urban populations. Through the lens of landscape ecology and animal behavior, they have reconstructed how colonists adopted native horticultural practices to produce the commercial crop tobacco and develop an open woodland husbandry system. Palynological and phytolith studies have produced evidence of forestation in the eighteenth

century, followed by a decline in pine pollen and an increase in weedy plants associated with disturbed soils. On the household level, numerous faunal, pollen, macrobotanical, and parasite studies have identified household subsistence practices of all walks of life, the elite, enslaved, tradesperson, and more (Walsh et al. 1997; Mrozowski et al. 2008). Current work is continuing to expand our understanding of Williamsburg by reconstructing garden and other cultural landscape features in urban houselots and by identifying broad regional and neighborhood changes in the biotic landscape (Fig. 3).

- *Virtual Williamsburg*, an interactive 3D computer model of Williamsburg currently in development (Fig. 4), reflects the latest archaeological and architectural research. Virtual heritage is an increasingly important expression of a cultural heritage site's state of research and one that is also creating new paradigms for understanding the past (Kalay et al. 2008: 9). *Virtual Williamsburg*, which is being built neighborhood by neighborhood, will recreate the colonial cityscape of Williamsburg in 1776 on the eve of the American Revolution. The assimilation of multiple archaeological datasets to create the virtual reconstruction is providing new insights into the town's history and development. The model draws upon a range of material culture and archaeologically derived topographical and environmental data are being combined to reconstruct the eighteenth-century landscape virtually. The digital reconstruction will be used to create a range of educational media for exploring the town during this important period in its history and to enhance the on-site guest experience. The first neighborhood being virtually reconstructed – the east end of town – includes significant buildings that have not been physically reconstructed, such as the second Capitol and the Douglass Theatre, and is being modeled in conjunction with the University of Virginia's Institute for Advanced Technology in the Humanities. Funding for *Virtual Williamsburg* and 3D modeling at Colonial Williamsburg has been provided by the Institute of Museum and Library Services, the National Endowment for the Humanities, and the Andrew W. Mellon Foundation.

Archaeology at Colonial Williamsburg in the twenty-first century continues as it has in the past, by taking an up-to-date interdisciplinary approach to the historical archaeology of the British Atlantic World and the Chesapeake Region.

Colonial Williamsburg Foundation (CWF): Historical Archaeology, Fig. 3 Environmental sampling at George Washington Birthplace National Monument by Colonial Williamsburg archaeologists and environmental archaeologist Lisa Kealhofer

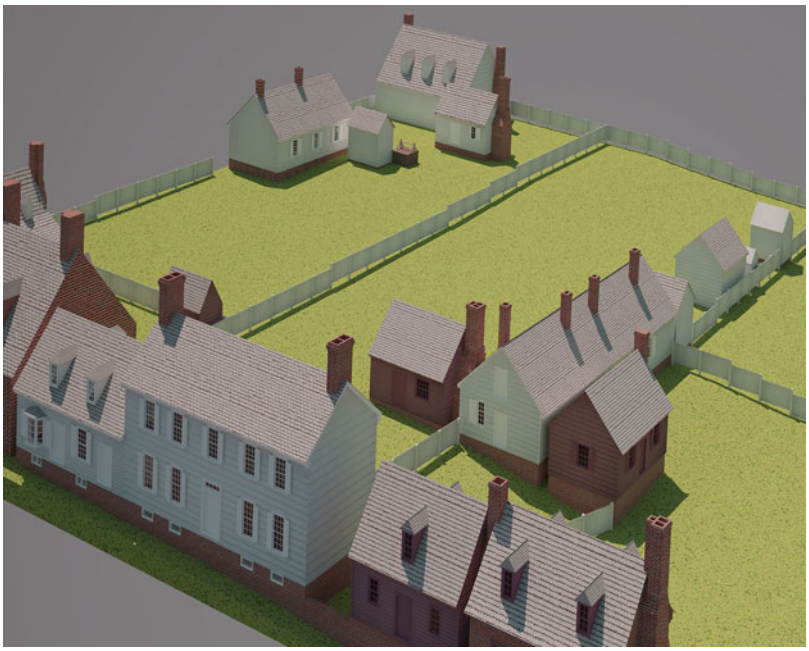

Colonial Williamsburg Foundation (CWF): Historical Archaeology, Fig. 4 Virtual view of the Public Armoury in Williamsburg, 1779

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Archaeobotany
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Excavation Methods in Archaeology
- ▶ Field Schools, Archaeological
- ▶ Heritage Museums and the Public
- ▶ Landscape Archaeology
- ▶ Noël Hume, Ivor
- ▶ North America (USA): Historical Archaeology
- ▶ Public Archaeology, The Move towards
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Zooarchaeology

References

Chappell, E.A. 2009. The Bermuda House. *Post-Medieval Archaeology* 45: 93–143.

Edwards-Ingram, Y. 2005. *Medicating slavery: Motherhood, health care, and cultural practices in the African diaspora*. Unpublished Ph.D. dissertation, The College of William and Mary.

Horning, A.J. 1994. *'A verie fit place to erect a great cittie'. Comparative contextual analysis of archaeological Jamestown*. Unpublished Ph.D. dissertation, University of Pennsylvania.

Kalay, Y.E., T. Kvan, and J. Affleck. 2008. *New heritage: New media and cultural heritage*. London: Routledge.

Mrozowski, S., M. Franklin, and L. Hunt. 2008. Archaeobotanical analysis and interpretations of enslaved Virginia plant use at Rich Neck Plantation (44WB52). *American Antiquity* 73: 669–728.

Walsh, L., A. Smart Martin, and J. Bowen. 1997. *Provisioning early American towns, the Chesapeake: A case study.* Final Performance Report, National Endowment for the Humanities Grant RO-22643-93.

Wehner, K.B. 2006. *Crafting lives, crafting society in seventeenth-century Jamestown, Virginia*. Unpublished Ph.D. dissertation, New York University.

Further Reading

Bowen, J., C. Carson, W. Graham, M. McCartney, and L. Walsh. 2008. New world, real world: Impoverishing English culture in seventeenth century Virginia. *The Journal of Southern History* LXXIV: 31–88.

Brown, G.J., and D.F. Muraca. 1993. Phasing stratigraphic sequences at Colonial Williamsburg. In *Practices of archaeological stratigraphy*, ed. E.C. Harris, M.R. Brown III, and G.J. Brown, 155–166. London/San Diego: Academic.

Brown, M.R., and P. Samford. 1990. Recent evidence of 18th-century gardening in Williamsburg, Virginia. In *Earth patterns: Essays in landscape archaeology*, ed. W.M. Kelso and R. Most, 103–121. Charlottesville: University Press of Virginia.

Orser, C.E., ed. 2002. *Encyclopedia of historical archaeology.* London: Routledge.

Sullivan, K., and L. Kealhofer. 2004. Identifying activity areas in archaeological soils from a colonial house lot using phytolith analysis and soil chemistry. *Journal of Archaeological Science* 31: 1659–1673.

Colony of Avalon Archaeological Site

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Basic Information

Colony of Avalon, Ferryland, Newfoundland, Canada.
www.colonyofavalon.ca

Major Impact

The Colony of Avalon archaeological site, nestled in the community of Ferryland, Newfoundland, Canada, and located on a major promontory along the eastern coast of the Avalon Peninsula roughly 80 km south of St. John's, represents one of the earliest attempts at English settlement in the New World.

The modern town of Ferryland has a history of occupation that extends backward in time more than 500 years. The first reference to the place is found on Giovanni Verrazano's 1529 map of the world, on which the familiar Newfoundland headland is labeled as "Farilham." The first notation by the English, in the 1590s, refers to the harbor as "Farillon." Either name can likely be traced as a corruption either of *farelhao*, the Portuguese nomenclature for steep rock or point, or of the French word *forillon*, meaning "cape", or "point."

The Colony of Avalon archaeological site provides us with a record of a long and rich cultural history. Early exploitation of the rich Newfoundland fishing grounds began in the early 1500s. The early fishery was a shore-based operation, whereby fishermen deployed to the sea in day-to-day expeditions from camps along the shore. The conspicuous Ferryland headland, jutting prominently into the North Atlantic, boasted a harbor with easy access to the fishing grounds, and extensive cobblestone beaches for drying catch.

Throughout the sixteenth and seventeenth century, Portuguese, Spanish, Basque, French, and West Country English fisherman are known to have been exploiting the resources of Newfoundland's waters. After 1565, English involvement in the Newfoundland fishery dramatically increased as European economic conflicts severely affected both the Spanish and Portuguese fisheries, and an economic shift in France's transatlantic fishery shifted much of its massive contingency to a "wet" offshore fishery. These two processes opened the way for England to officially dominate much of the inshore niche from the end of the sixteenth century onward (Matthews 1973; Pope 2004). By the 1600s, the English fishery was firmly established on the peninsula, and the first attempts at permanent settlement quite inevitable.

Intermingled with the residual fragments of migratory European fishermen, archaeologists have uncovered evidence of Newfoundland's now-extinct native Beothuk people at Ferryland, including bifaces, projectile points, stone tools, and Beothuk hearths. The Beothuk campsites have been found in association with sherds of early European ceramic wares, suggesting a concurrent exploitation of the resources at Ferryland during the sixteenth century, and attesting to the importance of the site at this time, although notably, archaeological evidence indicates a *terminus ante quem* for Beothuk presence at the site of no later than 1580 (Gaulton 2001).

The colony itself was variously referred to across time as Avalon, the Pool Plantation, and Ferryland. In 1620, George Calvert (later the first Lord Baltimore, whose heirs would come to settle St. Mary's City in modern Maryland, U.S.A.) purchased a tract of land between modern-day Calvert and the headland between Aquaforte and Fermeuse from Sir William Vaughan, whose earlier attempts to start a settlement in the area had been unsuccessful. Construction of the settlement of Avalon, as Calvert would come to call his colony, began on August 4, 1621, when Captain Edward Wynne, acting on behalf of Lord Baltimore, arrived in Newfoundland along with 11 other settlers and erected a series of buildings, including a 13.3 by 4.5 m dwelling with a semi-attached kitchen and parlor, as well as tenements, a forge, saltworks, a brewhouse, a hen house, a

well, a wharf, and a defensive palisade, concentrated around a sheltered inner harbor referred to as "The Pool" (Gaulton and Tuck 2003; see also Gaulton and Miller 2009). These buildings established the site as a permanent settlement, one that would eventually become the predominant colony in Newfoundland throughout much of the seventeenth century.

The colony has an intriguing and interesting history. In the winter of 1622/23, thirty-two additional settlers arrived and by the middle of the decade, roughly 100 settlers inhabited the colony of Avalon, although Baltimore himself left Ferryland and its "intolerable cold" within a year of his own arrival in 1627, leaving the colony in the hands of a trusted representative (Cell 1982; see also Miller et al. 2011). In 1637, a syndicate headed by Sir David Kirke was granted administrative proprietorship of Newfoundland through the close connections of its members with the court of Charles I. In 1638, Kirke, along with his wife Lady Sara, their three sons, and a group of about 100 new settlers, arrived in Ferryland to take advantage of this grant. Exploiting Lord Baltimore's absence from the settlement, Kirke evicted the Calvert's representative, Captain William Hill, and expropriated Ferryland. Kirke and his family took up residence in the mansion house, and Calvert's settlement came to be known as the Pool Plantation (Gaulton and Tuck 2003). A series of lawsuits ensued between the Calverts and the Kirkes as both parties pressed for ownership, and in 1651, Kirke was called to England for an official inquiry into the administration of Newfoundland and his activities there (for further context, see Pope 1998). Kirke lost proprietorship of Newfoundland and was forced to forfeit his lands and possessions to Cromwell's Commonwealth. In spite of this, and regardless of the government's appointment of a new commissioner of the colony in 1653, Lady Sara Kirke and her sons remained at the settlement and Lady Kirke eventually became one of the most successful fish merchants in the area until her death in the 1680s. Kirke himself died in prison in 1654.

The community is known to have thrived until the third quarter of the seventeenth century, when wars between the European countries spilled over into Newfoundland. Ferryland was subjected to an unopposed attack by four Dutch ships in 1673, and later to a more well-executed attack carried out by the French on September 21, 1696, as France competed with England to assert its own claims on Newfoundland and its fishery. When the inhabitants of Ferryland refused to swear allegiance to the French king, the colony was destroyed. Following several years of peace, France and England renewed their war in 1701, and the colony was attacked twice more by the French, in 1705 and 1708. In 1713, Queen Anne's War finally ended, culminating with the Treaty of Utrecht. The provisions of the treaty stipulated that France relinquish the Island of Newfoundland to the British. A long period of peace followed the signing of the treaty, and Ferryland's colonials remained safe from further collateral damage by the wars. Intriguing archaeological data from this period reflects the extent of the damage wrought during this era and provides us with an opportunity to explore how these events impacted and changed the social and economic context of life at the colony. While much of the archaeology at the site to date has focused on the Calvert and Kirke eras at the colony, research continues to expand our understanding of the development of the colony into the eighteenth century as well.

While the existence of the Colony was never lost from either history or from local memory, the actual location of the site was undetermined until the last two decades. Archaeology at Ferryland began in the late nineteenth century, when, based upon information gleaned from historical records, the antiquarian M.F. Howley unearthed several artifacts while attempting to pinpoint the coordinates of the original settlement. Limited excavations followed in 1937 by Carnegie Institute entomologist Stanley Brooks, in 1959 by Russell Harper on behalf of the Historic Sites and Monuments Board of Canada, in 1968 by the Memorial University Archaeology Unit, and in the 1970s by Robert Barakat. Intensive excavations at the site began in the mid-1980s by Memorial University and have continued on an ongoing basis since 1992 for up to 20 weeks each summer.

Archaeological assemblages have contained a remarkable collection of seventeenth and eighteenth century artifacts, and excavations have revealed the scale, as well as attested to the significance, of the site. Defensive works in the form of a

20-ft-wide ditch and 20-ft-wide rampart border the eastern side of the colony, with a large bastion at the south end of the fortification ideally placed to monitor ocean traffic and to support ordnance in defense of the colony (Gaulton and Miller 2009). The colony features a large quay, a massive stone seawall, and an impressive stone storehouse with interior dimensions of 16 by 56 ft. on a waterfront terrace immediately to the south of Ferryland's inner harbor. A well-built stone wall separates the waterfront terrace from a higher terrace to the south upon which a series of dwellings, including a group of interconnected structures which form the impressive "Mansion House," as well as tenements, outbuildings, a forge, and a brewhouse and bakery have been excavated. A cobblestone street, 13-ft wide and 400-ft long, spans the distance of the original colony's boundaries, and connects the structures of the upper terrace to those of the waterfront on the terrace below. Archaeologists have surmised that the colony in its entirety must have resembled one of the small port towns of the West Country with its layers of buildings and cobbled walkways, courtyards, and work areas (Gaulton et al. 2011).

The English colony of Avalon at Ferryland, Newfoundland, is a site extraordinarily rich both in history and in archaeological remains. The site continues to provide a rich archaeological heritage of the seventeenth and eighteenth century in Ferryland, and a window into one of the earliest settlements in the New World. Significant discoveries continue to occur today. Supported by the Colony of Avalon Foundation, the facility includes an interpretation center with guided onsite tours, a conservation laboratory, a collection storage area, a gift shop, a reproduction of a seventeenth century kitchen, and three heritage gardens.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Ceramics: Stonewares
- ▶ Clay Pipes in Historical Archaeology
- ▶ Historic St. Mary's City
- ▶ Portuguese Redwares and Coarse Wares in Historical Archaeology

References

Cell, G.T. 1982. *Newfoundland discovered: English attempts at colonisation 1610–1630*. London: The Hakluyt Society.

Gaulton, R. 2001. An early historic Beothuk occupation at Ferryland, Newfoundland. *Avalon Chronicles* 6: 19–56.

Gaulton, B.C., and A.F. Miller. 2009. Edward Wynne's *The British India or a compendious discourse tending to advancement (circa 1630–1631)*. *Newfoundland and Labrador Studies* 24: 111–120.

Gaulton, B., and J.A. Tuck. 2003. The archaeology of Ferryland, Newfoundland, until 1696. *Avalon Chronicles* 8: 187–224.

Gaulton, B.C., J.A. Tuck, and A.F. Miller. 2011. Archaeology at Ferryland 2010. In *Provincial archaeology office 2010 archaeology review*, ed. S. Hull and D. Mercer, vol. 9, 57–60. Department of Tourism Culture and Recreation.

Pope, P.E. 2004. *Fish into wine: The Newfoundland plantation in the seventeenth-century*. Chapel Hill: The University of North Carolina Press.

Further Reading

Matthews, K. 1973. *Lectures on the history of Newfoundland, 1500–1830*. St. John's: Maritime History Group, Memorial University of Newfoundland.

Miller, A.F., J.D. Krugler, B.C. Gaulton, and J.I. Lyttleton. 2011. 'Over shoes over boots': Lord Baltimore's final days in Ferryland, Newfoundland. *Journal of Early American History* 1: 167–182.

Pope, P.E. 1998. Baltimore vs. Kirke: Newfoundland evidence in an interregnum lawsuit. *Avalon Chronicles* 3: 63–98.

Commingled Remains

Field Recovery and Laboratory Analysis

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Introduction and Definition

The term "commingling" refers to the intermixing of remains from more than one individual (Fig. 1) and, when present, is a challenging component of many anthropological analyses. The study of commingled remains may pertain to an

Commingled Remains, Fig. 1 Archaeological excavation showing commingled human remains *in situ* (photograph courtesy of John Byrd)

archaeological context or a forensic context. Within the archaeological context, the focus of study could be faunal (i.e., nonhuman) remains or human remains. Within the forensic realm, discussions of commingling usually refer to the intermixing of human remains, such as may occur from a mass disaster or in cases of mass graves resulting from periods of political, ethnic, or religious violence. Regardless of whether the context is archaeological or forensic, commingling of remains will complicate every facet of the process from recovery to final disposition. The focus of this section will be an overview of field recovery and laboratory analysis of commingled *human* remains, although there is clearly overlap with the recovery and analysis of faunal remains.

Historical Background

It is often the role of an anthropologist to document and attempt to resolve commingling. An early example of research into the forensic analysis of commingled remains is an article by Charles Snow (1948) who was the first physical anthropologist at the US Army's Central Identification Laboratory in Hawaii. In this article, Snow outlined protocols used in the anthropological analysis of US war dead from World War II. Although there have been technological advances since that time, most of the methods used for dealing with commingled remains are still relevant today. More recent publications on commingled human remains include Ubelaker (2002), Byrd and Adams (2009), Adams and Byrd (2008, 2014), Osterholtz et al. (2014), and a special edition of the journal Forensic Anthropology (2019), all of which provide comprehensive lists of additional references on the topic.

Key Issues

The primary considerations associated with commingled remains include field recovery and laboratory analysis. Field recovery deals with the documentation and collection of remains, while laboratory analysis primarily deals with sorting and quantification. As the number of commingled individuals increases, so does the complexity of the investigation and the skills and resources needed for case resolution. The analytical complexity is also tied to the condition of the remains. As the state of preservation declines, the complexity of the recovery and/or analysis increases. The condition of the remains will vary depending on the circumstances associated with death, depositional context, and the amount of time elapsed between death and recovery. States of preservation may range from fleshed to skeletonized, and from intact to fragmentary. Taphonomic changes, such as thermal alteration (Warren and Schultz 2002) and weathering, may further complicate the analysis of commingled remains. The degree of commingling can vary widely from situations that are relatively straightforward, such as intact remains and a small number of individuals, to those that are extremely challenging, such as a large number of individuals and/or extensive fragmentation.

It is possible to broadly categorize commingling scenarios into two types: small-scale and large-scale. Small-scale commingling exists when there are not many disassociated body portions and/or the overall number of individuals is small. Even if the overall number of individuals is large (such as a mass grave), the degree of commingling may still be considered to be small-scale if the skeletal elements are mostly articulated upon their recovery. Large-scale

commingling involves large numbers of individuals whose body parts are intermixed, or it may represent scenarios with extreme fragmentation. For example, a plane crash with a relatively small number of individuals may become a large-scale incident if the body fragmentation is extensive since each separate fragment initially needs to be treated as potentially coming from a different individual. Large-scale commingling often necessitates a greater reliance on DNA analysis and presents numerous logistical challenges, such as data management and analytical space.

The September 11, 2001 terrorist attack on the World Trade Center (WTC) in New York City represents an example of an event that resulted in large-scale commingling. There are 2753 known victims and over 21,000 human remains have been recovered to date. Anthropological methods have played an important role in the various aspects of recovery and analysis, but the high level of fragmentation necessitated a strong reliance on DNA for victim identification. At the Office of Chief Medical Examiner in New York City, the successful resolution of commingled WTC remains has been due to a collaborative effort between the Forensic Anthropology and Forensic Biology Departments (Mundorff et al. 2014).

Field Recovery

Familiarity with archaeological excavation and site mapping techniques are important factors for the successful recovery of commingled human remains (Dirkmaat and Adovasio 1997; Haglund 2002; Schmitt 2002; Skinner et al. 2002). Documentation (three-dimensional location) of the provenience of the remains and associated artifacts can prove critical for the subsequent laboratory analyses. It is important to remember that once remains are collected from the field, this important spatial information will be lost unless maps, notes, and photographs are completed while the remains are in situ (i.e., in their original position).

Laboratory Analysis

In the laboratory, the two primary objectives will be to sort the commingled remains into specific individuals and to quantify the overall number of dead. Within the forensic context, attempts will be made to identify the remains to a missing individual and return them to the next of kin. For situations with known or suspected commingling, all remains should initially be considered as coming from a separate individual unless they can be shown to be attached by soft tissue or to conjoin to another piece at a fracture site. As stated above, the context in which remains are found will often provide critical information in the sorting process, such as when body parts are found in correct anatomical position despite being disarticulated from the body.

The first step of the sorting process involves an inventory and determination of body part representation. As part of this step, fragmentary remains should be conjoined to the greatest extent possible as this will assist in overall sorting process. When working with fragmentary, fleshed human remains, it may be difficult to grossly recognize the full extent of commingling. Radiography can be a useful tool in the recognition of commingling depending on the type of incident and preservation of the bodies (Viner 2014; Goodman and Edelson 2002).

After an inventory of the skeletal elements is made and reconstruction completed, there are numerous anthropological sorting techniques that may be used in the resolution of commingling. In essence, these techniques are used to rebuild individuals. They include visual pair-matching (the association of homologous elements based on similarities in morphology) (e.g., Legarde 2019), articulation (formation of a congruent joint or juncture with another element), process of elimination (determination that certain remains could originate from one, and only one, individual), osteometric comparison (use of statistical models to objectively compare size and shape relationships between elements based on measurements) (e.g., Byrd and Legarde 2018; Thomas et al. 2013), and taphonomy (similarities and differences in postmortem preservation). Components of the biological profile (e.g., age, sex, and stature) may also be useful in the sorting process. The majority of these sorting

procedures are not stand-alone techniques and they are most relevant for small-scale incidents. For best results, they should be used in conjunction with each other, as well as with the contextual scene information. Finally, anthropologists utilizing these techniques should have a strong background in skeletal anatomy along with an understanding of bone morphology and human variation. Although not an anthropological technique, the comparison of postmortem DNA profiles also provides a powerful means of segregating remains, as mentioned above with the WTC example, and may be a primary means of sorting/re-association with large-scale and very fragmentary scenarios.

When working with commingled human remains, the goal of quantification is to estimate the total number of dead. Determination of the number of individuals usually occurs after the re-association process is complete (i.e., conjoining fragments and sorting into specific individuals). Components to consider when determining the appropriate quantification technique include bone preservation and scale of the incident. Probably the more important of the two is preservation since extremely fragmentary or poorly preserved remains may not be amenable to any accurate quantification technique.

For interpreting population size from a skeletal assemblage, the Minimum Number of Individuals (MNI) presents the minimum estimate of the number of individuals that contributed to the sample. Within anthropology, this technique is frequently used for estimating the number of individuals due to its ease of calculation. The most common variant of the MNI is simply calculated by sorting the bones by side and element and then taking the greatest number as the estimate. In order to deal with fragmentary remains, specific segments of an element (e.g., proximal humerus) can be used for the calculation of the MNI. Every fragment must share a specific landmark to ensure that fragments do not originate from the same skeletal element. The basic principle of an MNI estimate is to avoid counting the same individual twice.

Other quantification techniques are available for the analyst. One alternative method is the Most Likely Number of Individuals, or MLNI (Adams and Konigsberg 2004; Konigsberg and Adams 2014). This technique is used to estimate the actual number of individuals, as opposed to the minimum number, and research has shown that this can be an effective method (Palmiotto et al. 2019). The MLNI is calculated based on the number of paired and unpaired bones (as opposed to the MNI which is usually not dependent on pair-matching). In addition, confidence intervals can be calculated for the MLNI estimates. For proper use of the MLNI, preservation must be good since it is critical that elements can be accurately pair-matched. For situations where there has been random loss of body portions, the MLNI estimates should provide the most accurate estimates of the true population.

Final Considerations

For the anthropological analysis of commingled remains, it is imperative that appropriate methods are utilized during field recovery and laboratory analysis. Otherwise, important information may be lost. For forensic investigations, the successful resolution of commingling will be tied to personal identification of the decedents and reassociation of the greatest amount of remains possible. Ethically challenging decisions pertaining to the treatment of commingled remains will have to be determined within the forensic context (Kontanis and Sledzik 2014; Wagner 2014). Many of these decisions will likely fall outside the purview of the anthropologist, such as the scope of the effort (e.g., will every fragment be analyzed for reassociation or will there be a size parameter established for analysis) and the disposition of unidentified remains (e.g., the fate of common tissue which is not linked back to a specific decedent).

Cross-References

▶ Archaeology and Art
▶ Bioarchaeology: Definition

- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Bone, Trauma in
- ▶ Burned Remains in Forensic Contexts
- ▶ Cremation in Archaeological Contexts
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology and Archaeology in Disaster Response
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy: Definition

References

Adams, B.J., and J.E. Byrd, eds. 2008. *Recovery, analysis, and identification of commingled human remains*. Totowa: Humana Press.

Adams, B.J., and J.E. Byrd, eds. 2014. *Commingled human remains: Methods in recovery, analysis, and identification*. San Diego: Academic Press.

Adams, B.J., and L.W. Konigsberg. 2004. Estimation of the most likely number of individuals from commingled human skeletal remains. *American Journal of Physical Anthropology* 125: 138–151.

Byrd, J.E., and B.J. Adams. 2009. Analysis of commingled human remains. In *Handbook of forensic anthropology and archaeology*, ed. S. Blau and D.H. Ubelaker. Walnut Creek: Left Coast Press.

Byrd, J.E., and C.B. Legarde. 2018. Evaluation of method performance for osteometric sorting of commingled human remains. *Forensic Sciences Research* 3: 343–349.

Dirkmaat, D.C., and J.M. Adovasio. 1997. The role of archaeology in the recovery and interpretation of human remains from an outdoor forensic setting. In *Forensic Taphonomy*, ed. W.H. Haglund and M.H. Sorg. New York: CRC Press.

Forensic Anthropology. 2019. Special issue: Commingled remains. *Forensic Anthropology* 2: 1–142.

Goodman, N.R., and L.B. Edelson. 2002. The efficiency of an X-ray screening system at a mass disaster. *Journal of Forensic Sciences* 47: 127–130.

Haglund, W.D. 2002. Recent mass graves, an introduction. In *Advances in forensic Taphonomy: Method, theory, and archaeological perspectives*, ed. W.D. Haglund and M.H. Sorg. Boca Raton: CRC Press.

Konigsberg, L.W., and B.J. Adams. 2014. *Estimating the number of individuals represented by commingled human remains: A critical evaluation of methods. Commingled human remains: Methods in recovery, analysis, and identification*. San Diego: Academic Press.

Kontanis, E.J., and P. Sledzik. 2014. Resolving commingling issues during the medicolegal investigation of mass fatality incidents. In *Commingled human remains: Methods in recovery, analysis, and identification*, ed. B.J. ADAMS and J.E. BYRD. San Diego: Academic Press.

Legarde, C. 2019. Preliminary findings from a visual pair-matching study in a large commingled assemblage. *Forensic Anthropology* 2: 65–71.

Mundorff, A.Z., R. Shaler, E.T. Bieschke, and E. Mar-Case. 2014. Marrying anthropology and DNA: Essential for solving complex commingling problems in cases of extreme fragmentation. In *Commingled human remains: Methods in recovery, analysis, and identification*, ed. B.J. Adams and J.E. Byrd. San Diego: Academic Press.

Osterholtz, A.J., K.M. Baustian, and D.L. Martin, eds. 2014. *Commingled and disarticulated human remains: Working toward improved theory, method, and data*. New York: Springer.

Palmiotto, A., C. Brown, and C. Legarde. 2019. Estimating the number of individuals in a large commingled assemblage. *Forensic Anthropology* 2: 129–138.

Schmitt, S. 2002. Mass graves and the collection of forensic evidence: Genocide, war crimes, and crimes against humanity. In *Advances in forensic Taphonomy: Method, theory, and archaeological perspectives*, ed. W.D. Haglund and M.H. Sorg. Boca Raton: CRC Press.

Skinner, M.F., H.P. York, and M.A. Connor. 2002. Post-burial disturbance of graves in Bosnia-Herzegovina. In *Advances in forensic Taphonomy: Method, theory, and archaeological perspectives*, ed. W.D. Haglund and M.H. Sorg. Boca Raton: CRC Press.

Snow, C. 1948. The identification of the unknown war dead. *American Journal of Physical Anthropology* 6: 323–328.

Thomas, R.M., D.H. Ubelaker, and J.E. Byrd. 2013. Tables for the metric evaluation of pair-matching of human skeletal elements. *Journal of Forensic Sciences* 58: 952–956.

Ubelaker, D.H. 2002. Approaches to the study of commingling in human skeletal biology. In *Advances in forensic Taphonomy: Method, theory, and archaeological perspectives*, ed. W.D. Haglund and M.H. Sorg. Boca Raton: CRC Press.

Viner, M.D. 2014. The use of radiology in mass fatality events. In *Commingled human remains: Methods in recovery, analysis, and identification*, ed. B.J. Adams and J.E. Byrd. San Diego: Academic Press.

Wagner, S. 2014. The social complexities of commingled remains. In *Commingled human remains: Methods in recovery, analysis, and identification*, ed. B.J. Adams and J.E. Byrd. San Diego: Academic Press.

Warren, M.W., and J.J. Schultz. 2002. Post-cremation taphonomy and artifact preservation. *Journal of Forensic Sciences* 47: 656–659.

Communicating Archaeology: Education, Ethics, and Community Outreach in North America

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Introduction

Archaeology has always been a dynamic field with amazing discovers about the past being reported to the public. Over time there has been a transformation in communicating archaeology to the public from eighteenth-century museums as "cabinets of curiosities" to twenty-first-century anthropology/archaeology and history museums. Archaeologists in Canadian and United States universities, museums, government, and nonprofit organizations have been faced with the challenges of presenting archaeology to the public. Beyond museum exhibits, archaeologists give public lectures, have tours of their sites, write articles and pamphlets for the public, present programs for school-age children, and undertake excavations with students and adult volunteers. In the diverse ways in which North American archaeologists engage the public, how do ethics and community collaboration fit into the picture of public archaeology, especially in the realm of education? The focus of this entry is on community collaboration in educational outreach.

Historical Background

Nothing exists in a vacuum. Archaeologists' acceptance of community outreach and willingness to engage the public reflected trends found throughout Canada and the United States in the later part of the twentieth century. Educational efforts to reach out to the public were also taking place in affiliated fields such as museum studies and history, and these have affected our work. The 1960s and 1970s were the early years of the new social history. American historians were focusing on women, African Americans, American Indians, various ethnic minorities, and the working class – the people often overlooked in traditional historical research. The goals were to enlarge our view of history and bring to life the forgotten history of people without power – to tell the history of all Americans. With this interest in new areas of social history and outreach work, archaeologists such as James Deetz became involved in bringing archaeology to the public through outdoor museums (Deetz and Deetz 2000). In 1978, Deetz pioneered the idea of first person interpretation at Plimouth Plantation, in Massachusetts, which was later used at other living history museums.

Indoor museums were also trying to engage the public and promote museum education programs to a broader public. In the early 1970s, Thomas Hoving, then Director of the Metropolitan Museum of Art in New York City, championed opening the doors of fine art museums to the public regardless of socio-economic background, race, ethnicity, or religion. The goal was to dismiss the idea of the museum as a place for just the highly educated elite. Hoving argued for new types of exhibits that would be educational and would discuss the artifacts in their cultural contexts. The first of his new "block-buster" shows was the King Tut traveling exhibit in 1976. This exhibit excited the public about archaeology, and museum attendance rose dramatically. History and Anthropology museums were also challenged to design exhibits with public outreach components and to provide better programs in museum education.

In the 1980s, agencies such as the National Park Service were hiring professional writers to take data from the technical records and write archaeology articles and books for the public, especially for teachers (Jameson 2004). State agencies such as the Delaware Department of Transportation were requiring Cultural Resource Management firms (CRM) to produce both technical reports and "popular" reports for the public. To encourage public education,

professional organizations such as the Canadian Archaeological Association, the Society for American Archaeology, and the Society for Historical Archaeology created public archaeology committees and public archaeology columns in their professional newsletters and/or on their web sites. In 2000, the Society for American Archaeology's *Ethics in American Archaeology, 2nd edition* stressed the need for public education. In 2005, the Society for Historical Archaeology produced a book, *Unlocking the Past,* to present an overview of North American archaeology for the public. In addition, there are a growing number of books on state and city archaeology written for the educated public as the target audience.

By the 1980s, National, State, and Provencal Parks in North America were providing the public with educational tours of archaeological sites. There were heated debates over site tours: would it be educational, would it protect the sites by creating public interest, or would it make the sites more susceptible to looting? The looting did not happen and the tours did create excitement and interest in the archaeology and the sites (see articles in Jameson 1997). By the 1990s sites tours were becoming an accepted way of presenting archaeology to the public. For example, the public has been visiting the yearly excavations at Jamestown in Virginia since 1994.

Key Issues and Current Debates

Ethical Discussions

By the 1990s and into the twentieth-first century, archaeologists have debated the merits of public outreach and public archaeology. How should we engage the public? What should be the composition of these educational programs? Initially these programs were based on what the archaeologist wanted to present to the public or thought that the public needed (Jameson 1997). Archaeologists started to discuss the values of working collaboratively with scholars in other professions, such as museum curators and museums educators. For archaeologists working on historic sites, especially heritage sites, the work involved collaborations with historians, historic preservationists, architectural historians, and landscape architects. This cooperative work enhanced both the quality of the public programs and the underlining interdisciplinary research (Derry and Malloy 2003; Jameson and Baugher 2007).

The early outreach efforts often involved archaeologists working in isolation from community groups. It was the archaeologists and the interdisciplinary team of scholars who decided, without input from community members, what messages the public needed and wanted. Questions, such as who is the target audience, and what questions do they want answered, were often not on the archaeological radar screen. But archaeologists started to move out of the isolation model and partner with community members in order to develop more meaningful public programming. The major shift in archaeological outreach was moving from presenting material *for* the public to working *with* the public. But in working with the public there had to be a major shift from a hierarchical to a collaborative model.

One of the key ethical issues of the late twentieth century and the early twenty-first century has been the question of "who controls the past." In 1990 in the United States, the passage of the Native American Graves, Protection, and Repatriation Act (NAGPRA) altered the way archaeologists work. Native Americans have and continue to demand the right to protect their sacred sites and burial grounds and to repatriate both their ancestors' remains and their objects of cultural patrimony. Native Americans and First Nations no longer want to be research subjects and they do not want archaeologists to control the interpretations of the past. NAGPRA helped to stimulate collaborative work between archaeologists and Native Americans. By the late 1990s, two federally funded journals, *CRM* and *Common Ground* (formerly the *Federal Archaeologist*), and the Society for American Archaeology's newsletter, published positive examples of the cooperation between Native communities and archaeologists. In *Native Americans and Archaeologists: Stepping Stones to Common Ground*, produced by the Society for American Archaeology, the articles provide detailed examples of cooperative efforts. *Working Together: Native Americans and*

Archaeologists republished columns from the *SAA Bulletin* from 1993 to 1999. The edited book detailed both the cooperative efforts and tensions that still existed regarding the excavation of Native American sites and burial grounds.

One of the many positive results of NAGPRA is that it encouraged archaeologists to also evaluate the way they also worked with other non-Indian descendant communities. Archaeologists increasingly began to see community collaboration as a positive endeavor (Derry and Malloy 2003). The highly publicized excavation of the African American Burial Ground in New York City highlighted the involvement of the African American community in decisions regarding the preservation, protection, and public presentation of this site (LaRoche and Blakey 1997). Archaeologists became more receptive to presenting a multivocal history, to studying minority history, to incorporating oral history into their research, and to discussing their research agenda with members of the descendant community (Jameson 2004).

With the changing archaeological perspectives on outreach, community members were moving from the category of "research subjects" into "partners in outreach." Collaboration and partnership requires an ideological shift for archaeologists. The traditional academic or institutional hierarchy is gone – the "control" of the project is no longer solely in the hands of the archaeologists. In partnerships colleagues work together and respect each other. Each side has something to bring to the table and the goals of the project are decided jointly. The archaeologists also quickly learn that there are multiple voices within the community and those individuals do not always agree on goals, procedures, and end products for a project. Successful collaboration means opening up a dialogue, truly listening to each other, and exchanging ideas. For archaeologists, learning how to move away from a hierarchal model to a collaborative model was sometimes a slow process and difficult process. As archaeologists experimented with collaboration, sometimes a project began without community input, but as the project evolved, the insights, commentary, and suggestions from community members helped it to change over time. For other archaeologists undertaking participatory action research, the projects started with community partnerships and research agendas were decided jointly. During this time of experimentation, valuable lessons learned were learned from all of those diverse partnerships and the end products were greater than the parts (Shackel and Chambers 2004; Jameson and Baugher 2007). A growing number of archaeologists are becoming committed to community partnerships.

Challenges of Archaeological Education and Outreach

Archaeologists are involved in educational outreach in museum education, in CRM projects that present findings to the public through tours, exhibits, and lectures, and in publications written for the public. However, the rest of this entry is focused on innovative teaching approaches to outreach: (1) community service-learning classes for college-age students; (2) archaeological summer camps and school programs for high school, middle school, and elementary students; and (3) noncredit adult education programs in archaeological field and laboratory work. All are educational and involve partnerships with professionals in other disciplines, and they all promote community participation. Universities, museums, historical societies, and government agencies including municipal archaeology programs provide these programs.

Community Service-Learning for University Students

There has been a growing need in the profession for archaeologists to be trained in community service, public outreach, and ethics. Because of the numerous changes in the way archaeology is conducted, the Society for American Archaeology in their book, *Teaching Archaeology in the Twenty-first Century*, challenged archaeologists to rethink their approach to the teaching of archaeology and suggested the need to reform curriculum. Community service-learning is one of the reforms in archaeological education.

Service-learning is a North American higher education reform movement that combines community service with academic courses. Service-

learning is an educational pedagogy that had its roots in 1960s social activism in the United States. The Civil Rights movement motivated students toward community action and civic engagement. In the 1970s the students were involved in community-based internship programs. By the 1980s, college community service moved to a model where the outreach was part of academic courses.

Within the last decade of the twentieth century and the first decade of the twenty-first century, archaeologists started to experiment with service-learning courses (see articles in Nassaney and Levine 2009). Students in service-learning courses still learn traditional archaeological methods and theories. In addition, these courses address ethics, outreach, and community partnerships, link theory with practice, and encourage our students to become critical thinkers.

The field of service-learning contains diverse pedagogies and theories (Crews 2002). There is no one "right" methodology and archaeologists have employed diverse approaches to service-learning courses. Community service-learning can be the focus of an entire course or a component of a course. Incorporating service-learning into a field school is one method often used by archaeologists. Some large multiyear fieldwork-based community projects also have service-learning components linked to other classes, such as museum classes, or even introductory level classes. Faculty members can choose to have community outreach either as a required component for all students or as an option (see articles in Nassaney and Levine 2009) (Fig. 1).

The successful community partnerships are those that evolve over the years. With a multiyear project, there is time to develop a deeper understanding of the community and its history, time for the academic-community partnership to re-evaluate the original research questions, add new questions, revise the goals and the anticipated end products, and in the end accomplish a more detailed, mutually satisfying, community-based project (Baugher 2009). For example, for many decades there has been a tense relationship between Native Americans and archaeologists and slowly there have been efforts to build bridges through community-based projects (Colwell-Chanthaphonh and Ferguson 2008).

Some service-learning courses use participatory action research (PAR). In creating a research partnership with nonarchaeologists, archaeologists do not totally discard their own research questions when community members become involved. The research agendas are jointly decided. Community members can become involved in their own community history, assist in the research, and may come forward with information from family collections that provide unique additions to the research (Baugher 2009: 41). This work is now known as "engaged

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Fig. 1 Undergraduate student Brant Venables discusses his part of the excavation with community members who are visiting the archaeological site on "Heritage Days" in Robert H. Treman State Park, Ithaca, New York. (Photo: Sherene Baugher)

research." These collaborative projects have generated research valued by both the archaeologists and the community, such as the long-term Fort St. Joseph Project in Niles, Michigan by Michael Nassaney and his students from Western Michigan University.

One of the unique university collaborations has been in Quebec City in Canada. Since 1982, the City Archaeology Program has partnered with Laval University (Moss 2017: 123). Perhaps their most famous outreach project has been a collaboration with the owners of the Auberge Saint-Antoine hotel in the Old Town Historic District. Archaeological field schools were run from 1992 to 1996. After the work was completed, the City Archaeologist and archaeologists from Laval University worked with the hotel's designers to integrate the rich archaeological heritage into the design of the building (Moss 2017: 125). William Moss describes the archaeological outreach:

> Each of the six floors in the complex is associated with a period and an historical figure linked to the site. Special artifact displays representing the appropriate period are placed in controlled-access portions of the hotel, such as elevators and room-block corridors; custom-designed furniture displays artefacts from the corresponding period in each room. (Moss 2017: 125).

Archaeologists and students from Laval University in partnership with the City Archaeology Program have also collaborated with other community partners to develop additional innovative public outreach programs (Moss 2017).

In service-learning courses, students may also face ethical issues. For example, some students are faced with the realization that as academics they do not have the "right to know" everything about another culture. They may discover that while they may want to research a topic, such as a religious rite, but the community may not want to discuss the religious practice with the student. For Cornell University students working with Cayuga and Tutelo Indians in Ithaca, New York, the protection and preservation of burial grounds became a very real issue, not an abstract scientific topic (Baugher and Frantz 2013: 119). Students who unconditionally supported the scientific excavation of cemeteries came to support Native Americans right to protect their ancestors' remains. In summary, some of the major educational benefits of service-learning courses are that students learn to communicate with people from diverse cultural and economic backgrounds, discover how to become both better "listeners" and better collaborators, and hopefully become more civic-minded and engaged citizens.

Archaeological Summer Field Programs for School-Aged Children

Archaeologists in the United States and Canada have partnered with educators to create innovative programs for high school and elementary school-aged children. North American archaeologists have created training programs that educate and inspire youth, involve community partnerships, develop an appreciation for cultural diversity, teach work ethics, and perhaps create the next generation of preservationists. But this was not always the case. Traditional archaeological work with youth has involved only college-aged students. With processual archaeology and the emphasis on scientific fieldwork, the use of noncollege-aged youth was regarded by some archaeologists as weakening a project and introducing a greater potential for errors in fieldwork. Other archaeologists believed that work with teenagers and children were a waste of time and provided no benefit to the profession. In the 1970s, Stuart Struever, then a professor at Northwestern University in Chicago, was an early pioneer in archaeological training for high school and middle school children. Struever's programs at the Center for American Archeology in Kampsville, Illinois, were connected to Northwestern University, which has a long tradition of encouraging students to learn outside the classroom. Struever's highly structured summer programs provided student training in the various components of field and lab work. Students were able to experience the diverse components of laboratory work in ethnobotany, faunal analysis, palynology, lithics, and ceramics (Struever and Holton 1979: 81–136). This program was innovative for the 1970s because it not only brought the scientific rigor of what Louis Binford called the "new

archaeology" to the excavations, but Struever also demonstrated that younger students could be trained in interdisciplinary, scientific archaeology. Struever inspired other archaeologists to experiment with programs for children and teenagers.

These early programs often focused on involving students in half-day or full day programs. Some archaeologists offered 1-week summer field programs. Students participated in excavations, which could involve work on a mock dig, excavation through backfill, or excavation through the mid-to-late twentieth-century levels of a site. Archaeologists quickly learned what National Park Interpreters have known for decades that children are not miniature adults (Tilden 2007). Archaeologists discovered they needed to learn more about theories of how children learn and children's attention spans (Lewis 2007: 306). In all the successful programs, archaeologists partnered with educators to insure that the program was age appropriate and that the archaeological material fit into the education curriculum. By the twenty-first century, many of the 1-day youth training programs shifted emphasis away from fieldwork and now include laboratory and library work, experiential work such as flint knapping and making pottery, classroom lecture/discussions, and visiting sites (see articles in Jameson 1997 and Jameson and Baugher 2007). Fieldwork opportunities are often limited to highly supervised excavations, usually as 1-week summer programs. Examples of some successful programs for children and teenagers can be found on websites for the Fort St. Joseph Children's Camp in Niles, Michigan, the collaborative archaeology camps offered by Ontario Heritage Trust and the Spadina Museum in Toronto, the Suffolk County Archaeological Society's children's programs on Long Island, New York, and the Community Archaeology Program at Binghamton University in Binghamton, New York. These four successful programs have been operating for decades.

While archaeology rarely appears in state or provincial educational requirements, archaeologists have partnered with educators to bring archaeology into the classroom. The Society for American Archaeology, the Canadian Archaeological Association, and the American Institute of Archaeology all have information on their websites on how to incorporate archaeology into lessons for the elementary school classroom. Short paperback books written specifically for middle school or high school students bring archaeological discoveries to a younger audience. In North American public schools, archaeology can fit into both the social studies curriculum and in science education with its inquiry-based instruction. The successful programs all work because archaeologists design the programs in collaboration with teachers (see articles by Jeppson and Brauer, and Stone in Jameson and Baugher 2007). The programs are age-appropriate and also meet government mandated science and social studies curriculum requirements. Successful programs for children are enjoyable and fun as well as educational (see articles by Doroszenko, Ellick, and Stone in Jameson and Baugher 2007) (Fig. 2).

Communicating Archaeology: Education, Ethics, and Community Outreach in North America, Fig. 2 Excavating the base of a tea cup during the 2012 Adventures in Archaeology summer camp program at the Spadina Museum, Toronto. (Photo credit: Ontario Heritage Trust)

Archaeologists collaborated with teachers in art, communications, industrial arts, and social studies. Students were introduced to archaeology, preservation, and local history. The successful programs taught concepts of stewardship and ethical behavior in the field and demonstrated the roles the students could play in protecting and interpreting their community's history.

Adult Education

Teaching also involves innovative educational (noncourse credit) programs for adults. These programs not only teach field and lab methods, but also ethical practices. Some archaeologists were opposed to adult training programs because they feared that adults armed with a better understanding of archaeology would become looters. However, archaeologists directing adult training programs have found the opposite to be true – adult participants become grass roots preservationists NOT looters (Cressey et al. in Derry and Malloy 2003; Versaggi 2007). In the 1970s, Stuart Struever with Northwestern University and the Center for American Archaeology offered archaeology summer field and laboratory programs for adults. While no longer affiliated with Northwestern University, the Center for American Archaeology still offers noncredit adult archaeology programs.

In 1996, the Public Archaeology Facility (PAF), a research center at Binghamton University (State University of New York), established the Community Archaeology Program (CAP) and the program is still active after more than 20 years. The 4-day CAP training program is for adults and the participants include local teachers as well as interested community members. Some of the graduates of the CAP program return to volunteer on other PAF projects. The archaeologists have found that some CAP participants have become active preservationists who have lobbied to protect and preserve local sites (Versaggi 2007).

Adult programs are not just run by academics. Some of the very successful programs are in the domain of municipal archaeology programs. In 1977, archaeologist Pamela Cressey, through the City Archaeology Program in Alexandria, Virginia, established a program to train adults in field and lab methods and incorporate the trained public in her urban excavations (see Cressey et al. in Derry and Malloy 2003). The Alexandria Archaeology Program not only trains adults in archaeology but also learns from these community members. The community members are from many different professional, economic, and ethnic backgrounds and this interdisciplinary community team work in partnership with the archaeologists on excavations, exhibits, and the preservation of Alexandria's heritage (see Cressey et al. in Derry and Malloy 2003). The core of long-time volunteers makes up the majority of the staff for the City Archaeology Program's projects with a few full-time City Archaeologists directing the volunteer staff. One of their best-known projects was a community-initiated collaboration with the Friends of the Freedmen's Cemetery to preserve the cemetery buried underneath contemporary buildings. After the City of Alexandria purchased the properties and demolished the structures, the City Archaeologists and adult volunteer staff excavated the site and located 631 burials (Bromberg et al. 2017: 216–218). Respecting the wishes of the descendant community they did not excavate any bodies. In 2014, the city dedicated a memorial park to the Freedmen's Cemetery with a flat stone placed on each of the 631 graves, a remembrance wall listing the names of the deceased, and a large stone sculpture as the centerpiece of the site (Bromberg et al. 2017: 217–218).

Boston also has a very active adult education program, similar to the one in Alexandria, Virginia. Since the 1980s the Boston City Archaeologist has worked with a core of trained adult volunteers to excavate sites that face development but do not trigger environmental reviews and legally mandated archaeology (Bagley 2017).

More archaeological adult education training programs appear each year as archaeologists realize that an informed public will be the best partners for the preservation of heritage sites. Some state and provincial archaeological societies are engaging and training avocational archaeologists to work in partnership with professional archaeologists in both excavation projects and preservation efforts. Some nonprofit private organizations in both Canada and the United States provide field

and lab training for adults, and some of the adults end up providing much need volunteer labor on community excavations. Some examples of these collaborative projects are: the Fort St. Joseph Life Long Learners Program in Niles, Michigan, Crow Canyon Archaeological Center in Cortez, Colorado and the Artefactuel Program in Quebec City, Quebec. Community members bring to the project their unique knowledge of the community and contribute to the recording of community oral history. In the adult training programs, archaeologists have found that by involving community members in their own heritage that you help create grass roots preservationists (Versaggi 2007).

Conclusion and Future Directions

The challenge facing archaeologists is to move out of a hierarchal system that separates the archaeologist from the community and continues this privileged view that the archaeologist knows what is best for the public. It also involves giving up control and power because in community collaborations there are joint decisions. Partnership is a key component to a successful educational outreach project. The idea is for everyone to learn from each other. In working in collaboration with community partners, archaeologists combine their experience, background, and professional skills with the skills and knowledge of their community collaborators to create a successful project. Successful outreach results whenever all parties are willing to learn from one another, where there is respect and dialogue, where there is a sharing of responsibility and shared control of the project – in other words – where there is an equal partnership.

The other challenge is that it is time consuming to design and run field and lab programs for adults and children. However, archaeologists need to see the long-term benefits in creating programs for the public. Our current political climate is increasingly becoming antipreservation and pro-development. Therefore, archaeologists must create allies and supporters outside our profession. As we reach out and engage a wider audience, grass roots support for preservation and archaeology will grow.

Cross-References

- ▶ Canada: Cultural Heritage Management Education
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Ethics in Archaeology
- ▶ Heritage and Higher Education
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Service Learning and Public Archaeology

References

Bagley, J. 2017. Digging the hub: The evolution of the Boston City Archaeology Program. In *Urban archaeology, municipal government and local planning: Preserving heritage within the Commonwealth of Nations and the United States*, ed. S. Baugher, D.R. Appler, and W. Moss, 257–276. New York: Springer.

Baugher, S. 2009. Benefits of and barriers to archaeological service learning: Examples from New York. In *Archaeological practice and community service-learning*, ed. M. Nassaney and M.A. Levine, 36–58. Gainesville: University of Florida Press.

Baugher, S., and G. Frantz. 2013. The Inlet Valley project: Reflections on an early model for interdisciplinary and cross-cultural service-learning courses in landscape architecture. *Landscape Journal* 32 (1): 113–130.

Bromberg, F., P. Cressey, G. Fesler, P. Nasca, and R. Reeder. 2017. We dig Alexandria: A reflection on more than fifty years of community archaeology. In *Urban archaeology, municipal government and local planning: Preserving heritage within the Commonwealth of Nations and the United States*, ed. S. Baugher, D.R. Appler, and W. Moss, 203–225. New York: Springer.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2008. *Collaboration in archaeological practice: Engaging descendant communities*. Lanham: AltaMira Press.

Crews, R.J. 2002. *Higher education service-learning sourcebook*. Westport: Oryx Press.

Deetz, J., and P.S. Deetz. 2000. *The times of their lives: Life, love, and death in Plymouth Colony*. New York: W. H. Freeman.

Derry, L., and M. Malloy, eds. 2003. *Archaeologist and local communities: Partners in exploring the past*. Washington, DC: Society for American Archaeology.

Jameson, J.H., Jr., ed. 1997. *Presenting archaeology to the public: Digging for truths*. Walnut Creek: AltaMira Press.

Jameson, J.H., Jr. 2004. Public archaeology in the United States. In *Public archaeology*, ed. N. Merriman, 21–58. London: Routledge.

Jameson, J.H., Jr., and S. Baugher, eds. 2007. *Past meets present: Archaeologists partnering with museum curators, teachers, and community groups*. New York: Springer.
LaRoche, C.J., and M.L. Blakey. 1997. Seizing intellectual power: The dialogue at the New York African Burial Ground. *Historical Archaeology* 31 (3): 84–106.
Lewis, A.-E. 2007. Transportation collections: On the road to public education. In *Past meets present: Archaeologists partnering with museum curators, teachers, and community groups*, ed. J.H. Jameson Jr. and S. Baugher, 281–298. New York: Springer.
Moss, W. 2017. Quebec City's archaeological programme and provincial cultural heritage legislation. In *Urban archaeology, municipal government and local planning: Preserving heritage within the Commonwealth of Nations and the United States*, ed. S. Baugher, D.R. Appler, and W. Moss, 115–135. New York: Springer.
Nassaney, M.S., and M.A. Levine, eds. 2009. *Archaeology and community service learning*. Gainesville: University Press of Florida.
Shackel, P.A., and E. Chambers, eds. 2004. *Places in mind: Archaeology as applied anthropology*. New York: Routledge.
Struever, S., and F.A. Holton. 1979. *Koster: Americans in search of their prehistoric past*. New York: New American Library.
Tilden, F. 2007. *Interpreting our heritage*, 4th ed., expanded and updated with a new introduction by R. Bruce Craig. Chapel Hill: The University of North Carolina.
Versaggi, N. 2007. Partners in preservation: The Binghamton University Community Archaeology Program. In *Past meets present: Archaeologists partnering with museum curators, teachers, and community groups*, ed. J.H. Jameson Jr. and S. Baugher, 203–216. New York: Springer.

Community and Archaeology

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State of Knowledge and Current Debates

For at least two decades, the conjunction between Community and Archaeology has gained prominence in major disciplinary debates, contributing to generate new theoretical and methodological contributions, as well as new approaches to the role of Archaeology in relation to human beings and with the social contexts where its practice is developed. This conjunction is the product of a series of changes within the discipline that made it possible to open up new academic positions. Such changes, it should be clearly stated, have a much greater dimension, since they were not exclusive or originated in archaeology, as they are part of the transformations of subjectivity and human experience in the historical moment from modernity to postmodernity (Harvey 2008; Lyotard 1995) or submodernity (Auge 2000). It is precisely in this transformation that the words/concepts of Community and Archaeology begin to describe a new type of practice within the discipline from where these must be read and understood, configuring the discursive field for the appearance of the so-called Community Archaeology. To deepen this appreciation, it is necessary to develop a course of action that embodies the connotations of the two words/concepts in question: Community and Archaeology. And only then, we could get closer to some of the key issues that they display on the scene and that articulate Community with archaeology. It is important to highlight that this entry tries to provide a context of discussion for the issue in question and because the bibliography, both in relation to the thoughts of the Community and the connections that Archaeology has with it, is increasing, and it would be impossible to fully account for all the discussions. For this reason, some ideas and authors have been chosen to allow generating a general understanding on the subject.

In general, all social disciplines have tried from their start, to understand all aspects of human beings' social life: forms of sociability, change, economic and thought systems, intergroup relations, historical trajectories, and their symbolism, among others. Each discipline in delineating its object of study and its research methods was differentiating and building a corpus of knowledge about the aspects in which human beings' life was divided. These aspects can be summarized in the great social, political, and economic

fields, structuring fields of Political Science, Economics, Sociology, and History, as well as everything outside the West that was structured by means of the Anthropology and Oriental Studies (Wallerstein et al. 1999). Archaeology, depending on which side of the Atlantic you look at, has been connected to History or Anthropology. However, it has shared the concern of understanding the dynamics of human societies in the past. This interest has led it to adopt and combine both methodological and theoretical positions from different disciplinary fields: History, Anthropology, Sociology, Biology, Geology, and Philosophy, among others. Archaeology interdisciplinary nature has made it possible to assemble a very rich and diverse conceptual baggage, as well as giving it the possibility of intervening in increasingly wider social contexts that are not limited to the distant past. Likewise, the debate has been enriched because the dialogue with other disciplines has enabled questioning assumptions previously held as law, such as those referring to radical separations between material/immaterial, subject/object, and past/present.

Thus, the introduction of concepts in archaeological practice opens up doors to new paths, some of them, unexpected. This is the case of the word/concept: community. It is found regularly in many archaeology books and articles but as we find it in many texts, its use is often given as a word that fulfils the function of describing some organizational moment of human groups. So it is not uncommon to find it being interchangeable or functioning as a synonym of society, collectives, or groups. In Raymond Williams's classic book *Keywords: A Vocabulary of Culture and Society*, he pointed out five meanings for community that show its trajectory: the first use is located between the fourteenth and seventeenth centuries and made reference to "the commons or common people, as distinguished from those of rank"; the second sense is used from the ninth century onward and it refers to "a state or organized society, in its later uses relatively small"; the third sense is used since the eighteenth century and refers to "the people of a district"; besides, the fourth sense becomes effective since the sixteenth century and alludes to "the quality of holding something in common, as in community of interests, community of goods"; and finally, the fifth sense, also in use since the sixteenth century, refers to "a sense of common identity and characteristics" (Williams 2003: 76). Williams, in turn, points out that Community since the seventeenth century took on special importance and was thought of as a more immediate form than society. Such a sense of immediacy or locality was accentuated since the nineteenth century in the context of industrial societies. In the same century, the contrast between more direct and meaningful relationships of the community and more formal and instrumental relations of society is emphasized (Williams 2003). Thus, from this moment on, the community, in the classical sociological tradition, has been thought of in a dichotomous and temporal relationship with society since they were thought of in an oppositional relationship and in a sequence that begins with the community and then becomes the society. This way of setting out this dichotomous and temporal relationship has as a background the idea, also based on the tradition/modernity dichotomy, that modern society devastated community bonds.

Leaving the Community Behind

Ferdinand Tonnies (2001 [1887]) defined the meaning of each concept in a systematic way. He characterized the type of relationship and bond that was established within the social groups, and thus he was delineating the essence of the Community, in which, according to Tonnies, the relationship and the social bond derived from it can be conceived as a real organic life, opposed to Society, which establishes its relationship and social ties as a purely mechanical construction (2001: 17). "*Gesellschaft* means life in the public sphere, in the outside world. In *Gemeinschaft* we are united from the moment of our birth with our own folk for better or for worse. We go out into *Gesellschaft* as if into a foreign land" (2001: 18). This way of thinking about the community is connected to European

Romanticism, which "consecrated the human community as a suprapersonal force and an intramundane demiurge, which provided a source of historical legitimacy and sense, establishing itself in the secular reality that supplanted the transcendental God" (Gonzalez Requena 2010: 68). The community sense comes, then, from an inner nature, something organic installed in our being. It is for this reason that the sociology of the late nineteenth century and much of the twentieth century has thought of the community as something different from society, even in opposition.

The second half of the nineteenth century was a time of great political, economic, and social transformations in Western Europe. In this context, a social organization based on the liberal principles of individualism and reason combined with an increasingly expansive capitalist system and with the consolidation of nation-states is firmly established. These elements, in short, from a romantic view, were the cause of the dissolution of the bonds of belonging as well as the community values that gave place to the emergence of the individual, in abstract terms, who had to face the disenchantment of the world, as Weber would say, with the then reigning power of reason. Thus, the new political structures, the consolidation of capitalism as a planetary economic form, the rationalization of social life, and the emerging consolidation of scientific thought generated, on the one hand, the condition of uncertainty of the modern individual who no longer had a stable handhold for his identity and future and, on the other, the emergence of a new structure of significance that sought to generate bonds between the heterogeneity of existing individuals within territorial borders: the nation-state. This construction sought to form the solid base for those rootless individuals creating stability in the face of the great transformations of the time.

The passage from tradition to modernity can be read through Tonnies' conceptualization of Community and Society. For him Community "means genuine, enduring life together, whereas Society is a transient and superficial thing. Thus *Gemeinschaft* must be understood as a living organism in its own right, while *Gesellschaft* is a mechanical aggregate and artefact" (2001: 19). Other sociologists interested in the forms of the social relationship have noted this same mutation in other terms: Weber, in *Economy and Society*, thinks of a type of relationship based on a subjective feeling of common belonging and another based on interests motivated by reason and oriented to objectives. Durkheim (1985), in turn, opposes an organic to a mechanical solidarity. These oppositions to social relation forms seem to be overcome due to the belief that the modern erased all traces of tradition. At present, we all know that this was not the case. What should be highlighted is that this kind of thinking about social relations and forms of grouping are framed within a nostalgic context. As Fistetti (2004) points out, it should be noticed that Tonnies, above all, was a critic of capitalist "society," and in this sense, he expresses, analogous to Marx's critique, a desire or a "need for a community" (Fistetti 2004: 137). "Sometimes a romantic wish for a supposedly lost community, and at other times, no less frequent, a wish for a future community, for a "community" that is announced *later* and not *before* the "society" (Álvaro 2010: 10). Marinis (2005: 7) summarizes sociology's concern at the end of the nineteenth and early twentieth century about these forms of social relationship: "if in the community there was an order and there were solid and stable identity guarantees for its members, in society both things could be diluted."

The dissolution of an old order, solid and stable, gives rise to the configuration of a new one in which "everything solid vanishes in the air" (Berman 1989). For example, Bauman (2004) thought about the situations of social relations in modernity and defined those using liquid metaphors: liquid modernity, liquid love, etc. In these swampy fields, the modern subject, already disenchanted with the world, and in consequence, isolated from the community, will try to find security. Thus, the foundation of reason, a principle of individuality, and the abstraction of the world are the preconditions that inaugurate the new social order in the field of subjectivities. The modern episteme, described and located by

Foucault in the eighteenth century, is a sort of consolidation of that Cartesian subjectivity that privileges reason and consolidates modern subjectivity. It is, then, through reasoning that truth is achieved, principle of the modern rational conception that permeates all the scientific discourse until the present. The Cartesian subject, therefore, was configured as a subject capable, through reason, of knowing the world and knowing himself without mediations other than himself. This idea of a cognoscent subject, detached from the will of a supreme God, would guarantee the positioning and dominion over nature (external and internal) through technique-instrumental reason.

Both at the level of modern science and individual subjectivities, the idea of the modern subject implies certain categories that assure stability because they give it a pre-established framework, a priori, to grasp and relate to the world from a privileged position. These are Kant's transcendental categories with which the ontological sustenance of the experience of the modern subject is consolidated. Through this consolidation, an ontological, and therefore essential, superiority is declared, which fixes this subject at the top of a hierarchical scale. Such categories ride on the Western experience until the present, colonizing other realities. In this sense, the constitution of discursive training fields, such as archaeology at the end of the nineteenth century, and the constitution of subjects connected to such fields are inscribed in the processes of subjectivization proper to modernity. Berman says (1989: 13–14):

> To be modern is to live a life of paradox and contradiction. It is to be overpowered by the immense bureaucratic organizations that have the power to control, and often destroy all communities, values, lives; and yet, do not hesitate in our determination to face these forces, to fight to change their world and make it our own. It is to be both revolutionary and conservative: alive to new possibilities for experience and adventure, frightened by the nihilistic depths to which so many modern adventures lead, longing to create and to hold on to something real even as everything melts.

The nation is one of those modern adventures that sought to make sense of individual life by creating "imagined communities" (Anderson 1991) to bestow existence with meaning, to that mechanical aggregate Tonnies referred to as society. In this process, archaeology played an important role. According to Gnecco (2012: 94–95):

> Archaeology was related to the nation states through the creation of the national identity. It provided the temporal depth and unified symbolism upon which modern society was preached about. It gave the nation the necessary continuity so that it would not appear as the naked transgression of what it had replaced. The *new* (modernity, State-nation, national society) found in the *archaeological* (discourses on antiquities and ancestors based on objects) a profound density. What does it mean to be national in archaeological terms? It means modernizing the way of accounting time, making it transcendent (objective, neutral), bringing a collective (the national society) and a singularity (the modern individual) to recognize each other as a whole and part and unite them in a ceremonial, mnemonic space.

Gnecco's description of the role of archaeology in the formation of nation-states has been staged, with its various peculiarities, since the 1990s, without any doubt, in all countries where archaeology has been established as discipline (Diaz-Andreu and Champion 1996; Gnecco 1999; Kohl 1998; Kohl and Fawcett 1995). Thus, archaeology built the past of societies that were projected into the future. In general, this was done adopting evolutionary assumptions that indicated the succession of states until their culmination in Western civilization, now expressed more strongly in the principles of modernity. In this sense, as indicated by Almudena (2015: 28), the discourse of Archaeology, from its initial developments in the nineteenth century to more than half of the twentieth century, offered the scientific justification for ordering human groups from savagery to the civilization, order that corresponds to other historical transitions indicated in various social disciplines such as tradition/modernity or the one we are interested in here, that of the community to society. For the latter, the state of savagery would be associated with the forms of community organization, while civilization would be organized as societies with specific characteristics such as bureaucratization, hierarchies, and

surplus economies, among others. Not in vain, archaeology sought as the origin of nations societies that fulfilled the features of modern society.

The modern origin of Archaeology and its connections to the formation of nation-states and nationalisms accentuated the principles of individualism and progress in the discipline and helped to root them into the common sense of society. This historical moment was directed by a paradigm of homogenization. The example of ethnic minorities is one of the most evident examples of modern project's homogenizing pretensions. The idea in general was to uproot the human beings belonging to these minorities to incorporate them into the social body as free and autonomous citizens in their exercise of reason. This idea was materialized in different parts of the world through various strategies: territorial displacements, educational policies, and extermination of entire ethnic minorities, among others. The others of the nation-state were forced out from the community to be incorporated to the citizenship. This implied an abandonment of their own cultures (language, beliefs, and customs) to begin to share the elements of the majority of the society: to speak the dominant language and enter the literate education system and participate in market relations, among other things. This was part of the accentuated interest of modern discourse to individualism and the individualization of subjects within society in general. In short, modernity privileged a form of association that was oriented by the logic of reason and individualism; it sought to dissolve the bonds of human beings with local communities to replace them with the homogeneity of the national society. In this context, archaeology did not speak or relate in terms of explicit discursive production with communities, since it was directed toward the production of scientific knowledge. In turn, it provided vital elements that complemented the role of the nation-state as an element of social cohesion to the detriment of local association forms more connected to the idea of the community indicated at the beginning of this section. However, the last decades of the twentieth century witnessed social, political, and economic transformations that would reactivate the sense and the search for the community by witnessing the strength of the State's social cohesion weakened within the framework of neoliberal policies.

Community Resurgence

The transformation in the discourse of modernity supposed a political, economic, social, and cultural reorganization. This was due to the crisis of the nation-state in the 1970s and was basically due to the impossibility of maintaining an idea of a culturally homogeneous nation, promoted mainly by the visibility of human groups that had previously been marginalized and made invisible and even included as belonging to the same national culture. This crisis was also due to the states' loss of sovereignty in connection with politics and economics. The failure of the modern nation-state, particularly the nation, was due to the fact that the objective differences of culture and identity between the different groups within it prevented the construction of a national identity. In this sense, in the nation-state, according to Bauman (2006: 28), the permanent invitation (to assimilation) was represented as a sign of tolerance. In fact, the supply of assimilation derived its sense from the rigidity of the discriminatory norms, from the purpose of the inferiority verdict issued to the values that did not comply with the norm. Tolerance, conceived as a stimulus to the adoption of "progressive attitudes," expressed in the search for individual "improvement," made sense as long as progress measures were not negotiable. Within the assimilation policies, the tolerance exercised onto individuals was closely linked to intolerance toward collectives, values, and, above all, their powers to legitimize values. However, with the discursive change of modernity, a new tolerance arises: multicultural tolerance.

In the organization of the social, from the late 1970s and early 1980s, multicultural policies began to be established. Multiculturalism posed the coexistence of several cultures. Multicultural countries are therefore characterized by the acknowledgment of this coexistence and recognition of very diverse groups different from the

majority national group: ethnic and cultural minorities, gender, etc. This was a great transformation not only in terms of the conception and organization of the State but also in terms of the politics of identity. In this sense, identities ceased to be understood as fixed and immutable entities and became fluid identities always in the process of construction, and also, positional. Likewise, aspects that point to the relations of power and domination emerged in countries of the so-called third world, in terms of the colonial order, to constitute identities, particularly subaltern identities. These transformations in the field of the subject conception and identities also obey political issues related to the decline or erosion of the nation-state already mentioned. As Hall (1997: 44) has argued: "through the erosion and instability of the nation-state, of the self-sufficiency of national economies and, consequently, of national identities as points of reference, there has simultaneously been a fragmentation and erosion of collective social identity." Such conditions have been fostering for the emergence of new forms of sociability and association as well as the reemergence of different types of collectives throughout the world, which had been made invisible and/or subalternized by the identity policies of the modernity.

However, this emergence, and reemergence, of collective identities, which in many cases made reference to community or neo-community discourses, has been read from some perspectives of social disciplines not as liberation from every yoke imposed by the nation-state and/or capital but as a rearticulation of new forms of control and domination. Hence there has been a proliferation of the community in different places: governmental, nongovernmental, social movements, business sectors, and academics, among others. However, the reemergence of the community is related to a diverse experience linked to local territorial spheres but with associations and extra-local and global projections, making a broad contrast with the idea of national spaces. It is worth briefly mentioning the case of multiculturalism policies, which sought to create a paradise of harmony and coexistence of cultural diversity. And little by little, the non-compliance with their task and the number of problems that it carried out would be uncovered. In this regard, the Slovenian philosopher Slavoj Zizek clearly pointed out the existence of an intimate relationship between multiculturalism and global capitalism; moreover, he also helped to uncover the hidden faces of multiculturalism by saying that: "multiculturalism is a form of racism that is denied, inverted, self-referential, a 'racism with a distance': it respects the identity of the other, and conceives of it as an authentic closed community towards which the multiculturalist maintains a distance that is made possible thanks to his or her privileged universal position"(Zizek: 2003; 172).

Raymond Williams (2003: 77) pointed out that unlike the other terms referring to social organization, community never seems to be used unfavorably or to have as a contrast any positive term of opposition or distinction. In turn, Bauman (2006) says that beyond the meaning of the word Community, this is one of those few words that produce a feeling, and much more, a good feeling. In times of uncertainty, there is nothing like feeling the security of a warm, cozy, and comfortable place like the community (Bauman 2006: V). The search for that good sensation, that "lost paradise," was one of the answers to the reconfiguration of labor markets, the creation of new capital markets, the emergence of new subjectivities, and the blurring of political and academic borders. This indicates a contents' breakdown with earlier times. However, as suggested by Jameson (2002: 35) "the radical breaks between periods do not involve complete changes of content but rather the restructuring of a certain number of elements already given: traits that at a previous period or system were subordinated now become dominant, and others that had been dominant become secondary."

Thus, the reorganization of Western societies witnessed the emergence of complex frameworks between the flows of an increasingly present and incisive globalization and a diverse range of local responses. In the social field, global fragmentation implied a visibility and, therefore, a proliferation of interpretations of the world around the past,

present, and future of human beings, both individually and collectively. This situation has as a consequence the reemergence of concepts that had been or banished from social thought or had reduced their heuristic capacity for the interpretation of reality: example of them is the concept of multitude (Hart and Negri 2004) and, the one that interests us here, that of community (Agamben 1996; Esposito 2003, 2009; Nancy 2001, 2007). Even new concepts have come to be put forward for these new forms of sociability and association; this is the case of the concept "assembly" developed by Latour (2008) within the actor-network theory. In the case of archaeology, the concept of "entangled" proposed by Ian Hodder (2012) can be seen to express the dependencies between the social and the material world, almost in the manner of human communities and things.

The community has become a necessity in a present lacking a sense of roots. For this reason, it is promoted from all sectors. However, promotion can easily become regulation, and therefore denial of autonomy and freedom. The latter are vital elements in all community projects. The last two decades of the twentieth century and the first of the twenty-first century have witnessed a renewed interest in the human and social sciences for the theme of the community. In the field of archaeology, influenced by the global context, these transformations implied a rereading of its epistemological and ontological bases leading to the development of new approaches with interpretative strategies different from those already tested up to that moment. At the same time, and due to the empowerment of indigenous and Afro communities and other local communities that faced the "traditional" archaeological discourse as a colonialist discourse, archaeology was challenged to take a position in the different scenarios where the past was no longer that placid place that the archaeologists visited in their excavations and that they reconstructed in their texts but a territory in dispute where struggles were fought on territorial rights, autonomy, and identity. However, it has been pointed out that changes in discipline in the multicultural era have confronted what could be one of the most important and paradoxical questions of contemporary archaeology: one that says that "archaeology has entered politics to remain strictly out of it" (Gnecco 2017: 83). A kind of change so nothing changes. The opening and inclusion of other ways and visions to understand the past and the proliferation of archaeologies is its condition of possibility today and in turn is the way to rearticulate each of these "alternatives" to the canon of disciplinary control.

The Community in Community Archaeology

At present, the archaeology agenda includes issues that were once unacceptable in the disciplinary discussion. The participation of local communities in archaeology is due to an opening in the disciplinary field and to the reconfiguration of the social space at the end of the twentieth century. In the field of archaeology, such reconfiguration opened the doors to an archaeological practice and a more inclusive version of the past. In this context, discourse on the community has become a practice that can act as a counterhegemonic strategy or as a spearhead for state and/or capitalist policies. This is the case, for example, of Contract Archaeology, as it is known in Latin America, or of the Archaeological Resource Management (ARM), as they are known in the USA or Europe, where the discourse of the community has been incorporated in order to make high economic impact projects viable and thus to avoid problems with its execution, as Demas (2002: 32) assures, it is more unlikely that people will object to a project in which they have participated in its planning. In this way, interest in the community appears as a capitalist strategy to achieve intervention and exploitation of territories absent from colonial/capitalist cartography. The current discussions about mining and hydrocarbon multinationals and their relationship with local communities, and the intervention of archaeology as a mediator, is a good example of this situation.

However, many who practice community or in-community archaeology have a more positive

view pointing out that it transforms the nature of the discipline in fundamental ways (Marshall 2002: 215). In general, the work on archaeology and community is thought as oriented to citizen participation related to a democratic expansion, both socially and academically, and in the peoples' self-determination. They are strategic moves for a more equitable and egalitarian society. The *Journal of Community Archaeology & Heritage* is a good space to have a panorama of the diversity of themes and places community archaeology works with. This Journal, since its creation in 2014, tries to gather the experiences learned from more than a decade of development of community archaeology and the opportunities it opened for the discipline as pointed out by Yvonne Marshall in her famous text in World Archaeology dedicated to community archaeology. There Marshall says (2002: 218):

> Community archaeology represents an opportunity. We need it, not because it is politically correct, but because it enriches our discipline. Community archaeology encourages us to ask questions of the past we would not consider, to see archaeological remains in new light and to think in new ways about how the past informs the present.

Designing a field of more horizontal relationships between Archaeology and the communities is the interest of all the undertakings of this type of practice, which has tried to establish an autonomous approach generating their own methods and theories and staging them in different projects to world level (see Silverman 2011; Simpson 2010; Tully 2007). For example, Tully (2007) argues that community archaeology seeks to diversify the voices in the interpretation of the past and its objective is to facilitate collaboration in all research phases and it plays an important role in the subsequent presentation of research results. There is a firm commitment in this practice to recompose some of the damages committed by archaeology throughout its history, the lack of inclusion, the prevalence of a monological discourse, and the political detachment. There is an alternative known as inclusive archaeology, which covers the diverse voices about the past and which is committed to its social and political context. This attitude is not a novelty of community archaeology, but it tries to take these assumptions and consolidate "a multicultural conversation space" (Thomas et al. 2014: 2), as pointed out by the editors of the *Journal of Community Archaeology & Heritage*, thought and created to "provide a place where 'academic' voices and other voices participate in the same playing field" (Thomas et al. 2014: 2).

Some criticisms about community archaeology that have to do with the centrality given to archaeology in the relationship with the community have been pointed out (Moshenska 2008). Here the community often appears as a passive agent and being subjected to a kind of condescension and where power relations are disguised because, among other things, many of the community archaeology projects are developed in developing countries by archaeologists from the developed world. From another perspective, this turn of archaeology toward the community obeys to a strategy of change so that the order of things remains the same (a change so that nothing changes). This is Cristóbal Gnecco's criticism (2017) on the so-called alternative archaeologies. It is also possible to point out the privilege of the Western perspective in the conception of the community and its relationship with it; this privilege becomes evident when, for example, Tully (2007: 158) says that the inclusion of diverse voices by community archaeology does not compromise the scientific nature of archaeology. This situation is due to the fact that Archaeology is still protected by the objectivist idea of scientific discourse and continues to maintain the otherness in the outside, unleashing or consolidating with this what Esposito (2009: 88) calls the perversion of the idea of community, the one that raises walls instead of knocking them down.

A critical review of archaeology thought about the Community, both classical and contemporary thought, would confront it to unexpected situations that would force it to decentralize its perspective. This is due to the fact that the community confronts us with the opening, sharing, and dislocation of the being in common, which enable the appearance and interpellation between

the singular ones, which precisely are exposed in the suspense of the community, in the spacing and exteriority of the co-being (González Requena 2010: 82–83). The exposure of the co-being is not a natural knotting as you may think, it is rather a commitment that puts us in front of the other that constitutes us and before which we are due to. In this perspective, archaeology is no longer related only to the community, but it may be willing to interact with extended communities.

Community Extended and Archaeology

More local conceptions about the community refer to what could be called an enlarged or altered community. That is to say, that such a community does not belong exclusively to human beings. This situation is evident in human groups from all continents. In it, sociability exceeds the relationships between humans and installs itself in the realm of human/non-human relations. According to Grosso (2016: 20):

> "The extended community or the *altered* community is the community that is neither circumscribed sociologically nor anthropocentrically, and that, therefore, puts in tension a new thought of the political, because in those *community socialities*, non-human beings, the dead along with the living, hills, stones, water also intervene. . ."

In this sense, the conception of community, in Western terms, is limiting and does not express to be-in-common with all the beings of the world. The enlarged community calls life in constituent relationships. But at the same time, it maintains the values of freedom and autonomy, as well as its goals of the indigenous peoples' historical struggle and the recognition of the other.

In this conception a being-in-common is contained that is due to the other. It is a condensation of a responsibility toward the interior of the community as well as toward the exterior. Archaeology, from this perspective, is seen as a way to weaving ties with the ancestors, with the earth, with the historical struggles, and with the future-to-come of a society that seeks territories of existence where intercultural identities and policies are reproduced. It is well known that in this project archaeology must be transformed. Moving away from the disciplinary place that has driven it to pretend to be absent in the social relationships that shape the social contexts that are, in turn, its condition of possibility. Archaeology must become in relation, in coexistence, with the world. With that extended community that interacts not only with their human equals but also with nonhumans. The move, then, implies epistemological as well as political movements, which begin modifying their condition of exteriority in the social world. It is no longer *about* or with, but rather it is a *from* (Haber 2010). It is not *about* the community, but *from* the community. Thus, community archaeology will prove to be a transformative experience for all parties involved and not just instrumentalizing the spirit of the community that runs through our time, a time of ephemeral senses and fluid positioning. Finally, the conjunction of Community and Archaeology has not to be limited to a change of discipline; it has to have a much more ambitious commitment, that of transforming society.

Cross-References

- ▶ Authority and Legitimacy in Political and Social Archaeology
- ▶ Chile, Archaeology and Indigenous Communities of
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Cultural Heritage Project Management Based on Project Management Body of Knowledge (PMBOK)
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Historical Archaeology, Nationalism and National Identity in
- ▶ Histories of the Archaeological Discipline: Issues to Consider

- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ Public Archaeology and Education: Present Relevance to the Past
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Society for Historical Archaeology (SHA) (Modern World Archaeology)

References

Agamben, G. 1996. *La comunidad que viene*. Valencia: Pre-textos.

Almudena, H. 2015. ¿Por qué la arqueología oculta la importancia de la comunidad? Trabajos de Prehistoria. 72, N.° 1, pp. 22–40.

Álvaro, D. 2010. Los conceptos de "comunidad" y "sociedad" de Ferdinand Tönnies. *Papeles del CEIC* 1: 1–24.

Anderson, B. 1991. *Comunidades Imaginadas. Reflexiones sobre el origen y la difusión del nacionalismo*. México: Fondo de Cultura Económica.

Auge, M. 2000. *Los "no lugares" espacios del anonimato. Una antropología de la Sobremodernidad*. Barcelona: Gedisa.

Bauman, Z. 2004. *Modernidad liquida*. Buenos Aires: Fondo de Cultura Económica.

Bauman, Z. 2006. *Comunidad. En busca de seguridad en un mundo hostil*. Madrid: Siglo XXI Editores.

Berman, M. 1989. *Todo lo sólido se desvanece en el aire. La experiencia de la modernidad*. Buenos Aires: Siglo Veintiuno Editores.

Demas, M. 2002. Planning for conservation and management of archaeological sites: A values-based approach. In *Management planning for archaeological sites*, ed. J.M. Teutonico and G. Palumbo, 27–56. Los Angeles: Getty Conservation Institute.

Diaz-Andreu, M., and T. Champion, eds. 1996. *Nationalism and archaeology in Europe*. London/New York: Routledge.

Durkheim, E. 1985. *De la división del trabajo social*. Barcelona: Planeta De Agostini.

Esposito, R. 2003. *Communitas. Origen y destino de la comunidad*. Buenos Aires: Amorrortu Editores.

Esposito, R. 2009. *Comunidad, inmunidad y biopolítica*. Barcelona: Editorial Herder.

Fistetti, F. 2004. Comunidad. Léxico de Política. Nueva Visión. Buenos Aires.

Gnecco, C. 1999. Sobre el discurso arqueológico en Colombia. *Boletín de antropología* 30: 147–165. Universidad de Antioquia.

Gnecco, C. 2012. Arqueología multicultural. Notas intempestivas. *Complutum* 23 (2): 93–102.

Gnecco, C. 2017. *Anti-Decálogo. Diez ensayos (casi) arqueológicos*. Popayan: Universidad del Cauca.

González de Requena, J. 2010. Gemeinschaft, communitas y otras comunidades. *Revista pléyade* año III-n°6, julio-diciembre, pp. 65–86.

Grosso, J.L. 2016. La comunidad "alterada": Cuerpos, discursos y relaciones entre seres humanos y no-humanos. Matrices interculturales de la hospitalidad. Cuadernos de Trabajo. *Tejiendo la Pirka* 8: 18–28.

Haber, A. 2010. Animismo, relacionalidad y vida: perspectivas post-occidentales. In *Biografías de paisajes y seres. Visiones desde la arqueología sudamericana*, Dario Hermo and Laura Miotti (Compiladores), 75–98. Catamarca: Encuentro Grupo Editor. Facultad de Humanidades Universidad Nacional de Catamarca.

Hall, S. 1997. *Representation: Cultural representations and signifying practices*. London: Sage.

Hart, M., and A. Negri. 2004. *Multitud*. Barcelona: Editorial Debate.

Harvey, D. 2008. *La condición de la posmodernidad Investigación sobre los orígenes del cambio cultural*. Buenos Aires: Amorrourtu.

Hodder, Ian. 2012. *Entangled. An archaeology of the relationships between humans and things*. Oxford: Wiley-Blackwell.

Jameson, F. 2002. El giro cultural. Escritos seleccionados sobre el posmodernismo 1983–1998. Editorial Manantial. Buenos Aires.

Kohl, P. 1998. Nationalism and archaeology: On the constructions of nations and the reconstructions of the remote past. *Annual Review of Anthropology* 27: 223–246.

Kohl, P., and C. Fawcett, eds. 1995. *Nationalism, politics, and the practice of archaeology*. Cambridge, UK: Cambridge University Press.

Latour, B. 2008. Reensamblar lo social. Una introducción a la teoría del actor-red. Editorial Manantial. Buenos Aires.

Lyotard, J.F. 1995. *La Posmodernidad (explicada a los niños)*. Barcelona: Editorial Gedisa.

Marinis, P. 2005. 16 comentarios sobre la(s) sociología(s) y la(s) comunidad(es). In *Papeles del CEIC*, n° 15, CEIC (Centro de Estudios sobre la Identidad Colectiva), Universidad del País Vasco, http://www.ehu.es/CEIC/papeles/15.pdf

Marshall, Y. 2002. What Is Community Archaeology? *World Archaeology*. Community Archaeology (Oct), 34 (2): 211–219.

Moshenska, G. 2008. Community archaeology from below: A response to Tully. *Public Archaeology* 7 (1): 51–52.

Nancy, J.-L. 2001. *La Comunidad Desobrada*. Madrid: Arena libros.

Nancy, J.-L. 2007. *La comunidad enfrentada*. Buenos Aires: La cebra.

Silverman, H. 2011. Epilogue: perspectives on community archaeology. Historical Archaeology, 45 (1): 152–166.
Simpson, F. 2010. *The values of community archaeology: A comparative assessment between the UK and US*. Oxford: BAR International Series.
Thomas, S., Macdavid, C. and A. Gutteridge. 2014. Editorial. Journal of Community Archaeology & Heritage 1 (1): 1–4.
Tonnies, F. 2001. Community and civil society. Jose Harris (Ed). Cambridge University Press. United Kingdom
Tully, G. 2007. Community archaeology: General methods and standards of practice. *Public Archaeology* 6 (3): 155–187.
Wallerstein, I. (coordinador) 1999. Abrir las ciencias sociales. Informe de la Comisión Gulbenkian para la reestructuración de las ciencias sociales. Siglo XXI Editores, México.
Williams, R. 2003. *Palabras clave*. Buenos Aires: Ediciones Nueva Visión.
Zizek, S. 2003. Multiculturalismo o la lógica cultural del capitalismo multinacional. In *Estudios culturales. Reflexiones sobre el multiculturalismo*, ed. F. Jameson and Z. Zizek. Buenos Aires: Paidos.

Community Archaeology

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Introduction

This entry will provide an overview of "community archaeology" as it is practiced at the date of this writing (2012). Before narrowing the discussion to that topic, however, it is necessary to situate it within a somewhat broader frame – that of "public archaeology." The terms do not mean the same thing, even though they are often conflated. Even though the term "public archaeology" is discussed elsewhere in this volume, it needs to be touched on here in order to situate this entry. The position here is that public archaeology is a larger area of archaeological practice within which "community archaeology" operates (a particular variant of community archaeology that has emerged in the United Kingdom will be explored later in this entry).

In general terms, public archaeology can be seen as *any* endeavor in which archaeologists interact with the public *and* any research (theoretical or practical) that examines or analyses the public dimensions of doing archaeology. Therefore public archaeologists work in a variety of fields, including (but not limited to) heritage management, museums, education, curriculum development, the academy, journalism, tourism, commercial contract archaeology, and new technologies. Through both research and practice, they attempt to understand the political, social, and economic contexts in which archaeology is undertaken; the attitudes of disempowered and indigenous peoples toward archaeology; the educational and public roles of the discipline; the public perceptions of archaeology; how pasts are created and used; and the conflicts between academic and popular views of the past. In short, public archaeology is where information about the past, gathered by and sometimes for people in the present, is used by contemporary people for contemporary agendas and needs.

Definition

Community archaeology is, therefore, public archaeology situated in specific communities, populated by contemporary people within these communities. These communities are usually organized around a variety of overlapping and often fluid interests – family, descendant, ethnic, geographic, intellectual, political, cultural, and more. Therefore, community archaeologists attempt to understand these community interests and to incorporate them into their archaeological work in various ways. Not all public archaeologists are community archaeologists, but all community archaeologists do public archaeology.

Historical Background

The historical background of community archaeology emerged from the larger field of public

archaeology so, again, needs to be described in that context. Within Americanist anthropological archaeology, the term "public archaeology" was, until the early 1990s, usually defined as the commercial field of Cultural Resource Management (CRM), although it also included governmental programs such as the Federal Archaeology Program. This definition originally sprang from the reality that CRM archaeological projects were (and are) funded by the public purse and/or mandated by public legislation. Therefore, public archaeology work during this period included archaeology practiced on public lands (such as national parks) as well as archaeology conducted on native (tribal) lands.

It is important to note that during the beginning days of CRM, despite the widespread use of the term "public archaeology," there was little "public" input into in the archaeological work *itself* (McGimsey 1972). Part of the reason why (obviously this discussion glosses things a great deal) was that archaeological practice was dominated by those who advocated scientific methods as the best, if not only, way to do archaeology. Much has been written about this, but the main point is that this view did not allow much in the way of indigenous (or descendant or community) input as archaeological sites were being interpreted. During this period, most work with publics, when it did happen, was overtly educational (e.g., Smardz 2000). In addition, its primary aim was to convince the non-archaeological public that saving archaeological sites was important – that is, it was aimed at "stewardship." It was not aimed at involving the public in making decisions about archaeological sites or at including stakeholder communities in the ways archaeological sites were scientifically (or publicly) interpreted.

Changes in this view, with respect to community/stakeholder input into archaeological research, began to be explored by many archaeologists in the 1980s/early 1990s (see "Further Reading" for several examples). The most momentous early benchmark for discipline-wide change (in the United States) came in 1990, with the passage of NAGPRA (the Native American Graves Protection and Repatriation Act). This law gave indigenous Americans some measure of control over archaeological remains on tribal lands. The law was limited in many ways, but the key point here is that during this period the meaning of the word "public" in "public archaeology" began to shift and began to include living *publics* – and therefore living communities. Archaeologists working on native lands were, from that point, forced to take the opinions of descendant communities into account – and their methods and interpretations began, slowly, to reflect this. One major feature (some would say shortcoming) of NAGRA was the definition of "descendants" as documented, lineal descendants, and this limitation continues to create challenges for Indian groups which are unrecognized as such by the federal government (for one example, see Handsman and Richmond 1995). In addition, NAGPRA did not (and does not) apply to other descendant community contexts – such as historical archaeology on sites occupied by non-Indian, but also disempowered, cultural groups.

Even so, NAGPRA did drive important discipline-wide cultural changes, and the next major milestone in US public, and community, archaeology emerged within historical archaeology. This occurred in 1991 when, during a CRM archaeology project being conducted prior to the construction of a new federal office building in New York City, workers discovered the bones of more than 400 free and enslaved Africans and African Americans. The public uproar over these remains, and the public debate about how to excavate and interpret them, continued into the next decade and established new understandings of the words "descendant" and "community" within archaeology. Despite the lack of legislative mandate, the *cultural* descendants of those buried at what came to be called the African Burial Ground were successful in gaining control over how their ancestors' remains were excavated and interpreted (LaRoche and Blakey 1997). African American *communities* in New York City thus began key changes in historical archaeology, just as Indian groups had done the same thing in prehistoric archaeology.

There is still no NAGPRA for non-Indian lands, but the ethos that drove NAGPRA, and emerged from it, is now commonplace in many

archaeology projects across the United States. There is, however, a major exception to this rather broad statement: most archaeology (about 80 %) is still done in a CRM context (Neumann and Sanford 2001), which is driven by commercial agendas and motivations. It remains to be seen how, or if, meaningful community input (and by that I mean what might be called grassroots input, not corporate input) into CRM archaeology can ever happen.

In any event, as this has been happening in the USA, similar shifts have been occurring elsewhere, and a variety of postcolonial and global justice movements have played important roles in how archaeology, and community archaeology, is framed today. A major milestone in the global arena was the 1986 founding of the World Archaeology Congress, in part as a response to apartheid. Over the last two decades, there have been key developments within governmental, non-governmental, and scholarly arenas, all of which have been part of an ongoing global process of reimagining how archaeological work can, and should, intersect with community interests and needs.

Key Issues/Current Debates

A separate focus on communities as a *particular* arena for public archaeology began to emerge in the early 2000s, and these efforts slowly began to be referred to as "community archaeology" (Marshall 2002; Derry and Malloy 2003). Some archaeologists, also doing work with and for communities, did not frame their community-engaged work as "community archaeology" per se, but in a variety of other ways. One of the more recent frameworks would be "archaeological ethnography" (see Castaneda and Matthews 2008 and Mortensen and Hollowell 2009). Other frameworks include applied anthropology, heritage, activist or civically engaged archaeology, and participatory action research (see "Further Reading" for references). Finally, some of this work has been framed as simply "public archaeology" (Skeates et al. 2011) although some of this was also seen as specifically political in nature (McDavid and Babson 1997). Many of the same writers appear in books which were organized under all of these different approaches, and there is a great deal of overlap and conflation of indentifying terms.

The following are some features that have emerged in many community archaeology projects over the last decade:

- It acknowledges the community as a unit of identity that exists – whether or not "outsiders" (like archaeologists) indentify or recognize it.
- It also acknowledges that sometimes communities are constructed *by* archaeology projects – new alliances are forged, which, over time, can extend well past the boundaries of one archaeology project to address larger issues, such as social justice and housing equity.
- It recognizes that the idea of "community" is flexible and fluid and that each community person (and each archaeologist) is likely to claim many different community identities at the same time. That is, multivocality exists, and people tend to move between different communities and affiliations as their own needs and agendas dictate.
- It builds on community strengths and resources to gather, interpret, and publicly present different kinds of knowledge and to enhance archaeological knowledge. Therefore it often relies on interviews, maps, oral histories, ethnographic information, and photographic and video archives in order to integrate these resources into formal research designs.
- There is a strong focus on communication, collaboration, and equitable partnership. Ideally, all collaborators should be involved in, and empowered in, all phases of the research. Even when this ideal is not feasible, the goal is always foremost.
- It is sensitive to (and, importantly, informed about) any social inequalities that may exist in any given community context.
- It fosters co-learning and capacity building among all partners, including the development of employment and training opportunities whenever possible.

- It attempts to provide mutual benefit for all partners, whether that benefit be intellectual, political, or monetary (such as merchandising).
- It is focused more on the relevance of the research to *local* community issues than to larger academic research questions, although these goals are not mutually exclusive. Ideally all partners respect and recognize the right of other partners to achieve personal goals as well as group goals within the context of any given project.
- It distributes research results to all partners and involves all partners in their wider distribution and public presentation.
- It recognizes that community work involves a long-term commitment by all participants. There is commitment to sustainability even as individual players may change over time.

The above criteria draw on writing by Moser et al. (2002) and Mayan and Allen (2010), as well as the other case studies referenced here. Although this sort of listing can be a helpful jumping-off point when attempting to operationalize community archaeology (how does one *do* it?), it is important to recognize a very important aspect of all community-oriented work: it is *not* "one size fits all." Strategies, goals, and methods that work in one geographical, political, economic, social, or cultural context may not – probably will not –work for another. Therefore, community archaeology projects which *start* with in-depth research about the *individual* community – what one might call "contemporary context" or sometimes "ethnographic" research – are often the most successful.

This is true whether "success" is measured in archaeological or community terms – although it should also be noted that *evaluation* of community archaeology projects (and public archaeology projects in general, for that matter) is an under-explored but potentially important area of research. Thus far, most evaluation efforts have been aimed at developing "do's and don'ts" rather than examining the principles that underlie the development of any particular community or public project.

International Perspectives

These comments were written from the vantage point of practice in North America, although examples of community archaeology seen in this way have occurred all over the world. In the United Kingdom and Australia, however, the idea of "community archaeology" is slightly different and refers mostly to the practice of archaeology *by* communities. A good example of archaeology in this context would be Faulkner (2000). There is an active online listserv discussion group (http://www.britarch.ac.uk/caf/wikka.php?wakka=DiscussionList), as well as a long-standing journal, *British Archaeology*. Although the projects defined in this way are often (though not always) field-directed by a professional archaeologists, the overall direction and workforce is usually community- and/or amateur-driven. The main thrust is to involve local communities in archaeology and, as noted on the website of the Council for British Archaeology, to promote "the appreciation and care of the historic environment for the benefit of present and future generations" (http://www.britarch.ac.uk/). This echoes and supports the idea of "stewardship" mentioned above, but the work itself tends to be somewhat more "bottom-up" with respect to community involvement in various phases of archaeological research.

This idea is roughly equivalent to the idea of "avocational archaeology" in the United States, in which projects are conducted with large numbers of volunteers who have varying degrees of training. In many cases, avocational archaeologists are extremely skilled, especially with respect to field methods and material culture analysis (such as ceramics and glass). Avocational archaeology projects are very active across the United States, even when they are not necessarily referred to as community archaeology. Texas, for example, has the very active Texas Archeological Stewards Network (TASN, located at http://www.thc.state.tx.us/stewards/stwdefault.shtml) in which trained volunteer stewards find, record, and monitor archaeological sites; give talks to schools and preservation groups; assist professional archaeologists

on digs and surveys; and many other activities. Field direction is provided by trained professionals in all cases, even if the labor includes volunteers.

Future Directions

One positive feature of the most recent writing about community archaeology, likely to extend into the future, is that it tends to cross the usual disciplinary lines (arguably more so than earlier writing, which tended to be situated within the typical geographic and temporal discourses such as prehistoric archaeology, classical archaeology, and historical archaeology). In the past, a typical historical archaeologist/community archaeologist, for example, might not be conversant with work done by an Africanist, or an Egyptologist, or a prehistoric archaeologist, simply because they go to different conferences, read different journals, and so on. As this trend has evolved, particular methods and approaches common to community work in general have begun to emerge, as noted above.

Regardless which specific approaches are used in any particular project, many archaeologists are also now questioning earlier taken-for-granted definitions of the word "community" (e.g., Agbe-Davies 2010, and the contributors to Matthews et al. 2011). Whereas a somewhat traditional notion of community (referring to the descendants of a site and/or the locale around it) is still commonplace, not all communities fall into this sort of easy category, and community archaeology research and practice are starting account for this. A related idea has also emerged in the more recent work – the idea of "stakeholders," with stakeholders being loosely defined as any entity (person or group) which *sees itself* as having a stake in any particular site or project.

Seen in this way, stakeholders and communities are not necessarily defined by either professional archaeology or even supporters of it. For example, commercial developers could be said to have a stake in what they are allowed to build or not build on any given property. In some locales, developer "communities" have caused the destruction of many archaeological sites, even when neighborhood communities have emerged to resist this destruction – with varying success. In the same sense, antiquity dealers have a stake, as do "looters" (bearing in mind that this negative term sometimes includes descendants who regard archaeological remains as a legitimate cash crop which they have the moral right to exploit) (Velzen 1996; Hollowell 2006). In all of these self-defined and other-defined communities, context-specific tropes about power, property ownership, culture, and politics are at play. Therefore, the best community archaeology research (and practice) does not take any definition of community (or stakeholders or descendants) for granted. A critical, reflexive perspective is essential.

There is also a need to critically consider the desired results for community archaeology projects. Are they conducted so that archaeologists can better understand the communities they work with? Or are they meant mainly as a way to share archaeological research? Or are they a way for a community to better understand itself? In practice all of these sorts of understandings are developed, but not all are given priority in archaeological writing. Therefore one goal for future work would be to find better collaborative and open ways to write about the particular types of knowledge that emerge in community work.

Another goal would be to examine the reciprocal and long-term processes of both inclusion and exclusion. What does "inclusion" look like? Does it extend to offering communities the opportunity to review archaeological work? If someone from a community has a seat at the archaeological table, what are that person's responsibilities? By the same token, what are an archaeologist's responsibilities to a community which has, over years sometimes, acquired a stake in the work itself? Or in the archaeologist personally? Even though the last decade has seen a huge growth in community archaeology projects, few archaeologists have explored how this work plays out in the long run. Traditionally, archaeologists have tended to think of their work in terms of individual projects, which normally have a beginning, a middle, and an end. The work begins, community alliances and networks are built, and then what? What happens when a new project beckons?

Obviously the answers to this vary, but the point is that it is difficult for a community-engaged archaeologist to simply move on to the next project because both ethical and personal responsibilities need to be accounted for. These responsibilities are both to the communities involved and to the data itself. With regard to the data, once a project moves past the excavation/research stage, if the archaeologist remains connected to the community, his/her role usually shifts from "researcher" to one which is more concerned with public interpretation (museums, displays, etc.). How involved can or should the archaeologist continue to be? Can becoming less involved at that point allow more space for interpretations of data to change or be cast in ways that the archaeologist did not intend? When these public interpretations include mass media outlets, like television, non-archaeologists will be the ones who are reinterpreting, or reframing archaeological findings to suit other needs. Is this necessarily a bad thing? Some sites are, for good or ill, much more appealing than others to outside interests – whether those interests be Hollywood or a local public radio station. Can or should the archaeologist be concerned with how this plays out over time, for any particular project?

In terms of communities, things become complicated in part because *new* communities are often formed around the archaeological process. Friendships are formed and alliances are built, and often these alliances are aimed at solving community-wide concerns, not simply archaeological ones. This is especially true when archaeologists are working with communities which are disempowered for one reason or another – for example, when neighborhoods are fighting gentrification or when a community is endangered through a construction project of some sort. Even just considering "project-related" concerns, often there are fundraising and administrative duties which the archaeologist is used to expediting, which a community sometimes finds difficult to take on after the archaeologist leaves. Often funding cannot be obtained to keep the post-excavation work going – the outreach, the oral history interviews, the kids' programs, the museum displays, etc. During research phases of the work, often this work is done by the archaeologist who is trying to generate interest and get local input and publicity (and gather data). Local community groups usually have few resources to fund this sort of activity as paid work, and if/when the archaeologist leaves, it is all too easy for the work itself to falter.

It is true, of course, that these concerns are sometimes more important to archaeologists than to communities themselves – like everything else, each context and situation are different. A useful framework to consider these issues, and how they play out on the ground, comes from the "participatory action research" literature (Stoecker 1999). The idea is that archaeologists take on different roles, which vary according to the project, the individual archaeologist, and the community being engaged with. One such role is that of the "initiator." When acting as "initiators," the archaeologist comes up with a research or project idea and invites the community to participate – and keeps the process going, as described above. Another potential role would be the "consultant," in which the community commissions the research and the academic is accountable to it. In some scenarios – perhaps the "ideal" ones – the archaeologist is positioned as a "collaborator." Here the *community* would be driving the research, including partnering to formulate research questions, analyzing results, *and* keeping the process moving.

Chip Colwell-Chanthaphonh and T. J. Ferguson described these processes slightly differently in their discussion of a "collaborative continuum" (Colwell-Chanthaphonh and Ferguson 2008). The idea here is that all collaborative and community projects fall at one point or another on a continuum and a project's location on it can shift over time or as different players become involved. The questions that emerge in all of these scenarios could be:

- Do some public/community/collaborative efforts simply have a life cycle?
- To what extent should "capacity building" be a part of what archaeologists *do* – for some sorts of projects? If so, what would this look like – training, workshops, or something else?

- How do (or should) archaeologists devise ethical exit strategies from projects which have reached either a natural or unnatural end, or in which archaeological input work is no longer needed, or even just when the archaeologist reaches a point of wanting (or needing) to become less engaged?
- How do issues about "sustainability" play into the decisions that archaeologists and local communities make? How can projects sustain themselves in the face of contemporary financial challenges and the evolving interests and skillsets of individual professional and local collaborators?

Inclusive community-engaged projects are still not embraced by all archaeologists. Some still prefer to focus on purely academic agendas, and others resist mutually empowered scenarios which allow nonscientific views of the past equal standing. Even when an archaeologist is personally motivated to include community input (or, even, review) as part of her/his practice, there are often constraints which work against this – client restrictions, for example, are commonplace in contract, or commercial, archaeology.

It is also important to remember that archaeologists themselves are embedded in professional communities as well as academic, national, political, epistemological, and ontological communities of practice. The question in these contexts is not *whether* to engage; rather, it is to look at how engagement itself helps to define what archaeology is and what it accomplishes. Community archaeology, seen in this way, is not work that archaeologists choose to do, but is inherent to how archaeology is practiced.

Archaeologists are only beginning to competently understand and ethically engage with collaborating communities and to examine whether this engagement serves interests beyond those of archaeologists and related heritage professions. They are only starting to understand the roles that community members play in collaborative archaeology projects – that is, who participates and who does not and who is excluded and who is not? How do these performed roles reflect (or not) the roles that collaborators play in their communities *outside* of their relationships with archaeologists? What is the potential for community archaeology to be actively dialogic? Can a deeper and more developed understanding of communities be deployed in the archaeological research performed so that archaeology is not only "in" and "with" communities but "about" them as well? Can archaeological community engagement reveal and address "community-building" issues otherwise obscured by acts of inclusion and exclusion? How, or do, the communities formed through archaeology projects create new knowledge that is relevant to archaeologists and communities alike? Do they add to an informed understanding of the archaeological past?

On a different scale, archaeologists are also starting to contextualize community archaeology within the influential national and global trends already in play. What external and internal forces and goals motivate community members to take an interest in archaeology? Do imagined and actual intersections between archaeology and communities speak to the relationships between community members and other outside interests such as nonprofits/NGOs, interests in education and business, or deeper social and cultural interests of national and global capitalism?

Community archaeology has come of age in the last decade as one important form of public archaeology. At its most basic, community archaeology is the practice of working in and with communities during the archaeological process. Although, in its original forms, this was an educational endeavor, as the subfield developed, communities for archaeology have become far more than passive recipients of archaeological knowledge and expertise. Instead, community archaeology projects are now at the vanguard of creating a multivocal, inclusive knowledge-building process in which archaeology as it is traditionally practiced is just one of many routes to knowing the past.

Cross-References

- ▶ Community and Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage

▶ Indigenous Collaboration in Archaeology Education
▶ Multivocality and Archaeology
▶ "Public" and Archaeology
▶ Public Archaeology, The Move Towards
▶ Stakeholders and Community Participation

References

Agbe-Davies, A.S. 2010. Concepts of community in the pursuit of an inclusive archaeology. *International Journal of Heritage Studies* 16: 371–387.

Castaneda, Q.E., and C.N. Matthews, eds. 2008. *Ethnographic archaeologies: Reflections on stakeholders and archaeological practices*. Lanham, New York, Toronto, Plymouth, UK: Altamira Press.

Colwell-Chanthaphonh, C., and T.J. Ferguson. 2008. Introduction: The collaborative continuum. In *Collaboration in archaeological practice: Engaging descendant communities*, ed. C. Colwell-Chanthaphonh and T.J. Ferguson, 1–32. Lanham (MD): Altamira Press.

Derry, L., and M. Malloy, eds. 2003. *Archaeologists and local communities: Partners in exploring the past*. Washington (DC): Society for American Archaeology.

Faulkner, N. 2000. Archaeology from below. *Public archaeology* 1: 21–33.

Handsman, R.G., and T.L. Richmond. 1995. The Mahican and Schaghticoke peoples and us. In *Making alternative histories: The practice of archaeology and history in non-Western settings*, ed. P.R. Schmidt and T.C. Patterson, 87–118. Santa Fe (NM): School of American Research Press.

Hollowell, J. 2006. Moral arguments in subsistence digging. In *The ethics of archaeology. Philosophical perspectives on archaeological practice*, ed. C. Scarre and G. Scarre, 69–96. Cambridge: Cambridge University Press.

LaRoche, C.J., and M. Blakey. 1997. Seizing intellectual power: The dialogue at the New York African Burial Ground. *Historical Archaeology* 31 (3): 84–106.

Marshall, Y., ed. 2002. *World archaeology, special issue "community archaeology"*. Durham: Routledge.

Matthews, C.N., C. McDavid, and P.L. Jeppson. ed. 2011. *Dynamics of inclusion in public archaeology, a special issue of Archaeologies*.

Mayan, M.J., and M. Allen. 2010. Principles and practices of community-based research: Comparing health and heritage studies. 6th International Congress of Qualitative Inquiry, University of Illinois, Urbana-Champaign, Illinois.

McDavid, C., and D. Babson. ed. 1997. In the realm of politics: Prospects for public participation in African-American archaeology. *Historical Archaeology* (special issue) 31(3).

McGimsey, C.R.I., ed. 1972. *Public archaeology*. New York: Seminar Press.

Mortensen, L., and J. Hollowell, eds. 2009. *Ethnographies and archaeologies: Iterations of the past*. Gainesville: University Press of Florida.

Moser, S., D. Glazier, J.E. Phillips, L.N. el Nemr, S. Richardson, A. Conner, and M. Seymour. 2002. Transforming archaeology through practice: Strategies for collaborative archaeology and the Community Archaeology Project at Quseir, Egypt. *World Archaeology* 34: 220–248.

Neumann, T.W., and R.M. Sanford. 2001. *Practicing archaeology: A training manual for cultural resources archaeology*. Walnut Creek: AltaMira Press.

Skeates, R., C. McDavid, and J. Carman, eds. 2011. *The Oxford handbook of public archaeology*. Oxford: Oxford University Press.

Smardz, K. 2000. Digging with kids: Teaching students to touch the past. In *The archaeology education handbook: Sharing the past with kids*, ed. K. Smardz and S.J. Smith, 234–248. Walnut Creek: Altamira Press.

Stoecker, R. 1999. Are academics irrelevant? Roles for scholars in participatory research. *American Behavioral Scientist* 42: 840–854. (This is a revised version of a conference paper presented at the 1997 meetings of the American Sociological Association. Available at http://comm-org.wisc.edu/papers98/pr.htm).

Velzen, D.T. 1996. The world of Tuscan tomb robbers: Living with the local community and the ancestors. *International Journal of Cultural Property* 5: 111–126.

Further Reading

Agbe-Davies, A.S. 2010. Archaeology as a tool to illuminate and support community struggles in the Black Metropolis of the twentieth and twenty-first centuries. *Public Archaeology* 9: 171–193.

Brown, K.L., and D.C. Cooper. 1990. Structural continuity in an African-American slave and tenant community. Historical archaeology on southern plantations and farms. *Historical Archaeology* 24: 7–19.

Colwell-Chanthaphonh, C., and T.J. Ferguson. 2006. Memory pieces and footprints: Multivocality and the meanings of ancient times and ancestral places among the Zuni and Hopi. *American Anthropologist* 108: 148–162.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2008. *Collaboration in archaeological practice: Engaging descendant communities*. Lanham: Altamira Press.

Hodder, I. 1991. Interpretive archaeology and its role. *American Antiquity* 56: 7–18.

Jameson, J.H., Jr., ed. 1997. *Presenting archaeology to the public: Digging for truths*. Walnut Creek/London/New Delhi: Altamira Press.

Leone, M.P. 1991. Material theory and the formation of questions in archaeology. In *Processual and post-processual archaeologies: Multiple ways of knowing the past*, ed. R.W. Preucel, 235–241. Carbondale: Center for Archaeological Investigations, Southern Illinois University.

Little, B.J. 2007. Archaeology and civic engagement. In *Archaeology as a tool of civic engagement*, ed. B.J. Little and P.A. Shackel, 1–22. Lanham: AltaMira Press.

McDavid, C., and F.L. McGhee. 2010. CRM, public archaeology, and advocacy. In *WAC handbook of postcolonialism and archaeology*, ed. U. Rizvi and J. Lydon, 481–494. Walnut Creek: Left Coast Press and World Archaeology Congress.

Preucel, R.W., ed. 1991. *Processual and postprocessual archaeologies: Multiple ways of knowing the past*. Carbondale: Center for Archaeological Investigations, Southern Illinois University at Carbondale.

Potter, P.B., Jr. 1994. *Public archaeology in Annapolis: A critical approach to history in Maryland's ancient city*. Washington, DC: Smithsonian Institution Press.

Pyburn, K.A. 2009. Practising archaeology – as if it really matters. *Public Archaeology* 8: 161–175.

Shackel, P.A., and E.J. Chambers, eds. 2004. *Places in mind: Public archaeology as applied anthropology*. New York: Routledge.

Sorensen, M.-L.S., and J. Carman, eds. 2009. *Heritage studies: Methods and approaches*. London: Routledge.

Stottman, J., ed. 2010. *Archaeologists as activists: Can archaeologists change the world?* Tuscaloosa: University of Alabama Press.

Thomas, S. 2010. *Community archaeology in the UK: Recent findings*. York: Council for British Archaeology Available at http://www.archaeologyuk.org/sites/www.britarch.ac.uk/files/node-files/CBA%20Community%20Report%202010.pdf.

Community Economic Development and Archaeology

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Introduction

The intentional use of archaeology as a tool to promote community economic development has increased significantly over the past few decades. Archaeologists utilize their field activities to benefit communities in which they work, and development practitioners have recognized that archaeological research and heritage sites can provide a foundation for economic growth based on tourism. Archaeological engagement with development has not been without controversy within the field, both regarding the ethics of the engagement and the actual benefits for local communities that result from site museums, tourism initiatives, and other local development projects. Furthermore, experience in the field is generating important lessons about the resources and practices required if archaeology is to contribute successfully to local economic development. Perhaps the most salient of those lessons is that archaeologists' academic training leaves them relatively ill-equipped when it comes to promoting development. Greater exposure to development practice, and focused exposure to the challenges of development projects, will be required if archaeologists are to continue to engage in community economic development.

Definition

Archaeology, in this context, encompasses all aspects of practice in the field, from excavations and field schools, to museum development, to the preservation and public use of archaeological sites. Every aspect of archaeological and heritage management activity has economic consequences, and the benefits as well as the costs of those activities may be felt at the level of local communities.

Community is a term freighted with contention and ambiguity within and without archaeology (Smith and Waterton 2009, Chapter 1). In the discourse around community economic development and archaeology, however, "community" most often refers to a "local" community that is defined by geographic proximity to a tangible cultural heritage. The individuals in that community may live together harmoniously, or not; they may have parallel economic interests, or not; and their identification with the heritage itself may range from profound to indifference. The challenge for any community development project is to bridge these differences, negotiate the interface between the community and outside actors, and identify the archaeological activities and economic programs that the community itself can benefit from most directly.

The "local" community tends to be where archaeological excavations and heritage site management interact with individuals, whether as sources of labor, accommodation and provisions, or, in post-processual settings, as sources of knowledge and expertise. This is where archaeologists develop relationships with community members. Equally, those who live in closest proximity to heritage sites typically will have the most direct, sometimes contentious, relationships with sites that occupy a part of their local environment and intrude into everyday life. Those in closest proximity to sites are most likely to act in detrimental ways (e.g., grazing, reuse of materials, or looting) but also can be key allies in heritage protection because they may benefit most from site development and are in the best position to protect it from outside forces. The scale of a community geographically close to sites can vary widely, particularly between dense urban, and more dispersed rural, populations. As the size of the "local" community scales up, the complexities of working with diverse groups of individuals and defining effective strategies for community economic development become increasingly complex.

Economic development is a notion rooted in enlightenment concepts of progress but identified in recent decades with the unfolding economic and political structures that followed on the breakup of European colonial empires in the period after World War II. Development programs have funded investments in infrastructure, agricultural productivity improvements, industrial expansion, and the growth of service industries, both in former colonies and other countries whose standard of living lagged European and North American counterparts. Development, which is measured primarily through increments in gross domestic product (GDP) per national resident, has traditionally been the responsibility of national government agencies and large international governmental organizations (IGOs) such as the World Bank and its affiliates. This so-called "top-down" development process has been largely expert-driven and controlled from national and international centers. As will be noted below, however, this discourse is changing.

Thus, archaeologists' engagement in local economic development projects reflects a larger trend among governments, IGOs, and nonprofits to pursue programs that have tangible, positive impact on local communities. These efforts have led to experimentation in the organization and management of community projects; in programs to increase the skills, financial capacity, and market access of community groups; and in research to understand the metrics for success of community-level projects. Archaeologists have played a small role in that work.

Historical Background

Archaeology has come increasingly to be seen as a resource to promote economic development at the community level. This perspective, which has emerged gradually since the 1970s, is the result of the intersection of vectors of change in three separate fields: changing views within archaeology on the goals of the discipline and the responsibilities of archaeologists; transformation of the narrative in the development field toward a sustainable development agenda; and the emergence of a global tourism industry, built largely on cultural heritage resources, that has captured the attention of national governments and international development organizations.

Neither economic development nor community engagement was central to archaeological practice for most of its history. Even though the study and preservation of cultural heritage has proceeded with implicit, and sometimes explicit, understanding that the work was done for public benefit, archaeology through the end of the colonial era was largely practiced for academic inquiry and, to a degree, nation-building on colonial terms. With the breakup of European colonial empires in the aftermath of World War II, the challenge of economic advancement for former colonies became a focus of international organizations such as the United Nations and a preoccupation of nations contending for global leadership, particularly the United States and the former Soviet Union. In the same period and to some degree as a response to decolonization,

archaeologists adopted reflexive perspectives on their discipline that shifted the focus from the heritage itself to the peoples and communities whose heritage was under study.

In the 1970s and 1980s, the rise of public archaeology and the increased recognition of indigenous peoples' rights to their own past constituted a purposeful attempt to use archaeology for the public good and especially for disempowered communities. The process began with the self-interested perspective that increased public involvement in archaeological activities would augment the archaeological work force and build a constituency for political action to support archaeological research (McGimsey 1972).

Perspectives have changed considerably since then. Today, outreach to local communities to involve them in the process, share findings, and provide educational opportunities is essentially a best practice in the field. Archaeology's postcolonial ethical discourse extended those obligations to acknowledge both the agency of local, especially indigenous, communities and the potential that "multivocal" perceptions of archaeological findings could contribute meaningfully to interpreting the archaeological record. More pragmatic concerns also gained salience. The emergence of a robust antiquities market led to increasing concern to prevent looting, and the pressures of development focused the discipline on strategies to prevent local acts of heritage destruction. Some archaeologists have concluded that their ability to carry out their own projects has been enhanced through good community relations that include providing benefits to the community, and others have adopted ethical stances that communities should have a leading role, if not the leading role, in determining how their local heritage will be explored and exposed to the broader public. While every community will have a unique relationship with local cultural heritage, archaeologists, especially those working in developing countries, have found that the benefits most often relevant to local community members are economic.

National governments have focused on cultural heritage for other reasons. Nation-building by newly independent countries often has centered on cultural heritage and historical narratives informed by archaeology. An important, alternative motivation for government support for heritage, however, is the important contribution to national economies arising from the dramatic increase in global tourism. This has affected economically advanced countries of the global north and has become especially critical to countries emerging from colonial rule in the southern hemisphere. From virtually nil in the 1950s, international tourism arrivals have burgeoned in the current decade to more than one billion travelers per year globally. Advances in air travel, growing incomes and access to leisure time, and promotional efforts by tourism companies have combined to make tourism a major contributor to economic activity in places like the United Kingdom, Italy, or Greece and made tourism a vital economic engine in emerging countries in Latin America, Asia, and parts of Africa. This tourism is driven largely by travelers' desire to visit historic sites and iconic landscapes and to experience for themselves the cultural heritage of other people. If archaeologists have asked themselves about the societal relevance of archaeology, it is now clear that economic development, driven by archaeological research and heritage management, is among the essential answers.

Finally, the narrative about economic development has transformed in recent years. For decades after World War II, neoliberal policies of free markets, fiscal and monetary austerity, and openness to international trade dominated strategies among international development agencies and national governments. In recent years, disappointment with the effectiveness of neoliberal policies and concern that free-market development has not benefitted the broad public in many countries have led to a shift in perspective, especially amid a growing realization that increases in GDP involve collateral damage to the environment and to important cultural resources and community coherence. Neoliberal market rhetoric has given way to a search for policies more likely to deliver widespread and equitable development to emerging economies. The metrics for successful development have expanded beyond strictly economic measures to incorporate social, cultural,

and environmental factors key to long-term improvements in the quality of life. Beginning with the Brundtland Report of 1987 (WCED 1987), the idea that "sustainable" economic development requires the preservation of resources (including the environment and heritage) for future generations has become embedded in the international development discourse through a sequence of global summits. These concerns for the impact of development projects have resonated at the local level, driving recognition that development programs need deeper roots in local communities if they are to be successful. Even the World Bank has pursued policies seeking to promote "local community-driven development" (Binswanger-Mkhize et al. 2010).

The role of cultural heritage in economic development has only grown as the development narrative has transformed. This is particularly visible in international charters and the policies of international organizations and nongovernmental organizations. Sustainability has become a theme in the work of the United Nations Educational, Scientific and Cultural Organization (UNESCO), whose own conclaves have generated a series of international agreements on the protection of heritage, the Hague Convention of 1954; trade in cultural property, the Paris Convention of 1970; the concept and protection of World Heritage, the World Heritage Convention of 1972; and many others. Increasingly, these agreements incorporate explicit references to community engagement and economic development as part of sustainable cultural heritage practice. The Council of Europe's Faro Convention of 2005 explicitly places people and human values at the center of the concept of cultural heritage and acknowledges the potential contribution of cultural heritage to sustainable development. The role of heritage in urban development achieved global recognition with the adoption of the UN's Agenda 21 for Culture in 2004, and the International Council on Monuments and Sites devoted its 17th general assembly in 2011 to the topic, "Heritage, a driver of development." In the international legal and ethical discourse on sustainable development, heritage's central role is well established, as is the obligation of heritage managers to place local community considerations at the center of their work.

Perhaps unsurprisingly, given this history, the rhetoric of archaeology as source of economic benefit also has built expectations within communities. Community members increasingly expect those conducting projects in what communities consider their local domain to deliver both interaction, in the form of educational and communications efforts, and economic benefit. National governments increasingly are making excavation permits contingent on local participation in archaeological projects, by both indigenous archaeologists and community members. Artifacts once distributed internationally under a system of "partage" now generally remain where they were discovered to endow local and national archaeological museums. Reflecting the shifting ethos within archaeology, both individual archaeologists and international nonprofits have attempted to encourage and underwrite community-based cultural heritage projects intended to bolster local economies.

The confluence of these three vectors of change – in archaeology, in the economic value of tourism, and in the international development narrative – has produced a contemporary situation in which it has been argued that "it is development, rather than conservation that shapes the diverse work of archaeological practice in the world" (Lafrenz Samuels 2016, 355). In turn, this has produced a growing, frequently critical literature and numerous attempts by archaeologists to promote community economic development. Some projects have generated meaningful success, but disappointments abound. There exists a growing recognition that archaeological engagement with community economic development is in its infancy, with central issues and debates on ethics and practice still to be resolved.

Key Issues/Current Debates

It is important to note at this juncture that the literature examining the impacts achieved by archaeologists through local community development projects is sparse and characterized by a lack of explicitly stated goals and data with which to track the achievement of those goals. Many archaeologists are familiar with examples

of attempts by archaeologists to pursue community projects such as the erection of local museums and visitor centers, local craft projects, or local skills training. Some success stories have been told, but many archaeologists also are familiar with projects that failed to become sustainable. That is, they failed to attract funds (either from visitors or elsewhere) to continue to provide the educational or economic missions they were established to carry out. Widespread, systematic, and thorough reporting and evaluation of such projects, however, remains an unfulfilled agenda within archaeology.

Archaeology and cultural heritage management projects affect local economies both through direct interventions and through the beneficial consequences of tourism. Direct impact on local communities comes from field excavations, heritage preservation and conservation projects, and the spending impact of archaeological field schools. Local people will be employed for unskilled tasks and, in many cases, become skilled excavators or conservators in their own rights. Project participants require food, accommodations, and sundry items. Although projects generally are small in scale, the local consequences can be meaningful, especially if projects continue over a number of years. Because of the volume of visitors to recognized heritage sites, however, the economic impact of heritage tourism is the most significant economic force at the national and the local level. Local communities gain income from providing various services to visitors including accommodation, food, guiding, and souvenir production and sales. Local merchants benefit from the patronage of community members whose incomes are rising because they are directly engaged with tourism. Along with these benefits, however, have arisen important concerns about both policy and practice. Reflecting findings from examination of projects by the World Bank and UNESCO and the experience of nongovernmental organizations, three general categories of issues and concerns emerge clearly from experience in the field: the problem of community empowerment; the extent and value of the actual impact; and the challenge of endowing local communities with sufficient skills and resources to benefit meaningfully from archaelogy-related activities.

Community Empowerment

Local communities ordinarily have limited control over archaeological activities within their borders, often with traumatic consequences for community members and the heritage itself (Comer 2012; Meskell 2012). Project approvals typically are issued and supervised by government officials. Managers of the site often are specialists with formal qualifications beyond the reach of members of local communities. Local communities are typically not involved with the conversion of their site into a tourist destination and do not benefit from ticket sales or on-site commercial opportunities, which often are controlled by state authorities. Even site guides may require formal training and licensing from which local residents are excluded. Locals may find themselves excluded from the site itself if their presence does not conform to the image tourism officials seek to project. Even if a destination is developed by local communities, they may not have the resources for large-scale promotion and infrastructure needed to attract tourists and so lose any agency over the course of development of their own community heritage.

The vulnerabilities of weakly empowered communities have been documented in numerous regions of the world (Aas et al. 2005; Hampton 2005; Zorn and Farthing 2007; Adams 2010; Meskell 2012). Although the principles of good practice in public and community archaeology emphasize active engagement with stakeholders in communities, every tourism venue features a diverse range of stakeholders, many from outside the community and some, such as UNESCO, outside the country. Outside stakeholders typically have greater access to tourism industry expertise, financial capital, and political power. Meanwhile, local communities themselves may be riven with factional differences based on family, religion, or other factors. It is insufficient for local communities simply to "sign off" on economic development projects associated with their local cultural heritage. Without clear legal empowerment and strong local governance of the tourism activities, sustaining community heritage tourism has proven to be a significant challenge. Even in cases where community governance and national law have converged to empower local projects, such

as in the Val di Cornia in Italy, shifting national political and economic fortunes and local political conflicts can undermine even established and successful community-based heritage tourism projects (Gould 2018, Chapter 7). Although limited efforts have been made to identify the features of community governance that may give rise to sustainable outcomes, generalizable approaches to community empowerment remain to be articulated and enshrined in laws and in archaeological practice.

Actual Impact

Field schools and conservation projects offer another route to economic impacts. The jobs created in such projects can have important local impacts (Boytner 2014; Pyburn 2017). If projects continue over multiple seasons, they can provide predictable income to the local community. However, these are usually seasonal positions and completely dependent on outside funding, which can end leaving even trained conservators and excavators without means of employment (Roca 2017). While there are many examples of local community members becoming qualified archaeologists or conservators under the mentorship of long-term local projects, in many developing countries, management and skilled positions within excavations are predominately held by foreigners. Field school workers, generally students from the United States or Europe, are performing roles locals can easily be trained to carry out. In some settings, the need to distribute employment widely and fairly within a community prevents pay based on experience and minimizes each individual's income. A notable counterexample is the Temple of the Winged Lions Project in Petra, Jordan (Tuttle 2013): the original research project ensured that local community members were trained in conservation and research skills. Subsequently, supported in part by international development funds, the local community is now attempting to run an archaeological conservation services and training company (see selatrainingjo.com).

Similarly, efforts to generate income at the community level through projects that service the tourism industry directly have been successful but limited. There are real practical barriers to communities benefiting economically from visitors. Depending on distances and available amenities, tourists may not spend significant time or money in the community on accommodation or refreshments, with the actual benefits of tourism flowing to regional centers or beyond. Where local spending does occur, the impacts may attract nonlocals with more capital and experience in the industry who are better able to take advantage of opportunities. Local production of souvenirs has proven to be a modest contributor in many communities, but communities aspiring to sell products offsite require the capacity to locate markets and establish distribution channels to serve them effectively. In general, the barriers to community tourism initiatives have not been overcome through the actions of archaeologists. Although data is often limited, what does exist shows that the rhetoric of projects is not matched by the reality (Hampton 2005; Adams 2010; Comer 2012). However, the example of Agua Blanca in Ecuador (Hudson et al. 2016) demonstrates that real long-term benefits are possible with favorable market conditions and long-term sustained engagement.

Skills and Resources

Experience around the world with projects seeking to benefit local communities through their archaeological heritage has taught that no success is possible without external assistance. Typically, in emerging countries, local community members lack knowledge of archaeological conservation and the requirements of the tourism industry. They lack access to political patronage necessary in many countries for projects to proceed and typically lack access to requisite financial resources. Not all economic development projects aim to establish a self-sustainable business, and short-term or seasonal employment may provide benefit for crucial periods to community members. Projects with longer-term ambitions, however, need sound business plans and access to skilled external supporters.

In practice, archaeologists rarely collect the information they need to ensure that the economic activity they initiate can be sustained (see case

studies in Burtenshaw and Gould 2015; Gould and Anne Pyburn 2017). This is particularly true with regard to gathering information on the market local businesses are designed to serve. Visitor information, albeit often flawed, must be collected. Expectations for the level of new tourism must be tempered in reality. Product-based businesses often focus on production of traditional goods rather than working to understand which products prospective consumers want to purchase. Also required is a comprehensive understanding of suppliers and costs of production in order to ensure that the business can be profitable and provide employment at fair income levels for project participants.

The failed site museums and community crafts projects that litter the archaeological landscape reflect the need for communities, with assistance, to conduct thorough business planning and to couple those plans to effective and appropriate skills training and access to financial capital in the form of grants or highly concessionary loans.

If projects are to be self-sustaining over the long run, community leaders will need training in general business skills to manage financial aspects of the business and to adapt it to changing circumstances. With a workable business plan in hand, communities will need help to acquire the specific occupational skills needed to run a project without ongoing outside help. They will need substantive archaeological knowledge to serve as guides, and marketing and technical guidance to produce marketable products. The Sustainable Preservation Initiative (SPI) (sustainablepreservation.org) attempts to create sustainable community businesses associated with local cultural heritage in several countries. A key part of its strategy is that local project managers are guided through the diagnostics of assessing the market and understanding what businesses are viable and sustainable. Equally, SPI tries to ensure that local community members receive a "mini business school" which teaches them the basics of business governance, planning, accountancy, marketing, and product development so that they can manage their own businesses over the long term.

Moreover, not all members of a community will wish or be able to participate in a development project. Participants will need to manage potential frictions from within the community and to insulate the project from outside governmental or commercial interlopers. Even with a viable business plan in hand, community projects need effective organizational governance that is led by motivated community members, not outsiders (Gould 2018). Local community members need to be involved in the creation of projects from the beginning, must concur in final plans in order to ensure projects are locally relevant and supported, and must provide leadership to the project once it is launched. These conditions imply limits on the role of archaeologists and other outside advisers, who can provide assistance, advice, and insight but must not displace community members in leadership roles.

International Perspectives

Interest among archaeologists in participating in community economic development projects varies widely around the world, reflecting varied local political and economic contexts on one hand and local disciplinary imperatives on the other. From a geographic perspective, archaeologists working in countries with more modernized economies are more likely to operate within the context of government and private-sector economic development agencies with the skills and resources to promote industrial scale tourism and urban renovation projects. Archaeologists in these contexts are least likely to be found leading development efforts. Public archaeology programs are more commonly the vehicle through which archaeologists engage with communities in such settings, which include the United States, the United Kingdom, and parts of Europe. Where economic conditions are less advanced, archaeologists may more frequently be encountered supporting development projects rooted in archaeological sites and heritage. Countries with emerging economies tend to be the focus of archaeological NGOs that sponsor development projects and of projects sponsored by individual

archaeologists in conjunction with their own scholarly endeavors.

Interest in community development through archaeological projects also varies in response to differences in the scholarly, social, and political priorities of the discipline globally. Again, regions of the world that are less developed have been the object of more efforts to promote development led by socially conscious indigenous and foreign archaeologists. Heritage professionals have been deeply involved in the development of ecomuseums, primarily in Europe and other regions with advanced economies, but development efforts associated with archaeological heritage in those countries have often been led by government agencies. Archaeologists are less engaged in development in European segments of the Mediterranean region, perhaps because archaeologists trained in classical disciplines have been less exposed to the practical and ethical issues in developing countries that are routinely encountered by archaeologists trained in anthropology, who work more often in less advanced settings. However, concern for community development has been increasingly evidenced in practice and in ethical codes across the archaeological disciplines and throughout the world.

Future Directions

Archaeologists' engagement in community economic development is, to a degree, at a crossroads. Initial enthusiasm about the prospects for cultural heritage to enhance local community economies, although clearly successful in many parts of the global north, especially in Europe and the United States, has been tempered by experience elsewhere. Ill-thought-through projects, lacking in market understanding, have been pursued in communities that lacked skills and organization and faced daunting economic, political, and social challenges. Not surprisingly, results have been disappointing. Successes, where they have occurred, have been projects that are led by local community members who took the lead to build their own heritage-based economies and benefitted from advice, training, and support delivered in ways that reinforced, rather than undermined, the leading position of the community itself.

This reality has led some to question whether archaeologists belong in the economic development business (Pyburn 2017). The factors that have propelled archaeological engagement with community development – disciplinary ethics in archaeology and heritage management and the growing focus of the development industry on sustainable bottom-up projects – show no signs of abating, however. Thus, calls to make heritage and archaeological sites economically valuable to their host communities are likely to continue. This means, at a minimum, that the sobering experience to date needs to prompt reconsideration of the strategies of individual archaeologists and nongovernmental organizations rooted in the field. Practice needs to change substantially to focus on business training, market analysis, supply chain management, community governance, and comprehensive, light-touch external assistance.

For changes in practice to be successful, however, more systematic examination of current and past projects is required. Objectives need to be defined, and data on their achievement need to be gathered. Both short-term and long-term studies of successful, and unsuccessful, projects are needed to begin to define best practices in a manner that can be transmitted to practitioners in the field. Thus, an ambitious research agenda into what works, and why, should be at the heart of future archaeological interventions in pursuit of community economic development.

Cross-References

- ▶ Critical Community Engagement in Heritage Studies
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Heritage and Public Policy
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Marketing Heritage

▶ Sustainable Cultural Tourism Policies: Overview
▶ Uses of Heritage
▶ World Heritage Objectives and Outcomes

References

Aas, Christina, Adele Ladkin, and John Fletcher. 2005. Stakeholder collaboration and heritage management. *Annals of Tourism Research* 32 (1): 28–48.

Adams, Jeffrey Lee. 2010. Interrogating the equity principle: The rhetoric and reality of management planning for sustainable archaeological heritage tourism. *Journal of Heritage Tourism* 5 (2): 103–123.

Binswanger-Mkhize, Hans P., Jacomina P. de Regt, and Stephen Spector. 2010. *Local and community driven development*. Washington D.C.: The World Bank.

Boytner, Ran. 2014. Do good, do research: The impact of archaeological field schools on local economies. *Public Archaeology* 11 (1–3): 262–277.

Burtenshaw, Paul, and Peter G. Gould, eds. 2015. *Archaeology and economic development*. Oxford: Maney Publishing/Oxbow Books.

Comer, Douglas. 2012. *Tourism and archaeological heritage management at Petra: Driver to development or destruction?* New York, Dordrecht/Heidelberg/London: Springer.

Gould, Peter G. 2018. *Empowering communities through archaeology and heritage*. London: Bloomsbury Academic.

Gould, Peter G., and K. Anne Pyburn, eds. 2017. *Collision or collaboration: Archaeology encounters economic development*. Cham: Springer.

Hampton, Mark P. 2005. Heritage, local communities and economic development. *Annals of Tourism Research* 32 (3): 735–759.

Hudson, Chris, Maria-Isabel Silva, and Colin McEwan. 2016. Tourism and Community: An Ecuadorian Village Builds on its Past. *Public Archaeology* 15(2-3): 65–86.

Lafrenz Samuels, Kathryn. 2016. Transnational turns for archaeological heritage: From conservation to development, governments to governance. *Journal of Field Archaeology* 41 (3): 355–367.

McGimsey, Charles R. 1972. *Public archaeology*. New York/London: Seminar Press.

Meskell, Lynn. 2012. *The nature of heritage: The new South Africa*. Chichester/Malden/Oxford: Wiley-Blackwell.

Pyburn, K. Anne. 2017. Developing archaeology. In *Collision or collaboration: Archaeology encounters economic development*, ed. Peter G. Gould and K. Anne Pyburn, 189–199. Cham: Springer.

Roca, María Victoria. 2017. Archaeology, heritage and development in two south American colonial sites: The Guarani-Jesuit missions (1610-1767). In *Collision or collaboration: Archaeology encounters economic development*, ed. Peter G. Gould and K. Anne Pyburn, 117–136. Cham: Springer.

Smith, Laurajane, and Emma Waterton. 2009. *Heritage, community and archaeology*. London: Duckworth.

Tuttle, Christopher A. 2013. Preserving Petra sustainably (one step at a time): The Temple of the Winged Lions Cultural Resource Management Initiative as a step forward. *Journal of Eastern Mediterranean Archaeology and Heritage Studies* 1 (1): 1–23.

WCED. 1987. Our common future: From one earth to one world. In *Report of the world commission on environment and development: Our common future*. New York: United Nations.

Zorn, Elayne, and Linda Clare Farthing. 2007. Communitarian tourism: Hosts and mediators in Peru. *Annals of Tourism Research* 34 (3): 673–689.

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Community Engagement in Archaeology

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Introduction

For generations, archaeology has been conducted for, and shared among, a small group of scholars, but now many archaeologists consider "community engagement" to be an important part of their work. Archaeologists may make special efforts to share their interpretations in ways that are more accessible to a wide audience than are scholarly publications or even traditional museum displays and documentary films. Archaeologists may wish to see their research benefit modern groups with ties to the site through, for example, increased heritage tourism to their area or the enhancement of their status by drawing attention to the group's past. Archaeologists may believe that they have an ethical or political obligation to ensure that their research is beneficial to these groups. Archaeologists may even find that encouraging members of these groups to participate in their research increases their understanding of a site or improves their access to important data. Although all of the above are important, community engagement in archaeology extends far beyond these measures.

Community engagement means that archaeologists think about nonprofessionals as potentially active participants in, not simply passive audiences for, their research. It means that community members can influence the goals and outcomes of a project. It means that as a result of their close collaboration, archaeologists might learn things that change the way they approach a particular site or, more significantly, the methods and theories that they use to understand the archaeological record and interpret past human actions. These ideas are not uncontroversial. Many archaeologists are unconvinced that we can continue to consider knowledge production to be "science" once its political or ideological underpinnings are revealed. Such questions have been raised with respect to the "public" or "applied" scholarship produced in one of archaeology's sister disciplines: anthropology (but see Mullins 2011).

This paradigm shift has occurred in multiple disciplines. In archaeology, specifically, post-processual frameworks have developed research themes that inspire community-oriented work and also fostered the self-reflexivity that must underpin serious community engagement. But changes in media, communication, and travel also create structures which shape this relatively new way of approaching archaeological practice, as do contemporary heritage law and the global political economy. Thus, it seems that community engagement will be a feature of archaeological practice for some time to come.

Definition

Although many archaeologists initially became interested in community engagement through projects that connected them with the descendants of the people who created the sites they studied, researchers have come to realize that there are many types of communities for whom archaeology matters, who ought to be engaged. Certainly descendant communities have a special relationship to the sites and landscapes occupied by their ancestors, and their assertion of an authority on par with, or surpassing that of, archaeologists is increasingly supported by national and international law, as described below. However, other collectivities are considered by archaeologists to be legitimate stakeholders in the archaeological process. For example, people who live in the vicinity of archaeological sites form another kind of significant community – one that hews more closely to the traditional meanings of "community archaeology": the archaeological study of a past community, often defined by the proximity of its members or the scale of the group (larger than a household, smaller than a polity) (Canuto and Yaeger 2000).

The aim of community engagement in archaeology is to go beyond simply sharing the results of one's research with an audience with some claim to a site or social group in the past. Rather, archaeologists seek to produce scholarship that benefits that group, conceiving of them not as an "audience" but as a real constituency, one that has a very real stake in the outcome in an archaeological project. Furthermore, the aim of the archaeologist is to share power and responsibility with that group in the very act of research (see, e.g., Blakey 2010).

A good question to consider, then, is where does "public archaeology" end and "community engagement" begin? One useful distinction is the idea that public archaeology is any archaeological interaction with a public (i.e., non-archaeologists) and any scholarship analyzing these efforts. "Community archaeology" is public archaeology that creates the opportunity for all involved – community members and archaeologists – to reflect upon the ideas and interests that they share. It is furthermore less likely to be oriented toward scholarly interests than other forms of archaeological practice (McDavid 2009: 166). Some commentators emphasize the importance of community control over the archaeological project and in fact stress community engagement's transformative effect on scholarly research (see, e.g., Marshall 2002a; or Green et al. 2003). Indeed, archaeologists are growing increasingly self-reflexive in their discussions about what it means to do archaeology in the real world.

So here, "community engagement" should be taken to mean archaeology that responds to imperatives established by collectivities whose stake in the archaeological record is not professional but

rather stems from some other connection. Perhaps the site was occupied by their ancestors, or they live in the site's vicinity, or they identify with the site's inhabitants because of some shared status or identity. Whatever the reason, these people have a social connection with people in the past, people who left material traces that are amenable to archaeological study. As a result, these present-day people are connected with one another. When the connection extends to encompass the archaeological project as well, when the ideas of these community members have a meaningful effect on the research, and when their values and ideas are considered alongside those of the discipline, then we are speaking of community engagement in archaeology.

Historical Background

Milestones in the development of archaeologies of community engagement may be marked by the development of influential research programs. Other important watersheds include publications which are either reports describing these programs or synthetic and analytical treatments of the challenges and rewards of engaged scholarship.

Two early examples of community engagement in archaeology come from the Chesapeake region of the USA, an area with a long tradition of historical archaeology. The first, Alexandria Archaeology http://alexandriava.gov/historic/archaeology/default.aspx?id=39146, grew out of a community initiative to protect archaeological sites threatened by development. In 1975, the city established the Alexandria Archaeology Commission, hiring city archaeologist Pamela Cressey 2 years later. The program's aims include excavating sites, curating and interpreting finds, and especially providing opportunities for volunteer participation in preservation activities. By way of contrast, the second example, Archaeology in Annapolis, has tended to emphasize visitor education, rather than public participation, as central to their strategy for community engagement. Since 1981, tourists have been able to visit ongoing archaeological excavations and discuss life in the city from the eighteenth century to the present, using strategies and themes grounded in the project's Marxist approach to archaeology (see Potter 1994).

Elsewhere in the USA, work began at Little Rapids in the early 1980s as a traditional research project. But several years into the study, principal investigator Janet Spector's strategy shifted. Feminist concerns about bias and exclusion in scientific practice led her to critically reflect on what it would mean to

> include Indian people in the production of archaeological knowledge about their histories and cultures. How will this affect the ways we set our research agendas, organize field projects, treat archaeological materials? How would their inclusion shape the ways we generate, express and present our understandings of the past or the audiences we write for?. (Spector 1991: 389)

Similar concerns about the exclusion of indigenous people from the archaeological study of their ancestors – in addition to development pressures – led the Navajo Nation to establish the Navajo Nation Archaeology Department, wherein the archaeological and ethnographic staff must adhere not only to US laws but also to the laws and policies established by the Navajo Nation. While this mandate upholds the authority of Navajo people over the archaeological sites within their reservation, it does not mean that all of the people performing day-to-day archaeology are necessarily tribal members (Thompson 2009). The authority of the Navajo Nation to compel engagement and control archaeologists' access to materials is buttressed by federal legislation such as the Native American Graves Protection and Repatriation Act (NAGPRA). At the African Burial Ground http://www.africanburialground.gov/ABG_Main.htm in Manhattan, on the other hand, existing laws only mandated mitigation of damage to the archaeological resources, not engagement with any communities. The well-publicized struggle by New Yorkers and concerned African Americans to participate in decisions about the study and disposition of the burials has marked a major watershed in how US federal agencies and archaeologists work with descendant communities (see, e.g., La Roche and Blakey 1997).

At the same time that marginalized communities in the USA were becoming increasingly assertive of their right to the materials that archaeologists study, archaeologists working in economically and politically marginalized nations were teaming up with local communities in efforts that some labeled "applied archaeology" (Erickson 1998) and others, "action archaeology." The latter term is used by Mayanist Jeremy A. Sabloff to indicate "*involvement or engagement with the problems facing the modern world through archaeology.* In other words, by 'action archaeology,' I mean archaeologists working *for* living communities, not just *in* or near them" (Sabloff 2008: 17, emphasis in the original). Over the years, examples have included identifying ancient land-use techniques that promote higher crop yields than prevailing agricultural practices (Erickson 1998), creatively engaging host communities in site protection, promoting development http://www.savethemoche.org/ or educational http://www.machiproject.org/en/index.php projects in host communities, and incorporating local perspectives into research agendas (see, e.g., Atalay 2007).

The Community Archaeology Project at Quseir has had an extraordinary influence on how archaeologists approach community engagement. Most significantly, the scholars responsible for that project put forth a general methodology for engaged archaeology rather than a set of instructions or a how-to program (Moser et al. 2002).

The archaeological programs described above, and many others, are represented in, and paralleled by, a series of key publications. Notable contributions include collections of essays about engagement between archaeologists and indigenous communities and between archaeologists and members of the African diaspora. The issue of *World Archaeology* edited by Yvonne Marshall continues to have a major impact, not least because of its broad global scope. A recent collection compiled by Barbara J. Little and Paul A. Shackel emphasizes the role of archaeology in enhancing civil society, specifically (see McDavid and Babson 1997; Swidler et al. 1997; Marshall 2002b; Shackel and Chambers 2004; Little and Shackel 2007; Colwell-Chanthaphonh and Ferguson 2008; Bruchac et al. 2010).

Key Issues/Current Debates

Ever since archaeologists have discussed explicitly what it means to engage with communities, there have been disagreements about whether and to what end this engagement ought to take place. Parker Potter took early practitioners of "plantation archaeology" (now treated as a subset of African American or African diaspora archaeology) to task for failing to come to terms with the needs and desires of a broad-based descendant community of African Americans and for, in some cases, producing scholarship inimical to those same needs and desires. Responses to this critique included the retort that archaeologists should question their relevance not only to descendant audiences but also to scholars in other subfields who found archaeological studies of plantations to be arcane and irrelevant. Another dissenter rejected the idea that practitioners open the research process up to non-archaeologists or "that valid research questions and interpretations can be developed out of the contemporary agendas of groups on either side of the power line" (see Potter 1991; Farnsworth 1993; McKee 1994: 5).

While it might seem that a decision on the part of archaeologists to further engage with communities would be beneficial, or at worst, harmless, concerns have been raised, many of them centering on the idea of *which* communities merit engagement and on what terms. In a recent essay concerning the usefulness of archaeology, Shannon Lee Dawdy considered whether public archaeology and its related forms might be a stalking horse for a range of nationalist agendas. She sees this as a special danger in settings without a long history of (and therefore wariness about) nationalist archaeologies, or in settings in which archaeology is meant to be of use to a subaltern community. Though engagement is often meant to benefit the marginalized, archaeology can also serve powerful statist and extra-governmental interests, and Dawdy's essay asks

that archaeologists critically reflect upon the distinction. Archaeologists from a variety of employment sectors and across the globe responded to this analysis by refining the distinction between "public" archaeology and "community" archaeology (as described in "Definition," above) and providing concrete examples in which archaeological practice benefited constituencies besides archaeologists or the structures (institutional, economic, and political) that underpin archaeology's existence (see Dawdy 2009).

Many of the practical advances archaeologists have made in engaging with communities have been in the exploitation of new media environments. Just as newspapers and novels, the new media of the early modern period, were instrumental in creating alternatives to a purely local "community," the new media of the new millennium have allowed archaeologists to connect with others in fruitful ways. Archaeologists easily grasped the potential for the Internet to multiply the number of individuals who could "experience" a site or to communicate interpretations to colleagues and other interested parties. However, some have realized the ways in which the Internet can be used to facilitate collaboration and dialogues – to support the process of engagement. An early pioneer in this effort is Carol McDavid, whose work at the Levi Jordan Plantation was both a product of and an engine driving the project website http://www.webarchaeology.com. Such endeavors have only grown with the introduction of Web 2.0 technologies and the ascendance of electronic social media.

Archaeological associations and university departments have begun to explore how best to incorporate community engagement into archaeological education generally and especially how to expose future archaeologists to ideas about community engagement. An educational movement that has gained considerable following in universities in the USA is "service learning" in which students' intellectual and civic education is enhanced by opportunities to apply the principles of a particular discipline. As Michael Nassaney observes, this form of pedagogical practice is ideally suited to a hands-on, experiential endeavor such as archaeology (Nassaney 2009).

In the Society for American Archaeology's volume *Teaching Archaeology in the Twenty-first Century*, community engagement is presented as one of several areas that need additional attention, as educators consider the skills needed by emerging practitioners. The toolkit for archaeologists who effectively engage communities includes respect for different points of view, intensive coursework in ethics, an appreciation for the heterogeneity of communities, and a strong sense of professionalism. These matters are so important because, as the authors of one contribution conclude, "it is hard to deny the proposition that the social context in which archaeological research unfolds influences directly both the quality and efficiency of fieldwork and the validity of the knowledge that it generates" (Watkins et al. 2000: 80–1). The transformative effect of community engagement on archaeological knowledge is explored further below, under "Future Directions."

International Perspectives

Several observers have noted that the most prolific (English-language) writing about community engagement in archaeology comes from former settler societies – modern states with origins in colonialism and settlement by a foreign power, with continuing power imbalances between descendants of settlers and descendants of the indigenous inhabitants. It seems worthwhile, then, to consider community engagement as it relates to colonialism, postcoloniality, and indigenous archaeology.

Archaeology as a modern enterprise has been intimately linked with colonialism, with archaeologists from the metropole excavating sites located in nations in "the periphery." Like anthropology and many other scientific enterprises, archaeology served, whether deliberately or unintentionally, to provide ideological support for the domination of some nations by others (for a summary, see Lydon and Rizvi 2010). At times, this purpose could be served by the reification of social-evolutionary schema or the treatment of descendant groups as timeless and static, suitable analogues for archaeological data. Or the colonialist stance may even have

acted to *dis*engage or alienate contemporary communities from the archaeological sites occupied by their ancestors or other predecessors, as is especially common when the story of an ancient civilization ends in "collapse" or "disappearance." However, the postcolonial critique has begun to influence the practice of archaeology, including archaeologies of community engagement.

Postcolonial archaeologies, like other forms of postcolonial critique, have "a fundamental ethical basis in examining oppression and inequality in the present. . .reconsider[ing] colonialism from the perspective of colonized people and their cultures" (Lydon and Rizvi 2010: 19). To the extent that community-engaged archaeology seeks to work "for" and "with," not "on" and "in," contemporary communities, there are significant parallels between the postcolonial and engagement agendas. While modern states with prior histories of colonial occupation and/or colonialist archaeology have in many cases managed to curtail the wholesale removal and exploitation of their archaeological patrimony by foreign researchers, new structures have not necessarily meant *local* community control or oversight. And indeed, much of the population may be as alienated as ever from the process of archaeology and the resulting discoveries (see examples described in Eze-Uzomaka 2000; Moser et al. 2002; Atalay 2007 or Chirikure et al. 2010).

Through sustained and vigorous effort, many indigenous groups the world over have gained authority over the sites occupied by their ancestors. Many of the strategies and concepts that undergird community engagement in archaeology have their roots in indigenous archaeology (Atalay 2007). The promulgation of ethical standards has certainly done much to persuade archaeologists of the legitimacy of indigenous claims to archaeological sites, artifacts, and ancestral remains. The World Archaeological Congress's First Code of Ethics asserts, among other points, "that the indigenous cultural heritage rightfully belongs to the indigenous descendants of that heritage" and urges archaeologists to "establish equitable partnerships and relationships between Members and indigenous peoples whose cultural heritage is being investigated" (World Archaeological Congress 1990). However, such appeals may have been ignored if it were not for laws mandating engagement with indigenous communities. NAGPRA – a US law – has already been mentioned above. In Australia, a federal law, the *Aboriginal and Torres Strait Islander Heritage Protection Amendment Act* (1987), picks up where a variety of state laws, such as the *Heritage Conservation Act* (1991) of the Northern Territory, leave off (see Colley 2002).

Evolving circumstances within settler societies – like the USA and Australia – as well as between former colonizers and former colonies, have compelled many archaeologists from the global North to engage with communities at home and abroad. Similar efforts are underway among professionals around the world who recognize the importance of connecting with communities formerly alienated from archaeological research. Pamela Eze-Uzomaka notes, for example, that even a strategy as straightforward as using radio, newspapers, or television to inform people about archaeological discoveries and goals has been ineffective in Nigeria. Scholars from elsewhere in Africa suggest that the question is one of bringing community and scholar interests into alignment, as with some programs that have as a primary goal consultation and empowerment but also include poverty alleviation through employment or tourism (see Eze-Uzomaka 2000: 35; Chirikure et al. 2010).

Ajay Pratap observes that there is still an urban and majoritarian bias to history (and by extension, archaeology) in India. He describes tribal exhibits in museums that treat these people as a part of the nation's timeless "natural" history.

> The fact that the past of ethnic minorities, particularly tribes, is usually neglected, even sixty years after independence is not a very pleasing scenario. . .[It] is a serious lacuna in our curriculums that needs to be addressed and rectified. In a context when history writing in India is increasingly being identified as an exercise in postcoloniality, how can we possibly justify the deletion of the pasts of ethnic minorities?. (Pratap 2009: 15)

What distinguishes Pratap's perspective from that of his colleagues in the West is that he views this as a problem to be solved using archaeological methods rather than policy.

If one were to characterize the "styles" of community engagement that appear to predominate in a range of international settings, the following patterns seem to emerge (see also Marshall 2002a: 212–4). Within the states that have emerged from the independence movements and revolutions of the twentieth century, "community engagement" is frequently described as necessary in order for archaeology to remain viable in tenuous economic or political environments (e.g., Eze-Uzomaka 2000) or in the face of looting (e.g., Qin 2004: 298). Furthermore, engagement becomes a management concern or a problem of definition – which communities should participate? How does an archaeologist build collaborations with resistant communities (e.g., Chirikure et al. 2010)? In the former colonial centers, "community engagement" often seems to entail community participation not only in establishing goals and research agendas but especially in the actual collection of archaeological data (e.g., Merriman 2004; Smith and Waterton 2009). Meanwhile, within the settler societies, "community engagement" tends to be oriented toward addressing imbalances and ameliorating the social and political hardships of subaltern groups. This tendency is also evident in the projects described by researchers with origins or training in the global North at work in the South (e.g., Green et al. 2003). All of which prompts one to consider to what extent these different international "styles" of community engagement have their roots in the power relationships within and among contemporary societies as well as modern concepts of "self" and "other."

Future Directions

Archaeologists often expect community engagement to bring (positive) change to a community. Sometimes, they expect it to reshape an archaeological project. Recent analyses suggest that community engagement has a transformative effect on the discipline more generally. Certainly, working with stakeholders also has led archaeologists to, for example, take oral history more seriously and consider the significance of nonscientific ways of knowing about the past. Archaeologists must also confront the real-world consequences of their research activities. These are no small matters in and of themselves, but community engagement can reach farther, even, than this.

Changes to archaeological practice may shape methods or techniques, for example, something as prosaic as identifying new kinds of sites or landscapes to examine. In one case, investigators were encouraged to think about their research problems spatially rather than temporally – a major methodological shift that helped them to better understand how to tackle a complex regional history. The researchers also learned a great deal about local concepts of ethnic-group belonging that were grounded in theories of identity very different from those traditionally used by social scientists (Green et al. 2003). Multiple cases also demonstrate that engaging with communities permits archaeologists to envision an ethics that is situational without being relativist. These examples reinforce Yvonne Marshall's argument that "Community archaeology represents an opportunity. We need it, not because it is politically correct, but because it enriches our discipline." And furthermore, that examples such as those hinted at above should "change the perspective that community archaeology is simply a CRM [Cultural Resource Management] or heritage management issue and of little relevance for academic research" (Marshall 2002a: 218, 215).

One of the factors militating against the closer integration of academic researchers and communities is the structure of the academy itself. For although engaged scholarship can be intellectually complex, theoretically grounded, and rigorously executed, the standards for assessment are less obvious than with the traditional process of publication for peer review. Without metrics in place for evaluating the quality of community engagement projects in archaeology-or any other discipline – and thus the assurance that such work "counts," these endeavors can seem risky to scholars whose careers are not yet established. One reason to hope for change sooner rather than later is that many universities, while uncertain how to handle engaged scholarship on the part of their faculty and staff, aggressively promote its importance for students (though a casual

examination suggests that this trend is more pronounced among institutions in the global North).

It may be that the imperative to provide quality training for the next generation of practitioners will have the unintended consequence of encouraging engaged scholarship at the research level. "Recent developments in archaeological practice [including openness to community engagement] have led to the recognition that training archaeology students poses new challenges as the discipline attempts to meet the diverse needs of the twenty-first century" (Nassaney 2009: 4).

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Archaeological Stewardship
- ▶ Archaeology and Anthropology
- ▶ Community and Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage and Communities
- ▶ Ethnic Identity and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Historical Archaeology
- ▶ Indigenous Peoples, Working with and for
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Postcolonial Archaeologies
- ▶ Post-Processual Archaeology
- ▶ "Public" and Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Society for American Archaeology (SAA)
- ▶ Stakeholders and Community Participation
- ▶ World Archaeological Congress (WAC)

References

Atalay, S.L. (Ojibwe). 2007. Global application of Indigenous archaeology: Community based participatory research in Turkey. *Archaeologies: Journal of the World Archaeological Congress*: 3(3): 249–270.

Blakey, M.L. 2010. African Burial Ground Project: Paradigm for cooperation? *Museum International* 62 (1–2): 61–68.

Bruchac, M.M., S.M. Hart, and H.M. Wobst, eds. 2010. *Indigenous archaeologies: A reader on decolonization*. Walnut Creek: Left Coast Press.

Canuto, M.A., and J. Yaeger, eds. 2000. *The archaeology of communities: A New World perspective*. London: Routledge.

Chirikure, S., M. Manyanga, W. Ndoro, and G. Pwiti. 2010. Unfulfilled promises? Heritage management and community participation at some of Africa's cultural heritage sites. *International Journal of Heritage Studies* 16 (1): 30–44.

Colley, S. 2002. *Uncovering Australia: Archaeology, indigenous people and the public*. Washington, DC: Smithsonian Institution.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2008. *Collaboration in archaeological practice: Engaging descendant communities*. Lanham: AltaMira Press.

Dawdy, S.L. 2009. Millennial archaeology: Locating the discipline in the age of insecurity. *Archaeological Dialogues* 16 (2): 131–142.

Erickson, C. 1998. Applied archaeology and rural development: Archaeology's potential contribution to the future. In *Crossing currents: Continuity and change in Latin America*, ed. M.B. Whiteford and S. Whiteford, 34–45. Upper Saddle River: Prentice Hall.

Eze-Uzomaka, P.I. 2000. *Museums, archaeologists and Indigenous people: Archaeology and the public in Nigeria*, BAR International series. Oxford: Archaeopress.

Farnsworth, P. 1993. What is the use of plantation archaeology? No use at all, if no one else is listening! *Historical Archaeology* 27 (1): 114–116.

Green, L.F., D.R. Green, and E.G. Neves. 2003. Indigenous knowledge and archaeological science: The challenges of public archaeology in the Reserva Uaçá. *Journal of Social Archaeology* 3 (3): 366–398.

La Roche, C.J., and M.L. Blakey. 1997. Seizing intellectual power: The dialogue at the New York African Burial Ground. *Historical Archaeology* 31 (3): 84–106.

Little, B.J., and P.A. Shackel, eds. 2007. *Archaeology as a tool of civic engagement*. Lanham: AltaMira Press.

Lydon, J., and U.Z. Rizvi. 2010. Introduction: Postcolonialism and archaeology. In *Handbook of postcolonial archaeology*, ed. J. Lydon and U.Z. Rizvi, 17–33. Walnut Creek: Left Coast Press.

Marshall, Y. 2002a. What is community archaeology? *World Archaeology* 34 (2): 211–219.

Marshall, Y., ed. 2002b. Community archaeology. *World Archaeology* 34(2).

McDavid, C. 2009. Back to the futurist. Response to Dawdy. *Archaeological Dialogues* 16 (2): 163–169.

McDavid, C., and D.W. Babson, eds. 1997. In the realm of politics: Prospects for public participation in African-American and plantation archaeology. *Historical Archaeology* 31(3).

McKee, L. 1994. Is it futile to try and be useful? Historical archaeology and the African-American experience. *Northeast Historical Archaeology* 23: 1–7.

Merriman, N. 2004. Involving the public in museum archaeology. In *Public archaeology*, ed. N. Merriman, 85–108. London: Routledge.
Moser, S., D. Glazier, J.E. Phillips, L.N. el Nemr, S. Richardson, A. Conner, and M. Seymour. 2002. Transforming archaeology through practice: Strategies for collaborative archaeology and the Community Archaeology Project at Quseir, Egypt. *World Archaeology* 34 (2): 220–248.
Mullins, P.R. 2011. Practicing anthropology and the politics of engagement: 2010 year in review. *American Anthropologist* 113 (2): 235–245.
Nassaney, M.S. 2009. The reform of archaeological pedagogy and practice through community service learning. In *Archaeology and community service learning*, ed. M.S. Nassaney and M.A. Levine, 3–35. Gainesville: University Press of Florida.
Potter, P.B., Jr. 1991. What is the use of plantation archaeology? *Historical Archaeology* 25 (3): 94–107.
Potter, P.B., Jr. 1994. *Public archaeology in Annapolis: A critical approach to history in Maryland's ancient city*. Washington, DC: Smithsonian Institution Press.
Pratap, A. 2009. *Indigenous archaeology in India: Prospects for an archaeology of the subaltern*, BAR International series. Oxford: Archaeopress.
Qin, D. 2004. The effects of the antiquities market on archaeological development in China. In *Public archaeology*, ed. N. Merriman, 292–299. London: Routledge.
Sabloff, J.A. 2008. *Archaeology matters: Action archaeology in the modern world*. Walnut Creek: Left Coast Press.
Shackel, P.A., and E.J. Chambers, eds. 2004. *Places in mind: Public archaeology as applied anthropology*. New York: Routledge.
Smith, L., and E. Waterton. 2009. *Heritage, communities and archaeology*. London: Gerald Duckworth and Co. Ltd.
Spector, J. 1991. What this awl means: Toward a feminist archaeology. In *Engendering archaeology: Women and prehistory*, ed. J.M. Gero and M.W. Conkey, 388–406. Oxford: Blackwell Publishers.
Swidler, N., K.E. Dongoske, R. Anyon, and A.S. Downer, eds. 1997. *Native Americans and archaeologists: Stepping stones to common ground*. Walnut Creek: AltaMira Press.
Thompson, K.F. 2009. Government cultural resource management versus Navajo people. *Heritage Management* 2 (2): 241–251.
Watkins, J., K.A. Pyburn, and P. Cressey. 2000. Community relations: What the practicing archaeologist needs to know to work effectively with local and/or descendant communities. In *Teaching archaeology in the twenty-first century*, ed. S. Bender and G.S. Smith, 73–81. Washington, DC: The Society for American Archaeology.
World Archaeological Congress. 1990. First code of ethics. Available at: http://www.worldarchaeologicalcongress.org/site/about_ethi.php. Accessed 7 July 2011.

Community Partnerships in Safeguarding World Cultural Heritage

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C

Introduction and Historical Background

The Interface Between Conservation and Development

Over the past four decades many, if not most, developing countries have experienced unprecedented economic prosperity brought about by strategies based on capital investment in infrastructure for industry, agro-business, urban renewal, and tourism. These strategies mirror those adopted by developed countries in previous decades. However, like in the developed economies, these strategies have exacted a heavy toll on environmental and cultural resources. The damage to environmental resources has for some time been recognized and is a matter of public concern and debate. More recently it has been recognized that there is also an alarming depletion of the common stock of cultural capital. Adding to the urgency of the situation are the accelerating forces of globalization which promote the homogenization of cultures and the degradation of the socioeconomic relevance of cultural heritage, both tangible and intangible. In spite of our emotional attachment to the past, our heritage resources are fast disappearing at a rate unprecedented in history.

Cultural resources – when they have been considered at all within the development paradigm – have typically, but incorrectly, been seen as permanent and, therefore, inexhaustible. This has been true especially of built culture heritage: archaeological sites, ancient monuments, and historic buildings are regarded as permanent fixtures of our cultural landscapes. Nothing could be further from the truth. Cultural resources, particularly the built cultural heritage, are nonrenewable resources, each a creation of a specific time and place, now past. These resources are under constant threat of degradation, dismemberment, disintegration, and disappearance.

In spite of the public's avowed devotion to our cultures, misuse and abuse culture heritage resources are rampant. This is obvious to anyone who has seen the graffiti, trash, and vandalism at an ancient monument. This is obvious to anyone who has been unable to experience the serenity of a mosque, church, or temple because of the noise pollution and uncontrolled crowds. Yet, when the overexploitation of a culture heritage resource becomes so unbearable it cannot be ignored, the most common response is to transfer responsibility for this situation to the local inhabitants by citing their somehow lax stewardship and to put severe restrictions on their use of the site and its resources. In the most extreme scenario, local populations have been relocated out of protected areas altogether. Historic districts have lost their traditional inhabitants and have been repopulated with more economically profitable tourists. This strategy, however, only hastens the deterioration of the heritage through the loss of traditional custodians and endogenous techniques for sustainable management of the heritage.

It is obvious that urgent, strategic, and comprehensive action is required to protect a community's and the world's culture heritage assets. In the early twenty-first century, we are operating with a new and much expanded understanding of what constitutes our heritage and so there is the need for a marked shift in the way we manage our cultural heritage resources. Culture heritage conservation must be integrated into strategies for sustainable development, taking into account the needs and aspirations of the communities where cultural assets are found.

Only through community stewardship of the heritage can it be ensured that the heritage will be protected everywhere, and that its protection will be sustained over the long term. Sustained, universal stewardship is prerequisite for the survival of cultural heritage.

Key Issues/Current Debates

Community-Based Conservation Requires a Systematic Approach

Sustainable heritage conservation depends upon the commitment and involvement of local communities. Conservation policies, if they are to be successful, need to promote local community stewardship of the heritage as well as provide socioeconomic benefits for local communities. Therefore, a direct link must be made between the safeguarding of the heritage and socioeconomic development.

Heritage conservation must be anchored in the institutions of the local community and local populations must be given a leading role in the development of conservation policy, as well as in the management of culture heritage sites. Unfortunately, because of the decoupling of heritage conservation with development, community action has become the weakest link in the chain of conservation.

Therefore, the development of the capacity of local government, community-based institutions, and nongovernmental institutions to successfully manage their heritage resources for both conservation and development is a global priority.

The basis of such a strategy to empower local communities in heritage conservation is to be found in a series of participatory and catalytic activities that spur local interest groups to assess the nature, characteristics, and economic potential of indigenous resources and then to develop these resources in ways that are both profitable and sustainable. In the process, local communities are empowered to take more active role in the management of their heritage and in the development of culture tourism-related industries that can alleviate poverty, finance the conservation of local heritage on which tourism is based, and enhance living conditions:

- The first objective of such a strategy is to empower individuals in and local communities as a whole to understand and advocate the long-term conservation of the heritage in their communities. For this purpose, traditional community leaders are mobilized and traditional consensus-building mechanisms are used within the community to arrive at a shared vision and a common goal.
- The second objective of empowerment is to enable the local communities to play a leading role in actual hands-on conservation and preservation work, such as monitoring the

condition of the site or taking part in preventive conservation and ongoing maintenance and restoration projects.

- The third part of the empowerment equation is to develop the means through which local communities can benefit financially from the enhanced conservation of the heritage while at the same time maintaining their social and spiritual traditions intact. Activities here involve a wide variety of income-generating and self-employment opportunities, such as support to the expansion and mass marketing of traditional handicraft industries.

Project activities will differ from site to site, depending on site problematics and assessed needs. However, there is a common strategic ten-step sequence, which when followed, gradually leads to community participation and competence in the maintenance, management, and development of their heritage. This structural framework of activities provides a model which makes the experience sites replicable and transferable to other communities elsewhere in the region and, indeed, worldwide. The sequential activities are as follows:

- Step 1 Activities which promote a stewardship ethic and community participation in historic conservation
- Step 2 Hands-on training involving local town and neighborhood managers to develop gazetting, zoning, and environmental management plans for both preservation and development of historic sites
- Step 3 Training and support activities to identify pilot projects within the community through community-based participatory research work
- Step 4 Research, development, and training in low-cost, traditionally appropriate, and historically accurate techniques for building maintenance and restoration
- Step 5 Reviving the use of traditional building and associated trades necessary for the maintenance of historic buildings in an authentic manner
- Step 6 Promotion and training to preserve artisan skills and other intangible cultural activities which have potential market appeal and can be developed into income-generating professions
- Step 7 Training and promotion of community-based and community-controlled tourism industry-related occupations grounded in the accurate interpretation of the unique local culture, history, and environment
- Step 8 Assistance in curriculum development for both formal and nonformal education in local history, heritage conservation, and small business management skills in the culture industries
- Step 9 Assistance to avail of revolving soft loans and micro-credits for conservation, maintenance, and business development
- Step 10 Creating networks for the exchange of technical information among site managers and town planners.

International Perspectives

Case Studies Provide the Management Prerequisites for Community-Based Conservation

To be successful, a community-based program for conservation must be people centered, focused on local community participation. Activities relative to heritage management and development should be carried out by the local stakeholders themselves at the village level and not by outside parties who siphon off much of the generated income that is meant for the heritage custodians. To ensure this, it is essential that individuals, informal groups, or people's organizations that play traditional roles in the maintenance of heritage sites should first be identified and then work with them, through them, and assist them build up their managerial and technical capabilities.

Given the lack of financial resources and support mechanisms in many countries, it is important that pilot sites have (1) strong private sector involvement in heritage conservation and management, (2) facility to provide micro-credit schemes, and (3) local policy makers are willing to set up required legal frameworks for heritage protection. Implementation strategies should aim at sustainability and replicability of activities that

can result in multiplier-effect or spin-off projects in other target heritage sites.

To complete this strategic scenario, incentives and other forms of recognition should be put in place in order to encourage local community participation and to counteract the perceived negative effects of conservation vis-à-vis modernization and economic progress.

In the ten-step strategy outlined above, it is obvious that there will be growing demand for technical and managerial expertise at the grassroots level and management tools to implement this expertise in a practical way. Among these tools are the following.

Establishment of Information Networks

Fostering, facilitating, and strengthening the communication and lateral links between heritage site managers themselves and with other professionals in their field are one of the priority strategies. It is a goal of the program to provide and foster the means whereby site managers and communities can learn and share from each others' experiences.

Heritage Conservation Awards

The *UNESCO Awards for Culture Heritage Conservation* were established to recognize the achievement of individuals and organization within the private sector and public-private initiatives, in successfully restoring and adapting for viable reuse structures of heritage value in the region.

Promotion of Responsible Tourism

Resulting from many requests from site managers and tourism industry personnel for guidelines and real-life examples of sustainable tourism practices, case studies exploring issues of tourism and culture preservation need to be undertaken and guidelines on cultural tourism for heritage managers, tourism industry personnel, and site visitors.

Heritage Homeowners' Manuals

Designed as a practical tool to guide individuals and families in the care, renovation, and possible adaptive reuse of their historic houses, *Heritage Homeowners Manuals* return responsibility for home (or shop, or temple) maintenance back into the hands of the owners of these buildings themselves.

The purpose of such manuals is not to turn every homeowner into a professional conservation architect but to guide building owners in accomplishing those tasks of routine maintenance and preventive conservation, which are clearly within their competence and responsibility. The *Heritage Homeowners' Manuals* provide the technical guidelines necessary for owners to carry out the necessary work in a manner that preserves the historic authenticity of the structure.

Future Directions

UNESCO-ICCROM Academy for Culture and Heritage Management

There is a rapidly increasing demand for improved professional management of both tangible and intangible culture heritage resources and the institutions that safeguard and foster them. The recently established UNESCO-ICCROM Academy for Heritage Management is the response to meet this need in a professional, systematic, sustainable, and cost-effective way. The Academy is not a physical structure. Instead it is a network of institutes of higher learning that are engaged in the research and teaching of some aspect of heritage conservation and/or culture resource management. The specific focus of the Academy is on management training, but within that focus, the range of institutional members is wide and the management training they offer is broad covering all aspects of culture protection, development, and management. Included in the Academy are institutions that teach culture protection and intellectual property law, culture industry management, culture institution management (museums, theaters, art galleries, dance companies, music groups, etc.), human settlement planning, architecture and architecture conservation, archaeological and protected site management, and tourism, to name but a few of the many aspects of culture management covered by the Academy.

For many members of the network, the high local demand for heritage site managers has been the entry point into the field. However, the Academy pointedly and actively promotes a holistic approach to culture resource and institution management, which emphasizes legal protection for both tangible and intangible cultural expressions, as well as the integrated management of the entire scope and diversity of cultural resources with a view to their role in the paradigm of sustainable development.

The main activities offered by the Academy consist of (a) formal postgraduate training, leading to M.A. degrees in management; (b) short certificate courses in specific management skills; (c) joint field schools where the different fields of culture resource management are brought together; (d) seminars and workshops for in-service professionals to renew and update their professional knowledge; (e) collaborative research and publication; (f) accreditation and licensing; and (g) distance-learning (Web-based) extramural diploma courses for mid-career professionals.

The Academy network organizes field schools that offer in-service professionals, advanced students, and staff from institutional members the opportunity to study heritage conservation in real-life situations with the guidance of leading experts in this field. The field schools also facilitate exchange between members and serves as a platform to discuss current professional issues in the field of conservation management of the region's cultural heritage. Field schools include flagship field school, which are co-organized and cohosted by local institutional members, UNESCO and ICCROM, and focus on issues directly related to integrated management. Institutional members also organize affiliated field schools which focus on training about a specific topic. The Academy Field Schools and affiliated field schools are planned within a coordinated framework in order for diverse field schools to complement each other and to address needs within the existing regular program curricula offered in the region.

Hoi An Protocols for Best Conservation Practice

Experts in conservation from and/or working in the developing work specialized in the various fields of archaeology, architecture, urban planning, and site management met in Hoi An, Vietnam, in early 2001. The conservation experts convened to discuss the establishment and promulgation of regional standards of best conservation practice which will assure that the values inherent in the heritage sites are safeguarded and that their authenticity is preserved and truthfully explicated during the process of conservation, restoration, rehabilitation, and subsequent use and maintenance. The workshop resulted in the development of the Hoi An Protocols for Best Conservation Practice. The types of heritage sites explicated in the Hoi An Protocols include archaeological sites, both excavated and unexcavated; monuments and other standing structures, whether ruined or intact; buildings and other structures of historic or other cultural, social, economic, political, or ideological significance; architectural ensembles, historic urban areas, and townscapes; landscapes and environments of historical, cultural, and/or socioeconomic significance; and underwater cultural heritage sites.

The Hoi An Protocols provide site-specific methodologies for assessing five categories of heritage sites: (a) cultural landscapes; (b) archaeological sites; (c) historic urban sites and heritage groups; (d) building, monuments, and structures; and (e) underwater cultural heritage sites. The Hoi An protocols incorporate guidelines for (a) inventorying of tangible and intangible cultural resources; (b) identification of threats to cultural authenticity; (c) establishment of indicators, measurement, and modeling of impact; (d) use of professional mitigation tools and negotiation procedures/strategies; and (e) community-based evaluation.

Cultural Impact Assessments

The majority of legal regulations which exist focus on protecting the cultural heritage, through the designation of landmark status, restricting

alterations to the property, and limiting the involvement of the property owners or managers in deference to government conservation professionals. While this process highlights the significance of the property, it restricts the ability of owners or managers to flexibly maintain or adapt the properties to more viable or sustainable uses. This may negatively detract from the ability to conserve the property sustainably. At the same, it restricts the ability to develop the property or its surrounding area.

Introducing a system of cultural impact assessment will allow for a more balanced approach to ensuring proper conservation while at the same time accommodating development. Over the past 30 years, environmental impact assessments have gradually been incorporated into the project feasibility and loan evaluation process of multilateral and domestic project financing. There exists a similar need to evaluate the potential impacts of investment and implementation, particularly of large projects, on both tangible and intangible cultural resources. Through the development and testing of cultural impact assessments, the goal of sustainable development can be extended from the ecological realm to the broader societal milieu, incorporating the existing built heritage, living traditions, and socioeconomic needs of local communities and sites.

With the cooperation of the World Bank, the regional development banks, and other international and national financing partners, systematic undertaking of cultural impact assessments can be mainstreamed into standard procedure for evaluating the impact of large infrastructure development projects at culturally sensitive and/or vulnerable sites.

Conclusion

The preservation of the heritage is an undertaking of such scope and long-term commitment that it can only be successful if there is active participation by local communities everywhere. By focusing on local ownership of heritage and local control over its preservation and future use, heritage conservation can claim its rightful place at the center of human development.

The purpose of community-based heritage conservation is not to encourage people to return to some nostalgic past, but rather to use heritage as the divining rod for determining the direction each community wishes to take in its future development. This will help to ensure that the end result of development efforts will be acceptable and appropriate to each community's economic needs and respectful of each community's social and cultural values.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Heritage Management: Project Management
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ World Heritage Education, Training, and Capacity Building

Further Reading

UNESCO. n.d. UNESCO culture impact assessments. Available at: www.unescobkk.org/culture/impact assessements

UNESCO. n.d. UNESCO heritage conservation awards. Available at: www.unescobkk.org/culture/heritage awards

UNESCO. n.d. UNESCO heritage home owners manual. Available at: www.unescobkk.org/culture/homeowners manuals

UNESCO. n.d. UNESCO impact series. The impact of tourism on culture and development. Available at: www.unescobkk.org/culture/impactseries

UNESCO. n.d. UNESCO ICCROM academy for heritage management. Available at: www.unescobkk.org/cuture/asianacademy

UNESCO. 2009. UNESCO Hoi An protocols for best conservation practice. Available at: www.unescobkk.org/culture/hoianprotocols

Comparative Urbanism in Archaeology

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Introduction

Urbanism, its origins, form, and characteristics, is a pivotal subject of interests in archaeological investigations. The theme of urbanism has played an active role in the (re)definitions of theoretical paradigms, methodological advances as well as in explaining some of the large-scale transformations in the human past. The significance of the study of urbanism was originally established through regional foci on the Near East and Europe, especially Mesopotamia, the Greek Polis, and the Roman Empire. Thanks to broadening its scope over time, and the increasing availability of archaeological datasets with improving quality, coverage, resolution, and analytical rigor, the archaeology of urbanism now progressively reveals the great variety of urban form and life that has populated the globe throughout human history. Cities and urban landscapes constitute a determinant factor in the development of many more regions than previously thought. Urban societies emerged independently and flourished in highly diverse cultural, social, economic, political, and environmental conditions (see further reading, e.g.). This is now known to include most of the Global South, while before the importance of urbanism in, e.g., sub-Saharan Africa, Central-, and North America was often denied or diminished in scientific discourse. Recently, these previously marginalized regions started to inform urban studies both within and beyond archaeology. With the growing number of case studies emerging around the world, archaeologists have begun to juxtapose evidence on ancient urban settlements and processes of urbanization. Consequently, comparative approaches are regaining importance, because systematic and intensive comparison of equivalent data enables and enhances knowledge production on the socio-cultural, functional, and environmental characteristics of urbanism both in individual cases and across regions. In this way, comparative urbanism facilitates the recognition and articulation of cross-cultural patterns and caters for discourse shaped by urban analysis and interpretation that is directly relevant for the understanding of societies and human-environment relations in the past, as well as processes and possibilities in the present.

Due to a persistent trend of rapid urbanization, the twenty-first century is regularly referred to as the urban century. Along with a rising global population, the urgency associated with the scales of this developmental trend is such that current challenges are often only captured in "recentist" frames of reference, disregarding millennia of similar scenarios that have shaped this phenomenon. Comparative urban archaeology is acutely relevant to elucidating the transformations, experience, and social-ecological performance of cities over the long term and the outcomes of urban developmental responses across the widest possible variety of cultural and environmental settings. Achieving greater levels of sustainability requires rigorous insights into the resilience, adaptability, persistence, and reinvention of urban practices as accommodated by spatial-material land-use configurations and the potential of such configurations to facilitate urban life locally and to revise global social-ecological relations. The archaeology of comparative urbanism has a key role to play in the critical contextualization and anticipation of long-term effects of design strategies for sustainable urban development and agendas that guide equitable and ecological urban growth.

Definition

Comparative urbanism has hitherto not been treated as a distinct field in archaeology but can be recognized as a recurrent research aim and

practice. It builds on those lines in archaeological research that promote answering "big questions" on major trends in the history of humankind. The basic principle holds that we can infer meaningful patterns in material culture that afford and affect processes in the human past. In the case of comparative urbanism, this refers to evidence on, broadly conceived, intensively developed environments designed, built, and inhabited by humans. Contrasting samples of intensively constructed landscapes, architecturally developed areas, or entire towns reveal and articulate differences and regularities in urbanism's societal role and cultural purpose, the shape, structure, and lived experience of urban life, the social-ecological responses and functions of cities, and the developmental trajectory and endurance of settlement. The study of urbanism in archaeology is inherently multi-scalar. Investigation relies on the collection and analyses of material evidence on landscapes and settlements. This evidence permits the determination and explanation of the presence, distribution, formal characteristics, delimitation, performance, and experience of cities and urban life. Comparative urban studies in archaeology are principally centered on what remains of intense socio-spatial investments in structuring land for inhabitation with architectural and infrastructural elements.

Material evidence on such socio-spatial investments comprises spatial-material features, mobile features (especially artifacts), and ecological features (derived from bodies, chemistry, and biology). Spatial-material features include all elements of the built environment and frequently also the landesque capital of anthropogenic landscapes, which may be more or less tangible or materially persistent (compare, e.g., stone buildings and tents), but all represent spatial concentrations of social complexity. Techniques for analyzing spatial-material features are particularly developed for urban settings and can regard building materials, construction techniques, stylistic analysis of architecture, functional characteristics, and especially structural and spatial organization. For the study of urban settlement, sample collection of mobile and ecological features concentrates on the spatial concentrations of social complexity, such as within architectural structures, across built-up areas, and covering their hinterland. Built environments are a ubiquitous source of information on cities and play a major role in structuring the functioning of cities. Built environments respond to social-ecological conditions and act on and, through time, react to human sensory and emotive perception. This intertwined constitutive relationship affects cultural interpretations of how built environments afford social behavior and development (Barth et al. 2012). More recently, it is also widely accepted that studying the "open" space that makes up the voids that bind spatial-material features and individual buildings into intensely settled constellations is materially inextricable from the experience and functioning of urban life. The significance of urban open space is now regularly incorporated in archaeological research on urbanism (see further reading). All material evidence combined forms the information resource that allows urban archaeology to formulate and substantiate overarching arguments on urban planning and governance by appreciating what results from policies, social acceptance, and tolerance.

Comparative urban research can evoke the entire gamut of analytical dimensions in comparative archaeology (see Smith and Peregrine 2012). Comparative urbanism is distinct from buildings archaeology and most architectural studies in that it is predominantly not concerned with the classification, style, and construction of single buildings or architectonic complexes. Instead it focuses on the social and spatial coherence of representative parts of or entire urban settlements, on intra- and inter-city scales, within one region or across geographical locations and conditions globally, within one culture or across cultures, in synchronous or diachronic modes of investigation. Regardless of whether the methods used are primarily suited to an intensive or systematic comparative strategy, the aim is to identify and elucidate patterns of difference and similarity and to derive insights into the nature of regularity and equivalence across selected cases. The nature and qualities of any comparative study of cities will depend greatly on data availability, the

commensurability of methods, and the category of questions it aims to answer, involving higher or lower levels of detail, social intricacy, and cultural meaning. The efficacy and potency of comparative urban research rely heavily on the overall research design (Vis 2018). Through a comparative lens, we enable a specific perspective that relates any two or more sets of built space or urban effects within predetermined limitations. Since there is no single way to do comparative urban archaeology, cogent research specifies how the precise approach is adjusted according to the research questions, the local or set conditions, and the targeted characteristics of the accessible data. In this way, we may consider towns with a similar economic function (e.g., trade posts) or cultural ascription (e.g., Islamic towns), even if they did not have any prior contact with one another, to see whether and what similarities their street layout and distribution of buildings displays (e.g., Baumanova et al. 2019). The next step in these comparisons might then be to explain how the observed patterns could have originated and what they mean. In practice, diachronic analyses that would enable tracing and comparison of the processes by which a city developed are often hampered by the fact that the next phase of urban construction usually obliterates the preceding material situation. Furthermore, urban archaeology in municipal heritage management contexts tends to yield highly fragmented data that offer selective windows onto past situations, pragmatically delimited by requirements of the present. Even when there are sufficient data available, adequate analytical constructs and frames of reference for radically inclusive ancient-to-modern comparisons are as yet scarcely available, especially beyond natural scientific approaches (cf. Chase and Scarborough 2014 and Carballo and Fortenberry 2015).

Historical Background

Urban settlements have been a focus of archaeological investigation since the antiquarian tradition of the nineteenth century. However, the maturity of thinking about urbanism emerged when comparative approaches enjoyed widespread popularity in archaeology, not least as supported by the disciplinary paradigms of culture history and processualism. In the first half of the twentieth century, Gordon Childe developed several publications that found a large audience within and beyond archaeology. He coined, among other influential propositions, the notion of the "Urban Revolution." The term reveals a strongly felt preoccupation with the ability to define the essential nature of what a city is and the ability to pinpoint when the characteristics of urbanism first emerge in large settlements. The strand of research concerned with the origins and classification of cities followed influential geographical and sociological thought from theorists like Max Weber, Louis Wirth, Gideon Sjoberg, Lewis Mumford, and Richard Fox which promote ideal-type constructs and trait-complex approaches to define and categorize cities according to functional or historical types. Such classificatory notions make productive tools for comparisons. The origins of urbanism have also captured the attention of geographers. Contrary to Childe's frequently substantiated model that agricultural surpluses precede the emergence of urbanism, the popular, but unsubstantiated model proposed by Jane Jacobs that puts cities first, is often cited outside archaeology.

The relatively coarse nature and limited coverage of the available data on ancient cities and urban landscapes meant that alongside trait-complexes, in the following decades much work on urbanism regarded inter-city-level settlement patterns taking cue from ideas such as environmental determinism and central place theory. Popular approaches include size rankings, site catchments, and other quantitative spatial distribution analyses, which is very much in keeping with the general "scientific turn" that characterizes archaeology in the 1960–1970s. The leading notion held that in order to allow for comparisons, researchers should agree on certain behavioral and evolutionary developmental patterns that humans and possibly all societies have in common, at least when facing similar economic and environmental constraints. Nonetheless, publications in the 1970–1980s show significant variety among

approaches to studies of settlements and urbanism, with interpretation of high-level meaning through hermeneutic and semiotic lenses soon appearing alongside established formal and quantitative methods. For the development of comparative urbanism in archaeology, the work of Paul Wheatley is noteworthy. He not only reviews the variety of theoretical strategies toward urbanism but is himself a strong proponent of including perspectives on urbanism from non-Western areas in Asia and Africa. Wheatley's stance is reflective of the fact that both trait-complexes and quantitative and economic models had predominantly been derived from examples from Near Eastern and Classical Antiquity. Both approaches have remained influential in urban discourse throughout the meaning and context-oriented postprocessual archaeology in the 1980–1990s and beyond, inspiring new and more nuanced approaches. For example, Michael E. Smith (2017) recently proposed a polythetic set of attributes to determine the intensity of urbanism comparatively, while energetics continues to inform analyses of material and labor investments associated with the monumentality in cities as well as urban scaling laws applied to archaeological evidence (Ortman et al. 2014).

Drawing on critical social theoretical concepts and grand societal narratives, postprocessualism saw an increase of interest in social organization, meaningful events, and the role of individual agents, emphasizing sensory perception, phenomenological experience, semiotic and hermeneutic interpretation, and behavioral psychology. In this way, while the paradigm stressed sensitivity to individual contexts and therefore did not favor the generalizing tendencies of preceding approaches, it enriched comparative studies of urbanism in archaeology nevertheless. The methodological and data requirements of these alternative vantages have encouraged experimentation and development of new methods, especially with regard to modelling and interpreting social experience, spatial cognition, and sensory perception (e.g., Creekmore and Fisher 2014, see further reading). Initially critiqued for being individualistic and subjective, postprocessual interests now regularly blend into innovative computational approaches. Many lean on cognitive science, neuroscience, and actor-network theory to refocus questions on universal human responses, bodily capacities, and cultural variability, be that with greater sensitivity for a more comprehensive and inclusive set of norms and values that reflect different lifeways.

The comparative perspective on urbanism in archaeology today is, without question, reinvigorated. This emanates from the large number of recent volumes that gather diverse case studies on ancient cities and urbanism, displaying an array of methodological approaches (e.g., Creekmore and Fisher (2014) and Yoffee (2015), see further reading). Many of the featured scientific and interpretive approaches are derivatives of other disciplines in the environmental, social, and humanities domains. These collections of essays cut across urban research themes featuring cultures across the world, but their selections also reveal divergence in the concerns, convictions, and inclinations of their editors. Most of all, they are witness to the increasingly good quality and coverage of data on urbanism that is now available to archaeologists, progressively enabling direct dialogues with contemporary urban studies and affiliate disciplinary discourse. Nonetheless, few contributions tackle cross-cultural urban comparisons head-on, and, equally, most volumes treat ancient urbanism separate from present-day cities and urbanization. This may be an indication that the richness and diversity of data and the particularity of cultural specialisms of individual cases have become so complex that we lack appropriate frames of reference, data models, and commensurate methods to design sufficiently rigorous comparative urban research (Yoffee 2009; Vis 2018). This state of affairs also highlights the urgency of data sharing and collaboration to effectively address the big urban questions.

Key Approaches/Current Debates

For archaeology to play a pertinent role in the understanding of society-space relations, contextualizing international development, and influencing current concerns in urban studies in general,

rigorous comparative research is essential. Only through comparison can we evaluate and consolidate the insights on any individual urban settlement by relating it to the global context of the continuing phenomenon of urbanization. Applying urban comparisons with appropriate research designs, employing commensurate data structures and analytical concepts, enables us to address key urban questions through archaeological research. These questions lead investigations into the scales, characteristics, rhythms, and effects of urban transformations that took place over the long term. Comparative analyses pursue understanding of the essential differences and similarities in urban forms and lifeways across diverse regional settings, cultures, societal organizations, and environments. Big urban questions also require that we elucidate and critically contextualize divergent and recurrent urban trajectories in human history.

Detailed archaeological studies of urban life and environments can be very costly. They regularly involve destructive and extensive test-pitting and surface excavations, while the diversity of material evidence and richness of assemblages can require a host of laboratory tests and intensive post-excavation analyses to establish chronology; to unravel complex stratigraphies; to understand climatic conditions and events; to determine diets and subsistence; to infer social strata, demography, and governance; to recognize the functioning of trade and redistribution; the societal exposure to external ideas and influences; etc. Where urban archaeology concerns pasts of cities that continue to be inhabited and developed, archaeological research is typically dependent on the opportunities that are generated. Excavation may only take place along new construction, creating undesirable fragmentation of data and understanding. Meanwhile the local political situation concerning urban planning and heritage management policies may prevent archaeological research from taking place at all. In other instances, heritage management strategies may favor consolidation over excavation, as is the case in Mexico, preventing the acquisition of data on its development and planning history even where ancient cities have been abandoned. Alongside excavation, the (spatial) data collected through topographical surveys and mapping, surface collection through field-walking, or remote sensing (including geophysics, aerial, and satellite imagery) has proven highly revealing and analytically productive over the years, especially as technologies such as Light Detection and Ranging (LiDAR) have matured. These types of data complement the detail of excavation at varying scales and position evidence and analysis in different frames of reference. Also, when excavation and sampling activities are unattainable for any reason, spatial investigations using noninvasive techniques may still allow archaeological work on urban questions. In addition, secondary analyses of archived maps, historical records and cartography, and legacy data from previous projects can serve the purpose of urban comparisons in archaeology (e.g., Vis 2018).

Analysis and interpretation in comparative urbanism are not without controversy. While cities seem almost infinitely complex, it is a feature of any comparative approach that a level of simplification or generalization is needed in order to enable direct comparisons using the same terms. On the one hand, the empirical and material nature of evidence in archaeology is more suitable for certain quantitative generalizations, such as analyzing spatial patterns, on the other, as regional and cultural specialists, archaeologists chiefly focus on single or particular sets of cases. In urban studies, contemporary comparative urbanism has been critiqued for favoring the particularities of individual cases (Scott and Storper 2015; Vis 2018), which is echoed by the juxtaposed chapters in major volumes on ancient cities in archaeology. Likewise, because comparative studies cannot be expected to include all examples of a phenomenon in their selections, there is an issue with generalization through representation in sample selection. Selected cases usually act as a pars pro toto for wider occurring phenomena, or there is an assumption that the selected data under investigation are capable of representing or expressing a particular meaning, such as building types reflecting function or spatial configurations reflecting actual behavior and events.

Population is a crucial variable that enables comparative urban research. Geographic and demographic size and complexity doubtlessly matter in current investigations into early urbanism and questions around megasites in Eastern and Central Europe, the Near East, and North America (e.g., Krausse and Fernandez-Götz 2017 and Bernardini and Schachner 2018). The imprecision of population estimates continue to be a challenge, while reconstructing demography is fundamental to questions on settlement size, urban nature or origins, social complexity, demographic composition and change, sustainability, monumentality, etc. Population estimates follow from ways that a number of people can be extrapolated from evidence that approximates a population, such as human bodies, volumes and assemblages of artifacts, number of architectural structures or residences, areal extents of sites, floorspace, and roofed space, ethnohistorical family units, and calculating the environmental carrying capacities from agricultural yields (see Currie et al. 2015 and Drennan et al. 2015).

Each city is irrefutably unique, but comparisons depend on exploiting common references, dimensions, and categories in data on cities and urban landscapes. Finding theoretical stances that are bound to material evidence and give rise to methods of analysis and interpretation that balance commonalities without overly reducing the individual particularities that give each city its intrinsic characteristics is the overriding challenge for comparative urbanism (Vis 2018). In accordance with archaeological interpretation elsewhere, social inference of urban life results from empirical observations of physically constructed spaces, their shapes, context, configuration, and the artifact assemblages they contain. The potency of comparative urbanism depends on the balance between analytical reduction and interpretation, resulting from how sociocultural and socio-ecological contexts and relations interlink with measured or calculated quantitative observation.

While the urban data collected in archaeology is quite particular to the discipline, the concepts and analyses employed for its understanding often derive from other disciplines. Smith (2011) gives a particularly useful account of the range of methods derived from what he terms "empirical urban theories" with successful applications to a variety of urban cases and situations. Among the most popular is undoubtedly space syntax (Hillier and Hanson 1984). Space syntax provides a theory and tools for spatial (ground plan) analyses at the level of the internal arrangement of individual buildings or entire settlement layouts. The quantitative output from graphs and associated probabilistic measures offer values that are easily compared with one another. Network analysis provides a similar approach to modelling spatial data on cities. When applied to the layouts of towns, streets are understood as edges (links) between individual nodes, e.g., buildings. Following social network theory, this approach allows archaeologists to create schematic layout plans which can then be analyzed using various algorithms to produce, e.g., measures of centrality based on connectivity, which may not correspond with the topographical center on a geographical map. However, these kinds of quantitative analyses make assumptions about the nature and comprehensiveness of the spatial data input, reduce interpretations in quantitative fashion, and the data modelling requirements can limit comparative applicability and suitability.

Approaches where abstract theoretical assumptions guide quantitative empiricism exist alongside the significant rapprochement between qualitative and quantitative reasoning, coming from integrating phenomenological and affordance reasoning into landscape and spatial archaeology. These philosophical ideas innovate geographical information system (GIS) and virtual reality (VR) analyses to address the sensory and social experience of acting in and inhabiting urban environments (e.g., Richards-Rissetto 2017, Vis 2018, and Baumanova et al. 2019). Generative, discriminative, and agent-based modelling are being applied to understand the development and functioning of urban space. Modelling usually relies on arguments claiming that predictions from law-like formulas reflect social behavior accurately or that when empirical evidence matches predicted patterns, the social dynamics assumed by the model can be inferred to be responsible (e.g., Morton et al. 2014 and

Ortman et al. 2014). Urban developmental trajectories are effectively being addressed through comparative studies approaches concerned with urban resilience, vulnerability, path dependence, scaling, and settlement dynamics (e.g., Fletcher 2009, Chase and Scarborough 2014, and Carballo and Fortenberry 2015). Similarly, the social, ethnical, spatial, and governmental divisions of cities into distinct areas such as neighborhoods and districts form a vibrant area of comparative research as well as social inequality and segregation (e.g., Arnauld et al. (2012) and Carballo and Fortenberry (2015); see further reading). Interpretively these approaches reflect a growing dialogue between methods that elucidate top-down or bottom-up dynamics in cities. With growing bodies of applied examples, this tension in urban analysis is expected to spur on conceptual growth in archaeological comparative urbanism.

An International Perspective: The Tropical Global South

Urbanism in archaeology was initially strongly determined by representation of the Near East and Classical Antiquity. While cities in all parts of the world have been the object of study for several decades, in recent years, the archaeology of cities in the tropical Global South is especially exciting and revealing. Here we exemplify the role this area is playing in spurring on and promoting comparative urbanism in archaeology.

There are several reasons why archaeological urbanism in the Global South has recently arrived at the forefront of urban interests. First, data availability both in coverage and quality has reached a level on which substantive arguments with regard to urgent social and environmental scientific concerns can be made. Although certainly not exclusively so and comprising much internal variability, the visibility of archaeological urban landscapes in tropical climates often includes examples of abandoned and overgrown cities. This means the topography of these cities is partially visible on the surface, sometimes comprising entire landscapes. The development of remote sensing techniques and especially the recent application of LiDAR has now had sufficient sustained success at providing Digital Elevation Models (DEM) for tropical cities in astonishing detail at large scales. This is especially true for the Khmer cities in Cambodia (Evans 2016) and the urban landscapes of the Maya culture area (Chase et al. 2016). Urbanism in sub-Saharan Africa had not been seriously studied until the 1990s, but now archaeologists document fully fledged urban societies in Mali (Jenne-Jenno and Old Djenne), East Africa (e.g., Swahili city-states, the Great Lakes), Zimbabwe (Great Zimbabwe), and others. What binds these geographically disparate examples is a history of colonialism and globalization. The normative bias toward Western and globalized notions of urbanism significantly downplayed the significance of indigenous forms of urbanism, denying tropical archaeological cities an urban status. Because these settlements show patterns of built form that are radically different, the failure to recognize them as urban diminished the comparative understandings that could be generated. Current appreciation of the evidence acknowledges that newly formulated concepts and descriptors are required to adequately capture their cityness. Replacing the inappropriate suggestion of cities comprised of "urban sprawl," the notion of "low-density agrarian based urbanism" was coined (Fletcher 2009), but not universally adopted (though low-density urbanism is used elsewhere, Krausse and Fernandez-Götz 2017). Alternative terms that are being explored include "tropical- or dispersed urbanism" and "agro-urban landscapes" (e.g., Graham and Isendahl 2018). The comprehensive views of urban landscapes afforded by remote sensing are eliciting the introduction of concepts such as conurbation, polynucleation, peri-urban interfaces, and multicentered cities which resonate with discourse on contemporary urban development and emphasizes the indispensable role of non-urban inter-site space (e.g., Garrison et al. 2019). The discontent about the concepts and descriptors with which best to approach the coverage and growing variety of evidence on ancient tropical urban landscapes thus reinvigorates essential questions about urbanism and the controversy of comparability.

Unprecedentedly, the archaeology of the tropical Global South is opening up an archive of urban diversity and possibilities of urban life that previously went unimagined. These indisputable revelations unequivocally refute any thought that urbanism is unique to any particular trajectory of societal development. Alongside the step change in spatial data availability and our progressing grasp on tropical urban landscape configurations, the development of experiential and socio-spatial approaches is now burgeoning, opening new grounds for comparative analyses (e.g., Richards-Rissetto 2017, Vis 2018, and Baumanova et al. 2019). These developments anticipate the demand for new methods and associated analytical units that will be able to process the intricate and sometimes perplexing spatial data currently being generated. The conceptual and methodological advances in the wake of revealing tropical urban landscapes are adjusting comparative urban research. The tropical Global South requires new levels of comparative integration, which will further improve our ability to explain the diversity of urban traditions, understand their long-term performance, and evaluate the future potential of their developmental principles. From this vantage tropical archaeology also pushes cogent arguments for more inclusive approaches to comparative urbanism in global contemporary urban studies.

The Future Role of Comparative Urbanism

The future development of comparative urbanism in archaeology will likely see growth in rigorous combinatorics of measures and methods and their application to greater varieties of case studies, both cross culturally and breaking down temporal divides. This will enhance the field to generate more concrete and representative insights, which in turn lead to more influential dialogues with direct societal relevance. Many of the key approaches previously discussed, as well as conceptual innovation and data acquisition such as seen in the tropical Global South, are not settled and will continue to give rise to new perspectives, questions, and interpretations. We foresee that such developments will ensure that urban archaeology can play an accepted, recognized, and substantive role in comparative urbanism as practiced in urban geography and urban studies more broadly (see Smith (2009) and Robinson (2016) for portrayals of the field).

Urbanism promises to constitute an important area for "applied archaeology," that is the application of archaeological knowledge directly to practical problems perceived in the present (Isendahl and Stump 2019). As such – notwithstanding the immediate value comparative urbanism adds to understanding and appreciating cultural variety and the importance of urban heritage – comparative urbanism seems primed to address the role of archaeology in worldwide developmental issues as targeted by the social and environmental sciences. When archaeology can contribute data and frames of reference that can directly relate to discourse in other disciplines, archaeological comparative urbanism will be able to communicate its messages more cogently. The fact that the deep past reveals enormous cultural, societal, and environmental variety means that archaeology can contribute evidence on developmental trajectories that diversify urban scenario building utilizing insights derived from the performativity and possibilities of urban design and land-use. However, with the stakes and urgency of human development running so high, and global political and market pressures driving socio-technological "smart cities" that rely on multinationals, any archaeological place at the table is likely to remain hard-won. There are some early examples of the archaeology of urbanism that prove a useful lens on international development at peri-urban interfaces and that inform suggestions for adjusting global advisory planning policies to achieve food security (e.g., Barthel et al. 2019). These examples are generally framed in terms of principles and processes for improving sustainability, resilience, or adaptability in urban systems and their trade-off effects on global resources and equitability.

The efficacy of meeting this challenge for comparative urbanism in archaeology will largely depend on future scholars' ability to construct

appropriate analytical units and to continue to develop commensurate methods which will link archaeological evidence to present-day information on cities. For this to happen, archaeologists must engage in research communities where empirical methodological innovation takes place, such as in space syntax, urban morphology, actor-network theory, network analysis, virtual reality, sensory perception, and cognitive science. Subsequently, behavioral, social, individual, agent-based, and cultural information derived from the topography, morphology, and topology of the physical environment can successfully be integrated with the fine-grained specificities resulting from architectural studies, artifact and assemblage analysis, and ecological sampling. There is a potential for archaeological comparative urbanism to become for urban development, what paleoecology is to current climate change studies.

Cross-References

- ▶ Archaeology and Geography
- ▶ Buildings Archaeology
- ▶ Buildings, Archaeological Study of
- ▶ Critical Historical Archaeology
- ▶ Sensory Archaeology
- ▶ Space, Place, and Architecture in Historical Archaeology
- ▶ Urban Archaeology
- ▶ Urban Archaeology in Twenty-First Century Perspective
- ▶ Urban Landscapes: Environmental Archaeology

References

Arnauld, M.C., L.R. Manzanilla, and M.E. Smith. 2012. *The Neighbourhood as a social and spatial unit in Mesoamerican cities*. Tucson: University of Arizona Press.

Barth, F.G., P. Giampieri-Deutsch, and H.-D. Klein. 2012. *Sensory perception: Mind and matter*. Wien: Springer.

Barthel, S., C. Isendahl, B.N. Vis, A. Drescher, D.L. Evans, and A. Van Timmeren. 2019. Global urbanization and food production in direct competition for land: Leverage places to mitigate impacts on SDG2 and on the earth system. *The Anthropocene Review* 6 (1–2): 1–27.

Baumanova, M., L. Smejda, and H. Rüther. 2019. Precolonial origins of urban spaces in the West African Sahel: Street networks, trade, and spatial plurality. *Journal of Urban History* 45 (3): 500–519.

Bernardini, W., and G. Schachner. 2018. Comparing near Eastern Neolithic Megasites and Southwestern Pueblos: Population size, exceptionalism and historical trajectories. *Cambridge Archaeological Journal* 8 (4): 647–663.

Carballo, D.M., and B. Fortenberry. 2015. Bridging prehistory and history in the archaeology of cities. *Journal of Field Archaeology* 40 (5): 542–559.

Chase, A.F., and V. Scarborough. 2014. Diversity, resiliency, and IHOPE-Maya: Using the past to inform the present. *Archaeological Papers of the American Anthropological Association* 24: 1–10.

Chase, A.F., C. Reese-Taylor, J.C. Fernandez-Diaz, and D.Z. Chase. 2016. Progression and issues in the Mesoamerican geospatial revolution: An introduction. *Advances in Archaeological Practice* 4 (3): 219–231.

Creekmore, A. III., Fisher, K. eds. 2014. Making Ancient Cities: Space and Place in Early Urban Societies. Cambridge: Cambridge University Press.

Currie, T.E., A. Bogaard, R. Cesaretti, N.R. Edwards, P. Francois, P.B. Holden, D. Hoyer, A. Korotayev, J. Manning, J.C.M. Garcia, O.K. Oyebamiji, C. Petrie, P. Turchin, H. Whitehouse, and A. Williams. 2015. Agricultural productivity in past societies: Toward an empirically informed model for testing cultural evolutionary hypotheses. *Cliodynamics: The Journal of Quantitative History and Cultural Evolution* 6 (1): 24–56.

Drennan, R.D., C.A. Berrey, and C.E. Peterson. 2015. *Regional settlement demography in archaeology*. New York: Eliot Werner.

Evans, D. 2016. Airborne laser scanning as a method for exploring long-term socio-ecological dynamics in Cambodia. *Journal of Archaeological Science* 74: 164–175.

Fletcher, R.J. 2009. Low-density, agrarian-based urbanism: A comparative view. *Insight* 2 (4): 1–19.

Garrison, T.G., S. Houston, and O.A. Firpi. 2019. Recentering the rural: LIDAR and articulated landscapes among the Maya. *Journal of Anthropological Archaeology* 53: 133–146.

Graham, E., and C. Isendahl. 2018. Neotropical cities as agro-urban landscapes: Revisiting 'Low-density, agrarian-based urbanism'. In *The Resilience of heritage: Cultivating a future of the past. Essays in honour of Professor Paul J.J. Sinclair*, ed. A. Ekblom, C. Isendahl, and K.-J. Lindholm, 165–180. Uppsala: Department of Archaeology and Ancient History, Uppsala University.

Hillier, B., and J. Hanson. 1984. *The social logic of space*. Cambridge: Cambridge University Press.

Isendahl, C., and D. Stump, eds. 2019. *The Oxford handbook of historical ecology and applied archaeology*. Oxford: Oxford University Press.

Krausse, D., and M. Fernandez-Götz, eds. 2017. *Eurasia at the dawn of history: Urbanization and social change*. New York: Cambridge University Press.

C

Morton, S.G., M.M. Peuramaki-Brown, P.C. Dawson, and J.D. Seibert. 2014. Peopling the past: Interpreting models for pedestrian movement in ancient civic- ceremonial centres. In *Mapping spatial relations, their perceptions and dynamics: The city today and in the past*, ed. S. Rau and E. Schönherr, 25–44. Cham: Springer International.

Ortman, S.G., A.H.F. Cabaniss, J.O. Sturm, and L.M.A. Bettencourt. 2014. The pre-history of urban scaling. *Plos One* 9(2): e87902. Accessed online 9 July 2019. https://doi.org/10.1371/journal.pone.0087902.

Richards-Rissetto, H. 2017. What can GIS + 3D mean for landscape archaeology? *Journal of Archaeological Science* 84: 10–21.

Robinson, J. 2016. Comparative urbanism: New geographies and cultures of theorizing the urban. *International Journal of Urban and Regional Research* 40 (1): 187–199.

Scott, A.J., and M. Storper. 2015. The nature of cities: The scope and limits of urban theory. *International Journal of Urban and Regional Research* 39 (1): 1–15.

Smith, M.E. 2009. Editorial – Just how comparative if comparative urban geography? A perspective from archaeology. *Urban Geography* 30 (2): 113–117.

Smith, M.E. 2011. Empirical urban theory for archaeologists. *Journal of Archaeological Method and Theory* 18: 167–192.

Smith, M.E. 2017. How can archaeologists identify early cities? Definitions, types, and attributes. In *Eurasia at the Dawn of history: Urbanization and social change*, ed. M. Fernández-Götz and D. Krausse, 153–168. Cambridge: Cambridge University Press.

Smith, M.E., and P. Peregrine. 2012. Approaches to comparative analysis in archaeology. In *The comparative archaeology of complex societies*, ed. M.E. Smith, 4–20. New York: Cambridge University Press.

Vis, B.N. 2018. *Cities made of boundaries: Mapping social life in urban form*. London: UCL Press.

Yoffee, N. 2009. Making ancient cities plausible. *Reviews in Anthropology* 38: 264–289.

Yoffee, N., ed. 2015. *Early cities in a comparative perspective, 4000 BCE – 1200 CE*, The Cambridge world history. Vol. 3. New York: Cambridge University Press.

Further Reading

Atkin, T., and J. Rykwert, eds. 2005. *Structure and meaning in human settlement*. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Clark, P. 2013. *The Oxford handbook of cities in world history*. 1st ed. Oxford: Oxford University Press.

Cowgill, G.L. 2004. Origins and development of urbanism: Archaeological perspectives. *Annual Review of Anthropology* 33 (1): 525–549.

Fletcher, R.J. 2004. *The limits of settlement growth: A theoretical outline*. Cambridge: Cambridge University Press.

Garlake, P.S. 2002. *Early art and architecture of Africa*. Oxford: Oxford University Press.

Hansen, M.H., ed. 2000. *A comparative study of thirty city-state cultures: An investigation*. Copenhagen: Kongelige Danske Videnskabernes Selskab.

Ingold, T. 2013. *Making: Anthropology, archaeology, art and architecture*. New York: Routledge.

Kintigh, K.W., J.H. Altschul, M.C. Beaudry, R.D. Drennan, A.P. Kinzig, T.A. Kohler, W.F. Limp, H.D.G. Maschner, W.K. Michener, T.R. Pauketat, P. Peregrine, J.A. Sabloff, T.J. Wilkinson, H.T. Wright, and M.A. Zeder. 2014. Grand challenges for archaeology. *PNAS* 111 (3): 879–880.

Kohler, T.A., and M.E. Smith. 2018. *Ten thousand years of inequality: The archaeology of wealth differences*. Tucson: The University of Arizona Press.

Knappett, C. 2011. *An archaeology of interaction: Network perspectives on material culture and society*. Oxford: Oxford University Press.

Marcus, J., and J.A. Sabloff, eds. 2008. *The Ancient City: New perspectives on urbanism in the old and new world*. Santa Fe: School for Advanced Research Press.

McCurdy, L., and E.M. Abrams, eds. 2019. *Architectural energetics in archaeology: Analytical expansions and global explorations*. Abingdon: Routledge.

Paliou, E., U. Lieberwirth, and P. Silvia, eds. 2014. *Spatial analysis and social spaces: Interdisciplinary approaches to the interpretation of prehistoric and historic built environments*, Topoi 18, Berlin studies of the ancient world. Berlin: Walter de Gruyter.

Pinol, J.-L. 2003. *Histoire de l'Europe urbaine. I de l'Antiquité au XVIIIe siècle*. Vol. 1. Paris: Seuil.

Simon, D., and A. Adam-Bradford. 2016. Archaeology and contemporary dynamics for more sustainable, resilient cities in the Peri- urban Interface. In *Balanced urban development: Options and strategies for liveable cities*, Water science and technology library, ed. B. Maheshwari, V.P. Singh, and B. Thoradeniya, vol. 72, 57–83. Cham: Springer international publishing.

Smith, M.L. 2003. *The social construction of ancient cities*. Washington, D.C: Smithsonian Institution Press.

Smith, M.L. 2008. Urban empty spaces: Contentious places for consensus-building. *Archaeological Dialogues* 15 (2): 216–231.

Stanley, B.W., B.L. Stark, K.L. Johnston, and M.E. Smith. 2012. Urban open space in historical perspective: A transdisciplinary typology and analysis. *Urban Geography* 33 (8): 1089–1117.

Stanley, B.W., T. Dennehy, M.E. Smith, B.L. Stark, A. York, G. Cowgill, J. Novic, and J. Ek. 2015. Service access in premodern cities: An exploratory comparison of spatial equity. *Journal of Urban History* 42 (1): 121–144.

Stark, B.L. 2014. Urban gardens and parks in pre-modern states and empires. *Cambridge Archaeological Journal* 24 (1): 87–115.

Storey, G.R., ed. 2006. *Urbanism in the preindustrial world: Cross-cultural approaches*. Tuscaloosa: University of Alabama Press.

Ucko, P.J., R. Tringham, and G.W. Dimbleby, ed. 1972. Man, settlement and urbanism. Research seminar in archaeology and related subjects meeting, Institute of archaeology, London University, 1970, 601–637. London: Duckworth.

Complex Hunter-Gatherers

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Introduction

Complex hunter-gatherers are hunter-gatherers whose cultures and societies have cultural, social, and economic traits that anthropologists and other scholars had long assumed required agriculture for them to develop. Permanent inequality is the trait that has attracted the most attention among archaeologists, but others include large, dense populations; large, relatively permanent settlements; and intensive economies among other characteristics. First widely recognized by archaeologists in the late 1970s, they have been a focus of major research efforts since. This research has been a testing ground for many theories about the origins and evolution of social complexity, especially of the origins and development of permanent inequality in small-scale societies.

Definition

At the most fundamental level, complex hunter-gatherers are hunter-gatherers who do not fit Richard B. Lee and Irven DeVore's characterization of hunter-gatherers in the 1968 seminal volume *Man the Hunter*, "We make two basic assumptions about hunters and gatherers: (1) they live in small groups and (2) they move around a lot" (Lee and Devore 1968: 11). They go on to list five additional characteristics of hunter-gatherers: first, because of mobility, the amount of personal property is kept low; second, the resource base keeps group size very small, below 50; third, local groups do not "maintain exclusive rights to territory" (i.e., do not control property); fourth, food surpluses are small to nonexistent; and fifth, groups are not strongly attached to "any single area." An additional characteristic not listed by Lee and DeVore here is that these small social groups are strongly egalitarian. These hunter-gatherers approximate stereotypes of hunter-gatherers that were widely held by scholars and others during the past several centuries. These stereotypes began to break down in the 1960s and 1970s as the great diversity among hunter-gatherer societies became clearer as a consequence of archaeological research. However, the *Man the Hunter* characterization does accurately describe some hunter-gatherer groups; those are labeled "generalized hunter-gatherers" in Table 1. Current definitions of complex hunter-gatherers often focus on trait lists of how they contrast with generalized hunter-gatherers (Table 1).

Certain attributes of complex hunter-gatherers are more central to our understanding of them than are others.

Demography and Group Size

Complex hunter-gatherer societies tend to have larger populations than do generalized hunter-gatherers. They also have higher population densities and larger communities. The significance here is that there are more people in daily face-to-face contact.

Corporate Groups

Generalized hunter-gatherer social groups beyond the nuclear family tend to be very fluid in their membership. Complex hunter-gatherers generally have stable, long-lived corporate groups, often in the form of households.

Residential and Mobility Patterns

Complex hunter-gatherers tend to be partially to fully sedentary. Mobility across and exploitation of the landscape tends to be logistical, a pattern in which long-term residential bases are established and task groups harvest and process resources at some distance from the base and return with the processed material. Generalized hunter-gatherers, in contrast, shift their residential bases as needed to position them close to available resources.

Property, Wealth, and Inheritance

Generalized hunter-gatherers usually consume resources as they are harvested, and while individuals may own objects they make or acquire, accumulation of property is usually repressed by social means. Among complex hunter-gatherers,

Complex Hunter-Gatherers, Table 1 Generalized and complex hunter-gatherer traits. (Modified from Kelly 1985)

	Generalized	Complex
Environment	Unpredictable or variable	Highly predictable or less variable
Diet	Terrestrial game	Marine or plant foods
Mobility	Residential	Logistical
Settlement size	Small	Large
Demography	Low population density relative to food	High population density relative to food
Food storage	Little to no dependence	Medium to high dependence
Social organization	No corporate groups	Corporate descent groups (lineages)
Political organization	Egalitarian	Hierarchical; classes based on wealth or descent
Occupational specialization	Only for older persons	Common
Territoriality	Social-boundary defense	Perimeter defense
Warfare	Rare	Common
Slavery	Absent	Frequent
Ethic of competition	Not tolerated	Encouraged
Exchange	Generalized reciprocity	Wealth objects, competitive feasts

consumption or use of harvested resources may be delayed through storage, and corporate groups and individuals own property which is transferred from one generation to the next. Recent research distinguishes among three forms of wealth: embodied (health, knowledge, skills), relational (social networks and ties), and material (things, beings) (Bowles et al. 2010). Among generalized hunter-gatherers, wealth is generally embodied or relational (Smith et al. 2010); among complex hunter-gatherers, wealth is also manifested through material wealth.

Subsistence and Economy

Subsistence economies are likely to be "broad spectrum," that is, harvesting a diverse array of resources, some of which are highly productive but require significant amounts of labor to realize their potential (e.g., seeds). The high levels of labor can be invested in harvesting and/or in processing. Within the subsistence economy, there may be a few "keystone" resources which are fundamental to long-term economic success. Thus, while a group may harvest a wide diversity of plants, over the long run, they are most heavily dependent on just one or two species. Complex hunter-gatherer economies tend to rely most heavily on aquatic resources (marine, lacustrine, riverine) and/or plants.

Social Organization and Economy

Complex hunter-gatherers are generally characterized by formal, permanent social inequality in the form of ranking or stratification. The systems of inequality are supported and reinforced by political economies which manage the creation and movement of material wealth through the society.

Some definitions of complex hunter-gatherers focus primarily on population size (e.g., Koyama and Thomas 1981). Another label for complex hunter-gatherers, "affluent foragers" as originally defined, emphasized their larger populations. Yet other definitions exclude all characteristics except permanent inequality (Arnold 1996), restricting the term "complex hunter-gatherers" to only those hunter-gatherer societies with permanent inequality and elite control over non-kin labor (i.e., the political economy extends beyond the corporate or kin group). Arnold (2001) proposes applying "affluent forager" to those groups displaying many of these traits, but lacking permanent inequality. Whichever definition or set of traits individual scholars prefer, most research focuses on the development and maintenance of permanent inequality.

As an alternative to trait-based definitions, some researchers (e.g., Price 1981; Binford 2001) define hunter-gatherer complexity in terms of systems' complexity, that is, as cultural systems with many subsystems and many links among subsystems. This carries the implication that the subsystems are heterogeneous, that is, different from each other. The nature of this heterogeneity is often unspecified. Implicit to this definition is the notion that generalized hunter-gatherer

cultural systems lack internal differentiation (subsystems) and are consequently homogeneous.

Historical Background

Lee and DeVore's description of hunter-gatherers essentially crystallized a view of hunter-gatherers that was several centuries old of small, simple, and egalitarian societies. Anthropologists, historians, and others took for granted that these societies represented the pristine human condition and that the appearance and subsequent development of complex societies required agriculture. A few ethnographically documented hunter-gatherer societies displayed traits thought to require agriculture. The classic example was the hunter-gatherer-fisher peoples of the Northwest Coast of North America (coastal northern California, Oregon, Washington, British Columbia, and southeast Alaska). They had dense populations, large communities, and an incipient class system among other things. They were explained away as the consequence of an unusually rich environment: the abundance of the natural environment substituted for the abundance produced by farming. Other exceptions were explained away as a consequence of contact with Europeans or other complexly organized peoples. Hunting and gathering was viewed as a very ancient lifeway that had persisted unchanged for millennia, at least since the appearance of the first modern humans if not their ancestors. The *Man the Hunter Conference*, in fact, grew out of a famous Harvard University project that conducted research among hunter-gatherers in South Africa's Kalahari Desert that was based on the assumption that these people were behaviorally the closest modern analogues to that ancestral state.

The *Man the Hunter* conference was held at the University of Chicago in 1966. By the late 1970s–early 1980s, the picture of hunter-gatherers presented at the conference had become obsolete. As a consequence of a global expansion of archaeological research and knowledge, it was clear that many ancient hunter-gatherer societies were far more diverse and complex than anticipated in 1966. The concepts of "affluent foragers" and "complex hunter-gatherers" were developed in part to encompass and describe this newly discovered diversity. Three international conferences were crucial. The first of these was held in 1979 in Osaka, Japan, with the original purpose of comparing the ancient foraging economies of Japan and California (Koyama and Thomas 1981). It was at this conference that the notion of "affluent foragers" was formalized. As noted above, central to that idea was high population densities supported by rich environments, which required subsistence economies capable of supporting those densities. The second conference was held in Amsterdam in 1980, and its topic was Archaeological Approaches to Complexity (van der Leeuw 1981). Price (1981) presented a paper in which he coined the term "complex hunter-gatherers" and developed the first set of characteristics distinguishing them from generalized hunter-gatherers. His list was based upon comparisons among Japanese, California, and Mesolithic European hunter-gatherers. Thus, two of his three examples were archaeological. He also presented the systems theory definition of complexity. The third conference again was a major international conference held in Vancouver, British Columbia, in 1983 (Price and Brown 1985). It established the concept of complex hunter-gatherers and laid out the agenda for much of the research on hunter-gatherer complexity over the next two decades. This agenda focused on the causal relationships among population growth, subsistence and economic intensification (including storage), mobility patterns, and permanent inequality. At the same time, the importance of corporate groups (Hayden and Cannon 1982) and the domestic mode of production (Ames 1985) to the development of hunter-gatherer complexity was recognized. This was both a crucial theoretical and methodological step, since much subsequent research on hunter-gatherer complexity was framed within household archaeology (e.g., Coupland 1985).

The initial interest in complex hunter-gatherers stemmed from three sources: first, they were a range of societies poorly represented in the modern ethnographic sample, and neither how common they were in the past nor their time depth was

known. Research on complex hunter-gatherers was also research on the diversity of human cultures. Secondly, they represented routes to complexity, particularly to permanent inequality, not dependent on agriculture; they were in a sense an independent set of cultural evolutionary experiments in the evolution of complexity. Investigating them might clarify how and why permanent inequality and other aspects of complexity arose from small, egalitarian societies. Thirdly, they were implicated in the domestication of plants and animals. Research in the 1960s and 1970s suggested that the preliminary steps toward domestication were taken by what became known as complex hunter-gatherers. The origins of civilization – complex societies – and of agriculture were major disciplinary issues globally beginning in the 1950s and were the subjects of intensive research. Research on complex hunter-gatherers could provide insights into both issues. Their presumed role in domestication is now far less clear. They still represent a diverse set of experiments in cultural evolution, and research has tended to focus on the hows and whys of the development of permanent inequality.

This research has investigated key case studies. In North America, these include the Northwest Coast, the Fraser-Thompson Plateau of interior British Columbia, the Santa Barbara Bight of southern California, and western Florida. In these instances, complex societies developed within the last 2000 years or so, although on the Northwest Coast they may have evolved as much as a millennium or two earlier. In these cases, archaeologists have access to both the archaeological record and to ethnographic and ethnohistoric records which can be used as parallel lines of evidence in investigating complexity. Thus, we know, for example, that permanent inequality existed in southern California and on the Northwest Coast based on the ethnographies. Recently, archaeologists in the southeastern United States have explored a record of fluctuating levels of hunter-gatherer complexity between about 5500 and 3000 years ago. Here, complexity is marked by extensive systems of earthen mounds, plazas, and in some places large rings constructed of marine and freshwater mollusk shells – for example, monumental architecture. There is no ethnographic record for these hunter-gatherers.

Globally, among the key case studies are the Jomon hunter-gatherers of Japan, the Natufian peoples of the Levant, and the Upper Paleolithic and Mesolithic peoples of western Europe. These ancient societies illustrate the difficulties and ambiguities of investigating complex hunter-gatherers known only from the archaeological record. It has proven very difficult, for example, to demonstrate the presence of permanent inequality in any of these cases. In fact, Price, who used the Mesolithic in his original formulation of the complex hunter-gatherer concept, has subsequently decided Mesolithic societies were not complex given the ambiguity of the available evidence (Price 1995).

Key Issues/Current Debates

Current debates revolve around the causes of permanent inequality in these small societies (as opposed to the causes of permanent inequality in large societies, such as the Aztec or Incan Empires), although there are other "key" unresolved issues, including the subject matter itself. "Hunter-gatherer" as a category of human society and subsistence has proven difficult to define or at least to draw boundaries around. There are some scholars who argue that the entire concept of hunter-gatherers needs to be abandoned. Similar suggestions have been made for the notion of complex hunter-gatherer, perhaps substituting less economically specific phrases like "middle range society" or "transegalitarian" society. Part of the difficulty arises from preconceptions about hunter-gatherers. A particularly powerful preconception is that they have no significant environmental impact. They harvest wild foods but do not "produce" foods or create "anthropogenic" environments (anthropos – human; genic, genesis as in created, human created or modified environments). It is now clear that all environments in which humans live are anthropogenic to one degree or another, even those occupied by the most "pristine" generalized hunter-gatherers. However, most complex hunter-

gatherers actively modify their environments, acting to increase productivity and predictability through practices such as regular burning or firing the environment, selective harvesting, tilling, pruning, transplanting, and landscape engineering. Such practices are difficult to reconcile with the notion of hunter-gatherers as environmentally passive. Should people who do these things even be considered hunter-gatherers?

Setting that issue aside, a second is whether hunter-gather complexity can be sustained for long periods of time. T. Douglas Price (1995) has suggested that most instances of hunter-gatherer complexity are actually the result of contact with farmers and that hunter-gatherer complexity in any case is relatively ephemeral – that is, it does not last long because hunter-gatherer economies are not capable of the sustained economic production complexity requires. Price may be correct, in long archaeological sequences; complexity among hunter-gatherers does seem to come, go, and sometimes come again in a different form, or not at all. Once complexity develops, it is not necessarily permanent, in some cases disappearing after a few centuries and in other cases persisting for millennia.

A third issue is the notion of egalitarianism. One definition of egalitarianism is that egalitarian societies are those with as many positions of high prestige as their people to fill them and that there is equal access to resources (of all sorts) necessary for life in the particular culture. Many small-scale societies practice what might be termed "formal egalitarianism" in which egalitarianism is highly valued and morally reinforced and anti-egalitarian behavior repressed. It is thought that egalitarianism was essential for small group survival during the Pleistocene with its extreme and rapid environmental shifts. The balanced or reciprocal social ties that formal egalitarianism reinforces provided a crucial safety net when local resources failed. Recently, the whole notion of egalitarianism has been critiqued by anthropologists and others, and this "formal egalitarianism" rethought as a form of reverse dominance hierarchy in which alliances among subdominants restrain and repress dominance. The issue then is whether egalitarian societies as once conceived ever existed. If not, it would suggest that permanent inequality is not, in itself, an attribute of social complexity but rather an attribute of the human condition (Ames 2010).

A fourth issue is the trait-based definitions of complex hunter-gatherers and affluent foragers. It is argued, correctly, that the lists bundle together attributes of complexity, causes of complexity, and the consequences of complexity (Arnold 1996). For example, looking at Table 1, high populations, food storage, and logistical mobility are all attributes of complexity, but perhaps, as Binford (2001) argues, logistical mobility is a consequence of increased population density. If that is so, is population density a trait of complexity or a cause (or perhaps both)? Distinguishing causes and consequences and teasing out their relationships are in part epistemological questions, but they are also methodological. In many instances, our chronological controls are simply not refined enough to know what comes first.

However, current debates focus primarily on the origins and causes of permanent inequality among egalitarian peoples. Prior to about 1990, most explanations invoked general demographic, social, or economic causal processes or circumstances. These included population growth, sedentism, storage, property, and economic intensification (increased production per capita, per unit time, or per unit land). Theoretical work in the 1990s recognized these processes not as causes but either as consequences or catalysts of the development of complexity. The search for causation shifted to human agency, seeing permanent inequality as emerging from the actions of individuals in particular historical circumstances. Some theories (e.g., Hayden 2001) invoke the existence of prestige-seeking individuals or aggrandizers (AAA personalities). Aggrandizers forcefully act or compete to advance their own interests and those of their near kin at the expense of others. Formal egalitarian societies actively repress the actions of aggrandizers since they would disrupt the reciprocal social ties necessary for group survival. The emergence of inequality requires that repression to end, allowing aggrandizers to pursue their own ends. Why does the repression of aggrandizers end?

Answers differ and engender considerable debate. Maschner (1991) argues that aggrandizers will act whenever the opportunity presents itself. In contrast, Brian Hayden posits that repressing aggrandizers is costly in time and energy and therefore erodes or ends when the local environment becomes productive and stable enough to meet everyone's basic needs. This can be the result of environmental or technological changes. When people's needs are met and when reciprocal ties are no longer central to survival, people stop enforcing the rules against aggrandizer behavior, and aggrandizers are free to manipulate their way to social prestige and power. Other scholars (e.g., Fitzhugh 2003) think that inequality develops during times of stress, which provide aggrandizers opportunities for self-advancement. Others do not invoke human personality types, suggesting instead that times of stress facilitate the development of inequality from the normal jostling and friction of human social relationships. Yet other explanations look not to human personalities or material conditions but to changing ideologies and control of symbolic resources (e.g., Sassaman 2004).

Research on the evolution of inequality among hunter-gatherers is part of a broader inquiry into why permanent social inequality is a common feature of most human societies, regardless of subsistence economy or size. Recent work suggests that a common thread among all societies with permanent inequality is the intergenerational transfer (inheritance) of wealth from one generation to the next (Smith et al. 2010). Importantly, this work reconceives wealth to include three forms: material wealth (what we normally think of when we think of wealth, i.e., property, control of material resources, structures), embodied wealth (physical health, skills, knowledge), and relational wealth (exchange partners, social networks, etc.). It appears that inherited differences in embodied and relational wealth occur among modern egalitarian hunter-gatherers. However, such differences may be very difficult to observe and measure among living peoples and even more elusive among ancient ones known only archaeologically. It also appears to be the case that strong systems of inequality are based on material wealth. Archaeologists usually assume that a lack of evidence for material differences in wealth or prestige indicates an ancient society is egalitarian. That assumption can no longer be made. However, more to the point here, this research suggests a rethinking of the general approach to the origins and evolution of social inequality is in order – the key question becomes "under what circumstances does material wealth develop so that inequality becomes both archaeologically visible and stronger?"

Complex hunter-gatherer archaeology has been strongly materialist since its beginnings in the 1970s. Research has emphasized either material causes (e.g., demography, subsistence, economy, ecology, environmental change) or those with relatively clear material consequences (e.g., corporate groups). This research was also comparative (searching for cross-cultural regularities). However, for most of that time, there has been a strong minority among archaeologists taking an idealist stance, arguing for the primacy of ideological systems (e.g., spirituality, belief systems, ethical systems) in shaping hunter-gatherer (and all human) behavior. This scholarship has also tended to focus on the importance of local, contingent (non-repeating, unique) events in shaping cultural history (e.g., Cannon 2011). This division is not restricted of course to complex hunter-gatherer studies. The tension between these approaches raises persistent issues.

International Perspectives

Although the literature may seem dominated by a few case studies (e.g., southern California, Northwest Coast, Plateau, Japan) and a few theorists (e.g., Hayden, Arnold), research on complex hunter-gatherers has been strongly international and intellectually diverse since its inception. Thus, while the Koyama and Thomas' (1981) volume emphasized the North Pacific Rim, the Price and Brown volume drew its examples broadly from North America, Eurasia, the Levant, and Australia and temporarily from the late Pleistocene through the Holocene. A recent volume (Grier et al. 2006) includes papers from East

Africa, Australia, Central and South America, and Korea as well as Jomon Japan and the Northwest Coast. What is new is that while the original literature was written almost exclusively by Anglophone (American and British Commonwealth) scholars, that is no longer the case. The papers are now still primarily in English, but the authorship is much more truly international.

This is a reflection of the expansion of both archaeology as a profession and of the known archaeological record of the past two or three decades. It is obvious that ancient societies were far too diverse to be easily accommodated either by the old stereotypes that all hunter-gatherers were similar to modern generalized hunter-gatherers, and all more or less complex societies were agricultural. The difficulties increase as the variability among human subsistence economies and the degree to which people have modified the environment in the past are more evident. The concepts of "complex hunter-gatherers" or "affluent foragers" provide intellectual and methodological frameworks with which to approach that diversity. While the trait lists (e.g., Table 1) may be problematic in terms of mixing causes and consequences, they provide useful comparative frameworks for conceiving research and dimensions of variability along which that research can be conducted (e.g., Grier et al. 2006). There are three significant elements of this research: it is being conducted within the frameworks of local research traditions but to address questions of global interest, it is interested in testing the basic assumptions and hypotheses of the Anglophone literature, and it is strongly comparative, conducting its tests using multiple case studies.

Future Directions

Several trends seem likely. At a very general level, debate will continue over the ontological status of hunter-gatherers and complex hunter-gatherers: are they real or figments of the anthropological/archaeological imagination. To that extent, this debate is useful; it will either sharpen our understanding of these concepts or help our understanding of the limits of their usefulness. For example, it may be that Arnold is right and that "complexity" is best restricted to hereditary inequality coupled with control of non-kin labor or that Price is correct and complexity is most usefully conceived as a description of a heterogeneous system. Debate will also continue over whether the past is best investigated from a materialist or an idealist epistemology. At some level, these are mutually exclusive, but at less exalted levels, they can be seen as complimentary, and archaeologists will work to build bridges between. Thus, for example, while the sudden appearance of earthen mounds in the southeastern USA may indeed reflect an equally sudden ideological shift, their construction had material consequences in how labor was organized, fed, etc. that also needs to be understood.

The construction of case studies will continue. To my mind, the most useful will be those that endeavor to cover very long periods of time, such as the entire Holocene. Most research tends to focus on particular examples within relatively limited time frames. Thus, in coastal southern California, strong social inequality developed after 1200 cal BP. Consequently, research on the evolution of complexity has tended to focus most heavily only on the last 2000 years. However, an examination of the entire 12,000 year sequence for this region from the perspective of social complexity would be useful. It would facilitate comparisons with other regions and times, and it would help to elucidate the dynamics at work. It is possible, for example, that some aspects of "complexity" came and went over the last several thousand years there. Taking a different example, logistical mobility is widely seen as a crucial causal element in hunter-gather complexity. In south central British Columbia, it appears or develops sometime just after 4000 cal BP, but permanent inequality does not develop until 1200 cal BP. There is a similar temporal lag between the development of logistical mobility and inequality in southern California. Thus, while logistical mobility may be necessary for the development of other aspects of hunter-gatherer complexity, its presence does not seem to trigger rapid social change. Long sequences will also answer questions such as whether hunter-gatherer complexity is inevitably of short

duration, always comes and goes, or if in some cases it is quite durable, and if so, why? At present, almost all well-documented examples of complex hunter-gatherers are Holocene in age. An important question is whether such societies existed earlier. A related question is how, given the difficulties of the Pleistocene archaeological record, we can find them. As part of developing lengthy sequences, archaeologists need improved, finer-grained chronological controls which can only come from improved, finer-grained excavations, use of new field techniques, larger samples of radiocarbon dates (e.g., Prentiss et al. 2007), and alternative methods of independent dating not subject to the problems of radiocarbon dating.

The purpose of long sequences and their comparison, the purpose of any empirical work, is not only establishing patterns in the past but the testing of explanatory hypothesis and the building of theories. Research on complex hunter-gatherers has been one the most significant areas of research into the origins of inequality in human societies since World War II, and most of the theories and hypotheses have been proposed and tested by archaeologists. This will continue.

Cross-References

- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Keatley Creek and Bridge River: Complex Hunter-Gatherer Villages of the Middle Fraser Canyon
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts

References

Ames, K.M. 1985. Hierarchies, stress, and logistical strategies among hunter-gatherers in northwestern North America. In *Prehistoric hunter-gatherers: The emergence of cultural complexity*, ed. T.D. Price and J.A. Brown, 155–180. New York: Academic.

Ames, K.M. 2010. On the evolution of the human capacity for inequality and/or egalitarianism. In *Pathways to power: Archaeological perspectives on inequality, dominance and explanation*, ed. T.D. Price and G. Feinman, 15–44. New York: Springer.

Arnold, J.E. 1996. The archaeology of complex hunter-gatherers. *Journal of Archaeological Method and Theory* 3: 77–126.

Arnold, J.E. 2001. The Chumash in world and regional perspective. In *The origins of a Pacific Coast chiefdom: The Chumash of the Channel Islands*, ed. J.E. Arnold, 1–20. Salt Lake City: University of Utah Press.

Binford, L.R. 2001. *Constructing frames of reference: An analytical method for archaeological theory building using hunter-gatherer and environmental data sets*. Berkeley: University of California Press.

Cannon, A. 2011. *Structured worlds: The archaeology of hunter-gatherer thought and action*. Sheffield: Equinox Publishing.

Coupland, G. 1985. Household variability and status differentiation at Kitselas Canyon. *Canadian Journal of Archaeology* 9: 39–56.

Fitzhugh, B. 2003. *The evolution of complex hunter-gatherers: Archaeological evidence from the North Pacific*. New York: Kluwer Academic/Plenum Publishers.

Grier, C., J. Kim, and J. Uchiyama, eds. 2006. *Beyond affluent foragers: Rethinking hunter-gatherer complexity*. Oxford: Oxbow Books.

Hayden, B., and A. Cannon. 1982. The corporate group as an archaeological unit. *Journal of Anthropological Archaeology* 1 (1): 132–158.

Kelly, R.L. 1995. *The foraging spectrum: Diversity in hunter-gatherer lifeways*. Washington, DC: Smithsonian Institution Press.

Koyama, S., and D.H. Thomas, eds. 1981. *Affluent foragers: Pacific Coasts east and west*. Senri Ethnological Studies, Vol. 9. Osaka: National Museum of Ethnology.

Lee, R.B., and I. Devore, eds. 1968. *Man the hunter*. Chicago: Aldine Publishing Co.

Maschner, H.D.G. 1991. The emergence of cultural complexity on the northern Northwest Coast. *Antiquity* 65: 924–934.

Prentiss, A.M., N. Lyons, L.E. Harris, M.R.P. Burns, and T.M. Godin. 2007. The emergence of status inequality in intermediate scale societies: A demographic and socio-economic history of the Keatley Creek Site, British Columbia. *Journal of Anthropological Archaeology* 26: 299–327.

Price, T.D. 1981. Complexity in "non-complex" societies. In *Archaeological approaches to the study of complexity*, ed. S.E. van der Leeuw, 55–99. Amsterdam: Universiteit van Amsterdam.

Price, T.D. 1995. Social inequality at the origins of agriculture. In *Foundations of social inequality*, ed. T.D. Price and G.M. Feinman, 129–146. New York: Plenum Publishing Co.

Price, T.D., and J.A. Brown, eds. 1985. *Prehistoric hunter-gatherers: The emergence of cultural complexity*. Orlando: Academic Press, Inc.

Sassaman, K.E. 2004. Complex hunter-gatherers in evolution and history: A North American perspective. *Journal of Archaeological Research* 12: 227–280.

Smith, E.A., K. Hill, F.W. Marlowe, D. Nolin, P. Wiessner, M. Gurven, S. Bowles, M.B. Mulder, T. Hertz, and A. Bell. 2010. Wealth transmission and inequality among hunter-gatherers. *Current Anthropology* 5: 19–34.

van der Leeuw, S.E., ed. 1981. *Archaeological approaches to the study of complexity.* Amsterdam: Universiteit van Amsterdam.

Conferences on Hunting and Gathering Societies (CHAGS)

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Over five decades, a series of spontaneously organized conferences brought together a global array of specialists on hunting and gathering societies and became known as CHAGS. The series has brought together in roughly equal measure, archaeologists, social anthropologists, human evolutionists, and activists concerned about the fate and future of foraging peoples.

The ultimate origin of the CHAGS series of conferences dates to the mid-1960s when Irven DeVore and Richard Lee organized the 1966 "Man the Hunter" Conference at the University of Chicago, resulting in the 1968 book of the same name (Lee and DeVore 1968). The book was successful in launching an era of renewed interest in the anthropology of hunters and gatherers. Despite the title, a major thesis of the book was to emphasize the vital and hitherto underestimated importance of women's work in hunter-gatherer societies and in human evolution overall, the ethnographic evidence for which amplifies and augments the archaeological record.

Man the Hunter had been intended as a one-off event, but a decade later in 1978, Maurice Godelier convened a follow-up meeting on hunters and gatherers in Paris at the Maison des Sciences de l'Homme (Leacock and Lee 1982). The gathering which brought together scholars from six continents and both sides of the Cold War was highlighted by an address by the Dean of the University of Yakutia, himself a member of the Yakut ethnic group. The Paris conference's success indicated that there was a serious demand for conclaves about hunting and gathering peoples, heightened no doubt by the speed with which the remaining viable foragers were being absorbed into regional and global markets and nation-states.

Laval University hosted the next conference, convened in historic Quebec City, Canada, in 1980 chaired by Bernard Saladin d'Anglure and the late Bernard Arcand. It was at Laval that the term CHAGS was coined to provide a shorthand for what was becoming an ongoing enterprise.

CHAGS III, unlike the two previous, was a by-invitation affair, convened in 1983 at Bad-Homburg, Germany, under the auspices of Prof. I. Eibl-Eibesfeldt. Participants were drawn largely from supporters of the "revisionist" side of the emerging debate on the historical status of hunter-gatherers, particularly the Kalahari San (Schrire 1984).

There was a general consensus that if CHAGS was to have long-term viability, it was important for there to be an open invitation, extended to all who demonstrated an interest in the subject, who had research to report, and who were self-financed. This open-door policy was to set the tone for the next three decades of CHAGS gatherings.

CHAGS IV was held in 1986 at the London School of Economics and was convened by a UK-based committee that included Alan Barnard, Barbara Bender, Tim Ingold, Brian Morris, David Riches, and James Woodburn and resulted in two excellent publications (Ingold et al. 1988a, b).

The pace of convening CHAGS accelerated. After a 2-year interval, CHAGS V convened in Darwin, northern Australia, in 1988, organized by the late Les Hiatt and an active cohort of Australian-based anthropologists.

Only 2 years after Darwin, CHAGS VI was convened in Fairbanks, Alaska, in June 1990. Organized by the late Linda Ellanna, the Fairbanks meetings, like those in Darwin, attracted a wide range of spokespersons from aboriginal communities and attracted a large contingent of Soviet anthropologists and archaeologists, who made the short flight from Provideniya in the

Russian Far East to Nome, Alaska (Burch and Ellanna 1994).

Given the enthusiasm of the Russian delegation, there was a consensus that CHAGS VII would convene in Russia. Under the leadership of Valery Tishkov and Victor Shnirelman, one of the largest CHAGS ever opened in Moscow in August 1993. Delegates from 15 countries experienced the excitement of Perestroika, as Russians experimented with new political formations (Biesele et al. 1999).

CHAGS VIII was convened at the famous Japanese National Museum of Ethnology ("Minpaku") in Osaka in October 1998. Chaired by Drs. Shuzo Koyama and Jiro Tanaka, it brought together over 200 scholars from many countries and resulted in publication of an important series of five volumes (see entries for Senri Ethnological Studies, below).

CHAGS IX returned to the United Kingdom and was held in Edinburgh, Scotland, in 2003, chaired by Prof. Alan Barnard (Barnard 2004). A full decade passed before the next CHAGS was convened. Then in June of 2013, CHAGS X was held at the University of Liverpool under the chairmanship of Prof. Larry Barham (chags@liv.ac.uk). Among the publications generated by CHAGS X is a special issue on hunter-gatherer violence and war, edited by Kirk Endicott for the Journal of Aggression, Conflict, and Peace Research (2014).

Until 2013, the global community of hunter-gatherer researchers had (not unlike hunter-gatherers themselves) convened on irregular intervals without a central organizing authority. This global research and activist communities concerned with foraging peoples, their history, present conditions, and future prospects decided to change their format and formed the International Society for Hunter-Gatherer Research (ISHGR). The society's journal – formerly titled "Before Farming" – is now titled "Hunter-Gatherer Research."

These new arrangements were formalized at CHAGS XI which convened in Vienna, Austria, in September 2015 under the auspices of the Department of Anthropology of the University of Vienna and the Austrian National Museum of Ethnology. Key organizers were Khaled Hakami, Peter Schweitzer, and Helmut Lukas. Edited volumes of papers from CHAGS XI are in preparation.

CHAGS XII (chags.usm.my) will convene at the Universiti Sains Malaysia, in Penang, Malaysia, July 23–27, 2018, under the convenorship of Dr. Lye Tuck-Poe (chags2018@gmail.com).

Looking back on a remarkable series of CHAGS conferences spanning a half century, one is struck by the remarkable diversity of venues, with settings as varied as Fairbanks, Darwin, Quebec, and Penang, as well as London, Paris, and Vienna. A wide range of themes have characterized the papers presented at CHAGS, with Archaeology and Evolutionary Theory sharing time with papers on Social Anthropology and, increasingly, papers on indigenous rights and political struggles. CHAGS I through X have left a permanent legacy in the form of substantial volumes of collected papers listed below.

References

Anderson, David, and Kazunobu Ikeya, eds. 2001. *Parks, property and power: Managing hunting practice and identity within state policy regimes*, Senri ethnological studies No. 59. Osaka: National Museum of Ethnology. (VIII).

Barnard, Alan, ed. 2004. *Hunter-gatherers in history, archaeology, and anthropology*. London: Berg. (IX).

Biesele, Megan, and Robert Hitchcock. 1999. In *Hunter-gatherers in the modern world*, ed. Peter Schweitzer. Providence: Berghahn. (VII).

Burch, Ernest. 1994. In *Key issues in hunter-gatherer studies*, ed. Linda Ellanna. Oxford: Berg. (VI).

Endicott, Kirk. 2014. Special issue on hunter-gatherer aggression and peace. *Journal of Aggression Conflict and Peace Research* 6 (4): 255.

Habu, Junko, John M. Saville, Shuzo Koyama, and Hitomi Hongo. 2003. *Hunter-gatherers of the North Pacific rim*, Senri ethnological studies No. 63. Osaka: National Museum of Ethnology. (VIII).

Ingold, Tim. 1988. In *Hunters and gatherers, Vol. II: Power, property and ideology*, ed. David Riches and James Woodburn. London: Berg. (IV).

Ingold, Tim, David Riches, and James Woodburn, eds. 1988. *Hunters and gatherers, Vol. I: History evolution and social change*. London: Berg. (IV).

Keen, Ian. 2001. In *Identity and gender in hunting and gathering societies*, Senri ethnological studies No. 56, ed. Takako Yamada. Osaka: National Museum of Ethnology. (VIII).

Leacock, Eleanor. 1982. In *Politics and history in band societies*, ed. Richard Lee. Cambridge: Cambridge University Press and La Maison des Sciences de l'Homme. (I).
Lee, Richard, and Irven DeVore, eds. 1968. *Man the hunter*. Chicago: Aldine.
Schrire, C.Ed. 1984. *Past and present in hunter-gatherer studies*. San Francisco: Academic. (III).
Stewart, Henry, and Alan Barnard. 2002. In *Self- and other-images of hunter-gatherers*, Senri ethnological studies No. 60, ed. Keiichi Omura. Osaka: National Museum of Ethnology. (VIII).
Wenzel, G., G. Hovelsrude-Broda, and N. Kishigami. 2000. Senri ethnological studies No. 53. Osaka: National Museum of Ethnology. (VIII).

Further Reading

Lee, Richard B., and Richard Daly, eds. 2004. *The Cambridge encyclopedia of hunters and gatherers*. Cambridge: Cambridge University Press.
Smith, Clare, ed. 2014. *Encyclopedia of global archeology*. Heidelberg: Springer.

Confinement and Detention in Political and Social Archaeology

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Introduction

Confinement and detention played a central role in many of the most infamous episodes in modern history, including the use of civilian concentration camps in the Boer War, the internment of Japanese-Americans in the Second World War, the Soviet Gulags, and the secret prisons of the Argentinian Junta. The Holocaust of European Jews largely took place within a vast infrastructure of slave labor camps, transit camps, concentration camps, and extermination camps. The material traces of this event at Auschwitz-Birkenau and elsewhere remain among the most iconic modern heritage sites. Penitentiaries and jails – holding people accused or convicted of behavior deviant of social norms – though usually out of everyday view, are of course quotidian features of almost any every society.

The archaeology of confinement and detention is part of a growing field studying the material remains of modern power and structural violence on a global scale. Studies of sites, artifacts, and other traces of confinement reflect many archaeologists' desire to engage with processes of commemoration, truth and reconciliation, education, and heritage management in societies often coming to terms with historical narratives of oppression and social control. Recent work in the archaeology of confinement demonstrates the extent to which it is living up to the heavy responsibility imposed by this historical background. Worldwide, archaeologists are intervening on sites of internment to create and recreate historical narratives. In Argentina and Poland excavators are unearthing sites that the perpetrators of violence had tried to erase (Fig. 1). In the United States and South Africa, former prisoners have participated in the transformation of detention sites into heritage sites, adding their memories to the historical record. These types of projects work to provide a foundation and a platform for the voices of the imprisoned.

Definition

The archaeology of confinement and detention has emerged as an interdisciplinary initiative within the larger and more established fields of historical archaeology, conflict archaeology, and the archaeology of the modern world. The question of scope is often raised, as terms such as confinement, detention, internment, imprisonment, incarceration, and captivity are problematic to define. Broad definitions encourage boundary-pushing work and lively intellectual discourse, and the authors have previously stated:

> Incarceration or internment might be described as the practice of organizing material culture and space to control and restrict the movement of a person or a group of people. Sites of internment can range in scale from a single room or building to entire landmasses (Myers and Moshenska 2011: 2).

Confinement and Detention in Political and Social Archaeology, Fig. 1 A sweater with bullet holes, excavated evidence of the murderous regime of the Argentinian dictatorship (1976–1983). (Courtesy of Melisa Salerno)

Thus, a common sense definition of the archaeology of confinement and detention might be *any study where archaeological approaches are used to interpret the material remains of confinement*.

Historical Background

An early example of the archaeology of confinement took place in Berlin in 1985, when prison cells beneath the ruins of the former Gestapo headquarters were subjected to an unofficial "guerrilla excavation" by a community history group, the *Active Museum against Fascism and for Resistance in Berlin* (Baker 1990). The excavation was largely symbolic, aimed at drawing attention to the official neglect of the site and the perceived failure to adequately memorialize the victims of the Gestapo. The excavators included former prisoners held in the cells on the site, as well as relatives of those who did not make it out alive. The dig was a vivid reminder of the power of archaeology to literally and figuratively uncover hidden histories of oppression and control.

The Berlin Gestapo site has since been more fully excavated and is now open to the public as a striking and unique archaeological museum: the *Topography of Terror* (Hesse et al. 1989). Through their action the diggers sent a message that archaeology can and should be used to study recent violent pasts. Twenty-five years on this maxim has been embraced by archaeologists studying incarceration and internment, and the expansion of this field of study is due in part to the energy and enthusiasm of grassroots community and human rights groups seeking information about people and events, exposure of injustices, healing of wounds, and reconciliation between erstwhile adversaries.

Key Issues

Control and Surveillance

Spaces of confinement and detention are chosen or constructed primarily to control their inmates; among the most distinctive material manifestations are boundaries and other material restrictions on movement. Some of these boundaries are constructed: the concrete walls of a prison, the barbed wire fence of a prison camp. Other, apparently ephemeral boundaries rely on a known threat: step across the line and you will be shot. Another common mechanism of control is the natural boundary: many sites of detention are islands or parts of islands such as Robben Island in South Africa, Ai Stratis in Greece, and Alcatraz

in the United States. Other geographical boundaries include deserts and wildernesses – where survival in the landscape is impossible and physical boundaries are unnecessary. For these reasons Second World War Prisoner of War (PoW) camps were often located in remote areas such as Finnish Lapland, the Australian outback, central Canada, and the mountains of southern Arizona. The remote locations of these sites are an advantage to the archaeologist, as they are considerably less likely than other sites to have been destroyed or damaged by development or other human activities.

Alongside physical control, surveillance is an important element of confinement and detention, the most noted example of which is Bentham's Panopticon, in which large numbers of prisoners could be observed from a central location (Bentham 1791). Surveillance appears in the archaeological record in the watchtowers of prison camps, in the spy holes in prison doors, and in the CCTV and other electronic monitoring systems employed in more recent periods. Traces of these and other elements of surveillance have been studied and recorded in abandoned prisons and prison camps such as Long Kesh/Maze in Northern Ireland. González-Ruibal (2011) has shown how, during and after the Spanish Civil War, certain sites were used for internment due to their symbolism: schools and monasteries represented the authority and order to be imposed on the prisoners. Control takes many forms, many but by no means all of which can be traced in the material remains.

A key component of control and surveillance in institutions – and one that is often exposed through the material remains of sites of internment – is repetition in materials and structures. This trend is patent both in portable material culture (e.g., identical ceramic dishes for all prisoners) and in architecture (e.g., row upon row of matching barracks). The repetition of small materials, and their close regulation, contributes to the institutional goals of social conformity and the elimination individuality and of more easily identifying prohibited items (Fig. 2). Repetition in architecture and the broader penal landscape facilitates surveillance by maintaining long and linear lines of sight, and by eliminating interior variability which could be used to deceive the captors (Fig. 3). The cult of repetition, of course, is not limited to material culture. In reforming institutions at least, repetition encompasses the human body through physical and moral training and adherence to time discipline regimes.

Domination, Resistance, and Cooperation

The experience of internment is one of coercion, oppression, domination, and surveillance. From the perspective of the jailer internment serves numerous purposes but is most commonly used to remove a perceived threat, whether by containment, reform, or annihilation. Almost by necessity, confinement will include domination by the captor and resistance by the captive. Resistance to captivity can take a number of forms, many of them visible in the archaeological record of the internment site. Internment sites are often governed by sets of rules to control the behavior of internees: these include curfews, uniform codes, restrictions on association and communication between prisoners, and the prohibition of trading with guards and outsiders.

The violations of some of these rules can be regarded as acts of resistance to internment, albeit frequently petty and self-defeating ones if they lead to repercussions on the rule breaker or other prisoners. Steve McQueen's character in the film *The Great Escape* is the quintessential internee rebelling petulantly against his captors. The solitary confinement cells at *Stalag Luft III* are testament to the occurrence of this sort of behavior. From an archaeological perspective the most obvious evidences of rule breaking are the remains of contraband goods such as nonuniform clothing (Casella 2000), foodstuffs (Myers 2008), and personal hygiene and grooming products (Pringle et al. 2007).

Perhaps the most direct form of resistance to internment is escape, either by absconding or, where necessary, overcoming the physical barriers. In PoW camps the escape options were summarized as "over the wire" (usually under cover of darkness), "under the wire" (tunneling), or "out the front door" (in disguise). Tunneling is the most archaeologically visible and enduring of

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U.S.P., ALCATRAZ
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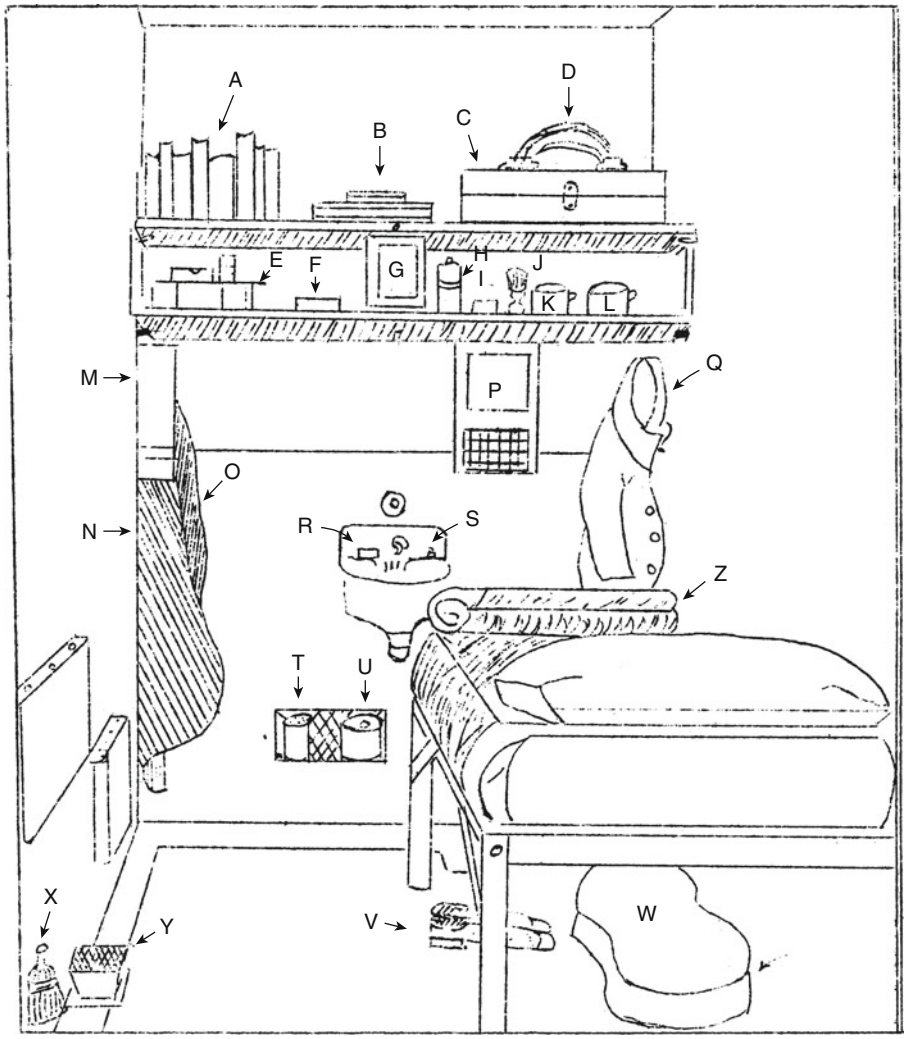

A – 12 Books (Maximum)
B – Personal Papers
C – Paint Box etc.
D – Radio Headphones
E – Ash Tray & Tobacco
F – Extra Soap
G – Mirror
H – Toothpowder
I – Razor & Blades
J – Shaving Brush
K – Shaving Mug
L – Drinking Cup
M – Face Towell
N – Bathrobe
O – Raincoat
P – Calendar
Q – Coat & Cap
R – Soap
S – Sink Stopper
T – Cleaning Powder
U – Toilet Tissue
V – Extra Shoes & Slippers
W – Musical Instrument/Case
X – Broom
Y – Trash Basket
Z – Extra Blankets

Confinement and Detention in Political and Social Archaeology, Fig. 2 Instructional graphic depicting proper placement of approved personal items at the United States Penitentiary Alcatraz, California. (Reproduced from Madigan 1956)

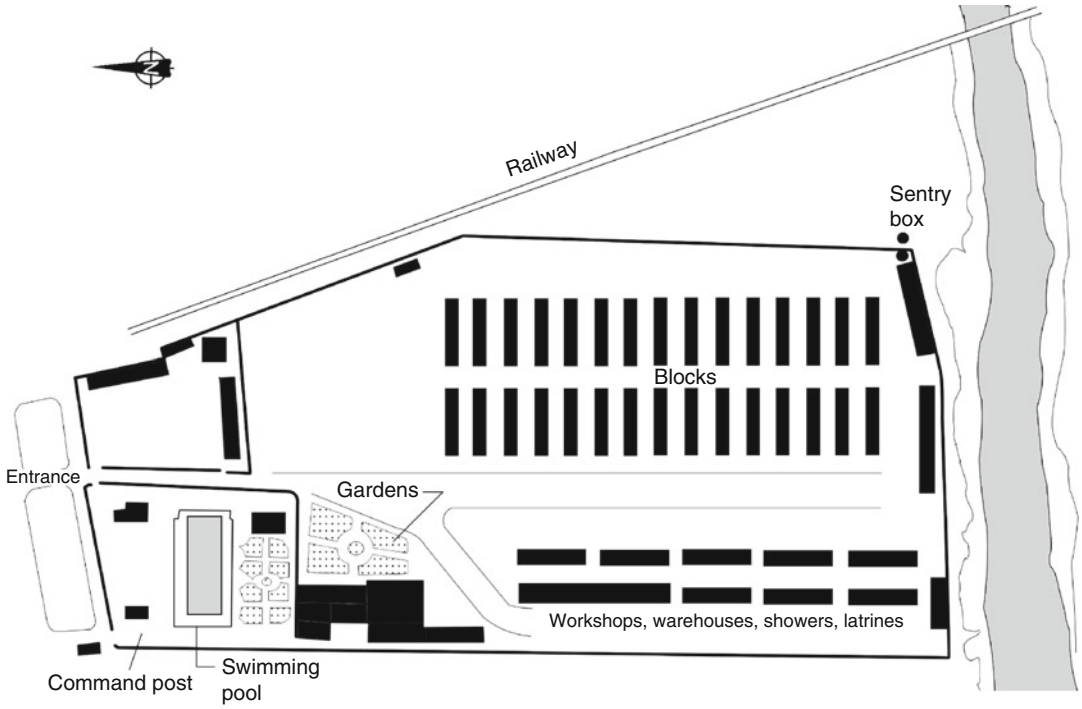

Confinement and Detention in Political and Social Archaeology, Fig. 3 Plan view of Miranda de Ebro concentration camp, Spain. Regularized pattern of building arrangement facilitates surveillance and prisoner management. (Courtesy of Alfredo González-Ruibal)

these, and the archaeological investigation of escape tunnels using geophysical and excavation techniques has been successfully conducted at *Stalag Luft III* in Zagan, Poland (Pringle et al. 2007).

Attempting to damage, destroy, or "improve" the prison site is also a form of resistance, often symbolic but in some cases practical. Wall art and graffiti such as that recorded at Long Kesh/Maze served to stamp the internees ideology and identities on an institutional space and may well have served to intimidate outsiders and guards. These artworks were also an act of cultural resistance, a more common theme in internment, often demonstrated in the nostalgic or defiant craftworks and artworks produced by civilian or military detainees and often curated into the present. Such seemingly petty symbols of cultural resistance can maintain the morale of prisoners, and often remained entirely unnoticed by the captors. On a more practical level, many internment sites show traces of the consumption of alcohol and other intoxicants, both as evidence of contraband and a form of temporary escape from the oppression of internment.

González-Ruibal (2011) criticizes overemphasis of resistance in studies of internment, particularly the abstracted formulations of internment that stress the agency of the oppressed and neglect the brutal real-world manifestations of the "discourse" of power. In studying the archaeology of internment there is a risk of becoming too enamored with the glamour of resistance and failing to take into account the constraints, threats of violence and psychological effects of long-term incarceration. To do so would be a betrayal of the victims of the historical crimes we study. In turn, the hierarchical "domination/resistance" paradigm itself, as a whole, has come under increasing scrutiny. Often in cases of internment evidence points to multiple layers and directions of control and surveillance – for example, the notion that prisoners can watch the guards, just as the guards watch the prisoners – which has led some to move

towards analyses of *heterarchy* rather than *hierarchy* (e.g. Casella 2011). Heterarchical approaches leave open the possibility of cooperation between guard and prisoner.

Things in Stories/Stories in Things

The experience of incarceration in all its forms has inspired works of literature, philosophy and scholarship for centuries, from Boethius, Cervantes and de Sade to Hitler, Pound and Gramsci. Diaries, autobiographies and accounts of 'life inside' are also a consistently popular genre, particularly those that describe escape attempts. Accounts of internment are potentially of interest to archaeologists as ethno-historical source materials which can provide valuable information for the archaeologist about the layout of sites, the functions of structures, and the material possessions of prisoners, as well as providing color to reports and publications. The use of such textual sources must, of course, take into consideration the vagaries of memory and artistic license in their creation.

Another use of these accounts focuses on the material culture of internment from a biographical rather than purely descriptive point of view, drawing on theories of the social lives of objects developed in the 1980s. In this model objects are considered in terms of their "life histories" from creation through use, reuse or consumption, disposal, and deposition. The plethora of accounts of internment, particularly for certain periods and events including the Second World War, Apartheid, and the Holocaust, encourages us to consider some of the ways in which we can use these texts to study the material culture of those periods. This is particularly salient in the case of internment sites for which we have multiple accounts by different authors, such as Colditz Castle where the same site, structure and even some objects such as articles of escape equipment are described at different times by different authors.

Throughout history Prisoners of War and internees have passed the time by making craft objects and artworks for use, for sale or as gifts. Dusselier (2008) has shown how Japanese-American internees in the Second World War used handicrafts to domesticate the spaces they found themselves in, to reassert their national and ethnic identities, and to provide themselves and others with emotional support. Studies of British civilian internees in Second World War Germany show a similar phenomenon, including an emphasis on patriotic symbolism. Following the end of periods of detention many of these objects were curated as souvenirs or family heirlooms, often serving as material repositories for stories or memories.

Prison Economies

In every case of confinement, smuggling and trading of both allowable and forbidden goods takes place. This maxim remains true even in situations of extreme material depravity, such as at the death camps of the Holocaust. Secret trading was in fact an integral component even of the mass executions at Birkenau, since the food and valuables found on the bodies of the deceased by the *Sonderkommando* forced laborers were redirected to sustain those not yet sentenced to the gas chamber (Myers 2007). Intriguingly, smuggling often goes "both ways" – goods and services pass from outside the camp or prison to the inside and, in turn, from the inside to the outside. This might happen when, counter intuitively, a prisoner has access to goods not available to neighboring civilian communities, such as the case of Allied PoWs in Europe who received Red Cross care packages filled with items long unavailable under Nazi wartime rationing.

In many cases smuggling and trading are used to supplement grossly inadequate caloric intake, such as at the Nazi death camps in Europe and Japanese camps holding Allied PoWs in Asia during the Second World War. But once basic sustenance is achieved (and sometimes even where it is not), smuggling and trading serve other purposes, such as rediscovering small comforts of home, protecting the body against the natural elements, or preparing for an escape attempt. In some cases, astute black marketing by the confined leads to the accumulation of great wealth and power. Perhaps the most colorful example of this is described by James Clavell (1963), in his historical novel *King Rat*.

Popular culture has often well represented the historical reality that in many situations of confinement the cigarette becomes the base unit of currency. From the PoW camps of the Second World War to present-day penitentiaries in the Unites States, the relative values of all other goods and services are usually measured in cigarettes (Radford 1945; Lankenau 2001; Reed 2007). In some cases, extremely complex prison economies develop which include phenomena such as base currencies (e.g., cigarettes or prisoner-developed paper currencies), offering of services by small business entrepreneurs (such as laundering, cooking, and prostitution), notice boards with classified advertisements, monopolies, price fixing and price gouging, price falls and price rallies, inflation and deflation, and even stock-exchange style traders and speculators working on "futures markets" (Radford 1945).

Trading and smuggling might be seen as a form of resistance, since usually the action is forbidden by institutional regulations. But trading is also often a form of cooperation or even collaboration, since trade networks incorporate guards and other staff. Thus, the prison black market is an example of a social aspect of confinement that challenges the duality of the "domination/resistance" paradigm by showing how guards and prisoners sometime work together for mutual benefit.

Gender

The theme of gender is vital to our understanding of internment from historical, sociological, and archaeological perspectives, as demonstrated by Casella's ground-breaking studies of a nineteenth-century prison in Tasmania (e.g., Casella 2001a, 2007). The practice of internment has often been explicitly gendered in cases where only the military-age males of a population have been interned, or where the families of men involved in insurgencies have been interned to isolate, demoralize and blackmail the combatants – as in South Africa during the Boer War. In most internment sites where both men and women were held there was physical segregation of the sexes, and women were sometimes held in accommodations considered more comfortable, secure or private than that of the men. This separation is a common pattern that might be recoverable in the archaeological analysis of internment camp sites. Most of the cases where male and female internees were treated without differentiation are those where murder or genocide was the ultimate aim of the internment.

There is a need for more studies in the visibility of gender in the archaeology of internment. As Casella has argued, even acknowledging the existence of women in these sites genders the history and archaeology of internment, an important stage in the evolution of the discipline, albeit one we might hope by now to have superseded (Casella 2001b: 68). Future studies in the archaeology of gender in internment might consider the construction and interpretation of gendered material culture assemblages, gendered representations and commemorations of internment, and forge links with studies of sexuality and sexual and reproductive health in internment and incarceration. One of the most important outcomes of a gendered archaeology of internment will be a critique of the widespread view of female internees as vulnerable, helpless victims. The archaeological evidence, as Casella has demonstrated, is likely to tell a very different story.

Sexuality

Though all forms and expressions of sexuality that exist outside of confinement can also plausibly occur within prisons and prison camps, sexual activity, like all other activities, is constrained and changed under conditions of confinement. Institutions usually aim to control sexuality and sexual reproduction, and perhaps the most obvious attempt at this is through the common practice of separating women prisoners from men prisoners, and both of these from non-prisoners of any gender. This obstruction of heterosexual relationships is of course often challenged through prohibited access to buildings or wards (possibly facilitated by bribes), permanent or temporary escapes, assignment to work details or billeting outside of the prison, and in some contexts sanctioned conjugal visits. In addition to separation of the sexes, working against all sexual activity in prisons and prison camps are two further forces of institutional control: the unfailing lack of privacy

and the reduction of caloric intake, which has the side effect of reducing sex drive.

Where prisoners are housed in open areas or have access to each other – which is the case in most situations of confinement – same-sex relationships are maintained with comparative ease. This trend came under the scrutiny of military doctors after the Second World War when anecdotal evidence suggested that some formerly heterosexual Allied PoWs "turned" to homosexuality when faced with many years in camps populated exclusively by men (Cochrane 1946; Jackson 2004).

Both consensual and non-consensual sexual relations take place under conditions of confinement, and sexual abuse, sexual slavery, forced prostitution, and rape and mass rape are consistent aspects of institutional confinements. In some cases in the Nazi concentration camps, female prisoners were selected by the guards for housing in the camp brothels, which both guards and wealthy prisoners could pay to visit.

Stakeholder Communities

There is a recurrent theme in the archaeology of the modern world in general, and of the archaeology of internment in particular, of surviving participants of the events under investigation becoming involved in the research process (Moshenska 2009) (Fig. 4). This trend has theoretical, methodological, and ethical dimensions which future archaeologists studying internment sites will need to take into account. A central aspect of community involvement in archaeologies of internment is the value of individual memories in reconstructing the material and social formations of the site. Many internment sites teeter on the edge of living memory, and oral historical research can reveal an enormous amount of information of use to the archaeologist.

The most important consideration in community archaeologies of internment is the recognition of the multiple, overlapping and often violently antagonistic communities involved. These include victim, perpetrator, and bystander communities; exiled or diaspora communities; and current residents on or near the site who may be associated with some or none of these (Cappelletto 2005). Planning for the engagement or involvement of these multiple communities may make the archaeology of internment a more difficult task, but the ethical and practical implications of ignoring them are far greater.

Confinement and Detention in Political and Social Archaeology, Fig. 4 Project archaeologist (*right*) looking at finds in the laboratory with Mario Villani (*left*), a survivor of an Argentinian torture prison. (Courtesy of Andres Zarankin)

Future Directions

Today the sites of some of the most infamous prisons and concentration camps of the twentieth century are forest. Within a few decades – the blink of an eye in archaeological terms – vast settlements carved and built from the forests of central Europe, for example, have been reabsorbed by their natural environment. What are the mnemonic and archaeological implications if one can walk for miles across the sites of Treblinka or *Stalag Luft III*, once home to tens of thousands of prisoners, without realizing it? One of the most common and striking characteristics of internment sites, and from an archaeological perspective one of the most troubling, is physical ephemerality (Fig. 5). This is particularly the case with internment camps; indeed, the very term "camp" implies a temporary residence.

This ephemerality has been repeatedly exploited by the perpetrators of internment – from Nazi Germany to Pinochet's Chile – to erase the traces of camps and other internment sites from the earth and thereby from history. Combined with the absence or destruction of documentary evidence and the murder, silencing, or shaming of prisoners and witnesses, it is terrifyingly feasible that a substantial episode of internment can be erased and subsequently denied. Against this backdrop of physical and historical ephemerality, devastating c-transforms and powerful n-transforms, the responsibility of the archaeologist grows: to diligently collect what meager traces remain, and to bear witness legally or historically. The term "forensic archaeology" is usually taken to refer to studies of human remains. Its literal meaning is archaeology carried out as part of the judicial process, and it is in this sense of the term that archaeologists might want to approach sites of internment: as crime scenes where the gathering and interpretation of evidence must be carefully conducted, documented, and maintained for future use. Archaeologists are uniquely skilled to collect and store these fragile forms of data.

This appeal to careful examination is not meant to disparage or belittle the more descriptive or interpretive archaeological work conducted on internment sites, nor to suggest that archiving a site totally fulfills our moral responsibility to the past. Many internment sites are well recorded or well preserved and will survive as heritage sites or sites of memory for the foreseeable future. Yet to these as much as to faint traces of barracks beneath a forest floor archaeologists arguably have a duty of stewardship.

Confinement and Detention in Political and Social Archaeology, Fig. 5 Ruins of Auschwitz-II Birkenau. The site was razed by the fleeing Nazis, and vast fields are all that remain of large sections of the concentration camp. (Courtesy of Adrian Myers)

It is heartening to note, however, that countering this fact of ephemerality and trend towards erasure is the growing interest of archaeologists. With increasing temporal distance from the two World Wars, for example, we are beginning to see increasing archaeological research on internment camps from these most devastating and influential eras. Clearly, however, there are presently major gaps in the archaeological study of prisons and prison camps, and archaeologists need to expand their interest to outside of North America, Europe, and Australia.

Cross-References

- ▶ Internment and Prisoners of War in Historical Archaeology
- ▶ Nationalism and Archaeology
- ▶ Nationalism and Archaeology: Overview

References

Baker, F. 1990. Archaeology, Habermas and the pathologies of modernity. In *Writing the past in the present*, ed. F. Baker and J. Thomas, 54–62. Lampeter: St. David's University College.

Bentham, J. 1791. *Panopticon: Or, the inspection-house*. Dublin: Thomas Byrne.

Cappelletto, F. 2005. Introduction. In *Memory and World War II: An ethnographic approach*, ed. F. Cappelletto, 1–37. Oxford: Berg.

Casella, E. 2000. 'Doing trade': A sexual economy of 19th century Australian female convict prisons. *World Archaeology* 32 (2): 209–221.

Casella, E. 2001a. Landscapes of punishment and resistance: A female convict settlement in Tasmania. In *Contested landscapes: Movement, exile, and place*, ed. B. Bender and M. Winer, 103–120. Oxford: Berg.

Casella, E. 2001b. To watch or restrain: Female convict prisons in 19th century Tasmania. *International Journal of Historical Archaeology* 5 (1): 45–72.

Casella, E. 2011. Lockdown: On the materiality of confinement. In *Archaeologies of internment*, ed. A. Myers and G. Moshenska, 285–295. New York: Springer.

Clavell, J. 1963. *King rat*. Greenwich: Fawcett Publications.

Cochrane, A. 1946. Notes on the psychology of prisoners of war. *The British Medical Journal* 1 (4442): 282–284.

Dusselier, J. 2008. *Artifacts of loss: Crafting survival in Japanese American concentration camps*. New Brunswick: Rutgers University Press.

González-Ruibal, A. 2011. The archaeology of internment in Francoist Spain (1936–1952). In *Archaeologies of internment*, ed. A. Myers and G. Moshenska, 53–73. New York: Springer.

Hesse, K., K. Kufeke, A. Sander, R. Rürup, and P. Selwyn. 1989. *Topography of terror: Gestapo, SS and Reichssicherheitshauptamt on the 'Prinz-Albrecht-Terrain': A documentation*. Berlin: Willmuth Arenhovel.

Jackson, P. 2004. The enemy within the enemy within: The Canadian army and internment operations during the Second World War. *Left History* 9 (2): 45–83.

Lankenau, S. 2001. 'Smoke 'em if you got 'em': Cigarette black markets in U.S. prisons and jails. *The Prison Journal* 81 (2): 142–161.

Madigan, P. 1956. United States penitentiary Alcatraz, California. Institution rules & regulations. United States Penitentiary Alcatraz.

Moshenska, G. 2009. Resonant materiality and violent remembering: Archaeology, memory and bombing. *International Journal of Heritage Studies* 15 (1): 44–56.

Myers, A. 2007. Portable material culture and death factory Auschwitz. *Papers from the Institute of Archaeology* 19: 57–69.

Myers, A. 2008. Between memory and materiality: An archaeological approach to studying the Nazi concentration camps. *Journal of Conflict Archaeology* 4 (1): 231–245.

Myers, A., and G. Moshenska, eds. 2011. *Archaeologies of internment*. New York: Springer.

Pringle, J., P. Doyle, and L. Babits. 2007. Multidisciplinary investigations at Stalag Luft III allied prisoner-of-war camp: The site of the 1944 'great escape', Zagan, western Poland. *Geoarcheology: An International Journal* 22 (7): 729–746.

Radford, R. 1945. The economic organisation of a POW camp. *Economica* 12 (48): 189–201.

Reed, A. 2007. The action of cigarettes in a Papua New Guinea prison. In *Thinking through things: Theorising artefacts ethnographically*, ed. A. Henare, M. Holbraad, and S. Wastell, 32–46. London: Routledge.

Further Reading

Casella, E. 2007. *The archaeology of institutional confinement*. Gainesville: University Press of Florida.

Cotter, J., R. Moss, B. Gill, and J. Kim. 1988. *The Walnut Street Prison workshop: A test study in historical archaeology based on field investigation in the garden area of the Athenaeum of Philadelphia*. Philadelphia: The Athenaeum of Philadelphia.

Funari, P., A. Zarankin, and M. Salerno, eds. 2009. *Memories from darkness: Archaeology of repression and resistance in Latin America*. New York: Springer.

Johnson's Island Civil War Prison Project. n.d.. Available at: http://interactive.archaeology.org/johnsonsisland/.

Morris, N., and D. Rothman, eds. 1995. *The Oxford history of the prison: The practice of punishment in western society*. New York: Oxford University Press.

The Archaeology of Internment. n.d.. Available at: http://archive.archaeology.org/1105/features/world_war_II_internment.html.
Vance, J., ed. 2006. *Encyclopedia of prisoners of war and internment*. Oxford: ABC-CLIO.

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Basic Biographical Information

Margaret (Meg) Conkey (Fig. 1) is one of the leaders in archaeological method and theory, gender and feminist archaeology, and Paleolithic art. She received her B.A. in Ancient History and Art from Mount Holyoke College in 1965, and an M.A. (1969) and Ph.D. (1978) in Anthropology from the University of Chicago. Conkey taught at San Jose State University (1970–1976), University of California, Santa Cruz (1979–1980), and SUNY Binghamton (1982–1986), where she also served as codirector of Women's Studies. She joined the faculty of the University of California at Berkeley as an Associate Professor in 1987, received the Class of 1960 endowed chair in 1997, and became an Emerita Professor in 2011. Conkey also served as Director of the Archaeological Research Facility (1994–2007).

Conkey has held numerous professional administrative positions and been honored by many awards. She was the Chairperson of the Committee on the Status of Women in Archaeology of the American Anthropological Association (1975), and served as President of the Association for Feminist Archaeology of the American Anthropological Association (1997–1999) and President of the Society for American Archaeology (2009–2011). At Berkeley, Conkey received the Distinguished Teaching Award of the Division of Social Sciences in 1996, the Educational Initiatives Award in 2001, and the Chancellor's Award for Advancing Institutional Excellence in 2009.

Conkey, Margaret Wright, Fig. 1 Margaret (Meg) Conkey

She was awarded an honorary degree from her alma mater, Mount Holyoke College, in 1995. Conkey is an elected Fellow of the California Academy of Sciences (1998) and serves on the board of the Center for Advanced Studies in the Behavioral Sciences at Stanford University. *Discover Magazine* named Conkey one of the "Fifty Most Important Women in Science" in 2002.

Major Accomplishments

Conkey's contributions can be divided into three interrelated arenas: (1) Paleolithic, or Ice Age art (though Conkey prefers the term "visual imagery"); (2) the archaeology of gender; (3) a feminist approach to archaeological method and theory.

Conkey's 1978 dissertation was the first structural analysis of portable Paleolithic art pursued at an American university. In the mid-1970s, the University of Chicago was at the forefront of the "New" or Processual Archaeology, which emphasized the relationships between the natural environment and culture. This perspective did not consider Ice Age art a legitimate topic of scientific inquiry because at the time no one could imagine imagery painted on cave walls or carved into bone, antler, and ivory as having any adaptive value.

Conkey was the first to apply a culture-as-adaptation perspective to the question of Ice Age visual imagery. But she merged this "Americanist" focus with the structuralist work of French archaeologist André Leroi-Gourhan. Conkey

demonstrated that seemingly inconsequential portable artifacts "decorated" with patterned lines, hatch marks, half-circles, and the like had an adaptive function in promoting hunter-gatherer aggregation activities during the Upper Paleolithic (specifically Magdalenian) (Conkey 1980, 1984, 1989). Importantly, Conkey was not trying to decipher what the images meant. Rather, she was analyzing how their patterning would have been adaptive for those making and seeing them. Conkey has long stressed the important distinction between trying to get at the meaning-content of prehistoric visual imagery (an unverifiable orientation open to speculation) and the more anthropological (and also testable) concern with understanding how such imagery was full of meaning for the makers, users, and viewers.

Conkey's research on Paleolithic visual imagery has advanced archaeological method and theory in at least two important ways. First, it demonstrates that Paleolithic art is a valid scientific topic amenable to hypothesis testing. Second, her work has also paved the way for understanding ancient visual imagery from an adaptive perspective. In this, Conkey has shown how ancient visual imagery was as central and necessary to ancient cultural survival as were stone tools or fire.

Conkey's second major contribution to the discipline concerns the archaeology of gender. Prior to her path breaking article with Janet Spector "Archaeology and the Study of Gender" (1984), the activities of ancient women and men were taken for granted. It was assumed, uncritically, that in the past men made and used the hard tools (that conveniently survive in the archaeological record) to hunt, to dominate nature and thus ensure cultural survival, while ancient women were assumed to have pursued the "less important" activities (with perishable tools) such as gathering and childcare. Conkey was among the first to call into question such unfounded assumptions. Importantly, she went further by suggesting that ancient gender relations (much like Paleolithic visual imagery) mattered substantially to how cultures functioned in the past (Gero and Conkey 1991; Conkey 2008). In this regard, Conkey helped make gender both a necessary and legitimate topic of archaeological inquiry.

Conkey's third major contribution is also her most ambitious: developing a feminist-inspired alternative to mainstream archaeological research. Her focus on "doing archaeology as a feminist" is an extension of her work uncovering gender bias in the everyday practice of archaeology (Conkey and Tringham 1995; Conkey and Gero 1997; Conkey 2003). Among other revelations, Conkey has demonstrated the extent to which New Archaeology's systems-theory definition of ancient culture was shaped by insidious gender biases producing sterile understandings of the past. As a result, Conkey's feminist insights have stimulated archaeologists around the world to rethink their categories of data, the analytical scales deemed appropriate for particular research questions, and even to reassess which empirical patterns are relevant (e.g., Du Cros and Smith 1993). In feminist theory, this is known as the "receding horizon," whereby an initial challenge to mainstream thought or practice raises additional concerns that, over time, lead to more fundamental epistemological, ontological, and philosophical questions. In archaeology, Conkey's initial concern with how mainstream archaeology undertheorized ancient gender has led to far more substantial concerns with archaeological research and theory building.

Influence on the Discipline

Conkey's perspective on Ice Age visual imagery is important not only for having introduced English readers to the structuralist theories of Leroi-Gourhan. She also vastly improved this perspective by infusing it with an anthropological concern with ecology, function, and adaptation. Conkey is directly responsible for elevating Paleolithic "art" to a legitimate topic of scientific inquiry, exemplified by the widely popular "art-as-information" school of thought. She also radically transformed our understanding of gender in prehistory, arguing through her own research, that gender was a process central to both social reproduction and to culture change. As a result, gender is now a theoretically informed and empirically grounded topic pursued by archaeologists studying practically every time and place in the world's past. Her work has also raised awareness of the

extent to which gender bias shapes every facet of the discipline, in turn leading to a significant amount of retrospection and reformulation (Conkey 2003). Finally, Conkey has been an articulate, tireless, and passionate advocate for a feminist (and more generally, a humanistic) approach to prehistory. In the field and in the classroom, Conkey has substantially reshaped the everyday practice of contemporary archaeology. Through her innovative blending of French and American perspectives, the sciences and the humanities, and feminism, few twentieth-century archaeologists have influenced so many different aspects of the discipline.

Cross-References

- ▶ Art, Paleolithic
- ▶ Europe: Paleolithic Art
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Leroi-Gourhan, André
- ▶ Mobiliary Art, Paleolithic
- ▶ Semiotics in Archaeological Theory
- ▶ Structural Archaeology

References

Conkey, M.W. 1980. The identification of prehistoric hunter-gatherer aggregation sites: The case of Altamira. *Current Anthropology* 21: 609–630.

Conkey, M.W. 1984. To find ourselves: Art and social geography of prehistoric hunter gatherers. In *Past and present in hunter gatherer studies*, ed. C. Schrire, 253–276. Orlando: Academic Press.

Conkey, M.W. 1989. The structural analysis of Paleolithic art. In *Archaeological thought in America*, ed. C.C. Lamberg-Karlovsky, 135–154. Cambridge: Cambridge University Press.

Conkey, M.W. 1996. A history of the interpretation of European "Palaeolithic art": Magic, mythogram, and metaphors of modernity. In *Handbook of human symbolic evolution*, ed. A. Lock and C.R. Peters, 288–349. Oxford: Clarendon Press.

Conkey, M.W. 2003. Has feminism changed archaeology? *Signs* 28 (3): 867–879.

Conkey, M.W. 2007. Questioning theory: Is there a gender of theory in archaeology. *Journal of Archaeological Method and Theory* 14: 285–310.

Conkey, M.W. 2008. One thing leads to another: Gendering research in archaeology. In *Gendered innovations in science and engineering*, ed. L. Schiebinger, 43–64. Stanford: Stanford University Press.

Conkey, M.W., and J.M. Gero. 1997. Programme to practice: Gender and feminism in archaeology. *Annual Review of Anthropology* 26: 411–437.

Conkey, M.W., and J.D. Spector. 1984. Archaeology and the study of gender. *Advances in Archaeological Method and Theory* 7: 1–38.

Conkey, M.W., and R. Tringham. 1995. Archaeology and the goddess: Exploring the contours of feminist archaeology. In *Feminisms in the academy: Rethinking the disciplines*, ed. D. Stanton and A. Stewart, 199–247. Ann Arbor: University of Michigan Press.

Du Cros, H., and L. Smith. 1993. *Women in archaeology: A feminist critique*, Occasional papers in prehistory 23. Canberra: Australian National University.

Gero, J.M., and M.W. Conkey, eds. 1991. *Engendering archaeology: Women and prehistory*. Oxford: Blackwell.

Further Reading

Conkey, M.W. 1987. New approaches in the search for meaning? A review of research in "Palaeolithic art". *Journal of Field Archaeology* 14: 413–430.

Conkey, M.W. 1995. Making things meaningful: Approaches to the interpretation of the ice age imagery of Europe. In *Meaning in the visual arts: Views from the outside, a centennial commemoration of Erwin Panofsky*, ed. I. Lavin, 49–64. Princeton: Institute for Advanced Study, Princeton University Press.

Conkey, M.W. 1997. Mobilizing ideologies: Palaeolithic "art," gender trouble, and thinking about alternatives. In *Women in human origins*, ed. L. Hager, 172–207. London: Routledge.

Conkey, M.W. 2009. Materiality and meaning-making in the understanding of the Palaeolithic 'arts'. In *Becoming human: Innovation in prehistoric material and spiritual cultures*, ed. C. Renfrew and I. Morley, 179–194. Cambridge: Cambridge University Press.

Conkey, M.W. 2010. Re-visioning archaeology or, the future matters as much as the past. In *Voices in American archaeology*, ed. W. Ashmore, B. Mills, and D. Lippert, 8–36. Washington, DC: Society for American Archaeology Press.

Conkey, M.W., and C. Hastorf, eds. 1990. *The uses of style in archaeology*. Cambridge: Cambridge University Press.

Conkey, M.W., and S. Williams. 1991. Original narratives: The political economy of gender in archaeology. In *Gender at the crossroads of knowledge: Feminist anthropology in the post-modern era*, ed. M. di Leonardo, 102–139. Berkeley: University of California Press.

Conkey, M.W., O. Soffer, D. Stratmann, and N.G. Jablonski. 1997. *Beyond art: Pleistocene image and symbol*. San Francisco: California Academy of Sciences.

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Basic Biographical Information

Professor Graham Edward Connah is an archaeologist of both Africa and Australia. His particular expertise is archaeological field research, including excavation, in tropical Africa and in Australia. He is a noted author and editor, particularly of archaeological syntheses. He has excavated and conducted archaeological fieldwork in Britain, Nigeria, Egypt, Uganda, and Australia. He was born in 1934 and grew up in Northern England. He received a B.A. in 1959 and an M.A. in 1964 from Cambridge University. He received a Doctor of Letters degree from the University of New England in 1984 on the basis of his two books *The Archaeology of Benin* (Connah 1975) and *Three Thousand Years in Africa* (Connah 1981). He is a member of the Order of Australia, awarded in 2000, "For service to the promotion and enhancement of the profile of Australian historical archaeology through the University of New England, as a researcher and author, and to African archaeological research."

Professor Connah joined the University of New England in NSW, Australia, as a lecturer in 1971 and was appointed Emeritus Professor upon his retirement in 1995. Professor Connah continues to take an active role in both national and international archaeology since his retirement, always ably assisted by his wife Beryl. Professor Connah has been a fellow of the Royal Anthropological Institute of Great Britain and Ireland since 1966 and a fellow of the Society of Antiquaries of London since 1968. He was elected a fellow of the Academy of the Humanities in 1988 and was chairperson of the Academy's Archaeology and Prehistory Electoral Committee in 1993. He was elected president of the Australasian Society for Historical Archaeology (ASHA) in 1992 and has had a long-standing involvement with ASHA as committee member, president, and founding editor of what became *Australasian Historical Archaeology.*

Major Accomplishments

Professor Connah is a respected member of the national and international research communities. He has presented papers at conferences across the world, from Los Angeles, Mombasa, Cambridge, Adelaide, and Harare to Canberra and Minneapolis. Professor Connah is a passionate advocate of the importance of publishing archaeological results, and he has not only provided outlets for others to do so but has published conscientiously himself. His most influential publications are *Of the Hut I Builded: Archaeology of Australia's History* (1988), revised as *Archaeology of Australia's History* (Connah 1993) and *African Civilizations: An Archaeological Perspective* (Connah 1987, second edition 2001, third edition 2015). Some of his other important Africanist books are *The Archaeology of Benin* (Connah 1975), *Three Thousand Years in Africa* (Connah 1981), and *Kibiro* (Connah 1996). In 2004, he published a general book on the archaeology of Africa entitled *Forgotten Africa* (Connah 2004), which has since been translated into German (2006), French (2008), and Italian (2009). His book *The Same Under a Different Sky? A Country Estate in Nineteenth-Century New South Wales* (Connah 2007) is about his work at Lake Innes in northern NSW. He recently completed a book on archaeological writing for Cambridge University Press, *Writing About Archaeology* (Connah 2010). The impact and breadth of Professor Connah's research is shown by three of his volumes becoming standard texts in their subject areas: *Australian Field Archaeology: A Guide to Techniques* (Connah 1983a) in courses on archaeological field methods; *Archaeology of Australia's History* (Connah 1993) in the area of Australian historical archaeology; and *African Civilizations* (Connah 1987) in the study of precolonial cities and states in Africa.

Professor Connah's career has had a profound impact on the discipline of archaeology in three principal ways. In 1971, Professor Connah joined the (then) Department of Classics and Ancient History at the University of New England. He was a founder of historical archaeology as a subdiscipline of Australian archaeology (Connah 1998, 2003); he has been a major player in the

development of archaeological studies of Africa and within African countries; and he established one of the most successful archaeology university departments in Australia. Originally (and still) an Africanist, he turned his focus to historical archaeology when he came to the University of New England and wanted to provide students with more diverse field experiences. So he trained many students over the years at historic Australian sites such as Saumarez Station, Winterbourne, Bagot's Mill, and Regentville (Connah 1976, 2003) as well as carrying out field archaeological investigations of Aboriginal sites (Connah et al. 1977; Horton and Connah 1981; Connah and Jones 1983). He has been instrumental in providing pathways to higher education, for example, in 1993, he helped to organize and teach a series of seminars for postgraduate students at the University of Nairobi, Kenya, which was funded by the Swedish government as part of an overseas aid program.

In 1986, Professor Connah began teaching one of the first historical archaeology courses at an Australian university. This tapped into the heritage interests of the Australian public, which have since burgeoned. Historical archaeology is now taught at many Australian universities, including the Australian National University, Charles Darwin University, Flinders University, James Cook University, La Trobe University, Sydney University, the University of Queensland, University of Tasmania, and the University of Western Australia. He was appointed as head and sole staff member of the newly established Department of Prehistory and Archaeology in 1974. When he retired in 1995, the (renamed) Department of Archaeology and Palaeoanthropology had a staff of 13, including 8 academic appointments, an ARC fellow, a professional officer, and a technical officer. The Archaeology and Palaeoanthropology teaching unit at UNE has not been as large, either before or since 1995. In 1995, it had an undergraduate enrolment of 600, comprising about 50% distance education students, and Professor Connah attracted a contingent of high-quality postgraduate students. The expansion of this Department during this period was largely due to his extended efforts (Connah 1983b, 1997, 1998).

Currently, he is a visiting fellow in the School of Archaeology and Anthropology at the Australian National University, Canberra. His main interest remains the archaeology of tropical Africa, particularly the last 4000 years.

C

Cross-References

- ▶ Australasian Historical Archaeology
- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Colonial Encounters, Archaeology of
- ▶ East Africa: Historical Archaeology
- ▶ Kirkman, James
- ▶ Posnansky, Merrick
- ▶ Schmidt, Peter R.
- ▶ Southern Africa: Historical Archaeology
- ▶ West and Central Africa: Historical Archaeology

References

Connah, G. 1975. *The archaeology of Benin, excavations and other researches in and around Benin City, Nigeria*. Oxford: Clarendon Press.

Connah, G. 1976. Archaeology at the University of New England, 1975–76. *Australian Archaeology* 5: 1–6.

Connah, G. 1981. *Three thousand years in Africa, man and his environment in the Lake Chad region of Nigeria*. Cambridge, UK: Cambridge University Press.

Connah, G., ed. 1983a. *Australian field archaeology: A guide to techniques*. Canberra: Australian Institute of Aboriginal Studies.

Connah, G. 1983b. Stamp collecting or increasing understanding: The dilemma of historical archaeology. *Australian Journal of Historical Archaeology* 1: 15.

Connah, G. 1987. *African civilizations: An archaeological perspective*. Cambridge, UK: Cambridge University Press, 2001 (2nd ed.), 2015 (3rd ed.).

Connah, G. 1988. *The archaeology of Australia's history*. Melbourne: Cambridge University Press, 1993 (2nd ed.).

Connah, G. 1996. *Kibiro, the salt of Bunyoro, past and present*. London: British Institute in East Africa.

Connah, G. 1997. The purpose of archaeology. *Australian Archaeology* 45: 48–53.

Connah, G. 1998. Pattern and purpose in historical archaeology. *Australasian Historical Archaeology* 16: 3–7.

Connah, G. 2003. Problem orientation in Australian historical archaeology. *Historical Archaeology* 37 (1): 146–158.

Connah, G. 2004. *Forgotten Africa. An introduction to its archaeology*. London: Routledge.

Connah, G. 2007. *The same under a different sky? A county estate in nineteenth century New South Wales*, British Archaeological Reports, International series 1625. Oxford: John & Erica Hedges.

Connah, G. 2010. *Writing about archaeology*. Cambridge, UK: Cambridge University Press.

Connah, G., and A. Jones. 1983. Photographing Australian prehistoric sites from the air. In *Australian field archaeology: A guide to techniques*, ed. G. Connah, 73–81. Canberra: Australian Institute of Aboriginal Studies.

Connah, G., I. Davidson, and M. Rowland. 1977. Prehistoric settlement. In *An atlas of New England*, ed. D. Lea, J. Pigram, and L. Greenwood, vol. 2, 130. Armidale: University of New England.

Connah, G., M. Rowland, and J. Oppenheimer. 1978. *Captain Richards' house at winterbourne: A study in historical archaeology*. Armidale: Department of Prehistory and Archaeology, University of New England.

Horton, D.R., and G.E. Connah. 1981. Man and megafauna at Reddestone Creek, near Glen Innes, northern new South Wales. *Australian Archaeology* 13: 35–52.

Further Readings

Connah, G. 1975. Current research at the Department of Prehistory and Archaeology, University of New England. *Australian Archaeology* 3: 28–31.

Connah, G. 1977. Wool, water and sediment: The archaeological landscape of Saumarez Station. *Armidale and District Historical Society Journal* 20: 117–127.

Connah, G. 1978. Aborigine and settler: Archaeological air photography. *Antiquity* 52: 95–99.

Connah, G.E., and A. Jones. 1983. Aerial archaeology in Australia. *Aerial Archaeology* 9: 1–23.

Gronenborn, D., and S. Maceachern. 2012. Graham Connah: An archaeologist's life in Africa and Australia. *Azania: Archaeological Research in Africa* 47: 249–255.

Higginbotham, E. 2009. In conversation with Graham Connah. *Australasian Historical Archaeology* 27: 7–16.

Conservation and Management of Archaeological Sites

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Brief Definition of the Topic

International peer-reviewed journal. Published four times a year by Taylor and Francis.

Address: 5 Howick Place, London, SW1P 1WG, UK.

Website: http://www.tandfonline.com/loi/ycma20

Past editors: Nicholas Stanley-Price (1995–2006) and Tim Williams (2007–2016).

Current editor: Kimberley Tewinkle (2017 onward).

The peer-reviewed journal *Conservation and Management of Archaeological Sites (CMAS)* is a primary reference in the field of archaeological site management both for active professionals and for the academic community. Launched in 1995, the journal covers both theoretical and practical issues in archaeological site management and conservation. Peer-reviewed papers from around the world report on new thinking and best practice in site management and conservation. CMAS also publishes short comments, conference reports, book and website reviews, and lists forthcoming conferences and meetings.

Topics covered have included cultural, social, ethical, and theoretical issues in archaeological site management and conservation; documentation and condition reporting; site deterioration and environmental monitoring; preventative conservation, including reburial and protective sheltering of sites; perseveration in situ; building materials analysis and treatment; restoration and reconstruction of buildings; visitor management; sustainable tourism; site interpretation and education; and national and international legislation and charters.

Special issues have included the following: 2002 Shelters on Archaeological Sites, 5(1–2); 2004 Reburial of Archaeological Sites, 6(3–4); 2008 Archaeological Sites and Education, 10(1); 2009 Conserving Marine Cultural Heritage, 11(1); 2009 Archaeology and Conflict, 11(3–4); 2011 Managing Archaeological Sites in Sub-Saharan Africa, 13(2–3); 2012 The 4th International Conference on Preserving Archaeological Remains In Situ (PARIS4), 14(1–4); 2013 Managing Archaeological Sites in Greece 15(1); 2014 Perspectives from the Arabian Peninsula 16(2); 2014 Coudenberg, Brussels, 16(1); 2015 Living with Our Dark Heritage, 17(1); and 2016 The 5th International Conference on Preserving Archaeological Remains In Situ (PARIS5), 18(1–3).

Cross-References

- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Site Visitation and Interpretation: Management

Conservation and Preservation in Archaeology in the Twenty-First Century

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Introduction

For the past half century, the focus of conservation and preservation in archaeology has been moving away from an overriding concern with developing and applying treatments (the chemical and physical means by which arrest deterioration or prepare an object or structure for display) toward a focus on the holistic management of archaeological sites and landscapes (Getty Conservation Institute 2003). While treatments remain essential, this new approach emphasizes the need to inventory and evaluate archaeological sites systematically, to assess and prioritize conservation and preservation needs with reference to the context provided by evaluation, and to acquire the resources by which to protect sites though careful presentation of them to the public. The ideal is acknowledged to be protection of archaeological materials in situ and to do this by utilizing nonintrusive research methods as much as possible. The challenge now is to balance the ideal of preservation with the need to garner the resources required for preservation through engagement with the public at archaeological sites and through the responsible use of media. This requires constant negotiation with all parties having an interest in archaeological sites. Outcomes have proven to be favorable when archaeologists, material conservationists, and architectural conservationists work together to advocate and plan for the preservation of archaeological material and context.

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Definition

Conservation Versus Preservation

The terms conservation and preservation have been used in reference to archaeological sites in ways that they are not used in other fields. Environmental management is closely allied to archaeological heritage management, yet environmentalists draw a clear distinction between conservation and preservation: Conservation is seen as the proper use of nature, while preservation is regarded as the protection of from improper use. The primary concern of environmentalists is conservation, not preservation. Populations of plants and animals are renewable, despite the removal of individuals within populations through harvesting or environmental change. Conservation goals allow for change within acceptable limits. Those *limits of acceptable change*, a term that has become central to the practice of natural resource conservation, ensure that new individuals will take the place of those lost. Preservation, from the standpoint of natural resource management, is short sighted. It seeks to protect individuals within the population, the population as a whole, and the environment from change. Given that ecologies are dynamic, the application of preservation principles to environmental management has proven to be ecologically unsound.

In contrast, archaeological materials are finite, nonrenewable, and irreplaceable. To preserve what these might contribute to scientific and historical knowledge requires that we safeguard not only the materials themselves but also the context in which they occur, that is, they must preserved in situ. Therefore, to an archaeologist, preservation must be the ideal. The concept of "limits of acceptable change" does not fit well with this ideal.

Preservation in the field of architectural conservation has a different but not altogether unrelated meaning, which is to stabilize a structure by preventing further deterioration and to leave it in its current form (United States National Park Service 1968: 21). The present form of a structure might contain elements from different time periods. Whatever is present when the structure is found is stabilized.

Nonetheless, as they are commonly used by archaeologists, the terms conservation and preservation are largely interchangeable. The manner in which the term conservation has been historically been used is reflected and has been further propagated by the Venice Charter. Article 5 of that document says, for example, that "The conservation of monuments is always facilitated by making use of them for some socially useful purpose. Such use is therefore desirable but it must not change the lay-out or decoration of the building. It is within these limits only that modifications demanded by a change of function should be envisaged and may be permitted" (ICOMOS 1964). Similarly, conservation treatments of archaeological sites and materials are usually done in an effort to make them available to some social useful purpose, and often this is to present archaeological materials on-site or in museums.

Stabilization

Stabilization has been defined as the effort to minimize the deterioration of a structure, as a means to the end of preservation as defined just above, thereby accomplishing the objective of preservation. It was so defined, for example, in the United States Secretary of the Interior's Standards and Guidelines, but in the revised guidelines issued in 1995, the term itself was removed.

Restoration

According to the Venice Charter (1964: Article 9), restoration "must stop at the point where conjecture begins, and in this case moreover any extra work which is indispensable must be distinct from the architectural composition and must bear a contemporary stamp." The latter part of this statement is widely interpreted to mean that any new materials must be distinguishable from original fabric. The further statement is made that "The restoration in any case must be preceded and followed by an archaeological and historical study of the monument."

Reconstruction

Reconstruction is widely regarded as problematic but is acceptable under certain conditions according to most of the relevant published standards. The document that probably carries the most far-reaching influence in the field of conservation and preservation is *the Convention Concerning the Protection of the World Cultural and Natural Heritage (the World Heritage Convention)* (UNESCO 1972). *The Operational Guidelines for the Implementation of the World Heritage Convention* (UNESCO 2012) have this to say: "In relation to authenticity, the reconstruction of archaeological remains or historic buildings or districts is justifiable only in exceptional circumstances. Reconstruction is acceptable only on the basis of complete and detailed documentation and to no extent on conjecture." As Stanley-Price points out (2009), the World Heritage Convention is the only document that pertains to conservation and preservation issues that have a legal basis. Signatories to the World Heritage Convention become States Parties and are bound in that way. It is especially notable that more countries have signed the World Heritage Convention than any other international treaty.

Among other organizations that have stewardship responsibilities for archaeological sites and a well-developed policy for cultural resource management is the United States National Park Service. The Cultural Resource Management Guidelines for the National Park Service (NPS-28) describe the circumstances under which restoration can be conducted, which include "Archeological, documentary, or physical evidence is available to permit accurate reconstruction with minimal conjecture, and such reconstruction is essential to public understanding of the cultural associations of a park established for that purpose" (United States National Park Service 1998: 128).

Authenticity

The need for authenticity is related to the application of the Venice Charter to instances of restoration and reconstruction. As the Nara Document on Authenticity (1994: Paragraph 10) puts it:

Authenticity, considered in this way and affirmed in the Charter of Venice, appears as the essential qualifying factor concerning values. The understanding of authenticity plays a fundamental role in all scientific studies of the cultural heritage, in conservation and restoration planning, as well as within the inscription procedures used for the World Heritage Convention and other cultural heritage inventories.

This would appear to directly address the reservations about reconstructions and restoration that are evident in the Venice Charter and the World Heritage Convention, as well as many other conservation and preservation guidelines. These include those published by the United States National Park Service (1998: 129–31), which, despite a cautious approach, also allow for restoration given adequate archaeologically derived evidence or documentary evidence.

Heritage Versus History

David Lowenthal (1996: 102) draws a distinction between heritage and history. He sees heritage as a commemoration of people and places that produces a sense of personal and community associations. Heritage is an "exalted legacy," one so seductive that it can threaten the study of "history," which attempts to study the past with as much objectivity as possible. Heritage can be "popularized, commoditized, and politicized" (Lowenthal 1996: 87). It can also become an economic asset. This is perhaps more true than ever before, as transportation networks have greatly expanded and travel has become less expensive.

The economic use of archaeological sites can generate widespread support from business, communities, and governments. It can also provide the funding necessary to safeguard archaeological sites from damage by looting, conflict, or natural forces such as erosion. Because economic values often override all others in practice, the distinction between conservation and preservation becomes more crucial. The latter is essential if archaeology is to serve history while managing the market demands of heritage.

Historical Background

For many years, archaeologists, especially those employed by academic institutions and museums, have been engaged in the conservation and restoration of structures and the acquisition of aesthetically pleasing artifacts for display at museums, in addition to undertaking research. The practice of archaeology, in this role as handmaiden to monument conservation and restoration, was guided by the Athens (Le Corbusier 1933) and Venice Charters (ICOMOS 1964), which promoted the idea of minimum intervention, reversibility, and anastylosis (the recomposition of existing architectural members) as the only acceptable form of reconstruction. It also focused upon material authenticity. Anastylosis was conducted at many sites across the globe, in part as a means through which archaeologists could secure both political and financial support, which enabled countries with an architecturally rich heritage to develop destinations for tourism. These sites also became potent forces for the construction of national identities and as a foundation for the "imagined community" (see Anderson 1983) needed to secure a place in global politics.

The emphasis was on excavation as the means by which to advance such goals, and this was inherently problematic because excavation is an unavoidably destructive process. Conservators were often not on site when vulnerable materials were exposed. As funds and energies became exhausted at the end of field sessions, the stabilization and protection of the exposed site was, in some cases, overlooked. More than 100 years after Schliemann excavated Troy, artifacts from the site were being treated for conservation. Artifacts from sites of lesser renown would never benefit from such sustained attention. Clearly, a more comprehensive and realistic approach to discharging the responsibilities that archaeologist must accept when excavating ancient materials and structures was required.

Today, archaeology is intertwined with archaeological heritage management. A benchmark in this was a session organized by the Getty Conservation Institute at the Fifth World Archaeological Congress (WAC-5) in 2003, held in Washington, DC. The introduction to the resulting publication stated, "Foremost among the directions in which archaeological conservation has moved are methodological that provided the cultural foundation for the constitutional state, which is site management planning and implementation and support for the increasing participation of indigenous peoples and communities and other stakeholders. . ."(Getty Conservation Institute 2003: 2). It is has become generally acknowledged that holistic planning and establishing capacity for comprehensive and effective site management are prerequisites for effective conservation and preservation. Without these, benefit realized from any treatment is temporary, and the site and component materials will continue to deteriorate and ultimately be lost.

Key Issues/Current Debates

It is likely that the most vigorous and important debates regarding the conservation and preservation of archaeological sites revolve around the issue of how to balance preservation in the archaeological sense – preservation of material as discovered in the context in which it was discovered – with the necessity to gather the economic and political support needed to ensure preservation. Tourism, which powerfully attracts political and popular support for preservation of archaeological sites and landscapes, carries with it a cost in terms of loss of material culture unless it is carefully managed, and too often this is not the case (see Comer 2012). Yet without the support that tourism generates, many sites would be damaged or destroyed by natural processes or by looting.

Archaeology must also look to its ethical standards. Frank Matero and others have been critical of archaeologists for not observing what they see as basic conservation principles. Matero (2008: 2) has said that "The practices of archaeology and conservation appear by their very nature to be oppositional". It can also be said that many treatments done in the name of conservation have, ironically, proven to be destructive of the very materials that were to have been conserved. Both archaeological research and the conservation of archaeological sites and materials have and can be conducted in ways that prioritize economic benefit over scientific and historic knowledge. The standing structures fashioned by anastylosis by archaeologists and conservators working together create not only a didactic device but also a tourism asset. Artifacts are prepared for display in museums to attract visitors, sometimes in ways that destroy material that with analysis in the future might be informative.

An approach that minimized the need for both intrusive archaeological excavation and conservation treatments would amount to a preservation approach and one consistent with the objectives of archaeological heritage management. Archaeological heritage management by its nature must take the long-term view to be effective. From that perspective, the first priority is protecting archaeological sites and materials from destruction or damage. Effective archaeological heritage management directs research and controls the marketing of heritage in ways that preserve archaeological materials. Yet the long view also must accommodate economic and political realities until the day when nondestructive technologies and fully developed management capacities become commonplace.

Future Directions

Minimizing and Mitigating Archaeological Intrusion

Archaeologists today utilize many methods, technologies, and approaches that are intended to minimize excavation and maximize information retrieved from archaeological materials. Archaeological guidelines and standards that are now common in most parts of the world stipulate that materials recovered by means of excavation be carefully catalogued and analyzed in ways that become part of the permanent record. Excavation

records are typically subject to examination and review by a variety of administrative authorities at the national, regional, and local levels. Given such capacities and this obligation, it is only practical nowadays to limit excavation and the numbers of artifacts recovered to that which is absolutely necessary to accomplish carefully formulated excavation objectives. Recordation of findings mitigates to some degree the destruction and removal from context of archaeological remains.

Further, the availability and use of remote sensing and the analysis of data collected by digital technologies make it possible to extract information from archaeological sites and landscapes in ways that demand much less excavation. Geophysical technologies, such as ground-penetrating radar, magnetometry, electrical resistivity, and the electrical conductivity can be used to conduct a nondestructive, subsurface inventory. Aerial and satellite remote sensing can provide information about subsurface remains given optimal conditions but, more importantly, can be used to reconstruct environmental context and suggest relationships between archaeological sites and the environment, and among archaeological sites themselves, which enrich interpretation of what is retrieved via archaeological excavation. Such relationships can be further revealed and tested through the use of spatial analyses. Among spatial analyses of particular promise are space syntax analysis, least cost analysis, and others that can highlight relationships among terrain, environmental attributes, and human settlement and regional use patterns (Comer and Harrower 2013).

It might be said, therefore, that the ultimate objective of both archaeological research and heritage management has always been preservation but that the proximate objectives, often driven by institutions that provide finding for archaeological research, have included the necessary use of destructive methods. The destruction that has been necessary is quickly being minimized.

A Unified Approach to Preservation of Nonrenewable Resources: From Treatments to Strategy

Materials taken from the ground are confronted with a very different environment than that from which they were removed, and often deteriorative processes accelerate in this new environment. It is the responsibility of the archaeologist to stabilize these materials in ways that allow and do not impede analysis of them. Conservators also are tasked with preparing materials for display or for long-term storage from which they can be retrieved for future study or display. In addition, conservators address the means employed to stabilize and maintain standing structures. As noted previously, treatments have been the focus of conservators for many years, and many improvements to treatments will be seen in preservation and conservation entries found within this encyclopedia. A unified approach to archaeological site management includes prioritization of conservation and preservation needs; identifying the facilities, human resources, and funding needed to satisfy those needs; and protecting archaeological sites from the degradation that accompanies poorly managed visitor flow and unregulated development on and around archaeological sites. This unified approach can be given forms by means of planning documents that go by a variety of names: Management plans, general management plans, operating planes, and sometimes conservation plans. The plans themselves do not ensure either conservation or preservation of archaeological sites and materials, of course, and often building capacity to implement plans takes many years.

Nonetheless, capacity to conserve and preserve begins with a plan. Given the ever-present threats to archaeological sites and landscapes because of widespread global development, rapidly increasing exploitation of natural resources over broad landscapes and the international tourism industry, we can only expect that preservation planning will grow in importance.

It has become apparent that that environmental change can produce damage to cultural as well as natural resources. Where burgeoning agricultural, industrial, and tourism economies have produced drastic environmental change, especially hydrological, vegetative, and land cover change, the damage to archaeological sites has been severe. For example, development associated with tourism creates impervious surfaces as hotels,

restaurants, roads, and parking are built. At sites such as Petra, this has produced damaging floods as rainwater accumulates on impervious surfaces and runs, ultimately in torrents, downslope. Floods not only erode subsurface archaeological resources but also carry minerals, such as salts, which are destructive to the stone from which tombs and standing structures are formed. At sites such as Angkor, hydrological changes associated with development are equally destructive. Here, so much water is pumped from aquifers for use in hotels and restaurants that the foundations of ancient structures are undermined.

Preservation of archaeological sites requires a broad landscape approach, one that plans for sustainable development. This landscape approach also would provide the means by which to structure and control visitor flow away from sensitive archaeological resources and into already developed areas. These developed areas are places where small businesses owned by members of the local community are located. They can also be locations for museums and other interpretive facilities. Thus, visitor flow through the landscape will be directed in ways that generate community benefit and remove pressure on vulnerable archaeological sites.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ International Heritage Conservation Principles: Historical Overview

References

Anderson, B. 1983. *Imagined communities: Reflections on the origin and spread of nationalism*. New York: Verso.

Comer, D.C. 2012. *Tourism and archaeological heritage management at Petra. Driver to development or destruction?* New York: Springer.

Comer, D., and M. Harrower, eds. 2013. *Mapping archaeological landscapes from space: In observance of the 40th anniversary of the World Heritage Convention*. New York: Springer.

Getty Conservation Institute. 2003. Of the past, for the future: Integrating archaeology and conservation. In *Proceedings of the conservation theme of the 5thWorld Archaeological Congress, Washington, DC*, ed. N. Agnew and J. Bridgeland. Los Angeles: Getty Publications.

ICOMOS. 1964. *Charter for the Conservation and Restoration of Monuments (The Venice Charter)*. Paris: ICOMOS.

ICOMOS. 1994. *The Nara Document on Authenticity*. Paris: ICOMOS.

Le Corbusier. 1933. *Charte d'Athènes*. New York: Grossman Publishers. (1973).

Le Corbusier. 1996. *The heritage crusade and the spoils of history*. London: Free Press.

Matero, F. 2008. Heritage, conservation, and archaeology: An introduction. In *Heritage, conservation, and archaeology*. Online publication, Archaeological Institute of America. Available at: http://www.archaeological.org/sitepreservation/hca?page=1

Stanley-Price, N. 2009. The reconstruction of ruins: Principles and practice. In *Conservation principles, dilemmas, and uncomfortable truths*, ed. A. Richmond and A. Bracker, 32–46. London: Elsevier.

UNESCO. 1972. *The Convention Concerning the Protection of the World Cultural and Natural Heritage (The World Heritage Convention)*. Paris: UNESCO.

UNESCO. 2012. *Operational guidelines for the implementation of the World Heritage Convention*. Paris: UNESCO.

United States National Park Service. 1968. *Compilation of the administrative policies for historical areas of the National Park system*. Washington, DC: United States National Park Service.

United States National Park Service. 1998. *Cultural resources management guidelines*. NPS-28. Washington, DC: National Park Service.

Further Reading

Cronyn, J.M. 1990. *The elements of archaeological conservation*. London: Routledge.

Getty Conservation Institute. 2003. *The GCI project bibliographies series: Conservation and management of archaeological sites*. Los Angeles: Getty Conservation Institute.

Grattan, D.W., ed. 1982. *Proceedings of the ICOM Waterlogged Wood Working Group conference. Waterlogged Wood Working Group, Committee for Conservation*. Ottawa: ICOM.

Hamilton, D. L. 1975. *Conservation of metal objects from underwater sites: A study in methods*. Texas Antiquities Committee Publication 1. Austin: Texas Antiquities Committee.

Hamilton, D.L. 1996. *Basic methods of conserving underwater archaeological material culture*. Washington, DC: US Department of Defense Legacy Resource Management Program.

ICOM Waterlogged Wood Working Group Conference. 1985. Waterlogged wood: study and conservation. In

Proceedings of the 2nd ICOM Waterlogged Wood Working Group Conference, Grenoble.
Lowenthal, D. 1985. *The past is a foreign country*. Cambridge: Cambridge University Press.
Pearson, C., ed. 1987. *Conservation of marine archaeological objects*. London: Butterworths.
Plenderleith, H.J., and A.E.A. Werner. 1977. *The conservation of antiquities and works of art*. Oxford: Oxford University Press.
Smardz-Frost, K. 2004. Archaeology and public education in North America: View from the beginning of the millennium. In *Public archaeology*, ed. N. Merriman, 59–84. New York: Routledge.
United States National Park Service. 1968. *Archaeology and historic preservation: Secretary of the Interior's standards and guidelines*. Washington, DC: United States National Park Service.

Conservation in Archaeological Practice

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Introduction

Archaeology, in itself a scientific discipline, often requires the expertise of other disciplines to help in the process of reconstructing past ways of life. According to ICOMOS's Charter for Archaeological Heritage (1990), "Archaeological heritage constitutes the basic record of past human activities. The protection of this heritage cannot be based upon the application of archaeological techniques alone (and) should be based on an effective collaboration between specialists from many different disciplines."

Whether dealing with recent history or prehistory, the contribution of related sciences such as biology, geology, geomorphology, metallurgy, and material science, to name only a few, needs no further proof. The archaeologist draws on all these disciplines to produce an overview that enhances the understanding of the history and evolution of a site. But despite this interdisciplinary approach, even today, conservators complain about the lack of integration of conservation in archaeological practice (Bergeron 1994). However, the potential of conservation for archaeology remains: whether it be for the discovery of new information, preserving transient information, or rescuing fragile elements of material culture, the conservator can provide new data to the archaeologist's approach.

For example, careful examination of the surface of objects may sometimes enable the conservator, with the help of special lighting, to discover a pattern invisible to the naked eye, to provide an analysis of surface coating which will reveal to the archaeologist valuable information on the use of the object, to understand the structure or assemblage of a composite object from fragments, and to suggest a hypothesis of reconstruction. The conservator can equally note the presence of transient elements such as impressions of plants or shells, which are lost during the stabilization treatment, or the release of the surface. The conservator's training encourages a subtle understanding of material culture: determining the structure and composition of the object is essential to adequately treat it and preserve it.

The presence of the conservator is not always necessary on many field sites, but the environmental context of certain sites demands the presence of a conservator. The consultation of a conservation specialist helps the archaeologist to plan a strategy for preservation as well as appropriate conservation measures to meet the demands of the excavation. A level sealed with clay, flooded by groundwater, or a site with permafrost constitutes environments conducive to the preservation of organic materials. The intervention of a conservator on-site greatly facilitates the acclimatization of these objects, which after having come into equilibrium with their environment for hundreds, even thousands of years, are suddenly subjected to new environmental constraints.

Definition

Conservation is defined as any action to safeguard a cultural property in the long term. The goal of conservation is to study, to document, to preserve, and to restore the essential features present in the

physical and chemical structure of cultural property, minimizing intervention as much as possible. Conservation involves examination, documentation, preventive conservation, preservation, treatment, restoration, and reconstitution (ACCR/CAC 2000).

The conservator is a person who has the training, knowledge, professional skills, and experience necessary to formulate and undertake conservation activities, in accordance with a code of ethics. Conservators are usually designated according to their domain of specialization, for example, furniture, textiles, or paintings conservators; the conservator specialized in archaeological conservation thus possesses the requisite knowledge and experience to work in collaboration with an archaeologist and their team. This conservator is competent to undertake restoration, stabilization, and preventive conservation of artifacts and structures discovered during archaeological intervention.

Historical Background

A Question of Perspective

Since its beginning, the human species has produced tangible goods whose attributes are determined in part by what is intangible in human experience: the beliefs, language, value system, and representation of the world. This immaterial heritage, which leaves no trace in the soil, influences all the production of material culture. The archaeologists concentrate their research on the portion of goods that are preserved in various states according to their immediate environment and burial conditions. The differential preservation of materials in the soil thus constitutes a limited sample that is more or less representative of the past.

Figure 1 illustrates the evolution of cultural archaeological property from some time in the past, entitled Time 0, until today:

Circle 1 illustrates the overall production of culture at a given time. The cone emerging from the center represents material culture, and the rest corresponds to intangible production: language, belief, and value system.

Circle 2 represents human activities that leave material traces.

Circle 3 indicates that only a part of these traces traverses time, the others disappear, and the archaeologist only knows a small part at the moment of discovery.

Circle 4 represents the beginning of the excavation: only one part of identified traces survives materially; the others disappear by the very fact of being uncovered.

Circle 5 shows that only part of the traces which survive the dig are spontaneously preserved; the rest disappears or is profoundly altered without appropriate measures taken. An even tinier part receives restoration treatment, sometimes years after the dig.

This narrow sample of the past indicates great responsibility of the archaeological team, as their intervention will break an equilibrium that has sometimes occurred over very long periods of time. This is what is illustrated in Hodges diagram in Fig. 2.

A Balance To Be Achieved

After abandonment, many objects will suffer some degradation according to the climate, the type of soil, the context of burial, and the speed of this burial. For some material, this degradation is rapid and inevitably leads to loss, while for others, it will sometimes slow down or even stabilize. It is thus said that the object has entered into equilibrium with its environment. The Hodges diagram is a tool that allows us to establish the relationship between the deterioration of material culture over time.

The intervention of the archaeologist upsets this balance and provokes a resurgence of the deterioration of objects, which must acclimatize to new environmental conditions. At this point, the common goal of the archaeologist and conservator is to minimize the damage by the adoption of appropriate conservation measures, whether environmental or through direct intervention on the material.

An object that loses its wholeness because of an alteration to its physical-chemical properties sees its

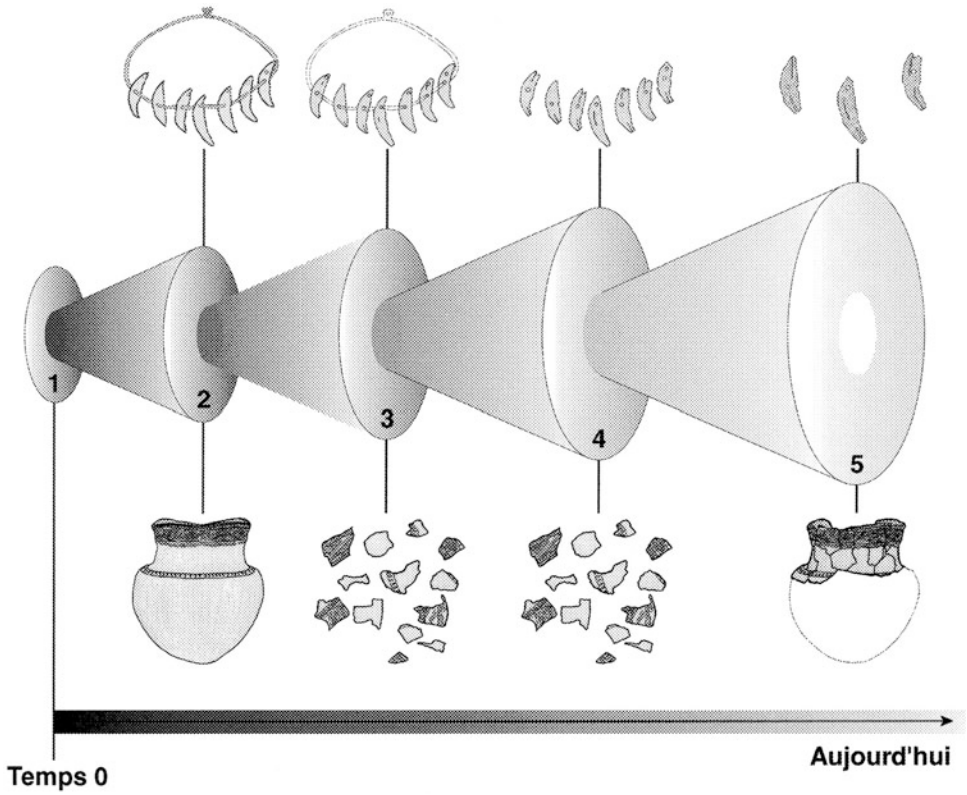

Conservation in Archaeological Practice, Fig. 1 Sequence of successive reductions established by Berducou (1990: 16–18)

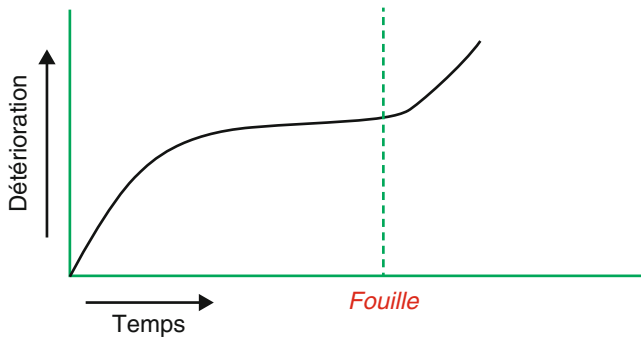

Conservation in Archaeological Practice, Fig. 2 The Hodges diagram expresses the relationship which exists between the deterioration of material culture and time. (Extract from Dowman 1970)

potential for study and research diminishes. Often, the resulting loss of legibility will also limit its potential for exhibition. Conversely, the adoption of conservation strategies applied in the field improves the preservation of collections, which facilitates their study and promotes their development. The responsibility for preservation is here shared between the archaeologist and the conservator, who must have agreed, before the beginning of the dig, on the sharing of tasks as well as the strategies to be implemented in order to optimize the preservation of the uncovered objects.

Key Issues/Current Debates

The Intervention of the Conservator

Although human beings have always repaired objects that they used, conservation as a discipline cannot be understood without considering the development of art history and archaeology in the nineteenth century together with the appearance of the museum as an institution of knowledge. In itself, conservation is not a scientific discipline, nor an artistic undertaking, even if the two aspects play an important role. Its practice is located at the confluence of several fields of knowledge, particularly chemistry, physics, biology, material science, environmental sciences, anthropology, and the history of art, to cite only a few.

The conservator borrows from the chemist his or her workplace, namely, the laboratory, as well as the rigor of scientific research; from the historian, their capacity for interpretation; from the surgeon, the scalpel and great dexterity; and from the artist, his brushes and sensitivity. Before any intervention, the ethics of the conservator always requires a dialogue with the person responsible for the object or the collection, which may also involve the archaeologist who is responsible for the discovery. Consensus is essential to the activity of the conservator who, like the archaeologist, must constantly keep up to date with new scientific breakthroughs.

Like the archaeologist, the conservator remains on the lookout for new elements of information that could be revealed by the analysis and study of objects. An interesting example is the treatment of a bandolier discovered on the Wreck of the Elizabeth and Mary (1690). Since its discovery in 1996 (Fig. 3), this object has been examined by a conservator and specialists in material culture to try and understand its structure. Several hypotheses were proposed, but none was completely satisfactory. For some time, the best hypothesis to describe the object suggested that the paper cartridges each equipped with two lead bullets may have been wrapped in paper. An analysis suggested that the wrapping was in fact a thin layer of tin (Fig. 4), but still then, the specialists in material culture were not completely convinced. A review of all the available information this time has shown that the paper cartridges were placed in tinplate box with stiff openings. This box served to protect the cartridges during transport to the battlefield. Never used, its contents were dismantled during the excavation. It was only after many hours of observation and examination spread over 15 years that the structure of this object, its likeness never before seen in museum collections, could be specified.

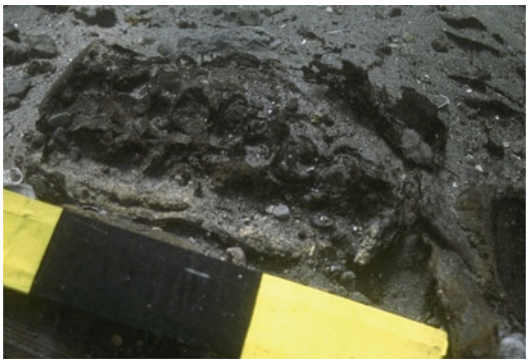

Conservation in Archaeological Practice, Fig. 3 View of the bandolier 12N2-61 in situ. (Photography: Parks Canada)

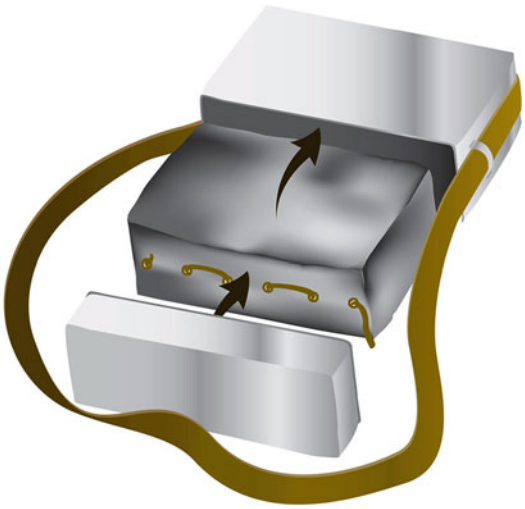

Conservation in Archaeological Practice, Fig. 4 The second hypothesis of the reconstruction of the bandolier 12N2-61, developed from field data, test results, and the conservator's observations

Today, the conservator has become in some ways like a doctor for objects. Their intervention

requires an understanding of the materials and their process of decomposition. Each object is in this way documented, measured, and photographed, and all the information is recorded in a condition report. The beginning of treatment is only performed after discussion and agreement with the manager of the collection. Then, all the materials used, added, or subtracted as well as the results and the procedure of intervention are recorded in a conservation report, which becomes the memory of the transformation of the object over time. This documentation will prove invaluable if further interventions become necessary (Fig. 5).

Figure 6 is a good example of the choices that the conservator is regularly faced with: to intervene or not to intervene. This archaeological discovery, a cannonball colliding with a wooden structure, involves two materials requiring treatment and different environments for optimal preservation. However, it is by keeping them together that the significance of their message emerges; to separate them would greatly diminish their potential. In this case, as in many others, the question of the degree of intervention and of the need for long-term stabilization of the archaeological object becomes a priority for the conservator.

International Perspectives

A Different Context in the Marine Environment

Maritime heritage is a nonrenewable resource that is threatened not only by natural elements but also by ignorance and sometimes, unfortunately, looters' greed. Due to its inherent characteristics, including the difficulty of access and usually fragmentary state, its preservation requires special awareness and an important public education effort. As is the case for other types of archaeological heritage, the preservation of maritime heritage, rather than being a technical issue, is often a cultural issue.

If this fact is not constantly kept in mind, public opinion, being reassured by the techniques used by specialists, inevitably feels it can be relieved of all responsibility, while the technical process, left to itself and lacking the means to act in the cultural context, is easily reduced to the automatic application of recipes, and even risks of losing sight of the purpose that justifies it (Philipot 1986: 2).

At a marine site, the interest of the archaeologist for questions related to conservation is crucial to optimize the preservation of material culture that is uncovered. The archaeologist also has the responsibility to convince and explain to local groups (history societies and divers) the significance of his/her project as well as the limits of archaeological intervention in the absence of conservation measures. It is also the archaeologist who must meet the goals of adequate preservation, as what is optional for terrestrial sites becomes mandatory for marine sites; all the materials must receive treatment, sometimes complex, which can take several years. As Pearson recalls (1977), "in the marine domain, an excavation carried out without conservation is tantamount to vandalism." In the marine environment, it is recognized that 1 month of intensive excavation requires 1 year of conservation treatment in the workshop (Pearson 1980: 147–150). This estimation should, however, be regarded as a minimum which in certain cases can double, even triple. Figure 7 illustrates the precautions to take when retrieving a gun. To use a protective support when exiting the water ensures that the fragile object has the best chances of preservation; archaeological information conveyed by the gun can bring new data useful for research, the foundation of any archaeological approach.

If the excavation of an underwater site regularly constitutes a complex and onerous undertaking, the preservation of associated remains is equally important. In addition to the conservation of materials that are preserved for hundreds, sometimes thousands, of years due to the presence of water, the question arises of the level of intervention and its objectives. Moreover, marine sites can sometimes lead to the discovery of marine concretions which trap in their gangue numerous objects or structures carrying information. The subtle excavation of these concretions by a conservator involves some delegation of

Centre de conservation Québec

AE-2010-25-01

PROPOSITION DE RESTAURATION

DEMANDEUR			
Nom:	Laboratoire et Réserve d'archéologie du Québec	**Représentante :**	Claudine Giroux
Adresse:	1825, rue Semple, Québec (Québec) G1N 4B7	**Téléphone :**	
		Télécopieur :	
Propriétaire: (si différent du demandeur)		**Courriel :**	

-Stabilisation et lisibilité des objets

CONSTAT D'ÉTAT			
Désignation	**Clé en fer forgé**	**CeEt-28-1A7-113** **AE-2010-25-01**	
Description	Objet plein constitué d'une seule pièce, sans assemblage, en fer forgé. Des produits de corrosion volumineux (sédiments, éléments allogènes, concrétions) empêchent de visualiser le panneton de la clé.		
Décor	Il ne semble pas y avoir de décor.		
Matériaux et techniques	Fer forgé		
État mécanique	Objet complet apparemment, et d'une bonne tenue mécanique pour la partie hors concrétion. Celle-ci ne permet pas de visualiser l'état de l'extrémité de la clé sous jacent, mais la présence de produits de corrosion indique que le fer est corrodé, et probablement en moins bon état que le fer appartenant au reste de la clé.		
Description de la corrosion	L'artefact semble avoir subi un traitement partiel: effet lustré et noir sur la tige et l'anneau, révélant sans doute que cette partie a fait l'objet non seulement d'un dégagement, mais aussi d'un traitement à l'acide tannique ou d'un convertisseur de rouille, suivi d'une application de cire micro cristalline. Aspect: la corrosion est localisée exclusivement à l'extrémité de la clé sous forme de concrétion volumineuse ; localement le long de la tige, le métal a une apparence fibreuse reflétant la structure métallurgique d'originedu fer forgé. Forme: très reconnaissable pour ce quiest de l'anneau et de la tige, mais le pannetonest non visible.		

Conservation in Archaeological Practice, Fig. 5 (continued)

État physique du métal	Présence d'un noyau métallique apparemment sain, hormis sous la concrétion: le fer semble s'être solubilisé presqu'entièrement. La surface ne révèle aucune fissure ni soulèvement dans la partie hors concrétion.	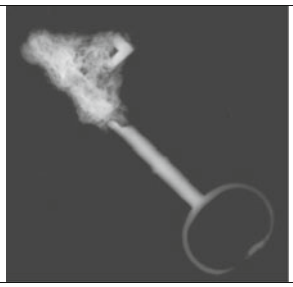

Importance de la corrosion	Sous la concrétion, la radiographie permet de visualiser que le fer à l'état métallique a presqu'entièrement disparu. Hors concrétion, la corrosion est très peu développée et quasiment nulle.	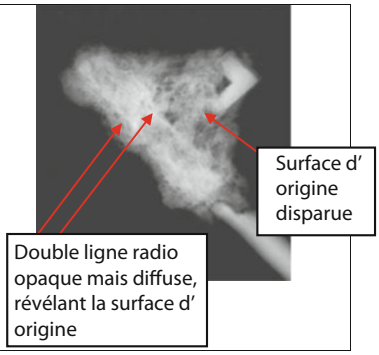
Surface d'origine	Très lisible, hormis sous la concrétion: une double ligne plus radio opaque (blanche), mais diffuse et irrégulière permet de penser que la surface d'origine est au moins en partie conservée au niveau de la tige, mais celle-ci est peut être déplacée de son niveau d'origine. Une partie de la matière supportant cette surface a disparu au niveau du panneton.	

DIAGNOSTIC

La clé a vraisemblablement déjà fait l'objet d'un traitement qui a stoppé le processus de corrosion et modifié son aspect post fouille, en dehors de la partie en concrétion (panneton). L'objet est donc stable en l'état, hormis dans cette zone. Il est néanmoins difficile de définir comment était l'objet avant traitement. Mais, àpartir de l'état actuel, on peut avancer le diagnostic suivant:

Période d'enfouissement:

-Partie hors concrétion: Le métal a une apparence fibreuse qui reflète sa structure métallurgique d'origine. Cette aspect est significatif de la corrosion qui se produit avec les fers forgés en milieu anaérobie. Il est vraisemblable que l'objet était situé dans un milieu d'enfouissement anaérobie, probablement gorgé d'eau, favorisant une altération biologique par les bactéries sulfato-réductrices (BSR) du cycle du soufre. Durant leur métabolisme, ces bactéries libèrent dans le milieu des ions qui précipitent les ions métalliques. Ce milieu est favorable à la formation de concrétion qui forme une gangue autour du métal qui parallèlement se solubilise. Une fois recouvert de concrétion, le fer forgé se corrode préférentiellement le long des inclusions qui sont orientées selon le sens de forgeage. A l'interface métal/produits de corrosion, il en résulte une forme de corrosion particulièrequi rappelle l'apparence du grain du bois, tel que constaté sur la clé. L'état physique visible laisse donc penser que la clé était initialement recouverte complètement de concrétion.
-Partie sous la concrétion: le métal est très corrodée. Il semble avoir été presque complètement solubilisé. Cette zonepeut être ou a pu être le siège d'une corrosion active mais aussi d'une corrosion à caractère évolutif, reliée à la présence des bactéries sulfato-réductrices.

Nouvelle exposition aux conditions atmosphériques:

La partie déjà traitée est stable.
Le panneton est plus à risque en raison de la poursuite de l'activité supposée des bactéries anaérobies (corrosion évolutive), car même en condition aérobie, la concrétion fait une barrière aux échanges limitant l'apport d'oxygène sous la concrétion.
La poursuite de la corrosion active se poursuit tant qu'il subsiste un noyau métallique. Une de ses manifestations est l'apparition de gouttelettes à la surface de l'objet. Les autres manifestations sont la présence de gonflements, délitements, éclatements et fissures. Elle peut entraîner la fragilisation de la zone du panneton et possiblement sa ruine.

Blandine Daux — 8 septembre 2010

Signature du restaurateur ou de la restauratrice — **Date**

Conservation in Archaeological Practice, Fig. 5 (continued)

Proposal for Conservation

APPLICANT			
Name:	Laboratoire et Réserve d'archéologie du Québec	**Representative:**	Claudine Giroux
Address:	1825, rue Semple, Québec (Québec) G1N 4B7	**Telephone:**	
		Fax:	
Owner: (if different from the requester)		**email:**	

SUBJECT OF APPLICATION
-Stabilization and readability of objects

STATE OF OBJECT			
Designation	**Wrought iron key**	**CeEt-28-1A7-113 AE-2010-25-01**	
Description	Complete object comprised of one piece, without assembly, in wrought iron. Products resulting from extensive corrosion (sediments, foreign elements, concretions) impede visualization of the blade part of the key.		
Setting	The object does not seem to have any ornamenttion.		
Materials and Techniques	Wrought iron.		
Mechanical state	The object appears complete with good mechanical strength for the part that is not corroded. This does not allow for visualization of the blade part of the key, but the presence of corrosion on the blade indicates that the iron on this part of the key is probably in a worse condition than the iron belonging to the bow component of the key.		
Description of the corrosion	The artifact seems to have undergone partial treatment since it has a glossy, black effect on the bow and ring sections, revealing that these parts were not only subject to clearance, but also to a tannic acid treatment or a rust converter, followed by the application of microcrystalline wax. Appearance: the corrosion is localized exclusively at the blade end of the key as a large concretion; locally along the rod, the metal has a fibrous appearance reflecting the original metallurgical structure of the wrought iron. Form: very recognizable in terms of the ring and bow components, but the blade component is not visible.		
Physical state of metal	Presence of an apparently healthy metal core, except under the corrosion: the iron seems to have almost completely dissolved. The surface shows no cracks or swellings in those parts that are outside the main area of corrosion.		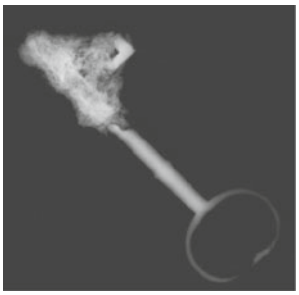

Conservation in Archaeological Practice, Fig. 5 (continued)

Importance of the corrosion	Under the corrosion, the radiography makes it possible to see that the iron in the metallic state has almost entirely disappeared. Outside of the corroded section, the corrosion is largely under-developed and almost nil.	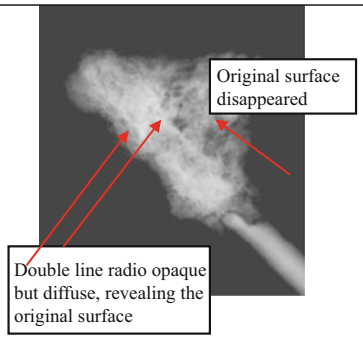
Original surface	Very readable, except under the corrosion: a double line more radio opaque (white), but diffuse and irregular suggests that the original surface is at least partially preserved at the level of the stem, but it may have moved from its original level. Part of the material supporting the surface has disappeared at the blade end of the key.	

DIAGNOSTIC

The key has probably already been the subject of treatment to stop the corrosion process. It is likely to have changed its post excavation aspect, apart from the part that is subject to corrosion.Thus, the object is in a stable state, except for the corroded area. Nonetheless, it is difficult to be certain of the condition of the object before treatment. However, from its current state, we can advance the following diagnosis:

Period of burial:

- Part outside the concretion.The metal has a fibrous appearance that reflects its original metallurgical structure. This is typical of the corrosion that occurs with forged iron in anaerobic environments. It is likely that the object was situated in an anaerobic burial environment, probably waterlogged, which promoted biological damage by sulfate-reducing bacteria. During metabolism, these bacteria release in the milieu ions that precipitate metal ions. This environment is favorable to the formation of concretion that forms a matrix around the metal that dissolves in parallel. Once covered in the concretion, the wrought iron corrodes preferentially along the inclusions that are oriented along the direction in which it was forged. At the interface of the metal/products of corrosion, this produces a particular form of corrosion that recalls the look of wood grain, such as is observed on the key. The visible physical condition therefore suggests that the key was originally completely covered in concretion.
- Part under the concretion. The metal is very corroded. It seems to have been almost completely dissolved. This area could be or may have been the seat of an active corrosion but could also be due to a natural corrosion related to the presence of sulfate-reducing bacteria.

New exposure to atmospheric conditions:
The part already treated is stable.

The blade section of the keyis more at risk due to the continued activity of assumed anaerobic bacteria (active corrosion). This is because even under aerobic conditions, the concretion is a barrier to exchanges that limit the oxygen supply under the concretion. The corrosion continues as long as there exists a metal core. One of its manifestations is the appearance of droplets on the surface of the object. Other manifestations include the presence of swelling, disintegrations, cracks and splits. These can cause brittleness of the bit zone and possibly its ruin.

Blandine Daux	8 September 2010
Signature of the conservator	**Date**

Conservation in Archaeological Practice, Fig. 5 A condition report produced for an archaeological object coming from the collections secured by the Ministry of Culture and Communications

archaeological intervention, as the archaeologist is not usually equipped to combine the excavation of these shapeless masses and the preservation of objects trapped inside. Figure 8 illustrates the complex work and equipment necessary to treat a marine concretion, a task that corresponds more or less to in-laboratory excavation.

Here again, it is the dialogue and regular interaction between stakeholders that allow the achievement of a common goal. Each professional is guided by his/her own code of ethics, and every difference in the perception and interpretation of the respective roles must take place in a climate open to different practices. The actions of the

Conservation in Archaeological Practice, Fig. 6 Cannonball embedded in a piece of wood. (Collections from Québec City, Îlot Hunt. Photography: Centre de conservation du Québec, André Bergeron)

Conservation in Archaeological Practice, Fig. 7 Two underwater archaeologists at work when excavating a gun found on the Wreck of the Elizabeth and Mary. (Photography: Peter Waddel, Parks Canada)

conservator, with a view to optimizing the preservation of archaeological information, must coordinate with those of the archaeologist.

Future Directions

The preservation of archaeological collections is a complex question, possessing multiple complementary facets. The main international charters provide multiple tags to guide the relations between archaeology and conservation, but they do not contain all the answers. The ultimate responsibility in the interaction between these two disciplines which study, preserve, and

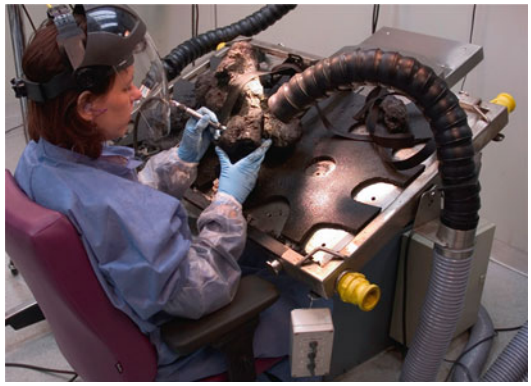

Conservation in Archaeological Practice, Fig. 8 A conservator at work during the excavation of a concretion found on the Wreck of the Elizabeth and Mary. (Photography: Centre de conservation du Québec, Michel Élie)

highlight archaeological heritage must be addressed on the basis of broad principles which generate a consensus among the disciplines that compels individual professionals to engage and participate. Every stakeholder, within their field of competence, must strive to achieve the highest of standards, whether they are practical or theoretical. The preservation of cultural heritage stemming from archaeology constitutes a delicate issue, and it is essential to address it for the benefit of future generations.

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Excavation Methods in Archaeology
- ▶ Freshwater Archaeology
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Heritage and Archaeology
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Underwater Sites in Archaeological Conservation and Preservation
- ▶ Waterlogged Finds: Conservation
- ▶ Wood: Conservation and Preservation

References

Association Canadienne pour la Conservation et la Restauration/Canadian Association for Conservation. 2000. *Code de déontologie et guide du praticien*. 3rd ed. Ottawa: A.C.C.R.

Berducou, M.C. 1990. *La conservation en archéologie*. Paris: Masson.

Bergeron, A. 1994. Archéologie et conservation, convergence ou divergence? Vestiges archéologiques, la conservation in-situ. In *Actes du deuxième colloque international de l'ICHAM*, 315–322. Montréal: ICAHM.

Bernier, M.-A., and A. Bergeron. 1999. Le sauvetage des vestiges d'un navire de la flotte de Phips: interventions de 1996–1997. *Archéologiques* 11–12: 97–102.

Dowman, E.A. 1970. *Conservation in field archaeology*. London: Methuen.

ICOMOS. 1990. Charte internationale pour la gestion du patrimoine archéologique. Available at https://www.icomos.org/charters/arch_f.pdf. Accessed 17 May 2017.

Pearson, C. 1980. Conservation and maritime archaeology. *International Journal of Nautical Archaeology and Underwater Exploration* 9: 147–150.

Philipot, P. 1986. La conservation des œuvres d'art, problème de politique culturelle. *ICCROM, Chronique* 12: 2.

Further Reading

Bergeron, A. 2007. *La restauration des céramiques archéologiques, quelques exemples du cheminement d'une pratique*. Centre de conservation du Québec. Available at http://www.ccq.gouv.qc.ca/fileadmin/images/publications/ceramiques.pdf. Accessed 17 May 2017.

Bergeron, A. 2013. Restauration et conservation archéologique; Quelle interaction avec l'archéologie? Available at http://www.ccq.gouv.qc.ca/fileadmin/images/publications/doc_adm/Bergeron-Restauration-archeologique-interaction.pdf. Accessed 17 May 2017.

Bergeron, A., and M. Balac. 2007a. La pirogue du lac Gour, une découverte majeure au Québec, Centre de conservation du Québec. Available at http://www.ccq.gouv.qc.ca/fileadmin/images/img_centre-ress/pirogue.pdf. Accessed 17 May 2017.

Bergeron, A., and M. Balac. 2007b. The Lac Gour Dugout, A Major Quebec Discovery, Centre de conservation du Québec. Available at http://www.pointedubuisson.com/wp-content/uploads/La-pirogue-du-Lac-Gour-anglais-2014.pdf. Accessed 17 May 2017.

Bergeron, A., and K. Morin. 2003. Conservation archéologique et patrimoine maritime: même combat! *Archéologiques* 1: 228–235.

Bergeron, A., and F. Rémillard. 2000. *L'archéologue et la conservation, Vade-mecum québécois*. Québec: Centre de conservation du Québec.

Bergeron, A., and F. Rémillard. 2012. Le traitement de conservation des embarcations du Musée de la civilisation, Vingt ans après, Centre de conservation du Québec. Available at http://www.ccq.gouv.qc.ca/fileadmin/images/publications/embarcations_civilisation.pdf. Accessed 17 May 2017.

Bergeron, A., B. Daux, J. Dendy, A. Lalande, K. Morin, and F. Rémillard. 2015. La conservation archéologique, Réseau Archéo-Québec. Available at http://www.archeoquebec.com/fr/larcheologie-au-quebec/dossier/la-conservation-archeologique-0. Accessed 17 May 2017. (English version of this thematic file) available at http://www.archeoquebec.com/en/archaeological-conservation-0. Accessed 17 May 2017.

Pearson, C. 1977. On-site conservation requirements for marine archaeological excavations. *International Journal of Nautical and Underwater Exploration* 6: 37–46.

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Conservation in Museums

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Introduction

The conservation of museum collections is a vital endeavor in the recovery, protection, and advocacy of the past. The protection of items that are removed from their primary context, and the information associated with that context, is part of the museum's role as a guardian of the past. Recording and preserving the past for future generations and displaying it for the enjoyment and enlightenment of present day communities all lend to the successful management of museum collections. The constantly evolving nature of museum collections necessitates that conservators and collection managers maintain longstanding collections while continuing to collect and serve institutional missions. While a myriad of factors contribute to the shape that museum collections take, standards for conservation must be applied equitably to the care of the various objects that give museums their substance.

Definition

The primary goal of conservation is to preserve the item, in both the physical and intangible sense.

Though the precise methodologies employed to undertake this effort might have changed over the years, the goals of conservators have largely remained the same. The value of an item in a museum collection is not tied only to the physical integrity of the piece. Rather, in the contemporary practice of archaeology, value is no longer bound solely to the artifact as an object, but as a manifestation of cultural adaptations to the world. Conservation is not only about protecting the object from damage or deterioration. It is about preserving the meaning and knowledge that are derived from the object and making sure that both tangible and intangible aspects of archaeological museum collections are accessible and equipped to persist into the future (Grattan and Moses 2006). On a more scientific level, the goal of conservation is to ascertain the causes and preventative measures relating to the deterioration of museum assets.

Conservators must deal with the management of collections on two levels. Conservation measures geared towards preservation and stabilization are necessary in all collection storage settings. While preventative measures deal with researching the potential harms that may come to a collection, stabilization is an issue of discovering what is causing harm to an object and how to arrest this process. Preventative procedures may include the development of appropriate storage and display areas, installation of climate control mechanisms, careful and routine analysis of materials present in the museum environment, and regular evaluations of the integrity of objects in the collection (Bradley 2005).

Key Issues/Current Debates/Future Directions/Examples

Over the past few decades, both the number and extent of museums and their collections have grown (Keene 2002). As museum collections grow and expand, so do many of the issues associated with the conservation of items in that collection. Issues of space, visibility, and staffing resources are all tied to how the growth and management of museum collections are handled and are all linked to the well being of the items in that collection. The rate at which collections are growing has been especially problematic in the case of storage. The curation crisis – the lack of space to store ever-growing museum collections – not only prohibits objects from being stored in a safe, well-managed environment, but can also limit the amount of engagement communities have with the objects in a museum's collection.

One aspect of museum-based conservation efforts is the protection and storage of the physical object. However, the preservation of the intangible knowledge associated with that object is equally essential. Without interaction in the form of display or study, the object loses its voice and its ability to open a window to the past (Grattan and Moses 2006). A careful assessment of objects up for accessioning, a renewed emphasis on research with museum collections, and the careful planning of long-term care for newly excavated objects are steps that must be taken in order to diminish issues of storage and visibility. Furthermore, an increased drive to digitize collections and provide alternative forms of access is a strategy that can address the issue of visibility. Maintaining public and scholarly avenues of access lends to the preservation of the object's integrity as part of a collection that serves the museum's mission and community.

Digitizing collections not only allows for objects to be made accessible for research and public interest via websites, but it also opens the door for greater connectivity within the museum. Digital clouds and smartphone applications have developed in a way that large amounts of information can be distributed with the touch of a screen, allowing for objects in storage to be related to those on display. Digitizing fragile items in particular can make them accessible to the public in a way that their condition would typically not allow (Forde 2006). The fragile nature of the object and its irreplaceability are often factors that drive preservation and conservation over use and demonstration. Digitization can act as an avenue for the access to these items that is frequently desired by the museum going public (Keene 2002; Forde 2006). In the case of human remains, digitization can aid in analysis and condition monitoring in ways that photographs and visual inspections may not be able to

accomplish without a risk of damage or loss (Kuzminsky and Gardiner 2012).

The conservation of material objects becomes uniquely complex when a local community has a vested interest in the life course of the collection. Some groups may wish that an object associated with their history be cared for in a way that does not adhere to traditional conservationist practices. For some, spiritual and other culturally sanctioned methods of conservation take precedence over standard practice (Grattan and Moses 2006). With the development of legislation protecting the indigenous ancestral remains of groups in the United States and Australia, the role of the conservator in handling these remains in a museum setting has become increasingly vital. Not only is it necessary to know how to effectively preserve these materials – and do so in a way that does not violate agreements made as to how human remains and funerary items must be cared for – but the history of the treatment of those items must also be carefully evaluated. In some cases, ceremonial objects that are eligible for repatriation may not be ready to reenter use safely without further conservation initiatives. In this case, the conservator's role would not only include caring for the physical remains but assuring that the treatment of those remains over the years was not in fact detrimental to the integrity of the object (Cassman and Odegaard 2004). Moreover, the job of assuring that physical and material cultural remains are treated in a respectful manner, as well as the preservation of the integrity, humanity, and, in some cases, spiritual elements associated with human remains, must also fall within the purview of conservation efforts (Cassman and Odegaard 2004).

Available personnel and funding also contribute to conservation issues (Forde 2006). Although the scientific aspect of conservation – in terms of how things deteriorate and how to arrest this process – has come a long way, it is not always possible to have a professional conservator on staff. In order to combat this issue, conservators are frequently contracted on an as needed basis and may serve a region rather than a single institution, or their duties may be rolled into those of collections managers and registrars. In many cases, like those of Canada, the United Kingdom, Australia, and the Netherlands, government or national institutions were developed to oversee and assist with the conservation of museum collections. The International Council of Museums Conservation Committee drives the professional and scientific development of conservation research on the international level (Keene 2002). In the coming decades, the digitization of collections and the sociocultural implications of collection-based legislation will continue to alter the way that conservation practices in museums must be approached.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Archaeological Stewardship
- ▶ Australia: Indigenous Cultural Property Return
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Bones: Preservation and Conservation
- ▶ Ceramics: Conservation and Preservation
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation Laboratory Design
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation
- ▶ Documentation of Treatment and Intervention in Archaeological Conservation and Preservation
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Heritage and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Historic Building Conservation: Current Approaches
- ▶ Human Remains in Museums

- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Peoples, Working with and for
- ▶ Intangible Cultural Heritage
- ▶ International Council of Museums (ICOM)
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Mosaics: Conservation and Preservation
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ North America (USA and Canada): Museums
- ▶ Preservation Paradigm in Heritage Management
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Stewardship, Concept of
- ▶ Tangible Heritage in Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

Bradley, S. 2005. Preventive conservation research and practice at the British Museum. *Journal of the American Institute for Conservation* 44 (3): 159–173.

Cassman, V., and N. Odegaard. 2004. Human remains and the conservator's role. *Studies in Conservation* 49 (4): 271–282.

Forde, H. 2006. Access and the social contract in memory institutions. In *Preservation management: For libraries, archives and museums*, ed. G.E. Gorman and S.J. Shep, 166–181. London: Facet Publishing.

Grattan, D., and J. Moses. 2006. Intangible heritage: Museums and preservation. In *Preservation management: For libraries, archives and museums*, ed. G.E. Gorman and S.J. Shep, 42–53. London: Facet Publishing.

Keene, S. 2002. *Managing conservation in museums*. Oxford: Butterworth-Heinemann.

Kuzminsky, S.C., and M.S. Gardiner. 2012. Three-dimensional laser scanning: Potential uses for museum conservation and scientific research. *Journal of Archaeological Science* 39: 2744–2751.

Further Reading

Clavir, M. 2002. *Preserving what is valued: Museums, conservation, and first nations*. Toronto: UBC Press.

Lowenthal, D. 2006. Natural and cultural heritage. *International Journal of Heritage Studies* 11 (1): 81–92.

Odegaard, N., and A. Sadongei, eds. 2005. *Old poisons, new problems: A museum resource for managing contaminated cultural materials*. Walnut Creek: AltaMira Press.t

Conservation Laboratory Design

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Introduction

This entry presents guidelines for consideration when designing and planning the construction of a permanent archaeological conservation facility. It is hoped that this information will provide practical ideas and recommendations for archaeological projects and organizations that are considering this undertaking. The authors of this entry are mindful of the financial constraints within the fields of archaeology and cultural heritage worldwide. While recognizing the need for substantial resources to fund the construction of a permanent conservation facility, it is hoped that these guidelines may prove helpful for any size lab or project.

Whether a laboratory is designed to support a particular project for a limited period of time or is intended to become a multi-program facility, a brick and mortar conservation laboratory differs widely in scope and cost from a temporary field lab. Essential questions to be addressed prior to planning, regardless of the cost and size of the new facility, include the following: the purpose and need for the laboratory, whether there is an existing facility nationally or internationally that could serve as a template for the design and construction, and how to ensure that the design and

layout of the lab makes full use of the space to reduce operating costs and make the facility economically and environmentally sustainable in the long term.

Definition

Archaeological artifacts can be extremely vulnerable when freshly excavated and can deteriorate rapidly once removed from their context. The conservation and long-term preservation of excavated finds, whether terrestrial, waterlogged, or wet, requires specific processes and equipment that are quite different from those employed in other conservation specialties, for example, those used in fine or decorative art conservation.

The construction of a new conservation laboratory usually occurs within the context of a complex cultural, political, and economic environment. The impetus can come from a major discovery such as a shipwreck or a well-established long-term need in a particular region (King 1999, 2008; Seifert 2000; Mardikian 2004; Mardikian et al. 2016). While this is not always the case, conservation labs are sometimes integrated into a facility that encompasses the study, conservation, curation, storage, and possibly also the display of the excavated artifacts (see Figs. 1 and 2). These activities involve different spatial organizations within a lab, depending on the types of artifacts and the research and/or display goals.

Key Issues/Current Debates/Future Directions/Examples

Collaborative Planning

Effective planning for conservation depends on collaboration and a mutual understanding of archaeology and conservation's shared goals in developing an integrated approach to preservation (McCarthy 1989). The design and construction of a conservation laboratory, or the retrofit of an existing building or laboratory, also requires a multidisciplinary approach, with the conservator playing a pivotal role (Mardikian et al. 2016). One of the keys to creating a functional conservation lab is to involve experienced conservators as early as possible in the entire process from initial design development, review of construction drawings, through to final construction. This will ensure that the lab is well suited to all planned conservation activities, is safe for personnel and artifacts, and is functional and not aesthetically pleasing.

A complicated layout with poor access to essential needs, such as power, water, ventilation, and adequate light, can severely compromise a lab's functionality. Good communication with the architect, mechanical engineers, contractors,

Conservation Laboratory Design, Fig. 1 General view of conservation lab at the Japanese Institute of Anatolian Archaeology at Kaman-Kalehöyük, Turkey. (Photo courtesy of the Japanese Institute of Anatolian Archaeology)

Conservation Laboratory Design, Fig. 2 View of large conservation area at the Maryland Archaeological Conservation Laboratory (MAC Lab). St Leonard Maryland, USA. (Photo courtesy of the MAC Lab)

and other stakeholders will ensure that these objectives are met. If possible, visits to other conservation laboratories that have a similar scope of work are recommended.

Flexible Design and Layout

The type of archaeological site or sites to be excavated, whether wet, dry, or both, and the archaeological research goals of the project will directly influence planning for the construction of a new lab, as well as the internal layout and equipment needed for the lab. It is essential that the lab is flexible in its design and layout to accommodate different phases of an excavation, or different excavation teams, if needed. An important requirement of lab design is to limit the functional conservation space to one level. Heavy, oversize, and extremely fragile objects are easier to deal with without the need for elevators or overhead cranes.

Most terrestrial archaeological sites typically yield small- to medium-sized objects, sometimes in very large quantities, generally with relatively straightforward handling and storage requirements. Conversely, wet or waterlogged sites, and particularly marine sites, can involve large quantities of extremely fragile, wet materials such as wood, ceramic, or metal artifacts. These materials have immediate stability problems following excavation; can be extremely fragile, heavy, and difficult to transport and move; and require wet storage before and during treatment.

Underwater excavations that produce oversize artifacts present additional challenges when designing a conservation lab. The layout of the lab must address the need for extra space to accommodate suitable lifting equipment such as overhead cranes or forklifts and have an easy approach and entrance to the lab with appropriate door size for large artifacts. Large tanks for the impregnation of oversized waterlogged timbers or entire shipwrecks with polyethylene glycol (PEG), or for the desalination of large iron artifacts in caustic solutions, require a large amount of floor space and adequate drainage. Additional storage tanks may be required for temporary storage of chemical solutions or effluents prior to safe discharge.

In exceptional cases, the artifact itself is a self-contained archaeological site requiring a very specific environment. An example is the recovery and excavation of the American Civil War era submarine *H.L. Hunley* (1864) (Mardikian 2004). The excavation of the *Hunley* took place in a controlled environment within a specially constructed conservation laboratory (see Fig. 3). Following recovery,

Conservation Laboratory Design, Fig. 3 View of the *H.L. Hunley* excavation tank at the Warren Lasch Conservation Center in Charleston, South Carolina, USA. (Photo courtesy of Friends of the Hunley, Inc.)

the submarine was placed in a 340 m^3 (90,000 US gallon) tank containing refrigerated fresh water. An impressed current protection system was used to minimize the corrosion of the iron hull without having to use corrosion inhibitors that could have damaged the organic materials found on the submarine, particularly the degraded human remains and textiles. During the multiyear excavation, the tank was drained on a daily basis and refilled at the end of each day using an automated system. Exterior tanks were used for temporary storage of tank water during excavation of the vessel.

The excavation of human, animal, and other organic remains can require additional lab space for examination, treatment, or rehousing, especially if multiple burials are excavated. If excavated from waterlogged, wet, or frozen sites, these finds can present further challenges in lab design and layout. Conservation of these materials may require specialized equipment such as large walk-in cold storage, freeze dryers, and filtrated baths. Conservation of human, animal, or organic remains from terrestrial sites is also challenging due to the fragility of the material and, in arid environments, the extreme desiccation of the finds.

Task-Specific Lab Spaces and Lab Environment

Another important aspect to consider in the design of a conservation lab is the need for separate lab spaces to deal with "wet," "dirty," and "clean" tasks. Wet areas of the lab can be useful for dealing with waterlogged material or wet tasks such as desalination of artifacts affected by soluble salts like glass or ceramics. Certain conservation activities can generate a large amount of dirt and dust that should, ideally, be separated from processes such as documentation, photography, packing, and rehousing that require a relatively clean, dust-free space. Areas of the lab for dirty work should be easily cleaned and floors coated with hardwearing, chemical-resistant materials. If possible, all electrical cables, water, and compressed air hoses should be mounted to the walls or ceilings on heavy-duty, extra-long retractable reels, allowing easy access from different parts of the lab, as well as outside the lab if needed.

Tasks such as the cleaning of waterlogged artifacts, especially large marine concretions, and excavated block lifts from terrestrial sites can be particularly messy. One option when planning these tasks is to designate an area outside and adjacent to the lab where such activities can take place. If exterior spaces are sheltered, they may also be used as additional space for the treatment of artifacts or chemical storage. Areas of the lab where heavy pneumatic or electric tools are used, for example, grinding and abrasive equipment for cleaning metal artifacts, should be as isolated as

possible to prevent excessive noise and impact on the air quality in the rest of the lab.

All areas of the lab where heavy equipment is used should be fitted with adequate fume, dust, and particle extraction units. Hard ducted hoods or portable units with proper filters should be planned into the lab's design, with at least one chemical-proof fume hood, as shown in Fig. 4. This particular fume hood includes an oversized stainless steel sink, which have access to hot, cold, and deionized water, as well as compressed air. It also allows sufficient leg space for conservators to work comfortably in a seated position.

Control of the environment in a conservation lab may be extremely difficult depending on the construction materials used and the physical location of the lab. The temperature and relative humidity in the lab should be as stable as possible for the personnel but also to the level that is required by the materials being treated. The method by which the environment is controlled may vary throughout the lab. Very precise control achieved via complex mechanical systems may be necessary in discreet areas of the lab, particularly for areas where artifacts like damp or wet organic materials, metal, or salt-laden ceramics are housed and treated. However, more passive means of control, for example, by the use of a desiccating agent, may be a more cost-effective way to achieve localized control for unstable objects. Air movement is also important, particularly in hot and humid countries where strict environmental control is not feasible. The installation of ceiling fans will help with air circulation. Cross-ventilation, a high ceiling, and adequate insulation will also help to buffer and stabilize the internal environment.

Conservation Laboratory Design, Fig. 4 Custom-made fume hood with stainless steel sink specifically designed for the Hunley Project at the Warren Lasch Conservation Center in Charleston, South Carolina, USA. (Photo courtesy of Friends of the Hunley, Inc.)

Transportation, handling, and storage of excavated artifacts from the excavation site to the laboratory are often challenging, particularly of large, fragile material. To avoid damage, it is imperative to plan ahead of time for artifact movement with a continuous, obstacle-free path available from the excavation site to the conservation lab and within the lab. Smooth floor surfaces are essential when transporting fragile or heavy artifacts. Likewise, adequate planning for artifact storage before and during treatment is necessary, with consideration of the environment that the artifacts will require during different stages of the conservation process, as well as allowing access to the materials for research. If a conservation lab must also function as a storage facility, the design and layout of the lab must contain adequate space to store finds before and after conservation, in addition to the space that is needed while conservation is underway. Long-term artifact storage requires the installation of appropriate storage furniture, for example, shelving units suitable for the volume and weight of the excavated finds.

Another consideration is whether conservation activities should be on view to the public. Access should refrain from direct disturbance of the daily activities of the lab, particularly when large tour groups are involved. One option is to plan for large bay windows overlooking the conservation area. This allows direct and safe viewing of the conservators at work, particularly when working on large artifacts, as shown in Fig. 5.

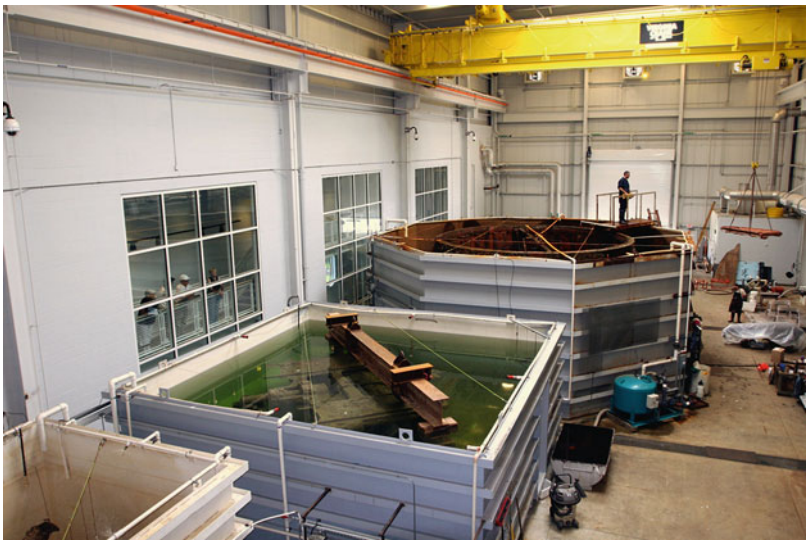

Conservation Laboratory Design, Fig. 5 General lab view showing ongoing conservation work on the USS *Monitor* Project and public viewing through lab window. Norfolk News, Virginia, USA. (Photo courtesy of the Monitor Project)

Laboratory Equipment and Furniture

Outfitting a conservation lab with expensive analytical and optical equipment will depend on the scope of the lab and its conservation activities and whether the lab will undertake research. An example is the use of digital radiography, which may be a practical tool for conservators to use on a daily basis, and a purchase that is financially justifiable in the long term. Large equipment such as a scanning electron microscope with energy dispersive capabilities (SEM-EDS) usually requires a dedicated technician to operate the equipment and adequate space. The operational cost of large analytical equipment is often too high for a conservation lab to justify. In most cases, it is preferable to contract these services through local universities or private research laboratories.

Industrial X-ray machines are often required to penetrate large and complex archaeological artifacts, concretions, and block lifts. These machines differ widely from X-ray units used in the medical field. Their operation requires the use of shielded cabinets or rooms in order to protect personnel from harmful ionizing radiation. The need for these shielded enclosures can restrict the size of the artifacts that can be X-rayed. Another approach is to use a portable X-ray tube that can be used either inside a lead cabinet or a shielded room, or remotely on large objects. This option offers more flexibility but also requires stringent radiation safety requirements and trained operators. These factors can weigh considerably on the budget of a laboratory and require careful planning with the architect. It may be preferable in the long term to invest in a computed radiography (CR) or direct radiography (DR) X-ray system rather than a conventional system using photographic film and wet processing facilities. In computed radiography, an imaging plate is used to create the digital image, which is then transferred to the computer, while direct radiography captures the image directly on a panel detector. The use of these systems enables fast processing of images and eliminates the chemicals used for developing film. As these chemicals are considered as hazardous waste and require special disposal, CR and DR are far more environmentally friendly and sustainable in the long term than conventional film radiography.

If local tap water is unsuitable for the desalination of artifacts due to the presence of excess chlorine or mineral salts, a reverse osmosis unit or a deionized water column may be needed. These two systems can also be combined to produce very pure water if required. Water treatment systems should be scaled to the size of the laboratory and nature of the activity, particularly when dealing with artifacts affected by soluble salts absorbed from the burial context. When feasible, rainwater may be collected for use in treatment, provided that it is filtered and stored in the dark to help avoid biological growth.

The purchase of lab furniture also requires a flexible approach. Conventional, built-in furniture,

such as bench tops permanently attached to the walls, may not be appropriate for a multipurpose space, with the exception of sinks. Sinks should preferably be made of stainless steel, be wide and shallow, and have direct access to hot, cold, and deionized water. A heavy-duty sink sprayer is useful for cleaning the sink and filling portable containers. When dealing with artifacts from a marine environment, it is preferable to use a grade 316 stainless steel which is much more resistant to pitting corrosion from chloride ions released during deconcretion. Modular or custom-designed furniture and storage will allow more flexibility to adjust to the specific conservation requirements of individual artifacts. For example, the use of adjustable height heavy-duty stainless steel tables mounted on locking casters is recommended to create mobile work surfaces. Adequate lighting is critical for conservation work, and good general lighting should be available in the lab. In addition, task-specific lighting from portable lights is suitable for a large space and allows greater flexibility.

Cross-References

- ▶ Bones: Preservation and Conservation
- ▶ Ceramics: Conservation and Preservation
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Glass: Conservation and Preservation
- ▶ Metals: Preservation and Conservation
- ▶ Mosaics: Conservation and Preservation
- ▶ Stone: Preservation and Conservation
- ▶ Textiles and Fabrics: Conservation and Preservation
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

King, J.A. 1999. New digs for old artifacts. Available at: http://www.nps.gov/archeology/cg/sum_1999/Dig.htm. Accessed 22 Aug 2012.

King, J.A. 2008. Archaeological collections, government warehouses and anxious moderns: The Maryland archaeological conservation laboratory. *Archaeologies: Journal of the World Archaeological Congress* 4 (2): 264–287.

Mardikian, P. 2004. Conservation and management strategies applied to post-recovery analysis of the American civil war submarine *H.L. Hunley* (1864). *The International Journal of Nautical Archaeology* 33: 137–148.

Mardikian, P. Chemello, C. Alexander J. 2016. One small step for man, one giant leap for conservation. Objects Specialty Group Postprints, 2015, The American Institute for Conservation of Historic & Artistic Works. eds Hamilton, E. Dodson, K. Barack, S. Moomaw, K., 22: 123–150.

McCarthy, M. 1989. The excavation continues. . .in the laboratory. *Bulletin of the Australian Institute for the Conservation of Cultural Materials* 15: 21–26.

Seifert, B. 2000. The design of an archaeological conservation laboratory: Three case studies. Paper presented at the 28th Annual Meeting of the American Institute for Conservation, Philadelphia, PA, June 8–13.

Further Readings

Conn, D. n.d. Project management for the construction of conservation laboratories. Available at: http://www.ala.org/alcts/sites/ala.org.alcts/files/content/resources/pubs/chapter1_free.pdf. Accessed 28 Sept 2012.

Considine, B. 1998. The design of the decorative arts and sculpture conservation laboratory at the Getty Center. Available at: http://cool.conservation-us.org/coolaic/sg/wag/1998/WAG_98_considine.pdf. Accessed 25 Sept 2012.

Freeman, J.K. 1989. Rome wasn't built in a day: Design of an archival conservation laboratory. Available at: http://cool.conservation-us.org/coolaic/sg/bpg/annual/v08/bp08-03.html. Accessed 25 Sept 2010.

Henry, W. 1992. Notes on conservation lab design. Available at: http://cool.conservation-us.org/byauth/henry/labdesgn.html. Accessed 26 Sept 2012.

Conservation, Restoration, and Preservation in Classical Archaeology

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Introduction

A common terminology developed for the conservation of cultural heritage, adopted at the 2008

ICOM-CC (International Council of Museum Committee for Conservation conference, New Delhi), has removed ambiguity and helped conservation and restoration specialists to communicate more clearly and accurately. Museum managers, art historians, conservators, archaeologists, the public, and the media use the ICOM-CC definitions in order to preserve archaeological and cultural sites and artifacts more effectively than they were able to do previously by relying on encyclopedias and dictionaries. Different cultures and languages – including the Anglo-Saxon languages and Latin in particular – assigned different meanings to terms, which created confusion and led to misunderstanding about how preservation should be carried out.

Definition

The ICOM-CC terminology was developed during a decade of consultation among conservation and restoration specialists.

Conservation – all measures and actions aimed at safeguarding tangible cultural heritage while ensuring its accessibility to both present and future generations. Conservation embraces preventive conservation, remedial conservation, and restoration. All measures and actions should respect the significance and the physical properties of the cultural heritage item.

Preventive conservation – all measures and actions aimed at avoiding and minimizing future deterioration or loss. These are carried out within the context or on the surroundings of an item, but more often a group of items, whatever their age and condition might be. These measures and actions are indirect – they do not interfere with the materials and structures of the items. These methods do not modify their appearance. Examples of preventive conservation are appropriate measures and actions for registration, storage, handling, packing and transportation, security, environmental management (light, humidity and pollution, and pest control), emergency planning, education of staff, public awareness, and legal compliance.

Remedial conservation – all actions directly applied to an item or a group of items aimed at arresting current damaging processes or reinforcing their structure. These actions are only carried out when the items are in such a fragile condition or deteriorating at such a rate that they could be lost in a relatively short time. These actions sometimes modify the appearance of the items. Examples of remedial conservation are disinfestation of textiles, desalination of ceramics, deacidification of paper, dehydration of wet archaeological materials, stabilization of corroded metals, consolidation of mural paintings, and removing weeds from mosaics.

Restoration – all actions directly applied to a single and stable item aimed at facilitating its appreciation, understanding, and use. These actions are only carried out when the item has lost part of its significance or function through past alteration or deterioration. They are based on respect for the original material. Most often, such actions modify the appearance of the item. Examples of restoration are retouching a painting, reassembling a broken sculpture, reshaping a basket, and filling losses on a glass vessel.

Key Issues/Current Debates/Future Directions/Examples

Conservation measures and actions can sometimes have more than one purpose. For instance, varnish removal, the application of protective coatings, and the reburial of mosaics can be both preventive and remedial conservation. Conservation is complex and demands the collaboration of qualified professionals. In particular, any project involving direct actions over cultural heritage requires a conservator/restorer.

The word "conservation" embraces in its present definition three different disciplines that indicate different activities linked by a common aim represented by the preservation of tangible heritage and of the cultural message embedded in archaeological assets. These disciplines have a very distinct history that, in some respects, goes back to ancient times; however, they can now be interpreted as a unified whole.

Traces of restoration have been found on monuments and items brought to light by means of archaeological fieldwork. Such traces show us

that people always have had an impulse to repair materials that constitutes today's cultural heritage (Cagiano De Azavedo 1952). Damage occurred during the execution of art works, for example, the breaking down of sculpted elements of the monumental funerary art. Damage also occurred by accident due to robberies, wars, or by the prolonged use of objects and surfaces. We often encounter simple repairs such as those to damaged parts of mosaic floors, which were fixed with new *tesserae* without paying attention to the motifs, the welding of broken vases with bronze staples, or the mimetic replacement of lost or broken marble elements to recover the functionality and aesthetic of sculptures or monumental architecture also constitute examples of ancient repairs.

The Roman town of Pompeii itself, for example, was undergoing a series of restorations at the moment of the fatal eruption of Mt. Vesuvius in 79 BCE. These repairs were part of a plan to recover from the earthquake of c. 62 BCE. Even ancient sources describe restoration as a habitual activity.

In ancient literary sources, we can find names of restorers and examples of restoration, such as the one mentioned by Pliny on the statue of Janus in the Roman Forum (Plin. *HN* 34.33). The hand of Janus had been reconstructed; his fingers indicated the number of days in a year after the calendar reform promulgated by Caesar in 46 BCE (Pliny). All of these works were characterized by the will to restore either the function of the artwork, its aesthetic appearance, or both, all the while erasing the damage.

In ancient times, together with the activities defined as restoration, great care was taken to lengthen the durability of art work through constant maintenance, an activity that today we would call "remedial conservation." As maintenance, the surfaces were cleaned and the most appropriate kind of protective films were applied according to the material of the artwork. It is now taken for granted that lime was used on Roman monuments with a protective function; painted surfaces of marble sculptures were periodically replaced and protected with waxes, while oils and bituminous resins were applied to the damaged gilding of bronzes. During the Middle Ages, the attitude toward ancient art is one of reutilization, recycling the materials in order to build modern artworks instead of restoring the lost function of the works of art (Rossi Pinelli 1986). This attitude was already present in the ancient world; parts of sculptures and monuments were modified or replaced according to ideological aims. For instance, the *damnatio memoriae* led to the modification of the bronze statue from Cape Misenum in order to transform the face of Domitian into that of Nerva; the statue is on exhibit at Naples' Museo Nazionale today; heads of heroic statues have been replaced to glorify the virtues of Roman emperors. Sculptural elements have been reused or reprocessed to build monuments and artworks of high symbolic value.

The main archaeological discoveries during the Italian Renaissance led to a series of activities that we can define as "restoration": the increasing requests of art works by collectors and enthusiasts of the ancient led sculptures and artists to "embellish" and "complete" archaeological remains; special care was dedicated to the statues through reconstructions and mimetic integrations of mutilated parts. Concerning the repairs of Palazzo della Valle's court conducted in 1520 by the Tuscan sculptor Lorenzo Lotti (known as Lorenzetto) in Rome, Vasari himself wrote:

> *E nel vero hanno molta più grazia queste anticaglie in questa maniera restaurate che non hanno que' tronchi imperfetti e le membra senza capo o in altro modo difettose e tronche* (These antiquities restored in this way have more grace compared to those imperfect trunks and bodies with no head or with other imperfections). (Vasari 1568)

Many artists and architects were engaged in prestigious restorations in this period such as the Antonine Column in Rome, where the works were directed by Domenico Fontana and commissioned by Pope Sixtus V. The Laocoön statue group, discovered on Rome's Esquiline hill in 1506, was restored first by Baccio Bandinelli and then by Giovanni Angelo Montorsoli. The reconstructive intent of the restorations combined the willingness to maintain philological rigor in respecting the ancient with the aim to reconstruct the original appearance of the artworks. To achieve this final goal, people involved in

restorations emulated the technical methodology used to create the artworks in the first place. The profession of the restorer started to emerge when integrative restoration became common in the seventeenth century; being a restorer was previously considered not as important as artistic activity. Benvenuto Cellini was a sixteenth century artist who restored the sculpture collection of Cosimo de Medici in Florence. He defined restoration as *occupazionedi artista mediocre, onde egli adattossi a condurre un restauro solo per far cosa grata al suo Principe* ("an occupation for a mediocre artist, often done just to please his Prince") (Cellini and Camesasca 1985).

It was the century of the restoration of the collection of Ludovisi's sculptures with Gian Domenico Bernini, Ippolito Buzzi, and Alessandro Algardi all involved in the works. The first specialist treatises on the topic emerge in this period, a first effort to systematize and standardize from the technical point of view the interventions on artworks. Orfeo Boselli, sculptor and restorer, wrote his *Osservazioni sulla scultura antica* between 1642 and 1663 and dedicated the thirteenth chapter to restoration. The chapter has become a precious source of documentation on methodology of integration, techniques, and material used at the time of the sculpture's restoration (Boselli 1978). The restorer's profile had a slow evolution until a proper recognition in the 1700s. Large numbers of travelers visited archaeological and art sites at that time during their Grand Tour, fostering a new blooming antiques market. During this century, the antiquarian discipline evolved into archaeological science, thanks to the work of the German scholar Johann Joachim Winckelmann. His theories led to a new concept of restoration; this development incurred with the encounter of Bartolomeo Cavaceppi, sculptor and restorer engaged with the restoration of the Albani collection. Winckelmann, being an expert, was in charge of his training as requested by the Cardinal. Antiquities started to be seen as original documents that needed to be studied in order to be fully appreciated for their historic and literary values. Restoration according to Winckelmann had become a cognitive experience, requiring careful study and knowledge of the ancient work before an intervention; this meant that professionals had to renounce any creative personal interpretation.

The professional relationship between Winckelmann and Cavaceppi led to the development of the discipline as an autonomous activity with respect to artistic disciplines, anticipating today's interaction between the art historian, the archaeologist, and the restorer – a fundamental combination of expertise to complete the conservation cycle. Cavaceppi dedicated a long chapter to restoration in his work published between 1768 and 1772. He gives technical indications together with indications of theoretical and methodological nature such as *Non per altro si restaura che per apprendervi* ("We restore to learn"), marking a turning point in the emerging profession of the restorer (Cavaceppi 1772).

The emergence of the discipline of Classical archaeology in the 1800s assisted in the development of a trend against the uncontrollable reconstructive restorations conducted to satisfy a flourishing market for ancient art, the new trend that would promote respect of the integrity of the original artwork and of the historical message carried by it. This school of thought spread among the field of monumental architecture. John Ruskin and William Morris founded the Anti-Restoration Movement and the Society for the Protection of Ancient Buildings with the aim of protecting monuments from "restoration in style," and progressively, the movement included sculpture and artworks in general. The culture of "the beauty of a ruin" and the taste for fragments developed and consequently the basis for a different theoretical model of restoration emerged. Antonio Canova refused Lord Elgin's commission to work on the Parthenon marbles; he instead preferred to leave them as fragments and he promoted some de-restorations when he was curator of restoration for the Vatican Museums. The distinction between the word "restoration" and "conservation" started in this period; "restoration" acquired a negative meaning being associated with a concept of reconstruction and consequently falsity, while "conservation" was interpreted as protection of the original material (Melucco 1998).

Many schools of thought emerged between hundreds of interventions of restoration from the end of the 1800s to the first decades of the 1900s. Cesare Brandi came up with a conclusive concept stating that each technical-scientific data, concerning the artifact's material object of the intervention, had to be object of critical aesthetical and historical reflection itself. Cesare Brandi's theories were published as "Teoria del Restauro" in 1963, more than two decades after the author started working on the book in the 1940s. This work constituted the methodological starting point for the operative activities of the Istituto Centrale del Restauro (ICR); Brandi founded the institute in 1939 and directed it until 1959. In his book, Brandi defines restoration as:

> *un momento metodologico del riconoscimento dell'opera d'arte, nella sua consistenza fisica e nella sua duplice polarità estetica e storica, in vista della sua trasmissione al futuro* (a methodological moment of recognition of the artwork, in his material consistence and double aesthetical and historical polarity, before his transmission to future generations). (Brandi 1963)

In his *Teoria*, the author clarified that *si restaura solo la materia dell'opera d'arte* ("only the material of the artwork is restored") and that

> *il restauro deve mirare al ristabilimento dell'unità potenziale dell'opera d'arte nella sua consistenza fisica, purché sia possibile raggiungere ciò senza commettere un falso artistico o un falso storico, e senza cancellare ogni traccia del passaggio dell'opera d'arte nel tempo* (the aim of the restoration is to recover the physical consistency of the artwork; it should be done without committing artistic or historic falsity and without erasing any signs of the artwork's history).

In Brandi's *Teoria* are collected all elements that would lead to the development of conservation as we conceive it today: reversibility and identification of the interventions, status quo's conservation, and principles of what the author calls *restauro preventivo* ("preventive restoration"); an entire chapter is dedicated to this last concept.

Brandi's theories of respect for the artworks and identification of the interventions have been fully applied through the high-level technical interventions for the large, postwar restorations of the 1950s. In this period, restoration became an essential instrument for the study and publication of historical and technical instances that were previously ignored. In the following years, we progressed toward a further evolution brought by Giovanni Urbani, an important figure in the restoration scene in the 1980s. Urbani saw the limits of a discipline that intervenes directly on a single monument at the time, with often long and expensive operations; the efficiency of those operations was compromised by the absence of "structural" intervention over the context that originated the damage restored.

It is the beginning of the evolution from restoration to conservation, development, and change of scale that would lead to this evolution at the end of the 1970s. Urbani, director of the ICR from 1973 to 1983, promoted the analysis of the causes of artwork damage in order to start working on the causes and prevent the damage, the value of the restoration and conservation benefit of the contribution of various professionals: chemists, biologist, geologist, physics that work together with specialists in restoration and conservation supporting them in understanding the microscopic scale of degrading mechanisms, materials' reactions, and efficiency of operational techniques. On the other hand, Urbani, according to Brandi's indications on preventive restoration, promotes the concept of "planned conservation" as an activity of preservation and protection of heritage on a large scale, characterized by prevention of environmental hazards and routine maintenance (Urbani and Zanardi 2000).

More and more accurate techniques of documentation emerge in this period (Nardi 1992): what was previously the occasional activity of an operator, it slowly become a systematized practice both in language and procedures; public administrations report these kind of activities in their balance sheets. Examples of application of these techniques are the identification and recorded evidence of the working process in the interpretation of marks left by historical events (Rockwell 1989), the identification of old restorations, mistakes and second thoughts, the interpretation of monuments' vertical surfaces (Nardi 1987). The documentation became the main instrument to record activities carried on during the interventions. It constituted a precious instrument to

record the state of conservation of monuments and artworks, instrumental to the study of deterioration to prevent corrective measures, preservation, and protection activities (Figs. 1 and 2).

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 1 Arch of Septimius Severus in the Roman Forum, 1983. Table of stone's deterioration mechanisms. The documentation regarding the state of conservation of monuments has slowly become a fundamental instrument for the curator/restorer. (Pictures Nardi, Copyright CCA)

With the contribution of Gael de Guichen (ICCROM, the International Centre for the Study of the Preservation and Restoration of Cultural Property in Rome), we progress to the birth of the state of art of the discipline 30 years later: preventive conservation. During the last few decades, parallel to the methodological evolution of restoration into conservation followed by the evolution of conservation into preventive conservation, the restoration changes operational scale: the interest in a single coating developed into interest for its building, from the repairs of a single object to entire collection, from the intervention on a monument to its site, from the single restorer to multidisciplinary groups. The archaeologist, the art historian, and the architect more and more often work side by side with the curator/restorer adding a fundamental humanistic contribution to connect operational technical choices to the original nature of the monument – its historical message. Examples of this interaction are the definition of the conservation principle in situ and the use, in current restorations, of materials and techniques belonging to original practices. In the past, restoration privileged the aesthetic appearance of the artwork, often destroying the context of its origin and historical message such as the destruction of monuments

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 2 Arch of Septimius Severus in the Roman Forum, 1995. The ordinary maintenance of marble surfaces is an integral part of the preventive conservation process of the monuments. (Pictures Nardi, Copyright CCA)

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 3 Zippori, Israel, 1994. The conservation in situ is the result of the encounter between archaeologist, art historian, architect, restorer/curator: their contribution is essential to bring together technical operative choices to the original nature of the monument and express its historical message. (Pictures Nardi, Copyright CCA)

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 4 Ostia Antica, 1989. The reburial of delicate archaeological surfaces, such as mosaics, represents a very efficient measure of preventive conservation. (Picture Nardi, Copyright CCA)

and sites to remove frescos and mosaics – the aim of the conservation in situ is to promote a different scenario (Fig. 3).

In the same way when it comes to materials and techniques to use in present interventions, the contribution of humanistic literature is of fundamental importance since it has led to the technical-conservative debate. For instance, in the choice of materials based on original formulas (such as the use of lime-based mortars instead of synthetic industrial products) and similar techniques to the original techniques of construction with the result of diminish the impact of invasive operation in favor of practices closer to routine and emergency maintenance rather than restoration or reconstruction (Fig. 4).

The principle of conservation led to a new approach adopted by some institutions in the

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 5 Musei Capitolini, 2000. The project "Aperto per Restauro" has allowed thousands of visitors to the museum to see the works of conservation and restoration of the Centaurs from the Villa of Hadrian at Tivoli. (Picture Costanzi Cobau, Copyright CCA)

1980s. The old Istituto Centrale del Restauro, called Istituto Superiore per la Conservazione del Restauro nowadays, conducted mainly technical courses, while the ICCROM first followed by the CCI (Canadian Conservation Institute) in Ottawa, the Université Paris-Sorbonne (Paris IV) in France, the Getty Conservation Institute in Los Angeles, and the Institute of Archaeology of University College London took the distances from the purely technical field of restoration and started new multidisciplinary courses about control of context of exhibition of artworks and study of deterioration mechanisms according to the latest methodological indications. The need to preserve, enhance, and pass on the cultural message of archaeological heritage has become an important part of the recent evolution of the profession. For example, several interventions of conservation and restoration have been conducted with free access for the public, with specific initiatives that have transformed technical intervention in cultural operations of great success (Nardi 1999) (Fig. 5). The contribution of de Guichen in supporting preventive conservation, the public acknowledgement of his ideas, and the application of his methodologies have played an important role in the modern development of the field (Fig. 6).

Conclusion

Despite the general acceptance of all this, supported by literature on the subject and various didactic programs, a lot of work needs to be done in order to spread the concept of preventive conservation among administrators and technicians, public administrations, and the daily life of monuments and sites. Doubtless, this is the path that we all should follow as curators, archaeologists, architects, art historians, and administrators, for we all have to move forward in the interest of archaeological heritage that is both unique and nonrenewable.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Art Studies: Normative Approaches
- ▶ British Museum
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Archaeological Practice
- ▶ Mosaics: Conservation and Preservation
- ▶ Parchment: Preservation and Conservation

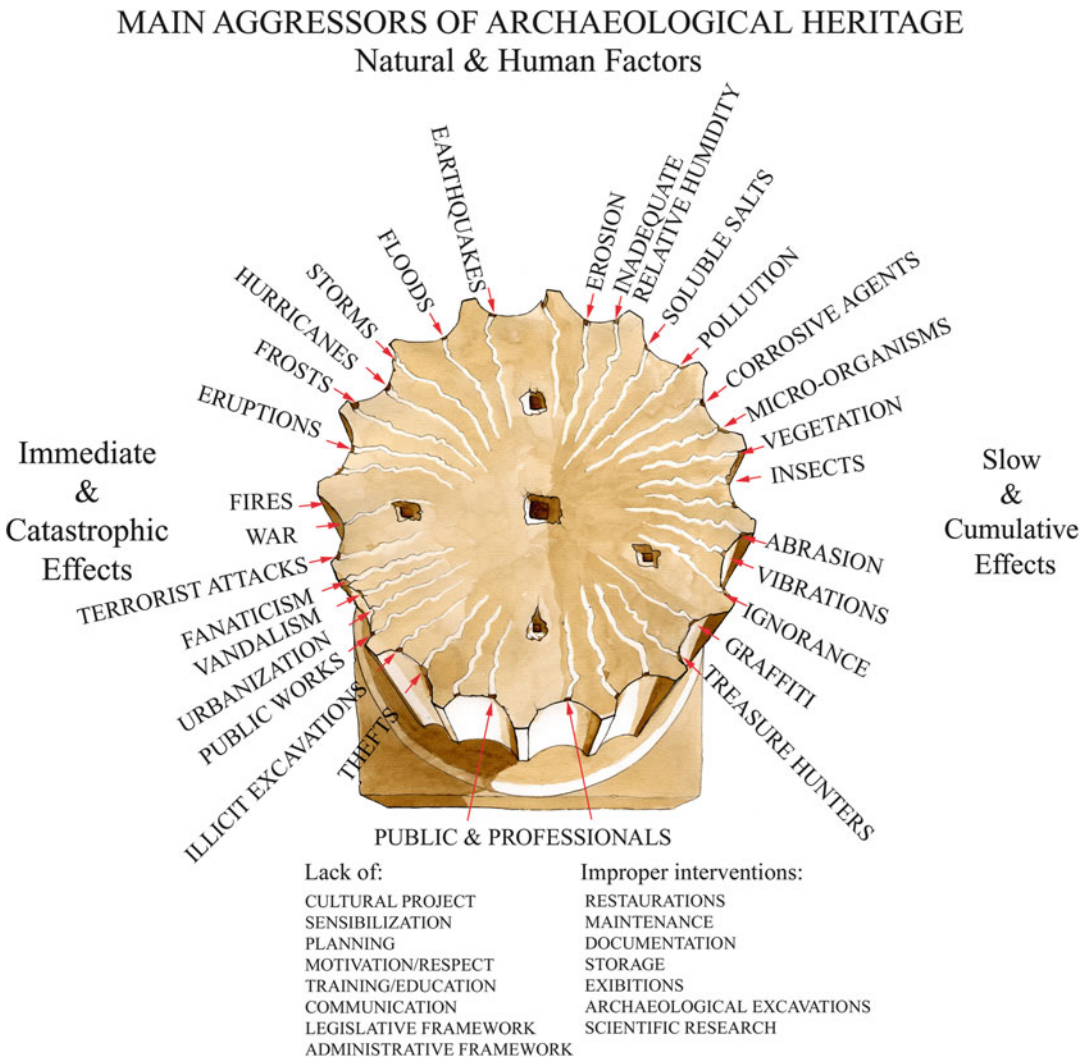

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 6 Table of the aggressors. It collects and divides by categories the possible agent of deterioration of cultural heritage (Gael de Guichen). (Copyright CCA)

References

Brandi, C. 1963. *Teoria del restauro*. Rome: Edizioni di Storia e Letteratura.

Boselli, O. 1642/1978. *Osservazioni sulla scultura antica opera di Orfeo Boselli, sculture romano divisa in 5 libri 1642–63*: Libro V, capitolo XIII. D. Weil (a cura di). Florence.

Cagiano De Azavedo, M. 1952. Conservazione e restauro presso i Greci e i Romani. *Bollettino dell'Istituto centrale del restauro* 9–10: 53–60.

Cavaceppi, B. 1772. Raccolta d'antiche statue, busti, bassorilievi ed altre scultrestaurate da Bartolomeo Cavaceppi scultore romano. Rome.

Cellini, B., and E. Camesasca. 1985. *Vita*. E. Camesasca (a cura di). BUR Classici italiani 532. Milan: Rizzoli.

Melucco Vaccaro, A. 1998. Restauro e conservazione. In *Enciclopedia archeologica*. Rome: Istituto dell' Enciclopedia Italiana.

Nardi, R. 1987–1988. Il Tempio di vespasiano: un palinsesto nella storia del Foro Romano. *Rendiconti della Pontificia Accademia di Archeologia* 60: 71–90.

Nardi, R. 1992. Una tecnica grafica assistita da computer per il disegno e l'archivio di documentazione archeologica in G. Urbani (a cura di) *Materiali e strutture*: II, 1. Roma.

Nardi, R. 1999. Going public: A new approach to conservation education. *Museum International* 51 (1): 44–50.

Rockwell, P. 1989. *Lavorare la pietra: manuale per l'archeologo, lo storico dell'arte e il restauratore*. Rome: La nuova Italia scientifica.
Rossi Pinelli, O. 1986. Chirurgia della memoria: scultura antica e restauri storici. In *Memoria dell'antico nell'arte italiana 3*, ed. S. Settis, 183–250. Turin: Einaudi.
Urbani, G., and B. Zanardi, eds. 2000. *Intorno al restauro*, 31–35. Milan: Skira.
Vasari, G. 1568. *Le vite dè più eccellenti pittori, scultori e architetti, IV*. Florence: Giunti.

Further Reading

AARAFU. 1992. *La conservation preventive. Atti del convegno, Paris, 8–10 octobre 1992*. Paris.
Berducou, M. C. 1990.*La conservation en archeologie. Methodes et pratique de la conservation-restoration des vestiges archeologiques*. Paris: Mason.
Cagiano De Azavedo, M. 1948. *Il gusto nel restauro delle opere d'arte antiche* (Bollettino dell'ICR). Rome: Olympus.
Cassar, M. 1995. *Environmental management guidelines: For museums and galleries*. London: Routledge.
De Guichen, G. 1982. Conservation: A challenge to the profession. *Museum International* 34 (1): 4–5.
De Guichen, G. 1999. Preventive conservation: A mere fad or far-reaching change? *Museum International* 51 (1): 4–6.
De Guichen, G. 2001. Rencontre avec un précurseur. *Techné* 30.
De Guichen, G. 2007. Forbes Prize lecture. A common definition of conservation and restoration: Agree or disagree, but we are living in the Tower of Babel. *Studies in Conservation* 52 (1): 69–73.
De Guichen, G., and C.P. D'Ieteren. 2009. Raising awareness for better conservation. *Museum International* 61 (3): 98–106.
Karsten, I. 2011. *The role of risk management in sustainable collections preservation, reflections on conservation*. Ottawa: CCI, IIC.
Melucco Vaccaro, A. 1989. *Archeologia e restauro: tradizione e attualità*. Milan: Il Saggiatore.
Mora, L., P. Mora, and P. Philippot. 1984. *Conservation of wall paintings*. London: Butterworths.
Rockwell, P. 1993. *The art of stoneworking: A reference guide*. Cambridge: Cambridge University Press.
Roy, A., and P. Smith, eds. 1994. *Preventive conservation practice, theory and research: Preprints of the contributions to the Ottawa Congress, 12–16 September 1994*. London: International Institute for Conservation of Historic and Artistic Works.
Urbani, G. 1976. *Piano pilota per la conservazione programmata dei beni culturali in Umbria*. Rome: Ministero per i beni e le attività culturali. Istituto centrale per il restauro.
Waller, R., and S. Michalski. 2005. A paradigm shift for preventive conservation, and a software tool to facilitate the transition. In *ICOM Committee for Conservation, preprints of the 14th Triennial Meeting, The Hague*, ed. I. Sourbès-Verger, 733–738. London: James & James.

Constructivism in Archaeology Education

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C

Introduction

Archaeological remains in themselves are silent. They do not speak to us in the same way as documents or oral testimony. We have to ask questions of the evidence and judge between different interpretations. The meaning of the evidence has to be constructed by the archaeologist. In a similar way, modern teaching methods involve students learning to ask questions, to construct their own understanding of the topic being taught. This is empowering students to be active learners. Modern constructivist educational theory in the west thus has a great deal in common with archaeological theory as developed in the UK, Scandinavia, and the USA, what is broadly known as a post-processual approach in archaeology. This reinforces the utility of using archaeology for educational purposes.

Definition

Constructivism is an approach to epistemology which sees all knowledge of the world we live in as constructed by the individual. This includes scientific knowledge and knowledge gained through subjects like archaeology. Constructivism has much in common with postmodern habits of thought. If our knowledge of the world is constructed by us, then there can be no commonly accepted single interpretation of that world. Instead there is a diversity of understandings.

Within education, constructivism accepts that pupils are actively constructing their understanding of the world and are not merely empty vessels being filled with knowledge imparted by the teacher. Every child will do this through active

engagement with teaching materials and the application of their own preexisting knowledge, attitudes, and beliefs. Much constructivist education is based around problem solving, group work, and setting school subjects within a practical real-world context.

Historical Background

Among educators in the west, it was John Dewey (1867–1949) in the USA who began the constructivist revolution through his ideas about hands-on learning and matching learning to the experiences of the student (Dewey 1916). He advocated that child-centered learning is the key to good education. The three people most commonly referred to as the fathers of modern constructivist theory are Jean Piaget (1896–1980), Lev Vygotsky (1896–1934), and Jerome Bruner (b. 1915).

Piaget was concerned to discover the stages through which a child progressed during its mental development (Piaget 1950). He identified certain key points at which a child's thinking moved upwards into more complex intellectual reasoning about his or her environment. Before c.18 months, a child is dominated by a purely sensorimotor relationship to the external world. Until the age of c. 7, children are preoperational, that is, they learn by doing rather than by applying logic to work things out. From 7 to 11, children are concrete operational where they can begin to think about things before they do them and can apply logic to what they observe. At the age of c. 11, pupils develop formal operational skills where they can think logically about abstract propositions and can form hypotheses about future actions. For Piaget, there was no point in trying to teach a child something it was not intellectually equipped to understand and so teaching had to differ according the stage reached, that is, the age of the child.

Vygotsky emphasized the social interaction of children with each other and teachers as an important part of learning (Vygotsky 1962). While accepting that children of different ages had different learning capabilities, he held that social interaction could help raise a child's capability above what it could achieve on its own. Interaction involves language and the language used must be appropriate for the interaction to take place. Intelligence is therefore not so much innate as a product of social and cultural interaction.

Piaget and Vygotsky laid the foundations for an approach to education that centered on understanding how children learn. It is upon that foundation that constructivism was built. The main architect of constructivism was Jerome Bruner, who resembled Dewey in his emphasis on learning as an active process in which students or children build upon their own experience and current knowledge to construct new ideas or knowledge for themselves (Bruner 1966). Teaching is thus an active dialogue between teacher and learner, and learners needed to be keen and willing to learn (motivated) for effective teaching to take place. Forms of teaching should thus be structured to provide a relevance for their learning and carefully fit in with what children can understand. Good teachers should encourage their students' thinking to go beyond what they are being presented with. Pupils need to be enabled to construct their own learning from the materials and guidance provided by the teacher.

The overall nature of constructivist learning is that learners should be involved and empowered through communication appropriate to their level of mental development. Pupils, and adults, need to be enthused about what they are asked to learn and to feel that they are actively engaged in learning. Teachers need to learn to speak and structure what they say so that the learner can follow and understand what they are learning.

The most recent adaptation of constructivist education is by Howard Gardner, who has developed the idea that there are multiple intelligences (Gardner 1999). What he means by this is that we cannot measure intelligence in only one way. Different people will have different ways of understanding the world around them and turning that understanding into something we can measure as intelligence. It might be better to think of his multiple intelligences as multiple skills or ways of reasoning.

Gardner's intelligences are:

- Linguistic – good at understanding and using words, highly developed in writers and poets

- Logical – good with number and problem solving, found in scientists, engineers, computer programmers
- Spatial – good at visualizing abstract notions or designs, found in architects, designers, chess players
- Musical – identifying sound, pitch, and rhythm, developed in musicians, sound engineers, mechanics
- Kinesthetic – good balance, coordination, and body skills, useful for sports, dancing, etc.
- Naturalist – good at observing, recognizing patterns, and classifying the world around them, found in farmers, astronomers, etc.
- Interpersonal – people who are good with other people, good social skills, for example, teachers, counselors
- Intrapersonal – self-awareness, for example, spiritual and expressive people

Other models of constructivist learning exist and are used by teachers and educators, such as those of Benjamin Bloom and David Kolb.

Benjamin Bloom described three "domains of learning": cognitive, affective, and psychomotor (Bloom et al. 1964). The cognitive domain involves the acquisition and intellectual manipulation of knowledge. The affective domain covers our emotional responses, how we feel about things, what motivates us, and what we value. The psychomotor domain involves our use of physical movement and coordination to achieve tasks and how we develop these physical skills. Each domain needs teaching in a different way and with different levels of attainment. Some students will respond more readily within one domain than another.

David Kolb developed four "learning styles" based on how we perceive the world – by thinking or feeling and how we interact with the world – by doing or by watching (Kolb 1984). The interaction of these four poles of behavior produces four kinds of learner. The reflective observer who watches an activity or a presentation, the abstract conceptualizer who likes to think about an issue or problem, the active experimenter who likes to learn by physically doing an activity, and the concrete experiencer who likes to reflect on their emotional experience of an event. The learning cycle involves moving between each form of learning as a progression, one from the other, although any one learner may have a dominant style.

Key Issues/Current Debates

This idea of multiple intelligences is now being used in the UK to devise appropriate learning styles for different pupils and is the basis of the *Inspiring Learning for All* website produced by the former Museums, Libraries and Archives Council. Archaeology is perfectly placed to provide educational opportunities aimed at most of these kinds of learning ability, for example:

- Linguistic – writing site reports and interpretation panels
- Logical – devising excavation strategy and analyzing evidence
- Spatial – piecing together the stratigraphy of a site or a building
- Kinesthetic – the processes of fieldwork and artifact analysis
- Naturalist – recording and surveying landscapes, analyzing classes of evidence
- Interpersonal – the teamwork involved in excavation
- Intrapersonal – reflecting on our own interpretations of the past

Archaeology can therefore engage the interests of a wide variety of learners, many of whom are disengaged from traditional classroom learning. It is a common feature of school visits to museums for a school teacher to be surprised at the enthusiasm and ability of a child in the class whom they normally think of as less able when that child is given tasks to do that are better matched to its intelligences than traditional school work.

Why is archaeology such a good tool for constructivist learning? Archaeology is a set of processes applied to physical remains in the real world. It therefore provides an immediately relevant real-world context for the application of abstract skills like numeracy and literacy. The

application of skills in relevant situations is a key part of constructivist methodologies. However, it is also the processes of archaeology themselves which match well with constructivist learning. We can think of archaeological processes as forming a sequence from finding remains, recovering, recording, analyzing them, and then producing a synthesis of results as an interpretation of the past. Finding remains is more than an act of discovery. To find is also to identify and categorize remains as worth seeking out. We construct the category of archaeological site or artifact as an object of study. For many, the public image of archaeology is that of the patient and meticulous craftsman toiling away in the ground to recover and record remains during excavation. While the technical processes of excavation and survey are the bedrock of the discipline, they are only part of archaeology. Sites and finds in themselves are mute. They have to be analyzed to reveal their secrets, and this process of analysis is deeply permeated by constructed methodologies, purposes, and assumptions. We construct categories of artifact. We design research strategies to accomplish a constructed goal. Analysis is more than mere measurement. It is an attempt to understand the form and occurrence of the remains. We cannot help but construct our analysis. Likewise, taking the results of analysis and turning them into a narrative of the past is a highly constructivist task. Constructivism permeates archaeology.

Constructivism has not gone unchallenged. Many academic writers have characterized constructivism as letting children find their own understandings through unstructured inquiry-based learning. Constructivists themselves often seem averse to any idea that there is a necessary body of knowledge that needs to be imparted to pupils. Debate between the two sides usually, and unhelpfully, can often be polarized between an advocacy of acquiring knowledge and a counter-advocacy of developing skills. The center ground of the debate is concerned with the idea of scaffolding, that is, providing the necessary information to the learner to help them make sense of what they see and with which they can construct an understanding of the object of study. Skills can only be developed from a knowledge of what something is or how it works. Knowledge and skills work together to produce learning. Archaeology has knowledge in abundance: sites, artifacts, and data of all kinds. It also has many skills of analysis that help us make sense of this data and construct meanings out of the past.

Furthermore, learning theories are often criticized as not having proper experimental verification and being constructs in the minds of their advocates rather than models derived from isolation of variables, observation, and verification. The whole point of constructivism of course is that it consciously does not recognize the positivist view of knowledge creation and testability. Its relative lack of experimental verification has not stopped it being used by educators in practice.

In an important critique of the instructivist versus constructivist debate, Duffy (2009) suggested that the key difference between the two was the recognition by constructivists that learning is easier and more successful when the learner relates what they are learning to a reason for the activity of learning – that what they learn can be put to a relevant or practical use in their world. This presents a problem for archaeology. For some people it is enough that the past is a fascinating unknown world to be explored or that archaeology is a process of detection and discovery. These in themselves provide enough motivation to learn. But for many, the past is a dead place with little relevance in the present, and its investigation by archaeologists is a hobby with little practical purpose. Indeed, many archaeologists find it hard to articulate a reason for their own discipline beyond mere curiosity or conservation for the sake of it. Good constructivist learning using archaeology must involve an understanding of why we do archaeology in the first place and its importance for people in society today. Organizations like the World Archaeological Congress show how archaeology is practiced in a real and contentious world and have a key role in helping archaeologists understand their current, real-world utility and purpose.

Good constructivist teaching needs teachers to have high levels of instructional skills using problem-solving methodologies and high amounts of subject-based knowledge. Good professional development is therefore key to getting teachers to use constructivist methods. This is

especially true for teaching involving archaeology as most teachers have little expert knowledge in the subject. Archaeologist educators will therefore need to engage in teacher training and professional development as much as dealing directly with schoolchildren themselves.

One further issue that needs to be addressed derives from the relationship constructivism has to postmodernist modes of thought. If understanding of the world around us is constructed by each individual according to their own intelligences and experiences, then does this mean that all interpretations of the world are equally valid? Does a constructivist approach to learning allow the student to construct whatever meaning they wish about a topic? Such ultra-relativist positions are held by some, but most would accept that there are limits to interpretation that are based on ethics or factual knowledge. The past is a fruitful source of debate for postmodernist scholars since we can never fully know all the facts, and interpretation of the past is highly contingent rather than positivist. Archaeologists and historians construct their understandings of the past. However, to treat the past as source of ideas for the telling of literary tales ignores the factual basis of past lives and events. As the historian Richard Evans has written (Evans 1997: 124), "Auschwitz was not a discourse. It trivializes mass murder to see it as a text. The gas chambers were not a piece of rhetoric." There are necessary limits to using constructivism in education. The construction of understandings by students has to be guided and constrained by the factual nature of the day-to-day lived world of human experience.

Future Directions

The major development in education over recent years has been the introduction of computing technologies into the learning experience. Teaching is no longer the monopoly of school. Children, and adults, learn in a variety of ways in different arenas through the medium of their television, their computer (PC, laptop, tablet, etc.), their smartphone, and their experiences at places they visit with their friends or parents. The computing revolution provides an unparalleled access to vast amounts of knowledge. The task for archaeologist educators is to enable their audiences to navigate this knowledge and construct meaningful, accurate (a contentious but important word) understandings of the past. This need not be through their work with schools but through their websites, smartphone, tablet apps, etc.

This is not to say that schools can be ignored. Schools and teachers will continue to play a role in the raising of children. Archaeologists now have the capability to provide resources for teachers more widely than before through the distributed media of digital technologies. These technologies also allow more experts than before to enter the classroom through the interactive whiteboard and platforms such as Skype. We will have ever more opportunities to engage in a true dialogue with learners, helping them construct their understandings of the past. Pupils already have the ability to engage in online inquiry for themselves. The school is no longer the main source of information about subjects like archaeology. The presence of archaeology on TV has a long history in some countries (such as the UK), and its presence on screen and in other media play a key role in raising interest and directing inquiry. Our role as educators may well become that of guiding students in how to navigate multiple sources of knowledge and evaluate their value. Teachers may no longer act as sources of knowledge, but as coaches and mentors in skills of evaluating and applying information. The constructing of understanding by learners is entering a new and potentially empowering phase.

Cross-References

- ▶ Avocational Archaeology
- ▶ Formal Education up to Age 18, Archaeology in
- ▶ Heritage Values and Education
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Material Culture and Education in Archaeology
- ▶ Narrative and Storytelling for Archaeological Education
- ▶ Public Education and Archaeology: Disciplining Through Education

References

Bloom, B., B.B. Mesia, and D.R. Krathwohl. 1964. *Taxonomy of educational objectives*. New York: David McKay.
Bruner, J. 1966. *Towards a theory of instruction*. Cambridge, MA: Belknap Press.
Dewey, J. 1916. *Democracy and education: An introduction to the philosophy of education*. New York: Macmillan.
Duffy, T.M. 2009. Building lines of communication and a research agenda. In *Constructivist instruction: Success or failure?* ed. S. Tobias and T.M. Duffy, 351–367. New York: Routledge.
Evans, R. 1997. *In defence of history*. London: Granta Books.
Gardner, H. 1999. *Intelligence reframed. Multiple intelligences for the 21st century*. New York: Basic Books.
Kolb, D. 1984. *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs: Prentice Hall.
Piaget, J. (trans.). 1950. *The psychology of intelligence*. London: Routledge and Kegan Paul.
Vygotsky, L.S. (trans.). 1962. Thought and language. Cambridge, MA: MIT Press.

Further Reading

Hein, G. 1995. The constructivist museum. *Journal of Education in Museums* 16: 21–23.
Henson, D. 2004. Archaeology and education, an exercise in constructing the past. In *Creació i divulgació de l'arqueologia i de la història*, ed. P. Gonzalez Comunicar el passat, 5–16. Barcelona: Universitat Autònoma de Barcelona.
Inspiring Learning for All. n.d. Available at: http://www.inspiringlearningforall.gov.uk/.

Consumption, Archaeology of

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Introduction

A tremendous range of archaeological studies could be construed as consumption studies because of their focus on the ways people use material goods to confirm, display, accent, mask, and imagine who they are and wish to be. Most archaeological analyses of consumption focus on mass consumption in complex societies, but a picture of consumption that examines how people make and use goods for self-definition and collective identification could be applied to virtually any archaeological context. Expanding consumption is most closely associated with the industrial revolution and the development of a global market economy in the last half millennium, but the roots of such consumption reached well into the medieval world and could contribute to an interpretive framework for nearly any archaeological study. We focus here on archaeological research that examines the agency of consumers and acknowledges that structural and localized processes alike shape the way goods assume meaning.

Definition

Archaeological scholarship on consumption emerged in the 1970s, but much of that research examines consumption as a largely reflective process that instrumentally displays social identity, ethnicity, or status or otherwise confirms some essential identities. Archaeologists have typically focused on consumption as an act of exchange, expression of self, or a moment otherwise isolable in the "life" of a good. Consumption is basically approached from two main directions in the archaeological research. Many scholars see consumption as a patterned reflection of structural constraints or people's identities that determine the sorts of goods a consumer acquires and the meanings they give to those things. The other approach considers consumption in terms of personal agency, viewing consumption as a social process in which people construct their individual, social, and cultural identities.

Consumption scholarship has most closely studied commodities, understood here as items produced specifically for exchange (Orser 1996: 191–3). During the emergence of consumer society, the stereotypical self-sufficient family economy was rearranged to a producer–distributor–acquirer chain model. Things and services became

commodities defined primarily by their exchange value (Kopytoff 1986: 68), and the people who used and needed them became consumers who acquired commodities by exchange. Commoditization separated the production, distribution, and use of things from each other.

Key Issues/Current Debates/Future Directions/Examples

Since the late 1970s, North American historical archaeologists have extensively studied the correlation between social and economic relations, aspiring to establish relationships between material consumption patterns and social and economic standing. This sort of scholarship tends to focus on how market constraints, supply, costs, and social status shape material consumption. The most influential of these early studies was John Solomon Otto's (1984) groundbreaking work at Cannon's Point Plantation in Georgia, which argued that archaeological analysis could establish patterns specific to consumers who shared the same social and economic positions. At Cannon's Point, Otto identified three social groups living alongside each other: the planter household that owned the plantation, White overseers who managed its everyday operation, and African-American captives. Otto identified clear distinctions in material culture from the three groups, ranging from distinctions in ceramic decorative types to architectural differences, concluding that the groups' consumption was a reflection of how access to goods was dictated by socioeconomic standing.

Such work on socioeconomic status and material consumption was significantly expanded in the 1980s by George Miller's (1980) study of English ceramic prices. Miller's research on English ceramic price-fixing agreements underscored that late eighteenth- through nineteenth-century English ceramics were priced primarily by decorative type. The Staffordshire price-fixing agreements revealed that undecorated cream-colored ware (known to potters as CC) was universally the most inexpensive ware available. Establishing cream-colored wares as a "baseline" against which all other ceramic prices could be measured, Miller outlined "index values" for most of the price-fixing agreements that survived between the late eighteenth and late nineteenth centuries. Using Miller's index value tables, an archaeologist can quantify the value of an assemblage and compare it to other assemblages from the same period, providing a methodological mechanism to compare ceramic consumption patterns.

Numerous North American historical archaeologists spent the 1980s calculating ceramic index values, though much of this scholarship on "socioeconomic status" ignored contextually distinct influences on consumption. Nevertheless, Miller's contributions led to a flourishing discussion of consumer behavior and consumer choice studies among North American scholars. Many of these socioeconomic status studies were included in the 1987 Suzanne Spencer-Wood edited volume Consumer Choice in Historical Archaeology. Spencer-Wood aspired to use methods like Miller's ceramic scaling indices to forge a systematic definition of socioeconomic status including factors such as market availability, ethnicity, and family size. However, she considered "income or wealth, usually determined by occupation, as the major factor limiting consumer choices" (Spencer-Wood 1987: 325).

The consumer choice approach sought to evaluate social and economic relations on the basis of choices that people make in acquiring commodities (Spencer-Wood 1987: 9–12), but such models are not especially good frameworks for interpreting consumption outside the nineteenth-century urban United States. For example, Christina Rosén's (1999: 16-7) study of Scandinavian consumption of ceramics argues that external "status display" expressions were not necessarily typical of northern Europeans. Ann Smart Martin (1996) raised much the same point in her comparison of urban and rural consumption in the colonial Chesapeake, pointing to very distinct social patterns in cities and countryside that shaped consumption patterns. Archaeological research into commodity consumption has reached outside North America since the 1980s, often contemplating the concept of socioeconomic status. The European adaptations, however, have revealed a number of problems concerning the theoretical framework of

socioeconomic status and consumer choice. Paul Courtney (1997) and Frans Verhaege (1997) highlighted the problem of adopting the traditional Marxian model of a direct transition from feudal to capitalist society in Europe, arguing that the model seriously underestimates the impact of mercantile ideology and economy on the development of modern Europe from the late medieval period to the eighteenth century (Gaimster 2009: 528). Likewise, North American consumer theory models tend to be based on conceptions of symbolic and economic value that are distinctive to urban American bourgeois, assuming public displays of stylish and costly wares in competitive status hierarchies. However, these models do not work especially well in many other contexts or early modern periods, and they may in fact be somewhat problematic even in American urban settings. People in places like northern Europe, for instance, were consuming mass-produced goods from the eighteenth century onward, but they imposed their own values, meanings, and uses based on local material and cultural practice. Northern European redware consumption patterns reflect persistent use of local ceramics for functional tasks including dining across class groups, with extensive recycling and reuse that contrasts with the urban bourgeois model of consuming cyclically stylish goods in public displays of "cost status."

Risto Nurmi's (2011) dissertation on consumption in Tornio in northern Finland in the two centuries between roughly 1600 and 1800 demonstrates that many mass-produced products were imported and traded to the town and acquired by local customers. However, Nurmi found that these goods had exceptionally long use-lives and included numerous vessels with evidence of repair, including relatively inexpensive redwares. Nurmi suggests that Tornio consumers viewed material things in quite different ways than urban bourgeois consumers who acquired cyclically stylish goods in public displays of "cost status." Market constraints did deliver a relatively homogenous range of commodities to these northern European markets, and the aesthetic homogeneity of the material assemblages from Tornio reflects quite different local rules for curation, functional use, and display of goods.

Archaeologists studying consumption initially reduced mass-produced goods to markers of "acculturation," but archaeologies of colonial encounter increasingly focus on indigenous agency. For example, Michael Dietler's (2005: 61–2) study of the early Iron Age Western Mediterranean examines how indigenous consumers influenced colonizers. Dietler argues that indigenous peoples routinely accepted some colonizers' mass-produced goods and turned others into points of resistance that complicate the picture of colonialism. Dietler indicates that early Iron Age European communities were peopled by discriminating consumers who embraced some goods of Greek colonizers, consuming massive quantities of wine and drinking material goods but rejecting many other goods. Dietler (2005: 57) suggests that the indigenous demand for imported Mediterranean trade goods was quite regionally distinctive, a conclusion that underscores the shortcomings of mechanistic models of colonization that distinguish between cores and peripheries and hazard, ignoring all of the cultural and historical contingencies of colonization. Dietler argues that archaeologies of consumption should focus on four fundamental elements: archaeological and cultural context, patterns of association, relative quantitative representation within sites and across regions, and spatial distribution of specific goods.

Like Dietler, many scholars have focused on consumer agency as a mechanism to avoid deterministic pictures of consumption dictated by market supply, advertising, and similar structural conditions. For instance, Christina Hodge's (2007) study of a c. 1720–1775 site in Newport, Rhode Island examines how "middling" households selectively appropriated genteel material practices. Hodge recovered a colorfully decorated tin-glazed earthenware assemblage that was apparently used alongside pewter, which breaks with Georgian dining styles favoring individual matching vessels (Hodge 2007: 438). Yet the household consumed other Georgian forms, including punch and tea drinking vessels that suggest a favor for "fashionable drinking" over formal dining. Hodge argues that this piecemeal adoption of dominant practices illustrates

consumer agency that did not simply reproduce gentry materialism.

Some archaeologists have examined consumption as agency that is wielded tactically (if not strategically) against domination. In about 1892, for instance, an African-American household in Annapolis, Maryland filled a cellar with household refuse that included 79 bottles, and nearly all were from nationally advertised brands and did not include any local marketer (Mullins 1999). Rather than interpret this simply as assimilation to the mass market, some African-American households were probably consuming brand goods to circumvent local racism. Local White marketers who bottled their own goods persistently provided poor quality or adulterated goods for their Black customers and sold such goods at less competitive prices than those offered to many of their White neighbors, but nationally produced and priced goods evaded such racist tactics. Some African-American brand allegiance certainly revealed that African Americans sought some measure of genteel standing, and an 1875 probate inventory from the Annapolis home confirmed that the home included stylish decorative furnishings such as mahogany chairs in a room decorated with chromolithographs and figurines (Mullins 1999: 29).

Nearly any archaeological study could cast itself as a consumption study, so the question revolves around specifically how archaeology's picture of everyday materiality reveals the ways people negotiate, accept, and resist goods' meanings within specific contexts. Rather than reduce all consumption simply to a reflection of market determinism or inflate the agency within all material consumption, the most interesting scholarship focuses on the persistent tensions between structural and localized processes. This casts consumption as a study of dominant marketing, state, and social conditions even as it acknowledges that consumers acquire things to confirm, mask, and imagine who we are and who we wish to be. The dual influences of structural factors and consumer agency provide a rich framework for interpreting material consumption in a vast breadth of archaeological studies.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Annapolis: Historical Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Materiality in Archaeological Theory
- ▶ Modern Material Culture, Archaeology of
- ▶ Scandinavia/Northern Europe: Historical Archaeology

C

References

Courtney, P. 1997. The tyranny of constructs: Some thoughts on periodisation and change. In *The age of transition: The archaeology of English culture 1400–1600*, ed. D. Gaimster and P. Stamper, 9–24. Oxford: Oxbow Books.

Dietler, M. 2005. *Archaeology of colonialism: Consumption, entanglement and violence in ancient Mediterranean France*. Berkeley/Los Angeles: University of California Press.

Gaimster, D. 2009. An embarrassment of riches? Post-medieval archaeology in northern and central Europe. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 525–547. New York: Springer.

Hodge, C. 2007. A middling gentility: Taste, status, and material culture at the eighteenth-century Wood Lot, Wanton-Lyman-Hazard Site, Newport, Rhode Island. Unpublished PhD dissertation, Boston University.

Kopytoff, I. 1986. The cultural biography of things: Commoditisation as process. In *Social life of things, commodities in cultural perspective*, ed. A. Appadurai, 65–91. Cambridge: Cambridge University Press.

Martin, A.S. 1996. Frontier boys and country cousins: The context for choice in eighteenth-century consumerism. In *Historical archaeology and the study of American culture*, ed. L. De Cunzo and B.L. Herman, 71–102. Knoxville: University of Tennessee Press.

Miller, G. 1980. Classification and economic scaling of 19th century ceramics. *Historical Archaeology* 14: 1–40.

Mullins, P.R. 1999. *Race and affluence: An archaeology of African America and consumer culture*. New York: Kluwer/Plenum.

Nurmi, R. 2011. Development of the urban mind – An object biographical approach, the case study of the town of Tornio, northern Finland. Unpublished PhD dissertation, University of Oulu.

Orser, C.E., Jr. 1996. Beneath the material surface of things: Commodities, artifacts and slave plantations. In *Contemporary archaeology in theory*, ed. R. Preucel and I. Hodder, 189–201. Oxford: Blackwell.

Otto, J.S. 1984. *Cannon's Point Plantation, 1794–1860: Living conditions and status patterns in the Old South*. Orlando/London: Academic.

Rosén, C. 1999. *Föremål och social status i Halmstad ca 1550–1750*. Gothenburg: University of Gothenburg.
Spencer-Wood, S.M., ed. 1987. *Consumer choice in historical archaeology*. New York: Plenum Press.
Verhaege, F. 1997. The archaeology of transition – A continental view. In *The age of transition: The archaeology of English culture 1400–1600*, ed. D. Gaimster and P. Stamper, 25–44. Oxford: Oxbow Books.

Contemporary and Historical Archaeology in Theory (CHAT)

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Brief Definition of the Topic

CHAT – Contemporary and Historical Archaeology in Theory – is a conference group focused on the study of the archaeology of the postmedieval and contemporary world. The group was set up by Dan Hicks and Angela Piccini (then teaching the MA programs in Historical Archaeology and Archaeology for Screen Media at the University of Bristol) in February 2003. Hicks and Piccini formed a standing committee – including Mary Beaudry, Sarah Tarlow, Tadhg O'Keeffe, Eleanor Casella, and David Austin – and organized the first meeting at Bristol in November 2003, with keynote papers given by Mary Beaudry and Victor Buchli. The first meeting comprised four sessions – on the themes of "the archaeology of colonial and postcolonial worlds," "archaeology and popular culture," "connection and evocation: beyond explanation in archaeology," and "archaeology as political action."

The purpose of the establishment of the group was, in part, to develop a new, informal forum for the development of approaches and exchanges in the archaeological study of the recent past – distinct from those then offered by the meetings of the Society for Post-Medieval Archaeology, the Association for Industrial Archaeology, or the Society for Historical Archaeology. But its main aim was to bring together the archaeological study of the early modern, modern, and contemporary worlds: connecting modern archaeology with material culture studies rather than purely with economic and social history.

The format for the conference – a full schedule of short papers in plenary, themed sessions – has been retained at the annual meetings of the group that have been held since 2003: at the University of Leicester (2004), University College Dublin (2005), University of Bristol (2006), University of Sheffield (2007), University College London (2008), the University of Oxford (2009), University of Aberdeen (2010), Boston University (2011), and the University of York (2012). The founding standing committee was committed to ensuring that their composition would change over time, and many stood down in 2008 to allow CHAT contributors to take the group in new directions. Through the energy of new standing committee members including Sefryn Penrose, Rodney Harrison, Jeff Oliver, Krysta Ryzewski, James Symonds, Laura McAtackney, Sarah May, and James Dixon, the CHAT group has retained the atmosphere of the first meetings.

A series of publications have developed from the meetings, including the contributions to the "Studies in Contemporary and Historical Archaeology" series, several of which are based on the proceedings of CHAT meetings. However, the principal outcomes of the group have been new connections between archaeological researchers interested in working at the temporal boundaries between anthropology and archaeology, and it is by the vibrancy of these exchanges and collaborations that the ongoing success of the group continues to be judged.

Cross-References

► Contemporary Past, Archaeology of the

Further Reading

Fortenberry, B., and L. McAtackney. 2011. *Modern materials: The proceedings of CHAT Oxford, 2009*. Studies in Contemporary and Historical Archaeology 8. Oxford: Archaeopress.

Harrison, R., and J. Schofield. 2010. *After modernity: Archaeological approaches to the contemporary past*. Oxford: Oxford University Press.
Holtorf, C., and A. Piccini, eds. 2011. *Contemporary archaeologies: Excavating now*. 2nd ed. Frankfurt: Peter Lang.
May, S., H. Orange, and S. Penrose. 2011. *The good, the bad and the unbuilt: Handling the heritage of the recent past*. Studies in Contemporary and Historical Archaeology 7. Oxford: Archaeopress.
McAtackney, L., M. Palus, and A. Piccini, eds. 2007. *Contemporary and historical archaeology in theory: Papers from the 2003 and 2004 CHAT Conferences*. Studies in Contemporary and Historical Archaeology 4. Oxford: Archaeopress.
Oliver, J., and T. Neal, eds. 2009. *Wild signs: Graffiti in archaeology and history*. Studies in Contemporary and Historical Archaeology 6. Oxford: Archaeopress.
Schofield, J., ed. 2009. *Defining moments: Dramatic archaeologies of the twentieth-century*. Studies in Contemporary and Historical Archaeology 5. Oxford: Archaeopress.

Contemporary Past, Archaeology of the

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Introduction

The archaeology of the contemporary past is a new and interdisciplinary field of research that intersects with heritage studies, art, ethnography, and modern history. This kind of archaeology, as it is practiced today, was born in the late 1990s. However, its intellectual roots go further back (Harrison 2011: 144–9). While *archaeology* literally means the study of ancient things, archaeologists have always been concerned with the present, although in very different ways. During the nineteenth century, there was no clear-cut division between present and past, archaeology and anthropology, and prehistory books regularly included living societies (but always non-industrial). This perspective soon fell into disrepute due to its inherent racism and simplistic evolutionism. From the late 1950s onward, archaeologists renewed their interest in the contemporary world through a new method – ethnoarchaeology – and a new theory: processualism. As in the previous century, it was traditional groups that were targeted: other societies were not studied. This is because ethnoarchaeology was conducted for the sake of developing analogies to understand the past, not as an end in itself to understand the present.

Definition

The proliferation of archaeologies of the recent past has produced a diversity of definitions for the subfield. One of the main issues is time. In the United Kingdom, the archaeology of the contemporary past tends to focus on the last 50 years (Harrison and Schofield 2010). From this point of view, the goal of the archaeology of the contemporary would be the study of our present society in the strict sense, following one of the definitions of *contemporary* as that which exists synchronically. It also fits a period that has been characterized as postmodern or high modern. For the study of a longer period, the term *archaeology of the recent past* is preferred. The problem with this approach is that, on the one hand, it privileges a period defined by theorists and culture critics which is not necessarily relevant archaeologically. On the other hand, the division may hamper an adequate comprehension of the present day within longer historical trends. There are two ways in which this problem has been dealt with: some archaeologists prefer to dissolve the uniqueness of late modernity and of modernity in general (Dawdy 2010), whereas others have tried to characterize the late modern phase archaeologically within the trajectories of modernity (González-Ruibal 2008; Olivier 2008). In the latter case, the move implies an extension of the boundaries of the contemporary past beyond what is strictly contemporary. With this definition, another meaning of *contemporary* is privileged – what belongs to the same period of time. From this perspective, we can say that we are contemporaries of First World War soldiers, even if no one is alive

anymore, because we live in the same historical phase. In a similar vein, some archaeologists project the contemporary even further back in time to the mid-nineteenth century, for both historical and methodological reasons. This might be helpful for filling the gap left by historical archaeology, which tends to focus primarily on the period before the late nineteenth century while simultaneously forces us to see connections between present processes and those of the recent past. Other authors explicitly reject the phase approach and instead consider the archaeology of the contemporary past as the study of all relations between past and present (Holtorf and Piccini 2009). In any case, all authors agree that in approaching the most recent past from an archaeological point of view forces us to rethink modernist temporalities and transgress the well-ordered time frames of conventional archaeology (González-Ruibal 2008; Olivier 2008; Holtorf and Piccini 2009; Harrison 2011).

A lingering problem with the definition of the archaeology of the contemporary past is its equation with the *archaeology of us* (Gould and Schiffer 1981), this *us* being equated to *Western*. It is true that late modern societies present problems of their own and deserve to be studied specifically. Yet this should not lead us to reduce the archaeology of the contemporary past to one kind of societies only (reversing the discrimination of ethnoarchaeologists). Although some practitioners have worked in both Western and non-Western contexts, there is still an important unbalance with the geographic scope of the subdiscipline, and the amount of non-Western archaeologists working on the recent past is still limited. What do not seem to have limits are the topics explored by this archaeology: a few of them will be described in the following sections.

Historical Background

Despite their overt lack of concern for contemporary communities, processual archaeologists, like Lewis Binford, paved the way for an archaeological study of the present. On the one hand, unlike culture-historical archaeologists, processualists were not concerned with particular periods and cultures, but with understanding human behavior and social processes in general – and this could include the present. On the other hand, processual archaeologists who decided to do ethnographic work with living communities did so because many issues in which they were interested were usually overlooked by ethnographers (garbage, abandonment, recycling, settlement patterns, technology, etc.). With their detailed archaeological documentation, ethnoarchaeologists did prove the relevance of archaeological method to see the present differently.

There was only one further step to be taken: to study the present for its own sake. This occurred in the mid-1970s in the United States. Instead of looking at non-modern communities, a group of archaeologists decided to focus on their own culture and in this way inaugurated a new field: the *archaeology of us*. Its leading proponents were William Rathje, Richard Gould, and Michael Schiffer (Gould and Schiffer 1981), who went on to produce influential work on garbage, modern technology, and contemporary disasters. Despite this promising start, archaeological studies of the present did not take root. A similar interest in modern material culture developed in the early 1980s in the United Kingdom, with the emergent post-processual archaeology. Although some archaeologists engaged with contemporary things, the field was mostly taken over by anthropologists and lost much of its archaeological edge.

It can be argued that the archaeology of the contemporary past was reborn again in 2001 when the seminal book *Archaeologies of the Contemporary Past* (Buchli and Lucas 2001a) was published. The introductory chapters by the editors provided, for the first time, a strong theoretical background to the archaeological study of the recent past, which still grounds in one way or the other the large majority of the research. Other events in the United Kingdom explain the consolidation of the subdiscipline: the establishment of the Contemporary and Historical Archaeology in Theory (CHAT) annual conferences in 2003; the work of English Heritage, which has been faced with the task of managing the unwieldy remnants of the twentieth century; and the publication of the

first handbook on the archaeology of the contemporary past (Harrison and Schofield 2010). The archaeology of the contemporary past, however, has not only developed in the Anglo-Saxon world. Often simultaneously, archaeologies of the present time have emerged in Argentina, Chile, Iran, Spain, France, and the Scandinavian countries.

Key Issues/Current Debates

Everyday Life

Everyday life is the main concern of what could be called the British school of archaeology of the contemporary past which revolves around CHAT. Archaeologists associated with this school have cast their archaeological gaze on the world that surrounds them and have investigated furniture, graffiti, highways, malls, zoos, and even virtual worlds, to mention but a few things (cf. Holtorf and Piccini 2009; Harrison and Schofield 2010). One of the most controversial projects in this line was the archaeological excavation of a van from 1991 that had been used by an archaeological team for about 15 years. The evidence was analyzed through a combination of customary archaeometric methods (Bailey et al. 2009) and an object-biography approach, which has been consistently applied to prehistoric and ancient contexts over the last two decades (http://www.archaeologychannel.org/content/film/festival2008/InTransit.htm). As it happens with much of this kind of work, the conclusions were not precisely counterintuitive, but this was probably not the point. What the van excavation and similar projects do is to encourage us to look at our world (and archaeology) in a different way. It is more a creative engagement with ordinary materiality than an interpretative work (cf. Harrison 2011).

However, archaeology can also allow us to go deeper and in more detail into other people's lives and reveal something of them. This is the case with abandoned houses where everything has been left behind. The objects that have been abandoned following a catastrophic event can tell intimate stories about ordinary women and men. Thus, Dezhamkhooy and Papoli Yazdi (2010) excavated several houses in Bam (Iran) that collapsed following a major earthquake in 2003. In their powerful work, they introduce us to six Iranian families through the objects left in their destroyed homes. In this way, archaeology manages to keep alive something of those persons and becomes a poetical memory practice. A similar investigation was undertaken by Buchli and Lucas (2001b) in a council house in the UK that had been recently abandoned by its occupiers: a young unmarried woman and her two children. The study documented many intimate details of the woman's sad life story: the archaeologists suggest that the house was abandoned in the wake of a relationship breakdown with a heroin-addict partner. Similar intimate stories can be documented in the rural houses that were abandoned during the second half of the twentieth century in Galicia (Spain) (González-Ruibal 2005). Due to a desire to break with a peasant past that was perceived as shameful, the owners of many of these houses decided never to return to them and often abandoned many personal objects behind, such as photographs and letters, which allow us to piece together personal stories, often tragic (Fig. 1). This kind of work confronts the archaeologist with an ethical dilemma: is it legitimate to break into other people's life? Although the identity of the people is not revealed, we get to know too much about them, things that the subjects would probably not like to be disclosed. It can be argued, however, that archaeology can become a sort of memory work for the people without history and, in fact, most of the situations studied by archaeologists have to do with anonymous, often humble, people that rarely make it into history books.

Indeed, a concern with the less gentle side of everyday life has characterized the archaeology of the contemporary. This includes analyses of the *microphysics of power*, such as the studies carried out on school and domestic architecture or on the destructive operations that sustain consumption in the Western world. The asymmetries and inequalities within the West are also being addressed by archaeologists interested in homelessness. Some projects in the UK and the USA are conducted as community archaeology, with an active involvement of homeless people. Other subaltern groups

Contemporary Past, Archaeology of the, Fig. 1 A house abandoned in Galicia (Spain) during the 1960s

have attracted the attention of archaeologists, too, such as migrant laborers and miners in the United States.

Conflict

The archaeological study of modern conflict has grown exponentially in recent years. Starting from battlefield archaeology, archaeologists of modern conflict are now covering wider ground (cf. Schofield et al. 2002). The archaeology of the First World War has been relevant in the development of the subfield. Archaeologists and amateurs, as in other areas, have worked closely together, and they have mostly focused on the experiences of common soldiers fighting in the trenches of the Western Front. Researchers have also studied memorials, graffiti, and trench-art. More recently, the field has expanded geographically and thematically, to include other scenarios and topics, such as the Great Arab Revolt and POW camps. Comparatively, the other major conflict of the twentieth century, the Second World War, has received little attention. An important part of the work conducted so far has been carried out as part of heritage management programs (CRM). Interestingly, archaeological research on the Second World War is far from being centered on conventional battlefields. The British Home Front and the Blitz, for instance, have been thoroughly studied by Gabriel Moshenska (e.g., 2009), who has looked at air-raid shelters, shrapnel collecting by children, and bombed out civilian houses. He has excavated the latter in the context of innovative projects of community archaeology. Something that characterizes twentieth-century conflicts is precisely the blurring between combatants and noncombatants. This can be seen materially in the destruction of cities (Fig. 2) but also in concentration camps: similar technologies of repression were used to control civilians and military personnel – see examples in Myers and Moshenska (2011). Another aspect of the war to which archaeology can contribute is its impact on non-Western societies: in places like Ethiopia, some indigenous groups were first exposed to modernity through the war machinery of Italy and the Allies.

Paradoxically, more archaeological work has been produced on the Cold War than on the other conflicts, despite being a more recent conflict and not having many proper battlefields. Again, research has often been driven by heritage concerns. Most endeavors have focused on the UK and the USA, where nuclear silos, military factories, and bases have been catalogued, studied, and, sometimes, opened to the public. The

Contemporary Past, Archaeology of the, Fig. 2 The facade of a civilian building in Sarajevo riddled with bullet holes during the Bosnian War (1992–1995)

material effects of the Cold War in communist countries have been less studied (with the exception of East Germany), but some initiatives have already been undertaken, in places like Cuba and Ethiopia. Countries in Africa and Asia often suffered the hottest side of the Cold War, and their lands became the testing grounds of war machinery, which was then left to rust. This provides a significant area of research for archaeologists.

The last global war, the so-called War on Terror, is also being scrutinized by archaeologists. They have been working on detention camps, the destructive effects of terrorism in New York, and its memorialization. Finally, the archaeology of local (or rather glocal) wars is also contributing to the wider debate. This is the case with the Spanish Civil War. Although mass graves have been the main goal of researchers and grassroots associations, other initiatives have aimed at landscapes of conflict more generally, including battlefields, concentration camps, and prisons.

Dictatorship and Human Rights Violations

One of the phenomena that have characterized the last 100 years of global history is dictatorship. The study of this political phenomenon could be considered part of conflict archaeology, but in fact it goes well beyond it and intersects with other areas of study, such as everyday life and industry. Archaeological work on this issue has a triple purpose: throwing light on the material strategies that made those regimes work (and fail), providing incriminating evidence for the courts (such as the ICC), and helping the mourning process of victims and relatives. The archaeology of human rights violations is usually associated with the exhumation of mass graves. Archaeologists have participated in the recovery of bodies of victims of political cleansing in almost every continent, and the recovered evidence has often played an important role in incriminating perpetrators. One of the problems with this work is that since it is used in court, as in the former Yugoslavia, it is confidential and cannot be published. This is not a problem when perpetrators will not be taken to justice, as in Spain.

The archaeology of dictatorship cannot be reduced to mass graves, though. Researchers also investigate strategies of social engineering, control, and punishment. One of the most promising fields of research is the archaeology of concentration camps (Myers and Moshenska 2011). It is there where the horror of totalitarianism can be better grasped, by revealing the work of repressive technologies and recovering the traces of the individual lives that were shattered. The personal objects housed in the Museum of Auschwitz are a well-known testimony to Nazi barbarity. Similar evidence has been recovered during excavations at other camps and provides a unique corpus of data on the Jewish communities of Central Europe before their extermination.

Nevertheless, dictatorships cannot be based on systematic terror alone. They also rely on the seduction of the masses. Practices aimed at attaining hegemony are often material: architecture and landscape are two of the areas where totalitarianism strove to impress the people (Fig. 3).

Archaeologists, however, have paid more attention to openly repressive practices than to

Contemporary Past, Archaeology of the, Fig. 3 Seducing the masses: a communist-period mural in Berlin

the construction of totalitarian order. An exception is the study of the Bükeberg arena, where the Nazis celebrated a Harvest Festival which summoned hundreds of thousands of people every year. The scenario was cleverly devised to cause the highest impact on the masses: a 600-m-long alley (*Führerweg*) flanked by flagpoles was laid out for Hitler to "walk through the people" before reaching the tribune (Burström and Gelderblom 2011). Fascist Italian colonialism used space to imprint in the local population the idea of the colonizers' racial superiority, and Soviet urbanism resorted to large avenues and plazas to create dramatic scenarios of power (Andreassen et al. 2010). Apart from studying how these strategies work, archaeology can also explore the ways in which people survived totalitarianism. In the Soviet town of Pyramiden, Andreassen et al. (2010) have documented the *customization* of domestic space, but they found no open criticisms to the regime, in the shape of graffiti, vandalism, or similar. Due to its rigidity and disregard for actual human needs, totalitarian dreams often fail. The abandoned farms planned by Mussolini's regime in Sicily are proof of fascism's inability to adapt to local necessities.

While social repression and violence are immediately associated with dictatorship, democratic regimes can also employ them. During the first third of the twentieth century, for instance, the labor movement suffered bloody attacks at the hands of liberal governments. Archaeologists have excavated the remains of the mining camp of Ludlow (Colorado), where striking miners and their families were killed by the US Army (Larkin and McGuire 2009). Another case of a totalitarian strategy deployed by a democratic regime is that of Delta Camp in Guantanamo, where prisoners of war are held in contravention of international treaties.

Industry

Industrial archaeology was one of the first archaeologies of the recent past to appear and is now a well-established field in itself. The industrial ruins of the last 100 years, however, have received less attention than older ones. Efforts have been devoted recently to document the changing industrial landscape of the United Kingdom: new phenomena such as nuclear power, renewable energy, and shopping malls have substantially changed the cultural landscape here. Apart from chronology, there is another bias in industrial archaeology that has to be overcome: its focus on Euro-American countries. The effects of industrialization in other continents have been less studied,

Contemporary Past, Archaeology of the, Fig. 4 An abandoned gas station belonging to a ruined industrial complex from the late 1980s, Metekel (Ethiopia)

although there is a plethora of themes worth exploring: development projects in the Third World (Fig. 4), outsourcing, and industrialization in former communist nations. Regarding industrialization beyond the West, an interesting case is Flora Vilches' study of the nitrate mining town of Chacabuco (Chile) (Vilches 2011). After mining stopped in 1938, the place was abandoned only to be reoccupied as an internment camp during the Pinochet regime. Vilches shows the connections and continuities between a regimented working space under a liberal government and a disciplinary surveillance space under dictatorship. An example of communist industrialization is the aforementioned study conducted by Andreassen et al. (2010) in the ruins of the Soviet mining town of Pyramiden. The place was not vacated until 1998, and everything was left in place then, a phenomenon that allowed the researchers to have a glimpse into a vanished era. While archaeologists have been much concerned with the archaeology of industry, they have been less interested in processes of deindustrialization, despite the many ruins that they leave behind.

A kind of industry that is specific of the last half century is the one related to space technology. Archaeologists have explored issues related to space junk, rocket ranges, landing sites, and the way in which this particular heritage is managed, appropriated, and contested.

Ruins and Garbage

Modern ruins and garbage are both the raw material and a theme of study for the archaeologists of the recent past. The interest in ruination is shared with scholars from other disciplines. In fact, archaeologists have discovered paradoxically late that ruins are an interesting phenomenon per se (Fig. 5), not just a medium to obtain other information (cf. González-Ruibal 2005; Andreassen et al. 2010; Dawdy 2010). Geographers, anthropologists, and cultural historians have also offered important insights which are relevant for archaeology. Ruination itself is the focus of Andreassen et al. (2010), who have combined both art and archaeology to produce a powerful account of Pyramiden. It is at the same time an intimate exploration of the abandoned settlement and a reflection on the nature of ruins.

Modern ruins produce a fascination that goes well beyond the limits of academia, as shown by the proliferation of coffee-table books with impressive photographs of abandoned places and derelict buildings and the emergence of a singular phenomenon: urban exploration. Archaeologists have yet to engage in a dialogue with these new

Contemporary Past, Archaeology of the, Fig. 5 Ruins of an unfinished resort on the island of Corisco (Equatorial Guinea), early twenty-first century

participants. Their explorations and the often extraordinary documentation that they produce also challenge professionals: in which sense is an archaeological take on ruins different from that of amateurs? What can archaeologists add? The same questions are pertinent for the relationship between archaeological research and that conducted by scholars from other disciplines. It can be argued, on the one hand, that archaeologists have a unique methodology, which allows them to produce richly textured narratives. On the other hand, as social scientists, we can contextualize the phenomenon of ruination within long-term material processes and combine the micro-history of particular ruins with the macro-history of modernity.

Regarding garbage, its *discovery* was partly due to the New Archaeology's concern with formation processes: discard, recycling, and refuse were central concepts in ethnoarchaeology and behavioral archaeology. William Rathje went a step forward when he decided to study garbage in an industrial society as a means to understand social issues related to that society, not in an analogical way (Rathje and Murphy 1992). Rathje proved that discarded objects can tell a story wildly different from the one reported by consumers. Apart from the sociological interest, garbology has had an important practical role in raising awareness among Americans of the importance of recycling and the repercussions of unbridled consumerism.

Future Directions

The archaeology of the contemporary past has progressed much during the last decade. Although it is true that the subdiscipline – as Harrison (2011) has argued – has been more welcomed than criticized by other archaeologists, the truth is that it runs the risk of becoming ghettoized, as another area of expertise within the wider discipline. This would be regrettable because the archaeology of the contemporary world is in a privileged position to address in novel ways crucial archaeological concerns, such as rhetoric, materiality, politics, and memory (González-Ruibal 2008). It can also actively contribute to problematize concepts of heritage and time (Olivier 2008; Harrison and Schofield 2010; Harrison 2011). In addition, due to its hybrid character and its focus on issues of current relevance, this archaeology can be a way of starting fruitful dialogues with other disciplines, not in a subordinate role, as has often been the case, but in equal terms. Finally, the archaeology of recent phenomena easily engages a wide public and

allows people to rethink critically their own society. To avoid turning it into a scholarly exercise, archaeologists have to keep imagining ways in which their work can be relevant for other archaeologists, other researchers, and society as a whole.

In fact, there are some promising areas of research that may help establish bridges with other disciplines and with society: as it has been pointed out, there is a disproportion of studies between the West (and particularly the Anglo-Saxon world) and the rest. Besides, those that have worked in non-Western contexts have often emphasized poverty and violence. While this is a fundamental part of life for many people in Africa, Asia, or Latin America, there are many aspects of daily life that would benefit from an archaeological approach, such as the construction and use of domestic space or the appropriation of foreign technologies. In fact, the material creativity of shanty towns that is so important for the social life of their inhabitants has been largely disregarded: an archaeological gaze has much to offer.

Perhaps the most important challenge for an archaeology of the contemporary past, however, lies in producing ambitious works. So far, this subfield has been mostly concerned with offering commentary on contemporary life. It has engaged in micronarratives, often forgetting the larger picture. Along with micronarratives and creative interventions, the archaeology of the contemporary past should also construct elaborate accounts of complex issues – with an archaeological perspective: some themes that deserve monographic treatment are the postindustrial metropolis, urban poverty, political resistance and revolution, decolonization, global economic crises, the effects of climate change, and migration, to mention but a few. The idea is to not just engage in specific case studies but, as archaeologists of other periods do, develop coherent, synthetic approaches to those large-scale phenomena. Starting from essentially archaeological topics such as materiality, ruins, fragmentation, and time, archaeology should be able to craft rich, alternative visions to those proposed by history, sociology, or anthropology.

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Chronopolitics and Archaeology
- ▶ Consumption, Archaeology of
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Critical Historical Archaeology
- ▶ Gould, Richard A.
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Internment and Prisoners of War in Historical Archaeology
- ▶ Modern Material Culture, Archaeology of
- ▶ Modern Ruins: Remembrance, Resistance, and Ruin Value
- ▶ Modern World: Historical Archaeology
- ▶ Rathje, William Laurens
- ▶ Schiffer, Michael Brian (Modern World)
- ▶ Supermodernity and Archaeology

References

Andreassen, E., H. Bjerck, and B. Olsen. 2010. *Persistent memories. Pyramiden – A Soviet mining town in the High Arctic*. Trondheim: Tapir Academic Press.

Bailey, G., C. Newland, A. Nilsson, J. Schofield, S. Davis, and A. Myers. 2009. Transit, transition: Excavating J641 VUJ. *Cambridge Archaeological Journal* 19: 1–28.

Buchli, V., and G. Lucas, eds. 2001a. *Archaeologies of the contemporary past*. London: Routledge.

Buchli, V., and G. Lucas. 2001b. The archaeology of alienation. A late twentieth-century British council house. In *Archaeologies of the contemporary past*, ed. V. Buchli and G. Lucas, 158–168. London: Routledge.

Burström, M., and B. Gelderblom. 2011. Dealing with a difficult heritage: The case of Bückeberg, site of the Third Reich Harvest Festival. *Journal of Social Archaeology* 11: 266–282.

Dawdy, S.L. 2010. Clockpunk anthropology and the ruins of modernity. *Current Anthropology* 51: 761–793.

Dezhamkhooy, M., and L. Papoli Yazdi. 2010. The archaeology of last night. . . what happened in Bam (Iran) on 25–6 December 2003. *World Archaeology* 42: 341–354.

González-Ruibal, A. 2005. The need for a decaying past. An archaeology of oblivion in Galicia (NW Spain). *Home Cultures* 2: 129–152.

González-Ruibal, A. 2008. Time to destroy. An archaeology of supermodernity. *Current Anthropology* 49: 247–279.

Gould, R., and M.B. Schiffer. 1981. *Modern material culture: The archaeology of us*. New York: Academic.
Harrison, R. 2011. Surface assemblages. Towards and archaeology *in* and *of* the present. *Archaeological Dialogues* 18: 141–161.
Harrison, R., and J. Schofield. 2010. *After modernity. Archaeological approaches to the contemporary past*. Oxford: Oxford University Press.
Holtorf, C., and A. Piccini, eds. 2009. *Excavating now. Archaeologies of the contemporary past*. Frankfurt/Main: Peter Lang.
Larkin, K., and R.H. McGuire. 2009. *The archaeology of class war: The Colorado Coal Field Strike of 1913–1914*. Boulder: University Press of Colorado.
Moshenska, G. 2009. Resonant materiality and violent remembering: Archaeology, memory and bombing. *International Journal of Heritage Studies* 15: 44–56.
Myers, A., and G. Moshenska, eds. 2011. *The archaeology of internment*. New York: Springer.
Olivier, L. 2008. *Le sombre abîme du temps. Archéologie et mémoire*. Paris: Seuil.
Rathje, W., and C. Murphy. 1992. *Rubbish! The archaeology of garbage*. New York: HarperCollins.
Schofield, J., W.G. Johnson, and C.M. Beck, eds. 2002. *Matériel culture: The archaeology of twentieth-century conflict*. London: Routledge.
Vilches, F. 2011. From nitrate town to internment camp: The cultural biography of Chacabuco, northern Chile. *Journal of Material Culture* 16: 241–263.

Further Reading

Bellan, G., and F. Journout. 2011. *Archéologie de la France moderne et contemporaine*. Paris: La Découverte.
Buchli, V. 1999. *An archaeology of socialism*. Oxford: Berg.
Buchli, V., ed. 2002. *The material culture reader*. Oxford: Berg.
Bulgrin, L. 2005. The Tudela site. Fire and steel over Saipan, 15 June 1944. *Journal of Conflict Archaeology* 1: 1–18.
Burström, M. 2007–2008. Looking into the recent past. Extending and exploring the field of archaeology. *Current Swedish Archaeology* 15 (16): 21–36.
Burström, M. 2009. Garbage or heritage? The existential dimension of a car cemetery. In *Contemporary archaeologies: Excavating now*, ed. C. Holtorf and A. Piccini, 131–143. Frankfurt: Peter Lang.
Burström, M., T. Díez, E. González, A. Gustafsson, I. Hernández, H. Karlsson, J.M. Pajón, J.R. Robaina, and B. Westergaard. 2009. Memories of a world crisis. The archaeology of a former Soviet nuclear missile site in Cuba. *Journal of Social Archaeology* 9: 295–318.
Camp, S.L. 2011. Materializing inequality: The archaeology of tourism laborers in turn-of-the-century Los Angeles. *International Journal of Historical Archaeology* 15: 279–297.
Casella, E.C., and J. Symonds, eds. 2005. *Industrial archaeology: Future directions*. New York: Springer.
Demuth, V. 2009. "Those who survived the battlefields". Archaeological investigations in a prisoner of war camp near Quedlinburg (Harz/Germany) from the First World War. *Journal of Conflict Archaeology* 5: 163–181.
Desilvey, C. 2006. Observed decay: Telling stories with mutable things. *Journal of Material Culture* 11: 318–338.
Dezhamkhooy, M. 2011. The interaction of body, things and the others in constituting feminine identity in lower socio-economic ranks of Bam, Iran. *Archaeologies* 7: 372–386.
Edensor, T. 2005. *Industrial ruins: Space, aesthetics and materiality*. Oxford: Berg.
Funari, P.P., A. Zarankin, and M. Salerno, eds. 2010. *Archaeology of repression and resistance in Latin America*. New York: Springer.
Gassiot, E., and D.W. Steadman. 2008. The political, social and scientific contexts of archaeological investigations of mass graves in Spain. *Archaeologies* 4: 429–444.
Gilead, I., Y. Haimi, and W. Mazurek. 2009. Excavating Nazi extermination centres. *Present Pasts* 1: 10–39.
González-Ruibal, A. 2006. The dream of reason. An archaeology of the failures of modernity in Ethiopia. *Journal of Social Archaeology* 6: 175–201.
González-Ruibal, A. 2007. Making things public: Archaeologies of the Spanish Civil War. *Public Archaeology* 6: 203–226.
González-Ruibal, A. 2010. Fascist colonialism. The archaeology of Italian outposts in western Ethiopia (1936–1941). *International Journal of Historical Archaeology* 14: 547–574.
González-Ruibal, A., and A. Hernando. 2010. Genealogies of destruction. An archaeology of the contemporary past in the Amazon forest. *Archaeologies* 6: 5–28.
Gordillo, G. 2011. Ships stranded in the forest. Debris of progress on a phantom river. *Current Anthropology* 52: 141–167.
Gorman, A. 2005. The cultural landscape of interplanetary space. *Journal of Social Archaeology* 5: 85–107.
Gould, R. 2007. *Disaster archaeology*. Salt Lake City: The University of Utah Press.
Grandin, G. 2009. *Fordlandia: The rise and fall of Henry Ford's forgotten jungle city*. New York: Metropolitan.
Graves-Brown, P., ed. 2000. *Matter, materiality and modern culture*. London: Routledge.
Harrison, R. 2009. Towards an archaeology of the welfare state in Britain, 1945–2009. *Archaeologies* 5: 238–262.
Harrison, R., and J. Schofield. 2009. Archaeo-ethnography, auto-archaeology: Introducing archaeologies of the contemporary past. *Archaeologies* 5: 185–209.
Harrison, R., and C. Williamson, eds. 2004. *After Captain Cook. The archaeology of the recent indigenous past in Australia*. Walnut Creek: AltaMira.
Jeffery, W. 2006. A CRM approach in investigating the submerged World War II sites in Chuuk Lagoon. *Micronesian Journal of the Humanities and Social Sciences* 5: 137–155.

Kiddey, R., and J. Schofield. 2011. Embrace the margins: Adventures in archaeology and homelessness. *Public Archaeology* 10: 4–22.
McAtackney, L., M. Palus, and A. Piccini, eds. 2007. *Contemporary and historical archaeology in theory: Papers from the 2003 and 2004 CHAT conferences*, BAR international series 1677. Oxford: Archaeopress.
Montero, J. 2009. La visibilidad arqueológica de un conflicto inconcluso: La exhumación de fosas comunes de la Guerra Civil española a debate. *Munibe. Sociedad de Ciencias Naturales Aranzadi (San Sebastian)* 60: 289–308.
Morín de Pablos, J., M. Escolá, R. Barroso, and A. Pérez-Juez. 2001. Arqueología de la Guerra Civil: Excavaciones arqueológicas en las trincheras. *Revista de arqueología* 250: 22–31.
Moshenska, G. 2008. A hard rain. Children's shrapnel collections in the Second World War. *Journal of Material Culture* 13: 107–125.
Myers, A. 2010. Camp Delta, Google Earth and the ethics of remote sensing in archaeology. *World Archaeology* 4: 455–467.
Olivier, L. 2001. The archaeology of the contemporary past. In *Archaeologies of the contemporary past*, ed. V. Buchli and G. Lucas, 175–188. London: Routledge.
Penrose, S. 2007. *Images of change*. Swindon: English Heritage.
Rathje, W. 1979. Modern material studies. *Advances in Archaeological Method and Theory* 2: 1–37.
Robertshaw, A., and D. Kenyon. 2008. *Digging the trenches. The archaeology of the Western Front*. Barnsley: Pen & Sword.
Samuels, J. 2010. Of other scapes: Archaeology, landscape, and heterotopia in fascist Sicily. *Archaeologies* 6: 62–81.
Saunders, N.J. 2007. *Killing time: Archaeology and the first world war*. Stroud: Sutton.
Saunders, N.J., and N. Faulkner. 2010. Fire on the desert: Conflict archaeology and the Great Arab Revolt in Jordan, 1916–18. *Antiquity* 84: 514–527.
Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Albuquerque: New Mexico University Press.
Schiffer, M.B. 1994. *Taking charge. The electric automobile in America*. Washington: Smithsonian Institution.
Schofield, J. 2009. *Aftermath: Readings in the archaeology of recent conflict*. New York: Springer.
Schofield, J., and W. Cocroft, eds. 2007. *A fearsome heritage. Diverse legacies of the Cold War*. Walnut Creek: Left Coast Press.
Hell, J., and A. Schönle, eds. 2010. *Ruins of modernity*. Durham: Duke University Press.
Shanks, M., and C. Tilley. 1987. *Re-constructing archaeology: Theory and practice*. London: Routledge.
Steele, C. 2008. Archaeology and the forensic investigation of recent mass graves: Ethical issues for a new practice of archaeology. *Archaeologies* 4: 414–428.
Varsanyi, K. 2011. The social life of ruins: Urban exploration of abandoned spaces in Budapest. MA dissertation, Central European University. Available at: www.etd.ceu.hu/2011/varsanyi_kata.pdf.
Vilches, F., C. Rees, and C. Silva. 2008. Arqueología de asentamientos salitreros en la región de Antofagasta (1880–1930): síntesis y perspectivas. *Chungará. Revista de Antropología Chilena* 40: 19–30.
Wilson, R. 2011. Remembering and forgetting sites of terrorism in New York, 1900–2001. *Journal of Conflict Archaeology* 6: 200–221.
Zarankin, A. 2002. *Paredes que domesticam: Arqueologia da arquitetura escolar capitalista: O caso de Buenos Aires*. Campinas: Universidade Estadual de Campinas.
Zimmerman, L.J., C. Singleton, and J. Welch. 2010. Activism and creating a translational archaeology of homelessness. *World Archaeology* 42: 443–454.

C

Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)

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Introduction

The Convention for the Protection of Cultural Property in the Event of Armed Conflict, in regard to the place and year of its adoption also known as the "1954 Hague Convention", is an international treaty adopted on May 14, 1954, in The Hague, Netherlands. It is aimed at the protection of cultural property against destruction or damage, as well as theft, looting, or other forms of unlawful seizure but also military use during periods of armed conflict. The Convention contains 40 articles in the main text and 21 articles in separately drafted Regulations for its execution, which include specific requirements for the monitoring of the Convention and the so-called Special Protection regime. The provisions of the Convention were supplemented and specified in two protocols, the First Protocol of May 14, 1954, and the Second Protocol of March 26, 1999, both likewise adopted in The Hague. The First Protocol contains 15 paragraphs delivering provisions to prevent the export of cultural property by a Party to the Convention from the occupied territory of another

Party and regulates the return of illegally exported cultural property. With 47 articles, the Second Protocol serves the extension and amendment of the provisions of the Convention and its revision in those areas, where their implementation over the decades had proven to be inadequate, in particular introducing the Enhanced Protection regime. All three agreements are part of International Humanitarian Law (formerly also Law of Armed Conflict). UNESCO is primarily responsible for monitoring compliance with the Convention; in this regard it is partly supported by the UNESCO-affiliated NGO network of the Blue Shield, consisting of the International Committee of the Blue Shield (in Paris) and various national committees primarily in countries Party to the Convention, which form together the Association of National Committees of the Blue Shield (in The Hague).

Historical Background

The idea that cultural property should be protected in armed conflicts is relatively young; the thought was unknown in ancient to medieval periods, if one disregards the principle of asylum of sanctuaries. Regulations by the Austrian Empress Maria Theresa and the claim of the Vienna Congress in 1814 (in response to the looting of cultural property in the course of the Napoleonic campaigns), the General Order № 100 of U.S. President Abraham Lincoln to the Union troops during the American Civil War (Lieber Code of 1863) as well as the regulations of the Brussels Declaration of 1874, not to destroy works of art during war and not to remove them from their place of origin, constitute the important steps towards the protection of cultural property in wartime.

The first international treaty, which contained provisions for the protection of cultural property during war, was the 1899 adopted and in 1907 slightly modified Hague Convention. Article 27 requires the attacking Party to spare (as much as possible) historical sites, educational institutions, and institutions with religious, charitable, scientific, or artistic importance in sieges and bombardments. The attacked Party is required to identify appropriate buildings, whereby the type of marking was not suggested or even specified. In addition, Article 56 contains a generally worded prohibition of confiscation, destruction, or damage of such facilities.

The first international treaty that dealt exclusively with the protection of cultural property in the event of war was the Treaty on Protection of Artistic and Scientific Institutions and Historic Monuments signed in 1935 by the American States, in regard to the place of its adoption also known as the Washington Treaty or more commonly after its initiator – the Russian lawyer, painter, writer, philosopher, and archaeologist Nicholas Roerich – the Roerich Pact. It contains eight articles and includes several significant innovations compared with the general provisions of the Articles 27 and 56 respectively of the Hague Conventions. The treaty established the neutral status of historic monuments, museums, scientific and artistic institutions, as well as educational and cultural facilities – comparable to the neutral status of medical personnel and facilities. The Parties to the treaty were required to submit lists of the monuments and facilities, for which they request protection in accordance with the treaty, to the Pan American Union, which should then pass these lists to all State Parties.

After the 2nd World War – and in light of the massive looting and destruction of cultural property during this war – the Convention for the Protection of Cultural Property in the Event of Armed Conflict emerged within UNESCO on the initiative of the Netherlands.

Key Issues

Legal Validity

The Convention and the First Protocol generally entered into force on August 7, 1956, in accordance with Article 33 and the Second Protocol on March 9, 2004, in accordance with Article 43. The Convention and the Protocols "*enter into force, for each High Contracting Party, three months after the deposit of its instrument of ratification or accession*" according to Article 33 paragraph 3. As of April 1, 2013, 126 states are parties to the

Convention; 102 states have signed the First Protocol, and the Second Protocol was signed by 64 states.

According to Article 18, the Convention applies to every armed conflict between two or more Contracting Parties and in the case of the occupation of the territory of a Contracting Party. In non-international armed conflicts on the territory of a Contracting Party, all parties in the conflict are obliged to at least comply with and apply the provisions of the Convention to respect cultural property.

In states which have not signed the Convention, it is not in force and therefore not generally applicable, provided that this is not otherwise regulated in the Convention. Thus, Article 18, paragraph 3, states that "*if one of the Powers in conflict is not a Party to the present Convention, the Powers which are Parties thereto shall nevertheless remain bound by it in their mutual relations. They shall furthermore be bound by the Convention, in relation to the said Power, if the latter has declared, that it accepts the provisions thereof and so long as it applies them*."

Under Article 37, a Contracting Party may denounce the Convention, although the provisions of the Convention do not lose their effectiveness until 1 year after termination.

Definitions of Key Terms in Accordance with the Convention

According to Article 1, the term "cultural property" is defined as:

> (a) movable or immovable property of great importance to the cultural heritage of every people, such as monuments of architecture, art or history, whether religious or secular; archaeological sites; groups of buildings which, as a whole, are of historical or artistic interest; works of art; manuscripts, books and other objects of artistic, historical or archaeological interest; as well as scientific collections and important collections of books or archives or of reproductions of the property defined above;
> (b) buildings whose main and effective purpose is to preserve or exhibit the movable cultural property defined in sub-paragraph (a) such as museums, large libraries and depositories of archives, and refuges intended to shelter, in the event of armed conflict, the movable cultural property defined in sub-paragraph (a);
> (c) centers containing a large amount of cultural property as defined in sub-paragraphs (a) and (b), to be known as 'centers containing monuments.'

Archaeological sites and archaeological objects are here explicitly mentioned as "cultural property" as defined by the Convention and thus every time implicitly referred to when the Convention speaks of "cultural property."

In Article 2, the term "protection" of cultural property is defined as "*the safeguarding of and respect for such property.*" The concept of "*safeguarding*" is defined in Article 3 and the concept of "*respect*" is defined in Article 4. Measures of "safeguarding" are basically those that are undertaken "*in time of peace*" for "*cultural property situated within their own territory against the foreseeable effects of an armed conflict*"; how these measures have to be designed remains the responsibility of the national states as Contracting Parties. The respect for cultural property, however, concerns all measures in the event of an armed conflict. Article 4, paragraph 1, requires the Contracting Parties to "*respect cultural property situated within their own territory as well as within the territory of other High Contracting Parties by refraining from any use of the property and its immediate surroundings or of the appliances in use for its protection for purposes which are likely to expose it to destruction or damage in the event of armed conflict; and by refraining from any act of hostility, directed against such property.*" And paragraph 3 requires the Contracting Parties "*to prohibit, prevent and, if necessary, put a stop to any form of theft, pillage or misappropriation of, and any acts of vandalism directed against, cultural property.*" And "*They shall refrain from requisitioning movable cultural property situated in the territory of another High Contracting Party.*"

As late as Article 18, the term "armed conflict" is, in the scope of the Convention, defined as:

> 1. . . . the event of declared war or of any other armed conflict which may arise between two or more of the High Contracting Parties, even if the

state of war is not recognized by, one or more of them.

2. . . . all cases of partial or total occupation of the territory of a High Contracting Party, even if the said occupation meets with no armed resistance.

With Article 19 the area of application is extended to include "*the event of an armed conflict not of an international character*." With Article 5 additional provisions in the event of an occupation – as a special form of armed conflict – are elaborated on.

Key Provisions of the 1954 Hague Convention

In Article 4, paragraph 2, the exemption of "*military necessity*" is introduced in the principles of the Convention, thereby not further defining what the term "*necessity*" actually means. Based on this, this exemption is with Article 11 transferred to the provisions of the special security and allowing a waiver of that status during an armed conflict under certain circumstances, including, for example, an "*unavoidable military necessity*," the term "*unavoidable*" not being further defined. The issue of "*military necessity*" is dealt with in more detail in the Second Protocol (see below).

Article 5 deals with the case of occupation and generally states that the occupying force "*shall as far as possible support the competent national authorities of the occupied country in safeguarding and preserving its cultural property.*" Beyond this obligation it shall "*take measures to preserve cultural property situated in occupied territory and damaged by military operations*" if the competent national authorities are unable to do so. Beyond these basic provisions, the Convention does not contain further obligations or restrictions to the occupying force, e.g., no prohibition of handling cultural property in any way and also no prohibition of archaeological excavation. The whole problematic issue is dealt with in some more detail in the Second Protocol (see below).

With Article 6 the "distinctive emblem" of the Convention is introduced: "*In accordance with the provisions of Article 16, cultural property may bear a distinctive emblem so as to facilitate its recognition*." This is the Blue Shield, the design of which is described in Article 16 as "*a shield, pointed below, persaltire blue and white (a shield consisting of a royal-blue square, one of the angles of which forms the point of the shield, and of a royal-blue triangle above the square, the space on either side being taken up by a white triangle)*." Its use is specified in Article 17, whereas paragraph 4 generally states: "*The distinctive emblem may not be placed on any immovable cultural property unless at the same time there is displayed an authorization duly dated and signed by the competent authority of the High Contracting Party*." According to Article 20 of the Regulations, the marking of cultural property with the Blue Shield is not a requirement but just an option. In fact, many Contracting Parties have so far omitted use of the emblem.

Article 7 describes the basic military measures, to which the Contracting Parties are already committed in time of peace, namely, "*to introduce in time of peace into their military regulations or instructions such provisions as may ensure observance of the present Convention, and to foster in the members of their armed forces a spirit of respect for the culture and cultural property of all peoples*" and "*to plan or establish in peacetime, within their armed forces, services or specialist personnel whose purpose will be to secure respect for cultural property and to co-operate with the civilian authorities responsible for safeguarding it*." Although Article 7 has a military key function for an effective protection of cultural property, only a few Contracting Parties have implemented these provisions in a comprehensive and sustainable manner. Thus, the idea of the protection of cultural property is in most nation states already missing at the political level of national security and defense doctrines. Therefore, there is hardly any national armed force that has adopted its own guidelines for the military protection of cultural property, and therefore, the issue of cultural property protection has hardly found entry into any rules of engagement of those military units that are also actually deployed onto missions. There are only very few national armed forces that consistently educate expert officers (e.g., liaison officers) for the protection of cultural property. And cultural property protection

is in most nation states barely or not at all anchored in the curricula of its military personnel, for commissioned as well as noncommissioned officers. This has as a consequence, among others, that even commanders in the field fail to recognize cultural property, which is particularly true of archaeological sites and other archaeological structures of a non-monumental character.

Articles 8 to 11 regulate the issue of Special Protection for certain cultural property. According to Article 8 this includes "*a limited number of refuges intended to shelter movable cultural property in the event of armed conflict, of centers containing monuments and other immovable cultural property of very great importance*." Requirement for the granting of special protection is that the relevant objects "*are situated at an adequate distance from any large industrial center or from any important military objective constituting a vulnerable point*" (subparagraph 1a) and "*are not used for military purposes*" (subparagraph 1b), whereas the guarding of cultural property by, e.g., police, is not viewed as military use (paragraph 4). The granting of special protection furthermore requires the registration in the International Register of Cultural Property under Special Protection (paragraph 6). Cultural property under Special Protection counts as inviolable (Article 9). According to Article 17 the emblem of the Convention is to be used in triplicate for cultural property under Special Protection, as well as in single copy for all other cultural property to be protected, for the staff responsible for the protection of personnel, and for appropriate identity cards. This important issue is dealt with under the term Enhanced Protection in the Second Protocol (see below).

Articles 12 to 14 regulate the transport of cultural property. Thus, transport relocating cultural property can also be placed under Special Protection (Article 12). According to Article 14, transported cultural property is granted "*immunity from seizure, placing in prize, or capture*," which does not limit the "*right of visit and search*." Article 15 obliges Contracting Parties to respect the personnel protecting the cultural property, and in case of capture, the staff may not be prevented from carrying out their work.

Articles 20 to 28 contain the provisions for the execution of the Convention. They, among others, specify the role of protecting powers (Art. 21 and 22), as well as of UNESCO (23). In addition, Article 25 includes an obligation to disperse the agreement in peacetime and during conflict, for example, through training in the military and civilian sectors. According to Article 28, the parties are required to prosecute violations of the agreement in penal or disciplinary terms.

The final provisions in Articles 29 to 40 regulate, among other things, the signature, the ratification, the accession, the entry into force, the amendment, and the termination of the Convention. In Article 36 the relationship of the Convention to previous conventions is regulated and established and states that the Convention supplements the provisions of the Hague Conventions of 1899 and 1907 respectively as well as the Roerich Pact of 1935, given the Contracting Parties are bound to these previous conventions.

Important Provisions of the Second Protocol of 1999

Articles 5 to 9 supplement the general provisions of the Convention regarding protection. Article 5 covers the safeguarding of cultural property and defines, as minimum security measures in peacetime, "*the preparation of inventories, the planning of emergency measures for protection against fire or structural collapse, the preparation for the removal of movable cultural property or the provision for adequate* in situ *protection of such property, and the designation of competent authorities responsible for the safeguarding of cultural property.*" Article 6 increases the provisions for respecting cultural property. Thus, as subparagraph (a) points out, hostile acts directed against cultural property that are carried out on the basis of an "*imperative* (sic!) *military necessity*" must be limited to the duration "*i. that cultural property has, by its function, been made into a military objective; and ii. there is no feasible alternative available to obtain a similar military advantage to that offered by directing an act of hostility against that objective*." Similar restrictions apply to the military use of cultural property through which it is exposed to the risk of

destruction or damage. On the basis of this provision, each attack must be preceded by an effective warning. In Article 7 precautions during military operations are defined, through which damage to the cultural property protected is to be prevented as much as possible. Article 8 analogously commits the conflict parties to remove cultural property from the vicinity of military targets or otherwise to protect and prevent the installation of military targets in the vicinity of cultural heritage.

Article 9 specifies the provisions in case of occupation and establishes the rule that an occupying power in the occupied territory must prohibit and prevent:

1. (a) any illicit export, other removal or transfer of ownership of cultural property;

   (b) any archaeological excavation, save where this is strictly required to safeguard, record or preserve cultural property;

   (c) any alteration to, or change of use of, cultural property which is intended to conceal or destroy cultural, historical or scientific evidence.
2. Any archaeological excavation of, alteration to, or change of use of, cultural property in occupied territory shall, unless circumstances do not permit, be carried out in close co-operation with the competent national authorities of the occupied territory.

Therefore, Article 9 explicitly addresses the conduct of archaeological excavation, limits it in occupied territory to rescue excavation in paragraph 1b, and demands the cooperation with competent national authorities in paragraph 2.

Articles 10 to 14 contain the provisions for "enhanced protection," which represent an alternative to the "special protection" of the Convention that has in part been experienced as insufficient. According to Article 10, cultural property may be placed under enhanced protection if:

(a) it is cultural heritage of the greatest importance for humanity;
(b) it is protected by adequate domestic legal and administrative measures recognising its exceptional cultural and historic value and ensuring the highest level of protection;
(c) it is not used for military purposes or to shield military sites and a declaration has been made by the Party which has control over the cultural property, confirming that it will not be so used.

Article 11 regulates the granting of "enhanced protection" by an appropriate committee of UNESCO (i.e., the Committee, which is constituted with Articles 24 to 27) involving the Contracting Parties and "*non-governmental organizations with relevant expertise*" (Art. 11, paragraph 3), such as *expressis verbis* the International Committee of Blue Shield. According to Article 12, inviolability applies to cultural property under enhanced protection comparable with the special protection of the Convention. Articles 13 and 14 regulate the loss as well as the suspension and cancellation of enhanced protection.

Articles 15 to 21 contain provisions on the "criminal responsibility and jurisdiction." These therefore represent, in addition to the system of enhanced protection, the main innovation of the Second Protocol and a fundamental improvement in regard to the Convention. Article 15, paragraph 1, defines five serious violations of the protection of cultural property during armed conflict:

(a) making cultural property under enhanced protection the object of attack;
(b) using cultural property under enhanced protection or its immediate surroundings in support of military action;
(c) extensive destruction or appropriation of cultural property protected under the Convention and this Protocol;
(d) making cultural property protected under the Convention and this Protocol the object of attack;
(e) theft, pillage or misappropriation of, or acts of vandalism directed against cultural property protected under the Convention.

The Contracting Parties are, according to the Second Protocol and also according to their respective national legislation, required to place these offences under penalty. The other articles regulate this in respect to jurisdiction (16), criminal prosecution (17), extradition (18), and mutual legal assistance (19–20) and furthermore also measure to prevent violations of the other provisions of the Convention and the Second Protocol (21).

Article 22 basically provides, parallel to Article 19 of the Convention, the applicability of the Second Protocol in conflicts of non-international character (paragraph 1) but introduces five limitations of the applicability (paragraph 2–6), essentially addressing the issue of "*internal disturbances and tensions, such as riots, isolated and sporadic acts of violence and other acts of a similar nature,*" and finally suggests – as already in the case of the Convention – UNESCO as a mediator in these conflicts (paragraph 7).

In Articles 20 to 29 institutional issues are dealt with, such as meetings of the Contracting Parties (Article 23) and the establishment of a Committee for the Protection of Cultural Property during armed conflict in Articles 24 to 28. With Article 27, paragraph 3, the importance of the participation of "*non-governmental organizations having objectives similar to those of the Convention, its First Protocol and this Protocol*" (cf. also Article 11, paragraph 3) is again highlighted in relation to the Committee; expressis verbis "*the International Committee of the Blue Shield (ICBS) and its constituent bodies*" as well as ICCROM and ICRC are mentioned. With Article 29, a Fund for the Protection of Cultural Property in the Event of Armed Conflict is established.

The provisions of Articles 30 to 33 relate to the dissemination of the Second Protocol to which the parties are committed, as well as the international cooperation and support, also by UNESCO. In Article 30, it is explicitly stated that the armed forces of a Contracting Party have to "*incorporate guidelines and instructions on the protection of cultural property in their military regulations*" (paragraph 3a) and their distribution among members of the armed forces which is one of the main desiderata with many armed forces in reality (cf. above).

Articles 34 to 38 contain the rules for the execution of the Second Protocol, thus in Article 34 the function of the Protecting Powers, and in Articles 35 and 36 arbitrations in conflicts of opinion concerning the interpretation of the Second Protocol. The final provisions for signature and ratification, accession and entry into force, and termination are contained in Articles 39 to 47.

Relation Between the Convention and the Geneva Additional Protocols I and II

Before the provisions of the Convention were extended and refined by the Second Protocol, the first two of the now three Additional Geneva Protocols were implemented in 1977, whose primary objective is to increase the effectiveness of the protection of the Geneva Convention of 1949. These Additional Geneva Protocols thereby address – unlike the Geneva Convention itself – the protection of cultural property.

The Additional Protocol to the Geneva Convention of August 12, 1949, on the Protection of Victims of International Armed Conflicts (Protocol I), adopted in Geneva on June 8, 1977, explicates in Article 53, on the "Protection of cultural objects and of places of worship":

> Without prejudice to the provisions of the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict of 14 May 1954, and of other relevant international instruments, it is prohibited:
> (a) to commit any acts of hostility directed against the historic monuments, works of art or places of worship which constitute the cultural or spiritual heritage of peoples;
> (b) to use such objects in support of the military effort;
> (c) to make such objects the object of reprisals.

The Additional Protocol to the Geneva Convention of August 12, 1949, on the Protection of Victims of Non-International Armed Conflicts (Protocol II), adopted in Geneva on June 8, 1977, explicates in Article 16, on the "Protection of cultural objects and of places of worship":

> Without prejudice to the provisions of the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict of 14 May 1954, it is prohibited to commit any acts of hostility directed against historic monuments, works of art or places of worship which constitute the cultural or spiritual heritage of peoples, and to use them in support of the military effort.

With these two Additional Geneva Protocols, the basic principles of the Hague Convention of 1954 are incorporated into the Geneva Convention and thus binding for those states that have not signed the Hague Convention of 1954 but are party to the Geneva Convention of 1949 and the two Additional Protocols. With the two

Additional Geneva Protocols, the central role of the Red Cross, respectively the International Committee of the Red Cross (ICRC), in the protection of cultural property during armed conflict is justified, which it still holds today, in cooperation with the International Committee of the Blue Shield.

Archaeology

Archaeological sites and archaeological objects are explicitly mentioned in Article 1 of the Convention as "cultural property" as defined by the Convention and thus every time implicitly referred to when the Convention speaks of "cultural property." The mentioning of archaeological sites as cultural property was not included in the preliminary drafts of the Convention text and was upon an Israeli proposal added to the list of immovable cultural property at the Hague Diplomatic Conference in May 1954, as the Israeli delegate noted "*that it was absurd to protect museums and allow their sources, which were the sources of history itself, to be exposed to the ravages of war*." The proposal was finally adopted by the Hague Conference by 30 votes to 1, with 5 abstentions. Accordingly, archaeological objects were explicitly included in the list of movable cultural property. In the following articles, archaeological property is no longer explicitly mentioned and the provisions of the Convention remain unspecific in this regard. This leaves the issue untouched of how the conduct of an archaeological excavation relates to the measures required in the Convention to protect cultural property in general and in regard to rescue excavation.

Archaeological excavation was subsequently also the subject of discussion on the protection of cultural property in occupied territory. Greece proposed the following addition to Article 5 of the Convention: "*The Occupying Power shall refrain from excavations or other action for the discovery of unknown cultural property save with the consent and participation of the competent national authorities of the occupied territory*." The proposal was only submitted orally at the closing stage of the last session of the Hague Conference and lost on the vote 9 votes to 8, with 22 abstentions. Thus, Article 5 of the Convention for the Protection of Cultural Property in Occupied Territory is phrased rather generally and does not refer to archaeological excavation at all.

The First Protocol does not explicitly mention archaeological sites, objects, or excavation.

The discussion on archaeological excavation in the occupied territory was, however, resumed at the 9th UNESCO General Assembly in December 1956 in New Delhi. The Conference finally passed the *Recommendation on International Principles Applicable to Archaeological Excavations*, whereby these principles had been pre-drafted by a Committee of Governmental Experts at an expert meeting in Palermo in May of that year. Article 32, the last but one, concretely refers to archaeological excavation in occupied territory: "*In the event of armed conflict, any Member State occupying the territory of another State should refrain from carrying out archaeological excavations in the occupied territory. In the event of chance finds being made, particularly during military works, the occupying Power should take all possible measures to protect these finds, which should be handed over, on the termination of hostilities, to the competent authorities of the territory previously occupied, together with all documentation relating thereto*." Nevertheless, this text does not imply the quality of a legally binding document in the sense of international humanitarian law (cf. the classification of official UNESCO texts – convention, recommendation, declaration). Therefore, experts, particularly the participants of the conference, requested that the principle expressed in Article 32 should be upgraded as an annex to the Hague Convention of 1954 aimed at an appropriate international legally binding character and a relevant revision of the Convention. A driving force behind the discussion was Jordan that expressed criticism of Israeli policy and suspected an attempt to twist historical facts behind the archaeological excavations in the – according to the then existing status based on the UN partition plan of 1947 – occupied territory of Palestine.

Consequently, specific considerations concerning archaeology in the discussions on the Second Protocol were primarily focused on the

issue of the protection of cultural property in occupied territory. Yet, the revised Lauswolt Document, as a result of the Lauswolt expert conference in 1997, did not contain any definite relation to archaeological excavation. But the draft text of the Second Protocol did state as a result of the Vienna expert conference of 1998 (in Article 3, paragraph 3, in the preliminary draft and) in Article 10, paragraph 1, in the final draft the sentence: "*Any form of theft, pillage or misappropriation of any archaeological excavation, any act of vandalism directed against any illicit purchase, or any other breach of integrity [or: authenticity] or any transformation of cultural property is prohibited*."

At the Hague Diplomatic Conference in March 1999, the issue of the protection of cultural property in occupied territory and therefore the issue of archaeological excavation in occupied territory were controversially discussed. The United States and others rejected the wording "*any archaeological excavation*" as being too comprehensive and proposed to exempt such excavation from the prohibition, which would be necessary for the preservation and protection of cultural property (in terms of rescue excavation). Israel viewed that the proposed wording by far exceeded the provisions of the original Convention. Lebanon suggested, as a compromise, to draft the provisions relating to theft and looting of archaeological sites and of archaeological excavation in two separate paragraphs, but insisted on the absolute prohibition of archaeological excavation in occupied territory. The UK rejected a total ban as being potentially counterproductive in practice. The working group "Chapter 2" under Austrian management eventually prepared the final wording of the prohibition: "*any archaeological excavation, save where this is strictly required to safeguard, record or preserve cultural property.*" This phrasing took into account all concerns as far as possible. On the one hand, it explicitly prohibits archaeological excavation in occupied territory in general as it had been repeatedly demanded since the 9th UNESCO General Assembly in 1956. On the other hand, it explicitly allows archaeological excavation if it is absolutely necessary for the purpose of conservation and protection of the archaeological property. The latter corresponds to the objections raised during the Hague Diplomatic Conference regarding a possible practical necessity of such excavation, e.g., in the course of the construction of buildings and roads, in occupied territory, as well as those concluding that an absolute prohibition of archaeological excavation in occupied territory was basically contradicting the Convention's requirement to protect cultural property in occupied territory.

Cross-References

- ▶ Blue Shield
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Military Personnel Training in Archaeology

Further Reading

Abtahi, H. 2001. The protection of cultural property in times of armed conflict: The practice of the International Criminal Tribunal for the former Yugoslavia. *Harvard Human Rights Journal* 14: 1–32.

Bevan, R. 2006. *The destruction of memory. Architecture at war*. London: Reaktion Books.

Bogdanos, M. 2005. The casualties of war. The truth about the Iraq Museum. *American Journal of Archaeology* 109 (3): 477–526.

Bos, A. 2005. The importance of the 1899, 1907 and 1999 Hague Conferences for the Legal Protection of Cultural Property in the Event of Armed Conflict. *Museum International* 228: 32–40.

Chamberlain, K. 2004. *War and cultural heritage. An analysis of the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict and its two protocols*. Leicester: Institute of Art and Law.

Cogbill, J.B. 2008. Protection of arts and antiquities during wartime. Examining the past and preparing for the future. *Military Review* 1: 30–36.

Desch, T. 1999. The Second Protocol to the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict. *Yearbook of International Humanitarian Law* 2: 63–90.

Emberling, G. 2008. Archaeologists and the military in Iraq, 2003–2008: Compromise or contribution? *Archaeologies* 4: 445–459.

Fechner, F., T. Oppermann, and L.V. Prott. 1996. *Prinzipien des Kulturgüterschutzes. Ansätze im deutschen, europäischen und internationalen Recht*. Berlin: Duncker & Humboldt.

Fiedler, W., and S. Turner. 2003. *Bibliographie zum Recht des internationalen Kulturgüterschutzes*. Berlin: Walter de Gruyter.

Fleck, D., ed. 2008. *The handbook of international humanitarian law in armed conflicts*. Oxford: Oxford University Press.

Forrest, G.J.S. 2007. The doctrine of military necessity and the protection of cultural property during armed conflicts. *California Western International Law Journal* 37 (2): 177–220.

Gerstenblith, P. 2006. From Bamiyan to Baghdad. Warfare and the preservation of cultural heritage at the beginning of the 21st century. *Georgetown Journal of International Law* 37: 245–351.

Gerstenblith, P. 2008. *Art, cultural heritage and the law.* Durham: Carolina Academic Press.

Gooren, R. 2007. Civil-military cooperation in protecting cultural heritage. *Forum Kulturgüterschutz* 10: 50–54.

Haunton, M. 1993. Peacekeeping, occupation and cultural property. *Humanitäres Völkerrecht – Informations-Schriften* 4: 199–203.

Henckaerts, J.-M. 1999. New rules for the protection of cultural property in the event of armed conflict. *International Review of the Red Cross* 835: 593–620.

Henckaerts, J.-M., and I.L. Doswald-Beck. 2006. *Customary international humanitarian law.* Cambridge: ICRC and Cambridge University Press.

HladÍk, J. 1998. The review process of the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict and its impact on international humanitarian law. *Yearbook of International Humanitarian Law* 1: 313–322.

HladÍk, J. 1999a. The 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict and the notion of military necessity. *International Review of the Red Cross* 835 (81): 621–635.

HladÍk, J. 1999b. Documents, diplomatic conference on the Second Protocol to the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict, The Hague, Netherlands (March 15–26, 1999). *International Journal of Cultural Property* 8 (2): 526.

HladÍk, J. 2000. Reporting system under the 1954 Convention for the Protection of Cultural Property in the Event of Armed Conflict. *International Review of the Red Cross* 840 (82): 1001–1016.

HladÍk, J. 2001. The control system under The Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict 1954 and its Second Protocol. *Yearbook of International Humanitarian Law* 4: 419–431.

HladÍk, J. 2004a. The UNESCO declaration concerning the intentional destruction of cultural heritage. *Art Antiquity and Law* 9 (3): 215–236.

HladÍk, J. 2004b. Marking of cultural property with the distinctive emblem of the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict. *International Review of The Red Cross* 86 (854): 379–387.

HladÍk, J. 2005. La Convention de la Haye de 1954: Quelques observations sur sa mise en oeuvre au niveau national. *Museum International* 228: 71–75.

HladÍk, J. 2007. Aspects civils et militaries. *Forum Kulturgüterschutz* 10: 29–33.

HladÍk, J. 2008. The main activities of the UNESCO secretariat related to the implementation of the Second Protocol to the Hague Convention of 1954. In *Culture and international law*, ed. P. Meerts, 155–166. The Hague: Hague Academic Press.

Hoffman, B.T., ed. 2006. *Art and cultural heritage. Law, policy, and practice*. Cambridge: Cambridge University Press.

Holtorf, C. 2005. Iconoclasm: The destruction and loss of heritage reconsidered. In *Art in the age of terrorism*, ed. G. Coulter-Smith and M. Owen, 228–239. London: Paul Holberton.

Kila, J. 2008a. Utilizing military cultural experts in times of war and peace: An introduction – Cultural property protection within the military, experiences in theatre, different perceptions of culture and practical problems. In *Culture and international law*, ed. P. Meerts, 183–229. The Hague: Hague Academic Press.

Kila, J. 2008b. The role of NATO and civil military affairs. In *Antiquities under siege. Cultural heritage protection after the Iraq war*, ed. L. Rothfield, 175–192. Lanham: Altamira.

Kila, J. 2010a. Embedding cultural property protection within the military in planning for protection of cultural heritage in times of conflict. In *Protecting cultural property in armed conflict. An insight into the 1999 Second Protocol to the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict*, ed. N. van Woudenberg and L. Lijnzaad. Leiden: Martinus Nijhoff.

Kila, J. 2010b. Can white men sing the blues? Cultural property protection in times of armed conflict deploying military experts. In *Archaeology, cultural property and the military*, ed. L. Rush, 41–59. Woodbridge: The Boydell Press.

Kila, J. 2011. Überlegungen zum Status quo der Beteiligung des Militärs am Schutz von Kulturgut. *Österreichische Militärzeitschrift* 5: 589–596.

Kila, J. 2012. *Heritage under siege: Military implementation of cultural property protection following the 1954 Hague Convention*. Leiden: Brill.

Kono, T., ed. 2010. *The impact of uniform laws on the protection of cultural heritage and the preservation of cultural heritage in the 21st century.* Leiden: Martinus Nijhoff.

Layton, R., J. Thomas, and P.G. Stone, eds. 2001. *Destruction and conservation of cultural property.* London: Routledge.

Manhart, C. 2004. UNESCO's mandate and recent activities for the rehabilitation of Afghanistan's cultural heritage. *International Review of The Red Cross* 86 (854): 401–414.

Matyk, S. 2000. The restitution of cultural objects and the question of giving direct effect to the Protocol to the

Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict 1954. *International Journal of Cultural Property* 9 (2): 341–346.

Meerts, P., ed. 2008. *Culture and international law*. The Hague: Hague Academic Press.

Menegazzi, C., ed. 2004. *Cultural heritage disaster preparedness and response*. Paris: International Council of Museums.

Meron, T. 2005. The protection of cultural property in the event of armed conflict within the case-law of the International Criminal Tribunal for the former Yugoslavia. *Museum International* 228: 41–60.

Meskell, L., ed. 1998. *Archaeology under fire. Nationalism, politics, and heritage in the Eastern Mediterranean and the Near East*. London: Routledge.

Micewski, E., and G. Sladek, eds. 2002. *Protection of cultural property in the event of armed conflict. A challenge in peace support operations*. Vienna: National Defence Academy.

Nafziger, J.A.R. 1976. UNESCO-centered management of international conflict over cultural property. *The Hastings Law Journal* 27 (5): 1051–1067.

Nelson, R.S., and M. Olin. 2004. *Monuments and memory, made and unmade*. Chicago: University of Chicago Press.

Nowicki, J., K. Slacinski, and K. 2004. *Cultural heritage in the face of threats in war and peace time*. Warsaw: Wydawnictwo SBP.

O'Keefe, R. 2006. *The protection of cultural property in armed conflict*. Cambridge: Cambridge University Press.

Odendahl, K. 2005. *Kulturgüterschutz. Entwicklung, Struktur und Dogmatik eines ebenenübergreifenden Normensystems*. Tübingen: Mohr Siebeck.

Olbrys, M. 2007. The Polish contribution to protection of the archaeological heritage in central south Iraq, November 2003 to April 2005. *Conservation and Management of Archaeological Sites* 8: 88–104.

Pabst, F. 2008. *Kulturgüterschutz in nicht-internationalen bewaffneten Konflikten*. Berlin: Duncker & Humboldt.

Reichelt, G., ed. 1992. *Internationaler Kulturgüterschutz*. Vienna: Manz.

Renfrew, C. 2006. *Loot, legitimacy and ownership. The ethical crisis in archaeology*. London: Duckworth.

Rothfield, L., ed. 2008. *Antiquities under siege. Cultural heritage protection after the Iraq war*. Lanham: Altamira.

Rothfield, L. 2009. *The rape of Mesopotamia. Behind the looting of the Iraq Museum*. Chicago: University of Chicago Press.

Roye, I., and G. Blazeby, eds. 2001. *Implementation of international humanitarian law and cultural heritage law*. Pretoria: ICRC.

Rush, L., ed. 2010. *Archaeology, cultural property and the military*. Woodbridge: The Boydell Press.

Schindler, D., and J. Toman, eds. 1988. *The laws of armed conflicts: A collection of conventions, resolutions and other documents*. Alphen aan den Rijn: Sijthoff & Noordhoff.

Schipper, F.T. 2005. The protection and preservation of Iraq's archaeological heritage from spring 1991 to spring 2003. *American Journal of Archaeology* 109 (2): 251–272.

Schipper, F.T. 2008. Zur Situation des Kulturgüterschutzes in den Palästinensischen Autonomiegebieten. In *Kulturelles Erbe – Vermächtnis und Auftrag*, ed. G. Sladek, 165–190. Klagenfurt/Vienna: Österreichische Gesellschaft für Kulturgüterschutz.

Schipper, F.T. 2010a. Archaeology in conflict. Setting the agenda. *Forum Archaeologiae* 54(4). http://farch.net

Schipper, F.T. 2010b. The protection of cultural property in the event of armed conflict and non-governmental organizations: The Blue Shield perspective. In *2010 World Universities Congress. 20/24 October 2010, Çanakkale Turkey. Proceedings*, 1522–1532. Çanakkale: Çanakkale Onsekiz Mart University.

Schipper, F.T., and H. Eichberger. 2010. The protection of cultural property in the event of armed conflict: The cultural property protection officer as a liaison between the military and the civil sector. *Present Pasts* 2 (1): 169–176.

Schipper, F.T., F. Schuller, K. von Habsburg-Lothringen, H. Eichberger, E. Frank, and N. Fürstenhofer. 2010. Cultural property protection in the event of armed conflict – Austrian experiences. In *Archaeology, cultural property, and the military*, ed. L. Rush, 145–158. Woodbridge: The Boydell Press.

Sladek, G., ed. 2008. *Kulturelles Erbe – Vermächtnis und Auftrag*. Klagenfurt/Vienna: Österreichische Gesellschaft für Kulturgüterschutz.

Stone, P.G. 2005. The identification and protection of cultural heritage during the Iraq conflict. A peculiarly English tale. *Antiquity* 79 (306): 933–943.

Stone, P.G. 2009a. Protecting cultural heritage in times of conflict. Lessons from Iraq. *Archaeologies* 5 (1): 32–38.

Stone, P.G. 2009b. Archaeologists and conflict: An impossible relationship? *Conservation and Management of Archaeological Sites* 11 (3–4): 315–332.

Stone, P.G., and J. Farchakh-Bajjaly, eds. 2008. *The destruction of cultural heritage in Iraq*. Woodbridge: The Boydell Press.

Strobl, L.M., and F.T. Schipper, eds. 2010. *Пакт Рериха. 75 лет защиты культуры и миротворчества/Der Roerich Pakt. 75 Jahre für Kulturgüterschutz und Frieden/The Roerich Pact. 75 years for protection of culture and peace-building*. Vienna: Blue Shield.

Syssoeva, E. 2004. *Kunst im Krieg. Eine völkerrechtliche Betrachtung des deutsch-russischen Kontroverse um kriegsbedingt verbrachte Kulturgüter*. Berlin: Duncker & Humboldt.

Toman, J. 1996. *The protection of cultural property in the event of armed conflict. Commentary on the Convention for the Protection of Cultural Property in the Event of Armed Conflict and its Protocol, signed on 14 May 1954 in The Hague, and on other instruments of international law concerning such protection*. Aldershot: UNESCO.

Toman, J. 2009. *Cultural property in war: Improvement in protection. Commentary on the 1999 Second Protocol to the Hague Convention of 1954 for the Protection of Cultural Property in the Event of Armed Conflict*. Paris: UNESCO.

van Woudenberg, N., and L. Lijnzaad, eds. 2010. *Protecting cultural property in armed conflict. An insight into the 1999 Second Protocol to the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict*. Leiden: Martinus Nijhoff.

von Schorlemer, S. 1992. *Internationaler Kulturgüterschutz. Ansätze zur Prävention im Frieden sowie im bewaffneten Konflikt*. Berlin: Duncker & Humboldt.

Convention for the Safeguarding of Intangible Cultural Heritage (2003)

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Introduction

UNESCO's Convention for the safeguarding of intangible cultural heritage was adopted in October 2003 at its 31st General Conference and entered into force on 20 April 2006. With the ratification of Malta on 13 April 2017, it now has 172 States Parties representative of all regions of the world. For some States, particularly in Africa, oral and traditional culture represents a major form of cultural heritage, and intangible heritage makes a significant contribution to the social and economic development of such societies and the well-being of their populations (Blake 2001). This was an important factor in giving the impetus to strengthen international safeguarding of this heritage and to give it more prominence. Moreover, the international community has recognized the importance of intangible cultural heritage as a basis for cultural diversity (an important value given recognition in UNESCO's Universal Declaration on Cultural Diversity of 2001) and the major role it can play in fostering truly sustainable development (UNESCO 2002).

Previous to the adoption of this Convention, the 1989 Recommendation on Safeguarding Traditional Culture and Folklore was the only international instrument addressing this question, although it had originally been proposed that intangible cultural heritage should be included as a subject matter of the 1972 Convention on the Protection of the World Cultural and Natural Heritage of UNESCO (Aikawa 2004). Two operational programs of UNESCO have also played an important part in normative development in this field: first, the Living Human Treasures program (1993) (UNESCO 1998) which was aimed at giving recognition to those individuals who are the living exponents of traditional culture and who ensure the transmission of their ICH to future generations by transmitting their skills, techniques, and knowledge. The second, entitled Masterpieces of the Oral and Intangible Heritage of Humanity (1998) (UNESCO 2006), had the aim of raising awareness of the importance of ICH among Member States and people at large through international proclamations of outstanding examples of such heritage.

In considering the model for a Convention on ICH, it was felt that one based broadly on the principles and mechanisms of the 1972 Convention would be the most appropriate, given the importance of raising awareness of this heritage and the great success of that older treaty (Bedjaoui 2004). However, it needed to be substantially adapted to the needs of intangible cultural heritage and the communities that create and maintain it (Kuruk 2004). In particular, it was important to give recognition to representative examples of ICH rather than "outstanding" ones (i.e., to avoid creating a hierarchy of items of ICH) and to avoid the "fossilization" of this living and evolving heritage that the use of a listing mechanism might risk (Kurin 2004). Another important consideration in developing this Convention was to make a clear separation from intellectual property approaches to protection (although very valuable in themselves) and for UNESCO to develop a purely cultural approach (Blake 2006).

Definition

The Convention in Brief

The Convention is divided into nine parts as follows. Part I (Articles 1–3) sets out the purposes of the Convention, definitions of key terms, and its relationship with other international instruments. Part II (Articles 4–10) is concerned with the organs of the Convention as described above, and Part III (Articles 11–15) is devoted to measures to be taken at national level to ensure the safeguarding of intangible cultural heritage, especially that which is not inscribed on either international List. Part IV (Articles 15–18) which deals with safeguarding ICH at the international level establishes two international Lists (the Representative List and the Urgent Safeguarding List) and a Register of Good Safeguarding Practices. Provisions relating to international cooperation and assistance are set out in Part V (Articles 19–24), and the establishment and operation of the Intangible Heritage Fund are placed in Part VI (Articles 25–28). Part VII (Articles 29–30) establishes a reporting system, and Part VIII (Article 31) comprises a transitional clause allowing for "Masterpieces" proclaimed under the 1998 program to be incorporated into the Representative List before the entry into force of the Convention. The final clauses are set out in Part IX (Articles 32–38).

The purposes of the Convention as set out in Article 1 are (a) to safeguard ICH; (b) to ensure respect for ICH; (c) to raise awareness at local, national, and international levels of the importance of ICH and thus to ensure a mutual appreciation of it; and (d) to provide for international cooperation and assistance. "Intangible cultural heritage" is defined in Article 2(1) as comprising "practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith" recognized by communities as their own, a source of identity and continuity for them, subject to intergenerational transmission and compatible with international human rights standards, mutual respect among communities sustainability. Paragraph 2 of this article then describes some of the main domains in which this heritage is manifested: (a) oral traditions and expressions, including language as a vehicle of the intangible cultural heritage; (b) performing arts; (c) social practices, rituals, and festive events; (d) knowledge and practices concerning nature and the universe; (e) traditional craftsmanship (van Zanten 2004). The term "safeguarding" is also defined in paragraph 3, and this understanding of safeguarding is a central motif that runs throughout the whole of the Convention text. It comprises "measures aimed at ensuring the viability of the intangible cultural heritage" that include the identification, documentation, research, preservation, protection, promotion, enhancement, transmission (particularly through formal and nonformal education) of it, as well as revitalization of various aspects of it.

In terms of institutional mechanisms, the 2003 UNESCO Convention establishes two main organs, namely, a General Assembly of the States Parties, that is, its sovereign body, and an Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage (henceforth "ICH Committee") whose task is to oversee the implementation of the Convention, especially those provisions relating to the listing of ICH (selection criteria, amendments to the lists, etc.), international assistance, and the participation of non-state actors, especially cultural communities in implementing actions. The aforementioned Representative List of the Intangible Cultural Heritage of Humanity and the List of Intangible Cultural Heritage in Need of Urgent Safeguarding are established under Articles 16 and 17, on which ICH is inscribed according to criteria to set out in the Operational Directives for implementing the Convention (see below). These lists are designed, respectively, to raise awareness of the ICH (both internationally and locally) and to respond urgently in cases where ICH is in immediate danger of disappearance or serious distortion; for example, the requirement under Article 12 of the Convention that Parties draw up one or more inventories of ICH present in their territories, which is closely tied to the international listing system and represents a crucial aspect of national

safeguarding policies. The Convention also provides for a system of international assistance and cooperation to address the fact that the safeguarding of ICH is a matter of common concern to humanity and requires international solidarity to be achieved. In recognition of the fact that many of the States richest in ICH are also some of the world's least developed, an Intangible Heritage Fund is set up to support Parties in their safeguarding activities and the overall implementation of the Convention. In parallel with the establishment of these two international Lists, a general duty is placed on Parties to take the necessary measures for the national safeguarding of ICH present on their territories. This means that the international dimension of the Convention – the international Lists, assistance, and cooperation and the Fund – is to be fully complemented by safeguarding of all ICH whether listed or not at national level. A fundamental step in this is the identification and definition of such heritage which should be undertaken with participation of communities, groups, and relevant nongovernmental organizations. This should also be strengthened by the drawing up of one or more inventories of ICH; notably, the selection criteria for inscription on the two Lists require that any item of ICH proposed for inscription should already have been entered on a national inventory through a participatory process. Other national safeguarding measures should include promoting the function of ICH in society and taking account of it in planning programs; designating (or establishing) one or more competent bodies for safeguarding national ICH; encouraging study of the ICH and development of new research methodologies; adopting appropriate legal, technical, administrative, and financial measures that encourage training in ICH and its transmission; ensuring access to ICH while respecting customary practices governing this; and setting up institutions for the documentation of ICH. Education, awareness-raising, and capacity-building are also given prominence as national part of a national safeguarding strategy, with an emphasis on young people and the communities and groups related to this heritage, nonformal means of education, and building management and research capacities within communities. A notable provision is Article 15 that requires Parties to seek the widest possible participation of communities, groups, and (where appropriate) individuals "that create, maintain, and transmit" ICH in safeguarding activities and their active involvement in its management. This is an innovative approach for a cultural heritage instrument and poses important challenges to many States that operate a top-down, state-driven approach to cultural heritage management.

The implementation of the Convention's provisions is overseen by the Intangible Heritage Committee and governed by the Operational Directives adopted by the General Assembly of States Parties in 2008 (and subsequently revised in 2010, 2012, 2014, and 2016). The Directives cover such matters as criteria for inscription on the Urgent Safeguarding and Representative Lists; incorporation of items proclaimed "Masterpieces of the Oral and Intangible Heritage of Humanity" into the Representative List; criteria for selecting programs, projects, and activities that best reflect the principles and objectives of the Convention; the use of the ICH Fund established by the Convention; the purposes and forms of international assistance; participation of communities, groups, and, where applicable, individuals, as well as experts, centers of expertise, and research institutes in the operation of the Convention; and the role of nongovernmental organizations. The Directives are evolving in response to experience of implementing the Convention as well as new scientific knowledge, just as the Operational Guidelines to the 1972 World Heritage Convention have over the past 40 years. For example, new directives on raising awareness of ICH were adopted in 2010 that strengthen forms of community participation, and a new Chapter VI on sustainable development was added in 2016 that includes reference, inter alia, to gender equality. In 2012, the ICH Committee established the Evaluation Body on composed of six qualified governmental experts and six members of accredited nongovernmental organizations for the purpose of examining nominations for inscription on the Urgent Safeguarding List, proposals to the Register of Good Safeguarding Practices, and

requests for international assistance greater than US $100,000. This body, therefore, has a role similar to that of ICOMOS and IUCN for the World Heritage Committee of the 1972 Convention.

The List of ICH in Need of Urgent Safeguarding, which contained 47 items by 2016, comprises elements of intangible heritage that require urgent measures to keep them viable as judged by the States Parties and concerned communities, and, by inscribing an element on this List, international cooperation and assistance for stakeholders to undertake appropriate safeguarding measures can be mobilized. Examples of inscribed elements include a black pottery manufacturing process (Portugal); a popular ritual for maintaining the social and cosmic order (Brazil); traditional Lenj boatbuilding and sailing skills (Iran); wooden movable-type printing (China); the Mongol Tuuli epic (Mongolia); the Sanké mon collective fishing rite (Mali); and the Suiti cultural space (Latvia). The Representative List of the ICH of Humanity (RL) contains practices and expressions of ICH that demonstrate the diversity of this heritage and raise awareness about its importance. Unlike inscriptions on the World Heritage List, these items may be fairly mundane per se but are significant for their *representative* character. In 2008, the ICH Committee incorporated 90 items into the RL that had formerly been proclaimed as Masterpieces (under the terms of Article 31 of the Convention). By 2016, the number of elements inscribed on this List reached 365, with the addition of 33 in 2016 and including 2 re-inscriptions. This List is broad ranging and includes beer culture in Belgium, an annual carnival bell ringers' pageant (Croatia), irrigators' tribunals of the Mediterranean coast (Spain), the sociocultural space of the Candombe (Uruguay), an ethnic Korean farmers' dance (China), the art of falconry (a joint nomination from the UAE, Austria, Belgium, the Czech Republic, France, Germany, Hungary, Italy, Kazakhstan, Republic of Korea, Mongolia, Morocco, Pakistan, Qatar, Saudi Arabia, Spain, Syrian Arab Republic), the gastronomic meal (France), and a customary normative system (Colombia). The Register of Good Safeguarding Practices had 17 inscribed good practices by 2016, with 5 added in that year which included an ecomuseum (Croatia), a modern approach to traditional boatbuilding (Norway), a folklore festival (Bulgaria), regional craftsmanship centers (Austria), and a concept of safeguarding folk music (Hungary).

C

Key Issues

During the Convention's operation, certain key issues will continue to be confronted, and the response of the Parties (as expressed in the ICH Committee and the General Assembly) will have to be refined. Although it is relatively early still for much experience to have been gathered, we can identify certain aspects of its implementation that require further development. For example, the approach of this Convention toward the role of the wider community (especially those communities and groups that have a special relationship with a certain ICH) sets it apart from other cultural heritage Conventions. Although such a participatory approach may be found in Conventions dealing with sustainable environmental protection, for example, it is the first time that the central role of the community in safeguarding and managing cultural heritage has been explicitly recognized in a legal instrument. In a similar vein, the notion of "safeguarding" under this Convention is a comprehensive one that not only includes classic "protection" actions such as identification and inventorying of the ICH but also extends to providing the conditions within which it can continue to be created, maintained, and transmitted. This, in turn, implies the continued capability of the cultural communities themselves to do this – i.e., the community itself is the vital context for the existence of ICH and is placed at the center of this Convention rather than the heritage itself. In this way, the safeguarding of ICH is a more context-dependent approach that takes account of the wider human, social, and cultural contexts in which the enactment of ICH occurs.

Another significant conceptual departure from previous cultural heritage treaties, in particular, the 1972 Convention on which it was largely modeled,

has been the removal of any reference to the notion of "outstanding" or "exceptional" value as a definitional criterion. The intention behind this is to avoid any suggestion of creating a hierarchy of ICH and emphasizing that it is the significance of the ICH to its bearer community that is primarily being celebrated and safeguarded (Deacon and Beazley 2007). This involves a major paradigm shift in the approach both of national cultural heritage bodies and the international community. The implications of both of these developments are still to be fully understood.

The system for international cooperation and assistance for safeguarding ICH is another central feature of the Convention, and an important innovation here is the provision for joint requests for inscription by two or more States Parties in recognition of the fact that much ICH is transfrontier in character and will therefore often have more than one State Party with a territorial interest in its safeguarding. Again, this introduces new understanding of cultural heritage protection and management that accepts that cultural and geopolitical "frontiers" are frequently not coterminous and one that will have important effects on how States cooperate for the safeguarding of ICH. Moreover, the main purposes for which international assistance may be granted now include support for programs, projects, and activities for safeguarding ICH on national, subregional, and regional levels.

This Convention also raises important questions concerning the relationship between tangible and intangible cultural heritage and how to integrate safeguarding approaches to both these aspects of heritage. Earlier UNESCO cultural heritage treaties had been explicitly designed to protect and preserve the material (or "tangible") heritage, even if the associated intangible elements may also have been implicitly recognized. The effect of this is to create an artificial and arbitrary distinction between the "tangible" and "intangible" aspects of cultural heritage that is meaningless, for example, to many indigenous cultures since it fails to reflect their holistic view of heritage (Daes 1997 at para. 25). In many ways the result of an historical evolution in cultural heritage lawmaking has created an interesting "gray area" between the 1972 and 2003 Conventions where the same element may be subject to international protection and safeguarding under both treaties. A clear example of this is the Rice Terraces of the Philippine Cordilleras which were inscribed on the World Heritage List in 1995 as the first "organic evolving cultural landscape." In 2001, the Hudhud Chants of the Ifugao, songs of the women working on the Rice Terraces as part of the special ritual of rice planting, were recognized as Masterpieces of the Oral and Intangible Heritage of the World in 2001 (and subsequently incorporated into the Representative List of Intangible Heritage of the 2003 Convention). This overlap between the tangible and intangible aspects of heritage will require further consideration and the development of new approaches to implementation to resolve.

As noted above, the role that safeguarding intangible cultural heritage within the framework of the Convention can play in contributing to achieving more sustainable forms of development (in areas such as food security, health, conflict prevention and post-conflict resolution, and providing sustainable livelihoods) is a more recently addressed contextual issue of implementation that the Committee has addressed in its Directives. This new section also seeks to make States Parties more aware of the complex gender dimensions of ICH safeguarding and, in particular, the imperative to maintain gender equality as far as possible.

Given the relative youth of safeguarding measures for ICH in many countries, questions regarding such issues as establishing national ICH inventories (their scope, the criteria for inventorying, the ownership of inventoried items, etc.), ensuring community participation, capacity-building in both national bodies and communities, and dealing with secret and sacred heritage will increasingly be confronted. For this reason, it will be important for good practices from around the world to be gathered, shared, and evaluated so that the national safeguarding of ICH can reach the same level of expertise as that for the material cultural heritage. To take this further, it can also be said that improving the safeguarding of ICH will also address gaps in protecting "tangible" cultural heritage since they have such a close and intimate relationship with each other.

Cross-References

- ▶ Intangible Cultural Heritage
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO World Heritage Convention (1972)
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Aikawa, N. 2004. An historical overview of the preparation of the international convention for the safeguarding of intangible cultural heritage. *Museum International* 221–222: 137–149.

Bedjaoui, M. 2004. The convention for the safeguarding of intangible cultural heritage: The legal framework and universally accepted principles. *Museum International* 221–222: 150–154.

Blake, J. 2001. *Developing a New Standard-setting Instrument for Safeguarding Intangible Cultural Heritage—Elements for Consideration*. Paris: UNESCO.

Blake, J. 2006. *A commentary on the UNESCO convention for safeguarding the intangible cultural heritage*. Leicester: Institute of Art & Law.

Daes, E.-I. 1997. *Protection of the heritage of indigenous peoples*. New York/Geneva: United Nations.

Deacon, H., and O. Beazley. 2007. Safeguarding intangible heritage values under the world heritage convention: Auschwitz, Hiroshima and Robben Island. In *Safeguarding intangible cultural heritage – Challenges and approaches*, ed. J. Blake, 93–108. Leicester: Institute of Art & Law.

Kurin, R. 2004. Safeguarding intangible cultural heritage in the 2003 UNESCO Convention: A critical appraisal. *Museum International* 221–222: 66–77.

Kuruk, P. 2004. Cultural heritage, traditional knowledge and indigenous rights: An analysis of the convention for the safeguarding of intangible cultural heritage. *Macquarie Journal of International and Comparative Environmental Law* 1: 111–134. 471.

UNESCO. 1998. *Guidelines – Living human treasures*. Paris: UNESCO.

UNESCO. 2002. *Intangible cultural heritage – A mirror of cultural diversity. Declaration of the 3rd Round Table of Ministers of Culture, Istanbul*. Paris: UNESCO.

UNESCO. 2006. *Masterpieces of the oral and intangible heritage of humanity. Proclamations 2001, 2003 and 2005*. Paris: UNESCO, Intangible Heritage Section.

van Zanten, W. 2004. Constructing new terminology for intangible cultural heritage. *Museum International* 221–222: 36–45.

Further Reading

Blake, J., ed. 2007. *Safeguarding intangible cultural heritage – Challenges and approaches*. Leicester: Institute of Art & Law.

Davis, P., and M.L. Stefan, eds. 2016. *Intangible cultural heritage*. London: Routledge.

Lixinski, L. 2013. *Intangible heritage in international law*. Oxford: Oxford University Press.

Smith, L., and N. Akagawa, eds. 2008. *Key concepts in cultural heritage – The intangible cultural heritage*. London: Routledge.

C

Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)

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Introduction

The Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970) is an attempt to control the movement of cultural property from one State to another where this is against the laws of one or both. The property may be stolen from its owner or the movement itself may be prohibited such as when an object is smuggled from one state into another. As of 30 March 2018, there were 136 States Parties to the Convention.

Definition

Cultural property for the purposes of the Convention is defined in Article 1. To qualify, the property must be "specifically designated by each State as being of importance for archaeology, prehistory, history, literature, art or science." In addition, it must belong to 1 of 11 categories of objects set out in the Article. These include the products

of archaeological excavations (including regular or clandestine) and antiquities more than 100 years old.

The meaning of "specifically designated" has been contested over the years. However, it is now widely accepted that each State has the right to decide what objects are important for its own cultural heritage. There is wide variation in how States do this. Some have a list of individually named items that are prohibited from export. Others have what is called a control list – there is a description of general categories, for example, archaeological objects, which is then broken down by criteria based on significance, age, and representation in local collections. Only that material is subject to export control.

Key Issues

The Convention can only be directly utilized by States. Individuals have no right to take any action under this instrument. For example, an archaeologist who knows objects are being clandestinely excavated and smuggled out of the country cannot directly rely on this Convention to do anything about it. He or she would have to go to the authorities and make a complaint. It is then up to those authorities to take what action they consider desirable in accordance with local law, the Convention and, particularly, political considerations. They may conclude that other factors outweigh any benefits to be taken by pursuing the smugglers.

Like other UNESCO Conventions, the 1970 Convention was drafted at a diplomatic conference attended by representatives of States interested in the issue. During these conferences, compromises are often made among the delegates. In 1970, the conference was presented with a draft convention prepared by a "special negotiating committee" established by UNESCO. The United States of America, having taken no part in the negotiation of this document, produced its own draft. In order to encourage the United States' participation, two articles from its draft were incorporated in the UNESCO draft. These now appear as Articles 7 and 9 of the Convention.

The view has been taken by the United States and some other countries that these articles are the heart of the Convention. Article 7 deals with offers to museums of illegally exported cultural property and theft from museums and other public institutions. Article 9 provides for concerted international efforts, including the control of exports and imports, when "cultural patrimony is in jeopardy from pillage of archaeological or ethnological material." Concentration on these two articles gives the Convention a very narrow application.

Those who want a broader interpretation rely on Article 3: "The import, export or transfer of ownership of cultural property effected contrary to the provisions adopted under this Convention by the States Parties thereto, shall be illicit." They regard Article 3 as the overall governing provision of the Convention and Articles 7 and 9 as specific applications (O'Keefe 2017).

While these interpretations indeed represent different philosophies regarding the trade in cultural property, the issue is exacerbated by different approaches to legal drafting. The United States draft was prepared by Common Law lawyers who are accustomed to working with very precise and defined legal documents. The UNESCO draft came from the Civil Law tradition where legislation is expressed in terms of general principle which is then applied to specific situations by officials or the courts. These different approaches can be seen in Articles 3, 7, and 9.

When States become party to a Convention, they are required to comply with any obligations it imposes. But how this is done depends very much on the State concerned. For example, under its Constitution, the Convention may automatically become part of the local law when the State ratifies, and its meaning would then have to be interpreted by the national courts. In other States, if the Convention affects the rights of citizens, legislation must be passed to implement it.

These different views of the Convention influence how States use it to control imports of cultural property that is alleged to have been illegally exported. For example, Australia takes a broad view. It considers as an illegal import all cultural property that another State regards as illegally

exported under a law concerning cultural property. It does not matter when the object was illegally exported provided it was imported into Australia after the date the Australian implementing legislation came into force, that is, 1 July 1987. Nor does Australia require the other State to be party to the Convention. Forfeiture of such cultural property is not automatic. There must first be a request from the government of the country concerned to the Australian government for its return.

The United States does not implement the provisions of this Convention on foreign export controls directly but only through further bilateral agreements with individual States to restrict imports of defined archaeological and ethnological material. The foreign State has to prove to a Cultural Property Advisory Committee that there is an emergency condition regarding the defined material. If the argument is accepted, and an agreement is entered into, any such material entering the United States is subject to seizure and forfeiture carried out under normal Customs procedures. As of 30 March 2018, there were 17 such agreements or Memoranda of Understanding as the United States calls them. Countries involved include China, Cyprus, Greece, and Italy (full details of this system are available at https://eca.state.gov/cultural-heritage-center/cultural-property-protection/bilateral-agreements). The other State party to the bilateral agreement may also accept obligations. For example, Italy agreed to continue its efforts to:

- Ensure the prompt prosecution of looters
- Stop the illicit use of metal detectors in archaeological areas
- Enhance training for the Carabinieri Special Unit for the Protection of Artistic Patrimony
- Create and pursue innovative and effective ways to detect and stop the looting of archaeological sites

Switzerland has followed the United States in demanding bilateral agreements for implementation of the foreign export controls. As of 30 March 2018, it had such agreements with China, Columbia, Cyprus, Egypt, Greece, Mexico, and Peru (http://www.bak.admin.ch/kulturerbe/04371/04377/index.html?lang=en).

While limited, the method of enforcement adopted by the United States and Switzerland is much more effective than that of Japan which took a very narrow interpretation of the Convention and narrowed it further by administrative arrangements that can apply only in a few instances. Objects from clandestine excavations and unlawful exports from foreign countries into Japan are not covered. Only cultural property stolen from a museum or other institution under Article 7(b)(i) of the Convention after 9 December 2002 and which is on an inventory supplied to the Japanese Government can be considered for return if found in Japan (Kono and Kani 2003).

Some States that are listed as party to the Convention have had their status questioned in other States. For example, France is listed as having ratified the Convention, but in an English case – *Iran v. Berend* [2007] EWHC 132 – the judge took the view that the Convention was not "yet part of the law of France." France had assumed that its existing law was sufficient to implement the Convention. Either the English judge was wrong as to the effect of French law or France needs to effectively implement it.

This complicated situation may cause despair in the hearts of some. However, if they are seeking the return of an object, it is the law of the State where the object is located that must be considered, preferably by an expert legal advisor. If the law of that country incorporates the 1970 Convention, then there is a greater chance of being successful.

Even if that State is not a party to the Convention, the latter can still have influence. Its courts may be prepared to consider the Convention as representing public policy that they should follow. There was a well-known case in Germany in 1972 – *Allgemeine Versicherungsgesellschaft v. E.K.* (BGHZ 59 at 83) – where the court found that the Convention represented emerging international public policy. A German company had insured a consignment of African masks and statues sent by a Nigerian company from Port Harcourt in Nigeria to Hamburg. Six bronze statues disappeared and the Nigerian company

sought to recover their value under the insurance contract. The statues had been exported contrary to Nigerian law. The court held that, even though Germany was not a party to the Convention, the contract was unenforceable in Germany as it was against public policy including emerging international public policy.

The Convention has also heavily influenced codes of ethics adopted by museums and other public bodies. For example, the International Council of Museums (ICOM) has a Code of Ethics (http://icom.museum/who-we-are/the-vision/code-of-ethics.html) which lists the Convention as "international legislation that is taken as a standard in interpreting" the Code. It further states that museum policy should acknowledge this. Thus, the Convention, through the Code, applies not only to member museums but also to the conduct of individual members of the museum profession as they need to be "conversant with relevant international, national and local legislation"(Paragraph 8.1) and they "should not support the illicit traffic or market in natural and cultural property, directly or indirectly" (Paragraph 8.5).

Independently of the ICOM Code, many collecting institutions have used the date the UNESCO General Conference adopted the Convention, that is, 1970, as a watershed in their collecting policies. For example, the British Museum states that objects "acquired for the Collection should have a documented legal history; which, where applicable, should extend back before November 14th 1970" (https://www.britishmuseum.org/pdf/Acquisitions%20policy%20July%202013%20FINAL.pdf). The J. Paul Getty Museum has decided that the object should be outside its country of modern discovery since 1970 or legally exported from its country of modern discovery since 1970 (http://www.getty.edu/about/governance/pdfs/acquisitions_policy.pdf). Many other museums have adopted the same approach which illustrates the significance of the 1970 Convention outside its purely legal role.

There are other provisions of the Convention that attempt to control illicit traffic in cultural property. For example, dealers play a major part in the transmission of such property. The Convention does have a provision intended to regulate dealing in cultural property. Article 10 requires dealers to have a register recording the origin of each item, the name and address of the person they acquired it from, and the price and description of each item sold. This should allow objects to be traced more easily. However, the Convention stated that registration would be "as appropriate for each country." Once again, there are major variations in how States implement this provision. Some have very detailed rules which are enforced by regular visits from the police. Others have relied on the information they collect in connection with value added tax. For example, the United Kingdom maintains that what dealers have to report for this purpose gives up the same information as Article 10 requires. However, being in a different context means that the information is not as obvious or as readily available as it would be if collected in the context of enforcing the Convention.

Since its inception, UNESCO has been concerned with protection of cultural property in time of armed conflict. It has a Convention with two Protocols concerned with this. One significant aspect of such protection is the control of movement of cultural property during the conflict. The Protocol to the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict 1954 is entirely devoted to this issue, and Article 9 of the Second Protocol 1999 is also relevant. Article 11 of the 1970 Convention should also be applied although it seems to have been largely ignored. There are significant questions concerning its implementation. For example, the Article refers only to export and transfer of ownership. If either of these is done "under compulsion," arising from the occupation of a country, the transaction is to be regarded as "illicit." What this means is not clear. Perhaps the transaction should be regarded as void and ineffective as contrary to public policy. At the very least, it should not be allowed to stand, and the position prior to the occupation should be reinstated.

Future Directions

The 1970 Convention now has 136 States Parties, but the geographical distribution of these States is very uneven. There are few States Party from the Pacific area, and in Africa, significant States such as Kenya, Malawi, Mozambique, Namibia, and Uganda are not party. In Europe, the past decade has seen that major art market countries such as Belgium, Denmark, Germany, the Netherlands, and the United Kingdom become party but not yet States such as Ireland and Malta. UNESCO is seeking to increase the number of States Parties through targeted national information campaigns directed to parliamentarians and other people at the political level to explain "how far action developed internationally can help reinforce the legal and operational framework of States for the protection of their cultural heritage" (UNESCO Doc. 184/EX 20). UNESCO has decided that the 1970 Convention would be given priority for monitoring.

Some consider the Convention to be outdated after 48 years. They argue that it should be replaced by one more attuned to current conditions, for example, that there should be a greater emphasis on penal aspects of the fight against illicit traffic. But any attempt to change the Convention is fraught with difficulties. First, there would be a problem in obtaining agreement among States on the content of such a Convention. We have seen the different ways in which States implemented the present Convention. Reaching agreement on a new text would be a long and controversial undertaking. The second point is related to this. Negotiating a convention that affects the rights of States and their citizens is a lengthy and costly project. For example, the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001 took 10 years from the time the Member States of UNESCO were presented with a draft text by the International Law Association and involved four major negotiating meetings in Paris as well as numerous subsidiary ones. These meetings are costly to run both for the States sending delegates and for UNESCO, which has to provide the facilities including simultaneous interpretation in a number of languages. Finally, if a new Convention were to be adopted, would it require States becoming party to denounce the 1970 Convention? If so, there would be a period when some States were party to the new Convention and some to the old. For a long time, protection would be diminished till the former gained sufficient adherents to make it workable. If States were not required to denounce the 1970 Convention, there would be a situation where some States were party to the new Convention, some to the 1970 Convention, and some to both.

Cross-References

- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Vandalism and Looting (Ethics)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Kono, T., and E. Kani. 2003. Japan's measures for the implementation of the 1970 UNESCO convention. *Art Antiquity and Law* 8: 107–131.

O'Keefe, P.J. 2017. *Protecting cultural objects: Before and after 1970*. Builth Wells: Institute of Art and Law.

Further Reading

Forrest, C. 2010. *International law and the protection of cultural heritage*. Abingdon: Routledge.

House of Commons Culture, Media and Sports Committee. 2000. *(HC 371–1) Seventh report: Cultural property return and illicit trade*. London: The Stationery Office.

Ministerial Advisory Panel on Illicit Trade. 2000. *Report*. London: Department of Culture, Media and Sport.

O'Keefe, P.J., and L.V. Prott. 2011. *Cultural heritage conventions and other instruments: A compendium with commentaries*. Builth Wells: Institute of Art and Law.

Prott, L.V. 2009. *Witnesses to history: A compendium of documents and writings on the return of cultural objects*. Paris: UNESCO.

Raschèr, A.F.G., et al. 2005. *Cultural property transfer*. Brussels/Zurich: Bruyland and Schulthess.

Convention on the Protection of the Underwater Cultural Heritage (2001)

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The Convention on the Protection of the Underwater Cultural Heritage was adopted by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 2001. It entered into force internationally on 2 January 2009, 3 months after the date of deposit of the twentieth instrument of ratification. As at 29 August 2017, the Convention had been ratified by 57 States. The genesis of the Convention was in 1988, and it was therefore the product of 13 years of drafting work and negotiations.

The Convention is an international treaty which is designed to create a comprehensive and uniform legal framework to regulate human interference with underwater cultural heritage (UCH) in order to ensure that such heritage is preserved for the benefit of humanity. For the most part, its provisions are aimed at regulating activities which are "directed at" UCH, in other words activities conducted with an intention to physically disturb UCH. Therefore, while the Convention is primarily aimed at controlling the activities of treasure hunters and souvenir seekers, its regulations apply with equal force to activities of archaeologists as well. The Convention is not designed to prohibit deliberate interference but instead to ensure that any such interference is regulated in accordance with internationally accepted archaeological standards. Those standards are enshrined in the Rules set out in an Annex to the Convention, and they form an integral part of the Convention. The Rules are based on the Charter on the Protection and Management of Underwater Cultural Heritage 1996, a set of guidelines produced by the International Council for Monuments and Sites (ICOMOS).

UCH is defined by the Convention to mean "all traces of human existence having a cultural, historical or archaeological character which have been partially or totally underwater, periodically or continuously, for at least 100 years" (Art. 1(1)(a)). A non-exhaustive list of examples of such "traces" provided by the Convention makes it clear that the definition extends to three categories of remains: (i) sites, structures, buildings, artifacts, and human remains, together with their archaeological and natural context; (ii) vessels, aircraft, other vehicles or any part thereof, their cargo, or other contents, together with their archaeological and natural context; and (iii) objects of prehistoric character. Controversially, there is no significance criterion. Instead the key limiting factor is that the material must have been underwater for at least 100 years. This means that material remains of the twentieth century are gradually falling within the scope of the Convention, and, significantly, all the remains of World War I located in maritime areas around the world will soon be covered. The reason that a time limit of this sort is necessary in the context of material found in the sea is that there needs to be some way of distinguishing between material that is subject to ordinary commercial laws, including the law of salvage, and that which falls within the preserve of heritage law. The Convention follows the approach of some national underwater heritage legislation in adopting 100 years as the point of division.

At the heart of the Convention lie a number of core principles and objectives. Preservation in situ must be considered as the first option in determining a management plan for any site, and interference will be permitted only where justified for scientific or protective purposes. In circumstances where recovery of UCH is permitted, the recovered material must be deposited, conserved, and managed in a manner that ensures its long-term preservation. Among other things, UCH must not be commercially exploited and, subject to two limited provisos, this means that it must not be "traded, sold, bought or bartered as commercial goods" (Annex, Rule 2). While the law of salvage is not explicitly excluded from applying to UCH falling within the scope of the Convention, the circumstances in which it can apply are so restricted that its application is very unlikely in practice. Responsible nonintrusive access to observe or document in situ UCH is encouraged except where incompatible with its protection and management. The cornerstone of the Convention is the broad general principle that

States Parties must cooperate in the protection of UCH. This principle underlies many of its protective mechanisms and is one of the Convention's most valuable features.

Although some provision is made for all maritime waters, including the territorial sea, the focus of attention of the drafters was on creating a viable regulatory framework for UCH lying in international waters, in other words beyond the 12-mile territorial limit. The need for such a framework has arisen over the last 30 years, during which time there has been a revolution in marine technology. As a result, humans aided by submersible vehicles now have direct physical access to 98% of the ocean floor (O'Hara 2000). Although operations on the deep seabed (at depths of thousands of meters) are likely to remain relatively few and far between, the continental shelf is now highly accessible, and UCH in this sometimes extensive geological area is under growing threat. The threat comes not only from well-funded commercial treasure salvage companies equipped with the latest technologies but also from individual divers using specialized mixed gases which permit access to waters well in excess of 100 m. Prior to the introduction of the Convention, the only international laws providing specific protection for UCH were two short articles of the 1982 UN Convention on the Law of the Sea, and, significantly, these articles provide no specific means of controlling activities directed at UCH on the continental shelf. The provision the 2001 Convention makes for this maritime zone is therefore a crucial component of its regime.

While the majority of the Convention's provisions are aimed at creating a regulatory framework for activities "directed at" UCH, some useful provision is also included for activities "incidentally affecting" UCH. By this is meant activities which may inadvertently, rather than deliberately, disturb or damage UCH. Activities such as trawling by fishermen, dredging for marine aggregates, pipeline- and cable-laying, and construction of wind farms and oil and gas rigs all clearly fall into this category. Among other things, each State Party is required to use the best practicable means at its disposal to prevent or mitigate any adverse effects that might arise from such activities. Furthermore, there is provision for the reporting of UCH finds by such operators working on the continental shelf and on the deep seabed.

The meat of the Convention is made up of technical legal provisions facilitating the control of activities affecting UCH, as well as the standard-setting principles and Rules in respect of such activities. However, the Convention also includes many other useful provisions that supplement the regulatory regime. Of particular note is the framework it establishes for cooperation, information-sharing, and mutual assistance by States Parties. The Convention clearly envisages that the States that participate in its regime will develop broad-ranging collaborative efforts on a whole host of matters including investigation, excavation, documentation, conservation, study and preservation of UCH (Art. 19), and training (Art. 21). In the longer term, the benefits that could be derived from such collaboration could be very significant.

UNESCO's intention was to create an international legal framework for UCH that would be capable of achieving global acceptance. Throughout the negotiation process, considerable efforts were made to try to ensure that the final text would be adopted by consensus. Unfortunately, this aim was not fulfilled. Although the general principles and objectives of the Convention, including the Rules in the Annex, do appear to have achieved universal support, a small but significant minority of the negotiating States were unable to fully support the final text. Among these were a handful of major maritime States, all of which had the same, or similar, objections. This group included the United States, the Russian Federation, the Netherlands, France, Germany, Norway, and the United Kingdom. Since these are the States whose nationals and flag vessels have the capability to undertake deepwater search and recovery work, it is vital to the overall success of the Convention that they participate in its regulatory regime. The nature of the regulatory mechanisms is such that unless and until they participate, the Convention cannot be fully effective.

There were two main areas of difficulty for these States. The first was that they regarded some of the technical provisions of the Convention, particularly its articles with respect to the continental shelf, as being incompatible with the 1982

Convention on the Law of the Sea. These States (and, it should be said, many others) regard the 1982 treaty as having a preeminent status along the lines of a "Constitution for the Oceans." As such, they believe that subsequent treaties dealing with maritime activities should not interfere with the framework it sets out. The second area of difficulty related to the treatment the 2001 Convention affords to sunken warships and other State vessels and aircraft, which form a major component of UCH. The maritime States insist that such vessels and aircraft, even when they have been lying on the seabed for many years or even centuries, are subject to sovereign immunity and can only be interfered with under the express authority of the flag State. While the Convention takes this position into account, some of its technical provisions (which envisage States Parties cooperating in the management of sites) can be interpreted as prejudicial to the immunity principle.

Despite these and other areas of concern for some States, the Convention has now garnered a very respectable number of ratifications, and State practice under the Convention is starting to develop. In several parts of the world, including the Caribbean and the Mediterranean and Adriatic Seas, the Convention's cooperation mechanisms should soon be effective in countering treasure-hunting activities and ensuring activities directed at UCH are conducted appropriately. Interestingly, a number of the maritime States that abstained from voting in favor of the Convention at the time of its adoption have revised their view. In 2013, having concluded that the benefits the Convention provided in respect of regulating treasure hunting on its continental shelf outweighed its original objections, France deposited its instrument of ratification to become a State Party. The Netherlands has formally expressed its intention to ratify in the future, and there are indications that Germany may have revised its position too. For the foreseeable future, it seems likely that other significant States, including the United States, the Russian Federation, Norway, the United Kingdom, Greece, Turkey, and Venezuela, will remain outside the regime. Nonetheless, there is no doubt that even for these States, the general principles of the Convention and the Rules set out in its Annex will be highly influential and standard-setting.

References

O'Hara, E. 2000. *Maritime and fluvial cultural heritage. Report prepared for committee on culture and education*. Strasbourg: Parliamentary Assembly of the Council of Europe.

Further Readings

Camarda, G., and T. Scovazzi, eds. 2002. *The protection of the underwater cultural heritage: Legal aspects*. Milan: Giuffrè Editore.

Dromgoole, S. 2006. *The protection of the underwater cultural heritage: National Perspectives in light of the UNESCO convention 2001*. Leiden/Boston: Martinus Nijhoff Publishers.

Dromgoole, S. 2013. *Underwater cultural heritage and international law*. Cambridge: Cambridge University Press.

Forrest, C. 2010. *International law and the protection of cultural heritage*. London/New York: Routledge. Chap. 6.

Garabello, R., and T. Scovazzi, eds. 2003. *The protection of the underwater cultural heritage: Before and after the 2001 UNESCO convention*. Leiden/Boston: Martinus Nijhoff Publishers.

O'Keefe, P.J. 2014. *Shipwrecked heritage: A commentary on the UNESCO convention on underwater cultural heritage*. Leicester: Institute of Art and Law.

Prott, L.V. 2006. *Finishing the interrupted voyage: Papers of the UNESCO Asia-Pacific workshop on the 2001 convention on the protection of the underwater cultural heritage*. Leicester: Institute of Art and Law.

Copley, Vincent

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Basic Biographical Information

Vincent (Vince) Copley is an elder of the Ngadjuri people of South Australia. He has made important contributions to the reclamation and protection of Australian Indigenous cultural heritage, especially by revitalizing the fragmented cultural identity of the Ngadjuri people. He is also an important figure in Australian sporting history.

Copley was born in 1936 in Point Pearce, South Australia. At a young age, he moved to live at St Francis' Anglican Home in Adelaide, where he came into contact with Charlie Perkins, John Moriarty, Gordon Briscoe, and others who

went on to become important campaigners for Indigenous rights.

Copley was an eager sportsman and won several sporting awards including the Port Adelaide Football Club's Best and Fairest in 1954. He went on to coach the Curramulka Football Club for over a decade during the 1950s and worked for the Aboriginal and Torres Strait Islander Commission as sports officer from 1982 to 1993. Copley was also a keen cricketer, and the Vince Copley Medal now recognizes the "most outstanding cricketer" at the annual Lord Taverner's Statewide Indigenous Carnival. Copley was appointed cochair to the National Indigenous Cricket Advisory Council in 2000, in tandem with Dr. John Bannon, ex-premier of South Australia. In this role, Copley organized various national and international programs for Indigenous cricketers including the 1988 tour of England, which commemorated the first ever Australian tour of 1868.

While Copley's sporting successes helped him to find recognition in Australian society, his influence extends beyond the sports field and into political affairs. Throughout the 1970s, Copley directed the first Aboriginal community center in Adelaide, significant for offering Indigenous health and education services outside of state services. He was also involved in the establishment of South Australian legal aid for Indigenous people and worked as Executive Officer and later Regional Manager for Aboriginal Hostels Ltd. until the 1980s. Copley played a key role in organizing the 2012 reunion of the "St Francis boys" and their families.

Major Accomplishments

Vincent Copley's major accomplishments in the field of archaeology have been reconstructing, protecting, and promoting Ngadjuri identity and heritage. Much of Ngadjuri cultural knowledge was lost during the nineteenth and twentieth centuries as a result of land dispossession and the relocation of Ngadjuri people to the Point Pearce Mission.

In the late 1990s, Copley led Ngadjuri people in a concerted plan to repossess Ngadjuri cultural knowledge. After several years as chair of the Ngadjuri Walpa Juri Land and Heritage Association Inc., Copley became chair of Ngadjuri Elders Heritage and Land Care Council. As leader of the Ngadjuri Heritage Project, Copley was instrumental in bringing descendants of the Ngadjuri "back to country" and helping them to reclaim a sense of their Indigenous identity by rediscovering important sites on their traditional lands. This project developed the Ngadjuri nation's capacity to manage cultural heritage places on Ngadjuri lands and served as a model for other Indigenous groups.

Copley has placed an emphasis on close and ongoing cooperation between Indigenous and non-Indigenous partners, working with archaeologists and students to research rediscovered sites significant to the Ngadjuri. This has resulted in the establishment of a research partnership between the Ngadjuri people and Flinders University, fostering the documentation of rock art and archival research projects investigating early Ngadjuri anthropological work. Copley's efforts have encouraged greater cooperation between Indigenous and non-Indigenous landowners in matters of land use. After being approached by the Regional Council of Goyder, Copley initiated the excavation, study, and reburial of human skeletal remains at Red Banks Conservation Park.

Copley has stressed the importance of recognizing mixed Indigenous heritage; while much of his work has focused on the Ngadjuri, he also has family links to the Narangga, Ngarrindjeri, and Kaurna people and has worked towards Native Title claims with the Narangga and Kaurna groups.

Copley has encouraged cooperation between Indigenous peoples internationally, organizing a delegation of Aboriginal storytellers, artists, and dancers between 1974 and 1977 for the Festival of African Culture in Nigeria. From 1993 to 1995, he worked independently as a consultant in cultural awareness for schools and colleges. He was also involved in the organization of the 2006 Indigenous Cultural Heritage Symposium held in Burra, South Australia, which saw Indigenous contributors from all over the world.

Copley's grandfather Barney Warria was a friend and important source for the anthropologist Ronald Berndt. Upon Berndt's death in 1990, an embargo was placed on his field notes for a period of 30 years. Copley debated the legality of this embargo on the grounds that it deprived Ngadjuri

people of an important source of knowledge about their cultural heritage. Copley demonstrated that this information was intellectual property shared between Warria and Berndt. Copley's challenge successfully lifted the embargo, making Berndt's field notes available to a number of Indigenous groups whose histories and knowledge had been recorded in them.

Cross-References

► Australia: Indigenous Cultural Property Return
► Indigenous Archaeologies: Australian Perspective

Further Reading

Anderson, S., F. Knight, A. Pring, and F. Warrior. 2005. *Ngadjuri: Aboriginal people of the Mid North region of South Australia*. Prospect Hill: SASOSE Council.

Birt, P., and V. Copley. 2005. Coming back to country: A conversation at Firewood Creek. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 249–265. London/New York: Routledge.

Blau, S., V. Branson, V. Copley, G. Jackson, and C. Smith. 2006. Mother and child. *Dig* 8 (4): 10–13.

Hastwell, A. 2006. Archaeological symposium with an indigenous angle. Available at: http://www.thewire.org.au/storyDetail.aspx?ID=3131. Accessed 12 July 2012.

Ladgrove, P. 2010. Local legends – Vince Copley. Available at: http://blogs.abc.net.au/sa/2010/01/local-legends-vince-copley.html. Accessed 12 July 2012.

Corning Museum of Glass

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Basic Information

The Corning Museum of Glass, located in Corning, New York, opened on May 19, 1951. It was founded by Corning Glass Works (now Corning Incorporated) to celebrate the 100th anniversary of the Houghton family's involvement with glassmaking. Amory Houghton had helped to start the Union Glass Works in Somerville, Massachusetts, in 1851, and he purchased the Brooklyn Flint Glass Works in Brooklyn, New York, in 1864. Four years later, he moved that firm's equipment and employees to "the foot of Walnut Street" in Corning, where Corning Incorporated continues to have its headquarters today.

Major Impact

The museum was initially part of the Corning Glass Center, which also housed the Steuben Glass factory and shop, a municipal auditorium, a recreation area for Corning Glass Works employees, and a gallery demonstrating the science of glass. Chartered by the Board of Regents of the University of the State of New York, the museum is a not-for-profit educational institution. From a modest beginning, with nearly 2,000 glass objects from around the world, the museum has assembled a collection that now has more than 47,000 objects spanning 3,500 years of glassmaking history. The mission of the museum – to tell the world about glass and its history – has not changed, however.

The museum's Rakow Research Library is the library of record for the art and history of glass, and it seeks to acquire every publication in every format in this field. It also houses a collection of rare books and incunabula, as well as several hundred prints that illustrate glass factories, glassmaking, glass advertisements, and the use of glass from the seventeenth to twenty-first centuries.

During its 60-year history, the museum has presented more than 90 exhibitions. Some of these shows have been drawn exclusively from its own collection, but others have included substantial numbers of loans from other museums and private collections in the United States and abroad. Illustrated catalogs have been published to document more than two dozen of these exhibitions. Seven collection catalogs have also been issued, as well as more than two dozen books on other glass-related subjects. Since 1959, the museum has published the *Journal of Glass Studies*, which contains articles of new research in glass history from antiquity to the early twentieth century. It also produces *New Glass Review*, another annual publication, which focuses on contemporary glass.

On June 23, 1972, flooding caused by Tropical Storm Agnes left five feet of water in the museum's galleries and library. It was the worst natural disaster to strike an American museum up to that time. The museum reopened on August 1, even though much of the collection was still covered with mud. A new museum building, designed by Gunnar Birkerts, opened in June 1980, with all of the collection housed above the 1972 flood level. The Birkerts building is attached to the original Harrison and Abramovitz Glass Center building. Between 1998 and 2001, the Glass Center collections became part of the museum, which substantially expanded again. The Studio, which opened in 1996, offers instruction in glassmaking to students at all levels of expertise throughout the year. In addition to daily demonstrations of glass-blowing and flame working at the museum, the museum sponsors the Hot Glass Show which involves demonstrations in a variety of locations including celebrity cruise ships.

The museum has welcomed about 28 million visitors in its 60 years of operation.

Cross-References

- ▶ Association Internationale pour l'Histoire du Verre (AIHV)
- ▶ Consumption, Archaeology of

Further Reading

Corning Museum of Glass. n.d. Available at: http://www.cmog.org/.

Cornwall, Ian Wolfram

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Basic Biographical Information

Ian Cornwall (1909–1994) was an important figure in the early development of what became environmental archaeology and in particular in the study of animal bones from archaeological deposits. Although his background was in the arts, Cornwall was strongly influenced by the pioneering geochronologist Frederick Zeuner (1905–1963), and he became reader in Human Environment at the Institute of Archaeology, University of London, by the time of his retirement in 1974.

Major Accomplishments

Cornwall's reputation rests on a series of textbooks that he produced in the 1950s and 1960s. *Bones for the Archaeologist* (1956; revised 2nd ed. 1974) aimed to put a working knowledge of skeletal anatomy within the reach of archaeologists and Quaternary scientists. The book's structure resembles Flowers' classic text *Osteology of the Mammalia* (1885) and is notable for its anatomical precision, verging on pedantry. The style, however, is highly accessible and *Bones for the Archaeologist* became one of the first successful enterprises in archaeological science. Cornwall followed this in 1958 with *Soils for the Archaeologist*, which attempted to do the same for soils and sediments. Although described at the time as "a pioneer undertaking," *Soils* did not have quite the impact of *Bones*, possibly because of its less intrinsically fascinating subject matter.

Bones and *Soils* established Cornwall's reputation as a communicator of archaeological science. His subsequent books built on that initial success by offering more synthetic views of the human past. *The Making of Man* (1960) was a radical undertaking for its day: an informative and quite detailed account of the fossil evidence for human evolution written for children. *The Making of Man* was awarded the Carnegie Medal for 1960, putting Cornwall in the company of C.S. Lewis, Walter de la Mare, and Rosemary Sutcliff. It also marked Cornwall's first collaboration with the illustrator Marjorie Maitland Howard. Her lively illustrations graced Cornwall's *The World of Ancient Man* (1964) and *Prehistoric Animals and Their Hunters* (1968). The latter book includes a chapter "Ecology, Biotopes and Faunal Communities" that was exceptionally integrative for its day and still reads well.

Cornwall returned to a more geomorphological topic in 1970 with *Ice Ages: Their Nature and Effects*. One other Cornwall volume of note is the novel *Hunter's Half-Moon* (1967), set in a fully realized and, for its day, highly credible upper Paleolithic world. Mrs. Maitland Howard provided mammoths for the dust jacket. Taken in sum, Cornwall's books reflect his wish to understand past human lives in their full environmental context and to communicate that knowledge to a wide audience. His intellectual reach was broader than that of many academics today, and his published output was not constrained by the pressures of modern academia.

Apart from the sole-authored books, Cornwall appears in the literature mainly as a coauthor or contributor to many and diverse archaeological publications. He contributed studies of bones or sediments to a wide range of major excavations, including the 1957–1960 campaigns at Knossos, Pre-Pottery Neolithic human burials at Jericho, and Ramm's investigations into Roman York. An early contribution to *Proceedings of the Prehistoric Society* in 1953 discussed sedimentation events at Bronze Age sites in southern England, prefiguring John Evans' influential account of the same topic in *PPS* in 1990. Cornwall was a member of the Experimental Earthwork Committee that set up the Overton Down experiment, and coauthored (with Paul Ashbee) the first report of that experiment in *Antiquity* (1961). He also experimented with thin-section studies of Neolithic pottery, working with Henry Hodges, and was an early advocate of soil micromorphology in archaeology. Later in his career, Cornwall developed a strong interest in human settlement in Mexico, the subject of his 1970 Henry Stopes lecture to the Geologists' Association.

Aside from his published work, Ian Cornwall was an inspiring and memorable teacher. He looked like an academic, his slight build supporting a shapeless corduroy jacket from which protruded a well-used pipe, not necessarily fully extinguished. Precise but good-humored, he engaged well with students, albeit more so with men than with women, encouraging the enthusiastic ones and gently coaxing the others. Cornwall had a remarkable knack for making archaeological science memorable, whether that was rolling up a sleeve to demonstrate the workings of skeletal articulations on his own boney frame or using a metal teaspoon and cigarette lighter to demonstrate loss on ignition with a pinch of sediment. His contributions to archaeology were those of an amiable and broad-minded bridge between "digging" archaeology and the rapidly developing specialisms of archaeological science and of an exceptionally gifted communicator who could inform and enthuse academic and lay audiences alike.

Cross-References

- ▶ Geoarchaeology
- ▶ Zeuner, Frederick Everard
- ▶ Zooarchaeology

References

Ashbee, P., and I.W. Cornwall. 1961. An experiment in field archaeology. *Antiquity* 35: 129–134.

Cornwall, I.W. 1956. *Bones for the archaeologist*. London: J.M. Dent.

Cornwall, I.W. 1958. *Soils for the archaeologist*. London: J.M. Dent.

Cornwall, I.W. 1960. *The making of man*. London: J.M. Dent.

Cornwall, I.W. 1964. *The world of ancient man*. London: J.M. Dent.

Cornwall, I.W. 1967. *Hunter's half-moon*. London: John Baker.

Cornwall, I.W. 1968. *Prehistoric animals and their hunters*. London: Faber & Faber.

Cornwall, I.W. 1970. *Ice ages: Their nature and effects*. London: John Baker.

Corsican Late Prehistory

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Introduction

This is the first English-language discussion of Corsican prehistory. Research about Corsican prehistory began late in comparison to the enthusiasm that inspired the early days of French

archaeology. Indeed, it was necessary to wait until the nineteenth century for some pioneers of the discipline to address the problems posed by this insular territory. In addition, the two worlds considerably delayed the progress of knowledge on the subject. It was not until the mid-1950s that a real investigative program was launched, with numerous and varied results that were frequently renewed up until the present day.

Definition

The island of Corsica, located in the heart of the western basin of the Mediterranean, has been populated by people since at least the Mesolithic (Fig. 1). The earliest traces of human presence date to the tenth millennium BC. Recent excavations have revealed the existence of a hunter-gatherer-collector open-air camp on the site of Caniscione (Monacia-d'Aullène, Corse-du-Sud), which today is coastal but previously was several kilometers from the sea. The current state of knowledge suggests that this first colonization of the island collapsed around 6500 BC, 5000 years after the time when the marine regression separated the Corsican-Sardinian block into two islands to form Corsica to the north and Sardinia to the south. Consequently, it seems that the island has been totally depopulated for a few centuries.

Key Issues and Current Debates

Many of the key issues in the prehistory of Corsica are concerned with its colonization, occupation, and the relationships between people living on Corsica with other peoples in the Mediterreanean. While the possibility of brief occupations by fishermen from the continental coasts was accepted in the past, today it is accepted that there were more permanent occupations, as demonstrated by the mountain camp of Curacchiaghju (Levie, Corse-du-Sud). At the same time, three sepulchral assemblages are known, making the island a particularly favorable territory for the study of tombs of that time. These are always burials in natural cavities: a group of people at Campu Stefanu (Sollacaro, Corse-du-Sud; seven to eight individuals), and an individual at Torre d'Aquila (Pietracorbara, Haute-Corse), and at Araguina-Sennola (Bonifacio, Corse-du-Sud; grave of the famous "Lady of Bonifacio"). Throughout this period, the lithic industry is characterized by a tooling that was very different from continental standards, one in which microlithic tools are almost absent.

At around 5800 BC, Corsica was subject to new human exploration (Fig. 2), by groups bearing the *impressa* ceramics, whose economy is of the early Neolithic type. It is interesting to note that this industry is represented across the entire island, including the mountain areas of the inner zone (shelter Albertini; Albertacce, Haute-Corse). The process of neolithisation continued quite classically to around 5700 BC. Following this, the cardial industries were introduced (Bailloud 1969), characterized by pottery decorated with shells and the recurrence of certain lithic tools, such as cross-cutting arrowheads, mostly in Sardinian flint. The cultural expression of the middle of the sixth millennium BC illustrates shared traditions between Corsican, Sardinian, and Tuscan populations (Pienza-Basì-Filiestru type pottery). At this time, agriculture seems to have emerged, but hunting and gathering were still omnipresent. Partial sedentarization is highlighted by the appearance of habitats composed of several houses built of perishable materials, for example at Rinaiu (Sartène, Corse-du-Sud) (D'Anna et al. 2001) or at A Petra (L'Ile-Rousse, Haute-Corse) or in caves (Araguina-Sennola, Campu Stefanu, Filitosa (Sollacaro, Corse-du-Sud), Basì (Serra-di-Ferro), Corse-du-Sud), Strette (Barbaggio, Haute-Corse), shelter Albertini). Interments were carried out in the natural cavities (Araguina-Sennola, Torre d'Aquila). In the south of the island, the end of the Early Neolithic period (around 5200/5000 BC) evolved according to microregional precepts to give rise to the Curasian style (of the Curacchiaghju cave).

The middle phase of the Neolithic period is marked by a sedentary settlement which is materialized by the development of important villages such Monte Revincu (Santo-Pietro-di-Tenda, Haute-Corse) (Leandri 2013) in the north and

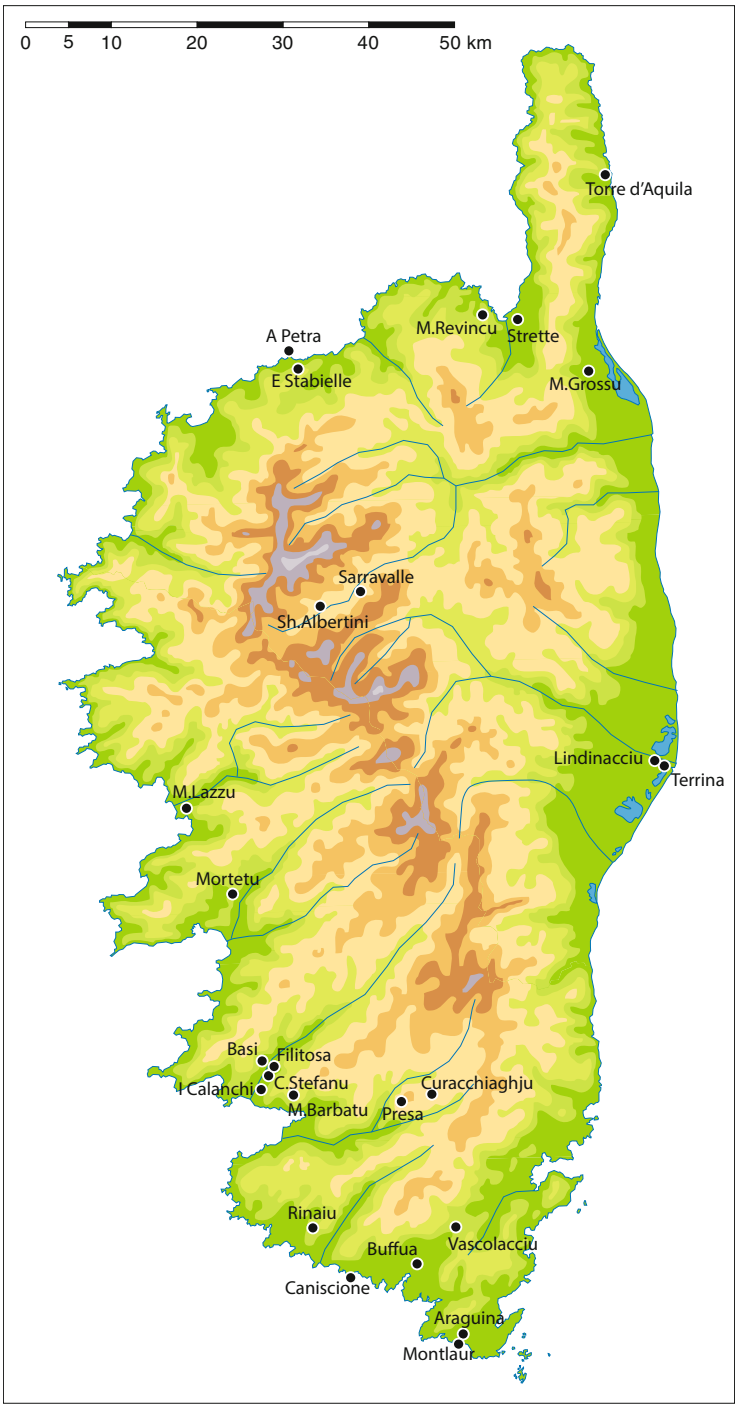

Corsican Late Prehistory, Fig. 1 Map of main Mesolithic and Neolithic Corsican settlements/burials (KPQ)

Presa (Altagène, Corse-du-Sud) in the south. The houses are of rectangular plan with permanent bases made up of large stone slabs. It is assumed that the rise of this type of architecture favored the remarkable integration of the megalithic architectures on the island. In fact, near the habitats, the first coffers with a tumular structure, illustrated by the monuments of Monte Revincu or Vascolacciu (Figari, Corse-du-Sud), designed to welcome the deceased of the

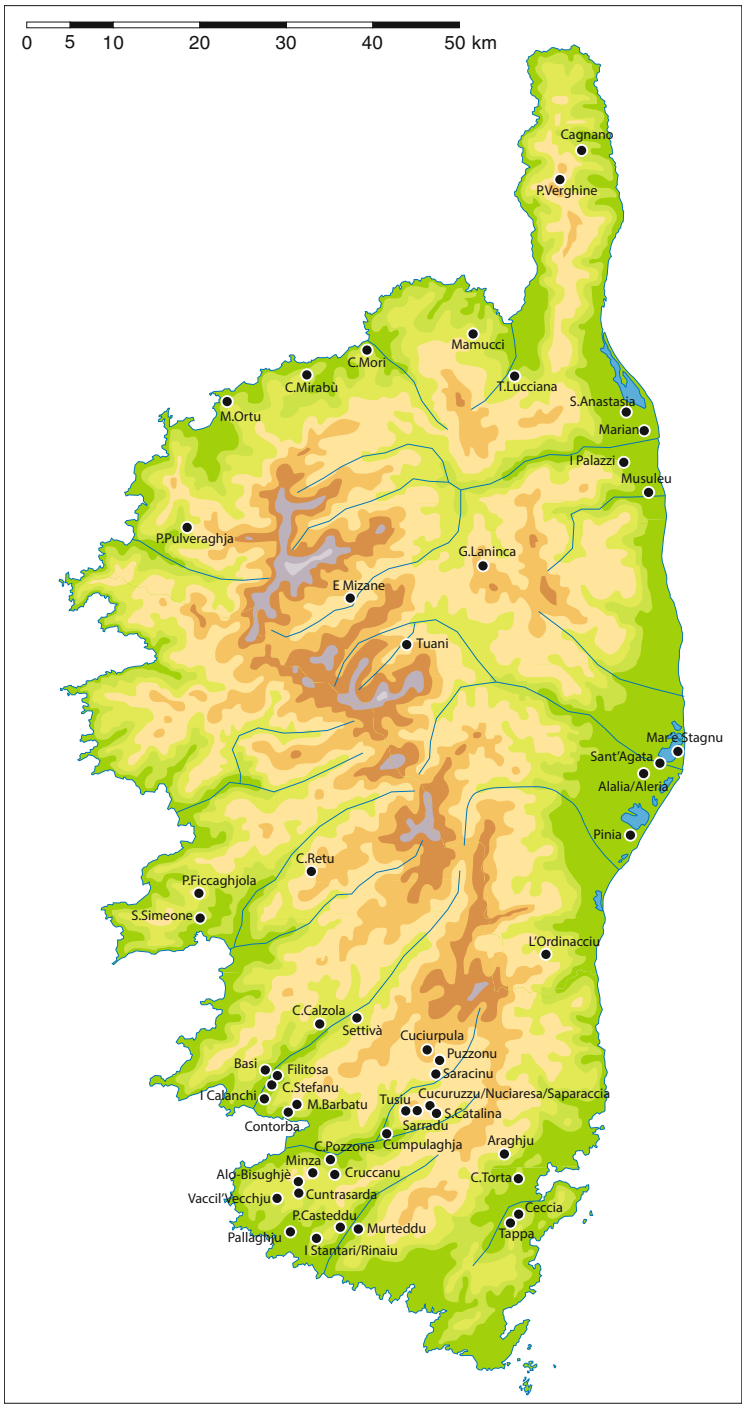

Corsican Late Prehistory, Fig. 2 Map of main Bronze/Iron Ages Corsican settlements/burials (KPQ)

community and very similar to contemporary Sardinian monuments (Li Muri, Macciunitta). At the same time, alignments of small menhirs appeared (Rinaiu) around the graves. The industries are of the presian type with fine dishes that have little decoration and a lithic instrumentum essentially based on the exploitation of local quartz. Pastoralism would have grown significantly during this phase (de Lanfranchi and Weiss 1997).

During the Late Neolithic, from 4000 BC, domestic and funeral architecture remain little known. The main site is Basì (Bailloud 1969), in the southwest of the island, whose industries have become eponymous: the Basian type industry. It is characterized by a fine dish and lithic tools favoring the obsidian imported from the Monte Arci massif in Sardinia. The links with Sardinia are materialized in ceramics with fairly obvious similarities with the Ozieri style. In the calcareous regions of the south, the Sardinian component becomes predominant (site of Montlaur; Bonifacio, Corse-du-Sud). Basian was mostly recognized in the south of the island. In the north, the material culture is quite similar (Monte Grossu; Biguglia, Corse-du-Sud) but probably partly autonomous.

About 3200 BC the Terrinian style was established (Camps 1988a, b). This was present on all parts of the island but with microregional and chronological variants. This trend is characterized by the emergence of large and perched habitats close to the mouths of major rivers: Monte Lazzu (Casaglione, Corse-du-Sud), Mortetu (Sarrola-Carcopino, Corse-du-Sud), I Calanchi (Sollacaro, Corse-du-Sud), Buffua (Figari, Corse-du-Sud), and of course the eponymous Terrina (Aleria, Haute-Corse). Nearly nothing is known about contemporary burials, except at the end of the period in which the deceased are placed in natural cavities (I Calanchi). The industry is characterized by a certain cultural retreat on the island territory. Sardinian influences slowed considerably, as did imports of obsidian and flint. The lithic tooling favored local resources, essentially rhyolite, and serial productions appeared, in particular piercing-type arrowheads armatures. The dishes were quite stereotyped, in forms as well as decoration. The appearance of copper metallurgy at the beginning of the period is a notable innovation, which started in Corsica from 2200 BC. The Campaniform current, perhaps via Sardinia, infiltrated slightly some southern contexts at I Calanchi and Monti Barbatu (Olmeto, Corse-du-Sud) but without impacting the material systems as it did at that time in Sardinia and in the south of France.

During the Early Bronze Age (2000–1650 BC), Sardinia continued to opening up. This seems to have put an end to the Terrinian cultural references. At the beginning of the second millennium BC, the habitat takes on smaller dimensions and adopts positions naturally fortified (Cesari 1992). Starting from 1700 BC, these defensive sites have fortifications, and their summit houses a tower, like at Castellucciu-Calzola (Pila-Canale, Corse-du-Sud), I Calanchi, Alo-Bisughjè (Bilia, Corse-du-Sud), or Tappa (Porto-Vecchio, Corse-du-Sud). These, called *torra* (Grosjean 1966; Virili and Grosjean 1979), are similar to a monument that appears at the same time in Sardinia, the corridor-type *nuraghe*, illustrating deep connections between the two islands. These *torre* are likely to have been used for the storage of community reserves (Peche-Quilichini 2011). At that same time, there are some examples of occupations in the plain, probably dedicated to agricultural production (Campu Stefanu), or near the ponds (Pinia; Ghisonaccia, Haute-Corse) in order to develop the exploitation of lagoon resources. Several burials are known for this period. Dolmens (Settivà; Petreto-Bicchisano, Corse-du-Sud) and coffers (Pallaghju; Sartène, Corse-du-Sud) are reused or built for the occasion and accommodate burials. The natural cavities, however, remain privileged spaces like for the shelters of Murteddu (Sartène, Corse-du-Sud), Minza-Castellucciu (Sartène, Corse-du-Sud), and Capu Retu (Carbuccia, Corse-du-Sud). A possible case of secondary incineration and deposit of ashes in an urn is known at Folelli (Penta-di-Casinca, Haute-Corse), in the north of the island. In the south, the first great alignments of menhirs appeared at that time like I Stantari (Sartène, Corse-du-Sud), Rinaiu, Pallaghju, and Vaccil'Vecchju (Grossa, Corse-du-Sud), while isolated menhirs structure the territory. The furniture shows a specialization in terms of contexts. The funerary ensembles integrate dishes and specialized objects, of Campaniform tradition or, more often, of Sardinian affinity (Bonnànaro phase). In the settlements, the dishes show Sardinian or North-Italic affinities but also local initiatives (Tappa-Tiresa-Mugliunaccia typical industries). The same applies to the production of bronze tools, whose references are rather Alpine and North Italian.

In the Middle Bronze Age (1650–1200 BC), perched and defensive habitats developed, and the south of the island was covered with *torre* and fortifications like Filitosa, Contorba (Olmeto, Corse-du-Sud), Cucuruzzu (Levie, Corse-du-Sud), Araghju (San-Gavino-di-Carbini, Corse-du-Sud), or Monti Barbatu, which hosted some houses behind their dry stone enclosures. These dwellings have quite varied plans, adapted to the morphology of the land and the walls. The occupation around the ponds continued and strengthened in certain regions, notably on the eastern coasts and notably at Sant'Agata (Aleria, Haute-Corse) and Mar'e Stagnu (Aleria, Haute-Corse). Any associated burials have not yet been recognized. Only one case of the reuse of a coffer (Cuntrasarda; Sartène, Corse-du-Sud) and a burial under shelter (Campu Stefanu) is known and only for the end of the phase. The latter falls, in particular, with a set of beads ornaments in amber (originating in Baltic but with a Mycenaean typology) and glass (Mesopotamian but with Egyptian typology), which illustrate the peripheral position of Corsica in Mediterranean exchange networks around the thirteenth century BC. This aspect of distance relations is illustrated at the same time by several other cases of glass beads and by the presence of an ox-hide copper ingot in the north of the island, at Sant'Anastasia (Borgo, Haute-Corse). Middle Bronze Age dishes show the importance of Italian models in local production; Grotta Nuova, Viverone, proto-Apenninic, and Apenninic types are fairly well represented, especially at the beginning of the period, although typically local forms are not absent. At the same time, the rare metallic objects seem to bear witness to a form of continuity with the Early Bronze Age, since the references are to be found around the Alpine arc.

The Late Bronze Age (1200–850 BC) marked a rather sharp break with the end of the Middle Bronze Age. This phase is currently only well known in the south of the island. The habitat is characterized by a rather frequent occupation of the fortified sites of the Middle Bronze Age, marked by restructuring, as it's evident at Alo-Bisughjè, Cucuruzzu, Ceccia (Porto-Vecchio, Corse-du-Sud), and Castidetta-Pozzone (Sartène, Corse-du-Sud). New, much smaller fortresses were also built toward the end of the second millennium BC: Saracinu (Quenza, Corse-du-Sud), Casteddu di Sarradu (Altagène, Corse-du-Sud), Cruccanu (Sartène, Corse-du-Sud), or Cuciurpula (Sorbollano, Corse-du-Sud). At the foot of these defensive acropoles, big villages made up of elliptic dwellings like Cuciurpula, Puzzonu (Quenza, Corse-du-Sud), and Tusiu (Altagène, Corse-du-Sud) were already forming, a precursor to the pre-urban norms of the Early Iron Age (Peche-Quilichini et al. 2015). The tombs perpetuated the tradition of the use of shelters (Punta di Casteddu; Sartène, Corse-du-Sud), perhaps by substituting the practice of burial with that of incineration, in some cases. The only known site in the north of the island dates from the twelfth century BC. The Grotta Laninca (Lano, Haute-Corse) is a suspended limestone cavity which has been the site of several burials with the particularity of combining coffins carved from yew. The style and form of ceramic dishes were totally renewed at that time and showed a double influence of Protovillanovian Tuscany and of Northern Sardinia to constitute the Apazzu-Castidetta-Cucuruzzu style. It should be noted that some forms indicate the use of a particular technical knowledge and the existence of specialized workshops. The metallurgical production is also very dynamic, with tools inspired by the Nuragic area and weapons rather italic. One of the most important features of the Late Bronze Age is the appearance of statues menhirs (D'Anna et al. 2007), anthropomorphic monoliths that are sometimes grouped in alignments (I Stantari, Filitosa). These monumental works present warrior attributes (Fig. 3), especially in the south: helmets, cuirasses, and offensive weapons (swords and daggers). It is assumed that the sites of settlement constitute sanctuaries and/or structuring points of the territory.

The Early Iron Age (850–550 BC) is characterized by a regionalization of sociocultural characteristics. From one valley to another, forms of habitat and furniture present significant differences. In the south, villages like Cuciurpula, Cumpulaghja (Sainte-Lucie-de-Tallano, Corse-du-Sud), Saparaccia (Levie, Corse-du-Sud), Nuciaresa (Levie, Corse-du-Sud), and Cozza

Corsican Late Prehistory, Fig. 3 Statue-menhir Santa Naria (Olmeto, Corse-du-Sud): with 4 m long, it's the highest on the island

Torta (Porto-Vecchio, Corse-du-Sud) are made up of elliptical-shaped houses clustered on the edge of the plateau, often in continuity with the settlements of the Late Bronze Age (Peche-Quilichini et al. 2015). In the center of the place of life, there is often a large circular building whose function remains undetermined. The fortifications of the Bronze Age are almost all abandoned at the beginning of the first millennium BC. The ceramic dishes (Nuciaresa style) are in keeping with the tradition of the previous epoch, even if they stand out quickly and lead to new shapes and to a profusion of decors. The period is characterized in particular by the appearance of horned zoomorphic vases in particular contexts (foundation deposits and burials). The tombs are in most cases burials in caves and include some metal objects that illustrate cultural connections with Sardinia (l'Ordinacciu cave; Solaro, Haute-Corse) as well as local dynamics. At the end of the period, the coastal settlements (Cozza Torta) show relations with the Greek colonies of the Western Mediterranean. In the north, the situation is less clear. Some relatively perched habitats are known in a mountainous context, housing dwellings with irregular planes behind networks of earthworks, as we can observe at E Mizane (Calacuccia, Haute-Corse) and partially at Tuani (Corté, Haute-Corse). The dishes (Tuani-Mizane style) are totally different from those of the south. The metal furniture, especially represented in the burials, reveal contact with Villanovan Etruria, especially in the shape of the fibula as the ones of Cagnano cave (Cagnano, Haute-Corse) or Teppa di Lucciana shelter (Vallecalle, Haute-Corse). The tombs are most often burials under shelter, but some coffers with tumulus that have hosted cremations are also documented (Mamucci; Santo-Pietro-di-Tenda, Haute-Corse).

The foundation of Alalia (Aleria, Haute-Corse) by the Phocaeans at about 565 BC marks the Late Iron Age (550–100 BC) (Jehasse and Jehasse 1973). The settlers, expelled by the Etruscans 25 years later, had a negligible influence on the majority of the island. The beginning of this period is not well known. It is from the third century BC that the data are available. At that time, the communities were regrouping again in fortified settlements: Cima a i Mori (Palasca, Haute-Corse), Capu Mirabù (Monticello, Haute-Corse), Punta Pulveraghja (Galeria/Calenzana, Haute-Corse), and Punta Ficcaghjola (Alata, Corse-du-Sud). It is likely that this situation was due to the influence of the extension of the conflict of the First Punic War, in which the indigenous groups are placed at the heart of the geostrategic stakes between Rome and Carthage. After the victory of the Latins, the indigenous populations of Corsica gradually became integrated into the Roman cultural world and imported typical goods of the republican era. On the northeastern coast, small towns (I Palazzi; Venzolasca, Haute-Corse) emerge and develop,

notably thanks to the growth of these commercial networks. Some tombs are known for this phase: Pinzu a Verghine (Barretali, Haute-Corse), Monte Lazzu, San Simeone (Ajaccio, Corse-du-Sud), and Santa Catalina (Levie, Corse-du-Sud). Once again, these burials were under shelter, with very poor furniture. The indigenous industries of the Late Iron Age are mainly characterized by dishes, degreased with asbestos (in the north), and decorated with combs, as well as by some types of fibula and daggers and by production in series of white glass beads ("porcelain rings"). These artifacts will sometimes be exported to Liguria, Tuscany, Calabria, and Sardinia.

About 99 BC, the foundation of the city of Mariana (Lucciana, Haute-Corse) by the veterans of General Marius marked the entry of Corsica into history. This was in spite of several centuries of sociocultural dithering, sprinkled with several indigenous revolts, which involved some delay in the processes of romanization.

In the end, Corsican prehistory (Fig. 4) reveals a typically Mediterranean evolutionary structure. After a Mesolithic whose perenniality is uncertain, the phase of neolithisation is perfectly synchronous with the processes observed in Tyrrhenian context, including for internal and difficult to access zones. In the Middle Neolithic period, the rise of megalithic manifestations took place contemporaneously with the primitive developments of this phenomenon in the Mediterranean and Atlantic domains. From an economic point of view, the assertion of sedentariness, agriculture, and pastoralism during this phase underlines the integration of the island with the major concepts of this pivotal period. With the massive importation of Sardinian obsidian in the fourth millennium BC, but especially with the assimilation of techniques of fusion and shaping of copper around 3300 BC, Corsica enters an era of technological differentiation for which it is showing no delay, despite its sharp deficit in primary resources, especially in comparison with its neighbor, Sardinia. Adaptation and its corollary, organization, seem to dictate the precepts of the economic, and therefore social, structure of the island groups of the Late Neolithic. It is, moreover, perhaps this path that generated, in the Chalcolithic period, a phenomenon of withdrawal and cultural closure. The Terrinian was a fundamentally Corsican style, from its origins to its progressive dissolution under the impact of Campaniform and/or Sardinian cultural infiltrations.

It was necessary to wait for the beginnings of the Bronze Age to see the island open, massively, to Sardinia in the south and to the Italo-Alpine world to the northeast. These influences were evident in the architectural and material culture of local populations and are quite likely to be associated with an influx of populations. As elsewhere in the Mediterranean, the Bronze Age saw the development of long-distance networks, as well as the power of those who were able to control them. The end of the Middle Bronze Age (or Late Bronze Age) is a paroxysm, with the local assimilation of cultural codes from the Aegean through countless intermediaries, a phenomenon in which Nuragic Sardinia probably played a leading role. As elsewhere, the Late Bronze Age, with the climatic changes that accompanied it, marked a quite clear break with the Middle Bronze Age. The social organization then seems in full redefinition, under the aegis of local chiefdoms immortalized in the megalithic art, even if this art is deeply anchored in its neolithic substratum. The Early Iron Age, continuing in certain aspects, remained a period of transformation, especially marked by development of an open habitat. This marked the end of an era of two millennia of defensive installations, full of significance about

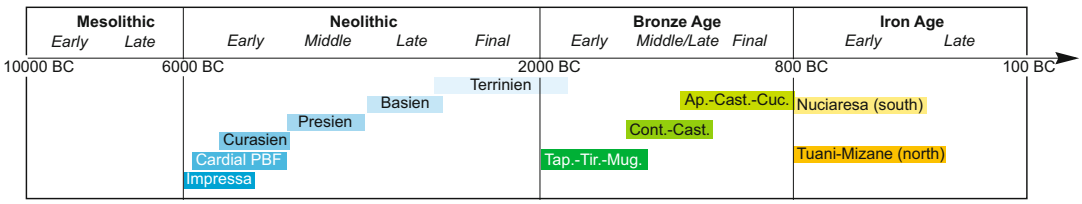

Corsican Late Prehistory, Fig. 4 Chronology of material cultures and periodization of Corsican prehistory (by KPQ)

the social instability that could prevail from one valley to another. At the end of this period, Corsica entered into the era of the colonies, Greek, then Etruscan, even Carthaginian, without their impact being really important to island societies. It was only with the great conflicts of the third century BC that there was radical change, which led gradually to the assimilation of local groups into the great historical ensembles of antiquity.

Future Directions

The study of Corsican prehistory can be fruitfully extended in a number of directions. People on the island of Corsica had interactions with people from many different parts of the Mediterranean, and it is clear that these influences and interactions changed through time. A closer comparison of material evidence could allow these relationships to be studied in greater detail and provide a more nuanced understanding of the past of this island and of the region. The changing nature of relationships between Corsica and Sardinia, in particular, is of great interest. Furthermore, as the first discussion of Corsican prehistory published in the English-language, this paper brings new data to English-language analyses of prehistory in the Mediterranean. It is hoped that the data presented in this paper will be used to enrich English-language interpretations of regional prehistories.

Cross-References

- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Mediterranean Sea: Maritime Archaeology
- ▶ Trade and Transport in the Ancient Mediterranean

References

Bailloud, G. 1969. Fouille d'un habitat néolithique et torréen à Basi (Serra-di-Ferro, Corse). *Bulletin de la Société préhistorique fraçaise* 66: 367–384.

Camps, G. 1988a. *Préhistoire d'une île. Les origines de la Corse*. Paris: Errance.

Camps, G. 1988b. *Terrina et le Terrinien. Recherches sur le Chalcolithique de la Corse*, 109. Roma: Ecole Française de Rome.

Cesari, J. 1992. Contribution à l'étude des habitats de l'Age du Bronze de la Corse du Sud. In *La Sardegna nel Mediterraneo tra il Bronzo medio e il Bronzo recente (XVI-XII sec. a. C.),* atti del III Convegno di Studi (Selargius-Cagliari, 1987), 379–398. Cagliari: della Torre editore.

D'Anna, A., H. Marchesi, P. Tramoni, F. Demouche, and C. Gilabert. 2001. Renaghju (Sartène, Corse-du-Sud), un habitat de plein-air néolithique ancien en Corse. *Bulletin de la Société préhistorique fraçaise* 98: 431–444.

D'Anna, A., J.-L. Guendon, L. Pinet, and P. Tramoni. (2007). Le plateau de Cauria à l'âge du Bronze: De la lecture évènementielle à l'approche pluridisciplinaire anthropologique. In *XXVIe Congrès Préhistorique de France* (Avignon, septembre 2004), 331–346. Paris: SPF.

Grosjean, R. 1966. *La Corse avant l'Histoire*. Paris: Klinksieck.

Jehasse, J., and L. Jehasse. 1973. *La nécropole préromaine d'Aleria*. 25e supplément à Gallia. Paris: CNRS.

de Lanfranchi, F., and M.C. Weiss. 1997. *L'aventure humaine préhistorique en Corse*. Ajaccio: Albiana.

Leandri, F. 2013. *Monte Revincu. Aux origines du mégalithisme en Méditerranée*. Paris: Errance.

Peche-Quilichini, K. 2011. Les monuments turriformes de l'âge du Bronze en Corse: tentative de caractérisation spatiale et chronologique sur fond d'historiographie. In *L'âge du Bronze en Méditerranée. Recherches récentes,* ed. D. Garcia, 155–170. Paris: Errance.

Peche-Quilichini, K., T. Lachenal, S. Amici, G. Bartoloni, L. Bergerot, E. Biancifiori, C. Colomba Carraro, S. Delvaux, A.-L. Grevey, F. de Lanfranchi, M. Milletti, C. Mottolese, and A. Volpi. 2015. L'espace domestique au Bronze final et au premier âge du Fer dans le sud de la Corse. *Trabajos de Prehistoria* 72: 259–281.

Virili, F.-L., and J. Grosjean. 1979. *Guide des sites torréens de l'Age du Bronze corse*. Paris: Vigros.

Council for British Archaeology (CBA)

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Major Impact

The Council for British Archaeology (CBA) is a UK-wide organization which works to promote "archaeology for all." It was originally established in 1944 by a consortium of county archaeological societies which were concerned at the archaeological implications of the redevelopment that would be needed at the end of the Second World War.

Since 1944, the CBA's work has expanded and increased in scale, with funding provided initially from the UK Government via the British Academy. In recent years the CBA has become more self-sufficient but has been successful in raising funding from various trusts and foundations, as well as via grants from the national heritage agencies across the UK, particularly Historic England, and other sources.

Initially, the CBA's membership consisted of a range of institutions at national, county/district, and local levels. In 1993, the membership offer was extended to individuals, and the CBA also took over the Young Archaeologists' Club (YAC) for young people under 17. The CBA's membership now includes some 7500 members and subscribers, together with c 450 institutional members. The membership offers links with membership of a UK-wide network of similar charitable organizations at national and regional scale, including Archaeology Scotland, CBA Wales/Cymru, and 11 English CBA Regional Groups.

In recent years, the CBA's activities have been structured into four areas: participation, discovery, advocacy, and, more recently, sustainability. The CBA has been a strong advocate for public participation in UK archaeology, originally via its *Calendar of Excavations* and most recently via support for "community archaeology." The CBA not only works to encourage others to involve the public in archaeology but has also run its own activities, such as the Home Front Legacy 1914–1918 project looking at the physical legacy of the First World War across the UK. Large numbers of volunteers are also involved in delivering hands-on archaeology to young people through YAC branches across the UK (http://www.yac-uk.org).

The CBA's advocacy work relates to all forms of archaeological evidence, including historic buildings, archaeological sites and landscapes, and portable antiquities. The CBA is one of the National Amenity Societies which is notified about the proposed demolitions to listed buildings in England and Wales and works with a network of volunteers to make informed responses. The CBA also works with partners through The Archaeology Forum (http://archforum.archaeologyuk.org/), The Heritage Alliance (http://www.theheritagealliance.org.uk), and Wildlife and Countryside Link (http://www.wcl.org.uk) to provide a strong voice for archaeology across the UK, as well as supporting the All Party Parliamentary Archaeology Group at Westminster (http://www.appag.org.uk). Some of the key issues in which the CBA has been involved as an advocate in recent years include heritage protection legislation, definitions of treasure and illicit trade in antiquities, heritage crime, the impact of climate change on the historic environment, the value of local authority-based archaeology services and their Historic Environment Records, and the protection and presentation of World Heritage Sites, such as Stonehenge.

The CBA is an active and innovative publisher with over 200 monographs either in print or available electronically free of charge via the Archaeology Data Service (http://archaeologydataservice.ac.uk). Its regular magazine, *British Archaeology*, brings the latest news and thinking on archaeology to CBA members. An electronic open-access journal, *Internet Archaeology* (http://intarch.ac.uk), has been published since 1995, allowing online multimedia content to be made widely available. The CBA supports research, participation, and training through a range of online services. The CBA is a charity registered in England and Wales and also registered independently as a charity in Scotland. The charity is overseen by an elected group of 15 trustees on behalf of CBA members. The CBA's UK headquarters and most of the CBA's staff are located in York.

Cross-References

- ▶ Archaeology Data Service (ADS)
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Avocational Archaeology
- ▶ Cleere, Henry
- ▶ Clubs and Societies Promoting Archaeology (National and Local)
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Heritage and Society
- ▶ Heritage and Public Policy
- ▶ Heritage Values and Education
- ▶ Heritage: Public Perceptions
- ▶ Industrial Archaeology
- ▶ Institute for Archaeologists (IfA)
- ▶ Metal Detecting in Archaeology
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Stakeholders and Community Participation
- ▶ Underwater Archaeology
- ▶ United Kingdom: Cultural Heritage Management Education
- ▶ Urban Archaeology
- ▶ Volunteers in Archaeology

References

Council for British Archaeology. n.d. Available at: www.archaeologyuk.org

Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)

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Introduction

The Council of Europe Framework Convention on the Value of Cultural Heritage for Society (Council of Europe 2005a), known as the Faro Convention after the city in which it was signed, was opened for signature on 27 October 2005. Following ratification by ten member states, it came into force on 1 June 2011. At the time of writing (June 2011), it has been ratified by 11 of the Member States of the Council of Europe (Bosnia and Herzegovina, Croatia, Georgia, Latvia, Luxembourg, Moldova, Montenegro, Norway, Portugal, Serbia, and Slovenia).

This is a Framework Convention, which sets out principles and broad areas for action which have been agreed by States Party. None of its provisions can convey rights to individuals solely through national ratification without legislative action by individual States.

Key Issues/Current Debates/Future Directions/Examples

Aims and Origins of the Convention

The Convention arose from the desire of the Committee of Ministers to provide a framework of reference for heritage policies in the context of rights and responsibilities in this area and the positive benefits to be drawn from the use of the heritage as cultural capital, with a view to underpinning existing CoE instruments concerning more specific aspects of cultural heritage. These were judged not to affirm the growing importance of the cultural heritage relative to sustainable development, globalization, and awareness of the cultural identity dimension in conflicts. The possibility of drawing up an additional protocol to existing conventions was explored but was rejected as unsatisfactory, and so in 2003, a select committee of experts responsible to the Steering Committee for the Cultural Heritage (CDPAT) was appointed in order to draw up a draft framework convention. Among its aims were:

- Reaching agreement on an enlarged and cross-disciplinary approach to the cultural heritage and the concept of a common European heritage
- Establishing the principle of fair treatment for heritages that represent the various cultural traditions that coexist in Europe

- Committing States to introducing heritage policies and educational initiatives to promote dialogue and mutual understanding, with a view to preventing conflicts
- Establishing a pan-European context for the cooperative preparation of criteria for sustainable development in the use of knowledge and skills as a development resource
- Committing States to the use of management approaches based on participation by all players in society

The Convention was drafted at a series of meetings in 2003 and 2004, which took account of suggestions made by other related committees, and it was adopted by the Ministers' Deputies on 13 October 2005.

The Text of the Convention

The Faro Convention consists of a preamble followed by 20 articles, divided into five sections, as follows:

- Section I Aims, definitions, and principles
  - Article 1 Aims of the Convention
  - Article 2 Definitions
  - Article 3 The common heritage of Europe
  - Article 4 Rights and responsibilities relating to cultural heritage
  - Article 5 Cultural heritage law and policies
  - Article 6 Effects of the Convention
- Section II Contribution of cultural heritage to society and human development
  - Article 7 Cultural heritage and dialogue
  - Article 8 Environment, heritage, and quality of life
  - Article 9 Sustainable use of the cultural heritage
  - Article 10 Cultural heritage and economic activity
- Section III Shared responsibility for cultural heritage and public participation
  - Article 11 The organization of public responsibilities for cultural heritage
  - Article 12 Access to cultural heritage and democratic participation
  - Article 13 Cultural heritage and knowledge
  - Article 14 Cultural heritage and the information society
- Section IV Monitoring and cooperation
  - Article 15 Undertakings of the Parties
  - Article 16 Monitoring mechanism
  - Article 17 Cooperation in follow-up activities
- Section V Final clauses
  - Article 18 Signature and entry into force
  - Article 19 Accession
  - Article 20 Territorial application

Explanatory Report

Simultaneously with the approval of the Convention in 2005, the Council of Europe issued an Explanatory Report (Council of Europe 2005b). This document puts professional flesh on the legislative bones of the Convention proper, and is essential reading for planners, administrators, and others concerned with the protection of those elements of the European cultural heritage located within the frontiers of their own countries.

It begins by commenting that the approach adopted in the Convention is consistent with the specificity of the Council of Europe while at the same time being innovative. For example, in accordance with the concept of the "common heritage of Europe," constituted essentially through shared experience and commitment to human rights and democratic principles, the Convention deals with heritage as an object of individual rights which give it meaning. This avoids the uncertainty of changing definitions of heritages, by referring to their foundation in human rights and liberties (Article 4 exactly follows the logic of interpretation of the European Convention on Human Rights). In the present Convention, heritage is treated both as "source" (Preamble, paragraph 1) and as "resource" for the exercise of freedoms (Preamble, paragraph 3 and Article 2).

The text also addresses the right to cultural heritage (Article 4), which it expresses as a dimension of the right to participate in the cultural life of the community (Article 1) and the right to education (Preamble, paragraph 4, citing Article 27 of the Universal Declaration of Human Rights, and Articles 13 and 15 of the International Covenant on Economic, Social and Cultural Rights). In this way, all reference to cultures and to heritages as concrete entities is avoided.

The text develops the idea of a "common heritage of Europe" (Article 3) in which the cultural heritage shared by Europeans interacts with the

agreed democratic, political, and social ideals of Europe to generate the idea of a common European responsibility toward cultural heritage. This corresponds with the distinctive character of the European heritage that has resulted from its depth and rich historical stratification, its diversity of regions, and its shared cultural phenomena, the products of the interaction of diverse cultures over the centuries.

Thus defined, the European cultural heritage is a primary resource for democratic engagement in support of cultural diversity and sustainable development; it is also a source of prosperity and unity for the diverse communities present in Europe. Europe's cultural heritage is treated in this Convention as the "cultural capital" from which, through the investment of human ingenuity and effort, have originated the rich and varied cultures of modern Europe. Conservation of this cultural capital is essential, both for its intrinsic value and for its potential as an investment from which future development (cultural, social, and economic) may be generated.

The Faro Convention is consistent with new trends which underline the growing importance of cultural values in the environment, territorial identity, the character of landscape, and the environmental dimensions of cultural heritage. This specificity clearly distinguishes the Convention from earlier international instruments of the Council of Europe and from those launched by UNESCO. It provides the basis for the concept of a "cultural environment."

The idea of the common heritage of Europe allows an approach to the notion of "heritage communities," for there can be no cultural life without a community (Article 27 of the Universal Declaration of Human Rights). A heritage community is defined here as a variable geometry (Article 2b), avoiding reference to ethnicity or other rigid communities. "Heritage communities" here are therefore a very different concept from "the heritage community," the term sometimes used to encompass all professionals engaged in heritage-related activities. This Convention concentrates upon the benefits of developing cooperation between the diverse heritage communities that occur within Europe.

This is an area which, more than any other, requires international and transnational cooperation to bring together the community of peoples represented in the Council of Europe. Consequently, the Convention is distinct from the work of UNESCO, in respect of:

- *Cultural diversity*: The field has been expanded by the Universal Declaration of UNESCO on Cultural Diversity (2001). The present Convention, while recognizing the important synergy between cultural heritage and cultural diversity, concentrates primarily upon how the cultural heritage can be used sustainably to create economic and social conditions favorable to the survival of diverse communities. The maintenance of cultural diversity in the face of globalization is the objective of international effort.
- *Tangible elements of the heritage*: UNESCO's work on a global scale continues to operate using a sectoral approach, establishing lists of major assets regarded as world heritage, whereas the present Convention deals with cultural heritages as ensembles.
- *Intangible aspects of cultural heritage*: Here is where the present Convention focuses primarily on ascribed values rather than on the material or immaterial elements which combine to constitute heritages, thus taking an approach which is distinct from UNESCO's Convention for the Safeguarding of the Intangible Cultural Heritage (2003).

This is a Convention which, without excluding the exceptional, particularly embraces the commonplace heritage of all people.

Cross-References

► Convention for the Safeguarding of Intangible Cultural Heritage (2003)

References

Council of Europe. 2005a. *Council of Europe Convention on the Value of Cultural Heritage for Society* (CETS 199). Strasbourg: Council of Europe.

Council of Europe. 2005b. *Council of Europe Convention on the Value of Cultural Heritage for Society: explanatory report* (CETS 199). Strasbourg: Council of Europe.

Crannog Investigations in Scotland

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The primary type of wetland settlement found in Scotland are *crannogs*; these are artificial islands, made or significantly modified by human agency, which, with the exception of one example in Wales, are found only in Scotland or Ireland. The majority of dated examples were built in the first millennium BC, but they continued to be built and used episodically until the early modern period. They generally take the form of a foundation of organic materials and stone carrying a platform of timber logs or planks raised above water level (Fig. 1). The island may be connected to the shore by a timber causeway. On top of the timber platform, buildings were erected made of timber and, in later periods, of stone. Recent excavations at Black Loch of Myrton in SW Scotland have now revealed another type, a settlement built on a natural island of peat in a shallow loch (Crone and Cavers 2016). This is unlikely to be a unique site; re-examination of antiquarian literature suggests that there was a similar settlement at nearby Dowalton Loch (Stuart 1866, 120–121, Plate XII) and it is possible that some crannog islands began as wetland settlements similar to Black Loch. The great archaeological asset of these wetland settlements is that organic materials such as structural timbers, wooden artifacts, textiles, and food debris are preserved in cold anaerobic conditions.

Most known crannogs survive as islands surrounded by water, but some are completely submerged and others are now drying out in drained agricultural land. **Site formation** is critical to understanding and interpreting crannogs (see SWAP 2007 for discussion) but is not easy to resolve without large-scale intervention. Although most excavated examples appear to have been constructed by dumping material into the loch to form a mound (known as a *Packwerk* construction), a pile-dwelling construction has been proposed for other sites. This clearly has implications for the interpretation of materials found in the core of the mound; do they represent occupation debris which has built up under the pile dwelling or do they represent relict material used in the construction of the mound which predates the occupation of the crannog? Soil micromorphological studies, such as those carried out on some Swiss lake villages (Wallace 2000) and Lithuanian lake dwellings (Menotti et al. 2005), might resolve these issues, but coring through stony mounds has not yet proved possible.

Scottish lochs are particularly cold and murky, and extensive **underwater excavations** have only been carried out in the larger (clearer) Highland lochs, at Oakbank crannog in Loch Tay (e.g., Dixon 2004) and Ederline crannog in Loch Awe (Cavers and Henderson 2005). At both sites, a basket of techniques adapted from shipwreck excavation and the investigation of continental lake villages was employed, with removal of silt carried out using a Venturi system water dredge (see Dean et al. 1992). Although Scottish lochs present a challenging environment in which to excavate, crannogs are generally located in water less than 6 m deep, allowing divers to work for long periods of time using surface-supplied air (Fig. 2).

Buiston, in Ayrshire (Crone 2000), is an example of an excavated "dryland site," which had been drained in the nineteenth century and now lay within a boggy but accessible field. Coring demonstrated that, despite the drainage, significant organic deposits survived (Fig. 3). The site was initially treated as a *box excavation* with small trenches separated by balks. Water management soon became a crucial issue, and a deep trench was subsequently cut across the site which served as a sump from which the water could be pumped. The trench had another advantage in that the substructure could be fully investigated, and it provided greater stratigraphic control; dark organic deposits are much more clearly seen in section than in plan. This became a major issue at Black Loch of Myrton where stratified floor surfaces of highly compacted plant litter could not be easily distinguished from earlier or later floors because the deposits oxidized

Crannog Investigations in Scotland, Fig. 1 Crannog in Loch Nell, Argyll. The majority of crannogs survive as vegetation-covered mounds projecting just above the water

Crannog Investigations in Scotland, Fig. 2 Underwater excavations at Ederline crannog, Loch Awe. Divers excavating below water are supported by a safety supervisor based on a scaffolding platform above the site

almost immediately upon exposure (Fig. 4). This issue has been tackled by intensive monolith sampling of the deposits in section and subsequent soil micromorphological analysis which has helped to reveal the repeated refurbishment of the floor surfaces (Crone et al. 2019; Robertson and Roy 2019).

Unsurprisingly, water levels have been a problem at every wetland site excavated to date. At Cults Loch and Whitefield Loch, both in SW Scotland, this severely restricted the areas that could be excavated in plan. The Cults Loch crannog is now a promontory extending out into the loch (Cavers and Crone 2018), while Dorman's Island, in Whitefield Loch, survives as a tree-covered island which had to be reached by boat (Cavers et al. 2011). In both cases narrow, "sacrificial" trenches were dug around the edges of each

Crannog Investigations in Scotland, Fig. 3 Excavation underway on the seventh century AD "dryland" crannog at Buiston, Ayrshire. The stone hearth and wooden flooring of a round house lie to the left of the photograph while on the right, the palisaded walkway, which formed the defensive perimeter of the crannog, curves around

Crannog Investigations in Scotland, Fig. 4 One of the roundhouses at Black Loch of Myrton. In the thick black deposit overlying the hurdle subfloor of the structure consists of multiple layers of compacted plant litter laid down as flooring and not visible to the naked eye

trench to act as sumps and keep the central area of the trench relatively dry. At Black Loch of Myrton, trenches were sometimes up to 2 m below the water table, and deep sumps had to be dug, with pumps running almost continuously, but once drained the trenches were very workable, while open-sided event shelters protected the surfaces from rain.

Placing crannogs in their contemporary physical and social landscapes is now recognized as key to their understanding and is central to the research agenda of the Scottish Wetland

Archaeology Programme (SWAP 2007). The crannogs in Whitefield Loch and Cults Loch were selected for investigation following a systematic review of the evidence and subsequent field assessment, which identified the rich later prehistoric landscape within which they both sit (Cavers et al. 2011; Cavers and Crone 2018). Reconstruction of the contemporary landscapes, including excavation of neighboring cropmark sites, formed part of the program.

References

Cavers, G., and A. Crone. 2018. *A lake dwelling in its landscape; Iron Age settlement at cults loch, castle Kennedy, Dumfries & Galloway*. Oxford: Oxbow.

Cavers, M.G., and J. Henderson. 2005. Underwater excavation at Ederline crannog, Loch Awe, Argyll, Scotland. *International Journal of Nautical Archaeology* 34: 282–298.

Cavers, G., A. Crone, R. Engl, L. Fouracre, F. Hunter, J. Robertson, and J. Thoms. 2011. Excavations at Dorman's island, Whitefield Loch: An Iron Age crannog in SW Scotland. *Journal of Wetland Archaeology* 10: 71–108.

Crone, B.A. 2000. *The history of a Scottish lowland crannog: Excavations at Buiston, Ayrshire 1989–90*. Edinburgh: STAR Monog Ser 4.

Crone, A., and G. Cavers. 2016. Black Loch of Myrton. An Iron Age village. *British Archaeology Issue* 151: 36–41.

Crone, A., G. Cavers, E. Allison, K. Davies, D. Hamilton, A. Henderson, H. Mackay, D. McLaren, J. Robertson, L. Roy, and N. Whitehouse. 2019. Nasty, brutish and short?; the life cycle of an Iron Age roundhouse at Black Loch of Myrton, SW Scotland. *Journal of Wetland Archaeology*. https://doi.org/10.1080/14732971.2019.1576413.

Dean, M., B. Ferrari, I. Oxley, M. Redknap, and K. Watson, eds. 1992. *Archaeology underwater: The NAS guide to principles and practice*. London: Nautical Archaeology Society, Archetype Press.

Dixon, N. 2004. *The crannogs of Scotland: an underwater archaeology*. Stroud: Tempus.

Menotti, F., Z. Baubonis, D. Brazaitis, T. Higham, M. Kvedaravicius, H. Lewis, G. Motuzaite, and E. Pranckenaite. 2005. The first lake-dwellers of Lithuania: Late bronze age pile settlements on Lake Luokesas. *Oxford Journal of Archaeology* 24 (4): 381–403.

Robertson, J., and L.M. Roy. 2019. A Scottish Iron Age wetland village built from nature's bounty: Understanding the formation of plant litter floors. *Environmental Archaeology*. https://doi.org/10.1080/14614103.2019.1618650?src=recsys.

Stuart, J. 1866. Notices of a group of artificial islands in the Loch of Dowalton, Wigtonshire, and of other artificial islands or "crannogs" throughout Scotland. *Proceedings of the Society of Antiquaries of Scotland* 6: 114–183.

SWAP, ed. 2007. *Archaeology from the wetlands: Recent perspectives. Proceedings of the 11th WARP conference, Edinburgh 2005*. Edinburgh: Soc Antiq Scot Monog Ser.

Wallace, G.E. 2000. Microscopic views of Swiss lake villages. *Antiquity* 74: 283–284.

Cremation in Archaeological Contexts

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Introduction

The earliest recorded use of ceremonial burning in the disposal of the dead comes from Australia and dates to c. 24000 BCE (Lange et al. 1987: 17). Cremation appears to become a major mortuary ritual from around c. 8000 BCE (Davies and Mates 2005: 455–573) and its use has varied temporally and geographically. In the British Isles, for example, cremation formed the predominant rite within the periods c. 2400–1100 BCE, CE 43–150 and 410–650. A similar temporal pattern existed in much of Europe but with regional variations, including a persistence of the rite in the northern provinces of the Roman Empire (third to fifth centuries CE) and Late Iron Age/Norse Scandinavia (eighth to eleventh centuries CE). Following the adoption of the middle-eastern practice of inhumation by the Romans, particularly after Emperor Constantine embraced Christianity (CE 313), cremation became a minority rite in Europe and other areas where that faith was followed until the late nineteenth century when it was revived for largely practical reasons. It remained common elsewhere, however, notably in parts of Asia.

Irrespective of the time and place, the mortuary rite of cremation has always formed a complex and multi-faceted mode of disposal of the dead.

Expensive in terms of time and effort, the rite has the potential to generate a variety of archaeological deposits and features. The primary rite of cremation transformed the corpse from one state to another, and was viewed in some cultures to free the spirit/soul, rendering it "inert" and transportable. Secondary rites could include a diversity of actions and uses to which the cremated remains were put, but predominantly it is evidence of the burial which is encountered archaeologically.

The rite can be studied via two inextricably linked archaeological sources – the cremated remains (human bone, pyre goods, and pyre debris) and the contexts in which they are found. The latter chiefly relate to the secondary part (s) of the rite, but much pertaining to the cremation itself may be deduced from the archaeological components recovered within deposits. Inevitably, not all aspects of the rite are likely to be represented or easily accessible archaeologically, but other sources of data – historical, cultural (contemporaneous poetry and art), ethnographic, and anthropological – may enable some of the missing components to be illustrated or further deduced.

Definition

Cremation is a process of dehydration and oxidation effected by the interaction between three basic requirements: sufficient temperature to ensure the corpse will burn; adequate air supply creating oxidizing conditions; and enough time to allow the organic components of the body to oxidize. In modern cremators, these requirements are monitored by computer-linked sensors and are automatically adjusted where necessary. The operating temperature fluctuates during the process (c. 800–1,000 °C) which generally takes c. 1.5 h to complete. Comparable temperatures are routinely observed in experimental pyre cremations; however, a number of variables, some more or less controllable than others, could affect the efficiency of pyre cremation, for example, quantity of fuel, weather, size of the deceased, and materials (such as furs/leather) muffling all or parts of the body from the full effects of the pyre.

Materials

Cremated bone is variously described as "burnt," "oxidized," or "calcined." The latter two are both expressions of one of the two major chemical changes which occur in cremation leaving only the mineral component of the bone (hydroxyapatite, a calcium phosphate) in its fully oxidized state. Although much of the cremated bone recovered archaeologically can accurately be described in these terms, such is not always the case. Full oxidation of the organic components of the body is a requisite of modern Western cremation, but this is not a ubiquitous requirement within other contemporary cultures and may not have been so in the past. Similarly, not all burnt bone would have undergone the mortuary rite of cremation; consequently, the interpretive term "cremated bone" indicates that the mortuary rite has been followed. Ashes are the inorganic remains surviving oxidation of the organic components of a material. The term is not restricted to specific particle size or material type (e.g., bone ash or fuel ash).

Materials cremated and/or buried with the dead allude to beliefs in the nature of and entry point to the afterworld. Material types generally fall into two main categories: personal items "worn" by the deceased ("intrinsic"), linked to dress and display (e.g., jewelry, clothes fastenings, items contained in pouches/bags suspended from the neck or waist); and separate items ("extrinsic"), for example, food offerings and other practical or "personal" items (including "pet" or status animals) the deceased might require for their journey to and/or in the afterworld. Other goods might have represented gifts or mementos from friends or relatives, or ritual offerings not pertaining directly to the deceased.

Pyre and grave goods relate to different parts of the mortuary rite. The former were cremated with the deceased, and parts/all of these items may have been included in the burial but some are often recovered from other forms of deposit, such as redeposited pyre debris, their differentiated distribution sometimes appearing deliberate. Grave goods are unburnt materials (e.g., ceramic table wear in graves of Roman date, Fig. 1) added only during placement within the burial container or grave; some may even have been added as later

Cremation in Archaeological Contexts, Fig. 1 Late Iron Age (0–50 CE) cremation grave Kent, England, containing the remains of an unurned burial (*center-left*) with ceramic grave goods. (© Oxford Wessex Archaeology)

offerings to the revisited grave. Organic materials would also have featured at both stages but confirmation of these items rarely survives. The archaeologist sees only the minimum, but further evidence is accessible via contemporaneous written and visual sources.

Pyre debris represents all the burnt material remaining after cremation following the removal of the bone and pyre goods intended for burial. The major component usually comprises charred wood (remains of fuel) covering a range of particle size (dust-sized particles to lumps of charred log), with variable quantities of cremated bone (not collected for burial) and sometimes pyre goods, and occasionally (dependent on the underlying soil type) burnt flint/clay and fuel ash slag (general hearth slag formed on highly siliceous soils). Other forms of fuel ash may be represented in some geographic areas, for example, peat or (rarely) coal.

Contexts

The deposit types outlined are not comprehensive, but serve to illustrate the range that may be encountered archaeologically. The remains from a pyre might be distributed between a variety of features/deposits within the funerary landscape, having been included in a formal burial, left within the pyre debris (in situ or redeposited), scattered, and/or packaged for curation or distribution to mourners. Some forms of feature/deposit are more frequently encountered than others (graves), more easily recognized (urned burials, burials with grave goods), have better survival rates (e.g., graves under mounds, grüben*busta* – pits over which pyres were constructed, into which the remains fell and which eventually formed the place of burial), or are easier to define. Scatters of cremated bone, for example, may be observed but it can be difficult to deduce if they are accidental (disturbance), incidental, or deliberate deposits. Some disposal mechanisms, such as deposition of some/all the cremated remains in water (as still occurs in modern India), would leave little/no trace in the archaeological record.

The majority of pyre sites formed discrete features, but in some urban environments, where many cremations were undertaken within a designated area (e.g., the Roman *ustrina*), individual pyre sites might not be discernable among a mass of pyre debris. Most pyre sites were probably constructed directly on the ground surface, the necessary up-draught being provided by the structure of the pyre itself. In many soils (clays, silty clays, chalk), clear evidence of in situ burning will

Cremation in Archaeological Contexts, Fig. 2 Reconstruction of a grüben*bustum* (combined pyre site and grave) showing discolouration of the soil, the fall of the fuel ash into the pit and the cremated bone lying on top of the debris

be apparent via soil discoloration (Fig. 2), but elsewhere, such as in calcareous sands or humic/garden soils, there may be no surviving evidence. The visual effects of in situ burning do not penetrate far into the soil (c. 50–100 mm) and all traces could be easily removed by later disturbance, such as ploughing. Associated features, for example, stone surrounds or platforms, may offer greater protection and accessibility. Cut features include under-pyre draught pits or scoops, and deeper pits which may also form the grave (grüben*busta* – see Fig. 2). Pyre sites might have been cleared of debris after use or left with some in situ which could include cremated bone.

The most frequently recorded archaeological cremation-related deposit is the remains of the cremation burial: the cremated bone recovered from the pyre site for formal deposition in a grave. The burial may have been made in an urn (ceramic, glass, or metal). Most vessels were probably sealed, though organic lids are lost during decomposition and even ceramic or stone lids are often destroyed through disturbance (Fig. 3). Unurned burials generally seem to have been made in some form of organic container, evident from concentrated deposits of cremated bone toward or at the base of the grave (see Fig. 1). Even where grüben*busta* were employed as the place of burial, a proportion of the bone was often collected and placed in an urn or some other form

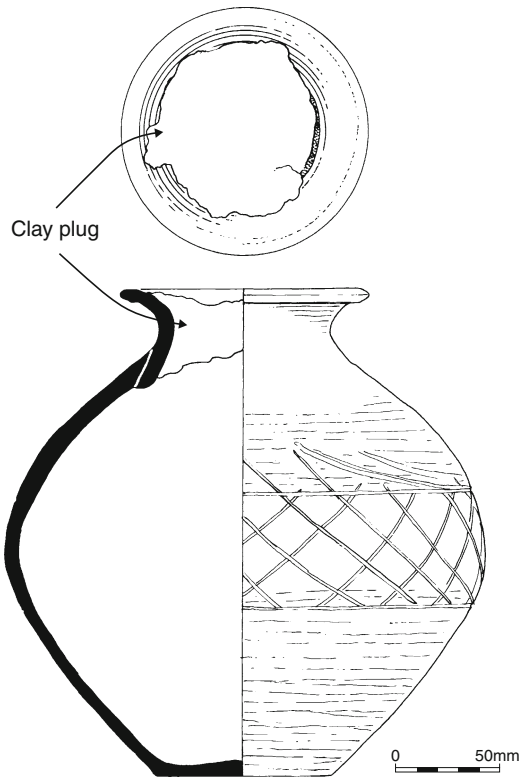

Cremation in Archaeological Contexts, Fig. 3 Late Romano-British (late third-fourth century CE) burial urn from Dorset, England, showing rare survival of the clay plug used to seal the vessel. (Copyright Wessex Archaeology)

of container before being replaced among the pyre debris: NB not all grüben*busta*-style pyre sites also functioned as the grave. Examples of wholly uncontained deposits have also been recovered with the bone spread across the base of the grave (generally stone-lined cists in UK examples). Most burials probably occurred shortly after cremation, however, the portability of cremated remains means this would not always have been the case, particularly where an individual died away from their home (e.g., some Roman military and Norse warriors).

This secondary part of the rite commonly did not require collection and deposition of all the cremated bone. Although a variety of taphonomic factors may affect the quantity of bone surviving in cremation burials (form of burial, disturbance, soil/geology), and some minor temporal and geographic variations have been observed, the average weight of bone included in adult burials from the British Isles, for example, falls within the 600–900 g range (c. 38–50% of the average expected from an adult cremation (fragments >2 mm).

Most cremation burials would have been made in an earth-cut grave but some cultures utilized communal mausolea/monumental structures in which, for example, urns were deposited in niches in the floor and/or walls. The size and form of earth-cut graves varies from small pits just big enough to accommodate an urn (Fig. 4) to relatively large (occasionally substantial) circular or rectilinear features which would hold an array of grave goods in addition to the cremated material (see Fig. 1).

Most graves contained the remains of a single individual but there are variations, some more common than others and some which seem to have been specific to certain periods. A grave might contain:

- A dual/multiple cremation and burial i.e., the remains of two or occasionally more individuals cremated and buried together in a single deposit (adult plus child most common combination)
- A dual/multiple burial i.e., the remains of two or occasionally more individuals cremated separately but buried contemporaneously in individual urns/containers (Fig. 5)
- The remains of one cremated individual buried in more than one vessel ("accessory" burial) or split between an urned and an unurned deposit ("combined" burials)
- An "animal accessory" burial; a human and an entire animal cremated and buried together as

Cremation in Archaeological Contexts, Fig. 4 Early Bronze Age (2200–1600 BCE) urned burial, made in an inverted vessel from Anglesey, Wales

Cremation in Archaeological Contexts, Fig. 5 Early Anglo-Saxon (mid fourth-fifth century CE) grave showing pair of vessels (adult male and adult female) buried contemporaneously (Norfolk, England). (© Norfolk Museums and Archaeological Service (McKinley 1994))

Cremation in Archaeological Contexts, Fig. 6 Group of 20 Early Anglo-Saxon urned burials made within two/three adjacent re-used graves (Norfolk, England). (© Norfolk Museums and Archaeological Service (McKinley 1994))

largely separated deposits, either both urned or with the human urned and the animal remains unurned. Currently in the British Isles these deposits appear restricted to the earliest part of the Anglo-Saxon period (CE 410–530) and the species featured are generally "status" animals such as horse or dog.

- The remains of more than one burial (separate cremations and burial events: Fig. 6)

Cenotaphs are features which have the characteristic appearance of graves, often including pyre goods, pyre debris, and even grave goods, but which are either devoid of or contain very little cremated bone (often less than 10 g). Toynbee (1996: 54) noted the Roman's use of cenotaphs "if a person's body was not available for burial" or "for some person whose remains were buried elsewhere." Numerous examples have been

recorded from Romano-British (CE 43–410) sites and elsewhere in Europe (including France and Sweden), and the practice is likely to have been fairly widespread if relatively infrequent.

Pyre debris may be found in situ at pyre sites, where the distribution of skeletal elements and other materials can reveal vital details about the formation process of the deposit. However, pyre debris is most frequently encountered redeposited as a more-or-less homogeneous mix of archaeological components. It is a common component within cremation graves but is also found in: pre-existent features (Fig. 7) specifically excavated features (i.e., formal deposits of pyre debris); and as surface spreads (particularly within Roman *ustrina*). Its presence suggests that the pyre site was in the vicinity of the deposit and, if not from a cremation grave it will often signify the close proximity of the "burial" to which it relates. Depositions of this type clearly formed a deliberate and significant part of the mortuary rite, and study of the materials within such deposits have revealed significant information pertaining to funerary practices.

The word "token," variously defined as "symbolic," "nominal" or a "memento" has been used to describe burials where only small quantities of

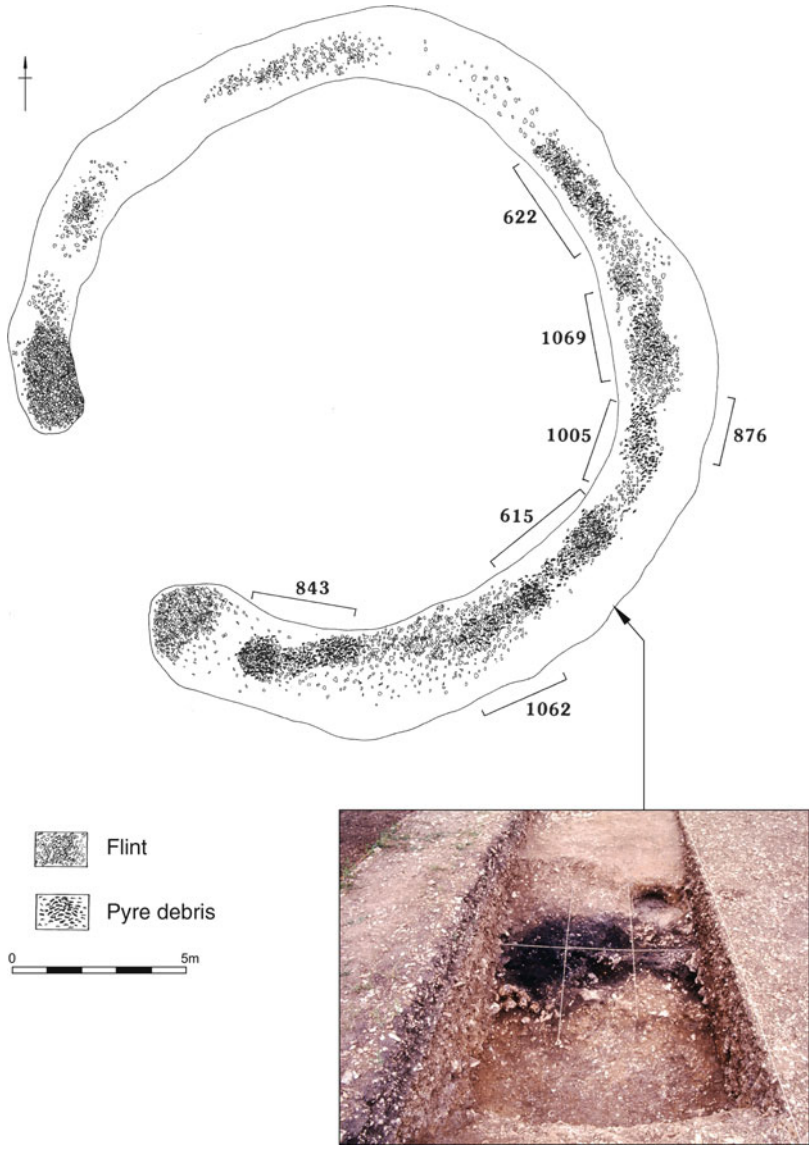

Cremation in Archaeological Contexts, Fig. 7 Early-Middle Bronze Age (2200–1100 BCE) ring ditch (Hampshire, England) showing deposits of pyre debris made from within the confines of the ditch. Context 615 contained debris from a minimum of six pyres. (© Wessex Archaeology)

bone (<100 g; see above) are recovered. The use of "token" in respect to cremation is slightly problematic, as some of the deposits referred to as "token burial" might better be interpreted as "cenotaphs." Others may have formed small, symbolic amounts of bone retained by the deceased's friends or relatives as, for example, the mementoes distributed in eighteenth century Aboriginal Australia (Hiatt 1969). Such deposits might eventually have been buried, perhaps at a much later date, together with the remains of another individual, and there are possible examples of such deposits from Anglo-Saxon (sixth-seventh century CE) inhumation graves. Another potential form of *memento mori* deposit could be represented by the deliberate incorporation of one or two bone fragments from a second individual amongst the cremated burial remains of another.

Osteological Analysis

Osteological analysis illustrates many aspects of the mortuary rite (e.g., McKinley 1994, 2000) Pyre temperature and efficiency of oxidation (demonstrated via thermally induced color variations, shrinkage and warping, and microscopically from the crystal structure); the quantity of bone included in the burial; degree of fragmentation; skeletal elements represented and their distribution; and the form and location of pyre goods can all give insights into the pre-cremation treatment of the corpse and post-cremation manipulation of the remains as well as the pyre technology employed. Outside the various taphonomic factors which may effect many of these attributes, variations have been observed demonstrating the diversity operating within the rite on both a temporal and geographical basis.

Historical Background

Many early Antiquarians dismissed cremated remains as valueless. Improvements in the nineteenth and early twentieth century saw some archaeologists presenting good descriptions of graves and potential pyre sites, but recording was erratic and details of the formation processes, and particularly the relevance of the cremated bone itself, were often overlooked or misunderstood.

As late as the early 1960s in Britain cremated remains were being discarded on some sites and neither they nor the context were being considered in detail, with a tendency to describe all deposits as "cremations." Elsewhere in Europe, particularly in Germany, Poland, and Sweden, cremated remains from sites were being routinely examined from an earlier date, analytical techniques were being developed and the nature of cremated bone was being explored both in Europe and the USA (associated with the development of forensic anthropology).

Over the last two decades of the twentieth century there was a growing interest in the mortuary rite and recognition of its complexity. Observations in modern crematoria, experimental work in laboratories, and numerous experimental pyre cremations have enhanced the understanding of how cremation works and what may be expected to survive at the end of the process. This information has fed-back into the contextual data and enabled a wider appreciation of the various parts of the rite which continues to be explored, together with the potential symbolic relevance of what was being undertaken at different stages. The development at Groningen University (Netherlands) of a dating method for use on cremated bone provided, for the first time, the ability to place unaccompanied burial remains in their correct temporal context.

Key Issues and Future Directions

Archaeologists undertaking the excavation of cremation-related features/deposits have to appreciate that they are dealing with the physical remains of a multifaceted rite from which much can be deduced. Thorough excavation and recovery of the primary archaeological data enables details of the formation processes to be deduced and is essential for future exploration of the rite. Adoption, by both excavators and osteologist, of a common (or at least commensurate) form of reference, excavation methodology, and analytical methods, will allow comparison of cremation data across broader geographic and temporal areas.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Burned Remains in Forensic Contexts
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology

References

Davies, D., and L.H. Mates, eds. 2005. *Encyclopaedia of cremation*. Aldershot: Ashgate.

Hiatt, B. 1969. Cremation in Aboriginal Australia. *Mankind* 7: 104–115.

Lange, M., H. Schutkowski, S. Hummel, and B. Herrmann. 1987. *A bibliography on cremations*, PACT 19. Straßburg: Council of Europe.

McKinley, J.I. 1994. *Spong Hill part VIII: The cremations*, East Anglian Archaeology report 69. East Dereham: East Anglian Archaeology.

McKinley, J.I. 2000. The analysis of cremated bone. In *Human osteology*, ed. M. Cox and S. Mays, 403–421. London: Greenwich Medical Media.

Further Reading

Artelius, T., and F. Svanbery, eds. 2005. *Dealing with the dead: Archaeological perspectives on prehistoric Scandinavian burial ritual*. Stockholm: National Heritage Board Sweden.

GrÄslund, B. 1994. Prehistoric soul beliefs in northern Europe. *Proceedings of the Prehistoric Society* 60: 15–26.

Holck, P. 1986. *Cremated bones. A medical-anthropological study of an archaeological material on cremation burials*, Anthropologiske skrifer 1. Oslo: Anatomisk institutt, University of Oslo.

Hope, V.M. 2007. *Death in ancient Rome*. London: Routledge.

Knusel, C., and R. Gowland, eds. 2006. *The social archaeology of funerary remains*. Oxford: Oxbow Books.

McKinley, J.I. in press. Cremation: Excavation, analysis and interpretation of material from cremation-related contexts. In *Handbook on the archaeology of death and burial*, ed. L. Nilsson Stutz and S. Tarlow. Oxford: Oxford University Press.

Millett, M., J. Pearce, and M. Struck, eds. 2000. *Burial, society and context in the Roman world*. Oxford: Oxbow Books.

Parsons, B. 2005. *Committed to the cleansing flame: The development of cremation in nineteenth-century England*. Reading: Spire Books.

Schmit, C.W., and S.A. Symes, eds. 2008. *The analysis of burnt human remains*. London: Academic.

Sigvallius, B. 1994. *Funeral pyres: Iron Age cremations in North Spånga*, Theses and Papers in Osteology 1. Stockholm: Stockholm University.

Smits, E., E. Iregren, and A.G. Drusini, eds. 1997. *Cremation studies in archaeology*. Saonara: Logos Edizioni.

Toynbee, J.M.C. 1996. *Death and burial in the Roman world*. London: Johns Hopkins University Press.

Crete, Archaeology of

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State of Knowledge and Current Debates

The Production of Archaeological Knowledge on Crete

The archaeological remains of Crete first reached a wide audience through the accounts and drawings of Renaissance-era travelers, such as the Italian Cristoforo Buondelmonti. Later explorations built upon these works with, for example, Robert Pashley, Capt. Thomas Spratt, and Victor Raulin writing about the island's botany, geology, peoples, and ancient ruins in the eighteenth and nineteenth centuries (early travelers are summarized in Pendlebury 1939). The large-scale excavations of the English archaeologist Sir Arthur Evans at the site of Knossos early in the twentieth century (following on from the oft-overlooked preliminary work by Minos Kalokairinos in the late 1870s) propelled Cretan archaeology into European, if not global, consciousness. Since then, over a century of continuous fieldwork has resulted in Crete becoming one of the best-explored islands in the Aegean region. Although it is most famous for the Bronze Age "Minoan" civilization, named for the mythical king Minos who ruled from Knossos, the island has a long history of settlement, conquest, occupation, and resistance, leading to numerous chronological and material specializations within Cretan archaeology.

The archaeological fieldwork carried out on Crete traditionally has focused on specific areas, in particular Knossos and its environs, the Mesara, and the Gulf of Mirabello. This has been dictated primarily by the investigation of Minoan "palaces," towns, and their hinterlands. In more recent times, the under-explored landscapes of western, southeastern, and upland regions have yielded equally important discoveries, populating the diverse Cretan landscape widely since early prehistory. Surface survey has played an important part in increasing our knowledge of the island's past since the 1980s, both by encompassing large swathes of land and by considering occupation and activity at a diachronic level (e.g., surveys of Vrokastro, Kavousi, Gournia, Knossos, western Mesara, Ayios Vasilios, Lasithi, Sphakia, and Chania, to name a few). These projects tend to combine artifactual and site typologies with studies of geology, geomorphology, environment, ancient literary references, and ethnoarchaeological inquiries, all painting a valuable picture of the island over time. They also serve to counter the early predominance of Bronze Age archaeology above that of all other periods (Table 1). Internationally, archaeology on Crete punches above its weight, thanks to the heavy burden that the Minoan culture bears as the first "European" society. Features like flushing toilets and Art Deco-style frescoes contribute to making this strange past into something familiar, and myths of the labyrinth and Minotaur are deeply embedded in western society. It is no coincidence that the emergence of archaeology proper on Crete correlated with the aim of union with Greece in the late nineteenth century – the antiquities demonstrating that Crete too could play a role in the imagination as home of western civilization. Political exploitation of the past is not restricted to Crete, of course, but for an island with multiple, complex narratives of occupation, archaeologists, Cretans, and the general public alike have been highly selective in the past they choose to prioritize.

Crete, Archaeology of, Table 1 Chronology of main archaeological periods on Crete (all prehistoric dates are approximate)

Neolithic	7000–3200
Bronze Age	3200–1200
Postpalatial	1200–1050
Iron Age	1050–700
Archaic	700–480
Classical	480–323
Hellenistic	323–67
Roman	67 BCE–400 CE
First Byzantine	400–828
Arab	828–961
Second Byzantine	961–1210
Venetian	1210–1669
Ottoman	1669–1898

Since Evans, archaeologists from many countries have played an important role in uncovering Crete's past, working under permits issued to the foreign archaeological institutes based in Greece. Close cooperation with their counterparts in the relevant branches of the General Directorate of Antiquities and Cultural Heritage (itself a branch of the Greek Ministry of Culture and Sports) is essential. Oversight of archaeology on Crete is divided among four main, regional ephorates (Chania, Rethymnon, Heraklion, and Lasithi) alongside those responsible for certain subcategories of material such as caves and underwater sites. These units also undertake year-round rescue excavations as necessary. The somewhat colonial division of Cretan fieldwork by region and nationality (e.g., American projects in the east of the island, Italians in the Mesara, British at Knossos) so prominent during the earlier twentieth century is shifting in the new millennium. International collaboration between scholars is now standard, although the permit system means that officially projects will continue to run under the auspices of specific foreign institutes. Smaller foreign institutes are now following in the steps of the more established ones and also organizing Cretan projects: Sissi is a Belgian expedition, while Priniatikos Pyrgos is Irish-led. The majority of these archaeological projects occur during June–August, when academics and the student volunteers have time off from university. The process of excavation is changing too, moving from the once predominant Wheeler box-grid system to the single context, open area excavation methods developed in contract archaeology and espoused on recent projects like Priniatikos Pyrgos and Azoria. Digital recording technologies are embedded in many projects from their

inception, and the digital and/or online presentation of data facilitates speedy sharing of results. Indeed, the provision of Open Access publications and data online is often a requirement of grant awards, although the extent to which these replace traditional monographs remains to be seen.

The economic crisis of recent years has impacted seriously on archaeology in Greece in general. Funding cuts have slashed the number of people employed by the Ministry of Culture and Sports at all levels, leading to reductions in museum and site openings, delays in processing of permits and applications, and deferral in research and publication of results (Howery 2013). Increased looting at archaeological sites and museums is directly related to this reduction in personnel, although both looting and forging Cretan antiquities for international markets are not a new phenomenon (e.g., Butcher and Gill 1993).

Geography and Economy

The island of Crete is the southernmost and largest of the Greek islands, 245 km long but only 50 km across at its widest, with a total area ca. 8300 km^2 (Fig. 1). Situated at the collision point of the Eurasian and African tectonic plates, the landscape is dominated by mountain ranges (some, such as the western White Mountains, over 2000 m.a.s.l.) and dramatic deep gorges (Fig. 2). Unsurprisingly, seismic activity has affected the island and its inhabitants: earthquakes have caused occasional serious disruption, and coastline levels have changed. Geologically, limestones and the phyllite-quartzite family predominate (Rackham and Moody 1996: 15). Settlement has usually focused along the coastal zones or cross-island communication routes, as well as near fertile land. Upland plateaus like the Lasithi and coastal plains such as the southern Mesara provide good soils for agriculture, while the mountainsides have been terraced since antiquity to extend the cultivable land. The varied Cretan landscape gives rise to a range of ecological niches, encouraging a diversity of botanical and animal life, and the island is home to over 100 endemic plants (Rackham and Moody 1996: 53–73). The current Mediterranean climate of hot, dry summers and mild, wet winters has not always persisted, and data from deep sea, ice, and pollen cores as well as flood deposits sheds light on Crete's climate throughout the Holocene (Rackham and Moody 1996: 33–40; Moody 2005). Agriculture has long been the dominant industry, with olives, viticulture, and sheep rearing especially important, and the related food products remain primary exports. Its strategic location on cross-Mediterranean shipping routes has led to a recurrent role in trade networks and military strategy. Tourism is now of great economic importance too. Knossos is the second most visited site in Greece after the Athenian Acropolis, and archaeology must strike a balance between supporting this industry, monitoring development, and ensuring best-practice site preservation, all the while on increasingly smaller budgets.

Historical Summary

Archaeological survey results from the Plakias region in the south of the island suggest Lower Paleolithic (ca. 130,000 B.P.) and Mesolithic (ca. 11,000–8000 B.P.) occupation on Crete (Strasser et al. 2010), contradicting the long-held belief that human activity only began there early in the Neolithic period. Acheulean lithic artifacts suggest Middle Pleistocene activity in this part of the island at least (Runnels et al. 2014), while stratified microliths from excavation at Damnoni cave in the same area attest to a Mesolithic presence (Strasser et al. 2015). For evidence of more permanent occupation, the earliest Neolithic (ca. 7000 BCE) must still be the starting point. These early farmers brought with them animals and crops typical of the contemporary Neolithic lifestyle of the Near East and Anatolia. An initial aceramic phase at Knossos was the beginning of 4000 years of Neolithic activity there, creating a tell site. No other sites on the island exhibit such a long sequence of early human activity, but Knossos was by no means the only inhabited place. Late Neolithic sites included caves and open-air settlements like Gerani and Sphoungaras, while in the Final Neolithic, site numbers and types increased and included upland defensible locations also such as Monastiraki Katalimata (Fig. 2) (Tomkins 2008).

The transition to the Bronze Age is placed around 3200 BCE (Table 2), and during the

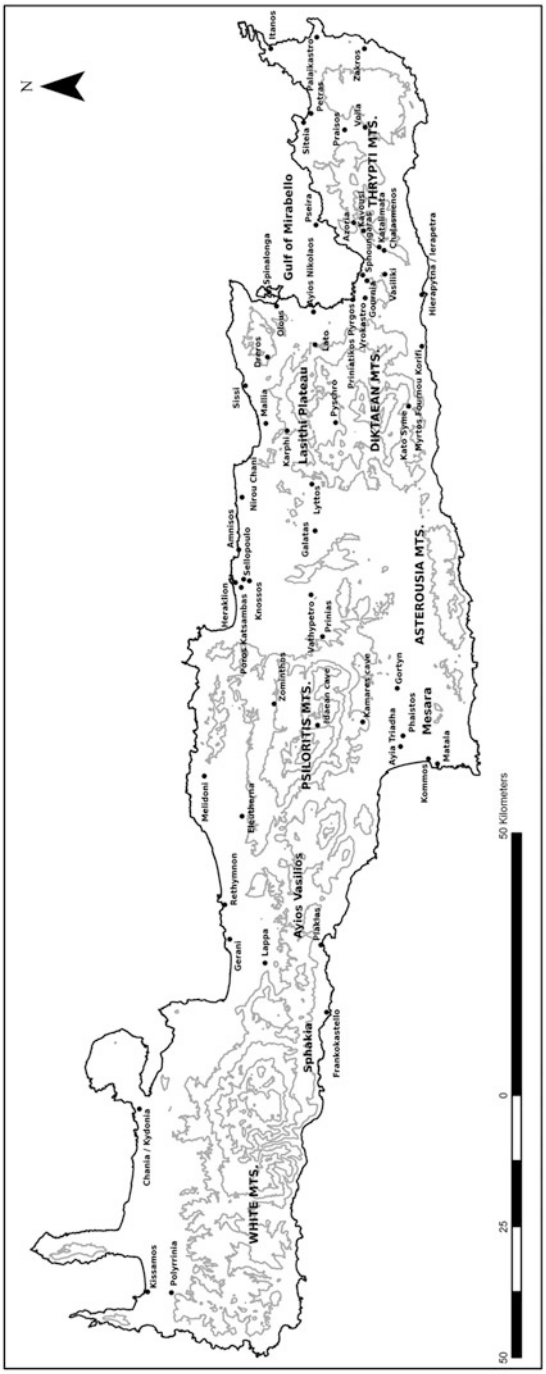

Crete, Archaeology of, Fig. 1 Map of Crete with sites mentioned in text. Map made by J. Day

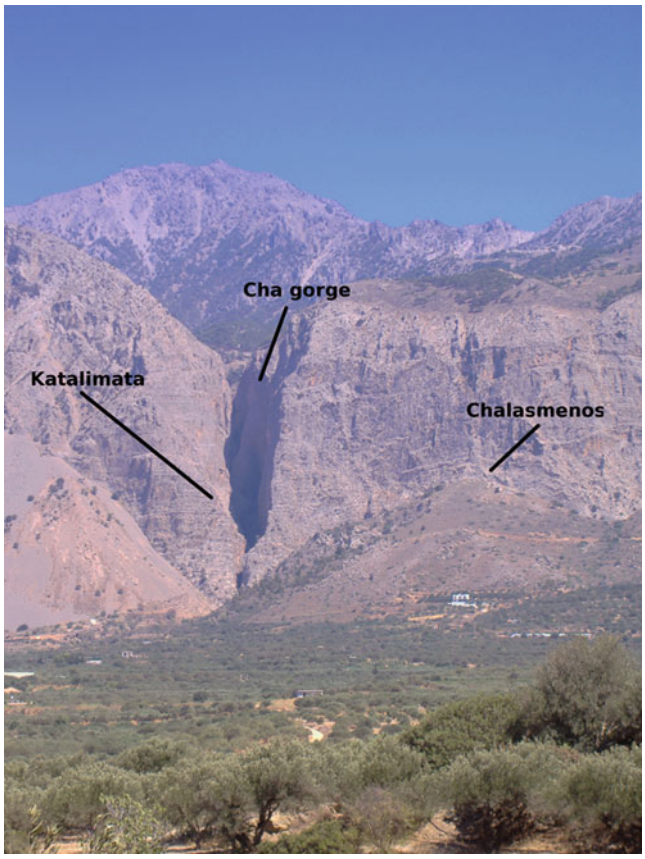

Crete, Archaeology of, Fig. 2 The Cha gorge in eastern Crete, with two nearby archaeological sites. Photo J. Day

Crete, Archaeology of, Table 2 Bronze Age chronology. Minoan chronology is still much debated, and the dates used here follow Dickinson 1994. All dates are approximate and are BCE

3200–1900	Early Minoan I–Middle Minoan IA	Prepalatial
1900–1700	Middle Minoan IB–Middle Minoan IIIA	Protopalatial
1700–1450	Middle Minoan IIIB–Late Minoan IB	Neopalatial
1450–1200	Late Minoan II–Late Minoan IIIB	Final Palatial (also known as Third Palace period)
1200–1050	Late Minoan IIIC	Postpalatial

following millennium, settlement numbers continued to rise, accompanied by changes in material culture. It is possible that at least some of these social transformations were driven partly by newcomers from overseas, with the Cyclades, the Dodecanese, and Anatolia potential points of origin (Betancourt 2008: 93–94). By the mid-third millennium BCE, sizeable villages had developed in association with fertile land and natural communication routes (e.g., Vasiliki, Myrtos Fournou Korifi). Distinctive Early Bronze Age ceramics, such as Vasiliki Ware and Fine Gray Ware, and divergent burial practices suggest strong local identities, despite the evidence for interregional movement of goods.

The Middle and Late Bronze Age (or Middle and Late Minoan periods) was the time of the so-called palaces, most famously Knossos, Malia, Phaistos, and Zakros. These complex structures were initially considered to be royal residences, but archaeologists now believe that they were multifunctional. Extending around a central court, they provided a place for ritual and commensal events. Areas were also dedicated to storage and craft manufacture (Fig. 3). Two main phases of development, divided by an earthquake

Crete, Archaeology of, Fig. 3 Storage magazine at Knossos. Photo J. Day

ca. 1700 BCE, have been accepted by scholars, leading to the terms Protopalatial and Neopalatial for the First (ca. 1900–1700 BCE) and Second (ca. 1700–1450 BCE) Palace periods. Thriving towns emerged, some adjacent to "palaces" (e.g., Knossos, Malia, perhaps Gournia) (Fig. 4), others as separate settlements (e.g., Kommos, Palaikastro). Neopalatial "villa" sites like Vathypetro, Nirou Chani, and Ayia Triadha shared certain palatial architectural features (e.g., pier-and-door partitions that allow control over the light and air entering rooms; well-carved blocks of ashlar masonry) and were probably also associated with the elite. An administrative system is evidenced by two undeciphered scripts, Cretan Hieroglyphic and Linear A, which occur mainly on clay tablets and sealings. High-quality ceramics, frescoes, faience, metalwork, and ivory and stone carving proliferated, aided by technological developments like the potter's wheel and a wide-ranging network of overseas contacts (see Shelmerdine 2008 for numerous papers on Minoan Crete).

Toward the end of the Late Bronze Age, the island likely experienced a period of domination by the Mycenaeans of mainland Greece. Certainly Linear B tablets from Knossos and Chania were written in the same language (an early form of Greek) and suggest a similar administrative system to that which occurred contemporaneously on the mainland at places like Pylos and Mycenae. Other mainland-style artifacts and symbols replaced or merged with Minoan ones (Preston 2008 on the "Mycenaeanization" of Crete), but this adoption of new practices and things was not necessarily the result of military conquest and could also indicate the movement of people and ideas.

Like other complex societies of the Eastern Mediterranean, Crete experienced major upheavals around 1200 BCE, the causes of which are uncertain but may have included natural

Crete, Archaeology of, Fig. 4 Minoan town of Gournia. Photo J. Day

Crete, Archaeology of, Fig. 5 View across saddle of Karphi. Photo J. Day

catastrophes, overseas raiders, systems collapse, or internal strife. The society that emerged in the Early Iron Age (ca. 1050–700 BCE) was very different from its predecessor. Many sites were abandoned or destroyed, and settlement generally withdrew from coastal zones to upland, relatively inaccessible locations in the twelfth and eleventh centuries BCE. Excavations at Vrokastro, Karphi, Kavousi Kastro, and Kavousi Vronda, for example, show the typical stone-built agglomerative housing of this period; social differentiation is perhaps recognizable in certain features (monumental thresholds) or house size (e.g., Great House at Karphi) (Fig. 5). Other characteristics such as the disappearance of writing, the development of Geometric-style pottery,

Crete, Archaeology of, Fig. 6 Civic center of Lato. Photo J. Day

and the rise in cremation are shared across the wider Aegean world during these "Dark Ages" (Wallace 2010: 23). Growing complexity is evident once again from the tenth century as trade with the east increased, later leading to the "Orientalizing" style in the arts (Wallace 2010: 213).

Nucleation and expansion of some settlements and corresponding abandonment of others characterized the Archaic period (700–480 BCE), during which the foundations for the emergence of the city-state (the *polis*) were laid, often with an associated harbor town (e.g., Lato and its port at Lato Pros Kamara, modern Ayios Nikolaos) (Fig. 6). Some communities seem to have had close links with Egypt, attested by Egyptianizing dedications in sanctuaries and tombs, as well as with the Phoenicians for whom Crete probably served as a stopping point on voyages to their western colonies (Erickson 2005: 625; Wallace 2010: 219). Contact with mainland Greece in this period is attested predominantly by ceramics, such as Laconian kraters, Corinthian aryballoi, and Attic black figure vessels. A proposed period of decline (the "sixth-century gap") based on the lack of textual and archaeological information has been contradicted by recent work at thriving sixth-century settlements such as Azoria and Eleutherna. Even at the site of Knossos, long thought to be devoid of sixth-century BCE activity, the results of the Knossos Urban Landscape Project show that this period witnessed continuous occupation (Trainor forthcoming). Archaic Cretan society probably favored oligarchies, and public display of law codes on civic buildings, most famously at Gortyn, is a tangible reflection of social organization at the time.

Crete did not play an important role in the major conflicts of the fifth-century BCE Greek world, the Persian and Peloponnesian wars, and has often been considered somewhat isolated from the commercial, intellectual, political, and military developments of mainland Greece (Erickson 2005: 622). The island was, however, an important node in pan-Mediterranean trade networks at this time. Coinage using a common standard was first issued by prominent city-states in 470 BCE (Wallace 2010: 361), and ceramic imports from the Peloponnese and Attica, in particular, confound the impression of inactivity. Classical and later Hellenistic times saw increasing conflict on the island, as city-states tried to expand their territory. Larger states like Knossos, Gortyn, and Hierapytna swallowed up smaller *poleis*, occasionally leading to total destruction, such as that which befell Lyttos when it resisted Knossian conquest ca. 220 BCE. Transport amphorae indicate Hellenistic trade with the Dodecanese, Egypt, and the Black Sea (Vogeikoff-Brogan 2004), and ancient texts refer to Cretan mercenaries serving overseas at this time (Chaniotis 1999: 183).

Crete had been sporadically involved in Roman affairs since the early second century BCE, but it was fully incorporated into the Roman world after 67 BCE, when it was conquered by Metellus. United with Cyrene as a province, its capital at Gortyn acquired the trappings of a Roman city; theaters, temples, baths, a circus, and an amphitheater can still be seen across the 200 ha. site today (Fig. 7). In the early Roman era, settlement expanded into the countryside through small farms and villages, while the cities of Asia Minor influenced its art and architecture (Sanders 1982: 30, 135). The rise of Christianity led to the construction of basilica churches across the island, and large country villas appeared later in the fifth and sixth centuries CE, a time of prosperity and peace.

Arab expansion around the Mediterranean in the seventh century CE caused increased military activity, and eventually Crete was conquered in the ninth century, bringing an end to the first Byzantine period (ca. 400–828 CE). Little is known about the ensuing Arab rule, and apart from pottery and coins, only one building has thus far been attributed to this phase (Warren and Miles 1972). The island soon returned to the Byzantine empire following the capture of the stronghold at Khandax (now Heraklion) by general Nikephoros Phokas, commencing the second Byzantine period (961–1210 CE). Close ties with Constantinople characterize this prosperous era when Crete became a "theme" (province) with its own governor, although urban settlements were outnumbered by small rural villages (Tsougarakis 1988: 136).

Following the sack of Constantinople by crusaders in 1204, Crete became the property of Genoa, briefly, and then Venice in 1210. The Venetians faced a strong local resistance to their harsh taxation regime which funded military exploits, although the settlers from Venice received many privileges. Another unpopular move was the restriction on Orthodox Christianity, which was seen as a uniting force for the native Cretans. Venetian remains are some of the most impressive to be seen on Crete today and include fortresses (e.g., Rethymnon, Ierapetra, Frangokastello) (Fig. 8), ship sheds or *arsenali* (Heraklion), Latin churches (e.g., St. Francis in Chania, which has housed the city's archaeological museum), and deserted villages (e.g., Voila). A gradual blending of Cretan and Venetian cultures fostered a distinct artistic environment by the sixteenth and seventeenth centuries, which included skilled fresco and icon painting (El Greco was a Cretan) and literature, most famously the verse romance *Erotokritos*.

The island remained under the control of La Serenissima (Most Serene Republic of Venice) until 1669 when, with the exception of a few

Crete, Archaeology of, Fig. 7 Aqueduct at Gortyn. Photo J. Day

Crete, Archaeology of, Fig. 8 Venetian fortress in Heraklion harbor. Photo J. Day

strongholds like Spinalonga, it was finally conquered by the Ottoman Empire following a lengthy siege at Candia (Heraklion). The subsequent *Tourkokratia* (period of Ottoman rule) lasted over 200 years, but the only remains visible of this era today are occasional fountains and mosques. Numerous rebellions during this period sought to gain Cretan freedom, most famously those of 1770 led by Daskalogiannis, of 1821–1830 triggered by the Greek War of Independence, and the Cretan Revolt of 1866–1869 (Detorakis 1994: 278–346).

It was not until 1898 that Crete finally became autonomous, aided by the Great Powers of Europe. The next goal was *enosis*, or union with Greece, which was achieved in 1913. Crete's history from this point onward is closely intertwined with that of the rest of Greece. The forced removal of Cretan Muslims in a population exchange with Turkey in the early 1920s was a traumatic event for the island (Koufopoulou 2003). During World War II, Allied-controlled Crete was subject to an airborne invasion by Nazi Germany in May 1941, the "Battle of Crete." Despite the bravery of the Cretans and Allies alike (including archaeologists like J.D.S. Pendlebury whose detailed knowledge of the island was put to strategic use), the defending troops were evacuated, leaving the island occupied by German and Italian forces. The resistance movement fought on until the end of the war, and exploits such as the kidnapping of General Kreipe meant that the Germans enacted brutal reprisals on the civilian population. The rapidly disappearing material traces of the invasion and resistance belong to a recent past that deserves more systematic archaeological investigation than has thus far been attempted.

Current Debates

The results of over a century of intensive archaeological fieldwork on Crete and paradigmatic shifts within the discipline are impressive: detailed information is available on artifact typologies, settlement patterns, site types, chronology, and diachronic changes in society. Bronze Age archaeology has emerged from the shadow of Classical archaeology, to be recognized and practiced as the study of a distinctive prehistoric society. This is tied to a change in emphasis more generally within the archaeology of the ancient Mediterranean, now a field less focused on iconography (as exemplified by studies of Classical figural pottery) and more on social and ideological processes. The international makeup of archaeologists working on Crete means that research is subject to the influences of different academic

traditions. In the 1980s, inspired by New Archaeology and its processual methodologies, many archaeologists on Crete embraced advances in archaeobotany, faunal studies, survey methodology, and sampling strategies. The influence of post-processual thinking is also evident, albeit mainly within Bronze Age archaeology, as issues like gender, commensality, and ritual practice are considered. On the other hand, a claim that Greek archaeologists adhere firmly to Classical training and reject modern methodological and theoretical changes (Kardulias 1994: 375) may still be applicable to some in an older generation of scholars. Yet as archaeology becomes more reflexive, past and present research agendas are being re-evaluated. For example, the term "Minoan" has been problematized as a modern construct, laden with the baggage of Evans's Edwardian worldview (see various papers in Hamilakis 2002). Similarly, periods outside the Bronze Age that for so long were eclipsed by Minoan-centric studies are now receiving attention. Crete's rich Byzantine heritage, its Venetian cultural mix, and the Archaic-Classical periods are becoming clearer. Five current debates that cross temporal boundaries within the discipline are outlined below.

Origins

The discovery of Paleolithic and Mesolithic artifacts on the island has renewed interest in the question of when Crete was first settled, as well as in the wider implications of such occupation. Potential Miocene tetrapod footprints with hominin-like characteristics recently have been identified at Trachilos, in the west of the island (Gierlinskì et al. 2017). Should this surprising find be accepted by the academic community (and this is by no means guaranteed at the time of writing), it would indicate either a very early presence (just over 5.6 Ma) of hominins in the area now known as Crete or a previously unrecognized primate (Gierlinskì et al. 2017). While Miocene visitors would have had access via the Greek mainland which was connected to Crete until ca. 5 million years B.P., the Paleolithic arrivals must have come across the sea. If they arrived on the island by boat from the north, the east, or Africa, this is of great significance in understanding the capabilities of early humans for seaborne travel and for hominin arrival and dispersal in Europe (Strasser et al. 2010). Crete's distinctive Pleistocene fauna, including dwarf hippos and elephants, did not survive into the Holocene epoch (Rackham and Moody 1996: 47–48); can their extinction be linked to these first peoples?

Neolithic and Early Bronze Age studies have also been revitalized within the last 10 or 15 years. Cretan Neolithic chronology has been revised to bring terminology into line with that used for the Greek mainland (Tomkins 2008) and the continual discovery and publication of Neolithic era sites means there is now a significant body of material to draw upon. The Knossos-centric approach to the island's first farming communities is diminishing in the face of this emerging evidence for widespread Neolithic occupation. These were not isolated communities; the distribution of nonlocal materials such as ceramics and stone tells of intraisland interaction from earliest times (Tomkins 2008: 28). By the Final Neolithic period, in the late fourth millennium BCE, some communities such as Kephala Petras demonstrate considerable overseas links too, attested by obsidian from Melos, non-Cretan ceramics, copper, and *Spondylus* shell (Papadatos and Tomkins 2014). These goods and technologies were not just valued in themselves as new materials but for the symbolic and political capital they brought to communities and to individuals within them.

The ensuing Early Minoan period is no longer viewed simply as an uneventful predecessor of the palatial periods but as a millennium worthy of study for the complexity demonstrated by technological, social, and economic changes (Betancourt 2008). The tensions between "households" and "communities" in relation to social development have been fruitfully explored for this period, recognizing the variety of dwelling and experience covered by each of these broad terms (Schoep and Tomkins 2012: 13–14). Unsurprisingly, the Early Minoan period has been scrutinized for the origins of the famous Minoan "palaces" of the Middle and Late Bronze Age. Traditional opinion purports that these complexes first appeared on Crete ca. 1900 BCE, perhaps inspired by overseas

models in the Near East, but it now seems that they may have roots in the indigenous, large structures of the Early Bronze Age (e.g., at Malia) or even at Neolithic Knossos.

Throughout its history, Crete has hosted continual waves of newcomers, each leaving distinctive marks not only in the archaeological record but also in the islanders' identities. Whether the use of Linear B to write Greek indicates a mainland Greek identity or origin for at least some of the islanders during Late Minoan IIIA–IIIB remains debated (Preston 2008). Conversely, Archaic inscriptions from east Cretan *poleis* are written in Greek script but the language is not Greek. This language has been linked to the Eteocretans ("true Cretans" – perhaps descendants of the Bronze Age populations), who were associated with the Praisos region in Classical literature. The mingling of Latin and Greek peoples and cultures that occurred during Venetian rule (McKee 2000) and the deserted Muslim villages serve as reminders of just how mutable island society has been.

Palaces, Poleis, Pashas

The varying nature of regional and island control throughout Crete's settlement history is another key research theme. It has long been thought that the Minoan "palaces" functioned as regional administrative centers, although the extent of their ritual, economic, political, or ideological dominance is unclear. This interpretation is based on the Mycenaean system and hence may have limited applicability to earlier times. Other ways of understanding the complexity of palatial era society without using an anachronistic or top-down approach have been sought (e.g., peer-polity interaction). The "palaces" as entities still demand explanation, however, and it is not only their function(s) that remains uncertain, but so too the very definition of what exactly is, or was, a "palace." Recently discovered court-centered complexes at Galatas and Petras, for example, add to the growing number of sites given this appellation, and debate continues about the Gournia "palace" also. It is becoming clearer that "palaces" had varying construction and occupation histories and that exact parallels in function between Protopalatial and Neopalatial complexes are unlikely. Moreover, Crete in the Bronze Age was a land of regional diversity (as it still is), and seeking overarching explanations for any kind of social transformation is redundant.

Moving into later periods, Crete was referred to by ancient sources as being a land of 100 *poleis*. Archaeological exploration of these early city-states permits consideration of the development of urban centers, the links between these centers and their hinterland, and the political economy of the island during Archaic times (Haggis et al. 2004: 345). Unlike the tyrannies that emerged elsewhere in Greece, in Cretan *poleis* power rested in the hands of councils (*kosmoi* and *gerontes*) made up from elite clans (Wallace 2010: 358). Planned urban development at Archaic sites such as Azoria and Dreros included city walls and public buildings with ritual and political functions, revealing cities as materializations of their civic identity (Haggis et al. 2004: 393).

Knowledge of administration of the island in Byzantine, Venetian, and Ottoman times is based primarily on textual sources and suffers from being understudied in comparison to the earlier periods. Much of this work is published in Greek or Turkish, which has also impacted on the international impact of such research. In particular, economy, taxation and land usage are popular fields of study for these periods, and archaeological surveys often include these later eras in their studies of diachronic landscapes (Brumfield 2002 combines both approaches). Catalogues of archaeological remains like Ottoman tombstones (Fig. 9) and other monuments (*The Ottoman Centuries* by FORTH) or studies of Byzantine ceramics (e.g., Klontza-Jaklova 2015) are all contributing to slowly broadening our understanding of the later periods of Cretan administrative history.

Trade, Economy, and Overseas Interaction

Thanks to its location between North Africa, Europe, and the Near East, the island has long been an important transshipment point on sea voyages, as well as a destination in its own right. Crete and the Cycladic islands to its north have had a close relationship since the Mesolithic –

Crete, Archaeology of, Fig. 9 Ottoman-era tombstones outside the Stratigraphic Museum, Knossos. Photo C. Trainor

finds of obsidian microliths at Damnoni attest to ninth millennium BCE links with Melos. This contact increases during the Final Neolithic and Early Bronze Age, with so-called gateway communities along the north coast of the island such as Kephala Petras, Mochlos, and Priniatikos Pyrgos receiving not just obsidian but ceramics and copper, some of which was then traded or exchanged to the southern Cretan coast (Papadatos and Tomkins 2014). Indeed, during the Early Minoan period, some sites appear to have had very close ties with the islands to the north of Crete (leading to suggestions of Cycladic settlers in early publications), such as the cemetery of Hagia Photia with its Cycladic-style burial customs and material culture and actual Cycladic imports mixed in with indigenous products and technologies.

During the Late Bronze Age, Cretan elites participated in an Eastern Mediterranean exchange network of prestige goods such as ostrich eggs, copper ingots, faience, perfumed oils, and spices. The nature of this interaction is unclear: to what extent was the movement of goods due to gift exchange or trade, and what was the role of traveling craftworkers or iconographic and ideological transfer in the spread of material culture? Certainly, the theory that a Minoan thalassocracy, or sea empire, was responsible for the Minoan-style material culture at places like Akrotiri on Santorini, Ayia Irini on Keos, and as far afield as Tell el-Dab'a in the Egyptian Delta has been replaced by more nuanced levels of interaction.

The location of Crete's main overseas partners changed after the Bronze Age. Some communities developed close ties to Cyprus and Phoenicia, and eastern imports like bronzes and ivories increased during the Iron Age. Unlike many mainland Greek states, Cretan *poleis* had no colonies to form natural trading partners, and the sixth century saw a decline in Orientalizing motifs and a swing toward relations with the west. It is thought that the eastern and western ends of the island now favored trade with different parts of Greece; the west formed links with the Peloponnese, as attested by finds of Laconian and Argive pottery at Eleutherna, Lappa, and Kydonia, while the east looked to the Cyclades, as indicated by finds at Olous, Azoria, and Itanos (Erickson 2005: 630–631). The lack of imported ceramics dating from 460 to 400 BCE is puzzling and may reflect a cessation of overseas trade, perhaps caused by Athenian pressure during the Peloponnesian War (Erickson 2005: 656). From Classical through Roman times, the island exported agricultural produce including wine, oil, wood, fish (evidenced by rock-cut coastal fish tanks, e.g., at Siteia), and murex. The southern ports became important stopping points on the grain route from Egypt to Rome. In return, imports from around the Roman Empire flowed into the island, such as granites from Egypt and ceramics like Phocaean Red Slip Ware. Cretan sweet wine was

exported in great quantities during the Venetian era, apparently at the expense of grain production; under the Ottomans, the opposite occurred, but olive oil became the dominant export crop (Brumfield 2002: 42–43).

The identification of harbors and shipwrecks is an important aspect of the study of Cretan trade. Archaeology and textual sources combine to identify harbors around the coast, such as the Bronze Age sites of Kommos, Poros-Katsambas and Gournia (where Minoan ship sheds have been recently discovered), or Hellenistic Lato Pros Kamara. Roman prosperity in particular encouraged the growth of coastal towns at the expense of those inland – e.g., Polyrrinia dwindled while its port at Kissamos flourished (Sanders 1982: 31). Undersea exploration augments our knowledge of Cretan trade throughout the ages, and shipwrecks provide unique snapshots of interconnections at discrete moments in time. Middle Minoan II ceramics in the sea near Pseira may indicate a wreck once lay here, but the wooden hull has not survived its long immersion; this is a persistent problem when seeking prehistoric shipwrecks, which, combined with sedimentation from the dynamic seabed and bottom trawling, makes the likelihood of any intact Cretan finds slim. A second potential Minoan shipwreck has been reported at Koulenti, off the coast of Laconia, but publication is pending at the time of writing. Later wrecks around the island are attested by their cargo too; for example, several Roman and post-Roman wreck sites have been identified around the island of Dia, just north of Heraklion.

Ritual Practices and Places

Today the Cretan countryside is dotted with small chapels, but the close link between ritual practice and landscape goes back millennia. The use of caves for rituals probably dates to Neolithic times and is a more plausible explanation of the earliest skeletal and ceramic finds than their use as dwellings, stores, or refuges. In the Bronze Age, subterranean deposition of bronze figurines and fine ceramics occurred (e.g., the Kamares and Psychro caves) (Fig. 10). Some caves continued to be visited for ritual purposes into historic times; the Idaean cave, high in the Psiloritis range, has produced offerings including seventh-century BCE bronze shields. The dedication of such goods in sanctuaries enhanced the prestige of the giver and was a common practice across Greece at this time. Cave chapels can still be found; some of these, such as Melidoni (the site of a siege between Ottomans and Cretans in 1823), should be linked to their prior use as places of refuge.

Minoan-era communities worshipped at mountain shrines also, leaving votives of human and animal figurines and making offerings of food or feasting there. These peak sanctuaries have been

Crete, Archaeology of, Fig. 10 The entrance to the Kamares cave. Photo J. Day

poorly served by academia, however, with few being both fully excavated and fully published (Haysom 2015: 94). Nevertheless, at Kophinas and Vrysinas, for example, careful analysis of ceramics is allowing a clearer understanding of the chronologies of and activities at these sacred places. Architectural features of the "palaces" like lustral basins and pillar crypts suggest that rituals were carried out there too, some perhaps deriving from those that occurred in the natural environment, e.g., pillar crypts standing in for caves in an urban environment. Despite a wealth of iconographic and material remains, the actual deities worshipped and beliefs held by the Bronze Age Cretans are unknown. Linear B includes the names of Mycenaean divinities (e.g., Poseidon, Zeus), but whether there was any similarity with the later Classical gods beyond a shared name is unclear.

Extra-urban sanctuaries were used in later periods too, such as that of Hermes and Aphrodite at Kato Symi. By Archaic times, however, worship in Crete mainly occurred in the temples familiar from the wider Greek world. The small eighth-century BCE temple at Dreros is one of the earliest free-standing temples in the Greek world, while seventh-century Temple A at Prinias is the earliest such building with sculptural decoration. A contemporary potential Phoenician tripillar shrine at Kommos suggests that foreigners (settlers or passing traders?) may have worshipped at this port town. Epigraphic, numismatic, and literary sources show that Roman Imperial cult came to Crete, but of greater significance for archaeology of religion was the emergence of Christianity. Following the appointment of Titus as the first bishop of Crete by St. Paul during the first century CE, Early Christian basilicas replaced temples to the Olympian deities. Excavations of these buildings are rare, but surviving examples dating mainly from the fifth and sixth centuries suggest that simple three-aisled structures with a nave and narthex were customary (Sanders 1982: 89).

Funerary rituals also provide food for thought. The Early Minoan stone tholoi of the Mesara are among the most impressive tombs on the island. These monuments for communal burial would perhaps have served as markers of territory and identity, while the periodic cleaning events brought kin groups or communities together. Fewer burials of Palatial-era Minoan society have been discovered, although chamber tombs, some with weapons among the grave goods, were in use by Late Minoan IIIA, indicating a change in beliefs (e.g., Sellopoulo). The iconography of Late Minoan clay larnakes is intriguing and may provide glimpses of belief in an afterlife. The North Cemetery at Knossos has yielded over 100 Early Iron Age graves, many with rich grave goods. Archaic and Classical burial practices varied, with interments in pithoi, pits, cists, and rock-cut tombs. Christian inhumation practices were diverse, too, and include rock-cut *loculi* tombs at Lappa and Matala that were inhabited by hippies in the 1960s.

Consuming, Remembering, and Sensing

Recent archaeological engagement with food consumption is reflected in the studies of the diachronic social roles of feasting. Faunal assemblages and sets of elaborate drinking and serving vessels from throughout the Bronze Age indicate the importance of eating and drinking events, arguably as venues for negotiating social position. In the Early Iron Age, communal dining is again suggested by archaeology, ranging from large tripod cooking pots at Chalasmenos (Fig. 2) to sizeable buildings such as Kavousi Vronda's "Big House," which perhaps hosted communal events. Ancient texts describe the Archaic and Classical *syssition*, a combination of a shared meal and political institution, as a distinctive feature of Cretan *poleis* (Erickson 2011). These daily meals for the urban elite, financed by taxes and personal contributions, occurred in large, purpose-built structures or *andreion* such as that excavated at Azoria (Haggis et al. 2004: 387–390). Distinguishing between *andreion* and early temples can be problematic, and undoubtedly overlap existed between the social, religious, and political functions of these buildings. More easily identifiable is the later *Prytaneion* at Lato, where city officials dined (Fig. 6, *Prytaneion* at the top left of the central staircase).

The continued occupation and rebuilding at certain Cretan sites such as Knossos has been interpreted as fostering a deliberate link between past and present, perhaps at key cosmological centers or seats of power. Ruins of older structures would have been visible at such palimpsestic sites and in some cases received special attention. For example, Early Iron Age cult was practiced at older Bronze Age remains at numerous sites (e.g., Knossos, Phaistos, Amnisos, Palaikastro), while ninth-century BCE Knossians imitated and reused large Bronze Age chamber tombs (Prent 2003). These conscious attempts to associate themselves with the past were perhaps integral to legitimizing the authority of a rising aristocracy (Prent 2003: 91). The curation of heirloom objects may be another manifestation of this interest in memory across different periods, and Classical era coins from Knossos bore a labyrinth, stressing the long, mythical past of the site.

Feasts, rituals, and funerary ceremonies in ancient Crete have all been reconsidered in terms of the creation and manipulation of sensory, bodily experiences to create embodied memories with political and social significance. Indeed, the sensory turn in arts, humanities, and social sciences of the last 20 years has filtered through to Cretan archaeology more broadly, and artifacts and monuments have been approached through this new lens with stimulating results, at least for the Bronze Age. Hamilakis' (2014) exploration of Minoan Early Bronze Age tholoi and later "palaces" using concepts such as "sensorial assemblages" and "sensorial flows" highlights how the human body and the world around it are an unpredictable blend of materials, movements, and memories. It remains to be seen whether his call for a paradigm shift in how we do archaeology materializes any time soon.

Cross-References

- ▶ American School of Classical Studies at Athens (ASCSA)
- ▶ Andron
- ▶ British School at Athens
- ▶ Ceramics, Ancient Greek
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Classical (Greek) Archaeology
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Evans, Arthur
- ▶ Greece: Cultural Heritage Management
- ▶ Greek Islands (excluding Crete), Archaeology of
- ▶ Greek Houses, Archaeology of
- ▶ Mediterranean Sea: Maritime Archaeology
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Polis
- ▶ Religion, Greek, Archaeology of
- ▶ Survey Archaeology in the Greek Aegean World
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ Urban Planning in the Greek World

References

Betancourt, P. 2008. *The Bronze age begins. The ceramics revolution of early Minoan I and the new forms of wealth that transformed prehistoric society*. Philadelphia: INSTAP Academic Press.

Brumfield, A. 2002. Agriculture and rural settlement in Ottoman Crete, 1669–1898. In *A historical archaeology of the Ottoman empire: Breaking new ground*, ed. U. Baram and L. Carroll, 37–78. New York: Kluwer Academic Publishers.

Butcher, K., and D. Gill. 1993. The director, the dealer, the goddess, and her champions: The acquisition of the Fitzwilliam goddess. *American Journal of Archaeology* 97: 383–401.

Chaniotis, A., ed. 1999. *From Minoan farmers to Roman traders. Sidelights on the economy of ancient Crete*. Stuttgart: Franz Steiner Verlag.

Detorakis, T. 1994 (1990). *History of Crete*. Trans. J.C. Davis. Iraklion: T. Detorakis.

Erickson, B. 2005. Archaeology of empire: Athens and Crete in the fifth century B.C. *American Journal of Archaeology* 109: 619–663.

Erickson, B. 2011. Public feasts and private symposia in the archaic and classical periods. In *STEGA: The archaeology of houses and households in ancient Crete*, Hesperia supplement 44, ed. K. Glowacki and N. Vogeikoff-Brogan, 381–391. Princeton: American School of Classical Studies at Athens.

FORTH Institute for Mediterranean Studies. The Ottoman centuries. http://digitalcrete.ims.forth.gr/index.php?l=1. Accessed 25 Sept 2017.

Gierlinskì, G., G. Niedzwiedzki, M. Lockley, A. Athanassiou, C. Fassoulas, Z. Dubicka, A. Boczarowski, M. Bennett, and P.E. Ahlberg. 2017. Possible hominin footprints from the late Miocene (c. 5.7 Ma) of Crete? In *Proceedings of the geologists' association.* Corrected proof online: https://doi.org/10.1016/j.pgeola.2017.07.006. Accessed 23 Sept 2017.

Haggis, D., M. Mook, C.M. Scarry, L. Snyder, and W. West. 2004. Excavations at Azoria, 2002. *Hesperia* 73: 339–400.

Hamilakis, Y., ed. 2002. *Labyrinth revisited. Rethinking 'Minoan' archaeology.* Oxford: Oxbow.

Hamilakis, Y. 2014. *Archaeology and the senses: Human experience, memory and affect*. Cambridge, MA: Cambridge University Press.

Haysom, M. 2015. Recent research into Minoan extra-urban sanctuaries. *Archaeological Reports* 61 (2014–2015): 94–103.

Howery, C. 2013. The effects of the economic crisis on archaeology in Greece. *Journal of Eastern Mediterranean Archaeology* 1: 228–233.

Kardulias, N.P. 1994. Archaeology in modern Greece: Bureaucracy, politics, and science. In *Beyond the site: Regional studies in the Aegean area*, ed. N.P. Kardulias, 373–387. London/Lanham: University Press of America.

Klontza-Jaklova, V. 2015. History hidden in broken pots or broken pots hidden in history? The late Roman – Early Byzantine stratigraphy at Priniatikos Pyrgos (Crete). *Studia Archaeologica Brunensia* 20: 137–162.

Koufopoulou, S. 2003. Muslim Cretans in Turkey. The reformulation of ethnic identity in an Aegean community. In *Crossing the Aegean: An appraisal of the 1923 compulsory population exchange*, ed. R. Hirschon, 209–220. Berghahn: Oxford/New York.

McKee, S. 2000. *Uncommon dominion: Venetian Crete and the myth of ethnic purity.* Philadelphia: University of Pennsylvania Press.

Moody, J. 2005. Unravelling the threads: Climate changes in the late Bronze III Aegean. In *Ariadne's threads: Connections between Crete and the Greek mainland in late Minoan III (LM IIIA2 to LM IIIC)*, ed. A.L. D'Agata and J. Moody, 443–474. Athens: Scuola Archeologica Italiana di Atene.

Papadatos, Y., and P. Tomkins. 2014. The emergence of trade and the integration of Crete into the wider Aegean in the late 4th millennium: New evidence and implications. In *Western Anatolia before Troy: Proto-urbanisation in the 4th millennium BC*, Oriental and European archaeology, ed. B. Horejs and M. Mehofer, vol. 1, 329–343. Vienna: Austrian Academy of Sciences.

Pendlebury, J.D.S. 1939. *The archaeology of Crete: An introduction*. London: Methuen.

Prent, M. 2003. Glories of the past in the past: Ritual activities at palatial ruins in early Iron Age Crete. In *Archaeologies of memory*, ed. R.M. van Dyke and S. Alcock, 81–103. Oxford: Blackwell.

Preston, L. 2008. Late Minoan II – IIIB Crete. In *The Cambridge companion to the Aegean Bronze age*, ed. C. Shelmerdine, 310–326. Cambridge, MA: Cambridge University Press.

Rackham, O., and J. Moody. 1996. *The making of the Cretan landscape*. Manchester: Manchester University Press.

Runnels, C., C. DiGregorio, K. Wegman, S. Gallen, T. Strasser, and E. Panagopoulou. 2014. Lower Palaeolithic artifacts from Plakias, Crete: Implications for hominin dispersals. *Journal of Eurasian Prehistory* 11: 129–152.

Sanders, I. 1982. *Roman Crete. An archaeological survey and gazetteer of late Hellenistic, Roman and early Byzantine Crete*. Warminster: Aris & Phillips Ltd.

Schoep, I., and P. Tomkins. 2012. Back to the beginning for the Early and Middle Bronze Age on Crete. In *Back to the beginning: Reassessing social and political complexity on Crete during the Early and Middle Bronze Age*, ed. I. Schoep, P. Tomkins, and J. Driessen, 1–31. Oxford: Oxbow.

Shelmerdine, C., ed. 2008. *The Cambridge companion to the Aegean Bronze Age*. Cambridge, MA: Cambridge University Press.

Strasser, T., E. Panagopoulou, C. Runnels, P. Murray, N. Thompson, P. Karkanas, F. McCoy, and K. Wegmann. 2010. Stone age seafaring in the Mediterranean. Evidence from the Plakias region for lower Palaeolithic and Mesolithic habitation of Crete. *Hesperia* 79: 145–190.

Strasser, T., E. Panagopoulou, P. Karkanas, C. DiGregorio, M. Clinton, N. Thompson, E. Kapranos, and S. Murray. 2015. An excavation at Mesolithic Damnoni in the Ayios Vassilios region: A new chronological/cultural period on Crete. In *Archaiologiko ergo Kritis 3. Tomos B: Chania, Rethymno, Lasithi*, ed. P. Karanastasi, A. Tzigkounaki, and C. Tsigonaki, 271–279. Rethymnon: Eforeia Archaiotiton Rethymnou.

Tomkins, P. 2008. Time, space and the reinvention of the Cretan Neolithic. In *Escaping the labyrinth. The Cretan Neolithic in context*, ed. V. Isaakidou and P. Tomkins, 21–48. Oxford: Oxbow.

Trainor, C. Forthcoming. Polis, colony and beyond: urban Knossos from Archaic to Late Antique times. In *Proceedings of the 12th international congress of Cretan studies*. Heraklion: Society of Cretan Historical Studies.

Tsougarakis, D. 1988. *Byzantine Crete. From the fifth century to the Venetian conquest*. Athens: Historical Publications S.D. Basilopoulos.

Vogeikoff-Brogan, N. 2004. The late Hellenistic period in East Crete. In *Crete beyond the palaces: Proceedings of the Crete 2000 conference*, ed. L.P. Day, M.S. Mook, and J.D. Muhly, 213–220. Philadelphia: INSTAP Academic Press.

Wallace, S. 2010. *Ancient Crete. From successful collapse to democracy's alternatives, twelfth to fifth centuries BC*. Cambridge, MA: Cambridge University Press.

Warren, P., and G. Miles. 1972. An Arab building at Knossos. *Annual of the British School at Athens* 67: 285–296.

Further Readings

Beevor, A. 1991. *Crete: The battle and the resistance*. London: John Murray.

Broodbank, C. 2013. *The making of the middle sea: A history of the Mediterranean from the beginning to*

the emergence of the classical world. London: Thames and Hudson.
Cappel, S., U. Günkel-Maschek, and D. Panagiotopoulos, eds. 2015. *Minoan archaeology: Perspectives for the 21st century*. Louvain-la-Neuve: Presses universitaires de Louvain.
Cavanagh, W.G. and M. Curtis, eds. 1998. *Post-Minoan Crete*. London: British School at Athens.
Cline, E., ed. 2010. *The Oxford handbook of the Bronze Age Aegean (ca. 3000–1000 BC)*. Oxford: Oxford University Press.
Davies, S., and J. Davis, eds. 2007. *Between Venice and Istanbul: Colonial landscapes in early modern Greece*, Hesperia Supplement 40. Athens: American School of Classical Studies at Athens.
Dickinson, O.T.P. 1994. *The Aegean Bronze Age*. Cambridge, MA: Cambridge University Press.
Dickinson, O.T.P. 2006. *The Aegean from Bronze Age to Iron Age: Continuity and change between twelfth and eighth centuries BC*. London/New York: Routledge.
Erickson, B. 2010. *Crete in transition: Pottery styles and island history in the Archaic and Classical periods*, Hesperia supplement 45. Boston: American School of Classical Studies at Athens.
Evans, A.J. 1921–1935. *The palace of Minos at Knossos*. London: Macmillan.
Hamilakis, Y., and N. Momigliano, eds. 2006. *Archaeology and modernity*. Padova: Bottega d'Erasmo.
Moore, D. 2010. *Dawn of discovery: The early British travellers to Crete*. Oxford: British Archaeological Reports (International Series 2053).
Moss, W.S. 1950. *Ill met by moonlight*. London: Harrap.
Myers, J.W., E.E. Myers, and G. Cadogan, eds. 1992. *The aerial atlas of ancient Crete*. Berkeley: University of California Press.

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Basic Biographical Information

Felipe Criado-Boado is an archaeologist specializing in landscape archaeology, archaeological theory, and heritage studies. He was born in 1960 in Santiago de Compostela (Spain), in whose university he graduated (1982), obtained a PhD (1989) and taught until 2000, when he became research professor at the Spanish National Research Council (CSIC). He spent an academic year in Cambridge (1986–1987), at the time of the emergence of post-processual theory. At present, he is the director of the Institute of Heritage Sciences (Incipit) of the CSIC and since 2015 president of the European Association of Archaeologists (Fig. 1).

Major Accomplishments

Felipe Criado-Boado is one of the most influential theoretical archaeologists in the Spanish-speaking world and the author of an original and ambitious theoretical model for the discipline. During the heyday of post-processualism, he turned his attention to structuralism. Inspired by Lévi-Strauss, he developed the first systematic structuralist paradigm in archaeology (Criado-Boado 2000), together with colleague Almudena Hernando. He also drew upon the work of anarchist anthropologist Pierre Clastres. From Lévi-Strauss, Criado-Boado took the idea of "thought" (*pensée*), which

Criado-Boado, Felipe, Fig. 1 Felipe Criado-Boado

in the last instance boils down to the savage-domesticated dichotomy and from Clastres he adopted the concept of society, where the main difference is between divided and undivided societies. From the latter, he also borrowed the notion of social resistance, which he applied to the Neolithic and other contexts.

Structuralism deeply influenced Criado-Boado's views on landscape and on the production of archaeological reasoning. In the late 1980s and early 1990s, he wrote a series of highly influential papers, particularly in Iberia and Latin America, on the archaeology of landscape, where he outlined the main principles of his paradigm. The empirical basis for his theoretical proposals was his own work on Neolithic megaliths in NW Iberia. He moved away from the functionalist perspective of the megalith as a territorial marker to the megalith as part of a system of thought, which he labelled "post-savage." Post-savage thought evinces a transformation of the rationality characteristic of hunter-gatherers and early cultivators, particularly in terms of the nature-culture relationship (Criado-Boado 1989). From this perspective, monuments would not be just an index of the domestication of nature but of the domestication of savage thought (Criado-Boado 2000: 278). The nature-culture relationship was further explored in subsequent papers.

Thus, Criado-Boado (1993) argued that there exist four attitudes in human societies in relation to nature: passive, participative, active, and destructive. The passive attitude would be characteristic of hunter-gatherers; the second would encompass all the communities with a non-permanent agriculture both in the past and in the present. According to Criado-Boado, in these societies, there is a close relationship between nature and culture, in that social reproduction depends on the natural reproduction of the environment. Therefore, the Neolithic would have implied a *naturalization of culture* and not a *domestication of nature*, as has been traditionally maintained. The domestication of nature proper would characterize those communities that have an active stance toward the environment. Farmers practicing intensive agriculture would be the best representatives of this attitude and of domesticated thought more generally, which implies a heavy modification of landscape. Finally, a destructive stance would be associated with modern societies. These different attitudes are not to be regarded as evolutionary stages but as forms of rationality (Criado-Boado 2000).

Criado-Boado also explored the conditions of visibility of the archaeological record (Criado-Boado 1995). He defends that the greater or lesser visibility of the archaeological record is not arbitrary but structurally related to "cultural rationalities, attitudes towards space, and modes of conceptualisation of the nature/culture relationship" (Criado-Boado 1995: 195). He argues that we can isolate a specific "will" to render the result of social action visible or invisible. He distinguishes four main "strategies of visibility": (1) *inhibition* or the absence of any attempt at rendering social actions visible; (2) *hiding*, which is the result of a conscious will not to visibilize social action; (3) *exhibition* or the intentional materialization of the processes of social action, and, finally, (4) the *monumental* strategy, which differs from the latter in that social processes are not only materialized spatially but also projected temporally into the future. The absence of monuments and material traces can be considered in Clastrian terms as a rejection of inequalities (Parcero and Criado-Boado 2013).

From the mid-1990s, Criado-Boado developed an interest in cultural heritage, in part stemming from his work as head of a team engaged in culture resource management. Indeed, he saw landscape archaeology as a way of managing cultural landscapes. Criado-Boado introduced the notion of "cultural heritage value chain" (*cadena de valor del patrimonio*), which understands that primary entities are transformed into heritage through acts of identification, documentation, signification, value-making, dissemination, circulation, and reception. He would later incorporate the criticisms raised against dominant views by public archaeology and diverse critical paradigms (indigenous, postcolonial, and community archaeologies) (Criado-Boado et al. 2015).

Underpinning these theoretical proposals stands a larger epistemological theory on the nature of archaeological knowledge (Criado-

Boado 2001). Criado-Boado sought a third-way between what he criticizes as the hyper-subjectivism of post-processual hermeneutics and the neoempiricism of processualists. He proposes a structuralist-inspired methodology that controls subjectivist excesses in interpretation. In the case of Neolithic megaliths, this methodology is based on detailed analyses of locational patterns of monuments, their visibility and intervisibility, which allows him to recognize part of a prehistoric rationality and phenomenology (Criado-Boado 2000). More recently, he has resorted to experiments in visual perception, using eye-tracking, to identify patterns of visual exploration. These vary depending on sociocultural context; thus, horizontal eye movements are dominant in periods with lesser social division, whereas vertical movements are more frequent in periods marked by greater social complexity (Criado-Boado et al. 2019).

Cross-References

- ▶ Interpretation in Archaeological Theory
- ▶ Landscape Archaeology
- ▶ Post-Processual Archaeology
- ▶ Structural Archaeology

References

Criado-Boado, F. 1989. We, the post-megalithic people. In *The meanings of things. Material culture and symbolic expression*, ed. I. Hodder, 79–89. London: Routledge.

Criado-Boado, F. 1993. Límites y posibilidades de la Arqueología del paisaje. *SPAL* 2: 9–55.

Criado-Boado, F. 1995. The visibility of the archaeological record and the interpretation of social reality. In *Interpreting archaeology. Finding meaning in the past*, ed. I. Hodder, M. Shanks, et al., 194–204. Oxford: Routledge.

Criado-Boado, F. 2000. Walking about Lévi-Strauss. Contributions to an archaeology of thought. In *Philosophy and archaeological practice. Perspectives for the 21st century*, ed. C. Holtorf and H. Karlsson, 277–303. Bricoleur: Göteborg.

Criado-Boado, F. 2001. Problems, functions and conditions of archaeological knowledge. *Journal of Social Archaeology* 1 (1): 126–143.

Criado-Boado, F., D. Barreiro, and R. Varela-Pousa. 2015. Sustainable archaeology in post-crisis scenarios. In *Fernweh: Crossing borders and connecting people in archaeological heritage management. Essays in honour of Prof. Willem JH Willems*, 56–60. Leiden: Sidestone Press.

Criado-Boado, F., D. Alonso-Pablos, et al. 2019. Coevolution of visual behaviour, the material world and social complexity, depicted by the eye-tracking of archaeological objects in humans. *Scientific Reports* 9 (1): 3985.

Parcero, C., and F. Criado-Boado. 2013. Social change, social resistance. A long-term approach to the processes of transformation of social landscapes in NW Iberia. In *The prehistory of Iberia: Debating early social stratification and the state*, ed. M. Cruz, L. García, and A. Gilman, 249–266. London: Routledge.

Further Reading

Criado-Boado, F. 2012. *Arqueológicas. La Razón Perdida*. Barcelona: Bellaterra.

Criado-Boado, F., and V. Villoch. 2000. Monumentalizing landscape: From present perception to the past meaning of Galician megalithism (North-West Iberian Peninsula). *European Journal of Archaeology* 3 (2): 188–216.

Hernando, A. 2001. *Arqueología de la Identidad*. Madrid: Akal.

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition

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Introduction

For a long time, data regarding the Late Middle Paleolithic-Early Upper Paleolithic (hereafter LMP and EUP) transition was too poor to obtain a real understanding of cultural processes during this period. On one hand, the absence of reliable absolute dates for Middle Paleolithic sites prevented identification of true LMP industries in Crimea. On the other hand, EUP data is limited to only the 1920s excavations of the lower and middle layers at Siuren I rockshelter, generally

interpreted by Soviet colleagues as unclear Aurignacoid assemblages situated during the Last Glacial Maximum. Although the presence of some Middle Paleolithic artifacts among the Upper Paleolithic artifacts in the lower layer led to speculation regarding either local or intrusive origin of EUP humans with "Aurignacoid"/ "Aurignacian-like" assemblages in Crimea, it was not possible to propose a well-grounded hypothesis on the subject. As a result, Crimea remained on the "side of the road" for Middle to Upper Paleolithic research in Europe from the 1950s to the early 1990s.

Key Issues/Current Debates

The 2000s Concept of the LMP-EUP Transition

The situation changed dramatically in the 1990s and the early 2000s after new excavations of both known and newly discovered Middle Paleolithic and Upper Paleolithic sites in Crimea, a significant number of absolute dating results and data obtained from the natural sciences related to LMP-EUP transition. For the EUP, excavations took place at Siuren I rockshelter in 1994–1997 and at a new site, Buran-Kaya III grotto, between 1990 and 2001, although both sites also contain LMP components. For the LMP, new excavations at Kabazi II and V, and new dates for Zaskalnaya V and VI, Prolom I and II, and Kiik-Koba, allowed Victor Chabai to identify a set of Late Levallois-Mousterian/Western Crimean Mousterian and Late Micoquian assemblages in Crimea. It was then possible to propose a hypothesis for the LMP-EUP transition that also corresponded to most LMP and EUP data for the East European record (Chabai 2004). Additional data were later added to the 2004 concept (Chabai 2008; Demidenko 2008).

The LMP-EUP transition is proposed to be viewed as a rather lengthy period (7–8000 years) of coexistence of LMP and EUP complexes and is subdivided into two stages.

The *first transitional stage (Les Cottes/ Huneborg Interstadial and Huneborg Stadial: c. 36–32 ky uncal BP)* precedes the Arcy Interstadial, and apart from the coexistence of LMP and EUP industries, is also characterized by the absence of Aurignacian industries in Crimea. The LMP is represented by the Levallois-Mousterian/Western Crimean Mousterian and Crimean Micoquian Tradition. The Late Levallois-Mousterian is known from Kabazi II, levels II/7 to II/1 and Kabazi V, levels III/3-3A to III/3–1 in western Crimea. The Late Micoquian is known from more sites, in both western and eastern Crimea, and at least two types of the industry relate to the stage: Kiik-Koba type (Kiik-Koba, upper layer; Prolom I) and Ak-Kaya type (Zaskalnaya V, layer II; Zaskalnaya VI, layers IIIa–II; Kabazi V, levels III/2A and III/2). On the other hand, the first EUP industry, the "Eastern Szeletian," appeared in Crimea at Buran-Kaya III, level C, during the stage's second stadial phase – Huneborg. The "Eastern Szeletian" is characterized by bifacial "biconvex" leaf points, bifacial trapezes, end-scrapers, and a series of worked bone tubes (see in Chabai et al. 2004). Thus, two LMP industries and one EUP industry have been connected to the first transitional stage.

The *second transitional stage (Arcy Interstadial: c. 32–28 ky uncal BP)* features not only further coexistence of the two LMP industries and the absence (!) of the "Eastern Szeletian" but also the appearance of Aurignacian industries in Crimea. The Levallois-Mousterian persists at Kabazi II, levels II/1A to A4 in western Crimea. Again, Crimean Micoquian Tradition sites are known in both western and eastern Crimea and all three variants are present: Ak-Kaya, Kiik-Koba, and Starosele. The latest Micoquian of Ak-Kaya type has been identified at Kabazi V, levels II/7 and II/4A in western Crimea. The latest Micoquian of Kiik-Koba type has been proposed for Buran-Kaya III, layer B and Micoquian finds at Siuren I 1920s lower layer/1990s Units H and G in both eastern and western Crimea. The latest Micoquian of Starosele type is proposed at Zaskalnaya V, layer I and Prolom II, layer II in eastern Crimea, and Kabazi V, levels III/1A and III/1 in western Crimea. Finally, Aurignacian industries emerged in Crimea – the Proto-Aurignacian with Dufour bladelets at Siuren I, 1920s lower layer/1990s Units H and G, and the

Evolved Aurignacian with Roc de Combe microblades at Siuren I, 1920s middle layer/1990s Unit F.

By region, only the Latest Micoquian occurs in both western and eastern Crimea. The Late Levallois-Mousterian is known with late dates only in western Crimea, although some levels at eastern Crimean sites could also belong to the LMP-EUP transition. "Eastern Szeletian" and Aurignacian complexes are found at single sites (Buran-Kaya III and Siuren I), the former in eastern Crimea and the latter in western Crimea. At the same time, it is worth noting the occurrence of all four Crimean LMP and EUP industries at some sites in the Lower Don river region and/or Northwestern Caucasus (Chabai 2004; Demidenko 2008). These two regions, along with Crimea and the territories between the Lower Dniester and Lower Dnieper rivers, form the Great North Black Sea region in the south of Eastern Europe. Accordingly, the 2000s concept of the LMP-EUP transition with two stages appears to correspond well to the whole south of Eastern Europe region.

The following archaeological data are characteristic of the LMP-EUP transition. First, the Aurignacian was not the chronologically first EUP industry. The often assumed role of the Aurignacian in acculturation processes leading to local origins of the EUP following interaction between Middle Paleolithic Neanderthals and Aurignacian *Homo sapiens* is therefore more than doubtful for this region. Rather, the coexistence of several LMP and EUP industries in the Great North Black Sea region must be postulated. This very probably did not take the form of a literally synchronous co-occurrence of LMP and EUP humans in the same area but would have occurred in the form of alternating and discrete occupations. Such a situation is demonstrated by a series of intermittent visits to Siuren I by Aurignacian *Homo sapiens* and Micoquian Neanderthals during rapid deposition forming the 1920s lower layer/1990s Units H and G (Demidenko 2000). Furthermore, the Micoquian layer B and the "Eastern Szeletian" level C at Buran-Kaya III are even more suggestive in this sense since here the EUP level is stratigraphically situated *below* the Middle Paleolithic level. This model is also supported by the absence of any features in the lithic industries suggesting mutual influence between contemporary LMP and EUP industries. Indeed, there is no evidence of borrowing of any traits or elements between industries. That is, no EUP (either Szeletian or Aurignacian) trait/element can be observed within the Micoquian and Levallois-Mousterian industries and vice versa. Therefore, the term "geochronological coexistence" of LMP and EUP industries at best reflects the situation for the transition, where Buran-Kaya III and Siuren I show movement of human groups that made it highly unlikely that different hominins encountered one another, especially given the absence of archaeological evidence for such contact.

Thus, Crimea is seen as a "melting pot" of various LMP and EUP hominins between c. 36 and 28 ky BP. Moreover, the south of Eastern Europe acted as a crossroads for migration routes of LMP and EUP hominins and provided the setting for their geochronologically independent and mutually exclusive existence. As a result, the transitional period represents a mosaic, in which local LMP hominins with Micoquian (made by Neanderthals) and Levallois-Mousterian industries continued to survive, while contemporaneous EUP technologies (made by *Homo sapiens* for the Aurignacian) were imported by "immigrants" from other regions, Eastern Europe for the "Eastern Szeletian," and Central Europe and possibly Levant and Middle East for the Aurignacian (Demidenko 2008, 2011a, b). Accordingly, the Late Crimean Neanderthals do not represent one of their last pure refuge "islands" but are rather found in a context of complex Paleolithic human history.

The Early 2010s Challenges to the 2000s Concept

New data has, however, been obtained in the last few years that challenges in part this seemingly perfectly substantiated industrial-chronological structure of the LMP-EUP transition in the Great North Black Sea region.

Two key sites for Crimea (Siuren I and Buran-Kaya III) and Mezmaiskaya Cave in Northwestern Caucasus have provided new information that necessitates revisions to the geochronology

and/or industrial status of the LMP and EUP levels at these sites.

Siuren I

Systematic AMS dating of 25 ungulate bone samples from Units H, G, and F was carried out at Oxford (partially with pretreatment at the Max Planck Institute for Evolutionary Anthropology in Leipzig), Groningen and BETA (Florida) labs in 2009–2011. These results were combined with eight additional bone samples from the 1990s excavations selected for AMS dating at Oxford. In total then, 33 bone samples were selected to attempt to obtain AMS dates for the site's middle (Unit F with Late/Evolved Aurignacian finds) and lower (Units H and G with both Proto-Aurignacian and Micoquian finds) levels (Demidenko et al. 2012; Demidenko et al. in press).

Of these, only 11 AMS dates fall within the Aurignacian sensu stricto time span. These are as follows (uncalibrated): Unit H (two dates), c. 30.5 and 28.4 ky BP; Unit G (two dates), c. 28.2 and 28.0 ky BP; and Unit F (two dates), c. 30.9 and 26.6 ky BP. These dates, like the three AMS dates obtained in the 1990s for Unit H and level Ga, both c. 28 ky BP, and level Fb1-Fb2 c. 29 ky BP, indicate rapid deposition for the three units as the dates are nearly statistically identical. Since all dates for Units H and G were obtained only on ungulate bone (with collagen problems for bone artifacts), it is reasonable to exclude the younger dates on three bone artifacts from Unit F dating to c. 28.2–26.6 ky BP. In this case, Unit F dates are within the narrower interval of c. 30.9–29.4 ky BP, and the dates for the three units become indeed identical.

Yet the "collagen presence/absence" issue for bone samples used for the Siuren dating should be discussed. Grouping data by unit from the 33 submitted samples provides a "dating success" rate for each unit. Only 2 out of 9 samples from Unit F had collagen problems (22.2%). Unit G had 16 out of 18 samples with either collagen problems or dates considered too young (88.9%). Unit H had four out of six samples with either collagen problems or too young dates (66.7%). Combined data for Units G and H are 20 out of 24 (83.3%).

Thus, while a few samples had collagen problems in Unit F, only a few samples were suitable for dating in Units G and H. It is thus clear that bone content was affected within Units G and H causing most of them to have problems with chemical content. Moreover, having a few Aurignacian-like dates between c. 30.5 and 28.0 ky BP for Units H and G that are the same as dates from stratigraphically higher Unit F (c. 30.9–29.4 ky BP for ungulate bone samples), it is proposed that the four Aurignacian-like dates c. 30.5–28.0 ky BP do not represent any true age either, being also too young as no Aurignacian-like dates exist between 22 and 13 ky BP.

Following this line of reasoning, we come to uncalibrated AMS dates in Europe for the Proto-Aurignacian with Dufour bladelets and the Late/Evolved Aurignacian with Roc de Combe bladelets (c. 37–36 to 34–33 ky BP and c. 32–28 ky BP, respectively), recalling that the Siuren I Aurignacian complexes entirely correspond to these two European Aurignacian industries (see artifact illustrations in Figs. 5 and 6 of the present author's "Siuren I rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic in Crimea" this volume). It is certain that the AMS dates from Siuren I Unit F absolutely correspond to the analogous European industry. However, the AMS dates from Units H and G do not fit into the European Proto-Aurignacian chronology. Given that they should correspond, the probability of problems with chemical content increases.

In sum, it is now seen that the existing AMS dates for Siuren I Units H and G are too young for their real uncalibrated C14 age, which should be older than 31 ky BP. Taking into consideration not only the AMS dates but also fauna and microfauna results (see in Demidenko et al. 2012), the following geochronology for the Siuren I Aurignacian complexes is proposed:

- Proto-Aurignacian and Micoquian: Stadial between Hengelo and Les Cottes/Huneborg Interstadials (Siuren I, Unit H) and Les Cottes/Huneborg Interstadial (Siuren I, Unit G);
- Late/Evolved Aurignacian: Arcy Interstadial (Siuren I, levels Fc and Fb1-Fb2 of Unit F) and Maisières Interstadial (levels Fa3 and Fa1-Fa2).

Siuren I Proto-Aurignacian can thus be connected with the European Proto-Aurignacian thorough chronological parameters.

Buran-Kaya III

The partially collapsed grotto was discovered by A.A. Yanevich in 1990 and has been investigated by him since then with colleagues from Ukraine, Japan, Belgium, the USA, and France.

The following sequence of Middle and Upper Paleolithic levels was established for the site in the 2000s (Chabai 2004; Chabai et al. 2004; Yanevich et al. 2009) with AMS dates obtained in the late 1990s at Oxford on ungulate bone samples and interstadial/stadial determinations based on pollen data (from bottom to top) (Fig. 1):

- Level E (archaeologically unclear, either Middle or Upper Paleolithic due to rarity of diagnostic artifacts) – Hengelo Interstadial, no absolute dates
- Level D (archaeologically unclear, Middle Paleolithic due to a few diagnostic artifacts) – Stadial after Hengelo, no absolute dates
- Level C ("Eastern Szeletian," EUP) – also Stadial after Hengelo, one date c. 36.7 ky BP and two dates c. 32.3 and 32.2 ky BP
- Layer B with lower level B1 and upper level B (Micoquian of Kiik-Koba type, LMP) – Arcy Interstadial, 2 dates c. 28.8 and 28.5 ky BP for level B1
- Levels 6–5, 6–4, and 6–3 (Late Aurignacian, according to Yanevich, or Gravettian, according to Otte and Noiret) – Stadial of Late Pleniglacial c. 27–18 ky BP but with inconsistent order of dates: level 6–5 – c. 34.4 and 28.7 ky BP; level 6–4 – c. 11.9 ky BP; and level 6–3 – c. 11.9 ky BP
- Levels 6–2, 6–1 and 5–2 (Epigravettian) – Stadials of Late Pleniglacial for levels 6–2 and 5–2 and upper part of level 6–1, and Lascaux Interstadial of Late Pleniglacial for lower part of level 6–1 c. 18–13 ky BP, but with a single date c. 30.7 ky BP for level 6–2 only

This archaeological sequence at Buran-Kaya III has been interpreted as follows by Chabai. The lower part of the sequence (levels E through B), with a total thickness of c. 1 m in the inner part of the grotto close to the drip-line, is considered to be correctly archaeologically and geochronologically attributed. The upper part of the sequence (levels 6–5 through 5–2), c. 0.7 m thick, with Epigravettian levels at the top, is considered as having been deposited very slowly, especially adding levels C and B. The "mess" with the AMS dates for levels 6–5 to 6–2 has been explained both by slope sediments near the grotto's drip-line and horizontal "artificial level" excavations of levels 6–5 to 5–2 by Yanevich in the 1990s, such that incorrect bone samples were selected for AMS dating due to possible mixing of layers. There is now general agreement among colleagues on Chabai's interpretation for the Buran-Kaya III Middle and Upper Paleolithic industrial-chronological sequence.

Yanevich also grouped materials from levels 6–2 and 6–1 (level 5–2 was not always mentioned by him as Epigravettian– see Yanevich 2000, but see Yanevich et al. 2009) (Fig. 2), Siuren I 1920s upper layer and Adzhi-Koba, 1920s upper layer materials into the "Buran-Kaya culture of Crimean Gravettian," or Epigravettian (Yanevich 2000). Moreover, the Epigravettian culture had its origin within Buran-Kaya III, levels 6–5 to 6–3, which contain Aurignacian materials with micro-Gravette points already present. The materials from Buran-Kaya III, levels 6–5 to 6–1/5–2 were of crucial importance for the Crimean Paleolithic for Yanevich. Yanevich's Epigravettian attribution was accepted by the author, as well as Ukrainian and American colleagues, for levels 6–2 and 6–1, although the absence of microliths with thick backed lateral edge was notable, considering, at the same time, levels 6–5 to 6–3 as belonging to the same Epigravettian industry. The differences between the two sets of levels were explained by a rather sparse number of artifacts in the lower sublevels of level 6 as due to ephemeral human occupations, while upper sublevels of level 6 were certainly remains of intensive short-term human occupations with numerous finds (Demidenko 2003).

The Buran-Kaya III Epigravettian became more important and enigmatic when a new series

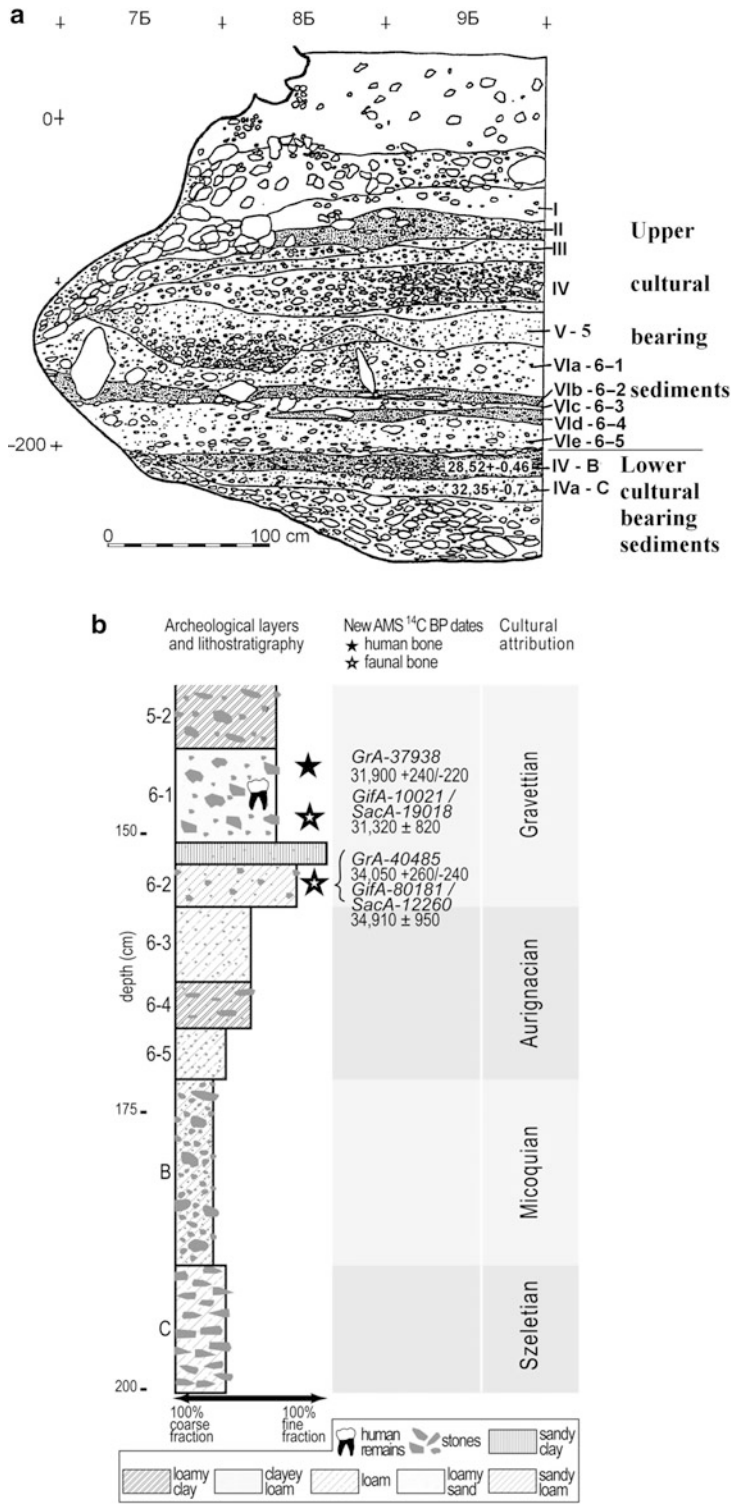

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition, Fig. 1 Buran-Kaya III. Combined stratigraphy for Middle and Upper Paleolithic levels. ((**a**) After Chabai 2004; Yanevich et al. 2009; (**b**) After Prat et al. 2011)

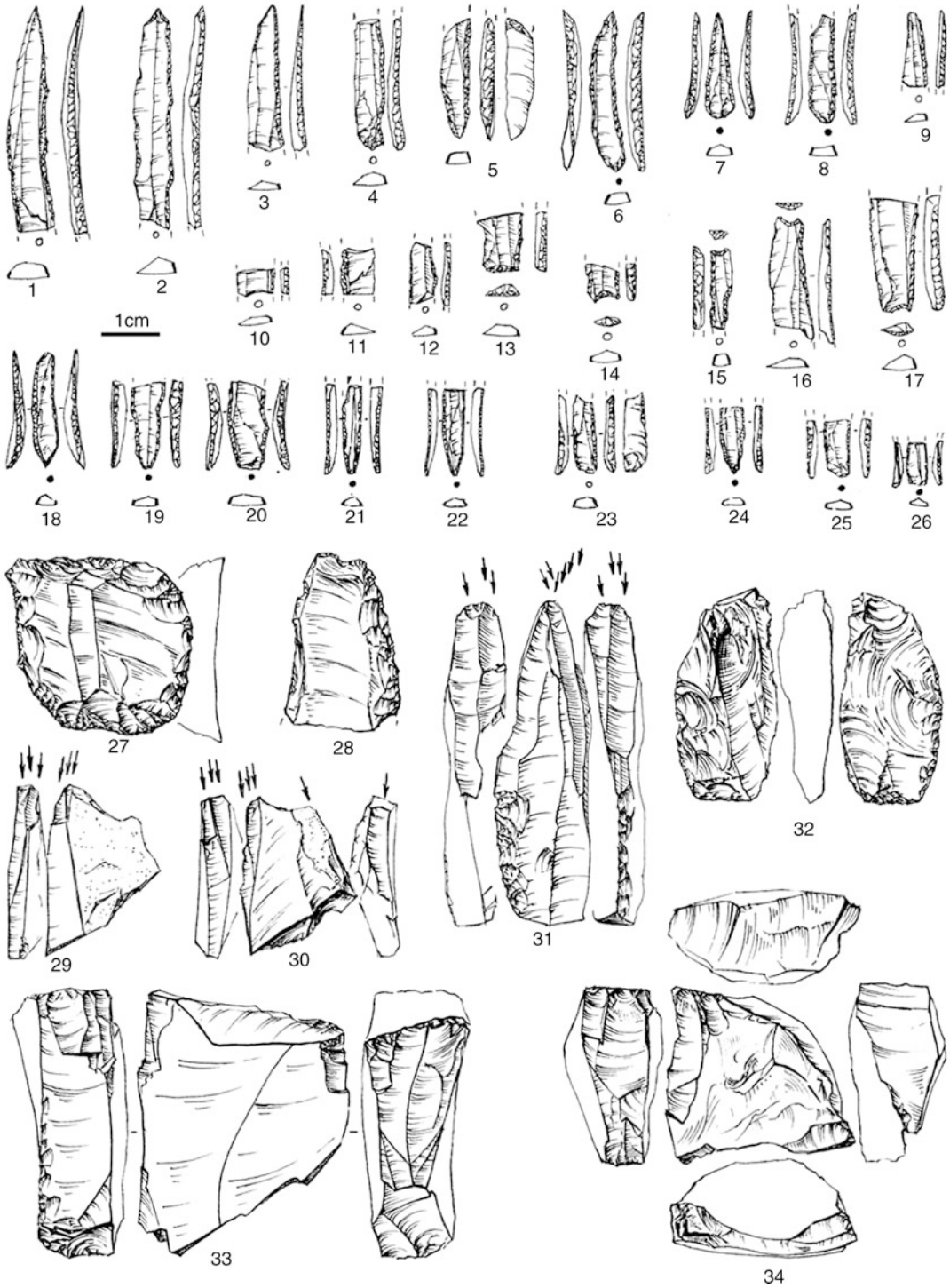

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition, Fig. 2 Buran-Kaya III, level 6–1. Flint artifacts. (After Prat et al. 2011)

of four AMS uncalibrated dates on three ungulate bones and a human parietal fragment after well-controlled excavations in 2001 were obtained at the Groningen and Gif-sur-Yvette labs for levels 6–2 (c. 34 and 34.9 ky BP) and 6–1 (c. 31.3 and 31.9 ky BP), although the levels were still considered as belonging to the "Gravettian tradition" (Prat et al. 2011) (Fig. 1b). The new dates, however, certainly call for revision of the previous interpretation for the site's sequence from level C to level 6–1/5–2 since they are either identical or even older than the dates obtained in the 1990s for underlying levels C and B.

The present author proposes a new interpretation of the level C to level 6–1/5–2 sequence based on additional and/or reconsidered data.

1. *Archaeological data*. The archaeological attribution of levels 6–5 through 6–1/5–2 needs to be discussed. Given the near absence or minor role of true backed bladelets and the dominance of finely retouched microblades with not only lateral, but often bilateral, dorsal retouch (Yanevich et al. 2009; Prat et al. 2011), it appears clear that assemblages from these levels do not belong to either Gravettian or Epigravettian. New AMS dates of c. 31 and 35 ky BP cannot represent any Gravettian tradition *sensu lato*. The levels are also not Aurignacian. This industry is thus not comparable to any Upper Paleolithic industry in either Crimea or Eastern Europe. The present author's search for comparable EUP assemblages, however, identified a very similar industry in Northwestern Caucasus (Mezmaiskaya Cave, levels 1C, 1B, and 1A, AMS dates between 33 and 28 ky uncal BP) (Fig. 3) and Southern Caucasus (Dzudzuana cave, layer D, AMS dates between 32 and 27 ky uncal BP; Ortvala Klde rockshelter, layers 4d and 4c, AMS dates between c. 38–34 and 30 ky uncal BP) (Meshveliani et al. 2004; Golovanova et al. 2006, 2010a, b; Adler et al. 2008). In addition to similarities between the lithic assemblages, the EUP materials of the four sites (especially from Buran-Kaya III and Mezmaiskaya) also include numerous bone tools (points and awls) (Figs. 4 and 5) and personal ornaments (perforated shells, mammal teeth, and even mammoth ivory beads) (Figs. 6 and 7). Thus, the proposed origin of the Buran-Kaya III EUP industry is in Southern Caucasus via Northwestern Caucasus.

In addition, based on the pollen data for Buran-Kaya III, it is now possible to suggest the Arcy Interstadial for level 6–1 and the Huneborg Stadial for levels 6–2 to 6–5 at Buran-Kaya III.

2. *The 1990s uncalibrated AMS dates*. With new AMS dates for levels 6–1 and 6–2, the 1990s AMS dates can now be reevalauted. The 1990s dates for level 6–5 (c. 34.4 and 28.7 ky uncal BP) are analogous to both the 1990s dates for levels C and B1 and the new dates for levels 6–1 and 6–2. The two 1990s dates for levels 6–4 and 6–3 (c. 11.9 ky BP) relate to level 5–1 of the Final Paleolithic Shan-Koba occupation at the site and certainly indicate slope deposition processes near the grotto's drip-line where the Final Paleolithic bone samples were recovered during horizontal excavations, being at levels 6–4 and 6–3 "pseudo-elevation" there. Finally, the single 1990s date for levels 6–2 to 5–2, c. 30.7 ky BP for level 6–2, is not different from new dates between c. 31 and 35 ky BP for levels 6–1 and 6–2. As a result, the new look at the 1990s dates, instead of rejecting all of them, indicates a series of not ordered dates between c. 36 and 28 ky BP for all Middle and Upper Paleolithic levels C through 6–1 at Buran-Kaya III.
3. *Interfacing of the 1990s and 2011 uncalibrated AMS dates and new interpretation for the Buran-Kaya III LMP and EUP sequence*. Some younger C14 ages for the 1990s levels B1 and C dates in comparison to the 2011 dates for level 6–2 and/or 6–1 can be due to the following reasons. First, the 1990s dates in Oxford were obtained without the ultrafiltration protocol for bone samples from Buran-Kaya III, making them younger in comparison to the new dates. Second, the younger age of 28 ky BP for level B1 may be similar to the situation for Siuren I, Units H and G where collagen problems played a crucial role. The

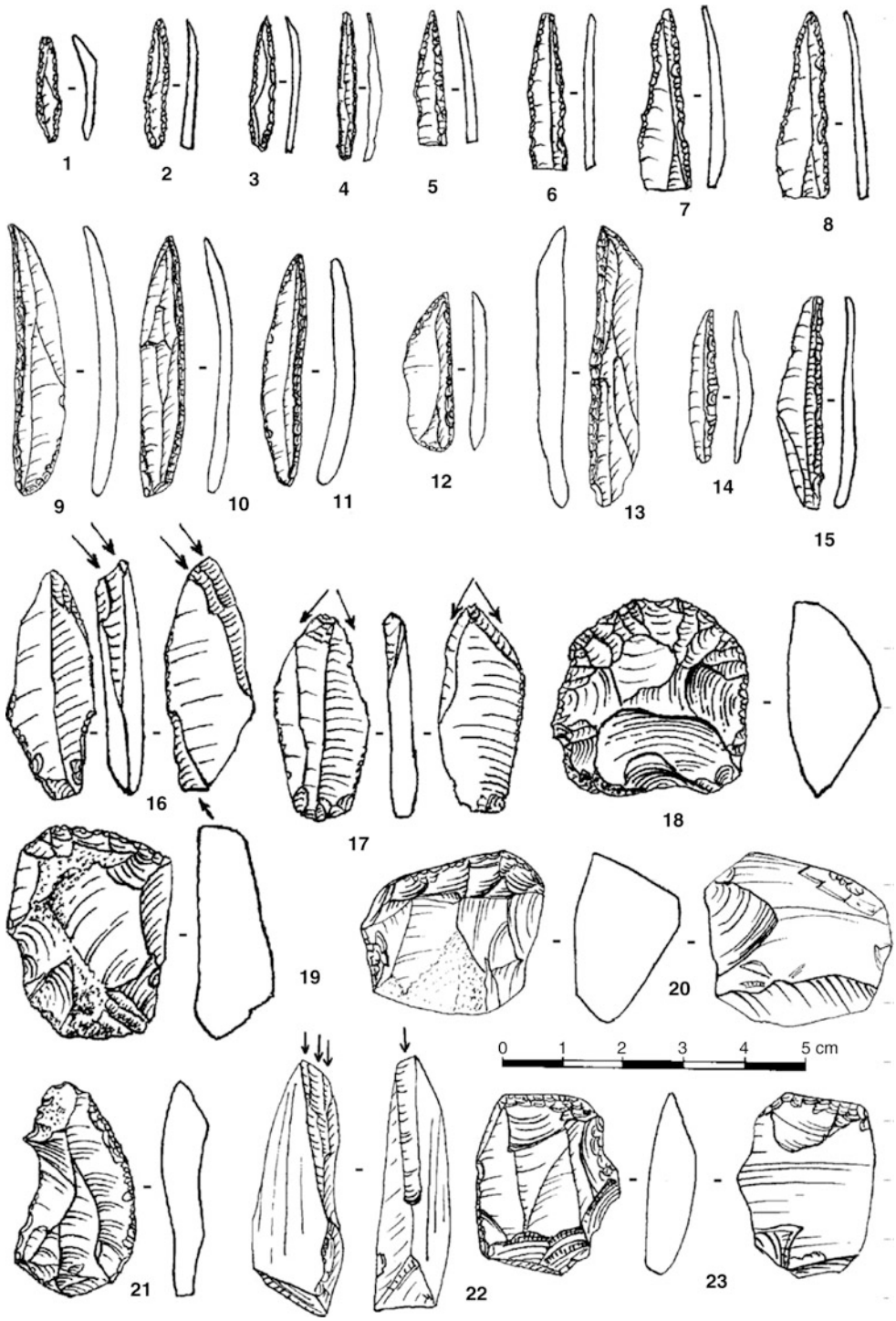

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition, Fig. 3 Mezmaiskaya cave, level 1C. Flint artifacts. (After Golovanova et al. 2010b)

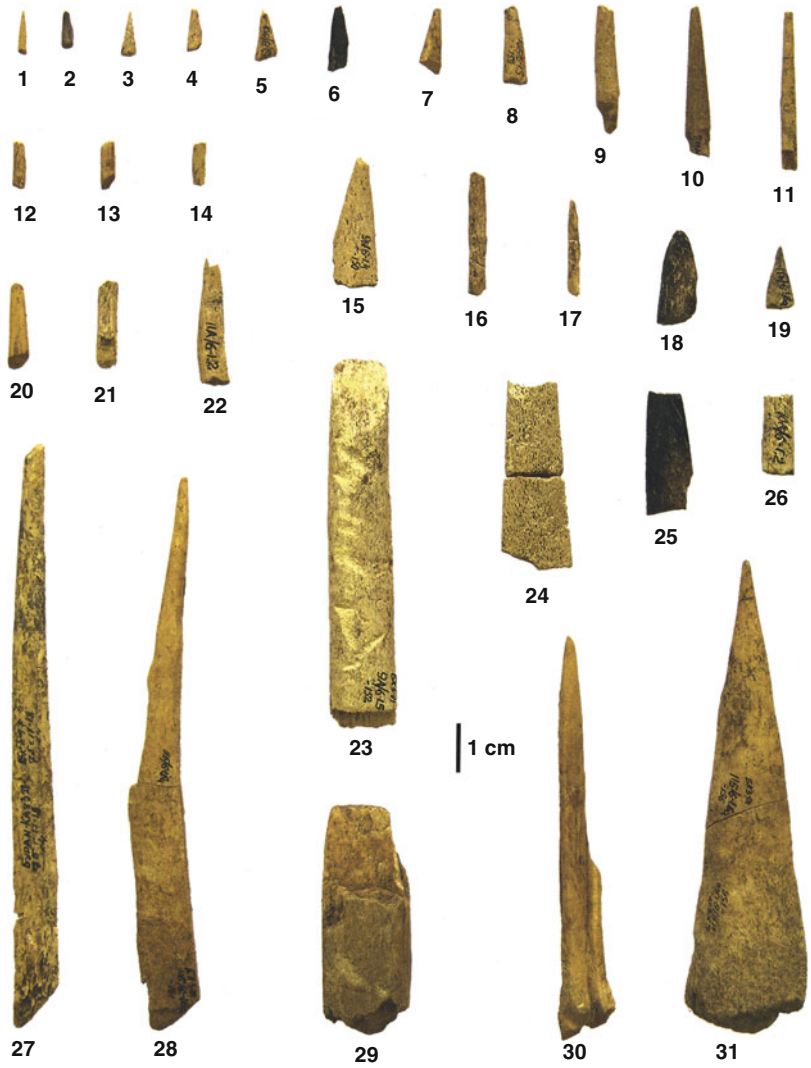

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition, Fig. 4 Buran-Kaya III, levels 5–2, 6–1, and 6–2. Bone tools. (After Yanevich et al. 2009)

Micoquian layer B may actually be older than 30 ky BP and would fit well between the extreme dates for level C (c. 36.7 ky BP) and levels 6–2 and 6–1 (c. 31 ky BP). The same also relates to the date of c. 28.7 ky BP for level 6–5, while the date of c. 34.4 ky BP for the same level could be close to its real age. Thus, the entire LMP and EUP sequence from level C to level 6–1/5–2 (an overall thickness c. 1 m), dated to around c. 36–31 ky BP, can be characterized by a high deposition rate, contrary to the previously proposed low sedimentation rate.

Using the 2004 pollen data, the following order for the Buran-Kaya III sequence can be proposed: level C, Stadial after Hengelo Interstadial; layer B, Les Cottes/Huneborg Interstadial; and levels 6–5 to 6–2, Huneborg Stadial and Arcy Interstadial for level 6–1.

The EUP sequence rapidly ends with a hiatus between levels 5–2 and 5–1 as the latter level is attributed to the Final Paleolithic Shan-Koba with two uncalibrated C14 dates from the Kiev lab, c. 11.4 and 10.9 ky BP (Allerød Interstadial), followed then by another Final Paleolithic, but this time Swiderian occupation in level 4 with

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition,
Fig. 5 Mezmaiskaya cave, levels 1C, 1B, and 1A. Bone tools. (After Golovanova et al. 2010a)

two uncalibrated C14 dates from the Kiev lab, c. 10.7 and 10.5 ky BP (Younger Dryas).

Mezmaiskaya Cave

Recently published new AMS dates from different labs for the LMP (Micoquian) layers and Upper Paleolithic layers at Mezmaiskaya Cave, complemented by pollen data (Golovanova et al. 2006, 2010a, b; Pinhasi et al. 2011), also allow the present author to reconsider the previous position of our Crimean team (Chabai 2004; Demidenko 2008) on this cave's sequence, in which the Huneborg Stadial (c. 36–32 ky BP) was proposed for the LMP layers and rejection of EUP status for levels 1C to 1A. Now, as shown above, the assemblages from levels 1C to 1A (c. 33–28 ky BP) are acknowledged as belonging to the South Caucasus EUP industry, along with Buran-Kaya III, levels 6–5 to 6–1/5–2. Below archaeologically sterile level 1D, the youngest LMP level 2 is dated between c. 44–36 ky BP, including an AMS date of c. 39.7 ky BP for a bone from the Mezmaiskaya 2 human infant. Accordingly, the last LMP occupations at Mezmaiskaya Cave occurred c. 36 ky BP or c. 39 ky calibrated BP. From the Crimean geochronological positions, it is also possible to propose relating Mezmaiskaya EUP to Huneborg Stadial (levels

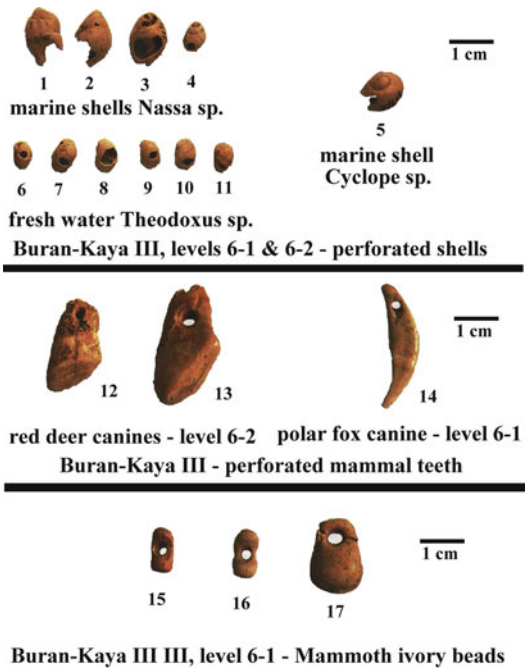

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition, Fig. 6 Buran-Kaya III, levels 6–1 and 6–2. Personal ornaments. (After Yanevich et al. 2009)

1C-1B) and Arcy Interstadial (1A), while the cave's LMP seems to be no younger than the Les Cottes/Huneborg Interstadial.

New Geochronological Suggestions for the LMP-EUP Transition

In comparison to the 2000s proposal, the two key Crimean sites with both LMP and EUP components (Buran-Kaya III and Siuren I), keeping also in mind similar data for Mezmaiskaya Cave in Northwestern Caucasus, make older the geochronological borders for the Aurignacian and newly defined EUP complexes and the upper geochronological border of LMP in Crimea.

Taking solely data from the two Crimean sites, the EUP geochronology can be viewed as follows:

- "Eastern Szeletian" (Buran-Kaya III, level C): Stadial between Hengelo and Les Cottes/Huneborg Interstadials
- Proto-Aurignacian: Stadial between Hengelo and Les Cottes/Huneborg Interstadials (Siuren I, Unit H) and Les Cottes/Huneborg Interstadial (Siuren I, Unit G)
- EUP industry of Southern Caucasus (Buran-Kaya III, levels 6–5 to 6–1/5–2): Huneborg Stadial (Buran-Kaya III, levels 6–5 to 6–2) and Arcy Interstadial (Buran-Kaya III, levels 6–1 to 5–2)
- Late/Evolved Aurignacian: Arcy Interstadial (Siuren I, levels Fc and Fb1-Fb2 of Unit F) and Maisières Interstadial (levels Fa3 and Fa1-Fa2)

The LMP (Micoquian of Kiik-Koba type) levels and/or separate finds at the two sites can be geochronologically connected to the Stadial between the Hengelo and Les Cottes/Huneborg Interstadials (Siuren I, Unit H) and the Les Cottes/Huneborg Interstadial (Siuren I, Unit G; Buran-Kaya III, layer B).

Following the EUP and LMP geochronology for Buran-Kaya III and Siuren I, it can be seen that the Late Micoquian can be no younger than the Les Cottes/Huneborg Interstadial (c. 36 ky BP), coexisting with both "Eastern Szeletian" and Proto-Aurignacian industries, while the EUP industry of the Southern Caucasus and the Late/Evolved Aurignacian did not coexist with the Micoquian. The latter possible situation corresponds well to the Northwestern Caucasus Mezmaiskaya Cave sequence in which the Micoquian sequence seems end during the Les Cottes/Huneborg Interstadial.

If the new geochronological version for the LMP-EUP interface at two key Crimean sites for the transitional period is correct, then the 2000s concept should be significantly altered. First, both "Eastern Szeletian" and Proto-Aurignacian appeared in Crimea at about the same time and there is even a possibility that Proto-Aurignacian groups of Siuren I, Unit H came to Crimea before the Szeletians. Second, Late Micoquian Neanderthals coexisted with unknown, yet Szeletian, humans, and Proto-Aurignacian *Homo sapiens* and people of the three industries did not survive in western (Siuren I) and eastern (Buran-Kaya III) Crimea until the appearance of the Late/Evolved Aurignacian and the EUP industry of Southern Caucasus.

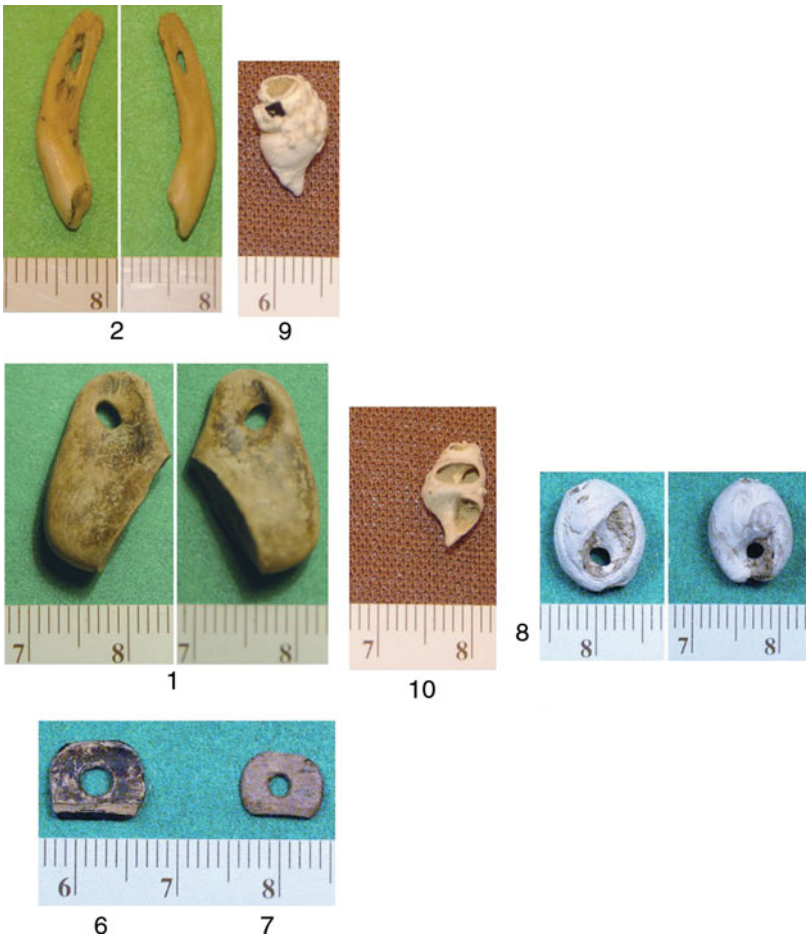

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition,
Fig. 7 Mezmaiskaya cave, levels 1C, 1B, and 1A. Bone tools. (After Golovanova et al. 2010a)

At the same time, no archaeological level at the two sites contained Levallois-Mousterian, also absent in Northern Caucasus, which is why their persistence in Crimea during the subsequent Huneborg Stadial and Arcy Interstadial cannot be excluded, according to the 2000s concept. On the other hand, the 2000s concept suggesting the presence of Late Micoquian Neanderthals at other Crimean sites during the Huneborg Stadial and Arcy Interstadial should be verified. The indicative case with Siuren I, Units H and G AMS dating with too young results c. 31–28 ky BP because of collagen problems may also occur at other Crimean sites that have been dated by AMS.

For example, the geochronological position of the Kiik-Koba, Micoquian upper layer was proposed on the basis of lithological and pollen data to be related to either the Stadial between the Moershoofd and Hengelo Interstadials or to the Stadial preceding the Arcy Interstadial (Demidenko 2004). A C14 date of c. 32.3 ky BP obtained on an ungulate bone by the Kiev lab served to support the late variant of the proposed geochronology – Huneborg Stadial (Demidenko 2008). But the new Oxford AMS-dating attempt casts some doubts on this. Within the frame of the 2000s reanalyses of the Kiik-Koba materials, two ungulate bones were selected for AMS dating. One sample failed. The second was of *Bos/Bison* and dated to c. 25.7 ky BP (with $\delta 13C = -20.1$). The determination was <1% wt. collagen, which is below the usual threshold (comment to Th. Uthmeier from D. Baker 27.02.2007). This, and the fact that the first sample failed, strongly suggests that this very young date be treated with caution, as well as the c. 32.3 ky BP date, given

the lack of information on the bone sample characteristics from the Kiev lab.

All in all, new data from the 2010s and new considerations have "opened the door" for a new geochronology and industrial structure for LMP-EUP transition, although further work is needed.

Cross-References

► Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea

References

Adler, D.S., O. Bar-Yosef, A. Belfer-Cohen, N. Tushabramishvili, E. Boaretto, N. Mercier, H. Valladas, and W.J. Rink. 2008. Dating the demise: Neandertal extinction and the establishment of modern humans in the southern Caucasus. *Journal of Human Evolution* 55: 817–833.

Chabai, V.P. 2004. *The Middle Paleolithic of Crimea: Stratigraphy, chronology, typological variability and eastern European context*. Simferopol: Shlyakh (in Russian).

Chabai, V.P. 2008. Kabazi V in the context of the Crimean Middle Palaeolithic. In *Kabazi V: Interstratification of Micoquian and Levallois-Mousterian camp sites. Palaeolithic sites of Crimea, vol. 3, Part 2*, ed. V.-P. Chabai, J. Richter, and T. Uthmeier, 509–524. Simferopol/Cologne: Shlyakh.

Chabai, V.P., K. Monigal, and A.E. Marks, eds. 2004. *The Middle Paleolithic and early Upper Paleolithic of eastern Crimea*, ERAUL 104. Vol. 3. Liège: Université de Liège.

Demidenko, Y.E. 2000. "Crimean enigma" – Middle Paleolithic artifacts within early Aurignacian of Krems-Dufour complexes at Siuren I: Alternative hypothesis for solution of the problem. *Stratum plus* 1: 97–124 (in Russian).

Demidenko, Y.E. 2003. The Upper Paleolithic of Crimea: Industrial-chronological variability. *Archeological Proceedings (Rostov-na-Donu)* 2: 36–50 (in Russian).

Demidenko, Y.E. 2004. The common characteristic of Middle Paleolithic Micoquian industry of Kiik-Koba type sites and find complexes. In *Buran-Kaya III rockshelter, Layer B – The etalon find complex for Kiik-Koba type industry of Crimean Micoquian tradition. Complex analysis of flint artifacts*, ed. Y.E. Demidenko, 8–29. Kiev/Simferopol: Shlyakh (in Russian).

Demidenko, Y.E. 2008. The early and Mid Upper Palaeolithic of the North Black Sea region: An overview. *Quartaer* 55: 91–106.

Demidenko, Y.E. 2011a. The late Middle Palaeolithic and early Upper Palaeolithic of the northeastern and eastern edges of the Great Mediterranean (south of eastern Europe and Levant): Any archaeological similarities? In *The Lower and Middle Palaeolitihic in the Middle East and neighbouring regions. Proceedings of the Basel Symposium (8–10 May 2008)*, ERAUL 126, ed. J.-M. Le Tensorer, R. Jagher, and M. Otte, 151–167. Liège: Université de Liège.

Demidenko, Y.E. 2011b. *North Black Sea region archaic Aurignacian complexes with different microliths and their role for western Eurasia Aurignacian variability and origin studies*, Abstracts 26. Leipzig: European Society for the study of Human Evolution.

Demidenko, Y.E., M. Otte, and P. Noiret, eds. 2012. *Siuren I rock-shelter. From late Middle Paleolithic and early Upper Paleolithic till Epi-Paleolithic in Crimea*, ERAUL 129. Liege: Université de Liège.

Demidenko, Y.E., P. Nigst, S. Talamo, et al. in press. AMS C14 dating of bone samples for the Micoquian and Proto-Aurignacian, and Late/Evolved Aurignacian interfaces at Siuren I, Crimea (Ukraine). *Journal of Archeological Science*.

Golovanova, L.V., N.E. Cleghorn, V.B. Doronichev, J.F. Hoffecker, G.S. Burr, and L.D. Sulergizkiy. 2006. The early Upper Paleolithic in the northern Caucasus (new data from Mezmaiskaya cave, 1997 excavation). *Eurasian Prehistory* 4: 43–78.

Golovanova, L.V., V.B. Doronichev, and N.E. Cleghorn. 2010a. The emergence of bone-working and ornamental art in the Caucasian Upper Palaeolithic. *Antiquity* 84: 299–320.

Golovanova, L.V., V.B. Doronichev, N.E. Cleghorn, M.-A. Koulkova, T.V. Sapelko, and M.S. Shackley. 2010b. Significance of ecological factors in the Middle to Upper Paleolithic transition. *Current Anthropology* 51: 655–691.

Meshveliani, T., O. Bar-Yosef, and A. Belfer-Cohen. 2004. The Upper Paleolithic in western Georgia. In *The early Upper Paleolithic beyond western Europe*, ed. P.-J. Brantingham, S.L. Kuhn, and K.W. Kerry, 129–143. Berkeley: University of California Press.

Pinhasi, R., T.F.G. Higham, L.V. Golovanova, and V.B. Doronichev. 2011. Revised age of late Neanderthal occupation and the end of the Middle Paleolithic in the northern Caucasus. *PNAS* 108: 8611–8616.

Prat, S., S.C. Pean, L. Crepin, D.G. Drucker, S.J. Puaud, H. Valladas, M. Laznikova-Galetova, J. van der Plicht, and A. Yanevich. 2011. The oldest anatomically modern humans from far southeast Europe: Direct dating, culture and behavior. *PLoS One* 6: 1–13.

Yanevich, A. 2000. Buran-Kaya culture of Gravettian in Crimea. *Archeology (Kyiv)* 2: 11–19 (in Ukrainian).

Yanevich, A., S. Pean, L. Crepin, M. Laznikova-Galetova, S. Prat, and V. Prysyajnuk. 2009. Upper Palaeolithic settlements in Buran-Kaya 3 (Crimea, Ukraine): New interdisciplinary researches of the layers 5-2, 6-1 and 6-2. *Archeological Almanac* 20. (Donetsk): 187–202.

Crimean Middle Paleolithic

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Introduction

Geographical Setting

The Crimean peninsula (Fig. 1) is located in the southeastern corner of the European continent, on the northern coast of the Black Sea in southern Ukraine. Moreover, except during the Last Interglacial period (c. 128–116 year BP, MIS 5e) when Crimea was an island, present-day Crimea was not a peninsula but rather the southernmost edge of a continuous land belt from the Eastern Balkans to Northwestern Caucasus in Eastern Europe during most of the Upper Pleistocene. Occupying such a transitional geographical position between different European and Asian regions, Crimea is quite important for Western Eurasian Paleolithic studies.

Crimea, (see Ferring in Marks and Chabai 1998), 300 km wide and 180 km from north to south with a total area of about 26,000 km^2 centered on 45° N, 34° 30′ E, is subdivided into two main regions by its physiography. The steppe is located in the north and the mountainous areas in the south. All of the known in situ Paleolithic sites are situated in the latter. The Crimean Mountains, with three ridges, stretches 160 km west–east and 50 km north–south. The ridges are composed of limestone, sandstone, sedimentary rock, chalk, marl, and conglomerates, often added including karstic terrain. A number of natural sheltered places (caves/grottos/rockshelters) and primary

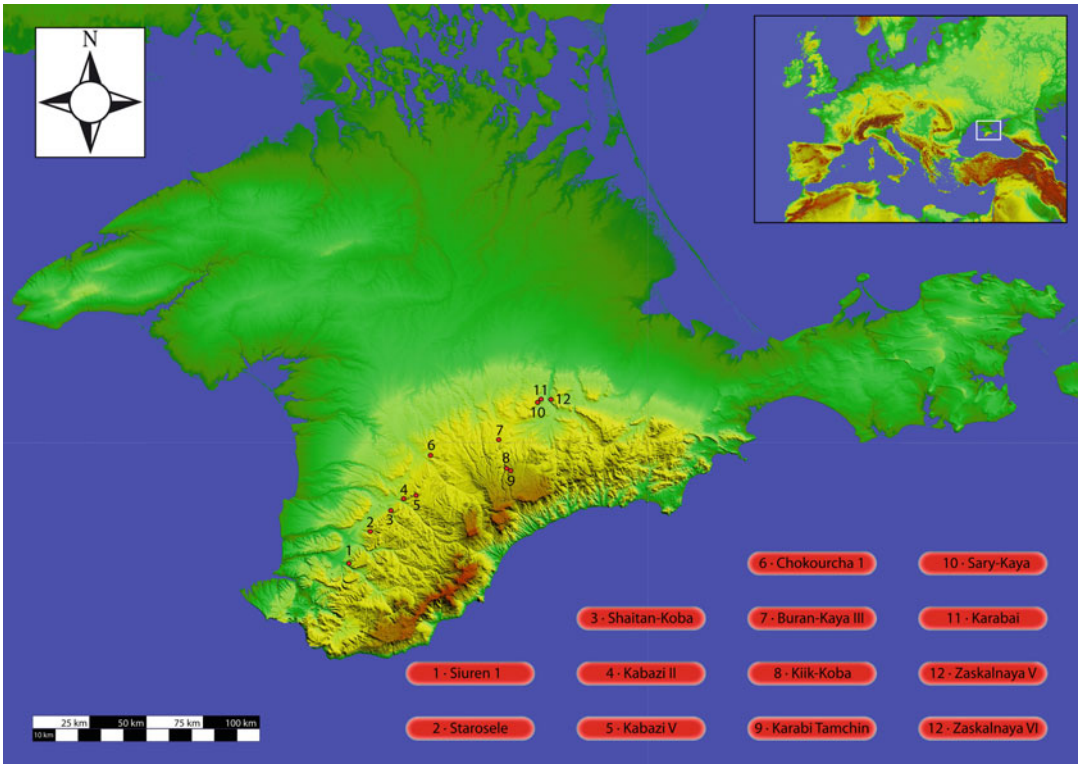

Crimean Middle Paleolithic, Fig. 1 Map of the Crimea with Middle Paleolithic site locations. (Map prepared by Dr. G. Bataille, Cologne University)

and secondary high-quality flint outcrops are known along various cuestas and cliffs. These two key components for the survival Paleolithic human groups certainly attracted them to this region. In addition, it was possible to hunt different ungulates (*Equus hidruntinus*, *Saiga tatarica*, *Bovinae*) near steppe plateaus located above limestone cuestas and cliffs adjacent to river valleys. Such resources made the Crimean mountainous region indeed an attractive region for occupation over the last 100,000 years, by different hominin groups with different cultures and industries, some of whom stayed for a long time, while others simply passed through the region during long distance migrations.

At the same time, the majority of Crimea, its northern steppe zone, from a geological point of view, usually features many-meter-thick loess deposits with no rocky cuestas or cliffs with caves/grottos/rockshelters. Only a few archaeological surveys have been attempted to find Paleolithic sites in this region, but very few Mesolithic and Neolithic sites have been found in Holocene deposits and not a single Paleolithic site. Systematic survey is needed for to discover open-air Paleolithic sites in the Crimean steppe region. Before such sites are found, present knowledge of the Crimean Paleolithic is based only on in situ sites in the southern mountainous region, which while important, is still but a part of the entire Crimean territory. Future discoveries of sites in both the northern steppe zone and the southernmost sea coastal shore, zones lacking high-quality flint outcrops, in addition to the very few surface flint artifacts found, will make the picture of Crimea and its Middle Paleolithic much more mosaic.

Historical Background

History of Middle Paleolithic Studies in the Crimea

Another Paleolithic feature of the Crimea should be noted. Despite some suggestions for the presence of the Acheulian or Lower Paleolithic in Crimea, there are neither in situ sites nor clearly identifiable artifacts for such industries as yet (Chabai et al. 2000). The oldest Crimean Paleolithic is therefore represented by the Middle Paleolithic, the subject of this entry.

The first Middle Paleolithic site (Volchiy Grotto, eastern Crimea) and surface flints (Kabazi Mountain, western Crimea) were discovered by the pioneer of Crimean Paleolithic archaeology, Konstantin S. Merejkowski (St. Petersburg) in 1879–1880. These Middle Paleolithic finds in the Crimea were also the first for the entire Russian Empire at that time. These important discoveries, however, were not followed up and actually forgotten, despite the fact that G. de Mortillet (France), the most authorized Paleolithic Age archaeologist in the last quarter of the nineteenth century, confirmed the Mousterian Age of the Volchiy Grotto finds in 1900. Only with the real rediscovery of the Crimean Paleolithic by Gleb A. Bonch-Osmolowski (Leningrad) during fieldwork from 1924 to 1932 was Crimea recognized as a region rich in Paleolithic sites in Eastern Europe. Bonch-Osmolowski excavated three Middle Paleolithic sites in Crimea in the 1920s: Kiik-Koba grotto with two Neanderthal burials, Shaitan-Koba grotto and Adzhi-Koba cave. The Kiik-Koba deposits contained two Paleolithic layers, the lower of which was considered to be "*an amorphous stage of the Pre-Chelleen*," also comparable to the "*Old Clactonian*," "*Tayacien*," and the upper "*Late Micoquian*" connected to "*the end of the Acheulian or . . .to the transition from Acheulian to Mousterian*" (Bonch-Osmolowski 1940). The lower layer of Adzhi-Koba was similar to the upper layer of Kiik-Koba "*Late Micoquian*" artifacts, but the lithic assemblage was limited (Bonch-Osmolowski 1940). These two sites, with assemblages characterized by a near absence of core reduction and the presence of bifacial "plano-convex" tool production, a term introduced by Bonch-Osmolowski, were the first Paleolithic sites for both Middle and Upper Paleolithic (the upper layer at Adzhi-Koba contained, in modern Paleolithic terms, an Epigravettian assemblage) in the first ridge areas of Crimean Mountains in eastern Crimea. Shaitain-Koba grotto with

two Middle Paleolithic layers, on the other hand, was characterized by many Levallois and blade cores and very rare bifacial tools. The Shaitan-Koba assemblages were considered to be "*Late Mousterian*," perhaps even transitional to the Upper Paleolithic (Bonch-Osmolowski 1940). Two other "*Late Micoquian*" assemblages were excavated in the 1930s by O.N. Bader (Moscow) at Volchiy Grotto and N.L. Ernst (Simferopol, Crimea) at Chokurcha cave. On the basis of these Crimean Middle Paleolithic sites, Bonch-Osmolowski (1940) laid the foundations of Crimean Middle Paleolithic studies, proposing a unilinear Middle Paleolithic evolutionary sequence in Crimea containing the amorphous "*Pre-Chelleen*," "*Late Micoquian*," and "*Late Mousterian*" stages.

Moreover, looking at this database today, we clearly see that assemblages from all three of the now defined Middle Paleolithic industries in Crimea were already known in the 1930s: Denticulate Mousterian of Kiik-Koba, lower layer; Crimean Micoquian Tradition with bifacial "plano-convex" tools; and Western Crimean Mousterian/Levallois-Mousterian. The latter two industries were supplemented in the late 1930s and the 1950s by new assemblages from sites excavated by D.A. Krainov and A.A. Formozov (Moscow): Bakchisaraiskaya, Kholodnaya Balka grotto, Kabazi I buried grotto, and Starosele. Here it should be noted that the 1950s marks the end of systematic Crimean Paleolithic fieldwork by Russian archaeologists from Leningrad and Moscow because in February 1954 Crimea passed from Russia to Ukraine. Subsequently, Ukrainian archaeologists were actively involved in Crimean Paleolithic studies.

Yuri G. Kolosov (Kiev) was the leader of Crimean Paleolithic archaeology studies from the 1960s to the early 1990s. Regarding the Middle Paleolithic, he discovered and excavated Prolom I and II grottos and, most importantly, several buried rockshelters at Ak-Kaya and Zaskalnaya and the open-air site of Krasnaya Balka in Red Valley behind the Ak-Kaya Cretaceous and Eocene limestone and marl rocky massif, more than 100 m above the surrounding steppe areas in eastern Crimea. Excavations of Zaskalnaya V and VI multilevel buried rock-shelters led to the recovery of abundant flint assemblages, fauna, and even Neanderthal remains. Moreover, several repeated and probably chronologically successive collective child burials with eight individuals in layers III and IIIa at Zaskalnaya VI were found. On the basis of Zaskalnaya, Kolosov identified another Mousterian culture with bifacial tools – Ak-Kaya – in addition to the Kiik-Koba, upper layer and Starosele cultures. In the mid-1980s, Kolosov began new excavations in western Crimea and several new important Middle Paleolithic sites were found (notably among them, Kabazi II and Kabazi V) (Kolosov et al. 1993).

New and ongoing fieldwork for the Crimean Middle Paleolithic was initiated in 1992 after the collapse of the Soviet Union, when it became possible to collaborate with Western colleagues. Such studies in Crimea were realized by Crimean archaeologists headed by Victor P. Chabai (Kiev-Simferopol, one of Kolosov's students) with archaeologists from the USA (A.E. Marks), Belgium (M. Otte) and Germany (J. Richter and Th. Uthmeier) and their associates and students, as well as many natural science specialists from Ukraine, Russia, Moldova, the USA, Canada, France, and England. Between 1993 and 2006, these groups of researchers excavated the following stratified Middle Paleolithic sites and multi-period Paleolithic and/or prehistoric sites with Middle Paleolithic level(s), both already known and newly discovered: Kabazi II, Kabazi V, Starosele, Siuren I, Chokurcha I, Buran-Kaya III, Karabi Tamchin, Karabai I, Sary-Kaya I, and Karabai II. The analysis of new materials from these ten sites and reanalysis of old collections, a great number of articles, and eleven books have been published (Marks and Chabai 1998; Chabai and Monigal 1999; Chabai et al. 2000, 2004, 2005, 2006, 2007, 2008; Chabai 2004; Demidenko 2004; Demidenko et al. 2012), plus two more volumes in press. These present the results from new approaches, multi-complex studies and absolute dates for the Crimean Middle Paleolithic.

Key Issues/Current Debates

Geochronology of the Crimean Middle Paleolithic

Prior to the collapse of Soviet Union, no absolute dates had been obtained for the Crimean Middle Paleolithic, excluding two radiocarbon dates older than 45,000 BP for Zaskalnaya VI, layer II (Kiev lab), and older than 50,000 BP for Zaskalnaya V, layer II (Novosibirsk lab), and attempts to obtain U-series dates for Kabazi I (31–33,000 BP) and Starosele (31,000 BP, 41,000 BP, and 110,000 BP) by the founder of the method, V.V. Cherdyntsev in the late 1950s. Pollen data was analyzed only for sediments at Kiik-Koba in the 1960s and Zaskanaya V in the 1980s. Geological studies were very general and did not allow specialists to propose real internal sediment geochronology for the Crimean sites, or such proposals were completely wrong, such as the Last Glacial Maximum for the Proto-Aurignacian/Micoquian of Kiik-Koba-type industry and the Evolved Aurignacian at Siuren I.

The situation for determining Middle Paleolithic geochronology in Crimea has changed dramatically over the last two decades. Well more than 100 absolute dates using AMS/C14, ESR, U-series and TL-dating methods have been obtained. Geological, pollen, fauna, small mammal, and malacofauna studies have also added significant results for determination of Crimean Middle Paleolithic and Early Upper Paleolithic geochronology. All such geochronological data were analyzed and synthesized by Chabai in the mid-2000s and the most recent version (Chabai et al. 2008) is presented in Table 1. The three Crimean Middle Paleolithic industries are viewed as only geochronologically dated to the Upper Pleistocene: MIS 5–3, c. 120–30,000 BP. The Denticulate Mousterian in the Kiik-Koba, lower layer is dated only to the Lower Pleniglacial/MIS 4 (c. 70–60,000 BP) on the basis of geochronological data from Starosele, particularly level 3. The only Middle Paleolithic industry that covers the whole period between c. 120 and 30,000 BP is the Crimean Micoquian Tradition with three industry types–Ak-Kaya, Starosele, and Kiik-Koba. Moreover, not counting the possibly brief "Denticulate Mousterian episode" during the Lower Pleniglacial in Crimea, the Micoquian, beginning in the Last Interglacial and ending during the Hosselo Stadial before the Hengelo Interstadial, was the only representative of Middle Paleolithic industries in Crimea. It was only around 45,000 BP, during the Hosselo Stadial that, in addition to the Micoquian, the Levallois-Mousterian appeared in Crimea. Both of these industries apparently survived until the Denekamp Interstadial (c. 30–28,000 BP) when Early Upper Paleolithic industries appeared in Crimea.

New dating results and/or industrial attributions for the EUP industries at Siuren I and Buran-Kaya III allow the present author to propose an older time period for the last Middle Paleolithic industries in Crimea (see the entry on "▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition" in this encyclopedia).

Crimean Middle Paleolithic Industrial Variability

The presence of three Middle Paleolithic industries in Crimea – Denticulate Mousterian, Micoquian, and Levallois-Mousterian – has been addressed through the application of two different approaches: cultural and noncultural. In general, the Denticulate Mousterian and Levallois-Mousterian and their very basic interpretations do not vary much between the two approaches. However, interpretations of the Micoquian industry are too different, depending on the approach, and will be discussed below.

The *Crimean Denticulate Mousterian* (Kiik-Koba grotto, lower layer and Starosele site, level 3) can be described as follows (Demidenko 2003–2004; see also artifact illustrations in Fig. 2 of Demidenko's entry on "▶ Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union", and in Fig. 3 of Demidenko's entry on "▶ Starosele Middle Paleolithic Site with Hominin Remains" in this encyclopedia. Technologically, primary flaking processes are based on reduction of both unsystematic globular multiplatform and primitive parallel single-platform cores with transverse, shortened metric proportions, with almost no striking platform preparation. Most of the

Crimean Middle Paleolithic, Table 1 Geochronology of the Crimean Middle Paleolithic and Early Upper Paleolithic. (After Chabai in Chabai et al. 2008: Tables 18–2 & 18–3).

MIS	Geochronology	Vegetation	Sites, levels	AMS/C^{14}	ESR	U-series	Industries, types
Stage 3	Vytachiv, vt_{3b}, (Denekamp Int.)	South-boreal forest-steppe	Buran Kaya III, B	OxA-6674, 28.52 ± 0.46			Micoquian, Kiik-Koba type
				OxA-6673, 28.84 ± 0.46			
			Siuren I, Fb2	OxA-5155, 29.95 ± 0.7			Evolved Aurignacian
			Siuren I, Ga	OxA-5154, 28.45 ± 0.6			Proto-Aurignacian/
			Siuren I, H	OxA-8249, 28.2 ± 0.44			Micoquian, Kiik-Koba type
			Kabazi V, II/4A & II/7				Micoquian, Ak-Kaya type
			Prolom II, II	Ki-10,617, 28.1 ± 0.35			Micoquian, Starosele type
			Zaskalnaya V, I	Ki-10,891, 28.85 ± 0.4			
				Ki-10,744, 30.08 ± 0.35			
			Kabazi V, III/1		30.0–26.0		
			Kabazi V, III/1A	OxA-X-2134-45, 30.98 ± 0.22	<41.0		
			Kabazi II, A3A, A3B, A3C, A4				Levallois-Mousterian/ WCM
			Kabazi II, II/1A		30 ± 2		
	Vytachiv, vt_2, (Huneborg Stadial)	Boreal xeric grassland	Zaskalnaya VI, II	OxA-4131, 30.11 ± 0.63			Micoquian, Ak-Kaya type
				Ki-10,893, 30.70 ± 0.45			
				Ki-10,607, 30.22 ± 0.4			
			Zaskalnaya V, II	Ki-10,743, 31.60 ± 0.35			
			Kabazi V, III/2 & III/2A				
			Prolom I, upper layer	GrA-13,917, 30.51 ± 0.58/ 0.53			Micoquian, Kiik-Koba type
				GrA-13,919, 31.3 ± 0.63/ 0.58			
			Kiik-Koba, upper layer	Ki-8163, 32.3 ± 0.3			Micoquian, Kiik-Koba type

(continued)

C

Crimean Middle Paleolithic, Table 1 (continued)

MIS	Geochronology	Vegetation	Sites, levels	AMS/C^{14}	ESR	U-series	Industries, types
			Buran Kaya III, C	OxA-6869, 32.2 ± 0.65			Eastern Szeletian
				OxA-6672, 32.35 ± 0.7			
				OxA-6868, 36.70 ± 1.5			
			Kabazi II, II/1	OxA-4770, 31.55 ± 0.6			Levallois-Mousterian/WCM
			Kabazi II, II/2	OxA-4771, 35.1 ± 0.85			
			Kabazi II, II/3				
			Kabazi II, II/4	OxA-4858, 32.2 ± 0.9			
			Kabazi II, II/5	OxA-4859, 33.4 ± 1			
			Kabazi V, III/3–1–III/3-3A				
	Vytachiv, vt_{1c}, (Huneborg/Les Cottes Int.)	South-boreal forest-steppe	Prolom I, lower layer	Ki-10,615, 33.5 ± 0.4			Micoquian, Kiik-Koba type
				Ki-10,616, 35.2 ± 0.45			
			Zaskalnaya VI, III	OxA-4772, 35.25 ± 0.9			Micoquian, Ak-Kaya type
				Ki-10,609, 38.2 ± 0.4			
				Ki-10,894, 36.4 ± 0.45			
			Kabazi II, II/6				Levallois-Mousterian/WCM
			Kabazi II, II/7				
			Zaskalnaya VI, IIIa	OxA-4132, 30.76 ± 0.69			Micoquian, Ak-Kaya type
				OxA-4773, 39.1 ± 1.5			
				Ki-10,610, 39.4 ± 0.48			
	Vytachiv, vt_{1b2}, (Hengelo Int.)	South-boreal forest-steppe	Kabazi V, III/5-3B2	OxA-14,726, 38.78 ± 0.36			Micoquian, Starosele type
			Starosele, 1	OxA-4775, 41.2 ± 1.8	41.2 ± 3.6		
				OxA-4887, 42.5 ± 3.6			
			Starosele, 2		38.0 ± 5.0	60.0	
			Kabazi II, II/7AB		36.0 ± 3.0		Levallois-Mousterian/WCM

(continued)

Crimean Middle Paleolithic, Table 1 (continued)

MIS	Geochronology	Vegetation	Sites, levels	AMS/C^{14}	ESR	U-series	Industries, types
			Kabazi II, II/7C, II/7D, II/7E				
			Kabazi II, II/8		44.0 ± 5.0	45.0 ± 7.0	
			Kabazi II, II/8C, IIA/1				
	Vytachiv, vt_{1b2-b1}, (Hosselo Stadial)	Boreal xeric forest-steppe	Kabazi V, IV/1-IV/3				
			Kabazi II, IIA/2				
			Chokurcha I, IV-I, IV-M				Micoquian, Ak-Kaya type
			Chokurcha I, IV-O	OxA-10,877, >45.4			Micoquian, Starosele type
			Zaskalnaya V, IV	GrA-13,916, >46.0			
			Zaskalnaya VI, IV	Ki-10,611, >47.0			
	Vytachiv, vt_{1b1}, (Moershoofd Int.)	South-boreal forest-steppe	Kabazi II, IIA/4B – IIA/4				Micoquian, Ak-Kaya type
Stage 4	Uday,ud, Pryluki, pl_3, (Ognon Stad. & Int.)	Boreal forest-steppe	Kabazi II, III/1A–III/1			73.3 ± 6.0	
			Starosele, 3			67.5	Denticulate Mousterian
Sub-stage 5a	Pryluki, pl_{1b2}, (Rederstall Stadial)	South-boreal forest-steppe	Starosele, 4			>80.0	Micoquian, type?
			Kabazi II, III/2		74.0–85.0	54.0 ± 3.0	
Sub-stage 5b	Pryluki, pl_{1b2-b1}, (Rederstall Stadial)	Boreal/ south-boreal forest-steppe	Kabazi II, III/2A				
			Kabazi II, III/3		82.0 ± 10.0		Micoquian, Ak-Kaya type
Sub-stage 5c	Pryluki, pl_{1b1}, (Brörup Int.)	South-boreal forest-steppe	Zaskalnaya V, V–VI				
Sub-stage 5d	Tyasmin, ts, (Herning Stadial)	???					
	Kaydaky, kd_{3b2+c}, (Eemian Intergl.)	South-boreal forest/forest-steppe	Kabazi II, V/3-VI/17				

products are small shortened pieces with massive thick butts usually with a very pronounced cone and bulb indicating hard hammer percussion. Blades are fairly uncommon and are usually, like most of the flakes, very irregular in shape and dorsal scar patterns, indicating their removal from the same cores with no specific blade production. The tool kit is characterized by the absence of bifacial tools, dominance (more than half of all formal tools) of both pieces with

marginal and/or irregular retouch and denticulates and notched pieces, and a very low representation of points. The very minor presence of convergent forms among side-scrapers, a combination of simple side-scrapers with either retouched notched pieces or "Clactonian" ones, and the presence of side-scrapers and denticulates with ventral and/or alternate retouch are also worth noting. Many denticulates and notched pieces are set apart by one feature: a "Clactonian notch" was first created and then a single-blow notch was additionally retouched. Very specific is the occurrence of "combined tools" as side-scrapers + denticulates-notches and end-scrapers or perforators + denticulates-notches. Since the 1970s (Gladilin 1976), similarities between the Kiik-Koba lower layer assemblage and "Tayacian" complexes in Moldova have been noted. Such a relationship is still considered as probable (Demidenko 2003–2004).

The *Crimean Levallois-Mousterian*, often also termed the Western Crimean Mousterian after the location of its most typical assemblages in that part of Crimea, is best represented by finds from Kabazi II, Units II and IIA; Kabazi V, Subunit III/3 and Unit IV; Karabi Tamchin, layers II/2 and III; and Shaitan-Koba grotto (see in Marks and Chabai 1998; Chabai 2004; Chabai et al. 2008). According to Chabai, the Crimean Levallois-Mousterian is subdivided into two stages – early (Hosselo Stadial-Huneborg Interstadial) and late (Huneborg Stadial-Denekamp Interstadial) – based on technological changes through time. The stages are best represented by assemblages from Kabazi II, the key Middle Paleolithic site for Eastern Europe as a whole, where the early stage is represented by levels IIA/2 to II/7 and the late stage by levels II/6 to II/1A. The early stage features technological coexistence of Levallois reduction with finely prepared main and lateral supplementary core striking platforms (Fig. 2: 1–3), and parallel volumetric method (Fig. 2: 4–5), while the late stage is characterized only by the parallel volumetric method. The early stage assemblages thus contain both Levallois and laminar products, and the late stage shows a dominance of blades. Blades commonly form a high percentage in both stages (15–35% within debitage products). Typologically, both early and late stages of the Levallois-Mousterian are rather similar given the absence of bifacial tools and dominance of simple (Fig. 3: 1–3) and double (Fig. 3: 4–6) side-scrapers (together they generally account for more than 50% of formal tools) and about equal percentages of convergent side-scrapers and points (Fig. 3: 7–8) most of which were produced on elongated flakes and blades. The only significant typological difference between the two stages is the presence of obliquely backed blades (Fig. 3: 9–10). At the same time, the technological evolution of Levallois-Mousterian almost toward the Upper Paleolithic reduction method was not accompanied by typological changes, such that Upper Paleolithic tool types did not appear during the late stage of the Levallois-Mousterian in Crimea (Chabai 2004). Thus, the Crimean Levallois-Mousterian did not evolve into a typologically Initial Upper Paleolithic industry but remained in the framework of the Middle Paleolithic.

Yu.G. Kolosov (1972), after studies of Bonch-Osmolowski's 1920s materials from Shaitan-Koba, suggested movement of Levallois-Mousterian groups from the Balkans into Crimea. Today, the commonly accepted hypothesis is to see the appearance of Levallois-Mousterian groups in Crimea as a result of migration from the Dniester River region in Western Ukraine and Moldova (Molodova I & V sites, Buteshty grotto) (Chabai 2004; see in Chabai et al. 2006). Recently, significant technological similarities have been shown between the latest Levantine Mousterian assemblages in the Near East and early stage assemblages of the Crimean Levallois-Mousterian (Demidenko 2011). Moreover, the timing of the disappearance of latest Levantine Mousterian assemblages in the Near East fully coincides with the appearance of the first Levallois-Mousterian assemblages in Crimea around 45,000 BP. Kolosov's (early 1970s) hypothesis of a Balkan origin thus deserves more attention and reexamination, keeping in mind the possibility for Near Eastern Latest Neanderthal migrations to the south of Eastern Europe via the Balkans.

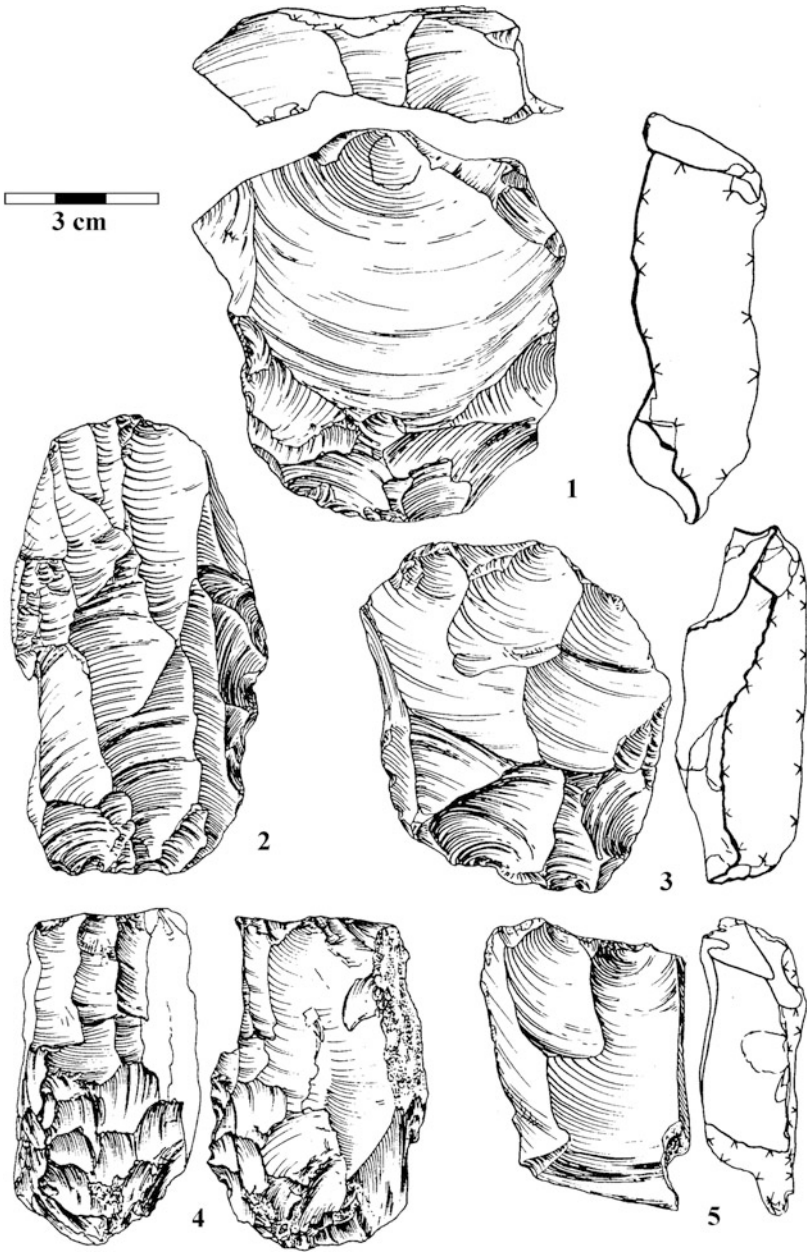

Crimean Middle Paleolithic, Fig. 2 Crimean Levallois-Mousterian/Western Crimean Mousterian industry from Unit II of Kabazi II site. Flint artifacts: *1* Levallois core; *2–3* bidirectional cores with finely prepared striking platforms; *4–5* cores of parallel volumetric method. (Modified after Chabai 2004).

The *Crimean Micoquian* assemblages, or Middle Paleolithic assemblages with bifacial "plano-convex" tools, are the most well-known Crimean Middle Paleolithic industry for both ex-Soviet Union and foreign Paleolithic archaeologists. Their fame is connected to both abundant tools including nicely produced bifacial ones and Neanderthal bone remains found at Kiik-Koba grotto, Zaskalnaya VI buried rockshelter, and below Zaskalnaya V buried rockshelter. The cultural approach was first applied to Crimean Middle Paleolithic assemblages with bifacial tools in the 1970s by V.N. Gladilin (1976). After all the Middle Paleolithic culture identifications in Crimea in the 1970s–1980s, three cultures with bifacial tools were identified: Ak-Kaya (sites of Ak-Kaya III; Zaskalnaya III, V, and VI; Sary-Kaya I; Krasnaya Balka; Prolom II), Kiik-Koba (Kiik-Koba, upper

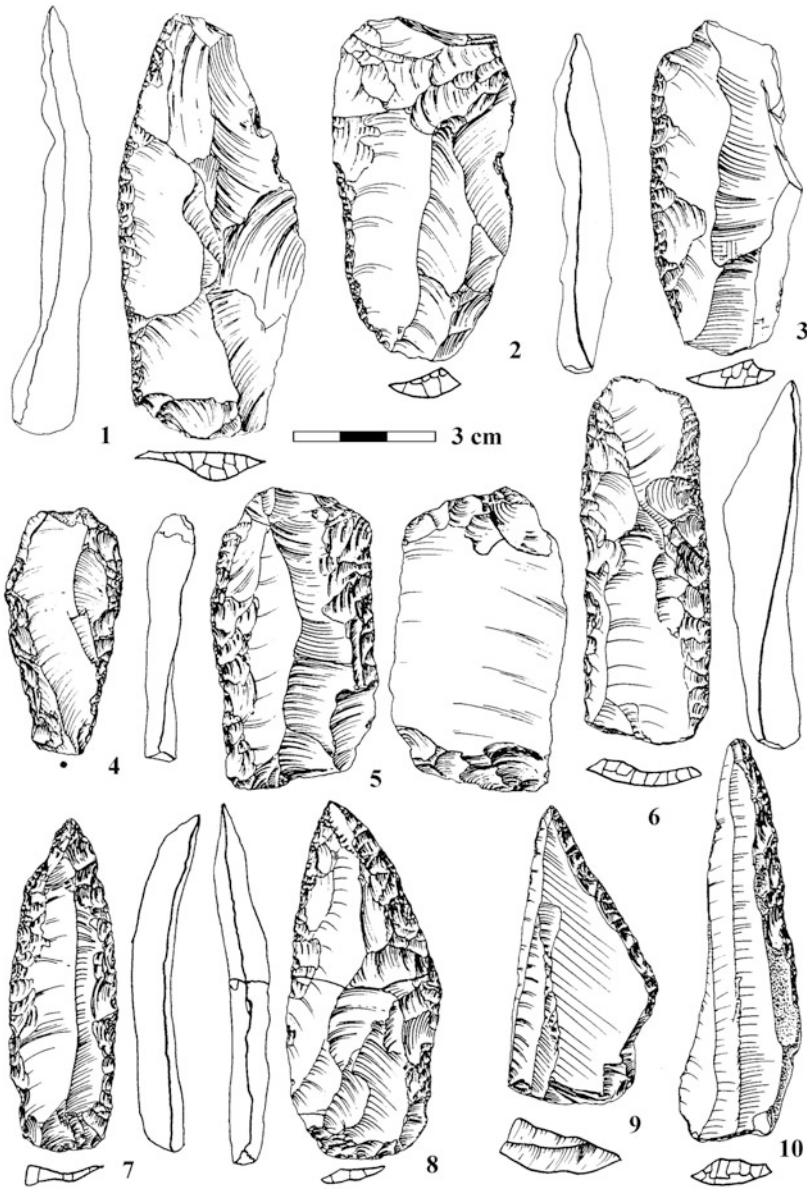

Crimean Middle Paleolithic, Fig. 3 Crimean Levallois-Mousterian/Western Crimean Mousterian industry from Unit II of Kabazi II site. Flint artifacts: *1–2* simple lateral side-scrapers on Levallois flakes; *3* simple lateral side-scraper on a blade; *4*, *6* double side-scrapers on blades; *5* double side-scrapers, bi-truncated faceted; *7–8* points; *9–10* obliquely backed blades. (Modified after Chabai 2004).

layer; Prolom I), and Starosele (Starosele, the 1950s excavation finds; Kabazi V, 1980s Units I–III; GABO, Kabazi II, the 1980s excavation Units I and III) (Kolosov et al. 1993). The three cultures are technologically similar with use of a combination of radial, discoidal, multiplatform, and parallel reduction techniques but no Levallois methods, and no careful main and/or lateral supplementary core platform preparation. Faceting indices are thus either low or medium, less than 45% for the IFl index and less than 30% for the IFst index. Blade indices are also not particularly high, varying between 5% and 20%, with the highest rates for the Starosele culture, in which, however, blades are mainly the result of bifacial tool reduction. There are some typological differences between the three cultures. The Ak-Kaya industry type/culture contains a high percentage of bifacial tools (c. 20–30%) with many and various so-called backed knives, a medium range of convergent types among unifacial tools, mainly side-scrapers, relatively rare points among

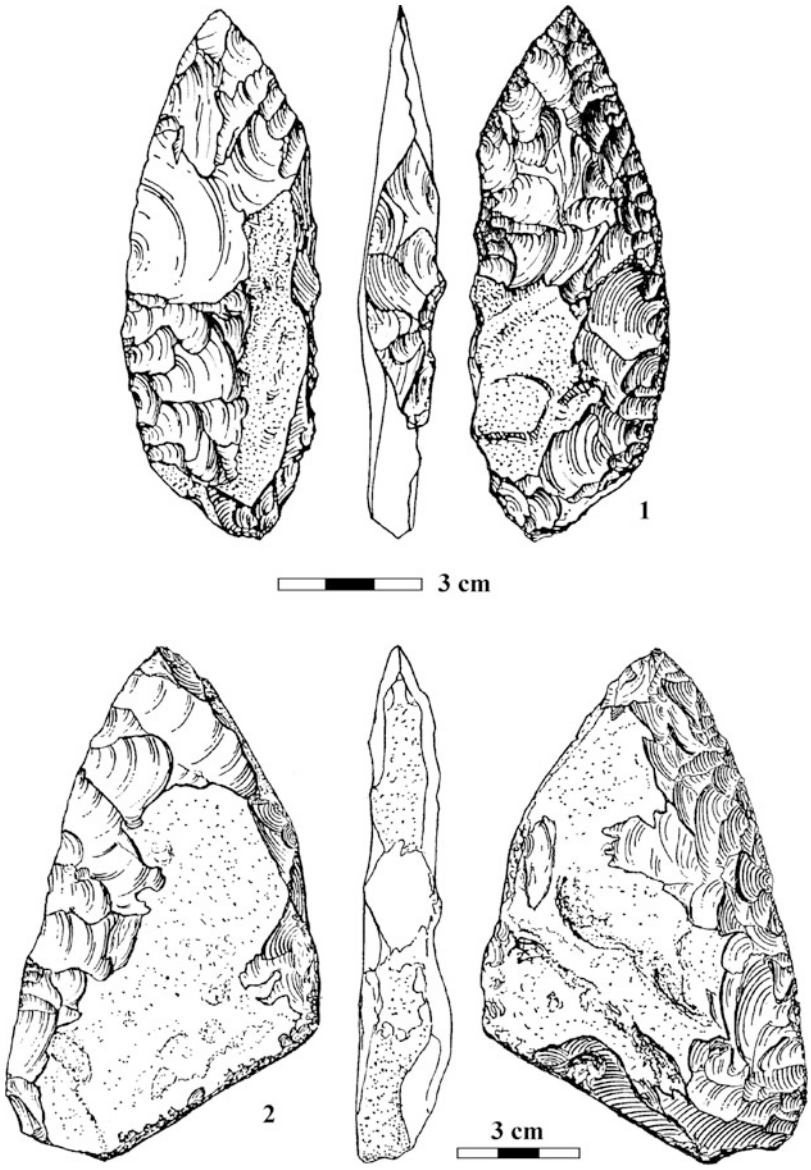

Crimean Middle Paleolithic,
Fig. 4 Crimean Micoquian Tradition industry of Ak-Kaya type. Flint artifacts: *1* bifacial leaf point; *2* bifacial side-scraper. *1–2* Zaskalnaya V buried rockshelter. (Modified after Chabai 2004).

unifacial tools, and a considerable number of simple side-scraper types (from c. 40%) (Figs. 4, 5, 6 and 7). The Kiik-Koba industry type/culture shows a medium amount of bifacial tools (around 15%) with a rarity of backed knives among them, an abundance of points among unifacial (c. 40%) and bifacial (c. 50%) tools, a rather low frequency of simple side-scraper types (c. 20–30%) among unifacial tools, as well as mostly small (less than 5 cm long) bifacial and unifacial tools; this industry is often related to the Micro-Mousterian (see artifact illustrations in Fig. 3 of Demidenko's entry on ▶ Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union). The Starosele industry type/culture was thought to be distinguished by a low presence of bifacial tools (c. 5–10%) with the almost exclusive occurrence of leaf-shaped and crescent points among them, a medium to high frequency of points (c. 20%) and convergent side-scrapers (c. 40%) within unifacial tools, while simple side-scraper types are

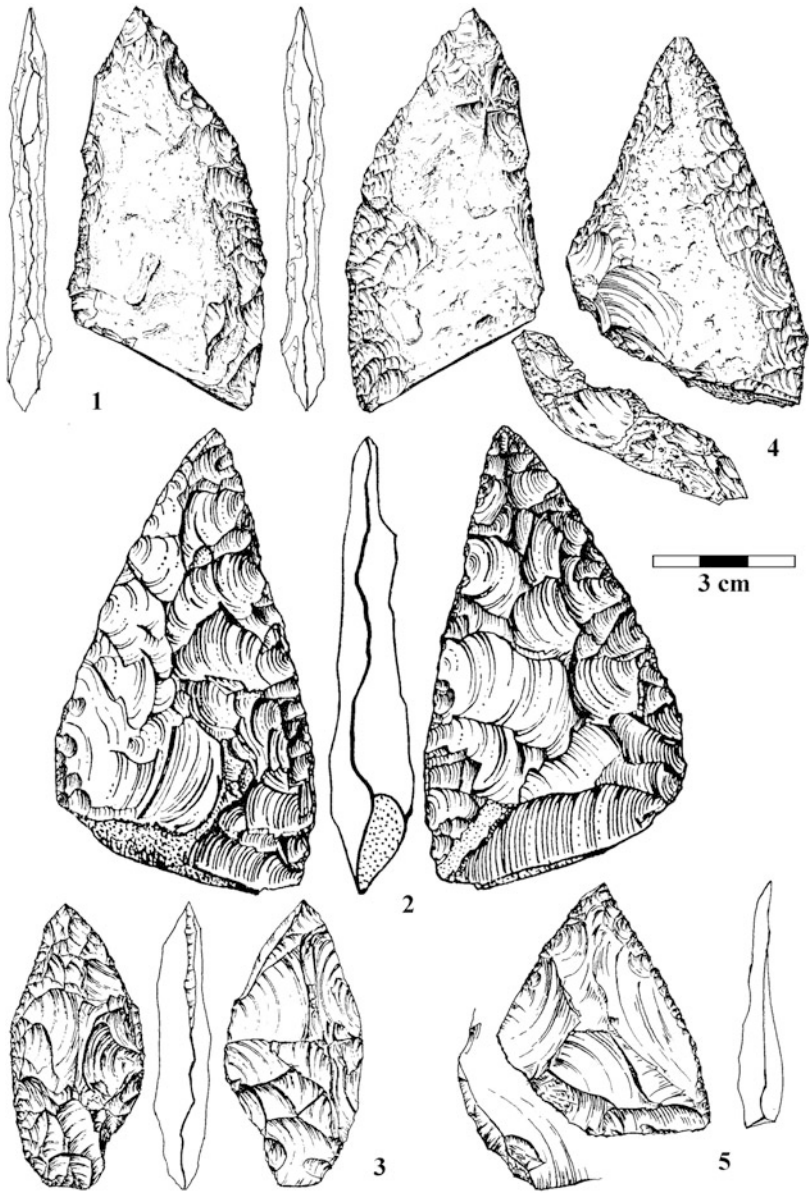

Crimean Middle Paleolithic, Fig. 5 Crimean Micoquian Tradition industry of Ak-Kaya type. Flint artifacts: 1–2 bifacial semi- and sub-crescent points; 3 bifacial leaf point; 4 subtriangular point; 5 semi-trapezoidal point. 1, 3–5 Chokurcha I site; 2 Zaskalnaya V buried rockshelter. (Modified after Chabai 2004).

subordinate (see artifact illustrations in Fig. 4 of Demidenko's entry on ▶ Starosele Middle Paleolithic Site with Hominin Remains). So-called Upper Paleolithic tools and denticulates/notches occur irregularly in insignificant numbers in these industry types. So, the typological variations for the three industries served to isolate the three distinct Middle Paleolithic cultures in the Crimea and are still in use by some East European colleagues.

However, when the new stage of Crimean Paleolithic studies began in the early 1990s, the basic typological uniqueness of the three cultures together was well established; when one ignores differences in typological indices, the cultures all have principally the same tool types. After a complex synthesis of various anthropogenic and natural factors to understand and interpret the sites, all Crimean Middle Paleolithic industries with bifacial tools are now considered within the

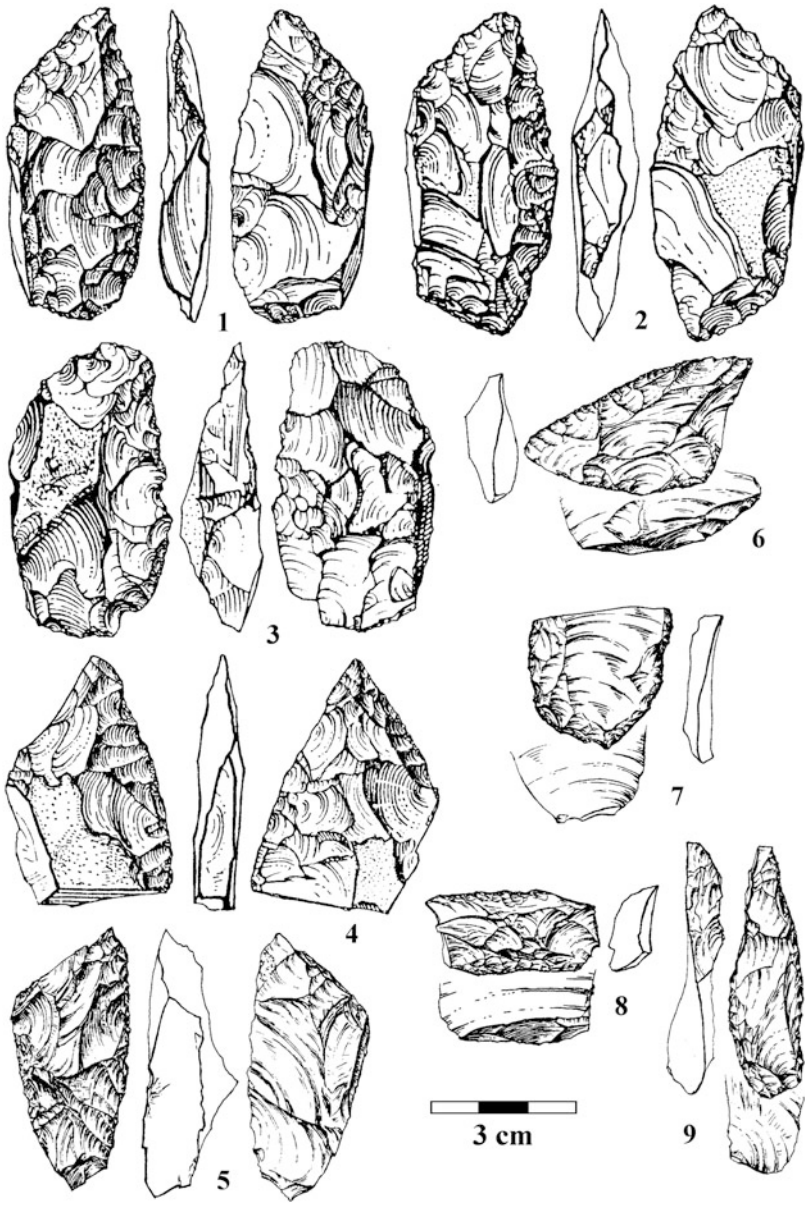

Crimean Middle Paleolithic,
Fig. 6 Crimean Micoquian Tradition industry of Ak-Kaya type. Flint artifacts: *1–5* bifacial side-scrapers; *6* transversal oblique side-scraper; *7*, *9* double side-scrapers; 8 transversal side-scraper (*6–9* side-scrapers on bifacial tool debitage pieces). *1–4* Zaskalnaya V buried rockshelter; *5*, *7–9* Chokurcha I site; *6* Kabazi II site. (Modified after Chabai 2004).

framework of the Crimean Micoquian Tradition (Chabai et al. 2000). The tradition envelopes the three known industries (Ak-Kaya "*étalon* like," Kiik-Koba, and Starosele) through a "uniformity in diversity" methodological approach. Along with this, the industrial variability of the Crimean Micoquian Tradition is not limited to these three industry types. At least two more typologically transitional industry types are also included: so-called Ak-Kaya-"genuine" and Ak-Kaya-Starosele based on Chabai's analyses of Zaskalnaya V and VI, and Prolom II (Chabai et al. 2000). The 1990s–2000s research indeed showed a very mosaic typological variability of the Crimean Micoquian Tradition and its Neanderthal site system that "erases" typological "index borders" between the traditionally defined cultures. Instead, a large group of assemblages with more or less "smooth and continual" typological variation and their site complex and

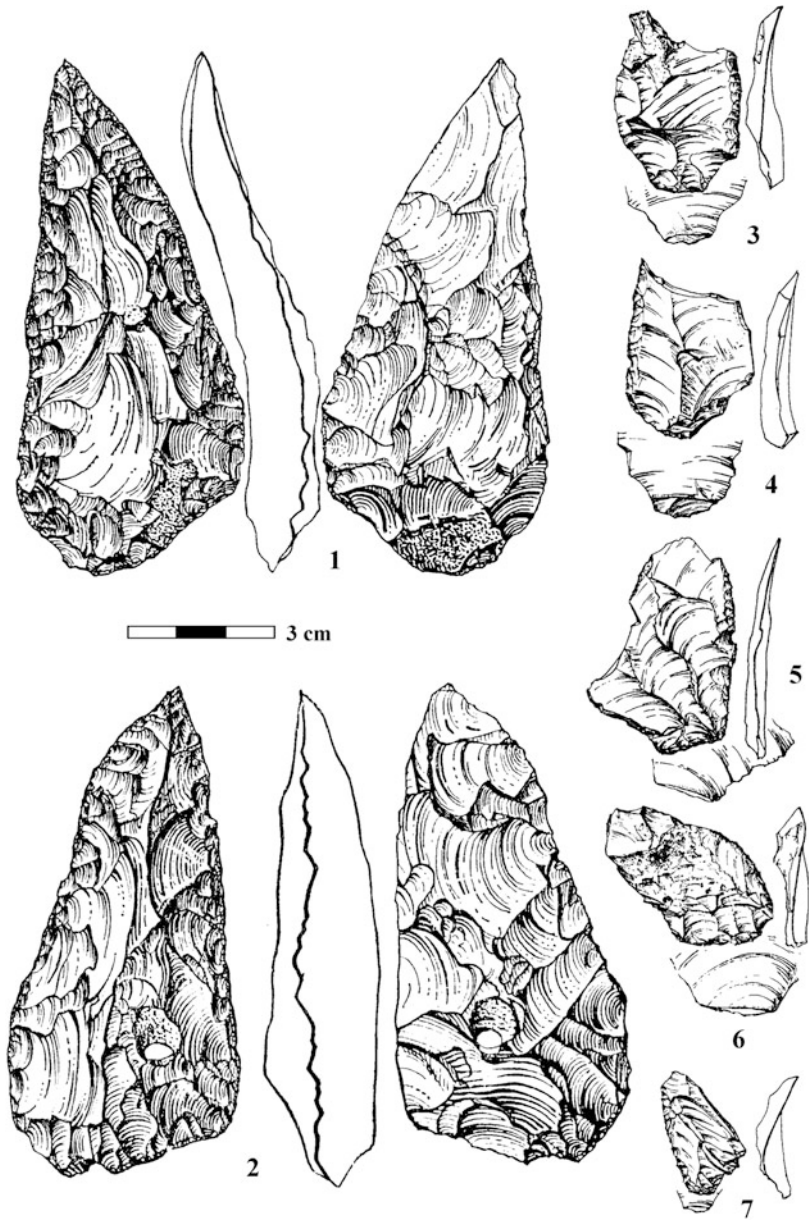

Crimean Middle Paleolithic, Fig. 7 Crimean Micoquian Tradition industry of Ak-Kaya type. Flint artifacts: *1–2* bifacial sub-crescent points; *3–5* simple lateral side-scrapers on bifacial tool treatment flakes; *6–7* retouched pieces on bifacial tool treatment flakes. *1–2* Zaskalnaya V buried rockshelter; *3–7* Chokurcha I site. (Modified after Chabai 2004).

variable settlement types appears. Also, although proposed by "culture archaeologists" (e.g., Stepanchuk in Kolosov et al. 1993), a strict subdivision of Crimean territory into the western region with Starosele culture and the eastern region with Ak-Kaya and Kiik-Koba cultures is no longer supported after identification of the all three industry types in both regions (Chabai et al. 2000; Demidenko 2000). An important method for analysis of Crimean Micoquian typological variability was introduced by Chabai when he proposed to subdivide tools into three broad groups: (1) simple types of unifacial tools – simple, transverse, and double side-scrapers; (2) convergent types of unifacial tools – convergent side-scrapers and points; and (3) identifiable bifacial tools (Chabai et al. 2000: Table 10). The reason for such a method for typological structure was that the tool classes and types both constitute the main body of any Crimean Micoquian tool-kit and

can be readily identified by any archaeologist; old collections can also be analyzed in this way using old publications. As a result, five industry types are structured as follows (Chabai et al. 2000: Table 10). Ak-Kaya "*étalon*-like"-type indices are as follows: simple unifacial tools – 52.5–58%; convergent unifacial tools – 21.3–23.8%; and bifacial tools – 23.6–28.7%. Ak-Kaya-"genuine"-type indices are characterized as follows: simple unifacial tools – 41–57.5%; convergent unifacial tools – 16–35%; and bifacial tools – 16–27%. The Ak-kaya-Starosele type has the following indices: simple unifacial tools – 43–52%; convergent unifacial tools – 37–43%; and bifacial tools – 9–17%. Starosele-type indices have the following indices: simple unifacial tools – 44.3–48.1%; convergent unifacial tools – 38.9–43.4%; and bifacial tools – 12.2–13.3%. The Kiik-Koba type has the following indices: simple unifacial tools – 21.5–37%; convergent unifacial tools – 51.9–56.2%; bifacial tools – 11.1–14.3%. These index variations show certain index overlap between the industry types. Adding new assemblages (e.g., Kiik-Koba-type assemblages from Siuren I and Buran-Kaya III – Demidenko 2000, 2004; Chabai 2004; see in Chabai et al. 2004), typological variability in the Crimean Micoquian Tradition becomes more evident as variations of the three tool groups have the following index deviations: simple unifacial tools – 21.5–58%; convergent unifacial tools – 16–63.8%; and bifacial tools – 9–28.7%. Extreme ranges of the three tool groups vary within intervals between 2.7 and 4 times. Such high Crimean Micoquian Tradition typological variability is caused by diversity in site function related to use of different flint reduction methods and primary and secondary fauna exploitation (see in Chabai and Monigal 1999; Chabai et al. 2000; Chabai 2004; see in Chabai et al. 2006).

The Crimean Micoquian Tradition industrial flint treatment (Demidenko 2003: 130–1) was based on systematical and intensive production and reuse of bifacial tools through typical Micoquian "plano-convex" technique (Figs. 4, 5: 1–3, 6: 1–5, 7: 1–2). Primary flaking processes are characterized by a significant prevalence of bifacial tool treatment debitage over core reduction debitage in any given assemblage. Thus, one of the most typical Crimean Micoquian Tradition technological features is a minor role of core reduction. As a result, most of debitage blanks for unifacial tool production were products of bifacial tool reduction and multiple rejuvenations (Figs. 6: 6–9, 7: 3–7). Unifacial tools (usually produced on short flakes that are very different from Crimean Levallois-Mousterian unifacial tools) are characterized by various convergent forms with many points among them (Fig. 5: 4–5). The Crimean Micoquian Tradition third characteristic feature is almost exclusive use of high quality flints for flint treatment processes and shares of low quality flints or cherts are usually extraordinarily rare. Namely, the three fundamental parameters of the Crimean Micoquian make it distinct from other East European Micoquian industries (see Gladilin 1976) why its assemblages have been grouped under the name of Crimean Micoquian Tradition (Chabai et al. 2000; Demidenko 2003).

Another feature of the Crimean Micoquian Tradition is its chronology, which covers the entire Middle Paleolithic Upper Pleistocene period (c. 120,000 to c. 30–28,000 BP). Taken together, chronological and industrial aspects show that the Crimean Micoquian Tradition, lasting for 90,000 years, preserved its industrial parameters with no change. Such persistence is significant. First, the tradition's lithic technology was very conservative but also capable of meeting needs in the changing Crimean Upper Pleistocene paleoenvironments. Also, according to natural science and especially pollen data for Crimean sites (see in Chabai and Monigal 1999; Chabai et al. 2005), Crimean Micoquian Neanderthals were living in variable landscapes forming two basic groups during this long period. The Last Interglacial and different interstadials are characterized by varying south-boreal forests/forest-steppes. On the other hand, stadials are known through boreal/south-boreal forest-steppe, a boreal forest-steppe, a boreal xeric forest-steppe, and boreal xeric grassland. It should also be remembered that the ungulate species hunted remained about the same during this period: *Equus hidruntinus* and *Saiga tatarica*. Second,

the conservative nature of the Crimean Micoquian Tradition is shown by the fact that no techno-typological changes occurred even when the tradition coexisted with other industries, whether Middle Paleolithic (Levallois-Mousterian) or Early Upper Paleolithic ("Eastern Szeletian" and Proto-Aurignacian) in Crimea (Chabai 2004; Demidenko 2000, 2004, 2008). Indeed, there is no evidence for Micoquian borrowing of any traits from other industries. Thus, it is possible to postulate universal characteristics of the Crimean Micoquian Tradition enabling Neanderthal survival for 90,000 years in Crimea.

Further studies of the Crimean Middle Paleolithic industrial and chronological variability will certainly bring to light new and new interesting aspects.

Cross-References

- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union
- ▶ Starosele Middle Paleolithic Site with Hominin Remains

References

Bonch-Osmolowski, G.A. 1940. *Kiik-Koba grotto*, Paleolithic of the Crimea series 1. Moscow: Vypusk 1 (in Russian).

Chabai, V.P. 2004. *The Middle Paleolithic of Crimea: Stratigraphy, chronology, typological variability & eastern European context*. Simferopol: Shlyakh (in Russian).

Chabai, V.P., and K. Monigal, eds. 1999. *The Middle Paleolithic of western Crimea*, ERAUL 87. Vol. 2. Liège: Université de Liège.

Chabai, V.P., Y.E. Demidenko, and A.I. Yevtushenko. 2000. *Paleolithic of the Crimea: Methods of investigations and conceptual approaches*. Simferopol/Kiev.

Chabai, V.P., K. Monigal, and A.E. Marks, eds. 2004. *The Middle Paleolithic and early Upper Paleolithic of Eastern Crimea*, ERAUL 104. Vol. 3. Liège: Université de Liège.

Chabai, V.P., J. Richter, and T. Uthmeier. 2005. Kabazi II: Last interglacial occupation, environment & subsistence. In *Palaeolithic sites of Crimea*, vol. 1. Simferopol/Cologne: Shlyakh.

Chabai, V.P., J. Richter, and T. Uthmeier. 2006. Kabazi II: The 70 000 years since the last interglacial. In *Palaeolithic sites of Crimea*, vol. 2. Simferopol/Cologne: Shlyakh.

Chabai, V.P., J. Richter, and T. Uthmeier. 2007. Kabazi V: Interstratification of Micoquian and Levallois-Mousterian camp sites. In *Palaeolithic sites of Crimea, vol. 3, Part 1*. Simferopol/Cologne: Shlyakh.

Chabai, V.P., J. Richter, and T. Uthmeier. 2008. Kabazi V: Interstratification of Micoquian and Levallois-Mousterian camp sites. In *Palaeolithic sites of Crimea, vol. 3, Part 2*. Simferopol/Cologne: Shlyakh.

Demidenko, Y.E. 2000. "Crimean enigma" – Middle Paleolithic artifacts within early Aurignacian of Krems-Dufour complexes at Siuren I: Alternative hypothesis for solution of the problem. *Stratum plus* 1: 97–124 (in Russian).

Demidenko, Y.E. 2003. Tool treatment pieces as indicators of peculiarities and intensity of Neanderthals flint working processes and life activities at Middle Paleolithic sites in the context of Crimean Micoquian tradition industrial variability. *Archeological Almanac (Donetsk)* 13: 128–57 (in Russian).

Demidenko, Y.E. 2003–2004. Problems of epochal and industrial attribution for Kiik-Koba grotto, lower layer type complexes in the Crimea. *Stratum plus* 1: 271–300 (in Russian).

Demidenko, Y.E., ed. 2004. *Buran-Kaya III rock-shelter, layer B – The etalon find complex for Kiik-Koba type industry of Crimean Micoquian tradition. Complex analysis of flint artifacts*. Kiev/Simferopol: Shlyakh (in Russian).

Demidenko, Y.E. 2008. The early and Mid-Upper Palaeolithic of the North Black Sea region: An overview. *Quartär* 55: 99–114.

Demidenko, Y.E. 2011. The late Middle Palaeolithhic and early Upper Palaeolithic of the northeastern and eastern edges of the Great Mediterranean (south of eastern Europe and Levant): Any archaeological similarities? In *The Lower and Middle Palaeolithic in the Middle East and neighbouring regions. Proceedings of the Basel Symposium (8–10 May 2008)*, ERAUL 126, ed. J.-M. Le Tensorer, R. Jagher, and M. Otte, 151–167. Liège: Université de Liège.

Demidenko, Y.E., M. Otte, and P. Noiret, eds. 2012. *Siuren I rock-shelter. From late Middle Paleolithic and early Upper Paleolithic to Epi-Paleolithic in Crimea*, ERAUL 129. Vol. 4. Liège: Université de Liège.

Gladilin, V.N. 1976. *The problems of the early Paleolithic of eastern Europe*. Kiev: Naukova Dumka (in Russian).

Kolosov, Y.G. 1972. *Shaitan-Koba, the Mousterian site in the Crimea*. Kiev: Naukova Dumka (in Russian).

Kolosov, Y.G., V.N. Stepanchuk, and V.P. Chabai. 1993. *The early Paleolithic of the Crimea*. Kiev: Naukova Dumka (in Russian).

Marks, A.E., and V.P. Chabai, eds. 1998. *The Middle Paleolithic of western Crimea*, ERAUL 84. Vol. 1. Liège: Université de Liège.

Crimean Upper Paleolithic

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Introduction

The first Crimean Upper Paleolithic (UP) sites in situ and stratified rockshelters of Siuren I and Kachinski (second ridge of the Crimean Mountains, western Crimea) were discovered and excavated by Konstantin S. Merejkowski in 1879–1880. Both Middle and Upper Paleolithic sites were first discovered in the late nineteenth century in the Crimea, but today they differ in numbers of sites and find spots (around 30 for the UP and more than 100 for the MP) (Kolosov et al. 1990a, b; Chabai 2004). The key difference in these sites, however, is relative amount of relevant data at these different sites and their scientific value for the analysis of variability in Crimean Paleolithic industries and chronology. The MP is thus represented by about 30 stratified sites with abundant lithic artifacts and fauna, while the UP record has less than five such stratified sites. Yet despite this paucity, data is still sufficient to interpret the Crimean UP.

Historical Background

History of Crimean Upper Paleolithic Studies and Some Conceptual Interpretations

After the Bonch-Osmolowski's 1920s excavations at Siuren I, this site with three UP layers identified at the time became the key site for the Crimean UP. Bonch-Osmolowski (1934) considered these layers as "corresponding to three different developmental stages of Aurignacian culture." However, attribution to the Aurignacian alone was not accepted in ex-Soviet Paleolithic archaeology. Since the 1950s, the dominant opinion of Soviet archeologists was that the Siuren I sequence covers the entire Upper Paleolithic. The clearest position was expressed by E.A. Vekilova (1957). In her view, the Siuren I finds are "dated" to "Aurignacian"-"Solutrean periods and possibly the beginning of the Magdalenian"-"time of Late Magdalenian and Early Azilian" and the finds "testify to the continuity of human society development in the Crimean peninsula" during the UP. Vekilova also compared the Siuren I middle layer ("Solutrean – beginning of Magdalenian") with redeposited UP flints from the early 1930s Bonch-Osmolowski and Trusova's excavations at Adji-Koba cave (First Ridge of the Crimean Mountains, eastern Crimea), although they noted a similarity between this site and the Siuren I upper layer.

Since the Crimean UP record was limited to materials from only Siuren I and Adji-Koba until the second half of the 1980s, some hypotheses were proposed to explain the surprising rarity of UP sites in Crimea. Bonch-Osmolowski (1934) early on suggested that UP humans moved to the southernmost areas of Crimea during cold periods of the Last Glacial and that their sites did not survive due to significant erosion and the karst topography. Another hypothesis proposed human migrations outside the Crimea during the UP to the Eastern European Plain (Bibikov and Lyubin 1978). A critical analysis of these hypotheses (Kolosov et al. 1990a) rejected both, arguing that the problem is rather related to developing suitable survey strategies to locate new UP sites in Crimea.

The number of UP sites has slowly increased, primarily due to the fieldwork of Yuri G. Kolosov, Vadim N. Stepanchuk, Victor P. Chabai, and Alexander A. Yanevich in the late 1980s. At that time, apart from excavations at the well-known MP sites near Ak-Kaya and Sary-Kaya rocky cliffs (second ridge of the Crimean Mountains, eastern Crimea), Kolosov's team also conducted intensive surveys along the first fluvial terrace of the Biyuk-Karasu river in that area. As a result, Late UP surface finds (e.g., Biyuk-Karasu XIII and XIV) and sites with in situ level(s) (e.g., Biyuk-Karasu III, VI, and IX, Vishennoe II) were discovered (Kolosov et al. 1990a; Yanevich 1992). A few Late UP flints were also found in the upper deposits at Zaskalnaya IX cave in the Red

Valley behind Ak-Kaya (Kolosov et al. 1990a). These surveys in eastern Crimea were also complemented by surveys in western Crimea in the Bodrak river valley (second ridge of the Crimean Mountains) where Kolosov's team discovered in situ Late UP levels at Skalistyi grotto and the open-air site of Skalistoe (Kolosov et al. 1990a; Cohen et al. 1996). Thus, these investigations increased the Crimean UP database, adding, however, only Late UP and Epigravettian, sites.

Major advances in Crimean UP studies occurred when Yanevich discovered and began to excavate the multilevel site of Buran-Kaya III (second ridge of the Crimean Mountains, eastern Crimea) in 1990 and when new 1994–1997 excavations at Siuren I were conducted (see section "Cross-References"). At the same time as the Siuren I excavations, a new stratified Late UP site was also found and partially excavated in 1996 in the Bodrak river valley (Veselskiy 2003–2004).

As a result, the 1990s investigations not only significantly added to but also much changed our understanding of the Crimean UP. Before presenting the new chronological sequence of the UP industries, the Crimean UP sites and their contribution to scientific debates will be discussed.

Key Issues/Current Debates

The Crimean UP Database

The Crimean UP sites can be structured as follows (Fig. 1). There are only two in situ and multilevel sites in rockshelters/grottos with abundant lithic artifacts and fauna: Siuren I and Buran-Kaya III. A single multilevel open-air Late UP site with diagnostic artifacts, including tools, is known: Vishennoe II. Two sites have been found in caves, with a few redeposited but industrially uniform and diagnostic flint artifacts: Adji-Koba and Zaskalnaya IX. Finally, some in situ workshops have been found at flint outcrops, however lacking diagnostic tools: Biyuk-Karasu III, VI, and IX; Skalistoe I; Bodrak; and Skalistyi grotto, as well as separate finds of nondiagnostic flints at Krasnyi grotto, a hyena den based on the faunal remains. These 12 sites comprise the entire Upper Paleolithic database in Crimea.

The other known so-called UP sites (see Kolosov et al. 1990a, b) are find spots with a few UP surface flints (e.g., Biyuk-Karasu XIII and XIV), sites with industrially heterogeneous and redeposited finds (e.g., Shaitan-Koba II Big grotto), and even find spots with ambiguous flints for which period cannot be attributed (e.g., Vitina stoyanka, Kacha, Kochkin domik, Kapselskaya bukhta, Subotkhan). Regarding the famous

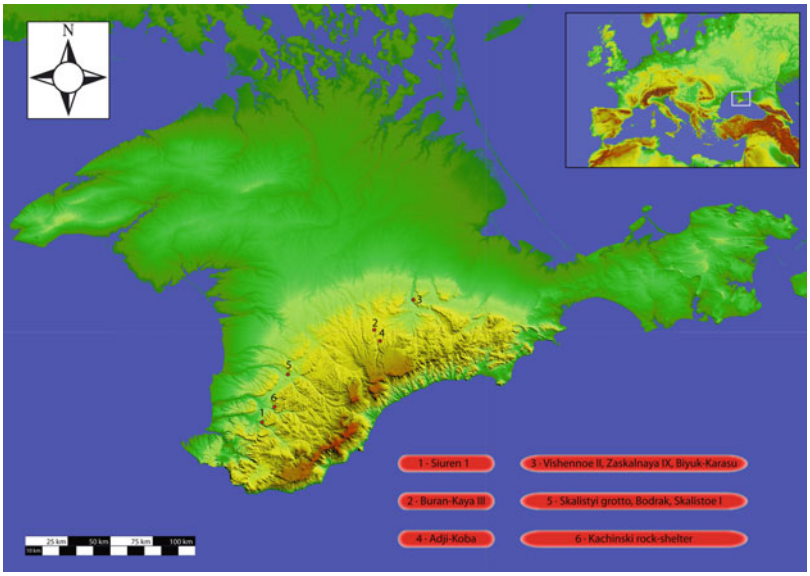

Crimean Upper Paleolithic, Fig. 1 Map of the Crimea showing Upper Paleolithic site locations. (Map created by Dr. G. Bataille, Cologne University)

Kachinski rockshelter excavated by Merejkowski in the nineteenth century, the site remains a "thing in itself" because of the loss of finds, the unclear stratigraphy, and the impossibility of undertaking any new excavations there.

There are thus only a few UP sites in Crimea which can be considered as having significant scientific value. The other sites are variably informative and with different functions. Siuren I, Buran-Kaya III, and Vishennoe II will thus be used for the analysis of different research issues and to potentially connect them with the other sites.

Industrial Variability and Geochronological Context of the Crimean Upper Paleolithic

The available data enable the present author to propose the following geochronological sequence for the following seven industries of the Crimean UP: "Eastern Szeletian," Proto-Aurignacian, Southern Caucasus EUP, Late/Evolved Aurignacian, Late Gravettian, Epigravettian, and Final Epigravettian.

The "Eastern Szeletian" at Buran-Kaya III, level C (situated in the stadial between the Hengelo and Les Cottes/Huneborg interstadials, no younger than 36 kyr uncal BP), is characterized as follows (Figs. 2 and 3): bifacial leaf "biconvex" points, bifacial trapezes mostly made on small flakes and chips produced during bifacial point production and rejuvenation, and end scrapers, including fan-shaped and a series of worked bone tubes (see in Chabai 2004; Chabai et al. 2004). The Crimean "Eastern Szeletian" is very similar in technology and typology to another Szeletian sensu lato industry in Eastern Europe, "Kostenki-Streletskaya culture," well known at sites northeast of Crimea in the Middle and Lower Don River areas (Kostenki XII, layer 3, Kostenki VI, Kostenki I, layer 1; Biryuchiya Balka sites) (Anikovich et al. 2007). The only formal differences between the two East European Szeletian industries are the lack of triangular bifacial "biconvex" points with a concave base in the Crimean industry and the lack of bifacial trapezes in the Don industry. At the same time, the Don small-sized triangular bifacial "biconvex" points with a concave base can be also considered a variant of the Crimean bifacial trapezes with a concave base. Accordingly, the two industries can be considered as "industrial cousins" within the East European Szeletian sensu lato. The hypothesis of the appearance of the "Eastern Szeletian" in Crimea from the north as a result of population movement of the "Kostenki-Streletskaya culture" (Chabai 2004) following the Don river valley deserves much attention and should be considered the most probable in the present state of the East European Szeletian research (see also Demidenko 2008).

The Proto-Aurignacian is present at Siuren I, Units H and G (situated in the stadial between the Hengelo and Les Cottes/Huneborg interstadials and Les Cottes/Huneborg interstadial, older than 31 kyr uncal BP) (see Demidenko, "► Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea" entry, Fig. 5; also see in Demidenko et al. 2012). It is characterized technologically by the dominance of bladelet production via the reduction of "regular" and "carinated" bladelet cores to produce mostly on-axis and flat/incurvate blanks. Typologically it is represented by retouched microliths where alternate Dufour bladelets of Dufour subtype account for almost 70%, as well as some Font-Yves/Krems points; the presence of carinated and thick shouldered/nosed end scrapers and simple end scrapers on blades; a dominance of angle and truncation burin types, while dihedral type are subordinate; a rare presence of Aurignacian blades; and a minor presence of scaled tools, truncations, and perforators. The Siuren I Proto-Aurignacian has direct comparisons within the European Proto-Aurignacian with Dufour bladelets of Dufour subtype, in territories west of Crimea: in Western Europe (e.g., Fumane, levels A3–A1 and Riparo Mochi, layer G in Italy; Le Piage, level K in France; Cueva Morin, levels 9–8 in Spain) and Central Europe (Krems-Hundssteig in Austria; Tincova, Romanesti-Doumbravita, and Cosava in Romania; Kozarnika cave, layer VII in Bulgaria; Beregovo I in the Ukrainian Transcarpathians). It is thus suggested by the present author that the Crimean Proto-Aurignacian is the result of population migrations from the west into

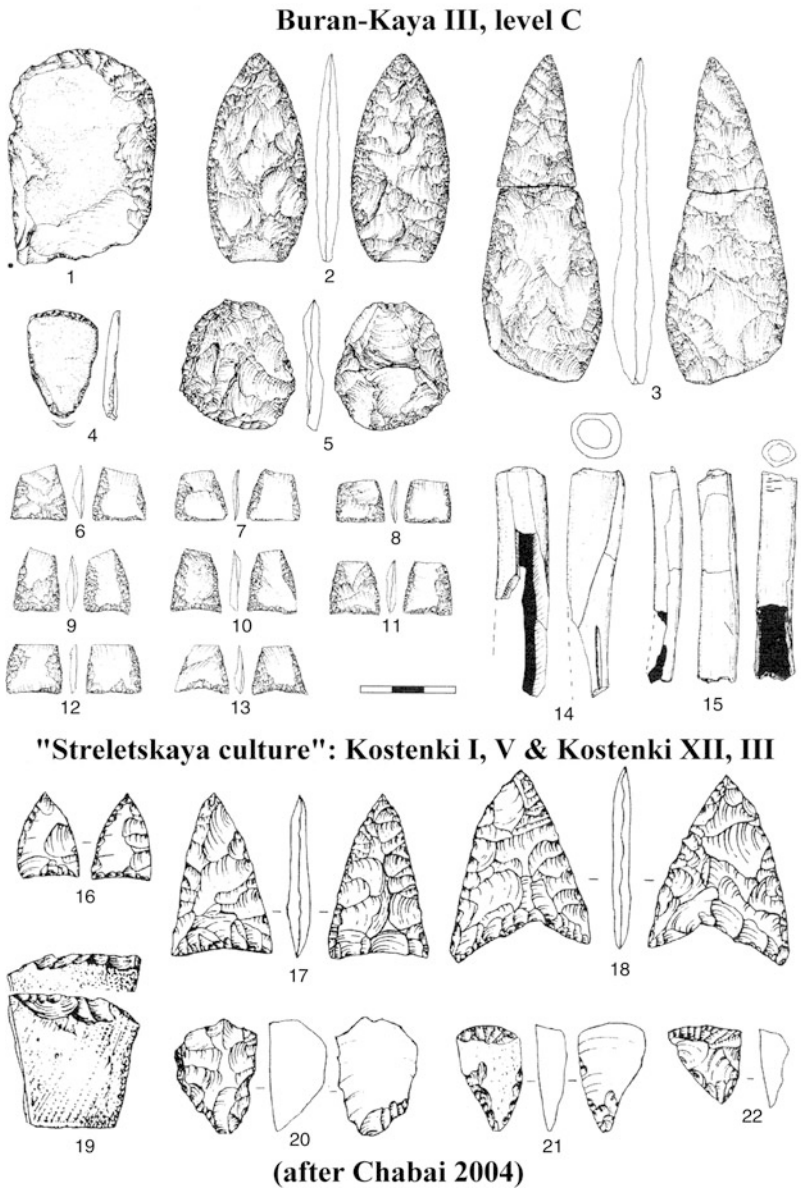

Crimean Upper Paleolithic, Fig. 2 Buran-Kaya III, level C; "Eastern Szeletian"; and "Kostenki-Streletskaya culture," diagnostic artifact types. (After Chabai 2004)

the south of Eastern Europe via the "Lower Danube Corridor".

The "Southern Caucasus EUP" at Buran-Kaya III levels 6–5 to 6–1/5–2 (Huneborg stadial and Arcy interstadial, c. 35–31 kyr uncal BP) (see Demidenko's entry ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition in this volume, Fig. 2, 4, 6; Yanevich 2000; Yanevich et al. 2009; Prat et al. 2011) features, technologically, predominant reduction of both exhausted narrow-flaked bladelet cores on plaquettes and multifaceted (not carinated) burins producing very numerous incurvate and twisted narrow bladelets and microblades, and, typologically, a dominance of "non-geometric microliths" with fine backed dorsal retouch (nearly 75% of all formal tools) where unusually around half are represented by points, particularly those with bilateral fine retouch. Based on the lithic assemblage structure, as well as numerous bone tools and personal ornaments, the Buran-Kaya III industry finds direct comparisons in the east

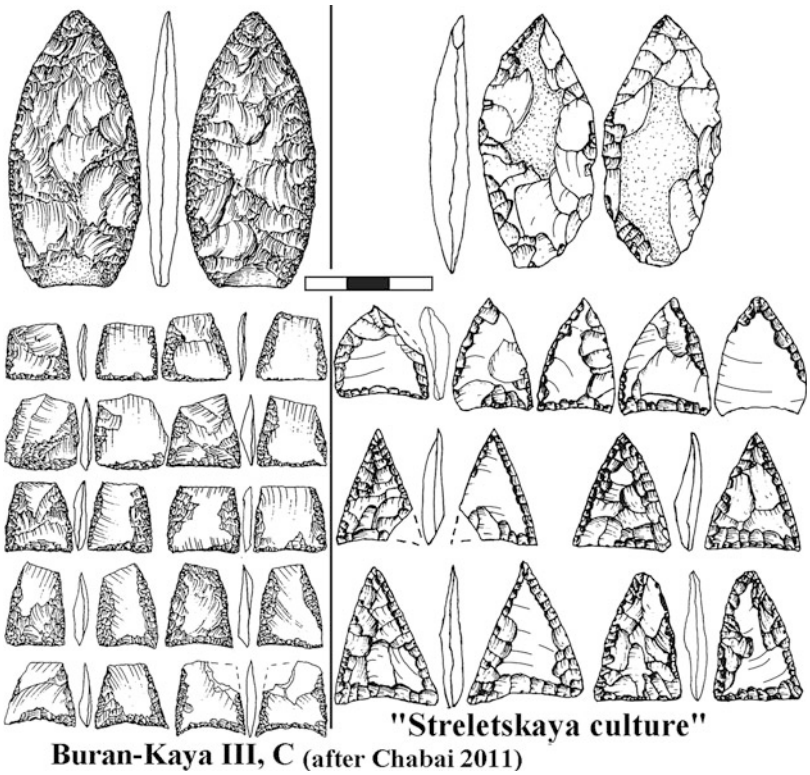

Crimean Upper Paleolithic, Fig. 3 Buran-Kaya III, level C; "Eastern Szeletian"; and "Kostenki-Streletskaya culture," bifacial points and trapezes. (After Chabai 2011)

(Mezmaiskaya cave, levels 1C–1A, Northwestern Caucasus) and south (Ortvale Klde rockshelter, layers 4d & 4c; Dzudzuana cave, layer D, western part of Southern Caucasus). The present author thus proposes that the origin of Buran-Kaya III, levels 6–5 to 6–1/5–2, is the result of the population movement from the Southern Caucasus into both Northwestern Caucasus and Crimea.

The Late/Evolved Aurignacian at Siuren I, Unit F (Arcy and Maisières interstadials, c. 30.9–29 kyr uncal BP on ungulate bone samples and c. 28.2–26.6 kyr uncal BP on bone artifact samples) (see Demidenko "▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea", Fig. 6, also see in Demidenko et al. 2012), is defined by the primary reduction of mainly off-axis and twisted microblades produced on both "regular" and "carinated" bladelet cores, and carinated tools (end scrapers and notably burins). The tool kits include carinated and thick end scrapers and also flat shouldered/nosed end scrapers, dominance of dihedral and carinated burins, and typically Roc de Combe subtype ventral bladelets and alternate Dufour bladelets (c. 45% of all microliths) as well as pseudo-Dufour dorsal bladelets (c. 40% of all microliths) with marginal abrasion retouch. The Siuren I Late/Evolved Aurignacian finds archeological similarities in the west, within the West European Aurignacian II–IV with Dufour bladelets of Roc de Combe subtype (e.g., Roc de Combe, levels 6–5 and Abri Pataud, levels 8–7 in France; Cova Beneito, levels B8–B9 in Spain) and Late/Evolved Aurignacian complexes such as at Mitoc-Malu Galben (Romania) in Eastern Europe. Therefore, the author proposes a European western vector of migration into Crimea.

The Late Gravettian at Siuren I, 1920s third "artificial excavation level" of the upper layer and 1990s Unit D (Upper Pleniglacial of the Last Glacial, probably c. 24–23 to 20 kyr uncal BP) (see Demidenko "▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea"

entry, Fig. 7, also see in Demidenko et al. 2012), is represented by a few but industrially diagnostic cores and tools: elongated bidirectional blade and bladelet cores, an elongated Gravette point with truncated base, a truncated blade, a truncated bladelet, a "microsaw" with one backed lateral edge, two *pièces à cran* on a blade and a bladelet, and two bidirectional fragmented bladelets with a backed lateral edge. Such artifacts have no comparisons within the Crimean and North Black Sea region Epigravettian assemblages and may indicate population movement from the East European Plain to the south during the onset of the Last Glacial Maximum.

Finally, the last two UP industries are related to Epigravettian occupation in Crimea. Given the much higher number of sites and variability in site function, the Epigravettian sites are the most representative UP sites in Crimea. Based on stratigraphy, lithic assemblage, and fauna, the Epigravettian reference site is Siuren I, 1920s second "artificial excavation level" of upper layer/1990s Unit A, along with some flints found in humus. The Siuren I Epigravettian complex can be joined by another site, but Final Epigravettian, Vishennoe II, which, however, lacks fauna (Yanevich 1992). These two reference sites are complemented by other less informative Epigravettian sites: upper layers at Adji-Koba and Zaskalnaya IX caves; Biyuk-Karasu III, VI, and IX; Skalistyi grotto; and the open-air sites of Bodrak and Skalistoe I. Thus, the Crimean Epigravettian is represented by ten sites with both in situ and redeposited but still homogeneous assemblages.

The Epigravettian and Final Epigravettian complexes can be differentiated by technology and typology. The Siuren I Epigravettian can be characterized as follows.

Technologically, it is based on intensive reduction of short single-platform and double-platform bidirectional bladelet cores (c. 3–4 cm long) in about equal percentages. Typologically, end scrapers and burins are fairly rare, whereas backed bladelets and microblades with thick abrupt retouch are much more common and also include a few "microgravettes" and a "rectangular" piece (see Demidenko, "▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea," Fig. 8a, see in Demidenko et al. 2012). The Vishennoe II Final Epigravettian, defined by Yanevich (2000) as a separate Final Epigravettian type from the "first half of the Final Paleolithic" and by data from Vishennoe II, level Б, can be characterized by single-platform and double-platform bidirectional narrow-flaked blade cores and a special microlith set – "triangles with oblique or straight retouched base," "low crescents of varying shape" (Fig. 4), and "rectangles with two retouched narrow ends and a lateral edge" (Yanevich 1992). No absolute dates are available for the Epigravettian and Final Epigravettian sites, but some hypotheses have been proposed. The present author is inclined to situate the Epigravettian from Siuren I and Adji-Koba to the period 19–18 to 15,000 uncal BP (see in Demidenko et al. 2012). It is also assumed that the Crimean Epigravettian is connected to Epigravettian complexes located west of Crimea, in the eastern Carpathians in Romania. Yanevich (1992) considers the Vishennoe II Final Epigravettian to fall within the "final stages of the Pleistocene: Dryas II, Allerød, and Dryas III," 12–10 kyr uncal BP. He also connects the appearance of the Final Epigravettian in Crimea with "immigrants of the Late Moldova culture from the Dniester river areas" (Yanevich 2000).

The other Crimean Epigravettian sensu lato sites could be connected to the above-discussed Epigravettian and Final Epigravettian as follows. Workshops at Biyuk-Karasu III, VI, and IX and Vishennoe II, levels A, A1, Б1, Б2, Б3, and B, based primary reduction data (Kolosov et al. 1990a; Yanevich 1992), are similar to the Vishennoe II Final Epigravettian. However, located near these sites, Zaskalnaya IX cave with five backed points and bladelets is typologically similar to the backed tools from the Siuren I and Adji-Koba Epigravettian assemblages. An attribution of the workshops at Skalistyi grotto and the open-air sites of Bodrak and Skalistoe I in western Crimea is much less clear. Their assemblages, which lack diagnostic tool types, could be either

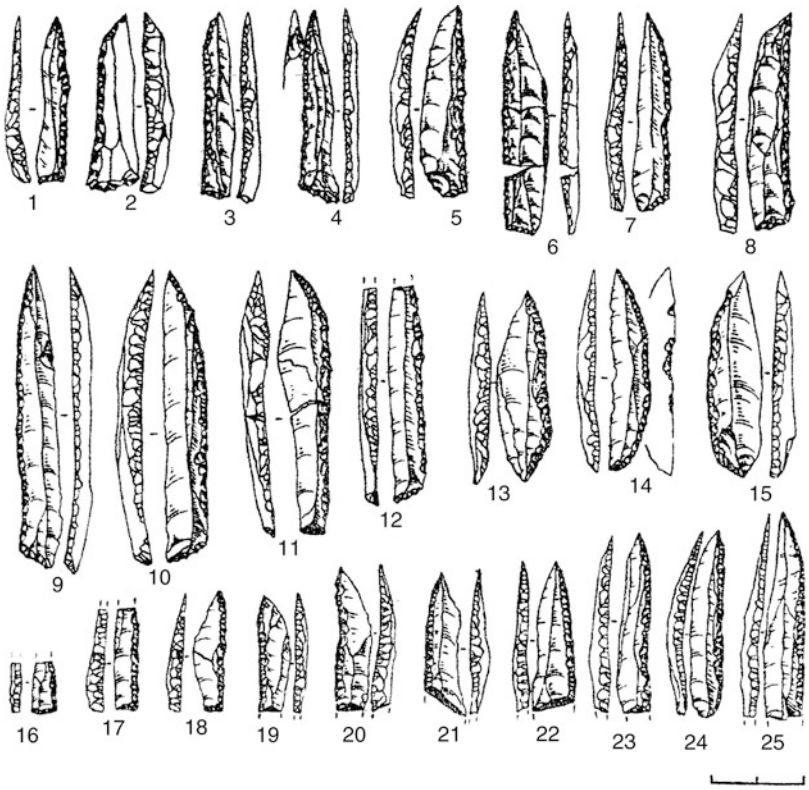

Crimean Upper Paleolithic, Fig. 4 Vishennoe II, level Б, Final Epigravettian. *1–12*, *16–25*: triangles with oblique or straight retouched base; *13–15*: crescents. (After Yanevich 1992)

Epigravettian or Final Epigravettian. Only very hypothetically can they be compared to the Siuren I and Adji-Koba Epigravettian based on the fact that sites like the Vishennoe II Final Epigravettian are as yet unknown in western Crimea, while Siuren I is 15 km south of these workshops.

Concluding Remarks

Data is now available to support strong arguments in favor of a complex multi-industrial Upper Paleolithic sequence in Crimea, from the "Eastern Szeletian" and Proto-Aurignacian (older than c. 31 kyr uncal BP) to the Final Epigravettian (c. 12–10 kyr uncal BP). This sequence, albeit with some hiatuses, covers the entire Upper Paleolithic period of the Last Glacial. The most poorly represented period is the Late Gravettian in Crimea, suggesting a possible temporary hiatus in human occupations in Crimea during 28–27 to 19–18 kyr uncal BP, which also corresponds well to a similar hiatus for the entire Great North Black Sea region during c. 28–27 to 22 kyr uncal BP (see in Demidenko 2008). On the other hand, industries and occupational episodes of "Eastern Szeletian," Proto-Aurignacian, Late/Evolved Aurignacian, and Southern Caucasus EUP, while represented by impressive assemblages, fauna, and paleoenvironmental data, are only known from single sites – Buran-Kaya III in eastern Crimea and Siuren I in western Crimea. It is indeed urgent to "develop more flesh" on the Crimean Upper Paleolithic "skeleton" through the discovery of new sites in different areas of the peninsula. Only then will it be possible to investigate models of changes in landscape use by the different UP human groups and their modes of survival. These questions can now be addressed for the Epigravettian and Final Epigravettian, which are represented by base camps, short-term sites, and workshops at flint outcrops; although incomplete, these are known in both piedmont and mountainous Crimean areas.

Finally, the question of possible generic links between the different Crimean UP industries and

their subsequent "historical fates" should also be addressed. In this regard, the lack of any industrial successions and "evolutionary links" between the Crimean UP industries should be strongly stressed. All of the seven known UP industries should be regarded as being transported to Crimea rather than reflecting local continuity and change through time. Migration from the west is represented by humans bringing the Proto-Aurignacian, Late/Evolved Aurignacian, and Epigravettian. Migration from the north is connected to humans with "Eastern Szeletian," Late Gravettian, and Final Epigravettian industries. Migration from the south is associated with the Southern Caucasus EUP. Such an absence of local Upper Paleolithic human groups is not very surprising when one considers that the present-day Crimean peninsula was the southernmost terrestrial area of the Great North Black Sea region's rather continuous belt of land in the south of Eastern Europe, extending from the eastern Balkans in the west to Northwestern Caucasus in the east, during most of the Upper Paleolithic. As a result, the Crimea was open to human migrations into its territories from any direction. Moreover, the absence of any evolutionary trends within the Crimean UP also testifies to rather short-term stays of these different UP human groups in Crimea; they ought to be considered as temporary visitors and not actual long-term residents in Crimea. It is indeed quite reasonable to search for comparable UP industries outside Crimea.

Concluding this overview of the Crimean Upper Paleolithic, it is also of interest to note the so-called Crimean UP "echo and epigone": the "Shpanskaya Mesolithic culture" during the Boreal and start of the Atlantic periods in the Holocene, c. 9–7 kyr uncal BP (Yanevich 1993) that is part of the European Early Holocene Epi-Tardigravettian (Kozlowski and Kozlowski 1979; Demidenko 2000). These industries show the clear Epigravettian characteristic of numerous non-geometric microliths, suggesting the "formation of the Shpanskaya culture on the basis of local Epigravettian Final Paleolithic industries of North Black Sea region and Crimea" (Yanevich 1993) and thus population continuity.

Cross-References

- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea

References

Anikovich, M.V., N.K. Anisyutkin, and L.B. Vishnyatsky. 2007. *Key problems of Middle – Upper Paleolithic transition in Eurasia*. St. Petersburg: Nestor-History (in Russian).

Bibikov, S.N., and V.P. Lyubin. 1978. Distribution of Crimean and Caucasus Lower Paleolithic sites and history of their investigation. In *Archeology and Paleogeography of Crimean and Caucasus Lower Paleolithic*, 7–11. Moscow. (in Russian).

Bonch-Osmolowski, G.A. 1934. The results of the investigations in the Crimean Paleolithic. *The Proceedings of the Second International Congress of the Association for the Quaternary Investigations in Europe* 5: 114–83 (in Russian).

Chabai, V.P. 2004. *The Middle Paleolithic of Crimea: Stratigraphy, chronology, typological variability & eastern European context*. Simferopol: Shlyakh (in Russian).

Chabai, V.P. 2011. The problem of Crimean Micoquian and Streletskaya culture specific tool type similarity. In *Paleolithic and Mesolithic of eastern Europe. In honor of the sixtieth anniversary of Hizri A. Amirkhanov*, ed. K.-N. Gavrilov, 119–140. Moscow: Taus.

Chabai, V.P., K. Monigal, and A.E. Marks, eds. 2004. *The Middle Paleolithic and early Upper Paleolithic of eastern Crimea*, ERAUL 104. Vol. 3. Liège: Université de Liège.

Cohen, V., N. Gerasimenko, L. Rekovetz, and A. Starkin. 1996. Chronostratigraphy of rockshelter skalistiy: Implications for the Late Glacial of the Crimea. *European Prehistory* 9: 325–356.

Demidenko, Y.E. 2000. "Crimean enigma" – Middle Paleolithic artifacts within early Aurignacian of Krems-Dufour complexes at Siuren I: Alternative hypothesis for solution of the problem. *Stratum plus* 1: 97–124 (in Russian).

Demidenko, Y.E. 2008. The early and Mid Upper Palaeolithic of the North Black Sea region: An overview. *Quarter* 55: 91–106.

Demidenko, Y.E., M. Otte, and P. Noiret, eds. 2012. *Siuren I rock-shelter. From late Middle Paleolithic and early Upper Paleolithic till Epi-Paleolithic in Crimea*, ERAUL 129. Liege: Université de Liège.

Kolosov, Y.G., V.N. Stepanchuk, and V.P. Chabai. 1990a. *Paleolithic of Crimea. Upper Paleolithic of Crimea*. Part 1. Kiev.

Kolosov, Y.G., V.N. Stepanchuk, and V.P. Chabai. 1990b. *Paleolithic of Crimea. Upper Paleolithic of Crimea*. Part 2. Kiev.
Kozlowski, J.K., and S.K. Kozlowski. 1979. *Upper Palaeolithic and Mesolithic in Europe. Taxonomy and palaeohistory*, Prace Komisji Archeologicznej 18. Wroclaw: Ossolineum.
Prat, S., S.C. Pean, L. Crepin, D.G. Drucker, S.J. Puaud, H. Valladas, M. Laznickova-Galetova, J. van der Plicht, and A. Yanevich. 2011. The oldest anatomically modern humans from far southeast Europe: Direct dating, culture and behavior. *PLoS One* 6: 1–13.
Vekilova, E.A. 1957. Siuren I site and its place among Paleolithic sites of the Crimea and neighboring territories. *Materials and Investigations of the Archaeology of the USSR* 59: 235–323 (in Russian).
Veselskiy, A.P. 2003–2004. Bodrak – A new Upper Paleolithic site in south-western Crimea. *Stratum plus* 1: 228–47 (in Russian).
Yanevich, A.A. 1992. New final Paleolithic Vishennoe II site in Crimea. In *Upper Paleolithic sites of the center of North Black Sea region (new materials)*, ed. M.P. Olenkowski, 20–31. Kherson. (in Russian).
Yanevich, O.O. 1993. Shpanska Mesolithic culture. *Archeology* 1: 3–15 (in Ukrainian).
Yanevich, O.O. 2000. Buran-Kaya culture of Gravettian in Crimea. *Archeology* 2: 11–19 (in Ukrainian).
Yanevich, A., S. Pean, L. Crepin, M. Laznickova-Galetova, S. Prat, and V. Prysyajnuk. 2009. Upper Palaeolithic settlements in Buran-Kaya 3 (Crimea, Ukraine): New interdisciplinary researches of the layers 5-2, 6-1 and 6-2. *Archeological Almanac* 20: 187–202.

Critical Community Engagement in Heritage Studies

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Introduction

In last decade, the field of community engagement has developed and improved itself within the broader spectrum of heritage studies that include understanding, interpreting, engaging, managing, and conserving cultural heritage and material culture. Understanding of the community and its role in the field of heritage studies have also been widely studied and discussed, including ethics, approaches, and methods (Jones 2017; Ireland and Schofield 2015; Waterton 2015; Watson and Waterton 2011; Waterton and Smith 2010; Moshenska 2017). While heritage studies has developed and put forward different methodologies, in practice, engagement with communities raises several issues, particularly identifying and clarifying effective methods and approaches as heritage is a complex subject and strongly interlinkage with social and political issues.

In this entry, I consider issues around the term "critical community engagement" in heritage context. In heritage studies, community engagement encompasses the significance of sharing knowledge and power as well as learning through material culture and life experiences of the communities who attach and ascribe values and meanings to cultural heritage. Critical community engagement raises difficult questions for the researchers: how do we engage and what kind of methodology is more ethical and effective? Some community engagement projects impose knowledge, therefore changing the value and meaning of material culture, while others are including local and indigenous voices and aim to be more participatory. However, to date, in praxis the field of community engagement in heritage studies has employed very fluid methodologies to be ethical and effective and therefore critical. In this entry, I argue that community engagement in heritage context can be more ethical and effective using ethnographic field methods from a critical perspective by exposing and considering the diversity, social, cultural, political, and economic backgrounds of communities.

This entry will first present and discuss how community can be diverse and the relationship of communities with heritage can be very complex and second introduce effective and ethical ways of community engagement by discussing democratization of community engagement and the impact of dialogue to be more inclusive and consider all diversities in community. This will be accomplished by taking into account of recent approaches, and particularly those of Paulo Freire, whose works and research challenged with the dominant pedagogy of education from a critical

perspective and brought radical and critical methods to the social sciences.

Definition: The Notion of Community and Interlinkage to Heritage

It is quite significant to explore the term "community" in heritage context. As the term "heritage" is itself very abstract and diverse, so the "community" is also abstract and ambiguous as a heritage term (Crooke 2010: 17). Particularly with the globalization of the world, people can come together and make any sort of community, especially by using technology. For instance, online communities who come together around shared ideas and values. Social media communities are a good example of community, as people create platforms around the ideas and values that they want to share and advocate.

Cohen (1985) describes community as a group of people who share common aspects and values which also frame the boundaries of group identity and separate them from other communities. Cohen's description gives the sense of communities made out of obligations or bound up by outside force. The main reason for this is that boundaries are framed because of a threat or danger that comes from outside of the group. Bauman (2001: 1) points out:

> community is a warm place, a cosy and comfortable place. It is like a roof under which we shelter in heavy rain, like a fireplace at which we warm our hands on a frosty day . . . in the street, all sorts of dangers lie in ambush; we have to be alert when we go out . . ..

Because of outside force and threat or individual and social needs people come together and make the community; therefore, community is itself not something natural, but it is bound to outside factors and indispensable for people to be able to survive. Within this process communities develop their own shared heritage, which also comes to define the community (Crooke 2010: 17; Waterton 2015: 54). This process of making communities is even evident in the Neolithic period: when considering different Neolithic communities, they all have different customs, social practices, as well as lifestyles. Although there are many factors play role in construction of social values, practices, e.g., natural environment, geographic structure, archaeological evidence suggests that most of the Neolithic communities shaped their values because of their social needs, interaction, as well as protection from outside threats. For instance, a Neolithic site Çatalhöyük, the house architecture and structure was shaped for a social interaction or as Lévi-Strauss (1987) describes house becomes a form of social organization place. This also makes the main foundation of building community and people feel safety and protection in community. Similarly, many highland communities shaped their life on the top of the mountains to protect themselves. Isolating themselves from one to other also shapes communities and establishes their boundaries.

In today's world, while outside forces are still shaping communities, these forces act for political purposes such as identity making, national narratives, and nation making. There are many different variations in community construction today, but because of political pressures, most define themselves with their ethnic, social, and political structures (Crooke 2010: 19). These three factors therefore are the most significant in community making and define every community as socially, culturally, and politically distant from each other. This should also underpin the community concept in heritage context.

Although since 1970s and 1980s community engagement in heritage studies has shown great progress, social, political, ethnic, or economic background of communities has been widely neglected. Similar models and methodologies have been used in many parts of the world, quite often in a "top-down" manner which imposes values and knowledge on communities. Heritage is without doubt plural (Ashworth et al. 2007: 2–3) in concept as it has different meanings and values that are attached by the communities who develop emotions and memories in connection to heritage over a period of time. These values, affections, and memories are quite subjective, as they are developed and attached by socially, culturally, and politically different groups of people. Every community has a different interest in

heritage and heritage sites, and therefore, their relationship with the heritage is shaped accordingly. This also relates to community expectations from heritage: some communities may have a political interest in heritage which may be significant for their identity; some may have spiritual expectation as some sites are religiously important for some communities; or specific heritage or sites may be economically significant for some communities (Apaydin 2016a: 375–376).

Furthermore, the importance of the daily relationship of communities with heritage, heritage site, or historic places and landscapes has also been widely neglected. Every local community has a different scale relationship with the local heritage apart from those being used for national-level imposed identity and nation making, i.e., in developing national narratives and heritage discourses (Apaydin 2018; see Smith 2006). Alternately, some heritage sites may not be considered as historically important for some local communities, as in the case of some community members living near the site Çatalhöyük who do not consider this UNESCO World Heritage Site as their heritage and therefore do not value it at all (Apaydin 2016b). Therefore, it is important to consider these subjects during community engagement in heritage studies to avoid being a "top-down" imposition of heritage values but most importantly for being more ethical and effective during engaging with communities.

Key Issues: Community Engagement in Heritage Context

Community engagement in theory and practice has a long history within social sciences, and many case studies have been described in many parts of the world. Although it is more recently taken up in heritage studies compared to other fields in the social sciences, many projects and publications in the field of heritage studies have pointed out the difficulties, issues, and complexities inherent in community engagement (Waterton 2015; Watson and Waterton 2011). However, community engagement still has great challenges, difficulties, and issues that need more clarification. One of the main issues is that "community" has been considered as a singular homogenous entity. As I discuss above and as has been discussed by other scholars in the context of heritage studies (Crooke 2010: 19; Waterton 2015: 54–55; Waterton and Smith 2010), communities are very diverse and one certain community might even contain many other subgroups (Waterton 2015: 55). On many occasions, heritage professionals who work in community engagement fall into this trap by neglecting the fact that of how communities are diverse.

While every single community has diversity, whether it be of, i.e., gender, age, education, some communities also have ethnic, economic, and political diversity within themselves. These differences certainly impact on valuing heritage and material culture as well as worldview. A recent study (Apaydin 2018) has exposed that while those differences within one community impact on its construction, they also impact on individuals from those communities' own interpretations of heritage. Therefore, the internal diversity of communities and the political context that they live in need to be taken into account during the community engagement.

The main reason for considering communities as a singular subject is, I would argue, that communities have been considered as a pure "data sources" (Koster et al. 2012: 200; Waterton 2015: 59; Apaydin 2016a: 372) on many occasions for academic research projects. Some scholars have been able to overcome this issue and consider the diversities of communities with results reflecting this in their research projects and publications. Having said this, the field of heritage still needs more qualitative case studies to expose the diversity of communities as well as how to include communities more effectively in community engagement projects, heritage management process, and how to share the knowledge and power produced through heritage studies with communities.

All these questions surely are very complicated, great dilemmas and challenges for professionals and academics in this field. This is also related to the "top-down approach" which has impacted this field for many years. In most community engagement projects, academics and heritage

professionals consciously or unconsciously have imposed knowledge and values to communities instead of learning about the dynamics of communities and the values that they have attached to heritage and material culture. In these cases, community engagement projects can even undermine local and indigenous knowledge. Because of the life experiences and relationship with the heritage and material culture, every single person develops knowledge and has capacity to reflect on any heritage related issues. Here, the task of the heritage professional or academics should be more constructivist, to expose that knowledge and encourage individuals and groups to act more actively about the heritage that is developed and valued over a time by the community, as well as learning more about the dynamics of the relationship between communities and heritage. In an ontological manner, if our aim is the protection and preservation of diversity of societies, heritage, and material culture, how this is possible by excluding communities from this process? If our aim is to expose the complex relationship between community and heritage, how this is possible by neglecting backgrounds, particularly political context along with others, of the communities?

While critical approach to community engagement is preventing ethical issues and for being "top-down" it also gives more flexibility and reflection about communities. There have been many attempts to overcome some of these issues for being participatory, as it is the recent trend in community engagement, and in many occasions it has proofed its very successful though vague, undefined, and unclarified aim and goals. Not developing unique and critical methodology for each project in community engagement raises more questions than answers and solutions.

International Perspectives: Critical Approach in Community Engagement

Paulo Freire was one of the greatest thinkers and educators of the twentieth century. The publication of *Pedagogy of the Oppressed* without doubt is one of the radical ways of looking at education and community development which challenge with the dominant ideologies and power structures while aiming at achieving social justice, particularly for communities who live under conditions of poverty (Allman 1988; Mayo 2004). According to Freire (1993, 2005), every educator or community worker needs to be as critical as possible, and the roles of educator or community worker must be defined and should be equal to the community members. As Freire describes it, an educator or community worker also learns from the individuals in the classroom, or in this case in the community (Freire 1993).

The work of Freire without doubt challenges with the common approach "top-down" and critically questions the power relationship between educator or community worker and the people they serve to be more democratic. It emphasizes the knowledge of local people and helps to develop sustainable communities. Freirean thought focuses on transformation of life experiences and stories of people whose lived realities are taken into account seriously. For Freire, the "dialogue" method is the main tool to achieve this critical approach in praxis.

In heritage context, community engagement should always be about the stories of the people as well. Personal experiences in the past and the present are the basis of community construction as well as shaping the values, memories, and attachment of people to heritage and material culture. As Jones (2017: 25–26) points out: "contemporary communities re-work, and reproduce, the materiality and meaning of the historical landscape through performance and practice." Therefore, a community worker needs to encourage people to expose stories that are hidden behind the "performance and practice" in as detailed as possible through dialogues, and the exposing stories of people should be the main resource to shape the aims and goals of research. This kind of critical community engagement will avoid being "top-down" and provide a grounding for community worker to be able to more "bottom-up," ethical, and effective during the community engagement.

The theories and methods of Paulo Freire focus on democratization and effective dialogue with communities to be able to be as people-centered as possible, to act and reflect for the benefit of

communities, and to understand the discourses that shape community life and community construction by critically approaching to issues that are developed within society. For the heritage context, the question still remains: how can we be more critical and therefore effective and ethical? What is the best way of engaging communities and exposing community construction and the interlinkage between community and heritage?

The key tool to answer these questions is that, as Jones (2017: 26–27) emphasizes, we need to apply more qualitative research methods to understand "social value and meanings" in heritage context. Other social sciences have effectively used and applied qualitative social research methods. So, what is the benefit of carrying out ethnographic field methods, e.g., interviews, participatory observation?

In a heritage context, as I discuss above, community, heritage, and material culture cannot be separated from each other as the community makes the heritage and heritage also defines the community. Thus, every single aspect and dynamic of the community should be exposed, particularly social, cultural, economic, ethnic, and political underpinnings, as these play a large role in the construction of communities and therefore in heritage making (Fig. 1). Designing appropriate research methodology is the key for identifying these aspects and effective community engagement, but the community worker must have sufficient knowledge about the community they aim to work with and the values and meanings of heritage and material culture for that community.

A community worker should be able to combine and use more than one ethnographic field method in a heritage context in order to be able critical, effective, and get sufficient knowledge. They should aim to focus on the dynamics of the community by being people-centered, and the goal needs to be defined through the communities' development by providing grounds for members of communities to express their needs, expectations, and most importantly life experiences. As academics or heritage specialists we often carry out interviews, but questions and answers do not always provide sufficient knowledge about communities. For instance, structured questions always lead people and do not let them speak freely; in other words, we give direction to our participants. As Jones (2017) points out, combining more than one qualitative methods provides effective ground to get detailed knowledge about communities and material culture and its interpretation. Therefore, I argue that participatory observation is the key method to expose those aspects that are neglected in the interviews, surveys, or other forms of social research methods. It gives great insight about communities whose social, political, and economic backgrounds are much more complicated than we

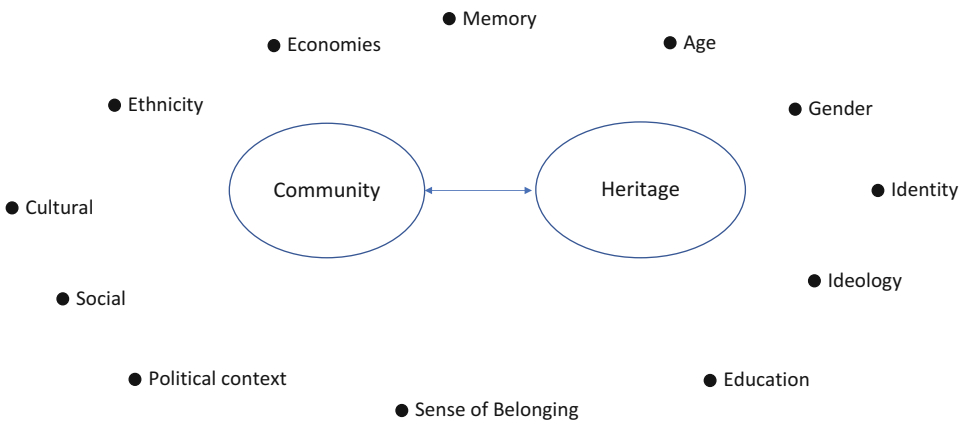

Critical Community Engagement in Heritage Studies, Fig. 1 The complex relationship of community and heritage, and the dynamics that forms this interlinkage

may think. Furthermore, it also gives greater understanding about the relationship of communities' daily life to heritage as well as answering the questions of how heritage is valued or not valued and how memories and emotions are developed through heritage. This will help to expose hidden discourses that are embedded within the community.

In my recent research (Apaydin 2018) that focused on exposing different uses of heritage, and valuing and interpreting material culture from a different perspective, there are examples of how to use, for instance, two different ethnographic methods together and the benefit of using these different methods together. The medieval site Ani, located in the east of Turkey, on the border of Turkey and Armenia, marks a conflict between Turkish and Armenian nationalists. The site and its monuments also has been used for identity making and national narratives by both sides. The semi-structured interviews that I run during the fieldwork exposed this different interpretation of this heritage site as well as defining the authorized heritage discourse that are developed by Turkish nationalists. However, the participatory observation method that I used to expose historical relationships between community and heritage also provided ground to understand the fact that the site also represents different meanings and values for some of the local village people who live next to the site. The site is significant for those villagers because the site takes important place in their daily life, without forming part of political discourses, as the site used to be a grazing area for animals, a place where villagers used the site for social activities in which they develop memories and emotions and attached values. Therefore, while the site is significant economically, it is also significant emotionally for these villagers. Since the site became a UNESCO World Heritage, this economically and socially impacted locals' life and changed the value and attachment of locals to the site. Thus, while participatory observation increase the effect and impact of dialogue between community worker and members of the community, it also helps to expose embedded meanings and values that are developed, and most importantly, it provides ground for to be as critical as possible seeing, feeling, and experiencing the life of local people.

As can be seen the site itself, the community and the relationship with the heritage site, has become quite complicated. Semi-structured interviews and questionnaires can help to expose some of the aspects that mark the interlinkage between the local community and the site. However, as a community worker, before reaching the conclusion and most importantly before making any interpretation, through participatory observation, it is necessary to see, sense, and feel these changing dynamics that impact significantly on communities and the meaning and value of heritage for them. Furthermore, in critical community engagement, as heritage practitioners or academics, we need to critically think and find solutions to how our work can be used for the benefit of the community who may need support for sustainability and development, or how community engagement can serve as a bridge in building peace and a tool for reconciliation using cultural heritage between communities in conflict.

Conclusion: Future Directions

The interlinkage between community and heritage is very complicated and many dynamics play a role in this reflexive relationship. Because of this, community engagement is one of the most difficult areas in heritage studies and therefore needs the extra consideration of a critical approach to be able to be more effective and ethical in engaging communities. Although recent developments in community engagement have brought new perspectives, approaches, and research methods to this field, there is still a need to develop new methodologies in order to increase the "dialogue" between community worker (or heritage field worker) and communities themselves to achieve a critical community engagement. There is still a need to clarify and expose our approach, aim, and goals in this field as well as to turn our works toward communities benefit and use. Therefore, first a community worker needs to delineate their role during community engagement. Second, a community

worker needs to define every single dynamic of the community they work with, particularly to expose diversity and subgroups within the community. As I point above, every community draws boundaries between each other. These boundaries are set for many reasons, but social, political, ethnic, and economic backgrounds are the crucial aspects of any community that needs to be explored. Community workers should design their research methodology in parallel to those characteristics using mixed ethnographic methodologies.

References

Allman, P. 1988. Gramsci, Freire and Illich: Their contributions to education for socialism. In *Radical approaches to adult education: A reader*, ed. T. Lovett. London: Routledge.

Apaydin, V. 2016a. Economic rights, heritage sites and communities: Sustainability and protection. *Complutum* 27 (2): 369–384.

Apaydin, V. 2016b. Effective or not? Success or failure? Assessing heritage and archaeological education programs – The case of Çatalhöyük. *International Journal of Heritage Studies* 22 (10): 828–843. https://doi.org/10.1080/13527258.2016.1218912.

Apaydin, V. 2018. The entanglement of the heritage paradigm. Values, meanings and uses. *International Journal of Heritage Studies* 24: 491.

Ashworth, G.J., B. Graham, and J.E. Tunbridge. 2007. *Pluralizing pasts. Heritage, identity and place in multicultural societies*. London/Ann Arbor: Pluto Press.

Bauman, Z. 2001. *Community: Seeking safety in an insecure world*. Cambridge: Polity Press.

Cohen, A. 1985. *The Symbolic construction of community.* London/New York: Routledge.

Crooke, E. 2010. The politics of community heritage: Motivations, authority and control. *International Journal of Heritage Studies* 16 (1–2): 16–29.

Freire, P. 1993. *Pedagogy of oppressed*. London: Routledge.

Freire, P. 2005. *Education for critical consciousness*. London/New York: Continuum.

Ireland, T., and J. Schofield, eds. 2015. *The ethics of cultural heritage*. London: Springer.

Jones, S. 2017. Wrestling with the social value of heritage: Problems, dilemmas and opportunities. *Journal of Community Archaeology & Heritage* 4 (1): 21–37. https://doi.org/10.1080/20518196.2016.1193996.

Koster, R., K. Baccar, and R. Harvey Lemelin. 2012. Moving on from research ON, to research WITH and FOR indigenous communities: A critical reflection on community-based participatory research. *Canadian Geographer* 56 (2): 195–210.

Lévi-Strauss, C. 1987. *Anthropology and myth: lectures 1951–1982*. Oxford: Blackwell.

Mayo, P. 2004. *Liberating praxis. Paulo Freire's legacy for radical education and politics*. Westport: Praeger.

Moshenska, G., ed. 2017. *Key concepts in public archaeology.* London: UCL Press.

Smith, L. 2006. *Uses of heritage*. London: Routledge.

Waterton, E. 2015. Heritage and community engagement. In *The ethics of cultural heritage*, ed. T. Ireland and J. Schofield, 69–88. London: Springer.

Waterton, E., and L. Smith. 2010. The recognition and misrecognition of community heritage. *International Journal of Heritage Studies* 16 (1–2): 4–15.

Watson, S., and E. Waterton. 2011. Heritage and community engagement: Finding a new agenda. In *Heritage and community engagement: Collaboration or contestation*, ed. E. Waterton and S. Watson, 1–11. London: Routledge.

Critical Historical Archaeology

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Introduction and Definition

The subject of this entry, critical historical archaeology, can mean several different things. One common reading would be as Critical Theory as applied in historical archaeology. This obviously directs our attention to the copious work of Mark Leone and his students. Another meaning would emphasize the role of critique in historical archaeology. This perspective includes critical theory, but broadens the focus to include other aspects not strictly under its purview. Both of these meanings will be explored in this entry. In its most basic form, critical archaeology can be defined as using the skills and craft of archaeology to understand the structures of inequality and oppression in the world. Therefore, a Critical Historical Archaeology directly confronts and challenges the history, nature, and structure of inequalities in capitalism. A critical historical archaeology explicitly uses the activities of archaeological projects and knowledge about the past to engage in political struggles in the present.

Archaeologists have used many different terms to capture these ideas: critical theory, praxis, pragmatism, public scholarship, public archaeology, activist archaeology, action archaeology, and civic engagement. A survey of how archaeologists have approached these issues demonstrates that our activities occur at several different scales: larger scale issues that confront the very structures and ideologies of the capitalist system itself, to smaller, local scales that deal with the inequalities and concerns of local contexts and communities. Each of these perspectives takes as axiomatic that archaeology is as much about the present as it is the past, and seeks ways to make our work socially relevant to political concerns of the modern world (Little 2007; Little and Shackel 2007; McGuire 2008; Sabloff 2008; Stottman 2010).

Historical Background

Critical historical archaeology in its various guises can trace its roots to Marxism. Marx expended a great deal of energy studying capitalism, the same topic that defines our subdiscipline. Rather than a quest for abstract knowledge, Marx undertook these exhaustive empirical investigations in order to transform the capitalist system based on exploitative social relations. Marx and Engels (1970: 123) famous quote "the philosophers have only *interpreted* the world, in various ways; the point is to *change* it," indicates the political nature of their scholarship. All Marxists would agree that there is real oppression and exploitation in the capitalist world and that a vital part of any scholarship is challenging these wrongs. In this way, Marxism is inherently political and subversive of modern capitalist society. A Marxist archaeologist must always ask "scholarship for whom?" and question whether their scholarship challenges or reinforces the power relations of the social world (McGuire et al. 2005: 368). For archaeologists, this means recognizing that our knowledge of the past is created in and influenced by modern social and political conditions that derive from a capitalist system defined by relations of power and inequality that are unjust.

A Critical Historical Archaeology is most clearly associated with the work of Mark Leone and his students. Leone's work was inspired by Marxist scholars of the Frankfort School, Lukacs, and the French Structural Marxism of Louis Althusser, in particular Althusser's notion that a dominant ideology creates a false consciousness for all members of society. Leone began with this problem of ideology and wondered why our taken-for-granted assumptions of the world permeate every aspect of daily life, and work so effectively to uphold dominant interests while making true knowledge of class interests difficult. The driving force of Leone's work was to uncover and critique the workings of ideology in modern Capitalist society. Once armed with this knowledge, people could work to overcome it: "ideology serves to reproduce society intact; knowledge, or consciousness of ideology, may lead to illumination or emancipation" (Leone et al. 1987: 284). Leone and his students focused their research on many aspects of everyday life, such as eating utensils, type face, clocks, town planning, and objects related to personal hygiene, as well as the way that historical knowledge is presented to people through museum exhibits. The dominant theme was to demonstrate that our notions of segmentation, standardization, and individualism were intimately connected to the dominant ideology and thus capitalism (Leone et al. 1987). Once aware of how ideology masks the structures of capitalism, people could struggle to change it.

To promote consciousness and change, the Annapolis' public education program introduced visitors to the contradictions and social inequalities of the capitalist system evident in landscape, architecture, and material culture in order to illuminate "elements of daily life that are normally concealed" (Leone et al. 1987: 291). The project organizers sought to create a participatory experience that would engage the tourists in a critical reflection of the colonial history of the United States. They sought to challenge the dominant ideology by demonstrating to the tourists that the historic Annapolis that they were presented with had been constructed to support dominant class interests. In the end, this challenge to the standard ideological history of Annapolis failed to overcome the official history and the cultural and social relations that produced it (Leone 2010).

The public generally responded by reinterpreting the alternative vision in terms of their preconceptions derived directly from the ideology being critiqued. These responses should not have been surprising given the background of the tourists who visit Annapolis and the types of historical interpretations that they were already exposed to. The fact that Annapolis is a high-end tourist destination only amplifies this trend. Clearly, in Annapolis, the privileged classes of US society did not question the dominant history even when presented with alternatives.

The archaeological literature has been peppered with critiques of Leone's Critical Theory approach, but few more damming than his own recent retrospective (Leone 2010). Leone's account presents his frustration and recognition that piercing the ideology alone could not lead to the kind of social transformation that he hoped for. He argues not that Althusser was wrong, but that because he was right, his ideas are too unsettling and could never be accepted since they foreclose any hope for change except through violence (Leone 2010: 182). As a result of this realization, Leone (2010) adopted instead Habermas' notion of communicative action. He recognized that the people who would be the most open to alternative histories were those who had been most directly and negatively affected by the contradictions, inequalities, and exploitation in society, a position more in keeping with Marx's idea that the working classes, because of their position in the productive relations of capitalism, are better positioned to achieve true class consciousness. Leone's research has thus shifted focus to an African-American community in Annapolis and to a project that actively incorporates members of that community. This shift makes it difficult for archaeologists to assume they know the interests of the masses like some intellectual vanguard. Instead they must actively work with the community to develop an alternative historical discourse that meets the interests of both parties. The current program of the Annapolis Project confronts both the practice of the archaeologist and the racial and class realities of modern Maryland (Palus et al. 2006), and shifts the focus of a critical historical archaeology toward a collaborative approach that is discussed below.

Other scholars have approached a critical historical archaeology through the Marxist concept of praxis. Praxis refers to the uniquely human ability to knowingly and creatively make and change both the world and, in the process, ourselves. Marxist praxis implies a dialectical relationship between gaining knowledge of the world, critiquing the world, and taking action in the world (McGuire et al. 2005). As archaeologists, we gain knowledge through the empirical study of the past. This knowledge is trivial if it is not linked to a critique of the world; the knowledge we generate gains relevance from how it informs, challenges, or reinforces the Marxist critique of capitalism, including ideas of dominant ideologies that so engaged the Critical Theorists. Critique also includes the critical self-examination of the role of scholars in the world and of how their scholarship reinforces or questions the inequalities in society. Without accurate knowledge, action can lead to unintended and often pernicious consequences. In the absence of self-critique, this can result in self-delusion, the idea that archaeologists are involved in positive or progressive change when they may not be.

Like the Critical Theory of Mark Leone, Historical Archaeologists using this concept of praxis recognize that inequality and exploitation characterize the structures of capitalism, but rather than beginning with ideology, they use class as their entry point into the analysis of these social relations (Wurst 2006; McGuire 2008; Gadsby and Barnes 2010). The goal entails building knowledge about the class structure, combining this knowledge with a critique of inequality and exploitation in capitalism, and using this awareness to foster action to make our world a more humane one (McGuire 2010).

Randall McGuire and his colleagues of the Ludlow Collective have used this approach to build an archaeology of political action in their study of Colorado's 1913–1914 Coalfield Strike and the Ludlow Massacre Site (Saitta 2007; McGuire 2010). The project has focused on the massacre site as well as a nearby company town to gain a richer and more systematic understanding of the everyday lived experience of the Colorado miners and their families. The excavations themselves are a form of political action since they

focus attention on the events of 1913–1914, making them news again, and raise public awareness of the class basis of American history. The project has also worked directly with the United Mine Workers to build educational programs that include interpretive displays at the site, teacher's institutes to educate public school teachers, a traveling display, public talks, and web sites. The strikers have assisted the project's excavations as the archaeologists try to assist them by educating the general public about labor's struggles in the United States.

In this case, the knowledge derived from the excavations of the Ludlow Massacre Site is combined with a critique of the class structure and exploitative labor practices in order to build an archaeology of political action to transform the world (McGuire 2010: 223). As McGuire (2010: 231) states, "an emancipatory praxis can exist only within real contexts of social relations, struggles, interests, institutions, and agents." Praxis can only be realized through collective action, and this requires us to work in and with real communities.

Key Issues/Current Debates

In recent years, archaeologists have seriously confronted the class structure of archaeology as a middle class practice connected to modern capitalism. Challenges posed globally by indigenous peoples and descendant communities have forced archaeologists to face a larger network of social relations in the context of their research. US archaeologists have certainly risen to the challenge since NAGPRA was passed in 1990 and the African Burial Ground galvanized descendant communities in New York in 1991. Since then, archaeologists have scrambled to engage various descendant communities in a dialogue that seeks to move beyond archaeology's colonial heritage and instead engage in community or collaborative work. As noted above, working with descendant communities (however defined) has become key to both Critical Theory and praxis approaches to a critical historical archaeology. Collaborating with descendant communities is rapidly becoming the norm in Historical Archaeology. Notable examples of this kind of public, collaborative project include Carol McDavid's (2002, 2010) work at the Levi Jordan Plantation, the New Philadelphia Community Archaeology Project (Shackel 2011), and, of course, the African Burial Ground (LaRoche and Blakey 1997).

While these are exciting developments, archaeologists need to be aware that simply being aware of multiple interests in the past and collaborating with community groups does not necessarily result in a critical historical archaeology the way it has been defined here– that is, one based on critique of the structures of capitalism and geared toward political action to change them. Stottman (2010: 8) contrasts public and applied archaeology which collaborates and considers the public as stakeholders with an activist archaeology. In his view, "archaeologists can do more than collaborate with communities and the public, they can use archaeology to *affect change within an activist agenda*." (Stottman 2010: 8, emphasis in original). A great deal of public, engaged, or collaborative archaeology runs the risk of falling into the trap of sentimentality when dealing with communities (Little 2010: 158). The question that archaeologists often fail to answer is what the ultimate goal is: archaeology or collaboration for what end? While historical archaeologists have become more comfortable with the idea that our work is always political, we have not been as clear in defining what that political agenda is or should be. Phrased another way, if the goal of praxis or an activist approach is to affect change, we have seldom articulated just what kind of change we mean. One notable example is the work of Larry Zimmerman and his colleagues on the materiality of homelessness. Zimmerman et al. (2010) argue that this work must be political and geared toward translating our archaeological knowledge into practical applications to solve real problems of social relevance (Zimmerman et al. 2010: 445). Their research has increased visibility of the problems of homelessness and has provided valuable data that can help to develop better ways to provide aid that homeless people can actually use. As Little (2010: 158) makes clear, "we must be vigilant and continually self-critical and questioning about the types of changes we advocate." And this reminds us that without a clear political agenda, our best intentioned activist archaeologies can

easily descend into sentimentality and the self-delusion that we are engaged in change while accomplishing little more than supporting the status quo.

Future Directions

All of the approaches discussed here reject the possibility that archaeologists objectively recreate the past. Once any truth claims are laid to rest, the next question must deal with what archaeology is for. Most answers revolve around some utility for the present. All of these approaches entail a dialectic interweaving of past and present and embrace the fact that archaeology is always imbricated in politics. The differences in these approaches are all minor and can largely be characterized by starting point. Critical theorists frame their work around exposing aspects of the dominant ideology that serves capitalism while a praxis approach uses class as the entry point to analysis of capitalist social relations. Collaborative approaches and work with descendant communities is an important aspect of both.

Given that these approaches are all framed in the rejection of objective truth, it is interesting that there seems to be a quest for the "right" way to do this. Instead of an either/or, best/worst approach to engaging in a critical historical archaeology, it is important that archaeologists think much more critically about notions of scale in this work. Leone's early work has been instrumental in making us realize the ideological structures of the larger capitalist system. There is real value in the critique of capitalism's taken-for-granted ideas that are the hallmark of Leone's Critical Archaeology. Since few topics have elicited as profound "ah ha" moments for students, it is hard to agree with his recent statements that "Critical Theory doesn't work" (Leone 2010: 152). However, it is equally true that this "consciousness" alone cannot change the gross inequities that define our world. The smaller scale or local level may be a more effective and satisfying scale for our critical historical archaeologies, but it is imperative that archaeologists be just as cautious about work with descendant communities. The danger is that by turning to work only with local communities, the political nature of critical historical archaeology is often lost, as is any larger sense of what the struggle is against and for.

Cross-References

- ▶ Activism and Archaeology
- ▶ Annapolis: Historical Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Critical Theory in Archaeology
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Pragmatism in Archaeological Theory
- ▶ "Public" and Archaeology

References

Gadsby, D.A., and J.A. Barnes. 2010. Activism as archaeological praxis: Engaging communities with archaeologies that matter. In *Archaeologists as activists: Can archaeology change the world?* ed. M.J. Stottman, 48–62. Tuscaloosa: University of Alabama Press.

LaRoche, C.J., and M.L. Blakey. 1997. Seizing intellectual power: The dialogue of the New York African burial ground. *Historical Archaeology* 31: 84–106.

Leone, M.P. 2010. *Critical historical archaeology*. Walnut Creek: Left Coast Press.

Leone, M.P., P.B. Potter Jr., and P.A. Shackel. 1987. Toward a critical archaeology. *Current Anthropology* 28: 283–302.

Little, B.J. 2007. *Historical archaeology: Why the past matters*. Walnut Creek: Left Coast Press.

Little, B.J. 2010. Epilogue: Changing the world with archaeology. In *Archaeologists as activists: Can archaeology change the world?* ed. M.J. Stottman, 154–158. Tuscaloosa: University of Alabama Press.

Little, B.J., and P.A. Shackel, eds. 2007. *Archaeology as a tool of civic engagement*. Lanham: AltaMira.

Marx, K., and F. Engels. 1970. *The German ideology*. New York: International Publishers.

McDavid, C. 2002. Archaeologies that hurt: Descendants that matter: A pragmatic approach to collaboration in the public interpretation of African-American archaeology. *World Archaeology* 34: 303–314.

McDavid, C. 2010. Public archaeology, activism, and racism: Rethinking the heritage 'product'. In *Archaeologists as activists: Can archaeology change the world?* ed. M.J. Stottman, 36–47. Tuscaloosa: University of Alabama Press.
McGuire, R.H. 2008. *Archaeology as political action*. Berkeley: University of California Press.
McGuire, R.H., M. O'Donovan, and L. Wurst. 2005. Probing praxis in archaeology: The last eighty years. *Rethinking Marxism* 17: 355–372.
Palus, M.M., M.P. Leone, and M.D. Cochran. 2006. Critical archaeology: Politics past and present. In *Historical archaeology*, ed. M. Hall and S.W. Silliman, 84–104. Malden: Blackwell.
Sabloff, J.A. 2008. *Archaeology matters: Action archaeology in the modern world*. Walnut Creek: Left Coast Press.
Saitta, D.J. 2007. *The archaeology of collective action*. Gainsville: University Press of Florida.
Shackel, P.A. 2011. *New Philadelphia: An archaeology of race in the Heartland*. Berkeley: University of California Press.
Stottman, M.J., ed. 2010. *Archaeologists as activists: Can archaeology change the world?* Tuscaloosa: University of Alabama Press.
Wurst, L. 2006. A class all its own: Explorations of class formation and conflict. In *Historical archaeology*, ed. M. Hall and S.W. Silliman, 190–206. Malden: Blackwell.
Zimmerman, L.J., C. Singleton, and J. Welch. 2010. Activism and creating a translational archaeology of homelessness. *World Archaeology* 42: 443–454.

Further Reading

Mullins, P.R. 2011. Practicing anthropology and the politics of engagement: 2010 year in review. *American Anthropologist* 113: 235–245.

Critical Theory in Archaeology

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Introduction

Critical theory calls on scholars to view the past and the present as locations of nuanced ideological negotiation. Critical theory, as used by archaeologists, explores the relationship between our knowledge of the past and the context of its production. It urges scholars to question who they are working for and the ways in which their interpretations can be used in the present. One of the major concerns in critical archaeology is the way that conflict and contradiction have been hidden or masked through the ideology of those who are producing the knowledge. A critical archaeology calls for extricating or recontextualizing interpretations of the materiality of past social worlds from cultural to ideological capacities. Foundational to this is the recognition that power permeates nearly every aspect of social and material life ranging from broader hierarchical structures to intimate everyday practices (O'Donovan 2002). The relationship between power and ideology is invested in social practices, and these exist along with a material world endowed with the power to produce, reproduce, and maintain them. These relationships have material correlates and can be examined archaeologically. Critical theory also involves exploring the point of view from which interpretation is constructed (Leone et al. 1987: 284).

The manipulation of the past has been documented in many studies over the past several decades. It is clear that representations of the past are not inconsequential and that they shape peoples' identities and perceptions of others. Critical archaeology recognizes that the meaning of archaeological materials is not natural or immediate and that the social relationships between people and things give objects their meaning. Through exploration of the ways in which archaeological materials come to be associated with particular meanings, critical theory urges archaeologists to question common sense claims or traditional interpretations that have been made about the human experience in the past. Critical theory in archaeology also urges the examination of fundamental beliefs and guiding structures in the contemporary world and present practice of archaeology. Archaeological materials, through the framework of critical archaeology, can be considered to represent ideologies that are invested with power because they are embedded in particular historical constructions. Interpretations of

history have salience to present conditions because they can help to justify exploitative relationships and naturalize them, thereby supporting the maintenance of the status quo. Archaeological interpretation of history is therefore a battleground for political life and ideology in the present. A critical archaeology questions the relationships between objects, social relations, and meanings by historicizing the process of history and meaning making, challenging its immutability, or offering or illuminating alternatives.

Definition

Critical archaeologists have demonstrated that present ideologies play a significant role in the process of interpreting the archaeological remains of the past. Artifacts and other archaeological materials are open to multiple readings, each of which is based on ideologies related to what they mean, what meaning is, and how the world works. Everyone carries these implicit beliefs, and the goal of a critical archaeology is to expose these ideologies and question them. Althusser (1971) describes ideologies as the taken-for-granted things, the things that go without saying, and the naturals for a given society. Through study of the functions of ideology, scholars have attempted to show that unequal social relationships are integral to the reproduction of social order and sustain systematic inequality, sexism, and racism. Critical archaeologists examine the ways in which the practice of contemporary archaeology has contributed to the reproduction of the social order and aim to develop an archaeological perspective that is conscious of the power of archaeology to contemporary life. They seek to identify and demystify contemporary ideologies and work with the recipients of archaeological knowledge to build greater social consciousness.

Conceived as an emancipatory project, critical archaeology aims to bring an understanding of ideology in order to foster new understandings of, challenges to, and a reimagining of present society. Since critical archaeologists question the ideologies that stem from noncritical readings of history, the relevance of archaeology toward the general critical inquiry becomes clear. Archaeology can do more than describe past lifeways; it can also show that the roots of modern society are arbitrary and not inevitable. From the perspective that archaeology can use history to critique our modern world (Leone et al. 1995), it can be understood how the taken-for-granted notions in a society came to be that way. The focus of most work has been on modern capitalist societies and investigations that reveal how life was before the definition of the modern individual, time discipline, wage labor, and advanced capitalism.

Historical Background

Critical theory is most commonly associated with the work of the Frankfurt School of Social Research, established in 1923. The development of critical theory, and its retooling of classical Marxist thought, is associated with two social currents of the early and mid-twentieth-century Europe. Scholars of the Frankfurt School including Adorno, Horkheimer, and Habermas, along with other European scholars including Benjamin, Lukacs, and Althusser, turned their attention toward the functions of ideology and culture and the roles they play in perpetuating the status quo. These European scholars, while diverse and sometimes divergent in their ideas, established an influential program of Marxist-oriented, interdisciplinary social research, known as the critical theory.

First, in the wake of World War I, capitalism's goal of building a modern, rational society, with economic, scientific, and technological advancement at its foundation, was being called into question. Second, Marxist theory had been circulating in Europe for decades but had failed to bring into existence the sweeping revolutions and socialist republics that the central premises of Marxism were based upon (Kellner 1989). By the second quarter of the twentieth century, the countries of Europe were turning toward fascism or nationalist-chauvinism, often with the support of their working classes, who had turned away from socialist revolution. Critical theorists devoted their study to analyzing the material and

ideological contexts, and psychoanalytic personalities, of a modern industrial-capitalist society which could drive its citizens to sometimes act against their own best interests. Critical theorists departed from the classical vocabulary and conceptual core of Marxism while remaining committed to work within the tradition by identifying with many of its approaches and analytic premises. To this they added the vocabulary of psychoanalysis, nesting an account of individual subject formation within a broader sociological analysis of political, material, and economic structures. Their thought emphasizes the role of ideology and culture, not the economic base of social organization, as fundamental to the creation and maintenance of exploitive social relations. In the early twentieth century, they turned Marxist attention toward consumerist commodity culture (Kellner 1989).

Critical theory emerged in archaeology in the 1980s, along with other forms of postmodern thought that challenged claims to objectivity in interpretations of the past. Its use in archaeology was initially influenced by ethnographic studies of historical museums (e.g., Wallace 1981), which pointed to the fact that the distinction between past and present was being blurred in these presentations. They suggested that the role of the curator in the presentation of history was removed, depicting prehistory and history as evolving unattended into an improved present. In contrast, the critical effort examines how knowledgeable social actors exist in and move through their past and present social contexts. At this time, critical ethnographers began to generally examine taken-for-granted realities and look at the way that cultural mechanisms assure social harmony and conformity through the employment of organizational rules, norms of interaction, institutional practices, and ideological concepts. They suggested a reflexive approach, which was concerned with what was communicated as researchers worked from the present to the past, instead of asking how we got from the past to the present. Critical theory came to the consciousness of archaeologists due to a variety of factors including a recognition that archaeology was being used to serve political aims. This came out of a growing controversy in archaeology over ownership of cultural artifacts and human remains and control over the preservation and interpretation of the past (Leone et al. 1987: 284). As processual archaeology gained popularity in North America, many of the supporters of the New Archaeology began to express concern for the social relevance of archaeology through the nationalization of historical sites. This is exemplified in the work of Russell G. Handsman and the American Indian Archaeological Institute (1981), which analyzed the formation of nucleated villages as part of the rise of urbanization and capitalism in New England. Handsman brought attention to the ways in which ideas – including the ideas of the individual, wealth, and the relationships between people and objects – that have distinct historical origins within distinct social structures and processes come to be taken as part of the natural social and physical landscapes by historians. Handsman argued that modern historians were projecting modern categories onto the past and conflating modern people with past people. Alison Wylie (1985) also examined the ideological role that reconstructions of the past based on archaeological evidence played in everyday life. Leone et al. (1987) set out the goals for a critical archaeology in which research was explicitly designed to have political impacts in the present (Palus et al. 2006).

Through its attempt to historicize facets of contemporary ideology, critical archaeology helps to question naturalized connections between the events, structures, and processes of the past with the present. At the same time that critical archaeology was being developed through historical archaeology in the United States, a reaction against processualism that espoused similar but more radical principles regarding the epistemological foundations of the discipline was being developed in England, particularly through the work of Shanks and Tilley (1987). Shanks and Tilley called attention to archaeology as a political practice and urged archaeologists to acknowledge that they are working in the present, for the purposes of the present (Palus et al. 2006). Archaeology has an interesting dual nature in that its data, before interpretation, is vulnerable to very different ways of application, either through the

incorporation and perpetuation of racist, sexist, and nationalist agendas or to counter popular mythologies and support critical reexamination of these agendas.

Key Issues/Current Debates

As a reflexive approach with a goal of emancipation from coercion – including that which is self-imposed – critical theory has been successfully applied in the fields of law, history, the decorative arts, literature, geography, museum studies, and the philosophy of science, among others. Critical theory applied to archaeology – critical archaeology – is based on ideas from Althusser and Lukacs. From Althusser (1971), archaeologists understand that ideology can be discovered and that it is tied to the material correlates of past societies. And when ideology is made visible through critical analysis, Lukacs (1971) suggests that we attempt to write the history of ideology or the history of bias, identifying the mystifying relations behind modern ideologies. By giving a history to contemporary ideology, critical archaeology helps to disassociate the events, structures, and processes of the past from their naturalized connection with the present. According to Russell Handsman (1981), a critical archaeology writes histories that show and explain structural continuities and cultural discontinuities and interrogates the relationship between the present and the past. Critical archaeologists argue that modern ideologies can be challenged as arbitrary and contingent on specific circumstances of social relations. This can be done by contextualizing the origins, or history, of these practices in discrete social forms and exploitative circumstances as these existed in the past. Since its introduction to the field, critical archaeology has expanded these ideas to study the relational negotiations of class, race, sexuality, age, ethnicity, and gender. Much of this work has been influenced by Giddens and Foucault, and critical archaeologists have focused on shifting social relationships and behaviors instead of relying on static, essentialist categories.

The goal of critical archaeological work is to avoid creating self-justifying or ex post facto metanarratives by conducting careful analyses of archaeological materials using inclusionary, local histories (Schmidt and Walz 2007). The point is to understand the relationship of these identifying factors as tied to ideology as well as in relation to one another without mistakenly overemphasizing any one as causational or isolated. To study the negotiations of these identities in the past is to study inequalities and the genealogy of ideology which created and sustained them. Critical archaeology recognizes that structural inequalities are created and reproduced through ideological narratives of the past. This ideology consists of illusions, seemingly natural, timeless, and placeless, that mystify exploitive conditions that are ultimately local and particularistic. In every locality, the past serves as a site of ideological struggle. Because of this, it is concerned with memory and representation. Memory is argued to be necessary to understand society and control the future. Therefore, as an archaeologist, knowing the past and having the power to create a genealogy or speak to origins equates to the power to control. Genealogy is a political necessity and serves as an enduring form of polemical discourse (Shklar 1971), so critical archaeology becomes a tool to subvert ideologies by using material culture to make criticisms concrete, understandable, and testable. Critical archaeology recognizes that its public activities, like all scholarly endeavor, operate as socially constituted agents with claims to authority over knowledge of the past (Castañeda and Matthews 2008). The responsibility of this position has resulted in an effort to form a praxis that mitigates, or maximizes, the effect of political critique in the present. This effort has theoretically been guided by the work of Lukács and Habermas. The work of Georg Lukács (1971) identifies the central importance for every critical scholarly endeavor to create an emancipatory consciousness among its audience. He does not, however, offer a model for how to proceed with this.

The work of Jürgen Habermas (1984) enables a way of imagining what the actualized goals of a critical archaeology might look like. Habermas emphasizes the significance of standard speech acts and dialogues where the voices of subordinate groups are unheard in the practice of

everyday life. An ideal dialogue for Habermas exists where the voices of all parties are heard equally without being filtered by social inequalities so that a more equal negotiation can occur. In archaeology, this is especially crucial because competing interests frequently concern meanings assigned to the past. One of the key contributions of critical archaeology has been to introduce archaeology into public arenas (the media, museum exhibits, and interpretive programs) in new ways and to consider a responsibility to public audiences as a constituency for archaeological studies.

Public archaeology is one of the most accepted applications of critical thought into recent archaeological theory (Palus et al. 2006: 92). Public-oriented, community-based, and collaborative archaeology projects function as experimental approaches to linking critical thought to archaeological practice. While methods vary, at their core, these approaches embrace political activism as a primary goal. All attempt to use interaction with the public to enhance this role. Working with communities with histories of ideological struggle illustrates one way ideology can be subverted or resisted in the present. In the process, they challenge monolithic, sanitized, or homogenized histories with the possibility of alternatives (Leone et al. 1995). Many scholars collaborate with politically and socially disfranchised communities to define research that maximizes its benefits (Colwell-Chanthaphonh and Ferguson 2008; McDavid 2011). Others use ethnographic techniques to understand past and present social groups in an effort to enhance the effectiveness of making connections to contemporary inequalities (Shackel and Chambers 2004). All these approaches vary as to the degree or type of accommodation or intellectual engagement scholars take with the diversity of groups that make up the "public" audience of archaeological work.

Centrally, it is recognized that an unrelenting political activism coupled with self-reflexivity defines research that sustains an effective social critique. Notwithstanding the positive directions of this movement, however, it can be questioned whether it has brought the intended level of social commentary or analysis. Some scholars contend, however, that public involvement alone does not guarantee archaeological work is effectively critical or politically activist. Sayer argues that a critical project does not work in the absence of a revolutionary praxis which takes confident responsibility for its professionalism and unrelentingly problematizes the parts of society responsible for injustice (Sayers 2015). Nonetheless, the application of critical thought implies a central importance for archaeology to make contributions to public political and social consciousness through its research activities. Exploring these modes of interaction reinforces and enhances the recognition of these social roles as central to archaeology among both the public and researchers.

International Perspectives

Globally, critical archaeology confronts political and economic power relationships – historical and contemporary and local and global – that have determined or guided our present understanding of archaeological pasts. Archaeology has operated globally for nearly a century now, embedded within the structures of political discourse. A self-reflexive postcolonial turn in the scholarship of related disciplines of anthropology and history has influenced a reckoning among global scholars of the role archaeology has played in colonial projects (Croucher and Weiss 2011; Lydon and Rizvi 2010). Archaeology arose as a science alongside other aspects of enlightenment philosophy including the study of natural and cultural history. As such, it is entangled and embedded within the growth and spread of modernist ideologies including capitalism, colonialism, scientific racism or Eurocentrism, and nationalism. The global spread and local integration of these "haunts" has become, as Charles Orser (1996) suggests, the primary research interest of the historical branch of the field. As a component of this, a critical global postcolonial archaeology today attempts to examine local alternative, peripheral, silenced, or prior histories to the broad narratives of modernity as a critical project.

As an effort to promote and explore a self-reflexive, politically conscious exploration of the uses of the past, critical approaches can be seen as an effort to disentangle the complex relationship between representations of the past and the development of, for example, constructed nation-building archaeological histories. Archaeological material is particularly susceptible to political manipulation because of the way it can be appropriated and reproductively employed for political purposes as heritage, patrimony, and consumerist destination. In its history of functioning within governmental structures, archaeological research has served to facilitate the selective remembering, forgetting, or constructing of historical traditions. With its power to influence or challenge written historical accounts with novel material evidence, archaeological evidence has proven invaluable in this capacity, establishing the authority of competing or conquering groups by shaping continuity or discontinuity with a particular historical era or movement. The appropriation and preservation of archaeological sites can serve to invent or subvert heritage in ways advantageous to dominant groups, excluding those on the margin. In such cases the formalization and governmentalization of historic preservation can serve to promote, diffuse, and maintain the authority of a nationalist ideology.

Postcolonial or decolonialized approaches to the colonial past deconstruct or problematize monolithic or simplified narratives of the materialization of the "haunts" of capitalism, colonialism, and modernity in local contexts (Croucher and Weiss 2011; González-Ruibal 2008; Pezzarossi In Press). In keeping with the self-reflexivity of critical approaches, postcolonial scholarship operates "in dialogue with the present," considering archaeological history as a toolbox of themes and narratives to imagine alternatives and enact social justice in the present and future (Croucher and Weiss 2011: 2).

One large intervention in historical narrative is to challenge the direction, totality, and spatiality of colonialism, namely, its traditional focus on the Atlantic world and the diffusion of materials, identities, and influence from the European metropole to peripheral sites (Leone and Knauf 2015: 7; Lydon and Rizvi 2010; Croucher and Weiss 2011). A major result of this intervention is a radical multiplication of the possible contexts, conceptual themes, and geographic and temporal boundaries within which the field is practiced.

Future Directions

Walter Benjamin famously wrote that "To articulate the past historically does not mean to recognize it 'the way it really was.' It means to seize hold of a memory as it flashes up at a moment of danger" (1970: 257). Loosely connected to the Frankfurt School of critical theory, Benjamin has recently grown in stature as a thinker with important perspectives on the production of history, political activism, and material culture. Namely, Benjamin provides invaluable insight on the relationships between the politics of the past and present. In his time, he recognized the instability of all historical narratives which, he concluded, are always composed out of the juxtaposition between the past and present. As each era ushers in its own political threats, critical archaeologists should identify the specific historical precedents which may serve as the appropriate medium to reflect upon the exigencies of the present. Moreover, through this exercise, archaeologists can recognize and appropriate past means of resisting these political threats. Essentially, Benjamin urges us to be attentive to the fact that democracy, equity, and tolerance are moving targets which must be pursued with constant vigilance and innovation. At the same time, critical thinkers must remain attentive to the epochal cycles of oppressive power and be wary of the capricious nature of scholarly fashion.

Apropos of Benjamin's notion, awareness of new threats to our present democracy has revealed heretofore hidden *longue durée* histories of past oppression. In response, there has been a flourishing of new foundations for critical thought beyond traditional Marxist or Marxist-influenced scholarship. Some of this work developed in parallel or branching rhizomatically from the interventions of postcolonialism – eschewing an overdetermined or overly simplistic appraisal of

the monolithic "haunts" of modern history: capitalism, colonialism, heteronormativity, white supremacy, patriarchy, and class struggle – to focus on situated regional or thematic actualities or materializations. Some of these critical strands are influenced by the insight or reappraisal of well-established, but ever-changing, bodies of knowledge including Marxist-influenced strains, but also feminism, gender studies, peasant studies, and black vindicationist scholarship. Others are new to archaeology. More than simply cultivating comfort with decentered critical scholarship, this work often takes up the perspectives of positionality in history as a rich foundation for novel criticism and creative resistance including scholarship framed by postcolonial, decolonized, or global histories of capitalism (Croucher and Weiss 2011; Leone and Knauf 2015; Lydon and Rizvi 2010; Pezzarossi In Press), queer studies (Blackmore and Springate 2018), animal rights (Sayers 2014), and black feminist archaeology (Battle-Baptiste 2011). Among the pivotal contributions of this scholarship to critical archaeology is the materialization of a multivocal and multivalent critical scholarship as a source of strength in ensuring the plasticity and breadth of resistance needed to challenge the "moving targets" of oppression.

Recent scholarship has similarly questioned traditional definitions of capitalism as a bounded, or spatially consistent, object of analysis. Rather, scholarship of capitalism has re-envisioned it as a continuously evolving set of processes or systems, albeit with material components observable in the archaeological record. On one scale, this reconceptualization has brought into focus the need to challenge our most basic methods or narratives of history making (Dawdy 2010; González-Ruibal 2008; Wurst and Mrozowski 2014; Leone and Roller in press). If capitalism involves ever-changing, elusive processes irreducible to a consistent conceptual center, where can critical archaeologists find the Real among the flux? Working out of a psychoanalytic tradition, social theorist Slavoj Žižek (1989: 191) suggests that waste, ruins, peripheral places, and the precariously un- or underemployed are both the realities and the products of this process: "...the Real is at the same time the product, remainder, leftover, scraps of . . .symbolization, the remnants, the excess which escapes symbolization and is as such produced by symbolization itself." Such a perspective leads critical thought to seek out peripheral places, people, and concepts not as an anthropological exercise at documenting marginal statistical outliers but in understanding the destructive processes at the very center of capitalism. This is the Real, which is truly material and concerns the nature of exploitation in capitalism.

In rejection of archaeology as reinforcement or confirmation of ideological integrity, recent critical traditions in archaeology worldwide focus on suppressed or forgotten aspects of social, political, and economic history, bringing attention to the contradictions of modernist progress: capitalist excess, violence, under- or unemployment, environmental ruin, and political inequality (González-Ruibal 2008). Research on subjects such as sites of early primitive accumulation, maronage, industrial ruins, environmental disasters, mass graves, the traumatic passage of migrants, concentration camps, and detention centers all point to these absences in memory and accounting. Some of this research is focused on recent history rather than distant mythologized pasts, proposing these undertheorized eras as more appropriate or poignant parables for the present and challenging the distance society places between comfortable remote pasts and the ambiguously detemporalized present. The importance of understanding with nuance the regionalized differences among those resisting, peripheral to, excepted from, preceding, or fleeing from capitalist processes is of great importance to tracing the *longue durée* of the evolving dimensions of capitalism in the past, present, and future.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Critical Historical Archaeology
- ▶ Historical Archaeology
- ▶ Ideology and Materiality in Archaeological Theory

- ▶ Leone, Mark P.
- ▶ Marx, Karl
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Practice Theory in Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Reflexive Approaches in Archaeology, Development of
- ▶ Reflexivity in Archaeology

References

Battle-Baptiste, W. 2011. *Black feminist archaeology*. Walnut Creek: Left Coast Press.

Benjamin, W. 1970. *Illuminations*. New York: Schocken Books.

Blackmore, C., and M. Springate. 2018 (in press). *Queering the past: Theory, politics and practice in archaeology*. New York: Routledge.

Castañeda, Q.E., and C. Matthews. 2008. *Ethnographic archaeologies, reflections on stakeholders and archeological practices*. Lanham: Altamira.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2008. *Collaboration in archaeological practice: Engaging descendant communities*. Lanham: AltaMira.

Croucher, S.K., and L. Weiss. 2011. *The archaeology of capitalism in colonial contexts*. London: Springer.

Dawdy, S. 2010. Clockpunk anthropology and the ruins of modernity. *Current Anthropology* 51 (6): 761–793.

González-Ruibal, A. 2008. Time to destroy: An archaeology of supermodernity. *Current Anthropology* 49 (2): 247–279.

Handsmen, R. 1981. Early capitalism and the center village of Canaan, Connecticut: A study of transformations and separations. *Art* 9 (3): 1–22.

Kellner, D. 1989. *Critical theory, Marxism, and modernity*. Baltimore: Johns Hopkins University Press.

Leone, M.P., and J. Knauf. 2015. *Historical archaeologies of capitalism*. London: Springer.

Leone, M.P., and M. Roller. in press. Waste. *Cuadernos de Prehistoria y Arqueología de la Universidad de Granada*. In press.

Leone, M.P., P.B. Potter Jr., and P.A. Shackel. 1987. Toward a critical archaeology. *Current Anthropology* 28 (3): 283–302.

Leone, M.P., P.R. Mullins, M.C. Creveling, L. Hurst, B. Jackson-Nash, L.D. Jones, H.J. Kaiser, G.C. Logan, and M.S. Warner. 1995. Can an African-American historical archaeology be an alternative voice? In *Interpreting archaeology: Finding meaning in the past*, ed. I. Hodder, A. Alexandri, V. Buchli, J. Carman, J. Last, and G. Lucas, 110–124. New York: Routledge.

Lydon, J., and U. Rizvi. 2010. *Handbook of postcolonial archaeology*. Walnut Creek: Left Coast Press.

McDavid, C. 2011. From 'public archaeologist' to 'public intellectual': Seeking engagement opportunities outside traditional archaeological arenas. *Historical Archaeology* 45 (1): 24–32.

O'Donovan, M. 2002. The dynamics of power. In *The dynamics of power (occasional paper 30)*, ed. M. O'Donovan, 3–16. Carbondale: Southern Illinois University, Center for Archaeological Investigations.

Orser, C.E. 1996. *A historical archaeology of the modern world*. New York: Plenum Press.

Palus, M.M., M.P. Leone, and M.D. Cochran. 2006. Critical archaeology: Politics past and present. In *Historical archaeology*, ed. M. Hall and S.W. Silliman, 85–104. Malden: Blackwell.

Pezzarossi, G., ed. In Press. Rethinking capitalism. Special issue of *Historical Archaeology*.

Sayers, D.O. 2014. The most wretched of beings in the cage of capitalism. *International Journal of Historical* 18: 529.

Sayers, D.O. 2015. Alienation, praxis and significant social transformation through historical archaeology. In *Historical archaeologies of capitalism*, ed. M.P. Leone and J. Knauf, 51–76. London: Springer.

Schmidt, P.R., and J.R. Walz. 2007. Re-representing African pasts through historical archaeology. *American Antiquity* 72 (1): 53–70.

Shackel, P., and E. Chambers. 2004. *Places in mind: Public archaeology as applied anthropology*. London: Routledge.

Shanks, M., and C. Tilley. 1987. *Reconstructing archaeology: Theory and practice*. New York: Routledge.

Shklar, J.N. 1971. Subversive genealogies. In *Myth, symbol, and culture*, ed. C. Geertz, 129–154. New York: W.W. Norton.

Wallace, M. 1981. Visiting the past: History museums in the United States. *Radical History Review* 25: 63–96.

Wurst, L., and S. Mrozowski. 2014. Toward an archaeology of the future. *International Journal of Historical Archaeology* 18 (2): 210–223.

Žižek, S. 1989. *The sublime object of ideology*. London: Verso.

Further Readings

Althusser, L. 1971. Ideology and ideological state apparatuses. In *Lenin and philosophy*, 127–188. New York and London: Monthly Review Press.

Habermas, J. 1984–1987. *The theory of communicative action, volume 1: Reason and the rationalization of society; volume 2: Lifeworld and system: A critique of functionalist reason* (trans: McCarthy, T.). Boston: Beacon.

Leone, M.P. 1981. Archaeology's relation to the present and the past. In *Modern material culture: The archaeology of us*, ed. R. Gould and M. Schiffer, 5–13. London: Academic.

Lukács, G. 1971. *History and class consciousness: studies in Marxist dialectics* (trans: Livingstone, R.). Cambridge, MA: MIT.

Wylie, A. 1985. Putting Shakertown back together: Critical theory in archaeology. *Journal for Anthropological Archaeology* 4: 133–147.

Critique of Romanization in Classical Archaeology

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Introduction

During the 1990s, archaeologists and historians of the late Iron Age and Roman period sparked discussion on the concept of Romanization which was an omnipresent and predominant interpretational framework in the Roman studies of the Western academic tradition. Scholars such as Martin Millett, David Mattingly, Jane Webster, Richard Hingley, Greg Woolf, Nico Roymans, Ton Derks, Nicola Terrenato, Benjamin Isaac, Peter Wells, and Colin Haselgrove (to name just a few) started to reconsider traditional approaches drawing inspiration from postcolonial intellectual waves and processual and post-processual archaeological paradigms. Primarily, they have addressed previous academic favoritism of the Roman side within simplistically and ethnocentrically conceptualized binary opposition of "Romans" and "barbarians/natives." This black-and-white perspective was constituted within the context of nineteenth- and twentieth-century European imperialisms and colonialisms, accompanying centrist worldviews, and related reflexive relationship the Western world had toward the Roman past/heritage. The initial critiques, coming predominantly from the United Kingdom, pointed out the biased nature of the concept, deconstructed its value-laden epistemic background and ideological context, and introduced new theoretical and methodological possibilities for interpreting the Roman and related worlds. These initiatives were further spurred by Theoretical Roman Archaeology Conference (TRAC) whose annual activities and volumes (available at www.trac.org.uk) contributed to the enlargement of the debate by including ever-growing number of academics and topics. The evolution of the Romanization critique was successively expanded further as discussion gradually spread outside the United Kingdom and affected cognitive spectrum of individual scholars and academic circles of different "national schools" of Roman archaeologies (Hingley 2005, 2012; Hingley in Versluys 2014). All of these processes unfolded into very dynamic international "ideas-exchange market," not only among the Romanists of different trades (archaeologists, historians, art historians, philologists) but also through engaging with various other disciplines (anthropology, literature theory, sociology, science). However, because of the fluctuation within the theme, its patchy character in general, and the varied status it enjoys within particular academic contexts, the definition of critique(s) of Romanization, together with designation of its overall features and clear path of development, is difficult to grasp and hard to provide in the form of compact unilineal narrative. As with any "work in progress," critique(s) of Romanization is diversified and (apart from elemental ideological ground) could not be easily restrained to homogenous and universally valid set of features. Hence, one should always keep in mind that the following survey is an outline constituted from unavoidably selective and subjective perspective/experience, which stands as one of many possible ways to write about the topic.

Definition

A critique of Romanization in classical archaeology (CRCA in further text) could be defined as a heterogeneous set of diverse interpretative frameworks that consider the effects and processes which took place in the course of the emergence and existence of the Roman imperialistic structure. Since these processes were traditionally comprehended and explained by the concept of Romanization, which is considered here as one-dimensional (ethno-cultural) and one-directional (Roman to native) simplification of much more complicated realities, the CRCA could be regarded as a group of different perspectives sharing a common ground of discontent and rejection of the long-established (nineteenth–twentieth centuries) reductive academic views on the character

of "Roman culture" and its influence on provincial populations. The initial criticism that was articulated during the 1990s addressed several key problems of traditional paradigm which are possible to epitomize as the role of the ancient written sources in the constitution of modern interpretations, the (mis)understanding of the interpretational potential of archaeological material, the ideological provenance of Romanization as a concept, and the question of the alternative theoretical approaches (Hingley 2005, 2012; Mattingly 2011). All of these assessments were linked to the wider contemporary discussions and theoretical problematization within archaeology, but they had specific manifestations inside the Roman studies due to the field's immanent peculiarities.

Thus, the so-called terror of text was an inherent feature of classical archaeology because the full confidence in and acceptance of worldviews derived from the ancient narratives completely colored all interpretations of Greek, Hellenistic, and Roman periods. Since the literary and epigraphic evidence had absolute priority in historical/archaeological reconstructions of the ancient era, the focus on their content dictated the form and nature of academic interests/questions, simultaneously marginalizing the topics absent from the written accounts or diminishing the need for development of interpretative paths which are not based on reliance in classical narratives (Laurence 2012). Directly reflecting this perspective is the second basic feature of CRCA – the question of the testimonial potential of the Roman period material data. In the context of giving interpretational priority to the written narratives, archaeological material mainly played a role of illustrating the conclusions and reconstructions formed by historiography or else providing nice pieces for museums and private collections. "Ordinary" or "small" finds of no material or esthetic values, on the other hand, were seen as convincing proofs of uniform character of normatively imagined "Roman culture" wherever it "spread" with the imperial conquests and political power. They were thus recognized merely as indicators of native populations' transformation into the Romans by "inevitable" surrounding to the lure of "superior" cultural form, whereas the artifacts retaining pre-Roman features were seen as symptoms of sociocultural conservatism and stagnancy. To put it simply, Roman archaeology of the nineteenth and twentieth centuries was dominated by the historiographical approach and archaeological perspective characteristic for the culture-historical paradigm (Laurence 2012).

Of course, both ancient written accounts and material remains were interpreted with the help of the general ideological and intellectual trends current in the nineteenth and better part of twentieth century, which were intimately linked with undisputed, deeply rooted, and often unconsciously reproduced beliefs such as Eurocentrism, sociocultural evolution, racial division of humankind, nationalism, progress, superiority/inferiority of cultures, "natural right" of "superior" populations to dominate "inferior" ones, and civilizing missions (Díaz-Andreu 2007). Since the majority of Western academics evaluated classical antiquity by reading the norms of their own culture back into the past, and due to self-identification of modern European societies with "advanced" ancient civilizations, Romanization implied cultural superiority of the Roman Empire that supposedly brought progress to native ("barbaric") cultures. Because all of the abovementioned concepts are markedly value-laden and prejudiced, their application to evidence from the Roman past (whose analytical potential was already problematically conceived) boosted and perpetuated distinctively partial (European/Western) interpretations. Therefore, with an increased awareness of the very specific character of ancient written sources as the material of highly biased conceptual nature, limited and selective content, and peculiar operational logic (both in terms of creation and utilization), CRCA started to dismantle long-lasting essentialist premises derived from ancient narratives. Simultaneously, it also began to employ a variety of new possibilities developed for the interpretation of material datasets and to question ideological inheritance constituted in the context of Western imperial and colonial projects. All these interdependent and parallel realizations finally generated the application of different theoretical positions and interpretational paths, at first borrowed from processual and post-

processual "movements" and social anthropology but afterward directly informed by wider theoretical considerations within humanities and social sciences. To sum up, the four aspects singled out in this section as exemplification of CRCA's initial phase can be seen as its fundamental elements that remain central issues in the field to this day.

Since there is no single correct way to define CRCA, another understanding might also be helpful. Critique(s) of Romanization can be characterized as reflexive study of local, regional, but most often national histories of ideas about the Roman Empire. It is possible to define these endeavors as the questioning, introspection, and deconstruction of basic and frequently subconsciously embedded presumptions about the modes of functioning of the Roman world. Since the majority of European archaeological traditions of the nineteenth, twentieth, and twenty-first centuries share the general ideological beliefs on how past societies worked, CRCA is to be comprehended as dealings with "singularized" (national) genealogies of enduring academic and widespread public images about the nature of the Roman culture and its impact on native populations. These overall commonalities of European and Eurocentric academic mindsets are reviewed shortly in the next section by focusing on triple-bind relation of ancient written narratives, theory of sociocultural evolution, and views on the Roman Empire.

Historical Background

The inception of ideas which characterize the concept of Romanization can be identified in the formation of so-called ancient *environmental theory* or *climatic paradigm* which argued the existence of several main climatic zones characterized by distinctive natural properties (Isaac 2004: 56–109; Woolf 2011: 44–51). This cognitive framework was present in ancient Greek intellectual setting as a means of explaining differences between people living in Mediterranean and continental parts of Europe, Asia, and Africa. The paradigm, of course, did not have a single form and a precisely fixed content but was used in many variations that shared one pivotal ideal: climate, relief, and natural conditions determined the character of groups of people, not only in terms of physical appearance and abilities but also in regard to their mental capacities and moral features. This kind of mental map operated by a centric principle, according to which lands of the Greek world were in the most favorable position, whereas distant regions were marked by distinctively hot or cold weather and associated relief and natural life. Correspondingly, the Greeks saw themselves as the most human, advanced, and superior group of people, while other populations were affected by the rough margins of the world and, respectively, barbaric, peripheral, and wild. Hence, the physical, psychological, and moral qualities of *others*, as well as their cultures (i.e., ways of life, habitation, economy, customs, knowledge, technology, etc.), were perceived as different, strange, and often in stark contrast to those of the Greeks. In other words, the ethnic and cultural alterities were imagologically construed as less human and getting closer to the animal world or mythological populations as they were more distanced, unfamiliar, and exotic to the Greek perception.

As the key ingredients of this cognitive system became commonplace in the Hellenistic scholarly world, they have also subsequently entered the imagology of Roman elites, who adapted them to serve their own needs and suit the imperialistic self-perception/promotion. Most frequently used in first-century BCE and first-century CE at the peak of Roman imperial ideology, this "commonsense anthropology" gained conspicuously Romano-centric discourse. Not only did the authors such as Lucretius, Caesar, Cicero, Vitruvius, Vergil, Ovid, Strabo, Seneca, Pliny the Elder, and Tacitus regard their capital (and Italy) as the center of the known world, but they also evaluated the populations of "barbarian" others with criteria of (geographical and cultural) closeness to their own society. The frame of reference remained similar to its Greek precursor (appearances, sedentism, habitation, economy, customs, technological knowledge, etc.), but the categorization of alterity somewhat changed due to the fact of Roman expansion, encounter with and incorporation of a broad span of different

communities. Those closer to the imagined center, more familiar to imperial elites and with sociopolitical structures that (at least roughly) resembled Roman, were regarded as more similar to the Roman society and more human/cultivated. On the other hand, those who were more different, exotic, and distant were imagined as being more wild and proportionally so as the length from the center increased and familiarity fell. In other words, there was a kind of scale of "cultivation and wildness" which revolved around the norm of other populations' greater or lesser similarity to Roman sociocultural milieu. Although there were no strictly defined stages of "barbarity," and the content and elaboration of the scheme varied, the Roman imaginarium did recognize nuanced diversity: Greeks, Egyptians, Gauls, Germans, Frisians, and Scythians were stereotyped as progressively strange or savage as geographical extremity grew and the Roman acquaintance with them shrank (Isaac 2004; Woolf 2011). In conclusion, in Roman antiquity, at least in the elite circles, there was a sort of naïve anthropology whose logic classified social and cultural differences in centric manner, having its own context and value system as a main unit of measure. This idea was also accompanied by speculations on the general evolutionary path of humankind, present since Hesiod and the most famously depicted by Lucretius. According to these views, humans had humble beginnings, living in caves not unlike the animals, using basic tools, hunting, and gathering the food. Gradually, they started to invent things and acquire knowledge, technology, and skills which led them to a life of more luxury and carelessness but simultaneously to a moral decline. The idea was relatively popular and often symbolized through the concept of eras, starting from the Golden and ending with the Iron Age. The significant point here is (some of the) ancient writers' comparison of the way of life of contemporary "barbarians" on the edges of the Roman world with primitive humans imagined in a described manner (see Evans 2008: 78–83, 149–154). Not only were the contemporary "barbarians" represented as inferior to the Roman culture and less human than its population (i.e., as geographical and cultural *others*), but according to this scheme, they also showed striking parallels with the population of the primitive temporal *others*.

There is a reason why these qualifications and logic of association sound very familiar to modern ears: it is because they have demonstrated more influence and deep-seatedness than they are usually credited for. Namely, ancient intellectual heritage did not disappear in the medieval period, but was actively reused and served as inspiration for many aspects of life, from legislation, philosophy, and history to medicine, geography, and ethnography. Starting with the Renaissance, classical works went through an accelerated revival and became the usual frame of references for nearly all academic spheres in the Western European tradition. Thanks to this omnipresence and wide circulation of the (adapted) ancient knowledge, the ways of understanding, explaining, and constructing ethnic and cultural *others* were under great (but certainly not exclusive) influence of classical tropes of barbarians as savage and inferior people. With the advance of European colonialism, ancient ethnographic inheritance was utilized as a part of the explicatory frame for the encounters with different and exotic populations of newly discovered worlds (see Hodgen 1964). Native groups of the Americas, Africa, and Asia were conceptually equalized with "barbarians" of antiquity, while their present was qualitatively assimilated with the European past. In turn, contemporary cognizance of "noble and ignoble savages" informed the understandings and evaluation of classical ethnographic *others*, which ultimately created a spiral of circular interrelationships between colonial present and ancient imperial past (Dietler 2005). Subsequently, accumulated information on exotic populations and varieties of humankind had to be systematized in some way, which happened during the Enlightenment, in the middle of the eighteenth century, with the articulation of the idea of sociocultural evolution. The ancient conceptual framework of alterity was built in the theory as its basic ideas were merged with experiences of otherness currently shaped around the colonized planet. In other words, the initial form of sociocultural evolution, with its classification/

qualification of people according to the stages of development and the principle of superiority/inferiority, was well inspired by Greek- and Roman-centric cognitive system and related assortment of human differences. Even after the publication of Darwin's theory of biological evolution, nineteenth-century scholars were still referring to ancient perspectives of alterity (e.g., Edward B. Tylor and Lewis H. Morgan), which actually means that the theory of sociocultural evolution rests on longue durée matrices of naïve anthropology generated in ancient times and reworked in the course of European medieval, Renaissance, and modern periods to suit current needs (Stoczkowski 2002).

How do Romanization and its critique fit into this picture? First, the concept of Romanization strongly relied on ancient narratives, which means it was directly exposed to and deeply influenced by conceptualization and value judgment of ethnic and cultural *others* found in them. Second, since overall *Zeitgeist* of the nineteenth century held sociocultural evolution for self-evident universal law applicable to all human societies in the past or present, the theory was abundantly employed as "objective" and independent academic groundwork for the constitution of the idea of Romanization. Thus, the concept of Romanization was influenced by the ancient discourse of otherness via two mutually reflexive but distinct lines: directly from the sources and remotely through sociocultural evolution which already contained deeply nested classical ethnographic rationale. In other words, Greek and Roman subjective mental map and "commonsense anthropology" were twice projected into the concept of Romanization making it a doubly biased interpretative framework. This is exactly why CRCA appeared and why Romanization simply cannot be taken as reliable outlook for the Roman world.

Key Issues/Current Debates

The outlined epistemological roots of Romanization were exactly what caused the first wave of critique to come from postcolonial perspective and point to its imperialistic and colonial background. From such standpoint, the concepts of *creolization*, *hybridization*, and *discrepant experiences* were proposed, suggesting much more complex picture of Roman and native interactions and taking into account the latter's active participation, resistance, subversion, and transformation of the imperial influences. These theoretical perspectives initiated a revision of passive position of indigenous/provincial population and the rejection of idea that Roman "civilization" radiated unidirectional cultural influences toward the "primitive" Iron Age societies (Scott and Webster 2003; Hingley 2012; Mattingly 2011). Consequently, the aim to "raise native/subaltern voices," covered in silence by the (ancient and modern) colonial discourses, produced a variety of works that investigate local responses to Roman power and persistence of indigenous sociocultural practices (e.g., Scott and Webster 2003). Although the authors applying postcolonial inspiration offered mutually different interpretational outcomes, they have generally succeeded in decentering traditional perspective and opened the space for more nuanced visions of the Roman world (Gardner 2013; Hingley in Versluys 2014). While this line of thought stays very important and could provide even more fruitful insights if refined through elaborated theory, the main problem remains the lack of methodology for a safe recognition of a subtle resistance (Mattingly 2011: 40–41; Laurence 2012: 67). The peril of erroneous reading the (presumed) "anti-Roman" actions/feelings into any kind of material culture or practice motivated the recent review of postcolonial critique of Romanization as being in essence and practice not post- but anti-colonial, i.e., only converting the previous idea of "Roman Empire as good" to the standpoint of "Roman Empire as bad" phenomenon (Versluys in Versluys 2014). The criticism is however not entirely justified as the "anti-colonial" discourse never became the normative, nor it had a chance to develop more comprehensively during its short period of utilization within the Roman studies (Gardner 2013; Van Dommelen in Versluys 2014). Thus, postcolonial criticism and analytical tools it offers remain quite relevant to the field, though they should be employed with considerable caution in order not to exaggerate the role of indigenous resistance and only perpetuate the

problematic dichotomy of "Romans and natives" under different names. The same is valid for potentially very useful concepts of hybridization and creolization since the imperial/colonial complexities of the Roman world could be easily reduced to black-and-white picture if they are utilized in a sense of interactions between two normatively conceived cultures with strictly defined contents/specificities (Versluys in Versluys 2014). Again, these concepts provide very rewarding lines of thinking about the Roman imperial structure and local communities but only with full awareness of their limits and explicated and clearly defined positions, methodology, terminology, and case studies.

Directly linked with the question of postcolonial perspective is the imperialistic order of the Roman world, vividly debated in contemporary academia. Indeed, this issue is traditionally at the fore of the Roman history/archaeology, while the Roman imperialism evaluated in affirmative light was a vital element of the concept of Romanization. Specifically because of this epistemic heritage and due to recent changes of perception and interpretation of imperialisms in general, investigations of the forms and practices of control still represent one of the most important concerns of the Roman studies. The theoretical inspiration and methodological devices imported from postcolonial discourse analysis, theories of structuration, habitus, connectivity, and networking facilitated much more delicate and sophisticated problematization of the Roman hegemony and its effects on overall communal settings across the Empire and beyond. It is now a widespread opinion that specific ideology (or "attitudes of mind" – Isaac 2004) and geometries of power pervaded all levels of Roman society and diverse groups within, and there can be little doubt in the existence of meaningfully structured social inequalities and their continual structuring of societal realities and relationalities. Roman imperial formation indubitably (directly or indirectly) generated transformations, re-articulations, and negotiations of social positioning wherever its impact reached, influencing everyday life and functioning of a great number of different collectivities and individuals. However, recent studies decidedly show that Roman imperialism(s) was not a stable and immutable phenomenon. Rather, it had changeable character, a variety of articulations, different levels of functioning and uneven impact on the Empire's and surrounding populations, and, contrary to the traditional belief, differed considerably (although not entirely) from the empires of the early modern age (Dietler 2005; Mattingly 2011). Although there are many and often mutually conflicting ways of how exactly to define the practices of dominance and their repercussions (Hoyos 2013: 5–10), when meticulously explicated, the concept of Roman imperialism(s) is successfully employed in relation to wide range of spheres and particular case studies: administration, institutions, relations with local elites and communities, economy, army, landscape and settlement patterns, urbanism, religion, funerary practices, art and architecture, symbolic systems, and interactions with neighboring societies (Mattingly 2011; Hoyos 2013; Gardner 2013; Janković et al. 2014; Janković and Mihajlović 2018; Gonzalez Sanchez and Guglielmi 2017). Nevertheless, any absolute evaluation of the character of the Roman sovereignty simply does not work since it was neither centrally dictated total rule of terror (although it certainly was for some) nor a world of benign welfare and absolute freedom. Symbolic and physical violence, opportunities and power gains, privileged and deprived, and winners and losers were all in the picture, producing the dynamic Empire of drastically diversified life stories (Mattingly 2011; Gardner 2013; Morley; Witcher in Pitts and Versluys 2015). Although there is a danger of "explaining all away" with higher-order generalization (some would even say truism) such as the concept of Roman imperialism is, if crossed with advanced theoretical-methodological frameworks, it certainly enables a wider grasp of the complexities and effects of the Roman imperial structure.

A critique of Romanization based on postcolonialism and different understandings of imperialism stimulated the discussion of identities in the Roman world. The problematization of the issue started with repositioning the importance of native identities but soon took on a much wider sway to encompass very different and various

approaches and topics. Generally, the researches try to employ the constructivist theory of identities in order to comprehend highly diverse ways and kinds of identifications in the context of the Roman Empire and neighboring worlds, especially taking into consideration how they were tied to material culture. The fundamental theoretical premise is that each individual engages in a plethora of associations with collectivities of different natures and levels, creating the array of social personae which are activated and lived in dependence to context. Particularly, identity studies of the Roman world tend to advance approaches for understanding in what ways were the surviving written accounts and material remains linked to mentioned basic notion and how did the individual and collective social roles and (self-)perceptions/representations change in relation to Roman imperial system. In this light, the issue of ethnicity has been the most frequently discussed (due to its pivotal part in nineteenth-century and twentieth-century scholarship), making the subject of relationship of local/regional ethnic affiliations with the Empire's social structure still ongoing (Derks and Roymans 2009). However, other types of identifications also received a substantial attention in the last couple of decades, and inquiries of ways of being Roman, status differentiations, profession, religion, gender, age, marginal groups, and ambiguous intersections of social roles produce valuable results (see Gardner 2013; Revell 2016; Janković et al. 2014; Janković and Mihajlović 2018; Gonzalez Sanchez and Guglielmi 2017). The best quality studies of these fields bring the insights from current social theory to archaeology, pointing out the situational, relational, and performative character of social positioning and trying to grasp how the identifications of the Roman world were created, maintained, reproduced, and changed through various sets of (routine and special) behaviors, beliefs, and materialities. Some of them also posed very important questions regarding the relation of individual agents and social structures/institutions of the high level, pointing to the (previously not realized enough) dialectical and very complex nature of such bonds (Gardner 2013; Revell 2016). Similarly fresh standpoint is employed in the studies of religion and underlines that individuals appropriated and lived religious experiences, practices, and ideas in many different ways which were strategic and even subversive. In this way, the socioreligious norms were not just reproduced but in the same time modified and transformed through everyday practices and interactions (Rüpke 2016). On the other hand, a large number of researches conducted so far are regrettably characterized by essentialistic utilization of the concept of identities and only wrap up the old notions (Romanization in particular) in new terminology. As with previous interpretational directions, constructivist theory of identification enables rewarding *multidimensional thinking about* instead of *two-dimensional reduction of* the Roman world but only with careful and reflective engagement with its postulates.

Recently, it has been proposed that the Roman world could be understood as a network of heightened interconnectedness and thus treated as global, which is why the theories of globalization could bring great benefits into the Roman studies. Although the concept of "globalizing Roman culture" was already advocated by Hingley (2005), it is now called for broadening of the original connotation (primarily as a frame for epistemological reflection on "hermeneutical relationship of the past and present"), to include experimental borrowing and adapting of the methodological apparatus used in the analysis of contemporary globalization process (Versluys in Versluys 2014: 15–19; Pitts and Versluys 2015: 3–25). According to this view, the globalization theories should contribute to the ending of dichotomized thinking and enable academics to leave aside binary conceptualization of the Roman world, no matter under what new name it might appear (Pitts and Versluys 2015: 8, 22–23). It has been suggested that the globalization theories also allow decentered understanding of the consumption practices in the Empire, pulling it away from the simplified notion of a single center of power that influenced provincial peripheries. In other words, economic and cultural processes in the Roman Empire should not be considered as necessarily linked to and boosted by imperialism but

as events which advanced in a less direct manner and depended on "pre-existing cultural geographies and economic systems" (Pitts in Pitts and Versluys 2015: 80). In this way, the studies of consumption of everyday artifacts and commodities are to be privileged as the approach which could reveal "degrees of global consciousness, participation and exclusion from aspects of global culture, and the general experiences of living in the Roman world for all social groups, especially non-elites" (Pitts in Pitts and Versluys 2015: 93). The discussions of such perspective include globalization of Roman visual material culture, the question of Roman urbanism as decentered globalization of local and localization of globally shared ideas of urbanity, Roman economy, mobility and ancient perceptions of their world, etc. (see case studies in Pitts and Versluys 2015). Shortly, there is a notion that globalization theories could assist very well in research of shared cultural symbols, practices, ideas, etc. and their dynamic and fluid trajectories throughout space, time, and variety of social contexts in the Roman world.

Although the applicability of theories of globalization within the Roman studies represents a valuable and interesting approach yet to develop, and it is certainly unavoidable in the context of omnipresent contemporary ideas of globalization (Hingley in Pitts and Versluys 2015), this theoretical path is strongly associated with serious difficulties (pointed out in different ranges by all the contributors in Pitts and Versluys 2015). To begin with, the concept of "globalized Roman world" could be wrongly comprehended as an axiom with normative meaning, i.e., as a kind of cultural totality which differed only in its local manifestations but actually accommodated the same cultural essence. Most often this viewpoint does not answer the basic questions – globalization of whom, by whom, of what, how, and by which exact mechanisms – which leaves the term very unclear, vague, and all-encompassing but at the same time deterministic. Furthermore, instead of overthrowing traditional dichotomies, the globalization perspective carries a risk of disguising them with general but equally generic pair of "global versus local." Finally and most importantly, it is crucial to remember that globalization speculations are just as ideologically and value-laden as any of the concepts they allegedly challenge. The idea and theories of globalization are intensely intertwined with power relations and embedded in the Western capitalistic conceptualization of the world, as well as in the (almost unconscious and uncontested) belief in the principles of commercialistic free market, economic development, and consumerism. With this severe shortcoming, the utilization of globalization as an explicatory model for the Roman world is linked with a great hazard of masking its power relations with allegedly faceless/neutral cover term or, worse, equalizing it with our own time and downplaying the crucial contextual particularities of both (Gardner 2013; Morley; Witcher in Pitts and Versluys 2015). Thus, globalization of the Roman world could surely come handy as loose metaphor for the increased connectivity, but immediate utilization of interpretative tools and themes developed for the contemporary setting remains open to doubt.

Finally, it is necessary to single out refreshing developments inside the CRCA which are drawing from so-called ontological/material turn in archaeology, i.e., consider material sphere not just as a passive product of culture but as an active agent, in a manner professed by actor-network, entanglement, and "post-humanism" theories (Versluys in Versluys 2014; Van Oyen and Pitts 2017). Such views point out that Roman archaeology was under the everlasting comprehension of objects through instrumentalist (things as tools) and representational (things as signifiers) approach, which treated artifacts as direct representations of people or historical processes. The traditional standpoint is inherent to modernist ontological separation of humans and things and denies that objects can have agencies and meanings outside those invested in them by people. In other words, there is a fixed common belief that things cannot act outside the (humanly determined) roles of proxies for certain aspects of life or symbols for some identity categories, which is the stance that needs to be revised and abandoned. In order to successfully do so, it is invited for shifting of general questions about objects from "what they meant and were used for" to "what

they are," "what activities they allowed," and "what they did" (Van Oyen and Pitts in Van Oyen and Pitts 2017). The changed sets of inquiries open very rewarding paths of comprehending the materialities of the Roman past and their relationship with general sociocultural processes: did the respective groups of objects constituted categories; how did some types emerge; what were the trajectories (i.e., relational constellations) and influences of particular kinds of things; in what ways did specific distributions happened; how did particular bodies of objects correlate with some of the general/global social, political, and economic trends or omnipresent kinds and types of artifacts; etc. In other words, the emphasis is on what certain classes of objects did in specific contexts and how their qualities and materialities impacted the wider dynamics of relational networks built not only by humans but other nonhuman material and immaterial entities as well. This perspective adds very important and often forgotten dimension in considerations of the Roman world – various and multileveled capacities that materiality brings into the picture. The important aspect here is that mentioned approach could essentially complement and enhance the older theoretical positions such as constructivist-performativity approach to social identifications or perspectives of structuration and power relations, although they are initially evaluated as generally less insightful than the latter (Van Oyen and Pitts in Van Oyen and Pitts 2017). Nevertheless, as with any theorizing, there are certain difficulties to be aware of. First is a danger of turning in truisms and inability of coming to any conclusion beyond "things have agency." Furthermore, it is very difficult to show the agency and trajectories of things really independent of referring to social identifications and historical frameworks. These are of course inseparable, but the problem lies in claimed autonomous potential of materiality which actually leads us back to old ontological separation of humans and things. However, with the realization that we research "emerging" and "becoming" (instead of "being") through behaviors, practices, and beliefs which are indivisibly pervaded with materiality, simplified interpretational framework of Romanization or similar stances could be completely and rightfully left behind and aside, not only in terms of overcoming Romano- or Euro- but also anthropo-centric ideas about the Roman past.

International Perspectives

Despite of being initiated and developed in the United Kingdom, CRCA has become a strikingly international field of research (Hingley 2012; Hingley in Versluys 2014). Even though it spread relatively quickly to other schools of Roman archaeology (most notably the Dutch school), this tendency should not be regarded as simple outcome of the direct and unilineal British influence. Along with the pioneering works that profoundly inspired and informed individual scholars and academic circles outside the United Kingdom, one should always be aware of the local/national theoretical revisions and reconsiderations of particular relations toward the Roman past. Therefore, the scope, types, and forms of CRCA depend on the peculiar developments of regional/national Roman archaeologies and even specific academic backgrounds of individual researchers. This is well illustrated by few recent volumes which demonstrate well the general application of more advanced interpretative/explicatory frameworks but with notably unequal success and quality (Derks and Roymans 2009; Janković et al. 2014; Janković and Mihajlović 2018; Gonzalez Sanchez and Guglielmi 2017). Indeed, the "global" Roman cultural templates are not seen anymore as indicators of becoming ethno-cultural Roman but as diversified and inventive local reactions to interplays with the imperial structure. However, some of these perspectives simply substitute the concept of Romanization with undeveloped and uncritical employment of some of the novel approaches, resulting in declarative invoking of "trendy" perspectives with simultaneous keeping of highly problematic traditional matrices. Additionally, in the environments where archaeology still operates with the idea that the evidence, typology, analogies, and reliance on written accounts speak for

themselves, Romanization continuously serves as "natural" explanation of the Roman past. In spite of these drawbacks, CRCA has received wide international attention which gives it a huge potential for developing sophisticated and as-much-as-possible bias-free approaches in the Roman studies.

Future Directions

The outcomes of CRCA are already manifold and evolve further, but its future directions will be shaped both by the reflective relations between particular schools of archaeology and the Roman past and the perspectives that general ideological/intellectual Zeitgeist will have toward it. Although there are no certainties, it is highly probable that future courses will rely heavily on some of the themes and approaches which are now emerging inside humanities, not least because of the generally increased familiarization and involvement of archaeologists in contemporary theoretical flows (González-Ruibal 2013). It is important to remember that as "every generation has its way" so too has its Roman Empire, relationship with and peculiar interpretations of it features. Still, judging by actual trends of questioning phenomenology, ontology, anthropocentric perspective, and ever-growing utilization of advanced hard science analyses, it is reasonable to expect few parallel lines of progression, which will intersect, at least in some segments and the work of some scholars, to award inspirational views on dynamics and relationalities of the Roman world. Nevertheless, it is hard to expect that the Romanization-like ways of thinking will disappear completely as they are practically intact in some academic contexts and operate on very simplified logic which seems to be still very alluring.

Cross-References

- ▶ Post-processual Archaeology
- ▶ Romanization
- ▶ Second Modernity and the Second Phase of European Colonialism
- ▶ Unilinear Evolution and Lineal Time: A Critique

References

Derks, T., and N. Roymans, eds. 2009. *Ethnic constructs in antiquity: The role of power and tradition*. Amsterdam: Amsterdam University Press.

Díaz-Andreu, M. 2007. *A world history of nineteenth-century archaeology: Nationalism, colonialism, and the past*. Oxford: Oxford University Press.

Dietler, M. 2005. The archaeology of colonization and the colonization of archaeology: Theoretical challenges from an ancient Mediterranean colonial encounter. In *The archaeology of colonial encounters: Comparative perspectives*, ed. G.J. Stein, 33–68. Santa Fe: School of American Research.

Evans, R. 2008. *Utopia antiqua: Readings of the golden age and decline at Rome*. London/New York: Routledge.

Gardner, A. 2013. Thinking about Roman imperialism: Postcolonialism, globalisation and beyond? *Britannia* 44: 1–25.

González-Ruibal, A., ed. 2013. *Reclaiming archaeology. Beyond the tropes of modernity*. London/New York: Routledge.

Gonzalez Sanchez, S., and A. Guglielmi, eds. 2017. *Romans and barbarians beyond the frontiers. Archaeology, ideology and identities in the North*. Oxford: Oxbow Books.

Hingley, R. 2005. *Globalizing Roman culture: Unity, diversity and empire*. London: Routledge.

Hingley, R. 2012. Romanization. In *Encyclopedia of global archaeology*, ed. C. Smith, 6373–6380. New York: Springer.

Hodgen, M.T. 1964. *Early anthropology in the sixteenth and seventeenth centuries*. Philadelphia: University of Pennsylvania Press.

Hoyos, D., ed. 2013. *A companion to Roman imperialism*. Leiden: Brill.

Isaac, B. 2004. *The invention of racism in classical antiquity*. Princeton: Princeton University Press.

Janković, M.A., and V.D. Mihajlović, eds. 2018. *Reflections of the Roman imperialisms*. Newcastle: CSP.

Janković, M.A., V.D. Mihajlović, and S. Babić, eds. 2014. *The edges of the Roman world*. Newcastle: CSP.

Laurence, R. 2012. *Roman archaeology for historians*. London: Routledge.

Mattingly, D.J. 2011. *Imperialism, power and identity: Experiencing Roman Empire*. Princeton: Princeton University Press.

Pitts, M., and M.J. Versluys, eds. 2015. *Globalisation and the Roman world*. Cambridge: Cambridge University Press.

Revell, L. 2016. *Ways of being Roman*. Oxford: Oxbow Books.
Rüpke, J. 2016. *On Roman religion. Lived religion and the individual in ancient Rome*. Ithaca: Cornell University Press.
Scott, S., and J. Webster, eds. 2003. *Roman imperialism and provincial art*. Cambridge: Cambridge University Press.
Stoczkowski, W. 2002. *Explaining human origins: Myth, imagination and conjecture*. Cambridge: Cambridge University Press.
Van Oyen, A., and M. Pitts, eds. 2017. *Materialising Roman histories*. Oxford: Oxbow Books.
Versluys, M.J. 2014. Understanding objects in motion. An *archaeological* dialogue on Romanization (with responses from Hingley, R., Hodos, T., Stek, T.D., van Dommelen, P., and Woolf, G.). *Archaeological Dialogues* 21: 1–64.
Woolf, G. 2011. *Tales of the barbarians: Ethnography and empire in the Roman West*. Oxford: Wiley-Blackwell.

Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories

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Introduction

The Greeks were a mobile people who regularly interacted with a host of non-Greek populations near and far, from the Bronze Age through the historical periods. In particular, a strong maritime orientation facilitated contact with distant people and places. These interactions were both direct and indirect; peaceful and violent; purposeful and incidental; ephemeral and profoundly influential; short-lived and enduring. This entry attempts to characterize current issues and debates surrounding the archaeology of cross-cultural contact from the Bronze Age to the end of the Classical period (Figs. 1 and 2). Once Alexander and his successors initiated the Hellenistic world, an entirely new set of issues concerning Greek identity and culture came into play, which for reasons of length are not included here.

Definition

The simplest way to envision cross-cultural interaction is in terms of the movement of people from one culture area to another, but the reality is much more complex. Cohabitation with non-Greek populations at home and especially in colonies abroad provided the greatest cultural impact, but is only one of several dimensions of cross-cultural interaction. Profound innovations in language, art, and technology were initiated indirectly through the activities of a small number of merchants, craftsmen, and other travelers. We learn about these contacts through ancient texts (including prose histories; verse epics, odes, tragedies, and comedies; and inscriptions) and from the archaeological record. Durable archaeological objects are a minimal residue standing in for a diverse array of perishable and non-material products, including foodstuffs, raw material, technologies, aesthetic tastes, and cult practices. These may be passed directly from one people to another, or they may travel indirectly through a series of intermediaries. Objects and ideas are commonly transformed in function and meaning as they are transferred from one cultural system to another. To cite one example, in the Archaic period, *kouros* and *kore* statues derived from Egyptian statuary (Fig. 3) were adapted to the project of aristocratic self-definition in Greece, as dedications at sanctuaries and prominent markers on elite graves. In these and similar cases, foreign objects and ideas could assume new roles, often as elements of social contestation, once they were "domesticated," i.e., integrated into intelligible codes or systems of meaning in Greek society.

Cross-cultural interaction can be characterized along several dimensions: (1) the occasions, or *modes*, of cross-cultural contact; (2) the instigator(s) of and participants in the contact; (3) the location of the contact; (4) the material and intellectual products (goods and ideas) moved and exchanged through the contact; and (5) the ramifications and effects of cross-cultural contact. The usual modes of contact include exploration, trade, colonization, diplomacy, military action, and communal activity (such as religious pilgrimage). These categories obviously overlap in

Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories, Fig. 1 (**a**) Map of the Mediterranean with sites mentioned in the text; (**b**) Detail map of the Aegean with sites mentioned in the text. (Base maps ©Daniel Dalet)

multipurpose travels and interactions. Exploration and trade relations for the purpose of gaining access to supplies of raw materials, particularly precious metals in which Greece is poor such as copper, tin, and gold, began at least as early as the Bronze Age and continued through the historical periods. Colin Renfrew's "modes of exchange" (Renfrew 1975: 41–43) are still useful models for the myriad locations and relationships through which trade was carried out (Fig. 4). Exploration

Conventional period name	Approximate calendar dates (B.C.)	Key events
Early Bronze Age	3100–2100	Early Cretan contacts with Egypt
Middle Bronze Age	2100–1600	Minoan palaces on Crete
Late Bronze Age	1600–1150	Mycenaean palaces on Greek mainland
Iron Age	1150–700	"Dark Age" c. 1150–850; "Eighth Century Renaissance"
Submycenaean	1150–1050	Nadir of Greek overseas contacts
Protogeometric	1050–900	Prominence of Lefkandi on Euboea island
Early Geometric	900–850	Phoenicians re-engage with Aegean
Middle Geometric	850–750	Pithekoussai settled; alphabet adopted from Phoenicians
Late Geometric	750–700	Great age of colonization underway
Archaic	700–490	Colonies reach from Spain to Black Sea
Classical	490–323	Persian Wars conclude in Greek victory, 479 B.C.

Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories, Fig. 2 Basic chronological chart for later prehistory and early history

was also directed toward the foundation of colonies, ranging from coastal footholds to secure access to trade items, to permanent agricultural settlements. "Protocolonial" activity can be recognized already among the Minoans and Mycenaeans of the Bronze Age, a prelude to the massive experiment in cross-cultural interaction that was the great colonizing period (c. 800–500 BCE). Although the Greeks were intrepid explorers, contact was also initiated from outside, with Phoenician westward expansion making the most enduring contribution in the form of the adaptation of the West Semitic alphabet to the Greek language. Greeks and Phoenicians encountered one another in their respective homelands as a result of the impulse to trade, and subsequently in the central Mediterranean where they were both active in establishing coastal settlements and trading posts. Across the Mediterranean, networks of interaction resulted in widespread sharing of material culture, technology, and customs. While the Greeks transmitted an appreciation for their fine painted pottery and cultural practices such as wine-drinking and sympotic feasting, they absorbed iron-making technology, the decorative motifs and aesthetics of the "Orientalizing" style, and the Phoenician alphabet. Further, the crucible of colonial interaction was partially responsible for the formation of a collective, "Hellenic," identity in the Archaic and Classical periods (Mitchell 2007; Malkin 2011). In recent years, archaeologists have shown intense interest in exploring each of these dimensions, through a combination of archaeological fieldwork, laboratory analysis, and theoretical modeling.

Historical Background

In the Bronze Age, two complex, palace-based societies arose in the Aegean – the Minoans on Crete and the Mycenaeans on the Greek mainland. Both are thought to have emerged under some influence from an already established state. In the years just before the first palaces appeared on Crete, Minoan contacts with Egypt and the Near East increased dramatically, embracing not only exchanges of material culture such as scarab seals and stone vessels, but also transfer of technologies of metal and faience working, as well as the sail. Some of the structural changes in Cretan society that paved the way for the first palaces, including urbanization and administration using hieroglyphic writing and seals, may have been inspired by these contacts. The presence of Cretan

Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories, Fig. 3 The Kroisos kouros, from Anavyssos (Attica). National Archaeological Museum, Athens. http://upload.wikimedia.org/wikipedia/commons/e/ea/Kouros_anavissos.jpg

craftsmen in the East is implied by Aegean-style wall paintings at Tel Kabri in Israel, Alalakh and Qatna in Syria, and Tell el-Dab'a in Egypt, ranging from the late seventeenth to the fifteenth century BCE (Cline et al. 2011). Egyptian New Kingdom tomb paintings appear to depict Cretans, described as "Keftiu," presenting gifts to the pharaoh (Panagiotopoulos 2001).

The rich Shaft Graves of Mycenae, which represent the first stirring of complex society on the mainland, betray strong influence from Neopalatial Crete in iconography, ceramic forms and styles, metalworking, and funerary architecture. It is often suggested that a "special relationship" with one or more Minoan palaces gave nascent elites at centers like Mycenae access to exotic materials and artisans. The influx of Minoan goods and ideas destabilized the egalitarian social structures of Middle Helladic Greece and created opportunities for social differentiation, setting into motion a gradual trajectory toward the Mycenaean palaces (Voutaski 2010).

The discovery of Mycenaean fine painted pottery at hundreds of sites from the Near East to the central Mediterranean shows the extent to which the palaces participated in cross-cultural trade networks, but the nature of those relationships is not so easy to ascertain. It is still uncertain whether Mycenaean merchants or palatial representatives actually visited all of the coastal areas where the pottery appears, rather than relying on middlemen such as Cypriots to transship Mycenaean products (Bass 1998). In Egypt, there are no certain visual representations of Mycenaeans comparable to the Keftiu depictions. At Tell el-Amarna (ancient Akhetaten, the capital of the heretic pharaoh Akhenaten), thousands of sherds of Mycenaean pottery have been recovered, but this impressive corpus is not matched by a single mention of Mycenaeans in the contemporary Amarna archives (see Hankey 1981). On the other hand, two artifacts offer tantalizing but controversial evidence for more significant relations. The so-called Aegean List inscribed on the back of one of five statue bases at the mortuary temple complex of Amenhotep III (reign c. 1390–1352 BCE) mentions more than a dozen places in the Aegean, and has been interpreted by some as the itinerary of a royal diplomatic mission. The second artifact, a papyrus fragment from Amarna dated to the mid-fourteenth century BCE, bears a painted scene in which a group of Mycenaean-looking soldiers appears to fight alongside Egyptian comrades. If this interpretation is correct, it suggests that the later tradition of Greek mercenary activity around the Mediterranean has a Bronze Age antecedent.

The poverty of Greece in a host of raw materials, particularly metals, compelled the Mycenaean palaces to tap into eastern Mediterranean networks in which copper, tin, and other metals circulated, and may have encouraged early

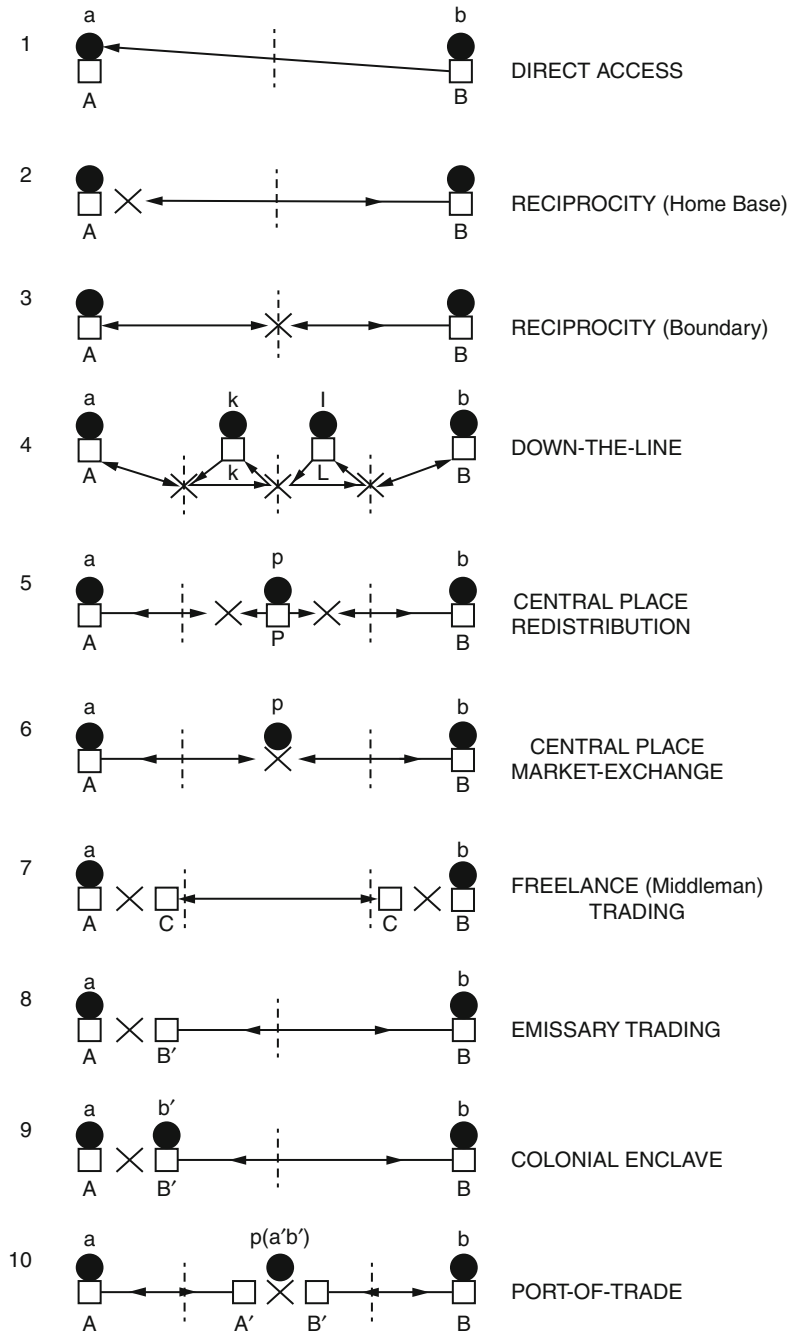

Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories, Fig. 4 Graphic representation of Colin Renfrew's modes of exchange (Renfrew 1975: 42, Fig. 10)

exploration of Sicily and southern Italy. The concentration of precious metal objects in tombs and the careful control over supplies of raw metals implied in the Linear B tablet archive at Pylos demonstrate how essential they were to the Mycenaean palatial elite. The Uluburun ship, which sank off the coast of southwestern Turkey c. 1300 BCE with a primary cargo of 10 t of copper and 1 t of tin, may have been sailing toward one of the Mycenaean palaces (Pulak 2005). Few finished objects of foreign origin have been found in Mycenaean Greece, however, and the pattern of their distribution suggests that palaces had rather specific relationships, e.g.,

Mycenae with Egypt and Tiryns with Cyprus. Further, the Linear B tablets contain virtually no explicit references to long-distance trade, with the result that scholars must resort to reading ethnic identifiers ("Cypriot" persons or products; "Women of Asia" taken as slaves) or exotic commodities (sesame, gold) to reconstruct cross-cultural contact of any kind (Chadwick 1976).

The Minoans and Mycenaeans established contacts and later colonies in the Aegean islands and on the Aegean coast of Asia Minor at Miletus; the Mycenaeans pushed west into the central Mediterranean. Their extra-Aegean interventions and trading activities may have had little cultural impact, however. A contextual analysis of the Mycenaean pottery at the *emporium* (trade outpost) at Ugarit on the Syrian coast revealed that these fineware vessels were neither restricted in their circulation nor held in particularly high esteem (van Wijngaarden 1999). The Mycenaean colony at Miletus is a special exception since most scholars now accept that the *Ahhiyawa* in Hittite New Kingdom records refer to Mycenaeans, who possessed a foothold at *Millawanda*, or Miletus. The Ahhiyawa were an irritant on the western flank of the Hittite Empire, but at least for a time, the Hittites accorded the king of the Ahhiyawa the status of Great King, equivalent to other Near Eastern monarchs. This short-lived diplomatic status ended before the Mycenaean settlement at Miletus was finally destroyed in the later thirteenth century BCE (Niemeier 2003).

The Mycenaean world experienced various disturbances in the second half of the thirteenth century BCE, culminating in the final collapse and disappearance of the palatial system shortly after 1200 BCE. The causes of the collapse are largely speculative, but a complex mix of universal and locally specific, environmental and social/cultural, factors cannot be doubted (see Middleton 2010). Disruption of long-distance trade routes supplying raw materials, linked with widespread disturbances in the eastern Mediterranean, may have been one contributing factor that undermined the capacity of the Mycenaean palaces to reward loyal elites with status goods and to produce weapons and armor.

It was long assumed that the collapse of the palace system ushered in a Dark Age of some 400 years duration, but recent research has challenged the characterization of the period 1200–800 BCE as a time of grinding poverty and isolation. There was no complete break in cross-cultural communication; in the twelfth century BCE, Tiryns maintained contacts with Cyprus and Crete, and small objects from Syria, Egypt, Mesopotamia, and Cyprus were deposited in the chamber tomb cemetery at Perati on the east-facing Attic coast. Maritime activity was especially vigorous on both sides of the Euboean Gulf, where depictions of galleys were painted onto pottery (Crieelard 2006; Dakoronia 2006). At Lefkandi on Euboea's western coast, Cypriot, Egyptian, and Syro-Palestinian objects were placed in graves in the mid-eleventh century BCE. Iron technology was transmitted to Greece from Cyprus during this period, perhaps by the descendants of Greeks who fled the palatial collapse. Other descendants of Greek refugees may have formed the Aegean cultural element that is strongly expressed in the Philistine cities of the southern Levant. In the depths of the Dark Age, c. 950 BCE, Lefkandi produced a remarkable apsidal building measuring 45 × 10 m with mud-brick walls on a stone socle and an exterior peristyle of wooden posts. Near the center of the building's interior were two graves, one containing the cremation burial of a male and the inhumation of a female, and the other four sacrificed horses. The bronze vessel holding the man's remains and some of the woman's jewelry were Bronze Age heirlooms from Cyprus and the Near East. Subsequent burials in the adjacent Toumba cemetery (c. 950–825 BCE) contained many examples of bronze and faience vessels of Egyptian or Syro-Phoenician origin (Thomas and Conant 2003: 85–102). In the postpalatial period, the Cypriots pursued an active and independent overseas agenda with ties in the Levant, the Aegean, and the central Mediterranean; it is conceivable that Greeks accessed Near Eastern materials through Cypriot intermediaries. Nevertheless, sites with international contacts were exceptional and despite more positive assessments and new light shed on the Dark Age, the view from Greece was still one of attenuated contacts with the outside world by comparison with Mycenaean palatial times, and much

diminished indicators of social, political, and economic complexity. A general model that sees palatial collapse and a subsequent twilight of Mycenaean culture from 1200 to 1000 BCE, followed by rupture and depression between 1000 and 800 BCE, and finally regeneration of complex society after 800 BCE, has many adherents (Morris 2006).

The explanations for regeneration in the so-called Eighth-Century Renaissance are varied. Population growth, perhaps linked to a favorable shift to a wetter, cooler climate in the Mediterranean, is reflected in significant increases in site numbers and burials (see Morris 2009). Phoenician commercial expansion westward, driven at least in part by pressure from the Neo-Assyrian Empire, began in the ninth century BCE and soon impacted Greece. It is possible to trace early Phoenician routes and entrepôts in the archaeological record. The Tyrians established a colony on Cyprus at Kition in the second half of the ninth century BCE, followed by enclaves at a number of indigenous coastal settlements well situated to exploit copper resources and as transshipment nodes. En route to the west, the Aegean was integrated into Phoenician maritime networks, and some places became important stopovers. On a direct sea lane to the central Mediterranean lay Rhodes and Crete. After sporadic traces of contact in the ninth century, during the eighth century BCE, Rhodes imported Phoenician luxury goods (ivory, shell, gold, and silver jewelry), and workshops on the island produced imitations of Phoenician and Cypriot pottery and faience (see Markoe 2000). Crete too was visited fairly regularly by the ninth century. At the port of Kommos on Crete's southern coast, a Phoenician-style tri-pillar shrine founded c. 800 BCE, associated with Phoenician pottery of the ninth and eighth centuries, gives witness to mariners' worship and ritual banqueting (Shaw 1989). From Rhodes and Crete, the Phoenicians established other sea lanes through the Cyclades and via Kythera to the Greek mainland. These forays activated Euboean interest and initiated Greek-Phoenician entanglements that would take on increasing frequency and significance over the next few centuries. The Euboeans became prominent partners in east–west maritime trade. Al Mina, a harbor founded on the north Syrian coast c. 800 BCE, produced for the first time a large quantity and wide range of Greek ceramics, well in excess of the amounts known from contemporary sites of the Levant. To some, this distinction suggests a Greek settlement or a Greek-Phoenician foundation, but on archaeological grounds, this is unlikely, since indigenous pottery is at least as abundant as Greek, and elements of Greek domestic life, notably a kitchen assemblage, are conspicuously absent. More plausible is that Al Mina was an emporium frequented by Greek traders, who perhaps resided there on a seasonal basis. The initial exposure of Greeks to the Phoenician alphabet must have occurred in a setting of intensive interaction, either at an eastern emporium such as Al Mina or Kition, or aboard merchant ships carrying multinational crews (Woodard 1997).

Greek colonization around the Mediterranean, falling mainly c. 800–500 BCE, was the most important development in cross-cultural interaction prior to the military conquests of the Hellenistic period. The so-called Aeolian and Ionian migrations of Greeks to Anatolia's Aegean coast as early as the eleventh to tenth centuries BCE are largely the creation of retrospective traditions that served the needs of Greeks of the Persian War era and later for civic propaganda and to justify hegemonic claims, such as Athenian leadership of the Delian League (see Rose 2008). Archaeological evidence for the organized establishment of Greek colonies abroad is scant before the eighth century, but once underway, the proliferation of colonies was rapid and spread from Spain to the Black Sea.

The motivations for planting settlements beyond the Aegean must have been diverse. The perennial search for metals, focused increasingly on iron ores, encouraged early exploration, but to a great extent, Greek colonists sought new agricultural territories. Population growth may have put some pressure on land by the eighth century, but it is more accurate to say that common farmers were incrementally disenfranchised by a burgeoning aristocracy that appropriated the best agricultural land. Joining these unfortunates must have been victims of intra-elite conflict, sons shut

out of inheritance, and miscellaneous adventurers, though in later stages, colonists were formally conscripted and some method must always have been in place to ensure that the party had the necessary blend of numbers and skills to survive. Some colonial migrations occurred under threat: In the late seventh and sixth centuries BCE, the Milesians and Phocaians sent out many colonies to the central Mediterranean and the Black Sea under pressure from the Achaemenid Empire. Traditions about colonial foundations and their affairs were recorded in literature and inscriptions in the Classical period and beyond (for examples, see Dillon and Garland 2010). Many colonial forays, about which we know little or nothing, failed.

Pithekoussai, the modern island of Ischia in the Bay of Naples, is usually thought to be the site of the earliest Greek colonial foundation c. 775 BCE. The original impetus for the settlement may have been to secure access to Italian metal ores, perhaps following along with the Phoenicians, who were exploiting sources in Spain, Sardinia, and North Africa. Yet, within a generation, the population reached 5,000–10,000, according to cemetery evidence, possibly contributing to the foundation by c. 730 BCE of Cumae, a colony on the Italian mainland with far more space for agricultural expansion. Although Pithekoussai was held by tradition to have been a Euboean foundation, archaeological evidence indicates a mixed population of Euboeans, East Greeks, Phoenicians, and indigenous people (Ridgway 2000). This cosmopolitan milieu is vividly evoked by the late eighth century cremation burial of a 10-year-old boy, furnished with Protocorintian and Phoenician style pottery and the famous "Cup of Nestor," a Late Geometric Rhodian kotyle inscribed with a whimsical graffito in accomplished Euboean script: "I am the cup of Nestor, good to drink from. Whoever drinks from this cup, may desire of fair-crowned Aphrodite seize him" (Osborne 2009: 109). The reference to Nestor seems a deliberate allusion to a story in the *Iliad* (11.632–637) about a golden cup that only the old Pylian king could lift.

The western episodes in Homer's *Odyssey* are often read as metaphors for early colonizing expeditions, and can be understood in light of cross-cultural encounters. Once the action moves from the Aegean and eastern Mediterranean into the central Mediterranean, places and characters shift from the real and identifiable (e.g., Pylos, Sparta, the Nile River) to an unreal world of monsters, goddesses, and the realm of the dead. Some of the sea-tales in the *Odyssey* might reflect the imperfect knowledge of these new worlds, and fears of hostile indigenous people. Odysseus and his men repeatedly encounter natives living in incomprehensible ways, from the Cyclopes living in isolation from one another and failing to recognize the rich agro-pastoral and maritime potential of their offshore island (*Odyssey* 9.116–139), to the cannibalism of Scylla, the Cyclopes, and the Lystraegonians. False or exaggerated representations of the "other" in seafaring lore served to underscore the dangers of incipient contacts in the absence of a common language or customs.

Once colonial expansion opened up distant worlds, the effect on the Greek mainland was dramatic. New trading opportunities in the West prompted Corinth to found colonies such as Corcyra and Syracuse, and to export its distinctive painted fineware, which dominated western markets between c. 725 and 575 BCE until superseded by Athenian black-figure and red-figure production. Etruscan elites, from whom Greek merchants sought metals, became consumers of Greek pottery, aesthetics, and the alphabet. In the East, the mobility of Greek colonists, merchants, craftsmen, and mercenaries during the eighth and seventh centuries resulted in the introduction of a range of craft skills and artistic influences from Anatolia, the Levant, and Egypt to Greece. Among these were techniques in bronze working and textile manufacture, and the striking "Orientalizing" style in pottery, characterized by a new range of decorative motifs, most prominently griffins, lions, sphinxes, lotuses, rosettes, and palmettes, arranged in horizontal friezes across the body of the vessel (Fig. 5). The growth of Panhellenic sanctuaries in Greece, particularly at Delphi and Olympia, was bolstered by colonial dedications and the efforts of colonials to proclaim their Greek identity by participating in mainland communities of cult. By Classical times, general

Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories, Fig. 5 Orientalizing motifs on a Protocorinthian olpe c. 640–630 BCE, from Corinth. Louvre Museum, Paris. http://upload.wikimedia.org/wikipedia/commons/c/cc/Olpe_sphinx_Louvre_Cp10475.jpg

prosperity and population growth in partly urbanized city-states sometimes strained agricultural resources. Athens relied to some degree on imports of Black Sea grain, and one inscription records that Cyrene, a prosperous Greek colony in North Africa, distributed a gift of 50,000 t of grain to 41 cities on the Greek mainland and islands in response to a general famine in 330–326 BCE (Tod 1948: #196). These examples merely scratch the surface of the free flow of goods and influences in all directions, but they illustrate the profound effects of cross-cultural interaction and the central role of colonization in shaping Greek history.

Warfare, and the diplomatic interactions surrounding it, introduced violent cultural encounters, and the Persian Wars were particularly pivotal in helping to define a Greek identity in opposition to a caricature of Eastern culture. Greek mercenary activity, so familiar to us from Xenophon's *Anabasis*, was a fixture of the Archaic and Classical periods (Trundle 2004).

Key Issues/Current Debates

Current discourse concerning cross-cultural contact in the ancient Greek world is best understood in the context of a postcolonial scholarly milieu. There is a pronounced movement away from Helleno-centric perspectives, including notions such as "Hellenization," toward investigating cross-cultural interactions as diverse and locally contingent encounters in which indigenous communities are active agents who, more often than not in the period under consideration, were able to selectively adopt or reject elements of Greek culture, and who negotiated their relationship with colonists. There is also a realization that in these increasingly nuanced and situational scenarios, the "Greek–native" binary is both untenable and archaeologically problematic. Much attention has been directed to deconstructing notions of identity and ethnicity, and to exploring archaeological approaches that may result in meaningful insights on cross-cultural interaction. The encounters of Greeks with non-Greeks around the Mediterranean have been examined across multiple scales, from microregions to world systems, using the language of connectivity and network analysis.

A number of theoretical perspectives begin from the premise that ancient societies did not exist in isolation, but tended naturally to interact across geographic and cultural boundaries. The late nineteenth and early twentieth century CE witnessed the final phases of European colonialism around the world; the virtual enslavement of entire nations was justified by various means, including explicit comparison with Greek colonization or the imperial expansion of Rome. V. Gordon Childe's diffusionist models of *ex oriente lux* seemed to fit the archaeological record and support the notion that human advances emanated from certain centers of enlightenment and diffused outward over time. The radiocarbon revolution of the post-World War II years appeared to

confirm a pattern of the gradual spread of agricultural and metalworking technologies from the Near/Middle East westward.

These ideas can be characterized as *hierarchical* and *generalizing*, in that they assume relationships of inequality between dominant and acquiescent partners, and they tend to work at broad geographical and temporal scales in which entire corporate entities – societies or social systems – are the actors. A natural outgrowth of hierarchical models of cross-cultural interaction was a focus, beginning in the 1970s, on *cores* and *peripheries*. A typical scenario might involve a powerful center or core seeking raw materials from a distant and comparatively underdeveloped periphery. A coherent framework for these ideas was found in the *world systems theory* (WST) of Immanuel Wallerstein (1974), which sought to explain the global emergence of modern capitalism in terms of European core states siphoning off raw materials from politically and technologically underdeveloped Third World nations. Using superior political organization and technology, these cores exploited the periphery with seeming impunity by exercising control over production, transportation, and communication. In spite of Wallerstein's own objections, WST in some form has been applied to the ancient world in the Near East, the Mediterranean, Mesoamerica, the American Midwest, and elsewhere. Whether such world systems of dominant cores exploiting distant peripheries existed in the ancient world – indeed, whether WST has a useful application in archaeology – has been sharply debated for decades. Applied to the Greek world, the existence of a proliferation of small, independent political units from prehistory to the end of the Classical period makes it difficult to speak of a powerful core able to dominate a distant periphery. A dubious holdover from Wallerstein's original formulation is the absence of agency in the periphery. The more plausible reality is that neither the foreign party, separated from its center of power, nor the indigenous community, less developed politically and economically, could impose its will forcibly; thus, some form of accommodation had to be negotiated. As a consequence, each encounter was unique and contingent upon specific local and historical process, and generalizing perspectives such as WST have been criticized as unable to capture the diversity of these cross-cultural encounters (see Stein 1999).

On the other hand, critics often fail to acknowledge that WST has been modified to better fit the circumstances of the ancient world. Nick Kardulias (2009: 54) recommends the name *world systems analysis* (WSA) to emphasize the multiplicity of theoretical approaches now assembled under the world systems umbrella, and to make a clear distinction between current applications and Wallerstein's original model. Among the refinements is the realization that "complete domination of a peripheral zone was technologically and politically impossible" (Kardulias 2009: 58); accordingly, relations are described not in terms of domination or hierarchy but as differentiation of roles in interregional economic networks. Agency is accorded to communities who are able to negotiate the terms of their peripherality. By accommodating valid critiques and riding contemporary interest in globalization, WSA emerges as potentially complementary to the study of cross-cultural interaction at the local or regional level.

Current research on cross-cultural interaction is profoundly influenced by the postcolonial critique of European colonization, which seeks explicitly to restore agency to colonized societies by examining their responses, which might include various forms of resistance to, or selective adoption of, colonial culture (Lyons and Papadopoulos 2002). Furthermore, the general concern of postmodern studies to deconstruct and fragment conventional categories has caused notions of Hellenization, in which indigenous people are passive recipients of Greek knowledge and culture, to fall out of favor as has "Romanization" for the Roman world. Curiously, however, the postcolonial critique as a modern literary and political movement is not particularly well suited to describing or analyzing Greek colonization around the Mediterranean, because it focuses primarily on the specific conditions of modern European imperial oppression and the efforts of colonized people to regain agency for their own histories. As a result, this point of view tends to perpetuate the assumption of relationships

of dominance and dependence, of static and monolithic entities embedded in asymmetric and mutually antagonistic relations, replicating Wallerstein's colonial world of cores and peripheries. Yet Greek colonization of the eighth to sixth century BCE was nothing like the British Empire, or even the Roman Empire. A few obvious differences were the absence of a nation-state, the lack of a coherent imperial strategy or "civilizing" mission, and the essential independence of the colony from the mother city (claims to the contrary were usually pressed only at times when crucial strategic imperatives were at stake, or when some advantage was to be had from a successful colony, as in the famous case of Thera from Cyrene; see Osborne 2009: 8–17). It is highly debatable whether Greek colonists of the Late Geometric to Archaic periods were ever able to dominate indigenous peoples any more than Minoan or Mycenaean colonists had before them.

An important, and vigorously debated, question is whether cross-cultural interaction in colonial settings helped to forge collective Greek identities – a sense of common "Greekness" or "Hellenicity" based on shared traits and practices in contrast to those of indigenous people. Ethnicity, or ethnic identity, has attracted the most attention, but shared age, gender, cult practice, and geographical territory are alternative criteria for the formation of collective identities. Identities are constructed, rather than inherent, self-definitions, and as such are deployed situationally and change over time. Multiple identities can and do exist for an individual or community at any given time; a Greek inhabitant of Syracuse might think of himself simultaneously as a citizen of the Syracusan polis, a colonist from Corinth, a Dorian, a Greek, and a *Sikeliote* (Greek living in Sicily) (Malkin 2011: 18–19). These cross-cutting and sometimes competing identities could be invoked strategically to fit the situation: In 424 BCE, Hermocrates the Syracusan urged representatives of the Sicilian Greek cities to place their common interests as Sikeliotai, neighbors sharing an island home, ahead of their civic and ethnic (Dorian, Ionian) identities in order to meet the Athenian threat (*Thucydides* 4.61).

Ethnicity as a special form of collective identity has been foregrounded because of Jonathan Hall's provocative thesis on ethnogenesis in Greek society (Hall 1997, 2002). Hall challenged the prevailing notion, most explicitly expressed by anthropologist Frederik Barth, that "core ethnicities" do not exist; rather, ethnic groups and their boundaries are defined *oppositionally* against the traits and practices of others (Barth 1969). According to structuralists like Lévi-Strauss, humans are mentally predisposed to this sort of binary thinking. By this definition, colonial encounters would *prima facie* be ideal crucibles of ethnogenesis as Greeks recognized their stark differences with natives and at the same time all that they shared with Greeks wherever stationed. Hall proposed, however, that in the Archaic period, a common Hellenic identity was achieved by *aggregative* means through the creation of mythical genealogies by which the traditional "sub-ethnicities" (Dorian, Ionian, Aeolian, Achaean, etc.) were subsumed under a common, fictive set of Panhellenic kinship relationships. Only later at the time of the Persian Wars did the need to unite the Greeks against a barbarian Other result in recourse to an oppositional sense of common identity composed on cultural rather than ethnic grounds: Herodotus (8.144.2) famously has an Athenian envoy appeal to multiple dimensions of a collective Greek identity on the eve of the Persian invasion of Athens: "Again there is the Greek nation—the community of blood and language, temples and ritual; our common way of life…" (transl. Aubrey de Sélincourt). Hall denied that colonization made a significant contribution to a common Hellenic identity, because the cross-cultural experience of difference forged only civic or regional, not Hellenic, concepts of identity.

Hall's specific criteria for ethnicity and ethnogenesis – common descent and place of origin – in the Archaic period have been generally criticized as too narrow (Antonaccio 2001; Malkin 2001; Mitchell 2005). Lynette Mitchell emphasizes the role of cult in ethnogenesis: In the Iron Age, when regional authority was weak or absent, communities of cult served as aggregative centers of identity formation, and certain

sanctuaries grew to regional and finally Panhellenic prominence as at Olympia and Delphi, contributing heavily to a common Hellenic identity. In at least one case, an oppositional sense of Hellenic identity was fostered in a colonial setting in the sixth century BCE. At Naukratis in the Nile Delta, a common Greek sanctuary known as the Hellenion was established on land set aside for the Greeks to build altars and temples to their gods (*Herodotus* 2.178). The genealogical construction of identity was in fact far from universally inclusive or accepted; some ethnic groups with key claims on mythic traditions were marginal or excluded, and Hall is dismissive of alternative origin myths, particularly claims of autochthony by Athenians, Arcadians, and others. Further, mythological genealogies can be seen as one of the "tools of exclusion" by which emerging aristocracies monopolized power (Tandy 1997: 141–165); just how pervasive this Hellenic identity was among the lower registers of society is questionable. Cult, language, and material culture may therefore have had broader implications for ethnogenesis than Hall allows. To another view, a collective Hellenic identity emerged in the Archaic period from the interaction of the aggregative forces of cult and kinship with the gradual process of finding difference among people who did not share Greek language and practices (Mitchell 2005: 416).

Literary sources tend to be privileged over archaeological data in discussions of identity in cross-cultural contact scenarios, but as they rarely originate from the "front lines" and are often much later than the events they describe, they require a good deal of source criticism and interpretive effort. Because the archaeological record can be equally ambiguous, there is an especial need to develop archaeological concepts and methods to explore cross-cultural contact in situ. Such a contextual approach can be applied to the study of interaction in colonial situations, or to assess the meaning and impact of imported objects and ideas, by working from the local and particular to the global and general. Several archaeologists have taken up this challenge specifically in the colonial realm. Interactions between Greeks and indigenous communities in Sicily and southern Italy have been extensively evaluated and can serve as a good representation of the contextual approach. Carla Antonaccio (2001) suggests that we contextualize each situation by examining precolonial, colonial, and postcolonial levels, with the aim of recognizing the essential features of indigenous culture before contact, the changes that occurred to both parties during the colonial phase, and how lasting these changes were. Tamar Hodos (2006) analyzed the Greek–native relationship using several material culture categories – architecture, burial customs, religious practices, consumption patterns, artistic styles, and language and writing – as proxies. Certain salient patterns emerged. Native Sicilians absorbed Greek culture, but they did so selectively. Although there are broad regional patterns in preferences for particular forms and styles, the adoption of Greek culture was not uniform either in the elements adopted or the rate of adoption – even neighboring communities showed divergent preferences. There is little evidence that they were forced to adopt any Greek practice or material; rather, they adapted Greek forms and practices to existing cultural codes of consumption. An example is the popularity across Sicily of Greek sympotic pottery, implying the adoption of wine-drinking rituals using oinochoai and drinking cups. In the late eighth and seventh centuries BCE, these were integrated into existing feasting practices and served as markers of status. By the sixth century, however, such vessels became part of funerary sets and were often locally made.

The mixing of people and cultural elements in colonial settings confounds efforts to flesh out Greek–native interaction by reference to the material correlates of distinct identities. Scholars have long sought to identify markers of identity or ethnicity, often with the implicit assumption that these are immutable and carried with a person in perpetuity. Such a "pots equal people" mentality has characterized approaches to the question of intermarriage among Greek males and indigenous females; specifically, grave forms and artifacts such as metal fibulae deposited in burials at colonial sites have been used to infer the presence of indigenous females in Greek communities. Gillian Shepherd's (2005) meticulous analysis of

grave forms, burial practices, and grave goods across Sicily prompted the conclusion that cemeteries in the Western colonies are not useful for detecting indigenous females, or more generally for determining the ethnic composition of living populations. Practices were not sufficiently universal or consistent within indigenous societies to be reliable baselines, and cultural markers, particularly material culture but also customs and practices, were simply too transferable to be stable indicia. Shepherd found that colonial communities sought to forge new cultural identities, adopting from the start practices distinct from their mother cities, but also converging over time with indigenous influences into novel cultural foundations that resist characterization in binary terms.

In these environments of intensive interaction, it has been useful to speak in terms of hybrid cultural forms in order to acknowledge the dynamism of the process and the agency of both Greeks and natives, although in some cases, hybridity does not account for cultural creations as entirely new phenomena, rather than simply as chimeras of existing traits drawn from both parties. The Sikeliote identity of Greek colonists in Sicily was a novel creation formed both by opposition – interaction with indigenous communities – and aggregation, possibly focused on the sanctuary of Apollo Archegetes at Naxos, where Greeks first landed to colonize Sicily in 734 BCE, as a common place of origin (Malkin 2011: 97–118). Unlike the process unfolding in Greece, this regional identity was defined not by ethnicity or cult, but primarily by shared geography and enacted through interaction with both natives and other colonies. When Sicilian Greeks participated in cult and games at Olympia or Delphi, their Sikeliote identity was expressed as competitive emulation with other Sikeliotai and simultaneously subsumed to a Panhellenic identity.

The colonial milieu has often been described as a "middle ground," a term coined by Richard White (1991) to designate the negotiated physical and social space, as well as the process, in which Europeans and Native Americans learned to coexist in the Great Lakes region of North America in the seventeenth to nineteenth centuries CE. A middle ground allows two participants to negotiate the terms of a mutually comprehensible world where neither can impose its will by brute force. Important to this concept are "creative misunderstandings" that arise as each side seeks to define the other in terms that it can understand, and on this basis attempts to engage in terms that the other will expect. This process allows for cooperation and adaptation while still retaining one's essential culture; an individual or group can choose to display an adopted practice when it is strategic to do so. A "mediating culture" emerges that over time may develop as hybrid or essentially novel cultural forms shared by the two parties. A community may participate in multiple middle grounds at different scales. Sikeliote Greeks interacted in middle grounds with natives in spaces connecting the coasts with the island's interior, with the other colonies in coastal regions and at Panhellenic sanctuaries, and in the latter space also with mainland Greeks. In Italy, Campania witnessed the emergence of a middle ground where Greeks, Etruscans, and local elites interacted in a nonthreatening environment to negotiate the terms of coexistence and cultural exchange. Greek mythic frameworks were disseminated, transformed, and appropriated by Etruscans and Italians, and a mixture of traditions in burial, pottery styles, and other elements of culture prevailed (see Malkin 2002).

Cross-cultural contact with all that it implies in terms of the exchange of material goods, the movement of ideas, and the formation of identity, occurs at multiple scales. Seeking a way to integrate local with regional and Mediterranean-wide dynamics, archaeologists have been drawn to the two powerful concepts of *connectivity* and *networks*. The idea of connectivity, popularized by Peregrine Horden and Nicholas Purcell's *The Corrupting Sea* (2000), explicitly aims to show that intensive local connections forming *microregions* are linked "...both internally and also one with another—in aggregates that may range in size from small clusters to something approaching the entire Mediterranean" (Horden and Purcell 2000: 123). Archaeologists

have explored network analysis as a means to operationalize the concept of connectivity by mapping the nodes (settlements), ties (connections), and flows (content of goods and ideas) that connected Greeks with each other and with the societies they encountered around the Mediterranean and Black Seas. Network analysis, drawn from physics and sociology, models the ways in which connectivity is created and elaborated, how local and regional clusters of dense connections form, and how key nodes preferentially attract ties to become network centers. Connectivity is not purely dependent on geographical proximity or even ease of travel; relatively distant centers may forge "shortcuts" bypassing nodes and clusters. Multiple networks coexist and overlap in time and space; trade networks with local, regional, and long-distance manifestations coexist with networks of kinship, cult, and so forth.

Prehistorians made initial forays into network analysis for the Aegean world with investigations of Bronze Age maritime networks in the Cycladic islands (Broodbank 2000) and in the entire Aegean Sea (Knappett et al. 2008). Malkin (2011) is the first to apply a pan-Mediterranean network approach, with the explicit proposal that the connectivity established by Greek settlements on the shores of the Mediterranean and Black Sea in the Archaic period played a fundamental role in the formation of Classical Greek civilization. Far from being peripheral or epiphenomenal (in an instrumental sense), Greek colonies facilitated the multidirectional connections through which commodities and ideas flowed, allowing Greece to prosper. The lack of a central organizing authority or logic to the Greek diaspora underscores the agency of the colonies in producing a decentralized, "self-organizing" system. Malkin (2011: 54–55) asserts that distance, not proximity, led Greeks to heightened awareness of their shared characteristics, creating the notion of a Greek Mediterranean around which Hellenic identity converged. This identity was always weak, however, due precisely to the political and geographical decentralization of the Greek world (Mitchell 2005: 418).

Future Directions

Greeks came into contact with many and diverse foreign cultures between the Bronze Age and the Classical period. These contacts, both direct and indirect, expanded the horizons of the Greek world and made a central contribution to the emergence of civilization in the Bronze Age and its reemergence in the Iron Age. Greek intervention abroad was limited mainly to coastal zones; even the larger colonies rarely expanded very far inland to annex agricultural land, suggesting that maritime orientation remained important and that indigenous people had a say in the matter. Socrates observed pithily that Greeks lived "like ants or frogs around a pond" (Plato, *Phaedo* 109a–b). Already in the Bronze Age, a distinction is apparent between contacts with the highly developed civilizations of Egypt and the Near East, and those with societies of lesser complexity in the central Mediterranean (and later the Black Sea). In the former areas, the Greeks colonized rarely but traded vigorously and borrowed ideas; in the latter regions, most Greek colonies were founded and the transmission of Greek ideas and material culture had a greater and more lasting impact. Many indigenous communities became Hellenized to one degree or another, particularly in places like Sicily, where Greek presence was widespread and prolonged. Morgantina in the interior of eastern Sicily is often held up as an example; even there, many indigenous cultural forms and practices survived, into which Greek objects and customs were adapted (Tsakirgis 1995). There were cases of genuine fusion yielding hybrid or entirely novel cultural forms; the so-called Greco-Scythian art form – if not a culture – is one instance (Jacobsen 1993). In spite of the current scholarly emphasis on indigenous agency and negotiation in middle grounds, violence did occur where Greeks forcibly seized territory or where their colonies were destroyed.

The current rethinking of colonial interaction, aimed at recovering the indigenous community and placing more emphasis on negotiation and accommodation, is a salutary trend. But work is needed to ensure that our archaeological methods

and research designs are up to the new questions we hope to address. In dynamic interaction scenarios, reconstructing identities through material culture remains problematic. Antonaccio's appeal for a diachronic, contextual approach outlines the best way forward, though we must not confuse our etic (externally defined) categories with emic (internally defined) self-identifications. The latter may only be accessible through texts, which represent however only a narrow, typically elite-oriented sample. A goal of archaeological research should be to identify middle grounds in locations where interaction activates mutual changes in the material record, and to explore their physical, symbolic, and processual dimensions.

Network approaches promise new insights into connectivity at all spatial and temporal scales, but at present, there is work to do to find a better fit between theoretical models of network behavior and the actual patterns of connectivity in the past, since human choices and rationales may be unrecoverable or seem counterintuitive to us. Geographical distance may not be essential to "small world" connections in network theory, but in human experience, real travel times, measured by distance but modified by currents, winds, safe harbors, and existing relationships, do matter. The use of Geographic Information Systems (GIS) has facilitated the visualization of countless complex and overlapping network ties, particularly because it is just as easy to map symbolic connections as actual maritime or terrestrial routes. GIS models have been used to portray realistic travel times by texturing the sea with winds and currents (Leidwanger 2011). Approaches that employ complex mathematical models to construct networks (e.g., Knappett et al. 2008) suffer from a high degree of subjectivity in the assignment of value to variables, and particularly to those that are difficult to quantify: For example, how does one arrive at the "costs" and "benefits" of maintaining links when key data such as site size, population, and carrying capacity are missing, and how are symbolic factors added to economic rationality?

Cross-cultural interaction in diverse settings around the Mediterranean played a key role in the creation and constant renewal of Greek society. There is great interest in targeting those relationships for reassessment based on newer interpretive frameworks such as postcolonial critique or social network theory. In the future, these increasingly nuanced approaches can be harmonized with traditional practices of archaeological excavation, survey, and artifact analysis to produce narratives that embrace the complex reality in which diverse individuals and communities met, interacted, negotiated, transmitted, and borrowed, and thereby changed the world of the ancient Greeks.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Ceramics, Ancient Greek
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Classical (Greek) Archaeology
- ▶ Crete, Archaeology of
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Culture in Archaeology
- ▶ Cyprus, Archaeology of
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Emporion
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Ethnoarchaeology
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Islands (Excluding Crete), Archaeology of
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Middle-Range Theory in Archaeology
- ▶ Multicultural Archaeology
- ▶ Nationalism and Archaeology
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Panhellenism
- ▶ Polis
- ▶ Race in Archaeology
- ▶ Religion, Greek, Archaeology of

▶ Renfrew, Colin
▶ Romanization
▶ Sicily and Magna Graecia, Archaeology of
▶ Style: Its Role in the Archaeology of Art
▶ Trade and Transport in the Ancient Mediterranean
▶ Visualizing Mediterranean Archaeology
▶ World-Systems Analysis

References

Antonaccio, C. 2001. Ethnicity and colonization. In *Ancient perceptions of Greek ethnicity*, ed. I. Malkin, 113–157. Washington, DC: Center for Hellenic Studies.

Barth, F., ed. 1969. *Ethic groups and boundaries*. Boston: Little, Brown.

Bass, G.F. 1998. Sailing between the Aegean and the Orient in the second millennium BC. In *The Aegean and the Orient in the second millennium: Proceedings of the 50th anniversary symposium, Cincinnati, 18–20 April 1997. Aegaeum*, ed. E.H. Cline and D. Harris-Cline, vol. 18, 183–191. Liège: Université de Liège.

Broodbank, C. 2000. *An island archaeology of the early Cyclades*. Cambridge: Cambridge University Press.

Chadwick, J. 1976. *The Mycenaean world*. Cambridge: Cambridge University Press.

Cline, E.H., A. Yasur-Landau, and N. Goshen. 2011. New fragments of Aegean-style painted plaster from Tel Kabri, Israel. *American Journal of Archaeology* 115: 245–261.

Crielaard, J.-P. 2006. *Basileis* at sea: Elites and external contacts in the Euboean Gulf region from the end of the Bronze Age to the beginning of the Iron Age. In *Ancient Greece: From the Mycenaean palaces to the age of Homer*. Edinburgh Leventis studies 3, ed. S. Deger-Jalkotzy and I.S. Lemos, 271–297. Edinburgh: Edinburgh University Press.

Dakoronia, F. 2006. Mycenaean pictorial style at Kynos, East Lokris. In *Pictorial pursuits: Figurative painting on Mycenaean and geometric pottery*, ed. E. Rystedt and B. Wells, 23–29. Stockholm: Svenska Insitutet i Athen.

Dillon, M., and L. Garland. 2010. *Ancient Greece: Social and historical documents from archaic times to the death of Alexander the Great*. 3rd ed. London: Routledge.

Hall, J. 1997. *Ethnic identity in Greek antiquity*. Cambridge: Cambridge University Press.

Hall, J. 2002. *Hellenicity: Between ethnicity and culture*. Chicago: University of Chicago Press.

Hankey, V. 1981. The Aegean interest in El Amarna. *Journal of Mediterranean Anthropology and Archaeology* 1: 38–49.

Hodos, T. 2006. *Local responses to colonization in the Iron Age Mediterranean*. London: Routledge.

Horden, P., and N. Purcell. 2000. *The corrupting sea: A study of Mediterranean history*. Oxford: Blackwell.

Jacobsen, E. 1993. *The art of the Scythians: The interpenetration of cultures at the edge of the Hellenic world*. Leiden: Brill.

Kardulias, P.N. 2009. World-systems applications for understanding the Bronze Age in the eastern Mediterranean. In *Archaic state interaction: The eastern Mediterranean in the Bronze Age*, ed. W.A. Parkinson and M.L. Galaty, 53–80. Santa Fe: School for Advanced Research Press.

Knappett, C., T. Evans, and R. Rivers. 2008. Modelling maritime interaction in the Aegean Bronze Age. *Antiquity* 82: 1009–1024.

Leidwanger, J. 2011. *Maritime archaeology as economic history: Long-term trends of Roman commerce in the northeast Mediterranean*. Unpublished PhD dissertation, University of Pennsylvania.

Lyons, C.L., and J.K. Papadopoulos, eds. 2002. *The archaeology of colonialism*. Los Angeles: Getty Research Institute.

Malkin, I. 2001. Introduction. In *Ancient perceptions of Greek ethnicity*, ed. I. Malkin, 1–28. Washington, DC: Center for Hellenic Studies.

Malkin, I. 2002. A colonial middle ground: Greek, Etruscan, and local elites in the Bay of Naples. In *The archaeology of colonialism*, ed. C.L. Lyons and J.K. Papadopoulos, 151–181. Los Angeles: Getty Research Institute.

Malkin, I. 2011. *A small Greek world: Networks in the ancient Mediterranean*. Oxford: Oxford University Press.

Markoe, G.E. 2000. *Phoencians*. Berkeley: University of California Press.

Middleton, G.D. 2010. *The collapse of Palatial society in LBA Greece and the Postpalatial period*. British archaeological reports international series 2110. Oxford: Archaeopress.

Mitchell, L. 2005. Ethnic identity and the community of the Hellenes: A review. *Ancient West and East* 4: 409–420.

Mitchell, L. 2007. *Panhellenism and the barbarian in Archaic and Classical Greece*. Swansea: The Classical Press of Wales.

Morris, I. 2006. The collapse and regeneration of complex society in Greece, 1500–500 BC. In *After collapse: The regeneration of complex societies*, ed. G.M. Schwartz and J.J. Nichols, 72–84. Tucson: The University of Arizona Press.

Morris, I. 2009. The eighth century revolution. In *A companion to Archaic Greece*, ed. K.A. Raaflaub and H. van Wees, 64–80. Oxford: Blackwell.

Niemeier, W.-D. 2003. Greek territories and the Hittite Empire: Mycenaeans and Hittites in West Asia Minor. In *Sea routes. . .from Sidon to Huelva, interconnections in the Mediterranean 16th–6th C. BC*, ed. N.C. Stampolidis, 103–107. Athens: Museum of Cycladic Art.

C

Osborne, R. 2009. *Greece in the making, 1200–479 BC*. 2nd ed. London: Routledge.

Panagiotopoulos, D. 2001. Keftiu in context: Theban tomb-paintings as a historical source. *Oxford Journal of Archaeology* 20: 263–283.

Pulak, C. 2005. Discovering a royal ship from the age of King Tut: Uluburun, Turkey. In *Beneath the seven seas: Adventures with the Institute of Nautical Archaeology*, ed. G.-F. Bass, 34–47. London: Thames & Hudson.

Renfrew, C. 1975. Trade as action at a distance: Questions of integration and communication. In *Ancient civilization and trade*, ed. J.A. Sabloff and C.C. Lamberg-Karlovsky, 3–59. Albuquerque: University of New Mexico Press.

Ridgway, D. 2000. Seals, scarabs, and people in Pithekoussai I. In *Periplous: Papers on classical art and archaeology presented to John Boardman*, ed. G.-R. Tsetskhladze, A.J.N.W. Prag, and A.M. Snodgrass, 235–243. London: Thames & Hudson.

Rose, B. 2008. Separating fact from fiction in the Aiolian migration. *Hesperia* 77: 399–430.

Shaw, J. 1989. Phoenicians in southern Crete. *American Journal of Archaeology* 93: 165–183.

Shepherd, G. 2005. Dead men tell no tales: Ethnic diversity in Sicilian colonies and the evidence of the cemeteries. *Oxford Journal of Archaeology* 24: 115–136.

Stein, G.J. 1999. *Rethinking world-systems: Diasporas, colonies, and interaction in Uruk Mesopotamia*. Tucson: University of Arizona Press.

Tandy, D.W. 1997. *Warriors into traders: The power of the market in early Greece*. Berkeley: University of California Press.

Thomas, C.G., and C. Conant. 2003. *Citadel to city-state: The transformation of Greece, 1200–700 B.C.E.* Bloomington: Indiana University Press.

Tod, M.N. 1948. *Selection of Greek historical inscriptions*. Oxford: Oxford University Press.

Trundle, M. 2004. *Greek mercenaries: From the late Archaic period to Alexander*. Oxon: Routledge.

Tsakirgis, B. 1995. Morgantina: A Greek town in central Sicily. In *Ancient Sicily.* Acta Hyperborea 6, ed. T. Fischer-Hansen, 123–147. Copenhagen: Museum Tusculanum Press.

van Wijngaarden, G.-J. 1999. An archaeological approach to the concept of value: Mycenaean pottery at Ugarit (Syria). *Archaeological Dialogues* 6: 2–23.

Voutsaki, S. 2010. From the kinship economy to the palatial economy: The Argolid in the second millennium BC. In *Political economies of the Aegean Bronze Age*, ed. D.J. Pullen, 86–111. Oxford: Oxbow Books.

Wallerstein, I. 1974. *The modern world-system, Volume I: Capitalist agriculture and the origins of the European world-economy in the sixteenth century.* New York: Academic.

White, R. 1991. *The middle ground: Indians, empires, and republics in the Great Lakes region, 1650–1815*. Cambridge: Cambridge University Press.

Woodard, R.D. 1997. *Greek writing from Knossos to Homer: A linguistic interpretation of the origin of the Greek alphabet and the continuity of ancient Greek literacy.* Oxford: Oxford University Press.

Further Reading

Barabási, A.-L. 2002. *Linked: The new science of networks*. Cambridge, MA: Perseus.

Barrett, C.E. 2009. The perceived value of Minoan and Minoanizing pottery in Egypt. *Journal of Mediterranean Archaeology* 22: 211–234.

Bietak, M. 2007. Introduction: Context and date of the wall paintings. In *Taureador scenes in Tell-el Dab'a (Avaris) and Knossos*, ed. M. Bietak, N. Marinatos, and C. Palyvou, 13–43. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.

Blake, E. 2008. The Mycenaeans in Italy: A minimalist position. *Papers of the British School at Rome* 76: 1–34.

Boardman, J. 1999. *The Greeks overseas, their early colonies and trade*. 4th ed. London: Thames & Hudson.

Cherry, J.F. 2009. Sorting out Crete's prepalatial off-island interactions. In *Archaic state interaction: The eastern Mediterranean in the Bronze Age*, ed. W.A. Parkinson and M.L. Galaty, 107–140. Santa Fe: School for Advanced Research Press.

Cline, E.H. 2007. Rethinking Mycenaean international trade with Egypt and the Near East. In *Rethinking Mycenaean palaces II: Updated and expanded version*, ed. M. Galaty and W. Parkinson, 190–200. Los Angeles: Cotsen Institute of Archaeology.

Dietler, M. 2007. The Iron Age in the western Mediterranean. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, vol. 1, 242–276. Cambridge: Cambridge University Press.

Dougherty, C., and L. Kurke, eds. 2003. *The cultures within ancient Greek culture: Contact, conflict, collaboration*. Cambridge: Cambridge University Press.

Given, M. 2004. *The archaeology of the colonized*. London: Routledge.

Hurst, H., and S. Owen, eds. 2005. *Ancient colonizations: Analogy, similarity and difference*. London: Duckworth.

Iacovou, M. 2008. Cyprus: From migration to Hellenisation. In *Greek colonisation: An account of Greek colonies and other settlements overseas*, ed. G.-R. Tsetskhladze, vol. 2, 219–288. Leiden: Brill.

Kardulias, P.N. 2007. Negotiation and incorporation on the margins of world-systems: Examples from Cyprus and North America. *Journal of World-Systems Research* 13: 55–82.

Maran, J. 2004. The spreading of objects and ideas in the Late Bronze Age eastern Mediterranean: Two case examples from the Argolid of the 13th and 12th centuries B.C. *Bulletin of the American Schools of Oriental Research* 336: 11–30.

McInerney, J. 2001. Ethnos and ethnicity in early Greece. In *Ancient perceptions of Greek ethnicity*, ed. I. Malkin, 51–73. Washington, DC: Center for Hellenic Studies.

Owen, S. 2005. Analogy, archaeology and Archaic Greek colonization. In *Ancient colonizations: Analogy, similarity and difference*, ed. H. Hurst and S. Owen, 5–22. London: Duckworth.

Parkinson, W.A., and M.L. Galaty. 2007. Secondary states in perspective: An integrated approach to state formation in the prehistoric Aegean. *American Anthropologist* 109: 113–129.
Schofield, L., and R.B. Parkinson. 1994. Of helmets and heretics: A possible Egyptian representation of Mycenaean warriors on a papyrus from el-Amarna. *Annual of the British School at Athens* 89: 157–170.
Tartaron, T.F. 2005. *Glykys Limin* and the discontinuous Mycenaean periphery. In *Emporia: Aegeans in the central and eastern Mediterranean*. Aegaeum 25, ed. R. Laffineur and E. Greco, 153–160. Liège: Université de Liège.
Thomatos, M. 2006. *The final revival of the Aegean Bronze Age: A case study of the Argolid, Corinthia, Attica, Euboea, the Cyclades and the Dodecanese during LH IIIC Middle*. British archaeological reports international series 1498. Oxford: Archaeopress.
Vagnetti, L. 1999. Mycenaean pottery in the central Mediterranean. In *The complex past of pottery*, ed. J.-P. Crielaard, V. Stissi, and G.J. van Wijngaarden, 137–161. Amsterdam: Gieben.
van Dommelen, P. 1997. Colonial constructs: Colonialism and archaeology in the Mediterranean. *World Archaeology* 28: 305–323.
Voutsaki, S. 1999. The shaft grave offerings and symbols of power and prestige. In *Bronze Age elites: Symbols of power and prestige in the Bronze Age Aegean*, ed. I. Kilian, 103–117. Mainz: Römisch-Germanisches Zentralmuseums.
Yasur-Landau, A. 2010. *The Philistines and Aegean migration at the end of the late Bronze Age*. Cambridge: Cambridge University Press.

Cross-Cultural Interaction Theories in Classical Archaeology

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Introduction

The Greek world of the first millennium BCE was one of social and cultural change, stimulated by population movement and long-distance trade that brought Greek populations into direct contact with new cultures, materials, and ideologies. In a changing, fluid world identities were negotiated and forged in reaction to new stimuli and articulated in often extended periods of cross-cultural contact. Greek colonial activity from the eighth century BCE and the emergence of various forms of overseas settlements, including the later development of the Greek *polis* as city and citizen state, brought direct interaction with a non-Greek *other* that often had divergent social and cultural norms. In turn, Greek/non-Greek and Greek/Greek interaction contributed to a growing sense of self-identity at both individual settlement and, increasingly, a broader *Hellenic* level, particularly in opposition to a neighboring Persian Empire.

Interest in the nature of these interactions and their effects on Greek culture has been a prominent theme in classical archaeology. While the central role of the Greek world has often been highlighted, academic research since the 1980s has demonstrated the nuanced nature of these interactions and the key roles played by all parties. This has produced an extensive and healthy debate focused not only on the intricacies of interaction, although these remain important, but significantly on the theoretical basis by which they may be explored. Influenced by emergent *post-colonial* discourse, the focus in recent years has been on the role of the individual and the material in the formation of Greek cultural identity.

Definition

Cross-cultural interaction defines the way in which people interact. It recognizes that no population group or their cultural traditions were *pure* or *original* nor that they were isolated from internal or external change. Rather, it extends beyond simplistic identifications of cultural provenance to focus on the social practice behind which dynamic and interrelated cultural identities are continually transformed by the experiences of those involved in culture contact. At a microlevel, the individual has agency in these interactions through their reactions, conscious or otherwise, to new influences, often visible overtly through resistance, coercion, or mutual accommodation. Equally, objects may play an active role in the creation and transformation of culture and cultural identity. At a broader scale, cross-cultural interaction may

have implications that extend far beyond the daily experiences of the individual to transcend social and cultural boundaries. Specifically, this relates to the presence of long-distance trade routes and migrant or colonial activity that enabled the transfer of ideas and technology.

Within the Greek world, cross-cultural interactions are evident in colonial contact with neighboring populations, particularly following the spread of diaspora and later interactions with the Persian Empire. While the lack of an integrated political or social *Greek* world is recognized by current scholarship, increasing appreciation of the multilayered nature of Greek culture has enabled the identification of cultural interaction at home and overseas within a broader framework of emergent *Hellenic* identity. Greek culture can thus be viewed as a permeable, complex system of interaction subject to constant renegotiation and redefinition and visible through similarity or difference between disparate cultural groups.

Historical Background

Studies of cross-cultural exchange developed contiguously with the emergence of classical archaeology as a discipline. This was rooted in the intellectual awakenings of eighteenth- and nineteenth-century Europe and against a backdrop of growing Western nationalism, nationhood, and imperialism that brought with it increasing perceptions of Western cultural superiority. Early studies viewed the Greek world as a unique, self-contained culture that became synonymous with cultural enlightenment and as progenitor of modern Europe (Trigger 2010: 61). The emphasis was on the recovery and identification of artistic, literary, and material remains associated with the Greek world and a preoccupation with their classificatory study. Evolutionary approaches stressed difference and inequality between divergent population groups and sought to demonstrate continual, linear progress in both biological and cultural terms. This was encapsulated in the search for the cultural origins of the classical world through the detailed analysis of material remains, their seriation, and interpretation as distinct stages of cultural development. The stimulus for cultural change was regarded as external and emphasized population movement and cultural diffusion from cores to their peripheries, as expounded by the likes of Oscar Montelius (1843–1921). By stressing a direct lineage to a perceived culturally superior classical world, the West was placed as preeminent and Western imperialism was thus legitimized (Hodos 2010: 5–6; Trigger 2010: 61–64, 215).

Growing emphasis on racial determinism and correlations between cultural and ethnic continuity led, by the end of the nineteenth century, to the emergence of a culture-historical archaeology encapsulated in the work of Gustaf Kossinna (1858–1931). This sought to identify discrete material assemblages that were perceived as ethnic markers for individual populations or *cultures*. Vast typological analyses, such as J. D. Beazley's studies of Greek vase painting, were integral, and, while focused on classification as an aim in its own right, they enabled comment on the development and distribution of artifact types in varied geographical and chronological contexts (Knapp and van Dommelen 2010: 4; Trigger 2010; Hodos 2010: 7). Yet, this approach also brought with it dangerous political or nationalist agendas that sought to create direct links to the classical past, most disastrously evident in World War II Germany.

Drawing on both evolutionist and culture-historical frameworks, the concept of *culture* was encapsulated by V. Gordon Childe (1892–1957) (Fig. 1) who first explicitly employed the term to define those shared attributes that formed the essence of a population group, its nature, and outward appearance. In Childe's model, each culture had specific traits that differentiated it from another and, by consequence, had a specific ethnic identity, resulting in a complex vision of European prehistory formed of myriad cultures. But this went beyond simple outward definition of culture. Change was stimulated by external factors such as migration and diffusion, while those local, *ethnic* traits defining each culture, such as burial practice, would remain less receptive to change (Trigger 2010: 246; Hodos 2010: 7–8).

Cross-Cultural Interaction Theories in Classical Archaeology, Fig. 1 V. Gordon Childe, 1892–1957. (Photograph: Swan Watson, Andrew. Portrait of V. Gordon Childe, c. 1930s. nla.pic-an23815428, National Library of Australia; Reproduced courtesy of the National Library of Australia and the Evatt Collection, Flinders University Library, Australia)

Childe's culture-historical approach remained influential until the latter half of the twentieth century. Classical archaeology in this period remained conservative and engaged in the study of the cultural remains to the detriment of understanding the cultural contexts that produced them (Trigger 2010: 498–502). Encapsulated in examinations of Greek colonial interaction by the likes of T. J. Dunbabin (1911–1955) and John Boardman (1927–), analysis of the Greek world for much of the twentieth century often assumed colonialist or philhellenic tones. Interaction with non-Greek populations focused on core-periphery models that stressed an exploitative, impermeable, and *civilizing* Greek core actively involved in the acculturation of a *barbarian* periphery and articulated by the term *Hellenization*. Typically this was explored at an elite social level that emphasized prestige or gift exchange and the correlation with historical events or figures. In Greek interaction with the East, this was inextricably bound with the notion of an *Orientalizing* phenomenon. This acknowledged the selective adoption of Eastern artistic and ideological elements by Greek populations during the formative periods of the Iron Age while stressing the active Greek role in this interaction.

While the emphasis on culture process and systems highlighted by *processualism* in European prehistory impacted little on classical archaeology, calls by the likes of Anthony Snodgrass (1934–) and Colin Renfrew (1937–) for greater theoretical focus did stimulate some development. Renfrew's theory of *peer-polity interaction* (1986) (Fig. 2) sought to remove the top-down diffusionist trends of core-periphery models (Fig. 3) by viewing interaction between communities within part of a broader network of exchange engendering competition and competitive emulation. An alternative approach employing similar ideas adapts Immanuel Wallerstein's *world-systems theory* to explore the ancient Mediterranean economy. Overseas contact and long-distance trade brought with it a range of interactions traditionally interpreted in terms of diffusionism from the East; the *Orientalizing* phenomenon. Contrastingly, the *world-systems* model posits a politically and economically dominant core with a periphery producing raw materials for the core. Within this, an interregional merchant class stimulates societal development and, by actively responding to economic stimuli, creates links between diverse populations while enabling the transmission of materials and ideas within the wider world system (Hodos 2006: 6; Trigger 2010: 438). Criticism of the model highlights its economic focus, which may not have been applicable to the ancient Greek world, as well as the difficulties in defining the *core* given the lack of a unified *Greece*. It has furthermore been suggested that *world-systems theory* overlooks the social context of interaction, potentially oversimplifying complex exchanges (Morris 1999: 68).

This change in focus by the 1980s coincided with increasing interest in Greek colonial

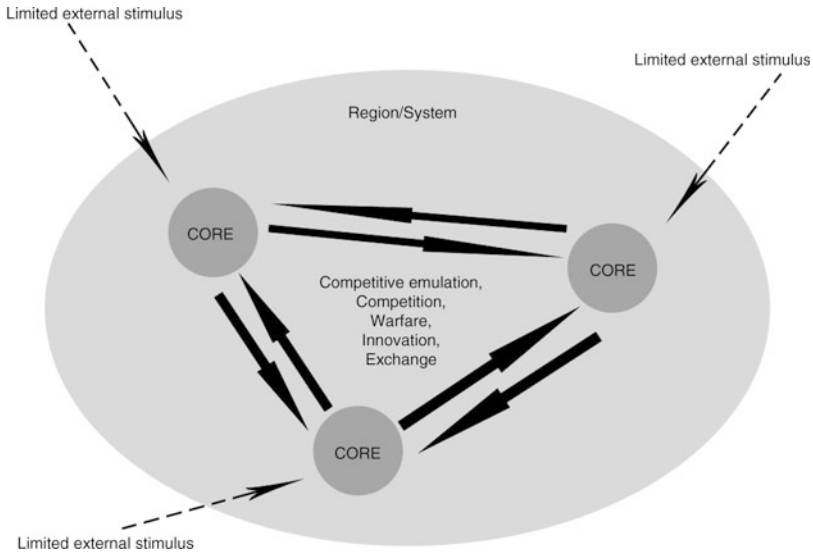

Cross-Cultural Interaction Theories in Classical Archaeology, Fig. 2 Peer-polity interaction: Exchange and competitive emulation between similar communities (*cores*) within a broader network of exchange and with little external stimulus

interaction and the *polis*. Closer examination of *polis* development, both at home and overseas, demonstrated the Greek world to be far from a monolithic, closed system but one that influenced and was influenced by those it came into contact with. No longer could Greek colonies be regarded solely as *homes away from home* (*apoikia*) or exploitative trading *emporia* nor could those traditionally perceived archetypical *Greek* cultural elements be seen solely as markers of ethnicity or population movement. Instead, scholarship focused on their formation and roles or functions in cultural interaction with, potentially hostile, non-Greek populations. While analysis of migration received limited attention (although see Knapp 2008: 47–53), the multicultural nature of the Greek world was explored through its interactions with Egypt and the Near East. Thus, Martin Bernal's *Black Athena* (1987) emphasized the cultural debt owed by Greece to Egypt but also maintained a rigid dichotomy that obscured the complexities of cultural interaction and arguably presented a reversal of *Hellenization*, the Greek world serving as cultural vacuum to be filled by Eastern culture (Dougherty and Kurke 2003: 2–4). It was only at the end of the twentieth century with the implementation of *post-processualist* frameworks that the theoretical debate fully engaged.

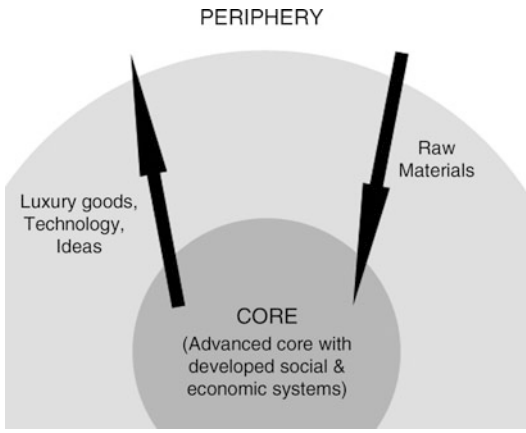

Cross-Cultural Interaction Theories in Classical Archaeology, Fig. 3 Core-periphery model demonstrating exploitative core with exploited periphery

Influenced by the likes of Ian Morris (1960–), the *post-processual* approach stressed the social meanings behind and interpretative potential of material sources as cultural representations (Hodos 2010: 9). An emphasis on agency, the individual and the social context of interactions often brought direct conflict with the broader generalizations of *processualism* but, at the same time, shifted the focus from traditional colonialist and diffusionist models. This is most clearly demonstrated in *postcolonial* critique emergent following the postwar dismantlement of Western

empire. Encapsulated in Edward Said's seminal text *Orientalism* (1978), *postcolonial* debate challenged traditional perceptions of Hellenic cultural dominance and stressed the complexities of cross-cultural exchanges (Knapp and van Dommelen 2010: 1). At a theoretical and interpretative level, this has generated a range of social and cultural frameworks aimed at understanding the structures, practices, and processes behind cultural change and the active role of the individual in defining changing identities. It is this approach that continues to inform academic debate.

Key Issues/Current Debates

Where analysis of cultural interaction had traditionally presented a static, monolithic depiction of something definably and intrinsically *Greek*, often in opposition to equally functionalist perceptions of static *others* (e.g., the Persian Empire), current scholarship takes a more nuanced approach to culture contact, exploring the social aspects and processes behind its formation. At the heart of the debate has been the deconstruction of traditional notions of *Greek culture* and the creation of an expansive theoretical discourse that explores the mechanisms of cross-cultural exchange and role (s) of the individual in their interplay. Much of the focus has been on the colonial Greek world through the implementation of *postcolonial* discourse.

Criticism of the *culture-historical* model emphasizes its search for simplistic and material representations of an *original* Greek culture (Dougherty and Kurke 2003: 1–2; Hales and Hodos 2010; Knapp and van Dommelen 2010). The approach taken by the likes of Bernal has met with similar disfavor due to what is seen as a lack of theorization and an essentializing nature (Dougherty and Kurke 2003: 2–3). Equally, the traditional focus of classical archaeology, emphasizing the *civilizing* nature of a dominant Greek culture over a passive *other*, has also met with disagreement (Hodos 2006: 10; Knapp 2008: 55–6). This is encapsulated in the abandonment of *Hellenization* as a concept, since it is argued that it lacks analytical power due to the assumption of Greek cultural dominance, unidirectional influence, and implied subjugation of the *other* (Dougherty and Kurke 2003: 3; Hodos 2006: 10, 15; Knapp 2008: 55–6). Instead, current scholarship expands beyond simple cultural identification to highlight the multifaceted, dynamic nature of interaction and the active role of both individual and material in defining it (Canepa 2010). However, it has been noted that this shift often maintains stereotypical, dualist perceptions of opposition (*us* vs. *them*), with the continued use of the term *colonization* rather than *colonialism* to define the Greek colonial encounter evidence of a reluctance to engage in cross-cultural analysis (Knapp and van Dommelen 2010: 3; although see Hodos 2006: 13–8).

It is argued that material culture is demonstrative of the social *practices* behind cross-cultural interaction, since it is through the process of interaction that objects can be modified or modify to suit the specific needs of all parties involved (Dougherty and Kurke 2003: 1; Langin-Hooper 2007). Material cultures may be interpreted as socially constructed representations of culture, each bringing with them distinct cultural, social, and even ethnic meaning or identity and dependent upon the context and time in which they form (Dougherty and Kurke 2003; Hodos 2010: 9). This need not necessarily be representative of cultural identity but rather demonstrates selective adoption and adaptation by the *recipient* population within a specific cultural context. Culture is thus seen as a permeable, complex system subject to constant renegotiation, collaboration, and conflict (Dougherty and Kurke 2003; Hodos 2006, 2010: 14–19). While material culture is regarded as a representative and constructive facet of conscious self-identification, a focus on ethnicity and ethnic identity within a multilayered *Hellenic* world has furthered debate.

By employing an *emic* approach (one produced from within, and meaningful to, the culture under study) that combines textual and archaeological data, this focus on ethnicity has been considered in the context of emergent *Hellenic* and *polis* identity and has removed essentializing approaches that assume unchanged ethnic identity based on racial and biological lines: the notion

that all Greeks are *Greek* (Hall 2002; Dougherty and Kurke 2003: 3–4; Antonaccio 2010). Instead, ethnicity is viewed as a fluid representation of society defined by its cultural, historical, and political experiences through which a sense of self-identity and perceived similarity or difference with others is formed (Hodos 2010: 11). Thus, the maintenance of Carian onomastics into the fourth century BCE or the perception by *both* Lydian and Greek populations throughout the Archaic period that Lydian culture was distinct from that of the Greek world demonstrates that despite Greek influence cultural interaction was more complex than simple domination by one monolithic entity over another (Hall 2002: 104–11). This approach furthermore recognizes individual settlement or *polis* identity within a broader *Hellenic* diaspora but with commonalities articulated in different ways (Hall 2002; Hodos 2010; Antonaccio 2010). Cultural interaction between subcultures was facilitated at key geographical locations, such as the panhellenic sanctuaries at Delphi and Olympia, which acted as *internal contact zones* for the cross-fertilization of ideas (Dougherty and Kurke 2003). This may have been reflexive and manifest materially at a range of social levels. Within this interpretation, population movement through trade and migrant activity has been regarded as indicative of a culture receptive to interaction. While this is often viewed in terms of an elite-level exchange, examination of broader social and cultural divisions, in conjunction with the removal of *Orientalizing* and *Hellenizing* concepts, indicates this may not have been representative of the Greek world (Hall 2002; Gosden 2004; Antonaccio 2010). Recontextualizing cultural elements in this *emic* approach has brought recognition of new identities resultant from cross-cultural interactions, as has been suggested in Sicily, for example, in the mixed cult practices at Sabucina or the divergent burial practices at sites like Syracuse and Gela (Hall 2002; although see Gosden 2004).

Emphasis on ethnicity has not been without its detractors or difficulties. It is argued that it is a modern fascination which is unhelpful in identifying cultural interaction and identities (Antonaccio 2010: 43). Equally, as a socially constructed facet of culture, it is not only difficult to define but, in reality, may have played little role in culture contact other than to simplify interaction (Dougherty and Kurke 2003: 6). But, it is also maintained that ethnicity is more than a static reflection of shared cultural similarity or difference and, while not equating to cultural identity per se, may be indicated materially (Hodos 2006: 17–8; Antonaccio 2010: 33–4).

A central theme in current discourse is the notion of identity, both outwardly created in antiquity or interpreted from the *etic* perspective of modern scholarship, that is, from the objective perspective of the observer external to the culture under analysis. Key to exploring this has been the notion of hybridity (Fig. 4) (Antonaccio 2003).

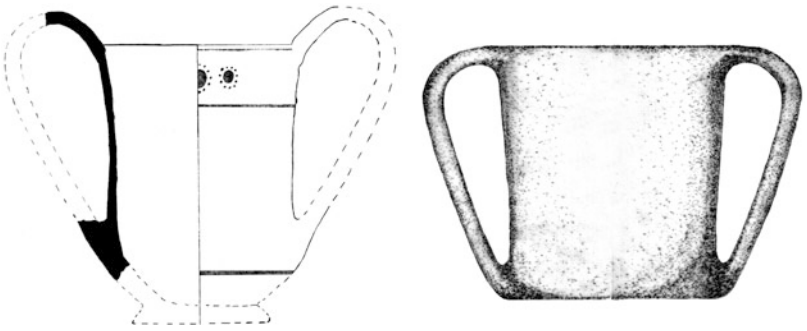

Cross-Cultural Interaction Theories in Classical Archaeology, Fig. 4 Possible evidence for hybridity in material culture: G2–3 ware kantharos (left) and grayware karchesion cup (right) from the island of Samothrace. The combination of Greek artistic with local cultural elements and their apparent function in specific cultural roles has been interpreted as evidence for the emergence of hybrid Greek/non-Greek identity on the island by the Archaic period (Ilieva 2010: Figs. 4–5. Reproduced courtesy of P. Ilieva)

This concept argues for the creation of new identities in reaction to the cross-cultural amalgamation of *new* and preexisting populations. Arguments against the usefulness of hybridity highlight that simple mixing of diverse aspects of material culture or ideologies does little to reveal the social or human aspects of interaction (Knapp 2008: 59). Equally, it presupposes the presence of identifiable and bounded cultural entities, which in the long term may be difficult to identify archaeologically as any *hybrid* identity gradually becomes what is perceived to be *local* (Gosden 2004; Antonaccio 2010: 48). However, proponents of the model argue that hybridity can be seen as the mixing of social, cultural, and material elements that stimulate the creation of entirely new identities (Knapp 2008: 53, 58–9). In colonial contexts, this often reflects the reinterpretation of meanings attached to individual objects or ideas, demonstrable materially through the appearance of new assemblages that combine differing cultural elements with social meaning specific to their context, for example, through the adoption and adaptation of ceramic form or decoration to reflect local social practice or meaning, rather than simply in imitation of new cultural traditions.

In defining where hybridity operates, *post-colonial* discourse has adopted the notion of the *Middle Ground* as an alternative to other core-periphery frameworks (Antonaccio 2010: 44–5) (Fig. 5). The *Middle Ground* is regarded as both an intellectual and physical space, with such physical contexts arguably identified in North Syria, Sicily, and North Africa. It serves as a neutral ground where all participants have agency but, through mutual accommodation, redefine meaning and value, often creating new hybrid identities. In this respect, the *Middle Ground* serves as both core *and* periphery within which divergent material culture, ideas, and ideologies engage (Hodos 2006: 7).

An important conceptual tool has been the role of *agency*. This draws on Pierre Bourdieu's (1930–2002) notion of *habitus*, which refers to the learned and experiential practices perpetuated through everyday life that inform the conscious or subconscious reactions by an individual, an *agent*,

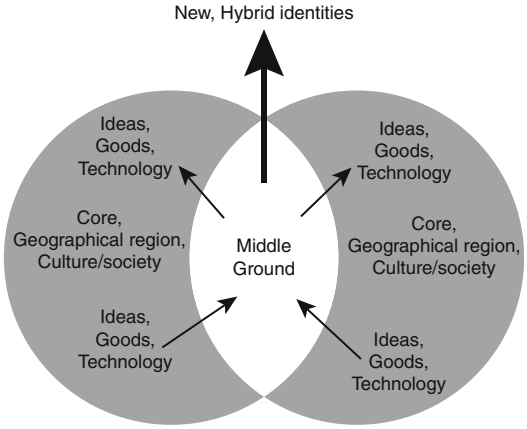

Cross-Cultural Interaction Theories in Classical Archaeology, Fig. 5 The Middle Ground: A physical and ideological melting pot where ideas and material may combine to produce distinct new *hybrid* identities

to any given situation. *Agency* is seen as a means of identifying the individual and their capacity for choice in cross-cultural exchanges, although there has been little consensus with regard to how it might be recognized or indeed its implications (e.g., Dobres and Robb 2000). In colonial settings, the importance of the concept lies in the ability to identify the spread and reinterpretation of imported items in tandem with the cultural codes of local or hybrid populations (Douglas and Isherwood 1996; Hodos 2006: 8–9). Thus, it is argued that the choice to adopt a particular form of imported material culture and reinterpret it so that it has both social and cultural meaning also ascribed to it a certain value, whether intrinsic or societal (Appadurai 2008). This may result in it becoming integral to that social or societal context. For example, while the presence of hoplite armor in Sicily might initially suggest *Hellenization* of the region, it is only through an understanding of its context that it is realized that it performed a differing, elite function specific to its colonial context as armor for mounted warriors (Hall 2002: 109).

Related to agency and hybridity has been the introduction of *performativity* as a means of defining the way in which identity is produced. In this framework, material culture is seen as constructing and constructed by cultural interaction through the meanings and ideas that embody

it. An intentional, *performative*, act by an individual might reinforce or alter cultural identity through the selective consumption of specific items that have distinct cultural codes (Douglas and Isherwood 1996; Hodos 2010: 18–9). While objects can transcend cultural boundaries, the transmission of culture itself is dependent on recognition by those involved of the ideologies or meanings behind such objects. However, it is also stressed that recognition of *performativity* is dependent on sociohistorical understanding of their context and that changes may occur between each *performance* or be read at multiple social or cultural levels (Hodos 2010: 18).

The need for an approach that explores the impact and involvement of localized interactions within broader cultural systems has also been recognized by recent scholarship (Knapp and van Dommelen 2010: 3). The *diffusionist* model has met with criticism, but the reconciliation of the local and global into a more encompassing narrative has produced something of a dichotomy. Critics of the *post-processual* approach highlight that the social focus has been both too narrow and geographically localized. Indeed, supporters of *world-systems theory* argue that it is only through broader, global perspectives that the context of localized exchange can be understood (Morris 1999: 68). In contrast, detractors to the *world-systems* approach point to the generalizations and oversimplifications of core-periphery models, with the *Middle Ground* highlighted as a potential alternative. However, it is the notion of *connectivity* that has generated renewed discourse. This stresses the interaction and interconnectedness of divergent Mediterranean micro-regions facilitated by diverse microecologies that interact through a sea conducive to communication (Horden and Purcell 2000). Thus, production, risk, and redistribution stimulate mobility of objects and people, forging coherence and *connectivity* between micro-regions. An emphasis on wider Mediterranean interactions is apparent, but the model also highlights the dynamic role of local interaction internal to each micro-region and, at the same time, shifts the focus away from that of core-periphery approaches to view urban centers as larger units within a more complex, interrelated system (Horden and Purcell 2000: 123). Within this framework, consumer demand can also drive production and is reflected in the attachment of both intrinsic and social value or meaning to specific objects through the mechanisms of the *habitus* (Hodos 2006: 8–9; Hodos 2010: 20). In this regard, cross-cultural interaction may initially occur at an elite or prestige level until the cultural codes of the objects themselves are more widely understood and lose their exclusivity, with *agency* enabling the transmission of technology and ideas (Douglas and Isherwood 1996; Hodos 2006: 8–9). In colonial interactions, this may reveal the reasons behind the adoption of specific objects and further draws on the notion of *materiality*, whereby the cultural identities of those involved in interaction shape and are shaped by the material world around them (Knapp and van Dommelen 2010: 2–8).

Developing from notions of *connectivity*, there has been increasing emphasis on *Mediterraneanization* and *globalization* within the Greek world. The *globalization* model posits the presence of an overriding *global* culture that transgresses localized cultural identity, within which intensified interaction reinforces local diversity (Hodos 2010: 23–24). This stresses the particularities within the broader cultural framework, often leading to overt assertions of self-identity in opposition to others (e.g., Ilieva 2010). *Mediterraneanization* draws on both *globalization* and *connectivity* to suggest a broader network of interaction that emphasizes the active process of connectedness within the Mediterranean region (Hodos 2006: 9). While both approaches offer broader perspectives with respect to cross-cultural interactions, the danger of replacing simple ethnic markers with regional labels, and thereby conflating ethnic and cultural distinctiveness, has also been highlighted (Isayev 2010: 224).

International Perspectives

The current focus of British academia is twofold. At a social level, *postcolonial* studies have had a significant and lasting impact on scholarship, with emphasis on the nuances of interaction and the removal of traditional colonialist approaches. The individual and the role of agency continue to inform debate, and recent studies have

focused specifically on the mechanics behind the creation and redefinitions of identity both within the Greek world and in their interactions overseas (e.g., Hales and Hodos 2010; Knapp and van Dommelen 2010). These studies view Greek culture as changing and dynamic, exploring the many sociocultural facets subject to potential change.

The connectivity of the Mediterranean region has become an increasing area of discourse (e.g., Horden and Purcell 2000), and this relates in part to the second focus of research into the wider systems within which the individual, *local* exchanges took place. Notions of *Hellenization* have largely been dropped from academic debate, while attention has returned to the question of how ideas, technologies, and *culture* were transmitted within and around the Greek world. Critique of traditional *diffusionist* models is apparent, and, with the implementation of frameworks such as *globalization* or *Mediterraneanization*, the beginnings of a more holistic approach incorporating elements of wider world systems with the minutiae of localized culture contact are emerging.

Future Directions

While current discourse has produced an active and scholarly debate, particularly surrounding notions of identity and materiality, aspects of the discussion provide scope for future research. There remains a problem of theorization within classical archaeology, which has been slow to adopt new direction and frameworks of analysis. Furthermore, there is a maintained tendency of *hyper-specialization* and localized or regional research that lacks an interregional scope (Knapp and van Dommelen 2010: 3; Mattingly 2010: 284). A sociohistorical approach that draws together material, social, and textual data may well provide the basis for a framework that incorporates local and global interactions while avoiding generalizations (e.g., Knapp and van Dommelen 2010; Mattingly 2010: 287). This may be facilitated by renewed focus on migratory processes and the role of material culture in cross-cultural interactions.

While scholarship has begun to shift from traditional paradigms, the incorporation of new theoretical directions has in some areas met with reluctance and reticence. To fully understand the nature of cross-cultural exchanges at local, regional, or global levels requires that the archaeological and textual remains produced through academic research are engaged in theoretical frameworks that allow for their full potential to be understood.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Agency in Archaeological Theory
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology and Anthropology
- ▶ Archaeology as Anthropology
- ▶ Beazley, Sir John Davidson
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Ceramics, Ancient Greek
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Childe, Vere Gordon (Theory)
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Colonial Encounters, Archaeology of
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Culture in Archaeology
- ▶ Emporion
- ▶ Ethnic Identity and Archaeology
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Greek Colonialism, Archaeology of
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Lydia, Archaeology of
- ▶ Materiality in Archaeological Theory
- ▶ Middle-Range Theory in Archaeology
- ▶ Montelius, Oscar
- ▶ Multicultural Archaeology
- ▶ Nationalism and Archaeology
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective

▶ Panhellenism
▶ Polis
▶ Post-Processual Archaeology
▶ Processualism in Archaeological Theory
▶ Race in Archaeology
▶ Renfrew, Colin
▶ Romanization
▶ Sicily and Magna Graecia, Archaeology of
▶ Trade and Transport in the Ancient Mediterranean
▶ Trigger, Bruce Graham
▶ Visualizing Mediterranean Archaeology
▶ World-Systems Analysis

References

Antonaccio, C. 2003. Hybridity and the cultures within Greek culture. In *The cultures within Greek culture: Contact, conflict, collaboration*, ed. C. Dougherty and L. Kurke, 57–74. Cambridge: Cambridge University Press.

Antonaccio, C. 2010. (Re)defining ethnicity: Culture, material culture, and identity. In *Material culture and social identities in the ancient world*, ed. S. Hales and T. Hodos, 32–53. Cambridge: Cambridge University Press.

Appadurai, A., ed. 2008. *The social life of things: Commodities in cultural perspective*. Cambridge: Cambridge University Press.

Canepa, M. 2010. Preface: Theorizing cross-cultural interaction among ancient and early medieval visual cultures. *ARS Orientalis* 38: 7–30.

Dobres, M.-A., and J.E. Robb, eds. 2000. *Agency in archaeology*. London: Routledge.

Dougherty, C., and L. Kurke. 2003. Introduction: The cultures within Greek culture. In *The cultures within Greek culture: Contact, conflict, collaboration*, ed. C. Dougherty and L. Kurke, 1–22. Cambridge: Cambridge University Press.

Douglas, M., and B. Isherwood. 1996. *The world of goods: Towards an anthropology of consumption*. London: Routledge.

Gosden, C. 2004. *Archaeology and colonialism*. Cambridge: Cambridge University Press.

Hales, S., and T. Hodos, eds. 2010. *Material culture and social identities in the ancient world*. Cambridge: Cambridge University Press.

Hall, J. 2002. *Hellenicity: Between ethnicity and culture*. Chicago: University of Chicago Press.

Hodos, T. 2006. *Local responses to colonization in the Iron Age Mediterranean*. London: Routledge.

Hodos, T. 2010. Local and global perspectives to the study of social and cultural identities. In *Material culture and social identities in the ancient world*, ed. S. Hales and T. Hodos, 3–31. Cambridge: Cambridge University Press.

Horden, P., and N. Purcell. 2000. *The corrupting sea*. Oxford: Blackwell.

Ilieva, P. 2010. Samothrace: Samo- or Thrace? In *Material culture and social identities in the ancient world*, ed. S. Hales and T. Hodos, 138–170. Cambridge: Cambridge University Press.

Isayev, E. 2010. Unintentionally being Lucanian: Dynamics beyond hybridity. In *Material culture and social identities in the ancient world*, ed. S. Hales and T. Hodos, 201–226. Cambridge: Cambridge University Press.

Knapp, A.B.. 2008. *Prehistoric and protohistoric Cyprus: Identity, insularity and connectivity*. Oxford: Oxford University Press.

Knapp, A.B.., and P. van Dommelen. 2010. Material connections: Mobility, materiality and Mediterranean identities. In *Material connections in the ancient Mediterranean. Mobility, materiality and identity*, ed. A.B.. Knapp and P. van Dommelen, 1–18. London: Routledge.

Langin-Hooper, S.M. 2007. Social networks and cross-cultural interaction: A new interpretation of the female terracotta figurines of Hellenistic Babylon. *Oxford Journal of Archaeology* 26: 145–165.

Mattingly, D. 2010. Cultural crossovers: Global and local identities in the Classical World. In *Material culture and social identities in the ancient world*, ed. S. Hales and T. Hodos, 283–296. Cambridge: Cambridge University Press.

Morris, I. 1999. Negotiated peripherality in Iron Age Greece: Accepting and resisting the East. In *World-systems theory in practice: Leadership, production and exchange*, ed. P.N. Kardulias, 63–84. Oxford: Rowman and Littlefield Publishers, Inc.

Trigger, B. 2010. *A history of archaeological thought*. Cambridge: Cambridge University Press.

Crossland, Leonard Brighton

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Basic Biographical Information

Mr. Leonard Brighton Crossland (Fig. 1) is a Ghanaian archaeologist born on November 10, 1941 in Accra, Ghana. He attended the Wesley Grammar

Crossland, Leonard Brighton, Fig. 1 Leonard B Crossland assisting graduate students with European ceramic analysis

School, Accra (1958–1962), and the Ghana National School, Cape Coast (1962–1964) before proceeding to the University of Ghana (1969–1971) for his Bachelor of Arts (B.A) degree in Archaeology and Ancient History. He obtained his Master of Arts (M.A) in African Archaeology from the University of Ghana in 1971 and was a Junior Fulbright-Hays Fellow at the Arizona State University, Tempe, USA from 1977 to 1978.

Mr. Crossland began his archaeology career as a teaching assistant at the Department of Archaeology, University of Ghana, Legon (1971–1972), then as assistant lecturer (1973–1975), and lecturer (1975–1991) at the same department. He was promoted to the position of senior lecturer in 1991 and served in that capacity until his exit from active teaching service from the University of Ghana in 2010. This long service to the University of Ghana includes 9 years of post-retirement contract (2002–2010). His areas of specialization include museums conservation, archaeological field and laboratory methods, technological traditions of Ghana, and analysis of seventeenth- to nineteenth-centuries European imports (particularly ceramics and glassware) in West Africa.

At the University of Ghana, Mr. Crossland held several positions including Head, Department of Archaeology (1993–2001), and Acting Director of the West African Trade Project (1974–1975). He served on several Boards of the University of Ghana such as Board of Faculty of Social Studies (1997–2001), Board of Faculty of Arts (1992–1996), Board of Graduate Studies (1993–2006), Academic Board (1990–2001) Admissions Board (1990–2001), and Examiners Board (1993–2001). Mr. Crossland is a member of various national and international associations. These include the Old Accra Conservation and Development Association, Ghana Bead Society, World Archaeological Congress, and the West African Museums Programme (WAMP).

Major Accomplishments

Mr. Crossland had taught and mentored several students of the Department of Archaeology, University of Ghana, including majority of current faculty members of the department. Following the exit in the early 1980s of most of the expatriates who helped to establish the Department of Archaeology, University of Ghana, and the exodus of the few Ghanaian archaeologists to Nigeria and elsewhere, Mr. Crossland was one of the key Ghanaian archaeologists among a skeletal teaching staff (comprised of John Sutton, Joan Dombrowski, and James Anquandah) that worked assiduously to ensure that the department survived. He had to abandon his doctoral program at the Arizona State University, Tempe, USA, and rush home to strengthen the teaching faculty of the department.

His involvement in the West African Trade Project directed by Merrick Posnansky led to the publication of one of the key reference books for the analysis of local ceramics in particular and on the ancient trade and urban site of Begho, Ghana, in general (Crossland 1975, 1976, 1989a, b; Crossland and Bredwa-Mensah 1997; Crossland and Posnansky 1978). His broad research interests also include the history and archaeology of communities in the Accra plains (Crossland 1989b, Crossland and Bredwa-Mensah 1997). Mr. Crossland has in-depth knowledge of European trade materials in West Africa and provides expert analysis of these materials to students and faculty of the Department of Archaeology (Fig. 1). His exhibition of these materials at the Department of Archaeology Museum, University of Ghana, from 2008 to date as part of the department's exhibition on the general theme "Researching Ghana's Heritage" is most illuminating. He was a member of the Board of Examiners for University of London Diploma in Conservation and Management of Museums in sub-Saharan Africa from 1995 to 1996.

Mr. Crossland was an advisor to the committee that put together a highly successful exhibition on textiles to commemorate the 50th independence anniversary of Ghana in 2007. The exhibition dubbed "Fabric of a Nation: textiles and identity in modern Ghana" was mounted concurrently at the Department of Archaeology Museum, University of Ghana, and the British Museum in London, UK. He was also a subcommittee member that successfully upgraded the permanent museum at the Kwame Nkrumah Memorial Park, Accra, also in connection with Ghana's 50th anniversary celebrations. He was a member of Ghana's National Committee for the Return and Restitution of Cultural Property from April to June 1985.

Mr. Crossland successfully mounted a bead exhibition at the VIP Lounge of the Kwame Nkrumah Mausoleum, Accra, in 2008. This was part of a collaborative research between the Italian Embassy, Accra, and the Centre for African Studies, University of Milan, Italy, dubbed "A Study of Trade Beads from Venice to the Gold Coast." His immense knowledge of beads also led to the publication of a useful chapter (Crossland 2003), based on his bead exhibition at the Department of Archaeology Museum, University of Ghana.

Away from the academia, Mr. Crossland has chalked enormous success in the world of private business.

Cross-References

- ▶ Anquandah, James
- ▶ Historical Archaeology
- ▶ Posnansky, Merrick
- ▶ West Africa: Museums
- ▶ West and Central Africa: Historical Archaeology

References

Crossland, L.B. 1975. Traditional textile industry in Northwestern Brong Ahafo, Ghana. The archaeological and contemporary evidence. *Sankofa, Legon Journal of Archaeological and Historical Studies* 1: 69–73.

Crossland, L.B. 1976. Archaeological investigation at the Nyarko and Dwinfuor-D3 sites, Begho. *Sankofa, Legon Journal of Archaeological and Historical Studies* 2: 19–22.

Crossland, L.B. 1989a. *Pottery from the Begho B2-site, Ghana*, African Occasional Papers 4. Calgary: University of Calgary Press.

Crossland, Leonard B. 1989b. Recent archaeological research in the western Accra Plains, Ghana. *Nyame Akuma* 32: 8–12.

Crossland, Leonard B. 2003. The Crossland bead collection in the Museum of Archaeology, University of Ghana-Legon. In *The bead is constant*, ed. Alexandra Wilson. Accra: Ghana Universities Press.

Crossland, Leonard B., and Y. Bredwa-Mensah. 1997. Archaeological investigation at the Danish plantation settlements along the south Akwapim Ridge, Ghana. *Papers from the Institute of Archaeology, London* 8: 59–71.

Crossland, L.B., and M. Posnansky. 1978. Pottery, people and trade at Begho. In *The spatial organization of culture*, ed. Ian Hodder, 77–89. London: Gerald Duckworth.

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Basic Biographical Information

Born in 1935 and dying in 2011, Ole Crumlin-Pedersen was constantly active in the field of maritime archaeology from 1957 onward, when he first worked at the Skuldelev site that he is most famously connected to. For the majority of his career, he was effectively in charge of Denmark's maritime heritage, serving as Curator of Maritime Archaeology at the National Museum of Denmark between 1962 and 2003. Between 1998 and 2003, he also served as Visiting Professor at the Institute of Medieval Archaeology, Aarhus University. Following his retirement, from 2003 onward, he continued to work as a researcher at the Viking Ship Museum in Roskilde that he helped found. Crumlin-Pedersen had initially studied naval architecture at the Technical University of Denmark (1957–60), before serving in the Royal Danish Navy (1960–62), returning to Skuldelev for its final excavation in 1962. He was at the forefront of maritime archaeology and ethnology from 1962 onward, focusing on Denmark but with an international research profile. He was central to the development of maritime archaeology as a formal academic discipline, including the public understanding of this specialism.

Major Accomplishments

Crumlin-Pedersen came to prominence through his involvement in the survey, excavation, and recovery of what eventually turned out to be five Viking Age ships deliberately sunk as part of a barrage at Skuldelev, in Roskilde Fjord some 20 km north of the medieval town of Roskilde somewhere between c. 1070 and 1090 CE. This work led to the first of numerous publications on the vessels recovered, commencing in 1958 (see Crumlin-Pedersen and Olsen 1958). The full publication of this site continues, following most recently from the first of a series of final publications (Crumlin-Pedersen and Olsen 2002). The remainder of Crumlin-Pedersen's career after 1962 was spent in the study of these vessels and their related materials, but this process of discovery led to a diverse career examining many aspects of maritime archaeology in northwest Europe from prehistory to the Middle Ages, including a significant leadership and educational role, both within the museum sector and also in the then-burgeoning academic specialism of maritime archaeology. Not for nothing is his British contemporary Seán McGrail said to have responded "to become the British Crumlin-Pedersen" when asked at an interview for the new position of maritime archaeologist at the National Maritime Museum in Greenwich what his intentions were.

Crumlin-Pedersen's long career and research interests are neatly summed up in two books, one by him and one by his friends. In 1995, in celebration of his 60th birthday, his friends and colleagues published a book of essays in his honor entitled "Shipshape" (see Olsen et al. 1995). In 2010, Crumlin-Pedersen himself then published his "Rhind" lectures of 2008, a book that explains both his activities and his philosophy over his career (see Crumlin-Pedersen 2010). In particular, Crumlin-Pedersen was instrumental in the development of three interrelated fields of study in maritime archaeology: firstly, the study of medieval (especially Viking Age) ship technology and shipbuilding traditions (see in particular Crumlin-Pedersen 1991); secondly, the study of related prehistoric and medieval maritime cultures, especially the symbolism of these communities (see in particular Crumlin-Pedersen and Munch Thye 1995); and thirdly, the use of experimental archaeology in maritime archaeology, especially the construction and sailing of full-scale reconstructions of Viking age ships (see in particular Crumlin-Pedersen and Vinner 1986). It is the

latter in particular, which resulted in the series of dramatic replicas of the Skuldelev ships sailed around the waters of Europe and in some cases even further afield that brought Crumlin-Pedersen to widespread public attention. The largest of these reconstructions, of the Skuldelev 2 "long-ship," was built in the experimental shipyard at the Viking Ship Museum in Roskilde between 2000 and 2004, and famously made a return journey to Dublin and back in the summer of 2007, the likely construction location of the original ship in c. 1042 CE (see Viking Ship Museum 2007). It is this long-term leadership role in museum development and public education that as much as anything marks out the significance of Crumlin-Pedersen's career in archaeology. The fame of and respect for the Viking Ship Museum that he was so instrumental in creating and promoted helped advance the cause of maritime archaeology around the world from the 1960s onward.

Cross-References

► Experimental Maritime Archaeology
► Ship Archaeology

References

Crumlin-Pedersen, O., ed. 1991. *Aspects of maritime Scandinavia AD 200–1200*. Roskilde: Viking Ship Museum.
Crumlin-Pedersen, O. 2010. *Archaeology and the sea in Scandinavia and Britain*. Roskilde: Viking Ship Museum.
Crumlin-Pedersen, O., and B. Munch Thye, eds. 1995. *The ship as symbol in prehistoric and medieval Scandinavia*. Copenhagen: Danish National Museum.
Crumlin-Pedersen, O., and O. Olsen. 1958. The Skuldelev ships (I): A preliminary report on an underwater excavation in Roskilde Fjord, Zeeland. *Acta Archaeologica* 29: 161–175.
Crumlin-Pedersen, O., and O. Olsen, eds. 2002. *The Skuldelev ships, volume 1*. Roskilde: Viking Ship Museum.
Crumlin-Pedersen, O., and M. Vinner, eds. 1986. *Sailing into the past*. Roskilde: Viking Ship Museum.
Olsen, O., J. Skamby Madsen, and F. Rieck, eds. 1995. *Shipshape: Essays for Ole Crumlin-Pedersen*. Roskilde: Viking Ship Museum.
Viking Ship Museum. 2007. *The Sea Stallion from Glendalough*. Roskilde: Viking Ship Museum.

Further Reading

Crumlin-Pedersen, O., ed. 1997. *Viking-age ships and shipbuilding in Hedeby/Haithabu and Schleswig*. Roskilde: Viking Ship Museum.
Crumlin-Pedersen, O., and A. Trakadas, eds. 2003. *Hjortspring: A pre-Roman Iron-Age warship in context*. Roskilde: Viking Ship Museum.

Cuba: Archaeological Heritage Rescue and Management

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Introduction

Rescue, conservation, and management of the archaeological heritage of the island of Cuba are closely linked to the development of archaeology in the country. Since 1847, when Spanish Miguel Rodríguez Ferrer performed the first explorations and collections of archaeological evidence in the island, discussions began about how to conserve and use the archaeological wealth that collecting of those times exposed (Rodriguez Ferrer 1876).

This would be a constant discussion within the scientific and intellectual circles of the country related to inquiries about archaeology. Reflecting this debate and concerns of scholars and others interested in these issues, the formula of encouraging private collections was shaped by the same scholars. Private collecting was a response of the archaeologists of these times to cope with the deficiency of state structures that paid little attention to these issues. Within these private collections, Eduardo García from Holguín, R. L. O'Fallon and Bacardi from Santiago de Cuba, and Pedro García Valdés from Pinar del Rio stand out.

These collections as well as some others of less territorial representativeness were always available to scholars and people interested in archaeological studies. Scholars included Mark

R. Harrington from the Museum of the American Indian, who worked in Cuba between 1915 and 1921; European Sven Loven who worked in 1930; and Irving Rouse from Yale University in 1941. These collections presented a significant amount of information about indigenous cultures that inhabited the territory and were available to scientists from other countries over the years; many of these collections became part of important museums and are treasured heritage of our country.

Key Issues/Current Debates/Future Directions/Examples

During those years, and as a result of the interest promoted by archaeological research, collecting, and naturalistic studies, some museums were promoted and over the years they became paradigms of conservation of the archaeological heritage of the country, such as the case of the Anthropological Museum Montane in La Habana, Bacardi Museum in Santiago de Cuba, Natural Sciences Museum in Pinar del Río, and Oscar María de Rojas Museum in Cárdenas.

At the same time, during the 1920s, 1930s, and 1940s, there was some progress in recognizing heritage values of colonial buildings, and this was reflected in Republican legislation aimed at protecting and safeguarding colonial sites or sites linked to important events of colonial history. The 24 July 1928 Law authorized the President to perform such functions.

Advances in legal aspects to safeguard locations and buildings considered as National Heritage helped to create a favorable environment to historical and archaeological studies related to major events of national history. The declaration of national monuments applied to the Cathedral of Havana and town of Mantua in Pinar del Rio (3 September 1935), the City of Bayamo (30 December 1935), Santa Ifigenia Cemetery in Santiago de Cuba (7 September 1937), Paula Church in Havana (5 August 1944), José Martí's birthplace (5 February 1949), and Aldama Palace (22 April 1949), and the National Commission for Archaeology was created in August 1937. All this impacted positively on the development of a new archaeological discipline in the country: historical archaeology (La Rosa 2000).

It was with the birth of the Academy of Sciences of Cuba under the protection of the 1011 Act 20 February 1962 and the creation of an Institute of Anthropology that archaeological studies in Cuba reached certain levels of significance and along with it the existence of a coherent and systemic state policy aimed at the rescue, preservation, and management of the archaeological wealth of the country.

From that moment, and for the first time, a group of professional archaeologists would enjoy legal, institutional, and economic support to transform archaeology into their main activity. This enabled work in a national scope to be organized and systematized so that the task of rescuing and studying history's most remote past on superior bases related to technical resources and theoretical approaches could be connected with universities and related institutions. Substantial support to archaeological research with heritage purposes was given by historians and architects who had been working in the field of colonial buildings (Prat Puig 1996; Weiss 2002; Soraluce and Machado 2005).

Historical archaeology, as the latest of the disciplines of the field, emerged in those years in the country and continued opening up its way and gaining a space. Thus, F. Boytel Jambu conducted archaeological research and restoration of a plantation of French settlers in the Sierra Maestra in eastern Cuba and published the results in a title that would serve as a guideline in this field (Boytel 1962). It is not the mere study of a building, but one of the first examples in the specialized historiography of archaeological research directly concerned with the rescue and restoration of an architectural and spatial complex and its touristic exploitation. In short, Boytel Jambú's work demonstrated, in the context of the period in which archaeology of Cuba acquired institutional character, the great potential of the so-called historical archaeology, not only at the level of rescue by colonial history and heritage values but also at the economic benefits of such work, as it was implemented at the service of tourism.

The procedures used for field work and restoration of archaeological evidence and its social

Cuba: Archaeological Heritage Rescue and Management, Fig. 1 La Habana in 1851. (Engraving published in 1851 in London by Smith Brothers)

and economic implications turned this work into a new starting point for rescue and restoration tasks that have later developed in the country. In that work, the genesis of the current rescue and coffee heritage management of the eastern region of the island is found, with the location and safeguarding of 171 ruins of such plantations in the eastern mountains. These have been declared as World Heritage by UNESCO.

The institutional system that supports this rescue and management policy has been perfected over the years, in the same way as the laws that protect such policy. In August 1977, Law number 1 on the Natural and Cultural Heritage Protection was passed. Law number 2 also defined and upheld the declaration of local and national monuments, under whose protection Material and Immaterial Cultural heritage is defined, and the National Monument Commission was created as the highest Institution responsible for its fulfillment, ascribed to the National Council of Cultural Heritage of the Republic of Cuba.

The main objectives of the National Council of Cultural Heritage are protection, rescue, conservation, restoration, exhibition, research and dissemination of cultural and natural heritage, and the training of professionals in the field. It performs its tasks at a national level, through the Provincial Cultural Heritage Centers ascribed to museums, Monument Technical Teams and Provincial Cultural Property Records.

This policy has been particularly concerned with the necessary measures to ensure the enjoyment of heritage goods by the general population and tourism and protection.

The national network of Municipal Museums of Culture, Provincial Museums, and Museums offering a particular thematic line based on historical events of cultural significance in the territories are linked to general education programs and cultural and commemorative activities.

Work has been done in the rescue of important archaeological and cultural sites, involving archaeologists, architects, and historians. This work has resulted in solid archival and field research and has led to the restoration and enjoyment of the people visiting the major historic centers of the first villages founded during the conquest and colonization (Figs. 1–4) (Domínguez 1984, 2005; Gómez and Gomora 1986; La Rosa 2003; Leal 2003; Garcia 2004, 2008; Office of the Curator 2005).

The largest of the Antilles has a National Registry of Cultural Property that is constantly updated with the declaration and management of sites declared National Monuments and numerous

Cuba: Archaeological Heritage Rescue and Management, Fig. 2 San Francisco Square and Convent, Habana Vieja, World Heritage. (Photo: G.L.R)

Cuba: Archaeological Heritage Rescue and Management, Fig. 3 368 San Ignacio House in Plaza Vieja during its restoration. (Photo: City Historian Office)

Cuba: Archaeological Heritage Rescue and Management, Fig. 4 Plaza Vieja restored. At the end of the street, to the right, 368 San Ignacio House. (Photo: G.L.R)

enclaves. Some are "world cultural heritage" recognized by UNESCO, of which Cuba is signatory to the Convention.

Cuba's World Heritage sites are:

- Urban Historic Centre, Old City of Havana and its Fortifications, 1982. Cultural Asset
- Urban Historic Centre of the City of Trinidad and the Valle de los Ingenios, 1988. Cultural Asset
- Castillo de San Pedro de la Roca, Santiago de Cuba, 1997. Cultural Asset
- Landing of Granma National Park, 1999. Natural Asset
- Viñales Valley, 1999. Natural Asset
- Archaeological Landscape of the First Coffee Plantations in the Southeast of Cuba, 2000
- Alejandro de Humboldt National Park, 2001. Natural Asset
- Historic City of Cienfuegos, 2005. Cultural Asset
- Historic Centre of Camaguey City, 2008. Cultural Asset
- The Tumba Francesa, 2008. Masterpiece of Oral and Immaterial Heritage

At a national level, there are a number of teams of archaeologists, architects, engineers, builders, and historians who are engaged in the rescue and preservation of archaeological heritage of the island. In recent years, the work that Dr. J. M. Guarch began in the 1980s, in a large aboriginal cemetery on the site Chorro de Maita, Banes, Holguin Province, has come to life again. There is an open museum that reproduces a village where aboriginal potters and farmers worked and lived in the mid-sixteenth century. Replicas of 108 exhumed burial sites and the accompanying grave goods are shown there (Fig. 5).

Similarly, we indicate the Buchilones site, located in the wetlands of the northern province of Ciego de Avila, from which hundreds of archaeological wood pieces have been exhumed, including canoes, idols, and remains of houses, with a chronological range between CE 1220 and 1640. The work carried out with the cooperation of specialists from the University of London permitted that the most valuable pieces could be treated. In that place a Museum to display and preserve this valuable Aboriginal heritage is being finished (Fig. 6).

Cuba: Archaeological Heritage Rescue and Management, Fig. 5 Wooden anthropomorphic idol from Buchillones, Ciego de Ávila. (Photo courtesy of J. Calvera)

The authors of this work also advise on the rescue of the French coffee plantation ruins in Sierra del Rosario, west of Havana, where almost one hundred of these important coffee plantation remains are found. They are examples of the architecture of French influence in Cuba and technological development of the mid-nineteenth century (Figs. 7, 8). This task is part of the work of Las Terrazas Resort and its sustainable development project through the ecological use of heritage and trail tourism.

Virtual reconstruction of San Pedro coffee plantation, carried out as part of the study, salvage and information dissemination about these archaeological sites. To the *right*, is the domestic area; in the *middle* and to the *left*, is the

Cuba: Archaeological Heritage Rescue and Management, Fig. 6 Open Museum at Taíno Chorro de Maíta Cemetery, Banes, Holguín. (Photo courtesy of D. Torres)

Cuba: Archaeological Heritage Rescue and Management, Fig. 7 San Pedro coffee plantation ruins in Sierra del Rosario at the moment salvage works began. (Photo: G.L.R)

production area, with the driers and the coffee benefit house (elaborated by the authors).

In 1985, UNESCO declared the existence of 25,000 ha of forest in the Sierra del Rosario, as a Biosphere Reserve.

Old Havana, declared a Monument of Humanity in 1982, has been archaeologically worked since the 1960s, with a systematic study based on the suggestions of the UNESCO Venice Charter 1964. This study has examined

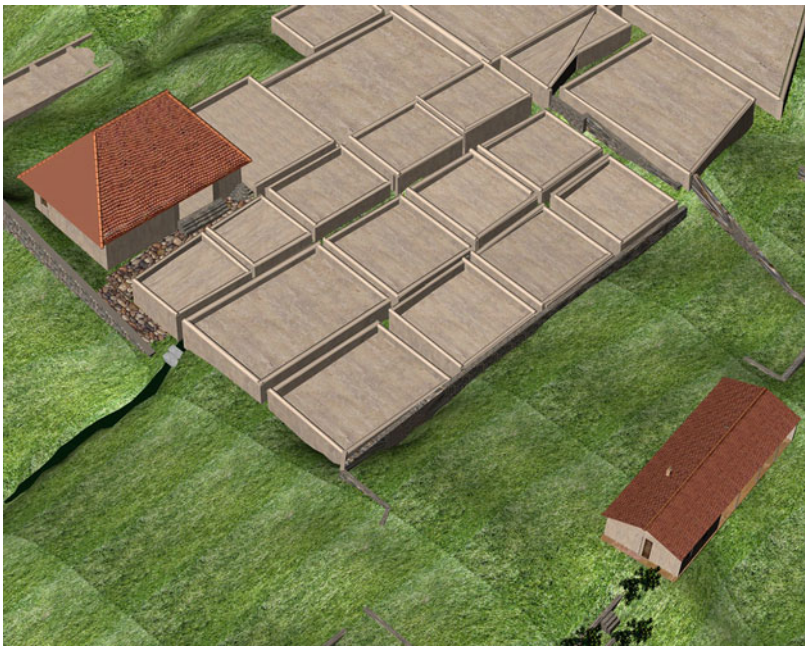

Cuba: Archaeological Heritage Rescue and Management, Fig. 8 Virtual reconstruction of San Pedro coffee plantation, carried out as part of the study, salvage and information dissemination about these archaeological sites. To the *right*, is the domestic area; in the *middle* and to the *left*, is the production area, with the driers and the coffee benefit house (elaborated by the authors)

remains underground and also on the surface, under the direction of the Archaeology Cabinet of the Havana City Historian Office and its Master Plan.

The treatment given to the first Havana City is a real testimony to the efforts of generations that have offered their expertise to this endeavor from the systematic policy of heritage work that has been carried out there.

Cross-References

- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ UNESCO World Heritage Convention (1972)

References

Boytel, F. 1962. Restauración de un cafetal de colonos franceses en la Sierra Maestra. *Revista de la Junta Nacional de Arqueología y Etnología*, Imprenta El Siglo XX.

Domínguez, L.S. 1984. *Arqueología colonial cubana: Dos estudios*. La Habana: Editorial de Ciencias Sociales.

Domínguez, L.S. 2005. Patrimonio en Cuba: El caso de La Habana Vieja como sitio arqueológico. *Diálogos* 9: 23–31.

García Santana, A. 2004. *Trinidad de Cuba, ciudad, plazas, casas y valles*. La Habana: Consejo Nacional de Patrimonio.

García Santana, A. 2008. *Las primeras villas de Cuba*. España: Ediciones Polymita.

Gómez, L., and D. Gomora. 1986. Tipología urbana del Centro Histórico de Camagüey. *Arquitectura u Urbanismo* 1: 40–45.

La Rosa, G. 2000. Perspectivas de la arqueología histórica en los umbrales del XXI en Cuba. *Revista Bimestre* 12: 124–135.

La Rosa, G. 2003. La ciencia arqueológica en Cuba: Retos y perspectivas en los umbrales del XXI. *Catauro* 8: 36–46.

Leal, E. 2003. *Fundada Esperanza*. La Habana: Ediciones Boloña.

Oficina Del Conservador De La Ciudad. 2005. *Sito cultural vinculado al desarrollo cafetalero del suroriente de Cuba*. Santiago de Cuba.

Prat Puig, F. 1996. *El prebarroco en Cuba. Una escuela criolla de arquitectura morisca*. Barcelona.

Rodriguez Ferrer, M. 1876. *Naturaleza y civilizacio'n de la Grandiosa Isla de Cuba*. Madrid: Imprenta de J. Noguera.

Soraluce, J.R., and R.L. Machado. 2005. *La casa cubana: Colonia y eclecticismo*. La Habana.

Weiss, J. 2002. *La arquitectura colonial cubana, siglos XVI al XIX*. Habana-Sevilla.

Cueva de las Manos, Río Pinturas Cave Art

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Introduction

Cueva de las Manos is an archaeological site with rock art located on the rocky walls of the extraordinary Río Pinturas canyon, northwest of the province of Santa Cruz, Argentina. The site includes a cave and several surfaces of open air cliffs decorated with magnificent pictographs and is surrounded by a unique natural habitat. Cueva de las Manos undoubtedly possesses outstanding universal value which justifies its inclusion on the UNESCO World Heritage List in 1999 (Fig. 1).

Definition

Rock art, as one component of the archaeological record, gives us important information about the material and spiritual past of humans. This type of site is subject to constant natural and cultural deterioration. For this reason, the scientific community has become aware of the importance of its preservation.

Since 1995 the National Institute of Anthropology and Latin American Thought (INAPL) has initiated a program to prevent the destruction of rock art sites and to encourage their preservation. Conservation priority has been given to Cueva de las Manos, with concrete conservation actions that are still implemented today.

Key Issues

The paintings in the cave, overhangs, and cliffs of the Alto Río Pinturas are impressive because of their location on the deep ravine wall surrounded by a lovely setting and because of its artistic composition, the polychrome design, and beauty. Cueva de las Manos stands out not only for the beautiful natural environment but also for the countless cave paintings and art forms represented along the cliffs and rocky overhangs that line the river. There is a profusion of pictorial motifs made in different shades and countless superimpositions that have occurred throughout eight millennia of art production. The combination of these factors provides a unique aesthetic experience for the visitor (Figs. 2 and 3).

Outstanding universal values of the site are fully contained both in the core and in the buffer zone. The habitat surrounding the archaeological site remains intact and contains the same zoological species represented from 10,000 years ago in the rock art (Fig. 4).

This is a particular environment, unique and atypical, both at the provincial and regional levels, with great value for the conservation of natural systems in Argentina. The same can be said about the rock art, which despite the inevitable but very slow natural decay suffered for ten millennia and the damage caused by human action, it is in outstandingly good condition.

Moreover, research broadly corroborates the authenticity of Cueva de las Manos as a unique evidence of one of the first groups of hunter-gatherers that inhabited the South American region in the early Holocene.

Scientific excavations coordinated by C. J. Gradin together with C. A. Aschero and A. M. Aguerre demonstrated the link between the rock art with groups that inhabited the region ten millennia ago. Evidence from excavations in the cave area allowed for contextual associations between cultural levels and paintings, based on a detailed study of the overlays, the differential use of tones, the different degree of conservation, and the location of representations in different sectors. This relationship between the different cultural levels of the site is based on evidence showing a direct association between mineral pigments or painted-fragment remains detached from the wall, found during excavations, and the radiocarbon dates (Gradin et al. 1976, 1979; Gradin and Aguerre 1994) (Fig. 5).

Cueva de las Manos, Río Pinturas Cave Art, Fig. 1 Site location

Cueva de las Manos, Río Pinturas Cave Art, Fig. 2 Río Pinturas canyon

The main product of the hunt was the guanaco (camelid), which was the main food support of these groups, providing meat, skin, fat, bones, and tendons. Naturalistic representations of this animal in a variety of attitudes were painted on the rocks.

The most outstanding scenes are those with high anecdotal value in which the animals are chased and surrounded by hunters, trapped, and killed using their throwing weapons or spears and stone balls. There are hunting scenes showing several hunters with lances attacking a herd of 20 guanacos.

Hand stencils (negative handprints) are a constant artistic expression at the site from its earliest days. There are concentrations of various sizes and colors, including red, purple, white, black, yellow, orange, ochre, and a few green. Studies revealed interesting findings about this tradition that has lasted for nine millennia.

Then guanacos appear in isolated sets of static attitude and bulging belly, with no connection between man and the prey.

The next phase is characterized by increasingly schematic art including drawings of lizards (or matuastos), negative hands, stylized human figures, and guanacos crudely executed, besides "rosettes" or circles surrounded by dots, a three-toed bird print similar to choique (a rhea, a large flightless bird).

Cueva de las Manos, Río Pinturas Cave Art, Fig. 3 Rock art details

The final phase in the artistic sequence is characterized by outlining and the use of an intense red color for predominantly geometric figures such as zigzags, straight lines and angles, pinpoint, and circles. The human figure is produced with linear strokes. It also includes schematic representations of hands and negative hands, some executed on a prepared base in another color.

Protection and Management

INAPL undertake rock art documentation and study the natural and cultural damage to the site, as well as providing for the transfer of knowledge and community empowerment. It has also

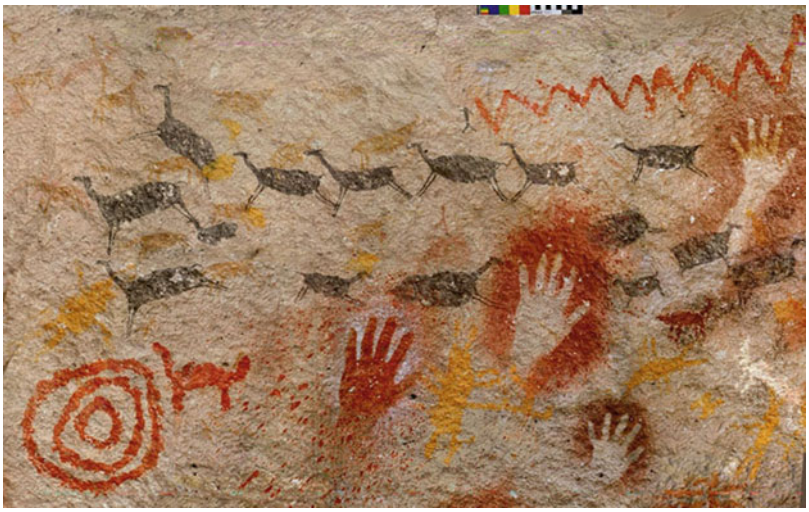

Cueva de las Manos, Río Pinturas Cave Art, Fig. 4 Scenes panel

Cueva de las Manos, Río Pinturas Cave Art, Fig. 5 Painted hand superimposed to painted guanaco

developed a management plan for the overall management of the site and work on the dossier for entry onto the UNESCO World Heritage List (Onetto 1998). Since 1997 the National Architecture Office carried out infrastructure works proposed in the plan. It also conducted an analysis of the stability of the slope, which included the study of mobility in soils and potential risks by a geologist (Zárate 2005).

The management plan for the site has been praised because it meets the conservation requirements of World Heritage properties (UNESCO 1999). This plan proposed several concrete actions, which have been fulfilled over 10 years of management: permanent custody of the place; strict control of entry of visitors, tour guides trained for that purpose, set schedules for visits, and times for guided tours; bounded groups of 15 people; and prohibition to enter without a guide, facilities for guide accommodation, interpretative posters, and high-resistance wooden walkways in the circuit of the paintings (Onetto et al. 2010).

In 2008, the Agencia Espaþola de Cooperación Internacional para el Desarrollo (AECID) provided a project grant for "Conservation and Sustainable Management of Cultural Heritage. Hands Cave: 10,000 Years of History in Patagonia," based on the INAPL and coordinated by Maria Onetto. This has allowed a new phase of research and public use of the site, adding María Luz Funes and Andrea Murgo to the team, with a proposal that directly involves the community. The overall objective of the project is education and raising community awareness for the safeguarding of traditional knowledge (Podestá and Onetto 2004).

An interpretation center was opened in the reception room on the site, we worked on the edition of a handbook for schools of the province of Santa Cruz and the project of the Museum Carlos Gradin in the town of Perito Moreno was implemented, for the exhibition of archaeological material and laboratory researchers (Onetto et al. 2010).

Fieldwork was completed, monitoring of the condition of the art. A photographic survey to

make a digital archive that will provide a complete record of art was also made.

The tasks of management, monitoring, and research on the site by the National Institute of Anthropology and Latin American Thought continue ensuring ongoing maintenance of the integrity of its outstanding universal values.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and Communities
- ▶ Heritage and Archaeology
- ▶ Heritage Research and Visitor Planning
- ▶ Heritage Values, Communication of
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art Sites: Management and Conservation
- ▶ Site Visitation and Interpretation: Management
- ▶ South American Rock Art

References

Gradin, C.J., and A.M. Aguerre. 1994. *Contribución a la arqueología del Río Pinturas*. Provincia de Santa Cruz: Ed. Búsqueda, Ayllu. Concepción del Uruguay.

Gradin, C.J., C.A. Aschero, and A.M. Aguerre. 1976. Investigaciones arqueológicas en la Cueva de Las Manos. Estancia Alto Río Pinturas (Provincia de Santa Cruz). *Relaciones de la Sociedad Argentina de Antropología* 10: 201–250.

Gradin, C.J., C.A. Aschero, and A.M. Aguerre. 1979. Arqueología del Área del Río Pinturas (Provincia de Santa Cruz). *Relaciones de la Sociedad Argentina de Antropología* 13: 183–227.

Onetto, M. 1998. *Informe Proyecto Conservación y Administración del Sitio Cueva de las Manos, provincia de Santa Cruz*. Secretaria de Cultura de la Nación: Instituto Nacional de Antropología y Pensamiento Latinoamericano.

Onetto, M., G. Cassiodoro, M. Colombo, V. Salerno, A. Elías & A. Castro. 2010a. Imagínatelo en vivo: patrimonio en acción y arqueología "Todo Terreno" en Cueva de las Manos, Santa Cruz (Cuadernos del Instituto Nacional de Antropología 22).

Onetto, M., M.L. Funes, and A. Murgo. 2010b. Conservación y gestión sostenible del patrimonio cultural: Cueva de las Manos (Río Pinturas, Provincia de Santa Cruz). In *Arqueología Argentina en el Bicentenario de la Revolución de Mayo: Capítulo 9*, Tomo, ed. R. Bárcena and H. Chiavazza, vol. 2, 527–531. Mendoza.

Podestá, M.M., and M. Onetto. 2004. Role of local communities in the management of world heritage in Argentina: The case of Cueva de las Manos. In *Linking universal and local values: Managing a sustainable future for world heritage*, 159–164. Amsterdam: The Netherlands National Commission for UNESCO.

UNESCO. 1999. Convention Concerning the Protection of the World Cultural and Natural Heritage. Bureau of the World Heritage Committee. 23 session. Paris, UNESCO Headquarters, Room X, 5–10 July 1999. Draft report of the rapporteur. Part II.

Zárate, M. 2005. Estudio de la ladera del MHN Cueva de las Manos para la evaluación de la caída eventual de rocas. Informe a la Empresa Constructora Torraca Hnos.

Cult Stones of the Ancient Eastern Mediterranean

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Introduction

Aniconic stones feature in the cultic traditions of several cultures of the ancient eastern Mediterranean. In the Bronze Age Aegean they are called baetyls and, based on their representation in Minoan glyptic iconography, are associated with ecstatic ritual evoking divine epiphany (Evans 1901; Warren 1990; Crooks in press). Early religio-historical sources support the ascription of cultic significance to standing stones in the Levant, where they are called *masseboth* (singular: *massebah*), known primarily from Bronze and Iron Age sites (Moore 1903; Graesser 1972; Mettinger 1995; Avner 2001; Zevit 2001). Phoenician expansion across the Mediterranean during the Iron Age sees the increased incidence of stone cult in the region (Mettinger 1995), including in Cyprus where cult stones are known from the late Neolithic (Crooks 2012).

Definition

Cult stones in the ancient eastern Mediterranean are naturally formed or modified stones of varying appearance and use. They are associated with cult, particularly in the Levant, Cyprus, and Crete during the Bronze and Iron Ages. Ranging in shape and size from small water-worn ovoid stones as little as 20 cm in diameter in Cyprus to large roughly hewn standing stones up to 2 m in height in the Levant, they are typically of igneous rock or limestone and may be arranged singly or in groups. While the appearance and function of cult stones varies regionally, the unifying quality of such stones is their cultic significance, discernible through context.

Key Issues/Current Debates/Future Directions/Examples

In the ancient Near East, the veneration of stones is particularly well attested in the Levant (Moore 1903; Graesser 1972; Mettinger 1995; Avner 2001; Zevit 2001). The book of *Genesis* describes the story of *Jacob's Dream at Bethel* where Jacob "took the stone that he had put under his head and set it up for a pillar and poured oil on the top of it. He called that place Bethel.... Then Jacob made a vow, saying, 'If God will be with me... this stone, which I have set up for a pillar, shall be God's house...'" (Genesis 28: 18–22). Jacob's *massebah* is characteristically *set up*, acting as a mnemonic marker commemorating a covenant. The sacred stone is also the house of god, "Bethel" – the dwelling place of the supernatural spirit or power. Levantine masseboth may serve as cult idols located within a holy-of-holy, as boundary markers or mnemonic devices memorializing territorial control, or as liminal markers situated in proximity to city entryways.

In the Aegean, aniconic stones feature in the cultic tradition of the Minoan Bronze Age, where they are called baetyls, a term suggestive of an etymological link with the Hebrew "beth-el" (Evans 1901: 132–3, Moore 1903; Rutkowski 1986; Marinatos 2009). Best known from their depiction in Neopalatial glyptic iconography, baetyls commonly appear as waist-high ovoid stones which are hugged or leant upon by an anthropomorphic figure, sometimes in association with the shaking of a sacred tree. Such scenes are thought to represent ecstatic ritual evoking enacted or embodied epiphany, the immanence of the divinity or spirit resident within the stone thought to be represented by flying creatures, such as insects or birds, or by floating anthropomorphic figures. Minoan baetyls may have served as aniconic cult objects or as the animistic dwelling places of divinities or spirits (Warren 1990; Crooks in press).

Phallic cult stones are known from as early as the Ceramic Neolithic in Cyprus (Crooks 2012), however, the use of stones in Cypriot cult is most commonly attested from the Iron Age, following increased exposure to Phoenician and Aegean cultural influence. While not typically phallic in appearance, Cypriot cult stones are nonetheless most frequently associated with fertility cults (Karageorghis 1992: 212), reflecting the influence of Frazerian seasonal-allegory theory which posits a preoccupation with fertility as a feature common to all early agricultural societies (Frazer 1890: IV).

Cultural evolutionism has often informed the interpretation of ancient cult stones, so-called "primitive" cultures thought to employ aniconic cult images as precursors to the more sophisticated anthropomorphic images utilized by more highly evolved groups. This is demonstrably inaccurate, aniconic cult stones commonly occurring alongside anthropomorphic cult images. Similarly, it is often held that theistic religions evolve out of ancestor cult, manifest in the idea that grave stones, a common point of focus in rituals commemorating the dead, may over time come to be perceived as the physical abodes of the spirit of the deceased. Finally, the concept of animism expounded by the Victorian comparative ethnologists (Tylor 1871; Smith 1889; Frazer 1890) is enduringly influential in interpretations of ancient cult stones, asserting that primitive humans believed every part of the natural world could be inhabited by supernatural spirits (Tylor 1871: vol. 2). Thus, natural phenomena such as falling meteorites, equipped with the power of motion, might be seen to be animated by spirits residing within.

The ambivalence or ambiguous quality inherent in aniconic cult stones poses significant challenges to their identification and interpretation archaeologically. However, their multivocality is central to their ritual value, through their accommodation of multiple individual ritual experiences in the context of shared ritual action; a single stone may evoke one or many divinities or spirits, and multiple aspects or manifestations of a single supernatural power, during a single moment and through time, rendering them useful in strategies of social cohesion.

Cross-References

- ▶ Authority and Legitimacy in Political and Social Archaeology
- ▶ Crete, Archaeology of
- ▶ Cyprus, Archaeology of
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Multivocality and Archaeology
- ▶ Religion, Greek, Archaeology of

References

Avner, U. 2001. Sacred stones in the desert. *Biblical Archaeology Review* 27 (3): 30–41.

Crooks, S. In press. *What are these queer stones? Baetyls: Epistemology of a Minoan fetish*, British Archaeological Reports International series. Oxford: Archaeopress.

Crooks, S. 2012. Cult stones of ancient Cyprus. *Journal of Prehistoric Religion* XXIII: 25–44.

Evans, A. 1901. Mycenaean tree and pillar cult and its Mediterranean relations. *Journal of Hellenic Studies* 21: 99–204.

Frazer, J. 1890. The golden bough.

Graesser, C.F. 1972. Standing stones in ancient Palestine. *Biblical Archaeology* 35 (2): 34–63.

Karageorghis, V. 1992. I. On 'baetyls' in Cyprus. *Levant* 24: 212.

Marinatos, N. 2009. Meta-mythology of "baetyl cult." The Mediterranean hypothesis of Sir Arthur Evans and Fritz Graf. In *Antike Mythen: Medien, Transformationen und Konstruktionen*, ed. U. Dill and C. Walde, 73–80. Berlin/New York: Walter de Gruyter.

Mettinger, T. 1995. *No graven image? Israelite aniconism in its ancient Near East context*. Stockholm: Almqvist & Wiksell International.

Moore, G.F. 1903. Baetylia. *American Journal of Archaeology* 7 (2): 198–208.

Rutkowski, B. 1986. *The cult places of the Aegean*. New Haven: Yale University Press.

Smith, W.R. 1889. *Lectures on the religion of the Semites. Fundamental institutions. First series*. London: Adam & Charles Black.

Tylor, E.B. 1871. *Primitive culture: Researches into the development of mythology, philosophy, religion, art, and custom*. London: John Murray.

Warren, P. 1990. Of baetyls. *Opuscula atheniensia* 18 (14): 193–206.

Zevit, Z. 2001. *The religions of ancient Israel: A synthesis of Parallactic approaches*. London/New York: Continuum.

Cultural Ecology in Archaeology

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Introduction

From its very beginnings, anthropology has shown a marked concern for the environmental components that affect what anthropologists have deemed, at one time or another, to be the object of their investigations. This has given rise to countless proposals. Some of these identify factors in nature that limit the development of communities; others highlight the stimulus generated in societies by the same adverse environmental conditions they must confront. Some anthropologists have approached the environment-culture debate by evaluating the capacity of communities to adjust to their surroundings. In this way, they have identified social practices that help regulate the relationship between the environment and society – an emphasis that doubtlessly contributed to the development of the detailed examinations of current ethnography data that explained the functioning of those systems and a focus that ignored the history that set the stage for the present day. It is therefore not surprising that since the close of the twentieth century, the search for this history would take on an unusual relevance. The work of some anthropologists has gone beyond these

perspectives, questioning the separation between nature and culture. A dissection that seemed artificial, on the one hand, and ethnocentric, on the other, in contrast with those standpoints arrived at under other conceptualizations. It was possible that nature did not exist, at least not in the way that had been assumed for so long in the west. This idea allowed a questioning of the perception and analysis carried out within the Judeo-Christian tradition, the fundamental pivot that gave form to the modern world.

It is clear that the studies advanced by those anthropologists created disparate, contrasting perspectives. The very nature of these discrepancies is found in the views and the emphases that we have developed, in one time or another, to perceive these realities; no less important is the data that corroborate or refute these constructions. Under titles such as "Cultural Ecology," "Human Ecology," "Cognitive Anthropology," "Historical Ecology," and "Ethno-Science," to name just a few of those reference points, the field has advanced little by little in examining the world and its inhabitants, a process that feeds more and more on other areas and incorporates other disciplines.

Definition

This entry is written from a viewpoint that considered the complex relationship between environment and culture as part of a long history, which includes the dialectic transformative processes generated from the mutual relationship between humans and their surroundings (Crumley 2006). This relationship has not only contributed to the "intervention" of nature and the transformation of culture but opens up a space to reflect on the character of these relationships where explanations can be found – including the anthropological – that give form to the behaviors developed in one or other historical period.

Historical Background

In the New World, anthropology arose amidst reflection on the forms in which human societies developed in the geographical space they occupied. Its founder, a scholar with training in physics and geography, tried to understand cultures from a historical perspective, despite being aware of the importance of the geography they occupied. Thus, a theory was born – later known as historical particularism – in the writings of Franz Boas (1848–1942). Boas instilled in his students, among many other ideas, the concept of cultural relativism as well as a marked skepticism of the scope of the generalizations they can make. Despite this, it was under the guidance of Boas that one of his students – Alfred Louis Kroeber (1876–1960) – would concern himself with outlining guidelines that would be used to understand the relationship between cultures and the geographical spaces they occupied. In fact, this was the central theme of his book "Cultural and Natural Areas of Native North America," published in 1939. In this way, the concept of cultural areas was formulated, a concept that linked geographical zones with characteristic cultural forms and in which cultural change was explained as part of a continuous process of diffusion. Although this was not a new idea, the same had been expounded and extended from ethnographic data obtained by anthropologists such as Wissler (1870–1947) in the United States; at each recurrence, it became more attractive. In this way, a map was developed that "naturalized" cultures by linking them with specific geographical spaces.

This correlation between cultures and geographical spaces was revolutionized when the idea of adaptation was inserted. Julian Steward (1902–1972) proposed that the similarities observed between different cultures could be explained as convergences created by evolutionary processes. In these, the adaptations that came about would play a fundamental role. Possibly the most familiar example of the adaptation processes that Steward tried to highlight is found in his texts on the *Patrilineal Band* (Steward 1973). For Steward, this constituted a social type whose principal characteristics – patrilineality, patrilocality, exogamy, territorial appropriation, and the composition of lineages – are defined by the narrow limit of possibilities generated by the interaction

of a simple technology and specific ecological conditions (Steward 1973). In an atmosphere in which the key resource is found to be made up of nonmigratory prey widely distributed, it proves advantageous for groups to remain in the territory where individual members were born and to maintain a low population density. This was particularly true if the freight and transport systems were limited by simple human effort. The bond between the idea of evolution, which Boas saw as irrelevant in his time, and the concept of adaptation, bearing in mind the community structure in the light of its composition and the behaviors of its members, meant Steward's "Cultural Ecology" a powerful tool for understanding cultural change. After all, this theory had been designed to determine if the different adaptations to the environment generated transformations of an evolutionary character in society. However, the legacy of Steward was not limited to these ideas; Steward left us a clear methodology for embarking on the study of cultural change in which ecology was a central component (Steward 1977).

Steward was not the only researcher concerned with cultural evolution and its relationship with the environment, in the mid-twentieth century. Leslie White's (1900–1975) interest in this led him to design a model in which human societies were abstracted from three components – the techno-economic, the socioeconomic, and the ideological. White (1949) emphasized the first of these components, particularly the human capacity to develop technologies that allowed societies to "harvest" a progressive quantity of energy. For White, the energy extracted from the environment, multiplied by the efficiency of the technologies employed, would determine the level of cultural development reached. In this way, it was possible to organize human societies in an evolutionary continuum that implied a progression from the simple to the complex. This singular emphasis on technology contributed to the relegation of the ecological components to second place or, in the worst cases, to being viewed as constants. This vision reinforced the development of some environmental determinism. One of the most outstanding examples of this approach was carried out by Betty Meggers (1957) in her interpretation of Amazon prehistory. In this context culture was examined exclusively in function of its environmental productive capabilities. This interpretation was severely criticized. The oversimplification of the proposed models and the nature of the evidence supporting them placed in doubt the results presented.

Anthropology in the second half of the last century faced new challenges. Social problems and their correlation with ecological factors were evident. Pollution, desertification, and even the possible scarcity of freshwater began to take up more and more discussion space. Thus, the study of interrelationships between the domain of nature and that of culture took on an unprecedented importance. Undoubtedly, this contributed to the proliferation of proposals by anthropologists; the publications of the time reveal an explosion of approaches on this theme. Toward the 1960s, a new vision emerged. The work of Roy A. Rappaport (1926–1997) and Andrew Vayda explored ecosystems, in which humans were a fundamental part, from a perspective that viewed culture as an adaptive strategy. This approach was based on the general theory of systems, from which it was possible to insert human populations as one more element in the complex relationship between the biotic and non-biotic elements of an ecosystem. Cultural practices were, then, considered to be mechanisms whose purpose was to maximize adaptation, at the same time contributing to the conservation of ecosystems (Rappaport 1967). In fact, Rappaport's analysis of Tsembaga rituals indicated that they did not solely serve to validate and intensify the relationships that contribute to the integration of society, or to symbolically present the links societies forged with nature, but that they were also important regulatory systems of the relationship between human populations and the ecosystems these populations occupied. As Rappaport showed, many of these rituals helped maintain a balance between the populations and the resources used (Rappaport 1967, 1996). In the same period that Vayda and Rappaport carried out their work, Marvin Harris (1927–2001) published a study of the management and valuation of cattle in India. Harris (1966) saw in these practices an adaptive process

that had influenced Hinduism. For this author, the sanctification of the cattle and the abolition of its sacrifice for human consumption generated benefits that had been ignored by previous studies. Among those were found milk production, the use of dung as cooking fuel, and the use of the animals for hauling and agricultural labor. In short, Harris interpreted the behaviors from a point of view external to the values of the society in question, seeking to understand their possible adaptive function.

The approach of Harris, as well as the proposal of Rappaport and Vayda, was criticized for excessive functionalism; additionally, the work of the last two authors leads discussion toward the delimitation of terminology and the viability of quantifying its logical consequences in empirical form. Concepts such as population, homeostasis, equilibrium, dynamic equilibrium, retroalimentation, resilience, and charge capacity had empirical implications and forced their verification in the field, which was difficult to carry out given the type of information required and the problems inherent in the definitions applied (Friedman 1974).

As these discussions were taking place, on the ground, ethnographers were busy qualifying and quantifying the dietary composition of natives' societies. In this way, they hoped to assess actual consumption as well as the practices of appropriation and production used by small communities. Two themes complemented this work. On the one hand, an acute interest was developed in the ways decisions were made (i.e., Hames and Vickers 1982). This led to the construction of mathematical models that weighed up the investment and risk of success or failure in light of the results obtained from different production activities, a subject which proved especially revealing in the analysis of hunting.

On the other hand, attention was being drawn to the way the cosmologies of the premodern societies contributed to reinforcing practices that preserve the dynamic equilibrium of the ecosystems they occupied. A good example of this treatment is found in the article that Gerardo Reichel-Dolmatoff would publish in 1976 about cosmology as an ecological analysis.

The beginning of the 1990s saw a deepening of the study of ecological factors and adaptive behaviors. From "evolutionary ecology" (see Durham 1992), "human behavioral ecology" was developed (see Irons and Cronk 2000). This theoretical trend centered on the study of rules that define human decisions and the conditions in which these operate.

Basically, researchers were asking what ecological forces result from one behavioral alternative being selected above others. Unlike previous studies, they intended to study these practices in a broad context that included the whole of society. In another vein, they sought to generate models that could be corroborated empirically; simultaneously attempts were being made to formulate predictions about the future selection of behaviors.

Other theorists took a different route. By the early 1950s, the influence of Claude Lévi-Strauss (1908–2009) on anthropology had become patently obvious. Due to this, new subject matters took on an exceptional importance. In North America, this influence encouraged the development of orientations such as cognitive anthropology. This school of anthropological thought, arising from the study of languages, centered on the rational aspects of culture. It was accepted that marked, strong semantic categories across linguistic forms were related to meaningful cultural categories. This study hoped to improve understanding of how societies perceive, organize, and use culture. These anthropologists asserted that culture could not be seen as a material phenomenon, but is a form of knowledge that organizes the material forms (Tyler 1996).

One obvious consequence of this line of thought was the need to undertake a detailed inventory of the categories used for different societies and comparing them with those used in the west. An important example in this sense is the article that Harold C. Conklin published in 1955 about the definition and use of colors by the Hanunóo. From these reflections areas emerged that would gradually gain importance such as ethnoscience, ethnobotany, and ethnoecology; this last is understood to be the transcultural study of societies' manipulation of their environment.

The models generated by anthropologists up till then had dealt with "small-scale" societies that were seen as units isolated from the overwhelming movement of the West, a fiction of anthropological thinking that was difficult to maintain in the latter half of the twentieth century. The limits to resources being utilized to fulfill the needs of national societies and international markets obligated reconsideration of the levels of resolution that should be utilized, as well as the very nature of the problems.

Toward the 1980s, Eric Wolf (1923–1999) demonstrated the absurdity of maintaining a viewpoint that refused to recognize the history of some populations while omitting the impact of dominant societies (1982). "Traditional cultures" had their own history; a history that intersected with that of the West, a history on which the West had had a great impact; and a point of view that led to the revision of the anthropologists' daily tasks; three decades later, some anthropologists are still delving into this topic (Godelier 2009).

By the beginning of the 1990s, a remarkable quantity of data had been compiled. The point of view of the natives, and their knowledge accompanying the results presented by anthropologists, not only offered a new horizon for studies but revealed problems of appropriation of that knowledge. In the west, the avid traders of learning and matter began a process of legal appropriation of anything that offered the possibility of enrichment. After all, the research in some areas, such as ethnobotany, had been financed in part by companies that now tried to patent the results. In response, a strong activism arose among social and political groups. These movements gave greater meaning to the results of research that dealt with relationships between culture and environment. A second consequence of this environmental activism was to highlight the importance of certain geographical regions. Due to this, it is not surprising that the tropical regions – for example, the Amazon – have become the space where confrontation occurred between those concerned about the present and future of the populations and those who saw the exploitation of resources as a logical process for sustaining and increasing the inequitable economic growth that characterized the twentieth century.

The press was filled with images of those who participated in these conflicts; new leaders personified the social drama arising from the conflict generated by the diverse forms of resource use. The world stopped to watch and listen to what the poor country folk, such as Chico Mendes, had to say. The discussions between academics, despite being on a continuum, became polarized: some, principally biologists, saw indigenous or rural occupation of the areas they were trying to protect or conserve as a problem; others accepted that conservation was impossible without the participation of those same communities (Balée 1985; Redford and Sanderson 2000). A revised version of the notion of the "noble savage" returned to academic discussion. In parallel, studies moved away from a way of thinking that would view stability and balance as the nature of the systems studied. These new directions were documented utilizing new technologies, among which was found more and better satellite-generated images (such as Brondizio et al. 1994).

The growing polarization around environmental conflicts established a new alternative in anthropology: a politico-ecological anthropology opened a path that helped reinforce links to other fields such as ecology, biology, and geography; at the same time, it developed a strong critique to the implemented policies using terms such as "environmental rights," "resource ownership," and "territorial rights." The anthropologists' viewpoint enriched the debate with empirical data and new theoretical contributions and opened a discussion that cut across a good number of knowledge fields.

Key Issues/Current Debates

Since the turn of the century and in the first decade of the twenty-first century, three fundamental changes in anthropologists' work have become clear.

First, the examination of "the world" in some non-western societies reveals a more varied range of representations than what westerners included in dominion over nature. Complex cosmos organized under rules of kinship, affinity, and

opposition structure the relationship of universes that conceive "nature" as a continuum that can be described using the forms taken by social relationships. One conclusion has become clear: nature is society and society is nature. Thus, it becomes manifest that the vision that separated nature and culture was following the western historical development: an ethnocentric vision. This discovery led to the evaluation of the concepts underpinning the vision of the world on which the West had built a philosophical and economic system (Pattberg 2007). In another vein, this perspective enabled the comparative study of forms in which relationships are identified, qualified, and understood – the relationships between different forms of presenting the whole and the biases that define the cultures and their worlds.

Clearly the premises employed in these constructions establish different relationship forms, affecting the interactions generated between the different dominions (e.g., Descola 1996). This orientation not only influences the vision of the worlds built by natives but impacts the form in which the west has conceived its surroundings and has interacted with itself.

The environmental conflicts constitute a second topic of importance. During the 1980s arose, in an almost natural way, an alliance between local communities – indigenous and rural – and conservation groups.

The political plan of some, and the revindications that others were seeking, allowed them to identify common objectives. This alliance meant a figurative broadening, at the local and international levels, of the actions they wanted to carry out. Nonetheless, there was a contradiction between the two groups. At the international level, the conservationist wanted to use the local image to support their arguments; this implied the decontextualization and transformation of the localities. At the local level, the communities tried to reinforce and capitalize on the action with outside help, which forced changes to objectives, thus creating confusion among participants. The distance arising from these processes led to them growing apart and failing to understand the role that each played. The consequences did not take long to be felt. Possibly the clearest example of this lack of understanding is the assassination of Chico Méndez. In brief, there arose oppositions and contradictions that joined in with the already complex environmental conflicts. This situation was further compounded, on the conservationists' side, by their use of categories whose scientific application was, to say the least, incomplete but offered novel arguments valuable to the discourse. For example, terms such as biodiversity are part of a complex that goes beyond science, given that you are not trying to identify the composition and structure of "nature," but seeking to highlight the functional value of its present and future uses. In this sense, the category itself transcends science by placing the discussion in a form that relates it with the environment (Escobar 2005). In short, the critical analysis of the proposed discourse, and the activism on the part of anthropology sectors that advocate for an anthropology positioned face-to-face with the problems, constitutes an extremely important aspect in the present day.

Finally, work carried out since the 1980s demonstrated that the idea of worlds being untouchable, isolated, and free from human influence was nothing more than fantasy, an illusion built by a science that separated humans from the world they inhabited. More and more data corroborated the impact that human societies have had on the planet throughout history. Even those sites that not so long ago would have been considered untouchable have been affected and were in part the result of human activities. These observations were evidence of the magnitude of human influence on the planet. The loss of the ozone layer, attributed by many to recent human activities, or aspects of global warming are new phenomena; these are just two among the great impacts generated by humans throughout history. Without a doubt, a global history is emerging in which it is impossible to separate the human history of ecology from the ecology of history. The characteristics of the problems these approaches were tackling make it imperative to reconsider the resolution levels and the scales that must be employed.

One response to these necessities has been the development of historical ecology. This in itself comes as part of a multidisciplinary approach that

utilizes information such as the reconstruction of paleoclimates, as well as ethnographic, ethnohistorical, and archaeological data. One example would be the incorporation of geographical models to understand humans and their activities as an integral part of the planet on which they live. Highlighted in this approach is the human and ecological past viewed as a whole. It is now recognized that the environmental dynamic does not run parallel with human activities, but rather the two are as one, indivisible. In short, the proposition of historical archaeology is to understand the formation of present and past societies through an analysis of the complex relationships between humans and their surroundings in the light of the consequences of their interactions (Balée 1998, 2006). Landscape is a fundamental focus of analysis in these studies; it is seen as a point of interaction, with a temporal dimension both historical and cultural, at the center of evolution. It allows researchers to decode the interactions between humans and the environment during clearly defined periods. Nonetheless, investigators see how the landscape is in a continua state of physical and cognitive transformation.

Historical ecology currently faces several challenges. On the one hand, recognition of the cultural-ecological unity means combining approaches of different kinds. Models generated from the natural sciences tend to be deductive, while those created in the humanities are inductive; despite this, the two do try to give an account of the self-same reality.

It is necessary, then, to create and refine concepts, such as that of the landscape, in order to articulate these views, a job that is advancing with care (Crumley 2006). A second challenge lies in the resolution levels and spatial-temporal scales. The nature of the different data used, as well as their limitations, creates gaps and inconsistencies in the spatial-temporal scales of analyses. In this way, in some cases, the data contributes to an excessive extrapolation of the information which creates an illusion that detracts from the reality being studied. Finally, it is necessary to make note of one of the greatest advantages of historical ecology – its capacity to integrate diverse fields – which can lead to the use of categories under multiple definitions that are not always congruous. For example, the concept of history appears to have different connotations in the writings of ethnographers, archaeologists, and geographers (see Little 1999).

Future Directions

Far from the apocalyptic dreams presented by the communication media, humanity has before it some important challenges, but also opportunities. A growing number of people aspire to enjoy the same standards of living reached by the wealthiest countries. However, that well-being has been founded on an accelerated race to use and appropriate resources, on a global scale, which has contributed to inequities in other sectors. At the same time, a large proportion of the planet's inhabitants live in conditions of extreme poverty. The economic models used, as well as the premises on which the twentieth century is built, appear to be teetering.

At this crossroads, an anthropology interested in the environment should offer theoretical alternatives, while it continues its meticulous studies. This same anthropology should continue being critical and committed. If it is not capable of growing in this direction itself, it runs the risk of remaining condemned to live inhabit the world of sophists. Still, the recent literature suggests that anthropology has accepted the challenge.

Cross-References

▶ Historical Ecology and Environmental Archaeology
▶ Historical Ecology in Archaeology

References

Balée, W.L. 1985. Ka'apor ritual hunting. *Human Ecology* 13 (4): 485–510.

Balée, W.L. 1998. Historical ecology: Premises and postulates. In *Advances in historical ecology*, ed. W. Balée, 13–29. New York: Columbia University Press.

Balée, W.L. 2006. The research program of historical ecology. *Annual Review of Anthropology* 35: 75–98.
Brondizio, E., E. Moran, and P. Mausel. 1994. Land use change in the Amazon estuary: Patterns of Caboclo settlement and landscape management. *Human Ecology* 22 (3): 249–278.
Crumley, C.L. 2006. Historical ecology: Integrated thinking at multiple temporal and spatial scales. In *The world system and the earth system global socioenvironmental change and sustainability since the Neolithic*, ed. A. Hornborg and C. Crumley, 15–28. Walnut Creek: Left Coast Press.
Descola, P. 1996. Constructing natures: Symbolic ecology and social practice. In *Nature and society. Anthropological perspectives*, ed. P. Descola and G. Pálsson, 82–102. London/New York: Routledge.
Durham, W.H. 1992. Applications of evolutionary culture theory. *Annual Review of Anthropology* 21: 331–355.
Escobar, A. 2005. Does biodiversity exist? In *The environment in anthropology. A reader in ecology, culture, and sustainable living*, ed. N. Haenn and R.R. Wilk, 243–245. New York: New York University Press.
Friedman, J. 1974. Marxism, structuralism and vulgar materialism. *Man* 9 (3): 444–469.
Godelier, M. 2009. *In and out of the West. Reconstructing anthropology*. Charlottesville: University of Virginia Press.
Hames, R.B., and W.T. Vickers. 1982. Optimal foraging theory as a model to explain variability in Amazonian hunting. *American Ethnologist* 9 (2): 358–378.
Harris, M. 1992 (1966). The cultural ecology of India's sacred cattle. *Current Anthropology* 33(1): 261–276.
Irons, W., and L. Cronk. 2000. Two decades of a new paradigm. In *Adaptation and human behavior. An anthropological perspective*, ed. L. Cronk, N. Changnon, and W. Irons, 3–26. New York: Aldine de Gruyter.
Little, P.E. 1999. Environments and environmentalism in anthropological research: Facing a New Millennium. *Annual Review of Anthropology* 28: 253–284.
Meggers, B. 1957. Environment and culture in the Amazon basin: An appraisal of the theory of environmental determinism. In *Studies in human ecology*. Social Science Monographs 3, 71–89. Washington, DC: Panamerican Union.
Pattberg, P. 2007. Conquest, domination and control: Europe's mastery of nature in historic perspective. *Journal of Political Ecology* 14: 1–9.
Rappaport, R.A. 1967. *Pigs for the ancestors: Ritual in the ecology of the New Guinea people*. New Haven: Yale University Press.
Rappaport, R.A. 1996 (1967). Ritual regulations of environmental relations among a New Guinea people. In *Anthropological theory. An introductory history*, ed. R.J. McGee and R.L. Warms, 296–309. Mountain View: Mayfield Publishing Company.
Redford, K.H., and S.E. Sanderson. 2000. Extracting humans from nature. *Conservation Biology* 14 (5): 1364.
Steward, J.H. 1973. The patrilineal band. In *Theory of cultural change*, 122–142. Chicago: University of Illinois Press Urban.
Steward, J.H. 1977. The concept and method of cultural ecology. In *Evolution and ecology*, ed. J.C. Steward and R.F. Murphy, 43–57. Chicago: University Illinois Press.
Tyler, S.A. 1996 (1969). Introduction to cognitive anthropology. In *Anthropological theory. An introductory history*, ed. R.J. McGee and R.L. Warms, 351–366. Mountain View: Mayfield Publishing Company.
White, L.A. 1949. *The science of culture: A study of man and civilization*. New York: Grove Press.
Wolf, E.R. 1982. *Europe and the people without history*. Berkeley: University of California Press.

Further Reading

Conklin, H.C. 1955. Hanunóo color categories. *Southwestern Journal of Anthropology* 11 (4): 339–344.
Kroeber, A.L. 1939. *Cultural and natural areas of Native North America*. University of California Publications in American Archaeology and Ethnology 39. Berkeley: University of California Press.
Redford, K., and J.G. Robinson. 1987. The game of choice: Patterns of Indian and colonist hunting in the neotropics. *American Anthropologist* 89 (3): 650–667.
Redman, C.L. 1999. *Human impact on ancient environments*. Tucson: The University of Arizona Press.
Reichel-Dolmatoff, G. 1976. Cosmology as ecological analysis: A view from the rain forest. *Man* 11 (3): 307–318.

Cultural Heritage and Communities

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Introduction

Cultural heritage is inevitably implicated in the creation of a sense of community (Howard 2003: 147–85; Byrne 2008: 170–1), and the management of cultural heritage has consequences for those communities and their heritage. Communities can be defined from the "outside" or can be self-defining. The concept of "community" is therefore never a straightforward identification

of "others" with whom archaeologists engage: heritage professionals too are a community among other communities, each with a claim on particular pasts and particular versions of those pasts. The role of the heritage professional can be a varied one, depending on context and the vision of the purpose of archaeology the professional espouses.

Definition

This section will explicitly avoid predefining its objects, on the grounds that what is at issue in the field of cultural heritage studies is precisely what the terms "cultural heritage" and "community" mean in any particular context, how they are applied, and to what they are applied (see, e.g., Tunbridge and Ashworth 1996; Carman 2002; Fairclough et al. 2008; Sørensen and Carman 2009).

Key Issues and Current Debates

Recent debates in the field of public archaeology have turned on two related issues:

- A recognition that the concept of "community" which is applied in the heritage field is one open to challenge and that communities themselves are at once varied and complex phenomena.
- The different forms of engagement that are at once possible and desirable (see, e.g., Carman 2005; Smith and Waterton 2009; Matthews et al. 2011).

Beyond this, there are questions concerning the role that heritage professionals play in their relations with communities.

Smith and Waterton (2009: 24–5) accuse heritage professionals generally of assuming that the communities with which they deal share particular characteristics, especially:

- Homogeneity
- A lack of internal conflict
- Locality
- Small scale

There is also a tendency to assume:

- That a community will preexist the arrival of the professional
- That such communities have an established sense of identity
- Grounded in what they perceive as their past as represented by certain kinds of material (Carman 2011).

However, and while they challenge this vision of community very effectively, Smith and Waterton (2009) and others (e.g., Agbe-Davies 2011) emphasize that the idea of "community" has a history, and the idea of what constitutes a community has changed over time. Moreover, how communities identify themselves – and indeed if a group of people choose to identify themselves as a community – is to be understood as much as a strategic and contingent decision as a statement of established identity (Agbe-Davies 2011). Smith and Waterton (2009: 25-7) emphasize how recent an arrival "community" is in archaeological concerns, at least in the UK: they date the first major period of interest to the 1970s and trace its gradual adoption in heritage policy until recent years has seen the concept used as a justification for official support for archaeology.

Types of Communities

Yvonne Marshall (2002: 216) suggests that in general archaeologists encounter two kinds of human community: one defined by geographical proximity to a heritage site is the "local" and the other defined by affiliation is the "descendant." These are not mutually exclusive categories: a "local" community may also be "descendant" (and vice versa). On the other hand, there is no reason for a "descendant" community to have any geographical connection.

The Indigenous community is a particular example of the descendant community (Smith 2004) and frequently taken as the model for archaeological consideration (see, e.g., Smith and Waterton 2009). There are, however, other

kinds of descendant community (see, e.g., Funari and de Carvalho 2011; Davidson and Brandon 2012). Diasporan communities may also claim affiliation with culture quite distant from them in space, such as communities who claim links with the culture of a place of origin: examples include African-Americans adopting specifically African aspects of dress and hairstyle, expatriate Irish who celebrate St. Patrick's Day, and others who retain the language, traditions, and dress of a distant or lost "homeland." However, descendant communities need not make heritage claims on the basis of direct or provable biological or cultural descent: modern British Pagans, for instance, may claim an association with prehistoric sites such as Stonehenge despite the lack of any demonstrated historical continuity between them and the builders of prehistoric stone circles; similarly, modern battle reenactors who name themselves for historic regiments can claim affiliation to sites where the historic regiment fought despite the lack of any historical continuity (Carman 2010: 197–8).

As Smith and Waterton (2009: 138) emphasize, however, heritage professionals such as archaeologists also constitute a community: they come together at conferences, through publication, and in other ways such as via digital technology (Smith and Waterton 2009: 119–37). They share a common set of understandings of what they do and why, which although subject to contestation between themselves (see, e.g., Hodder et al. 1995: 220–4, 228–9) necessarily excludes others (Hodder et al. 1995: 30–231). Increasingly, the languages in which archaeology is published have become fewer over the years (Kristiansen 2012), and archaeology is becoming increasingly professionalized across the world (Darvill 2012). As a result heritage professionals cannot be considered to be disinterested observers or managers, but rather to represent a particular set of interests.

Types of Engagement

Any kind of community may be involved in an emerging community archaeology project. The issue is primarily, however, not one of who is involved, but the nature of the involvement. In this connection, Stephanie Moser and her colleagues in Egypt (Moser et al. 2002: 221–3) note that there is a standard hierarchy of types of collaboration:

- "Outreach" represents a one-way process of communication and education.
- Beyond this is a willingness to recognize the contribution to knowledge and information others can make.
- Beyond this is an active process of consultation, most evident with Indigenous and descendant communities.

In going further, the project at Al-Quseir in Egypt involved a series of additional steps:

- Fostering social relationships with the local community
- Maintaining a presence in the community between fieldwork seasons
- Employing locals as part of the project
- Using locals as the means of outreach programs
- Ensuring the retention of remains retrieved locally in the local area (Moser et al. 2002: 223).

Similar ideas emerge from the work of Judith Field and her colleagues with the Aboriginal community at Cuddie Springs in Australia (Field et al. 2000: 43–4). Here, it was important to the community:

- That the archaeologists establish their integrity
- That they engendered trust
- That they encouraged active participation in the project, especially by employing members of the community in the work
- That they maintained a constant presence in the area
- That they conveyed information to the community members in ways to which they could respond
- As in Egypt, that locally found archaeological material remained in the area.

In both these cases, these factors contributed to a sense among the local community of the project

as something of direct relevance to them and in which they had a direct stake, both emotional and economic. It also engendered trust among them of the archaeological team, who arrived as strangers. In both cases, however, the community was involved after the researchers had established the grounds for the project.

A similar kind of project in Fiji (Crosby 2002) aimed to go a little beyond this by listing the requirements for a "true" community archaeology project, which are said to be:

- Initiation of the project by the local community
- A basis in local ideology and attitudes, linked to concerns for sustainable resource use
- The provision of expert advice from outside the community
- External (in this case, government) funding.

Here, the community calls upon others to undertake the work, which is then organized and financed from outside. Although dependent upon the willingness of professional experts to place themselves at the service of untrained locals and of government agencies to provide full financial support, which may be exceptional and peculiar to the Fijian context, there is nevertheless an indication here of a shift of power between the professional advisor and the community whereby it is the community that leads rather than the archaeologist.

"Democratic" archaeology projects take a similar approach. At Sedgeford in England, a local committee of trustees had control over the project as well as employing – indeed relying heavily upon – local labor, while hierarchical structures were minimal (Faulkner 2000: 31–2). In other cases, more formal structures serve to support community control. At the Levi Jordan Plantation site in Brazoria, Texas, USA (McDavid 2000), control over archaeological research and its public interpretation was in the hands of a board of trustees drawn from descendants of former owners of the plantation and those they enslaved and their representatives, the aim of archaeologists being to collaborate with members of local descendant communities in reciprocal, nonhierarchical, mutually empowering ways (McDavid 2000: 222). It is also clear, however, that any particular initiative required the permission of the trustees and that committee members were involved in every stage of the project and were seen as the "bosses" who directed the archaeologists; these were then concerned both to involve committee members and to be "involved in [committee members'] own agendas, according to… mutual needs" (McDavid 2000: 222). Nevertheless, McDavid admits that the committee members perceived her as the project leader, a role she both claimed and does not attempt to disguise (McDavid 2000: 222).

Carol McDavid takes an explicit approach to her work with African-American descendant communities, grounded in American pragmatist philosophy, which entails the establishment of a continuing "conversation" about issues at the site (McDavid 2000: 229, 2002: 305, 2009). In her work she emphasizes the diversity of backgrounds of committee members and of attitudes toward the site, both white and African-American, and draws upon the pragmatist approach as a way to accommodate this without closing the conversation. First, she notes how involving herself as one actor in a conversation among many serves to enhance her standing in the community, rather than diminish it: effectively by denying her own "expert" status as an archaeologist she is able to emerge as the community's expert (McDavid 2000: 230). Second, she sees how the abandonment of scholarly authority allows her to engage more closely with the more contingent and contextual interpretations of others' lives by those others (McDavid 2000: 230–1). Third, a pragmatic approach is about keeping the conversation going, not about winning arguments: accordingly, disagreements between actors become not problems to be overcome but opportunities to engage more deeply with colleagues (McDavid 2000: 231). The outcome is an approach grounded in four principles: reflexivity, multivocality, interactivity, and contextuality (McDavid 2002: 307–10), designed to maintain the conversation and by doing so to build trust with the community whose project it is.

Creating Communities

A function and opportunity frequently ignored is the capacity of the professional to construct communities through their work. In a series of case studies, Boyd et al. (2005: 98-107) indicate the processes by which professional interest in sites in Australia engendered the development of local interests and values built around differing attributes. Accordingly, they show how local aboriginal interests mostly focussed upon sites representing Indigenous and traditional attitudes to land and environment, or to the history of their engagement with incoming colonizers. European Australians also recognized such claims and sometimes the spiritual dimension these indicate. Others however were more concerned with current social and economic uses – as tourist sites, recreational space, or thoroughfares – although not all of these conflicted with Aboriginal conceptions: the attitude of skateboarders to a rock-art site, for instance, could be seen as another example of significance to a particular subculture (Boyd et al. 2005: 107). However, these values did not attach to the site until it became the focus of attention by researchers: it was by raising questions about such places that values were ascribed and which marked their importance to inhabitants of the locality and beyond.

The same set of processes was evident at the Hilton of Cadboll site in Scotland (Jones 2004). Here, excavation of the lower portion of an inscribed Pictish stone and its reconstruction ignited controversy over the ownership and placement of the reunited object, which was claimed both by the national museum in Edinburgh and the locality. Investigation of the contexts within which contemporary meanings for the stone are created identified a complex set of interlocking values. Academic and intellectual values included those of archaeology, art history, folklore, and oral history (Jones 2004: 27–33). In parallel to these, there was a more symbolic sense of its identity, as a living part of the community, and as an object "born" into the locality (Jones 2004: 33–7). As such it at once belongs to the community, is part of it, and is also constitutive of it: "as well as being conceived of as a living member of the community, the monument is also simultaneously an icon for the [community] as a whole" (Jones 2004: 37). This extends into the monument's role in the construction of a sense of place, and indeed of reforging a "lost" sense of community cohesion (Jones 2004: 39) that could be "healed" (at least symbolically) by reuniting the two original pieces of the monument.

A third instance is in the case of the commemoration of the 300th anniversary of the Battle of Oudenaarde in Belgium (Carman 2012). Here, a disinterested local population – many of whom who lived on the land where this internationally and historically important event took place – had to be transformed into a community of interest. A combination of public meetings and press stories, involvement of scholars from several countries, and active research on the battlefield all contributed to the emergence of a community who made a connection to both the place as a location of historical significance and to the memory of the event it signified. The result was the successful organization of a major commemorative event including a museum exhibition, a reenactment weekend, and an international academic conference. The sense of community interest thus created has since allowed ongoing research on the battlefield and encouraged the Flemish authorities to develop an inventory of historic conflict sites for purposes of heritage management.

In these cases "community" interest did not preexist scholarly attention to a particular site or monument. It was the presence and interest of scholars that incited such interest.

Activist Archaeologies

Questions as to the role of the professional with the communities with which or for whom they work inevitably embrace the degree to which professionals engage with the particular agendas of those communities. Some (e.g., LaRoche 2011; Levin 2011; Davidson and Brandon 2012) become involved in community projects in order to allow that community to reclaim part of its past and thereby to emphasize present inequalities; others (e.g., Saitta 2007; McDavid 2009) are more concerned to use the study of the past as a

means to engage directly with issues of inequality in the present. For the former, the past matters in itself as a means to empowerment, while for the latter the past is a mechanism to address current concerns. This kind of work has been called "civic engagement [which calls for] a commitment far beyond that of" conventional engagement with communities (Little 2007: 162).

Such agendas raise issues about how archaeologists can contribute to political, social, and economic change. One is to use archaeological interpretation to challenge conventional and expected understandings of current norms. Others take a different line – by directly involving non-archaeologists in the process of archaeological work. Whether you call this "community archaeology," "collaborative archaeology," or "democratic archaeology" (Carman 2005: 86–90), it works to challenge the idea that professionally trained archaeologists are the sole providers of archaeological interpretations and the only people qualified to undertake archaeological investigation. It involves abrogating some or all professional authority and putting professional skills and knowledge at the service of others who direct the project. Not only does this provide them with access to what is – after all – their past but also serves to undermine in a very direct and manifest way the structures of authority and power that are part of the modern order and in part invested in academic disciplines and agencies (such as those employing archaeologists) operating under the authority of law and government.

Conclusion

The topic of "cultural heritage and communities" is much larger than can be conveniently covered in the space allotted here. While heritage can be considered constitutive of community, the reverse is also true. The choices groups make as to what constitutes their heritage will define them as a community: while at the same time anything classed as heritage will serve to define the community to which it is deemed to be affiliated. In considering how communities relate to heritage and vice versa, it becomes necessary to make a decision as to the direction of the constitutive link. This then raises the question of the role of the heritage professional: in defining something as "heritage," the professional may also be defining a particular community of interest which may not otherwise be recognized by its members. In their activities professionals may also create communities of interest that did not previously exist – either by choice (as at Oudenaarde) or by other processes (as recorded in Boyd et al. 2005) – which must then not be identified as preexisting. Others go beyond this by adopting the agendas of the communities with which they work, becoming at once part of the community and serving it.

The result is a complex set of relationships that are impossible to analyze in an entirely disinterested manner, since the researcher is inevitably implicated in the process of community construction and maintenance. As we increasingly come to recognize this, the processes of archaeology in the public arena become the subject of research in their own right.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Archaeology
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management and Native Americans
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Museums and the Public
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions

References

Agbe-Davies, A. 2011. Inside/outside, upside down: Including archaeologists in communities. *Archaeologies* 7: 574–595.

Boyd, W.E., M.M. Cotter, J. Gardiner, and G. Taylor. 2005. 'Rigidity and a changing order. . . disorder, degeneracy and daemonic repetition': Fluidity of cultural values

and cultural heritage management. In *Heritage of value, archaeology of renown: Reshaping archaeological assessment and significance*, ed. C. Mathers, T. Darvill, and B.J. Little, 43–57. Gainesville: University Press of Florida.

Byrne, D. 2008. Heritage as social action. In *The heritage reader*, ed. G. Fairclough, R. Harrison, J.H. Jameson, and J. Schofield, 149–173. London: Routledge.

Carman, J. 2002. *Archaeology and heritage: An introduction*. London/New York: Continuum.

Carman, J. 2005. *Against cultural property: Archaeology, heritage and ownership*, Duckworth debates in archaeology. London: Duckworth.

Carman, J. 2010. Where the value lies: The importance of materiality to the immaterial aspects of heritage. In *Taking archaeology out of heritage*, ed. L. Smith and E. Waterton, 192–208. Cambridge: Cambridge Scholars Press.

Carman, J. 2011. Stories we tell: Myths at the heart of 'community archaeology'. *Archaeologies* 7: 490–501.

Carman, J. 2012. Past war and European identity: Making conflict archaeology useful. In *The archaeology of violence: Interdisciplinary approaches*, ed. S. Ralph. Albany: Statue University of New York Press.

Crosby, A. 2002. Archaeology and *vanua* development in Fiji. *World Archaeology* 34: 363–378.

Darvill, T. 2012. Archaeology as a profession. In *The Oxford handbook of public archaeology*, ed. R. Skeates, C. McDavid, and J. Carman, 373–394. Oxford: Oxford University Press.

Davidson, J.M., and J.C. Brandon. 2012. Descendant community partnering, the politics of time, and the logistics of reality: Tales from North American, African diaspora, archaeology. In *The Oxford handbook of public archaeology*, ed. R. Skeates, C. McDavid, and J. Carman, 605–628. Oxford: Oxford University Press.

Fairclough, G., R. Harrison, J.H. Jameson, and J. Schofield, eds. 2008. *The heritage reader*. London: Routledge.

Faulkner, N. 2000. Archaeology from below. *Public Archaeology* 1: 21–33.

Field, J., J. Barker, R. Barker, E. Coffey, L. Coffey, E. Crawford, L. Darcy, T. Fields, G. Lord, B. Steadman, and S. Colley. 2000. 'Coming back': Aborigines and archaeologists at Cuddie Springs. *Public Archaeology* 1: 35–48.

Funari, P.P., and A.V. de Carvalho. 2011. Inclusion in public archaeology in Brazil: Remarks on collaborative practices. *Archaeologies* 7: 554–572.

Hodder, I., M. Shanks, A. Alexandri, V. Buchli, J. Carman, J. Last, and G. Lucas, eds. 1995. *Interpreting archaeology: Finding meaning in the past*. London: Routledge.

Howard, P. 2003. *Heritage: Management, interpretation, identity*. London/New York: Continuum.

Jones, S. 2004. *Early Medieval sculpture and the production of meaning, value and place: The case of Hilton of Cadboll*. Edinburgh: Historic Scotland.

Kristiansen, K. 2012. Archaeological communities and languages. In *The Oxford handbook of public archaeology*, ed. R. Skeates, C. McDavid, and J. Carman, 461–477. Oxford: Oxford University Press.

LaRoche, C.J. 2011. Archaeology, the activist community and the redistribution of power in New York City. *Archaeologies* 7: 619–634.

Levin, J. 2011. Activism leads to excavation: The power of place and the power of the people at the President's House in Philadelphia. *Archaeologies* 7: 596–618.

Little, B.J. 2007. *Historical archaeology: Why the past matters*. Walnut Creek: Left Coast Press.

Marshall, Y. 2002. What is community archaeology? *World Archaeology* 34: 211–219.

Matthews, C., C. McDavid, and P.J. Jepson. 2011. Dynamics of inclusion in public archaeology: An introduction. *Archaeologies* 7: 482–489.

McDavid, C. 2000. Archaeology as cultural critique: Pragmatism and the archaeology of a southern United States plantation. In *Philosophy and archaeological practice: Perspectives for the 21st century*, ed. C. Holtorf and H. Karlsson, 221–239. Göteborg: Bricoleur Press.

McDavid, C. 2002. Archaeology that hurts; descendants that matter: A pragmatic approach to collaboration in the public interpretation of African-American archaeology. *World Archaeology* 34: 303–314.

McDavid, C. 2009. The public archaeology of African America: Reflections on pragmatic methods and their results. In *Heritage studies: Methods and approaches*, ed. M.L.S. Sørensen and J. Carman, 217–234. London: Routledge.

Moser, S., D. Glazier, J.E. Phillips, L. Nasr el Namr, M.S. Mouier, R.N. Aiesh, S. Richardson, A. Conner, and M. Seymour. 2002. Transforming archaeology through practice: Strategies for collaborative archaeology and the community archaeology project at Quesir, Egypt. *World Archaeology* 34: 220–248.

Saitta, D. 2007. *The archaeology of collective action*. Gainesville: University Press of Florida.

Smith, L. 2004. *Archaeological theory and the politics of cultural heritage*. London: Routledge.

Smith, L., and E. Waterton. 2009. *Heritage, communities and archaeology*, Duckworth debates in archaeology. London: Duckworth.

Sørensen, M.L.S., and J. Carman. 2009. *Heritage studies: Methods and approaches*. London: Routledge.

Tunbridge, J.E., and G.J. Ashworth. 1996. *Dissonant heritage: The management of the past as a resource in conflict*. Chichester: Wiley.

Further Reading

Archaeologies 7(3) (2011).

Derry, L., and M. Malloy, eds. 2003. *Archaeologists and local communities*. Washington, DC: Society for American Archaeology.

International Journal of Heritage Studies 16(1–2) (2010); 18:3 (2012).

Little, B.J., and P.A. Shackel. 2007. *Archaeology as a tool of civic engagement*. Lanham: AltaMira Press.

McGuire, R.H. 2008. *Archaeology as political action*. Berkeley/Los Angeles/London: University of California Press.
Public Archeology.
Pyburn, A. 2007. Archeology as activism. In *Cultural heritage and human rights*, ed. H. Silverman and D.F. Ruggles, 172–183. New York: Springer.
Sabloff, J.A. 2008. *Archaeology matters*. Walnut Creek: Left Coast Press.
Skeates, R., C. McDavid, and J. Carman, eds. 2012. *The Oxford handbook of public archaeology*. Oxford: Oxford University Press.
Waterton, E., and S. Watson, eds. 2010. *Heritage and community engagement: Collaboration or contestation?* London: Routledge.

Cultural Heritage and Foreign Investment

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Introduction

Defined as the scientific study of the material remains of past human life and activities, archaeology seems to have very little to do with international investment law, the field of public international law governing foreign investments. Archaeology and international investment law seem to constitute different fields of study, with different aims and objectives. Archaeology studies material objects and aims to illuminate the past. International investment law addresses current issues, governs foreign investors and their investments, and aims to protect them against abusive behavior of the host state and to contribute to the sustainable development of the same. Nonetheless, in the past decades, foreign investors have invested in areas with important archaeological artifacts or constituting significant cultural landscapes, and questions have arisen about how to balance investors' rights under the applicable investment treaties and the state right to protect important archaeological artifacts, architectural features, and landscapes (Vadi 2014). Not only is the right to regulate cultural resources an intrinsic element of state cultural sovereignty, but it is also increasingly recognized under international law. After briefly introducing the field of international investment law and arbitration, this entry will discuss the key issues arising from the clash between the protection of archeological and cultural artifacts and the promotion of foreign investments in international investment law and arbitration, by referring to some paradigmatic examples. Then, it will discuss some current debates and conclude by illuminating some future directions.

Defining International Investment Law and Arbitration

The law of foreign investment is one of the oldest and most complex areas of international law and has gained preeminence in the field. More than 3000 international investment agreements (IIAs) govern foreign investments and provide foreign investors with direct access to international arbitration. States have signed such treaties to attract foreign investment and accord adequate legal protection to their investors. Rare in international law, these treaties give private parties standing to arbitrate disputes under international law and then enforce any award in their favor in domestic courts of the host country. Without the possibility of domestic enforcement, awards would be meaningless. Investment treaties provide extensive protection to investor rights in order to encourage foreign investment and foster economic development. While investment treaties differ in their details, their scope and content have been standardized over the years, as negotiations have been characterized by an ongoing sharing and borrowing of concepts.

At the substantive level, investment treaties broadly define the notion of foreign direct investment (FDI), which typically includes ownership in businesses operating outside the country of origin of the investor, and provide protection against discrimination, fair and equitable treatment, full protection and security, and assurances that the host country will honor its commitments regarding the investment. Other common

provisions in investment treaties concern the repatriation of profits and prohibit currency controls that are worse than those in place when the treaty was signed. Investment treaties generally guarantee compensation in the event of nationalization, expropriation, or indirect expropriation and clarify what level of compensation will be owed in such cases.

At the procedural level, most IIAs provide investors direct access to an international arbitral tribunal. In so doing, they create a set of procedural rights for the direct benefit of investors. This is a major novelty in international law, as customary international law does not provide such a mechanism. The rationale for internationalizing investor-state disputes lies in the intended depoliticization of such disputes. The home country is no longer involved in litigating international disputes on behalf of its affected citizens; the host country is no longer subject to the political and/or military pressures of the so-called gunboat diplomacy. The affected investor is no longer subject to the vagaries of diplomatic protection, which entitles the home state to file a claim against the host state for wrongs committed against the citizens of the former state but that is traditionally perceived to be a right of the home state rather than a duty of the same. Arbitral awards shape the relationship between the state, on the one hand, and private individuals on the other. Arbitrators determine matters such as the legality of governmental activity, the degree to which individuals should be protected from regulation, and the appropriate role of the state.

Key Issues

When countries pursue economic growth, their policy makers may have an incentive to lower cultural standards to promote economic activities. If states nonetheless maintain a high level of cultural heritage protection, disputes may arise as foreign investors can claim that such policies affect their economic interests thereby breaching investment treaty provisions (Vadi 2012). Given the extraordinary increase of foreign investment flows in recent years, the privileged regime created by international investment law within the boundaries of the host state has increasingly determined a tension between investors' rights and cultural heritage protection. In some cases, foreign investors have claimed that cultural policies negatively affected their investment, thereby amounting to indirect expropriation. In other cases, the investors alleged discrimination and/or violation of the fair and equitable treatment standard. In sum, there is a variety of potential conflict areas between investor rights and cultural policies relating the protection of archaeological artifacts (Vadi 2012).

Examples

Three examples may clarify the issues at stake. In the Glamis Gold case, a Canadian mining company planned to mine gold on federal land in southeastern California (the Imperial Project). Because the area in and around the Imperial Project was used by precontact Native Americans as a pilgrimage route, the Quechan, a Native American tribe, opposed the project as it would destroy the Trail of Dreams, a sacred path still used for performing ceremonial practices (Vadi 2011). The Department of the Interior withdrew the Imperial Project from further mineral entry for 20 years to protect historic properties. In 2002, however, permission for the project was granted, and the State Mining and Geology Board enacted emergency regulations requiring the backfilling of all open-pit mines to re-create the approximate contours of the land prior to mining.

According to the claimant, however, not only did the US Interior Department fail to promptly approve the project, thus unreasonably delaying its mining operations, but California's regulation requiring the backfilling of open-pit gold mines also made its mining operation uneconomical. Therefore, the investor claimed inter alia that the United States had expropriated its mining rights in violation of Article 1110 of the North American Free Trade Agreement. According to the claimant, the expropriation began with the federal government's refusal to approve the claimant's plan of operations and continued with the backfilling requirement. In particular, backfilling would be

uneconomical and arbitrary since it would not be rationally related to its stated purpose of protecting cultural resources. The claimant argued that whereas taking gold out of the ground destroys any cultural resources on the surface, putting the dirt back in the pit actually does not protect those resources but may lead to the burial of more artifacts and cause greater cultural loss (Vadi 2011).

In its award, the Arbitral Tribunal held that the complained measures did not amount to an indirect expropriation. Not only did not they cause a sufficient economic impact to Glamis' investment, but they were also rationally related to their stated purpose. The Tribunal admitted that "some cultural artifacts will indeed be disturbed, if not buried, in the process of excavating and backfilling," but concluded that, without such measures, the landscape would be harmed by significant pits and waste piles in the near vicinity (Glamis Award, Vadi 2011). Remarkably, the Arbitral Tribunal also expressly referred to Article 12 of the World Heritage Convention, which requires States to protect their cultural heritage even if it is not listed in the World Heritage lists. This is rather extraordinary, as cultural heritage experts have repeatedly stressed that Article 12 of the WHC is an often-neglected provision.

In *Southern Pacific Properties (Middle East) Limited v. Arab Republic of Egypt*, the arbitration involved the development of a tourist village at the pyramids of Giza. During construction, artifacts of archaeological importance were unearthed. Therefore, notwithstanding the previous approval of the investment at stake, Egypt canceled the project and the area was added to the World Heritage List (Vadi 2014). The ICSID Tribunal noted that certain acts of Egyptian officials "created expectations protected by established principles of international law" and that the listing had been requested after the cancelation of the project (SPP v. Egypt, Award, Vadi 2014). Therefore, it found contractual liability and sustained the Claimant's argument that the particular public purpose of the expropriation could not change the obligation to pay fair compensation.

In *Malaysian Historical Salvors v. Malaysia*, the arbitration centered on the question as to whether a salvage contract for the finding, identification, and recovery of an ancient shipwreck constituted an investment, thus receiving protection under the UK–Malaysia Bilateral Investment Treaty (BIT). Malaysian Historical Salvors (MHS), a British salvage company, entered into a contract with the Malaysian Government to locate and salvage the cargo of the *Diana*, a vessel licensed by the East India Company that mysteriously sank in the Straits of Malacca on 5 March 1817 (Vadi 2014). Under the terms of the contract, which was on a no finds-no pay basis, all the costs of the salvage and its risks would be borne exclusively by the salvage company. Artifacts directly related to Malaysian history and culture would be retained by the Government for study and exhibition in the National Museum, while the other recovered items would have been auctioned in Europe. The Malaysian Government would receive the sale proceeds, while paying a percentage of the sum to the company. The salvage efforts took almost 4 years; when MHS found and salvaged the sunken vessel, it recovered nearly 24,000 complete pieces of Chinese blue-and-white porcelain. The dispute arose with regard to the proceeds of the auction and the quantity of items which Malaysia withheld from sale. As MHS contested the amount of the salvaged items which were withheld from sale, the company commenced arbitration proceedings against the Malaysian Government in Kuala Lumpur. As the award dismissed the claim, and every challenge failed, the claimant filed a Request for Arbitration at the International Center for the Settlement of Investment Disputes (ICSID) in Washington DC, contending that there was a violation of the UK–Malaysia BIT. In particular, the claimant argued that its performance under the contract fell within the meaning of investment and that, accordingly, it was protected under the BIT. Substantially, the investor contended that the respondent had violated BIT provisions concerning protection of investment and expropriation. For its part, the respondent objected to jurisdiction over the dispute, arguing that the contract was not an investment. This line of argument was upheld by the sole arbitrator who dismissed the claim on jurisdiction (MHS v. Malaysia Award, Vadi 2014).

The arbitrator considered that the nature of the claimant's activities was largely similar to that of a commercial salvage contract and that an ordinary commercial contract could not be considered as an investment. The majority of the Annulment Committee, however, held that a salvage contract is a form of investment, on the basis of the broad definition of investment provided by the UK–Malaysia BIT. Therefore, it concluded that the Tribunal exceeded its powers by failing to exercise jurisdiction with which it was endowed by the UK–Malaysia BIT and the ICSID Convention and that it manifestly did so because it did not consider the definition of investment provided by the same BIT (MHS v. Malaysia, Decision on the Application for Annulment, Vadi 2014).

These arbitrations took place in different locations and concerned facts taking place in the American, African, and Asian continents, respectively. They were conducted by different arbitral tribunals under different international investment treaties and concerned different subject matters and causes of action. One may legitimately wonder whether there is any commonality between these awards. One may also question the relevance of discussing previous awards, given the fact that there is no binding precedent in international (investment) law. Nonetheless, investment arbitrations – while not binding on each other – have become the most important source of international investment law. Moreover, these awards show an increasingly frequent pattern in the reference to cultural heritage protection in investment treaty arbitration. Cultural heritage issues arise in a variety of contexts, delimiting substantive standards of protection and even quantifying damages. The study of previous awards is useful because patterns of consistent use can and do influence subsequent awards. Moreover, many other investment arbitrations clearly involve cultural heritage and archaeological artifacts (Vadi 2014).

Current Debates

The interplay between investors' rights and cultural heritage protection raises a number of questions. First, have arbitral tribunals paid any attention to cultural heritage? If so, how have they balanced investors' rights and the cultural policies of the host State? Second, what values and interests are at the heart of their thinking and practice? Third, is investor-state arbitration a suitable forum to protect the public interest? Finally, if one admits that adjudication is a bottom-up mode of governance, and has a fundamental importance with regard to the concrete implementation of a given legal regime, then analyzing the adjudicative patterns of cultural heritage-related investment disputes also tests the effectiveness of international investment law and, indirectly, of international cultural heritage law.

Recent studies have shown that arbitral tribunals have increasingly considered the protection of cultural heritage as an essential aspect of state sovereignty (Vadi 2014). The interaction between international investment law and cultural heritage law has been productive, in showing the gradual emergence of customary norms requiring the protection of cultural heritage in times of peace (Vadi 2014). This is a significant outcome, as most scholars have pinpointed the existence of customary norms requiring the protection of cultural heritage in times of war (Forrest 2014; Venturini 2016). The jurisprudence of arbitral tribunals is thus contributing to the development of international law requiring the protection of cultural heritage (Vadi 2014).

Nonetheless, cultural values and interests are not necessarily at the heart of arbitral thinking and practice. The available jurisprudence shows the need to reinforce the protection of cultural heritage, for instance, by introducing specific reference to cultural concerns such as cultural exceptions or carve-outs in international investment treaties, in order to prevent a "culture clash" between investors' rights and the host state's protection of cultural heritage (Vadi 2014). Rather than considering cultural heritage as an exception to treatment standards or as a defense justifying State measures, arbitral tribunals have considered heritage protection as a legitimate objective pursued by the host state when such tribunals interpreted and applied relevant investment

treatment standards. Much remains to be done to successfully accommodate cultural heritage considerations within international investment law and arbitration. Arbitral tribunals are of limited jurisdiction: they are required to check whether state conduct complied with its investment treaty obligations. They are not required to adjudicate on state's compliance with its obligations under international cultural law. Therefore, requiring investor's compliance with domestic laws and regulations in the text of the relevant international investment agreements can reinforce the state right to protect its cultural heritage. Inserting the possibility for states to bring counterclaims in case of investor's major breaches of domestic laws can also add teeth to these provisions.

Much ink has been spilled on the question as to whether investor-state arbitration constitutes a suitable forum to protect the public interest. This dispute settlement mechanism has become the object of intense scrutiny in the past few years. Even if one assumes that it is desirable to promote foreign investment in order to foster economic development, the argument goes that some rules of international investment law can hurt host states by limiting the state's ability to protect its cultural heritage (Ratner 2017). Moreover, investor-state arbitration is based on a model of commercial arbitration that seems ill-suited to deal with (international) public law issues. Because arbitral tribunals are not generally subject to an appeal mechanism, inconsistent awards have resulted.

Future Directions

What could be done to improve the situation? What techniques are available to avoid collisions between the protection of foreign investments and the safeguarding of cultural heritage? From a procedural perspective, countries and commentators have proposed a range of alternatives moving toward some judicialization of investor-state arbitration (Roberts 2018). While a discussion of the various reform proposals is outside the scope of this entry, it will suffice to mention the fact that some reforms can actually foster the consideration of important policy objectives, including the protection of archeological artifacts, a special type of cultural heritage. The establishment of a Multilateral Investment Court, a proposal backed by Canada and the European Union, can contribute to the development of a relatively consistent jurisprudence (even in the absence of binding precedent in international law). Tenured judges may be perceived to be more independent and impartial than ad hoc arbitrators. Their background might be in international law and public law rather than commercial law, and this can favor a more balanced assessment of potential clashes between the safeguarding of cultural heritage and the promotion of foreign investments. The establishment of appeals mechanisms, an initiative adopted by countries such as the United States in some of its BITs, can also provide an additional layer of scrutiny. Nonetheless, the establishment of a permanent world investment court does not necessarily offer a magic formula for balancing the various interests at stake; substantively, further reflection is needed.

Substantively, customary norms of treaty interpretation enable arbitral tribunals to consider cultural concerns within the current framework of international law. When they interpret international investment law, arbitral tribunals can use systematic interpretation and consider other international law commitments of the states, including UNESCO Conventions. Moreover, as states periodically renegotiate international investment treaties, they can expressly accommodate cultural concerns in the text of these treaties. For instance, Canada has inserted specific clauses protecting the cultural industries in the recent EU–Canada Comprehensive Economic and Trade Agreement (CETA). This clause can allow Canada to protect its cultural industries without the fear of expensive investment claims. While only a few investment treaties include a "general exceptions" clause, such clause might be inserted in future treaties. A parallel inclusive way states can build some safeguards within international investment treaties is by requiring compliance with domestic law (Vadi 2019). For instance, states can clarify that the relevant investment treaty protects only those investments that comply with domestic law.

Such a clause can enable an adaptation of the treaty to the social, cultural, and political needs of the state. Recent international investment agreements tend to add such legality requirements (Vadi 2019).

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Cultural Heritage Management and Native Americans
- ▶ Journal of Cultural Heritage Management and Sustainable Development
- ▶ Tangible Heritage in Archaeology

References

Forrest, C. 2014. Safeguarding cultural heritage in times of war. *World Politics Review*. 29 July 2014.

Ratner, S. 2017. International investment law through the lens of global justice. *Journal of International Economic Law* 20: 747–775.

Roberts, A. 2018. Incremental, systemic, and paradigmatic reform of investor-state arbitration. *American Journal of International Law* 112: 410–432.

Vadi, V. 2011. When cultures collide: Foreign direct investment, natural resources and indigenous heritage in international investment law. *Columbia Human Rights Law Review* 42: 797–889.

Vadi, V. 2012. Culture clash: Investors' rights v. cultural heritage in International Investment Law and Arbitration. *Society of International Economic Law Working Paper*, 3rd Biennial Global Conference, June 2012, 1–25. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2087823

Vadi, V. 2014. *Cultural heritage in international investment law and arbitration*. Cambridge, UK: Cambridge University Press.

Vadi, V. 2019. Global v. Local: The protection of indigenous heritage in international economic law. In *A new millennium for indigenous rights*, ed. S. Sargent and J. Samantha, 2nd ed., 1–31. Buckingham: Buckingham University Press.

Venturini, G. 2016. International law and intentional destruction of cultural heritage. In *Cultural heritage scenarios 2015–2017*, ed. S. Pinton and L. Zagato, 102–118. Venice: Ca' Foscari University.

Further Reading

Pulkowski, D. 2014. *The law and politics of international regime conflict*. Oxford: Oxford University Press.

Vadi, V. 2015a. Crossed destinies: International economic courts and the protection of cultural heritage. *Journal of International Economic Law* 18: 51–77.

Vadi, V. 2015b. Global cultural governance by arbitral tribunals: The making of a *Lex Administrativa Culturalis*. *Boston University International Law Journal* 33: 101–138.

Vadi, V. 2018. Heritage, power and destiny: The protection of indigenous heritage in international investment law and arbitration. *George Washington International Law Review* 50: 101–155.

C

Cultural Heritage and Sustainable Development in Ghana

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Introduction

The interconnectedness between culture and development is vigorous (Arthur and Mensah 2006). Cultural heritage can enhance economic development at both national and local level through job creation, tourist attraction and investments, relaxation, and recreation (Communities and Local Government 2009). Currently, in Africa, it has become an urgent matter to recognize the important role of cultural heritage in sustainable development (Mawere 2015). The cultural and natural diversification of Africa is often linked to its long history. However, the African local government strategies on culture and heritage policies have been given little attention (Barillet et al. 2006). In Ghana, many heritage assets have been destroyed without considering future generations. Most historic buildings, heritage assets, and other assets of historic importance have been destroyed or abandoned (Ghana Vision 2020). This failure to sustain key cultural heritage assets has limited the achievements of sustainable development in Ghana.

Definition

The World Commission on the Environment and Development (1987, p. 43.) has defined sustainable development as "development that meets the needs of the present without compromising the ability of the future generations to meet their own needs." Cultural heritage on the other hand is the transfer of lifestyle in the form of assets, customs and traditions, values, norms, etc. from one generation to the other. Cultural heritage could be either tangible or intangible (International Council on Monuments and Sites (Charter 1999). UNESCO (1972) describes cultural heritage as monuments, group of buildings, and sites which are of a distinguished ubiquitous value passed on from generation to generation. The definitions by the World Commission on the Environment and Development and UNESCO are the operational definitions for this study. In almost about 50 years now, Ghana has been a part of the international heritage community (Fredholm 2016). It ratified the UN convention on protecting natural and cultural heritage in 1972. The intangible cultural heritage of Ghana is currently been safeguarded by the development of an enabling environment (UNESCO 2019). In December 2018, for instance, Ghana organized a needs assessment validation workshop to identify the needs for protecting intangible cultural heritage (UNESCO 2018).

Key Issues/Current Debates/Future Directions/Examples

The recognition of cultural heritage in the sustainable development agenda is peripheral (Nocca 2017). This is evident as it appears just once in the sustainable development goals (SDGs). Specifically, it is mentioned in SDG target 11.4 which states that "strengthen efforts to protect and safeguard the world's cultural and natural heritage"; this is out of the 169 specified targets. It is however not specific to cultural heritage which is mentioned together with natural heritage.

Ghana is located in West Africa around the Gulf of Guinea with its economy recognized as part of the fastest-growing economies in Africa (USAID 2012). Since independence, Ghana has initiated a number of policies, strategies, and programs to speed up the economy. According to Insoll (2008, 10), Ghana's recent interest in the possible use of culture for development has increased with the aim of making its cultural heritage an archetype of tourism in Africa (Insoll 2008). However, many of the safeguarding mechanisms are aligned around Ghana's forts and castles (Boswell and ÓKane 2011). The government of Ghana has been condemned for its inability to incorporate issues of cultural heritage in the developmental goals, plans, and designs of the country. Most professionals in the heritage industry have suggested that Ghana needs a more coherent policy (Fredholm 2016).

In most developing countries like Ghana, investments toward cultural infrastructure are very few (Bandarin et al. 2011). However, Ghana has a mandate in Article 39.4 of the 1992 Constitution to preserve and protect places of historical interest and artifacts. Again, the cultural policy of the country emphasizes an obligation to develop cultural assets and heritage and also appreciate and promote usage (The Cultural Policy of Ghana 2004). In this regard, the country has made a conscious effort to sustain its cultural heritage. Recently, the World Heritage Convention approved Ghana's requests for international assistance for its cultural heritage based on the urgency of the request. This included an amount of USD 85,086 for the "Preparation of a management plan for the Forts and Castles of Ghana" under the Conservation and Management Culture budget (UNESCO World Heritage Centre 2018). Regardless, the index of development of a multidimensional framework for heritage sustainability presents a final report of Ghana's heritage sustainability at 0.53/1 (UNESCO 2013). Though this is an intermediate result, Ghana still has a lot more to do in order to sustain its cultural heritage.

Currently, Ghana has incorporated Ghanaian Language and Culture into its basic education curriculum to help the youth have a basic overview of the Ghanaian culture to impact future generations. Ghana's commitment level and activities by authorities fluctuate according to the

multidimensional framework. In analyzing the framework, it is realized that though 50% of Ghana's cultural asset is protected, managed, and safeguarded, 26% of the cultural asset have not been registered and inscribed (UNESCO 2013). This gap therefore calls for a registry and inventory of intangible heritage assets in Ghana.

Efforts made by the public have been devoted to the creation of awareness and establishing a national record of tangible heritage assets. The awareness creation strategies adopted include workshops and sensitization programs (Arthur and Mensah 2006). The efforts undertaken are evident in the statistics of the multidimensional framework which indicates a 73% record for communicating and marshaling support for cultural heritage in Ghana. Though a lot has been done toward awareness creation, efforts made to attract the support of private sector and civil society have been minimal (UNESCO 2013). It is therefore important for Ghana to further explore the engagement of civil societies and private sector in protecting, communicating, and promoting its cultural heritage.

The cultural heritage of Ghana serves as a tourist investment for the country and its future generations. According to Heritage (2009), cultural heritage in itself can enhance local and national economic development through job creation which will in turn attract investment and tourism as well as recreation and leisure provision, hence the need to manage cultural heritage to generate economic and social benefits for their host communities (Hampton 2005). The Ghana Museums and Monuments Board (GMMB) was established in 1957 and governed by the National Liberation Council Decree (NLCD) Act 387, 1969, to legally serve as custodians and managers of the material (mobile and immobile) cultural heritage in Ghana. For instance, the board protects the Cape Coast and Elmina castles as well as the Fort St. Jago making them integral to Ghana's tourist attraction. Other forts including James Fort, Accra, and Fort William, Anomabu, have however been abandoned.

Researchers and practitioners in the past 10 years have argued that preserving cultural heritage yields multifaceted benefits (Nocca 2017). However, issues of cultural heritage in our cities have been left out of most developmental policies and programs other than being prioritized for formal management (Nocca 2017). In Ghana, many historic sites, buildings of historical importance, and sites of scientific interest have all been destroyed without protection for the future generations according to Ghana vision 2020 (Arthur and Mensah 2006). Other cultural heritages have been modernized hence losing the touch of culture in them.

The convention for protecting intangible cultural heritage was approved by UNESCO in October 2003 and enforced in April 2006 (Blake 2018). This saw a number of countries ratifying the convention with currently about 172 countries' representatives of regions across the world (Blake 2018). As Ghana also has ratified the UNESCO Convention on cultural heritage, it is expected that it will intensify promotion of its cultural heritage. This could be done through storytelling and writing or by revisiting the strategies of the likes of Ama Ata Aidoo and Efua Sutherland who used their books to promote and preserve the culture of Ghana. In the past preserving Ghana's cultural heritage involved the use of documentaries and audio visuals for the transmission of knowledge to future generations. Sustaining cultural heritage in Ghana requires a high level of financial, technical, and legal expertise. In order for Ghana to safeguard its cultural heritage, it is important to invest in this sector.

Cross-References

► Convention for the Safeguarding of Intangible Cultural Heritage (2003)

References

Arthur, S. Nana Ato, and J. Victor Mensah. 2006. Urban management and heritage tourism for sustainable development: The case of Elmina cultural heritage and management programme in Ghana. *Management of Environmental Quality: An International Journal* 17 (3): 299–312.

Bandarin, F., J. Hosagrahar, and F. Sailer Albernaz. 2011. Why development needs culture. *Journal of Cultural*

Heritage Management and Sustainable Development 1 (1): 15–25.
Barillet C., T. Joffroy, and I. Longuet. 2006. *Cultural heritage & local development: A guide for African Local Governments*. In Paris (Cra-terre-ENSaG/Convention France-UNESCO).
Blake, J. 2018. Convention for the safeguarding of intangible cultural heritage (2003). In *Encyclopedia of Global Archaeology*, ed. C. Smith. Springer, Cham
Boswell, R., and D. O'Kane. 2011. Introduction: Heritage management and tourism in Africa. *Journal of Contemporary African Studies* 29 (4):361–369. https://doi.org/10.1080/02589001.2011.600845
Communities and Local Government. 2009. *Draft planning policy statement 15: Planning for the historic environment*. London: Communities and Local Government Publications. Available at: https://webarchive.nationalarchives.gov.uk/20120920030641/. http://www.communities.gov.uk/documents/planningandbuilding/pdf/consultationhistoricpps.pdf
Charter, M. 1999. *Managing Tourism at Places of Heritage Significances*. https://www.icomos.org/charters/tourism_e.pdf
Fredholm, S. 2016. Assets in the age of tourism: The development of heritage planning in Ghanaian policy. *Journal of Contemporary African Studies* 34 (4): 498–518. https://doi.org/10.1080/02589001.2017.12 85011.
Hampton, M.P. 2005. Heritage, local communities and economic development. *Annals of Tourism Research* 32 (3): 735–759.
Insoll, T. 2008. Negotiating the archaeology of destiny: an exploration of interpretive possibilities through Tallensi shrines. *Journal of Social Archaeology* 8 (3): 380–403.
Heritage, E. 2009. Handbook, 2008/9. English Heritage.
Mawere, M. 2015. Colonial heritage, memory, and sustainability in dialogue: An introduction. In *Colonial heritage, memory and sustainability in Africa: Challenges, opportunities and prospects*, Vol. 1. https://books.google.com.gh/url?client=ca-googleprint&format=google print&num=0&id=3c1RCwAAQBAJ&q=http://www.africanbookscollective.com/books/colonial-heritage-memory-and-sustainability-in-africa&usg=AFQjCNEQ6qCFL7LTwy3i0mti-9eCQ3B6pQ&source=gbs_buy_r
Nocca, F. 2017.The role of cultural heritage in sustainable development: Multidimensional indicators as decision-making tool. *Sustainability* 9 (10): 1882.
The Cultural Policy of Ghana. 2004. National commission on Ghana. http://www.ghanaiandiaspora.com/wp/wp-content/uploads/2014/09/CULTURAL.-POLICY-FINAL.pdf
UNESCO. 2013. Ghana-Heritage indicator-heritage sustainability. https://en.unesco.org/creativity/ghana-heritage-indicator-heritage-sustainability
UNESCO. 2018. Meetings on intangible cultural heritage (Co-) organized By UNESCO. https://ich.unesco.org/en/events?meeting_id=00703
UNESCO. 2019. Ghana developing an enabling environment for the safeguarding of intangible cultural heritage. https://ich.unesco.org/en/news/ghana-developing-an-enabling-environment-for-the-safeguarding-of-intangible-cultural-heritage-00330
United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Centre. 2018. 42 Session of the world heritage committee decision: 42 COM 13 International Assistance. http://whc.unesco.org/en/decisions/7100/
USAID. 2012. USAID/Ghana country development cooperation strategy 2013–2017. United States Agency for International Development, UNDP/WTO, 1995.
World Commission On Environment and Development. 1987. Our Common Future. Oxford: Oxford University Press

Cultural Heritage and the Public

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Introduction

Few communities have enjoyed as long and productive a relationship with their archaeological heritage as has the City of Alexandria, Virginia. For more than 50 years, beginning with the archaeological investigation and restoration of Fort Ward in 1961, archaeology has played a major role in shaping the city's identity. In the mid-1960s, residents forged an innovative partnership with the Smithsonian that linked Urban Renewal to archaeology – while other cities were losing their past, Alexandrians were rediscovering theirs. Again with resident impetus, in 1975, the City formed its own archaeological commission to guide the direction of archaeology with non-professional volunteers, and 2 years later, it hired its first professional archaeologist. Volunteers carrying out a variety of tasks – studying documents, processing artifacts, excavating sites, commission members, artists, educators, students, museum visitors, descendants of those buried in cemeteries, developers and other supporters – have helped

to define the character of archaeology in Alexandria, both how it is carried out and how archaeological information reenters the modern world. The City and developers have created parks, reconstructions, preserves, trails, memorial spaces, and interpretive signs on archaeological sites from all eras; public art has been commissioned to commemorate historical events and to honor the lives of earlier generations of Alexandrians whose stories have been pushed to the margins of history. In short, Alexandria provides a great example of what can happen when a community embraces its archaeological heritage.

Definition

Archaeology in Alexandria brings together the resources and authority of local government, the skills of professional archaeologists, and perhaps most importantly, the interest and enthusiasm of residents to form a unique environment in which the community decides how archaeological information reappears on the modern stage. With the management of the City's archaeologists, this arrangement allows Alexandria's archaeological record to be discovered, preserved, and protected using professional standards and current best practices. This process is conducted in such a fashion that the identification, interpretation, and long-term use of archaeological sites are carried out in accordance with the values and priorities of the local community. As a result, the public is able to take archaeology in directions that may be completely unexpected by archaeologists, and which are more likely to draw the interest and continued support of city residents.

In the United States, the legal protection offered to archaeological resources located on private land is almost nonexistent. While Section 106 of the National Historic Preservation Act requires an evaluation of how proposed projects may impact historic resources on federal land, or how federally funded or permitted projects may impact privately owned historic resources, private development on private land almost never includes this process for archaeological resources. Since private land use regulation is generally carried out by local government, the only way in which archaeological protection can occur is if the thousands of city and county governments in the United States adopt their own regulations. While many communities control actions on historic structures, only a handful regulate archaeological resources. Alexandria, fortunately, is part of this select group.

Alexandria's progressive approach to the management of its archaeological heritage is in many ways a result of the city's citizen-led advisory body, the Alexandria Archaeological Commission (AAC). The AAC recommends actions to City Council regarding Alexandria's archaeological heritage. It was established after the Urban Renewal projects of the 1960s exposed the vast, rich, and significant archaeological materials buried underground. Its citizen members are not required to have archaeological training. The major assets of AAC members through the years have proven to be their willingness to fight for the preservation and contemporary use of the city's buried past, and their insider's perspective on the possibilities of using archaeology within their own community. The Alexandria Archaeological Protection Code (AAPC) offers an example of how these traits have combined to better protect the city's 13,000-year heritage.

The AAPC was first conceptualized by members of the AAC even though the City archaeologists did not consider a local code a possibility. The AAC members met for years to consider methods of regulating development so that archaeological resources were not unconsciously destroyed. Given their commitment to the concept that developers should share with the City in the responsibility to search, study, and share the past, an interesting partnership emerged. Development attorneys helped craft a code which outlined a specific process to be conducted before site construction, thereby reducing what their clients feared most – surprises, delays, and unbudgeted costs. A strong AAC chairman, the support of local archaeology enthusiasts, a long history of community preservation, and goodwill generated

by the City's archaeological activities assisted in producing the unanimous City Council vote in September 1989.

The Alexandria Archaeological Protection Code mandates that archaeological review become part of the private land development process. New developments that require a site plan (this includes nearly all new projects proposing the construction of more than two housing units) also require archaeological review. Approved preliminary and final site plans contain conditions to ensure archaeological assessment, evaluation, preservation, long-term care of collections, and public interpretation.

Key Issues/Current Debates/Future Directions/Examples

A key management tool in Alexandria is the staff's access to a large quantity of historical data organized spatially for reviewing site plans, as well as projects going through the Board of Architectural Review and building/demolition permits. Volunteers, students, and staff have collected this information on thematic maps and files, as well as developed GIS overlays using historical maps. In the first step of the City's review process, staff consults all the data for the site plan location to assess whether there is a possibility that archaeological resources can be damaged by the proposed project. If this is the case, conditions are written to require the developer to hire professionals to prepare an Archaeological Evaluation Report and a Resource Management Plan, outlining the results of documentary research and field investigations, stating site significance and recommending a treatment plan to protect some resources and/or recover those that would be lost. The City archaeologists write scopes of work for these products, and review and approve the work to assure consistency with professional standards, accuracy, and contribution to the public's knowledge. The plans may call for the excavation of portions of the site and preparation of a report, or they may find other appropriate methods for protecting and possibly interpreting the site's archaeology for the public.

Cross-References

- ▶ Community Archaeology
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Public Involvement in the Preservation and Conservation of Archaeology

Further Reading

Appler, D.R. 2012. Municipal archaeology programs and the creation of community amenities. *The Public Historian* 34 (3): 40–67.

Cressey, P.J., and N. Vinton. 2007. Smart planning and innovative public outreach: The quintessential mix for the future of archaeology. In *Past meets present: Archaeologists partnering with museum curators, teachers and community groups*, ed. J.H. Jameson and S. Baugher, 393–410. New York: Springer.

Cressey, P.J., R. Reeder, and J. Bryson. 2003. Held in trust: Community archaeology in Alexandria, Virginia. In *Archaeologists and local communities: Partners in exploring the past*, ed. L. Derry and M. Malloy, 1–17. Washington, DC: Society for American Archaeology.

Cultural Heritage in the Digital Age

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Introduction

We are living now in the twenty-first century, at the height of the new era of *Information Technology*. Behind us, we have a rich, inherited, human culture that goes back over five millennia. With the technologies we have in our hands today, we can really preserve this heritage of the past and showcase it to future generations in an unprecedented way. In this entry, we are going to investigate the evolution of *documentation technology* from ancient times up until today. And, at the

same time, we will also investigate the different aspects of this cultural and natural heritage, and finally explore how we are using these developed technologies to preserve our heritage. To conclude, we will investigate the prospects for the future and how we will view our heritage.

Key Issues

Technology: From Hieroglyphs to Cyberspace

Human beings started, about 20,000 years ago, to draw rock art on the walls of caves. Five thousand years ago, man started to engrave his hieroglyphs on stone walls in Egypt, and to inscribe mud tablets with what is known as cuneiform in Mesopotamia.

Five hundred years later, Egyptians began to use papyrus as a wonderful medium for writing. Papyrus is made out of the stem of the papyrus plant, which is about 2-cm wide. This stem is cut into long strips. These strips are then laid down beside each other and covered with another layer of strips perpendicular to them. The two layers are then pressed together to get rid of the moisture, before being left to dry. We are finally left with a sheet which is a little bigger than the A4-size sheets that we use today. Several of these papyrus sheets were stuck together to form a scroll that could be as long as a few meters.

About 1500 BCE, Egyptians began to use a third medium. This medium was *ostraka*, fragments of broken pottery. About CE 1000, another medium appeared, known as "paper," a word derived from the word "papyrus." In addition to this, Egyptians started binding sheets together to create what was known as a codex, which we all refer to today as a "book."

They also started using another new material – parchment – which competed with paper and papyrus. Parchment is made from the skin of certain animals.

In the fifteenth century, Gutenberg made a real leap in the progress of humanity by inventing his printing machine.

Humanity continued reading books for more than 500 years till a new medium was invented – the digital computer. The first digital computer was introduced in 1945. It was, physically, a very big machine and owned by organizations rather than individuals.

Personal computers first became available in the early 1980s. In the 1990s, computers became far more sophisticated, starting to employ different media such as sound, images, and videos – what is known as multimedia.

In the mid-1990s, small computers started to possess the capability to handle maps, with what is known as the *Geographic information system* (GIS). GIS allows information to be positioned on maps, according to longitude and latitude.

Of course, the really big breakthrough in the 1990s was the advent of the *Internet*. The Internet has taken the world to another dimension, in which all information is shared between subscribers around the world, in what is now known as cyberspace.

In cyberspace, people are connected. Information can be stored in a computer server anywhere in the world and accessed by many people around the world. Compare this with a book that you keep on a shelf in your home and that can only be accessed by yourself.

In cyberspace, you can communicate with someone or many people at the same time, without having to resort to the postal service or a telephone. In cyberspace, you can access an unlimited number of books and publications without having them physically with you in your home or office.

In cyberspace, you can download any video or soundtrack you want to have. In cyberspace, you can share your albums of photos and videos with other people on what is known as YouTube.

In cyberspace, you can have your own space with multiple applications that you can share with your selected friends. Cyberspace has created a cyber social network, in which people from different parts of the world can communicate live in an unprecedented, spontaneous way.

At the moment, we can say the physical books live side by side with digital space. But for how long this state of affairs might continue, nobody knows. Each medium has its own merits.

Remember that in the old seaport of Alexandria, a few years ago, divers found some blocks of

stones on the seabed that were thousands of years old. Experts carefully cleaned them and then deciphered the ancient hieroglyphic inscriptions on them. Now imagine immersing your computer in a bucket of water for a few seconds. You would not dare do it, as all the information you had patiently stored on it would probably be destroyed, along with the computer itself.

With the increase in the storage capacity of computers and the speed of processing, it has become possible to handle not only flat images, but also three-dimensional objects, such as museum exhibits. This is normally achieved by a technique that involves a combination of both the photographic and laser scanning techniques.

To perform this 3D dimensional scanning, we normally put the object we want to scan on a turntable and then scan it while it is revolving. The product is normally a 3D picture that you can rotate on your screen when viewing it. You can also look at it in 3D with special stereoscopic eyeglasses.

The scanners we use for such operations are classified as small-scale scanners. For the purpose of creating a 3D visualization for large spaces, such as halls, buildings, or ancient temples, we usually use bigger devices classified as medium-scale scanners.

Normally, when such places are scanned, we end up with a *virtual reality* visualization, allowing the user to navigate virtually inside a building, for example, looking inside the different rooms and their contents at his leisure.

Another advanced level of virtual reality is the virtual addition of a missing part to the existing virtual space.

Let us take as an example the Temple of Luxor in Upper Egypt. This temple used to have two obelisks in front of its entrance wall or pylon. During the nineteenth century, one of the obelisks was transferred to the main square in Paris, the Place de la Concorde.

So today, using this *Augmented Virtual Reality* technique, we can show a 3D virtual model of the temple with one of the two obelisks missing. Then we can insert the missing one, which is now in the Place de la Concorde, allowing the viewer to see how it looked when it was still standing in its original place. The result is like looking into the far-distant past.

Heritage: From Folklore to Monuments

Now let us examine a new dimension of the problem, namely, the *thematic dimension of heritage*.

Some years ago, UNESCO divided Heritage into two main categories, Cultural and Natural. The difference between them is that *Cultural Heritage* refers to manmade heritage, while *Natural Heritage* refers, of course, to the heritage we find in the nature around us.

It is vital to preserve both sorts of heritage, which is why UNESCO, along with many governments, organizations, associations, and centers, including the Center for Documentation of Cultural and Natural Heritage in Egypt, is investing a lot of effort in this domain.

To help satisfy his religious needs, man erected temples to show his reverence for the gods. And for shelter, he built houses. Because he also felt the urge to record the diverse shapes and colors that impressed him, he did paintings and sculptures. To express the heavenly rhythms and sounds in the depth of his soul, man composed music.

All of these fall into the category of Cultural Heritage. On the other hand, protectorates, national parks, wild animals, birds, vegetation, all types of biodiversity, natural formations like geological masses, sand dunes, and landscapes are all examples of Natural Heritage.

UNESCO then subdivided Cultural Heritage into two types: Tangible and Intangible, or, as they are sometimes called, Materialistic and Non-Materialistic Heritage.

Tangible Heritage is heritage that we can touch with our hands, including movable objects like the coins, statues, and other treasures we find in museums, as well as immovable objects like ancient tombs, temples, and pyramids, or structures like buildings and bridges or even towns.

For this Tangible Heritage, UNESCO has created a center called the World Heritage Center (WHC). One of the activities of this center is the creation of a World Heritage List (WHL), to which member states have added monuments and sites that are of universal value and interest.

Intangible and *Oral Heritage* is, meanwhile, the heritage that we cannot touch. We can grasp it only through seeing, hearing, smelling, tasting, and feeling. Examples of this are music, folk epics, traditional stories, oral literature, and food.

We must take into consideration the fact that there is a gray, overlapping area between Tangible and Intangible Heritage, especially in the area of folklore. Paintings, for example, are considered intangible, though we can touch them.

Intangible Heritage is in general much more fragile and more vulnerable to loss than Tangible Heritage. That is why the issue of documenting and preserving Intangible Heritage is very delicate and requires special skills in terms of dealing with the ravages of time and fragility.

UNESCO has therefore created a special register for the Oral and Intangible Heritage of Humanity.

UNESCO also has another category: *Documentary Heritage*. This includes archives and books in libraries, as well as collections of manuscripts. *Archival Heritage* is, of course, treated in a different way. Again a special program has been developed by UNESCO especially for that purpose, known as Memory of the World (MOW) program.

Concluding Remarks

During the past few decades, with the introduction of *Information and Communication Technology* (*ICT*), we have started to handle the various categories of heritage in a systematic way, using the different available technologies, such as databases, multimedia, GIS, 3D imaging, virtual reality, and augmented reality.

Now different institutes have started building huge information systems. These days, with systems such as Kindle, IPad, and others, you can download hundreds of books at the click of a button.

Meanwhile, an international project under the title of the World Digital Library, coordinated by the Library of the Congress, is trying to digitize different media such as books, images, sound, videos, maps, and manuscripts from different parts of the world, and linking them together.

Now we can easily imagine gathering the artifacts from a certain historical period, that are scattered in different museums across the world, into one digital system, just as if they were in one museum.

A very good example of this application is the website www.globalegyptianmuseum.org which contains Egyptian artifacts from 13 European museums, in addition to three Egyptian museums. This website is in eight different languages. The reader is also encouraged to visit these websites:

- www.cultnat.org
- www.bibalex.org
- www.eternalegypt.org
- www.egyptmemory.com

As for the field of imaging and cinematography, new technologies are under development that will allow three-dimensional viewing on both the television screen and the silver screen. To start with, viewers will have to use special eyeglasses and then, later, they would not even need glasses at all.

We can imagine the amazing effect that this will have on the photographing and visualizing of different monuments and buildings. A virtual reality application using such technology will be very impressive.

Another thing that we can expect to see in the future is a huge increase in storage capacity that will probably allow us, within a couple of decades, to store everything that humanity has been able to produce throughout the course of its evolution.

Finally, within a few decades, we will probably have every museum, library, archive, and archeological site round the globe digitized and available at our fingertips.

Cross-References

- ► Cultural Heritage and the Public
- ► Experiencing Cultural Heritage
- ► Heritage and Archaeology
- ► Heritage and Society

Further Reading

Empereur, J.-Y. 1998. *Alexandria rediscovered*. London: George Braziller.
Jefferis, D. 1999. *Cyber space: Virtual reality and the world wide web*. New York: Crabtree Pub Co.
Man, J. 2010. *The Gutenberg revolution*. London: Transworld Publishers.
Robinson, A. 2007. *The story of writing: Alphabet, hieroglyphs, and pictograms*. New York: Thames & Hudson.
Roger, S. 2004. *History of writing*. London: Reaktion Books.

Cultural Heritage in Times of Economic Crisis

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State of Knowledge and Current Debates

Applied archaeological practice, as a means of investigating and protecting archaeological sites, landscapes, and material, is a young profession that emerged across the world during the twentieth century. As a practice that has become increasingly linked to land-use change and development expenditure, it has been impacted upon by all of the crises that the global economy has gone through in the twentieth and twenty-first centuries.

The Great Depression of the 1930s led to the first examples of archaeological practice being affected by an economic crisis. In the United States, the recovery plans of President Roosevelt's *New Deal* involved federal investment in capital projects. This included the Tennessee Valley Authority's dam-building program where extensive archaeological excavations were funded ahead of dam construction and subsequent reservoir flooding (Jameson 2004).

Subsequently, since the early 1970s, there have been four international waves of financial crises, and each of these has been followed by recession with impacts on cultural heritage each time. The fourth wave, which began in 2007 and was followed by recession from 2008, was the most severe and the most global since the Great Depression of the 1930s (Kindleberger and Aliber 2011, 1).

Patterson (1999) considers that the emergence of commercial archaeological practice in the United States (as part of cultural resource management) was a consequence of legislative changes that coincided with a transition from Keynesian to monetarist policies in response to the global economic crisis of the 1970s. This crisis followed the enormous costs to the US government of the Vietnam War and the rapid rise in oil prices following the Arab-Israeli War of 1973.

The pre-transformation situation is extensively detailed by Clelow (1973), and from that point on, the commercialization of archaeology in the United States became the norm. This model has been subsequently adopted or adapted in many states around the world, leading to a significant expansion in the scale of archaeological investigation. The political response to the economic situation of the early 1970s shaped how archaeology is undertaken, and this has been the most significant effect of economic crisis upon archaeological practice.

In the United Kingdom, recession at the start of the 1980s led to a lengthy period of mass unemployment. The *Community Programme* of the Manpower Services Commission (MSC), a governmental agency established to introduce unemployment relief measures, funded a very significant number of archaeological projects. These initiatives – like those of the Tennessee Valley Authority 50 years before – aimed to provide work for unemployed individuals and tended to be labor-intensive excavation projects. British archaeology became significantly reliant upon MSC funding, and by 1986–1987, the majority of individuals working in UK applied archaeology were employed on MSC projects (Sheldon 1986).

The UK economy recovered in the late 1980s. The expanding economy led to increasing demand for urban redevelopment, particularly in the City of London. In order to rapidly expedite archaeological work ahead of this construction work, some developers began to directly fund archaeological projects (Spence 1993, 24). At the same time, unemployment was falling and

the MSC program was wound up, leaving a substantial publication backlog as that funding stream had focused on highly visible, labor-intensive excavation. However, during another period of recession in 1990–1991, approximately 300 staff were made redundant by the Museum of London (Young and O'Sullivan 1991).

There were also state programs to reduce unemployment in Germany in the 1970s and 1980s, the most significant of which for archaeology was the ABM (Arbeitsbeschaffungsmaßnahmen); this was continued post-1989 in the Länder of former East Germany. Across central and eastern Europe, the years of transition from 1989 to 1996 (the year in which Poland's GDP surpassed its 1989 level) were marked by significant reductions in the education and culture budgets which had previously funded archaeology (Lozny 2011, 27). Following the transition period, the polluter-pays principle was widely adopted, removing archaeology's reliance on state funding, but in turn exposing archaeological practice to the risks of market engagement.

The Asian Financial Crisis affected east and southeast Asian countries from mid-1997, with the most significant impact on archaeological practice being in Japan, where a system of pre-development archaeological intervention had emerged in response to economic growth, rather than through legislative direction (Okamura and Matsuda 2010).

The Japanese economy had entered an extended period of stagnation 5 years before, leading to the Japanese economy stabilizing into a "lost decade" – subsequently updated to be described as the "lost two decades." The annual number of pre-construction excavations in Japan peaked in 1996, with a decline following the onset of the crisis, but then stabilizing at around 75% of the 1996 level from 2000 onward (Ikawa-Smith 2011, 696; Okamura 2011, 78). There was a decline in the number of individual archaeologists working in Japanese archaeology but this was not dramatic – between 2000 and 2013, the workforce shrank by 17% (less than 1.5% per annum (Zorzin 2013, 9)). Economic stagnation reduced worker mobility (90% of Japanese archaeologists work for local government or semi-public foundations (Okamura 2011, 77)) and reduced opportunities for new entrants – only 3% of "field" archaeologists were aged in their 20s in 2008 (*ibid*, 85). As stagnation continued after 2008, while governmental archaeological services appeared to remain secure, some private companies began to enter the market and a trend toward this model was being recognized by practitioners (Zorzin 2013, 16).

Before 1991, archaeology in the USSR featured "the world's largest network of archaeological research" (Dolukhanov 1993, 150), with wide-ranging organizations and state funding – but following the end of the Soviet Union in 1991, "... the deep economic crisis combined with the painful transition to the market economy has resulted in considerable reduction in the funding of fundamental sciences and particularly of the humanities" (ibid.). In a situation where the collapsed system was left in a chaotic financial state, archaeology had to rapidly adapt to the realities of the market economy, with the first private sponsorship of excavation in Russia taking place in 1992.

A subsequent economic crisis in Russia in 1998 had little immediate impact upon archaeology, but 2 years later the effects of recession on the building industry then led to a significant reduction in the amount of archaeological work being undertaken (Engovatova 2010, 100). Recovery was again threatened by the effects of the global crisis from 2008, but investment in infrastructure projects protected the sector from immediate effects (Kradin 2011, 248; Engovatova 2010, 101–102).

The scale of the global financial crisis of 2008 and subsequent investment to stimulate recovery by national governments was vastly greater than any of the previous crises. John Lanchester suggests that it cost the US taxpayer $7.76trn, more "than the cost of the Marshall Plan, the Louisiana Purchase, the 1980s savings and loans crisis, the Korean war, the New Deal, the invasion of Iraq, the Vietnam war and the total cost of NASA including the moon landings, all added together [and adjusted upwards for inflation]" (Lanchester 2010).

The impact on archaeological practice was considerable. Different approaches to market

engagement were central to the visibility of the effects of the economic crisis on archaeological practice in different countries around the world, and the impact was most immediately visible where archaeology was most commercialized and relying primarily on private sources of funding (Aitchison 2009b).

Altschul and Patterson (2010) estimated that approximately 11,350 people worked as professional archaeologists in the United States in 2008, with spending on cultural resource management between US$600 m and $1bn at that time, which was just as the crisis was beginning to break. While US federal expenditure on archaeology remained roughly constant in the short term through the indirect benefits of federal economic stimulus legislation (*The American Reinvestment and Recovery Act* (ARRA) was signed into law by President Obama in February 2009), private sector spending on cultural resource management dropped significantly in 2009 and ARRA funding was slow to come on stream (Altschul 2010, 104–105).

Archaeological work in the United Kingdom is largely commercialized and very closely linked to land use change and property development, with 93% of all archaeological projects in 2007 being initiated through the land-use planning system (Aitchison 2009a). The volume of housebuilding began to decline from 2007 and effectively halted in the autumn of 2008, with applied archaeology being seriously and rapidly affected (10% of all jobs in archaeology were lost in the 6 months to April 2009, and spending by developers on archaeology fell by 12% between 2007–2008 and 2009–2010 (Aitchison 2010, 26)).

State funding for national and local government archaeological agencies in the United Kingdom then fell considerably from 2010, with numerous individual archaeological advisers losing their jobs and the effective levels of protection for archaeological sites and landscapes being reduced (Aitchison 2011).

In Ireland, the effects of the economic crisis were even more extreme. Irish archaeology grew at a remarkable rate in the early twenty-first century, funded by infrastructure projects that were accessing European Union support and by a private housing boom. The numbers of individual archaeologists in employment increased by 263% between 2002 and 2007, from 650 to 1709 (McDermott and La Piscopia 2008, 5). When the crisis led to the end of the building boom, "between July 2008 and January 2009 there was a 52% reduction in the total number of archaeological staff employed in Ireland … an 82% reduction in contract [commercial] archaeologists employed in the same period" (Eogan and Sullivan 2009). By early 2011 it was estimated that only 350 people were still working in the sector (Heritage Council 2011).

All across Europe, public debt before 2007–2008 was often high, and one of the direct effects of the crisis was a steep deterioration in government finances and an increase in government debt. Countries that were particularly exposed to this were forced into cutting spending and implementing austerity budgets. The effects of this were most significant in Greece, where the recession lasted from 2009–2017 (Pagoulatos 2017). Almost all archaeological work and site management in Greece was financially dependent upon the state and sweeping budget cuts impacted on both staff numbers and the public accessibility of archaeological sites and museums (Howery 2013) – and there was also a significant rise in site looting and artefact trafficking (ibid.).

In the developing world, the threats to cultural heritage are a different order of magnitude entirely. The relative poverty of countries that are essentially in perpetual economic crises makes the consequences of underinvestment in the management of cultural heritage significant, in terms of how heritage – monumental, portable, and intangible – is, or is not, protected.

Commercial archaeology has been described as an economic canary (Schlanger 2010), vulnerable to rapid changes and one of the first sectors to suffer the impacts of economic crisis. Because archaeology has received funding in times of crisis from capital expenditure programs (and unemployment reduction initiatives), some mistakenly believe that crises have a positive effect on archaeology (such arguments are presented by Merrony and Eisenburg (2009) and are critiqued by Altschul (2010, 104)). The amounts spent on

archaeological practice through these measures in the years following 2008 were insignificant when compared with the sums that were being invested by developers and other funders pre-crisis.

All of the crises discussed here have had significant and long-lasting effects on the delivery of archaeological practice and upon the careers and livelihoods of individual archaeologists, and thus upon the protection of the material remains of the human past.

In the United States in the 1970s and in the United Kingdom in the 1980s, economic crises led to the structural reorganization of archaeology following the models of "neoliberalism or late capitalism" (Zorzin 2013, 5). The global political changes that followed the economic crisis of 2007–2008 have been a rise in populism and nativism. These have not yet led to structural changes in the global economic order, and as yet no transformations comparable to the anglophone experiences of the 1970s and 1980s have changed the way that cultural heritage management is undertaken.

Cross-References

- ▶ Cultural Heritage Management: Cost and Benefit of Change
- ▶ Japan: Cultural Heritage Management
- ▶ United States: Cultural Heritage Management

References

Aitchison, K. 2009a. Archaeology and the global financial crisis. *Antiquity* 83 (319). http://antiquity.ac.uk/projgall/Aitchison319/.

Aitchison, K. 2009b. After the "gold rush": Global archaeology in 2009. *World Archaeology* 41 (4): 659–671.

Aitchison, K. 2010. United Kingdom archaeology in economic crisis. In *Archaeology and the global economic crisis: Multiple impacts, possible solutions*, ed. N. Schlanger and K. Aitchison, 25–29. Tervuren: Culture Lab Editions.

Aitchison, K. 2011. The economic crisis and the coming second wave – How the economic situation will affect archaeological practice in universities and government. *Archaeological Review from Cambridge* 26 (1): 79–98.

Altschul, J.H. 2010. The effect of the global recession on cultural resource management in the United States. In *Archaeology and the global economic crisis: Multiple impacts, possible solutions*, ed. N. Schlanger and K. Aitchison, 103–106. Tervuren: Culture Lab Editions.

Altschul, J.H., and T.C. Patterson. 2010. Trends in employment and training in American archaeology. In *Voices in American archaeology*, ed. W. Ashmore, D.T. Lippert, and B.J. Mills, 291–316. Washington, DC: SAA Press.

Clelow, C.W. 1973. Private enterprise and the crisis in American archaeology. In *The crisis in north American archaeology*, ed. A.G. Pastron, P.S. Hallinan, and C.W. Clelow, 35–52. Berkeley: Kroeber Anthropological Society Special Publication 3.

Dolukhanov, P.M. 1993. Archaeology in the ex-USSR: Post-perestroika problems. *Antiquity* 67 (254): 150–156.

Engovatova, A. 2010. The impact of the economic crisis on rescue archaeology in Russia. In *Archaeology and the global economic crisis: Multiple impacts, possible solutions*, ed. N. Schlanger and K. Aitchison, 97–102. Tervuren: Culture Lab Editions.

Eogan, J., and E. Sullivan. 2009. Archaeology and the demise of the 'Celtic Tiger'. *The Archaeologist* 72: 26–27.

Heritage Council. 2011. The Archaeological profession in Ireland: a workshop on future possibilities. http://www.mooregroup.ie/wp-content/uploads/2011/04/Archaeological-Profession-in-Ireland-2011.pdf

Howery, C. 2013. Forum: The effects of the economic crisis on archaeology in Greece. *Journal of East Mediterranean Archaeology and Heritage Studies* 1 (3): 228–233.

Ikawa-Smith, F. 2011. Practice of archaeology in contemporary Japan. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.-R. Lozny, 675–706. New York: Springer.

Jameson, J. 2004. Public archaeology in the United States. In *Public archaeology*, ed. N. Merriman, 21–58. London/New York: Routledge.

Kindleberger, C.P., and R.Z. Aliber. 2011. *Manias, panics and crashes: A history of financial crises*. 6th ed. Basingstoke: Palgrave Macmillan.

Kradin, N.N. 2011. A panorama of social archaeology in Russia. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 243–271. New York: Springer.

Lanchester, J. 2010. *Whoops! Why everyone owes everyone and no one can pay*. Harmondsworth: Penguin.

Lozny, L.R. 2011. Archaeology in the age of globalization: Local meanings, global interest. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 21–49. New York: Springer.

McDermott, C., and P. La Piscopia. 2008. *Discovering the archaeologists of Europe*. Ireland: Institute of Archaeologists of Ireland. http://www.discovering-archaeologists.eu/national_reports/DISCO_national_Ireland_Final_Web.pdf.

Merrony, M., and J.M. Eisenburg. 2009. The global heritage industry and the recession: Bucking the trend? *Minerva* 20(1): 2.

Okamura, K. 2011. From object-centered to people-focused: Exploring a gap between archaeologists and the public in contemporary Japan. In *New perspectives in global public archaeology*, ed. K. Okamura and A. Matsuda, 77–86. New York: Springer.
Okamura, K., and A. Matsuda. 2010. Archaeological heritage management in Japan. In *Cultural heritage management: A global perspective*, ed. P.M. Messenger and G.S. Smith, 99–110. Gainesville: University Press of Florida.
Pagoulatos, G. 2017. Lessons for the Eurozone from Greece's painful crisis years, *Financial Times,* August 7, 2017. https://www.ft.com/content/d61da8a2-7b61-11e7-ab01-a13271d1ee9c?mhq5j=e7
Patterson, T.C. 1999. The political economy of archaeology in the United States. *Annual Review of Anthropology* 28: 155–174.
Schlanger, N. 2010. Postscript: On dead canaries, Guinea-pigs and Trojan horses. In *Archaeology and the global economic crisis: Multiple impacts, possible solutions*, ed. N. Schlanger and K. Aitchison, 107–115. Tervuren: Culture Lab Editions.
Sheldon, H. 1986. The wainwright interview. *RESCUE News* 39: 2.
Spence, C. 1993. Recording the archaeology of London: The development and implementation of the DUA recording system. In *Practices of archaeological stratigraphy*, ed. E.C. Harris, M.R. Brown III, and G.J. Brown, 23–46. London: Academic Press.
Young, R., and D. O'Sullivan. 1991. Archaeology in London. . . both ends burning? *RESCUE News* 52: 6.
Zorzin, N. 2013. The political economy of Japanese archaeology: Reflective thoughts on current organisational dynamics. *Japanese Journal of Archaeology* 1: 5–21.

Cultural Heritage Interpretation

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I can only note that the past is beautiful because one never realises an emotion at the time. It expands later, and thus we don't have complete emotions about the present, only about the past. – Virginia Woolf

Philosophical Background

Interpretation and the Conservation Movement

By the last half of the nineteenth century, the conservation movement had taken hold among natural resource advocates and influential politicians in the United States such as Theodore Roosevelt. The movement emphasized sustainable use of natural resources and preservation of wilderness areas. Conservation efforts aimed to preserve natural resources expressly for their continued sustainable use by humans. Conservation for its own sake became a popular theme for influential thinkers such as John Muir. Muir, the inspirational nineteenth-century conservationist, is often credited with establishing the basis for modern-day institutional standards for interpretation. Among many attributes, Muir believed that "the power of imagination makes us infinite," and "Government protection should be thrown around every wild grove and forest on the mountains . . . " (Wolfe 1979).

After Muir, another prominent American, Enos Mills, led "wilderness walks" and helped urban dwellers connect with the countryside. Mill's lobbying efforts were pivotal in establishing Rocky Mountain National Park in 1915.

Freeman Tilden and Developments in the Twentieth Century

By the early twentieth century, the US National Park Service recognized the value in programs which encouraged people to both respect their surroundings and support public stewardship in the parks. In 1957, this approach was set down on paper by Freeman Tilden in his *Interpreting Our Heritage*. His six principles have defined heritage interpretation for over half a century. Tilden, in his seminal 1957 book (Tilden 1957, 1977), laid out six principles of interpretation:

1. Interpretation that does not somehow relate what is being displayed or described to something within the personality or experience of the visitor will be sterile. Interpretation should be personal to the audience.

2. Information, as such, is not interpretation. Interpretation is revelation based upon information. Successful interpretation must do more than present facts.
3. Interpretation is an art, which combines many arts. Any art is in some degree teachable.
4. The chief aim of interpretation is not instruction but provocation. Interpretation should stimulate people into a form of action.
5. Interpretation should aim to present a whole rather than a part. Interpretation is conceptual and should explain the relationships between things.
6. Interpretation addressed to children should not be a dilution of the presentation to adults but should follow a fundamentally different approach. Different age groups have different needs and require different interpretive programs.

To Tilden, heritage interpretation "is an educational activity which aims to reveal meanings and relationships through the use of original objects, by firsthand experience, and by illustrative media, rather than simply to communicate factual information" (Tilden 1957).

Tilden's principles have remained highly relevant to interpreters worldwide, although elaborations on the principles have been suggested by Beck and Cable (2002, 2011) and others. With Tilden's principles as a basis, leading organizations have adopted similar elaborations:

- *Interpretation facilitates a connection between the interests of the visitor and the significance and relevance of the park.*
- *The primary goal is not to provide information, but to provide access to these meanings.*
- *The interpreter must be able to subjugate his or her own passions for, and understandings of, the resource in order to allow the audience to form theirs.*

— U.S. National Park Service (2007)

Interpretation is a mission-based communication process that forges emotional and intellectual connections between the interests of the audience and the meanings inherent in the resource.

— The National Association for Interpretation (NAI n.d.)

[Interpretation is] …. any communication process designed to reveal meanings and relationships of cultural and natural heritage to the public, through first-hand involvement with an object, artifact, landscape or site.

— Interpretation Canada (https://interpretation canada.wildapricot.org/page-18058)

Interpretation enriches our lives through engaging emotions, enhancing experiences and deepening understanding of people, places, events and objects from past and present.

— The Association for Heritage Interpretation (https://ahi.org.uk/)

*Interpretation refers to the full range of potential activities intended to heighten public awareness and enhance understanding of [a] cultural heritage site [*sic*]. These can include print and electronic publications, public lectures, on-site and directly related off-site installations, educational programs, community activities, and ongoing research, training, and evaluation of the interpretation process itself.*

— ICOMOS Ename Charter for the Interpretation and Presentation of Cultural Heritage Sites (2008)

[Interpretation is] …. all the ways of presenting the cultural significance of a place.

— Australia ICOMOS (2013)

Evolving Philosophies of Interpretation

With conceptual roots going back to the first half of the twentieth century, the public interpretation and presentation of cultural and archaeological heritage has become an essential component in the conservation and protection of cultural heritage values and sites. Beginning in the 1930s with the Athens Charter of 1933 (Munford 2000: 73–91) and accelerating as the expanding concepts of heritage and heritage conservation progressed in subsequent decades, an evolving list of international documents, conventions, and charters has led to more recent discussions and debates about resource significance. Concerns for relevancy, community engagement, and inclusion led to calls for the promulgation of principles and guidelines for interpretation and presentation.

By the latter part of the twentieth century, cultural heritage specialists were beginning to address the contemporary context of their research as part of a growing practical and ethical awareness. Inspired by visionaries such as Tilden, interpretation practitioners increasingly rejected programs and presentations that did not attempt to go beyond a recitation of facts. Only programs that facilitated and provoked emotional and intellectual connections of the audience to meanings inherent in the resource were deemed acceptable.

In recent years, the public interpretation of archaeological and cultural heritage sites has come to be recognized as an essential component within management schemes surrounding the conservation and protection of cultural heritage sites and resources worldwide (Jameson 1997, 2004b, 2007, 2013, 2016, 2019).

Leading Global Initiatives

As mentioned, standards development for cultural heritage public interpretation gained momentum with initiatives in the 1990s by the US National Park Service (NPS) and the National Association for Interpretation (NAI). NPS, through its Interpretive Development Program (IDP), promulgated a multifaceted, delivery mode-specific, employee training program (Jameson 1997, 2007), and in the year 2000, NPS finalized the archaeology/interpretation shared competency Module 440 "Effective Interpretation of Archeological Resources" Study Guide (Jameson 2007; DeCunzo and Jameson 2005). On site, interdisciplinary workshops based on the module were conducted at multiple national parks and international sites between 2004 and 2018. Also stemming from the model are two online courses, "Archaeology for Interpreters" and "Interpretation for Archaeologists" (NPS 2019). NAI, a non-governmental and nonprofit, independent organization, provides many training and certification opportunities and is a major advocacy group for standards development among both government and non-government organizations and agencies (NAI n.d.). The European counterpart to these organizations is Interpret Europe. Headquartered in Freiburg, Germany, Interpret Europe acts as a European platform for interpretation cooperation and exchange, especially on research and education. Interpret Europe has issued several recent guidelines for interpretation on topics such as migrant inclusion in schools and adult learning (Interpret Europe 2019).

Prelude to an International Charter

Beginning with the 1931 Athens Charter for the Restoration of Historic Monuments, through the 1964 Venice Charter, and continuing with the adoption of the 2003 ICOMOS Charter for the Analysis, Conservation and Structural Restoration of Architectural Heritage, the international heritage community has produced and ratified a long line of doctrinal texts setting out standards for best practices in the conservation and maintenance of cultural resources all over the world. Still, there remained a gap in the international consensus. By 2006, while most existing cultural heritage charters and documents dealt primarily with issues of physical conservation and site management, none specifically addressed the principles of effective communication of the significance of cultural heritage sites. Although interpretation was recognized as an abstract and subjective concept, when compared to the tangible conservation challenges of frescoes, mosaics, stonework, and earthen architecture, it was also seen as giving life to the ideas and images that determine how people relate to the material remains that surround them (Silberman 2006).

Another recognized urgency was the need for the development of interpretation methods and technologies that helped stimulate local economic development through paid admissions, souvenir sales, employment opportunities, and a steady flow of tourist revenue for hotels, shops, and restaurants in the local community. The transformation of cultural heritage sites into venues for tourism and leisure-time entertainment was seen as posing great dangers for the cause of conservation in the long run. If the right balance is not achieved between the contribution of outside scholars, exhibit designers, and heritage professionals and the local community, the site development project, even if financially successful, could appear to local residents as an outside imposition –

like a shopping mall or private theme park – with solely or mainly economic significance for the community. It can also sow resentment among those not immediately benefiting from the gains and who often suffer from the successful site's side effects – a lack of parking, traffic congestion, and disruption of normal routines. It can thus be dismissed as "someone else's" monument, an alien intrusion not meaningfully integrated into the memories, stories, and attitudes that constitute the entire community's shared identity (Silberman 2006).

These concerns about interpretation plans and methods served as the impetus for the formulation of a charter that might achieve international consensus about the intellectual, ethical, social, and economic contexts in which heritage interpretation might be most effectively and constructively carried out. In the spring of 2002, an initial draft was formulated by the staff of the Ename Center, based on close consultation with a range of international colleagues and following the model of earlier charters in the cultural heritage field. This first draft was circulated widely during the summer of 2002 in anticipation of the Ghent Conference on Heritage, Technology and Local Development later that year (Silberman 2006).

The effects of dramatic increases in heritage tourism have stirred a dramatic expansion of interpretive activities at cultural heritage parks and sites. Agencies and institutions in Australia, North America, and Europe have promulgated standards and policies that are aimed at facilitating social, conservation, and stewardship principles. The expansion of interpretive activities, coupled with the introduction of elaborate interpretive technologies in emerging economic contexts, has created new challenges for interdisciplinary collaboration among public archaeology and interpretation professional communities as they attempt to formulate workable approaches at local and community levels.

US/ICOMOS 2005 Charleston Declaration on Heritage Interpretation

On the occasion of the 8th International Symposium of US/ICOMOS, "HERITAGE INTERPRETATION, Expressing Heritage Sites Values to Foster Conservation, Promote Community Development, and Educate the Public," approximately 200 delegates from all over the United States, more than a dozen nations and several disciplines met in Charleston, South Carolina, in May 2005 to share experience, draw lessons and address issues surrounding the public interpretation of cultural heritage sites. The Declaration sought to establish an international consensus on the scientific, ethical, and educational principles for the public presentation and interpretation of cultural heritage. The symposium benefited from continuing scholarly and professional discussion of the methods and philosophy of heritage interpretation in many regions of the world and the ongoing review and revision process of the ICOMOS Ename Charter on the Interpretation of Cultural Heritage sites, drafted under the scientific auspices of ICOMOS and sponsored by the government of the Province of East Flanders and the Flemish Community of Belgium.

The Council of Europe's Faro Convention of 2005

The protection of cultural heritage and the definition of its value to society were the focus of the Faro Convention that was adopted by the Council of Europe in 2005. The Convention addressed the innovative concept of the "common heritage of Europe" and its relationship to human rights and fundamental freedoms. The right to cultural heritage defined by the Faro Convention was expressed as a dimension of the right to participate in the cultural life of the community, as well as the right to education and to be informed. Together with other international human rights documents, such as the *Universal Declaration of Human Rights* or the International Covenant on Economic, Social and Cultural Rights, the Convention addressed individual rights and the organization of public responsibilities for cultural heritage or access to cultural heritage and democratic participation. This was complemented by Interpret Europe's Freiburg Declaration that emphasized how stakeholders can contribute to the development of the interpretive profession (Interpret Europe 2019).

The ICOMOS Ename Charter on the Interpretation and Presentation of Cultural Heritage Sites (2008) (ICOMOS Charter)

The Ename Charter Initiative

Probably the most important international document guideline to date relating to interpretation and presentation of cultural heritage sites is the ICOMOS Ename Charter on the Interpretation and Presentation of Cultural Heritage Sites (2008). The Charter lays out seven principles of interpretation and presentation about the conservation, education, and stewardship messages that represent the transcendent humanistic values of the resource. These principles provide an outline of professional and ethical standards, placing emphasis on the essential roles of public communication and education in heritage preservation. ICOMOS International Committee on Interpretation and Presentation of Cultural Heritage Sites (ICIP), formed in 2006, in addition to promoting the development, adoption, and application of the Charter principles, sponsors conferences and events designed to foster the formulation of best practices in interpretation and presentation within prescribed cultural and political settings.

The ICOMOS Charter is an important instrument for intercultural dialogue. Like the Council of Europe's European Landscape Convention in the year 2000 and the Faro Declaration on the Council of Europe's Strategy for Developing Intercultural Dialogue of 2005, the ICOMOS Charter is a modern-style "enabling" instrument in that it suggests and facilitates ways forward that depend on democratic consensus and interdisciplinary cooperation; it is not a top-down prescriptive directive in the tradition of earlier twentieth-century heritage paradigms. It regards heritage as a contemporary issue – a resource for social and economic development, for the enhancement of cultural diversity and the promotion of intercultural dialogues and as part of an economic development model based on the principles of sustainable resource use. In response to increased economic and political pressures from the tourism industry, coupled with an enhanced public interface, the standards for interpretation of heritage sites have become important topics for international discussion and debate.

The Ename Charter Principles

The Ename Charter on Interpretation is internationally significant in the history of heritage management in that it addresses the purpose and principles of public interpretation, arguably the most important activity that occurs at a historic site, by delivering the conservation, education, and stewardship messages that represent the transcendent humanistic values of the resource. The principles place emphasis on the essential roles of public communication and education in heritage preservation and are presented under the following basic headings: Access and Understanding, Information Sources, Context and Setting, Authenticity, Sustainability, Inclusiveness, and Research, Education, and Training. On the surface, the principles are generally commonsensical in terms of conditions and prescriptions for effective public interpretation. Just how the principles are articulated, however, determines how well they are received in international circles and whether they will be considered desirable, practical, and feasible. In countries with fragile or questionable human rights histories or poorly developed infrastructure, practical applications are problematic.

Adoption by ICOMOS

International dialogue and reaction spurred by the Ename Charter initiative led ICOMOS to expand global discussions using the Ename Charter as a stimulus to guide and inform the process. In early May 2005, in recognition of high public interest and the effects of mass tourism, the connections to current heritage management practices, and technological advancements, US/ICOMOS held a conference in Charleston, South Carolina, to better articulate a consensus on internationally applicable public interpretation principles. The main outcome of the conference was the Charleston Declaration on Heritage Interpretation, issued on May 7, 2005, which reiterated the importance and purpose of establishing a set of internationally relevant principles for interpretation. The declaration pointed out that additional clarifications were needed before the final adoption of a doctrinal document on interpretation at the ICOMOS General Assembly in Quebec in 2008 (Silberman 2006, 2009).

Interpretation and the Concept of Authenticity

The concept of authenticity has become a central concern in the conservation and interpretation of cultural heritage. The Nara Document of 1994 (ICOMOS 1994) built on the Venice Charter (ICOMOS 1965) considering an expanding scope of cultural heritage concerns. It addresses the need for a broader understanding of cultural diversity and cultural heritage and underscores the importance of considering the cultural and social values of all societies. It emphasizes respect for other cultures, other values, and the tangible and intangible expressions that form part of the heritage of every culture. There are no fixed criteria to judge value and authenticity of cultural property; rather it must be evaluated within the cultural context to which it belongs. Though responsibility for the care and management of heritage belongs primarily to the culture that produced it, the document calls for adherence to the principles and responsibilities imposed by international charters.

At Chaco Canyon in the mid-1990s, Christine Finn (1997) examined the quandary of US National Park Service employees in dealing with ritual objects left at Casa Rinconada. In her essay, she raises the issue of "authentic" use of an ancient site and asks whether it is possible to discriminate one use as more worthy than another. The Native American community argued their right through inheritance or continued use: How might more recent visitors, such as twenty-first century New Age followers, claim their right to use the site? Is their use, for ritual purposes, an expression of care and understanding, or does it mark a lack of consideration for earlier claims on the site? Is the site, or the significance of the encompassing landscape, the main issue? Chaco Canyon, she points out, as a celebrated heritage complex located in the American Southwest desert, continues to be a valuable resource to Native Americans while also becoming a ceremonial center for New Age followers, who were, ironically, in part inspired by Native American knowledge.

As this case exemplifies, and as was reflected in the conclusions of the Charleston Declaration and as listed as a core principle in the ICOMOS Ename Charter of 2008, further discussions are needed on the concept and meaning of "authenticity" in interpretation. Traditional attitudes that focus on static, material authenticity will need to be replaced with more conditional and contextual definitions shaped by acknowledgment of dynamic processes of cultural change and diversity rather than judgments based on fixed criteria. Definitions of authenticity should be tempered or guided by local and community-based, inclusive analyses. Any analysis model for authenticity should reflect and represent multiple perspectives on what is authentic or "true" about a site or place and should provide a roadmap for practical solutions. The nature and qualifications of "experts" on authenticity should reflect the diversity of cultural affiliations and values attributed to the site, which, in turn, should be periodically reviewed and reassessed.

Nara +20

Building on international conventions and charters and the work done by academics and professionals since the drafting of the Nara Document, we can expand the scope of cultural heritage and underscore the importance of cultural context and cultural diversity. The Agency for Cultural Affairs (Government of Japan), in celebrating the 20th anniversary of the Nara Document, initiated a series of meetings of experts in cooperation with Kyushu University to evaluate and learn from the practical experiences of applying the Nara Document to the identification and management of heritage sites over the last 20 years (Silberman n.d.). This Nara +20 text (adapted from Silberman n.d.), building on the Himeji Recommendation, identified five key interrelated issues highlighting prioritized actions to be developed and expanded within global, national, and local contexts by wider community and stakeholder involvement:

1. *Diversity of heritage processes*. Just as the Nara Document indicates that authenticity varies according to the cultural context, the concept of cultural heritage itself assumes diverse forms and processes. In the last 20 years, heritage management and conservation practices have increasingly taken into

consideration the social processes by which cultural heritage is produced, used, interpreted, and safeguarded. In addition, social processes and perceptions of authenticity have been affected by emerging modes and technologies for accessing and experiencing heritage. Further work is needed on methodologies for assessing this broader spectrum of cultural forms and processes and the dynamic interrelationship between tangible and intangible heritage.

2. *Implications of the evolution of cultural values.* The Nara Document acknowledges that cultural heritage undergoes a continuous process of evolution. In the last 20 years, recognition of this evolution has created challenges for heritage management and has led practitioners to question the validity of universal conservation principles. In addition, during this period, fruitful engagement by communities in heritage processes has given rise to the acceptance of new values that had previously gone unrecognized. These changes require that the identification of values and the determination of authenticity be based on periodic reviews that accommodate changes over time in perceptions and attitudes, rather than on a single assessment. A better understanding is needed of the processes by which authenticity can be periodically assessed.
3. *Involvement of multiple stakeholders.* The Nara Document assigns responsibility for cultural heritage to specific communities that generated or cared for it. The experience of the last 20 years has demonstrated that cultural heritage may be significant in different ways to a broader range of communities and interest groups that now include virtual global communities that did not exist in 1994. This situation is further complicated by the recognition that individuals can be simultaneously members of more than one community and by the imbalance of power among stakeholders, often determined by heritage legislation, decision-making mechanisms, and economic interests. Those with authority to establish or recognize the significance, value, authenticity, treatment, and use of heritage resources have the responsibility to involve all stakeholders in these processes, not forgetting those communities with little or no voice. Heritage professionals should engage in community matters that may affect heritage. Further work is needed on methodologies to identify the rights, responsibilities, representatives, and levels of involvement of communities.
4. *Conflicting claims and interpretations.* The Nara Document calls for respect of cultural diversity in cases where cultural values appear to be in conflict. In the last 20 years, it has become evident that competing values and meanings of heritage may lead to seemingly irreconcilable conflicts. To address such situations, credible and transparent processes are required to mediate heritage disputes. These processes would require that communities in conflict agree to participate in the conservation of the heritage, even when a shared understanding of its significance is unattainable. Further work is needed on consensus-building methods to heritage practice.
5. *Role of cultural heritage in sustainable development.* The Nara Document does not specifically address issues of culture and development. Over the last 20 years, however, the need for considering cultural heritage in sustainable development and poverty reduction strategies has gained broad acceptance. The use of cultural heritage in development strategies must take into account cultural values, processes, community concerns, and administrative practices while ensuring equitable participation in socioeconomic benefits. The trade-offs between conservation of cultural heritage and economic development must be seen as part of the notion of sustainability. Further work is required to explore the role that cultural heritage can play in sustainable development and to identify methods of assessing trade-offs and building synergies so that cultural values and community concerns are integrated in development processes.

Despite years of expert discussion, the concept of "authenticity" continues to be elusive. Additional research and discussion are needed to define its nature and role in heritage interpretation.

The Challenges of Today and the Future

Recognizing Key Concepts in Interpretation: Multiculturalism, Inclusiveness, and Community Engagement

In present-day discussions and debates about interpretation standards, as with "authenticity," the subject of inclusiveness tends to be one of the more contentious and problematic issues. There are many, often overlapping, roadblocks to inclusiveness involving cultural, political, economic, and social factors. It can seem hopeless in a wide variety of sites and settings: Can Jerusalem, for example, ever be interpreted in a way that we can describe as inclusive to all, or even a majority, of stakeholders?

Multiculturalism is a view, or policy, that immigrants and other groups should preserve their cultures with the different cultures interacting peacefully within one nation. It is one of those terms that are difficult to describe definitively, but it is a key concept in heritage studies because it describes the general sociopolitical environment that is necessary for public policy in managing cultural diversity in multiethnic societies, stressing mutual respect and tolerance for cultural differences within a country's or region's borders. As a policy, multiculturalism emphasizes the unique characteristics of different cultures, especially as they relate to one another within national boundaries. This has been the official policy of Australia, Canada, and the United Kingdom. Multiculturalism has been described as preserving a "cultural mosaic" of separate ethnic groups and is contrasted to a "melting pot" that mixes them, the United States commonly being given as an example of a melting pot. Some use the term multiculturalism differently, describing both the melting pot and the "cultural mosaic" condition, such as in Canada, as being multicultural and referring to "pluralistic" vs. "particularist" multiculturalism. Pluralistic multiculturalism, like the melting pot concept, views each culture or subculture in a society as contributing unique and valuable cultural aspects to the whole culture. Particularist multiculturalism is more concerned with preserving the distinctions between cultures. Probably no country falls completely into one, or another, of these categories.

When we contemplate the challenges posed by the study and commemoration of heritage places within modern multicultural societies, we step into a complicated maze of terminology and semantics centered on international debates about relevance and conscience as well as cross-cultural and international priority and appropriateness. The nature of the reality of multiculturalism in any one country or region affects public policies and attitudes about inclusive heritage interpretation and where to focus the discussions: that is, what are the messages, and to whom are the messages directed?

We come to the table with developing, and sometimes divergent, assumptions and purposes for site commemoration and treatment. While no country or region in the world practices or exhibits multiculturalism in the same manner, most of the these conversations occur in countries from the Western cultural tradition, or, at least, the terminology used in these discussions stems from the predominately Western ideas of equal treatment, ethnic sensitivity, and accountability for multiple points of view that are constantly and openly debated. Many of the categories used in heritage site management, such as national park, national monument, and world heritage site, are notions of commemoration originating in the West. We should remind ourselves that, as we enter discussions of international and universal relevance, we need to be cautious in avoiding terminology that can appear, to a non-Westerner, to be patronizing and insensitive. Notably, the concept of "multiculturalism" has been described as "no longer tenable" by nondemocratic leaning political leaders (BBC News 2019). Multiculturalism may be rejected altogether as invalid or undesirable by some cultures and countries, making the preconditions for inclusive heritage interpretation more challenging.

Developing Community-Engaged Relationships in Interpretation

Heritage studies are increasingly engaged in publicly interactive research involving interpretation programs that are a collaboration between

archaeologists and other heritage specialists and the lay public. During the last two decades, globalization forces created a need for contextualizing knowledge in order to address complex issues and collaboration across and beyond academic disciplines, using more integrated methodologies that include the participation of nonacademics and increased stakeholder involvement. Successful programs empower (or share power), as well as motivate, lay persons to more active involvement in not only archaeological fieldwork but also interpretation and dissemination processes. The resulting collaborative relationships generate "multivocality" within a participatory culture model. In these cases, participatory approaches often apply public/professional mediation within established principles of public presentation and interpretation. At times, this complements the academic perceptions of the past, but in others it challenges or replaces them. Cultural heritage specialists should embrace these collaborative opportunities that ultimately strengthen public support and appreciation of archaeology and cultural heritage (Jameson and Eogan 2013; Jameson 2013).

The relationship between community participation and interpretation of the sites is an important topic for current and future research. We are only beginning to evaluate our results and experiences. In these endeavors, we need to work with our social science colleagues in such fields as sociology and social psychology in developing methodologies (surveys, focus groups, interviews, ethnographic observations, etc.) that can be applied to studies of cultural and archaeological heritage. We need to complement these studies with innovative ways to identify, and receive input from, stakeholders. We need to develop marketing and social media skills. We need also to work with our communication partners such as interpreters, guides, exhibit designers, and site managers in developing collaborative relationships.

Those of us who strive to work in community-engaged environments often carry out our deliberations and reflections in the context of a juncture of cultural heritage and community values. Those of us in resource management positions seek to empower, and share power, with diverse communities of defined stakeholders interacting in a variety of social contexts. In our interactions with and within communities, however they are defined, we need to recognize that our work is always going to be an intervention into an existing social context where people are already actively producing and negotiating identities and where the past is plural and contested. Community archaeology may well contribute to social cohesion, i.e., using fieldwork to counter a spike in crime and disorder in school-aged populations, but "we should also recognize that outcomes are not invariably positive and beneficial; once archaeologists engage with the heritage process they are engaging with the politics of recognition. And recognition and inclusion must, by definition, also differentiate and exclude" (Smith 2012; Nevell and Redhead 2015).

We should also recognize that there may be a complex play between individual motivations and benefits and any sense of community. Participation in projects may primarily be to augment the school curriculum or as parts of therapeutic practices. Recognizing the importance of individual motivation has led to new and significant forms of evaluation, pioneered by the Dig Greater Manchester project in the United Kingdom that found that "volunteers and participants usually have more personal reasons for engaging with community projects: to gain confidence, for the enjoyment of working with others, and for the empowerment that comes from giving the present more meaning. Simply by taking part in the process and engaging in these activities, individuals can acquire new life skills while some of our larger academic questions are being addressed".

We know that funding is always a challenge, both because resources are increasingly scarce and because funding schemes can impose their own rules and conditions, which, in themselves, make the relationships between communities and professional heritage studies practice more complicated. We have seen the reduction of major funding sources, such as the National Science Foundation in the United States and the National Lottery Heritage Fund in the United

Kingdom, and a draining away of support from universities, exacerbating the problem.

Advancement of Community Activism and Collaboration

Today, application of a participatory culture model and cultural specialist/lay person collaborative relationships are central components of effective interpretation of cultural heritage sites. An active role by the community in the interpretation of material culture is an essential ingredient that gives non-archaeologists power to interpret the past. Practice shows that people can ascribe new relationships with sites, with technical or scientific interpretation being just one of the many variations of meaning.

The attainment of effective and sustainable outcomes is unlikely if heritage professionals plan interventions without consulting stakeholder groups or believe they are the experts in a field and think that they know what is best for the community. In simple terms, community engagement in heritage practice involves ongoing consultation and support to develop the community's confidence, skills, and resources to identify, prioritize, organize, and collectively solve its heritage-related problems and issues.

Authorized Discourses, Elitism, and the Politics of Power

In most countries, the authorized heritage discourse (AHD) has dominated interpretation at managed sites reflecting an elitist narrative, displaying and requiring technical knowledge and insight to be comprehended. In many cases, the interpretation is very classical with a romantic vision and little or no conservation, highlighting the aesthetic, monumental, and "spectacular" aspects of sites at the expense of other significant features. Laurajane Smith (2012) has examined the consequences of this discourse for heritage study practices associated with community engagement and outreach. Smith maintains that the AHD frames archaeology heritage practices and works to conceive heritage as specifically "archaeological heritage." The archaeological discipline owes much to the existence of this discourse, which privileges expert values over those of community and other subnational interests and which works to constrain understandings of heritage as primarily material, neglecting intangible values. The political dominance of this discourse has hindered productive and critical community engagement, rendering it essentially a top-down interaction. This is particularly the case in cultural resource management (CRM) and cultural heritage management (CHM) situations where the government or regulatory authority is dominant. However, as they partake in decision-making schemes and processes worldwide, archaeologists are increasingly engaged in self-conscious and explicit challenges to this discourse to facilitate meaningful community partnerships (Jameson 2016).

Ideally, these community partnerships and conversations between two or more groups of people are democratic in considering all perspectives. But this is not the reality. Too often, these communications are "silently" dictated by those with authority. In cases of heritage management, it is the archaeologists and heritage authorities with meaningful power. For example, within the South African context, the perspectives of communities are considered against unrepresentative legal mandates that do not consider their ritual beliefs meaningfully. In these situations, a truly democratic approach to heritage management, framed within a framework of community empowerment, is difficult, if not impossible, to attain (Ndlov 2019).

Pedro Funari and colleagues in Brazil (Funari et al. 2016; Funari and Alfonso 2019) have dealt with the question of using material culture (artifacts) to change perceptions of people and empower them. They present a case of African-Brazilian community participation in Southern Brazil, discussing how heritage issues can be a catalyst for empowerment and social diversity. Their work illustrates the importance of collaboration between universities and communities and shows how, through community-based participatory research and the use of museum material, participative principles can guide the construction of more pluralist interpretive narratives, embracing issues associated with memory, exclusion, and empowerment.

Knowledge-Making and New Narratives

Coburn and Stein (2006) have described the promise of local knowledge for a new generation of scholars that seek a connection rather than domination or mastery over their subjects/objects of interest. The focus is on a situated knowledge-making practice that includes, on equal footing, expert and local knowledge-makers. In this context, "knowledge-making" is a transformative connection between the people and the outcomes of collaboration, research, and action.

Proponents of community-based participatory research advocate for the active involvement and engagement of community members, citing improved construct validity, intervention efficiency, and accountability (Montoya 2017; Montoya and Kent 2011).

In some interdisciplinary collaborations, a new creative space emerges, created beyond the realms of all the participants' disciplinary and bureaucratic silos. The resulting entirely new community space is possible only through nonspecialist participation in the planning and carrying out of the research project's design and the sharing of archaeological knowledge through engagement with "others" (Jeppson et al. 2019).

In several parts of the world, indigenous populations have adopted the works of tourist art to create new interpretive narratives that imply a transformation in the appreciation and revaluation of indigenous cultural heritage sites. In the case of the Maya architecture in Chichén Itzá, the rebuilding of a new pyramid emphasizes the importance of the physical site to the ancient Chichén Itzá community, helping to demonstrate the need for continued preservation, allowing for acknowledgment of the past while moving toward the future. Here, commercialization and tourism have generated a new way to visit the distant past, where the spectacle of restoration catches the visitor's eye through illuminating the pyramid at night. The economic power of tourism dominates the scene. Modern Maya people accept this homily and have made it part of their culture today (Barry 2014, 2016). Conversely, in the American Southwest, traditional decorative design elements of pottery collected by nineteenth-century archaeologists have inspired modern indigenous potters to replicate the designs in the production of tourist art, resulting in a rediscovery of an important aspect of their traditional culture as well as an appreciation of the economic power of tourism (Jameson et al. 2003).

Facilitated Dialogue and Civic Engagement

The traditional approach in public interpretation defines interpretation as a communication process that facilitates emotional and intellectual connections between the interests of the audience and the meanings inherent to the resource. Effective programs have designs and content that is appropriate for the audience and provides clear focus for these connections by demonstrating the cohesive development of a relevant idea or ideas rather than relying primarily on a recital of a chronological narrative or series of facts or lists.

Today, one measure of success in the practice of heritage interpretation is a robust degree of community engagement. Many of these projects and programs emphasize substantial efforts in professional/community collaboration and power sharing. Cultural heritage interpretation, as an expression of certain cultures, can be an important mediator between pasts and futures. New philosophical/methodological trends in public interpretation are reshaping the messages delivered at archaeological and cultural heritage sites throughout Europe and worldwide. The role of the experts, as well as the participatory engagement of audiences and stakeholders, is being redefined and reassessed. For example, the communication technique of facilitated dialogue is used by professional interpreters to connect and interact with audiences. Facilitated dialogue engages and fosters an environment where the experiences of participants are shared and explored. It is designed to join the experiences and expertise of participants to contemplate conditions and opportunities for impacting the topic or issue being discussed. Dialogue facilitators need not be topical experts, but they do need to have personal communication skills that enable as many people who want to contribute to do so yet allowing others to feel comfortable about not wanting to be actively involved in the dialogue. Facilitated dialogue is designed to engage and foster an environment

where the experiences of participants are shared and explored. The goal is to encourage an environment where people feel free to consider other perspectives (NPS 2015).

One possible concern to heritage specialists with facilitated dialogue is the deemphasized role of the resource expert and his/her intrinsic knowledge of the resource. Will this lead to programs being developed that discount this role or an attitude by management that experts are not needed, do not need to be hired, by management and interpretation entities? If so, does this represent a major conceptual shift in effective interpretation and presentation philosophy and practice?

Community empowerment is about working in ways in which people and communities become empowered, where power is shared with the experts, and refers to the process of enabling communities to increase control over their lives. In these settings, people are satisfied and confident within inclusive and organized groups where the formed networks are cooperative, supportive, and influential.

The Limited Effects of Official Documents, Guidelines, and Charters

At the same time, several international guidelines, although they address the need for community engagement, also serve to promote the agendas of the educated and privileged, carrying some form of AHD. For example, the Convention on the Value of Cultural Heritage for Society (Faro Convention 2005, Council of Europe) states that the community must be involved in cultural heritage management. The aforementioned ICOMOS Charter on the Interpretation and Presentation of Cultural Heritage Sites (the 2008 Ename Charter) also addresses the importance of local community involvement. Internationally, primarily in the West, national guidelines, such as the Burra Charter of 1979 and 2013 (Australia ICOMOS 2013), generally follow the 2008 ICOMOS Ename Charter guidelines in terms of definitions, concepts, and principles. These and other international guidelines, however, tend to be optimistic and positivist, in the sense that they reflect the definitions and engineering of the heritage domain through top-down instruction of archaeologists or heritage managers. As an example, Barry (2016) outlined the challenges of the Tell Balata Archaeological Park project in Palestine, where it is almost impossible to comply with such professional standards and to follow the 2008 ICOMOS Charter due to the political, social, and economic situation and a lack of recognition of, and respect for, multiculturalism (Jameson 2014).

The Continuing Challenges of Heritage Tourism

As alluded above, an important current and ever-growing challenge affecting the inclusiveness of heritage interpretation is the juggernaut of heritage tourism. Heritage tourism is a collaboration between conservationists and commercial promoters. In heritage tourism, the goal is to harness people's fascination and sense of connection to the past and turn it into a commodity. It is often an uneasy association because the motives of these respective groups are not always compatible. While there is general recognition that heritage tourism can work to promote preservation of communities' historic and cultural resources and also educate tourists and local residents about the resources, the resulting effects are not always viewed as beneficial, especially from those of us on the conservationist side of the fence. Nevertheless, because heritage tourism is a growth industry in almost every part of the world, the issues it conjures up – good and bad – must be addressed.

Globalization and global tourism are changing our world in ways that we are just beginning to understand. Heritage tourism, with its ties to the currents of rapidly evolving global economies, is causing increasing needs and demands for cross-cultural and international communication and interdisciplinary training. Greater importance is being placed on transferable skills such as the application of interdisciplinary approaches, writing for both academic and nonacademic audiences, oral presentation, experience with multimedia packages, and social media.

Heritage tourism run amok – when the relationship lacks conservation-driven decision-making and objectively derived value assessments – threatens or limits the goal of inclusiveness in interpretation by rendering

community and other stakeholder involvement superficial. Interpretation of the meaning of sites is inherently important to the conservation process and therefore plays a defining role in conservation/tourism interactions. Those of us whose primary goals and interests are conservation should be determined that our values and standards in this relationship are not compromised or diminished.

Interpretation as a Mechanism for Resource Sustainability

Much of the established principles for interpretation in the United States and internationally stem from the writing and philosophy of Freeman Tilden. Tilden (1957) defined interpretation as an educational activity that aims to reveal meanings and relationships using original objects by first-hand experience and illustrative media rather than to simply communicate information facts. Freeman's six principles emphasized relevance to the experience of the audience and interpretation as a teachable art form. According to Tilden, the chief aim of interpretation is not instruction but provocation and must address itself to the whole person rather than any phase. Tilden advocated what we would describe today as a "layered" approach to interpretation that considers the perspectives of a variety of audiences differentiated by age, sociocultural background, and other factors.

Later advocates have built on the foundations of Tilden and applied postmodern theoretical approaches. Jon Kohl (2003), for example, defines interpretation in terms of a "paradigm," a deeply embedded set of beliefs that together form a story or worldview. To Kohl, each culture has a story that explains its people's creation, significance, and destiny. This set of beliefs directs how they relate to resources. Kohl advocates expanding the scope and goal of interpretation beyond conservation goals toward an integration of "deep stories" that "carry it across the divide to conservation in the short-term and sustainability of natural and cultural resources in the long." For interpreters, he says, these changes will first be felt in conservation, a sector of sustainable resource management, and then later for sustainability issues in general. Kohl believes that effective interpretation in the future will involve a paradigm shift that rewrites the worldview script by interpreting new ideas and meanings in order to move society toward sustainability.

Interpretation Through Inspiration and Cognitive Connection

Many cultural heritage specialists today are not content to rely solely on traditional methodologies and analytical techniques in their attempts to reconstruct human history and bring it to life for people. They want to venture beyond utilitarian explanations and explore the interpretive potential of cognitive imagery that archaeological and cultural heritage information and objects can inspire. They realize the value and power of artistic expression in helping to convey this information to the public and are increasingly concerned with how the past is presented to, and consumed by, nonspecialists. They want to examine new ways of communicating cultural heritage information in educational venues such as national parks, museums, popular literature, film and television, music, and various multimedia formats.

Archaeology and archaeologically derived information and objects have inspired a wide variety of artistic expressions ranging from straightforward computer-generated reconstructions and traditional artists' conceptions to other art forms such as poetry and opera. Although some level of conjecture will always be present in these works, they are often no less conjectural than technical interpretations and have the benefit of providing visual and conceptual imagery that can communicate contexts and settings in compelling ways. Two such interpretive formats, two-dimensional paintings and popular history writing, are used by the National Park Service as public interpretation and education tools (Jameson et al. 2003).

Interpretation Practice

In the United States, the development of resource protection legislation and cultural resource management (CRM) strategies in the 1960s and 1970s, and the resultant very rapid accumulation of archaeological and historical site information

and collected artifacts, led to concerns for inclusiveness and sensitivity to heritage values of multidimensional communities and constituent stakeholders.

From the input of Freeman Tilden and the experience of NPS, the United Kingdom and Canada were two of the countries which began to introduce interpretation alongside conservation, first in natural surroundings and later in towns and historic sites. The Countryside Commission for Scotland and its sister organization in England and Wales produced a two-part guide to Countryside Interpretation in 1975, the year the Society for the Interpretation of Britain's Heritage was founded. It later became the Association for Heritage Interpretation. In North America, two organizations came together to form NAI, which was followed by similar bodies in Canada and Australia with a number of individual advocates located in other countries. Leaders such as Mark Sagan in the United States and Don Aldridge in the United Kingdom became spiritual successors of Freeman Tilden. They in turn inspired interpreters in Spain, Italy, Scandinavia, and elsewhere to take up the baton and introduce interpretation as a complement to environmental interpretation aimed at children.

By the late 1980s, many cultural heritage specialists in the United States and elsewhere were addressing the contemporary context of their research as part of a growing practical and ethical awareness. The 1990s saw the emergence of greater energy and funding devoted to the public interface of archaeology as the professional community became aware that intellectual introversion was no longer acceptable and that more attention should be paid to the mechanisms, programs, and standards of public presentation. In the face of an increasing public interest and demand for information, archaeologists and their cultural heritage colleagues began to more actively collaborate to devise the effective strategies for public presentation and interpretation. Until the 1990s, publications on public presentation and interpretation strategies and standards were rare and largely obscured in isolated accounts and academic gray literature.

By 2005, traditional definitions for the terms *heritage*, *historic*, *archaeological*, and *scientific* were changing to incorporate intangibles such as aesthetic, artistic, spiritual, emotional, and other values stemming from introspection and reflection. An expansion and broadening of the content of "archaeological knowledge," this term increasingly subsumed in professional practice parlance under the more general category of "cultural heritage," to be more inclusive and less authoritative has emerged, broadening the definition and meaning of "expert." An important result has been the emergence of the interpretive narrative approach in archaeological and cultural heritage interpretation, where heritage specialists actively participate in structuring a compelling story instead of just presenting sets of derived information. The interpretive narrative is used as a vehicle for understanding and communicating, a *sharing* as well as an *imparting* of, cultural heritage values within the interpretation process. This trend is resulting in profound ramifications for definitions of significance in heritage management deliberations and what is ultimately classified, conserved, maintained, and interpreted. It has changed the role we play and the values we present in historic preservation and education. It affects our strategies for conducting research and the public interpretation of that research. The challenge for heritage managers, archaeologists, cultural historians, and other resource stewards is to educate ourselves on the requisite knowledge, skills, and abilities to deal with these developments.

Paramount for professional educators and interpreters today is ensuring that their audiences connect with and understand cultural heritage values, those tangibles and intangibles that define what is important to people. They strive in these endeavors to develop more holistic interpretations in which the values of sustainable environment and heritage are inextricably linked. They also recognize that multidisciplinary, inclusive, and community-engaged approaches are the most effective. Heritage sites are no longer limited to great iconic monuments and places but include millions of places of importance to sectors of society that were once invisible or intentionally ignored. These under-recorded sites can play an

important role in fostering peaceful multicultural societies, maintaining communal or ethnic identities, and serving as the indispensable theater in which the ancient traditions that make each culture a unique treasure are performed periodically, even daily. The values of these previously ignored and heretofore low-priority sites and features are often not readily obvious in the material fabric or surrounding geography but today carry an imperative that they must be identified and require a narrative for the fullness of their meaning to be properly conveyed to local communities, site visitors, and the public at large. This is accomplished through processes of public interpretation, presentation, and education.

Interpretation is now a recognized skill and an essential part of managing special sites and protected areas worldwide. In many countries, there are degree and postgraduate courses in interpretation, which include interpretation alongside other subjects. Courses and programs are run for professional interpreters and for volunteers at heritage sites, museums, and visitor centers (Interpret Europe 2019).

Recurring Issues in Interpretation

Today, new philosophical and methodological trends in public interpretation are reshaping the messages delivered at archaeological and cultural heritage sites worldwide. The role of the expert, as well as the participatory engagement of audiences and stakeholders, is being redefined and reassessed. For example, as mentioned, the communication technique of facilitated dialogue is being utilized by professional interpreters to connect and interact with audiences.

Pervading the philosophical underpinning and evolving global history of public interpretation are several issues and questions that carry over to present-day practice and program implementation. Examples include:

- **Why interpret?**
  What are the categories and cultural, socio-political circumstances that surround and influence our decisions to interpret?
- **Devising effective mechanisms for securing stakeholder participation**
  How do we define and promulgate mechanisms for securing stakeholder participation in that there are no universally shared views on who qualifies as valid stakeholders?
- **Establishing acceptable boundaries**
  Establishing acceptable boundaries and better guidance on the interpretation of religious and sacred sites, places of memory, and "sites of conscience."
- **Debates surrounding the nature and circumstances of "authenticity"**
  The nature and circumstances of "authenticity" as it relates to both tangible and intangible heritage resources in both multicultural and more endemic societies.
- **Defining and identifying more inclusive target audience infrastructure**
  Defining "target audience" to include not only the professional preservation community but also the growing numbers of communities of specialists that conceive, design, and build interpretation programs and infrastructure that know little about the principles of heritage conservation and management.
- **Recognition that community participation, buy-in, and power sharing are essential**
  Many examples are emerging of a bottom-up approach where members of the respective communities provide feedback, actively participate, and *effectively change* the original design of the way cultural heritage is presented. Community participation and buy-in are essential ingredients for successful outcomes in terms of public understanding, support, and building collaborative relationships that effectively protect heritage sites and the dynamic traditions they represent.

Interpretation Organizations

Notably, in 2019, six of the largest heritage interpretation organizations in the world (Association for Heritage Interpretation (UK), Interpret Europe, Interpretation Canada, Interpretation Network New Zealand, Interpretation Australia, and National Association for Interpretation) have come together to form the Global Alliance for Heritage Interpretation advocacy organization whose stated purpose is to coordinate efforts in

support of individuals and interpretation groups around the world (NAI 2019).

The predominant interpretation agencies and organizations include:

- Asociación para la Interpretación del Patrimonio, Spain
- Association for Heritage Interpretation, UK
- Association for Living History, Farm and Agricultural Museums, USA
- Interpretation Australia
- Interpretation Canada
- Interpret Europe
- Interpret Scotland
- Interpretation Network New Zealand
- ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites, International
- ICOMOS International Committee on Interpretation and Presentation
- International Council of Museums (ICOM)
- National Association for Interpretation, USA
- National Park Service, USA
- Swedish Centre for Nature Interpretation
- Global Alliance for Heritage Interpretation

Conclusions

In modern contexts, applications of a participatory culture model and cultural specialist/lay person collaborative relationships are central components of effective interpretation of cultural heritage sites. Innovative participatory approaches, avoiding the pitfalls of authorized and elitist heritage discourses, are raising the potential of cultural resources to heighten public sensitivity to the rich cultural heritage these resources represent. These approaches serve to connect multiple perceptions of the past, all equally important, that must be transmitted or facilitated by the cultural heritage manager.

Many argue that the incorporation of local knowledge is important to the survival of archaeology and other fields of heritage studies as an academic discipline. Community involvement serves to end the elitism and exclusive control that heritage authorities have had over the material in the past, resulting in a "decolonized" archaeology, giving non-archaeologists a shared role in interpreting the past. The degree of interpretive control that communities have in archaeological projects can vary from using interview and consultation data to producing academic publications written by community members based on community-identified research questions. Project success requires investing the requisite time and resources to develop rapport and mutual respect with the local community. Today, experience has taught cultural heritage specialists to plan for long-term collaborations beginning at project inception (Nevell and Redhead 2015). Recent publications highlight alternative and innovative participatory approaches in cultural heritage management and interpretation. They also reveal a need to develop effective and sensitive interpretation in all communities (Jameson and Musteata 2019).

Fundamental Questions Going Forward

What are the new trends and transnational perspectives, as well as levels of communication – from local to regional, national, and international – on public interpretation of archaeological and cultural heritage? Do these activities represent new emphases in interpretation, and can they contribute to, or help mediate, dialogues between European identity and diversity of cultures? Can they be shared experiences as examples of best practice at national and international levels? What are the interpretation and presentation challenges for the future?

In our deliberations regarding who owns the past and what constitutes inclusive public interpretation, we can couch our discussions within the framework of attempting to answer some fundamental queries. While present and future deliberations will not easily resolve these questions, they continue to encompass many of the key issues (Jameson 2012).

Firstly, what constitutes an inclusive public interpretation of heritage? The Ename Charter on Interpretation defines "inclusiveness" as that which seeks to ensure that the interpretation of a cultural heritage site is not merely a carefully scripted presentation prepared by outsiders but

should instead actively involve the participation of associated communities and other stakeholders. In all aspects of site commemoration and site management, whether these are interpretive programs, exhibits, physical maintenance activities, or the effects of heritage tourism, according to the charter, an interpretation program must be seen as a community activity rather than something imposed by persons or institutions perceived to be outside the community. "Community" in this sense is simply a group or class having common interests, or likeness or identity. Communities include educational, professional, academic, governmental, descendant, local, or virtual. Communities are not discrete in that they can and do overlap. For example, members of a descendant community may also be part of the educational and the professional communities. In discussions of inclusiveness, our ideal for communities is that they be involved in participatory education and public interpretation where members of a community actively participate in developing, carrying out, delivering, or otherwise producing the program or elements of the program or interpretive product.

The second question we might pose is: does the term "inclusive" connote democratic or equal treatment? How does it relate to, appeal to, and be available to broad masses of people? If we accept the assumption that some form of multiculturalism is a necessary backdrop for inclusiveness, our approaches to commemoration and public interpretation should follow an objective process that seeks to identify the attributes, or values, inherent in the resource that make them important to people and therefore worthy of protecting, preserving, celebrating, and interpreting.

A third question comes to mind: in multicultural societies, how are standards of significance and authenticity promulgated and agreed upon, and how are they effectively formalized while accommodating multiple points of view in heritage interpretation? And, once commemoration standards are formalized in official management and interpretation oversight procedures, how are the values of immigrant and minority communities, as well as evolving values of the "majority," addressed and accommodated within the identification/commemoration process?

Public interpretation treatments worldwide run the gamut for tendencies of inclusiveness and exclusiveness. What does a Palestinian, or Palestinians as a group, believe as authentic and therefore worthy of protection and commemoration? How does this compare in terms of commonality of commemoration, sense of place and setting, etc., with the heritage values of Israelis for the same territory or site? Can divergent communities in terms of values and opinions on commemoration ever arrive at a consensus, or even develop a constructive dialogue, about the rights of inclusion in heritage interpretation and site management?

The last decades have witnessed a dynamic period of evolving standards and philosophy in public archaeology and heritage interpretation. Philosophical approaches and techniques exemplified by the US National Park Service's IDP program, NAI's Certification and Training Program, Interpret Europe's European projects on heritage interpretation, and the goals of the newly organized Global Alliance for Heritage Interpretation have formed a basis for the development of international definitions, standards, and collaborative approaches that lead to more effective strategies for site protection and interpretation through enhanced public stewardship. Discussions on issues such as authenticity and inclusiveness will continue to dominate international debates about the significance and proper use of sites. The challenges for international relevance and application posed by the ICOMOS Ename Charter initiative will form the center of future debates and deliberations. The goal of more inclusive interpretations will require an acceptance of divergent definitions of authenticity that depend on a level of tolerance of multiple definitions of significance with concomitant, objectively derived, assigned, and ascribed heritage values. We can hope that these efforts lead to the recognition of humanistic values that are reflected in cultural heritage narratives and heritage tourism practices as well as site commemoration and protection decisions by controlling authorities.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Outreach
- ▶ Ethics in Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Museums and the Public
- ▶ Heritage Research and Visitor Planning
- ▶ Heritage Tourism and the Marketplace
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ Multivocality and Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ "Public" and Archaeology
- ▶ Site Visitation and Interpretation: Management
- ▶ Stakeholders and Community Participation

References

Australia ICOMOS. 2013. Australia ICOMOS Burra charter. https://australia.icomos.org/publications/charters/. Accessed 10 July 2019.

Barry, K.M. 2014. Framing the ancients: A global study in archaeological and historic site interpretation. Ph.D. dissertation, Art History. The Pennsylvania State University Graduate School, College of Arts and Architecture, University Park.

Barry, K.M. 2016. Maya architecture and interpretation: Chichén Itzá as part of the cultural heritage narrative. Manuscript on file, Ball State University, Muncie, Indiana.

BBC News. 2019. Putin: Russian president says liberalism 'obsolete'. *BBC News* Online, 28 June 2019. https://www.bbc.com/news/world-europe-48795764. Accessed 12 July 2019.

Coburn, C.E., and M.K. Stein. 2006. Communities of practice theory and the role of teacher professional community in policy implementation. In *New directions in education policy implementation: Confronting complexity*, ed. M.I. Honig, 25–46. Albany: State University of New York Press.

DeCunzo, Luann, and John H. Jameson Jr., eds. 2005. *Unlocking the past: Celebrating historical archaeology in North America*. Gainesville: University Press of Florida.

Faro Convention of 2005. https://www.coe.int/en/web/culture-and-heritage/faro-convention

Finn, Christine. 1997. "Leaving more than footprints": Modern votive offerings at Chaco canyon prehistoric site. *Antiquity* 71 (271): 177–178.

Funari, Pedro Paulo A., and Louise Prado Alfonso. 2019. Increasing heritage awareness through community participation: African-Brazilian community participation in a diversity context. In *Transforming heritage practice in the 21st century: Contributions from community archaeology*, One world arshaeology Series, ed. John H. Jameson and Sergiu Musteata, 1st ed., 2019. New York: Springer.

Funari, P. Paulo A., Garraffoni R.S., and Aparecida de Andrade Almeida, M. 2016. Archaeology and social inclusion in Brazil. Paper delivered at the Association of Critical Heritage Studies (ACHS) conference, Montreal.

ICOMOS. 1965. International charter for the conservation and restoration of monuments and sites (The Venice Charter 1964). https://www.icomos.org/charters/venice_e.pdf. Accessed 6 July 2019.

ICOMOS. 1994. The Nara document on authenticity. https://www.icomos.org/charters/nara-e.pdf. Accessed 6 July 2019.

ICOMOS Ename Charter for the Interpretation and Presentation of Cultural Heritage Sites. 2008. http://icip.icomos.org/downloads/ICOMOS_Interpretation_Charter_ENG_04_10_08.pdf. Accessed 10 July 2019.

Interpret Europe. 2019. European projects on heritage interpretation. http://www.interpret-europe.net/top/projects.html. Accessed 10 July 2019.

Jameson, J.H. 2007. *Making connections through archaeology: Partnering with communities and teachers in the national park service in past meets present*. Archaeologists Partnering with Museum Curators, Teachers, and Community Groups. Springer.

Jameson, J.H. 2012. On-site interpretation. In *The Oxford companion to archaeology*, 2nd ed, ed. Neil A. Silberman, 570–578. Oxford: Oxford University Press.

Jameson, J.H. 2013. Archaeologists at the table: From community to global. In *Training and practice for modern day archaeologists*, ed. John H. Jameson and James Eogan, 3–14. Cham: Springer.

Jameson, J. H. 2014. International conventions and charters and archaeology presentation. In *Encyclopedia of global archaeology*, 3948–3954. Springer-Verlag New York

Jameson, John H. 2016. Management and interpretation of world heritage through community engagement. In *Furnace, the postgraduate journal of the Ironbridge International Institute for Cultural Heritage,* Issue 7. Birmingham: University of Birmingham

Jameson, John H. 2019. Introduction: The critical junctures of archaeology, heritage, and communities. In *Transforming heritage practice in the 21st century: Contributions from community archaeology*, One world

archaeology series, ed. John H. Jameson and Sergiu Musteata, 1st ed., 2019. New York: Springer.
Jameson, John H., Jr., ed. 1997. *Presenting archaeology to the public: Digging for truths*. Walnut Creek: AltaMira Press.
Jameson, John H., Jr. 2004a. Public archaeology in the United States. In *Public archaeology*, ed. Nick Merriman, 21–58. New York: Routledge.
Jameson, John H., Jr., ed. 2004b. *The Reconstructed Past: Reconstructions in the public interpretation of archaeology and history.* Walnut Creek: AltaMira Press.
Jameson, John H., Jr., John E. Ehrenhard, and Christine A. Finn, eds. 2003. *Ancient muses: Archaeology and the arts*. Tuscaloosa: University of Alabama Press.
Jameson, J. H., and J. Eogan, eds. 2013. *Training and practice for modern day archaeologists*. New York: Springer.
Jameson J.H. and S. Musteata (2019). *Transforming heritage practice in the 21st century: Contributions from community archaeology*, One world archaeology series. 1st ed. Hardback, 460 pages. New York: Springer. ISBN 10 3030143260, ISBN 13 9783030143268.
Jeppson, Patrice L., Glen Muschio, and Jed Levin. 2019. Computational science, convergence culture, and the creation of archaeological knowledge and understanding. In *Transforming heritage practice in the 21st century: Contributions from community archaeology*, One world archaeology series, ed. John H. Jameson and Sergiu Musteata, 1st ed.. 2019. New York: Springer.
Kohl, Jon. 2003. Post-revolution interpretation. *Legacy* (Nov/Dec 2003, Parts 1–3). Interpreters and the big story. http://jonkohl.com/publications/categories/interp.htm. Accessed 25 May 2006.
Montoya, Michael. 2017. Community knowledge project (UCI). http://coled.ucsd.edu/community-knowledge-project-uci/. Accessed 4 Aug 2017.
Montoya, M.J., and E.E. Kent. 2011. Dialogical action: Moving from community-based to community-driven participatory research. *Qualitative Health Research* 21 (7): 1000–1011.
Munford, Eric. 2000. The functional city. In *CIAM discourse on urbanism, 1928–1960*, 73–91. Cambridge, UK: The MIT Press.
NAI (National Association for Interpretation). 2019. Global alliance for heritage interpretation. https://www.interpnet.com/NAI/interp/About/About_Interpretation/International_Federation/nai/_About/International_Federation.aspx?hkey=fc7fe1eb-98d7-4164-bdef-df8074e3033f. Accessed 14 July 2019.
NAI (National Association for Interpretation). n.d. Certification & training program. https://www.interpnet.com/NAI/interp/Certification/nai/_certification/NAI_Certification.aspx?hkey=0c08ac07-c574-4560-940f-82fba3a22be9. Accessed 12 July 2019.
NAI (The National Association for Interpretation). n.d. Interpretation. https://www.interpnet.com/NAI/interp/About/About_NAI/What_We_Believe/nai/_About/Mission_Vision_and_Core_Values.aspx?hkey=ef5896dc-53e4-4dbb-929e-96d45bdb1cc1. Accessed 10 July 2019.
Ndlov, Ndukuyakhe. 2019. Barriers to community archaeology: Reviewing the legal heritage frameworks within the south African context. In *Transforming heritage practice in the 21st century: Contributions from community archaeology*, One world archaeology series, ed. John H. Jameson and Sergiu Musteata, 1st ed., 2019. New York: Springer.
Nevell, M., and N. Redhead, eds. 2015. *Archaeology for all: Community archaeology in the early 21st century: Participation, practice and impact*, Salford applied archaeology series. Vol. 2. Salford: University of Salford Centre for Applied Archaeology.
NPS (National Park Service). 2019. *Interpretation for archeologists: A guide to increasing knowledge, skills, and abilities.* https://www.nps.gov/Archeology/IforA/index.htm. Accessed 8 July 2019.
Silberman, N. 2006. The ICOMOS Ename charter initiative: Rethinking the role of heritage interpretation in the 21st century. *George Wright Forum.*
Silberman, N.A. 2009. Process not product: The ICOMOS Ename charter (2008) and the practice of heritage stewardship. From the selected works of Neil A. Silberman, July: 7–8. Amherst: University of Massachusetts.
Silberman, N. n.d.. Nara + 20: On heritage practices, cultural values, and the concept of authenticity. https://www.academia.edu/8972643/NARA_20_ON_HERITAGE_PRACTICES_CULTURAL_VALUES_AND_THE_CONCEPT_OF_AUTHENTICITY
Smith, Laurajane. 2012. Discourses of heritage: Implications for archaeological community practice. https://nuevomundo.revues.org/64148. Electronic ISSN 1626-0252. Accessed 10 July 2019.
Tilden, Freeman. 1957. *Interpreting our heritage*. North Carolina: University of North Carolina Press. ISBN 0-8078-4016-5.
Tilden, Freeman. 1977. *Interpreting our heritage*. 3rd ed. Chapel Hill: University of North Carolina Press.
Wolfe, Linnie Marsh. (ed.) 1979. Reprint of *John of the Mountains: The unpublished Journals of John Muir (1938)*, 2nd ed, 226. University of Wisconsin Press.

Further Reading

Addison, L. 2001. Virtual heritage: Technology in the service of culture'. In *VAST 2001: Virtual reality, archeology and cultural heritage*, ed. N.S. Stephen. New York: Association for Computing Machinery.
Araoz, Gustavo (2006). Some background on the need for an ICOMOS-Ename charter for the interpretation of cultural heritage sites. The George Wright forum 23 (1): 40–43.
Araoz, Gustavo F. 2011. Preserving heritage places under a new paradigm. *Journal of Cultural Heritage Management and Sustainable Development* 1 (1): 55–60.
Ashworth, G.J., Brian Graham, and J.E. Turnbridge. 2007. *Pluralising pasts: Heritage, identity and place in multicultural societies*. London: Pluto Press.
Avrami, Erica, Randall Mason, and Marta de la Torre. 2000. *Values and heritage conservation*, Getty research report. Los Angeles: Getty Conservation Institute.

Australia ICOMOS. 2013. Practice note: Interpretation. https://australia.icomos.org/wp-content/uploads/Practice-Note_Interpretation.pdf. Accessed 6 July 2019.

Bandarin, Francesco, Jyoti Hosagrahar, and Frances Sailer Albernaz. 2011. Why development needs culture. *Journal of Cultural Heritage Management and Sustainable Development* 1 (1): 15–25.

Barthel-Bouchier, Diane L. 2012. *Cultural heritage and the challenge of sustainability*. Walnut Creek: Left Coast Press.

Beck, Larry, and Ted T. Cable. 2002. *Interpretation for the 21st century: Fifteen guiding principles for interpreting nature and culture*. 2nd ed. Champaign: Sagamore Publishing.

Beck, L., and T. Cable. 1998. *Interpretation for the 21st century: Fifteen guiding principles for interpreting nature and culture*. Champaign: Sagamore Publishing ISBN 1-57167-133-1.

Beck, L., and T. Cable. 2011. *The gifts of interpretation: Fifteen guiding principles for interpreting nature and culture*. Champaign: Sagamore Publishing ISBN 978-1-57167-636-8.

Blake, Janet. 2000. On defining the cultural heritage. *International & Comparative Law Quarterly* 49 (1): 61–85.

Bendix, Regina. 1997. *In search of authenticity: The formation of folklore studies*. Madison: University of Wisconsin Press.

Bennett, M.M. 1997. Heritage marketing: The role of information technology. *Journal of Vacation Marketing* 3: 272–280.

Brochu, Lisa. 2003. *Interpretive planning*. Fort Collins: InterpPress ISBN 1-879931-12-5.

Brochu, Lisa, and Tim Merriman. 2002. *Personal interpretation: Connecting your audience to heritage resources*. Fort Collins: InterpPress ISBN 1-879931-06-0.

Butler, Richard, and Thomas Hinch. 2007. *Tourism and indigenous peoples: Issues and implications*. Amsterdam: Elsevier /Butterworth-Heinemann.

Caputo, Paul, Shea Lewis, and Lisa Brochu. 2008. *Interpretation by design: Graphic design basics for heritage interpreters*. Fort Collins: InterpPress ISBN 1-879931-25-7.

Clark, Kate, ed. 2006. *Capturing the public value of heritage*. London: English Heritage.

Council of Europe. 2005. *Faro convention – Council of Europe framework convention on the value of cultural heritage for society*. Strasbourg: Council of Europe.

Cowen, Tyler. 2002. *Creative destruction: How globalization is changing the world's cultures*. Princeton: Princeton University Press.

Dinçer, Iclal. 2011. The impact of neoliberal policies on historic urban space: Areas of urban renewal in Istanbul. *International Planning Studies* 16 (1): 43–60.

Fairclough, G., R. Harrison, J.H. Jameson, and J. Schofield, eds. 2008. *The heritage reader*. London: Routledge.

Feltault, Kelly. 2006. Development folklife: Human security and cultural conservation. *Journal of American Folklore* 119 (471): 90–110.

Galla, Amareswar. 2013. *World heritage*. Cambridge: Cambridge University Press.

Gathercole, P., and D. Lowenthal, eds. 1989. *The politics of the past*. London: Routledge.

Glassberg, David. 1990. *American historical pageantry: The uses of tradition in the early twentieth century*. Chapel Hill: University of North Carolina Press.

Gracia, Jorge J.E. 2003. *Old wine in new skins, the role of tradition in communication, knowledge, and group identity*. Milwaukee: Marquette University Press.

Hadden, Robert Lee. 1999. *Reliving the civil war: A reenactor's handbook*. Mechanicsburg: Stackpole Books.

Ham, Sam. 1992. *Environmental interpretation: A practical guide for people with big ideas and small budgets*. Golden: Fulcrum Publishing ISBN 1-55591-902-2.

Ham, S.H. 2007. From interpretation to protection: Is there a theoretical basis? *Journal of the Association for Heritage Interpretation* 12: 20–23.

Ham, S. 2009. From interpretation to protection – Is there a theoretical basis? *Journal of Interpretation Research* 14 (2): 49–57.

Hampton, Mark P. 2005. Heritage, local communities and economic development. *Annals of Tourism Research* 32 (3): 735–759.

Handler, R., and E. Gable. 1997. *The new history in an old museum: Creating the past at colonial Williamsburg*. Durham: Duke University Press.

Henson, D., P. Stone, and M. Corbishley, eds. 2004. *Education and the historic environment*. London: Routledge.

Herzfeld, Michael. 2010. Engagement, gentrification, and the neoliberal hijacking of history. *Current Anthropology* 51 (S2): S259–S267.

ICIP (ICOMOS International Scientific Committee on Interpretation and Presentation). 2008.The ICOMOS charter for the interpretation and presentation of cultural heritage sites. Available at http://www.international.icomos.org/charters/interpretation_e.pdf. Accessed 11 July 2019.

ICOMOS Australia. 2013. Interpretation. https://australia.icomos.org/wp-content/uploads/Practice-Note_Interpretation.pdf. Accessed 6 July 2019.

Interpret Europe. 2019. European projects on heritage interpretation 2016–2018. http://www.interpret-europe.net/top/projects.html. Accessed 4 July 2019.

Interpret Europe. 2016. Professional development in heritage interpretation manual. http://www.interpret-europe.net/fileadmin/Documents/projects/InHerit/Manual-InHerit-EN.pdf. Accessed 19 June 2019.

Joeckel, Jeff. 1 February 2002. Telling the stories, part 4: National register of historic places bulletin. nps.gov. Archived from the original on 26 January 2018.

Jameson, J.H. 2012. International conventions and charters and archaeology presentation. In *Encyclopedia of global archaeology*, 3948–3954.

Kirshenblatt-Gimblett, Barbara. 2004. Intangible heritage as metacultural production. *Museum International* 56 (1–2): 52–65.

Kohl, P.A., and C. Fawcett, eds. 1996. *Nationalism, politics and the practice of archaeology*. Cambridge, UK: Cambridge University Press.

Labadi, Sophia, and Colin Long. 2010. *Heritage and globalisation*. New York: Routledge.

Larsen, David L. 2011. *Meaningful interpretation: How to connect hearts and minds to places, objects, and other resources*. 2nd ed. Fort Washington: Eastern National ISBN-10: 187993129X. October 31 2011.

Larsen, Knut Einar. 1995. *Nara conference on authenticity in relation to the world heritage convention*. Paris: UNESCO, ICOMOS, ICCROM.

Levine, Lawrence. 1988. *Highbrow/lowbrow: The emergence of cultural hierarchy in America*. Cambridge, UK: Harvard University Press.

Leask, A., and I. Yeoman, eds. 1999. *Heritage visitor attractions: An operations management perspective*. London: Cassell.

Levy, Barbara Abramoff, Sandra Mackenzie Lloyd, and Susan Porter Schreiber. 2001. *Great tours! Thematic tours and guide training for historic sites*, 159. Walnut Creek: Altamira Press. ISBN: 0-7591-0099-3.

Lewis, William J. 1991. *Interpreting for park visitors*. Fort Washington: Eastern Acorn Press, Eastern National Park and Monument Association.

Licciardi, Guido, and Rana Amirtahmasebi. 2012. *The economics of uniqueness: Investing in historic city cores and cultural heritage assets for sustainable development*. Washington, DC: World Bank Publications.

Little, B.J. 2002. *Public benefits of archaeology*. Gainesville: University Press of Florida.

Lowenthal, D. 2002. The past as a theme park. In *Theme park landscapes: Antecedents and variants*, ed. T. Young and R. Riley. Washington, DC: Dumbarton Oaks Press.

Matsuda, Matt K. 1996. *The memory of the modern*. New York: Oxford University Press.

McManamon, Francis P., and Alf Hatton, eds. 2000. *Cultural resource management in contemporary society, one world archaeology*. Vol. 33. London: Routledge.

Meskell, L., ed. 1998. *Archaeology Linder fire: Nationalism, politics and heritage in the eastern Mediterranean and Middle East*. London: Routledge.

Misiura, Shashi. 2006. *Heritage marketing*. Oxford: Elsevier Butterworth-Heinemann.

Moscardo, Gianna, Roy Ballantyne, and Karen Hughes. 2007. *Designing interpretive signs: Principles in practice*. Golden: Fulcrum Publishing ISBN 978-1-55591-550-6.

Mouton, Benjamin. 2013. *Heritage, driver of development: Rising to the challenge*. Paris: ICOMOS.

Nevell, Michael. 2013. Archaeology for all: Managing expectations and learning from the past for the future – The dig Manchester community archaeology experience. In *Archaeology, the public and the recent past*, ed. Chris Dalglish, 65–75. Suffolk: The Boydell Press.

NAI (National Association for Interpretation). 2005. Mission, vision, and core values. http://www.interpnet.com/about_nai/mission.shtml. Accessed 11 July 2019.

NPS (U.S. National Park Service). 2005. Module 440: Effective interpretation of archeological resources. http://www.nps.gov/idp/interp/440/module.htm. Accessed 10 July 2019.

NPS. 2015. Facilitated dialogue. https://www.nps.gov/orgs/1244/upload/About-Allies-for-Inclusion-Dialogues_2015.pdf. Accessed 6 July 2019.

NPS IDP (Interpretive Development Program). 2006. The interpretive development program, aiming for high ground. http://www.nps.gov/idp/interp/. Accessed 15 June 2006.

Pastor Pérez, Ana. 2018. Shaping community heritage synergies between Roman Barcelona spaces and the gothic Neighbourhood. In *Shared knowledge, shared power: Engaging local and indigenous heritage*, Springer briefs in archaeology, ed. Veysel Apaydin, 61–86. Cham: Springer.

Pastorelli, John. 2003. *Enriching the experience: An interpretive approach to guiding*. French's Forest: Hospitality Press ISBN 1-86250-522-5.

Perkin, Corinne. 2010. Beyond the rhetoric: Negotiating the politics and realising the potential of community-driven heritage engagement. *International Journal of Heritage Studies* 16 (1–2): 107–122.

Petzet, Michael. 2010. International principles of preservation. ICOMOS Open Archive. http://openarchive.icomos.org/432/1/Monuments_and_Sites_1_Charters_Petzet.pdf. Accessed 11 July 2019.

Regnier, Kathleen, Michael Gross, and Ron Zimmerman. 1994. *The interpreter's guidebook: Techniques for programs and presentations*. 3rd ed. Stevens Point: UW-SP Foundation Press ISBN 0-932310-17-6.

Rousso, A.P. 2002. The "vicious circle" of tourism development in heritage cities'. *Annals of Tourism Research* 29: 165–182.

Ruiz-Ballesteros, E., and M. Hernandez-Ramirez. 2010. Tourism that empowers?: Commodification and appropriation in Ecuador's Turismo Comunitario. *Critique of Anthropology* 30 (2): 201–229.

Salazar, N. 2007. Towards a global culture of heritage interpretation? Evidence from Indonesia and Tanzania. *Tourism Recreation Research* 32 (3): 23–30.

Salazar, N. 2012. *Envisioning Eden: Mobilizing imaginaries in tourism and beyond*. Oxford: Berghahn ISBN 978-0-85745-903-9.

Sandes, A.C. 2010. *Archaeology, conservation and the city Post-conflict redevelopment in London, Berlin and Beirut by Caroline A. Sandes*. Oxford: British Archaeological Reports Gordon House. ISBN 978-1-4073-0701-5

Schmidt, Peter R. 2017. Contests between heritage and history in Tanganyika/Tanzania: Insights arising from community-based heritage research. *Journal of Community Archaeology and Heritage* 4 (2): 85. *In Special series: African perspectives on community engagements,* guest-edited by Peter R. Schmidt.

Shettel, H.H. 1968. *Strategies for determining exhibit effectiveness*. Pittsburgh: American Institute for Research.
Silberman, Neil A. 2007. Sustainable heritage? Public archaeological interpretation and the marketed past. In *Archaeology and capitalism. From ethics to politics*, ed. Yannis Hamilakis and Philip Duke, 179–193. Walnut Creek: Left Coast Press.
Silberman, Neil A. 2013. Discourses of development: Narratives of cultural heritage as an economic resource. In *Heritage and tourism: Place, encounter, engagement*, ed. Russell Staif, Robyn Bushell, and Steve Watson, 213–225. London: Routledge.
Smith, Laurajane. 2006. *Uses of heritage*. London: Routledge.
Staiff, Russel. 2014. *Re-imagining heritage interpretation: Enchanting the past-future*. Vermont: Ashgate Publishing, Ltd.
Starn, Randolph. 2002. Authenticity and historic preservation: Towards an authentic history. *History of the Human Sciences* 15 (1): 1–16.
Stone, Peter G., and Brian Molyneaux. 1994. In *The represented past: Heritage, museums and education*, ed. Peter G. Stone and Brian L. Molyneaux, 1–28. New York: Routledge.
Throsby, David. 1999. Cultural capital. *Journal of Cultural Economics* 23 (1–2): 3–12.
UNESCO Media Services. 2013. Intangible cultural heritage: A force for sustainable development. http://www.unesco.org/new/en/media-services/in-focus-articles/intangible-cultural-heritage-for-sustainable-development. Accessed 2 July 2019.
Ward, Carolyn, and Alan Wilkinson. 2006. *Conducting meaningful interpretation: A field guide for success*. Golden: Fulcrum Publishing ISBN 978-1-55591-530-8.

Cultural Heritage Issues in Africa

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Introduction

Africa is a continent rich in diverse cultural and natural heritage. Most African countries, however, are facing major challenges in preserving this heritage. According to various Africa's Periodic Reports prepared by the World Heritage Centre and presented to various sessions of the World Heritage Committee, these challenges include development pressures, lack of human and financial capacity, and inadequate legislation (World Heritage Committee 2002). It has been argued that some of these challenges stem from a lack of appreciation of the role that heritage can play in sustainable development (Makuvaza and Chiwaura 2014). This is partly because African policy makers still regard archaeology and heritage management as colonial pursuits that fail to generate tangible benefits to their economies (Schmidt 2017a). The result is that heritage issues have a low priority for most African governments leading to provision of low budgetary support to those institutions responsible for cultural heritage management. This leads to poorly paid staff with inadequate specialist skills. This entry will briefly look at some of these challenges.

Definitions

This entry considers the trends that are occurring in the African continent. There are 54 countries in the African continent. UNESCO, however, has grouped the African continent into two regions, the African region that covers all countries in sub-Saharan Africa and the Arab region that covers countries in Northern Africa (Arab-speaking African countries: Algeria, Egypt, Libya, Morocco, Sudan, and Tunisia) and extends to Arabia. The African World Heritage Fund (AWHF), however, deals with the entire African continent as one unit, and this is the perspective that this entry will take. While the examples discussed here only apply to countries in sub-Saharan Africa and especially those in Eastern and Southern Africa, these examples, however, provide insights into the critical issues that are important to cultural heritage and sustainable development throughout the continent as a whole.

The definition of cultural heritage for this entry is drawn from ICOMO's (2002) definition that sees cultural heritage as an expression of the ways of living that a community develops and

thereafter passes on from one generation to another. Most scholars now acknowledge that heritage is not only manifested through tangible forms such as artifacts, buildings, or landscapes but also through intangible forms such as voices, music, dances, values, traditions, and oral history (Abungu 2012; Kiriama 2009). The intangible dimensions of cultural heritage act as a means of preserving the links between the past and the present and also allow the transmission of its different shades and colors to future generations (Kiriama 2009). UNESCO (2003) defines intangible heritage as a "people's learned processes along with the knowledge, skills and creativity that inform and are developed by them, the products they create and the resources, spaces and other aspects of social and natural context necessary to their sustainability. Intangible cultural heritage is transmitted from generation to generation, and is constantly recreated by communities and groups in response to their environment, their interaction with nature and other people, and their history and it provides communities with a sense of identity and continuity."

Historical Background

Most African countries save for Ethiopia were under various colonial administrations for most of the nineteenth and twentieth centuries. During the colonial period, only those heritage places that enabled the colonial government to achieve their colonial objectives of colonialism were preserved; for instance, in Rhodesia (present-day Zimbabwe), the colonial government argued that the site of Great Zimbabwe had been built by conquering Phoenicians, showing that local inhabitants had no capacity for such developments, and therefore it was the duty of the colonialists to govern the country in order to enlighten the populace and in the process denying "the legitimacy of local narratives that omit discussion of colonialism or that do not arise out of colonialism" (Schmidt and Pikirayi 2018: 447; Sinamai 2019). From the mid-twentieth century, however, these countries started gaining independence, and some of them utilized the heritage places to assert their new found identity; for instance, Rhodesia took the name of Zimbabwe as name for the country (Sinamai 2014).

The years 2010–2015 witnessed most of sub-Saharan Africa striving to achieve lower or upper middle-income status within the next 15 years. This aspiration has been enshrined in the development plans and economic policies of these countries. The end result is that most heritage places have come under pressure to give way to the development of infrastructural projects that can enable these countries to achieve this intended goal. The dilemma that many of these countries are facing now is how to balance the development needs with conservation of their heritage (UNESCO 2015).

Key Issues and Current Debates

Development Pressures

Most African countries are facing unprecedented population growth. In 2019, the total African population is projected to be 1,287,920,518 people. This growing population is accompanied by migration from the rural areas into the cities and the coasts (Breen 2014). One result is that cultural sites in cities and along the coasts, such as open spaces and historic buildings, bear the brunt of this migration by being demolished to give way to high-density buildings and infrastructure. Moreover, the increased population in urban centers motivates local authorities to shift budgetary resources from heritage conservation to the provision of basic needs for the population; hence, low investment is put into heritage conservation. In their quest to uplift the livelihoods of their people, African governments, with assistance from their development partners, are investing heavily in infrastructural developments such as construction of roads, rail, airports, energy supply facilities, and telecommunication networks. These developments have had adverse effects on heritage resources. For example, the Chinese government is helping Kenya, Ethiopia, and South Sudan to develop the Lamu Port South Sudan Ethiopia Transport (LAPSSET) project.

This is going to see construction of rail, road, airports, and a port from Lamu on the northern Kenya coast up to Juba in South Sudan and Addis Ababa in Ethiopia. This project will be undertaken in areas, especially Lamu and southern Ethiopia, that have archaeological sites dating to millions of years ago as well as historic buildings dating to the nineteenth century CE. Inevitably, some ancient sites as well as historical buildings will be impacted negatively. In Lamu, some communities are up in arms against the project because of fears that it will negatively impact on heritage resources (Basravi 2019). Another example is in the Central Rift Valley of Kenya where rapid population growth has resulted in a population density of 191 persons per square kilometer. This has put pressure on the Nakuru-Naivasha Basin which is home to some of the archaeological sites that have yielded significant data on the evolution of human societies (Government of Kenya 2009; Nyanchoga 2012; Wilshaw 2012; Frahma and Tryon 2019).

The discovery of oil and minerals in most African countries and the belief that these resources are a panacea to the poverty of Africa have led to an emphasis being placed on the exploitation of these resources. However, the utilization of these resources is associated with massive infrastructure development which poses a danger to heritage. For example, many heritage sites in Zimbabwe, Cameroon, and Swaziland are threatened with destruction as a result of the increased exploitation of minerals. For instance, Swaziland withdrew the Ngwenya Middle Stone Age ochre mines from the UNESCO World Heritage Sites nomination list in order to allow the government to revive industrial iron ore extraction in the area (Ndlovu 2016). Other African World Heritage Sites facing danger because of mining activities include Mount Nimba Strict Nature Reserve (Cote d'Ivoire and Guinea – iron ore mining), Virunga National Park (DRC – oil drilling), Selous Game Reserve (Tanzania – uranium mining), and the Mana Pools National Park, Sapi and Chewore Safari Areas (Zimbabwe – heavy mineral sand deposits) (Osipova et al. 2017). Lake Turkana in northern Kenya, with its associated hominid sites (Leakey and Walker 1988; Brown et al. 2001), is threatened as a result of the damming of rivers that feed the lake by the Ethiopian government. Similarly, the Mapungubwe Cultural Landscape in South Africa, though the home of a thriving Kingdom between the late eleventh and early thirteenth centuries and was listed on the World Heritage List, in respect of its significance as an archaeological site that offers an important insight into Southern Africa's early civilization, is, however, now faced with threats from mining and need for more energy (Meskell 2011; Ndlovu 2016). On the other hand, infrastructure development also provides an opportunity to survey areas that were previously unknown and thus contributes to improving our knowledge of the past. However, at the moment, this development poses greater threats than benefits to Africa's cultural heritage. The World Heritage properties of the region also pay a heavy toll to the increasing need for energy. Indeed, mining operations (exploration and/or exploitation) affect 27% of the properties and oil and gas exploration/exploitation 14%. When the dam projects (14%) are added, this leads to nearly one property out of three (35%) of heritage sites that are impacted in the region (Osipova et al. 2017).

Inadequate Financing

Development pressures and the provision of essential services, such as education and health services, along with a poor understanding of the role that heritage can play in sustainable development, has led to small budgetary allocations for heritage conservation. The result is that most heritage sites in Africa – even those with a recognized high value – have been neglected. A case in point is the Khami site in Zimbabwe, which, despite being on the UNESCO World Heritage List, has seen minimal financial allocation to it by the Zimbabwean government. The result is that the site has been left to go into ruins (Sinamai 2019). The focus by governments on meeting the basic needs of their people has led to inadequate funding of antiquities departments making it difficult for these departments to attract the best talent or

pay the salaries needed to retain talented individuals; therefore, there is a high staff turnover which leads to limited institutional memory (Deacon 2014). In addition, the lack of sufficient funds has made it difficult for African countries to support the nomination of their sites to the World Heritage List or indeed the proper management of those sites already inscribed in the List; this has partly led to Africa being underrepresented in the List while at the same time being overrepresented in the List of World Heritage Sites in Danger (Makuvaza and Chiwaura 2014). However, there is a counter-argument that some national heritage institutions do not prudently use the available resources. Irrespective, low budgetary allocation has negatively affected the management of heritage resources in most African countries.

Weak Legislation and Weak Institutional Frameworks

Every heritage conservation decision is based on the values of that heritage. Unfortunately, in many African countries, the legislation does not make it clear how to define the values that attend cultural heritage (Gwasira 2005). Further, most African legislation stems from the colonial past of that specific country and tends to emphasize the protection of physical heritage more than the protection of intangible heritage. This is because in Europe, monumentality or physicality of places was for a long time considered as the embodiment of heritage, and therefore any legislation that was enacted was meant to take care of the tangible aspects of heritage and not the intangible elements. In addition, the continued use of this colonially influenced legislation in the post-colonies has seen the communities, who traditionally have been the keepers of heritage and who are the major stakeholders in the continued existence of the heritage, kept at the periphery of key decision-making concerning that heritage (Gwasira 2005; Sinamai 2014). Another problem is that most African heritage legislation is weak and therefore cannot adequately protect heritage resources. For instance, in the majority of African countries, the legislation does not demand that heritage impact assessments are carried prior to any development, even in areas that are rich in heritage resources. Where such legislation is available, it is so weak that it cannot be enforced. In Kenya, for example, the National Museums and Heritage Act of 2006 requires an impact assessment to be done prior to commencement of any development project. This requirement is, however, premised on the fulfillment of the requirements of the Environmental Management Act (EMCA). In other words, a developer is told to comply with the EMCA, and when that is done, they are free to continue with the project. The EMCA, however, deals only with the physical environment and not with cultural heritage. The result is that most developers do not engage an archaeologist or heritage practitioner to carry out a dedicated assessment of the cultural heritage.

These deficiencies in legislation are exacerbated by weak institutional structures. In some African countries, heritage institutions are placed into government ministries where heritage is given low priority. For instance, national heritage institutions may be placed under the Ministry of Constitutional Affairs or the Ministry of Home Affairs which is also responsible for internal security. As Mahachi and Kamuhangire (2008) point out, the priority of such ministries cannot be heritage conservation. In my view, heritage can only be afforded sufficient protection when it is included in the title of a designated ministry, such as heritage and environment. In this situation the ministry has a mandate to protect heritage.

Low Levels of Local Participation

The combination of archaic legislation and inadequate financial support has made it difficult for most heritage institutions in Africa to involve local communities in decision-making regarding the conservation of heritage resources. A failure to include them in decision-making has made many local communities detached from the conservation of the sites. This can lead to the destruction of important sites as the local communities want to know how they can benefit from these sites (Chirikure and Pwiti 2008). Ironically, this situation can emerge from the listing of a site as national heritage. A case in point is the Sacred Mijikenda sites in Kenya. After they were listed as

national monuments, the local communities that hitherto had cared for the sites were forbidden from doing so. This led to the destruction of some of the sites by people who previously had feared the wrath of the traditional custodians if they interfered with the forest (Kiriama 2013). In addition, due to lack of local involvement in policy making and a lack of financial and human capacity to manage the sites, the sites of Shanga and Pate in the north coast of Kenya are slowly being destroyed by the local community, who want farming land, in case of Pate and grazing land for their animals, in the case of Shanga (pers. Obs). These issues can be addressed more effectively through an increase in local participation in site management.

Inadequate Training and Capacity Building/ Lack of Enough Specialist Human Resources

Most African countries have inadequate expertise and experience in heritage management. It is only very few countries in Africa that have colleges/ universities that teach heritage conservation and management. In those countries where these courses are taught, the few students who are willing to study heritage management are unwilling to work for government heritage departments after graduation because of poor remuneration; they instead work for private companies or other organizations with higher salaries. This has made it difficult for these African countries to use their heritage resources for the sustainable development of the local communities. The site of Kilwa Kisiwani in Tanzania is an example of a site that was destroyed because experienced staff refused to work there as a result of poor pay offered by the government and the location of the site in a remote part of Tanzania (Sinamai 2019).

Gender Inequities

Many discourses on heritage as well as exhibitions tend to ignore gender issues. Therefore, the stories told at heritage places and museums tend to convey and legitimize gender stereotypes of men and women (Smith 2008). In the end this perpetuates societal gender inequality. This perpetuation of gender inequality can be seen within the sacred Mijikenda Kayas of the Kenya coast. The Kayas are the sacred forests of the Mijikenda people of the coastal belt of Kenya. These forests are important both for their ritual power and as centers of cultural identity of the Mijikenda; people go to the Kayas to hold prayers either to seek guidance or when calamitous times hit the community. The Kayas become significant ritual places because they are the resting (burial) places of the ancestors – who are now spirits that mediate between the living and the god of the Mijikenda. Consequently, any prayers that either the community or individuals need to offer have to be done in the Kayas but with the assistance of the ordained Kaya elders, who are believed to be the mediums between the ancestors (the dead) and the living. The Kaya elders pray on behalf of the affected person to the ancestors who in turn pass the request to god. These ordained male elders, who form the council of elders, are the custodians of the Kaya forests. They enforce sanctions against anybody who goes against the rules and regulations that govern the Kayas. Consequently, for a long time, it has been assumed that women do not play a role in the management of the Kayas. Though the management of the Kayas is vested in the council of elders which, on the surface, seems to comprise only men, women, however, are also members of the Kaya management, and they play an important role in ensuring adherence of the Mijikenda beliefs and customs.

The Kaya rituals and ceremonies have their symbolism built around the concept of the home and village (Mitzange and Giles 2014). Therefore, big ceremonies for the entire village are not done before a ritual clearing of the paths, and cleaning of the central space has been done by the women elders. There are two types of Kaya women elders, one is the Wanguchi (Akuzi) and the other is the medicine women (waganga). The medicine women are responsible for anointing the house of God (Kadzumba ka Mulungu) immediately after it has been constructed by the elders. The women elders also prepare the food offerings for the gods. No ceremony can be complete and accepted by the gods without the food offerings. In spite of this important role women elders

play, they are not publicly acknowledged as elders. Indeed, the role that women play is overlooked or considered as nothing by the community, and yet no ceremony can continue if the women refuse to play their part. In everyday life of the community, both women and men take for granted the various roles that women play in the Kaya; "it is their duty," it is often said. The elders however aver that women are an important component in the life of not only the Kaya but the community as a whole because the well-being of the community is dependent on the fullness of the ceremonies carried by the entire Kaya eldership – both male and female. The consequence of this omission is that stories of women within the Kayas are not told, and therefore any conservation efforts that are made do not involve the input of women. This is the same case in most other African countries as well.

These issues partly arise as a result of the cultural change that most African countries are going through because of westernization. The end result is the depreciation of intangible heritage – "the neglect of the materials imbued with meaning" (Schmidt 2017b: 235) – and this leads to lack of appreciation and therefore neglects destruction of the heritage that is connected with these intangible elements.

The Relationship between Donors and NGOs

In most African countries, development partners that include governments and nongovernmental organizations (NGOs) have been the driving force for the protection of heritage sites (Segobye 2006). One problem that has been cited for this involvement of NGOs in heritage conservation is that they tend to dictate what aspects of heritage that should be conserved and who should be involved, even if this is against the wishes of the local community. For instance, in some places, tradition demands who should and should not enter into a sacred place, but when a site is being conserved using donor funding, sometimes this aspect is overlooked to the chagrin of the local community. The result is that the community may refuse to be associated with the site. Another issue is that reliance on donor funding may lead to a dependency syndrome. When the donor funds dry up, governments do not take any steps to support the conservation of the affected sites. Further, if there are strained relations between countries and the donors pull out, the sites that were supported end up suffering as a result of this withdrawal. For instance, when Western countries imposed sanctions on Zimbabwe in the 1990s because they did not agree with the policy directions of the then Zimbabwean government, funding for major heritage sites was also withdrawn. This has had a negative impact on the conservation of these sites (Sinamai 2019).

Conflict and War

A number of African countries have seen conflicts within themselves or with neighbors. This conflict has affected many sites in these countries. For instance, places of worship have been targeted in Mali, Nigeria, Kenya, and Egypt. The Arab spring that affected the countries of North Africa has also been associated with the looting of sites (Al Azm and Paul 2017; Doppelhofer 2016). In the Democratic Republic of the Congo, the conflict has seen most of its World Heritage Sites placed on the List of World Heritage Sites in Danger (Kiriama 2014). The conflict in Somalia has not only affected research and the proper documentation of its heritage sites but also has affected the care and protection of Kenyan heritage sites on the Somalia border. Important sites such as Ishakani in Kiunga that has a thirteenth-century doomed mosque and is only one of the three domed mosques in Kenya have been allowed to become derelict because of insecurity caused by the Somalia conflict. In Mali, ethnic, religious, and political problems have impacted negatively on the sites of Timbuktu and the Tomb of Askia (Thiaw 2014; Silverman and Ruggles 2007).

Risk Preparedness

The majority of African countries have not put in place risk management protocols to protect their heritage resources from unforeseen disasters such as fire, earthquakes, and armed conflict. For instance, the Kasubi Royal Tombs in Uganda and the Royal Palaces of Abomey in Benin were destroyed by fire (Butagira and Haywood 2010;

World Heritage Centre 2009); available evidence indicates that the governments concerned had no risk control measures in place.

Unresponsiveness of Heritage Managers

Some heritage managers do not sensitize policy makers and administrators of the role of heritage in national development. Therefore, instead of collaborating with other government agencies, they become arrogant and refuse to compromise with other stakeholders, making it difficult for government to carry out development projects. It is important for heritage managers to be cognizant of the role of government in promoting the livelihoods of its populace and to seek to a middle ground where heritage and development can coexist.

Illegal Activities

Another key threat affecting the conservation of the heritage places in Africa is related to illegal human activities such as poaching, illegal logging, and destruction of heritage, as well as illegal settlements (UNESCO 2002).

International Perspectives

While this entry has focused on cultural heritage issues in Africa, many of the concerns raised here are also relevant to the sustainability of heritage in other parts of the world, particularly in relation to tourism and human rights. In Latin America, for example, the Second Cycle of the Periodic Reporting Exercise done by the UNESCO World Heritage Centre identified the lack of management capacity and expertise as one of the many issues that some countries in the region face (World Heritage Centre 2014; Kiriama et al. 2010; Ndoro et al. 2018; Sam 2014). The same Second Cycle of the Periodic Reporting for the Asia Pacific region done in 2012 shows that similar issues have been raised for parts of Asia and the Pacific (Taylor 2004; Henderson 2012; World Heritage Centre 2012).

In addition, some of the concerns raised in this paper are also relevant to countries with high incomes (Graham et al. 2005). Concerns about the coexistence of development and heritage have been raised in Japan (Kakiuchi 2014; Matsuda 2014), Australia (Carter 2010; Marsh 2013), and North America where development pressures are threatening a number of heritage sites in the region (Meier 2013) and Europe (Guštin and Nypan 2010; EU JPI 2009; Bartel-Bouchier 2013; Moukala and Odiaua 2018). These are all legitimate concerns. The situation in Africa, however, is particularly dire due to the confluence of the wide range of factors described in this entry. In Africa, the threat to cultural heritage is both imminent and extreme. Immediate action needs to be taken (Kiriama et al. 2010).

Future Directions

This entry has briefly discussed the issues that heritage in Africa is facing. It has been shown that most of the issues stem from the fact that African leaders and policy makers still do not understand the role that heritage can play in sustainable development. Consequently, this leads to development of policy or lack of development of policies that can adequately support heritage conservation. This then leads to misplacement of heritage administrative units that in turn leads to low budgetary allocation which in turn leads to lack or engagement of poorly trained staff and therefore improper management of heritage resources. It is however gratifying that the African Union, in its Agenda 2063 that intends to turn Africa into a middle-income continent by 2063, has recognized heritage as one of the important pillars that should be used to attain this goal. As a result, African governments are being encouraged to set aside a substantial amount of their national budgets for heritage activities (African Union).

Cross-References

- ▶ African World Heritage Fund (AWHF)
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Management: Project Management
- ▶ Heritage as Resilience

▶ Intellectual Property Issues in Cultural Heritage (IPinCH) Project
▶ Local Populations and Global Heritage

References

Abungu, G. 2012. Africa's Rich Intangible Heritage: Managing a continent's diverse resources. In *Safeguarding intangible cultural heritage*, ed. L.S. Michelle, D. Peter, and C. Gerard, 57–70. Woodbridge, Boydell Press.

Al Azm, Amr., and K.A. Paul. 2017. ISIS Eyes Tunisia's Cultural Heritage as Militants Return. Middle East Institute. https://www.mei.edu/publications/isis-eyes-tunisias-cultural-heritage-militants-return

Basravi, Zein. 2019. Kenya: Environmental activists campaign against Lamu port project Activists say the proposed Lamu Port-South Sudan-Ethiopia-Transport Corridor project will damage the environment. https://www.aljazeera.com/news/2019/03/kenya-environmental-activists-campaign-lamu-port-project-190310091007360.html

Breen, C. 2014. World heritage sites, culture and sustainable communities in Africa. In *The management of Cultural World Heritage Sites and development in Africa*, ed. S. Makuvaza, 83–91. New York: SpringerBriefs in Archaeological Heritage Management.

Brown, B., F. Brown, and A. Walker. 2001. A. New hominids from the Lake Turkana Basin, Kenya. *Journal of Human Evolution* 41 (1): 29–44. https://doi.org/10.1006/jhev.2001.0476).

Butagira, T., and K. Haywood 2010. Fire Destroys Kasubi Tombs. Uganda Daily Monitor, 17 March 2010. https://www.monitor.co.ug/News/National/-/688334/880860/-/wjplfo/-/index.html.

Carter, J. 2010. Displacing indigenous cultural landscapes: The naturalistic gaze at Fraser Island world heritage area. *Geographical Research* 48 (4): 398–410. https://doi.org/10.1111/j.1745-5871.2010.00644.

Chirikure, S., and G. Pwiti. 2008. Community involvement in archaeology and cultural heritage management; an assessment from case studies in southern Africa and elsewhere. *Current Anthropology* 49 (2): 467–485.

Deacon, J. 2014. An overview of the History of Nomination of Cultural World Heritage sites in Africa, In *The Management of Cultural World Heritage Sites and the Development of Africa*. ed. S. Mukavaza, 1–16. New York, Springer.

Doppelhofer, Ch., 2016. Will Palmyra rise again? – War Crimes against Cultural Heritage and Post-war reconstruction. [online]. http://www.ohchr.org/EN/Issues/CulturalRights/Pages/IntentionalDestruction.aspx

EU JPI. 2009. The challenge for cultural heritage: providing protection in response to major change for Europe in a global context. *JPI on Cultural Heritage Version* 3, 10 October 2009.

Frahma, E., and C. Tryon. 2019. Later Stone Age toolstone acquisition in the Central Rift Valley of Kenya: Portable XRF of Eburran obsidian artifacts from Leakey's excavations at Gamble's Cave II. *Journal of Archaeological Science: Reports* 18: 475–486.

Guštin, M., and T. Nypan. 2010. *Cultural heritage and legal aspects in Europe*. Koper: Institute for Mediterranean Heritage, Institute for Corporation and Public Law, Science and Research Centre, University of Primorska.

Government of Kenya. 2009. *Guide to Kenya's National Heritage and Culture*. Nairobi, Kenya Literature Bureau.

Gwasira, G. 2005. Managing with borrowed laws: Cultural heritage management in Namibia. In *Legal frameworks for the protection of immovable cultural heritage in Africa*, ICCROM Conservation Studies, ed. W. Ndoro and G. Pwiti, vol. 5, 46–48. Rome: ICCROM.

Henderson, J.C. 2012. Conserving Heritage in South East Asia: Cases from Malaysia, Singapore and the Philippines. *Tourism Recreation Research* 37 (1): 47–55. https://doi.org/10.1080/02508281.2012.11081 687.

ICOMOS, 2002. International cultural tourism charter: principles and guidelines for managing tourism at places of cultural and heritage significance. ICOMOS International Tourism Committee.

Kakiuchi, E. 2014. *Cultural heritage protection system in Japan: current issues and prospects for the future*. National Graduate Institute for Policy Studies (GRIPS) Discussion Paper 14–10.

Kiriama, H.O. 2009. Shimoni: Contested heritage. *Historic Environment* 22 (3): 38–41.

Kiriama, H.O. 2013. Intangible heritage, identity and archaeology at Kaya Mudzi Mwiru, Kenya. In *Sacred Natural Sites and Cultural Heritage in East Africa*, eds. MP. Ballarin, HO. Kiriama and C. Pennacini, 100–120. Kampala: Fountain Publishers.

Kiriama, H.O. 2014. The role of the African World Heritage Fund in the conservation of African World Heritage Sites. In *The management of cultural World Heritage Sites and development in Africa*, ed. S. Makuvaza, 17–31. New York: SpringerBriefs in Archaeological Heritage Management.

Leakey, R.E.F., and A. Walker. 1988. New Australopithecus boisei specimens from east and West Lake Turkana, Kenya. *American Journal of Physical Anthropology* 76: 1–24. https://doi.org/10.1002/ajpa.1330760102.

Mahachi, G., and E. Kamuhangire. 2008. Administrative arrangements for heritage resources management in sub-Saharan Africa. In *Cultural heritage and the law: Protecting immovable heritage in English speaking countries of sub-Saharan Africa*, ICCROM Conservation Studies, ed. W. Ndoro, A. Mumma, and G. Abungu, vol. 8, 45–51. Rome: ICCROM.

Makuvaza, S., and H. Chiwaura. 2014. African state parties, support, constraints, challenges and opportunities for managing cultural World Heritage sites in Africa. In *The management of cultural World Heritage Sites and development*

in Africa, ed. S. Makuvaza, 45–53. New York: SpringerBriefs in Archaeological Heritage Management.
Marsh, J. 2013. Decolonising the interface between indigenous peoples and mining companies in Australia: Making space for cultural heritage sites. *Asia Pacific Review* 54 (2): 171–184.
Matsuda, A. 2014. Japan: Cultural heritage management. In *Encyclopaedia of global archaeology*, ed. C. Smith, 4156–4160. New York: Springer.
Meier, Allison. 2013. Five issues threatening the destruction of cultural heritage sites. *Hyperallergic*, October 9, 2013. https://hyperallergic.com/87139/five-issues-threatening-the-destruction-of-cultural-heritage-sites/
Meskell, L. 2011. From Paris to Pontdrift: UNESCO meetings, Mapungubwe and mining. *South African Archaeological Bulletin* 66 (194): 1–8.
Mitzange, J., and L. Giles. 2014. The kaya legacy: The role of the Mijikenda Makaya and kaya elders in postcolonial Kenya. In *Contesting identities: the Mijikenda and their Neighbors in Kenyan Coastal Society*, ed. Rebecca Gearhart and Linda Giles, 201–224. Trenton: Africa World Press.
Ndlovu, N. 2016. Fragmented approach to governance? Critical review of the role played by various government departments and agencies in the Administration of Heritage Matters in South Africa. *Archaeologies* 12 (3): 281–303. https://doi.org/10.1007/s11759-017-9302-1.
Nyanchoga, B.N. 2012. Pastoral Neolithic settlement behaviour in the Central Rift Valley of Kenya. Unpublished PhD Thesis, University of Nairobi
Osipova, E., P. Shadie, C. Zwahlen, M. Osti, Y. Shi, C. Kormos, B. Bertzky, M. Murai, R. Van Merm, and T. Badman. 2017. *IUCN World Heritage Outlook 2: A conservation assessment of all natural World Heritage sites*. Gland: IUCN.
Schmidt, P.R. 2017a. *Community-based heritage in Africa: Unveiling local research and development initiatives*. New York: Routledge.
Schmidt, P.R. 2017b. Peter Ucko memorial lecture, decolonizing archaeological practice: Gazing into the past to transform the future. *Archaeologies* 13 (3): 392–411. https://doi.org/10.1007/s11759-017-9329-3.
Schmidt, P.R., and I. Pikirayi. 2018. Will historical archaeology escape its Western prejudices to become relevant to Africa? *Archaeologies* 14 (3): 443–470. https://doi.org/10.1007/s11759-018-9342-1.
Segobye, A. 2006. Divided commons: The political economy of southern Africa's cultural heritage landscapes observations of the central Kalahari Game Reserve, Botswana. *Archaeologies* 2 (1): 52–72.
Sinamai, A. 2014. The management of cultural World Heritage sites in Africa and their contribution to the development of the continent. In *The management of Cultural World Heritage Sites and development in Africa*, ed. S. Makuvaza, 55–67. New York: SpringerBriefs in Archaeological Heritage Management.
Sinamai, A. 2019. *Memory and cultural landscape at the Khami World Heritage site, Zimbabwe: An un-inherited Past*. New York: Routledge.
Smith, L. 2008. Heritage, gender and identity. In *The Ashgate research companion to heritage and identity*, ed. B. Graham and P. Howard, 159–178. Aldershot: Ashgate.
Taylor, K. 2004. Cultural heritage management: A possible role for charters and principles in Asia. *International Journal of Heritage Studies* 10 (5): 427–433.
Thiaw, I. 2014. The management of Cultural World Heritage sites in Africa and their contribution to sustainable development in the continent. In *The management of Cultural World Heritage Sites and development in Africa*, ed. S. Makuvaza, 69–91. New York: SpringerBriefs in Archaeological Heritage Management.
UNESCO 2002. *World Heritage Committee: Budapest Declaration on World Heritage (WHC 02/CONF.202/25)*. http://whc.unesco.org/en/decisions/1217/ [Accessed 14 May 2019].
UNESCO 2003. *Convention for the Safeguarding of the Intangible Cultural Heritage*, UNESCO, Paris.
UNESCO. 2015. *UNESCO Science Report, toward 2030: Focus on Subsaharan Africa*. Paris: UNESCO.
Wilshaw, A. 2012. An investigation into the LSA of the Nakuru-Naivasha Basin and Surround, Central Rift Valley, Kenya: Technological classifications and population considerations. PhD dissertation, Cambridge University, Cambridge, UK.
World Heritage Centre. 2009. *Devastating fire at the Royal Palaces of Abomey (Benin)*. Paris: UNESCO World Heritage Centre. http://whc.unesco.org/en/news/488. Retrieved 22 May 2019.
World Heritage Centre. 2012. *The second cycle of periodic reporting in Asia & Pacific Region*. Paris: UNESCO World Heritage Centre. https://whc.unesco.org/en/asia-pacific. Retrieved 22 May 2019.
World Heritage Centre. 2014. *The second cycle of periodic reporting in the Latin America and the Caribbean region*. Paris: UNESCO World Heritage Centre. http://whc.unesco.org/en/lac. Retrieved 22 May 2019.
World Heritage Committee. 2002. *Periodic report: Report on the state of conservation of the World heritage in Africa*. Paris: UNESCO World Heritage Centre.

Further Reading

Barakat, S. 2005. Postwar reconstruction and recovery of cultural heritage: Critical lessons from the last fifteen years. In *Cultural Heritage in Postwar Recovery*, ed. N. Stanley-Price, 26–39. Rome: ICCROM.
Bartel-Bouchier, D. 2013. *Cultural heritage and the challenge of sustainability*. Walnut Creek: Left Coast Press.
Graham, B., G.J. Ashworth, and J.E. Tunbridge. 2005. The uses and abuses of heritage. In *Heritage, museums and galleries*, ed. G. Corsane, 26–37. London: Routeledge.
Kiriama, H.O., I. Odiaua, and A. Sinamai, eds. 2010. *Cultural heritage impact assessment in Africa: An*

C

overview. Mombasa: Centre for Heritage Development in Africa.
Moukala, Edmond, and Ishanlosen Odiaua, eds. 2018. *World heritage for sustainable development in Africa*. UNESCO: Paris.
Ndoro, W., S. Chirikure, and J. Deacon, eds. 2018. *Managing Heritage in Africa: Who cares?* London: Routledge.
Sam, Mukavaza, ed. 2014. *The management of Cultural World Heritage Sites and the development of Africa*. New York: Springer.
Silverman, H., and D. Fairchild Ruggles. 2007. *Cultural heritage and human rights*. New York: Springer.

Cultural Heritage Management and Armed Conflict

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Introduction

Cultural heritage and armed conflict are two domains that sit uncomfortably side by side and yet are irrevocably linked. In the violent and volatile circumstances that characterize armed conflict, cultural heritage is often caught in the crossfire: deliberately targeted, looted, vandalized, its ownership contested, and its meanings reinterpreted by confronted sides. Recent conflicts have also shown how cultural heritage can be instrumentalized in order to drive cleavages between communities. Cultural heritage sites have been taken hostage and are employed as bargaining chips, or their destruction used to send intimidating messages. It is not surprising then that the management of cultural heritage during armed conflicts poses a considerable challenge.

Cultural heritage is managed at all stages in a conflict cycle, from the initial sabre-rattling through the phases of the conflict and right to the reconstruction process. The management of cultural heritage before armed conflict takes the form of preventive actions, preparedness training for site managers and museum staff, and training for military personnel including informing them of what responsibility international treaties hold them accountable for. The management of cultural heritage during armed conflicts often becomes a race to secure and evacuate movable heritage, prevent destruction form "friendly" fire, and alert customs officials in order to stem the seemingly inevitable flood of illicitly obtained archaeological and other heritage objects that comes from the region in turmoil. Once a conflict formally ends, the efforts to restore, recover, return, and repair the damage to cultural heritage begin.

Definition

Cultural heritage is a rapidly growing field of fundamental contemporary significance. Diverse institutions, political movements, and communities of all sizes have been recurring to it as a core element of identity formation, an object and tool of contestation, a basis for rights claims, and a resource in development strategies. Cultural heritage is and always has been political, it has and always will be a part of armed conflict, and yet many have noted a recent intensification in the scale and complexity of these ties (Meskell 2015; Viejo-Rose and Sørensen 2015). Once seen as the tame realm of amateur antiquarians, its contested nature is increasingly coming to the fore as much in the highly mediatized acts of deliberate destruction as in fervent debates about protection strategies; this is nowhere more explicit than during armed conflicts.

Armed conflict critically impacts on cultural heritage in all its variety of forms and manifestations; in the process, heritage is managed and mismanaged, protected and neglected, and used and abused. The contact begins already before the first shots are fired when propaganda battles are ignited, redrawing lines of belonging and exclusion, of "us" and "them." The violence against cultural heritage escalates during actual periods of combat as a further dimension of physical violence becomes a demolishing force. And, in the aftermath, with a transformed landscape as a base, the conscious (re)construction of

a new vision begins with its selective regard toward the remains of the past.

Historical Background

Prevention and Protection

In response to destruction, the actions that have been most developed thus far are the pairing of prevention and protection. Efforts to prevent the destruction of cultural heritage in the event of armed conflict have evolved along two main lines. The first, and most important in terms of the volume of work accomplished, is the legislative. Attempts to control the wartime destruction and plunder of cultural property go back to the 1500s (O'Keefe 2006), yet the Lieber Code of 1863, prepared during the American Civil War (1861–1865), is often cited as the first stage in this process of codification (Schindler and Toman 1988). This code was also a precursor to the first attempt to codify customary international rules regulating this kind of action with the 1907 Hague Rules (O'Keefe 2006; Hadik 2001). Today, the Convention on the Protection of Cultural Property in the Event of Armed Conflict (Hague Convention, 1954) and its subsequent protocols (1999) are the principle instruments. Furthermore, many of the basic principles concerning respect for cultural property present in the convention have become part of customary international law (Toman 1996). It is important to note that the two key moments in the drafting of this convention were wars in which the destruction of cultural heritage became an important bellicose act, the Second World War and the wars of the 1990s in the former Yugoslavia, respectively. Then, in the wake of the destruction of the statues of Buddha in the Bamiyan Valley of Afghanistan, UNESCO's General Conference approved a declaration concerning the intentional destruction of cultural heritage in 2003.

The second prevention line has involved training and sensitization programs directed at heritage professionals and military personnel. Here the International Committee of the Blue Shield and UNESCO have taken important steps. The Blue Shield is a protective emblem created by the 1954 Hague Convention and intended to function as the cultural equivalent of the Red Cross. The International Committee of the Blue Shield, established in 1996, comprises representatives of the five NGOs working in the field: International Council on Archives (ICA), International Council of Museums (ICOM), International Council on Monuments and Sites (ICOMOS), International Federation of Library Associations (IFLA), and Coordinating Council of Audiovisual Archives Associations (CCAAA).

Several intergovernmental and professional organizations as well as numerous NGOs also do considerable work directed at preventing the destruction of cultural heritage during armed conflicts by establishing professional networks, offering training, communicating information about existing protocols and legal instruments, administering exchange programs, and developing sensitization campaigns around the issues. Aside from those programs specifically relating to armed conflicts, there are also valuable initiatives (e.g., numerous ones by the Getty's research and conservation institutes) that explore the values of cultural heritage; how these are constructed, selected, and communicated, and the conflicts that might arise over different valuations. This is an important part of preparedness as it begins to map out where the vulnerabilities of sites might be should conflict break out and it links in with a broad range of work on contested heritage (Silverman 2011).

Protection if perhaps a less straightforward action than might appear at first glance, for the act of caring for heritage, has the effect of signaling its importance for one group, even when that groups speak in the name of "humanity." Gestures of destruction and of protection both have symbolizing effects tying the objects of their attention to a set of values. "The history of iconoclasm," writes Gamboni "[. . .] recommends certain objects to the care of those who share these values but attracts the aggression of those who reject them or who feel rejected by them" (Gamboni 2011: 11). And the instruments created for the, selective, protection of culture have also involved important degrees of appropriation and disowning. The two world wars prompted attempts

at the international management of both armed conflicts and cultural heritage with the two merging in the 1954 Hague Convention. The debate continues, however, about whether signaling something out for particular protection turns it into a target, a debate that in part informed the 1999 Second Protocol of the Hague Convention amid fears that sites in the former Yugoslavia had been targeted *because* they were marked out as heritage. Yet protective strategies have also evolved considerably through initiatives working in parallel to, complementing, or completely separate from the international legal instruments. Notable among these are the collaborations of heritage academics and professionals with military and police outfits. The Blue Shield in particular has led in this area. The Blue Shield is in an advisory body that was set up as the 1999 Second Protocol of the Hague Convention was being prepared, by the joint action of the International Council of Archives (ICA), the International Council of Museums (ICOM), the International Council on Monuments and Sites (ICOMOS), and the International Federation of Library Associations and Institutions (IFLA). Often referred to as the "Red Cross for culture," it is nonetheless significantly different in terms of its longevity, being barely 20 years old; finances, having none to speak of; and staff, having no permanent staff (Stone 2016). The Blue Shield works with the military in a four-tier approach responding to the different phases of the conflict cycle: immediately pre-deployment, during conflict, during post-conflict stabilization, and long-term (Stone 2013).

Key Issues and Current Debates

The key issues today are numerous, which include issues about practice and also about more comprehensive understandings of the relationship between cultural heritage and armed violence. On the practical side, the issues are about improving pre-conflict preparedness, developing responsive action in the face of fatalism when the fighting begins, and developing comprehensive recovery and reparation strategies that genuinely consult with the communities affected and not only with post-conflict reconstruction "entrepreneurs." On the more conceptual side, the issues are about mapping the polysemic interpretations of sites, the values that they are used to project, and the symbols and narratives that they are integrated into; unpacking the often multilayered motivations underlying destruction, and assessing the nature of the harm caused by it including taking full account of intangible manifestations of cultural heritage.

Preparedness involves a combination of analysis and planning; aside from practical technical measures, it essentially takes the form of training programs and the establishment of emergency protocols, and it is an area in which the specialized agencies, both intergovernmental and non-governmental, have assumed a great deal of leadership. For instance, the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) runs regular workshops aimed at training heritage professionals to assess risks, identify key stakeholders, take preventive actions, improve response, establish networks, and apply relevant international legal instruments. Other examples include the publication edited by ICOM entitled "Cultural Heritage, Disaster Preparedness and Response" (2003) and the Prince Claus Fund's Cultural Emergency Response program.

Responses to destruction once fighting has begun involve close monitoring of the conflict in ways that combine satellite imagery and sources on the ground, military expertise, and heritage expertise. Together these collaborations can indicate what sites are likely to be targeted, can communicate the coordinates of sites to be avoided by military interventions, and can help collect evidence to track and stem the illicit trafficking of artefacts. What all responses need is a much more joined-up approach that addresses not only one dimension of the destruction but the whole picture. Illicit trafficking is a good case in point; whereas efforts have often focused on the act of looting, there has been less of an effort to tackle the demand side, the market, dealers, and collectors that make looting profitable in the first place (Brodie 2015).

Addressing the UN Security Council in March 2017, the Director General of UNESCO stated: "The deliberate destruction of heritage is a war crime, it has become a tactic of war to tear societies over the long term, in a strategy of cultural cleansing. This is why defending cultural heritage is more than a cultural issue, it is a security imperative, inseparable from that of defending human lives" (http://en.unesco.org/news/security-council-adopts-historic-resolution-protection-heritage). During this meeting, the Security Council adopted Resolution 2347, the first ever to focus on cultural heritage.

The Nature of Destruction and Harm

In order to develop comprehensive recovery and reparation strategies, it is important to be able to estimate and understand both the nature of the destruction and of the harm done. Once an armed conflict begins, the management of cultural heritage becomes increasingly complicated. One measure put forth in the existing literature is response, defined as "the action taken during the period of an actual emergency to minimize its effect on both life and property" (Boylan 2003: 66). Behind the modestly calm appearance of this phrase, however, lie the chaos and confusion of war, in the face of which even heroic efforts are often frustrated. A moving, literally blow-by-blow, account of the struggles faced by the museum's staff, and some of its civilian neighbors, to safeguard the National Museum of Baghdad during the 2003 invasion was documented by Donny George (2008: 97–107).

The dangers to which cultural heritage is exposed during armed conflict come in a myriad of ways; there are those that have to do with human resources such as weakened governments, disrupted professional activities, collapsed rule of law, and personnel denied access to the heritage sites and collections under their care. Then there are the dangers posed to the material integrity of heritage sites: collateral damage, misuse (as defined by the 1954 Hague Convention), looting, vandalism, and deliberate targeting – expressed not only by the destruction of monuments and objects but also the persecution of particular cultural groups, artists, intellectuals, crafts persons, and religious leaders. And there are also the dangers related to the instrumentalization of the symbolic meanings associated with cultural heritage whereby "ownership" is reassigned – i.e., this represents "us" and that represents "them" – and conflicts are pitted as black-and-white scenarios that forcefully categorize differences into opposed factions, leaving no room for the nuances and hybrid alternatives more true to life. It is in this third area that the much work has yet to be done, for the current understanding of the complex nature of cultural heritage, with all of its multifaceted ramifications, and has yet to be mirrored by an equally substantial appreciation of how it fares in situations of armed conflict.

While the development of a typology might seem a futile exercise when trying to pin down actions carried out in highly volatile conditions, mired by a web of political, social, and cultural subcurrents, it can at least help to bring out precisely that complexity of interactions. Table 1 indicates two elements in developing a typology

Cultural Heritage Management and Armed Conflict, Table 1 Destruction of cultural heritage during armed conflicts: a typological exercise (revised version of Viejo-Rose 2007: 104)

Destructive action	Object destroyed or damaged
Looting and pillaging Deliberate misuse/reuse Deliberate targeting (frontlines) Deliberate targeting (behind frontlines) Neglect Vandalism Collateral damage Military imperative Iconoclasm Official policy of selective abandon Failure to safeguard Disrepair	Museum and/or collection Heritage site Archaeological site Library or archive Civilian building (i.e., school) Historical monument Religious building/objects Cemetery Memorial Government building Political monument Infrastructure (bridges) Tourist infrastructure Natural heritage
Enemy image propaganda Symbolic/cultural violence Appropriation Misrepresentation	Historical narratives Constructions of identity (group belonging) Ownership and significance Sense of belonging (to a place)

of destruction: the violent action itself and the object targeted. Depending on which combination is made when linking the act with the object targeted, a different story emerges. For instance, the purposeful neglect of a piece of public art suggests different motivations and expected outcomes than the deliberate targeting of an archive. A further indicative element to take into account is the type of armed conflict and its contextual specificity. Armed conflicts come in a variety of forms, and most recently there have been conglomerates of different types: declared wars and international armed conflicts, occupations, and non-international armed conflicts (which can easily become a fuzzy category if a third state, or multinational force, becomes involved or if the conflict spreads across a border as soldiers and refugees move), and finally there is the nebulous category of terrorism and counter-terrorism (i.e., the "war on terror"). Thus, understanding the nature of the destruction of cultural heritage during armed conflicts –getting at the underlying motivations, dynamics, and impacts – cannot be approached as a uniform, blanket action. Developing a typology of the destruction of cultural heritage can be a useful tool to this end as long as the dynamics of particular historical and social contexts are not taken out of the picture (Gamboni 2007: 22–24).

As indicated at the outset of this entry, while the destruction of cultural heritage during armed conflicts is not new, there is certainly a sense that its intensity and global reach of these highly performative acts is a relatively recent phenomenon. What a schematic typology can help us do is, when complemented with further information about the context of a given conflict and the means by which the acts of destruction are communicated, to allow us to begin to develop a more complete vision of the motivations, aims, and impact of these. This in turn helps to understand the nature of the violence, for instance, whether it is systematic and sustained, opportunistic and media oriented, and how to address it. Constructing this deep and contextualized understanding of the destruction is fundamental, not least because it will help understand how the uses of heritage, often in the name of protection, turn it into a particularly attractive target. The outrage caused by such destructions often incites fiery retorts denouncing the destroyers as barbarians, yet failing to place these acts within the context of the specific political genealogy in which they take place makes protection measures clumsy at best. In the case of Iraq, for instance, this means understanding the long history of archaeology in the country and its political uses by national regimes, colonial powers, and other international actors including museums and archaeologists (di Cesari 2015).

Reconstruction, Recovery, and Reparations

International law has for the most part focused on imposing obligations on states to preserve, protect, and prosecute the destruction of cultural property, yet treaties remain silent on guiding the reconstruction and reparations process with regard to cultural heritage. Moreover such treaties concentrate on the physical manifestations of heritage, neglecting its more intangible dimensions which war also damages and transforms.

In the aftermath of armed conflict, cultural heritage can be used to serve a number of functions acting simultaneously as receptor, container, and reflector of meaning and emotions. Whether it is rebuilt, restored, ignored, or preserved in a ruined state, each action will be presented and interpreted as part of the construction of the new, post-conflict, society. Considering the points made above, concerning how conflict not only destroys but also transforms cultural heritage by adding and altering meanings and how the intangible dimensions are also targeted, it is then possible to appreciate that the post-conflict management of cultural heritage occurs on the basis of a transformed symbolic landscape and that the intangible therefor matters immensely. In emerging from the chaos of war, societies often aspire to create order. With regard to cultural heritage, this can translate into policies that often lie between two extremes, that of "tabula rasa," of clearing the ruins and starting anew, or that of trying to restore and recover what has been lost. Neither of these options is exclusively realizable. Instead, post-conflict reconstruction processes combine what often seems to be contradicting aspirations. On the one hand, they contain projects

to build a new landscape of monuments and symbolic markers that will reflect the emerging society, and they take advantage of some of the destruction to modernize urban plans and infrastructures. On the other hand, there is an affective drive to recover some of what has been lost, to retrieve it, and to recover the roots of society by looking to its past and selecting key defining moments to carry forth into the present and the future.

Another issue in the post-conflict management of cultural heritage is that of how the conflict itself is to be remembered. This emerges in memorial processes and policies as revealed by the decisions that are made about what anniversaries to commemorate officially and what sites of traumatic events to mark with monuments. It is frequently reiterated that memorials have an aspiration to remind, so that the errors of the past are not repeated. If so, then they would have a dual mission of public recognition of loss on the one hand and peace on the other. Yet one of the trends that can be observed in the aftermath of recent armed conflicts is a competition over victimhood by which each side uses memorial gestures not only as a vehicle for mourning but also as a means of planting a sign of contention and, occasionally, provocation. This results in one-dimensional narratives of events that create a pantheon of martyrs and heroes with their associated values; the messages evoked then become those of reminding of "our" suffering at "their" hands; "we will not forget" that this context is far from having a peaceful intention.

It is important to realize that cultural heritage can be managed in such a way as to divide and exclude as much as to unite and include. This is not only true in a context of armed conflict, but these extreme moments do make such uses more explicit. Cultural heritage can be a richly textured tool to engage in bringing a variety of groups together, discuss, share stories, and collaborate in activities that will help define them as a community. Achieving access to and education about this heritage is essential, for without them there will be no sense of individual and group "ownership" of cultural heritage and it is precisely that alienation ultimately fuels destruction both inside and outside the context of armed conflicts.

The destruction in Syria spurred the creation of several funds dedicated to the protection of cultural heritage during armed conflicts, a Cultural Protection Fund was created in the UK and endowed with 30 million pounds, and a Safeguarding Endangered Cultural Heritage conference jointly organized by France and the United Arab Emirates in 2016 aimed to endow it with a $100 million fund in a UNESCO-backed International Alliance for the Protection of Heritage in Conflict Areas (ALIPH).

One weakness inherent in the existing legal instruments is that they legislate for the protection of cultural *property.* The broader concept of cultural *heritage*, while gleaning affirmative strength from the relative concreteness of the first term, is far more complex and is overlooked due to the emphasis placed on the physical property aspect of the problem. Encouragingly a nascent, and as yet somewhat timid, trend can be observed in organizations taking up the use of the broader term "cultural heritage." One recent instance of this is the Reparations Order issued by the International Criminal Court (ICC) on 17 July 2017 in the case of *The Prosecutor v. Ahmad Al Faqi Al Mahdi* that reads:

> The Chamber highlighted the importance of cultural heritage and stressed that, because of their purpose and symbolism, most cultural property and cultural heritage are unique and of sentimental value. Their destruction thus carries a message of terror and helplessness; destroys part of humanity's shared memory and collective consciousness, and renders humanity unable to transmit its values and knowledge to future generations. (ICC 2017 Press Release ICC-CPI-20170817-PR1329)

Language use aside, these reparations set an important precedent in the management of cultural heritage in the aftermath of armed conflict. The Court identified and ordered reparations for three different categories of harm: damage to the attacked historic and religious buildings, consequential economic loss, and moral harm. One challenge for the Court is determining who the victims of this destruction are and what is the nature of the harm done. Another challenge is that for the last category, moral harm, the envisioned reparations involve symbolic measures such as memorialization, commemoration,

and ceremony, yet these approaches are largely informed by Western notions of mourning and repair, whereas not all victims of cultural destruction will want to be signaled out nor have their loss marked through museum exhibitions or granite monuments.

Future Directions

An important development in recent years has been the integration of cultural heritage management into peacekeeping operations, notably by the United Nations Department of Peacekeeping Operations (UNDPKO) and via the Security Council's Resolution 2100 (2013) that included cultural heritage protection as a mandate of the mission in Mali (MINUSMA). On 27 April 2015, Irina Bokova, Director General of UNESCO, declared in a meeting of the UN Security Council: "Culture stands on the front-line of conflict – it should be at the front-line of peacebuilding" (UNESCO 2015), and on the 9th of June 2016, European Union High Representative for External Relations Federica Mogherini commented that "Promoting heritage is not for archaeologists only — it is a peace imperative" (UNESCO 2016). Leaving aside the semantic slippage present throughout the official rhetoric by which culture and heritage are often used as synonyms, we are observing an interesting moment in which an attempt is being made to explicitly integrate cultural heritage into international peacebuilding and peacekeeping activities in a more concrete way than has been the case until now.

To improve current protection measures, three areas of cultural heritage management require improvement (see Curtis 2011: 56–75). First, it would be important for more states to ratify the Hague Convention and for the Blue Shield to become a more substantial institution. As key countries move to ratify the convention and, significantly, its protocols, this will become more practicable. Second, consultation mechanisms between government and military authorities on the one hand and heritage experts on the other need to be established in order that consultation can be constant – occurring before, during, and after conflicts – and are not just sporadic responses to emergency situations. This is already underway, and a series of regular meetings, conferences, and training workshops that bridge the two areas have been running for the past few years. Finally, more collaboration is required across the board to develop thorough appreciations of the circumstances that lead to the destruction of cultural heritage; this means linking research, policy, and practice but also a concerted effort to further our understanding of heritage values and valuation.

In order to support the two final areas of action, one future direction suggested here would be to combine quantitative and qualitative research in order to develop indicators relating to the wartime destruction of cultural heritage. This could help develop interventions at the various conflict stages: predicting the outbreak of conflict, its location, targets, and "tone," informing mitigation strategies that might allow preventive protective actions to be more effective than they have been to date, and gathering data on the destruction (its sustained and expansive nature when it is such) to use as evidence in trials that seek to attribute criminal responsibility and to generate reparations frameworks.

In addition to the need for deepening our understanding of these processes, there are three more avenues that require further exploration. The first is the imperative of developing a greater critical awareness of exactly when cultural heritage is being instrumentalized symbolically and rhetorically at different stages in armed conflicts – run-up, fighting, negotiations, and post-conflict reconstruction. The second is the need to fully appreciate the implications of the realization that armed conflict not only destroys cultural heritage, but it also has deep transformative effects on it as sites are interfered with and reinterpreted or become the location of critical events in the fighting. Guernica, Coventry, Dresden, and Hiroshima are but a few examples; all of these cities became signifiers for new sets of meanings after their respective bombings. Armed conflict thus also creates and adds to the heritagescape. The third avenue is that of reparations discussed above.

In sum, a great deal of work remains to be carried out in this field, but it is encouraging to

examine an overview of efforts made thus far and evaluate the extent to which legislation and awareness have evolved in the field (O'Keefe 2006: 1–3). The challenge remains to match approaches to the management of cultural heritage during conflict with the ever-expanding appreciation of what constitutes cultural heritage.

Cross-References

- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage: History and Context
- ▶ Intangible Cultural Heritage
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Museums)
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ International Conventions Pertaining to Heritage Policy: Introduction
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Somaliland: Cultural Heritage Management
- ▶ Tangible Heritage in Archaeology

References

Boylan, P. 2003. Assessing risk: Museum emergency planning for natural, civil and armed conflict risks. In *Cultural heritage disaster preparedness and response. International symposium proceedings*. Slar Jung Museum, Hyderabad, 23–27 Nov. ICOM.

Brodie, N. 2015. Syria and its regional neighbors: A case of cultural property protection policy failure? *International Journal of Cultural Property* 22 (2–3): 317–335.

Curtis, J. 2011. Archaeology and cultural heritage in war zones. In *History for the taking? Perspectives on material heritage*. London: Policy Centre & The British Academy.

Di Cesari, C. 2015. Post-colonial ruins: Archaeologies of political violence and IS. *Anthropology Today* 31 (6): 22–26.

Gamboni, D. 2007. *The destruction of art. Iconoclasm and vandalism since the French revolution*. London: Reaktion Books.

George, D. 2008. The looting of the Iraq National Museum. In *The destruction of cultural heritage in Iraq*, ed. P.G. Stone and J. Farchakh Bajjaly. Woodbridge: Boydell Press.

Hadik, J. 2001. Protection of cultural heritage during hostilities. *Museum International* 53 (3): 65–66. UNESCO, Paris, No. 211.

International Criminal Court. 2017. Al Mahdi case: ICC Trial Chamber VIII issues reparations order, Press Release ICC-CPI-20170817-PR1329, 17 July 2017, at: www.icc-cpi.int/Pages/item.aspx?name=pr1329. Accessed 9 Oct 2017.

Meskell, L. 2015. World heritage and WikiLeaks. Territory, trade, and temples on the Thai-Cambodian border. *Current Anthropology* 57 (1): 72–95. (February 2016).

O'Keefe, R. 2006. *The protection of cultural property in armed conflict*. Cambridge, UK: Cambridge University Press.

Schindler, D., and J. Toman, eds. 1988. *The laws of armed conflicts: A collection of conventions, resolutions and other documents*. Leiden: Martinus Nijhoff.

Silverman, H., ed. 2011. *Contested cultural heritage. Religion, nationalism, erasure and exclusion in a global world*. New York: Springer.

Stone, P.G. 2013. A four-tier approach to the protection of cultural property in the event of armed conflict. *Antiquity* 87 (335): 166–177.

Stone, P.G. 2016. The challenge of protecting heritage in times of armed conflict. In *News in Conservation*, issue 53. www.iiconservation.org/node/6323. Accessed 9 Oct 2017.

Toman, J. 1996. *The protection of cultural property in the event of armed conflict: Commentary on the Convention for the Protection of Cultural Property in the Event of Armed Conflict and its Protocol, signed on 14 May 1954 in The Hague, and on other instruments of international law concerning such protection*. Aldershot: Dartmouth.

UNESCO. 2015. Culture stands on the front-line of conflict – It should be at the front-line of peace building, Director-General states to UN Security Council, 27 April 2015, http://whc.unesco.org/en/news/1269/. Accessed 5 Oct 2017.

UNESCO. 2016. UNESCO calls to harness the role of heritage in peace-building. June 9. www.unesco.org/new/en/culture/themes/single-view/news/unesco_calls_to_harness_the_role_of_heritage_in_peace_buildi/#.V7XQ8_krLIU. Accessed 5 Oct 2017.

Viejo-Rose, D. 2007. Conflict and the deliberate destruction of cultural heritage. In *Conflicts and tensions. The cultures and globalization series*, ed. Y.R. Isar and H. Anheier, vol. 1. London: Sage.

Viejo-Rose, D., and M.L.S. Sørensen. 2015. Cultural heritage and conflict: New questions for an old relationship. In *A companion to contemporary heritage research*, ed. E. Waterton and S. Watson. Basingstoke/New York: Palgrave McMillan.

Further Reading

Bevan, R. 2006. *The destruction of memory. Architecture at war*. London: Reaktion Books.

Boylan, P.J. 1993. *Review of the convention for the protection of cultural property in the event of armed conflict (The Hague Convention of 1954)*. Paris: UNESCO.

Isar, Y.R., H. Anheier, and D. Viejo-Rose, eds. 2011. *Heritage, memory and identity. Cultures and globalization series*. Vol. 4. London: Sage.

Meskell, L. 1998. *Archaeology under fire: Nationalism, politics and heritage in the Eastern Mediterranean and Middle East*. London: Routledge.

Rothfield, L. 2009. *The rape of Mesopotamia: Behind the looting of the Iraq museum*. Chicago: University of Chicago Press.

Rush, L., ed. 2010. *Archaeology, cultural property, and the military*. Woodbridge: The Boydell Press.

Sørensen, M.L.S., and D. Viejo-Rose, eds. 2015. *War and cultural heritage: Biographies of place*. Cambridge, MA: CUP.

Stone, P.G. 2011. Introduction: The ethical challenges for cultural heritage experts working with the military. In *Cultural heritage, ethics, and the military*, ed. P.-G. Stone, 1–28. Woodbridge: Boydell.

Stone, P.G., and J. Farchakh Bajjaly, eds. 2008. *The destruction of cultural heritage in Iraq*. Woodbridge: Boydell Press.

UNESCO. *Protect cultural property in the event of armed conflict.* UNESCO document CLT/CIH/MCO/2008/PI/69/REV. Available on-line at: http://unesdoc.unesco.org/images/0013/001386/138645e.pdf.

Uzzel, D., and R. Ballanty. 2008. Heritage that hurts. Interpretation in a postmodern world. In *The heritage reader,* ed. J. Schofield et al., 502–513.

Cultural Heritage Management and Gender

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Introduction

Since the seminal article by Conkey and Spector in 1984, calling for an archaeology of gender, the theory and literature on archaeology and gender have developed rapidly through the work of many authors, including Gero and Conkey (1991), Claassen (1994), Wright (1996), Pyburn (2004), Nelson (2006), Hamilton et al. (2007), Bolger (2010), and others. Writing and theorizing that focuses explicitly on the intersection of gender and cultural heritage management, however, is not yet as well-articulated and is often expressed indirectly in terms of diversity, multivocality, egalitarian methodology, and community participation, all themes that figure prominently in discussions of gender and archaeology.

Definition

Cultural heritage management (CHM, also called "cultural resource management," "heritage stewardship," or "archaeological resource management") is the process of undertaking activities to "care for such heritage assets as heritage places, sites, artefacts, cultural property, and other tangible heritage items in a society," according to Lee et al. (2007: 1). In assessing the maturity of heritage conservation in countries around the world, these authors note that "while CHM is a global phenomenon, its practitioners have no real sense of being a part of it." Instead, they say, many practitioners (called variously "cultural resource managers," "preservationists," or "historic building conservationists") focus on disciplinary and thematic issues, while wrestling with similar sets of issues related to management and stakeholder issues, including creating definitions and shared understandings of heritage. Some key issues that surface in the way cultural heritage assets are described in CHM literature are power, quality of life, specialist knowledge, community involvement, and a pluralistic narrative approach. As CHM practices evolve, according to Lee et al., a wide array of stakeholders emerges, and more attention is paid to community interests and consultations, to the point of considering community members "as legitimate managers and co-managers of assets" with a "goal of achieving a consensus approach to management" (pp. 13–4).

Gender, according to Sørenson (2000: 52),

> is best understood as a set of values that assign gendered meaning to behaviour and affect that behaviour. Through such meaning, culturally specific notions of femininity and masculinity. . .are constructed.

Moreover, "engendered individuals are social agents and their actions form society" (p. 8). At

the same time, she argues, we should not lose sight of the distinctions between "gender identity and gender ideology" that contribute to our understanding of the "interaction between self and society which lies behind normative behaviour." Sørenson discusses the importance of gender as a necessary part of theorizing about social relations, especially in archaeology, and the need for further analysis of gender "as a social construct that uses materiality" (p. 11) and "about how society relates to and constructs cultural categories from the differences that always exist amongst its members" (p. 72). These categories of gender identities and relations of past and present societies are of particular interest and relevance to archaeologists and heritage managers in a variety of ways, as discussed below.

Historical Background

While the origins of heritage management are not the subject of this entry, it is worth noting that, until quite recently, there has been a strong bias toward preserving, interpreting, and managing sites and events generally considered to have a masculine connotation. For example, in the United States, cultural resource management has its roots in historic preservation, which was based on efforts to commemorate the American Revolution and the Civil War and men "(and they were largely men)" who were the heroes of those and other wars (Davis 2010: 188). A century of legislation related to preservation, including laws designed to include Native American tribes and local governments and citizens in decision making, has slowly moved the pendulum toward more inclusive representations of whose heritage is being preserved.

The development of feminist theory and the role of gender in archaeology, gender in postcolonial and postprocessual archaeologies, and the relationship of cultural practices and gender have been discussed by many authors, including Claassen (1994), Gero (1996), Wright (1996), Nelson (1997), Kehoe and Emmerichs (1999), Hamilton et al. (2007), and Ströbeck (2010). Gero discusses the gendered nature of what is considered acceptable fieldwork techniques and argues that "the organization of gendered personnel in the field insinuates itself in the creation of archaeological fact" (1996: 250). Ströbeck (2010) summarizes the trajectory of feminist theory and gender issues in archaeology, particularly in relation to indigenous communities, and makes connections to choices that are made today. She argues that feminist work has revealed inherent gender biases in archaeological work, showing how feminist perspectives in archaeology have been marginalized (2010: 331–2). Furthermore, these biases have been reflected in heritage management, and challenges have been made to counteract androcentric constructions of the past, which in past decades would have been presented as uncontested truth in interpretations of the past at heritage sites and codified through decisions related to heritage management. Instead, according to Ströbeck (2010), Franklin and Paynter (2002), Jackson and Smith (2005), and Robles García and Corbett (2010), among others, relationships between colonists and colonized/indigenous subjects are being reframed at the intersections of race, class, and gender.

Key Issues

Examples from archaeological practice, discussed here and elsewhere, use similar sets of descriptors to discuss issues related to gender, whether it be research, fieldwork, or public engagement. This language describing aspects of communication and professional practice also applies to heritage management more broadly and can help us understand the relationship between cultural heritage management and gender.

Gero (1996: 275) discusses the gendered aspects of archaeological practice, including work relationships, divisions of labor, and specializations. She argues that values of the scholarly community are reflected in how and what work is carried out, providing a case study of how cultural politics work on the ground. She argues for a theorizing of gender that crosscuts race and class in order "to recognize and embrace a wide range of cognitive styles." Wright (1996: 15) notes that many authors who address gender issues illustrate an "open-ended and relational style of discourse

that promotes productive and fruitful exchange." These authors do not suggest that these styles of discourse "are possessed exclusively by females," she says, but that "feminist pedagogy argues against built-in, innate, natural states of gender constructs."

Democratizing strategies help to validate diverse ways of knowing the past and expand the voices heard in interpretation and management strategies. Franklin and Paynter (2010: 111–2), for example, discuss how feminist archaeologists use multivocality, multilinear narratives, and active engagement and collaboration to decenter archaeologists' knowledge claims and open space for community-based management frameworks. At the same time, they argue that "we can't compartmentalize gender inequality in the profession and theorizing about gender in the past as if they are separate projects." Hamilton (2007: 143) describes archaeology as still largely "a 'macho' craft", which "continues to pertain even while archaeological theory and practice have moved on to issues of reflexivity, multiplicity, and subjectivity, alongside considerations of the creative nature of fieldwork and its contribution to the building of knowledge." She calls for a "greater recognition and incorporation of female-gendered practice and approaches" in order to keep the craft dynamic and enrich the way forward.

Gender is reflected in research questions, fieldwork strategies, and interpretation of data, as discussed by numerous authors, including Dobres (2006), Nelson (2006: 1–27), and Smith and O'Donnell (2007). The gender of field researchers shapes the kinds of questions asked, who their informants are, and even what is considered to be important information. According to Jackson and Smith (2005: 337–8), many scholarly discussions about informants in field-based research fail to "recognize the intrinsic power that individuals and social structures within the research community may have over the choice of colleagues." Describing their own experiences in Australia, they suggest that "the areas of interest of individual researchers and their specific position in society (in terms of age, gender, marital status) predetermine them to work with individuals of comparable interests and status" which is helped along by informants steering researchers to "the appropriate people with whom we might/should work." The categories of data gathered, the networks developed, and the resulting interpretations also affect management decisions, and the role and influence of gender, age, and other variables should be acknowledged and taken into account. As Jackson and Smith describe it,

> This means that different data sets and different archaeological stories can be produced from the same community at the same time, according to the specific social relationships of individual researchers (p. 339).

According to Robles García and Corbett (2010: 115), the contemporary framework of archaeological resource management implies managing in multiple ways, including education as well as protecting, studying, and "conserving elements of heritage in socially defined contexts." They discuss the challenges of moving away from traditional styles of thinking and action, which may be top-down, authoritarian, and not allowing for flexible, participatory self-management. They describe the management plan for Monte Albán in Mexico as an alternative within the national plan, protecting the "social integrity of the archaeological site," while creating a "horizontal network among a complex array of social actors" (p. 118). The plan builds relations with local communities and stakeholders using a collaborative, sociological framework and a discourse "more sensitive to conservation, problem solving, and flexibility" (p. 120).

A discussion of CHM and gender must also address issues of gender inequity in education, research, and employment opportunities. The number of women in archaeology and related fields has steadily increased in the last 30 years, yet many disparities still persist. A special report to the Society for American Archaeology on the status of women in archaeology (Rizvi and Berg 2008) describes significant improvements in many areas affecting women and families but also cautions that progress still needs to be made to reach full gender equity. According to Altschul and Patterson (2010: 306), "The shape of the discipline in the academy still reflects

demographic trends set in motion in the 1940s". For example, the practice of steering female archaeologists away from fieldwork and into museums and labs, which persisted into the last decades of the twentieth century, is discussed by the authors in Classen (1994), Kehoe and Emmerichs (1999), and other biographers of women in the field. Smith and O'Donnell (2007) discuss the pattern that persists in Australian universities of greater numbers of women in research positions than in professorships. Franklin and Paynter (2010: 113) summarize key sources for discussion of gender disparities in employment and placement, citation practices, the marginalization of gender and feminist theory, training of studies, and other practices.

Future Directions

Debates about feminist theories in archaeology and their relationship to processual, post-processual, and postcolonial archaeology continue today and will no doubt expand to more fully encompass cultural heritage management and its diverse sets of stakeholders. These debates and scholarly work in this area will contribute to our understanding of the role of gender in heritage management; a theory of cultural heritage management and gender should be more thoroughly developed. A welcome contribution to the literature in this area would be case studies that show the impact of gender considerations on heritage management programs and policies. Similarly, more study of social identity formation at the crossroads of race, class, and gender and its relationship to issues in cultural heritage management should be carried out.

Cross-References

- ▶ Ashmore, Wendy
- ▶ Australia: Cultural Heritage Management Education
- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Balme, Jane
- ▶ Beck, Wendy E.
- ▶ Bowdler, Sandra E.
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Conkey, Margaret Wright
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Native Americans
- ▶ Davis, Hester
- ▶ Du Cros, Hilary
- ▶ Gero, Joan
- ▶ Heritage and Higher Education
- ▶ Heritage Museums and the Public
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Joyce, Rosemary
- ▶ Kent, Susan
- ▶ Local Populations and Global Heritage
- ▶ Marcus, Joyce
- ▶ McBryde, Isabel
- ▶ Meehan, Betty
- ▶ Meskell, Lynn
- ▶ Public Humanities and Cultural Heritage
- ▶ Smith, Claire
- ▶ Smith, Laurajane
- ▶ Sullivan, Sharon
- ▶ United States: Cultural Heritage Management Education
- ▶ Wylie, Alison

References

Altschul, J.H., and T.C. Patterson. 2010. Trends in employment and training in American archaeology. In *Voices in American archaeology*, ed. W. Ashmore, D.T. Lippert, and B.J. Mills, 291–316. Washington, DC: Society for American Archaeology.

Bolger, D. 2010. The dynamics of gender in early agricultural societies of the Near East. *Signs* 35: 503–531.

Claassen, C., ed. 1994. *Women in archaeology*. Philadelphia: University of Pennsylvania Press.

Conkey, M., and J. Spector. 1984. Archaeology and the study of gender. In *Advances in archaeological method and theory*, ed. M. Schiffer, vol. 7, 1–38. New York: Academic Press.

Davis, H. 2010. Heritage resource management in Mexico. In *Cultural heritage management: A global perspective*, ed. P.M. Messenger and G.S. Smith, 111–123. Gainesville: University Press of Florida.

Dobres, M.A. 2006. Gender in the formation of the earliest human societies. In *A companion to gender history*, ed. T.A. Meade and M.E. Wiesner-Hanks, 211–226. Oxford: Blackwell Publishing.
Franklin, M., and R. Paynter. 2010. Inequality and archaeology. In *Voices in American archaeology*, ed. W. Ashmore, D.T. Lippert, and B.J. Mills, 94–130. Washington, DC: Society for American Archaeology.
Gero, J. 1996. Archaeological practice and gendered encounters with field data. In *Gender and archaeology*, ed. R. Wright, 251–280. Philadelphia: University of Pennsylvania Press.
Gero, J., and M. Conkey, eds. 1991. *Engendering archaeology: Women and prehistory*. Oxford: Basic Blackwell, Ltd.
Hamilton, S. 2007. Women in practice: Women in British contract field archaeology. In *Archaeology and women: Ancient & modern issues*, ed. S. Hamilton, R.D. Whitehouse, and K.I. Wright, 121–146. Walnut Creek: Left Coast Press.
Hamilton, S., R.D. Whitehouse, and K.I. Wright, eds. 2007. *Archaeology and women: Ancient & modern issues*. Walnut Creek: Left Coast Press.
Jackson, G., and C. Smith. 2005. Living and learning on Aboriginal lands: Decolonizing archaeology in practice. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 329–351. New York: Routledge.
Kehoe, A.B.., and M.B. Emmerichs, eds. 1999. *Assembling the past: Studies in the professionalization of archaeology*. Albuquerque: University of New Mexico Press.
Lee, Y.F., H. Du Cros, L. Distefano, and W. Logan. 2007. Introduction. In *Cultural heritage management in China: Preserving the cities of the Pearl River Delta*, ed. H. Du Cros and Y.F. Lee, 1–21. New York: Routledge.
Nelson, S.M. 1997. *Gender in archaeology*. Walnut Creek: AltaMira Press.
Nelson, S.M., ed. 2006. *Handbook of gender in archaeology*. Walnut Creek: AltaMira Press.
Pyburn, K.A., ed. 2004. *Ungendering civilization*. New York: Routledge.
Rizvi, U.Z., and C. Berg. (eds.) 2008. Looking forward, looking back: A special issue from the Committee on the Status of Women in Archaeology (COSWA). *The SAA Archaeological Record* 8.
Robles García, N., and J. Corbett. 2010. Heritage resource management in Mexico. In *Cultural heritage management: A global perspective*, ed. P.M. Messenger and G.S. Smith, 111–123. Gainesville: University Press of Florida.
Smith, C., and E. O'Donnell. 2007. Gender and the culture of Australian archaeology. In *Worlds of gender: The archaeology of women's lives around the globe*, ed. S.M. Nelson, 97–138. Walnut Creek: AltaMira Press.
Sørensen, M.L.S. 2000. *Gender archaeology*. Cambridge: Polity Press.
Ströbeck, L. 2010. Gender and sexuality. In *Handbook of postcolonial archaeology (World Archaeological Congress Research Handbooks in Archaeology 3)*, ed. J. Lydon and U.Z. Rizvi, 327–350. Walnut Creek: Left Coast Press.
Wright, R., ed. 1996. *Gender and archaeology*. Philadelphia: University of Pennsylvania Press.

Further Reading

Articles in *International Journal of Heritage Studies; Heritage and Society*.
Gender and archaeology series, AltaMira Press (from 2001).
Regendering the past Book series (from 1994).

Cultural Heritage Management and Images of the Past

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Introduction

There are many sensory experiences that mingle as we apprehend and interpret our world, but one sense, sight, enjoys prominence in the documentation and mediation of the past. The power of sight and of viewing images does not lie in an inherent dominance of the sense of sight over any other senses. Rather, as John Berger (1972) argued in *Ways of Seeing*, sight and seeing is the earliest communicative medium in human development. It comes before words, and thus, it has a fundamental role in the understanding of our orientation to the world around us.

For the study of the past, sight has long been a sense by which knowledge was discerned, interpreted, and shared. For example, the recording of sites and monuments by the second century CE Greek writer Pausanias were founded upon the use of sight and seeing to correctly identify places, sites, and buildings and orient oneself in the world. At the outset of Book 1 of his *Description of Greece*, Pausanias (1918) begins what will be a recurring method of using sight to orient the reader towards places being described.

> On the Greek mainland facing the Cyclades Islands and the Aegean Sea the Sunium promontory stands

> out from the Attic land. When you have rounded the promontory you see a harbor and a temple to Athena of Sunium on the peak of the promontory (*Description of Greece* 1.1.1).

Pausanias' writings have a professed intention to orient people visually to the appearance of the world. This is a tradition of writing that continues today in the genre of travel writing, but it is Pausanias's visual descriptions that are of particular relevance to a consideration of archaeology and cultural heritage. They form a clear effort to share a visualization of place over time – an image of the past.

Key Issues

The Antiquarian Image

The value of the image of the past, as was apprehended by Pausanias as well as by artists and antiquarians throughout the centuries, is its mobility. Whether recorded in narrative, drawing, or painting, the image of the past allowed for the transportation and communication of visual experiences of places and sites both over distances and over time. Following in the geographic tradition of Pausanias, William Martin Leake (1777–1860), a geographer for the British military in Greece, pioneered the use of ancient texts to make connections to contemporary geography (see Witmore 2004). Leake is credited with being one of the earliest antiquarians to utilize advanced surveying techniques in order to fix the "images of the past" from these ancient sources in order to generate more precise and quantifiable images of the ancient landscape.

With the advent of the printed book and printmaking, the image of the past gained an additional value. Modern antiquarian studies advanced some of the earliest extensive use of printed illustrations as part of their texts. Antiquarian texts, such as Thomas Wright's *Louthiana* (1758), utilized abstracted schematic drawings of sites and places such as earthworks to create sets of images that could be used for comparative analysis of form and method of construction. For the first time, visualizations of structures, sites, and places separated by great distances could be compared alongside each other, and these comparisons could be printed and shared widely throughout the world through the libraries of learned societies.

The proto-scientific value of these illustrations and visualizations of the past quickly led to the incorporation of image making as a central aspect of antiquarian practice. In the nineteenth century, these efforts became part of broad efforts to survey and codify the state and condition of extant ancient sites throughout the landscapes of Europe. For example in Ireland, artist and antiquarian George Victor Du Noyer (1817–1869) was employed as part of the Irish Ordnance Survey to produce drawings and watercolors of sites being recorded as part of the vast cartographic endeavor. Du Noyer's drawings and watercolors formed a critical component of the survey, but given his reputation as an artist in his own right, they were also appreciated aesthetically as art. Similarly the so-called father of Irish archaeology, George Petrie (1790–1866), who also worked as part of the Ordnance Survey, was a famed painter. His subject was often Romantic views of the Irish landscape. Beyond his painting and his leadership of the antiquities committee of the Royal Irish Academy, he contributed illustrations to many of the earliest tourist guide books to the Irish countryside.

This situation illustrates a fundamental tension in the relationship of the image of the past to archaeological and heritage work. On the one hand, images and technologies of image making were adopted as a means of documenting faithful representations of sites, structures, artifacts, and places. However, Du Noyer's drawings and Petrie's paintings and illustrations, like other antiquarians illustrations of their time, were their own artistic interpretations of their visual encounters. They were their own images, but they were consumed simultaneously by burgeoning archaeological science as objective representations and by the wider public as subjective interpretations.

The Archaeological Image

As the discipline of archaeology was established at the end of the nineteenth century, a rift grew between objective and subjective appreciations of images of the past. The development of the discipline relied on the ability of practitioners to

visually observe and objectively document the changing colors of soil deposits, recognize the stylistic and compositional similarities between artifacts and sites, and visualize the architectural form of buildings long since destroyed. In order to render a visual archaeological record to sustain the objective comparative analysis required by the nascent science, the drawing and visualization of the objects and sites of the past became a fundamental part of the skill set of a professional archaeologist. Archaeological students were trained in the practice of technical drawing as a means of rendering objective, scientific documentations of objects, structures, and sites, and over the twentieth century, as new methods and technologies of visualization presented themselves (such as photography), they were incorporated as extensions of the endeavor to render an objective, visual archaeological record of the past. Especially after the acceptance of positivism as a central epistemological orientation for the discipline in the mid-twentieth century, archaeologists pursued and incorporated these image-making tools (e.g., laser scanning) as progressive steps in the endeavor to truthfully represent the exact condition of the traces of the past for the purpose of documentation and preservation.

Parallel to this growth in visual positivism, there remained, however, a steady use of illustration for the purposes of communicating the image of the past to the wider public. Archaeological illustrators were commissioned by archaeologists to respond to data and narrative interpretations of data to create artistic interpretations of objects, structures, places, and at times, whole communities and societies (e.g., the Greek and Roman archaeological illustrator Peter Connolly). Continuing in the somewhat more subjective or interpretive aspect of antiquarian images, these illustrations facilitated the imagining of the past through the enjoyment of a skilled artist's interpretation of objective archaeological science.

The Representation of Heritage

Eighteenth- and nineteenth-century antiquarianism and early archaeological science significantly impacted the representation of heritage in the modern era. Images of the past being produced by antiquarians and prehistorians received increasingly wider audiences as their images and illustrations began to be consumed by wider society as representations of burgeoning national identities. A growing interest and concern over the representation of distinct and glorious national identities spread throughout Europe as more and more unique "ancient" objects and sites were "discovered," documented, and illustrated. In some countries, archaeological objects themselves became nationalistic symbols. For example, the membership card of the National Repeal Association in Ireland (a political group determined to repeal the Act of Union between Ireland and Great Britain) featured images of many artifact types that were being discovered throughout Ireland – socketed axes, Bronze Age shields, medieval brooches, and Iron Age torcs. These appropriations of images of the past for the purpose of distinct, unique, indigenous national and cultural symbols that established a tradition of cultural representation were not restricted to Europe and expanded and persisted throughout the twentieth century to our contemporary moment. Extreme examples from the twentieth century include the use of archaeological research, distribution maps, and design motifs derived from Germanic runes and pottery by the national socialist regime in Germany in the 1930s and 1940s to articulate and represent a distinct ethno-nationalist identity. A more common example would be the use of archaeological objects and ancient sites on currency and coinage by nations throughout the globe as a way of expressing unique visual identities. The significance of this for cultural heritage work is that these national cultural identities in many respects have become the primary product and experience that is marketed by states as part of tourism and development initiatives. Thus, the objects and sites with which we work are often charged with social and cultural expectation to be materializations and representations of core national identities which may limit the possibilities for subjective reinterpretations and, in the extreme, displace subaltern and minority identities, articulating a singular representation rather than allowing for diverse and multivocal images of the past.

Current Debates

The Image of the Past as Popular Culture

The image of the past has tremendous power and value in modern society. Heritage and archaeology are not simply academic pursuits but are also important parts of popular culture (see Holtorf 2002). As the popularity of cultural tourism has grown in the later half of the twentieth century, so too has interest in cultural heritage. Cultivating and stewarding interest in the past and promoting a broad "archaeo-appeal" of various experiences, heritage practitioners are both the initiators and the subjects of creative mediations of the data and experience of the past in the modern world. Beyond the enjoyment of heritage sites and museum exhibitions as touristic experiences, cultural heritage and also archaeology have been themes in popular media and entertainment in the twentieth century. For example, the cinematic image of the past has been a source of creative collaboration for archaeologists and historians with filmmakers either hoping to recreate plausible scenarios for dramatic narratives or dramatizing the character of the archaeologist or historian themselves (e.g., Indiana Jones) (see Schablintsky 2007). In the first decade of the twenty-first century, the use of the cinematic image of the past has expanded beyond the cinema. With the boom of "reality" television, historical enthusiasts, historians, archaeologists, and heritage professionals have seized the new genre as an opportunity to move beyond the objects of archaeological and historical enquiry and mediate the experience of discovery itself (e.g., Time Team) (see Piccini 2010). Not always an altruistic act, the presentation of the past within modern media is also a means to brand, market, and sell the past (and identities associated with it) to modern society, with many stakeholders from small businesses to national tourism industries (see Holtorf 2007). As part of the expanding marketplace of identities, images of the past rendered through cultural heritage provide potent visual identities for the experiences and products being marketed to people throughout the globe.

New and Emerging Media

Responding to technological progress, there has also been an increasing use of digital and web-based technologies to render visualizations and visual experiences of the past. In the early part of the twenty-first century, scholars at University of California, Berkeley, and Stanford University (i.e., the Metamedia Lab) established substantive initiatives to explore and interrogate the role of digital media in the visualization of archaeology. Of particular note is Ruth Tringham's work with students and colleagues to apply multimedia to the interpretation of the site of Çatalhöyük in Turkey. In 2007, they began the use of the online, three-dimensional social media site Second Life (secondlife.com) as a tool for interpreting and sharing a virtual visual experience of the site. A major step in the engagement of new and emerging multimedia (digital, visual, and social) for the experience of the image of the past, it can be seen to be within a tradition of digital illustration simultaneously being developed and adopted by more traditional archaeological illustrators.

Engaging these emerging trends, the recent Visualisation in Archaeology project undertaken at the University of Southampton (viarch.org.uk) was an important effort to discuss the history of and the contemporary role of visualization in archaeological practice. Bringing together archaeologists, artists, illustrators, and art historians, the project followed on from important work by scholars such as Brian L. Molyneaux (*The Cultural Life of Images* (1997)) and Stephanie Moser and Sam Smiles (*Envisioning the Past* (2005)) in opening up a critical discussion into the ways human beings view archaeology and view objects which they interpret as having archaeological authority. These scholarly efforts also mark an important step in reflexively critiquing not only the role of the image in archaeological practice but also the exhibition of archaeological materials.

Future Directions

Recently, there has also been a move towards a deeper engagement between archaeological image making and the discourses of art history

and contemporary art practice. Broadly dissatisfied with the approach to the image as a purely objective representation of the past, scholars and practitioners such as Colin Renfrew (1999, 2005 also see Renfrew et al. 2004), Michael Shanks (1991; also see Shanks and Pearson 2001), or Doug Bailey (2005, 2008) have undertaken substantive endeavors to sustain critical, interdisciplinary initiatives in the exploration of the image of the past through both archaeological and artistic practices. Their work is inspiring shifts in the next generation of archaeological thinkers and practitioners challenging the objective representational image of archaeological practice (e.g., Cochrane and Russell 2007). What is resulting is a diverse range of projects ranging from artist-in-residence projects at archaeological sites (e.g., the Stonehenge Riverside Project) to curatorial projects such as the *Ábhar agus Meon* exhibition series from the Sixth World Archaeological Congress to *avant-garde* practices by artist-archaeologists such as Fotis Ifantidis, Michael Jasmin, or Christine Finn.

Another important shift in more recent archaeological and heritage work is balancing the sense of sight by exploring other senses' ability to explore the past. Work by scholar-practitioners such as Aaron Watson (2006) on archaeoacoustics highlights the possibility of sound and of hearing to reveal compelling archaeological interpretations of sites. Similarly, new research is currently being undertaken in Istanbul, Turkey, by scholars at Koç University engaging with artist and smell expert Sissel Tolaas on an exploration of the role of smell in the understanding of the past and heritage of the city. These initiatives are part of a widening effort within archaeology and heritage practice to have a more holistic approach to human experience, apprehension, and interpretation of the past. Building on the long tradition of creating images of the past, these new modes of archaeological practice are a reminder that the image of the past is not fixed but is a continually renewed expression of how humans see the world, interpret it, and imagine its meanings.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in the Digital Age
- ▶ Experiencing Cultural Heritage
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions
- ▶ Intangible Cultural Heritage
- ▶ Marketing Heritage
- ▶ Public Humanities and Cultural Heritage
- ▶ Renfrew, Colin
- ▶ Tangible Heritage in Archaeology

References

Bailey, D.W. 2005. *Prehistoric figurines: Representation and corporeality in the Neolithic*. Oxford: Routledge.

Bailey, D. 2008. Art to archaeology to archaeology to art. *UCD Scholarcast*. Available at: http://www.ucd.ie/scholarcast/scholarcast9.html.

Berger, J. 1972. *Ways of seeing*. London: The British Broadcasting Corporation and Penguin Books Limited.

Cochrane, A., and I. Russell. 2007. Visualizing archaeologies: A manifesto. *Cambridge Archaeological Journal* 17 (1): 3–19.

Holtorf, C. 2002. *From Stonehenge to Las Vegas: Archaeology as popular culture*. Walnut Creek/Oxford: Altamira Press.

Holtorf, C. 2007. *Archaeology is a brand*. Oxford: Archaeopress.

Molyneaux, B.L., ed. 1997. *The cultural life of images*. London: Routledge.

Pausanias. 1918. *Description of Greece, Volume I: Books 1–2 (Attica and Corinth)*. Loeb Classical Library.

Piccini, A. 2010. The stuff of dreams: Archaeology, audience and becoming material. In *Unquiet pasts: Risk society, lived cultural heritage, redesigning reflexivity*, ed. S. Koerner and I. Russell, 305–326. Aldershot: Asghate.

Renfrew, C. 1999. It may be art but is it archaeology. In *Mark Dion: Archaeology*, ed. A. Coles and M. Dion, 12–23. London: Black Dog Publishing.

Renfrew, C. 2005. *Figuring it out*. London: Thames & Hudson.

Renfrew, C., C. Gosden, and E. DeMarrais. 2004. *Substance, memory, display*. Cambridge: McDonald Institute.

Schablintsky, J.M. 2007. *Box office archaeology: Refining Hollywood's portrayals of the past*. Walnut Creek: Left Coast Press.

Shanks, M. 1991. *Experiencing the past*. London: Routledge.

Shanks, M., and M. Pearson. 2001. *Theatre/archaeology*. London: Routledge.
Smiles, S., and S. Moser, eds. 2005. *Envisioning the past: Archaeology and the image*. Oxford: Blackwell.
Watson, A. 2006. (Un)intentional sound? Acoustics and Neolithic monuments. In *Archaeoacoustics*, ed. C. Scarre and G. Lawson. Cambridge: McDonald Institute Monographs.
Witmore, C. 2004. On multiple fields. Between the material world and media: Two cases from the Peloponnesus, Greece. *Archaeological Dialogues* 11 (2): 133–164.
Wright, T. 1758. *Louthiana: Or, an introduction to the antiquities of Ireland. In upwards of ninety views and plans: Representing, with proper explanations, the principal ruins, curiosities, and ancient dwellings, in the County of Louth*. Divided into three books, 2nd ed. London: Printed for Thomas Payne.

Cultural Heritage Management and Maritime Law

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Introduction

The management of submerged cultural heritage is not only difficult because of the nature of the marine environment but especially so because this environment is subject to a very different regulatory regime to that applicable on land. It is subject to "maritime law." This potentially impacts on every aspect of cultural heritage management the further out to sea the heritage lies.

Definition

In a very broad sense, "maritime law" is composed of two separate bodies of law: admiralty law (largely of a private law nature) and the law of the sea (public law). These bodies of law, together with a third body of law – cultural heritage law – intersect and potentially apply to cultural heritage that lies below the low-water mark. All three of these bodies of law are underpinned by an international law framework, though this is interpreted, implemented, and supplemented by differing national perspectives, making the management of underwater cultural heritage particularly challenging. While each country has a unique regulatory regime, common, though debated, themes exist.

Historical Background

The law of the sea developed through customary use over many years to a point when, in 1958, it was codified in four separate international conventions: the Convention on the Territorial Sea and the Contiguous Zone, the Convention on the Continental Shelf, the Convention on the High Seas, and the Convention on Fishing and Conservation of Living Resources of the High Seas. With a changed international sociopolitical context together with rapidly changing technology that allowed access to the depths of the oceans, a new convention was adopted in 1984 (coming into force in 1996), which replaced these earlier conventions: the UN Convention on the Law of the Sea (UNCLOS). Not all countries, however, are party to UNCLOS, and the earlier conventions may still apply to some countries, though this is now only a very few. The conventions are supplemented by the customary international law of the sea, being rules of law derived from the consistent legal conduct of countries. To a large extent, UNCLOS codified the customary international law, and while it continues to develop, it effectively embodies the contemporary international law that governs the sea.

UNCLOS is often described as the "constitution of the oceans," and its most important function is to allocate rights and duties to countries through the creation of six maritime zones: internal waters, the territorial sea, the contiguous zone, the exclusive economic zone, the continental

shelf, and the Area (high seas and deep seabed). Within these zones, a balance is struck between the interests of the coastal countries and those of other countries, especially with "maritime countries," being those with significant investment in the world's merchant fleet through ownership, ship registration, or shipping logistics, such as Panama, Greece, Denmark, the United States, Korea, China, Japan, and Singapore. As each zone is situated further away from the coast, the interests of the coastal country wane and give way to the interests of maritime countries and the broader international community. The ability of any country to manage cultural heritage in each of these zones is therefore dependent on what rights and duties apply in each zone coupled with the coastal country's implementation of those rights and duties in its national laws.

While the international law of the sea defines the rights and duties of countries, a body of admiralty law has developed which regulates the conduct between individuals that relate to ships and shipping. It addresses, for example, issues relating to liability for collisions between vessels, liability for pollution and other hazards emanating from ships, and rewarding those that have saved ships and their cargo from the perils of the sea. Since much of the underwater cultural heritage is sunken ships, this admiralty law may play an important part in determining the regulatory and protective environment for this heritage. While underpinned by international customary law and a number of international conventions which seek uniformity across countries' laws, this admiralty law is essentially that of each country, applying to the maritime zones over which it exercises jurisdiction, as well as to its nationals and to those ships that are registered there and said to fly that country's flag.

This maritime law, as the law of the sea and admiralty law, when applied to underwater cultural heritage, necessarily imports a third newer body of international law: cultural heritage law. This cultural heritage law is an emerging area of international law underpinned by a number of international conventions adopted under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO), including the Convention for the Protection of the World Cultural and Natural Heritage, the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property, and the Convention on the Protection of the Underwater Cultural Heritage. Fundamentally, these conventions attempt to structure a regulatory regime which "protects" cultural heritage by ensuring its physical integrity, recognizing its social context, and emphasizing its contextual importance.

Key Issues

The management of underwater cultural heritage is entirely dependent on the regulatory regime of each coastal country and, depending on its constitutional structure, possibly sub-entities, such as provinces, states, territories, etc. However, the scope of this regulatory regime is dependent on the rights and duties the coastal country has in accordance with the law of the sea as set out in UNCLOS. When UNCLOS was negotiated, underwater cultural heritage was not particularly high in the order of priorities and therefore did not receive the consideration that was necessary to establish a strong protective regime in any of the maritime zones. Furthermore, a number of issues were left open for differing interpretation and country implementation. These legal problems are compounded in their practical application by the fact that, while most underwater cultural heritage lies in internal waters and territorial sea, advancement in diving technology has opened up the other maritime zones to exploration and exploitation. An appreciation for the possible scope of the coastal country's jurisdiction and the geographical extent of each zone becomes the essential framework for the management of the underwater cultural heritage.

Since UNCLOS applies where the land ends and the sea begins, it is from this point that each maritime zone is measured. This is never constant given the ebb and flow of the tide and which is exasperated by the fact that coastlines are not uniform and usually indented by bays, estuaries, ports, and rivers and may have numerous islands

close to the mainland. The solution provided in UNCLOS is for each country to measure this "baseline" at the low-water mark and have this represented on appropriate nautical charts. Exactly how this is done is left to each country. Some may use the lowest astronomical tide, while others might use a nominal point which might exist some way out to sea given changing sea levels and shifting coastlines. The baseline does not necessarily always follow the low-water mark around the coast and may be drawn across river mouths, bays, and harbors and along islands or sandbanks that appear at low tide. The baseline does not, therefore, necessarily reflect its geographical descriptor.

The maritime zones in which the coastal country has absolute sovereignty are its internal waters, and refer to those waters which lie on the landward side of the baseline, and usually include waters in harbors, ports, bays, and tidal rivers or between islands lying close to the shore and the mainland. As a sovereign country, the coastal country can regulate all activities in this zone as if those waters were land.

The sovereignty of a coastal country extends, beyond its internal waters to an adjacent belt of sea measuring up to 12 nautical miles from the baseline, described as the territorial sea. This sovereignty is subject to the convention, which provides for the innocent passage of foreign ships through this zone. Any activity directed at cultural heritage in the territorial sea would not, however, constitute innocent passage, and the coastal country has the exclusive right to enact laws that regulate such activity and protect cultural heritage in that zone. Indeed, most countries have legislation that regulates activities in the territorial sea, many of which also include the regulation of shipwrecks and underwater cultural heritage, such as the United States' Abandoned Shipwrecks Act, the United Kingdom's Protection of Wrecks Act, and Australia's Historic Shipwrecks Act. Naturally, the vast majority of submerged cultural heritage sites are likely to lie close to the land and within the territorial sea and include such important sites as the sunken city of Port Royal, underwater Alexandria, and the submerged temples of Mahabalipuram, as well as important shipwrecks such as the Bronze Age wrecks of Cape Gelidonya and Uluburun, *Batavia*, *La Belle*, *Lusitania*, and the *San Juan de Pasajes*.

Beyond the territorial sea, the jurisdictional capacity of the coastal country is less clear and subject to some international disagreement. This is particularly the case in relation to the exact jurisdictional capacity of the coastal country in the contiguous zone. This zone is an area adjacent to the territorial sea, measured 24 nautical miles from the baseline, in which the coastal country has limited control to prevent or punish infringements of its custom, fiscal, sanitary, or immigration laws. A number of countries, including Australia, Brazil, Canada, China, Denmark, Greece, Ireland, the Netherlands, and the United States, extended their national legislation to take into account underwater cultural heritage in this zone.

Whether the coastal country has any jurisdiction over underwater cultural heritage on the continental shelf is also subject to disagreement. The continental shelf extends from the shallows of the territorial seas down to the deep seabed and may extend up to 350 nautical miles from the baseline. Each coastal country is given the exclusive right to explore and exploit the natural resources of this zone, which includes mineral, gas, and oil resources as well as the living resources of the seabed such as lobsters, crabs, etc. Underwater cultural heritage was not, however, included in the definition of "natural resources," though UNCLOS requires countries to "protect objects of an archaeological and historical nature found at sea and shall co-operate for this purpose." A number of countries have interpreted this as allowing for an extension of their jurisdiction so as to regulate underwater cultural heritage on their continental shelves. These include Australia, Ireland, Seychelles, Cyprus, Spain, Portugal, Norway, and China. These are contentious claims, and while other countries, such as the United States, have indicated a contrary interpretation, no formal objection has been made to these possible extensions of jurisdiction. Coextensive up to 200 nautical miles of the continental shelf is the exclusive economic zone, in which the coastal state has the right to exploit the living resources of the seabed and water column, most importantly

fish. Like the continental shelf, UNCLOS failed to set out a clear regulatory regime for underwater cultural heritage in the exclusive economic zone. Heritage such as the wreck of the *RMS Titanic*, which lies on the continental shelf of Canada, is not therefore well regulated by UNCLOS.

A further complication in both the continental shelf and exclusive economic zone is the contextual relationship between the underwater cultural heritage and the marine environment. In these zones, the coastal country has rights with respect to the marine environment and its natural resources. Cultural heritage, such as historic shipwrecks, may quickly become part of the marine environment, through the concretization of marine flora and use by marine fauna, and subject to coastal country environmental protection regimes (such as the wreck of the *USS Monitor* on the continental shelf of the United States). This invokes the considerable body of international and national environmental law, compounding the complexity of the regulatory regime.

Beyond the continental shelf lies the Area (high seas and deep seabed), in which countries have the right to search for, survey, and excavate underwater cultural heritage and can authorize their nationals and vessels flying their flag to do so. While UNCLOS urges countries to protect underwater cultural heritage in this zone, the provision is too vague and imprecise to provide a basis for any regulatory regime.

While the extent of the coastal country's jurisdiction beyond the territorial sea is debatable, and therefore impacts on its ability to regulate activities by foreign-registered ships and nationals, it does not hinder the ability of the country to regulate its own nationals and registered ships. A country can therefore adopt laws regulating the conduct of its registered ships and nationals in any international maritime zone, including in relation to underwater cultural heritage found in that zone. The agreement between France, the United Kingdom, Canada, and the United Countries in relation to the activities directed at the *RMS Titanic*, for example, is based upon this jurisdictional capacity.

Within this jurisdictional context, countries may regulate underwater cultural heritage. It is here that cultural heritage law principles and admiralty law principles intersect. This intersection is fraught with tension as the two bodies of law are underpinned by fundamentally different principles. Cultural heritage law is fundamentally of a public law nature, seeking to preserve and protect the physical manifestations of our past for the benefit of society as a whole. This, for example, ensures that through the science of archaeology, pictures of past cultures and societies and their ways of life can be constructed through interpretation of scientifically gathered evidence. Increasingly, this protection of underwater cultural heritage is achieved while preserving the cultural heritage in situ. This body of law is underpinned by notions of collective interests, preservation, and non-commercialization.

Admiralty law, on the other hand, is fundamentally of a private law nature, regulating the manner in which private individuals interact in shipping activities. An ancient principle of admiralty law, for example, is the right of a person who has saved, or salved, another's property from the dangers of the sea to a reward from the owner of that property. This salvage principle is underpinned by notions of private ownership and commerce.

Attempts to reconcile these two bodies of law with their fundamentally different principles in international law continue to be particularly difficult. The 1989 International Salvage Convention seeks to achieve uniformity in the way countries implement salvage principles and fundamentally encourages individuals to voluntarily save lives and property at sea and to return such saved property to its owner and back into the stream of commerce. This, however, may be inconsistent with notions of protection in situ where the property is, for example, a sunken ship of archaeological importance. Whether salvage principles ought to apply in such a situation was the subject of much debate during the negotiation of the Salvage Convention and required a compromise. The compromise was essentially to leave this decision to each country, allowing the country the right not to apply the convention "when the property involved is maritime cultural property of prehistoric, archaeological or historic interest and is situated on the sea-bed." While some countries

such as Australia, China, France, Norway, Netherlands, Sweden, and Spain entered such a reservation, the majority of countries have not. That does not however necessarily mean that these countries apply salvage law to underwater cultural heritage as, despite not entering a reservation to the convention, they may nevertheless not allow for the provision of salvage law in their national legal systems.

A second attempt at addressing this conflict between cultural heritage law and admiralty law was made through UNESCO with the adoption of the Convention on the Protection of the Underwater Cultural Heritage. While the convention was prompted by this conflict, and the need to ensure that any activity directed at underwater cultural heritage was undertaken in accordance with appropriate scientific methods, it also sought to address the international law of the sea uncertainties in the jurisdictional capacities of countries to regulate underwater cultural heritage beyond the territorial sea. Both objectives were controversial and required compromise. The result was the partial extension of coastal countries' rights to regulate underwater cultural heritage on the continental shelf, requiring that country to cooperate with the country or countries with which the cultural heritage as some cultural or legal connection; and a restriction on the application of salvage law to underwater cultural heritage to those instances where prior authorization for disturbance has been given by the relevant country, which is usually the coastal country. Of great significance are the rules of good archaeological practice for underwater cultural heritage that are contained in an annex to the convention. It is the application of these rules that provides protection for that heritage in each of the maritime zones.

This attempt at reconciling these two bodies of law has only been partially successful, not only because of the compromise inherent in the text but because the convention has yet to achieve broad acceptance and ratification by countries. Some countries, such as the United States and the United Kingdom, which have traditionally favored the application of salvage law to underwater cultural heritage, have failed to become a party, as have a great many developing countries that have yet to address this conflict in their waters. The countries that have ratified the convention have tended to be those that have favored a cultural heritage context to the management of the cultural heritage and have largely excluded the application of traditional admiralty law. A number have taken such an approach, including Greece, Turkey, Spain, and Portugal. Nevertheless, for many, whether a party to the convention or not, their regulatory regimes evince an attempt at reconciling these two bodies of law without completely excluding either. Usually this compromise is underpinned by a system which allows private individuals to engage with the underwater cultural heritage but within a country's regulated system. Ordinarily this is underpinned by a system of authorization such that a license is needed prior to, variously, searching for, disturbing, or excavating underwater cultural heritage. In some cases, such as the United Kingdom, elements of salvage law persist such that the private individual may benefit financially from the sale of some of the recovered heritage. In other cases, such as Australia and South Africa, while private individuals may be involved in activities directed at underwater cultural heritage, no commercialization is permitted. In a number of countries, such as China, Greece, and Turkey, only the State, and not individuals, may engage in activities directed at underwater cultural heritage. Some though, such as Indonesia, appear to do so for commercial gain.

The scope of these regulatory systems differs remarkably between countries. Some, such as the United States and United Kingdom, while largely maintaining an admiralty law system, have excluded a small number of historic wrecks from this system. Only those specifically deemed to be of importance are excluded. Many other countries take a broad approach, excluding not only historic wreck of a certain age but also underwater cultural heritage other than historic wreck, such as submerged landscapes and settlements. What qualifies as an historic wreck is also subject to a number of different approaches. In South Africa, for example, it is wreck that has been underwater for more than 50 years, in Australia, 75 years, and in Ireland, 100 years.

Whether a country's regulatory regime is fundamentally based upon admiralty principles, or embraces a publically orientated cultural heritage framework, questions of ownership of underwater cultural heritage may still persist. Notions of continuing private ownership of underwater cultural heritage, most notably sunken ships and cargo, are entirely consistent with admiralty law principles and, indeed, underpin the very basis of salvage law. While problems may arise in establishing ownership, or determining whether ownership has been lost or abandoned, either expressly or impliedly, the notion of ownership prevails, so much so that in some countries, such as the United States, a finder of abandoned property may become the owner of that property, including the property of cultural or historical importance. In most countries, however such abandoned property will vest in the State. At the other end of the spectrum, a number of countries, such as Greece, Turkey, and South Africa, vest ownership of all cultural heritage, whether abandoned or not, in the State. This vesting of ownership in the State may be problematic when a private owner exists, as it effectively becomes a form of nationalization or confiscation, invoking human rights issues.

Given that a large number of historic ships are warships, and therefore State owned, a further problem in the regulatory regime is dealing with foreign State-owned cultural heritage within maritime zones over which the coastal country exerts jurisdiction. For example, the wreck of the *CSS Alabama*, sunk in 1864 off the coast of France, was claimed by the United States, while France has claimed ownership of the *La Belle*, which sank in 1686 off the coast of Texas, United States. This is particularly problematic in the territorial sea and internal waters when the regulatory regime of the coastal country does not necessarily give effect to the ownership rights as perceived and exerted by the owning country.

Future Directions

While the law of the sea provides a basic, but opaque, framework within which individual countries may exert regulations to manage the underwater cultural heritage, it does little to encourage a uniform approach to heritage management. Admiralty law too, though capable of taking some archaeological and historical value into account when awarding salvors for the recovery of private property, is no longer the basis upon which most countries manage underwater cultural heritage, and at its core, admiralty law principles are incompatible with cultural heritage law principles. The most promising mechanism for a uniform and effective management regime for underwater cultural heritage lies in the 2001 Protection of the Underwater Cultural Heritage Convention. Having come into force in 2009, a number of countries that had abstained from voting in favor of the convention, such as Germany, have now indicated that they will ratify the convention in due course. Similarly, countries such as the United States and United Kingdom face significant internal pressure to adopt the convention or, at the very least, to adopt the annex of the convention which sets out the code for best practice for activities directed at underwater cultural heritage.

Conclusion

Given its geographical location, the management of underwater cultural heritage is at times compromised by the need to address maritime law issues. The extent to which maritime law impacts on this management is entirely dependent in the particular national legal system. The extent of this impact can only be managed globally through the development of agreed regulatory regimes such as the 2001 Convention, which brings certainty and predictability to what is increasingly an international management issue.

Further Reading

Aznar, M. 2014. The contiguous zone as an archaeological maritime zone. *International Journal of Marine and Coastal Law* 29: 1–51.

Dromgoole, S. 2010. Revisiting the relationship between marine scientific research and the underwater cultural

heritage. *International Journal of Marine and Coastal Law* 25: 33–61.
Droomgoole, S., ed. 2006. *Legal protection of the underwater cultural heritage: National and international perspectives*. Leiden: Martinus Nijhoff Publishers.
Droomgoole, S. 2013a. *Underwater cultural heritage and international law*. Cambridge: Cambridge University Press.
Droomgoole, S. 2013b. Reflections on the position of the major maritime powers with respect to the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001. *Marine Policy* 38: 116–123.
Forrest, C. 2002. New international regime for the protection of underwater cultural heritage. *International and Comparative Law Quarterly* 51: 511–554.
Forrest, C. 2010. *International law and the protection of cultural heritage*. Abingdon: Routledge.
Garabello, R., and T. Scovazzi. 2003. *The protection of underwater cultural heritage: Before and after the 2001 UNESCO Convention*. Leiden: Martinus Nijhoff Publishers.
O'Keefe, P. 2014. *Shipwrecked heritage: A commentary on the UNESCO Convention on Underwater Cultural Heritage*. 2nd ed. Leicester: Institute of Art and Law.
Prott, L.V., ed. 2006. *Finishing the interrupted voyage: Papers of the UNESCO Asia-Pacific Workshop on the 2001 Convention on the Protection of the Underwater Cultural Heritage*. Leicester: Institute of Art and Law.
Williams, M. 2001. Protecting maritime military remains: A new regime for the United Kingdom. *International Maritime Law* 8: 288–301.

Cultural Heritage Management and Native Americans

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Introduction

The involvement of Native American groups in the field of cultural/heritage resource management is in some ways antithetical to the history of the discipline in the United States. A brief review of the historic preservation movement in the United States makes it clear that early historic preservation efforts were based primarily on upper-class values applied to concepts of history practiced by nationalist-focused groups. This nationalist focus has had implications for tribal groups who often get caught up in the conflict between "anthropology" as the study of allegedly simpler people and "history" as the study of groups which have evolved into civilizations. Such a conflict is also implicit in the term "historic preservation," since it seems to focus on saving those things whose purpose was fulfilled primarily in the past. For example, when tourists visit places like New Mexico's Taos Pueblo, they see a cramped, dusty, five-story structure that Americans have come to know as a pueblo. However, they are often disappointed when they encounter the Pueblo's inhabitants operating motor vehicles while talking on a cell phone in perfect English.

Historical Background

The first piece of legislation that related to the preservation of heritage resources in the United States – the Antiquities Act of 1906 – directly impacted the Native American heritage. The law extended governmental protection to historic and prehistoric remains on public lands; it established criminal sanctions for the unauthorized destruction or appropriation of antiquities owned or controlled by the federal government; it authorized a permit system for the scientific investigation of antiquities on federal land; and, peripheral to this discussion, it established a process whereby the President could set aside areas of "importance" for national monuments. In this manner, the law established a national principle relating to heritage – that cultural resources, regardless of origin, were an important fabric of the cultural history of the United States and were worthy of protection.

This attempt at protecting the cultural heritage of "all" Americans carried with it an unintended complication. The permit system which was established privileged the scientific community in that "the examinations, excavations, and gatherings are undertaken for the benefit of reputable museums, universities, colleges, or other recognized scientific or educational institutions, with a view to increasing the knowledge of such objects, and that the gatherings shall be made for

permanent preservation in public museums." Thus, early on in the historic preservation legislation, American Indians were denied any consideration of any interests they might have had in protecting their own unwritten history and material culture from appropriation by those "reputable museums, universities, colleges, or other recognized scientific or educational institutions." While the federal government deemed it was important to protect the material evidence of the American Indian cultures that had gone before, the fact that the contemporary tribal groups did not rate a mention in the law perhaps illustrates the amount of consideration that living American Indians rated at the time.

The cultural context of the time of the passage of the Antiquities Act is telling as well, especially as it related to those American Indian groups and their participation in federal legislation related to heritage preservation. 1906 was during the second decade of the federal government's grand experiment to "de-Indianize" the Indian by turning them from nomads into farmers and from communal land ownership/stewardship into individual "owners" of land. The Dawes Commission (1893–1907) and the Jerome Commission (1889–1893) turned millions of acres of American Indian tribally owned land into small allotments owned by individual Indians, with the "excess" land made available to homesteaders and non-Indian settlers. In this way, the land within and upon which Native American heritage rested was removed from American Indian control.

It was not until the passage of the Archaeological Resources Protection Act (ARPA) in 1979 that Native Americans were formally incorporated into historic preservation legislation, being given the right to participate in the granting of permits for archaeological excavations on Indian land. Still, while the uniform regulations developed to carry out ARPA required consultation with tribal groups who owned the land upon which the archaeological resources were located, the intent of these regulations was more to govern the issuance of permits than to involve American Indian groups. Additionally, as demonstrated by the inclusion of human skeletal material as "cultural resources" within the definitional section of the Act, Native American sensibilities were far removed from any underlying intentions of the Act.

While these two laws have had strong influences on the extent to which Native Americans have become involved in cultural heritage management, the most far-reaching law has been the National Historic Preservation Act (NHPA) of 1966, but only after the passage of later amendments.

The NHPA requires federal agencies to identify and mitigate the impacts of federal actions on historic properties within the scope of the federal project. These agencies conduct or contract for cultural resources surveys to find the historic properties that might be affected by the project, find the most appropriate ways of protecting the information within those properties, and then document the information so that the American public derives a benefit from the entire process.

As one aspect of this process, federal agencies consult with Native American groups in order to determine the extent to which American Indian heritage issues are impacted. Consultation (defined in the federal regulations that govern the NHPA as "the process of seeking, discussing, and considering the views of other participants, and where feasible, seeking agreement with them regarding matters" arising in the compliance process (King 1998: 94) is required at various stages in the historic preservation compliance process. In the United States, the status of land ownership or the level of federal involvement in a project determines which (or even whether) cultural resources protection laws apply. Federal laws apply to projects that occur on federal or tribal land, if there is federal funding involved in a project, or if a federal permit of any kind is required for the project to occur. Privately funded projects on private land are not required to follow federal laws regarding cultural resources *unless* a federal permit is required for the project to occur.

In addition to the consultation requirements of the NHPA, amendments to the Act passed in 1992 enhanced the role of tribes in the national preservation program. The amendments also strengthened the protection to places of cultural significance to Indians and Native Hawaiian

organizations. Specifically, the amendments allowed for the creation of tribal historic preservation programs and funding mechanisms, allowed for the creation of a competitive grant program to fund tribal initiatives in this regard, and required that one presidentially appointed member of the Advisory Council on Historic Preservation be a Native American or Native Hawaiian.

In 1996, as a result of the 1992 amendments, the National Park Service of the United States Department of the Interior approved the applications of 12 American Indian tribes to assume the responsibilities of the State Historic Preservation Officer to carry out compliance activities on tribal lands. By assuming these functions, the tribes agreed to be responsible for conducting (or causing to be conducted) historic property surveys within the areas under their jurisdiction, preparing and maintaining permanent inventories of historic properties within the lands under their jurisdiction, nominating properties to the National Register of Historic Places, and reviewing federal agency undertakings pursuant to Section 106 of the NHPA. As of July 2018, 183 tribes have been formally recognized as qualified to take over SHPO responsibilities on their lands.

Under the NHPA, Tribal Historic Preservation Officers are officially designated by a federally recognized Indian tribe to direct a program approved by the National Park Service. In addition, the THPO must have assumed some or all of the functions of State Historic Preservation Officers on the lands under the tribe's jurisdiction. In this manner, it is the tribe, and not the particular state (or states) within whose borders the tribe lies, that has the final say regarding the effects to cultural resources.

Key Issues and Current Debates

Limitations on Tribal Heritage Management Programs

The status of land ownership is the primary factor taken under consideration in regard to implementing federal historic preservation programs. As noted above, federal laws apply only to projects that occur on federal or tribal land, if there is federal funding involved in a project, or if a federal permit of any kind is required for the project to occur. Privately funded projects on private land are not required to follow federal laws regarding cultural resources *unless* a federal permit is required for the project to occur.

In this regard, some tribal groups are geographically removed from their aboriginal lands as a result of federal removal policies of the 1800s which forced tribal groups to give up land in the eastern United States and move to areas hundreds of miles away. Some groups still occupy large tracts of land within traditional or aboriginal lands within reservations originally defined in the 1800s. In other areas such as Oklahoma, land ownership has been interrupted because of the actions of the Dawes and Jerome Commissions that divided up reservation lands into individually owned allotments. This land tenure issue is doubly important, however, when one takes into consideration the fact that the cultural heritage of Native American tribes is so closely tied to the lands where their cultures originated, developed, and flourished – lands that, in the majority of cases, are no longer under the jurisdiction or control of its original occupants.

Additionally, because of the vast number of different tribal groups (567 as of October 1, 2017), land issues, relationships with local and the federal governments, financial conditions, size of population, and other issues vary by tribe. For some tribes like the Navajo Nation, it is economically and geographically feasible to undertake a heritage protection program, while, for others such as the Berry Creek Rancheria of Maidu Indians of California, finances and small population numbers preclude the need for such action.

Balancing scientific values required under federal laws with tribal values associated with heritage protection is a difficult and challenging task for tribal groups involved in heritage management programs. Because of the importance of oral tradition within tribal culture, many tribal historic preservation plans emphasize the importance of ongoing consultation with tribal elders and spiritual leaders with special knowledge of the tribe's traditions. Tribal groups also have given emphasis

to the importance of protecting "traditional cultural properties." These places are eligible for inclusion on the National Register of Historic Places not merely because of any archaeological or historical reasons but because of their association with cultural practices and beliefs that are rooted in the history of the community. They are important in maintaining the continuity of the community's traditional beliefs and practices and are links between past and contemporary cultures.

There are, however, many tribal programs that successfully managed to incorporate the best of tribal and scientific values (Swidler et al. 1997; Dongoske et al. 2000). The Society for American Archaeology published a "Working Together" column in the *SAA Bulletin* (http://www.saa.org/AbouttheSociety/Publications/SAABulletin/tabid/1341/Default.aspx) that explored these issues. The Society's current venue, the *Archaeological Record* (http://www.saa.org/AbouttheSociety/Publications/TheSAAArchaeologicalRecord/tabid/64/Default.aspx), continues to offer examples of ways that tribes work in these fields. These projects provide models for how archaeologists and indigenous peoples can work together to attain goals that are mutually beneficial to all heritage management parties involved.

Examples of Tribal Heritage Management Programs

The Navajo Nation exists within the largest reservation in the United States, covering about 25,000 miles^2 (about 65,000 km^2). The development of the Navajo cultural resources management program should be seen as a watershed event in the history of American Indian heritage management. The establishment of the Navajo Tribal Museum in 1956 was the beginning of tribal involvement in an archaeological and historical research program. In January 1972, the Navajo Tribal Council passed a resolution enacting an Antiquities Preservation Law for the Navajo Reservation which acknowledged the existence of the many ruins and artifacts on the Navajo Reservation. It also noted that the sites and objects were irreplaceable and invaluable in the study of the history and preservation of the cultural background of the Navajo Nation. It went on to set up procedures for permitting archaeological studies, the punishment of lawbreakers, and the protection of the resources. This resolution was one of the first attempts to extend tribal protection over cultural resources on tribal lands.

In 1977, the Navajo Nation established its own Cultural Resource Management Program to combine Navajo customary knowledge with professional anthropological expertise. Today it maintains several programs relating to protecting and preserving Diné (Navajo) culture in the Arizona, New Mexico, Colorado, and Utah region of the American Southwest, including its Chaco Sites Protection Program, its Cultural Resources Compliance Section, Facilities Management, its Forestry/Natural Resources Program, a Roads Planning Program, and its Traditional Culture Program. The overall program is not a tribally operated copy of the dominant scientific culture, however; the Navajo use traditional religious practitioners in the identification of project impacts on sacred sites, shrines, and other localities of importance to the Navajo quite apart from any other archaeological or ethnographic professionals (Navajo Nation n.d.).

The Zuni, another tribe in the American Southwest, have been involved in cultural preservation programs since the formal establishment of the Zuni Archaeology Program in 1978 and formed the Zuni Cultural Resource Enterprise in 1982. In 1994, the tribe preplaced the Zuni Archaeology Program with the Zuni Heritage and Historic Preservation Office, which is charged with the development and implementation of tribal policies to preserve the cultural and historic heritage of the Zuni people. This new organization now operates with a staff separate from that of the Zuni Cultural Resource Enterprise.

Since then, the tribe has been able to protect its cultural resources in the manner it wishes, without relying on outsiders to implement what might be perceived to be alien policies and procedures. The Zuni government recognizes the need for protecting their heritage as well as the benefits of

cultural resources management. They play an active role in the federal cultural resources management compliance process in a way that provides an interface between the historic preservation bureaucracy and the tribal structure in a way that helps to alleviate conflict between the tribe and outside interests. Additionally, the formulation of the Cultural Resources Advisory Team of the Pueblo of Zuni in 1991 added another process by which cultural resources are protected by the Pueblo.

In the state of Oregon in the American Northwest, the Cultural Resources Protection Program of the Confederated Tribes of the Umatilla Indian Reservation (CRPP n.d.) has been in existence since 1987 and was one of the first 20 tribes to take over the function of the Oregon State Historic Preservation Officer in 1996. It utilizes a combination of educational programs including cultural sensitivity, tribal cultural resources management perspectives, and other areas relative to heritage management. It also incorporates traditional cultural knowledge into its program as a means of further customizing its approach to the management of heritage resources important to the tribe and its members. Through these processes, the Umatilla have managed to modify the federal program into one that meets the needs of the tribal communities rather than only those of the anthropological or archaeological community.

As a result of treaties between the Choctaw and the United States, the Choctaw left their homeland in Alabama and Mississippi and trudged more than 400 miles westward to new lands in Oklahoma. This resulted in two things: the archaeological and historical manifestations of Choctaw heritage were no longer under tribal control, and the archaeological heritage of the Caddo and Wichita was placed under the control of the Choctaw as new landowners.

After the jointly held tribal land was divided among individual Indians during the allotment period, and after the excess land was opened to homesteading by non-Indians, the tribe had only minor control over cultural heritage that existed on non-Indian-owned lands. Currently, however, the Choctaw Nation of Oklahoma maintains a Tribal Historic Preservation Office as a means of protecting not only the historic culture of its own tribal members, but it also works with the Caddo Nation of Oklahoma and the Wichita and Affiliated Tribes of Oklahoma through intergovernmental agreements and procedures to ensure that the heritage of all groups is protected in ways each tribe wishes them to be protected.

These examples are glimpses of ways that tribal organizations are involved in heritage management and heritage protection. They are committed to protecting the manifestations of heritage on the landscapes over which they maintain control. More importantly, however, many tribal groups see cultural and heritage preservation as more than the protection of the archaeological or historic sites that more often are the focus of archaeologists. Some tribes focus on the interrelationships between land and people rather than on the single manifestations of human habitation on the landscape; others include botanical and other resources among items of heritage and provide mapping to prevent the destruction of traditional gathering places of wild resources; still others utilize state-of-the-art geophysical techniques to identify and protect areas that contain tribal grave locations.

The National Association of Tribal Historic Preservation Officers (NATHPO)

In 1998, the National Association of Tribal Historic Preservation Officers was formed to "support the preservation, maintenance, and revitalization of the culture and traditions of Native peoples of the United States." It does this through its support of tribal officials who undertake the role of the Tribal Historic Preservation Officer through training programs, lobbying for improved historic preservation funding, and providing an interface between federal agencies and the tribes. It also serves as a clearinghouse for tribal issues related to historic preservation, repatriation, and other cultural issues deemed important to the continuation of tribal sovereignty (NATHPO n.d.).

As is apparent in the previous discussion, American Indian tribes have chosen to participate

within the United States' cultural resources management and preservation programs. Many of the tribes operate programs that mirror those of the federal government as a means of protecting tribal historic resources from impacts to the physical manifestations of tribal history; many others have extended the definition of "cultural resources" to cover other aspects of heritage such as language, places where traditional plants are gathered, sacred locations, and other traditional cultural properties.

In this manner, Native American tribal programs have adapted federal programs to fulfill the needs of their membership in ways that strengthen ongoing concepts of tribal identity, contribute to the education of young tribal members, and protect one of the more important pieces of the fabric of American Indian life.

Cross-References

- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Heritage and Archaeology
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Local Populations and Global Heritage
- ▶ Stakeholders and Community Participation
- ▶ Uses of Heritage

References

CRPP of the CTUIR. n.d. Available at: http://ctuir.org/tribal-services/natural-resources/cultural-resources-protection-program

Dongoske, K.E., M. Aldenderfer, and K. Doehner, eds. 2000. *Working together: Native Americans & archaeologists*. Washington, DC: Society for American Archaeology.

King, T.F. 1998. *Cultural resource laws and practice: An introductory guide*. 2nd ed. Walnut Creek: AltaMira Press.

NATHPO. n.d. Available at: http://www.nathpo.org/aboutthpos.htm

Navajo Nation. n.d. Available at: http://www.hpd.navajo-nsn.gov/index.php?option=com_content&view=article&id=76&Itemid=481

Swidler, N., K.E. Dongoske, R. Anyon, and A.S. Downer, eds. 1997. *Native Americans and archaeologists: Stepping stones to common ground*. Walnut Creek: AltaMira Press.

Cultural Heritage Management and Poverty

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Introduction

For most of the time that cultural heritage management has been a discipline of study and practice, the impoverished members of society have been overlooked. Their contributions to the world's tangible and intangible heritage have been undervalued, and their role in the management of their own heritage has been minimized. In recent decades, this has changed to a considerable degree, but the process of bringing the poor from the periphery to (or closer to) the center of heritage management has been a complex one.

Definition

This entry considers the evolution of cultural heritage management from the perspective of the less advantaged members of society. It considers "poverty" as an evolving subject of study within cultural heritage management, while also considering the ways in which the material culture of the poor (including the gentrified poorer quarters of cities) are now drivers for heritage town planning and sympathetic urban redevelopment. It considers the involvement of "the poor" in community-based heritage planning and the role of heritage in the empowerment of Indigenous communities (which are commonly the most disadvantaged members of society).

Key Issues/Current Debates/Future Directions/Examples

Moving the Poor from the Periphery to the Core of Cultural Heritage Management

In the eighteenth and nineteenth centuries, "cultural heritage" (including the disciplines of

archaeology, art history, and architecture) was commonly the preserve of the wealthy. The "Grand Tour," as often as not, involved elites visiting the aging villas and ancient palaces of other elites. Most archaeologists (even those that did not necessarily come from wealthy backgrounds themselves) concentrated their efforts on the lavish tombs and palaces of Egyptian pharaohs and Mycenaean warrior-kings, while architects and art historians tended towards the study of grand monuments and masterpieces at the expense of the modest dwellings and art forms of the poor. As a result, a one-dimensional history of the world began to emerge, in which the history of past cultures became a history of the wealthy and powerful. The "other 98%" of society featured less commonly in these histories.

This phenomenon was reflected in the management of cultural heritage at the time. Typically, heritage management was governed by the principle of property ownership, which excluded less wealthy members of society from the process. To use the UK as an example, the *Ancient Monuments Protection Act 1882* was controversial (only narrowly being voted by parliament into law and only after a number of attempts) because it placed responsibility for the conservation of ancient monuments in the hands of government, thereby taking control of items of national heritage out of the hands of private (and almost invariably wealthy) land owners. There was, and still is, a clear philosophical divide between those who assert that property rights should prevail over the rights of the community to conserve and appreciate the nation's heritage, on the one hand, and those who argue that the community's views and interests should prevail over those of individual property owners, on the other hand. In the nineteenth century, when government became involved in the management of the national estate at all, it was typical to impose its own view of order on the populace and rarely took account of the heritage of its poorer citizens. For example, Haussmann's rebuilding of large parts of Paris (1853–1870), which resulted in the fine boulevards that characterize the city today, was carried out at the expense of large swathes of the medieval city, which were demolished en masse, despite the objections of the city's poorer residents.

This period was not entirely without proponents of a different approach to cultural heritage. The nineteenth-century essayist and art critic, John Ruskin, argued strongly for the conservation (rather than restoration) of cultural heritage places, which to Ruskin included the works of humble artisans and craftspeople. While Ruskin's political philosophy inspired early Christian Socialists and the creators of the welfare state, his philosophy in relation to art and architecture, which emphasized the "dignity of labor," underpinned the "Arts and Crafts" movement – a movement that drew inspiration from the tastes and skills of the poorer classes.

At around the same time, people began to appreciate the importance of good housing for the working classes. While European industrialization was at its height, some wealthy industrialists made a point of constructing "model villages" for their workers, drawing on sentimental perceptions of the rural idyll as inspiration for their housing schemes. These model villages provided a mental template for what the "true" historic English village looked like and became somewhat kitsch heritage goals to aspire to. Some of these model villages (e.g., Saltaire in Yorkshire) are today cultural heritage places in their own right. However, it took some time for the profession of town planning to truly appreciate the importance of a city's older quarters to its character and sense of self. It was not until after the Second World War, when inner-city gentrification became fashionable in western society, that the principles of town planning and urban design were augmented to reflect this concept. Sites that had hitherto not generally been thought of as heritage places, including the former residences and work places of the down-at-heel (rows of Victorian terrace houses and the chimney stacks of defunct factories), began to be listed on heritage registers and to receive legislative protections.

Such places are now commonly protected by legislation that makes no distinction between the heritage places of the rich and poor. For example, the Burra Charter, which provides guidelines for the assessment and management of heritage

places, makes no distinction on the grounds of the economic circumstances of the place's construction. In fact, the criteria that the Burra Charter provides for the assessment of heritage places are entirely neutral on this subject.

The Poor as an Object of Study

In the first half of the twentieth century, there was a slow shift away from the academic focus on the history and material culture of the rich and powerful. This has seen a concomitant expansion of the concept of cultural heritage and an embrace by many of the heritage of "slums," "the working class," and "the humble abode." Marxist theorists in particular began to ask very different questions of material culture in the early decades of the twentieth century, reorienting the emphasis of study towards the lives of the urban and rural poor. The "archaeology of poverty" has become a productive field of research for historians and archaeologists, particularly as inner-city development commonly occurs on the sites of the earliest-settled parts of cities (e.g., New York's "Five Points" and Melbourne's "Little Lon" District). Related to this are fields of research such as "the archaeology of capitalism," "the archaeology of inequality," and "the archaeology of slavery." Similarly, archaeologists began to expand their interests beyond the classical cultures of Greece and Rome to include prehistoric and "non-complex" cultures where the badges of rank and status were less clear and possibly less relevant. Archaeological sites, characterized by little more than scatters of stone artifacts or rudimentary mud-brick dwellings, appeared more commonly in both the academic and nonspecialist literature.

These shifts in the archaeological literature were reflected in the broader fields of cultural heritage. A new discipline – industrial archaeology – began to emerge in the 1970s and 1980s. "Industrial archaeology" does not necessarily involve material culture excavated from below the ground. Rather, it is a fast-expanding field of cultural heritage that concerns itself with the technologies, machinery, and work places of past cultures. In other words, it deals with the kinds of material culture that were traditionally the domain of the working classes and the poor.

Town planners have also been responsive to the desire of many people to reinhabit the houses and streets of the historically poorer parts of cities. The "gentrification" of parts of the world's great cities has been accompanied by new fields of research in architecture and design. Today, instead of the demolition of old buildings, we are more likely to see their retention and adaptive reuse. This trend has seen the emergence of a new kind of architect who specializes in the creative introduction of contemporary design into historical built forms.

Similarly, heritage interpretation has shown a willingness to embrace the stories of the urban and rural poor. Plaques, heritage trails, and public art now commonly reconnect us to the lives and living conditions of the poorest members of past societies.

The Poor as Participants in, and Proponents of, Cultural Heritage Management

In 1963, the monumental and iconic New York landmark Pennsylvania Station (or "Penn Station") was demolished in the face of international outcry. Many have pointed to the demolition of this heritage building as the birth of the modern architectural preservation movement. The demolition of Penn Station formed part of a program of "urban renewal" which was resisted by representatives of all sections of New York society on the grounds that it failed to appreciate the importance of historic built forms and ways of life. The 1950s and 1960s were characterized by many such urban renewal initiatives across the world. They typically entailed the wholesale demolition of the older parts of cities, those usually inhabited by the urban poor, and the construction of "modern" high-density residential structures in their place. This often pitted town planners and architects (who commonly held a single-minded commitment to the principles of "modernism" and to Le Corbusier's objection to the "disorder" of working class living places) against residents and others who recognized the value that the older parts of town (often places characterized by existing or recent poverty) lend to the character of a city as a whole. As a result, the latter decades of the twentieth century saw a movement towards the

recognition of the rights of *all* residents (including the poor) to be consulted in relation to the redevelopment of their living places. Today, legal processes in most developed countries provide everybody, including the poor, with access to the courts in order to object to development that they find offensive.

In Australia, a modernist-inspired movement to demolish some of the country's oldest homes in the inner-city Sydney suburb of "The Rocks" resulted in widespread resistance from both the local residents and the union movement, which imposed the so-called "green bans" on heritage places earmarked for demolition. Their resistance saved numerous heritage homes from the wrecking ball and resulted in the retention of social housing in this part of the city.

Similar battles are now being fought outside of the western world. Recent decades have seen an increased appreciation of the rights of Indigenous cultures to conserve both their tangible and intangible heritage. Indigenous cultures are commonly the most marginalized and economically disadvantaged members of society and their opposition to mining and development activities that threaten their cultural heritage often occurs at great personal and financial risk. The management of the impacts of such things as rampant tourism on the tangible and intangible heritage of Indigenous cultures (e.g., at Angkor in Cambodia and Machu Picchu in Peru) is a common challenge, recognized by UNESCO through international conventions such as the *Convention for the Safeguarding of the Intangible Cultural Heritage 2003*, which makes no distinction between the living heritage of the rich and poor. Equally, there are many who now recognize that cultural heritage can actually provide a means of poverty alleviation by providing developing countries with opportunities for sustainable development.

Today, all sections of society are heavily involved in cultural heritage practice. For example, community archaeological excavations regularly invite participation from volunteers, many of whom ask the legitimate question: "well, whose heritage is it anyway?" Meanwhile, in the inner-city suburbs of our metropolises, the gentrification of once down-at-heel places has seen a renewed appreciation of the houses and technical skills of yesteryear's poor. In most developed countries, all members of a community have the right, through heritage legislation, to be consulted about the form that their part of their cities may take and to object to offensive development in the courts.

Cross-References

- ▶ Community and Archaeology
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Outreach
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions
- ▶ Indigenous Archaeologies
- ▶ Labor Archaeology
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ "Public" and Archaeology
- ▶ Social Archaeology

Further Reading

Bakaye, B.L. 2007. Cultural heritage and poverty eradication in Uganda. *CRM: The Journal of Heritage Stewardship* 4 (1).

Casella, E.C., and J. Symonds. 2005. *Industrial archaeology: Future directions*. New York: Springer.

Leone, M.P., and P.B. Potter, eds. 1999. *Historical archaeologies of capitalism*. New York: Kluwer Academic/Plenum Publishers.

Mackay, R. 2003. Whose archaeology is it anyway? In *Exploring the modern city: Recent approaches to urban history and archaeology*, ed. T. Murray, 169–173. Melbourne: La Trobe University.

Matthews, C.N. 2010. *The archaeology of American capitalism*. Gainesville: University Press of Florida.

Mayne, A., and T. Murray, eds. 2001. *The archaeology of urban landscapes: Explorations in Slumland. New directions in archaeology*. Cambridge: Cambridge University Press.

McGuire, R.H., and R. Paynter, eds. 1991. *The archaeology of inequality*. Oxford, UK/Cambridge, MA: Blackwell.

Smith, L., P.A. Shackel, and G. Campbell. (eds.) 2011. Approaches to labour's heritage. *International Journal of Heritage Studies* 17 (4).

Cultural Heritage Management and Submerged Sites

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Introduction

Submerged cultural heritage encompasses everything from shallow, freshwater environments, through the coastal zone, down into the waters of the continental shelves, and ultimately into the abyssal depths of the oceans. Unfortunately, national inventories for such sites are still in their infancy, well behind equivalent inventories for cultural heritage sites on land. Meanwhile, international, collaborative inventories of submerged cultural heritage are virtually nonexistent. But hundreds of thousands of historically known wrecks have been mapped around the world, alongside countless other single find-spots of cultural materials identified by archaeologists, divers, fishermen, and other marine-zone users. There are thus potentially millions of such sites in existence, including everything from single find-spots up to complicated multiperiod submerged "landscapes." Technological advances now mean that there is no corner of the worlds' oceans that is not accessible to humans, although the logistics and costs of such access remain considerable, particularly in the deep ocean (Ballard 2009).

Submerged cultural heritage site types can be split into four main groups:

1. Wreck sites that are the result of accidental or deliberate loss (including sea, air and spacecraft debris, also land vehicles like tanks lost during amphibious warfare or transport)
2. Submerged settlement sites, especially prehistoric sites, that have been inundated over the long term through natural processes of climate change
3. Coastal industrial and settlement sites submerged due to medium- to short-term processes of flooding and erosion, both naturally and culturally driven
4. Inland and coastal freshwater and wetland sites, including lakes and rivers

The latter include both sites that have been lost to natural processes of coastal flooding and erosion and also through *cultural* processes of large-scale environmental management, particularly water management schemes that flood cultural sites, a contentious practice that has regularly been challenged by resident, especially Indigenous, communities. The US National Reservoir Inundation Study undertaken between 1976 and 1980 was one of the first and remains one of the best examples of the analysis of the impact of such practices on cultural remains (Lenihan et al. 1981).

There are particular issues of the public understanding of and engagement with submerged cultural heritage, including problems of understanding from within government. The scale and invisibility of many such sites encourage an "out of sight, out of mind" mentality among many communities. Related to this are issues of the lack of clear responsibility for site management, with a large number of sites lying in international waters outside of the direct control of any one nation, representing legally ambiguous sites with no management analogies to sites on land. The extreme depths of some sites, and thus the technical problems (also costs) of site access, exasperate these management problems. Even within the territorial waters of individual nations, cultural heritage management on submerged sites is regularly confused by an overly complicated management and planning regime. In general, most nations manage their marine cultural and natural assets, and also their terrestrial and marine environments, via different planning policies, environmental protection, and management laws. Different departments within a single government are in turn usually responsible for these different policies and laws. Such policies and laws operate within a broader management framework – including specific national cultural heritage laws, for which again there is often further variation in application and extent between the land and sea

zones. Exasperating this complicated management regime, many governments also fail to maintain overlapping terrestrial and marine zone datasets and inventories. Overall, such fragmented management and data regimes prevent a "seamless" understanding of these different environments and thus make effective cultural and natural heritage management extremely difficult. Such dedicated marine cultural resource management teams as different governments maintain – if any – are also usually under-resourced and overcommitted. One of the best known and most experienced of these is the US National Park Service's Submerged Resources Center (formerly the Submerged Cultural Resources Unit) founded in 1980 (Lenihan 2002).

Definition

The term "underwater cultural heritage" is most often used to define submerged heritage sites, including in legal terms. UNESCO defines underwater cultural heritage as meaning "all traces of human existence having a cultural, historical or archaeological character that have been partially or totally under water, periodically or continuously, for at least 100 years" (UNESCO 2001: article 1, point 1(a)).

Recognizing the urgent need to preserve and protect such heritage, UNESCO developed the *Convention on the Protection of the Underwater Cultural Heritage* in 2001 (UNESCO 2001) in order to promote international collaboration in the field of submerged cultural heritage. In January 2009, this convention came into force with respect to the first 20 States that had deposited their instruments prior to October 2008. As of September 2011, 40 nations had ratified or accepted the convention (Dromgoole 2006). However, many nations with major marine industrial or commercial commitments have so far failed to ratify the convention, variously citing (a) concerns about "creeping coastal state jurisdiction" (e.g., additional legal responsibilities stemming from ratification, which could upset the international jurisdictional balance achieved under the United Nations *Convention on the Law of the Sea* (UNCLoS) (1982) – see below), (b) concerns about the possible dilution of the principle of Sovereign Immunity by the convention (see below), and (c) the convention's "blanket" application to all underwater cultural heritage irrespective of relative archaeological or historical significance. Many nations also voice broader concerns as regards the costs of management and enforceability of the principles laid out in the convention.

In terms of definition, it is important to also clarify the basic relevant legal principles for the international marine zone as agreed under the United Nations *Convention on the Law of the Sea* (UNCLoS) (1982) (United Nations 2011):

- Article 3: Coastal States exercise sovereignty over their territorial sea, which they have the right to establish to a limit not to exceed 12 nautical miles.
- Article 49: Archipelagic States (made up of a group or groups of closely related islands and interconnecting waters) have sovereignty over a sea area enclosed by straight lines drawn between the outermost points of the islands.
- Article 57: Coastal States have sovereign rights in a 200-nautical mile "exclusive economic zone" (EEZ) with respect to natural resources and certain economic activities and exercise jurisdiction over marine science research and environmental protection in this zone.
- Article 76: Coastal States have sovereign rights over the continental shelf (the national area of the seabed) for exploring and exploiting it; from the shore, the shelf can extend at least 200 nautical miles or more under specified circumstances.

Of related relevance is also the principle of "Sovereign Immunity" (as agreed under Article 236 of UNCLoS (1982)). This relates to the wreck of any warship, naval auxiliary, and other vessels or aircraft owned or operated by a State and used only on government noncommercial service. Such wrecks are deemed to remain – irrespective of their location – under the control and ownership of their nation-states, unless lost by capture or sinking during battle, by international agreement,

or by an express act of abandonment, gift, or sale by the sovereign. Examples of such historic vessels protected under this principle include the CSS *Alabama* (lost 1864) (US ownership in French waters), HMS *Birkenhead* (lost 1852) (British ownership in South African waters), and HMS *Spartan* (lost 1944) (British ownership in Italian waters). Many nations also protect the remains of warships or aircraft (both on land and underwater) that are war graves through domestic legislation, for example, the US Sunken Military Craft Act (2005) or the UK's Protection of Military Remains Act (1986). Such laws operate over and above various nations' dedicated cultural heritage management laws.

Historical Background

The formal practice of cultural heritage management on submerged sites arose in the 1950s with the advent of commercially available technologies to access the marine zone regularly and reliably. To this end, cultural heritage management on submerged sites is a part of the wider global development of cultural heritage management as a practice and theoretical discipline following from World War II. Many of the approaches and philosophies of underwater cultural heritage management were consequently first developed on terrestrial sites. In the twenty-first century, there are increasing efforts being made to interlink terrestrial and submerged cultural heritage management practices and philosophies, such as through the use of "seamless" GIS datasets running across the coastline to allow the holistic management of contiguous terrestrial and marine cultural zones. An example of such seamless management are former island battlefield and/or military testing sites in the Pacific associated to World War II and the Cold War, such as at Chuuk Atoll (part of the Federated States of Micronesia), which was a major Japanese military base subject to assault by the US military in 1944 (Rainbird 2000), and Bikini Atoll (part of the Republic of the Marshall Islands), which was a US military atomic test site between 1946 and 1958 (Delgado et al. 1991) (Fig. 1).

Cultural Heritage Management and Submerged Sites, Fig. 1 A World War II US Sherman tank in Saipan's lagoon (Photo by Jennifer McKinnon, courtesy and copyright of Ships of Discovery)

Through the 1950s and 1960s, the rise of "sports" (e.g., amateur) (and to a lesser extent "commercial," e.g., professional) diving led to growing concerns with the looting of submerged heritage sites, initially of classical era wreck sites in the Mediterranean (UNESCO 1972) and later in more inaccessible areas, notably of historic wreck sites associated to the Spanish Armada around the western and northern coasts of Ireland and Scotland (Martin 1975), and also of Dutch East India Company (VOC) wreck sites around the Indian Ocean, especially the western coast of Australia (Parthesius 2009). Concerns about such activities were instrumental in the development of the formal academic discipline of "maritime archaeology" and also of the emergence of "avocational" groups dedicated to promoting public understanding and training. Notable among such organizations is the charitable Nautical Archaeology

Society (NAS) (founded in 1986), which has its origins in the Council for Nautical Archaeology founded in the UK in 1964. The avocational training scheme of the NAS has been taught around the world and is a central component of ongoing efforts to ensure consistent submerged cultural heritage management (Bowens 2008). Growing international concern about the extent of looting of submerged cultural heritage subsequently led to increasingly strenuous lobbying of governments around the world in the 1960s and 1970s, demanding that legal protection be given to submerged heritage sites commensurate to that already in existence on land. Such legal protection is now in force among many other nations around the world, although there remains a considerable disjuncture between and even within different nation's approaches in this respect. Many nations of the world also have yet to enforce any legal protection of their underwater cultural heritage. Since the 1980s, the problem of site-specific looting of historic wrecks has largely moved out of the sphere of individuals and into the growing international concern with what is sometimes erroneously termed "commercial maritime archaeology." This involves multimillion dollar organizations undertaking the wholesale looting of entire wreck sites to recover cargoes for resale, often in partnership with or on behalf of governments. Such salvage has been a particular problem in southeast Asian waters, with the recovery of materials – with limited archaeological analysis at best – of numerous sixteenth-, seventeenth-, and eighteenth-century CE China cargo ships. The recovered cargoes of such vessels have ended up at auction, their contents dispersed around the world and thus unavailable for comparative study. Such salvage is also undertaken in increasingly deep, often international waters of the continental shelves. Archaeologists criticize the recovery of materials from such sites for profit as being contrary to the ethical principles underlying archaeology (counter, in particular, to the 2001 UNESCO *Convention on the Protection of the Underwater Cultural Heritage*, especially the convention's Annex, Rule 2). Archaeologists also criticize such projects as being of limited scientific merit, with scant consideration of wider research objectives in the selection of sites to explore and recover materials from and with little attention being paid to the survey or recovery of nonprofitable but culturally important materials such as the hulls of vessels. In reply, proponents of such activities counter that the UNESCO convention is an unenforceable political and bureaucratic quagmire and that the concept of "preservation in situ" does not work (see discussion below).

The 1990s onward witnessed an expansion of interest in submerged cultural heritage management beyond the traditional concern of the protection of historic wreck sites. In particular, there has been growing global interest in the identification, exploration, analysis, and management of "submerged prehistoric landscapes." These are land surfaces that have been flooded after the end of the Last Glacial Maximum from c. 20000 BCE onward (Benjamin et al. 2011). Such interest has increasingly been undertaken in relation to industry, especially marine extractive industries such as oil and gas companies and aggregates extractors (Flatman 2012). Although the existence of such sites had been acknowledged since the early twentieth century, and their general extent hypothesized from the 1960s onward, it was only in the 1990s that the full extent and cultural significance of such sites began to be fully recognized, and formalized programs of cultural heritage management put in place (Fig. 2).

In particular, the Aggregates Levy Sustainability Fund (ALSF), a British government management initiative that ran between 2002 and 2011, funded millions of pounds of collaborative research between academia, commercial archaeology, and the marine aggregates industry exploring the extent of the submerged prehistoric landscapes of the southern North Sea within the UK's Exclusive Economic Zone (Gaffney et al. 2009). The ALSF also funded much other work relating to the prioritization of different marine cultural site types (especially different types of wreck site) and thus the development of refined types of exclusion zone around wrecks, as well as contributing greatly to the UK's dataset and mapping of such materials (Archaeological Data Service 2011). Similar initiatives to map, prioritize, and manage marine cultural assets have also

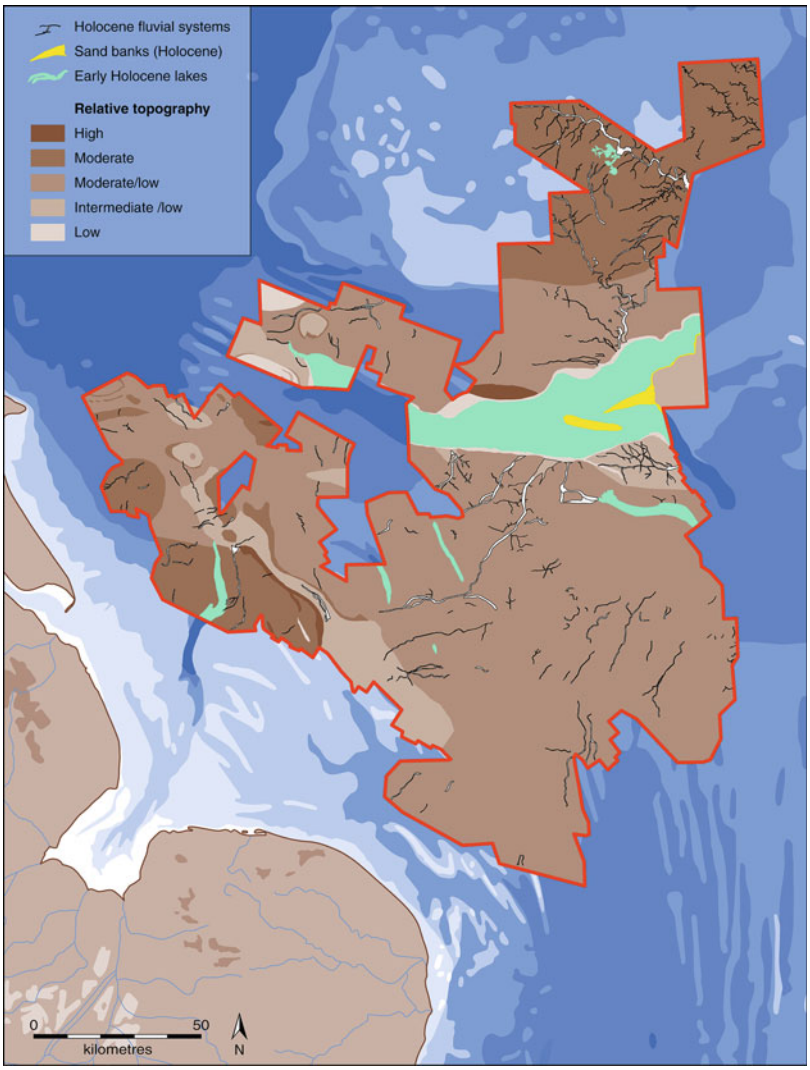

Cultural Heritage Management and Submerged Sites, Fig. 2 General distribution map of features analyzed by the North Sea Palaeolandscapes Project, from Gaffney et al. (2009: 83, Fig. 3.17) (Courtesy and copyright of the Institute of Archaeology and Antiquity, University of Birmingham, UK)

been implemented in other locations around the world, notably in US territorial waters by the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) through their management of federally controlled marine zones (BOEMRE 2011).

The later 2000s has witnessed an expansion of not the type of heritage site impacted by industrial developments, but rather of these types of industrial development themselves. In particular, there has been a growth of marine zone renewable energy infrastructure that has been recognized to have considerable potential impacts on submerged cultural heritage. This mainly comprises offshore and onshore wind farms, and to a lesser extent tidal energy barrages (Wessex Archaeology 2007). The later 2000s has also witnessed growing concern about other marine zone industries impacts upon submerged cultural heritage, including commercial fishing. Meanwhile, new marine industrial areas are coming into increasing commercial use for which the full potential of the cultural heritage has only just begun to be considered, especially the High Arctic.

In a different sphere, the 2000s witnessed a growing concern with the place of cultural heritage management in land and underwater "Integrated Coastal Zone Management" (ICZM). Such

management aims to reconcile the overlapping demands of different coastal zone industries with broader cultural values – including the protection of heritage – alongside medium-term environmental management regimes. In particular, this process has witnessed the recording of historic coastal sites felt at particular risk from coastal flooding and erosion and also from coastal management such as "hard rock" defenses as well as "soft" responses like "managed retreat" through the restoration of coastal salt marshes. The development of ICZM strategies has in turn led to specific types of related marine archaeological survey, most notably Rapid Coastal Zone Assessment Surveys (RCZAS). This is a distinctive form of rapid evaluation of coastal heritage assets that was first developed and implemented in England during the 1990s by English Heritage.

Key Issues

The current key issue in the field of submerged cultural heritage management is that of the legal status of such management, and stemming from this the effectiveness of existing management strategies. International cultural heritage management of submerged sites is currently enforced legally at a national level through various national laws (both specific heritage management laws and also broader planning and development laws and also policies). The majority of these laws and policies are ill equipped to deal with the scale, extent, and subtlety of submerged sites that do not conform to the normal expectations of cultural heritage sites found on land. In addition, international cooperation on cultural sites in transnational and international waters is still in its infancy. There are serious ongoing debates as regards the effectiveness of existing management strategies. In particular, this involves the question of the principle of in situ preservation as the preferred option for submerged archaeological sites. This is a principle common on terrestrial cultural heritage sites and is enshrined as a key principle in the 2001 UNESCO *Convention on the Protection of the Underwater Cultural Heritage*. However, the principle has been subject to sustained criticism in the marine zone, both the accusation that it is a form of "laissez faire" government (i.e., an excuse for minimal low-cost institutional intervention in submerged cultural sites on the grounds of a spurious preservation philosophy) and also that it neither protects sites effectively nor allows opportunities for archaeologists to excavate sites in order to gain new knowledge or learn how to properly execute such fieldwork and thus train the next generation of site managers. Leaving aside the published hyperbole on this issue – much of it self-servingly written by communities such as treasure hunters who have the most to gain by the public criticism of all forms of marine zone cultural heritage management – the concept of in situ preservation is a sound one with well-established practical and theoretical principles. However, there has been a lack of critical analysis of this principle's formal application in submerged contexts, given both the distinctive nature of submerged cultural sites (e.g., issues of their extent and survival) and also the nature of marine zone impacts on submerged archaeological sites in comparison to terrestrial sites (e.g., that terrestrial archaeological sites in many nations are required to be explored, including excavated, under law, even where remains will be left in situ, which is not true of most marine archaeological sites). Until marine archaeological sites are required under different nations' laws to be explored to the same extent as terrestrial sites in advance of development, this disjuncture between the protection and understanding of submerged cultural sites is likely to remain. This relationship is evolving – witness the increasing requirements of development-led marine archaeological intervention in relation to offshore renewable energy (Wessex Archaeology 2007) – but is still nowhere near the scale of development-led in situ site management witnessed on land (Fig. 3).

The principle of in situ preservation is based on a terrestrial heritage resource management model. This model has problems of compatibility in the marine zone on two fronts. Firstly, the terrestrial model assumes much lower levels of preservation and much lesser physical extent of sites than is commonly witnessed in the marine zone. This means that archaeological intervention in such

Cultural Heritage Management and Submerged Sites, Fig. 3 Offshore wind farm near the Isle of Thanet, UK, with the turbines between 7.1 and 10.8 miles distant (Photo by David Ball, courtesy and copyright of the US Bureau of Ocean Energy Management, Regulation and Enforcement)

sites on land can be relatively small scale and thus faster, easier, and cheaper. Secondly, the terrestrial model assumes generally precise, immovable locations of sites of the types hard to ensure and accurately measure in the shifting seabed of some marine areas. This means that it is much easier to leave some or all of a site in situ on land in comparison to at sea. These management problems are exasperated by the relative lack of data on the scale and extent of marine cultural heritage, which makes site prioritization hard to achieve – that is, the relative significance of different types or ages of site are difficult to judge. This means that modern terrestrial management principles on the basis of judgments of things like relative "significance," "setting," and so on are difficult to formulate for marine cultural heritage.

Barring a few high-profile discoveries, usually of historic ships – for example, the *Mary Rose*, the *Vasa*, the *Hunley* – most marine archaeological sites remain invisible to the general population, and even when in such cases they are visible, this is normally as a consequence of costly recovery efforts rather than in situ site management. Such public mentalities are hard to shift. Partly, this is an issue of influencing public perception. The marine natural environment lobby has worked hard over the past decades to foster a sense of communal responsibility for the seas and oceans of the world, of the need to respect and protect as communities marine biodiversity. These efforts have paid considerable dividends – concern about marine ecology is now on the "radar" of politicians. But many of the same threats to marine biodiversity also threaten marine cultural heritage. The problem is one of perception and recognition; these threats are not generally understood to be to cultural as well as natural heritage. Combined cultural and natural heritage site management regimes are in their infancy in this respect and require considerably greater political will, as much as anything in many cases forcing different responsible government departments for cultural and natural heritage to work more closely together in their shared interest. In some cases this even means the management of marine cultural heritage sites that represent a threat to the natural environment, for example, World War II era vessels leaking oil, such as the example of the wreck of the USS *Arizona* in Pearl Harbor, Hawaii, that is subject to ongoing monitoring by the US National Park Service (Murphy 2010) (Fig. 4).

Management regimes also need to be developed to better deal with the sheer extent of submerged cultural heritage. Current management models are still generally tied to the principle of

Cultural Heritage Management and Submerged Sites, Fig. 4 NPS archaeologist Matthew Russell conducting precision GPS survey on USS *Arizona* (Photo by Brett Seymour, courtesy and copyright of the US National Park Service)

"spot finds" of individual wrecks in precise locations, but this is not an effective form of management of many types of marine cultural heritage, in particular large, overlapping and complicated marine heritage sites such as prehistoric submerged landscapes on the one hand or World War I and World War II marine and coastal battle sites (covered with wrecked ships, aircraft, and other battle debris) on the other hand. What is needed in such circumstances are developments of the types of marine-protected zone or reserve commonly used to identify locations of marine natural environment significance, but which are exceptionally unusual in the case of marine heritage (a rare example being the USS *Monitor* National Marine Sanctuary off the eastern seaboard of the USA).

International Perspectives

As noted above, there are particular issues in UK waters as regards the management of submerged prehistoric sites in relation to industry. The example of the ALSF serves as a model for other nations to follow in which the key is close working relationships between archaeologists and industry. Overlapping EEZ management in the southern North Sea involving the UK and neighboring nations has also been attempted, reaching beyond the British national territorial sea remit of the ALSF, with governments working together to overcome the legal challenges to conjoined cultural heritage management and submerged sites (Peeters et al. 2009). What is most notable over the long term is the key place of the "public" in cultural heritage management of submerged sites. Around the world, there is a long and admirable history of public engagement helping to actively manage such submerged sites for the common good. Many of the most famous investigations of submerged heritage sites began as, and in some cases remained throughout, entirely "voluntary sector" activities with little or no government, academic, or other "professional" involvement – from shipwreck sites like the *Mary Rose* in England to the submerged prehistoric settlement of Tybrind Vig in Denmark. Thanks to initiatives like the Nautical Archaeology Society's (NAS) international training scheme, there are standards of good practice in place for the thousands of volunteers who yearly commit extraordinary amounts of time, effort, and money to the management of submerged sites, without reliance upon the often-insecure government or industry support.

Future Directions

Submerged cultural heritage management is likely to become a growing concern of the international heritage community in the mid-twenty-first century. This is due to issues of increased access, thanks to advanced marine survey/sensing technologies (especially remotely and autonomously operated underwater vehicles) alongside an

increased scale and intensity of marine resource development. As the growing global population makes ever-increasing demands for resources and as existing terrestrial supplies of many resources dwindle, the marine zone is an appealing source for such resources, both "traditional" resources such as oil and gas, minerals and metals as well as "alternative" resources such as renewable energy, alongside new developments such as large-scale marine zone farming for fish and nutrients. The marine zone is also increasingly being looked to as a locale for new developments such as deep ocean storage of CO_2 as forms of "carbon offsetting."

Industrial developments are particularly likely in areas of the world traditionally underexploited for marine resources but close to expanding industrial markets, such as the marine zones of Southern America, the Indian Ocean, and the South China Sea. Such locations have a limited history of formalized cultural heritage management, with little catalogued documentary and archaeological data to help judge the extent and significance of cultural resources in such areas. Meanwhile, speculators are increasingly also looking to the High Arctic as a potential new industrial and also shipping zone, anthropogenic climate change making these areas more accessible to oil and has exploration and cargo ships alike. The potential for cultural discoveries, especially submerged prehistoric remains, in all of these areas is significant, as is the likelihood of conflict with existing Indigenous Communities in these areas over the control of such industrial and also cultural resources. Such communities claims of ownership of submerged industrial resources on the basis of identified ancestral remains may become the great legal challenge of cultural heritage management in the twenty-first century, akin to the land ownership battles on the basis of cultural patrimony of the Americas and Australia in the 1980s and 1990s.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ China: Cultural Heritage Management
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management: Project Management
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: Public Perceptions
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ UNESCO (1972) and Malta (1992) Conventions
- ▶ United States: Cultural Heritage Management

References

Archaeological Data Service. 2011. Aggregates levy sustainability fund programme overview. Available at http://archaeologydataservice.ac.uk/archives/view/alsf/. Accessed 27 Sept 2011.

Ballard, R.D. 2009. *Archaeological oceanography*. Princeton: Princeton University Press.

Benjamin, J., C. Bonsall, A. Fischer, and C. Pickard, eds. 2011. *Submerged prehistory*. Oxford: Oxbow.

Bowens, A., ed. 2008. *Archaeology underwater*. Oxford: Wiley-Blackwell.

Bureau Of Ocean Energy Management, Regulation And Enforcement. 2011. Gulf of Mexico archaeological information. Available at http://www.gomr.boemre.gov/homepg/regulate/environ/archaeological/introduction.html Accessed 27 Sept 2011.

Delgado, J., D.J. Lenihan, and L.E. Murphy. 1991. *The archaeology of the atomic bomb*. Santa Fe: National Park Service.

Dromgoole, S., ed. 2006. *The protection of the underwater cultural heritage 2001*. Leiden: Brill.

Flatman, J. 2012. What the walrus and the carpenter did not talk about: maritime archaeology and the near future of energy. In *Archaeology in society*, ed. M. Rockman and J. Flatman, 167–191. New York: Springer.

Gaffney, V., S. Fitch, and D. Smith. 2009. *Europe's lost world*. York: Council for British Archaeology.

Lenihan, D.J. 2002. *Submerged*. New York: Newmarket.

Lenihan, D.J., T.L. Carrell, S. Fosberg, L. Murphy, S.L. Rayl, and J.A. Ware. 1981. *The final report of the national reservoir inundation study*. Santa Fe: National Park Service.

Martin, C.M. 1975. *Full fathom five: wrecks of the Spanish Armada*. London: Viking.

Murphy, L.E. 2010. Balancing historic preservation, science and the environment in underwater cultural heritage site management. *Conservation and Management of Archaeological Sites* 12: 13–38.

Parthesius, R. 2009. *Dutch ships in tropical waters*. Amsterdam: Amsterdam University Press.
Peeters, H., P. Surphy, and N. Flemming, eds. 2009. *North Sea prehistory research and management framework (NSPRMF)*. London: English Heritage. Available at http://uu.academia.edu/KimCohen/Books/136251/North_Sea_Prehistory_Research_and_Management_Framework_NSPRMF_2009. Accessed 9 Aug 2011.
Rainbird, P. 2000. 'Round, black and lustrous': A view of encounters with difference in Chuuk Lagoon, Federated States of Micronesia. In *The archaeology of difference*, ed. R. Torrence and A. Clarke, 32–50. London: Routledge.
UNESCO. 1972. *Underwater archaeology*. Paris: UNESCO.
UNESCO. 2001. *Convention on the Protection of the Underwater Cultural Heritage. 2001*. Paris: UNESCO. Available at http://www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/the-2001-convention/official-text/. Accessed 9 Aug 2011.
United Nations. 2011. Convention on the Law of the Sea of 10 December 1982. Available at http://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm. Accessed 26 Sept 2011.
Wessex Archaeology. 2007. *Historical environment guidance for the offshore renewable energy sector*. Salisbury: Wessex Archaeology. Available at http://www.offshorewind.co.uk/Assets/archaeo_guidance.pdf (Accessed 9 Aug 2011.

Further Reading

Advisory Council On Underwater Archaeology. 2011. Available at http://www.acuaonline.org/. Accessed 29 Sept 2011.
Australasian Institute For Maritime Archaeology. 2011. Available at http://aima.iinet.net.au/. Accessed 29 Sept 2011.
Firth, A. 2002. *Managing archaeology underwater*. Oxford: Archaeopress.
Flatman, J. (ed.) 2009. Special issue: Conserving marine cultural heritage. Conservation and Management of Archaeological Sites 11.
Flemming, N.C., ed. 2004. *Submarine prehistoric archaeology of the North Sea (CBA Research Report 141)*. York: Council for British Archaeology.
Grenier, R., D. Nutley, and I. Cochran, eds. 2006. *Heritage at risk: Underwater cultural heritage at risk*. Paris: UNESCO.
ICOMOS. 2011. Charter on the protection and management of underwater cultural heritage (1996). Available at http://www.international.icomos.org/under_e.htm. Accessed 29 Sept 2011.
Jameson, J.H., and D.A. Scott-Ireton, eds. 2007. *Out of the blue*. New York: Springer.
Macmullen, P.H. 2011. *CR643 underwater cultural heritage: An assessment of risks from commercial fishing*. London: Sea Fish Industry Authority Available at http://www.jnapc.org.uk/CR643_WrecksandFishing.pdf. Accessed 9 Aug 2011.
Nautical Archaeology Society. 2011. Available at http://www.nauticalarchaeologysociety.org/. .
Satchell, J., and P. Palma, eds. 2007. *Managing the marine cultural heritage*. New York: Council for British Archaeology.
Spirek, J.D., and D.A. Scott-Ireton, eds. 2003. *Submerged cultural resource management*. New York: Springer.
UNESCO. 2011. Underwater cultural heritage. Available at http://www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/. Accessed 29 Sept 2011.

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Cultural Heritage Management and the Colonial Culture

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Introduction

In the wake of Columbus' voyages of "discovery" of the Americas in the late fifteenth century, Europeans began aggressive colonial settlement of what became known as the New World regions of North and South America. Continuing European maritime explorations of the world in the sixteenth, seventeenth, and eighteenth centuries resulted in the establishment of colonies in Africa, Southern Asia, Australia, and Oceania. While the history of colonial impact in these various places differed in form and scale, in all cases it involved the European appropriation of Indigenous lands and seas. In settler-colonial contexts such as Australia and the USA, such appropriation frequently involved removal of Indigenous peoples from their lands, often through murder. Left behind were landscapes materially rich with cultural sites and places representing the cumulative products of millennia of complex and intimate cultural engagements by countless generations of Indigenous peoples. The ensuing history and fate of these cultural sites and places parallel in many respects the ways local Indigenous peoples were subsequently treated by colonial regimes. Equally

important, such history entails not only colonial disassociation of Indigenous people from their cultural sites but also colonial appropriation of these sites by European colonizers in the name of science, heritage, and nation building. Reversing the colonial processes of disassociation and appropriation has been a challenging task for Indigenous communities seeking to regain control of their pasts and cultural sites within the broader context of redefining and attaining social, political, economic, and cultural autonomy within nation states (Atalay et al. 2014; Colwell-Chanthaphonh and Ferguson 2010; Nicholas and Andrews 1997; McNiven and Russell 2005; Smith and Wobst 2005; Liebmann and Rizvi 2008; Lydon and Rizvi 2010). The settler-colonial contexts of the USA, Canada, and Australia provide well-documented and instructive examples of these anticolonial dynamics.

Definition

The process of colonization of Indigenous peoples and their lands is complex and varied and subtle and catastrophic. The intensity of impact was broadly correlated with the intensity of colonial settlement, with major urban regions seeing the most extreme examples of usurpation and destruction of Indigenous cultural sites. In more remote regions, colonial impact was marginal, with Indigenous peoples often maintaining strong traditional relationships with their lands, seas, and cultural sites. Yet in all settler-colonial settings such as the USA, Canada, and Australia, erasure of Indigenous sites was seen to be as important to the success of colonial settlement as removal of the peoples themselves. Erasure was both literal and symbolic. Literal erasure was the most obvious strategy and involved physical removal or destruction of cultural sites and objects. Expanding settlements with roads and railway lines, deforestation, and plowing of topsoil to make fields literally obliterated millions of Indigenous sites and objects across the Americas and Australia. A more symbolic and in many ways more insidious and pervasive form of erasure was redefinition and appropriation of Indigenous cultural sites and objects as non-Indigenous. Such symbolic appropriation was underwritten by Eurocentrism and the denial of history and inventiveness to Indigenous peoples located far from the self-proclaimed cultural hearth of Europe (Blaut 1993). While literal (physical) erasure has at its heart the process of forgetting, symbolic erasure also acts to undermine the legitimacy of Indigenous occupation and connections to place (Trigger 1989; Kehoe 1998; McNiven and Russell 2005; Díaz-Andreu 2007). The legacy of this history of erasure and appropriation underpins and defines the colonial culture of contemporary practices of cultural heritage management.

Examples

In Canada, much like the USA and Australia, the interpretation of archaeological sites during the late nineteenth century to early twentieth century was steeped in racist views of Indigenous peoples and their lifeways. Colonial settlers viewed the Indigenous past (and present places which Indigenous people occupied and continued to use during the colonial era) as disposal. A celebrated example of physical erasure occurred in Stanley Park located in Vancouver where the Coast Salish village site – *xʷáyxʷay* – was mined to surface the park's first road in 1888 (Fig. 1). Little is known about this village from an archaeological perspective, as the site's matrix was dispersed across the park as part of the road construction (Barman 2005:21). *xʷáyxʷay* was (and still is) an important place, with an origin story and deep significance reflecting Coast Salish peoples' relationship to what is now known as Stanley Park. The forced removal of Indigenous peoples from this place in the early twentieth century further demonstrates how the government determines where "Indianness" stops and property begins (Wolfe 2016:145). Even today Indigenous peoples must organize themselves to prevent the destruction of ancient sites and sacred places in the face of development capitalism.

Earthen mounds in the USA and Kimberley rock art of Australia provide celebrated examples of symbolic erasure. The monumental earthen

Cultural Heritage Management and the Colonial Culture, Fig. 1 Photograph of *xʷáyxʷay* being destroyed. (J. Wood Laing photo, City of Vancouver Archives, SGN 91)

mound sites of southeastern USA gave rise to the myth of the Mound Builders as archaeologists in the nineteenth century delved into their supposedly mysterious origins. Marginalizing sixteenth- and seventeenth-century European observations of Native American ritual use of these mounds, a colonial narrative was created such that the mounds were ascribed a non-Indigenous origin, with possible ancestral links to the barrow cultures of ancient Europe. Native Americans were subsequently presented as usurpers of the Mound Builder race. This ideologically driven interpretation represented Native Americans as violent and savage destroyers of a sophisticated society and unworthy of respect. Such views were part of a broader ideology which attempted to delegitimize Native American connections to land and cultural sites and to present European colonization as righteous, legitimate, and indeed worthy (Silverberg 1968; Kehoe 1998; Mann 2002; Wolfe 2016).

The Kimberley region of northern Western Australia is renowned for two major styles of rock paintings – recent Wandjina figures with large radiant heads and much older Gwion Gwion ("Bradshaw") figures with slender bodies and elaborate adornments (Fig. 2). Since these paintings came to the attention of Europeans in the nineteenth century, their complexity and aesthetic virtuosity were seen to indicate a non-Indigenous origin. In short, the European representation of Aboriginal Australians as primitive "savages" precluded ascribing elaborate Kimberley rock art an Indigenous origin. As with the Mound Builders myth, Aboriginal Australians were seen as recent interlopers who, unlike Europeans, were not legitimate and worthy inheritors of the Australian landscape and its complex human past (McNiven and Russell 2005; McNiven 2011; Porr and Bell 2012).

Key Issues

With the professionalization of archaeology as a formal discipline in the late nineteenth and early twentieth centuries, colonialist narratives of Indigenous pasts in the USA, Canada, and Australia were increasingly replaced by more scientific approaches to the past. As a result, ancient human sites and objects and associated "prehistoric" cultures were seen to be of Indigenous origin. As more resources were directed toward

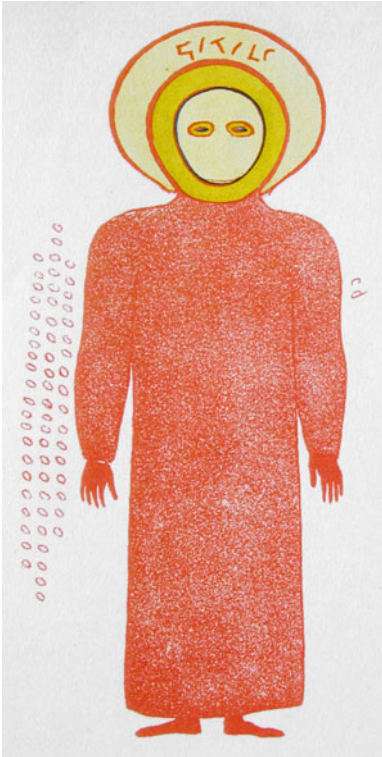

Cultural Heritage Management and the Colonial Culture, Fig. 2 George Grey's colonialist recording of a Wandjina following his 1838 observations. (From Grey 1841, 1: plate opp. p. 214)

archaeological research in the USA, Canada, and Australia, understandings of the deep chronology and historical and cultural complexity of Indigenous occupation of both landmasses grew dramatically. In North America in particular, this resourcing of archaeological research took place in the context of the development of museums which became storehouses for millions of Native American objects and the skeletal remains of hundreds of thousands of Native Americans (Thomas 2000). In Australia, archaeology developed more slowly, with large museum collections of Aboriginal artifacts and ancestral remains developing within the second half of the twentieth century.

The pace of development of archaeological research in both North America and Australia was matched by the enactment of laws to protect Indigenous archaeological sites. In the USA, the *Antiquities Act* of 1906 was aimed inter alia at protecting and preserving Native American archaeological sites from the ravages of "pot hunters." The scope of this protection was expanded considerably with the *Archeological and Historic Preservation Act* of 1974 which made it an offense to destroy Native American archaeological sites without prior assessment during projects either funded or endorsed by a federal agency.

Canada does not have a single definition for federal cultural heritage in Canadian law despite earlier attempts (Burley 1994). Rather, it is defined by specific statutes enabled by provincial governments. In British Columbia, for example, tangible cultural heritage is regulated by the Archaeology Branch which enforces the *Heritage Conservation Act* (*HCA*) (RSBC 1996) but only protects sites that existed pre-1846. The purpose of the *HCA* is to encourage and facilitate the protection and conservation of heritage property in British Columbia.

In Australia, the move to legally protect Indigenous archaeological sites came much later with most states introducing "relics" legislation during the 1960s and 1970s. Examples include Queensland's *Aboriginal Relics Preservation Act* of 1967 and Victoria's *Archaeological and Aboriginal Relics Preservation Act* 1972. While in the USA the *Antiquities Act* only applied to sites on federal lands, "relics" legislation in Australia applied to both public and private lands, with all archaeological sites and objects considered property of the Crown. The most obvious spin-off of the new legislation was the efflorescence of the cultural resource management (CRM) industry in the 1970s. CRM brought into sharp focus the view that the significance of archaeological sites was based primarily on notions of representativeness and archaeological research value in terms of sites as repositories of prehistoric data. Most archaeologists agreed that CRM was a positive move for site preservation (Smith 2004).

For many First Nations, Native Americans, and Aboriginal Australians, development of the CRM industry brought to a head the sense of marginalization created by archaeology's legislative and scholarly advances during the twentieth century. Such marginalization, as a further dimension of

colonial disassociation and appropriation, was expressed on four fronts. First, legal protection and excavation of sites were aimed at creating a cultural history for the benefit of White settlers. Second, Indigenous people had little or no say in the processes of archaeological research on their ancestral remains and little or no rights to veto what they considered to be inappropriate research. Third, couching cultural sites in terms of archaeological sites and relics was limited as it not only ignored other types of cultural sites (e.g., places of spiritual significance without archaeological remains), but it also implied that real Indigenous culture belonged to a dead past. Fourth, Indigenous people considered it inappropriate that the cultural heritage significance of Indigenous sites identified through the CRM process was assessed simply on scientific grounds without consideration of Indigenous cultural values. Many Indigenous peoples felt that non-Indigenous control and management of these cultural sites was based not on cultural right but on colonial might. The message was clear – archaeologists rather than Indigenous peoples were the appropriate stewards of the Indigenous past (Nicholas and Hollowell 2007).

Issues of marginalization and appropriation came to a head in the 1970s with debates over "who controls the past?" and "who owns the past?" (McBryde 1985). Many Indigenous communities in the North America and Australia demanded the return of ancestral remains and sacred objects held by museums as a counter-hegemonic and anticolonial strategy to reassert ownership and control of their past and heritage. The repatriation debate resulted in much soul-searching among archaeological and museum communities. Initially, Indigenous calls for ownership and control of ancestral sites and remains met with considerable resistance from archaeologists. Many archaeologists felt that the scientific integrity of their research would be jeopardized if Indigenous peoples dictated and censored research agendas and research results.

A watershed in the evolving debate over Australian Aboriginal control of archaeological sites and research arrived at the 1982 annual meeting and conference of the Australian Archaeological Association Inc. (AAA) held in Hobart, Tasmania. Present was Ros Langford, who on behalf of the Tasmanian Aboriginal community delivered a paradigm-challenging paper with a blunt message: "We say that it is our past, our culture and heritage, and forms part of our present life. As such it is ours to control and it is ours to share on our terms. That is the Central Issue of the debate." After considerable discussion, AAA passed a motion declaring that "This conference acknowledges Aboriginal ownership of their heritage. Accordingly, this conference calls on all archaeologists to obtain permission from Aboriginal owners prior to any research or excavation of Aboriginal sites." While during the 1980s most Australian archaeologists and CRM consultants took Indigenous permission as a given, it was not until the early 1990s that such values were enshrined in the AAA Code of Ethics. Similarly, the Canadian Archaeological Association's Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples of 1996 fully acknowledges the need for meaningful engagement and involvement of First Nations peoples in archaeological research (McNiven and Russell 2005: Chap 6). In contrast, the Society for American Archaeology's (SAA) eight Principles of Archaeological Ethics in 1996 make no mention of Native American ownership of archaeological sites. Internationally, the World Archaeological Congress First Code of Ethics, exemplified in Point 4, states: *To acknowledge that the important relationship between indigenous peoples and their cultural heritage exists irrespective of legal ownership.*

For many Indigenous peoples in settler-colonial contexts such as the USA, Canada, and Australia, security in controlling the destiny and management of their cultural heritage sites and objects is assured only after it becomes legislatively mandated. In the USA, among the legislative turning points were the *American Indian Religious Freedom Act* of 1978 and the *Native American Graves Protection and Repatriation Act* of 1990 (NAGPRA). The upshot of this legislation was that Native American tribes were to be given back human remains and associated funerary objects and other sacred objects held by federally funded institutions. In the case of ancestral remains returned for reburial, repatriation was

linked directly to land and cultural site management. In a related sense, the *Tribal Self-Governance Act* of 1994 provided opportunities for Native American communities to compel federal agencies to enter into co-management arrangements for federally owned public lands as a dimension of self-determination. Thus, the issues of Native Americans regaining religious freedom and control of cultural objects immediately reframed cultural heritage management as a dimension of land management. In short, the Indigenous cultural value and significance of objects and sites (including archaeological sites) could only be realized when set within their appropriate landscape context (Swidler et al. 1997; Watkins 2000).

In Canada, Aboriginal affairs and Aboriginal rights are a federal responsibility governed under the *Indian Act* (1876). This act enabled the forced removal of Indigenous peoples from their land and heritage, outlawed cultural practices and customs, and forced children into residential schools to assimilate into settler society. The Canadian federal government is starting to take responsibility by acknowledging the past through the truth and reconciliation commission and publishing multiple reports (http://www.trc.ca/websites/trcinstitution/index.php?p=890), including 94 *Calls to Action* (http://www.trc.ca/websites/trcinstitution/File/2015/Findings/Calls_to_Action_English2.pdf) to redress the legacy of residential schools and advance the process of Canadian reconciliation. Heritage is mentioned in Point 79 but largely to integrate Indigenous history, values, and memory practices into Canada's national heritage and history. The recent Canadian Supreme Court decision *Tsilhqot'in Nation v. British Columbia* (2014 SCC 44) established a precedent for the establishment of Aboriginal title on unceded land, without the requirement of a treaty. This decision has yet to be fully understood but could lead to significant changes in archaeological practice in British Columbia.

In Australia, the legislative push that gave Indigenous peoples greater say in the management and protection of their cultural heritage sites and places similarly came from the federal government. The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* provided a process whereby Indigenous people could apply to the Australian government to protect threatened sites and places of traditional significance irrespective of whether or not they exhibited archaeological evidence or were located on public or private land. A decade later, the passing of the historic *Native Title Act* of 1993 created a situation where government agencies and land developers (particularly mining companies) are obliged to negotiate with local Indigenous communities to determine mutually agreeable strategies to manage Indigenous cultural heritage sites and places on public (Crown) land (Lilley 2007; McGrath 2016).

Thus, one of the more important outcomes of federal legislation in Australia and the USA has been an expanded understanding of Indigenous cultural heritage sites and places as a dimension of a more holistic approach to landscape and environmental management. Important consequences of these changes for government authorities were that Indigenous cultural site protection and management not only required a broadened landscape perspective but also necessitated the employment of Indigenous peoples in cultural heritage and environmental management agencies. In short, Indigenous cultural sites could no longer simply be seen as geographical isolates and repositories of scientifically important (archaeological) data. Rather, the cultural importance of such sites centered on their capacity to define and help conceptualize the geographical and spiritual word and landscape of living Indigenous communities. Thus, archaeological sites reconceptualized as cultural heritage places beseeched the meaningful incorporation of Indigenous landscape management values and practices (Nicholas 2017; Swidler et al. 1997; Ucko and Layton 1999).

Current Debates

Reconceptualizing archaeological sites as cultural heritage places represented an important anti-colonial step whereby Indigenous peoples regained better control of their lives. In a practical

sense, this development has provided opportunities for Indigenous communities to be considered as stakeholders in cultural site and land management practices. In Australia, the stakeholder model has seen Aboriginal communities become senior advisors and co-managers of numerous national parks and World Heritage areas such as Mungo National Park, Kakadu National Park, and Uluru-Kata Tjuta National Park. In other contexts where Indigenous communities own lands and seas, the Australian government has provided support and funding for the establishment of Indigenous Protected Areas whereby protection of cultural and natural places, including archaeological sites, centers on Indigenous values managed by Indigenous rangers. In the USA, similar examples of co-management of national parks well known for archaeological sites include Canyon de Chelly National Monument in Arizona. In other cases, parks fall within tribally owned lands and are managed by Native American communities. Examples include Monument Valley Navajo Tribal Park in Arizona and Utah and the Santa Clara Pueblo and the Puye Cliff Dwellings in New Mexico.

First Nations of Canada have declared culturally important areas within their traditional territories as tribal parks. Tribal park designation ensures that lands, resources, and archaeological resources are protected and managed according to First Nation's visions and preferences. These areas are designed to protect traditional values in a modern context. It may also offer protection of natural resources and implement restrictions on access and/or visitation guidelines and resource extraction. In 1984, Tla-o-qui-aht First Nation in Clayoquot Sound designated Meares Island a tribal park to protect it from clear-cut logging. In 2009, they continued to establish more tribal park projects working with Parks Canada. In 1987, the Nlaka'pamux declared the Stein Valley as the Nlaka'pamux Tribal Heritage Park to protect its old growth forests; it has since been designated a Class A provincial park. Recently in 2014, the Tsilhqot'in National Government established the Dasiqox Tribal Park to manage the sustainability of the ecosystems necessary to support their Aboriginal rights. Although tribal parks exist, the term "tribal park" is not recognized legally in either provincial or federal jurisdictions in Canada. This term or the designation tribal park is not present on either the BC or federal government websites (Paquet 2013:3). Tribal parks have largely come into existence via negotiation spurred by protests. This has led to land resource management plans and negotiations over use between First Nations and provincial governments.

Co-management of World Heritage areas introduces a number of broader philosophical issues beyond those associated with equitable power-sharing arrangements. For a site or place to be included on the World Heritage list, it must be of "outstanding universal value" and meet at least one out of ten selection criteria. Some Indigenous communities believe that the notion of world significance is part of a colonial meta-narrative whereby Indigenous cultural sites and places are appropriated and ranked into a universal human history of Western construction. Such issues came to a head in Australia in the 1990s when scientific arguments for the world significance of certain Aboriginal cultural remains and artifacts attempted (unsuccessfully) to override local Aboriginal cultural values. Examples include the repatriation of the Kow Swamp Pleistocene human remains held by the Museum of Victoria to the Yorta Yorta Aboriginal community and the return of rare Pleistocene occupation deposits from southwest Tasmania held by La Trobe University to the Tasmanian Aboriginal community (Smith 2004; McNiven and Russell 2005: Chap 7). Yet in 2011 the Gunditjmara people of western Victoria commenced negotiations with state and federal government agencies to have the Budj Bim cultural landscape which contains complex eel trapping and aquaculture structures dating back at least 6600 years nominated for World Heritage listing. In 2017 the Australian government put forward the Budj Bim cultural landscape for inclusion on UNESCO's World Heritage tentative list. Clearly, different Indigenous communities see different values and opportunities with the World Heritage convention and the notions of world significance. Arguably the critical point of difference in acceptance or nonacceptance is whether the engagement process is proactive or reactive, respectively.

Future Directions

Many Indigenous communities see co-management of lands and cultural sites as simply a step toward the larger goal of cultural heritage autonomy. While the past century has seen Indigenous peoples make important anticolonial advances in regaining control and ownership of their cultural heritage sites and places, it is equally true that economic problems and poor resourcing often limit the potential of advances to be realized and put into practice. Lack of economic independence ensures that the degree of control many Indigenous communities have over their cultural sites and places is conditional on government funding or development capitalism. Clearly, cultural heritage autonomy for Indigenous communities is closely linked to economic independence. The postcolonial challenge for settler-colonial nation states such as the USA, Canada, and Australia will be accommodating Indigenous cultural heritage autonomy and replacing the colonial fantasy of a single national heritage with plural and polyvocal heritages featuring cultural sites, places, and objects that are shared and not shared.

Cross-References

- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Heritage Ethics, Cultural Base of
- ▶ Intangible Cultural Heritage
- ▶ Local Populations and Global Heritage
- ▶ United States: Cultural Heritage Management

References

Atalay, S., L.R. Clauss, R.H. McGuire, and J.R. Welch, eds. 2014. *Transforming archaeology: Activist practices and prospects*. Walnut Creek: Left Coast Press.

Barman, J. 2005. *Stanley Park's secret: The forgotten families of Whoi Whoi, Kanaka Ranch, and Brockton Point*. Madeira Park: Harbour Publishing.

Blaut, J.M. 1993. *The colonizer' s model of the world: Geographical diffusionism and Eurocentric history*. New York: Guilford.

Burley, D.V. 1994. A never ending story: Historical developments in Canadian archaeology and the quest for federal heritage legislation. *Canadian Journal of Archaeology* 18: 77–98.

Colwell-Chanthaphonh, C., and T.J. Ferguson. 2010. Intersecting magisterial: Bridging archaeological science and traditional knowledge. *Journal of Social Archaeology* 10 (3): 325–346.

Díaz-Andreu, M. 2007. *A world history of nineteenth-century archaeology: Nationalism, colonialism, and the past*. Oxford: Oxford University Press.

Grey, G. 1841. *Journals of two expeditions of discovery in north-west and Western Australia, during the years 1837, 38 and 39*. Vol. 2. London: T. & W. Boone.

Heritage Conservation Act (RSBC 1996) Chapter 187.

Kehoe, A. 1998. *The land of prehistory: A critical history of American archaeology*. London: Routledge.

Liebmann, M., and U.Z. Rizvi. 2008. *Archaeology and the postcolonial critique*. Lanham: AltaMira Press.

Lilley, I., ed. 2007. *Native title and the transformation of archaeology in the postcolonial world*. Walnut Creek: Left Coast Press.

Lydon, J., and U.Z. Rizvi, eds. 2010. *Handbook of postcolonial archaeology*. Walnut Creek: Left Coast Press.

Mann, B.A. 2002. *Native Americans, archaeologists, and the mounds*. New York: Peter Lang.

McBryde, I., ed. 1985. *Who owns the past?* Melbourne: Oxford University Press.

McGrath, P., ed. 2016. *The right to protect sites: Indigenous cultural heritage management in the era of native title*. Canberra: Aboriginal Studies Press.

McNiven, I.J. 2011. The Bradshaw debate: Lessons learned from critiquing colonialist interpretations of Gwion Gwion rock paintings of the Kimberley, Western Australia. *Australian Archaeology* 72: 35–44.

McNiven, I.J., and L. Russell. 2005. *Appropriated pasts: Indigenous peoples and the colonial culture of archaeology*. Walnut Creek: AltaMira Press.

Nicholas, G.P. 2017. Touching the intangible: Reconsidering material culture in the realm of Indigenous cultural property research. In *The Routledge companion to cultural property*, ed. J. Anderson and H. Geismar, 212–231. London: Routledge.

Nicholas, G.P., and T.D. Andrews, eds. 1997. *At the crossroads: Archaeology and first peoples in Canada*. Department of Archaeology, Simon Fraser University. Burnaby: Archaeology Press.

Nicholas, G., and J. Hollowell. 2007. Ethical challenges to a postcolonial archaeology: The legacy of scientific colonialism. In *Archaeology and capitalism: From ethics to politics*, ed. Y. Hamilakis and P. Duke, 59–82. Walnut Creek: AltaMira Press.

Paquet, M.M. 2013. *Parks as mechanisms to protect cultural and biological diversity. Land use designations: Definitions, descriptions, and legislation*. Port Alberni: MAIA BioLogics.

Porr, M., and H.R. Bell. 2012. 'Rock-art', 'animism' and two-way thinking: Towards a complementary epistemology in the understanding of material culture and 'rock-art' of hunting and gathering people. *Journal of Archaeological Method and Theory* 19 (1): 161–205.

Silverberg, R. 1968. *Mound builders of ancient America: The archaeology of a myth*. Greenwich: New York Graphic Society.

Smith, L. 2004. *Archaeological theory and the politics of cultural heritage*. London/New York: Routledge.
Smith, C., and H.M. Wobst, eds. 2005. *Decolonizing archaeological theory and practice*. New York: Routledge.
Swidler, N., K.E. Dongoske, R. Anyon, and A.S. Downer, eds. 1997. *Native Americans and archaeologists: Stepping stones to common ground*. Walnut Creek: AltaMira Press.
Thomas, D.H. 2000. *The skull wars: Kennewick man, archaeology, and the battle for Native American identity*. New York: Basic Books.
Trigger, B. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.
Tsilhqot'in Nation v. British Columbia. 2014. SCC 44.
Ucko, P.J., and R. Layton, eds. 1999. *The archaeology and anthropology of landscapes*. London: Routledge.
Watkins, J. 2000. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: AltaMira Press.
Wolfe, P. 2016. *Traces of history: Elementary structures of race*. London: Verso.

Further Reading

Connaughton, S.P., and J. Herbert. 2017. Engagement within: An anthropological exploration of First Nations engagement and consulting archaeology within a transnational corporation. *Archaeologies: Journal of the World Archaeological Congress* 13 (2): 306–343.
McGuire, R.H. 2008. *Archaeology as political action*. Berkeley: University of California Press.
McNiven, I.J., and L. Russell. 2008. Towards a decolonisation of Australian indigenous archaeology. In *Handbook of archaeological theories*, ed. R.A. Bentley, H. Maschner, and C. Chippindale, 423–443. Walnut Creek: AltaMira Press.
Thomas, N. 1994. *Colonialism' s culture: Anthropology, travel, and government*. Melbourne: Melbourne University Press.

Cultural Heritage Management Quality Control and Assurance

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Introduction

This entry briefly summarizes how quality control (QC) and quality assurance (QA) protocols and procedures came to be implemented in archaeology as a means of managing cultural heritage resources. This entry reviews how laws protecting cultural heritage resources led to the development of commercial archaeology in the 1970s and 1980s. With the advent of commercial archaeology, leading practitioners established best practices standards that were designed to ensure that archaeological sites were investigated and documented by qualified archaeologists. An integral component of best practices in archaeology is the implementation of QC/QA on all aspects of a project.

Definition

QC refers to the process implemented by a company or organization to ensure that standards are in place to ensure production of a quality project or service: This includes providing training for management and staff, providing software programs and equipment that facilitate provision of quality products and services, and establishing a culture of quality service within the organization. QA refers to programs that are established by companies or organizations to conduct systematic monitoring and evaluation of processes that are undertaken to complete a project, or provide a service, to ensure that their standards of quality are being attained.

Key Issues/Current Debates/Future Directions/Examples

Professional archaeologists have always been concerned about the quality of their work and the accuracy of their interpretations of the material remains left by past civilizations. With the advent of commercial archaeology in the 1970s to 1980s, however, archaeological investigations started being undertaken for profit and a new breed of archaeologists was born (Willems and van den Dries 2007a). In some instances, the desire to make a profit outshined the desire to perform quality research and archaeological resources suffered (Willems and van den Dries 2007a). Oddly, commercial archaeology started being practiced in many countries following the establishment of

laws that required infrastructure and development projects to consider the potential impact of their project on cultural heritage resources. These same laws, though designed to protect cultural heritage resources, in many instances resulted in a poor level of work being performed because either no professional standards were required (Willems and van den Dries 2007a, b), or if they were required, they were not enforced (Willems and van den Dries 2007a, b).

Laws to protect archaeology sites from impacts associated with development were first established in the United States, but other countries soon followed suit (Willems and van den Dries 2007a). Although the agencies that established these laws promulgated standards (i.e., 36 CFR Section 61 of the National Historic Preservation Act of 1966, 16; U.S.C. 470 et. seq., as amended; and Council of Europe 1969), it soon became apparent to the archaeology community that there was a need to establish a system of accountability among archaeologists practicing Cultural Resource Management (CRM) (Archaeological Institute of America 1994, as amended; Lyons et al. 1996; Lynott 1997; Adams 1997; European Association of Archaeologists 1998; Willems and van den Dries 2007a, b; Willems 2008).

In many countries, professional archaeologists banded together and created professional organizations that detailed educational and performance standards that must be met by its members (Table 1). Table 1 lists professional archaeology organizations that stipulate a code of ethics, minimum standards of education, training, and work performance to which their members must comply. These member organizations provide a valuable service to CRM by requiring members to apply professional standards in commercial archaeological investigations. In the United States, federal agencies require archaeologists who supervise archaeology work on federal lands, or federally funded projects, to be registered with the Register of Professional Archaeologists (RPA). The RPA reviews the work of registered archaeologists if they are reported as performing work that does not meet the standards of the RPA – in essence providing QC/QA of the work performed by its members. Nonetheless, it is difficult for a professional organization to ensure that its members conduct CRM at a level that meets the standards stipulated by the organization. One means of ensuring that CRM companies are performing work at the standards outlined by professional member organizations is to encourage companies to become accredited in International Standardization Organization (ISO) 90,001 QC/QA management systems.

Cultural Heritage Management Quality Control and Assurance, Table 1 Archaeology organizations with professional standards and a code of ethics

Acronym	Organization
ACRA	American Cultural Resources Association
AIA	Archaeological Institute of America
AAA	Australian Archaeological Association
ASAPA	Association for Southern African Professional Archaeologists
CAA	Canadian Archaeological Association
EAA	European Association of Archaeologists
IAFA	Irish Association of Professional Archaeologists
IAI	Institute of Archaeologists of Ireland
ICOMOS	International Council on Monuments and Sites
ICOMOS/ ICAHM	ICOMOS/International Scientific Committee on Archaeological Heritage Management (ICAHM)
IFA	Institute for Archaeologists
RPA	Register of Professional Archaeologists
SAA	Society for American Archaeology
SAFA	Society of Africanist Archaeologists

Adopting ISO Standards in Archaeology

The ISO became established during World War II out of a need for ensuring an acceptable level of quality in the mass production of equipment and materials needed for war. Since 1947, the ISO has developed several programs to help organizations establish management systems and operations that help ensure provision of quality services and products. If an organization is ISO certified, it is recognized by other organizations and agencies as

providing QC/QA on the work it performs. According to ISO 9001:2000, an organization meets the specific requirements for a quality management system by:

- Demonstrating its ability to consistently provide product that meets customer and applicable regulatory requirements
- Enhancing customer satisfaction through the effective application of the system, including processes for continual improvement of the system through auditing and adjusting the system to eliminate or minimize problem areas
- The assurance of conformity to customer and applicable regulatory requirements

By adopting the ISO 9001 QC/QA management system, an archaeology compliance company would ensure that the work it performed met national and international performance standards (i.e., Valletta Convention 1992). By integrating ISO 90001 QC/QA systems in all phases of an archaeological project, consultants can assure agencies, clients, and the public that the cultural heritage resources they are investigating are managed with the highest standard of care.

Integrated QC/QA in CRM

The information derived from archaeological investigations is largely dependent upon the questions posed during the proposal writing, or scoping phase of a project. Expertise is required to formulate the right questions to determine the scope of work required for a project. Accordingly, a system of QC/QA should be employed during the scoping phase. One or more archaeologists with considerable experience working in the geographic region where a project is proposed should critique the scope of work before it is submitted to a client or agency for consideration. This experience is needed to determine:

- What information should be reviewed (archives, maps, literature) to learn as much about the cultural history and archaeology of the project area as possible before field work is conducted
- The appropriate survey methods to be implemented (e.g., systematic transects versus shovel probes)
- How to document artifacts and features identified on the survey
- Mapping techniques to use
- Whether buried archaeological resources might be present

If buried archaeological resources are present:

- How to conduct test excavations, trenching, and stripping of the ground surface to expose buried cultural features
- How to sample an archaeological site through excavations to optimize the information that can be derived from these excavations
- The types of analysis that may be required (lithics, ceramics, fauna, flora, etc.)
- How to establish a date for the periods of occupation at the site
- How to reconstruct the environment that existed when the site was occupied
- What stakeholders and community members should be consulted

Another integral part of the scoping phase is determining who should conduct the investigations (from archival research, to specialists such as geomorphologists). Additionally, understanding the project needs facilitates developing an accurate schedule and budget for a project. A good way of assuring your project will stay on time and on budget as well as meet national/international best practices is by having a qualified archaeologist peer-review the proposal – a critical first step in implementing a successful QC/QA management system.

Beyond Project Scoping

Correctly scoping and costing a project can be critical to project success, but several other steps are also required in an integrated QC/QA management system. Whenever feasible, one or more senior qualified archaeologists should provide oversight of all stages of a commercial

archaeological project. Independent peer review of the project proposal, work plans, and deliverables by one or more professional archaeologists provides a further step in achieving good QC/QA practices in archaeology.

Other important elements for ensuring quality performance on a project include consultation with stakeholders, including groups or individuals who may have some knowledge of the historical occupation of a site, or have traditional ties to the site or to the landscape, and using a good database, project management software, and cost-tracking software.

Stakeholder Consultation

Inadequate consultation with stakeholders can result in the failure of a project. Stakeholders often have political and/or social power and can influence whether a project moves forward or is shut down. Correspondingly, establishing policies, protocols, and procedures for conducting stakeholder consultation is important for the success of archaeological investigations. The Warkworth Sands Excavation Project (WSE), undertaken in Australia by Rio Tinto Coal, Scarp Archaeology, and the Upper Hunter Valley Aboriginal Cultural Heritage Working Group (CHWG), provides an excellent example of a good stakeholder consultation program. Rio Tinto Coal has a suite of comprehensive Aboriginal cultural heritage management policies, protocols, and procedures (Godwin 2010). Since 2005, Rio Tinto has been working with the CHWG to obtain their input on archaeological investigations undertaken in the Upper Hunter Valley. The WSE was a large-scale and technically complex project that was successfully planned and implemented in the heart of an operational mine. The excavation of four 25 m^2 test pits up to 3 m in depth was undertaken by hand over an 8-week period. Although Rio Tinto archaeologists supervised the excavations, the CHWG actually performed the excavations, supported by a wide variety of technical specialists (e.g., ground-penetrating radar and geomorphology). By following their stakeholder consultation policies, Rio Tinto successfully completed the project on time and on budget, and helped train Aborigines in archaeological best practices, which has contributed to maintaining a good working relationship with the CHWG (Klar 2008).

Database Programs

Accurately tracking the provenience of cultural horizons and associated artifacts, fauna, and other samples collected during archaeological investigations is important for ensuring reliable interpretation of these data. To help ensure the accurate tracking of this information, it is critical to employ a good relational database and stringent QC/QA on data entry. How to set up a database is beyond the scope of this section. However, it is important to note that a qualified archaeologist should be involved in the database design to ensure the right variables are entered to enable statistical analyses. Data entry should be cross-checked and verified frequently to help minimize key-stroke errors, or miss-entry in specific data fields. Microsoft Access is one of the most common databases used in archaeology.

Improving the capabilities of a database is an iterative process that requires reviewing input variables to determine their adequacy for the types of analyses needed for a project, or for a future project. By continually refining a database, archaeologists can continue to improve their interpretations of the cultural resources being investigated.

Management Software

Microsoft Project, Quitiq, and Attask are scheduling software programs that facilitate tracking project tasks, milestone due dates, and meetings, and help identify whether additional staff is needed for a specific task or additional equipment needs to be purchased (Fig. 1). Utilizing these types of software programs makes it easier for project managers to identify potential problems meeting the project schedule. By identifying

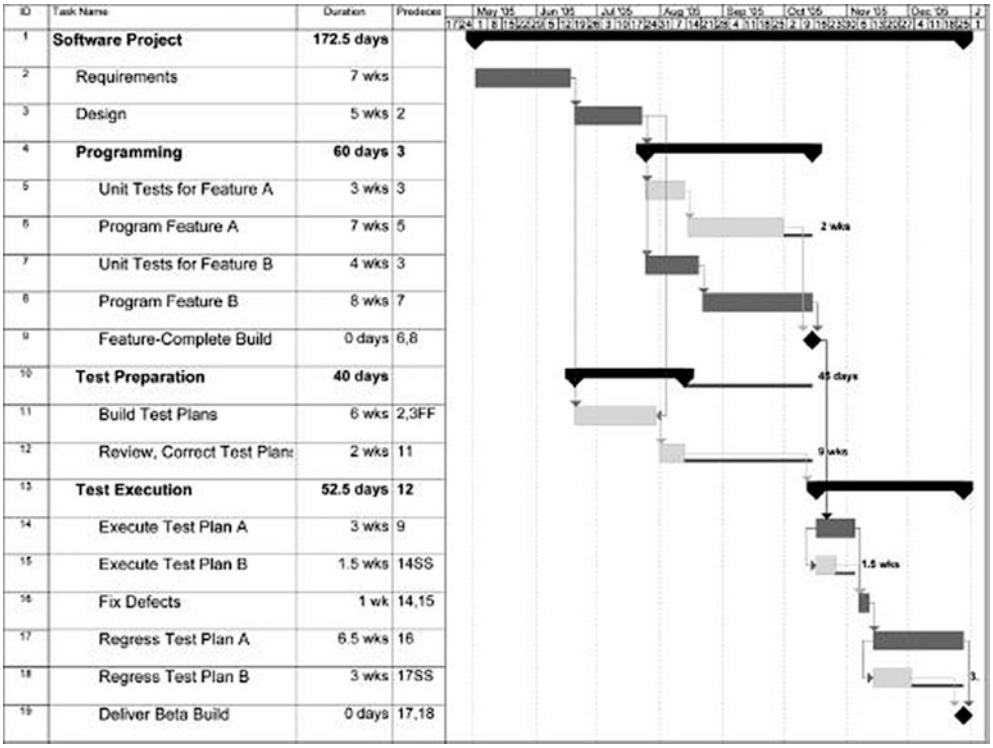

ID	Task Name	Duration	Predecessors
1	**Software Project**	**172.5 days**	
2	Requirements	7 wks	
3	Design	5 wks	2
4	**Programming**	**60 days**	**3**
5	Unit Tests for Feature A	3 wks	3
6	Program Feature A	7 wks	5
7	Unit Tests for Feature B	4 wks	3
8	Program Feature B	8 wks	7
9	Feature-Complete Build	0 days	6,8
10	**Test Preparation**	**40 days**	
11	Build Test Plans	6 wks	2,3FF
12	Review, Correct Test Plans	2 wks	11
13	**Test Execution**	**52.5 days**	**12**
14	Execute Test Plan A	3 wks	9
15	Execute Test Plan B	1.5 wks	14SS
16	Fix Defects	1 wk	14,15
17	Regress Test Plan A	6.5 wks	16
18	Regress Test Plan B	3 wks	17SS
19	Deliver Beta Build	0 days	17,18

Cultural Heritage Management Quality Control and Assurance, Fig. 1 A sample schedule for tracking tasks and resources for a project

scheduling problems early, managers can either juggle tasks to meet the schedule requirements, or inform the client that a due date cannot be met and request an extension. Closely managing a project schedule can help minimize missing important meetings and due dates, and providing clients with an early warning of problems meeting the schedule can enhance consultant-client relationships. This process can also help managers develop more realistic schedules for future projects.

Cost-Tracking Software

Accurately costing a project during the scoping phase is extremely important for completing a project within the approved budget. Equally important is the need to track a project budget during all phases of the work that is being performed. Typically, on any archaeology project, several people can be involved in performing the work. Although each of these individuals may be assigned a certain number of hours to perform a task, individuals may go over their approved hours without informing the project manager.

To circumvent potentially going overbudget as a result of individuals charging too much time to a project, cost-tracking software should be utilized. These programs are utilized for tracking the number of hours each person charges on a weekly basis, and provides an analysis of the percent complete (hours charged relative to the number of hours assigned for a particular task). Weekly analysis of a project budget can help managers determine whether a specific task is nearly overbudget. This provides the manager with an opportunity to determine whether an adjustment needs to be made to the level of effort undertaken to complete a particular task or request additional funding from the client. As with scheduling, providing clients with an early warning of problems

can enhance consultant-client relationships. The budget review process can also help managers develop more accurate budgets on future projects.

Cost-tracking software can be proprietary or purchased. Common cost-tracking programs include: Attask, EcoSys – Enterprise, Kronos, and Replicon. In addition to provide a means of tracking hours, these software programs can track project expenses and provide up-to-date summaries of budget status.

Bringing It All Together

An example of how a comprehensive QC/QA management system works in CRM can best be illustrated by a brief summary of the QC/QA management system practiced by Statistical Research Inc. (SRI). SRI is one of the largest heritage management companies in the world and has an outstanding reputation with its clients and agencies for the quality of work it performs. This reputation by and large can be attributed to the company's implementation of an integrated QC/QA management system, from the point of careful hiring and training of staff in SRI procedures, to the submittal of reports to clients and agencies. Senior archaeologists (Ph.D. plus 15 or more years of experience) provide internal review during all project phases, from scoping and costing a project, to analysis and report writing. Quality control is further facilitated through use of SRI's proprietary database (SRID) and budget-tracking software (NAVISION).

An example of how SRI's integrated QC/QA management system results in high-quality archaeological investigations and project reports is exemplified in the Joint Courts Complex Archaeological Project (JCC Project). The JCC Project was undertaken in Tucson, Arizona, and entailed the excavation of a 4.3-acre parcel located in the downtown area of the city that contained a large historical-period cemetery dating from the 1860s to 1881. Nearly 1400 individuals were recovered, and these remains and associated burial objects were either repatriated or reburied in a specially designated area in a local cemetery. The project required mitigation of all prehistoric and historical-period cultural resources within the land parcel, including Middle and Late Archaic features, Formative period artifact scatters, and a large late-nineteenth- and twentieth-century urban residential and commercial components. The JCC Project was undertaken by SRI from 2006 to 2010, and required the work of qualified specialists that included historians, historical archaeologists, geoarchaeologists, GIS experts, osteologists, 3-D scanning specialists, and public outreach and public relations consultants. The work performed by these specialists was overseen by a QC/QA team that routinely reviewed all work being performed in the field, as well as analysis and report writing. The QC/QA team also provided support for the extensive stakeholder consultation performed for the project. Consultation was undertaken with various groups who had ties to the site, including claimants for the historical-period human remains that were excavated. All project data and non-burial-associated artifacts and samples were curated at an approved facility in Tucson, Arizona.

SRI used Microsoft Project to track the progress of the project over its 4-year duration, and Navision data allowed detailed analysis of staff time expended by task. SRID was used to track all excavations including individual grave excavations, to provide the client, Pima County, with weekly completion reports and a dynamic map of the project area that reflected progress. SRID links multiple data categories – discovery units, features, proveniences, artifact collections, osteological remains, and on-site storage locations – in a single database that manages data from discovery to final curation. This was essential for QC/QA at JCC, where SRI recovered 37,000 different artifact collections from 30,000 proveniences and 1900 features. The budget for the project was approximately 15 million USD (included fee for demolition contractors), and the work was completed on time and on budget. The project was reported in 2010 in a four-volume report series (Gray and Swope 2010; Hall et al. 2010; Heilen and Gray 2010). SRI QC/QA procedures were used during all phases of the project, ensuring the work was performed at the highest standard of professionalism and the reports

provide an accurate interpretation of this time period in Tucson's history.

Conclusion

Implementing a QC/QA management system in CRM can circumvent multiple types of problems that can otherwise occur, ranging from budget and schedule overruns, to misinterpreting important elements of a cultural heritage resource site. By implementing a management system that replicates ISO 9001, such as the system employed by SRI, or by becoming ISO accredited, CRM companies can better assure that they are recognized as providing a quality service. Further, the general reputation of CRM could be improved among academic archaeologists. More CRM companies would be accepted as professionals making an important contribution to the archaeological literature and to the public understanding of the past.

Cross-References

- ▶ Canada: Cultural Heritage Management
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Management: Project Management
- ▶ Cultural Heritage Project Management Based on Project Management Body of Knowledge (PMBOK)
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Heritage Research and Visitor Planning
- ▶ Netherlands: Cultural Heritage Management
- ▶ United States: Cultural Heritage Management
- ▶ World Heritage Education, Training, and Capacity Building

References

Adams, R.E.W. 1997. SOPA/ROPA: important both at home and abroad, in comments from the membership on the ROPA proposal. *Society for American ArchaeologyBulletin* 15.

Archaeological Institute of America. 1994. *Code of professional standards, as amended 1997 and 2008*. Boston: Archaeological Institute of America.

Council of Europe. 1969. European Convention on the Protection of the Archaeological Heritage. London.

European Association of Archaeologists. 1998. The EAA principles of conduct for archaeologists involved in contract archaeological work, in *Annual Business Meeting, Goteborg (Sweden), 26 September* 1998. Available at http://www.e-a-a.org/princond.htm. Accessed 21 June 2011.

Gray, M.A. and K. Swope, eds. 2010. *History and archaeology of the joint courts complex postcemetery period, 1875–2006. Deathways and lifeways in the American southwest: Tucson's historic Alameda-Stone Cemetery and the transformation of remote outpost into an urban city, volume 3*, (Technical Report 10–97). Tucson: Statistical Research.

Godwin, L. 2010. Appendix H: Aboriginal cultural heritage study, in *Carrington West Wing Aboriginal cultural heritage assessment report*. Rio Tinto: Coal Australia, Central Queensland Cultural Heritage Management Pty Ltd.

Hall, J.D., K.C. Linde, M.A. Keur and K.J. Sewell, eds. 2010. *Feature descriptions from the joint courts complex archaeological project, Tucson, Arizona. Deathways and lifeways in the American Southwest: Tucson's historic Alameda-Stone cemetery and the transformation of remote outpost into an urban city, volume 4* (Technical Report 10–98). Tucson: Statistical Research.

Heilen, M. and M.A. Gray, eds. 2010. *Context and synthesis from the joint courts complex archaeological project, Tucson, Arizona. Deathways and lifeways in the American Southwest: Tucson's historic Alameda-Stone cemetery and the transformation of a remote outpost into an urban city, volume 1* (Technical Report 10–95). Tucson: Statistical Research.

Klar, M. 2008. Groundbreaking archaeological dig aims to uncover the past, in *Coal and Allied*. Available at http://www.coalandallied.com.au/media/498_1533.asp. Accessed 21 Aug 2011.

Lynott, M.J. 1997. Certification and professionalism. Comments from the membership on the ROPA proposal. *Society for American Archaeology Bulletin* 15.

Lyons, C., N. Wilkie, W.D. Lipe, K. Kintigh, H. Miller, D. Seifert, C.R. McGimsey III and C. Cleland. 1996. Proposal for the establishment of the Register of Professional Archaeologists. Comments from the membership on the ROPA proposal. *Society for American Archaeology Bulletin* 15.

United States. 1966. National Historic Preservation Act, 36 CFR 61. United States Code 470 et. seq.

Willems, W.J.H. 2008. The work of making Malta: The council of Europe's archaeology and planning committee 1988–1996. *European Journal of Archaeology* 10: 57–71. https://doi.org/10.1177/1461957108091482.

Willems, W.J.H., and M.H. van den Dries. 2007a. *Quality management in archaeology*. Oxford: Oxbow Books Publishing.

Willems, W.J.H., and M.H. van den Dries. 2007b. The origins and development of quality assurance in archaeology. In *Quality management in archaeology*, ed. W.J.-H. Willems and M.H. van den Dries, 1–12. Oxford: Oxbow Books Publishing.

Further Reading

Andrikopoulou-Strack, J.-N. 2007. Archaeology and heritage management in Germany. In *Quality management in archaeology*, ed. W.J.H. Willems and M.H. van den Dries, 13–21. Oxford: Oxbow Books Publishing.

Angelescu, M. 2007. Quality management in Romanian archaeology. In *Quality management in archaeology*, ed. W.J.H. Willems and M.H. van den Dries, 66–77. Oxford: Oxbow Books Publishing.

Demoule, J.P. 2007. Scientific quality control and the general organisation of French archaeology. In *Quality management in archaeology*, ed. W.J.H. Willems and M.H. van den Dries, 135–147. Oxford: Oxbow Books Publishing.

Ferris, N. 2007. Always fluid: Government policy making and standards of practice in Ontario archaeological resource management. In *Quality management in archaeology*, ed. W.J.H. Willems and M.H. van den Dries, 78–99. Oxford: Oxbow Books Publishing.

Gowen, M. 2007. Quality management and Irish commercial sector archaeology. In *Quality management in archaeology*, ed. W.J.H. Willems and M.H. van den Dries, 22–34. Oxford: Oxbow Books Publishing.

Hinton, P., and D. Jennings. 2007. Quality management of archaeology in Great Britain: Present practice and future challenges. In *Quality management in archaeology*, ed. W.J.H. Willems and M.H. van den Dries, 100–112. Oxford: Oxbow Books Publishing.

Lekberg, P. 2007. Making it matter: Towards a Swedish contract archaeology for social sustainability. In *Quality management in archaeology*, ed. W.J.H. Willems and M.H. van den Dries, 148–159. Oxford: Oxbow Books Publishing.

O'Rourke, D. 2007. Quaestors, quality and quantity: Archaeology and the national roads authority in Ireland. In *Quality management in archaeology*, ed. W.J.-H. Willems and M.H. van den Dries, 35–49. Oxford: Oxbow Books Publishing.

Peacock, E., and J. Rafferty. 2007. Cultural resource management guidelines and practice in the United States. In *Quality management in archaeology*, ed. W.J.-H. Willems and M.H. van den Dries, 113–134. Oxford: Oxbow Books Publishing.

van den Dries, M.H., and W.J.H. Willems. 2007. Quality assurance in archaeology, the Dutch perspective. In *Quality management in archaeology*, ed. W.J.-H. Willems and M.H. van den Dries, 50–65. Oxford: Oxbow Books Publishing.

Cultural Heritage Management Technology and Training

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Introduction

Understanding and applying appropriate technologies to the preservation and treatment of cultural heritage has been a hallmark of good resource management since the earliest days of the conservation and preservation movements. It is important to know the traditional technologies or trade practices used to create a site, structure, or object in order to understand the integrity of the resource and the mechanics of its deterioration over time. Understanding modern technologies as they are applied to cultural heritage is critical as well, for it is impossible to make responsible decisions regarding evaluation and treatment until the immediate and long-term effects of the proposed technology are understood and accounted for. Technology is itself a critical component of the scrape/anti-scrape debate which arose early in the modern preservation movement, since some technologies, e.g., nondestructive evaluation techniques, are inherently more suitable to the preservation of the original fabric of the resource than others. The rise of the modern conservation/preservation ethic in the late eighteenth and nineteenth centuries coincided with the rise of the industrial revolution in Europe and then the rest of the world, so that the technologies available to create heritage resources were constantly shifting, as were the techniques available to study and treat them. Even in the field of archaeology, where most of the resources arguably already existed by this time, the growth of technologies to identify, unearth, and treat artifacts continued to shift constantly.

Key Issues/Current Debates

Those with an avid interest in the past have naturally been more interested in traditional technologies than in modern ones, but as the modern preservation movement "grew up" in the twentieth century almost every ministry of culture or other national conservation organization around the globe included a laboratory for the study of historic materials and modern treatment alternatives. The deepening interest in scientific and technical solutions was one driver behind an international meeting of "architects and technicians of historic monuments" held in 1931 in Athens. Their resolutions, which became known as the *Athens Charter*, recommended in part that "architects and curators of monuments should collaborate with specialists in the physical, chemical, and natural sciences with a view to determining the methods to be adopted in specific cases" (Athens Charter 1931). In the wake of two World Wars that devastated resources around the globe, an increasing awareness grew among those that were responsible for cultural heritage management that more needed to be done to share knowledge and expertise, both in the approaches to and the technology of preservation. In 1956, the Ninth General Conference of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) (see the entry on UNESCO-ICOMOS-ICAHM and Other Relevant Scientific Committees in this encyclopedia) recommended the creation of "an intergovernmental center for the study and improvement of methods of restoration," resulting in the founding of the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) in 1959 in Rome (ICCROM 2005). ICCROM included a strong technical bent from its founding, as well as a commitment to training practitioners from around the globe. For more than 50 years, it has brought together, among others, experts in the technologies of preservation and conservation and has helped to build the technical capacities of agencies and organizations worldwide.

As international interest in cultural heritage continued to grow, a congress of architects and historic building specialists (which, like the meeting in Athens three decades earlier, included leading field and academic archaeologists) was held in Venice in 1964. It adopted a number of resolutions, the first of which came to be known as the *Venice Charter*. The *Charter's* second article stated that "[t]he conservation and restoration of monuments must have recourse to all the sciences and techniques which can contribute to the study and safeguarding of the architectural heritage" (Venice Charter 1964), recognizing the importance of technologies new and old to the preservation of historic resources. The congress also adopted a number of other recommendations, including one put forward by UNESCO that recommended the creation of the International Council on Monuments and Sites (ICOMOS) as a nongovernmental institution within UNESCO, supported by a network of national committees in participating nations (ICOMOS 2011). ICOMOS was founded immediately and headquartered in Paris, and had among its goals the research and dissemination of techniques for preserving buildings and sites, and the training of specialists to undertake such work (ICOMOS Statutes 1978).

The passage of the Venice Charter and the call for the creation of ICOMOS inspired additional attention to preservation around the world and with it an emphasis on understanding and applying appropriate technologies to preservation problems. In the USA, James Marston Fitch established the first masters level program in historic preservation at Columbia University in 1964, with an emphasis on materials analysis and traditional technologies that was shared by only a few of the collegiate programs that blossomed in the USA in the ensuing years. The passage of the National Historic Preservation Act in the USA in 1966 (NHPA as amended 1966) established a broad federal preservation program and created overnight a market for contract archaeology to clear federally funded projects for development. The demand for additional tools to quickly identify the presence of archeological resources

stimulated research into the application and efficacy of various prospection or remote sensing techniques and the search for new technologies for nondestructive evaluation of archeological sites.

The perceived need for a better understanding of the technologies involved in preservation practice in North America led to the establishment of the Association for Preservation Technology International (APT) in Canada in 1968 (APT 2012). APT began and operated for many years as a joint US/Canadian professional organization dedicated to the cross-disciplinary exploration of the technologies involved in preserving cultural heritage. In recent years, APT has added chapters in several other countries and has become more truly international in scope. While APT tended to focus on the built environment, conservators in the USA who dealt primarily with museum collections and other cultural objects founded the American Institute for Conservation of Historic and Artistic Works (AIC) in 1972 (AIC 2012). Over the last 40 years, AIC has established specialty groups (10 in all) dedicated to topics from architecture to painting to wooden artifacts. Annual meetings of both APT and AIC have become internationally recognized sources for the latest research on cultural heritage technology and training and frequently attract papers and sessions from experts around the world. Other significant organizations devoted to objects and collection conservation were also created at this time, including the Smithsonian's Conservation Research Laboratory (now the Museum Conservation Institute) in 1963 (MCI n.d.) and the Canadian Conservation Institute in 1972 (CCI 2011).

UNESCO stepped back onto the world stage of cultural heritage technology and training with the establishment of the World Heritage Convention in 1972. While the primary thrust of the convention was to encourage signatory states to identify and protect their own heritage resources and to recognize the value to all humanity of the premier resources in other countries, it also addressed technology and training needs. Article 5.3 of the convention encourages the State parties "to develop scientific and technical studies and research and to work out such operating methods as will make the State capable of counteracting the dangers that threaten its cultural or natural heritage," while Article 5.5 suggests that they "...foster the establishment or development of national or regional centres for training in the protection, conservation and presentation of the cultural and natural heritage and to encourage scientific research in this field" (UNESCO 1972). Many countries responded by incorporating an emphasis on scientific and technical research and training into their national heritage agencies. In the USA, the National Park Service (USNPS) created a Technical Preservation Services unit within its Office of Archaeology & Historic Preservation about this time, headed first by W. Brown Morton (author of the Secretary of the Interior's Standards for Rehabilitation) and shortly thereafter by Lee H. Nelson, who had overseen the restoration of Independence Hall in Philadelphia. TPS became the US government's loci of technical expertise in preservation and led the establishment of preservation standards for many types of heritage resources.

Over the next decade, the number of US universities offering graduate and undergraduate degrees in historic preservation ballooned, leading to the creation in 1985 of the National Council for Preservation Education. NCPE, as it became known, established the first national standards for preservation programs in the USA and specifically required that programs instruct students on the technological issues affecting historic building materials and systems (NCPE n.d.). That same year, the Getty Conservation Institute (GCI) was founded in Los Angeles, bringing together the financial resources of the Getty Trust and technical experts assembled from around the globe. GCI in the ensuing years has researched new and traditional technologies and supervised the restoration and documentation of world-renowned heritage resources in countries throughout the world. GCI, like APT and AIC, publishes original research on technical issues and produces training materials for heritage resource managers (GCI 2009).

By 1986, the burgeoning interest in the technologies of heritage management and the perceived need for specialized training found its way into the halls of the US congress. Congress

had requested that its Office of Technology Assessment (OTA), which advised the relevant committees on science and technology issues in many areas (including space and nuclear policy), examine the US historic preservation program and make recommendations for improving the management of heritage resources in the USA. OTA responded by holding a series of expert panels around the country focused on different disciplines within the field (e.g., archaeology, historic landscapes, historic structures, etc.). Its conclusions and recommendations were presented to congress in a 1986 report, *Technologies for Prehistoric and Historic Preservation*. Though the report made a number of suggestions for improving the federal preservation estate, one was of special interest to NPS: that congress establish a research and training center specifically devoted to the transfer of technology from other fields into heritage management. It further recommended that the new center be established within the Department of the Interior (parent agency of NPS) or as an independent entity managed by a consortium of universities (OTA 1986). Although the OTA report languished for several years after submittal to congress, NPS actively studied possible locations for it within NPS and eventually found a sponsor in J. Bennett Johnston, the senior senator from Louisiana. Johnston had a strong interest in preservation and proposed amendments to the National Historic Preservation Act that essentially created a hybrid of the two recommendations – a center that was part of the NPS but located at a University in Johnston's home district. With the passage of this legislation in 1992 (NHPA as amended 1966), the National Center for Preservation Technology and Training (NCPTT) was established in the USA on the campus of Northwestern State University in Natchitoches, LA, as a program of the National Park Service. Since that time, it has awarded over US $8 million in grants and funded research and training in most of the disciplines within heritage management.

While NCPTT remains somewhat singular in its dedication to technology and training in the heritage management field, government-sponsored and private cultural institutions around the globe have strengthened their expertise and commitment to technology issues in heritage management by establishing research laboratories and supporting research. English Heritage, Historic Scotland, and national agencies in France and Germany have joined multiple organizations in Italy (including ICCROM, which is still active in Rome) to strengthen understanding of heritage management technologies in Europe. Public and private groups in Australia, China, and India have also taken an interest, and organizations such as the World Monuments Fund, while not themselves focused on technology, have helped to bring technology experts to cultural crisis spots all over the world.

Future Directions

At the dawn of the twenty-first century, technology in the service of cultural heritage management is a blossoming field, and training programs that help to transfer technology to heritage managers are springing up everywhere. While traditional technologies, such as lime mortars and washes, lead and calcimine paint systems, and prehistoric ceramics continue to garner research interest and produce useful results, it is the technologies transferred from science, engineering, and medicine that are changing the face of cultural heritage management. Nondestructive evaluation techniques have been keenly sought for many years, since any excavation technique has the potential to damage the resourced. Many modern tools are available now to specialists and are increasingly becoming available to generalists. In archaeology, geophysical prospection technologies help locate subsurface cultural features. Magnetometry uses magnetic fields to detect changes in soil composition caused by human occupation; electrical resistivity and conductivity can detect changes in soil type and strata; ground penetrating radar (GPR) detects the echo of radio waves bouncing off buried features; and gradiometry uses a pair of magnetometers to measure minute differences in local magnetic fields and the earth's gravity. These instruments are becoming increasingly sophisticated in

sensitivity and simpler in application, so that they are more and more available to practicing archeologists. Laboratory techniques such as X-ray fluorescence (XRF) and reflectance transform imaging (RTI) are now portable enough to take into the field, where they can help identify the elemental composition of metals and ceramics or discern images that are not visible to the naked eye. Infrared thermal cameras are used, particularly from the air, to detect the presence of buried wall foundations and other features that store and release heat at a different rate than the surrounding soil.

Historic buildings and structures also benefit from a variety of nondestructive inspection techniques. Some of the technologies are simple, like fiber optic boroscopes that can peek inside wall cavities or moisture meters to check the water content of building materials. Some are borrowed from the archaeology toolbox; GPR, for example, is now used to find voids inside masonry walls or hidden changes in construction materials. Infrared thermography uses thermal cameras to pinpoint heat losses during energy audits of historic buildings or to identify moisture hidden inside walls because liquid water has a different thermal signature than surrounding dry materials. Resistance drilling can spot deterioration inside wood structural members by charting the change in resistance as a drill bit passes through softer, rotted wood. Radioactive sources and film have been used for many years to create X-ray images of hidden structural members and fasteners. More recently, digital radioscopy has been used to achieve the same ends by using electrically-induced X-rays and an image capture system to produce data in real time.

Materials conservators use many of these same technologies to look through object layers or capture views of hidden surfaces. Laboratory or portable XRF (pXRF) is used to identify the composition of substrates and surface deposits. Additional tools include Fourier transform infrared spectroscopy (FTIR) and Raman spectroscopy, which use infrared and laser light, respectively, to excite molecules and capture the elemental signatures that can help to identify unknown materials. Eddy current testing, borrowed from heavy industry, can be used to measure the microns-thin gilding of an antique bronze or to recover the lost hallmark on a well-polished teapot. Acoustic resonance technologies use sound to characterize materials; acoustic resonance microscopy, for example, can also be used to recover lost hallmarks.

Every technology used in other industries to characterize materials or look beneath the surface has the potential to be applied to the management of heritage resources. Cultural scientists continually search for new applications for old technologies and for new technologies to transfer from other areas of science, medicine, and industry. In the USA, NCPTT, APT, AIC, and other professional organizations continue to research and train heritage professionals in the application of these technologies. Worldwide, ICOMOS encourages collaborative research and information sharing across international boundaries through its expert committee system, and national ICOMOS organizations (such as USICOMOS) promote the sharing of data and exchanges between countries. In a world where technological innovation drives the economy and continually shapes culture, cultural heritage management will always be engaged in understanding new technologies and how they can best be used to preserve heritage.

Cross-References

► International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

References

AIC. 2012. http://www.conservation-us.org/index.cfm?fuseaction=Page.viewPage&pageId=489&parentID=471. Accessed 10 Jan 2012.

APT. 2012. http://www.apti.org/about/apt-history.pdf, p. 2. Accessed 10 Jan 2012.

Athens Charter. 1931. http://www.icomos.org/docs/athens_charter.html. Accessed 7 Jan 2012.

CCI. 2011. http://www.cci-icc.gc.ca/cci-icc/about-apropos/index-eng.aspx. Accessed 3 Feb 2012.

GCI. 2009. http://www.getty.edu/conservation/about/science/building_mr.html. Accessed 10 Jan 2012.

ICCROM. 2005. http://www.iccrom.org/eng/00about_en/00_03history_en.shtml. Accessed 10 Jan 2012.
ICOMOS. 2011. http://www.icomos.org/index.php/en/about-icomos/mission-and-vision/history. Accessed 10 Jan 2012.
ICOMOS Statutes. 1978. http://www.international.icomos.org/publications/EN_Statuts_1978_20110301.pdf, p. 2. Accessed 10 Jan 2012.
MCI. n.d.. http://www.si.edu/mci/english/about_mci/history.html Accessed 3 Feb 2012.
NCPE. n.d.. http://www.ncpe.us/ncpestds.html. Accessed 10 Jan 2012.
NHPA as amended. 1966. http://www.nps.gov/history/local-law/nhpa1966.htm. Accessed 10 Jan 2012.
OTA. 1986. http://www.princeton.edu/~ota/disk2/1986/8631/8631.PDF, p. 12. Accessed 10 Jan 2012.
UNESCO. 1972. http://whc.unesco.org/en/conventiontext. Accessed 7 Jan 2012.
Venice Charter. 1964. http://www.international.icomos.org/charters/venice_e.htm. Accessed 10 Jan 2012.

Cultural Heritage Management: Building Bridges

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Introduction

It is summer solstice 2009 at Yupqöyvi, the Hopi name for Chaco Culture National Historic Park in New Mexico, U.S.A. Just before the sun rises at around 5:30 AM, a group of Hopi youth and elders are already up and running to greet the sun so that the sun will not be burdened to carry them throughout the day. The group is visiting Yupqöyvi to learn from the traditions of their ancestors, the Hisatsinom, who left their *footprints* or archaeological sites to teach all Hopi generations the way to live. The trip is part of the *Footprints of the Ancestors* program, an intergenerational cultural preservation project designed to connect Hopi youth with their past. The elders teach the youth their language, values, and traditions. Archaeologists teach them how land use patterns change over time, specific types of artifacts that are associated with particular ancestral places, and regional cultural timelines. This program was developed collaboratively between the Hopi Tribe's Cultural Preservation Office and Northern Arizona University's Anthropology Department in response to a growing crisis of language and culture loss among Hopi youth. The *Footprints of the Ancestors* program is an example of building a bridge between indigenous communities and archaeologists to create cultural heritage education programs that allows youth to interact with elders, educators, archaeologists, and other professionals in meaningful ways in order to better understand and integrate their cultural heritage with their modern-day lives and future selves.

The initial idea for the *Footprints of the Ancestors* program was to teach archaeology, a scientific discipline, to Hopi youth. It was soon clear in collaborative community conversations that this one-way bridge would not work. A shared vision, respect, and understanding for the past from both Hopi cultural perspectives and scientific processes were needed. This goal of building true multiple-pathway bridges with communities for a common purpose is shared by many cultural heritage managers and educators.

Definition

Literally, a bridge is a structure that spans across some obstacle allowing for easier access and transport. In communication, a bridge often means the creation of shared understanding between individuals. For cultural heritage managers and educators, building bridges refers to the establishment of intentional structures (i.e., management policies, program designs, or advisory groups) and processes (i.e., collaborative meetings where dialogue occurs) between researchers, other professionals, and communities that allow for an exchange of ideas, cultural understanding, resources, and respect. In this way, archaeologists can learn about specific cultural heritage values and issues important to community groups and

communities can learn how archaeologists study the past and how their research complements (or not) community heritage values.

Some fundamental principles for building bridges are that they must be:

- Collaborative among all parties involved
- Respectful of community heritage values
- Reflective of quality research and best professional practices
- Comprehensive, integrative, and flexible

Because the "past" is a concept constructed by individuals who make meaning from objects and events, it is important to recognize that reconstructing the past is an academic, social, and cultural endeavor. For some, the past is meticulously and empirically analyzed and interpreted. For others, the past is intrinsically linked to both the present and the future. It cannot be separated and considered distinctly. Groups of people often place personal/emotional, scientific, economic, and cultural values on heritage places and the objects and stories related to them. Paying attention to community values, concerns, and needs has been part of public archaeology and education efforts for decades. However, when initiating or designing collaborative archaeology projects, it is critical to determine: How is heritage defined?; Whose heritage is being studied?; How is heritage being studied?; How is heritage being presented?; Who makes heritage decisions in various contexts (community level, academia, schools, museums, etc.)?; Are all heritage values included?

Examples

In the United States, the journey for building bridges in the context of education came from the Society for American Archaeology Public Education Committee (SAA/PEC). In 1995, SAA/PEC established a Native American Education Task Group whose charge was to build collaborative relationships with American Indian communities through educator workshops. The intent was to "build bridges" between archaeology (and archaeologists) and American Indians through classroom education. In order to do this, the group needed to demonstrate to indigenous educators how they could use archaeology education materials to develop and enhance their school curricula. The Task Group held workshops, professional development planning sessions, and retreats over the course of 7 years to help achieve their goal. The work of the SAA/PEC met with initial success. Teacher participants in the workshops discovered professional archaeologists were approaching their work with new attitudes that included not only studying archaeology using scientific methods, but also including interpretations from descendants' cultural stories and beliefs. After several years of conducting workshops, the SAA/PEC reassessed the strategy and concluded that the workshops were effective up to a certain point. Because of the national audience, the content tended to be focus on the locale where the workshop was held. Teachers were asking for materials and instruction that were tied to their own specific, local contexts. The group concluded that local context, cultural relevance, language, and community were integral to the success of any indigenous heritage education effort. The group changed focus to building two-way educational bridges with specific indigenous communities to better address local cultural issues and needs. The Hopi Footprints project is one example of this effort.

Another example is the revision of the curriculum materials and professional development used in the initial Native American Education Task Group workshops. The workshop materials were a set of archaeology lessons designed for students aged 9–13 from the Bureau of Land Management, Project Archaeology program. These materials, *Intrigue of the Past: Investigating Archaeology* (Smith et al. 1996), included American Indian perspectives in teaching archaeology. Although these materials are still widely used and effective, the Project Archaeology program decided to build new inquiry-based curricular materials. In the process, Project Archaeology staff invited American Indian educators help draft and review and new lessons. The American Indian educators suggested that a descendant be included in the curriculum to introduce his or her own

culture and to provide an oral history and contemporary cultural significance. This direct inclusion of native voices in educational materials represents a significant leap from using ethnographic resources written by nonnative scholars to using primary sources to present American Indian heritage values. In the new curriculum, *Project Archaeology: Investigating Shelter*, the combination of oral histories and accurate archaeological data allows students to draw their own conclusions about the meaning of the archaeological record, the heritage values it represents, and its significance in contemporary life.

In both examples, community partners share in the dialogue and are equal givers of knowledge in these cultural knowledge exchanges. This shift in the paradigm of how archaeology professionals and indigenous community members work together to build bridges provides opportunities for learning and teaching culturally relevant, scientifically accurate heritage histories.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Community Engagement in Archaeology
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Cultural Heritage Outreach
- ▶ Heritage Ethics, Cultural Base of
- ▶ United States: Cultural Heritage Management Education

References

Smith, S.J., K.A. Letts, J.M. Moe, and D. Paterson. 1996. *Intrigue of the past: A teacher's activity guide for fourth through seventh grades*. Delores: Anasazi Heritage Center, U.S. Bureau of Land Management.

Further Reading

Ashmore, W., D. Lippert, and B.J. Mills, eds. 2010. *Voices in American archaeology*. Washington, DC: Society for American Archaeology.

Barton, K.C., and L.S. Levstik. 2004. *Teaching history for the common good*. Mahwah: Lawrence Erlbaum Associates.

Clark, K., ed. 2006. *Capturing the public value of heritage: The proceedings of the London conference January 2006*. Swindon: English Heritage.

Colwell-Chanthaphonh, C., and T.J. Ferguson. 2006. Memory pieces and footprints: Multivocality and the meanings of ancient times and ancestral places among the Zuni and Hopi. *American Anthropologist* 108: 148–162.

Derry, L., and M. Malloy, eds. 2003. *Archaeologists and local communities: Partners in exploring the past*. Washington, DC: Society for American Archaeology.

Dongoske, K.E., M. Aldenderfer, and K. Doehner. 2000. *Working together: Native Americans & archaeologists*. Washington, DC: Society for American Archaeology.

Jameson, J.H., ed. 1997. *Presenting archeology to the public: Digging for truths*. Walnut Creek: AltaMira Press.

Layton, R., ed. 1989. *Who needs the past?: Indigenous values and archaeology*. London: Routledge.

Letts, C.A., and J.M. Moe. 2009. *Project archaeology: Investigating shelter*. Bozeman: Project Archaeology, Montana State University in a joint project with the U.S. Department of the Interior, Bureau of Land Management.

Little, B.J., and P. Shackle. 2007. *Archaeology as a tool of civic engagement*. Lanham: AltaMira Press.

Stone, P.G., and R. MacKenzie, eds. 1990. *The excluded past: Archaeology in education*. London: Routledge.

Swidler, N., K.E. Dongoske, R. Anyon, and A.S. Downer. 1997. *Native Americans and archaeologists: Stepping stones to common ground*. Walnut Creek: AltaMira Press.

Cultural Heritage Management: Business Aspects

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Introduction

Cultural heritage can be understood within a business context, in terms of an industrial sector comprising organizations working to supply products or services associated with the understanding, protection, and promotion of objects, sites,

monuments, and other forms of tangible and intangible cultural heritage. The business side of cultural heritage management can also be articulated within a service and experience economy as well as a policy context through activities such as tourism, where value may be understood in terms of market share, or as a sector which can have sets of values assigned to it.

Definition

Cultural heritage is recognized in many forms as having value, and the accordingly immediately implies a proposition of a particular type of value. Work in the first decade of the twenty-first century built on earlier work of David Throsby in cultural economics (updated in Throsby 2010), and a UK-based articulation of a threefold set of values in heritage, namely: intrinsic, instrumental and institutional, was seminal (Clark 2006). Cultural heritage therefore can be seen to have a set of intangible and tangible qualities that can be inherently appreciated; heritage can also do something within society; and heritage is articulated, marshaled, and treated in particular ways by organizations. This theoretical typology of value proposition allows for the objectification of something which we consider as heritage, and placing of it within a matrix of relationships and external pressures on it. Cultural heritage as object thus can only assert a value through identification of its proposition, and as such, it can be considered in its physicality as object, place, or commodity; historical reference point or evidence; or social identifier. The value proposition reinforces what the heritage is, how it should be perceived, and how forces can either act on it, or bestow the ability of actor for it. Any particular value proposition for heritage is laden with facets and symbolic meaning, and these may be both co- and multi-variant simultaneously through agency action. The very process of articulation of value is reliant on a set of management processes which categorize, compare, value, and position the heritage against a product or environmental set of circumstances. The business side of heritage management is therefore already implicit in any consideration of it, but may be considered in its explicit form also. A cultural heritage site can, for example, therefore be both sacred and commercial at the same time – a cathedral is a good example of this. The site may be operated commercially for tourists and as a center for religious practice and spirituality at the same time and by the same managing agency, using different functional and operative teams. The work of Dallen Timothy here, considering heritage tourism, is of particular importance (Timothy and Boyd 2002; Timothy 2011).

In following this argument therefore, the variance of action surrounding cultural heritage, the articulation of proposition for cultural heritage, and the functional operation of cultural heritage within different circumstances, means that the notion of agency itself must be considered. Agency can be most usefully understood in the context of thinking about cultural heritage management as business – whereby the business of managing cultural heritage creates value through a proposition which may have a monetary or non-monetary facet for both input and output. The context for the value proposition influences the type and level of investment required and return on investment in managing cultural heritage in a particular way. Cultural heritage may have money invested in it, but the return on that investment may be aesthetic improvement and welfare or higher educational attainment, rather than a quantifiable financial outturn – recent thinking by organizations, such as the New Economics Foundation and Demos (UK-based think tanks), ally this to a "Social Return on Investment" (SROI), and there are a number of techniques for analysis of this. Equally, an investment of volunteer time at a cultural heritage site may allow it to operate as a visitor attraction, and produce a direct financial return on a nonfinancial investment. Consideration of cultural heritage agency has both benefits and disbenefits, and it is important therefore to distinguish between an understanding of heritage as a business and the business of managing heritage. Cultural heritage as a business means that the organizational form that forms the agent needs to be identified: Often for cultural heritage these are charitable organizations such as a National Trust

or heritage/preservation foundation, or public/tax-payer-funded organizations such as Governmental cultural ministries and conservancies, national parks, and heritage services. There are also a group of commercial cultural heritage organizations, which may be private or share-holder governed enterprises, instrumentally using heritage as a positive economic generator in the service sector – often there are covariant commercial interests at play here forcing an interdependence between the preservation of the cultural heritage and that intrinsic value acting as a possible return on investment – and property investment companies are a good example of these where maintenance of a historic building through renovation can make it an attractive office rental proposition.

Key Issues/Current Debates/Future Directions/Examples

Cultural heritage as business requires the organizational structure such as those defined above to operate or act in a particular way, and in a particular business environment. The way of acting, and the environment in which agency occurs influence a cultural heritage organization's products, services, and by consequence benefits and customers as stakeholders in that benefit. The requirements of the cultural heritage sector produce a business environment large enough to sustain a wide variety of heritage "businesses" operating at a range of scales (economic and geographic). The business of managing cultural heritage should be understood through analysis of business and management operations – i.e., the actions and processes which contribute to the creation of the value proposition. Traditional management tools can be deployed to do this, such as environmental analysis using PESTEL technique (identifying political, economic, social, technological, environmental, and legal environments in which an organization is operating), strategic planning, and SWOT (strengths, weaknesses, opportunities, and threats) analysis of organizational capabilities. General strategic management texts, such as that by Johnson et al. (2010), introduce the major concepts which can be readily identified as contributing to the business of managing cultural heritage. Detailed aspects of management draw on the established field of operations management, the most developed form of which is seen in the applied management of heritage visitor attractions and the work of Swarbrooke (2001). Subject-specific academic studies of management and operations have been limited in number however, which is surprising given the organizational structures and capabilities for cultural heritage management agencies are so important, and for many organizations is a large and expensive operation in its own right. Most studies of this have been undertaken internally within the central administration of the organizations, to support the corporate and business planning function, and large organizations in the USA, such as the US National Parks Service, and the United Kingdom's National Trust (charity) and governmental heritage agencies have developed sophisticated internal mechanisms for setting strategic goals, deploying and generating resources. Many cultural heritage organizations throughout the world suffer from a management deficit however, and effective strategic planning and understanding of the role of management is underdeveloped. This is in part due to the inevitable tension between the perception of what management is and what effective management is trying to do, and against a global economic downturn, it remains unfortunate that the academic community has yet to engage fully with the intricacies of business operations in cultural heritage in as a sophisticated way as has happened with arts or museum organizations, where particular business functions (such as marketing) have an established stream of literature apart from the internal policy documentation. Good examples of these are seen in the works of Rentschler and Hede (2007) and Lord and Lord (2009). Where texts have been produced on heritage, (such as Waterton 2010, or Harrison 2012) they have tended to focus attention on policy issues associated with the application of management at sites, and may be considered as policy development critique and subject theoretical underpinning rather than a proper engagement with the business of heritage.

Where effective processes which an organization uses within the business planning function provide feedback, in turn they help form the future shape of the organization and its internal (and external) dynamic in order to produce effective "product" (conservation of the cultural heritage resource), develop a consumer or customer base (be it visitors or supporters of cultural heritage protection), and sustainability of both the resource and the managing agency responsible for it. This level of sophistication in business planning paves the way for organizations to engage in scenario planning or "futures" thinking, which is an important capability for dealing with "product" (i.e., cultural heritage resources) which are being preserved and potentially managed for an indeterminate period of time into the future. Scenario-based thinking is at an early stage of development within the cultural heritage sector generally, although development is being seen in Australia, Scandinavia, and the United Kingdom, where long-range planning within organizations is helping to determine new organizational forms and ways of thinking about internal organizational business structure and how it can support the wider mission to conserve the cultural heritage resource. The United Kingdom's largest conservation charity, the National Trust, for example, undertook a large-scale restructure between 2009 and 2011 to create internal business planning and consultancy units, aimed at driving efficiency within a large and complex structure. The creation of internal specialized consultancy capability provides individual conservation actions to be treated as projects where a cost-benefit analysis can be undertaken. The required resources feeding through to quantifiable outputs and benefits of a project can be tracked transparently, where the functional management process is clearly mapped. A caveat for such a "back-office" process and concentration on management technique is that it is often not well communicated or understood outside the organization, and can lead to negative perception about the business oriented culture of the organization. Such perception may be reinforced due to the lack of wider appreciation of the role of the process of management within the realm of cultural heritage management, and efforts must be made to promote the understanding of the business function of heritage internally and externally to a cultural heritage organization and how it positively contributes to that conservation effort.

It is worth noting that in an international business context, the management of cultural heritage resonates with current business preoccupations associated with social development and cultural capital development, issues of corporate social responsibility, and environmental sustainability. These large-scale themes are in many respects at the heart of good cultural heritage management, and therefore, the interplay of the business of cultural heritage is likely to be of growing interest in the coming years, beyond the focus to date on the basic enterprise of cultural heritage management, tending to focus on the enterprise of heritage tourism.

Cross-References

- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values, Communication of
- ▶ Jorvik Viking Centre
- ▶ Marketing Heritage
- ▶ US National Park Service and World Heritage
- ▶ York Archaeological Trust

References

Clark, K. 2006. *Capturing the public value of heritage – The proceedings of the London conference 25–26 January 2006*. London: English Heritage & Heritage Lottery Fund.

Harrison, R. 2012. *Heritage: Critical approaches*. London: Routledge.

Johnson, G., R. Whittington, and K. Scholes. 2010. *Exploring strategy – Text and cases*. London: Financial Times/Prentice Hall.

Lord, G.D., and B. Lord. 2009. *The manual of museum management*. 2nd ed. Lanham: AltaMira Press.

Rentschler, R., and A.-M. Hede. 2007. *Museum marketing: Competing on the global marketplace*. London: Butterworth Heinemann.

Swarbrooke, J. 2001. *The development and management of visitor attractions*. London: Butterworth Heinemann.

Throsby, D. 2010. *The economics of cultural policy*. Cambridge: Cambridge University Press.
Timothy, D. 2011. *Cultural heritage and tourism: An introduction*. Bristol: Channel View.
Timothy, D., and S. Boyd. 2002. *Heritage tourism*. London: Prentice Hall.
Waterton, E. 2010. *Politics, policy and the discourses of heritage in Britain*. London: Palgrave Macmillan.

Further Reading

Andoniadis, A. 2010. *Museum retailing: A handbook of strategies for success*. Edinburgh: Museums ETC.
Chahabra, D. 2010. *Sustainable marketing of cultural and heritage tourism*. London: Taylor & Francis.
Cooper, M., et al., eds. 1995. *Managing archaeology*. London: Routledge.
Demos (Thinktank). n.d. Available at: http://www.demos.co.uk
New Economics Foundation (Thinktank). n.d. Available at: http://www.newweconomics.org
UK – The National Trust. n.d. Available at: http://www.nationaltrust.org.uk
US National Parks Service. n.d. Available at: http://www.nps.gov (especially Park Policy Development).

Cultural Heritage Management: Cost and Benefit of Change

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Introduction

Cultural heritage management (CHM) has changed a great deal since it first became a recognized field of practice. Some changes have been restrictive and regulatory, while others have been democratic and emancipatory. In either case, change – and reflection on the causes and consequences of change – is critical for improving practice and generating better ways of engaging with the power relations and legacies of colonialism that still pervade many heritage management schemes. This entry looks at areas where significant change has taken place and some of the costs and benefits associated with those changes.

Key Issues/Current Debates/Future Directions/Examples

The Rise of CHM as a Profession

The rise of CHM as a distinct, vital field of archaeological practice in so many parts of the world is undoubtedly one of the most significant changes in archaeology over the last century. Nation-states have long been aware of the salience of connections between heritage sites and cultural identity. The initial mandate of the nascent field of cultural heritage management was managing, maintaining, and preserving sites of "significance" to the nation-state. During the second half of the nineteenth century, in many places, the role of a cultural heritage manager also came to focus on salvage and mitigation of damage to sites that were targeted for development or otherwise endangered, whether by roads, dams, airstrips, looting, or urbanization. As cultural heritage managers turned toward safeguarding sites from development and looting, they faced practical and ethical quandaries raised by considering the costs and benefits of preservation versus development.

A Conservation Ethic

In many places, the idea of a "conservation ethic" became a hallmark of CHM (Lipe 1974). Site preservation was the primary goal, with the destructive processes of excavation reserved for sites that are endangered. Benefits of such an approach have included recognition of the importance of in situ preservation and a more holistic, less object-centered perspective on sites and landscapes. On the other hand, conservation approaches offer less opportunity for hands-on training in excavation methods and techniques and generate less archaeological data.

Standardization

Another change accompanying the rise of CHM has been the passage of legislation and the promulgation of government regulations mandating specific standards and practices, at least for projects where government agencies or funds were involved. With this change, archaeology found itself entrenched within government agencies,

where it became codified and bureaucratized, subject to government oversight and decisions about what was significant or worth preserving. Once heritage management procedures became standardized, making a change of any kind was more difficult to accomplish. Much of this legislation did bring heritage management into the development planning process, albeit in a very limited way, and it also showed growing recognition of the importance of preserving culturally significant sites. As a result, a significant percentage of archaeological work shifted from being research driven to regulation driven. Changes in government-level funding have also greatly influenced priorities and how things get done.

The Business of CHM

The rise of heritage management as a business, often called "contract archaeology," has been one of the most far-reaching changes in the field of CHM. In many places, both private and public sector firms act as contractors and service providers for government-mandated heritage work. An obvious benefit is that today the majority of aspiring archaeologists find employment (and training) in contract archaeology or a related field. One of the resulting costs has been a split between research-oriented archaeology, based in the academy, and contract archaeology, based in government or the private sector. Until recently, the results of work done in the context of contract archaeology tended to remain in the gray literature, difficult to access and so without much influence on research and theory. This has gradually been changing, both because of increased recognition of contract archaeology's contributions to research and the increase in peer-reviewed journals and other publications that embrace topics in heritage management and applied archaeology.

Professionalization

Another important change, motivated in part by the steady growth of the field of CHM, relates to professionalization of the discipline. The establishment of professional archaeological organizations (such as the Register of Professional Archaeologists in the USA), the adoption of standards and codes of conduct and training, and the development of certification programs are all aspects of professionalization that help assure employers. Professionalization has created a cadre of practitioners with many shared principles, challenges, and experiences. On the other hand, professionalization comes at the cost of drawing boundaries that exclude those who don't have the proper credentials, whether amateur archaeologists or traditional culture bearers. Codes of conduct tend to reinforce these boundaries at the risk of becoming rigid unchanging rules rather than principles to aspire to or guidelines for more inclusive practice. While professionalization adds value to the role and position of practicing heritage managers, it can also distance them from the people they serve.

Increased specialization is yet another area of change within archaeology that has incurred both costs and benefits. Specialized knowledge brings added depth of knowledge and skills to a particular problem, but among the costs is the need for a larger, more interdisciplinary team to make sure that particular skill sets and knowledge areas are covered.

Anticommercialization

One outgrowth of professionalization has been a move to denounce the commercialization of objects and the excavation of sites for the purpose of locating objects to exploit their commercial value. In general, the field of CHM has championed the ethic of anticommercialization as a step toward preventing site destruction and preserving the value of sites and the stories they tell for a state and its many publics. No longer are excavations sponsored by wealthy patrons who have first pick of objects for their personal collections. No longer are antiquities dealers welcome to sell their wares to museum curators. Many museums today are skeptical of acquiring archaeological objects that were purchased on the market. While CHM has taken a clear stance against looting, many ethical contradictions still exist when it comes to entanglements with commercialization. Consider the growing involvement that cultural heritage managers have with for-profit tourism or the role they play in evaluating site

significance so that for-profit development or resource extraction can go ahead.

Archaeology for the Public

With the development of CHM as a distinct field has come a heightened sense of accountability among practitioners – a sense of responsibility that stretches beyond simply being a good scholar, scientist, or steward of the archaeological record. Archaeology was no longer just about dead people and what they left behind. Public outreach became an obligatory aspect of ethical archaeological practice. This spawned a branch of archaeology often known as "public archaeology," which is essentially synonymous with public sector CHM. This change brought a mandate to educate and involve the public, which meant having to negotiate among multiple values, agendas, and perspectives. There were many publics and stakeholders, each with different (and potentially conflicting) ways of valuing of the past (McManamon 1991).

These public outreach programs typically were established as part of state and federal programs, whose objectives are to educate the public about the value of site preservation. Heritage managers were initially trained to see themselves as having the authority to serve as stewards of a nation's heritage in the name of the public trust. Cultural heritage managers also reached out to groups and individuals with connections to sites and objects, sometimes in the course of gathering information about the history of a site for a report or exhibition. Many received training in ethnography or oral history as ways to obtain more holistic and informed understandings of sites and their meanings from multiple perspectives.

Greater democratization has been another important benefit of the focus on public archaeology. On the other hand, consultation and outreach are time-consuming and unpredictable. In some contexts, these changes have resulted in increased restrictions on access to information or objects once considered public. For example, some Aboriginal groups prohibit certain objects held by museums from public view or require permission for researchers to work with particular collections or cultural materials.

Curation

The field of CHM has also encountered changing attitudes about curation and collections management over the past generation. Once the lack of adequate storage for collections reached crisis proportions, this forced a reevaluation of curation standards and guidelines and encouraged new perspectives on accessions and deaccessions. This has meant making some hard choices about what to keep – choices that could even prove wrong in hindsight. It's now common practice to perceive curation as beginning in the field, with decisions about what to collect and what to discard. (In the United States, current regulations do not allow federally funded repositories to deaccession archaeological materials. This legislation needs changing, but the process is difficult and painfully slow.) One positive outcome of the curation crisis is that heritage managers, collections curators, and source communities are beginning to work together. Culturally sensitive and appropriate curation practices have added a new dimension of understanding to collections and the meanings of objects. The new relationships that are built in these contexts reflect the changing role of museums and archives, from colonialist institutions to places of access that serve as keeping places for the treasures of particular groups. The curation crisis has also caused people to reflect on the ethics of digging things up and keeping them – for whom? For what?

New Contexts for CHM

Other major changes for the field of CHM have come from the expanding roles that archaeology and heritage management now have in the contexts of urban renewal, community revitalization, or Indigenous rights. Cultural heritage management now plays a major role in community development and revitalization, a change that parallels increasing interest in historic preservation in both public and private sectors. Some of this has been in conjunction with the adaptive reuse of historic sites – lighthouses, warehouses, former government installations – by nonprofit or for-profit public and private enterprises. Nearly 50% of all building renovation or construction in European cities today is related to heritage preservation

(Cassar 2006: 1). As Cassar (2006) notes, the renovation of historic city centers offers benefits of numerous kinds – from better transportation and less pollution to social revitalization of communities and neighborhoods, increased wellness, conviviality, and a sense of common identity and aspiration. Costs include the consequences of revitalization for already marginalized groups, such as homeless individuals or low-income families, who tend to become displaced as a result of urban development.

Cultural heritage management also plays an important role in tribal and Aboriginal self-governance, where strong connections are recognized between heritage management and sovereignty (see Welch et al. 2006). Many groups have their own heritage management programs that deal with issues of land claims, resource rights, comanagement agreements with state agencies, research permissions, repatriation, youth education, development decisions, and a host of other things.

Working with Development Agencies

Those who work in cultural heritage management today may also find themselves working with projects led by multilateral development banks or transnational corporations (TNCs). Rio Tinto, the World Bank, UNESCO, and other transnational entities have come to recognize the importance of "culture" to the success of their plans and operations (see Bradshaw et al. 2011) and so have taken a strong interest in the "economics of culture" (see World Bank 2000; Throsby 2001), particularly how cultural factors affect their costs and benefits. Connections between the sustainability and appropriateness of development with cultural heritage have been demonstrated over and over and now are generally accepted. Development agencies are interested in identifying changes in value that result from a proposed project, and it turns out that many of these changes are tied to culture, not simply economics. Many development agencies and TNCs have turned to CHM to help them assess local values or develop strategies for interfacing with local communities that are at risk or otherwise affected by their projects, often as a way to mitigate negative social and cultural effects. In Canada, Australia, South America, and elsewhere, cultural heritage managers are being hired by mining interests and other for-profit resource development companies to map areas of traditional resource use, train development workers in community relations, and more. While collaborations with major development firms may help mitigate some forms of cultural and environmental harm, the costs can also be great and difficult to predict. Some of the conflicts that arise are in part because developers neglect to integrate heritage management into the early stages of the planning process. Often local communities end up having little or no share in substantive decisions or profits. The large power imbalances and the nature of what is at stake for substantial numbers of people necessitate that the costs and benefits of these kinds of collaborations be carefully considered and negotiated. Cultural heritage managers may find themselves in situations that demand a full review of ethical implications and potential consequences. In any case, working with development initiatives at all different scales (from local to transnational) is likely to be an increasingly important aspect of cultural heritage management in the years ahead.

Cost-Benefit Analysis

Cultural heritage managers today often use value-based approaches to evaluate the significance of sites and inform management decisions (see de la Torre 2002). Although some have advocated using a modified version of cost-benefit analysis to inform CHM decisions, there are many problems with such an approach. Many of the cultural costs of development are difficult to identify and even more difficult to quantify, and they often have unintended and unforeseen consequences. Moreover, these decisions typically involve someone else's heritage and may reflect values or potentials that are not obvious or straightforward, especially to cultural outsiders. Cost-benefit analysis has also been criticized as a discourse that tends to distance management decisions from actual people and their concerns and instead objectify and predict based on "the public good." The general conclusion is that cost-benefit analysis is not a useful tool at the scale that most CHM

decisions are made, since local governments or small businesses are usually the ones involved. Some are exploring ways to make CBA more culturally appropriate and relevant, given that it could present ideas and information in terms that developers and others understand.

War and Civil Unrest

The field of CHM has also been affected by the increased recognition of the role that cultural heritage sites and objects play during times of war and civil unrest. The costs are great in that the most meaningful cultural sites are those at greatest risk of becoming targets because of their high symbolic value (see the entry on "▶ Somaliland: Cultural Heritage Management" in this encyclopedia). In times of war and civil unrest, looting, site destruction, and smuggling escalate. People who have lost their livelihoods are tempted to turn to commercial exploitation of portable antiquities. The global antiquities market feeds on this instability. Military occupation of sites is another form of physical and symbolic violence.

It's likely that the cultural value of sites will continue to have great salience in times of struggle and in global identity politics. Many countries recognize cultural heritage as a potent aspect of international diplomacy and national identity. Global attention to these issues has also increased awareness of the significance and fragility of cultural sites.

Other Global Flows

The past generation has witnessed an explosion in the global circulation of people, ideas, and information surrounding tangible and intangible heritage. Today, archaeologists and heritage managers often find themselves working on shifting global terrains that involve international conventions, world heritage sites, the international circulation of cultural property, digital access to information, and cultural tourism development.

The globalization of CHM is evident in the rise of international charters, conventions, and programs covering a range of cultural heritage management concerns, from protection for underwater heritage resources, safeguarding intangible heritage, protecting the built environment, or the development of World Heritage Sites. Today, most countries have an administrative framework that gives heritage management a high profile, and many have passed legislation protecting heritage sites and cultural properties. International bodies such as UNESCO and ICOMOS have promulgated conventions and charters that address global and regional concerns. To be enforceable, these documents must be ratified and then developed into legislation by individual nation-states. In most instances, cultural heritage managers will be the ones to implement and oversee these agreements.

Global attention to heritage and its many values is gradually changing people's perceptions about the antiquities trade, damage to heritage sites, and in general has created a resurgence of national and local interest in safeguarding tangible and intangible heritage. Today, more and more countries, especially those "archaeologically rich" nations that have watched their cultural goods drain onto the antiquities market, are focusing cultural heritage management efforts on the protection and restitution of movable and immovable cultural property, seeking the return of objects that have left their borders under questionable circumstances, and protecting those that remain. While these policies can reinforce nationalistic ties to heritage objects, they also bring growing attention to the problematic nature of the antiquities market.

The move to digital records and collections has brought significant changes, especially for museums and source communities. Digital information sharing facilitates access to collections, wherever the technology exists. There are many benefits, but digital sharing of cultural information also brings new costs and considerations about ownership, copyright, appropriate use, and the sustainability of digital media. Cultural groups are becoming more and more concerned about uncontrolled sharing of cultural knowledge and the consequences of releasing certain kinds of information into the public domain. For some source nations or communities, the "digital return" of objects, images, and information constitutes a significant form of restitution.

Cultural heritage managers have an important role to play in how local and national histories are interpreted and whether these narratives and their production take a more exclusive or more democratized approach. In situations where nationalistic views of a homogenized past have become state doctrine, cultural revitalization can potentially work to exacerbate ethnic tensions or it can foster respect for multiple, alternative histories. One problem is that players in the field of international cultural heritage often seem out of touch with local realities. The world heritage sector has tended to focus on global or state-level needs and relationships, instead of benefits for local people.

Cultural Tourism

Another international realm where CHM has become increasingly important is cultural tourism, also called "heritage tourism." Cultural tourism is big business. Study after study indicates that tourists are looking for "authentic" cultural experiences. Archaeological sites, historic places, and cultural attractions all over the world are being developed for tourism by public and private investors. In most cases, the potential for economic benefits is the driving force. While cultural tourism can indeed generate local pride and profits, potential costs include an economic dependency on tourism and the unforeseen social changes wrought by mass infusions of people and money. Sometimes, profits go directly to the care and management of sites or to support local artisans, but in many situations, the benefits of turning cultural capital into economic capital are not so clear. As Amalia Perez-Juez notes (this volume), "It is becoming very clear that incorporating archaeological sites in a tourist itinerary can generate benefits for the region, but only sustainable management of these sites will lead to local development." In too many cases, tourist dollars are diverted to nonlocal channels, bypassing local beneficiaries. The danger is that heritage is being managed and manipulated not in the best interests of people living near or with cultural connections to sites, but as a form of international cultural capital, to draw tourists or enhance nationalist narratives. Cultural heritage managers are likely to play an integral role in tourism development and in identifying costs and benefits in terms of local values, authority, and potential for good or harm.

Collaborative and Community-Based Heritage Management

One very positive change in the field of CHM in recent decades has been the proliferation of truly collaborative approaches to heritage management. Today, cultural heritage managers often work at the interfaces between source communities, cultural institutions, and the public, developing partnerships and sharing management decisions, in spite of the significant costs in time and effort this can entail. Making sure that source communities are involved in decisions that affect them or their cultural resources is a significant part of the role of a cultural heritage manager today. In a growing number of situations, cultural heritage managers work with and for local communities on projects and initiatives designed to meet community needs. These transformative CHM practices render many benefits from richer understandings of culture and heritage to more meaningful and just relationships with those who have their own connections to pasts and places.

Community-based management challenges heritage managers in numerous ways. There are costs in terms of the time and patience it takes to build authentic, trusting relationships, especially for heritage managers who are ever more stretched by the expanding responsibilities that come with involvement in community development. Community-based approaches require a shift in control and authority that can be challenging for heritage managers who have been trained to act in the name of "the archaeological record," the state, or an elusive "public trust." In general, it has been shown that the costs of giving up control and listening to the voices of those who have the most at stake are well worth it. The relationships created in the process are opportunities to learn a great deal about sites and objects and their agency in the past and present.

Another less tangible, but equally significant, benefit is that democratized, community-based approaches offer some excellent examples of

good practice and innovation in heritage management that move toward decolonializing CHM. There are times when the democratization of CHM – the inclusion of the voices and opinions of those who have the most at stake – may result in decisions to limit access to specific sites or heritage performances for cultural reasons, or to restrict the circulation of certain information or images, or to require special permits from researchers seeking to work with particular objects or collections. Cultural heritage management has also been the subject of ethnographic critiques that explore topics such as relationships between people and sites, strategic deployment of cultural symbols for various ends, and the potential for heritage to divide people or to bring them together. These critiques help us reflect on the direction that the field of CHM might be heading or has been (see Edgeworth 2006; Hamilakis and Duke 2007).

Training

Finally, the field of CHM is faced with the challenge of developing training programs that keep up with the many changes its practitioners are experiencing. Are future heritage managers being adequately prepared to make decisions about the many contradictory and ethically challenging topics that they will face? Are those already in CHM positions receiving training that supports the new roles they will take on in their positions? UNESCO, for example, has been conducting regional training programs for cultural heritage managers, covering topics such as standards for maritime archaeology, how to ensure sustainable benefits for source communities, and how to build local and regional capacity. Such programs create a cohort of people who work in the same region and face similar challenges in translating global directives into beneficial and sustainable local initiatives. In this way, they provide heritage managers with much-needed networks and support.

Conclusion

As a practice and a profession, heritage management must remain open to change. Change has many costs. It is risky and time-consuming. It requires defining new roles and building new relationships. It can mean having to give up control, face painful memories, or withstand criticism. But the costs of not changing, and of not reflecting critically on where CHM has been and where it is heading, are far greater. Since Henry Cleere's seminal volume in 1984, many others have described and compared approaches to CHM from all over the world. This breadth and awareness transformed CHM from a nationalistic enterprise into a globally significant endeavor, operating at a range of scales, ever more involved with transnational forces but also ultimately concerned with how these integrate with local goals and aspirations. Willingness to reflect on the cost and benefits of change can only lead to better understandings about what constitutes good practice and will continue to enrich the ever-changing field of CHM.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ China: Cultural Heritage Management
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Somaliland: Cultural Heritage Management
- ▶ Spain: Archaeological Heritage Management
- ▶ Zimbabwe: Cultural Heritage Management

References

Bradshaw, E., K. Bryant, T. Cohen, D. Brereton, J. Kim, K. Gillespie, and I. Lilley. 2011. *Why cultural heritage matters: A resource guide for integrating cultural heritage management into communities work at Rio Tinto*. Melbourne: Rio Tinto, Pty.

Cassar, M. 2006. *Evaluating the benefits of cultural heritage preservation: An overview of international initiatives*. London: Centre for Sustainable Heritage.

Cleere, H., ed. 1984. *Approaches to the archaeological heritage: A comparative study*. Cambridge: Cambridge University Press.

De La Torre, M., ed. 2002. *Assessing the values of cultural heritage*. Los Angeles: Getty Conservation Institute.

Edgeworth, M., ed. 2006. *Ethnographies of archaeological practice: Cultural encounters, material transformations*. Lanham: AltaMira Press.
Hamilakis, Y., and P. Duke, eds. 2007. *Archaeology and capitalism: From ethics to politics*, One World Archaeology series. Vol. 54. Walnut Creek: Left Coast Press.
Lipe, W.D. 1974. A conservation model for American archaeology. *The Kiva* 39: 213–245.
McManamon, F. 1991. The many publics for archaeology. *American Antiquity* 56: 121–130.
Throsby, D. 2001. *Economics and culture*. Cambridge: Cambridge University Press.
Welch, J., M. Altaha, D. Gatewood, K. Hoerig, and R. Riley. 2006. Archaeology, stewardship, and sovereignty. *The SAA Archaeological Record* 6: 17–20.
World Bank. 2000. *Culture counts: Financing, resources, and the economics of culture in sustainable development*. Washington, DC: World Bank. Available at: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2000/11/17/000094946_00110405591265/Rendered/PDF/multi_page.pdf. Accessed 1 Apr 2012.

Further Reading

Carman, J. 2002. *Archaeology and heritage: An introduction*. London: Continuum.
Cleere, H., ed. 1989. *Archaeological heritage management in the modern world*, One World Archaeology series. Vol. 9. London: Unwin Hyman.
Eagles, P.F.J., S.F. McCool, and C.D. Haynes. 2002. *Sustainable tourism in protected areas: Guidelines for planning and management*. Gland/Cambridge, UK: IUCN (The World Conservation Union).
Garrod, B., and A. Fyall. 2000. Managing heritage tourism. *Annals of Tourism Research* 27: 682–708.
Mathers, C., T. Darvill, and B.J. Little, eds. 2004. *Heritage of value, archaeology of renown: Reshaping archaeological assessment and significance*. Gainesville: University Press of Florida.
McManamon, F.P., and A. Hatton, eds. 1999. *Cultural resource management in contemporary society: Perspectives on managing and presenting the past*, One World Archaeology series. Vol. 33. London: Routledge.
McManamon, F.P., A. Stout, and J.A. Barnes, eds. 2010. *Managing archaeological resources: Global context, national programs, local actions*, One World Archaeology series. Vol. 58. Walnut Creek: Left Coast Press.
Merriman, N., ed. 2004. *Public archaeology*. London: Routledge.
Messenger, P.M., and G.S. Smith, eds. 2010. *Cultural heritage management: A global perspective*. Gainesville: University Press of Florida.
Phillips, C., and H. Allen, eds. 2010. *Bridging the divide: Indigenous communities and archaeology into the 21st century*. Walnut Creek: Left Coast Press.
Rowan, Y.M., and U. Baram, eds. 2004. *Marketing heritage: Archaeology and the consumption of the past*. Walnut Creek: AltaMira Press.
Sebastian, L., and W. Lipe, eds. 2010. *Archaeology and cultural resource management: Visions for the future*. Santa Fe: School of American Research Press.
Smith, L. 2006. *Uses of heritage*. London: Routledge.
Smith, L., and E. Waterton. 2009. *Heritage, communities, and archaeology*, Duckworth Debates in Archaeology. London: Duckworth.
Smith, G.S., P.M. Messenger, and H.A. Soderland, eds. 2009. *Heritage values in contemporary society*. Walnut Creek: Left Coast Press.
Sorenson, M.L.S., and J. Carman, eds. 2009. *Heritage studies: Methods and approaches*. London: Routledge.
Sully, D. 2008. *Decolonizing conservation: Caring for Maori meeting houses outside of New Zealand*. Walnut Creek: Left Coast Press.

Cultural Heritage Management: International Practice and Regional Applications

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Introduction: Shifting Ground

In approaching this chapter to the second edition of the encyclopedia through an update of the original first edition chapter, it seemed inappropriate to undertake nothing other than minor revisions and edits. Rather, the original is used as a stepping stone for a reflection on changes that have taken place incrementally in the heritagization process since the mid to late 1980s. There are two reasons for this decision. The first is encompassed in the pithy comment by Lowenthal (1996:xi):

> All at once heritage is everywhere … One can hardly move without bumping into a heritage site. Every legacy is cherished.

The second is tied to one of the key issues discussed in the first edition "Protecting Whose Values?" (page 1942) under the premise that:

> Laying down global frameworks for protecting cultural heritage underpinned by methodical approaches to identification and assessment of heritage resources, analysis of significance, and evaluation of proposals has led to an internationally accepted *modus operandi*. It represents a modern bureaucratic system where heritage resources are itemized through categories and entered in registers and lists. While we need to apply such tools anchored in a systematic and demonstrable way of working, they, and associated charters, have in the past shown their Western cultural origins (Byrne 1991) and, one may add, Western values. Although what is needed now is consideration of how these may well be values shared by other cultures. Nevertheless the underlying concern is how far do such universal approaches based on Western methodologies and thinking adequately address regional cultural values and differences across the world?

Since Byrne made his observation, changes have taken place in international debate on concern for regional values coincidental with the promulgation of new charters and declarations as I discuss in the following section and with reference to Table 1. Nevertheless there continues to be debate on whether international practice is dominated by Western ideologies and particularly those from Europe/North America associated with the cultural phenomenon referred to as "Eurocentrism." Eurocentric exceptionalism posits the idea of Eurocentric cultural values as superior to non-European societies and advocates adoption of Western values – individuality, human rights, equality, democracy, free markets, secularism, and social justice – as a universalist phenomenon no matter how different various societies are socially, culturally, and historically (Pokhrel 2011:321). Related to these culture clashes has been growing questioning particularly, for example, in Asia, of Western/European approaches to cultural heritage conservation, i.e., superimposing, as superior, a Western context on different cultural contexts. Winter (2014:123) refers to this as a "discourse of difference [that] has emerged where Asia is claimed to be materially, culturally and historically different to the west; most pointedly Europe, the global birthplace of the modern conservation movement." Winter aptly applies the term "politics of difference" to what in effect could be in danger of becoming an insurmountable east/west divide. I contend that it should not be seen as a divide but something to be bridged with cross-cultural understanding of different cultural contexts under the umbrella of cultural relativism.

At this point I suggest also that the concept of heritage conservation in Asia supposedly dominated and steered by "Eurocentrism" – Winter's politics of difference – is being overplayed, often for nationalistic political reasons. It is advisable, therefore, to take a reflective, rather than an essentialist, approach to the concept of "Eurocentrism" (Taylor and Xu (2018)). An essentialist approach assumes that nothing has changed in Europe from a material fabric-oriented approach to famous monuments and sites. This may have been the case in the 1970s and stretching into the 1980s, but the 1990s were when the winds of change started to be felt, such that since then the "conservation discourse of material culture has moved on in Europe" (Winter 2014:134). One may also speculate that the idea of the imposition of "Eurocentrism" is readily used in Asia to legitimize, while obfuscating, the drive to be on the global World Heritage stage with its political and nationalistic prestige and prestige of attracting tourists whose spending boosts government coffers.

The World Heritage Convention has been variously criticized as being hegemonic and culturally inappropriate by forcing Western notions on countries with different value systems. As a result, questions are raised by many scholars on the extent to which nominations to the World Heritage list can or may distort local and regional values as nation states seize on political and economic considerations as drivers of nominations to the List. Such criticisms can be simplistic and problematic as they may – and do misguidedly in my view – eschew the role of agencies such as UNESCO and ICOMOS as imposing their standards and ideas on cultures outside the Western (read European) world. They ignore the fact that instruments such as the World Heritage Convention are routinely used by national governments around the world, not least in Asia, to further nationalistic agendas. In a trenchant critique Askew (2010:21/22) argues that:

Cultural Heritage Management: International Practice and Regional Applications, Table 1 Chronology of steps and actions in development of the heritage process

• **1945** the **United Nations** was formed
• Creation of the **United Nations Educational, Scientific and Cultural Organization [UNESCO]**, November 1945. The Constitution of UNESCO [November **1946**] mandates the Organization to ensure the conservation and protection of the world's inheritance of books, works of art, and monuments of history and science (UNESCO 2007). Here was established the firming of globalized thinking on cultural heritage protection in the modernist tradition of "ideas and practices that could be applied around the world regardless of differences in local cultures" (Logan 2001)
In the early UNESCO years, various missions were organized to advise member states on the conservation of heritage sites. Later these developed into international campaigns, of which the first was launched in **1959** on the temples of Abu Simbel, Egypt, threatened by the construction of the Aswan Dam
UNESCO also collaborated in the organization of meetings of experts in the preservation of heritage resources. These included a conference on the preservation of monuments held in Venice in **1964**, which adopted the ICOMOS ***International Charter for the Conservation and Restoration of Monuments and Sites*, (the *Venice Charter*)**
• In **1972** at a UN conference on the human environment in Stockholm, it was recommended that a UNESCO convention on World Heritage should be adopted, resulting in ***the Convention Concerning the Protection of the World Cultural and Natural Heritage*** (16 November 1972). Generally known as **the World Heritage Convention**, it has achieved a great deal during its existence. "Today, it is among the foremost international tools of conservation, and certainly among the best known" (Bandarin 2007:18)
• UNESCO was instrumental in setting up key international organizations – **ICOMOS, ICCROM**, and **IUCN** – that have become official advisory bodies to the World Heritage Centre
ICOMOS *(International Council on Monuments and Sites), a non-governmental organization with headquarters in Paris, was established in 1965. It is dedicated to the conservation of the world's historic monuments and sites and provides a forum for professional dialogue and a vehicle for the collection, evaluation, and dissemination of information on conservation principles, techniques, and policies. It also advises UNESCO on World Heritage cultural matters*
ICCROM *(International Centre for the Study of the Preservation and Restoration of Cultural Property) based in Rome was established in 1956 by UNESCO. It has a worldwide mandate to promote the conservation of all types of cultural heritage, movable and immovable, with the aim of improving the quality of conservation practices and raising awareness about the importance of preserving cultural heritage through training, cooperation, research, information, and awareness*
• **1979/1999/2013** ***Australia ICOMOS Charter for Conservation of Places of Cultural Significance* (*the Burra Charter*)**
• **1987** ***ICOMOS Charter for the Conservation of Historic Towns (Washington Charter)***
• **1992** the **World Heritage Centre** was established and is the focal point and coordinator within UNESCO for all matters related to World Heritage including managing of the Convention, organizing annual World Heritage Committee meetings, providing advice to States Parties in the preparation of nominations, and coordinating the reporting on the condition of sites and the emergency action undertaken when a site is threatened. The Centre also organizes technical seminars and workshops, updates the World Heritage list and database, develops teaching materials to raise awareness among young people of the need for heritage preservation, and keeps the public informed of World Heritage issues
• **1992 UNESCO Experts Meeting La Petite Pierre proposes categories for World Heritage recognition and revisions to WH Operational Guidelines**
• **1992 UNESCO World Heritage Centre recommends three categories of cultural landscapes for World Heritage recognition by WH Committee**
• **1993 Cultural Landscape Colloquium Montreal**
1993 UNESCO Experts Meeting, Templin, Germany
• **1994 ICOMOS,** ***the Nara Document on Authenticity***
• **1994** the World Heritage Committee (WHC) launched the ***Global Strategy for a Representative, Balanced and Credible World Heritage List*** (http://whc.unesco.org/en/globalstrategy), with the aim ensuring that the List reflects the world's cultural and natural diversity of outstanding universal value. The WHC wanted to broaden the definition of World Heritage to reflect better the full spectrum of the world's cultural and natural treasures and to provide a comprehensive framework and operational methodology for implementing the World Heritage Convention. It resulted from a global study carried out by ICOMOS from 1987 to 1993 which revealed that Europe, historic towns and religious monuments, Christianity, historical periods, and "elitist" architecture (in relation to vernacular) were all overrepresented on the World Heritage List, whereas, all living cultures, and especially "traditional cultures," were underrepresented

(continued)

Cultural Heritage Management: International Practice and Regional Applications, Table 1 (continued)

• **1996** ***Cities of Asia,*** **UNESCO,** http://whc.unesco.org/en/activities/498/
• **2000** ***ASEAN Declaration on Cultural Heritage*****, Bangkok, Thailand, 24–25 July 2000**
• Early 2000s to present: mounting critical heritage studies debate on what is heritage and importance of "culture" in cultural heritage; questioning of universality of heritage values particularly in the WH Convention, intangible cultural heritage, criticism of a primary locus of attention on famous monuments and sites
• **2002 UNESCO Budapest Declaration on World Heritage addressing intangible cultural heritage**
• **2002 ICOMOS China** ***Principles for Conservation of Heritage Sites in China***
• **2003 UNESCO World Heritage Centre,** ***Convention for the Safeguarding of the Intangible Cultural Heritage***
• **2003 ICOMOS** ***the Hoi An Declaration on Conservation of Historic Districts of Asia***
• ***The World Heritage List. Filling the Gaps: An Action Plan for the Future*** **(ICOMOS 2005).** The plan was intended as a contribution to the further development of the Global Strategy for a Credible, Representative, and Balanced World Heritage List
• **2004, UNESCO World Heritage Paper 13,** ***Linking universal and local values***
• **2005a, UNESCO,** ***Convention on the Protection and Promotion of the Diversity of Cultural Expressions***
• **WH Committee decision (Decision 31 COM 13B) at its meeting in 2007** in Christchurch to include "Community" with the four Cs (Credibility, Conservation, Capacity Building, and Communication) of the **Budapest Declaration on World Heritage (UNESCO 2002).** Also at this meeting the Committee requested that ICOMOS and IUCN submit commentary on inclusion of local people in World Heritage nominations
• ***World Heritage Challenges for the Millennium 2007*** **(UNESCO World Heritage Centre)**
• **2007** ***ICOMOS Declaration on Heritage and Metropolis Asia and the Pacific***
• **2009 UNESCO Bangkok,** ***Hoi An Protocols for Best Conservation Practice in Asia***
• **2009** ***UNESCO World Heritage Papers 26 World Heritage Cultural Landscapes: A Handbook for Conservation and Management***
• ***UNESCO World Heritage Papers 31 Community Development through World Heritage*** (UNESCO 2012) and ***UNESCO World Heritage Papers 40 Engaging Local Communities in Stewardship of World Heritage: A methodology based on the COMPACT experience*** (UNESCO 2014)
• **2011 UNESCO** ***Recommendation on the Historic Urban Landscape***
• **2013 UNESCO** ***New Life for Historic Cities: the historic urban landscape approach explained***
• **UNESCO 2013 Publication:** ***Managing World Cultural Heritage***
• **2016 UNESCO et al.** ***The HUL Guidebook. Managing heritage in dynamic and constantly changing urban environments. A practical guide to UNESCO's Recommendation on the Historic Urban Landscape***

> The Eurocentric and crypto-imperialist [claim] is both redundant and a conceptual red herring: it misrecognises the real locus of power and exploitation in the global heritage game, which is the nation-state and not any dominant global institutional structure or discourse of heritage classification.

That differences and diversity between cultural contexts of east and west exist is clear. That approaches to cultural conservation can be different is also clear, not least in the Asian approach to partial replacement of fabric or total replacement through demolition and rebuilding. "Asian conservation is not so much about protecting the way a building or structure *looks* but what a building *does*" (Staiff 2016:33). In this regard Taylor and Altenburg (2006:271) note that in Asia:

> Replacement of fabric is acceptable because the significance of the place resides primarily in its continued spiritual meaning and symbolic value related to everyday use rather than pre-eminence of the fabric itself, the latter being held as a Western preoccupation.

Heritagization Process: Shifting Discourse?

A central question, therefore, is have we progressed, and if so to what extent, from when Byrne (1991) reflected that methods of working, tools, and in particular associated charters did show their Western cultural origins and in particular European values as has repeatedly been claimed? My answer to this question is that undoubtedly progress has been made and has been seen to be made not only through scholarly

and academic discourse but through changes in thinking in the global conservation profession and global agencies. This chapter, therefore, is a review of incremental changes in heritagization theory and practice – that have taken place over the past three decades as I explain below – and how they have addressed the question of universal values vis-à-vis regional values. How far have we progressed in broadening our thinking by moving away from a narrow focus explicit in Smith's (2006) Authorised Heritage Discourse (AHD) paradigm? To what extent have we transcended what I previously alluded to as "the concept of cultural imperialism – imposition of a foreign viewpoint or culture over another country – that emerged in the 1960s?" (page 1942). In this connection Winter (2014:125) addresses shifts in approaches to heritage conservation and the politics of difference, noting that "from within academia and the heritage conservation profession the calls for approaches more sensitive and responsive to the cultural context of the site or country in question have become increasingly loud."

My view is that progressive changes have occurred and notable ones at that. Table 1 outlines my take on notable milestones in the chronology of, and actions in, development of the heritage process, including various charters and declarations, in the late modern/postmodern period since World War II, but particularly from c1990 onward. Contrary to the skepticism of some scholars that the international bureaucracies and agencies, in particular UNESCO and ICOMOS, are immune to changes in thinking and broadening of cultural heritage theory and practice is the counterargument that it is a view not supported by evidence of shifts that have occurred (Table 1) in the 45 years since 1972 (see also Taylor 2017). Criticisms of the agencies revolve, inter alia, around what is seen as "a one size fits all" globalizing approach that stifles regional cultural differences. Contrary to such a view is that changes that have occurred are indicative of "UNESCO's progressive accommodation of heritage diversity" (Askew 2010:28) and demands to expand its thinking and practice. Askew (2010:19/20) further cogently argues that UNESCO has expanded its programs to mitigate the destructive effects of capitalism's globalization of cultural industries and that its key texts can be seen as beneficent globalization by its advocacy for worldwide protection of cultures and their valued tangible and intangible past. Harrison similarly reflects how there has been a shift "to accommodate an increasingly large number of objects, places, and perhaps most importantly, practices, and the landscapes in which these occur" (Harrison 2013:115). Coincidental has been the broadening of concern with culture and the intangible rather than focusing primarily on things. In the shift away from a concentration on monuments and sites, heritage now embraces:

> Precincts, historic urban centres, whole towns and villages, cultural landscapes, and historic urban landscapes, associative values and intangible heritage – the talents embodied in people, such as artistic skills in dance, music and painting, or skills in language, or craft and construction skills. (Logan 2010:38)

A key concept in changes has been the movement to acknowledge intangible heritage and related associative values, i.e., the values people associate with their heritage and how values change between cultures. Linked to this movement has been increasing attention being paid to cultural diversity and differing communities with diverse habits and modes of thinking and acting. Nevertheless, and notwithstanding heritage discourse with its interest expanding to acknowledge values-based approaches with the move away from a major focus on famous monuments and sites (the great White House syndrome (Australian colloquialism that neatly encapsulates the meaning.)), there still remains disquiet. In particular is the counterview of heritage (counterheritage) that sees mainstream heritage discourse as essentially hegemonic rather than democratic; that it relies on expert assessment and advice; that it constructs heritage items out of old things; and in particular reference to Asia that local people need to be educated by practitioners and governments (Byrne 2014). These transgressions certainly occur in Asia, but are often the outcome of top-down approaches by governments and agencies that not only distrust community participation, but avoid it. There are

exceptions as in the recent study and work in China at Shuang Wan Village (Verdini et al. 2017).

The context to the Shuang Wan study is the causes and effects of hitherto rapid and dislocating urbanization in China leading to loss of rural cultural roots. However, winds of change are blowing in terms of attention being given to rural cultural traditions as something quintessentially Chinese. It is part of a Chinese cultural revival movement (see, e.g., Billiou 2007) and extended cultural heritage thinking. These sit alongside an understanding of the potential role of "sustainable transformation of traditional villages" (Verdini et al. 2017:321). Notably, these changes are coincidental with China's participation in global heritage practice and its rise to second place on the UNESCO list of World Heritage properties behind Italy. On the outskirts of Suzhou, Shuang Wan village retains a distinctive rural character and is located in an area including the World Heritage listed water town of Tongli where tourism is thriving and increasing. A 2015 research project tested the UNESCO Historic Urban Landscape (HUL) approach to strike a balance between urban development and rural landscape conservation (Verdini et al. 2017). The study was undertaken in cooperation with a village committee and participatory workshops to get consensus on a shared vision for future development and income-generating activities. The result has been "discussions on how to rebrand the entire village" (UNESCO 2016) and maintain such activities as home-based textile enterprises through online selling alongside improvements to the physical setting.

Role of Landscape: Politics of Similarity

Further to Byrne's (2014) counterheritage discourse is his setting out for the Asian context the significance of popular religions with their numinous or spiritual quality where people call on spirits for help in daily life, their belief in ancestor worship, myths, legends, and folklore and the relationship of such intangibles to the concept of sacred landscapes. Such numinous character is seen in sacred sites or places commonly throughout the landscapes in Asia where they are viewed as spiritscapes, as, for example, in the Lua people of Northern Thailand whose relationship with various sacred mountain sites along the Thongchai range is grounded in their animistic and Buddhist beliefs (Pongpandecha and Taylor 2016). "It is becoming increasingly clear that the sacred dimension can and does play an important role in landscape care and nature conservation" (Studley 2010:107). The spiritual qualities are indicative, in effect, of what has nicely been called the "ordinarily sacred" (Sexson 1992). Numinous beliefs also accord with the notion that heritage is concerned with the here and now, not just the past as in the 1970s' monuments and sites syndrome. It is a view that has gained traction globally since the 1990s and is now universal. A simple but telling example occurred at Bagan in Myanmar (now in the process of being nominated for World Heritage listing). In addition to major religious monuments and stupas, Bagan in its heyday had many small stupas representing events such as birth, enlightenment, and miracles. Most of these disappeared over time. With the advent of interest in Bagan from the 1980s, many of these small stupas have been rebuilt without reference to research or archaeological evidence. The practice in the 1980s and 1990s came in for criticism by Western archaeologists, ignoring the significance of the Buddhist spiritual context of making merit and its meaning. The rebuilt physical aspect of the stupas was/is immaterial to Buddhist practice and life meaning and the practice of merit making. It was also argued by detractors that rebuilding by people giving donations was a way of making money.

Notably, the notion of the ordinarily sacred is recognized in everyday places in Western society as set out by Lynda Sexson (1992) in her book *Ordinarily Sacred*. Indeed since the promulgation of the World Heritage cultural landscape categories (1992), there has been an increase in nominations to the World Heritage list of landscapes that represent everyday lived-in landscapes operated by ordinary people in both western and eastern settings: for example, Bali Rice Terraces, the Philippines' Rice Terraces, Cornwall and West Devon Mining Landscape (UK), and Blaenavon Mining

Landscape (UK). It is important, therefore, in the field of heritage conservation that, for such vernacular landscapes, we understand the spiritual relationships between people and their landscapes as in Byrne's numinous, spiritual quality. Such a link is seen in the European Landscape Convention (Roe and Taylor, 2014:8):

> In particular, the ordinary landscapes where most people live are seen as having potential value to someone, even though the quality may be low in terms of many of the commonly identified indicators, such as scenic beauty, biodiversity rating, range of use and accessibility. The emphasis here is very much on the value to 'someone' (communities, cultures and individuals).

What this perspective suggests is that there are distinct similarities in human associative relationships with, and sense of, place. Specifics may differ in terms of nuances of aspects such as the spiritual associated with the ordinarily sacred, but what this suggests to me is that there is a need to bridge the politics of difference and think in broader term of politics of similarity. In the broadening of thinking that has occurred, a movement to cross-cultural and societal boundaries and understanding regional differences in values is discernible. It is a movement which has gathered pace since the 1992 World Heritage cultural landscape categories and ICOMOS (1964) *Nara Document on Authenticity.* In this regard Bi et al. (2016:192) note:

> The international heritage arena has witnessed a trend of moving from a single discourse – the "authorized heritage discourse" (Smith 2006) – to multiple discourses . . . However, the dominance of the "authorized heritage discourse" does not imply that it has not been unchallenged or responded. The value, culture, and community input of heritage conservation has been acknowledged and has gradually gained momentum since the 1980s, through interest in such things as cultural diversity, *cultural landscape* (my italics) and community development both in academia and within international bodies like UNESCO and ICOMOS.

Setting

In the context of this chapter – and linking to the previous version – a keyword in the shifting heritagization discourse is "setting." Setting is used in the notion of situating mentally and locating physically a heritage place or site. It is the area of land with which a heritage site interacts as expressed, for example, in the ICOMOS (2005a) *Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas* and in the reference to setting in ICOMOS (1994) *Nara Document on Authenticity.* In this sense "setting" encompasses intangible associative aspects of heritage and has close connection with the construct of (cultural) landscape. This was expressed in the earlier chapter version (p. 1947) as "A synonym for setting is landscape and presumably embraces the notion of cultural landscape reflecting how and why people have shaped their surrounds according to their ideologies." It corresponds with the *Burra Charter* (Australia ICOMOS 2013 Article 8) reference to conservation requiring retention of an appropriate *setting*. This includes retention of the visual and sensory setting, as well as the retention of spiritual and other cultural relationships that contribute to the *cultural significance* of the *place*.

The terms "landscape" and "setting" are closely linked; for example, we often refer to "the landscape setting" of a heritage site (see also below reference to Sullivan 1985). Notably in *Principles for the Conservation of Heritage Sites in China* (China ICOMOS 2000), the term "landscape" is quoted as a synonym for "setting." There are connections here with the notion of landscape as "bounded area" (Wylie 2007:21). Wylie discusses how the term "landscape" and its meanings infer connections with various words emanating from German and Dutch etymological roots. The bounded area definition stems from the German *landschäft* (to which the term *Kulturlandschaft*, from which "cultural landscape comes," is linked), while "the Dutch equivalent, *landchap,* has a much more strongly visual and artistic connotation, it is much closer to the idea of land as perceived, or a picture of land, whereas the Germanic ties much more closely to the land itself, to the notion of objective external space" (Wylie 2007:21). Nevertheless the cultural landscape construct transcends that of objective external space. It has its origin in the development of the Germanic geographical tradition and notion of

kulturlandschaft, a word first used by the German geographer, Otto Schlüter who "came to champion the view that the essential object of geographical inquiry was landscape morphology as a cultural product" (Livingstone 1992:264). Schlüter's work was followed by that of Franz Boas, anthropologist and geographer, with his tenet that it is critical to landscape study to understand cultural traits of societies – behaviors, beliefs, and symbols – and the necessity to examine them in their local context. Boas' precepts are philosophically critical to modern understanding of "landscapes as a clue to culture" (Lewis 1979:15) and how appreciation of this has played a significant part in broadening of thinking and practice in the heritagization process.

It should be noted that the term "cultural landscape" did present challenges in an Asian context (particularly Southeast and East Asia) in the 1990s and into the later 2000s. It was viewed as a Western notion, and the fact that Asian languages have no direct equivalent to the term was problematic. For example, from a Chinese perspective, the term was seen as a tautology in that all landscape is cultural: landscape without people is oxymoronic. As discussed in a 2009 paper (Taylor 2009), it could be seen that Asian terms equivalent to landscape intrinsically involved interaction between people and landscape – travelling through, being in, looking at, and imagining being in the landscape – and interpreted concepts of nature differently to those of a Western binary between culture and nature. What the contested discourse misread was that the 1992 World Heritage categories were in fact an attempt to bridge global cultural diversity and values with the notion that cultural landscapes were at:

> The interface between nature and culture, tangible and intangible heritage, biological and cultural heritage. Rössler (2006:334)

Nevertheless the term "cultural landscape" has become increasingly accepted (For example, SACH (State Administration of Cultural Heritage, the national agency responsible for management of cultural heritage management sites and policy and museums in China) indicated that the subject of cultural landscapes was to be addressed when the Director of SACH at a May 2008 ICOMOS Asia Pacific Conference referring to the international significance of cultural landscapes declared they will be a focus of attention for China over the next few years. He also mandated the use of the term "cultural landscape."), not least with the inscription of various Southeast and East Asian cultural landscapes on the World Heritage list. By the beginning of 2017, there were 17 such landscapes in Southeast and East Asia included on the World Heritage list as cultural landscapes out of a global total of 88 (UNESCO website http://whc.unesco.org/en/culturallandscape/). Prior to 2004 there were four.

Pivotal to the rise of the cultural landscape construct has been the concept of landscape as process. Parallel has been critical inquiry into the concept of heritage as process (Harvey 2001; Howard 2003), and in my view the coincidence is not accidental. The two are intellectually linked. Covering far more than simply buildings, structures, and sites, such processes embrace concepts of living history and living heritage to encompass the full spectrum of people's sense of place, traditional knowledge and its transmission, cultural production including equity and access, creativity and innovation, and the safeguarding of natural resources and cultural traditions that provide the foundations of local livelihoods. Further, the concept of living heritage as a resource for local community-based sustainable development offers a foundation for an association of cultural sustainability with heritage management action.

Living History and Living Heritage

In addition to recognizing the profundity of the concepts of living history and living heritage as a prime resource for local community-based sustainable development, they have become a lens through which cultural heritage management is increasingly perceived. The significance of these concepts is grounded in the 1980s/1990s academic and serious professional debates in public history and folklore studies as seen, for example, in the emergence of two journals: *The Public Historian*, in the USA in 1978 (National Council

on Public History), and the Australian journal *Public History Review* (University of Technology Sydney, editor Paul Ashton) with its first edition in August 1992. In the first edition of *Public History Review*, the idea of landscapes as public historical resource was explored (Taylor and Winston-Gregson 1992:81):

> The term cultural landscape is now commonly used by a range of professionals involved in historical research, heritage conservation and heritage interpretation. Interest in cultural landscapes follows from a growth in understanding of the role of landscape as a statement of the history of people . . .
>
> It is part of an increasing awareness of the historic significance and social significance, with resultant heritage values, of cultural landscapes. Sharon Sullivan commented in 1985 on the growth of the popular heritage movement leading to history becoming more accessible to the public because "People are asking themselves What happened in our history" [see Sullivan 1985:15]. As part of presenting answers Sullivan points to the importance of cultural landscapes as the total setting for public history. She suggests that these landscapes are part of our "intellectual and cultural background of which they are a product."

Scholarly commentary on the link being forged between public history and popular interest in heritage was apparent in the work of the Marxist historian Raphael Samuel. In his *Theatres of Memory* (1994), Samuel explores "the *social* role of heritage" (Harrison 2010:241) and its expanding horizons from the rich and famous and the elite country house and park image of history and heritage to ideas of people's history or "history from below" (West and McKellar 2010:196; see also Harrison 2010:241). The tension here is where does history from "below the stairs' imagery – cosily reassuring film and television images of servants in their quarters and their relationships with masters and mistresses – change to real history from below?" Harrison (2013:100) suggests that Samuel saw the answer to this in regarding heritage as a social process that had "served to make the past more democratic through an emphasis on 'ordinary' people." It is reflected in my view in cultural landscape nominations for World Heritage recognition. Popular interest in genealogy may be seen as another reflection of the democratizing of heritage.

Changing ideas on living history and living heritage and history/heritage from below are also reflected in various international heritage initiatives – milestones – such as ICCROM 2000 *Promoting People Centre Approaches to Conservation: Living Heritage* (http://www.iccrom.org/priority-areas/living-heritage/); *Filling the Gaps* (ICOMOS 2005b); *World Heritage Challenges for the Millennium* (UNESCO 2007); "Community" added in 2007 (World Heritage Committee, Decision 31 COM 13B) as fourth "C" to Credibility, Capacity Building, Communication in the 2002 *Budapest Declaration on World Heritage*; UNESCO *World Heritage Papers 26* 2009 on Cultural Landscapes (Mitchell et al. 2009); *UNESCO World Heritage Papers 31 2012 on Community Development and World Heritage* (Albert et al. 2012); and *UNESCO World Heritage Papers 40 2014 on Engaging Communities in Stewardship of World Heritage* (Brown and Hey-Edie 2014). These initiatives are part of the notable milestones shown in Table 1.

The shift that has occurred in thinking on living history/living heritage is part of the reorientation of the "conventional" (Wijesuriya et al. 2013) cultural heritage management approach – once lionized by focus on care of the physical fabric of heritage structures – toward recognizing the significance of intangible cultural heritage and associated values of living communities and the needs and wishes of living communities who are the custodians of this heritage. Putting living history/living heritage center stage, the thinking goes and ensures a more engaged, better informed, and locally rooted conservation management process, which is more culturally sustainable. It also represents a move away from thinking of heritage as places and objects from the past and recognizing their continuing contemporary community role in society and social practices. Poulios (2014:28) expresses this in his three key principles that determine a "living heritage approach":

1. Recognizing local communities as the true long-term custodians of their heritage sites
2. Empowering communities in the conservation and management process and benefiting from

their traditional knowledge, management systems, and maintenance practices
3. Linking conservation to the sustainable development of the communities, by developing a process to manage change and by making heritage relevant to the needs of the contemporary communities

In regard to local community values and practice, the stated position of UNESCO should be noted as Logan (2012:115) reflects:

> UNESCO now argues that it is imperative that the values and practices of the local communities, together with traditional management systems, are fully understood, respected, encouraged and accommodated in management plans if the heritage resources are to be sustained into the future (UNESCO World Heritage Centre, 2004:9). This is a major advance towards establishing a human rights-based approach to World Heritage site management and would seem to give hope to further progress in this direction

At this point in the discussion, I reiterate that the two emergent ideas – cultural landscapes as process and heritage as process – are coincidental and mutually dependent. This link does not infer haphazard coincidence; rather that both movements and thought processes are closely interwoven and mutually dependent. They crystallized from growing concern for what exactly is heritage and scholarly critique of heritage practice globally from the mid-1980s onward with a perceived focus on famous monuments and sites. In addressing this topic, Harrison (2013:115) reflects that the post-1980s period has seen:

> . . . increasingly heritage shift away from a concern with 'things' to a concern with cultures, traditions and the 'intangible' . . . While this broadening agenda has been driven partially by economic interests and the need to appeal to increasingly diverse audiences, this has paralleled a movement in academic heritage studies away from a concern with materiality of heritage to a concern with heritage as a discourse and a system of values.

Materiality

While the movement toward concern for value systems has occurred, informed concern for materiality of heritage has not disappeared. Rather it has shifted away from a narrow focus on famous monuments and sites to inquiry into understanding better the role of fabric in meaning of heritage places without demeaning the role of physical preservation techniques. The two concerns run in parallel and indeed overlap and inform each other. They demand to be considered in tandem in approaches to understanding international practice and regional values. In contemplating this point, Winter (2014:134) observes that in relation to changes in pluralization of heritage and creation of different languages, diversification, and expansion of definition of heritage:

> . . . there is a much more developed understanding of the connections between the role of the fabric of heritage and the cultural economies of contemporary life. Endless examples could be cited that illustrate how the conservation of material fabric is understood as the starting point for the broader goal of maintaining sociocultural continuities, the very real, albeit analytically elusive, social glue that binds past and present. In other words, in many instances material authenticity operates as a guiding principal rather than an absolutist perspective ...

Is a focus on the real, "the 'really real'" (Harrison 2013:88) at odds with the focus on intangibility? I think not. It is my contention that some places/objects because of strong political and historical connotations can and do have inherent/intrinsic qualities (values?) that make people recognize them as heritage without any instruction from experts or learned arguments on whether values are universal. For example, tourists visiting Angkor know the archaeological remains are significant universally and inherently recognize them as such. They may have read in a tourist guide or coffee-table magazine that this is the case without giving it much thought. Here Berliner's (n.d.:2) commentary is instructive:

> what about the object, the site and the ritual per se? Are there any inherent, intrinsic qualities to sites, objects or gestures that make them catchy enough to become patrimoine? Something about their size, surfaces, colours, texture, localisation, rhythm, sound, taste; something sensual that makes them more likely to be noticed by a human observer, to trigger specific emotional reactions and to produce long-lasting memories about them? In other words, do buildings, practices and objects hold inner iconic properties and how may these (or not) influence the heritagization process?

Conclusion

This chapter has attempted to track what are tantamount to major structural shifts in heritage thinking and practice over the last few decades. The shifts relate particularly to the gradual opening post-1972 of a remarkable broadening critical debate and understanding of the concept of cultural heritage to that which had prevailed earlier in the 1960s and 1970s. I have attempted in Table 1 to summarize critical milestones in this broadening approach. It was a movement that emerged internationally in the late 1980s/early 1990s, and, as it gathered pace, it paved the way for deeper and more critical thinking and approaches to cultural heritage, including questioning of what is heritage, what is culture, and what are the social and political contexts of the globalization of heritage. Suffusing all these aspects has been an increasing perception of the significance of people and communities under the banner of what can be expressed as "heritage is about people."

It can also be seen how the leitmotif of heritage has been the focus of contestation between different groups, each claiming the high ground on what heritage is and, often more to the point, what in their opinion it is not. Contrary to academic and scholarly critiques of international agencies such as UNESCO and ICOMOS in the globalization of heritage, I have pointed to actions and initiatives where such organisations have advocated for, and set in train, measures to protect culture and heritage globally. They have done this through protocols, charters, declarations of universal principles, and compilation of inventories, the prime aim of which is to protect the world's tangible and intangible heritage. Parallel with this movement has been the growing understanding of the importance of applying universal methods of action through the lens of whose values are at stake. Nevertheless we have seen how the best of international intentions can be upset by the actions of individual players such as nation states.

A significant aspect of the heritage debate has been and remains a sometimes uneasy truce between different opinions in a dialogue on the tangible and intangible: things as opposed to culture. Such a dialogue should not encourage a view that disconnects conservation of material heritage from intangible aspects of heritage. On this point Skounti (2010:77) makes the point, with which I entirely agree:

> . . .there is no *one* intangible cultural heritage, there is a wide spectrum, ranging from the non- material dimension of a material heritage element (site, monument, object) to the most intangible aspect (tale, poem, song, musical note, prayer scent, perfume etc). Furthermore, pure immateriality is a fiction . . . There is obviously a material dimension to every element of intangible heritage.

My concluding observation is that heritage is about people, their places and objects, and how they see and value the physicality of things deemed to be heritage. In this sense managing cultural heritage is about exchange of ideas or opinions between people and those involved in cultural heritage management. It is vital that in the move to embrace affective aspects of heritage, we do not lose sight of the need to care for the quintessential material properties and qualities of "things." Above all there is a need to reinforce the idea that tangible and intangible heritage as demonstrated by the cultural landscape concept are not in opposition.

References

Albert, M.T., M. Richon, M.J. Viñales, and A. Whitcomb, eds. 2012. *UNESCO World Heritage papers 31 2012 on Community development and World Heritage*. Paris: UNESCO World Heritage Centre.

Askew, M. 2010. The magic list of global status: UNESCO, World Heritage and the agencies of states. In *Heritage and globalisation*, Routledge key issues in cultural heritage series, ed. S. Labadi and C. Long, 19–44. Abingdon/New York: Routledge.

Australia ICOMOS. 2013. *The Burra Charter. The Australia ICOMOS charter for places of cultural significance*. Australia ICOMOS. http://australia.icomos.org/publications/charters/.

Bandarin, F. (2007) 'Introduction: Present and Future Challenges to the World Heritage Convention', in *World Heritage – Challenges for the Millennium*, (pp.18–24), Paris: UNESCO World Heritage Centre.

Berliner, D. n.d. Can anything become heritage? Postscript to M. van de Port and B. Meyer (eds.), *Heritage dynamics: Politics of authentication, aesthetics of persuasion and the cultural production of the real*. https://www.academia.edu/31058805/Can_anything_become_heritage.

Bi, L., D. Vanneste, and J. van der Borg. 2016. Cultural heritage development in China: A contextualized

trajectory or a global-local Nexus. *International Journal of Cultural Property* 23: 191–207, Cambridge: Cambridge University Press.

Billiou, S. 2007. Confucianism, "cultural tradition" and official discourses in China at the start of the new century. *China Perspectives. Creating a Harmonious Society* 2007 (3): 50–65.

Brown, J., and T. Hey-Edie. 2014. *UNESCO World Heritage papers 40 2014 on engaging communities in stewardship of World Heritage*. Paris: UNESCO World Heritage Centre.

Byrne, D. 1991. Western hegemony in archaeological heritage management. *History and Anthropology* 5: 269–276.

Byrne, D. 2014. *Counterheritage. Critical perspectives of heritage conservation in Asia*. Abingdon/New York: Routledge.

China ICOMOS. 2000. *Principles for the conservation of heritage sites in China*: see English translation edited by Neville Agnew and Martha Denis, (2002) Getty Institute, Los Angeles, CA.

Harrison, R. 2010. Heritage as social action. In *Understanding heritage practice*, ed. W. West. Manchester: Manchester University Press.

Harrison, R. 2013. *Heritage. Critical approaches*. Abingdon/New York: Routledge.

Harvey, D. 2001. Heritage pasts and heritage presents: Temporality, meaning and the scope of heritage studies. *International Journal of Heritage Studies* 7 (4): 319–338.

Howard, P. 2003. *Heritage: Management, interpretation and identity*. London: Continuum.

ICOMOS. 1994. *Nara document on authenticity*. Paris: ICOMOS.

ICOMOS. 2005a. *Xi'an declaration on the conservation of the setting of heritage structures, sites and areas*. Paris: ICOMOS.

ICOMOS. 2005b. *Filling the gaps*. Paris: ICOMOS.

Lewis, P. 1979. Axioms for reading the landscape. Some guides to the American scene. In *The interpretation of ordinary landscapes. geographical essays*, ed. D.-W. Meinig, 11–32. New York/Oxford: Oxford University Press.

Livingstone, D. 1992. *The geographical tradition*. Oxford: Blackwell.

Logan, W. (2001) Globalising heritage: world heritage as a manifestation of modernism and challenges from the periphery, (pp. 51-57), *Proceedings of the Australia ICOMOS National Conference 2001, 20th Century Heritage–Our Recent Cultural Legacy*. Adelaide, 28 November–1 December 2001. Burwood: ICOMOS Australia.

Logan, W. 2010. Development in World Heritage studies in university education. In *World Heritage and diversity*, ed. D. Offenhöußer, W. Zimmerli, and M.-T. Albert, 38–45. Germany: German Commission for UNESCO.

Logan, W. 2012. States, governance and the politics of culture: World Heritage in Asia. In *Routledge handbook of heritage in Asia*, ed. P. Daly and T. Winter, 113–128. London/Abingdon/New York: Routledge.

Lowenthal, D. 1996. *The heritage crusade and the spoils of history*. London: Viking.

Pokhrel, A.K. 2011. Eurocentrism. In *Encyclopedia of global justice*, ed. D.K. Chaterjee, 321–325. New York: Springer.

Pongpandecha, N., and K. Taylor. 2016. Lua people. Traditions, beliefs and sacred natural sites in Northern Thailand. In *Asian sacred natural sites. Philosophy and practice in protected areas and conservation*, ed. B. Verschuuren and N. Furuta, 245–258. London/New York: Routledge.

Poulios, I. 2014. *Past in the present: A living heritage approach – Meteora, Greece*. London: Ubiquity Press.

Roe, M., and K. Taylor. 2014. New cultural landscapes: Emerging issues, context and themes. In *New Cultural Landscapes*, ed. M. Roe and K. Taylor, 1–13. Abingdon/New York: Routledge.

Rössler, M. (2006) 'World Heritage cultural landscapes', *Landscape Research*, 31(4), 333–353.

Skounti, A. 2010. The authentic illusion. In *Intangible heritage*, Routledge key issues in cultural heritage series, ed. L. Smith and N. Akagawa, 1–10. Abingdon/New York: Routledge.

Sexson, L. 1992. *Ordinarily sacred*. Charlottesville: University of Virginia Press.

Smith, L. 2006. *Uses of heritage*. Abingdon: Routledge.

Staiff, R. 2016. Is cultural sustainability diminishing the heritage enterprise. *AHMT (Journal of The International Program in Architectural Heritage Management and Tourism)* and *NAJUA Architecture, Design and Built Environment*, 31–34, 21–38. Bangkok: Silpakorn University.

Sullivan, S. (1985) 'Cultural Resource Management and Historical Studies' in Committee to Review Australian Studies in Tertiary Education (CRASTE), *History and Cultural Resources Project 2 Seminar Papers*, Canberra.

Studley, J. 2010. Uncovering intangible values of Earth care: Using cognition to reveal the eco-spiritual domains and sacred values of the Kham peoples of Eastern. In *Sacred Natural Sites. Conserving Nature and Culture*, (eds.), Kham. B. Verschuuren, R. Wild, J.A. McNeeley, and G. Oviedo. 107–118. London/Washington, DC: Earthscan.

Taylor, K. 2009. Cultural landscapes and Asia: Reconciling international and Southeast Asian regional values. *Landscape Research* 34 (1): 7–31.

Taylor, K. 2017. *Landscape, culture and heritage. Changing perspectives in an Asian context*. Geelong: Deakin University Library. http://dro.deakin.edu.au/view/DU:30102152.

Taylor, K., and K. Altenburg. 2006. Cultural landscapes in Asia-Pacific: Potential for filling World Heritage gaps. *International Journal of Heritage Studies* 12 (3): 267–282.

Taylor, K. & Winston-Gregson, J. (1992) 'Cultural Landscapes as Historical Resource: A Case Study at Windmill Hill, Appin, New South Wales', *Public History Review*, Vol 1 August 1992.

C

Taylor K and Xu Q (2018), 'Challenging Landscape Eurocentrism: an Asian Perspective' in P Howard, I Thompson, E Waterton & M Atha eds *The Routledge Companion to Landscape Studies*; London and New York: Routledge; 311–328.

UNESCO. 2004. *Linking universal and local values*, World Heritage papers 13. Paris: UNESCO World Heritage Centre.

UNESCO. 2016. The HUL guidebook. Managing heritage in dynamic and constantly changing urban environments. A practical guide to UNESCO's recommendation on the historic urban landscape. http://historicurbanlandscape.com/themes/196/userfiles/download/2016/6/7/wirey5prpznidqx.pdf.

Verdini, G., F. Frassoldati, and C. Nolf. 2017. 'Reframing China's heritage conservation discourse. Learning by testing civic engagement tools in a historic village', *International Journal of Heritage Studies* 23 (4): 317–334.

West, S., and E. McKellar. 2010. Interpretation and heritage. In *Understanding heritage practice*, ed. S. West, 166–204. Manchester: Manchester University Press.

Winter, T. 2014. Beyond Eurocentricism? Heritage conservation and the politics of difference. *International Journal of Heritage Studies* 20 (2): 123–137.

Wijesuriya, G., J. Thompson, and C. Young. 2013. *Managing World Cultural Heritage*. Paris: UNESCO World Heritage Centre in association with ICCROM, ICOMOS, IUCN.

Wylie, J. 2007. *Landscape*. Abingdon/New York: Routledge.

Cultural Heritage Management: Project Management

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Introduction

Cultural heritage management (CHM) projects differ significantly from traditional academic research on cultural heritage (CH) subjects. They require a management strategy that focuses on client-consultant expectations and schedules, stakeholder concerns, and adherence to laws and regulations, in addition to completing project research objectives.

Definition

The primary difference between studying cultural heritage through an academic as opposed to a CHM project is that academic research is driven by the initiator's own topical and geographic research interests, whereas a CHM project is conducted in response to a proposed development project that triggers the project sponsor to comply with laws and regulations protecting CH resources. In addition, the former is generally funded through grants, endowments, or other funds dedicated to the advancement of research and administered through a university. The host institution is responsible for managing research endeavors and generally has a well-established administrative infrastructure that supports research throughout the institution. CHM projects are funded through a polluter-pays model, in which the developer (whether they are a private company or a government agency) is responsible for mitigating the harm caused to CH resources by their project. Because the developer is paying, CHM is driven by their specific needs. Project management is less about realizing the best research outcome than it is about producing needed CHM information to meet legal requirements in the most efficient manner possible. As a consequence, CHM projects require a very different management structure.

Historical Background

Whereas nearly all countries recognize the importance of CH, the development of CHM in any particular country is closely related to its historical, political, legal, social, and cultural context. Countries with strong legal requirements for the protection of heritage at various government levels (national, provincial, state, county, etc.) are generally the ones where a more mature CH industry has emerged over time. More detail on CHM around the world can be found in country-specific entries in this encyclopedia.

Key Issues/Current Debates

To manage a CHM project successfully, the CH consultant must understand the sponsor's (client's) objectives. These objectives are generally outlined in a document termed a scope of work (SOW), performance work statement (PWS), or terms of reference (TOR). This initial document describes the technical tasks to be completed, a schedule to be met, and a host of other requirements that the consultant must meet (e.g., qualifications and experience of CH professionals proposed to conduct the work, insurance requirements, health-and-safety plans, and often complex logistical protocols). In an open-competition scenario, consultants are asked to respond to a request for proposals (RFP), which commonly presents specific instructions on how the proposals are to be prepared and how they will be evaluated. In some countries, providers of CHM services are limited to government agencies. In these cases, the agency works closely with the project sponsor to scope the CHM project to meet compliance needs. Once agreed to by both the agency and the sponsor, the bid focuses primarily on the price and schedule.

Although legal requirements vary considerably by country, and laws and regulations are often supplemented by international conventions (Willems and Van Den Dries 2007), there are three basic types of CHM services. As a first step, the sponsor must identify CH resources that could be impacted by their project. Often termed an inventory, this step can in turn be subdivided between physical, tangible resources, such as archaeological sites and historic buildings, and intangible resources, such as songs, poems, and language. (Some countries, such as the United States, limit protection to sites with physical manifestations; however, these countries do protect traditional sites and use areas.) Once resources are discovered during inventory, the second step required of the sponsor is to distinguish between CH resources that merit protection from those that do not (termed evaluation). Those resources that merit protection move on to the third step (termed treatment), which attempts to minimize impacts to important tangible or intangible resources or to capture those values that make the resources important through a variety of activities, including scientific studies, public education, museum exhibits, festivals, oral history programs, technical reports, and popular books and articles.

At its most basic level, CHM is a service business. Depending on the requested services, a private consultancy or government agency determines the mix of expertise that will be required, the amount of time that will be needed by each position to complete each task (level of effort), and the schedule for the project team to complete the service(s). Each CHM service described earlier utilizes similar management techniques but with a slightly different project management focus. Inventory, for example, requires an assumption about how much area can be covered by a field crew in a day, how many sites will be discovered, and how long it will take to record each site. In the field, project management of inventories is all about logistics: ensuring that field crews have access to the project area; have sufficient vehicles, mapping equipment (e.g., not only that crews have global positioning system [GPS] units that meet the specifications required in the scope of work but also have Internet access to differentially corrected locational data at night), and other equipment; and have lodging and meals close to the project area to minimize travel time. Evaluation and treatment, or mitigation, projects also have field logistical requirements but in addition require substantial management of analytical and curatorial services that are performed once fieldwork is completed.

Many analytical services are provided by subcontractors, such as research laboratories (e.g., radiocarbon, palynology) or material culture analysts (e.g., ceramic, lithic, and faunal analysts), who first must be placed under contract. Subcontracts require the consultant to prepare a separate SOW/PWS/TOR for each analytical service, ensuring that all conditions of the master contract between the project sponsor and the consultant are enforced. A bid (or tender) process may ensue with one or more vendors. Managing subcontracts is different than managing internal staff in that the consultant has no direct control over the manner in which the services are provided. Management of subcontractors, often composed of specialists

spread around the world, requires ensuring that schedules are maintained and that the research focus of the overall project is adhered to as opposed to the interests of the individual specialist.

Regardless of project size, the proper tools to define the project work flow and monitor progress must be implemented from the outset. These are often outlined in the contractor's response to the original SOW/PWS/TOR and developed further after notice is given to proceed with work. It is critical that the sponsor as well as the entire project team understands the chain of command, who is responsible for what and who reports to whom. These relationships and the projected work flow are commonly outlined in a project organizational chart; Fig. 1 is a generic example of such a chart.

The first step in the management of any CHM project is the development of a work plan during the project design and mobilization phase. This plan can be informal or formal but should contain the consultant's understanding of the project, listing of project participants and their roles and responsibilities, discussion of project tasks and how they are related and sequenced and the field and analytical methods to be used, definition of the progress reporting process and format, statement of deliverables and schedule/milestones (for both client and consultant), administrative and financial procedures (e.g., communication protocols, budget and budget tracking, invoicing requirements), and reporting and curation requirements (including standard forms and formats to be used, number of iterations of report[s], metadata content and format, etc.). Gantt charts are a common management tool used to illustrate how the schedule, deliverable, and milestones will be achieved (Fig. 2). They also can be portrayed in

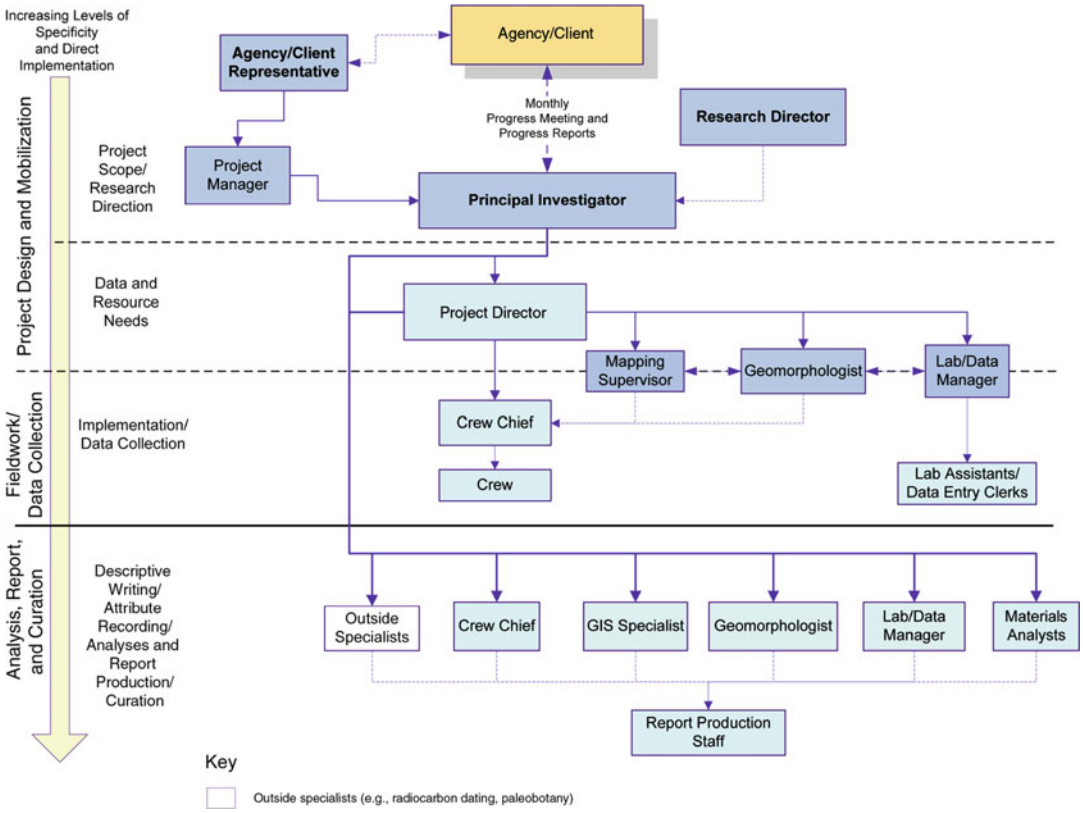

Cultural Heritage Management: Project Management, Fig. 1 Generic example of a staff organizational chart by project phase

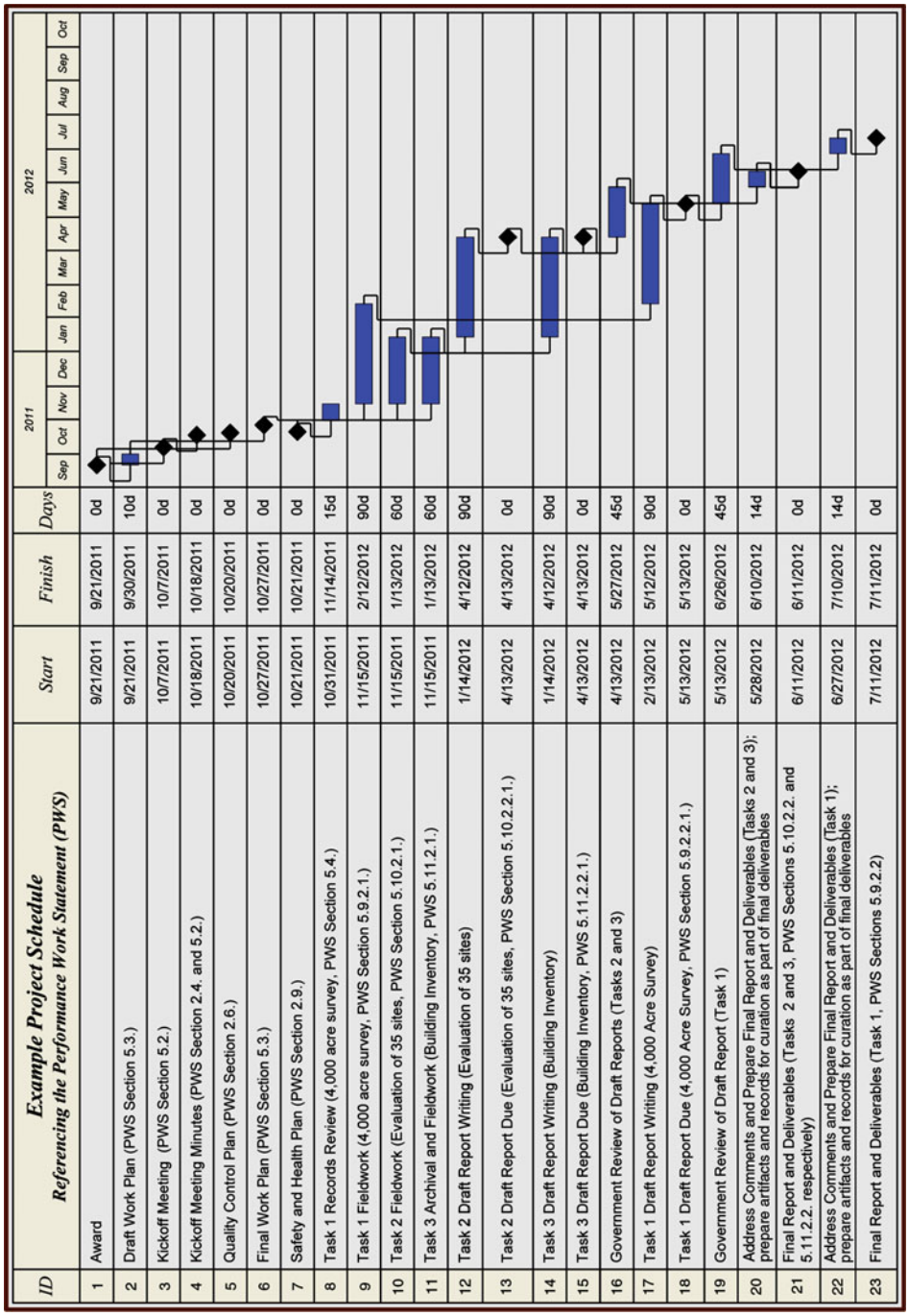

ID	Example Project Schedule Referencing the Performance Work Statement (PWS)	Start	Finish	Days
1	Award	9/21/2011	9/21/2011	0d
2	Draft Work Plan (PWS Section 5.3.)	9/21/2011	9/30/2011	10d
3	Kickoff Meeting (PWS Section 5.2.)	10/7/2011	10/7/2011	0d
4	Kickoff Meeting Minutes (PWS Section 2.4. and 5.2.)	10/18/2011	10/18/2011	0d
5	Quality Control Plan (PWS Section 2.6.)	10/20/2011	10/20/2011	0d
6	Final Work Plan (PWS Section 5.3.)	10/27/2011	10/27/2011	0d
7	Safety and Health Plan (PWS Section 2.9.)	10/21/2011	10/21/2011	0d
8	Task 1 Records Review (4,000 acre survey, PWS Section 5.4.)	10/31/2011	11/14/2011	15d
9	Task 1 Fieldwork (4,000 acre survey, PWS Section 5.9.2.1.)	11/15/2011	2/12/2012	90d
10	Task 2 Fieldwork (Evaluation of 35 sites, PWS Section 5.10.2.1.)	11/15/2011	1/13/2012	60d
11	Task 3 Archival and Fieldwork (Building Inventory, PWS 5.11.2.1.)	11/15/2011	1/13/2012	60d
12	Task 2 Draft Report Writing (Evaluation of 35 sites)	1/14/2012	4/12/2012	90d
13	Task 2 Draft Report Due (Evaluation of 35 sites, PWS Section 5.10.2.2.1.)	4/13/2012	4/13/2012	0d
14	Task 3 Draft Report Writing (Building Inventory)	1/14/2012	4/12/2012	90d
15	Task 3 Draft Report Due (Building Inventory, PWS 5.11.2.2.1.)	4/13/2012	4/13/2012	0d
16	Government Review of Draft Reports (Tasks 2 and 3)	4/13/2012	5/27/2012	45d
17	Task 1 Draft Report Writing (4,000 Acre Survey)	2/13/2012	5/12/2012	90d
18	Task 1 Draft Report Due (4,000 Acre Survey, PWS Section 5.9.2.2.1.)	5/13/2012	5/13/2012	0d
19	Government Review of Draft Report (Task 1)	5/13/2012	6/26/2012	45d
20	Address Comments and Prepare Final Report and Deliverables (Tasks 2 and 3); prepare artifacts and records for curation as part of final deliverables	5/28/2012	6/10/2012	14d
21	Final Report and Deliverables (Tasks 2 and 3, PWS Sections 5.10.2.2. and 5.11.2.2. respectively)	6/11/2012	6/11/2012	0d
22	Address Comments and Prepare Final Report and Deliverables (Task 1); prepare artifacts and records for curation as part of final deliverables	6/27/2012	7/10/2012	14d
23	Final Report and Deliverables (Task 1, PWS Sections 5.9.2.2)	7/11/2012	7/11/2012	0d

Cultural Heritage Management: Project Management, Fig. 2 Generic example of a Gantt chart, a commonly used management tool for illustrating project schedule, deliverables, and milestones

a way that illustrates the "iterative" or "critical path" nature of tasks on a project. Gantt charts can also be updated as the project unfolds. Many project management software packages have a function that allows the creation of a Gantt chart. The generic example in Fig. 2 was produced using Microsoft Visio software.

CHM projects end well when the client and consultant establish similar expectations at the outset, often through a project initiation meeting where all elements of the work plan can be discussed and refined, as necessary. This step helps avoid any future conflicts or differences of opinion between the parties. Similar meetings should be held among internal team members (and any specialists or subcontractors providing services to the project) at project initiation and when key milestones are met (e.g., when fieldwork is complete and analysis and reporting are about to begin). These meetings provide the opportunity to discuss project roles, schedule, and level of effort (amount of time allotted to each person to complete their tasks and how their work relates to the larger project goals and deliverables). For nonemployee specialists or subcontractors, contracts are prepared that spell out and formalize expectations.

Most clients minimally require monthly progress reports, and they often follow specified formats (e.g., task-monitoring basis or percentage analysis) and are tied to invoicing for completed work. The progress report also allows the consultant to identify problems and issues that might affect project schedule, budget, and deliverables and bring them to the client's attention. Internally, robust accounting software is necessary to track the hours spent by employees on a particular project. These data can be used to generate management charts that provide detailed information on where a project stands on a monthly or weekly basis. These data can also be captured in a task-monitoring spreadsheet using standard software such as Microsoft Excel. Numerous project management software solutions are commercially available, and the most useful include modules for managing collaborative tasks, issue tracking, scheduling, project budget, resources (e.g., available employees, vehicles), documents, work flow, and reporting and analyses. The trend is toward web-based management, and although there are a few "open-source" tools, most are proprietary and require payment for licensing fees, upgrades, and maintenance.

In addition to tracking project schedule, budget, and deliverables, it is important to monitor project quality (see the entry on "▶ Cultural Heritage Management Quality Control and Assurance"). Most if not all of the worldwide organizations, associations, and societies focusing on cultural heritage have adopted standards that set out what a research project must achieve and define the resulting products. Many of the standards have lengthy sections on the processes that must be followed to achieve the desired results. Hinton and Jennings (2007: 102) note that these standards form the basis for a tripartite "quality management" approach, where the suitability of work is assessed and regulated by process, product, and person. A primary challenge of CHM work is balancing the traditional academic meaning of quality as "degree of excellence" (Merriam-Webster Dictionary) with more commercial meanings such as "meeting customer requirements" and "satisfying the customer" or as stated in ISO 9000 from the International Organization for Standardization (ISO) "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs" (Hinton and Jennings 2007: 101). Around the world, heritage organizations, associations, societies, and government agencies have defined the appropriate qualifications required by professionals in the various CHM roles ("person") and have created standards for the products of CHM investigations ("product"). Increasingly, commercial firms worldwide have adopted the ISO 9000 family, or series, of standards – an international consensus on good quality management practices – to address the "process" aspect of the quality management approach. ISO 9001:2015 (ISO n.d.) sets out the criteria for a quality management system, regardless of what the user organization does, its size, or whether it is in the private or public sector. It is the only one in the family of standards against which organizations can be certified, although certification is not compulsory. Over one million companies and organizations in over 170 countries are certified to ISO 9001. The

other standards in the family cover specific aspects such as fundamentals and vocabulary, performance improvements, documentation, training, and financial and economic aspects.

Although the appropriate management of CH resources is the foremost goal of CHM, conducting innovative research is an important component, especially when resources will be damaged or destroyed by a proposed development and cannot be preserved. In this regard, CHM has led to a surprising number of new and important scientific and cultural discoveries because it forces CH specialists to investigate areas often shunned by their academic counterparts. But for these discoveries to be recognized by the scientific community, they must be documented well and published in peer-reviewed academic journals, books, and monographs. When performing CHM work under contract, however, some clients claim intellectual ownership of the "products," because they have purchased them. This situation obviously presents a challenge from a knowledge dissemination perspective. Gowen (2007: 32) notes that CHM clients often have little or no perception of the need for quality in the end product of the work. As a result, it is often left to the "company culture" to govern and influence the commitment to quality.

As indicated earlier, CHM research differs markedly from typical academic research in its breadth and scope. The latter, usually constrained by small budgets and limited resources, tends to focus on one or more specific research issues and small-scale sampling using teams of student or volunteer labor that are deployed on the researcher's schedule. Impacts to CH resources may be minimal. By contrast, where CH resources are endangered by a proposed development, CHM is tasked with recovering as much important information as possible and in a rapid fashion with professional teams working on the developer's schedule. To obtain the best results, CHM data recovery or mitigation projects are done within a framework that supports a broad range of research issues that can be investigated with the type of information expected to be provided by the affected CH resources. Similarly, excavation methods must be geared to intensive sampling or even complete exposure or controlled destruction of the CH resource, while a diversity of analytical methods must be applied to a broad set of archaeological materials and specialized analyses. Finally, detailed and comprehensive reporting of all excavation and analytical methods, results, and interpretations must be completed in a timely fashion rather than be disseminated in a few journal articles as usually required in academic research.

Development of a CHM research framework also requires a solid grounding in the cultural historical background (cultural context) of the region and a good understanding of the type of CH resources that will be impacted by the development and the important information that they might contain. In countries with a well-developed archaeological and historical record, this cultural context and related research issues can be assembled from a review of existing literature. In some cases, land-managing agencies with extensive experience in managing CH resources have developed their own research frameworks based on previous research on their lands or in the adjacent regions. CHM researchers must adapt their research for a particular development project to the research issues and, in some cases, methods outlined in these preexisting frameworks. The opposite situation holds true in countries lacking a well-documented archaeological and historical record. In these situations, CHM researchers must turn to other countries or regions with similar cultural historical settings or similar CH resources to develop their research frameworks from scratch. These, in turn, are often works in progress that must be refined as the research proceeds.

The larger and more complex scale of CHM investigations also creates a greater need for managing teams with numerous researchers, research services, and their products. In academic research, the principal investigator (PI) also often serves as the project (field) director (PD), whereas in CHM PIs generally are responsible for all non-administrative aspects of the project and are aided by one or more PDs, who are charged with implementing the fieldwork portion of the work plan and for postfield reporting tasks. The role of project manager (PM) also is key on small and

large CHM projects alike. PMs are responsible for handling most if not all of the administrative tasks and for monitoring the project budget and schedule, freeing the PIs and PDs to focus on non-administrative tasks.

The broad scope of research and great diversity of specialized analyses in many CHM projects, however, often exceed the capabilities of even the most experienced PIs and PDs. Outside peer reviewers are commonly hired as subconsultants on large CHM projects to provide additional expertise in advising project researchers and providing quality assurance and independent evaluations of their work to project sponsors, government regulators, and other stakeholders. Peer reviewers usually come from academic backgrounds, and their work schedules and professional responsibilities often conflict with CHM project schedules. Thus, as with other subcontractors, it can be difficult to obtain these services within the schedule set by the project sponsor, and the quality of their input often depends on the individual peer reviewer's level of interest in the project. Many of the larger CHM consulting companies maintain teams of highly experienced analysts (often these are staff positions) to conduct a variety of materials analyses, which allows for better management of these services and better control of the research product. To respond to the research needs and possibilities of CHM projects, large CHM consultancies, such as US-based Statistical Research, Inc., have instituted the position of research director (see Fig. 1), staffed by the firm's most experienced senior archaeologists, to advise both PIs and analysts, to provide timely internal peer review as well as to coordinate more lengthy independent peer review for large CHM projects, and to ensure that project research goals are being met. Although there is still an important role for outside peer reviewers, research directors have a better understanding of the unique requirements and short time frames of CHM projects and are better integrated into the project team.

The goal of progress reporting is to show both the client and the consultants performing the work where a project stands vis-à-vis the schedule and budget. If the project cannot be completed on schedule and within budget, the consultant must make up for overages by readjusting the internal work flow. There will be times when situations arise that the client and the consultant together could not reasonably anticipate. In these situations, it may be necessary to modify the project SOW/PWS/TOR and possibly the project budget and/or schedule.

The type of contract executed between a consultant and client also influences project management (Klein and Majewski 2012). Basic contract types include (1) fixed price or lump sum and (2) time and materials and related variants. A fixed-price project is completed for a sum not subject to any adjustment. The firm receives the predetermined amount regardless of what occurs in the execution of the contract (with some exceptions for unanticipated changes of condition or scope). Fixed-price contracts provide a great incentive for a consultant to control costs and be efficient but are best suited to projects where the parameters are well known. The time-and-materials contract establishes hourly rates for specific labor categories to be used by a consultant, in addition to direct costs such as vehicle mileage reimbursement, travel, specialist services, equipment rental, field and laboratory supplies, document reproduction, and curation. This form of contract is generally used when project scope, duration, and cost cannot be estimated accurately, although initial ceilings for tasks or entire projects are generally established. Time-and-materials contracts require considerably more administrative time than do fixed-price contracts and are often phased (e.g., inventory, evaluation, and data recovery), with separate work plans and budgets developed for each phase.

Regardless of the type of contract, once final project deliverables have been submitted, a closeout review should be conducted for each project. This process identifies and documents both successes and problems encountered during the execution of the original schedule, budget, and deliverables. The results of the project closeout can serve as the foundation for improving future performance and enhancing future project outcomes.

International Perspectives

Much of the previous discussion pertains to CHM conducted in countries with a well-established CHM framework and bureaucracy. In these cases, there are specified government agencies that are charged with the responsibility for regulating CHM services and ensuring that laws protecting CH are enforced. Many developing countries, however, lack a legal framework and a CHM infrastructure. As importantly, these countries often have few, if any, trained CH specialists. Yet, many of these countries are state parties to UNESCO conventions, which require them to protect important tangible and intangible cultural heritage. Also, in response to major infrastructure projects, such as the Three Gorges Dam in China or the Namibian Lower Hydropower project in Angola, where significant cultural properties were damaged and/or destroyed, international lenders, such as the World Bank and the International Finance Corporation (IFC), now require countries to protect their tangible and intangible heritage in order to receive funds for development projects (Fleming 2010).

To meet these regulations and conventions, sponsors of development projects, such as mining companies, are requesting CHM consultancies from industrial countries to partner with in-country CHM institutions (see Gunchinsuren et al. 2011a; Rio Tinto 2011). Institutions in developing countries that are delegated CH responsibilities generally are either government agencies with scientific missions, such as institutes of archaeology, or universities with archaeology or anthropology departments. Members of these institutions may be well trained, but commonly have only performed their research as part of academic projects. Project sponsors expect foreign CH specialists to help make the transition from academic research to CHM by building CHM capacity in the host country so that in the future, in-country CH specialists can be called on to perform and regulate CHM services. In-country specialists need to understand the role of consultants as "honest brokers" of CH information and that their recommendations take into account the goals of not just the client but all CH stakeholders (e.g., government officials, regulators, local communities, elders' groups, and nongovernmental organizations [NGOs]).

The goal of foreign-domestic partnerships is to create a sustainable cultural heritage infrastructure in the developing country (see, e.g., Gunchinsuren et al. 2011b). One key is to enshrine a form of the polluter-pays model to fund CH programs in laws and regulations. To ensure that CH policies reflect public concerns, CH fees from development projects need to be sufficient not only to cover the costs of compliance projects but also to sustain community involvement, heritage education, museum maintenance and repair, and cultural festivals and activities. Additionally, the CH infrastructure must be staffed with trained specialists. Some of these specialists will be professionals in CH fields, such as archaeology, anthropology, heritage tourism, education, history, or architecture. The majority, however, will be nonprofessionals, such as staff in local museums, teachers, and heritage tour guides. Training programs need to include scholarships for advanced training in CH; most such programs are at universities in industrial countries. In addition, short training courses for nonprofessionals need to be developed, and funds need to be secured to ensure that these programs are continually available throughout the country.

Contracts for foreign-domestic partnerships in developing countries are likely to include a variety of services, including training and performing fundamental CHM services (e.g., conducting of a systematic, intensive archaeological survey), assisting in the development of a CH framework to regulate CHM services, and building CHM capacity. Because the in-country partners in many developing countries have little CHM experience, sponsors need to be realistic in their expectations. It is likely, for example, that inventory and evaluation tasks will take longer and be performed in a less-efficient manner than they would in a developed country. Also, establishing government offices with enforcement authority may require legal changes; almost certainly, it will necessitate training government personnel. In

these endeavors, the consultant must walk a fine line, for these projects are rife with potential conflicts of interest. The project sponsor's objective is to receive permission to proceed on a development project and is relying on the foreign-domestic partnership to achieve this end; the in-country partner institution, with little if any CHM experience, must produce, with the aid of the foreign specialists, a technical study meeting international standards, while a government agency, coached by the foreign specialists, must independently evaluate the study.

To be successful, these foreign-domestic CHM partnerships require strong project management. The transition from working on projects with minimal funding and essentially no deadlines to fully funded projects on very short time lines can be extremely difficult for in-country institutions with little experience with contract work and few, if any, financial cost-control mechanisms. Also, in-country institutions are generally not in a position to pay employees, acquire equipment and tools, or fund per diem and travel expenses without advanced payment. Often, the project sponsor expects the foreign consultancy to advance its in-country partner funds to meet these obligations. In addition, projects in developing countries can take place in remote regions, some of which are politically unstable. Foreign consultancies will need forms of insurance not commonly required in industrial countries, such as health policies with medivac provisions and kidnap and ransom ("extraction") insurance. All risks – economic, political, and social – need to be considered when negotiating overhead and profit fees. In addition, the management of these projects needs to include provisions for monitoring not only the technical aspects of the CHM services but also the sociopolitical climate and the economic performance of its in-country partner.

One of the keys to success in foreign-domestic CHM partnerships is to establish lines of communications at three levels: (1) between the project team and the sponsor, (2) between the foreign and domestic PIs and PMs, and (3) between foreign technical specialists and their domestic counterparts. We have found that the best way to achieve these objectives is to divide large and complex CHM projects into smaller, easily achievable tasks. Project team meetings (including translators as needed), often facilitated by Internet communication mechanisms, such as Skype, should be held at least every other week, and, if there is a large amount of project activity underway, more frequently. Difficulties in meeting project objectives or milestones need to be discussed as they are encountered with the project sponsor and, if necessary, with government regulators, local communities, and international lenders so that reasonable decisions about how to meet the sponsor's project-specific objectives and the larger CHM goals of the other stakeholders can be reached.

Future Directions

Successful CHM project management requires managers with strong leadership, problem-solving, and personnel skills and the ability to direct and influence staff to complete tasks on schedule and on budget and to implement efficiencies at all project stages, from project planning to eventual curation of the records and materials generated by the work. Until quite recently, traditional academic training for CHM professionals included little if any practical training in project management. This is changing, however, with some institutions offering summer schools/institutes or degree programs in heritage management or "practicing" archaeology. The latter programs often require internships with commercial firms or other practical experience. In the early days of CHM in any country, archaeologically trained staff performed the majority of required tasks, whether or not they were proficient in all of those tasks, including project management. As the field matures, project management has become singled out as a particular specialty that is essential for a consultancy to be successful. Many CHM firms in the United States, for example, regardless of size, now employ accountants, editors, graphic artists, and experts in cartography and geospatial technology and information technology to support traditional CHM staff and free them up to focus on the CHM aspects of projects. Senior staff members in some firms are acquiring advanced degrees in business administration to make themselves more competitive and to take

firms in new directions in terms of marketing and project management.

Above all, CHM, whether in developing or industrial countries, requires flexibility. Development plans change as do the needs and desires of local communities and other CH stakeholders. Good project management is about more than just ensuring that a project is completed within budget and on time. Management is essential to performing quality work. All too often, projects expend too much effort on field and analytical studies, leaving little time to interpret the results. Yet, the latter is essential for a CHM project to have the greatest possible scientific and public benefits (see Altschul 1997).

Cross-References

- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Project Management Based on Project Management Body of Knowledge (PMBOK)
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ International Conventions Pertaining to Heritage Policy: Introduction
- ▶ UNESCO (1972) and Malta (1992) Conventions
- ▶ United States: Cultural Heritage Management
- ▶ United States: Cultural Heritage Management Education
- ▶ Willems, Willem J.H.

References

Altschul, J.H. 1997. The Lower Verde archaeological project, big projects, and cultural resource management. In *Vanishing river: Landscapes and lives of the Lower Verde Valley: The Lower Verde archaeological project: Overview, synthesis, and conclusions*, ed. S.M. Whittlesey, R. Ciolek-Torrello, and J.H. Altschul, 639–659. Tucson: SRI Press.

Fleming, A.K. 2010. Heritage values, public policy, and development. In *Heritage values in contemporary society*, ed. G.S. Smith, P.E. Messenger, and H.A. Soderland, 101–112. Walnut Creek: Left Coast Press.

Gowen, M. 2007. Quality management and Irish commercial sector archaeology. In *Quality management in archaeology*, ed. W.J.H. Willems and M.H. van den Dries, 22–34. Oxford: Oxbow Books.

Gunchinsuren, B., J.H. Altschul, and J.W. Olsen, eds. 2011a. Protecting the past, preserving the future: Report on phase 1 activities for the Oyu Tolgoi cultural heritage program design for Ömnögovi Aimag. Submitted by the Mongolian International Heritage Team to Oyu Tolgoi, LLC. Ulaanbaatar.

Gunchinsuren, B., J.H. Altschul, and J.W. Olsen. eds. 2011b. The Oyu Tolgoi cultural heritage program. Submitted by the Mongolian International Heritage Team to Oyu Tolgoi, LLC. Ulaanbaatar.

Hinton, P., and D. Jennings. 2007. Quality management of archaeology in Great Britain: Present practice and future challenges. In *Quality management in archaeology*, ed. W.J.H. Willems and M.H. van den Dries, 100–112. Oxford: Oxbow Books.

ISO. n.d. ISO 9001 quality management. Available at: https://www.iso.org/iso-9001-quality-management.html. Accessed 31 Dec 2017.

Klein, T.H., and T. Majewski, with contributions by S.A. McElroy, and T. Craig. 2012. *Contracting for cultural resource management services: A handbook for DoD [Department of Defense] installations, Project 06-314* (SRI Technical Report 09-53). Tucson: Statistical Research, Inc.

Rio Tinto. 2011. Why cultural heritage matters: A resource guide for integrating cultural heritage management into communities work at Rio Tinto. Available at: http://www.riotinto.com/documents/ReportsPublications/Rio_Tinto_Cultural_Heritage_Guide.pdf. Accessed 30 Dec 2017.

Willems, W., and M. Van Den Dries. 2007. The origins and development of quality assurance in archaeology. In *Quality management in archaeology*, ed. W.J.-H. Willems and M.H. van den Dries, 1–12. Oxford: Oxbow Books.

Further Reading

Carman, J. 2015. *Archaeological resource management: An international perspective*. Cambridge: Cambridge University Press.

Gerike, C. 2012. *Effectively managing archaeology projects*. Walnut Creek: Left Coast Press.

King, T.F. 2005. *Doing archaeology: A cultural resource management perspective*. Walnut Creek: Left Coast Press.

King, T.F., ed. 2011. *A companion to cultural resource management*. Chichester: Wiley-Blackwell.

McManamon, F.P., A. Stout, and J.A. Barnes, eds. 2008. *Managing archaeological resources: Global context, national programs, local actions*, One world archaeology, 58. Walnut Creek: Left Coast Press.

Stapp, D., and J. Longenecker. 2009. *Avoiding archaeological disasters: A risk management approach*. Walnut Creek: Left Coast Press.

Cultural Heritage Objects and Their Contexts

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Introduction

This entry considers cultural heritage objects and their sociocultural, political, and legal contexts, and examines the implications of those contexts for understanding the past and the present.

Definition

What marks out a cultural object from an ordinary object is its "cultural worth." Cultural worth is a multifaceted concept, meaning that individual objects can be valued for different reasons by different cultures – on account of their artistic merit, their spiritual or religious significance, their historical importance, or their scientific interest (Lipe 1984). Cultural objects range in type from paintings or other recently produced works of art at one extreme, through to natural objects with no human modification at the other. It is the cultural context that affords value, the broader system of beliefs and practices enfolding the object, not the object itself. A pair of Zuni Ahayu:da (War Gods) in the context of their outdoor shrine speak of one belief system; the same pieces removed from their shrine and displayed in a museum vitrine speak of another belief system. The change of context imparts new values to the objects, which come to instantiate a larger cultural whole. Sometimes the "objects" have been forcibly removed from a larger architectural context, in which case they are really spolia. The Parthenon Marbles are an obvious case in point. Created in fifth century BCE Athens as decorative sculpture for the Parthenon temple, they are now exhibited as art objects in the British Museum. The different and sometimes competing valuations that are placed on cultural objects can impart monetary worth, and also give rise to conflicting ownership claims.

The removal of a cultural object from one context and its placement in another can cause irreparable damage to the cultural whole of which it was originally a part, while at the same time altering the value and significance of the object itself. For archaeologists, this process is of immediate concern when objects are looted from archaeological sites and sold on the art market. The archaeological context, which is necessary for their correct interpretation, is damaged or destroyed, thus constraining archaeological research and limiting what is knowable about the past. The insertion of archaeological objects into new contexts might also encourage an erroneous view of the past. The sixth century BCE "Euphronios" krater, for example, bought by the Metropolitan Museum of Art in 1972 for $1 million, is now regarded as an artistic masterpiece and a high-priced commodity, which has encouraged a view that it was similarly so regarded in antiquity. But is that interpretation correct? (Vickers and Gill 1994).

Many though not all cultural objects have archaeological value, but episodes of recontextualization may have sociocultural and political implications that go far beyond the archaeological. In the first place, they might undermine collective memory. Collective memory is an important component of ethnic and other cultural identities, and when the recontextualization of cultural objects helps to eradicate a material reminder of history, or disrupt long-established practices or beliefs, it can cause a weakening or refashioning of those identities. This process has been particularly grievous for colonized or occupied peoples, when the theft or forced sale of cultural objects has been an active or passive accompaniment of assimilation policies aimed at eradicating their identities (Vrdoljak 2006). In 1897, for example, when the British invaded and occupied of Benin ahead of creating the colony of Nigeria, they seized approximately 3,000 bronze and ivory artifacts. Many of these artifacts had comprised a visual archive, recording Benin history as far back as the twelfth century, and their removal compromised the identity of the

Benin people (Coombs 1994). Subsequently sold to defray the invasion's expenses, the Benin bronzes and ivories are now displayed in museums around the world as "art," stripped of their historical connotations and effectively depoliticized.

Like the Benin bronzes and ivories, many cultural objects that are removed from their original contexts become commodities for a time, to the financial benefit of the art market, and once curated in private collections or museums, they become capital assets, able to generate long-term income streams through visitor revenue, sale of image rights, and rent of museum space for corporate and private events. None of these benefits filter back to the countries or communities from which the objects were taken, and so, their removal can constitute a real, long-term economic loss (Brodie 2010).

Key Issues/Current Debates/Future Directions/Examples

Property Protection

The cultural and economic worth of cultural heritage objects has caused them to be placed in new sets of legal and ethical contexts, which have been developed to ensure that cultural objects remain in the possession and control of their rightful owners, whether private or public. While ostensibly protecting the rights of owners, the rationale is ultimately to protect the objects and their contexts. If objects are kept with their rightful owners, the incidence of theft is diminished and contextual damage is minimized.

There are national and international laws. On a national level, trade controls on cultural objects were first introduced in the seventeenth century by Italian city-states such as Rome and Florence, a reflection of the growing cultural prestige and economic importance of visual art at that time. By the end of the twentieth century, most countries had placed cultural objects under some kind of legislative control, ranging from weak regulation intended to prevent the export of particularly important objects, through to strong regulation that might prohibit the export of all privately owned objects and take undiscovered (archaeological) objects into public ownership (Prott and O'Keefe 1990). These national laws are usually criminal ones, and although they are intended to exert a cooling effect on would-be traders and collectors, implementing a policy of protection through deterrence, they are not merely for show. In 2005, for example, US antiquities dealer Robert Hecht and museum curator Marion True were placed on trial in Italy for conspiring to receive art stolen in contravention of Italian law (Watson and Todeschini 2007). The case against True was dismissed in 2010 without a verdict being reached. Sometimes these heritage laws can be used in conjunction with standard criminal law to prosecute cases of international smuggling. In 2003, for example, US antiquities dealer Frederick Schultz was convicted after appeal under the United States National Stolen Property Act for conspiring to deal in antiquities stolen from Egypt (Gerstenblith 2009). Customs laws can also be used to intercept traded objects. In 1997, a third century BCE gold phiale illegally exported from Italy was seized by US Customs from the home of US collector Michael Steinhardt because of false declarations on import documents, which recorded Switzerland, rather than Italy, as the country of origin. In 1999, a US court ordered that the phiale should be returned to Italy (Lyons 2002).

The international interest in protecting cultural objects can be traced back to eighteenth century concerns about the damaging effects of war on civilian life and property. In 1815, Wellington, who together with Blucher had finally vanquished Napoleon at Waterloo, declared that Napoleon's plunder of cultural objects from museums and collections around Europe had been "contrary to the practice of civilized warfare" (Miles 2008: 332). A series of military codes and international agreements followed, establishing the principle that cultural objects should not be looted or destroyed in wartime, culminating in 1954 with the Hague Convention on the Protection of Cultural Property in the Event of Armed Conflict and its First Protocol, with a Second Protocol added in 1999. The main body of the 1954 Hague Convention is concerned to protect cultural sites and monuments from damage during wartime. The

First Protocol, however, places obligations on occupying powers to prevent the export of cultural objects from occupied territory and to seize any exported material for return after the close of hostilities. It states specifically that cultural objects cannot be retained by occupying powers as war reparations. The Second Protocol establishes that any violation of these requirements should be prosecuted as a criminal offense. However, the obligations contained in the Convention and its Protocols are binding only on states that are party to them. At the time of the Coalition invasion of Iraq in 2003, for example, neither the United States nor the United Kingdom had ratified the 1954 Hague Convention or either of its two Protocols, and so were not bound to take action against the trade in looted archaeological and other cultural objects from Iraq that flourished during the invasion and its immediate aftermath. (The United States subsequently ratified the Convention but neither of its two Protocols in 2009).

The 1954 Hague Convention was drafted in light of the widespread theft and misappropriation of cultural objects by the Nazis in occupied Europe during the Second World War. By the 1960s, however, it was evident that a large and growing peacetime market in cultural objects was causing the plunder of cultural sites on a global scale. Thus, in 1970, UNESCO adopted the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property. Among other things, the 1970 UNESCO Convention places obligations on state parties to prohibit the import of stolen or illegally traded cultural objects from other state parties, and to recover and return such material when requested by the dispossessed state. Again, the reciprocal obligations imposed by this Convention only exist between states that are party to it. The United States has implemented Articles 7b and 9 of the 1970 Convention by the 1983 Convention on Cultural Property Implementation Act. This Act enables the United States to enter into bilateral agreements with other state parties to place import restrictions on declared categories of cultural objects shown to be in jeopardy of plunder and illegal trade (Kouroupas 2009). The 1970 UNESCO Convention was augmented in 1995 by the UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects which is designed to harmonize international differences in limitation periods and "good faith" acquisitions that were not addressed in the 1970 Convention.

The continuing creation and extension of laws aimed at defining and protecting cultural heritage objects have in turn created further problems and inequalities. First, there is the issue of unequal recognition and enforcement. Typically, the trade in cultural objects proceeds from poorer countries at source to richer countries at destination. Source country laws are routinely broken, in part, because in destination countries, they are either not enforced by police and customs agencies, ignored by individual or institutional collectors, or not recognized by the judiciary. This failure of destination countries to respect or enforce source country laws may be due more to resource shortfalls than policy, but nevertheless violates source country sovereignty, and might suggest that source countries are not regarded as fully equal members of the international community. Secondly, there is the issue of broader criminalization. Outlawing the trade in cultural objects makes criminals of those who do the buying and selling, and opens it up to further criminal penetration. Thus, it is suspected that the trade might on occasion be implicated in other organized criminal activities such as fraud and money laundering. Links with drug smuggling have been demonstrated in Latin America, and it has been shown in Afghanistan that money derived from the trade goes to support armed groups. In view of these potentially broader criminal associations, the UN is considering placing the trade under the purview of its 2000 Convention against Transnational Organized Crime (Manacorda 2011).

The fact that illicit trade of cultural objects persists in the face of statutory regulation, which in turn creates its own criminal problems, emphasizes the importance of non-legislative approaches to protection. Most commercial and professional organizations that engage with cultural objects now have codes of ethics or practice that are intended to provide a normative guide for their members and minimize activities that are likely to have damaging consequences. Again, like laws, these codes vary in the strength of their requirements, the nature of their enforcement, and the degree to which they

are respected. For example, the Association of Art Museum Directors (AAMD), which is the professional organization representing most art museums in the United States, had for decades required a much weaker standard as regards the acquisition of cultural objects than the International Council of Museums, to which many AAMD members were also affiliated. It was not until the Italian authorities threatened criminal prosecution of some museum staff suspected of malpractice that the AAMD adopted a much stronger code in 2008.

Human Rights Protection

The national and international laws and ethical codes discussed so far that are intended to prevent the illegal movement of cultural objects create and/or protect a property right, and in so doing defend the status quo. They are not retroactive in effect, meaning that their sanctions apply only to acts committed after the time of their implementation. Thus, although Greece would have recourse under the 1970 UNESCO Convention to claim the return from a another state party of any object removed from Greece illegally after the date of Greece's accession (1981) and that of the state concerned, it cannot claim any object that was moved out of Greece before those dates. It cannot claim, for example, the return of the Parthenon Marbles, which were removed from Greece in the early nineteenth century, many decades before the UNESCO Convention was even thought about. This non-retroactivity of laws designed to protect cultural objects is aggravating for communities or states that were dispossessed of objects in the past, as it protects the ownership of those that have come into possession of the objects while offering no opportunity for restitution or repatriation. The Parthenon marbles are again a case in point – while Greece has no claim for repatriation under the 1970 UNESCO Convention, paradoxically the same Convention actually protects the ownership of the British Museum. The most contentious ownership circumstances of this sort hold over from nineteenth and early twentieth century episodes of colonial occupation or settlement. Cultural objects were often collected by missionaries or military personnel and later anthropologists for study and display in universities and museums. Whether intentionally or not, the removal of these objects from their original contexts compromised traditional identities and belief systems, thus diminishing political cohesion and facilitating the construction and imposition of colonial or settler society by the occupying powers. The case of Benin has already been mentioned. Their continuing alienation of these cultural objects is a source of grievance, symbolic of the act of colonization itself and constituting a real cultural and economic loss.

By the late twentieth century, Indigenous communities were expressing their dissatisfaction at this inequity of the established legal regime, which from their perspective did little more than legitimize their dispossession. They began to articulate a new type of argument around the idea of restorative justice, whereby in this instance the return of cultural objects would offer some redress for injustices suffered during the period of colonial settlement and help reconstruct Indigenous identities and societies. Typical of this new approach is the 1990 Native American Graves Protection and Repatriation Act (NAGPRA), which applies to human remains and cultural objects. As regards cultural objects, it vests ownership of objects found on federal land with the appropriate Native American tribe, and makes provision for the restitution of previously taken objects from the possession of federal or federally funded institutions. In that NAGPRA restores to Native Americans some fundamental civil liberties, such as freedom of religion and cultural expression, it has been characterized as human rights legislation, in contrast to the emphasis on property rights of previous legislation (Nafziger 2009). In other countries without specially drafted legislation, a similar end is sought through negotiation and sympathetic interpretations of already established laws.

NAGPRA instrumentalizes the principle of self-determination, restoring in part to Native Americans the right to pursue their own sociocultural (though not fully sovereign) development. Recognition of this principle has been extended internationally by the 2007 UN Declaration on the Rights of Indigenous Peoples. It is noticeable, however, that while the protection and repatriation of cultural objects is seen to be fundamental to the sociocultural self-determination of Indigenous peoples, no similar recognition has been afforded

to postcolonial states. Despite an impassioned plea by the then Director-General of UNESCO in 1978, in which he observed that "The power of the *fait accompli* is a survival of barbaric times and a source of resentment and discord which prejudices the establishment of lasting peace and harmony between nations" (M'Bow 1978), UNESCO has so far failed to provide an appropriate convention (Prott 2009). Thus, while many postcolonial states have achieved political autonomy, without full sociocultural self-determination of the type increasingly being won by Indigenous peoples, in an international context, they cannot be said to have achieved full political equality.

Conclusion

The idea of the cultural heritage object is a recent one, gathering together within a single term and concept types of object that in the past would have been considered and treated differently. The idea, for example, that the Mona Lisa, painted in the sixteenth century by Leonardo da Vinci, and the Willamette Meteorite, sacred to the Grande Ronde Confederation of Oregon, have much in common would have seemed outlandish, which is why the Mona Lisa is on display in an art museum (the Louvre) while the Meteorite can be seen in a science museum (the American Museum of Natural History). What these objects have in common, however, is their cultural worth. Their value is not intrinsic, it is culturally constructed. The idea of the cultural object reflects a growing dissatisfaction with taxonomies of "the other" established in Europe during the centuries following the Renaissance. Once thought to be absolute, these taxonomies are now recognized as political as much as rational constructs, and the ongoing debates over the significance and ownership of cultural objects are at the end of the day a symptom of this recognition.

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Repatriation: Overview
- ▶ SAFE/Saving Antiquities for Everyone
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions

References

Brodie, N. 2010. Archaeological looting and economic justice. In *Cultural heritage management, policies and issues in global perspective*, ed. P.M. Messenger and G.S. Smith, 261–277. Gainesville: University Press of Florida.

Coombs, A.E. 1994. *Reinventing Africa. Museums, material culture and popular imagination*. New Haven: Yale University Press.

Gerstenblith, P. 2009. Schultz and Barakat: Universal recognition of national ownership of antiquities. *Art, Antiquity and Law* 14: 21–48.

Kouroupas, M.P. 2009. Preservation of cultural heritage: A tool of international public diplomacy. In *Cultural heritage issues: The legacy of conquest, colonization and commerce*, ed. J.A.R. Nafziger and A.M. Nicgorski, 325–334. Leiden: Martinus Nijhoff.

Lipe, W.D. 1984. Value and meaning in cultural resources. In *Approaches to the archaeological heritage*, ed. H. Cleere, 1–11. Cambridge: Cambridge University Press.

Lyons, C.L. 2002. Objects and identities: Claiming and reclaiming the past. In *Claiming the stones naming the bones*, ed. E. Barkan and R. Bush, 116–140. Los Angeles: Getty Publications.

M'bow, A.-M. 1978. A plea for the restitution of an irreplaceable cultural heritage to those who created it.

http://unesdoc.unesco.org/images/0003/000346/034683eb.pdf. Accessed 11 Oct 2011.
Manacorda, S. 2011. Criminal law protection of cultural heritage: An international perspective. In *Crime in the art and antiquities world*, ed. S. Manacorda and D. Chappell, 17–50. New York: Springer.
Miles, M.M. 2008. *Art as plunder. The ancient origins of debate about cultural property*. Cambridge: Cambridge University Press.
Nafziger, J.A.R. 2009. Protection and repatriation of indigenous cultural heritage in the United States. In *Cultural heritage issues: The legacy of conquest, colonization and commerce*, ed. J.A.R. Nafziger and A.M. Nicgorski, 37–80. Leiden: MartinusNijhoff.
Prott, L.V. 2009. UNESCO international framework for the protection of cultural heritage. In *Cultural heritage issues: The legacy of conquest, colonization and commerce*, ed. J.A.R. Nafziger and A.M. Nicgorski, 257–286. Leiden: Martinus Nijhoff.
Prott, L.V., and P.J. O'Keefe. 1990. *Law and the cultural heritage, volume 3: Movement*. London: Butterworths.
Vickers, M., and D. Gill. 1994. *Artful crafts: Ancient Greek silverware and pottery*. Oxford: Clarendon Press.
Vrdoljak, A. 2006. *International law, museums and the return of cultural objects*. Cambridge, UK: Cambridge University Press.
Watson, P., and C. Todeschini. 2007. *The Medici conspiracy*. New York: PublicAffairs.

Cultural Heritage Outreach

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Introduction and Definition

Cultural heritage outreach is an active, context-specific, and multilateral process in which practitioners and stakeholders work together to define and develop both tangible and intangible aspects of an area's heritage. This is an organic process that involves intersections between research, education, and dialogue. Within the field of archaeology, context-specific cultural heritage outreach permits relationships to develop in conventional locations of site-based archaeological research but also in locations that are well beyond the traditional domain of archaeological fieldwork, including virtual spaces, prisons, and post-disaster settings. A primary goal of cultural heritage outreach within archaeology is to encourage accountability on the part of archaeologists, particularly in engaging the multiple voices within stakeholder communities through regular discussion, debate, and strategizing. As Jameson (1994) notes, cultural heritage outreach is an imperative to archaeological practice; it is the foundation for sustainable archaeological practice and the vehicle through which non-archaeologists can participate in crafting the visions of their cultural heritage, past and present.

Key Issues

Background

Over the past two decades, the growing literature on community archaeology has advocated for recognition of the plurality of publics in cultural heritage outreach efforts and a concomitant need for increased multiplicity in approaches for studying and interpreting the past (McManamon 2005). No longer is it desirable or appropriate for archaeologists to design top-down, structured engagements that maintain an authoritative distance between practitioners and nonspecialists.

Notable early efforts to involve stakeholder communities in the design and interpretation of archaeological projects were in place as early as 1966 during the excavations of the Ozette site in northwestern Washington, when archaeologists and the local Makah Indians worked together in developing recovery, interpretation, and outreach strategies. During the 1970s, archaeologist James Deetz established a precedent for outreach-based practice, when, during the excavations of Parting Ways, he worked in close collaboration with the African American community in Massachusetts, some of whom were descended from the site's historical inhabitants (Deetz 1996).

The 1990s was the turning point for the integration of cultural heritage outreach into the design of archaeological research initiatives. Following the passage of NAGPRA in 1990, issues

of collaborative practice, outreach, and accountability became frequent topics of discussion and, more gradually, essential components of professional training within the discipline. In the United States, early discussions about heritage outreach initially took the form of short commentaries featured in the "Working Together" column of the Society for American Archaeology's newsletter publication, *The SAA Bulletin* (now called *The Archaeological Record*). Many of these commentaries are now recognized as pioneering steps toward the development of collaborative archaeological practice within the USA (e.g., McManamon 1991; Jameson 1994).

Academic training in cultural heritage or archaeological heritage management in US universities was slower to develop than in the United Kingdom, which witnessed a fluorescence of archaeological heritage programs during the 1990s at the University of York, University College London, and the University of Cambridge, among others. As these programs grew into larger research entities, such as the Centre for Applied Heritage Studies at York, positions toward and training in heritage outreach practices became more integrated with archaeological practice internationally.

In the United States, the integration of cultural heritage outreach into archaeological practice was due in no small part to the enactment of the Society for American Archaeology's Code of Ethics in 1996. Public outreach was Principle 4 of the Code of Ethics. It advised that all professional archaeologists should "reach out to and participate in cooperative efforts with others interested in the archaeological record with the aim of improving the preservation, protection, and interpretation of the record" (SAA 1996). In raising the expectations for engaged archaeological practice, the SAA Code of Ethics outreach principle encouraged the development of heritage outreach strategies of varying scale and duration along what Colwell-Chanthaphonh and Ferguson call the "collaborative continuum" of archaeological practice (2008: 1).

As evidenced in the development of academic programs, new approaches in cultural resource management, modified museum policies, and cultural heritage outreach initiatives have proliferated over the past decade and have certainly changed how archaeology is both taught and practiced. Through a series of publications including *Common Ground, CRM Journal, and Heritage News*, the National Parks Service Public Outreach Program implements communication strategies to promote cultural resource awareness and preservation across a range of professional and lay audiences. Similarly, UNESCO's Movable Heritage Outreach Program promotes the proper preservation, handling, and documentation of tangible heritage objects through a series of bilingual comic strip books called "Cultural Heritage Protection Handbooks".

Since 2000, several major centers for heritage studies have been established in the United States in which archaeology and outreach are integral components. These include the Center for Heritage Resource Studies at the University of Maryland (2000), the Center for Heritage and Archaeological Studies at Montclair State University in New Jersey (2007), The Penn Cultural Heritage Center at the University of Pennsylvania (2008), and the Center for Heritage and Society at the University of Massachusetts, Amherst (2009).

Within this new climate, where archaeological training, research, and heritage outreach are increasingly inseparable, researchers are building strategies for outreach and participating in collaborative practice from the inception of their archaeological fieldwork. Two successful examples include Carol McDavid's decade-long work at the Levi-Jordan plantation and the plantation's descendant communities in Texas (2011). McDavid's work underscores the importance of long-term involvement in the community that archaeologists must undertake in implementing certain types of productive outreach strategies. This level of commitment has proven integral to McDavid's success in building mutual respect among the Levi-Jordan stakeholders, in understanding local knowledge, and in balancing the multiple voices and difference in promoting an inclusive view of the past. Extending the use of outreach as an archaeological methodology, Sonya Atalay has implemented what she calls community-based participatory research (CBPR) at Çatalhöyükin Turkey (Atalay 2010).

Atalay involved local communities in the management, care, and development of the site by developing an internship program in which archaeologists and the community members engaged in a mutually beneficial and reciprocal training process, one that shared power while integrating local knowledge into applied research. The primary advantage of these two (and similar) outreach designs is that they pay attention to contemporary concerns within the historical context of their research (McDavid 2011).

Today it is not desirable or appropriate for archaeologists to design top-down, structured outreach engagements that maintain an authoritative distance between practitioners and nonspecialists. Instead, cultural heritage outreach is increasingly based on the development of context-specific initiatives that are interactive, mutually beneficial strategies for fostering collaborative practice and sustainable archaeological stewardship.

Examples

Cultural heritage outreach exists in many forms and scales within archaeological practice; it can be experiential, overtly political, or descriptive; a one-time occasion; or a long-term initiative. Examples can include participation in or open days at excavations, school visits, town hall meetings, radio or TV interviews, coauthorship on reports or articles, internships, collaborative project design, exhibit development, or the creation of educational curricula. There is no prescribed method or set of steps that archaeologists are expected to follow in proceeding with heritage outreach. By necessity, this is a flexible process of engagement because, as Pyburn (2010) notes, communities are complex and fluid, with people belonging to multiple communities simultaneously.

As the following examples illustrate, context-specific cultural heritage outreach permits communication and collaborative relationships to develop in conventional locations of site-based archaeological investigations but also in scenarios where such outreach activities remain less well-established or involved: occasions where archaeological research is less fixed (e.g., survey projects), where archaeology is conducted and presented in highly visible public places (e.g., urban settings, university campuses, or on the internet), when archaeology is differentially accepted by local stakeholders (e.g., political situations), or when archaeological work intersects with highly sensitive, emotional circumstances (e.g., in the wake of mass disasters).

The Maya Area Cultural Heritage Initiative (MACHI), developed in 2006 by Patricia McAnany of the University of North Carolina at Chapel Hill and directed by Shoshaunna Parks of UNC-Chapel Hill, exemplifies the potential benefits of the multilateral nature of outreach activities. MACHI has created seven separate educational programs focused on mapping places of local heritage in the Maya region of Mesoamerica. These heritage maps are created as local community members identify heritage places and community boundaries, and then chart their location using icon-driven GPS software (Parks et al. 2006). In addition to identifying over a hundred types of heritage and archaeological sites, MACHI's outreach activities have resulted in the creation of a youth radio program in Belize focused on Maya heritage and have integrated local involvement into the planning processes for future development projects in the Maya region.

Cultural heritage outreach is also a valuable tool for engaging with seemingly more familiar places and pasts in high-visibility venues. For example, a recent increase in campus-based archaeology projects, as chronicled in *Beneath the Ivory Tower: The Archaeology of Academia* (Skowronek and Lewis 2010), demonstrates how well small-scale excavations of archaeological sites on university campuses connect with the students and alumni in the university community, many of whom feel lasting ties to the place where they spent 3 or 4 years of study. Although many of the campus archaeology finds tend to predate current student or recent alumni communities, these projects are a form of outreach that illustrates how particular places reinforce the collective identity that comes with the membership of a university's community or culture. One additional advantage of campus archaeology projects is that they are

often taught as a field methods course or field school, during which students are trained in archaeological methods of excavation, recovery, and interpretation. Although the majority of student participants do not pursue careers in archaeology, this engagement is a type of outreach that trains students to become informed advocates for the archaeological process.

Digital modes of engagement offer even higher-visibility platforms for outreach initiatives. Examples range from the documentation of individual excavation projects to databases of classroom resources for teachers. One innovative form of cyber engagement is the virtual reconstruction of Çatalhöyük in 3D and on Second Life, developed by Ruth Tringham, Colleen Morgan, Daniel Wei, and Mark Moglenat the University of California Berkeley (Morgan 2009). The Remixing Çatalhöyük website is part of the Open Knowledge and Public Interest (OKAPI) Scholar's Box, an open access digital collection designed to facilitate sharing between academic institutions, libraries, museums, and K-12 students. In addition to experimental and high-tech uses of digital media in outreach activities, archaeologists have developed countless easily accessible blogs and websites as means of initiating collaborations and discussing recent finds; examples include the African Diaspora Newsletter (http://www.diaspora.uiuc.edu/newsletter.html) and Archaeology (www.archaeolog.org). Open access to digital media enables rapid dissemination of information and the possibilities for interactive discussion forums, making digital media an indispensible mode of outreach.

Cultural heritage outreach in archaeology often conjures images of welcoming, progressive, and participatory collaborations. But outreach is also a means of engaging with and addressing more sensitive, painful issues that shape communities' cultural heritage. Engaging with these issues can involve encountering those who do not want to participate in the process, those who are not yet ready (or present) to participate, or those who have been excluded by other members of the community. The history of the African Burial Ground excavations beginning in the late 1990s vividly details such tensions as the project transitioned (at the community's urging) to a focus that involved the creation of knowledge about the archaeological and cultural heritage of the Burial Ground in the service of the community (Perry 1999). A result of the outreach collaborations is that the recently opened African Burial Ground Museum is supported by an Office for Public Education and Interpretation, whose remit is to develop and continue heritage outreach initiatives. Additional examples of outreach in more challenging contexts include work in sensitive political situations and in the process of post-disaster recovery. In her contemporary archaeological research of the Long Kesh/Maze prison in Northern Ireland, Laura McAtackney collected oral histories from both former Republican and Loyalists prisoners in order to understand the experiences of the prison in connection with different groups and to inform how heritage professionals might approach the interpretation of contentious sites in general (McAtackney 2008). Heritage outreach also has an important role to play in the processes of coping, recovery, and memory in post-disaster situations. Two settings are Shannon Dawdy's (2006) work with the communities and destruction of the built environment in post-Katrina New Orleans, and Krysta Ryzewski and John F. Cherry's (2012) collaboration on the Caribbean island of Montserrat with the Montserrat National Trust in the identification protection of archaeological and heritage sites the wake of ongoing volcanic eruptions.

Future Directions

Cultural heritage outreach is now inseparable from most archaeological projects, but it is not a constrained set of practices or even a single, established methodology. Outreach is a context-specific form of practice, and, to operate well, it demands flexibility. As Paul Shackel reminds archaeologists, the results of outreach are neither automatic nor guaranteed (2011: 1). At any moment, an archaeologist working within an engaged community can be called upon to become involved at a number of different levels –

as an academic expert, as a liaison between the community and larger issues, or as a commentator on larger issues beyond the discipline (see McDavid 2011). In accordance with ethical principles of professional archaeological practice, archaeologists are responsible for recognizing and responding to the many publics who exist for archaeology by implementing effective strategies of outreach (SAA 1996). The process of practicing socially responsible and transparent modes of engagement is critical for establishing and maintaining the relationships that make for successful and productive outreach initiatives between archaeological practitioners and non-archaeologist stakeholders.

Cross-References

► Community Archaeology

References

Atalay, S. 2010. 'We don't talk about Çatalhöyük, we live it': Building community capacity through archaeological research using a community-based participatory research (CBPR) methodology. *World Archaeology* 42: 418–429.

Colwell-Chanthaphonh, C., and T.J. Ferguson. 2008. *Collaboration in archaeological practice: Engaging descendant communities*. Walnut Creek: AltaMira Press.

Dawdy, S.L. 2006. In Katrina's wake: How one archaeologist's role in the post hurricane recovery forced her to confront New Orleans' catastrophic history. *Archaeology* 59: 16–21.

Deetz, J. 1996. *In small things forgotten: An archaeology of early American life*. Expanded and revised version of 1989 edition, originally published in 1977. New York: Anchor Books, Doubleday.

Jameson, J.H. 1994. The importance of public outreach programs in archaeology. *SAA Bulletin* 12: 16–17.

McAtackney, L. 2008. Experiencing 'the Maze': Official and unofficial interactions with place in post-conflict Northern Ireland. In *Making sense of place: Exploring concepts and expressions of place through different senses and lenses*, ed. F. Vanclay, M. Higgins, and A. Blackshaw, 191–197. Canberra: National Museum of Australia.

McDavid, C. 2011. From "public archaeology" to public intellectual: Seeking engagement opportunities outside traditional archaeological arenas. *Historical Archaeology* 45: 24–32.

McManamon, F. 1991. The many publics for archaeology. *American Antiquity* 56 (1): 121–130.

McManamon, F. 2005. The public interpretation of America's archaeological heritage. *SAA Archaeological Record* 5: 22–23.

Morgan, C. 2009. (Re)Building Çatalhöyük: Changing virtual reality in archaeology. *Archaeologies* 5: 468–487.

Parks, S., P.A. McAnany, and S. Murata. 2006. The conservation of Maya cultural heritage: Searching for solutions in a troubled region. *Journal of Field Archaeology* 31: 425–432.

Perry, W.R. 1999. Archaeology as community service: The African burial ground project in New York City. *North American Dialogue* 2: 1–5.

Pyburn, A. 2010. Engaged archaeology: Whose community, which public? In *Global public archaeology*, ed. A. Matsuda and K. Okamura. New York: Springer.

Ryzewski, K., and J.F. Cherry. 2012. Communities and archaeology under the Soufrière Hills Volcano on Montserrat, West Indies. *Journal of Field Archaeology* 37 (3).

SAA. 1996. Principles of archaeological ethics.

Shackel, P. 2011. Pursuing heritage, engaging communities. *Historical Archaeology* 45: 1–9.

Skowronek, R.K., and K.E. Lewis. 2010. *Beneath the ivory tower: The archaeology of academia*. Gainesville: University Press of Florida.

Cultural Heritage Project Management Based on Project Management Body of Knowledge (PMBOK)

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Introduction

This entry discusses adaptive use of "Project Management Body of Knowledge (PMBOK)" as an alternative approach for heritage sites management, so that managers of heritage sites conservation projects may utilize project management approach to cover their requirement. Comparing the PMBOK guidelines with traditional "heritage sites management" practice for conservation, PMBOK Guide may not only accommodate the traditional management responsibilities for a cultural heritage site but also may h more to suggest

for a more complete management scheme. The guide arranges a systematic procedure for management of any kind of projects, with relevant methods, techniques, and tools for a successful management.

Definition

PMI: The "Project Management Institute" is a professional institute in USA, expert in "project management," which has published books and guides regarding project management.

PMBOK Guide: "*P*roject *M*anagement *B*ody *O*f *K*nowledge" Guide is a procedure for project management developed by the "Project Management Institute (PMI)."

Project: A temporary endeavor undertaken to create a unique product, service, or result. Temporary means that every project has a definite beginning and definite end but has lasting outcome. Temporary does not necessarily mean short in duration, many projects last for several years. Projects also may often have intended and unintended social, economic, and environmental impacts that far outlast the projects themselves. Projects have progressive elaboration that accompanies the concepts of temporary and unique, meaning that it develops in steps, for example, the project scope will be broadly described early and become more explicit and detailed as project develops. (PMBOK Guide 2004).

Stakeholders: Persons or organizations (e.g., customers, sponsors, the performing organization, or the public) who are actively involved in the project or whose interests may be positively or negatively affected by the performance or completion of the project. Stakeholders may also exert influence over the project, its deliverables, and the project team members. Project stakeholders of a cultural heritage site may be client, government authorities, final users, sponsors, internal and external owners and investors, ICOMOS, environmental preservation organizations, researching institutes, universities, specialists, consultants, contractors, suppliers, workers, local people in the site and around the site, tourists and tourism agencies, site manager, performing organization, management team, public, people not directly related to the acquisition, but have influence, positively or negatively, and society.

Project Charter: A document that formally authorizes a project or a phase and documenting initial requirements that satisfy the stakeholder's needs and expectations.

Project Scope Statement: A document that describes in detail the project's deliverables and the work required to create those deliverables. The project scope statement also provides a common understanding of the project scope among project stakeholders. It may contain explicit scope exclusions that can assist managing stakeholder expectations. It enables the project team to perform more detailed planning, guides the project team's work during execution, and provides the baseline for evaluating whether requests for changes or additional work are contained within or outside the project's boundaries.

Project Management Plan: Document describing the actions necessary to define, prepare, integrate, and coordinate all subsidiary plans for the site management.

C.H.: Cultural heritage.

Key Issues

> World heritage sites . . . must be managed in such a way that they are preserved for future generations and at the same time presently made accessible to the public for its education and enjoyment. Finding the proper balance between these two demands is the difficult and important task of the World heritage site managers (Colombo ICOMOS 1993a).
> Only in a few cases around the world is there sufficient national money allocated for educating and hiring staff for the professional care, maintenance, and presentation of these great places (Colombo ICOMOS 1993b).

They have cultural values and accordingly merit special protection from the chance of erosion (Feilden and Jokilehto 1993).

The common practice for management of cultural heritage is developed and documented as *site management*; the main references used for it in this entry are "*Tourism at World Heritage Cultural Sites: The Site Manager's Handbook*, by ICOMOS

International Scientific Committee, 1993, and *Management Guideline for World Cultural Heritage Sites*, 1993, by Feilden and Jokilehto.

> Organizations perform work to achieve a set of objectives. Generally work can be categorized as either projects or operations, although the two sometimes overlap. They share the characteristics of being performed by manpower, constrained by limited resources, and also must be planned, executed, and controlled. Projects and operations differ primarily in that operations are ongoing and repetitive, while projects are temporary and unique (PMBOK Guide 2004).

Current Debates

Adapting Two Management Approaches

ICOMOS Scientific Committee (Colombo ICOMOS 1993) and also Feilden and Jokilehto suggest some guidelines for management of a cultural heritage site (Feilden and Jokilehto 1993). Summing up the guidelines suggested for cultural heritage management in the above references and comparing the mentioned responsibilities with project management areas of knowledge, it is observed that an adaptation may be recognizable. In other words, we see that most activities of the cultural heritage site management may be accommodated within some areas of project management knowledge (Hajialikhani 2006).

Defining Structure of Management Scheme

As per PMBOK Guide, the structure for cultural heritage (C.H.) site conservation projects is proposed, consisting of the below sections:

- *C.H. Site Integration Management shall include:*
  - Developing C.H. site Charter, which accommodates activities like establishing a management philosophy, determining the conservation and cost control policy, determining executing organization, collection of legal documents and regulations, defining objectives and short- and long-term goals, defining relation between visitors and local population, and improving local economic relations.
  - Developing C.H. Site Scope Statement, which accommodates activities like determining method of managing the site from organizational point of view and professionals required, collection of basic data, reports about present situation, determining minimum required conservation measures by considering values and priorities, submission of suggestion with least loss, noting limits and obstacles, and conservation and protection of cultural resources as a priority.
  - Developing C.H. Site Management Plan, which includes activities like developing site management plan, documentation, and listing procedure for all the monuments, buildings, and their appurtenances and site views; categorizing and evaluating resources; determining priorities for future measures; studying relation between visitors and local population; determining the communication management policy; developing research and study plan; scheduling the major activities; reporting investigations; researching and studying previous measures; submission of management plan for approval; reporting about planning and implementation documents; and developing yearly plans.
  - Directing the C.H. Site Execution, which includes basic measures, and execution according to management plan, and documentation of carried works.
  - Monitoring and Controlling C.H. Site Works, which accommodates reporting during execution (short- and long-term reporting).
  - Integrated Change Control, which accommodates reviewing the plan, future planning, and developing and updating management plan.
  - C.H. Site Activities Closing, which has not been discussed in the cultural heritage site management. It may be due to the reason that normally no end is considered for conservation of cultural heritage sites, but if the site is to be conserved for the purpose of adaptive use or any other economical utilization by private sector, an end shall be defined for the project type activities.

- *C.H. Site Scope Management* includes site description and scope definition; defining works boundary, land use plan, conservation plan, utilities and service plan, community development plan, and tourism plan its coordination with of conservation; primarily estimate of the site; identifying, taking an inventory and evaluation of existing resources; documenting and listing all the monuments, buildings, and their appurtenances and site views; determining minimum required conservation measures; considering values, priorities, and suggestion with least loss; and identifying limits and obstacles of the project.
- *C.H. Site Time Management* schedules by identifying the problems and priorities for urgent, medium-term, and long-term works.
- *C.H. Site Cost Management* covers cost estimating and approving cost plan, cost budgeting according to similar previous works, and cost control.
- *C.H. Site Quality Management* includes implementing conservation policy; collection of the latest technical and conservational regulations; and considering values, priorities, and giving suggestion with least loss.
- *C.H. Site Human Resource Management* accommodates activities like planning the existing staff, determining staff responsibilities, staffing the human resources, studying management success, and determining consulting methods and the consulting team.
- *C.H. Site Communication Management* may cover proper documentation of the resource, assuring accessibility of the documents, and keeping copy of the documents in a safe place; communicating with universities and research institutes; communicating with international organization concerned with conservation of cultural heritage sites (like ICOMOS), documentation and reporting, and storing information and documents.
- *C.H. Site Risk Management* covers activities like reporting the potential risks that may be encountered in future, developing accident and fire protecting plan, determining the responsible person and his substitute, and studying reasons of possible failure of regulations.
- *C.H. Site Procurement Management* is not discussed in the cultural heritage site management guidelines, although procurement of material and services shall be surely required for execution of conservation works.
- *C.H. Site Safety Management* covers activities such as developing accident and fire protection plan, determining the responsible person and his substitute, and establishing management policy according to security and insurance considerations.
- *C.H. Site Environmental Management* covers processes such as studying local economic relations, studying relation between visitors and local population, and applying national and local master plans and industrial zoning.
- *C.H. Site Financial Management* accommodates activities of income budgeting, reporting the requests for financial and technical supports, improving local economic relations, and management of visitors' related activities (image and marketing, recording and analyzing visitors, moving travelers to and from the sites, welcoming visitors, providing services to visitors, and interpretation of the site to visitors.)
- *C.H. Site Claim Management* is not discussed in cultural heritage site management guides. It shall be noted that conservation of C.H. sites is often accompanied with excavation, exploring, removal of debris, and communicating with local inhabitants that may be relocate from the site and other uncertainties and risks which may affect the work procedure and progress. Therefore, there is always potential of raising claims by the client, financers, local people, contractors, etc. Thus, claim management may be helpful for the cultural heritage site management.

Future Directions

Proposed Management Scheme

The main documents, which enlighten the management procedure, are proposed by adding the

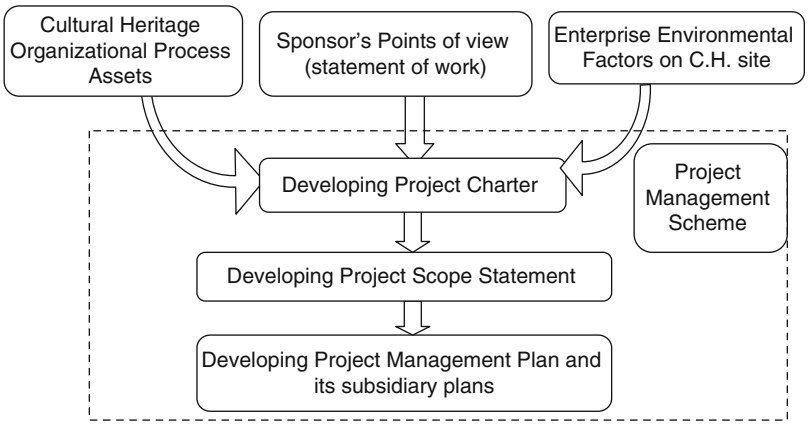

Cultural Heritage Project Management Based on Project Management Body of Knowledge (PMBOK),
Fig. 1 Preparing management Scheme

guidelines for project management and cultural heritage site management. Due to space limitation, they are presented very briefly in this entry. There are three major documents described within the PMBOK Guide and each has a specific purpose (PMBOK Guide 2004):

- C.H. Site Charter formally authorizes the project and provides the project manager with the authority to apply organizational resources to project activities. Project charter needs 3 major inputs (see Fig. 1).
- C.H. Site Scope Statement states what work is to be accomplished and what deliverables need to be produced.
- C.H. Site Management Plan states how the work will be performed and consists of subsidiary plans (Scope Management Plan, Schedule M.P., Cost M.P., Quality M.P., Staffing M.P., Communication M.P., Risk M.P., Procurement M.P., Safety M.P., Environmental M.P., and Financial M.P.)

Therefore, in order to develop a cultural heritage conservation project scheme, we shall collect main inputs of:

- Cultural Heritage Organizational Process Assets, which have been prepared or practiced before in the organization, such as quality assets (ICOMOS and other national and international charters, standards and regulations), standards, guidelines, templates, cost and accounting control regulation, countries laws and regulations, documentation and communication requirements, etc.
- Statement of Work (SOW), which is a narrative description of products or services to be supplied by the project. It may be submitted by the project sponsor, including items such as product scope description, business need, project stakeholders, and organization strategic plan
- Enterprise Environmental Factors, which are environmental factors and systems that surround and influence the project's success, such as organizational culture and structure, governmental or industry standards (tourism standards, product standards, quality standards, and workmanship standards), available site infrastructure (existing human resources, marketplace conditions), stakeholder risk tolerances, commercial databases, and environmental data (climate, soil, geotechnical, tectonic, culture of surrounding people, etc.)

And the output shall be the project management scheme consisting of the below items. Due to lack of space, just a few headings are mentioned:

Project Charter

This document shall address items such as requirements that satisfy sponsor and other stakeholder needs and expectations, establishing management philosophy, determining the conservation policy, collection of legal documents and regulations, defining objectives and short- and long-term goals, summary of milestone

schedule, defining relation between visitors and local population, improving local economic relations, defining business needs and high-level project description, determining product requirements and project purpose, assigning project manager and authority level, determining executing organization, determining project stakeholders and their influences (also their functional organizations and their participation), organizational and environmental assumptions and constraints, business case justifying the project (including return on investment), and summary budget (determining cost control policy).

Project Scope Statement

This document shall address items such as project and product objectives, product or service requirements and characteristics, product acceptance criteria, project boundaries, project requirements and deliverables, project constraints, project assumptions, initial defined risks, schedule milestones (such as investigation periods, considering weather, or tourist season), initial WBS, project configuration management requirements, approval requirements, collection of basic data, reports about present situation, determining minimum required conservation measures by considering values and priorities, submission of suggestion with least loss, noting limits and obstacles, and conservation and protection of cultural resources as a priority.

Developing Project Management Plan

This document shall address items such as the project management processes selected by management team and level of implementation, how the selected processes will be used to manage the specific project (including the dependencies and interactions among those processes and the essential inputs and outputs), descriptions of the tools and techniques to be used for accomplishing those processes, how work will be executed to accomplish the project objectives, how changes will be monitored and controlled, how integrity of the performance measurement baselines will be maintained and used, the need and techniques for communication among stakeholders, developing research and study plan, studying relation between visitors and local population, reporting investigations, studying previous measures, the selected project life cycle (and for multiphase projects, the associated project phases), key management reviews for content (also extent and timing to facilitate addressing open issues and pending decisions), documentation of procedure for all monuments and buildings and their appurtenances and site views, categorizing and evaluating resources, scheduling the major activities, determine priorities for future measures, developing yearly plans, submission of management plan for approval, reporting about planning and implementation documents, risk register (including probable risks, their possible influences, probability of occurrence, possible response to them, etc.), project management plan, and other components such as milestone list, resource calendar, schedule baseline, cost baseline, and quality baseline.

Project management plan itself may be composed of subsidiary plans and other components:

- Project scope management plan: describes how the project scope (and boundary) will be defined, verified and controlled, and how the work breakdown structure will be defined
- Schedule management plan: describes how to developing and controlling the project schedule (timing)
- Cost management plan: how cost estimate, control and budgeting shall be done
- Quality management plan: how implement the performing organization's quality policy
- Staffing management plan: how and when project team members will be acquired and released, and addresses to identification of training needs, plans for recognition and rewards, compliance considerations, safety issues, and impact on the organization
- Communication management plan: describes communications needs and expectations for the project, how and in what format information will be communicated, when and where each communication will be made, and who is responsible for each type of communication
- Risk management plan: how to schedule, plan, identify, analyze, and respond to risks

- Procurement management plan: how the procurement processes will be managed
- Project safety plan: guides and recommend how to perform the work to reduce accidents, protect workers, public and properties from probable damages
- Environmental Management plan: describes how to assess environmental conditions and impacts of project on surrounding environment and vice versa, which environmental standards and concepts shall be satisfy and how to be satisfied
- Financial management plan: defining financial status, economic conditions, source of funds, possible incomes and their probable time, visitor's management, etc.

With the help of the above structure, it is expected to have an alternative systematic method for management of a cultural heritage site.

Cross-References

- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Gender
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Heritage Management: Cost and Benefit of Change
- ▶ Cultural Heritage Management: Project Management
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Heritage Areas
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
- ▶ Journal of Cultural Heritage Management and Sustainable Development
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management

C

References

Colombo ICOMOS. 1993a. *Tourism at world heritage cultural sites: The site manager's handbook*. Colombo: International Scientific Committee.

Colombo ICOMOS. 1993b. *Conservation economics*. Colombo: International Scientific Committee.

Feilden, B., and J. Jokilehto. 1993. *Management guidelines for world cultural heritage sites*. Rome: ICCROM.

Hajialikhani, M.R. 2006. Management scheme of cultural heritage projects. Paper presented at the 1st International conference on sustainable local heritage conservation, the transdisciplinary approach, Udonthani, Thailand, 19–21 November 2006.

PMI. 2004. *A guide to the project management body of knowledge (PMBOK)*. 3rd ed. Pennsylvania: Project Management Institute.

Further Reading

ISO. 2003. ISO 10006:2003. In *Quality management systems – guidelines for quality management in projects*. Geneva: International Organization for Standardization.

Kerzner, H. 2003. *Project management, a systems approach to planning, scheduling and controlling*. 8th ed. Hoboken: John Wiley and Sons, Inc.

Cultural Heritage Protection: The Legal Sphere

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Introduction

In an overview, cultural heritage may be seen as the material remains of the past, created by human endeavor, and held preserved by nations or subset

political bodies, which are the domain of the cultural group within which they are created. The cultural group puts the items into context and imparts the meaning by which they are regarded. The political unit establishes the rules for compliance, enforcement, and resolution of claims for control or return of cultural items. The meaning and importance attached to places and items of cultural heritage are in part a product of the custom and use of the cultural group. When items are held within a group, the local understanding and cultural ethic will constrain improper use or transfer. Such internal rules are often referred to as common law. In times of war or other international actions, such as development or exploration, outside actors may not be imbued with the same ethic. Graffiti on historic sites and removal of items from sites by those for whom the site does not hold revered interest creates a need for local protection ordinances.

Definition

The legal sphere in protecting cultural heritage has at its core the ethics of the cultural group within which the items were created, have meaning and use, and intrinsic value; this exists within the context of the political units that set compliance ordinances for use, access, and transfer; enforcement actions for harmful acts; and tangible and intangible property rights protections.

Key Issues/Current Debates/Future Directions/Examples

Private Cultural Heritage and Internal Rules – The Common Law: The rules of the creating cultural group determines individual or group control, the allowable scope of internal or external knowledge dispersal, maintenance and consumption of heritage items, or their release from use, and the availability for private or public use in what is known as the marketplace. Privately held items, not made for or considered for public consumption and trade, are thus not typically brought under trademark, trade-name, or copyright protections. Those are tools for protection of property rights in the marketplace.

Within the group, there is an orderly nature of the protection and use of cultural heritage that has developed over time as the common law. The common law is that of organized, civilized, cultural groups of homogeneous thought. The common law is the rules of the group, which are so well understood, that they are not and need not be written in texts. Over time, external impacts, such as war, migration, cultural infusion, and assimilation, bring into play competing interests in property. Conflicts may arise between groups, to be resolved by those of superior ability to control. These notions play out over time and nations. The common law is assumed within the legacy of group knowledge and may be insufficient to resolve property protection issues when competing doctrines of control, or imposition of self-interest over the group, are present. It is then the role of legal code, which is statutory law, to impart order into competition for control of property.

Statutory imperatives: There are compliance laws and enforcement laws, which regulate access and use of and protection of cultural heritage, respectively. There are also laws of restitution, repatriation, and compensation, which sort out the effects of takings by war, superior imposition of action without property right, or other conflict over time.

Compliance

Compliance laws establish legal requirements for care of sites prior to infrastructure development, for prior notice to potential owners or cultural groups with an interest in a site or objects, and for permission to excavate or for other actions which will impact heritage sites or monuments. Examples of such statutes in the United States are the National Historic Preservation Act, which establishes a National Register of Historic Places for sites of significance and which together with the National Environmental Policy Act requires consideration of impact to heritage sites prior to invasive and possibly harmful action. There are also laws in the United States, France, and other countries which allow funds expended to rehabilitate or restore historic properties to be used as

income tax credits for the private owners. Typically compliance laws exist at the national level, to be effective on actions within that nation.

There are zoning laws throughout the world in countries which indicate the uses for real estate in certain areas to protect historic districts and to maintain the character of heritage sites. Even in liberal democracies, there is an ability of government to establish an aesthetic environment, using the police power of government, to regulate how a local area will be maintained. When private property is controlled willingly by the private property owner to maintain an historic façade in an historic district, the private property owner may give the permission or be compensated. Zoning most often occurs at the local level, such as locally designated historic districts.

There are also laws that enable scientific data retrieval or other extractive activities on public heritage lands for the benefit of society in addition to scientific and historical knowledge. The permits given to investigations at heritage sites confer access and/or use, but do not change ownership of heritage sites and items. Permits may be issued by a local or national authority, for lands within local or national control.

These examples are all laws to protect cultural heritage, sensitive to market demands, evolving use of land, and desires to preserve heritage. The political unit establishes the laws, but the land manager will utilize the laws as tools to regulate access and use of heritage sites, as well as to establish heritage monuments and districts on public and private lands.

Enforcement

There are enforcement laws which prohibit consumptive use of heritage assets for self-interest, damage without authority of a permit, or theft. These laws establish prosecution and punishment of wrongdoing. Punishment may include incarceration and/or a fine. An example of such a law in the United States is the Archaeological Resources Protection Act (ARPA), which established permits for lawful data retrieval and also penalties for theft, destruction, or sale of heritage items without permission. Local laws may establish fines, but laws such as ARPA are national in scope.

Enforcement of civil laws, where money damages are the issue, can be brought in court by the land manager. When the punishment includes incarceration, the action is criminal and is actually a matter assumed by the state or national court. The land manager is then a witness, an expert on the nature of the object and its heritage value, and stands in for society as the aggrieved party.

Restitution/Repatriation/Compensation

There are also laws for the resolution of competing claims to cultural heritage. If the possessor is determined not to hold a lawful ownership interest, a court may require the item be restituted to the proper owners. When there is an inability to return items, resolving owner interests may include compensation. Repatriation is the act of returning items to a cultural group. In the United States and Australia, laws require repatriation of items to indigenous people that were previously removed without permission from the indigenous group or tribe. These laws have international implications when the out-of-country rightful owner seeks to enforce their rights in the nation in which the object is held.

Examples of these laws include statutes allowing restitution for Nazi confiscated art, repatriation of cultural items by dominant society to indigenous culture, such as the Native American Graves Protection and Repatriation Act in the United States, and return of looted or conscripted items recognized by nations as protected items and listed under UNESCO Conventions for return of looted items in international commerce. Laws can also include monetary damages, when the item has been destroyed or lost. Each nation must recognize the rights of the nonnational when foreign owners pursue their rights in objects held in other nations, or nations seek restitution.

Conclusion

The concepts of community norms for cultural heritage preservation and protection through compliance and enforcement laws can be seen across nations and across time. In multicultural society, where common law or moral law notions are mixed or disregarded by individuals, the codified law can afford some protection and assign

responsibility to deter destructive action and provide some punishment and restitution, or repatriation, to resolve the interests of the victim. Good heritage management begins with knowing the extent of the heritage resource and taking steps to deter and prevent harm with barriers, signs, and public education. When reasonable means fail to protect heritage resources, and voluntary steps are not forthcoming, then the law provides incremental tools to establish protections, limit or regulate access and use, and if the need arises, to punish destructive acts.

Cross-References

- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ UNESCO (1972) and Malta (1992) Conventions

Further Reading

Hutt, S., C. Blanco, W. Stern, and S. Harris. 2004. *Cultural property law*. Chicago: ABA.

Thomas, D.H. 2001. *Skull wars*. New York: Basic Books.

Watkins, J. 2000. *Indigenous archaeology*. Walnut Creek: AltaMira Press.

Cultural Heritage Site Damage Assessment

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Introduction

Cultural heritage sites throughout the world are harmed on a regular basis by unauthorized damage. This damage may be accidental or intentional and may occur in association with other authorized acts or as a result of looting or vandalism of cultural heritage sites. Inadvertent unauthorized damage from authorized activities, for example, timber harvesting, occurs when these activities exceed the scope of their allowable impacts, such as operating in areas where they are not permitted. Looting involves the theft of artifacts and other cultural materials from cultural heritage sites. This causes damage to the context of the sites through the removal of these items and the activities associated with their removal, such as unauthorized excavation. Vandalism is damage to cultural heritage sites, resulting from malicious acts, the purpose of which is to leave the perpetrator's mark on the site or to harm it solely to cause injury.

Because cultural heritage sites must be protected in order to effectively manage them now and for the future, actions to attempt to prevent unauthorized damage to them are an essential component of cultural heritage management. These actions fall into two basic categories. The first is investigation and criminal or civil prosecution of those involved the unauthorized damage. The second is education of the general public to inform them about this problem and the need to protect cultural heritage sites. Assessment of the damage to cultural heritage sites is a necessary step in investigation and prosecution actions. It is a forensic process akin to the job of the medical examiner or forensic pathologist in a homicide case.

In the United States, there are legal and professional standards for assessing damage to cultural heritage sites caused by unauthorized damage. The legal standards derive from the Archaeological Resources Protection Act (ARPA), a statue enacted by the United States Congress in 1979 (16 United States Code Section 470aa-mm). The provisions of this statute are enhanced by implementing regulations, the ARPA Uniform Regulations, that were adopted in 1984 by the four major departments of the United States government that manage cultural heritage sites. The professional standards are based on a damage assessment methodology that has been developed over the past 34 years by the author (McAllister 1981) and other archaeologists involved in this effort. Since 2000, the author's firm has presented a five-day class for archaeologists on archaeological damage assessment that has also helped to

develop professional standards. In 2003, the Society for American Archaeology (SAA), the organization that represents the majority of professional archaeologists in the United States, adopted professional standards for the determination of archaeological value, one critical component of the measures of the harm resulting from unauthorized damage (see below). Also, the United States National Park Service has published a technical brief entitled, *Archeological Resource Damage Assessment: Legal Basis and Methods* (McAllister 2007). These legal and professional standards are the basis for the discussion which follows.

This damage assessment methodology has been developed specifically for use in the United States. As will be discussed further later, it could be employed in other countries, presuming that comparable legal and professional standards for damage assessment exist in these countries.

Definition

Assessing unauthorized damage to cultural heritage sites is the process of determining the severity of harm to these sites caused by the effects of the damage. It is part of the investigation of the damage, and its results are used in the effort to prosecute those who are responsible.

Three steps are involved in the damage assessment process. The first is on-site examination and documentation of the damage. Second, the severity of harm is determined using measures accepted in the legal system. Third, a damage assessment report is prepared that describes and explains the procedures and findings of the first two steps.

Procedures

On-Site Examination and Documentation of Damage

Four operations must be accomplished in the on-site examination and documentation of unauthorized damage to cultural heritage sites, all of which involve standard archaeological data collection methods. These operations have been described as follows:

1. Identification of the … [cultural heritage] resource damage locations:
   a. Identify all damage locations.
   b. Attempt to distinguish new damage locations from old damage locations, if the latter are present.
2. Identification of the … [cultural heritage] resources damaged and the damage to them:
   a. Identify … [legally protected cultural heritage resources].
   b. Identify the damage to these resources in terms of … [prohibited] acts.
3. Measurement of the amount of … [cultural heritage] resource damage:
   a. Make accurate tape measurements of the amount of damage, unless other, more sophisticated quantification methods are available (see 3b.). To meet forensic standards of documentation, make as complete a series of measurements as possible given the time available. Either metric or English standard measurements (e.g., inches, feet, yards) may be used … Note that if the damage has extended below the surface of a site, depth measurements are important. Sufficient measurements should be made to calculate the volume of damage.
   b. Use other more sophisticated methods to quantify the amount of damage, such as total station or 3D laser scanning. More detailed measures such as these may be employed to complete an assessment, following the initial use of tape measurements.
4. Documentation of findings:
   a. Take accurate and complete notes on all aspects of the field damage assessment process.
   b. Photograph the damage locations, the … [cultural heritage] resources damaged and the damage to them.
   c. Map the damage locations.
   d. Documentation should be as detailed and objective as possible (McAllister 2007: 8–9).

Determination of Severity of Harm

In cases of unauthorized damage prosecuted under the federal law in the United States, the

severity of harm is determined using two of three measures identified in the ARPA statute, commercial value, archaeological value, and cost of restoration and repair. Criminal charges or civil penalties are based on the total monetary amount of either commercial value and cost of restoration and repair or archaeological value and cost of restoration and repair. Definitions of these values and costs are established by Section __.14 of the ARPA Uniform Regulations:

Archaeological value. For purposes of this part, the archaeological value of any archaeological resource involved in a violation of the prohibitions in § __.4 of this part or conditions of a permit issued pursuant to this part shall be the value of the information associated with the archaeological resource. This value shall be appraised in terms of the costs of the retrieval of the scientific information which would have been obtainable prior to the violation. These costs may include, but need not be limited to, the cost of preparing a research design, conducting field work, carrying out laboratory analysis, and preparing reports as would be necessary to realize the information potential (Section __.14(a)).

Commercial value. For the purposes of this part, the commercial value of any archaeological resource involved in a violation of the prohibitions in § __.4 of this part or conditions of a permit issued pursuant to this part shall be its fair market value. Where the violation has resulted in damage to the archaeological resource, the fair market value should be determined using the condition of the archaeological resource prior to the violation, to the extent that its prior condition can be ascertained (Section __.14(b)).

Cost of restoration and repair. For purposes of this part, the cost of restoration and repair of archaeological resources damaged as a result of a violation of prohibitions or conditions pursuant to this part shall be the sum of the costs already incurred for emergency restoration or repair work, plus those costs projected to be necessary to complete restoration and repair, which may include, but need not be limited to, the costs of the following:

1. Reconstruction of the archaeological resource
2. Stabilization of the archaeological resource
3. Ground contour reconstruction and surface stabilization
4. Research necessary to carry out reconstruction or stabilization
5. Physical barriers or other protective devices, necessitated by the disturbance of the archaeological resource, to protect it from further disturbance
6. Examination and analysis of the archaeological resource including recording remaining archaeological information, where necessitated by disturbance, in order to salvage remaining values which cannot be otherwise conserved
7. Reinterment of human remains in accordance with religious custom and state, local, or tribal law, where appropriate, as determined by the Federal land manager
8. Preparation of reports relating to any of the above activities (Section __.14(c))

The combination of archaeological value and cost of restoration and repair provides the most accurate measure of harm to the behavioral context of cultural heritage sites resulting from unauthorized damage. Commercial value is used primarily for artifact trafficking cases.

National Park Service Technical Brief 20 includes a step-by-step methodology for making each of these determinations and that for archaeological value is based on the SAA professional standards for this determination. These professional standards also are presented and used in the 5-day class on archaeological damage assessment offered by the author's firm. Their use in cases involving unauthorized damage to cultural heritage sites in the United States is highly recommended to archaeologists who will conduct the damage assessments.

Damage Assessment Report Preparation

Damage assessment reports for unauthorized damage to cultural heritage resources in the United States typically include the following sections:

1. Introduction
2. [Cultural Heritage] . . . Resource Description
3. Field Damage Assessment Procedures

4. [Cultural Heritage] . . . Resource Damage
5. Value and Cost Determinations
6. Conclusions
7. Summary (McAllister 2007: 22)

Information on the location of the resource may be included as part of its description or as a separate section.

Statutes prohibiting unauthorized damage to cultural heritage sites will have legal elements that must be proven for a successful criminal or civil prosecution. For example, if the statute has a definition of a cultural heritage site or resource, it will have to be shown that this definition is met. The goal of a damage assessment report is to describe and explain the procedures and findings of the examination and documentation of the damage and the determination of the severity of harm so that there is convincing proof that these legal elements are met.

Evaluation of the Damage Assessment Methodology

When used properly, the methodology for assessing unauthorized damage to cultural heritage sites developed in the United States has worked well in cases that have been charged and prosecuted under ARPA. The methodology also has been used in cases brought under other statutes of the United States that can be used to protect these sites, either in addition to or in place of the ARPA statute, such as the theft and injury of government property statutes (18 United States Code Section 641; 18 United States Code Section 1361). In addition, this methodology has been adopted for use in two relatively new United States' statutes that protect submerged cultural resource sites and paleontological resource sites, the Sunken Military Craft Act of 2004 (10 United States Code Section 113, 1401–1408) and the Paleontological Resources Preservation Act of 2009 (16 United States Code Section 470aaa-1-11). Also, it has now been codified in a new cultural heritage protection statute of the State of California (California Public Resources Code Section 5097.5-5097.993).

In a recent article, an amendment to the ARPA statute has been proposed that would extend its jurisdiction to protect submerged cultural heritage sites on the Outer Continental Shelf:

This amendment does not state that the United States has fee title to the Outer Continental Shelf but does assert our nation's sovereign rights and exclusive jurisdiction over activities controlled by ARPA that occur there. As a result, this proposed amendment would appropriately extend ARPA jurisdiction to the Outer Continental Shelf and would improve and expand protection of the extensive underwater cultural heritage located there (McAllister et al. 2011).

This would provide a firm legal basis for the use of the damage assessment methodology for unauthorized damage to these sites.

Clearly, this methodology has been shown to have broad applicability in the United States, even when the ARPA statute does not apply for definitional or jurisdictional reasons. The components of this methodology involving on-site examination and documentation of damage and preparation of a damage assessment report are standard operations that would be applicable in any legal context. Although the legal definitions of the measures of the severity of harm come directly from the ARPA Uniform Regulations, they are based on common sense or archaeological concepts that are not strictly tied to the legal system of the United States. They can be restated in simple, nonlegal terms as follows:

- Commercial value: What is the current monetary worth of an object removed from cultural heritage site without authorization?
- Archaeological value: What would have been the cost of an archaeological project to scientifically investigate the damaged portion of a cultural heritage site before the unauthorized damage occurred?
- Cost of restoration and repair: What amount of money has been or would be expended to attempt to restore the damaged portion of a cultural heritage site to the condition it was in prior to when the unauthorized damage occurred?

Therefore, it is reasonable to assume that this damage assessment methodology could be used effectively in criminal or civil prosecution of those involved in unauthorized damage of cultural heritage sites in other countries.

Key Issues

Obviously, the damage assessment methodology developed in the United States can only be employed when statutes exist that prohibit unauthorized damage to cultural heritage sites and make such actions subject to criminal penalties, civil penalties, or both. The use of the damage assessment methodology in other countries would be viable presuming that statutes of this type have been or could be enacted. It cannot be employed in legal jurisdictions in which such statutes do not exist or do not apply because there are then no legal standards for the use of the methodology.

In addition to this basic issue, there are five others that will affect the use of the damage assessment methodology in any legal jurisdiction where there are statutes prohibiting and penalizing unauthorized damage to cultural heritage sites. The first two relate specifically to the practice of damage assessment while the other three are broader and affect whether or not there will be a need for damage assessment. These issues can be summarized as follows:

- A lack of professional standards for assessing damage to cultural heritage sites
- Failure by archaeologists to adhere to legal and professional standards when assessing damage to cultural heritage sites and resulting prosecutorial problems
- A lack of support from land managers for investigation and prosecution of cases of unauthorized damage to cultural heritage sites
- The failure of law enforcement officers to detect and properly investigate such cases
- A lack of interest from prosecuting attorneys in pursuing cases of unauthorized damage to cultural heritage sites which they see as a "victimless" and, therefore, less serious type of crime

Future Directions

All of the issues identified above need to be addressed in future efforts to better protect cultural heritage sites. Clearly, statutes prohibiting and penalizing unauthorized damage to these sites should be enacted in legal jurisdictions where they not exist currently. Also, existing statutes, even the venerable ARPA statute of the United States, can potentially be amended to improve their protective measures. The lack of professional standards for assessing damage to cultural heritage sites and the failure of archaeologists to follow both legal and professional standards in conducting these assessments must be addressed and acted on by the professional archaeological community in the legal jurisdiction where the sites are located. The existence of these standards and adherence to them by archaeologists should help convince land managers, law enforcement officers, and prosecuting attorneys that professionally credible and legally sustainable assessments of damages will be produced. A more difficult task is increasing the commitment of land managers, law enforcement officers, and prosecuting attorneys to the detection, investigation, and prosecution of cases of unauthorized damage to cultural heritage sites. It will require the combined efforts of descendant groups, the professional archaeological community, and supporters among the general public using a wide array of consciousness-raising strategies to convince these government officials that cultural heritage sites are irreplaceable resources that must be protected not only through public education but also through enforcement.

Summary and Conclusions

In the United States, there are legal and professional standards for assessing damage to cultural heritage sites caused by unauthorized damage. The legal standards derive from the ARPA statute and the act's Uniform Regulations. The professional standards have been formulated in conjunction with the development and use of an archaeological damage assessment methodology. The purpose of this methodology is to determine the severity of harm to these sites caused by the effects of the damage. Three steps are involved in the methodology; on-site examination and documentation of the damage, determination of the severity of harm from the damage, and

preparation of a damage assessment report. What are referred to as commercial value, archaeological value, and cost of restoration and repair are the legally established measures of harm. This damage assessment methodology is applicable not only to criminal and civil violations of the ARPA statute but also to violations of other federal or state laws that prohibit and penalize unauthorized damage to cultural heritage sites and also may be extended to damage to sites on the Outer Continental Shelf. Although there are legal and professional issues that can affect the use of the archaeological damage assessment methodology that has been developed in the United States, it certainly could be used in criminal or civil prosecution of those involved in unauthorized damage of cultural heritage sites in other countries.

Based on over 30 years of experience with this archaeological damage assessment methodology in the United States, it is known that it can be highly effective in determining the severity of harm to cultural heritage sites from unauthorized damage. Therefore, other countries should consider adopting it for use in conjunction with their existing statutes or those that may be enacted protect these sites.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Cultural Heritage Outreach
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage and Public Policy
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: History and Context
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ United States: Cultural Heritage Management Education

References

Mcallister, M.E. 1981. Smokey and the looters: The Jones-Gevara pothunting case December 1977 – June 1980. In *Cultural resources law enforcement in the United States*, ed. D.F. Green and P. Davis, 2nd ed. Albuquerque: USDA Forest Service, Southwestern Region.

Mcallister, M.E. 2007. Archeological resource damage assessment: Legal basis and methods. *National Park Service Technical Brief* 20. http://www.cr.nps.gov/archeology/pubs/techBr/TCH20.htm. Accessed 21 Sept 2011.

Mcallister, M.E., L.E. Murphy, and J.E. Moriarty IV. 2011. ARPA and site damage assessment applicability to offshore underwater cultural heritage. In *ACUA underwater archaeology proceedings 2011*, ed. F. Castro and L. Thomas. Pensacola: Advisory Council on Underwater Archaeology.

Further Reading

Foster, E. 2007. *Using ARPA civil penalties to protect archaeological resources on public lands and Indian land*. Washington, DC: National Park Service and USDA Forest Service.

Green, E.L., ed. 1984. *Ethics and values in archaeology*. New York: The Free Press.

Hutt, S., E.W. Jones, and M.E. Mcallister. 1992. *Archeological resource protection*. Washington, DC: The Preservation Press.

Hutt, S., M.P. Forsyth, and D. Tarler, eds. 2006. *Presenting archaeology in court: Legal strategies for protecting cultural resources*. Lanham: AltaMira Press.

Lee, R.F. 1971. *The antiquities act of 1906*. Washington, DC: National Park Service.

Mcallister, M.E. 1988. Areas and issues in future research on archaeological resource protection. In *Tools to manage the past: Research priorities for cultural resources management in the southwest*, ed. J. Tainter and R. Hamre. Fort Collins: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station.

Rothman, H. 1989. *Preserving different pasts: The American national monuments*. Urbana/Chicago: University of Illinois Press.

Smith, G.S., and J.E. Ehrenhard, eds. 1991. *Protecting the past*. Boca Raton/Ann Arbor/Boston/London: CRC Press.

Cultural Landscapes: Conservation and Preservation

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Introduction

Cultural landscapes offer a way of understanding how societies interact with their environment. Built features and land modifications combined with the natural landscape are the cultural landscape expression that holds records of how communities live in time and space within a landscape. Records of human activities may extend back in time for thousands of years to tell the story of the economic organization of a long past society such as the "Kuk Early Agricultural Site", Papua New Guinea, and "Schokland and Surroundings", the Netherlands, that is land reclaimed from the sea containing vestiges of historic and prehistoric human habitation. More extensive cultural landscapes, such as the "Incense Route and Desert Cities in the Negev", Israel, combine associated fortresses and agricultural landscapes in the Negev desert with the relics of their sophisticated irrigation systems, urban constructions, forts, and caravanserai (examples from UNESCO World Heritage List 2012).

The introduction of new concepts during the twentieth century such as new ecological ideas, innovative trends in the study of geography, anthropology, and other disciplines, provided a new consideration of the landscape, especially from a cultural point of view. The long process that changed the concept of landscape resulted in the consideration of landscapes as complex living beings having physical structure, as well as immaterial, intangible values that give meaning. In the recent decades, cultural landscapes have been referred to as "historic landscapes" or "vernacular landscapes" to describe areas evidencing features constructed in the traditional style of a cultural group. The United States Park Service provides definitions of the historic and vernacular landscapes as well as ethnographic landscapes and notes that they fall under the umbrella of cultural landscapes (Birnbaun 1994).

The concept of cultural landscape that incorporated the spatial dimension along with the temporal and intangible qualities was mirrored in archaeology but in reverse. Where the important temporal and macrogeographical factors had been of importance, the local spatial dimension and intangible qualities became of increasing significance. Landscape archaeology, ideally as a multidisciplinary study, focuses on the interaction of the natural environment with human-induced

Cultural Landscapes: Conservation and Preservation, Fig. 1 An archaeological agricultural mound of the "Kuk Early Agricultural Site", Papua New Guinea. (Courtesy of The Kuk archive, Australian National University)

processes through time. It is argued that all archaeology is landscape archaeology. Archaeologists use the term "archaeological landscape" to describe landscape areas that are interpreted from scientific studies such as for the World Heritage inscription of the "Petroglyphs within the Archaeological Landscape of Tamgaly," Kazakhstan; "Gobustan Rock Art Cultural landscape," Azerbaijan (UNESCO World Heritage List); and "Kuk Early Agricultural Site" where archaeological research established human agricultural practices dating to over 6,000 years BP (Denham et al. 2004: 853) (Fig. 1).

Precedents for the term "cultural landscape" can be found in works by German and French historians and geographers, but the geographer Carl Sauer is widely cited and given credit for introducing the term in his work "Morphology of Landscape," published in 1925, where he described cultural landscapes as "culture is the agent, the natural area is the medium, the cultural landscape is the result" (Schein 2004: 13–14). Later J. Brinckerhoff Jackson in his work "Discovering the Vernacular Landscape" (1984) claimed that all landscapes are inherently cultural, so that "cultural landscape" is a pleonasm.

Since 1992 when the United Nations, Educational, Scientific and Cultural Organization (UNESCO) adopted "cultural landscapes" for describing and valuing heritage, the term has become increasingly popular. However, despite the increasing appreciation of cultural landscapes as heritage properties, in the twenty-first century, their management and conservation remains challenging.

Definition

As the term "landscape" relates to several different disciplines such as geography, anthropology, archaeology, architecture, urban planning, and regional planning, all of which offer different views and definitions, the meaning of "landscape" can be ambiguous. However, the various disciplines hold in common the understanding that landscape is an entity based on perception. The European Landscape Convention Article 1 (2000) defines landscape as "an area as perceived by people, whose character is the result of the action and interaction of natural and/or human factors". The definition adds a human perception to the classic definition of landscape, regarding landscape as a dynamic event (Zoido 2010: 207). All landscapes thus reflect the interaction between people and the environment through time and space, and therefore it can be understood that every landscape is a cultural landscape, "because humans modify the landscapes in which they live, and because they attach names, myths and affective value to features of the territory they inhabit" (Lipe 1984: 1). The landscape, therefore, can be interpreted as a dynamic code of symbols that tells us about the culture of its past, its present, and its future that may become an outstanding heritage property to be conserved for future generations. People identify with the landscape they inhabit, and therefore, the role of landscape is fundamental in the construction and consolidation of a national or regional identity.

In the 1990s and in the twenty-first century, heritage sites shifted from a predominance of monumental architecture to include landscapes of high value to communities for their spiritual and economic sustainability. To fill gaps in global heritage, the World Heritage Convention gave status to the term "cultural landscape" by introducing cultural landscapes as a category of sites within the Convention's 1992 Operational Guidelines. In 1993, "Tongariro," New Zealand, became the first cultural landscape under the Convention to be given World Heritage protection. To provide direction for identification and management, the World Heritage Convention added to their basic definition of cultural landscapes – representing the "combined works of nature and of man" – by delineating three categories of cultural landscape in the 1999 Operational Guidelines: the "clearly defined," the "organically evolved" (relict or continuing), and the "associative" (UNESCO 1999: 9–10).

Clearly defined landscapes are those designed and created intentionally by man and are usually highly modified to incorporate style ideals or planned economic exploitation such as the "Garden Kingdom of Dessau-Wörlitz," Germany;

Cultural Landscapes: Conservation and Preservation, Fig. 2 Segment of the Subak rice terraces, Bali Province, Indonesia

"Aranjuez Cultural Landscape", Spain; and the "Royal Botanic Gardens", Kew, United Kingdom. Pastoral or agrarian landscapes that may have developed over many years would be within the "continuing evolved" category. Some of the continuing evolved landscapes that retain a traditional land use practice have little modification such as the "Orkhon Valley Cultural Landscape," Mongolia, while other rural productive landscapes may express extensive surface modification that have sustained communities for generations such as the "Rice Terraces of the Philippine Cordilleras" and "the Cultural Landscape of Bali Province: the Subak System as a Manifestation of the Tri Hita Karana Philosophy" (Fig. 2). Numerous evolved landscapes are now relict such as the "Archaeological Landscape of the First Coffee Plantations", Cuba. Cultural landscapes in the associative category are generally minimally modified natural landscapes that have been utilized traditionally for hunting and gathering or, in other cases, valued for aesthetic and spiritual importance such as "Uluru-Kata Tjuta National Park," Australia; "Sacred Sites and Pilgrimage Routes in the Kii Mountain Range," Japan; and the "Koutammakou, the land of the Batammariba," Togo. (All examples are from UNESCO World Heritage List.)

The World Heritage definition and categories for cultural landscapes identify multiple points of view for consideration that bring cultural landscape close to archaeology. Cultural landscapes contain human history. They are a living memory and witnesses of past human settlements and their cultural influences, and they are currently considered as an important category of cultural heritage that is a product of the time and place of those who have created it and continue to shape it (Ashword and Tunbridge 2000: 10).

Key Issues/Current Debates/Future Directions/Examples

A fundamental problem is that the concept of a cultural landscape is still unknown in some regions, but building up an understanding of the importance of valuing cultural landscapes is increasing. The identification and description of a cultural landscape must have the full involvement and support of the local community and their traditional knowledge, particularly for describing tangible and intangible elements. Identification of heritage values must also be conducted through multidisciplinary studies. The cultural landscape of "Kuk Early Agricultural Site" notes the involvement of the Kawelka people but also how multidisciplinary archaeological, archaeobotanical, and palaeoecological research revealed a phenomenal time depth of the

agricultural practice and ancient plant domestication (discussed in detail by Tim Denham et al. 2004).

Management plans are a necessity for the conservation of cultural landscapes. Initiatives for special landscape management, that considered a property as having a heritage value, arose in the United States. Subsequently, similar management to that of natural parks developed, but with an added sociocultural component while offering an opportunity for local development. The basic premise for management plans is that cultural landscapes have dense significance that keep and convey information, and therefore, thorough research of it is an essential initial step. Detailed descriptions (inventory) of all features that form part of the heritage landscape are required and may include structures, watercourses, trees, landform features, archaeological sites, viewscapes and landscape areas, as well as their connections and interrelationships. Intangible aspects require documenting spiritual and other associative value, access to places of special meaning, past as well as current social structures, land use activities, and the linkages of these aspects with the landscape. The associative value of "Cultural Landscape of Bali Province: the Subak System as a Manifestation of the Tri Hita Karana" demonstrates a traditional and disciplined social organization that has developed over a millennium for economic sustainable production. Importantly, it is a system of people and landscape that pays homage to spiritual life forces in a series of rituals that are an integrated component of the cultural system (UNESCO World Heritage List 2012, report 1194).

Delineating a suitable boundary for cultural landscapes, but particularly those in the evolved and associative categories, requires an understanding of societies that live or have lived in the area, determining the catchment of their economic land use as well as intangible associations and relationships of communities to the surface and subsurface features. The delineated cultural landscape must contain representation of significant land use activities, cultural life, and important symbolism. Boundaries may reflect a contiguous landscape or may need to include distant-related components to capture the full heritage importance. The heritage area of "Mount Wutai," China, consists of an extensive landscape area and a distant component area, while the "Cultural Landscape of Bali Province: the Subak System as a Manifestation of the Tri Hita Karana" has five component landscape areas.

The harmonious relationships between people and their environment must be safeguarded in a management plan, and a wide range of different sectorial policies integrating traditional knowledge of local communities are needed. Management plans must respond to the needs and interests of the people and be owned by them. Communities associated with the landscape have an ongoing role in heritage management as well as ensuring that local knowledge and skills are passed on. Every case must consider how sustainable development can be adapted to specific local conditions. The Uluru-Kata Tjuta cultural landscape is a perfect example where nature and man act according to ancient rituals and customs, to a sacred law. It is the result of centuries of traditional management through *Tjukurpa*, a social code that governs the behavior of men, animals, and places for 5,000 years. The aboriginal Anangu are deeply involved in the management that includes a traditional regime of controlled fires while water sources are carefully tended, assuring the characteristic plant community. The "Richtersveld Botanical and Cultural Landscape", South Africa is owned and managed communally by the Nama people, a seminomadic population that assure the conservation of the seasonal patterns that may have persisted for as much as two millennia in southern Africa.

Defining acceptable changes with a predicted optimum outcome is a consideration for cultural landscape management planning. Conservation must also take account of distant factors essential to the health of the landscape, such as damming an upstream river that may alter the water table or water quality of the landscape. Management for natural disasters is required along with measures to moderate possible threats that can damage heritage integrity such as excessive tourism and looting of heritage objects in open landscape areas. There are numerous other issues with

regard to the conservation and protection of cultural landscapes, and the publication *Managing Cultural Landscapes* discusses many of the challenges under the chapter "Prospects and challenges for cultural landscape management" (Taylor and Lennon 2012: 345–364).

Protecting the cultural landscape can be resolved through legal measures relating to cultural heritage, such as natural heritage, town planning, territorial planning, protection of agricultural land, and protection of archaeological sites and objects. It is necessary to coordinate the various existing laws, the different administrations involved at all territorial levels, as well as the traditional governance of customary laws. Management plans require statutory ratification, while legal mandatory requirements for social value and archaeological research should be built into major development works. Other essential aspects are public awareness and specific training for the management of cultural landscapes.

Not all countries have legal measures in place. Legal framework varies in a very wide range, but not always national legislation includes specific and strong traditional land management practices that must be coupled with adequate funding to support conservation of cultural landscapes. As an example, a legal framework for conservation protection measures of the "Kuk Early Agricultural Site" is the *Organic Law on Provincial and Local Level Governments (1995/1997)* used by local communities and provincial governments to declare and protect significant traditional sites independent of the central government (http://whc.unesco.org/uploads/nominations/887.pdf).

In 2007, the UNESCO World Heritage Centre published *World Heritage – Challenges for the Millennium* in which a chapter on cultural landscapes (Labadi 2007: 112–117) highlighted the concern over the imbalance of the listed cultural landscapes with over 70% located in Europe and which reflected only positive interpretations of human practices in cultural landscapes. The listing of "Bikini Atoll," in the Marshall Islands, demonstrates a change in cultural landscape perception. The Bikini Atoll landscape exemplifies the violence exerted on the natural, geophysical, and living elements by nuclear weapons demonstrated by the damaged ecosystems and the terrestrial, marine, and underwater landscapes of Bikini Atoll. The nuclear tests changed the history of Bikini Atoll and the Marshall Islands, through the displacement of inhabitants and the human irradiation and contamination (World Heritage List 2010: report 1339).

Although the World Heritage List has inscribed many cultural landscapes, there are important unlisted cultural landscapes throughout the world that embody values of national or local importance, need protection, and are subject to similar issues as faced by World Heritage cultural landscapes. Such landscapes, often regarded as "ordinary", are vulnerable to damaging development. In many countries, the resources of cultural landscapes are being exploited to produce green energy to counter the effects of climate change and energy demands. Farming landscapes are being invaded by an ever-increasing number of industrial installations such as wind farms, electricity stanchions, natural gas infrastructure, and production of biofuels. Undertaking national or regional thematic research and preparing inventories of cultural landscapes including their subsurface layers are desirable to safeguard landscapes of heritage importance. Building a balanced heritage list of cultural landscapes globally and nationally is an ongoing challenge particularly, as many countries do not have the resources for such research.

Cross-References

- ▶ Intangible Cultural Heritage
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)

References

Ashword, G.J., and J.E. Tunbridge. 2000. *The tourist-historic city. Retrospect and prospect of managing the heritage city*. Oxford: Elsevier Science.

Birnbaun, C. 1994. Protecting cultural landscapes. Planning, treatment and management of historic landscapes. National Park Service, U.S Department of Interior, 36 Preservation Briefs. Available at: http://www.nps.gov/hps/tps/briefs/brief36.htm (accessed 12 August 2012).

Denham, T., S. Haberle, and C. Lentfer. 2004. New evidence and revised interpretations of early agriculture in Highland New Guinea. *Antiquity* 78: 839–857.

Labadi, S., ed. 2007. *World heritage challenges for the millennium*. Paris: UNESCO.

Lipe, W.D. 1984. Value and meaning in cultural resources. In *Approaches to the archaeological heritage*, ed. H. Cleere, 1–11. Cambridge: Cambridge University Press.

Schein, R. 2004. Cultural traditions. In *A companion to cultural geography*, ed. J. Duncan, N. Johnson, and R. Schein, 13–14. Oxford: Blackwell Publishing.

Taylor, K., and J. Lennon. 2012. Prospects and challenges for cultural landscape management. In *Managing cultural landscapes*, ed. K. Taylor and J. Lennon, 345–364. London/New York: Routledge.

UNESCO. 1999. Operational guidelines for the implementation of the World Heritage Convention, WHC-99/2 March, January, Paris.

UNESCO. 2012. World Heritage List. Available at http://whc.unesco.org/en/list/ (accessed 22 August 2012). http:reference number and site names: 887 Kuk Early Agricultural Site; 739 Schokland and Surroundings; 1107 Incense Route – Desert Cities in the Negev; 1076 Gobustan Rock Art Cultural Landscape; 722 Rice Terraces of the Philippine Cordilleras; 534 Garden Kingdom of Dessau-Wörlitz; 763 Lednice-Valtice Cultural Landscape; 1044 Aranjuez Cultural Landscape; 1084 Royal Botanic Gardens, Kew; 1246 Iwami Ginzan Silver Mine and its Cultural Landscape; 1081 Orkhon Valley Cultural Landscape; 447 Uluru-Kata Tjuta; 1140 Koutammakou, the Land of the Batammariba, Togo; 1279 Mount Wutai; 1145 Petroglyphs within the Archaeological Landscape of Tamgaly; 1194 Cultural Landscape of Bali Province: the *Subak* System as a Manifestation of the *Tri Hita Karana* Philosophy; 1139 Bikini Atoll, Marshall Islands; 1265 Richtersveld Botanical and Cultural Landscape.

Zoido, F. 2010. Paisajes y conjuntos arqueológicos. In *Paisaje y patrimonio*, ed. J. Maderuelo, 199–240. Madrid: Abada Ediciones.

Further Reading

Binford, L.R. 1980. Willow smoke and dogs' tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45: 4–20.

Council of Europe. 2000. European Landscape Convention, explanatory report. Available at: http://conventions.coe.int/Treaty/en/Treaties/Html/176.htm (accessed 23 August 2012).

Fowler, P. 1972. *Archaeology and the landscape*. London: John Baker.

Jackson, J.B. 1984. *Discovering the vernacular landscape*. New Haven: Yale University Press.

Schama, S. 1995. *Landscape and memory*. New York: Alfred A. Knopf.

Taylor, K., and J. Lennon, eds. 2012. *Managing cultural landscapes*. London/New York: Routledge.

UNESCO. 2010. *Cultural landscapes*. World Heritage series 26. Available at http://whc.unesco.org/en/series

UNESCO. 2003a. *World heritage cultural landscapes 1992–2002*. World Heritage series 6. Available at http://whc.unesco.org/en/series

UNESCO. 2003b. *Cultural landscapes: The challenges of conservation*. World Heritage series 7. Available at http://whc.unesco.org/en/series

Von Droste, B., S. Titchen, and M. Rössler, eds. 1999. *Linking nature and culture: Report of the global strategy natural and cultural heritage expert meeting*. Paris: World Heritage Center. Ministry for Education, Culture and Science of the Netherlands.

Yamin, R., and K. Bescherer. 1996. *Landscape archaeology, reading and interpreting the American historical landscape*. Knoxville: The University of Tennessee Press.

C

Cultural Property, Trade, and Trafficking: Introduction

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Introduction

Over the course of the past 50 years, the appetite for cultural property by individuals wanting to own a piece of the past has become voracious, resulting in damage to and destruction of countless archaeological sites, monuments, and communities. While some of the objects currently on the market have undoubtedly been in circulation before legislation was enacted to protect heritage material, the routine absence of substantial collecting histories has made it easy for recently looted artifacts to contaminate the licit trade. Consequently, the illicitly acquired material has become so intermingled with the licit, as to be indistinguishable from it.

Definition

Despite the fact that cultural heritage has become accepted as terminology that more adequately reflects the values placed on manifestations of the past, in the context of trade, cultural property better reflects the commodification that tangible remains undergo when treated as merchandise. Definitions of cultural property are provided in Article 1 of the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict and Article 1 of the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property.

Dishonest trading is implied more often than not in the use of the term trafficking.

Key Issues/Current Debates/Future Directions/Examples

It is self-evident that dealers exist to satisfy demand. Demand is hyped by advertising and skilful marketing of wares (Fig. 1). Transparency about sources of stock is largely absent. However, given the demonstrable destruction of sites and monuments, such secrecy leads to suspicion that objects on the market without provenience and verifiable collecting histories are likely to be the product of looting.

The ongoing trade in the cultural heritage of indigenous peoples, who have suffered egregious losses of their material heritage historically, damages communities and violates their cultural rights.

Many art-rich countries have national patrimony laws vesting ownership of their cultural heritage in the state. Its misappropriation is thus theft. Arguments by dealers and collectors that these states should patrol sites and control their borders more effectively are used to justify purchasing such artifacts. In addition, claims are made that without a market, metal artifacts would be melted down for bullion, and chance finds would be destroyed to avoid complications that might arise if they were to be reported to the authorities. The excellence of curation by wealthy individuals and museums is contrasted with neglect by the originating state. The corruption of officials is also cited as a reason for disregarding national laws. Archaeologists are

Cultural Property, Trade, and Trafficking: Introduction, Fig. 1 Compilation of marketed artifacts from areas in the Middle East that have been extensively looted. (Courtesy of Stuart Laidlaw)

variously decried as a self-protecting, self-seeking group more destructive than looters in failing to publish the results of their excavations. The laws themselves are criticized as retentionist, nationalistic instruments that run counter to the universal value of the cultural property for all humankind. The fact that the legislation is tied to the borders of modern nation-states is also used to question the entitlement of their current populations to the remains of the past.

Heritage professionals have challenged these arguments as imperialistic, fostering an unwillingness to acknowledge the academic and social impact of the destruction of context. Without context, the ultimate goal of scientific excavation, any potential to interpret the past is grossly diminished as associated materials, structures, environments, and so forth are sacrificed in recovering the saleable object. Scientific excavation entails documentation of the process through field records including plans, sections, site notebooks, and photographs. Summaries of excavation seasons often appear promptly, and significant finds are often exhibited shortly after discovery prior to the final publication.

Political and economic instability coupled with conflict makes for extreme vulnerability of cultural property generally with devastating consequences. This has been evident in the Sumerian city sites of southern Iraq, in the Bactrian areas of Afghanistan and Pakistan, in Syria, and in many eastern European countries such as Romania and Bulgaria, to cite but a few examples (Fig. 2).

The advocates for the trade and collectors stand in stark opposition to advocates for archaeology. Evidence that connects an individual object to a hole in the ground is usually unobtainable. This makes detection of illicitly traded material and prosecution for trafficking very unlikely. It is in the interests of the illicit trade to obscure the origins of an artifact, and this laundering is facilitated by rapid turnover preferably across national borders multiple times, a process facilitated by the Internet. This lack of information also facilitates contamination of the market with forgeries.

Until recently, concern expressed by archaeologists and heritage professionals that dealers and collectors were fuelling the destruction of archaeological sites was rebutted as anecdotal accusation without foundation.

Scholars such as Ricardo Elia (Apulian red-figure vases, 2001), Vinnie Nørstok (Greek vases, 2002), and David Gill and Christopher Chippindale (e.g., collections and exhibitions of Classical artifacts, 2000) among others have conducted research in response.

Cultural Property, Trade, and Trafficking: Introduction, Fig. 2 Aerial view of the Sumerian city-state of Isin, southern Iraq, devastated by looting, January 2004. (Courtesy of John Russell)

Of wider effect has been the exposure of a trafficking ring by the Carabinieri Tutela Patrimoniale Culturale (Watson and Todeschini 2006). Their investigation resulted in the recovery of hard evidence that has resulted in the recovery by Italy and Greece of large numbers of extremely rare and valuable artifacts from museums such as the Metropolitan Museum of Art in New York and the J. Paul Getty Museum in Malibu, California (Felch and Frammolino 2011). Here the sequence of transactions from looting an object out of the ground to its acquisition and display in illustrious establishments has been clearly and indisputably demonstrated.

Nevertheless, because of the clandestine nature of the illicit trade, it has been a difficult area to research, resulting in insufficient data being available to pronounce definitively on the scale and value of the material being exchanged. In recognition of this, the European Research Council has awarded a very substantial grant for a team of investigators from the Scottish Centre for Crime and Justice Research, University of Glasgow, to research in this area with the aim of developing strategies to enhance the protection of cultural heritage (http://www.gla.ac.uk/research/researchfeatures/headline_219877_en.html).

ICOM, the International Council of Museums, has also announced its intention to create a new entity called the International Observatory on Illicit Traffic in Cultural Goods, pending approval of funding from the European Commission (http://worldnews.nbcnews.com/_news/2012/11/14/14944606-new-intelligence-body-set-to-fight-illicit-trade-in-worlds-priceless-treasures?lite).

Cross-References

- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Heritage Ethics, Cultural Base of
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions
- ▶ Vandalism and Looting (Ethics)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Chippindale, C., and D.W.J. Gill. 2000. Material consequences of contemporary classical collecting. *American Journal of Archaeology* 104: 463–511.

Elia, R.J. 2001. Analysis of the looting, selling and collecting of Apulian red-figure vases: a quantitative approach. In *Trade in illicit antiquities: The destruction of the world's archaeological heritage*, ed. N. Brodie, J. Doole, and C. Renfrew. Cambridge: McDonald Institute for Archaeological Research.

Felch, J., and R. Frammolino. 2011. *Chasing Aphrodite: The hunt for looted antiquities at the world's richest museum*. Boston: Houghton Mifflin Harcourt.

Nørstok, V. 2002. Greek vases for sale: Some statistical evidence. In *Illicit antiquities: The theft of culture and the extinction of archaeology*, ed. N.J. Brodie and K.W. Tubb. London: Routledge.

Watson, P., and C. Todeschini. 2006. *The Medici conspiracy: The illicit journey of looted antiquities from Italy's tomb raiders to the world's greatest museums*. New York: Public Affairs.

Further Reading

Brodie, N., J. Doole, and P. Watson, eds. 2000. *Stealing history: The illicit trade in cultural material*. Cambridge: McDonald Institute for Archaeological Research.

Brodie, N., J. Doole, and C. Renfrew, eds. 2001. *Trade in illicit antiquities: The destruction of the world's archaeological heritage*. Cambridge: McDonald Institute for Archaeological Research.

Lidington, H. 2002. The role of the internet in removing 'shackles of the saleroom': Anytime, anyplace, anything, anywhere. *Public Archaeology* 2 (2): 67–84.

Mackenzie, S. 2005. *Going, going, gone: Regulating the market in illicit antiquities*. Leicester: Institute of Art and Law.

Mackenzie, S., and P. Green. 2008. Performative regulation: A case study in how powerful people avoid criminal labels. *British Journal of Criminology* 48 (2): 138–153.

Merryman, J.H. 2000. *Thinking about the Elgin Marbles: Critical essays on cultural property, art and law*. The Hague/London/Boston: Kluwer Law International.

Merryman, J.H., A.E. Elsen, and S.K. Urice. 2007. *Law, ethics and the visual arts*. 5th ed. Kluwer Law International: Alphen aan den Rijn.

Messenger, P., ed. 1999. *The ethics of collecting cultural property*. Albuquerque: University of New Mexico Press.

Prott, L.V. 2009. *Witnesses to history: A compendium of documents and writings on the return of cultural objects*. Paris: UNESCO.

Tubb, K.W. 2012. Extreme or commonplace: The collecting of unprovenanced antiquities. In *Extreme collecting: Challenging practices for 21st century museums*, ed. G. Were and J.C.H. King. New York/Oxford: Berghahn Books.

Tubb, K.W., and N.J. Brodie. 2001. From museum to mantelpiece: The antiquities trade in the United Kingdom. In *Destruction and conservation of cultural property*, ed. R.L. Layton, P.G. Stone, and J. Thomas, 102–116. London: Routledge.

Ulph, J., and I. Smith. 2012. *The illicit trade in art and antiquities: International recovery and criminal and civil liability*. Oxford: Hart Publishing.

Culture in Archaeology

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Introduction

With this entry I want to present some general ideas about the meaning of culture and how it has been used in the field of archaeology. As this tool of analysis has undergone changes throughout the history of the discipline, this entry provides a commentary on such changes and briefly introduces what constitutes the current debate regarding archaeological research objects.

Definition

It was with Emile Durkheim's work *Rules of the Sociological Method* ([1895]1994) that the systematization of the tools of analysis that enabled the investigation of society began. It is well known that within such systematization, Durkheim coined the term "social fact" to refer to the series of elements that laid the foundation of the subjects' behavior and that were exterior to the individual. The social fact had an independent existence from the subject, and thus, it was possible to investigate it scientifically or in other words sociologically. Durkheim suggested a methodological principle which would mark social and cultural research. In order to appreciate a social fact, Durkheim emphasized that it was sufficient to examine the force such facts would typically manifest when certain individuals did not respect a preestablished rule or agreement. Durkheim also argued that the study of the social facts was not related to the study of individual trajectories, a field kept for psychology; in this field, it was indeed legitimate to investigate why subjects refused to follow preliminary agreements. This individual refusal, Durkheim believed, did not detract from the fact of an agreement taken by the group as a larger whole and that this occurrence justified sociological inquiry with methods taken from the natural sciences.

The concept of shared agreements that are independent of individual subjectivity was the concept that enabled the emergence of the field of investigation in non-modern societies. This is called anthropology. In the first anthropological systematizations, such as those of British anthropologist A.R. Radcliffe-Brown (1986?), the object of anthropological investigation was defined as the relationship between subjects that does not vary even when they are absent. In Radcliffe-Brown's aforementioned work, a series of systematizations of kinship relations on a global level stand out, which proved the notion that the blood and non-blood relationships among subjects formed an organized framework independently from people. Radcliffe-Brown called this phenomena social structure. In a further account, social structure exteriority, according to Radcliffe-Brown, enabled anthropology to be a science which would not be distinguished from physics or chemistry as its object of inquiry was not limited to subjective caprice. In this sense, Radcliffe-Brown established a methodological difference between anthropology and history, in which the first was charged with identifying recurrent phenomenon that, independently of the subjects, regulated social life; the second was charged with recording specific trajectories related to literature and biography.

In the American tradition, the object of anthropological investigation was not, in fact, social structure, although some starting points such as the extrasomatic nature of culture (White 1959) were shared. It should be noted that it is in the use of the notions of culture in American anthropology where one of the most important definitions of culture comes from. It was in the 1960s that Lewis Binford published an article (Binford 1962) in which it is pointed out that archaeology is anthropology. In this text, which became mythical within the discipline's history, Binford turned to Neo-Evolutionary proposals (White 1959) pointing out that culture is an extrasomatic complex in which there are symmetric relationships between political and economic systems. That is, to a determined economic system, there is, in turn, a determined political system. However, the most interesting point in Binford's proposal was his suggestion that it was possible to think in archaeological markers of economic and even political systems; thus, it was possible to inquire about the sequences of the social change. It should be mentioned that from that perspective, social change was understood as a way to make political and economic systems complex. The approach holding that culture was an extrasomatic means of adaptation in constant evolution was called processualism.

Besides the currents which focus on the way economic systems determine political relationships, not only in archaeology but also in anthropology, there are other strands favoring subjects' active roles in social and cultural change process. Culture, from this perspective, more than being just a tool, is a kind of script, where subjects can build their histories in accordance with their individual trajectories. This tradition that considers culture as a text is more related to hermeneutics (Hodder and Hutson 2003) and privileges the closeness of archaeology to history (Hodder 1987).

In terms of definitions, it may be possible to distinguish two significant conceptualizations of culture in archaeology: one that considers culture as an extrasomatic means of adaptation and another that considers it as a text that can be used to address the process of social change (Hodder 1989). The first could summarize what is considered processualism and the other what is referred to as post-processualism (Hodder 1985).

Besides metropolitan definitions of culture, in recent years, there has been an emerging movement of non-central peripheral theory that has stressed how the traditional definitions of culture, especially those of the British and American academy, have overemphasized stability while ignoring tension and conflicts, especially those that are emerging and have emerged from colonization (Trouillot 1992). Besides the terms and methodological principles for identifying culture already mentioned, there were others that considered culture as a mechanism of political answer before colonization processes (Leone 1995). As it is stated by the hermeneutic approach, this perspective suggests moving forward from an apparent local autonomy, focusing on the effects that the colonial politics produced on local communities. These definitions of culture have interesting names such as the notion of "colonial wound" made popular by Walter Mignolo's work (Mignolo 2005). As suggested by this notion, social investigation cannot ignore the fact that there are effects produced by the attempt to erase local communities on the pretext that those communities were obstacles to development. It has to be mentioned that in these inquiries what it is studied is not the other's culture but the hegemonic processes exerted on certain communities with the excuse of civilization or development.

Current Debates

At the end of the nineteenth century, as can be appreciated in Durkheim's work, there was a concern to demarcate a discipline which would address societal issues, understanding "society" as the set of subjects inhabiting a state (Anderson 1993). The purpose was to study the complexities of a social organization that, as the state, was thought of as a natural formation, inherent to civilization's developmental stages. What could not be perceived in the nineteenth century was that the state had been a construct that had enabled the development of all components of a commercially based, manufactured, and capitalist society (Patterson 2011).

As Renato Rosaldo (1991) suggested some years ago, this view which considers culture as

an agreed-upon system of ideas that exist independently of the subject, as Durkheim's vision suggests, had the same definition of the state that Thomas Hobbes had proposed in 1651. To Hobbes, it was necessary that society would follow the path of progress, and in order for that to happen, he thought that there had to be a secular God, as a Leviathan, that brought together a series of agreements which, in turn, would enable the flow of all processes and mechanisms of a society which was, at that moment, beginning to globalize capitalism. Hobbes supposed that a society without a state, that is, an institution in charge of enforcing the series of agreements intended to safeguard individual autonomy, was in a "state of nature," which was worse since it was not possible that any institution would guarantee any kind of right. With this vision, Hobbes described a dichotomy which had been being woven throughout several centuries when nature was thought to be at one side and culture on another. Hence, Hobbes established an idea which is almost natural today, that society needs the state to go out from nature that is a place reserved only to savages (de la Cadena 2010).

From the moment the notion of culture emerged as a subsidiary concept stemming from the broader ideologies legitimating modernity (as the only way of possible social and cultural organization), such a notion of culture has been falling into disuse because when it is staged, as a category of analysis, it naturalizes the state. Culture is not necessarily a way of adapting to an environment where the political conflict harassing most of the tribal nations is absent. Neither is it a script that is designed and redesigned in a political vacuum. In current debates, it is more important to consider culture as the device that, for example, enables, locally, the detection of global practices (Gibson-Graham 1996), the resistance of social insertion, or the denunciation of collective rights violations. In the case of Latin America, archaeology, hand in hand with ethnic social movements, has given a way to question how the state and church banned and made local practices invisible (Gnecco and Hernández 2008). In this sense, archaeology has been a tool, among multiple tools, to the epistemological decolonization process (Haber et al. 2010).

Future Directions

Nowadays, there is a movement within social sciences that disposes of Durkheim's inherited view regarding what should be the object of investigation. For this reason, there is an increasing tendency to critique and dispose of the view of culture as a normative device which imposes itself on subjects. As Bruno Latour suggests (Latour 2008), nowadays, it is not about investigating social phenomena, but investigating how the social is a product of a series of associations taking place between human and nonhuman subjects. This discussion regarding the participation of nonhumans in the conformation of the social has returned the view to phenomena such as in animism, which were gradually ignored in anthropological investigation (Haber 2009).

Considering the nonhuman aspects of this discussion, it is possible to include the landscape. There exists an increasing tendency to understand the landscape as a subject that participates in the human symbolic constructions. This approach, known as the "phenomenological view," has interesting connection with another tendency exploring how, in social analysis, humans not only generate representations but also build a world to inhabit (Ingold 2000). With this approach, the Western Cartesian idea "I think, therefore I am" has even been questioned, with the surrounding world increasingly construed within the terms of "inhabiting." Considering landscape and nonhuman actors, the sentence "I think, therefore I am" could be changed into "I inhabit, therefore I am." As can be noted in this reflection, it is more productive not to consider thinking as something completely abstract, but as something that requires being in a specific place in a series of concrete relationships with human and nonhuman actors. Undoubtedly, this is the direction in which the theoretical discussion will be orientated in archaeology in the following decades.

As with the previous concepts, given the increasing generation of local autonomies, especially in communities subordinated in the past, the notions of culture used in archaeology will have to take into account the decolonization project. This

is happening around different parts of the world (Gnecco and Hernández 2008). Due to this tendency, it is most likely that archaeology will take alternate routes that will carry it away from being a science that only studies past behavior.

Cross-References

- ▶ Binford, Lewis R. (Theory)
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Second Modernity and the Second Phase of European Colonialism

References

Anderson, B. 1993. *Comunidades imaginadas. Reflexiones sobre el origen y la difusión del nacionalismo*. México: Fondo de Cultura Económica.

Binford, L. 1962. Archaeology as anthropology. *American Antiquity* 28 (2): 217–225.

de la Cadena, M. 2010. Indigenous cosmopolitics in the Andes: Conceptual reflections beyond "politics". *Cultural Anthropology* 25 (2): 334–370.

Durkheim, E. 1994. *Las reglas del método sociológico y otros escritos sobre filosofía de las ciencias sociales*. Barcelona: Altaya.

Gibson-Graham, J.K. 1996. *The end of capitalism (as we knew it): A feminist critique of political economy.* Oxford: Blackwell.

Gnecco, C., and C. Hernández. 2008. History and its discontents. Stones statues, Natives histories, and archaeologists. *Current Anthropology* 49 (3): 439–466.

Haber, A. 2009. Animism, relatedness, life: Post-Western perspectives. *Cambridge Archaeological Journal* 19 (3): 418–430.

Haber, A., L. Roda, E. Mamaní, and W. Londoño. 2010. Part of the conversation. Archaeology and locality. In *Bridging the divide: Indigenous communities and archaeology into the 21st century*, One world archaeology series, ed. H. Allen and C. Phillips. Walnut Creek: Left Coast Press.

Hodder, I. 1985. Post-processual archaeology. In *Advances in archaeological method and theory, volume 8*, ed. M.B. Schiffer, 1–26. Orlando: Academic.

Hodder, I. 1987. The contribution of the long term. In *Archaeology as long-term history*, ed. I. Hodder, 1–8. Cambridge: Cambridge University Press.

Hodder, I. 1989. Post-modernism, post-structuralism and post-processual archaeology. In *The meanings of things. Material culture and symbolic expression*, ed. I. Hodder, 64–78. London: Harper Collins Academic.

Hodder, I., and S. Hutson. 2003. *Reading the past. Current approaches to interpretation in archaeology.* Cambridge: Cambridge University Press.

Ingold, T. 2000. *The perception of the environment*. London/New York: Routledge.

Latour, B. 2008. *Reemsablando lo social: una introducción a la teoría del actor-red*. Buenos Aires: Manantial.

Leone, M. 1995. A historical archaeology of capitalism. *American Anthropologist* 97 (2): 251–268.

Mignolo, W. 2005. *La idea de América Latina. La herida colonial y la opción decolonial*. Barcelona: Gedisa.

Patterson, T. 2011. Trade, merchant capital, industrial capital, and blocked capitalist development in early state economies. *Jangwa Pana* 10: 96–114.

Rosaldo, R. 1991. *Cultura y verdad. Nueva propuesta de anÃlisis social*. México: Editorial Grijalbo.

Trouillot, M.-R. 1992. The Caribbean region: An oper frontier in anthropological theory. *Annual Review of Anthropology* 21: 19–42.

White, L. 1959. *Science of culture*. New York: Grove Press.

Further Reading

Gnecco, C., and P. Ayala, eds. 2011. *Indigenous peoples and archaeology in Latin America*. Walnut Creek: Left Coast Press.

McGuire, R. 2008. *Archaeology as political action*. Los Angeles: University of California Press.

Phillips, C., and H. Allen, eds. 2010. *Bridging the divide. Indigenous communities and archaeology in 21st century.* Walnut Creek: Left Coast Press.

Shanks, M. 1992. *Experiencing the past. On the character of archaeology.* London: Routledge.

Shanks, M., and C. Tilley. 1987. *Re-constructing archaeology. Theory and practice*. Cambridge: Cambridge University Press.

Tilley, C., ed. 1990. *Reading material culture. Structuralism, hermeneutics and post-structuralism*. Oxford/Cambridge: Basil Blackwell.

Tilley, C., ed. 1991. *Material culture and text. The art of ambiguity.* London: Routledge.

Watkins, J. 2011. Indigenous archaeology as complement to, not separate from, scientific archaeology. *Jangwa Pana* 10: 46–60.

Cuneiform and Cuneiform Artifacts

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Introduction

Cuneiform is a writing system of the ancient Near East expressed by impressing signs into wet clay tablets, of which approximately 600,000 are

known. It could also be inscribed or stamped on to other types of media: seals made of precious stones, monumental stones, bricks, clay prisms, and wall reliefs in monumental architecture. Objects inscribed with cuneiform records are studied as texts (i.e., for philological, linguistic, or historical information), but can also be studied as archaeological artifacts. Unfortunately most tablets were not found in situ but acquired through illicit digging.

Definition

Cuneiform refers to a writing system used to express a variety of ancient Near Eastern languages. The word means "wedge shaped" and refers to signs including pictographs, syllables, and semantic indicators. Use of the writing system in the Near East spanned more than three millennia, with the invention occurring in the last centuries of the fourth millennium BCE in southern Mesopotamia and the last attestation dating to the first century CE. Over this span, scribes adapted the writing system for different languages, administrative needs, or local traditions. The earliest cuneiform signs are curvilinear and pictographic, but signs gradually became more abstract. The earliest versions of cuneiform pictograms conveyed little phonological or grammatical information.

The writing system was expanded and adapted over millennia to accommodate Sumerian, Akkadian (including Babylonian and Assyrian dialects), Elamite, Hittite, Luwian, Hurrian, and a variety of other dialects such as Eblaite and West Peripheral Akkadian. Bilingual texts are also written using cuneiform, and these have aided in the decipherment of many of these dead languages. Also, cuneiform was used to express languages after they were no longer spoken, preserving dead languages and archaic scribal conventions for archival or liturgical conventions. Sumerian is the prime example of this.

The expansion of cuneiform also corresponded to developments in how writing was used in the society and government. The earliest cuneiform records from the city of Uruk in southern Mesopotamia indicate the system was developed as a byproduct of urban economy and administration; the earliest texts keep accounts and record economic transactions. This contrasts with ancient Egypt or China, where writing was invented to serve more explicitly ideological and religious purposes. Even though the majority of cuneiform tablets from the ensuing millennia are also concerned with economic and administrative information, the uses of writing expanded to other genres: literature, letters, law, magic and medicine, religious works such as hymns, monumental and royal inscriptions for kings and gods, and even school texts pertaining to the study of cuneiform and cuneiform textual traditions (Van De Mieroop 1999). Because the media of cuneiform is baked clay or stone, many inscribed objects survived political upheavals even if destruction occurred as well. Scribes throughout ancient Near Eastern history could actively engage in the compilation and study of older written traditions and works.

Key Issues

Since the first decipherments of cuneiform in the mid-nineteenth century by George Grotefend and Henry Rawlinson, much scholarly energy has been devoted to philology and reading inscribed objects as texts, but scholars have also recognized the value of studying these objects as artifacts with a context, provenience, and social and material life. The materiality of cuneiform documents receives increasing treatment (Delnero and Lauinger 2015). Technology-aided initiatives now enable study of both aspects of cuneiform records.

Events in both modern and ancient history complicated efforts to determine the context and lives of cuneiform records, particularly tablets, seals, and seal impressions, and objects inscribed to serve as building dedications. It is understood that most tablets from the Near East were at some time organized either in state or "public" archives (within temple or palace institutions) or private archives (in households of entrepreneurs, local leaders, or families with important stakes in urban political and economic life). At the time of recovery, tablets may have been located near an original archival context, or they may have been

discarded and separated into a secondary context as trash or as the result of historical circumstances such as a city destruction or regime change. Construction and renovation projects, integral to the performance of Near Eastern kingship, also disrupted temple and palace archives, displacing inscribed objects of earlier generations.

In more recent history, information about archaeological context was lost during excavation and looting and the consequences of two World Wars interrupting excavations and the transport of finds. Many of the recovered cuneiform artifacts are housed in European and North American museums and university collections. Of the catalogued cuneiform documents in these collections, tablets were recovered by excavations during the nineteenth and early twentieth centuries or purchased in bulk from looters. During this time, texts were often viewed as non-archaeological material and removed without attention to context or record of find spot. The era of Western imperialism following the collapse of the Ottoman Empire and World War I witnessed more formal excavations and expeditions under the auspices of Western universities and societies and the introduction of new methods of expertise. However, sloppy extraction and sale of tablets and inscribed objects continued. After the US-led invasion of Iraq in 2003, a new phase of looting and illegal distribution of cuneiform texts resulted in the proliferation of more documents, many finding their way into Western collections. Questions about the nature and legality of acquisition remain a source of intense controversy among scholars and government officials (Goode 2005).

Regardless of individual positions on the ethical debates about acquisitions, the complexities of tablet proveniences and archaeological contexts have prompted philologists, historians, and archaeologists of the Near East to develop innovative methods for reconstructing lost information. Because the cuneiform writing system evolved over time and entails numerous local traditions, philologists have been able to determine provenience using paleography and clues provided in date formulae, information in colophons, or other overt or implicit indicators about filing systems or purpose (Reade 1986). To understand the probable find spots of tablets excavated during the nineteenth and early twentieth centuries, archaeologists analyzed excavation reports, continually using new technologies such as GIS or digital reconstructions of buildings. Some archive contents have been reassembled without even knowing the location of the original archive (the Garshana and Irisagrig archives are two examples from the late third millennium BCE).

To postulate the original archival context of a tablet, scholars have also developed the concept of "artificial archives" of tablets using clues provided by these methods. Artificial archives may consist of tablets hypothetically comprising of one original archive that was dispersed in later ancient or modern historical circumstances, such as looting or excavations in the nineteenth century. Some methods of reconstructing archives also include integrating other types of inscribed items or bureaucracy technologies, such as seal impressions or seals that bear the names of officials cited in economic and administrative transactions.

Combined, these methods not only shed new light on individual tablets and how they were used but also on the general purpose of written records and record keeping in Near Eastern societies.

In the last two decades, a number of digital archives emerged to compile cuneiform artifacts, providing not only transcriptions of cuneiform texts but also high-quality images of the objects and databases of information pertaining to provenience and history of recovery. These aid in data mining and prosopography while accelerating the pace of published editions of texts. Additionally, digital archives include means for visualizing the artifacts, such as 3-D image capture. Cuneiform signs are lemmatized for searchability (Cohen et al. 2004). Examples of these databases are the Cuneiform Digital Library Initiative (CDLI), the Database of Neo-Sumerian Texts (BDTNS), and ARCHIBAB, a corpus of Old Babylonian texts, among others. The Open Richly Annotated Cuneiform Corpus (ORACC) assembles cuneiform sources and has numerous projects organized by topic. The multi-institutional collaboration of databases virtually reunites the cuneiform record into a globally accessible corpus of evidence from which scholars can reconstruct archives. These technologies also allow researchers to study individual objects and their inscriptions, identifying

signatures that place the objects in archival, temporal, and geographic contexts.

Cross-References

- ▶ Breasted, James Henry
- ▶ Empire in the Ancient Near East, Archaeology of
- ▶ Households in the Ancient Near East, Archaeology of

References

Cohen, J., D. Duncan, D. Snyder, J. Cooper, D. Hahn, Y. Chen, B. Purnomo, and J. Graettinger. 2004. iClay: Digitizing cuneiform. In *Proceedings of the fifth international symposium on virtual reality, archaeology and cultural heritage*, ed. Y. Chrysanthou, K. Cain, N. Silberman, and F. Niccolucci, 135–143. Available at http://www.jhu.edu/digitalhammurabi/research/2004_12_vast.pdf.

Delnero, Paul, and Jacob Lauinger. 2015. *Texts and contexts: The circulation of cuneiform texts in social space*, Studies in Ancient Near Eastern Records 9. Berlin: De Gruyter.

Goode, J.F. 2005. *Negotiating for the past: Archaeology, nationalism, and diplomacy in the Middle East, 1919–1941*. Austin: University of Texas Press.

Reade, J. 1986. Archaeology and the Kuyunjik archives. In eds. K. Veenhof. Archives and libraries. Papers read at the 30th Rencontre Assyriologique Internationale, Leiden, 408 July 1983, 213–22. Istanbul: Nederlands Historisch-Archaeologisch Institutte Istanbul.

Van De Mieroop, M. 1999. *Cuneiform texts and the writing of history (approaching the ancient world 6)*. London: Routledge.

Cyber-archaeology

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State of Knowledge

Introduction

As it currently stands, *cyber-archaeology* can essentially be divided into two schools of thought. *Cyber-archaeology* was first brought into the archaeological discourse following a meeting of the Theoretical Archaeology Group in 2009 which evaluated *cyber-archaeology* and its theoretical underpinning as a tool for archaeological research, culminating in several publications on the topic (Forte 2010, 2011 and citations there within) (*Cyber-archaeology* emerged in the 1990s in communications and anthropology to investigate virtual communities and online behavior ("the systematic exploration of cyberspace") – in other words, an "archaeology" of the cyber rather than the application of cyber-tools within archaeology (Jones 1997; Escobar et al. 1994).). Growing out of *virtual archaeology* (Forte and Siliotti 1997), this *cyber-archaeology* focused primarily on simulating "a potential past" in a 3-D "cyber-environment" (Forte 2011). In other words, *cyber-archaeology* "embodies multiple interpretations [of the archaeological record] through virtual simulations, embedding real-empirical and digital-virtual data" (Forte 2014). The second approach to *cyber-archaeology* adopted a broader definition, essentially synonymous with *digital archaeology*, in using "digital" and "cyber" tools (e.g., digital photography, laser scanning, remote sensing, virtual reality, etc.) to explore and investigate the archaeological record (Jones and Levy 2018; Averett et al. 2016; Kansa et al. 2011). Today, both forms of *cyber-archaeology* coexist with Maurizio Forte (2015) at the forefront of the interpretive model focusing on simulation and Thomas E. Levy (2017) adopting *cyber-archaeology* in the more general sense. This entry will focus on *cyber-archaeology* as defined by Levy (see below) and developed in practice at the University of California, San Diego (UCSD) (see References and Further Reading for additional sources concerning *cyber-archaeology* as developed by Forte).

Levy (2013, 2015) defines *cyber-archaeology* as the integration of the latest developments in computer science, engineering, the natural sciences, and archaeology. Furthermore, he identifies four main domains or phases of *cyber-archaeology* – data capture, data analysis, data curation, and data dissemination – representing the entire *cyber-archaeology* workflow for archaeological research/fieldwork (conceptualized as a pie diagram, Fig. 1) (Levy 2013). These four

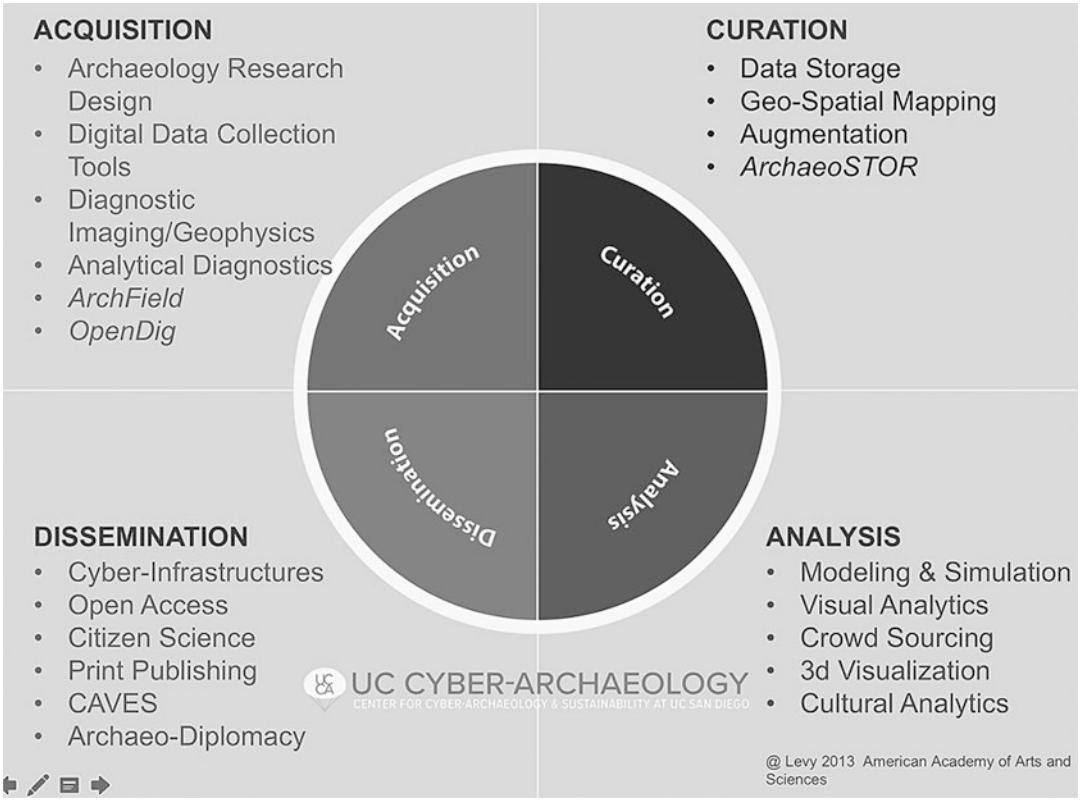

Cyber-archaeology, Fig. 1 Model representing the cyber-archaeology workflow as developed by the University of California, San Diego (after Levy 2013)

phases are completed using entirely digital tools that are relatively seamlessly integrated to create a cyber-workflow (i.e., paperless) for recording archaeological and cultural heritage data. UCSD has been dedicated to developing this approach to *cyber-archaeology* through its "Training, Research, and Education in Engineering for Cultural Heritage Diagnostics" initiative beginning in 2010 (Levy 2017) and with partnering institutions as part of the "At-Risk Cultural Heritage and the Digital Humanities" Research Catalyst Grant awarded in 2016. This entry is organized into four sections representing each of the components of the *cyber-archaeology* workflow as envisioned by Levy. In addition, each section will include a discussion of the *cyber-archaeology* tools developed by UCSD specifically for each phase. Along with references to relevant case studies throughout, the entry concludes with a brief review of a representative example of *cyber-archaeology* based on recent work by UCSD and the University of the Aegean in Greece. In doing so, this entry provides an overview of the *cyber-archaeology* workflow for an archaeologist to use a basis for implementing *cyber-archaeology* on any project or field site.

Data Capture/Acquisition

Critical to *cyber-archaeology* is a fully digital, data capture system that accounts for the difficulties of a field setting0020 (such as limited access to the Internet or even electricity) and maximizes the amount of data that is brought back to the research institution (mitigating the issues of access to archaeological sites, artifacts, and data). At UCSD, *cyber-archaeology* combines off-the-shelf technologies with custom computer programs/hardware developed specifically for

collecting archaeological/cultural heritage data in a digital format in the field (Levy et al. 2010). On an archaeological excavation, both artifacts and loci (discrete and three-dimensional excavation units or contexts) require precise recording of their geospatial location (X, Y, and Z coordinates) along with data and metadata such as number identifiers, types, classifications, descriptions, etc. (Smith and Levy 2014). *ArchField* – a custom software developed by Neil Smith for this purpose – combines real-time, 3-D recording of geospatial data with data entry forms for relevant archaeological data (Smith and Levy 2012). To do so, *ArchField* integrates digital surveying equipment (a Total Station or GPS unit) with digital data entry (a laptop computer or tablet device) to streamline recording artifact and loci locations in 3-D space (Smith and Levy 2012, 2014). The Total Station is simply connected to a laptop or tablet running *ArchField* through its serial cable; the coordinates of points collected by the Total Station are immediately captured by *ArchField* where any additional information is added by the archaeologist. Thus, *ArchField* can handle collecting the main elements of archaeological data in the field through a single digital platform. All data is stored in an Apache CouchDB (open-source software) database which is also run on the computer, allowing for offline storage – critical for most field applications (see Smith and Levy (2012) and Levy et al. (2014) for a case study of *ArchField* on excavations in Jordan).

The *cyber-archaeology* workflow also requires a digital method for recording the more detailed contextual information associated with loci (e.g., sediment descriptions, periodization, construction styles, stratigraphic relationships, etc.), in other words, digital locus sheets (Levy et al. 2012). *OpenDig*, a custom software developed by Matthew Vincent, is a mobile application for recording excavation data associated with loci (Vincent et al. 2014a; Levy et al. 2012). It was designed for iOS devices which are both affordable and portable. By using these handheld devices, digital notes can be recorded in the field during the excavation process. In this way, *OpenDig* replaces paper recording and alleviates potential issues with handwritten notes such as illegible writing or inconsistent terminology used across field directors and supervisors. Instead, *OpenDig* utilizes a series of drop-down menus with pre-set descriptions and terminology for rapid and consistent recording. These menus and the set of available descriptions/terms are customizable to the specific field project. Furthermore, *OpenDig* eliminates the need for digitization of paper documents at the end of the field day or season, a common step on excavations still using paper-based recording strategies. Similar to *ArchField*, *OpenDig* uses a CouchDB database that is backed up to a locally hosted field server. This step also allows for synchronization across devices (as each square/area supervisor will have a personal device for recording their own excavations), provides a central location where all data is stored, and enables data review and editing while in the field (Vincent et al. 2014a). Together, *OpenDig* and *ArchField* create a unified digital recording system for all the archaeological and excavation data collected in the field (see Vincent et al. (2014b) for additional discussion of the integration between *ArchField* and *OpenDig* and Levy et al. (2010, 2014) for its application on excavations in Jordan).

Along with using advanced technologies for field recording, capturing/documenting archaeological sites and excavations using 3-D methodologies is becoming a common practice on twenty-first-century excavations/surveys, and this is an integral component of *cyber-archaeology* (e.g., De Reu et al. 2013, 2014; Howland 2017; Howland et al. 2015). With reduced equipment costs and easy-to-use/affordable computer software packages for producing image-based 3-D data, the modern archaeologist can easily create 3-D models in the field using a digital camera and a laptop computer. A common method of 3-D modeling (and the primary method used at UCSD) is Structure from Motion (SfM) (Howland et al. 2014). SfM is a computational technique for producing a 3-D structure or model from a collection of 2-D images. Using overlapping digital photographs encompassing an object or area of interest, ranging from an individual artifact to an entire site, SfM is able to match similar points between images and create depth

from their different perspectives. As such, SfM can produce a 3-D model from just a collection of digital photographs. After taking the necessary photographs, models can be processed using commercially available software packages like Agisoft PhotoScan/Metashape (there are also other options available such as Bentley ContextCapture). Agisoft is widely used by archaeologists to generate 3-D models from SfM because of its intuitive interface and georeferencing functionality; along with 3-D models, Agisoft can produce georeferenced, high-resolution orthophotos (a photograph with a top-down perspective corrected for distortion to display the true ground position of features and to have a uniform scale for accurate measurements) which provide an ideal basis for GIS-based digitization and mapping of site features. As such, the 3-D models produced by SfM are a valuable dataset in their own sense (for documentation, preservation, and outreach), but they can also improve the accuracy and efficiency of site mapping (see Howland et al. (2015) for a case study).

Moreover, SfM can produce models on any scale when provided with the necessary imagery and computing power. To maximize this potential, archaeologists can employ both aerial and terrestrial photography strategies. Helium balloons and drones (UAVs) are common data capture tools used by archaeologists for photography, mapping, and 3-D model-building on the largest scales including the entire site or excavation area. A helium balloon system has proved most useful for the UCSD workflow to capture low-altitude aerial photography (LAAP) for site modeling and mapping (Howland et al. 2015). The current LAAP platform includes a Kingfisher™ Aerostat K9U helium balloon with a camera frame. Attached to the frame is a Canon EOS 50D DSLR equipped with an 18 mm lens positioned directly downward for high-resolution, vertical shots. The balloon is tethered to a reel carried by an operator who controls the direction of the balloon to fly transects over the site and the altitude which varies based on the specific context to capture overlapping photographs for SfM. Photographs are automatically taken at regular time intervals by an intervalometer controller; time between images is similarly determined based on the size of the site/area being photographed. Drones are an alternative to balloons, and they are gaining in popularity among archaeologists (Smith et al. 2014a). In particular, affordable, off-the-shelf drones built by companies such as DJI have made drones much more accessible to archaeological projects; DJI's out-of-the-box Phantom 3 Standard Quadcopter Drone can be purchased for less than $800. The drone is also easy to fly with an automated flight system and includes a video/12-megapixel camera, a gimbal to stabilize the camera, a live video feed, and a 25-minute single charge for the battery. The downside of drones is that they are delicate and have limited flying time, before the batteries need to be recharged. While balloons require expensive helium, for excavations that last longer than a few weeks, they are great for day-to-day recording, needing only occasional top-ups of helium. Thus the particular aerial platform used should be determined based on the specific project (size of site, length of project, budget, etc.). Whether using balloons or drones (or other platforms, see Howland 2017), aerial photography for 3-D modeling has become common data capture tool in *cyber-archaeology*.

A terrestrial approach to SfM is essentially identical to the aerial method described above: collecting overlapping photographs with complete coverage of a desired target intended to be modeled in 3-D. In this case, images are simply captured from the ground manually; however, rather than transects, overlapping images with complete coverage are captured by circling the entire area/artifact from varying heights if needed. Terrestrial methods are typically used to produce models of individual artifacts, loci, and excavation units/features. For excavation units, the results can also be georeferenced for digitizing top plans and GIS analysis. Using SfM for top plan generation is beneficial in removing some of the possible error in hand measuring and drawing (Olson et al. 2013). Together, a combined aerial and terrestrial SfM capture strategy creates 3-D models on various scales during the course of

excavation, providing and preserving an exceptional digital record of all field work.

In addition to SfM models, a "CAVEcam" system is also used to capture 3-D imagery of an excavation area/site (CAVE stands for Cave Automated Virtual Environment, discussed further below in the "Data Dissemination" section). The CAVEcam is a digital camera platform developed for shooting stereo photography in 360 degrees intended for visualization in a CAVE environment. To do so, it combines a GigaPan EPIC Pro Robotic Controller with a dual-camera image capture system (Ainsworth 2012). The robotic controller is a camera mount which automatically and accurately positions a camera (in this case, two cameras) to capture slightly overlapping photographs in a grid which can be stitched to create GigaPan images, panoramic photographs with over a billion pixels. The dual-camera system includes two Panasonic Lumix GF-1 cameras which provide 12.1 megapixel resolution while still being relatively small for mounting side by side in the controller (Ainsworth 2012). By bracketing two cameras next to each other, they collect two sets of images with slightly differing perspectives to provide stereoscopic vision (much like human eyes). The robotic mount is outfitted with an Ainsworth CC-1 Dual-Camera Controller to automatically capture images from both cameras simultaneously from each position, automating the entire capture process. The CAVEcam creates two 6x12 grids of photographs (one from each camera) from distinct perspectives. And these grids are individually stitched using the PTGui Pro software and displayed to create a single, high-resolution 3-D image in 360 degrees. When viewed on a 3-D visualization platform, this encompassing perspective allows the user to "look" around the photographed environment, which along with the depth created through stereoscopy can provide the realistic effect of standing at the original location. However, recording archaeological sites in 3-D, especially using multiple methodologies, along with the excavation data recorded using *ArchField* and *OpenDig*, creates massive digital datasets that require special consideration for curation, storage, and dissemination.

Data Curation and Storage

As seen above, the transition to a *cyber-archaeology* introduces new questions and potential problems for data storage, curation, and dissemination based on the size (in terms of computer memory) of produced datasets – the "data avalanche" (Levy et al. 2010). With these challenges in mind, UCSD developed software for managing archaeological data in the field and partnered with the UCSD Library for final storage and long-term curation of digital archaeological and cultural heritage data. Following the collection of field data using *ArchField,* this data is synced to a local server in a field lab providing data redundancy, and the artifact and loci information is integrated into *ArchaeoSTOR. ArchaeoSTOR* is a web-based application (also developed at UCSD by Aaron Gidding) and database designed specifically for digital storage, management, and curation of archaeological data (Gidding et al. 2013, 2014; Smith et al. 2017). As a database, *ArchaeoSTOR* allows for text-based artifact data/metadata and geographic information into digital forms which can be associated with photographs and point cloud data. Created data is stored on a local server using a CouchDB database software which allows data to be quickly retrieved, organized, and managed through *ArchaeoSTOR's* sorting and searching functions. *ArchaeoSTOR* has the capability to function as a stand-alone server as well as hosting in the home lab, making it a versatile tool for recording data in the field and data storage/analysis in the research institution. *ArchaeoSTOR* is deployed using a localized network and field server housed in an on-site lab, and users simply access the platform through personal laptops (connected to the local network). This server also hosts the *ArchField* data, providing straightforward integration between the two applications (Smith et al. 2017). Once back from the field, the collected data can be easily moved to more permanent storage (see below). All data remains accessible through the *ArchaeoSTOR* webpage for continued post-excavation management and analysis.

ArchaeoSTOR was specifically developed to facilitate the transfer of archaeological data to the university library as the final storage facility;

all data can be exported as spreadsheet file (the format required for integration into the library) with a functionality built directly into the program. The library is the ideal repository for the "data avalanche" produced by *cyber-archaeology* recording methods because it provides both long-term digital data curation/preservation and widespread data dissemination through accessible digital (web-based) and physical (publications and 3-D visualization environments) means ("Data Dissemination" is further discussed in the relevant section below). The UCSD Library has developed a curated digital storage system, the UCSD Library Digital Asset Management System (DAMS), for storing, searching, and retrieving digital files and their associated metadata. The DAMS affords researchers with a large-scale data repository for perpetual storage and conservation by library curation staff. All content within the DAMS is also replicated and geographically distributed across a preservation system, the Chronopolis digital preservation network (Yoo et al. 2017). Chronopolis currently includes hundreds of terabytes of storage and four geographically disparate nodes for data redundancy and disaster protection. Integrating archaeological data into the DAMS therefore provides multiple levels of data storage and protection.

All 3-D data, including CAVEcam imagery and SfM models, are similarly stored on the UCSD Library servers; however, this data is first organized, curated, and stored on a locally developed database called CAVEbase (McFarland et al. 2017). CAVEbase, created by Chris McFarland at UCSD in collaboration with the Center for Cyber-Archaeology and Sustainability and the Cultural Heritage Engineering Initiative, was designed to address the data management and sharing challenges associated with producing big data such as large-scale 3-D files and datasets. CAVEbase currently provides storage and visualization for images, videos, and 3-D models through a web-based platform. By accepting various 2-D and 3-D file types, CAVEbase can store both raw and processed data associated with 3-D models. Data is uploaded to CAVEbase through its custom webpage which accommodates typical data and metadata fields associated with 3-D files/models such as descriptions, locations, instruments used, level of processing, and copyright information (McFarland et al. 2017). The uploaded data is stored on a local server, and it is immediately copied to a second high-capacity server for data redundancy and protection. Data on CAVEbase is also getting integrated into the UCSD Library DAMS for long-term data storage and protection. For visualization, a subset of the 3-D data is made available via a Network File System to 3-D visualization environments for exploration and outreach (see "Data Dissemination" section).

Data Analysis

A major benefit of *cyber-archaeology* and collecting archaeological data in a digital format is that it is readily available for analysis. Data analysis within *cyber-archaeology* can take a variety of forms and emphasizes using digital data and tools to support our understandings and interpretations of the archaeological record. For example, at UCSD, data analysis includes 3-D modeling for artifact analysis and crowdsourcing of satellite imagery (Levy et al. 2012, 2014; Smith et al. 2014b; Savage et al. 2017). As described above, terrestrial SfM techniques (and also 3-D scanners such as the NextEngine Scanner) can be used to produce 3-D models at the artifact scale in the field or lab. The UCSD *cyber-archaeology* workflow has found this to be particularly useful for pottery analysis (Levy et al. 2014; Smith et al. 2014b). Using a 3-D scanner or SfM to model ceramic sherds can expedite and increase the accuracy of ceramic drawings usually completed by hand. To facilitate analysis of these sherds, UCSD, the Weizmann Institute of Science, and the Hebrew University of Jerusalem collaborated in developing the Pottery Informatics Query Database (PIQD) (Smith et al. 2014b). The PIQD is an online tool that allows for the upload and storage of 3-D models and profiles of ceramic sherds. Moreover, the database is queryable, allowing for archaeologists to search for parallels and objective classifications of pottery sherds to look for patterns of historical and anthropological significance (Smith et al. 2014b). The PIQD works in tandem with Pottery3D (developed by A. Karasik) which allows for the automatic

generation of 2-D profiles of ceramic sherds from the 3-D models which are suitable for upload to the PIQD or publication (Smith et al. 2014b: Fig. 5). As such, a workflow of producing a 3-D model of a sherd, generating a profile with Pottery3D, and uploading to the PIQD creates a fully digital record of the sherd. In doing so, it provides a digital methodology for constructing ceramic typologies, comparisons, and statistical analysis through the web. Currently, the PIQD has over 10,000 data entries with approximately 3000 of these sherds converted to the required format for mathematical queries and readily available for archaeologists through its online platform (see Smith et al. (2014b) for a case study from the Southern Levant).

Satellite imagery is also playing an increasing role in archaeology and *cyber-archaeology* (Parcak 2019), but analyzing these datasets, which often cover substantial geographical scales, can be time-consuming. To facilitate analysis, *cyber-archaeology* at UCSD has embraced crowdsourcing (Savage et al. 2017; Lin et al. 2014). Crowdsourcing uses the voluntary assistance of a large group from the general public to conduct research (Savage et al. 2017). By leveraging the work of hundreds to even thousands of volunteers, crowdsourcing makes analysis of large-scale satellite imagery feasible by alleviating constraints of time and money. One example of combining satellite imagery analysis with crowdsourcing for archaeological research developed at UCSD is the TerraWatchers platform (Savage et al. 2017). TerraWatchers is a web-based application built on the Google Maps API to provide satellite imagery for crowdsourcing of at-risk world heritage. Registered users of TerraWatchers are provided with satellite imagery of known archaeological sites to look for evidence of looting or other visible damage (Savage et al. 2017). The users can then "tag" what they see using pre-set descriptors such as "looting" or "impact crater" in conflict zones (Savage et al. 2017). The archaeologist can then aggregate this data to inform their understanding of at-risk archaeological sites. By crowdsourcing, TerraWatchers has collected data on 2551 archaeological sites with thousands of observations of damage in some form (Savage et al. 2017). TerraWatchers has partnered with the American Schools of Oriental Research Cultural Heritage Initiative to use the produced data to monitor at-risk sites, to inform preservation and mitigation projects, and for international outreach.

For additional case studies of using *cyber-archaeology* for data analysis, see Lercari 2019 (using terrestrial laser scanning to monitor earthen architecture), Levy et al. 2008 (a combination of terrestrial laser scanning, 3-D visualization, and radiocarbon dating for understanding the archaeological record), von Schwerin et al. 2016 (for collecting and processing LiDAR data), and Opitz and Limp 2015 and Optiz and Herrmann 2018 (for a general discussion of 3-D and spatial technologies such as laser scanning, remote sensing, and photogrammetry in archaeology).

Data Dissemination

Data storage and dissemination are intimately linked in the *cyber-archaeology* workflow. The UCSD Library serves the dual function of the final repository of all collected data and also a primary outlet by which this data is shared with both scholars and the general public. Data in the UCSD Library DAMS is accessible from the UCSD Library Digital Collections (DC) website (https://library.ucsd.edu/dc) to facilitate teaching, learning, and research. Once data is published in the DC, it is freely accessible to the public at-large and is indexed by major search engines and several data search portals (e.g., the DC and its datasets are discoverable through a simple Google search). As such, the UCSD Library also provides online data discovery/sharing of digital archaeological data. CAVEbase similarly allows for both 3-D data storage and sharing. The CAVEbase website is currently only accessible with permission due to data copyright and ownership; however, with appropriate authorizations, users can access a complete collection of 3-D models and CAVEcam imagery collected by UCSD teams. Critically, making all of this data available through the web facilitates sharing between all the stakeholders involved in an archaeological project. For example, joint projects, which are frequent in archaeology, can easily share data

between institutions (see the case study below based on a joint excavation by UCSD and the University of the Aegean).

Cyber-archaeology is also dedicated to using state-of-the-art visualization environments for sharing 3-D data. To this end, UCSD (and the partnering institutions of the UC Catalyst grant) constructed a CAVEkiosk in a location that would be accessible to the public (e.g., a university library or museum). CAVE environments, using technology pioneered by Thomas DeFanti of UCSD, are platforms for immersive, virtual reality visualization of 3-D data (Knabb et al. 2014). CAVEs are built by mounting multiple 3-D compatible screens on a frame and integrating their displays to present a single 3-D dataset on a large scale, thereby creating an immersive experience. In this way, CAVEs provide an ideal device for visualizing 3-D models or CAVEcam imagery of archaeological/cultural heritage sites. The CAVEkiosk model combines six 3-D televisions mounted on their side in a semicylinder formation. When the viewer is standing in front of the CAVEkiosk, it provides the sensation of being surrounded. The entire system is run through a single desktop computer using the Unity game development software for handling 3-D data. Moreover, the CAVEkiosk can access CAVEbase and its remote storage over high-bandwidth networks, allowing 3-D data stored on CAVEbase to be viewed at fully interactive rates. The Catalyst Project has successfully shared and visualized data from CAVEbase on CAVEs at the other UC campuses through the Pacific Research Platform (PRP), a high-speed data-sharing network connecting all ten UC campuses and other universities. The combination of CAVEbase, CAVEkiosks, and the PRP allow unprecedented sharing of 3-D data with scholars, students, and the general public.

A Case Study: At-Risk Cultural Heritage and the Digital Humanities in Greece

In order to field-test this approach to *cyber-archaeology*, a team from UCSD deployed the above-described methods at a joint University of the Aegean-UCSD excavation at Kastrouli, Greece, in 2016 as part of the At-Risk Cultural Heritage and the Digital Humanities Catalyst Project (for an additional *cyber-archaeology* case study in Jordan, see Levy et al. (2010, 2014)). Kastrouli is a small fortified site located on a rocky hill about 11 kilometers southeast of Delphi (Sideris et al. 2017). It was the focus of a small archaeological project in 2005 which included some excavation (primarily cleaning) to evaluate the condition of exposed tombs at the site (Raptopoulos 2012). Based on their disturbed nature, the excavations determined that the tombs were previously looted, and this understanding was reiterated by local shepherds who affirmed the tombs were looted over the past 50 years (Raptopoulos 2012; Sideris et al. 2017). The 2016 project aimed to fully excavate and document this tomb and survey the site more generally with 3-D methodologies. The area immediately to the east of the tomb was also excavated, and the defensive wall surrounding the site was probed in two locations (for a full discussion of the results and finds from the excavation, see Levy et al. (2017a) and Sideris et al. (2017)). Using a *cyber-archaeology* methodology was particularly important as Kastrouli was looted as recently as the early 2000s (Sideris et al. 2017) and is at risk for future theft/damage.

Excavation, Context, and Artifact Recording

The excavation at Kastrouli including all artifact and context data across all areas/units was recorded in an entirely digital format using a combination of *ArchField* and *ArchaeoSTOR* (*OpenDig* was not used on this particular project. A Microsoft Access database was used to digitally record locus information.). For this project, *ArchField* was installed on a Microsoft Surface for a balance of computing power and portability. Using ground control points established at the beginning of the excavation, each day in the field began by setting up a Leica TS02 Total Station close to the tomb excavation and connecting it directly (by serial cable) to the computer with *ArchField* (Levy et al. 2017a). *ArchField* and the Total Station successfully recorded all of the geospatial information associated with the loci and artifacts during the extent of the excavation. *ArchField*'s interface affording

rapid data entry also made handling and recording different artifact types quick and easy. Moreover, the real-time visualization and local storage of *ArchField* data proved a valuable capability for editing data immediately following any mistakes such as a bow-tied locus perimeter or a mislabeled artifact; an incorrect locus or artifact point could be immediately deleted from the local database and recorded again correctly. At the end of each day, the Microsoft Surface was brought to the field lab (located in the small village of Desfina near Kastrouli), and the *ArchField* data was synced with the local server hosted on a Mac Mini. The geospatial data was also exported as shapefiles each day, a functionality built into *ArchField*, to keep a record of each excavation day and for further analysis within GIS.

Once transferred to the field server, the *ArchField* data was integrated into *ArchaeoSTOR*. A unique entry for each recorded artifact and locus from Kastrouli along with its coordinates was generated within *ArchaeoSTOR* by extracting the data from the shared lab server. Each day's collection of artifacts were also processed in the field lab (such as photography, weighing, and measuring), and this information was added to the appropriate record within *ArchaeoSTOR*. The large number of excavated bones was not anticipated prior to fieldwork (under the expectation the tomb was entirely looted/disturbed), so *ArchaeoSTOR* was not initially prepared to handle osteological data; however, because *ArchaeoSTOR* is entirely run on-site, it was possible to add the appropriate data fields in real time. Following processing, artifacts were bagged and assigned to specific crates which were also documented in *ArchaeoSTOR* prior to final physical storage in the Delphi Museum. At the end of the excavation season, the Mac Mini field server was easily transported back to UCSD, allowing the archaeologists to return to the research institution with a complete record of all the archaeological data recorded. In addition, because the data exists in a digital format, it was easily shared with the University of the Aegean collaborators and replicated for protection against any potential data loss (discussed further below).

3-D Documentation: SfM and CAVEcam

Both the excavation areas and the site more generally were documented with 3-D photogrammetry to create a digital, photorealistic record of Kastrouli. A combined aerial and terrestrial approach was used to construct 3-D models on multiple scales. The LAAP helium balloon system was used for the aerial perspective of the entire site. In total, 6 balloon flights captured over 2000 photographs. An additional flight focused specifically on the excavation area around the tomb to provide a contextualized perspective in combination with terrestrial methods. The tomb excavation was photographed daily for SfM from the ground (sometimes more than once) over the course of the excavation. By the end of the season, over 2200 photographs were collected to produce 9 unique 3-D models of the tomb. The interior of the tomb was also photographed to model and document the architecture and to provide an internal perspective of the excavation (680 photographs). One of the wall excavation probes and the excavation extension to the east of the tomb were modeled once each (an additional 150 photographs). To date, these photographs have been used to produce 24 distinct 3-D models of the site and specific areas. This dataset including the photographs, edited photographs, and processed 3-D models comprises over 530 gigabytes of digital data. The CAVEcam was also used at Kastrouli to capture stereo-panoramic images throughout the site at seven locations of interest. All of the photographs and processed GigaPans (most of the image stitching was completed in the lab at UCSD after the expedition) comprise an additional 22 gigabytes of data. Total, these 3-D methodologies created a dataset of over 550 gigabytes (the "data avalanche").

Data Storage and Dissemination

After returning from the field, the final step was to deposit the collected archaeological and 3-D data at the UCSD Library for perpetual storage, curation, and dissemination (Yoo et al. 2017). All data captured in the field is first transferred to the UCSD Levantine and Cyber Archaeology Lab server for immediate replication and backup.

For transfer to the library, the artifact data and metadata collected from Kastrouli and stored in *ArchaeoSTOR* were exported as a spreadsheet and moved to the library staging server. The spreadsheet/data was then ingested using the library protocol (see Yoo et al. 2017), and a UCSD Library Digital Collection was created. Once the Kastrouli data was incorporated into the DC, it was replicated in Chronopolis providing long-term data preservation and protection. The final result is now available online and discoverable through major search engines providing exceptional access to all the excavation data (Levy et al. (2017b) which includes a link to the digital collection). All of the data is now readily available for any analyses by archaeologists and researchers.

The 3-D data including the CAVEcam images and 3-D models were processed while still in the Levantine and Cyber Archaeology Lab and also immediately backed up to local servers. The Levantine and Cyber Archaeology Lab has computers for processing high-resolution models with Agisoft and for stitching CAVEcam images using PTGui. From the lab, the models and stereoscopic panoramas were uploaded to the CAVEbase website along with all necessary data and metadata. Once in CAVEbase, everything was copied to the library servers for storage. As mentioned, CAVEbase access through a web browser currently requires permission; however, this 3-D data is still available for visualization by students and the public through the CAVEkiosk. The CAVEkiosk in the UCSD Library is open to visitors during regular library hours and can access data in the CAVEbase repository. Moreover, this data can be shared with CAVEkiosks at the other UC campuses over the PRP providing additional opportunities for outreach and dissemination. Finally, the results of this excavation have also been published in academic journals and book chapters, which are still considered a critical component of data dissemination even in *cyber-archaeology* (Levy et al. 2017a; Sideris et al. 2017).

Conclusion

As can be seen, *cyber-archaeology* is transforming archaeology through new data capture tools, curation methods, analyses, and dissemination. With the exponential increase in the global use of digital technologies, including cell phones and the Internet, it is essential that archaeology continues incorporating advanced technologies as integral components of our pedagogy, research, and outreach. The *cyber-archaeology* workflow as envisioned by Levy and UCSD provides an integrated and fully digital approach for dealing with these essential processes; critical to this workflow is the combination of off-the-shelf technologies (laptops, Total Stations, helium balloons/drones, digital cameras, etc.) with custom software/hardware (*ArchField*, *ArchaeoSTOR*, *OpenDig*, CAVEs, etc.). In this way, *cyber-archaeology* facilitates a seamless flow of digital archaeological and cultural heritage data from the moment it is collected in the field to final storage and curation in the university library. Moreover, the integration of web-based data sharing (CAVEbase and the UCSD Library Digital Collection) allows widespread data dissemination among project collaborators, stake holders, students/educators, and the general public. Sophisticated 3-D visualization environments, in particular the CAVEkiosk in the UCSD Library, also provide new and exciting methods for both education on campus and public engagement. In sum, while excavation still relies on the classic tools like trowels and buckets (for now), *cyber-archaeology* is moving archaeology forward into the Digital Age.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage in the Digital Age
- ▶ Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation
- ▶ Ethics of the Archaeological Record
- ▶ Experiencing Cultural Heritage

References

Ainsworth, R.A. 2012. *Stereo panoramic photography for virtual reality*. Wisconsin: Ainsworth & Partners.

Averett, E.W., J.M. Gordon, and D.B. Counts, eds. 2016. *Mobilizing the past for a digital future: The potential of digital archaeology*. Grand Forks: The Digital Press at the University of North Dakota.

De Reu, J., G. Plets, G. Verhoeven, P. De Smedt, M. Bats, B. Cherretté, W. de Maeyer, J. Deconynck, D. Herremans, P. Laloo, M. Van Meirvenne, and W. De Clercq. 2013. Towards a three-dimensional cost-effective registration of the archaeological heritage. *Journal of Archaeological Science* 40: 1108–1121.

De Reu, J., P. De Smedt, D. Herremans, M. Van Meirvenne, P. Laloo, and W. De Clercq. 2014. On introducing an image-based 3D reconstruction method in archaeological excavation practice. *Journal of Archaeological Science* 41: 251–262.

Escobar, A., D. Hess, I. Licha, W. Sibley, M. Strathern, and J. Sutz. 1994. Welcome to Cyberia: Notes on the anthropology of cyberculture. *Current Anthropology* 35: 211–231.

Forte, M., ed. 2010. *Cyber-archaeology*. BAR International Series. Vol. 2177. Oxford: Archaeopress.

Forte, M. 2011. Cyber-archaeology: Notes on the simulation of the past. *Virtual Archaeology Review* 2: 7–18.

Forte, M. 2015. Cyberarchaeology: A post-virtual perspective. In *Humanities and the digital: A visioning statement*, ed. D.T. Goldberg and P. Svensson. Boston: MIT Press.

Forte, M., and A. Siliotti, eds. 1997. *Virtual archaeology: Great discoveries brought to life through virtual reality*. London: Thames and Hudson.

Gidding, A., Y. Matsui, T.E. Levy, T.A. DeFanti, and F. Kuester. 2013. ArchaeoSTOR: A data curation system for research on the archeological frontier. *Future Generation Computer Systems* 29: 2117–2127.

Gidding, A., T.E. Levy, and T.A. DeFanti. 2014. ArchaeoSTOR: The development and utilization of a web-based database for the field and lab. *Near Eastern Archaeology* 77: 198–202.

Howland, M.D. 2017. 3D recording in the field: Style without substance? In *Cyber-archaeology and grand narratives: Digital technology and deep-time perspectives on culture change in the Middle East*, ed. I.W.-N. Jones and T.E. Levy, 19–34. Cham: Springer.

Howland, M.D., F. Kuester, and T.E. Levy. 2014. Structure from motion: Twenty-first century field recording with 3D technology. *Near Eastern Archaeology* 77: 187–191.

Howland, M.D., B. Liss, M. Najjar, and T.E. Levy. 2015. GIS-based mapping of archaeological sites with low-altitude aerial photography and structure from motion: A case study from Southern Jordan. In *Proceedings of the 2015 digital heritage international conference*, ed. G. Guidi, R. Scopigno, J.C. Torres, and H. Graf, vol. 1, 91–94. IEEE.

Jones, Q. 1997. Virtual-communities, virtual settlements, and cyber-archaeology: A theoretical outline. *Journal of Computer-Mediated Communication* 3: 24.

Jones, I.W.M. and T.E. Levy. 2018. Cyber-archaeology and grand narratives: where do we currently stand? In Cyber-Archaeology and grand-narratives: Digital technology and deep-time perspectives on cultural change in the Middle East, ed. I.W.N Jones and T.E. Levy, 1–18. Cham: Springer

Kansa, E.C., S.W. Kansa, and E. Watrall, eds. 2011. *Archaeology 2.0: New tools for communication and collaboration*. Los Angeles: Cotsen Institute of Archaeology Press.

Knabb, K.A., J.P. Schulze, F. Kuester, T.A. DeFanti, and T.E. Levy. 2014. Scientific visualization, 3D immersive virtual reality environments, and archaeology in Jordan and the near east. *Near Eastern Archaeology* 77: 228–232.

Lercari, N. 2019. Monitoring earthen archaeological heritage using multi-temporal terrestrial laser scanning and surface change detection. *Journal of Cultural Heritage*. https://doi.org/10.1016/j.culher.2019.04.005.

Levy, T.E. 2013. Cyber-archaeology and world cultural heritage: Insights from the Holy Land. *Bulletin of the American Academy of Arts and Sciences* 66: 26–33.

Levy, T.E. 2015. The past forward. *Biblical archaeology review special Issue: "40 futures: Experts predict what's next for biblical archaeology"*, 81–87.

Levy, T.E. 2017. The future of the past: At-risk world heritage, cyber-archaeology, and transdisciplinary research. In *Rethinking Israel: Studies in the history and archaeology of ancient Israel in honor of Israel Finkelstein*, ed. O. Lipschits, Y. Gadot, and M.J. Adams, 221–232. Winona Lake: Eisenbrauns.

Levy, T.E., T. Higham, C. Bronk Ramsey, N.G. Smith, E. Ben-Yosef, M. Robinson, S. Munger, K. Knabb, J. Schulze, M. Najjar, and L. Tauxe. 2008. High-precision radiocarbon dating and historical biblical archaeology in southern Jordan. *Proceedings of the National Academy of Sciences USA* 105: 16460–16465.

Levy, T.E., V. Petrovic, T. Wypych, A. Gidding, K. Knabb, D. Hernandez, N.G. Smith, J.P. Schulz, S.H. Savage, F. Kuester, E. Ben-Yosef, C. Buitenhuys, C.J. Barret, and T. DeFanti. 2010. On-site digital archaeology 3.0 and cyber-archaeology: Into the future of the past – new developments, delivery and the creation of a data avalanche. In *Cyber-archaeology*, ed. M. Forte, 135–153. Oxford: Archaeopress.

Levy, T.E., N.G. Smith, M. Najjar, T.A. DeFanti, A.Y. Lin, and F. Kuester. 2012. *Cyber-archaeology in the Holy Land: The future of the past*. Washington, DC: The Biblical Archaeology Society.

Levy, T.E., E. Ben-Yosef, and M. Najjar. 2014. The Iron age Edom lowlands regional archaeology project: Research. Design, and methodology. In *New insights in the Iron age archaeology of Edom, southern Jordan volume 1*, ed. T.E. Levy, M. Najjar, and E. Ben-Yosef, 1–88. Los Angeles: Cotsen Institute of Archaeology Press.

Levy, T.E., A. Sideris, M.D. Howland, B. Liss, G. Tsokas, A. Stambolidis, E. Fikos, G. Vargemezis, P. Tsourlos, A. Georgopoulos, G. Papatheodorou, M. Garaga, D. Christodoulou, R. Norris, I. Rivera-Collazo, and I. Liritzis. 2017a. At-risk world heritage, cyber, and marine archaeology: The Kastrouli-Antikyra Bay Land and sea project, Phokis, Greece. In *Cyber-*

archaeology and grand narratives: Digital technology and deep-time perspectives on culture change in the Middle East, ed. I.W.N. Jones and T.E. Levy, 143–234. Cham: Springer.

Levy, T.E., A. Sideris, M.D. Howland, B. Liss, and I. Liritzis. 2017b. Kastrouli mycenaean excavations, Greece 2016. *UCSD Library Digital Collections*. Last modified 2017. https://library.ucsd.edu/dc/collection/bb0378352k

Lin, A.Y.-M., A. Huynh, G. Lanckriet, and L. Barrington. 2014. Crowdsourcing the unknown: The satellite search for Genghis khan. *PLoS One* 10: e0121045.

McFarland, C., T. DeFanti, T.E. Levy, and F. Kuester. 2017. CAVEBase: Preserving and accessing cultural heritage through 3D virtual reality environments. In *Poster presented at the American Schools of Oriental Research annual meeting*. Boston.

Olson, B.R., R.A. Placchetti, J. Quartermaine, and A.E. Killebrew. 2013. The Tel Akko total archaeology project (Akko, Israel): Assessing the suitability of multi-scale 3Dfield recording in archaeology. *Journal of Field Archaeology* 38: 244–262.

Opitz, R., and J. Herrmann. 2018. Recent trends and long-standing problems in archaeological remote sensing. *Journal of Computer Applications in Archaeology* 1: 19–41.

Opitz, R., and W.F. Limp. 2015. Recent developments in high-density survey and measurement (HDSM) for archaeology: Implications for practice and theory. *Annual Review of Anthropology* 44: 347–364.

Parcak, S. 2019. *Archaeology from space: How the future shapes our past*. New York: Henry Holt and Co.

Raptopoulos, S. Y. 2012. ΜΥΚΗΝΑΪΚΟΣ ΘΟΛΩΤΟΣ ΤΑΦΟΣ ΣΤΗ ΔΕΣΦΙΝΑ ΦΩΚΙΔΟΣ. In ΑΡΧΑΙΟΛΟΓΙΚΟ ΕΡΓΟ ΘΕΣΣΑΛΙΑΣ ΚΑΙ ΣΤΕΡΕΑΣ ΕΛΛΑΔΑΣ, 1071–1078. ΒΟΛΟΣ.

Savage, S.H., A. Johnson, and T.E. Levy. 2017. TerraWatchers, crowdsourcing, and at-risk world heritage in the middle East. In *Heritage and archaeology in the digital age: Acquisition, curation, and dissemination of spatial cultural heritage data*, ed. M.L. Vincent, V.M. Lopez-Menchero Bendicho, M. Ioannides, and T.E. Levy, 67–77. Cham: Springer.

Sideris, A., I. Liritzis, B. Liss, M.D. Howland, and T.E. Levy. 2017. At-risk cultural heritage: New excavations and finds from the Mycenaean site of Kastrouli, Phokis, Greece. *Mediterranean Archaeology and Archaeometry* 17: 271–285.

Smith, N. G., and T. E. Levy. 2012. Real-time 3D archaeological field recording: ArchField, an open-source GIS system pioneered in Jordan. *Antiquity* 85: on-line http://antiquity.ac.uk/projgall/smith331/.

Smith, N.G., and T.E. Levy. 2014. ArchField in Jordan: Real-time GIS data recording for archaeological excavations. *Near Eastern Archaeology* 77: 166–170.

Smith, N.G., L. Passone, S. al-Said, M. al-Farhan, and T.E. Levy. 2014a. Drones in archaeology: Integrated data capture, processing, and dissemination in the al-Ula Valley, Saudi Arabia. *Near Eastern Archaeology* 77: 176–181.

Smith, N.G., A. Karasik, T. Narayanan, E.S. Olson, U. Smilansky, and T.E. Levy. 2014b. The pottery informatics query database: A new method for mathematic and quantitative analyses of large regional ceramic datasets. *Journal of Archaeological Theory and Method* 21: 212–250.

Smith, R.E., C. Breeze, T. Harman, F. Reece, A. Gupta, M. Tolentino, B. Liss, M.M. Burton, and T.E. Levy. 2017. ArchaeoSTOR: A user-friendly archaeological database. In *Poster presented at the American Schools of Oriental Research annual meeting*. Boston.

Vincent, M.L., F. Kuester, and T.E. Levy. 2014a. OpenDig: Digital field archaeology, curation, publication, and dissemination. *Near Eastern Archaeology* 77: 204–208.

Vincent, M.L., F. Kuester, and T.E. Levy. 2014b. OpenDig: Contextualizing the past from the field to the web. *Mediterranean Archaeology and Archaeometry* 14: 109–116.

von Schwerin, J., H. Richards-Rissetto, F. Remondino, M. Grazia Spera, M. Auer, N. Billen, L. Loos, L. Stelson, and M. Reindel. 2016. Airborne LiDAR acquisition, post-processing and accuracy-checking for a 3D WebGIS of Copan, Honduras. *Journal of Archaeological Science: Reports* 5: 85–104.

Yoo, H.J., B. Liss, R.E. Smith, R.E. Johnson, and T.E. Levy. 2017. Curating excavation data for long-term access and discovery in a library digital repository. In *Poster presented at the American Schools of Oriental Research annual meeting*. Boston.

Further Reading

Forte, M. 2009. Participatory research in cyber-archaeology. In *CAA 2009: Making history interactive: Computer applications and quantitative methods in archaeology; Proceedings of the 37th annual computer applications and quantitative methods in archaeology conference, Williamsburg, Virginia, March 22–26 2009*, ed. B. Frischer, J.W. Crawford, and D. Koller, 76–85. Oxford: Archaeopress.

Forte, M. 2014. 3D archaeology: New perspectives and challenges – The example of Çatalhöyük. *Journal of Eastern Mediterranean Archaeology and Heritage Studies* 2: 1–29.

Forte, M. 2016. Cyber archaeology: 3D sensing and digital embodiment. In *Digital methods and remote sensing in archaeology: Archaeology in the age of sensing*, ed. M. Forte and S. Campana, 271–289. Cham: Springer.

Kenderdine, S. 2013. *Place-Hampi: Inhabiting the panoramic imaginary of Vijayanagara*. Heidelberg: Kehrer Verlag.

Lercai, N. 2017. 3D visualization and reflexive archaeology: A virtual reconstruction of Çatalhöyük history houses. *Digital Applications in Archaeology and Cultural Heritage* 6: 10–17.

Richards-Rissetto, H., and K. Landau. 2019. Digitally-mediated practices of geospatial archaeological data: Transformation, integration, & interpretation. *Journal of Computer Applications in Archaeology* 2: 120–135.
Schettino, P., and S. Kenderdine. 2010. PLACE-Hampi: Narratives of inclusive cultural experience. *International Journal of the Inclusive Museum* 3: 141–156.
von Schwerin, J., H. Richards-Rissetto, F. Remondino, G. Agugiaro, and G. Girardi. 2013. The MayaArch3D project: A 3D WebGIS for analyzing ancient architecture and landscapes. *Literary and Linguistic Computing* 28: 736–753.

Cyprus, Archaeology of

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State of Knowledge and Current Debates

Introduction

Located in the northeastern Mediterranean Sea, the island of Cyprus has played an important, if often overlooked, role in the development and spread of cultural innovation in this region, serving as a major node of connectivity between the western and central Mediterranean and the Near East. Emphasizing the island's Prehistoric and Protohistoric periods, this entry outlines some of the significant social, political, economic, and ideological changes that took place on Cyprus from its earliest human occupation through to its incorporation into the Roman Empire. It addresses important debates, including the entanglement of the past in the politics of the present, as well as new discoveries and approaches that are changing the way we understand and interpret the Cypriot past. Cyprus serves as a compelling case study for those interested in a number of fundamental issues in archaeological research and practice, including connectivity and insularity, colonization and cultural encounters, human-environment dynamics, the origins of agriculture and development of complex societies, urbanization, identity formation, and colonial legacies. The discussion begins by briefly tracing the development of Cypriot archaeology from its antiquarian roots to a modern scientific discipline.

Archaeologies of Cyprus

The island's archaeology grew out of the explorations of various nineteenth-century antiquarians and early archaeologists who sought to unearth finds suitable for display in major European museums and private collections (see Tatton Brown 2001). The close proximity of Cyprus to the Levant and its (then) lack of obvious remains linking it to the Classical world placed it firmly in the "oriental" sphere with early scholars emphasizing its connections to Assyria and Phoenicia. Among the most (in)famous figures from this period was Luigi Palma di Cesnola, the United States consul to Cyprus (1865–1877) who recovered a large quantity of artifacts from the tombs and sanctuaries of several Iron Age sites. Although Cesnola's methods were questionable even by the standards of the day, his finds helped bring Cypriot antiquities to the attention of a wider scholarly audience and would eventually form the basis of the collections of the new Metropolitan Museum of Art in New York, where he served as the first director (for further reading see Karageorghis 2000: 3–15). Archaeological interest in Cyprus intensified following the transition from Ottoman to British control in 1878. The ensuing decades saw the beginnings of more methodologically rigorous investigations of the island's past with a focus on careful recording of stratigraphic sequences and the development of ceramic typologies. Interpretation was rooted in traditional art historical approaches concerned with the description of objects and their stylistic influences as well as the judgment of their aesthetic merits, by which Cypriot art was nearly always compared unfavorably with that of its Near Eastern and Greek contemporaries. The Swedish Cyprus Expedition (SCE) excavated a range of Neolithic through Roman sites between 1927 and 1931, marking the first effort to collect data systematically using then-current field methods in order to construct an island-wide

Cypriot culture history (Gjerstad et al. 1934, etc.). The SCE's work has been highly influential in framing discussion of the island's culture history and their ceramic-based chronology continues to form the basis of the traditional dating system (see below).

The influences of traditional art historical and culture historical perspectives continue to be felt in Cypriot archaeology even today and the anthropologically oriented approaches of "New" and, later, processual archaeologies were initially slow to gain acceptance. This began to change in the late 1970s through early 1990s with important new research supported by the application of scientific methods of analysis that focused on political economy and the development of social complexity and its links to ideology and power (e.g., Knapp and Cherry 1994; Manning 1993; Peltenburg 1993; Rupp 1988). The adoption of such approaches has meant that archaeological field work as currently practiced in Cyprus is, for the most part, problem-oriented and undertaken using current scientific methods. While field survey had been conducted by Hector Catling under the auspices of the Department of Antiquities since 1955, this period also saw the introduction of intensive regional surveys as a means of systematically investigating long-term changes to settlement patterns, demography, and land use (e.g., the Vasilikos Valley Project [Todd 2004]; see Iacovou ed. [2004]).

Postprocessual perspectives were also initially slow to penetrate into Cypriot archaeology but since the mid-1990s a number of scholars have adopted critical and postcolonial approaches, bringing not only a focus on issues of gender, agency, identity, and materiality (e.g., Bolger 2003; Fisher 2009; Knapp 2013) but also examination of the practice of Cypriot archaeology and its past and present engagement with politics (e.g., Bolger 2003: chap. 8; Knapp and Antoniadou 1998). In the field this resulted in the integration of landscape approaches with a focus on the social and symbolic dimensions of the physical environment, as seen in the influential Sydney Cyprus Survey Project (Given and Knapp 2003). Archaeological geophysics and other methods of remote sensing, scarcely mentioned in a 2004 review of field survey on Cyprus (Iacovou 2004), have become increasingly important as a means of mapping ancient urban landscapes and providing direction for excavation (e.g., The Kalavasos and Maroni Built Environments Project; see Manning et al. 2014; see also Sneddon 2015).

A number of organizations currently play a role in facilitating archaeological research on Cyprus. The Department of Antiquities is the government body responsible for the administration, protection, and promotion of cultural heritage on the island and as such it oversees all archaeological work, in addition to the Cyprus Museum (the national archaeological museum) in Nicosia, various regional and local museums, and monuments. It not only carries out its own vigorous program of excavation (including rescue work), conservation, and publication but has actively supported the many foreign expeditions that continue to work on the island. The Archaeological Research Unit of the University of Cyprus also plays a leading role in education, training, and archaeological research on various periods of the island's past. Since its founding in 1978, the Cyprus American Archaeological Research Institute (CAARI) has provided important logistical and technical support for archaeological research on Cyprus and the wider eastern Mediterranean. Its library is an important resource for research and CAARI supports dissemination through its program of lectures, symposia, and publication. The A.G. Leventis Foundation, established in 1979, has also played an important role in supporting the dissemination of Greek and Cypriot cultural heritage, particularly through its funding of archaeological publication and museum galleries around the world. The Nicosia-based Cyprus Institute hosts the Science and Technology in Archaeology Research Center (STARC), which has leading-edge fixed and mobile lab facilities and is devoted to the development and application of advanced science and technology in archaeology, cultural heritage, and history within and beyond Cyprus (see web resources below).

Physical Geography

One cannot begin an account of the Cypriot past without considering the island's physical geography. Settlement and movement within Cyprus and its connections with the mainland have always been influenced by its landscape, its surrounding sea and changing conceptions of insularity. It is the third largest island in the Mediterranean with an area of 9251 sq. km and is located nearly 70 km from the southern coast of Anatolia and just over 100 km from Syria (Fig. 1). Even at the last glacial maximum (c. 25,000–18,000 cal. BP), when sea levels were 130–120 m lower than today, Cyprus was still c. 40 km from the Levantine coast (Knapp 2013: 57). This barrier was sufficient to limit the sea-borne migration of terrestrial fauna to a few species, the largest of which were the pygmy hippopotamus and dwarf elephant. This would change significantly with the Holocene as various episodes of human visitation and colonization introduced a number of both wild and domesticated plant and animal species. Sea levels continued to rise during the Holocene (beginning ca. 11,500 cal. BP), sometimes quite rapidly, significantly altering the coastal landscape of Cyprus and inundating coastal plains throughout the Mediterranean.

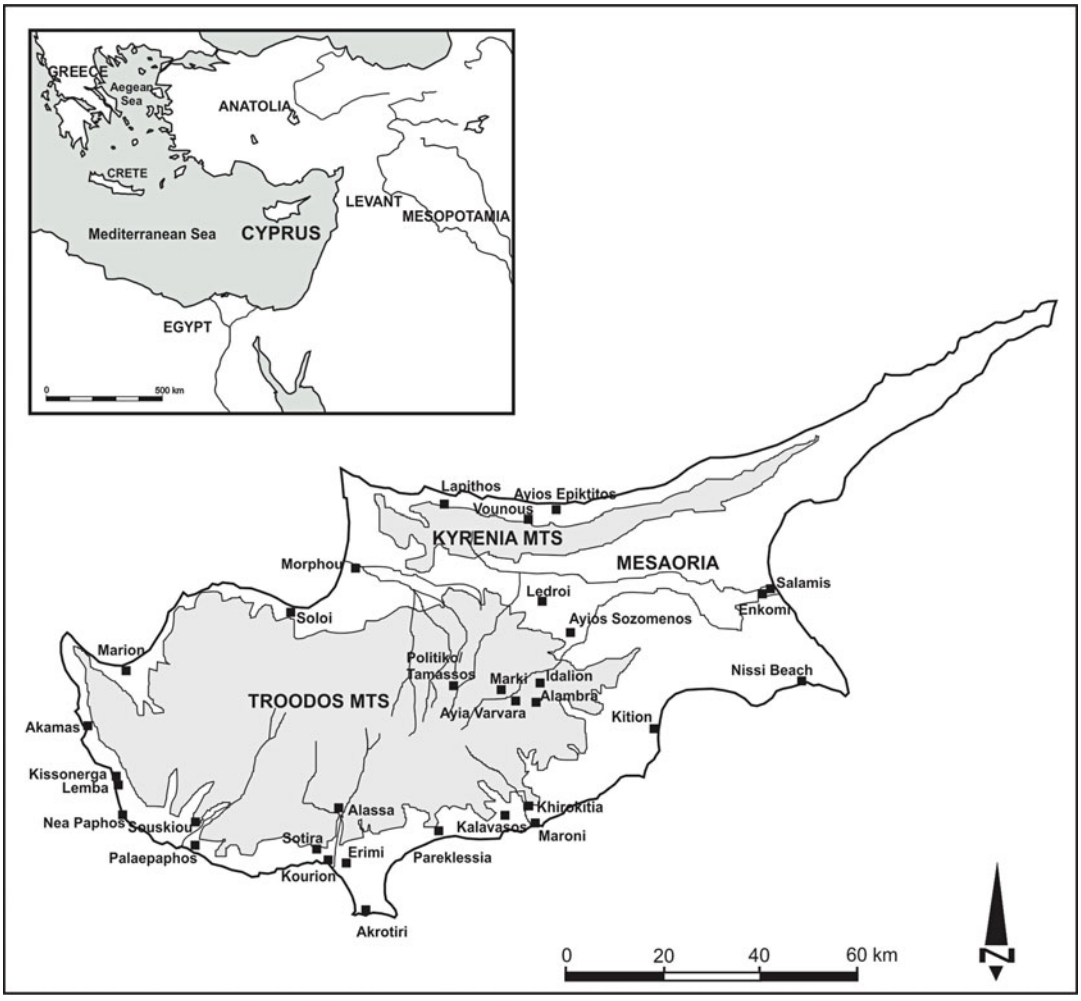

Cyprus, Archaeology of, Fig. 1 Map of Cyprus showing locations of sites mentioned in text. Shaded area = land above 300 m (drawn by Kevin Fisher)

The island's most prominent landform is the Troodos massif in the southwest, a centralized mountain range rising as high as 1951 m asl (at Mt. Olympos). It consists mainly of igneous rocks surrounded by a ring of pillow lavas, which are significant as the source of sulfide ores, particularly the rich copper deposits for which Cyprus became famous beginning in the Bronze Age. The Kyrenia mountain range consists mainly of sedimentary rock and runs in a roughly east-west line following the island's north coast, forming a narrow coastal plain. Between the Troodos and the Kyrenia mountains lies the Mesaoria, a plain cut by a number of seasonal rivers that is currently used largely for grain production. According to Strabo (*Geography* 14.6.5), Eratosthenes remarked in his lost *Geographica* that the Mesaoria was thickly forested in antiquity but had been at least partially cleared by the third century BCE for shipbuilding, agriculture, and fuel for metal smelting. Coniferous forests continue to thrive today only in the upper reaches of the Troodos massif and the Akamas peninsula on the western coast, while much of the island's remaining vegetation presently consists of introduced maquis and garrigue.

Chronology

The traditional chronological sequence for Cyprus uses the Three Age system adapted from Greek archaeology and shares the culture-historical roots of such sequences in many regions of Europe and Asia. It therefore bears the weight of assumptions of cultural progress and the use of fairly arbitrary criteria to define periods, particularly ceramics. The notable lack of long cultural sequences from Cypriot settlements has meant that this chronology is based mainly on the seriation of ceramic assemblages from tombs along with their attendant assumptions regarding stylistic change and the issue of how representative such assemblages are of materials in daily use (Table 1). The chronology currently in use was institutionalized largely by the Swedish Cyprus Expedition, although it has become increasingly (perhaps unrealistically) complex with various

Cyprus, Archaeology of, Table 1 Chronology for ancient Cyprus (after Knapp 2013: table 2 and Papantoniou 2012: xxv)

Period	Phase/culture or alternative name	Dates (calibrated for prehistoric periods)
Late Epipaleolithic	Akrotiri phase	11,000–9000 BCE
Cypro-Pre-Pottery Neolithic A (PPNA)		9000–8500/8400 BCE
Cypro-PPNB	Early Aceramic Neolithic	8500/8400–7000/6800 BCE
Late Aceramic Neolithic	Khirokitia culture	7000/6800–5200 BCE
Ceramic Neolithic	Sotira culture	5200/5000–4500/4000 BCE
Early Chalcolithic	Erimi culture	4000/3900–3600/3400 BCE
Middle Chalcolithic		3600/3400–2700 BCE
Late Chalcolithic		2700–2500/2400 BCE
Philia Phase/Facies	Prehistoric Bronze Age 1	2400/2350–2250 BCE
Early Cypriot (EC) I-II		2250–2000 BCE
Early Cypriot III-Middle Cypriot (MC) I-II	Prehistoric Bronze Age 2	2000–1750/1700 BCE
Middle Cypriot III-Late Cypriot (LC) I	Protohistoric Bronze Age 1	1750/1700–1450 BCE
Late Cypriot IIA-IIC early	Protohistoric Bronze Age 2	1450–1300 BCE
Late Cypriot IIC late-IIIA	Protohistoric Bronze Age 3	1300–1125/1100 BCE
Protogeometric (Late Cypriot IIIB)	Early Iron Age	1125/1100–1050 BCE
Cypro-Geometric (CG)		1050–750 BCE
Cypro-Archaic (CA)		750–480 BCE
Cypro-Classical (CC)		480–310 BCE
Hellenistic		310–30 BCE
Roman		30 BCE–fourth century CE

ceramic-based phases and subphases (e.g., Late Cypriot IIIA:1b). An alternative chronology for the Bronze Age has been proposed based on a range of material indicators of sociopolitical change rather than ceramic sequences alone (see Knapp 2013: table 2), and is used here. The prehistoric end of the chronology has changed significantly in light of new discoveries and through high-precision dates obtained using Bayesian modeling to integrate radiocarbon dating and tree ring sequences (see Manning in Knapp 2013: 485–533). New terminology for the earliest periods recognizes the interconnections of Cyprus within its wider Near Eastern context.

Colonization and Early Prehistory

Recent discoveries have completely revolutionized what is known about the initial colonization of Cyprus and its earliest prehistory (see Knapp 2013: 43–119 for a detailed review). The site of Akrotiri-*Aetokremnos* (Cypriot sites are typically known by both the name of their municipality and an italicized local toponym) currently has the earliest securely dated remains of human presence on the island (Simmons 1999), although it is probable that the island was visited occasionally before that time by mainland fisher-foragers who left little trace of their presence. This 50 sq. m collapsed rock shelter, located on the Akrotiri peninsula of the island's south coast, produced four intact strata, two of which are of particular interest. Stratum 2 contained the vast majority of the cultural material including flake-based stone tools (mostly scrapers and burins) made from local chert, while Stratum 4, the earliest deposit, contained the majority of the faunal material, including two deposits of burnt pygmy hippopotami (*Phanourios minor*) bones, as well as a few chipped stone tools. Radiocarbon dating leaves little doubt of the site's eleventh through early tenth millennia cal. BCE occupation, but debate continues over the excavator's interpretation of *Aetokremnos* as a pygmy hippo processing site used by hunter-gatherers who eventually hunted the "mini-megafauna" to extinction, and some scholars question the association of the faunal and cultural material and the role of human agency in the Stratum 4 bone deposits.

For many years since its discovery *Aetokremnos* stood alone as the earliest site on the island. Recent work at both Nissi Beach (at Ayia Napa) and Akamas-*Aspros* has recovered sites located on fossilized sand dunes with flake-based lithic assemblages similar to that from *Aetokremnos* but not yet securely dated. Nevertheless, we might see these sites as locations of periodic, short-term visitation by fisher-foragers from the Levant, forced by the shrinking coastal plains and the cooler, more arid climate of the Younger Dryas event (10,800–9,600 BCE) to seek subsistence opportunities further afield (Knapp 2013: 51).

The lacuna that once existed between Akrotiri-*Aetokremnos* and the Late Aceramic Neolithic sites now dated to the seventh to eighth millennia cal. BCE, such as Khirokitia, is also vanishing in light of new discoveries. Excavations at Ayia Varvara-*Asprokremnos* have revealed the earliest Neolithic site on the island, dated to 9141–8569 cal. BCE, which places it within the date range of the late Pre-Pottery Neolithic A (PPNA) and early PPNB of the Levant (Manning et al. 2010). The site yielded evidence for blade-based lithic production as well as a possible semi-subterranean structure. Other significant finds include two groundstone shaft-straighteners of a type well known from the Natufian and Pre-Pottery Neolithic Levant, as well as a fragment of a baked clay figurine – the earliest representation of a human on Cyprus (Fig. 2). The recovered lithics, combined with a faunal assemblage dominated by wild pig, suggest subsistence based on hunting and foraging, rather than the nascent farming apparent elsewhere in the Near East during the PPNA (Manning et al. 2010).

These new discoveries place Cyprus within the mainstream of a wide-ranging Eastern Mediterranean-Near Eastern interaction sphere during the transition from the Epipaleolithic through Pre-Pottery Neolithic B (PPNB), and the island therefore takes on greater significance in discussions on the origins, timing, and directionality of early seafaring, colonization, and the spread of farming in the region. While some groups chose foraging lifeways that would continue on the coasts of Cyprus into the Cypro-

Cyprus, Archaeology of, Fig. 2 PPNA artifacts from Ayia Varvara-*Asprokremnos*; (left) baked clay human figurine fragment; (right) shaft-straightener fragment (courtesy of the Elaborating Early Neolithic Cyprus Project)

PPNB, other groups brought to the island a lifeway based on agropastoralism. These early farmers carried with them wild and (semi-?) domesticated plants and animals that served as the subsistence basis for the island's first permanent settlements during the Cypro-PPNB.

Excavations at sites such as Parekklisha-*Shillourokambos*, Kissonerga-*Mylouthkia*, and Kalavasos-*Tenta* (Periods 2–5), reveal early Cypro-PPNB architectural features carved into bedrock such as wells (some of which were reused for secondary burials), pits, and postholes and linear trenches that may have defined animal pens (e.g., Guilaine et al. 2011). These were later replaced by circular structures with stone foundations that may have been houses. Remains of domesticated wheat and barley, along with a lithic industry that included blades with gloss characteristic of use in harvesting grains, and groundstone querns and pounders, attest to the growing dietary importance of cereals. Faunal assemblages indicate the presence of several introduced species that were important for subsistence including fallow deer, as well as "pre-domestic" or managed caprids (sheep and goats) and cattle, and domesticated pigs. Thus, by the late ninth millennium cal. BCE, the island was inhabited by food producers – a surprisingly early date, which suggests that Cyprus was part of the initial developments in the origins and spread of resource production, rather than a late and peripheral participant. The motivations behind this initial colonization, though likely driven in part by the loss of coastal territories, might also be seen in social terms, perhaps prompted by a colonizing ethos or the desire of some

Cyprus, Archaeology of, Fig. 3 Photo of Kalavasos-*Tenta*, Late Aceramic Neolithic (courtesy of Ian Todd)

to turn their backs on the "Neolithic Revolution" (for further reading see Peltenburg and Wasse eds.).

The subsequent Late Aceramic Neolithic (LAN) witnessed the growing differentiation of Cypriot Neolithic groups from their mainland counterparts. The known sites share a common material culture, although it is unclear whether this signals the existence of a common group identity. Settlements were typically small villages (e.g., 1.5 ha for Khirokitia) founded on higher ground and both Khirokitia and Kalavasos-*Tenta* show evidence for outer settlement walls of stone or pisé (rammed earth) with stone facing (Fig. 3). Within were a number of closely packed circular structures, typically 2–5 m in diameter, with stone foundations and pisé or mudbrick superstructures. We know little about the social structure of these

villages. It is likely that a group of structures around an open space served as the residence of a single household. The construction of settlement walls suggests at least some suprahousehold coordination and singularly large and complex structures, such as the Structure 14 complex at *Tenta*, may have been a communal structure or perhaps the residence of a village leader, although there are no finds to indicate differential status for its occupants. These appear to have been largely egalitarian communities, and the evidence from burials, while indicating differential treatment based on gender, does not suggest overt displays of wealth. Individuals were often buried in a contracted position in pits below the floors of houses, although at *Tenta* a number were also interred in the rubbish that accumulated between buildings. Representational art consists mainly of figurines, carved of volcanic stone or modeled in clay, which show the human form with varying degrees of abstraction. The sex is usually ambiguous, although some appear phallic in nature (Steel 2004: 58–59). The general lack of overtly female imagery, the continued use of circular rather than rectilinear architecture, and the relative scarcity of obsidian (imported from Anatolia during the Cypro-PPNB) are among the many phenomena that point to the divergence of the LAN from its mainland roots and the island's growing insularity. This seems to have been a deliberate choice, perhaps in an effort to forge a distinct identity, as it is unlikely that the island's inhabitants were unable to retain contact with the mainland. This highlights, even at this early stage, the importance of insularity in the construction of identities on ancient Cyprus.

The island's inhabitants would continue along their own trajectory in the subsequent Ceramic Neolithic, although the apparent gap in the archaeological record between the end of the LAN and the Ceramic Neolithic (or Sotira Culture), while narrowed, has yet to be adequately explained (Steel 2004: 63–65). The most significant innovation is pottery, which appears fully developed, leading to suggestions by some scholars of a new colonization from the mainland. The recent illumination of other such "gaps" in the archaeological record, combined with continuities in elements of Cypriot Neolithic culture and significant differences from developments on the mainland, suggest at least some degree of local initiative. As seen at Sotira-*Teppes* and Ayios Epiktitos-*Vrysi*, settlement in small villages continued to be the norm, although houses were now usually subrectilinear in form. Peltenburg (1993: 10–12) has argued that *Vrysi* shows a division of the settlement into two social groups, based on the higher concentration of artifacts, evidence for ritual activity, and craft production in the older, northern part of the settlement. The burial record for this period is sparse but, in contrast, shows little evidence of social differentiation. The abandonment of the Late Neolithic sites and the transition to the Chalcolithic period that followed are poorly understood.

The Chalcolithic Period

New settlement patterns characterize the Early Chalcolithic, including the first known settlement of the southwestern part of the island, and sites with ephemeral timber architecture and pits of various sizes that might indicate communal storage. Other important innovations include the production of the first metal artifacts – tools hammered from native copper – and the growing importance of the production and consumption of artifacts made of picrolite, a light to olive green, soft stone originating on Mt. Olympos but found as river pebbles in the Kouris and Karyotis River beds.

Increases in both settlement and population numbers mark the Middle Chalcolithic, which is best known from the sites of Ermi-*Bamboula*, Lemba-*Lakkous*, and Kissonerga-*Mosphilia* in southwest Cyprus (e.g., Peltenburg et al. 1998). Some villages, such as *Mosphilia*, were quite large (c. 10 ha) suggesting the possibility of some form of site hierarchy. These villages consisted of an agglomerative arrangement of mainly circular structures, usually much larger than typical Neolithic buildings (up to 16 m in diameter), built with stone foundations and pisé or mudbrick superstructures. In the open spaces among these structures were numerous pits, some of which were used for burials, as well as storage and waste disposal. As during the LAN, a

cluster of structures might represent the living space of single household and Peltenburg has argued that some houses on the upper terrace at *Mosphilia* were arranged in pairs and associated with discrete burial groups that indicate the emergence of property rights (Peltenburg et al. 1998: 242–243). Larger buildings often have a raised central platform hearth and well-delineated activity areas for work, storage, and living/sleeping. In contrast to the Early Chalcolithic, production and storage appear take place at the household level, although a possible pendant workshop at *Mosphilia* suggests some degree of craft specialization (Peltenburg et al. 1998: 190–192).

The Middle Chalcolithic is remarkable for the elaboration of symbolic behavior. Much of this activity focused on symbolically-charged figurines and objects of personal adornment made from picrolite. While the finished products were likely locally made by nonspecialists, the distribution of picrolite in raw form appears to have been tightly controlled and linked to emerging inequalities on the island (Peltenburg 1993: 14). Human representation (usually female) took on many forms in stone and painted clay, with picrolite cruciform figurines being one of the hallmarks of the period (see Steel 2004: 99–103). They are often found as grave offerings but also appear in other contexts and many were undoubtedly worn on necklaces or otherwise used in daily practice and reproductive rituals. At *Mosphilia*, Peltenburg identified a ceremonial area with large, well-built versions of domestic structures that were set apart from the rest of the settlement and entered through a formal approach (Peltenburg 1993: 13–14). Ceremonial feasting events may have been staged in an adjoining open area, evinced by the nearby concentration of ovens and serving bowls. It was in this area that a spectacular deposit of birthing figurines and other ritual paraphernalia was found inside a Red-on-White ware ceramic house model (Fig. 4). Mortuary rituals also became more elaborate and differentiated during the Middle Chalcolithic. While children tended to be buried in pit graves outside of houses, adult burials now appear in the first known extramural cemeteries. The cemetery at Souskiou-*Vathyrkakas* consists of shaft graves and other funerary structures with evidence for multiple burials, both primary and secondary inhumations, and long-term reuse (see Bolger 2003: 153–158).

Both Lemba-*Lakkous* and Kissonerga-*Mosphilia* were abandoned at the end of the Middle Chalcolithic, only to be reoccupied after a hiatus of some two centuries. The Late Chalcolithic, however, brought a number of innovations as the relative insularity of the previous four millennia gave way to renewed contacts with the mainland. Cultural influences from southeast Anatolia included the appearance of more technologically advanced ceramics and new vessel forms. At the same time, changes in spatial organization, the decreasing use of figural art and the introduction of chamber tombs point to changes in social and ideological practices (Peltenburg et al. 1998: 70–72; Steel 2004: 107–108). The period also witnessed incipient attempts by some individuals and groups to accumulate power through control over productive labor. This is seen in the

Cyprus, Archaeology of, Fig. 4 Deposit of figurines and other ritual paraphernalia from Kissonerga-*Mosphilia*, Middle Chalcolithic; (left) in situ; (right) detail of ceramic building model (courtesy of the Lemba Archaeological Project)

Pithos House at *Mosphilia*, a large structure with evidence for the large-scale processing, storage, and possible redistribution of foodstuffs, perhaps including olive oil, and craft production in the form copper metallurgy and shell pendants (Peltenburg et al. 1998: 252–254). Peltenburg (1993) suggests that its (purposeful) destruction indicates that such attempts at aggrandizement and private accumulation of resources were actively resisted as part of a wider strategy of settlement discontinuity and fissioning that prevented the concentration of wealth and institutionalization of power. This would change dramatically over the course of the Bronze Age.

The Prehistoric Bronze Age

A suite of cultural innovations resulting from nascent international contacts, particularly with southern Anatolia, as well as more intensive exploitation of the island's mineral resources, and the localized emergence of pronounced social inequality, are among the interrelated developments that define the Prehistoric Bronze Age (PreBA). It begins with the short-lived and still poorly understood Philia phase (c. 2400/2350–2250 BCE), distinguished by a number of new cultural developments including Red Polished ceramics, mould-made copper artifacts, new architectural forms, and the reintroduction of cattle, which had disappeared from the faunal record by the Ceramic Neolithic (for detailed accounts of the PreBA see Knapp 2013: 278–280; Steel 2004: 119–148). While the Anatolian roots of these innovations are now unquestioned, there is debate among scholars regarding the degree to which these changes reflect local developments, spurred by emerging elites who were able to control both the internal distribution of prestige goods and long-distance exchange of copper with Anatolia (e.g., Manning 1993), or rather were the result of the arrival of Anatolian settlers (e.g., Webb and Frankel 1999). Knapp (2013: 130, 268–277) has recently explained EC culture as the product of the hybridization of native Cypriot and intrusive Anatolian cultural elements through the copresence of these groups during the Late Chalcolithic and Philia phase.

Certainly some of the most significant developments are associated with what has been termed the Secondary Products Revolution, which includes the use of animals (especially newly reintroduced cattle) for traction and products other than their meat. Use of the ox-drawn plough brought new areas under cultivation and underpinned a more efficient agropastoral system with surpluses that could be mobilized by emerging elites in strategies of wealth and status enhancement (Manning 1993). Combined with differential access to copper resources and metallurgical technology, these elites were able to take advantage of increased local and foreign demand for Cypriot copper, resulting in growing economic and social inequalities among households and extended family groups (Knapp 2013: 298–311), a process borne out in the EC cemeteries of Lapithos-*Vrysi tou Barba* and Bellepais-*Vounous* on the island's north coast. There, chamber tombs reused over generations exhibit evidence of elaborate burial rituals involving feasting, as well as large quantities of grave goods, particularly copper tools, weapons, and items of personal adornment, elaborate ceramic vessels with complex visual symbolism, and terracotta genre scenes either as separate models or displayed as scenes on the shoulders of vessels (Keswani 2004: chap. 4). Whether these tombs represent the emergence of hereditary elite lineages (Manning 1993) or more negotiable prestige distinctions, it seems that such pronounced inequalities were largely localized to the north coast. Nevertheless, funerary ritual at extramural cemeteries became the primary arena for intracommunity interaction and identity formation, as well as social competition and status display at this time (Keswani 2004: 37–83; Knapp 2013: 321). The establishment of corporate burial areas affirmed connections between the living, their ancestors and the land in which they were buried, and the territory to which the wider community laid claim in the context of growing land scarcity (Keswani 2004: 41).

The settlements associated with the *Vrysi tou Barba* and *Vounous* cemeteries have not been found, but the available evidence suggests that a relatively egalitarian social organization persisted elsewhere. The new agricultural practices

precipitated by the secondary products revolution brought other social changes, however, including a shift from communal and kin-based production to a household-based system with a more complex division of labor along gender lines (Bolger 2003: 38–41). This is reflected in new types of domestic architecture seen at sites such as Sotira-*Kaminoudhia*, Alambra-*Mouttes*, and Marki-*Alonia* – villages with rectilinear, multiroom dwellings arranged in accretive forms that were unplanned but required some level of cooperation among households. Marki, a 5–6 ha village at its largest extent, has the longest continuous habitation sequence (Philia through MC II), in which the typical rectilinear compound or house consisted of two or more covered rooms at the back of a larger courtyard, an idealized concept that remained in place throughout the life of the settlement (Frankel and Webb 2006: 311–318; Fig. 5). The segmentation and more specialized use of domestic space reflects the increasing task differentiation among household members during the PreBA. Community-level interactions and identities are also evident in the built environment of PreBA villages. Ceramic or stone anthropomorphic plank figurines found near entrances to communal activity areas at Politiko-*Troullia* and other sites may have played an important role in signaling suprahousehold identities in such contexts (Falconer et al. 2014). New survey and excavation work at Alambra-*Mouttes* reveals that the village consisted of several nodes of habitation, perhaps representing kin-based neighborhoods or specialized activity areas, separated by open spaces containing tombs, agricultural fields, and vacant land (Sneddon 2015). Several of these trends would greatly intensify in the Protohistoric Bronze Age that followed.

The Protohistoric Bronze Age

It is no exaggeration to say that the Protohistoric Bronze Age (ProBA) brought revolutionary changes to nearly every aspect of Cypriot society. While highly complex, state-level societies had

Cyprus, Archaeology of, Fig. 5 Plan of Marki-*Alonia*, Phase G, MC I-II (courtesy of David Frankel and Jennifer Webb)

emerged in Mesopotamia and Egypt during the fourth millennium BCE and by the early third millennium in Anatolia and the Levant, Cyprus had remained a mostly egalitarian, insular and village-based society until the transition to the Late Bronze Age. We then see the rapid development of social stratification, population growth, and agricultural intensification, elite control over specialized systems of production and exchange, the appearance of the first cities and monumental architecture, and the development of the as yet undeciphered Cypro-Minoan script (Knapp 2013: 348–447; for further reading see Ferrara 2012 and Karageorghis 2002).

Not all of these transformations occurred immediately, and it is possible to distinguish a Proto-urban phase lasting until the fourteenth century BCE. This period is characterized by the appearance of a series of forts at sites such as Ayios Sozomenos and Enkomi, which were the first large-scale monumental buildings on the island and likely constructed to control the nascent copper industry, including transportation routes from the copper mines in the foothills of the Troodos to newly emerging coastal centers in the north and east. In a distinct break from centuries of burial in extramural cemeteries, we also see the placement of chamber tombs in the open spaces between buildings at Proto-urban Enkomi. The visibility and continued reuse of these tombs throughout this period indicates that they were the primary means of status display among competing groups (Keswani 2004: chap. 5) and used in the negotiation and demarcation of both physical and social boundaries between them.

This was followed by a fully urban phase (LC IIC-IIIA periods) that witnessed the (re)construction or urbanization of a number of settlements, particularly in the southern coastal region, although this played out along different trajectories. While sites such as Enkomi and Kalavasos-*Ayios Dhimitrios* show clear evidence of nucleated urban planning with contiguously placed buildings on street systems that followed an orthogonal grid (Fig. 6), others, such as Maroni, appear to have had a lower-density urban form dispersed over multiple nuclei (e.g., Manning et al. 2014). New types of houses were woven into this ProBA urban fabric, which were rectilinear, but, in contrast to their PreBA predecessors, tended to have more standardized forms (often court-centered or L-shaped) and were much larger with many more individual spaces. The new houses both produced and reflected an intensification of more specialized divisions of labor that began in the PreBA based on gender, age, and other factors. While the household continued to be an important unit of social and economic production, its members became enmeshed in a multiplicity of suprahousehold social networks at various scales, from neighborhoods through various levels of community, which they drew on in the formation of individual and group identities (Fisher 2014).

In these new urban environments, monumental buildings constructed using ashlar (cut stone) masonry provided venues for competitive feasting and other ritual activities during which statuses and identities were displayed and negotiated, replacing the funerary realm as the primary social arena (Fisher 2009). At Kalavasos-*Ayios Dhimitrios*, Maroni-*Vournes*, and Alassa-*Palaeotaverna*, this took the form of massive court-centered buildings, which appear to have been the administrative foci of their respective regions and yielded evidence for the large scale production and storage of agricultural goods, especially olive oil (Fig. 7). By contrast, no obvious single administrative focus has been recovered at Enkomi and a more heterarchical power structure may have existed there, as also suggested by the site's mortuary record (Keswani 2004: 93–98).

The new, mostly coastal, cities stood at the top of multitier, regional settlement hierarchies that included smaller inland sites engaged in production, administration, and transport, and specialized villages focused on agriculture, pottery production, or the mining and production of copper (Knapp 2013: 349–359). They were primary nodes in both local and interregional trade networks within Cyprus and long distance trade networks that connected the island to the wider Eastern Mediterranean world and beyond. Cities were also centers for the production and redistribution of a variety of specialized craft products,

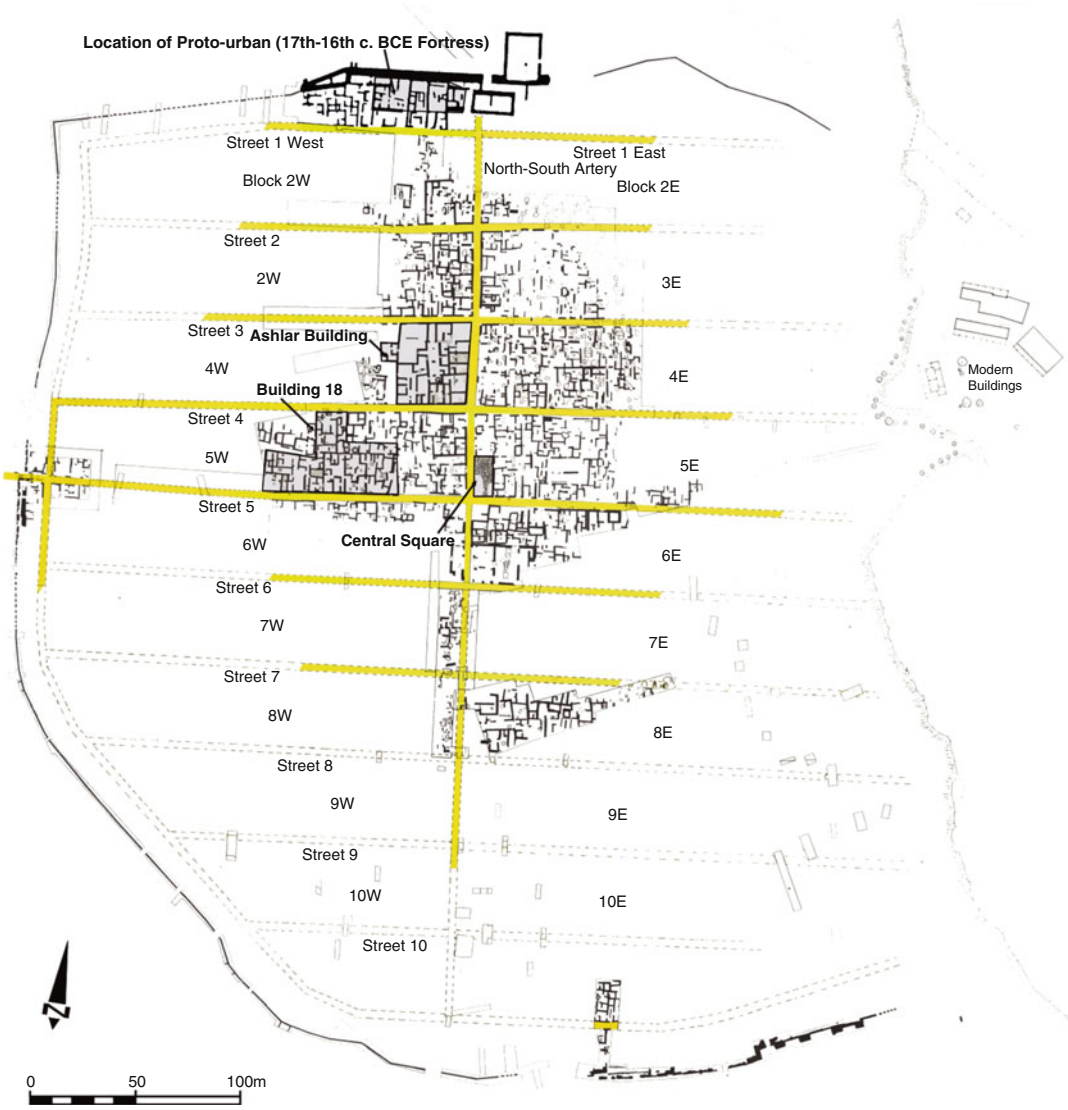

Cyprus, Archaeology of, Fig. 6 Plan of Enkomi, c. 1200 BCE (drawn by Kevin Fisher)

although copper appears to have been the vital commodity in Cyprus's overseas exchanges. Control over its production underpinned at least in part the economic power of ProBA elites and was legitimized through ideological means (Knapp 2013: 371–2) – a strategy materialized in the bronze "Ingot God" statue found at Enkomi in the sanctuary that bears its name. Cypriot copper was widely distributed around the Mediterranean (and beyond) and typically shipped in the form of "oxhide" ingots (usually c. 25–28 kg in weight). Three-hundred and forty-eight such ingots, weighing nearly 10 tons, were part of the impressive cargo recovered from the Uluburun shipwreck, a late-fourteenth century BCE vessel likely headed for an Aegean port, which sank off the southern coast of Turkey near modern Kaş (Pulak 2010). Debate continues regarding the vessel's origin and the nature of the exchange represented by its cargo, although some form of elite- (if not royal-) directed exchange seems likely. Among the ship's cargo were numerous

Cyprus, Archaeology of, Fig. 7 The Pithos Hall in Building X, Kalavasos-*Ayios Dhimitrios* (LC IIC). Each stone base supported a large storage jar (*pithos*), likely containing olive oil, with a combined capacity of over 33,000 liters (photo by Kevin Fisher)

Cypriot ceramic vessels packed into large storage jars (*pithoi*), including distinctive handmade finewares such as White Slip and Base Ring, which have been recovered from sites around the Mediterranean.

These exchanges marked Cyprus's growing connectivity and engagement in an emerging LBA network that linked the island to other polities in a complex web of economic and political relations. Such interconnections were undoubtedly a significant factor in the rapid development of (ostensibly) state-level sociopolitical organization in the ProBA, but questions remain as to whether this took the form of an island-wide polity or series of regional polities, or vacillated between these configurations over the course of the LBA. Few would question the identification of Cyprus as the territory of *Alašiya* referred to in a number of Late Bronze Age textual sources, although it is uncertain if this refers to the whole island or only a particular city or region. The terms of address used in official diplomatic correspondences of the period, such as the mid-fourteenth century BCE Amarna Letters found in the capital of the Egyptian pharaoh Akhenaten (for further reading see Moran 1992), make it clear that the King of *Alašiya* was among the "great kings" of the period. These letters and the status they imply, in addition to the cultural homogeneity reflected in many aspects of the material record, are central to arguments that favor Cyprus being ruled as a unified, centralized state during much of the Late Bronze Age, or at least during the fourteenth–thirteenth centuries BCE (see Knapp 2013: 432–447). Others favor a more decentralized system, characterized by a heterarchical or corporate distribution of power in which the king was something of a "first among equals" representing the island's elite in international affairs (e.g., Peltenburg 2012).

The LBA system collapsed in the decades around 1200 BCE, a period of upheaval marked by the destruction or abandonment of a number of major centers and the disintegration of the highly centralized palace-based economies in the region. Based on the presence of locally made Mycenaean-style ceramics (particularly so-called Mycenaean IIIC:1b) and certain "Aegean" architectural features (e.g., large halls with central hearths), and bolstered by foundation legends associated with Homeric heroes, some scholars argue that there was an initial influx of colonists or refugees on Cyprus at this time, who left the Aegean region in the wake of the collapse of the Mycenaean palace system (e.g., Karageorghis 2000). These settlers are often equated with the enigmatic "Sea Peoples," who are thought to have played a key role in the disruptions and population movements in the region, including those that mark the LC IIC to IIIA transition on Cyprus. Proponents of this colonization model suggest that these events mark the beginning of the Hellenization of the island as the Greek settlers came to dominate the island culturally, if not politically,

by the early Iron Age, perhaps even earlier (e.g., Iacovou 2008). A number of scholars have taken issue with this model on archaeological grounds, arguing against simplistic "pots = people" concepts of ethnicity and some have also criticized its role in a broader Hellenocentric narrative aimed at legitimizing present-day political claims (e.g., Leriou 2007). While not discounting the likely presence of some Mycenaeans on the island, a stronger case can be made for viewing Aegean influences in ProBA material culture as the product of the hybridization or entanglement of Aegean with native Cypriot and Levantine elements in the context of growing socioeconomic interaction (e.g., Knapp 2013: 454–470). Explanations for the end of the LBA have moved away from unicausal models (such as the Sea Peoples), recognizing that climate and other natural disasters, the highly centralized and interconnected nature of the palatial economies, and intensified mobility all had roles to play in the "crisis years," but even a careful marshalling of the documentary, archaeological and scientific evidence (e.g., Knapp and Manning 2016) cannot yet explain the causes of events that played out over the course of decades throughout large areas of the Mediterranean.

Iron Age City-Kingdoms

By the start of the Iron Age, a period known as the Protogeometric (or LC IIIB), most of the Late Bronze Age centers were destroyed and/or abandoned, yet cultural continuity is seen in a number of areas, including pottery styles and production, architecture, metallurgy, and religious practices (Iacovou 2008; Knapp and Manning 2016: 134). Indeed, Cyprus fared better than many regions and the disruptions of the period were relatively short-lived as the ProBA system was replaced with the emergence of a new sociopolitical landscape defined by city-kingdoms. While occupation continued at Kition (Smith 2009), Palaepaphos, Enkomi (moved to nearby Salamis) and Idalion, a number of new centers were founded at sites such as Soloi, Lapithos, and Marion – settlements that would all later become the centers of Iron Age kingdoms. Most evidence from this period comes from the burial record, however, as extramural cemeteries with family-oriented tombs once more became the norm. The cultural, social, and political developments of the Early Iron Age have typically been explained in terms of the presence and influence of new ethnic groups. For proponents of the aforementioned Aegean colonization model, the Greek population, bolstered by additional immigration at this time become culturally dominant in the Cypro-Geometric (CG) period, reflected in Aegean-inspired pottery, tomb types, and the introduction of Greek language and political institutions. Phoenicians also arrived on the island, perhaps as early as the eleventh century BCE, eventually establishing a colony at Kition from which they too were able to exert economic and cultural influence (see Janes 2010: 128–130). These foreign cultures (particularly the Greek) are seen to absorb a less complex and gradually acculturated native "Eteocypriot" culture, while providing the impetus for state formation (see Knapp 2013: 454–470 for a more detailed discussion).

New approaches to understanding the sociopolitical developments of this period have moved away from problematic discussions of the ethnicity of material culture and focus instead on the complex external and intra-island interactions of these and other groups that created the hybridity seen in the mortuary record, iconography, and built environment of this period (Counts 2010; Janes 2010; Kearns 2011). Although often cited as evidence for Greek colonization and sociopolitical preeminence, the bronze *obelos* (skewer) inscribed with the Greek name "Opheltas" found in Tomb 49 at Palaepaphos-*Skales* embodies the hybridized nature of Iron Age material culture on the island. Not only is the act of inscribing one's name on an object a Levantine and Cypriot practice, but the artifact is a distinctly Cypriot type and the Greek name is written in the Cypro-syllabic script used on the island throughout much of the Iron Age (Sherratt 2003).

Janes (2010) argues that burial practices at each of the major CG centers reflect different strategies of social organization and interaction by which they became kingdom centers. While the placement of tombs around Palaepaphos was intended to project the community's identity to the

outside world, the first burials among the "Royal" Tombs at Salamis during the late CG announced the emergence of a ruling lineage to the local population, a process facilitated by successful competition for both island resources (particularly copper and timber) and control of increasingly lucrative trade links with the eastern Mediterranean. This culminated with Tomb 79, dated to the CG III/CA I, with its evidence of elaborate funerary ritual and conspicuous consumption performed in its wide, sloped, ashlar-lined *dromos* (entryway). This included the sacrifice of horses in full harness with their chariots and the interment of impressive ivory-inlaid furniture and a bronze cauldron with griffin protomes (Karageorghis 1973) – hybridized funerary practices and material culture that referenced Greek, Near Eastern, and Egyptian exemplars. These various processes saw the emergence of a number of city kingdoms throughout the island by the Cypro-Archaic Period (700–400 BCE). From this point forward, a wider range of historical and epigraphic sources are available to help elucidate the picture provided by archaeology.

It is unclear precisely how many Cypriot city-kingdoms existed at any given time, although several are attested in textual sources from the Neo-Assyrians, the first of the great first millennium BCE Near Eastern empires to exert some form of nominal control over the island. A stele from Kition commemorates the 707 BCE submission of seven unnamed kings of Cyprus to Sargon II, while the Prism of Esarhaddon (613/2 BCE) lists ten cities and their rulers, including Idalion, Chytroi, Palaepaphos, Kourion, Tamassos, Ledra, Salamis, and Soloi, while two others, Qartihadasti and Noure, remain unclear (Iacovou 2008: 642–643). The island was largely Greek-speaking by this time (Iacovou 2008: 640), although hybridity continued to be a characteristic trait of its material culture – a combination of local creation and foreign stimuli that arrived through growing long-distance exchange and outside political control as the island became an important node for the transition of innovations between the Greek and Near Eastern worlds. Despite some regional variations (seen especially in ceramic decoration and sculpture), there was general "material homogeneity" on Cyprus during the period of the city-kingdoms, indicating a shared cultural system (Papantoniou 2012: chap. 3).

The kingdoms were typically characterized by a fortified urban center and surrounding hinterland. Urban and extramural sanctuaries dedicated to local gods and Cypriot variants of Greek and Near Eastern deities were especially important elements of the Iron Age landscape, playing an active role in the definition and organization of political space, the negotiation of social relationships, and the formation of religious, cultural, and political identities (Counts 2010; Papantoniou 2012). Some, like the Sanctuary of Aphrodite at Palaepaphos became internationally famous. Based on the archaeological and textual records, Cypriot kings (*basileis*) likely held wide-ranging political, military, socioeconomic, and probably religious control over their territories (Counts 2010: 141–143). While most people were buried in rock-cut chamber tombs, ruling dynasts and other high ranking elites often built impressive tombs using ashlar masonry, as seen in the royal necropolis at Tamassos. The palaces of the Archaic and Classical rulers are known mainly from Amathous and Vouni and a recent reassessment of the palace at Vouni, built in c. 500 BCE during the period of Persian rule, demonstrates how its layout, construction, and renovation used hybridized architectural forms that marked the complex as a critical site of local sovereignty, while simultaneously tying its builders to larger currents within the eastern Mediterranean (Kearns 2011).

Interrelations among the Cypriot kingdoms were rarely amicable and their political ambitions and rivalries were occasionally resolved militarily as seen in the annexation of Idalion by Kition in 470 BCE. During the late Cypro-Archaic and Cypro-Classical periods the kingdoms became directly embroiled in the wider struggles between the Greeks and the Persian Empire. Following a possible brief period of Egyptian rule, the Cypriot kingdoms submitted to the Persians in 545 BCE but largely retained their independence. In 499 BCE all except Amathous joined the Greek side in the Ionian revolt and were defeated by a Persian force who lay siege to several cities. As

the conflict between Persia and Greece continued, allegiances were divided as some Cypriot rulers resisted the Persians, while others took a pro-Persian stance. The Greeks, under the leadership of Athens, made a number of unsuccessful attempts to liberate the island and, in spite of the efforts of Evagoras I of Salamis to gain control of the island with Athenian help in the early fourth century BCE, it remained under Persian control until the conquests of Alexander the Great.

Age of Empires: Hellenistic and Roman Cyprus

After Alexander's death in 323 BCE, his successors fought for control of his short-lived empire and the Cypriot *basileis* were divided between the Antigonids and the Ptolemies. Cyprus, highly desired for its strategic location, rich copper and grain resources, and timber for ship building, eventually fell to Ptolemy I. After a brief period of Antigonid rule starting in 306, Ptolemy regained the island in 294 BCE, beginning a 250-year period of nearly unbroken control. There is no further mention of the city-kingdoms or their rulers after 306, a situation corroborated by numismatic evidence as local rulers could no longer mint their own coinage. Papantoniou (2012: 11) argues that, despite the imposition of a unified state, the administrative functions of Cypriot cities likely continued at least through the third century BCE. The Ptolemies eventually installed a *strategos* (governor-general) who was a member of the royal court in Alexandria and directly responsible to them. The administrative system was reorganized at the end of the third century BCE, imposing a unifying administrative system backed by a state ideology linked to the royal cult and, based on epigraphic evidence, a court like that of Alexandria may have existed on Cyprus at this time (Papantoniou 2012: chap. 4). It is notable that many of the extra-urban sanctuaries that had played such an important role in local politics, territorial definition, and identity formation during the period of the city-kingdoms began to fall into disuse after this time. The result of these changes was a more unified cultural and religious system in relative conformity with wider the Hellenistic *koiné* (Papantoniou 2012: 360).

Little public or domestic architecture from the Hellenistic period has been recovered, much of it having been obscured by later Roman construction or destroyed by the severe earthquakes of the first centuries BCE and CE. The capital was moved to Nea Paphos in the second century BCE as part of the administrative restructuring of the island. Ongoing excavations and survey by both Cypriot and foreign teams suggest that, from its founding in the fourth century BCE, the town was built on an orthogonal plan with well-defined commercial and residential areas, as well as a c. 8000-seat theater, agora, and city walls (Balandier 2016; Młynzarczyk 2016). While rock-cut chamber tombs continued to be the norm for many non-elite Cypriotes, the so-called Tombs of the Kings cemetery in the *Palaeokastra* locality at Nea Paphos demonstrates how local elites drew on Alexandrian exemplars in the construction of a monumental funerary landscape. The most impressive examples of these subterranean, rock-cut tombs include the use of a peristyle court with Doric-style columns and architectural elements of stuccoed and painted limestone (Fig. 8).

The eastward expansion of the Romans in the first century BCE, coupled with the declining power of the Ptolemies, led to the annexation of Cyprus by Rome in 58 BCE. Following the battle of Actium, Julius Caesar's heir Octavian (soon to be given the title *Augustus*) was left sole ruler of Rome's vast empire. Cyprus was initially added to the province of Syria, under Augustus's direct control, but was soon made a senatorial province governed by a senate-appointed proconsul. Nea Paphos initially continued as the island's capital and excavations in the *Maloutena* locality have revealed a residential area with a number of Roman urban villas with impressive mosaic floors, including the massive second century CE Villa of Theseus, a *villa publica* that likely served as the proconsul's official residence. The Hellenistic street grid was retained at least until the rebuilding of the city following an earthquake, likely during the reign of Hadrian in the early-mid-second century CE (Młynzarczyk 2016: 35). This rebuilding included the construction of an Odeon and Asklepieion adjoining a new

Cyprus, Archaeology of, Fig. 8 Tomb 3 peristyle with Doric columns; "Tombs of the Kings," Nea Paphos (*Palaeokastra*); Hellenistic, third century BCE (photo by Kevin Fisher)

colonnaded agora. The island flourished under the so-called *Pax Romana* and cities like Nea Paphos and Salamis benefitted from imperial patronage. The Roman civic and domestic architecture still visible at Kourion, Nea Paphos, and Salamis remain some of the island's most impressive archaeological monuments and are testament to its relative prosperity during the early empire. Current approaches to the archaeology of Roman Cyprus have taken up the critique of "Romanization" seen elsewhere in Roman studies, emphasizing Cypriot agency through connectivity and participation in local and long-distance exchange networks (e.g., Lund's [2015] study of Hellenistic and Roman ceramics), as well as the production of local insular identities expressed through Cypriot material culture, such as the hybridized Temple of Apollo Hylates at Kourion, whose polyvocal design incorporated Roman, Cypriot, and Near Eastern elements (e.g., Gordon 2018).

The island would not truly regain its independence until 1960 as its strategic position ensured its incorporation into an almost unbroken succession of empires and colonial powers, each of which left its own traces on the Cypriot landscape. Yet, this was not a process of passive reception on the part of the island's inhabitants. Rather, as the foregoing account demonstrates, the Cypriotes actively shaped these encounters, adapting foreign influences to local circumstances and creating a unique, vibrant, and fascinating culture in the process.

Key Issues and Current Debates

The foregoing account also raises a number of significant issues that continue to spark debate and influence the direction and scope of archaeological research on Cyprus. The origins and timing of the island's first episodes of visitation and colonization and the interactions of its first inhabitants with the mainland during the Neolithic period are undoubtedly some of the key questions archaeologists are now trying to address. The interplay of indigenous developments and foreign influences at several key transformations in the Cypriot past (e.g., the Chalcolithic to Early Bronze Age, the origins of the Late Bronze Age, and the transition to the Early Iron Age) and their implications for identity formation are vital areas of research and debate. The adoption of post-processual approaches by some scholars has seen critical examinations of the role of modern

politics and colonial legacies in the interpretation of the island's archaeological record (e.g., Knapp and Antonidou 1998; Leriou 2007; various papers in Tatton-Brown 2001). Indeed, one cannot discuss the archaeology of Cyprus without consideration of its current political situation, which continues to have a profound effect on our understanding of the island's past. Growing tensions between Greek and Turkish Cypriotes following independence culminated in 1974 with a short-lived *coup d'état* by pro-*Enosis* (union with Greece) forces and an invasion of the northern part of the island by Turkey. In the wake of these events, Cyprus became partitioned along ethnic lines. The government of the largely Greek south (the Republic of Cyprus) is recognized by the international community as the island's legitimate regime, while the self-declared Turkish Republic of Northern Cyprus is recognized only by Turkey, who maintains a substantial military presence in this territory. The result has been a cessation of "officially sanctioned" archaeological work in the north since 1974, and what work that has taken place there is not well reported. Perhaps more worrisome is the fact that some cultural objects and sites in the north have been subject to neglect, theft, and, in some cases, purposeful damage and destruction (Knapp and Antoniadou 1998: 24–29). Consequently, there are now significant gaps in our knowledge of this important region, which has been largely disengaged from mainstream archaeology and the systematic application of advancements in archaeological method and theory seen on the rest of the island over the last few decades.

Future Directions

The future scope of archaeological inquiry will obviously depend on whether a solution can be found to the "Cyprus Problem." Regardless of the outcome of this thorny issue, increasing pressures of development, spurred in no small part by the tourism industry, will present a difficult challenge for archaeologists working on the island and particularly for the Department of Antiquities as the government body charged with protecting the island's cultural heritage. In response to this situation and current trends in archaeological data collection, scientific methods for detection (e.g., archaeological geophysics, terrestrial, and aerial remote sensing), recording and analysis at various scales will need to play an increasingly important role in the investigation and conservation of Cyprus's archaeological record. Growing engagement with the critical perspectives of post-processual archaeology, which has spurred fruitful research on issues of gender, identity, agency, power, and materiality, will undoubtedly continue. This includes an emphasis on the perspectives of "island archaeology" and concepts such as *islandscape* and *coastscape*, which are essential to understanding ancient Cypriotes' relationships with the surrounding sea and the important role of insularity and connectivity in identity formation and change through time (see Knapp 2013: 34–37). Introspection on the practice of Cypriot archaeology itself and its political entanglements in the past and present will also continue and the discipline will unquestionably play a key role as Cyprus grapples with issues of heritage management and identity thrown into relief not only by its current political and ethnic division, but also by its accession to the European Union and the growing pressures of economic development and immigration.

Cross-References

- ▶ Classical (Greek) Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cyprus: Cultural Heritage Management
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Early Regional Centers: Evolution and Organization
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Frankel, David
- ▶ Greek Colonialism, Archaeology of
- ▶ Households in the Ancient Near East, Archaeology of

▶ Looting and Vandalism (Cultural Heritage Management)
▶ Nationalism and Archaeology
▶ Near East (Including Anatolia): Origins and Development of Agriculture
▶ Numismatics, Ancient Greek
▶ Post-Processual Archaeology
▶ Trade and Transport in the Ancient Mediterranean
▶ Urban Planning in the Greek World

References

Balandier, C., ed. 2016. *Nea Paphos. Fondation et développement urbanistique d'une ville chypriote de l'antiquité à nos jours. Études archéologiques, historiques et patrimoniales*. Bordeaux: Ausonius Éditions.

Bolger, D.R. 2003. *Gender in ancient Cyprus: Narratives of social change on a Mediterranean island*. Walnut Creek: AltaMira Press.

Counts, D.B. 2010. Divine symbols and royal aspirations: The master of animals in Iron Age Cypriote religion. In *The master of animals in Old World iconography*, ed. D.B. Counts and B. Arnold, 135–150. Budapest: Archaeolingua Alapítvány.

Falconer, S., E. Monahan, and P. Fall. 2014. A stone plank figure from Politiko-*Troullia*, Cyprus: Potential implications for inferring Bronze Age communal behavior. *Bulletin of the American Schools of Oriental Research* 371: 3–16.

Fisher, K.D. 2009. Elite place-making and social interaction in the late Cypriot Bronze Age. *Journal of Mediterranean Archaeology* 22 (2): 183–209.

Fisher, K.D. 2014. Making the first cities on Cyprus: Urbanism and social change in the Late Bronze Age. In *Making ancient cities: Space and place in early urban societies*, ed. A. Creekmore and K.D. Fisher, 181–219. New York/Cambridge: Cambridge University Press.

Frankel, D., and J.M. Webb. 2006. *Marki Alonia: An Early and Middle Bronze Age town in Cyprus: Excavations 1995–2000*. Sävedalen: P. Åströms Förlag.

Given, M., and A.B. Knapp. 2003. *The Sydney Cyprus Survey Project. Social approaches to regional archaeology survey*. Los Angeles: Cotsen Institute.

Gjerstad, E., et al. 1934. *The Swedish Cyprus Expedition*. Vol. I. Stockholm: The Swedish Cyprus Expedition.

Gordon, J.M. 2018. Insularity and identity in Roman Cyprus: Connectivity, complexity, and cultural change. In *Insularity and identity in the roman Mediterranean*, ed. A. Kouremenos. Oxford: Oxbow.

Guilaine, J., F. Briois, and J.-D. Vigne. 2011. *Shillourokambos. Un établissement néolithique précéramique à Chypre. Les fouilles du secteur 1*. Paris: Editions Errance.

Iacovou, M., ed. 2004. *Archaeological field survey in Cyprus: Past history, future potentials*. London: The British School at Athens.

Iacovou, M. 2008. Cultural and political configurations in iron age Cyprus: The sequel to a protohistoric episode. *American Journal of Archaeology* 112 (4): 625–657.

Janes, S.M. 2010. Negotiating island interactions: Cyprus, the Aegean and the Levant in the Late Bronze to Early Iron Age. In *Material connections in the ancient Mediterranean: Mobility, materiality and identity*, ed. P. van Dommelen and A.B.. Knapp, 127–146. New York: Routledge.

Karageorghis, V. 1973. *Excavations in the Necropolis of Salamis III,* Salamis Vol. 5. Nicosia: Department of Antiquities.

Karageorghis, V. 2000. Cultural innovations in Cyprus relating to the sea peoples. In *The Sea Peoples and their world: A reassessment*, ed. E.D. Oren, 255–279. Philadelphia: The University Museum, The University of Pennsylvania.

Kearns, C. 2011. Building social boundaries at the hybridizing first-millennium BC complex of Vouni (Cyprus). *Journal of Mediterranean Archaeology* 24 (2): 147–170.

Keswani, P. 2004. *Mortuary ritual and society in Bronze Age Cyprus*. London: Equinox.

Knapp, A.B. 2013. *The archaeology of Cyprus. From earliest prehistory through the Bronze Age*. New York/Cambridge: Cambridge University Press.

Knapp, A.B., and S. Antoniadou. 1998. Archaeology, politics and the cultural heritage of Cyprus. In *Archaeology under fire: Nationalism, politics and heritage in the eastern Mediterranean and Middle East*, ed. L. Meskell, 13–43. New York: Routledge.

Knapp, A.B., and J.F. Cherry. 1994. *Provenience Studies and Bronze Age Cyprus: Production, Exchange, and Politico-Economic Change*, Monographs in World Archaeology 21. Madison: Prehistory Press.

Knapp, A.B., and S.W. Manning. 2016. Crisis in context: The end of the Late Bronze Age in the eastern Mediterranean. *American Journal of Archaeology* 120 (1): 99–149.

Leriou, N. 2007. Locating identities in the eastern Mediterranean during the Late Bronze Age-Early Iron Age: The cast of 'Hellenized' Cyprus. In *Mediterranean crossroads*, ed. S. Antoniadou and A. Pace, 563–591. Athens: Pierides Foundation.

Lund, J. 2015. *A study of the circulation of ceramics in Cyprus from the 3rd century BC to the 3rd century AD, Gösta Enbom monographs 5*. Aarhus: Aarhus University Press.

Manning, S.W. 1993. Prestige, distinction, and competition: The anatomy of socioeconomic complexity in fourth to second millennium BCE. *Bulletin of the American Schools of Oriental Research* 292: 35–58.

Manning, S.W., C. McCartney, B. Kromer, and S.T. Stewart. 2010. The earlier Neolithic in Cyprus: Recognition and dating of a Pre-pottery Neolithic a occupation. *Antiquity* 84: 693–706.

Manning, S.W., G.-M. Andreou, K.D. Fisher, P. Gerard-Little, C. Kearns, J.F. Leon, D.A. Sewell, and T.M. Urban. 2014. Becoming urban: Investigating the

anatomy of the Maroni Late Bronze Age complex, Cyprus. *Journal of Mediterranean Archaeology* 27 (1): 3–32.
Młynzarczyk, J. 2016. Walking around the site of Nea Paphos and through the decades of its exploration. In *Nea Paphos. Fondation et dévelopment urbanistique d'une ville chypriote de l'antiquité à nos jours Études archéologiques, historiques et patrimoniales*, ed. C. Balandier, 33–46. Bordeaux: Ausonius Éditions.
Papantoniou, G. 2012. *Religion and social transformations in Cyprus: From the Cypriot* basileus *to the Hellenistic* strategos. Leiden/Boston: Brill.
Peltenburg, E.J. 1993. Settlement discontinuity and resistance to complexity in Cyprus, ca. 4500–2500 BCE. *Bulletin of the American Schools of Oriental Research* 292: 9–23.
Peltenburg, E.J. 2012. Text meets material culture in Late Bronze Age Cyprus. In *Cyprus: An island culture. Society and social relations from the Bronze Age to the Venetian period*, ed. A. Georgiou, 1–23. Oxford: Oxbow Books.
Peltenburg, E.J., et al. 1998. *Excavations at Kissonerga-Mosphilia 1979–1992* (Lemba archaeological project 2:1A, SIMA 70/2). Jonsered: P. Åströms Förlag.
Pulak, C. 2010. Uluburun shipwreck. In *The Oxford handbook of the Bronze Age Aegean*, ed. E. Cline, 862–876. Oxford: Oxford University Press.
Rupp, D.W. 1988. The 'Royal Tombs' at Salamis: Ideological messages of power and authority. *Journal of Mediterranean Archaeology* 1 (1): 111–139.
Sherratt, E.S. 2003. Visible writing: Questions of script and identity in Early Iron Age Greece and Cyprus. *Oxford Journal of Archaeology* 22: 225–242.
Simmons, A.H. 1999. *Faunal extinction in an island society: Pygmy hippopotamus hunters of Cyprus*. Dordrecht/Boston: Kluwer Academic/Plenum.
Smith, J.S. 2009. *Art and society in Cyprus from the Bronze Age into the Iron Age*. New York/Cambridge: Cambridge University Press.
Sneddon, A. 2015. Revisiting Alambra *Mouttes*: Defining the spatial configuration and social relations of a Prehistoric Bronze Age settlement in Cyprus. *Journal of Mediterranean Archaeology* 28 (2): 141–170.
Steel, L. 2004. *Cyprus before history: From the earliest settlers to the end of the Bronze Age*. London: Duckworth.
Tatton-Brown, V., ed. 2001. *Cyprus in the 19th century AD: Fact, fancy and fiction*. Oxford: Oxbow Books.
Todd, I.A. 2004. *The Field survey of the Vasilikos Valley*, Vasilikos Valley Project 9. Vol. 1. Sävedalen: Paul Åströms Förlag.
Webb, J.M., and D. Frankel. 1999. Characterising the Philia facies. Material culture, chronology and the origin of the Bronze Age in Cyprus. *American Journal of Archaeology* 103: 3–43.

Further Reading

Bolger, D.R., and N.J. Serwint, eds. 2002. *Engendering Aphrodite: Women and society in ancient Cyprus*. Boston: American Schools of Oriental Research.
Ferrara, S. 2012–14. *Cypro-Minoan inscriptions*. Vol. 2. Oxford: Oxford University Press.
Karageorghis, V. 2002. *Early Cyprus: Crossroads of the Mediterranean*. Los Angeles: J. Paul Getty Museum.
Moran, W.L. 1992. *The Amarna letters*. Baltimore: Johns Hopkins University Press.
Peltenburg, E.J., and A. Wasse, eds. 2004. *Neolithic revolution: New perspectives on Southwest Asia in light of recent discoveries on Cyprus*. Oxford: Oxbow Books.

Web Resources

A.G. Leventis Foundation. http://www.leventisfoundation.org/en/
American Schools of Oriental Research (ASOR). http://www.asor.org/
Archaeological Research Unit of the University of Cyprus. https://www.ucy.ac.cy/aru/en/
Catalog of the Ancient Cyprus Collection of the British Museum. http://www.britishmuseum.org/research/publications/online_research_catalogues/ancient_cyprus_british_museum.aspx
Cyprus American Archaeological Research Institute (CAARI). http://www.caari.org/
Cyprus Institute, Science and Technology in Archaeology Research Centre (STARC) https://www.cyi.ac.cy/index.php/starc/about-the-center/center-overview.html
Department of Antiquities Cyprus. http://www.mcw.gov.cy/mcw/da/da.nsf/DMLindex_en/DMLindex_en
Kalavasos and Maroni Built Environments Project (KAMBE). http://kambe.cnrs.ubc.ca/
Karageorghis, V., J.R. Mertens, and M.E. Rose. 2000. *Ancient art from Cyprus: The Cesnola collection in the Metropolitan Museum of Art*. New York: Metropolitan Museum of Art. (available at http://www.metmuseum.org/research/metpublications/Ancient_Art_from_Cyprus_The_Cesnola_Collection_in_The_Metropolitan_Museum_of_Art).

Cyprus: Cultural Heritage Management

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Introduction

The factors that have affected the Cypriot culture diachronically are the island's strategic

geographical position in the eastern Mediterranean, its central role in the interactions and exchanges taking place in the broader region, and its natural prosperity. These specifications have made the island a place where cultural traits from different civilizations are encountered. Based on archaeological evidence, it is believed that these interactions, together with endogenous factors, lead to the emergence of Neolithic settlements and the development of complex social structures already from the Bronze Age. The island's rich natural resources and centrality in the eastern Mediterranean basin continued to determine its history in the following periods, evidenced in the variability characterizing the material culture, as developed within each period's sociopolitical, economic, and ideological framework. As evidenced in the archaeological record, due to its island-specific traits, and as a crossroad between the eastern and western Mediterranean, Cyprus played a crucial role in the diachronic exchange of ideas and the transfer of information among diverse civilizations. Continuous occupation from prehistoric times resulted in the existence of numerous archaeological sites throughout the island and the need to provide protection and promotion of cultural heritage.

The character of Cultural Heritage Management in Cyprus is strongly linked to the modern history of the island and the establishment of the Department of Antiquities in 1935. Given the significant historical and archaeological background of Cyprus, extending from the Paleolithic to the Ottoman period, and its rich folk heritage, Cultural Heritage Management developed into a vital sector of the Republic of Cyprus, established in 1960. Most importantly, it became a milestone in the promotion of tourism, economic development, and the reinforcement of cultural identity. Nevertheless, Cultural Heritage Management only involves the south area of the island, as a result of the Turkish invasion of 1974 and the loss of control over many important monuments and archaeological sites, situated in the occupied northern area. This section aims at giving a brief account of the definition of Cultural Heritage Management in Cyprus and the broader factors that affected its development. It will also focus on the key issues governing the structured actions in order to understand its scope and the underlying factors.

Definition

Cultural Heritage Management on Cyprus, practiced by the Department of Antiquities, primarily involves the protection, restoration, conservation, and promotion of classified sites, monuments, and artefacts, such as mosaics, frescoes and icons. It also involves the establishment, management, and operation of archaeological museums and the control of private collections. Its operation falls within the realm of the two sectors (Ephorates) of the Department of Antiquities: the sector responsible for the Ancient Monuments and the sector responsible for the operation of Archaeological Museums. It also encompasses the government's efforts against the looting of the island's cultural heritage primarily, as a result of the Turkish occupation of the northern area of the island.

As portrayed in the Antiquities Law (Cap. 31),

> antiquity means any object, whether movable or part of immovable property which is a work of architecture, sculpture, graphic art, painting or generally any form of art which has through human effort been produced, sculptured, inscribed, or painted or generally made in Cyprus earlier than the year 1850A.D. in any manner whatsoever and from any material and which has been found, discovered or excavated in Cyprus or recovered from the sea within the territorial waters of Cyprus and includes any such object or part thereof which has at a later date been added, reconstructed, readjusted or replaced subsequently.

According to this legal statement, Cultural Heritage Management on Cyprus is particularly engaged with the protection of the antiquities falling within the above categories.

Cultural Heritage Management on Cyprus is tightly affiliated with its modern history, and in particular with the British Colonial period (1878–1960) of the island. In fact, the establishment of the Cyprus Museum in 1882 was the result of the reaction of locals against the illicit excavations and the smuggling of antiquities from the island. According to the Ottoman Law on Antiquities of 1874, one third of the

excavated antiquities belonged to the Government, one third to the owner of the land, and the remaining third to the excavator. It is worth noting that the British maintained this law for over 20 years, while many excavators, taking advantage of the legal status and the poverty prevailing on the island, bought the land in order to posses the two thirds of the excavated antiquities. The Antiquities Law was enacted in 1905, during the British Colonial period, with an amendment in 1927, regarding the exportation of antiquities. The enactment of the new Antiquities Law in 1935 coincides with the establishment of the Department of Antiquities as a governmental organization, and the abolition of the previous Museum Committee.

The establishment of the Department of Antiquities is associated with the conduct of large-scale systematic excavations, which were to increase following the independence of the island in 1960. It is the intensification of excavations which largely determined the development of management of archaeological sites, reflected in the Antiquities Law of 1935 and the subsequent amendments. The establishment of the management of cultural heritage, however, was significantly triggered by the severe destruction of archaeological sites and antiquities caused by the Turkish invasion in 1974. Archaeological research on the occupied northern area of the island ceased, and archaeological sites and monuments, including churches and museums, remained neglected, or suffered violations. These new circumstances imposed the adoption of new strategies regarding the protection of Cypriot cultural heritage. Yet, Cyprus still became a central focus for international archaeological research, resulting in the great increase of excavations undertaken by foreign missions in the non-occupied area. The economic recovery of Cyprus following the disaster of 1974 and the role of tourism in the economic development bestowed a new role to the Cultural Heritage Management of the island.

In essence, it is the totality of the aforementioned circumstances that affected and eventually formed the character of Cultural Heritage Management on Cyprus, envisaged in the efforts for revealing, protecting, and promoting the remains of the island's important ancient past. The mechanisms employed for the management of cultural heritage can be traced in the Antiquities Law of 1935. Together with the subsequent amendments, the Antiquities Law, alongside the Regulations, still regulates the Cultural Heritage Management in Cyprus.

Key Issues

The key issues of Cultural Heritage Management, encompassed in the Antiquities Law of Capital 31, are summarized into owning property in antiquities, the accidental discovery or disposal of antiquities, aspects relating to the Ancient Monuments, including the declaration of Ancient Monuments and compensation, and the legal status of the conduct of excavations. Further issues involve the control and management of museums and advisory bodies, the antiquities to be held in them, rent control, and tax exemptions. The broader category of Miscellanea (Part VIII) includes crucial aspects, such as the licensing of dealers, the export of antiquities, loans of antiquities outside the Republic of Cyprus, immunity from criminal liability, disposal of forfeitures, extension of criminal jurisdiction of criminal court, regulations, and saving of license.

The emphasis put on classified monuments in the island's Cultural Heritage Management is reflected in the extensive legislation governing their regulation in the Antiquities Law. In particular, monuments are classified as "Ancient Monuments" and are distinguished into the so-called First and the Second Schedule of the Antiquities Law. Ancient Monuments in the First Schedule refer to plots belonging to ancient sites, therefore encompassing antiquities, and their surrounding area. In these cases, the land is expropriated and the owners are compensated, as it comes under the ownership of the Republic of Cyprus. This mechanism constitutes the basic tool for the protection and promotion of archaeological sites, as it defines their boundaries, therefore preventing any actions inhibiting their potential destruction or endangerment.

Ancient Monuments in the Second Schedule of the Antiquities Law involve plots that are controlled by the Republic of Cyprus but are, nevertheless, under the possession of the legal private owners. A plot may be declared into the Second Schedule, once there is surface evidence or it is suspected, based on contextual evidence, that it may encompass antiquities, or if the plot is in proximity with an archaeological site. Following the declaration of a plot into the Second Schedule, the owner is obliged to have the permission of the Department of Antiquities to proceed with any kind of activity within the plot. In these cases, activities are supervised by the Department of Antiquities. In the cases in which ancient remains are found, the Department of Antiquities commands the cessation of the work and proceeds with the expropriation of the plot, which is thereafter declared into the First Schedule. Ancient monuments in the Second Schedule of the Antiquities Law also encompass religious monuments, which are excluded from expropriation.

To an extent, Cultural Heritage Management on the island is determined by the conventions signed by the Republic of Cyprus, which place it within a wider, European or international, framework sharing common objectives and structures. The signing of the European Cultural Convention of 1954 has set the principles toward the management and protection of a common European heritage and culture. Certain signed conventions and international binding treaties, such as the Hague convention of 1954 (Article 9 of the second Protocol for the protection of Cultural Property in the Event of Armed Conflict), stemmed from the current political situation on the island and the need to secure the safety of cultural heritage. Other signed conventions include the Granada Convention of 1985, the Valetta European Convention of 1992, the Paris conventions of 1972 and 2003, the Rome Convention of 1995, the Statutes of the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), and the charters for the Protection and Management of the Archaeological Heritage (Lausanne 1990) and for the Conservation of Historic Towns and Urban Areas (Washington 1987). The Memorandum of Understanding between the Government of the United States of America and the Government of the Republic of Cyprus, concerning the imposition of import restrictions on preclassical and classical archaeological objects, and Byzantine period ecclesiastical and ritual ethnological material aims at impeding the looting of cultural heritage occurring on the island. More recently, Memorandum of Understandings concerning the protection of cultural heritage, have also been signed with the government of the People's Republic of China (2008), the Russian Federation (2010), and the Palestinian National Authority (2011), while a Bilateral Agreement exists with Switzerland (2011) and a Memorandum of Cooperation with the Government of the State of Israel (2011).

Furthermore, the inclusion of certain sites in the UNESCO World Heritage list has formed the basis for the introduction of measures for the protection of archaeological sites and the establishment of management plans and reporting systems on the state of their conservation. The fact that the archaeological site of Paphos was included in the UNESCO World Heritage list in 1980 (Karageorghis 2002), the Medieval painted churches of the Troodos region in 1985, and the prehistoric site of Choirokoitia in 1998 best demonstrates that the establishment of management strategies is a fairly recent development. The recent management plans of Choirokoitia are part of the Participation Programme of UNESCO, 2011.

The national committees of UNESCO and the International Council on Monuments and Sites (ICOMOS) in Cyprus act as recommendatory boards. The actions and decisions, nevertheless, concerning the management of archaeological sites, and the strategies that should be employed in their conservation and presentation to the public, remain with the Department of Antiquities.

A decisive factor affecting the management of cultural heritage in Cyprus is recent building expansion, which is the result of economic development. The present-day situation on the island imposes the need to secure the surroundings of archaeological sites and monuments through the inclusion of plots into the First and Second Schedule of the Antiquities Law. These pressures also

often lead to incomplete excavations resulting in the loss of important information. Furthermore, the problem becomes even greater when large-scale systematic excavations are conducted in urban centers, and especially in sites that belong to development projects. The archaeological sites on the Hill of Agios Georgios (PA.SY.D.Y.) and at the so-called Palaion Demarcheion, both in the island's capital, Nicosia, constitute such examples.

The first site, proposed to house the new House of Representatives, is the ancient predecessor of Nicosia. As such, it provides evidence on the character of successive periods, from the Archaic to the Hellenistic, previously lacking from the city's history, although phases from other periods are also apparent. The latter site, destined to house the new town hall, is also important as it elucidates hitherto obscured aspects of the Byzantine period, including town planning, architecture, and everyday life. It covers a period from the eleventh to the nineteenth century. It is the only large-scale excavation in the city's historical center, within the medieval walls. In both cases, the delays in the final decision-making concerning the plans and the future of the sites, severely put the ancient remains at risk as they are exposed in the elements, despite the efforts of the Department of Antiquities to proved annual conservation. Both archaeological sites have been included in the ICOMOS World Report 2006/2007 (Petzet and Ziesemer 2006/2007), following intense efforts on behalf of the Department of Antiquities.

The Department of Antiquities, in an attempt to develop further the management of archaeological sites, has established collaborations with prestigious organizations from abroad, such as the Courtauld Institute. Such endeavors are also reflected in an older collaboration with the Getty Conservation Institute (1987–1991), involving the conservation of the mosaics of the archaeological site of Paphos.

Further key issues involve the destructive consequences of the cultural heritage of the northern area of the island, following the Turkish invasion of 1974 (Jansen 2005). Apart from the destruction of archaeological sites and monuments, including churches (Papageorghiou 2010), an unknown number of antiquities, including items of Byzantine art, were illegally exported from the island, while museums were also looted. The recent interactions between the Turkish-occupied area and the area controlled by the Republic of Cyprus, following developments in the political sphere, have resulted in a new trend concerning illicit trafficking, as looted antiquities are illegally transferred throughout the island to be sold. The Department of Antiquities makes great efforts to control and reverse this situation, through the international binding treaties and conventions for the protection of cultural heritage in events of armed conflict and military invasion. It also follows the world trade of antiquities in an attempt to imbed the illicit trade of looted artifacts. Toward this objective, the Department of Antiquities has included special references on its official website, in order to notify the world regarding the destruction of cultural heritage and the sites or museums involved. Furthermore, the policy of the Ministry of Foreign Affairs of the Republic of Cyprus, and of Cypriot embassies abroad, encompasses the dissemination of the grave problem of heritage destruction in the occupied territories. In relation to this issue, the Church of Cyprus has contributed immensely in the protection of monuments in the occupied part of the island and the repatriation of objects of cultural heritage, as has the A.G. Leventis Foundation, through the retrieval and purchase of looted objects in international auctions.

The Department of Antiquities also works in collaboration with foreign museums and particularly with UNESCO, as well as the Council of Europe, ICOM, ICOMOS, and Europa Nostra, in order to address this problem. The return in 1983 of the mosaic medallions depicting Apostles that were looted in 1979 from the church of Panagia Kanakaria in the occupied village of Lythrangomi, via Germany, constitutes an example of the important, but, nevertheless, sparse circumstances in which the resilient efforts against the destruction of cultural heritage through looting were fruitful. Further pieces from these mosaics were retrieved and returned to Cyprus in 1991 and 1997, respectively. Other attempts to raise public awareness

and promote the need to protect the occupied archaeological sites include the publication of a book by ICOMOS Cyprus National Committee regarding the destruction and the illicit excavations currently conducted on the important occupied archaeological site of Salamis. Salamis was an archaic and classical kingdom, which also thrived in the Hellenistic and Roman period and became the capital of the island in the early Christian period.

For the dissemination of knowledge regarding Cypriot antiquity, a digital catalogue (CADIP) is currently being developed by the Department of Antiquities that will manage information, ranging from the finds excavated in various sites to excavation and survey data, including maps, and archival information. Moreover, the first web-page concerning archaeological finds, stored in the Cyprus Museum, has recently been established, enabling students and researchers to examine an important part of the material culture of a site situated in the occupied area of the island. It involves the archaeological finds from the tombs in Enkomi, excavated by the British Museum at the end of the nineteenth century. The innovations inaugurated with this project have set the basis for the digital unification of archaeological assemblages, part of which has in the past been transported to museums abroad.

Current Debates

The Need to Further Develop Cultural Heritage Management

Despite the efforts of the Department of Antiquities to adequately manage cultural heritage on the island, the operation of this governmental body is based on the structures set during the British Colonial period, or at the genesis of the Republic of Cyprus. This is enough evidence for the changes that must occur in order to be in pace with the modern conditions prevailing on the island and in the broader region, as well as with current scientific developments. It is vital to adopt a more dynamic approach that will be based on a solid theoretical and methodological framework, following the principles of the discipline of Cultural Heritage Management. On this basis, the future agenda should also encompass the Intangible Cultural Heritage (Μπακιρτζής 2006). Furthermore, it is equally vital to incorporate approaches associated with "red-zones"; with the prospect of a solution being reached between the Greek and Turkish Cypriot communities, a new and more complex situation will arise, which must be taken into consideration.

The salience of this issue and the necessity to establish an infrastructure for an adequate supervision of Cultural Heritage Management have led the Department of Antiquities to propose changes in its administrative and management framework, through reconsidering the sectors in which it operates. On this basis, it is setting new directions for achieving radical modifications in order to adjust with the current circumstances and address the overwhelming pressures imposed upon the management of cultural heritage by the increasing estate development.

To this end, it is pertinent to increase the scientific staff of the Department of Antiquities with scientists specializing on different fields of cultural heritage, including architecture, conservation, and museum studies. It is also important to employ archaeologists specializing on particular areas of archaeology, in order to enhance the ability to evaluate the increasing archaeological evidence within the context in which they were produced, circulated, and used or consumed. Given the increasing construction development and the international economic crisis, this simple, albeit crucial, mechanism will enable the establishment of specialized boards responsible for the evaluation process of the plots that need to be expropriated due to their archaeological importance. As a result, this measure will reinforce the protection of urban and rural archaeological sites, and their surrounding areas, as modern conditions increasingly coerce the Department of Antiquities to redefine their boundaries in order to adjust with regional economic development and growth. It is also essential to increase the technical staff, and to develop further the use of technology for cataloguing and promoting cultural heritage. A step toward this direction has been achieved through collaborations between the Department

of Antiquities, on one hand, and the Cyprus University of Technology, the University of Cyprus, and the Cyprus Institute, on the other.

Another important step to further secure the protection of cultural heritage is to proceed with concrete amendments of the Antiquities Law and its Regulations that would be in accordance with the legislation of the European Union. Such amendments would provide a solid basis against the illicit trafficking and looting of all antiquities, and not solely of those produced on the island. The definition of the existing law stems from past interpretations of the archaeological record; it therefore ignores recent scientific advances relating to the importance of trade and interactions throughout antiquity that result in the identification of ancient artifacts in areas other than their origins.

The line followed by the Department of Antiquities for the promotion of the Cypriot cultural heritage also involves the establishment of new premises for the Cyprus Museum and the upgrading of Provincial Archaeological Museums. A new building for the Cyprus Museum would enable the reassessment of Cypriot antiquity as evidenced in newly identified archaeological assemblages. It would also enable the display of archaeological finds based on recent approaches advocated by the discipline of Museum studies. Despite the inherent difficulties for a swift achievement of this objective, the Department of Antiquities, in an attempt to advance Cultural Heritage Management on the island, based on recent principles of the discipline, has established thematic museums. Such museums include the museum of the Mycenaean colonization of Cyprus, the Ethnological Museum in Nicosia, the Folk Art Museum at Geroskipou, the Rural Museum at Fikardou, and the Museum of Traditional Embroidery and Silver-Smith work at Lefkara. Furthermore, thematic exhibitions are occasionally organized in Cyprus and abroad for the promotion of particular fields of the Cypriot cultural heritage. The educational programs introduced in recent years, in collaboration with the Ministry of Education and Culture, aim at tutoring the civilians at a young age concerning the importance of cultural heritage and thus encourage its preservation and protection. Toward this objective, free tours are organized to monuments and provincial museums. Yet, it is commonly agreed that for the effectiveness of the above activities it is pivotal to employ archaeologists specializing in particular fields.

Cross-References

- ▶ Archaeological Informatics
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Heritage and Higher Education
- ▶ Heritage and Public Policy
- ▶ Heritage Landscapes
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Intangible Cultural Heritage
- ▶ Tangible Heritage in Archaeology
- ▶ Urban Heritage
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Jansen, M. 2005. *War and cultural heritage: Cyprus after the 1974 Turkish invasion*. Minneapolis: University of Minnesota.

Karageorghis, V. 2002. *The preservation and presentation of the cultural heritage of the coastal city of Paphos in Cyprus*. UNESCO.

Μπακιρτζής Χ. 2006. Επάνοδος από την Ελλάδα. Οι αρχαιότητες στην αυγή του εικοστού πρώτου αιώνα. Ετήσια διάλεξη εις μνήμην Κωνσταντίνου Λεβέντη (14 Νοεμβρίου 2005). Λευκωσία.

Papageorghiou. 2010. *Christian art in the Turkish-occupied part of Cyprus*. Nicosia: The Holy Archbishopric of Cyprus.

Further Reading

Bridgland, J. 1995. The Getty Conservation Institute 1985–1995: A retrospective. *Newsletter* 10(2) Summer 1995. Available at: http://getty.edu/conservation/publications_resources/newsletters/10_2/feature1.html

Committee for the Protection of the Cultural Heritage of Cyprus. 1998. *Cyprus: A civilization plundered*. Athens: The Hellenic Parliament.

Department of Antiquities of the Republic of Cyprus official website. Available at: http://www.mcw.gov.cy/mcw/da/da.nsf/DMLindex_en/DMLindex_en

Department of Antiquities of the Republic of Cyprus. n.d. The looting of cultural heritage in occupied Cyprus. Available at: http://www.mcw.gov.cy/mcw/da/da.nsf/DMLlooting_en/DMLlooting_en?OpenDocument

Embassy of the Republic of Cyprus in Washington D.C. n.d. On the destruction of cultural heritage in occupied Cyprus. Available at: http://www.cyprusembassy.net/home/index.php?module=page%26pid=22

Example of problems created to cultural heritage by the construction development on the island. Available at: http://www.international.icomos.org/risk/2001/cypr2001.htm

ICOMOS Cyprus. 2002. Cultural heritage at occupied territories is at risk. Available at: http://international.icomos.org/risk/2002/cyprus2002.htm

ICOMOS Cyprus National Committee. 2001. *Salamis in Cyprus. A violation of scholarly ethics*. Nicosia: ICOMOS.

Ioannides, M., and D.O. Arnold, eds. 2006. *The e-volution of information communication technology in cultural heritage: Where hi-tech touches the past: Risks and challenges for the 21st century. Papers from the joint event CIPA/VAST/EG/EuroMed 2006*. Budapest: Archaeolingua.

Ministry of Foreign Affairs of the Republic of Cyprus. 2006. Destruction of cultural heritage. Available at: http://www.mfa.gov.cy/mfa/mfa2006.nsf/cyprus07_en/cyprus07_en?opendocument

Pilides, D. n.d. The digitisation of the artefacts of the Enkomi tombs. Available at: http://www.enkomicm.org/

Press and Information Office. 1989. *Flagellum Dei: The destruction of the cultural heritage in the Turkish occupied part of Cyprus*. Nicosia: Press and Information Office.

World Heritage List. n.d. Available at: http://whc.unesco.org/en/list

D

Stewart, T. Dale

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Basic Biographical Information

Thomas Dale Stewart (1901–1997) was born June 10, 1910, in the Welsh community of Delta, Pennsylvania, USA. Following graduation from high school in 1920 and subsequent employment at the local bank, Stewart enrolled (1922) at the George Washington University in Washington, D.C., focusing on a pre-medicine program. Through family friend John L. Baer and roommate Henry B. Collins Jr. (1899–1987), Stewart was introduced to anthropology, especially as practiced at the nearby Smithsonian Institution (Ubelaker 2000a) (Fig. 1). In 1924, he began to work part-time as a temporary assistant to the legendary Smithsonian Curator of Physical Anthropology Aleš Hrdlička (1869–1943). Hrdlička needed help assembling data and preparing tables for his many publications. With his banking experience, tabulating numbers and balancing accounts, Stewart rapidly became a relied-upon assistant (Ubelaker 2000b). By 1927, Hrdlička's confidence in Stewart had grown to the point that he not only offered Stewart a permanent position but also the opportunity to succeed him eventually if Stewart acquired a medical degree. With such an incentive, following college graduation in 1927, Stewart enrolled in medical school at the Johns Hopkins University in Baltimore, receiving his MD degree in 1931 (Ubelaker 2006).

With his medical degree in hand, Stewart returned to the Smithsonian to work with Hrdlička and began his long and productive career in physical anthropology. When Hrdlička retired in 1942, Stewart was promoted to the position of curator. Career milestones include initiation of consultation with the US Army Quartermaster Corps in 1948, organization of a human identification project in Kokura, Japan (1954), conducting a seminar in human identification in 1955, becoming head curator of the Department of Anthropology (1961), appointment as director of the Smithsonian Institution's National Museum of Natural History (1962), election to the National Academy of Sciences (1962), organization of a conference on human identification in mass disasters (1968), election as honorary member of the American Academy of Forensic Sciences (1974), and recipient of the Physical Anthropology Section Award of the American Academy of Forensic Sciences in 1981 (this award was renamed the "T. Dale Stewart Award" in 1987). Stewart served as president of the American Association of Physical Anthropologists from 1950 to 1952 and as its secretary-treasurer from 1960 to 1964. He received the Viking Fund Medal in 1953 and the Charles Darwin Lifetime Achievement Award in 1993 from the American Association

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Stewart, T. Dale, Fig. 1 T. Dale Stewart (Courtesy NAA, Smithsonian Institution)

of Physical Anthropologists. Stewart was the editor of the American Journal of Physical Anthropology from 1942 to 1948. Although he retired in 1971, he subsequently continued research and publication. At the age of 91, his last publication emerged, a monograph on archaeological research at a site in Virginia (Stewart 1992).

Major Accomplishments

Through his numerous publications, meticulous attention to detail, editorial efforts, and congenial manner, T.D. Stewart became internationally recognized as a scholarly leader in physical anthropology. His published works include broad topics within anthropology (Stewart 1970b) but largely center on forensic anthropology (McKern and Stewart 1957; Stewart 1970a, 1979), paleopathology (Ubelaker 2012), anthropometry, human paleontology (especially the Shanidar Neanderthals), and the peopling of the New World. Stewart served as consultant to the FBI laboratory on matters relating to forensic anthropology and reported on at least 254 cases for them between 1943 and 1969. He also found time for formal teaching at the Washington University School of Medicine in St. Louis in 1943, the Escuela Nacional de Antropología e Historia in Mexico City in 1945, and the George Washington University School of Medicine in Washington D.C. from 1958 to 1967.

T. Dale Stewart's publications are models of careful research design, broad academic perspective, attention to detail, and accuracy (Ubelaker 2000c). His many contributions to such issues as the complexity of skeletal age changes, Neanderthal morphology, anterior femoral curvature, vertebral osteophytosis, dental alterations, trephination, treponemal disease, and the peopling of the Americas (Stewart 1973) are both highly regarded and long-standing. He published at least 394 works from 1924 to 1992 including several key books and monographs. He provided international leadership in the scholarly development of forensic anthropology, paleopathology, and other areas of physical anthropology.

Cross-References

- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Forensic Anthropology and Archaeology in Disaster Response
- ▶ Forensic Anthropology: Definition
- ▶ Hrdlička, Aleš

References

Stewart, T.D. 1992. *Archeological exploration of Patawomeke: The Indian town site (44St2) ancestral to the one (44St1) visited in 1608 by Captain John Smith*, Smithsonian contributions to anthropology 36. Washington, DC: Smithsonian Institution Press.

Ubelaker, D.H. 2000a. The forensic anthropology legacy of T. Dale Stewart (1901–1997). *Journal of Forensic Sciences* 45 (2): 245–252.

Ubelaker, D.H. 2000b. T. Dale Stewart's perspective on his career as a forensic anthropologist at the Smithsonian. *Journal of Forensic Sciences* 45 (2): 269–278.

Ubelaker, D.H. 2000c. Publications of T. Dale Stewart (1901–1997). *Journal of Forensic Sciences* 45 (2): 279–291.

Ubelaker, D.H. 2006. *Thomas Dale Stewart 1901–1997*, Biographical Memoirs 88. Washington, DC: National Academy of Sciences.

Ubelaker, D.H. 2012. Contributions of T. Dale Stewart (1901–1997) to paleopathology. In *The global history of paleopathology*, ed. J.E. Buikstra and C.A. Roberts, 119–125. Oxford: Oxford University Press.

Further Reading

McKern, T.W., and T.D. Stewart. 1957. *Skeletal age changes in young American males (Report EP-45)*. Natick: Quartermaster Research and Development Center, Environmental Protection Research Division.

Stewart, T.D., ed. 1970a. *Personal identification in mass disasters*. Washington, DC: Smithsonian Institution.

Stewart, T.D., ed. 1970b. *Handbook of Middle American Indians*. Austin: University of Texas Press.

Stewart, T.D. 1973. *The people of America*. New York: Charles Scribner's Sons.

Stewart, T.D. 1979. *Essentials of forensic anthropology, especially as developed in the United States*. Springfield: Thomas.

Dali, Archaeology of

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Introduction

The site was found by a geologist during a geological survey. It was located in a small gully, named Tianshuigou, near Jiefang Village, Dali County, Shaanxi Province in northwestern part of China. The human cranium was embedded in the brown grayish gravels in the third terrace of the Luohe River. It is a rather complete cranium, but the supero-posterior part of the skull-cap, some part of the zygomatic arches, and the pterygoid processes are missing. The lower part of the face was deformed by the upward depression of the alveolar process which is not intact and without dentition. The robustness of the cranium indicates it belongs to a male. Most of the cranial sutures are clear, except that part between the greater wing of the sphenoid and the temporal squama which was obliterated. This suggests that the cranium probably belonged to an individual of an age in lower thirties.

Key Issues/Current Debates/Future Directions/Examples

The maximum cranial length of the Dali cranium is 206.5 mm. Its maximum cranial breadth is 149.5 mm and across the supramastoid crest. This position of the maximum breadth and the height of the vault are intermediate between those of *Homo erectus* and *Homo sapiens*. The Dali cranium is closer to *Homo sapiens* than to many other Middle Pleistocene humans (MPH) in some measurements such as the overall size of the cranium, sagittal curvature, ratio of height to breadth of occipital, frontal angle, and degree of postorbital constriction. The Dali cranium is within the variation range of MPH of both eastern and western Eurasia in some measurements such as various length of the cranium, breadth of cranial base, bi-asterionic breadth, horizontal circumference, and transverse arc. The Dali cranium possessed many measurements closer to MPH of China than to those of Europe, such as in the occipital angle, depth of facial cranium, anterior interorbital breadth, minimum cheek height, degree of transverse flatness of upper face, and ratio of bregmatic height to maximum cranial length. It seems that the Dali cranium is closer to MPH of Europe than to *Homo erectus* of China, in maximum frontal breadth; total sagittal arc; its curvature; sagittal curvatures of frontal, parietal, and occipital bones; length of posterior margin of parietal; length of lower occipital scale; profile angle of frontal bone; bregmatic angle; transverse frontoparietal index; difference between g-op and g-i; and degree of postorbital constriction. The length-height index and upper facial index of the Dali cranium seem to be intermediate between MPH of China and Europe/Africa.

Many nonmetrical features of the Dali cranium are similar to those of other Pleistocene crania in China. These are a median sagittal ridge at the lower part of frontal squama; the fronto-nasal and fronto-maxillary sutures constitute a more or less horizontal curve; the most protruding point of

median sagittal profile of frontal bone is located at its lower half; nearly vertical nasal profile; the anterolateral surface of the fronto-sphenoidal process of zygomatic bone faces more forward; blunt orbital margin; and curved lower margin of zygomatic process of maxilla. A top view of the cranium shows the broadest part of the vault is at the posterior part of middle third of the cranial length.

Some non-metric features of Dali cranium are worthy to be specially noticed. The thickest part of the brow ridge is at its middle part. This is similar to that of Bodo, Kabwe, and Petralona while in most other fossils from China it is at the medial portion of the brow ridge. There is a bulge between the pyriform aperture and the orbit. This feature is close to that in Bodo, Kabwe, and Petralona, as well as Neanderthals, and has never been seen in any other Pleistocene specimens from China. A short sagittal ridge found behind the middle part of the brow ridge of the Dali cranium has also never been seen in other Pleistocene specimens from China, but it appears in a few specimens attributed to *Homo heidelbergensis*.

The cranial wall of Dali is as thick as that of the hominin from Locality 1 at Zhoukoudian. Brow ridges of the Dali cranium are much thicker than that of other early *Homo sapiens* in China such as that from Jinniushan and Maba. A lateral view of the cranium shows the frontal squama is rather flat. The upper border of temporal squama is curved. Angular torus exists on the outer cranial surface but does not appear on the inner surface. The transition between the occipital and nuchal planes is angular instead of being rounded turn.

The Dali cranium is also associated with stone artifacts, vertebrate and molluscan fossils, and carbon particles. Most of the stone tools are scrapers, others include points, burins, and a stone awl. Most tools were made by hammering, and the manufacture is simple and rough, the technique belongs to Mode I.

The fauna associated with the human fossil includes beaver, elephant, wooly rhinoceros, thick jaw bone deer, water buffalo, gazelle, ostrich, and others. The environment might be warmer with more trees than present.

The U-series ($^{231}Pa/^{230}Th$) date of an ox tooth associated with the human cranium is 209 ± 23 ka (Chen et al. 1984); and IRSL date on the paleosol located ~13 m above the human cranium is earlier than 247 ka;^{230}Th dates for enamel and dentine of the rhinoceros associated with the human cranium are 258 +34/−26 ka and 349 + 53/−38 ka, respectively; ESR date of the associated Lamprotula is 297– ~ 210 ka. All of these suggest a date between 300 and 260 ka (Yin et al. 2002). The ESR/U-series date for animal teeth is around 280 ka (Yin et al. 2011).

Comprehensive analysis on the morphology of human fossil and archaeology suggests that the Dali individual was most probably one of the descendants of early Middle Pleistocene humans of eastern Eurasia with assimilation of genes from western Eurasia. Alternative opinion is that Dali represented the East Asian member of *Homo heidelbergensis*.

Cross-References

- ▶ Archaic *Homo sapiens*
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ *Homo heidelbergensis*
- ▶ *Homo sapiens*
- ▶ Zhoukoudian, Archaeology of

References

Chen, T.M., S.X. Yuan, and S.J. Gao. 1984. The study of uranium series dating of fossil bones and an absolute age sequence for the main Paleolithic sites of north China. *Acta Anthropologica Sinica* 3: 259–269.

Yin, G.M., H. Zhao, J.H. Yin, and Y.C. Lu. 2002. Chronology of the stratum containing the skull of the Dali Man. *Chinese Science Bulletin* 47: 1302–1307.

Yin, G.M., J.J. Bahain, G. Shen, H. Tissoux, C. Falguères, J.M. Dolo, F. Han, and Q. Shao. 2011. ESR/U-series study of teeth recovered from the paleoanthropological stratum of the Dali Man site (Shaanxi Province, China). *Quaternary Geochronology* 6 (1): 98–105.

Further Reading

Wu, X.Z. 2009. A metrical study of the Dali cranium. *Acta Anthropologica Sinica* 28: 217–236.

Wu, X.Z., and F.E. Poirier. 1995. *Human evolution in China*. New York: Oxford University Press.

Dampier Archipelago Petroglyphs

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Introduction

The Dampier Archipelago, located off the north-west coast of Australia, latitude 20°35′ south, comprises 42 islands and rocky outcrops which extend over some 1925 km^2 (~743 sqmiles) (see Fig. 1). It is an area rich in archaeological sites, but it is most famous for the large number (estimated one million) of engraved rock art (petroglyphs) images and the enormous variety in subject and style displayed. This region was added to Australia's National Heritage List in 2007 (McDonald and Veth 2009). The high density of petroglyphs and great stylistic diversity are among the reasons for this style province's addition to the NHL (JMcD CHM 2005, 2006; http://www.environment.gov.au/heritage/places/national/dampier-archipelago/). It has also been recommended that this art province be added to the UNESCO World Heritage List (JMcD CHM 2011).

The Dampier Archipelago also houses one of Australia's largest bulk export ports, shipping iron ore and liquefied natural gas. The geological structure of these islands formed as remnants of Archaean igneous rocks, comprising gabbro and granophyre (~2725 Ma), younger dolerite and basalt, these all overlying granites associated with the Dampier Granitoid Complex (~2990 Ma). A more recent limestone development forms some of the northern outer islands. The harder, intrusive rock types have provided a useful resource for stone tools as well as support for the rock art and a truly unique landscape.

Dampier Archipelago Petroglyphs, Fig. 1 Location map of the Dampier Archipelago showing main islands and the adjacent mainland

Definition

This area contains one of the largest concentrations of petroglyphs in the world, set among an inspiring landscape containing many other archaeological features. So far very little research has been undertaken into this important cultural asset, and what has taken place largely focused on the shell middens and specific sites (e.g., Lorblanchet and Jones 1979; Lorblanchet 1992; Vinnicombe 2002; Clune and Harrison 2009). While the majority of archaeological surveys have been conducted only in industrial lands prior to their development, a few surveys have been done for inventory and management purposes (Veth et al. 1993; JMcD CHM 2009). While there has been no direct dating of the province's petroglyphs, it is believed this rock art corpus spans some 25–30,000 years, documenting the changing ecological conditions of the Last Glacial Maximum, through the Holocene marine transgression and the creation of the area as islands some 7000 years ago, to the present (Mulvaney 2013). The earliest date signifying human presence within the Dampier Archipelago is 21,000 BP (cal), obtained from a large seashell (*Syrinx aruanus*) found among the rocky slopes on the southern Burrup (Lorblanchet 1992). At this time, the coast was over 160 km distance. Baler and trumpet shells were valued as containers for carrying water and food.

The images also reflect the cultural practices and social values of the people that produced them. There are at least five distinct artistic phases or traditions, the last continuing until the practice ceased with the coming of European settlement to the region (Mulvaney 2011).

Key Issues/Current Debates/Future Directions/Examples

The Dampier Archipelago is a drowned landmass, a former undulating plain now converted to subtidal reefs, shoals, and channels, while the higher hills and ridges form the islands. The largest island, some 118 km^2, is the focus of both industrial development and archaeological investigation. Dampier Island was officially named Burrup Peninsula in 1979. It became linked to the mainland in the 1960s, when Hamersley Iron constructed a rail and road access causeway to the island and the intervening mangrove-fringed tidal mudflats became evaporative salt fields.

The Dampier archaeological record maps people in a landscape, how they interacted with, and were affected by, their environment and habitat. Some of this relates to the subsistence activities of the people; other aspects reflect their spiritual beliefs and practice. In addition to containing the largest concentration of petroglyphs in the world, the area also includes thousands of campsites, quarries, and other stone-working areas, shell middens, and stone structures. Much of the rock art and stone features are intertwined with the spiritual beliefs and ceremonial practices of the local Aboriginal people.

Traditional ownership of the islands of the Archipelago is recorded as held by the *Yaburara* people; however, two events effectively brought to an end the Aboriginal occupation and production of rock art in the islands. A consequence of European settlement and exploitation of the region, the first was a smallpox epidemic which spread through the area in 1866. The second action, which became known as the Flying Foam Massacre (Gara 1983), occurred in February 1868, and this resulted in the slaughter of a large number of *Yaburara*. Today the *Mardudenera* and *Ngarluma* people have responsibility as custodians for the traditions and sites of the area. With the declaration of the Murujuga National Park in January 2013, a new management regime came into effect, with a jointly managed National Park and the development of the Murujuga Aboriginal Corporation, with responsibility for management decisions made in this National Park.

For the Dampier Archipelago, there are at least five distinct artistic phases spanning some 25,000 (Mulvaney 2013), possibly as much as 30,000 years (Figs. 2, 3, and 4). Some motifs continue to be produced through successive phases, such as concentric circles. Other motifs, like the distinctive decorated torso anthropomorph, are particular to single artistic phase

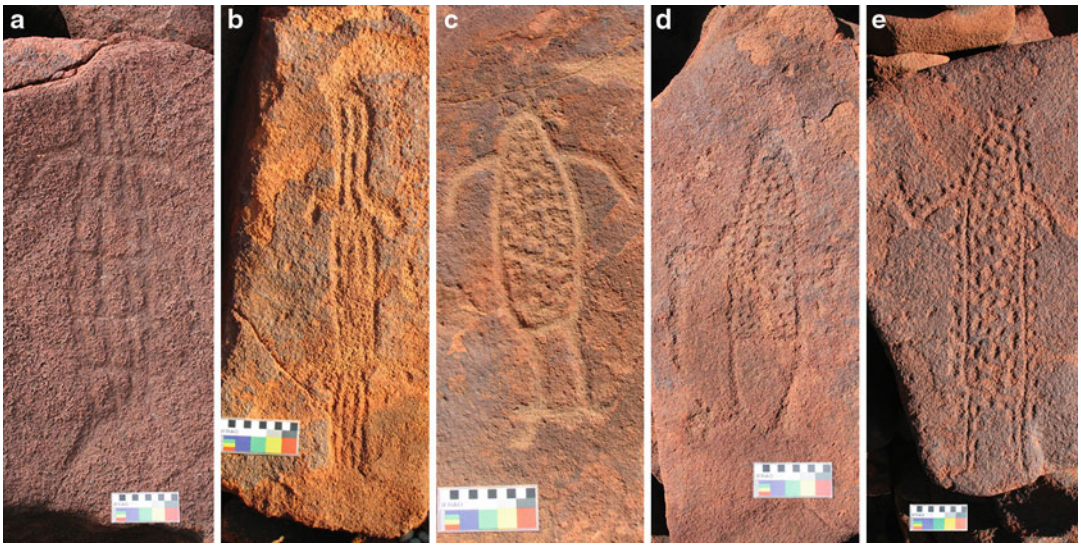

Dampier Archipelago Petroglyphs, Fig. 2 Examples of the distinctive decorated torso anthropomorph, pertaining to the early artistic phase

Dampier Archipelago Petroglyphs, Fig. 3 Example of two large outline macropods, style associated with the second artistic phase; motif at left has been re-abraded in subsequent time

(Fig. 2). Weathering patterns have been used to provide an indication of the relative age of the art, for there are no scientific techniques available able to give an accurate date for the age of petroglyphs. Images of extinct fauna, particularly the Thylacine (Tasmanian tiger), which became extinct on mainland Australia some 3500 years ago, and changes in the style of terrestrial and marine fauna depictions assist with the formulation of the sequence.

Despite this wealth of cultural heritage, the area is still zoned for additional industrial development. There are no economic minerals or large population resource present in the Dampier Archipelago: Industry is here simply as a consequence of planning decisions made half a century ago. Grandiose plans for the development and peopling of the region took no account of the indigenous population nor of their significant cultural heritage. In addition to direct industry impacts on

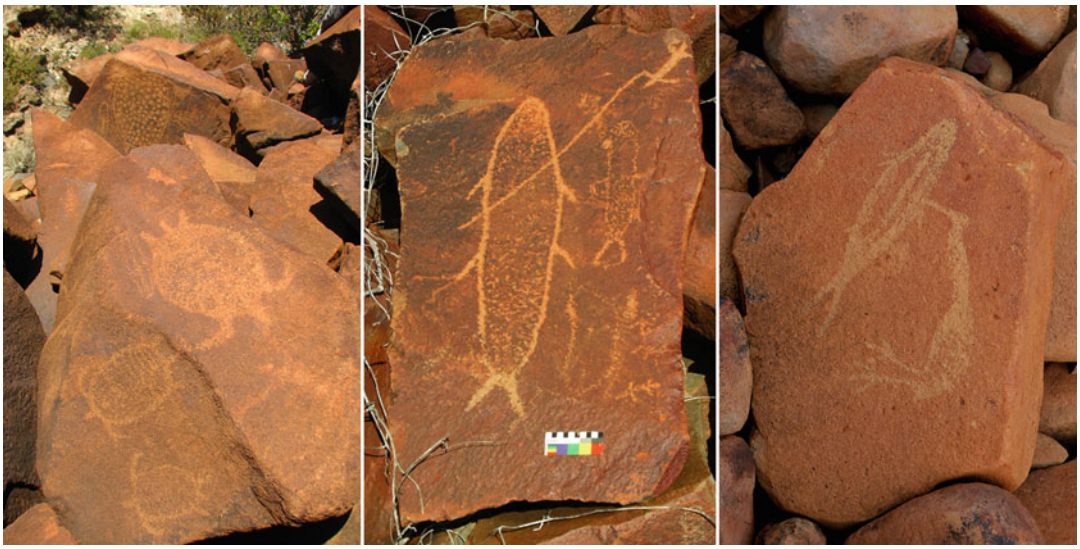

Dampier Archipelago Petroglyphs, Fig. 4 Examples of petroglyphs relating to the marine period phase 4 artistic tradition of the Dampier Archipelago rock art

the rock art, there are concerns over emissions, vandalism, and graffito and visitor impacts. The nonindustrial lands are easily accessible by vehicle and boats; with an increasing population attracted by commercial work, vehicle and pedestrian traffic is inadvertently exacerbating impact. There is an urgent need for a proper management plan and a strategy to regulate access, and to this end a ranger training program has been developed for the local Aboriginal people.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art, Paleolithic
- ▶ Australia's Archaeological Heritage
- ▶ Australian Paleoart
- ▶ Australian Rock Art
- ▶ Burrup Peninsula
- ▶ Heritage Landscapes
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Kakadu National Park: Rock Art
- ▶ Rock Art, Forms of
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Submerged Prehistoric Landscapes
- ▶ Techniques of Paleolithic Art
- ▶ UNESCO World Heritage Convention (1972)

References

Clune, G., and R. Harrison. 2009. Coastal shell middens of the Abydos Plain, Western Australia. *Archaeology in Oceania* 44 (Supplement): 70–80.

Gara, T.J. 1983. The flying foam massacre: An incident on the north-west frontier, Western Australia. In *Archaeology at ANZAAS, 1983*, ed. M. Smith. WA Museum: Perth.

Jo McDonald Cultural Heritage Management. 2005. *Desktop assessment of scientific values for Indigenous cultural heritage on the Dampier Archipelago, Western Australia*. Canberra: Report to the Heritage Division of the Department of Environment & Heritage.

Jo McDonald Cultural Heritage Management. 2006. *A study of the distribution of rock art and stone structures on the Dampier Archipelago*. Canberra: Report to the Heritage Division of the Department of Environment & Heritage.

Jo McDonald Cultural Heritage Management. 2009. Archaeological survey of Deep Gorge on the Burrup Peninsula (Murujuga) Dampier Archipelago WA. Report to Department of Indigenous Affairs, WA.

Jo McDonald Cultural Heritage Management. 2011. Study of the outstanding universal values of the Dampier Archipelago, Western Australia. Report to the Australian Heritage Council.

Lorblanchet, M. 1992. The rock engraving of Gum Tree Valley and Skew Valley, Dampier, Western Australia:

Chronology and functions of the sites. In *State of the art: Regional rock art studies in Australia and Melanesia (AURA Occasional Publications 6)*, ed. J. McDonald and I.P. Haskovec, 39–59. Melbourne: Australian Rock Art Research Association.
Lorblanchet, M., and R. Jones. 1979. Les premieres fouilles a Dampier, (Australie Occidentale), et leur place dans l'ensemble Australien. *Bulletin de la Société Préhistorique Française* 76 (10–12): 463–487.
McDonald, J.J., and P. Veth. 2009. Dampier Archipelago petroglyphs: Archaeology, scientific values and National Heritage Listing. *Archaeology in Oceania* 44 (Supplement): 49–69.
Mulvaney, K. 2011. About time: Towards a sequencing of the Dampier Archipelago petroglyphs of the Pilbara region, Western Australia. 'Fire and hearth' forty years on: Essays in honour of Sylvia J. Hallam. *Records of the Western Australian Museum* 79 (Supplement): 30–49.
Mulvaney, K. 2013. Iconic imagery: Pleistocene rock art development across northern Australia. *Quaternary International* 285: 99–110.
Veth, P., E. Bradshaw, T. Gara, N. Hall, P. Haydock, and P. Kendrick. 1993 Burrup Peninsula Aboriginal heritage project. Unpublished report to the Department of Conservation and Land Management, Perth.
Vinnicombe, P. 2002. Petroglyphs of the Dampier Archipelago: Background to development and descriptive analysis. *Rock Art Research* 19 (1): 3–27.

Further Reading

Bradshaw, E. 1995. Dates from archaeological excavations on the Pilbara coastline and islands of the Dampier Archipelago, Western Australia. *Australian Archaeology* 41: 37–38.
Vinnicombe, P. 1987. *Dampier archaeological project: Resource document, survey and salvage of Aboriginal sites, Burrup Peninsula, Western Australia*. Perth: West Australian Museum.

Dark Heritage

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Introduction

The concept of "dark heritage" has gained traction in recent years in archaeology and in cultural heritage studies more broadly. Its origins lie in the somewhat more specific field of "dark tourism" studies. Both dark heritage and dark tourism are rather vague terms in their current usage, but they generally revolve around places of death, suffering, and disaster, whether battlefields, concentration camps, or notorious sites of disaster such as Chernobyl. Indeed, dark tourism studies have tended to assume that death, and an attraction to death, is a central trope of both dark heritage and dark tourism. However, dark heritage is better seen in broader terms, that is, as an attempt to expand the scope of heritage studies.

There are several terms that are closely connected to "dark heritage," including "difficult heritage," "contested heritage," "dissonant heritage," and "negative heritage." These terms have started to appear frequently in the heritage discourse fairly recently, and, like dark heritage, they lack established and generally agreed on definitions. There are both overlaps and different emphases between these terms, but "difficult heritage," for instance, can be understood as broader in scope than dark heritage. Essentially, however, all these terms – including dark heritage – represent an attempt to expand the scope of heritage studies and diversify heritage meanings, recognizing that heritage is multivocal, controversial, and frequently problematic. There is an increasing awareness that heritage comes also in diverse "negative" forms, such as environmental pollution, social inequality, and poverty, inherited from the past and having myriad impacts in the present.

Definition

"Dark heritage" research explores the concept of cultural heritage as a potentially "dark" force. In other words, dark heritage researchers are interested in how and why people choose to engage with aspects of cultural heritage that are related to times of conflict, death, and suffering. These aspects may have different meanings for different groups or communities depending, for instance, upon their role in the conflict, temporal distance from the events, and hierarchies of power.

Researchers have noted that while similar terms exist, dark heritage seems somehow to encapsulate also the complexity of the social

impact, multifaceted aspects, and politically charged nature of this kind of heritage. While dark tourism studies initially tended to emphasize death as a key theme, it seems evident that reducing the meaning of dark heritage to the fascination with death and the macabre is too simplistic. Indeed, one of the potential benefits of the concept of dark heritage is that it enables pursuing heritage values – or how and why the past in the present matters – beyond the traditional frameworks of heritage thinking. Understanding the reasons for the attraction of dark heritage is nonetheless a common theme and a central challenge to dark tourism studies and dark heritage studies. For instance, Eerika Koskinen-Koivisto has used dark heritage as an umbrella term, to refer to "several related concepts that are connected with dark, macabre, difficult and even painful elements of cultural heritage" (Koskinen-Koivisto 2016: 24). Traditionally, heritage studies have tended to prioritize or concentrate on monumental and aesthetically pleasing remains of the past, whereas dark heritage grasps the significance and meanings of "heritage that hurts" (Sather-Wagstaff 2011), negative and unpleasant things inherited from the past, having an impact on the present in one form or another. Thus conceived, the idea of dark heritage represents an attempt to establish a more balanced understanding of how and in what forms the past is present in the present, in recognizing the diversity of impacts that both recent and more distant past has on contemporary issues. When editing a themed journal issue on "dark heritage," Julie Carr and Mike Corbishley reflected on their process on selecting the term "dark heritage" for the collection: "Originally, our working title was 'difficult heritage', but, as discussions with contributors progressed, it became clear that this term was not nuanced enough. Because these articles relate to events which might shock, unsettle, shame, or enrage, we have chosen to use the term *dark heritage*. . ." (Carr and Corbishley 2015: 1).

Some forms of dark heritage, such as concentration camps (Fig. 1), are officially and formally identified as heritage and incorporated in heritage protection schemes, as reflected in their listing as national heritage or UNESCO World Heritage sites, whereas difficult heritage in the form of, for instance, pollution is usually not discussed in heritage terms. However, an awareness of how such issues – or "unwanted" remains from the past – are linked to heritage matters is currently increasing. Dark heritage, then, can also refer to certain ignored types of sites and materialities inherited from the past, but it may also be conceived as an aspect (rather than merely a type) of heritage overlooked within the established or "authorized" heritage discourse. Thus, for instance, the suffering associated with (early) industrial work could be treated as dark heritage, while industrial architecture, for instance, may be listed as heritage on more traditional heritage-values grounds. In other words, dark heritage embraces the past in the present in less sanitized and unpolished terms than traditional heritage discourses. As dark heritage is troublesome or shameful, it often becomes silenced and thus excluded in narratives and representations of local and/or national history (see Thomas and Koskinen-Koivisto 2016). Commonly, dark heritage relates to the cultural legacy of major conflict events such as the Second World War (WW2), as in the case of the project Lapland's Dark Heritage which has studied, in 2014–2018, the Nazi German presence in Finnish Lapland, first as Finland's cobelligerent in 1941–1944 and then as an enemy in 1944–1945 (e.g., Herva et al. 2016; Koskinen-Koivisto and Thomas 2016) (Fig. 2). In other cases, the term has been used in the context of a longer period of violence and political unrest, including state responses to such situations, as in the case of Laura McAtackney's (2014) research on the controversial Long Kesh/Maze prison in Northern Ireland.

Historical Background

The closely related idea of "dark tourism" appears to have originated with Malcolm Foley and J. John Lennon (1996: 195) as a means of recognizing the process of visiting, primarily as tourists, heritage sites connected with atrocity "for remembrance, education or entertainment." Influenced by these and other scholars, Philip

Dark Heritage, Fig. 1 Rails leading to Auschwitz, probably the most well-known Second World War Nazi concentration and extermination camp, Poland. (Photograph: Bundesarchiv, B 285 Bild-04413/Stanislaw Mucha/CC-BY-SA 3.0)

Stone (2006) developed a "spectrum" of dark tourism, in which individual attractions may exhibit different degrees of "darkness" (Fig. 3). Factors affecting the extent to which a tourist attraction is dark may include such variables as authenticity and the extent to which the attraction has been commoditized for touristic consumption. The darkest sites are those that have the least tourism infrastructure and the worst atrocities associated with them; thus death camps are arguably the darkest of these sites (Stone 2006: 157).

Dimitrovski et al. (2017: 696) have noted the relationships between notions of dark heritage and dark tourism, critiquing the overuse of the latter, as visitor motivations are often more complex and nuanced, noting that many touristic sites demarcated as "dark" are also heritage sites:

> ...dark heritage sites could be perceived in a broader local, regional, or national historical context. The labelling of such places as dark tourism sites depends on their level of darkness. The difference between an ordinary heritage site and a dark heritage site is determined by the shade of darkness, with the darkest sites such as those of genocide and death camps on one side of the spectrum, to those such as battlefields – viewed as profound heritage experiences without any special interest in death itself – on the other side. Commemorative events are perceived as part of national and personal intangible heritage, but simultaneously, they have dark attributes which gives them the annotation of dark heritage events.

There are clearly many overlaps between difficult, contested, and dark heritage, although – inspired by its sister term "dark tourism" – dark heritage as it is currently understood always has an element of physical conflict, destruction, or other atrocity, which may include but also go beyond other, less physically violent or specific event-related, controversies. Therefore, "dark" heritage is always "contested" and "difficult," but "difficult" and "contested" heritage is not always necessarily "dark." In a recent review of the past couple of decades of dark tourism scholarship, Duncan Light suggested some conflation between dark

Dark Heritage, Fig. 2 The Norvajärvi Mausoleum in Rovaniemi, where the remains of the German Second World War soldiers recovered in Finnish Lapland are interred. (Photograph: Oula Seitsonen 2016)

tourism and related terms such as "dark heritage tourism" and "dark heritage" (Light 2017). However, some scholars arguably lean toward the term "dark heritage" specifically rather than "dark tourism" in recognition that "dark" heritage sites have more than just a touristic value. That is to say, that the heritage aspects of the dark heritage under scrutiny may or may not also have touristic aspects and values and vice versa.

Dark heritage practices may also include, for example, collecting material connected to wartime (e.g., Thomas et al. 2016: 336). It is also recognized that the "dark" aspects of cultural heritage may be just one facet of the overall "value" of the heritage; other aspects making the cultural heritage meaningful to people might include the geographical or temporal proximity between those who engage with it and the historical events to which it relates (e.g., Koskinen-Koivisto and Thomas 2016: 121). The presence of WW2, for example, within the living memory of many people, or at least of relatives and friends that they remember, as well as the continued legacy of the war within popular culture, may go to explain the huge interest that many have in that period (Fig. 4).

Key Issues/Current Debates

Debate around this still-new term has been in some cases related to discussions concerning the coining of the related term *dark tourism* (discussed above) where some have critiqued this process of the term's development. There have been suggestions that it has become a "research brand," cautioning that assumptions must not be made about the purpose of visitors

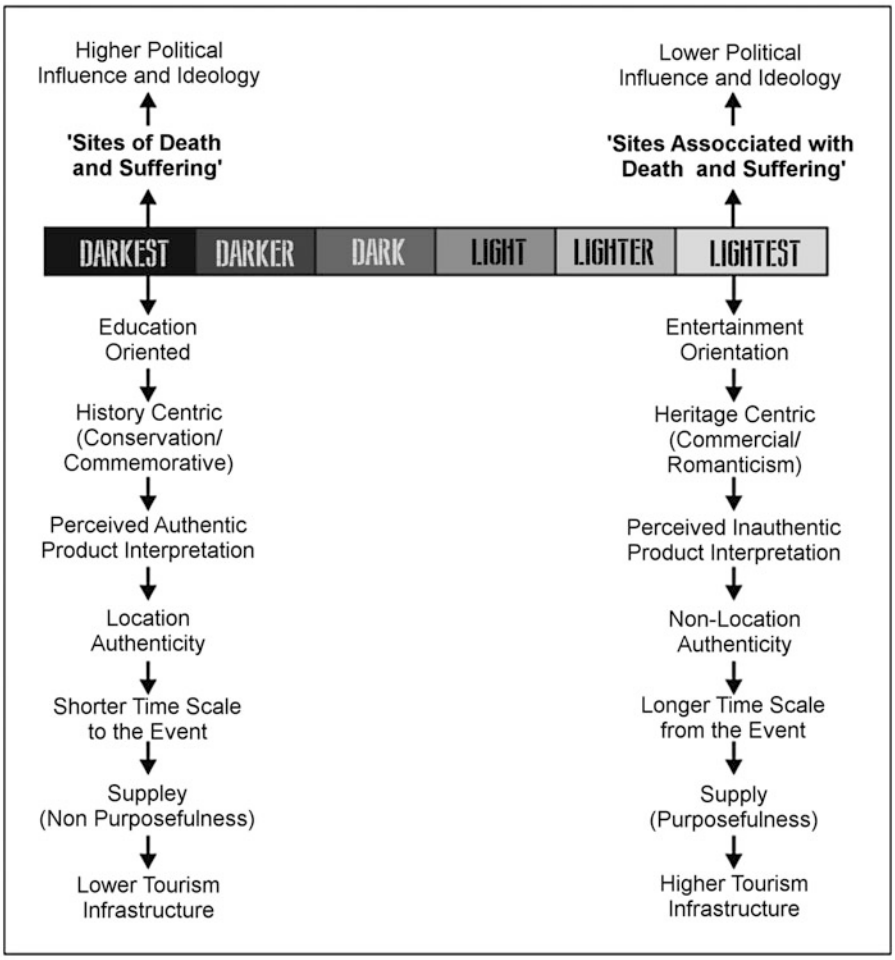

Dark Heritage, Fig. 3 Philip Stone's (2006) dark tourism spectrum: perceived product features of dark tourism within a "darkest-lightest" framework of supply. (Drawn after Stone 2006: 151)

to such attractions nor the significance of the perceived "darkness" in motivating the visit (Yankholmes and McKercher 2015: 235).

Critiques of the prevalence of the term "dark" in this context and that of "dark tourism" could be that connotations could be read into its use for denoting negative and "evil" heritage as an indication drawing ethnic or racial parallels. Goldenberg (2009), for example, has highlighted the uses of black and white as metaphors for good and evil as having their roots in racist thinking. However, even research that has looked especially at Black understandings and experiences of, for example, slave heritage as dark tourism, have not problematized the terminology in this way (e.g., Mowatt and Chancellor 2011). Nonetheless it is an important issue to be mindful of as the term gains more usage within scholarship.

Like all heritage, dark heritage is polysemous and multivocal. It is important to note and reflect on different perspectives to dark heritage that heritage professionals and other interest groups, including researchers themselves, may have. Researchers need to ask who labels the heritage dark, who are those who want to engage with it, and to whom this heritage might be unwanted and difficult. For instance, exit surveys of people with different (national) backgrounds showed very different reactions to a temporary exhibition in Rovaniemi in 2015–2016 of the peaceful

Dark Heritage, Fig. 4 Hiroshima Peace Memorial, registered as a UNESCO world heritage site in 1996, against the city's modern buildings, Japan. (Photograph: CC BY-SA 2.0, https://commons.wikimedia.org/w/index.php?curid=245138)

coexistence of Finns and Germans in northern Finland during WW2. Locals tended to feel that their past and wartime experiences were finally recognized after decades of overlooking and marginalization, whereas visitors from many other countries felt that the rather neutral portrayal of German soldiers as ordinary human beings, as opposed to Nazi monsters, was disgraceful and offensive (Herva et al. 2016). Similarly, it is clear that within heritage discourses generally there is an element of power concerning how different heritage is framed, sometimes regarding the extent to which different aspects of the heritage are either emphasized or silenced: "The knowledge that dark heritage sites can have a variety of meanings for the various publics that wish to consume them can result in contested and politically loaded sites being overly controlled and interpreted through state interventions" (McAtackney 2014: 229).

War, and WW2 in particular, is a recurrent theme in dark heritage and dark tourism studies. An interest in and appropriation of Nazis (e.g., in the form of collecting Nazi paraphernalia) might, at the outset, seem to be a form of dark heritage engagement, but such a priori assumptions and generalizations may also be problematic and misleading, as it is not necessarily fascination with Nazi ideology and atrocities that motivates collecting or related practices. Rather, the appeal to Nazi heritage may stem from an interest in local history and heritage, as studies in Finland, for instance, have indicated (Herva et al. 2016; Thomas et al. 2016). Although such seemingly "innocent" engagements with difficult pasts can be understood in terms of dark heritage just as

well, it is nonetheless important not to avoid making too many assumptions about why different people are interested in dark heritage. The perception of this apparent "darkness" in connection to dark heritage does indeed vary for the consumer of that heritage, affected by personal or family connection, locational closeness to the event to which the heritage relates, political leanings, and many other variables. Therefore one of the challenges that researchers have sometimes faced has come from individuals interacting with the heritage, who may question whether the heritage should be labeled as "dark" at all (see Koskinen-Koivisto and Thomas 2016).

Besides death and suffering in the most immediate sense, dark heritage can be related to a host of broader themes, including broad-ranging existentialist matters, as well as more specific matters such as failures or dark sides of (super)modernity (Fig. 5). While some dark heritage practices are rather distinctively associated with particular subcultures or specialized hobbies – sometimes illicit, clandestine, or suspicious in nature (Thomas et al. 2016) – other forms of dark heritage are popular and thoroughly commercialized. These include, for instance, places like "torture museums" and practices like ghost walks and ghost hunting, which are nevertheless within the dark heritage field, even if in the lighter end of the spectrum. Issues of and curiosity with decay and ruination, for instance, may be seen to resonate, to at least some degree, both with existential matters in a broad sense and with anxieties of modernity more specifically (see, e.g., Stone and Sharpley 2008).

These heritage engagements would appear to suggest that destruction in its different forms is a central issue of dark heritage and an element of how and why dark heritage appeals to people. Dark heritage speaks of dimensions of human life and experience, which are integral to being human, yet largely ignored within the traditional – and arguably dominant – idea of what heritage is about. Moreover, since many dark heritage sites

Dark Heritage, Fig. 5 Remains of a Soviet weather station and military base abandoned in 1992 on the New Siberian Islands in the High Arctic Russia. (Photograph: Oula Seitsonen 2004)

are not listed and protected as heritage, they afford forms of engagement that would be unacceptable at official heritage sites, and they provide opportunities for "unmediated" encounters with the past in the present differently from museum and curated heritage sites. For example, increasingly globalized economies and the changing character of industrial production in the Western world has had myriad negative impacts, which can be explored within a framework of dark heritage. More concretely, modernity and its failures have left behind (industrial) ruin landscapes, wastelands, substantial dumps of waste, and other such negative heritage. This heritage (although not necessarily identified as such within authorized heritage discourses) attracts all kinds of attention and practices, including the hobby known as urban exploration and the aesthetization of destruction, decline, and decay (see Olsen and Pétursdóttir 2014).

Deliberate destruction and desecration of cultural heritage are forms in which dark heritage comes into being. This befalls most often in the conflict contexts, for instance, when one community tries to eradicate the memories and rights of another group, but also as collateral damage, like in many places during WW2, such as at Dresden, Monte Cassino, and Norwegian and Finnish Lapland (Fig. 6). Some recent examples include the destroying of Stari Most Bridge in Mostar during the Yugoslavian Civil War (e.g., Wollentz 2017), the blasting of the Bamiyan Buddhas by the Al-Qaida in Afghanistan (e.g., Francioni and Lenzerini 2006), and the widespread devastation caused by the so-called Islamic State of Iraq and the Levant (ISIL/ISIS), for example, at the UNESCO World Heritage site of Palmyra, which received wide social media coverage (e.g., Harmanşah 2015). The deliberate destruction and its effects on, for instance, the communal

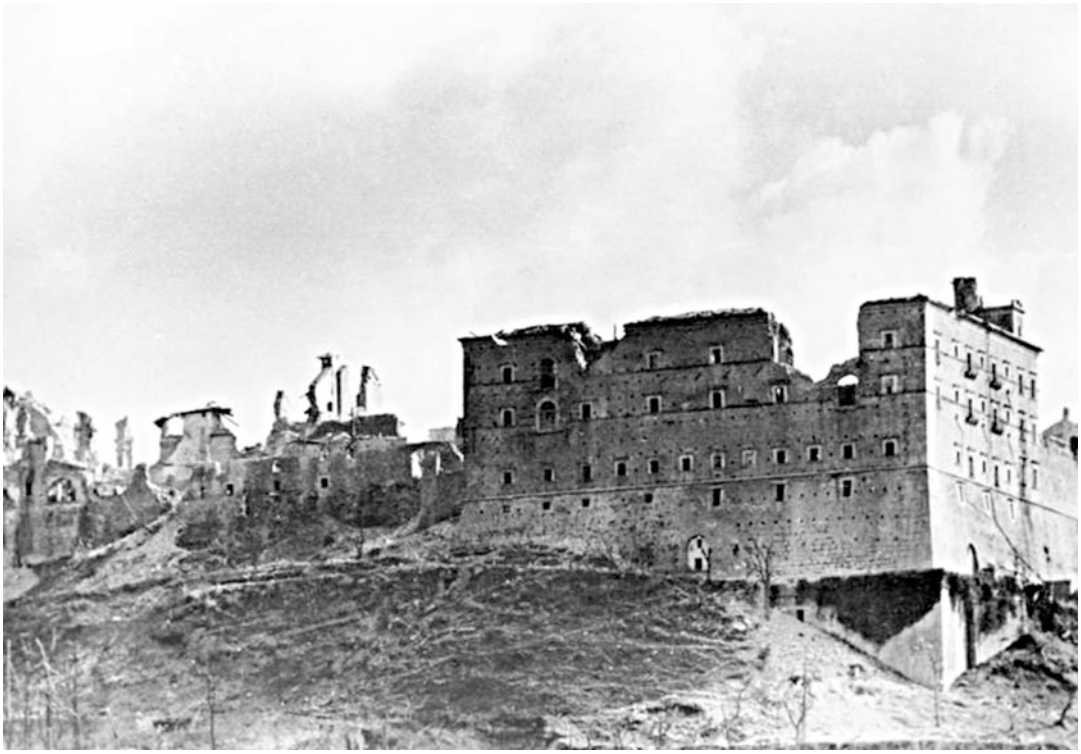

Dark Heritage, Fig. 6 Monastery of Monte Cassino, the birthplace of the Benedictine Order, in ruins after Allied bombing in 1944, Italy. (Photograph: Bundesarchiv, Bild 146-2005-0004/Wittke/CC-BY-SA 3.0)

memory, identity, and reconciliation, have so far received limited attention from a heritage perspective but have vast potential for wider research (e.g., Giblin 2014; Seitsonen and Koskinen-Koivisto 2018).

International Perspectives

Dark heritage study is a distinctively international field, and the themes central to it have been pursued around the world. This of course is expected in the view that dark heritage largely revolves around issues that are characteristic to the modern world, whether industrialized warfare (including the legacy of nuclear weapons testing and other environmentally catastrophic and ethically dubious practices), industrialization/deindustrialization (including industrial disaster), large-scale pollution of the environment, or consequences of climate change and their impact upon cultural and intangible heritages.

Future Directions

The concept of dark heritage is not necessarily new, even if its name arrived quite recently, but it is a notion which is still in flux. As perceptions of heritage – within academic discourse and also within communities themselves – fluctuate over time, so will ideas of what constitutes "darkness" within those viewpoints and definitions. It is sadly the case that "new" dark heritage will continue to be generated as conflicts and other disasters continue to break out and later resolve, and unfortunately atrocities continue to be committed by states, splinter groups, and others. Deliberate destruction of heritage due to its heritage status is to be included within this.

Horror and fantasy as literary and popular culture genres were long regarded as a subculture but have become mainstream in Western culture over the 2000s, with, for instance, television shows about vampires, zombies, and ghosts being aired prime time, as exemplified by the series like Most Haunted and Walking Dead. These themes closely resonate with the themes central to dark heritage, and this popularization of the dark may be expected to emerge as a subject of an increasing interest also in dark heritage studies. This development coincides with the recent interest in ghosts, haunting, and the uncanny in various disciplines across humanities and social sciences. This is perhaps particularly clearly reflected in the field of human geography where the concept of haunting has been productively deployed for many years toward a better understanding of, for instance, the significance and experience of modern ruins as part of modern cultural landscapes (e.g., DeSilvey and Edensor 2012). Dark heritage, in other words, is likely to become a more mainstream field of research with links to various disciplines.

Dark heritage also represents a logical expansion of the questions we ask of cultural heritage studies in general. University courses focusing on dark heritage as a theme for learning are emerging across the world, suggesting that future researchers will continue the interest in this area. Dark heritage can also be a useful source for history teaching in the form of school visits. Meanwhile, cultural heritage is also brushing alongside future studies, with concerns about such issues as toxic and nuclear waste (e.g., Harrison et al. 2016), suggesting development also of related areas of inquiry. Issues of pollution and the Anthropocene would also seem to be emerging as increasingly important research themes. While these topics may appear to be somewhat different from the "classical" dark heritage issues, where dark heritage was understood primarily as negative and hurting heritage, they do actually represent a logical continuum to and development of this subfield of heritage studies. Subsequently, dark heritage studies will provide different angles on, for instance, the questions of nature-culture relation or the human relationship with the world (e.g., Olsen and Pétursdóttir 2014). In this respect, then, the field of dark heritage studies reflects the changing and broadening field of heritage studies in general, with previously marginalized issues becoming mainstream.

Cross-References

- ▶ Archaeology and Politics
- ▶ Battlefield Archaeology
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Contemporary Past, Archaeology of the
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Heritage and Society
- ▶ Homelessness, Archaeology of
- ▶ Modern Material Culture, Archaeology of
- ▶ Modern Ruins: Remembrance, Resistance, and Ruin Value
- ▶ Non-places in Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Supermodernity and Archaeology
- ▶ Urban Heritage

References

Carr, J., and M. Corbishley. 2015. Editorial. *Conservation and Management of Archaeological Sites* 17 (1): 1–3. https://doi.org/10.1179/1350503315Z.00000000097.

Desilvey, C., and T. Edensor. 2012. Reckoning with ruins. *Progress in Human Geography* 37 (4): 465–485. https://doi.org/10.1177/0309132512462271.

Dimitrovski, D., V. Senić, D. Marić, and V. Marinković. 2017. Commemorative events at destination memorials–a dark (heritage) tourism context. *International Journal of Heritage Studies* 23 (8): 695–708. https://doi.org/10.1080/13527258.2017.1317645.

Foley, M., and J.J. Lennon. 1996. Editorial: Heart of darkness. *International Journal of Heritage Studies* 2 (4): 195–197. https://doi.org/10.1080/13527259608722174.

Francioni, F., and F. Lenzerini. 2006. The obligation to prevent and avoid destruction of cultural heritage: From Bamiyan to Iraq. In *Art and cultural heritage: Law, policy and practice*, ed. B.T. Hoffman, 28–40. Cambridge, UK: Cambridge University Press.

Giblin, J.D. 2014. Post-conflict heritage: Symbolic healing and cultural renewal. *International Journal of Heritage Studies* 20 (5): 500–518. https://doi.org/10.1080/13527258.2013.772912.

Goldenberg, D. 2009. Racism, color symbolism, and color prejudice. In *The origins of racism in the west*, ed. M. Eliav-Feldon, B. Isaac, and J. Ziegler, 88–108. Cambridge, UK: Cambridge University Press.

Harmanşah, O. 2015. ISIS, heritage, and the spectacles of destruction in the global media. *Near Eastern Archaeology* 78 (3): 170–177.

Harrison, R., N. Bartolini, C. Desilvey, C. Holtorf, A. Lyons, S. Macdonald, S. May, J. Morgan, and S. Penrose. 2016. Heritage futures. *Archaeology International* 19: 68–72. https://doi.org/10.5334/ai.1912.

Herva, V.-P., E. Koskinen-Koivisto, O. Seitsonen, and S. Thomas. 2016. 'I have better stuff at home': Treasure hunting and private collecting of World War II artefacts in Finnish Lapland. *World Archaeology* 48 (2): 267–281. https://doi.org/10.1080/00438243.2016.1184586.

Koskinen-Koivisto, E. 2016. Reminder of the dark heritage of humankind – experiences of Finnish cemetery tourists of visiting the Norvajärvi German cemetery. *Thanatos* 5 (1): 23–42. https://thanatosjournal.files.wordpress.com/2016/06/koskinen-koivisto_dark_heritage.pdf.

Koskinen-Koivisto, E., and S. Thomas. 2016. Lapland's dark heritage: Responses to the legacy of World War II. In *Heritage in action: Making the past in the present*, ed. H. Silverman, E. Waterton, and S. Watson, 121–133. New York: Springer. https://doi.org/10.1007/978-3-319-42870-3_9.

Light, D. 2017. Progress in dark tourism and thanatourism research: An uneasy relationship with heritage tourism. *Tourism Management* 61: 275–301. https://doi.org/10.1016/j.tourman.2017.01.011.

McAtackney, L. 2014. *An archaeology of the troubles: The dark heritage of long Kesh/maze prison*. Oxford: Oxford University Press.

Mowatt, R.A., and C.H. Chancellor. 2011. Visiting death and life: Dark tourism and slave castles. *Annals of Tourism Research* 38 (4): 1410–1434.

Olsen, B., and Þ. Pétursdóttir. 2014. *Ruin memories: Materiality, aesthetics and the archaeology of the recent past*. Oxon: Routledge.

Sather-Wagstaff, J. 2011. *Heritage that hurts: Tourists in the memoryscapes of September 11*. Walnut Creek: Left Coast Press.

Seitsonen, O., and E. Koskinen-Koivisto. 2018. 'Where the F… is Vuotso?': Heritage of Second World War forced movement and destruction in a Sámi Reindeer Herding community in Finnish Lapland. *International Journal of Heritage Studies* 24 (4):421–441. https://doi.org/10.1080/20518196.2016.1252129.

Stone, P. 2006. A dark tourism spectrum: Towards a typology of death and macabre related tourist sites, attractions and exhibitions. *Tourism: An Interdisciplinary International Journal* 54 (2): 145–160.

Stone, P., and R. Sharpley. 2008. Consuming dark tourism: A thanatological perspective. *Annals of Tourism Research* 35 (2): 574–595.

Thomas, S., and E. Koskinen-Koivisto. 2016. 'Ghosts in the background' and the 'Price of the war': Representations of the Lapland war in Finnish museums. *Nordisk Museologi* 2016 (2): 60–77.

Thomas, S., O. Seitsonen, and V.-P. Herva. 2016. Nazi memorabilia, dark heritage and treasure hunting as "alternative" tourism: Understanding the fascination with the material remains of World War II in Northern Finland. *Journal of Field Archaeology* 41 (3): 331–343. https://doi.org/10.1080/00934690.2016.1168769.

Wollentz, G. 2017. Making a home in Mostar: Heritage and the temporalities of belonging. *International Journal of Heritage Studies* 23 (10): 928–945. https://doi.org/10.1080/13527258.2017.1347891.

Yankholmes, A., and B. McKercher. 2015. Rethinking slavery heritage tourism. *Journal of Heritage Tourism* 10 (3): 233–247. https://doi.org/10.1080/1743873X.2014.988159.

Further Reading

Convery, I., G. Corsane, and P. Davis. 2014. *Displaced heritage: Responses to disaster, trauma, and loss*. Woodbridge: Boydell.

Herva, V.-P. 2014. Haunting heritage in an enchanted land: Magic, materiality and Second World War German material heritage in Finnish Lapland. *Journal of Contemporary Archaeology* 1 (2): 297–321.

Jasinski, M.E., M.N. Soleim, and L. Sem. 2012. 'Painful heritage'. Cultural landscape of the Second World War in Norway: A new approach. In *N-TAG TEN. Proceedings of the 10th Nordic TAG conference at Stiklestad, Norway 2009*, BAR International Series 2399, ed. R. Berge, M.E. Jasinski, and K. Sognnes, 263–273. Oxford: Archaeopress.

Kobiałka, D. 2014. Let heritage die! The ruins of trams at depot no. 5 in Wrocław, Poland. *Journal of Contemporary Archaeology* 1 (2): 351–368.

Logan, W., and K. Reeves. 2008. *Places of pain and shame: Dealing with 'difficult heritage'*. London: Routledge.

Macdonald, S. 2006. Undesirable heritage: Fascist material culture and historical consciousness in Nuremberg. *International Journal of Heritage Studies* 12 (1): 9–28.

Sørensen, M.L.S., and D. Viejo-Rose. 2015. *War and cultural heritage. Biographies of place*. New York: Cambridge University Press.

Viejo-Rose, D. 2013. Reconstructing heritage in the aftermath of civil war: Re-visioning the nation and the implications of international involvement. *Journal of Intervention and Statebuilding* 7 (2): 125–148.

Dark Tourism

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Introduction

Dark tourism is an academic label from the imagination of scholars who wish to shine a critical light on heritage that hurts. As such, "ghosts" of the significant Other dead who haunt our collective conscience have been increasingly commodified through memorials, museums, and visitor attractions – and, consequently, the dead now occupy touristic landscapes. In other words, the term "dark tourism" (or thanatourism) has been branded into an internationally recognized taxonomy to denote travel to sites *of* or sites *associated with* death and "difficult heritage" within global visitor economies. As such, dark tourism is a broad, provocative, and contested concept that divides opinion both within academic practice as well as in empirical circles. While dark tourism as a scholarly term may have been imposed upon industry by academia, touristic sites of death and disaster across the world often blur the line between commemoration and commercialization. Yet, despite its historical foundations in practice, dark tourism as a multi-disciplinary field of study, including in archaeology and heritage studies, attempts to capture contemporary (re)presentations of the noteworthy dead. Dark tourism allows us to examine issues of dissonance, politics, and historicity, as well as furthering our sociological understanding of death, the dead, and collective memory. In turn, dark tourism permits the dead to become contemporary commodities, and for tragic memories to be retailed in socially sanctioned tourist environments.

In essence, dark tourism mediates specific heritage narratives of the known and unknown dead. Thus, dark tourism offers a selective voice and records tragedy across time, space, and context and, subsequently, can provide reflectivity of both place and people. Different cultural, political, and linguistic representations of dark tourism and varying interpretive experiences are complex and multifarious and cannot be taken at face value. Instead, dark tourism in its many guises offers visual signifiers and multiplicity of meanings within touristic landscapes, as global visitor sites function as retrospective witnesses to acts of atrocity or tragedy. Contemporary memorialization is played out at the interface of dark tourism, where consumer experiences can catalyze sympathy for the victims or revulsion at the context. Yet, despite the cultural

complexity and moral dilemmas of dark tourism, we disconnect a (tragic) past from the (fretful) present for our (hopeful) future. We gaze at dark tourism in the knowledge that the victims are already dead, though the precise context and history of the victims can never be truly understood. Ultimately, dark tourism and its difficult heritage is about death and the dead, but through its current production and ephemeral consumption, it perhaps tells us more about life and the living.

Definition

Dark tourism is travel to visitor sites associated with death, disaster, or "difficult heritage."

Key Issues/Current Debates/Future Directions/Examples

While journeys or pilgrimages to sites of death have chronological pedigree and have evolved through historic periods of Christianity, Antiquarianism, and Romanticism (Seaton 2009), the contemporary nature of travelling to sites of real or recreated death has captured academic and media imaginations. Indeed, commodification of death for popular touristic consumption – whether in the guise of certain memorials and museums, particular attractions, special events and exhibitions, or specific tours – has become a focus for the modern visitor economy. Diverse global examples of dark tourism include sites such as the London Dungeon (a purpose-built attraction in the United Kingdom depicting death, disease, and torture), the Body Worlds exhibition (an anatomical touring exhibition employing human cadavers and animal corpses), Ground Zero (the site of the September 11 atrocity in New York), and Auschwitz-Birkenau Memorial and Museum (the infamous Holocaust site in Poland). Yet, dark tourism remains a contested concept. The production of these "deathscapes" in tourism and, consequently, the consumption of recent or distant trauma within a safe and socially sanctioned environment, raises fundamental questions of morality, mortality, and contemporary approaches to death, dying, and (re)presentation of the dead. Even though an increasing number of scholastic spotlights are now being shone on dark tourism as a contemporary visitor experience, the concept remains challenged (Light 2017; Hartmann 2014; Stone 2013).

Problematic issues with the typological and theoretical foundations of dark tourism raise complex questions between "dark heritage" and both its representation and consumption. Furthermore, dark tourism provokes challenging debate over the relationships between *heritage that hurts* and how contemporary society deals with its significant Other dead. While dark tourism, in its broadest sense, can be considered dialogic and mediatory, its implications mediating death and the dead in modern society are fraught with complexity (Stone 2012). Moreover, dark tourism exposes particularities of people, place, and culture, where visiting sites of death can reveal ontological anxieties about the past as well as the future. It also symbolizes sites of dissonant heritage, sites of selective silences, sites rendered political and ideological, sites powerfully intertwined with interpretation and meaning, and sites of the imaginary and the imagined. Therefore, analyzing dark tourism as a concept and researching its mediating interrelationships with the cultural condition of society is important in contributing to understanding the complex associations between (dark) heritage and the tourist experience.

However, dark tourism has, to some extent, domesticated death and exposes a contemporary cultural institution that mediates between the ordinary Self and the significant Other dead. The term *dark tourism* as a codified research area was brought to mainstream attention by John Lennon and Malcom Foley in 2000 in their book *Dark Tourism: The Attraction of Death and Disaster*. In 2009, Richard Sharpley and Philip Stone published *The Darker Side of Travel: The Theory and Practice of Dark Tourism* which drew together conceptual themes and debates surrounding dark tourism in broader interdisciplinary contexts. In 2013, Leanne White and Elspeth Frew published *Dark Tourism and Place Identity: Managing and*

Interpreting Dark Places which focused on the intersections of tourism motivations, destination management, and place interpretation. More recently, in 2018, Philip Stone offered a comprehensive tome of dark tourism and its global reach with *The Palgrave Macmillian Handbook of Dark Tourism Studies*. With an increasing literature base, the study of the commodification of death emerged from broader sociological, anthropological, and museological discourses, as well as a collision of thanatological education and tourism studies. Consequently, dark tourism scholarship is now located within interdisciplinary social, cultural, historical, and political responses to death and disaster, and has controversially elaborated the range and type of visitor sites (Stone 2011).

However, while there is no universal typology of dark tourism, there has been an increasing trend among scholars to use the concept as an academic lens to scrutinize broader sociocultural considerations, managerial and political consequences, or ethical dilemmas. Ultimately, dark tourism is a complex, emotive, multidimensional, politically vulnerable, and morally challenging phenomenon. There are no simple definitions of dark tourism, no simple answers to many of the questions that surround it, and no quick solutions to the numerous contestations inherent in the development and management of its sites. Nevertheless, as a particular theme in heritage tourism studies, it is not only a fascinating subject in its own right, but it also represents a powerful mechanism for exploring contemporary social life and cultural practices. In short, the principal benefit of studying dark tourism lies in what it reveals, or may not reveal, about the cultural condition of contemporary society – and its relationship with the significant Other dead.

References

Hartmann, R. 2014. Dark tourism, thanatourism, and dissonance in heritage tourism management: New directions in contemporary tourism research. *Journal of Heritage Tourism* 9 (2): 166–182.

Lennon, J., and M. Foley. 2000. *Dark tourism: The attraction of death and disaster*. London: Continuum.

Light, D. 2017. Progress in dark tourism and thanatourism research: An uneasy relationship with heritage tourism. *Tourism Management* 61: 275–301.

Seaton, A. 2009. Thanatourism and its discontents: An appraisal of a decade's work with some future issues and directions. In *The sage handbook of tourism studies*, ed. T. Jamal and M. Robinson, 521–542. London: Sage.

Sharpley, R., and P.R. Stone. 2009. *The darker side of travel: The theory and practice of dark tourism*. Bristol: Channel View.

Stone, P.R. 2011. Dark tourism: Towards a new post-disciplinary research agenda. *International Journal of Tourism Anthropology* 1 (3/4): 318–332.

Stone, P.R. 2012. Dark tourism and significant other death: Towards a model of mortality mediation. *Annals of Tourism Research* 39: 1565–1587.

Stone, P.R. 2013. Dark tourism scholarship: A critical review. *International Journal of Culture, Tourism and Hospitality Research* 7 (3): 307–318.

Stone, P.R., et al., eds. 2018. *The Palgrave handbook of dark tourism studies*. London: Palgrave Macmillian.

White, L., and E. Frew. 2013. *Dark tourism and place identity: Managing and interpreting dark places*. Abingdon: Routledge.

Further Reading

Current issues in dark tourism research. Available at www.dark-tourism.org.uk.

D

Dart, Raymond Arthur

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Basic Biographical Information

Raymond Arthur Dart (anthropologist, anatomist, and academic) was born 4 February 1893 in Brisbane, Australia, and died 22 November 1988 in Johannesburg, South Africa. He was raised in a devout Methodist and Baptist environment by parents Samuel and Eliza. He attended Ipswich Grammar School. Dart had the desire to attend medical school at the University of Sydney and become a medical missionary. However, he was granted a scholarship to the University of Queensland and graduated in 1914 with a Bachelor of Science (Hons). In 1914, Dart obtained a scholarship to study

medicine at the University of Sydney. During this time, he was also enlisted to the rank of Captain serving in the Australian Imperial Forces.

After his service, Dart took a post at University College, London, working under (Sir) Grafton Elliot Smith. Between 1920 and 1921, he spent time at Washington University, St Louis, Missouri, under a Rockefeller Foundation Fellowship. It was also in 1921 that he married anatomy instructor Dora Tyree, whom he later divorced. He returned to the University College, London, before being offered a post, much to Dart's initial annoyance, as a professor of anatomy at the University of Witwatersrand, Johannesburg. Dart would transform this fledgling medical school. He started a specimen collection which is now known as the Raymond Dart Collection of Human Skeletons which remains a testament of his legacy in modern-day understanding of human origins. In 1936, he married Marjorie Gordon Frew in Johannesburg and had two children with, a daughter, Dr. Diana Graham, and a son, Galen Dart. He retired from Witwatersrand in 1958 spending 36 years there and 18 as Dean of the Faculty of Medicine. Although retired, Raymond Dart became the first occupant of the United Steel Workers Chair of Anthropology of the Institutes for the Achievement of Human Potential and continued to share his knowledge with academic and scientific communities.

Major Accomplishments

Dart is credited with groundbreaking research in paleoanthropology, revolutionizing the concepts of human origins. However, he was also involved in a variety of scientific projects and interests. Dart caused international scientific debate on human origins when he announced the discovery of an early human fossil, popularly known as "Taung child" from the African continent. The exact date of discovery of the fossil is unknown; however, from accounts at the time, the specimen had been blasted from limestone by M. de Bruyn, a lime worker.

Dart painstakingly extracted the fossil to reveal a skull that almost had a complete face. Within the features of this skull, Dart identified both human- and apelike characteristics. A cast of the braincase played a pivotal role towards Dart's claim. Dart identified the lunate sulcus as being located in the posterior, the same as humans, rather than anterior as with apes. Other features Dart identified included an upright spinal column and small canine teeth which are comparable to modern humans.

The controversy stemmed from the widely held scientific belief that human origins would be found in Asia. However, this skull, the "missing link," was found near Taung, South Africa. Dart named this new species *Australopithecus africanus* (the first of four Australopithecus species). The announcement came 3 months after he freed a skull embedded in rock that had been specially delivered to him.

The scientific community was skeptical over the claim that the "missing link" between humans and apes had been found on the basis of one fossil. Arguments ranged from Dart being inexperienced to disliking the name Australopithecus. A significant point for many was the small braincase. At the time, it was thought that brain size had expanded early in hominin development, and the indication that this skull was that of a child and claims upon brain size could not be inferred. It was not until after World War II, over 20 years later, when Louis Leakey made a succession of significant fossil finds that supported Dart's assertion of the early origins of humans.

After World War II, Dart led multiple expeditions, the most significant being Makapansgat, where fossilized remains of baboons were located. Dart became intrigued by thousands of antelope bones that had been broken and fossilized. Dart proposed the theory that early humans, in particular australopithecines, had utilized bones as tools prior to developing the use of stone. He termed this technology *Osteodontokeratic Culture* where *Australopithecus Prometheus* deliberately shaped

and used bone to kill animals for subsistence. While this hypothesis has been rejected, Dart's theory spurred interest in understanding what happens to bone after death of the animal and impacts upon the bones. It could be argued that Dart's theory was the catalyst for the development of a new field of research that is known as taphonomy. Prior to Dart's osteodontokeratic culture theory, minimal was known about the processes that affect bone once deposited. Multiple studies were developed specifically to study various impacts on bone.

Dart also had an interest in primate studies and established a baboon colony within the Anatomy Department at the University of Witwatersrand. A number of studies relating to endocrinology and behavioral studies were conducted by other researchers.

Although some of Raymond Dart's views challenged conventional paradigms of the time, he revolutionized modern perceptions on human evolution and provided a foundation for scientific inquiry surrounding taphonomy.

Raymond Dart authored numerous publications on his research and wrote an autobiography with Dennis Craig.

Cross-References

► Australopithecines
► Leakey Family

Further Reading

Štrkalj, G., and P.V. Tobias. 2008. Raymond Dart as a pioneering primatologist. *Journal of Comparative Human Biology* 59: 271–286.

Tobias, P.V. 1989. Raymond Dart (1893–1988). *Nature* 337: 211.

Tobias, P.V. 2008. Raymond Arthur Dart: The man who unwillingly ushered in a revolution in the evolution of humankind. In *Rebels, mavericks, and heretics in biology*, ed. O. Harman and M.R. Dietrich, 84–102. New Haven: Yale University Press.

Wheelhouse, F., and K.S. Smithford. 2001. *Dart: Scientist and man of grit*. Sydney: Transpareon Press.

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D

Basic Biographical Information

Charles Robert Darwin (1809–1882), an English naturalist, is preeminently known for his theory of evolution by natural selection although he contributed an extensive body of work to the field of life sciences. Almost 150 years later, Darwin remains personified in modern scientific research and the exploration for new knowledge about life on earth.

Charles Darwin was born on February 12, 1809, in Shrewsbury, England, the son of Robert Waring Darwin, a doctor, and Susannah Darwin nee Wedgwood (Darwin 1887). In 1825, Darwin enrolled in the University of Edinburgh Medical School and withdrew before completion the same year. In 1828, Darwin enrolls in a general bachelor degree at Christ's College, University of Cambridge, and it is here that he develops an interest for the study of beetles. The following year, Darwin travels through Wales collecting samples with entomologist Frederick William Hope, and in the same year, Darwin's name first appears in Stephen's Illustrations of British Entomology. Darwin qualifies his self-educated observations of nature by attending Professor John Stephen Henslow's botany classes at Cambridge.

In 1831, Darwin graduates tenth in his class from Cambridge, and Henslow requests that he join the 5-year surveying voyage aboard the *Beagle*. At the age of 22, Darwin embarks with Captain Robert FitzRoy and his crew on an expedition that would become the cornerstone of Darwin's body of work. Upon his return to England in 1836, Darwin began a torrent of scientific publication. Amidst this success in his academic career, Darwin's personal life also flourished, and in 1839 he married his first cousin Emma

Wedgwood who would later bear him 10 children, 7 of whom would reach adulthood. Darwin spent the remainder of his life at his home in Down House, Kent, where he continued to revise his theory of evolution by natural selection, and also pursued the correlation between his theories and what is now known as Mendelian genetics.

Major Accomplishments

The height of Darwin's academic career was undoubtedly the publication of *Evolution by Natural Selection*, *or the Preservation of Favoured Races in the Struggle for Life*. His ideas were controversial and generated intense debate that continued throughout his life. Both Darwin and Wallace independently defined natural selection as a concept whereby if a heritable trait improves the survival or reproduction of an organism, then those organisms exhibiting the selected trait would slowly outnumber those without it, leading to changes in the organism over time; Darwin termed this as "descent with modification" (Ladiges et al. 2010). The concepts are now without repudiation; however, this is not where Darwin's contribution to science began. During his first notable expedition, the *Beagle* Voyage in 1831, Darwin observed many of his publishable findings.

The *Beagle* set sail on December 27, 1831, and made its first landing at St. Jago, Cape Verde Islands, on January 16, 1832 (Barlow 1933). While on board, the *Beagle* Darwin spent much of his time writing about the samples of marine invertebrates collected at sea (Barlow 1933). After surveying the east and west coasts of South America, the *Beagle* departed Lima in September 1835 and made for the Galapagos Archipelago, where Darwin spent 2 months exploring these islands, as well as Tahiti and New Zealand (Barlow 1933). Darwin's field notes from this period reveal his growing interest in geology and taphonomy; the pages abound with descriptions of the landscape and geology of each region, the fossilized assemblages they yielded, and meticulous records of barnacles and early life forms (Barlow 1933). Correspondence between Darwin and Professor Henslow during the *Beagle* voyage was publically read (without Darwin's knowledge) at a meeting of the Cambridge Philosophical Society on November 16, 1836 (Darwin 1887). In the same year, these letters were published in *Entomological Magazine*, and further extracts appeared in *Magazine of Natural History*, constituting the first published review of Darwin's observations.

In 1836, the *Beagle* anchored in Sydney, while Darwin recorded geological descriptions of the Blue Mountains and collected samples of the native flora and fauna. Furthermore, while in Van Diemen's Land, Darwin makes sociological observations of the Indigenous people he encountered (Barlow 1933). In 1839, Darwin published an account of the voyage, *Journal of Researches into the Geology and Natural History of the Various Countries Visited by H.M.S. Beagle*.

Upon the *Beagle*'s return from 1836 until 1858, Darwin authored a number of publications spanning a wide variety of subjects, describing the geology, fossil record, insects, and native flora of the places he visited while sailing on the *Beagle* (Darwin 1887). He also published *The Zoology of the Voyage of the Beagle*, to which a number of experts contributed. During this time, Darwin befriended geologist Charles Lyell, and before 1940 his attention was drawn to concepts of human variation, population, and extinct species of human (Barlow 1958). In this decade, Darwin also completes his *Notebook of the Transmutation of Species* (Barlow 1958).

However, it was not until 1856 that Darwin was advised by Charles Lyell to begin consolidating his ideas into a working theory on "natural selection" (Barlow 1958). Over 2 years, Darwin drafts his *Origin of the Species* but is astonished to receive a letter from Alfred Russel Wallace whom, while on the other side of the earth, had independently reached the same theoretical concept of evolution, which bore a striking resemblance to Darwin's own abstract of evolution by natural selection. Though both authors presented a joint review of their theories, Darwin was the first to publish his book *The Origin of Species by means of Natural Selection*, *or the Preservation of Favoured Races in the Struggle for Life* in November of 1859 (Ladiges et al. 2010). Several

editions are reprinted and expanded upon over the remainder of Darwin's life.

While *The Origin of Species* would rightly be considered the pinnacle of Darwin's career, he continues to publish material discussing the variations of plant and animal species. In 1871 he released *The Descent of Man, and Selection in Relation to Sex*. The advent of this book prompted heated debate between Darwin and St. George Mivart. As a result, Darwin supplemented the *Origin of Species*, then in its 6th edition, with an additional chapter to counter many of Mivart's arguments. However, the height of Mivart's criticism was fuelled by what Darwin later recognized in his own theory as "deficiencies in his argument" through lack of comprehension for the mechanisms of inheritance published by Gregor Mendel in 1875 (Ladiges et al. 2010). Arguably, if Darwin had known about Mendel's laws of inheritance at the time of publishing *Origin of the Species*, the criticisms he received may have been far less antagonistic (Ladiges et al. 2010).

Though Darwin cannot claim sole credit for the theory of evolution by natural selection, his body of work until his death at the age of 73 comprised the most comprehensive, judicious evaluations of life on earth at the forefront of science during his time. His selection of influential books and papers are still referenced in contemporary scientific research.

Cross-References

- ▶ Human Evolution: Theory and Progress
- ▶ Human Evolution: Use of Fire
- ▶ Journal of Human Evolution
- ▶ Niah Caves: Role in Human Evolution

References

Barlow, N., ed. 1933. *Charles Darwin's diary of the voyage of H.M.S. Beagle*. London: Pilot Press LTD.

Barlow, N., ed. 1958. *Autobiography of Charles Darwin*. London: Collins and Clear-Type Press.

Darwin, F. 1887. *Life and letters of Charles Darwin*. London: John Murray.

Ladiges, P., B. Evans, R. Saint, and B. Knox. 2010. *Biology: An Australian focus*. 4th ed. North Ryde: McGraw-Hill.

Date Palm: Origins and Development

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Basic Species Information

The date palm, *Phoenix dactylifera* L., is one of the 15 species in the genus *Phoenix* of the palm family (Arecaceae, previously Palmae) distributed in the subtropics and tropics of the Old World (Henderson 2009: 140–143). Traditionally cultivated in the arid regions of the Middle East and North Africa, the date palm has been introduced into other parts of the world, for example, to California, Peru, and Australia. The species thrives in hot conditions and can stand a certain degree of soil salinity as long as the roots receive a regular supply of water, most often provided by irrigation. *Phoenix dactylifera* has a solitary or sparsely clustering growth habit with erect stems that can reach up to 30 m tall (Fig. 1). The large pinnate leaves are 3–5 m long and composed of 50–130 leaflets on each side of a ligneous midrib. The date palm is a dioecious species with female and male inflorescences borne on separate individuals. The fruits, called dates, are fleshy berries containing one lignified seed.

The dates, rich in sugar (up to 80% in dry fruits), dietary fibers, and certain essential vitamins and minerals, constitute an important food source in the desert regions where the date palm is cultivated. They can be consumed fresh, more or less dried, or as a sweetening ingredient in various food preparations. Both fruits and seeds are traditionally used as a complementary fodder for livestock, the latter most often after boiling and/or crushing. Besides being important in local diets, the date palm has multiple other uses. The stem and the woody midribs of the leaves can be used for construction works and fuel. Whole palm fronds are employed for covering roofs or the construction of huts. The leaflets are transformed

Date Palm: Origins and Development, Fig. 1 Date palm (*Phoenix dactylifera* L.), Makran, Pakistan. (Photograph by M. Tengberg)

into basketry, matting, and cordage, and the rough fibers surrounding the leaf bases (fibrillum) are useful for making ropes and baskets as well as for packaging and padding. Finally, the date palm constitutes the main species and structural element in traditional date palm gardens, agrosystems perfectly adapted to the specific constraints of arid environments, in which a wide array of useful plants can be grown in the shade of the palm fronds.

Timing and Tracking Domestication

The earliest examples of the use of date palm come from two Neolithic sites in the Persian Gulf region: Dalma on an island off the coast of Abu Dhabi (United Arab Emirates) and H3 near Sabiyah in Kuwait. There, date seeds preserved by carbonization have been dated by C14 to the late sixth–early fifth millennia BCE (Beech 2003).

Date Palm: Origins and Development, Fig. 2 Carbonized date seeds and fruits from Iron Age (first millennium BCE) Muweilah, United Arab Emirates. (Photograph by M. Tengberg)

Even though the morphology of the seeds seems to indicate rather the collecting of wild fruits than date palm cultivation, at least in the case of H3 (Gros-Balthazard et al. 2017), the characterization of early finds (wild or cultivated?) is often problematic, and this is also true for other fruit species, for example, grape and fig. This difficulty is to a large extent due to the predominant use of vegetative reproduction techniques that has little impact on the genetic composition, and subsequently on the phenotypic characters, of the offspring. As a consequence there is relatively little difference between a cultivated variety of date palm and its wild ancestor that was chosen for cloning one or several generations earlier. Nevertheless, methods using geometric morphometry on modern date seeds have been successful in distinguishing between cultivated varieties and wild-growing date palms and seem promising for the determining of archaeological samples too (Terral et al. 2012; Gros-Balthazard et al. 2017).

A supplementary difficulty in retracing the domestication of date palm is that its wild ancestor remained unknown for a long time. In the absence of a definite candidate, different hypotheses have been advanced, for example, that the cultivated date palm would result from either the domestication of another *Phoenix* species or from the hybridization of several different species within

Date Palm: Origins and Development, Fig. 3 Artificial pollination of a female date palm, Makran, Pakistan. (Photograph by M. Tengberg)

this genus (Barrow 1998). Recent genetic analyses show however that *Phoenix dactylifera* possesses a high number of private alleles, suggesting that it stems from wild populations belonging to the same species (Pintaud et al. 2010). Such original populations of *Phoenix dactylifera* are still insufficiently known today, as millennia of cultivation in the putative areas of origin have blurred the limits between feral and "authentically" wild palm trees. While the earliest archaeological date remains are found in the Middle East, several independent domestication events in different regions cannot be excluded as suggested by genetic studies placing present African and Asian cultivars in separate genotypic groups (Arabnezhad et al. 2012).

While the status (wild or cultivated) of the earliest date remains can still be discussed, cultivation of date palm seems irrefutable from the late fourth and early third millennia BCE as archaeobotanical evidence multiplies on archaeological sites around the Persian Gulf as well as in the Levant (Fig. 2) (Tengberg 2012; Zohary and Hopf 2000). Date palm cultivation seems to appear somewhat later in North Africa, for example, in Egypt where finds are rather sporadic until the New Kingdom (c. 1540–1070 BCE) when cultivation can be confirmed by literary, iconographic, and botanical evidence.

One of the main differences between spontaneously growing date palms and their cultivated counterparts concerns the fruits. While small and hardly palatable in the former, the fleshy fruit wall of the latter (pericarp) is usually more developed and sweeter, even though diversity in fruit quality does exist between the numerous cultivars. Under cultivation date palms are usually propagated by cloning, achieved by the cutting off and planting of offshoots that form naturally around the base of the stem. Sexual reproduction is rarely practiced, as the result especially in terms of fruit quality is unpredictable. Individuals grown from seeds are however taken into cultivation occasionally and thus enhance the genetic diversity of traditional palm groves. Another practice associated with date palm cultivation is that of artificial pollination, known from Mesopotamian textual sources since the third millennium BCE. In date palm gardens, fruit-bearing female trees are preferred to pollen-producing male trees that are reduced to a strict minimum. In order to compensate for deficient wind pollination, pollen from male inflorescences is applied artificially to the female flowers by climbing the trees one by one (Fig. 3).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants

▶ Domestication: Definition and Overview
▶ Figs: Origins and Development
▶ Genetics of Early Plant Domestication: DNA and aDNA
▶ Grapes: Origins and Development
▶ Olives: Origins and Development
▶ Plant Domestication and Cultivation in Archaeology
▶ Plant Processing Technologies in Archaeology

References

Arabnezhad, H., M. Bahar, H.R. Mohammadi, and M. Latifian. 2012. Development, characterization and use of microsatellite markers for germplasm analysis in date palm (*Phoenix dactylifera* L.). *Scientia Horticulturae* 134: 150–156.

Barrow, S. 1998. A monograph of Phoenix L. (Palmae: Coryphoideae). *Kew Bulletin* 53: 513–575.

Beech, M. 2003. Archaeobotanical evidence for early date consumption in the Arabian Gulf. In *The date palm – from traditional resource to green wealth*, 11–31. Abu Dhabi: The Emirates Center for Strategic Studies and Research.

Gros-Balthazard, M., M. Galimberti, A. Kousathanas, C. Newton, S. Ivorra, L. Paradis, Y. Vigouroux, R. Carter, M. Tengberg, V. Battesti, S. Santoni, L. Falquet, J.-C. Pintaud, J.-F. Terral, and D. Wegmann. 2017. The discovery of wild date palms in Oman reveals a complex domestication history involving centers in the Middle East and Africa. *Curr Biol* 27 (14): 2211–2218 (online).

Henderson, A. 2009. *Palms of southern Asia*. Princeton: Princeton University Press.

Pintaud, J.-C., S. Zehdi, T. Couvreur, S. Barrow, S. Henderson, F. Aberlenc-Bertossi, J. Tregear, and N. Billotte. 2010. An evaluation of the taxonomy of the genus Phoenix (Arecaceae) using SSR markers, with emphasis on the identity of the date palm (Phoenix dactylifera L.). In *Diversity, phylogeny and evolution in the monocotyledons*, ed. O. Seberg, G. Petersen, A. S. Barfod, and J. I. Davis, 267–286. Aarhus: Aarhus University Press.

Tengberg, M. 2012. Beginnings and early history of date palm garden cultivation in the Middle East. *Journal of Arid Environments* 86: 139–147.

Terral, J.-F., C. Newton, S. Ivorra, M. Gros-Balthazard, C. Tito De Morais, S. Picq, M. Tengberg, and J.-C. Pintaud. 2012. Insights into the historical biogeography of the date palm (*Phoenix dactylifera* L.) using geometric morphometry of modern and ancient seeds. *Journal of Biogeography* 39 (5): 929–941.

Further Readings

Zohary, D., and M. Hopf. 2000. *Domestication of plants in the Old World. The origin and spread of cultivated plants in West Asia, Europe and the Nile Valley.* 3rd ed. New York: Oxford University Press.

Dating Methods (Absolute and Relative) in Archaeology of Art

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Introduction

Chronology of rock art, ranging from Paleolithic to present times, is a key aspect of the archaeology of art and one of the most controversial. Prehistoric art assemblies are among the most relevant archaeological remains on a global scale, because they are a clear expression of the symbolic mind of the people that produced them. In this regard, it has been one of the key elements for the identification of modern human behavior. Therefore, rock art should be considered as an independent source of information about ancient societies that yield evidence complementary to other archaeological sub-disciplines and genetic data. The evolution of social change and human adaptation or the transformation of identity and mind can be inferred from the study of rock art assemblages over time. But the utility of these invaluable prehistoric "databases" is strictly dependent on our ability to specify chronological time frames for every style and every site. The issue is that rock art dating is still considered one of the most intractable issues in rock art research and in archaeology (Bednarik 2010).

Rock art chronologies were based for decades in archaeological methods that used stylistic analysis of imagery to establish one-way evolutionary schemes. Application of scientific methods, also called absolute dating, started to be used in the 1980s and since then has increased more and more its significance, as judged by the large number of papers published in the last two decades on this subject (Rowe 2012). Uncertainties about the reliability of specific dating methods are still important, but the expected benefits are so huge that it is rapidly becoming a central topic of the discipline, and it is very likely that it will increase its centrality in the upcoming years.

Definition

Absolute and relative dating methods have been used to establish tentative chronologies for rock art. Relative dating refers to non-chronometric methodologies that produce seriation based on stylistic comparison and stratigraphic assumptions. On the other hand, absolute dating methods are based on scientific techniques that yield a chronometric age for a physical-chemical phenomenon in direct or indirect relation to rock art (same age, older, or younger). Dating of some binders in pictographs or the alterations of surfaces by petroglyphs are examples of direct ages related to rock art production. However, it is controversial to consider these dates as "absolute" as they merely reflect experimental propositions, which often lack independent verification (Pettitt and Pike 2007). Most scientific dating methods are indirect because they produce constraining ages for imagery, and the age obtained is related to but not the actual time of manufacture of the art. If these indirect ages are in a stratigraphic relation to rock art (older or younger), then they produce minimum/maximum direct dates for related imagery (Morwood et al. 2010; Ruiz López et al. 2012).

Rock art research has been treated for years as a minor aspect of archaeology. Lack of reliable methods to date ancient imagery, both pictographs and petroglyphs, on open-air sites or inside of deep caves, kept it outside of mainstream archaeology. This began to change with the introduction of scientific dating approaches, and there are reasons to feel optimistic about dating rock art at this time.

State of Knowledge and Current Debates

Relative Dating

Before direct dating techniques began to be used on petroglyphs and pictographs, the only way to estimate the age of rock art was based on relative dating procedures. Methods like stylistic comparison, superimposition analyses, or images covered by archaeological strata, among others, are included in this concept. All of them are based on the assumption that an approximate age for a rock art figure can be deduced from the context in which it is incorporated. The reliability of the deduced ages is limited, but they are still widely used because absolute dating is not always possible.

Many of these methods yield terminus ante quem and terminus post quem, or minimum/maximum ages, when based on stratigraphic relations. The identification of painted or engraved figures totally or partially covered by sediments was one of the first methods used to assess a prehistoric context to some European Paleolithic cave art at Pair-non-Pair (France). Since then this relative dating system has been used a couple of times, mainly for engravings, because pigments can degrade or alter chemically after millennia in contact with soil. The minimum age of the underlying imagery will be yielded from the age of the strata covering it, which is obtained from the objects incorporated into it or from the scientific dating of the strata. A good example is the engravings of Fariseu at Côa Valley (Portugal) where the archaeological strata covering them were dated by luminescence (TL, OSL) and radiocarbon (Aubry et al. 2010) securing a Pleistocene age for them. A similar case could arise from the retrieval of a piece of

rock art detached from a panel in an archaeological stratum.

Stylistic comparison is rooted in the principles of stylistic dating. This method proposes that the age of a parietal figure is similar to that of a well-dated archaeological material retrieved from an excavation. For example, the chronology of European Paleolithic art was based for decades in the comparison with mobiliary figurines or with painted and incised engravings on slabs recovered from excavations, like in the exceptional sequence of decorated slabs of El Parpalló cave (Spain) (Villaverde Bonilla 1994). The foundations of one-way evolutionary styles proposed for European Paleolithic art were based on these assumptions (Pettitt and Pike 2007). Other items like decorated pottery, mobiliary idols, or personal adornments have been used with the same purpose. This dating procedure is founded on the chronostylistic principle that only one style is specific of a human group in a given moment, assuming that styles evolve over time in just one direction. However, only very specific portable imagery replicated on rock art panels could have some real chronological value, like the European Paleolithic mobiliary art, and even in that specific contexts cannot explain all changes over time, as the discussion on the chronology of Chauvet Cave pictographs has demonstrated. Stylistic comparison ignores phenomena often attested in historical and ethnological contexts like imitation or recovery of old traditions. Another issue of this method is subjectivity, because it greatly depends on the researcher's perception. For these reasons, stylistic comparison cannot be considered a secure method of dating, except in well-contrasted contexts, unless it is based on reliable evidence.

Identification of overlapping images is likely the most important relative method, because it allows a relative seriation. In these seriations, the older stages at a site are necessarily underlying younger ones. The order of superimposition can be deduced for well-preserved engravings, because these subtractive techniques remove fractions of any underlying image. Careful naked-eye observation, macrophotography, or microscopic inspection on site are used for this task. But determination of pictograph superimpositions is more difficult. Naked-eye observation is usually not sufficient because it depends on the perceptual conditions of the observer and of the environment and on physical properties of painting such as opacity, density, chroma, or contrast. A low degree of opacity or density in painting could lead to erroneous conclusions as it is impossible to identify by naked eye which one is overlying each other in a superimposition. This is evident for a dense painting layer and a semitransparent one, but it can be even worse for two low-density paintings where human vision system tends to bring closer to the observer the darker color. For these reasons, there is a high degree of uncertainty associated to many seriations based on naked-eye observations.

In the past few years, several techniques have been introduced to increase the accuracy for seriations based on overlapping. In situ digital microscopy is probably one of the more successful to identify the order of painting (Boyd 2016). Microscopy, and sometimes macrophotography, allows identification of micro weathering events that were covered later by a new layer of painting. Digital imaging techniques like multispectral imaging can be very useful as well, because they are based on physical properties of paint substances. Spectral classification based on multispectral imaging can help to produce an accurate seriation. DStretch has been proposed, as well, as a way to deduce an accurate seriation associated with creation of Harris' matrices (Gunn et al. 2010). Some spectroscopic techniques have been tested for this purpose as well. Handheld XRF, μ-Raman, or handheld LIBS can be a noninvasive or micro-destructive alternative to identify the order in a seriation of paintings based on the characterization of overlapping figures (Huntley et al. 2011). Sampling and subsequent spectroscopic analyses on a thin section are undoubtedly the best option to define a reliable order in superimpositions, but because of its invasive and destructive nature, it should be used sparingly or when other choices are not helpful. Preservation of rock art images is essential and should be placed on top of the priority ranking of researchers.

Weaknesses of these relative dating procedures were pointed out (see Bednarik (2007) and Pettitt and Pike (2007) for recent reviews), but it is important to recognize that they are still useful for rock art chronological studies because it is impossible to date scientifically every figure in a site and every site all over the world. A well-defined proxy with stylistic, technical, and chemical data would be very helpful as a complement to absolute dating.

Absolute Dating

Archaeological studies of rock art demand a temporal framework in which a particular imagery was produced, as it is the only way to relate decontextualized pictographs and engravings to archaeological cultures. Relative dating does not produce high-resolution chronological frameworks. Moreover, many rock art assemblages lack a clearly associated archaeological context or mobiliary parallels, like the Great Mural style in Baja California (Mexico), the earlier styles of Saharan rock art, or the Levantine rock art in Spain, in which the usefulness of relative dating is limited. Independent chronological evidence is required to exploit the huge heuristic potential of prehistoric pictographs and engravings as data sources for archaeological research. This independent evidence can be based on scientific chronometric techniques that began to be used on rock art at the late 1980s and that are directly responsible of the revival of this discipline since then. After a few years of scientific dating, a broader conscience about new possibilities offered by absolute dating dictated that the time of stylistic paradigms was over (Lorblanchet and Bahn 1993).

"Absolute dating" refers to physical-chemical phenomena that can be measured chronometrically by a given method. But these phenomena may be directly linked to the cultural event, that is, to the production of pictographs or engravings, or not. Direct dating of a pictograph is produced by measuring the age of any of the components of a paint recipe, mainly pigment or binder or vehicle. Most pictographs are based on iron oxide pigments, so pictographs are not currently datable by radiocarbon decay, the most ubiquitous absolute dating method, *except* when they include an organic pigment (mainly charcoal) or an organic binder/vehicle (fat, vegetable juice, wax, egg, etc.). Direct dating is not currently available for engravings and nonorganic pictographs; hence indirect dating is the only option to get a scientific chronological framework for them. Indirect dating refers to direct dating of a substance or an event that is in stratigraphic relation with the artwork, overlying or underlying, yielding minimum and maximum age limits for the production of rock art. Most of these methods were developed for geochronological research and are not exempt of problems on their application to rock art, but they are improving year after year, offering better opportunities for its application to ancient imageries.

Direct Dating

The first radiocarbon dating on rock paintings was carried out on a charcoal pictograph in South Africa in the late 1980s, quickly followed by others in 1990 in Australia, USA, and Europe, which added to pioneer research on engraving dating. Radiocarbon is the most common technique for dating rock paintings worldwide, most often on charcoal pigments frequently used in pictographs. Dating charcoal has been well honed by the radiocarbon community, and the results can be considered to be generally reliable. The main disadvantage to radiocarbon dating charcoal pigments is that the date measured is not that of the time of execution of the painting. Rather it dates the pigment, and it should be noted that under the concept charcoal may include many different pigments (Bonneau et al. 2011) obtained after combustion of an organic carbon-bearing substance, including wood, bone, or lampblack, specimens that can be short-lived or long-lived. There are two caveats that accompany any date of charcoal: old wood and old charcoal (Steelman and Rowe 2012). Old wood phenomena are situations, usually encountered in desert areas where wood decays slowly, in which the wood burned to make charcoal may be up to centuries old. Old charcoal may occur when freshly hewn wood is burned, but not used to construct a painting until much later. Both these caveats should be kept in

mind at all times when interpreting charcoal pigment radiocarbon dates.

In recent years, increasing attention has been paid to identifying the origin of charcoal in samples collected for dating (Sanchidrián Torti et al. 2017). In situ characterization by spectroscopic techniques is an alternative. Raman spectroscopy can identify amorphous charcoal before removing specimens, a way to avoid unnecessary harm to pictographs. The use of pXRF has been proposed as well for in situ identification of carbon before sampling, but it should be carefully used; XRF cannot detect carbon so its presence is deduced from the absence of manganese or iron, elements that may be predominant in black pigments. However, other elements, like antimony (L. Mansilla, pers. comm. 2016) or lead (Wesley et al. 2014), have been characterized as main pigments of some black pictographs.

Dating of charcoal pictographs has been broadly used in French and Spanish Paleolithic caves (Alcolea González and de Balbín Behrmann 2007) but also in Africa, North America, Australia, and other regions of the world (e.g., Steelman and Rowe 2012). Most of the charcoal pigment dates are considered reliable, but, for example, in Chauvet Cave dates have been considered controversial because they are unusually old and conflict with stylistic paradigm (Pettitt and Bahn 2015), so several authors have claimed for a likely contamination of radiocarbon dates from this cave. A similar case has been discussed about the ages yielded by different samples of one single figure in Peña de Candamo (Asturias, Spain), showing that results by Geochron lab (USA) were 15,000 years younger than those produced by LSCE lab (France), responsible of all Chauvet dates (Pettitt and Pike 2007). This situation reflects pitfalls of the method that could be accompanied by contamination of unknown origin, possible repainting for younger dates, mistakes in laboratory treatment of samples, and the presence of carbon of different origin, for example, incomplete dissolution of calcium oxalates during pretreatment of samples. In a recent study, an improved specific protocol to remove contamination produced by calcium oxalates from charcoal paintings has been proposed (Bonneau et al. 2011).

AMS ^{14}C has been used to date any other kind of carbon-bearing substances related to pictographs or petroglyphs (Aubert 2012). The presence of binders has been used to produce direct radiocarbon dates of beeswax pictographs in Australia (Morwood et al. 2010). Vegetal resins and wax are binders of these pictographs. It is considered that wax would have been fresh when applied on walls to construct the drawings, so it should be a reliable source of carbon to date rock art. Radiocarbon dating of this exceptional assemblage of pictographs from Australian Kimberley area yielded a range of dates from 3780 ± 60 BP to present times (Morwood et al. 2010). Rowe and co-workers have dated non-charcoal paintings in several sites in North and South America (Steelman and Rowe 2012). These pictographs were made with inorganic pigments, mainly iron oxides, so it is assumed that some organic binder must be present in them. Replicate measurements on samples of the same pictograph yield an uncertainty of ±250 years suggesting results are reliable (Steelman and Rowe 2012). A major attempt to get radiocarbon dates from inorganic pigment pictographs in Central Australia has successfully dated associated organic binders (McDonald et al. 2014). However, these researchers also found that binders could be a source of error; some nineteenth–twentieth-century designs yielded a radiocarbon age of several millennia, which was attributed to the use of a petroleum-based binder.

It is indispensable to follow a strict protocol to collect samples for radiocarbon dating during fieldwork. The protocol described in the literature tries to avoid contaminations using sterile latex gloves and surgical masks. Samples are removed from walls with a sterile surgical blade that is changed and discarded after each sample. They are put inside of a sheet of folded sterile aluminum foil and placed inside of a labeled plastic bag. Exact positions where samples were removed should be recorded with photographs. Extreme care should be observed in the selection of sampling points to avoid major visual impact or harm to the pictographs, for example, selecting flakes that appear likely to spall from the walls naturally.

The size of samples required is uncertain, but around 1–2 cm^2 is generally used for pictographs with inorganic pigments and much less for charcoal-pigmented paintings. For AMS ^{14}C dating, only 40–100 micrograms of carbon is needed for an accurate date. For pictographs with inorganic pigments, e.g., iron ochre or manganese oxides, it is essential to take an unpainted rock sample as near to the sample taken as is feasible. That background rock sample should be processed identically to the pictograph sample. A more detailed report on sampling protocol, reporting of radiocarbon results, and laboratory pre-treatment of samples can be seen in Steelman and Rowe (2012). The decision to collect one specimen for dating should be guided by a previous hypothesis; a date archaeologically decontextualized is of little value, so it must be stressed that any dating should be included in archaeological hypotheses that help to understand results.

Direct dating of iron oxide in inorganic red pictographs is still an unobtainable objective. Some recent advances on the use of archaeomagnetic properties of iron oxides may open a gate to their direct dating. Hematite-bearing pigments may orient toward the past direction of the Earth's geomagnetic field and keep this paleo-direction without change for millennia. This natural remanent magnetization has been identified in Roman age paintings in Pompeia, and first tests on rock art pictographs have been carried out in Mexico and Chile. Some of the results are promising and compatible with those produced by radiocarbon dating of the same figures (Goguitchaichvili et al. 2016), but more detailed results of those radiocarbon determinations would be necessary to figure out the reliability of the archaeomagnetic method. Large size samples are required, so, in consequence, its use should be constrained by conservation issues.

Indirect Dating

Indirect dating by AMS ^{14}C has been widely used to date carbon-bearing accretionary crusts (like calcium oxalate skins) or organic matter inclusions in mineral coatings (amorphous silica skins). Calcium oxalate dating is a procedure to set a temporal frame on the age of a pictograph or a petroglyph. Similar age constrains can be reached by U-Th dating of speleothems in stratigraphic relation with rock art.

Calcium oxalate coatings appear naturally on walls in two mineral forms: whewellite ($CaC_2O_4 \cdot H_2O$) and weddellite ($CaC_2O_4 \cdot 2H_2O$). The exact process of formation and the kinetics of these accretionary crusts are still unknown, but there is a broad consensus that they form from ambient carbon dioxide and that they are deposited on external faces of rocks after metabolic activity of lichens, microbes, and bacteria (Beazley et al. 2002). This method was first used in Australia in the early 1990s, and since then it has been used in sites all over the world (see review by Jones et al. (2017)). It has been shown to be useful to get minimum ages for petroglyphs and minimum/maximum ages for pictographs. On certain locations researchers have bracketed dates for rock paintings between two oxalate skins, producing a temporal frame for pictographs in agreement with archaeological expectations (Ruiz López et al. 2012). Some of the earlier applications of this method were considered unreliable, because they did not attempt to eliminate other possible carbon-bearing substances included in samples. The isolation of calcium oxalate has been tried by different methods including plasma-oxidation and different acid chemical pre-treatment. Jones et al. (2017) have recently proposed an improved chemical pre-treatment to separate and isolate carbon from calcium oxalate from any other carbon-bearing substances that could be incorporated into accretionary crusts. This new method has produced robust results that constrain the age of Northern Running Figures style from Arnhem Land, Australia, in a range of ages from 9400 cal BP to at least 6000 cal BP. This improved method was combined with the collection of samples underlying or overlying pictographs. Technical developments like the one by Jones et al. (2017) could have a great impact in future chronometric research because of ubiquitous nature of calcium oxalate crusts.

The procedure for removal of calcium oxalate specimens is similar to that described for radiocarbon dating (Cole and Watchman 2005).

Sample sizes range from 25 mm^2 to 1 cm^2, depending on oxalate content. As mentioned above, stratigraphic relations of rock art to oxalate crusts should be observed to produce reliable results from the collected samples. There are several considerations for oxalate dates that should be taken into account: (1) radiocarbon age of any calcium oxalate crust layer is a weighted "average" of oxalate deposited for long periods of time, even into modern times; (2) in consequence, radiocarbon determinations always yield minimum ages, whose archaeological significance is limited by our ignorance of the time lapse among rock art creation and the formation of the oxalate crust; but (3) bracketing rock art between superimposed oxalate layers is a reliable way to reduce uncertainty of individual ages (Ruiz López et al. 2012; Viñas Vallverdú et al. 2016; Jones et al. 2017). Additionally, combination of oxalate dating with micro-stratigraphic analysis and micro-excavation techniques to avoid contamination between layers of calcium oxalate could improve their accuracy. Mechanical procedures and laser ablation have been used so far for this purpose.

Calcium carbonate coatings interstratified with pictographs or engravings can be used to obtain constrains on their time of manufacture. Uranium (U)-thorium (Th) series disequilibrium method is applied to date the formation time of calcite coatings. They are formed from redeposition of dissolved calcium carbonate from saturated solutions of water that flow across the surfaces of rocks and eventually deposit over rock art. In these flowstone crusts are contained with small quantities of U, an element soluble in water, while they are relatively free of Th, quite insoluble in water. The method is based on the radioactive decay series from parent ^{238}U, into the intermediary isotope ^{234}U (half-life of 246,000 years), and finally to daughter ^{230}Th (half-life of 76,000 years). In a closed system, equilibrium between ^{234}U and ^{230}Th is reached at a time dependent on their respective half-lives, a moment in which the rate of radioactive disintegration will be the same for both of them and for parent ^{238}U. This system will approach equilibrium at a predictable rate. Relative measurement between these three isotopes in calcium carbonate crusts allows calculation of the age of the carbonate host as the decay rate is known. This is assumed for closed systems, defined by the absence of U or Th gaining or losing other than from radiocarbon decay.

Detrital materials such as aeolian dust or silts and clays dissolved into water can incorporate nonradioactive ^{232}Th into calcite flowstones. This is a potential contaminant that could distort the results producing overestimated ages (Taçon et al. 2012). Low $^{230}Th/^{232}Th$ ratios (<10) are indicative of detrital contamination, while higher ratios (>20) are indicative of a closed system. The effect of this contamination can be greatly alleviated by measuring the activity of ^{232}Th in isochrons (subsamples of a calcite layer), which allow calculation of the effect of detrital contamination and produce a corrected age. Alternatively, $^{230}Th/^{232}Th$ ratio can be directly measured on samples of detritus as a way to correct the effect in calcite samples collected nearby. However, it is more common to apply an assumed bulk Earth $^{232}Th/^{238}U$ concentration ratio with conservative values to correct the age of samples. Another potential problem is the leaching of U from calcites caused by running water over the surface of speleothems. This could be a more significant problem for open-air sites than in deep caves (Plagnes et al. 2003; Fontugne et al. 2013).

Samples could be extracted by scraping with a surgical blade or with an electric drill. They can be small (10–150 mg) and thin (0.5–2 mm), depending on U content. Submillimeter-thick laminations can be accurately dated by this method. Several lab treatments are described in literature, micro-excavation, micro mill preparation, and finally an acid wash. Laser ablation has been proposed as an option for in situ U-series dating when U concentrations are higher than 1 ppm (Aubert et al. 2007). Finally, U-series isotopes are measured on an MC-ICPMS.

U-Th dating was first used in South Australia to give an estimation of the age of two petroglyphs concealed by speleothems (Bednarik 1999). The result yielded a minimum age for these cupules of 28,000 ± 2000 years BP. At least two research groups are currently working with this method, one in Australia and Asia and the other one in Europe. A large-scale U-series dating program has recently been carried out in several Paleolithic

caves of northern Spain (Pike et al. 2012; Hoffmann et al. 2016); the extremely old results of some of these dates (a red disk in El Castillo has a minimum age of 41,400 ± 570 years BP) have been extremely controversial, because the oldest of these dates could be chronologically attributed to both *H. neanderthalensis*, still inhabiting there, and *H. sapiens* that first appeared on this region in a moment close to this date. This hypothesis has been openly rejected by many prehistorians that see unnecessary sensationalism on the treatment of this announcement.

Very ancient U-Th dates from coralloid speleothems overlapping pictographs were obtained in different caves in Sulawesi (Indonesia) (Aubert et al. 2015). A hand stencil from Leang Timpuseng site has a minimum age of 39,900 years, while an animal painted nearby in the same panel has a minimum age of 35,400 years. These very old ages suggest that art was as ancient in Europe as in Indonesia and that it is associated to the first modern human populations in both regions. Alternative explanations have been proposed: on one hand, an independent origin of art in Europe and Austronesia or, alternatively, that modern humans leaving Africa have been practicing rock art for thousands of years before their arrival to Europe and Sulawesi.

These extremely old results have been considered suspicious by some researchers, who have stressed the limits and sources of error associated to U-series dating, mainly for European Paleolithic art (Sauvet et al. 2015). They focused mainly on the possibility of open systems, on wrong corrections of initial ^{230}Th content, and critique the usefulness of this method to obtain mainly negligible Holocene minimum ages in comparison with the damages inflicted on panels. Finally, they propose that, given the unreliability of the method, henceforth it should be submitted to an independent control based on ^{14}C dating of the same calcite crusts or in protactinium (^{231}Pa/^{235}U) dating. The debate is still under way (Pike et al. 2016). In these papers, additional information has been provided to defend the original results (Hoffmann et al. 2016), they have alleged serious misunderstanding, and the proposal of using ^{14}C dating of calcite as a proxy to verify U-Th results has been rejected. In their opinion, the reliability of ^{14}C dating of calcite is limited by the poor knowledge of dead carbon fraction (i.e., carbon depleted in ^{14}C, mainly of geological origin) contribution to dating and the behavior of calcite crusts as an open system for other possible organic contamination in caves or in dripping water of unknown origin (Hoffmann et al. 2016).

It is hoped that this debate will lead to an increase in the accuracy of these chronometric techniques. In fact, Sauvet et al.'s (2015) suggestion of a cross-dating methodology has been previously tried and could be the standard in the future to produce alternative or corroborative dating (Steelman et al. 2002; Fontugne et al. 2013). U-Th and ^{14}C dating were used, for example, in Southern China, to compare minimum/maximum ages for U-Th dating of naturalistic pictographs in an open-air shelter, with ^{14}C AMS dating obtained from plant debris and microorganisms trapped inside of calcite crust, after an estimation of the contribution of geological carbon in calcium carbonate (Taçon et al. 2012). The results were comparable and reinforce the conclusions of an early Holocene age. In a similar way, the radiocarbon age of a black Paleolithic pictograph from Nerja cave (Spain) was bracketed between two ^{14}C results from calcite layers underlying and overlying pigment, producing coherent results (Sanchidrián Torti et al. 2017). But any of the methods should be considered as independent evidence that contribute to obtaining more accurate conclusions on the age of a rock art site.

Geochronological Constrained Ages

Optically stimulated luminescence (OSL) dating has been successfully used by several research groups in recent years. The method is based on an estimation of the time since grains of quartz or feldspar were last exposed to daylight. Stimulating samples with laser produces luminescence signals whose intensity varies depending on the radiation absorbed before last light exposition. Obviously, samples should be collected in absolute darkness and mainly on quartz-based soils or rocks. Pioneering work with this method was on

quartz grains on mud-wasp nests overlying pictographs in northern Australia. The resultant ages range from present time to 1530 ± 220 years old but yielded three very old dates between 17,000 years and 24,000 years. These extremely old dates have been criticized as it is very difficult to believe that those fragile structures have survived many millennia (Bednarik 2007). Additional concerns have been expressed by different authors, but this technique is improving its efficiency and reliability very quickly.

OSL dating has been applied to date petroglyphs in Qurta sites (Nile valley, Egypt). A part of panel QII.4.2 was concealed by aeolian sediment accumulations that yielded dates from 10,000 ± 1000 years at the top to 16,000 ± 2000 years at the base of the sequence. This is considered as evidence of Pleistocene age rock art in Egypt (Huyge et al. 2011). Also in Northern Africa, a dating program has been carried out to constrain the age of Algerian pictographs from several Tassili-n-Ajjer sites (Mercier et al. 2012). The results indicate that these pictographs are <c. 9–10,000 years and were made during the Holocene. But a more precise dating will be required to clarify whether the origin of Tassili pictographs should be placed in early Holocene or in middle Holocene.

This chronometric technique has been used as well to constrain the age of Barrier Canyon Style (Utah, USA) (Pederson et al. 2014) and to date the exposure of a surface based on luminescence bleaching profiles (Sohbati et al. 2012). This is promising for rock art dating, because of its ability to establish both ongoing and prior exposure times that could be related to geological events identifiable at rock art sites or that could provide evidences of the age of archaeological materials subsequently buried. Future directions for this technique could try to date individual quartz grains underlying dense opaque layers of pigment, but many uncertainties and conservation concerns have to be resolved first.

Other geochronological techniques have been proposed to date rock art. The use of cosmogenic nuclides like chlorine-36 (^{36}Cl) to measure surface exposure in Côa Valley (Portugal) was first used in the 1990s with controversial results. However, techniques for surface exposure dating with cosmogenic nuclides have improved accuracy significantly over the last 10 years, and a growing community of geochronological researchers are devoting significant efforts to their refinement. The accuracy of any cosmogenic nuclide exposure age critically depends on the accurate knowledge of the production rate of each nuclide; hence production rate determination and site-specific scaling represent the larger issue for the application of these methods. These methods have been used on rock art sites to evaluate weathering of engravings in Burrup Peninsula (Australia) (Pillans and Fifield 2013) based on beryllium-10 (^{10}Be) concentration. The exposure of ^{36}Cl to cosmic rays of the cliff overhanging the Chauvet Cave was used to demonstrate that the original cave entrance was sealed by a collapse at least 21,000 years ago.

Petroglyphs Dating

At least three techniques have been specifically tested to date petroglyphs: micro erosion, micro lamination of desert varnish, and buildup of manganese in desert varnish. The older of the more commonly used techniques is that of "micro erosion analysis" developed by Bednarik who has published widely on the subject (see bibliography Rowe 2012 for references through 2011). The method is based on direct microscopic observations on fractures of crystals in rock surfaces produced by petroglyphs. Newly broken or abraded rock surfaces are very sharp, but over time they become progressively more rounded. Two major advantages of the technique are (1) that it is nondestructive and (2) it measures the date of the targeted event, i.e., the manufacture of the petroglyph. A perceived problem, one shared by almost all of the described dating techniques, is that it has not been independently verified by any other laboratory. Its dependence on calibration from rock surfaces of known age and on weathering assumptions has been criticized.

Micro lamination analysis of desert varnish, developed by Liu and co-workers (see

bibliography Rowe 2012 for Liu et al. complete references through 2011), has been applied specifically to rock art in only one recent instance (Tratebas and Dorn 2012). Although destructive, only a small sample is needed for the analysis. The method is fairly straightforward for archaeologists and geologists. It is based on stratigraphy of desert varnish formation over a fresh rock surface. Once a rock surface is removed, desert varnish begins to form, but not a uniformly in depth. Rather it is varied depending on the climatic conditions that change over time. A situation develops that may be viewed in analogy to tree rings, except that with micro lamination that it has far less resolution, changing discernibly on centuries rather than years. Obviously, calibration is needed, using studies of rock surfaces dated with independent methods to construct the necessary curve. The method, developed by Dr. Liu, has been blind tested and replicated and hence can be viewed with promise for dating petroglyphs.

Determining buildup of manganese in desert varnish as it forms over newly exposed petroglyphs over time is the basis for a technique developed by Lytle et al. (Rogers 2010). This technique is also nondestructive; measurements can be carried out in situ on site. It requires construction of a calibration curve. The principle of the method is quite straightforward. In a newly constructed petroglyph, the removed surface exposes fresh rock, usually very low in manganese. As the petroglyph weathers over time, manganese content steadily builds up as a component of the desert varnish that forms over the previously exposed surface over time. Manganese measurements can be performed in a few minutes with pXRF devices without sample removal. Using the calibration curve, the time of formation of the petroglyph is directly measured. Only Lytle's group has measured petroglyph construction dates using the technique. At present, the method claims an uncertainty of ~± 30%.

In our opinion, the time has come for the three groups conducting petroglyph dates to compare the methods, one against the other. If all agree, petroglyph dating would at that point be considered viable by all techniques, a very important verification.

Key Debates: Chauvet Cave and the Outbreak of Art

The inherent difficulties to get reliable dating of rock art at a worldwide scale are inextricably linked to the globally growing interest on the origin of our species and the onset of some of the cultural attributes of human complexity. One of the more characteristics is the emergence of graphic activity. It is therefore hardly surprising the harsh debates on the age of outbreak of cave art in Europe, Indonesia, or even Australia and about the accuracy and reliability of scientific dating techniques used for those age estimations.

Chauvet-Pont d'Arc Cave (France) was discovered in 1994 and included in UNESCO's World Heritage List in 2014. Some of the best preserved images of Pleistocene age are preserved in this site, but their precise chronological framework has been considered controversial since the publication of the first ^{14}C AMS dating of some samples collected on charcoal made pictographs. Thirty-one samples were radiocarbon dated giving clues about 2 different stages of human occupation of the cave, but 1 of them was really old. The earliest was dated to 32,900 ± 490 BP. This uncalibrated age suggested that these gorgeous pictographs and engravings were of Aurignacian age, in open contradiction with stylistic paradigms. According to the stylistic dating, these artworks were considered of Gravettian and Early Magdalenian style, so it was adduced contamination of samples or that some of the abundant old charcoal pieces laying on the floor of the cave was used to draw these images, and henceforth the very early ages were rejected (see Pettitt and Bahn (2015) for a comprehensive review of the arguments against an old chronology for Chauvet pictographs).

The French research team answered these criticisms by carrying out a large dating program in which several techniques were used to corroborate the results, one with another. More than 350 dates have been achieved since 2001, using ^{14}C, U-Th, TL, and ^{36}Cl (Quiles et al. 2016). For this reason, this team maintains that this is the best dated cave in the world. Cross-dating methodologies have identified two periods of human activity in the cave (37–33,500 years ago and

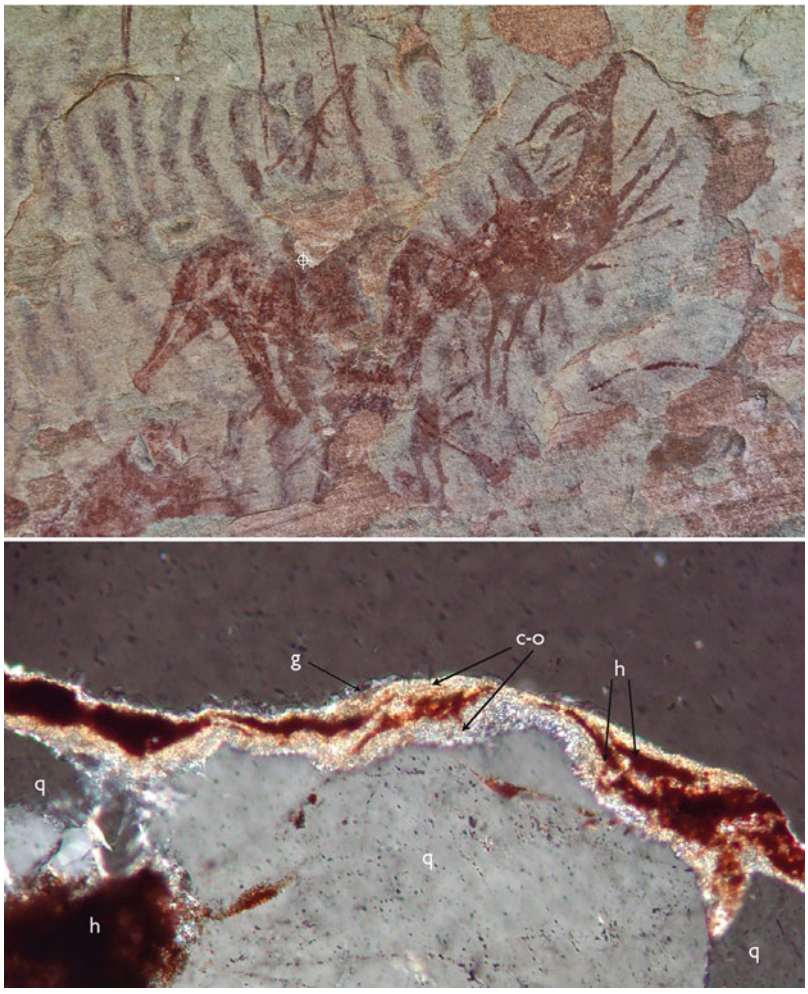

Dating Methods (Absolute and Relative) in Archaeology of Art, Fig. 1 Group of zigzags and Levantine zoomorphs from Cueva del Tío Modesto (Henarejos, Cuenca, Spain). A microsample was collected from point indicated in upper picture. Cross section shows two painting events interstratified with calcium oxalate layers (down). Two ^{14}C AMS dates were obtained related to this micro-stratigraphic packet. (q, quartz; h, hematite; g, gypsum; c-o, calcium oxalate)

31–28,000 years ago). That is reflected by ages of pictographs and on charcoal pieces dispersed on the floor. These results were strengthened by U-series dating of some calcite crusts overlying charcoal pigment. Finally, the age of the closure of the original entrance of the cave was estimated using ^{36}Cl cosmogenic dating. These extensive interdisciplinary results suggest that artistic activity on this site happened much earlier than could be expected according to stylistic dating.

Other issues like reliability of U-Th and the old ages estimated by this method (Pike et al. 2012) are points in which undoubtedly researchers will focus in the near future and hopefully with positive results. But opportunities to get direct dating of artworks are scarce, so it will be necessary to increase the level of confidence in indirect dating techniques. Large-scale projects oriented to identify absolute chronological frameworks for sites or for rock art assemblages using minimum/maximum age constrains are required to improve our knowledge about these symbolic products.

Conclusions

The estimation of the age of any kind of rock art production is one of the main concerns of this discipline. Significant advances have occurred in

the last three decades thanks to absolute dating techniques that have provided dates that, in some cases, may conflict with former estimations based on relative dating procedures.

The usefulness of absolute dating is without doubt, but it is obvious that a topic as complex as the age of a rock art assembly demands open-minded approaches and collaboration among archaeological sub-disciplines. A date archaeologically decontextualized is of little value, so it must be stressed that any dating should be included in archaeological hypotheses. For this reason, holistic approaches are the ideal situation, in which cross-dating by absolute and relative methods is intermingled to yield the best possible time frame for a rock art assemblage. At the same time, it would be desirable that absolute dating laboratories and research groups increase their collaboration to reduce the uncertainties that still nowadays are hindering a more significant role of rock art in the investigation of the symbolic evolution of human beings.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Archaeology and Art
- ▶ Australian Rock Art
- ▶ Bednarik, Robert G.
- ▶ Chronological Systems, Establishment of
- ▶ Côa Valley Rock Art Sites
- ▶ Dating Techniques in Archaeological Science
- ▶ Europe: Prehistoric Rock Art
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Leroi-Gourhan, André
- ▶ Mainland Southeast Asia: Rock Art
- ▶ Mobiliary Art, Paleolithic
- ▶ Organic Residue Analysis in Archaeology
- ▶ Pigment Analysis in Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ South American Rock Art
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Techniques of Paleolithic Art
- ▶ Unilinear Evolution and Lineal Time: A Critique

References

Alcolea González, J.J., and R. de Balbín Behrmann. 2007. C^{14} et style: La chronologie de l'art pariétal à l'heure actuelle. *L'Anthropologie* 111: 435–466.

Aubert, M., S. O'Connor, M. McCulloch, G. Mortimer, A.L. Watchman, and M. Richer-LaFlèche. 2007. Uranium-series dating rock art in East Timor. *Journal of Archaeological Science* 34 (6): 991–996.

Aubert, M., A. Brumm, M. Ramli, T. Sutikna, E.W. Saptomo, B. Hakim, M.J. Morwood, G.D. van den Bergh, L. Kinsley, and A. Dosseto. 2015. Pleistocene cave art from Sulawesi, Indonesia. *Nature* 514: 223–227. https://doi.org/10.1038/nature13422.

Aubry, T., L.A. Dimuccio, M. Mercè Bergadà, J. Davide Sampaio, and F. Sellami. 2010. Palaeolithic engravings and sedimentary environments in the Côa River Valley (Portugal): Implications for the detection, interpretation and dating of open-air rock art. *Journal of Archaeological Science* 37: 3306–3319. https://doi.org/10.1016/j.jas.2010.07.033.

Beazley, M.J., R.D. Rickman, D.K. Ingram, T.W. Boutton, and J. Russ. 2002. Natural abundances of carbon isotopes (^{14}C, ^{13}C) in lichens and calcium oxalate Pruina: Implications for archaeological and paleoenvironmental studies. *Radiocarbon* 44 (3): 675–683.

Bednarik, R.G. 1999. The speleothem medium of finger flutings and its isotopic geochemistry. *The Artefact* 22: 49–64.

Bonneau, A., F. Brock, T.F.G. Higham, D.G. Pearce, and A.M. Pollard. 2011. An improved pretreatment protocol for radiocarbon dating black pigments in San rock art. *Radiocarbon* 53: 419–428.

Boyd, C.E. 2016. *The white shaman mural*. Austin: Texas University Press.

Cole, N., and A.L. Watchman. 2005. AMS dating of rock art in the Laura Region, Cape York Peninsula, Australia - protocols and results of recent research. *Antiquity* 79: 661–678.

Fontugne, M., S. Qingfeng, N. Frank, F. Thil, N. Guidon, and E. Boeda. 2013. Cross-dating (Th/U-^{14}C) of calcite covering prehistoric paintings at Serra da Capivara National Park, Piaui, Brazil. *Radiocarbon* 55: 1191–1198.

Goguitchaichvili, A., J. Morales, J. Urrutia-Fucugauchi, A.M. Soler Arechalde, G. Acosta, and J. Castelleti. 2016. The use of pictorial remanent magnetization as a dating tool: State of the art and perspectives. *Journal of Archaeological Science: Reports* 8: 15–21. https://doi.org/10.1016/j.jasrep.2016.05.042.

Gunn, R.G., C.L. Ogleby, D. Lee, and R.L. Whear. 2010. A method to visually rationalise superimposed pigment motifs. *Rock Art Research* 27: 131–136.

Hoffmann, D.L., A.W.G. Pike, M. García Díez, P.B. Pettitt, and J. Zilhão. 2016. Methods for U-series dating of $CaCO_3$ crusts associated with Palaeolithic cave art and application to Iberian sites. *Quaternary Geochronology* 36: 104–119. https://doi.org/10.1016/j.quageo.2016.07.004.

D

Huntley, J., A.L. Watchman, and J. Dibden. 2011. Characteristics of a pigment art sequence: Woronora Plateau, New South Wales. *Rock Art Research* 28: 85–97.

Huyge, D., D.A.G. Vandenberghe, M. De Dapper, F. Mees, W. Claes, and J.C. Darnell. 2011. First evidence of Pleistocene rock art in North Africa: Securing the age of the Qurta petroglyphs (Egypt) through OSL dating. *Antiquity* 85: 1184–1193.

Jones, T., V.A. Levchenko, P.L. King, U. Troitzsch, D. Wesley, A. Williams, and A. Nayingull. 2017. Radiocarbon age constraints for a Pleistocene-Holocene transition rock art style: The Northern Running Figures of the East Alligator River region, western Arnhem Land, Australia. *Journal of Archaeological Science: Reports* 11: 80–89. https://doi.org/10.1016/j.jasrep.2016.11.016.

Lorblanchet, M. & P.G. Bahn. 1993. *Rock art studies: the Post-Stylistic era or where do we go from here?* Papers presented in symposium A of the 2nd AURA Congress, Cairns 1992. Oxford: Oxbow Books, Oxbow Monographs, 35.

McDonald, J., K.L. Steelman, P. Veth, J. Mackey, J. Loewen, C.R. Thurber, and T.P. Guilderson. 2014. Results from the first intensive dating program for pigment art in the Australian arid zone: Insights into recent social complexity. *Journal of Archaeological Science* 46: 195–204. https://doi.org/10.1016/j.jas.2014.03.012.

Mercier, N., J.L. Le Quellec, M. Hachid, S. Agsous, and M. Grenet. 2012. OSL dating of quaternary deposits associated with the parietal art of the Tassili-n-Ajjer plateau (Central Sahara). *Quaternary Geochronology* 10: 367–373. https://doi.org/10.1016/j.quageo.2011.11.010.

Morwood, M.J., A.L. Watchman, and G.L. Walsh. 2010. AMS radiocarbon ages for beeswax and charcoal pigments in North Kimberley rock art. *Rock Art Research* 27: 3–8.

Pederson, J.L., M.S. Chapot, S.R. Simms, R. Sohbati, T.M. Rittenour, A.S. Murray, and G. Cox. 2014. Age of Barrier Canyon-style rock art constrained by cross-cutting relations and luminescence dating techniques. *Proceedings of the National Academy of Sciences* 111: 12986–12991. https://doi.org/10.1073/pnas.1405402111.

Pettitt, P.B., and P.G. Bahn. 2015. An alternative chronology for the art of Chauvet cave. *Antiquity* 89: 542–553. https://doi.org/10.15184/aqy.2015.21.

Pettitt, P.B., and A.W.G. Pike. 2007. Dating European Palaeolithic cave art: Progress, prospects, problems. *Journal of Archaeological Method and Theory* 14: 27–47. https://doi.org/10.1007/s10816-007-9026-4.

Pike, A.W.G., D.L. Hoffmann, M. García Díez, P.B. Pettitt, J.J. Alcolea González, R. de Balbín Behrmann, C. González Sainz, C. de las Heras, J.A. Lasheras, R. Montes, and J. Zilhão. 2012. U-series dating of Paleolithic art in 11 caves in Spain. *Science* 336: 1409–1413. https://doi.org/10.1126/science.1219957.

Pike, A.W.G., D.L. Hoffmann, P.B. Pettitt, M. García Díez, and J. Zilhão. 2016. Dating Palaeolithic cave art: Why U-Th is the way to go. *Quaternary International* 432: 1–9. https://doi.org/10.1016/j.quaint.2015.12.013.

Pillans, B., and L.K. Fifield. 2013. Erosion rates and weathering history of rock surfaces associated with aboriginal rock art engravings (petroglyphs) on Burrup Peninsula, Western Australia, from cosmogenic nuclide measurements. *Quaternary Science Reviews* 69: 98–106. https://doi.org/10.1016/j.quascirev.2013.03.001.

Plagnes, V., C. Causse, M. Fontugne, H. Valladas, J.M. Chazine, and L.H. Fage. 2003. Cross dating (Th/U-^{14}C) of calcite covering prehistoric paintings in Borneo. *Quaternary Research* 60: 172–179. https://doi.org/10.1016/S0033-5894(03)00064-4.

Quiles, A., H. Valladas, H. Bocherens, E. Delqué-Količ, E. Kaltnecker, J. van der Plicht, J.J. Delannoy, V. Feruglio, C. Friz, J. Monney, M. Philippe, G. Tosello, J. Clottes, and J.M. Geneste. 2016. A high-precision chronological model for the decorated Upper Paleolithic cave of Chauvet-Pont d'Arc, Ardèche, France. *Proceedings of the National Academy of Sciences* 113: 4670–4675. https://doi.org/10.1073/pnas.1523158113.

Rogers, A.K. 2010. A chronology of six rock art motifs in the Coso Range, eastern California. *American Indian Rock Art* 36: 23–36.

Rowe, M.W. 2012. Bibliography of rock art dating. *Rock Art Research* 29: 118–131.

Ruiz López, J.F., A. Hernanz Gismero, R.A. Armitage, M.W. Rowe, R. Viñas Vallverdú, J.M. Gavira-Vallejo, and A. Rubioi Mora. 2012. Calcium oxalate AMS ^{14}C dating and chronology of post-Palaeolithic rock paintings in the Iberian Peninsula. Two dates from Abrigo de los Oculados (Henarejos, Cuenca, Spain). *Journal of Archaeological Science* 39: 2655–2667. https://doi.org/10.1016/j.jas.2012.02.038.

Sanchidrián Torti, J.L., H. Valladas, M.A. Medina-Alcaide, E. Pons-Branchu, and A. Quiles. 2017. New perspectives for ^{14}C dating of parietal markings using $CaCO_3$ thin layers: An example in Nerja cave (Spain). *Journal of Archaeological Science Reports* 12: 74–80. https://doi.org/10.1016/j.jasrep.2017.01.028.

Sauvet, G., R. Bourrillon, M.W. Conkey, C. Fritz, D. Gárate Maidagán, O. Rivero Vilá, G. Tosello, and R. White. 2015. Uranium-thorium dating method and Palaeolithic rock art. *Quaternary International* 432: 1–8. https://doi.org/10.1016/j.quaint.2015.03.053.

Sohbati, R., A.S. Murray, M.S. Chapot, M. Jain, and J. Pederson. 2012. Optically stimulated luminescence (OSL) as a chronometer for surface exposure dating. *Journal of Geophysical Research: Solid Earth* 117: 253–258. https://doi.org/10.1029/2012JB009383.

Steelman, K.L., and M.W. Rowe. 2012. Radiocarbon dating of rock paintings: Incorporating pictographs into the archaeological record. In *A companion to rock art*, ed. J. McDonald and P. Veth, 565–582. Oxford: Blackwell Publishing Ltd.

Steelman, K.L., R. Rickman, M.W. Rowe, T.W. Boutton, J. Russ, and N. Guidon. 2002. AMS radiocarbon ages

of an oxalate accretion and rock paintings at Toca do Serrote da Bastiana, Brazil. In *Archeological chemistry VI: Materials, methods and meaning*, ed. K. Jakes, 22–35. Washington, DC: ACS Symposium Series.

Taçon, P.S.C., M. Aubert, L. Gang, Y. Decong, L. Hong, S.K. May, S. Fallon, J. Xueping, D. Curnoe, and A.I.R. Herries. 2012. Uranium-series age estimates for rock art in Southwest China. *Journal of Archaeological Science* 39: 492–499. https://doi.org/10.1016/j.jas.2011.10.004.

Villaverde Bonilla, V. 1994. *Arte paleolítico de la Cova del Parpalló. Estudio de la colección de plaquetas y cantos grabados y pintados*. Valencia: Diputación de Valencia. S.I.P.

Viñas Vallverdú, R., A. Rubio i Mora, J.F. Ruiz López, M. Vaquero Rodríguez, J. Vallverdú i Poch, M.W. Rowe, and N. Santos. 2016. Investigación cronoestratigráfica en el conjunto rupestre de la sierra de la Pietat: Abrigos de Ermites I y IV (Ulldecona, Tarragona, Catalunya). *Cuadernos de Arte Prehistórico* 2: 70–85.

Wesley, D., T. Jones, and C. Reepmeyer. 2014. Pigment geochemistry as chronological marker: The case of lead pigment in rock art in the Urrmarning "Red Lily Lagoon" rock art precinct, western Arnhem land. *Australian Archaeology* 78: 1–9. https://doi.org/10.1080/03122417.2014.11681993.

Further Reading

Aubert, M. 2012. A review of rock art dating in the Kimberley, Western Australia. *Journal of Archaeological Science* 39: 573–577. https://doi.org/10.1016/j.jas.2011.11.009.

Aubert, M. 2016. Further comment on: "Uranium-thorium dating method and Palaeolithic rock art" by Sauvet et al. (2017). *Quaternary International* 432: 1–2. https://doi.org/10.1016/j.quaint.2016.04.020.

Bednarik, R.G. 2007. The dating of rock art. In *Rock art science. The scientific study of palaeoart*, 115–152. New Delhi: Ayran Books.

Bednarik, R.G. 2010. Developments in petroglyph dating. *Rock Art Research* 27 (2): 217–222.

Breuil, H. 1952. *Four hundred centuries of cave art*. first ed. London: Zwemmer.

Clottes, J. 2001. *La Grotte Chauvet: L'art des Origines*. Paris: Seuil.

David, B., C. Tuniz, E. Lawson, Q. Hua, G.E. Jacobsen, J. Head, and M.W. Rowe. 2000. Dating charcoal drawings from Chillagoe, North Queensland. In *Time and space: Dating and spatial considerations in rock art research*, 84–89. Melbourne: Australian Rock Art Research Association. Occasional Publication 8.

Dorn, R.I., and D.S. Whitley. 1983. Cation-ratio dating of petroglyphs from the Western Basin, North America. *Nature* 302: 816–818.

García Díez, M., D.L. Hoffmann, J. Zilhão, C. De las Heras, J.A. Lasheras, R. Montes, and A.W.G. Pike. 2013. Uranium series dating reveals a long sequence of rock art at Altamira cave (Santillana del mar, Cantabria). *Journal of Archaeological Science* 40: 4098–4106. https://doi.org/10.1016/j.jas.2013.05.011.

Hassiba, R., G.B. Cieslinski, B. Chance, F.A. Al-Naimi, M. Pilant, and M.W. Rowe. 2012. Determining the age of Qatari Jabal Jassasiyah petroglyphs. *QScience Connect* 4. https://doi.org/10.5339/connect.2012.4.

Hernanz Gismero, Antonio, Juan F. Ruiz López, and José María Gavira Vallejo. 2010. Raman, IR, optical and SEM/EDX microscopy of prehistoric rock paintings. In *Rock chemistry*, ed. B. en Macias and F. Guajardo, 89–102. Nueva York: Nova Publishers.

Hess, D., D.J. Coker, J.M. Loutsch, and J. Russ. 2007. Production of oxalates in vitro by microbes isolated from rock surfaces with prehistoric paints in the lower Pecos region, Texas. *Geoarchaeology* 23 (1): 3–11.

Hippe, K. 2017. Constraining processes of landscape change with combined in situ cosmogenic ^{14}C-^{10}Be analysis. *Quaternary Science Reviews* 173: 1–19. https://doi.org/10.1016/j.quascirev.2017.07.020.

Hoffmann, D.L., C. Spötl, and A. Mangini. 2009. Micromill and in situ laser ablation sampling techniques for high spatial resolution MC-ICPMS U-Th dating of carbonates. *Chemical Geology* 259: 253–261. https://doi.org/10.1016/j.chemgeo.2008.11.015.

Hoffmann, D.L., M.P. Utrilla Miranda, M. Bea Martínez, A.W.G. Pike, M. García Díez, J. Zilhão, and R. Domingo. 2016. U-series dating of Palaeolithic rock art at Fuente del Trucho (Aragón, Spain). *Quaternary International* 432: 1–10. https://doi.org/10.1016/j.quaint.2015.11.111.

Leroi-Gourhan, A. 1971. *Préhistoire de L'Art Occidental*. 2nd ed. Paris: Mazenod.

McDonalD, J., K. OfficeR, T. Jull, D. Donahue, J. Head, and B. Ford. 1990. Investigating AMS: Dating prehistoric rock art in the Sydney Sandstone Basin. *Rock Art Research* 7: 83–92.

Petchey, F. 2017. Radiocarbon dating in rock art research. In *The Oxford handbook of the archaeology and anthropology of rock art*, ed. B. David and I.J. McNiven, vol. 1, 1–21. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190607357.013.13.

Pike, A.W.G. 2017. Uranium-thorium dating of cave art. In *The Oxford handbook of the archaeology and anthropology of rock art*, ed. B. David and I.J. McNiven, vol. 1, 1–17. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190607357.013.24.

Pons-Branchu, E., R. Bourrillon, M.W. Conkey, M. Fontugne, C. Fritz, D. Gárate Maidagán, A. Quiles, O. Rivero Vilá, G. Sauvet, G. Tosello, H. Valladas, and R. White. 2014. Uranium-series dating of carbonate formations overlying Paleolithic art: Interest and limitations. *Bulletin de la Société Préhistorique Française* 111: 211–224.

Pons-Branchu, E., M. Fontugne, V. Michel, and H. Valladas. 2015. Comment on: "Uranium-thorium dating method and Palaeolithic rock art" by Sauvet

D

et al. (2015, in press). *Quaternary International* 432: 1–4. https://doi.org/10.1016/j.quaint.2015.10.015.

Roberts, R.G. 2017. Optical dating of rock art. In *The Oxford handbook of the archaeology and anthropology of rock art*, ed. B. David and I.J. McNiven, vol. 1, 1–10. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190607357.013.32.

Roberts, R., G. Walsh, A.S. Murray, J. Olley, R. Jones, M. Morwood, C. Tuniz, E. Lawson, M. MacPhail, and D. Bowdery. 1997. Luminescence dating of rock art and past environments using mud-wasp nests in northern Australia. *Nature* 387 (6634): 696–699.

Rowe, M.W. 2009. Radiocarbon dating of rock paintings: Cold plasma extraction of organic carbon. *Analytical Chemistry* 81 (5): 1728–1735.

Rowe, M.W., and K.L. Steelman. 2003. Comment on "some evidence of a date of first humans to arrive in Brazil". *Journal of Archaeological Science* 30: 1349–1351.

Russ, J., M. Hyman, H.J. Shafer, and M.W. Rowe. 1990. Radiocarbon dating of prehistoric rock paintings by selective oxidation of organic carbon. *Nature* 348: 710–711.

Sadier, B., J.J. Delannoy, and L. Benedetti. 2012. Further constraints on the Chauvet cave artwork elaboration. *Proceedings of the National Association of Science* 109: 8002–8006. https://doi.org/10.1073/pnas.1118593109/-/DCSupplemental.

Sauvet, G. 2015. À la recherche du temps perdu. Méthodes de datations en art préhistorique : l'exemple des sites aurignaciens, in White R., Bourrillon R. (dir.) avec la collaboration de Bon F., *Aurignacian Genius : art, technologie et société des premiers hommes modernes en Europe*, Actes du symposium international, 8-10 avril 2013, New York University. *P@lethnologie* 7: 210–225.

Taçon, P.S.C., S.K. May, S. Fallon, M. Travers, D. Wesley, and R. Lamilani. 2010. A minimum age for early depictions of Southeast Asian praus in the rock art of Arnhem Land, Northern Territory. *Australian Archaeology* 71: 1–10.

Valladas, H., and J. Clottes. 2003. Style, Chauvet and radiocarbon. *Antiquity* 295: 142–145.

Valladas, H., H. Cachier, and M. Arnold. 1990. AMS C-14 dates for the prehistoric Cougnac Cave paintings and related bone remains. *Rock Art Research* 7: 18–19.

Van der Merwe, N.J., J.C. Sealy, and R. Yates. 1987. First accelerator carbon-14 date for pigment from a rock painting. *South African Journal of Science* 83: 56–57.

Watchman, A.L. 2000. Micro-excavation and laser extraction methods for dating carbon in silica skins and oxalate crusts. In *Advances in dating Australian rock-markings*: Papers from the First Australian Rock-Picture Dating Workshop. Held at Woods Centre, Lucas Heights, 8 to 10 February 1996, eds. G.K. Ward & C. Tuniz, 35–39. Melbourne: Australian Rock Art Research Association. Occasional AURA Publication no. 10.

Dating Methods in Historical Archaeology

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Introduction and Definition

Dating methods in historical archaeology differ little from the methods of archaeology in general. Both absolute and relative dating approaches are employed. However, historical archaeology has tended to de-emphasize archaeometric analyses because of the availability of a documentary record.

Key Issues/Current Debates/Examples

Absolute dating methods that rely on specialized laboratory analyses such as dendrochronology, radiocarbon, and luminescence measurements are available to historical archaeologists. Radiocarbon dating generally is not reliable for samples postdating c. CE 1650 (Holdaway 2006: 128) but has been used successfully for earlier historic sites. The method may also help rule out prehistoric origin, for example, of dugout canoes (Porter 2009). Dendrochronology is used widely and may offer precise cutting dates for timbers harvested as recently as the twentieth century and offers added benefits for clues to past environment and climate as well as to behaviors relating to construction and the harvesting and storage of timber (Towner & Clary 2001). Intra-site tree-ring sequences may help with relative dating even if precise dates are not obtainable (Pringle et al. 2000). Optical stimulating luminescence (OSL) helped date a feature to the sixteenth–seventeenth centuries in New Mexico (Ramenofsky et al. 2008). Thermoluminescence (TL) dating has been applied to protohistoric and historic ceramics, providing dates as recent as the later nineteenth century (Feathers 2003). Although dendrochronological dates can offer an accuracy of ±1 year, not all attempts to date timbers achieve such precision, and

radiocarbon, OSL, and TL dates present statistical uncertainties. These methods are not used often because historical archaeologists are comfortable with the dates offered by historical sources and perhaps because of the expense of the laboratory analyses.

Artifacts and sites can be dated in a number of ways through documentary sources. Some artifacts, like coins and gravestones, bear dates (but see Mytum [2002] for cautions regarding gravestones). For others, manufacturing records may pinpoint initial and final production dates. Dates for the initial and final occupations of sites may also be found in or closely estimated from various records, dating both the sites and the artifact assemblages found in them. Although Noël Hume's (1969: 13) famous dictum that "This kind of [dating] information is all written down somewhere" is too absolute for strict truth, many kinds of artifacts and artifact typologies are well dated historically, and archaeologists have assiduously pursued such information (e.g., Noël Hume 1974; Miller et al. 2000). Collectors' literature is a great resource as well, and in contrast to prehistorians' concerns about looted artifacts, most collectors discuss antiques which never entered the archaeological record as opposed to antiquities which all too often have been removed from archaeological contexts.

Future Directions

One of the contributions of historical archaeology to archaeology in general is the empirical demonstration that artifact frequencies wax and wane through time, thus supporting the concept of seriation (Dethlefsen & Deetz 1966). Binford (1961) took Harrington's (1954) historically dated assemblages of British pipestems, which reflected a diminishing bore diameter through the seventeenth and eighteenth centuries, and derived a linear algebraic formula which translated the mean bore diameter of an assemblage to a date which he could employ as a proxy for the median date of occupation of the deposit represented by the assemblage. South (1971) applied the concept to ceramics, using historic manufacture periods for various ceramic types to create the mean ceramic dating formula (MCD). South further argued that the close match between the MCD and the historic median occupation of his test sites indicated that manufacture-to-deposition time lag is minimal.

Reservations about this generalization have been expressed, but the pipestem and MCD formulas have become fixtures in historical archaeology, leading to similar formulas for window glass, pipe bowls, and even prehistoric ceramics. Wesler (in press) argues that the statistical properties of these formulas have been poorly explored, that calculated uncertainty levels can approach those of radiocarbon dates, and that formula dates should be reported with their standard deviations for full evaluation of their significance and accuracy.

Cross-References

- ▶ Archival Research and Historical Archaeology
- ▶ Binford, Lewis R. (Theory)
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Clay Pipes in Historical Archaeology
- ▶ Dating Techniques in Archaeological Science
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Historical Archaeology
- ▶ Noël Hume, Ivor
- ▶ Radiocarbon Dating in Archaeology
- ▶ South, Stanley A.

References

Binford, L. 1961. A new method of calculating dates from kaolin pipe stem samples. *Southeastern Archaeological Conference Newsletter* 9: 19–21.

Dethlefsen, E., and J. Deetz. 1966. Death's heads, cherubs, and willow trees: experimental archaeology in colonial cemeteries. *American Antiquity* 31: 502–510.

Feathers, J. 2003. Use of luminescence dating in archaeology. *Measurement Science and Technology* 14: 1493–1509.

Harrington, J. 1954. Dating stem fragments of seventeenth and eighteenth century clay tobacco pipes. *Archaeological Society of Virginia Quarterly Bulletin* 9: 9–13.

Holdaway, S. 2006. Absolute dating. In *Archaeology in practice, a student guide to archaeological analysis*, ed. J. Balme and A. Paterson, 117–158. Malden: Blackwell Publishing.
Miller, G., P. Samford, E. Shlasko, and A. Madsen. 2000. Telling time for archaeologists. *Northeast Historical Archaeology* 29: 1–22.
Mytum, H. 2002. The dating of graveyard memorials: evidence from the stones. *Post-Medieval Archaeology* 36: 1–38.
Noël Hume, I. 1969. *Historical archaeology*. New York: Alfred A. Knopf.
Noël Hume, I. 1974. *A guide to artifacts of colonial America*. New York: Alfred A. Knopf.
Porter, K. 2009. A historic dugout from the Apalachicola River, Florida. *Historical Archaeology* 43: 42–55.
Pringle, D., G. Ewart, and N. Ruckey. 2000. Tilbury Fort: a post-medieval fort and its inhabitants. *Post-Medieval Archaeology* 34: 3–105.
Ramenofsky, A., C. Vaughan, and M. Spilde. 2008. Seventeenth-century metal production at San Marcos Pueblo, north-central New Mexico. *Historical Archaeology* 42: 105–132.
South, S. 1971. *Evolution and horizon as revealed in ceramic analysis in historical archaeology*, Conference on Historic Site Archaeology Papers 6, 71–106. Columbia: Institute of Archaeology and Anthropology, University of South Carolina.
Towner, R., and M. Clary. 2001. Historical dendroarchaeology in central Colorado: lessons from the keystone area. *Southwestern Lore* 67: 8–32.
Wesler, K. in press. Assessing precision in formula dating. *Historical Archaeology*.

Further Reading

Adams, W. 2003. Dating historical sites: the importance of understanding time lag in the acquisition, curation, use, and disposal of artifacts. *Historical Archaeology* 37: 38–64.
Schott, M.J. 2012. Toward settlement occupation span from dispersion of tobacco-pipe stem-bore diameter values. *Historical Archaeology* 46: 16–38.

Dating Methods: Genetic

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Introduction

Human genomes contain the signatures of the evolutionary and demographic processes that shaped them. This includes information about the timescales over which these processes occurred. Using a tool known as the molecular clock, analyses of genetic data can produce estimates of the timing of divergence between species, major migrations in the past, and changes in population sizes. Molecular clocks can even be used to estimate the ages of ancient samples, such as those from ancient modern humans or archaic hominins. Collectively, these date estimates offer a valuable complement to the temporal information provided by archaeology and paleontology.

The molecular clock describes the relationship between genetic change and time. It relies on the fundamental assumption that mutations cause genomes to diverge gradually from each other. In its simplest form, the molecular clock assumes that the rate of genetic change has been constant through time and across populations and species. This leads to a proportional relationship between genetic divergence and the time elapsed. There are various ways to measure the genetic divergence between individuals or species, but the most common is to examine the differences in the nucleotide sequences of their DNA or the amino acid sequences of their proteins. These comparisons can be based on a single gene, a set of genes, or even entire genomes. In studies of human evolution, analyses of whole genomes are now becoming routine.

Over the past five decades, genetic dating methods have made substantial contributions to our knowledge of human evolutionary and demographic history. Some of the earliest studies were concerned with the evolutionary divergence between humans and other primates (Sarich and Wilson 1967). Others focused on "mitochondrial Eve," the last common ancestor from whom all living humans have inherited their mitochondrial genomes (Endicott et al. 2009). More recently, analyses of nuclear genomes have provided detailed estimates of mutation rates at unprecedented levels of resolution. These have been used to resolve the demographic histories of different regions of the world, to date the peopling of Oceania and the Americas (Nielsen et al. 2017), and to gain insights into the causes of mutation rate variation between the sexes and across populations (Scally and Durbin 2012; Scally 2016).

Historical Background

The molecular clock has a long history, with origins predating the advent of automated DNA sequencing. The concept of a molecular clock was proposed in the early 1960s, when Emile Zuckerkandl and Linus Pauling (1962) assumed a constant rate of protein evolution to place a timescale on the evolution of globin proteins in vertebrates. Their analysis was based on differences in the amino acid sequences between modern human and horse. By referring to fossil evidence that these two species last shared a common ancestor 100–160 million years ago, Zuckerkandl and Pauling (1962) were able to estimate the evolutionary rate along the two lineages. They extrapolated this rate to the rest of the sequences being compared in their study, allowing them to infer the timing of splits between different globin proteins. Their analysis placed the split between modern human and gorilla at about 11 million years before present.

Several years after the pioneering study of globins, the molecular clock was used to estimate the timing of the evolutionary split between humans and their closest extant relatives, chimpanzees. By analyzing data from the albumin protein, Sarich and Wilson (1967) produced a controversial estimate of 5 million years for the age of this event. Their proposed timeframe contradicted the previous estimates of a much more protracted evolutionary timescale, which had been based on interpretation of the primate fossil record.

In the ensuing decades, the molecular clock was applied to a growing range of genetic data sets to answer questions about the evolutionary timescale of life on earth. Researchers presented date estimates for the divergences among kingdoms of life, among animal phyla, and among orders of birds and mammals, but these estimates were almost invariably in stark disagreement with the timescales implied by fossil evidence. For example, a study of a large set of proteins placed the split between deuterostome and protostome animals at more than 100 million years earlier than indicated by the fossil record (Doolittle et al. 1996). Some of the disparities between genetic and paleontological estimates persist to the present day, including those relating to the origins of angiosperms (Foster et al. 2017) and the deep splits among animal phyla (dos Reis et al. 2015).

The striking inconsistencies between molecular and paleontological evidence raised doubts about the validity of the molecular clock. A valuable outcome of these challenges was the development of new types of molecular clocks that had a better capacity to capture the various complexities of the evolutionary process. Research into molecular clocks and related methods of genetic analysis has also been spurred by rapid growth in genomic sequence data over the past two decades (Ho 2014). This has led to increased confidence in the estimates of evolutionary rates and timescales produced by molecular clocks.

The Molecular Clock

The concept of a molecular clock is usually incorporated as an assumption in phylogenetic analysis, which aims to reconstruct the evolutionary tree that describes the relationships among a group of individuals or organisms (taxa). Each taxon is represented by genetic data, most commonly in the form of a DNA sequence. In statistical phylogenetic methods, the differences among these sequences are estimated using models of nucleotide substitution. These models have parameters that represent the rates of change between pairs of nucleotides, as well as the frequencies of the four nucleotides in the DNA sequences. Substitution models are designed to account for any mutations that have been overwritten by subsequent mutations at the same site in the DNA. Using these substitution models, the relationships among the sampled taxa are inferred by phylogenetic methods (Yang and Rannala 2012).

One of the principles of molecular phylogenetic analysis is that closely related taxa will tend to have more similar DNA sequences. Among the most widely used methods of phylogenetic analysis are those based on maximum likelihood and Bayesian frameworks, both of which have strong statistical foundations (Yang

and Rannala 2012). In studies of evolutionary timescales, Bayesian phylogenetic methods are widely used because they are able to implement complex models of the evolutionary process (dos Reis et al. 2016; Bromham et al. 2018). Bayesian phylogenetic analysis can allow the joint estimation of evolutionary relationships, timescales, demographic parameters, geographical movements, and changes in traits. In other approaches, such as maximum likelihood, many of these analyses would need to be conducted separately, making it difficult to describe the uncertainty in the resulting estimates.

Phylogenetic methods will not be described in further detail here, but the relevant point is that they produce a tree that describes the relationships among the taxa of interest (Fig. 1). This tree consists of nodes that are connected by branches. The nodes can represent the taxa in the data set (terminal nodes or tips) or their hypothetical ancestors (internal nodes). The branches represent the passage of evolution and can be depicted so that they are proportional to the amount of genetic change or to the amount of time that has elapsed. In the latter case, the entire tree is drawn to a timescale and is referred to as a "chronogram" or a "time tree."

In order to obtain time trees, phylogenetic methods must incorporate the concept of a molecular clock. This is done using clock models, which describe how evolutionary rates are assigned to branches in the tree. The earliest molecular-clock studies involved the assumption of rate constancy across lineages, but it was soon recognized that evolutionary rates can vary substantially among species (Langley and Fitch 1974). For example, there appears to have been an evolutionary slowdown in primates compared with related mammals and in apes compared with other primates (Moorjani et al. 2016b). The discovery of extensive rate heterogeneity was a key motivating factor behind the development of new clock models that could relax the restrictive assumption of rate constancy (Sanderson 1997).

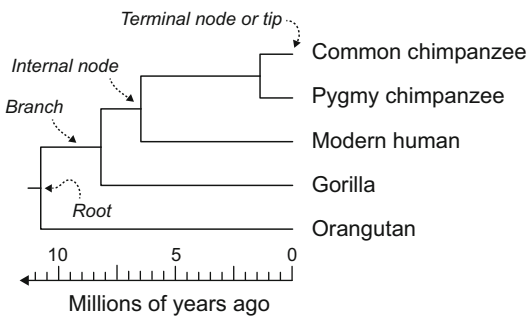

Dating Methods: Genetic, Fig. 1 Chronogram or "time tree" showing the evolution of five primate species. Features of the time tree are labeled. The tree is drawn to a timescale, such that the lengths of the horizontal branches are proportional to time (in millions of years)

Over the past two decades, a diversity of clock models has been made available to researchers (Ho and Duchêne 2014). These methods are generally statistical rather than mechanistic, such that they aim to model the patterns of evolutionary rate variation but without any attempt to model the process that led to these patterns. There are various schemes by which we can classify the clock models that have been developed. These models have been implemented in various statistical frameworks and as options in a range of software. However, an intuitive approach is to group them according to the number of distinct evolutionary rates (k) that are permitted across the phylogeny (Fig. 2).

Models of Rate Variation

The simplest molecular clock assumes that the rate of genetic change is constant across lineages ($k = 1$). This model of rate variation is known as a strict clock and is often used when analyzing genetic data drawn from individuals within the same population or species. The strict clock is widely used in analyses of human genetic data, for which there is no strong expectation of rate heterogeneity among individuals or among lineages. Given its simplicity, the strict clock is also an appropriate choice in analyses of small data sets, where the use of more complex, parameter-rich models would introduce an undesirable amount of estimation error while bringing little benefit to estimation accuracy.

In analyses involving multiple, divergent species, the assumptions of the strict clock are likely to be violated. Evolutionary rates can vary substantially among species, owing to differences

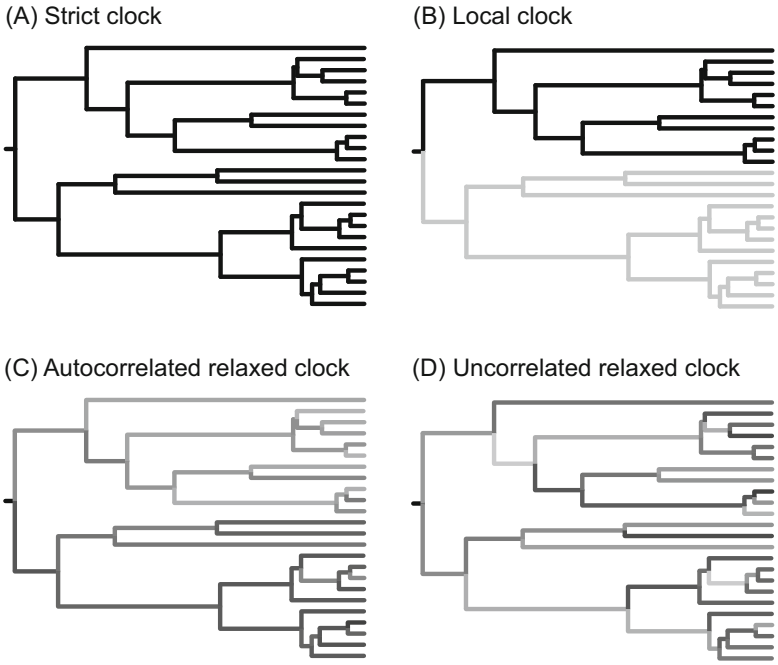

Dating Methods: Genetic, Fig. 2 Four different clock models, each providing a different description of rate variation among branches. Branches are colored according to evolutionary rate. (**a**) Strict clock, which assumes rate constancy across branches. (**b**) Local clock, which assumes a small number of distinct rates across branches. In this example, there are two different evolutionary rates in the tree. (**c**) Autocorrelated relaxed clock, which allows a distinct rate along each branch but assumes that rates are correlated between neighboring branches. (**d**) Uncorrelated relaxed clock, which allows a distinct rate along each branch and assumes that these are drawn independently from a chosen distribution

in generation time, DNA repair mechanisms, and exposure to mutagens (Bromham 2009). Although these factors can lead to large disparities in evolutionary rates between distantly related species, they also have the potential to produce discrepancies between closely related species and populations. These departures from clocklike evolution can lead to highly inaccurate estimates of biological timescales if they are not adequately taken into account.

Rate variation across lineages can be accommodated by models that relax the assumption of rate homogeneity, either by allowing the existence of several "local" clocks across the tree ($1 < k < n$, where n is the number of branches in the tree) or by allowing a distinct evolutionary rate along each branch of the tree ($k = n$). The use of these clock models can lead to drastic improvements in statistical fit for some data sets, but they also bring increased computational complexity.

Local molecular clocks present an appealing compromise between biological plausibility and model complexity (Fig. 2b). They acknowledge that rates can vary across lineages, but they attempt to capture this variation using a small number of parameters (Yoder and Yang 2000). Local clocks have been implemented in maximum likelihood and Bayesian phylogenetic methods, although they are not as widely used as other clock models. One of the most flexible local-clock methods is the Bayesian random local clock, which is able to estimate the number of the times that the evolutionary rate has experienced shifts across the phylogenetic tree (Drummond and Suchard 2010). An advantage of this method is that the evolutionary relationships can be jointly estimated, whereas

other local-clock methods tend to require a fixed phylogenetic tree.

A more widely used approach is to allow each branch in the tree to have a distinct evolutionary rate. These "relaxed" molecular clocks involve large numbers of parameters, but the variation in rates across branches must be constrained in some way. There are various statistical models of among-lineage rate variation that have been proposed, but these can generally be classed as either autocorrelated or uncorrelated relaxed clocks. This division is based on whether there are correlations between the rates along neighboring branches in the phylogenetic tree.

In autocorrelated relaxed clocks (Fig. 2c), the rate is regarded as a heritable trait and is assumed to evolve gradually through the phylogenetic tree (Gillespie 1991; Sanderson 1997). For example, the rate along a branch might be drawn from a lognormal distribution centered on the rate along its ancestral branch (Thorne et al. 1998). In this autocorrelated lognormal relaxed clock, the degree of variation across branch rates is governed by a variance parameter, which reflects the strength of heritability. Autocorrelation in evolutionary rates can be described using various other models, of which some assume that rates vary continuously with time and others assume that rates change in an episodic manner.

In uncorrelated relaxed-clock models (Fig. 2d), the branch rates are drawn independently from a chosen parametric distribution, such as a lognormal or exponential distribution (Drummond et al. 2006). No other assumptions are made about the relationship between rates along neighboring branches in the tree. The degree of variation in rates across branches can be used to provide a measure of how closely the genetic data conform to the expectations of a strict-clock model. Most commonly, this is done by computing the coefficient of variation of rates, which is calculated by dividing the standard deviation of the branch rates by the mean rate across the tree.

Choosing among models of evolutionary rate variation can have important consequences for the outcomes of a molecular dating analysis. In most cases, the first step is to test for clocklike evolution. This can be done using a range of methods, for example, by comparing likelihood scores or other information criteria. Choosing among more complex models of rate variation is considerably more difficult. One approach is to analyze the data using a range of clock models to evaluate the robustness of the date estimates that are produced. Alternatively, model selection can be performed using appropriate information criteria or by computing Bayes factors when using Bayesian phylogenetic methods (Baele et al. 2013). However, standard methods for model selection are only able to compare the relative fit of candidate models, but it might be the case that all of these models provide a poor description of the pattern of evolutionary rate variation (Duchêne et al. 2015).

Calibrating the Molecular Clock

On their own, clock models are only able to provide estimates of relative times. These might be useful when the goal is to determine the order of evolutionary and demographic events or when studying shifts in diversification rates or population size. In most cases, however, obtaining an estimate of the absolute timescale is more useful because it allows evolutionary and demographic events to be interpreted against the background of climatic, ecological, and other influences. For example, one might wish to examine whether human populations expanded after the end of the Last Glacial Maximum, about 20,000 years before present.

An additional challenge arises when attempting to estimate absolute times, because of the confounding of evolutionary rate and time. Genetic divergence is the product of these two components. In other words, the same degree of genetic divergence can be attained by rapid evolution over a short period of time or by slow evolution over a long period of time, or any of the countless intermediate combinations. Thus, to separate the contributions of rate and time, we require information about one or the other. If we do not know the evolutionary rate, then we need to incorporate information about time. This is known as "calibrating" the molecular clock.

There are several different ways to calibrate molecular clocks (Fig. 3). The most common method is to include information about the age

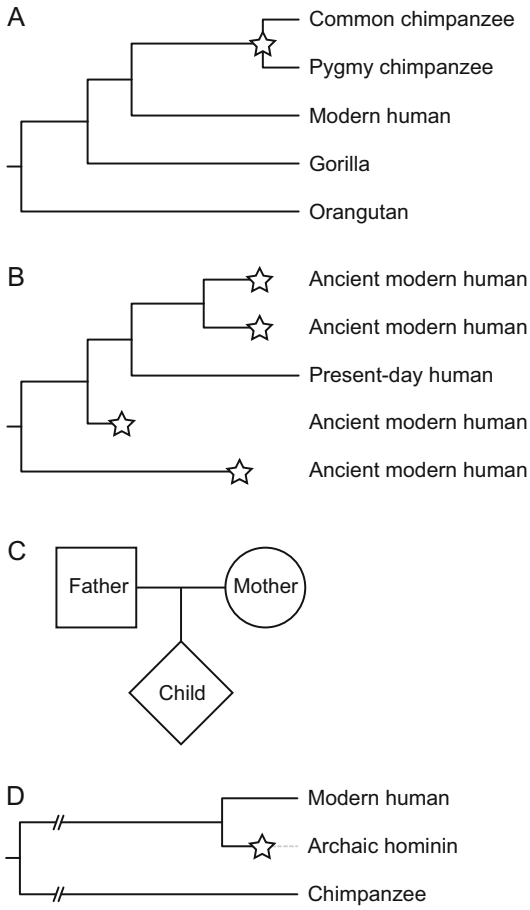

Dating Methods: Genetic, Fig. 3 Methods for calibrating estimates of evolutionary rates. (**a**) Constraining the age of an internal node using fossil, biogeographic, or climatic evidence. (**b**) Fixing the ages of tips based on radiometric dates for ancient DNA samples. (**c**) Comparison of genomes from parent-offspring trios in a pedigree. (**d**) Branch shortening in an ancient genome from an archaic hominin compared with the genome of a modern human, with reference to an outgroup sequence from chimpanzee. (Note that the two branches descending from the root have been truncated for display purposes)

of one or more of the internal nodes in the phylogenetic tree. This allows us to infer the evolutionary rate along the branches descending from these nodes, which can then be extrapolated to the rest of the tree. This method of calibration was used by Zuckerkandl and Pauling (1962) in their seminal study of globin proteins. In studies of human genetic data, the molecular clock is often calibrated by constraining the timing of divergence between humans and chimpanzees. The split is represented by an internal node in the phylogenetic tree (Fig. 1) and has been estimated at about 7 million years (Benton et al. 2015).

The use of fossil calibrations comes with a number of strong assumptions. First, the fossil is assumed to have been identified correctly and assigned to an appropriate position in the evolutionary tree. Second, there is some uncertainty about the age of the fossil itself, but this is usually trivial when compared with the uncertainty relating to the association between the fossil and the node to which it has been assigned as a calibration. For example, humans and chimpanzees might have diverged well before the appearance of *Sahelanthropus tchadensis*, the fossil taxon that is usually employed to constrain the age of this evolutionary split. This particular form of uncertainty is exacerbated by the highly fragmentary nature of the fossil record, a problem that is particularly acute for hominins.

One of the most concerning problems with the use of the human-chimpanzee calibration is that there is a substantial gulf between the age of this evolutionary event and the timeframe of interest (Endicott et al. 2009). The origin and spread of modern humans unfolded within a small fraction of the time since our divergence from chimpanzees. Across such large timespans, the evolutionary process is unlikely to be entirely homogeneous. The assumption of rate constancy might be rendered invalid if there is an excess of mutations in the younger portions of the tree, where natural selection has had insufficient time to act. A pattern of higher rates of genetic change has been observed in human mitochondrial genomes (Henn et al. 2008), whereas the opposite has been found for the nuclear genome (Scally and Durbin 2012).

Apart from the human-chimpanzee calibration, there are few reliable sources of information that can be used to constrain the ages of internal nodes in the human tree. This is primarily because investigations of human prehistory often involve timescales that are too short for fossil evidence to be informative about specific divergence events. Some researchers have calibrated the human molecular clock using the timing of climatic or

geological events, such as postglacial population expansions in Europe. However, these types of calibrations require strong assumptions about the correspondence between genetic and demographic events and about the impact of abiotic factors on human populations.

Calibrations can also be applied to terminal nodes of the tree, which represent individuals or taxa that have been sampled (Fig. 3b). This is the case when the data set includes radiometrically dated ancient samples, such as those from archaeological sites or from archaic hominins. The ages of these ancient DNA sequences provide an indication of the absolute timescale of genetic change, allowing them to act as calibrations in the analysis (Rieux and Balloux 2016). This method is sometimes referred to as tip-dating and is frequently applied in studies of rapidly evolving pathogens. Several tip-dating techniques have been developed, including some based on least-squares fitting (To et al. 2016) and others implemented in Bayesian phylogenetic methods. These methods have been used to generate comprehensive estimates of the evolutionary rate of the human mitochondrial genome (Rieux et al. 2014).

Tip-dating approaches have some important advantages over the use of calibrations at internal nodes. In particular, they remove the need to assume a close correspondence between fossils and evolutionary divergence events. They also avoid the problem of using a deep calibration, such as the human-chimpanzee divergence, to estimate the timescale of human demographic events that occurred much more recently. Tip-dating methods have been extended in a number of useful ways. For example, they can be used to estimate the ages of ancient samples, if any of them are unknown (Shapiro et al. 2011).

Many studies of human genetic data do not employ calibrations directly, but instead use a published estimate of the evolutionary rate. There have been numerous attempts to estimate the rate of molecular evolution in the human mitochondrial genome, Y chromosome, and autosomes. These have produced a set of rate estimates that are widely used by the research community. The practice of using "standard" evolutionary rates has been particularly common in studies of human mitochondrial genomes (Endicott et al. 2009). However, the uncertainty in these rate estimates is often overlooked, leading to inferred evolutionary and demographic timescales that have artificial precision.

Rates of Molecular Evolution in Humans

The rate of molecular evolution in human DNA has been a key area of research over the past few decades. Mitochondrial genomes were the focus of study until relatively recently, when the sequencing of nuclear genomes became much more financially viable. Molecular evolutionary rates in humans have been studied using various calibration methods, including age constraints on internal nodes in the tree, the inclusion of ancient DNA samples, and on the basis of climatic or biogeographic hypotheses. The resulting disparities among rate estimates have generated considerable debate.

Mitochondrial Genome

Until the past decade, the mitochondrial genome was the key source of genetic information about the history of human evolution and migration. The first complete sequence of the mitochondrial genome was published in the early 1980s (Anderson et al. 1981), leading to a succession of mitochondrial evolutionary studies throughout the 1980s and 1990s. The preference for this genetic marker was based on its high copy number and lack of recombination, making it easy to extract, sequence, and analyze. The presence of mitochondrial genomes in high numbers is particularly important for studies of DNA from degraded biological specimens, including archaeological samples. As a result of intensive study, the rate of mitochondrial evolution in humans has been characterized in detail.

Phylogenetic analyses of mitochondrial evolutionary rates, calibrated using the human-chimpanzee split, have yielded estimates on the order of 10^{-8} substitutions/site/year (Endicott et al. 2009). These estimates are typically predicated on an assumed human-chimpanzee split of

about 6.5 million years. Phylogenetic estimates of human mitochondrial rates stand in stark contrast with those from genetic studies of pedigrees, which are higher by an order of magnitude (Howell et al. 2003). These pedigree estimates were obtained by sequencing DNA from members of documented family trees. There have been several attempts to account for the discrepancy between pedigree and phylogenetic estimates of rates when inferring demographic timescales. Some researchers have developed correction factors for evolutionary rates in human mitochondrial genomes (Gignoux et al. 2011).

The growing availability of mitochondrial genomes from ancient human samples has allowed comprehensive estimates of evolutionary rates to be made using tip-dating methods (Rieux et al. 2014). There has been good consistency across estimates from different studies, with rates of 2.4×10^{-8} mutations per site per year (95% credibility interval $1.7–3.2 \times 10^{-8}$) from an analysis of Neolithic European samples (Brotherton et al. 2013) and 2.7×10^{-8} mutations per site per year (95% credibility interval $2.2–3.2 \times 10^{-8}$) from a study of samples spanning a period of 40,000 years (Fu et al. 2013). Rate estimates calibrated using ancient DNA have been consistently higher than those inferred using phylogenetic methods calibrated by the human-chimpanzee split. These results echo similar findings in studies of ancient DNA from other organisms.

Y Chromosome

The male-specific Y chromosome is part of the nuclear genome, but unlike the 22 autosomes, it is present in a single copy only. This makes it the paternal equivalent of the mitochondrial genome for tracing human evolution through time and space. Until recently, molecular-clock analyses of the Y chromosome were restricted to the use of regions of short sequence repeats, known as microsatellites. The utility of microsatellites is potentially compromised by uncertainties concerning the underlying process of mutation. However, the development and refinement of high-throughput sequencing technologies now make large-scale sequencing feasible, allowing accurate phylogenetic inference and molecular dating using the Y chromosome. Studies of these data have confirmed that ages estimated using microsatellites can be misleading but that some of the discrepancies can be resolved by using models informed by analysis of complete sequences (Karmin et al. 2015; Willems et al. 2016).

The evolutionary rate of the Y chromosome has been estimated in analyses of ancient DNA. Estimates have varied between 7.3×10^{-10} and 8.9×10^{-10} mutations per site per year, depending on the depth of the calibrations being used, the oldest of which dates to about 45,000 years (Fu et al. 2014; Karmin et al. 2015). These estimates are consistent with a comprehensive estimate from a large-scale pedigree study that spans the equivalent of 47,000 years of paternal transmissions, which yielded a mutation rate estimate of 8.7×10^{-10} mutations per site per year (Helgason et al. 2015). However, it is uncertain whether these rates are equally applicable across longer evolutionary timeframes. When applied to dating the last common paternal ancestor, for example, they tend to produce estimates of about 250,000 years, considerably greater than those for the last common mitochondrial ancestor (Helgason et al. 2015; Karmin et al. 2015).

Mitochondrial genomes and the male-specific Y chromosome are falling out of favor in genetic studies of human prehistory. This is primarily because the lack of recombination places a severe limit on their utility for resolving complex demographic and phylogeographic events (Nielsen and Beaumont 2009). The mitochondrial genome and the male-specific Y chromosome are each inherited as a single unit, whereas recombination causes the nuclear genome to represent thousands to millions of distinct units (loci) that are inherited with varying degrees of linkage. By tracing the history of each locus in the genome, we can gain large numbers of data points for estimating evolutionary and demographic parameters. For this reason, there has been a growing shift away from an exclusive reliance on single-locus data for resolving complex demographic scenarios.

Nuclear Autosomes

Analyses of genetic data from nuclear genome are now ubiquitous; this has been made possible by the development and refinement of high-throughput sequencing techniques. The average evolutionary rate across the recombining portions of the human nuclear genome is lower than that of the mitochondrial genome, meaning that it tends to be less informative on a per-site basis. However, this lower evolutionary rate is outweighed by the sheer size of the nuclear genome, which is more than 180,000 times the size of the mitochondrial genome in humans.

Genome analyses can be performed at various scales of evolution, including human-chimpanzee comparisons and studies of pedigrees from modern humans. Among the most common have been studies of genomes from parent-offspring trios (Fig. 3c). Genomic data are obtained from the father, mother, and child, and these are compared to identify mutations in the child's genome that are not present in either the father or mother. This procedure yields an estimate of the number of mutations that have occurred in the space of one generation.

Comparisons of parent-offspring trios can be difficult because they typically involve very small numbers of genetic differences, with only about 60–100 mutations per individual (Scally 2016). As a result, analyses of parent-offspring trios can be sensitive to false-positive or false-negative mutations, so the DNA sequencing results need to be filtered carefully and appropriately. Despite being subject to various potential sources of error, estimates of mutation rates from parent-offspring trios have appeared to reach a consensus of about 5×10^{-10} mutations per site per year (Scally 2016). This rate is similar to that estimated from a chimpanzee pedigree (Venn et al. 2014).

Uncertainty in estimates of rates can be reduced by studying deeper pedigrees that span multiple generations. By examining the accumulation of mutations across a longer period of time, we can more easily distinguish between genuine genetic change and sequencing error. Studies of deep pedigrees have yielded disparate estimates, and a consensus on the evolutionary rate has not yet been reached for this scale of analysis. For example, Campbell et al. (2012) analyzed genome sequences from 15 members of a Hutterite pedigree and inferred a nucleotide mutation rate of 1.20×10^{-8} mutations per site per generation. Based on a study of nearly 500 Dutch individuals, Palamara et al. (2015) estimated a higher rate of 1.66×10^{-8} mutations per site per generation. Assuming a generation length of 29 years in humans, this rate can be expressed as 5.71×10^{-10} mutations per site per year.

The rate estimates from parent-offspring trios and pedigrees are similar to the rate of 5×10^{-10} mutations per site per year obtained using a 45,000-year-old calibration (Fu et al. 2014). Strikingly, however, these are lower than those inferred from comparisons between humans and chimpanzees, which have produced rate estimates of about 10^{-9} substitutions per site per year. Not only is this a substantial disparity, but the pattern is the opposite of that seen in mitochondrial evolution. The available evidence supports a slowdown in mutation rates in apes, but not exclusively along the branch leading to modern humans (Moorjani et al. 2016b). This slowdown has long been recognized, but its causes remain unknown.

The sequencing of ancient genomes has opened up the possibility of estimating evolutionary rates using the sample ages. Early studies of ancient DNA focused on mitochondrial genomes, because their higher copy number gave researchers a better chance of retrieving intact DNA molecules. Subsequent developments in sequencing methods have made it possible to access nuclear genomes from ancient specimens. Hundreds of genome sequences have been obtained from ancient modern humans and archaic hominins, including Neanderthals and Denisovans (Marciniak and Perry 2017). The oldest of these are genomic data from archaic hominins from Sima de los Huesos, Spain, which have been dated to approximately 430,000 years before present (Meyer et al. 2016).

Using ancient genome sequences, mutation rates can be estimated by taking advantage of a phenomenon known as "branch shortening" (Fig. 3d). Specifically, older sequences are expected to have accumulated less genetic change than younger sequences, because the latter have

had a greater amount of time to evolve. For example, the genomic distance between the Altai Neanderthal and chimpanzees is 1.02% shorter than that between modern humans and chimpanzees (Prüfer et al. 2014). The additional genetic change occurring along the lineage leading to modern humans is assumed to have occurred during the 50,000 years between the age of the Altai Neanderthal and the present day.

Even with whole-genome estimates, evolutionary rates are not always directly applicable to the genetic data at hand. Evolutionary rates vary across the genome, particularly between protein-coding and noncoding regions. For example, protein-coding exons tend to be rich in cytosine and guanine, a feature that is correlated with an increased rate of mutation. At sites where cytosine and guanine occur in tandem, known as CpG sites, mutations tend to be more clocklike because they occur spontaneously rather than as a result of replication error (Moorjani et al. 2016b). Variation in evolutionary rates also exists between the sexes, and there is evidence of both paternal and maternal age effects (Wong et al. 2016).

DNA sequences are the dominant form of genetic data for molecular dating, but researchers have also investigated other sources of genetic information. Evolutionary rates have been estimated for short sequence repeats (microsatellites) and for recombination. The estimation of a "recombination clock" allowed the authors to estimate the mean generation length in humans over the past 45,000 years (Moorjani et al. 2016a). Their inferred generation length of 26–30 years was reasonably consistent with demographic estimates of this parameter.

Future Directions

Genetic dating methods are playing a growing role in our understanding of human evolutionary history, particularly in the postgenomic era. This places great importance on developing, evaluating, and refining the techniques and models that are used in molecular-clock studies. There have been considerable advances in the molecular clock over the past few decades, but estimates of human evolutionary rates and timescales can still be improved in a number of ways. First, continued refinement of the human mutation rate will lead to more accurate and precise estimates of evolutionary and demographic timescales. Second, the growing availability of genomic data will allow detailed quantification of evolutionary rates across human populations. Third, further investigation of generation times in different human populations will improve the accuracy of our estimates of population parameters, including demographic timescales. Together, these will allow us to harness the full power of genomic data to answer key questions in human evolution, archaeology, and anthropology.

D

Cross-References

- ▶ Anthropological Genetics
- ▶ *Homo neanderthalensis*
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies

References

Anderson, S., A.T. Bankier, B.G. Barrell, M.H.L. de Bruijn, A.R. Coulson, J. Drouin, I.C. Eperon, D.P. Nierlich, B.A. Roe, F. Sanger, P.H. Schreier, A.J.H. Smith, R. Staden, and I.G. Young. 1981. Sequence and organization of the human mitochondrial genome. *Nature* 290: 457–465.

Baele, G., W.L.S. Li, A.J. Drummond, M.A. Suchard, and P. Lemey. 2013. Accurate model selection of relaxed molecular clocks in Bayesian phylogenetics. *Molecular Biology and Evolution* 30: 239–243.

Benton, M.J., P.C.J. Donoghue, R.A. Asher, M. Friedman, T.J. Near, and J. Vinther. 2015. Constraints on the timescale of animal evolutionary history. *Palaeontologia Electronica* 18: 18.1.1FC.

Bromham, L. 2009. Why do species vary in their rate of molecular evolution? *Biology Letters* 5: 401–404.

Bromham, L., S. Duchêne, X. Hua, A.M. Ritchie, D.A. Duchêne, and S.Y.W. Ho. 2018. Bayesian molecular dating: Opening up the black box. *Biological Reviews* 93: 1165–1191

Brotherton, P., W. Haak, J. Templeton, G. Brandt, J. Soubrier, C.J. Adler, S.M. Richards, C. Der Sarkissian, R. Ganslmeier, S. Friederich,

V. Dresely, M. van Oven, R. Kenyon, M.B. Van der Hoek, J. Korlach, K. Luong, S.Y.W. Ho, L. Quintana-Murci, D.M. Behar, H. Meller, K.W. Alt, A. Cooper, and The Genographic Consortium. 2013. Neolithic mitochondrial haplogroup H genomes and the genetic origins of Europeans. *Nature Communications* 4: 1764.

Campbell, C.D., J.X. Chong, M. Malig, A. Ko, B.L. Dumont, L. Han, L. Vives, B.J. O'Roak, P.H. Sudmant, J. Shendure, M. Abney, C. Ober, and E.E. Eichler. 2012. Estimating the human mutation rate using autozygosity in a founder population. *Nature Genetics* 44: 1277–1281.

Doolittle, R.F., D.-F. Feng, S. Tsang, G. Cho, and E. Little. 1996. Determining divergence times of the major kingdoms of living organisms with a protein clock. *Science* 271: 470–477.

dos Reis, M., Y. Thawornwattana, K. Angelis, M.J. Telford, P.C.J. Donoghue, and Z. Yang. 2015. Uncertainty in the timing of origin of animals and the limits of precision in molecular timescales. *Current Biology* 25: 2939–2950.

dos Reis, M., P.C.J. Donoghue, and Z. Yang. 2016. Bayesian molecular clock dating of species divergences in the genomics era. *Nature Reviews Genetics* 17: 71–80.

Drummond, A.J., and M.A. Suchard. 2010. Bayesian random local clocks, or one rate to rule them all. *BMC Biology* 8: 114.

Drummond, A.J., S.Y.W. Ho, M.J. Phillips, and A. Rambaut. 2006. Relaxed phylogenetics and dating with confidence. *PLoS Biology* 4: e88.

Duchêne, D.A., S. Duchêne, E.C. Holmes, and S.Y.W. Ho. 2015. Evaluating the adequacy of molecular clock models using posterior predictive simulations. *Molecular Biology and Evolution* 32: 2986–2995.

Endicott, P., S.Y.W. Ho, M. Metspalu, and C. Stringer. 2009. Evaluating the mitochondrial timescale of human evolution. *Trends in Ecology and Evolution* 24: 515–521.

Foster, C.S.P., H. Sauquet, M. Van Der Merwe, H. McPherson, M. Rossetto, and S.Y.W. Ho. 2017. Evaluating the impact of genomic data and priors on Bayesian estimates of the angiosperm evolutionary timescale. *Systematic Biology* 66: 338–351.

Fu, Q., A. Mittnik, P.L.F. Johnson, K. Bos, M. Lari, R. Bollongino, C. Sun, L. Giemsch, R. Schmitz, J. Burger, A.M. Ronchitelli, F. Martini, R.G. Cremonesi, J. Svoboda, P. Bauer, D. Caramelli, S. Castellano, D. Reich, S. Pääbo, and J. Krause. 2013. A revised timescale for human evolution based on ancient mitochondrial genomes. *Current Biology* 23: 553–559.

Fu, Q., H. Li, P. Moorjani, F. Jay, S.M. Slepchenko, A.A. Bondarev, P.L.F. Johnson, A. Aximu-Petri, K. Prüfer, C. de Filippo, M. Meyer, N. Zwyns, D.C. Salazar-García, Y.V. Kuzmin, S.G. Keates, P.A. Kosintsev, D.I. Razhev, M.P. Richards, N.V. Peristov, M. Lachmann, K. Douka, T.F.G. Higham, M. Slatkin, J.-J. Hublin, D. Reich, J. Kelso, T.B. Viola, and S. Pääbo. 2014. Genome sequence of a 45,000-year-old modern human from western Siberia. *Nature* 514: 445–449.

Gignoux, C.R., B.M. Henn, and J.L. Mountain. 2011. Rapid, global demographic expansions after the origins of agriculture. *Proceedings of the National Academy of Sciences of the United States of America* 108: 6044–6049.

Gillespie, J.H. 1991. *The causes of molecular evolution*. Oxford: Oxford University Press.

Helgason, A., A.W. Einarsson, V.B. Gudmundsdóttir, A.M. Sigurdsson, E.D. Gunnarsdóttir, A. Jagadeesan, S.S. Ebenesersdóttir, A. Kong, and K. Stefánsson. 2015. The Y-chromosome point mutation rate in humans. *Nature Genetics* 47: 453–457.

Henn, B.M., C.R. Gignoux, M.W. Feldman, and J.L. Mountain. 2008. Characterizing the time dependency of human mitochondrial DNA mutation rate estimates. *Molecular Biology and Evolution* 26: 217–230.

Ho, S.Y.W. 2014. The changing face of the molecular evolutionary clock. *Trends in Ecology and Evolution* 29: 496–503.

Ho, S.Y.W., and S. Duchêne. 2014. Molecular-clock methods for estimating evolutionary rates and timescales. *Molecular Ecology* 23: 5947–5965.

Howell, N., C.B. Smejkal, D.A. Mackey, P.F. Chinnery, D.M. Turnbull, and C. Herrnstadt. 2003. The pedigree rate of sequence divergence in the human mitochondrial genome: There is a difference between phylogenetic and pedigree rates. *American Journal of Human Genetics* 72: 659–670.

Karmin, M., L. Saag, M. Vicente, M.A. Wilson Sayres, M. Järve, U.G. Talas, S. Rootsi, A.M. Ilumäe, R. Mägi, M. Mitt, L. Pagani, T. Puurand, Z. Faltyskova, F. Clemente, A. Cardona, E. Metspalu, H. Sahakyan, B. Yunusbayev, G. Hudjashov, M. DeGiorgio, E.L. Loogväli, C. Eichstaedt, M. Eelmets, G. Chaubey, K. Tambets, S. Litvinov, M. Mormina, Y. Xue, Q. Ayub, G. Zoraqi, T.S. Korneliussen, F. Akhatova, J. Lachance, S. Tishkoff, K. Momynaliev, F.-X. Ricaut, P. Kusuma, H. Razafindrazaka, D. Pierron, M.P. Cox, G.N.N. Sultana, R. Willerslev, C. Muller, M. Westaway, D. Lambert, V. Skaro, L. Kovacevic, S. Turdikulova, D. Dalimova, R. Khusainova, N. Trofimova, V. Akhmetova, I. Khidiyatova, D.V. Lichman, J. Isakova, E. Pocheshkhova, Z. Sabitov, N.A. Barashkov, P. Nymadawa, E. Mihailov, J.W.T. Seng, I. Evseeva, A.B.. Migliano, S. Abdullah, G. Andriadze, D. Primorac, L. Atramentova, O. Utevska, L. Yepiskoposyan, D. Marjanovic, A. Kushniarevich, D.M. Behar, C. Gilissen, L. Vissers, J.A. Veltman, E. Balanovska, M. Derenko, B. Malyarchuk, A. Metspalu, S. Fedorova, A. Eriksson, A. Manica, F.L. Mendez,

T.M. Karafet, K.R. Veeramah, N. Bradman, M.F. Hammer, L.P. Osipova, O. Balanovsky, E.K. Khusnutdinova, K. Johnsen, M. Remm, M.G. Thomas, C. Tyler-Smith, P.A. Underhill, E. Willerslev, R. Nielsen, M. Metspalu, R. Villems, and T. Kivisild. 2015. A recent bottleneck of Y chromosome diversity coincides with a global change in culture. *Genome Research* 25: 459–466.

Langley, C.H., and W.M. Fitch. 1974. An examination of the constancy of the rate of molecular evolution. *Journal of Molecular Evolution* 3: 161–177.

Marciniak, S., and G.H. Perry. 2017. Harnessing ancient genomes to study the history of human adaptation. *Nature Reviews Genetics* 18: 659–674.

Meyer, M., J.-L. Arsuaga, C. de Filippo, S. Nagel, A. Aximu-Petri, B. Nickel, I. Martínez, A. Gracia, J.M. Bermúdez de Castro, E. Carboneil, B. Viola, J. Kelso, K. Prüfer, and S. Pääbo. 2016. Nuclear DNA sequences from the Middle Pleistocene Sima de los Huesos hominins. *Nature* 531: 504–507.

Moorjani, P., S. Sankararaman, Q. Fu, M. Przeworksi, N. Patterson, and D. Reich. 2016a. A genetic method for dating ancient genomes provides a direct estimate of human generation interval in the last 45,000 years. *Proceedings of the National Academy of Sciences of the United States of America* 113: 5652–5657.

Moorjani, P., C.E.G. Amorim, P.F. Arndt, and M. Przeworksi. 2016b. Variation in the molecular clock of primates. *Proceedings of the National Academy of Sciences of the United States of America* 113: 10607–10612.

Nielsen, R., and M.A. Beaumont. 2009. Statistical inferences in phylogeography. *Molecular Ecology* 18: 1034–1047.

Nielsen, R., J.M. Akey, M. Jakobssen, J.K. Pritchard, S. Tishkoff, and E. Willerslev. 2017. Tracing the peopling of the world through genomics. *Nature* 541: 302–310.

Palamara, P.F., L.C. Francioli, P.R. Wilton, G. Genovese, A. Gusev, H.K. Finucane, S. Sankararaman, Genome of the Netherlands Consortium, S.R. Sunyaev, P.I.W. de Bakker, J. Wakeley, I. Pe'er, and A.L. Price. 2015. Leveraging distant relatedness to quantify human mutation rate and gene-conversion rates. *American Journal of Human Genetics* 97: 775–789.

Prüfer, K., F. Racimo, N. Patterson, F. Jay, S. Sankararaman, S. Sawyer, A. Heinze, G. Renaud, P.H. Sudmant, C. de Filippo, H. Li, S. Mallick, M. Dannemann, Q. Fu, M. Kircher, M. Kuhlwilm, M. Lachmann, M. Meyer, M. Ongyerth, M. Siebauer, C. Theunert, A. Tandon, P. Moorjani, J. Pickrell, J.C. Mullikin, S.H. Vohr, R.E. Green, I. Hellmann, P.L.F. Johnson, H. Blanche, H. Cann, J.O. Kitzman, J. Shendure, E.E. Eichler, E.S. Lein, T.E. Bakken, L.V. Golovanova, V.B. Doronichev, M.V. Shunkov, A.P. Derevianko, B. Viola, M. Slatkin, D. Reich, J. Kelso, and S. Pääbo. 2014. The complete genome sequence of a Neanderthal from the Altai Mountains. *Nature* 505: 43–49.

Rieux, A., and F. Balloux. 2016. Inferences from tip-calibrated phylogenies: A review and a practical guide. *Molecular Ecology* 25: 1911–1924.

Rieux, A., A. Eriksson, M. Li, B. Sobkowiak, L.A. Weinert, V. Warmuth, A. Ruiz-Linares, A. Manica, and F. Balloux. 2014. Improved calibration of the human mitochondrial clock using ancient genomes. *Molecular Biology and Evolution* 31: 2780–2792.

Sanderson, M.J. 1997. A nonparametric approach to estimating divergence times in the absence of rate constancy. *Molecular Biology and Evolution* 14: 1218–1231.

Sarich, V.M., and A.C. Wilson. 1967. Immunological time scale for hominid evolution. *Science* 158: 1200–1203.

Scally, A. 2016. The mutation rate in human evolution and demographic inference. *Current Opinion in Genetics and Development* 41: 36–43.

Scally, A., and R. Durbin. 2012. Revising the human mutation rate: Implications for understanding human evolution. *Nature Reviews Genetics* 13: 745–753.

Shapiro, B., S.Y.W. Ho, A.J. Drummond, M.A. Suchard, O.G. Pybus, and A. Rambaut. 2011. A Bayesian phylogenetic method to estimate unknown sequence ages. *Molecular Biology and Evolution* 28: 879–887.

Thorne, J.L., H. Kishino, and I.S. Painter. 1998. Estimating the rate of evolution of the rate of molecular evolution. *Molecular Biology and Evolution* 15: 1647–1657.

To, T.-H., M. Jung, S. Lycett, and O. Gascuel. 2016. Fast dating using least-squares criteria and algorithms. *Systematic Biology* 65: 82–97.

Venn, O., I. Turner, I. Mathieson, N. de Groot, R. Bontrop, and G. McVean. 2014. Strong male bias drives germline mutation in chimpanzees. *Science* 344: 1272–1275.

Willems, T., M. Gymrek, G.D. Poznik, C. Tyler-Smith, The 1000 Genomes Project Chromosome Y Group, and Y. Erlich. 2016. Population-scale sequencing data enable precise estimates of Y-STR mutation rates. *American Journal of Human Genetics* 98: 919–933.

Wong, W.S.W., B.D. Solomon, D.L. Bodian, P. Kothiyal, G. Eley, K.C. Huddleston, R. Baker, D.C. Thach, R.K. Iyer, J.G. Vockley, and J.E. Niederhuber. 2016. New observations on maternal age effect on germline *de novo* mutations. *Nature Communications* 7: 10486.

Yang, Z., and B. Rannala. 2012. Molecular phylogenetics: Principles and practice. *Nature Reviews Genetics* 13: 303–314.

Yoder, A.D., and Z. Yang. 2000. Estimation of primate speciation dates using local molecular clocks. *Molecular Biology and Evolution* 17: 1081–1090.

Zuckerkandl, E., and L. Pauling. 1962. Molecular disease, evolution and genic heterogeneity. In *Horizons in biochemistry*, ed. M. Kasha and B. Pullman, 189–225. New York: Academic Press.

Dating Techniques in Archaeological Science

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Philosophers and physicists have long debated the nature of time (Dainton 2010), a subject that the historical sciences, surprisingly, have put less effort into. While archaeology has delved into the methods and techniques of dating in considerable detail, less attention has been paid to how these should be employed toward our goal of understanding the archaeological record. In this essay, I review some theoretical aspects of dating, and in this context, discuss the utility of various methods as they are currently understood and practiced.

The reality of the past, the present, and the future has long puzzled philosophers. Some say only the present is real, others that the past and the present are real, and still others that all three are real. I am not qualified to discuss the merits of these three positions, but as an archaeologist, I find attractive the view that only the present is real (although maybe only as a first approximation because in relativity theory, the present is relative!). So how can we know the past? An objection to presentism is that if the past and future are not real, how can we judge the truth of a tensed sentence, such as "this happened"? The response is that traces of the past still exist. The archaeological record is a contemporary phenomenon, but what make artifacts interesting are the clues to the past that they contain. Artifacts become our maps to the past.

In modern physics, space and time are not independent of each other, something called spacetime being the only absolute. But there is something different about time, as opposed to space. Some versions of string theory, for example, posit additional spatial dimensions, but still only one dimension of time. Time is unique by its directionality, often called the arrow of time (Gould 1987). Time is symmetric in equations governing the microscopic world (quantum mechanics), but many physical processes in the macroscopic world are asymmetric in regards to time, such as radioactive decay or thermodynamics (entropy always increases). Causes occur before effects. We remember the past, not the future. There is evidence of the past, not the future.

Dunnell (2000) argues that Darwinian evolution provides a better model of time for archaeology. Table 1 shows how time is distinguished between physics (although perhaps not astronomy) and the historical sciences. Dating, defined by Dunnell (2000) as the process of assigning a temporal value to a historically unique event, is only relevant to the historical sciences. In physics an event is a single point in spacetime with infinitesimal duration, leaving aside the possibility of quantum time. In the historical sciences an event is some interval of time during which some entity changes its attributes, assuming there is no time when nothing happens. Artifacts have time built into them by the configuration of their attributes. It is when those attributes came together as a set which defines an event. Chronology is the temporal ordering of events.

An event can be dated only if the material under consideration has properties that are dependent on time, and best if they are only dependent on time. These provide a clock. Not all events can be dated, and Dean (1978) was one of the first to distinguish dating events, those events which can be dated, and target events, those events which are of interest. To relate dating events to target events, where the two do not coincide, requires what Dean calls bridging arguments. These are

Dating Techniques in Archaeological Science, Table 1 Nature of time

Physics	Historical sciences
Elapsed time	Unique time
Interval scale	Ratio scale
Law-like, uniformitarian	No laws, contingency
Predictive	Nonpredictive
Arguments from analogy	Arguments from homology

qualitative assessments of validity (Ramenofsky 1998). Association, or locational proximity, is often used but not always valid.

Events have durations. They can be trivial for the manufacture of discrete objects. They can be highly significant for aggregates of objects that have come together as a set (often called an occupation). Stonehenge, for example, reached its present configuration over centuries. Asking the age of Stonehenge is therefore not a simple question. Aggregates of objects or even discrete objects themselves are often described as palimpsests, a superposition of multiple events. Bailey (2007) defined five kinds: (a) true palimsests, where all traces of earlier activity have been removed; (b) cumulative, where traces of events accumulate in one place causing a loss of resolution and time averaging; (c) spatial, where contemporaneity on a regional scale must be addressed; (d) temporal, where depositional and manufacturing ages are widely separated in time; and (e) meaning, where use of an object or aggregate changes through time. One can try to disentangle palimpsests (called accumulation research) but it is not possible to remove the effect entirely. The Pompey principle, the myth that archaeological sites represent frozen moments in time, was refuted in the Schiffer-Binford debates of the 1970–1980s. Resolving palimsests also misses the larger picture. Bailey's (2007) notion of time perspective recognizes that different time scales of analysis bring into focus different features of behavior. One of the great advantages of archaeology is the long-time perspective it affords, which cannot be realized by short-term processes documented, for example, by ethnology.

These considerations are important in evaluating dating methods as they apply to any given situation. What kind of bridging arguments are required? What kind of resolution is needed? How can one balance accuracy (how close to the true age) with precision (how replicable). The power of a dating method is judged by the degree that these questions can be answered archaeologically, not by the physics of the method.

Relative Methods

The oldest dating methods in archaeology are those which arrange events on a relative or ordinal scale. When one thinks of scientific dating methods, the various chronometric techniques (interval or ratio scale), like radiocarbon or luminescence, come to mind, but the backbone of archaeological dating has always been ordinal methods such as stratigraphy and the various similarity-based methods, which are no less scientific. Often chronometric methods are simply supplemental.

Stratigraphy

Stratigraphy is the oldest of these methods, its use in geology dating to Steno in the seventeenth century. Its accomplishments are considerable. It showed that earth had a deep history (Rudwick 1972), and it played a key role in demonstrating human antiquity (Grayson 1983). The principles of stratigraphy (Harris 1979) can be summarized in four laws: (a) superposition of younger strata over older strata; (b) original horizontality; (c) original continuity within a basin of deposition; and (d) inclusion formation being older than their deposition. The event dated by stratigraphy is the deposition of a body of sediment. What is not dated, as the fourth law makes clear, is the formation of particles, such as artifacts, that make up the strata. The manufacture or use of an artifact takes place before its deposition. To claim that strata deposition can date manufacture or use requires a bridging argument to the effect that the time between manufacture/use and deposition is short. Such bridging arguments are at the core of geoarchaeology's interest in site formation processes. Failure to distinguish dates of manufacture/use from dates of deposition leads to misnomers such as reverse stratigraphy or secondary deposits.

Seriation

In 1802, Rasmuth Nyerup, who 5 years later helped found the National Museum of Antiquity in Copenhagen, wrote "...everything which has come down to us from heathendom is wrapped in

a thick fog: it belongs to a space of time we cannot measure" (Gräslund 1987). Yet over the next half century, the Danish National Museum became the leader in constructing prehistoric chronology, starting with Christian Thomsen and later J. J. Worsaae. Their method was based on similarity, association, and provenience. By considering what kinds of artifacts occurred with what other kinds of artifacts where, they were able to arrange chronologically Danish prehistory within the framework of the three-age system (a concept dating back to the Greeks). Beginnings of seriation, an ordering based on similarity and applied chronologically, can be traced to the 1870s also in Scandanavia. Oscar Montelius, a Swede, developed one of the first occurrence seriations in 1885 and later extended his approach over much of northern Europe, using cross-dating to tie regional chronologies together and ultimately with the Aegean (Gräslund 1987). Working in the Southwest, Americans (Nelson, Spier, Kroeber) were the first to develop frequency seriation (O'Brien and Lyman 1999).

Seriation is an ordering, not necessarily chronological, based on artifact characteristics. O'Brien and Lyman (1999) identify three kinds: phyletic seriation, occurrence seriation, and frequency seriation. Phyletic seriation is an ordering based on the artifact characteristics alone, not their association. Ordering is based on similarity where the similarity arises from homology, or historical relatedness, not from analogy, or shared adaptation. The more similar two artifacts are, the closer together they are in an order. The orderings are essentially lineages, and various methods such as phyletics (parents evolving into offspring) or cladistics (branching) have been employed to model them. Phyletic seriation at an interval scale has been attempted but requires knowledge of rates of change. Glottochronology, for example, uses percentage of shared cognates (words with common origins) to measure time of language divergence but has largely been discredited due to inaccurate models of evolution and adherence to strict rates. Application of more up-to-date cultural phylogenetic methods have renewed potential, but any widespread use in archaeology will require good estimations of "mutation" rates in cultural transmission, i.e., either copying errors or internal cognitive processes.

Occurrence and frequency seriations are variants of the same model. In terms defined by Dunnell (1970), such seriations use classes to order groups. Classes are conceptual, i.e., types defined by a set of attributes. Groups, in contrast, are empirical, i.e., assemblages or aggregates of types. Classes form the basis for judging the similarity of groups. Groups are the units of seriation – those things being ordered. The event being dated is when the types comprising the group came together during some interval of time. Implicit is the assumption that the objects were made and deposited during this interval, and bridging arguments are required to exclude the possibility of objects made earlier or later from being part of the group. The criteria of seriation, used to order the groups, are the classes, or types, again constructed using homologous, or historically related traits.

Occurrence seriation involves the presence or absence of classes. The ordering of the groups is based on a single principle: the distribution of any historical class is continuous through time. Frequency seriation involves the relatively frequency of classes. The ordering is based on the same principle for occurrence seriation plus one more: the distribution of any historical class exhibits the form of a unimodal curve through time. The popularity of a particular class rises through time to a peak and then declines. A seriation obtains if the only deviation from this principle can be accounted for by sampling error. Two additional conditions must apply. The groups must be of comparable duration and the groups must belong to the same cultural tradition. The order obtained may not be chronological. It could reflect variation across space because of differential receptivity of change. A seriation also does not indicate which end is earliest and which latest. That has to be obtained from other data (and there have been some spectacular errors in this regard). Controlling spatial variation is not easy. It is often imperfectly done by limiting the area of analysis. Smith and Neiman (2007) proposed using correspondence analysis in tandom with frequency seriation to detect different sources of variation other than time. The problem of spatial variation has also

been turned to a benefit, where interaction areas have been defined by the ability to obtain a seriation (Lipo et al. 1997).

Why does seriation work? It was recognized early on (Phillips et al. 1951) that the traits best suited for defining historical classes were those with no functional values, sometimes called style. If the environment exercises no influence over style, which is therefore adaptively neutral, then the distribution of stylistic traits is controlled only by chance and transmission processes, which entail historical relations. Simulations of transmission processes of traits involving only drift (chance) and innovation produce the same unimodal curves seen in seriation (Neiman 1995).

Seriation has not been used as much as the benefit of its analytical rigor might recommend. In the USA in the early 1900s, there was a perception that the American past had little time depth, particularly when compared with the scale of change documented in Europe (The discovery of Folsom did not occur until 1927.). Small-scale change, however, was being documented, particularly in the Southwest, using seriation and stratigraphy. But no one understood why seriation worked, and it was believed that stratigraphy was necessary to validate seriation. Kroeber famously wrote "the proof is in the spade." Stratigraphy got credit for demonstrating change in the American past, also reinforcing a "perception that artifacts within vertically bounded recovery units comprised real, discrete entities rather than accidental (results of deposition) chunks of a cultural continuum" (Lyman and O'Brien 1999). Dendrochronology was also beginning to provide absolute dates in the Southwest, and archaeologists found that it could be used to infer dates of pottery, even though it dates a different event. The painted designs on Southwest pottery proved to have limited temporal spans, so cross-dating replaced seriation, despite having much less rigor. Seriation was widely used in the Eastern woodlands in the 1920s and 1930s, but difficulties in spatial variation led to comparisons among areas using stratigraphic-bound parts of the seriation, which were called "phases." Phase construction, a grouping method based on similarity of artifacts and anchored by dates from newly developed radiocarbon, replaced seriation as a preferred dating method, at a cost of clarity. As groups, phases change their definition with each new assemblage added to them, resulting in some situations where the similarity within phases is less than the similarity between them. Neither cross-dating, which is analogous to the use of index fossils in geology, nor phase construction, moreover, solved the problems of spatial variation and the time-transgressive nature of types, and both therefore have produced chronological confusion. The rigor of seriation, where one has to produce a seriation that works, is much needed.

D

Absolute Dating

Methods Based on Cyclical Variations

Varves

The first absolute dating method was the use of varves, which are horizontal sedimentary layers of varying structure based on annual depositions. They were first recognized in Sweden (varve is Swedish for cyclical layer) in the late nineteenth century and were first used for chronology by the Swedish geologist Gerard de Geer, who used glacial lake varves in 1912 to determine the age of glacial retreat in Scandanavia. Clastic varves are created by the annual deposition of different grain sizes. For glacial lakes, during spring runoff coarse particles are deposited, while in late summer and fall, slower water carries only fine particles and allow clays to settle out. This results in annual bands of lighter coarse grains and darker fine grains. The thickness of the layers is dependent on temperature so that sequences of thick and thin layers can be cross-referenced from one lake to another. In Scandanavia a cross-referenced varve sequence extends with one-year resolution to 13,000 years. Biogenic varves are created by seasonal pulses of aquatic biological layers. The best known are varves in the Cariaco Basin in Venezuela where lighter layers, representing deposition of diatoms during winter and spring upwelling, alternate with darker layers, representing sediment run-off during rainy summer and fall. Varves have limited applicability in

archaeology aside from environmental reconstructions and radiocarbon calibration. They can date pollen sequences which are then compared with pollen from archaeological sites.

Dendrochronology

More applicable to archaeology is dendrochronology, also developed in the early twentieth century, by Andrew E. Douglass, an astronomer working in the Southwest. He was interested in the cycle of sunspots as might be recorded in tree rings but realized the variable ring widths could be used for dating. He produced his first archaeological chronology in 1921. Europeans did not get started until the 1930s, and it was not until last 25 years that long chronologies have been developed.

The principle behind dendrochronology is similar to that for varves (Baillie 1995). Cross-sections of trees display successive layers of annual xylem growth, which in many trees form rings. The inner band of light colored cells is called early wood, and the outer band of dark-colored cells is called late wood. Trees vary in their usefulness for dating. Some have rings that do not vary much but others vary dramatically in thickness, density, and cell structure as a function of several environmental variables, mainly temperate in cold climates and precipitation in dry climates. Other variables affecting rings include frost, fire, insects, and floods. Patterns of thickness or density variation in rings can be correlated from tree to tree. If cross-references can link modern trees with ancient ones, a master curve can be built, allowing absolute dates at one-year resolution (Fig. 1). If one cannot match ancient curves with modern trees, then only a floating chronology is obtained, but which can still be useful for relative dating. The history of dendrochronology is replete with search for missing links to connect floating curves with the master. Gaps in the curves often reflect periods of tree depletion, so are themselves interesting. Best-known sequences are those built on conifers from the American Southwest and on oaks in Northern Europe (both extend back about 10–12 ka), but the method has been extended to nearly every region in the world.

Two requirements limit the applicability of dendrochronology in archaeology: prehistoric use of wood with suitable rings for dating and preservation of that wood. These are large

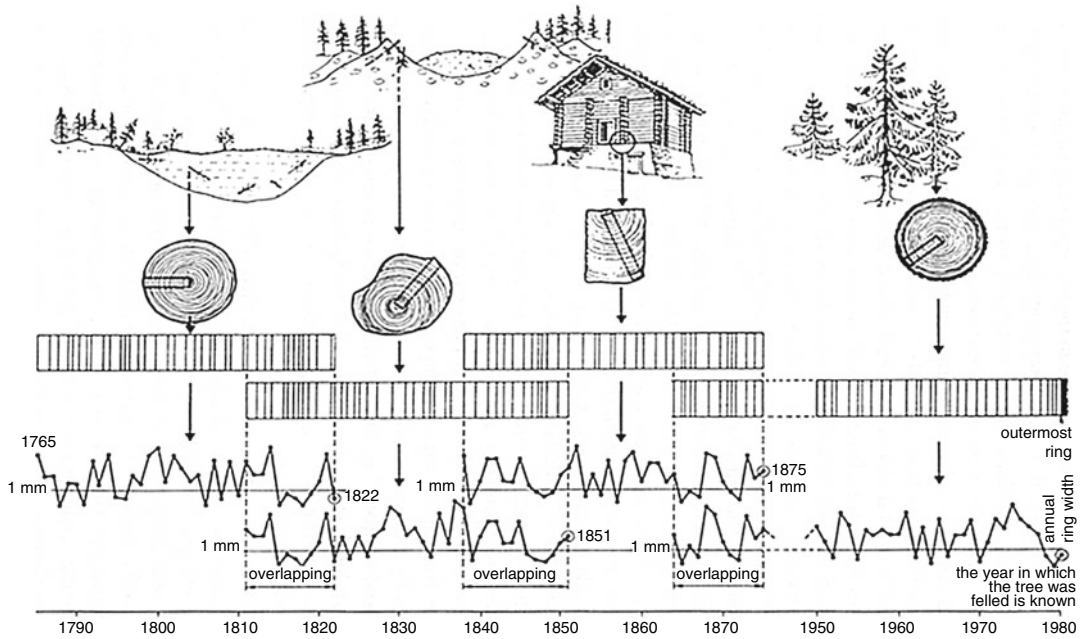

Dating Techniques in Archaeological Science, Fig. 1 Schematic showing how cross referencing works in dendrochronology. This is a reproduction of a figure from Schweingruber (1989: 51)

requirements and so the exceptional precision of dendrochronology can seldom be exploited. Even where dating is possible, there are a number of potential problems. Missing rings or double rings, both caused by stress, affect counting and cross-referencing. More serious are mismatches between the dating event and the target event. Wood may be cut long before it is used. It can be incorporated into earlier features for repair reasons (although interesting in itself), and it can be reused. For these reasons date clustering is often used to estimate building construction, but even then stockpiling, and multiple reuse, and repair can produce a broad array of dates difficult to interpret. Another problem is non-cutting dates, which are age estimates from wood missing its outer rings. Sapwood is the outer living part of the trunk, while heartwood is the hard, dense, physiologically dead inner part. Sapwood is more prone to decay and is often removed initially during construction for that reason. It is also more likely to be burned. Non-cutting dates are attempts to salvage dates by estimating the number of outer rings lost, possible by regression using living trees if all the sapwood is not removed. If some of the heartwood has been removed, only a maximum date is possible. Non-cutting dates are not uncommon. Of 194 available dendro dates from the Chama River region of New Mexico, only 55 are cutting dates. A final problem with dendrochronology is the attempt to use it to date other things. For example, one might try to date the manufacture of ceramics found in a room by the age of beams in the walls of the room. This obviously requires a bridging argument, and not always an easy one to make because the firing of the ceramic and the construction of the room can be separated by significant time. Where these problems can be controlled, dendrochronology provides spectacular resolution. Dating of timbers from lake settlements in Central Europe, for example, showed that settlements were not continuous but episodic, something that would be completely blurred by less precise techniques such as radiocarbon.

Another use of dendrochronology, only briefly mentioned here, is for environmental reconstruction by correlating ring widths and densities with known climatic indices. Many prehistoric events – such as settlement changes in the Southwest – have been correlated with climatic variables gleaned from tree-ring data (Dean et al. 1985). The one-year resolution has also made it possible to correlate cultural change with singular events such as a large volcanic eruption creating a dust veil. An eruption in AD 536 has been correlated with Sierra Nevada cold years, European dry fogs, Scandanavian cold summers, the Irish failure of break, famines in China, stars not seen in China, high mortality rates in Ireland and England, and the beginnings of the Justinian plague (Baillie 1995). Cultural events have also been correlated with climatic variables dated by marine oxygen isotope records and ice-core layering produced by annual dust cycles.

Various marine fauna also exhibit annual growth patterns that are dependent on environment conditions. These have been widely used for reconstructing past environments and seasonality of collection. Very recently attempts have been made to use them for dating by developing a cross-referenced master curve that can be assigned dates by ^{14}C wiggle matching. Work has been done on bi-valve shells, fish otoliths, and corals, but the dating range has been limited to just 100 s of years.

Methods Based on Radioactive Decay

Radioactivity was discovered in the late 1890s by Henri Becquerel, Marie Curie, and others. In 1902 Ernest Rutherford and Frederick Soddy established that radioactivity resulted from transformation of unstable elements into new forms. In 1906 Rutherford proposed that the He/U ratio could be used to determine the age of the earth. The next year Bertram Boltwood proposed using Pb/U ratio toward the same end. The Pb/U method was improved by Arthur Holmes, who established a geologic time scale in 1911, which is in general agreement with modern values. Isotopes were discovered in the 1920s, and improvement of instrumentation to measure them resulted in the mass spectrometer in the 1930s. In the 1940s, U-series dating, K-Ar dating, and ^{14}C dating were all developed. While there are many other such dating methods, most are relevant only in geology, whereas these three have seen common use in

archaeology. The methods are all similar in concept. The ratio of a radioactive element to a stable one is related to age by the half-life of the decaying element.

Uranium Series Dating

Two of the most common natural radioactive elements are ^{238}U and ^{232}Th. Both have half-lives (how long it takes for the concentration to be reduced by half) of the same magnitude (10^9 years) as the age of the universe. They decay so slowly that their concentrations are nearly constant over the time span of human evolution. Neither decay directly to a stable element but rather decay through a series of daughter radioactive elements before reaching a stable isotope of lead. The half-lives of the daughters are very short compared to the half-lives of the parents, so that after some period of time, if there are no perturbations to the system, equilibrium is reached where the production rate of the daughter equals its decay rate. The parent and each daughter will then have the same activity, a condition known as secular equilibrium. Because of the different half-lives, the parents will have a much higher concentration than any of the daughters. There is also a third decay chain headed by ^{235}U, but this one is much less common.

If some geological process disrupts the decay chain, disequilibrium results. This is the basis for uranium-series dating. ^{238}U decays into ^{234}Th and then into ^{234}Pa, both short-lived daughters that remain in equilibrium with the parent, then into ^{234}U with a relatively long half-life (2×10^5 years), then ^{230}Th (half-live $= 7 \times 10^4$ years), and then through a series of short-lived daughters until the stable ^{206}Pb is reached. Uranium has two oxidation states, a tetravalent and a hexavalent one. In oxidizing conditions, it forms a hexavalent uranyl ion complex, which is soluble. Thorium occurs only in the tetravalent state and is insoluble. Water will contain mainly U because Th will settle out. When water-lain materials such as stalactites, stalagmites, travertines, and corals are deposited, they will contain only U without the daughters. After deposition, the daughters begin to rebuild. The ratio of ^{230}Th to its parent ^{234}U will increase with time as a function of the ^{234}U half-life. There are other ratios within the series, and also the ^{235}U series that can be used for dating, but this is the most common in archaeological applications. The event being dated is a depositional event. It can be related to archaeological events only by the relationship of the archaeological material to the deposit. For example, archaeological materials sealed by a travertine layer must be older than the age of the travertine. A unique application in this regard is the dating of rock art by calcite layers that have grown over it.

There are four requirements for U-series dating to work. First, the initial fractionation must occur over a short period of time relative to the half-life of the daughter. Second, the initial abundance of the daughter must be negligible or known. If the sediment is not initially free of ^{230}Th, this can be estimated by measuring ^{232}Th. Third, all U must be derived from the ambient water in the depositional habitat. Adjustment for $^{234}U/^{238}U$ fractionation is needed. ^{234}U is more susceptible to leaching because the energy from alpha recoil injects ^{234}Th (the short-lived parent of ^{234}U) into pore space or damages the ^{234}U site. The ratio of ^{234}U to ^{238}U in sea water, for example, is about 1.147. Both the initial $^{234}U/^{238}U$ and the $^{230}Th/^{232}Th$ ratios can be estimated by isochron dating. Fourth, after fractionation the system must remain closed.

U-series dating does not work as well with bones, teeth, and shell, because of U uptake after the initial fractionation, violating the closed system requirement, unless the U uptake can be modelled. One recent attempt at this is the absorption/diffusion model. If one knows the U diffusion co-efficient in the bone, the bone porosity, and the environmental concentration of uranyl ions, one can predict distribution profiles of U and U-series isotopes transversely across the bone. The profiles are u-shaped and gradually flatten out with time.

Traditionally, U series measurements were made by alpha spectrometry (count decays), but better precision and a wider age range is possible with mass spectrometry (count atoms), particularly thermal ionization mass spectrometry (TIMS) and multicollector inductively coupled mass spectrometry (MC-ICPMS). The age range

is about 500,000 years (controlled by the half-life of ^{230}Th) to a few hundred years (depending on the ability of mass spectrometer to resolve disequilibrium).

Potassium-Argon Dating

Potassium-argon dating is based on the decay of ^{40}K, which has a half-life of 125×10^9 years. It has two decay paths. Almost 90% of the time it decays to ^{40}C with the emission of a beta particle. About 10% of the time it decays to ^{40}Ar via electron capture with the emission of a neutrino and a gamma ray. The ratio of ^{40}K/^{40}Ar is related to time since a degassing event when all the argon from a sample is removed. This occurs during a volcanic event when heat brings all Ar in the sample into equilibrium with the atmosphere. The method assumes there is no Ar escape after cooling, but this is rare because the Ar ion is large enough that it becomes trapped in the solid crystal lattice. Initially the ^{40}K/^{40}Ar ratio was measured on two aliquots, one for K, measured on a flame photometer assuming natural atomic abundance (^{40}K is 0.0117% of total K), and one for Ar, measured on a mass spectrometer. Nowadays, the sample is placed in an atomic reactor and bombarded with neutrons to transform ^{39}K (the most common isotope of K) to ^{39}Ar. From atomic abundance, ^{39}Ar serves as a proxy for ^{40}K. All measurements can then be made on a mass spectrometer using only one aliquot. Because only the ratio needs to be determined, this avoids trying to compute absolute abundances, increasing accuracy, and precision. Because a correction must be made for atmospheric Ar, five different isotopes of Ar are typically measured, and isochron dating used. The method now is commonly called argon-argon dating.

Measurements are commonly done using step heating, which allows diffusion of Ar out of the sample successively. Because diffusion occurs at a lower temperature on the surface than the core, step heating can show any evidence of Ar loss or gain since the time of interest, using a plateau test for the best estimate of age. Laser ablation is used to date single grains, allowing assessment of heterogeneous materials such as lavas which can be contaminated with older grains.

K-Ar dating is restricted to volcanic materials so can only date archaeological materials that are bracketed by volcanic depositions. It has seen most use in early human evolution. Its upper age limit is the age of the earth. Young ages are difficult because of low signal to noise ratios, but the eruption of Mt. Vesuvius in AD 79 has been dated.

Radiocarbon Dating

This is the most common chronometric method used in archaeology. Carbon has three naturally occurring isotopes: ^{12}C (99%), ^{13}C (1%), and ^{14}C (one part in million million). Only ^{14}C is unstable. It is continually formed in the upper atmosphere by collisions between cosmic-ray produced neutrons and nitrogen. It rapidly combines with oxygen to form carbon monoxide and then carbon dioxide. Carbon dioxide mixes in the atmosphere, dissolves in the oceans (the hydrosphere), and enters the biosphere through photosynthesis. There is a somewhat delayed and indirect entry into a fourth reservoir, the sedimentary sphere (Fig. 2). ^{14}C decays at a statistically constant rate (half-life of 5730 ± 30 years) into ^{14}N, emitting a beta particle. The production and decay are in equilibrium so that there is a more or less constant amount in each of the carbon reservoirs. The event dated is when carbon material is isolated from the carbon cycle ending any replenishment with new ^{14}C. This is ultimately an end of photosynthesis, corresponding to the death of an organism.

Assumptions of the method (Bowman 1990) include: (1) the concentration of ^{14}C in each carbon reservoir has remained constant through time; (2) there is complete and rapid mixing of ^{14}C throughout the reservoirs; (3) there is the same ^{14}C concentration in all parts of the biosphere; (4) ^{14}C concentration has not changed in the sample since isolation by any other mechanism than radioactive decay; (5) natural levels of ^{14}C can be measured with sufficient accuracy and precision; and (6) the event dated is close in time to the event of interest. The first three of these assumptions are not strictly true and the last three are sample specific.

Constant concentration of ^{14}C in the atmosphere was proven incorrect by comparison of tree rings dates with ^{14}C assays on the same

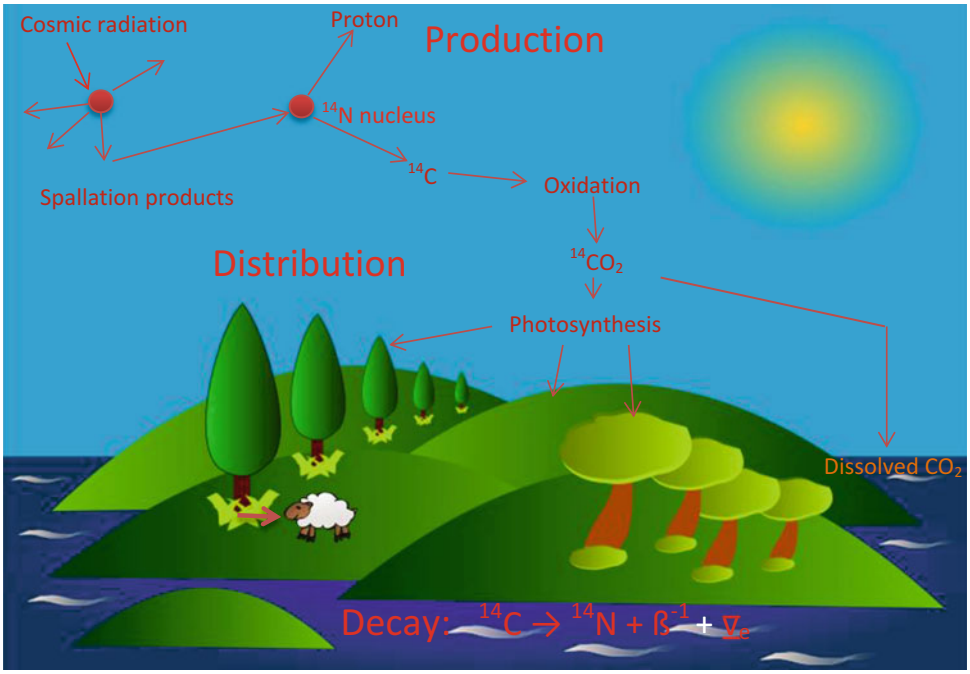

Dating Techniques in Archaeological Science, Fig. 2 Illustration of carbon cycle. Production occurs in the upper atmosphere. Distribution occurs through photosynthesis, and then by transfer through trophic levels, and by dissolution into the ocean. The decay equation is entered at the bottom, where β^{-1} is a beta particle and $\bar{\nu}_e$ is an antineutrino. The drawing is based on similar ones found on radiocarbon lab web sites

rings. There is a long-term systematic underestimation of ^{14}C dates, which correlates with shifts in the earth's magnetic field strength. Cosmic rays are charged particles deflected by the magnetic field. The stronger the field, the more deflection. Short-term trends, which limit precision, are oscillations superposed over the long-term trend. Called "wiggles," or the de Vries effect, they are thought to be caused by sunspot activity which influences the magnetic field between the earth and sun. Over the past couple of centuries, there has also been a decrease in concentration of ^{14}C in the atmosphere, called the Seuss effect, due to burning of fossil fuels releasing old carbon. In the 1950s and early 1960s, there was an increase in ^{14}C due to atomic bomb testing. This has been used to study mixing of ^{14}C in the biosphere, for example, to show that adjacent tree rings do not exchange carbon. It has also been used to produce very accurate dates in the last half of the twentieth century. Finally, the solubility of carbon dioxide into water is affected by temperature, so glacial and interglacial periods can affect the level of ^{14}C. For all these reasons, radiocarbon dating cannot produce calendar dates. There must be a calibration. For terrestrial samples, this has been done by carbon dating tree rings of known age. Rings from bristlecone pine in North America and oaks and pines in Europe have allowed calibration to 13.9 ka. For marine samples, carbon dating of foraminifera from varved sediments in the Cariaco Basin and carbon dating of U-series dated corals have been used. The most common method for calibration is a probability method using Bayesian statistics. Bayesian statistics, using stratigraphy as aprior, are also used to constrain dates from multiple intercepts when the calibration curve is relatively flat.

Reservoir effects refer to problems in extending calibration to other reservoirs besides the atmosphere. Mixing rates of dissolved carbon in the oceans is slow so that carbon is "older" by the time it reaches the bottom. Upwelling can bring this carbon to the surface, so that surface

waters can have a modern age, on a global average, of about 400 years (R_g). Additional offsets, called ΔR, are controlled by local factors and can vary by up to 1000 years and can vary temporally, making dating of marine organisms difficult. Another reservoir effect is a 30-year offset of the southern hemisphere from the Northern Hemisphere because of direction of trade winds and the greater surface area occupied by ^{14}C–depleted ocean in the Southern Hemisphere. Rivers and lakes also exchange carbon dioxide with the atmosphere requiring some correction. Dissolution of calcium carbonate and soil humic material into freshwater also introduce old carbon.

Concentration of ^{14}C in living organisms differs from the atmosphere due to differential uptake of carbon dioxide during photosynthesis. Lighter isotopes (^{12}C and ^{13}C) are taken up preferentially, so plants will have a ^{14}C deficiency. This is routinely corrected by measuring the ratio of $^{13}C/^{12}C$ and assuming the effect of ^{14}C is double that of ^{13}C. Differences among plants in the carbon uptake, used to advantage in reconstructing diet, create complications in dating animals that draw food from plants with different fractionations. Long-lived trees can be depleted in ^{14}C because the inner heartwood has ceased to exchange carbon with the atmosphere, creating the old wood effect.

In preparing samples, care must be taken to remove recently incorporated, but loosely bound, contaminates. The acid-alkaline-acid pretreatment is routinely used. A more rigorous pretreatment, called ABox, involving additional chemical oxidation stages, is used for charcoal near the age limit of the method, where contamination has the largest effect. Measurement of ^{14}C is challenging. Low concentration increases the difficulty as the age limit of about 40–50 ka is neared. Beta particles are also weak. The conventional method was to use gas counters or liquid scintillation. In both cases, decays are counted. The advent of accelerated mass spectroscopy allowed the counting of atoms, which permits higher sensitivity (by 1000 to 10,000 times) and smaller sample sizes. AMS may not be the last word. Recently, laser-assisted isotope ratio analysis (LARA), based on isotope specificity of laser resonance in CO_2, has been introduced. Currently, the sensitivity is not as high as AMS, but may eventually allow sample sizes as small as 10 μg.

Charcoal has been a mainstay of radiocarbon dating. Because long-lived samples have the old wood problem, preference is for short-lived species, although with increasing risk of contamination from rootlets and humic acids. Other short-lived flora such as grass, seeds, leaves, and even pollen are good dating candidates as long as fractionation is controlled. For shells, the inorganic fraction is usually dated but can exchange carbonate with the environment. Recrystallization from aragonite to calcite is often a sign of possible contamination. Marine and fresh-water shells require reservoir correction. Terrestrial shells and insects are less desirable because they interact with the sedimentary reservoir which often is not in equilibrium with the atmosphere. Because of environmental exchange in the inorganic fraction, most effort in dating bone uses organic collagen. Collagen does not readily exchange carbon but degrades easily and for older bones there may not be sufficient amounts. It has a characteristic amino acid profile, so if this is intact, it is not likely the collagen has been altered. Work has even been done on dating individual amino acids. There are a variety of ways to extract collagen or individual amino acids, all with the aim to reduce contamination. The most common is ultrafiltration which takes advantage of the large molecules of collagen, allowing separation from smaller molecules with a filtering membrane. The inorganic fraction of bone may be dated if it is heated high enough to remove carbonates and upon cooling recrystallizes, becoming resistant to environmental exchange. This is called calcined bone. One problem is that some of the carbon in calcined bone may come from the fuel, which is subject to the old wood effect. Organic matter is incorporated into soils from a variety of sources, most during pedogenesis. This can be dated but the date reflects the mean residence time, a variable dependent on rates of deposition, pedogenesis, and depth of burial. Longer the mean residence time, less meaningful is the date. Dates provide a minimum date for events associated with the initiation of soil development or

maximum age for burial by overlying sediments. Different fractions of the soil, e.g., the insoluble residue or the base-soluble humate, can sometimes give different dates. Organics in ceramics can be dated. These have disparate sources (original organics in clay, temper, soot from fires, and food residues) creating severe association problems. Best targets are food residues, particularly lipids.

Radiocarbon will probably remain the most valuable absolute dating method in archaeology, but it is not a panacea. As Christopher Bronk Ramsey (2008) of the Oxford radiocarbon lab has noted, "If we are to interpret radiocarbon measurements on samples in terms of chronology, there is much more that needs to be considered and thought about. There is an expectation that as the method has developed and become more precise, all of this has become routine and no longer needs to be considered. This is far from the truth." This is an exhortation to the archaeological community not to treat radiocarbon as a black box. All dates must be evaluated, particularly in how it relates to the target event. Ranked criteria for judging radiocarbon dates, assuming all technical matters have been accounted for, have been proposed. From best to worse, these are (1) congruence of target and dating events, (2) direct functional relationship between target and dating event (e.g., hearths in floor of houses), (3) quantity of organics such that relationship seems reasonable (e.g., charcoal concentrations), (4) just spatial association, and (5) just assumed association. Obviously there is a large difference from dating use of corn by dating a cob to dating an occupation by a random piece of charcoal found in the vicinity. Bridging arguments need to be stated clearly and their validity needs to be evaluated, on a case by case basis. Some have applied strict hygienic rules to radiocarbon dates and have thrown out 80% of the available ones. Others argue this may be going too far and valuable information is being thrown out with the bad. Perhaps the best solution is not to rely solely on radiocarbon dates but to consider other dating methods as well. This of course is the basis for the Bayesian analyses that are increasing in popularity.

Methods Based on Radiation Exposure

Luminescence Dating

The second most used absolute dating method and one that can complement radiocarbon well is luminescence dating. Understanding luminescence as a phenomenon was achieved in the first half of the twentieth century, and suggestions of its use for dating were made as early as 1953. A dating method was worked out on pottery by an Oxford group in the 1960s and 1970s. Extension to dating sediments came in the 1980s. Major strides in method development occurred in the last 20 years.

Luminescence dating has several advantages. First, the target event and the dating event are often the same. The dating event for pottery and burned lithics or rocks is the last heating event, usually when made. The dating event for sediments is the last exposure to sunlight, often when the sediment was deposited. Second, it works on materials that are ubiquitous: quartz and feldspar, the two most common minerals in the world. Third, it has a wide dating range, from a few years before the present to more than 500,000 years. The drawback is that it is a very complicated method, perhaps the hardest for archaeologists to understand, and dates need proper evaluation. Because it is complicated, error terms are propagated over a number of measurements, reducing precision.

Luminescence is defined as the emission of light from a material following the initial absorption of energy from an external source (Chen and McKeever 1997). To distinguish it from similar phenomenon such as fluorescence, there is a time delay between absorption and emission. This time delay, from a few seconds to millions of years, implies the storage of energy in some metastable state before return to ground state. The source of this energy, for dating, is naturally occurring radioactivity. Release of the energy from the metastable state requires an additional stimulus of energy, usually heat or light. If the stimulus is heat, it is called thermoluminescence (TL); if the stimulus is light, it is called optically stimulated luminescence (OSL) or infrared-stimulated luminescence (IRSL), depending on the wavelength.

Luminescence is usually observed in ordered crystals and the metastable states are associated with defects in the crystal lattice that produce a charge deficiency. Radiation ionizes atoms creating an electron (negative charge) and hole (positive charge) pair. These are attracted to defects of opposite charge, where they are held until sufficient stimulus releases them. Those defects where the stimulus energy required to liberate the charge carrier is relatively small are called traps. Those where the stimulus energy is relatively large are called recombination centers. When released, the trapped charge recombines with opposite charge in the centers. The process of recombination results in release of energy, some of it luminescence (Fig. 3). The intensity of the luminescence signal is proportional to the rate at which the system moves from the metastable state to the ground, or equilibrium state. It is therefore proportional to amount of trapped charge and to the amount of radiation the sample has received. The "palaeodose" is the amount of dose the sample has absorbed through time. The "equivalent dose," often abbreviated D_e, is the laboratory measurement of the palaeodose, determined by calibrating the measured luminescence signal against laboratory irradiation. The unit of absorbed dose is the gray (Gy), or one joule per kilogram. The dose rate is the amount of radiation absorbed per unit time (Gy/unit time). The age is determined by dividing the D_e by the dose rate. The age is in terms of years before present, where the present is the date of the laboratory radiation. Unlike radiocarbon, no further calibration is needed.

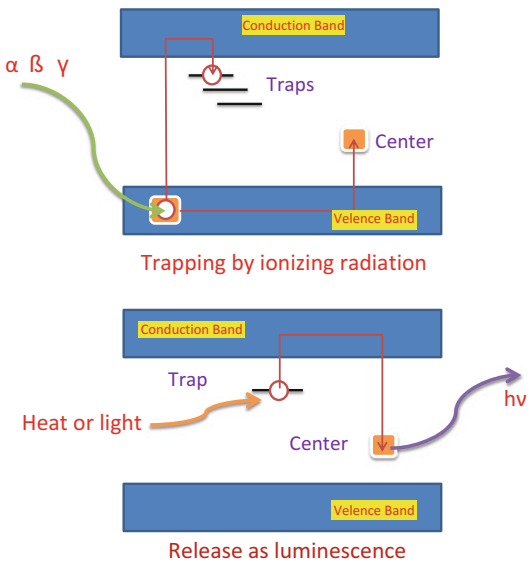

Dating Techniques in Archaeological Science, Fig. 3 Illustration of the luminescence process using energy band theory where the valence band represents the ground state and the conduction band represent the lowest excited state. Traps and centers have energy levels in the gap between the two bands. Ionization lifts the electron to the conduction band and it and the hole are attracted to traps and centers. Heat or light liberates the electron from the trap and it recombines at the center to yield luminescence. The process is simplified and does not include all possibilities for recombination routes. The drawing is adapted from a similar drawing by Dorothy Godfrey-Smith

Terrestrial natural radiation consists of alpha, beta, and gamma particles. They are distinguished by the penetrating power of the emissions, short for alphas (~20 μm in sediment), medium for betas (~2–3 mm), and long for gammas (~30 cm). There is also a minor contribution from cosmic radiation, which is deeply penetrating. The main producers of the terrestrial radiation are the ^{238}U and ^{232}Th decay chains and ^{40}K, all discussed earlier. There are minor contributions from the ^{235}U decay chain and ^{87}Rb. Because of the long half-lives, the concentrations of these are effectively constant for the time range of luminescence dating. This is convenient because if allows estimation of the dose rate from current radioactivity, unless there has been some geological disruption. The latter includes processes like leaching and changing burial depths, but fortunately significant changes in the dose rate, although always a consideration, are not common. Most materials found in samples being dated have similar coefficients of absorption, but not so in water. It will absorb radiation at a different rate than the sample, so estimation of average water content through time is a requirement. This sometimes hinders dating, but the usual practice is to make an estimate based on measured contents and any climatic considerations, and then apply wide error bars to cover most possibilities. The range of radiation influences the size fraction of the sample that is dated. Quartz and feldspar have negligible internal sources of alpha radiation.

Using sand-size particles (etched in the case of quartz) limits the alpha contribution, so that the dose rate is mainly betas, gammas, and cosmic. This simplifies procedures, and so is the most common form of dating. Where the sample lacks coarse grains, fine-grain procedures are followed where particles are limited to 1–8 microns, small enough not to attenuate the alphas. Then the dose rate must include the alphas as well. This is sometimes advantageous where the gamma rate is poorly known, because including alphas reduces the proportion of gammas to the dose rate. Because of their short range, alphas do not use all their energy before the sample becomes locally saturated (all traps are filled). Thus they are less efficient at producing luminescence. An efficiency factor, sometimes called a-value or b-value, must be determined to correct the alpha dose rate in fine-grain dating. Because of the long range of gamma radiation, much of the gamma contribution to the sample arises outside the sample. In the case of discrete pieces such as ceramics or lithics, a sample of associated soil is often collected to measure the gamma dose rate. Alternatively, gamma radiation can be measure in situ by placing dosimeters or using a portable gamma spectrometer. Dose rate is measured in a number of ways: alpha counting, beta counting, gamma spectrometry, and flame photometry (for K). Methods such as ICP and INAA are also used, but these usually only measure the parent of the decay chains and can produce misleading results if there is disequilibrium.

Determination of D_e involves measuring the natural intensity and the sample's sensitivity in terms of luminescence induced per unit radiation dose. Sensitivity depends not only on the number of trapped charge carriers but the proportion of them that are emptied during read-out and the proportion of recombination centers that emit light. Some centers release the energy as phonons. Changes in sensitivity occur as a function of dose, heat, light exposure, and time. Calibrating the natural OSL signal against that produced by known laboratory dose will provide an accurate D_e only if (a) any competition for charge during trap filling is the same for laboratory and natural irradiation (especially considering the rates are vastly different), (b) the luminescence response is the same during measurement of natural and laboratory induced signals, and (c) the traps are stable over the relevant time period (Murray and Wintle 2000). The latter is usually assured by preheat to remove unstable signal. Two basic methods for measuring D_e are additive dose and regeneration. In additive dose, increments of dose are added to aliquots that still retain their natural signal. A growth curve pairing dose versus luminescence intensity is extrapolated to the dose axis to estimate D_e. The method assumes that the fitted function for the known points is appropriate for the extrapolated region, but this is often not the case. This and large errors in extrapolation, especially for old samples, limit the usefulness of additive dose. In regeneration, increments of dose are added to aliquots that have had their natural luminescence removed (by heat or light). The natural signal is then interpolated into the growth curve, avoiding the problems of additive dose. The problem with regeneration is sensitivity change caused by emptying aliquots of natural dose. One solution to the problems of additive dose and regeneration is to combine them so that one corrects the problems of the other. Multi-aliquot techniques such as supralinearity correction and the slide method are two examples. Improved solutions have followed efforts to determine D_e on single aliquots, in particular the single aliquot regeneration (SAR) method developed by Murray and Wintle (2000). This involves measuring the luminescence after successive regeneration doses (including the natural dose). The problem of sensitivity change is solved by inserting a test dose of equal magnitude after each step. Dividing the signal from the regeneration dose by the signal from its corresponding test dose provides a normalization of each regeneration signal. The regeneration/test dose signal ratios are then plotted in a growth curve, and the natural/test dose signal is interpolated into it, providing a D_e. The main assumption of SAR is that the sensitivity of the test dose signal is proportional to the sensitivity of the regeneration dose signal for any given dose. The method, and variations of it, has proven remarkably robust and is the most common method used.

Deep traps in some minerals seem to lose electrons at ambient temperatures even though kinetic considerations suggest very low probability of the energy barriers being breached. This is called anomalous fading. It appears commonly in feldspars but is rarely observed in quartz. A widely accepted explanation is quantum tunneling. In any sample that exhibits such fading, steps need to be taken to correct for it or to circumvent it. A correction was proposed by Huntley and Lamothe (2001), which uses fading rates observed at laboratory time scales and extrapolates them to a geologic time scale. This seems to work where the growth curve is in the linear region, up to about 50 ka for feldspars. More recently (Buylaert et al. 2009), high-temperature stimulation using IRSL following a low-temperature stimulation has been shown to tap a signal that does not fade or fades only weakly (called post-IR IRSL, or pIRIR). The low stimulation preferentially empties traps that are close to recombination centers and thereby more susceptible to quantum tunneling, and the succeeding high-temperature stimulation empties traps that are far from recombination centers and much less likely to fade. These traps are also more difficult to empty by sunlight, so that a residual signal remains, making the method somewhat problematic for younger samples. But overall, the method seems to work over a wide age range.

In dating ceramics or lithics, the dating event is the last exposure to at least 450 °C heat. Materials that can be dated include not only pottery but structural materials (bricks, daub), fire-cracked rocks, and heated cherts or other micro-crystalline silicates. Glass, porcelain, and slag are more problematic. Traditionally, ceramics were measured by TL on multi-aliquots, but increasingly OSL is now being used on single aliquots using SAR. The ability to date individual ceramics directly (to their time of manufacture) has large potential for sorting out mixed assemblages, measuring duration of occupation, and dating small sites difficult to date otherwise. The main drawback is the expense, but with prudent sampling strategies, it can serve to validate other less expensive dating techniques. TL is still the preferred method for cherts or flints, as there is some question about the reliability of OSL. TL on flints has played a major role in deciphering the chronology of the Middle to Upper Palaeolithic transition, often beyond the reach of radiocarbon. Dating fire-cracked rock is an under-utilized application. Insufficient heat of the rock at the time of interest is a problem (rocks have a steep thermal gradient, and the inside of the rock is usually sampled for dating). A good approach is single-grain dating on coarse grains to separate out those grains that were heated sufficiently from those that were not. Recent work has also aimed to date the surfaces of rock to when they were last exposed to sunlight, useful for rocks used in structures.

The largest application of luminescence dating is in dating sediments to their last exposure to light. Luminescence dating of sediments has two difficulties not often encountered in ceramics. One is the possibility that the sediment was not exposed or insufficiently exposed to sunlight at the time of deposition. Insufficient exposure is called partial bleaching. The other is the possibility that grains of different ages have been mixed post-depositionally. One way to deal with the possibility of partial bleaching is to try to isolate a signal that is rapidly bleached. Quartz bleaches more readily than feldspar, and within quartz the fast-bleaching component is preferred. Single-grain dating, or dating of aliquots that have a very small number of grains on them, is utilized to separate bleached grains from partially bleached or unbleached grains. Single-grain dating, using the smallest fundamental unit of analysis, is the only method for parsing mixed-aged samples. Single-grain dating also has the advantage of allowing smaller sample size and of removing from analysis inappropriate signals (e.g., from feldspars contaminating a quartz sample) that are averaged into multi-grain aliquots, thereby avoiding potentially misleading results.

But single-grain dating has some disadvantages. First, because the signals may be small, poorer and more variable precision will result. Second, even though D_e is measured on single grains, dose rate can only be measured currently on bulk samples (although research into determining dose rates at a single-grain level is beginning). If the dose rate is heterogeneous, grains of the same age might have different D_e values. The

biggest problem, however, is that single-grain dating produces a distribution of D_e values that can be hard to interpret, and that are the subject of considerable debate. Variation in D_e has both intrinsic and extrinsic causes (Thomsen et al. 2005). Intrinsic causes include statistical variation, instrumental error, and variation in luminescence properties of individual grains. Extrinsic causes include partial bleaching, mixing, and heterogeneous dose rates. A number of statistical methods have been developed to evaluate these distributions (Galbraith and Roberts 2012). Measure of central tendency is commonly assessed by the central age model. The model also specifies an over-dispersion statistic that can be interpreted as the amount of dispersion beyond that accounted for by differential precision. The debate is over how much over-dispersion is allowable for a single-aged sample. One procedure is to do a dose recovery test. This involves removing the natural signal from an aliquot, administering a known dose, and then applying the SAR protocol to see if the known dose can be obtained. While a test of procedures, the dose recovery on single-grains because every grain is known to have received the same dose, can also be used to assess intrinsic variation. Any over-dispersion in the natural distribution beyond that obtained in dose recovery can be attributed, at least in part, to extrinsic causes. If partial bleaching is suspected, a minimum age model can be applied to isolate statistically the youngest grains. If post-depositional mixing is suspected, a finite mixture model can be applied to divide the sample into single-age components. Determination of partial bleaching or post-depositional mixing requires not only assessment of the distribution but also consideration of context and other factors. There is little consensus in the luminescence community about this, although convincing arguments have been made in many individual cases.

Many kinds of sediments have been dated. Aeolian sediments are considered the best choice because of the high probability of air-borne particles being fully bleached, although post-depositional mixing can be a problem. Fluvial sediments are prone to partial bleaching; sediments laid down by relatively calm water are preferred to turbulent water. Colluvial sediments, including in rock shelters, can be dated, although short duration episodes such as landslides and tsunamis can be problematic. Palaeosols are datable by isolating the youngest grains that were brought to the surface by turbation and bleached while the soil was on the surface. Ocean and lake sediments have also been dated, as has tephra.

Luminescence has also been applied to dating structural features. Dating structures has been a persistent problem in archaeology. Traditional dating approaches suffer from unconvincing bridging arguments. Materials in the structure can be much older than the structure, and stuff around the structure can also be of different age. Dating palaesols that underlie the structure is one solution, in effect treating the structure as a burial event. Dating construction materials, such as bricks, adobe, mortar, or rock surfaces, is another solution. Bricks were heated in antiquity but the other materials need to be dated to last exposure to light. Dating agricultural features, such as canals, dams, or terraces, has also been tried, but finding sediments that directly address the construction event is a problem.

A final issue in luminescence is whether to date quartz or feldspar. (Calcium carbonate has also been used in selected applications.). Both have advantages and disadvantages. The luminescence properties in quartz are fairly well known and it does not suffer from anomalous fading, but it has two drawbacks. One is that it saturates relatively early (less than 100,000 years) and the growth curve is linear over a shorter range. Dating quartz near saturation has several complications that can result in under-estimations of age. The other is that quartz can be quite insensitive, with signals 10–15 times dimmer than feldspars. In many parts of the world, particularly mountainous areas or areas in northern latitudes, quartz is too insensitive for practical use. Feldspar saturates much later and the growth curve is linear over a longer period. But feldspar composition is more diverse (usually only potassium and sodium feldspars are datable) and luminescence mechanisms, particularly charge transitions, are more complicated. Plus, anomalous fading is ubiquitous in feldspars and must be addressed.

Electron Spin Resonance

Electron spin resonance (ESR) is based on the same principles as luminescence but instead of releasing charge as a way of measuring it, ESR measures the electron concentration in the traps. More specifically, ESR studies paramagnetic centers with permanent magnetic dipoles. These are aligned randomly in the overall structure so there is no magnetism, but they can be aligned in the presence of a magnetic field. Magnetic dipoles are produced by spin of unpaired quasi-free electrons. Electrons in traps, or point defects, are not paired. Spin has two energy states, spin up and spin down. The difference between these two levels equals $g\mu_B H$, where g is a characteristic factor of a particular paramagnetic center, μ_B is quantum of magnetic moment (Bohr magneton), and H is the magnetic force. If in addition to the magnetic field, electromagnetic radiation in the microwave frequency is also applied, a strong absorption of energy results where the microwave energy is equal to the amount of energy needed to flip spin from up to down – a resonance effect. Microwave energy is expressed as hv (Planck's constant times frequency), so the basic resonance equation is $hv = g\mu_B H$. Experimentally hv is kept constant, while H is varied. The resonance intensity of g is proportional to the amount of trapped electrons, and thus to the time since the electrons were emptied out. ESR is less sensitive than luminescence, and this limits dating to samples more than about 20 ka. Most dating is done on calcium carbonates where the dating event is precipitation. It is less precise than U-series dating but has a longer age range (2 Ma). The most common medium is tooth enamel, because it is resistant to diagenic change. ESR of carbonates suffers from U uptake through time, which must be modelled. Often U-series dating is performed on the same sample to help restrain when uptake might have happened. Because of its long time range, ESR has played an important role in dating early human evolution. ESR has also been employed to date heated and sedimentary quartz. Sufficient bleaching is often a problem in ESR dating of quartz, but it does have a longer dating range than luminescence.

Dating Based on Weathering

A number of methods are based on chemical or biological changes in materials that accumulate from exposure to weathering or during faunal diagenesis. The rates of change for these methods are highly dependent on local environmental factors, making them difficult to apply.

Obsidian Hydration

Perhaps the most controversial is obsidian hydration. Developed in the mid-twentieth century, it is based on the observation that water diffuses into the surface of freshly broken obsidian and forms a hydration rind that can be measured. Thickness of the rind can be related to age after taking into account composition, temperature, burial depth, and other variables to estimate a hydration rate. There are two approaches. The empirical approach determines the rate for any given obsidian type either (a) by reference to independently dated material in the same area or (b) by measuring the rate directly in laboratory experiments using high water pressure and elevated temperature. A problem with the latter is that short-term experiments may not provide a suitable model for long-term processes. The intrinsic approach tries to estimate various parameters experimentally to calculate a hydration rate. The empirical approach has limed applicability, while the intrinsic approach faces a host of difficulties.

There is little agreement on any aspect of obsidian hydration dating: how to measure the rind, what is the proper rate equation, and how to measure the various parameters of the equation. Despite the problems, a big advantage, making continued research worthwhile, is that the target event equals the dating event. Obsidian hydration measures when a piece of obsidian was last chipped.

Traditionally the rind, thought to have a sharp boundary, was measured using an optical microscope. More recently, secondary ion mass spectroscopy (SIMS) has shown that the boundary is gradational and that the diffusion of water extends beyond the sharp optical border, which may have other causes. Rate equations are based on diffusion formulas called Fick's laws. The original formula was $x = Dt^{1/2}$, where x is depth, D is

the diffusion coefficient, and t is time. Since D is temperature dependent, it follows the Arrhenius equation, $D = Ae^{-E/RT}$, where A is a constant peculiar to a given type of obsidian (related to structural water content), E is the activation energy for diffusion to begin, T is temperature, and R is the universal gas constant. In an influential paper, Anovitz et al. (1999) argued that this formulation is an inappropriate application of Fick's laws because it does not take into account water concentration. The hydration rate changes as the absorbed water content changes. In plotting water against distance, the original formula has an exponential shape. Accounting for changes in water concentration results in a sigmoid curve (Fig. 4). Neither curve predicts a sharp diffusion boundary. The mechanism of hydration is not well understood, but it has been suggested that diffusion is slow at first because of high water concentration at the surface but then becomes faster when the glass structure undergoes hydrolysis. The diffusion layer advances not according to $t^{1/2}$ but t^n, where n is empirically derived. Some argue that parts of the sigmoid depth profile (measured by SIMS) may be related to time through modified Fick equations, but others are less optimistic, opting for empirical approaches., which have been successful in a few studies. Perhaps the greatest utility of obsidian hydration currently is as an ordinal measure, assessing the contemporaneity of artifacts in surface assemblages, tracing dimensions of trade through time, evaluating artifact reuse and stratigraphic mixing, and determining how well certain point types can be used in cross-dating.

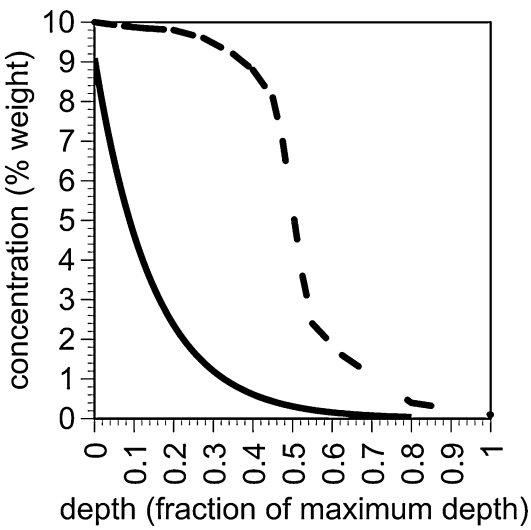

Dating Techniques in Archaeological Science, Fig. 4 A depth versus concentration plot for obsidian hydration. The solid line represents a profile from the original hydration formula. The dotted line is a sigmoid-shaped curve representing a profile where the diffusion rate changes with water concentration. The drawing is adapted from Fig. 2 in Anovitz et al. (1999)

Amino Acid Racemization

Another method based on diagenesis is amino acid racemization. Original work on bone was not successful, but more recent work on shell has shown promise. Amino acids are the building blocks of proteins. Most contain an asymmetric central carbon atom (called chiral carbon) to which four different side atoms or molecules are linked. This structure can be arranged in two different ways, called isomers, which are mirror images of each other. All living organisms have L-amino acid forms. When the organism dies, these forms spontaneously switch to D-amino acid forms, and then switch back. The proportion of L-amino acid forms steadily decline until some equilibrium is reached. The conversion process is called racemization, a term which refers to a change in optical properties from active (when one or the other is dominant) to inactive (when the ratio is 1:1). Some amino acids have more than one chiral carbon. When only one undergoes conversion it is called epimerization. The rate of conversion is dependent on many environmental variables, predominantly temperature. The time dependence of the reaction rate is the basis for dating. Depending on the type of amino acid and the environment, the maximum age range until equilibrium is achieved extends from 50 ka to 1 Ma. An intrinsic method of dating is too complicated, requiring detailed knowledge of reaction kinetics and temperature history. Rather, an empirical method is commonly used. Determine the racemization rate at a site with samples of known age, and then apply it to nearby sites. Measurements is by high-pressure liquid chromatography.

Bone is a poor candidate for amino acid racemization dating because it is an open system, subject to chemical exchange with the environment, introducing a host of additional variables to consider. Most studies focus on carbonate biominerals (aragonite and calcite): shell (mollusk, brachiopods, ostracods), eggshell, corals, and foraminifera. These systems are more closed so mainly temperature affects the rates. Eggshell from ratite birds (ostriches, emus, and rheas) has a very stable structure and works well. It is common at many archaeological sites where these birds live. Exposure to fire, as in hearths, however, can dramatically affect rates. Over limited geographic range and elevation, where shells can be expected to experience similar temperatures, shells with similar D/L ratios are all the same age. This is called aminostratigraphy and is used to correlate raised marine terraces and other kinds of formations. Mollusks are generally used. Changes in rates can be used to infer changes in temperature, helping to identify glacial and interglacial cycles.

Ceramic Rehyroxylation

This is a relatively new method based on the rehydroxylation of clays after they have been fired. When ceramics are fired between 450 °C and 900 °C, clays lose structurally bound hydroxyl (OH) ions. After cooling, ceramics, subject to even modest moisture levels, will slowly regain the hydroxyl ions. Data indicate the rehydroxylation follows a power law after an initial rapid stage. The equation is $(m[t] - ß/m_0) = \alpha(T)t^{1/4}$, where m = mass, m_0 is mass after heating, ß is a constant related to the first stage, α is a kinetic constant, T is temperature, and t is time. The rate is determined experimentally by first weighing the sample before (m_α) and after (m_0) heating. Then the sample is continually weighed while exposing it to moisture and keeping it at the temperature assumed to be average for the period in question. When rate of mass change becomes constant, then one can calculate the time require to reach m_α. Original studies showed that the method agreed with independent evidence over 2000 years of prehistory in Britain. The method is still undergoing development.

Archaeomagnetism

The earth's geomagnetic field changes significantly on scales of decades to centuries. Certain minerals retain a record of these temporal changes, called remanent magnetism. By comparing this magnetism to a dated record of change, the event when it was recorded can be dated. There are three kinds of changes: direction and intensity changes which are both regional in scope and polarity reversals which are global. Directional and intensity changes are called secular variation. Thermoremanent magnetization (TRM) is acquired during heating events of ceramics, burned rocks, burned earth, hearths, kilns, and furnaces. The heating is the event dated. Detrital remanent magnetization (DRM) is acquired during aqueous depositional events of clastic materials. For both TRM and DRM, the target event and the dating event are often the same. Archaeomagnetism is a derivative dating method in that a master curve of magnetic changes must first be established and then dating is done by matching the sample to this reference.

The geomagnetic field is defined by three parameters: declination, which is directional deviation on a horizontal plane from geographic north; inclination, which is the angular dip from the horizontal plane; and intensity. The magnetic field is produced by movement of electrical charge. Diamagnetic substances have outer electrons shells filled. When placed in a magnetic field, the electron orbits create magnetic field in the opposite direction of the applied field. Paramagnetic substances have incomplete outer electron shells and a magnetic moment due to uncompensated electron spin. When placed in a magnetic field, the internal magnetic field aligns in the same direction as the applied field. In ferromagnetic materials, magnetization from unpaired electron spins can couple between adjacent atoms within regions called magnetic domains. The extent to which they are susceptible to become magnetized is much higher than diamagnetic or paramagnetic materials. Their magnetization is retained even when the external magnetic field is removed. The magnetism of ferromagnetic substances is dependent on inter-atomic distances. These increase with temperature, so above a

certain temperature, called the Curie temperature (about 570 °C for iron), coupling breaks down and material becomes paramagnetic and any remanent magnetization is removed. As the material cools below the Curie temperature, the magnetic domains align in the direction of the earth's magnetic field over a relaxation time. Below some "blocking temperature" (somewhat lower than the Curie temperature), the magnetic alignments will become effectively frozen (TRM). When ferromagnetic grains settle in quiet water, they will align partially with the magnetic field. Subsequent compaction can stabilize this orientation (DRM), although the alignment can be disturbed by post-depositional disturbances.

Archaeological dating mostly uses TRM. An oriented specimen (hearths, kilns, bricks from walls) uses both direction and intensity for dating. Direction is expressed as both declination and inclination, using a mathematical transformation to define the latitude and longitude of a virtual geomagnetic pole (VGP). Unoriented specimens, such as pottery, use only intensity. To construct a master curve of secular variation requires many samples that are independently dated at fairly high precision. One method is graphical where VGP positions are plotted and a curve is drawn through points to minimize the variance. A second method is a smoothing technique called the moving-window, where VGP values for overlapping intervals of time are averaged and weighted by precision and amount of overlap. There can a problem of damping where the curves are sharp. A separate curve must be drawn for each region. About 1000 km is the estimated maximum for a valid region. Aside from producing absolute dates, archaeomagnetism is useful for sorting out intrasite chronology and assessing contemporaneity between sites. There are some problems in assigning dates. Because the curves loop around, there can be a problem of multiple intercepts, which must be distinguished by archaeological context or by intensity measurements.

Polarity changes occur at irregular intervals, at least 23 times in the last 5 million years as documented by cooled magmas erupted from mid-ocean ridges. Long intervals or relatively uniform polarity are called chrons. The last reversal, the Brunhes-Matuyama, occurred at 780 ka and is important for archaeology. Short episodes are called subchrons, and there are also excursions which are not reversals but large deviations from normal secular variation that may not be global in extent. Polarity changes are dated by K-Ar.

Conclusion

With a wide assortment of dating methods available, how do archaeologists choose which method to use? The first step is to define clearly what the target event is, and then to choose which method best addresses that event at the necessary precision. This will involve constructing bridging arguments to link the dating event to the target event. Often more than one method will be desirable to build a convincing case and to increase temporal information. Combining dates requires mapping out the relationships between all target events and all dating events: using the lowest common denominator for resolution, defining limiting points (*terminus post quem* or *terminus ante quem*), and applying Bayesian statistics to constrain dates and identify outliers. A criticism might arise that dating methods lose their independence if their evaluation depends on other dating methods, but are any methods truly independent in their application? Convincing chronological arguments require convergence of different sources of information.

References

Anovitz, L.M., J.M. Elam, L.R. Riciputi, and D.R. Cole. 1999. The failure of obsidian hydration dating: Sources, implications, and new directions. *Journal of Archaeological Science* 26: 735–752.

Bailey, G.N. 2007. Time perspectives, palimpsests and the archaeology of time. *Journal of Anthropological Archaeology* 26: 198–223.

Baillie, M.G.L. 1995. *A slice through time*. London: B. T. Batsford.

Bowman, S. 1990. *Radiocarbon dating*. London: British Museum Publications.

Bronk Ramsey, Christopher. 2008. Radiocarbon dating: Revolutions in understanding. *Archaeometry* 50: 249–275.

Buylaert, J.-P., A.S. Murray, K.J. Thomsen, and M. Jain. 2009. Testing the potential of an elevated temperature IRSL signal from K-feldspar. *Radiation Measurements* 44: 560–565.
Chen, R., and S.W.S. McKeever. 1997. *Theory of thermoluminescence and related phenomena*. Singapore: World Scientific.
Dainton, B. 2010. *Time and space*. 2nd ed. Montreal: McGill-Queen's University Press.
Dean, J.S. 1978. Independent dating in archaeological analysis. *Advances in Archaeological Method and Theory* 1: 223–255.
Dean, J.S., R.C. Euler, G.J. Gummerman, and F. Plog. 1985. Human behavior, demography and paleoenvironment on the Colorado Plateau. *American Antiquity* 50: 537–554.
Dunnell, R.C. 1970. Seriation method and its evaluation. *American Antiquity* 53: 305–319.
Dunnell, R.C. 2000. Dating. In *Archaeological method and theory: An encyclopedia*, ed. L. Ellias, 143–150. New York: Garland Publishing.
Galbraith, R.F., and R.G. Roberts. 2012. Statistical aspects of equivalent dose and error calculation and display in OSL dating: An overview and some recommendations. *Quaternary Geochronology* 11: 1–27.
Gould, S.J. 1987. *Time's arrow, time's cycle*. Cambridge: Harvard University Press.
Gräslund, B. 1987. *The birth of prehistoric chronology*. Cambridge: Cambridge University Press.
Grayson, D.K. 1983. *The establishment of human antiquity*. New York: Academic.
Harris, E.C. 1979. *Principles of archaeological stratigraphy*. London: Academic.
Huntley, D.J., and M. Lamothe. 2001. Ubiquity of anomalous fading in K-feldspars and measurement and correction for it in optical dating. *Canadian Journal of Earth Sciences* 38: 1093–1106.
Lipo, C., M. Madsen, R.C. Dunnell, and T. Hunt. 1997. Population structure, cultural transmission, and frequency seriation. *Journal of Anthropological Archaeology* 16: 301–333.
Lyman, R.L., and M.J. O'Brien. 1999. Americanist stratigraphic excavation and the measurement of cultural change. *Journal of Archaeological Method and Theory* 6: 55–108.
Murray, A.S., and A.G. Wintle. 2000. Luminescence dating of quartz using an improved single-aliquot regenerative-dose protocol. *Radiation Measurements* 32: 57–73.
Neiman, F. 1995. Stylistic variation in evolutionary perspective: Inferences from decorative diversity and interassemblage distance in Illinois woodland ceramic assemblages. *American Antiquity* 60: 7–36.
O'Brien, M.J., and R.L. Lyman. 1999. *Seriation, stratigraphy and index fossils: The backbone of archaeological dating*. New York: Kluwer.
Phillips, J., J.A. Ford, and J.B. Griffin. 1951. *Archaeological survey in the lower Mississippi Valley*. Papers of the Peabody Museum of Archaeology and Ethnology, Harvard University, No. 25, 219–236.
Ramenofsky, A.F. 1998. The illusion of time. In *Unit issues in archaeology*, ed. A.F. Ramenofsky and A. Steffen, 74–84. Salt Lake City: The University of Utah Press.
Rudwick, M.J.S. 1972. *The meaning of fossils*. New York: American Elsevier.
Schweingruber, Fritz H. 1989. *Tree rings: Basics and applications of dendrochronology*. Dordrecht: Kluwer (originally published in German in 1983).
Smith, K.Y., and F.D. Neiman. 2007. Frequency seriation, correspondence analysis, and woodland period ceramic assemblage variation in the deep south. *Southeastern Archaeology* 26: 47–72.
Thomsen, K.J., A.S. Murray, and L. Bøtter-Jensen. 2005. Sources of variability in OSL dose measurements using single-grains of quartz. *Radiation Measurements* 39: 47–61.

D

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Basic Biographical Information

Professor Iain Davidson studied archaeology at the University of Cambridge under Eric Higgs and David Clarke. Between 1963 and 1973, he was involved with and/or directed excavations in the region between Britain and Jordan, including Aşvan in Turkey, Rakafet Cave in Israel, and Cueva del Niño in Spain. From 1970 to 1973, he analyzed material from Parpalló in Spain for his Ph. D. and has subsequently argued for the significance of this material in understanding the emergence and change of rock art in Western Europe (Davidson 1989). In 1974, Iain was appointed to the then recently formed Department of Prehistory and Archaeology at the University of New England (UNE), Australia. Iain would spend the majority of his career here and evolved with it (to Emeritus Professor) as it became the Department of Archaeology and Palaeoanthropology. From 1993 to 1998, Iain was head of the department and of its later incarnation, the School of Human and Environmental Studies from 1998 to 2000. Over this period, he supervised 18 Ph.D. students and produced over 140 publications including 7 books.

On arriving at UNE, Iain compiled one of the first Australian mammal skeletal archaeological reference collections and established research projects at Coonabarabran (NSW with Wendy Beck) and in the Selwyn Ranges (Queensland). The latter project also spawned Iain's involvement with archaeological consultancy, with major projects conducted with students in the Hunter Valley (NSW) and western Queensland. Later he became involved with Aboriginal plant resources in northern NSW. These projects led him to form long term relationships with Aboriginal communities, particularly the Wangkamadla, Kalkadoon/Yulluna, Wonarua, Gamilaray, and Yindjibarndi. Extending from these relationships was Iain's drive to establish a code of ethics for the Australian Archaeological Association while he was its president from 1990 to 1991 (cf. Davidson 1991). He is a Fellow of the Australian Academy of Humanities, was Visiting Chair in Australian Studies, Harvard University, and in 2010 was awarded the Rhys Jones Medal of the Australian Archaeological Association (its highest award) for "outstanding contribution to Australian archaeology." In retirement, Iain continues an interest in cultural heritage management and rock art, recently completing a consultancy in the Burrup Peninsula of Western Australia.

Major Accomplishments

Iain's career has tracked along several interrelated themes. These extend from his research interests in rock art, stone tools, human cognition, the colonization of Australia, and heritage. Mid-career, Iain's work in the Selwyn Ranges led him to realize the importance of integrating all lines of evidence (Davidson et al. 2005). For Australia, Iain has argued this concerns how Aboriginal archaeology is understood through its diversity rather than its uniformity (Davidson 1999). In rock art, he has argued it means exploring more than archaeological context and interpretation but extends to symbolic conventions and by consequence the concerns of the origins of language (Davidson 1997). By extension, Iain has also demonstrated how the evolution of symbolic behavior in humans has critical implications for the colonization of Australia (Davidson 2008) and interpretations of human evolution (Davidson 2007). For stone tools, he has shown that it involves our interpretation of form versus function and ultimately how these change to reveal aspects of the evolution of human cognition (Davidson and McGrew 2005). Collectively, these lines of argument are testimony to Davidson's intellectual diversity and theoretical contribution to the discipline.

Stringing together these quite diverse themes in Iain's career has been a concern about what we recognize as heritage and the role archaeology plays in it. As he states:

> Who really cares about the past? This line of questioning evokes [a] statement from my first years in the discipline that really got us talking about the value of archaeology. . .Is the material I have been talking about only a 'brain-game for the more intellectual members of the meritocracy'?. . . I think we should discuss it, for without doing so, archaeology can come to be no more than the source of authentic imagery for computer games, movies or theme parks (Davidson 2008: 134).

Iain has consistently kept an eye on the role of archaeology to broader society throughout his career. At his inaugural public lecture at UNE in 1999, he outlined his hope that an education in archaeology is not just for future archaeologists but also provides a unique perspective on human affairs by emphasizing our collective histories and how we came to be the people we are today. For Iain, such sentiments are the crux what archaeology contributes to our understanding of heritage:

> . . .analysis and interpretation lie at the core of the importance of cultural heritage still surviving from those remote pasts. The beauty or the traditional values are important aspects of the materials of cultural heritage, but faced with conflict with alternative land uses and real choices about financial impacts of decisions, those may not be enough. . . .as David Clarke and Gordon Childe saw so clearly, what is important is the use to which the information is put and the stories that we tell (Davidson 2008: 137).

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Australia's Archaeological Heritage
- ▶ Burrup Peninsula
- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Dampier Archipelago Petroglyphs
- ▶ Ethics in Archaeology
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Paleolithic Art
- ▶ First Australians: Origins
- ▶ Heritage and Higher Education
- ▶ Heritage Values, Communication of
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Peoples, Working with and for
- ▶ Isaacson, Ken
- ▶ Zooarchaeology

References

Davidson, I. 1989. Freedom of information: Aspects of art and society in western Europe during the last ice age. In *Animals into art*, ed. H. Morphy, 440–456. London: Unwin Hyman.

Davidson, I. 1991. Archaeologists and Aborigines. *The Australian Journal of Anthropology* 2: 247–258.

Davidson, I. 1997. The power of pictures. In *Beyond art: Pleistocene image and symbol*, Memoirs of the California academy of sciences, ed. M. Conkey, O. Soffer, D. Stratmann, and N.G. Jablonski, vol. 23, 125–160. San Francisco: California Academy of Sciences.

Davidson, I. 1999. First people becoming Australian. *L'Anthropologie* 37: 124–141.

Davidson, I. 2007. 'As large as you need and as small as you can'-implications of the brain size of Homo floresiensis. In *Mental states: Evolution, function, nature*, ed. A. Schalley and D. Khlentzos, 35–42. Amsterdam: John Benjamins.

Davidson I. 2008. Scales and balance: Archaeology, cultural heritage and sustainability. In *The Academy Lecture 2007,* Proceedings of the Australian Academy of the Humanities 31: 121–50.

Davidson, I., and W.C. McGrew. 2005. Stone tools and the uniqueness of human culture. *Journal of the Royal Anthropological Institute* 2005: 793–817.

Davidson, I., N.D.J. Cook, M. Fischer, M. Ridges, J. Ross, and S.A. Sutton. 2005. Archaeology in another country: Exchange and symbols in north west central Queensland. In *Many exchanges: Archaeology, history, community and the work of Isabel McBryde*, Aboriginal history monographs, ed. I. Macfarlane, M.-J. Mountain, and R. Paton, vol. 11, 101–128. Canberra: Aboriginal History Inc.

Further Reading

Davidson, I., C. Lovell-Jones, and R. Bancroft. 1995. *Archaeologists and Aborigines working together*. Armidale: University of New England Press.

Noble, W., and I. Davidson. 1996. Human evolution, language and mind. In *A psychological and archaeological inquiry*. Cambridge: Cambridge University Press.

D

Davis, Hester

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Basic Biographical Information

Hester Ashmead Davis was an active participant in the development of cultural resources management legislation and programs in the United States. Born June 4, 1930, in Ayer, Massachusetts, she took an unconventional route to a career in archaeology at a time when few opportunities existed for women.

Major Accomplishments

After receiving a B.A. in history from Rollins College in 1955, an M.A. in Social and Technical Assistance from Haverford College in 1955, and an M.A. in Anthropology from the University of North Carolina in 1957, Hester became preparator at the University of Arkansas Museum in 1959. This began a lifelong association with archaeology in Arkansas, first at the museum until 1967 and then as state archaeologist with the Arkansas Archeological Survey from 1967 to 1999, when she retired.

At Arkansas, Hester became associated with Charles R. McGimsey III, and they were both involved for more than a decade in CRM issues and activities. She participated in the foundational Airlie House Seminars and coedited the subsequent report in 1977. She was a founding member of the National Association of State Archaeologists, the American Society for Conservation Archaeology, and the Society of Professional Archaeologists and served in numerous committee and officer positions, including president in the latter two organizations.

In Arkansas, Hester extended her role in public archaeology and CRM through several organizations. She was a member of the Arkansas State Review Board on Historic Preservation from 1969 to 2000 and served terms as vice chair and chair. She taught a public archaeology course that included CRM at the University of Arkansas between 1974 and 1991. She was a founding member of the Arkansas Archeological Society and served in several officer positions including 20 years as editor of the bulletin and 40 years as editor of the newsletter.

On the regional level, she was a longtime member of numerous organizations, including the Southeastern Archaeological Conference and the Southeastern Museums Conference, serving as president of both. Nationally, she was a member of the Society for American Archaeology, the Society for Historical Archaeology, the Coordinating Council of National Archaeological Societies, the Archaeological Institute of America, and the Association for Field Archaeology and served on boards and committees in all of them. She was a consultant for several federal agencies, including the National Park Service and Bureau of Land Management, and was a CRM program reviewer and/or consultant to a long list of agencies and universities.

On the international level, Hester was a member of the US Committee, International Council on Monuments and Sites. She was appointed by President Clinton to the Cultural Properties Advisory Committee of the US Information Agency.

As testimony to her long and dedicated service to CRM, Hester has received many awards and honors, including Certificate of Honor from the American Society for Conservation Archaeology, Distinguished Service Awards from the Society of Professional Archaeologists and the Society for American Archaeology, the Seiberling Award for Public Service from the Society of Professional Archaeologists, and Doctors of Humane Letters from both Rollins College and Lyon College. The Register of Professional Archaeologists awarded her both a Distinguished Service Award in 2003 and the Charles R. McGimsey III-Hester A. Davis Distinguished Service Award two years later in 2005. And, hanging outside her office door is her "Best Damn State Archaeologist Award" given by the National Association of State Archaeologists on the occasion of her retirement.

Cross-References

► McGimsey III, Charles R.
► Register of Professional Archaeologists (RPA)

Further Reading

Davis, H.A. 1972. The crisis in American archeology. *Science* 175: 267–272.

Davis, H.A. 2009. Archaeologists looked to the future in the past. In *Archaeology & cultural resource management: Visions for the future*, ed. L. Sebastian and W.D. Lipe, 19–40. Santa Fe: School of Advanced Research Press.

Davis, H.A. 2010. Heritage resource management in the United States. In *Cultural heritage management: A global perspective*, ed. P.M. Messenger and G.S. Smith, 188–198. Gainesville: University Press of Florida.

Davis, H.A., ed. 1982. *A state plan for the conservation of archeological resources in Arkansas*, Arkansas Archeological Survey Research series 21. Fayetteville: Arkansas Archaeological Survey.

Davis, H.A., and C.R. McGimsey III, eds. 1977. *The management of archeological resources: The Airlie House report*. Washington, DC: Society for American Archaeology.

Davis, H.A., and C.R. McGimsey III. 1984. The United States of America. In *Approaches to the archaeological heritage*, ed. H.F. Cleere, 116–124. Cambridge: Cambridge University Press.
White, N.M. 1999. Hester A. Davis: A legend in public archaeology. In *Grit-tempered: Early women archaeologists in the southeastern United States*, ed. N.-M. White, L.P. Sullivan, and R.A. Marrinan, 206–229. Gainesville: University Press of Florida.

D

Day, Michael

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Basic Biographical Information

Michael Day, who died on June 1, 2018, aged 91, was born in March 8 in the North Kensington district of London. After attending Sevenoaks School in Kent, he did his mandatory national service in the Royal Air Force from 1945 to 1948. After his national service, Michael Day entered the Royal Free Hospital School of Medicine (RFHSM), where he earned his medical degree, qualifying in 1954.

After 4 years of clinical work, Day joined the Anatomy Department of the RFHSM with the intention of retaking the first part of the surgical fellowship he needed to be an orthopedic surgeon. But by 1958, John Napier had established the Unit of Primatology and Human Evolution within the RFHSM Anatomy Department, and Day discovered that for someone interested in the mechanics of the skeleton, the study of human evolution provided an alternative career. As a consequence, he abandoned orthopedic surgery and instead registered for a PhD at the University of London. In 1962, Day moved from the RFHSM to the Middlesex Hospital Medical School, where he rose through the academic ranks, becoming a University Reader in Physical Anthropology in 1969. In 1972, he was appointed to the Chair of Anatomy at St. Thomas's Hospital Medical School, where he remained until his formal retirement in 1989, but for several years after that, he was affiliated with the Paleontology Department of the Natural History Museum in London.

Michael Day

Major Accomplishments

Michael Day's major archaeology-related accomplishments are research that contributed to our understanding of the evolution of locomotion within the hominin clade, the *Guide to Fossil Man*, and his role in decolonizing archaeology by helping to establish, support, and promote the World Archaeological Congress.

When Louis Leakey sought advice from Wilfrid Le Gros Clark about whom he should invite to interpret the early hominin postcranial bones he and Mary Leakey had been recovering from Bed I in Olduvai Gorge, Tanzania, Le Gros Clark recommended John Napier, who, in turn, recruited two junior colleagues at the RFHSM Anatomy Department, Day and Peter Davis, to help him.

Day's 1964 publication, with Napier, on the OH 8 foot bones recovered from Bed I at Olduvai concluded that it belonged to an individual possessing "the structural requirements" . . . "for an upright stance and a fully bipedal gait" (Day and Napier 1964, p. 10). The anatomical evidence

for bipedalism was an important component of the argument that Leakey et al. (1964) advanced for including OH 8 in the hypodigm of *Homo habilis* and not *Zinjanthropus boisei*, a robust australopith. It was also a crucial component of the argument for including the new species within the genus *Homo*. The interpretation of true- and ichnofossils (i.e., footprint trails) relevant to reconstructing human locomotion would be a major focus of Day's career.

After Louis Leakey handed over research at Olduvai to Mary Leakey in the late 1960s, Michael Day was the anatomist that Mary Leakey turned to when hominin limb bones were recovered, or recognized, at Olduvai Gorge. Day's 1969 paper showing that OH 20 matched the morphology of proximal femora from Swartkrans was crucial evidence linking the hominins recovered from Eastern and Southern Africa. His meticulous description and analysis of a femur and a pelvis (OH 28) from Bed IV at Olduvai Gorge (Day 1971) led to an interest in the postcranial remains of *Homo erectus* from China and Java. Thus, when 3.66 million year-old fossil hominin footprint trails were uncovered at Laetoli in 1978, Mary Leakey asked Day to analyze them, and his report (Day and Wickens 1980) that used innovative photogrammetric methods to compare the fossil footprints with modern human footprints is a landmark paper. Day was later one of the three anatomists Richard Leakey entrusted to describe the fossils being recovered from East Rudolf, latterly Koobi Fora, in northern Kenya. Day's reviews of early hominin postcranial fossils (e.g., Day 1978, 1986) are essential sources for anyone retracing the history of ideas about the evolution of hominin locomotion.

Early in his career, Day recognized there was no English language publication that summarized the fossil evidence for human evolution, so he prepared his own highly successful version of Vallois and Movius' *Catalogue de Hommes Fossiles*. The *Guide to Fossil Man* appeared in 1965, and Day prepared four editions of the guide. It was a deservedly popular summary of the most productive hominin sites and the major discoveries at each site, and in the last, 1986, edition, he included three insightful essays on conceptually problematic aspects of hominin evolution.

Michael Day was politically committed to enhancing inclusivity in scientific life and in particular to opposing the apartheid regime in South Africa. He was the chair of the first World Archaeological Congress (WAC) held in Southampton in 1986, as well as the inaugural Chair of its Executive Committee (1986–1990). In 1989, he led a campaign under the WAC to formalize a code of ethics for researchers and others who deal with skeletal remains (Vermillion Accord on Human Remains 1989). In addition, Day played an active role in several other professional organizations. He was elected President of the Primate Society of Great Britain (1976–1979) and was twice elected President of the Royal Anthropological Institute (1979–1983).

Cross-References

► Olduvai Gorge Archaeological Site
► Prehistoric Human Footprint Sites

References

Day, M.H. 1971. Post-cranial remains of *Homo erectus* from Bed IV, Olduvai Gorge, Tanzania. *Nature* 232: 383–387.

Day, M.H. 1978. Functional interpretations of the morphology of postcranial remains of early African hominids. In *Environment, behavior and morphology: Dynamic interactions in Primates*, ed. C. Jolly, 311–345. London: Duckworth.

Day, M.H. 1986. Functional interpretations of the morphology of postcranial remains of early African hominid locomotion – From Taung to the Laetoli footprints. In *Hominin evolution – past, present and future*, ed. P.-V. Tobias, 115–127. New York: Alan Liss.

Day, M.H., and J.R. Napier. 1964. Hominid fossils from Bed I, Olduvai Gorge, Tanganyika: Fossil foot bones. *Nature* 201: 967–970.

Day, M.H., and E.H. Wickens. 1980. Laetoli Pliocene hominid footprints and bipedalism. *Nature* 286: 385–387.

Leakey, L.S.B., P.V. Tobias, and J.R. Napier. 1964. A new species of the genus *Homo* from Olduvai Gorge. *Nature* 202: 7–9.

Further Reading

Aiello, L.C., and B.A. Wood. 2018. Obituary: Michael Herbert Day (1927–2018). *Journal of Human Evolution* 124: 4–6. https://doi.org/10.1016/j.jhevol.2018.08.007.

Turnbull P. 2014. Vermillion accord on human remains (1989) (Legislation). In: Smith C. (eds) Encyclopedia of Global Archaeology. Springer, New York, NY
Wood, B.A. 2018. Obituary: Michael Herbert Day (1927–2018). *American Journal of Physical Anthropology* 167: 697–700. https://doi.org/10.1002/ajpa.23693.

De Castro Faria, Luiz

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Basic Biographical Information

Luiz de Castro Faria was born in São João da Barra, Rio de Janeiro State, on July 5, 1913. He graduated in Library Science (National Library) and Museology (National Historical Museum, 1937), while working as a free practitioner and then as a volunteer assistant at the National Museum, Brazil, under the supervision of Heloísa Alberto Torres (archaeology), Raimundo Lopes (ethnology), and José Bastos de Ávila (physical anthropology). At the Division of Anthropology, Ethnology, and Archaeology at the National Museum, Castro Faria prepared material for classes and drawings. He also participated in activities and courses of archaeology, physical anthropology, and linguistics, following an anthropological training program that was based in a four-field perspective (Miranda and Araújo 2002).

In 1938 (May–November), as a "praticante gratuito" (a practitioner without pay) at the National Museum, he participated in Claude Lévi-Strauss' expedition, following the Linha Telegráfica Estratégica do Mato Grosso ao Amazonas, to visit different Nambikwara Indigenous groups.

In 1939, Castro Faria joined the technical body of the museum first as an auxiliary and, in the same year, as an interim naturalist. In 1944, following a series of public exams, he was accepted as an tenured naturalist. In 1953, he became Professor of Anthropology and Ethnology in the Faculdade Fluminense de Filosofia (Fluminense Federal College, which became part of the Universidade Federal Fluminense/Fluminense Federal University in the 1960s) and Titular Professor in 1969.

Throughout his career, Castro Faria worked mainly in archaeology and social anthropology, excavating shell mounds, such as the Sambaqui de Cabeçuda (Santa Catarina State, in 1950 and 1951), and conducting ethnographic fieldwork with fishing communities, such as the community from Arraial do Cabo (Rio de Janeiro State, in 1953).

Although he retired in 1977, Castro Faria continued to publish and promote the study of fishing communities until his last years, staying active and collaborating with colleagues and former students from Museu Nacional and Fluminense Federal University. His personal archive was donated to the Museu de Astronomia e Afins (Museum of Astronomy and Related Sciences) in 2000, under a curatorial council that had been appointed directly by him. His archive was incorporated into the MAST holdings, in respect for the original contributions made by Castro Faria throughout his life.

Castro Faria passed away in August 15, 2004.

1938. Arquivo Castro Faria, Acervo MAST.

Major Accomplishments

Castro Faria contributed directly and indirectly to all four fields of anthropology. He is a seminal leader of Brazilian archaeology, and his contributions range from the discipline itself to the

protection of archaeological sites. His work is marked by a strong concern with both living and extinct populations, having worked mainly in the southeast and south regions (Espírito Santo, Rio de Janeiro, and Santa Catarina). Castro Faria taught courses and published research that spanned the excavation of shell mounds, ethnographic field work, archaeology, physical anthropology, and ethnology.

From as early as 1947, Castro Faria presented and published about the "shell mound problem" (problema dos sambaquis), in national and international events and scientific meetings, such as the International Congress of Americanists (Cronologia n.d.; Castro Faria 1952, 1955, 1959). The shell mound problem was twofold: (a) what are sambaquis and (b) the studies conducted since the nineteenth century about sambaquis. Castro Faria proposed a debate about all bibliography produced theorizing about the origin of such sites and the population involved, stating that various texts and data had been dismissed by recent researchers. His harsh analysis focused on the lack of detailed information such as stratigraphic data and analysis of material cultural related to burials, stating that much of what was theorized and published was generic, based on a cultural homogeneity assumption, with "an arbitrary and simplistic generalization of very particular data"(1955). Castro Faria published a proposition for heritage protection laws, giving special attention to shell mounds as an archaeological category. His efforts include developing the first registration form for a national register of archaeological sites and working with government agencies to promote their protection, such as with the so-called law of archaeology, Lei n°. 3.924, published in 1961 (Simão 2009; Lima 2009).

Castro Faria executed the first scientific excavation of the Sambaqui de Cabeçuda, Laguna, Santa Catarina State in 1950 and 1951. His fieldwork to identify the archaeological potential of different regions, such as at Saquarema and Arraial do Cabo (both in Rio de Janeiro State), is fundamental to understanding the history of archaeological study in Brazil, especially as it relates to the study of shell mounds.

Castro Faria was one of the founders and the first presidents of the Associação Brasileira de Antropologia, ABA (Brazilian Association of Anthropology, created in 1955). He acted as Director of the National Museum, Federal University of Rio de Janeiro, from 1964 to 1967. He was also appointed as the first chief of the Department of Social Sciences, Fluminense Federal University, in 1968, after participating in the committee to study the creation and organization of an Institute of Social Sciences.

In the late 1980s, Castro Faria characterized the state of Brazilian archaeology as a colonized space, dependent and insecure, plagued by a discourse of interdisciplinarity without a definition of its own identity. At that time, Castro Faria pointed to a focus on methods and techniques and the need for a relativization of theory and analysis. He called this state a branco teórico (theoretical emptiness), which left Brazilian archaeology as an empty field available to be conquered. Castro Faria understood the creation of the Sociedade Brasileira de Arqueologia (Brazilian Society of Archaeology) in 1980 as an important step for the autonomy of archaeology as a field and scientific community, with its own identity that is distinct from the related fields (Castro Faria, 1989).

Since 2013, the Prêmio Luiz de Castro Faria (Luiz de Castro Faria Award) is granted annually to the best monograph, dissertation, and thesis concerning the preservation of Brazilian archaeological heritage.

Cross-References

► Museums of Brazil
► Sambaquis Shell Mounds, Archaeology of

References

Castro Faria, L. 1952. Le problème des Sambaquis du Brésil: récentes excavations du gisement de Cabeçuda (Laguna, Santa Catarina). In: *Proceedings of the thirtieth international congress of Americanists – Held at Cambridge*, 18–23, August 1952; 86–91.

Castro Faria, L. 1955. *A formação do problema dos Sambaquis. Anais do XXXI Congresso Internacional de Americanistas*, 569–577. São Paulo: Anhembi.

Castro Faria, L. 1959. O Problema da Proteção aos Sambaquis. *Arquivos do Museu Nacional* XLIX: 95–138.
Castro Faria, L. 1989. Domínios e fronteiras do saber: a identidade da arqueologia. In *Dédalo*, vol. 1. São Paulo: Publicações Avulsas.
Cronologia - Castro Faria. n.d. Luiz de Castro Collection, Museum of Astronomy and Related Sciences. Available at: http://castrofaria.mast.br/cronologia_LuizCastroFaria.pdf.
LIMA, Tania Andrade. 2009. Luiz de Castro Faria, também um Arqueólogo. Memórias da C&T – Série Produção Científica Brasileira. Brasília: Centro de Memória do Conselho Nacional de Pesquisa, Available at: http://centrodememoria.cnpq.br/publicacoes3.html
Miranda, A., and M. de Araújo. 2002. Entrevista com Luiz de Castro Faria. *Cadernos de Campo* 10 (10): 97–114.
Simão, L.C. 2009. Elos do patrimônio: Luiz de Castro Faria e a preservação dos monumentos arqueológicos no Brasil. Boletim do Museu Paraense Emílio Goeldi. *Ciencias Humanas* 4 (3): 421–435.

Deacon, Hilary John, Fig. 1 Professor Hilary John Deacon c. 1976. (Photo: Janette Deacon)

Deacon, Hilary John

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Introduction

Hilary John Deacon was a South African archaeologist and academic. His research centered around the emergence of modern humans and multidisciplinary African archaeology. He was principal researcher at the well-known sites of Scott's Cave, Amanzi, Howiesons Poort, Wilton, Melkhoutboom, Highlands, Boomplaas, and Matjes River, and latterly at Klasies River, one of the oldest known cave sites with well-preserved anatomically modern human remains dating from circa 115,000 years ago. He worked as the archaeologist at the Albany Museum in Grahamstown and was professor and head of the Department of Archaeology at the University of Stellenbosch (Figs. 1 and 2).

The 1960s saw the introduction of new scientific techniques in archaeology that Hilary Deacon embraced. He had received his undergraduate degree from the University of Cape Town in geology and archaeology, working initially as an exploration geologist in East and West Africa, with a more personal interest in Quaternary soft sedimentary geology. His experience as a geologist, combined with his multidisciplinary interests such as the preparation and analysis of organic remains, and experience excavating a wide range of sites made him what one of his colleagues later called "a polymath."

Major Accomplishments

During his time at the Albany Museum, his first major excavation, which was analyzed for his master's dissertation in 1966, was the Earlier Stone Age site at Amanzi near Uitenhage in the Eastern Cape (Deacon 1970). This, and the collections in the Museum, encouraged him to apply to the Wenner-Gren Foundation for funding for a

Deacon, Hilary John, Fig. 2 Hilary Deacon visiting Professor Lyn Wadley's excavation at Sibudu Cave, KwaZulu-Natal in 2007. (Photo: Janette Deacon)

long-term project, *The Prehistory of the Eastern Cape*. Subsequent excavations were undertaken from a broad ecological viewpoint at mainly Later Stone Age sites such as Wilton, Highlands, and Melkhoutboom. The material was analyzed for his PhD that was awarded in 1974. The results were published in 1976 under the title *Where Hunters Gathered* and were conceived as an archaeological study of the organization, subsistence, and demography of the Holocene hunter-gatherer populations in the contrasting habitats of the Eastern Cape (Deacon 1976: 159).

Keen to provide projects for his students after he began teaching at the University of Stellenbosch, he turned to the Southern Cape where he sought a limestone environment that would yield well-preserved bone in layers that were older than 10,000 years. The excavation of Boomplaas Cave in the Cango Valley between 1974 and 1978 became a model for long-sequence sites and multidisciplinary research with students and colleagues breaking new ground in the analysis of charcoal, pollen, microfauna, mammalian fauna, isotopes, and artifacts that tracked the environmental and cultural changes through the last glacial maximum and the Holocene (Deacon 1979; Klein 2010). With the knowledge of climate change in the last 125,000 years, he was invited to join the Fynbos Biome project and encouraged further research into vegetation changes in the Mediterranean-type vegetation of the Southern Cape region over the past several million years (Deacon 1983).

In 1984, he initiated another major project based on further excavations at Klasies River that yielded not only more fragmentary remains of early anatomically modern humans but also better dates and contexts for the Middle Stone Age sequence between about 115,000 and 40,000 years ago (Deacon 1996; Deacon and Wurz 2001). This led to the initiation of the concept of modern human behavior as a research focus that became the topic for most of his publications in the 1990s and 2000s. His wide interests and encyclopedic knowledge that he gathered over nearly 30 years of lecturing were published with Janette Deacon as co-author in *Human Beginnings in South Africa* in 1999 (Deacon and Deacon 1999).

His research contributed to explaining triggers for change seen across the late Middle to the Late Pleistocene in sub-Saharan African cultures. Deacon (1996, 2001) supported claims that the continental population expansion between 130,000 and 60,000 years ago coincided with environmental changes in the middle and low latitudes due to orbital forcing, and it was only after 60,000 years ago that the population in the higher latitudes of Eurasia expanded, partly in association with the spread of modern humans of the Upper Paleolithic. He identified some of the earliest evidence for "modern symbolic behavior" evident in the MSA of Africa (Deacon 2001: 213–214).

After the large bifacial Acheulian artifacts were replaced by MSA artifacts on regularly formed stone flakes that were half as large, Hilary Deacon termed this a "ready-to-use-technology" (Deacon 1997: 322), because the preparation of

the cores made flakes that were struck off in predetermined proportions on hard-rock types. The robust edges of derived flakes did not need strengthening by secondary trimming. Modification of the edges was frequently the result of damage caused by use.

In "Modern Human Emergence: an African Archaeological Perspective," Deacon (2001: 217–219) argued that the archaeological markers of the "eurocentric symbolic revolution" in the European Upper Paleolithic cannot be taken as universal markers for the recognition of the emergence of symbolic behavior everywhere. In contrast he suggested a search for distinctive attributes of "modern behavior" through Africa, centered on inferences from the ethnographic present to Holocene and Pleistocene behavioral archaeology as is more and more taken into account in the current multi- and interdisciplinary modeling of the MSA. He concluded that the MSA and LSA foragers were eurytopic and able to occupy all positions in the landscape, while Acheulian archaic groups were stenotopic and occupied a narrow ecological niche, typically in riverine and wetland habitats, with lifeways that cannot be understood by analogy to ethnographically known hunter-gatherers (Deacon 1998; Deacon 2001: 219).

Basic Biographical Information

Hilary John Deacon was born in Cape Town, South Africa, on 10 January 1936 and died in Stellenbosch, on 25 May 2010. He graduated from the University of Cape Town in 1955 with a BSc in Geology and Archaeology and then worked as a field geologist in Tanzania, Kenya, Ghana, and the United Kingdom for 6 years. He returned to UCT to do an honors degree in archaeology under Ray Inskeep in 1962. Here he met the archaeologist, Janette Buckland, whom he married in 1962. The couple had three children, Andrew (b. 1964), Harriet (b. 1966), and Melissa (b. 1975).

In 1963 Hilary Deacon was appointed as archaeologist at the Albany Museum in Grahamstown and later deputy director of the museum. He was the recipient of a British Council scholarship in 1967/1968 that enabled him to attend the University College London. It was here that he was able to gain experience in the preparation of pollen samples, charcoal, and other organic materials from archaeological sites. In 1971 he became the first staff member and head of the newly established Department of Archaeology at the University of Stellenbosch where he remained until he retired at the end of 1999.

He became widely known in the field of African archaeology at numerous conferences at home and abroad and was a visiting professor at the University of Chicago (1978), visiting fellow at the Australian National University (1984), and a visiting lecturer at the University of California, Berkeley (1986). He was a founding member of SASQUA (South African Society for Quaternary Research) and the Southern African Association of Professional Archaeologists (ASAPA) and was president of both organizations, as well as the South African Archaeological Society. He played a leading role in setting standards for fieldwork and best practice for archaeological impact assessments.

References

Deacon, H.J. 1970. The Acheulian occupation at Amanzi Springs, Uitenhage District, Cape Province. *Annals of the Cape Provincial Museums (Natural History)* 8: 89–189.

Deacon, H.J. 1976. Where hunters gathered: A study of Holocene Stone Age people in the Eastern Cape. *South African Archaeological Society Monograph Series* 1: 1–232.

Deacon, H.J. 1979. Excavations at Boomplaas cave – A sequence through the Upper Pleistocene and Holocene in South Africa. *World Archaeology* 10: 241–257.

Deacon, H.J. 1983. The comparative evolution of Mediterranean type ecosystems: A southern perspective. In *Ecological studies 43: Mediterranean-type ecosystems*, ed. F.J. Kruger, D.T. Mitchell, and J.U.M. Jarvis. Berlin/Heidelberg/New York: Springer Verlag.

Deacon, H.J. 1996. Southern Africa in the debate on the origins of modern people. In *The origins of modern man*, The Lower and Middle Palaeolithic Colloquium X, Xlll, UISPP Congress, ed. O. Bar-Yosef, L. Cavalli-Sforza, and M. Piperno, 167–172. Forli: A.B..A.C.O. Edizioni.

Deacon, H.J. 1997. African cultures in transition and adaptation. In *Encyclopedia of precolonial Africa. Archaeology, history, languages, cultures, and environments*, ed. J.O. Vogel, 320–324. Walnut Creek/London: AltaMira Press.

Deacon, H.J. 1998. Elandsfontein and Klasies River revisited. In *A master of his craft: Papers in stone age archaeology presented to John Wymer*, ed. N.M. Ashton, F. Healy, and P.B. Pettitt, 23–28. Oxford: Oxbow.

Deacon, H.J. 2001. Modern human emergence: An African archaeological perspective. In *Humanity from African naissance to coming millennia. Colloquia in human biology and palaeo-anthropology*, ed. P.V. Tobias, M.-A. Raath, J. Moggi-Cecchi, and G.A. Doyle, 213–222. Firenze: Firenze University Press and Johannesburg: Witwatersrand University Press.

Deacon, H.J., and J. Deacon. 1999. *Human beginnings in South Africa: Uncovering the secrets of the stone age*. Cape Town: David Philip.

Deacon, H.J., and S. Wurz. 2001. Middle Pleistocene populations and the emergence of modern behaviour. In *Human roots – Africa and Asia in the Middle Pleistocene*, ed. L. Barham and K. Robson Brown, 55–63. Bristol: Western Academic & Specialist Press.

Klein, R.G. 2010. In memoriam. Hilary John Deacon 1936–2010. *South African Archaeological Bulletin* 65 (191): 109–110.

Deagan, Kathleen A.

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Basic Biographical Information

Kathleen A. Deagan (b. 1947) is the eldest of three children born to a career US Navy family. As a child of the Cold War, Deagan's family was repeatedly reassigned to naval bases around the world. Guam, in Micronesia, was one of these assignments. Her life-long interest in the processes underlying the development of the Spanish cultural legacy would be conceived on this distant island, for it was there in what once was a remote corner of the Spanish Empire that she saw the remnants of colonial-era missions, fortifications, and towns. In 1966 the family was transferred to Jacksonville, Florida, and Deagan matriculated at the University of Florida in Gainesville. Eight years later, under the tutelage of Charles Fairbanks, she earned her doctorate in anthropology based on research conducted on eighteenth-century Spanish colonial St. Augustine, Florida, a site she continues to study.

Immediately following graduation, Deagan joined the faculty at Florida State University. There, for the next 8 years, she continued research in St. Augustine expanding her study era back into the sixteenth century. Her presence at Florida State reinvigorated the archaeology program there and inspired dozens of undergraduate and graduate students to continue into anthropology, archaeology, historical preservation, and other related fields.

In 1982 Deagan returned to Gainesville where she served on the faculty of the Florida Museum of Natural History and in the Department of Anthropology at the University of Florida until her retirement in 2010. During these 28 years, her international field research focused on Spanish fifteenth- and sixteenth-century settlements in the Dominican Republic and Haiti at such sites as La Isabela (Deagan and Cruxent 2002a) and Puerto Real (Deagan 1995). This was in addition to fieldwork in St. Augustine and collections research in the circum-Caribbean basin and Europe.

Major Accomplishments

A dominant theme in Deagan's research is identity and culture change. Using the processual approach to consider adaptation and acculturation and the pattern recognition method developed by Stanley South, she found distinct differences between eighteenth-century British and Spanish colonial sites. Deagan explained these differences in terms of gendered spheres of influence with the indigenous female spouses of creole and mestizo soldiers and settlers leaving their marks in the less visible private aspects of food, food preparation, and foodways while males were associated with

"higher-status" European objects associated with the public sphere of activities (Deagan 1973, 1983, 1985). This biological and cultural *mestizaje* created a new form of culture combined elements of both the colonizing and colonized group.

Kathleen Deagan is the author or editor of a dozen books and monographs, 50 articles, more than two dozen book chapters, and over a hundred papers and presentations. Two of the books published by the Smithsonian Institution provide an in-depth study of ceramics, glassware, and other portable Spanish sixteenth- through eighteenth-century material culture (Deagan 1987, 2002). She has received major research grants from the National Science Foundation, National Endowment for the Humanities, and National Geographic Society and other funds from a number of Florida-based endowments and state agencies. A consultant with the SmithsonianInstitution, Organization of American States, and UNESCO, she has also worked with the National Park Service and other international and national organizations.

Over the decades Deagan has served on National Review Panels for the NSF and NEH and other prestigious organizations as well as on the editorial advisory boards including *Antiquity*, *Journal of Field Archaeology*, *International Journal of Historical Archaeology*, and *Historical Archaeology*.

Deagan has been repeatedly recognized for her outstanding contributions to the fields of anthropology, archaeology, and history. These include book awards from the Florida Historical Society (Deagan and McMahon 1995) and Society for American Archaeology (Deagan and Cruxent 2002b) and lifetime achievement awards from the Florida Anthropological Society, the Florida Department of State, the Society for American Archaeology, and the J. C. Harrington Award for Distinguished Lifetime Contributions to Historical Archaeology from the Society for Historical Archaeology (McEwan 2004).

Today, Deagan is Distinguished Research Curator Emerita, Florida Museum of Natural History, University of Florida, where she is also the Lockwood Professor of Florida and Caribbean Archaeology.

Cross-References

- ▶ Caribbean Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Colonial Encounters, Archaeology of
- ▶ Goggin, John M.
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historical Archaeology
- ▶ International Journal of Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

D

References

Deagan, K.A. 1973. Mestizaje in colonial St. Augustine. *Ethnohistory* 20: 55–65.

Deagan, K.A. 1983. *Spanish St. Augustine: The archaeology of a colonial Creole community*. New York: Academic Press.

Deagan, K.A. 1985. Spanish-Indian interaction in 16th century Florida and the Caribbean. In *Cultures in contact*, ed. W. Fitzhugh, 281–318. Washington, DC: Anthropological Society of Washington.

Deagan, K.A. 1987 (2002). *Artifacts of the Spanish colonies of Florida and the Caribbean, 1500–1800, volume 1: Ceramics and glassware*. Washington, DC: Smithsonian Institution Press.

Deagan, K.A., ed. 1995. *Puerto Real: The archaeology of a sixteenth century Spanish town in Hispaniola*. Gainesville: University Press of Florida.

Deagan, K.A. 2002. *Artifacts of the Spanish colonies: Florida and the Caribbean, 1500–1800, volume 2: Portable, personal possessions*. Washington, DC: Smithsonian Institution Press.

Deagan, K.A., and J.M. Cruxent. 2002a. *La Isabela: Columbus's outpost among the Tainos 1493–1498*. New Haven: Yale University Press.

Deagan, K.A., and J.M. Cruxent. 2002b. *Archaeology at America's first European town: La Isabela, 1493–1498*. New Haven: Yale University Press.

Deagan, K.A., and D. McMahon. 1995. *Ft. Mose: Colonial America's black fortress of freedom*. Gainesville: University Press of Florida.

McEwan, B.G. 2004. J.C. Harrington medal in historical archaeology, Kathleen A. Deagan. *Historical Archaeology* 38: 5–7.

Death, Burial, and Commemoration in Historical Archaeology

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Introduction

The study of death, burial, and commemoration in the historic period has been a multidisciplinary interest, with cultural historians, anthropologists, art historians, folk life scholars, and architectural historians all with their own particular modes of enquiry and emphasis on their own forms of data. Most research has concentrated on the monuments of the elite, though some disciplines have been more wide-ranging. Archaeological concerns have focused on the one hand on excavating human remains and the cultural features of coffins and graves and on the other on the study of the more mundane commemorative memorials of the majority. While cultural values limit research on burials largely to opportunities linked to development, memorials are easily accessible, and in most communities archaeologists are able to record and study these. As monuments can be studied non-intrusively and relatively rapidly with limited resources, they are popular subjects for student and community volunteer projects. Burial grounds may be forgotten, but those still in use carry much emotional significance to local and descendant communities; this provides both opportunities but also sometimes challenges in practice and interpretation. Nevertheless, mortuary archaeology of the historic period is now a dynamic and influential part of the discipline. A particular strength is that most monuments, and many coffins, provide details of names and dates for the deceased, allowing not only the establishment of tight chronologies but also links to many documentary sources. This allows complex, subtle, and contextualized research questions to be asked not only about death, burial, and commemoration but wider cultural and social issues relevant across the whole discipline.

Definition

All communities in the recent past have developed clear cultural and legal frameworks for dealing with the deceased, often with accompanying documentary materials such as burial registers and death certificates. The material evidence for burial and commemoration can be found at a range of scales: the grave and its contents, the plot, the burial ground, and the landscape. The first is below ground, and the remainder can often be largely investigated from surface remains, including study of memorials.

Until the late nineteenth century, all burial in European and European colonial contexts was inhumation, with cremation only becoming significant from the later twentieth century. Inhumation always required formal disposal, and there were several options, though not all were available at all times and in all cultural contexts. Early historic burials could be in wooden or lead coffins for the elite, but most people were wrapped on cloth shrouds held in place by shroud pins. By the later eighteenth century, the use of wooden coffins became the norm (Fig. 1), often with fittings (coffin furniture); some coffins were made of several layers (shells) including some of lead. By this stage the funeral industry developed, and specialist producers of both coffin fittings and memorials emerged. In North America, cast iron coffins were also popular in the nineteenth century, as were those with glass windows through which the deceased could be viewed. European coffins tended to be hexagonal, single-break coffins widest at the shoulders. In North America the rectangular casket became most popular from the nineteenth century onwards, though this also is found elsewhere from that time.

The most frequent mode of interment was in an earth grave dug directly in the ground, which could be for one or several interments in a short space of time, with a grave shaft lined with brick or stone as a more complex form. Built structures for family or community use include a crypt or

vault below a church, a completely or partially subterranean vault or tomb within the burial ground, or an upstanding mausoleum on private land. In Mediterranean countries and parts of the American South, aboveground structures provided individual or family chambers, *loculi*, in which coffins could be placed (Fig. 2). Cremated remains (ashes in UK, cremains in North America) were only sometimes formally deposited, though these could be interred in the ground or in *columbaria*, similar to *loculi* but for caskets.

Death, Burial, and Commemoration in Historical Archaeology, Fig. 1 Wooden coffin with fittings in a brick-lined shaft (Kellington, North Yorkshire, UK)

Apart from some deaths at sea and in isolated frontier locations, death and burial have been certificated and recorded, with specific burial locations available. In Europe, ecclesiastically controlled burial in churchyards (also called graveyards) was the norm and often in land surrounding a church. Burial within the church (intramural burial) was also common until the nineteenth century for the more wealthy or influential. Burial was frequent, and the disturbance of earlier interments was routine. In European colonies there was less burial within churches, some communities established burial grounds apart from religious structures, and in many places there was also a strong rural tradition of family burial grounds near farmhouses. Within historical archaeology, the term cemetery has been largely limited to formal cemeteries developed outside ecclesiastical control from the late eighteenth century onwards, this becoming the major form of urban burial location across the globe in the nineteenth century. Cemeteries tend to be highly planned, regulated, and densely used, though

Death, Burial, and Commemoration in Historical Archaeology, Fig. 2 Aboveground *loculi* (right) and mausoleums (left) (Granada, Spain). (Author's photograph)

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Death, Burial, and Commemoration in Historical Archaeology, Fig. 3 Garden and lawn cemeteries. Left: Mount Auburn, Boston, USA. Right: Forest Lawn, Los Angeles, USA. (Author's photograph)

without routine disturbance of interments; they often also have significant landscape characteristics and architectural features and may belong to particular design or management traditions, such as the garden or the lawn cemetery movements (Fig. 3). Many cemeteries are spatially divided by denomination or may be open to only one denomination. They are often also structured by cost of plots which affects the type of monuments allowed, plot size, and burial density.

Memorials come in a wide range of forms over time, space, and cultural context (Mytum 2000, 2004). While most are of stone, use of wood, cast iron, terracotta, and concrete is also common in some contexts. Memorials usually carry text giving details of the deceased and may have further information including familial relationships, place of residence, occupation, and an epitaph. Some memorials commemorate many people, often formed over time in a series of inscriptional events (Mytum 2002). Decorative features include the form of the monument itself but can also be added in the form of religious symbols, markers of identity (including portraits), or elements generally derived from contemporary architectural styles.

Historical Background

The interest in historic memorials began with antiquarians fascinated by genealogy, and heraldry, followed by a phase of collecting amusing and instructional epitaphs for publication in popular books in the nineteenth century. Modern academic studies began in the UK with Burgess (1963) and in the US with Forbes (1927). These and many subsequent important regional studies continued their largely art-historical framework but have provided the basis for much recent work using more overtly archaeological approaches. These were first developed in North America by Dethlefsen and Deetz in a series of papers (most notably 1966, see Bell 1994 for other references). In the UK, efforts in the 1970s aimed at encouraging graveyard recording did not lead to published analysis, but subsequent recording protocols (Mytum 2000) have been more effective. Output derived from doctoral research (Cannon 1989; Tarlow 1999) revealed the potential of memorials, and in North America the major bibliography by Bell (1994) sets a significant benchmark. While most studies remain at a regional, state, or national level (Willsher and Hunter 1978; Veit and Nonesteid 2006), it has now become possible to consider wider synthetic treatment of the subject (Mytum 2004).

Studies of historic burials were largely limited in the UK because they were rarely threatened or seen as important, and ethical concerns prevented research excavation in burial grounds still in use. Landmark UK projects were Spitalfields, London, where a large crypt was investigated before clearance and where both cultural (Reeve and Adams

1993) and demographic and pathological dimensions were considered (Molleson and Cox 1993). Bell's (1990) study of coffin hardware initiated serious interest in the material culture of North American coffins, where many government infrastructure projects have uncovered burial grounds, including many of African-American communities. The unexpected discovery and subsequent excavation of the African-American burial ground in New York, with inappropriate levels of consultation with descendant communities, led to significant public protest. This resulted in a fuller investigation than is normally the case for urban excavations and a permanent memorial at the site, as well as greater awareness among the profession of the cultural significance of burials among descendant groups (Mack and Blakey 2004). Following lessons learnt from this experience, the skeletal and cultural aspects of these types of sites are now routinely investigated as part of development projects, with community engagement before appropriately celebrated reburial. Large-scale developer-funded projects have now also become more frequent in the UK (Emery and Wooldridge 2011) but are still rare elsewhere, where most excavation has been of small numbers of burials in any one project. The major difficulty for analysts is that most of the reports on excavations remain only locally published or in "gray" literature in archives.

Key Issues/Current Debates

There are now standard recording procedures for both monuments (Mytum 2000) and human remains, though those for coffin fittings are still at an earlier stage of development. Nevertheless, there is now sufficient data for many forms of analysis to be carried out, even as further data collection continues apace, aided by digital storage. However, there are still some methodological concerns regarding commemorative practices. One is the proportion of the population represented by upstanding monuments. This issue has thus far been mainly examined in the UK, with universally low proportions for earlier periods but highly variable percentages of the community with surviving memorials from the nineteenth century onwards in regional studies. Skewed samples are also being investigated within coffin furniture, as some soils or particular burial conditions such as crypts differentially favor survival of cultural material. In some cases these are taphonomic postdepositional processes (certain materials for monuments decay, coffin furniture rarely survives in acidic soils) but also linked to class (a certain affluence is required to commission a permanent memorial; thus middle-class urban crypt burials survive intact while earth burials have been heavily disturbed). In both below- and aboveground evidence, the biases need to be understood before some of the wide-ranging cultural questions can be addressed with confidence. Nevertheless, there are some important current debates that can develop despite these concerns.

Archaeological study of historic mortuary remains has concentrated first on issues such as large-scale cultural change and status and more recently on identity and attitudes to the body. Dethlefsen and Deetz (1966) attempted the identification of broad cultural changes and proposed ideological causes (Fig. 4); the trends had already long been recognized by others (Forbes 1927), and indeed art historians proposed more nuanced, though still far from agreed, interpretations. Ideology is still a key theme but now more subtly investigated by archaeologists who have considered a wide range of evidence to probe into the burial and commemorative practices of the recent past. While functional factors such as dealing with increased population densities affected practice, archaeologists also now see the changing attitudes to the body, as much as concerns over health issues, as relevant. There are trends in iconography and inscriptions showing changes form an emphasis on mortality through salvation to sentimentality (Fig. 5). Nevertheless, different scholars place the emphasis on diverse factors; all are undoubtedly relevant, though their relative importance no doubt varied over time and space; one of the current challenges is to evaluate these in particular contexts. In the post-Reformation period, the anxieties released by abandoning Catholic interpretations of purgatory were worked through

Death, Burial, and Commemoration in Historical Archaeology, Fig. 4 New England memorials demonstrating the shift from death's heads to cherubs and then urns and willows (Kingston, MA, USA). (Author's photograph)

Death, Burial, and Commemoration in Historical Archaeology, Fig. 5 Indications of sentimentality on memorials (Toxteth, Liverpool, UK). (Author's photograph)

over generations (Tarlow 2011), eventually leading to a greater emphasis on emotion (Tarlow 1999). Parallel with these changes, however, there was a growing materialism where ownership and display of goods, and the desire to place named people within an inscribed history formed in linear time, created other pressures on mortuary practice (Mytum 2006, 2007).

Identity linked to large diasporic groups such as the Ukrainian, Czech, or Mexican communities in North America has been identified (Meyer 1993), and this is now being explored in many other contexts. Religious identity, which forms part of the above, is also relevant in recent studies, while others have taken a Marxist exegesis examining class structures. Relatively few studies have had a dominant focus on gender or the family, though it is often an element in many analyses; there is some debate regarding both the relative frequency of child commemoration and the attitudes to childhood mortality in the past (Mytum 2004).

Artifact biography offers significant opportunities in historic mortuary analysis. There has been a long tradition of studying production, of both coffin fittings and monuments, and in the case of the latter, many individual carvers and workshops have been identified. While there is still much opportunity to expand this, there is also increasing recognition of the role of the consumer in the location and form of burial and choice of form and content of memorials. The repeated inscribing, and even intra-site movement, of memorials in some regions creates complex artifact histories (Mytum 2002). Burial ground histories, seen either through excavated interments dated by coffin fittings or by spatial patterning of memorials, allow examination of

issues of control and management, sometimes under extreme pressures of demand (Emery and Wooldridge 2011). Other issues of family, ethnic and religious identity, changes in the managerial control of burial location and monument choice, and issues of competition between families for visibility and elaboration of plots and burial markers are all current concerns (Mytum 2004).

International Perspectives

The evidence to date suggests a remarkable similarity in overall material reactions to death, burial, and commemoration in the historic period across the English-speaking world (Mytum 2004). Although there are significant changes over time, and both regional and national traits that are noticeable and important, the broad patterns remain similar. Simple, largely locally made memorials are replaced in the later eighteenth and nineteenth centuries by products of more standard forms, often of materials imported into the region (such as marble and granite). Large cemeteries emerge as a dominant burial form in the nineteenth century to deal with large demands caused by urban population densities and allow the removal of the dead from closed proximity of the living for both public health and private grieving reasons. Such new landscapes of death also allowed denominational, religious, and class distinctions to be materially elaborated, within broadly similar designed landscapes that were adapted to physical, vegetational, and cultural conditions as far apart as Australia, Europe, or North America.

The only significant distinctive variations noted thus far are the Mediterranean-inspired traditions of family mausoleums and use of *loculi* and the North American cemetery style of plot with a large founder memorial surrounded by very small markers for other family members (Mytum 2004). Denominational differences in body treatment and disposal, burial ground organization, and types of commemoration are often important, however. While archaeological evidence demonstrates that practice did not always conform to stated theological and liturgical conventions (Stock 1998), generally the cultural codes that accompanied the beliefs of a particular religion, and indeed denomination or sect within that religion, could be significant. As denomination was often a significant cultural marker for diasporic communities, it can be a valuable indicator of ethnicity and identity (Meyer 1993). Forms of body disposal and commemoration in developing colonial contexts suggest use of isolated, temporarily marked burial and unregulated small settlement-based burial grounds. The treatment of and reactions by indigenous and slave groups within these contexts have received some consideration but are still a relatively undeveloped field, and most attention has been directed to issues of cultural survival.

Future Directions

In many regions, broad cultural trends are now identified, but most of the cultural choices have not been explained, and variation and change has merely been identified. While concepts such as emotion or attitudes to ownership or the body have been proposed to explain the rise in commemorative practices and its forms, exploring these themes is still in its infancy. The rich diversity of text, form, and symbol on many memorials (and indeed some coffin furniture), combined with many documentary sources from burial registers, cemetery company records, coffin hardware pattern books and personal diaries, allows development of studies from highly contextualized examination of particular sites (Reeve and Adams 1993) to wide-ranging studies of issues such as ethnicity and class (Cannon 1989).

A major concern linking ethics, religious beliefs, and archaeological practice is the accessibility of human remains for future research. Descendant communities and religious groups have very different views regarding reburial or what reburial can mean. For example, some Christian sects such as the Quakers have no concerns regarding retention of human remains in museums, while Anglican churches require placing in consecrated spaces; in some cases, however, these can be made accessible for further

research if permission is granted, by being stored in a crypt, for example. Other groups demand immediate reburial. Archaeologists need to be sympathetically active within a constantly changing set of attitudes and relationships between living communities and their dead. In addition, further research and development of already existing protocols for the recording and study of human and cultural remains in the short window of opportunity between excavation and reburial will greatly increase information available for archaeologists and communities, the latter often extremely interested in the findings.

Much of the research to date has been within the English-speaking world and thus has had an emphasis towards communities with dominantly Protestant and northern or western European cultural traditions. The development of new research in other religious traditions, notably those originating from southern and eastern Europe and Asia, will be particularly important.

Cross-References

- ▶ Church Monuments Society
- ▶ Churchyard Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Ethics and Human Remains
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Mytum, Harold
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Tarlow, Sarah

References

Bell, E.L. 1990. The historical archaeology of mortuary behavior: Coffin hardware from Uxbridge, Massachusetts. *Historical Archaeology* 24 (3): 54–78.

Bell, E.L. 1994. *Vestiges of mortality & remembrance. A bibliography on the historical archaeology of cemeteries*. Metuchen: Scarecrow Press.

Burgess, F. 1963. *English churchyard memorials*. London: Lutterworth Press.

Cannon, A. 1989. The historical dimension in mortuary expressions of status and sentiment. *Current Anthropology* 30 (4): 437–458.

Dethlefsen, E., and J.F. Deetz. 1966. Death's heads, cherubs and willow trees: Experimental archaeology in colonial cemeteries. *American Antiquity* 31 (4): 502–510.

Emery, P.A., and K. Wooldridge. 2011. *St Pancras burial ground: Excavations for St Pancras International, the London terminus of High Speed 1, 2002-3*. London: Gifford & Museum of London.

Forbes, H.M. 1927. *The gravestones of early New England*. Boston: Houghton Mifflin. (Reprinted 1955, Princeton: Pyne Press; 1967 New York: Da Capo Press; 1989 Vermont: Barre Granite Association).

Mack, M.E., and M.L. Blakey. 2004. The New York Burial Ground project: Past biases, current dilemmas, and future research opportunities. *Historical Archaeology* 38 (1): 10–17.

Meyer, R.E., ed. 1993. *Ethnicity and the American cemetery*. Bowling Green: Bowling Green State University Popular Press.

Molleson, T. & M. Cox. 1993. *The Spitalfields project, volume 2: The anthropology. The middling sort*. Council for British Archaeology Research Report 86. New York: Council for British Archaeology.

Mytum, H. 2000. *Recording and analysing graveyards*. Council for British Archaeology Practical Handbook 15. New York: Council for British Archaeology.

Mytum, H. 2002. The dating of graveyard memorials: The evidence from the stones. *Post-Medieval Archaeology* 36: 1–38.

Mytum, H. 2004. *Mortuary monuments and burial grounds of the historic period*. New York: Kluwer Academic/Springer.

Mytum, H. 2006. Popular attitudes to memory, the body, and social identity: The rise of external commemoration in Britain, Ireland, and New England. *Post-Medieval Archaeology* 40 (1): 96–110.

Mytum, H. 2007. Materiality and memory: An archaeological perspective on the popular adoption of linear time. *Antiquity* 81: 381–396.

Reeve, J. & M. Adams. 1993. *The Spitalfields project, volume 1. The archaeology: Across the styx*. Council for British Archaeology Research Report 85. New York: Council for British Archaeology.

Stock, G. 1998. Quaker burial: Doctrine and practice. In *Grave concerns: Death and burial in England 1700 to 1850*. Council for British Archaeology Research Report 113, ed. M. Cox, 129–143. New York: Council for British Archaeology.

Tarlow, S. 1999. *Bereavement and commemoration. An archaeology of mortality*. Oxford: Blackwell.

Tarlow, S. 2011. *Ritual, belief and the dead in early modern Britain and Ireland*. Cambridge: Cambridge University Press.

Veit, R., and M. Nonesteid. 2006. *Stranger stop and cast an eye: New Jersey's historic cemeteries and graveyards through four centuries*. New Brunswick: Rutgers University Press.

Willsher, B., and D. Hunter. 1978. *Stones: Eighteenth century Scottish gravestones*. Edinburgh: Cannongate Books.

Further Reading

Pointers to further reading can be found in Bell (1990) and Mytum (2004). Many studies of graveyard memorials, mostly art-historical but many with other disciplinary approaches including overtly archaeological or anthropological, can be found in the journal of the Association for Gravestone Studies, *Markers*. While the dominant geographical emphasis is North America, particularly the northeast, there is a global representation. From *Markers* 12 (1995), there has been an extremely wide-ranging listing of recent publications. Back numbers of all but the most recent issues are available for free download at http://www.library.umass.edu/spcoll/umarmot/?p=991.

DeBlasis, Paulo

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DeBlasis, Paulo, Fig. 1 Paulo DeBlasis

Basic Biographical Information

Paulo DeBlasis, born in 1954, is a Brazilian archaeologist from the Museum of Archaeology and Ethnology of the University of São Paulo (MAE-USP), Brazil. After graduating in history, he started studying hunter-gatherer societies from southern Brazil and specialized in lithic and spatial analysis, getting a Master's degree in social anthropology and his Ph.D. in archaeology in 1996. Another early subject of his interest is the diverse art rock styles across central Brazil. During the 1990s he has turned his research focus towards the shell mounds (*sambaquis*), investigating the emergence of complexity among these preceramic coastal societies that occur along the southern and southeastern shores of Brazil. He currently teaches at the University of São Paulo and advises students from all over the country in many subjects ranging from rock art to heritage management, ceramist societies, funerary rituals and art, settlement patterns, lithic industries, and hunter-gatherer societies. He has taken part on international boards such as the Committee of the Americas of the Society for American Archaeology and is currently member of several editorial boards, including the International Advisory Board of *the Encyclopedia of Global Archaeology* (Fig. 1).

Major Accomplishments

Professor DeBlasis has conducted seminal research on hunter-gatherer societies from the Southern Brazilian Plateau, helping to establish the low mobility settlement pattern and diversified technological spectrum that characterizes their adaptation to tropical and subtropical rainforest environments from middle Holocene onwards. From the 1990s on, he turned to the shell mound-building (*sambaqui*) societies, both riverine and coastal, that occur along the Southern shores of Brazil, maintaining a long-term research project in Santa Catarina's coast for more than a decade. Together with partners like Madu Gaspar, he has helped to change the views towards these coastal cultures, highlighting the emergent social complexity displayed by shell mound architecture and its long duration as coastal adapted culture, a research theme that lasts to this day.

Throughout his career, Professor DeBlasis has advocated the fundamental importance of spatial and regional analyses in archaeology in an effort to integrate territorial approaches with landscape studies. He has successfully integrated cross-disciplinary methods and researchers from different areas, such as geology and geophysics, into his research in order to increase the knowledge about the monumental sambaquis from the Santa Catarina's coast.

Besides these academic accomplishments, Dr. DeBlasis has also worked with contract archaeology, advocating the use of high output scientific standards within this practice and the inception of archaeology as an integrative agency towards a better symmetry between large and ecologically blind global enterprening initiatives and local, ecologically set but usually voiceless, native societies and their often overseen knowledge.

Professor DeBlasis has made a major contribution to archaeology in Brazil through his teaching and research supervision. His projects have sponsored many students in their careers while covering diverse aspects of mound building and hunter-gatherer societies. His advice on such a wide variety of subjects and areas has given many students opportunities to pursue their own careers in archaeology. Many of these students are now professors carrying on archaeological practice throughout the country.

Cross-References

► Sambaquis Shell Mounds, Archaeology of

Further Reading

DeBlasis, P. 2007. Sambaquis e paisagem: dinâmica natural e arqueologia regional no litoral do sul do Brasil. *Arqueología Suramericana* 3: 28–61.

DeBlasis, P. 2010. Twenty years of heritage resource management in Brazil: A brief evaluation (1986–2006). In *Cultural heritage management: a global perspective*, ed. P.M. Messenger and G.S. Smith, 38–47. Gainesville: University Press of Florida.

Fish, P.R., S.K. Fish, P. DeBlasis, and M.D. Gaspar. 2013. Monumental shell mounds as persistent places in southern coastal Brazil. In *The archaeology and historical ecology of small scale economies*, ed. V.-D. Thompson and J.C. Waggoner Jr., 120–140. Gainesville: University Press of Florida.

Gaspar, M.D., P. DeBlasis, S.K. Fish, and P. Fish. 2008. Sambaqui (Shell mound) societies of coastal Brazil. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 319–335. New York: Springer.

Decapolis, Archaeology of

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Introduction/Definition

The Decapolis ("ten cities") was a group of Greco-Roman cities in the southern Levant, in today's Jordan, Syria, and Israel (Bietenhard 1977; Isaac 1981; Hoffmann and Kerner 2002; Lichtenberger 2003). Several cities are attributed to the Decapolis, among them Damascus, Canatha, Dion, Adraa, Gadara, Hippos, Abila, Capitolias, Gerasa, Philadelphia, Pella, and Nysa-Scythopolis. The number of cities belonging to the Decapolis varied. One list of cities of the Decapolis is provided by Pliny (NH 5.16.74).

The Decapolis first is mentioned in the New Testament (Mk 5:20; Mk 7:31; Mt 4:25). In the Hellenistic period, the cities were supported by Ptolemaic and Seleucid rulers and received civic status. With the Roman conquest of Syria by Pompey in 64 BCE, the cities were attached to the new provincia Syria and were backed by Rome.

Probably in this time, the term "Decapolis" was created, and several cities counted back their civic eras to Pompey's conquest. The cities did not form a territorial unit, and they also were not connected directly with other territories of the provincia Syria. Between them and the northern and coastal parts of the province, tribal and less-Hellenized political entities were positioned (e.g.,

Judaea, Nabataea, Ituraea), and it was probably due to the Decapolis' Greek orientation that its cities were supported by Hellenistic rulers and later by Rome.

The Hellenized profile of the Decapolis probably resulted from pre-Hellenistic and early Hellenistic Greek influence conveyed from the Phoenician coast (Lichtenberger 2011, 2014).

Key Issues/Current Debates

Some of the Decapolis' cities have yielded rich Bronze and Iron Age finds (such as Philadelphia and Scythopolis), and according to literary sources, Damascus was an important Achaemenid settlement. However, a direct continuity to the Hellenistic and Roman periods is difficult to establish. Although from literary sources we are well informed about the importance of the cities already in the Hellenistic period, little archaeological evidence for Hellenistic settlements is available yet (Thiel 2007).

Mainly Gerasa (Camp Hill and Sanctuary of Zeus), Gadara (acropolis), and Nysa-Scythopolis (Tell Istabba) have provided some Hellenistic finds. These finds predominantly stem from the second century BCE, and they seem to be related to Seleucid activities. At that time, many cities received Seleucid dynastic names (Seleucia, Antioch), and the cult of Zeus Olympios, the protector deity of Antiochus IV, was introduced (Lichtenberger 2008).

Only under the Pax Romana can a thorough urbanization be observed and traced in the archaeological record. Starting in the late first century BCE, the cities expanded and erected civic monuments typical for Greco-Roman cities (Seyrig 1959; Segal 1997; Ohlig 2008). Several temples, theaters, baths, hippodromes, colonnaded streets, nymphaea, city gates, etc. were built, and the cities had the urban fabric of typical Greco-Roman cities. Especially the Antonine age, starting with the visit of the emperor Hadrian to the Decapolis was a period of urban blossom, and cities like Gerasa experienced large-scale building projects such as the monumental complex of the Artemision with terracing, forecourts, and several propylaea (Kraeling 1938; Zayadine 1986; Kennedy 2007; Lichtenberger and Raja 2017).

The cities were decorated with imported marble sculptures, and the language of the inscriptions mainly was Greek with only some Latin exceptions. The cities issued coins. Damascus was already a mint under the Seleucids, and civic bronze coins were given out in some of the cities starting in the first century BCE and ending in the third century CE (Spijkerman 1978; Lichtenberger 2003).

Most of the cities only minted coins in the Antonine/Severan period. The coins are a prime source for the reconstruction of the civic life in the Roman period as they display local deities and myths as well as civic buildings (Stein 1990; Lichtenberger 2003; Riedl 2005). We learn from them that, in the second and third centuries CE, the cities emphasized their Greek and Roman descent, although at the same time, it is obvious that some of their cults and deities are of Semitic origin and only superficially Hellenized (Lichtenberger 2014). This however is not a contradiction, but it fits well into the civic culture in the Greek East under Roman rule: the cities propagated their Greek origins and their local specifics.

Such a cultural orientation is of interest as it demonstrates that the cities were not simply Greco-Roman cities as opposed to indigenous settlements, but they themselves were clearly embedded into the Semitic environment, being Hellenized and Romanized. Local sculpture in the Decapolis was dependent on the stone material available (Weber 2002). Especially limestone and basalt were used for local production. There is a rich corpus of tombstones with portraits (e.g., Gadara), and there are several local productions of limestone sarcophagi (e.g., Gerasa). In some cities of the Decapolis, Roman underground chamber tombs with arcosolia and sometimes loculi were found.

In Abila and Capitolias, many of the tombs were lavishly decorated with paintings (Barbet and Vibert-Guigue 1994). The hinterlands (chorai) of the cities of the Decapolis have been only little investigated yet. Some of the cities had large territories with extra-urban sanctuaries and

smaller rural settlements with agricultural installations (Moors 1992). The mostly semiarid environment of the transition zone of the Arabian Desert and the Mediterranean climate belt was suitable for agriculture. In today's northwestern Jordan, sophisticated water supply systems, dating to the Roman period, have been uncovered (Ohlig 2008).

In late antiquity, many churches were built in the cities of the Decapolis, such as in Gerasa, Gadara, Abila, and Philadelphia. These churches were extensively decorated with polychrome mosaics. Pagan temples went into decay or were transformed and reused by Christians (March 2008). In Gerasa, the classical city was transformed, and urban spaces were used by churches and ecclesiastical buildings. This period in general is a period of urban growth, concentration, and extension of civic and rural settlements. The settlement intensity in this period reaches its peak. Glass and imitations of fine wares ("Jerash bowls") were produced locally in the Byzantine period. With the Muslim conquest of the Levant in CE 636/640, the Byzantine period ends, but the material culture (e.g., pottery) changed only very slowly in the Umayyad period, and the transition is difficult to identify (Avni 2014).

Cross-References

► Seleucid, Parthian Mesopotamia, and Iran, Archaeology of

References

Avni, G. 2014. *The Byzantine-Islamic Transition in Palestine: An Archaeological Approach*. Oxford: Oxford University Press.

Barbet, A., and C. Vibert-Guigue. 1994. *Les peintures des nécropoles romaines d'Abila et du nord de la Jordanie*. Beirut: Geuthner.

Bietenhard, H. 1977. Die syrische Dekapolis von Pompeius bis Trajan. *Aufstieg und Niedergang der Römischen Welt Volume II* 8: 220–261.

Hoffmann, A., and S. Kerner, eds. 2002. *Gadara – Gerasa und die Dekapolis*. Mainz: Zabern.

Isaac, B. 1981. The Decapolis in Syria: A neglected inscription. *Zeitschrift für Papyrologie und Epigraphik* 44: 67–84.

Kennedey, D. 2007. *Gerasa and the Decapolis. A "virtual island" in Northwest Jordan*. London: Duckworth.

Kraeling, C., ed. 1938. *Gerasa. City of the Decapolis*. New Haven: American Schools of Oriental Research.

Lichtenberger, A. 2003. *Kulte und Kultur der Dekapolis. Untersuchungen zu numismatischen, archäologischen und epigraphischen Zeugnissen*. Wiesbaden: Harrassowitz.

Lichtenberger, A. 2008. Artemis and Zeus Olympios in Roman Gerasa and Seleucid religious policy, in: T. Kaizer (ed.), The Variety of Local Religious Life in the Near East in the Hellenistic and Roman Periods. Leiden and Boston: Brill, 133–153.

Lichtenberger, A. 2011. The Decapolis and Phoenicia, ARAM 23, 2011, 559–583.

Lichtenberger, A. 2014. Continuity, discontinuity, and change in religious life in southern Syria during the Roman period. In *Redefining the Sacred*, ed. E. Frood and R. Raja, 209–229. Turnhout: Brepols.

Lichtenberger, A., and R. Raja, eds. 2017. Gerasa/Jerash. From the Urban Periphery. Aarhus: AUTRYK.

March, C. 2008. *Spatial and religious transformations in the late antique polis. A multi-disciplinary analysis with a case-study of the city of Gerasa*. Oxford: Archaeopress.

Moors, S.M. 1992. De Decapolis. Steden en dorpen in de Romeinse provincies Syria en Arabia. Unpublished PhD dissertation, Leiden.

Ohlig, C. (ed.) 2008. Cura aquarum in Jordanien. In *Proceedings of the 13th international conference on the history of water management and hydraulic engineering in the Mediterranean region. Petra/Amman 31 March – 9 April 2007*. Siegburg: Deutsche Wasserhistorische Gesellschaft.

Riedl, N. 2005. Gottheiten und Kulte in der Dekapolis. Unpublished PhD dissertation, Berlin (FU).

Segal, A. 1997. *From function to monument. Urban landscapes of Roman Palestine, Syria and Provincia Arabia*. Oxford: Oxbow.

Seyrig, H. 1959. Temples, cultes et souvenirs historiques de la décapole. *Syria* 36: 60–78.

Spijkerman, A. 1978. *The coins of the Decapolis and Provincia Arabia*. Jerusalem: Studii Biblici Franciscani.

Stein, A. 1990. Studies in Greek and Latin inscriptions on the Palestinian coinage under the principate. Unpublished PhD dissertation, Tel Aviv.

Thiel, W. 2007. *Untersuchungen zum hellenistischen Siedlungswesen in Palästina und Transjordanien*. Munich: Verlag Dr. Hut.

Weber, T.M. 2002. *Gadara – Umm Qes I. Gadara decapolitana*. Untersuchungen zur Topographie, Geschichte, Architektur und der Bildenden Kunst einer "Polis Hellenis" im Ostjordanland. Wiesbaden: Harrassowitz.

Zayadine, F., ed. 1986. *Jerash archaeological project 1981–1983*. Amman: Department of Antiquities.

Decolonization in Archaeological Theory

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Introduction

Decolonizing approaches in archaeology emerged as a means to counter the dominance of colonial ideologies and improve the accuracy of Indigenous representations. Historically, the routines of mainstream archaeological practice have been shaped by Western (primarily elite Euro-American) beliefs and categories. Although Indigenous people have long been used as informants, Western scientists have exerted control over Indigenous property, and Indigenous knowledges and concerns have been pushed to the margins. Decolonizing has both political and practical effects; it alters power relations among scientists and subjects while also expanding the volume and accuracy of available Indigenous data.

Decolonization as archaeological theory has been influenced by other critical research approaches, including feminist theory, critical race theory, postcolonial political theory, and gender studies (e.g., Denzin et al. 2008; Messenger and Smith 2010). Although Indigenous people have been the most visible proponents and beneficiaries of decolonization, decolonizing methods can be applied to virtually any research population. One might, for example, examine ethnic minorities, homeless people, diasporic groups, or others whose perspectives and histories have been imperfectly represented by mainstream archaeology. Increased communication with knowledge-bearers from formerly colonized communities improves the ethical component of archaeological practice. It can also improve the identification of collections, the educational content of exhibitions, and the relevance of archaeology to Indigenous and ethnic minorities (Merryman 2006; Nicholas 2010).

Definition

Decolonizing archaeologists seek to untangle colonial influences by encouraging greater collaboration with Indigenous peoples, reconsidering foundational knowledges, and paying closer attention to the ethics of handling other peoples' heritage. Decolonizing approaches are explicitly intended to recover materials and knowledges that were lost or made invisible during generations of living under colonial domination. In political contexts, decolonizing efforts have enabled formerly dependent or colonized Indigenous peoples, ethnic communities, and small nations to gain independence and local control (Smith 1999; Maybury-Lewis 2002). In archaeological contexts, decolonizing similarly shifts the power balance by liberating collections and interpretations from the presumed exclusivity of colonial control (Wobst 2005). This is accomplished, in part, by encouraging better collaborations with communities impacted by colonization (e.g., Smith and Wobst 2005; Bruchac et al. 2010; Nicholas 2010). Key strategies for decolonizing include critical analysis of social and political relations, collaborative consultation and research design, reclamation of cultural property, restoration of cultural landscapes and heritage sites, repatriation of human remains, co-curation of archaeological collections, and devising more culturally accurate museum representations. For examples of decolonizing projects and practitioners in different regions of the world, see Atalay (2012), Bruchac et al. (2010), Nicholas (2010), and Smith and Wobst (2005).

Research pursued from a decolonizing perspective typically focuses not only on potentially important scientific finds but also on the power dynamics and impact of practicing science among a particular research population. The emphasis on collaboration makes this an inherently activist and applied approach to practicing science. Members of descent communities and local stakeholders can be enlisted as partners in collecting material and data concerning the past and in crafting visions for the sustainable use of significant heritage sites in the future (Colwell-Chanthaphonh and Ferguson 2008; Atalay 2012). Community

members can provide diverse streams of evidence that crosscut disciplines, using such techniques as ethnographic interviews and linguistic analysis. Archaeological data is also typically embedded in oral traditions, ritual activities, and place names that evoke evidence of older human interactions with the landscape over time (Schmidt and Patterson 1995; Watkins 2000). Decolonizing archaeologists can build collaboration directly into their research plans via a process identified as community-based participatory research (CBPR). The working principles of CBPR emphasize a participatory, "community-based, partnership process" that builds "community capacity," encourages "a spirit of reciprocity," and recognizes contributions from "multiple knowledge systems" (Atalay 2012: 63).

Decolonization is an essential aspect of Indigenous archaeology, broadly defined as archaeological practice directed by, in collaboration with, representative of, and relevant to Indigenous people and Indigenous goals (Nicholas 2010: 11). The term Indigenous is used here, not just as a descriptive, but as a proper noun, to emphasize the sovereignty and agency of Indigenous peoples vis-à-vis the colonial states that have long attempted to dominate them (e.g., Watkins 2000; Wobst 2005; Nicholas 2010). Indigenous groups largely trace their identities and attachments to land through historical continuities with societies that predate colonization; they often maintain unique systems of cultural and political organization. Historically, Indigenous knowledge-bearers have long participated as scientific informants, gatekeepers, and field workers. These site monitors and informants have improved the identification of material in the field and inspired new modes of curation and interpretation in the museum (Oland et al. 2012). More recently, some Indigenous people have become professional archaeologists (see examples in Nicholas 2010); their inclusion in the discipline has stimulated more culturally complex understandings of material and ephemeral relations over time (Smith and Wobst 2005).

Indigenous communities living in the aftermath of (or still influenced by) colonization are sometimes hesitant, if not opposed, to the conduct of scientific research in ancestral sites. Applied sciences are never neutral; scientific discoveries can provoke or complicate understandings of the complex intersections among identity, nationalism, and social justice. Archaeologists may be placed in positions where they are expected to construct and interpret Indigenous identities and relationships, with or without the presence and consent of those communities (Bruchac et al. 2010: 55). Decolonizing archaeologists, regardless of their personal origins, have thus found it necessary to consider the political impacts of their own social relations, in the discipline and in the field. They pay particularly close attention to the relations between present and past populations and to the impacts of their research. By carefully weighing ethics and relations with the communities they study, they hope to replace colonial habits of appropriating knowledge with more culturally sensitive means of recovering knowledge. Indigenous people who choose to practice archaeology typically express a double consciousness that recognizes their unique (and sometimes fraught) positions as both scientific archaeologists and Indigenous activists (see, e.g., the individual contributors to Nicholas 2010).

Historical Background

Colonialism – which can be defined as the forced occupation by large nation-states of lands belonging to smaller state and non-state societies – has constituted a relatively limited but influential era within the long stream of human history. Colonialism is not a single process, but a "series of policies, processes, and relations that exploited people and resources in diverse ways and locales," for widely varying reasons and lengths of time (Oland et al. 2012: 2). Indigenous peoples have been particularly hard-hit by colonization; they are routinely defined as being "dominated by the states that claim jurisdiction over them" (Maybury-Lewis 2002: 7). In North and South America, colonization by multiple European nations resulted in steadily increasing losses of Indigenous land and sovereignty over the course of 500 years. In Australia and New Zealand,

English colonial dominance over aboriginal territory was effected within only a few generations (Smith 1999). In many regions of the world, Indigenous communities are still colonized and still struggling to reassert control over their lands and histories (Maybury-Lewis 2002; Bruchac et al. 2010). Many of the peoples impacted by colonization have been in existence for millennia; colonial occupation is only a small part of their history.

Colonialist thought and nationalist ideologies have long been intertwined with the politics and practice of scientific archaeology (Schmidt and Patterson 1995). During the emergence of the discipline, anthropologists exerted almost unquestioned power over the ownership of sites and collections, without regard for the cultural concerns and property rights of Indigenous peoples, ethnic minorities, or other marginalized groups; archaeology was often a "strategy in support of the state" (Wobst 2005: 28). Since the seminal proponents and practitioners of anthropology were privileged white male scientists with roots in white settler populations, inequities of gender and class were also in play. Until quite recently, few Indigenous people benefitted directly from archaeological research conducted in their midst (Smith and Wobst 2005; Nicholas 2010).

During the nineteenth and early twentieth centuries, salvage archaeologists engaged in the widespread collection of material objects, cultural heritage, and human remains belonging to colonized subjects, operating under the assumption that many of these populations were near extinction (Swidler et al. 1997; Mihesuah 2000). Scientists from Euro-American nations (predominantly England and America) mounted grand expeditions seeking evidence of past civilizations and collecting materials for museums. They routinely disturbed and destroyed heritage sites and collected thousands of human remains and items of cultural patrimony for scientific study, display, and sale (Merryman 2006). This research inspired the production of classifications, typologies, exhibitions, and educational materials that supported the historical dominance of European social classes and belief systems and the political marginalization of Indigenous people (Smith 1999; Wobst 2005). In museums and in print, the archaeological records of state societies were promoted as evidence of successful development, and the records of non-state societies were distorted to stand as failures (Wobst 2005: 28).

Mainstream archaeologists promoted these distortions by theoretically dividing time and geography, with colonial nations located at the "core" and Indigenous nations located at the "periphery" of knowledge and development (Smith 1999; Habu et al. 2008). Western academics also mined Indigenous knowledges and claimed possession of Indigenous property, while conceptualizing modern Indigenous peoples as philosophically disconnected from their premodern forebears (Smith 1999). Scientific research conducted from a universalist and positivist perspective can, even inadvertently, tend to legitimize and reinforce these misrepresentations.

During the mid-twentieth century, as the cannibalistic nature of the salvage enterprise became increasingly apparent, Indigenous people demanded the recovery of sacred objects, communal property, and human remains disturbed by archaeologists (Mihesuah 2000). The emerging repatriation movement provoked serious contests over the ownership and appropriate disposition of archaeological collections and Indigenous cultural material. As regional and ethnic communities around the world have increasingly asserted their distinct identities in resistance to forces of colonialism and globalization (Maybury-Lewis 2002), they have also sought control over the archaeological sites and materials that locate and validate these identities (Bruchac et al. 2010). Around the world, nation-states have been forced to contend with Indigenous peoples who demand, "tribal recognition, national sovereignty, cultural revitalization, economic independence, and control over heritage matters" (Nicholas 2010: 11).

Key Issues/Current Debates

Professional archaeologists have long claimed nearly exclusive ownership of materials from the past. During the twentieth century, they moved to

police the profession by implementing guidelines (e.g., the American Antiquities Act of 1906 and the Archaeological Resources Protection Act of 1979) that prohibited illicit looting and trading by amateurs. During this same era, ancient heritage sites located in regions claimed by colonial states were set aside for protection and preservation under the control of the state (e.g., the National Historic Preservation Act of 1966). The ethos of preservation embodied in these actions did not essentially change conceptions of privileged ownership by scientists. State control is, in essence, a paternalistic extension of colonial control. For Indigenous and ethnic communities around the world, the reclamation of Indigenous rights to property and culture is key to recovering from colonial domination. Assertions of claims to ancestral remains in archaeological collections have, however, provoked fierce debates (e.g., Mihesuah 2000; Merryman 2006). Some of the most heated of these are rooted in differing constructions of property rights.

Decolonizing archaeologists have been especially influential in encouraging the repatriation of human remains and items of cultural patrimony to affiliated communities and descendants (Mihesuah 2000; Smith and Wobst 2005). Claims have also been lodged for the recovery of archaeological and artistic items removed from classical European sites (Merryman 2006). Opponents to repatriation have argued that repatriation threatens the integrity of significant museum collections. Arguments like these are losing ground in light of increasing protections for Indigenous intellectual and cultural property and increasing world recognition of the nationalist dimensions of cultural heritage (Mihesuah 2000; Merryman 2006). Archaeologists and museums can no longer claim undisputed ownership of their collections, and they have been compelled by state laws and statutes (such as the United States' Native American Graves Protection and Repatriation Act of 1990) to recognize the validity of many of these claims. As a result, museums of anthropology, natural history, art, and science around the world now routinely engage in decolonizing activities that include consulting with descent communities, inventorying Indigenous remains and artifacts housed in museum collections, supporting protection for heritage landscapes, establishing cultural affiliations and tribal identities, and otherwise contextualizing material and ephemeral relations in the past. Given the sheer volume of archaeological materials resting in museum collections, and the number of Indigenous sites under exploration, these debates are likely to continue for some time.

From a practical level, colonial perspectives can cloak on-the-ground data; Indigenous perspectives may be visible, but overlooked, in site contexts (Watkins 2000). For example, archaeologists have long used standardized types and categories to suggest that human society and materiality can be separated into clear-cut divisions. The same evidence, however, when considered from a decolonizing perspective, suggests that human geographies, relationships, and materialities are far more fluid and flexible than popular boundaries and categories imply (Wobst 2005). By shifting Indigenous knowledges from the periphery to the center, one can better recognize and envision alternatives to colonialist constructions of time, place, and narrative (Smith 1999).

At the most basic level of analysis, decolonizing questions the relevance of binary choices that have long been used to categorize and classify archaeological finds. Eurocentric constructions of societal development have employed paired terms like savage/civilized and primitive/developed to located Indigenous peoples in a state of imagined opposition to European nations and modernity (Schmidt and Patterson 1995; Wobst 2005). Archaeological dichotomies have typically judged non-state sites and societies as prehistoric (compared to historic) and undeveloped (compared to European models of development). Yet, archaeological evidence is rarely this clear-cut. A more effective way of envisioning past lives would be the use of conceptual "transitions" that suggest both continuity and change (Oland et al. 2012: 3). The postmodern concept of multivocality, a visioning process that devises multiple possible narratives for

underrepresented groups, can also be a useful method for exploring alternative interpretations (Habu et al. 2008).

Collaborations among Indigenous scholars and archaeologists have inspired reconsideration of many of the routine assumptions that underlie archaeological practices (Smith and Wobst 2005; Nicholas 2010). Decolonizing archaeologists (e.g., Wobst 2005) have called attention to the historical distortions caused by extending modern and colonialist theories into the distant pasts of precolonial societies (see case studies from multiple venues in Schmidt and Patterson 1995). They suggest that colonial approaches to scientific study should be recast as a body of situational theory and practice emerging from colonial expansion rather than as a universal framework for interpreting all human societies over time. Feminist theorists have leveled similar critiques, arguing that positivist research, which aims to predict outcomes based on scientific thoughts and evidence, is, in itself, a form of colonialism (Smith 1999; Mihesuah 2000). Post-positivist research, which recognizes the importance of phenomenological, naturalistic, relational, and praxis-oriented perspectives and values, can enable intellectual emancipation from colonization (Smith 1999: 167).

By questioning the notion of a universal science, and drawing attention to human rights issues, decolonizing archaeologists trend toward social activism. They consider how worldviews, nationalist agendas, conceptions of social justice, human rights, and territorial boundaries are likely to be affected by scientific research. Efforts to include multiple voices and perspectives can reveal deep philosophical differences over the relative veracity of different modes for recording knowledge. For example, mainstream archaeologists may consider traditional Indigenous beliefs and modern scientific opinions to be polar opposites, as though one is unverifiable folklore and one is unquestionable hard data. Yet, oral traditions and written traditions both constitute strategies for recording and transmitting narratives and knowledges. When revisited from a decolonizing perspective, these strategies can be employed and interwoven in multiple ways to generate increased understanding. More holistic interpretations can allow for greater variability and flexibility in reconstructing past populations and can inspire more accurate representations of the past (Smith 1999; Smith and Wobst 2005; Wobst 2005).

International Perspectives

During the salvage era of archaeology, scientists collected and transported materials into museums around the world, with little regard for Indigenous property rights, but the ethics of the practice have shifted. Scientists can no longer assume exclusive control of their collections, and some foundational assumptions – most notably, that scientific excavation is a service to the common good and that archaeological sites around the world are common property – have been called into question (Smith and Wobst 2005; Merryman 2006). Indigenous and ethnic communities have asserted their rights to lands, to history, and to archaeological finds housed in museums around the world. Contests over the ownership of cultural property, the repatriation of human remains, and the protection of cultural landscapes now have national and international implications (Merryman 2006).

Decolonizing efforts in various parts of the world reflect the particular histories of colonization and the complexities of defining indigeneity. In Africa, for example, although Indigenous peoples constitute the dominant populations, there are serious struggles over control of ancestral territories, and some Indigenous groups are subjugated or marginalized by others (Maybury-Lewis 2002). Archaeological research in Africa has also been influenced by the search for ancient evidence of human origins, conducted by Western scientists who have treated the entire continent as a research site (Bruchac et al. 2010: 241). These inequities of access and representation can be addressed through decolonizing methods that make archaeology more representative of, and relevant to, local concerns.

Archaeological research in Mesoamerica and South America, conducted in the wake of Spanish

colonization, has been shaped by an emphasis on monumental architecture, high-value objects, and pre-Columbian state formation. Decolonizing efforts in this region have focused on the reclamation and reappropriation of Indigenous heritage sites, materials, and histories subsumed by colonialist interpretations (Bruchac et al. 2010: 201).

Across Asia, in the region stretching from Palestine to Japan, archaeology has been a largely nationalist endeavor serving the interests of powerful nation-states (e.g., China and Israel). Here, as in Africa, some Indigenous populations dominate others. Disempowered nations (e.g., Tibet and Palestine) have been physically forced out of their traditional territories. Decolonizing approaches in this region must grapple with questions of power, privilege, and resources in the effort to secure protections for the cultural heritage of these disenfranchised populations (Bruchac et al. 2010: 290).

Europe is an interesting locale for decolonizing archaeology, given its history of driving colonizing research among Indigenous peoples around the world. Decolonizing archaeologies in Europe are being shaped by the resurgence of Indigenous identities (e.g., Basque, Saami, Scots) and by efforts to reclaim representations of cultural heritage in museums (Bruchac et al. 2010: 323). The British Museum, for example, currently holds the Elgin Marbles taken from Greece, antiquities from Babylon and Assyria, and the Pergamon Altar from Turkey (Merryman 2006: 1). Some museums have resisted returning these great works of antiquity, arguing that they are safest and most accessible to an international public in the museum (Merryman 2006: 13). Each of these cases requires international negotiations and reexaminations of older archaeological practices.

In Australia and New Zealand, Aboriginal people have been imagined as outliers in the production of human history and have struggled to overcome colonial European perceptions that identified their traditional territory as "terra nullius" (an uninhabited "no-man's land") (Bruchac et al. 2010: 109). In recent years, some Aboriginal communities in Oceania have embraced archaeology as a tool that can support self-determination by providing "a material basis for the reclaiming of Indigenous cultural identity" (Smith and Wobst 2005: 13). The Australian Archaeological Association's Code of Ethics requires archaeologists to protect community claims to cultural heritage, recognize the importance of repatriation, and "acknowledge the special importance to Indigenous peoples of ancestral remains and objects and sites associated with such remains" (Australian Archaeological Association 1994). The 1995 ICOMOS New Zealand charter for the conservation of cultural heritage (called, in Maori, *Te Pumanawa o ICOMOS o Aotearoa Hei Tiaki I Nga Taonga Whenua Heke Iho o Nehe*) takes a similar approach by encouraging the identification, preservation, maintenance, and restoration of Indigenous cultural heritage places. The ICOMOS guidelines have been adopted by the Historic Places Trust/*Pouhere Taonga*, the Ministry of Culture and Heritage, and the Department of Conservation and have also been used in reckoning deeds that restore traditional lands (ICOMOS New Zealand 1995).

Around the world, state and institutional regulations and protocols have emerged that explicitly address the rights of Indigenous peoples vis-à-vis archaeologists. In 1991, for example, the World Archaeological Congress disseminated a new code of ethics that acknowledges Indigenous peoples as stakeholders by unambiguously stating that, "indigenous cultural heritage rightfully belongs to the descendants of that heritage" (World Archaeological Congress 1991). Articles in the United Nations' *Declaration on the Rights of Indigenous Peoples*, adopted by the General Assembly on September 13, 2007, similarly and explicitly assert Indigenous rights to identity, culture, and property.

Future Directions

Decolonizing approaches have already proven influential in world archaeology, by encouraging collaboration with Indigenous and local communities to improve the identification and understanding of significant traditional heritage sites.

Legal protections for cultural heritage and resource management policies have evolved to address the practical protocols and the social dimensions of practicing Indigenous archaeology; as a result, heritage organizations are producing less colonial and more culturally nuanced interpretations of the past (Messenger and Smith 2010). Decolonizing archaeologists have also worked to avoid reproducing the inequities inherent in colonial practices in the field. In Australia and New Zealand, for example, archaeologists are increasingly expected to negotiate with Indigenous communities before, during, and after excavating cultural heritage sites (Australian Archaeological Association 1994). In some regions, these negotiations have recovered evidence of older cultural practices that can be repurposed to ensure the conservation and regeneration of local flora and fauna over time (e.g., Colwell-Chanthaphonh and Ferguson 2008; Atalay 2012). Meetings facilitated by the World Archaeological Congress and other organizations have brought together archaeologists from disparate locales to share common cause and form global alliances focused on decolonizing (Smith and Wobst 2005: 13).

Future students of archaeology can learn from and build upon these strides to uncover new intersections among past and present identities and cultures. They will find that Euro-colonial concepts of race, kin, and identity do not easily mesh with non-Western visions of modernity. Decolonization must be viewed as a "long-term process involving the bureaucratic, cultural, linguistic, and psychological divesting of colonial power" (Smith 1999: 98). Archaeologists have found it necessary to renegotiate and redefine terms (e.g., post-racial, intercultural, transnational) that attempt to define complex expressions of Indigenous and ethnic identities in the postcolonial, postmodern world (Smith and Wobst 2005; Bruchac et al. 2010). Standardized terms and approaches (e.g., processual and post-processual, distinct temporal eras, social evolution) may no longer be universally applicable. Even the terms "postmodern" and "postcolonial" are problematic since these perpetuate the illusion that colonial domination of the Indigenous has ended.

Just as there is no single colonial model that encompasses all of colonialism, there is no single Indigenous model and no single decolonizing approach. The inclusion of nonscientists as research partners has revealed cultural and procedural differences that are not always easy to bridge. By engaging with living communities, archaeologists have improved popular understandings of Indigenous peoples and local communities in the present-day, postcolonial modern world. Processes of consultation and collaboration have been transformative, but they have also been difficult, given the inherent power imbalances among scientists (as apparent agents of colonial nation-states) and archaeological subjects (as recovering victims of colonization). Indigenous peoples and other colonized communities have expressed needs that do not always match with archaeological goals, categories, and routines. Better attention must be paid to the handling of tangible and intangible cultural heritage, with consideration for the spiritual, ephemeral, and experiential relations of Indigenous peoples with the natural world (Atalay 2012). These interactions will require careful, patient communication.

Future efforts in decolonizing archaeology will require situationally specific, carefully negotiated approaches that attend to social contingencies as well as scientific concerns (Bruchac et al. 2010; Messenger and Smith 2010). Many Indigenous communities (in common with other marginalized peoples) still suffer from the impacts of colonization, including persistent poverty and political marginalization. Teams of stakeholders – including archaeologists, museum staff, descent communities, traditional knowledge-bearers, developers, and representatives of state societies – can decolonize their own social relations and share common cause by coming together to protect locales that house unique histories (Messenger and Smith 2010).

The environmental effects of colonialism are most obvious in patterns of land use and development that resulted in the wholesale extraction of natural resources and destruction of cultural landscapes. Decolonizing projects that explicitly

involve and empower Indigenous and local communities are likely to have an impact on long-term land use. Some archaeologists have sought to preserve endangered cultural heritage sites by including both site preservation and social justice as a desired goal (e.g., Smith and Wobst 2005; Bruchac et al. 2010; Messenger and Smith 2010; Oland et al. 2012). Collaborations with Indigenous knowledge-bearers can inspire projects that draw upon traditional knowledges to shape new approaches. Rather than subject their lands and ecosystems to commercial development and resource extraction, formerly colonized communities might explore forms of sustainable development (such as heritage tourism and seasonal hunting) that can generate income and encourage site preservation. Archaeologists can assist in these efforts by conceptualizing and implementing projects that dovetail scientific research with historical preservation and community needs. International organizations (e.g., the United Nations, UNESCO, and the World Archaeological Congress) can support such initiatives by continuing to promote protocols that explicitly link cultural preservation with sustainability.

Cross-References

- ▶ Community Engagement in Archaeology
- ▶ Ethics in Archaeology
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Holographic Epistemology: Native Common Sense
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Multicultural Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Repatriation: Overview
- ▶ Sacred Sites in Indigenous Archaeology
- ▶ Stakeholders and Community Participation
- ▶ United Nations Declaration on the Rights of Indigenous Peoples (2007)

References

Atalay, S. 2012. *Community-based archaeology: Research with, by, and for indigenous and local communities*. Berkeley: University of California Press.

Australian Archaeological Association. 1994. Australian Archaeological Association code of ethics. Available at: http://www.australianarchaeology.com/about-2/code-of-ethics/#indigenous. Accessed 15 Oct 2012.

Bruchac, M.M., S.M. Hart, and H.M. Wobst, eds. 2010. *Indigenous archaeologies: A reader on decolonization*. Walnut Creek: Left Coast Press.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2008. *Collaboration in archaeological practice: Engaging descendant communities*. Lanham: AltaMira.

Denzin, N.K., Y.S. Lincoln, and L.T. Smith, eds. 2008. *Handbook of critical and indigenous methodologies*. Thousand Oaks: Sage Publications.

Habu, J., C. Fawcett, and J.M. Matsunaga, eds. 2008. *Evaluating multiple narratives: Beyond nationalist, colonialist, imperialist archaeologies*. New York: Springer.

ICOMOS New Zealand. 1995. ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value. Available at: http://www.icomos.org.nz/nzcharters.htm. Accessed 15 Oct 2012.

Maybury-Lewis, D. 2002. *Indigenous peoples, ethnic groups, and the state*. Boston: Allyn and Bacon.

Merryman, J.H., ed. 2006. *Imperialism, art, and restitution*. Cambridge: Cambridge University Press.

Messenger, P.M., and G.S. Smith, eds. 2010. *Cultural heritage management: A global perspective*. Gainesville: University Press of Florida.

Mihesuah, D.A. 2000. *Repatriation reader: Who owns Native American Indian remains*. Lincoln: University of Nebraska Press.

Nicholas, G.P. 2010. *Being and becoming indigenous archaeologists*. Walnut Creek: Left Coast Press.

Oland, M., S.M. Hart, and L. Frink, eds. 2012. *Decolonizing indigenous histories: Exploring prehistoric/colonial transitions in archaeology*. Tucson: University of Arizona Press.

Schmidt, P.R., and T.C. Patterson, eds. 1995. *Making alternative histories: The practice of archaeology and history in non-Western settings*. Santa Fe: School of American Research Press.

Smith, L.T. 1999. *Decolonizing methodologies: Research and indigenous peoples*. London: Zed Books.

Smith, C., and H.M. Wobst, eds. 2005. *Indigenous archaeologies: Decolonizing theory and practice*. London: Routledge.

Swidler, N., K.E. Dongoske, R. Anyon, and A.S. Downer, eds. 1997. *Native Americans and archaeologists:*

Stepping stones to common ground. Walnut Creek: AltaMira Press.
Watkins, J. 2000. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: AltaMira Press.
Wobst, H.M. 2005. Power to the (indigenous) past and present! Or: The theory and method behind archaeological theory and method. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 17–32. London: Routledge.
World Archaeological Congress. 1991. World Archaeological Congress code of ethics. Available at: www.worldarchaeologicalcongress.org/site/about_ethi.php#code1. Accessed 30 Mar 2010.

Further Reading

Atalay, S. 2006. Indigenous archaeology as decolonizing practice. *The American Indian Quarterly* 30 (3&4): 280–310.
Cassman, V., N. Odegaard, and J. Powell, eds. 2007. *Human remains: Guide for museums and academic institutions*. Oxford: AltaMira Press.
Conkey, M.W. 2005. Dwelling at the margins, action at the intersection? Feminist and indigenous archaeologies. *Archaeologies: Journal of the World Archaeological Congress* 1 (1): 9–59.
Dongoske, K.E., M. Aldenderfer, and K. Doehner, eds. 2000. *Working together: Native Americans and archaeologists*. Washington, DC: Society for American Archaeology.
Fforde, C., J. Hubert, and P. Turnbull, eds. 2002. *The dead and their possessions: Repatriation in principle, policy, and practice*. London/New York: Routledge Press.
Kerber, J.E., ed. 2006. *Cross-cultural collaboration: Native peoples and archaeology in the Northeastern United States*. Lincoln: University of Nebraska Press.
Kovach, M. 2009. *Indigenous methodologies: Characteristics, conversations, and contexts*. Toronto: University of Toronto Press.
Lonetree, A. 2012. *Decolonizing museums: Representing Native America in national and tribal museums*. Chapel Hill: University of North Carolina Press.
Pyburn, K.A. 1999. Native American religion versus archaeological science: A pernicious dichotomy revisited. *Journal of Science and Engineering Ethics* 5: 355–366.
Sullivan, L.E., and A. Edwards. 2004. *Stewards of the sacred*. Washington, DC: American Association of Museums and Harvard University Center for the Study of World Religions.
Wobst, H.M., and C. Smith. 2003. "Unothering": Theory and practice in archaeology. In *Indigenous people and archaeology: Proceedings of the 29th Annual Chacmool Conference*, ed. T. Peck and E. Siegfried, 211–225. Calgary: Archaeological Association of the University of Calgary.

The Decolonization of Venezuelan Archaeology

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Introduction

How does Venezuela situate itself in terms of worldwide movement towards decolonizing archaeology? The relevance of such a query is that since the last two decades, Venezuela has been receiving increased attention due to the political process claiming a radical transformation of society. Therefore, one of the central discourses in the government supporter scholarly field has been the potentiality of current scenario for a decolonial approach to knowledge production. Certainly, diverse ideological positions from nineteenth century onwards have influenced archaeology and current events are not an exception. In this trajectory, despite multiple changes in approaches, some elements of coloniality are still present, such as racism and inequality. Public policy in Bolivarian Revolution has not provided mechanisms to accomplish in practice what discourse offered. Neither state-driven archaeological projects nor Cultural Heritage management initiatives have included local communities in assertive ways. It actually supported Western models for understanding the pasts and approaching materialities, at the same time that disrespected other cosmologies. Moreover, practices in archaeology more broadly rarely assume critical perspectives to the cross-linking of past and present or human and nonhumans. Nevertheless, the scant attempts to forge alternatives procedures and epistemologies in Venezuelan archaeology in spite of adverse contexts are worth underlining, since it collaborates to discuss logocentrism and its deconstruction.

Definition

Venezuelan archaeology has experienced diverse influences concerning international debates on

theory and methodology, but there has also been an interesting local production of knowledge and specific practical experiences. Nevertheless, it has not always been attention directed to what the colonial ballasts of disciplinary archaeology are, neither how can researchers contribute to ongoing debates on cultural heritage, communities, and ethics. The decolonization of Venezuelan archaeology is a task to accomplish.

Historical Background

Modernity was the ideal to achieve by Venezuelan elite at the end of nineteenth century. Venezuelan country was seen as belated, especially due to the several wars effects at the Independence period. Therefore, European values were promoted and all past-related references were crossed by a necessity of overcoming. One of the salient aspects of this times that continues even now is the idea of Venezuelan prehispanic cultures' simplicity. Comparisons with other countries monumentality, such as Peru and Mexico, brought a conception of a local primitivism.

There were Venezuelan intellectuals interested in the historical aspects of the nation, who articulated the extraction of past artifacts and its collection. Also, foreign explorers set forth approaches to investigate archaeological vestiges. Therefore, expropriation of archaeological objects is commented as early as 1887, when Adolf Ernst described Andean pottery and said that valuable findings were carried to the Washington Museum and San José de Costa Rica Museum. Also, early in twentieth century, Alfredo Jahn organized archaeological excavations funded by the Berlin Ethnological Museum (Meneses and Gordones 2009). At that time, with Nation-state consolidation, there was a greater interest in official sponsoring of archaeological research and the organization of public collections to be exhibited in national museums.

President Guzman Blanco started an official cult of Simon Bolivar's image. Bolivar is the republic "founding father," also called "the Liberator," concerning his role in Venezuela's Independence from being a Spanish colony. There was a promotion of restoration of historical buildings related to Bolivar family. Also, in that context, the first legislation on historical heritage appeared: the 1917 Decree on Protection of Official Documents and Historical Objects. As Molina (2007) shows, from that time onwards, Heritage legislations had two characteristics: they did not contemplate the dynamism of cultural phenomena and took heritage management to be a State prerogative. State interest was more notable in the historical period, and prehispanic research was generally a camp of foreign researchers.

Archaeological collections from Venezuela were sold to the National Museum of the American Indian, at the Smithsonian Institute. Other institutions holding archaeological artifacts from Venezuelan territory are: American Archaeology and Ethnology Museum in Harvard University, the American Natural History Museum in New York, Yale Peabody Museum, the University of California, and Quai Branly Museum in Paris, holding as well ethnographical collections.

In the context of United States policy of Good Neighbor, there were wide funding for archaeological research. The diffusionist interpretations produced at that period served to promote a vision of Venezuelan past as underdeveloped, useful to support ideological framework of north-American economic expansion (Meneses and Gordones 2009). The main discussion was the "H" hypothesis of Cornelius Osgood and George Howard, explaining Venezuelan territory being a space for migration in prehispanic times.

This debate was maintained by the work Chronological Archaeology of Venezuela, authored by J.M. Cruxent and Irvine Rouse, which is a descriptive regional account of archaeological remains from all around the country. It classified objects and cultures as "simple" or "complex" according to their perceptions of complexity (Scaramelli 2016).

Venezuelan Miguel Acosta Saignes was an insightful critic of these archaeological interpretations by expressing his concern about history in education, when children were presented Venezuelan prehispanic past as nonrelevant and the idea that history started with Columbus's "discovery"

of this land. Therefore, several connections were established with an apology of colonialism.

Local research through a positivist perspective was related to the modernizing enterprise in Venezuela and the political structure that attempted to overpass indigenous past (Vargas 2005). Scaramelli's quotes of one of the most prominent ideologues advising President Perez Jiménez, in 1957, explains this position: "the country would be better off if the 'insignificant bits of ceramic plates and idols' were turned under by a tractor and replaced by real cities and agriculture" (Vallenilla Lanz 1957, in Scaramelli 2016: 70).

In a confrontation with that ideological context arises the movement of the Latin American Social Archaeology, a theoretical line based on Historical Materialism that had VenezuelansMario Sanoja and Iraida Vargas among their central thinkers. The proposal was considering archaeology as an oppression weapon when serving to justify exploration of indigenous and peasants, through theories that show their "historic inferiority" in front of European (Lumbreras 1974: 6). So, they intended to produce a different dialectic archaeology that recognized political activity in past and present.

During Bolivarian Revolution, these researchers have focused on linking the production and accumulation of labor in precolonial and colonial periods, the long-term trajectories of class fights, and subaltern solidarity. In that sense, they place a linkage between an "original indigenous socialism" and nineteenth-century "proto-socialist organizative forms," as the basis for the construction of present socialism (Vargas 2008). This work has resulted in an un-critical perspective on the continuation of power inequality in Venezuela and the adjustment of historical and archaeological research to provide an ideological foundation of a predetermined nationalist conception. Moreover, there was a development of an idea of homogenization of all "subaltern" subjects, such as indigenous, blacks, peasants, and urban poor people, agglutinated from the class-fight perspective.

By another side, critics against miscegenation theories were strongly established from the decade of 1980, as Miguel Acosta Saignes settled a tough position questioning Venezuelan discourse about the population to be a mixture of Spanish, Indians, and black people, from colonial times, then blurring any possibility for a distinctive ascendency. Even though there is no much debate on race in Venezuela, some researchers like Kelly (2016) re-actualize the current understanding of social dynamics regarding ethnicity in national society framework.

D

Key Issues/Current Debates

The political context in Venezuela has had a great impact on the disciplinary becoming of archaeology. Bolivarian Revolution displayed a public discourse of the country's transformation towards decoloniality. Situating themselves against Western neoliberalism, government ideologists designed a set of central nodes that could collaborate with their popular legimitization. One of those discourses is that of a "government of the people," where grassroot organizations were supposed to work in conjunction with centralized political powers to produce a re-distribution of power and resources.

The Community Archaeology Project developed by the Cultural Heritage Institute (IPC) has been an initiative for "empowering" communities as a public policy, conforming a proposal for a "social management of archaeological heritage." Through the assistance of archaeological workshops, ministered by IPC functionaries, local groups are "trained." The Project explicitly states its participation in the government's national project, the Plan Bolívar 2007–2013, and attests to affirm the socialism values, through the non-academic formation in archaeology by communities "interested in knowing their cultural past" (IPC 2011: 2).

IPC's workshops were to proportionate technical tools for archaeological recollections, registration, conservation, and exhibition. People were supposed to learn about cultural tourism and how to build community museums. In that sense, this program shares some of the philosophical basis about community archaeology discussed in the international literature, but it is *sui generis*,

due to several own notions about community management integrating archaeological techniques. It is certainly paradoxical the promotion of local decision-making coming from the state and overtly linked to government's structure. As Ferreira (2013: 80) states: "without civic movements, there would be no critic to the Western canon and to the logocentrism in heritage rhetoric, the archaeological legislations and the research ethics codes, would stay stopped." But what does it happen if transformations come with a community rhetoric, parting from a strongly institutionalized ideological project, disarticulating the possibilities of politic plurality? Following Ferreira, this inserts itself into a pretended democratic intonation that serves to better control and repress cultural diversity. This is so because there was a possibility for a nonorthodox model of public policy concerning archaeological management, where local people could have had a central role, but their pedagogic stance of technical knowledge and ideological propaganda achieved no real local participation. It was not comprising local heterogeneity, rather "community" in Venezuela is a category directly associated with government supporters. Several researchers worldwide attest to the diverse ways in which people interact with past materialities, and those other logics are highly important for a transformation of disciplinary archaeology. In that sense, IPC's project wasted a great opportunity for a radical move to decolonize.

Continuing this argumentation, Venezuelan Cultural Heritage laws promote local recognition and conservation of cultural and historical heritage, but no real possibilities of local management of archaeological sites are being established. This is related to the fact that state discourse declares a turn from elite-centered constructed heritage (as colonial houses, catholic churches, or military fortifications) to the understanding of heritage from a popular perspective. But there was no attention given to alternatives to top-down strategies in public policy, neither to the importance of the dynamic preservation of cultural heritage, away from state-related projects. National Constitution in its Chapter VI, Articles 99, designates the protection of tangible and intangible cultural heritage as a State function. Therefore, specific initiatives such as the I Census of Venezuelan Cultural Heritage (by the Institute of Cultural Heritage) are in a cloudy legal position. This Census included a declaration of heritage status to objects and places identified by local communal councils and promoted that these instances function as stewards (IPC 1997). But besides this attempt to develop an alternative heritage approach, no further movement was put into action. Moreover, initiatives to promote cultural heritage in local communities are not granted support. For instance, a museological exhibition by Yara Altez's team concerning "Osma Memories," including historical, anthropological, and archaeological research of an afro-descendant community in central coast Venezuela, was closed by state representatives from the National Library Foundation.

Another aspect to discuss is the contradiction at the State's heritage policy since they claim a discourse of local power without enabling it, and at the same, they wholly support the idea of "Universal Heritage" as proposed by the UNESCO. Internationally, there have been pointed out how the inventory scheme of UNESCO's projects institutes a rationality of "exemplarity," producing in parallel non-recognized heritage (Hafstein 2014). Even more, the relevance of this perspective of Cultural Heritage as a governmental technique (in a Foucauldian sense) contributing to population management is clear.

It is important to underscore how during the last decades, there has been a salient State's sponsoring of historical and archaeological research about the Independence period (nineteenth century) and the spaces where "national heroes" developed their actions and quotidian life. For example, the project "Bolivarian Archaeology" led by Professor Rodrigo Navarrete between in 2006 was designed to present an "evocative" view of Simon Bolivar's daily life context through material, historical, and oral sources. Representing Bolivar as a social agent highlighted him as a human being and not as a mythical figure, so it could be closer to people (Scaramelli 2016). Therefore, a museological exhibition in Caracas city served to publicly establish an ideological association of past dynamics with the current political process. It is not by chance that one of

the most popular mottos of Bolivarian Revolution is "the fight continues," and Chavez considered himself as the twenty-first-century Liberator. Furthermore, the activation of heritage process of Mapoyo people as the first indigenous cultural heritage proposed by Venezuelan State to one of UNESCO's list is closely related to Mapoyo's possession of a sword owned by Simon Bolivar in nineteenth century (Meza and Menezes Ferreira 2016).

By another side, Gender Archaeology has been actively promoted by Professor Rodrigo Navarrete. Constituting cross-disciplinary study group Contranatura, he explored sexual diversity, ideology, and the political perspectives of research focused on gender and queer theories. Several publications and seminars have been organized as well as the promotion of anthropology student's critical education. Professor Navarrete has also been a pioneer in approaching an archaeology of present in Venezuela. One of his main contributions is a study of discourses crossed by gender, ethnicity, race, and class, as present in material manifestations like street graffiti (Navarrete and Lopez 2009), and more recently on material culture associated to the practice of prostitution in Caracas' night. In spite of current discourses in Venezuela affirming the openness of spaces for this discussion, it has been occurring due to groups and individuals interested and not because of official support.

Similarly, beyond symbolic manifestation, Venezuelan State has not done significant actions to collaborate with contemporary indigenous resistance or with the respect of their perspectives on the past. At his candidate discourse, Hugo Chavez expressed the need of reparation towards the "pueblos originarios" (first nations), due to a historical debt from Venezuelan state. Nevertheless, as several research works indicate, that debt was not paid. Bolivarian Revolution identifies itself with a "multicultural rhetoric" that presented a better panorama for indigenous peoples rights, through the creation of several institutional and juridical instances specifically directed to attend them. But highly partidized and bureaucratic procedures produced bigger inequality in the access of resources and exclusion of indigenous groups or individuals who do not claim support of Bolivarian ideology, for example, the Indigenous Communal Councils. These are state-produced local organizations that were created to articulate local needs and public policy, but their actual characteristics have dismantled the "popular power" discourse. Political science scholars have criticized communal councils due to state clientelism and corruption cases. Also, it is remarkable that the government presentation of communal councils as an advanced popular organization takes as the reference for its constitution, indigenous ancestral organization. Nevertheless, there is no evidence of a real relationship with indigenous sociability, since several indigenous communities that have tried to propose communal councils to achieve needed resources have not being able to cope with Comunas Popular Power Ministry's procedures and exigencies. In that sense, a discourse of nonhegemonic inclusion ends up promoting the continuity of the establishment.

In the same vein, within national Constitution, there should be a previous consultation with communities affected by natural resources exploitation, but no indigenous community was consulted concerning the establishment of a mega-mining military industry, with mixed transnational capital, the Orinoco Mining Arc. Actually, the government banned protesting against this project, because it is considered as strategic to the nation development. Government representatives argue that they are doing an "ecological mining," but at the same time, their policy does not unlink itself from a neo-liberal project. This is having an enormous effect on indigenous communities and their territories, including archaeological and memory sites.

This context of generalized disrespect of indigenous peoples and ecosystems can be related to the fact that in terms of archaeological repatriation, there are very few experiences to relate. That debate has not been actively incorporated into universities discussions and local communities request for archaeological materials rarely take public dimensions. One exception is the case of Pemón indigenous people, who during two decades requested to Venezuelan authorities to

ask German government to return the "Piedra Kueka," considered by them an ancestor, a grandmother, who should not be in an artistic foreign public exhibition. The stone was not returned yet; however, it rekindled the national government interest in requesting the devolution of archaeological and ethnographical collections that were taken away in different moments and are part of European and Northamerican Museums, also without the appropriate measures to make this possible. This idea of archaeological repatriation was developed by archaeologists Lino Meneses and Gladys Gordones from Los Andes University in one of their books, where they propose the creation of a History Museum Network, working locally, regionally, and nationally, and where those artifacts could have a social use, advancing the knowledge on the Republic's origin (Meneses and Gordones 2009). Up to this moment, there is no History Museum in Venezuela. There was a project to the construction of a National Museum, but it was not finally accomplished.

In another path, an interesting case of repatriation took place close to the inauguration of Murükuní Community Museum. Mapoyo people received archaeologists Kay and Franz Scaramelli (Venezuelan Institute of Scientific Research (IVIC) and Central University of Venezuela) and supported their research during several years. One of the results was the documentation of Mapoyo ancestral territories as part of state exigencies to demarcate indigenous land. But also, Mapoyo people declared an interest in a local stewardship of materials found in their territory, one of the reasons for the construction of the museum. Therefore, researchers agreed to return archaeological collections as well as copies of written articles and dissertations developed in Mapoyo's territory to be part of a local library adjacent to the museum. Nevertheless, besides this experience, there is a shouting inexistence of collaborative projects and theoretical thinking towards decolonization of archaeological practices in the country.

This discussion can be crossed with the actual understanding of archaeological collections' state of affairs. According to a systematic overview of most archaeological collections in Venezuela carried out in 2011, research centers are not having the adequate conditions for material conservation. One paradigmatic case is Archaeology Department in the Central University of Venezuela, where in spite of internal attempts to organize the deposits, there is a fragile infrastructure that allowed the entrance of animals and humidity. Those conditions are very common in archaeological repositories in Venezuela (Díaz 2006). Another relevant problem is the lack of documentation of most of the archaeological materials, producing a de-contextualization of the artifacts. Both issues are especially worrying considering the presence of human remains from the past that were excavated and translated to museums or universities, without any sensibility, interest in reburial or even preservation of their physical integrity.

More generally, the deficiency in financial support of research centers promoted from Chavez government onwards has had a strong influence in the almost total paralyzation of archaeological work in Venezuela. For instance, the archaeological precolonial site "Taima-Taima," which was musealized to be an outdoor in situ exhibition of lithic artifacts and megafauna, now is practically closed.

International Perspectives

Nation-state formation in Latin America took various references from European perspectives around historical and archaeological objects, for example, the idea of the role of State in institutionalizing what would become a common patrimony and how is managed its conservation (Molina 2007). Enlightenment influences on conceptualizing monuments and antiquities, served as the basis for the constructions of museums with state financial. But it also promoted cultural artifact spoliation as a common practice. And that is a history uniting Europe and the Americas. Nevertheless, the conception of the "need of more information" from those artifacts and claims of the universal character of Cultural Heritage makes difficult serious thinking on repatriation, clearly an ethical-political endeavor (Lowenthal 2005). Of course, bad conditions in archaeological objects deposits, as it is the

case for Venezuela, but also for many countries, also contribute to a debate on artifacts conservation. In that sense, it is important to remark that archaeological fieldwork continuously produces more and more accumulation of fragments, in a way that even impedes its real processing, registration, and analysis, and that panorama should take into consideration the quantities of objects from past research that may even lack "contextual information."

There has been a relatively little discussion about these themes in Latin America, for instance, comparing to countries as United States, Australia, New Zealand, mostly promoted by indigenous groups. For instance, Smith (2005) comments on the construction of the exhibition at the National Museum of the American Indian (Washington) according to diverse indigenous cosmologies, challenging the racial hierarchy implicit in hegemonic cultural discourses. Even presenting particular challenges, these initiatives contribute to transforming the unequal power relationships permeating colonial practices in cultural heritage processes. This discussion goes hand in hand with the statements of Atalay (2006) regarding the decolonial approach, which question what are the "valid" views and actions with respect to the past. Archaeological and museological practices grounded on Western values have generally privileged material and scientific interpretations, instead of spiritual and sensorial dimensions. In that way, indigenous scholars and activists put the focus on native intellectual contributions and rights to stewardship.

One interesting experience is from Argentina, where a collection of human skeletons from Pampa and Patagonia region, attributed to Tehuelches and Araucano peoples, were being requested by indigenous associations since 1970s. These groups were massacred in nineteenth century in order to conquest their territories and their bodies were exhibited in La Plata Museum, from La Plata National University. This institution refused to repatriate the human remains in the base of the public property of the State and the impossibility of probing consanguineous kinship (Endere et al. 2010).

In 1991, the first repatriation law allowed the reburial of Tehuelche cacique Inakayal. The second one took one more decade. A recent more general legislation establishes that museums must put into the disposition of indigenous people the human remains from their collections. But a lack of specific procedures has difficulted its actual implementation. Even so, it has also promoted that researchers are compelled to request a permission to indigenous people to excavate. Also in Argentina, there have been some examples of conjunct projects with indigenous communities for archaeological site management, as Neuquén Province site-museum Añelo, under Mapuche Painemil stewardship. As well, the National Park Administration returned to Mapuche community of Ñorquinco the guard of a sacred site in Lanín National Park, safekeeping "rehue" which is a ritual monument and a space with rock paintings (Endere et al. 2010).

This kind of initiatives is almost inexistent in other Latin American contexts. This is so even though since the decade of 70 there was a development of the movement of Latin American Social Archaeology that strongly discussed theoretical perspectives "from our realities." Their critics of imperialism, capitalism, and class inequalities did not move them or their scholarly descendants to worry about communities relationships with objects from the past. In fact, historical materialism approach with its evolutionary perspective has little contributed to developing decolonial archaeologies. In cases like Venezuela, this current has been more attracted to support nationalistic enterprise than producing transformations of the disciplinary colonial conventions of archaeology.

Notwithstanding, archaeology development in Venezuela can be understood in terms of what Gnecco (2002) calls an "indigenization of national archaeologies." Above comments on Bolivarian Community Archaeology present a different setting of what is called "community archaeology" in other parts of the world, for instance, as part of Cultural Resources Management.

Most Latin American countries share the ideological construction of a history where European

descent is valorized and indigenous people are considered as savages from the past. Likewise, afrodescendant communities still face official denials of their contributions to the History of these nations.

In that sense, indigenous and afro-descendants have been systematically removed from decision-making processes concerning their Cultural Heritage, underscoring for our debate, archaeological remains. Therefore, the relevance of Collaborative Archaeology projects performing a political engagement with communities' rights or to the fight against prevailing racism and discrimination, rather than with State projects, is clear.

Future Directions

The preterization of indigenous and denial of black people is probably the most important task to de-construct with archaeological research in Venezuelan scenario. There is a clear continuity in historical processes that have led to a profound disparity between groups' possibilities to, among other things, participate in the production of knowledge about the past. A decolonization of archaeology necessarily goes through an understanding of diverse discourses, with a lucid recognition of past and present relationships.

But unidirectional efforts would not achieve any transformations. In that sense, there is an urgent need for collaborative projects in Venezuelan archaeology. Following Atalay's (2012) discussions, this implies close conjunct works, where local communities, understood in their heterogeneity, may debate the interpretations of archaeological artifacts and contexts, in a partnership level. There is no call for an unsophisticated claim of a vanishing of power relationships, rather a conscious position to promote a moving of those positions.

The work of/with native people has been a major engine of disciplinary transformation of archeology, showing strongly how much it is a political endeavor (McGuire 2008). We consider that decolonization "is not a naive abandonment of canonical epistemologies, but rather a gradual exercise of reinvention and critical revision, breaking the insularities of knowledge-producing spaces" (Silva and Falcão 2017: 166). Thus, it urges us to review the theoretical and methodological bases that constituted what we know as archeology, as well as the references it values, its forms of social circulation, and the dialogues (or lack thereof) established with descendants communities. This perspective is fundamental in the postcolonial world because the intersection of national, colonial, and racial modernity constituted the foundations from which we established a specific relationship with the past (Hamilakis 2018), which functions as a mechanism of (de) authorization of specific knowledge.

On the other hand, this attitude opens opportunities to explore diverse ways to relate to the past and with artifacts, from other cosmologies and from other political epistemologies. Then, it will gain relevance an archaeology of the present and further attention to other types of materialities beyond "traditional" sources for archaeological research. This has the potential to question the policies of conservation of collections from other points of view, not only the technical perspective that until now prevails all over the world. As well, it is possible to consider digital technologies for implementing more accessible, editable treatments of research products. A bigger compromise with alternative narrative constructions for archaeology can enable cross-borders projects, and so, more complex understandings of diachronic dynamics.

At last, it is important to mention non-anthropocentered archaeology as a potential perspective for a decolonization of archaeological methods and theories. The only work to the moment dealing with human–nonhuman relationships in Venezuelan archaeology is the recent PhD research by Konrad Anctzack (2017), about things and seafarers in Los Roques Island. Hopefully, this also would be a prolific field for re-thinking archaeology broadly in the future.

Cross-References

► Archaeology and Anthropology
► Heritage and archaeology

References

Anctzack, K. 2017. *Entangled by salt: Historical archaeology of seafarers and things in the Venezuelan Caribbean, 1624–1880*. Doctoral Dissertation in Anthropology. College of William and Mary.

Atalay, S. 2006. Indigenous archaeology as decolonizing practice. *American Indian Quarterly* 30: 280–310.

Atalay, S. 2012. *Community-based archaeology*. Los Angeles: University of California Press.

Díaz, N. 2006. *La documentación de las colecciones arqueológicas del Lago de Valencia: documentación y nueva museología*. Valencia: Alcaldía de Valencia.

Endere, M., P. Cali, and P.P. Funari. 2010. Arqueología y comunidades indígenas. Un estudio comparativo de la legislación de Argentina y Brasil. In *Pueblos indígenas y Arqueología en América Latina*, ed. C. Gnecco and P. Ayala. Bogotá: Ediciones Uniandes.

Ferreira, L.M. 2013. Essas coisas não lhes pertencem: relação entre legislação arqueológica, cultura material e comunidades. *Revista de Arqueologia Pública* 7: 87–106.

Gnecco, C. 2002. La indigenizacón de las arqueologías nacionales. *Convergencia* 27: 133–149.

Hafstein, V. 2014. Protection as dispossetion. Government in the vernacular. In *Cultural heritage in transit. Intangible rights as human rights*, ed. D. Kapcha. Philadelphia: University of Pennsilvanya Press.

Hamilakis, Y. 2018. Decolonial archaeology as social justice. *Antiquity* 92: 518–520.

Instituto del Patrimonio Cultural. 1997. *Proyecto Inventario Nacional del Patrimonio Cultural: plataforma conceptual*. Caracas: Instituto del Patrimonio Cultural.

Instituto del Patrimonio Cultural. 2011. *Taller de arqueologia comunitaria*. Caracas: Instituto del Patrimonio Cultural.

Kelly, J. 2016. *Sobre a Antimestiçagem*. Curitiba: Species-Núcleo de Antropologia Especulativa.

Lowenthal, D. 2005. Why sanctions seldom work: Reflections on cultural property nationalism. *International Journal of Cultural Property* 12: 393–423.

Lumbreras, L. 1974. *La Arqueología como Ciencia Social*. Lima: Ediciones Histar.

McGuire, R. 2008. *Archaeology as political action*. Berkeley, CA: University of California Press.

Meneses, L., and G. Gordones. 2009. *De la arqueología en Venezuela y las colecciones arqueológicas venezolanas. Colección Bicentenario*. Caracas: Centro Nacional de Historia.

Meza, E., and L. Menezes Ferreira. 2016. La espada de la independencia: agencia de los objetos, materialidad y recursos políticos en el proceso de patrimonialización entre los Mapoyo (Venezuela). *Revista de Arqueología Pública* 10 (3): 91–113.

Molina, L. 2007. La conservación del patrimonio cultural en Venezuela: Nuevas oportunidades a partir de 1999. *Revista Venezolana de Economía y Ciencias Sociales* 13 (3): 129–141.

Navarrete, R., and A. Lopez. 2009. Scratching behind the walls; graffiti and symbolic political imagination at Cuartel San Carlos (Caracas, Venezuela). In *Memories from darkness: Archaeology of repression and resistance in Latin America*, ed. P.P. Funari, A. Zarankin, and M. Salerno. New York: Springer.

Scaramelli, K. 2016. Historical archaeology and the politics of empowerment in Venezuela. In *Archaeologies of early modern Spanish colonialism*, ed. Sandra Montón-Subías, María Cruz Berrocal, and Apen Ruiz Martínez, 61–91. New York: Springer.

Silva, L., and I. Falcão. 2017. Colonialidade na dança e as formas africanizadas de escrita de si: perspectivas sul–sul através da técnica Germaine Acogny. *Conceição Concept* 6 (2): 162–173. Campinas.

Smith, C. 2005. Decolonising the museum: The national museum of the American Indian in Washington, DC. *Antiquity* 79: 424–439.

Vargas, I. 2005. Visiones del pasado indígena y el proyecto de una Venezuela futura. *Revista Venezolana de Economía y Ciencias Sociales* 11 (2): 187–210.

Vargas, I. 2008. Bases históricas para la creación de la Participación Democrática en Venezuela. Arqueología Social e Historia Regional. Boletín de Antropología Americana 41.

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DeCorse, Christopher

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Basic Biographical Information

Born in New York in 1956, Christopher DeCorse grew up in New Hampshire. Graduating with a B.A. in Anthropology in 1978, he joined the Peace Corps, working with the Sierra Leone Ministry of Agriculture and Forestry for 2 years. While in the Corps, he conducted an archaeological survey of and excavations at defensive sites in the Koinadugu District, northeastern Sierra Leone (DeCorse 2012). Subsequently, he enrolled in the relatively new Interdepartmental Program in Archaeology at the University of California, Los Angeles (UCLA), to study under Merrick Posnansky. He completed his master's degree on the Sierra Leonean sites in 1983 and a Ph.D. on the coastal town site of Elmina, Ghana, in 1989. He lectured at the Department of Archaeology at the University of Ghana, Legon, from 1985 to

1987 before returning to the United States where he initially worked in cultural resource management in Pennsylvania, later joining the anthropology faculty at the Indiana University of Pennsylvania. He moved to the Anthropology Department, Syracuse University, in 1992 where he became a full professor in 2006, serving as Department Chair from 2005 to 2012. DeCorse has maintained an active field program in Ghana's Central Region since the 1980s and has also returned to Sierra Leone (in 2006) where he is directing ongoing research at the Bunce Island slave-trading post (DeCorse 2015).

Major Accomplishments

DeCorse has made major contributions to West African archaeology, particularly by his substantive work on culture contact along the Gold Coast and on West Africa during the era of the slave trade (2016). His research has primarily focused on African settlements, rather than the European outposts that were the nodes of early trade relations. He has advocated a broad perspective of historical archaeology that extends beyond definitions that focus more narrowly on European records, source material, and expansion (DeCorse 2008). DeCorse's work on the African town of Elmina, which grew up around Elmina Castle during the time of the gold and slave trade, helped to shift the focus of historical archaeology studies in West Africa from the architectural study of the monumental nature of European trading forts to the nature and scope of how local people experienced such interactions. Adopting a cognitive, poststructuralist perspective, DeCorse demonstrated through material culture that, while a great many new types of artifacts may have been introduced at this time, there was still a great deal of continuity in the way in which such material culture was used in terms of architecture, foodways, and ritual practices (DeCorse 2001).

From 1993, DeCorse (2005) has broadened the chronological and geographical focus of his coastal research in Ghana, initiating the "Central Region Project" in 1998. In addition to providing data for his own work, this project also established a platform for student research, including the first underwater archaeological survey and subsequent excavation off the coast of Ghana (DeCorse et al. 2000). He has supervised projects in both coastal and northern Ghana and elsewhere in the West African subcontinent such as the Gambia, Senegal, and, particularly, Sierra Leone, which has otherwise received fairly little archaeological attention due to the civil conflict and Ebola crisis that has prevailed there.

DeCorse is well known for his expertise in bead identification and other classes of material culture dating to the Atlantic trade era (DeCorse et al. 2003). He has authored or co-authored a number of textbooks on general anthropology and archaeology.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Oral Sources and Oral History
- ▶ Posnansky, Merrick
- ▶ Society for Historical Archaeology (SHA) (Modern World Archaeology)
- ▶ West and Central Africa: Historical Archaeology

References

DeCorse, C.R. 2001. *An archaeology of Elmina: Africans and Europeans on the Gold Coast, 1400–1900*. Washington, DC: Smithsonian Institution Press.

DeCorse, C.R. 2005. Coastal Ghana in the first and second millennia AD: Change in settlement patterns, subsistence and technology. *Journal des Africanistes* 75: 43–52.

DeCorse, C.R. 2008. History, oral tradition, and archaeology on the Mina Coast. In *Small worlds: Method, meaning and narrative in microhistory*, ed. J. Brooks, C. DeCorse, and J. Walton, 77–93. Santa Fe: School for Advanced Research Press.

DeCorse, C.R. 2012. Fortified towns of the Koinadugu Plateau: Northern Sierra Leone in the Atlantic world. In *Landscapes of power: Regional perspectives on West African polities in the Atlantic Era*, ed. J.C. Monroe and A. Ogundiran, 278–308. Cambridge: Cambridge University Press.

DeCorse, C.R. 2015. Sierra Leone in the Atlantic world: Concepts, contours and exchange. *Atlantic Studies* 12 (3): 296–316.

DeCorse, C.R., ed. 2016. *West Africa during the Atlantic slave trade: Archaeological perspectives*. 2nd ed. New York: Bloomsbury Academic.
DeCorse, C.R., E. Carr, G. Chouin, G. Cook, and S. Spiers. 2000. Central region project, coastal Ghana – Perspectives 2000. *Nyame Akuma* 53: 6–11.
DeCorse, C.R., F.G. Richard, and I. Thiaw. 2003. Toward a systematic bead description system: A view from the Lower Falemme, Senegal. *Journal of African Archaeology* 1: 77–109.

Further Readings

Chouin, G.L., and C.R. DeCorse. 2010. Prelude to the Atlantic trade: New perspectives on Southern Ghana's pre-Atlantic history (800–1500). *The Journal of African History* 51: 123–145.
DeCorse, C.R. 1989. Material aspects of Limba, Yalunka and Kuranko ethnicity: Archaeological research in northeastern Sierra Leone. In *Archaeological approaches to cultural identity*, ed. S.J. Shennan, 125–139. London: Unwin Hyman.
DeCorse, C.R. 1991. West African archaeology and the Atlantic slave trade. *Journal of Slavery and Abolition* 12: 92–96.
DeCorse, C.R. 1992. Culture contact, continuity and change on the Gold Coast, 1400–1900 A.D. *The African Archaeological Review* 10: 163–196.
DeCorse, C.R., and Z. Beier. 2018. *British forts and their communities: Archaeological and heritage perspectives*. Gainesville: University Press of Florida.
DeCorse, C.R., and G.L. Chouin. 2003. Trouble with siblings: Archaeological and historical interpretation of the West African past. In *Sources and methods in African history: Spoken, written, unearthed*, ed. T. Falola and C. Jennings, 7–15. Rochester: University of Rochester Press.
DeCorse, C.R., and S. Spiers. 2009. A tale of two polities: Socio-political transformation on the Gold Coast in the Atlantic world. *Australian Journal of Historical Archaeology* 27: 29–42.

Deep-Water Archaeology

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Introduction

Several factors compel archaeologists to explore the deep for shipwrecks. Compared to shallow sites, deep wrecks are not affected by salvage, looting, or postdepositional damage from wave action and therefore may offer more complete information. Deep water may hold different types of vessels and cargoes than those that plied coastal routes, presenting entirely new archaeological data. Wrecks deeper than 1000 m lie beyond the present limits of trawl fishing, which destroys archaeological sites on shallower sea floors. Physical and chemical conditions in the deep sea are stable and conducive to the preservation of fragile remains, including DNA of original cargo elements. Finally, in certain special areas such as the Black Sea, the deep waters are anoxic and therefore preserve organic material including wooden hulls and superstructures, perishable cargo, and possibly even remains of passengers, crew, and livestock.

Definition

"Deep-water archaeology" is a term commonly used to describe investigations beyond normal diving depths, generally accepted to be deeper than 50 m. The average depth of the world's oceans is 4000 m, most of the Mediterranean Sea floor is 3500 m deep, and the abyssal depths of the Black Sea exceed 2500 m. Access to these vast expanses and the countless shipwrecks they contain represents one of archaeology's frontiers.

Despite its name, deep-water archaeology is defined more by the techniques and technologies employed than by water depth. Archaeologists working in the deep sea must adapt methods and technical systems drawn from other ocean sciences, commercial activities, and military applications. Archaeological exploration in the deep sea relies on a variety of technologies, including robotic remotely operated vehicles (ROV) and autonomous underwater vehicles (AUV), human-occupied vehicles, sonar, acoustic navigation sensors, and the global positioning system. As in all archaeology, professional standards require comprehensive pre-disturbance mapping of sites, careful documentation of features, proper conservation of artifacts, and publication of results in peer-reviewed journals.

Key Issues/Current Debates/Future Directions/Examples

In the 1970s, ocean engineer Willard Bascom drew attention to the archaeological potential of the deep sea. Bascom envisioned modifying oil drilling equipment to lift ancient shipwrecks from the sea floor in one piece. While this may seem bizarre, the United States' intelligence services took exactly that approach in Project Azorian, recovering a portion of the sunken Soviet submarine K-129 from 5000 m depth in the Pacific Ocean. However, Project Azorian's cost was staggering, estimated at over $500 million. Bascom's idea was not economically feasible for archaeological projects.

A different strategy for deep submersion investigations employs submersible robotic technology. In the late 1980s, deep-water archaeology took its first steps with robots. In 1988, Dr. Robert Ballard led a team of Woods Hole Oceanographic Institution oceanographers and engineers to Skerki Bank in the Mediterranean Sea, searching the sea floor with the *Argo* towed camera sled. The search revealed a fourth-century-CE wreck at 800 m depth. The following year, Ballard's team, including archaeologists, returned to the site with the *Jason/Medea* ROV system. They surveyed the wreck and adjacent sea floor, produced a photomosaic of the site and recovered artifacts.

Skerki Bank became deep-water archaeology's laboratory, as projects continued in 1995 with the US Navy nuclear research submarine *NR-1* surveying the deep-sea floor and locating three more wrecks. In 1997, the *Jason/Medea* team documented those wrecks, and *NR-1* extended the search area. The effort revealed four additional wrecks and two linear features dubbed "amphora alleys," apparently jettisoned cargo. In 2003, Ballard led a team back to Skerki Bank to reassess the wreck sites, determining that no observable changes had occurred in the intervening years.

NR-1 continued its archaeological survey activity in the eastern Mediterranean in late 1997, and discovered two eighth-century-BCE Phoenician shipwrecks at 400 m depth. These wrecks were investigated by the *Jason/Medea* ROV team in 1999. In 2000, researchers fulfilled another of Bascom's visions by locating intact and perfectly preserved shipwrecks in the deep anoxic layers of the Black Sea. One of these wrecks was partially excavated in 2003 by an ROV, revealing a complete hull and even wax sealing on the ship's amphora cargo. Elsewhere, a specially designed ROV with a robotic excavation system was deployed in 2005 by a Norwegian team to investigate a historic-era shipwreck at a depth of 200 m.

Archaeologists also have adapted autonomous underwater vehicles for site-specific and wide-area surveys. In 2005, the Hellenic Ephorate of Underwater Antiquities cooperated with Woods Hole Oceanographic Institution to document a fourth-century-BCE wreck in Greece. Using an AUV, in 1 day, the team precisely mapped the wreck and the surrounding sea floor at depths exceeding 70 m. Upon conclusion of the AUV survey, the team's ROV recovered artifacts from the site. From those artifacts, the team collected trace DNA samples to reveal the vessel's cargo. Elements of that international team continue to survey the Aegean and Mediterranean Sea floor with AUVs.

Autonomous robots present new opportunities for archaeology. In the future, cost-effective squadrons of robots may operate in unison in the deep sea, surveying thousands of square kilometers of sea floor regardless of depth while rapidly and precisely documenting the shipwrecks they discover. Since robots excel at repetitive tasks such as mapping and site photography, it is likely that shallow-water archaeologists will soon delegate these time-consuming chores to robots, while humans perform more interesting and appropriate activities such as delicate excavation. Deep-water archaeology as a special subfield may someday disappear as its methods and technologies are embraced by practitioners working anywhere in the marine environment.

Cross-References

► Underwater Archaeology

Further Reading

Ballard, R.D., A.M. McCann, D. Yoerger, L. Whitcomb, D. Mindell, J. Oleson, H. Singh, B. Foley, J. Adams, D. Piechota, and C. Giangrande. 2000. The discovery of ancient history in the deep sea using advanced deep submergence technology. *Deep-Sea Research I* 47: 1591–1620.

Ballard, R.D., F.T. Hiebert, D.F. Coleman, C. Ward, J. Smith, K. Willis, B. Foley, K. Croff, C. Major, and F. Torre. 2001. Deepwater archaeology of the Black Sea: The 2000 season at Sinop, Turkey. *American Journal of Archaeology* 105 (4): 607–623.

Ballard, R.D., L.E. Stager, D. Master, D. Yoerger, D. Mindell, L.L. Whitcomb, H. Singh, and D. Piechota. 2002. Iron Age shipwrecks in deep water off Ashkelon, Israel. *American Journal of Archaeology* 106 (2): 151–168.

Bascom, W. 1972. A tool for deep-water archaeology. *International Journal of Nautical Archaeology and Research* 1: 180–184.

Bascom, W. 1976. *Deep water, ancient ships: The treasure vault of the Mediterranean*. Garden City: Doubleday.

Foley, B., and R.D. Ballard. 2004. Amphora Alleys I and II. *Journal of Roman Archaeology* (Supplementary series) 58.

Foley, B.P., K. DellaPorta, D. Sakellariou, B. Bingham, R. Camilli, R. Eustice, D. Evagelistis, V. Ferrini, M. Hansson, K. Katsaros, D. Kourkoumelis, A. Mallios, P. Micha, D. Mindell, C. Roman, H. Singh, D. Switzer, and T. Theodoulou. 2009. The 2005 Chios ancient shipwreck survey: New methods for underwater archaeology. *Hesperia* 78: 269–305.

Hansson, M., and B. Foley. 2008. Ancient DNA fragments inside classical Greek amphoras reveal cargo of 2400-year-old shipwreck. *Journal of Archaeological Science* 35 (5): 1169–1176.

McCann, A.M., and J. Freed. 1994. Deep water archaeology: A late-Roman ship from Carthage and an ancient trade route near Skerki Bank off Northwest Sicily. *Journal of Roman Archaeology* (Supplementary series) 13.

Polmar, N., and M. White. 2010. *Project Azorian: The CIA and the raising of the K-129*. Annapolis: Naval Institute Press.

Søreide, F., and M.E. Jasinski. 2005. Ormen Lange: Investigation and excavation of a shipwreck in 170 m depth. Paper presented at OCEANS 2005, 19–23 September, Washington, DC.

Deetz, James (Historical Archaeology)

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D

Basic Biographical Information

Born (1930) and raised in Cumberland, Maryland, James Deetz took all of his degrees in anthropology at Harvard University (B.A. cum *laude* 1957, M.A. 1959, and Ph.D. 1960), where his principal mentor was J.O. Brew. Like most of his contemporaries, he learned his craft through the Smithsonian Institution's River Basin Survey program and began his experience on historic-period sites by working at the early home sites of Pilgrims at the invitation of fellow Harvard anthropology major, Henry Hornblower II. Hornblower, a stock broker by profession, had himself worked on some of the same sites as an undergraduate before the Second World War, and the Hornblower family donated the land and initial funding to create what became Plimoth Plantation. Deetz's work on sites in and around Plymouth, Massachusetts, was followed by an important early excavation at a Spanish mission outside of Santa Barbara (La Purisima) and the discovery, along with colleague Edwin Dethlefsen, of early New England gravestones as a source for experimental archaeology.

Those interested in his biography and accomplishments should see the section on Tributes to James Deetz at the online archive of James Deetz's work (www.histarch.uiuc.edu/plymouth/index.html).

Major Accomplishments

The year 1967 was an auspicious one for the field of historical archaeology; the Society for Historical Archaeology and its counterpart on the other side of the Atlantic, the Society for Post-Medieval

Archaeology, were both founded. James Deetz (1967) not only published his brilliant introductory text *Invitation to Archaeology*, in which he illustrated many important points with what are now considered classic examples of analyses of historic-period artifacts and sites, but he decided to leave the University of California at Santa Barbara, his first full-time teaching post, for a job in the Anthropology Department at Brown University, one that he split with a new position as Assistant Director of Plimoth Plantation, an outdoor living history museum dedicated to the Pilgrim settlement as it was thought to be in the year 1627.

The next year Deetz (1968) published the first of many essays alerting his colleagues in prehistory to the fact that another kind of anthropological archaeology had arrived on the scene. "Late Man in North America: Archaeology of European Americans" included in a volume *Anthropological Archaeology in the Americas*, edited by Smithsonian curator Betty J. Meggers, made the case for an explicitly comparative approach to different regions of early colonial settlement in the New World, using New England and the Chesapeake as his examples. This was precedent for the thematic approach that would structure his most important publication in historical archaeology (and arguably the most important publication ever in historical archaeology) *In Small Things Forgotten* (1977).

Deetz's move to Brown attracted a number of graduate students over several years and turned many undergraduates there into historical archaeologists as they pursued their graduate careers. One of the most successful of his students during this period is Mary Beaudry. More importantly to the development of historical archaeology, Deetz's decade-long tenure at Brown, and at Plimoth Plantation, established historical archaeology on a solid and theoretically eclectic anthropological footing (see the companion essay on Deetz's larger contribution to archaeological theory). Deetz himself went on record as being his own archaeologist in terms of larger intellectual trends, and indeed he was (1989). He clearly admired Walter Taylor, a fellow Harvard product (Deetz 1988), whose ideas, like Deetz's, were also heavily influenced by the social anthropologist Clyde Kluckhohn, a scholar with strong opinions about what archaeologists should be able to contribute to anthropology, but rarely did (Kluckhohn 1940).

In 1969, Deetz was formally introduced to folklorist Henry Glassie, and the latter's provocative analyses of vernacular buildings and folk material culture more generally marked an important turning point in the development of Deetz's scholarship and teaching, culminating in the publication of *In Small Things Forgotten* in 1977. After leaving Brown for the University of California at Berkeley in 1978, Deetz shifted his interests to the Tidewater Virginia settlement known as Flowerdew Hundred, where he trained another generation of doctoral students in historical archaeology, running an annual summer field school there for over a decade. He also began a long-standing relationship with archaeologists in South Africa, beginning with a semester as visiting professor at the University of Cape Town in the fall of 1984. Deetz collaborated with several South African archaeologists, most notably Martin Hall and Carmel Schrire (e.g., Schrire et al. 1990), and trained both American and South African doctoral students on several projects, particularly in the Eastern Cape.

The year that the University Press of Virginia published Deetz's synthesis of what he and other archaeologists had found at Flowerdew Hundred, 1993 (Deetz 1993), was the same year he was offered an endowed chair at the same institution. Jefferson's University became Deetz's final academic home, but after ending his fieldwork at Flowerdew Hundred in 1995, Deetz returned to the sites where he began his career in historical archaeology, sponsoring field schools outside of Plymouth during the summers of 1998 and 1999. Results from these projects were incorporated into Deetz's last book, *The Times of Their Lives: Life, Love, and Death in Plymouth Colony*, published in 2000 (Deetz and Scott Deetz 2000), the same year he died.

In the four decades of his active academic career (e.g., Brown 2004), James Deetz helped establish historical archaeology as a truly anthropological pursuit concerned with colonialism and its consequences for dispossessed indigenous

peoples and captive Africans alike. But like many of the field's founders, Deetz was most interested in what became of those who settled the colonized places. Through his work in Massachusetts, Virginia, and South Africa, Deetz helped pioneer a comparative colonial archaeology of settler societies and make the interdisciplinary approach, in which documents and artifacts from above and beneath the ground are productively integrated, a foundational one in contemporary historical archaeology. Like Walter Taylor who inspired his understanding of the relationship between history and anthropology, Deetz fashioned his own distinctive "conjunctive approach," which he was able to illustrate in case studies from Santa Barbara, California, to Grahamstown, South Africa. Even though it was revised and expanded more than 15 years ago, Deetz's book *In Small Things Forgotten* (1996) still introduces thousands of undergraduates to the field of historical archaeology and remains an especially useful point of departure to investigating contemporary and more politically charged perspectives on the archaeology of colonialism.

Cross-References

- ▶ Beaudry, Mary C.
- ▶ Clay Pipes in Historical Archaeology
- ▶ Dating Methods in Historical Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Deetz, James (Theory)
- ▶ Glassie III, Henry H.
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ North America (USA): Historical Archaeology
- ▶ Plimoth Plantation: Public Archaeology
- ▶ Willey, Gordon Randolph

References

Brown, Marley R., III. 2004. James Fanto Deetz, 1930–2000. *Historical Archaeology* 38: 103–123.

Deetz, J. 1967. *Invitation to archaeology*. Garden City: Natural History Press for The American Museum of Natural History.

Deetz, J. 1968. Late man in North America: Archaeology of European Americans. In *Anthropological archaeology in the Americas*, ed. B.J. Meggers, 121–130. Washington, DC: Anthropological Society of Washington.

Deetz, J. 1977. *In small things forgotten: The archaeology of early American life*. New York: Doubleday, Anchor Press.

Deetz, J. 1988. History and archaeological theory: Walter Taylor revisited. *American Antiquity* 53: 13–22.

Deetz, J. 1989. Archaeography, archaeology, or archeology? *American Journal of Archaeology* 93: 429–435.

Deetz, J. 1993. *Flowerdew Hundred: The archaeology of a Virginia plantation, 1619–1864*. Charlottesville: University Press of Virginia.

Deetz, J., and P. Scott Deetz. 2000. *The times of their lives: Life, love, and death in Plymouth Colony*. New York: W.H. Freeman.

Kluckhohn, C. 1940. The conceptual structure of Middle American studies. In *The Maya and their neighbors*, ed. C.L. Hay, R.L. Linton, S.K. Lothrop, H.L. Shapiro, and G.C. Vaillant, 41–51. New York: Appleton-Century-Croft.

Schrire, C., J. Deetz, D. Lubinsky, and C. Poggenpoel. 1990. The chronology of Oudepost I, cape, as inferred from an analysis of clay pipes. *Journal of Archaeological Science* 17: 269–300.

Further Readings

D'Agostino, M.E., E. Pine, E. Casella, and M. Winer, eds. 1995. *The written and the wrought: Complementary sources in historical archaeology: Essays in honor of James Deetz*, Kroeber Anthropological Society Papers 79. Berkeley: Kroeber Anthropological Society.

Loren, D.D., and M. Beaudry. 2006. Becoming American: Small things remembered. In *Historical archaeology*, ed. M. Hall and S. Silliman, 251–271. Malden: Blackwell Publishing.

Yentsch, A.E., and M.C. Beaudry, eds. 1992. *The art and mystery of historical archaeology: Essays in honor of James Deetz*. Boca Raton: CRC Press.

Yentsch, A.E., and M.C. Beaudry. 2001. American material culture in mind, thought, and deed. In *Archaeological theory today*, ed. I. Hodder, 214–240. Malden: Blackwell Publishing.

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Basic Biographical Information

James Deetz is one of the most influential historical archaeologists of his generation. Born in 1930

in Cumberland, Maryland, he took all of his academic degrees at Harvard University (B.A. cum *laude* 1957, M.A. 1959, and Ph.D. 1960). Originally meant to graduate Harvard College in 1952, Deetz took a year off to work with Don Lehmer on the River Basin Survey behind the Oahe Dam on the Missouri River in South Dakota. Drafted when the Korean War broke out, Deetz enlisted in the United States Air Force for a 4-year term. By the time he returned to Harvard, Deetz and his first wife Joanne had three children, and Deetz finished his anthropology studies from bachelor's degree to doctorate in only 4 years, receiving the latter in 1960. He took up his first teaching job at the University of California at Santa Barbara the next year and was promoted to full professor there in 1966. In 1967, he left to become a professor of anthropology at Brown University. After 11 years at Brown, Deetz moved to the University of California in the fall of 1978 and finally ended his teaching career as the Harrison Professor of Historical Archaeology at the University of Virginia, a position he held from 1994 until his death in 2000.

Major Accomplishments

In a plenary address to the First Joint Archaeological Congress held in Baltimore, Maryland, in 1989, James Deetz insightfully remarked that over a 30-year career at that point, he had been called a culture historian, a new archaeologist, a structuralist, and a poststructuralist, but in his view, he had not changed his interpretive approach at all since the 1960s. Instead, his position in the discipline at any particular moment was entirely the result of the perception of his work by others (Deetz 1989: 435). Although an important moment of self-reflection, Deetz should have said that, in fact, he was at once all of these kinds of archaeologist, and a few more he failed to mention. Although the categories of culture history and processual and post-processual archaeology seem fixed within the histories of archaeological theory, they do not do justice to the career of Deetz and his place as an archaeological theorist. His research and scholarly contributions simply do not fit these trends or phases, as his contributions to a range of subjects and interpretive frameworks unfolded simultaneously.

Deetz's debut was an impressive one, a 1960 dissertation entitled *An Anthropological Approach to Kinship Change in Eighteenth-Century Arikara Culture*. This document, strongly influenced by Clyde Kluckhohn, firmly established the "archaeology as anthropology" movement (the use of archaeological data to track changes in social organization employing the ethnographic categories then favored by cultural anthropologists like Kluckhohn) (Deetz 1965). That same year, Deetz also published his first two articles in historical archaeology on his excavations at the Joseph Howland site in Kingston, Massachusetts, which displayed his ability to use statistical dating of pipe stems as a surrogate measure for site occupation spans. Later, Deetz would use this same approach, calculating "Harrington histograms," to discover the boom-and-bust cycle of the international tobacco trade as it effected settlement dynamics at Flowerdew Hundred (Deetz 1993).

The decade of the 1960s was a time when Deetz demonstrated the range of his interests, as well as his eclecticism in terms of theoretical perspective and subject matter. He published two books, a monograph based on his dissertation and his classic introduction to archaeology, *Invitation to Archaeology*, brought out by Doubleday in *1967*. In 1968 he published his essay "Late Man in North America," which announced the potential of historical archaeology as a new dimension of American anthropological archaeology (Deetz 1968). During this same decade, Deetz also began to publish the results of his gravestone studies, undertaken with colleague Edwin Dethlefsen, demonstrating the validity of seriation as a relative dating technique, and establishing the field of experimental historical archaeology (Deetz and Dethlefson 1967). Finally, Deetz (1969) published his first revisionist piece on heritage interpretation, "The Reality of the Pilgrim Fathers," in *Natural History*.

Contained in his prolific 1960s output are all the larger theoretical trends in archaeology with which Deetz has been associated: culture history, processualism, and post-processualism. In fact,

his introduction to archaeology reveals the complexity and multifaceted nature of his research and interpretive gifts, ranging from his discovery of a gender-based division of labor in the mission housing at La Purisima, through the implications of both ceramic and gravestone stylistic change for understanding social and cultural change, to what he argued was an homologous relation between the production of sound in human language and the manufacture of artifacts (Deetz 1967: 87). The latter is seen as "the first steps towards structuralist archaeology" (Preucel 2006: 101). Interestingly, Deetz's use of linguistic models prompted a recent history of American archaeology to suggest that Deetz did, indeed, interpret archaeological data "in a postprocessual manner" and, further, that "with hindsight one can almost see it coming in his writings of the 1960s" (O'Brien et al. 2005: 224–5).

With his move to Brown University, Deetz took up a shared post, part-time professor of anthropology at Brown and part-time museum administrator at Plimoth Plantation, the organization that sponsored his first fieldwork in historical archaeology. He also met the folklorist Henry Glassie in 1969, and their intellectual collaboration produced the study of American material culture as an important impetus for material culture studies more generally. Deetz advocated for the "science of material culture," one that abandoned the categories of the ethnographer in favor of an entirely new set of concepts and terminology. His prior research on gravestones, together with a new found interest in vernacular architecture and folk material culture more generally derived from Glassie's influence, resulted in an important series of papers that made the larger argument that archaeology and material culture studies were essentially the same pursuit, a perspective that culminated in his masterpiece on historical archaeology and material culture studies *In Small Things Forgotten: The Archaeology of Early American Life* (1977a). And, importantly, a close reading of one of his most important papers of this period, "Material Culture and Archaeology – What's the Difference" (1977b), reveals the considerable extent to which Deetz anticipated the move to agentive-oriented approaches to objects (Gosden 2005) or what Ian Hodder describes as "human-thing entanglement" which he places within the much broader interdisciplinary intellectual movement now known as "thing theory" (Hodder 2011).

The major concept to come out of Deetz's introductory work on historical archaeology is the "Georgian mindset," which was simply a historically situated and substantiated version of the concept of "mental template," which was so crucial to the interpretive framework of *Invitation to Archaeology* of a decade before. An idea that Deetz had worked out for himself in terms of ceramic assemblages and how they changed over two centuries in the Plymouth, Massachusetts area, the idea of the Georgian mindset soon became, in the hands of Mark Leone, "the Georgian Order," and even though Deetz himself certainly understood the importance of economic factors in the changes that came to be described as "Georgianization," it was the work of Leone and his students who grounded this process and framed it in terms of neo-Marxist theory, thereby transforming Deetz's important insight into what is often referred to as critical theory in archaeology. Subsequent treatments of the archaeology of European colonialism have incorporated this interpretation to some extent, and many studies take Deetz's model of change, as a point of departure for discussion in recognition of the influence of what Chris Gosden describes as the enduring influence of "the Georgian-order thesis" (Gosden 2004: 127–9).

Deetz was an important synthesizer of historical archaeology and the field of archaeology more generally. At the invitation of the editors of *Science*, he published an influential review of the present state of American historical archaeology. In it Deetz previewed many of the most important insights derived from his last major research project, the exploration of Flowerdew Hundred, an early seventeenth-century settlement in Virginia. Deetz first came to Flowerdew while a distinguished visiting professor at the College of William and Mary in 1977. He conducted over ten seasons of summer fieldwork there while a professor at Berkeley and at the University of Virginia. Deetz's book on Flowerdew Hundred,

published in 1993, elaborates upon the major interpretive points of his *Science* essay; the proper relationship between documentary and archaeological evidence, the relationship of settlement dynamics to broader economic processes, and the manner in which formal variation in material culture (vernacular buildings and locally made ceramics) revealed the social and cultural changes occurring in the early Chesapeake. In the last chapter of this book, Deetz summarizes what his career as an historical archaeologist taught him, most notably that historical archaeology should be international in scope and international in comparative method (1993: 163–6).

In 1996 Deetz produced a major revision of his 1977 introduction to historical archaeology, with a new chapter on the archaeology of the African Diaspora. Here, Deetz brings his thinking on this important subject in line with the new scholarship, highlighting his ideas about how the material lives of enslaved Africans, and those newly free, were influenced by both traditional West African practices and beliefs and the circumstances of the new societies of which they were a part. In a substantial way, this revised version of *In Small Things Forgotten* delivers on what Deetz saw to be the immense promise of historical archaeology almost 30 years before in his essay on "Late Man in North America." He illustrates the value of rigorous comparison of different regions of early America and demonstrates the interpretive advantage of a variety of theoretical approaches to making sense of the patterns he saw in his archaeological and other material evidence. This book will continue to be an important introduction to the field of historical archaeology for many years to come.

Cross-References

- ▶ Clay Pipes in Historical Archaeology
- ▶ Dating Methods in Historical Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Glassie III, Henry H.
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ Leone, Mark P.
- ▶ North America (USA): Historical Archaeology
- ▶ Plimoth Plantation: Public Archaeology
- ▶ Southern Africa: Historical Archaeology

References

Deetz, J. 1965. *The dynamics of stylistic change in Arikara ceramics*, Illinois studies in anthropology. Vol. 4. Urbana: University of Illinois Press.

Deetz, J. 1967. *Invitation to archaeology*. Garden City: Natural History Press.

Deetz, J. 1968. Late man in North America: Archaeology of European Americans. In *Anthropological archaeology in the Americas*, ed. B.J. Meggers, 121–130. Washington, DC: Anthropological Society of Washington.

Deetz, J. 1969. The reality of the pilgrim fathers. *Natural History* 78 (9): 32–44.

Deetz, J. 1977a. *In small things forgotten: The archaeology of early American life*. New York: Doubleday, Anchor Press.

Deetz, J. 1977b. Material culture and archaeology – What's the difference. In *Historical archaeology and the importance of material things*, Special publication series, ed. L. Ferguson, vol. 2. Washington, DC: The Society for Historical Archaeology.

Deetz, J. 1989. Archaeography, archaeology, or archeology? *American Journal of Archaeology* 93: 429–435.

Deetz, J. 1993. *Flowerdew Hundred: The archaeology of a Virginia plantation, 1619–1864*. Charlottesville: University Press of Virginia.

Deetz, J., and E.S. Dethlefson. 1967. Death's head, cherub, urn and willow. *Natural History* 76 (3): 29–37.

Gosden, C. 2004. *Archaeology and colonialism: Cultural contact from 5000 BC to present*. Cambridge: Cambridge University Press.

Gosden, C. 2005. What do objects want? *Journal of Archaeological Method and Theory* 12 (3): 193–211.

Hodder, Ian. 2011. Human-thing entanglement: Towards an integrated archaeological perspective. *Journal of the Royal Anthropological Institute (N.S.)* 17: 154–177.

O'Brien, M.J., R.L. Lyman, and M.B. Schiffer. 2005. *Archaeology as a process: Processualism and its progeny*. Salt Lake City: The University of Utah Press.

Preucel, R.W. 2006. *Archaeological semiotics*. Malden: Blackwell Publishing.

Further Reading

Deetz, J. 1968. Cultural patterning of behavior as reflected by archaeological materials. In *Settlement archaeology*, ed. K.C. Chang, 31–42. Palo Alto: National Press Books.

Deetz, J. 1970. Archaeology as a social science. *Bulletin of the American Anthropological Association* 3 (3.), pt. 2): 115–125.

Deetz, J. 1983. Scientific humanism and humanistic science: A plea for paradigmatic pluralism in historical archaeology. *Geoscience and Man* 23: 27–34.
Deetz, J. 1987. Harrington histograms versus Binford mean dates as a technique for establishing the occupational sequence of sites at Flowerdew Hundred, Virginia. *American Archaeology* 6 (1): 62–67.
Deetz, J. 1998. Discussion: Archaeologists as storytellers. *Historical Archaeology* 32 (1): 94–96.

Deflation Archaeology

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Deflation is a geomorphological process that occurs when wind blows fine-grained sedimentary material away, leaving larger objects (**clasts** in gelological terminology) grouped together (**lagged**) on a lowered surface (Laity 2011). If archaeological artefacts occur in a matrix of fine sediments, then erosion can potentially remove the fine sediments, leaving these artefacts resting on a common surface. Deflated archaeological records are most common in environments where fine-grained sediments are exposed and therefore susceptible to aeolian transport, but there are other means of erosion, for example, freeze/thaw cycles, the drying and wetting of subsurface clays, or animal burrowing (Wood and Johnson 1978), and human earth-moving activities, for example, plowing that bring artefacts to the surface. Deflation archaeology may therefore be used to describe records where a variety of processes have concentrated artefacts together on a surface.

Archaeological sites in deflated contexts are known from many areas of the world, with well-studied examples from the desert areas of the Americas, Northern and Southern Africa, Southwest Asia, and Australia. Because deflation leads to the accumulation of artefacts that may have been deposited over considerable time periods, the numbers of artefacts revealed through deflation can at times appear staggering in comparison with more discrete archaeological deposits. Foley and Lahr (2015) cite a number of studies with artefact densities measured in the thousands to millions of objects per square kilometer. In an extreme case from the Messak Settafet region of Libya, artefacts accumulated over the last one million years are exposed on the surface in such numbers that they form a significant proportion of the land cover (Foley and Lahr 2015 cf. Knight and Zerboni 2018).

Deflation can lead to artefacts that are distinctive of particular periods or activities mixed together within the same deposit. While mixing of artefacts may seemingly create problems for assemblage interpretation, erosion by deflation can also be beneficial in the sense that it exposes deposits that would otherwise be covered. Archaeologists typically dig "sites," that is, places with concentrations of artefacts and features that are preserved in one location. However, past peoples did not spend all their time, or even in many instances the majority of their time, at such places. Many peoples moved extensively, yet the material record of these movements oftentimes remains buried by sediments or obscured by vegetation. In deflated deposits, these obscuring elements are removed, and items related to a wider range of activities that occurred across landscapes are often exposed. As Goldberg and Macphail (2006: 129) describe it, this provides archaeologists with windows into former landscapes and sites. In this sense, deflated deposits enable the archaeologist to trade off temporal resolution for visibility and spatial extent. Archaeological research that makes use of exposures in this way occurs under a number of different names including distributional archaeology (Ebert 1992) and off-site archaeology (Foley 1981) (discussed further below).

Another way of thinking about deflation archaeology, which takes cues from geoarchaeology, involves recognizing that deflated deposits have not lost stratigraphic integrity as such; rather, modification of the stratigraphy of all deposits occurred through a variety of processes that contribute to the formation of the archaeological record. Many of these continued to act during and after any deposition of cultural material, and since the relative degree

of deflation may change over time, surface concentrations of artefacts formed by deflation in the past may become incorporated into buried deposits or re-emerge at later times (e.g., Surovell et al. 2005). Seen from this perspective, deflated deposits are just one point in a continuum of formation that involves both erosion and aggregation. Surface-deflated deposits are often more visible than buried deposits, but except for this they are not fundamentally different to other types of archaeological deposit. As with all forms of the archaeological record, deriving correct inferences from a depositional sequence requires that archaeologists understand the ways in which these deposits formed.

These perspectives reflect a long history of archaeological interest in deflated archaeological deposits. Drawing on two detailed case studies as well as numerous other examples, we illustrate below how deflated archaeological deposits can be analyzed by understanding how erosion and aggregation lead to the formation of both vertical and horizontal landscape deposits and how this can be fruitfully incorporated into knowledge about the human past.

Archaeological Perspectives on Deflation

Between 1966 and 1967, ethnoarchaeologist Richard Gould spent time with a group of Aboriginal people in the southern Gibson Desert. Gould documented how the group moved their camp six times, spending no more than 3 weeks at a given location and covered a total distance of 185 kilometers (Gould 1980: 64). At one of the campsites, Tikatika, he observed the construction of windbreak shelters and campfires; the manufacture and maintenance of stone, wood, and fiber implements; and the processing and consumption of foraged plants and animals. 5 months later, Gould returned to resurvey the material remains from the earlier occupation. The organic components of the campsite were either decaying or in the process of being destroyed, but stone artefacts were still present on the surface. However, the number of these artefacts had *increased* by an average of eight times compared to the numbers Gould observed 5 months earlier. This was attributed not to any intervening occupation, but to the effects of erosion by wind and water that had exposed previously deposited artefacts. As in many places, these processes had removed sediments but left larger, heavier objects, including stone artefacts, more or less in place horizontally, producing a deflated assemblage of artefacts discarded during multiple occupation events on a common surface. Gould (1980: 27) lamented that "the apparently greater richness of the site in stone artefacts is in fact a sign of stratigraphic disturbance and mixing that renders the site almost useless for any later attempt to sort out its chronology or to discover former loci or most of the activities that produced this debris."

This juxtaposition between the richness of deflated deposits and the distortion caused by stratigraphic mixing characterizes many discussions of surface archaeological deposits. The deflation of archaeological materials on to a common surface often expands their horizontal exposure while decreasing their temporal resolution, presenting opportunities as well as challenges to behavioral reconstruction. These two concerns have been addressed in separate, but sometimes overlapping, theoretical and methodological trajectories.

Horizontal Exposure

Studies of the spatial organization of activity in contemporary human societies sometimes differ with the concept of "sites" as used in archaeological studies. Hunter-gatherer groups in particular are often highly mobile and may spend a good deal of time away from residential camps (Kelly 1983). The Western Desert Aboriginal groups that Gould (1980) observed, for example, abandoned more than 90% of the artefacts they used away from campsites. Reflecting on the ramifications of this kind of mobility for archaeological survey, Peterson (1971: 246) suggested that artefacts found distributed among surface deposits were more likely to reflect the range of places used by Australian Aboriginal people than the investigation of isolated locations by excavation.

When deflated deposits are exposed on the surface, their distribution provides the opportunity to determine how past peoples used

landscapes. The unique value of surface archaeological deposits lies primarily in their high visibility over large areas. Subsurface deposits impose logistical limits on the spatial scales of archaeological studies by the need to excavate. The high degrees of visibility in surface deposits provide archaeologists opportunities to examine the distributional properties of the archaeological record. This was summarized succinctly by Dunnell and Dancey (1983: 270): "There can be little doubt that surficial deposits retain considerable distributional information at least on a gross scale. As long as surface distributions contain patterned information that is analytically separable from post-depositional patterning, they are useful data."

Observations like this coincided with the development of alternative approaches to survey that were not focused on the identification of sites, but treated the entire landscape as a place that people occupied more or less intensively over time. "*Off-site*" (Foley 1981), "*siteless*" (Dunnell and Dancey 1983), and "*distributional*" (Ebert 1992) archaeologies are just a few names for approaches that imagine archaeological artefacts as forming a near continuous distribution across the surface of regions with variable densities. Methodological innovations in remote sensing, electronic range finding, portable computing, and geographic information systems have significantly reduced both financial and temporal costs associated with the collection of high volumes of surface finds while at the same time improving the quality and spatial fidelity of distributional data.

Studies of deflated deposits sometimes provide surprising results that counter conventional, "site-based" narratives. On the Egyptian high desert near Abydos, for example, Olszewski et al. (2005) emphasize how their survey included areas not targeted by earlier archaeologists, who focused almost exclusively on dense areas of artefact deposition. By deliberately targeting lithic landscapes, the high desert research showed that previous expectations that these areas were used for raw material gathering were not supported. Equally, the expectation that the area would be characterized by hunting camps with high proportions of armatures was also not met. Instead, the lack of formal retouched tool production together with the minimal presence of Nubian Levallois points and their production suggested high levels of mobility with a circulating settlement system that (Olszewski et al. 2005) labeled the "Nubian Complex Desert Adaptation."

As described in the introduction, deflated surfaces can provide "windows" into past archaeological surfaces that might be expanded to understand deposit formation across a wider landscape. This is well illustrated by the studies of the Geelbek Dunes in the Western Cape Province of South Africa (Kandel and Conard 2013). Here, deflation hollows in mobile sand dunes have revealed both stone artefacts and mammalian fossils across surface exposures in excess of 500 m^2 (Fig. 1). The investigation of 22 deflation hollows revealed more than 30,000 items that can be related to 3 distinct deposits. The oldest is a calcrete substrate with multiple layers that has ages ranging from 200 to 20 ka BP. This deposit has Middle Stone Age artefacts and fauna. Above this layer is a consolidated sand that has deposits from the pre-pottery Later Stone Age, while the uppermost layer is a yellow sand with artefacts belonging to the Later Stone Age with pottery that dates to the last 2000 years. The extensive nature of the deposits allowed landscape use to be considered. For example, the Middle Stone Age deposits lacked evidence for stone artefact reduction. Instead, the transport of flakes, cores, and tools to Geelbek resulted in low-density scatters, suggesting minimal activity. The faunal remains indicate some human modification (via impact fractures), but many of the bones show carnivore, rodent, and insect damage. In contrast, artefacts belonging to the Late Stone Age are more common. Faunal remains show cut marks indicating butchering. In one example, the remains of a butchered eland were associated with 30 backed microliths and the remains of ostrich eggshell water containers. Assemblages associated with the Late Stone Age pottery suggest the presence of domestic camps with evidence for ostrich eggshell bead manufacture and marine shell refuse. The extensive nature of the deflation deposits permits the changing use of landscape from the Middle Stone Age to the present to be understood

Deflation Archaeology, Fig. 1 Elephant pelvis and other faunal remains deflated on an old calcite surface at Toaster locality, Geelbek. (Photo courtesy of A. Kandel)

but only by determining the processes that have led to exposure and accumulation of items in the different deposits.

Temporal Resolution

As Gould (1980) observed, the mixing of artefacts from different occupations can make it difficult to isolate those deposited at the same time. A **palimpsest** is the term used to describe deposits that have undergone such mixing, meaning that artefacts are the products of multiple depositional events or actions that blends or erases original patterning (Bailey 2007). A "palimpsest" deflated deposit is therefore one considered disturbed or otherwise difficult to resolve due to limited chronological resolution or clear stratigraphic association. The view that deflated deposits are necessarily palimpsests, in contrast to other forms of the archaeological record, places emphasis on well-defined stratigraphic relationships above all others and implies that there is an ideal deposit type on which to build archaeological inference (cf. Binford 1981). Frequently, such well-stratified deposits are identified in rockshelters, and these are contrasted with deflated surface sites (but see below for a contrary example).

Unfortunately, such a view presents dismal prospects for studying the prehistory of the most ancient time periods. In many Paleolithic contexts, long-term accumulation and geological processes are likely to result in the combination of artefacts related to different types of activities that occurred at different times, providing a composite view of place use. Recognizing this, Isaac (1972) commented that the time depth represented in the Paleolithic record might require a different type of explanation than that typical for more recent periods to account for variation in temporal resolution. Artefacts accumulated together in Paleolithic deposits might reflect the action of a number of different processes, some natural as well as those relating to hominin behavior, and, therefore, it might not be possible to interpret artefact assemblages in relation to short-term sets of activities. Binford (1981) and Foley (1981: 8–9) both proposed that patterns in artefact densities related to repetitive behaviors maintained over long time periods should allow the investigation of the interrelationships among humans, artefacts, and land surfaces. Multiple generations of individuals who abandoned artefacts would illustrate what Binford referred to as a "long-term behavioral system" (Binford 1982). When applied to interpret

archaeological landscapes, these ideas led to the notion of **place use** histories, involving studying differing degrees of artefact accumulation at different geographic locations (Camilli et al. 1988). An understanding of place use histories requires sufficient time to pass (and therefore the mixing of materials from multiple occupations) to allow for the accumulation of rich assemblages reflecting a range of activities that occurred at one place.

Like some paleontological deposits, archaeological deposits accumulate over prolonged periods, and this means that artefacts found within a single deposit may originate from a variety of different cultural systems. This led Stern (1994) to argue that many behavioral interpretations of artefact assemblages were not suitable when investigating Paleolithic deposits because archaeological deposits are **time-averaged**. Instead of assuming that artefacts within a given deposit are contemporaneous and can be resolved into an ethnographic scene, time averaging requires consideration of the temporality of the interpretation and the temporality of the deposit. The Middle Stone Age deposits at Geelbek, for example, accumulated since the time of the surfaces on which they rest were initially deposited, making it difficult to draw conclusions about the organization of activities (Kandel and Conard 2013). Although the term includes the word "average," the processes that contributed to a deposit's formation do not occur with equal frequency, intensity, or visibility. Therefore, time-averaged deposits represent the summation of materials derived from a variety of behaviors and contexts and are not amenable to either the reconstruction of single events or an "average" of behavioral interpretations.

The issues of temporality and resolution, crucial to the interpretation of deflated archaeological deposits, lie at the center of the theoretical paradigm of **time perspectivism**. In a discussion of time perspectivism and the formation of the archaeological record, Bailey (2007) defines what he terms a "true palimpsest," in which the archaeological record is deposited in such a way that any previous material is removed before new material accumulates. This represents one extreme case, where the temporal window and resolution are constrained to the most recent depositional event. The opposite of a "true" palimpsest, then, is a "true" stratigraphy where once deposited, objects are immediately sealed within a distinct sedimentary layer, perfectly preserving the temporal sequence of depositional events (Lucas 2012). Following these definitions, any blurring, blending, or mixing of a deposit creates a form of palimpsest that reduces the ability to detect the type of behavioral events preserved in a true stratigraphy. In truth, virtually all archaeological deposits exist somewhere between the idealized true palimpsest and true stratigraphy states. Therefore, archaeologists always must consider the consequences of the type of mixing and exposure that drew the attention of Gould, regardless of the condition of the deposit. The challenge posed by time perspectivism is to develop ways of interpreting the record that takes account of both the nature and temporal scale at which accumulation occurred without relying on reconstructing behavioral averages.

Because many of these ideas merge the interpretation of human activity with the geomorphic formation of deposits, they fall under the umbrella of **geoarchaeology**. A geoarchaeological approach to deflated deposits facilitates the combination of the ideas concerning temporality and resolution and the distributional, landscape-based perspectives discussed above. Wandsnider (2008), for example, used the concept of archaeological **grain** to interpret a range of surface and buried deposits dated to the early and late Archaic and the Late Prehistoric periods in the Wyoming Basin (Fig. 2). Grain refers to the span of time surfaces are available to accumulate material, while occupation grain relates to the time over which occupation occurred. Grain relates to integration, defined as the degree of feature reuse between occupations. The nature of geomorphological processes varies across the region, with deflation and aggregation common in the interior basin, while in upland areas, sediment accumulation is slower. Where aggradation is slow and stable, radiocarbon dating indicates the accumulation of occupation remains occurs over both short and long time spans as well as durations between these two extremes. In the case

Deflation Archaeology, Fig. 2 Interior basin, eroded landforms, Seedskadee, SW Wyoming. (Photo courtesy of LuAnn Wandsnider, Seedskadee Archaeological Project, 1983)

of eroding surfaces, both single and repeated occupations occur, suggesting that the erosion of previous material or indeed its exposure made little difference to people who revisited locations. The same seems to be true for places that evidence slow aggradation of deposits. Here there are indications of both single and repeated occupations. Where integration is indicated, that is, where there is evidence of feature reuse, radiocarbon dates indicate repeated occupation over short time spans. Where no integration occurs, longer spans of time separate occupations. This combination allows Wandsnider (2008) to propose a simple model of place and land use composed of a set of single use places, short-term persistent places, and places that accumulated many unrelated single uses.

Ward et al. (2006) report a geoarchaeological study from Northern Australia where they discuss the formation of deposits with what Wandsnider would describe as different temporal grain. Their study illustrates how deflation and therefore palimpsest formation cannot be determined solely from site context. In a case study from the Keep River in Northern Australia, they compare record preservation inside rock-shelters with the preservation in nearby deposits found on the open sand plain. Investigations at two locations, Karlinga and Goorurarmum, showed similar sedimentary sequences both within rock-shelters and on the sand plains. The difference between the rock-shelter and sand plain deposits is in the chronology of deposition. Within the rock-shelters, basal or near-basal dates are Holocene in age, and stone artefacts are abundant only within the past 4000 years. In contrast, the sand sheet deposits outside the rock-shelters show occupation dating from the late Pleistocene and preserve a continuous record of stone artefact deposition. In the case of the rock-shelters, erosion likely removed material deposited in the late Pleistocene, and erosion in the Holocene resulted a variable rate of stone artefact deposition through deposit deflation and burial. In contrast, the open sand plain sites show regular rates of deposition and therefore preserve an older stone artefact record.

Surovell et al. (2005) used geoarchaeological techniques to study shallow sites subject to both deflation erosion and deposition over long periods at a buried Folsom site in Middle Park, Colorado,

USA. The authors consider vertical artefact distributions and dispersal, stratigraphy, and radiocarbon dating. Their analyses indicate that a Folsom occupation occurred around 10,450 C^{14} BP. During the subsequent 1000 C^{14} years, erosion exposed Folsom artefacts as a deflated lag deposit. After 9400 C^{14} BP deposition resumed and the deposit was buried only to be eroded again sometime after 7000 C^{14} BP when the upper part of the deposit was removed and a secondary lag of artefacts created. Finally, burial of the deposit occurred once again. This sequence of events was not apparent during excavation but only subsequently after analyzing the locational, stratigraphic, and dating results. As with the study by Ward and colleagues, this study emphasizes that deflation is a geomorphic process that may affect archaeological sites in a number of contexts at different times.

Case Studies in Deflation Archaeology

In the following, we describe two case studies in detail, from Egypt and Australia, which illustrate deflated archaeological records based on their distribution and geomorphic contexts.

Case Study I: The Fayum North Shore, Egypt

The Fayum is a natural depression, separated from the Nile Valley by a ridge known as the Nile-Fayum divide. A portion of the depression, the Fayum north shore, has a well-known archaeological record consisting of deflated deposits of stone artefacts, ceramics, animal bone, and hearths. The term north shore here refers to the shoreline of Lake Qarun although the present-day lake is much lower than it once was. Floodwaters from the Nile Valley flowed through a branch of the Nile that ran parallel to the main channel of the river and entered the Fayum Basin at Hawara, and this caused fluctuation in lake levels. The lake and adjacent lands provided resources for peoples who occupied the north shore from the beginning of the Holocene until around 6000 BP.

In the early twentieth century, Caton-Thompson and Gardner (1934) identified a number of locations across the Fayum north shore attributed to the Neolithic period, but they mainly focused on deposits that were stratified including the well-known sites of Kom K and Kom W, both consisting of archaeological remains that they interpreted as villages. While they noted the presence of extensive surface deposits, they spent little time considering these. Recent studies, however, have paid much more attention to the deflated surface deposits as well as to reinvestigating the stratified sites. When the deflated deposits are included, understanding the distribution, age, and relationship among archaeological materials across the Fayum north shore becomes both more informative and more complex than suggested in the earlier syntheses (Holdaway and Wendrich 2017). In addition, modern investigations indicate that the stratified sites like Kom K or Kom W were not fundamentally different in nature to the surface deposits. Based on recent reinvestigation, Kom K, for example, is composed of windblown sand deposits mixed with portable artefacts, fauna, and the rake out from hearths. Beyond these hearths, however, Kom K lacks examples of additional feature types that might indicate the presence of structures that would indicate a village as Caton-Thompson and Gardner originally proposed (Holdaway and Wendrich 2017). Kom W also has a complex geomorphic history with evidence derived from the section drawings that Cato-Thompson recorded, indicating that the site was repeatedly deflated after artefact deposition ceased and subsequently covered by an aeolian sand dune (Emmitt et al. 2017). Artefact density in some locations with deflated deposits matches that found in the stratified deposits. Modern assessments of both the stratified sites and the extensive surface record suggest that archaeological deposits from the Fayum north shore are not interpretable using functional categories like villages, hamlets, or occupation sites as suggested in the older literature.

Intensive survey across the Fayum north shore also indicates that stratified deposits of Kom K and Kom W form only a small part of the archaeological record. The majority of this record consists of surface scatters of stone artefacts, ceramics, faunal material, and the remains of heat-retainer hearths. Surface deposits are

Deflation Archaeology, Fig. 3 Surface artefact deposits, Fayum north shore, Egypt. Colored nails represent different artefact classes. (Photo courtesy of S.J. Holdaway, Fayum URU Project)

ubiquitous along the Fayum north shore but differ in density and composition (Fig. 3). Artefact concentrations occur within a few hundred meters to the north of the lake basins that Caton-Thompson and Gardner (1934) identified as forming the north shore edge of a once more extensive Lake Qarun. However, within this artefact-rich zone, considerably more spatial variability exists than that observed by many who worked in the Fayum subsequent to Caton-Thompson and Gardner. In some locations, the density of stone artefacts and ceramics suggests that there once existed other deposits comparable to the stratified mounds of Kom K and Kom W now deflated. The two Kom sites may therefore not be as unique as once thought.

Chronologies obtained from a limited number of radiocarbon determinations largely from stratified deposits originally indicated a chronological gap between an early Holocene occupation and a later mid-Holocene Neolithic occupation. However, additional recently obtained radiocarbon assays from the numerous surface hearths (Fig. 4) found in the surface deposits surrounding the stratified sites largely removed this gap. This suggests that the original pattern reflected a bias introduced by the type of deposits that were investigated (i.e., only stratified deposits) rather than a true abandonment of the region. In the Fayum, understanding the distribution and preservation state of the surface archaeological record has also proved important because in the past studies used dated archaeological deposits as an indication of past environments, particularly in supporting proposed advances and retreats in the heights of Lake Qarun (Phillipps et al. 2016). Detailed studies of the north shore topography combined with analysis of the character of sediments in archaeological deposits and assessments of the state of preservation of archaeological features such as hearths indicate that earlier chronostratigraphic associations and resulting changes in lake levels are in need of revision (e.g., Koopman et al. 2016; Holdaway and Wendrich 2017). To some degree, these findings reflect the availability of new technologies like GPS as well as satellite-derived topographic data that greatly aid the ability to make accurate spatial

Deflation Archaeology, Fig. 4 Near surface hearth, Fayum north shore, Egypt. (Photo courtesy of S.J. Holdaway, Fayum URU Project)

observations across large areas like the Fayum north shore.

Stone artefacts are abundant in north shore deposits, but flint is absent in the Fayum Basin, so raw material for flaking was moved into the area from elsewhere during all periods of occupation. Cobbles of flint were treated differently at different times, and estimates of original cobble size vary among the assemblages studied, suggesting that several sources were used. Flaked cores from all periods frequently retain some cortex and therefore show the potential for further flaking. Quantification of the volume and surface area of stone artefacts indicates that in some cases, after the transport of cobbles to the Fayum, movement of significant numbers of flakes to other locations occurred (Phillipps and Holdaway 2016). Variation in assemblage composition in different locations therefore reflects changes in the movement of stone artefacts around the Fayum. In older assemblages, movement of flakes occurred, with removal permanently from the Basin. In the later assemblages, as well as those from Kom K and Kom W, movement involved cores rather than flakes, with these transported within the Basin.

The ability to detect these differences in movement is possible because of the exposure of many tens of thousands of artefacts as lagged deposits together with the use of methods that allow for the rapid analysis of large numbers of artefacts. The results of the study of portable artefacts indicate that movement characterized all periods of occupation in the Fayum. However, it is important not to confuse density of material, a consequence of deflation, with lack of mobility. In the Fayum, the oldest of the sampling areas studied have the densest artefact deposits, but these contain evidence for the most extensive two-way movement. Accompanying the introduction of cores to these locations was the removal of substantial quantities of flakes. In other locations, densities of archaeological deposits vary, and the movement of cores is replaced by flake removal. In addition, sources of material varied compared to earlier times. These changes suggest a different form of mobility.

Pottery today occurs only as clusters of eroded sherds distributed unequally across the north shore or as concentrations of sherds across the surface of, and within, the stratified deposits. Modern excavations have not found complete pots, such as those Caton-Thompson and Gardner retrieved. Nevertheless, from their publication and study of the extant museum materials, we know the variety of sizes of complete pots found at Kom K and Kom W, as well as those associated with the K pits, basketry-lined pits with remnants of grain found to the north of Kom K (Wendrich and Holdaway 2017). Some of the larger pots

were of a size too large to carry suggesting that they acted as storage vessels. There is some indication of the placement of these larger vessels in small, excavated depressions at Kom W. A single, unfired pot discovered in situ at Kom K suggests deliberate placement at the site quite possibly for storage (Holdaway and Wendrich 2017). Thus, the pottery evidence suggests that like the basketry-lined K pits, places for storing materials existed in a number of locations across the Fayum north shore. It is possible that some of the surface pottery concentrations found as deflated deposits reflect other areas used for storage.

From the published sources and the results of recent excavations, the smallest of the K pits were not much larger than some of the complete ceramic vessels retrieved by Caton-Thompson and Gardner. Some of the pits may have held clay vessels like the example excavated in Kom K or indeed fired vessels like those Caton-Thompson and Gardner did retrieve intact from Kom W (Holdaway and Wendrich 2017). If so, and assuming that the pits and vessels were related to storage, then placing storage facilities at different points in the landscape was part of the Fayum settlement system during at least some periods of occupation of the region.

The ubiquity of the stone artefacts indicates spatially extensive activity within the band of a few hundred meters north of the basins that marked the ancient extent of Lake Qarun. Based on analyses of a range of artefact deposits identifiable, visible because of the extensive deflation, people moved into, out of, and across the region rather than settling within it. Early in the Holocene, activity was concentrated although temporary, while later in time, indications are for spatially variable forms of movement and settlement. There is no evidence for a village- or even hamlet-based settlement. Instead, the evidence indicates spatially extensive deposits made up of relatively short-lived features together with a material culture that indicates movement into, away from, and possibly within the region. Combined with this, there is evidence for dispersed locations with concentrated evidence for storage.

The extensive horizontal exposures of artefacts allow for a different perspective than that gained by archaeologists who concentrated only on the analysis of material from stratified deposits. Although a great deal of deflation has occurred across the region, the visibility this provides permits a very large number of observations at numerous locations. For the Fayum, understanding the significance of the extent and nature of the archaeological deposits allows a different set of inferences compared to those made from a more limited set of observations. This is important because the Fayum records some of the earliest evidence for use of domestic plants and animals in Egypt. However, the contexts of this evidence suggest a socioeconomy involving the use of domestic species quite different to that found in nearby southwest Asia.

Case Study II: Rutherford Creek, New South Wales, Australia

The western part of the state of New South Wales, Australia, is comprised of a variety of semiarid to arid landscapes, including creek-incised rangelands, riverine floodplains, and active dunefields. The land is predominantly low (< 250 m asl) and flat, with most surface undulations surrounding creek catchments and lakes in the form of low hills and lunettes. Local temperatures fluctuate seasonally between hot summers (mean air temperature ~32 °C) and mild to cool winters (mean air temperature ~18.5 °C), and average annual rainfall across the region is approximately 245 mm, with pan evaporation typically exceeding precipitation. However, rainfall can be highly variable on a month-to-month or year-to-year basis. Droughts and flooding feature episodically with shifts in global circulation.

The alternation between desiccating drought periods and inundating floods has the capacity to change rapidly the condition of land surfaces in the region. In the areas away from streams, rainfall can move loosely aggregated sediments downslope as sheetwash (Fanning 1999). This rainfall can be highly localized, with marked differences in rainfall over short distances. Aeolian transport of sediments is a common feature during dry periods, with heavier sediments accumulating locally and finer sediments dispersed further afield (Marx et al. 2009). Both fluvial and aeolian

sediment transport accelerated after changes to surface vegetation following the introduction of grazing ungulates in the nineteenth century (Fanning 1999).

In many places, the regular relocation of sediment has resulted in lagged exposures of archaeological materials, predominantly scatters of stone artefacts and heat-retainer hearths. These hearths typically present as concentrations of fire-altered stone, in some cases preserving charcoal embedded within sediment beneath the hearthstones (Fig. 5). The hearths began as pits lined with stone that acted as heat retainers and formed earth ovens used to cook game (Gould 1967). As the sediments deflated, the more stable baked sediments of the hearths sometimes converted into convex features on the surface covered with hearthstones (Fanning et al. 2009). Left to the elements, these eventually disintegrated, dispersing any charcoal-bearing sediment and leaving behind loose congregations of fire-altered rock.

At Rutherford Creek, an ephemeral stream emptying into equally ephemeral Peery Lake, exposed saline subsoils, known locally as "scalds," cover approximately 13% of the creek valley. These form when wind or water action removes less compacted top soils. Surface surveys identified 979 heat-retainer hearths from scalds along the creek valley. Charcoal samples submitted for radiocarbon dating from 96 of these indicated 93 of the hearths date to within the last 2000 years.

In many instances, hearths of different ages are located in close spatial proximity but separated in time by hundreds or thousands of years. However, rather than reflecting a cluster of campfires constructed by a large group of people, what the range of ages reflects is the age of the surface on which the archaeology rests, with repeated short-term occupations occurring in the same vicinity (Fanning et al. 2009). In such a case, spatial proximity is not a good indicator of contemporaneity.

Taken together (Fig. 6, black symbols), the distribution of dates shows fluctuations over time, but a general trend is indicated of increasing frequency in the number of determinations toward the present. In addition, several conspicuous gaps are present in the radiocarbon chronology, some about one or two centuries in length. Trends in the frequency of radiocarbon dates may reflect differential preservation and/or changes in occupation intensity, the latter of which is associated with a period of socioeconomic reorganization during the late Holocene (Smith 2013). The gaps have been suggested to indicate periods of greater or lesser intensity of hearth building, either through periodic abandonment and reoccupation (Holdaway et al. 2010) or through changes in the distance covered by logistic forays (Smith 2013).

Deflation Archaeology, Fig. 5 Surface hearths visible as concentrations of hearthstones, western New South Wales, Australia. (Photo courtesy of S.J. Holdaway, WNSWAP)

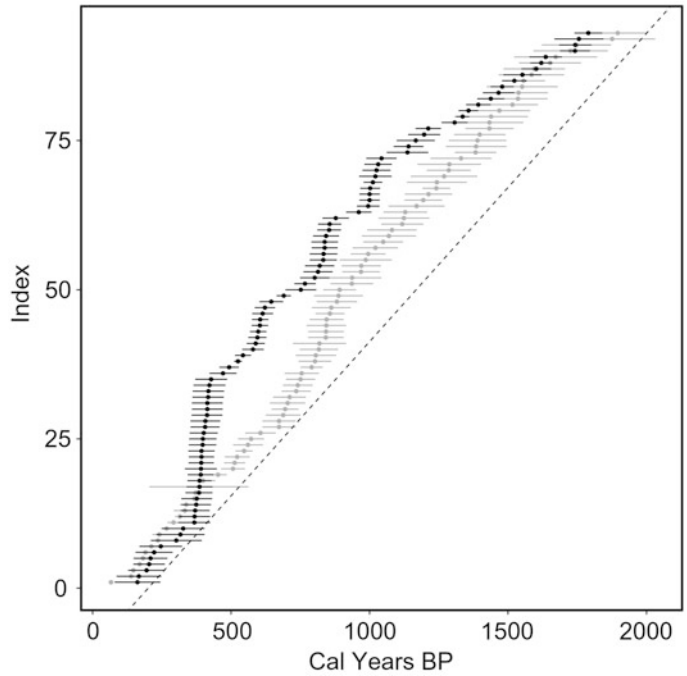

Deflation Archaeology, Fig. 6 Chronometric determinations from Rutherford Creek heat-retainer hearths using radiocarbon dating on charcoal (black) and optically stimulated luminescence dating on hearthstones (gray), calibrated using the ShCal13 calibration curve (Hogg et al. 2013) and ordered youngest to oldest. Dots show mean values; lines show one standard deviation. Dotted line indicates a uniform distribution of dates between 2000 and 200 BP

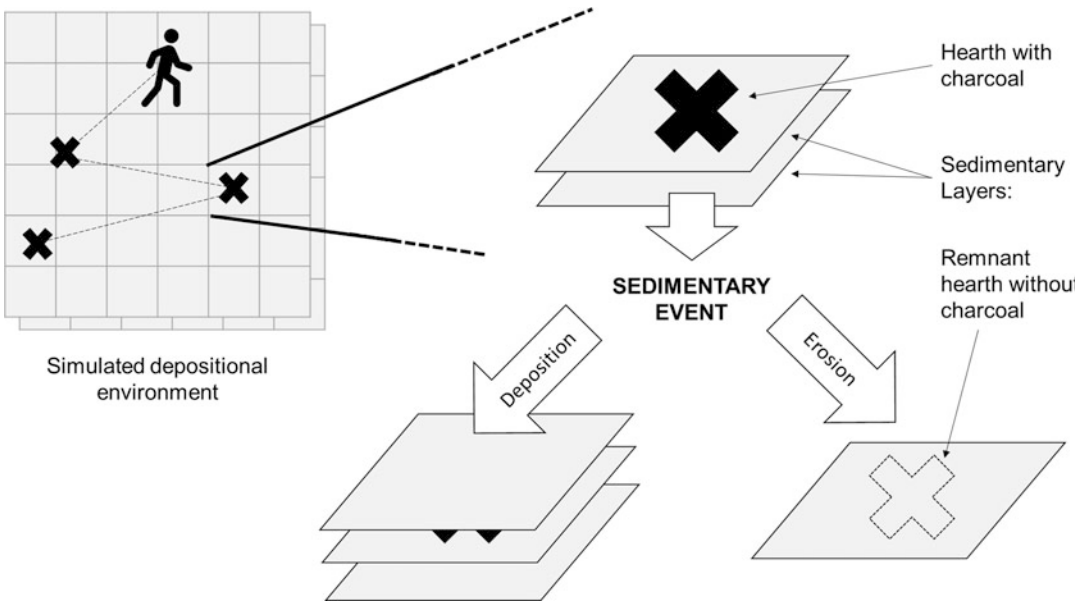

Deflation Archaeology, Fig. 7 Model of surface formation (After Davies et al. 2016)

To assess the influence of geomorphic processes, a computer simulation modeled how episodic, patchy sedimentary processes affected a record when populations and rates of hearth construction do not vary (Fig. 7). In the model, simulated agents moved within a gridded space,

constructing hearths at a constant rate per year; that is, if nothing else were to happen, the chronometric record generated in the simulation would show no change through time. Hearths in the simulation contained a carbon age recording the date the hearth formed in years before present. Grid cells also contained a set of sedimentary layers, each associated with a sediment age indicating the time of initial layer deposition, and agents constructed new hearths on the topmost layer. At a given interval (in years), an event occurred at the grid-cell level with one of two outcomes: erosion or deposition. If erosion occurred, the top layer of sediment eroded, and any hearths situated on that surface lost their charcoal and became undatable using radiocarbon. At the same time, surfaces underneath became visible, including any hearths built on them. A layer of sediment was added to the cell if deposition occurred, and any hearths visible on the surface became hidden and thus undetectable in a surface survey. At the end of the simulation period (2000–200 years BP), samples of hearths sitting on the surface were made for "dating" using radiocarbon (the carbon age of hearths with charcoal). The chronological sequences obtained were then compared with respect to their deviations from the uniform distribution used to generate the simulated record, and differences were associated with the geomorphic history that contributed to their formation.

Despite its simplicity, the results of the simulation provided some surprising insights. First, the hearth samples from both highly depositional and highly erosional settings showed nearly identical age distributions. In highly erosional contexts, this was due to the exponential likelihood of charcoal removal through time, making fewer older hearths available for dating. However, in depositional contexts, the opposite was true but with virtually the same effect; preservation of older hearths occurred because of burial, but burial prevented selection for dating in a surface survey. This means that, in a surface context, a mix of erosion and deposition was required in order for older hearths to be both intact and visible.

Another pattern emerging from the model was a set of periodic gaps in the hearth chronologies (Fig. 8). Since the rate of hearth construction did not change, the erosion and deposition process

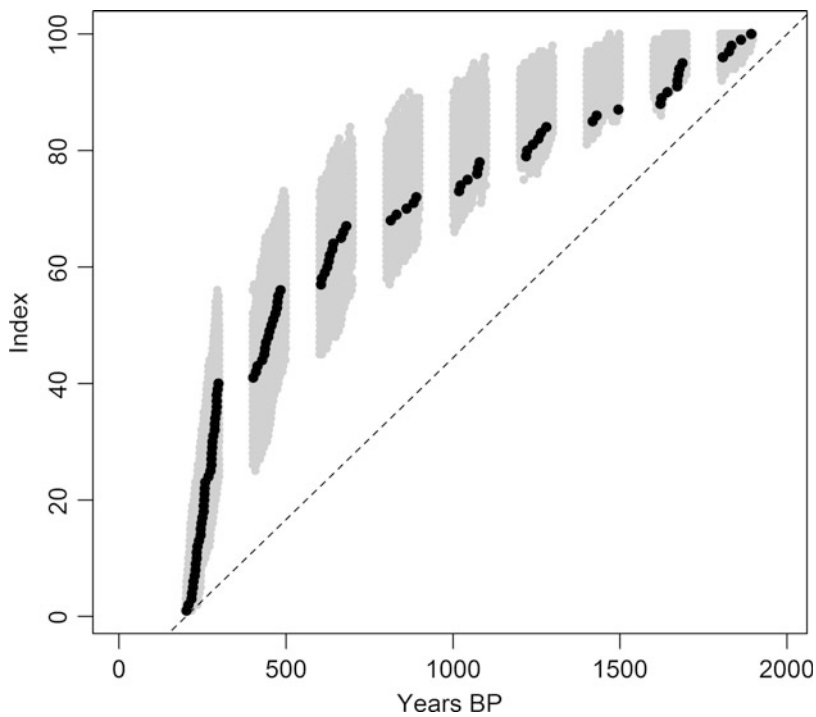

Deflation Archaeology, Fig. 8 Results from 1000 simulation runs where event interval = 100 years and erosion proportion = 0.5. Gray dots are the dates recorded from all 1000 runs, while black dots are a sample of 100 dates recorded from a single run, both ordered youngest to oldest

must explain gaps in the simulated chronology. In this case, because the sedimentary events operated over all surfaces, all hearths that accumulated over the interval preceding the event became invisible simultaneously, producing a gap for that period. This meant that as long as the sedimentary processes were operating over most of the simulated landscape, gaps like those observed at Rutherford Creek would occur in the chronometric record. If a portion of grid cells held stable through each sedimentary event would result in the gaps aggrading to the point that when a majority of cells were stable, they would disappear.

Even though the model showed how gaps *could* occur, this does not explain the presence of gaps in the western New South Wales radiocarbon data, but instead provides an alternative explanatory mechanism to changes in the rate of hearth construction by people in the past. However, because the mechanisms are quite different, one based in human behavior and the other in geomorphic processes, this allows for a testable hypothesis about differences in the kinds of patterns expected. For example, if the gaps in the record were the result of human absences and *not* sedimentary processes like those in the model, then they should also be present in components of hearths not affected by sedimentary processes in the same way.

The heat-retainer hearths found in western New South Wales are composed primarily of charcoal, sediment, and stone. Sediment deposition affects all equally; however while sediment and charcoal are likely to erode away by wind and water action, stones, particularly clasts larger than 20 mm (Fanning and Holdaway 2001), may lag as part of a deflated deposit and remain on the surface for longer periods shown by the presence of numerous remnant hearths without charcoal. The heated stones dated using optically stimulated luminescence (OSL) provide a second chronometric proxy on the hearths, but one that is more resistant to erosion.

If a mechanism like that in the model were operating on the Rutherford Creek landscapes in the past, then it would be expected that gaps in the radiocarbon chronology would be effectively absent in the OSL chronology; alternatively, if humans were building fewer hearths during these periods, then synchronous gaps should occur in both records. The test for this hypothesis involved using OSL measurements on stones from 135 hearths (Rhodes et al. 2010). Of these, 101 dated to the last 2000 years. Comparing a sample of OSL dates with the original radiocarbon dates shows that many of the gap periods in the radiocarbon chronology are not represented in the OSL (Fig. 6). Because the chronology is more even, the curve of the OSL sample is also much shallower. The model predicts this outcome while it is difficult to explain the difference in terms of changes in hearth-building behavior.

The surveys and the model used in this study were both oriented around how patterns in cultural materials come to be present on deflated archaeological surfaces at Rutherfords Creek. The widespread distribution of features such as heat-retainer hearths is a symptom of extensive exposure through erosion over time, while the temporal distance between spatially adjacent hearths suggests repeated occupations rather than congregations. The findings from the model, and the subsequent comparison between two chronometric proxies from hearths, suggest that the temporal patterning in the occupation of Rutherfords Creek was relatively consistent through time, suggesting a resilient socioeconomic system was in place through the late Holocene. People returned to the area regularly, using a variety of locations but with little evidence for integration (i.e., feature reuse) as Wandsnider (2008) defines it (Holdaway et al. 2017). Neither increases in the frequency of dated hearths through time nor gaps in the radiocarbon chronology likely relate to fluctuations in population levels and periods of abandonment, as once thought. Rather the types of geomorphic processes of deflation and deposition modeled in the simulation seem the most likely cause for the patterns in the radiocarbon hearth chronology.

Discussion and Conclusion

These two case studies share a common geoarchaeological view of deflated archaeological

deposits, one that brings their formation as a historical process to the fore. Based on such a view, archaeological deposits exist at different points between the extremes represented by a true palimpsest and a true stratigraphy. Following this, there is no simple dichotomy between deflated deposits and all other types of deposit; deflated deposits are simply one form of deposit where erosion has acted to concentrate artefacts together. The outcome of this process is apparent in both buried and surface deposits as well as in surface and rock-shelter sites, and as the examples discussed above illustrate, both have been foci for study by archaeologists.

The degree of deflation (or conversely, where sedimentation rates are comparably high in comparison with discard rates, what might be termed the degree of dilution or *inflation*) will influence what kinds of questions can be fruitfully asked of the deposit, and at what temporal grain, to use Wandsnider's (2008) term, deflated deposits can be integrated with other datasets. Where the deflation is high, there is a trade-off between temporal resolution and spatial visibility, as is the case in the Fayum study. Here, general trends in changing patterns of mobility and landscape use are apparent but only correctly interpretable through the investigation of both stratified and surface deposits equally. As the example of Kom W shows, consideration of deflation in process rather than typological terms shows how deflation archaeology really involves recognizing the formation of archaeological deposits by a combination of aggradation and erosion. These processes can be operationalized in a formal model, as was done in the Rutherfords Creek example, to explore a range of sedimentary conditions, and their outcomes can be used to make predictions about patterning in the archaeological record. In both cases, the specific insights into the activities of past peoples were only possible by understanding the anthropogenic and geomorphic formation dynamics of the deposits.

Sometimes erosion removes all previous traces of human occupation, as in the formation of Bailey's true palimpsests, but at other times, it does not and larger materials are concentrated together on deflated surfaces. When found on the surface, deflated deposits through their visibility and extent provide archaeologists a better view of the scale and nature of landscape use than is often possible when investigating buried deposits. And because such surface deposits are most visible in arid and semiarid environments, this is where many of the examples of archaeological studies that make use of deflated surface deposits are found.

However, apart from this difference in visibility, it would be wrong to consider deflation archaeology as fundamentally different to archaeology practiced in places where aggrading processes are more dominant. As the examples cited above show, what is important is gaining an understanding of the deposit formation processes, relating the temporality of these processes to the temporality of the mechanisms by which artefacts become incorporated into deposits. Assessing the time-averaged nature of archaeological deposits is important if appropriate inferences are to be made concerning behavioral interpretation. The increase in artefacts that Gould discovered when he returned to the camp at Tikatika invalidated reconstructions of the activities that he had witnessed a few months earlier. However, for archaeologists, it is not the reconstruction of isolated or ephemeral activities that is of interest; rather it is the inferences that can be drawn by looking at the material remnants of many activities that occurred through time, accumulating or not at different places.

References

Bailey, Geoff. 2007. Time perspectives, palimpsests and the archaeology of time. *Journal of Anthropological Archaeology* 26: 198–223.

Binford, Lewis R. 1981. Behavioral archaeology and the 'Pompeii premise.'. *Journal of Anthropological Research* 37: 195–208.

Binford, Lewis R. 1982. The archaeology of place. *Journal of Anthropological Archaeology* 1: 5–31.

Camilli, Eileen L., LuAnn Wandsnider, and James I. Ebert. 1988. *Distributional survey and excavation of archaeological landscapes in the vicinity of El Paso, Texas*. Las Cruces District Office: Bureau of Land Management.

Caton-Thompson, Gertrude, and Elinor W. Gardner. 1934. *The desert Fayum*. London: The Royal Anthropological Institute of Great Britain and Ireland.

Davies, Benjamin, Simon J. Holdaway, and Patricia C. Fanning. 2016. Modelling the palimpsest: An exploratory agent-based model of surface archaeological deposit formation in a fluvial arid Australian landscape. *The Holocene* 26 (3): 450–463. https://doi.org/10.1177/0959683615609754.

Dunnell, Robert C., and William S. Dancey. 1983. The siteless survey: A regional scale data collection strategy. *Advances in Archaeological Method and Theory* 6: 267–287.

Ebert, James I. 1992. *Distributional archaeology*. Albuquerque: University of New Mexico Press.

Emmitt, Joshua, Briar Sefton, Rebecca Phillipps, Willeke Wendrich, and Simon Holdaway. 2017. Reimag(in)ing the past: Adding the third dimension to archaeological section drawings. *Advances in Archaeological Practice* 5 (1): 44–53. https://doi.org/10.1017/aap.2016.5.

Fanning, Patricia C. 1999. Recent landscape history in arid western New South Wales, Australia: A model for regional change. *Geomorphology* 29: 191–209.

Fanning, Patricia C., and Simon J. Holdaway. 2001. Stone artifact scatters in western NSW, Australia: Geomorphic controls on artifact size and distribution. *Geoarchaeology* 16 (6): 667–686.

Fanning, Patricia C., Simon J. Holdaway, Ed J. Rhodes, and Tessa G. Bryant. 2009. The surface archaeological record in arid Australia: Geomorphic controls on preservation, exposure, and visibility. *Geoarchaeology* 24: 121–146. https://doi.org/10.1002/gea.20259.

Foley, Robert. 1981. Off-site archaeology: An alternative approach for the short-sited. In *Pattern of the past: Studies in honour of David Clarke*, ed. Ian Hodder, Glynn L. Isaac, and Norman Hammond, 157–183. Cambridge: Cambridge University Press.

Foley, Robert A., and Marta Mirazón Lahr. 2015. Lithic landscapes: Early human impact from stone tool production on the central Saharan environment. *PLoS One* 10 (3): e0116482. https://doi.org/10.1371/journal.pone.0116482.

Goldberg, Paul, and Richard I. Macphail. 2006. *Practical and theoretical Geoarchaeology*. 1st ed. Malden/Oxford: Wiley-Blackwell.

Gould, Richard A. 1967. Notes on the hunting, butchering, and sharing of game among the Ngatajara and their neighbors in the west Australian Desert. *The Kroeber Anthropological Society Papers* 36: 41–66.

Gould, Richard A. 1980. *Living archaeology*. Cambridge: Cambridge University Press.

Hogg, Alan G., Quan Hua, Paul G. Blackwell, Mu Niu, Caitlin E. Buck, Thomas P. Guilderson, Timothy J. Heaton, et al. 2013. SHCal13 southern hemisphere calibration, 0–50,000 years Cal BP. *Radiocarbon* 55 (2): 1–15.

Holdaway, Simon J., and Willeke Wendrich, eds. 2017. *The desert Fayum reinvestigated: The early to mid-Holocene landscape archaeology of the Fayum North Shore, Egypt*. Los Angeles: The Cotsen Institute of Archaeology Press.

Holdaway, Simon J., Patricia C. Fanning, Ed J. Rhodes, Samuel K. Marx, Bruce Floyd, and Matthew J. Douglass. 2010. Human response to Palaeoenvironmental change and the question of temporal scale. *Palaeogeography, Palaeoclimatology, Palaeoecology* 292: 192–200.

Holdaway, Simon J., Benjamin Davies, and Patricia C. Fanning. 2017. Aboriginal use of fire in a landscape context: Investigating presence and absence of heat-retainer hearths in western New South Wales, Australia. *Current Anthropology* 58 (S16): S230–S242. https://doi.org/10.1086/691436.

Isaac, Glynn. 1972. Early phases of human behaviour: Models in lower palaeolithic archaeology. In *Models in archaeology*, 167–199. London: Methuen.

Kandel, Andrew W., and Nicholas J. Conard. 2013. Stone age economics and land use in the Geelbek Dunes. In *The archaeology of the west coast of South Africa*, BAR international series 2526, 24–49. Oxford: Archaeopress.

Kelly, Robert L. 1983. Hunter-gatherer mobility strategies. *Journal of Anthropological Research* 39: 277–306.

Koopman, Annelies, Sjoerd Kluiving, Simon Holdaway, and Willeke Wendrich. 2016. The effects of Holocene landscape changes on the formation of the archaeological record in the Fayum Basin, Egypt. *Geoarchaeology* 31 (1): 17–33. https://doi.org/10.1002/gea.21538.

Laity, Julie E. 2011. Pavements and stone mantles. In *Arid zone geomorphology*, ed. S. David and G. Thomas, 181–207. Ltd: Wiley. https://doi.org/10.1002/9780470710777.ch9.

Lucas, Gavin. 2012. *Understanding the archaeological record*. Cambridge: Cambridge University Press.

Marx, Samuel K., Hamish A. McGowan, and Balz S. Kamber. 2009. Long-range dust transport from eastern Australia: A proxy for Holocene aridity and ENSO-type climate variability. *Earth and Planetary Science Letters* 282: 167–177.

Olszewski, Deborah I., Harold L. Dibble, Utsav A. Schurmans, Shannon P. McPherron, and Jennifer R. Smith. 2005. High Desert Paleolithic survey at Abydos, Egypt. *Journal of Field Archaeology* 30 (3): 283–303. https://doi.org/10.1179/009346905791072233.

Peterson, Nicolas. 1971. Open sites and the ethnographic approach to the archaeology of hunter-gatherers. In *Aboriginal man and environment in Australia*, ed. D.J. Mulvaney and J. Golson, 239–248. Canberra: ANU Press.

Phillipps, Rebecca S., and Simon J. Holdaway. 2016. Estimating core number in assemblages: Core movement and mobility during the Holocene of the Fayum, Egypt. *Journal of Archaeological Method and Theory* 23: 520–540. https://doi.org/10.1007/s10816-015-9250-2.

Phillipps, Rebecca, Simon Holdaway, Rebecca Ramsay, Joshua Emmitt, Willeke Wendrich, and Veerle Linseele. 2016. Lake level changes, lake edge basins and the paleoenvironment of the Fayum North Shore, Egypt, during the early to Mid-Holocene. *Open Quaternary* 2 (0). https://doi.org/10.5334/oq.19.

Rhodes, Edward J., Patricia C. Fanning, and Simon J. Holdaway. 2010. Developments in optically stimulated luminescence age control for geoarchaeological sediments and hearths in Western New South Wales, Australia. *Quaternary Geochronology*, 12th

international conference on luminescence and electron spin resonance dating (LED 2008), 5: 348–52. https://doi.org/10.1016/j.quageo.2009.04.001.
Smith, M.A. 2013. *The archaeology of Australia's deserts*. Cambridge: Cambridge University Press.
Stern, Nicola. 1994. The implications of time-averaging for reconstructing the land-use patterns of early tool-using hominids. *Journal of Human Evolution* 27 (1–3): 89–105. https://doi.org/10.1006/jhev.1994.1037.
Surovell, Todd A., Nicole M. Waguespack, James H. Mayer, Marcel Kornfeld, and George C. Frison. 2005. Shallow site archaeology: Artifact dispersal, stratigraphy, and radiocarbon dating at the Barger gulch locality B Folsom site, Middle Park, Colorado. *Geoarchaeology* 20 (6): 627–649. https://doi.org/10.1002/gea.20071.
Wandsnider, LuAnn. 2008. Time averaged deposits and multitemporal processes in the Wyoming Basin, Intermontane North America: A preliminary consideration of land tenure in terms of occupation frequency and integration. In *Time in archaeology: Time perspectivism revisited*, 61–93. Salt Lake City: University of Utah Press.
Ward, Ingrid, R.L.K. Fullagar, T. Boer-Mah, L.M. Head, P.S.C. Taçon, and K. Mulvaney. 2006. Comparison of sedimentation and occupation histories inside and outside rock shelters, Keep-River region, northwestern Australia. *Geoarchaeology* 21: 1–27. https://doi.org/10.1002/gea.20087.
Wendrich, Willeke, and Simon Holdaway. 2017. Basket use, raw materials and arguments on early and middle Holocene mobility in the Fayum, Egypt. *Quaternary International*. https://doi.org/10.1016/j.quaint.2017.01.010.
Wood, W. Raymond, and Donald Lee Johnson. 1978. A survey of disturbance processes in archaeological site formation. *Advances in Archaeological Method and Theory* 1: 315–381.

Delfino, Davide

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Basic Biographical Information

Davide Delfino was born in Genoa in 1976 (Fig. 1). In 2003, after a classical training at the Lyceum "Giuseppe Mazzini" in Genoa, he was awarded a degree in the conservation of cultural heritage from the University of Genoa. He specialized in prehistoric and protohistoric archaeology at the Statal University of Milan in 2007 and obtained a PhD from the Universidade de Trás-os-Montes e Alto Douro (UTAD.) in 2011. Between 2001 and 2007, Delfino was a freelance consultant for the Archaeological Superintendence of Liguria (Italy) and various enterprises in rescue archaeology. Between 2007 and 2010, he was a researcher for the Estrada Foundation within the project "Iberic Museum of Art and Archaeology" (MIAA). He has been an invited Associate Professor with the Instituto Politécnico de Tomar since 2011, teaching about pottery and protohistory in the master's degree "Prehistoric Archaeology and Rock Art" and in "Quaternary: Materials and Cultures" of UTAD. He became a researcher with the Instituto Terra e Memória in 2011, working on the project "Contact Archaeology in Protohistory of Middle Portuguese Tagus." Since 2010 Delfino has been a member of the Quaternary and Prehistory Group of the Geoscience Center at Coimbra University. From 2011 to 2016, he is archaeological advisor to the Abrantes

Delfino, Davide, Fig. 1 Davide Delfino

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Municipality (Portugal) for the project "Iberic Museum of Art and Archaeology." Today is archaeologist in Italian Ministry of Heritage, Cultural Activities, and Tourism/Regional Museum Center of Molise. He is secretary of the Commission for Protohistory with the IUPPS (International Union of Prehistoric and Protohistoric Sciences) and associated with the Association Pour la Recherche sur l' Age du Bronze.

Major Accomplishments

Delfino specializes in the study and interpretation of the Bronze Age through the two major classes of materials: ceramics and metals (Fig. 2) (Del Lucchese and Delfino 2008; Delfino 2008). He applies his knowledge of the Bronze Age in the Northwestern Italy (Delfino 2014), to a methodology and interpretation model at Portuguese territory in the middle valley of the Tagus (Delfino 2012a; Oosterbeek et al. 2011). He developed a model called "techno-typological" for the study of ceramic material (Delfino 2012b), deriving from his academic training and research experience working on metallic and ceramic materials with archaeometrists.

In 2007 Delfino began to concentrate on scientific and teaching activities in archaeological objects from private collections, with no known archaeological context (Delfino 2019). His experience with the Estrada collection helped him to take full advantage of all the information that can be obtained through observing an artifact and contextualizing its period of cultural history to make up for the lack of archaeological context. In addition, he concentrated on strategies to inform the public about cultural projects and building exhibition themes around a variety of archaeological objects. Public archaeology is an important line of research, especially in its actual work in Italian Ministry and in coordination of several pages of TimeMaps international platform since 2014. Delfino's international experience includes being a teacher in the Erasmus Mundus Master in "Prehistoric Archaeology and Rock Art" at the Instituto Politécnico de Tomar and UTAD and some lectures in University of Genoa. Starting 2011, Delfino began the research line on occupation of landscape, strategy of management of resources, and warfare in Bronze Age, with excavation in the hill top site of Castelo Velho da Zimbreira and Castelo de Abrantes (Central Portugal).

Delfino, Davide, Fig. 2 Davide Delfino during fieldwork in the Bronze Age walled hilltop settlement of Castelo Velho da Zimbreira (Mação-Portugal) in 2012, with students

Particularly on the warfare in Bronze Age, he develops the application of psychophysiology of violence at the archaeological evidences.

Cross-References

► Archaeometry: Definition

References

Del Lucchese, A., and D. Delfino. 2008. Metallurgia protostorica in Valbormida. In *Archeologia in Liguria I, n. s*, ed. A. Del Lucchese and L. Gambaro, 13–25. Genova: Soprintendenza per i Beni Archeologici della Liguria, editore De Ferrari.

Delfino, D. 2008. Some aspects of prehistoric metallurgy in Liguria (NW Italy). In *Proceeding of international conference geoarchaeology and archaeomineralogy, sofia 29–30 October 2008*, 232–237. Sofia: St. Ivan Rilski University.

Delfino, D. 2012a. Arqueologia do contacto: dinâmicas, problemas e modelos interpretativos da Proto-história da fachada atlântica da Península Ibérica. In *Arqueologia Ibero-Americana e arte rupestre (Arkeos 32)*, ed. L. Oosterbeek, J. Cerezer, J. Campos Bitencourt, and J. Roche, 57–70. Tomar: CEIPHAR.

Delfino, D. 2012b. Tipologia e Cadeia Operatória: para uma melhor interpretação das comunidades humanas na Liguria (Itália do Norte – Oeste) na Idade do Bronze. In *Estudos de tecnologia cerâmica (Arkeos 31)*, ed. L. Oosterbeek and J. Cerezer, 35–43. Tomar: CEIPHAR.

Delfino, D. 2014 L'età del Bronzo Media e Recente in Liguria. Percorsi tecnologici e culturali, B.A.R. int. series 2692, Oxford: Archaeopress.

Delfino, D. 2012d. A difusão do Orientalizante e a circulação de bens de prestígio no Mediterrâneo. Algumas referências na Colecção Estrada. In *Actas da II Jornadas do Museu Ibérico de Arqueologia e Arte de Abrantes*, ed. I. Jana, G. Portocarrero, and D. Delfino, 31–44. Abrantes: Câmara Municipal de Abrantes.

Delfino, D. 2019. The Estrada Collection in the project of Museu Iberico de Arqueologia e Arte (Abrantes-Portugal). Evaluation technic in archaeological private collection, forgery identification and valorisation. In *Anthropology of forgery*, eds. M. Baggio, E. Bernard, M. Salvadori, L. Zamparo. A multidisciplinary approach to the study of archaeological fakes, pp. 141–151, Padova: University Press.

Oosterbeek, L, D. Delfino, F.A. Baptista Pereira, and G. Portocarrero. 2011. Objectos, economia e sociedade nas origens da urbanização no sudoeste peninsular. In *Museu Ibérico de Arqueologia e Arte, Antevisão III, catalogo*, 149–154. Abrantes: Câmara Municipal.

Deloria Jr., Vine

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D

Basic Biographical Information

Vine Victor Deloria Jr. was born in Martin, South Dakota, on March 26, 1933, the first of three children of Vine V. Deloria Sr. and Barbara S. Eastburn Deloria. Vine Jr. was an American Indian scholar, political scientist, author, and human rights activist (American National Biography on-line n.d). Vine Jr. descended from a long line of Native American leaders and scholars; his grandfather Rev. Philip J. Deloria was an Episcopal priest and the leader of the Yankton band of the Dakota Nation. Deloria's parents were Vine Victor Deloria Sr. and Barbara Eastburn. His father became an Episcopal arch deacon and a missionary on the Standing Rock Indian Reservation. Vine Deloria's aunt was Ella Deloria, a renowned Native American anthropologist and ethnographer.

Vine Deloria Jr. graduated from Kent School, an Episcopalian college preparatory school in Connecticut in 1951. He served in the Marine Corps from 1954 to 1956 and then earned a B.S. in general science at Iowa State University in 1958. While a student at Iowa State University, Vine Jr. met his future wife Barbara Jeanne Nystrom; they were married for almost 50 years and had three children. Vine Jr. went on to the Lutheran School of Theology in Chicago where he graduated with a master's degree in Sacred Theology in 1963. In 1964, he was unexpectedly elected as the executive director of the National Congress of American Indians (NCAI), a position he held from 1964 to 1967. Deloria entered the University of Colorado Law School in 1968 and was awarded a JD in 1970.

Deloria was a lecturer at Western Washington State College (1970–1972) in the division of ethnic studies. He taught at the University of California at Los Angeles (1972–1974) and was a Professor of

Law and Political Science at the University of Arizona (1978–1990), where he established the first master's degree program in American Indian Studies in the United States. In 1990 Deloria moved to the University of Colorado at Boulder and held appointments in History, Law, Religious Studies, and Political Science. He retired in 2000 but remained actively involved in supporting Native American human rights, politics, and the education of Native Americans and the general population.

Major Accomplishments

Vine Deloria Jr. served in numerous leadership positions including the Indian Rights Association, the Council on Indian Affairs, the National Office for the Rights of the Indigent, the Institute for the Development of Indian Law, the National Museum of the American Indian, and the Citizens Crusade Against Poverty. He founded the Institute for the Development of Indian Law, a public interest law firm in Washington, D.C. in 1971 and served as its chairman until 1976. He also served as a board member of the Oglala Sioux Legal Rights Foundation (1971–1974) (Deloria 2004).

In the 1950s Deloria's father Vine Deloria Sr. spoke out against the federal government's plans to terminate tribal governments and force Indians to assimilate into the general population of the United States. Born in Indian Country and raised among the Sioux people, Vine Deloria Jr. wrote from an informed understanding of the lived experiences of oppression faced by Native American tribal groups as fourth world communities within North America. With clarity and a biting yet honest humor, he highlighted historical and ongoing Neocolonialism which negatively impacted North American Indigenous, Native American, and First Nations communities. He argued that anthropology which studied "Indians," but excluded them from the processes of knowledge production and decision-making regarding their heritage, should become relevant to Native Americans. In his work to force open the academic gates of anthropology and archaeology to Native Americans, he laid the foundations for what is now known as Indigenous archaeology.

Deloria was a much-needed mirror of self-reflection in American academia, one that many anthropologists conveniently avoided in their work of creating histories of the first people of North America. However, his scholarship inspired many anthropologists to reflect on the impacts of their work on contemporary Indigenous people. Deloria's critiques of academic knowledge production forced anthropologists to acknowledge that their craft was not a neutral pursuit based on solid science. Deloria's voice worked to rebuild bridges between Indian Country and the general population of the United States, bridges which had long been burned through historical processes of archaeological myth making and exclusion. Deloria brought attention to human rights concerns of Native Americans and supported the Native American civil rights movement. He acted as legal defense for Indians in federal trials that resulted from the takeover of Alcatraz in 1969 and the 71-day standoff between the Federal Bureau of Investigation (FBI) and the American Indian Movement (AIM) at Pine Ridge Reservation in 1973.

In 1969, he published the first of more than 20 books, *Custer Died for Your Sins: An Indian Manifesto*, in which he critiqued the US government's treatment of Indians. In *We Talk, You Listen: New Tribes, New Turf* (1970), he discusses the need for a return to traditional ways of respectful relationship among people, land, and religion. In *Red Earth: White Lies (1997)*, he highlights the pseudoscientific assumptions of anthropologists regarding the Bering Land Bridge theory of initial migrations, which have been embedded in the general discourse and knowledge production as scientific fact. In *God is Red (1973)*, he eloquently shared his views on Christianity and how it was the basis of a great weakness in the United States. In his writing Vine Deloria Jr. provided a critical reflection from an Indigenous perspective on Western thought and culture (Deloria 2004). Deloria spoke out on injustices in Indian Country and a long history of dehumanizing treatment of Indigenous people in a colonized land. He did this during a time when civil rights leaders and

Deloria Jr., Vine, Fig. 1 Vine Deloria, Jr. (Photo Credit Chris Richards)

presidents alike were assassinated in the United States. Vine Deloria Jr. was a true hero to his people with a strong vision and voice that opened many doors for those that followed in his footsteps.

Vine Deloria Jr. lives to see the successful implementation of many of the causes he supported including the passing of the Native American Graves Repatriation and Protection Act of 1990, tribal regeneration among groups that had historically been terminated by the federal government, and the recognition of fishing rights in the Northeast and Midwest based on treaties. Vine Deloria Jr. inspired a tsunami of moral and political conscience in the United States and globally. His legacy continues to ripple across numerous nations and is seen today in the thousands of Native American, First Nations, and Indigenous scholars being awarded PhDs across diverse fields of academia (Fig. 1).

Cross-References

- ▶ American School of Classical Studies at Athens (ASCSA)
- ▶ North America (USA): Historical Archaeology
- ▶ United States: Cultural Heritage Management
- ▶ World Heritage and Human Rights

References

American National Biography on-line. n.d.. http://www.anb.org/articles/15/15-01328.html. Accessed 01/10/2013

Deloria, Philip J. 2004. *Indians in unexpected places*. Lawrence: University Press of Kansas.

Further Readings

Bruguier, Leonard Rufus 1989. A legacy in Sioux leadership: The Deloria family. In *South Dakota leaders*, ed. Herbert T. Hoover and Larry J. Zimmerman, 367–378, 471. Vermillion: University of South Dakota Press.

Deloria, Vine, Jr. 1970. An afterword. In *Custer died for your sins: An Indian manifesto,* 262–272. New York: Avon Books.

Deloria, Vine, Jr. 1992. "Introduction" and "The Indians of The American imagination," In *God is red: A native view of religion*, 1–3, 25–45, 2nd edn. Golden: North American Press.

Gridley, Marion E. 1971. *Indians of today*, 347. Chicago: I. C.F.P.

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Demographic Transitions

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Introduction

A demographic transition can be defined as a quantitative leap in the self-regulated flow of population inputs and outputs which is determined by a qualitative change in the causal mechanisms underlying this regulation. This entry briefly describes the two demographic transitions which occurred during the Holocene, the Neolithic Demographic Transition (NDT) and the Contemporary Demographic Transition (CDT), and their underlying biodemographic mechanisms – the demographic, epidemiological, psychosociological, and cultural consequences – are set out in parallel and discussed from the perspective of human evolution over time.

The Neolithic Demographic Transition (NDT)

The quantity of archaeological remains is roughly proportional to the size of the population which

produced them (Parts of this article concerning the Neolithic Demographic Transition are taken from Bocquet-Appel (2011)). In general, very small populations leave few remains, while large populations leave a great many. In world archaeological sequences, the emergence of agriculture coincides with a considerable increase in archaeological remains, which was interpreted for a long time as indicating a spurt in demographic growth (Childe 1936; Kuijt 2008). But archaeological remains do not directly express demography. However, skeletons in cemeteries and their age distributions do reflect demography, as long as they are not disturbed by poor bone preservation in the soil or by cultural burial rites, which is most often the case. A signal of a major demographic shift can be observed in world archaeological sequences of cemetery data in the northern hemisphere. This signal is characterized by a relatively abrupt increase in the proportion of 5–19-year-old juveniles in cemeteries during the economic transition from foraging to farming (Fig. 1). This proportion (called ${}_{15}p_5$ in demographic notation) leveled off 1,000 years after the advent of the farming system locally ($dt = 1{,}000$ years). This

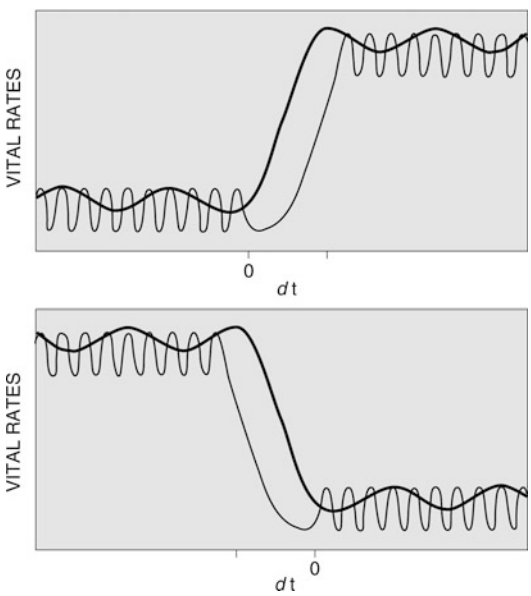

Demographic Transitions, Fig. 1 *Top*: Model of the Neolithic Demographic Transition. *Bottom*: Diagram of the Contemporary Demographic Transition. In *black*: birth rate; in *gray*: mortality rate

indicator ${}_{15}p_5$ expresses the input parameters in the living population (birth, growth, and fertility rates) and not, counterintuitively, mortality (Sattenspiel and Harpending 1983; Johansson and Horowitz 1986; McCaa 2002). When the value of ${}_{15}p_5$ rises, then the shape of the population pyramid tends to form the obtuse angle indicating increasingly young population, determined by a high birth (and fertility) rate; when the value of ${}_{15}p_5$ decreases, then the population pyramid tends to form the tower shape indicating an aging population, with a low birth (and fertility) rate. In Fig. 1, during the middle of the forager period (${}_{15}p_5 \times 100 = 22\%$) and up to the first leveling-off in the farming period (${}_{15}p_5 \times 100 = 28\%$) at $dt = 1{,}000$ years, an estimated average of 5.9 and 7.3 children per woman have been estimated, respectively. Also noticeable is the weak pre-NDT depression, where the proportion of immature individuals decreases (as well as the birth rate and fertility), which suggests a population experiencing hardship. This signal is interpreted as the signature of a major demographic shift in human history and is known as the Neolithic Demographic Transition (NDT) (Bocquet-Appel 2002) or, synonymously, the Agricultural Demographic Transition.

The NDT is detectable from a signal representing a shift toward higher fertility values, but the mortality part of the signal is missing and must be inferred. To do so, we have taken the universal density-dependent demographic model used in population ecology (also called the "Malthusian" model in social demography, or the homeostatic model). Unless we assume a demographic growth rate that would rapidly reach a cosmic number, the most likely scenario is that an increase in the birth rate was closely followed in time by an increase in mortality, producing the historical growth rate typical of preindustrial farming populations (0.2–0.1% per year), with their high birth and mortality rates.

What, in the agricultural economy, had the impact on human biology that ultimately determined the growth of the population? Increased natural maternal fertility, via a reduction in the birth interval, is mainly determined by the energy

balance and the relative metabolic load (Valeggia and Ellison 2004). It implies the return of a positive postpartum energy balance, which occurred earlier in farming than in foraging societies, due to the energy gain from the high-calorie diet of sedentary farmers (wheat, lentils, peas, maize, rice, and millet) compared to the low-calorie diet of mobile foragers (mainly game), coupled with a decrease in the energy expenditure of carrying infants in sedentary populations. With the emergence of agriculture and its impact on the energy balance, a kind of epidemic of hyperfertility in females appeared and spread among farming populations, rather like today's global epidemic of obesity. This will occur in any period, whether prehistoric or historical, when a mobile forager economy shifts to a sedentary farming economy.

Theoretically, the NDT was accompanied by the first epidemiological transition (Armelagos and Harper 2005). With the appearance of sedentary village life and the corresponding growth in local population density, mortality rates inherited from the foragers rose rapidly, particularly in children under 5 years of age. Causes of increased infant mortality would include a lack of clean drinking water, contamination by feces and the absence of latrines, and reduced breastfeeding as maternal fertility increased. Candidate infectious diseases, by epidemiological inference from current preindustrialized areas, would include those associated with diarrhea (*Rotavirus* and *Coronavirus*) as the main killers of children under 5 years of age. Zoonoses could have had an impact on the population with the introduction of significant animal domestication in the core areas of agriculture invention, whether at the same time as plant domestication (pigs, water buffalo, and probably chickens in China; guinea pigs, llamas, and alpacas in the Andean highlands) or later (goats, sheep, and subsequently cattle and pigs in the Levant). But while paleopathological data from skeletons seem consistent with the NDT epidemiological transition (Cohen and Armelagos 1984; Bocquet-Appel et al. 2008), the results based on ancient DNA (measles, severe form of smallpox, tuberculosis) are less consistent and require closer investigation.

Depending on the level and speed of population growth, what is to be expected in terms of population structure, age distribution and the distribution and structure of families and households? During the NDT, with the tempo at $dt = 1{,}000$ years, although fertility increased considerably (estimated TFR increasing from around 5 to 7 children per woman), the average family size increased only moderately (4.3–4.7 people) because of the increase in mortality; the size of households including one of the two surviving grandparents over 60 years old rose from 5 to 5.2 people. At the onset of the NDT, life expectancy at birth could have been about 24 years for males and 25 years for females, but it then rises to 33.6 and 34.1 years, respectively, at age 20. By the end of the NDT, due to the transition to higher mortality figures, life expectancy at birth was about 18 years in both sexes, but 28 years for males and 29.5 years for females at age 20. Fifty-five percent of the population would have been under 20 years old, with a median age of 17. These figures should be taken as orders of magnitude indicating a trend during the NDT, rather than as exact statistics.

As demographic density increased appreciably in the core zones of agricultural invention, the NDT triggered a major geographical redistribution of populations, with colonization or invasion by early farming populations bringing in their technologies, lifestyles and languages, which in some cases reached the continental scale, thus supporting Ammerman and Cavalli-Sforza's (1971) model of demic expansion (see Haak et al. 2010 for farmers in central and northern Europe) and Bellwood and Renfrew's "farming/language dispersal" hypothesis (2002). The speed of demographic expansion (and therefore linguistic expansion also) depended on the capacity for adaptation of agricultural packages (cereals, vegetables, tree crops, tubers, and domestic animals) to the various ecological areas colonized, in terms of yields and nutritional value (Harris 2002).

World archaeological sequences show that the first sedentary villagers emerged in large numbers from the NDT. They were faced with entirely new social, economic, and ecological challenges. In comparison with a forager culture that lasted for

200,000 years during the short chronology of anatomically modern humans, and with nearly three million years in the long chronology of the genus *Homo's* existence, the NDT, in just a few hundred years or two or three millennia at most, caused humans to "*domesticate themselves in villages*" (Bandy and Fox 2010). What psychosociological consequences should we expect from this very young population in terms of political institutions? With the demographic concentration from village to proto-city, the sphere of political institutions that became established was constrained by the population pyramid of the NDT. The top of this pyramid is formed by a very small proportion of individuals aged 60 and over (<5% as against 24% in Europe in 2011), the custodians of experience and social memory, while the bottom spreads out as a large proportion of 15–30 year-olds (>25% as against 8.8% in Europe in 2011), the holders of physical strength and youthful radicalism. Such a population pyramid supported the emergence of autocratic patriarchal powers, from big man to chiefdom (Drennan and Peterson 2006), but their longevity and the transmission of their status were jeopardized by the destabilizing impact of high mortality.

The observed signature of the NDT makes it possible to answer a recurrent question in cultural anthropology: was demographic pressure the cause (Boserup) or rather the effect (Malthus) of the cultural change? The graph in Fig. 1 in fact represents the demographic and economic transition (relative to the farming system at $dt = 0$) in a common chronological framework. It is the position of the two transitions, one relatively to the other, which makes it possible to provide an empirical answer to the question of the causes of the cultural change in the context of the shift to agriculture. A visual analysis of Fig. 1 shows that the demographic reaction neither precedes nor succeeds the economic change, but coincides with it. Thus, the population was simultaneously the cause and the effect of the cultural shift. The NDT was a self-catalyzing process capable of rapidly increasing the growth rate, locally or regionally (Bocquet-Appel and Naji 2006; Bocquet-Appel 2008), and it is this which, starting from the centers of agricultural invention, triggered the processes of geographical expansion (individuals, nuclear families, demic, and linguistic). This conforms to the predictions of the Malthus-Boserup demographic model (Wood 1998). The NDT is one of the structuring processes that has shaped the course of human history. The question of its initial directional impact on the economic, social, and cultural spheres during its rapid growth phase needs to be raised when reconstructing the social evolution over the long term.

The Contemporary Demographic Transition (CDT)

In the second half of the eighteenth century in Western Europe, the annual number of deaths began to decrease, indicating emerging control over mortality. This had an effect on children especially, whose contribution to mortality was considerable at that time, since nearly half of all children died before the age of five. From the 1790s in France (Dupâquier 1998: 13; Perrenoud and Bourdelais 1998: 64) and Sweden (Sköld 2002: 71), mortality and fertility began to decline simultaneously. During the nineteenth century, the pattern of a typically demographic process appears as it spreads geographically across Europe (Fig. 1 bottom). In the first phase, control over mortality occurs, bringing a continuous decline in mortality from 40–30 per thousand to 15–10 per thousand within 150 years, while the birth rate remained unchanged. During this period, the rate of natural increase leapt to 1–2.5% per year (Maddison 2001), as against 0.1–0.2% previously. This caused a significant increase in the European population, from 140 to 450 million between 1750 and 1914 (Dupâquier 1998: 10). During the second phase of this process, the birth (and fertility) rate declined in turn, eventually to the same low level as mortality. This double decline constitutes what is called the Demographic Transition, apparently detected by several authors independently (Thompson 1929; Landry 1934, Notestein 1945: for a review see Kirk 1996) and called here the Contemporary Demographic Transition (CDT) to distinguish it from the NDT. The CDT (also called the

Contemporary Historical Demographic Transition: Dyson 2010) emerged in Western Europe in a natural way, that is to say as a societal process. It then spread rapidly in countries under strong European influence (especially Australia, USA, and New Zealand). In the second half of the twentieth century, in the rest of the world, the CDT was established through voluntarist campaigns designed to bring down the size of populations, particularly in the then developing countries. For example, the World Health Organization (WHO) has meshed a birth control policy with its public health policies (vaccinations and dispensaries, see Weisz and Olszynko-Gryn 2009), which were expected to produce a combined effect on the frequency of births and deaths. Yet despite these consistently combined policies, mortality began to decline a few decades before the drop in fertility (Dyson 2010). With the CDT, the world's population rose from 0.77 to 7 billion inhabitants between 1750 (Biraben 1979) and 2011, thus multiplying by 9 in the space of 260 years, with a forecast of 9.2 billion by 2050.

The declining trend in mortality emerged in Europe at the end of the Enlightenment, when the idea of conscious human action on the world began to take precedence over the acceptance of Divine Providence. The American and French Revolutions happened at around the same time, as did Jenner's introduction of vaccination in England (1796). But as seen above, the decline in mortality, with the high NDT fertility rate remaining unchanged, caused a rapid increase in population. This had two effects: (1) an increase in population density from national to family scale, and (2) an unprecedented acceleration of urbanization, after millennia of near stagnation or almost imperceptible growth. While the tempo of the CDT varied from one country to another, it was slower and smaller in scale in the countries where it occurred naturally than in the rest of the world where it was triggered deliberately. In the former, the birth rate fell 100–150 years after the drop in mortality and growth rates to around 1–1.5%, while in the latter, birth rates fell 35–50 years after mortality rates, with growth rates of 2–3.5% (Dyson 2010).

As family density (i.e., size) increased, fertility began to drop due to the use of contraceptive techniques. The emergence of contraception during the CDT can be seen as a specifically human part of the density-dependent regulatory mechanisms of ecological models (Malthusian in the sociology of demographics, see above). Its effect was to restore the smaller average size of families – around four people – that prevailed in the older pre-CDT demographic regime due to the impact of high mortality, especially among children (Reher 2004). But unlike the mechanisms of what Malthus described as "preventive checks" to limit the size of a population, which are indirect (age at marriage) and unconscious (mortality), contraception is a means of control which is both direct and conscious. If we look at human demography from an evolutionary perspective, humans are one of the five hominoid species of great apes without tails. Until the CDT, the existence of human individuals, like that of the other great apes, revolved around natural routines over which control was unthinkable, such as feeding oneself (several times a day), sleeping, defecating, or menstruating. Mating and reproduction are among these natural regularly occurring routines. Birth control, which separated reproduction from mating, was the unprecedented qualitative change that influenced fertility during the CDT. Contraception is a direct result of the Enlightenment's impact on mortality.

In areas where the Contemporary Historical Demographic Transition occurred, the aging population and medical and social control over mortality resulted, after the NDT, in a second epidemiological transition. This began with a reduction in major infectious diseases and their virtual disappearance in the twentieth century (vaccines, antimicrobial drugs). At the same time, chronic and degenerative diseases began to emerge. From the 1980s, with globalization and demographic densification across the planet, new infectious diseases appeared, mainly zoonoses (HIV, Ebola, SARS) while others reappeared (Tuberculosis, Malaria) (Morens et al. 2004).

In the regions of the Contemporary Historical Demographic Transition, from 1750 to 1914, the European population multiplied by 3, from 140 to 450 million, with some 50 million people migrating

(Dupâquier 1998: 10–11) as entire continents of hunter-gatherers and/or subsistence farmers in North America, Australia, and Africa were invaded or colonized. By historical analogy, the current phase of the CDT, by causing significantly higher continental population increases than during the Historical CDT (China ×4, India ×5, Africa ×7), has had, and should continue to have, a significant impact on international migration.

In two centuries, in the regions where the Historical CDT occurred in Western Europe, farmers have decreased from 90% to less than 5% of the population, which has thus become almost entirely urban, or urban in lifestyle. The proportion of individuals aged 60 or more has increased dramatically, while the trend for 15–30-year-olds is in the opposite direction. The strong sexual division of labor in agricultural societies has disappeared. Women tend to have the same occupations as men, from the ideological elite to the armed forces. With a population pyramid made up of 25% of old and fragile people at the top and only 9% of young people, with their health and vitality, at the bottom, the psychosocial consequences on political institutions are those that favor compromise rather than conflict. With the CDT, representative democracy has emerged (Dyson 2010), despite limited previous experience in Antiquity and in the past and present totalitarian regimes of Europe and Asia.

Key Issues and Future Directions

The NDT and CDT are mirror images of each other. In the NDT, *increased fertility* was followed by increased mortality, but in the CDT, the *decline in mortality* was followed by a decline in fertility. The NDT was the springboard for world population growth; the CDT is acting as a brake. In both cases, however, the time lag between the two stages produced an interval in which fertility exceeded mortality and resulted in a rapid increase in the population with its many consequences in terms of invasion/colonization in the nineteenth and twentieth centuries, and migration since then.

From the perspective of human evolution, the NDT and CDT can be seen as the two extremities of a single demographic phenomenon. On the NDT side, relatively to the system of hunter-gatherers with its very low level of demographic saturation, the agricultural system simultaneously determined: (1) a level of potential saturation of about (population density per square kilometers: 50–80 farmers, divided by 0.01–0.001 hunter-gatherers =), 50,000 times higher than with the preceding hunter-gatherer system, and (2) hyper-fertility in females due to the maternal energy balance in farming communities. On the CDT side, as a result of control over mortality and declining mortality rates, the extraordinary historical increase in family demographic density triggered a conscious reaction to the hyper-fertility of the NDT, in the form of population-wide use of contraception. While technical progress has been extremely slow in the long chronology of the genus *Homo*, it accelerated at the same time as the increase in the metapopulation between the two transitions. During the period of 11,000 years when the metapopulation is forecast to increase from 6 million individuals (Biraben 1979) to 9.3 billion (average prediction) by 2050 – an increase equivalent to adding a population the size of the two most populous countries of the world, China plus India – the massive increase in demographic density is causing artificialization of natural ecological niches and the construction of an artificial and specifically human niche, in which an ever-growing proportion of the metapopulation has no connection with any activities relating directly to food production.

This demographic mega-schism from the hunter-gatherer regime, whose boundaries are, at one end, the accidental emergence of NDT fertility, and at the other end the conscious curbing of the population of the post-Enlightenment CDT, could be called the Holocene Demographic Transition (HDT).

There is a strong physical difference in general form (height and weight) between male and female hominoids. For example, male gorillas are about 50% larger and heavier than females; in chimpanzees the difference is 20% and in humans 10%. In zoology, this difference in form is called sexual dimorphism. Following Darwin's work (1871), we have known that this dimorphism appeared in the course of evolution through sexual selection: the propensity among females to

mate, by preference, with males who are more robust than themselves, in order to ensure fitness and protection from predators and other males. The post-HDT biological consequence of an older and more peaceful world could be the end of sexual dimorphism.

Cross-References

- ▶ Age Estimation
- ▶ Archaeology and Anthropology
- ▶ Children in Bioarchaeology and Forensic Anthropology
- ▶ Farming-Language Dispersals (1): Principles
- ▶ Foraging to Farming Transition: Global Health Impacts, Trends, and Variation
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Sex Assessment
- ▶ Social Archaeology

References

Ammerman, A.J., and L.L. Cavalli-Sforza. 1971. Measuring the rate of spread of early farming in Europe. *Man* 6: 674–688.

Bandy, M.S., and J.R. Fox. 2010. Becoming villagers. Comparing early village societies. In *Becoming villagers. The evolution of early village societies*, ed. M.S. Bandy and J.R. Fox, 1–16. Tuscon: The University of Arizona Press.

Biraben, J.N. 1979. Essai sur l'évolution du nombre des hommes. *Population* 34: 13–26.

Bocquet-Appel, J.P., and S. Naji. 2006. Testing the hypothesis of a worldwide Neolithic demographic transition. Corroboration from American cemeteries. *Current Anthropology* 47: 341–365.

Bocquet-Appel, J.P., S. Naji, and M. Bandy. 2008. Demographic and health changes during the transition to agriculture in North America. In *Recent advances in paleodemography: Data, techniques, pattterns*, ed. J.P. Bocquet-Appel, 277–292. Dordrecht: Springer.

Childe, V.G. 1936. *Man makes himself*. London: Watts.

Cohen, M.N., and G.J. Armelagos. 1984. *Paleopathology at the origins of agriculture*. New York: Academic.

Drennan, R.D., and C.E. Peterson. 2006. Patterned variation in prehistoric chiefdoms. *Proceedings of the National Academy of Sciences of the United States of America* 103: 3960–3967.

Dupaquier, J. 1998. Introduction. In *Histoire des populations de l'Europe II. La révolution démographique 1750–1914*, ed. J.P. Bardet and J. Dupâquier. Paris: Fayard.

Dyson, T. 2010. *Population and development. The demographic transition*. London: Zed Books.

Haak, W., O. Balanovsky, J.J. Sanchez, S. Koshel, V. Zaporozhchenko, C.J. Adler, C.S.I. Der Sarkissian, G. Brandt, C. Schwarz, N. Nicklisch, V. Dresely, B. Fritsch, E. Balanovska, R. Villems, H. Meller, K.W. Alt, A. Cooper, and the Genographic Consortium. 2010. Ancient DNA from European early neolithic farmers reveals their Near Eastern affinities. *PLoS Biology* 8: e1000536.

Harris, D. 2002. The expansion capacity of early agricultural systems: A comparative perspective on the spread of agriculture. In *Examining the farming/language dispersal hypothesis*, ed. P. Bellwood and C. Renfrew, 31–40. Cambridge: McDonald Institute for Archaeological Research.

Johansson, S.R., and S. Horowitz. 1986. Estimating mortality in skeletal populations: Influence of the growth rate on the interpretation of levels and trends during the transition to agriculture. *American Journal of Physical Anthropology* 71: 233–250.

Kirk, D. 1996. Demographic transition theory. *Population Studies* 50: 361–387.

Kuijt, I. 2008. Demography and storage systems during the southern Levantine Neolithic demographic transition. In *The Neolithic demographic transition and its consequences*, ed. J.P. Bocquet-Appel and O. Bar-Yosef, 287–314. Dordrecht: Springer.

Maddison, A. 2001. *The world economy. A millennia perspective*. Paris: OECD.

McCaa, R. 2002. Paleodemography of the Americas. From ancient time to colonialism and beyond. In *The backbone of history*, ed. R.H. Steckel and J.C. Rose, 94–124. Cambridge: Cambridge University Press.

Morens, M., G.K. Folkers, and A. Faucy. 2004. The challenge of emerging and re-emerging infectious diseases. *Nature* 430: 242–249.

Notestein, F.W. 1945. Population – The long view. In *Food for the world*, ed. T. Schultz, 36–57. Chicago: University of Chicago Press.

Perrenoud, A., and P. Bourdelais. 1998. Le recul de la mortalité. In *Histoire des populations de l'Europe II. La Révolution démographique 1750–1914*, ed. J.P. Bardet and J. Dupâquier, 57–101. Paris: Fayard.

Reher, D.S. 2004. The demographic transition revisited as a global process. *Population, Space and Place* 10: 19–41.

Sattenspiel, L., and H. Harpending. 1983. Stable populations and skeletal age. *American Antiquity* 48: 489–498.

Sköld, P. 2002. The history of smallpox and its prevention in Sweden. *Asclepio* 54: 71–91.

Thompson, W.S. 1929. Population. *American Journal of Sociology* 34: 959–975.

Valeggia, C., and P.T. Ellison. 2004. Lactational amenorrhoea in well-nourished Toba women of Formosa, Argentina. *Journal of Biosocial Science* 36: 573–595.

Wood, J.W. 1998. A theory of pre-industrial population dynamics: Demography, economy, and well-being in Malthusian systems. *Current Anthropology* 39: 99–135.

Further Reading

Armelagos, G.J., and K.N. Harper. 2005. Genomics at the origins of agriculture: Part II. *Evolutionary Anthropology* 14: 109–121.

Bellwood, P., and C. Renfrew, eds. 2002. *Examining the farming/language dispersal hypothesis*. Cambridge: McDonald Institute for Archaeological Research.

Bocquet-Appel, J.P. 2002. The paleoanthropological traces of Neolithic demographic transition. *Current Anthropology* 43: 638–650.

Bocquet-Appel, J.P. 2008. Explaining the Neolithic demographic transition. In *The Neolithic demographic transition and its consequences*, ed. J.P. Bocquet-Appel and O. Bar-Yosef, 35–55. Dordrecht: Springer.

Bocquet-Appel, J.P. 2011. When the world's population took off: The springboard of the Neolithic demographic transition. *Science* 333: 560–561.

Darwin, C. 1871. *The descent of man, and selection in relation to sex*. London: John Murray.

Landry, A. 1934. *La révolution démographique*. Paris: Librairie du Recueil Sirey. (ed Ined, Paris, 1982).

Vigne, J.D. 2008. Zooarchaological aspect of the Neolithic diet transition in the Near East and Europe and their putative relationships with the Neolithic demographic transition. In *The Neolithic demographic transition and its consequences*, ed. J.P. Bocquet-Appel and O. Bar-Yosef, 179–205. Dordrecht: Springer.

Weisz, G., and J. Olszynko-Gryn. 2009. The theory of epidemiologic transition: The origins of a citation classic. *Journal of the History of Medicine and Allied Sciences* 65: 287–326.

Wirth, T., F. Hildebrand, C. Allix-Béguec, F. Wölbeling, T. Kubica, K. Kremer, D. van Soolingen, S. Rüsch-Gerdes, C. Locht, S. Brisse, A. Meyer, P. Supply, and S. Niemann. 2008. Origin, spread and demography of the Mycobacterium tuberculosis complex. *PLoS Pathogens* 4: e1000160.

Demography of the Ancient Roman World

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Introduction and Historical Background

During the last half century, historical demography has become one of the central subdisciplines within the field of economic and social history. It is precisely in demography that some of the differences between the modern world and the preindustrial past are most prominently visible. We now live much longer than our ancestors, and there are also far more of us than there ever were. The change occurred during the so-called demographic transition, that began in Europe and North America in the nineteenth century, and subsequently also reached the rest of the world, though not yet completely. This demographic transition involved the change from a society with high mortality and high natality to a society with much lower mortality, and much lower natality. As a result, people in advanced modern economies now live on average two or even three times longer than their ancestors. Since mortality had begun to decline well before natality, population also started to grow at an unprecedented rate. This often slowed down once fewer children were being born, but even so, in many countries, populations have continued to grow at rates never seen before. The result has been that the world now has many times the number of inhabitants it had only two centuries ago.

For classical economists such as Thomas Malthus, population growth always was a nightmare scenario because they believed production would never keep up, with a declining standard of living as a result. This in turn would bring about the positive checks such as famine and disease that would once again reduce population to a smaller size. Only sexual restraint could ever bring about prosperity. Similarly in a more modern marginal utility analysis, with land in almost fixed supply, more labor working on that same land would suffer from declining marginal returns, and thus from lower wages. Before the Industrial Revolution population and wages thus indeed mostly moved in opposite directions, with periods of growing populations and declining standards of living alternating with periods of the demographic decline and rising prosperity. This all changed in the aftermath of the Industrial Revolution, when not only population and aggregate production started to grow enormously, but also *per capita* production. The Malthusian ceiling was finally breached.

Thus, demography intersects with economic performance in two different ways. The first is

that of population structure. When a long and healthy life is the ultimate scarce good, the failure of preindustrial societies to provide such happiness to as many people as possible is indeed the ultimate sign of their economic failure. The second intersection is at the aggregate level of trends in population size and total output, and in the resulting *per capita* production and consumption. The pessimistic Malthusian model is indeed one scenario for this, but it is not the only one. Demand from a growing population can also in and of itself encourage economic innovation and productivity growth. This is the model proposed by Ester Boserup (1965). Finally, population growth can be the product of improved economic or environmental conditions such as technical change, market integration, or climate change. Rising prosperity may make people more optimistic about their future and that of their offspring, and lead them to decide to have more children.

The big difference between modern populations and their pre-transition ancestors is in mortality levels. In modern populations, the majority of people live into old age. People can expect to live many years from birth (this is called life expectancy at birth, e_0, typically more than 70 years in modern populations) and only few people die before old age: ages at death are closely clustered in old age. In pre-transition populations, this is altogether different, with life expectancies in the range $e_0 = 20$ to $e_0 = 35$. Moreover, this low average also hides a far greater variation around the mean, with many infants and children dying at a very early age: in such populations, it is not unusual for about half of newly born children to die before the age of five. Even after this devastating infant mortality, mortality at later ages remained higher than in modern populations. Some, however, lived well beyond the average life expectancy, or even into old age. Thus, in such populations, there simply is much more variation around the mean life expectancy. For the composition of these populations, this implies that they have many children, rather fewer young adults, and very few old people. The population pyramid has a wide base and a slender top.

Key Issues and Current Debates

There can be little doubt that Roman population structure roughly conformed to this model of a pre-transition population, for the simple reason that all documented preindustrial societies conform to the pattern. The problem in the Roman case is that there is little actual evidence of the kind that is used in modern demographic analysis to document that. This was shown brilliantly in a seminal article by Keith Hopkins (Hopkins 1966), in which he argued that contrary to what was common practice at the time, the ages at death as recorded on Roman tombstones could not be used for a demographic reconstruction. He took a large sample of such data, and produced a modern scientific demographic reconstruction. Once he had done this, it was obvious, he argued, that such a population could never have existed in reality. That judgment was based on a comparison with modern model life tables for high mortality societies (originally he used the United Nations model life tables, and later the improved Princeton model life tables – Coale and Demeny 1983). Such model life tables are a standardized representation of the age-specific incidence of death for various levels of mortality. They are based on the best available modern data, even if these are admittedly often not very good for societies with low levels of life expectancy. So even if these model life tables have their limitations, they are the best comparative yardstick that we have. Hopkins therefore compared his demographic reconstruction from Roman funerary inscriptions with the patterns in the model life tables, and concluded that the tombstones produced demographically impossible results. The reason for this is quite simple, once you think of it: Not Everyone had an equal chance to be commemorated. For example, very young children were only rarely commemorated (Carroll 2011). Thus, the pattern of ages at death on tombstones is interesting, but as an indicator of cultural practices around commemoration, and not as demographic evidence.

This is not to say that Roman society did not keep census records (it did), but apart from a few exceptions, these have not survived. We have some for a few Egyptian towns and villages, and

we have (hard to interpret) aggregate numbers for the late Republican period. These Egyptian data have survived because the unique climatic conditions have preserved the papyri that were used here (but also elsewhere) as writing material. Elsewhere in the Empire, these data have not survived, and all we have for those regions are a few actuarial life tables, and the regulations and rates of a funeral association with an implied life table (*Corpus Inscriptionum Latinarum* 14.2112).

The Egyptian census data and tax records have been the subject of a brilliant critical analysis in Bagnall and Frier (1994), and some subsequent elaboration and criticism (Scheidel 2001a; Tacoma 2006). These studies have carefully pushed the data to their limit, and the result is that we can indeed say with some confidence that the demographic structure of Roman Egypt roughly conformed to the traditional demographic model of high mortality, high natality, and low life expectancy. In fact, Bagnall and Frier (1994) concluded that the life expectancy that they reconstructed was so low (around $e_0 = 20$) that it was at the very low end of what was still demographically possible if Egyptian society was to reproduce itself demographically. Extrapolation of the Egyptian data to the rest of the Empire is thus not necessarily unproblematic, since the specific and unfavorable conditions in the Egyptian countryside with its high population densities, high temperatures, and irrigation agriculture did not pertain elsewhere.

Comparative historical research does indeed show that there could be quite a bit of variation in preindustrial life expectancies, depending on conditions. Sparsely populated districts at higher elevations could be significantly more salubrious, just as densely populated urban regions may well have had mortality levels that were so low that populations could not maintain themselves without immigration (Wrigley 1978; Scheidel 2001b; Jongman 2003).

Skeletal data are a potential but controversial alternative data type for the reconstruction of demographic structure. The controversy concerns the reliability of ages at death from adult skeletons. Unlike skeletons of children and adolescents, those of adults do not show big changes, so aging them is far less precise. A recent alternative has been to look particularly at diseases that only occur in older age. Lazer (2009) has done so for the skeletal material from Pompeii and Herculaneum, and concludes that these diseases of old age were quite frequent, and that, therefore, there must have been rather more people who had survived into old age. This is all the more important because the Campanian region was one of high population density, and thus presumably of a high incidence of infectious disease. It suggests that earlier reconstructions of Roman life expectancy may have been a bit too pessimistic, even if, of course, Roman life expectancy never achieved modern levels.

The main cause of the pattern of high mortality and low life expectancy was infectious disease, and among infants and children in particular. Some diseases, like malaria (endemic in, e.g., the city of Rome), originate from contacts with disease-carrying animals. Many other infectious diseases are transmitted by humans, either through airborne transmission, or through polluted water supplies and inadequate drainage of human waste. Here, large parts of the Roman world were particularly vulnerable, due to high levels of population density and urbanization, combined with a high level of administrative and economic integration. People were moving around much more than they had done previously, along Roman roads, rivers, and from sea port to sea port. The cities were the nodes of this system of communication and transportation. Thus, Rome had not only created the first integrated economic and political system, but also the first integrated disease regime. All this was aggravated by an almost complete lack of understanding of the causes of infectious disease and mortality.

Roman levels of urbanization were indeed very high by comparative historical standards, and not just in Campania. Administratively early imperial Italy had 431 cities (apart from Rome), and the Empire at large counted at least 2,000 cities, but probably more (Scheidel 2007 – embarrassingly there is as yet no complete list). At the top of the rank size distribution were four very large cities: Rome, with perhaps one million inhabitants in the early imperial period, and Roman Carthage,

Alexandria, and Antioch on the Orontes, with a joint population of perhaps another one million. Below that there were a score of cities above 100,000 inhabitants, and even more in the 50,000–100,000 range. The implication of such large cities is that although most cities were rather smaller, the majority of the Empire's perhaps six million urban dwellers (but there could be more – we do not know until the research has been done) were living in large cities of perhaps 50,000 or more inhabitants. Thus, culturally and economically, the Roman urban experience was one of living in cities of a size that was both unprecedented and unmatched for a long time to come.

Demographically, that is obviously important in and of itself. However, it is also important because historically large preindustrial cities have rarely if ever succeeded to maintain their populations without massive immigration: they were so insalubrious that mortality levels far exceeded potential natality, and more so, the larger the size of the city. For the small early modern European cities, mortality typically exceeded natality by 5 per 1,000, and for a city like London, it was more like 10 per 1,000 (Wrigley 1978; De Vries 1984). The same almost certainly applied to the cities of antiquity, with massive rural to urban migration as an unavoidable consequence if cities were to maintain their size (Jongman 2003). In densely populated regions like Italy, the urban demand for warm bodies must have exceeded the rural surplus. Without immigration from further afield, such cities and rural districts could not have maintained their populations. Migration is indeed attested in both the written sources and from modern skeletal analysis, from neighboring rural districts and from the provinces. Contrary to traditional push arguments for the migration to Rome such as in the literary tradition (the late Republican story of the impoverished small Italian farmers and their desperate migration to Rome and other cities where they came to increase the numbers of a landless and jobless proletariat), the best explanation for rural to urban migration is thus the structural demographic and economic pull of the big cities. This is not to say that these migrants came voluntarily: many immigrants were slaves imported to work in urban industries or as domestic staff in the increasingly wealthy urban households of the Roman elite. Often, they lacked resistance to their new urban disease regime (and to malaria in particular), with even higher mortality as a sad consequence. Thus also, as soon as the pull of urban life weakened and fewer people migrated to the cities, cities would begin to shrink.

This brings us to the much discussed subject of aggregate population figures, and of population trends. Thus far, the debate on population totals has been focused on the Republican census data for Roman Italy. Every 5 years (the *lustrum*), two top ranking magistrates were elected to hold *inter alia* a census of all adult male citizens who were of military age, and of the value of their property so that they could be included in the right property class in the popular assembly (the richer you were, the more your vote counted in the *comitia centuriata*). So we should realize that in their origin, these are figures of free Roman citizens rather than all inhabitants of Italy that would also include the free Italians who did not have Roman citizenship, or slaves (Brunt 1971 for the most comprehensive modern study). And they are for adult males. We have the numbers for about half of the census years between 225 BCE and 28 BCE. This series shows some remarkable changes, and that has created a controversy that has now lasted for more than a century (Beloch 1886; Brunt 1971; Hopkins 1978; Lo Cascio 2001). The series shows quite a steady increase, and two major jumps, first in the censuses of 86/5 BCE (probably) and 70/69 BCE when the number roughly doubles compared to 125/4 BCE (there are no intervening data), and second in the Augustan census of 28 BCE where the number more than quadruples compared to 70/69 BCE (again, there are no data for intervening years).

The steady increase in the census figures is not that hard to explain, as the number of (ex)slaves and of Italians who gained Roman citizenship steadily increased over time. Similarly, the doubling of the figure in probably 86/5 and certainly 70/69 can be explained by the grant of citizenship to Rome's allies after the so-called Social War (Rome's war with its Italian allies – *socii*) of 91–88 BCE. Rome had won that war, but had to

give the allies what they wanted: citizenship. Suddenly, there were far more citizens. The jump in 28 BCE was harder to explain, and explanations have remained more controversial. Beloch 1886 argued that such a jump was demographically implausible, and that the jump must have been the product of a change in the census procedure: he hypothesized that women and some children were now also included.

Thus, we have two competing reconstructions of Italian population history: A low count that starts with a free and slave population in 225 BCE of 3.5–5 million, and a population in 28 BCE of perhaps 5–6 million, and a high count of the free population in 225 BCE of 4 million (plus some slaves) rising to a free population in 28 BCE of some 10 million (plus perhaps 4 million slaves). Population at the starting point in 225 BCE is roughly the same in the two models, but the end of the story in 28 BCE is totally different. A century of scholarly ingenuity has failed to solve this dilemma. A middle ground is hard to imagine, and the literary sources are not and will probably never be decisive. Yet, the historical implications are enormous: Was Roman Italy's population stagnant or even in decline during the two centuries that it successfully built its enormous empire? If we are to believe pessimistic traditional literary histories of Rome in this period, the Italian countryside did indeed suffer dramatically, and became depopulated, thanks to the growth of large slave estates and the migration of impoverished citizens to the growing cities populated by an idle and landless proletariat (Hopkins 1978). The alternative high count interpretation can take the census figures at face value, but the implication of a booming economy is rather at odds with the pessimistic literary tradition of rural poverty and social conflict.

The pessimistic reconstruction of Italian agricultural history has been undermined in recent years by the results of the archaeological field surveys in Italy beginning with the South Etruria Survey in the 1950s and later. Almost all of these surveys show a consistent pattern of increasing settlement density from the late fourth or early third century BCE and a continuity of small farms (Fentress 2009; Attema and De Haas 2011). The new villas are indeed visible in the landscape, but did not replace the small farms. Archaeologically, we see something that is completely at variance with the depopulated fields in the literary accounts. To be sure these are data on site numbers and site size, and not directly on population. The population estimates based on these data attach numbers of people to particular site categories, and then aggregate the result. Admittedly, that is an obviously error-prone procedure if we only look at absolute numbers. However, far less insecure than such absolute estimates of population is a reconstruction of the trend of relative change over time. I think we can confidently say that the trend was up rather than stagnant or even down, even if we cannot on the basis of these data say with a great deal of confidence that Italy had a population of 14 million rather than 6 million in the age of Augustus. However, that bipolar impasse vanishes if we are prepared to abandon the primacy of a literary tradition that is probably irrecoverable anyway.

Numbers of urban rather than rural inhabitants in Italy have been much harder to estimate with any confidence. We have an estimate for the city of Rome of close to one million inhabitants in the age of Augustus. The basis for this estimate is the number of roughly 200,000 adult male recipients of the imperial corn dole in the city (but in the early years of the *frumentationes* that number varied pretty wildly). If the number of 200,000 recipients is indeed roughly correct, and if Rome was a city of more than just adult male inhabitants, the number of free inhabitants must have been about 700,000. To this we should add a large number of slaves. Well-to-do Roman households included many domestic slaves, and slaves were also highly prominent in urban crafts. This is reflected in the prominence of slaves and freedmen in the urban funerary inscriptions, and in their prominence in associations of urban craftsmen. A remaining problem is that of the high incidence of manumission. Many (if not most) urban slaves were manumitted, and thus, slaves and free were as much age categories as they were social categories. Between them, these arguments imply that the one million inhabitants for Rome may be a conservative estimate.

The most common estimate of the joint population of Italy's other 431 towns is another one million or so (Hopkins 1978). Unfortunately, there is no real evidence for this claim. I think its origin is in what scholars felt to be a maximum plausible urbanization rate for Roman Italy of about 30%, assuming an Italian population of some 6 million. However, the estimate implies an average urban population of only about 2,000 people per city, and that is very low indeed, and all the more so since there were a number of cities that had considerably more inhabitants. Pompeii, for example, may have had 8,000 inhabitants at the lowest estimate, but more likely some 10–15,000 people. However, as soon as we allow for more urban inhabitants, the urbanization rate rises to some 50%, which is really very high. The only way out seems to be to allow for an Italian population in this period that was considerably larger than the 5–7 million of the low count.

These estimates for early imperial urban population are not only insecure, but become even more problematic once we go back in time. Keith Hopkins has estimated urban population in 225 BCE as perhaps 600,000, but that estimate is ultimately based on its compatibility with the low count estimates for Italy's total population (Hopkins 1978: 68). As with rural field surveys, the only empirical way forward would be to study changes over time in urban archaeology, including changes in the size of the built area. That research is only just beginning, but there is no doubt that cities were growing – considerably.

Data for other regions of the Empire are even harder to find. Beloch (1886) had concluded that the Empire as a whole had some 55 million inhabitants in the Augustan age, and some have argued that higher counts than Beloch's for Italy imply considerably larger figures for the Empire at large, up to 90–100 million people. Such estimates are intellectually ingenious, but the empirical basis for any of them is extremely tenuous. Here too, the future of research probably lies in field surveys and aggregate analysis of urban archaeology in order to at least ascertain trends. The only serious exception has been Roman Egypt, where the vast quantity of papyri has circumscribed the limits between highest and lowest possible estimates (5–8+ million). Archaeologically, the best evidence comes from the Rhineland, where Roman populations have been estimated at 10.8–17.9 people per sq. km, or about ten times larger than in the preceding Iron Age, and some 15 times larger than in the subsequent Merovingian period (Wendt et al. 2010: 320).

By the later first century BCE and the early first century CE, the upward trend of growing rural populations and expanding cities reached its peak, with sometimes very dense settlement and high estimated population densities that seem more in tune with the high count reconstruction than with the pessimistic low count. Yet, the early Principate also seems to represent some ceiling, after which the trend turned sometime in the second century CE, when for the first time, small farms did indeed suffer decline, and when both rural and urban populations began to shrink for the first time. The best explanation is probably the impact of the so-called Antonine Plague, a (likely) small pox epidemic that ravaged the Empire from the mid-160s CE, with apparently quite dramatic effect, not only in Italy, but everywhere (Jongman 2012). The Antonine Plague continued to ravage the Empire for another two decades, and notwithstanding the concerted efforts of Severan emperors, it inaugurated an even deeper political and military crisis (the "crisis of the third century"), from which the Empire only partially recovered. In Italy and the Latin West, late antique populations were dramatically lower than they had been, judging by the results of field archaeology and the signs of urban abandonment and decay. The Roman East witnessed an altogether different trajectory, however. It too suffered in the third century, but it recovered quite dramatically in the fourth century, and in some regions even reached levels of population density and urbanization never seen before. Here, the Justinianic Plague (*Yersinia pestis*) of 541–2 CE marked a turning point from which there was no return.

Future Directions

For a long time, research on ancient demography has progressed without much intellectual input from modern (historical) demography. Hopkins (1966) clearly exposed the dangers of such conceptual isolationism, but ancient historians and classical archaeologists still have some way to go. And in the end, it is only through comparison with other regions and periods that we can weigh the Roman experience. On the data side, there are two areas of great potential. The first is that of the scientific archaeology of human remains and the molecular biology of disease. These have the potential to inform us far better on actual disease and its impact, and thus on the causes and incidence of mortality. Here, the new era has only just begun. The second area is that of demographic analysis of field surveys. For Roman Italy, we already have a multitude of excellent surveys. What is lacking is on the one hand systematic aggregate (statistical) analysis of these surveys, and on the other hand an extension of this research into other areas of the Empire.

Cross-References

- ▶ Bioarchaeology in the Roman Empire
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Economy, Roman

References

Attema, P.A.J. & T.C.A. De Haas. 2011. Rural settlement and population extrapolation, a case study from the ager of Antium, central Italy (350 BC–AD 400). In *Settlement, urbanisation and population*. Oxford Studies on the Roman Economy 2, eds. A. Bowman and A. Wilson, 97–140. Oxford: Oxford University Press.

Bagnall, R.S., and B.W. Frier. 1994. *The demography of Roman Egypt*. Cambridge: Cambridge University Press.

Beloch, K.J. 1886. *Die Bevölkerung der griechisch-römischen Welt*. Leipzig.

Boserup, E. 1965. *The conditions of agricultural growth. The economics of agrarian change under population pressure*. London: Allen & Unwin.

Brunt, P.A. 1971. *Italian manpower 225 B.C.–A.D. 14*. Oxford: Oxford University Press.

Carroll, M. 2011. Infant death and burial in Roman Italy. *Journal of Roman Archaeology* 24: 99–120.

Coale, A.J., and P. Demeny. 1983. *Regional model life tables and stable populations*. 2nd ed. Princeton: Princeton University Press.

De Vries, J. 1984. *European urbanization 1500–1800*. London: Methuen.

Fentress, E. 2009. Peopling the countryside: Roman demography in the Albegna and Jerba. In *Quantifying the Roman economy. Methods and problems*, ed. A. Bowman and A. Wilson, 127–161. Oxford: Oxford University Press.

Hopkins, K. 1966. On the probable age structure of the Roman population. *Population Studies* 20: 245–264.

Hopkins, K. 1978. *Conquerors and slaves*. Cambridge: Cambridge University Press.

Jongman, W. 2003. Slavery and the growth of Rome. The transformation of Italy in the second and first centuries BCE. In *Rome the Cosmopolis*, ed. C. Edwards and G. Woolf, 100–122. Cambridge: Cambridge University Press.

Jongman, W. 2012. Roman economic change and the Antonine Plague: Endogenous, exogenous, or what? In *L'impatto della peste Antonina*, ed. E. Lo Cascio, 253–263. Bari: Edipuglia.

Lazer, E. 2009. *Resurrecting Pompeii*. London: Routledge.

Lo Cascio, E. 2001. Recruitment and the size of the Roman population from the third to the first century BCE. In *Debating Roman demography*, ed. W. Scheidel, 111–137. Leiden: Brill.

Scheidel, W. 2001a. *Death on the Nile. Disease and the demography of Roman Egypt*. Leiden: Brill.

Scheidel, W. 2001b. Roman age structure: Evidence and models. *Journal of Roman Studies* 91: 1–26.

Scheidel, W. 2003. Germs for Rome. In *Rome the Cosmopolis*, ed. C. Edwards and G. Woolf, 158–176. Cambridge: Cambridge University Press.

Scheidel, W. 2007. Demography. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 38–86. Cambridge: Cambridge University Press.

Tacoma, L.E. 2006. *Fragile hierarchies. The urban elites of third century Roman Egypt*. Leiden: Brill.

Wendt, K.P., J. Hilpert, and A. Zimmermann. 2010. Landschaftsarchäologie III. Untersuchungen zur Bevölkerungsdichte der vorrömischen Eisenzeit, der Merowingerzeit und der vorindustriellen Neuzeit an Mittel- und Niederrhein. *Bericht der Rőmisch-Germanischen Kommission* 91: 217–338.

Wrigley, E.A. 1978. A simple model of London's importance in changing English society and economy 1650–1750. In *Towns in societies. Essays in economic history and historical sociology*, ed. P. Abrams and E.A. Wrigley, 295–309. Cambridge: Cambridge University Press.

Further Reading

Frier, B.W. 2000. Demography. In *The Cambridge ancient history. XI The High Empire, AD 70–192*, ed. A. Bowman, P. Garnsey, and D. Rathbone, 2nd ed., 787–816. Cambridge: Cambridge University Press.

Jongman, W. 2009. Archaeology, demography and Roman economic growth. In *Quantifying the Roman economy. Methods and problems*, ed. A. Bowman and A. Wilson, 115–126. Oxford: Oxford University Press.

Morley, N. 2001. The transformation of Italy, 225–28 BC. *Journal of Roman Studies* 91: 50–62.

Parkin, T.G. 1992. *Demography and Roman society.* Baltimore/London: Johns Hopkins University Press.

Scheidel, W. 2007. Demography. In *The Cambridge economic history of the Greco Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 38–86. Cambridge: Cambridge University Press.

Dental Anthropology

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Introduction

In some respects, the dentition is a battleground. For organisms that use teeth to process food, tooth loss is directly related to survival – lose your teeth, lose your life (Lucas 2004). Cultural buffering during the later stages of human evolution removed this dramatic relationship, but dental conditions are nonetheless dictated by long-term evolution, not recent cultural advances. For that reason, human teeth, along with the teeth of all vertebrates, were formed under the influence of natural selection. For animals that eat meat, the dentition has slicing, dicing, and piercing elements with minimal emphasis on crushing and grinding teeth. Conversely, browsers and grazers process large quantities of plant foods and thereby have teeth devoted primarily to crushing and grinding, with little need for slicing and dicing. For omnivores, including most primates, the dentition processes a more varied assortment of foods so their teeth are not as specialized as those of carnivores or herbivores (Ungar 2010).

Teeth are comprised of four different tissues: enamel, dentine, cementum, and pulp. Enamel covers the dentine which in turn covers the pulp chamber that contains blood vessels and nerves. Cementum anchors the tooth roots in the sockets of the upper and lower jaws. Enamel, the hardest substance in the human body (97% inorganic), interfaces directly with the external environment. This basic observation has many ramifications. For example, teeth are used to process food so their shape and size are strongly influenced by diet. Because teeth come together while masticating food objects, the enamel eventually wears down, exposing the dentine, and finally the pulp. If wear is not too rapid, secondary dentine forms to protect the pulp from exposure to environmental variables, including oral microbiota that lead to infection.

Another plus to the hardness of enamel is preservability. Teeth are often the most abundant remnant of the skeletal system in the archaeological and fossil record.

Because tooth size and shape are linked to diet and survival, the dentition is under strong genetic control. Minor variations are tolerated, such as accessory cusps, styles, ridges, and roots (Fig. 1), but pronounced changes are pruned by the shears of natural selection. Still, minor changes that accrue over broad spans of time ultimately lead to major changes, providing a classic example of the relationship between microevolution and macroevolution emphasized by the modern synthetic theory of evolution. While dramatic changes occur over millions of years, as seen for example in the dentition of horses as they shifted from browsing to grazing (Peyer 1968), other changes are remarkably conservative. For example, the adaptive zone of felids is defined broadly by the elements of hunting strategy (ambush and pursuit), activity period (nocturnal), and sociality (solitary), but the subdivision of this zone by prey size resulted in a wide variation in felid body size (4 kg to over 200 kg). Despite variation in body size, including tooth size, the teeth of a small cat are basically identical to those of a lion or tiger from a morphological standpoint. One can see the same pattern in canids where body and tooth size vary considerably but

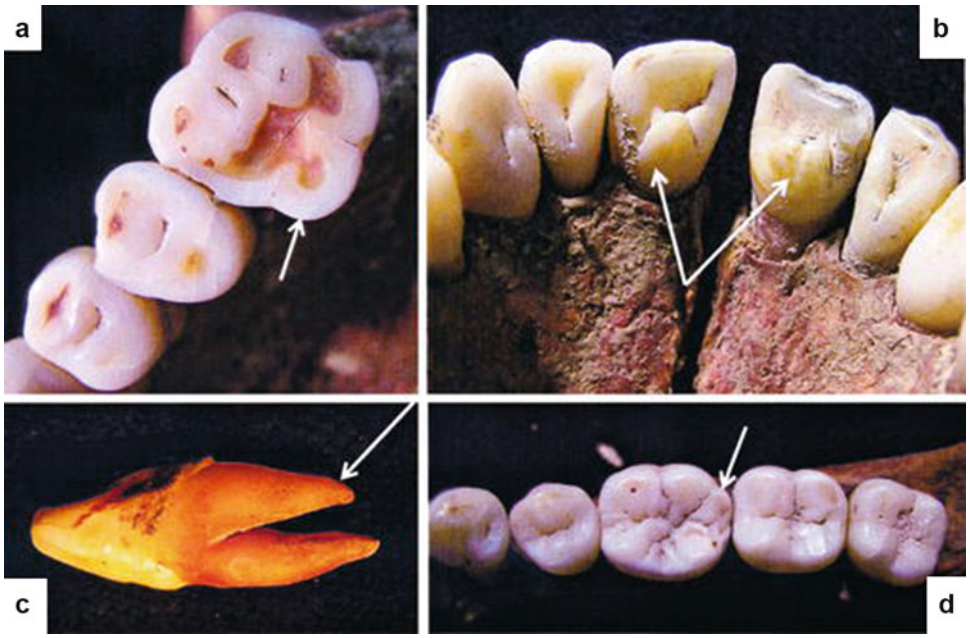

Dental Anthropology, Fig. 1 Examples of minor variants of human tooth crowns and roots. (**a**) Large Carabelli's cusp with dentine involvement; (**b**) large dental tubercles on upper central incisors, with moderate shoveling; (**c**) two-rooted lower canine; (**d**) five-cusped lower first molar and four-cusped lower second and third molars

tooth number and morphology are identical in most respects (Hillson 2005). The point is this: if you maintain the same diet (e.g., meat eating) but vary that diet by prey size (e.g., mice to water buffaloes), your teeth ultimately change in size but not in shape or morphological details.

Human teeth are remarkably similar throughout the world. A dentist who works on "normal human teeth" could ply his trade in Australia, Asia, Europe, Africa, or the Americas. With few exceptions, humans have the same number of deciduous teeth (20) and adult teeth (32) and the same types of teeth (incisors, canines, premolars, molars), along with many commonalities in morphological details. Beyond that, human teeth are like hominoid teeth, making it obvious that the great apes are our closest biological relatives (Swindler 2005). However, human teeth are distinguished from hominoid teeth in several ways. The most important difference is in the size of the canines. The general primate dental pattern includes large, projecting canines that are primarily used in male-male competition for access to valued resources. These canines form a shearing complex with the lower first premolar which assumes a sectorial shape (elongated front to back, or mesiodistally). For proper articulation of the two jaws, there is a space, or diastema, between the upper lateral incisors and canines to accommodate the lower canine. Paleoanthropologists often note canine reduction, homomorphic lower premolars, and lack of a diastema as hallmarks of early hominids. These traits are all linked to a single trait – canine size.

Hominoids and many other primates also differ from hominins in the form and relative size of the incisors. Humans have relatively small anterior teeth (incisors and canines) that are vertically implanted in the jaws. Monkeys and apes, by contrast, have broad, spatulate incisors that are disproportionately large compared to the cheek teeth (premolars, molars), and these are set obliquely in the jaw rather than vertically (Agrawal et al. 2008). This difference revolves around the degree to which different organisms manipulate food with their anterior teeth. Animals who emphasize incisal preparation of foodstuffs have broad incisors that jut out from the upper jaw

at an angle. Hominoids also show variation in enamel thickness on individual cusps, along with better developed cingula; orangs and some chimps also exhibit crenulations (small ridges) on the premolars and molars. Despite differences, the overall similarity in morphology is striking.

Definition

Dental anthropology is a subdiscipline of physical anthropology that focuses on the use of teeth to resolve anthropological problems. Teeth exhibit a wide array of variables, ranging from those largely controlled by genes to those largely dictated by environment. Dental variables under genetic control include crown and root morphology and size, along with tooth number (i.e., missing and extra teeth, or hypodontia and hyperdontia). Dental variables that reflect environmental factors include tooth crown wear and chipping, caries, abscesses, periodontal disease, calculus, and linear enamel hypoplasia. Anthropological questions focusing on teeth include issues of population origins and relationships (tooth morphology, size, number), diet and behavior (attrition, crown chipping, tooth-tool use), health (caries, abscesses, periodontal disease, calculus), and developmental stress (hypoplasia, asymmetry). Fields that involve significant elements of dental anthropology include bioarchaeology, forensic anthropology, human biology, paleoanthropology, primatology, and primate paleontology.

Key Issues

Population History

For the past 100 years, dental researchers have known human populations from different geographic regions varied in tooth size, crown and root morphology, and tooth number. By 1960, we knew that Australian aboriginals had the largest teeth in the world while the San (Bushmen) and Saami (Lapps) had the smallest. For morphology, Asian and Asian-derived groups were characterized by shovel-shaped incisors while Europeans were distinguished by Carabelli's cusp. After 1970, the number of papers using dental characters to assess population affinity grew exponentially. With the advent of computers, distance statistics, and new scoring standards, researchers started to examine many populations for multiple traits and worldwide patterns of variation emerged (Scott and Turner 1997). C.G. Turner II developed many of the ranked standards for making observations (Turner et al. 1991; Scott and Irish 2017). He also examined thousands of Asian and Asian-derived samples to develop the Sinodont-Sundadont dichotomy in Asia and the three-wave migration model for the peopling of the Americas from a northeast Asian Sinodont ancestor (Greenberg et al. 1986). Other researchers are using dental morphology to address issues ranging from regional microdifferentiation to global patterns of variation.

Genetics and Development

For teeth to be useful in the evaluation of phylogeny and population relationships, dental variables should be under strong genetic control. Although normal dental variation cannot be reduced to gene frequencies, twin and family studies show that traits defined by size or morphology are highly heritable (Fig. 2). The environment contributes to dental development but genes play a stronger role. Morphological traits, which are present or absent with variable degrees of expression when present, are quasicontinuous variants with polygenic modes of inheritance. Missing third molars, at one time thought to be a simple Mendelian trait, are also quasicontinuous. Over the course of the past two decades, research in evo-devo (evolution and development) has advanced our understanding of the genetic-developmental basis of tooth size and shape. Going beyond the identification of individual variables associated with tooth size and shape, Jernvall and Jung (2000) describe four types of characters based on developmental principles; that is, characters of initiation, termination, cusp shape, and configuration. These different developmental patterns are tied provisionally to size and presence of the hypocone and short cusps along with crown diameters, crown relief, and relative cusp size, etc. The patterning cascade model that ties crown and root traits to regulatory

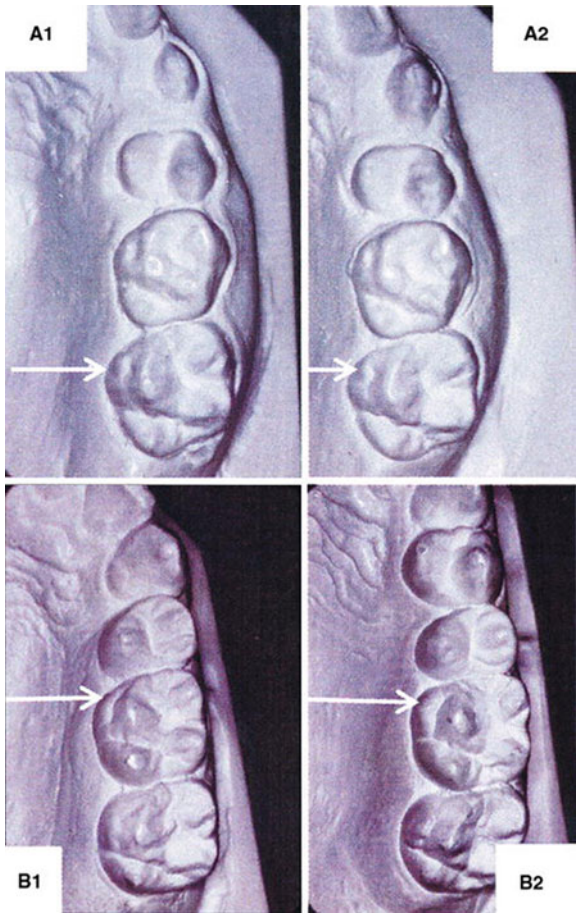

Dental Anthropology, Fig. 2 Two pairs of monozygotic twin dentitions with emphasis on upper left cheek teeth. Note symmetry of expression of Carabelli's cusp for **A1**-**A2** twins but contrast between this cusp on **B1**-**B2** twins

genes has further advanced the analysis of tooth characters in hominin fossils and recent human populations (cf. Hunter et al. 2010).

Diet and Behavior

Because teeth process food, dental variables provide several types of information on the diet of earlier human populations. With use, teeth wear down. Patterns of wear are used to infer both diet and dietary behavior. Hunter-gatherers often use their anterior teeth to process hides, so the incisors wear down more rapidly than the molars and premolars. This is less evident in early agriculturalists that show less wear on the anterior teeth but more wear on the cheek teeth because of abrasives introduced by grinding stones in processing grains. Agriculturalists also exhibit a steeper wear plane on the cheek teeth compared to hunter-gatherers, a pattern that may reflect a reduction in food toughness tied to the use of grinding stones and cooking (Smith 1984).

In addition to attrition and abrasion which are characterized by incremental change and a smooth polished surface, teeth can also fracture. As a brittle material with limited plasticity, enamel can be chipped when subjected to excessive force. Such chipping is common in Inuit populations where individuals generate powerful vertical occlusal forces and consume a diet of frozen or dried flesh that is often contaminated with grit (Turner and Cadien 1969). However, all populations chip their teeth to some degree, and this may be patterned relative to tooth-tool use and dietary behavior (Scott and Winn 2011).

Dental calculus, often an obstacle to those measuring teeth and making morphological observations, contains dietary information long under-appreciated by the anthropological

community. The DNA of oral microbes shows how major dietary shifts in human evolution are reflected in changing compositions of bacterial communities (Adler et al. 2013). Calculus provides further dietary insights as it absorbs and preserves starch granules (Hardy et al. 2009) and phytoliths (Henry et al. 2010). Even though it is primarily a mineral, calculus often preserves sufficient organic material in its calcified matrix to allow for stable carbon and nitrogen isotope analysis (Scott and Poulson 2012).

Oral Health

Some of the most common diseases in earlier human populations were those that impacted the oral cavity. The most widely studied of these pathologies is dental caries (Fig. 3). Because carious lesions are closely linked to the consumption of refined sugars, they were not common in earlier hominin populations who consumed protein and fat along with complex carbohydrates, including foliage and tubers. One exception is Kabwe (Rhodesian Man) who suffered from multiple carious lesions and associated abscesses over 100,000 years ago. Caries remained in relatively low frequencies in recent hunting/gathering populations, partially attributable to the rapid and pronounced tooth wear that eliminated the pits and fissures that served as safe harbors for oral bacteria. Even during medieval times in Europe, caries occurred primarily between the teeth (interstitial) rather than on the crown surfaces (coronal). With the spread of refined sugars after CE 1500, caries became a major health scourge. Recent studies show females usually exceed males in caries rates, perhaps due to male-female differences in snacking habits but also to differences in the oral environment of the two sexes influenced by female hormones associated with reproduction (Lukacs and Largaespada 2006).

Another oral pathology that crosscuts all geographic areas and subsistence practices is dental abscessing, or periapical osteitis. An abscess almost invariably develops at the root apex when the pulp chamber is exposed to the oral environment. This exposure can be the result of extremely rapid crown wear, coronal or interstitial caries, significant crown fractures, or periodontal disease. When oral bacteria invade the bloodstream, an individual is subject to a generalized infection. Many individuals in the archaeological record had active abscesses at death. To what extent such abscesses are implicated in mortality is difficult to assess. Caries and abscesses can lead to antemortem tooth loss. Individuals who retain their teeth throughout life live at least a decade longer than those who lose one or more teeth.

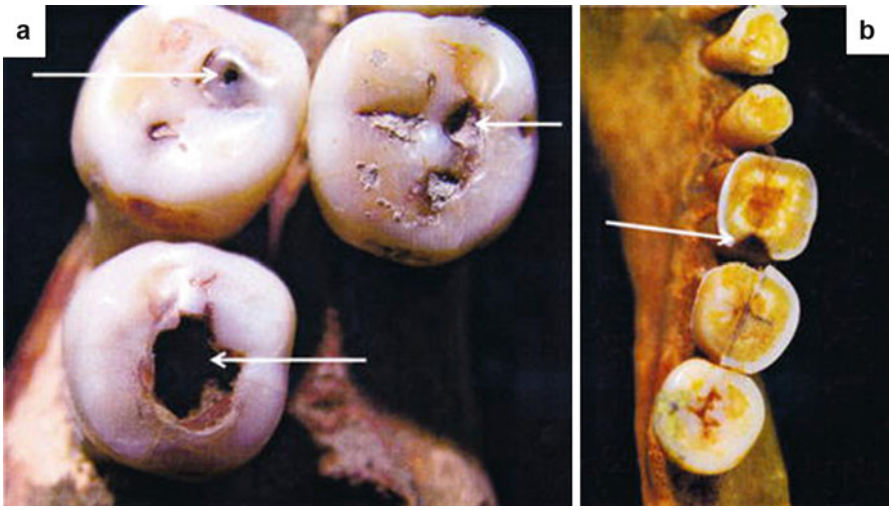

Dental Anthropology, Fig. 3 Carious lesions noted by arrows. (**a**) Coronal; (**b**) interstitial

Developmental Stress

Teeth are the calcified product of an original protein template. As environmental and genetic exigencies can impact the calcification of this template, there are markers that leave an imprint on teeth that researchers use to evaluate stress-related growth disturbances (Hillson 2014). The most commonly used marker is linear enamel hypoplasia (LEH) that takes the form of circumferential lines around a tooth (Fig. 4). Although all teeth can exhibit LEH, the anterior teeth show it most clearly. Hypoplastic lines vary in degree of expression and number. Because teeth develop within relatively limited time periods, some authors evaluate timing in terms of the biological age of the subjects. In Midwest Native Americans, these lines often occurred between the ages of two and four, leading researchers to conclude they were coincident with weaning infants off breast milk and transitioning them to a maize gruel lacking essential proteins (Goodman et al. 1984). As the major triggers for LEH are nutritional deprivation or disease, interpretation of the lines always depends on context. Populations can exhibit the same frequency and severity of lines but for altogether different reasons. In northern hunting populations, living in small, scattered communities with few endemic diseases, the trigger for LEH development is primarily seasonal food shortage. By contrast, in agricultural communities, periodic food shortages are less of an issue than diseases associated with crowding, including cholera, diphtheria, and typhus.

Forensic Odontology

One branch of forensic science involves teeth. Focus is primarily on bite marks left on the skin of victims of violent crimes. Most bite mark experts come from the field of dentistry, not anthropology. Dental anthropologists nonetheless have much to contribute in forensic contexts. With isolated teeth, one can estimate minimum number of individuals at a commingled grave site and provide reasonable age estimates based on tooth development and wear. Individual identification can sometimes be made based on unusual if not unique patterns of occlusion, especially those evident on the anterior teeth. Although tooth size is not a sensitive indicator of ancestry, tooth crown and root morphology exhibit sufficient differences among the major groups of humankind to allow discrimination at the level of European, African, Asian, and derived populations (Scott et al. 2018). A web-based application (rASUDAS) based on Bayes theorem has been developed to estimate the probability that an individual can be assigned to one of seven major geno-geographic groups.

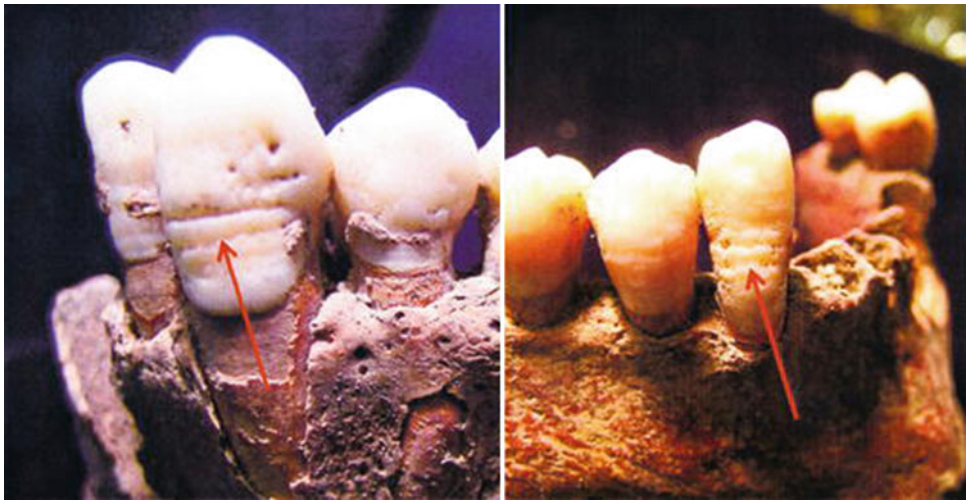

Dental Anthropology, Fig. 4 Well-developed linear enamel hypoplasia on upper and lower anterior teeth

Cross-References

- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Plant Domestication and Cultivation in Archaeology

References

Adler, C.J., K. Dobney, L.S. Weyrich, J. Kaidonis, A.W. Walker, W. Haak, C.J. Bradshaw, G. Townsend, A. Sołtysiak, K.W. Alt, J. Parkhill, and A. Cooper. 2013. Sequencing ancient calcified dental plaque shows changes in oral microbiota with dietary shifts of the Neolithic and Industrial revolutions. *Nature Genetics* 45: 450–455.

Agrawal, K.R., K.Y. Ang, Z. Sui, H.T.W. Tan, and P.W. Lucas. 2008. Methods of ingestion an incisal design. In *Technique and application in dental anthropology*, ed. J.D. Irish and G.C. Nelson, 349–363. Cambridge: Cambridge University Press.

Goodman, A.H., G.J. Armelagos, and J.C. Rose. 1984. The chronological distribution of enamel hypoplasias from prehistoric Dickson Mounds populations. *American Journal of Physical Anthropology* 65: 259–265.

Greenberg, J.H., C.G. Turner II, and S. Zegura. 1986. The settlement of the Americas: A comparison of the linguistic, dental, and genetic evidence. *Current Anthropology* 24: 477–497.

Hardy, K., T. Blakeney, L. Copeland, J. Kirkham, R. Wrangham, and M. Collins. 2009. Starch granules, dental calculus and new perspectives on ancient diet. *Journal of Archaeological Science* 36: 248–255.

Henry, A.G., A.S. Brooks, and D.R. Piperno. 2010. Microfossils in dental calculus demonstrate consumption of plants and cooked foods in Neanderthal diets (Shanidar III, Iraq; Spy I and II, Belgium). *Proceedings of the National Academy of Sciences* 108: 486–491.

Hillson, S. 2005. *Teeth*. 2nd ed. Cambridge: Cambridge University Press.

Hillson, S. 2014. *Tooth development in human evolution and bioarchaeology*. Cambridge: Cambridge University Press.

Hunter, J.P., D. Guatelli-Steinberg, T.C. Weston, R. Durner, and T.K. Betsinger. 2010. Model of tooth morphogenesis predicts Carabelli cusp expression, size, and symmetry in humans. *PLoS One* 5: e0011844.

Jernvall, J., and H.-S. Jung. 2000. Genotype, phenotype, and developmental biology of molar tooth characters. *Yearbook of Physical Anthropology* 43: 171–190.

Lucas, P.W. 2004. *Dental functional morphology: How teeth work*. Cambridge: Cambridge University Press.

Lukacs, J.R., and L.L. Largaespada. 2006. Explaining sex differences in dental caries prevalence: Saliva, hormones, and 'life-history' etiologies. *American Journal of Human Biology* 18: 540–555.

Peyer, B. 1968. *Comparative odontology*. Chicago: University of Chicago Press.

Scott, G.R., and J.D. Irish. 2017. *Tooth crown and root morphology: The Arizona State University Dental Anthropology System*. Cambridge: Cambridge University Press.

Scott, G.R., and S.R. Poulson. 2012. Stable carbon and nitrogen isotopes of human dental calculus: A potentially new non-destructive proxy for paleodietary analysis. *Journal of Archaeological Science* 39: 1388–1393.

Scott, G.R., and C.G. Turner II. 1997. *The anthropology of modern human teeth: Dental morphology and its variation in recent human populations*. Cambridge: Cambridge University Press.

Scott, G.R., and J. Winn. 2011. Dental chipping: Contrasting patterns of microtrauma in Inuit and European populations. *International Journal of Osteoarchaeology* 21: 723–731.

Scott, G.R., C.G. Turner II, G.C. Townsend, and M. Martinon-Torres. 2018. *The anthropology of modern human teeth: Dental morphology and its variation in fossil and recent Homo sapiens*. 2nd ed. Cambridge: Cambridge University Press.

Smith, H.B. 1984. Patterns of molar wear in hunter-gatherers and agriculturalists. *American Journal of Physical Anthropology* 63: 39–56.

Swindler, D.R. 2005. *Primate dentition: An introduction to the teeth of non-human primates*. Cambridge: Cambridge University Press.

Turner II, C.G., and J.D. Cadien. 1969. Dental chipping in Aleuts, Eskimos and Indians. *American Journal of Physical Anthropology* 31: 303–310.

Turner II, C.G., C.R. Nichol, and G.R. Scott. 1991. The Arizona State University Dental Anthropology System: Scoring procedures for key morphological traits of the permanent dentition. In *Advances in dental anthropology*, ed. M.A. Kelley and C.S. Larson, 13–31. New York: Wiley-Liss.

Ungar, P.S. 2010. *Mammal teeth: Origin, evolution, and diversity*. Baltimore: The Johns Hopkins University Press.

Further Reading

Bailey, S.E., and J.-J. Hublin, eds. 2007. *Dental perspectives on human evolution: State-of-the-art research in dental paleoanthropology*. Dordrecht: Springer.

Brothwell, D.R., ed. 1963. *Dental anthropology*. New York: Pergamon Press.

Dahlberg, A.A. 1945. The changing dentition of man. *Journal of the American Dental Association* 32: 676–690.

Dahlberg, A.A., ed. 1971. *Dental morphology and evolution*. Chicago: University of Chicago Press.

Gregory, W.K. 1922. *The origin and evolution of the human dentition*. Baltimore: Williams and Wilkins.

Hillson, S. 1996. *Dental anthropology*. Cambridge: Cambridge University Press.
Hrdlička, A. 1920. Shovel-shaped teeth. *American Journal of Physical Anthropology* 3: 429–465.
Irish, J.D., and G.C. Nelson, eds. 2008. *Technique and application in dental anthropology*. Cambridge: Cambridge University Press.
Irish, J.D., and G.R. Scott, eds. 2016. *A companion to dental anthropology*. Chichester: Wiley-Blackwell.
Kieser, J.A. 1990. *Human adult odontometrics*. Cambridge: Cambridge University Press.
Kurten, B., ed. 1982. *Teeth: Form, function, and evolution*. New York: Columbia University Press.
Moorrees, C.F.A. 1956. *The Aleut dentition*. Cambridge: Harvard University Press.
Pedersen, P.O. 1949. The East Greenland Eskimo dentition. *Meddelelser om Grønland* 142: 1–244.
Scott, G.R., and C.G. Turner II. 1988. Dental anthropology. *Annual Review of Anthropology* 17: 99–126.
Teaford, M.F., M.M. Smith, and M.W.J. Ferguson, eds. 2000. *Development, function and evolution of teeth*. Cambridge: Cambridge University Press.
Ungar, P.S. 2011. Dental evidence for the diets of Plio-Pleistocene hominins. *Yearbook of Physical Anthropology* 54: 47–62.
Weiss, K.M. 1990. Duplication with variation: Metameric logic in evolution from genes to morphology. *Yearbook of Physical Anthropology* 33: 1–23.

Derevianko, Anatoly P.

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Basic Biographical Information

Anatoly Panteleevich Derevianko (Fig. 1) was born in 1943. He is a Soviet and Russian historian, archaeologist, and an organizer of science and education who specializes in the archaeology and prehistory of Northern, Central, and East Asia. He was born in Kozmo-Demianovka village in the Amur Region and educated at the Blagoveshchensk State Pedagogical Institute.

From 1965 to 1976, A.P. Derevianko worked as associate scientist, curator, and Deputy Director of the Institute of History, Philology and Philosophy of the Siberian Branch of the USSR Academy of Sciences. In 1972, he received his doctorate degree in history. He was appointed as Chancellor of the Novosibirsk State University in 1980 and held that position until 1982. In 1981, Derevianko became a member of the Presidium of Siberian Branch of the USSR Academy of Sciences. In 1982, he became Professor and Head of the Department of History at the Novosibirsk State University. In 1983, he was elected Chairman of the United Scientific Council on Humanities of the USSR Academy of Sciences/the Russian Academy of Sciences. From 1983 to 1991, he was a Director of the Institute of History, Philology and Philosophy of the Siberian Branch of the USSR Academy of Sciences. From 1983 to 91, he was chief editor of the journal *Izvestiya SO AN SSSR. Seriya istorii, filologii i filosofii* (*Proceedings of Siberian Branch of the USSR Academy of Sciences. Series of History, Philology and Philosophy)*.

Derevianko, Anatoly P., Fig. 1 Anatoly Panteleevich Derevianko

Since 1991, A.P. Derevianko has held the position of Director of the Institute of Archaeology and Ethnography of Siberian Branch of the Russian Academy of Sciences. He was elected a full member of the Academy of Science of the USSR in 1987, and in 1998, he became an

Academic of the Mongolian Academy of Science. Since 2002, he has been the Academic Secretary of the Department of History and Philology of the Russian Academy of Sciences and a member of the Presidium of the Russian Academy of Sciences. He has been a corresponding member of the German Archaeological Institute since 1984 and is an honorable Professor at a number of foreign and national universities.

Major Accomplishments

A.P. Derevianko discovered and studied numerous archaeological sites which were recognized as type-sites for various ages and cultures, ranging across a wide time span from the Paleolithic to the Iron Age. He is an initiator and director of a multidisciplinary research program to study of Paleolithic cave sites in Southern Siberia and Central Asia. He has also made a major contribution to archaeological studies through his ideas around a new spatiotemporal version of early migration routes into Asia, and he developed the periodization, chronology, and dynamics of the Paleolithic in the region. He is editor-in-chief of the international scientific journal *Archaeology, Ethnology and Anthropology of Eurasia*.

A.P. Derevianko has been awarded state prizes and decorations from the USSR and Russia, as well as foreign countries.

Cross-References

► Northern and Central Asia: Culture During the Lower Paleolithic Era

Further Reading

Derevianko, A.P. 1970. *Novopetrovskaya kultura Srednego Amura*. Novosibirsk: Nauka.

Derevianko, A.P. 1975. *Kamennyi vek Severnoi, Vostochnoi i Tsentralnoi Azii*. Novosibirsk: Nauka.

Derevianko, A.P. 1983. *Paleolit Dalnego Vostoka i Korei*. Novosibirsk: Paleolit Selemdzhi.

Derevianko, A.P., ed. 1998. *The Paleolithic of Siberia: New discoveries and interpretations*. Urbana/Chicago: University of Illinois Press.

Descendant Communities in French Guiana: Amerindians

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D

French Guiana counts many minorities who, from a cultural, political, economic perspective, are administered by the state, the region, and the department controlled by Metropolitans (French coming from Metropolitan France), Guyanese Creoles, the Chinese, and Lebanese. These minorities include six Amerindian nations and four Bushinengés groups, all considered indigenous, as well as diverse Creole communities (from Saint Lucia, Martinique, Haiti, etc.) and some more recent immigrants such as the Hmong, Peruvians, Colombians, etc. and of course her next door neighbors: the Brazilians, the Surinamais, and the Guyanians that make up the country. Here, we will only focus on Amerindian communities, even if Bushinengés and Creole communities, who represent more than half of the population living in French Guiana today, should have earned their place in this encyclopedia.

For different ethnic Amerindians (current population of about 10,000), of very diverse ancestral history and languages, relationships with the past, with heritage, with memory, and with history are complex and contrasted. We will attempt to present them in a comprehensible and concise way, by first mapping the ancient history of each of the six populations in French Guiana, then explaining their position relative to their archaeological heritage, and describing their attempts at reclaiming their past in the last few years.

The Lokonos and the Palikurs, who speak languages affiliated to the Arawak group, have experienced very different histories in recent centuries. In as much as the evidence of the Lokonos' presence on the territory of what is now French Guiana can be provided through the first historical documents dating from the sixteenth century, that of the Palikurs', who currently live there, is

however recent; in fact, some groups ~~who~~ emigrated from Brazil in the 1950s and more precisely from the neighboring state of Amapa.

In recent decades, the Lokonos of Sainte-Rose-de-Lima in Matoury, and Balaté in Saint-Laurent-du-Maroni, settled on lands which are not their ancestral lands. Nevertheless, the Lokono community of Balaté, led by its traditional chief Brigitte Wyngaarde, showed great interest on the land adjacent to their village during the preventative archaeology excavations that took place in 2007 and 2008.

Visits of the excavation were set up by the archaeologists from the INRAP (Institut national de recherches en archéologie préventive), who were responsible for the site, and a presentation of the results was produced for the Lokono community, by one of the persons in charge and by the regional curator for archaeology, in the meeting hall of the village. Admittedly, the entire population could not attend the meeting where the preliminary findings were presented, but those present showed a real interest in the history of this ancient pre-Columbian Amerindian site, which the community claimed as its own even while not knowing whether it was Arawak or not. To tell the truth, no one really knows to this day. The excavations revealed an ancient Amerindian presence, of pre-Colombian era, which brings support to the community for land claims, whether those close to the Balaté village or those whose usage rights have been recognized by the community, through the 1987 decree, but were not respected.

In other Palikur and Lokono villages, created in the last 40 years, awareness of an Amerindian past is less acute, but members of these communities have approached the Archaeology Service either to report incidental findings of Amerindian or colonial archaeological pieces or relics, to demand information about sites near their current dwellings, or to inquire about the support of the archaeology department in the revitalization of their "traditions" in the broad sense of the term.

The Kalinas, who have been settled for centuries on the coast, and recognized by historical documents since Contact, and the Wayana, speak languages belonging to the Carib group. The Kalinas were increasing in number at the time of Contact and pushed back European settlement for over a century. It is accepted that they were at war or at least in competition with the Arawaks, who were considered as the oldest inhabitants of Guyana. In fact, before Contact, there is no scientific proof of the name of the population.

The Kalinas are the largest "Indian nation," with more than 2000 members, and are the most aware and assertive. Since 1981, they were the leaders of the Association des Amerindiens de Guyane Francaise, and it was Felix Tiouka, a Kalinas, who launched, on December 9, 1984, in the Aoura village his famous address to the government and people of France: "We want to gain recognition of our aboriginal rights, that is to say, the recognition of our land rights, of our right to remain Amerindians and to develop our own institutions and culture (The complete text can be found on the Internet by searching Félix Tiouka)."

They also created the Federation of Amerindian Organizations in Guyana in 1991. It is therefore not surprising to see the representatives of the municipality of Awala-Yalimapo created in 1989 as a separation from the mostly Creole town of Mana, as being the most advanced and innovative people to take into account Amerindian history and heritage of their communal territory, and beyond.

It should be noted that, with Camopi, this is one of the only two municipalities with an Amerindian majority in French Guiana.

The participatory heritage inventory, initiated by several young Kalinas of the township, under the guidance of local elected officials, elders, and a scientific committee, is one of the most remarkable aspects of this. The creation of a Council of Culture, which brings together all the stakeholders of the township, is another one.

Finally, the archaeology department regularly intervenes to study remains which are unearthed by chance or during construction work; a comprehensive study of funerary urns has been implemented in this way and will result in an exhibition to be held in 2012 at the Awala-Yalimapo library.

Other Kalinas communities also take into account this historical continuity in their claims

and their actions. Thus, the "new" residents of Couachi, on the edge of Mana township, have reoccupied in the last few years the site of their former village, abandoned ~~there~~ for 30 years. On these traditional lands, they have use rights but not property ownership rights; as a result, an association is legitimately trying to get the handover of these lands, but the French government is reluctant to cede land to a collective group. Communal land does exist in Metropolitan France. Why does the government not want land to belong to this or that association? Because the French nation is considered as one and indivisible and these associations are ethnically very homogeneous.

Similarly, the Yaou (Bellevue) community in Iracoubo asked the archaeology department to protect its traditional cemetery (dated from nineteenth to twentieth centuries) which was threatened by quarry projects. They succeeded in 2011, setting a precedent for the protection of other Amerindian and Bushinengés cultural sites such as cemeteries, sacred forests, altars, etc. and certain ancient villages which are also considered sacred or taboo by indigenous peoples of French Guiana.

Let's also consider the Kalina community of Kourou who appreciated the attitude and the work done by INRAP archaeologists, who excavated in 2006–2007 one of the sites linked to the construction of the Soyuz Launch Complex.

Indeed, after discovering an ancient site with eight graves dated mid-nineteenth century~~,~~ called "White Hill" by elders and on documents, the archaeologists left, before the completion of their studies and surveys of the graves, so that the Kalina community could pay tribute to its dead through the customary chief and shaman of Kourou. Then, a meeting was held so that the community could reclaim its past, in this particularly painful case. Based on strong evidence, it is believed that it was from this village that the Kalina were taken to be "shown" at the Jardin d'Acclimatation in 1882 and endured a tragic fate. From this ancient Kalina village, like the neighboring Creole village of Malmanoury, not much remains after the heavy earthworks associated with the construction of the Ariane and Soyuz launch pads. The inhabitants of these two villages were displaced in the 1960s and 1970s to "modern" villages specially made for them in the new city of Kourou.

The situation for the Wayanas is much more difficult. Indeed, "Wayana country" only exists for anthropologists and not for the administration, but for the 1500 Wayanas, it's a country that is real, mythical, and historical all at once. The Wayanas of the upper Maroni region form part of the Maripasoula township, populated mostly by Bushinengés, Creoles, and "Métropolitains." As with the Tekos and the Wayãpis, the fact that they are also inhabitants of the "French Guiana Amazonian Park" created in 2007 should be taken into account. Is this an opportunity or is it rather a misfortune to be an Amerindian in a national park? For instance, how will traditional rights (and regulations, according to the 1987 decree) of hunting, fishing, gathering, farming, etc. be incorporated into the park's future charter? And what will be their application? For the Wayanas, the inselbergs and the elevations of Tumuc Humac are above all also sacred sites, where the current Wayana nation was forged, led by its Promethean hero Kailawa.

The archaeology department has been involved in several studies of archaeological sites in the area, always accompanied as they are by Wayana guides, and conducted with the agreement of the Gran Man and the chiefs of Wayana villages. The archaeological remains found in the shelters of inselbergs in Tumuc Humac are older than the epic Kailawa, which seems to have taken place in the seventeenth century, according to research by Chapuis and Rivière (2003).

But, just as for the Kalinas, the interest of leaders and many Wayanas for the ancient Amerindian past of region exceeds ethnic contingencies. They all feel that they are the descendants of those who made the axes and the pottery, who carved and painted rock walls, and who left many traces in the Earth for those who know or want to see them, the fixed polishing stones being only the remains easily visible to ordinary mortals. The case is similar for the two other peoples living in the hinterland that we will now consider. (Gérald, je ne suis pas certain que j'ai bien compris le sens de cette paragraphe, tu peux me

contacter si mes corrections ne correspondent pas à ce que tu veux dire.)

The Wayapi and the Teko (formerly called the Emerillons), who are currently living on the Upper Oyapock, are representatives of the immense Tupi-Guarani language group.

The Camopi village, created in 1969, brings together the majority of the 1500 people from these 2 groups connected by numerous family, social, cultural, and historical relations. The city council has developed numerous initiatives to raise awareness of ~~the~~ traditional heritage such as basketry workshops, enabling the younger generations to hear and see the work of the elders.

Similarly, through a photography workshop organized by the cultural association of the village, young people were able to capture their village, with their own eyes, and reveal through their photographs their own representations of Camopi and its people.

With regard to the archaeological heritage, a project in progress at a secondary school should enable the collection of data on sites, as has already been done spontaneously with artifacts formerly collected and kept by people, in order to create the first participatory inventory of the archaeological heritage in the township. A bit like what was implemented in Awala-Yalimapo.

Conclusion

Our analysis has shown that to be master of one's own territory is fundamental for reclaiming the heritage and history of one's past. The Kalinas on the one hand, the Wayapi and the Teko on the other, can project themselves in space and also in time, as a result of the creation of their two townships. By contrast, the situation is critical for the Wayanas, given the current tensions with the French government. Their claim for a territory, i.e., in French republican law, their own township, has few chances of success. But changes will need to take place swiftly because these four communities have legitimate rights to the lands they believe, as we do too, belong to their Amerindian ancestors, even if they recognize that archaeologists cannot and will perhaps never be able to prove this kinship.

Deutsche Gesellschaft für Archäologie des Mittelalters und der Neuzeit e.V. (DGAMN)

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Basic Information

The German association of medieval archaeologists known as the *Arbeitsgemeinschaft für Archäologie des Mittelalters* was founded in 1975. Following developments in the field, and in related research areas, the association was enlarged 15 years later, and its focus extended to include "modern times" (*Neuzeit*). In 2001, the name of the association was changed to its current form, and its chronological remit formally expanded to reflect coverage of the archaeology of early modern times. The primary role of the association is to promote the exchange of research results, but it also promotes the teaching and practice of medieval and modern time archaeology and provides a forum for scientific exchange on these topics between all interested parties. Interdisciplinary is a key feature, and the association brings together researchers from all of the related disciplines and subfields of medieval archaeology such as art history, buildings research, European ethnology, medieval history, geography, and even Classics and provincial Roman archaeology. In this way, all sources concerning the history of people in the Middle Ages are considered.

At the time of writing (May 2018), the post of President is held by Dr. Betty Arndt, Göttingen, Head of the Department of Urban Archaeology, that of Vice-president by Dr. Dirk Rieger, Lübeck, Department for Culture and Education, and the association's Secretary is Prof. Ulrich Müller, University of Kiel, Department of Pre- and Protohistoric Archaeology. The association currently has about 400 members.

Major Impact

The society holds a conference at the annual congress of German associations and societies concerned with the ancient world. Each year, a special theme in either current medieval or post-medieval archaeology provides the focus of the meeting. Coverage tends to focus mainly on new research in German-speaking countries and the adjacent regions, but further European cross-correlations are also discussed, such as excavations in these areas, or the research results of young scientists, or those of larger research projects. A selection of papers presented at the conference is published the following year in the *Mitteilungen der Deutschen Gesellschaft für Archäologie des Mittelalters und der Neuzeit*. These are available for order via the association's website (www.dgamn.de).

The website also provides information about the latest developments in Europe and other conferences related to the medieval and post-medieval/modern time archaeology.

Cross-References

- ▶ Historische Archäologie
- ▶ Österreichische Gesellschaft für Mittelalterar chäologie
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Ruralia: The Jean-Marie Pesez Conferences on Medieval Rural Archaeology

Deutsches Archäologisches Institut (DAI), Rome Department

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Basic Information

The Deutsches Archäologisches Institut, today situated at Via Curtatone, 4d, 00185 Rome, Italy, dates back to the "Instituto di corrispondenza archeologica." This archaeological institution was founded in Rome in 1829 by a group of scientists and interested amateurs from different countries of Europe. Its first seat was in the Prussian Embassy on the Capitoline Hill at Rome (Palazzo Caffarelli) and from 1837 onwards in a newly constructed building nearby.

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Major Impact

After Johann Joachim Winckelmann (1717–1768), its declared mission was to increase knowledge of the antique periods of the Mediterranean and to work out an established history of art and culture. To this aim a library was built, gathering collections of antiquities and documentation. The results of research work were presented in weekly conferences and published in the *Annali* or the *Bulletin* (ceased in 1886) together with illustrations in the *Monumenti Inediti*.

Research work from this period is characterized by large corpora bringing together important materials such as Etruscan urns and the bronze mirrors decorated with mythological scenes, later the *Corpus Inscriptionum Latinarum* (*CIL*) and Roman sarcophagi.

These projects received financial support from the Prussian kings, and consequently, after the German-French War, the institute was transformed into a part of the larger institution of the Deutsches Archäologisches Institut (DAI) of the newly founded Deutsches Reich. In 1874 the institute was moved to a new building on the Capitoline Hill and for the remaining publications the *Bulletino* was edited in a new style (*Mitteilungen des DAI, Römische Abteilung*, starting in 1886) and published increasingly in German.

The situation in Italy has changed since the host nation became an independent nation state. However, compared with other centers of the Institute (e.g., in Athens or Cairo), which were involved from the beginning in extended fieldwork such as the excavation at Olympia in Greece, the situation in Rome did not change greatly. The scientific resources, mainly the

library, have been continuously expanded and curated. One of the current major interests was the extended Italian excavations such as those at Rome or Pompeii which are discussed and presented to a larger scientific public. Further work includes the publication of large corpora or catalogues such as those of the Vatican collections.

After the First World War, the building on the Capitoline Hill was expropriated, and after lengthy negotiations, the Institute was reopened in the former parish house of the Lutheran church in Via Sardegna. Despite serious financial problems, the library continued to grow and in 1928 the core of a photographic archive was established. The spectrum of sciences represented at the Institute was further enlarged with the addition of Christian archaeology, the research of ancient architecture (Bauforschung) and under the regime of National Socialism with the early history (Frühgeschichte).

After the Second World War, the allies attempted to place the Institute under the administration of an international committee, but after long treatises it was returned to the Federal Republic of Germany, which constructed the new building in Via Sardegna opened in 1964. Today the DAI is an institution of the Ministry of Foreign Affairs.

Because of its long tradition, and also thanks to private donations, the Institute boasts a library of worldwide renown and also an extensive reference collection for academic research. The latter includes the well-established archives and the archaeological bibliography (Realkatalog). It also boasts one of the largest specialized photograph collections in Italy, which allows for a search of relevant publications. Specifically, the collection focuses on Italian and North African archaeology from the prehistorical to the medieval period. It is increasingly possible to gain access and consult material electronically and online.

The publications of greater collections, building complexes, and corpora of material are still the center of interest, but the activities of the Institute have expanded to include fieldwork in Etruria and Campania, mainly at Pompeii. In Southern Italy and Sicily (*Magna Graecia*), the study of various temples such as at Paestum dates back to the scholarly tradition of the nineteenth century. These studies have been expanded to projects of Greek urbanity. This has recently included relations with the indigenous Greek population and the processes of cross-cultural exchange.

The fieldwork in North Africa started in the 1960s and had a different origin. There the main interest was in the ancient yellow marble quarries (Giallo Antico) of Simitthus as part of a larger project on quarries in the Mediterranean area. Research then extended to the Hellenistic phase with cultural testimony of the Numidians and also the international program for rescue work at Carthage.

Another center of interest lies in the testimonies of the early Christian period, e.g., the center of pilgrimage in Thebessa (Algeria). In recent years, excavations in Albania (Apollonia) have been started for research on similar questions concerning the relationship between the Greek city and the Illyrian hinterland.

To this day the DAI is the only foreign institute in Rome dedicated solely to different research areas in the sciences of antiquity. This research work embraces a period ranging from prehistory to the Middle Ages, and the importance of the institute lies in the depth and complexity in which the various branches of archaeology and ancient history are represented.

The research center currently houses evidence of the urban cultures of the Greeks and Phoenicians and exchange between local cultures, the urban way of life during imperial times, and self-representation of Roman emperors in their art and architecture. Besides the library and photography archives, the Institute is a center for international scientific dialogue and exchange; it offers courses and scholarships for the younger generation and tries to mediate the results of research work through courses and guided tours for the wider public (so-called Pompeikurs for German teachers, Italienkurs für German students). The publications have different series: the "Sonderschriften," the "Palilia," and the annual journal the "Römische Mitteilungen."

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Archaeology: The World at 1800–1850
- ▶ Classical (Greek) Archaeology
- ▶ Epigraphy, Imperial Latin
- ▶ Statues and Monumental Art in Archaeology
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Tombs, Etruscan
- ▶ Topography of Rome
- ▶ Winckelmann, Johann Joachim

Further Reading

Deutsches Archäologisches Institut, Rome Department. n.d. Available at: http://www.dainst.org/en/department/rom?ft=all

Dhavalikar, Madhukar Keshav, Fig. 1 Madhukar Keshav Dhavalikar

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Dhavalikar, Madhukar Keshav

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Basic Biographical Information

Madhukar Keshav Dhavalikar (Fig. 1) was born on May 16, 1930, at Patas (Maharashtra). He received his B.A. in second class in Economics and Political Science in 1952, M.A. in 1958 in first class, and Ph.D. degree in Archaeology in 1964 from University of Poona (Pune) in ancient Indian Culture and Archaeology. He was awarded the University prize for standing first in M.A. exam. He served in the Archaeological Survey of India as Technical Assistant from 1953 to 1965. He was a lecturer in Ancient Indian History and Archaeology at the Nagpur University from 1965 to 1967 and later Deccan College, Pune, as Reader in Ancient Indian History Culture and Archaeology from 1967 to 1980 and as Professor from 1982 to 1990 in Deccan College Post-Graduate Research Institute (now Deemed University), Pune. He held the position of Joint-Director from 1982 to 1985 and Director from 1985 to 1990.

He was President, Indian Archaeology Society, 1986; Secretary, Indian Archaeological Society (Protohistory), 1970–78; Vice-President, Indo-Greek Society, Varanasi, 1975–78; and is President, Indian history Congress, 1990. He is the member of Indian Archaeological Society, Indian Society of Art History and World Archaeological congress, member Culture group, Planning Commission, Government of India, member Advisory committee, American Institute of Indian Studies, New Delhi, 1988–1999.

Major Accomplishments

Dr. Dhavalikar excavated a number of archaeological sites in India, especially Protohistoric, in Central India, Western India, and the Deccan. Among these excavations, the most noteworthy is that at Inamgaon (Maharashtra) which has been acclaimed for its methodology and interpretation of data, and also at kuntasi, a port settlement of the Indus Civilization in Gujarat. He participated in national and international conferences and seminars on Indian Art and Archaeology, presented

papers, and chaired sessions. Some are International Conference on Radiocarbon and Archaeology, TIFR, Bombay, 1972; International Seminar on Indus Civilization, Srinagar, 1979; Indo-Pacific Seminar on Prehistory, Pune, 1979; first World Archaeological Congress, Southamptom, UK, 1986; South Asian Archaeology Conference, Paris, 1989, etc.

He was awarded the fellowship of the Bombay Branch of the Royal Asiatic Society in 2010 and the Ravindranath Tagore Fellowship in Cultural research by the Ministry of Culture, Government of India, in 2010. He received Indian's fourth highest civilian award, "Padma Shri" (2011). He was awarded the Sharda Sahakari Bank award for research in Indology, 2008; Srimant Nanasahib Peshwa award research, 2010; and Gold Medal and felicitated by the Prime Minister, 2012, and Dr. Wakankar Puruskar award by M.P. Government in 2012.

Dr. Dhavalikar was deputed by Government of India to participate in the excavations at Pella (Alexander's Capital in Greece) in 1962. Later he carried out excavations at quite a few sites in India, among which the most noteworthy are most at Inamgaon (Maharashtra), Prabhas Patan, and Kuntasi (Gujarat). Inamgaon was a settlement of an early farming community (1700–900 BCE) and the report, published in three volumes, is supposed to be a model of "Total" archaeology. The excavation was specially exhibited at Festival of India in London in 1982. The excavation at Prabhas Patgan brought to light a warehouse of the second millennium BC and a Harappan industrial estate was discovered at Kuntasi. A unique human-shaped Kshetrapala shrine (tenth century CE) was uncovered at Kandhar (Maharashtra) which was the capital of the Rashtrakutras.

Dr. Dhavalikar has authored a number of books which include *Cultural Imperialism: Indus Civilization in Western India* (1994), *Indian Protohistory* (1997), *Historical Archaeology of India* (1997), *Environment and Culture: A Historical Perspective* (2002), *The Aryans: Myth and Archaeological* (2006), besides excavation reports. His *Encyclopaedia of Indian Archaeology*, Vol. 3, is being published by Indian Council of Historical Research. His numerous research papers have been published in journals of international repute.

Dr. Dhavalikar was Visiting Professor to Havana (Cuba) 1982, Marathwada (1981A), Nagpur (1987), and Allahabad (1994) Universities. He has participated in many national and international conferences and was President of Indian Archaeological Society (1986) and Indian History Congress (1999). He was Senior Fellow of Indian Council of Historical Research (1991–93; 1994–96), Honorary Fellow, Asiatic Society, Mumbai, and Tagore Fellow (2011–13).

Cross-References

► Adaptation in Archaeology
► Domestication: Definition and Overview
► Trade Beads in Historical Archaeology

Further Reading

Dhavalikar, M.D. 1977. Settelement pattern of Inamgaon. *Man and Environment* 1: 46–51.

Dhavalikar, M.D. 1989. Kuntasi- a Harappan port on the West Coast. A paper read at the International Conference of South Asian Archaeologists, Paris.

Dhavalikar, M.D. 1992. Pre- Harappan period at Prabhas Patan and Pre- Harappan phase in Gujarat. *Man and Environment* 17: 71–78.

Dhavalikar, M.D. 1995. Chalcolithic architecture at Inamgaon and Walki – An ethnoarchaeological study. In *The living past*, ed. B. Allchin, 31–52. New Delhi: Oxford-IBH.

Dhavalikar, M.D. 2012. *Architecture and society.* Ancient India 1 new series. New Delhi: ASI.

Dhavalikar, M.D., and Z.D. Ansari. 1971. New light on prehistoric cultures of central India. *World Archaeology* 2 (3): 337–346.

Dhavalikar, M.D., and G. Possehl. 1973. Subsistence pattern of an early farming community of western India. *Puratattava* 7: 39–49.

Dhavalikar, M.D., H.D. Sankalia, and Z.D. Ansari. 1973. Inamgaon – A Chalcolithic settlement in western India. *Asian Perspectives* 14: 139–146.

Mishra, V.N. 2001. Prehistoric human colonization of India. *Journal of Biosciences* 26: 491–531.

Di Giovine, Michael A.

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Basic Biographical Information

Michael Di Giovine is an anthropologist whose research in Europe (Italy) and Southeast Asia (Cambodia and Vietnam) focuses primarily on heritage discourses and practices, global mobility studies (tourism/pilgrimage/diaspora), religious movements and cults, development and revitalization, and foodways. Currently Associate Professor at West Chester University of Pennsylvania and Director of the West Chester University Museum of Anthropology and Archaeology, Michael is also an Honorary Fellow in the Department of Anthropology at the University of Wisconsin-Madison. Michael earned his Ph.D. from the Department of Anthropology at the University of Chicago in 2012 with a dissertation examining the emergence and development of the cult of the immensely popular twentieth-century Catholic stigmatic and saint Padre Pio of Pietrelcina and the ways in which diverse forms of devotion, pilgrimage, and heritage notions associated with the saint have served as revitalizing forces in the socio-cultural, economic, religious, and political spheres during the turbulent twentieth and early twenty-first centuries. He is actively involved in advancing anthropological and interdisciplinary perspectives of tourism and heritage, appearing in public venues, and publishing numerous academic books, thematic journal issues, and articles that examine the intersection between cultural heritage and touristic mobilities, particularly as they relate to food systems, religion and devotion, and the seductive qualities of alterity.

Major Accomplishments

A former tour operator and consultant for museums and heritage sites in the United States and abroad, he is the author of the heralded volume, *The Heritage-scape: UNESCO, World Heritage, and Tourism* (2009), which thoroughly examines the ways in which the World Heritage Convention both contributes to and complicates UNESCO's broad peacemaking objectives. With Ronda Brulotte, he co-edited the popular volume, *Edible Identities: Food as Cultural Heritage* (2014), and with David Picard, both *Tourism and the Power of Otherness: Seductions of Difference* (2014) and *The Seductions of Pilgrimage: Sacred Journeys Afar and Astray in the Western Religious Tradition* (2015). The Book Reviews Editor of *Journeys: The International Journal of Travel and Travel Writing* and the *Journal of Tourism and Cultural Change*, Michael is also on the Editorial Board of *The International Journal of Religious Tourism and Pilgrimage*. With Noel Salazar, he is the co-editor of the book series, *The Anthropology of Tourism: Heritage, Mobility and Society* with Lexington Books.

In 2012, Michael helped found the Anthropology of Tourism Interest Group within the American Anthropological Association and is currently its Convenor. Di Giovine has previously served the Association as a member of the Task Force on Cultural Heritage and now sits on the organization's Nomination Committee in the Cultural Anthropology seat. He is also a founding member and trustee of the Tourism-Contact-Culture Research Network.

An expert member of the International Cultural Tourism Committee at the International Council on Monuments and Sites (ICOMOS), UNESCO's Advisory Body for cultural World Heritage sites, as well as a regional representative for the International Union of Anthropological and Ethnological Sciences, Michael has written and spoken widely on issues of heritage, preservation, and tourism, consulted for the BBC, and has been featured on Italian TV, National Public Radio's *Worldview with Jerome*

McDonnell, *Marginalia: LA Review of Books*, *Atlas Obscura*, and the *Boston Globe*.

Cross-References

- ▶ Cambodia: Cultural Heritage Management
- ▶ Heritage Tourism and the Marketplace
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ UNESCO World Heritage Convention (1972)
- ▶ Vietnam's Archaeological World Heritage Sites
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes

References

Brulotte, R., and M.A. Di Giovine. 2014. *Edible identities: Food and foodways as cultural heritage*. Surrey: Ashgate.

Di Giovine, M.A. 2009. *The heritage-scape: UNESCO, world heritage, and tourism*. Lanham: Lexington Books.

Di Giovine, M.A., and D. Picard. 2015. *The seductions of pilgrimage: Sacred journeys afar and astray in the western religious tradition*. New York: Routledge.

Picard, D., and M.A. Di Giovine. 2014. *Tourism and the power of otherness: Seductions of difference*. Clevedon: Channel View Press.

Further Readings

Di Giovine, M.A. 2011. Pilgrimage: Communitas and contestation, unity and difference – An introduction. *Tourism: An International, Interdisciplinary Journal* 59 (3): 247–269.

Di Giovine, M.A. 2014. Patrimonial ethics and the field of heritage production. In *Ethics and archaeological praxis*, ed. C. Gnecco, L. Zimmerman, and D. Lippert. New York: Springer.

Di Giovine, M.A. 2015a. When popular religion becomes authorized heritage. In *Encounters with the past: Heritage and popular culture*, ed. H. Silverman and M. Robinson. New York: Springer.

Di Giovine, M.A. 2015b. UNESCO's world heritage program: The challenges and ethics of community participation. In *Between imagined communities and communities of practice*, ed. N. Adell, R. Bendix, C. Bortolotto, and M. Tauschek. Göttingen: Universitätsverlag Göttingen.

Di Giovine, M.A. forthcoming-a. *Tourism: Anthropological insights*. Toronto: University of Toronto Press.

Di Giovine, M.A. forthcoming-b. *The Routledge handbook of heritage and tourism*. New York: Routledge.

Di Giovine, M.A, and J.M. Garcia-Fuentes. 2016. Sites of pilgrimage, sites of heritage. *The International Journal of Tourism Anthropology*.

Leask, A., and A. Fyall. 2006. *Managing world heritage sites*. Amsterdam: Elsevier.

Mathers, C., T. Darvill, and B.J. Little, eds. 2005. *Heritage of value, archaeology of renown. Reshaping archaeological assessment and significance*. Gainesville: University Press of Florida.

Timothy, D.J., and S.W. Boyd. 2003. *Heritage tourism*. Harlow: Prentice-Hall.

UNESCO. 2012. *World heritage sites. A complete guide to 936 UNESCO world heritage sites*. 4th ed. Buffalo: Firefly Books.

Dian Culture of Yunnan

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Introduction

The Dian culture describes the remains of a wealthy Bronze Age society (late first millennium BCE) excavated in Yunnan, Southwest China. Tens of thousands of grave goods from hilltop cemeteries show that the material culture was that of Southeast Asia, but there are also signs of early interaction with China in the field of metallurgy. Dian was conquered by China's Han Empire in 109 BCE, and the distinctiveness of its material culture diminished thereafter.

Definition

The Dian culture consists of Bronze Age sites and artifacts excavated from burials in the high plain south of modern Kunming. In the absence of skeletal material, most studies are based upon the thousands of bronze artifacts. Their distinctive figural decoration gives important information about social hierarchy and gender relations, as well as about interaction between animals and human.

Key Issues/Current Debates

Physical Setting and Resources

Lake Dian is the northernmost and largest of a set of four lakes occupying a high plan, c.1900 m ASL. The plain extends from Kunming City about 250 km to the Red River Fault which forms the southern edge of the Yunnan-Guizhou Plateau. The Red River (Hong He or Yuan Jiang) drains to the Gulf of Tongking across the Tropic of Cancer. The levels of the various lakes have changed over time, so that the site of Lijiashan may even have been an island when used for burials (Lustig et al. 2011: 60). The Red River is navigable for most of its course. Its headwaters are not far from the modern city of Dali (Xiaguan) from which there is access to the Upper Yangzi (Jinsha Jiang) and through Sichuan province into Central China. From Dali it is also possible to reach the Mekong (Lancang Jiang) and the Shan Plateau of Myanmar.

Despite its tropical location, the climate around Dian is relatively temperate. The upland plain is suitable for pasturing, and images of cattle and horses are common on the Dian bronzes. Sheep are also shown, as are pigs and dogs. There are many shell middens around the lakes, molluscs presumably being an important part of the diet, and there is evidence that millet, wheat, and rice were cultivated (Yao and Jiang 2012: 362).

Around modern Gejiu and Mangzi, between the lakes and the Red River, are extensive deposits of minerals, particularly tin, but also copper, lead, and silver. In 2015 parts of metal vessels were found in a huge shell midden at Xingyi, near Lake Qilu, dated c. 1400 BCE, and the site of Haimenkou gives dates for early bronzes by 1700 BCE (Li and Min 2014). These dates fit with the reported use of Yunnan copper in some of the bronzes deposited c. 1200 BCE in the tomb of Queen Fu Hao at Anyang, Henan, in Northeast China (Jiang 1999: 118). The quantities of bronzes found in the Dian graves, and the excellence of their workmanship indicates there was long experience of metal smelting and casting. The mineral deposits and their location were listed in Chinese geographical works of 2 CE and 140 CE (Crespigny 1996–97: 767).

Archaeological Research

Yunnan was so difficult of access from Central China that it was basically ignored until the creation of the People's Republic (PRC). Archaeological investigation then developed rapidly with many sites excavated since the 1950s. Between 1955 and 1960, the Yunnan Provincial Museum excavated 50 graves at Shizhaishan, which we now know to be the richest of the Dian cemeteries, dated at the time to third century BCE. In 1996, another 36 burials were excavated there, showing that the use of the cemetery dated back to the fifth century BCE. Numerous other burial sites have been excavated, but there is still a lack of information about settlement or metalworking sites.

Most researchers outside China have concentrated on the societal aspects, inevitably based on grave goods and thus partial. There is a consensus that the Dian polities were hierarchical and strongly gendered and that elite women had a high status (Rode 2004; Lee 2002: 111–115; Yao 2005: 399–400). The acquisition of power has been discussed by Robert Murowchick who identifies warfare and slave raiding as its basis (Murowchick 2002: 159–164).

Historical Information

A couple of paragraphs in the official history of the Han Empire, the *Shiji* by Sima Qian (writing between 109 and 94 BCE), explain how Dian came to the notice of Emperor Han Wudi, who was seeking a route to India. He invaded in 109 BCE, but because the local ruler sued for peace, he "was presented with the seals of the king of Dian and restored to the position of leader of the people" (Watson 1961: 258). The story is credible since the event occurred in Sima Qian's lifetime and is supported by the presence of a gold stamp inscribed *Dian wang zhi yin* "Seal of the King of Dian" in tomb M6 of the major cemetery at Shizhaishan. The Han established a prefecture (commandery) and renamed the greater region Yizhou.

Grave goods of the first century BCE to second century CE confirm an increasing Han presence (Allard 2015: 34). When the Han Empire collapsed, the region slipped out of China's control and did not return to it until the Yuan (Mongol) conquest of the thirteenth century, when Yizhou was renamed Yunnan ("Below the clouds"). The Han had abandoned the India-road project – largely because of the creation of the Silk Roads through the Western Regions (modern Xinjiang) – but all available evidence indicates that there were strong and ongoing connections between Yunnan and Southern Asia (Yang 2008, Chapter 2).

External Connections

Connections to Myanmar/Assam are marked by the quarter of a million of cowrie shells, most likely from the Indian Ocean or Maldives, deposited as grave goods in 25 bronze containers, some mounted onto old drums modified into pedestals. Other items from the south or southwest are ornamental stones, jade, agate, and turquoise.

A less well-known connection is the saddleback roof house which today survives only in Malaysia and Indonesia (Dumarçay 1981). Three are known from 3-D models in Shizhaishan (SZS). All are two-storey and supported on paired columns (Lee 2002: 117, 119).

Western Connections

Archaeologically, Dian's best-documented connections are up the Red River to modern Dali and beyond. Agricultural crops came this way (Stevens et al. 2016) and likely domesticated livestock from Central Asia: steppe ponies, realistically represented in bronzes from elite tombs, fat-tailed sheep, and longhorn cattle.

Eastern Connections and the Maritime Silk Road

Dian's most obvious connection to the east is its great quantity of bronze drums, which were clearly an important part of life. They are thin-walled hollow vessels with a flat base (tympanum) which is the percussion surface. Widespread in Southeast Asia with concentrations in Yunnan, Northern Vietnam, and Southeast China (Guangxi-Guangdong), they were manufactured in Myanmar until the twentieth century. They have been studied for well over a century – the standard typology still being that established by Franz Heger from a sample of 153 drums (Heger 1902).

The Dian drums are all of Heger Type I, the earliest and a most elaborately decorated; they were deposited as grave goods, sometimes adapted as cowrie containers, but also seen as miniatures, on ornaments and as part of three-dimensional narrative scenes (Bernet-Kampers 1986–87: 314–325). In one famous example, on SZS M12:26, 18 drums are shown on three sides of the raised platform of a communal hall where a ceremony is taking place; at ground-level double-height drums are placed on either side of a sacrifice-post. Near this post is a crossbar from which hang a large bell and another drum, both being played by the same musician (Lee 2002: 117; plan view in Yao 2005: 403). The drums have been compared to the well-known assemblage of over 200 drums from the Dong Son settlements around the Red River Delta of Northern Vietnam. Where comparisons can be made, it seems that any influences would have been downstream from Dian toward Dong Son (Murowchik 2002: 177).

Reciprocal exchange is hard to determine, but it is worth considering that there were at Shizhaishan two copies in bronze of the famous West-Asian silver box found in Guangdong in the tomb of the king of Nan Yue, who died 122 BCE (Cremin 2010: 115). This object is an indicator of the Maritime Silk Road, which passed around South India, Thailand, and up the Vietnamese coast, carrying goods from the Mediterranean and Western Asia; the reciprocal traffic included potash glass made in Guangxi. Brigitte Borell (2012) has published an important find of such glass with Han period Chinese goods, but also seven Heger Type I drums in what is presumed to have been a burial at Lao Cai, Vietnam, on the Red River, 360 km from the China sea, but only 260 km from the Dian lakes.

China

There are many connections with China's central plains, and they may go back a long time, if Yunnan copper was indeed used in Fu Hao's

tomb; it's worth noting that her tomb also contained over 6000 cowries and thus the use of cowrie containers as grave goods might well be borrowed from Shang or Zhou China (Li 2006: 18). Other Chinese elements include T-section disk bracelets and from Shizhaishan M6 a set of six chimes to be mounted on a stand of which only the feet remain. Chinese influences have also been detected in the art styles (Chiou-Peng 2008: 37–38). More significant is the use of lost wax (or lost lead) for casting the 3-D figurines and other items. Whereas images can be copied, a technical development of this sophistication requires a human interface, and artisans may have reached Dian during the troubled times of the Spring and Autumn or Warring States periods (771–221 BCE), though other scenarios are also possible (Barnard 1996–97). Whatever their ultimate origin, Dian piece-mold and lost-wax castings are technically accomplished and must reflect decades of practice (Murowchick 2002: 140–152).

Dian Culture of Yunnan, Fig. 1 Model of a building with a saddleback roof, from Shizhaishan M6. Steps lead up to the first level. At ground-level food is being prepared (at left) with domestic animals at right. Bronze. Height 11.5 cm, length 12.5 cm. (Photo L. Shih 2008)

Dian Culture of Yunnan, Fig. 2 Weaving scene from top of cowrie container from Lijiashan M 69. Bronze. Diameter c. 24.5 cm. (Photo T. Lustig 2008)

Imagery

The Dian bronzes are justly renowned for their imagery, whether flat or in 3-D (Chiou-Peng 2008). They provide a wealth of information about the people's life, such as music, weaving, ceremonies, and warfare all of which have been well studied (e.g., Murowchick 2002; Rode 2004; Cremin 2010).

Dian Culture of Yunnan, Fig. 3 Detail of openwork plaque from Shizhaishan M13. Two of four dancers with bells in their right hand. They each have a tall decorated headdress, large earrings, a waistband with a disk buckle, a short skirt, and a jeweled cross-strap beneath a shoulder cape. Gilded bronze. Height 11.6 cm. (Photo L. Shih 2008)

International Perspectives

China's archaeological heritage is on a huge scale, with major new discoveries every few years. Research and conservation measures are consequently vast in scope, and it is very difficult for non-Chinese reader to keep up with the stream of publications. In Yunnan matters are complicated by the relative dearth of information from the borderlands of Myanmar and Laos. Ongoing work on globalization and the role of the Maritime Silk Road will in time remedy this situation.

Future Directions

The most important aspect of Dian research has got to be a better understanding of the settlement pattern. It is also important to understand how and where mining was carried out and to learn more about the source of the ornamental materials (jade, agate, malachite, turquoise) and their transformation processes.

Dian Culture of Yunnan, Fig. 4 Disk buckle mounted onto gold-sheet waistband. Bronze inlaid with minuscule disks of malachite on either side of an open jade circle; agate stud at center. Diameter 20.5 cm. (Photo T. Lustig 2008)

The frequent representations of interaction between human and animal, whether wild or domesticated, should be of particular interest to students of the Anthropocene, as they suggest multiple levels of interpretations from realism to myth. A greater knowledge of the paleoenvironment might help to address this topic (Figs. 1, 2, 3, and 4).

Cross-References

► History of Archaeology in Japan

References

Allard, F. 2015. China's early impact on eastern Yunnan: Incorporation, acculturation, and the convergence of evidence. *Journal of Indo-Pacific Archaeology* 35: 26–35. https://journals.lib.washington.edu/index.php/JIPA/index. Accessed 10 Nov 2018.

Barnard, N. 1996–1997. The entry of cire-perdue investment casting and certain other metallurgical techniques (mainly metalworking) into South China and their progress northwards. In *Ancient Chinese and southeast Asian Bronze Age cultures*, ed. N. Barnard and D. Bulbeck, 1–94. Taiwan: SMC.

Bernet Kempers, A.J. 1986–1987. *The kettledrums of Southeast Asia: A Bronze Age world and its aftermath*, Modern Quaternary research in Southeast Asia 10. Rotterdam: A.A. Balkema.

Borell, B. 2012. The Han period glass dish from Lao Cai, northern Vietnam. *Journal of Indo-Pacific Archaeology* 32: 70–77. https://journals.lib.washington.edu/index.php/JIPA/index. Accessed 10 Nov 2018.

Chiou-Peng, T.H. 2008. Dian bronze art: Its source and formation. *Bulletin of the Indo-Pacific Prehistory Association* 28: 34–43. https://journals.lib.washington.edu/index.php/BIPPA/issue/archive. Accessed 10 Nov 2018.

Cremin, A. 2010. Seeing Dian through barbarian eyes. *Bulletin of the Indo-Pacific Prehistory Association* 30: 114–121. https://journals.lib.washington.edu/index.php/BIPPA/issue/archive. Accessed 10 Nov 2018.

de Crespigny, R. 1996–1997 [1988]. South China in the Han period. In *Ancient Chinese and southeast Asian Bronze Age cultures*, ed. N. Barnard and D. Bulbeck, 759–767. Taiwan: SMC.

Dumarçay, J. 1981. La faîtière tendue (histoire d'une technique). Bulletin de l'Ecole française d'Extrême-Orient. 70:231–252.

Heger, F. 1902. *Alte Metalltrommeln aus Südost-Asien*. Leipzig: Hiersemann. https://archive.org/details/bub_gbiAQNAQAAMAAJ. Accessed 10 Nov 2018.

Jiang, Z. 1999. New excavations at the Bronze Age site of Shizhaishan, Yunnan, and implications for the archaeology of the ancient Dian kingdom. *Indo-Pacific Prehistory Association Bulletin* 18: 117–119. https://journals.lib.washington.edu/index.php/BIPPA/issue/archive. Accessed 10 Nov 2018.

Lee, Y.K. 2002. Status, symbol and meaning in the Dian culture. *Journal of East Asian Archaeology* 3 (1–2): 103–131.

Li, Y.T. 2006. On the function of cowries in Shang and Western Zhou China. *Journal of East Asian Archaeology* 5 (1): 1–26.

Li, K., and R. Min. 2014. The site of Haimenkou: New research on the chronology of the Early Bronze Age in Yunnan. In *The 'Crescent-shaped cultural-communication belt': Tong Enzheng's model in retrospect*, BAR international series 2679, ed. A. Hein. Oxford: Archaeopress.

Lustig, T., K. Li, Z. Jiang, and G. Chen. 2011. *Bulletin of the Indo-Pacific Prehistory Association* 31: 50–63. https://journals.lib.washington.edu/index.php/BIPPA/issue/archive. Accessed 10 Nov 2018.

Murowchick, R.E. 2002. The political and ritual significance of bronze production and use in ancient Yunnan. *Journal of East Asian Archaeology* 3 (1–2): 133–192.

Rode, P. 2004. Textile production and female status in Bronze Age Yunnan. In *Gender and Chinese archaeology*, ed. K.M. Linduff and Yan Sun, 315–338. Walnut Creek: Altamira.

Stevens, C.J., C. Murphy, R. Roberts, L. Lucas, F. Silva, and D.Q. Fuller. 2016. Between China and South Asia: A Middle Asian corridor of crop dispersal and agricultural innovation in the Bronze Age. *The Holocene* 26: 1–15. https://doi.org/10.1177/0959683616650268.

Watson, B. 1961. Records of the grand historian; Han Dynasty II. By Sima Qian. Translation, rev. ed. New York: Columbia University Press.

Yang, B. 2008. *Between winds and clouds: The making of Yunnan* (*Second century BCE – 20th century CE*). Gutenberg-eBook. http://www.gutenberg-e.org/yang/index.html. Accessed 10 Nov 2018.

Yao, A. 2005. Scratching beneath iconographic and textual clues: A reconsideration of the social hierarchy in the Dian culture of southwestern China. *Journal of Antropological Archaeology* 24: 378–405. https://doi.org/10.1016/j.jaa.2005.05.003. Accessed 10 Nov 2018.

Yao, A., and Z. Jiang. 2012. Rediscovering the settlement system of the 'Dian' kingdom in Bronze Age southern China. *Antiquity* 86: 353–367. https://antiquity.ac.uk/ant/086/ant0860353.htm. Accessed 10 Nov 2018.

Further Reading

Yao, A. 2016. *The ancient highlands of southwest China: From the Bronze Age to the Han Empire*. Oxford: Oxford University Press.

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Basic Biographical Information

Jane Dieulafoy was an early French archaeologist who opened the way for the French exploration of Persia (modern-day Iran). She made several notable discoveries in 1884 and 1914 at her excavations in Susa and Hassan Mosque (Adams 2010: 41; Cohen 2010: 59). Dieulafoy also published her work so that others were able to learn from it.

Jane Dieulafoy, nee Magre, was born on June 29, 1851, in Toulouse, France (Cohen 2010: 35). She was raised by her mother with five siblings, as her father died while she was young (Adams 2010: 44). Dieulafoy began her education at age 11 at the Sisters of the Convent of the Assumption in Auteuil, France (Adams 2010: 44). She learnt Latin and Greek languages and developed skills in drawing and painting (Adams 2010: 44; Cohen 2010: 35). She stayed at the convent until she was 19 and, after leaving, met Marcel Dieulafoy (Cohen 2010: 36). They knew each other through their families, which led to their marriage on May 11, 1870 (Cohen 2010: 36). Shortly after their marriage, the Franco-Prussian War broke out. Marcel enlisted. Dieulafoy also wished to enlist but the law did not allow this (Cohen 2010: 37). Instead, she disguised herself as a boy and became a sharpshooter (Adams 2010). This is an example of how the Dieulafoys worked together, equally sharing the workload and credit (Diaz-Andreu Garcia and Sorensen 1998: 68; Adams 2010: 58). After France's defeat in the Franco-Prussian War, they both returned to France. Marcel resumed his engineering work, while Dieulafoy appeared to have continued with domestic duties (Adams 2010: 46).

Dieulafoy conducted her first expedition in Persia with her husband in 1882, after gaining permission in 1880 (Cohen 2010: 41). This was merely an introductory expedition, as she would return to conduct her first excavation at Susa in 1884 (Cohen 2010: 46). After the archaeological excavation of Susa, the Dieulafoys were unable to return, and that excavation was taken over by another French archaeologist, Jacques de Morgan (Abdi 2001: 54). However, Dieulafoy continued her archaeological work by giving lectures and writing about her travels through Persia (Adams 2010: 59–60; Diaz-Andreu Garcia and Sorensen 1998: 68). This continued for a few years, until World War I broke out in 1914. Again the Dieulafoys signed up. This time Jane Dieulafoy became a nurse (Adams 2010: 60). However, they were stationed in Morocco where they were asked to excavate the Hassan Mosque, but due to Marcel's workload, it was Jane Dieulafoy who ran the excavation (Diaz-Andreu Garcia and Sorensen 1998: 68). After working with injured soldiers, Jane Dieulafoy contracted amoebic dysentery, and after several trips back to France for recovery, she died on May 25, 1916 (Cohen 2010: 61).

Major Accomplishments

Jane Dieulafoy had many major accomplishments. The first of these was the excavation of the city of Susa, in Persia in 1884. One of her discoveries was the Lion Frieze, bricks glazed with enamel creating a mosaic of lions colored in blue, yellow, white, and green, measuring over 11 ft (Adams 2010: 52). What also made this extraordinary is that Dieulafoy implemented recently introduced archaeological techniques. This included recording both the relative and absolute position of the enamel bricks, overseeing the retrieval of the bricks, and ensuring their preservation and storage (Cohen 2010: 48). Dieulafoy also found a similar frieze at this site in the remains of the Palace of Darius, called the Frieze of Archers or the Frieze of the Immortals (Adams 2010: 54). This excavation was carried out with the same recording methods as the Lion Frieze. Both friezes were taken to Paris by the Dieulafoys and displayed in the Louvre (Dieulafoy 1890: 237). However, the Dieulafoys lost permission to excavate at Susa, possibly due to Jane Dieulafoys' public criticisms for the sovereign rule of Persia and possible disdain by both Persian and French governments for a woman engaged beyond her domestic duties. The work was continued by

Jacques de Morgan (Adams 2010: 59; Abdi 2001: 105; Cohen 2010: 55).

In-between her archaeological excavations and travels, Dieulafoy was known as an accomplished writer and lecturer (Diaz-Andreu Garcia and Sorensen 1998: 68). Her writing started with her recordings of archaeological sites, and on her return to Paris, she wrote about her travels (Cohen 2010: 62). These travel narratives were published in the review called *Le Tour du Monde* or *Around the World* (Cohen 2010: 39). Dieulafoy also wrote fictional novels based on her excavations. Her most famous novel, *Parysatis*, used Susa as its backdrop, which entertained audiences as both a novel and later an opera (Adams 2010: 59). Dieulafoy and other French female writers also created the Prix Femina in 1904, a literary award with Dieulafoy as one of the solely female jury (Adams 2010: 60). She also gave lectures on her work at universities in France, further gaining recognition for her research (Diaz-Andreu Garcia and Sorensen 1998: 68).

Another major accomplishment by Dieulafoy was the excavation of the Hassan Mosque in Morocco conducted during World War I, 1914. The excavation was directed solely by Jane Dieulafoy, as Marcel Dieulafoy was occupied with his engineering work (Adams 2010: 60). It was not ordinary for an excavation to be directed by a woman. The labor was carried out by German prisoners of war, who all gave Dieulafoy the respect of a commanding officer (Diaz-Andreu Garcia and Sorensen 1998: 68). The excavation was possible during World War I as it coincided with policies regarding the preservation of Moroccan antiques (Cohen 2010: 59). The excavation uncovered the layout of the tower of the mosque and the arrangement of rooms for visiting students, called the madrasa (Cohen 2010: 60). The site was also partially reconstructed, which included columns that outlined the layout of the mosque and the tower of Hassan restored as a minaret (Cohen 2010: 60). Due to Jane Dieulafoy's illness from her nursing work, this was her last excavation (Diaz-Andreu Garcia and Sorensen 1998: 68).

Jane Dieulafoy was a pioneering archaeologist of her time. She excavated the city of Susa and uncovered several important artifacts and also excavated the Hassan Mosque during wartime (Diaz-Andreu Garcia and Sorensen 1998: 68). Her work has made a lasting impact, as it has influenced modern archaeology and literary work today.

Cross-References

► Iran: Islamic Archaeology

D

References

Abdi, K. 2001. Nationalism, politics, and the development of archaeology in Iran. *American Journal of Archaeology* 105 (1): 51–76.

Adams, A. 2010. *Ladies of the field: Early women archaeologists and their search for adventure*. Vancouver: Greystone Books.

Cohen, G.M. 2010. *Breaking ground pioneering women archaeologists*. Ann Arbor: University of Michigan Press.

Diaz-Andreu Garcia, M., and M.L.S. Sorensen. 1998. *Excavating women: A history of women in European archaeology*. London: Routledge.

Dieulafoy, J. 1890. *At Susa: The ancient capital of the Kings of Persia*. Philadelphia: Gebbie & Company.

Further Readings

Ménant, J. 1887. The French expedition to Susiana. *The American Journal of Archaeology and of the History of the Fine Arts* 3 (1/2): 87–93.

Monicat, B. 1999. Dieulafoy, Jane (1851–1916). In *The Feminist encyclopedia of French literature*. Westport: Greenwood Publishing Group, Incorporated.

Vernoit, S. 1997. The rise of Islamic archaeology. *Muqarnas* 14: 1–10.

Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation

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Introduction

Archaeology is awash with data. Since the late 1940s, archaeology and related cultural heritage

disciplines have experienced rapid growth of data from a staggering rise in the number of investigations (e.g., see articles in Banks and Czaplicki 2014, Banks and Scott 2016, and McManamon (ed.) 2018; McManamon 2018a). The increased professional activity is driven in large part by studies now required as part of modern public development project planning (Altschul 2016; Departmental Consulting Archeologist 2010; McManamon 2018b). This is the good news.

The bad news is that most of these data, and the information they contain, have not been utilized effectively because they are difficult to find and access. Even worse, data, which increasingly are in digital file formats, are not curated in ways that will preserve them and provide for their future accessibility and use. Like many other disciplines, archaeology and cultural heritage disciplines generally need to find ways to discover, access, use/reuse, and preserve these data (e.g., OECD Publishing 2017:14–18). Otherwise, a great deal of useful information will be lost and enormous amounts of human energy and scarce funding will have been wasted.

The research value of and critical need for effective digital archiving and curation for archaeological and related data and information is highlighted in the concluding paragraph in a recent article in the *Proceedings of the National Academy of Sciences* addressing "Grand Challenges for Archaeology" (Kintigh et al. 2014a: 879; see also Kintigh et al. 2014b).

> Although new archaeological field work will be needed, the greatest payoff [from future research] will derive from exploiting the explosion in systematically collected archaeological data that has occurred since the mid-20th century… Both the needed modeling and synthetic research will require far more comprehensive online access to thoroughly documented research data and to unpublished reports detailing the contextual information essential for the comparative analyses. Indeed, our survey emphatically reinforced the need for the kinds of online access provided by the Digital Archaeological Record (United States) and the Archaeology Data Service (United Kingdom).

Professional ethics require attention to the curation of data in order to ensure their access and long-term preservation. Recognizing that archaeological resources are nonrenewable, in the United States, the Society for American Archaeology (SAA) includes among its ethical principles, "Principle No. 7: Records and Preservation: Archaeologists should work actively for the preservation of, and long-term access to, archaeological collections, records, and reports" (SAA 1996; see also Kintigh 2006: 571–572; McManamon and Kintigh 2010). Legal requirements for data access and preservation also exist, although this varies among different countries. Looking at US laws, Cultural Heritage Partners, PLLC (CHP), analyzed the legal requirements for curation of digital archaeological and cultural heritage data based on the National Historic Preservation Act, the Archaeological Resources Protection Act, and regulations (36 CFR 1220.1–1220.20) promulgated by the National Archives and Records Administration. Their report concludes that "relevant federal laws, regulations, and policies mandate that digital archaeological data generated by federal agencies must be deposited in an appropriate repository with the capability of providing long-term digital curation and accessibility to qualified users" (CHP 2012: 10).

Of course, archaeological data exist in paper and digital formats. Increasingly, digital records are more common and older paper records are being scanned and transferred to digital formats. The access to and preservation of paper records is an important topic (e.g., Fowler and Givens 1995; Drew 2004, 2010); however, this entry focuses on the curation of digital archaeological data, not paper records. As noted above, other cultural heritage disciplines, for example, historical architecture and public history, have similar data access and preservation issues. Much of what applies for archaeological data can be extended to these disciplines, as well.

Definition

The term "digital archaeological data" refers to documents created as digital files or scanned to create digital versions in various file formats of documents (e.g., .pdf, .pdfa, .doc, .docx, .rtf), data sets (e.g., .xls, .xlsx, .tab, .csv, .accdb, .mdb),

images (e.g., .jpeg, .tiff, .png, and other standard image file formats), geospatial data, and other kinds of digital files that result from contemporary archaeological investigations and research. Some of the new digital files have paper versions, others are primarily or exclusively in digital formats. Despite legal and policy mandates requiring preservation and access to digital data, many of them are difficult or impossible to access and will not be preserved in the formats in which they currently reside. Digital repositories, such as the Archaeology Data Service (ADS) digital repository in the UK and the Digital Archaeological Record (tDAR), are needed to provide wide and easy access to digital archaeological data and information and ensure that these data are preserved in the long run (Altschul et al. 2017; Clarke 2015; Eiteljorg 2004; Richards 2008; Kintigh and Altschul 2010; Lord et al. 2004; McManamon 2016; McManamon and Kintigh 2010; McManamon et al. 2010, 2017; OECD 2017; Richards et al. 2010; Richards 2017; Sheehan 2015).

Key Issues

Modern archaeological investigations produce vast amounts of digital data. Fieldwork, laboratory analysis, collection research, and literature-based studies all utilize and produce data and information in digital formats. Individual professionals and the discipline as a whole are now challenged to develop and implement methods and techniques to explore, present, publish, and preserve a wide range of digital data. Averett et al. (2016: 20) assert the need for more professional focus on digital "...publication and its attendant issues of long-term accessibility and preservation,...a central concern of the discipline since its inception, ...[and] a notable omission in the digital archaeological process at present." Digital data present distinct challenges and opportunities, at times making digital archaeological practice particularly complicated and different from archiving and curating paper records or material artifacts. For example, best practice for access and (re)usability of data for research might not be optimal for the long-term preservation of digital data. In addition, there are practical aspects related to the treatment of digital data that are unfamiliar to archaeologists and different from dealing with physical archaeological resources remains and records.

The types of data, produced by field, laboratory, collections, and library research since systematic archaeological and cultural heritage investigations began, exist in technical, often lengthy, limited-distribution reports scattered in offices across the world. Some of the data (e.g., analytical and descriptive data sets, images, GIS and GPS files) are encoded and stored on computer cards, magnetic tapes, CDs, flash and hard drives, and other digital media. Typically, these media are degrading, slowly but surely, in archives, museums, and collections repositories, on bookshelves and in file cabinets and desk drawers. Meanwhile, the technology and software necessary to retrieve the information and data and the human knowledge to make them meaningful (aka, metadata) rapidly disappears (Michener et al. 1997; Eiteljorg 2004). Unfortunately, rather than systematically archiving digital data so that it can remain accessible and useable, individuals, museums, offices responsible for maintaining site inventory systems, and other repositories typically treat the media on which the data are recorded as artifacts – storing them in various ways, but not making them easily accessible or ensuring their long-term preservation. The most common preservation treatment preserves the media on which the digital data files are stored but leaves the data on the media actually endangered and inaccessible (Eiteljorg 2004: 72–73; McManamon et al. 2017: 239–240; Watts 2011). Simple physical curation is an inadequate long-term preservation approach for digital data. Physical curation of media neither takes account of computer software and hardware change nor of the gradually but inevitably deterioration of the magnetic or optical media on which the digital data are stored (ADS & Digital Antiquity 2017: The Project Archive, Storage and Dissemination, 2013: 1–60).

Over 20 years ago, Fowler and Givens (1995: 2–4) wrote about the importance of

archaeological records and summarized the variety of documentation that, along with artifacts and other physical recoveries from investigations, is a part of the archaeological record:

Provenience documentation: Field records, including notes, forms, drawings, photos, etc., and accession and catalog records

Analytical documentation and data: Records of physical analyses and qualitative and quantitative analyses (e.g., statistical studies), the data themselves, etc.

Administrative documentation: Project background records, research designs, proposals, scopes of work, related correspondence, etc.

Project reports: Descriptive and analytical texts reporting on investigation or projects and their findings

Fowler and Givens, of course, referred to paper records. The categories they identified still are important, but now are more commonly found in digital formats, which require different actions and means to ensure long-term access and preservation for use and reuse. Moreover, digital data that were rare or nonexistent in 1995 are now common, for example, GIS, GPS, and scan files of artifacts, site areas, and landscapes.

The Digital Data Deluge

The amount of archaeological and cultural heritage digital data cannot be accounted for precisely. However, estimates of some aspects of the amount of digital data can be estimated (Altschul and Patterson 2010: 297; Schlanger et al. 2015: 81–88). As much as $1 billion is spent annually in the United States by public agencies and private sector companies involved in cultural resource management (CRM). In a recent analysis, Altschul (2016) uses information from reports by US federal agencies for the years 1985–2012 to show that staggering amounts of archaeological data have been collected (e.g., Departmental Consulting Archeologist 2010). During this 27-year period, the agencies report 851,271 archaeological field studies that surveyed more than 140,000,000 acres and recorded more than 880,000 archaeological sites. Among these field studies are 33,327 site excavation projects. The annual average is more than 30,000 field studies, including over 1000 excavations. These numbers almost certainly underestimate the actual totals since not all federal agencies reported or fully reported their cultural heritage work, and no state or local projects are included.

We can estimate that each of these 800,000-plus studies generates one or more digital files (e.g., reports, photographs, and data sets) that describe, analyze, or interpret the resources investigated. If each field study reported in Altschul's admittedly incomplete inventory produced only a single project report; each site inventoried merited a single photograph; and, each excavation produced a report, a database, and 20 photographs, the total would be more than two million digital files, with substantial amounts added annually. Clearly, there exists a huge backlog of legacy data. Furthermore, each year, an enormous amount of new digital data are created, all of which need to be managed to ensure access and preservation for future use (ADS & DA 2013: 9–60, 2017; Clarke 2015: 313–318, 324).

The real problem for archaeology, heritage resources generally, and other disciplinary data is not that a great deal of digital data exists and more are generated daily by contemporary investigations. The problem is that most data are difficult or impossible to discover, access, and use (Lord et al. 2004; Rumsey 2016). There is a data "stewardship gap" (York et al. 2016) in the curation of data. Archaeology and other cultural heritage disciplines are not unique in this regard. A wide-ranging survey reported in Science (2011 and Fig. 1) describes the data access and preservation problems in many disciplines.

Caring for and Using Digital Data

Much of the existing digital data are never curated and are lost when hard drives fail, servers are replaced, or investigators retire or die. If the digital documents, images, and data sets from cultural heritage studies are curated at all, they are

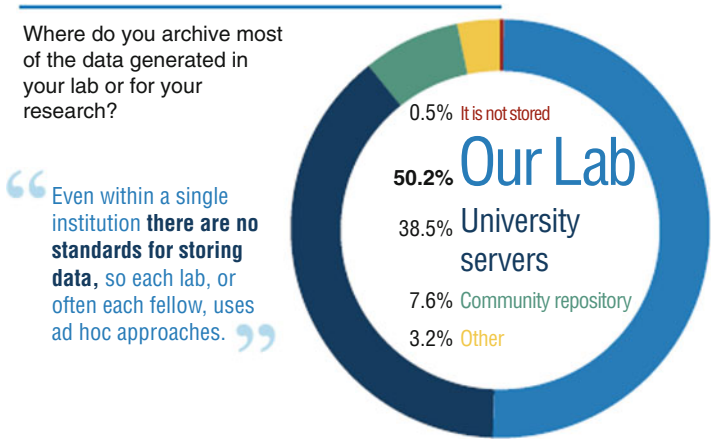

Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation, Fig. 1 Challenges for data discovery, access, and reuse. (From: Science 2011)

usually deposited with the artifacts and paper records in repositories that focus on maintaining physical objects. Few artifact repositories deal effectively with digital data – either to provide access or to ensure long-term preservation (Childs and Kinsey 2004; Childs et al. 2010: 196–197; Faniel and Yakel 2017: 109; Watts 2011). Typically, the media containing the digital data (e.g., CDs, external hard drives, thumb drives) are simply numbered, boxed, and curated as physical objects. The data are not accompanied by sufficient metadata for others to find or use them, nor are they easily discoverable or accessible online. Data are not checked systematically for readability or migrated as new digital file formats become standard.

The millions of digital files are the products of enormous public investments in archaeology and cultural heritage management. Equally important, they constitute a treasure trove of information. To utilize this incredible potential, the data must be discoverable and acquirable in formats that contemporary software can use. In addition, digital files must be accompanied by the information that makes them meaningful and reusable. If field notes and reports are searchable only by title or author, relevant documents would not be discovered by digital search functions. What use can be made of a digital photograph labeled only with an automatically generated image number? A data set with numeric codes for pottery types is useless in the absence of a key explaining the codes. For digital data to be discoverable and useful in future research, they must be documented by and linked with rich contextual and descriptive metadata (ADS & DA 2013: 46–52, 2017; Atici et al. 2013; Clarke 2015: 315–319; Faniel and Yakel 2017: 115–116; Faniel et al. 2013: 297–303; Kansa et al. 2014; Kintigh 2010; Kintigh et al. 2015: 8–11; McManamon et al. 2017; Richards 2017).

Physical collections repositories often lack the expertise, procedures, and resources to systematically acquire, make accessible, manage, and preserve digital files and associated metadata necessary for data sharing and reuse. Disciplinary digital repositories have emerged in archaeology and in other fields to fill these gaps. They have the expertise to provide the stewardship the data require in order to be found and used to advance knowledge. This stewardship is even more important in archaeology, where resources are nonrenewable and data often literally irreplaceable. To avoid a terrible loss of investment in human energy, intellectual focus, and funding data and metadata, both those in the existing backlog and those created by current investigations must be deposited in a digital archive where they can be discovered, accessed, preserved, and used.

Digital data repositories focused on archaeology and cultural heritage, such as tDAR (Digital Antiquity 2017; McManamon 2016; McManamon et al. 2017) and the ADS (2017; Richards 2017) repository, were established as responses to these problems. They constitute established infrastructure that is necessary if we are to take advantage

of the wealth of data from past investigations and integrate it with information being created now and in the future.

However, while this infrastructure is essential, so are changes in archaeological practice that will ensure the regular and systematic deposit of data into these repositories (ADS & DA 2013; Clarke 2015: 320–324; Kintigh et al. 2015: 8–11; McManamon et al. 2017:; Schlanger et al. 2015: 91–97). If this tremendous store of data was easily discoverable and accessible, it could be used to streamline the historic preservation review process required for most public undertakings, to create informative new educational materials, to provide critical information for comparative and synthetic research addressing important scientific questions, to support traditional cultural practices, and generally contribute to the advancement of knowledge.

Guidelines and Expert Organizations

Information in digital formats has the advantage of being easily copied and shared. Digital data can be queried in automated ways that make certain kinds of research much easier than when using paper records. Some new kinds of research, for example, querying, integrating, and analyzing large data sets, are possible with digital data that cannot be carried out with paper records. However, digital data also requires special administrative and technical procedures to ensure that it is properly accessed, preserved, and used.

Technologically, digital files are easily duplicated and shared. They can be accessed and distributed widely if they are in a digital repository that allows users to discover and use the information the files contain. Depending upon the content of the files, there may be administrative hurdles to be overcome for such easy sharing and distribution to be realized. Some data or information may be required to remain confidential with limited access. Proprietary or copyrighted information may have restrictions on its potential uses that must be worked out with the owner or copyright holder. There also are challenges in funding for the maintenance and preservation of files in any public digital repository (e.g., see Kintigh and Altschul 2010; McManamon et al. 2017; Richards 2017; Richards et al. 2010).

The preservation of digital files presents its own challenges. These files cannot be preserved, nor are they easily accessible, if they are curated as objects. Digital files must be stored on computer servers where they can be accessed, managed, and preserved. Effective long-term curation of digital files requires procedures that periodically assess the condition of the digital files to ensure their integrity, and over the long term provides for the "migration" of these files to new formats that are capable of being read and used by future versions of software.

The Digital Curation Centre (DCC), the national authority on the subject in the United Kingdom, describes digital curation as "maintaining, preserving, and adding value to digital research data" (DCC 2017). The management activities that digital curation involves aim to reduce the threats to the value of data over the long term and to overcome the hurdles of digital obsolescence. For effective digital curation, the DCC advises that repositories conceive of data as having a digital life cycle with various curatorial activities associated with different phases of the cycle. Overall, the DCC curation lifecycle model (2017) includes a number of steps and fits conceptually into a broader system of research, publication, and curation (Fig. 2).

Accessing and Preserving Digital Resources: The Current Landscape

A number of organizations, typically operating at the national or international levels, provide access to and preservation of digital archaeological and cultural heritage data. The Archaeology Data Service (ADS), at the University of York, operates a trusted digital archaeological repository in the United Kingdom (Richards 2017). The Center for Digital Antiquity (Digital Antiquity 2017) at Arizona State University maintains the Digital Archaeological Record (tDAR 2018), an international digital archaeological repository (McManamon et al. 2017). In Holland, the Data

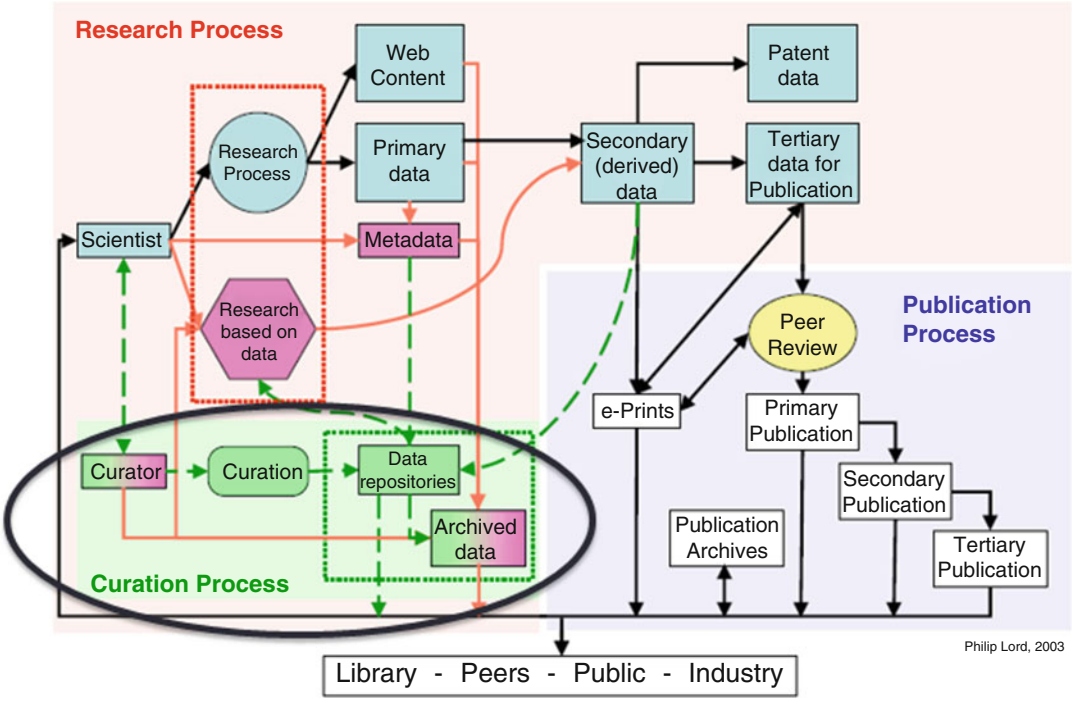

Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation, Fig. 2 Data curation as part of knowledge creation and dissemination. (Based on: Lord et al. 2004)

Archiving and Networking Service (DANS 2017) provides long-term data curation and preservation services.

The ADS and tDAR repositories are examples of "domain repositories." These repositories provide digital data access, curation, and preservation designed to serve specific scientific and scholarly communities (Cambridge Concord Associates 2013; Ember et al. 2013; ICPSR 2014). They are particularly valuable because they combine "domain-specific scientific knowledge, expertise in data stewardship, and close relationships with scientific communities" (Erway 2012; Ember et al. 2013: 2). Digital Antiquity's tDAR repository is an example, as is the Archaeology Data Service's repository in the United Kingdom (Archaeology Data Service 2017; Richards 2017). Both tDAR and the ADS repository focus on providing access to archaeological and other cultural heritage data and their reuse, as well as actively curating data for their long-term preservation.

ADS and Digital Antiquity provide a set of useful guidelines and steps also based on a concept of the life cycle of digital archaeological data and following generally the pattern advocated by the DCC. These steps run from planning for the development of digital records that can be archived easily and effectively, to the deposit of the digital records in a repository, to the long-term preservation and use of the records. These *Guides to Good Practice* (ADS & Digital Antiquity 2013, 2017) also describe general standards for archaeological digital repositories and specific guidelines for various kinds of digital files.

Other digital repositories are institutionally focused. University and large organizations sometimes contain such institutional data repositories, which are available for faculty, research staff, students, and employees. Institutional repositories exist at major research universities in the United States and other countries, examples include the University of California system, the University of Michigan, Harvard

University, Johns Hopkins University, and the University of North Carolina. These repositories focus on archiving research data created by researchers or teams of researchers at the institution (Johnson 2002; Lynch 2003). While they may provide access to the archived data, the breadth and ease of access may be limited by the extent to which the data are exposed to external search engines and any institutional limitations placed on access to the data. Lynch (2017) has raised a number of concerns regarding institutional repositories. He notes that faculty use of such repositories is spotty and that as universities come to realize the staff and technological commitment required to run a dedicated, high-quality digital repository, smaller institutions may find the administrative and financial commitment too great (Lynch 2017: 126–127).

For individuals, CRM firms, and other organizations outside of universities, there may be no typical way that they can deposit the digital products of their contracts or other research in institutional repositories. It also may be difficult for external users to find relevant data in institutional repositories, because the diversity of research data created by the wide range of disciplines encompassed by major research universities makes it impossible to supply the level of metadata detail needed for outside scholars to find and access the data (Ember et al. 2013: 5).

A third kind of organization focuses on access to and preservation of data from particular regions, types of sites, or topics. These organizations aggregate relevant data and information in databases that are Internet-accessible. Some of these organizations, such as the Chaco Research Archive (CRA) and OpenContext, utilize archival services provided by existing institutional repositories at major research universities.

The CRA (Heitman et al. 2016, 2017) is an online archive and database that integrates much of the widely dispersed archaeological data collected from Chaco Canyon from the late 1890s through the first half of the twentieth century. The CRA includes thousands of images, data, reports, and other documents from investigations of ancient sites, architecture, and artifacts related to the ancient culture found in and near Chaco Canyon in the US Southwest. A topically oriented project focused on data sharing is the Digital Archaeological Archive of Comparative Slavery (DAACS), which is designed for comparative studies focused on slavery and the lives of enslaved people in the United States and the Caribbean. Both DAACS and CRA focus on providing easy access to and fostering research on particular kinds of archaeological and cultural heritage resources and topics.

OpenContext focuses on publishing archaeological data sets, making them more accessible and advocating for greater professional attention to data archiving and publication (Atici et al. 2013; Kansa et al. 2014). Managed and supported by the Alexandria Archive Institute, OpenContext is "an open access, web-based publication system for archaeology and other field sciences." At present, OpenContext lists data from 98 projects – some complete, others in various states of editing. Unlike the CRA and DAACS, OpenContext does not concentrate on one area or topic.

Projects in OpenContext focus on the Middle East, but a number are located in Europe and the Americas. OpenContext concentrates its publication on data sets, in particular archaeofaunal data. In a series of recent articles, OpenContext leaders Eric C. Kansa and Sarah Whitcher Kansa and colleagues describe research involving reanalysis of archaeofaunal data sets created by different researchers and research projects (e.g., Arbuckle et al. 2014; Atici et al. 2013; Kansa et al. 2014). The method for data publication advocated by OpenContext is for data sets submitted by researchers to be reviewed and modified as necessary for structural coherence, consistency, and general and domain-specific quality by OpenContext editors before they are published (Atici et al. 2013: 675–677). Once published, the OpenContext data sets are archived with the California Digital Library. Digital Antiquity and the AAI are sharing links between archaeological site data common in both the Digital Index of North American Archaeology (DINAA) project in OpenContext and tDAR resources.

The Developing Best Practices for Digital Curation

The process of digital archiving for archaeological and cultural heritage data can be divided into two general sections. The first includes activities to be taken by the individual(s) or organization(s) that create the digital data, documents, image, or other digital file information, referred to here as "digital objects." Drawing upon information regarding digital curation from other disciplines (e.g., the DCC) and their own experiences with digital archaeological data, the ADA and Digital Antiquity (2013, 2017) provide guidance regarding the planning and caring for digital data produced by archaeological or cultural heritage investigations. Included also are specific recommendations regarding the most frequently produced digital data, for example, documents, data sets, images, 3D scans, and the types of digital files used most often for these kinds of data.

Actions that should be taken by digital data creators include:

Plan for the creation and subsequent management of the digital resources as part of a research or scholarly activity.
Produce the digital resources as part of the project, creating administrative, substantive, and technical descriptions of the digital objects, commonly referred to as "metadata."
Provide the means for users to access and make use of the digital objects.
As part of the project that created the digital objects, evaluate their likely continuing importance and select those objects that merit long-term preservation.
Dispose of the digital objects not selected for long-term preservation.
Deposit in a trusted digital repository the digital objects selected for long-term preservation.

The second set of activities are those undertaken by the digital repository where the digital objects produced by investigations are deposited for long-term care and curation. A trusted digital repository is one established and operated with the mission and capability of providing for discovery of, access to, long-term preservation of, and the use and reuse of the digital data curated by the repository. Such a repository is organized so that it can be sustained and function in its curation role indefinitely. Actions by trusted digital repositories include the following:

Upon deposit of the digital objects, test the objects to ensure that they have the characteristics described by the creators and can be adequately preserved in the repository.
Undertake actions, for example, regular check for file stability and retention of integrity; regular and frequent backups and storage in multiple locations for security and safety of files; etc., to ensure preservation of the digital objects in the repository.
Keep the digital objects stored in a secure manner.
Provide the means for access and use of the digital objects, within any constraints placed on use by the depositors.
Ensure that new digital objects, produced from the originals, are created when it becomes necessary to migrate the digital objects to new file types or in order to conform to new hardware and/or software standards.

In 2011, a national survey of archaeological repositories in the United States provided insights into how digital data are curated (Watts 2011). The survey contacted 208 archaeological repositories throughout the United States. Responses were obtained from individuals at 70 of the institutions. Nearly half of the respondents listed the care of digital data (e.g., providing for preservation of and access to these data) as an important mission of their repository (Watts 2011: Question 4). Yet, nearly half of the respondents also reported that their repositories lacked guidelines for the submission of digital data for curation and only a quarter felt that their institution has the means to provide access and long-term preservation of digital data effectively and efficiently (Watts 2011: 6–9). So, the need for digital archaeological curation is well recognized. The means and procedures to ensure that the challenges are met effectively need to be developed.

For two centuries, those who investigated archaeological sites systematically have realized that the information about the context of objects recovered from archaeological deposits tells more about the past than individual objects recovered by excavation or survey. The intense attention to context and the records that describe it are one of the characteristics that set professional archaeologists apart from casual collectors, commercial salvers, and looters. So, it is no surprise that archaeological concern extends to the care and future uses of the information derived from archaeological investigations. This information is expressed in documents, data sets, images, or other kinds of records. Archaeologists and others responsible for the management and preservation of archaeological information must be as concerned about the records of description and analysis as they are about how the artifacts and other recoveries from field studies are treated after they have been collected or excavated.

Furthermore, much of the archaeological record now exists only as collections and data from investigations undertaken prior to the destruction of in situ sites or portions of sites. Access to and preservation of these archival parts of the archaeological record is especially important since there is no alternative source of information. The ability to access already collected information is key to advancing understanding through new research and scholarship and imperative for both effectiveness and efficiency.

Maintaining digital data documenting cultural heritage in a robust repository provides important benefits for a broad community of archaeologists, cultural heritage specialists, librarians, ecologists, historians, historical architects, economists, climate scientists, and other researchers who need the unique long-term data that only archaeology can provide. Members of the general public, likewise value archaeological information as a means of learning about the ancient or historical past.

Despite enticing research potential, ethical obligations, professional calls for "open access" and data sharing, and government regulations and requirements for data management, archaeologists have been slow to include effective and explicit activities that provide for data and curation into their research and management activities. Although the benefits of good data management and sharing practices are evident (e.g., Atici et al. 2013; Clarke 2015; Hegmon et al. 2017; Heitman et al. 2017; Kansa et al. 2014; Kintigh et al. 2015: 10–12; examples described in McManamon et al. 2017: 242–246; Richards 2017; Schlanger et al. 2015), appropriate stewardship of archaeological data is far from commonplace. Those who are responsible for managing or who conduct research on archaeological and other cultural heritage resources need to embrace project workflows and practices that ensure both newly created and legacy reports, images, data sets, and other digital material that are documented fully and deposited in a publicly accessible digital repositories where they can be discovered, accessed, and reused to enable new insights and build cumulative knowledge. Granting, regulatory, and resource management agencies must ensure that research products of their actions are deposited in public repositories that provide for data discovery, access, reuse, and preservation.

This entry provides an introduction to the care, curation, and management of digital data and points readers to additional sources for more information. There remain many aspects of the topic to be investigated among them:

How can digital data be made discoverable and accessible to others for education and research?

What metadata is needed to provide sufficient contextual and descriptive information for data to be reusable?

What is the range of detail in metadata available for legacy and new digital data? How can archaeologists make best use of what is available?

How can data be preserved and made available in the long-term for reuse?

How can professionals in these disciplines be credited professionally for curating and using digital data? How can such crediting be made more common, in particular in academic evaluations for tenure and promotion?

Public agencies responsible for the care of archaeological and cultural heritage resources and related data, whether they have direct resource management or grant-related responsibilities, must enforce these requirements to ensure long-term preservation of and access to digital data. Consequences of the absence of enforcement include the loss of data, less informed and effective research, poorer resource management, and the squandering of scarce public funding. Government agencies at the national, state, tribal, and local agencies that directly undertake, sponsor, and issue permits for archaeological investigations must require the deposit of data from these investigations in such repositories as a part of each project's scope of work. All archaeologists share an obligation for effective stewardship of these irreplaceable data. The public and the profession all benefit when that obligation is met.

Cross-References

- ▶ Archaeological Informatics
- ▶ Cultural Heritage Management Technology and Training

References

ADS & Digital Antiquity (Archaeology Data Service & the Center for Digital Antiquity). 2013. *Caring for digital data in archaeology: A guide to good practice*. Oxford/Oakville: Oxbow Books.

ADS & Digital Antiquity (Archaeology Data Service & the Center for Digital Antiquity). 2017. Guides to good practice: the project archive, storage and dissemination. Available at: http://guides.archaeologydataservice.ac.uk/. Accessed 30 Oct 2017.

ADS (Archaeology Data Service). 2017. Home web page. Available at: http://www.archaeologydataservice.ac.uk/about.xhtml. Accessed 30 Oct 2017.

Altschul, J.H. 2016. The role of synthesis in American archaeology and cultural resource management as seen through an Arizona Lens. *Journal of Arizona Archaeology* 4 (1): 68–81.

Altschul, J.H., and T. Patterson. 2010. Trends in employment and training in American archaeology. In *Voices in American archaeology*, ed. W. Ashmore, D.T. Lippert, and B.J. Mills, 291–316. Washington, DC: Society for American Archaeology Press. Available at: https://www.researchgate.net/publication/303719585_Trends_in_Employment_and_Training_in_American_Archaeology. Accessed 22 Nov 2017.

Altschul, J.H., K.W. Kintigh, T.H. Klein, W.H. Doelle, K.A. Hays-Gilpin, S.A. Herr, T.A. Kohler, B.J. Mills, L.M. Montgomery, M.C. Nelson, S.G. Ortman, J.N. Parker, M.A. Peeples, and J.A. Sabloff. 2017. Fostering synthesis in archaeology to advance science and benefit society. *Proceedings of the National Academy of Sciences* 114: 10999–11002. Available at: http://www.pnas.org/content/114/42/10999.short?rss=1. Accessed 21 Nov 2017.

Arbuckle, B.S., S. Whitcher Kansa, E. Kansa, D. Orton, C. Cakirlar, L. Gourichon, L. Atici, A. Galik, A. Marciniak, J. Mulville, H. Buitenhuis, D. Carruthers, B. De Cupere, A. Demiregi, S. Frame, D. Helmer, L. Martin, J. Peters, N. Pollath, K. Pawlowska, N. Russell, K. Twiss, and D. Wurthenberger. 2014. Data sharing reveals complexity in the westward spread of domestic animals across Neolithic Turkey. *PLoS One* 9 (6): e99845. https://doi.org/10.1371/journal.pone.0099845. Accessed 22 June 2017.

Atici, L., S.W. Kansa, J. Lev-Tov, and E.C. Kansa. 2013. Other people's data: A demonstration of the imperative of publishing primary data. *Journal of Archaeological Method and Theory* 20: 663–681. https://doi.org/10.1007/s10816-012-9132-9. Accessed 22 June 2017.

Averett, E.W., J.M. Gordon, and D.B. Counts, eds. 2016. *Mobilizing the past for a digital future: The potential of digital archaeology*. The University of North Dakota, Grand Forks: The Digital Press. Available at: https://thedigitalpress.org/mobilizing-the-past-for-a-digital-future/. Accessed 20 Nov 2017.

Banks, K.M., and J.S. Czaplicki, eds. 2014. *Dam projects and the growth of American archaeology: The River Basin surveys and the interagency archeological salvage program*. Walnut Creek: Left Coast Press.

Banks, K.M., and A.M. Scott, eds. 2016. *The National Historic Preservation Act: Past, Present, and Future*. London and New York: Routledge.

Cambridge Concord Associates. 2013. *Sustaining domain repositories for digital data: A call for change from an interdisciplinary Working Group of Domain Repositories*. Interuniversity Consortium for Political and Social Research (ICPSR). Available at: https://www.icsu-wds.org/files/Domain_Repositories_Call_to_Action_16_Sept_2013.pdf. Accessed 17 Feb 2017.

Childs, S.T., and K. Kinsey. 2004. A survey of SHPO archeological reports bibliographic systems, 2002. *Studies in Archeology and Ethnography #5*. Washington, DC: Archeology Program, National Park Service, Department of the Interior. Available at: https://core.tdar.org/document/377011/a-survey-of-shpo-archeological-reports-bibliographic-systems-2002. Accessed 9 Nov 2016.

Childs, S.T., K. Kinsey, and S. Kagan. 2010. Repository fees for archaeological collections. *Heritage Management* 3 (2): 189–212. Available at: http://www.tandfonline.com/doi/abs/10.1179/hma.2010.3.2.264?src=recsys. Accessed 20 Nov 2017.

CHP (Cultural Heritage Partners, PLLC). 2012. Legal analysis of federal requirements for curation of digital archaeological documents and data. Report to the Office of the General Counsel, Arizona State University, Tempe. Available at: https://www.digitalantiquity.org/wp-uploads/2013/05/2013-CHP-Legal-Analysis-of-Fed-Req-for-Curation-of-Dig-Arch-Docs-Data-.pdf. Accessed 13 Nov 2017.

Clarke, Mary. 2015. The digital dilemma: Preservation and the digital archaeological record. *Advances in Archaeological Practice* 3 (4): 313–330. Available at https://www.academia.edu/18029286/The_Digital_Dilemma_Preservation_and_the_Digital_Archaeological_Record. Accessed 20 Nov 2017.

DANS (Data Archiving and Networked Services). 2017. Home web page. Available at: https://dans.knaw.nl/en. Accessed 30 Oct 2017.

DCC (Digital Curation Centre). 2017. DCC curation lifecycle model and what is digital curation? Digital Curation Center, The University of Edinburgh. Available at: http://www.dcc.ac.uk/resources/curation-lifecycle-model. Accessed 13 Nov 2017.

Departmental Consulting Archeologist. 2010. *The Secretary of the Interior's Report to Congress on the Federal Archaeology Program, 2004-2007*. Washington: Archaeology Program, National Park Service.

Digital Antiquity (Center for Digital Antiquity, Arizona State University). 2017. Home web pages. Available at: https://www.digitalantiquity.org/ and https://www.tdar.org/. Accessed 29 Nov 2017.

Drew, N. 2004. Preserving archaeological associated records. In *Our collective responsibility: The ethics and practice of archaeological collections stewardship*, ed. S.T. Childs, 55–66. Washington, DC: Society for American Archaeology. Full publication information is available at: http://www.worldcat.org/title/our-collective-responsibility-the-ethics-and-practice-of-archaeological-collections-stewardship/oclc/57375355. Accessed 13 Nov 2017.

Drew, N. 2010. Curating associated records: Budget development and cost-saving strategies. *Heritage Management* 3: 275–289. Available at: http://www.tandfonline.com/doi/abs/10.1179/hma.2010.3.2.275. Accessed 13 Nov 2017.

Eiteljorg, H., II. 2004. Archiving digital archaeological records. In *Our collective responsibility: The ethics and practice of archaeological collections stewardship*, ed. S.T. Childs, 67–77. Washington, DC: Society for American Archaeology. Full publication information is available at: http://www.worldcat.org/title/our-collective-responsibility-the-ethics-and-practice-of-archaeological-collections-stewardship/oclc/57375355. Accessed 13 Nov 2017.

Ember, C., R. Hanisch, G. Alter, H. Berman, M. Hedstrom, and M.Vardigan. 2013. *Sustaining domain repositories for digital data: A white paper*. Interuniversity Consortium for Political and Social Research, University of Michigan, Ann Arbor. Available at: http://datacommunity.icpsr.umich.edu/sites/default/files/WhitePaper_ICPSR_SDRDD_121113.pdf. Accessed 4 Nov 2016.

Erway, R. 2012. *Lasting impact: Sustainability of disciplinary repositories*. Dublin: OCLC Research. Available at: http://www.oclc.org/content/dam/research/publications/library/2012/2012-03.pdf. Accessed 30 Feb 2017.

Faniel, I. M., and E. Yakel. 2017. Practices do not make perfect: Disciplinary data sharing and reuse practices and their implications for repository data curation. In *Curating Research Data, Volume One: Practical Strategies for Your Digital Repository*, pp. 103–126. Association of College and Research Libraries, Chicago. Available at: http://www.oclc.org/research/publications/2017/practices-do-not-make-perfect.html. Accessed 19 Apr 2017.

Faniel, I., E. Kansa, S. W. Kansa, J. Barrera-Gomez, and E. Yakel. 2013. The challenges of digging data: A study of context in archaeological data reuse. In *Proceedings of the 13th ACM/IEEE-CS joint conference on digital libraries*, New York City.

Fowler, D.D., and D.R. Givens. 1995. The records of archaeology. In *Preserving the anthropological record*, 2nd edn, ed. S. Silverman, and N.J. Parezo. Wenner-Gren Foundation for Anthropological Research. Available at: http://copar.org/par/par9_fowler_givens.pdf. Accessed 30 Oct 2017.

Hegmon, M., J.R. McGrath, and M.K. Munson. 2017. The potential and pitfalls of large multi-source collections: Insights from the analysis of Mimbres gender imagery. *Advances in Archaeological Practice* 5(2):138–146.

Heitman, C., S. Plog, and W. Martin. 2016 Legacy records and digital innovation: The Chaco research archive and beyond. Presentation at the 81st annual meeting of the Society for American Archaeology, Orlando. Available at: https://core.tdar.org/document/404068/legacy-records-and-digital-innovation-the-chaco-research-archive-and-beyond. Accessed 13 Nov 2017.

Heitman, C., S. Plog, and W. Martin. 2017. Innovation through large-scale integration of legacy records: Assessing the "value added" in cultural heritage resources. *ACM Journal on Computing and Cultural Heritage* 10(3):Article 17. Available at: https://dl.acm.org/citation.cfm?doid=3129277.3012288. Accessed 30 Oct 2017.

ICPSR (Inter-university Consortium for Political and Social Research). 2014. Integrating domain repositories into the National Data Infrastructure: Meeting report. University of Michigan, Ann Arbor. Available at: http://datacommunity.icpsr.umich.edu/sites/default/files/IntegratingDomainRepositoresIntotheNationalDataInfrastructurev3.pdf. Accessed 28 Nov 2017.

Johnson, R.K. 2002. Institutional repositories: Partnering with faculty to enhance scholarly communication. *D-Lib Magazine* 8(11). Available at: http://www.dlib.org/dlib/november02/johnson/11johnson.html. Accessed 17 Feb 2017.

Kansa, E.C., S.W. Kansa, and B. Arbuckle. 2014. Publishing and pushing: Mixing models for communicating research data in archaeology. *International Journal of Digital Curation* 9 (1): 57–70. Available at: http://www.ijdc.net/index.php/ijdc/article/view/301. Accessed 13 Nov 2017.

Kintigh, K.W. 2006. The promise and challenge of archaeological data integration. *American Antiquity* 71: 567–578. Available at: https://www.jstor.org/stable/40035365?seq=1#page_scan_tab_contents. Accessed 22 Nov 2017.

Kintigh, K.W. 2010. Sustaining database semantics. In *Proceedings of the 38th conference on computer applications and quantitative methods in archaeology.* Granada.

Kintigh, K.W., and J.H. Altschul. 2010. Sustaining the archaeological record. *Heritage Management* 3: 264–274. Available at: http://www.tandfonline.com/doi/abs/10.1179/hma.2010.3.2.264?src=recsys. Accessed 20 Nov 2017.

Kintigh, K.W., J.H. Altschul, M.C. Beaudry, R.D. Drennan, A.P. Kinzig, T.A. Kohler, W.F. Limp, H.D.G. Maschner, W.K. Michener, T.R. Pauketat, P. Peregrine, J.A. Sabloff, T.J. Wilkinson, H.T. Wright, and M.A. Zeder. 2014a. Grand challenges for archaeology. *Proceedings of the National Academy of Science (PNAS)* 111 (3): 879–880. Available at: http://www.pnas.org/content/111/3/879.full. Accessed 22 Nov 2017.

Kintigh, K.W., J.H. Altschul, M.C. Beaudry, R.D. Drennan, A.P. Kinzig, T.A. Kohler, W.F. Limp, H.D.G. Maschner, W.K. Michener, T.R. Pauketat, P. Peregrine, J.A. Sabloff, T.J. Wilkinson, H.T. Wright, and M.A. Zeder. 2014b. Grand challenges for archaeology. *American Antiquity* 79: 5–24. Available at: http://www.public.asu.edu/~kintigh/Kintigh%26al2014AmAntiqGrandChallenges.pdf. Accessed 22 Nov 2017.

Kintigh, K.W., J.H. Altschul, A.P. Kinzig, W.F. Limp, W.K. Michener, J.A. Sabloff, E.J. Hackett, T.A. Kohler, B. Ludäscher, and C.A. Lynch. 2015. Cultural dynamics, deep time, and data planning cyberinfrastructure investments for archaeology. *Advances in Archaeological Practice* 3 (1): 1–15. Available at: https://core.tdar.org/document/392821/cultural-dynamics-deep-time-and-data-planning-cyberinfrastructure-investments-for-archaeology. Accessed 22 Nov 2017.

Lord, P., A. Macdonald, L. Lyon, & D. Giaretta. 2004. From data deluge to data curation. In *Proceedings of the UK e-Science All Hands Meeting,* 2004. Available at: http://www.ukoln.ac.uk/ukoln/staff/e.j.lyon/150.pdf. Accessed 9 Dec 2016.

Lynch, C.L. 2003. Institutional repositories: Essential infrastructure for scholarship in the digital age. *Libraries and the Academy* 3 (2): 327–336. Available at: http://muse.jhu.edu/article/42865. Accessed 17 Feb 2017.

Lynch, C.L. 2017. Updating the agenda for academic libraries and scholarly communications. Copyright, Fair Use, Scholarly Communication, etc. 40. Available at: http://digitalcommons.unl.edu/scholcom/40. Accessed 20 Apr 2017.

McManamon, F. P. 2016. Creating a sustainable domain repository: tDAR (the Digital Archaeological Record). Presented at the SciDataCon 2016, Denver. Available at: https://core.tdar.org/document/439857/creating-a-sustainable-domain-repository-tdar-the-digital-archaeological-record. (tDAR id: 439857; https://doi.org/10.6067/XCV8J67KM2. Accessed 29 Nov 2017.

McManamon, F.P. 2018a. The development of cultural resource management in the United States. In *New perspectives in cultural resource management*, ed. F.-P. McManamon, 11–55. New York: Routledge. Available at: https://www.routledge.com/New-Perspectives-in-Cultural-Resource-Management/Mcmanamon/p/book/9781138101128. Accessed 22 Nov 2017.

McManamon, F.P. 2018b. Developments in American Archaeology: Fifty Years of the National Historic Preservation Act. *The Annual Review of Anthropology* 47:in press.

McManamon, F.P., ed. 2018. New Perspectives in Cultural Resource Management. New York: Routledge. Availabe at: https://www.routledge.com/New-Perspectives-in-Cultural_Resource_Management/McManamon/p/book/978113810128. Accessed 22 Nov 2017.

McManamon, F.P., and K.W. Kintigh. 2010. Digital antiquity: Transforming archaeological data into knowledge. *The Society for American Archaeology Archaeological Record* 10: 37–40. Available at: https://www.tdar.org/images/SAA-McM-Kintigh.pdf. Accessed 20 Nov 2017.

McManamon, F.P., K.W. Kintigh, and A. Brin. 2010. Digital antiquity and the digital archaeological record (tDAR): Broadening access and ensuring long-term preservation for digital archaeological data. *The Center for the Study of Architecture Newsletter* 23. Available at: http://csanet.org/newsletter/fall10/nlf1002.html. Accessed 10 Dec 2011.

McManamon, F.P., K.W. Kintigh, L.A. Ellison, and A. Brin. 2017. tDAR: A cultural heritage archive for twenty-first century public outreach, research, and resource management. *Advances in Archaeological Practice* 5 (3): 238–249. Available at: https://repository.asu.edu/attachments/189868/content/tdar.pdf. Accessed 20 Nov 2017.

Michener, W.K., J.W. Brunt, J.J. Helly, T.B. Kirchner, and S.G. Stafford. 1997. Nongeospatial metadata for the ecological sciences. *Ecological Applications* 7: 330–342. Available at: http://onlinelibrary.wiley.com/doi/10.1890/1051-0761(1997)007%5B0330:NMFTES%5D2.0.CO;2/abstract. Accessed 20 Nov 2017.

OECD Publishing. 2017. Business Models for Sustainable Research Data Repositories. OECD Science, Technology, and Innovation Policy Papers No. 47. The Organisation for Economic Co-operation and Development (OECD), Paris. Available at: www.oecd.org/going-digital.

D

Richards, J.D. 2008. Managing digital preservation and access: The archaeology data service. In *Managing archaeological resources: Global context, national programs, local actions*, ed. F.P. McManamon, A. Stout, and J.A. Barnes, 173–194. Walnut Creek: Left Coast Press. Available at: https://www.routledge.com/Managing-Archaeological-Resources-Global-Context-National-Programs-Local/McManamon-Stout-Barnes/p/book/9781598743128. Accessed 20 Nov 2017.

Richards, J.D. 2017. Twenty years of preserving data: A view from the United Kingdom. *Advances in Archaeological Practice* 5 (3): 227–237. Available at: https://www.cambridge.org/core/journals/advances-in-archaeological-practice/article/twenty-years-preserving-data/4B801489107ECB1773E3618F47D2DBD2. Accessed 30 Oct 2017.

Richards, J.D., T. Austin, and C. Hardman. 2010. Covering the costs of digital curation. *Heritage Management* 3: 255–263. Available at: http://www.tandfonline.com/doi/abs/10.1179/hma.2010.3.2.255. Accessed 30 Oct 2017.

Rumsey, A.S. 2016. The risk of digital oblivion: What knowledge should we save? *Chronicle of Higher Education*. 4 May 2016. Available at: http://chronicle.com/article/The-Risk-of-Digital-Oblivian/236342/. Accessed 21 Dec 2016.

SAA (Society for American Archaeology). 1996. *Principles of archaeological ethics*. Available at: http://saa.org/AbouttheSociety/PrinciplesofArchaeologicalEthics/tabid/203/Default.aspx. Accessed 22 Nov 2017.

Schlanger, S., R. Wilshusen, and H. Roberts. 2015. From mining sites to mining data: Archaeology's future. *Kiva* 81 (1–2): 80–99. Available at http://www.tandfonline.com/doi/pdf/10.1080/00231940.2015.1118739?needAccess=true. Accessed 21 Nov 2017.

Science. 2011. Challenges and opportunities. *Science* 331 (6018): 692–693. https://doi.org/10.1126/science.331.6018.692. Accessed 17 Feb 2014.

Sheehan, Beth. 2015. Comparing digital archaeological repositories; tDAR versus open context. *Behavioral & Social Science Librarian* 34 (3): 173–213. Available at: http://tandfonline.com/doi/abs/10.1080/01639269.2015.1096155?src=recsys. Accessed 21 Nov 2017.

tDAR (the Digital Archaeological Record). 2018. *Home web page*. Available at: https://www.tdar.org/. Accessed 23 August 2018.

Watts, J. 2011. *Policies, preservation, and access to digital resources: the digital antiquity 2010 national repositories survey* (Reports in digital archaeology, Number 2). Tempe: Center for Digital Antiquity, Arizona State University. Available at: https://core.tdar.org/document/378318/policies-preservation-and-access-to-digital-resources-the-digital-antiquity-2010-national-repositories-survey. Accessed 30 Oct 2017.

York, J., M. Gutmann, and F. Berman. 2016. *What do we know about the stewardship gap?* Ann Arbor: University of Michigan Library, Deep Blue Repository. Available at: http://hdl.handle.net/2027.42/122726. Accessed 21 Feb 2017.

Dimbleby, Geoffrey W.

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Basic Biographical Information

Professor Geoffrey Dimbleby (1917–2000) was a pioneer in the research and development of soil pollen analysis and sediment from archaeologically related features.

Born in Newcastle upon Tyne, he trained as a botanist at Magdalen College, Oxford obtaining a B.A. and a B.Sc. He became demonstrator in Forest Ecology in 1947 where he obtained his D.Phil. (1950) entitled *The Ecology of Some British Podzol Formations*. This work examined soil formation in relation to vegetation history and pioneered the study of pollen preserved in soils underlying prehistoric funerary monuments and field banks of North East Yorkshire and the New Forest.

After joining the Oxford Forestry Commission, he published his work on vegetation change and soil genesis in *The Development of British Heathlands and Their Soils* (1962). In this seminal work, he demonstrated from his numerous examinations of the well-preserved pollen in acid soils: the transition from woodland to heathland due to human activity and consequent soil degeneration on sandy substrates. As a corollary to this work, he also examined the taphonomy of pollen in soils (1961a, 1961b) and the possibility of soil regeneration of podzolic soils (1962). These studies led him to become one of the pioneers in the field of Environmental Archaeology and subsequently he became Professor of Environmental Archaeology in a newly created post at The Institute of Archaeology, now part of University College, London (1964–1979). The University of St. Andrews awarded him an honorary D.Sc. in 1977.

During his tenure, he continued with his research in soil pollen analysis, producing copious pollen studies of soils and other

archaeological contexts for archaeologists. Much of this data remains unpublished. His earlier book publications include *Plants and Archaeology* (1978) and *Ecology and Archaeology* (1977). Subsequently he produced *The Palynology of Archaeological Sites* (1985). *The Domestication and Exploitation of Plants and Animals* (Ucko and Dimbleby 1969) resulted from one of the first conferences in the early acceptance of environmental archaeology as a significant discipline. He edited the first conference volume of the Association for Environmental Archaeology *The Archaeology of Coasts and Islands* (Brothwell and Dimbleby 1980) and *The Environment of Man: the Iron Age to the Anglo-Saxon Period* (Jones and Dimbleby 1981).

Major Accomplishments

As a part of his continued research, he was central to the study of contemporary soil processes and preservation of environmental remains on archaeological sites. He was a founder member of the Experimental Earthworks Committee (chairman from 1959 to 1972) studying taphonomy at the contrasting sites of Overton Down, Wiltshire, on calcareous soils (Jewell and Dimbleby 1966) and Wareham Dorset on acid heathland (Evans and Limbrey 1974).

As a lifetime Christian, he was active in the Congregational Church. However, as an academic, he questioned the doctrines and various inconsistencies of the church. In his final, privately produced book (1997), he discussed the tenet of man as the pinnacle of evolution drawing on his years of research in archaeology and past environments.

Cross-References

- ▶ Archaeobotany
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Silbury Hill: Environmental Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology

References

Brothwell, D., and G.W. Dimbleby, eds. 1980. *Environmental aspects of coasts and islands*. Symposia of the Association for Environmental Archaeology 1; British Archaeological Reports International series 94. Oxford: Archaeopress.

Dimbleby, G.W. 1961a. Soil pollen analysis. *Journal of Soil Science* 12: 1–11.

Dimbleby, G.W. 1961b. Transport material in the soil profile. *Journal of Soil Science* 12: 12–22.

Dimbleby, G.W. 1962. *The development of British heathlands and their soils*. Oxford Forestry memoirs, Vol. 23. Oxford: Clarendon Press.

Dimbleby, G.W. 1978. *Plants and archaeology*. 2nd ed. London: Baker.

Dimbleby, G.W. 1985. *The palynology of archaeological sites*. London: Academic.

Dimbleby, G.W. 1997. *Testing the foundations*. St. Albans.

Evans, J.G., and S. Limbrey. 1974. The experimental earthwork on Morden Bog, Wareham, Dorset, England: 1963–1972. *Proceedings of the Prehistoric Society* 40: 170–202.

Jewell, P.A., and G.W. Dimbleby. 1966. The experimental earthwork on Overton Down Wiltshire, England: the first four years. *Proceedings of the Prehistoric Society* 32: 313–342.

Jones, M., and G.W. Dimbleby, eds. 1981. *The environment of man: The Iron Age to the Anglo-Saxon period*. British Archaeological Reports British series 87. Oxford: Archaeopress.

Ucko, P., and G.W. Dimbleby. 1969. *The domestication and exploitation of plants and animals*. London: Gerald Duckworth Co.

Further Reading

Dimbleby, G.W., and J.G. Evans. 1974. Pollen analysis and land snail analysis of calcareous soils. *Journal of Archaeological Science* 1: 117–133.

Dinsmoor, Sr., William Bell

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Basic Biographical Information

A native of New Hampshire, Dinsmoor (1886–1973) graduated from Harvard in 1906 with a B.Sc. in Architecture. After two years

working in an architectural firm, he began his long association with the American School of Classical Studies at Athens in 1908, when he became the second holder of School's Fellowship in Architecture. This was followed in 1912 by his appointment as Architect of the School, a position he held until his commission as lieutenant in the United States Army in 1918. Dinsmoor was hired by Columbia University in 1920, where he taught until his retirement in 1963, becoming professor of archaeology in 1935. He served as president of the Archaeological Institute of America from 1936 to 1945, during which time he chaired the Committee for the Protection of Cultural Treasures in War Areas. In 1969, Dinsmoor was awarded the Archaeological Institute of America's Gold Medal Award for Distinguished Archaeological Achievement, an honor he shared with Oscar Broneer and Rhys Carpenter.

Major Accomplishments

Dinsmoor's chief scholarly focus was the architecture of the Athenian Acropolis, in particular the Propylaea and the several temples of Athena. Throughout the 1930s and into the 1940s, he published a series of fundamental articles reviewing all sources of evidence for the topography of the Athenian Acropolis. His interpretation of the Archaic Acropolis, which places the so-called Hekatompedon on the site of the later Parthenon, engaged him in an ongoing debate with the German models championed by Wilhelm Dörpfeld (1853–1940) and W. H. Plommer. The discovery of an inscribed archon list during his investigations of the Propylaea led Dinsmoor to publish a massive study which clarified Hellenistic Athenian chronology, *The Archons of Athens in the Hellenistic Age* (1931), which, however, kept him from his Propylaea research. Between 1920 and 1931, Dinsmoor also served as design consultant for the concrete replica of the Parthenon erected in Nashville, Tennessee.

Off the Acropolis, Dinsmoor attributed the design of four fifth-century-BCE Attic temples to a single individual, whom he named the "Theseum Architect." He also worked on the problem of the order of the sculpted frieze blocks from the Temple of Apollo at Bassae. Dinsmoor's most influential publication was his revision of Anderson and Spiers' 1906 *The Architecture of Ancient Greece* (1927; revised 1950), which amounted to a complete reworking and became the definitive work on the subject for over a generation.

His son William Bell Dinsmoor, Jr. (1923–1988) was also an accomplished ancient architectural historian in his own right and continued his father's study of the Propylaea. Their combined work on the Classical structure was collected and edited by the younger Dinsmoor's widow, Anastasia Norre Dinsmoor, and published in 2004.

Cross-References

- ► American School of Classical Studies at Athens (ASCSA)
- ► Archaeological Institute of America (AIA)
- ► Classical (Greek) Archaeology

Further Reading

Archaeological Institute of America. 1970. Seventy-first general meeting of the Archaeological Institute of America. *American Journal of Archaeology* 74: 185.

Dinsmoor, W.B. 1966. Bibliography of William Bell Dinsmoor. *Hesperia* 35: 87–92.

Lord, L.E. 1947. *A history of the American School of Classical Studies at Athens, 1882–1942*. Cambridge: Harvard University Press.

Medwid, L.M. 2000. *The makers of classical archaeology: a reference work*. Amherst: Humanity Books.

New York Times. W.B. Dinsmoor, 87, an archaeologist, 3 July 1973, p. 26.

Nicgorski, A.M. 1996. Dinsmoor, William Bell (1886–1973). In *An encyclopedia of the history of classical archaeology*, ed. N.T. de Grummond, vol. 1, 363–364. Westport: Greenwood Press.

Thompson, H.A. 1975. William Bell Dinsmoor (1886–1973). *Year Book of the American Philosophical Society for* 1974: 156–163.

Disaster Response Planning: Earthquakes

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Introduction

Earthquakes can cause instantaneous destruction without warning, producing extensive and often irreparable damage to cultural heritage (Erturk 2004: 243). This poses a major threat to cultural institutions and their cultural heritage collections, historic districts, and archaeological sites or landscapes (Taboroff 2000: 73), as earthquakes cannot be prevented and magnitudes are completely unpredictable, potentially resulting in major loss or damage. Developing an emergency disaster response plan with a particular focus on earthquake preparation and response measures can mitigate the impact of earthquakes and reduce the risk of damage to buildings and cultural heritage collections and sites.

Definition

Earthquake damage can be catastrophic, resulting in severe damage and loss. Some risks include the structural collapse, shift or damage of buildings, the breaking or displacement of cultural heritage collections, and the destruction of municipal and transport infrastructures, which can potentially impair the implementation of emergency response procedures. Earthquakes can also affect a building's stability and resistance to future shocks and increase the risk of secondary damage from fire and flooding (Taboroff 2000: 73; Stovel 1998: 57).

Key Issues/Current Debates/Future Directions/Examples

Earthquakes cannot be prevented or controlled; for this reason, it is particularly important that earthquake protection strategies focus on preparation, response, and recovery measures. These measures should aim to reduce risk, enhance earthquake resistance, improve earthquake detection systems, and develop an effective response plan (Stovel 1998: 59). Steps to consider when developing an emergency response plan are:

1. **Establishing a committee to develop and enforce an emergency response plan:** It is important that the responsibility for an institution's earthquake protection be permanently assigned to a committee that can continuously review and upgrade earthquake-related provisions. The committee should work closely with municipal and state officials when devising an earthquake emergency response plan for the property, its occupants, its cultural heritage contents, and its heritage values (Stovel 1998: 59). The committee appoints all emergency response team leaders, who are responsible for implementing and managing the emergency response plan during an emergency and organizing personnel and volunteers to assist in recovery procedures.
2. **Conducting a risk assessment of the facilities and collections to identify threats:** Risk assessments are conducted to identify any risks – both internal and external – posed to an institution and its collection and to understand what effect these impacts would have in an emergency situation. A clear understanding should follow regarding those risks that pose the greatest threat and those with least likelihood of occurring (Soderlund Consulting 2000). Reviewing the effects of past earthquakes, for example, areas most affected, magnitudes, and so forth, can play a significant role in assessing future risks. When conducting a risk assessment, it is important to consider the building's construction, any existing policies and procedures, legal responsibilities, and insurance coverage. It is also important to identify hazards that can cause secondary damage, such as fire or flooding from ruptured service supplies, or damage to heritage collections like crushing, from the collapse of building

components or heavy items that have been displaced during the shock (Stovel 1998: 57).

3. **Reducing risks:** Stovel (1998) argues that the best way to reduce the impact of earthquakes is to ensure that properties are systematically maintained; that sources with the potential to cause secondary damage are reduced, such as electrical, gas, or water supply systems; that building areas regarded as high-risk zones are used appropriately; and that earthquake detection and monitoring systems are used to provide early warning (Stovel 1998: 60).
4. **Conducting collection inventories:** Once threats have been identified, it is important to conduct an inventory of all cultural heritage collections, including equipment and data, prioritizing them in order of importance. Prioritizing the collection identifies which items must be recovered immediately after an emergency.
5. **Insurance and funding:** It is vital that institutions and their cultural contents are insured and that emergency response committees receive adequate financial resources to implement earthquake protection measures. Some institutions may not have the financial capacity to implement protection measures. Investigating external methods of funding, such as local council or government grants, may help institutions fulfil protection plans.
6. **Developing preparation, response, and recovery procedures:** Despite the fact that the occurrence of earthquakes cannot be prevented, preparation, response, and recovery methods can reduce the likelihood of loss or damage.

***Preparation*:** Preparing buildings and cultural heritage collections for earthquake emergencies can reduce the likelihood of damage. Preparing for an earthquake involves regular maintenance efforts of all facilities, including building structures; regular inspection of the state of electrical and water systems to limit the risk of secondary damage (Stovel 1998: 62); ensuring free-standing items are secured (if possible) to avoid displacement – consider items on display and in storage; supplies regularly checked and restocked, for example, first aid kits or condition assessment kits (camera, torch, batteries, recording sheets, pens, etc.), in preparation for an emergency; and all personnel adequately trained in all response and recovery procedures, including first aid. Preparation for an effective response plan will require the full involvement and collaboration of the institution's board and committees and earthquake response professionals (Stovel 1998: 65).

***Response*:** The effectiveness of an earthquake response relies heavily on the adequacy of advance planning. Unlike fire or flood emergencies, earthquake response strategies will occur after the earthquake event. Please note the possibility of aftershocks and the dangers these present (Stovel 1998: 66). To ensure that personnel are prepared for an emergency response, consider the following:

- Has an up-to-date emergency response plan been prepared for the site?
- Has the plan been effectively communicated to personnel, emergency response team members, and emergency service departments?
- Are emergency response team members aware of their responsibilities in the event of an earthquake?
- Are emergency response team members familiar, trained, and prepared to implement emergency plan provisions?
- Is the earthquake response plan at hand for immediate use and consultation during an emergency (Stovel 1998: 67)?

In the event of an earthquake, it is important to adhere to protection procedures, such as *Drop*, *Cover*, *and Hold On*. Once the initial shock is over, but bearing in mind the likelihood of aftershocks, the following response procedures should be carried out: calling emergency services; turning off electrical, water, and gas supplies; and accounting for all personnel. Although evacuating from a building may be an initial response, it is important to stay within the building until all internal and

external factors have been assessed (Stovel 1998: 67).

***Recovery*:** In the early phases of recovery, attention must be paid to the likelihood of seismic aftershocks. While these may be less severe than the initial earthquake, they may intensify post-disaster conditions and impair recovery plans (Stovel 1998: 67). As soon as possible, a condition assessment should be conducted in order to plan for urgently needed stabilization, repair, rebuilding, or further study. It is important to document all damage, using the condition assessment kit, paying particular attention to the condition of significant objects as identified in the collection inventory, the condition and stability of structural elements and foundations, the condition of the building's systems and services, availability of qualified professionals to carry out repairs and restorations, and expert supervision to repair and upgrade facilities to ensure future resilience (Stovel 1998: 68). Structures should be stabilized as soon as possible to protect the public and prevent further damage. Once the building is stable, recovery teams can conduct salvage operations and assessments (Stovel 1998: 68). Security and fire alarms and on-site fire equipment should be installed and activated once the building is stable (Stovel 1998: 68).

Clearing debris and salvaging architectural elements from outside the building will enable safe access for emergency services and recovery teams. Recruiting community members, conservation and preservation experts, and emergency service workers to help during recovery procedures is beneficial, depending on the scale of impact (Grupp 2004: 215).

Issues

When consulting experts to develop an emergency response plan, it is important to consider the legal implications involved. An Italian court convicted six scientists and one government official of manslaughter for failing to predict the magnitude of a devastating earthquake in L'Aquila, in Central Italy in 2009. Examples such as this illustrate the need for scientists, policy makers, and practitioners at all levels to be aware of the legal implications around disaster preparedness (McGowan 2012). For this reason, it is vital that committees seek advice from various organizations, scientific, government, or emergency services, when developing earthquake emergency response plans, and understand that extreme conditions may overcome well-planned emergency procedures (Stovel 1998: 75).

Earthquakes can have a disastrous effect on cultural institutions and their cultural heritage collections. Earthquakes cannot be prevented, but implementing an emergency response plan that has a particular focus on earthquake preparation and response measures can mitigate impacts and reduce the risk of damage to buildings and cultural heritage.

Cross-References

- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Disaster Response Planning: Fire
- ▶ Disaster Response Planning: Flood
- ▶ Disaster Response Planning: Tsunamis

References

Erturk, N. 2004. Earthquake preparedness and cultural heritage losses: The case study of Istanbul museums. In *Proceedings from the international symposium of cultural heritage disaster preparedness and response*, ed. C. Menegazzi, 243–248. Paris: ICOM.

Grupp, F. 2004. The 2001 earthquake in Arequipa: Lessons learned and international rescue network for endangered cultural heritage. In *Proceedings from the international symposium of cultural heritage disaster preparedness and response*, ed. C. Menegazzi, 211–218. Paris: ICOM.

McGowan, J. 2012. Blame game the enemy of good policy when disaster strikes. *The Conversation*. Available at: https://theconversation.edu.au/blame-game-the-enemy-of-good-policy-when-disaster-strikes-10337?utm_medium=email&utm_campaign=Latest+from+The+Conversation+for+26+October+20. Accessed 27 Oct 2012.

Soderlund Consulting PTY Ltd. 2000. *Be prepared: Guidelines for small museums for writing a disaster*

preparedness plan. Canberra: Heritage Collections Council.
Stovel, H. 1998. *Risk preparedness: A management manual for world cultural heritage*. Rome: ICCROM.
Taboroff, J. 2000. Cultural heritage and natural disasters: Incentives for risk management and mitigation. In *Managing disaster risk in emerging economies*, ed. A. Kreimer and M. Arnold, 71–80. Washington, DC: The World Bank.

Disaster Response Planning: Fire

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Introduction

Disaster response planning or disaster preparedness for fire is a procedure designed to reduce the risks of fire to property and cultural heritage. Fire prevention and response strategies to protect institutions and collections are becoming increasingly common in cultural heritage management practices as awareness of the potential risks and impact on cultural institutions and communities become more widely understood.

Definition

Fire damage includes the full or partial damage of property and cultural heritage collections by direct burning, damage from smoke, damage caused by heat and combustion by-products, water damage resulting from firefighting efforts, and damage to infrastructure systems such as electrical or natural gas systems (Stovel 1998: 43).

Key Issues/Current Debates/Future Directions/Examples

In the 1990s, a new approach to cultural heritage management emerged in response to the impact of natural disasters on cultural heritage institutions around the world. The aim of this approach was to minimize the impact that disasters had on cultural heritage collections by implementing step-by-step practices to guide institutions through the processes of prevention, preparation, response, and recovery. Organizations such as the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) and the International Committee of the Blue Shield (ICBS) have been active in facilitating international responses to threats and emergencies. Through initiatives such as ICCROM's *Risk Preparedness: A Management Manual for World Cultural Heritage* and the Getty Conservation Institute's *Building an Emergency Plan: A Guide for Museums and Other Cultural Institutions*, organizations around the world are implementing disaster response plans to protect their cultural heritage collections and to prepare for future disasters.

One of the major concerns cultural institutions face today is how to protect their collections against fire damage. Fire damage can occur as a result of a natural disaster; however, in most cases, fire damage is caused by human error or negligence, for example, poor electrical wiring or the use of extension cords or multiple power outlets. All institutions have a fire evacuation policy to protect individuals and help them to safety, and over the years institutions have introduced policies to protect their cultural heritage contents. The key to fire damage prevention is establishing a team-based emergency preparedness and response plan to mitigate the potential effects of a disaster (Dorge and Jones 1999).

Developing a Fire Prevention and Emergency Response Plan

The development of fire prevention and emergency response plans has proven to reduce the impact of fire damage to institutions and their cultural heritage collections. Emergency response plans must comply with the fire response and evacuation procedures of the institution and in accordance with state emergency service regulations. The key aspects of developing an effective plan include:

Establishing a committee to develop and enforce an emergency response plan: The committee is responsible for developing an emergency response plan according to their facilities and

collections and ensures that the plan is tested and modified and that all personnel are trained in all emergency procedures for successful implementation. The committee appoints all emergency response team leaders, who are responsible for implementing and managing the emergency response plan during an emergency.

Conducting a risk assessment of the facilities and collections to identify threats and solutions: Risk assessments are an important aspect of the emergency response plan as they identify areas of vulnerability within the facilities and collections by identifying threats and providing solutions to reduce the risk of damage. There are three major categories of threats that need to be recognized:

1. Threats that may prevent evacuation procedures, such as blocked emergency fire exits
2. Threats that can cause fire, such as gas bottles stored on-site or faulty electrical wiring
3. Threats that increase the potential for damage, such as no fire extinguishers or fire sprinklers in the building

Conducting collection inventories and establishing an emergency priority list: Once the threats have been identified, it is important to conduct an inventory of all cultural heritage collections, including equipment and data, prioritizing them in order of importance. Prioritizing the collection identifies which items must be recovered immediately after an emergency and may include valuable or extremely vulnerable items.

Insurance and funding: It is vital that institutions and their cultural contents are insured accordingly and that emergency response committees receive adequate financial resources to implement fire prevention measures.

Developing prevention, preparation, response, and recovery procedures:

- *Prevention:* Preventative procedures can eliminate or reduce the potential effects of fire on personnel, archaeological collections, and property. Reducing the likelihood of ignition, strengthening resistance against fire, and fire detection and monitoring systems are essential preventative measures that must be considered (Stovel 1998: 46), for example, using fire-retardant materials in buildings to reduce the spread of fire between spaces and buildings (Stovel 1998: 46) or ensuring electrical installations meet the appropriate regulations and standards through regular maintenance (Dorge and Jones 1999; Dargye 2003: 114).
- *Preparation:* Preparing personnel and cultural heritage collections or sites for an emergency can reduce the effects of fire damage. Preparation includes ensuring all personnel are familiar and practiced in the emergency response procedure including evacuation procedures; ensuring personnel are trained in the use of emergency equipment, e.g., fire extinguishers; ensuring emergency equipment is replenished and readily available; and ensuring emergency numbers and response/recovery team member contact details are known or easily accessible (Dorge and Jones 1999).
- *Response:* Effectively responding to an emergency can prevent injury and limit the detrimental impacts on collections and properties. Responses may vary depending on the scale of the emergency and may include contacting emergency services, turning off the power supply, extinguishing small fires, evacuating, and accounting for all personnel. It is the responsibility of the team leaders to evaluate the situation carefully, initiate the emergency response, and ensure that communication with emergency services and team members is clear and succinct (Dorge and Jones 1999).
- *Recovery:* Preparing and training staff to effectively carry out emergency recovery procedures on items that are damaged and/or may require treatment is critical, especially for items that are irreplaceable. Using the emergency priority list during the recovery process will ensure that available or vulnerable items are recovered as soon as possible (Dorge and Jones 1999).

Emergency response plans are essential to effective cultural heritage management practices, as they mitigate the potential effects of disasters. Many step-by-step manuals, such as *Risk Preparedness: A Management Manual for World Cultural Heritage and Buildings* and *an*

Emergency Plan: A Guide for Museums and Other Cultural Institutions, have been published to help organizations construct their own emergency response plans. It is important to note that in order for an emergency plan to be effective, it requires adequate funding to implement fire prevention measures. Engaging the local community to advocate disaster preparedness and emergency response plans is a good way to raise awareness about the potential risks of fire damage and to gain support for fire prevention and protection efforts.

Cross-References

- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Disaster Response Planning: Earthquakes
- ▶ Disaster Response Planning: Flood
- ▶ Disaster Response Planning: Tsunamis

References

Dargye, Y. 2003. A brief overview of fire disaster management in Bhutan. In *Proceedings from the international symposium of cultural heritage disaster preparedness and response*, ed. C. Menegazzi, 111–116. Paris: ICOM.

Dorge, V., and S.L. Jones. 1999. *Building an emergency plan: A guide for museums and other cultural institutions*. Los Angeles: Getty Conservation Institute.

Stovel, H. 1998. *Risk preparedness: A management manual for world cultural heritage*. Rome: ICCROM.

Disaster Response Planning: Flood

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Introduction

Flooding can have catastrophic impacts on property, cultural landscapes, and cultural heritage collections. Emergencies can arise from natural disasters or from incidents such as burst water pipes or leaky roofs. Flood prevention and emergency response plans have proven to reduce damage to property, cultural sites, and cultural heritage collections by implementing strategies that address prevention, preparation, response, and recovery measures. It is important to note, however, that extreme conditions may overcome well-planned emergency procedures (Stovel 1998: 75).

Definition

Flood damage is caused by the sheer force of water flow, which can lead to the dislodgment of structures and unsecured items, and the subsequent redepositing of such flood debris. Buildings and cultural heritage collections are also susceptible to moisture damage, which can lead to the weakening or disintegration of structures and artifacts (Stovel 1998: 74). Floods can also cause significant damage to infrastructure systems such as power supplies, natural gas systems, and even water supplies.

Key Issues/Current Debates/Future Directions/Examples

Recent disasters across the globe, such as the 2002 flooding of the Municipal Library of Prague which housed many of the Czech Republic's most important cultural collections, have drawn attention to the need to develop plans that can prevent flooding or reduce its impact. The entire communities can be devastated by floods (Stovel 1998: 75). For this reason, it is important to incorporate community-wide approaches to flood prevention and protection. Community members, local councils, emergency service organizations, and weather bureaus should be consulted when developing an emergency response plan.

Developing an Emergency Response Plan

Developing emergency response plans have proven to reduce the impact of flood damage to

institutions and their cultural heritage collections. Emergency response plans must comply with flood response and evacuation procedures enacted by the institution, local emergency services, and city councils. The following should be considered when developing a plan:

Establishing a team to develop and enforce an emergency response plan: Stovel (1998) recommends that the responsibility for the protection of institutions or cultural heritage collections be permanently assigned to an individual or team that can continuously review and upgrade flood protection provisions (Stovel 1998: 76). Together the team can develop an emergency response plan according to the needs of the facilities and collections and can ensure that all personnel are trained in emergency procedures. The team appoints all emergency response team leaders, who are responsible for managing the emergency response efforts during an emergency.

Conducting a risk assessment: Risk assessments are an important aspect of the emergency response plan as they identify potential flood risks pertaining to the area and areas of vulnerability within the facilities and collections in hopes to find appropriate solutions to reduce the risk of damage. It is important to recognize threats that may prevent evacuation procedures and threats that may hinder response and recovery procedures, which can increase the potential for damage.

Conducting collection inventories and establishing an emergency priority list: Once the threats have been identified, it is important to conduct an inventory of all cultural heritage collections, including equipment and data, prioritizing them in order of importance. Prioritizing the collection identifies which items must be recovered immediately after an emergency and may include valuable or extremely vulnerable items.

Insurance and funding: The importance of appropriately insuring facilities and collections cannot be understated, as insurance plays a vital role in the recovery process. It is also important that emergency response committees receive adequate financial resources to implement flood prevention measures.

Developing prevention, preparation, response, and recovery procedures: These procedures should address the following areas:

- Enhancing flood resistance
- Improving flood detection and monitoring
- Developing appropriate response methods (Stovel 1998: 76)

***Prevention*:** The key to flood preparedness and emergency response planning is identifying the potential flood risks pertaining to the area in order to develop prevention and protection strategies. Questions to consider are: Is the area prone to heavy rainfall? Are there river systems close by that present a flood risk? Have levees been constructed to protect against rising water levels? Is the area close to any major pipelines or underground water systems? Has the institution's internal plumbing been checked recently? (Williams 2004: 121).

To protect property and cultural heritage collections, precautions also need to be taken to reduce the risk of water damage and the impact of flood debris. Such precautions may include fastening furniture to prevent dislodging, storing artifacts in water-resistant containers, ensuring facilities or artifacts are not located in basements, and ensuring important items and artifacts are stored above ground level.

***Preparation*:** Preparing personnel and cultural heritage collections or sites for an emergency can reduce the effects of flood damage. Preparation includes ensuring all personnel are adequately trained and practiced in the emergency response procedure, including evacuation procedures and salvage procedures, and ensuring emergency numbers and response/recovery team member contact details are known or readily available.

Response: Response strategies are implemented during an emergency. Response strategies may include evacuation, calling emergency services, turning off electricity, water and gas supplies, arranging and placing sand bags, or removing cultural heritage collections to prevent water damage.

Recovery: Recovery strategies are implemented after the emergency event has

occurred and may include recovering unsecured items that have been dislodged and redeposited, removing cultural heritage collections, and relocating them to a safe area to begin conservation. Conservation methods may include freezing items, wet cleaning, and hanging items to dry (Ellis 2000: 119).

Flood prevention and emergency response plans mitigate the disastrous effects of flooding on property, cultural landscapes, and cultural heritage collections. It is important to establish an emergency response plan that incorporates prevention, preparation, response, and recovery strategies to reduce the likelihood of damage. Flood prevention and protection plans must adopt a community-based approach. It is vital that community members, local councils, emergency service organizations, and weather bureaus are consulted when developing a plan to ensure that all safety and legal responsibilities are fulfilled.

Cross-References

- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Disaster Response Planning: Earthquakes
- ▶ Disaster Response Planning: Fire
- ▶ Disaster Response Planning: Tsunamis

References

Ellis, S. 2000. Disaster recovery at the University of Alberta, or, every flood has a silver lining. *Journal of the American Institute for Conservation* 39: 117–126.

Stovel, H. 1998. *Risk preparedness: A management manual for world cultural heritage*. Rome: ICCROM.

Williams, E. 2004. Disaster planning for archaeological collections. *Journal of Middle Atlantic Archaeology* 20: 119–125.

Further Readings

Motoyoshi, T. 2006. Public perception of flood risk and community-based disaster preparedness. In *A better integrated management of disaster risks: Toward resilient society to emerging disaster risks in mega-Cities*,- ed. S. Ikeda, T. Fukuzono, and T. Sato, 121–134. Japan: TERRAPUB.

Disaster Response Planning: Tsunamis

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Introduction

Tsunamis are the result of a very large ocean wave caused by an underwater earthquake or volcanic eruption and are hazards that pose a great threat to life, property, and cultural heritage in coastal regions. As natural disasters cannot be prevented, emergency response plans must focus on preparation, response, and recovery measures to mitigate potential risks at a community-wide level. It is important to note that extreme conditions can overcome even well-planned emergency procedures (Stovel 1998: 75).

Definition

The impacts of tsunami can vary greatly. A small tsunami may result in unusual tides or currents that can be dangerous for swimmers and can cause damage to boats. A large tsunami can cause widespread flooding and destruction to communities and can create strong rips and currents in oceans around the world (Victoria State Emergency Service 2010). Buildings and collections become susceptible to moisture damage, which can weaken and disintegrate structures and cultural heritage. Flood debris – structures, plant life, transport vehicles, etc. that have been swept by the current – can cause serious damage and loss of life.

Key Issues/Current Debates/Future Directions/Examples

A tsunami warning will be issued by state or national emergency services once a threat has

been confirmed; this warning will outline the areas under direct threat and the actions that should be taken by the community (Victoria State Emergency Service 2010). Two categories of threat exist:

Marine environment threat: The tsunami is expected to mainly affect the marine environment for specified coastal areas. Warning of potential dangerous waves and strong ocean currents will be issued. Although major land flooding is not expected, there may be local amplification of the tsunami in some areas leading to flooding in limited low-lying coastal areas (Victoria State Emergency Service 2010).

Land inundation threat: These threats include warnings for low-lying coastal areas of major land flooding, dangerous waves, and strong ocean currents; significant over-topping of foreshore dunes and sea walls, with areas of flooding beyond the immediate foreshore; extreme danger extending beyond the water to low-lying coastal areas; probable extensive damage to ports, marina, and small boats; potential damage to buildings and infrastructure near the shore; and extremely dangerous effects in the water continuing for many hours and even days. Tsunami warnings can be canceled if the situation is reassessed as having no threat (Victoria State Emergency Service 2010).

Developing an Emergency Response Plan

The development of tsunami emergency response plans has proven to reduce the impact of tsunami damage to institutions and their cultural heritage collections. Emergency response plans must comply with regional and state tsunami response and evacuation procedures enacted by the institution, local emergency services, city councils, and in conjunction with the relevant legislation. The key aspects to developing a tsunami emergency response plan are:

Establishing a committee to develop and enforce an emergency response plan: Stovel (1998) recommends that the responsibility for the protection of institutions or cultural heritage collections should be permanently assigned to a committee who can continuously review and upgrade tsunami protection provisions (Stovel 1998: 76). Together the committee can develop a community-based emergency response plan according to the needs of the facilities and collections. Committees should consult experts to develop a plan that meets all legal and safety responsibilities and to ensure that all personnel are trained and aware of such responsibilities during an emergency. The committee appoints all emergency response team leaders, who are responsible for managing the emergency response efforts during an emergency.

Conducting a risk assessment: Risk assessments are a critical aspect of the emergency response plan as they identify the potential tsunami risks and identify high-impact zones and areas of vulnerability within facilities and collections, in the hope of finding appropriate solutions to reduce the risk of damage. It is important to recognize threats that may prevent evacuation procedures and threats that may hinder response and recovery procedures, which can increase the potential for damage. Researching the effects of past events may help determine risk areas and give some insight into the extent of the disasters.

Reduce risks to property: Reducing the risks of damage will help prevent loss or damage to property. When developing a plan, experts should provide advice on how best to protect buildings and infrastructure from tsunami damage.

Conducting collection inventories and prioritizing collections: It is necessary to conduct an inventory of all cultural heritage collections, including equipment and data, record the current condition of the item, and prioritize them in order of importance or value. This will help in the recovery process and help establish the impact the emergency has had on the collections. Establishing priorities is never a simple task, but it is necessary to identify important

collections before a disaster occurs so that they can be protected or removed safely during or after a disaster (CLRC Preservation Committee 2002).

Insurance and funding: The importance of appropriately insuring facilities and collections cannot be understated, as insurance plays a vital role in the recovery process. It is also important that emergency response committees receive adequate financial resources to implement tsunami prevention measures.

Developing preparation, response, and recovery procedures: Stovel (1998) advises that tsunami disaster planning should take the following into account:

- The probability of tsunamis occurring in the area or in nearby locations which may affect the area.
- The probability of the tsunami height and run-up (inland penetration). Maps should be produced to illustrate areas of high impact.
- The sensitivity of the region's cultural heritage to tsunami emergencies (Stovel 1998: 94).

***Preparation*:** Preparation measures are essential to preventing damage to property and cultural heritage collections. The key to tsunami preparedness and emergency response planning is identifying the potential tsunami risks in order to develop protection strategies. Questions to consider are: What is the likelihood of a tsunami event? What provisions have been out in place to reduce tsunami run-up (inland penetration)? Is the building able to withstand a tsunami event? Should cultural heritage collections be removed to a safer location until there are no further threats?

To protect property and cultural heritage collections, precautions also need to be taken to reduce the risk of water damage and the impact of flood debris. Such precautions may include fastening furniture to prevent dislodging; storing artifacts in water-resistant containers; ensuring facilities or artifacts are not located in basements or at ground level; ensuring all personnel are adequately trained and practiced in the emergency response procedure, including evacuation procedures, first aid procedures, and salvage procedures; and ensuring emergency numbers and response/recovery team member contact details are known and readily available.

***Response*:** Response strategies are implemented when the emergency occurs. Response strategies may include ensuring all personnel are accounted for and safe from injury; calling emergency services; turning off electricity, water, and gas supplies; arranging and placing sand bags; and removing cultural heritage collections to prevent water damage. Care must be taken when considering evacuation strategies. Tsunami emergency services will issue evacuations if there is a high risk of loss or damage. When developing building evacuation procedures, please contact emergency services for advice and training.

***Recovery*:** Recovery strategies are implemented after the emergency event has occurred. Immediately after a tsunami, an impact assessment should be conducted to assess the extent of loss and damage to the property and to all cultural heritage collections and to begin stabilization, repair, and rebuilding procedures. It is important to document all damage, paying particular attention to the condition of significant objects as identified in the collection inventory, the condition and stability of structural elements and foundations, and the condition of the building's systems and services. Structures should be stabilized as soon as possible to prevent further damage (Stovel 1998: 68).

Recovery procedures for collections may include recovering unsecured items that have been displaced and redeposited and removing cultural heritage collections and relocating them to a safe area to begin conservation. Conservation methods may include freezing items, wet cleaning, and hanging items to dry (Ellis 2000: 119).

Tsunamis pose a great threat to coastal regions, as they can be extremely destructive. Developing a community-based emergency response plan that emphasizes preparation, response, and recovery procedures can reduce the potential impacts of an emergency and prevent loss. Tsunami protection provisions must be regularly revised and

updated in order for plans to be effective. It is important that expert consultation is received when developing emergency response plans, to ensure that all safety and legal responsibilities are fulfilled.

Cross-References

- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Disaster Response Planning: Earthquakes
- ▶ Disaster Response Planning: Fire
- ▶ Disaster Response Planning: Flood

References

CLRC Preservation Committee. 2002. *In the face of disaster: Preparing for emergencies in Central New York. A self-planning manual for disaster prevention, response and recovery in libraries, museums, and cultural institutions of Central New York state*. New York: Central New York Library Resources Council.

Ellis, S. 2000. Disaster recovery at the University of Alberta, or, every flood has a silver lining. *Journal of the American Institute for Conservation* 39: 117–126.

Stovel, H. 1998. *Risk preparedness: A management manual for world cultural heritage*. Rome: ICCROM.

Victorian State Emergency Service. 2010. *State tsunami emergency plan*. Southbank: Victorian State Emergency Service.

Disease Introduction to America: Cultures in Crisis

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Introduction

Cross-disciplinary research has been evolving as a major approach to study the development of human culture in a global and regional context, with a central topic of complex health (physical, mental, social and cultural). In the twentieth century, the historiography's message was that European diseases were catastrophic for Native Americans from the sixteenth to the nineteenth century (e.g., Boyd 1999). This paradigm still continues to be followed by some authors (e.g., Kelton 2007), with new insights and arguments.

In contrast, a critical multidirectional approach began to dominate in early twenty-first century, to reveal a more complex and multilayered picture of evolution of the Native American population, in the context of European migrants. More attention is given to arguments based on solid facts, and on increasing of the diachronic and cross-cultural knowledge, not only of Native Americans, but also of the society as a dynamically changing culture, and on the methodology and theory of science, with proper application in the different specific fields (e.g., Verano and Ubelaker 1992; Steckel and Rose 2002; Alchon 2003; Carlos and Lewis 2011).

It should be stressed that archaeological records and research are of primary importance for the research of demography and health status of the Native Americans in the pre-contact period (e.g., Steckel and Rose 2002; Ramenofsky et al. 2003; Milner and Chaplin 2010). Today, this is considered one of the least researched segments of the complex records on the topic.

Last but not least, cultures in crisis is a theme of the complex transformation of the Native American cultures into a new multicultural context that includes transformation of values, social response, strategies and general understanding of the social life and communication between different cultures.

From resistance to acculturation, Native American history from the sixteenth to nineteenth century (see e.g., Salisbury 1982; Waldman 2009 and the section of further readings) is a mosaic of drama, hope, successful adaptation, innovation, preservation of traditions and integration with the new political system to keep the traditions and authentic ethnicity of the numerous Native American tribes.

Definition

There are two theoretical models regarding the introduction of European diseases to Native Americans: (1) As a rule, any contact of the

Native Americans with people of European descent created disaster for the Native Americans on the continent, despite the time, region and historical background (Model 1); and (2) European diseases are part of a complex system of social–cultural factors that have impacted the destiny of Native Americans, including historical background of the tribes, region, reasons for contact and the mechanism of contact (Model 2). Both models attempt to explain the diachronic change in the direction of development of original cultures; in particular, of the multicomponent health status of the native population from the perspective of the interrelation between pathogen, population and ecological–cultural context.

Historical Background

The introduction of European diseases to Native Americans is considered as one of the most striking cases of using viruses, even purposefully, for decimating Native Americans in order to decrease resistance to the European conquest of North America. It is believed, for instance, that variola virus was used in 1763 as the first known example of biological warfare, and that British forces in America had blankets contaminated with scabs from smallpox victims, and distributed them to American Indians. However, the spread of European diseases on the North American continent is not very well articulated in the literature, since there is a diachronic process of first contacts of the Native Americans with Europeans in the different parts, with different contexts, mechanisms and consequences. Also, the complex health status of the original population depended on a system of factors in which traditions dominated, while the contacts with Europeans caused adoption of innovations that gradually began to have a crucial impact on the lifestyle of native people. The historic development and increase of the impact of immigrants-colonists–created crises of native culture have to transform in the new contexts.

Within several centuries, Native American cultures had to evolve from being the only cultures on the American continent, into one category of different ethnical cultures that gradually became a minority. Additionally, the reinvention of slavery complicated the cultural and demographic problems in Native American communities, which obviously felt stronger keeping themselves in isolation from the new European culture environment, although they lived at risk of being treated as an inferior component of multicultural America. Then, Native Americans experienced a critical cultural situation that prevented the development of a network of relationships and strategies of preventive health that would have saved many communities in the eighteenth and nineteenth centuries from European diseases, which began to demographically damage some tribal groups in the 1600s. Most devastating was smallpox disease. Similarly to Eurasia and South America, successful preventive health strategies were missing, and this resulted in a series of deadly epidemics (Boyd 1999; Robertson 2001; Hackett 2002; Halverson 2007; Kelton 2007; Agnew 2010; Hodge 2010; Riley 2010; Carlos and Lewis 2011) that were not prevented, although by the late seventeenth century, Native Americans recognized that the cause of disease was contact with Europeans.

The smallpox epidemic of 1781–1782 in the Hudson Bay region caused mortality of at least 50% of the population. Four major epidemics in the Northwest (1781–1782, 1836–1837, 1852–1853 and 1862) were recorded by James Mooney. R. Boyd (1999) added a fifth epidemic to these statistics (1801–1802), as well as a possible outbreak in the winter of 1824–1825.

A smallpox epidemic killed off almost half the Pawnee tribe in 1831. Six years later, stolen blankets from a steamboat caused a severe epidemic among the Indians of the Great Plain.

Beyond smallpox, European diseases carried by traders and colonizers included influenza, measles, whooping cough, etc.

Between the sixteenth and eighteenth centuries, Native Americans used treatments that were unsuccessful for infectious diseases, similar to the rest of the world. They believed, as professionals did, that noxious air caused the disaster, and they tried to reduce contact with it, together with treating the patient with cool water, quarantining, burning infected sites and rituals (e.g., Smallpox Dance) in attempts to decrease the mortality rate.

Key Issues and Current Debates

The current key issue is reevaluating the different components of the controversial cultural processes of interrelation between Europeans and Native Americans from the end of fifteenth century through the nineteenth century that support or contradict the two theoretical models listed above.

It is a problem to estimate the size of the population in pre-contact America and compare it with data from before the first Censuses, which give low figures for Native Americans. The demography of both periods – pre-colonization and early colonization – is based on hypotheses with challenging data. Milner and Chaplin (2010) suggest a population range of 1.2 million to 6.1 million for the eastern half of North America just prior to contact. They used the spatial distribution of archaeological remains to generate and site densities and regional population. Boyd believes that the Northwest population decreased from 180,000 to 40,000–35,000 in the later 1700s to late 1800, after beginning contact with people of Euro-American descent. He describes a dramatic picture: "After a century of Euro-American contact . . . these cultures were shattered: populations had plummeted, some groups had become extinct, and others were shadows of their former selves" (Boyd 1999: 3) (cf. Jones and DeWitte 2012).

There are a few diachronic and cross-cultural issues: prior to contact, how did Native Americans react to epidemics and diseases on the continent that were known to be carried by potential disease vectors, such as lice and anopheline mosquitoes? How was the knowledge about the smallpox disease distributed between the Native Americans from the first years of European presence on the continent until the later eighteenth century, when devastating epidemics were documented? How was preventative health information communicated among the Native Americans?

Model 1 (Monofactor Model): Conflicting Arguments

The evaluation of the impact of diseases brought by the first Europeans and their animals on Native Americans is considered as crucial issue for drawing conclusions with regard to the role of Europeans on Native American population destiny on the North American continent. The focus is especially on wide spread epidemics (with high mortality rate), although the general health status of individuals is also of interest, due to the complex understanding of health and the role of the changing environment of the lives of people. The data have been considered as a basis for the widely distributed conclusion that infectious European diseases caused the greatest loss of Native American population after contact began.

This widely distributed thesis has two main pitfalls: (1) The record base for demographic statistical conclusions is fragmented and incomplete. (2) The history of Native American tribes during the sixteenth to nineteenth centuries developed a context of population decreasing below one million.

Model 2 (Multifactor Model): Problems

The complexity of historical processes that caused the graduate decrease of Native American population from the sixteenth to nineteenth century becomes the main model of explanation for understanding their culture and destiny before and after the beginning of contact with European colonizers and Americans of European descent. Infectious diseases were just one of many factors with dynamic interrelations and impacts on demography and cultural destiny; others include changing style of life, including declining birth rate, wars (with Europeans/Americans of European descent and inter-tribe) and massacres; emigration to Canada and Mexico; acculturation/assimilation, including conversions to Christianity; slavery; malnutrition; alcoholism; etc. The economic background was destruction of the traditional subsistence systems, together with political disruption in the context of gradually increasing influence by the newly arrived cultural values. The role of this last factor varies by regions and time.

To draw sound conclusions, more research is needed to analyze the interrelations of different factors that impacted the cultural processes in the sixteenth to nineteenth centuries within Native American tribes, as well as to compare the regional characteristics and peculiarities.

Important facts within the debate are the long period of searching for a cure from smallpox in Eurasia. It was not until the discovery of vaccine by Edward Jenner (1749–1823) in 1796 that Europe began to free itself of the deadly disease. Then, when smallpox reached America in the seventeenth and eighteenth centuries, it was still a danger for Eurasia, despite of the knowledge of variolation, which had limited results and also caused fatalities. Also, the deadly epidemics in the Northwest from 1770 to the 1780s were extensions of the epidemics in the American army and in cities like Boston. In other words, the usual measures were taken against smallpox (quarantine and inoculation were known on the American continent), although, as in Eurasia and Mexico, they were not very effective until the discovery of vaccinating.

DNA analyses of pre-contact skeletons include natural selection in response to the smallpox epidemics as one of the possible reasons for the reduced genetic diversity in extant Native Americans, together with the role of the founder effect and a genetic drift associated with the historical population decline (Halverson and Bolnik 2008).

International Perspectives

The topic of introduction of European diseases to America is both global and regional, since it studies the interaction between distant-by-origin cultures as a complex phenomenon and regional variability. In particular, the global perspectives of European–Native American interactions in the sixteenth to nineteenth centuries include cultural comparative analyses of typologically similar case studies (Alchon 2003).

The issue of the role of European diseases for decreasing of the population of Native Americans is really essential for scientific conclusions, since the size of population is of primary importance for the way compact groups would react to the invaders. In other words, was it possible for the Native Americans to be a predominant population in North America if they had vaccine against European diseases? A current, more detailed research of the evidence (see e.g., Carlos and Lewis 2011), and the theoretical consideration of the generally small density of the population in North America before Europeans discovered the continent, both allow us to infer that it was impossible for Native Americans to become the dominant ethnical component. However, preservation of the Native American culture by creating zones of monocultures on one side, and gradual development of the ideology of American multicultural society both have been stimulating reproduction of Native American cultural traditions. This unique co-existence and the unique interaction between the politics of monoculturalism (reservations) and multiculturalism (usually urban environment) is an extraordinary American experience that calls for international attention as a case study of how culture has been developing and evolving as a rich multi-culture by segmentation and reintegration of core cultures.

Future Directions

The future direction of research of the problem of impact of European disease on Native American cultures should be a more detailed examination of the evidence, and reevaluation of this impact regionally and as a whole on Native American culture and demography. It is also possible to obtain new scholarly results by complex comparisons with other similar historical situations, such as the compact European migration and colonization of Latin America and Australia, for instance, or the way the Balkan population responded to the Turkish occupation of the Balkan Peninsula in the fifteenth century. The advance of research on specific topics, such as health as a social, cultural and religious problem in Native American culture in the pre-contact period, may also influence the conclusions for later periods.

It is important to apply the most current research on infectious disease in Eurasia and the Americas in the sixteenth to nineteenth centuries, which indicates that Native had similar problems to the Americans and the majority of the global community. In other words, not until the end of eighteenth century when the real causes of infectious diseases were discovered was the world able to adequately response to the spread of viruses diseases including

smallpox. A search for new possible diseases that might have impacted Native Americans, especially in the early contact period in the seventeenth century (e.g., Marr and Cathey 2010), would probably result in important updates.

There are specific historical problems regarding the distribution of infectious diseases among the Native Americans. For instance, it is still unclear whether smallpox was distributed to the West Coast by the Shoshones following native trade networks down the Columbia River to the sea, or the pox arrived by sea, carried by Spanish voyages cruises.

Increasing the archaeological research of available pre-contact and early contact osteological data from burials (Jackes 1983) may help to specify some of the issues regarding the general health status of population, and how the demography changed as a result of diseases, changing diet and possible malnutrition.

During the nineteenth century, a system of preventative health was gradually developed from measures in both Eurasia and North America (Nikolova 2012) that resulted in the population's improved health status; this included Native Americans on the reservations and in the cities.

Cross-References

▶ North America (USA): Historical Archaeology
▶ Paleoindians

References

Agnew, J. 2010. *Medicine in the Old West: A history, 1850–1900*. Jefferson: McFarland & Company Inc.

Alchon, S.A. 2003. *A pest in the land: New World epidemics in global perspective*. Albuquerque: University of New Mexico Press.

Boyd, R.T. 1999. *The coming of the spirit of pestilence: Introduced infectious diseases and population decline among Northwest Coast Indians, 1774–1874*. Seattle: University of Washington Press.

Carlos, A.M., and F.D. Lewis. 2011. Mortality from smallpox: The 1780s epidemic in the Hudson Bay region. *Explorations in Economic History* 49: 277–290.

Hackett, P. 2002. *A very remarkable sickness: Epidemics in the Petit Nord, 1670–1846*. Winnipeg: University of Manitoba.

Halverson, M.S. 2007. Native American beliefs and medical treatments during the smallpox epidemics: An evolution. *Early American Review 7*. Available at http://www.earlyamerica.com/. Accessed 21 Jan 2013.

Halverson, M.S., and D.A. Bolnik. 2008. An ancient DNA test of a founder effect in Native American ABO blood group frequencies. *American Journal of Physical Anthropology* 137: 342–347.

Hodge, A.R. 2010. Pestilence and power: The smallpox epidemic of 1780–1782 and intertribal relations on the Northern Great Plains. *The Historian* 72: 543–567.

Jackes, M.K. 1983. Osteological evidence for smallpox: A possible case from seventeenth-century Ontario. *American Journal of Physical Anthropology* 60: 75–81.

Jones, E.E., and S.N. DeWitte. 2012. Using spatial analysis to estimate depopulation for Native American populations in northeastern North America, AD 1616–1645. *Journal of Anthropological Archaeology* 31: 83–92.

Kelton, P. 2007. *Epidemics and enslavement: Biological catastrophe in the Native Southeast, 1492–1715*. Lincoln: University of Nebraska Press.

Marr, J.S., and J.T. Cathey. 2010. New hypothesis for cause of epidemic among Native Americans, New England, 1616–1619. *Emerging Infectious Diseases* 16: 281–286.

Milner, G.R., and G. Chaplin. 2010. Eastern North American population at CA.A.D.1500. *American Antiquity* 75: 707–726.

Nikolova, L. 2012. History of consumption and waste, U.S., 1850–1900. In *Encyclopedia of consumption and waste: The social science of garbage*, ed. C. Zimring and W. Rathje, 359–362. Thousand Oak: Sage.

Ramenofsky, A., A.K. Wilbur, and A.C. Stone. 2003. Native American disease history: Past, present and future directions. *World Archaeology* 35: 241–257.

Riley, J. 2010. Smallpox and American Indians revisited. *Journal of the History of Medicine and Allied Sciences* 65: 445–477.

Robertson, R.G. 2001. *Rotting face smallpox and the American Indian*. New York: Caxton.

Salisbury, N. 1982. *Manitou and providence: Indians, Europeans, and the making of New England, 1500–1643*. New York: Oxford University Press.

Steckel, R.H., and J.C. Rose, eds. 2002. *The backbone of history: Health and nutrition in the western hemisphere*. Cambridge: Cambridge University Press.

Verano, J., and D. Ubelaker, eds. 1992. *Disease and demography in the Americas*. Washington: Smithsonian Institution Press.

Waldman, C. 2009. *Atlas of the North American Indian*. New York: Checkmark Books.

Further Reading

Arnold, M.S. 2000. *The rumble of a distant drum: The Quapaw and the Old World newcomers, 1673–1804*. Fayetteville: University of Arkansas Press.

D

Bliss, E.F., ed. 1972. *Diary of David Zeisberger: A Moravian missionary among the Indians of Ohio*. St. Clair Shores: Scholarly Press.
Buckland, J.A. 2002. *The Wiechquaeskeck Indians of southwestern Connecticut in the seventeenth century*. Bowie: Heritage Books.
Butler, M. 1939. *Three archaeological sites in Somerset County, Pennsylvania*. Harrisburg: Commonwealth of Pennsylvania.
Coates, K.S. 1991. *Best left as Indians: Native-White relations in the Yukon Territory, 1840–1973*. Montreal: McGill-Queen's University Press.
Crosby, A.W. 1976. Virgin soil epidemics as a factor in the aboriginal population in America. *The William and Mary Quarterly* 33: 289–299.
de Smet, P.-J. 1969. *Life, letters, and travels of Father Pierre-Jean De Smet, S. J., 1801–1873*. Edited by H.M. Chittenden and A.T. Richardson. New York: Kraus Reprint.
Decker, J.F. 1991. Depopulation of the Northern Plains Natives. *Social Science and Medicine* 33: 381–393.
Dixon, M.C. 1983. *These were the Utes: Their lifestyles, wars and legends: A collection of historical and biographical tales of the Ute Indians of central Utah*. Provo: Press Publishing Limited.
Duffy, J. 1953. *Epidemics in colonial North America*. Baton Rouge: Louisiana State University Press.
Espinosa, J.M. 1988. *The Pueblo Indian revolt of 1696 and the Franciscan missions in New Mexico: Letters of the missionaries and related documents*. Norman: University of Oklahoma Press.
Fenn, E.A. 2001. *Pox Americana: The great smallpox epidemic of 1775–82*. New York: Hill and Wang.
Grindle, D. 1977. *The Iroquois and the founding of the American nation*. San Francisco: Indian Historian Press.
Heard, J.N. 1987. *Handbook of the American frontier: Four centuries of Indian-White relationships*. Metuchen: Scarecrow Press.
Hutchinson, D.L., and J.M. Mitchem. 2001. Correlates of contact: Epidemic disease in archaeological context. *Historical Archaeology* 35: 58–72.
Kraft, H.C. 1986. *The Lenape: Archaeology, history, and ethnography*. Newark: New Jersey Historical Society.
Larsen, C.S. 1991. *Native American demography in the Spanish borderlands*. New York: Garland Pub.
Milburn, M.P. 2004. Indigenous nutrition. Using traditional food knowledge to solve contemporary health problems. *American Indian Quarterly* 28: 414–434.
Milloy, J.S. 1988. *The Plains Cree: Trade, diplomacy, and war, 1790 to 1870*. Winnipeg: University of Manitoba Press.
Murphy, P.L. 1986. Fifty years with the Kiowa Indians, 1850–1900. Photocopy of typewritten transcript of unpublished manuscript by Hugh D. Corwin, written about 1962. Cover title: Fifty years with the Kiowas.
Rogers, M.E. 1986. *A brief history of the Cherokees, 1540–1906*. Baltimore: Gateway Press.
Sabo, G., III. 1992. *Paths of our children: Historic Indians of Arkansas*. Fayetteville: Arkansas Archeological Survey.
Silvers, M., and M. Steptoe. 2001. Immunizations – historical overview of vaccines. *Primary Care Clinics in Office Practice* 28: 685–695.
Thornton, R. 1987. *American Indian holocaust and survival: A population history since 1492*. Norman: University of Oklahoma Press.
Warrick, G. 2008. *A population history of the Huron-Petun, A.D. 500–1650*. Cambridge: Cambridge University Press.

Dmanisi Hominins and Archaeology

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Introduction

Perched atop a forested promontory, in the foothills of the Caucasus Mountains in the Republic of Georgia, lies the paleolithic site of Dmanisi. The 1.8 Ma fossil site lies buried beneath the ruins of a medieval city, overlooking the modern farming village of Patara Dmanisi. Archaeological excavations at the medieval site serendipitously unearthed the first fossils, opening the site to paleontological excavation beginning in 1983 and the first archaeological discoveries in 1984. Dmanisi rose to prominence with hominin fossil discoveries in the 1990s and 2000s, becoming one of the richest sites for early *Homo erectus*.

The Dmanisi hominins (Fig. 1) are among the oldest specimens of *Homo erectus* yet recovered, contemporary with the oldest material from Africa. Stone tools (Fig. 2) there have been found in sediments directly overlying the Mashavera basalt, dated by argon-argon methods to 1.85 Ma; the fossil material and other lithics have been recovered from a subsequent layer dated to c. 1.77 Ma (Ferring et al. 2011).

Dmanisi Hominins and Archaeology, Fig. 1 The skeletal remains of several individuals were discovered at Dmanisi including (**a**) the subadult skull D2700 and (**b**) mandibles of large individuals (on the *left*, D2600) and much smaller (on the *right*, D211) individuals

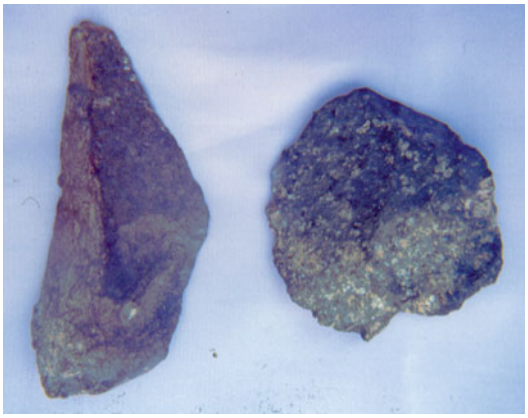

Dmanisi Hominins and Archaeology, Fig. 2 The stone tool assemblages at the site are similar in technology to so-called Mode 1 assemblages such as those from Olduvai Gorge, Tanzania

Key Issues/Current Debates/Future Directions/Examples

The Hominins, Site, and Behavior

The Dmanisi hominins are notable for their small size and primitive features. Four complete or largely complete crania have been published, three with associated mandibles. Cranial capacities are low, between 600 and 775 cc (Gabunia et al. 2000a; Vekua et al. 2002; Lordkipanidze et al. 2007). The face is as prognathic as Asian *Homo erectus* and evinces a strong nasal pillar and short nasal clivus. Other cranial traits are less pronounced; given the small size of the crania, the supraorbital tori are relatively small for *H. erectus*, and the occiput is more rounded and lacks a strong transverse torus (Rightmire et al. 2006). Other aspects of the cranium, including their shape in posterior (heptangular) and side (angular and elongated) view, the presence of cranial superstructures and parietal deflation, and specifics of cranial base architecture, place the Dmanisi material firmly within *Homo erectus* in both metric and nonmetric analyses (Rightmire et al. 2006; Baab 2008). Similarly, the dental morphology shows a mixture of primitive traits typically found in *Homo habilis* and earlier hominins with derived features typical of *Homo erectus* (Martinón-Torres et al. 2008). Of the four mandibles published to date, one is considerably larger than the others, suggesting a degree of sexual dimorphism similar to that of *Australopithecus* (Skinner et al. 2006), which is not atypical of *H. erectus* (Antón and Snodgrass 2012). While inclusion of the fossils in *H. erectus* seems likely, a separate species, *H. georgicus*, has been proposed as well (Gabunia et al. 2002).

Two partial skeletons and other postcranial remains indicate that the Dmanisi hominins were small in stature but functionally similar to later hominins (Lordkipanidze et al. 2007; Pontzer et al. 2010). Body mass is estimated at 40–50 kg and stature at 145–166 cm. The ratios of femur to humerus length, and hind limb length to body

mass, both fall within the range of *Homo sapiens*, and Dmanisi metatarsal morphology suggests the presence of a stiff plantar arch. These traits, and the presence of a humanlike talus, suggest that the hind limb mechanics and terrestrial locomotion of Dmanisi hominins were functionally similar to those of modern humans (Pontzer et al. 2010). Nonetheless, the shoulder exhibits a lack of humeral torsion and a cranially oriented glenoid fossa similar to australopiths and also KNM-WT 15000 (Larson 2009), and the lack of tibial torsion and pattern of metatarsal robusticity are also primitive.

The wealth of lithic and fossil material, including a large and diverse faunal and paleobotanical assemblage, makes it possible to begin reconstructing the ecology of the Dmanisi hominins. At the time of occupation, the site was near a lake shore that formed when the Masavera lava flow dammed the Masavera and Pinasaouri rivers. The Villafranchian fauna at the site includes several large carnivores, bovids, an equid, and other open steppe and gallery forest taxa (Gabunia et al. 2000b). Dmanisi stone tools were relatively simple cores and flakes, similar to contemporary Mode 1 from Olduvai Gorge (Ferring et al. 2011). While primitive, these tools helped make the Dmanisi hominins formidable competitors; cut marks on herbivore long bones indicate that the Dmanisi hominins were gaining early access to large game, either through hunting or power scavenging (Lordkipanidze et al. 2007). Microwear analysis of the Dmanisi dentition suggests their diet was broad, unlike that of *H. habilis* and as seen in later *Homo erectus* specimens (Pontzer et al. 2011).

The position of Dmanisi hominins within the expansion and dispersal of *Homo erectus* has been a focus of debate ever since their discovery. Given the antiquity of *Homo erectus* material from East Africa, it has generally been accepted that the species evolved there (likely from *Homo habilis*) before expanding its range across Eurasia. From this perspective, the Dmanisi hominins represent an early wave of migration, and their primitive features reflect their age as well as adaptation to their local environment (Antón 2003). An alternative hypothesis has emerged more recently, suggesting that *Homo erectus* evolved in Eurasia and expanded throughout Asia as well as (back) into Africa (Lordkipanidze et al. 2007; Martinón-Torres et al. 2008; Ferring et al. 2011). While this interpretation implies an earlier – and currently undocumented – hominin expansion from Africa into Eurasia, it is consistent with the primitive features and relative antiquity of the Dmanisi material. Additional material from older sediments in Eurasia and Africa will be needed to improve the resolution of hominin evolution and dispersal in the early Pleistocene.

Cross-References

► *Homo erectus*
► *Homo ergaster*

References

Antón, S.C. 2003. Natural history of *Homo erectus*. *American Journal of Physical Anthropology* S37: 126–170.

Antón, S.C. 2012. Early *Homo*: Who, when and where. *Current Anthropology* 53 (S6): S278–S298.

Antón, S.C., and J.J. Snodgrass. 2012. Origin and evolution of *Homo*: New perspectives. *Current Anthropology* 53 (S6): S479–S496.

Baab, K.L. 2008. The taxonomic implications of cranial shape variation in *Homo erectus*. *Journal of Human Evolution* 54: 827–847.

Ferring, R., O. Oms, J. Agustí, F. Berna, M. Nioradze, T. Shelia, M. Tappen, A. Vekua, D. Zhvania, and D. Lordkipanidze. 2011. Earliest human occupations at Dmanisi (Georgian Caucasus) dated to 1.85–1.78 Ma. *Proceedings of the National Academy of Sciences USA* 108: 10432–10436.

Gabunia, L., A. Vekua, D. Lordkipanidze, C.C. Swisher III, R. Ferring, A. Justus, M. Nioradze, M. Tvalchrelidze, S.C. Antón, G. Bosinski, O. Jöris, M.-A. Lumley, G. Majsuradze, and A. Mouskhelishvili. 2000a. Earliest Pleistocene hominid cranial remains from Dmanisi, Republic of Georgia: Taxonomy, geological setting, and age. *Science* 288: 1019–1025.

Gabunia, L., A. Vekua, and D. Lordkipanidze. 2000b. The environmental contexts of early human occupation of Georgia (Transcaucasia). *Journal of Human Evolution* 38: 785–802.

Gabunia, L., M.-A. de Lumley, A. Vekua, D. Lordkipanidze, and H. de Lumley. 2002. Découverte d'un nouvel hominidé à Dmanissi (Transcaucasie, Géorgie). *Comptes Rendus Palevol* 1: 243–253.

Larson, S.G. 2009. Evolution of the hominin shoulder: Early Homo. In *The first humans: Origin and early evolution of the genus Homo*, ed. F.E. Grine, J.G. Fleagle, and R.E. Leakey, 65–75. Dordrecht: Springer.

Lordkipanidze, D., T. Jashashvili, A. Vekua, M.S. Ponce de León, C.P. Zollikofer, G.P. Rightmire, H. Pontzer, R. Ferring, O. Oms, M. Tappen, M. Bukhsianidze, J. Agusti, R. Kahlke, G. Kiladze, B. Martinez-Navarro, A. Mouskhelishvili, M. Nioradze, and L. Rook. 2007. Postcranial evidence from early *Homo* from Dmanisi, Georgia. *Nature* 449: 305–310. https://doi.org/10.1038/nature06134.

Martinón-Torres, M., J.M. Bermúdez de Castro, A. Gómez-Robles, A. Margvelashvili, L. Prado, D. Lordkipanidze, and A. Vekua. 2008. Dental remains from Dmanisi (Republic of Georgia): Morphological analysis and comparative study. *Journal of Human Evolution* 55: 249–273.

Pontzer, H., C. Rolian, G.P. Rightmire, T. Jashashvili, M.S. Ponce de León, D. Lordkipanidze, and C.P. Zollikofer. 2010. Locomotor anatomy and biomechanics of the Dmanisi hominins. *Journal of Human Evolution* 58: 492–504.

Pontzer, H., J.R. Scott, D. Lordkipanidze, and P.S. Ungar. 2011. Dental microwear texture analysis and diet in the Dmanisi hominins. *Journal of Human Evolution* 61: 83–87.

Rightmire, G.P., D. Lordkipanidze, and A. Vekua. 2006. Anatomical descriptions, comparative studies and evolutionary significance of the hominin skulls from Dmanisi, Republic of Georgia. *Journal of Human Evolution* 50: 115–141.

Skinner, M.M., A.D. Gordon, and N.J. Collard. 2006. Mandibular size and shape variation in the hominins at Dmanisi, Republic of Georgia. *Journal of Human Evolution* 51: 36–49.

Vekua, A., D. Lordkipanidze, G.P. Rightmire, J. Agusti, R. Ferring, G. Maisuradze, A. Mouskhelishvili, M. Nioradze, M.P. De Leon, M. Tappen, M. Tvalchrelidze, and C.P. Zollikofer. 2002. A new skull of early *Homo* from Dmanisi, Georgia. *Science* 297: 85–89.

Further Reading

Lordkipanidze, D., A. Vekua, R. Ferring, G.P. Rightmire, J. Agusti, G. Kiladze, A. Mouskhelishvili, M. Nioradze, M.S. Ponce de León, M. Tappen, and C.P. Zollikofer. 2005. Anthropology: The earliest toothless hominin skull. *Nature* 434: 717–718.

Lordkipanidze, D., A. Vekua, R. Ferring, G.P. Rightmire, C.P. Zollikofer, M.S. Ponce de León, J. Agusti, G. Kiladze, A. Mouskhelishvili, M. Nioradze, and M. Tappen. 2006. A fourth hominin skull from Dmanisi, Georgia. *The Anatomical Record* 288: 1146–1157.

Rightmire, G.P., A.P. Van Arsdale, and D. Lordkipanidze. 2008. Variation in the mandibles from Dmanisi, Georgia. *Journal of Human Evolution* 54: 904–908.

DNA and Skeletal Analysis in Bioarchaeology and Human Osteology

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Introduction

Molecular analysis of skeletal material became possible in the mid-1990s with the advent of sensitive molecular techniques that allowed just a few molecules to be analyzed. Since this time the use of genetic analysis to address problems in forensic, archaeological, and evolutionary contexts, all of which rely on genetic material that is preserved in skeletal material, has burgeoned. The questions that can be addressed using molecular genetics depend on the context: in forensic analysis the primary interest is usually the identification of the human remains. In archaeological studies, several aspects may lend themselves to genetic analysis, such as kinship analysis when a population of potentially related remains have been recovered, establishing the sex of skeletal remains, and species identification. Many evolutionary questions have also been addressed using molecular techniques: in some cases by direct analysis of skeletal material and at other times by looking at extant populations.

Definition

For the purpose of this entry, bioarchaeology is taken to be the study of human remains, although much of what applies to human remains can also apply to animal and plant material. Whether samples are being studied to address forensic, archaeological, or anthropological questions may influence the choice of DNA marker to analyze and the methodology employed to evaluate the data. The term ancient DNA (aDNA) is often used to describe these samples, regardless of their actual age as they typically share the quality

of having a small amount of degraded and sometimes chemically modified DNA.

Key Issues/Current Debates/Future Directions/Examples

Persistence of DNA

It has been demonstrated through numerous independent research projects that DNA can be preserved for tens of thousands of years in certain environments. DNA has been preserved in different types of biological material such as skin, hair, feathers, and coprolites; however, hard tissues are the most common source of aDNA, acting as a harbor for DNA as the soft tissues decompose. The physical properties of bones and teeth offer some protection to the DNA from the activity of microorganisms, and apatite, hydroxyapatite, and collagen may stabilize the DNA, protecting it from the effects of degrading enzymes (Lindahl 1993). The environment plays a critical role in slowing down the rate of DNA degradation – material recovered from cold, dry, oxygen-poor environments holds the greatest probability of yielding endogenous DNA, with cold temperatures the most important variable in DNA preservation (Smith et al. 2003). Even under optimum conditions, there are limits to the survival of DNA with the upper limits in the tens rather than hundreds of thousands of years (Lindahl 1993).

Methodology for the Analysis of aDNA

The process of undertaking genetic analysis on skeletal material is similar regardless of the application. Following recovery and cleaning of the material, a portion of the sample is removed and powdered – typically by grinding under liquid nitrogen. DNA is then extracted from the sample using one of several established methods, often phenol chloroform or silica based (Rohland and Hofreiter 2007). Chemical inhibitors, such as humic acids that are often co-extracted with the DNA, also present a challenge as these can prevent further analysis.

There are several milestones that mark the evolution of molecular biology, but from a forensic/archaeological viewpoint, the critical advance was the development of the polymerase chain reaction (PCR) in 1983. This allowed targeted regions of DNA to be amplified using a cyclic enzymatic process where, in principle, one starting molecule can be amplified over one billion-fold using 32 cycles of amplification. In practice this translates to the potential to analyze DNA starting with as few as 10–20 starting (template) molecules. The sensitivity of the PCR is critical as the amount of aDNA recovered is typically very small and highly degraded.

Following amplification the target DNA is typically either analyzed to determine the length of the amplified fragment (i.e., when looking at length polymorphisms) or sequenced to determine the base-by-base composition of a region of DNA (Fig. 1). To date most sequencing has utilized Sanger sequencing; however, developments in sequencing technology, referred to as next-generation sequencing (NGS), offer an alternative approach that can potentially unlock the information contained in the whole genome and allow new problems to be addressed in bioarchaeology (Shendure and Hanlee 2008).

The genetic data, once collected, need to be evaluated, and the approach taken depends very much on the problem being considered. In some cases, such as sex determination, the process of evaluation is relatively straightforward, whereas with other types of data, complex statistical or/and phylogenetic methods may be required.

Authentication of aDNA

The sensitivity of PCR, as well as its greatest asset, is also its biggest limitation as the process does not distinguish between endogenous and exogenous (i.e., contaminating) DNA – indeed, chemical modifications such as the spontaneous loss of bases and base modification through hydrolysis and oxidation make endogenous DNA more difficult to amplify than contaminating exogenous DNA (which is usually from a contemporary source). Before the potential for contamination with exogenous DNA was fully understood, several reports published in high-impact journals erroneously claimed to have isolated DNA from specimens that were millions of years old, most infamously from a Cretaceous

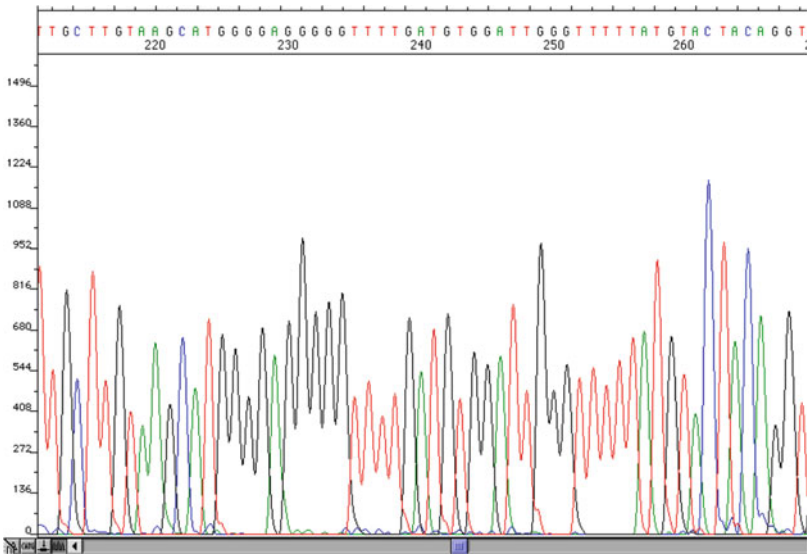

DNA and Skeletal Analysis in Bioarchaeology and Human Osteology, Fig. 1 Sequence data from mtDNA generated by Sanger sequencing. The sequencing software interprets the sequence data and "calls" the bases; this information is provided above the sequencing peaks. (Amended from Goodwin et al. 2011)

dinosaur. The contamination issue undermined the credibility of aDNA studies for several years, and establishing stringent criteria for the authentication of aDNA became of paramount importance; these included measures such as using clean rooms that are dedicated to aDNA work and, where possible, duplicating the analysis in separate facilities (Cooper and Poinar 2000; Green et al. 2009). Even following stringent anti-contamination procedures does not remove the possibility of introducing exogenous DNA – the problem was again highlighted in 2005 when two studies that were attempting to sequence a Neandertal genome produced inconsistent results even though the same bone sample was used. The differences were attributed to contamination during analysis after the initial extraction and highlighted the requirement for rigorous analysis of genetic data to assess for possible contamination (Green et al. 2009).

Genetic Polymorphisms

A species' genome can be defined as the full haploid complement of DNA; in humans it comprises approximately 3.1 billion base pairs. The variability between individuals is also part of the description of the species' genome. The vast majority of a cell's DNA resides in the nuclear genome (the DNA that is located in the nucleus); however, eukaryotes also contain extranuclear DNA in their mitochondria. While this is proportionally very small (the mitochondrial DNA (mtDNA) of humans is just over 16.5 thousand base pairs compared to the 3.1 billion base pairs in the nuclear genome), there are three features of mtDNA that make it valuable when analyzing highly degraded DNA: the mtDNA genome is present in multiple copies, with cells having thousands of copies in contrast to nuclear DNA, which in animals is diploid (two copies); the mtDNA is haploid in nature, and while there are multiple copies, they are, in most cases, identical; and the rate of mutation of mtDNA in specific regions is much higher than in the nuclear genome, which leads to higher levels of diversity between populations.

All species contain a large number of variable sites (polymorphisms) within their genome. Not surprisingly humans are the best studied eukaryote species, with the full genome being decoded by 2001, and since then 100s of genomes are being sequenced (The 1000 Genomes Project Consortium 2010), allowing millions of polymorphisms to be identified and characterized. There are several different classes of polymorphism – in forensic and archaeology/anthropology studies, the most commonly utilized polymorphisms are single nucleotide polymorphisms (SNPs) and short tandem repeats (STRs). SNPs are caused by variation in the sequence of DNA (Fig. 2)

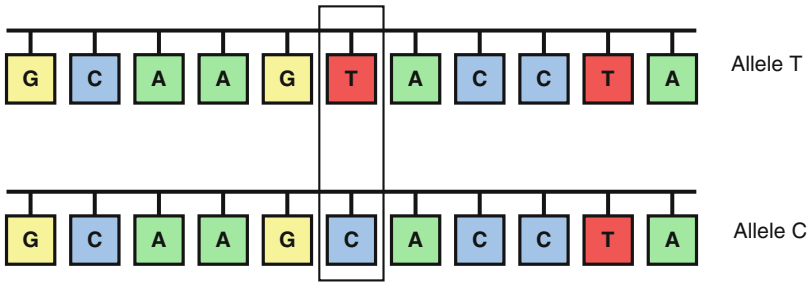

DNA and Skeletal Analysis in Bioarchaeology and Human Osteology, Fig. 2 Structure of single nucleotide polymorphisms (SNPs). SNPs are created when the DNA replication enzymes make a mistake as they copy the cell's DNA in the germ line cells. The enzyme incorporates the wrong nucleotide approximately once every 10^8 bases. In the vast majority of cases, SNPs are biallelic (having only two different alleles). In the example shown above, the thymine nucleotide (T) has been replaced by a cytosine (C). (Amended from Goodwin et al. 2011)

and account for around 85% of the variability between individuals; less common but more variable on a marker-by-marker basis are STRs, which are a class of tandem repeats, with variable numbers of blocks of sequence repeated. Until recently analysis of SNPs was limited to those contained within the mtDNA where a series of SNP polymorphisms are concentrated in hypervariable regions (Fig. 3). However, with the advent of next-generation sequencing, aDNA studies can now access genome-wide SNP polymorphisms from aDNA, opening up new possibilities for the application of aDNA analysis.

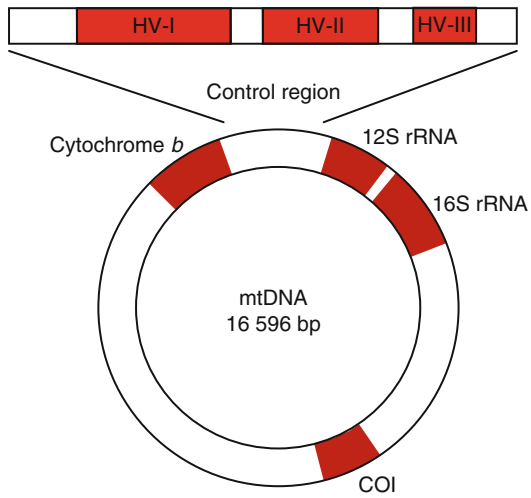

DNA and Skeletal Analysis in Bioarchaeology and Human Osteology, Fig. 3 Schematic representation of the mitochondrial genome. The human mitochondrial genome is circular and approximately 16,569 bp long. It encodes for 13 proteins, 22 transfer RNAs, and two ribosomal RNAs. The polymorphic hypervariable regions I, II, and III (HVI, HVII, and HVIII) are located within the control region. Other regions of the genome that are utilized in forensic casework for species identification are the coding regions for cytochrome *c* oxidase 1 (*COI*) 12S and 16S ribosomal RNAs and cytochrome *b*. (Amended from Goodwin et al. 2011)

Applications

The examples selected to illustrate the possibilities of aDNA studies are drawn from both contemporary (relatively speaking) forensic cases to the molecular analysis of ancient hominins and pathogens.

Forensic Genetics

Molecular genetics is used in forensic casework involving skeletal remains primarily for the purpose of establishing the identification of the human remains, although there are cases where skeletal remains of known individuals are used to assist in kinship cases, typically involving inheritance claims. The first DNA profile that could be used in forensic casework was generated by Alec Jeffreys in 1984. However, early methodology did not incorporate PCR and so was limited in its sensitivity and so was not very useful for the identification of skeletal material; it was not until 1991 that the first successful identification of skeletal material was reported.

As DNA technology has been adopted worldwide, it has been applied to more cases involving human identification, ranging from the

identification of individual bodies to large-scale identification projects following transport disasters, such as airplane crashes (that can result in thousands of fragmented remains from hundreds of individuals), to the identification of thousands of people following conflict and natural disasters. Large-scale projects that stand out as exemplars include forensic genetics contribution to the identification of over 1,600 victims of the 2001 World Trade Center attack in New York (Budimlija et al. 2003) and the identification of victims of conflict in the Balkans (1995–1999), where over 15,000 individuals have been identified through a DNA-led approach established by the International Commission on Missing Persons (ICMP) (Huffine et al. 2001). DNA analysis has also been used extensively to identify victims of the South Pacific tsunami of 2004, particularly in Thailand where there were over 5,000 victims. In all cases the process involved generating an STR profile, typically containing at least 15 different STR markers, and making comparisons with profiles generated from relatives of the missing persons or biological artifacts from the missing person (such as cellular material from toothbrushes or razors). In most cases high statistical significance can be given to the identification. mtDNA can also be used to assist with identification (Holland et al. 1993), but caution has to be taken not to give too much weight to matching mtDNA profiles as they are not unique and will often be shared by many people in a given population.

Bioarchaeology

Numerous publications have reported on the use of aDNA to shed light on different aspects of bioarchaeology. In this section examples will be given from two areas of research: firstly, the contribution of aDNA analysis to understanding the relationship between archaic hominins, in particular the Neandertals, and modern humans and, secondly, the use of aDNA to identify and analyze the genomes of pathogens recovered from skeletal material.

Neandertals and Modern Humans

The genetic relationship between archaic and modern humans is ongoing. Analysis of extant populations points to a recent origin for the modern human gene pool in Africa, with little contribution from archaic populations. However, with the Neandertals and early modern humans potentially coinhabiting the same geographical areas in parts of Europe and the Levant over tens of thousands of years, there has been interest in detecting evidence of gene flow. Early genetic studies focused on the hypervariable regions of mtDNA and have been followed by projects that have sequenced the mtDNA genome of several specimens (Briggs et al. 2009). These studies all found that the mtDNA pool of modern humans and Neandertals was distinct and therefore provided no evidence for admixture, but were limited in that they only examined one genetic locus. To address the question of admixture more rigorously, it was necessary to examine the nuclear genomes. Early attempts to sequence a Neandertal genome were complicated because of contamination with modern exogenous DNA (Green et al. 2009): however, a later study by Green et al. 2010 appears to have been more successful in presenting a draft version of the Neandertal genome. Comparisons of the sequence to extant genomes showed that the Neandertal genome is more similar to Eurasian than African genomes and approximately 1–4% of the modern Eurasian gene pool could have come from Neandertals. Perhaps even more remarkable than the analysis of Neandertal DNA is the work carried out on a bone fragment found in Denisova Cave in southern Siberia dated at between 50,000 and 30,000 years ago. mtDNA analysis showed that the sequence was quite different from either Neandertals or modern humans, diverging from the lineage that led to Neandertals and modern humans around one million years ago (Krause et al. 2010). Analysis of the draft genome indicates that this group of archaic hominins, termed the Denisovans, contributed 4–6% of its gene pool to present-day Melanesians (Reich et al. 2010). Care has to be taken not to over-interpret the results, but the data generated to date provides a useful platform for the genomic analysis of archaic hominins, which will no doubt be added to over the coming years, both in terms of additional samples being analyzed and improved data analysis. In addition to examining the relationship

between archaic hominins and modern humans, it may also be possible to identify regions of the extant human genome that have experienced strong selective pressures, thereby shedding light on the evolution of the modern human gene pool.

Paleopathology

Many pathogens, such as *Yersinia pestis* (that caused the plague otherwise known as "Black Death") and *Mycobacterium tuberculosis*, do not always leave unambiguous skeletal pathology to provide a definitive diagnosis. Early studies on identifying pathogen DNA using PCR-based methods have had to deal with the problem of differentiating between pathogen DNA and the DNA of related microorganisms; for example, *Y. pestis* has recently evolved from the soil-dwelling *Y. pseudotuberculosis* and they are highly similar over much of their genomes; the situation is even more complex when identifying tuberculosis, with over 100 species in the genus *Mycobacterium*, most of which are soil dwelling and many of which would give a positive reaction with a clinical-based test (Wilbur et al. 2009).

As with other areas of bioarchaeology, the advent of next-generation sequencing has enabled a genome-based approach to paleopathology. A seminal study by Bos et al. 2011 not only detected the presence of *Y. Pestis* from skeletal remains recovered from a cemetery in East Smithfield, London (the cemetery was established specifically for victims of the Black Death in 1348/1349), but also sequenced the ancient *Y. pestis* genome. With this level of information, it is possible to address questions around the biology of the pathogen, such as why are there differences in the symptoms and epidemiology between ancient and modern strains of *Y. pestis*, which may illuminate risk factors for future pandemics. Sequence comparison between the ancient and extant strains of *Y. pestis* has found that the genome has evolved little over the last 660 years indicating that the differences in the pathogens behavior may be due to the health status of the people living toward the end of the Middle Ages, rather than changes in the biology of the pathogen; however, more work has to be undertaken to understand subtle changes in the organization of the genome that may impact on its biology (Bos et al. 2011).

Future Directions

The development of next-generation sequencing allows the potential for a new era of paleogenomics. As the technology becomes more affordable and bioinformatics tools make the analysis of vast amounts of data easier, the approach may be used in more contexts. Regardless of the advances in sequencing technology, analysis of aDNA is technically challenging, and constant care must be taken to minimize and monitor for the presence of contamination.

Cross-References

- ▶ Ancestry Assessment
- ▶ Archaic *Homo sapiens*
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Ethics and Human Remains
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology and Archaeology in Disaster Response
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ *Homo neanderthalensis*
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Neanderthals and Their Contemporaries
- ▶ Out-of-Africa Origins
- ▶ Pathological Conditions and Anomalies in Forensic Contexts

- ▶ Pathological Conditions and Anomalies in Forensic Contexts

References

Bos, K.I., V.J. Schuenemann, G.B. Golding, H.A. Burbano, N. Waglechner, et al. 2011. A draft genome of Yersinia pestis from victims of the Black Death. *Nature* 478: 506–510.

Briggs, A.W., J.M. Good, R.E. Green, J. Krause, T. Maricic, and U. Stenzel. 2009. Targeted retrieval and analysis of five Neandertal mtDNA genomes. *Science* 325: 318–321.

Budimlija, Z.M., M.K. Prinz, A. Zelson-Mundorff, J. Wiersema, E. Bartelink, et al. 2003. World Trade Center human identification project: Experiences with individual body identification cases. *Croatian Medical Journal* 44: 259–263.

Cooper, A., and H.N. Poinar. 2000. Ancient DNA: Do it right or not at all. *Science* 289: 1139.

Goodwin, W., A. Linacre, and S. Hadi. 2011. *An introduction to forensic genetics*. Chichester: Wiley.

Green, R.E., A.W. Briggs, J. Krause, K. Prüfer, H.A. Burbano, M. Siebauer, M. Lachmann, and S. Pääbo. 2009. The Neandertal genome and ancient DNA authenticity. *EMBO* 28: 2494–2502.

Green, R.E., J. Krause, A.W. Briggs, T. Maricic, U. Stenzel, M. Kircher, et al. 2010. A draft sequence of the Neandertal genome. *Science* 328: 710–722.

Holland, M.M., D.L. Fisher, L.G. Mitchell, W.C. Rodriguez, J.J. Canik, et al. 1993. Mitochondrial-DNA sequence-analysis of human skeletal remains – Identification of remains from the Vietnam-War. *Journal of Forensic Science* 38: 542–553.

Huffine, E., J. Crews, B. Kennedy, K. Bomberger, and A. Zinbo. 2001. Mass identification of persons missing from the break-up of the former Yugoslavia: Structure, function, and role of the International Commission on Missing Persons. *Croatian Medical Journal* 42: 271–275.

Krause, J., Q. Fu, J.M. Good, B. Viola, M.V. Shunkov, A.P. Derevianko, and S. Pääbo. 2010. The complete mitochondrial DNA genome of an unknown hominin from southern Siberia. *Nature* 464: 894–897.

Lindahl, T. 1993. Instability and decay of the primary structure of DNA. *Nature* 362: 709–715.

Reich, D., R.E. Green, M. Kircher, J. Krause, N. Patterson, et al. 2010. Genetic history of an archaic hominin group from Denisova Cave in Siberia. *Nature* 468: 1053–1058.

Rohland, N., and M. Hofreiter. 2007. Comparison and optimization of ancient DNA extraction. *Biotechniques* 42: 343–352.

Shendure, J., and J. Hanlee. 2008. Next-generation DNA sequencing. *Nature Biotechnology* 26: 1135–1145.

Smith, C.I., A.T. Chamberlain, R.S. Riley, C. Stringer, and M.J. Collins. 2003. The thermal history of human fossils and the likelihood of successful DNA amplification. *Journal of Human Evolution* 45: 203–217.

The 1000 Genomes Consortium. 2010. A map of human genome variation from population-scale sequencing. *Nature* 467: 1061–1073.

Wilbur, A.K., A.S. Bouwman, A.C. Stine, C.A. Roberts, L.-A. Pfister, J.E. Buistra, and T.A. Brown. 2009. Deficiencies and challenges in the study of ancient tuberculosis DNA. *Journal of Archaeological Science* 36: 1990–1997.

Further Reading

Lalueza-Fox, C., and M.T. Gilbert. 2011. Paleogenomics of archaic hominins. *Current Biology* 21: 1002–1009.

Stoneking, M., and J. Krause. 2011. Learning about human population history from ancient and modern genomes. *Nature Reviews Genetics* 12: 603–614.

Tsangaras, K., and A.D. Greenwood. 2012. Museums and disease: Using tissue archive and museum samples to study pathogens. *Annals of Anatomy* 194: 58–73.

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Documentation of Treatment and Intervention in Archaeological Conservation and Preservation

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Introduction

Recording is a fundamental component of the conservation process, including initial examination of a cultural resource, through to its treatment, maintenance, and monitoring. Documentation of treatment and intervention is engrained within the code of ethics of many cultural organizations, such as the International Council of Museums (ICOM), the European Confederation of Conservator-Restorers (ECCO), and the American Institute for Conservation (AIC).

Definition

Documentation of conservation treatment and intervention consists of an appraisal of condition of a cultural resource, the treatment administered to it (including materials and methods), and

recommendations for future care. This is normally in both written and graphic forms. It is complementary to the process of archaeological recording. Examination before treatment contributes additional understanding of its material culture.

Key Issues/Current Debates/Future Directions/Examples

Effective conservation of an ancient or historic structure or artifact requires an objective understanding of its condition and the processes of deterioration affecting it. Most cultural resources have been subject to treatments and interventions in the past, and these may be responsible for current forms of degradation. Understanding causes of deterioration due to previous treatment is, therefore, essential. Some interventions are obvious, such as the addition of different materials to provide structural support, but concealed support is also common. The detection of surface coatings or chemical consolidants can also be elusive.

Objectives of Documentation

The objectives of documentation of new treatments or intervention are as follows:

- To establish a datum of condition, before and after treatment, to facilitate assessment of its efficacy over time
- To provide conservation professionals in the future the means to understand condition with respect to previous treatments, in order to make informed decisions for new treatments
- To communicate the rationale for a chosen treatment or intervention
- To record and share information of archaeological interest revealed during the course of investigations

Information Requirements

The type of information recorded varies according to the nature and context of the object or structure, including its ownership. There is no universal recording system. Some may form part of a recording protocol specific to an institution or national inventory.

Records of treatment and intervention should provide a clear description of:

- Reference information: owner, name of responsible institution name, structure/object name and number, location (museum or site, GIS coordinate as appropriate), names of individuals involved (curators and conservators), and dates of treatment
- Description: materials, composition, and dimensions and evidence or records of previous treatments or interventions
- Condition of the artifact/structure prior to treatment and probable causes of deterioration/damage
- Specialist investigations that were required to identify materials or understand deterioration processes
- Articulation of the requirements to address structural instability and aesthetic integrity
- An options appraisal of materials and methods to meet these requirements (risk assessment of performance and properties), including alternative approaches
- Any treatment trials carried out or exemplars that were produced
- The materials and methods ultimately chosen, how these were applied (including ambient conditions, as appropriate), the specific locations of application, and the response to treatment
- Supporting documents (e.g., the reports of any previous treatments or new diagnostic investigations)
- Recommendations for handling, storage (if appropriate), maintenance, and monitoring

Forms of Documentation

The basis of documentation consists of written records complemented by graphic and photographic ones.

Written Records

For the written record, standardized forms are essential in documenting condition and treatment. They ensure that information fields are

completed consistently with a reference glossary. This helps to reduce ambiguity of a written description, facilitating the comprehension for future users of the record. Such glossaries can be adopted from existing ones or designed specifically for a new recording system.

Graphic and Photographic Records

These can consist of photographs, sketches, or *metric survey* (measured survey drawings, rectified photography, photogrammetric images, or laser scanning). These serve to document the object or structure prior, during, and after treatment, including the specific treatments administered to its constituent parts. In particular, they can form the base for a *condition map* to record specific problems and their location (with a descriptive key of reference) and an associated *treatment map*.

Conventional records provide a two-dimensional description. In cases of exceptional cultural significance, a precise three-dimensional record may be necessary; this enables change to be measured (the rate of deterioration in a given environment); it also creates a precise topographical record in the event of irreversible deterioration and facilitates eventual replication. The most common three-dimensional technique for structures is photogrammetry. Of great interest is the development of laser scanning, which can generate topographical models of a large surface, or of a small object, to an accuracy of several millimeters.

Materials and Treatments

Description of materials employed may be relatively simple or more difficult when dealing with proprietary products subject to commercial confidentially. In the very least, the manufacturers' data sheets should always be appended to the treatment report to provide the maximum amount of information available at the time. Where materials conform to national or international standards, the current standard should also be included, as these are frequently revised and may be difficult to obtain retrospectively. Retention of raw material samples for the documentation archive is sometimes advisable, as this will allow future analysis if required.

Specialist Investigations

Intervention is frequently preceded by specialist investigations (ambient environmental conditions, material analysis, diagnostic investigations). Reports should be appended to the treatment file.

Documentation Archives

In a digital age, there is compelling pressure to exclude the production of hard copy documents altogether. The soundness of this policy depends on the robustness of information technology of a given institution and its future ability to transfer digital records into new formats. Backup electronic copies should always be retained on CD ROMS or on an external hard drive, which should be upgraded with any migration of IT systems. Otherwise, paper copies should be retained, all the more so by small conservation contractors and individual clients. Outside major institutions, reports for very important works of art or buildings should be deposited in local archives, or regional/national Sites and Monuments Records, as appropriate. This helps to ensure access of information to future researchers. Whatever their format, duplicate copies of reports should always be created and stored in separate locations.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ International Council of Museums (ICOM): Code of Ethics

Further Reading

American Institute for Conservation. 1994. Code of ethics. Guidelines for practice. Documentation. Available at: http://www.conservation-us.org/index.cfm?fuseaction=page.viewpage&pageid=1026 (accessed 23 October 2012).

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Barber, D., J. Mills, and D. Andrews. 2011. *3D laser scanning for heritage. Advice and guidance to users on laser scanning in archaeology and architecture*. Swindon: English Heritage. Available at: http://www.english-heritage.org.uk/publications/3d-laser-scanning-heritage2/ (accessed 23 October 2012).

Bedford, J., and H. Papworth, eds. 2010. *Measured and drawn: Techniques and practice for the metric survey of historic buildings*. 2nd ed. Swindon: English Heritage.

Caple, C. 2000. *Conservation skills. Judgement, method and decision making*. London: Routledge.

Corfield, M. 1992. Conservation documentation. In *The manual of curatorship*, ed. J. Thompson, 229–233. Oxford: Butterworth Heinemann.

Dollery, D., and J. Henderson. 1996. Conservation records for the archaeologists? In *Archaeological conservation and its consequences: Preprints of the contributions to the Copenhagen Congress, 26–30 August 1996*, ed. A. Roy and P. Smith, 43–47. London: International Institute for Conservation.

English Heritage. 2006. *Understanding historic buildings: A guide to good recording practice*. Swindon: English Heritage. Available at: http://www.english-heritage.org.uk/publications/understanding-historic-buildings/ (accessed 23 October 2012).

Lettelier, R., W. Schmid, and F. LeBlanc. 2011. *Recording, documentation, and information management for the conservation of heritage places, volume 1: guiding principles*. Shaftesbury: Donhead.

Millar, L.A. 2010. *Archives: Principles and practices*. London: Facet.

Warda, J., ed. 2011. *The AIC guide to digital photography and conservation documentation*. 2nd ed. Washington, DC: American Institute for Conservation of Historic and Artistic Works.

Dog: Domestication

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Basic Species Information

Dog domestication research is often controversial, but one point that is universally agreed upon by all parties is the identity of the direct ancestor of all domestic dogs: the gray wolf (*Canis lupus*). Since 1993, the domestic dog has been taxonomically classified as *Canis lupus familiaris*, though *Canis familiaris* is still commonly used. This genetic similarity to the gray wolf is equivalent for all dog breeds from Chihuahua to Great Dane (Vila et al. 1997). Within the taxonomic subfamily of *Caninae*, domestic dogs are grouped with the "wolf-life canids" (Fig. 1) also including gray wolf (*Canis lupus*), coyote (*Canis latrans*), golden jackal (*Canis aureus*), black-backed jackal (*Canis mesomelas*), and cape hunting dog (*Lycaon pictus*) (Wayne and Ostrander 2007). While evidence for prehistoric dog remains becomes ambiguous beyond about 15,000 years ago, fossil wolf remains have been found in association with human contexts from at least 100,000 years ago.

Although genetic material makes it clear that the gray wolf is the ancestor of the dog, it is not clear which or how many subspecies of *Canis lupus* were involved in the domestication process, though both the medium-sized Eurasian wolf (*Canis lupus lupus*) and the smaller Arabian wolf (*Canis lupus arabs*) are often mentioned. Although the details of dog domestication are debated (wolf subspecies involved, geographic location, intentional taming of wolf pups vs. "self-domestication"), it is agreed that humans played an important role in the path of the domestic dog. While some genetic researchers suggest the divergence between wolves and dogs may have taken place up to 135,000 years ago (Vila et al. 1997), the archaeological evidence suggests that dog domestication did not begin before 15,000 years ago, though there may have incomplete domestication processes around 33,000 years ago. Due to the genetic similarity between wolves and dogs, the determination between dog and wolf in early archaeological specimens often relies on examining the skeletal remains for a set of morphological traits that generally distinguish the two canids from one another.

Two of the primary questions in dog domestication research focus on whether dog domestication took place in a single or multiple locations and whether significant domestication happened once or multiple times. Conclusions from archaeological and genetic information are thus far unclear for both of these questions. Some

Dog: Domestication, Fig. 1 Wild members of the *Caninae* subfamily: (**a**) Eurasian wolf (*Canis lupus lupus*), (**b**) black-backed jackal (*Canis mesomelas*), (**c**) cape hunting dog (*Lycaon pictus*), (**d**) Arabian wolf (*Canis lupus arabs*), (**e**) golden jackal (*Canis aureus*), (**f**) coyote (*Canis latrans*)

researchers suggest the initial domestication of dogs may have happened in East Asia, specifically the Yangtze River area of China. They have suggested that a large founding population of wolves (probably several hundred) were intentionally domesticated here as part of a sustained cultural practice (Pang et al. 2009). Other researchers argue that genetic evidence points to the Middle East as the location of the most genetic diversity and thus the likely origin of dog domestication (von Holdt et al. 2010). A high level of genetic diversity in native dog population has also been found in Africa, suggesting the model of Eurasian dog domestication may need to be reconsidered (Boyko et al. 2009). Genetic testing shows that the oldest groups of dogs with the most genetic diversity (and which are most genetically similar to wolves) are primarily Asian and African in origin, including the Akita and Basenji. Many dogs which were thought to be ancient in origin, like the Irish Wolfhound and American Eskimo, are actually recently created breeds (Larson et al. 2012).

Like the genetic evidence, the archaeological data has also been interpreted in many different ways. The morphological traits which point to domestic dog in archaeological evidence earlier than about 15,000 are obscure and highly debated. Like all domesticated animals, the domestication of the gray wolf created distinct physical changes over time. These changes assist archaeologists and biologists in distinguishing between the two in fossil specimens. These changes include a general reduction in overall body size, a reduced muzzle length with crowding of the teeth, and the development of a distinctly stepped forehead or "stop" as opposed to the more sloped angle of the wolf face (Fig. 2). Due to the morphological similarities between wolves and early dogs, for many fossil specimens it is unclear whether they represent small wolves, large dogs, dog-wolf hybrids, or some sort of "in-between" species of wolves in transition to morphologically becoming domesticated dogs. The oldest uncontested archaeological dog remains from each geographic area are those from Bonn-Oberkassel (Germany; 14,708–13,874 cal. BP (before present)), Palegawra Cave (Iraq; 13,000 cal. BP), Ushki I (Russia; 12,900–12,600 cal. BP), Nanguanli (Taiwan; 4,800 cal. BP), Merimde Beni-Salame (Egypt; 6,800–6,520 cal. BP), Danger Cave (United States, 10,000–9,000 cal. BP), and

Rosamachay (Peru, 5,620–5,150 cal. BP) (Larson et al. 2012).

In addition to these remains, there are also many for which a final determination between wolf and dog is more controversial. A fossil canid skull from Goyet Cave in Belgium, which had been excavated in the mid-nineteenth century, was reexamined and radiocarbon dated to 31,700 cal. BP. Some argue that the morphological traits of the skull are more suggestive of dog than wolf, which would make the Goyet specimen one of the oldest dog remains even found. Others question the determination of the skull as a domestic dog. Similar potential early domesticated dog finds have been cited in Chauvet Cave (France; ~ 26,000 BP), Predmostí Cave (Czech Republic; 27,000–24,000 BP), and Razboinichya Cave (Russia; 33,500–33,000 BP), but all have had the identification of their remains as dog challenged.

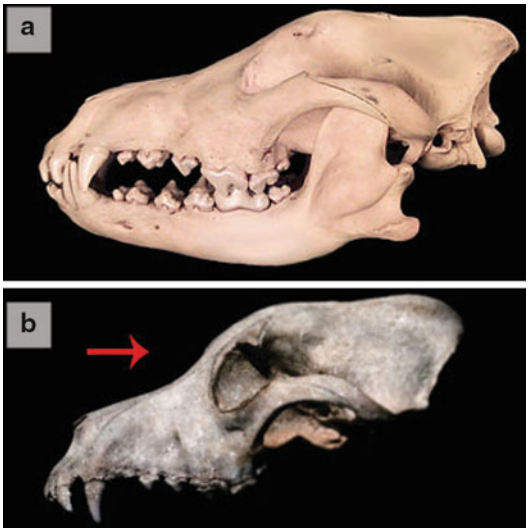

Dog: Domestication, Fig. 2 The sloped snout of a wild grey wolf (**a**) as compared to the distinctive 'stop gap' of a domesticated dog (**b**)

While the exact timing and location of dog domestication is still debated, the modern dog has spread throughout the world and now inhabits every continent aside from Antarctica. Through discerning breeding by humans, dogs now exist in an array of size, shapes, colors, and demeanors (Fig. 3). Their vast breadth of behavioral and morphological traits makes them the most adaptable land mammal on the planet.

Dog: Domestication, Fig. 3 Modern dog (*Canis lupus familiaris*) breeds: (**a**) Komondor, (**b**) Chinese Crested, (**c**) Pug, (**d**) Akita, (**e**) West Highland White Terrier, (**f**) Australian Dingo

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

References

Boyko, A.R., R.H. Boyko, C.M. Boyko, H.G. Parker, M. Castelhano, L. Corey, J.D. Degenhardt, A. Auton, M. Hedimbi, and R. Kityo. 2009. Complex population structure in African village dogs and its implications for inferring dog domestication history. *Proceedings of the National Academy of Sciences* 106: 13903–13908.

Larson, G., E.K. Karlsson, A. Perri, M.T. Webster, S.Y.W. Ho, J. Peters, P.W. Stahl, P.J. Piper, F. Lingaas, and M. Fredholm. 2012. Rethinking dog domestication by integrating genetics, archeology, and biogeography. *Proceedings of the National Academy of Sciences* 109: 8878–8883.

Pang, J.F., C. Kluetsch, X.J. Zou, A. Zhang, L.Y. Luo, H. Angleby, A. Ardalan, C. Ekström, A. Sköllermo, and J. Lundeberg. 2009. mtDNA data indicate a single origin for dogs south of Yangtze River, less than 16,300 years ago, from numerous wolves. *Molecular Biology and Evolution* 26: 2849–2864.

Vila, C., P. Savolainen, J.E. Maldonado, I.R. Amorim, J.E. Rice, R.L. Honeycutt, K.A. Crandall, J. Lundeberg, and R.K. Wayne. 1997. Multiple and ancient origins of the domestic dog. *Science* 276: 1687–1689.

von Holdt, B.M., J.P. Pollinger, K.E. Lohmueller, E. Han, H.G. Parker, P. Quignon, J.D. Degenhardt, A.R. Boyko, D.A. Earl, A. Auton, and A. Reynolds. 2010. Genome-wide SNP and haplotype analyses reveal a rich history underlying dog domestication. *Nature* 464: 898–902.

Wayne, R.K., and E.A. Ostrander. 2007. Lessons learned from the dog genome. *Trends in Genetics* 23: 557–567.

Domestic Archeology: Textiles of Northern Mediterranean

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Introduction

Throughout classical antiquity, textile manufacture was practiced on all levels of society and was one of the most labor-intensive of all occupations. As such, it was an industry of great cultural and social importance, playing an integral part in local and regional economies as well as local, regional, and long-distance exchange. The social significance of textile production in the northern Mediterranean was expressed in funerary ritual through the inclusion of textile implements among the burial goods, as well as in religious activities, through the deposition of textile tools in votive deposits and special ritual cloth production in sanctuaries.

Textiles were used for a variety of purposes, the most obvious of which was clothing. Like today, clothing in ancient times had multipurpose aspects, not least of which was expressing the identity of an individual or a group of peoples by symbolizing gender, age, family, social class, occupation, religion, or ethnic affiliation. Clothing and thereby textiles had an important communicative function since they combine both technological achievements and esthetic values of any society. In addition to clothing, however, textiles were used for a variety of utilitarian purposes. Colorful bed covers, cushions, curtains, and other textiles are frequently represented by the Greek, Etruscan, and Roman iconographic sources. Another important use of textiles was for sails and ship rigging. The extravagant awnings for theaters and fora were made of textiles. Textiles were also used for military tents, cart covers, *vela* hung between temples' columns and centones, special fabrics used for extinguishing fires. A rather unique use of textiles known in the Etruscan sphere was for books. Called *libri lintei* by the Romans, they were made of linen and used for recording religious rituals.

Among the various sources that provide evidence for the study of textile production in the ancient northern Mediterranean, archeological material is the most direct as it documents the productive activities through tools, installations, raw materials, and finished products. With the help of other, secondary sources of information, namely, the iconographic and written evidence, it is then possible to reconstruct the sequence of production processes involved in textile manufacture.

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Domestic Archeology: Textiles of Northern Mediterranean, Fig. 1 Mineralized textile from Poggio Aguzzo, Murlo, Italy, seventh century BCE (Photo: M. Gleba)

Although textiles surviving in their original form are relatively rare finds in northern Mediterranean archeological sites, almost all conditions of preservation can be found in this vast and geologically and climatically diverse region. The largest corpus consists of linen textile fragments found in various Neolithic and Bronze Age sites in the north of the Apennine peninsula (Bazzanella et al. 2003), where they have been preserved by the basic conditions of the Alpine lakes. Wool textile fragments, on the other hand, have been recovered primarily from burials, where they were conserved in waterlogged and/or acidic environments. Among these, the almost complete garments found in the Villanovan burials at Verucchio in Northeast Italy are significant. A few Iron Age clothing articles were recovered from the Alpine glaciers (Bazzanella et al. 2005). Charred or carbonized textiles were preserved as a result of the eruptions of Thera in Greece and Vesuvius in Italy. The vast majority of textiles in the northern Mediterranean, however, have been preserved in association with metal objects and survive in the shape of minute mineralized traces (Fig. 1).

Definition

A textile is a flexible, two-dimensional material produced by interconnecting fibers, which have generally been twisted into a yarn (Emery 1966; Seiler-Baldinger 1994). Fiber is a basic unit of raw material having suitable length, pliability, and strength for conversion into yarns and fabrics.

In the ancient Mediterranean, two basic fiber groups, divided on the basis of their origin into plant and animal, were used for textile manufacture. Plant fibers are derived from the inner bark or bast of plants, such as flax (*Linum usitatissimum* L.), hemp (*Cannabis sativa* L.), nettle (*Urtica dioica* L.), Spanish broom (*Spartium junceum* L.), and trees, such as linden (*Tilia* sp.), oak (*Quercus* sp.), and willow (*Salix* sp.). Tree bast was more important in prehistoric times, but it occasionally turns up during the Roman period as well, particularly in the rigging found in shipwrecks. Besides these locally available plant fibers, cotton was imported to Europe from the East by Roman times, although it was never economically important.

The major animal fiber was sheep's wool, with occasional use of goat hair and other, more unusual fibers, such as horse and camel hair. The other important animal fiber, silk, was imported from the Near and Far East and remained a relatively rare and luxury material throughout antiquity. Another animal fiber, sea silk, sometimes referred to as byssus, derived from the secretion of a marine mollusk, was also used to make precious textiles, although there is no direct evidence for its use before the late Roman period. Asbestos, a textile fiber derived from a mineral amphibole, has a unique quality of withstanding extremely high temperatures – a trait that was noticed and used in antiquity when producing funerary shrouds. Last but not least, gold sheet was cut into thin strips and wound around an organic core to create gold thread used at least since Hellenistic times for the most sumptuous textiles, often in combination with silk fiber and shellfish purple dye.

While plant fibers resulted in uniformly colored shades of gray-white, wool came in a variety of natural shades and could be dyed easily in a multitude of bright colors. Dyeing is probably no less ancient than the weaving of textiles themselves, as humans strove to improve their esthetic quality. A number of plants and animals could have been used for dyeing, including woad and indigo for blue, madder and kermes for red, and

weld and saffron for yellow (Cardon 2007). The most famous dye of antiquity was shellfish or Tyrian purple, which was obtained from a variety of marine mollusks of the muricid family.

To create a textile, raw material had to be transformed by means of a series of processes (Barber 1991). Every type of fiber had to be subjected to a preparation process, after which it could be spun or twisted into yarn using a drop spindle (Fig. 2). Once the fibers were spun, they could be woven into a two-dimensional structure (Seiler-Baldinger 1994). The woven textile is constructed by interlacing two thread systems at right angles. The static system is generally called warp, while the perpendicular movable system is known as weft. The simplest form of weaving, tabby or plain weave, is produced by weft threads passing over and under alternate warps. In the more complex, twill weave, weft threads pass over and under two or more warps in a regular staggered pattern, each row being stepped to one side of the row above, which creates a diagonal effect. Extra wefts may be worked into the basic weave to produce a brocade, thereby allowing the creation of complex patterns. Pattern, however, was not always dependent on a complex weave structure but could be formed using yarns of different colors.

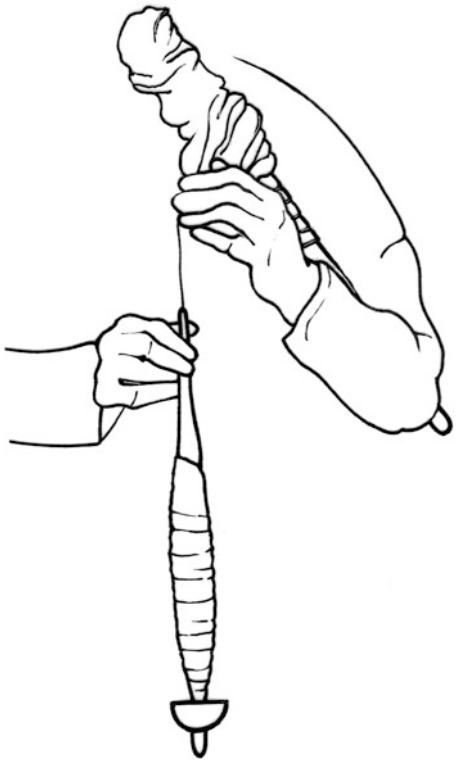

Domestic Archeology: Textiles of Northern Mediterranean, Fig. 2 Spinning with drop spindle and handheld distaff (Courtesy of Eva Andersson Strand)

Weaving was generally accomplished on a special frame known as loom (Fig. 3; Barber 1991). The loom used in the northern Mediterranean until the first century CE was of the warp-weighted type in which the warp threads were held under tension by weights attached to their bottom ends. Loom weights found on archeological sites represent the tangible evidence of textile-making. During the Roman Empire, the warp-weighted loom was gradually replaced with the two-beam vertical loom in which the warp was stretched between two horizontal beams.

Textiles could also be constructed by other means (Seiler-Baldinger 1994). Tablet weaving was a common technique to make bands but was also popular for making decorative borders. Sprang was created by twisting adjacent warps on a frame without the use of weft yarn and resulted in extremely flexible fabrics, which were used for headgear and bags but possibly also for leggings. Other techniques include lacing, braiding, and netting. Many of these techniques do not require any specialized tools. The fibers could also be entangled without forming a yarn, resulting in non-woven fabrics, such as felts.

After a textile had been created, it could be subjected to a variety of finishing processes. Fibers on the surface of a textile could be matted together by fulling carried out in *fullonicae*, some of which have been excavated in Pompeii. The cloth could be brushed and then shorn to produce a smooth napped surface – as in the case of the Roman toga. These treatments were generally applied to wool, while linen could be beaten to soften it or rubbed with a special stone to give it a more lustrous surface. Textiles could also be subjected to elaborate pleating. A textile could be cut and sewn into a garment, although the majority of Greek and Roman textiles were used straight off the loom, that is, they were wrapped around and

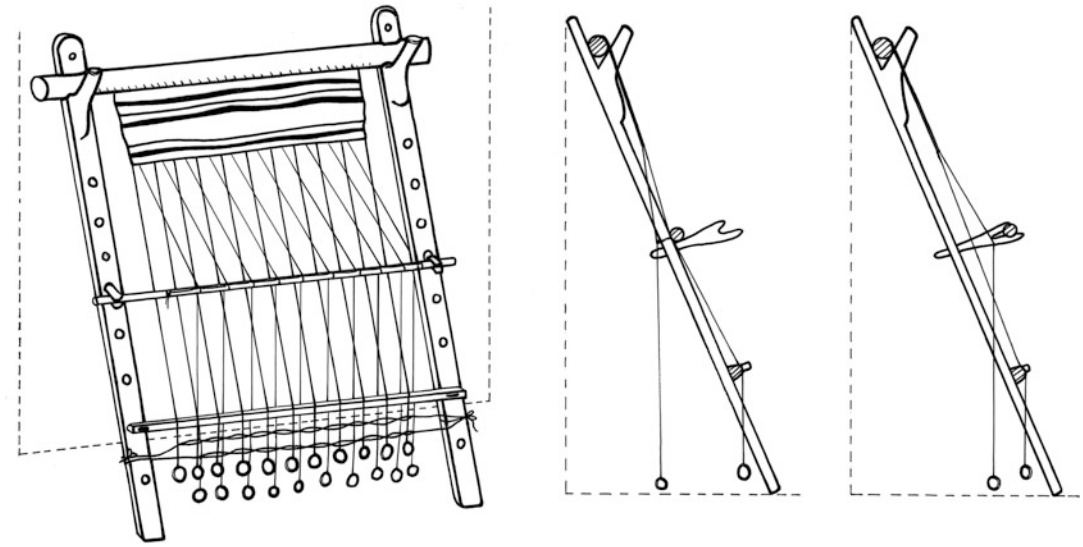

Domestic Archeology: Textiles of Northern Mediterranean, Fig. 3 Warp-weighted loom (Drawing: Annika Jepsson)

fixed on the body using devices such as pins and belts. In fact, looms were usually set up to produce a specific garment. Finally, decoration could be physically applied by a variety of techniques. One of these was embroidery, which included a variety of stitches. Shells, seeds, beads, and metal appliques could also be attached to the fabric to create a decorative effect.

The various stages of textile production are depicted in several ancient iconographic documents, including a late seventh-century BCE Etruscan bronze *tintinnabulum*, found in tomb 5 of the Arsenale Militare necropolis of Bologna (Fig. 4) and the Archaic Greek lekythos by Amasis (550–530 BCE), now in the Metropolitan Museum of Art.

Both of these objects illustrate the tools used in various textile production processes. Unlike the textiles themselves, textile implements are ubiquitous on the Mediterranean archeological sites and can be used to study the craft and its technological and economic aspects (Fig. 5). Spinning and weaving implements constitute the single most important and plentiful type of evidence for the assessment of the scale of production and the technology of this industry in the Mediterranean. Furthermore, many textile tools have been found in burial and votive contexts, providing another interpretative framework. The abundance of textile tools on settlements and in burials from the Early Iron Age onward demonstrates that textile production was one of the main economic activities and sources of wealth.

Historical Background

Textiles represent a category of archeological material little known to general archeological audience. While textiles were recovered in the earliest archeological excavations and much of the pioneering publications date to the early twentieth century, they began to be studied extensively as a part of the cultural record only recently. Over the last few decades, textile studies have developed into an important new field of archeology (Good 2001; Andersson Strand et al. 2010). The accumulation of data and the constant development of analytical techniques are permitting more precise fiber and dye identifications. The proliferation of technical studies is finally permitting a more synthetic approach to the history of textile technology, demonstrating how much we can learn about the culture, society, technology, and

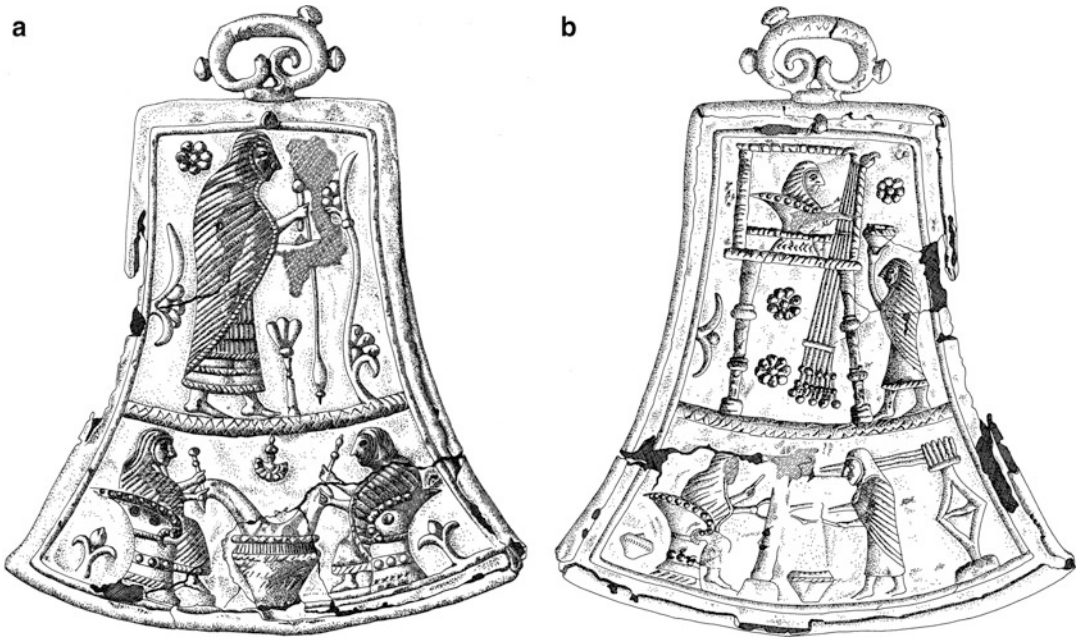

Domestic Archeology: Textiles of Northern Mediterranean, Fig. 4 *Tintinnabulum* from Bologna, Arsenale Militare, Tomba degli Ori, Italy, bronze, late seventh century BCE: (**a**) side A, with scenes of spinning (*top*) and dressing the distaffs (*bottom*); (**b**) side B, with scenes of weaving (*top*) and warping (*bottom*) (© Bologna Museo Civico Archeologico)

economy of the ancient world through textiles (Barber 1991, 1994; Gleba and Mannering 2012).

Because the environmental conditions in the northern Mediterranean are generally not conducive to the survival of organic material, the study of ancient textiles of this region has progressed much more slowly, in comparison to the situation in central and northern Europe. Thus, although the investigation of archeological textiles of Greece goes back to the 1950s, a period when many textiles were being discovered and studied, scientific research did not truly begin until only 2000 (Spantidaki and Moulhérat 2012). In Italy, too, scientific publications of archeological textiles started to appear on a more regular basis only in the 1980s and the 1990s. The most comprehensive work on the subject to date is M. Gleba's *Textile Production in Pre-Roman Italy* (2008), which includes a catalogue of published archeological textiles and an extensive study on textile tools and their various contexts. Archeological textiles of Spain have been investigated over the last 25 years, but the majority of published scholarship concerns textile tools (Alfaro Giner 2012).

The vast majority of archeological textiles recovered throughout the northern Mediterranean region survive as mineralized traces on metal grave goods, such as bronze and iron weapons, personal accessories, and vessels. In the past, they were often removed as part of the conservation process. Recently, more attention is being paid to these textile traces, which provide important and detailed data on ancient textiles. Even when minute, they can provide important information about the structure of the textiles and even raw materials. Thus, study of hundreds of such fragments recently demonstrated that Italy and Greece had differing textile cultures before Roman times: Italian populations favored twills, while in Greece weft-faced tabbies are prevalent (Gleba 2017).

Textiles have also been studied through indirect sources. An array of ancient texts contains information on textile materials, technologies, uses, and trade and includes "conventional classical literature," "technical handbooks," and

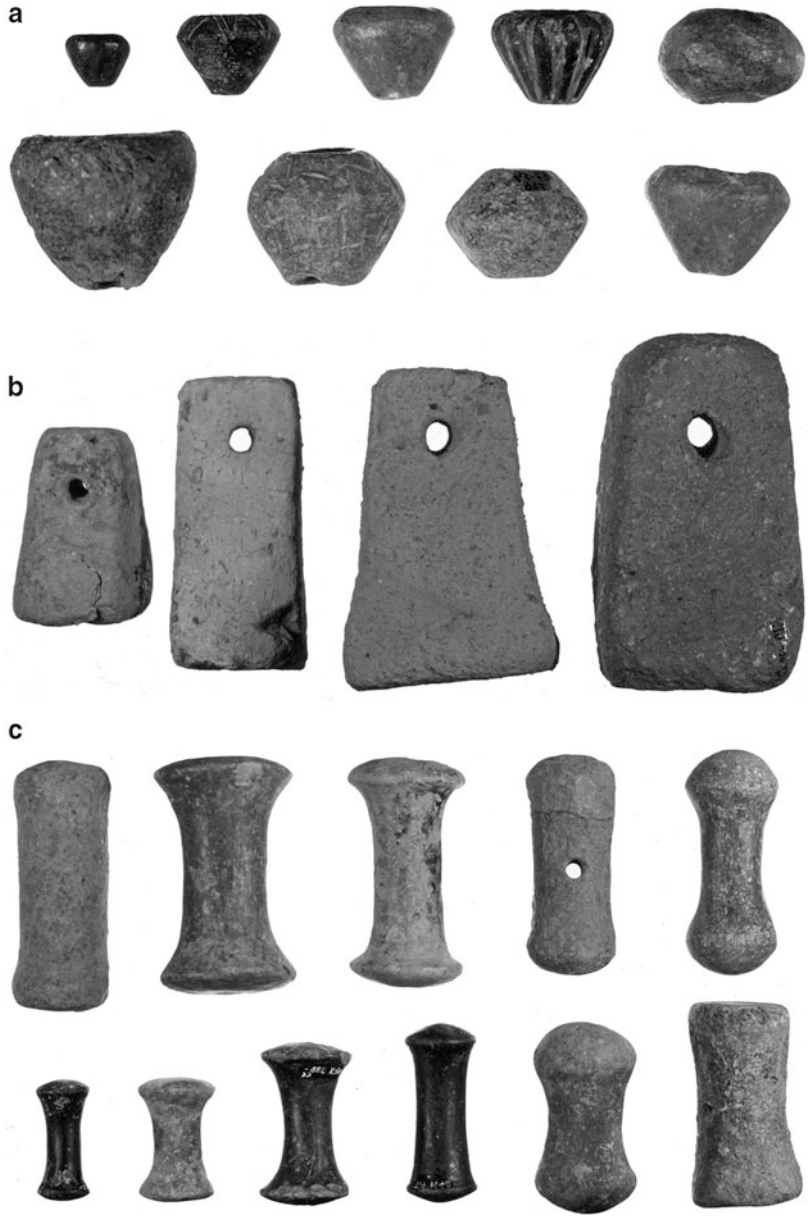

Domestic Archeology: Textiles of Northern Mediterranean, Fig. 5 (**a**) Ceramic spindle whorls, Poggio Civitate di Murlo, Italy, seventh–sixth century BCE (Courtesy of Anthony Tuck). (**b**) Terracotta loom weights, Poggio Civitate di Murlo, seventh–sixth century BCE (Courtesy of Anthony Tuck). (**c**) Ceramic spools, Poggio Civitate di Murlo, seventh–sixth century BCE (Courtesy of Anthony Tuck)

"public and private documents" consisting of tablet archives, epigraphic sources, and papyri (Wild 2000: 210). These diverse sources have been used with varied success by modern scholars to reconstruct different aspects of textile production in ancient times. Epigraphic evidence has been a useful source for the identification of textile professions (Larsson Lovén 1998), while mythological characters, such as Penelope, Kirke, Arachne, and the Fates, have provided social and religious context for ancient textile activities (Scheid and Svenbro 1996).

Iconographic material has been probably the most frequently cited source of information on ancient textiles. Mediterranean art encompasses one of the most interesting and informative collections of visual material in the ancient world. The proliferation of textiles in the painted tombs, vase painting, statuary, and other media has been scrutinized by numerous scholars, particularly in

studies of ancient dress. Etruscan clothing depicted on figurines, statues, vases, and tomb paintings has been studied extensively by Larissa Bonfante (2003). Greek and Roman dress has attracted attention since the antiquarian days (Cleland et al. 2007; Lee 2015).

Key Issues/Current Debates

Textile production was both a domestic and a commercial activity in ancient northern Mediterranean. Spinning and weaving were carried out by the women of every household (Barber 1994). Already at the end of the Bronze Age, the deposition of spindle whorls, distaffs, and spools in female funerary assemblages testifies to women's contribution to the communities as textile workers and indicates that the textile craft became a symbol of the female sphere. While the regional significance of textile tools in burials is a matter of debate, most scholars agree that women on their own or with the help of household slaves produced most of the household textiles needed.

During the Orientalizing and Archaic periods, there is a significant increase in the scale of textile production, indicated by the large number and standardization of tools on settlement sites. In some cases, textile implements are concentrated in specific areas where other kinds of production, such as ceramic or metal, have been documented, suggesting a household or even workshop mode of manufacture and the existence of at least part-time specialist craftspeople. Cloth was likely produced for commercial purposes, and textile trade has been tied to salt, amber, slaves, and other commodities. Textile trade seems to be indicated indirectly by the spread of fashion, for example, from Greece to Etruria and from Etruria to Central Europe (Hallstatt culture). By Roman times, textiles were also produced for the market by professional male and female workers in large specialized factories (Liu 2009). Diocletian's Edict of prices reflects the complexity reached by the textile production and trade by CE 301. Our understanding of the organizational aspects of the Mediterranean textile production and trade is, however, far from complete, requiring detailed regional studies.

Textiles produced by the women also formed an important part of public rituals. The ritual weaving of garments for cult statues was a well-documented phenomenon in Archaic and Classical Greece. The best-known example is the robe or *peplos* of the Athena Polias in Athens woven every year by the young girls called Arrhephoroi who were assisted by Ergastinai. The *peplos* was dedicated and placed on the statue of Athena during the Panathenaic festival (Barber 1992). The presence of textile tools in sanctuaries traditionally tied to votive activities needs to be reevaluated in the light of possible existence of sanctuary textile workshops.

Future Directions

Studies of textiles and textile production in the ancient northern Mediterranean are still in their infancy, and the field has much potential to develop further in the near future. Investigation of the individual finds is constantly increasing the corpus of textile material. Statistical analysis of their technical data is finally permitting to define chronologically and geographically specific characteristics of the textile material (e.g., Gleba 2017). Over the last 20 years, the field of textile archeology has been enriched by a series of new scientific methods including isotopic tracing, radiocarbon dating, dye analysis, scanning electron microscopy, X-ray spectroscopy, CAT-scanning, and DNA analysis (Good 2001; Andersson et al. 2010). Their systematic application to the archeological textile finds of the northern Mediterranean will generate valuable data on textile technology, chronology, provenance, and preservation.

In addition to (or in the absence of) textiles, a study of number, distribution, and morphology of tools, based on statistical analyses of their physical parameters of preservation, size, weight, and use wear, can provide valuable information about technology, scale of production, and the importance of textile manufacture for a particular site. Functional typologies of tools, combined with

analysis of the contexts in which they were found and their distribution patterns, allow inferences about changes and development of textile production in and between different sites and regions (Andersson Strand and Nosch 2015). This will make it possible to address issues such as the spread and use of technology, the mobility of craftspeople, communication patterns, and chronological changes in production.

An understanding of the development of textile production in the northern Mediterranean is crucial to any attempt to set textile technology in its social and economic context and to provide a more comprehensive view of textile production as an important and integral part of the ancient economy, placing it among other crafts, such as metal and pottery manufacture. The issue of textile production is also important for the investigation of craft specialization, workshop production, labor division, and gender, as well as the geographical and chronological variations in textile work as evidenced by differences in textile implements and how these technologies were transmitted between different geographical areas.

Cross-References

- ▶ Iconography, Etruscan
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Secondary Products and the "Secondary Products Revolution"
- ▶ Sheep: Domestication
- ▶ Textiles and Fabrics: Conservation and Preservation

References

Alfaro Giner, C. 2012. Spain. In *Textiles and textile production in Europe from prehistory to AD 500*, ed. M. Gleba and U. Mannering, 332–346. Oxford: Oxbow Books.

Andersson Strand, E., and M.-L. Nosch, eds. 2015. *Tools, textiles and contexts: Textile production in the Aegean and Eastern Mediterranean Bronze Age*. Oxford/Oakville: Oxbow Books.

Barber, E.J.W. 1991. *Prehistoric textiles. The development of cloth in the Neolithic and Bronze Ages*. Princeton: Princeton University Press.

Barber, E.J.W. 1992. The peplos of Athena. In *Goddess and polis. The Panathenaic festival in ancient Athens*, ed. J. Neils, 103–118. Princeton: Princeton University Press.

Barber, E.W. 1994. *Women's work: The first 20,000 years. Women, cloth, and society in early times*. New York: Norton.

Bazzanella, M., A. Mayr, L. Moser, and A. Rast-Eicher, eds. 2003. *Textiles. Intrecci e tessuti dalla preistoria europea*. Trento: Riva del Garda.

Bazzanella, M., L. Dal Rì, A. Maspero, and I. Tomedi. 2005. Iron Age textile artefacts from Riesenferner/Vedretta di Ries (Bolzano/Bozen, Italy). In *Hallstatt textiles: Technical analysis, scientific investigation and experiment on Iron age textiles*, British archaeological reports international series 1351, ed. P. Bichler, K. Grömer, R. Hofmann-de Keijzer, A. Kern, and H. Reschreiter, 151–160. Oxford: Archaeopress.

Bonfante, L. 2003. *Etruscan dress*. 2nd ed. Baltimore: Johns Hopkins University Press.

Cardon, D. 2007. *Natural dyes – Sources, tradition, technology, science*. London: Archetype Publications Ltd.

Cleland, L., G. Davies, and L. Llewellyn-Jones. 2007. *Greek and Roman dress from A to Z*. Oxon/New York: Routledge.

Emery, I. 1966. *The primary structures of fabrics. An illustrated classification*. Washington, DC: The Textile Museum.

Gleba, M. 2008. *Textile production in pre-Roman Italy*. Oxford: Oxbow Books.

Gleba, M. 2017. Tracing textile cultures of Italy and Greece in the early first millennium BC. *Antiquity* 91 (359): 1205–1222.

Gleba, M., and U. Mannering. 2012. *Textiles and textile production in Europe from prehistory to AD 500*. Oxford: Oxbow Books.

Good, I. 2001. Archaeological textiles: A review of current research. *Annual Review of Anthropology* 30: 209–226.

Larsson Lovén, L. 1998. Male and female professions in the textile production of Roman Italy. In *Textiles in European archaeology. Report from the 6th NESAT symposium, 7–11 th May 1996 in Borås*, GOTARC series A, 1, ed. L. Bender Jørgensen and C. Rinaldo, 73–78. Göteborg: Göteborg University.

Lee, M.M. 2015. *Body, dress, and identity in ancient Greece*. New York: Cambridge University Press.

Liu, J. 2009. *Collegia Centonariorum: The guilds of textile dealers in the Roman West*. Leiden: Brill.

Scheid, J., and J. Svenbro. 1996. *The craft of Zeus: Myths of weaving and fabric*. Trans. C. Volk. Cambridge, MA: Harvard University Press.

Seiler-Baldinger, A. 1994. *Textiles, a classification of techniques*. Bathurst: Crawford House.

Spantidaki, Y., and C. Moulhérat. 2012. Greece. In *Textiles and textile production in Europe from prehistory to AD*

500, ed. M. Gleba and U. Mannering, 182–200. Oxford: Oxbow Books.
Wild, J.P. 2000. Textile production and trade in Roman literature and written sources. In *Archéologie des textiles des origines au Ve siècle, Actes du colloque de Lattes, oct. 1999*, Monographies Instrumentum 14, ed. D. Cardon and M. Feugère, 209–213. Montpellier: Éditions Monique Mergoil.

Further Reading

Jenkins, D. 2003. The Greeks. In *The Cambridge history of western textiles, volume 1*, ed. I. Jenkins, 70–76. Cambridge: Cambridge University Press.
Weiner, A.B.., and J. Schneider, eds. 1989. *Cloth and human experience*. Washington/London: Smithsonian.

Domestic Architecture, Roman

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Introduction

The archaeological remains of Roman houses constitute one of the world's most common types of archaeological monument. Thousands of cities, each full of houses, were drawn together in a Mediterranean empire that stretched from northern Britain to Mesopotamia. These towns and their territories created a dense architectural landscape of palaces, town-houses, shops, villas, and farms. The remains of this architecture form a rich archaeological resource that continues to excite a wide public interest. As a consequence, the excavation, research, and management of Roman houses represent a major undertaking in those parts of the world that fell within the orbit of Rome (including much of Europe, North Africa, and Western Asia).

Although most domestic buildings in the Roman world were the modest homes of subsistence farmers, built following local vernacular traditions, elite residences were fashioned to provide an impressive setting for the conduct of familial, social, and commercial life. This involved a lavish investment in architectural magnificence: both in the scale of private residences as well as in luxurious display through features such as mosaics, wall paintings, sculptures, fountains, private baths, and gardens. There is considerable variety to this material, since each dwelling place was an individual artifact, built and rebuilt to serve the changing needs of different generations of owners and occupants. There are consequently many different types of Roman house, just as there were many different ways of being Roman.

Different regional identities and common world-views were represented in the layout and decoration of Roman houses. Elements of meaningful design include the way in which space was organized, encouraging the study of issues such as household organization and changing approaches to privacy and public life, as well as the intentionally vocal elements of art and design in both house and garden. The study of domestic architecture also draws us into the study of the building industry, both as an economic activity and as part of the history of technology, including specialist domains such as Roman carpentry (Ulrich 2006), tile roofing (Wikander 1988), earthen architecture (Lasfargues 1985), wall painting (Leach 2004), and stonemasonry (Adam 2003).

Definition

The Roman Atrium House

The study of the Roman house (Latin *domus*) has long been dominated by the spectacular remains of Pompeii and Herculaneum, interpreted through the lens provided by the writings of Roman authors, in particular Vitruvius. In its archetypal form (illustrated by the House of Pansa at Pompeii, Fig. 1) the Pompeiian house was characterized by an emphasis on visual lines of axial symmetry. The original focus of household activity was the central hall or atrium around which other rooms were arranged. Although Vitruvius describes a variety of arrangements, the atrium was usually covered by a roof which sloped

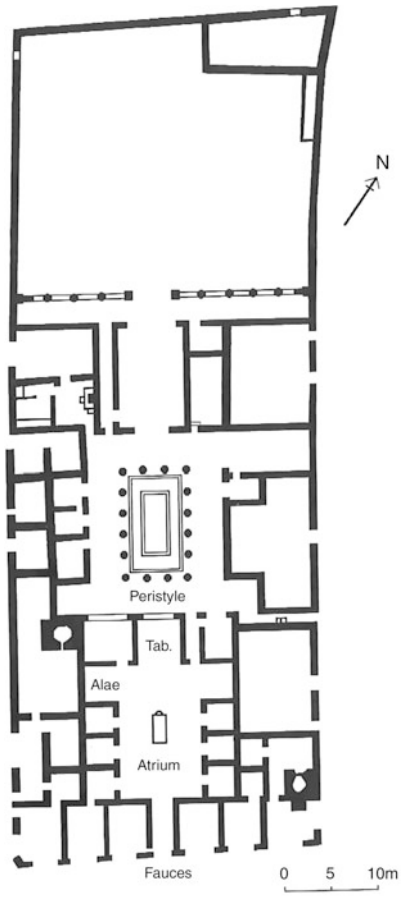

Domestic Architecture, Roman, Fig. 1 Plan of the House of Pansa, Pompeii

down to a central opening (*compluvium*) beneath which a rectangular basin (*impluvium*) was placed to catch rainwater. The ideal atrium was reached by a narrow entrance from the street (*fauces*) facing a principal reception room (*tablinum*), and flanked by wings (*alae*) and small rooms (*cubicula*) (Vitruvius *de Architectura* 6; Granger 1931–1934). By the time of eruption of Vesuvius in 79 CE, the main reception rooms of larger Pompeiian houses had been transferred to colonnaded gardens (peristyles) toward the rear of the house, where the principal dining room (*triclinium*) was located. These buildings offer invaluable information in understanding how Roman society functioned (Wallace-Hadrill 1994), but are not the whole story. The houses buried at Pompeii were the product of the social arrangements of a particular time and place, and this architecture is not necessarily representative of what was happening elsewhere in the Roman world.

The Roman Courtyard House

Rome grew to power within a Mediterranean world already dominated by complex urban societies in which private houses played a key role. Some of the most influential developments in domestic architecture accompanied the political changes of fifth century BCE Greece (Nevett 2010). Several local varieties of urban courtyard house were evident at this time, following standardized plans suggestive of democratic equality. Most houses included rooms intended for ritualized dinner parties (*symposion*) where men came together in wine-lubricated debate that helped build political bonds. The design of these buildings drew on ideas of wider currency, inspired in part by earlier architectural developments in Syria and the Near East, and may have provided a model for subsequent developments in Italian domestic architecture. Recent excavations have uncovered evidence of an early form of Pompeiian house ("row-house") built around open central courtyards rather than the roofed atria familiar from later periods (Wallace-Hadrill 1997). Similar buildings have been found in colonies such as Cosa, where the earliest examples also date to the third century BCE (Sewell 2010). This early type of house appears to have been modeled on the Greek courtyard house, but also shows a clear affinity with atrium houses. In other words, the distinction drawn between Roman and Greek domestic architecture has been exaggerated, following the interest of authors such as Vitruvius in establishing rhetorical contrasts to emphasize Roman virtues (Hales 2003).

The Roman Peristyle House

The dialogue of architectural influence between Greece and Rome has been given particular attention in studies of the use of peristyle courtyards in Roman houses. In Roman Italy, the introduction of the peristyle to the atrium house is generally dated to the second century BCE, where these

colonnaded porticoes were initially associated with gardens toward the rear of the house rather than being surrounded by reception rooms. This has occasioned the suggestion that they were inspired by the public architecture of the *gymnasia* (Dickmann 1997), although it is likely that these borrowings from public architecture first took place in Hellenistic palaces (Nielson 1999).

While columned porches were a feature of most types of courtyard house, the full peristyle – involving columned galleries surrounding all four sides of central inner courtyard – came to prominence in the late fourth century BCE Macedonian palace at Vergina. This building not only inspired the elite residences of the Hellenistic kingdoms, but influenced the design of early Imperial palaces built on the Palatine hill in Rome from the time of Nero's Golden House (*Domus Aurea*) onwards (Ball 2003). The design of these buildings gave emphasis to audience rooms and the public display of luxury, using a wide range of references drawn from Hellenistic art and architecture. It was this form of Hellenistic architecture, laid out around central peristyle courtyards, which eventually characterized the domestic architecture of the Roman provinces. This is strikingly evident in the design and layout of the late first century CE Roman villa at Fishbourne in Britain: this most Roman of buildings drew clear inspiration from Macedonian palatial architecture but lacked many of the features of the Italian atrium house. Even in Italy itself, the atrium house fell from fashion, to be replaced by the central courtyard peristyle house, in a process that started in the late first century CE (Baldini Lippolis 2002).

The Roman *Medianum* Apartment

Another much-studied type of domestic architecture is evidenced by the multistoried apartment blocks of Rome and Ostia known as *insulae* (Barton 1996: 3). This form of residential architecture was probably developed in response to increased population densities in Rome in the first century BCE, and given further impetus by developments in concrete construction in the first century CE. These apartments provided rented accommodation to a range of tenants. A typical layout involved three sides arranged around a central rectangular room, known as the *medianum* (DeLaine 2004). This space had large windows opening toward a street or courtyard providing the main source of light. The principal rooms, sometimes with mosaics and painted walls, were located at the ends of buildings. Interior design suggests that the paintings came with the building, and were not commissioned by the individuals who took occupancy, suggesting that those who rented such accommodation – even if from an aristocratic background – did not use interior design to draw attention to individual achievement.

The Roman Provincial House

Although the establishment of the Roman empire, and the adoption of common approaches to elite architecture based on the peristyle house, fuelled homogenizing tendencies in Mediterranean architecture, it is important to stress the abiding importance of different local traditions. Social competition depended on a common language of design, which provided universal terms of reference for the conduct of polite social behavior, but also encouraged a creative engagement with that language. Architectural arguments within the different corners of the Roman empire referred to Rome, but were essentially local. It is consequently the case that the houses of Roman Silchester were visibly and recognizably different to the houses of the neighboring Verulamium – although both housed facilities that were designed and arranged in ways that were distinctly Roman (Perring 2002). For this reason, the double-tower houses (*Oikia dipurgia*) of Roman Egypt were very different from the winged-corridor villas of the Roman north-western provinces: although in both cases, the defining feature of the building type was an interest in establishing an impressive and symmetrical house façade. Archaeological classifications give us many dozens of different types of buildings that can all be called Roman houses. There is no space here to examine the full range of types and influences, but in addition to the themes already alluded to here, it is also important to note the export of urban ideas to the countryside represented by the Roman villa,

where the influences of late Hellenistic design were particularly strong. The different circumstances of country living encouraged the development of new forms of architecture, that in turn contributed to how wealth and status came to be displayed in town (as also evidenced by the architecture of Nero's Golden House). In frontier provinces, the houses built within Roman forts also provided an important model in regional approaches to house design (Barton 1996).

Historical Background

Modern study of the architecture of Roman houses builds on the scholarly rediscovery of the writings of Vitruvius, published in the fifteenth century, and explorations at Pompeii from the mid eighteenth century onward. Large-scale investigations of other Roman towns and villas became a feature of nineteenth century antiquarianism, and generated a large body of excavation reports that has grown substantially with the results from more recent rescue excavations. These reports have been supplemented by specialist studies of decorations, in particular mosaics and wall paintings, and most recently by detailed typological studies of different aspects of building fabric (e.g., ceramic building materials, carpentry, etc.). The scale and range of this body of material makes synthesis difficult (although see de Albentiis 1990; Gros 2001; Ellis 2002). Most of the published material describes the decoration and layout of excavated Roman buildings, with a particular emphasis on typological development.

Scholarship has developed apace since 1990, encouraged in part by the quality of the new descriptive detail available from excavation and survey, by a greater willingness of both ancient historians and archaeologists to critically explore the relationship between text and material culture, and – in particular – by an increasing awareness of the value of spatial theory to the study of social change. Roman domestic space was designed to provide a setting for structured social encounters, and thereby helped to produce and reproduce social relationships. Recent work has concentrated on connections between specific spatial configurations, modes of behavior, and their associated ideologies. Houses were built to carry messages, and it has become fashionable to treat them as texts to be read. In this way, contemporary study of Roman domestic architecture contributes to research into the formations of Roman power both within the household, in civic life and in economic relations.

Key Issues/Current Debates

Architecture, Text, and Material Culture

It remains the case, however, that our reading of the evidence is shaped by the expectations that we bring to the exercise. For instance, it has recently been shown that pioneering studies of the architecture of late antiquity owed most to assumptions about the increasingly hierarchical nature of late antique society derived from ancient sources, thereby failing to give adequate attention to the evidence of peer competition which showed continuity with the earlier Roman period (Bowes 2010).

A principal concern of recent research is the relationship between the architectural remains, and the ancient texts that describe buildings and the activities that they housed. Excavation reports are littered with terms drawn from ancient sources, used first to identify and then give meaning to different types of feature, room, and building type. This modern use of these ancient terms is frequently confused, often anachronistic and has occasionally encouraged an over-static view of how ancient houses worked. Vitruvius was not writing to help archaeologists understand ancient houses, but to set out his own views on how houses should be built and why. His views were not necessarily those of the Pompeiian aristocrats whose houses we can visit, or of those who used these buildings and contributed to their design. It has consequently been suggested that we should renounce biased textual evidence as a means to understanding how Roman space functioned, relying instead on the quantifiable attributes of finds distributions supplemented by the evidence of fixtures and fittings within the house (Allison 2004). These data illustrate how the front halls of

Pompeiian houses, normally identified as atria, were put to different and sometimes contradictory uses. It is probable that such rooms had different uses at different times, operating to different cycles and involving different casts of players.

There are two problems to this approach. In the first instance, finds distributions within Roman houses are poor indicators of how such buildings were used. Most of the rubbish deriving from daily use would have been swept away in routine household cleaning. The archaeological finds made during the excavation of Roman buildings usually derive from construction deposits, where broken pottery from various sources could be recycled as the foundation of new floors. Destruction horizons are more likely to include objects lost in situ, but the circumstances of abandonment and destruction are far from typical. Secondly, the evidence of the written sources offers unique insight into contemporary perceptions of the purpose and meaning of domestic space. The study of domestic architecture benefits from differently constituted primary sources, all of which are valuable to research (Stewart 2008). These include spatial analysis, finds distributions, textual sources, and interior design. Mosaic pavements, wall-paintings, and sculptures help describe – at least allusively – the cultural identity and cosmological views of their patrons. Our reading of this evidence finds added meaning in the narrative dialogue offered by the sequencing, location, and intervisibility of different images. Further social and economic data – sometimes less consciously deployed than other aspects of design – are embedded in building fabric, as in the different traditions in roof design and carpentry, and the use of particular types of concrete construction (such as *opus africanum* and *opus reticulatum*).

The Construction Industry and Building Technology

The ancient world was transformed by changing approaches to construction techniques. In most traditional societies, houses are comparatively short-lived structures, intended to serve the needs of a single generation of use before being replaced. There is consequently an emphasis on timber and earthen constructions, based on low-cost locally available materials that are easily recycled. The use of property in the support of political power, and as a basis for taxation and rent, helped to change attitudes to property and contributed to the commodification of domestic buildings. The importance of managing buildings as property, and of resolving conflicts over basic resources such as water and light, is illustrated by the attention given to these subjects in late antique legislation – which forms an important body of evidence for the study of Roman domestic architecture (Saliou 1994). In the north-west provinces, changes in the perceived value of domestic property can be seen in the way in which the ephemeral timber constructions that characterized the earliest urban settlements came to be replaced by more permanent houses of brick and stone. Short-lived timber houses, some involving sophisticated carpentry and expensive interior decoration, required replacement every decade or so. The architects of these houses were perfectly capable of designing more durable structures, but did not see the need to do so. The subsequent decision to invest in more durable materials and structures reflects on the growing importance of real estate as a means of accumulating wealth and representing power. In the towns of Roman Britain, the pattern of development involved a shift from timber architecture (involving timber framing), to earthen architecture based on Gallo-Roman tradition, to masonry and concrete constructions.

This investment in structural permanence permitted and encouraged more elaborate spatial designs. Developments in concrete construction allowed for innovative and experimental approaches, as pioneered in the imperial architecture of Rome, and reinforced the trend toward more complex forms of building design – as in the use of apsidal and curved spaces, and of vaults and multistoried buildings.

The Origins of the Atrium House

Considerable attention has been given to the subject of where and when the atrium house first emerged (Wallace-Hadrill 1997). This is part of the continuing debate over the relative importance of imported (Greek) and local (Italic) contributions to Roman domestic design. Studies have

given undue significance to the presence of the *compluviate* roofed court around which other rooms were arranged. The key feature, from an archaeological point of view, is the *impluvium* (water basin) at the center of the room. This was not simply a decorative feature but an important part of water management. One of the benefits of building houses around central courtyards is the way in which the inwardly sloping roof arrangements captured and funneled all of the available rainfall, which could then be channeled toward underground cisterns. Prior to the introduction of aqueduct-fed water supply, rare in most cities before the first and second centuries CE, this was how households obtained their drinking water. The *compluviate* roof managed water supply in the same way but with even greater efficiency, and also allowed for the central area to be covered.

The standard evolutionary account, following Roman authors such as Vitruvius and Varro, has the *impluviate* central space as the original Italic characteristic. Archaeologists have found supporting evidence in the layout of houses in the fifth century Etruscan colony at Marzabotto, which had cruciform plans reminiscent of the atrium-*tablinum*-*alae* design. It seems likely that Roman houses were, indeed, influenced by these earlier Etruscan houses. What is not so certain is that this is where the *compluviate* atrium was first elaborated. Wallace-Hadrill (1997) draws our attention to three key features within the available evidence: firstly, the *impluvium* basin was a water-management feature that could be as useful in an open court as in a room with a *compluviate* roof; secondly, the evidence of "row-houses" at Pompeii and Cosa (summarized above) shows that many houses previously thought to have had covered central halls (known from Vitruvius as *displuviate* atria) were actually courtyard houses; and thirdly, changes to the drainage arrangements show that some Pompeiian atria started life as open central courtyards before the addition of *compluviate* roofs. The emerging model is one in which the *compluviate* atrium seems likely to have been an elaboration of the central courtyard that gained prominence in the course of the fourth/third century BCE as Rome and its allies developed new styles of housing in the formation of new models of Roman urbanization (Sewell 2010). This new architecture also found its place in the countryside. Excavations at the Auditorium site outside Rome have shown that the farm here was completely rebuilt in the late third century as an atrium villa. Here the introduction of the atrium was not the product of gradual evolution, but represented the imposition of an entirely new concept.

The House and Social Life

We now turn our attention from the house as artifact, subject to typological classification, to the social meanings that can be read from architectural design. A recurring theme in recent research has been the pivotal role of the private house in public life (e.g., Wallace-Hadrill 1994; Cooper 2007). Modern distinctions between private and public do not easily transfer to the ancient world, where public affairs were also private matters. The main focus of recent scholarship has been the role of the house as a setting for the ritualized social encounters from which political and economic life was built. The development of more complicated house-types was a product of the social complexity that came with the foundation of cities and formation of states. The Roman Empire depended on cities as vehicles of taxation and control, and as fora for the networks of patronage and dependency that sustained authority. Power in such places was mediated through individuals and therefore centered on the *domus*, which was designed to enhance the status and authority of the head of the household.

Roman authors describe two particular social events that routinely took place in the Roman house: the morning *salutatio*, when clients attended the head of the household, and the evening banquet when friends and colleagues were entertained in dining rooms. Domestic architecture was fashioned around these reception activities. Audience rooms found nearer to the entrance to the house – such as the atrium and *tablinum* – were used as formal settings for the morning *salutatio*. In contrast, dining rooms were usually set toward the rear of the property where they were arranged to best exploit available light, sometimes commanding views over formal

gardens or the wider landscape. These dining rooms were commonly found in relatively low-status buildings, and were as much a feature of the commercial premises ("strip buildings") of Roman London as of the atrium-peristyle houses of Pompeii. Decorated porticoes and corridors guided privileged guests toward these more intimate parts of the house, in a processional approach to space that became even more pronounced in the houses of late antiquity. Private bath houses were also a feature of the reception space of later Roman houses, and especially of country villas. These facilities were often placed on the opposite and more public side of the house to the rooms most likely to have housed the supper parties. Colonnades and porticoes were used to link these opposed and contrasting reception areas, in a form of spatial dialectic. The importance of these different reception facilities – audience halls, dining rooms, porticoes and peristyles, and bath houses – is illustrated by the disproportionate amount of space that they took up within the house, by the expense of their decoration, and by the fact that these were the rooms most likely to be extended and improved during the life of a property.

In all parts of the Roman world, and at a range of different dates, one of the most common forms of architectural alteration involved the addition of a peristyle or portico: such features were added to internal courtyards, to form new building façades, or to create garden colonnades (Perring 2005). These colonnades drew inspiration from the public architecture of the *gymnasia* and were usually built in association with dining rooms. The portico mediated between human and natural domains: a metaphorical opening from the house into the natural and therefore divine. The garden was important symbolic space, with fountains and ponds located to command the views that obtained from the dining room. The design of this part of the house was perhaps modeled on the dialectical contrasts that could be drawn between the rational debate of the *gymnasium* (in the peristyle) and the irrational discourse of the wine-fuelled supper party (in the dining room). In many houses, a square room – sometimes containing water features – was placed opposite the dining room projecting into the garden beyond. Although differently designed, this was a feature of many different provincial traditions (from North Africa to Britain). Dickmann (1997) has identified the Pompeian version of this space with the *exedra*: a place for meetings, readings, debate, and study. The spatial arrangement adds emphasis to the relationship between dining room, colonnade, and garden. The room identified as an exedra allowed for a form of synthesis between the contrasts posed between rational space (colonnade) and irrational space (dining room), and between human and natural worlds (house and garden). The presence of fountains and other water features in some such rooms reinforces the sense that this space straddled a conceptual boundary between human and divine.

Above all else houses can be read as statements of cultural affiliation. Different layers of meaning can be obtained from the ideas made explicit in the cultural references used in interior design, and implied by uses of space that reflected on particularities of family and household structure. While much recent research in Italy and the eastern Mediterranean has been concerned with the dialogue between Roman and Greek identities, work in the western provinces has been dominated by a concern with the way in which conquered provinces and provinces came to adopt Roman fashion. Roman aristocrats drew on a range of values intended to reinforce their prestige among their clients, friends, and peers. These values were likely to include those of Roman imperial authority, rooted in Roman history but influenced by the Augustan interpretation of hellenistic models, as well as those more directly derived from Greek philosophy. These values were developed through local competition, and were consequently expressed in local idiom. Roman identity was negotiated, and part of a plurality of coexisting identities (Hales 2003).

A core topic of recent research is the nature and structure of the Roman household, where the evidence of domestic architecture has been drawn upon to reconstruct social arrangements (Rawson 2011). It is difficult, however, to recognize the family as a social unit in the plans of Roman domestic buildings. Indeed, it usually

requires a considerable degree of speculative reconstruction to find boundaries between properties and households within the Roman housing block, since the only intervention needed to create two separately tenanted units from one former property is a lock on a door. Archaeology cannot usually tell us which thresholds were barriers and which were portals.

The common pattern of urban living involved a mixed distribution of the houses, apartments, and shops. We know from inscriptions at Pompeii that the owners of property could let out residential accommodation on upper floors, and in shops along street frontages. In most cities, the rich lived surrounded by their dependants: by slaves and freedmen, clients, and tenants. This community was the source of both social and economic power. As patrons and investors, urban aristocrats were actively involved in most aspects of the urban economy. This economy involved a significant degree of workshop production, and there was no clear distinction between industrial and domestic premises.

Several groups could be placed under one roof forming a "houseful" of potentially unrelated individuals such as friends, lodgers, servants, or slaves. Women and children are notoriously difficult to find in the spatial data. Attempts have been made to find the echo of gender distinctions in Roman houses, represented in the different pathways that might have helped limit and control encounters between outsiders and family members (Nevett 2010). These are not entirely convincing, since different access arrangements might equally have accommodated the different needs of important guests gaining honored entry through the front door, and those of slaves and tradesmen making a less conspicuous entry. Household slaves are equally difficult to locate within the archaeology of the house. We assume that these invisible communities made use of attics and work-rooms, sleeping at the foot of a master's bed or in the kitchen. The duplication of residential-suites in some buildings, notably in the villas of the western provinces, might illustrate the provision of separate quarters of near equal status for both lord (*dominus*) and lady (*domina*) of the household.

The End of the Roman House

The houses of late Antiquity have also become the focus of recent research (Lavan et al. 2007; Bowes 2010), with a particular focus on the introduction and development of more lavish and specialized reception facilities. The proliferation of such houses in the fourth and fifth centuries followed the expansion of imperial bureaucracy in the economic and social reforms of Diocletian and Constantine. This investment reflected on an intense aristocratic competition, given impetus by new avenues for advantage obtained through imperial honors and service. The growing importance of Christianity within the households of the later Roman empire, and the consequent emergence of Christian types of houses (including Episcopal houses), is a related theme of current academic interest. The early development of Christian architecture drew on the architecture of the private dining in the later Roman aristocratic house, which is the likely source of inspiration for the design of the apsidal-ended Christian basilica.

In the western empire, Roman styles of housing ceased to have social and political relevance with the failure of Roman administrations and the decline of Roman cities. In the eastern Mediterranean, patterns of use were also changing, and by the late sixth century, many grand houses had been subdivided and redesigned against a different form of occupancy. Despite such changes, Byzantine and early Islamic houses continued to be built in ways that would have been familiar to Roman aristocrats.

Future Directions

Academic research is well served by the large body of excavated data already available, and will continue to benefit from rescue excavations in modern cities built over the sites of Roman ones. This will allow for further refinements in understanding chronologies of change, and in defining particularly local features of design that shed light on regional and civic identities. There is most scope for such work in those areas of the Roman world that were neither particularly Italian nor Greek. We can anticipate wider interest

among students of Roman domestic architecture in the contribution made by the provinces formed within the former territories of the Achaemenid empire, within the Phoenician states, and in Punic North Africa. There is also a considerable scope for more advanced study into the building industry as a sector of the ancient economy, based on the quantitative data that can be obtained from the fabric of individual buildings.

The greatest challenges, however, are those that attach to the conservation needs of Roman buildings. The collapse of the house of the Gladiators in Pompeii in 2010 drew worldwide attention to the vulnerability of these buildings. Conservation issues will absorb an ever-increasing share of the available funding, and this will in turn inspire new areas of research.

Cross-References

- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman
- ▶ Romanization
- ▶ Symposion
- ▶ Urban Planning, Roman
- ▶ Vicus
- ▶ Villas and Farms in the Mediterranean World

References

Adam, J.-P. 2003. *Roman building: Materials and techniques*. London: Batsford.

Allison, P.M. 2004. *Pompeian households. An analysis of the material culture*. Los Angeles: Cotsen Institute of Archaeology, University of California, Los Angeles.

Baldini Lippolis, I. 2002. *La domus tardoantica: forme e rappresentazioni dello spazio domestica nelle città del Mediterraneo*. Bologna: Bologna University Press.

Ball, L. 2003. *The domus aurea and the Roman architectural revolution*. Cambridge: Cambridge University Press.

Barton, I.M. 1996. *Roman domestic buildings*. Exeter: University of Exeter Press.

Bowes, K. 2010. *Houses and society in the later Roman Empire*. London: Duckworth.

Cooper, K. 2007. Closely watched households: Visibility, exposure and private power in the Roman domus. *Past & Present* 197: 3–33.

De Albentiis, E. 1990. *La casa dei Romani*. Milan: Longanesi.

Delaine, J. 2004. Designing for a market: Medianum apartments at Ostia. *Journal of Roman Archaeology* 17: 146–176.

Dickmann, J.-A. 1997. The peristyle and the transformation of domestic space in Hellenistic Pompeii. In *Domestic space in the Roman world: Pompeii and beyond*, ed. R. Laurence and A. Wallace-Hadrill, 121–136. Portsmouth: Journal of Roman Archaeology.

Ellis, S. 2002. *Roman housing*. London: Duckworth.

Granger, F. 1931–1934.*Vitruvius De architectura*. 2 vols. London: Heinemann Loeb.

Gros, P. 2001. *L'Architecture romaine II. Maisons, villas, palais et tombeaux*. Paris: Picard.

Hales, S. 2003. *The Roman house and social identity*. Cambridge: Cambridge University Press.

Lasfargues, J., ed. 1985. *Architectures de terre et de bois. L'habitat privé des provinces occidentales du monde romain*. Documents d'Archéologie française 2. Paris: Maison des Sciences de l'Homme.

Lavan, L., L. Özgenel, and A. Sarantis, eds. 2007. *Housing in late antiquity. From palaces to shops*. Leiden/Boston: Brill.

Leach, E.W. 2004. *The social life of painting in ancient Rome and on the Bay of Naples*. Cambridge: Cambridge University Press.

Nevett, L.C. 2010. *Domestic space in classical antiquity*. Cambridge: Cambridge University Press.

Nielson, I. 1999. *Hellenistic palaces: Tradition and renewal*. Aarhus: Aarhus University Press.

Perring, D. 2002. *The Roman house in Britain*. London: Routledge.

Perring, D. 2005. Domestic architecture and social discourse in Roman towns. In *Roman working lives and urban living*, ed. A. MacMahon and J. Price, 18–28. Oxford/Oakville: Oxbow Books/David Brown Bk. Co.

Rawson, B., ed. 2011. *A companion to families in the Greek and Roman worlds*. Chichester/Malden: Wiley-Blackwell.

Saliou, C. 1994. *Les lois des bâtiments: voisinage et habitat urbain dans l'empire romain: recherches sur les rapports entre le droit et la construction privée du siècle d'Auguste au siècle de Justinien*. Beirut: Institut français d'archéologie du Proche-Orient.

Sewell, J. 2010. *The formation of Roman urbanism, 338–200 B.C.: Between contemporary foreign influence and Roman tradition*. Portsmouth: Journal of Roman Archaeology.

Stewart, P. 2008. *The social history of Roman art*. Cambridge: Cambridge University Press.

Ulrich, R.B. 2006. *Roman woodworking*. Yale: Yale University Press.

Wallace-Hadrill, A. 1994. *Houses and society in Pompeii and Herculaneum*. Princeton: Princeton University Press.

Wallace-Hadrill, A. 1997. Rethinking the Roman atrium house. In *Domestic space in the Roman world: Pompeii and beyond*, ed. R. Laurence and A. Wallace-Hadrill, 219–240. Portsmouth: Journal of Roman Archaeology.

Wikander, O. 1988. Ancient roof tile – Use and function. *Opuscula Atheniensia* 17: 203–216.

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Domestication Syndrome in Plants

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Introduction

The evolution of domesticated forms of plants involved the selection of traits that were suited to the human rather than the wild environment. The types of traits that are selected have been similar across different species plants giving rise to the concept of the domestication syndrome. Some controversy still persists about the nature of selection of such traits and the degree of human consciousness involved, although the majority of the field accepts that most traits were probably subject to unconscious selection. It has become apparent in recent years that understanding the nature of the plurality of processes underlying the domestication syndrome is key to understanding the origins of domestication.

Definition

The domestication syndrome can be defined as the characteristic collection of phenotypic traits associated with the genetic change to a domesticated form of an organism from a wild progenitor form. The term "adaptation syndrome" as applied to traits automatically selected through a harvesting regime of cereals was first coined by Harlan (Harlan et al. 1973), and the phrase "domestication syndrome" was first coined by Hammer (1984) a decade later. Typical syndrome traits include the loss of shattering (the ability for a plant to abscise and drop its seeds), changes in seed size, loss of photoperiod sensitivity, and changes in plant physiology and architecture. The concept was developed very much with cereals in mind but has been extended to other plant types as well, usually with traits that had already been recognized in cereals. For instance, tree species have often undergone a thinning of the pericarp under domestication, and pulse and tuber-forming species have reduced toxin content.

Key Issues/Current Debates/Future Directions/Examples

Understanding how the domestication syndrome traits arose has become key to understanding the origins of domestication itself. There are several reasons for this. Firstly, archaeological evidence in recent years has demonstrated a staggered appearance of traits (Fuller 2007) rather than the previous perception of an effectively synchronous rapid arrival of traits. In the case of cereals and pulses, seed size increases are seen some time before the loss of shattering for instance. This has served to emphasize the plurality of processes involved; different traits are selected by different particular pressures. Secondly, in parallel, in the genomic era of biology, the genetic mechanisms underlying traits are steadily being unraveled (Fuller and Allaby 2009). In some cases, traits are more or less monogenically controlled, such is the loss of shattering, and in other cases, there is polygenic control, such as in the case of seed size, often with pleiotropic effects of genes – genes being involved in more than one function in the plant. In particular, the network of genetic interactions within which a causative genetic locus sits is being better understood, such as the loss of an important component of the circadian clock (the molecular clock that measures day length that most plants and animals require) to achieve insensitivity to day length and so grow in new latitudes (Jones et al. 2008). In short, there is a growing appreciation of the interdependence of the genetic causes of the domestication syndrome, particularly with background genome function.

The drawn-out nature of the arrival of domestication syndrome traits has reopened the debate regarding the role of human agency. In particular, efforts are underway to explore the different human behaviors that give rise to the fixation of various traits (Fuller et al. 2010). Models are therefore being discussed which actively try to explore the coevolution of humans, both in terms of behavior and in physicality, and plants together. Naturally, this reopens the door to the debate about

consciousness of selection, since it has been argued that while some less obvious traits may be unconsciously selected for, more obvious traits may be part of a different, conscious selection (Abbo et al. 2010). Either way, it is clear that the rise of the domestication syndrome involves both the evolution of plants and humans. This latter has been brought into sharp relief by recent studies on the increase in human alpha-amylase copy number believed to be an adaptation to an increased starch-based diet introduced by agriculture (Perry et al. 2007).

The problems of balancing the plurality and commonality of the causes of the rise of the domestication syndrome have been further highlighted by attempts to measure the strength of selection of very different traits directly from the archaeological record (Purugganan and Fuller 2011). We understand much more about the genetic basis for traits such as seed size (a complex polygenic-controlled trait) and loss of shattering (a simple monogenic trait) and have models about the different selection pressures that most likely drove their fixation (sowing and harvesting practices, respectively), which serves to underline the plurality of the system. However, surprising signs of commonality are also evident in that both traits appear to have been subject to very similar strengths of selection that are very low compared to what may have been previously supposed about the strength of artificial selection and in fact in the range found in instances of "normal" natural selection.

The future challenge is one of integration of quite complex but interdependent factors, outlined in brief here. It remains to be seen whether the domestication syndrome includes pluralities that can be truly separated out and applied in parallel across plant species or whether there are pluralities that have dependence on each other that can only move together.

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Bananas: Origins and Development
- ▶ Barley: Origins and Development
- ▶ Breadfruit: Origins and Development
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Childe, Vere Gordon (Theory)
- ▶ Complex Hunter-Gatherers
- ▶ Darwin, Charles R.
- ▶ Grapes: Origins and Development
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Maize: Origins and Development
- ▶ Manioc: Origins and Development
- ▶ Millets: Origins and Development
- ▶ Near East (including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Pigeon Pea: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Potato: Origins and Development
- ▶ Rice: Origins and Development
- ▶ Sweet Potato: Origins and Development
- ▶ Wheats: Origins and Development
- ▶ Yams: Origins and Development

References

Abbo, S., S. Lev-Yadun, and A. Gopher. 2010. Agricultural origins: Centers and noncenters; a Near Eastern appraisal. *Critical Reviews in Plant Sciences* 29: 317–328.

Fuller, D.Q. 2007. Contrasting patterns in crop domestication and domestication rates: Recent archaeobotanical insights from the Old World. *Annals of Botany* 100: 903–909.

Fuller, D.Q., and R.G. Allaby. 2009. Seed dispersal and crop domestication: Shattering, germination and seasonality in evolution under cultivation. In *Fruit development and seed dispersal*, *Annual plant reviews*, ed. L. Ostergaard, vol. 38, 238–295. Oxford: Wiley-Blackwell.

Fuller, D.Q., R.G. Allaby, and C. Stevens. 2010. Domestication as innovation: The entanglement of techniques,

technology and chance in the domestication of cereal crops. *World Archaeology* 42: 13–28.
Hammer, K. 1984. Das Domestikationssyndrom. *Kulturpflanze* 32: 11–34.
Harlan, J.R., M.J. De Wet, and E.G. Price. 1973. Comparative evolution of cereals. *Evolution* 27: 311–325.
Jones, H., et al. 2008. Population based re-sequencing reveals that the flowering time adaptation of cultivated barley originated east of the Fertile Crescent. *Molecular Biology and Evolution* 25: 2211–2219.
Perry, G.H., et al. 2007. Diet and the evolution of human amylase gene copy number variation. *Nature Genetics* 39: 1256–1260.
Purugganan, M.D., and D.Q. Fuller. 2011. Archaeological data reveal slow rates of evolution during plant domestication. *Evolution* 65: 171–183.

Further Reading

Allaby, R.G. 2010. Integrating the processes in the evolutionary system of domestication. *Journal of Experimental Botany* 61: 935–944.

Domestication: Definition and Overview

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Introduction

The domestication of plants and animals represents a key turning point in human history. This first foray into genetic engineering created new varieties of plants and animals that could be grown around the world – most often at the expense of other species that remained outside a domestic partnership with humans. The development of agricultural economies based on domesticates is arguably the central factor in the loss of global biodiversity. It transformed earth's landscapes and its atmosphere. It fueled a population explosion of agro-pastoralists and has been a cornerstone of increasingly complex societies around the world. Understanding when, where, how, and, above all, why humans and certain plant and animal species began on their journeys into domestication remains an enduring and rewarding area of inquiry of archaeological research.

Answering these central questions requires a solid understanding of just what domestication is – and here there is a decided lack of consensus. Domestication at its heart represents a nexus between the biological world and the cultural. As such it has been a focus of inquiry for biologists, as well as archaeologists and anthropologists, who all bring different perspectives of how to define domestication. Recent advances in our ability to both detect and date the ongoing process of domestication and to trace its impact in both the genotype and phenotype of domesticates point the way to how the cultural and the biological components of this process can be reconciled and brought together in the construction of a definition of domestication that can more effectively guide the pursuit of questions of how, when, where, and why it developed.

Definition

Domestication is defined here as a sustained multi-generational mutualistic relationship in which humans assume some significant level of control over the reproduction and care of a plant/animal in order to secure a more predictable supply of a resource of interest and through which the plant/animal is able to increase its reproductive success over individuals not participating in this relationship (Zeder 2012a).

There are two other terms that require definition here: Agriculture, defined as a subsistence economy based primarily on resources garnered through the propagation and tending of domesticates, and Management, defined as the manipulation of the breeding and/or conditions of growth of a plant or animal, or the environment that sustains it, in order to increase its yield or predictability.

Historical Background

The definition of domestication adopted here represents an attempt to reconcile the different

approaches to defining domestication offered by researchers coming at the subject from different perspectives. All definitions, however grounded, recognize that domestication involves a relationship between humans and target plant/animal populations (Zeder 2006). They differ in the degree of emphasis placed on either the human or the animal side of the equation and the degree to which they portray domestication as a culturally driven process or a biological one.

Some approaches, especially those adopted by researchers focusing on animal domestication, cast humans as the dominant partner in a relationship in which humans, deliberately and with forethought, assume complete control over the domesticate's movement, supply of nutrients, its protection, its distribution, and, above all, its reproduction in order to achieve specific clearly identified goals that service the human community (Clutton-Brock 1994). Many working within this perspective emphasize the degree to which the domesticate becomes incorporated into the socioeconomic dimensions of human societies, either as productive capital (Meadow 1989), or as objects of ownership and vehicles for social relations between human individuals and households (Ingold 1984).

Other approaches, in contrast, define domestication as a symbiotic or mutualistic relationship in which both partners, humans and domesticates, reap benefits. This approach seems to be most common among researchers focusing on plant domestication (Blumler and Byrne 1991), although researchers primarily concerned with animal domesticates have also embraced it (O'Connor 1997). Perhaps the most extreme version of this approach can be found in the work of the late David Rindos (1984), who argued that the mutualism that lies at the heart of the relationship between humans and domesticates is no different from other mutualistic relationships in nature (i.e., that between social insects and a variety of other plants and animals). In fact, Rindos goes so far as to place the balance of power in this mutualism in the hands of the domesticate. According to this view, the domestic relationship confers great evolutionary advantage on the domesticate by raising its evolutionary potential far above other plants and animals outside of a mutualistic relationship with humans. Humans, on the other hand, do not fare as well because they become increasingly dependent on domesticates which offer lower energetic and nutritional returns at higher production and processing costs. This definitional approach, moreover, denies the role of any deliberate or directional intent on the part of humans who become ensnared in a coevolutionary dance with domesticates that effectively lowers their selective fitness.

An effective argument against this more extreme position comes, paradoxically perhaps, from entomologists drawing parallels between attine ant-fungal mutualisms and the relationships between humans and domesticates (Schultz et al. 2005). While these researchers highlight many features of the sustained multigenerational coevolutionary relationship between ants and their fungal gardens that resemble those between human farmers and their crops, they also identify a basic, essential difference that distinguishes the human/domesticate partnership from other mutualistic relationships found in nature. Mutualisms in nature, they note, are shaped by selection operating on random mutations in *both* partners that are passed on, through sexual reproduction, to their immediate descendants. Humans, on the other hand, have the ability to spontaneously invent and adopt new behaviors, or modify old ones, to meet consciously conceived goals. Humans, through social learning, are also able to pass on those innovations judged effective not only to their own offspring but also to others in their immediate group and beyond. The human ability to spontaneously, and with deliberate intent, invent new behaviors to meet consciously conceived goals and to pass these behaviors on through cultural transmission quickly shifts the balance of power in the developing mutualism between humans and developing domesticates far beyond the slowly evolving, balanced mutualisms between ants and fungus, as well as those found within other coevolutionary relationships in the natural world.

The definition offered here recognizes domestication as a form of symbiotic mutualism that, quite aside from questions of the quality of life of

either partner, enhances the fitness of both. At the same time it acknowledges the role of intent-driven human behavior at the heart of the process, making this an essentially asymmetrical form of mutualism in which humans become the dominant partner. Humans may not have foreseen the adaptive responses of target plants and animals to their efforts at promoting the biotic potential of economically useful species, nor could they have envisioned the development of agricultural economies based on the genetically modified varieties of plants and animals that developed as a result of these efforts. But they could, consciously and with intent, decide to influence the distribution, feeding, and reproductive cycle of these species in order to achieve consciously perceived proximate goals of enhancing the supply and, above all, the predictability of these important resources. And it is this driving element of purposeful human behavior that is a central distinguishing feature of domestication.

Portraying domestication as a sustained multi-generational mutualism between humans and target plants and animals shaped by both biological and cultural components requires that we think of domestication as a process that operates on multiple axes on both the plant/animal and the human side of the equation (Fig. 1). On the plant/animal side, a sustained relationship with humans results in genetic changes and their phenotypic expression that take the plant or animal from its wild phenotype and transform it into its domestic one. While directed, or artificial, selection for specific traits is most often thought of here as the major vector of genetic change in domesticates, other less directed factors probably played a greater role in moving plants and animals along this axis. Specifically, both the relaxation of pressures

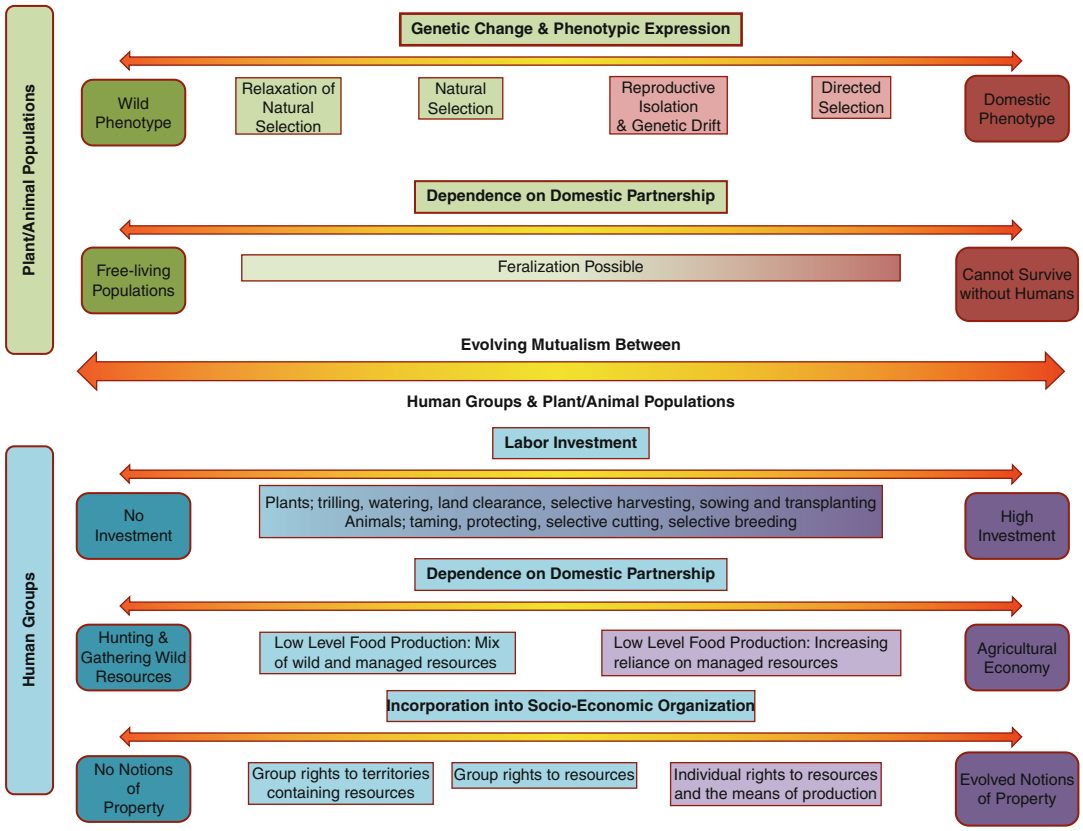

Domestication: Definition and Overview, Fig. 1 Multiple axes of domestication

that operated on the free-living plant or animal and the introduction of a whole new range of selective pressures as it came into closer association with humans are likely major shaping factors during the earliest stages of the process. Reproductive isolation and genetic drift also play major roles in moving the target species along this axis as humans prevent the plants and animals under their care from interbreeding with free-living populations, often by moving these managed resources away from the natural habitats of their progenitors. As the target domesticate precedes along this axis, it may also progress along another axis, moving from a free-living state to one in which some degree of feralization is possible should it leave the domestication relationship, to a plant or animal that is entirely dependent on humans for its reproduction and development.

On the human side of the equation lies an axis that involves the increasing investment of labor in the propagation and care of the target species as humans engage in progressively more intensive activities directed at increasing the yield or predictability of the species. These activities can be classified under the general rubric of *management*, as defined above. The degree of dependence on these managed resources forms another axis on the human side of the relationship as the human group moves from utilizing only free-living resources to the increasing incorporation of managed/domesticated resources into their subsistence economy, culminating in the adoption of an *agricultural economy*, also defined earlier. Another possible axis on the human side of the relationship might involve the degree to which the target species becomes woven into the socioeconomic fabric of the group, here moving from a state in which there are no notions of individual, or group, ownership over a resource or resource territory, to increasingly more defined and individualized notions of rights over resources and the means of producing them.

It is important to recognize that all of these axes are in play during the process of domestication and that the pace and direction that humans and their plant/animal partners progress along any of them varies from case to case. Movement along these axes is shaped by the biological potential and constraints of the target species, the cultural context in which the process takes place, and even accidental happenstance that brings potential domesticates together with receptive human groups at particular times and places. Arrival at all, or even any, of the endpoints of these various axes is not inevitable. In fact, human management of resources most often does not result in the development of phenotypically new varieties (or species) unable to survive outside the domestication relationship. Sustained management of certain resources may not, in fact, result in any genetically driven changes in behavior or morphology that, by some definitions, would qualify the resource as a domesticate. Management activities may remain stable at fairly low levels, without intensifying, for hundreds, if not thousands, of years. There are also many examples of long-lived low-level food-producing economies that are reliant on a diverse range of resources – free living, managed, and fully domesticated – in which domesticates remain minor components, serving more as buffers against leaner times than as major subsistence staples. These economies may persist for millennia without ever becoming full-fledged agricultural economies (Smith 2001). This approach, then, views resource management, domestication, and agriculture as three independent, though related, phenomena that are not linked in a unidirectional way of inevitable progression from one to another. All domesticated resources are managed, but not all managed resources become domesticates. By the same token, agricultural economies by definition focus primarily on the production of domesticated resources, but not all subsistence economies that utilize domesticates become agricultural economies.

When, then, can a managed resource be considered a domesticated one? Is there a clear threshold or line of demarcation that separates the wild from the domestic? Some researchers reserve the mantel of domesticate for those plants and animals which, over successive generations under human management, have undergone changes in their genetic makeup that preclude them from being able to survive and reproduce outside of the domestic relationship with humans (De Wet

and Harlan 1975; Blumler and Byrne 1991). Strict adherence to such a hard-line position would, as most would admit, exclude many clearly domesticated plants and animals that, although they do not revert to the pre-domestic form or behaviors, can survive apart from humans as feral escapes from domestication. Others take a slightly softer line, but still require the domesticate to have undergone genetically driven changes in either morphology or behavior (Meadow 1989) and that it be genetically isolated from populations of its wild relatives (Uerpmann 1996).

Researchers who focus more on the cultural side of the equation are generally less concerned with the genetic or phenotypic impacts on the plant or animal or with defining threshold where wild becomes domestic, emphasizing instead a continuum in human relationships with plants and animals that range from collecting to farming and from hunting to herding (Ingold 1984). Some have argued that the term domestication should be done away with altogether and replaced by a less biologically deterministic one like "cultural control" (Hecker 1982) or by defining a species as domesticated "whenever another species knows how to harvest it" (Terrell et al. 2003).

Once again the definition offered here seeks to chart a middle path through these contrasting approaches. It explicitly does not specify the degree of genetic and phenotypic change required for a managed plant or animal to qualify as a domesticate, nor does it indicate the degree of human investment in the management of the resource, its importance in the subsistence economy, or the extent to which it becomes an object of proprietary ownership needed for a resource to be classified as a domesticate. At the same time it acknowledges domestication as a unique form of human-driven mutualism. By spotlighting the sustained multigeneration relationship between humans and target domesticates, it distinguishes domestication from more casual episodic human-plant/animal interactions, like taming, periodic transplanting or sowing, or harvesting, that do not lead to the long-term coevolutionary relationship that defines domestication. By focusing on this process, rather than any particular threshold or defining criteria that separates the wild from the domestic, it directs attention to the full span of the evolving relationship on both the plant/animal and the human side of the equation and requires that all the different axes of change involved in this process be taken into consideration when trying to trace the course of domestication in any particular instance.

Key Issues/Current Debates

Always a major focus of archaeological inquiry, research on the domestication of plants and animals has seen a special resurgence in recent years thanks to the development of new analytical tools that provide a much more detailed understanding of when, where, and how different plant and animal species were taken into domestication. The development of markers (both biological and cultural) capable of tracing the domestication process is a particularly active area of current research and debate. In part as a result of the more robust understanding of the trajectory and timing of the domestication of different species in different parts of the world gained by the development of these markers, there has also been renewed energy directed toward answering the question of why people and target plants and animals set out on these various pathways to domestication.

Documenting Domestication

Some of the most exciting advances in documenting domestication have come in the form of genetic analyses of both modern and archaeological plants and animals (see Zeder et al. 2006 for a summary and extensive references). Phylogenetic analyses of neutral or non-coding genes have been widely used to (1) determine the wild progenitor species of a current day domesticates, and (2) identify the likely place (or places) of initial domestication. One of the more interesting outcomes of this work is the discovery that for almost all animal domesticates, and many domestic plants, more than one lineage of its wild progenitor was brought under domestication. There are, for example, six domestic lineages of domestic goats, five to six in cattle, and as many as five or more in pigs. The degree to

which these different "domestication events" are truly independent of one another, geographically and culturally, is unclear (Dobney and Larson 2006), but this discovery clearly shows that the process of domestication was more widespread and less centralized than originally thought. Much of this work has been done using modern representatives of domestic crops and livestock and their wild progenitors, where as much as 10,000 years or more of movement, directed breeding, hybridization, and introgression between wild and domestic forms may obscure the picture of the initial process of domestication. Increasingly, however, successful extraction of ancient DNA from archaeological plant and animal remains is allowing more direct insight into the history of domestication for a number of different plants and animals (e.g., Larson et al. 2007).

Especially with the advent of next generation genomic techniques, the specific genes and coding loci that control individual domestic traits are being discovered, giving new insight into the genetic responses of domesticates to human manipulation. These discoveries have been especially impressive in plants where the loci responsible for domestication traits such as the development of the non-shattering rachis in cereals like wheat, barley, and rice, or branching architecture in maize have now been identified. Progress in this direction has been slower in animals, perhaps because identification of genes responsible for the behavioral attributes most involved in animal domestication has proven more elusive, though there has been some progress in this area as well. Moreover, genetic studies of archaeological plant remains are beginning to be able to trace the timing and the trajectory of the development of these domestication traits in crops like maize (Jaenicke-Després et al. 2003), signaling a very promising area for future research.

There have also been significant advances in the development of archaeobiological markers of domestication. Until relatively recently, archaeologists looked to a few archaeologically detectable morphological changes in plant and animal remains as gold standard markers of initial domestication (see Zeder et al. 2006 for discussion and references). We now know that many of these markers may not, in fact, be leading edge indicators of domestication. The appearance of a few cereal grains from non-shattering seed heads can no longer be interpreted as evidence of domestication, since this trait has been documented to occur, in low levels, in wild stands. The dominance of non-shattering cereal rachis in archaeobotanical assemblages, moreover, may reflect a change in harvesting practices that may occur hundreds of years after people began actively sowing harvest seeds from cultivated fields (Tanno and Willcox 2006). The reduction in overall body size once thought to be an almost instantaneous artifact of animal management has been shown instead to be attributable to a shift in the demographics of prey populations reflecting the different harvest strategies of hunters and herders. In fact, we now know that archaeologically detectable changes in the morphology of domesticated animals may only manifest themselves hundreds of years, or more, after humans begin active management of an animal species. There is increasing awareness that significant genetic changes in both plants and animals under human management (i.e., lowering of seed dormancy rates or changes in the timing of maturation, selection for reduced wariness, or changes in coat color in animals) may not manifest themselves in ways that are detectable in the archaeological record. As a result, archaeobiologists are actively looking for new markers capable of detecting these crucial initial stages of the process – changes in the demographics of harvested animals mentioned above, changes in feeding patterns of managed animals detectable through isotopic analysis, epigenetic changes in bones and teeth reflective of reproductive isolation of managed animals, architectural evidence for the keeping of animals or storage of crops, artifacts or residues that point to the use of animal products, the presence of diagnostic plant microfossils (phytoliths and starches) in soils and on artifacts, modifications of landscape to accommodate the needs of transplanted crops, weed assemblages characteristic of cultivated fields, and plastic responses of seeds and other plant structures to artificial watering.

As promising as these new developments are in the genetic, archaeobiological, and archaeological documentation of domestication, it is crucial that those developing and employing these new approaches be able to explicitly link the marker they are using to some aspect of the process of domestication and to explain why the marker in question is an artifact of this evolving mutualism between human and a plant/animal species. There are plenty of examples of markers that have been linked to domestication in a *post hoc* way after they were observed in the archaeological record in assemblages thought to represent initial domestication, only to be discovered later to be attributable to entirely different factors unrelated to domestication (i.e., overall body size reduction in animals). There is still a tendency to engage in this kind of after the fact rationalization of how something observed in the archaeological, or genetic, record might be an artifact of domestication. Continuing development of these promising biological and archaeological techniques for documenting domestication can only make headway if there is an active dialectic that allows us to link our understanding of the process of domestication to the markers we use to trace this process.

Explaining Domestication

The more robust record of domestication produced by these advances in our methodological ability to document transformations in animal and plant species has energized efforts at answering the key question of why humans and plants and animals embarked on these various pathways to domestication (see Zeder and Smith 2009 for summary and references). Recent years have seen a resurgence of models featuring climate change as a major driving force behind plant and animal domestication, either as a response to climate deterioration during the Younger Dryas or as a response to the amelioration and stabilization of climate that followed. Models have been offered that feature the role of domesticates in promoting the ambitions of individuals who seek social promotion, that spotlight religion as key motivating force behind domestication, or that see the seeds of domestication as deeply buried within human cognitive abilities and their use of symbols to navigate and transform the world around them.

Perhaps the most prominent explanatory models offered in recent years are those that characterize domestication as a response to resource depression, usually caused by human demographic expansion, but sometimes due to environmental change. Framed within the precepts of optimal foraging theory, which was originally developed to account for the foraging behavior of animals, the adoption of plant and animal domesticates, with their purportedly lower energetic yields, higher processing costs, and delayed returns, can only be considered less than optimal, lower ranked resources resorted to only when higher yield, more optimal resources are no longer available. This resource depression model has been applied globally to account for the adoption of domesticates and the diversification of the resource base that often precedes it in early and middle Holocene context around the world (see Zeder 2012b for discussion and references).

Recently, however, archaeologists have begun to turn to another school of thought in evolutionary biology, niche construction theory, for an alternative explanatory model for the origins of plant and animal domestication (Smith in press; Zeder 2012b). This model emphasizes the role of humans in manipulating environments and resources within them to increase overall biotic potential. To many it is a better fit with an increasingly better-resolved archaeological record, in which resource diversification and follow-on domestication of certain plant and animal species seem to occur more often in the context of resource abundance and low population levels than in the context of resource depression and population packing.

Regardless of which model proves in the long run to be more useful in accounting for this transition, the richer empirical understanding of how domestication came about in different areas of the world makes it increasingly difficult to posit single lever, prime mover explanatory scenarios for initial domestication. Instead, it is becoming increasingly clear that multiple interacting

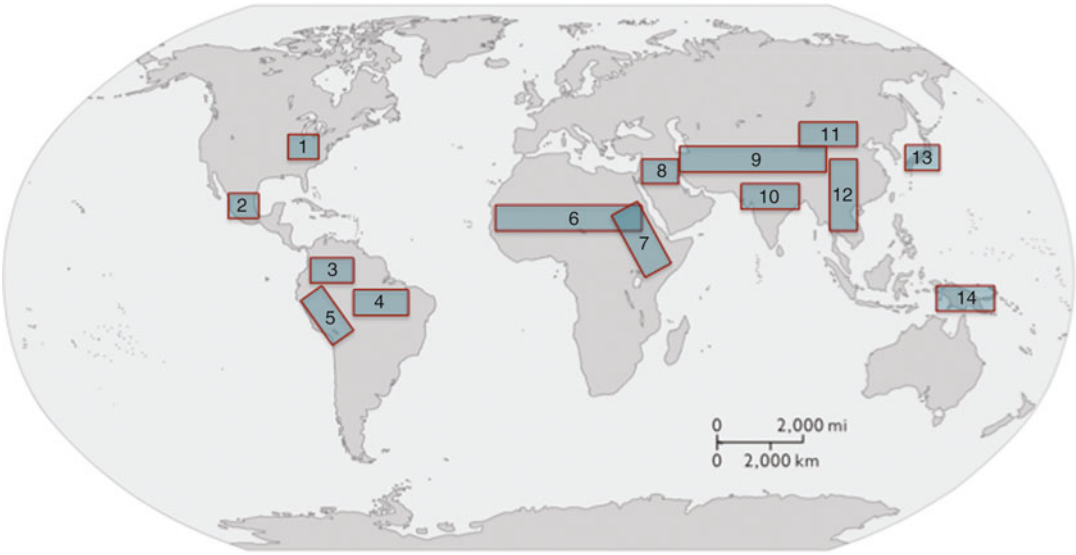

Domestication: Definition and Overview, Fig. 2 Currently recognized areas of domestication of plants and animals with some examples of plants and animals domesticated in each center. (*1*) Eastern North America: chenopodia, squash, sunflower, and maygrass; (*2*) Mesoamerica: maize, squash, beans, and turkeys; (*3*) northern Peru/Ecuador: squash and lima beans; (*4*) Amazonia: manioc, yams, peanuts, and Muscovy duck; (*5*) Andes: oca, potato, quinoa, amaranth, llama, alpaca, and guinea pigs; (*6*) sub-Saharan Africa: pearl millet, sorghum, and African rice; (*7*) Horn of Africa/Nile Valley: asses, taurine cattle?; (*8*) the Near East: wheat, barley, lentils, peas, sheep, goats, taurine cattle, and pigs; (*9*) Central Asia: horses; (*10*) South Asia: browntop millet, water buffalo, and zebu cattle; (*11*) North China: foxtail millet; (*12*) South China/Southeast Asia: rice and chickens; (*13*) Japan: barnyard millet, mung bean, burdock; and (*14*) New Guinea: bananas, yams, and taro. *Note: list of domesticates and areas identified not exhaustive* (Base map courtesy of the National Geographic Society)

factors – environmental, demographic, social, and biological – are responsible for driving this process and shaping its trajectory as it played out in different areas of the world with different plants and animals and human societies.

International Perspectives

Twenty years ago, the prevailing view was that domestication and agricultural economies based on them arose only in a handful centers around the world. The majority of work on origins of domestication and agricultural emergence focused primarily on two world areas – the Near East, primarily in the eastern and western arms of the Fertile Crescent region that stretches from southern Israel to southern Iran; and in Mesoamerica, primarily based on the small soundings in a handful of caves central and southern Mexico. In recent years the number of documented centers of independent domestication has skyrocketed (Fig. 2). Evidence of independent domestication has been documented on essentially every continent, save Antarctica, and the variety of domesticates under study has exploded from a handful of annual crop plants (wheat, barley, corn, rice, pulses) and livestock species (sheep, goat, cattle, pigs) to include a rich array of perennials, tree crops, tubers, mammals, birds, and even fish and shellfish. Moreover, the more fluid understanding of the process of domestication and the role of deliberate human manipulation of plants and animals and their environments has further broadened the global reach of domestication studies to all areas, terrestrial, coastal, and perhaps even marine, where humans and plants and animals have engaged in sustained, multigenerational interactions of the kind that, in the case of certain species, results in their domestication.

Future Directions

Clearly this expansion in the geographical and taxonomic reach of domestication studies signals a bright future for the study of plant and animal domestication. Moreover, the subsequent dispersal of domesticates and the knowledge of how to manage domestic species represents an additional future research frontier, as we try to better understand the rates and vehicles of transmission and the responses of indigenous people to this new technology.

Principle gains in domestication research are most likely to come in the area of documenting domestication as researchers continue to develop analytical methods capable of tracing the unfolding coevolutionary relationship between humans and target plant and animal species that defines domestication. The greatest advances in genetics will most likely come in the ability to extract and amplify DNA from archaeological plant and animal remains. Success in obtaining ancient DNA will vastly clarify the phylogenies of early domesticates, helping further pinpoint the timing, number, and the geographic and cultural contexts of initial domestication. Even more significant will be the ability to trace the evolution of loci responsible for the morphological, physiological, and behavioral responses that plants and animals made to human manipulation as they embarked on their various pathways to domestication.

We can also expect significant advances in the development of archaeobiological and archaeological methods for tracing these pathways. Thus far, much of the initial work in this area has concentrated on developing markers for annual crop plants and a handful of domesticated mammals. Future work will likely expand these efforts to more difficult challenges of discovering markers for the domestication of crop plants which are vegetatively reproduced or to tracking the responses that long-living crops – like tree crops – make to human manipulation. Advances can also be expected in discovering ways to monitor anthropogenic modifications of landscapes as humans try to influence the biotic productivity of local environments. Documenting the domestication of certain animal species that have thus far proven difficult to trace using archaeobiological and archaeological evidence may become possible with an enhanced attention to the likely pathways that these animals and their human partners took into domestication (Zeder 2012b). Expanding the markers of domestication for these species from a limited set of morphological, or even demographic, markers to a wider array of plastic responses and cultural indicators of their care and exploitation may point the way to a clearer understanding of their domestication.

Expanding the geographical scope of archaeological investigations into the origins of plant and animal domestication, coupled with the enhanced tools for documenting domestication, will provide a much needed empirical foundation for the assessment of various explanatory scenarios offered for why humans and their plant and animal partners started down the road to domestication. By being able to construct fine-grained accounts of the trajectory of a wide range of different types of domesticates in different cultural, environmental, and temporal settings, archaeologists will be able look for commonalities and differences in these trajectories, to isolate driving forces that cut across different instances of domestication from more localized factors that shape domestication trajectories in individual cases. This will make it infinitely harder to propose simple, single-lever, one-size-fits-all explanatory frameworks for the origins of plant and animal domestication and will result in a significantly richer, more robust, and more nuanced understanding of this transformative process.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Ali Kosh: Agriculture and Domestication
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Çatalhöyük Archaeological Site

▶ Çayönü: Agriculture and Domestication
▶ Duck: Domestication
▶ Göbekli Tepe: Agriculture and Domestication
▶ Jericho Archaeological Site
▶ Kuk Swamp: Agriculture and Domestication
▶ Millets: Origins and Development
▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
▶ Near East (Including Anatolia): Origins and Development of Agriculture
▶ Phytolith Studies in Archaeology
▶ Turkey: Domestication

References

Blumler, M., and R. Byrne. 1991. The ecological genetics of domestication and the origins of agriculture. *Current Anthropology* 32: 23–54.

Clutton-Brock, J. 1994. The unnatural world: Behavioural aspects of humans and animals in the process of domestication. In *Animals and human society: Changing perspectives*, ed. A. Manning and J.A. Serpell, 23–35. London: Routledge.

De Wet, J.M., and J.R. Harlan. 1975. Weeds and domesticates: Evolution in the man-made habitat. *Economic Botany* 29: 99–107.

Dobney, K., and G. Larson. 2006. Genetics and animal domestication: New windows on an elusive process. *Journal of Zoology* 269: 261–271.

Hecker, H. 1982. Domestication revisited: Its implications for faunal analysis. *Journal of Field Archaeology* 9: 217–236.

Ingold, T. 1984. Time, social relationships and the exploitation of animals: Anthropological reflections on prehistory. In *Animals and archaeology, volume 3: Early herders and their flocks*. British Archaeological Reports, International series 202, ed. J. Clutton-Brock and C. Grigson, 3–12. Oxford: British Archaeological Reports.

Jaenicke-Després, V., E.S. Buckler, B.D. Smith, M.T.P. Golber, A. Cooper, J. Doebley, and S. Pääbo. 2003. Early allelic selection in maize as revealed by ancient DNA. *Science* 302: 1206–1208.

Larson, G., U. Albarella, K. Dobney, P. Rowly-Conwy, J. Schibler, A. Tresset, J.-D. Vigne, C.J. Edwards, A. Schlumbaum, Al. Dinu, A. Balçsescu, G. Dolman, A. Tagliacozzo, N. Manaseryan, P. Miracle, L. Van Wijngaarden-Bakker, M. Masseti, D.G. Bradley, and A. Cooper. 2007. Ancient DNA, pig domestication, and the spread of the Neolithic into Europe. *Proceedings of the National Academy of Sciences of the United States of America* 104: 15276–15281.

Meadow, R.H. 1989. Osteological evidence for the process of animal domestication. In *The walking larder: Patterns of domestication, pastoralism, and predation*, ed. J. Clutton-Brock, 80–90. London: Unwin Hyman.

O'Connor, T.P. 1997. Working at relationships: Another look at animal domestication. *Antiquity* 71: 149–156.

Rindos, D. 1984. *The origins of agriculture: An evolutionary perspective*. Orlando: Academic Press.

Schultz, T.R., U.G. Mueller, C.R. Currie, and S. Rehner. 2005. Reciprocal illumination: A comparison of agriculture in humans and in fungus-growing ants. In *Ecological and evolutionary advances in insect-fungal associations*, ed. F. Vega and M. Blackwell, 149–190. New York: Oxford University Press.

Smith, B.D. 2001. Low level food production. *Journal of Archeological Research* 9: 1–43.

Smith, B.D. in press. A cultural niche construction theory of initial domestication. *Biological Theory.*

Tanno, K., and G. Willcox. 2006. How fast was wild wheat domesticated? *Science* 311: 1886.

Terrell, J.E., J.P. Hart, S. Barut, N. Cellinese, A. Curet, T. Denham, C.M. Kusimba, K. Latinis, R. Oka, J. Palka, M.E.D. Pohl, K.O. Pope, P.R. Williams, H. Haines, and J.E. Staller. 2003. Domesticated landscapes: The subsistence ecology of plant and animal domestication. *Journal of Archaeological Method and Theory* 10: 323–367.

Uerpmann, H.-P. 1996. Animal domestication – accident or intention? In *The origins and spread of agriculture and pastoralism in Eurasia*, ed. D.R. Harris, 227–237. Washington, DC: Smithsonian Institution Press.

Zeder, M.A. 2006. Central questions in the domestication of plants and animals. *Evolutionary Anthropology* 15: 105–117.

Zeder, M.A. 2012a. The broad spectrum revolution at 40: Resource diversity, intensification, and an alternative to optimal foraging explanation. *Journal of Anthropological Archaeology* 31: 241–264.

Zeder, M.A. 2012b. The domestication of animals. *Journal of Anthropological Research* 68: 161–190.

Zeder, M.A., and B.D. Smith. 2009. A conversation on agriculture: Talking past each other in a crowded room. *Current Anthropology* 50: 681–691.

Zeder, M.A., D.G. Bradley, E. Emshwiller, and B.D. Smith, eds. 2006. *Documenting domestication: New genetic and archaeological paradigms*. Berkeley: University of California Press.

Further Reading

Bar Yosef, O., and A. Befer-Cohen. 2002. Facing environmental crisis. Societal and cultural changes at the transition from the Younger Dryas to the Holocene in the Levant. In *Studies in early Near Eastern productions, subsistence, and environment*, ed. R.T.J. Cappers and S. Bottema, 55–66. Berlin: Ex Oriente.

Bökönyi, S. 1989. Definitions of domestication. In *The walking larder: Patterns of domestication, pastoralism, and predation*, ed. J. Clutton-Brock, 1–4. Cambridge: Unwin.

Budiansky, S. 1992. *The covenant of the wild: Why animals chose domestication*. New York: William Morrow.
Cauvin, J. 2000. *The birth of the gods and the origins of agriculture*. Cambridge: Cambridge University Press.
Cohen, M.N. 1977. *The food crisis in prehistory*. New Haven: Yale University Press.
Ducos, P. 1989. Defining domestication: A clarification. In *The walking larder: Patterns of domestication, pastoralism, and predation*, ed. J. Clutton-Brock, 28–30. Cambridge: Unwin.
Harris, D. 1996. Introduction: Themes and concepts in the study of early agriculture. In *The origins and spread of agriculture and pastoralism in Eurasia*, ed. D. Harris, 1–9. Washington, DC: Smithsonian Institution Press.
Hayden, B. 1995. A new overview of domestication. In *Last hunters, first farmers: New perspectives on the transition to agriculture*, ed. T.D. Price and A.-B. Gebauer, 273–300. Santa Fe: School of American Research Press.
Hemmer, H. 1990. *Domestication: The decline of environmental appreciation*. Cambridge: Cambridge University Press.
Hodder, I. 2001. Symbolism and the origins of agriculture in the Near East. *Cambridge Archaeological Journal* 11: 107–112.
Jarman, M.R., and P.F. Wilkinson. 1972. Criteria of animal domestication. In *Papers in economic prehistory: Studies by members and associates of the British Academy major research project in the early history of agriculture*, ed. E.S. Higgs, 83–96. Cambridge: Cambridge University Press.
Kennett, D., and B. Winterhalder, eds. 2006. *Behavioral ecology and the transition to agriculture*, 1–21. Berkeley: University of California Press.
Moray, D. 1994. The early evolution of the domestic dog. *American Scientist* 82: 336–347.
O'Brien, M.J., and K.N. Laland. in press. Genes, culture, and agriculture: An example of human niche construction. *Current Anthropology*.
Piperno, D.R., and D.M. Pearsall. 1998. *The origins of agriculture in the lowland Neotropics*. San Diego: Academic Press.
Price, E.O. 1984. Behavioral aspects of animal domestication. *Quarterly Review of Biology* 59: 1–32.
Richerson, P., R. Boyd, and R. Bettinger. 2001. Was agriculture impossible during the Pleistocene by mandatory during the Holocene? A climate change hypothesis. *American Antiquity* 66: 387–412.
Russell, N. 2002. The wild side of animal domestication. *Society and Animals* 10: 285–302.
Smith, B.D. 2007a. Niche construction and the behavioral context of plant and animal domestication. *Evolutionary Anthropology* 16: 188–199.
Smith, B.D. 2007b. The ultimate ecosystem engineers. *Science* 315: 1797–1798.
Watkins, T. 2010. New light on Neolithic revolution in Southwest Asia. *Antiquity* 84: 621–634.
Zeder, M.A. 2011. The origins of agriculture in the Near East. *Current Anthropology* 52: 221–235.
Zeder, M.A. 2012. Pathways to animal domestication. In *Biodiversity in agriculture: Domestication, evolution and sustainability*, ed. P. Gepts, T.R. Famula, R.L. Bettinger, S.B. Bush, A.B.. Damania, P.E. McGuire, and C.O. Qualset, 227–259. Cambridge: Cambridge University Press.
Zeder, M.A., E. Emshwiller, B.D. Smith, and D.G. Bradley. 2006b. Documenting domestication: The intersection of genetics and archaeology. *Trends in Genetics* 22: 139–155.

Donnan, Christopher

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Basic Biographical Information

Christopher Bruce Donnan (Fig. 1) (born 29 June 1940 [Covina (Los Angeles), CA, USA]) is an American archaeological anthropologist and leading authority on the Moche civilization (AD 200–850) and more broadly the ancient art and prehistory of the north coast of Peru. Donnan's body of work spans more than 50 years and involves the discovery of some of the most iconic archaeological finds in the ancient Andes including mortuary contexts at Pacatnamú, Sipán, San José de Moro, and Dos Cabezas. Renown as an intense and passionate researcher, Donnan revolutionized the iconographic study of Moche visual arts through approaching images thematically, bridging iconographic and

Donnan, Christopher, Fig. 1 Christopher B. Donnan. (Credit: C. B. Donnan)

archaeological levels of analysis, and spearheading the documentation of Moche pottery decoration through photography and standardized drawings.

Donnan developed an interest in archaeology after receiving projectile points as gifts from his paternal grandmother. The artifacts had been collected by Donnan's father back in his childhood home (Iowa). Between 1958 and 1962, he majored in anthropology at the University of California, Berkeley, and subsequently went to UCLA for a master's degree (1963–1965). There, he worked with Clement Meighan and participated in archaeological operations in San Diego County and the Mojave Desert. Upon the recommendation of Meighan, Donnan traveled to Peru in 1963 to assist Frédéric Engel, a French-born archaeologist based at the Universidad La Molina in Lima. Donnan spent 7 months excavating the Preceramic village site of Chilca in the Quebrada de Chilca between the Lurín and Mala Valley on the central coast of Peru (Donnan 1964).

Back in California, and during a semester of exchange at the University of California, Berkeley, Donnan took classes with John H. Rowe who suggested a study of Max Uhle's materials from coastal Peru. The collections had been sent to the Lowie Museum (now the Phoebe Hearst Museum), and many of the Moche pots were on display during the 1906 earthquake in the Bay Area. The broken pots allowed Donnan to look at the paste and study the technology of Moche pottery making (Donnan 1965). By then, Donnan was smitten with Moche art and iconography.

Donnan went back to Peru between 1965 and 1967 for his dissertation work and surveyed the Santa Valley focusing on the Moche occupation. His incentive to survey Santa came from the fact that many pots in museums and private collections originated from the port city of Chimbote. With the financial support of the Fulbright, Donnan spent 15 months living in Chimbote while single-handedly carrying out the first systematic survey of the Santa Valley (Donnan 1973).

In 1968, Donnan joined the anthropology faculty at UCLA where he initiated a program in Andean archaeology. He is currently Professor Emeritus in the Department of Anthropology and Director Emeritus of the UCLA Fowler Museum. Donnan helped train a vast number of Andean archaeologists including PhD students Alana Cordy-Collins, John Verano, William D. Sapp, and Ran Boytner. In 1971, he met Donna McClelland, then a student in one of his night classes. They would develop a life-long collaboration in the documentation of Moche imagery, the creation of the Moche Archive, and the study of iconography, in particular fineline drawings (Donnan and McClelland 1999). In 2015, the Christopher B. Donnan and Donna McClelland Moche Archive was donated to Dumbarton Oaks where Donnan was previously Senior Fellow (1977–1984) and Visiting Scholar in Pre-Columbian Studies (2009).

Major Accomplishments

As a field archaeologist, Donnan is better known for his extensive study of the coastal valleys of Peru and his involvement in numerous projects since the 1960s. After a formative field experience on the central coast, he spent most of his career working on the north coast in the Santa, Moche, Jequetepeque, and Lambayeque valleys. Following his dissertation fieldwork in the Santa Valley, Donnan participated in the Chan Chan-Moche Valley Project (1969–1974) and collaborated with Carol Mackey, one of the directors of the project, in excavating and publishing burial data from various sites in the Moche Valley (Donnan and Mackey 1978). From that moment onward, he was recognized as a leading authority in Moche grave patterns (Donnan 1995).

In 1980–1982, Donnan (2012) mapped and excavated at the multicomponent Sicán/Lambayeque, Chimú, and Inca complex of Chotuna-Chornancap in the Lambayeque Valley. Between 1983 and 1987, and in collaboration with Guillermo Cock, Donnan directed excavations at the multicomponent Moche and Chimú site of Pacatnamú in the Jequetepeque Valley (Donnan and Cock 1983–1985). In 1987, he became involved in Walter Alva's much publicized excavations of the royal burials at Sipán in the Lambayeque Valley, as well as the curation

and publication of the mortuary data (Alva and Donnan 1993). Donnan subsequently collaborated in the high-profile excavations of Moche elite women at San José de Moro in the Jequetepeque Valley where he collaborated with Luis Jaime Castillo (Donnan and Castillo 1992), one of his graduate students at the time. Since then, Donnan has initiated field projects at several Moche sites including Dos Cabezas (1994–2001) in the Jequetepeque Valley (Fig. 2) (Donnan 2007).

Donnan is recognized as a founding authority in the study of Moche art and iconography. Since 1970 he has systematically worked on photographing, drawing, and archiving Moche visual arts, in particular fineline drawings found on ceremonial vessels. In collaboration with Donna McClelland, he pioneered the technique of rollout drawing to standardize the visualization of Moche often complex fineline paintings and ceremonial narratives. Donnan's contributions to the understanding of Moche religious symbolism, worldview, and ritual life are numerous, durable, and significant. He is credited with the popularization of the "Thematic Approach" (Donnan 1975) or the analysis of Moche symbolism through the grouping of scenes and images into a series of categories or themes (e.g., Burial Theme [Donnan and McClelland 1979]). For Donnan, the number of themes in Moche symbolic system of visual communication is limited and the activities depicted relation to the life and rituals of religio-political actors (Donnan 1978, 2010). From that standpoint, his approach has been key in bridging iconographic analyses with archaeological contexts made at Moche ceremonial precincts, such as the discovery of the remains of liturgical actors associated with the presentation theme and more broadly the sacrifice ceremony.

Throughout his career, Donnan engaged in valuable and groundbreaking curatorial work (Fig. 3). In 1978 he curated the exhibition *Moche Art of*

Donnan, Christopher, Fig. 2 Donnan excavating Moche pottery at Dos Cabezas. (Credit: C. B. Donnan)

Donnan, Christopher, Fig. 3 Donnan at the Fowler Museum at UCLA. (Credit: C. B. Donnan)

Peru, which was the first exhibition to focus exclusively on the Moche. In 1993, Donnan curated *Ceramics of Ancient Peru*, and in 1994 he co-curated, in collaboration with Walter Alva, the exhibition *Royal Tombs of Sipán*. Each of these exhibitions was accompanied by a book-length catalog. Donnan's enduring legacy continues to shape the art and archaeology of the north coast of Peru as seen in the dominance of thematic approaches to Moche iconographic studies as well as the ever-growing literature bridging artworks, styles, and mortuary archaeological contexts.

Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Andes: Prehistoric Period
- ▶ Archaeology and Art
- ▶ Central Andes: Prehispanic Hunter-Gatherers
- ▶ Conservation in Museums
- ▶ Maritime Iconography
- ▶ Moche, Geography and Culture of
- ▶ Moseley, Michael
- ▶ "Motif" in the Archaeology of Art
- ▶ North America (USA and Canada): Museums

References

Alva, Walter, and Christopher B. Donnan. 1993. *Tumbas Reales de Sipán*. Los Angeles: Fowler Museum of Cultural History, University of California.

Donnan, Christopher B. 1964. An early house from Chilca, Peru. *American Antiquity* 30: 137–144.

Donnan, Christopher B. 1965. Moche ceramic technology. *Ñawpa Pacha: Journal of Andean Archaeology* 3 (1): 115–134.

Donnan, Christopher B. 1973. *Moche occupation of the Santa Valley, Peru*. Los Angeles: University of California Press.

Donnan, Christopher B. 1975. The thematic approach to Moche iconography. *Journal of Latin American Lore* 1 (2): 147–162.

Donnan, Christopher B. 1978. *Moche art of Peru. Pre-Columbian symbolic communication*. Los Angeles: Fowler Museum of Cultural History, University of California.

Donnan, Christopher B. 1995. Moche funerary practice. In *Tombs for the living: Andean mortuary practices [A symposium at Dumbarton Oaks 12th and 13th October 1991]*, ed. Tom D. Dillehay, 111–159. Washington, DC: Dumbarton Oaks Research Library and Collections.

Donnan, Christopher B. 2007. *Moche tombs at Dos Cabezas*, Costen Institute of Archaeology monograph 59. Los Angeles: Cotsen Institute of Archaeology at UCLA.

Donnan, Christopher B. 2010. Moche State religion. In *New perspectives on Moche political organization*, ed. Jeffrey Quilter and Luis Jaime Castillo Butters, 47–69. Washington, DC: Dumbarton Oaks Research Library and Collections.

Donnan, Christopher B. 2012. *Chotuna and Chornancap: Excavating an ancient Peruvian legend*. Los Angeles: Cotsen Institute of Archaeology.

Donnan, Christopher B., and Luis J. Castillo. 1992. Finding the tomb of a Moche priestess. *Archaeology* 45 (6): 38–42.

Donnan, Christopher B., and Guillermo A. Cock. 1983–1985. Excavaciones en Pacatnamú. *Revista del Museo Nacional* 47: 53–72.

Donnan, Christopher B., and Carol J. Mackey. 1978. *Ancient burial patterns of the Moche Valley, Peru*. Austin: University of Texas Press.

Donnan, Christopher B., and Donna McClelland. 1979. *The burial theme in Moche iconography*, Studies in Pre-Columbian Art & Archaeology. Vol. 21. Washington, DC: Dumbarton Oaks Research Library and Collections.

Donnan, Christopher B., and Donna McClelland. 1999. *Moche fineline painting: Its evolution and its artists*. Los Angeles: Fowler Museum of Cultural History, University of California.

Further Reading

Donnan, Christopher B. 2015. Oral history: Christopher Donnan. In *Image collections and fieldwork archives*, ed. Rona Razon. Washington, DC: Dumbarton Oaks, Trustees for Harvard University.

Dry/Desert Conditions: Preservation and Conservation

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Introduction

In hot, arid, and semiarid environments, often referred to as dryland environments, the absence

of significant water can provide excellent conditions for preservation. However, once artifacts and structures are exposed to new environmental conditions upon excavation, they can rapidly decay if preservation measures are not employed. Archaeological excavation breaks the equilibrium achieved by artifacts during burial, and steps must be taken to stabilize the materials and equilibrate them to the new, post-excavation environment. As a result, it is critical to involve professional conservators from the first stages of planning for excavation and to make sure that preservation concerns are well integrated with archaeological research projects.

The level of preservation will vary depending on the kind of burial environment being excavated, the agents of deterioration prevalent in that environment, and the type of material being excavated. Familiar agents of deterioration such as water, oxygen, bacteria, and the level of acidity or alkalinity of the soil affect all burial environments to some degree. The presence or absence of these and other deterioration mechanisms can profoundly affect the degree of preservation, and extreme environmental conditions such as desert, underwater, and anoxic waterlogged environments, or very cold climates can preserve materials that might have decayed in other burial contexts.

Definition

Preservation and conservation in dry/desert conditions can refer to the physical state of artifacts found in such environments and the degree to which they are preserved, but it also encompasses a wide range of conservation activities and concerns specific to both movable and immovable heritage from dry/desert sites.

Key Issues/Current Debates/Future Directions/Examples

Dry Environments and Preservation

In dry, desert environments, relative humidity is typically extremely low. In general, this type of environment is good for preservation. However, conservators and archaeologists should be aware that such sites may have been affected by water at various points in the past, and that material found at such sites can have a variety of condition problems. The type of archaeological deposit and the depth of burial will also affect the degree of preservation. For example, artifacts found in a tomb, where the environment is usually more stable, are less prone to disturbance by human, animal, or insect activity and to deterioration from environmental conditions.

Preservation of organic materials in dry/desert conditions is often very good, and materials like wood, leather, textile, skin and gut materials, plant materials such as basketry, and bone are often well preserved (Peacock 1987; Johansson 1987). Inorganic materials such as metal, ceramic, glass, and stone also survive well in dry deposits. Metal artifacts may have little or no corrosion when excavated other than a protective oxide layer, although this will depend on localized moisture in the soil. Porous materials like ceramic and stone are usually also stable unless affected by soluble salts absorbed from the soil.

Conversely, extremely dry conditions usually introduce new conservation challenges resulting from desiccation, shrinkage, distortion, and embrittlement of organic materials. For these reasons, it can be challenging to excavate, lift, handle, and store artifacts excavated from dry environments. Other causes of deterioration in arid climates include biodeterioration, caused by the action of bacteria and microorganisms, and insect activity. Both are limited to those species that can survive the harsh climate (Blanchette et al. 1991; Blanchette 1998, 2003).

Immovable cultural heritage can also be well preserved in dry climates. Architectural structures composed of materials such as stone, mud brick, wood, and decorated plaster typically tolerate dry conditions well, but environmental variables such as extremely low humidity, strong wind, and the topography of the site can influence the degree of preservation (French 1987; Spriggs 1987). Wind is a major cause of erosion, carrying abrasive dust and soil particles and causing weathering of exposed archaeological material. Desert climates

also experience large temperature changes between day and night, resulting in fluctuating relative humidity. This can cause repeated expansion and contraction of exposed architectural structures and may result in mechanical damage to stone and other rigid materials. This cycle is made worse by the presence of moisture, which can exacerbate dimensional changes. Structures remaining in situ can also be adversely affected by biodeterioration.

Lifting Archaeological Finds

One of the most difficult tasks for archaeologists and conservators working in arid environments is the retrieval or lifting of artifacts from the ground. Excavating desiccated artifacts can be problematic due to the extreme fragility of the material. The removal of supporting soil or sand from around the artifact leaves it vulnerable. Lifting from sand, sandy or very dry soils can be more challenging because of the difficulty in isolating the object from its burial context and ensuring that fragile and fragmented artifacts stay together. If possible, surrounding sand or adhering soil should be left attached and the artifact lifted as a block. Handling should be reduced to a minimum and a support used to immobilize the artifact as much as possible during lifting. The area being excavated can also add significant challenges, for example, if the deposit is in a deep shaft grave with restricted access.

Several approaches can be taken when lifting fragile, desiccated material, and the most suitable technique depends on many factors. The simplest method, if the artifact is robust enough, is to lift it directly onto an adjacent, suitably padded support. If the soil is compact enough, the artifact and its surrounding soil can be isolated and lifted in a block, with the surrounding soil acting as a support. The isolated block containing the artifact can be further strengthened by wrapping it with bandages prior to lifting. However, this may be challenging if the artifact is extremely fragmented or is large in size, such as human remains with associated clothing or jewelry. Another simple method is to insert a rigid support underneath the artifact to support it during lifting. For artifacts that cannot be handled without loss, providing a protective cover and cushioning around the artifact can be helpful.

Supports, like cloth impregnated with adhesive, that directly adhere to the surface can be applied to artifacts that are strong enough to withstand the adhesion and from which the support can easily be removed. Types of material that may be suitable for lifting by this method include mosaics and wall paintings, or stone and ceramic artifacts with very fragile surfaces. Temporary supports like this can be removed later in the conservation laboratory.

When artifacts are too fragile to be lifted without breakage or loss, as is often the case with severely embrittled organic material, consolidation in situ may be necessary. In this method, a consolidant is dripped directly onto the artifact to strengthen it before lifting. A range of reversible synthetic consolidants have been used successfully by conservators for this purpose. Examples include acrylic resins and substances such as cyclododecane, a hard wax-like volatile hydrocarbon which will sublime at room temperature, without leaving behind any visible trace (Balachandran 2010).

Transportation

Transporting fragile, desiccated archaeological artifacts can be challenging, particularly if the material must travel long distance over uneven surfaces. Well-padded containers, trays, or other rigid materials can be used to prevent damage during transport. Consolidation may also be necessary to strengthen the material prior to transportation, even if the material has been lifted successfully without consolidation. Well-padded enclosures are essential for long-distance travel and artifacts should be placed in rigid, lidded containers that are well secured in the vehicle and protected from the elements.

Work Areas

Conservation and study areas at an excavation site, whether indoors or outdoors, can create risks for fragile artifacts that have just been lifted from the ground. Pests such as insects, mice, snakes, cats, dogs, and birds can seriously damage artifacts that are not adequately protected and

housed. Further handling of fragile finds can increase the risk of damage, especially prior to conservation treatment. The use of storage enclosures, such as rigid, lidded containers, will help to safeguard the materials and buffer them from the environment during storage and study.

Outside work areas have extra risks; exposure to temperature extremes and wind can pose a serious problem for fragile, fragmentary material. Again, the use of rigid, lidded, storage containers will help to reduce these risks. If a temporary consolidant such as cyclododecane has been used for lifting, the treated artifact may require storage in a tightly sealed container until the artifact can be conserved, to prevent the wax from subliming.

Conservation Condition Issues and Treatment

Materials from dry sites can suffer from a variety of condition problems. As previously noted, these are likely to include desiccation, loss of structural integrity, biodeterioration, and water-soluble salts absorbed during burial. In general, principles of minimal intervention and reversibility should be followed when mitigating these issues, and consolidation and other conservation treatments should only be undertaken by an experienced conservator. Treatment for artifacts and structures excavated in dry/desert conditions depends on the material and its condition issues as well as on the archaeological project's goals.

Storage

In ideal circumstances, storage areas should be well organized, with ample room and a stable climate. Extremes of temperature and relative humidity should be avoided. Individual enclosures for artifacts should be protective, while still allowing easy access for research. Although these conditions are not the norm for most archaeological projects, planning and working toward better storage is a worthy goal. Substandard storage conditions can substantially detract from the long-term preservation and study of artifacts, particularly fragile material.

It is critical that extremely desiccated and fragmentary organic materials like textile, cartonnage, human remains, skin and gut products, and papyrus be well supported in storage. Rigid, lidded, padded containers are preferable to help prevent possible structural collapse, disassociation, and loss of loose and fragmentary material, and to prevent damage that may occur during handling or study. Protective enclosures also help buffer artifacts from deterioration due to fluctuating environmental conditions. In general, fragile finds should be stored in containers made from nonperishable materials such as metal or plastic, with individual, custom-fitted housing for particularly fragile artifacts. Wood boxes or crates can provide good physical support, but if possible, an attempt should be made to source acid-free, chemically stable packaging materials for long-term storage. Polyethylene or polypropylene plastic tubs and trays are good choices. These containers can be custom-fitted with interior support and padding. Suitable materials include acid-free tissue, washed unbleached muslin, cotton padding, and inert conservation-grade foam such as Ethafoam. If possible, polystyrene and polyurethane foams should be avoided since they will disintegrate within a few years.

Storage facilities may also have pest problems. The risk to artifacts can be lessened by storing finds in nonperishable containers as described above. This also helps prevent dirt and dust from accumulating. Large artifacts that cannot be housed in storage containers can be covered for further protection. These artifacts should be stored off the ground (i.e., on pallets or shelving) whenever possible.

Overcrowding of storage areas is a common problem on many archaeological projects and can result in damage and excess handling of excavated materials. Advance planning can address this problem and outfitting the storage area with floor to ceiling shelving, or designing custom storage configurations to meet specific needs, can help maximize storage space. Clear labeling and an accurate inventory of excavated finds is also extremely important to avoid unnecessary handling. In addition, conservators can provide written guidelines for handling extremely fragile finds. These guidelines can then be stored with the artifact or permanently recorded on the storage enclosure.

Artifacts Remaining In Situ

Immovable archaeological finds exposed during excavation, such as architectural features like walls, mosaic floors, and other structures, may require protection from the environment to prevent further deterioration. Their exposure also creates new challenges for short- and long-term maintenance. This is especially important if the exposed material is decorated, for example, with painted plaster, or if the fabric itself is fragile, like mud brick. If previous conservation interventions have been carried out on the exposed features, this will also impact the type of protection needed. Desert environments experience large temperature changes from day to night, which can accelerate deterioration. Extremes of temperature, humidity, and wind, as well as freeze/thaw cycles can cause irreversible damage to fragile surfaces, and even structural collapse.

Reburial of exposed features following excavation is one strategy for preserving immoveable finds, and it should be considered if there are no resources to provide stabilization and/or long-term maintenance. However, reburial after a prolonged period of exposure can create problems if the materials have equilibrated to their exposed environment. If conservation was undertaken on the structure prior to its reburial, reburial may affect the longevity of the treatment. Adding a protective barrier between the archaeological feature and the soil or sand, such as a geotextile, can provide protection and prevent localized biodeterioration. If security on the site is adequate, temporary reburial may also be used to preserve artifacts. However, in some cases, these solutions can exacerbate deterioration if they are not employed correctly or if they are not appropriate for the material being protected.

Alternative methods such as the construction of protective shelters, enclosures, or covers for exposed archaeological remains are possible and have been successfully employed. For example, such shelters have been used at Copan, Honduras, and Paphos, Cyprus. These methods can be controversial because of the visual impact they have on the archaeological site, particularly if the site is open for visitation. Balancing conservation and presentation is essential in the management of archaeological sites. Ideally this is a collaborative process that supports archaeological research and site preservation while also taking into account the needs and desires of stakeholder communities.

Cross-References

- ▶ Bones: Preservation and Conservation
- ▶ Ceramics: Conservation and Preservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Documentation of Treatment and Intervention in Archaeological Conservation and Preservation
- ▶ Ethics and Human Remains
- ▶ Field Stabilization of Immovable Heritage
- ▶ Field Stabilization of Movable Heritage
- ▶ Glass: Conservation and Preservation
- ▶ Leather, Archaeological: Conservation and Preservation
- ▶ Metals: Preservation and Conservation
- ▶ Mosaics: Conservation and Preservation
- ▶ Seeds: Conservation and Preservation
- ▶ Stone Treatments in Archaeological Conservation and Preservation
- ▶ Stone: Preservation and Conservation
- ▶ Textiles and Fabrics: Conservation and Preservation

References

Balachandran, S. 2010. The use of cyclododecane in field stabilization and storage of archaeological finds. In *The conservation of archaeological materials: Current trends and future directions*. British Archaeological Reports International series 2116, ed. E. Williams and C. Peachey, 77–88. Oxford: Archaeopress.

Blanchette, R.A. 1998. A guide to wood deterioration caused by microorganisms and insects. In *The structural conservation of panel paintings: Proceedings of a symposium at the J. Paul Getty Museum, 24–28 April 1995*, ed. K. Dardes and A. Rothe, 55–68. Los Angeles: Getty Conservation Institute.

Blanchette, R.A. 2003. Deterioration in historic and archaeological woods from terrestrial sites. In *Art, biology, and conservation: Biodeterioration of works of*

art, ed. R.J. Koestler, V.H. Koestler, A.E. Charola, and F.E. Nieto-Fernandez, 328–347. New York: The Metropolitan Museum of Art.
Blanchette, R.A., K.R. Cease, A.R. Abad, R.J. Koestler, E. Simpson, and G. Kenneth Sams. 1991. An evaluation of different forms of deterioration found in archaeological wood. *International Biodeterioration* 28: 3–22.
French, P. 1987. *In situ archaeological conservation: Proceedings of meetings April 6–13, 1986, Mexico*. Mexico/Los Angeles: Instituto Nacional de Antropología e Historia/J. Paul Getty Trust.
Johansson, L. 1987. *In situ archaeological conservation: Proceedings of meetings April 6–13, 1986, Mexico*. Mexico/Los Angeles: Instituto Nacional de Antropología e Historia/J. Paul Getty Trust.
Peacock, E. 1987. *In situ archaeological conservation: Proceedings of meetings April 6-13, 1986, Mexico*. Mexico/Los Angeles: Instituto Nacional de Antropología e Historia/J. Paul Getty Trust.
Spriggs, J. 1987. *In situ archaeological conservation: Proceedings of meetings April 6–13, 1986, Mexico*. Mexico/Los Angeles: Instituto Nacional de Antropología e Historia/J. Paul Getty Trust.

Further Reading

Barbour, R.J. 1990. Treatments for waterlogged and dry archaeological wood. In *Archaeological wood: Properties, chemistry and preservation*. Advances in Chemistry series 225, ed. R. Powell and R.J. Barbour. Washington, DC: American Chemical Society.
Barker, G. 2000. *Archaeology of drylands: Living on the margins*. One World Archaeology 39. London: Routledge.
Brown, C., F. Macalister, and M. Wright, eds. 1995. *Conservation in ancient Egyptian collections*. London: Archetype Publications.
Cronyn, J.M. 1990. *The elements of archaeological conservation*. London: Routledge.
Rowell, R.M., and R.J. Barbour, eds. 1990. *Archaeological wood: Properties, chemistry and preservation*. Advances in Chemistry series 225. Washington, DC: American Chemical Society.
Sease, C. 1987. *A conservation manual for the field archaeologist*. Los Angeles: Institute of Archaeology, University of California.
Spirydowicz, K.E., E. Simpson, R.A. Blanchette, A.P. Schniewind, M.K. Toutloff, and A. Murray. 2001. Alvar and Butvar: The use of polyvinyl acetal resins for the treatment of the wooden artifacts from Gordion, Turkey. *Journal of the American Institute for Conservation* 40: 43–57.
Watkinson, D., and V. Neal. 1998. *First aid for finds*. Hertford/London: RESCUE – The British Archaeological Trust and the United Kingdom Institute for Conservation Archaeology Section.
Will, B. 2001. *Excavating desiccated leather: Conservation problems on site and after*, 51–62. London: Archetype Publications.

du Cros, Hilary

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Basic Biographical Information

Hilary du Cros earned her B.A. from the University of Sydney and her Ph.D. from Monash University in Melbourne. From 2005 to 2010, Dr. du Cros was a Professor at the Institute for Tourism Studies in Macao, and from 2005 to 2009, she was a Lecturer at the University of Hong Kong. Currently, she is a Senior Research Associate of the University of Brunswick, Canada. Her research interests include cultural heritage management, arts, and tourism, specifically as it relates to Asia and the Pacific region.

Major Accomplishments

She is currently an expert member of the ICOMOS International Scientific Cultural Tourism Committee (ISCTC) (1999–present) and a HKIEd representative to the UNESCO and ICCROM-sponsored Asian Academy Heritage Management Network (2005–present).

Her most recent publications include the coauthored books *Cultural Heritage Management in China: Preserving the Cities of the Pearl River Delta* (du Cros and Lee 2007) and *Cultural Tourism* (du Cros and McKercher 2015). She serves as an editor for the *Journal of Heritage Tourism Management* (2005–present) and *Tourism, Culture, and Communication* (2001–present).

Cross-References

► China: Cultural Heritage Management
► China: Cultural Heritage Preservation and World Heritage
► Sustainable Cultural Tourism Policies: Overview

References

du Cros, H., and Y.F. Lee, eds. 2007. *Cultural heritage management in China: Preserving the Pearl River Delta cities*. New York: Routledge.
du Cros, H., and B. McKercher. 2015. *Cultural tourism*. Abingdon: Routledge.

Further Reading

Di Giovine, M.A. 2009. *The heritage-scape: UNESCO, world heritage, and tourism*. Lanham: Lexington Books.
du Cros, H. 2002. *Much more than stones & bones: Australian archaeology in the late twentieth century*. Melbourne: Melbourne University Publishing.
du Cros, H., and L. Smith, eds. 1993. *Women in archaeology: A feminist critique*. Canberra: Department of Prehistory, Australian National University.
Leask, A., and A. Fyall. 2006. *Managing world heritage sites*. Amsterdam: BH/Elsevier.
Mathers, C., T. Darvill, and B.J. Little, eds. 2005. *Heritage of value, archaeology of renown. Reshaping archaeological assessment and significance*. Gainesville: University Press of Florida.
Timothy, D.J., and S.W. Boyd. 2003. *Heritage tourism*. Harlow: Prentice-Hall.
UNESCO. 2012. *World heritage sites. A complete guide to 936 UNESCO world heritage sites*. 4th ed. Buffalo: Firefly Books.

Duarte, Paulo, Fig. 1 Joseph Emperaire, Paulo Duarte, and Paul Rivet at the Maratuá shellmound, São Paulo, Brazil, 1963

D

Duarte, Paulo

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Basic Biographical Information

Paulo Duarte (São Paulo, 1899–1984) (Fig. 1) was a lawyer, poet, journalist, and professor at the Universidade de São Paulo (USP) and a pioneer on the development of a framework for academic research and teaching as well as the legal protection of Brazilian archeological heritage. He had a special research interest on the coastal shell mounds of southern Brazil, which were mined for lime since the beginning of European colonization. Duarte's struggle to protect these sites eventually led to the consolidation of current Brazil's legislation to protect archaeological heritage. Duarte created several public institutions, participated in the instruction of cultural heritage laws, and formalized archaeological research at the Universidade de São Paulo.

Duarte did not receive formal training in archaeology. As was common at the time, he had a law degree but never practiced law. Duarte was active in the group of intellectuals and artists associated with the so-called Brazilian avant-garde modernism movement, that helped change the arts and intellectual production of the country in the 1920s. He was also deeply involved with the group of intellectuals and politicians that worked together to create the Universidade de São Paulo in 1934, which is today Brazil's

largest University (Hayashi 2001: 17). In 1935, working with the likes of Mario de Andrade and Claude Lévi-Strauss (then a French expatriate teaching at São Paulo), Duarte created the Department of Culture of São Paulo county (Alcântara 2007). Due to his political activities, Duarte was twice exiled to Europe in the 1930s, where he met and started collaborating with Paul Rivet at the Museé de l'Homme in Paris. In 1940, with the impending occupation of France by the Nazis, Duarte went again to exile, this time to New York, where he met once more his old friend Lévi-Strauss and befriended, among others, Spanish film-maker Luís Buñuel. With the end of the war, Duarte returned to France and to the Museé de l'Homme until his final return to Brazil in 1950.

Major Accomplishments

In 1952, Duarte created the Commission of Prehistory of the State of São Paulo. This was a low time for archaeology in Brazil, with research restricted basically to four museums spread around the vast country. Together with the Commission, he pushed, in 1953, for the creation of the first state law that aimed to protect the archaeological heritage (Mendes 1994; Alcântara 2007). In 1954, Duarte had a key role in organizing the 31st International Congress of Americanists in São Paulo. Rivet, then a leading figure in the anthropology of the Americas, participated in the Congress, which included field trips to the shell mounds outside of São Paulo. These events established a landmark in Duarte's battle for the protection of these sites. In 1957, answering a call from then Brazil's President Juscelino Kubitschek (1956–1960), Duarte created a federal commission to write the proposal for a law for the protection of Brazil's archaeological heritage. Law n° 3.924 was approved 5 years later, in 1961, and still stands as the main legal instruction to protect national archaeological resources (Anhembi 1958: 545, 1961: 133). In 1959, Duarte founded a civil association dedicated to archaeological and anthropological research, the Instituto de Prehistória e Etnologia. Two years later, the Commission and the Institute merged and were incorporated into the University of São Paulo, under the name of the Instituto de Pré-História. This was a turning point in institutionalization of the archaeological field in Brazil, despite the initial financial difficulties: The first years of research of the new institute were financed by the income Duarte received for directing it (Alcântara 2007: 264).

Duarte's plans for the new Institute included the development of associated graduate and undergraduate programs. However, his plans were frustrated by the right-wing military coup of 1964, and subsequent interventions in public institutions and universities resulting from it. Within this context, Duarte, in keeping with his combative and humanist spirit, began a series of public critics against the University's conservative establishment. This put him under further pressure.

Duarte's high profile as a public intellectual sustained him as director of the IPH-USP until 1969, when he was compulsorily retired (Mendes 1994), just after the declaration of the infamous *Institutional Act n°5* which closed the Brazilian National Congress for nearly 1 year and transferred absolute power to the President of the Republic. Until his death in 1984, Duarte was never allowed back to the University he helped to create.

Duarte was a remarkable figure who was persecuted by two dictatorships and who was paid for his struggles with exile and compulsory retirement. Although he did not have a diploma in archaeology, he promoted archaeological knowledge as well as heritage education throughout his life. Because of cultural resource management, Brazilian archaeology has been growing exponentially in the last decade. Today, several thousand Brazilians make their living from archaeological work. It is ironic that the man who helped to create the Federal law that organizes their practice had to pay from his own pocket to fund his research.

Cross-References

- ▶ Brazil: Cultural Heritage Management Education
- ▶ Brazil: Historical Archaeology
- ▶ Sambaquis Shell Mounds, Archaeology of

References

Alcântara, A.A. 2007. *Paulo Duarte entre sítios e trincheiras em defesa de sua dama – a pré-história*. Unpublished Master's dissertation, Museu de Arqueologia e Etnologia, Universidade de São Paulo, São Paulo.

Anhembi. 1958. Defesa do patrimônio pré-histórico do Brasil. *Revista Anhembi* 30 (90): 543–551.

Anhembi. 1961. Defesa das jazidas pré-históricas. *Revista Anhembi* 44 (130): 132–138.

Hayashi, M.G. 2001. *Paulo Duarte: um Don Quixote Brasileiro*. Unpublished Ph.D. dissertation, Faculdade de Filosofia Letras Ciências Humanas, Universidade de São Paulo, São Paulo.

Mendes, E.G. 1994. Paulo Duarte. *Revista de Estudos Avançados* 8 (22): 189–183.

Further Reading

Bruno, M.C.O. 1984. *Museu do Instituto de Pré-historia: um museu a serviço da pesquisa cientifica*. Unpublished Master's dissertation, Faculdade de Filosofia Letras e Ciências Humanas, Universidade de São Paulo, São Paulo.

Bruno, M.C.O., and C.M. Vasconcellos. 1989. A proposta educativa do Museu de Pré-História Paulo Duarte. *Revista de Pré-História* 7 (7): 165–186.

Duarte, P. 1968. *O sambaqui visto através de alguns sambaquis*. São Paulo: Instituto de Pré-História da Universidade de São Paulo.

Duarte, P. 1976. *Memórias*. 3rd ed. São Paulo: Hucitec.

Gaspar, M. 2000. *Sambaqui: arqueologia do litoral brasileiro*. Rio de Janeiro: Jorge Zahar Editor.

Dubois, Eugène

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Basic Biographical Information

Eugène Dubois (full name: Marie Eugène François Thomas Dubois), born January 28, 1858, Eijsden, Netherlands, died December 16, 1940, estate "De Bedelaer," Netherlands. Dutch anatomist and geologist, discoverer of the first-known fossils of *Homo erectus* ("Java Man") on the island of Java in the Dutch East Indies (Fig. 1).

Dubois, Eugène, Fig. 1 Dubois at about 40 years old. (From: Albers and De Vos 2010)

Major Accomplishments

Dubois was born one year before *The Origin of Species* of Charles Darwin was published. He grew up in a period when the theory of evolution and its implications for human ancestry were widely discussed. Dubois studied medicine at the University of Amsterdam and became a reader in anatomy there in 1886. Influenced by Darwin and other contemporaneous scholars such as Wallace, Haeckel, and Lydekker, Dubois did a remarkable thing: He gave up his position at the university and joined the colonial army of the Dutch East Indies in order to fulfill his plan, searching for the "missing link" and finding proof for human evolution in the Dutch East Indies. As a military surgeon, he arrived in Padang on West Sumatra in December 1987, where the following year he started excavations in limestone caves. He was soon released from his army duties and obtained permission from the colonial government to dedicate himself full time to his search. Realizing that the fossils he excavated near Padang were too young, he asked for permission to be transferred to Java, where in 1888 a fossilized human skull

had been unearthed in a cave near the village of Wajak. Towards the end of 1890, after initially having focused his attention on cave sites, he started looking for fossil vertebrates at open sites with the help of two military engineers and 25–50 convicts and soon found the first fossil of *Homo erectus* (then still unnamed): a mandible fragment of the right side with two premolars. During the second year in Java, he directed large-scale excavations along the banks of the Solo River near the village of Trinil and soon found a primate molar and skull cap among the large number of vertebrate fossils, followed by a femur the next year. The discovery of these fossils would reward him with international fame.

Dubois attributed the three Trinil fossils to a single individual that possessed a combination of human and apelike characteristics (Fig. 2). The humanlike femur indicated that this individual must have walked upright, whereas the skull cap, initially designated as a chimpanzee, appeared to be more humanlike than any anthropoid. In 1894, he published the finds in German under the title "*Pithecanthropus erectus*, eine menschenaehnliche Uebergangsform aus Java," thereby concluding that his finds belonged to an intermediary form between humans and apes, more humanlike than apelike. The colloquial name under which his finds became known was "Java man." After visiting the Siwalik Hills on the Indian subcontinent, Dubois returned to the Netherlands in 1895, where he was to become a professor of geology at the University of Amsterdam in 1899. His fossil finds were initially widely exposed and publicized but met with variable criticism and controversy, and eventually, Dubois withdrew the specimens from further examination. It would take several decades before additional evidence turned up from Java and China. The fossils are nowadays regarded as *Homo erectus*. The original fossils are housed at the Naturalis Biodiversity Center in Leiden, together with thousands of other fossils that were collected by Dubois and his assistants at Trinil and other fossil sites. Because there has been a wealth of documentation preserved besides the fossils, the Dubois Collection remains a major source of information on the natural history of SE Asia.

Dubois, Eugène, Fig. 2 Life-sized reconstruction of *Pithecanthropus erectus* made by Dubois for the 1900 World Exhibition in Paris (Negative in Collection Geological Museum Artis, Amsterdam)

The vertebrate species from Trinil were named by Dubois in two short publications that came out in 1907 and 1908, giving his taxon names priority over the results from the Selenka Expedition carried out at Trinil in 1907–1908. But Dubois never seemed to have had the patience to provide detailed descriptions of his finds, and a serious scientific analysis of the fossils, apart from the *Pithecanthropus* remains, was never published. Instead, Dubois was easily distracted by other projects. Some of these projects were the experimenting with self-made cameras in order to reduce optical distortions, nature conservation, but also research on the subsurface hydrology of the Netherlands. His name is also firmly attached to a collection of fossil flora and fauna originating from a number of clay quarries near Tegelen, the type locality of the geological Super-Stage "Tiglian," which is often used in Northwest Europe to designate the earliest part of the

Pleistocene Series. The Tegelen fossil collection is housed in Teylers Museum at Haarlem, where Dubois was curator.

Cross-References

- ▶ Darwin, Charles R.
- ▶ *Homo erectus*
- ▶ Human Evolution: Theory and Progress
- ▶ Java Man

References

Albers, P.C., and J. De Vos. 2010. *Through Eugène Dubois' eyes: Stills of a turbulent life*. Boston: Brill Academic Publishers.

Further Reading

De Vos, J., and P.Y. Sondaar. 1982. The importance of the Dubois collection reconsidered. *Modern Quaternary Research in SE Asia* 7: 35–63.

Dubois, M.E.F.T. 1894. *Pithecanthropus erectus, eine menschenaehnliche Uebergangsform aus Java*. Batavia: Landesdruckerei.

Dubois, M.E.F.T. 1908. Das geologische Alter der Kendeng- oder Trinil-Fauna. *Tijdschrift Koninklijk Nederlandsch Aardrijkskundig Genootschap* 2 (25): 1235–1270.

Shipman, P. 2001. *The man who found the missing link. Eugène Dubois and his lifelong quest to prove Darwin right*. New York: Simon & Schuster.

Theunissen, B. 1989. *Eugene Dubois and the ape-man from Java: The history of the "missing link" and its discoverer*. Dordrecht: Kluwer.

Duck: Domestication

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Basic Species Information

There are two species of domestic duck, the common duck, domesticated from the wild mallard (*Anas platyrhynchos*), and the muscovy duck (*Cairina moschata*). Both are members of the Anatinae. In both species, the same scientific binomial is used for the domestic and the wild forms. Farmers sometimes interbreed the two species, but their offsprings are infertile. The name "muscovy" duck does not come from Russia but is thought either to be a corruption of "musk" duck, from its musky smell (Darwin 1868), or of "miskito" duck, after the Mosquito coast of South America where the invading Spanish first encountered the duck. Both species of domestic duck produce eggs and down as well as meat and both are valuable on farms and smallholdings for reducing pests (Serjeantson 2009: 302–304).

The natural distribution of the mallard is across temperate Eurasia and North America. It has a wide ecological tolerance. The male mallard in breeding plumage has a gray body, green head, and purple speculum. The female is mottled brown. The weight ranges from 750 to 1450 g, with females in general slightly smaller than males (Snow and Perrins 1998). Genetics has shown that the common duck is derived almost exclusively from the mallard but some South Asian breeds also have some spot-billed duck (*Anas zonorhyncha*) in their genetic makeup (Li et al. 2010).

The muscovy duck is a native of neotropical South America with a range from southern Mexico to Peru and northern Argentina. Its habitat preference is for swamps and riverbanks flanked with trees. Both sexes are black with white wing patches. The male has a knob at the base of the bill and reddish skin on the face, while the face of the female is feathered. Muscovy ducks are strongly dimorphic: Their weight in the wild ranges from 4100 g to 1100 g.

Once domesticated, there were changes in plumage, size, and behavior in both. At least 20 distinct breeds of common duck have evolved with varied plumage and gait and a wide range of sizes (Luff 2000). Wild mallards can readily be raised in captivity, so it is likely that mallards were commensals before becoming fully domestic. White feathers start to appear within a few generations (Darwin 1868) and many colors can now be found. White is favored in birds bred for eating. Ducks became larger, with most modern breeds

now too heavy to fly, a change that is visible in the skeleton. The largest modern breeds are the Aylesbury and the Pekin, both of which can reach 5.5 kg (12 lbs). Ducklings naturally fatten quickly and can be eaten from the age of 6 weeks (Luff 2000). Despite the fact that the anatomy of ducks is adapted to swimming rather than walking, at least one breed, the Indian Runner, has developed an erect posture, which is reflected in changes to the femur and tarsometatarsus (Darwin 1868). One theory is that this adaptation took place in Indonesia, and was a response to being driven long distances to market. More significant are the changes in breeding behavior. The normally monogamous wild mallard has adapted to polygamy: The usual ratio is one drake to four to six ducks. The number of eggs laid has increased from up to 12 in the wild to as many as 240 eggs in a year.

Historical evidence for domestic ducks is thin and archaeological evidence even thinner. The mallard was domesticated in Eurasia, but there is no certainty about where and when. There are many different breeds of domestic duck in Southeast Asia, which points to the likelihood of domestication there. The process may have taken independently and later in Europe. Figurines in China dating from the fifth century BCE may be the earliest historical evidence for domestic ducks. Ducks were reared in captivity in both Ancient Egypt and Classical Rome but were not necessarily domestic, even in Rome (Albarella 2005). The earliest mention of domestic ducks in Europe is in the writing of St Hildegard of Bingen in the twelfth century. A few domestic ducks have been identified from sites in Europe based on numbers, age at death, or their larger size (Serjeantson 2006). As the main center of mallard domestication was likely in Southeast Asia, the earliest archaeological evidence for domestic ducks may one day be found there.

The muscovy duck has become larger under domestication, the color of the feathers has become more variable, and the number of eggs laid per year has increased. Though it was difficult to identify domesticated muscovy ducks in archaeological contexts because the natural size difference between male and female mask size changes, Stahl (2005) has identified domestic ducks on precontact sites in Ecuador. Muscovy ducks are depicted on pots in the Moche and Chimu cultures and their feathers were used in Chimu feather-work, so domestication may predate CE 1000.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

References

Albarella, U. 2005. Alternate fortunes? The role of domestic ducks and geese from Roman to medieval times in Britain. In *Feathers, grit and symbolism: Birds and humans in the ancient, old and new worlds*. Documenta Archaeobiologiae 3, ed. G. Grupe and J. Peters, 249–258. Munich: VML Verlag Marie Leidorf.

Darwin, C.R. 1868. *The variation of animals and plants under domestication, volume 1*. Project Gutenberg eBook, reprinted 2008. London: John Murray.

Li, H.F., W.Q. Zhu, W.T. Song, J.T. Shu, W. Han, and K.W. Chen. 2010. Origin and genetic diversity of Chinese domestic ducks. *Molecular Phylogenetics and Evolution* (epub). www.ncbi.nlm.nih.gov/pubmed/20674751

Luff, R.M. 2000. Ducks. In *The Cambridge world history of food, volume 1*, ed. K.F. Kiple and K.C. Ornelas, 517–524. Cambridge: Cambridge University Press.

Serjeantson, D. 2006. Birds: Food and a mark of status. In *Food in medieval England: Diet and nutrition*, ed. C.M. Woolgar, D. Serjeantson, and T. Waldron, 131–147. Oxford: Oxford University Press.

Serjeantson, D. 2009. *Birds*. Cambridge manuals in archaeology. Cambridge: Cambridge University Press.

Snow, D.W., and C.M. Perrins. 1998. *The birds of the western Palearctic, volume 1: Non-passerines*. Oxford: Oxford University Press.

Stahl, P.W. 2005. An exploratory osteological study of the muscovy duck (*Cairina moschata*) (Aves: Anatidae) with implications for neotropical archaeology. *Journal of Archaeological Science* 32 (6): 915–929.

Dugouts, Archaeology of

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Introduction

Underground housing was a common and expedient choice during European colonization in the United States, Canada, and Australia and is still used in the mining town of Coober Pedy in South Australia. This was not something new but a continuation of a long tradition.

Dugouts have been recorded across the world in North Africa, Europe, Australia, and Asia as well as in North and South America. In Northern China, dugouts were used for at least 4,000 years and remained home to 30–40 million people in the late 1990s (Long 1999). In Cappadocia, Turkey, there are at least 40 underground cities, with occupation peaking between the sixth and sixteenth centuries but likely predating this (Cappadocia Turkey n.d.; Ayhan 2004). In England, the Nottingham Caves Survey has recorded more than 450 caves dug out under the city and used for a variety of purposes since at least 1250 (Strange-Walker et al. n.d.).

Definition

Dugouts are fully or partially subterranean structures used as dwellings, excavated into the ground, with additional structure added as needs and resources allowed. Dugouts can include natural caves that have been enhanced and enlarged by people for various reasons but does not include rockshelters and caves used for shelter that are substantially unmodified. Terminology for underground housing is varied, sometimes interchangeable and often locally specific. Dugout, pit house, sunken feature building, earth lodge, cave house, rock house, and earth shelter are commonly used, along with local terms such as Badger Hut in Wisconsin (Strange-Walker et al. n.d.; Potosi Badger Hut Site n.d.; Willets 2010: 10).

Gilman (1987: 552) in discussing pit structures in the American Southwest noted that climate, linked to "biseasonal settlement pattern, and dependence on stored food," are the main determining factors for traditional societies using subsurface structures. For historic periods, climate and environment remained key factors for dugout residents, but subsistence concerns were less influential.

Dugouts require a suitable location to dig into – usually hillsides, gullies, creek banks or cliff faces, and soil or rock that is relatively easy to excavate and structurally sound. This was the case in Cappadocia, Nottingham, and Kinver Edge, all of which had suitable sites and easily excavated soil or rock, such as sandstone (Strange-Walker et al. n.d.; Ayhan 2004: 33; Willets 2010: 13). In Burra, South Australia, the clay banks of the Burra Creek provided easy excavation and sound dugouts but was vulnerable to flash flooding, which compromised structural integrity and effectively ended dugout use in this area (Birt 2004: 157).

Burra's dugouts are an example of subterranean structures, excavated horizontally into high creek banks, with floors, walls, and roofs formed from the red clay of the creek banks (Fig. 1, Birt 2004: 160, 2012). Cappadocia, Northern China, Nottingham, and Kinver Edge provide examples of more long-used subterranean dugouts (Strange-Walker et al. n.d.; Long 1999; Ayhan 2004; Willets 2010: 20). Partially dugout structures or pit houses are probably more common historically and geographically, with an excavated pit topped by walls and roof of various materials (see Hardesty 1988: 86; Linebaugh 2003: 84; Brooks 2005: 14).

In December 1847, a visitor to the Burra Mine in South Australia noted that "the miners have also, for want of houses, excavated little caverns, divided into apartments, into the steep banks of the creek" (*The South Australian* 1847). By 1851, there were literally hundreds of dugouts in the creek, housing 1,800 of Burra's population of 4,400 and providing an unusual and much noted aspect of colonial settlement at this site (Birt 2004: 156). It was the scale of dugout use in early Burra that was unusual, not the underground housing itself.

Dugouts, Archaeology of, Fig. 1 A Burra dugout reconstructed in the 1970s as a tourist attraction. The original dugouts were usually whitewashed inside and sometimes outside

Modern perceptions may see dugout homes as at best expedient and temporary, but evidence from China, the United Kingdom, and Cappadocia contradicts this, with the large-scale use of dugouts over long periods of time (Strange-Walker et al. n.d.; Long 1999; Ayhan 2004; Willets 2010). Even where dugout use is more transitory, considerable effort could be put into making the homes comfortable. Burra's dugouts had whitewashed walls, ceilings and floors, and sometimes exteriors, while fireplaces, with chimneys cut to the surface, were standard. Windows, doors, verandas, lean-tos, and other improvements were common (Birt 2004: 160–1, 2012).

Key Issues, Current Debates, and Future Directions

The questions a researcher might bring to the analysis of dugout homes in Northern China used for thousands of years and potentially still occupied (Long 1999) will be different to those posed by a dugout built by nineteenth-century Scandinavian immigrants to Minnesota (Linebaugh 2003). Common questions would revolve around environment, climate, topography, proximity to other settlements and industry, and social and cultural factors, seeking to answer why dugouts were built in preference to other structures and how long they were used.

Gilman (1987: 560) discussed the change from belowground structures to pueblos in the American Southwest, finding that increasing population linked to "subsistence intensification" was the main reason for change and suggesting lines of inquiry for other regions. In Cappadocia, climate environment and defensive advantages were cited as the main reasons for going underground, but cultural proclivities were not discounted (Ayhan 2004: 30–3).

Nineteenth-century American, Canadian, and Australian dugout sites can contribute evidence to the big questions in historical archaeology. The Burra Creek dugouts, for example, are direct evidence, albeit from the bottom up, of an international capitalism, driving European colonization, in an industrial company town, by working class mining families who left little record of their lives (Birt 2004: 162, 2012).

One of the strengths of archaeology is in providing evidence of people who may be largely missing from history (Leone 2010). In Nottingham and Kinver Edge, the underground homes were associated with the poor (Strange-Walker et al. n.d.; Willets 2010: 27); in Burra, the dugouts were mainly home to working class miners (Birt 2012); while in both Minnesota and Saskatchewan, dugouts were home to European migrants from Norway and Russia, respectively (Linebaugh 2003; Brooks 2005: 5). These are all groups who may have left little evidence of their passing.

Dugouts generate continued community interest, and in Cappadocia, Burra, Nottingham, Kinver Edge, and Saskatchewan are part of local cultural heritage tourism (Cappadocia Turkey n.d.; Strange-Walker et al. n.d.; Birt 2004; Brooks 2005: 1434–145; Willets 2010: 22). Dugouts are not usually forgotten, but they are sometimes misunderstood.

Cross-References

- ▶ American Pioneers and Traditions
- ▶ Australasian Historical Archaeology
- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Buildings Archaeology
- ▶ Capitalism: Historical Archaeology

References

Ayhan, A. 2004. *Geological and morphological investigations of the underground cities of Cappadocia using GIS*. Unpublished Master's dissertation, Middle East Technical University.

Birt, P.J. 2004. "The Burra": Archaeology in a small community in South Australia. In *Places in mind: Public archaeology as applied anthropology*, ed. P. Shackel and E. Chambers, 153–169. New York: Routledge.

Birt, P. J. 2012. *Whitewash and red clay: The archaeology of the Burra dugouts*. Paper presented at the World of Copper: Globalising the Industrial Revolution 1830–1870, Workshop, Burra, 23–26 Sept 2012.

Brooks, M. 2005. *Public archaeology with a Doukhobor descendant community*. Unpublished Master's dissertation, University of Saskatchewan.

Cappadocia, Turkey. n.d. Underground cities Cappadocia Turkey. Available at: http://www.cappadociaturkey.net/undergroundcities.htm. Accessed 22 Oct 2012.

Gilman, P. 1987. Architecture artifact: Pit structures and pueblos in the American Southwest. *American Antiquity* 52 (3): 538–564.

Hardesty, D. 1988. *The archaeology of mining and miners: A view from the Silver State*, Special Publication series 6. The Society for Historical Archaeology.

Leone, M. 2010. *Critical historical archaeology*. Walnut Creek: Left Coast Press.

Linebaugh, D. 2003. *Digging into a dugout house (Site 21SW17): The archaeology of Norwegian immigrant Anna Byberg Christopherson Goulson, Swenoda Township, Swift County, Minnesota*. Report prepared for the University of Kentucky Program for Archaeological Research. Technical Report 480, Lexington, Kentucky.

Long, P. 1999. Chinese earth shelter dwellings. Available at: http://www.caa.uidaho.edu/arch499/nonwest/china/index.htm. Accessed 15 Oct 2012.

Potosi Badger Hut Site (record number 425429). n.d. National register of historic places. Available at: http://nrhp.focus.nps.gov/natreghome.do?searchtype=natreghome. Accessed 15 Oct 2012.

Strange-Walker, D., S. Lomax, and J. Clarke. n.d. The Nottingham Caves Survey homepage. Available at: http://nottinghamcavessurvey.org.uk/index.htm. Accessed 9 Oct 2012.

The South Australian. 1847. The northern mines and country, December 17, p. 293.

Willets, M. 2010. *Living on the edge; The social and economic culture of the rock house communities in Kinver from 1700 to 1963*. Unpublished Master's dissertation, University of Birmingham.

D

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Aq Kupruk, Afghanistan: Late Paleolithic carved face on a stone pebble (Anonymous [L. Dupree] 1968; Kolb 2014)

Charles C. Kolb has retired.

Basic Bibliographic Information

Louis Benjamin Dupree (August 23, 1925–March 21, 1989), an internationally acclaimed American archaeologist, ethnologist, and historian who specialized in Afghan and Pakistan studies, was born in Dupree's Corner, Greenville, North Carolina, USA. He enlisted in the armed forces *before* earning his diploma, serving initially as a cadet-midshipman on Liberty ships in the US Merchant Marine in the North Atlantic (1943–1944), and then joined the US Army as a paratrooper in North Africa, attaining the rank of first lieutenant. After being wounded during a jump, he went to the Philippines in the late 1944, parachuting behind Japanese lines to organize native guerrilla units – the Hukbalahap – an experience that he later credited with having inspired his interest in ethnography. His medals included a Purple Heart and Bronze Star. In 1946, he was encouraged to apply for the General MacNider Scholarship to be awarded to a Pacific Theater of War veteran. He took the examination and was the sole awardee, opting to attend Harvard College on the "GI Bill" or Servicemen's Readjustment Act of 1944 (Kolb 2014, 2018).

At Harvard, he was an undergraduate and graduate student in Asian archaeology and ethnology, where he formed lifelong friendships with other student veterans (particularly William Sanders and Paul Baker) and faculty including Carlton Coon, who served with the OSS in Morocco during World War II. Dupree graduated AB *cum laude* in anthropology from Harvard College (1949) and attained an MA in anthropology (1953) and a doctorate in anthropology (1955) both from Harvard University. He served as field director for Coon's Hotu Cave site excavations in Iran in 1951. His undergraduate thesis was *A Typological Study of the Lithic and Bone Material of the Site of La Colombière (Ain) France*, 2 vols., and his fieldwork-based dissertation was *Shamshir Ghar: Historic Cave Site in Kandahar Province, Afghanistan*, 2 vols.

Major Accomplishments

Louis Dupree's accomplishments were often achieved in the face of adversity. For example, his initial desire to conduct research with the Hukbalahap was thwarted in early 1949 when his research application was rejected by the Philippine government (the Hukbalahap were perceived as "communists" fighting against the central government). However, a fortuitous invitation from Carlton Coon to join an archaeological survey in Afghanistan in the summer of 1949 led to Dupree's enduring interest in Central and South Asia. Dupree was assistant and then associate professor of Middle Eastern studies, Air University at Maxwell Air Force Base (1954–1957). He was approached to join the newly formed American Universities Field Staff (AUFS) with joint teaching and research appointment at 12 US institutions (2 years of research followed by 1 year lecturing in the United States). A key requirement was that AUFS staff must have a prior academic affiliation. Sanders and Baker had just become full-time faculty at the Pennsylvania State University and persuaded Fredrick Matson (professor of archaeology and dean for research in College of the Liberal Arts) to appoint Dupree as an adjunct faculty member. Hence, Dupree became an adjunct associate professor at Penn State (1957–1989) and an associate at AUFS (1959–1980) (Kolb 2018). He mentored four graduate students, all of whom continued in Afghan archaeological studies but whose fieldwork was stymied by the Soviet invasion in 1979: Charles Kolb, Richard Davis, Jim Shaffer, and Michael Hoffman.

Dupree's initial site excavations were in southern Afghanistan: historic Shamshir Ghar and Chalcolithic Deh Morasi Ghundai sites (Dupree 1958, 1963), but in 1962 he received permission to conduct archaeological surveys in north of the Hindu Kush up to the border of Afghanistan and the Soviet Central Asian republics. His most significant work was in sites related to early human habitation in Afghanistan during the Middle and Upper Paleolithic. Four sites in the Balkh River valley near the town of Aq Kupruk were excavated in 1963 and 1965; two excavations in Badakhshan Province were undertaken in 1966 (Dupree et al. 1972). Kolb served as field director and ceramic analyst for all six sites (Kolb 2008).

Overall, the four sites spanned the Upper Paleolithic through to the contemporary nomad period (Dupree et al. 1972): Aq Kupruk I, a rockshelter produced materials from 20 identifiable cultural periods (Kolb 2008); Aq Kupruk II, a cave yielded an Upper Paleolithic Solutrean-Aurignacian flint blade industry with 20,000 specimens; Aq Kupruk III, an open-air Upper Paleolithic campsite; and Aq Kupruk IV, a shallow burial cave dated Early to Late Iron Age. The Badakhshan excavations were in caves: Darra-i-Kur with Later Iron Age and Neolithic ceramics and Middle Paleolithic Mousterian stone tools, as well as a transitional Neanderthal (*Homo sapiens neanderthalensis/sapiens*) temporal skull fragment, and Ghar-i-Hazar Gusfand yielding mixed early Islamic and Later Iron Age artifacts. Massive roof fall precluded further excavation.

During a 1969 site survey, Louis and Nancy Dupree located a Mousterian rockshelter Ghar-i-Mordeh Gusfand that was similar to Darra-i-Kur (Dupree et al. 1970). Davis and Dupree excavated two prehistoric caves in northern Afghanistan, Ghar Luli in 1969 and Ghar-i-Mordeh Gusfand in 1970 (Dupree and Davis 1972), and published the results of a 1976 site survey in Dasht-i-Nawur, a highland volcanic-tectonic basin in central Afghanistan which had an Epipaleolithic tool industry utilizing locally available obsidian – the first in Afghanistan – and found nowhere else (Davis and Dupree 1977). Shaffer and Michael Hoffman (Shaffer and Hoffmann 1976) participated in excavations in the Kushano-Sasanian cemetery at Said Qala Tepe near Kandahar.

Dupree's diverse research interests reflected his own predilections and the AUFS mandate. He wrote 111 *American Universities Field Staff: South Asia Series* reports on Afghan and Pakistani archaeology, ethnography, folklore, contemporary politics, economic development, and modern history. The first was on West Pakistan (Dupree 1959). He would ultimately author more than 250 publications for the scientific and popular press and books on Afghanistan culture (Dupree and Albert 1975). The most significant volume, *Afghanistan*, published by Princeton University Press (Dupree 1973), covers the country from Middle Paleolithic times to the Russian invasion; it was nominated for the national book award in history. Reviewers commented that it was (and remains) the single best survey of Afghanistan ever written and yet available thanks to Nancy Hatch Dupree's updating and Oxford University Press (see "References"). He was a correspondent or stringer for *The Economist*, *The Guardian*, *Life*, *The New York Times*, *Time*, and *The Times* (London) and wrote major articles for *Encyclopaedia Iranica* in the 1980s. He also published in numerous journals, among them: *Afghanistan, American Antiquity*, *Arts Asiatique*, *Asian Affairs*, *Central Asian Survey*, *Human Organization*, *Journal of Field Archaeology*, *Journal of the Royal Central Asian Society*, *Journal of Asian Studies*, *The Muslim World*, and *Natural History*. During his career he served as adviser to several governments, including West Germany, France, Denmark, Sweden, Norway, Great Britain, and Australia and was a consultant on Afghan affairs to the State Department, the Peace Corps, the National Security Council, the Central Intelligence Agency, the Agency for International Development, and the United Nations High Commission on Refugees.

Following the Marxist coup d'etat in Afghanistan in April 1978, Louis Dupree was imprisoned and interrogated by Afghans and their Soviet KGB advisors before being released through the intervention of Afghan friends; he was deported to Peshawar, Pakistan. Dupree (1979) wrote an account of the incarceration. Afterward, he lived principally in North Carolina but returned frequently to Peshawar to monitor the progress of the Soviet-Afghan war and assist Afghan refugees. He was a mujahedeen advisor (1978–1984) and on several occasions joined Afghan guerrillas on sorties into Afghanistan. Beginning in 1983 he held visiting appointments at Princeton University, the US Military Academy, and the University of North Carolina at Chapel Hill. In 1985 he also became senior research associate in Islamic and Arabic studies at Duke University, a position he held at the time of his death – a month after the Soviet withdrawal from Afghanistan. His cremated remains and those of his wife Nancy (who died in 2017) are

interred at Bagh-e Bala, a hilltop restaurant in Kabul, where the Dupree's married on February 20, 1966.

Cross-References

- ▶ Archaeological Fieldwork
- ▶ Cold War
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Dupree, Nancy Hatch
- ▶ Matson, Frederick R.

References

Anonymous [L. Dupree]. 1968. Art: The oldest sculpted face? *Life* 64 (17): 72 (April 26, 1968).

Dupree, L. 1958. Shamshir Ghar: Historic cave site in Kandahar Province, Afghanistan. *Anthropological Papers of the American Museum of Natural History* 46 (2): 141–311.

Dupree, L. 1959. West Pakistan revisited. *American Universities Field Staff: South Asia Series* 3 (1): 1–12.

Dupree, L. 1963. Deh Morasi Ghundai: A Chalcolithic site in south-central Afghanistan. *Anthropological Papers of the American Museum of Natural History* 50 (2): 59–135.

Dupree, L. 1973. *Afghanistan*. Princeton: Princeton University Press [epilogues written in 1978 and 1980; 2nd ed. 1997, reprinted 2002 updated by Nancy Hatch Dupree, New York: Oxford University Press, and 3rd ed. as an eBook 2014.]

Dupree, L. 1979. Red flag over the Hindu Kush. *American Universities Field Staff Reports: South Asia Series* 44–45: 6 parts.

Dupree, L., and L. Albert, eds. 1975. *Afghanistan in the 1970s*. London/New York: Praeger.

Dupree, L., J.L. Angel, C.C. Kolb, et al. 1972. Prehistoric research in Afghanistan (1959–1966). *Transactions of the American Philosophical Society, new ser.* 62 (4): 1–84.

Kolb, C.C. 2008. Petrographic analysis of Afghanistan ceramics: Neolithic through the Iron Age. In *Materials issues in art and archaeology VII, symposium proceedings 1047*, ed. P. Vandiver et al., 147–174. Pittsburgh: Materials Research Society.

Kolb, C.C. 2014. *Oral history of Nancy Hatch Dupree*. Afghan Centre at Kabul University, Kabul, November 11–12, 2014 [conducted by Kolb].

Kolb, C.C. 2018. Maurice, Fred, Louie, Paul, Bill and friends: the beginnings of anthropology at Penn State. K. D. French (coord.), *Teotihuacan valley symposium & land and water revisited project*, San Juan Teotihuacan, July 2–3, 2018. PowerPoint.

Further Reading

Davis, R.S., and L. Dupree. 1977. Prehistoric survey in central Afghanistan. *Journal of Field Archaeology* 4 (2): 139–148.

Dupree, L., L. Lattman, and R. Davis. 1970. Ghar-i-Mordeh Gusfand (Cave of the dead sheep): A new Mousterian locality in north Afghanistan. *Science* 167 (3925): 1610–1612.

Dupree, N.H., L. Dupree, and A.A. Motamedi. 1974. *The National museum of Afghanistan: An illustrated guide*. Kabul: Afghan Air Authority and the Afghan Tourist Organization.

Shaffer, J.G., and M.A. Hoffmann. 1976. Kinship and burial among Kushano-Sasanians: A preliminary assessment. *East and West* 26 (1–2): 133–152.

Dupree, Nancy Hatch

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Louis and Nancy Hatch Dupree Wedding, February 20, 1966. (Photo courtesy of Nancy Hatch Dupree 2014)

Charles C. Kolb has retired.

Basic Bibliographic Information

Nancy Hatch Dupree (October 3, 1927–September 10, 2017) was a historian, anthropologist, archivist, humanitarian, and expert on Afghanistan. Nancy was born in Cooperstown, New York State, but grew up in Kerala (then known as Travancore), India, where her American parents worked on rural agricultural development projects for UNESCO. While her parents worked in India, she attended high school in Mexico, graduated from Barnard College, and earned an M.A. in Chinese art and culture from Columbia University. She married Alan Wolfe (1928–2004), an American classmate from New York City who received a master's degree in Chinese history. They arrived in Afghanistan in 1962 where he was assigned as a cultural attaché (in reality CIA station chief in Afghanistan). She was captivated by the country and its people and learned that there were no guidebooks about Afghanistan's prehistory and historic sites, so she undertook this task. She met the renowned – even then – archaeologist and anthropologist Louis Dupree, also an American and also married, when she asked him to read the draft of her first guidebook, *The Valley of Bamiyan* (Wolfe 1963) soon followed by one on Kabul (Wolfe and Kuhzād 1965). Their extramarital love affair caused a scandal in Kabul, and by 1966 Nancy and Louis had divorced their respective spouses and married in February 1966 (Alan Wolfe and Ann Dupree also married each other). Nancy and Louis would stay in Afghanistan conducting research and writing until the Soviet invasion in 1978.

Major Accomplishments

Nancy accompanied Louis Dupree on his archaeological expeditions to northern Afghanistan beginning in 1966 (see the cross-reference on ▶ Dupree, Louis B. for details). Nancy continued writing guidebooks (1966, 1967a, 1967b, 1970, 1971, 2002; Dupree and Kuhzād 1972; Dupree et al. 1974). Louis conducted archaeological investigations and focused his writing more on contemporary Afghan history, culture, and politics. They collaborated in writing archaeological and historical articles (Dupree and Dupree 1967), and she wrote and published on her own (1971). In addition, they collaborated on eight films about Afghan prehistory and ethnology sponsored by the American Universities Field Staff (1973–1974). She assisted in writing and editing his definitive book *Afghanistan* (1973), an encyclopedic tome covering prehistory to 1979, updated in 1978 and 1980: she prepared updates for the 2002 and 2014 editions published in Oxford University. Nancy wrote and updated entries for the *Encyclopædia Iranica* and was empowered to write and lecture about Afghan women (1981, 1987, 1989, 2010; Rahim and Dupree 1986). She wrote more than 300 articles and made over 200 presentations, and her articles on the plight of the National Museum's archaeological collections and Afghan library collections (1996, 1999) would help awaken the West (2017).

Following the Marxist coup d'état in Afghanistan, Louis was arrested as a suspected spy by the pro-Soviet Afghan government in April 1978, cruelly interrogated, and ultimately expelled by the new Communist regime. The Duprees relocated to Peshawar, Pakistan, and both later taught at Duke University in Durham, NC, and the University of North Carolina, Chapel Hill, he as professor and she as instructor. By 1987, their collaborative work earned them a joint award, the International Rescue Committee's Bronze Medal for Service to Afghanistan Refugees, and in 1988, they returned to Pakistan as Joint Fulbright Senior Scholars. Louis died of cancer on March 21, 1989, in North Carolina, a month after the Soviets left Afghanistan. Nancy continued teaching his classes at Duke and UNC for several years and continued to collect historic documents focusing on Afghanistan. The Duprees had conceived and established a predecessor to the Afghanistan Centre at Kabul University (ACKU) in Peshawar. This activity was the Duprees' response to the looting or destruction of private, university, and public libraries in Kabul – much in the manner that the National Museum collections had been decimated. Nancy spearheaded the effort to organize an international response to protect the

National Museum of Afghanistan and its unique collections during the Mujahedeen Civil War. The Afghanistan Centre at Kabul University served as a central repository and information center for materials about Afghanistan ranging from unique individual accounts and NGO materials to UN reports. By 1999 Nancy had amassed 7,739 titles written in Pashto, Dari, and several European languages. She returned to Kabul in 2005, smuggling in a unique collection of 35,000 documents in 300 plastic fertilizer sacks. Two years later, the Afghanistan Centre at Kabul University was physically established on the Kabul University, with funds from the Afghan finance ministry and fiscal support for facilities construction from several European nations and the United States. The building, designed by three Afghan architects and one Canadian, opened in 2013 on the university campus. Currently, the holdings in the state-of-the art ACKU library in Kabul surpass 150,000 items (monographs, government and NGO documents, newspapers, periodicals, magazines, maps, photographs and rare recordings of folk music, color slides, CDs, and other media), and there is a searchable online catalog. Much of the collection focuses on the period 1989–2005, the Soviet occupation, civil war, and Taliban eras (Kolb 2014). Nancy served as ACKU's Executive Director in 2006–2011; trained her successor, Abdul Waheed Wafa; and continued to work in her office until her passing in 2017. One of her last major activities was the organization an international conference "Preserving the Cultural Heritage of Afghanistan" in 2014; she helped edit the multilingual proceedings (Stein et al. 2017).

Nancy launched a mobile lending library scheme (ACKU Box Library Extension or ABLE) currently serving 252 mostly remote communities that brought thousands of books, including easy-to-read volumes in Pashto and Dari, to new literates in these villages. On its own, ABLE has published more than 350 books on topics ranging from how-to-do-it manuals through volumes on Afghan and world history. In 2007 Nancy established the Louis and Nancy Hatch Dupree Foundation, to promote the history and culture of Afghanistan.

Many Afghans and foreigners lovingly called her the "Grandmother of Afghanistan," said Wahid Wafa, "she understood and knew Afghanistan much better than anybody else." Nancy received numerous awards, including the Sir Percy Sykes Memorial Awards from the Royal Society of Asian Affairs in London, the Archivist of the Year from the Scone Foundation in New York, the Highest State Malalai Gold Medal from the Islamic Republic of Afghanistan, and an Outstanding Achievement Award from the Society of Women Geographers. She was also honored by late US Ambassador to Afghanistan Richard Holbrooke, and she was awarded honorary degrees from Williams College and the American University of Afghanistan.

Cross-References

- ▶ Archaeological Fieldwork
- ▶ Cold War
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Dupree, Louis B.

References

Dupree, N.H. 1966. *Herat: a pictorial guide*. Kabul: Afghan Tourist Organization.

Dupree, N.H. 1967a. *The road to Balkh: Kabul, Koh Daman, Salang, Pul-i-Khumri, Surkh Kotal, Samangan, Tashkurgan, Mazar-i-Sharif, and Qunduz*. Kabul: Afghan Tourist Organization.

Dupree, N.H. 1967b. *The valley of Bamiyan*. 2nd ed. Kabul: Afghan Tourist Organization/Franklin Book Programs.

Dupree, N.H. 1970. *Gandhara: An instant guide to Pakistan's heritage*. Karachi: Pakistan Tourism Development Corporation. (reprinted 1985).

Dupree, N.H. 1971. *An historical guide to Afghanistan*. Kabul: Afghan Air Authority/Afghan Tourist Organization.

Dupree, L. 1973. *Afghanistan*. Princeton: Princeton University Press.

Dupree, N.H. 1981. *Revolutionary rhetoric and afghan women*. New York: Asia Society.

Dupree, N.H. 1987. *Afghan refugee women in Pakistan, the psychocultural dimension*. Peshawar: WUFA.

Dupree, N.H. 1989. *Seclusion or service: Will women have a role in the future of Afghanistan?* New York: Afghanistan Forum.

Dupree, N.H. 1996. Museum under siege. *Archaeology* 49(2):42–51

Dupree, N.H. 1998. Afghan women under the Taliban. In *Fundamentalism reborn? Afghanistan under the Taliban*, ed. W. Maley, 145–166. New York: New York University Press.
Dupree, N.H. 1999. Libraries in Afghanistan. *International Preservation News* 19: 20–27.
Dupree, N.H. 2002. *The valley of Bamiyan*. Peshawar: Abdul Hafiz Ashna.
Dupree, N.H. 2006. Prehistoric *Afghanistan*: Status of sites, artefacts and challenges of preservation. In *Art and archaeology of Afghanistan: Its fall and survival: A multi-disciplinary approach*, ed. J. van Kreiken-Peters, 79–93. Leiden: Brill.
Dupree, N.H. 2010. *Feminism in Afghanistan: Taliban treatment of women*. Memphis: Books LLC.
Dupree, N.H. 2017. Nancy Dupree speaks on "The Importance of History in Conflict Resolution in Afghanistan." Kabul: TOLOnews. https://www.youtube.com/watch?v=WqZZ5HDbXJ8
Dupree, L., and N.H. Dupree. 1967. Dr. Brydon's report on the British retreat from Kabul in January 1842. *Afghanistan* 20 (3): 55–65.
Dupree, N.H. with A.A. Kuhzād. 1972. *An historical guide to Kabul*, 2nd. Kabul: Afghan Tourist Organization/Franklin Book Programs.
Dupree, N.H., L. Dupree, and A.A. Motamedi. 1974. *The national museum of Afghanistan: An illustrated guide*. Kabul: Afghan Air Authority/Afghan Tourist Organization.
Kolb, C.C. 2014. *Oral history of Nancy Hatch Dupree*. Kabul: Afghan Centre at Kabul University. November 11–12, 2014.
Rahim, F., and N.H. Dupree. 1986. *Women in Afghanistan/Frauen in Afghanistan, with a 1985 update*. Liestal: Stiftung Bibliotheca Afghanica.
Stein, G., M.T. Fisher, A.H. Latify, N. Popal, and N.H. Dupree, eds. 2017. *Preserving the cultural heritage of Afghanistan: Proceedings of the international conference held at Kabul University, November 2014*. Chicago: Oriental Institute, University of Chicago. In English and Dari. Online only https://oi.uchicago.edu/preserving-cultural-heritage-afghanistan.
Wolfe, N.H. 1963. *The valley of Bamiyan*. Kabul: Afghan Tourist Organization.
Wolfe, N.H. with A.A. Kuhzād. 1965. *An historical guide to Kabul*. Kabul: Afghan Tourist Organization.

Further Readings

Edwards, D.B. 2007. *The Louis and Nancy Hatch Dupree Foundation: The Afghanistan Centre at Kabul University: Rebuilding Afghanistan, one book at a time*. New York: Dupree Foundation.
Zelem, E. 2013. *Interviews with an Afghan Legend: ACKU founder Nancy Hatch Dupree on documenting and digitizing Afghanistan's cultural heritage*, 4 parts. http://www.filmannex.com/posts/blog_show_post/interviews-with-an-afghan-legend-acku-founder-nancy-hatch-dupree-on-documenting-and-digitizing-afghanistans-cultural-heritage/59532/online/features/afghan/

Dura-Europos, Archaeology of

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D

Introduction

Dura-Europos provides an excellent illustration of the potential of archaeology for the study of the human past. The detailed, vivid, and dramatic story of the life and violent death of this 2000-year-old Middle Eastern city has been told almost entirely through archaeological evidence and writings recovered in excavation; it was virtually unknown to conventional text-based history (Fig. 1).

The city's ruins stand on the edge of a plateau in eastern Syria, where cliffs, overlooking Mesopotamia, form the south side of the Middle Euphrates valley. This classical-era site has been regarded as a caravan city of the Syrian Desert like Palmyra, and called "the Pompeii of the East." Actually it was not in desert at all, but on dry steppe averaging c. 100 mm rain a year and exploited the rich Euphrates valley. Nor was it ever called Dura-Europos, but always one name or the other, and, unlike Pompeii, was destroyed by war, not natural disaster. Yet the Pompeii analogy does convey something of the nature of the site and of the discoveries made there. For Dura also met a sudden death in circumstances which preserved remarkable remains of daily life in classical antiquity, down to graffiti on the walls, and including things like textiles and papyri rarely found outside Egypt. And like Pompeii, Dura was never rebuilt as most other towns were, deeply burying such early phases. Again like Pompeii, Dura was actually not an especially large or important city of its time, but a medium-sized town which, through the accidents of burial and of discovery, gives us an unparalleled window on life in its region and its time. The treasures discovered there, above all, its painted synagogue (Kraeling

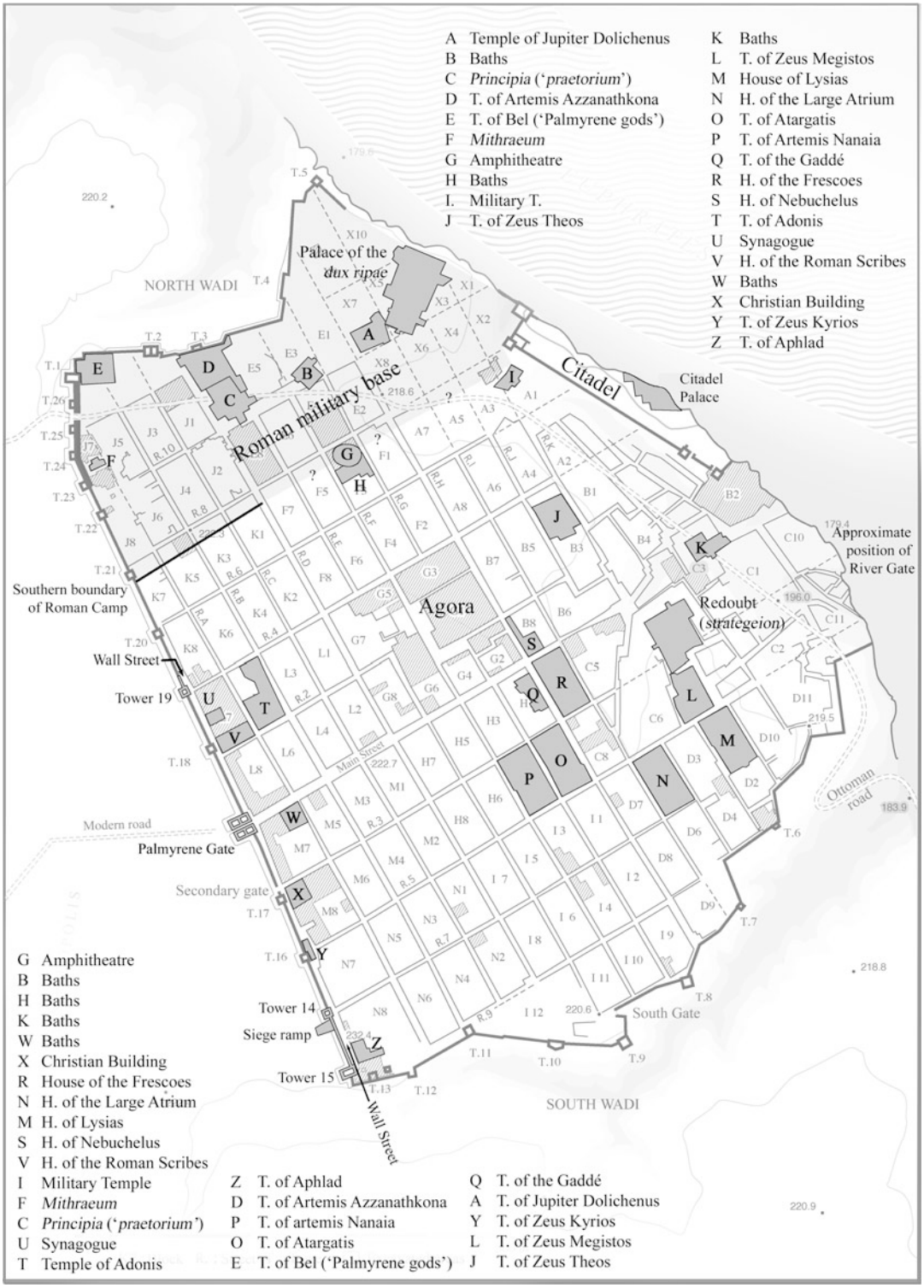

Dura-Europos, Archaeology of, Fig. 1 A plan of Dura-Europos, showing the principal identified features of the city. (Credit: Simon James after MFSED)

1956) and very early Christian church/baptistery (Baur 1934; Hopkins 1934), made the site famous.

Definition

Known locally as Salhiyeh, the ruins were identified in 1920 during the Allied occupation of Mesopotamia following World War I and were briefly studied by James Henry Breasted (Breasted 1924). The first major excavations were conducted by Franz Cumont in 1922–1923 (Cumont 1926), followed by the great ten-season project conducted by Yale and the French Academy, masterminded by Mikhail Rostovtzeff (Rostovtzeff 1932, 1938; Hopkins 1979). At an early stage, the twin ancient names of the city were identified, and the familiar modern compound "Dura-Europos" coined, and made famous in the series of *Preliminary Reports* and *Final Reports*. However, both series remain incomplete, largely due to the disruption of the Second World War, and the incapacitation of Rostovtzeff (for an overview of the Yale project, see: Hopkins 1979; for the unpublished tenth season: Matheson 1992; for a recent bibliography: Leriche et al. 2004: 249–65).

In 1998, Fergus Millar praised the achievements of the early excavators but also called for fresh study of the evidence and critique of their often overhasty interpretation (Millar 1998). Dura itself remained virtually untouched until the 1980s when a new Franco-Syrian Mission was inaugurated, inspired by Pierre Leriche, which has been conducting exactly the kind of program Millar called for. It continued work until 2011, When growing civil unrest in Syria enforced a hiatus in fieldwork. The Mission had been studying and conserving what was laid bare by the early excavators, and using modern methods to greatly extend and refine our understanding of the site (Leriche et al. 2004; Leriche et al. 2011). Leriche argues that the Greek identity of the city should be prioritized and refers to it as "Europos-Dura," the form now encapsulated in the project's revised name, *la Mission Archéologique Franco-Syrienne d'Europos-Doura* (MFSED) (Leriche et al. 2011: 33). It remains, however, commonly called "Dura" for short.

Historical Background

Before foundation of the town, the spot was already called Dura, local Semitic dialect for "stronghold," referring to a peninsula of plateau left between the river and a tributary wadi. In 303 BCE, after Alexander's empire was divided by his generals (Leriche et al. 2011: 19), a Macedonian military colony was founded at this spot halfway between the twin capitals of the new Seleucid kingdom: Antioch on the Orontes and Seleucia on the Tigris, with the dominating promontory being fortified as the citadel of the new settlement of Europos (Fig. 2). A nascent town developed in the bottom of the adjacent wadi, dominated by the residence of the ruling *strategos* of Europos on one side, and another palace inside the citadel representing royal power on the other.

The town expanded up onto the plateau under Seleucid rule, acquiring its street grid and beginning to build a wall circuit, c. 150 BCE. From c. 113 BCE, it fell under Arsacid Parthian rule, but this was unintrusive; the city retained its Greek constitution, remaining dominated by families with Macedonian names, worshipping Hellenic deities. However, the Macedonian colonists had married local women, making the city a cultural hybrid from the start. By 100 CE, Dura was a substantial town – almost all of the street grid had been densely built up with houses, shops, and temples. Dura had ties to other cities inside the Parthian empire, like Hatra to its northeast, and also outside, notably Palmyra, already in Rome's orbit, and apparently a major market for the produce of the rich valley lands ruled from Dura. The city attracted enclaves of people from other villages and cities, not least Palmyrenes.

It was a busy town full of people living cheek by jowl with their many gods. Excavation has revealed houses great and small, built of mortared rubble and mud brick, plastered, single storey and flat-roofed, and arranged around an inner court in the Mesopotamian style. Stairs led to the roof

Dura-Europos, Archaeology of, Fig. 2 The later Hellenistic citadel of Dura-Europos from the northeast, rebuilt as the early Seleucid military colony blossomed into a city with Greek constitution, and largely Syrian-Mesopotamian culture. This inner fortification was later taken over by the Roman garrison, who established a training ground and temples on the wadi floor beneath its walls (*center*). (Credit: © Simon James)

which provided additional living, working, and sleeping space in fine weather. Despite its Greek civic constitution, the city's temples were also of Semitic rather than Classical form, comprising a shrine room with stepped altar in front, in an enclosed court around which might be multiple feasting rooms. They were dedicated to various manifestations of Zeus and to other deities with both Greek and Semitic names like Artemis-Azzanathkona. These, too, were quite modestly built in plastered rubble and mud brick, although boasting colored wall paintings.

On the western fringe of the Parthian empire, Dura lay on the Euphrates invasion route available to Roman emperors who dreamed of emulating Alexander by conquering what are now Iraq and Iran. During Trajan's invasion of Mesopotamia, Roman troops briefly occupied Dura (c. 115–117 CE) before being withdrawn and Parthian suzerainty restored. A powerful earthquake struck Dura in 160 CE, soon followed by permanent Roman annexation (c. 165).

Under Rome, the city retained its Hellenistic visage and was treated by the Romans, then at the height of the fashion for all things Greek known as the Second Sophistic, as "liberated" rather than conquered. However, it became in practice even more cosmopolitan, with the establishment of Jewish and Christian communities, and the largest "alien enclave" of all: an imperial Roman garrison (Fig. 3).

By c. 210, the entire northern part of the city had been taken over as an urban military base, home to soldiers of Rome's Syrian army and their dependants, probably totaling several thousand people. The newcomers adapted blocks of civilian housing to military needs and built a headquarters, baths, and an amphitheater. The city walls were now shared by two autonomous social communities: the old civic population still ruled by families with Macedonian names and the "extended military community" of soldiers and their dependants.

Even with new forward bases like Dura, repeated Roman military aggressions failed to conquer the Parthian empire; instead, they had catastrophic unanticipated consequences, for Rome and especially for Dura. Repeated attacks undermined the Arsacid regime, which fell to revolt by Persian vassals. Parthia was replaced by Sasanian Iran, a far more aggressive and militarily effective empire. From the 230 s, Rome was on the defensive, and Dura suddenly switched from forward invasion base to exposed target for Sasanian attack.

Dura-Europos, Archaeology of, Fig. 3 The Twentieth (Palmyrene) Cohort of the Roman provincial army of Syria assembled for a regimental sacrifice, conducted by their tribune Terentius during the 230 s CE, in a wall painting from the Temple of Bel at Dura-Europos. One of the first discoveries in 1920, this painting helped identify the site: the city fortune figures bottom left are labeled "Palmyra" and "Dura." Note the "frontality" of the figures, a characteristic of Durene art. (Credit: after Cumont 1923, digitally amended by Simon James)

For Dura, the crisis came in the 250 s. In 254, anticipating a Sasanian siege, the garrison set about turning the city into a fortress to be held at all costs. The Roman garrison massively reinforced the city's defenses, especially along the vulnerable western wall undefended by wadis or river. This received a sloping glacis in front and an enormous rampart behind, engulfing all the buildings near the defenses, filling them with any available material, and entombing wall paintings, textiles, papyri, and much else. These measures, and the ensuing siege, led to deposition of the spectacular archaeological remains elucidated since 1920.

The Sasanians did indeed besiege the city, probably in 256 CE. Remarkably well-preserved siegeworks attest a sustained and ferocious attack. A vast assault ramp and elaborate undermining operations suggest the siege lasted weeks or months, before the Sasanians broke in to sack and partially burn the town. Depopulated and abandoned, Dura thereafter lay in "no man's land" between the rival empires, preventing reoccupation and rebuilding – but ensuring survival of the remarkable remains of the life and violent death of the city.

Key Issues/Current Debates

Was Dura a "Caravan City?"

Dura's trading partner Palmyra famously drew its wealth from the long-distance caravan trade in luxury goods between the Roman Empire and the East, and Dura was long thought to be similar (Rostovtzeff 1932, 1938). However, it is now clear that this was not so. Rather, under successive empires, Dura was a center of regional government and administration and of marketing and manufacture of ceramics and other goods, for a substantial stretch of the rich, densely settled "linear oasis" formed by the Middle Euphrates valley. Its economy was focused on regional rather than long-distance trade (Dirven 1999: 38–45).

Dura and "Parthian Art"

Dura became famous initially because of its artistic riches – especially polychrome wall paintings from temples and houses (Rostovtzeff 1938; Perkins 1973). While located in the third-century Middle East, these have received recognition as sources of inspiration for Byzantine and medieval

European figurative art (notably "frontality": static figures gazing directly at the viewer) (Breasted 1924). Durene paintings have also been used in debates on how far there was identifiably "Parthian art" (as opposed to artistic traditions within the Parthian empire) (Fig. 3).

Dura as a "Frontier Town"

Dura is often represented as peripheral, lying on the "edge of empires" (e.g., Chi and Heath 2011). While the city spent its last days as an exposed outpost of Roman imperialism, for most of its history, culturally and politically, it was far from peripheral, lying in the interior of the Seleucid and then Parthian empires. The arms deposited during the siege, including "Parthian"-style horse armor in Roman use and "Roman" iron mail on a Sasanian helmet, underline that even violently contested frontiers can be zones of intensive cultural interaction. Dura is, then, better characterized as a "cultural crossroads" (Brody and Hoffman 2011).

The Christians and Jews

The Christians and Jews of Dura left remains equally startling in different ways. The spectacular figural paintings of the synagogue attest the wealth, sophistication, and cultural connections (Iranian, Mesopotamian, and Greco-Roman as well as Hebraic) of Dura's Jewish community, as well as its strikingly relaxed attitude to biblical injunctions against graven images. A few blocks to the south, a small Christian community left exceptionally early relics which underline the fascinating but still enigmatic dynamics of life in Roman-ruled Dura. For at a time when, according to received wisdom, Christian communities were being persecuted by the imperial authorities, a house-church-cum-baptistery existed in a town swarming with Roman soldiers. And it was hardly clandestine: it lay right under a wall tower occupied by men of the imperial garrison, the largest and most powerful alien enclave of all. However, arguably, overfocus on the Jewish and Christian enclaves at Dura, which only existed late in the city's history and were apparently small and peripheral, has been at the expense of a balanced appreciation of the social and cultural dynamics of the city and offers a good example of how modern cultural preoccupations risk distorting our readings of the past.

Impact of the Roman Garrison

Rostovtzeff believed the presence of a Roman garrison was catastrophic for Dura, its oppressions and exactions so severe that they destroyed the existing "Macedonian" social structure, leaving the city "dying before the Sasanians killed it" (Rostovtzeff 1938: 31). Others echoed his gloomy assessment, while more recently Pollard has suggested at least virtual "*Apartheid*" between Dura's soldiers and civilians (Pollard 2000: 53, 166). The old Macedonian names do vanish from the record in Dura's last decades, but on the other hand, the town boasts indications of Roman provincial-style aggrandizement in the form of arches and colonnades, while Sommer has postulated a military-induced "economic boom" (Sommer 2005: 313). The city was clearly transforming radically under Roman rule, but the dynamics of the change, especially the role of the military, remain to be clarified.

Did the Sasanians Take Dura Twice?

There are a number of indications which appear to suggest that the Sasanian siege of c. 256 represented the second Iranian capture of the city. Texts written on the synagogue murals and a parchment document, all buried within the rampart raised in advance of the final siege, appear to attest the presence of Sasanians inside Dura (Grenet 1988). These probably represent a brief occupation around 252–253, when the Sasanians overran Roman Syria, before the Romans restored control, including Dura, by 254. This remains controversial (Leriche et al. 2011: 21), but the evidence is hard to explain away. The question is also critically important, because two Sasanian occupations would imply that, e.g., patterns of finds made in the buildings of the city likely belong to a final period of political and military chaos and so may tell us little of the life of Dura before its last few traumatic years.

Was Dura Typical or Exceptional?

A recurrent concern is how far we can use the testimony of Dura to understand other sites of the era: was it in any sense typical? There are reasons to think that the extent of its cosmopolitanism was unusual (Palmyra and Hatra were culturally less heterogeneous), but the difficulty remains that no other site has yet produced comparably rich and diverse evidence. Whether it is anyway meaningful to think of "a typical town" is a moot point, since each had a unique history.

The Early Excavations as a Colonial Project?

The history of Dura might be seen as the story of one western colonial implantation in Syria (the Macedonian military colonists and their still-dominant descendants) being, in the last century of the city's life, increasingly displaced by another (Roman soldiers). After being rediscovered by Indian troops of the British Empire in 1920, over the next two decades, it was explored by scholars representing the newly established regional colonial power (France) and the rising American superpower. The interwar exploration of the city could, then, be seen as a further episode of colonialism at the site, with its concentration on Macedonian and Roman power projection in the Middle East prefiguring modern western exploitation for oil, focus on the Jewish and Christian antiquities similarly reflecting Euro-American values, and the attention paid to "Semitic" and "Parthian" aspects being mere Orientalism. However, while the interwar excavations, and the interpretations placed upon them, can only be understood in the context of their times, such an extreme stance would be as misguided as assuming early Dura scholarship was entirely objective and unbiased. The pioneering scholars of Dura threw brilliant light onto the forgotten past of a region which contributed profoundly to the subsequent shared history of Western and Middle Eastern peoples, which new research, on the basis of more equal relations between Western and indigenous researchers, can examine from new perspectives.

Cross-References

- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Palmyra, Archaeology of
- ▶ Religion, Greek, Archaeology of
- ▶ Sasanian Empire, Archaeology of the
- ▶ Seleucid, Parthian Mesopotamia, and Iran, Archaeology of

D

References

Baur, P.V.C. 1934. Paintings in the Christian chapel. In *The excavations at Dura-Europos, preliminary report on the fifth season, 1931–1932*, ed. M. Rostovtzeff, 254–288. New Haven: Yale University Press.

Breasted, J.H. 1924. *The Oriental forerunners of Byzantine painting*. Chicago: Oriental Institute.

Brody, L., and G. Hoffman, eds. 2011. *Dura-Europos: Crossroads of antiquity*. Chestnut Hill: McMullen Museum of Art, Boston College.

Chi, J.Y., and S. Heath, eds. 2011. *Edge of empires: Pagans, Jews, and Christians at Roman Dura-Europos*. Princeton: Princeton University Press.

Cumont, F. 1923. "Le sacrifice du tribun romain Terentius" et les Palmyréniens a Doura. *Monuments et Mémoires publié par l'Academie des Inscriptions et Belles Lettres* 26: 1–46.

Cumont, F. 1926. *Fouilles de Doura-Europos 1922–3*. Paris: Geuthner.

Dirven, L. 1999. The Palmyrenes of Dura-Europos: A study of religious interaction in Roman Syria. In *Leiden; Boston*. Köln: Brill.

Grenet, F. 1988. Les Sassanides a Doura-Europos (253 ap. J.C.): réexamen du matériel épigraphique iranien du site. In *Geographie historique au Proche-orient*,- ed. P.-L. Gatier, B. Helly, and J.P. Rey-Coquais, 133–158. Paris: CNRS.

Hopkins, C. 1934. The Christian church. In *The excavations at Dura-Europos, preliminary report on the fifth season, 1931–1932*, ed. M. Rostovtzeff, 238–253. New Haven: Yale University Press.

Hopkins, C. 1979. The discovery of Dura-Europos. In *New Haven*. London: Yale University Press.

Kraeling, C.H. 1956. *Excavations at Dura-Europos, final report Volume VIII, Part 1: The synagogue*. New Haven: Yale University Press.

Leriche, P., M. Gelin, and A. Dandrau, eds. 2004. *Doura-Europos Études V, 1994–1997*. Paris: Geuthner.

Leriche, P., G. Coqueugniot, and S. de Pontbriand. 2011. New research by the Franco-Syrian archaeological expedition to Europos-Dura and new data on polytheistic sanctuaries in Europos-Dura. In *Edge of empires: Pagans, Jews, and Christians at Roman Dura-Europos*, ed. J.Y. Chi and S. Heath, 9–33. Princeton: Princeton University Press.

Matheson, S. 1992. The tenth season at Dura-Europos 1936–1937. *Syria* 69: 121–140.
Millar, F. 1998. Dura-Europos under Parthian rule. In *Das Partherreich und seine Ergebnisse/The Arsacid Empire: Sources and documentation. Beiträge des Internationalen Colloquiums, Eutin (27. – 30. Juni 1996)*, ed. J. Wiesehöfer, 473–492. Stuttgart: Franz Steiner.
Perkins, A. 1973. *The art of Dura-Europos*. Oxford: Clarendon Press.
Pollard, N. 2000. *Soldiers, cities, and civilians in Roman Syria*. Ann Arbor: Michigan University Press.
Rostovtzeff, M. 1932. *Caravan cities*. Oxford: Clarendon Press.
Rostovtzeff, M. 1938. *Dura Europos and its art*. Oxford: Clarendon Press.
Sommer, M. 2005. *Roms orientalische Steppengrenze: Palmyra – Edessa – Dura-Europos – Hatra; eine Kulturgeschichte von Pompeius bis Diocletian*. Stuttgart: Franz Steiner.

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Basic Biographical Information

Refik Duru was born in Kadıköy, İstanbul, in 1958. He graduated from Istanbul University's Prehistory Department in 1958. In 1960, he was employed as an assistant in the Ancient Near Eastern languages and Cultures Department. He was promoted as Assistant Professor in 1972 and as Professor in 1978. Duru served as head of the Protohistory and Near Eastern Archaeology Department at Istanbul University until his retirement in 1999.

Major Accomplishments

Refik Duru participated in studies such as the survey research project of Islahiye region, and in the Yesemek, Tilmen, Gedikli, Çatalhöyük excavations as a board member of the research teams. In 1973, he conducted the Değirmen Tepe excavations as a part of the Keban Project. Within the content of Burdur Antalya Regional Research studies, he led the Kuruçay Höyük and Höyücek excavations, beginning from 1976. His studies mostly focused on the neolithization of the Lake District and in this context, he conducted the Hacılar excavation that shed new light on the sequence of the Neolithic in the region. He also directed important excavations at Bademağacı.

Cross-References

► Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic

Further Reading

Duru, R. 1979. *Keban Projesi değirmentepe Kazısı 1973* (Keban Yayınları, Seri III, 2). Ankara: ODTÜ.
Duru, R. 1994. Hacılar'ın En Erken Kültürleri Gerçekten Çanak Çömlekli mi idi? *Anadolu Araştırmaları XIII*: 1–12.
Duru, R. 1996. Höyücek Kazıları – 1990/Höyücek excavations – 1990 summary. *Belleten 1* VIII (223): 725–745.
Duru, R. 1999. The Neolithic of the Lake district. In *Neolithic in Turkey*, ed. M. Özdoğan, 165–191. İstanbul: Arkeoloji ve Sanat.
Duru, R. 2000. Burdur Bölgesi Araştırmaları ve Kuruçay Höyük Kazıları. In *Türkiye Arkeolojisi ve İstanbul Üniversitesi (1932–1999)*, ed. O. Belli, 54–58. Ankara: Başak Matbaacilik ve Tanitim Hizmetleri.
Duru, R. 2003. *Unutulmuş Bir Başkent-Timen*. İstanbul: A forgotten capital city.
Duru, R. 2004a. *The largest sculpture workshop of the ancient Near East*. İstanbul: TURSAB Kultur Yayinlari.
Duru, R. 2004b. Bademağacı Kazıları 2003/Excavations at Bademağacı in 2003. In *Anadolu Akdeniz Arkeoloji Haberleri-News of archaeology from Anatolia's Mediterranean areas*, 15–20.
Duru, R. 2005. Gedikli. In *Eciclopedia Italiana*, 83. Roma.
Duru, R. 2007a. Der Siedlungshügel von Bademağacı. In *Vor 2.000 Jahren in Anatolien. Die ältesten Monumente der Menschheit. Landesausstellung Baden-Württemberg im Badischen Landesmuseum Schloß Karlsruhe 20.1.–17.6.2007*, ed. Badisches Landesmuseum, 143. Stuttgart: Badisches Landesmuseum Karlsruhe.
Duru, R. 2007b. Batı Akdeniz Bölgesi'nde Neolitik'e Geçiş. In *III. Likya Sempozyumu. Sempozyum bildirileri I*, ed. K. Dörtlük et al., 225–230. İstanbul.

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Earle, Timothy

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Basic Biographical Information

Timothy Earle (Fig. 1) is an anthropological archaeologist whose interests center on the political economies of intermediate societies (chiefdoms) and archaic states. Earle received a BA from Harvard College (1969) and a PhD from the University of Michigan (1973). He was a Professor of anthropology at the University of California, Los Angeles, from 1973 to 1995 and Director of UCLA's Institute of Archaeology from 1987 to 1992. He spent a year as a Visiting Professor at the University of Cambridge (1986–1987). In 1995, he joined Northwestern University as Chair of the Department of Anthropology and became Professor Emeritus in 2011. He served as President of the Archaeology Division of the American Anthropological Association (1993–1997) and as Mercator Fellow of the Department of Archaeology, University of Cologne (2015). He was elected to the Executive Committees of the American Anthropological Association (1999–2002) and of the Human Relations Area Files (2008–2011). In 2002, he delivered the Archaeology Division's annual distinguished lecture (Earle 2004). In 2013, he was elected to the American Academy of Arts and Sciences.

Major Accomplishments

Strongly evolutionary in its orientation, Earle's research is grounded in materialist approaches. Focused initially on the economic foundations of leadership, his interests widened to encompass ideology, culture, and agency, as well as exploring corporate forms of sociopolitical organization. The broad comparative sweep of his thinking is best reflected in *The Evolution of Human Societies* (first ed., 1987, second ed., 2000), co-authored with Allen Johnson. Unparalleled as a contribution to multi-linear social evolutionary theory, the book investigates the causes, mechanisms, and patterns of change through 19 ethnographic and archaeological case studies. Subsistence intensification, political integration, and social stratification are characterized as interdependent processes that unfold in varied environments – at distinct societal scales – across the globe. His most influential book, *How Chiefs Come to Power* (1997), compares the evolution of chiefdoms in three areas.

In Polynesia, the Andes, and Europe, Earle's archaeological field projects have incorporated rigorous testing of economic questions alongside innovative methods. As a doctoral student investigating irrigation, he mapped engineered landscapes in Hawaii as part of Marshall Sahlins' Hawaiian Social Morphology and Economy project (1971–1972). Demonstrating that land tenure translated into political control, (Earle 1978) argued that redistribution mobilized surpluses predominantly to finance elite domination rather than to even out access to

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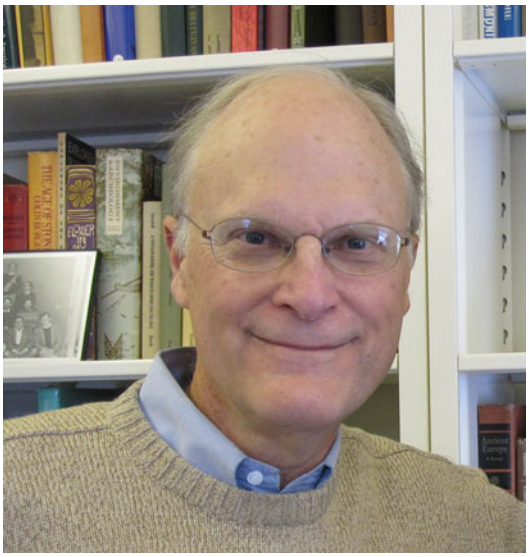

Earle, Timothy, Fig. 1 Tim Earle. (Photo: Kristian Kristiansen)

resources. Before the word *agency* entered common parlance, Earle recognized that leaders can – and do – influence trajectories of sociopolitical change. Earle and Spriggs (2015) present this Marxist orientation. In publications with Jonathon Ericson and Andrew Christenson, Earle elaborated approaches designed to examine exchange and to introduce formal economic modeling to archaeology (Earle and Ericson 1977; Earle and Christenson 1980; Ericson and Earle 1982).

Earle then established the Upper Mantaro Archaeological Project in Peru (1977–1986, with T. D'Altroy, C. Hastorf, and C. Scott) to investigate how the political and social upheavals of the Inka conquest affected the local household economy (particularly craft specialization and exchange). Excavations in centers and villages allowed comparison of households of different statuses, occupied before and after conquest. Densities of ceramic wasters, spindle whorls, and lithic debris were calculated, as well as ratios of finished goods to tools and debris. Detailed comparisons of diet, craft production, and consumption revealed that the economy saw the intensification of surplus production but little change in craft production or exchange. Instead, wealth goods controlled by the Inkas largely replaced local prestige goods for status legitimation and became less concentrated in elite compounds (Costin and Earle 1989).

In a collaborative publication with Terence D'Altroy, (D'Altroy and Earle 1985), Earle highlighted staple finance and wealth finance as contrasting political strategies, with implications for both ideologies and institutions of control. Subsequently, he edited a volume with Elizabeth Brumfiel (Brumfiel and Earle 1987) in which contributors investigated craft specialization in emergent political economies, making a distinction between *attached* and *independent* specialists. Acknowledging diverse local circumstances, contributors agreed that specialist craft activity was often organized by elites to strengthen their existing positions; specialization was therefore more a *consequence* than a *cause* of complexity.

In the mid-1990s, Earle turned his attention to the material basis of ideology. He argued that effective leadership depended not only upon economic control but also upon coercive force as well as ideologies that instituted and structured power relations. In discussions with Elizabeth DeMarrais and Luis Jaime Castillo, ideas about the materialization of ideology were developed to explain how messages about power became widespread, visible, and controlled. Part of a special section of *Current Anthropology* in 1996, this entry appeared with two companion articles that jointly focused attention on the agency of leaders and on ideology as a source of power.

Political instability in Peru led Earle to turn his attention toward Europe, where he established a highly successful collaboration with Kristian Kristiansen. The Thy Archaeological Project (1990–1997, co-directed with K. Kristiansen and M. Rowlands) investigated Neolithic and Bronze Age landscapes. Innovations in field methods united the paleoenvironmental reconstruction studies of Danish researchers with techniques including settlement survey and field excavations accompanied by full screening. Plow soil sampling (developed with J. Steinberg) facilitated identification and description of occupations in disturbed contexts, allowing detailed diachronic reconstruction of landscapes and settlement. Results showed that control of prestige goods (particularly bronze), as well as the creation

of property rights through construction of monuments, underpinned the emergence of regional elites and hierarchical sociopolitical structures. This Scandinavian research is published in another article in *Current Anthropology* (Ling et al. 2018). As part of a subsequent three-region comparison of Bronze Age societies (Earle and Kristiansen 2010), Earle has conducted a regional survey of Benta Valley, Hungary, which used rapid assessment of prehistoric, plowed-out sites to explore specialist production and regional exchange networks. He postulated that, despite the emergence of a commodity trade in metal, no evidence existed for regional control of staples or for emergent market economies (Earle et al. 2011). Looking at inter-regional metal trade during the Middle Bronze Age, he developed the idea of bottlenecks created by emerging elites to siphon off metal wealth (Earle et al. 2015).

Throughout his career, Earle's enthusiasm for anthropology led him to develop and to promote a four-field, integrated vision for the discipline. At UCLA, he was at the center of a dynamic group of researchers (including Jim Hill and Merrick Posnansky); many of his graduate students went on to develop innovative approaches to political economy. At Northwestern, Earle helped to create a distinguished four-field program that provides a model for other universities. Energetic and deeply committed to supporting colleagues, Earle maintains collaborations and friendships with former students, many now in posts in leading research universities. Through his own substantial publication record, as well as through mentoring of doctoral students and colleagues, Earle has been among the most influential archaeologists of his generation.

Cross-References

► Evolutionary Anthropology: Issues, News, and Reviews
► Kristiansen, Kristian

References

Brumfiel, E., and T.K. Earle, eds. 1987. *Specialization, exchange and complex societies*. Cambridge, UK: Cambridge University Press.

Costin, C., and T. Earle. 1989. Status distinction and legitimation of power as reflected in changing patterns of consumption in late prehispanic Peru. *American Antiquity* 54: 691–714.

D'Altroy, T., and T.K. Earle. 1985. Staple finance, wealth finance, and storage in the Inka political economy. *Current Anthropology* 26 (2): 187–206.

Earle, T.K. 1978. *Economic and social organization of a complex chiefdom*, University of Michigan Anthropological Papers 63. Ann Arbor: University of Michigan.

Earle, T.K. 2004. Culture matters: The Neolithic transition and emergence of hierarchy in Thy, Denmark. *American Anthropologist* 106: 111–125.

Earle, T.K., and A.L. Christenson, eds. 1980. *Modeling change in prehistoric subsistence economies*. New York: Academic.

Earle, T., and J.E. Ericson. 1977. *Exchange systems in prehistory*. New York: Academic.

Earle, T., and K. Kristiansen, eds. 2010. *Organizing Bronze Age societies*. Cambridge, UK: Cambridge University Press.

Earle, T., and M. Spriggs. 2015. Political economy in prehistory: A Marxist approach to Pacific sequences. *Current Anthropology* 56: 515–544.

Earle, T., A. Kreiter, C. Klehm, J. Ferguson, and M. Vicze. 2011. Bronze Age ceramic economy: The Benta Valley, Hungary. *European Journal of Archaeology* 14: 419–440.

Earle, T., J. Ling, C. Uhner, Z. Stos-Gale, and L. Melheim. 2015. The political economy and metal trade in Bronze Age Europe: Understanding regional variability in terms of comparative advantages and articulation. *European Journal of Archaeology* 18: 1–25.

Ericson, J.E., and T.K. Earle, eds. 1982. *Contexts for prehistoric exchange*. New York: Academic.

Johnson, A., and T. Earle. 1987. *The evolution of human societies*. 2nd ed. Stanford: Stanford University Press, 2000.

Ling, J., T. Earle, and K. Kristiansen. 2018. Maritime mode of production: Raiding and trading in seafaring chiefdoms. *Current Anthropology* 59, (in press).

Further Reading

D'Altroy, T., and C. Hastorf, eds. 2001. *Empire and domestic economy*. New York: Plenum Press.

DeMarrais, E., L.J. Castillo, and T. Earle. 1996. Ideology, materialization, and power strategies. *Current Anthropology* 37 (1): 15–31.

Earle, T. 1991. *Chiefdoms: Power, economy, ideology*. Cambridge, UK: Cambridge University Press.

Earle, T. 1997. *How chiefs come to power*. Stanford: Stanford University Press.

Earle, T. 2002. *Bronze Age economics*. Boulder: Westview Press.

Earle, T.K., T. D'Altroy, C. Hastorf, C. Scott, C. Costin, G. Russell, and E. Sandefur. 1987. *Archaeological field research in the Upper Mantaro, Peru, 1982–83: Investigations of Inka expansion and exchange*, Monograph XXVIII. Los Angeles: Institute of Archaeology, University of California.

Early Complex Society in South America, The Development of

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Introduction

All human societies are complex, some more than others depending on definitions and variables (e.g., technology, language, kinship). In archaeology, complex societies typically refer to political systems with permanent forms of inequalities and some degree of occupational specialization. To describe those, scholars have developed many categories including middle-range, ranked, stratified, chiefdoms, states, and civilizations. Overall, complex societies contrast with egalitarian systems, often called bands and tribes, where social differences are usually based on sex, age, and personal qualities.

South America has long been recognized as a center of primary state formation, with the Inca Empire standing as the historical culmination of this process. While early cultural historical research focused on art and monumental architecture, neo-evolutionary models and the processualist movement tried to explain the dynamic and systemic development of inequalities. Causal relationships were often sought between ecological, economic, demographic, social, political, and religio-ideological variables including the role of culture-nature relations, conflict, and the structural needs for larger and more complex political institutions.

This essay provides a brief summary of the archaeological study of the development of early complex societies in South America prior to the development of state-level polities. Building on a conceptual survey and review of the history of archaeological research, the core of the essay offers an overview of central issues and debates, including insights into regional variations from the Intermediate Area, the Andes, the Amazonian lowlands, and the Brazilian Highlands. The essay focuses on materialist and evolutionist models that have historically informed our understanding of the development of early social complexity in South America. For the sake of space, this entry focuses on early forms of social complexity, leaving untreated clear cases of state-level societies including the Moche, Tiwanaku, Wari, Lambayeque/Sicán, Chimú, Chancay, and Inca. Other entries in this encyclopedia treat in detail state and empire formation, as well as many of its pre-Columbian manifestations in South America (see Central Andes: Origins of Prehispanic State; Inca State and Empire Formation; Moche, Geography and Culture of; Tiwanaku, Geography and Culture of; Wari, Geography and Culture of).

Definition

Since humans – like other great apes – have a tendency to form dominance hierarchies, no human society is truly egalitarian. Yet, in some groups the number of social roles and statuses is limited, and permanent inequalities are absent. In such societies, which tend to be small in scale, differences are mainly based on age, sex, and other personal qualities. Here social statuses and roles tend to be achieved rather than ascribed. These societies, which commonly rely on hunting-gathering-foraging economies, have a strong egalitarian ethos often manifested in the lack of private property and prescriptions against material accumulation. In contrast, some societies display permanent and institutionalized forms of social inequalities and political power. Those tend to be larger in scale, settle in denser and more permanent ways, rely on surplus subsistence economies and extensive storage, and display some level of occupational specialization.

Since the writings of Enlightenment philosophers like Thomas Hobbes (1588–1679) and Jean-Jacques Rousseau (1712–1778), the origins of permanent social inequalities have been the topic of much debate. Beyond early and unilineal evolutionary attempts, such as Lewis H. Morgan (1818–1881) "savagery, barbarism, civilization" scheme, scholars have classified societies based

on variations in social and political organization. A series of categories and concepts have been coined to account for such variations. Most can be traced for the most part to the writings of Elman Service (1915–1996) (bands, tribes, chiefdoms, states) and Morton H. Fried (1923–1986) (egalitarian, ranked, stratified, state societies), who themselves drew heavily from Karl Marx's (1818–1883) notion that rank is closely linked to differential access to modes and means of production. Service and Fried's categories and their evolutionary implications have been vigorously debated and their archaeological applications questioned, modeled, and remodeled repeatedly.

Bands can be defined as egalitarian and demographically small (25–50 people) societies in which group membership is fluid and principally based on kinship. Subsistence strategies center around the exploitation of wild food sources including hunting, fishing, and gathering. The more controversial concept of tribe refers to groups that are also considered egalitarian but demographically larger. Here, membership is based on kinship, yet fixed. Both foraging and food-producing subsistence economies are habitually associated with tribal societies. In tribal societies, lineages are sometimes ranked.

The concept of chiefdom refers to stratified societies in which leadership positions are ascribed rather than achieved. Many typologies have been developed to account for the organizational variability of chiefdoms, but little consensus exists. Famous definitions and studies have been put forth by Colin Renfrew, Donnan Taylor, Irving Goldman, Vincas P. Steponaitis, William F. Keegan and Morgan D. Maclachlan, Richard S. Blanton, Robert D. Drennan (born 1947), and Gary M. Feinman. Chiefdoms are demographically large, and decision-making processes are centralized with a two-tier decision-making hierarchy. Yet, leadership lacks coercive and military power as chiefs usually rely on social capital and redistributive strategies to build and maintain a base of followers. Both foraging and food-producing economies correlate with chiefdoms.

From a cultural evolutionary standpoint, the concept of chiefdom was defined as a transitional stage between ranked tribal societies and state-level societies. Although it has been the subject of much criticism, most scholars still recognize a broad class of middle-range societies as chiefdoms. Of particular interest to this essay, South American ethnographic and archaeological case studies have often been used to exemplify the organizational variability of chiefdoms.

At the more complex end of the sociopolitical spectrum, states are large-scale stratified societies, with minimally a three-tier decision-making hierarchy. Here, leadership benefits from coercive power, and states usually have a territorial base. Preindustrial states have been given various names including primitive states, archaic states, civilizations, high civilizations, and early states.

In addition to the aforementioned categories, transegalitarian societies refer to groups that are neither egalitarian nor ranked. In transegalitarian arrangements, there may be unequal access to prestige, but the number and access to prestige positions are fluid. Social statuses are achieved and usually based on generosity and the ability of leaders to attract followers. Similarly, the concept of middle-range societies is broad and encompasses groups falling between bands and states, including tribes, ranked societies, and chiefdoms.

In sum, complex societies refer to various categories of the anthropological literature including middle-range societies, ranked tribal societies, chiefdoms, stratified societies, and early states. In this essay, I focus on non-state complex societies that developed in South America (Fig. 1).

Historical Background

Early attempts at tracing the origins of South American complexity were anchored in cultural historical methods and diffusionist ideas. This traditional view envisioned the rise of social complexity alongside the spread of pottery and agriculture, in particular maize and manioc. James A. Ford (1911–1968), for instance, argued that pottery, ground stone tools, fired-clay figurines, and agriculture diffused from Peru to the Eastern USA. Others, including Betty J. Meggers (1921–2012), suggested transoceanic contacts

Early Complex Society in South America, The Development of, Fig. 1 Map of South America

between East Asia and coastal Ecuador as seen through similarities in early pottery styles and technologies of the Jōmon and Valdivia cultures. In the Central Andes, following the lead of Julio C. Tello (1880–1947), the Chavín phenomenon was labeled as the first Andean civilization. Michael D. Coe (born 1929) and John H. Rowe (1918–2004) argued about the potential cross-influences between Chavín and the Mesoamerican Olmecs. Archaeological research has since contradicted the diffusionist paradigm. For instance, pottery developed independently in lowland Brazil, northern Colombia, coastal Ecuador, and the central coast of Peru. If the origins of pottery now appear more complex than originally thought, the same thing can be said of the development of village life, the adoption of agriculture, and incipient monumental architecture.

The first systematic attempt at describing indigenous and prehistoric South American peoples can be found in the *Handbook of South American Indians*, a six-volume monographic series (plus index) published by the Smithsonian Institution under the editorial guidance of Julian H. Steward (1902–1972) (Steward 1946a, 1946b, 1948a, 1948b, 1949, 1950, 1959). One of the underlying claims of Steward was that cultural ecological conditions are intricately related to evolutionary trajectories and societal types (e.g., Andean civilizations, Circum-Caribbean tribes). For Steward, South American ethnographers and archaeologists should move beyond the concept of "culture area" to "culture type." In this framework, cultural cores for the development of civilizations, chiefdoms, and tribes were to be found in the Andes, the Intermediate Area, and the Amazonian lowlands, respectively. This fueled an Andean-centric vision of South American prehistory, alongside eco-deterministic assumptions about incipient complex societies. Recent research away from the Andes has expanded our understanding and provided empirical foundations to explore the development of complex societies in different types of environments and geographic settings including the Intermediate Area, the Amazonian lowlands, the Orinoco and La Plata basins, as well as their associated plateaus.

For Americanist archaeologists, the development of complex societies is often synonymous with the "Formative," a period that is roughly the equivalent of the Neolithic. The concept emerged as part of development-evolutionary chronological frameworks such as those framed by Edward P. Lanning (1906–1981) and Luis Lumbreras (born 1936). Those schemes contrast with the "horizon/intermediate period" chronologies generated by the work of Max Uhle (1856–1944), Tello, Dorothy Menzel, Rowe, and Lawrence E. Dawson. As defined by Gordon R. Willey (1913–2002) and Philip Phillips (1900–1994), the Formative refers to the rise of agricultural food production and permanent patterns of settlement. Nowadays, the term "Formative" is often loosely used to refer to the changes in social complexity linked to village life, incipient craft specialization, public architecture, social inequalities, hierarchical political systems, and long-distance trade.

Key Issues/Current Debates

There is no single consensus on human social evolution or a unique model that explains the emergence of complexity. Societies develop along many lines, although outcomes are fairly limited. From such a multilineal evolutionary standpoint, some of the final and proximal causes of social inequality include high populations, specialization and regional interaction, feasting, productive subsistence bases and surpluses, sedentism, subsistence intensification, and competition and warfare.

A key matter is the relationship between hierarchical societies and surplus subsistence economies and in particular agriculture. Traditionally, archaeologists have assumed that agriculture is necessary for the production of surplus, one of the crucial preconditions for the establishment of social inequalities, occupational specialization, and redistribution. V. Gordon Childe (1892–1957) contributed in seminal ways to the premise that, in complex urban societies, large segments of the population are detached from primary subsistence activities. In South America, this translated into a

transfusion of Old World models, including Karl August Wittfogel (1896–1988) emphasis on the importance of hydraulic technologies and irrigation in the rise of bureaucratic institutions. This approach nourished interest in alluvial river valleys of the Pacific coast and contributed to the perception that those were the only production zones where complex societies could thrive.

Research by Michael E. Moseley (born 1941) challenged the importance of irrigation agriculture in the rise of complex societies on the coast of Peru and brought attention to the importance of marine adaptations. In his influential *The Maritime Foundations of Andean Civilization* published in 1975, Moseley argued that the rich Pacific littoral offered predictable and abundant wild resources that provided the impetus for prosperous foraging economies and the extraction of significant surplus. Based on the presence of numerous monumental platforms, he inferred that large-scale maritime populations thrived prior to the introduction of agriculture. In the early 1980s, a series of publications authored by J. Scott Raymond, David J. Wilson, Jeffrey Quilter, and Terry Stocker critically examined Moseley's claims and the validity of the maritime hypothesis.

The role of conflict and warfare has also been a cornerstone in the archaeological study of early complex societies in South America. Based on ethnographic data, Robert L. Carneiro (born 1927) developed an environmental circumscription or warfare theory for the origin of the state. For him, the geographically bounded coastal oases of the Andes represent ideal archaeological case studies to test the interplay between population pressure and warfare in the rise of political hierarchies. While survey archaeologists such as Richard E. Daggett, Brian R. Billman, David J. Wilson, and Hugo Ikehara have had difficulties confirming Carneiro's model and the causal role of warfare in the consolidation of early political authority, inter-grupal conflicts do appear to have played a significant role at the end of the first millennium BC in the Central Andes.

While materialist and evolutionist approaches have long informed our understanding of the development of early social complexity in South America, some scholars emphasize the role of religion and ideology in shaping early forms of complexity. For instance, Richard L. Burger (born 1950) and Edward R. Swenson contend that religion was at the heart of the labor mobilization and sociopolitical orders and suggest that prestige and authority were achieved through ritual expertise and generosity (rather than wealth). For them, such valuation of labor sets the Andes apart from other complex social formations.

All in all, no single model or theory accounts for the development of South American complex societies. Following the emergence of alternative models to the processualist movement in the early 1980s, archaeologists have spent considerably less effort in trying to develop explanatory and systemic models. Yet, our knowledge of regional developmental sequences has increased significantly due to sustained field research, in particular in regions where non-state complexity was previously unknown or little documented.

Regional Variations in Early South American Complex Societies

Intermediate Area

The Intermediate Area witnessed the development of chiefdom societies during the first millennium AD. As discussed by Drennan in SW Colombia, four groups of chiefdoms can be identified in Alto Magdalena (San Agustín), Tumaco, Calima, and Muisca. These societies mobilized labor toward the erection of earthen mounds and mortuary monuments, as well as craft specialists including stone sculptors and metal workers.

Andean Region

With the publication of the *Handbook of South American Indians*, the region became synonymous with the rise of complex societies at the detriment of other geographic regions perceived as being of lesser productive potential. While early views focused on Chavín, more recent studies indicate the development of diverse forms of hierarchical political systems, some prior to the introduction of pottery and agriculture.

North Andes

The work of Clifford Evans (1920–1981), Betty J. Meggers, and Emilio Estrada (1916–1961) in the late 1950s and early 1960s at the Valdivia Complex was seminal in South American archaeology. Here, early complex societies are best known from coastal Ecuador with the Valdivia culture and pottery (3500–1800 BC). In the 1970s, Donald W. Lathrap (1927–1990) and Jorge Marcos (born 1932) explored the public monuments and mortuary patterns at Real Alto. They documented elaborate funerary arrangements and architectural settings interpreted as ceremonial buildings including a mortuary facility and feasting hall. Complex societies also developed in the highlands of Ecuador. Fieldwork by Francisco Váldez indicates human occupation between 3000 and 200 BC, with major episodes of construction between 2600 and 1700 BC. Excavations by Jerry D. Moore in the Department of Tumbes in the far northern region of Peru indicate the emergence of village life as early as 4750–4320 BC. At the hamlet site of El Porvenir, half a dozen houses surround a plaza.

Central Andes

In the Central Andes, the emergence of social complexity is best documented along the north and central coasts, as well as the highlands of Peru. Here, the main lines of inquiry have been monumental and ceremonial architecture. Early complex developments are also reported from the Lake Titicaca Basin, in particular at the site of Chiripa and the Yaya-Mama tradition.

Early preceramic non-agrarian maritime villages on the coast of Peru have been documented by Daniel H. Sandweiss and Elizabeth J. Reitz at Quebrada Jaguay and the Ring site. At Huaca Prieta, excavations by Junius B. Bird (1907–1982) in the 1940s documented a 12-m-high mound surrounded by small stone structures. Based on the abundance of refuse (including food remains, textiles, and bottle gourds), Bird estimated that several hundred people lived at the site. In 2006, Thomas D. Dillehay (born 1947) and Duccio Bonavia (1935–2012) initiated additional operations at Huaca Prieta, demonstrating much earlier human occupations, perhaps as early as the late Pleistocene. Permanent settlements emerged by 7000–5500 BC, and moundbuilding did not develop from gradual accumulation of occupation midden but by deliberate and gradual planned moundbuilding. A recent volume edited by Dillehay (2017) summarizes the results of this significant project on the human occupation of Huaca Prieta.

Áspero (3700–2500 BC) in the Supe River was first studied by Willey and John Corbett and later excavated again by Robert A. Feldman in 1973–1974. Here, a 12 ha midden and seven artificial mounds suggest substantial residential populations. At Huaca de los Sacrificios, excavations revealed the burial of an infant accompanied by elaborate grave goods and exotics. The context contrasts with the grave an adult buried without any offering, a combined finding interpreted as evidence of ascribed status. At the nearby Huaca de los Ídolos, a ceremonial precinct along with figurines was discovered.

After 3000 BC, public architecture is ubiquitous on the central coast of Peru. El Paraíso (2400–1200 BC) was a ceremonial center of the Chillón Valley investigated by Frédéric Engel (1908–2002). More recent research by Ruth Shady (born 1946) at Caral (2600–1900 BC) and more broadly the Norte Chico region has yielded insights into dozens of monumental sites with raised platforms, sunken circular courts, plazas, and extensive residential zones between 3100 and 1800 BC. Based on settlement pattern analyses, Jonathan Haas, Winifred Creamer, and Alvaro Ruíz suggest that Late Preceramic Norte Chico was characterized by a symbiotic coast-inland interaction networks with inland centers occupying prominent political roles. They interpret the presence of botanical remains of cultigens as contradicting Moseley's hypothesis. For Haas and others, the sole presence of corporate architecture can be interpreted as a proxy for hierarchical social organization and centralized political systems. In contrast, fine-grained excavations by Rafael Vega-Centeno at Cerro Lampay (2400–2200 BC) suggest limited institutionalized authority and the need for social leaders to sponsor multiple, spontaneous, and recurrent small-scale work feasts in order to mobilize labor.

Late preceramic complex societies in the Peruvian highlands are often grouped under the umbrella of the Kotosh or Mito tradition. While the ritual chambers associated with this phenomenon are fairly homogeneous throughout the highlands, variations in size and numbers of ceremonial precincts point to groups of varying scales. The sites of Kotosh, Huaricoto, La Galgada, Piruru, Hualcayán, and Cosma have been associated with those developments and roughly dated between 3000 and 1500 BC. Kotosh and La Galgada are probably the best known of these. They were excavated by teams led by Seiichi Izumi, Toshihiko Sono, Kazuo Terada, and Terence Grieder (1931-2018), respectively. Recent research at Chavín de Huántar by Daniel A. Contreras suggest that similar architecture was incorporated into the site layout.

During the following Initial Period (1800–900 BC), and the introduction of pottery in coastal Peru, complex societies have been documented in association with the Cupisnique (north coast), Sechín (Casma Valley), and Manchay (central coast) phenomena. Rafael Larco Hoyle (1901–1966) pioneered research on the Cupisnique culture. Since Larco focused on grave contexts and associated grave goods, often with little contextual data, little insights were gained into sociopolitical structures. Excavations were carried out by Michael E. Moseley, Luís Watanabe, William J. Conklin, Thomas Pozorski, and more recently Jason Nesbitt at the Initial Period center of Caballo Muerto (2100–1200 BC), leading to some controversy over its building sequence and sociopolitical implications. Since 2007, Walter Alva (born 1951) and Ignacio Alva have been reporting on the discovery of spectacular painted murals dating back to more than 2000 BC at the temple sites of Ventarrón and Collud-Zarpán in the Lambayeque region.

Early complex societies on the Pacific coast are also well known from the Casma Valley at sites that include Las Haldas, Pampa de las Llamas-Moxeke, Sechín Bajo, Cerro Sechín, and Sechín Alto. The following early archaeological works in the 1930s by Tello, Rosa Fung (born 1935), Tsugio Matsuzawa, Terence Grieder, Peter Fuchs, Jesús Briceño, Shelia Pozorski, and Thomas Pozorski have investigated the Initial Period in Casma. Shelia and Thomas Pozorski suggest the development of state-level polities, one of those centered at the monumental center of Sechín Alto (2150–1400 BC). For them, the sheer scale of constructions and high levels of architectural and settlement planning point to hegemonic forms of political authority. This position is debated on the basis that Initial Period contexts have yet to reveal elite burials. In contrast, Burger and Lucy C. Salazar suggest that the large scale of the mounds is the result of multiple and relatively modest building episodes. Their fieldwork has focused on the Manchay culture of the central coast at sites such as Mina Perdida, Cardal, and Manchay Bajo. Previous fieldwork by Rogger Ravines (born 1942) and William Isbell at the Initial Period site of Garagay has fostered fascination with mural art and architectural sculptures.

Contemporary painted murals and temple architecture have been reported by Claude Chapdelaine and Tello from the valleys of Santa (San Juanito) and Nepeña (Punkurí, Cerro Blanco). More recently, field research by Koichiro Shibata at Cerro Blanco and Huaca Partida, in the lower Nepeña Valley, have brought renewed interest in Initial Period mural art and their implications to understand Cupisnique, Sechín, and Chavín interactions in the region.

In sum, the Initial Period in coastal Peru saw the rise of thousands of public buildings at hundreds of sites. Those varied in size, complexity, and density, and some displayed significant degree of planning and urban-like densities. Yet, the scale of regional integration of these local polities remains unclear and debated.

Toward the end of the Initial Period, the site of Chavín de Huántar (1000–500/400 BC) rose to prominence in the north-central highlands of Peru. It gained prominence during the Early Horizon (900–200 BC), and much has been written about the influence of Chavín across the Andes, including its relation to the Cupisnique, Sechín, Manchay, and Paracas phenomena. First studied by Tello in 1919, the site attracted significant attention and rapidly became iconic and foundational to prehistoric cultural historical and evolutionary narratives. An extensive literature delves into Chavín de Huántar and its associated cultural manifestations. The site was a ceremonial center in which monumental stone buildings, including temples, subterranean galleries, canals, and offering caches, were surrounded by a

proto-urban settlement. Elaborate stone sculptures adorned many buildings and depict a complex cosmology centered around key therianthropic beings. Although the dating of Chavín de Huántar has recently been the subject of renewed scrutiny, most Andeanists still recognized the existence of Chavín sphere of influence across the Andes. At the same time, research in the neighboring coastal Ancash region suggests that Chavín interaction zone was not continuous and that some groups avoided, ignored, and/or rejected Chavín precepts. In the lower Nepeña Valley, excavations by David Chicoine, Hugo Ikehara, and Matthew Helmer at Huambacho, Caylán, and Samanco point toward the development of early urban forms of settlement organization during the Early Horizon.

In the north-central highlands, Chavín developments were followed by centuries of armed conflicts and inter-grupal warfare. During the following Early Intermediate Period (200 BC–AD 600), a confederation of non-state complex societies emerged along the Callejón de Huaylas in conjunction with the Recuay art style. Fieldworks by Terence Grieder, Joan M. Gero (1944–2016), and George F. Lau at Pashash, Queyash, Chinchawas, and Yayno have brought insights into the rise of what could be called warring chiefdoms whose ceremonial practices unified around feasting and ancestor worship.

On the south coast of Peru, the Early Intermediate Period marked the transition from Paracas (800–100 BC) to Nazca (200 BC–AD 600). Multiple research projects by Helaine Silverman, Donal A. Proulx (born 1939), Christina A. Conlee, Kevin J. Vaughn, and Hendrik Van Gijseghem at Cahuachi, La Tiza, Marcaya, and La Puntilla have brought insights into nonurban complexity and the sustained role of pilgrimage, ceremonial constructions, feasts, and ritual craft production in the integration of middle-range societies in this arid region.

South Andes

Research by Elizabeth DeMarrais, Juan Leoni, and Félix Acuto in NW Argentina has yielded data on the emergence of village life around 100 BC followed by a period of regional development and population growth after AD 1000. Based on excavations at the site of Borgatta (AD 1000–1400) in the Calchaquí Valley, where more than 250 residential enclosures are arranged in patio groups, DeMarrais suggests that little evidence of social inequalities and integrative political activities existed beyond the household level. She suggests that rituals, including mortuary practices such as urn burials of children, served to integrate community members in the absence of formalized structures of political authority.

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Amazonian Lowlands, Brazilian Highlands, and Atlantic Coast

Until recently archaeological research in the Amazon lowlands had been limited to the identification of "dark earth" or *terra preta*. Early villages are now documented from the Central Amazon and SW Amazon regions. Mound complexes have been reported from the upper Upano Valley in Western Amazon. Fieldwork by Ernesto Salazar indicates that village life flourished between 500 and 200 BC in the Ecuadorian Amazon. In the Central Amazon, efforts by Eduardo Góes Neves indicate scant evidence for intense human occupation before 500 BC, with a major surge in the visibility of human occupation after AD 500.

A similar situation can be observed in the middle and lower Amazon where human occupations are little visible prior to AD 1. For example, at the site of Marajó Island, at the mouth of the Amazon River, nonagricultural chiefdoms flourished after AD 400. Even though human occupations and ceramic deposits at Marajó Island go back to 1500 BC, complex societies did not develop for at least 1000 years. Here, the use of pottery and the establishment of sedentary communities were not immediate precursors to social complexification.

In Central Brazil, Irmhild Wüst and Cristiana Barreto have documented ring villages, some covering up to 90 ha. In these settlements, houses surround an open plaza, as community layout is still in use today and documented ethnographically by Claude Lévi-Strauss (1908–2009). Here, maize agriculture dates to 850 BC, while complex societies only developed after AD 800.

Some of the most fascinating recent discoveries in South America have been made in the Western region of the Amazon where hundreds of

monumental earthworks and ditch enclosures have been documented. Anthropogenic landscape modifications have many forms including canals, raised fields, causeways, and mounds. Most of these earthworks appear to date between AD 500 and 1500. Denise Schaan, Sanna Saunaluoma, and colleagues have documented more than 250 enclosures at the sites of Severino Calazans, Fazenda Colorado, and Jaco Sá. The combined evidence points to major anthropogenic modifications of the landscape (including deforestation), and supra-household forms of group labor. John H. Walker points out that the earthworks created a ring ditch that divided and organized space. The center of the earthworks appears to have been kept clean, a pattern consistent with public gatherings and other ceremonial activities.

Shell mounds (*sambaquis*) are widely distributed along the Brazilian coast and further south where human occupation goes back to 6000 BC and plant domestication and settled village life to 2000 BC. Sambaquis are large, up to 50 m high, and contain large amounts of food remains, mainly marine shells and fish bones. They are normally found in productive bays and nearby lagoons and date to the prehistoric period. The large amount of food refuse is interpreted as evidence of significant resident populations, although architectural remains of permanent dwellings are scarce. The absence of cultigens and groundstones is interpreted as reinforcing the foraging foundations of those complex societies who developed in productive coastal environments. In the Uruguayan portion of the Merín Basin, Robert Bracco documented 1500 mounds.

Future Directions

South American complex societies prospered in very different environments, ecosystems, and production zones and developed numerous and heterogeneous forms of social, ideological, and political arrangements as exhibited by varying degrees of complexities. Regionally, the imbalances between the Andes and other regions remain palpable. Methodologically, much headways were made in techniques of spatial analyses including fine-grained stratigraphy, architectural modeling, GIS, and remote sensing. Satellite imagery, drone photogrammetry, and lidar technologies are particularly useful to document buildings, earthworks, fields, and other human-made features. This is a burgeoning field, and remote sensing applications have yet to reach their full potential.

Archaeologists have routinely relied on variations in burial patterns and the qualities and quantities of grave goods to evaluate social inequalities, including kin- and class-based systems. Recent developments in bioarchaeology, in particular archaeothanatology, stable isotopes, and aDNA, help bring additional lines of evidence on complex living-dead interactions, diet, health, population movements, and phylogenies and ultimately contribute to our understanding of the forms, implications, and meanings of incipient social inequalities.

Theoretically, growing efforts are targeted at better framing of the social dynamics and political structures of South American complex societies as seen through the coupling of ethnographic and archaeological case studies. Indeed, archaeologists have realized the need to move away from trait list approaches and other typological exercises, which often lead to the selective adoption of definitions and/or traits that fit particular case studies and/or assemblages.

While a growing body of literature exists on the anthropogenic modifications of the South American landscape, with a recent surge in interest for the Amazonian region, archaeologists have yet to pay systematic attention to the materiality of complex societies and its various levels of entanglement. The recent material turn in archaeology and anthropology has emphasized the heterogeneity and importance of relationalities in the structuration of societies. The works of DeMarrais on materiality and heterarchy in NW Argentina and Bill Sillar on the dead and the drying in the Andes are particularly inspiring.

South American students are beginning to explore systematically the flows and entanglements of early form of complex societies and their impact on entrapments, path dependencies, and ecological transformations. From that standpoint, advances in the integration of geosciences and paleoclimatological proxies in their reconstructions of ancient human-environmental interactions have helped South American scholars to

augment our grasp of the diversity of past anthropogenic strategies and their role in incipient forms of social complexity. The archaeobotanical works of José Iriarte, George Gumerman IV, Christine A. Hastorf, Katherine L. Chiou, and David Goldstein are of special interest to students of early social complexity.

While a significant body of work exists on agency, gender, and practice, much remains to be done in the instrumentalization of poststructural agendas to the study of South American complex societies. By focusing on the capacity to act and to the intended and unintended consequences of actions, South Americanists could gain insights into the lives and identities of different groups, genders, and factions that interacted at the nexus of the sociohistorical development of unique and alternate forms of political leadership. One pioneering example of such an approach is represented by the comparative work of Gero on Moche and Recuay gender relations as seen through visual arts. At the same time, scholars have been increasingly interested in exploring differential ontological perspectives, many of whom finding inspiration in the anthropological work of Eduardo Viveiros de Castro (born 1951). The works of Lau on ancient alterity and Recuay art and archaeology as well as Mary J. Weismantel on Chavín de Huántar represent good examples of such approaches.

Finally, scholars studying the origins of urbanism and state formation should reassess and potentially decouple these concepts. As recently pointed out by Justin Jennings and Timothy K. Earle (born 1946), the diversity of South American settlement patterns and sociopolitical organizations might benefit from a consideration of nonurban complex societies as well as non-state urban developments. This could indeed lead to breakthroughs in documenting new forms of ancient complex social arrangements.

Cross-References

- ▶ Andes: Origins and Development of Agriculture
- ▶ Andes: Prehistoric Art
- ▶ Andes: Prehistoric Period
- ▶ Caral: The Sacred City
- ▶ Central Andes: Prehispanic Hunter-Gatherers
- ▶ Chiripa and the Emergence of Social Complexity in the Lake Titicaca Basin
- ▶ Inca State and Empire Formation
- ▶ Moche, Geography and Culture of
- ▶ Paracas, Geography and Culture of
- ▶ South American Geography and Chronology
- ▶ Tiwanaku, Geography and Culture of
- ▶ Wari, Geography and Culture of

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References

Dillehay, Thomas D., ed. 2017. *Where the land meets the sea: Fourteen Millennia of human history at Huaca Prieta, Peru*. Austin: University of Texas Press.

Moseley, Michael E. 1975. *The maritime foundations of Andean civilization*. Menlo Park: Cummings Publishing Company.

Steward, Julian H., ed. 1946a. *Handbook of South American Indians*, Vol. 1: The marginal tribes. Washington, DC: Bureau of American Ethnology, Government Printing Office.

Steward, Julian H., ed. 1946b. *Handbook of South American Indians*, Vol. 2: The Andean civilizations. Washington, DC: Bureau of American Ethnology, Government Printing Office.

Steward, Julian H., ed. 1948a. *Handbook of South American Indians*, Vol. 3: The tropical forest tribes. Washington, DC: Bureau of American Ethnology, Government Printing Office.

Steward, Julian H., ed. 1948b. *Handbook of South American Indians*, Vol. 4: The circum-Caribbean tribes. Washington, DC: Bureau of American Ethnology, Government Printing Office.

Steward, Julian H., ed. 1949. *Handbook of South American Indians*, Vol. 5: The comparative ethnology of South American Indians. Washington, DC: Bureau of American Ethnology, Government Printing Office.

Steward, Julian H., ed. 1950. *Handbook of South American Indians*, Vol. 6: The physical anthropology, linguistics and cultural geography of South American Indians. Washington, DC: Bureau of American Ethnology, Government Printing Office.

Steward, Julian H., ed. 1959. *Handbook of South American Indians*, Vol. 7: Index. Washington, DC: Bureau of American Ethnology, Government Printing Office.

Further Reading

Burger, Richard L. 1992. *Chavín and the origins of Andean civilization*. New York: Thames and Hudson.

Jennings, Jesse D., ed. 1978. *Ancient South Americans*. New York: W. H. Freeman & Company.

Lumbreras, Luis G. 1974. *The peoples and cultures of ancient Peru*. Washington, DC: Smithsonian Institution Press.

Moore, Jerry D. 2014. *A prehistory of South America: Ancient cultural diversity on the least known continent*. Boulder: University Press of Colorado.
Olsen Bruhns, Karen. 1994. *Ancient South America*. Cambridge: Cambridge University Press.
Quilter, Jeffrey. 2014. *The ancient Central Andes*. London: Routledge.
Ribeiro, Darcy. 1971. *The Americas and civilization*. Boston: Dutton.
Silverman, Helaine, and William H. Isbell, eds. 2008. *Handbook of South American archaeology*. New York: Springer.
Wilson, David J. 1999. *Indigenous South Americans of the past and present: An ecological perspective*. Boulder: Westview Press.

Early Excavations Around the Globe

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State of Knowledge and Current Debates

Introduction

For many people, the history of archaeology is synonymous with the history of excavation. In the public imagination, the two are barely separable, yet this very strong association is a comparatively recent phenomenon, and one that can be unhelpful in defining a discipline. By the same token, development in archaeological method consists of more than the refinement of techniques in the field; again, a focus on excavation can be limiting and deceptive. The early history of excavation is best treated as one aspect of the broader methodological and intellectual history that helps us to understand archaeology's emergence as a discipline, and so this brief summary aims to relate early excavations to these other developments.

Excavation is not synonymous with archaeology, but it is the central and most prominent tool of the modern discipline. Why? Fundamentally, excavation has developed as a research tool in response to changing perceptions – in general, increasingly positive over time – of the scope of the material remains of the past to reveal information about past lives and societies. The early history of excavation is in part the story of that developing sense of possibility in the physical exploration of ancient sites. It is a process rooted in European intellectual history, and hence the history of early excavations, even at a global level, is one dominated by European antiquarians and excavators (among other biases: an overwhelming majority of early excavators were male, and a large proportion were amateurs of independent means and high social rank). In its origins and as a human impulse, however, the exploration of the material remains of the past can be seen as a global phenomenon.

Precursors

There are many ancient examples of antiquarianism. The interest shown by ancient Mesopotamian kings in the monuments and inscriptions of their predecessors is well documented. Ancient sites and artifacts in the classical world might acquire associations with the Homeric past, while several accounts exist of Roman building work leading to the discovery of ancient ceramics and bronzes, even to looting of tombs and a trade in antiquities. In China, the collection and cataloguing of ancient jades and bronzes was an established elite activity from at least the tenth century CE.

In medieval Europe, historical work was focused heavily on texts. Perhaps the strongest interest in the material remains of the past came through the value of saints' relics. Excavations such as those of Helena of Constantinople to discover the remains of the True Cross had pious rather than historical motives. There was ambivalence toward pagan remains but also little apparent sense that the material remains of the past could provide much useful information. This could certainly not be said of the Italian Renaissance, in which ancient classical art and architecture were seen as enormously useful – though not so much as a source of information about the past as a source of instruction for the artists and architects of the present.

The crucial changes that underpin the modern discipline of archaeology are specifically those of the Enlightenment. The philosophical turn toward empiricism and a greatly increased confidence in the explanatory power of observation and

experiment that characterizes eighteenth-century European intellectual culture enabled material that was always visible to be seen in a new light and for the investigation of questions about the ancient past to take new forms. These momentous changes reveal themselves first in the interpretation of discoveries and subsequently in the methods used to pursue questions about the past.

Italy

Eighteenth-century discoveries near Naples, in the shadow of Mount Vesuvius, were to demonstrate vividly the capacity of excavation to reveal past lives. In 1709, the chance discovery of marble blocks in an area southwest of the volcano led the Austrian Prince D'Elbeuf, Emmanuel de Lorraine, to buy the land and begin excavations, not for the sake of antiquities but for marble as a building material for his own villa. What his workmen found was a wealth of classical statuary; though no one realized the fact at the time, they had been fortunate enough to dig down to the stage of the theater of ancient Herculaneum, strewn with statuary from the theater's destruction by the eruption of Vesuvius in CE 79. Herculaneum had been buried below many meters of lava, and finds were tunneled from the rock in a largely haphazard fashion until 1716.

Twenty years later, the Prince D'Elbeuf's house became the home of Charles of Bourbon, King of Naples and Sicily (later Charles III of Spain), and of his queen-consort Maria Amalia of Saxony, who is reputed to have persuaded her husband to reopen the excavations. Charles placed these excavations under the charge of an engineer, Rocco Gioacchino de Alcubierre, who continued the earlier laborious (and destructive) practice of tunneling. In 1748, however, Alcubierre became aware of another nearby site where statues had been discovered. This site proved far easier to excavate than Herculaneum: although both had been destroyed by Vesuvius, the new site had been buried by ash rather than lava. In 1763, an inscription would reveal the site to be the city of Pompeii.

How to understand the sculptures and frescoes that emerged at Herculaneum and Pompeii? The answer was provided almost entirely by the German art historian Johann Joachim Winckelmann. After initial scholarly successes in Germany, Winckelmann moved to Rome in 1755 and from 1758 was employed by the antiquities collector Cardinal Albani. From 1763, he was supervisor of antiquities for Rome and its surrounding area, and as such, he visited both Herculaneum and Pompeii, where he was aghast at the brutal excavation techniques being used. Winckelmann saw a direct connection between social and political conditions and artistic production, arguing that the finest works of art depended on political freedom. He did not apply the principle consistently, but the idea stuck, in part because of the sheer brilliance of his prose: his *History of the Art of Antiquity* (1764) was uniquely influential, shaping European attitudes to ancient art and ensuring a special reverence for classical art. The subsequent (nineteenth century) enshrining of the Parthenon sculptures of democratic classical Athens as the highest artistic achievement of antiquity therefore represented both an aesthetic and a political judgment. The sculptures have become a potent symbol in the modern world, and the removal of many of them from the Parthenon and their shipment to London by Thomas Bruce, Earl of Elgin, at the beginning of the nineteenth century has provoked one of archaeology's most enduring controversies.

Northern Europe: Antiquarianism to Archaeology

In 1533, Henry VIII appointed John Leland to the new post of king's antiquary. His work included a survey of the monuments of England and Wales, built on by William Camden, who in 1586 published the first general account of Britain's ancient monuments. Activities of this kind were soon taking place across northern Europe, as ancient monuments became incorporated into a broader interest in national identity and heritage and the development of national pasts peopled by vaguely but romantically imagined Celts, Gauls, and druids. In Britain, antiquarians such as John Aubrey in the seventeenth century and William Stukeley in the eighteenth combined increasingly methodical recording of ancient monuments with the construction of fantasies around them: Aubrey

was the first to connect the druids with Stonehenge. The problem lay in a lack of historical sources and chronology: the earliest accounts of Britons were those of Julius Caesar, and it was his description of a land gripped by druids and mysticism that Aubrey and Stukeley elaborated and applied to most ancient remains.

For much of the eighteenth century, the excavation of ancient mounds remained a hobby. Richard Colt Hoare and William Cunnington had higher ambitions than most "barrow diggers," seeking patterns in the many mounds they excavated, but the real developments in excavation methods came toward the end of the century with Augustus Henry Lane-Fox Pitt Rivers. A British general, Pitt Rivers' retirement from the army in 1880 allowed him to concentrate on his antiquarian interests, focusing on his own large estate of Cranborne Chase in southern England. His work represented a revolution in method and recording, based on a simple principle that still governs archaeological excavation today: that since excavation itself is destructive and excavators cannot know what information will be useful in the future, they should set out to record as much detail as possible, whether or not it seems important to them personally at the time.

By the end of the nineteenth century, work on chronology was having a major impact. The German historian Johann von Eckart had first proposed a three-age principle (a stone age succeeded by ages of bronze and iron) in the early eighteenth century, but it was not until the early nineteenth and Christian Thomsen's work in the new Danish National Museum, attempting to classify its collections, that the idea was applied and developed into a usable tool. Thomsen's student Jens Worsaae took the system into the field, identifying the recurring characteristics of Stone, Bronze, and Iron Age burial mounds in Denmark and demonstrating the potential interpretive power of Thomsen's approach.

These dating methods were relative, capable of establishing the order of material in a sequence but not of applying absolute dates. In this field, the pioneer was the Swedish archaeologist Gustav Oscar Montelius, who through careful classification was able both to establish more detailed regional sequences and to identify where they intersected. Montelius used imports and mixtures of material in the border areas between regions to synchronize their chronologies, ultimately linking them through Greece to Egypt, where a historical chronology was known and fixed to absolute dates through hieroglyphic inscriptions including astronomical observations. In this way, by 1910, at least some of Europe's Bronze and Iron Age prehistory could be tied to an absolute as well as a relative chronology.

Northern Europe: Human Antiquity

Northern Europe was also the key region in the establishment of a long prehistory for humanity. Until the middle of the nineteenth century, the vast majority Europeans believed the history of the world and of humanity's existence to have been relatively brief. The primary source of information on human antiquity was the Bible. Since the Middle Ages, most scholars had placed the world's creation somewhere between 3500 and 4000 BCE; Archbishop James Ussher's chronology produced in the seventeenth century and based on a creation in 4004 BCE became perhaps the most influential in modern times. Revising the chronology required not only the right empirical research but also the cultural changes that allowed for its conclusions to find recognition. In the mid-seventeenth century, the French protestant Isaac La Peyrère's *Men Before Adam* had been treated as heresy by the Inquisition and its author arrested. The years 1830–1833 saw the publication of Charles Lyell's *Principles of Geology*, a convincing argument for the principle of uniformitarianism in geology, i.e., the assumption that past geological processes were the same as those of the present. To accept this view was to allow an immense time span for the existence of the earth, though Lyell himself took a further 30 years to become convinced of a long prehistory for humanity. By this time Darwin had identified a mechanism, natural selection, capable of explaining the long-term processes of change scholars now saw in the fossil record, while other developments shed light on human prehistory. The mid-nineteenth-century discoveries of Boucher de Perthes in Picardy showed the

existence of worked stone tools in contexts associated with the bones of extinct animals such as the mammoth. What is special about Boucher de Perthes is not what he found – in this he had several predecessors: John Frere had tried to convince the Royal Society of the same conclusions as early as 1797 – but that his discoveries were the first to achieve wide acceptance. This came in 1859, following careful inspection of his own and other sites by scholars including Lyell.

The mid-nineteenth century also witnessed the first discoveries of Paleolithic art. In 1860, Eduard Lartet discovered the first certain example of Ice Age art, an engraved bone depicting a bear's head, at Massat in the French Pyrenees. Further examples followed, and 1879 saw the discovery of spectacular cave paintings at Altamira by Don Marcelino Sanz de Sautuola (or more accurately, his young daughter Maria, who looked at the cave's ceiling while he had been focused on the search for stone tools at the floor). Sadly, de Sautuola's discoveries were dismissed as a fraud in his own lifetime; shortly after his death, discoveries at other sites were to vindicate him completely. Émile Cartailhac, professor of prehistory at Toulouse, published a full retraction of his earlier attacks on de Sautuola and visited Maria to apologize in person for the harm he had done to her father's reputation.

Egypt

Nowhere was Anglo-French imperial competition mirrored by competition over antiquities so closely as in Egypt. In 1798, Napoleon invaded Egypt, bringing with him not only soldiers and engineers but also a Commission of Sciences and Arts, consisting of more than 150 scholars, whose role was to study the country, including its ancient monuments. Napoleon's hold on Egypt was short-lived, but the *savants* and their studies were to have an enormous impact. Produced over the next 20 years and involving hundreds more artists and technicians, the monumental *Description de l'Égypte* provided one starting point for the modern study of Egypt's ancient past. The other, also as a result of the Napoleonic invasion, was the Rosetta Stone, discovered in 1799 at Fort Julien, near Rashid (French "Rosette," English "Rosetta"). The name of its excavator, a French soldier, is unknown, though it was his commanding officer, one Bouchard, who shipped the stone to Cairo. The potential value of its long trilingual inscription for decipherment was immediately recognized: that one of the languages was Greek and could therefore be read easily gave a strong starting point. The British seized the stone itself, but it was a French scholar, the extraordinarily gifted linguist Jean-François Champollion, who was ultimately to decipher the hieroglyphic script.

Champollion's success was widely celebrated, but not all things ancient Egyptian were seen to have value. With none of the modern restrictions on excavation or export, collectors such as Richard Lepsius, Henry Salt, and the larger-than-life Giovanni Belzoni succeeded in removing colossal Egyptian sculptures to Europe, but their entry into the British Museum, in particular, proved controversial, with Egyptian sculpture denigrated as inferior to the art of classical Greece. Auguste Mariette, too, excavated and exported sculptures, though he also came to recognize the catastrophic damage uncontrolled excavation was doing in the country and was the first to take serious steps toward limiting both this and the flow of antiquities to Europe, introducing some controls and establishing the national museum in Cairo.

A revolution in method came with the work of William Matthew Flinders Petrie. Petrie's work was remarkable from the beginning: his first project in Egypt, in 1881–1883, was to produce the first accurate, detailed survey of the three great pyramids at Giza. He was to spend the next 40 years excavating throughout Egypt, setting new standards in excavation techniques, recording, and publishing as he went. Where his predecessors had focused on the grand and monumental, Petrie recognized the importance of ceramics and small finds. He pioneered seriation, using close study and comparison of ceramic typologies to establish chronological sequences for the material he excavated. This involved a significant element of statistical analysis, now an integral part of archaeological research but novel at the time, and allowed Petrie to create the first sequences for predynastic remains.

If Petrie's achievements are among the most important in the history of archaeology, Howard Carter's discovery of the tomb of Tutankhamun in 1922 is surely the most celebrated. Much of the modern close identification of archaeology with excavation can be explained by the enormous public reaction to this discovery, to the romance of opening a room sealed for thousands of years and Carter's first amazed glimpse of the "wonderful things" within. The accident of discovery and the glitter of treasure may not be the images archaeologists would most like associated with their work, but the hold on the popular imagination of Tutankhamun has an enormous positive aspect that cannot be overlooked: Carter's discovery remains probably the greatest single spur to public interest in archaeology and the ancient past.

The Near East

Since the Middle Ages, European travelers in Mesopotamia (the lands of the Tigris and Euphrates, incorporating all of Iraq as well as parts of Turkey and Syria) had described great ancient mounds, attached sometimes to biblical locations and narratives. Unlike the monuments of Egypt, however, these ruins were entirely nondescript: artificial hills (known in different areas by the terms tell, tepe, and höyük) offering no hint as to the original appearance of their contents. In the disappearance of Babylon and Nineveh, it was easy to see the fulfillment of biblical prophecy. At the beginning of the nineteenth century, the East India Company agent Claudius James Rich produced invaluable surveys of both, considering the mounds around Mosul (i.e., ancient Nineveh) and Hillah (Babylon) in light of classical accounts, but it was not until mid-century that large-scale excavation provided a fuller picture.

The excavations of Paul-Émile Botta and Austen Henry Layard at Assyrian sites in the 1840s brought forth a new and unfamiliar material culture. Each believed they had uncovered biblical Nineveh – Layard eventually did, though the site of Nimrud, the subject of his famous *Nineveh and its Remains*, was actually another Assyrian capital, Kalhu, while Botta's main work at Khorsabad revealed yet another, ancient Dur-Sharrukin. In large-scale excavations based on open trenches and tunneling, they uncovered vast palaces whose walls were lined with stone bas-reliefs. Excavation concentrated simply on the removal of these, cutting them away for transport to London and Paris. The imagery these reliefs contained was entirely new to the modern world: before Botta's excavations began in 1842, the few Mesopotamian antiquities known gave little hint of what lay beneath the mounds around Mosul. Assyria's kings and courtiers, wars, and hunts were displayed in intricate detail, though art historians of the day gave little credit to what they saw as a crude and barbarous form of sculpture.

The Assyrian excavations also recovered vast quantities of cuneiform texts, including the great library of the seventh century BCE king Ashurbanipal at Nineveh. As decipherment proceeded apace through the mid-nineteenth century and a distinct field of study, Assyriology, developed around these texts, so excavations, particularly in southern Iraq in the late nineteenth century, came to focus heavily on their recovery, often with little or no recording of context.

More systematic excavation did not come until the close of the nineteenth century, with the formation of the German Oriental Society and the beginning of major excavations at Babylon, from 1899, and Ashur, from 1903. These excavations were of a very different character to their predecessors, focusing on the tracing and recording of architecture. At Babylon, Robert Koldewey uncovered the palaces and temples of Nebuchadnezzar's capital, as well as the vivid glazed-brick reliefs of the Ishtar Gate, later to be reconstructed in Berlin. The excavations at Babylon and Ashur were recorded in far greater detail than their predecessors, and at Ashur, Walter Andrae's sounding at the Ishtar temple is generally considered the first stratigraphic excavation in Mesopotamian archaeology.

In Palestine, Flinders Petrie applied the same attention to detail that had brought him success in Egypt; his work at Tell el-Hesi in 1890 established pottery sequences and a chronological framework for excavation in the region. Even more important in this respect was the work of the American William Foxwell Albright, who through his own excavations in the 1920s and 1930s and study of

material from others established the ceramic chronology for Syria-Palestine. Albright is regarded as the founding figure in biblical archaeology, and his work has exerted an enormous influence on the discipline's development.

Aegean Prehistory

The history of archaeology is rich in romantic stories, but surely none can equal that of Heinrich Schliemann's discovery of Troy. Obsessed with Homer as a child, Schliemann had a highly successful business career and ultimately achieved great wealth. At the same time, he discovered a prodigious talent for languages. When he returned to the Iliad, he did so armed with this expertise, a fortune to spend, and above all, an unshakeable faith in the literal truth of Homer's account. His approach, seen at the time and since as shockingly naive, was to follow as closely as possible every detail of geographical description in the Iliad and thus to arrive at the walls of Troy itself. He quickly rejected the site favored by most authorities – judging it impossible that Achilles and Hector could have fought for three laps around it – eventually settling on the mound of Hisarlik (a site that had been previously suggested by Frank Calvert), where in the face of his successes, scholars' mockery was forced to give way to amazed disbelief. Better still, Schliemann was discovering something of tell formation, realizing that the mound he excavated had layers like an onion and that he was effectively digging through not one but many cities. The level of the mound he believed to represent Homeric Troy, and where he discovered the hoard of gold that will now be known forever as Priam's, was eventually found to be much later than the Bronze Age world of which the Iliad sings. In truth, the relationships of that world itself to its Homeric portrayal, of the siege of Troy to a historical event, or of any settlement at Hisarlik to the Ilium it describes remain distant. It is hard to begrudge Schliemann his prize, however: in the eyes of his contemporaries, he had done the seemingly impossible, and in the process opened up new worlds. As if this were not enough, he went on to excavate the royal tombs of Mycenae, here discovering a golden funerary mask he believed to have belonged to Agamemnon himself.

More methodical, though hardly mundane, were the excavations of Sir Arthur Evans at Knossos. Schliemann himself had wished to dig at Knossos, believing Crete to be the key to an early culture spanning the Aegean. Over 25 years of work on Crete, beginning in 1900, Evans was able to explore the potential Schliemann had glimpsed. And as Schliemann surely would have done, he saw in his discoveries at Knossos the palace of King Minos and the Labyrinth, the world of Theseus, Ariadne, and the Minotaur. Much of what Evans found was spectacular, most famously the colored wall paintings that survived in parts of the palace. Moreover, his discoveries confirmed not only interaction across the Aegean but also relationships more distant: Near Eastern imports and influence abounded. The Bronze Age world of which Knossos formed a part was a very large one, and the dynamics of travel, trade, and cultural interaction within it remain a major preoccupation of scholarship today.

The Americas

Antiquarianism and early excavation in the New World took a different path. The pre-Columbian Americas did not bear on European cultural history in the same way as the ancient Aegean or Near East. In Central and South America, whole empires were destroyed by European armies and diseases and subsequently all but forgotten, to the point that in the late eighteenth and nineteenth centuries it is accurate to speak of their "rediscovery" by scholars. In 1786, the ruins of Palenque were discovered, overgrown, and forgotten in the Guatemalan rainforest, though it was not until the mid-nineteenth century and the expedition of the American John Lloyd Stephens that these and other Mayan sites would be fully explored and brought to the world's attention. In South America, it was Alexander von Humboldt, primarily a naturalist, who produced the first drawings and descriptions of Inca roads and architecture. Further descriptions followed, but no excavation took place until 1862, when Ephraim George Squire, originally sent to Lima to represent the United States in a diplomatic dispute, spent 18 months surveying and digging in Peru

and Bolivia, in the process coming to recognize that the remains he was observing were not only Inca but also those of other, earlier societies.

Seeing cities and monumental architecture as marks of civilization, the eighteenth- and nineteenth-century commentators generally avoided associating the discoveries with the indigenous populations of the present, with alternative candidates including ancient European colonists, Phoenicians, Egyptians, Lost Tribes of Israel, and even a lost civilization of Atlantis. There were exceptions, including Stephens himself, but their views were unpopular and very slow to find general acceptance.

In North America too indigenous populations suffered greatly as European settlement expanded, though here, the most prominent sites were already ancient. Famously it was Thomas Jefferson who made the first systematic study of one of the great ancient mounds, near his home in Monticello, Virginia, in 1784. Following initial investigations near the surface, he cut a section through the mound, describing in order the strata of stones, earth, and bones contained within. Jefferson attributed the mounds to earlier Indian populations, though both this conclusion and the practice of systematically investigating the monuments came a full century ahead of their time. Again, an association of large-scale monuments with civilization and a racist reluctance to ascribe this to Indians led in the eighteenth and nineteenth centuries to alternative theories involving Phoenician, Egyptian, or Israelite settlers.

Throughout the Americas, the late nineteenth century saw the beginning of more systematic excavations. In Peru, Max Uhle's excavations at Pachacamac enabled the construction of pottery sequences and relative chronologies for the first time and helped to distinguish between the remains of the several distinct cultures whose remains the archaeologists encountered. This was crucial work, though more spectacular was Hiram Bingham's 1911 discovery of incredible Inca ruins at Machu Picchu, high in the Andes. In Central America, too, excavation helped to establish typologies and relative chronologies, Manuel Gamio's work in the early twentieth century providing sequences and clarifying chronological relationships. In North America, the study of ancient mounds became far more systematic in the 1880s, with Cyrus Thomas leading a program of survey, mapping, and excavation on behalf of the Smithsonian Institution's newly established Bureau of American Ethnology – and coming to agree with Jefferson's earlier view that the mounds were indeed the work of Indians. Meanwhile, scientific excavations were conducted at several mounds, including the Great Serpent Mound, Ohio, by Frederick Ward Putnam of Harvard's Peabody Museum.

Africa

As in the Americas, the early history of archaeology in Africa was profoundly and negatively shaped by racial theories. For much of the nineteenth century, sub-Saharan Africa was imagined to be an ahistorical wilderness, not only inaccessible to archaeologists but also certain to contain nothing of note. The eighteenth- and nineteenth-century European engagement with Africa was characterized by an enormous sense of cultural superiority on the part of the Europeans, whose own technologies gave them military superiority and reinforced the idea that the people they encountered were primitive and backward. Some textual evidence did exist of ancient civilizations, in awareness in classical texts of the undefined region called by Greeks, Ethiopia, in the works of medieval Arab geographers, and in the sixteenth-century account of Leo Africanus, one of the few Europeans at that date to have traveled extensively in the African interior. In the late eighteenth century, James Bruce, a Scot searching for the source of the Nile, encountered a substantial kingdom whose army contained what to European eyes appeared a clear African parallel to medieval knights: cavalry wearing mail armor and using lances, swords, and shields. At the time his account was generally disbelieved. Meanwhile the antiquities of Sudan, the focus of considerable nineteenth-century scholarly attention, were seen as part of the ancient Egyptian world, and therefore spectacular discoveries at the Kushite capital Meroë did little to affect the perception of "black Africa" as a wilderness.

Even early discoveries in Southern Africa had little effect. The ruins known as Great Zimbabwe,

apparently referred to as an inhabited site in sixteenth-century Portuguese accounts but rediscovered as a ruin by Karl Mauch in 1871, were generally identified with the Ophir to which King Solomon sent an expedition and recovered huge quantities of gold. Mauch himself felt that the identification solved a problem: since in his view the huge walls of Great Zimbabwe could not have been the work of Africans, it made sense to look to the possibility of Israelite or Phoenician builders. This was the general pattern of thought on the ruins for the rest of the nineteenth century, and although competing models emerged, all invoked foreign colonists or a now-vanished white indigenous population. Perhaps what is most noteworthy about this situation is that further excavation during this period *did* produce many artifacts with strong and obvious relationships to some still in use in the area, but even these did not in themselves change people's minds. Instead the obviously African artifacts were disregarded as later deposits, and it was not until the systematic excavations of David Randall-MacIver in 1905 revealed such material in context that a strong case was made for African builders. Even then, the identification was disputed for decades: in 1931, it was still necessary for Gertrude Caton-Thompson to argue forcibly that the ruins were of African construction.

India and East Asia

In India, the early focus was on description of standing monuments and the study of languages and literature, most prominently William Jones' work on Sanskrit. Throughout the nineteenth century, the study of Sanskrit, its several scripts, and vast literature remained of prime importance. Excavation was rare, although many sculptures and architectural elements were removed to collections, and some sent to Europe, including the remains of the Amaravati Stupa, now in the British Museum. Though many early descriptions exist – Robert Knox's enticing late seventeenth-century account of the ruins of Anuradhapura in Ceylon (Sri Lanka) coming as early as 1681 – more systematic study of monuments and sites only began with Alexander Cunningham, from 1861, the head of the newly formed Archaeological Survey of India. The Survey reported, mapped, and described ancient sites in northern and central India. Among Cunningham's discoveries was the site of Harappa, where he found a seal carrying an unknown script. Excavations at Harappa and Mohenjo-daro during the 1920s revealed an entire, previously unknown civilization based around the Indus and its tributaries, dating to the third millennium BCE and thus contemporary with the world of early Mesopotamian city states and the pyramid-building pharaohs of Old Kingdom Egypt. The script found on the Indus Valley seals remains undeciphered.

Where in India European, and particularly British, familiarity increased through settlement, trade, and the development of empire, East Asia was less well known, with China and Japan in particular extremely difficult for foreigners to access. It was not until the second half of the nineteenth century that Japan became at all accessible for foreigners. The first archaeological excavations to be conducted in the country were those of Edward Morse, working on Neolithic remains at Omori, in 1877. In China, the introduction of archaeology, alien to the country's own strong scholarly historical and antiquarian traditions, came even later. In the early twentieth century, Aurel Stein explored remote parts of Central Asia, recording sites, sometimes excavating, and – controversially – collecting artifacts and manuscripts. In 1920, Johan Gunnar Andersson was appointed by the Chinese government to investigate prehistoric remains, and in 1928, the Academia Sinica added an archaeological section to its Institute of History and Philology under the leadership of Li Chi, a US-trained anthropologist.

One early Chinese discovery of particular note was that of an unusual tooth, made by Andersson in 1920. He later found another, and a further example had been purchased by a doctor in 1899. Andersson gave the teeth he had found to Davidson Black of the Peking Union Medical College for study. Black concluded that they represented an extinct species closely related to modern humans, which he named *Sinanthropus pekinensis* – Peking Man. Subsequent excavations yielded many more specimens and vindicated the identification, and the species, further examples of which have been discovered across Africa, Europe, and Asia

(including Eugene Dubois' late-nineteenth-century discovery, then known as Java Man), is now known as *Homo erectus*.

Perhaps the most spectacular nineteenth-century discoveries in East Asia were the ruins of Angkor in Cambodia. In fact earlier accounts of the ruins did exist, but it was the 1864 description of Henri Mouhot that sparked more intensive interest. Crucially this interest included photographs and drawings, the former produced by J. Thompson and the latter by Louis Delaporte, through which images of these remote remains were disseminated around the world.

Oceania

As in the Americas, in Oceania archaeology developed in tandem with anthropology. The earliest excavations in Australia, however, resemble antiquarianism in Britain: explorations of mounds by Phillip in 1788 and Oxley in 1817. Perhaps more representative are early ethnographic efforts to record an Aboriginal culture that in the late nineteenth century was presumed to be on the verge of extinction, since by mid-century the impact of European colonization had decimated Aboriginal populations and disrupted social structures to a huge extent in many areas. This process included the collection of material culture, some remaining in Australia but much traveling to European collections. Some of the early collectors, such as Dermot Casey and H. M. Cooper, also located and recorded archaeological sites.

If the influence of European archaeology remained weak, this was in part due to a perception that its methodologies and focus, geared to identifying and categorizing long-term change in material culture, were inappropriate for the study of a culture seen as timeless: most Europeans considered Aboriginal societies as unchanging and locked in an early stage of human cultural development. Indeed, this was a major factor in nineteenth-century ethnographic interest, with Aboriginal societies being studied as literally Stone Age survivals by anthropologists such as Baldwin Spencer. The major work toward changing this view took place in the twentieth century, as the work of Norman Tindale and Herbert Hale at Ngaut Ngaut (then known as Devon Downs: as at a number of sites in Australia, the local community has more recently made efforts to see the site's traditional name reinstated in the literature) and Fred McCarthy at rockshelters near Sydney began to identify changing patterns in material culture over time in the manner of contemporary European and American work. All the practitioners of this period were amateurs, although Tindale and McCarthy both worked in association with state museums and their work was methodologically far more sophisticated than that of most of their peers.

Across Oceania, archaeology was secondary to ethnography, as Europeans attempted to record the living societies they encountered and to collect examples of their material culture. Some nineteenth-century research did relate to origins: Tasmanians were regarded as more "primitive" even than Australian Aborigines, primarily on the basis of tool types. In New Zealand, Walter Mantell's excavation at Awamoa in North Otago in 1852 revealed evidence of people who had hunted the moa, extinct by the time of European colonization. The moa's extinction and the latest of these remains were in fact of relatively recent origin, but the discovery sparked a debate throughout the late nineteenth century on the ancestors of the Maori and a much longer prehistory.

An interesting aspect of the search for origins, though one whose significance was not much discussed at the time, was the fact that, despite land claims to the contrary, European colonizers virtually never met with true *terra incognita*. At earlier stages, human beings had colonized almost every part of the planet, however remote. The great statues of Easter Island were first seen by a Dutch sailor, Jacob Roggeven, in 1722. The first excavations and surveys were conducted by German and American teams in the 1880s, and more detailed survey and study was conducted by Katherine Routledge in 1914–1915. Easter Island lies 3,500 km from the South American coast, and perhaps it is appropriate to finish this brief survey with the study of a location so distant from the world of the earliest antiquaries and excavators. European in its origins, archaeological investigation had come to span the globe.

Conclusion

By the early twentieth century, archaeological excavations were taking place all over the world. The practitioners remained largely European, however, and in order for this to change a further process of globalization was required. The twentieth century would see the development in many countries of strong national traditions of archaeological research and excavation, a change that would also come to affect the political resonances of major excavation projects. For much of the nineteenth and early twentieth centuries, archaeology's political connections had most often taken the form of cultural and territorial competition between European empires. As the twentieth century progressed, by contrast, excavations and ancient monuments would play a growing role in nationalist politics and the construction of national pasts. The excavation of ancient sites has enormous political utility, being by nature highly visible, strongly tied to a particular location, and able to address the distant, often prehistoric past in which national mythologies are frequently rooted. Beyond this, theories on culture, race, and ethnicity prevalent in the early and middle parts of the twentieth century would add another, at times sinister, facet to excavation's role in the construction of modern identities. At the same time, however, the global distribution of archaeological research and excavation projects had other, more cosmopolitan consequences. A wealth of new data and an international community of scholars facilitated the study of ancient connections and relationships that constantly crossed modern borders, demonstrating the impossibility of understanding any area's past in isolation. Associated developments include the emergence of broadly shared methodologies and theoretical frameworks for research, neither homogenous nor imposed by any single authority, but established and constantly debated as the result of a strengthening global academic (and increasingly also public) discourse. Ultimately, the worldwide spread of excavation over the course of the nineteenth and early twentieth centuries would create the conditions for what has since become perhaps the dominant conception of archaeology: as a collective, worldwide endeavor aiming to better understand humanity's interconnected, global past.

Cross-References

- ▶ Archaeology: The World at 1800–1850
- ▶ Global Archaeology
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Nationalism and Archaeology: Overview

Further Reading

Bacon, E., ed. 1976. *The great archaeologists and their discoveries as originally reported in the pages of The Illustrated London News from 1842 to the present day*. London: Book Club Associates.

Bahn, P.G., ed. 1996. *The Cambridge illustrated history of archaeology*. Cambridge: Cambridge University Press.

Ceram, C.W., ed. 1966. *Hands on the past: Pioneer archaeologists tell their own stories*. New York: Alfred A. Knopf.

Ceram, C.W. 1967. *Gods, graves and scholars: The story of archaeology*. 2nd ed. New York: Alfred A. Knopf.

Daniel, G. 1967. *The origins and growth of archaeology*. Harmondsworth: Pelican.

Daniel, G. 1975. *150 years of archaeology*. London: Duckworth.

Daniel, G. 1981a. *A short history of archaeology*. London: Thames and Hudson.

Daniel, G., ed. 1981b. *Towards a history of archaeology*. London: Thames and Hudson.

Dìaz-Andreu, M. 2007. *A world history of nineteenth-century archaeology: Nationalism, colonialism, and the past*. Oxford: Oxford University Press.

Fagan, B.M. 1975. *The rape of the Nile*. New York: Charles Scribner's Sons.

Fagan, B.M. 1977. *Elusive treasures: The story of early archaeologists in the Americas*. New York: Charles Scribner's Sons.

Grayson, D.K. 1983. *The establishment of human antiquity*. New York: Academic Press.

Kohl, P.L., and C. Fawcett, eds. 1995. *Nationalism, politics and the practice of archaeology*. Cambridge: Cambridge University Press.

Larsen, M.T. 1996. *The conquest of Assyria: Excavations in an antique land, 1840-1860*. London: Routledge.

Marchand, S.L. 1996. *Down from Olympus: Archaeology and philhellenism in Germany, 1750-1970*. Princeton: Princeton University Press.

Renfrew, C., and P.G. Bahn. 2008. *Archaeology: Theories, methods and practice*. 5th ed. London: Thames and Hudson.

Schnapp, A. 1997. *The discovery of the past*. New York: Harry N. Abrams.

Silberman, N.A. 1982. *Digging for god and country: Exploration, archaeology and the secret struggle for the Holy Land, 1799-1917*. New York: Alfred A. Knopf.

Stiebling, W.H. 1994. *Uncovering the past: A history of archaeology*. Oxford: Oxford University Press.
Trigger, B.G. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.
Willey, G.R., and J.A. Sabloff. 1993. *A history of American archaeology*. 3rd ed. New York: Freeman.

Early Iron Age Greece (c. 1150–700 BCE)

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State of Knowledge and Current Debates

The Chronological Framework

The period that extends from the Late Bronze Age until the Classical period, namely, from the middle of the eleventh to the early fifth century, is divided into subperiods: the so-called Protogeometric (1050–900 BCE), the Geometric (900–700 BCE), and the Archaic (700–480 BCE). The last phase of the Late Bronze Age – the twelfth century – which saw the destruction of the Mycenaean world is classified as Late Helladic III C (LH IIIC) and Late Minoan in Crete (LM IIIC). In some areas the ceramic production reveals a short period between LH IIIC and PG, known as Submycenaean (or Subminoan in Crete).

The Protogeometric Period (Eleventh and Tenth Centuries BCE)

The destruction of the Mycenaean palaces and the collapse of the Mycenaean civilization were followed by a period of great unrest. Extensive population movements on the Greek mainland, the islands, and the coast of Asia Minor gradually led to the formation of the geopolitical map of the historical era. The distribution of the Greek dialects is to some extent associated with these population movements.

The two centuries extending from 1125/1075 until 900 BCE are often termed "Dark Ages," on one hand due to the few extant archaeological remains and on the other because the period is characterized by the population decline, poor life standards, and the loss of literacy. Nowadays, this term, based on the current archaeological data, does not correspond to reality.

The fall of the Mycenaean palaces led to the loss of monumentality in architecture and the appearance of the apsidal huts and the disappearance of the palatial art (wall painting, use of precious metals and semiprecious stones, fine-decorated pottery) as well as of the Linear B script, since they did not have to serve the developed Mycenaean system of bureaucracy any longer. During the same period, new burial customs appear, while iron became the dominant material. The reasons that led to the replacement of copper with iron are not fully understood, although one of them may have been the shortage of available resources.

The continuity or discontinuity from the Bronze to the Iron Age constitutes a major scholarly issue. Only in Crete is a continuity in cult obvious from one period to the other, while in mainland Greece such cases are few and mostly isolated (for instance, at Ay. Irini on Keos or at Kalapodi in Phocis) (LEMOS 2002).

Settlements and Sanctuaries: Society, Economy, Religion

Building Materials and Techniques

The domestic architecture of Early Iron Age Greece (1100–700 BCE) is characterized by detached buildings of various plans (apsidal, oval, round, and rectangular), built of ephemeral materials with the exception of the base of the wall that was usually formed of stones (see Drerup 1969; Fagerström 1988; Mazarakis Ainian 1997). In some areas, however, houses were built entirely of stone and each unit usually consisted of two or more chambers. The use of mud brick for the superstructure of the walls was common, although pisé or wattle and daub was occasionally applied, too. Archaeological excavation has amply demonstrated the widespread use of timber in the architecture of the period. Pitched roofs projecting over the sides and sometimes supported by a stoa of vertical posts protected

the exterior sides of the walls from the weather conditions and secured the roof. The contemporary small building models allow us to gain a fairly good idea of the external appearance of the buildings. In regions where timber and/or mud brick was not available or, on the contrary, in lands where stones were easily at hand, as, for example, in the Cyclades and on Crete, curvilinear plans do not occur often. It is not a coincidence that in these places flat roofs dominated. There, as well as in northern Greece, the settlements were densely nucleated, presumably because the space was limited due either to the presence of a circuit or defensive wall or to the topography of the site. The compact arrangement may have also been conditioned by the need for defense: when the settlement was unfortified, the exterior walls of the houses on the periphery of the village provided an elementary line of defense. The need for protection from the fierce winds which blow in the Aegean and from the high summer temperatures must have also constituted a factor which conditioned the densely packed form of settlements throughout the centuries as well as the small dimensions of the windows.

Society and the Form of Houses

In general, within settlements and inhabited areas, the dwellings of ordinary people can be distinguished from those of the wealthier or ruling members of the society. From an architectural point of view, the dimensions and the complexity of design are the distinguishing features. During the Protogeometric period, these differences are more pronounced but they become less evident throughout time. The political organization and the social stratification of the Early Iron Age communities are therefore reflected in this differentiation. But what can we infer about the political organization of the period between c. 1100 and 700 BCE?

What Kind of Leaders?

Soon after the destruction or decline of the Mycenaean administrative centers, Greece was segmented into petty kingdoms. It is generally believed that the *qa-si-re-u* (*basileus*) mentioned in the Linear B tablets was a rather unimportant official, perhaps the chief of a semi-independent provincial town or village who, following the collapse of central authority, succeeded the *wanax* and managed to consolidate his power. These local rulers, who may have also held priestly duties, would have gained their independence after the upheavals of the end of the Late Bronze Age and therefore assumed the leadership of self-sustained communities from local governors.

In the Homeric epics *basileis* are mentioned, but it is not clear whether they should be regarded as highborn leaders who held the right to rule on a hereditary basis or whether they held power due to their competence and personal wealth ("Big Man" system). A third alternative could be the so-called "chiefdom" model that stands in between the two, since power is vested in the chief on a hereditary basis but he is constantly challenged by peers. Gradually, however, especially from the middle of the eighth century BCE onwards, these leaders would have "given way to a system of collegial rule by a land-owning nobility," to use Walter Donlan's words (Donlan 1985). This transition would have occurred peacefully in some places, while in others following civil strife.

The So-Called "Dark Ages" or the "Age of Heroes"?

The Homeric *oikos*, according to Donlan, is "the basic kinship, residential, and economic unit, comprising both the house (dwelling, land, animals) and the household. The household consists of the family (often an extended family of three generations) plus servants and adopted members" (Donlan 1985).

The evidence so far recovered suggests that in the beginning of the first millennium BCE, communities lived in nucleated settlements or in loosely organized villages, a pattern which does not contradict the Homeric scheme. Nevertheless, the large mid-tenth century BCE apsidal building at Toumba-Lefkandi, in Euboea, stands out as an exception to this general rule, since it lies outside the actual settlement, which was situated on the plateau of Xeropolis (Coulton et al. 1993). This unparalleled monumental edifice, measuring c. 45 by 10 m, is among the few structures of the period divided into more than three compartments. It was built of stone up to a height of 1 m, while the rest of

the superstructure was of mud bricks. The shallow porch was followed by a roughly square compartment divided into two parts by a row of posts. Next came a spacious room, doubtless the main hall of the unit; at one corner there was a staircase leading to an attic beneath the pitched roof. This main room, which was also provided with a side doorway, communicated through a central corridor on either side of which there were two roughly square small chambers with the rear apsidal storage compartment (numerous cavities to receive pithoi were found). The edifice was covered by a high-pitched roof composed of perishable materials and supported by an axial wooden colonnade and a series of wooden posts set against the walls as well as a veranda of wooden posts (a "peristyle"). In the center of the main compartment, an exceptionally rich couple had been buried according to a "Homeric" manner: the warrior was cremated and his ashes placed in a bronze amphora, accompanied with his weapons; his female consort was buried next to him, adorned with precious jewels; in an adjacent pit lay the four horses of the warrior. It is probable that this was the "royal" couple of Lefkandi, buried within their "anaktoron." Alternatively, this may have been a funerary monument, a large-scale replica of their actual residence, which may have been situated elsewhere, perhaps on the neighboring promontory of Xeropolis occupied during the period of use of the Toumba building (a comparable though smaller "megaron," roughly of the same period, was excavated recently on Xeropolis). If the former hypothesis is retained, it could be argued that the ruler and the members of his entourage, during the mid-tenth century BCE, lived apart from the rest of the community. The fact that the Toumba building was used for one generation only and the area henceforth served as a rich burial ground of their descendents could favor in this specific case, James Whitley's model of "unstable settlement system," i.e., places occupied for a relatively short period due to the fact that authority is unstable (Whitley 1991). The building itself is a reflection of a chiefdom-based organization of the society, in which the ruler wishes to manifest his right to rule.

The other dwellings of the nobility of the Protogeometric period are not so impressive, but the differences in scale and design regarding the dwellings of the common people are fairly clear (in general see Mazarakis Ainian 1997). Not a few exceed 15 m in length and they are often divided into several compartments in a row, the one behind the other. It seems that the social, economic, and religious duties of the ruler dictated the basic prerequisites of the dwellings of the governing elite. There exists no exact parallel to the Lefkandi building in Early Iron Age architecture; the closest, although loose analogies may be drawn to, are Megaron B at Thermon, in Aetolia, and certain apsidal buildings from central and northern Greece. At Mitrou in East Locris, an apsidal building, contemporary to the one from Lefkandi, must have been the residence of an important family. At Halos in Thessaly several storage pithoi were found in situ in the apse of the edifice there. The large apsidal unit unearthed at Toumba (Thessaloniki) consisted of four (and subsequently five) rooms one behind the other and comprised numerous dependencies. Contemporary apsidal buildings such as Unit IV-1 at Nichoria, Unit 74 L-M at Asine, and Building A at Koukounaries (Paros) or rectangular Building T at Tiryns, dated to the twelfth century BCE, as well as several Cretan examples could be also identified as houses of the governing elite. Most of these dwellings were occupied for several generations, suggesting either some kind of hereditary leadership, although a long-lasting chiefdom model cannot be excluded. The Nichoria building, in the southwestern Peloponnese, is among the most interesting: it yielded rather rich metallic finds and presents a complex architectural layout, a pit hearth and a raised round platform in the main room, and significant storage facilities in the apse, something which has been taken as evidence that the house served communal, religious, and economic functions as well.

Normal houses of the same period were as a rule rather humble structures, provided with one single room and occasionally a porch and a back chamber. The basic daily indoor activities of the household were presumably concentrated in the same space. As typical examples one may mention some curvilinear huts at Nichoria and Asine and an oval hut at Old Smyrna.

Cult Buildings

The older cult buildings of the Early Iron Age have been found in suburban or extra-urban sanctuaries. At Ay. Irini on Keos, cult activities continue uninterrupted within the partly reused Late Bronze Age cult building. A clay head from a prehistoric statue was reused as a cult image of Dionysus in the eighth century BCE and was positioned on a cylindrical clay base. An impressive succession of cult buildings from the Late Bronze to the Early Iron Age is currently unearthed at Kalapodi in Phocis. Such uninterrupted cult continuity is widespread on Crete, especially in sacred caves and rural sanctuaries, while one of the earliest temples has been found at Kommos (temple A); it was in use from the late eleventh century up to the ninth century BCE, when it was replaced by a similar temple, B. The temple housed ritual meals. Likewise, a very early apsidal cult building, associated with burnt sacrifices, was excavated at Poseidi in the Chalkidike peninsula, which later became the suburban sanctuary of the Eretrian colony of Mende.

Burial Customs

Burial customs (Morris 1987; Whitley 1991; Lemos 2002) differ from area to area. Single burials and cremations represent common characteristics, while tumuli, bronze urns, and tomb markers are only found in specific areas. The practice of cremation might have been introduced from the East. It was firstly established in Attica, Crete, Rhodes, and the Cyclades (Naxos) and only later spread throughout the Greek world.

The Submycenaean Period (1200–1050 BCE)

During the Submycenaean period (Desborough 1964), single inhumations in cist graves appear in Athens, unlike the multiple burials in chamber and tholos "family" tombs which characterized the previous Mycenaean era. The *necropoleis* of the Kerameikos and Salamis are the most important for the period. The reuse of chamber and tholos tombs is detected in central Greece, the Peloponnese, and Crete.

The deceased were placed inside the grave either in an extended or in a contracted position. In exceptional cases, the dead are cremated and the ash remains placed inside an urn. Rectangular shaft graves appear towards the end of the period. Earthen tumuli could cover single burials in Epirus, Thessaly, and Euboea. The grave offerings are most often poor, consisting of clay vessels and occasionally bronze jewelry, while weapons are absent. Grave markers are not known, but low mounds cover some graves in the Kerameikos. The tumuli, known from north and northwestern Greece, appear also in the south towards the end of the twelfth century BCE.

The Protogeometric Period (1050–900 BCE)

The cremation employed for the adult population was adopted in Attica during the tenth century BCE and remained the dominant practice for the next 300 years, even though inhumations were not completely absent. The reuse of Mycenaean chamber and tholos tombs or the continuation of erecting such tombs is attested in Thessaly, Achaea, Messene, and Crete.

The richest burial evidence for the period comes from Athens. The cremation took place outside the grave and the ash and bone remains were placed inside an urn. Neck-handled amphorae were usually used for men and belly-handled amphorae for women. During the early tenth century, mounds covered the burials, while during its second half, an unworked rectangular stone or another vessel was used as the marker. Iron objects and weapons were now also included among the grave offerings.

Art

Pottery

The Submycenaean period saw the production of basic types of storage (amphorae and lekythoi) or table vessels (skyphoi, cups, oinochoes), decorated with simple linear patterns. The few figural scenes come from Crete and Cyprus. The use of the multiple brush might be placed in this era. The most numerous ceramic finds come from Athens, Salamis, and Lefkandi.

Around the middle of the eleventh century, the emergence of the Protogeometric style reflects the potters' and painters' will to apply a mathematical balance between shape and decoration. Basic

geometric motives are applied with the multiple brush and the compass. The burials of the Kerameikos in Athens were rich in Protogeometric finds. Amphorae, oinochoes, jugs, kraters, skyphoi, kantharoi, kalathoi, and pyxides form the shape repertoire of this period. Wavy lines and zigzags, concentric circles, and semicircles are the basic decorative motives. Isolated horses are the only exceptional figures occurring on vases. Due to trade contacts, Cypriot influences can be traced.

One of the most important settlements of the Protogeometric period is Lefkandi in Euboea. Around the middle of the tenth century BCE, deep skyphoi decorated with pairs of pendent concentric semicircles will become the trademark of the Euboean presence especially in the eastern Mediterranean. The type is found in Thessaly and Macedonia, where the Euboeans later established colonies (e.g., Methone, Mende, Torone). It is still found in the middle of the eighth century reflecting a prolonged PG stylistic phase that is contemporary with the Attic Early and Middle Geometric. The Attic Protogeometric style is also found in the Peloponnese as well as in the eastern Aegean. Crete retains older shapes, often decorated with figured scenes.

The PG style which was retained in the Corinthia until 875 BCE and in Thessaly and the North Cyclades until the middle of the ninth century or in Euboea, Achaea, Elis, Messenia, Laconia, Phocis, and Locris until 750 BCE is known as "sub-Protogeometric" (in general see Lemos 2002).

Sculpture

Figurines of humans, horses, and bovines are dedicated at major sanctuaries during this period, such as at Olympia and Samos. Two of the most important examples in terracotta come from burials: a deer from the Kerameikos and a centaur from Lefkandi. Both have wheel-made cylindrical bodies and rich linear decoration.

The Geometric Period (Ninth and Eighth Centuries BCE)

The ninth and eighth centuries BCE mark a period of important developments and changes, which become more obvious after the middle of the eighth century, which is often referred to as a period of "Renaissance." According to a widespread opinion, that century saw a kind of "revolution" with the overthrow of the old aristocratic model and its replacement by the "isonomy" of the polis. From a cultural perspective, this century is associated with the reintroduction of images or other artistic developments which have been forgotten since the fall of the Mycenaean palaces.

A demographic rise followed by the amelioration of life conditions, the development of agriculture and farming, a boost in pottery and metal production, and the rise of a class of traders which will allow the exit from the isolation and the renewal of contacts with the Mediterranean world with the foundation of colonies in the Northern Aegean, in South Italy, and Sicily can be placed in this era. The eighth century BCE also saw the development of monumental architecture and the intensification of cult activities at sanctuaries. The introduction of the alphabet and the spread of the Homeric epics belong here too. All these developments led to the birth of the polis.

Settlements and Sanctuaries: Society, Economy, Religion

The Geometric Period (900–700 BCE): From the Age of the Heroes to the Rise of the Polis

During the following two centuries (ninth–eighth centuries BCE), as the power and wealth of the lower and especially the middle classes rose, the flagrant differences between houses of members of the elite and those of the common people gradually fade out. Differences in the houses of the governing and nongoverning elite cannot be traced. The case of the settlement of Zagora on Andros is characteristic. There the dwellings of the elite, situated in the central part of the settlement, are all equivalent in size and design, with the exception of Unit H19 and its dependencies which are slightly better furnished with a more prominent location; next is the central open space of the settlement in close proximity to the hypaethral sanctuary of the community. On the other hand, there still exists a dividing line between the houses of the elite and the middle classes, though this difference is not very pronounced (i.e., Quarter D-H as opposed to J). In other Aegean

settlements, the social stratification is more difficult to discern. Nevertheless, in most places, it is still possible to spot a possible ruler's dwelling as at Emporio on Chios (the so-called Megaron Hall which lies alone inside the fortified acropolis, while the houses occupy the slopes of the hill), at Koukounaries (Building C), at Nichoria (Unit IV-5), or at Lathouriza (Unit I-IV).

Usually, aristocratic dwellings of the ninth and eighth centuries BCE were fairly long and narrow buildings of apsidal or rectangular plan which comprised at least a porch and a main room. Oval buildings were as a rule more modest structures unfit to serve as residences of the elite and therefore reserved for dwellings of the middle and lower classes as well as for workshops. Some buildings of this category, however, were more spacious and divided into two or three rooms (Building Θ at Oropos, Building A at Viglatouri in Euboea, Building IV at Antissa on Mytilene). The finds usually attest that in the latter cases we are also dealing with houses of wealthier individuals or with cult buildings. On the other hand, round buildings were apparently not considered fit to serve as dwellings; they usually have small dimensions and were reserved either for storage (i.e., Old Smyrna, Xeropolis-Lefkandi) or for industrial activities (i.e., Oropos) and exceptionally for cult activities (i.e., Oropos and Lathouriza).

One of the best-explored settlements of the Geometric period is Oropos, in northeast Attica, which may be identified with Homeric Graia (*Il.* 2, 498). Buildings of all types have been identified. Most of them belong to the Late Geometric period. The finds in the Central Quarter of the settlement attest that one of the main activities of the community was metalworking. The largest buildings there, Θ, which underwent three remodelings (oval–apsidal–oval), and perhaps oval building B, were presumably dwellings of members of the elite, who were managing these activities. The former presumably served communal needs as well and seems to have housed certain religious activities too. Various enclosure walls divide the architectural units into sectors. These *periboloi* probably served to define the limits of semiautonomous households within the community. From the evidence at hand, it is likely that the community here was organized according to well-defined family units, which may be compared to the Homeric *oikos* such as that of Odysseus. Each *oikos* unit would have consisted of a number of buildings surrounded by an enclosure wall (Homer's *erkos*, *Il.* 9.476; *Od.* 22.442). A family unit would have consisted of one or more dwellings, workshops, storage facilities, animal pens, and occasionally a household shrine. Analogies can be drawn with the Homeric Megaron, the *erkos* which is built around it, the dung heaps inside the courtyard due to the fact that animals were kept within it (*Il.* 24.163; *Od.* 17.297), the altar of Zeus within the *erkos* (*Od.* 22.334-335), associated perhaps with the practice of libations (*Il.* 16. 231; 24. 306), the enigmatic *tholos* (*Od.* 22.442-474), the chambers (*thalamoi*) which do not form part of the main megaron (2.6.242-250; *Od.* 1.425; 4.718, 802; 23.192), and the *laure* (*Od.* 22.136-138, 162-166) which could represent the narrow corridors formed between the various architectural units and the *periboloi*.

Thanks to the Oropos discoveries, it is today possible to reassess the evidence from a number of sites. The pattern, i.e., clusters of curvilinear buildings surrounded by enclosure walls, may be observed in other contemporary settlements, especially within the Euboean milieu. At Eretria, for instance, which lies opposite Oropos, as a rule, curvilinear buildings were also enclosed within *periboloi*. This remark is applicable to the area of the sanctuary of Apollo Daphnephoros as well. Some of these served to protect the buildings from the surrounding river and torrents. Others, on the other hand, seem to have delimited spaces and properties. This, in relation to the absence of clear votive offerings associated with these earlier structures, could lead one to suggest that the area of the sanctuary of Apollo was originally an aristocratic habitation quarter, which later on became the seat of the poliad divinity. The phenomenon of sanctuaries encroaching upon old residential areas was fairly common in antiquity.

A similar organization may be observed in the eighth century BCE at Viglatouri, in East Euboea (perhaps to be identified with Euboean Kymi), Xeropolis-Lefkandi, Old Smyrna, and elsewhere. It could be even argued that Athens (e.g., the

evidence deriving from the area of the future Agora) was organized in a similar manner during the Geometric period. It should be noted that in several of the above mentioned sites, we observe the custom of burying infants and children in close proximity to the *oikos*, outside the enclosed space.

Thanks to the architectural layout of the compounds described above, the separation of individuals and their activities would have thus become possible. On the basis of the archaeological evidence, one could suggest that each household under consideration had a significant degree of economic autonomy and probably in some instances going beyond self-sufficiency.

Building Θ at Oropos as well as certain buildings at Eretria and a large oval building at Viglatouri may have served for "Homeric" symposia and for the entertaining of guests, or even for other social occasions, which could be clearly separated from normal everyday activities. As argued earlier, cult activities would have been also performed within the *oikos*. Some were directed towards venerable ancestors. Certain cults were later on appropriated by the *polis*, for instance, that of the heroon by the West Gate at Eretria or even that of Apollo Daphnephoros, while others fell into oblivion together with the families which performed these cults, as at Oropos.

From the House of the Heroes to the House of the Citizens

It is usually argued that until the mid-eighth century, families in central Greece would have often lived in one-room houses that could not have afforded much privacy. This, however, presupposes that each house consisted of a single architectural unit, something not always obvious. In the earlier Dark Ages, restricted space would have allowed neither the separation of various activities nor the physical separation of the members of the *oikos*, although we can point out notable exceptions, such as the so-called "heroon" at Toumba-Lefkandi and to a lesser degree Unit IV-1 at Nichoria, which present complex plans and secondary entrances. In such buildings, during the tenth century, several functions (political, economic, religious) appear to have been gathered under the same roof. By the eighth century, the same functions were concealed within the same enclosed space, although each activity or group of activities was performed in a separate building or area.

The model of *oikoi* surrounded by *periboloi* was seemingly associated with curvilinear buildings or single-roomed structures. However, one can also detect a similar social organization in areas where rectangular forms prevailed. For instance, at Megara Hyblaia the *periboloi*, as well as streets, presumably delimitated the *cleroi* from the public space. In areas where agglutinative units were the norm, the social organization may not have differed significantly. For example, the houses at Zagora originally consisted of one main room and a porch, serving a variety of functions and developed later on into multi-roomed courtyard houses, with differentiated functions. We may witness here the beginnings of the process which led to the control over social contact, which characterizes the Classical period onwards. Multi-roomed houses were not necessarily of the courtyard type. At the Early Archaic settlement of Lathouriza in Attica, for instance, several chambers belonging to the same important unit (Unit I-IV, perhaps a leader's dwelling) have separate doorways and do not communicate with one another.

It is a fact that towards the end of the eighth century BCE, more complex rectangular house plans, consisting of several rooms clustered around a courtyard, as at Zagora, or opening onto a common corridor or courtyard, as at Eleusis and Thorikos in Attica, Corinth, and Dreros (Crete), appear. These buildings, predecessors of the courtyard or *pastas* houses of the Archaic period, mark a decisive step forward in house planning. Indeed, the amelioration of living standards, the social behavior of the head of the house, the position of the woman in the household, the presence of servants and the need of intimacy, as well as the diversification of the household activities led, towards the end of the eighth century, to the construction of more complex houses, which comprised more rooms, each of which had a specific function. The older tradition of rooms set one behind the other was gradually abandoned both due to the unpractical nature of the design (one has to cross a number of rooms in order to reach

the back of the house) and the social constraints of the new era. Thus, it was now essential that each house should possess a separate dining room (the future *andron*), a kitchen and a room, which sometimes may have been the same which was designed for the preparation of food, where women would pass most of their time. In continental Greece, the "long house," the origins of which may be sought in the technical limitations faced by the earlier architects, was finally replaced by the "wide house," which was more practical, comfortable, and better aerated. Moreover, the more square form of the new type of house was doubtless more appropriate for town planning. This design reached continental and east Greece later than the areas where dense construction had been the norm throughout the centuries, as in Crete or the Cyclades, and was applied from the beginning in the western colonies (with the exception of the earliest, Pithekoussai), where social and emotional restrictions were easier to surpass.

In conclusion, from the single elongated house of the Protogeometric period, composed of one or more rooms set the one behind the other, which afforded limited privacy, we pass to the complex *oikos* formed by several freestanding structures organized within an enclosed space and finally, from the early seventh century onwards, to the multi-roomed house articulated around a central courtyard or of the *pastas* type. The reasons for the gradual disappearance of curvilinear plans are varied: among these already mentioned and related to social, economic, religious, and political changes, one could add the technical advances of the builders (including the reinvention of roof tiles) and the rise of the *polis* which resulted in population growth within urban centers and inevitably led to a new management of space. The huts of the Age of the Heroes were practically everywhere replaced by rectangular multi-roomed houses but were sometimes preserved as relics of the past which were remembered down to Roman times (Vitr. *Arch*. 2.1.5).

The Birth of the Panhellenic Sanctuaries and the Ancient Greek Temple

Until the middle of the eighth century BCE, "rural" sanctuaries were in the open-air, while the cult buildings of the extra-urban sanctuaries seem to have been of small dimensions. The Panhellenic sanctuaries of Olympia (*Il*. 2.519; *Od*. 8.79-81, 11.581, 697-701), Delos (*Od*. 6.162-167), and Dodona (*Il*. 16.233-235; *Od*. 14.327-328, 19.296-297) are echoed in the epics. The ash altar of Zeus in Olympia formed the center of cult activity (Paus. 5.13.8-11). The sanctuaries, which have been founded in neutral areas, such as Delphi, Delos, and Dodona, were mostly visited by the contemporary elites that employed them as arenas of competition and ostentation. The traditional date of the first Olympiad (776 BCE) can partly reflect the reality of the official establishment of the games. The first temple of Apollo on Delos is considered a simple rectangular building, similar to others which came to light in smaller sanctuaries of the Geometric era, like the Heraion of Perachora or the sanctuary of Athena Alea at Tegea, and must have served for the protection of valuable offerings to the cult statue of the deity. At Kommos on Crete, the presence of hearths and the numbers of animal bones, mollusks, drinking and eating vessels, as well as iron spits from the interior and the exterior of the temple indicate the organization of banquets.

The first monumental temples appear towards the end of the eighth century BCE. A Late Geometric monumental temple was detected in the extra-urban sanctuary of Iria on Naxos. Its interior is divided into four naves by three rows of wooden columns. The presence of a hearth and benches along the side walls, as well as the burnt and unburned animal bones, attests to sacrifices and ritual banquets taking place inside the temple.

The first "hekatompedon" (meaning 100-ft long) temples appear towards the end of the eighth century. In the Heraion of Samos, a series of altars has been detected, the earlier of which has been placed to the end of the ninth century, while the first hekatompedon was constructed one century later. A stone base for the cult statue is found inside the temple. In the rural sanctuary of Artemis in Rakita (Ano Mazaraki) of Achaea, a Late Geometric apsidal hekatompedon temple with an unusual apsidal peristasis was found, where the wooden columns did not rest on the stylobate. The temple of Apollo at Corinth was built with dressed

blocks and was covered with terracotta roof tiles. The fist securely identified peripteral Corinthian temple was constructed one generation later in Isthmia at the sanctuary of Poseidon. The peripteral temple of the Argive Heraion is based on a terrace, founded on a strong terrace wall, which, according to its pseudo-cyclopean masonry, can be dated to c. 700 BCE. The chosen masonry might reflect the will of the Argive people to emphasize their own heroic ancestry.

The peristasis becomes one of the main characteristics of the Greek temple. The question is whether it first appeared in the northeastern Peloponnese or in Ionia or whether its origin can be related to some common source. It seems that it was not a homogeneous phenomenon. The origin of the Ionian peristasis should be sought in the East, while that of the northern Peloponnesian in Egypt, which could have also provided the inspiration for the Doric order of architecture. Indeed, beneath the temple of Artemis at Ephesus, built by Croesus, the remains of an older peripteral temple of the Early Archaic period have come to light. The interior columns, as well as those of the peristasis, were made prior to the temple walls, suggesting that they might have aimed at its protection from the weather conditions. The peristasis of the heroon at Lefkandi, dating two centuries earlier, might have had a purely functional role. The above examples prove that the peristasis has its roots in domestic architecture. How and why this functional element of Greek monumental architecture acquired a symbolic character that limited its use to temples remains an open question.

Burial Customs

Athens and Attica

Early Geometric, Middle Geometric I (Ninth Century BCE) During the ninth century BCE, burial customs do not present serious differences from those of the Protogeometric era. The *necropoleis* are small and there are many isolated burials. Cremation continues to characterize adult burials. Rectangular, roughly worked slabs, often coexisting with large amphorae and kraters with their undersides having been pierced for offering libations, are used as grave markers. The ninth century saw an increase in the quantity of jewelry placed inside the graves as well as of objects denoting contacts with the Near East. The social status is determined by the quality and not the quantity of the objects. Child burials are almost absent. The few Early Geometric I examples were, however, very richly furnished. This phenomenon cannot be associated with the reduced mortality rate, but with the exclusion of children from the mortuary record (Morris 1987). It has been rightly claimed that the core of the Athenian aristocracy is a product of this century.

Middle Geometric II and Late Geometric Periods (Eighth Century BCE)

(a) *MG II and LG I Periods (800–735 BCE):* During the second quarter of the eighth century, adult inhumation reappears, although cremation was not abandoned. Adults and adolescents were now buried in shaft or cist graves, while infants and small children were deposited inside vessels. Cremation was preferred for adult males and the ash remains tended to be placed in an amphora or a bronze cauldron (lebes). Markers were set over both inhumation and cremation tombs. Rich female burials are a characteristic feature of this period.

(b) *LG II Period (735–700 BCE.):* Practically all burials were inhumations in shaft graves. Cremations were few and in the majority of the cases, the ash remains were placed inside a bronze cauldron (lebes). The number of the burials increases sharply, while child burials are reintroduced. No grave markers are known. Large vessels are now placed inside the grave as offerings, while metal offerings are absent. At this time the first offering trenches appear in the Kerameikos, where ashes, burnt, and broken vases have been found.

The Other Areas of Greece

Outside Attica, inhumation in general prevails. The same *necropoleis* have been used continuously since the Protogeometric period. The Mycenaean tradition of inhumation in family tholoi, or

more rarely in chamber tombs, continues in Thessaly, Achaea, and Messenia. In Halos (Thessaly), primary cremations, covered by soil mounds, are common. Mounds of this type cover individual burials elsewhere, too (Vergina in Macedonia, Vranezi in Boeotia). In some areas of the Argolid, pithoi are used for adult burials. In Corinth organized cemeteries appear c. 770 BCE. During the Late Geometric period, cist graves gradually replace shaft graves.

A great variety in mortuary practices may be observed in the Cyclades. On Thera, a few metal urns are known as well as two eighth century BCE tripods. Two stone *stelae* with figural decoration in relief dating to c. 700 BCE are known from Paros and Kimolos. In Crete the cremation inside family chamber, or more rarely tholos, tombs remains the predominant practice. The ashes are placed inside a clay urn. In Eastern Crete, inhumations inside tholos tombs or even in caves prevail. Some of the Cretan tombs contain spits, a tradition also attested in the Argolid and Cyprus.

"Homeric" Burials and Hero Cults

Under the term "Homeric Burials," we consider the various funerary practices which seem to follow closely the Homeric descriptions (for instance, *Il*. books 18 and 23 and *Il*. 7.417-432; *Od*. 11.218-222 & 12.11-15) regarding the exceptional honors offered during the burial ceremony towards important individuals, leaders, or warriors. "Homeric" burials are known from Euboea (Lefkandi, Eretria), Crete (Eleftherna), Pithekoussai, and Cuma in the West and Salamis in Cyprus. The customs include the cremation of the dead and the placement of their ashes inside a metal urn, the sacrifices of horses, dogs, and occasionally servants, as well as the tumulus (*sema*). The case of the so-called heroon at Toumba/Lefkandi stands out. There, in the first half of the tenth century BCE, a powerful individual had achieved prominence during his lifetime and was remembered by the living for more than a century after his death: his descendents buried him, together with his female consort, in the middle of his *anaktoron* and subsequently raised a mound over his ruined dwelling, and they chose as a burial ground the area in front of the former entrance of the house. Yet, neither sacrifices nor ritual offerings were made in honor of the deceased. A huge krater that was found in the central room, next to the burial shafts, appears to have been a cultic vase, but it was presumably used only for the funerary ceremony and afterwards left behind and buried beneath the tumulus. An oversized bronze tripod by the entrance of the building, of which only the traces in the rock for the placement of its feet have been preserved, may have been positioned there after the burial ceremony, but presumably as a status symbol, rather than a cultic utensil for the performance of rituals. It seems, therefore, that the Homeric burial customs preceded by several centuries the recording of the epics.

The phenomenon of Hero Cult appears during the second half of the eighth century BCE. Such cults can be divided into three broad categories: (1) tomb cults at prehistoric tombs (mainly Mycenaean chamber and tholos tombs); (2) cults in the honor of recently heroized deceased (including hero-founders of new settlements and colonies); and (3) cults of eponymous heroes from the epic and mythic cycles.

The first category concerns chamber and tholos tombs of the Mycenaean period which were opened during the eighth century BCE in order to offer some cult in honor of the deceased. Characteristic examples are the cults at the tholos and chamber tombs at Georgiko (Thessaly), Orchomenos and Thebes (Boeotia), Menidi and Thorikos (Attica), Solygeia, Mycenae, Argos, and all over Messenia in the Peloponnese. At Eleusis an enclosure wall constructed in the Geometric period over a group of Middle Helladic burials was identified as a *temenos* of the Seven against Thebes mentioned by Pausanias (1.39.2).

In the second category, we may include sites such as Lefkandi, Grotta (Naxos), Paros, Eretria, and Eleusis. In all these cases, we witness the offering of exceptional honors at the graves of prominent individuals.

Lastly, during the eighth century BCE, we witness the foundation of sanctuaries dedicated to the worship of heroes from the epic or mythic cycles, such as the shrines of Odysseus in the Polis cave in Ithaca (*Od*. 8.390-391 και 13, 13-14), of

Agamemnon at Mycenae, of Menelaus at Therapne near Sparta, of Phrontis at Sounion, of Pelops at Olympia, and of Herakles in Thebes.

Long ago, it was suggested that the rise of hero cults in the Late Geometric period was partly due to the spread of the Homeric epics (J.N. Coldstream). It has been also argued that hero cults preceded the circulation of the Homeric epics and functioned independently. Since it is today widely accepted that the Homeric epics were not conceived in the eighth century, but were transmitted orally from generation to generation throughout the Dark Ages, it is more likely that the rise of hero cults is not an unrelated phenomenon. By Late Geometric times, a period during which the epics would have reached a wider audience, their impact in the shaping of these cults would have been even more significant. However, the rise of hero cults towards the end of the eighth century BCE has received numerous other explanations, too. According to one opinion, they could be regarded as one of the consequences of the shift from a pastoral into an agricultural economy: the small but free landowners who were threatened by the new elite were trying to establish connections with their estates through tracing their ownership of land to legendary ancestors (A. Snodgrass). Alternatively, competition for landownership as a cause for the rise of hero cults may be viewed through another prism: the landowners could have been the aristocrats themselves who felt that their estates were threatened by the lower social classes (J. Whitley). Hero cults may also be explained as one of the means through which the expanding body of the leading aristocracy managed to contain the reaction of the previous governing elite in order to enable a peaceful transition of the institutions of the rising polis (C. Bérard).

Art

Pottery

The Attic Geometric pottery production is divided into three periods: early (EG I: 900–875, EG II: 875–850 BCE.), middle (MG I: 850–800, MG II: 800–760 BCE), and late (LG I: 760–735, LG II: 735–700 BCE). The decoration includes a variety of Geometric motifs, while the shapes are now symmetrical. The vertical axis of the vases is emphasized, while the glazed areas are limited and followed by the inclusion of decorative motifs on the entire surface. The circular motives of the Protogeometric era yield their place to Geometric motifs, like the meander. Horse figurines also appear. New shapes are now introduced. The Middle Geometric period saw the introduction of the cylindrical pyxis with its handle being formed by horse figurines. In addition to horses, more animals and birds also enter the repertoire at this stage. Towards the end of the period, the first figural scenes appear. *Prothesis* (the laying out of the deceased), *ekphora* (the funeral procession from house to tomb), and battles on land and sea are the main subjects (Haug 2012). This period forms the peak of the Geometric expression: symmetrical Geometric motives and figural scenes and accuracy in the decoration are all hallmarks of the artistry of the period.

During the Late Geometric period, prosperity is reflected in the ceramic production, which tends to express monumentality. The known vases that come from Attic *necropoleis* were either placed inside the grave or used as markers. For the first time, the vases can be assigned to particular painters or workshops, which are given conventional names. The Dipylon Painter is considered the main artistic personality of the Late Geometric period. He has been ascribed a number of monumental shapes used as grave markers.

The second phase of the Late Geometric period is characterized by the decline of the style with the Geometric motifs being carelessly applied. Large shapes are no longer produced; the shapes are slimmer and plastic snakes occur on the rim, the shoulder, and the handles. Outline appears along with silhouette. The repertory of scenes is now enriched: chariot processions, riders, warriors, mourners, dance scenes, battles, hunting, and ritual scenes appear as well as scenes which have been considered as the earliest mythological representations. The presence of heraldically placed animals and monsters is announcing the Orientalizing character of seventh century BCE vase painting.

The Geometric style is a Panhellenic artistic expression which has been undoubtedly based on the Attic Geometric production. Euboea, with

Eretria, Chalcis, and Lefkandi, forms a prominent center. The Corinthian shapes are the first that travel in the Western Mediterranean. The Early proto-Corinthian production coincides with the Attic Late Geometric II and it is mostly composed of small perfume containers decorated with Orientalizing motifs (in general, see Coldstream 2008).

Sculpture

The small-scale sculpture follows the Geometric structure, while the repertory is enriched. The main axis of the figurines is emphasized. The development of their features is clear in the series of Attic clay horses from Early to Late Geometric with their volume gradually declining and their parts becoming more clearly defined. The human figurines follow the same development. Clay chariots, wheels, and pomegranates are known from this period, too.

Bronze figurines follow the same lines of development. Bronze horses are common, either being made individually or set on a perforated base or as attachments of tripod handles. The Argive, Corinthian, and Laconian workshops are the most prominent. Bulls, dogs, deer, and birds are also made. The Attic, Argive, and Corinthian workshops produce a good number of bronze human figurines as well. Warriors, flute or lyre players, archers, as well as groups, such as dogs attacking a deer, charioteers, and men with centaurs, are included in the eighth century production.

Objects of more precious materials are rare. The ivory female figurines from the Kerameikos are unique and point to Eastern prototypes, which can be sought in the Syrian representations of Astarte.

Metalworking

The introduction and the widespread use of iron characterize the early historical period. Weapons and tools are made of iron, while bronze is still widely used for objects, like jewelry, tripods, and weapons, which are also offered in the great sanctuaries after a victory. The knowledge of metalworking technology came from the East and was adopted by the peoples of the Aegean area. Bronze objects were cast in appropriately shaped casts and hammered, while details were formed by incision.

The origin of objects destined to support bronze vessels can be sought in the East and Cyprus. The freestanding rod-tripods consisted of a cast rim to which three legs were attached. They appear in the Greek world during the Protogeometric period (Crete) and continue to be produced during the Geometric (Crete, Athens, Thera). A second type of stand was formed by a square part attached to four legs, which often had wheels and a richly decorated rim. Most of the known examples come from Cyprus and Crete, although they also come from Delphi and Rhodes. A third related item is the bronze cauldron (lebes) with three attached legs and two disc-handles vertically attached to the rim. In the Late Geometric period, horses and charioteers are attached to the handles, while the legs bear linear decoration or figural scenes. These vessels have been known since the Mycenaean era as household equipment but later acquired a ritual use until they served as highly esteemed votives in the Greek sanctuaries or were offered as contest prizes during the Geometric period. The movable bronze cauldrons with animal protome attachments are of an eastern origin and they are hammered and made of a thin bronze sheet. The earliest date to the eighth century BCE.

Jewelry and Dress Ornaments

Diadems, made of thin golden electrum or silver strips, bearing incised or impressed linear or figural decoration are prominent during the Geometric era. They served as grave offerings. Examples come from Attica, Euboea, Skyros, Crete, and Rhodes.

Golden spirals have formed the most widespread type of earrings since the Protogeometric period. During the first half of the ninth century, new techniques and decorative themes are imported from the Near East. The earrings from the grave of the "Rich Athenian Lady" of the Areopagus are excellent examples of craftsmanship, possibly made by an eastern artist working in Athens (Smithson 1968). Geometric earrings are known from Attica, Patras, Delos, Boeotia, Corinth, Euboea, Lemnos, and Crete. Necklaces often of faience beads, rings, and bracelets are common.

Pins are the main types of dress ornaments. Their emergence is related to the new Doric

peplos. Attica, Argos, and Corinth are the main centers of production. The earliest fibulae can be traced back to the Mycenaean period, but they were widely used during the historic era. The plaque of the fibulae was often decorated with incised geometric motifs or figural scenes. During the end of the eighth and the seventh centuries, Boeotia is the most important production center of fibulae. The type of the spectacle fibula, possibly of northern origin, is found in a number of areas until the sixth century.

Weapons

The widespread use of iron during the Early Iron Age is obvious in the construction of weapons, since the material was now stronger and lighter. The sword and the spear are the main types of offensive weapons. The main type of sword (Naue II) appears around the end of the Mycenaean period and is retained until the Orientalizing period. The metal heads of the spears have been made of iron since the eleventh century. Yet, the finds from the main sanctuaries (Olympia, Delphi, Lindos on Rhodes) indicate that bronze spearheads continued to be produced during the Geometric period. The defensive equipment included the shield, the helmet, the cuirass, and the greaves. Round shields prevail, often with a central hump or an animal protome. The most characteristic examples come from Crete and date to the eighth century. A Late Geometric grave from Argos preserved the complete equipment of a warrior: the helmet and the cuirass are the only complete examples of this period. The earliest examples of greaves come from Crete and belong to the end of the eighth century BCE.

Mythological and Epic Scenes in Geometric Art

With its figural decoration, the Dipylon amphora marks a new era for Greek art, since for the first time in Attica after the fall of the Mycenaean palaces, human and animal figures coexist with linear motifs. Thereafter dynamic figural scenes enter the pottery repertoire while also decorating other objects, like tripods and fibulae.

Since 730 BCE, a number of figural scenes have been related to mythological or epic scenes, while individual persons have been identified as particular heroes (Snodgrass 1998). The Siamese twins, Actoriones or Moliones, mentioned by Homer and Hesiod, have been recognized on a number of Late Geometric vase scenes. Herakles killing the Stymphalian birds or struggling with the Nemean lion appears on Boeotian fibulae and an Athenian clay support. On the leg of a bronze tripod of the last quarter of the eighth century, two men are fighting over a tripod, a scene suggesting the struggle of Herakles with Apollo for the possession of the Delphic tripod. Individual centaurs have been interpreted as Typheus, Chiron, or Nessos. Ariadne and Theseus is one of the suggestions for the male and female figure depicted on an Attic louterion today in the British Museum, shown ready to embark on a boat. The scene on an Attic oenochoe, today in Munich, might point to Odysseus' wreck.

The poems of the Epic Cycle include all the incidents that took place before and after the Trojan War. Scenes referring to these epics appear around 700 BCE. The scene of a male figure ready to kill an Amazon on a clay shield from Tiryns has been interpreted as the struggle of Achilles and Penthesilea known from the *Aithiopis*. The Trojan horse is depicted on a Boeotian fibula of 700 BCE, while the most detailed and well-known representation of the fall of Troy decorates the neck of a monumental relief pithos from the Cyclades dating to 675 BCE.

The epic or mythological interpretation of these scenes is ambiguous and it remains a matter of scholarly debate. The scenes have a general character and they do not closely follow the preserved versions of the myths and epics. Time and space are not denoted, while the way that the figures are depicted – lacking any inscriptions – does not allow for their secure identification. The best artists of this period, however, seem to have been influenced by their contemporary developments and attempted to portray the narratives known to them with the available media. During the next century, mythical scenes can be more easily recognized with the aid of inscriptions, too.

The emergence of mythological scenes can be associated with the developments taking place during the second half of the eighth century. At that time, seafarers and traders actively participate

in the colonization of the western Mediterranean, and Panhellenic sanctuaries are established, the alphabet comes into use, epic poems acquire their written form, and the polis rises. The elites associated themselves with the glorious epic past and the epic heroes. The intensification of contacts with the East must have seriously contributed to the development of the narrative scenes. Imported precious objects, the adoption of new subjects and techniques, brought a new era to the Geometric repertoire, preparing the grounds for the Orientalizing phenomenon of the seventh century BCE.

Conclusion

The Birth of the Alphabet It is generally accepted that the Greek borrowed their alphabet (Powell 1991) from the Phoenicians and modified it in order to include vocalic sounds (Herodotus refers to the *phoinikeia grammata*, "Phoenician letters" [5.58.1-2]). Although the introduction of the alphabet has been firstly placed between c. 1100 and 750 BCE, today most scholars, based on older inscriptions and the comparison of the letters' forms with their Phoenician counterparts, do not accept a date much earlier than c. 800 BCE.

From the almost 100 Greek inscriptions which date before 650 BCE, one half belong securely to the second half of the eighth century, while only very few can be dated prior to 775 BCE. The earliest and most abundant examples of Greek script come from geographical areas with a Euboean presence, like Lefkandi, Eretria, Oropos, Methone, the Cyclades (Zagora on Andros, Grotta on Naxos), Al Mina in Syria (Euboean emporion of the ninth century), Italian Cumae, and Pithekoussai. The two oldest inscriptions come from Italy. The first was inscribed on a local vase, coming from the grave of a local woman in the cemetery of Osteria dell'Osa near Gabii in Latium, Italy (c. 800–775 BCE), and it includes five Greek letters (EYΛIN) which cannot be interpreted (Eileithyia, the protector of parturition and childbirth is characterized as *Εὔλινος*, weaving well by Pausanias 8.21.3) (Watkins 1995). Two Greek letters (A, X) were inscribed on a funerary urn from Bologna, dating to the first half of the eighth century. The inscribers might have been Greek visitors, Euboean pre-colonists.

Other inscriptions dating to the second half of the eighth century and the early seventh come from the sanctuary of Zeus Ombrios on Mt. Hymettos, the Acropolis of Athens, the Athenian Agora, Aegina, Boeotia, Kalapodi, Delphi, Corinth, Epidaurus, Kleonai, Thera, Amorgos, Anaphi, Syros, Rhodes, Kalymnos, Samos, Old Smyrna, Phaistos, Syracuse, and Selinus.

An inscription in dactylic hexameter is found on an oinochoe from the Dipylon cemetery in Athens. It dates to c. 740 BCE and reads:

> hος νυν ορχεστων παντων αταλωτατα παιζει τοτοδε κ(μ)μ(ν;)ν. . .
> (who, among the dancers, who dances most gracefully. . .)

An interesting three-verse inscription comes from Pithekoussai from the cremation of a young boy of c. 12–14 years of age. It is inscribed on a Rhodian kotyle of c. 720 BCE. The alphabet is Euboean, and the last two verses are in dactylic hexameter:

> Νεστορος: ε[ψ]ι: ευποτ[ον]: ποτεριον
> hος δ αν τοδε πιεσι: ποτερι[ο]: αυτικα κενον
> hιμερος αιρεσει: καλιστε[φα]νο: Αφροδιτες
> (Nestor's cup I am, good to drink from.
> Whoever drinks this cup empty, straightaway
> the desire of beautiful-crowned Aphrodite will
> seize)

Both texts must have been created during a symposion. It was a common practice for its partakers to recite a verse each, which led finally to the creation of a sarcastic or funny poem. Whether the father of the boy was named Nestor or the inscription points to the famous cup of the Homeric king remains an open question (cf. *Il.* 11.632-635).

The harmonious coexistence of Greeks and Phoenicians and their common aims suggests that the adoption of the alphabet must have taken place at a place where they both met. It has been suggested that mixed marriages might have led to the development of bilingual families that led to the invention of the alphabet. In the Greek world, there are Aramaic, Neo-Hittite, Phoenician, and Cypriot inscriptions. An inscribed bronze phiale from a tomb of c. 900 BCE from Knossos and a fragment of

800 BCE from Eretria preserve the earliest evidence. Other examples of the eighth century were found at Pithekoussai, Eretria, Kisamos on Crete, and Tragana (ancient Opountian Locroi).

Where can the adoption of the alphabet be placed? The idea that it took place along the Syro-Palestinian coast, possibly at the *emporion* of Al Mina, where a Euboean community has existed since the end of the ninth century, remains credible. Cyprus must have played an important role in the spread of the alphabet, where indigenous populations were living together with Phoenicians and Greeks. This assumption however can be supported only with difficulty, since Greek inscriptions appear much later on the island. Moreover, although part of the population has used Greek language since the eleventh century, they employed a different script, the Cypro-syllabic. The supporters of the theory of the spread of the alphabet from the Doric islands (Crete, Thera, Rhodes) accept that the alphabet went through different stages of evolution before acquiring its final form, and therefore they suggest that the letters φ, χ, and ψ were firstly missing, as shown from inscriptions from Phaistos and Thera. Attica belongs to the candidates that adopted the alphabet since close contacts with the Phoenicians can already be traced from the ninth century. Euboea remains the strongest possibility, since not only the majority but also the earliest inscriptions come from areas where Euboean communities existed. The recent discovery of a large number of graffiti at the Euboean colony of Methoni, in the Thermaic gulf, where Phoenician pottery has been noted as well, will doubtless lead towards a better understanding of the birth of the alphabet. The assumption that the alphabet first appeared in Boeotia and from there spread to the West has been recently strengthened by the finds from Oropos. The date of the establishment of Pithekoussai in 775 BCE suggests that the alphabet did not move from the East to West but that it must have been brought by the Euboeans from the West.

The adoption of the alphabet by the Greeks has been mostly related to the financial-trading needs in a private and public level. In contrast to the complicated Mycenaean script, only known among the scribes, none of the first texts of the historical era belong to the category of state archives or financial texts. On the other hand, it is worth noting that most of the early inscriptions on vases denote their owner. Therefore it has been claimed that the adoption of the script is closely related to the need to state ownership. However, philologists claim that the reason lies to the need to record oral poetry in dactylic hexameter. Except for the above mentioned examples, inscriptions of this kind dating to the second half of the eighth and the first quarter of the seventh come from Aetos on Ithaca, the Athenian Acropolis, the sanctuary of Zeus on Mt. Hymettos, Eretria, Corinth, Amorgos, Phaistos, and elsewhere. The known inscriptions verify that the Greeks have known how to read and write since the latter part of the eighth century BCE.

Trade and Colonization

Even though the fall of the Mycenaean civilization led to the decline of the contacts with the neighboring cultures, the maritime routes were not forgotten (Boardman 1980; Ridgway 1984; Tandy 1997). In some areas these contacts remained active during the eleventh and tenth centuries. These intensified from the ninth century onwards due to the general improvement of living conditions. All transactions have been further supported by the use of the alphabet since the first half of the eighth century. The Phoenicians are mentioned by Homer as "ναυσίκλυτοι" traders who circulated "αθύρματα", valuable objects. Until the middle of the ninth century, the Greek exports to the coast of the eastern Mediterranean littoral are exclusively Euboeans and remain strong until the end of the eighth century, when Greeks of different areas appear, too. The contacts with the Near Eastern world were reciprocal, as indicated by the gift exchange between Greeks (mainly Euboeans) with the Eastern cultures. Many of these objects were finally dedicated at the Greek sanctuaries.

The Phoenician expansion in the Mediterranean begins with the establishment of Kition on Cyprus around the middle of the ninth century and theoretically reaches its end with the foundation of Carthage towards the end of the century.

Phoenician smiths, goldsmiths, perfume-makers settled on Crete, the Dodecanese, Attica, and Euboea. The Euboeans followed parallel paths with the Phoenicians to the West, and a small group of Easterners, maybe Phoenician, mingled with the Euboean community of Pithekoussai. Recent discoveries attest to the presence of Phoenician pottery in the Northern Aegean as well, namely, at the Eretrian colony of Methone.

Finds from Sant'Imbenia in Sardinia testify to the cooperation of Euboeans and Phoenicians around 800 BCE. The mix of traders and artisans with the local populations had an important impact on the cultural developments of the early first millennium BCE. The colonization and the maritime explorations served as a source of inspiration for the *Odyssey* of Homer. The adventures of Odysseus are not simply a narration of an heroic sea voyage, but a mix of various incidents of different periods.

Warfare

If the Trojan War can be considered as the final war of the Bronze Age, the famous Lelantine war, which historians and archaeologists place in the eighth century or the early seventh century BCE, is the most crucial war of the period under examination. Chalcidians faced the Eretrians with many Greek cities taking the part of the one or the other polis. The discovery of a "polyandrion" at Parikia on Paros, dated at the end of the eighth century BCE and containing the funerary urns of c. 160 young males, cremated and buried at the same time together, could reflect an episode of this war. The prince of grave 6 of Eretria might have been killed during one of the battles, like Amphidamas from Chalcis. The fact that Hesiod participated in a poetic competition during the burial of the latter and he was actually awarded a tripod provides a safe dating of the war around 700 BCE (*Works and Days* 65ff.). The destruction of Lefkandi slightly earlier than the end of the eighth century and the discovery of a Late Geometric cup filled with gold buried beneath the floor of a house at Eretria have been considered as overtones of this war. The narration of the achievements of the Trojan heroes can be placed within the frame of the aristocratic competition among Chalcidians and Eretrians, the *hippeis* (cavalry) and the *hippobotai* (horse owners), respectively. The first Messenian war, which concerned the effort of the Spartans to occupy Messenia, can be also placed in the eighth century. The settlement of Nichoria was destroyed by fire in the middle of the eighth century and subsequently abandoned. This catastrophe might be relevant to this war.

Sociopolitical Organization

The "Transitional" period saw the rearrangement of the social and political power in the wider Greek world as well as the establishment of a new class of rulers which seem to have embodied the characteristics of the Big Men or chiefs of the primitive societies (see above). The importance of the symposion as a manner of social behavior in the Classical era is well known. The Homeric epics, as well as the excavation results, indicate that the origin of the symposion should be sought in the period under examination.

The Birth of the Polis

According to Thucydides, the citizens constitute the polis (7.77.7), while for Aristotle, the polis is a community of people characterized by political organization (*Pol*. 1252β 30, 1280β 33). The polis consists of public and private buildings as well as the land and the people. The polis is a state that is named after its citizens' ethnic identity (e.g., not "Athens" but "the polis of the Athenians"). The agora, the public buildings, and the urban temple dedicated to the protector deity are some of the basic characteristics of the polis. In the *Iliad*, the notion of the polis does not seem widespread. In contrast, temples, *agorai*, and public buildings are mentioned in the *Odyssey*. The combination of all these characteristics can be detected only in a few excavated settlements, although this may be due to the partial investigation of most sites.

The presence of a temple dedicated to the worship of the protector deity is conceived as one of the main characteristics of the polis of the historical period. The first urban temples dating to the eighth century are often adjacent to aristocratic dwellings, where the members of the local elite participated in meals offered by the local ruler (Mazarakis Ainian 1997). At the same

time, suburban sanctuaries are found in close or larger proximity to settlements, some of which gradually acquired Panhellenic prestige, like Olympia, Delphi, and Delos. There were also rural sanctuaries, which attracted the inhabitants of a wider area without being connected with a specific settlement. The oldest cult buildings belong to the extra-urban or rural sanctuaries, which often seem to have served for the organization of ritual dinners. The settlements which did not acquire urban temples did not develop into autonomous poleis. At that time, many settlements were abandoned, maybe due to the phenomenon of *synoikismos* (Snodgrass 1971).

The foundation of urban or suburban hekatompedon temples, as well as the construction of fortifications, was the result of communal decisions rather than individual initiatives. Towards the end of the Geometric period, the temples acquire a different architectural form, while at the same time various buildings, like the treasuries and the *hestiatoria* (dining rooms), are erected, in order to satisfy the different purposes that the temples no longer served. Hero cults were spreading from the middle of the eighth century BCE, a phenomenon linked, as already mentioned with the birth of the polis (Antonaccio 1995).

Although not necessary, a main feature of the ancient Greek polis was its fortification wall. After the fall of the Mycenaean civilization and until around 800 BCE, with very few exceptions, the settlements of the Greek mainland were unfortified or loosely organized villages. The fortified settlements reappear in the early eighth century but do not constitute the norm before the end of it. This is due to the fact that in many settlements the earlier walls of the Late Bronze Age were still in use. In north Greece and Crete fortified settlements are common, while other social groups settled in naturally protected sites.

The hoplite revolution, the formation of the hoplites into a phalanx, marked the birth of the polis. Every hoplite does not behave as an individual, since with his shield he protects the hoplite that stood to his left. The hoplites act as a single "person". The hoplite equipment that was found in a grave at Argos (730–720 BCE) offers a *terminus post quem* for the chronology of the new tactic. A well-known passage from the *Iliad* indicates that Homer understood the tactics of the phalanx (*Il*. 13.130-133).

The spread of the Homeric epics since the second half of the eighth century combined with the tendency towards the redefinition of the identity of the new social groups led to a number of innovations, such as the reintroduction of the narrative scenes in vase painting or novel behaviors, like the phenomenon of the hero cults or the aristocratic burials of Homeric type (Snodgrass 1998; Langdon 2008).

The seventh century is a period of social restructuring during which the lower social classes of traders and seafarers acquired wealth. This led to the reevaluation of the political and social organization and the codification of the laws, thus strengthening the institutions of the polis. At the same time, the communal sense of competition as well as of individuality were developed, as indicated by the development of monumental architecture and sculpture, lyric poetry, ownership inscriptions, regional variations of the Greek alphabet, and local workshops.

Cross-References

- ▶ Agora in the Greek World
- ▶ Andron
- ▶ Ceramics, Ancient Greek
- ▶ Classical (Greek) Archaeology
- ▶ Crete, Archaeology of
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cyprus, Archaeology of
- ▶ Emporion
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Houses, Archaeology of
- ▶ Greek Islands (Excluding Crete), Archaeology of
- ▶ Oral Tradition: Ancient Greece
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Panhellenism
- ▶ Religion, Greek, Archaeology of
- ▶ Stoa
- ▶ Tombs, Greek (Iron Age)

References

Antonaccio, C.M. 1995. *An archaeology of ancestors. Tomb cult and hero cult in early Iron Age Greece*. Lanham: Rowman & Littlefield.

Boardman, J. 1980. *The Greeks overseas: Their early colonies and trade*. London: Thames and Hudson.

Coldstream, J.N. 2008. *Greek geometric pottery*. 2nd ed. London: The British Museum.

Coulton, J., H.W. Catling, M.R. Popham, P.G. Calligas, L.H. Sackett, et al., eds. 1993. *The Protogeometric building at Toumba, Part 2: The excavation, architecture and finds, Lefkandi II*. London: British School of Archaeology at Athens.

Desborough, V.R.d'A. 1964. *The last Mycenaeans and their successors: An archaeological survey c. 1200–1000 B.C*. Oxford: Clarendon Press.

Desborough, V.R.d'A. 1972. *The Greek Dark Ages*. London/New York: St. Martin's Press.

Donlan, W. 1985. The social groups of Dark Age Greece. *Classical Philology* 80: 293–308.

Drerup, H. 1969. *Griechische Baukunst in geometrischer Zeit, Archaeologia Homerica II, O*. Göttingen: Vandenhoeck & Ruprecht.

Fagerström, K. 1988. *Greek Iron Age architecture*. Studies in Mediterranean archaeology 81. Göteborg: P. Åström.

Haug, A. 2012. *Die Entdeckung des Körpers. Körper-und Rollenbilder im Athen des 8. und 7. Jahrhunderts v. Chr*. Berlin/Boston: De Gruyter.

Langdon, S., ed. 2008. *Art and identity in Dark Age Greece: 1100–700 B.C.E*. Cambridge: Cambridge University Press.

Lemos, I.S. 2002. *The Protogeometric Aegean: The archaeology of the late eleventh and tenth centuries B.C*. Oxford: Oxford University Press.

Mazarakis Ainian, A. 1997. *From rulers' dwellings to temples. Architecture, religion and society in early Iron Age Greece (1100–700 B.C.)*. Studies in Mediterranean archaeology 122. Jonsered: P. Åströms förlag.

Mazarakis Ainian, A. 2000. *Όμηρος και αρχαιολογία*. Athens: Institouto tou Vivliou, A. Kardamitsa.

Morris, I. 1987. *Burial and ancient society*. Cambridge: Cambridge University Press.

Morris, I. 2000. *Archaeology as cultural history: words and things in Iron Age Greece*. Oxford: Blackwell.

Powell, B.B. 1991. *Homer and the origin of the Greek alphabet*. Cambridge: Cambridge University Press.

Ridgway, D. 1984. *L'alba della Magna Grecia*. Milan: Longanesi.

Smithson, E.L. 1968. The tomb of a rich Athenian lady, ca. 850 B.C. *Hesperia* 37 (1): 77–116.

Snodgrass, A.M. 1971. *The Dark Age of Greece: An archaeological survey of the eleventh to the eighth centuries B.C*. Edinburgh: Edinburgh University Press.

Snodgrass, A. 1998. *Homer and the artists. Text and picture in early Greek art*. Cambridge: Cambridge University Press.

Snodgrass, A. 2006. *Archaeology and the emergence of Greece. Collected papers on early Greece and related topics (1965–2002)*. Edinburgh: Edinburgh University Press.

Tandy, D.W. 1997. *Warriors into traders: The power of the market in early Greece*. Berkeley/Los Angeles/London: University of California Press.

Watkins, C. 1995. Greeks in Italy outside Rome. *Harvard Studies in Classical Philology* 97: 35–50.

Whitley, J. 1991a. *Style and society in Dark Age Greece*. Cambridge: Cambridge University Press.

Whitley, J. 1991b. Social diversity in Dark Age Greece. *Annual of the British School at Athens* 86: 341–365.

Whitley, J. 2001. *The archaeology of ancient Greece, 1100–300 B.C*. Cambridge: Cambridge University Press.

E

Further Reading

Coldstream, J.N. 2003. *Geometric Greece: 900–700 BC*. 2nd ed. London: Routledge.

de Polignac, F. 1984. *La naissance de la cité grecque: Cultes, espace et société VIIIe – VIIIe siècle avant J.-C*. Paris: Ed. la Découverte.

Deger-Jalkotzy, S., and I.S. Lemos, eds. 2006. *Ancient Greece from the Mycenaean palaces to the Age of Homer, Third A.G. Leventis Conference. Department of Classics, The University of Edinburgh, 23–26 January 2003*. Edinburgh: Edinburgh University Press.

Dickinson, O.T.P.K. 2006. *The Aegean from Bronze Age to Iron Age: Continuity and change between the twelfth and eighth centuries B.C*. London: Routledge.

Fisher, N., H. Van Wees, D.D. Boedeker, et al., eds. 1998. *Archaic Greece: New approaches and new evidence*. London: Duckworth.

Hägg, R., N. Marinatos, and G. Nordquist, eds. 1988. *Early Greek cult practice*. Stockholm: Åström.

Hurwit, J. 1985. *The art and culture of early Greece*. Ithaca/London: Cornell University Press.

Langdon, S., ed. 1997. *New light on a Dark Age: Exploring the culture of geometric Greece*. Columbia/London: University of Missouri Press.

Malkin, I. 1987. *Religion and colonization in ancient Greece*. Leiden: Brill.

Morgan, C. 1990. *Athletes and oracles: The transformation of Olympia and Delphi in the eighth century BC*. Cambridge: Cambridge University Press.

Morgan, C. 2003. *Early Greek states beyond the polis*. London: Routledge.

Murray, O. 1980. *Early Greece*. Brighton: Harvester Press.

Schweitzer, B. 1969. *Die geometrische Kunst Griechenlands: Frühe Formenwelt im Zeitalter Homers*. Köln: Du Mont Schauberg.

Van Wees, H. 1992. *Status warriors: War, violence and society in Homer and history*. Amsterdam: Gieben.

Vanschoonwinkel, J. 1991. *L'Egée et la méditerranée orientale à la fin du deuxième millénaire: Témoignages archéologiques et sources écrites*. Louvain-La-Neuve/Providence: Département d'archéologie et d'histoire de l'art Collège Erasme: Brown University Center for Old World Archaeology and Art.

Early Iron Age India

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Prelude

The advent of iron technology was a major breakthrough in the history of mankind. It changed the earlier face of lithic-based culture and led to great changes in the sociocultural and economic conditions of early societies. The iron technology period may vary from region to region, but the metallurgy and utility of iron changed the entire scenario of early societies. Early smelting methodologies, though primitive and crude, are the basis of technological development. During the iron technology period, many new trends evolved for the first time in the Indian subcontinent, as well as in other areas. Such trends included settlements with permanent structures, the use of metals and metallurgy, the development of various crafts, the beginnings of large-scale commercial-based production, the use of inter- and intra-regional contacts, and the evolution of sociocultural systems and religious faith. So many developments occurred which changed the entire scenario of the early lithic-based culture to a sophisticated way of life throughout the Indian subcontinent, and many cultural trends have prevailed up to the present.

Recent observations from archaeological excavations in India, along with the present author's studies in southern India—which are not only reported for the first time but also include some findings that are new to the records of archaeology—are presented in this volume. For the convenience of understanding, the reported data are discussed under various headings, including Technological Evolution, Memorializing the Dead and Rituals, Settlement Patterns, and Time Frames. Further, to understand the sociocultural systems that developed during the Early Iron Age, the material culture of this Age in India is also discussed under various subheadings, including bloomery and crucible smelting methods, discussed under the heading Technological Evolution; while different types of memorial structures, ceramic types, and other antiquities are discussed under the heading Memorializing the Dead and Rituals. Settlements and dwellings and ethnological data are also discussed.

Dispersal and Extraction of Metal

Iron is found in the environment in almost all geographical zones in India. It always appears in combination with other elements (usually oxygen or sulfur) in rocks, excluding meteorites and native iron, which have limited archaeological significance. When a rock contains enough iron for it to be profitable for us to attempt to use it to create iron, the rock is referred to as an ore. Lithic users of early societies realized the potential of iron and started to work on the ore. The easy accessibility of the ore in India and its strong and lustrous character attracted humans, and iron, a better metal that is harder than copper, gradually replaced other sources for making tools and weapons. In India, there is evidence in several localities to indicate that the Iron Age had started by the end of the second millennium BCE or a little earlier (Chakrabarti 1974, 1992).

India is one of the richest sources of iron ore deposits in Asia. Moreover, the iron ore reserves are easily accessible and of high grade. Further, the ore is good for smelting because it has few impurities such as phosphorus and sulfur. Hematite (Fe_2O_3) is a commonly available mineral ore, colored black to silver-gray, brown to reddish-brown, or red. It is mined as the main ore of iron. Hematite is harder than pure iron, but is much more brittle. Though huge deposits are concentrated in a few selected pockets, other deposits are distributed throughout the country. Centers where the production of good quality steel (corrosion-resistant iron), made by the technique of melting the ore in a crucible, have been reported from different pockets in southern India. The primacy of iron technology in the Indian subcontinent is well established, and several scholars have investigated the state of ancient Indian iron technology (Neogi 1914; Chakrabarti 1992; Biswas 1996; Tripathi 2001; Balasubramaniam 2002). The metallurgy of iron and steel in ancient India, which

includes the extraction of iron, the working of iron, and other salient features of ancient Indian iron technology, has been studied very well. Further, some objects illustrating the skill of the Indian blacksmiths provide ample information about Indian technological development; for example, the Delhi iron pillar, made in illustrates the skills of blacksmiths in India.

The substantial iron ore deposits in India helped the tremendous growth of the iron industry and technologies were developed by the smiths in India. The technology required to separate iron from its ores and convert it into durable and useful objects is far more complicated than that needed to work successfully with metals in general and particularly Iron. Smiths working with metallic iron have developed technologies throughout the Indian subcontinent.

The direct reduction method of iron extraction was used for a fairly long period in India's history. It may be noted that not only does iron melt at a higher temperature than copper, but also that iron oxide holds its oxygen atoms much more tenaciously. A temperature of about 2020 °F (wrought iron, 1482–1593 C; gray cast iron, 1127–1204 C) is required to cause iron to melt sufficiently so that it will flow.

Early Iron Working

The actual evidence of archaeometallurgy from sites in north and central India is very sparse; at sites such as Raja Nal-ka-tila (c. 1400 cal. BCE), Malhar (c. 1800 cal. BCE), and Atranjikhera (1265–1000 cal. BCE) in Uttar Pradesh, and Noh (885–580 cal. BCE) in Rajasthan (Agrawal and Kharakwal 2003; Chakrabarti 1992; Gaur 1983; Possehl 1989; Tewari 2003). In the Gangetic region, a study tracing urbanization in the Allahabad district (from c. 1000 BCE to 300 CE) reported slag at a few sites, with a very limited number of iron artifacts (Erdosy 1988). However, it is very difficult to ascertain details about local production from the available reports.

Early Iron Age sites such as Malhar, Raja Nal-ka-tila, Baba Wali Pahari, and Dadupur in north and central India have been excavated (Tewari 2003). Evidence at those excavations, such as tuyeres, heaps of slag, and finished iron artifacts, is related to smelting (Tewari 2003). Tewari (2003) suggested three sets of dates during which iron working was being practiced at these sites. They are c. 1200–900 cal. BCE, c. 1400–1200 cal. BCE, and c. 1800–1500 cal. BCE. In this context, the date range of 1550–1300 uncal. BCE for iron artifacts from the Megalithic phase at Gufkral in Kashmir is worth mentioning (Sharma 1992: 67). Allchin and Allchin (1993: 345) and Gaur (1997: 20; 1983: 15) proposed a date of c. 1200–1000 cal. BCE for iron working in the mid-Ganga Valley, and Chakrabarti (1977: 183) also suggested a similar date, of c. 1270 cal. BCE, for iron working there.

It may be noted that the Uttarakhand region in the Central Himalayan graves was older than those in Swat by obtaining new dates from the site of Bageshwar ranging between c. 2666 and 2562 cal. BCE (Agrawal et al. 1995: 251). Painted gray ware (PGW) pottery has also been reported in the Purola and Thapli areas of the Central Himalayan region (Khanduri et al. 1998). Further, in the Kumaon and Almora districts in the Central Himalayan region slag and crucibles have been reported. The slag from the Uleni site at Dwarahat in the Almora District has been dated as early in the first millennium BCE (c. 1022–826 BCE) (Agrawal and Kharakwal 1998: 252, 263; Singh 2008: 245); these investigators suggested that the people of the Ganga Valley most likely procured iron ore (which is locally available), or processed iron in the shape of artifacts from the Central Himalayan region. Agrawal and Kharakwal (2003) believed the Central Himalayan region played an important part in the diffusion of iron metallurgy in the Ganga Valley, primarily because they argued that the Ganga Valley itself is a foredeep filled with alluvium and without any mineral outcrops (Agrawal and Kharakwal 2003: 252–253).

Technological Evolution

The early iron technology landscape in India can be characterized as having seen different waves of evolution and growth in India. Iron metallurgy in India gradually evolved over centuries, from slag-

rich simple wrought iron to corrosion-resistant iron and steel. By the end of the last millennium BCE, smiths in India had developed iron metallurgy and mastered the large-scale production and preparation of both heavy weapons and sharp-edged weapons in corrosion-free iron. Such techniques were prevalent in India for a long time and promoted long-distance trading. It may be noted that, by the end of the last millennium BCE, Indian swords were popular among most of the early societies in general and particularly in the Mediterranean region. Early smelting methods reported from archaeological evidence are discussed in the following sections. Metallurgical development in the Indian subcontinent appeared in three different stages:

I. Bloomery iron
   Smelting and forging
II. From wrought iron to steel
   Carburization – accidental and/or deliberate
   Quenching and tempering
III. Crucible iron or Wootz steel

Bloomery or Bloomary Forge

The bloomery forge was the earliest form of smelter capable of smelting iron. A bloomery is a type of furnace once widely used for smelting iron from its oxides. A bloomery's product is a porous mass of iron and slag called a bloom (an iron bloom). The mix of slag and iron in the bloom is termed sponge iron, which is usually consolidated (shingled) and further forged into wrought iron. The bloomery has now largely been superseded by the blast furnace, which produces pig iron. Tripathi (2001) has discussed various aspects of the construction and operation of ancient Indian iron furnaces.

Different designs for iron extraction furnaces have been described in the literature. The heights of these furnaces ranged between 1.5 to 3 m. A typical ancient Indian bloomery furnace can be schematically compared with a modern blast furnace. Bellows placed at the bottom of the furnace were operated at a controlled rate. The iron ore had to be reduced in order to obtain the iron. Iron ore is essentially oxide of iron and it is reduced by the carbon monoxide (CO) that is produced by the burning of charcoal in the bloomery furnace (or coking coal in a modern blast furnace). Other, unwanted, oxides, such as silicon dioxide (SiO_2), which is commonly found in iron ores, have to be removed, and this was made possible by the creation of a liquid slag called iron silicate or fayalite ($FeSiO_4$ or $2FeO{\bullet}SiO_2$). While some of the liquid slag flowed out of the bloomery furnace during the reduction of iron ore to iron, some of the liquid slag still remained when the hot iron lumps were taken out of the furnace.

A bloomery consists of a pit or chimney with heat-resistant walls made of earth, clay, or stone. Near the bottom, one or more pipes (made of clay or metal) enter through the side walls. These pipes, called tuyères, allow air to enter the furnace, either by natural draughts or forced with bellows or a trompe. An opening at the bottom of the bloomery may be used to remove the bloom, or the bloomery can be tipped over and the bloom removed from the top.

The first step to be taken before the bloomery can be used is the preparation of charcoal and the iron ore. The charcoal is produced by heating wood to produce the nearly pure carbon fuel needed for the smelting process. The ore is broken into small pieces and usually roasted in a fire to remove any moisture. Any large impurity in the ore can be crushed and removed. Since slag from previous blooms may have a high iron content, it can also be broken up and recycled into the bloomery with the new ore.

In operation, the bloomery is preheated by burning charcoal, and, once it is hot, iron ore and additional charcoal are introduced through the top, in a roughly one-to-one ratio. Inside the furnace, carbon monoxide from the incomplete combustion of the charcoal reduces the iron oxides in the ore to metallic iron, without melting the ore; this allows the bloomery to operate at lower temperatures than the melting temperature of the ore. As the desired product of a bloomery is iron, which is easily forgeable, a low carbon content is required. The temperature and the ratio of charcoal to iron ore must be carefully controlled to

keep the iron from absorbing too much carbon and thus becoming unforgeable. Cast iron occurs when the iron melts and absorbs 2% to 4% carbon. Because the bloomery is self-fluxing, the addition of limestone is not required to form a slag (Killick and Gordon 1989; Pleiner 1971).

The small particles of iron produced in this way fall to the bottom of the furnace, where they combine with molten slag, which often consists of fayalite and iron mixed with other impurities from the ore. The mixed iron and slag cool to form a spongy mass referred to as the bloom. Because the bloom is highly porous, and its open spaces are full of slag, the bloom must later be reheated and beaten with a hammer to drive the molten slag out of it. Iron treated this way is said to be wrought (worked), and the resulting iron, with reduced amounts of slag, is called wrought iron or bar iron. It is also possible to produce blooms coated in steel by manipulating the charge and air flows to the bloomery.

Crucible Steel

The production of crucible steel is generally attributed to centers in India and Sri Lanka where it was produced using the so-called Wootz process. It is also assumed that the appearance of crucible steel in other locations was due to long-distance trade. Only recently it has become apparent that places in Central Asia, like Merv in Turkmenistan and Akhsiket in Uzbekistan, were important centers of crucible steel production (Bronson 1986; Craddock 2003). The Central Asian finds are all from excavations and date from the eighth to twelfth centuries CE, while the Indian/Sri Lankan material is as early as 300 BCE (Ranganathan and Srinivasan 2004).

Archaeological evidence for both the bloomery and crucible steel methods was retrieved from the Kanchipuram district in southern India (Pisipaty 2016). Early Iron Age settlements and iron smelting and workshop areas were traced in India and iron technologies, from bloomery to advanced crucible methods, with the production of corrosion-resistant iron, appeared in India. Further, evidence on habitations and iron smelting workshops, as well as huge megalithic burial structures (Pisipaty 2013), has been reported for the first time at Kanchipuram region in southern part of India; such evidence is very rare in India and elsewhere.

Evidence of Early Iron Smelting

As noted above, Early Iron Age settlements and iron smelting and workshop areas have been traced in the Kanchipuram region in southern India.

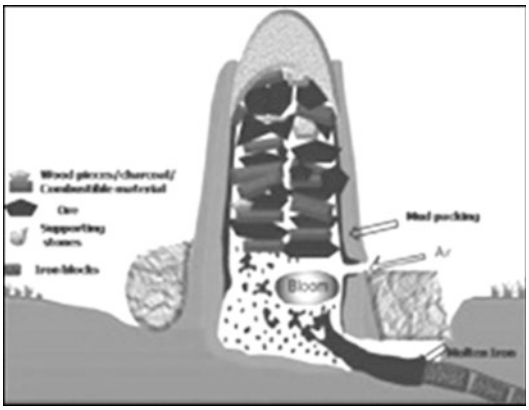

Bloomery furnaces in India were usually made of clay and stone pieces, and may also have included boulders in their construction.

It seems from the available evidence that different methods were adopted in the preparation of smelting furnaces in this region (Fig. 1). On flat bedrock, wood and ore pieces, along with carburant materials, were arranged in a circular pattern and tightly packed with clay and supporting stones or boulders. In some furnaces, large boulders were arranged in a semicircular pattern for supporting the furnace and the ore and wood pieces were then piled on top of the boulders. In these furnaces iron ore was smelted in small quantities to produce blooms. The blooms were then reheated and hammered into a more malleable form known as wrought iron.

Slag and iron blocks were found to be scattered in many areas in Vadamangalam (Fig. 2). The evidence shows that the earliest smelting method, known as bloomery smelting or the "direct method" was adopted by the early smiths in this region. The bloomery method of

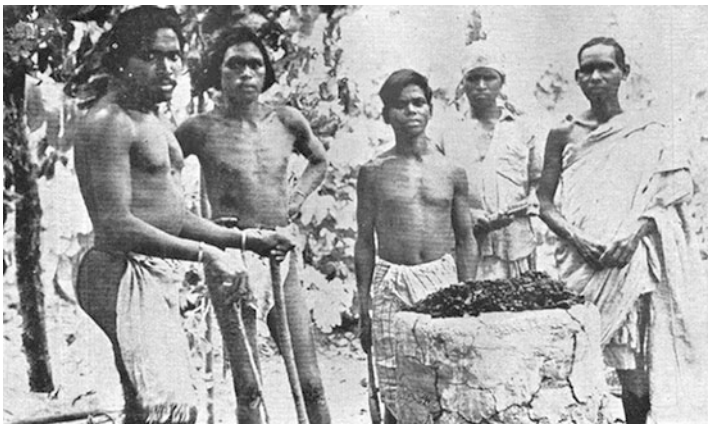

Early Iron Age India, Fig. 1 Ethnological data

Early Iron Age India, Fig. 2 Iron smelting area; excavations conducted in 2014

smelting was used from around the eighth century BCE and is reported for the first time in India. Bloomery smelting took place in a round furnace that was usually built from clay (Fig. 3). The walls of the furnace have not survived intact, so the original height of the furnace is difficult to determine. Flat stone and terracotta pipes were noticed; these may have been for bellows to blow air into the furnace through the blowing holes in the side. Iron slag and blocks in cubical (15 cm) and cylindrical (15-cm diameter and 25-cm long) shapes, along with cylindrical pipes, were unearthed from the site. Terracotta pipes (for blowing air and cooling the molten iron), together with metal deposits of different sizes were also found.

A series of iron smelting furnaces were found in this area. A more than 3-km-long stretch in the area was dotted with smelting furnaces. Similar smelting method patterns appeared in the entire area.

On flat bedrock (Fig. 3), wood and ore pieces, along with carburant materials, were arranged in a circular pattern and tightly packed with clay on the outer surface, with supporting stones or boulders. In some furnaces, large boulders were arranged in a semicircular pattern to support the furnace and then the ore and wood pieces were piled on top of the boulders.

Evidence unearthed in the excavations has provided information about early iron smelting methods in India. The iron was made in a simple furnace (Fig. 3) known as a shaft furnace.

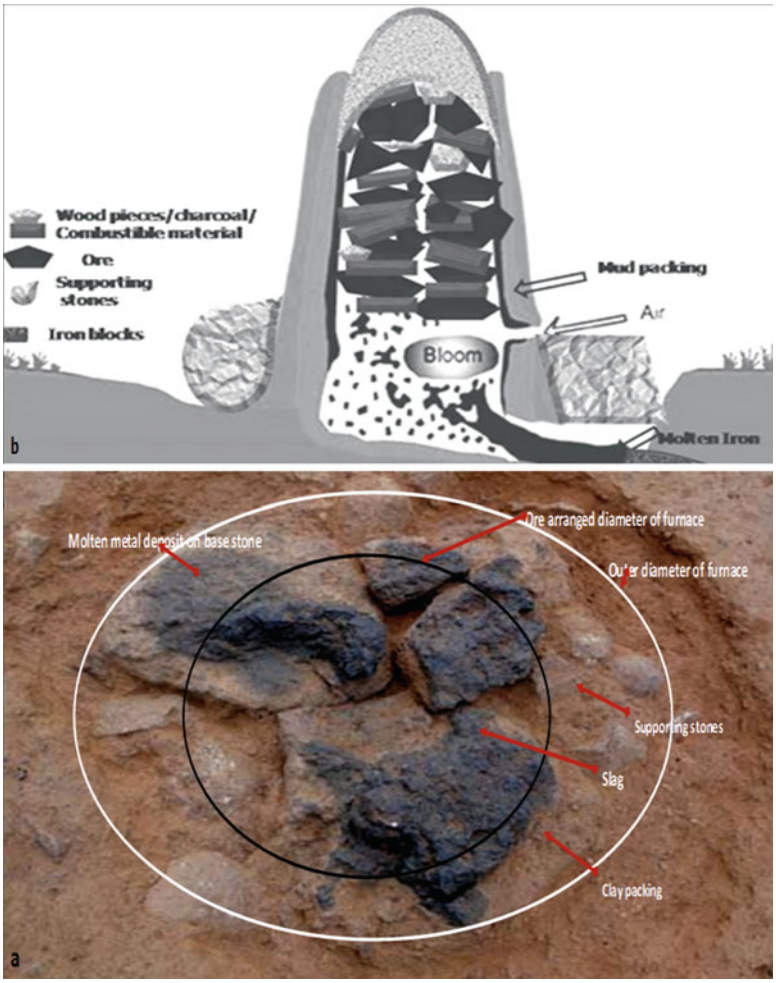

Early Iron Age India, Fig. 3 (**a**) Ground plan of excavation. (**b**) Tapping of a bloomery furnace

A cylinder of clay was built about a meter high with an arch at the bottom to allow slag to run off. Charcoal and iron ore were put into the furnace in layers. Some form of bellows would have been needed to raise the temperature to 1300° C in order to form a bloom (a mixture of molten iron and waste materials). This crude iron mixture would then be taken out of the furnace and heated and hammered until all the waste had been driven off, producing wrought iron. This iron was then used for making tools and weapons and the waste left behind is what we now call bloomery slag or cinders (Figs. 4 and 5).

The excavated evidence from India shows that the typical furnace had a height range from 60 to 100 cm, and a width of 30 to 50 cm at the bottom and 20–30 cm at the top. To reach the desired high temperature, bellows would have been used for forced air intake.

Crucible steel

During the early centuries of the present era, India was a production center for high-quality steel and exported such products to different parts of the world. In these times, in certain

Early Iron Age India, Fig. 4 Tuyères with metal deposit

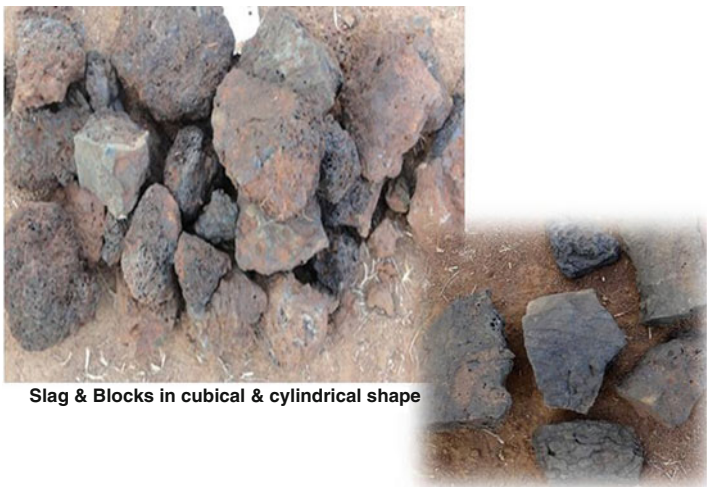

Early Iron Age India, Fig. 5 Ingot & Slag from Bloomery furnace

parts of the country, high-quality steel with a water pattern was used for making swords. The swords produced with this steel were famous all over the world as Damascus steel; the steel had excellent qualities of malleability, ductility, and durability of edge. Damascus steel swords are mostly preserved in collections in the Middle East, and experts in metallurgical sciences have tried to understand the processes used by the Indian artisans and master craftsmen (Fig. 6).

Early iron workshops were found in three different areas in Pal Nellur village, Kanchipuram, in southern India. Ore and slag, a terracotta crucible (Fig. 7), and pipes of different sizes were unearthed from the village. Unfinished or discarded objects, crucibles, and mold-like objects were also unearthed from the excavations (Fig. 8). Near the workshop area, an ore dump was retrieved from the site. Ore that was broken into small pieces, like round balls, was reported from the Pal Nellur excavations (Fig. 9a). The pieces may have been

Early Iron Age India, Fig. 6 Early corrosion-resistant iron products from the Indian region (courtesy Google images)

Early Iron Age India, Fig. 7 Crucible in situ

prepared for pre-roasting the ore. After being roasted for a few hours and cooled down, the ore was broken into pieces of approximately 2 cm (more or less) and together with charcoal (layer by layer) heated in a furnace. Any large impurities in the ore could have been crushed and removed.

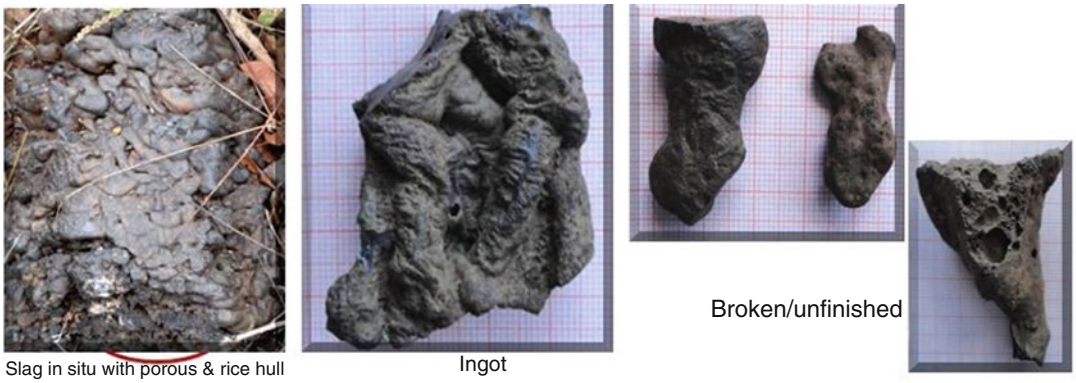

Early Iron Age India, Fig. 8 Slag, ingot, and unfinished objects

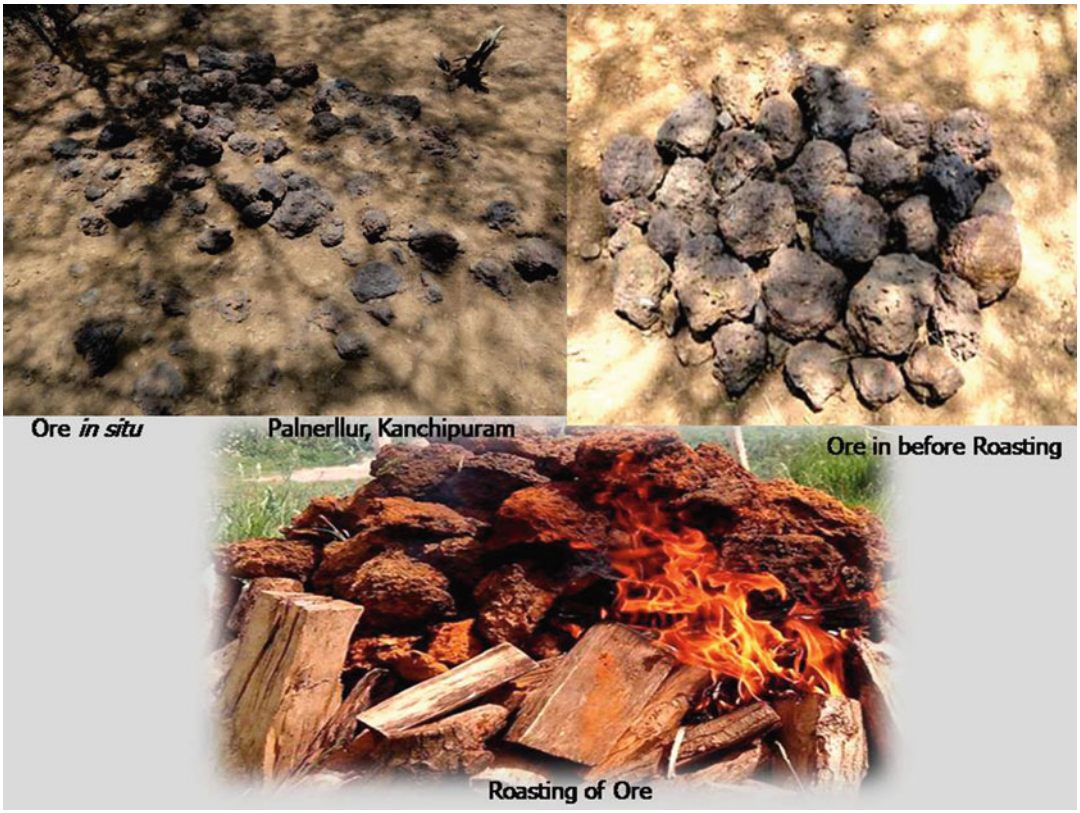

Early Iron Age India, Fig. 9 (a) Iron ore dump near workshop for iron roasting. (b) Roasting of Iron Ore

A widely accepted theoretical model for the reaction inside a furnace during smelting is the following:

Hydrated iron oxides (FeOOH) $->$ hematite (Fe_2O_3) $->$ magnetite (Fe_3O_4) $->$ wüstite (FeO) $->$ iron (Fe)

If we assume the ore has been roasted, and the water driven off any hydrated iron oxides, the chemical reaction can be expressed as:

$$3\ Fe_2O_3 + CO\ \ -\ >\ \ 2\ Fe_3O_4 + CO_2$$

$$Fe_3O_4 + CO\ \ -\ >\ 3\ FeO + CO_2$$

$$FeO + CO\ \ -\ >\ Fe + CO_2$$

At the same time, some iron is lost to the production of slag. As well as iron oxides, many ores contain unwanted gangue oxides like silica, and as well as the melting iron on the furnace wall, the fuel itself may also contain numerous other oxides. In the high temperature conditions of the furnace, any silica present is likely to combine with some of the iron (II) oxide, creating an olivine mineral known as fayalite.

$$2FeO + SiO_2\ -\ -\ -\ >\ Fe_2SiO_4$$
$$\text{or}\quad 2FeO.SiO_2$$

Qualitative analysis, by scanning electron microscopy with energy dispersive spectroscopy (SEM-EOS), of a few samples of the slag collected from Pal Nellur showed that the major constituents were iron and silicon. These may represent a fayalite (iron silicate)-type iron slag. The iron charge may have been smelted by the bloomery process to produce high carbon iron by the Wootz crucible process. The crucible fragments found on the mound appear to be from fired crucibles that had been broken to retrieve the finished ingots.

The preliminary investigations indicate that crucible steel production (corrosion-resistant iron) was carried out in the preindustrial era in Tamil Nadu in southern India. Analytical investigations indicate that closed crucible fragments were fired to a high degree of verification with the charge, to produce a high carbon steel. Use was made of refractory reinforced with rice hulls in the manufacture of the crucible, as observed in the process of Wootz steel production. Further archaeometallurgical investigations and surveys are required to determine the extent of metallurgical activity and the antiquity of at Kanchipuram in south India.

The review of archaeological documents has produced ample evidence regarding the demand for and trading of Indian iron and "Wootz" steel ingots in Western countries. The Persians were among the major buyers of "Wootz" steel ingots to manufacture the famous Damascus swords. The present evidence at Kanchipuram has been reported in an endeavor to develop a better understanding of the ancient Indian crafts of iron and steel making in India. It may be noted that the origin of the production of molten steel was in India. This technology was most probably developed for the first time in the Deccan plateau. The evidence further attests to the industrial activities in India and the production of rust-free iron/Wootz steel, which may have promoted long-distance trade. Traditional Indian metal crafts, in general, flourished until the end of the seventeenth century CE, and their gradual disappearance may have been due to new commercial-based technologies for large-scale industrial production.

Habitational Area

It may be presumed from the unearthed evidence that, during the Early Iron Age, the inhabitants in India at Vadamangalam selected an elevated area (Fig. 10) and a plain surface for their dwellings. The individual dwellings were probably circular in ground plan, aligned with large boulders. A long protected area enclosed with large boulders was also noted. Temporary materials may have been used for roof coverings. Mud floors with post holes were also found in India. This pattern of dwelling structures is not a new finding, but the pattern is very rare in India and is reported for the first time at Vadamangalam.

Memorializing the Dead

People want to remember and honor their loved ones in a special way, even after death. From the very beginning, humans have memorialized their dead in different ways; during the Early Iron Age particularly, such memorialization had increased

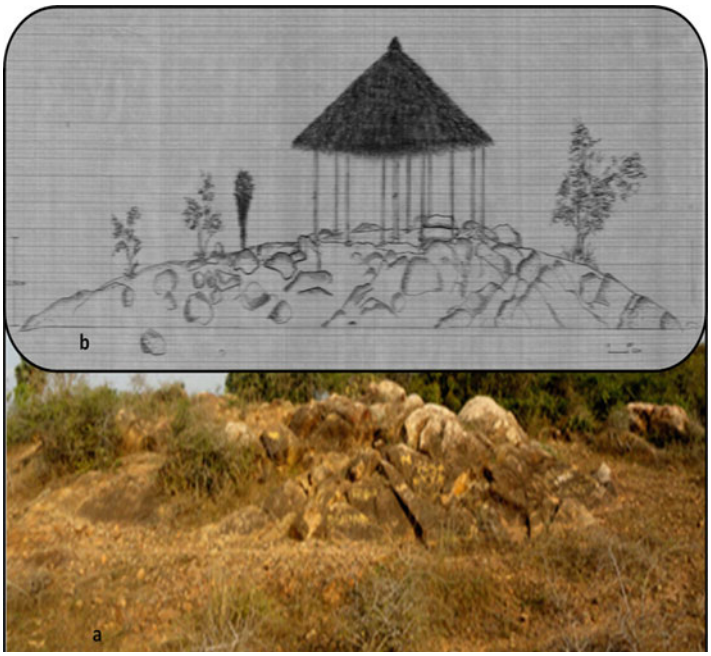

Early Iron Age India, Fig. 10 (**a**) Ground plan of a dwelling. (**b**) Tapping of the dwelling

compared with findings in earlier eras. Though the mode of disposal of the body of the deceased (whether cremation or burial) and the associated ritual may vary significantly from society to society, clan to clan, and period to period, human belief and respect for their deceased is similar. By the time of the Early Bronze/Iron Age, burial was the most familiar and best represented form of disposal of the body of the deceased and had become a prominent ritual practice. Practices varied from region to region and group to group, although there were similar traditions for quite some time among different groups. Burial in well demarcated areas protected with large boulders/blocks was a typical mode of disposing of the dead among Early Iron Age societies across the Indian subcontinent.

Memorials, that is, structures at burial sites established in memory of a deceased person by their survivors or other members of the community, are constructed in many different ways. In the Early Iron Age, there were two distinct types of memorial constructions, depending on the geographical zone, one with boulders/large stone blocks, dressed or undressed, and the other with artistic forms of clay elements with or without stones (Roth 2009). Various methods for the burial of the dead, and different types of constructions with more advanced working have been reported from various parts of the southern region of India. Some important and frequently reported types in India, along with rare structures, and those reported for the first time in the archaeological record in India, are enumerated in the following sections.

The Legacy of Megalithic Culture

In the Indian context, the methods of disposal of the body after death and the memorialization of the dead differ from clan to clan and region to region. However, it is interesting to note that the custom of constricting structures for memory of a deceased is still in practice among some groups in India. For example, the Maria Gond people of Bastar in Madhya Pradesh; the Bondo and Gadaba peoples of Orissa; the Oraon and Munda peoples of the Chotanagpur region, now in the state of Jharkhand; and the Khasi and Naga peoples of Assam still memorialize their dead with house structures. Their monuments, which are of a memorial nature, include dolmens, stone circles, and menhirs. The Northeast Indian megalithic culture seems to have a Southeast Asian affiliation rather than a western influence.

In the south Indian context, the remnants of megalithism among the Toda people of Nilgiris are very significant. The account of M.J. Walhouse (1874) regarding the funeral customs of the Toda people reflects surviving burial practices that were followed by the megalithic people. It helps us in understanding the probable customs that existed among the now extinct megalithic builders of south India. The existing burial practices of the Toda people include many common features of megalithic burials, with grave goods including food items, and the use of stone circles to mark the place of the burial.

Structural Activities for After Death Rituals

For a long time the culture of the Early Iron Age was known only through so-called megalithic monuments. Gordon Childe (1948: 5) described megaliths used in after death rituals as usually being constructed of large slabs or blocks of stone, either in their roughly quarried natural form or trimmed. Some of these monuments were rumored to contain gold or some mysterious ash which could convert any metal into gold. As a result, the monuments repeatedly fell victim to vandalism or served as sources of building materials (Nagaraja Rao 1981: 26).

The efforts of the first antiquarian amateurs to investigate the nature of the megaliths were not any better, as they tried to excavate them by means of dynamite (Sankalia 1962: 100). The megalithic burial style is also considered to show Neolithic/Chalcolithic traits (Chakrabarti 2008: 238–239). It may be concluded from recent studies that the megaliths form an integral part of Iron Age culture in south India; however, the study of the period is no longer focused exclusively on these monuments. A radical view states that the so-called megalithic complex does not form an independent cultural entity. However, the time of emergence of this burial tradition and its connection with the beginning of the Iron Age is not entirely clear.

Megaliths have been found in Baluchistan and in Makran in Iran, and in Waghapur, Shah Billawal, and Murad Memon, Asota, the Leh valley of Ladakh; Burzahom and Gufkral in the vicinity of Srinagar; Deosa, Khera, Devidhura, Kota, Banda, Mirzapur, and Varanasi (Kakoria) in Uttar Pradesh; and Saraikela in the Singhbhum district of Bihar. The occurrence of megaliths also extends into northeast India from Manipur to Bastar in Madhya Pradesh and the Hazaribagh and Singhbhum District of Bihar (Thapar 1985: 106). The latter group (i.e. ?) is not affiliated with the Iron Age and constitutes a separate cultural phenomenon. Generally, it can be said that the southern megaliths have a sepulchral character, while the northern ones are rather commemorative and represent the living tradition (Sankalia 1962: 100).

History of Monumental Studies

The study of megalithic monuments in India was started nearly three centuries ago by Babington, on the Malabar Coast in Kerala (Babington 1823: 324–330). Since then, the study of monuments constructed for after death rituals has increased throughout India. Various structures have been reported throughout India. Taylor (1841, 1851: 179–193) explored and excavated a few stone circles and compared these with the structures of the Scythians. Consequent searches for, and research studies of these monuments constructed for after death rituals were carried out in India by many amateur archaeologists, e.g., Fergusson (1871), Wallhouse (1874: 17–34), Rea (1903: 11–14), Hunt (1924: 156), Slater (1924: 66), and Ghurye (1926: 26–57). Their efforts provided an overview of the construction of these structures in India. It may be noted that the structures were reported across the country – from Jammu Kashmir through to Peninsular India.

It may be true that the main objective of the above-mentioned early research attempts was to determine who were the builders of these stone structures constructed for after death rituals. It may be noted that, India being a vast area, although the traditions and customs have some common features they also vary from region to region. Further, differences in the availability of raw materials in different regions are also

important in the construction of structures with megaliths. Hence, regional reports are discussed separately, in the following section.

In 1944, Wheeler conducted the first systematic excavations in India, at Bramhagiri in the western part of the country (Wheeler 1947: 181–308). The excavations provided, for the first time, a relative chronological framework for the Indian megaliths.

The emergence of the Iron Age in India remains a subject of debate in terms of the dates and traits of the appearance of iron across the country, which showed different regional characteristic features and dates of occurrence. It was observed that megalithic burials were not represented as an important feature of the Early Iron Age throughout the subcontinent. For example, the Early Iron Age culture of northern India does not show megalithic burial traditions, whereas these traditions are shown in Vidarbha and Peninsular India. Leshnik (1974), Brubaker (2001: 253–283), Mohanty and Selvakumar (2002: 315–351), and others reported Early Iron Age sociocultural activities in peninsular India.

It is very difficult to depict a typology of the megaliths of India in general because the structures constructed for after death rituals show a variety of methods and techniques to memorialize the deceased. Moreover, there are megaliths that are internally different but exhibit the same external features. Nevertheless, on the basis of the explorations and excavations carried out at different sites in India, the megaliths can be classified into different categories depending upon their outstanding features. These include rock cut burial sites, hood stones and hat stones/cap stones, menhirs, dolmenoid cists, cairn circles, stone circles, pit burials, and barrows. Structural activities and types of memorials in the various regions are enumerated in the following sections.

North India

Sporadic findings and some rare concentrations of megalithic structures in northern India are noteworthy. These monuments are mostly reported from Vindhyas, Mirzapur, and Allahabad (Misra 1972, 1988; Misra and Misra 1977; Gupta 1972; Sharma 1985: 477–480; Singh 1985: 473–476); Jagan Mahal (Gupta 1972; Pant 1985: 481–484); and the Kaimur Range (Pant 1985: 481–484) and Adwa Valley (Misra 1997: 59–65) regions. Iron Age megaliths are also found in the foothills of the Himalayas from Kashmir to the central Himalayas in the Kumaon region and Leh (Sharma 1991: 107; Francke 1909–10: 104 as cited in Gupta 1972; Agrawal and Kharakwal 1998; Nautiyal 2002: 74–80). Early Iron Age settlements have also been reported along with monuments at Gufkral and Kumaon excavations (Sharma 1991: 107; Kennedy 2000).

Western India

Early Iron Age burials are also reported in Gujarat, although here they coexisted with the Early Historic period, as revealed from burial appendage (Gupta 1972). Structures with megaliths were also reported in Rewa, Satna, Hoshangabad, and the Sidhi district of Madhya Pradesh (Indian Archaeology –a Review (IAR) 1963–64: 39; 1975–76: 27; 1979–80: 41, 46 & 49; 1979–80: 41; 1980–81: 70; 1982–83:5), as well as at Vindhyanchal and in the Ganga-Karmanasa river valley. Excavations carried out in the megaliths at Kakoria and Kotia revealed single culture remains of the Early Iron Age in the megaliths (Sharma 1985: 477–480; Singh 1985: 473–476; Mishra 1989: 191–193). These megaliths belong to the pre-Iron Age and Early Iron Age and were dated, respectively, as being from 1500 to 1000 BCE and from 800 to 300 BCE (Singh 1985: 475, 480).

Ganga River Valley

The Early Iron Age in the Ganga River valley region is also associated with PGW culture (Tripathi 2001). The PGW culture is denoted by settlements having a hierarchy of large and small sites, both circular and rectangular structures, beads made of semi-precious stones, and glass objects, as well as the remains of rice (Lal 1984, 1988; Erdosy 1985: 66–79; Tripathi 2001). In the PGW phase at Atranjikhera, many iron implements and tools were recovered, showing advanced iron technology (Gaur 1983). The excavations at Bhagwanpura (Joshi 1976: 178–80) yielded an overlap between the Late Harrapan

and PGW cultures, suggesting that the beginning of the Early Iron Age in this region was around 1300 BCE.

Interestingly, the black and red ware (BRW) culture of northern India, characterized as rural in nature, is also associated with the early use of iron in the middle Ganga plains (Lal 1993; Lal and Dixit 1997: 303–307). Recent investigations at sites such as Lahuradeva, Raja Nal Ka Tila, Dadupur, and Malhar have brought to light the early usage of iron going back to around the first half of the second millennium BCE (Tewari 2003: 536–544). These types of evidence highlight not only the existence of a well-developed iron technology in the BRW phase, but also suggest the use of iron for agricultural and domestic purposes as well. It is noteworthy to mention here that similar BRW was also found from the megaliths excavated in the Adwa valley (Mishra and Mishra 2002: 133–143).

Southern India

The megalithic tradition in the southern region of India has a distinct regional cultural trait with an intrusion of long distance contraction both in terms of burial type and the associated ceramic industry. In the south Indian megalithic tradition, BRW, along with russet-coated painted ware (RCPW) constitute the main ceramic types.

It is important to note here that Deccan megalithic traditions also have BRW as component ware; nevertheless, their predominant and characteristic ceramic is micaceous red ware. Same is the case with burial type. The principal megalithic burial types of southern India are cists and dolmens, whereas stone circles and cairn circles are the main megalithic type in Vidarbha. The megalithic tradition of Kerala is also notable for its varied architecture, despite its similarities in pottery with Tamil Nadu and Karnataka.

Studies pertaining to the Early Iron Age period in India deal with a plethora of different issues and have been carried out by scholars over the past five to six centuries. Noteworthy scholarly research related to interesting evidence in various fields is found in the works of the following scholars: the distribution pattern and typology of structures, by Krishnaswamy (1949), Sundara (1979), Leshnik (1972), Misra (1977), Sharma (1991), and Singh (1985); technology, by Moorti (1994), Rao (1972), Gogte (1982), Mujumdar (1969), Soundararajan (1969), Gururaja Rao (1972), Agarwal et al. (1990), and Biswas and Biswas (1996), and mortuary aspects, by Mohanty and Walimbe (1996) and Kennedy (2000).

Settlement patterns have been discussed by Leshnik (1974: 247), Narasimaiah (1980: 201), Moorti (1994), Gururaj Rao (1972), Deo (1970, 1985), Rajan (2013), Mohanty and Selvakumar (2002: 313–351), Pisipaty (2017, and others. The chronology of structures may be found in the works of Pearse (1869), Wheeler (1947), Nagaraja Rao (1963, 1971), Mohanty and Selvakumar (2002), Mohanty (2005), Vaidya and Mohanty (2010, 2012), Das et al. (2012, 2013), Rajan (2013), Sontakke (2013, 2013a), and Sontakke and Joge (2009), whereas ethnoarchaeological discussions are found in the works of Elwin (1945), Singh (1985), and Binodini Devi (1993).

Typology of Structures

The typology of megalith and other structures constructed for after death rituals in India is very difficult to depict, as these structures vary and may be quite elaborate. A variety of methods and techniques were employed to memorialize the deceased. Because India is a vast country with different geomorphological zones, the availability of raw material also played an important role in the constructions of the structures. Moreover, in most regions, structures constructed with megaliths are internally different but exhibit the same external features. Nevertheless, on the basis of the explorations and excavations carried out at different sites in India, the memorial structures, which maybe primary or secondary, can be classified into different categories based on their outstanding features. These categories include: rock cut caves, hood stones and hat stones/cap stones, menhirs, dolmenoid cists, cairn circles, stone circles, pit burials, and barrows (Fig. 11), and their details are discussed in the sections below.

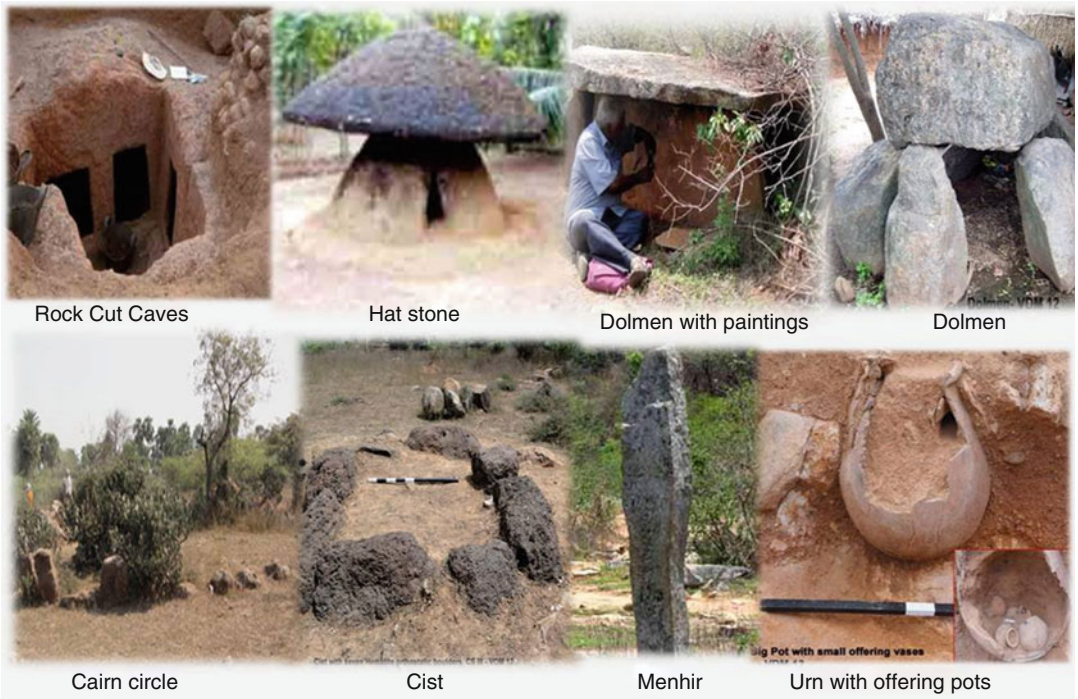

Early Iron Age India, Fig. 11 Common types of structures memorializing the dead

Northeastern India is one of the major areas of megalithic burial sites. It may also be noted that India is very important for the study of living tradition. The after death rituals practiced by the society here, and their customs, indicate the prevalence of early traditions and beliefs (Singh 1985: 491–496; Devi 1993). Cairn circles with or without chambers and stone circles are the main megalithic types observed in the northeast.

Rock Cut Caves

Rock cut caves are not common in the northeast region, with this type being reported more in the southernmost part of India. These caves are scooped out of soft laterite, as found in the southern part of the West Coast. These rock cut cave tombs are peculiar to this region and occur in the Cochin and Malabar regions of Kerala and are found at many sites e.g., Chowwannur, Kakkar, Porkalam, Eyal, and Kattakampal. The architecture of these rock cut burial caves in the Cochin region is of four types—(i) caves with a central pillar, (ii) caves without a central pillar, (iii) caves with a deep opening, and (iv) multichambered caves.

Hood Stones (Kudaikallu) and Hat Stones/Cap Stones (Toppikkals)

These memorial structures consist of a dome-shaped dressed laterite block, or hood-like stones (Kudaikallu). The structure covers an underground circular pit cut into a natural rock and may have a stairway. In some cases, a plano-convex slab rests on three or four quadrilateral clinostatic boulders, forming a square base and a truncated top, on which rests the toppikkal or the hat stone. This also covers an underground burial pit containing a funerary urn and other grave furnishings. Usually, the burial pit contains a burial urn covered with a convex or dome-shaped pottery lid or a stone slab, and contains skeletal remains, small pots, and sometimes ashes. Similar monuments are commonly encountered in the Cochin and Malabar regions extending along the Western Ghats into the Coimbatore region up to the Noyyal River valley in Tamil Nadu.

Menhirs

Menhirs are monolithic pillars or flat stones planted vertically into the ground, ranging from 1–5 m in height. They are often rudely dressed or not dressed, but occasionally they are dressed. These are essentially commemorative stone pillars set up at or near a burial spot; they have been reported at Komalaparathala in Kerala and at a number of other sites in India.

Zoomorphic Forms

Structures in different zoomorphic forms, such as reptiles (Fig. 12) were reported for the first time, from Tamil Nadu in southern India, at recent excavations conducted by the present author. This form was not only reported for the first time but is also new to the archaeological record. The total length of the structure is 15.50 m and its breadth is 12 m; it is made of natural bedrock. In the middle of the structure a circular pit has been made and stone has been removed up to 1.50 m depth. On four sides the non-retouched bedrock looks like a head, tail, and limbs. The total figure looks like a tortoise. There is a central circular structure that is 24 m in circumference; it is made of 21 huge semi-dressed boulders, two of which (numbers 6 and 21a) are well dressed. The central structure is two-chambered (8 and 7 × 3 feet) and is placed on a huge monolithic well-dressed sandstone slab from the same site, Vadamangalam in Kanchipuram district with arms extending toward the east. There are no grave offerings or mortal remains, except for two carnelian beads and two terracotta legged sarcophagi in the head portion. This well-planned and highly technically skilled structure was built to memorialize the deceased. It may be presumed from the evidence that the structure was constructed as the memorial of an important person(s) in the society.

Also in Tamil Nadu, other structures with reptile-shaped extensions on four sides, demarcated with boulders placed in circular fashion around seven orthostats cists, as well as cists and dolmens, were reported. All these forms of

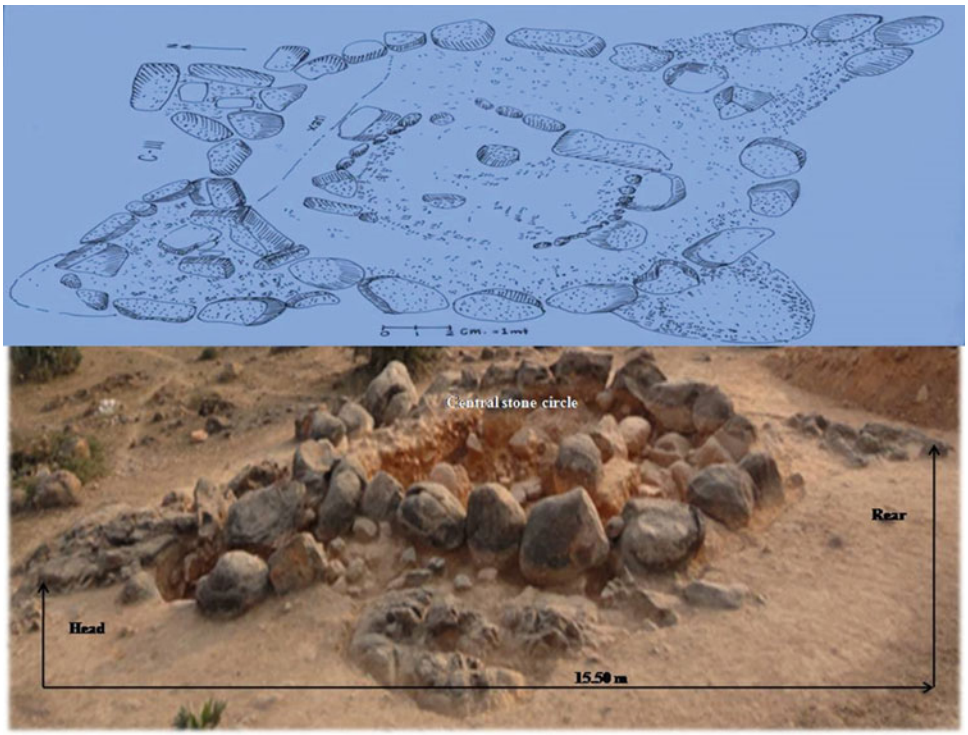

Early Iron Age India, Fig. 12 Structure in the form of a tortoise

structures to memorialize the dead are reported for the first time in the records for this region and elsewhere.

Another type of grave structure, sarcophagi, have also been found in India. The fashion for anthropoid sarcophagi had spread from Egypt to the Near East by the second half of the second millennium BCE. The Egyptians cremated their dead and buried the urns containing the ashes in elaborate underground tombs with good protection and demarcation. A heavily reconstructed sarcophagus made of terracotta was unearthed in from different parts of India. Other sarcophagi found at ? in India varied in length from 0.65 to 2.15 m and they had two to four rows of legs. Different forms of sarcophagi, such as ram-shaped (Fig. 13) and elephant-leg- and trunk-shaped, are unique examples of the artistic skill shown in clay modeling (Gururaja Rao 1972) in grave structures.

Other structures for memorializing the dead were constructed with terracotta rings; these not only constitute unique evidence but also were reported for the first time in the records of archaeology. The ring structures were unearthed in southern India from the Vegavathi river near Kanchipuram, Tamil Nadu. More than 35 of these structures were exposed in the dry river channel and many more were found in a disturbed condition (Pisipaty 2009, 2011, 2012). They were all constructed with seven terracotta rings of similar measurements (75 cm diameter and 15 cm height, with 5-cm thickness) and contained grave offerings (Fig. 14). Well-fired earthenware vessels, five in all, were also found; these were made of pots portion, and they may have been utilized for cooking and offerings. Three of the vessels have a round-shaped body and are of similar capacity, while one vessel has a spout.

Urn burial (Fig. 15) were used as primary or secondary burials. After a person died, the survivors cremated the body and collected the ashes in an urn as a secondary burial; some inhumation cases are also reported in this category of practice. In Tamil Nadu, in southern India (Gururaja Rao 1972; Leshnik 1974), broken pots with Tamil Brahmi inscriptions were placed in urns that could have contained the bodies of the dead or their bones. At Marungur, which is an urn burial site, and at sites of cist burials at Kodumanal and Porunthal in the Dindigul district, potsherds with Tamil Brahmi inscriptions have been found. From the Vegavati river, near Kanchipuram, a unique example of the funerary rituals of in India was unearthed. This was a globular vase with a drawing of two persons incised on its painted portion; however, the body portion of the vase was damaged (Pisipaty 2012) (Fig. 16).

Early Iron Age India, Fig. 13 Terracotta sarcophagi in Tamil Nadu, South India. (**a**) Ram-shaped sarcophagus (after Gururaj Rao 1972); (**b**, **c**) sarcophagus with legs and lid

Early Iron Age India, Fig. 14 Offerings in an urn

It may be noted that although the memorialization of the dead was a common practice throughout the India, the ways this was done varied. As noted earlier, the mode of disposal and ritual may vary from society to society, clan to clan, and period to period, but human respect for the dead is almost the same in all geographical zones. By the time of the Early Iron Age, burial of the dead was the most familiar and best represented form of body disposal and had become a prominent ritual practice.

Grave Furniture

The grave represents the final stage in the funerary ritual celebrated by the survivors. Early Iron Age graves often contain information about different kinds of rituals that were part of the funerary celebrations. Rich graves contain special vessels associated with the serving and consuming of liquids and intoxicants. In some cases, these vessels are luxury imports and imitations of vessels used elsewhere (found particularly in areas on trade routes) or in other cases they are lavish local products. As a number of investigators (Arnold 1999; Dietler 1990; Alelshin 1983) have shown, the drinking and feasting vessels often form structured sets in the graves.

The structures constructed for after death rituals have yielded a variety of objects that have proven to be very important for us in the study of Early Iron Age culture. The people of the Early Iron Age took pains to construct elaborate tombs that required much labor and they furnished them with as many essential objects as they could afford. They thought this practice to be necessary as they believed in life after death. And so the dead were suitably provided with a place to live in and with goods for their essential needs, as well as personal belongings.

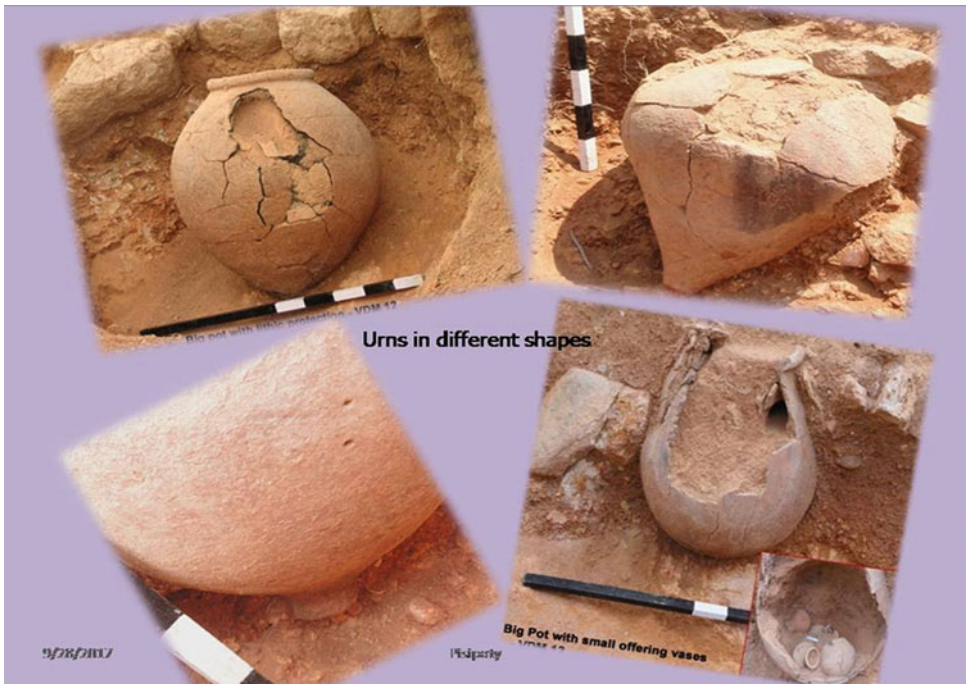

Early Iron Age India, Fig. 15 Urn burial

Early Iron Age India, Fig. 16 Terracotta ring memorials, Kanchipuram, Tamil Nadu, South India (from the author's personal file)

In India, especially in the southern region, Early Iron Age grave furniture consisted of a large variety of earthenware and metal objects, ornaments, stone objects, and miscellaneous other materials that either belonged to the deceased or were offered by the relatives. Further, in these memorial structures there was also a large variety of pottery, weapons, and implements, mostly made of iron but often made of stone or copper; and ornaments like terracotta beads, semi-precious stones, gold or copper beads, and shells, strung into necklaces, or rarely made as ear or nose ornaments, armlets, bracelets, and diadems. As well, food was often placed in the structures, as indicated by the presence of paddy husks and chaff and some other cereal plant residues, and sometimes animals had been put in the structures, as indicated by the presence of sometimes complete skeletal remains. Pots made of different ceramic materials, used both for cooking and for offerings, have been retrieved from the structures of after death rituals throughout the India. However, PGW, northern black polished ware (NBPW), BRW, and black ware (BW) are the most common pottery types reported in grave goods in northern India, whereas BRW, BW, and RCPW are reported in the south, as well as the usual red ware. Imported and imitation wares were also reported from places on trade routes. Jugs of different sizes, with or without a spout, were placed with liquid offerings.

The Early Iron Age in India is associated with three important diagnostic pottery types: PGW (c. 800 – 350 BCE); NBPW (c. 600 – 100 BCE); and BRW (c. 900 BCE – 100 CE) (Gaur 1983; Lal 1954: 13, 16, 1992: 425; Singh 1979: 315; Wheeler 1962: 34–35). However, there is a difference of opinion on the dating of BRW among scholars: Chakrabarti believes that it predates PGW (1992: 61), whereas Habib (1997: 20) argues that it postdates PGW in peninsular India. At upper Gangetic Valley sites such as Hastinapur, Atranjikhera, and Noh, iron artifacts are associated with PGW and NBPW (Chakrabarti 1992; Gaur 1983; Lal 1954; Singh 1979: 315), whereas at Chirand and Mahisdal in eastern India (Allchin and Allchin 1993b: 210–212) and at such central Indian sites as Nagda, Eran, and Navdatoli (Chakrabarti 1977) BRW and NBPW are associated with iron artifacts. At south Indian sites, BRW was found, with or without RCPW (Moorti 1994).

The pottery types most often associated with the megalithic culture in India are BRW, burnished black ware, red ware, micaceous red ware, gray ware, and RCPW. The wheel-turned pottery essentially consists of utilitarian shapes and a majority of the forms probably served as tableware in early society. The prominent shapes encountered in grave furniture are a variety of bowls, dishes, lids or covers, vases, basins, legged jars, channel-spouted vessels, and conjoins. Some specific shapes are found in limited types of pottery; for instance, circular ring stands, knobbed and rimmed lids with bird or animal finials, and tulip-shaped lids are found in black ware, and legged vessels and urns are found in red ware. Graffiti or incisions are generally seen on the surfaces of these items, although such markings are occasionally seen on the inner portion of the offerings. Urns and sarcophagi of different sizes and shapes, with or without decoration, have been reported.

All these varieties of pottery are characterized by the use of fine materials and are produced from well levigated clay, rarely with sand or such gritty material. The vessels were generally well fired in open kilns at low temperatures. Wheeler (1948) opines that possibly the pottery was turned on a slow wheel.

The evidence of pottery kilns from at least two sites, Polakonda and Beltada Banahalli, can be taken as supportive evidence for the practice of this craft. Although the evidence at both these sites comes from late Neolithic levels, there appears to be a continuation in the habitational deposit bearing megalithic levels. The wide variety of shapes, in different materials, that would have served as tableware for eating and drinking and as cooking utensils, as well as the technical efficiency evident in the preparation of these ceramics or pottery, hints at a professional class of potters and suggests that pottery making was an important economic activity.

The ancient people began to draw symbols of their emotions in the form of graffiti marks on easily available materials such as baked mud objects and stone surfaces. These marks on earthenware are often found on Indian pottery in general and particularly on most of the Early Iron Age memorial structures. These symbols on the earthenware were incised with a sharp needle both before and after firing or were engraved on clay pots that were either in a leather-hard condition or after baking. These incisions show single and ligature forms and range from small lines to complex designs. The symbols include swastikas; tridents; ladders; geometrical forms such as triangles, squares, rectangles, pyramids, circles, and single or multiple straight or curved lines; human or animal forms; and nature-related forms like the sun, clouds, rivers, hills, trees, and vines in many combinations. In general, most of the marks are on the outer surface and at the shoulder, neck, rim, or belly portion of the pots (Fig. 17). However, a few pots with graffiti marks on the base and inside the vessel were reported.

Early Iron Age India, Fig. 17 Graffiti marks on pottery from grave furniture

Evidence of Trade and Exchange Networks

Excavations in India have yielded various non-local items among the grave goods; the presence of these items indicates that there were exchange activities during the Early Iron Age. Imported and imitation ware, carnelian beads and other items reported from various sites on coastal and trade routes direct us to the presence of trade activities. Archaeological remains such as rouletted ware, amphoras, and other ceramic materials found at many sites have shown that the inter-regional and intra-regional exchange of goods was fairly well established in India by the end of the last millennium BCE. Regional variations in the production of commodities and the non-availability of local raw materials/finished goods had led to long-distance transactions under the initiative of long-distance traders from India, as well as other countries overseas. The exchange network, which was in an incipient state during the Early Iron Age, expanded over the centuries as a result of internal dynamics and external impetus involving the demand for goods in other parts of the subcontinent as well as the Mediterranean region.

Time Frame

The date and origin of the introduction of iron artifacts and iron work into India are a much debated research problem. According to the Rig Veda, an early text of in India, the second millennium BCE is often suggested as the timing. Early researchers reported that iron-working originated in India around 700–600 BCE (Gordon 1950; Wheeler 1959). Subsequent research studies and dating technologies push this date back toward the second millennium BCE (Chakrabarti 1992: 10–12) along PGW. Chakrabarti (1974: 354, 1976: 122) also suggested, regarding the origin of technology, that India was a separate and possibly independent center of early iron manufacture.

Considering the radiocarbon dates for the iron-bearing deposits at Atranjikhera, Kaushambi, and Jakhera near Uttar Pradesh, at Nagda and Eran in central India, and Hallur in Karnataka,

dates around 1000 BCE were suggested (Subramanyam 1964; Banarjee 1965; Chakrabarti 1974; Nagarajarao 1974).

Recent technical studies of iron materials dated around 1000 BCE at Komaranahalli (Karnataka) showed that the smiths at this site could deal with large artifacts, implying that they had already been experimenting for centuries (Agrawal et al. 1985: 228–29). Sahi (1979: 366) drew attention to the presence of iron in Chalcolithic deposits at Ahar and suggested that "the date of the beginning of iron smelting in India may well be placed as early as the sixteenth century BCE" and "by about the early decade of thirteenth century BCE iron smelting was definitely known in India on a bigger scale." On the basis of four radiocarbon measurements, ranging between 3790 ± 110 BP and 3570 ± 100 BP, available for the Megalithic period (without iron), Sharma (1992: 64, 67) has proposed a date range of 1550–1300 uncal. BCE for the subsequent iron-bearing period at Gufkral (Jammu & Kashmir).

It may also be true that the Early Iron Age in the Indian subcontinent may have succeeded the Late Harappan culture or Indus Valley tradition. The Early Iron Age in India is associated with three important diagnostic pottery types—PGW, NBPW, and BRW (Chakrabarti 1992; Gaur 1983; Lal 1954: 13, 16, 1992: 425; Singh 1979: 315; Wheeler 1962: 34–35). The main Early Iron Age cultures of northern India are associated with the PGW culture (1200 to 600 BCE) and the NBPW culture (700 to 200 BCE), whereas in the south the Early Iron Age cultures were mostly associated with BRWand RCPW.

Eastern Indian sites such as Chirand and Mahishadal were associated with BRW and NBPW (Allchin and Allchin 1993b: 210–212), whereas central Indian sites such as Nagda, Eran, and Navdatoli were associated with BRW and NBPW (Chakrabarti 1977). Toward the north and northwestern part of the subcontinent, now in Pakistan, the material culture of the Early Iron Age is first mentioned in the context of protohistoric graves or Gandhara graves, corresponding to period VII of the Ghalegay sequence (c 500 BCE) (Stacul 1970, 1979a, 1995, 2001).

Recent excavations in Uttar Pradesh have turned up iron artifacts, furnaces, tuyeres, and slag in layers that have been radiocarbon dated to between c. BCE 1800 and 1000. Tewari (2003: 543) suggested three sets of dates during which iron working was practiced at these sites in northern India: c. 1200–900 cal. BCE, c. 1400–1200 cal. BCE, and c. 1800–1500 cal. BCE. Prior to this report, the earliest date for iron artifacts came from the Megalithic phase at Gufkral site in Kashmir, with a date rage of 1550–1300 uncal. BCE (Sharma 1992: 67). Allchin and Allchin (1993b: 345) and Gaur (1997: 20, 1983: 15) proposed a date of c. 1200–1000 cal. BCE for iron working in the mid-Ganga Valley, and Chakrabarti (1977: 183) also suggested a similar date, of c. 1270 cal. BCE, for iron working there.

Inferences Drawn Regarding the Early Iron Age in India

It may be noted that the history of iron metallurgy has been a long process of evolution. Evidence indicates that it took centuries of concerted effort to improve upon metallurgical processes. It is the spirit of human endeavor that allowed humans to innovate, improvise, and master technology through experimentation. Iron technology not only developed from simple wrought iron to corrosion-resistant steel but also from tiny fragments and small objects to colossal structures. In this context, it is worthwhile to mention Chakrabarti's (1974: 354, 1976: 122) opinion that "there is no logical basis to connect the beginning of iron in India with any diffusion from the west, from Iran and beyond" and "that India was a separate and possibly independent centre of manufacture of early iron." Sahi (1979: 366) suggested that "the date of the beginning of iron smelting in India may well be placed as early as the sixteenth century BCE" and he noted that iron had occurred "by about the early decade of thirteenth century BCE." It may also be noted that iron smelting on a large scale was definitely known in India for quite a long time.

The development of metallurgy in India appeared in three stages in different periods:

The Early Iron Age (by the end of the second millennium BCE – 700 BCE)

The Middle Iron Age (800–100 BCE)

The Late Iron Age (100 BCE/CE 600)

In the Early Iron Age bimetallic objects like gold alloys or bronze were primarily ornamental rather than functional (Tipathi 2001). Moreover, iron did not completely replace bronze even for hunting weapons or war objects. Iron implements at this stage were sometimes replicas of early bone or stone objects from the Neolithic-Chalcolithic period, indicating a gradual transformation of the medium modeled after bone prototypes. Deliberate carburization was noted in certain cases from this period onward.

In the Second stage or Middle Iron Age in India deliberate smelting was common, and the techniques of carburization and quenching were discerned. The ironsmiths selectively applied specific techniques wherever required. Quenching was well known by the smiths of this stage. A rich variety of iron objects is mentioned in India literature in regional languages such as the Pali and Sanskrit texts of the fifth to fourth centuries BCE. Reports of excavations and the literature show that good quality iron and steel is known to have been produced by the smiths. It is evident from several examples noted above that gifts of steel ingots and swords were given and that steel surgical instruments were made (Tripathi 2001).

Carburized iron production in India not only increased inter-regional trading activities but also attracted long-distance trade. The production of different items for trading also increased. For instance, bead-making and ceramic industries were established to meet the needs of local and long-distance traders. Through trade, regional contacts and sociocultural exchanges also occurred. Many large settlements developed near natural resources, with many satellite centers, ports, and port towns being established as trade centers during this period. As a consequence, trade and commerce created affluent populations in the settlements.

During this second stage there were enormous sociocultural changes. Among the many changes that occurred, the custom of memorializing the dead and the construction of structures with megaliths appeared in the entire Indian region in general, particularly in southern India. The tradition appeared throughout in India with little variation. The relative lack of variation may reflect the availability of raw material and the geographical conditions. It may also be noted that very strong faith and dedicated worship appeared more widespread in southern India. The construction of complicated structures with huge undressed or semi-dressed blocks for after death rituals indicates that highly skilled and laborious efforts were made to create these structures. Vases for offerings, as well as personal belongings, were richly and carefully furnished in the structures.

The third stage or Late Iron Age is considered to show an advanced stage of iron metallurgy. By this time, in the Indian context, iron metallurgy, as well as the utility of iron objects, was greatly advanced. There was a rich variety of tools, implements, weapons, household objects, and common utilitarian items in iron. Heavy iron pillars were made for specific purposes; for example, the Mehrauli iron pillar, which weighs 6096 kg and is 7375 mm in height, 416 mm in diameter at the bottom, and 304 mm at the top, was made for. It was made in the fourth to fifth century CE, in an age of the culmination of technological skill (Fig. 6). At this time, surgical instruments and sophisticated weapons like tridents, swords, and caltrops, reportedly of good quality steel, were used. Organizational capabilities intensified in the course of time, as is evidenced in the colossal structures that came into existence in the early centuries of the Common Era. By this time iron working produced a homogenous type of wrought iron that was employed in colossal structures that commemorated events of great significance to the population, and good quality iron or steel was produced for weapons, tools, and implements. The commercial good quality of iron/steel production of in India attracted trade from other continental regions and these products became a major demand product of in India. Further, the exchange network strengthened and expanded over the centuries as a result of internal dynamics and external impetus involving the demand for goods in other parts of the subcontinent, as well as the Mediterranean region. As a result, there was an era of prosperity and overall growth in different fields in India. The age, lasting from (late Iron Age), earned the title of the Golden Age of Indian history.

Along with metallurgy and technology, a significant change in sociocultural systems also

appeared in India. Among many changes, memorializing the dead was not only a major practice but it also prevailed for many centuries and the practices still live on in the traditions of many groups in India. Sumptuous structures with megaliths of different shapes and sizes dating from the Late Iron Age are reported throughout in India.

In quite a few of the tribal zones in India, we have come across ethnological evidence and the survival of traditional methods of iron working until recent decades. This reinforces the assumption that there is a long and widespread tradition of iron making in different parts of India. It is noteworthy to mention in this context that there are many places that are rich in iron ore and fuel in the remote hilly parts of the country in which preindustrial iron working is done. These regions are still inhabited by ethnic groups who carry out iron smelting. It may also be found that smelting and producing high-carbon iron is still practiced by a few groups; however, many people have changed their profession because of the lack of demand for the product. Thus, there is an uninterrupted history of early iron working until very recently. There must have been stages that this iron working must have gone through.

Of note, many sociocultural systems were established for the first time during the Early Iron Age. Among many customs, after-death activities, which may include any type of meaningful ceremony to commemorate the life of the deceased, not only varied from region to region and clan to clan, but also still prevail in practice. The first burial customs then were crude efforts to protect the living from the spirits which early humans believed had caused the death of the person. It is possible that fear of the dead caused people to burn their bodies to destroy evil spirits. The grave represents the final stage in the funerary ritual celebrated by the survivors. Early Iron Age graves often contain information about different kinds of rituals that were part of the funerary celebrations. Rich graves contain special vessels associated with the serving and consuming of liquids and intoxicants. In some cases, these vessels are luxury imports and in other cases they are lavish local products. Memorial structures in India are also varied and sumptuous. Zoomorphic structures and terracotta sarcophagi, some with ring structures in terracotta, not only show different items used by the different groups of people but also indicate the sociocultural systems of in India. Multidimensional technological advances and the affluence of the societies have been revealed from the material culture of the periods under discussion. Complex societies with a rich culture appeared during the Early Iron Age across India; these complex societies may have resulted from the inter-regional and intra-regional contacts made through trade and commerce.

References

Agarwal, D.P. 2000. *Ancient metal technology and archaeology of South Asia*. New Delhi: Aryan Books International.

Agarwal, D.P., and J. Kharakwal. 2002. Outstanding problems of early Iron Age in India: Need of a new approach. In *Tradition and innovation in the history of iron making: an Indo European perspective*, ed. Girija Pande and Jan af Geijerstam, 3–20. Nainital: PAHAR Parikrama.

Agarwal, D.P., H. Narain, and G.P. Joshi. 1985. Iron objects from South Indian megaliths (Karnataka). A technological study and significance. In *Archaeology in Karnataka*, ed. A. Sundara, 219–234. Mysore: Directorate of Archaeology & Museums.

Allchin, B., and R. Allchin. 2007. *The rise of civilization in India and Pakistan*. New Delhi.

Balasubramaniam, R. 1999. On the corrosion resistance of the Delhi iron pillar. *India Corrosion Science* 42 (2000): 2103–2129.

Balasubramaniam, R. 2002. *Delhi iron pillar – New insights*. New Delhi: Aryan Books International.

Banarjee, N.R. 1965. *The Iron Age in India*. Delhi: Munshiram Manoharlal.

Banerjee, N.R. 1966. Amirthamangalam 1955: A megalithic urn-burial site in district Chingleput, Tamilnadu. *Ancient India* 22: 3–36.

Bauer, A.M., P.G. Johansen, and R.L. Bauer. 2007. Toward a political ecology in early South India: Preliminary considerations of the socio-politics of land and animal use in the Southern Deccan, Neolithic through early historic periods. *Asian Perspectives* 46 (1): 3–35.

Bisht, R.S., C. Dorji, and A. Banerji, eds. 2000. Radiocarbon date for Watgal, District Raichur. In *Indian archaeology 1993–1994. A review*, 141. New Delhi.

Biswas, A.K. 1991. *Minerals and metals in ancient India*. New Delhi: Indian National Science Academy.

Chakrabarti, D.K. 1974. Beginning of iron in India: Problem reconsidered. In *Perspectives in palaeoanthropology*, ed. A.K. Ghosh, 345–356. Calcutta: Firma K.L. Mukhopadhyay.

Chakrabarti, D.K. 1992. *The early use of iron in India*. Delhi: Oxford University Press.

Chakrabarti, D.K. 1999. *India an archaeological history*. Delhi: Oxford University Press.

Chakrabarti, D.K. 2008. *India an archaeological history*. New Delhi: Palaeolithic Beginnings to Early Historic Foundations.

Childe, V.G. 1948. Megaliths. *Ancient India* 4: 4–13.

Darsana, S.B. 1998. Megaliths of the Upper Palar Basin, Tamilnadu – A new perspec tive. *Man and Environment* 23 (2): 51–64.

Deo, S.B. 1990. The Megalithic economy in Vidarbha. In *Historical archaeology of India. A dialogue between archaeologists and historians*, ed. A. Ray and S. Mukherjee, 73–76. New Delhi: Books & Books.

Deo, S.B. 1991. New discoveries of Iron Age in India. In *Indian archaeological heritage I*, ed. C. Margbandhu, K.S. Ramachandran, A.P. Sagar, and D.K. Sinha, 189–197. New Delhi: Agam Kala Prakashan.

Dikshit, K.N. 1992. Iron Age and Peninsular India. *Purātattva* 22: 31–34.

Fukao, J. 1996. The position of dolmens in South Indian Megalithic culture. In *Gauravam. Recent researches in indology*, 66–71. New Delhi.

Gaur, R.C. 1997. *Studies in Indian archaeology and ancient India*, 238–250. Jaipur: Publication Scheme.

Gordon, D.H. 1950. The early use of metals in India and Pakistan. *Journal of the Royal Anthropological Institute* 80(1 & 2): 55–78.

Gururaja Rao, B.K. 1972. *Megalithic culture in South India*. Mysore: Government of Karnataka.

Joshi, M.C., ed. 1993. Radiocarbon dates for Vallam, District Thanjavur. In *Indian archaeology 1987–1988. A review*, 148. Mysore: Government of Karnataka.

Joshi, P.S. 2004. Vidarbha megaliths: Development and application of new techniques in the light of Budihal excavations. In *Indian prehistory and protohistory*, ed. A. Sundara, 251–254. Delhi: Government of Karnataka.

Killick, D., and R.B. Gordon. 1989. The mechanism of iron production in the bloomery furnace. In *Proceedings of the 26th international archaeometry symposium, held at University of Toronto, Toronto, Canada, May 16th to May 20th 1988*, ed. R.M. Farquhar, R.G.V. Hancock, and L.A. Pavlish, 120–123. Toronto: University of Toronto.

Krishnaswami, V.D. 1949. Megalithic types of South India. *Ancient India* 5: 35–45.

Leshnik, L.S. 1974. *South Indian Megalithic burials. The Pandukal complex*. Wiesbaden.

Leshnik, L.S. 1975. Nomads and burials in the early history of South India. In *Pastoralists and nomads in South Asia*, ed. L.S. Leshnik and G. Sontheimer, 40–67. Wiesbaden.

Mahapatra, S.K., ed. 1995. Radiocarbon date for Kodumanal, District Periyar. In *Indian archaeology 1990–1991. A review*, 101. New Delhi.

Manjhi, Hari, C. Dorji, and A. Banerji, eds. 2000. Radiocarbon dates for Adam, District Nagpur. In *Indian archaeology 1994–1995. A review*, 93. New Delhi.

McIntosh, J.R. 1985. Dating the South Indian Megaliths. In *South Asian archaeology 1983*, 467–493. Naples.

Misra, V.N. 2001. Prehistoric human colonization of India. *Journal of Biosciences* 26 (4): 491–531.

Moorti, U.S. 1994. *Megalithic culture of South India: Socio-Economic perspectives*. Varanasi: Ganga Kaveri Publishing House.

Morrison, K.D. 2005. Brahmagiri revisited: a re-analysis of the South Indian sequence. In *South Asian Archaeology (2001)*, vol. 1, 257–261. Paris.

Nagaraju, S., and Gururaja Rao. 1979. Chronology of Iron Age in South India. In *Essays in Indian protohistory*, ed. D.P. Agrawal and D.K. Chakrabarti, 321–329. Delhi: D.K. Publishers.

Narasimhaiah, B. 1992. Excavation at Banahalli, District Kolar. In *Indian archaeology 1986–1987 a review*, ed. M.-C. Joshi, 42–45. New Delhi: Government of India.

Pisipaty, S.R.K. 2011. *Multipurpose terracotta rings: from the river Vegavati excavations at Kanchipuram*. Delhi: Agam Kala Prakashan.

Pisipaty, S.R.K. 2012. Memorialize the dead: Some observation on early traditions. In *Arpitam: Multifaceted studies in South Asian Archaeology (Festschrift to Professor Vidula Jayaswal)*, British archaeological reports international series 2361, 37–42. Oxford. ISBN: 978-1-40730-948-4. http://www.archaeopress.com/archaeopressshop/public/defaultAll.asp?continueSearch=true&pageNo=8.

Pisipaty, S.R.K. 2013. Advent of iron and genesis of socio-cultural changes in India. In *Modernization of culture: paradigms of cultural changes*, ed. Vladimir Ionesov and Svetlana Soloviova, 80–86. Samara: Samara State Academy of Culture and Arts. Ebook – ISBN: 978-5-88293-334-9.

Pisipaty, S.R.K. 2017. Early iron smelting technologies: New evidences from archaeological excavations conducted on southern part of India. In *Modernization of culture: From human being of tradition to creative personality*, 150–165. Samara: Samara State Institute of Culture. ISBN: 978-5-88293-391-2 (ч. I) & 978-5-88293-389-9.

Pleiner, R. 1971. The problem of the beginning Iron Age in India. *Acta Praehistorica et Archaeologica* 2: 5–76.

Possehl, G.L., and P.C. Rissman. 1992. The chronology of prehistoric India: From earliest times to the Iron Age. In *Chronologies in old world archaeology*, ed. R.-W. Ehrich, vol. I, 465–490. Chicago/London: The University of Chicago Press. vol II, 447–474.

Prakash, P.V., and V. Gopikrishna. 1998. The impact of geomorphological changes on archaeological sites: Isunuru, a vanishing megalithic site on the Godavari River. *Man and Environment* 23 (2): 45–50.

Prakash, B., and V. Tripathi. 1986. Iron technology in ancient India. *Historical Metallurgy*: 568–579.

Rajan, K. 1994. *Archaeology of Tamilnadu (Kongu Country)*. Delhi: Book India Pub. Co..

Rajan, K. 2008. Situating the beginning of early historic times in Tamil Nadu: Some issues and reflections. *Social Scientist* 36 (1–2): 40–78.

Rajan, K., V.P. Yathees Kumar, and S. Selvakumar. 2009. *Catalogue of archaeological sites in Tamil Nadu 1*. Thanjavur: Heritage India Trust.

Rajendran, P. 2003. Prehistory of Kerala. In *Issues in Kerala historiography*, ed. V. Kusuman, 1–12. Thiruvananthapuram: International Centre for Kerala Studies.

Ramachandran, K.S. 1970. Chronology of the Indian megaliths some considerations. *Purātattva* 3: 107–109.
Ramachandran, K.S. 1975. *Radiocarbon dates of archaeological sites in India*. Hyderabad: Governemnt of Andhra Pradesh.
Ramachandran, K.S. 1980. *Archaeology of South India. Tamil Nadu*. Delhi: Sandeep Prakashan.
Rangacharya, V. 1985. *Pre-Historic India*. Delhi.
Rao, K.P. 1988. *Deccan megaliths*. Delhi: Sundeep Prakashan.
Rao, K.P. 2000. Megalithic anthropomorphic statues: meaning and significance. *Indo-Pacific Prehistory Association Bulletin* 19 (Melaka Papers 3): 111–114.
Selvakumar, V. 1996. Archaeological investigations in the Upper Gundar Basin, Madurai District, Tamilnadu. *Man and Environment* 21 (2): 27–42.
Ranganathan, S and S. Srinivasan. 2004. *India's Legendary Wootz Steel:* An Advanced Material of the Ancient World. National Institute of advanced studies. Banglore.
Sharma, A.K. 1991. Excavations at Karakabhat. *Purātattva* 21: 21–24.
Singh, H.N. 1982. *History and archaeology of Black-and-Red Ware (Chalcolithic period)*. Delhi: Sundeep Prakashan.
Singh, U. 2008. *A History of ancient and medieval India. From the Stone Age to the 12th century*. Delhi: Pearson Longman.
Srivastava, K.M. 1980. *Community movements in protohistoric India*. Delhi: Agamkala Prakashan.
Sudyka, J. 2011. The Megalithic Iron Age culture in South India – Some general remarks. *Analecta Archaeologica Ressoviensia* 5: 359–401.
Sundara, A. 1975. *The early chamber tombs of South India*. Delhi: University Publishers (India).
Sundara, A. 1979. Typology of megaliths in South India. In *Essays in Indian protohistory*, ed. D.P. Agrawal and D.K. Chakrabarti, 331–340. Delhi: Indian Society for Prehistoric and Quaternary Studies.
Sundara, A. 2004. Menhirs in mid-western Karnataka: Further notices. In *Indian prehistory and protohistory (Recent studies)*, ed. A. Sundara, 242–246. Govt. of Karnataka.
Swamy, L.N. 1996. Ancient smelting and forging furnaces. In *Gauravam: Recent researches in indology*, ed. K.V. Ramesh, V. Shivananda, M. Sampath, and L.N. Swamy, 109–122. New Delhi: Harman Publishing House.
Tewari, Rakesh. 2003. The origins of iron working in India: new evidence from the Central Ganga Plain and the Eastern Vindhyas. *Antiquity* 77 (297): 536–544.
Thapar, B.K. 1985. *Recent archaeological discoveries in India*. Paris–Tokyo: United Nations Educational.
Tiwari, D.P. 2013. The Ceramic Traditions from Kampil Excavations. Puratattva 44: 194.
Tripathi, V. 2001. *The age of iron in South Asia: legacy and tradition*. New Delhi: Aryan Books International www.infinityfoundation.com/mandala/t_pr/t_pr_tripa_iron_frameset.htm.
Vinay Kumar Gupta and B. R. Mani. 2017. Painted Grey Ware Culture: Changing Perspectives. *Heritage: Journal of Multidisciplinary Studies in Archaeology* 5: 370–379.
Walhouse, M.J. 1874. Notes on the Megalithic Monuments of the Coimbatore District, Madras. Journal of the Royal Asiatic Society. Vol 7, 1: 17–34.
Wheeler, M. 1948. Brahmagiri and Chandravalli 1947: Megalithic and other cultures in the Chitaldurg district, Mysore State. *Ancient India* 4: 180–310.

E

Early Peopling of the Atacama Desert

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Introduction

The hyperarid conditions of the Atacama Desert preserve remarkable evidence of ancient human foragers beginning at least 13,000 years ago. Although initially considered a harsh and inhospitable environment, recent interdisciplinary research suggests that the Atacama was originally inhabited by highly mobile hunter-gatherers bearing complex technological toolkits in what was a much wetter and ecologically more productive climate (Latorre et al. 2013; Núñez et al. 2002). Ongoing research is exploring the complexity of the socio-environmental dynamics that featured the peopling of the Atacama in the process of the early human colonization of South America, as well as during subsequent cycles of dramatic climate change, social transformations, and population displacements (Santoro et al. 2017).

Definition

The Atacama Desert extends over 10° of latitude from southern Peru to the Copiapó Valley (~17–27°S), encompassing the greater part of northern Chile and stretching from the Pacific coast to the Andes (0–>5000 masl). One of the driest deserts in the world, the annual rainfall in the Atacama ranges from 400 mm/year at high elevations in the northern Chilean Altiplano (18°S) to less than 1 mm/year in its low-elevation hyperarid core. The modern ecosystems of the Atacama Desert are characterized by vast expanses of absolute desert that lacks vegetation and are crosscut by a few deeply incised river canyons, groundwater-fed oasis, and *quebradas* that drain from the Andean highlands to the Pacific coast (Fig. 1). The broad swaths of plantless landscape (often used as an analog for the surface of Mars) are covered by a desert pavement that seals a subsurface sulfate soil composed of anhydrite and gypsum (Fig. 2; Fletcher et al. 2012). As elevation (and rainfall) increases toward the east, a climatic and ecological gradient composed of annuals and cacti appears, which is then progressively replaced by *tolar* shrublands, steppe grasslands, and eventually snow-capped Andean mountains (Armesto et al. 1998; Gutierrez et al. 1998).

Enormous preceramic shell middens located on the Pacific coast led early explorers and archaeologists to comment on the potential great antiquity of human occupation in the Atacama. In fact, the archaic Chinchorro Cultural Complex relied

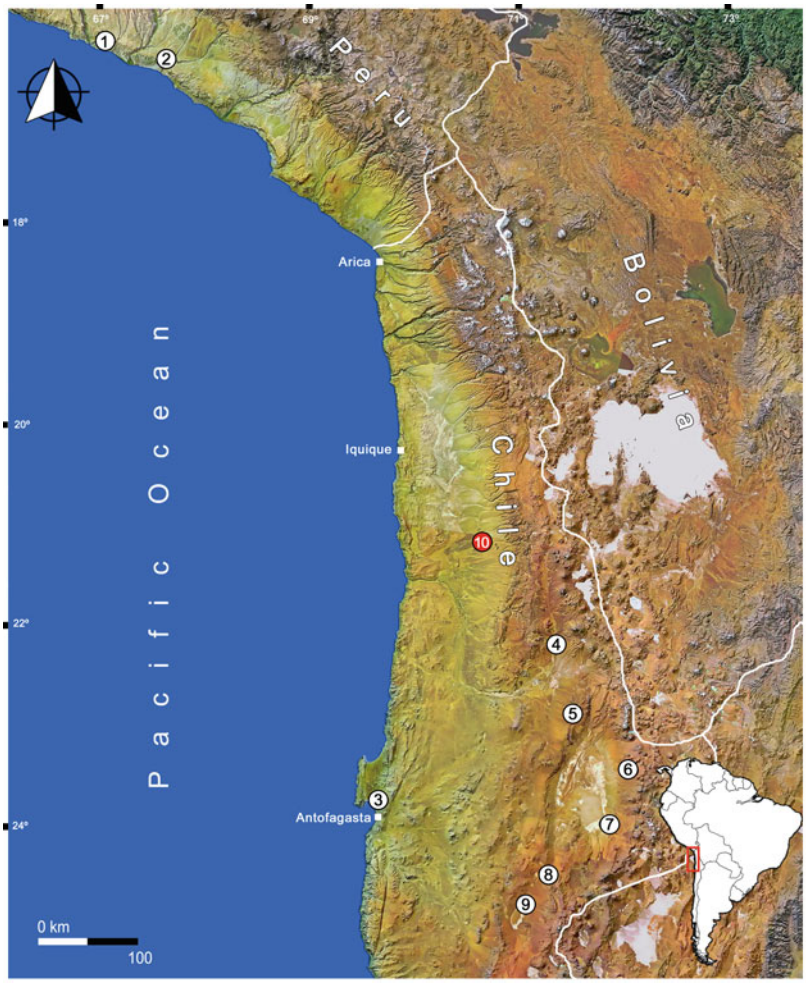

Early Peopling of the Atacama Desert, Fig. 1 Pampa del Tamarugal showing Quebrada Maní 12 (number 10, red circle) between the Pacific coast and the high Andes and contemporaneous late Pleistocene archaeological sites known for the Atacama Desert: (1) Quebrada Jaguay, (2) Quebrada Tacahuay, (3) La Chimba, (4) Alero El Pescador, (5) Tuina, (6) San Lorenzo, (7) Tulán, (8) Imilac, (9) Punta Negra

Early Peopling of the Atacama Desert, Fig. 2 View to the NE of Quebrada Maní 12 archaeological site covered by desert pavement and showing the paleowetland that flourished at the end of the Pleistocene

on the exploitation of the rich coastal resources and featured some of the oldest artificial mummification practices in the world (Arriaza et al. 2008; Marquet et al. 2012). More recent work focused on paleowetland deposits from inland basins and high elevation sites on the Altiplano has revealed new series of open-air sites and rock shelters containing evidence of diverse stone tools associated with early hunter-gatherers. Such sites have been interpreted as transitory camps from coastal groups that traveled seasonally to inland enclaves looking for stone raw materials and plant and animal resources. Until very recently, researchers often assumed that the prevailing hyperarid environment was just as severe in the past as it is today and that the Atacama Desert would only have been a marginal territory for human peopling (Núñez et al. 2016). Nevertheless, the excavation and dating of several new sites, such as Quebrada Maní 12 in the hyperarid Pampa del Tamarugal basin, have revealed the presence of humans during the late Pleistocene, which was then followed by their abrupt disappearance at the onset of the Holocene (Latorre et al. 2013; Grosjean et al. 2005; Núñez et al. 2002; Santoro et al. 2017). These occupations were coeval with other early archaeological sites (older than 11,500 cal B.P.) reported along the coast (i.e., Quebrada Jaguay, Quebrada Tacahuay, La Chimba 13) or in the Atacama Desert highlands (Alero El Pescador, Tuina 1, Tuina 5, San Lorenzo 1, Tulán 109, Imilac, Punta Negra; Fig. 1; Núñez et al. 2016).

The archaeological evidence of several recently discovered archaeological open camps in Pampa del Tamarugal show scattered exposed evidence of human activities that probably included making large open fires, hunting animals, manufacturing and reshaping stone tools for different purposes, preparing animal and plant fibers for weaving, and utilizing large trees (completely absent on the landscape today) for shelter, fuel, and raw material for manufacturing tools (Latorre et al. 2013). Particularly at the Quebrada Maní 12 site, archaeological excavations revealed a prepared hearth for cooking, postholes for tents or places for resting and protection, and a wide range of artifacts from different raw materials and origin including stones, bone, plant and animal fibers, and wood collected nearby. This evidence suggests that the first people to inhabit the Atacama were highly skilled artisans at making finely formalized tools made in stone, wood, and animal as well as plant fibers (Fig. 3).

Access to the coast (either directly or through trade) was evidenced by the presence of shells,

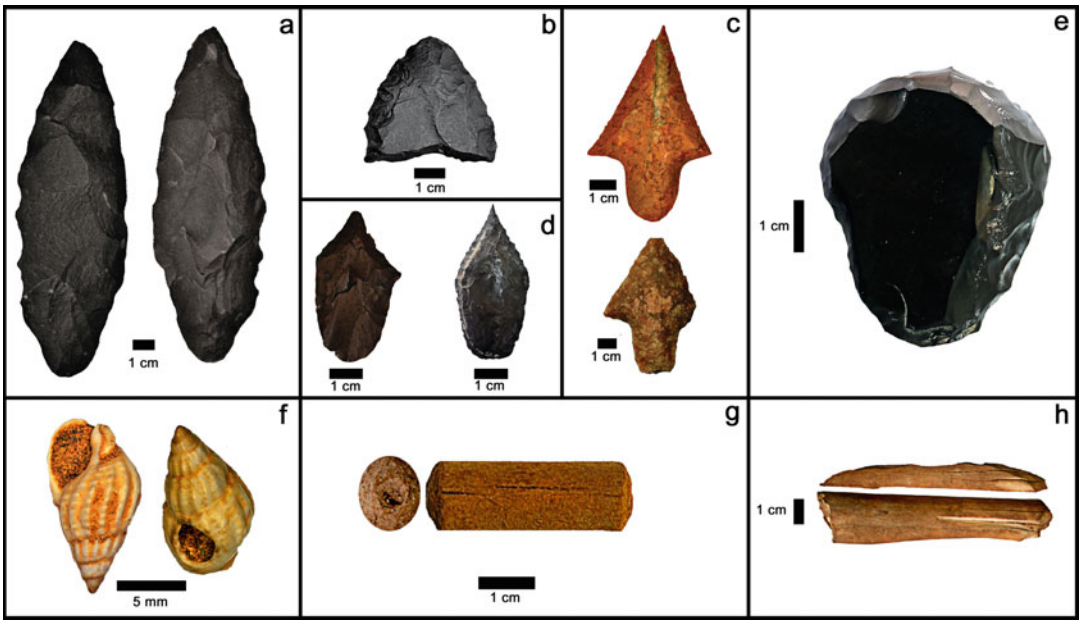

Early Peopling of the Atacama Desert, Fig. 3 (**a**) Bifacial tool; (**b**) broken bifacial tool reworked as a burinant point and as a sidescraper; (**c**) Las Cuevas style triangular stemmed projectile point; (**d**) "Patapatane" style (reworked projectile points); (**e**) frontal scraper; (**f**) gastropod shell (cf. *Nassarius gayii*); (**g**) proximal fragment of a wooden atlatl spear shaft; (**h**) pointed fragments of camelid bone. (Modified from Latorre et al. 2013)

possibly for ornamental and/or ritual purposes. Access to the high Andes is evinced by lithic raw materials (such as obsidian and silicified ignimbrite) for manufacturing tools and iron oxides for use as color pigments or other uses. Thus, the long distance network of these early inhabitants must have covered a circle of at least 160 km from the coast to the high Andes.

A number of recent paleoenvironmental studies suggest that moisture increased along the western Andes Cordillera during two phases of what is now called the Central Andean Pluvial Event (CAPE), the first phase dated to 17,600 and 14,500 years ago whereas the second occurred between 13,800 and 10,500 years ago (Gayo et al. 2012; Nester et al. 2007; Quade et al. 2008). During these phases fluvial and groundwater systems in the Atacama were activated by substantial increases in rainfall at higher elevations in Andes. This reorganization and acceleration of the summer hydrological cycle occurred during the last glacial-interglacial transition and was due to increased advection of moisture from the Amazon and Gran Chaco basins (Latorre et al. 2005; Quade et al. 2008). In turn, this brought about (a) a shallowing of underground aquifers from the high Andes to the Pacific Ocean; (b) outcropping of springs along the Andean foothills, below 3000 m, in currently hyperarid areas; (c) a downslope migration of plant species from higher elevations (>3000 m) into the Prepuna (<2000 m); (d) the flourishing of riparian vegetation and gallery forests in lowland basins (~1000 m) in what are today hyperarid drainages of the Pampa del Tamarugal (~1000 masl); and (e) the concentration of biotic resources (fauna and flora) along these gallery forests, which would have been veritable oases within a predominantly hyperarid landscape (Fig. 4). Thus, although the local environment at low elevations remained hyperarid during the Pleistocene, a network of freshwater oases appeared, which would have served as "stepping-stones" for groups of hunter-gatherers who could have either stayed or traversed the otherwise barren landscape of the Atacama Desert.

Paleoenvironmental data show that the Pampa del Tamarugal basin was considerably more vegetated and wetter during the latest Pleistocene, and the later portion of these wet phases featured the oldest known human occupations (Gayo et al.

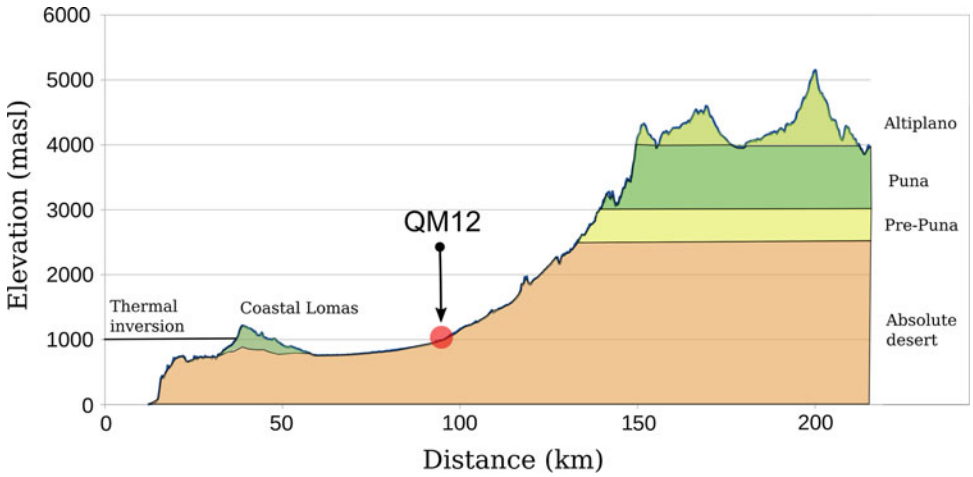

Early Peopling of the Atacama Desert, Fig. 4 Elevational profile with modern vegetational belts and the hyperarid absolute desert (red arrow indicates position of Quebrada Maní 12)

2012; Latorre et al. 2013). Coincidently, around ~13,000 years ago, many different biomes across the continent and especially in the southern cone were loci for the peopling of South America, which resulted in the creation of different cultural landscapes integrated into a complex mosaic of ecosystems coupled with continental networks of interaction and transmission of knowledge. Many of these areas were abandoned after 11,000 years ago as extreme aridity increased throughout the Andes. In the Atacama Desert, this pattern is known as "*silencio arqueológico*" or archaeological silence and has been attributed to much reduced environmental productivity that marked the onset of the Holocene. Occasionally brief (typically less than a few hundred years) spells of increased moisture interrupted the overall hyperarid climate, especially during the late Holocene (Núñez et al. 2013, 2016).

Key Issues/Current Debates/Future Directions/Examples

For decades, researchers have assumed that the Atacama stood as an obstacle to human settlement and biotic dispersal. Scientists therefore looked for and studied sites mostly along the Pacific coast or in upper-elevation environments in the adjacent high Andes and ignored the hyperarid core. In recent years, however, new evidence has emerged that gives clues for understanding the cultural complexity and diversity of the peopling of South America across a wide array of landscapes at the end of the last Ice Age. Nevertheless, the lack of well-contextualized and dated sites for the time span from ca. 15,000 to 14,000 years B.P. contrasts with the striking distribution of archaeological sites that date to around 13,000 years B.P. or younger, all of which show great cultural diversity and social contexts, albeit constrained by regional environmental productivity. Thus, questions about how and when human moved into the Americas and how the complexity of both cultural diversity and chronology evolved during the exploration and colonization processes are now one of the most widely scrutinized and debated topics in the archaeology of this continent.

Hyperaridity ensures that the Atacama may eventually be one of few places in South America that is best suited for finding late Pleistocene behavioral remains of hunter-gatherer societies. As this ecosystem completely disappeared at the onset of the Holocene (ca. 11,000 years ago), essentially "freezing" all remains of late Pleistocene antiquity, which were then never overwritten or mixed with evidence of more recent prehistoric activities, it could potentially reduce the gap between systemic and archaeological contexts. As discussed above, ongoing research is beginning to document this "frozen" record and providing a more integrated perspective of the late Pleistocene.

Another interesting theme of current research is regarding the origins of the Chinchorro Cultural Complex, which developed along the Pacific coast during the early Holocene. How the initial occupations in the hyperarid Atacama related to these subsequent cultural developments remains unclear, in part because of a lack of sites that bear evidence of direct continuity between the initial inland foraging versus the later marine subsistence systems. Similarly, the connection between desert adaptations and the coeval development of agropastoralist societies in the Andean highlands to the east of the Atacama are a current research frontier (Santoro et al. 2017).

In summary, considering the archaeological and paleoecological evidence in the Atacama Desert for sites dated between 12,800 and 11,600 years ago, an early and rapid process of human exploration and colonization directly related to the peopling of South America seems to have taken place. Ongoing studies of these prehistoric hunter-gatherer societies in the Atacama Desert are presently increasing our knowledge of this processes based on improved analytical and theoretical approaches.

Cross-References

- ▶ Andes: Prehistoric Period
- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Monte Verde, Archaeology of
- ▶ Núñez, Lautaro
- ▶ Paleoindians
- ▶ Peopling of the Americas
- ▶ South America: Lithic Industries

References

Armesto, J.J., R. Rozzi, C. Smith-Ramirez, and M.T.K. Arroyo. 1998. Conservation targets in South American temperate forests. *Science* 282: 1271–1272.

Arriaza, B.T., V.G. Standen, V. Cassman, and C.M. Santoro. 2008. Chinchorro culture: Pioneers of the coast of the Atacama Desert. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 45–58. New York: Springer.

Fletcher, L.E., J.E. Valdivia-Silva, S. Perez-Montano, R.M. Condori-Apaza, C.A. Conley, and C.P. Mckay. 2012. Variability of organic material in surface horizons of the hyper-arid Mars-like soils of the Atacama Desert. *Advances in Space Research* 49: 271–279.

Gayo, E.M., C. Latorre, T.E. Jordan, P.L. Nester, S.A. Estay, K.F. Ojeda, and C.M. Santoro. 2012. Late quaternary hydrological and ecological changes in the hyperarid core of the northern Atacama Desert (similar to 21 degrees S). *Earth-Science Reviews* 113: 120–140.

Grosjean, M., L. Núñez, and I. Cartajena. 2005. Palaeoindian occupation of the Atacama Desert, northern Chile. *Journal of Quaternary Science* 20: 643–653.

Gutierrez, J.R., F. López-Cortes, and P.A. Marquet. 1998. Vegetation in an altitudinal gradient along the Río Loa in the Atacama Desert of northern Chile. *Journal of Arid Environments* 40: 383–399.

Latorre, C., J.L. Betancourt, J.A. Rech, J. Quade, C. Holmgren, C. Placzek, A. Maldonado, M. Vuille, and K.A. Rylander. 2005. Late quaternary history of the Atacama Desert. In *23° S: The archaeology and environmental history of the southern deserts*, ed. M. Smith and P. Hesse, 73–90. Canberra: National Museum of Australia Press.

Latorre, C., C.M. Santoro, P.C. Ugalde, E.M. Gayo, D. Osorio, C. Salas-Egaña, R. de Pol-Holz, D. Joly, and J.A. Rech. 2013. Late Pleistocene human occupation of the hyperarid core in the Atacama Desert, northern Chile. *Quaternary Science Reviews* 77: 19–30.

Marquet, P.A., C.M. Santoro, C. Latorre, V.G. Standen, S.R. Abades, M.M. Rivadeneira, B. Arriaza, and M.E. Hochberg. 2012. Emergence of social complexity among coastal hunter-gatherers in the Atacama Desert of northern Chile. *Proceedings of the National Academy of Sciences* 109: 14754–14760.

Nester, P.L., E. Gayo, C. Latorre, T.E. Jordan, and N. Blanco. 2007. Perennial stream discharge in the hyperarid Atacama Desert of northern Chile during the latest Pleistocene. *Proceedings of the National Academy of Sciences* 104: 19724–19729.

Núñez, L., M. Grosjean, and I. Cartajena. 2002. Human occupations and climate change in the Puna de Atacama, Chile. *Science* 298: 821–824.

Núñez, L., I. Cartajena, and M. Grosjean. 2013. Archaeological silence and ecorefuges: Arid events in the Puna of Atacama during the middle Holocene. *Quaternary International* 307: 5–13.

Núñez, L., D. Jackson, T.D. Dillehay, C.M. Santoro, and C. Méndez. 2016. Cazadores-recolectores tempranos y los primeros poblamientos en Chile hacia finales del Pleistoceno (ca.13.000-10.000 años antes del presente). In *Prehistoria en Chile desde sus primeros habitantes hasta los Incas*, ed. C. Aldunate, F. Falabella, L. Sanhueza, J. Hidalgo, and M. Uribe. Santiago: Editorial Universitaria.

Quade, J., J.A. Rech, J.L. Betancourt, C. Latorre, B. Quade, K.A. Rylander, and T. Fisher. 2008. Paleowetlands and regional climate change in the

Central Atacama Desert, northern Chile. *Quaternary Research* 69: 343–360.

Santoro, C.M., J.M. Capriles, E.M. Gayo, M.E. de Porras, A. Maldonado, V.G. Standen, C. Latorre, V. Castro, D. Angelo, V. Mcrostie, M. Uribe, D. Valenzuela, P.C. Ugalde, and P.A. Marquet. 2017. Continuities and discontinuities in the socio-environmental systems of the Atacama Desert during the last 13,000 years. *Journal of Anthropological Archaeology* 46: 28–39.

Further Reading

Capriles, J.M., C.M. Santoro, and T.D. Dillehay. 2016. Harsh environments and the terminal Pleistocene peopling of the Andean highlands. *Current Anthropology* 57: 99–100.

Cartajena, I., R. Loyola, L. Núñez, and W. Faúndez. 2014. Problemas y perspectivas en la interpretación del registro espacial de Punta Negra e Imilac. In *Distribución espacial en sociedades no aldeanas: del registro arqueológico a la interpretación social*, ed. F. Falabella, L. Sanhueza, L.E. Cornejo, and I. Correa, 143–162. Santiago: Serie Publicaciones Monográficas, Sociedad Chilena de Arqueología N°4.

Diaz, F.P., C. Latorre, A. Maldonado, J. Quade, and J.L. Betancourt. 2012. Rodent middens reveal episodic, long-distant plant colonizations across the hyperarid Atacama Desert during the last 34,000 years. *Journal of Biogeography* 39: 510–525.

Gayo, E.M., C. Latorre, and C.M. Santoro. 2015. Timing of occupation and regional settlement patterns revealed by time-series analyses of an archaeological radiocarbon database for the south-Central Andes (16°–25° S). *Quaternary International* 356: 4–14.

Jordan, T.E., N.E. Kirk-Lawlor, N. Blanco, J.A. Rech, and N. Cosentino. 2014. Landscape modification in response to repeated onset of hyperarid paleoclimate states since ~15 Ma, Atacama Desert, Chile. *Geological Society of America Bulletin* 126: 1016–1046.

Latorre, C., J.L. Betancourt, and M.T.K. Arroyo. 2006. Late quaternary vegetation and climate history of a perennial river canyon in the Río Salado basin (22°S) of northern Chile. *Quaternary Research* 65: 405–466.

Núñez, L., M. Grosjean, and I. Cartajena. 2010. Sequential analysis of human occupation patterns and resource use in the Atacama Desert. *Chungara Revista de Antropología Chilena* 42: 363–391.

Pintar, E. 2014. Continuidades e hiatos ocupacionales durante el Holoceno medio en el borde oriental de la Puna Salada, Antofagasta de la sierra, Argentina. *Chungara Revista de Antropología Chilena* 46: 51–71.

Placzek, C., J. Quade, J.L. Betancourt, J.A. Rech, C. Latorre, A. Matmon, C. Holmgren, and N.-B. English. 2009. Climate in the dry, Central Andes over geologic, millennial and interannual timescales. *Annals of the Missouri Botanical Gardens* 96: 386–397.

Reitz, E.J., H.E. Mcinnis, D.H. Sandweiss, and S.D. Defrance. 2016. Terminal Pleistocene and early Holocene fishing strategies at Quebrada Jaguay and the Ring Site, southern Peru. *Journal of Archaeological Science: Reports* 8: 447–453.

Santoro, C.M., I. Cartajena, A. Maldonado, E.M. Gayo, C. Latorre, M.M. Rivadeneira, V.G. Standen, B.T. Arriaza, F. Rothhammer, D. Osorio, P.C. Ugalde, D. Valenzuela, M. Sepúlveda, P. de Souza, and L. Núñez. 2016. Cazadores, recolectores y pescadores arcaicos del Desierto de Atacama. entre el Pacífico y los Andes, norte de Chile (ca. 10.000–3.700 años a.p.). In *Prehistoria en Chile desde sus primeros habitantes hasta los Incas*, ed. C. Aldunate, F. Falabella, L. Sanhueza, J. Hidalgo, and M. Uribe, 117–180. Santiago: Editorial Universitaria.

Ugalde, P.C., C.M. Santoro, E.M. Gayo, C. Latorre, S. Maldonado, R.D. Pol-Holz, and D. Jackson. 2015. How do surficial lithic assemblages weather in arid environments? A case study from the Atacama Desert of northern Chile. *Geoarchaeology* 30: 352–368.

E

Early Regional Centers: Evolution and Organization

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Introduction

The shift from autonomous, egalitarian societies to complex societies with significant social inequalities is a historical phenomenon that occurred across the globe. To understand in part how this occurred, archaeologists have focused on the evolution and organization of early regional centers (Fig. 1). Much has been learned about the development of these ancient settlements, and recent studies utilizing more detailed data are providing rich understandings of the role of early regional centers in human history.

Regional centers are both physical entities and hubs for social interaction. Early regional centers were the loci of new configurations of social processes, human choices, and relationships. Three analytical problems have emerged from the comparative study of these types of sites. These are:

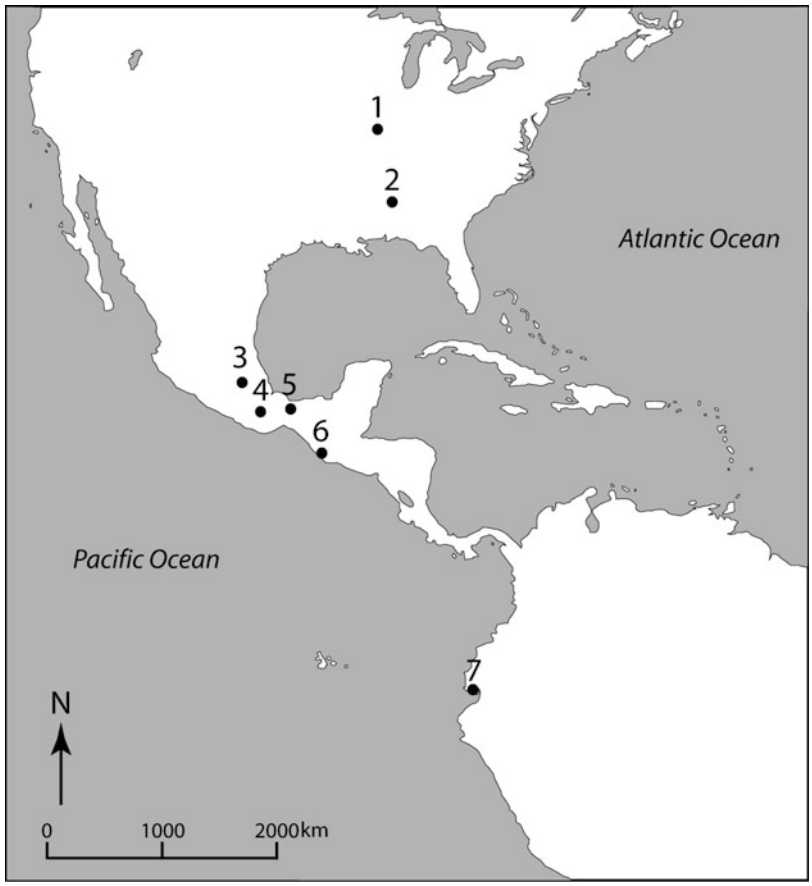

Early Regional Centers: Evolution and Organization,
Fig. 1 Map of several sites in the Americas mentioned in the text, including (1) Cahokia, (2) Moundville, (3) Tlapacoya, (4) San José Mogote, (5) San Lorenzo, (6) Paso de la Amada, and (7) Real Alto

1. The institutionalization of asymmetrical social relationships between people and between communities
2. The emergence of new forms of social integration and frameworks of organization
3. The evolution of these along different historical trajectories dependent on geographic, temporal, and historical context

Definition

Early regional centers were human settlements with a permanent and sedentary residential population. But they were more than just a permanent spot on the map; they were involved with ushering in new kinds of regional relationships. Regional centers are set apart from a network of villages through the daily operation of an asymmetrical regional social network, with the central settlement being most prominent. While interactions between villages within any region could take place on relatively equal grounds, regional centers created imbalanced relationships among communities. The regional asymmetry, however, was not just demographic in nature. It was often operationalized across one or more key dimensions, including (1) economy, (2) politics, or (3) ideology. As such, early regional centers could assume regional prominence when social groups living there utilized their standing as key economic, political, or ideological players to organize other regional populations.

Historical Background

Large-scale regional surveys in the early- to mid-twentieth century established a series of traits that served as criteria for the typological classification

of known archaeological sites. Regional centers were identified when evidence recovered from a site matched a series of expected features, including certain presumed population and settlement sizes, the presence of central and public spaces, the occurrence of specialized buildings, recognition that the settlement served as a nexus for regional trade, or indications that a segment of individuals living there were specialists who made unique and important craft goods. These traits allowed archaeologists to quickly distinguish probable regional centers from smaller-scale villages, larger urban centers, or other settlement types.

The development of processual archaeology in the 1960s and 1970s saw a shift in focus toward understanding the organization and operation of human social systems, with the objective to develop and assess models to describe the evolution of those systems. Regional centers were often defined as the central settlement of a regional polity, consisting of a group of villages that found themselves under the authority of a more dominant settlement. This kind of network, resulting from the loss of village autonomy to a politically dominant group, is commonly referred to as a chiefdom. Whereas chiefly rulers who lived at regional centers were sometimes assumed to direct the organization of not only politics but also economic and ritual-ideological life, already by the early 1970s, many archaeologists were aware that smaller human settlements often contained facilities for local ritual affairs (cf. Flannery 1976).

More recently, archaeologists have begun to decouple the study of settlements and their constitutive social practices from the study of sociopolitical evolution (Yoffee et al. 1999). The analytical focus is increasingly directed toward understanding the dynamic social processes occurring within early regional centers and between people residing in centers and those residing in smaller villages, hamlets, or with people engaging a mobile lifestyle.

New approaches recognize that greater diversity exists in the ways humans organize and that an analytical focus upon any number of historical trajectories can provide important information about social change through time (Birch 2013; Chesson and Goodale 2014). Thus, a focus on the development of regional centers and the kinds of activities that they embodied is a significant research objective in its own right. Importantly, this allows archaeologists to better understand the conditions under which regional centers and social complexity emerged, and it also positions researchers to ask questions about why many of these settlements suffered drop-offs in regional prominence or were abandoned outright.

E

Key Issues

Archaeologists studying early regional centers have identified several key issues involved with their emergence and organization. Four primary issues considered here are:

1. The human institutions that developed to take advantage of the new opportunities and the challenges of living in regional centers
2. The structural organization of early regional centers that resulted from the intersection of these institutions and how regional groups were centralized (i.e., through economic, political, or ideological dimensions)
3. The dynamics of local and regional institutions and the trajectories of their emergence, persistence, growth, and collapse
4. The tempos of variable trajectories

These issues are predicated on the ability of archaeologists to demonstrate, rather than assume, the presence of regional centers that are qualitatively different than other sites in the landscape. There are many social and taphonomic processes that can produce site-size hierarchies, and only some are the material remains of regional centers (Duffy 2015). Researchers have developed analytical tools to more accurately characterize variation in settlement patterns and demonstrate the presence of regional asymmetries (e.g., Peterson and Drennan 2005). Fine-grained chronologies are also critical for demonstrating that large and small settlements were contemporaneously occupied and potentially interacting (Bailey 2007;

Barrier 2017). Once the presence of large settlements is demonstrated, additional analyses are necessary to characterize the social, economic, political, and ideological underpinnings of early regional centers (e.g., Brughmans 2013; Knappett 2013; Quinn and Ciugudean 2018).

Local and Regional Institutions

Early regional centers presented new opportunities and challenges for the people living in and around them. In response to these novel conditions, new institutions – the socially mediated and communally accepted sets of rules for interaction and conduct – developed as means to organize economic, political, or ideological aspects of life. Archaeologists have focused on those institutions that structured the flows of people, resources, and ideas within a region. These include chiefly political offices, religious beliefs and practices, and institutions involved with kinship or identity. Within a chiefdom, for example, the institution of a regional chiefly political office is one way that decisions affecting people throughout a region are carried out. While chiefdoms are normally thought of as hierarchically structured political polities, the decisions of chiefly persona often deal with regional economic matters as well as major aspects of ideology.

Early regional centers did not always support hierarchical institutions but did minimally place important decision-making responsibilities into the hands of certain groups. For instance, sodalities, which are organizations whose members come from several kinship groups, can perform or organize important tasks associated with ritual, key portions of the economy, or political matters. In the Southeastern United States (Fig. 2), for example, the Mississippian settlement of Moundville was constructed around a very large plaza, ringed by several monumental earthen mounds, the summits of which were spaces where elite sodalities or representatives from distinct kin groups carried out tasks that ranged from the crafting of ritual items to processing of human

Early Regional Centers: Evolution and Organization, Fig. 2 Map showing geographic extent of the Mississippian world, with Moundville and Cahokia highlighted

remains (Blitz 2008; Knight 2010). Assuming important ceremonial roles, these groups fueled religious and productive cycles that demanded access to surplus foods, labor for building monuments and ceremonial architecture, and acquisition of the prized materials that specialists crafted into ritually charged items. The most successful may have also taken on roles overseeing important ceremonies associated with death and the afterlife and attendant mortuary practices. Kinship and sodality institutions operating within Moundville's larger regional society were one way that a more politically focused and hierarchical chiefly institution was organized.

Ritual practice and ideologies helped people overcome the new problems associated with living in close quarters (Bandy 2004). In many developed regional centers, archaeologists have recovered evidence for social institutions that operated to maintain a sense of commonality among the various groups that resided at the site. Ideology was important at the Terminal Formative settlement of Tetimpa in Central Mexico (Plunket and Uruñuela 2002). Early on in its history, families would mark their distinctive household compounds with burials to venerate their ancestors. During subsequent phases of growth, more recently arrived families constructed their domestic compounds following the standardized architectural pattern of several domestic rooms around a central courtyard space. Because these new arrivals did not have founding leaders to commemorate, these groups marked their central courtyards with shrines that displayed serpent and feline imagery associated with more widespread and commonly recognized worldviews.

Security and defense were important factors in the development of some regional centers. A village in a defensible location or protected by a strong leader may attract new residents, especially in situations where competition over resources was increasing between multiple villages, or when sedentary groups were seeking protection from ethnically distinct neighbors or in frontier situations. Political leadership may develop when an individual or group can effectively mitigate the negative effects of increasing warfare either through overseeing a larger group of warriors or through managing the construction and maintenance of defensive structures like palisades or other fortifications (Earle 1997). Globally, it has been recognized that warfare intensified alongside the demographic, economic, and institutional changes associated with increased sedentism and the adoption of agriculture (Haas 2001). The ability of leaders or institutions to funnel surpluses into channels for protection, but also to plan and carry out their own raids and acquisitions of new lands, would attract scattered groups from across a region to these new centers. Strength in numbers, defensive structures, and public symbols of success in battle or social violence can also lend a source of ideological power to the groups most associated with success (Earle 1997).

Institutional arrangements in early regional centers were diverse and varied depending on the histories of specific regions. In some cases, new institutions represented novel solutions to extant social problems. In other cases, however, they may have failed to resolve new problems associated with these changing social conditions. The dynamics of early regional centers are thus influenced by broader institutional configurations as well as historically specific events and processes. When archaeologists track the emergence of regional centers over the long term, they are better equipped to understand the trajectories of local and regional histories.

Structure and Organization of Early Regional Centers

Regional centers are part of multiscalar social systems. In fact, the development of regional centers is necessarily linked to the emergence of new scales of human organization. Consequently, understanding the structure and makeup of these settlements – from households to the sites themselves and to their regional settings – requires investigations at multiple analytical scales. Researchers have been quick to note that studying the emergence of regional centers requires an evaluation of the scale at which different organizing processes occur and how organizations at one level do or do not alter organization at other levels (Arnold 1996). Two spatial scales, the site and regional levels, are discussed here.

Intra-Site Scale

Regional centers contain some of the earliest forms of public meeting spaces and monumental constructions within permanent settlements (Fig. 3). Since people no longer lived solely among their relatives, large plazas, temples, earthen mounds, and pyramids, to mention a few examples, provided spaces for ceremonies, performances, and economic transactions to occur. New forms of architecture, like buildings that served specialized ritual or political functions, are evidence that the institutions necessary for community and regional integration existed. Likewise, the amount of work required to construct large monuments and clear spaces for public plazas demonstrates that several families or regional populations provided labor at a central site.

Regional centers will often have distinct residential sectors made up of multiple families who may have relocated from different settlements across the region through a process of aggregation and coalescence (Kowalewski 2013). Differences between these neighborhoods are sometimes recognizable through material remains, such as variation in house sizes and layouts or the uneven distribution of special foods, exotic goods, or craft items. In some cases, it may be possible to monitor these lines of evidence to identify elite communities in spatially discrete neighborhoods. Elite leadership roles normally develop when regional-level economic, political, or ideological institutions form.

The intra-site configurations of human activity can vary significantly both within and between cultural contexts. For example, the layout of settlement sites in the US Southwest varies a great deal across the region. At Anasazi pueblos, public architecture is often in the form of large kivas, great houses, and plazas (Fish and Scarry 1999). In contrast, Hohokam settlements display ballcourts, platform mounds, and, at Paquime, non-residential effigy mounds. Similarly, there is variability among residential architecture. While Puebloan settlements have highly nucleated room blocks, Hohokam settlements are dispersed with spaces between and within residential compounds.

Regional Scale

At the regional level, regional centers are the most critical settlement in an asymmetric interaction

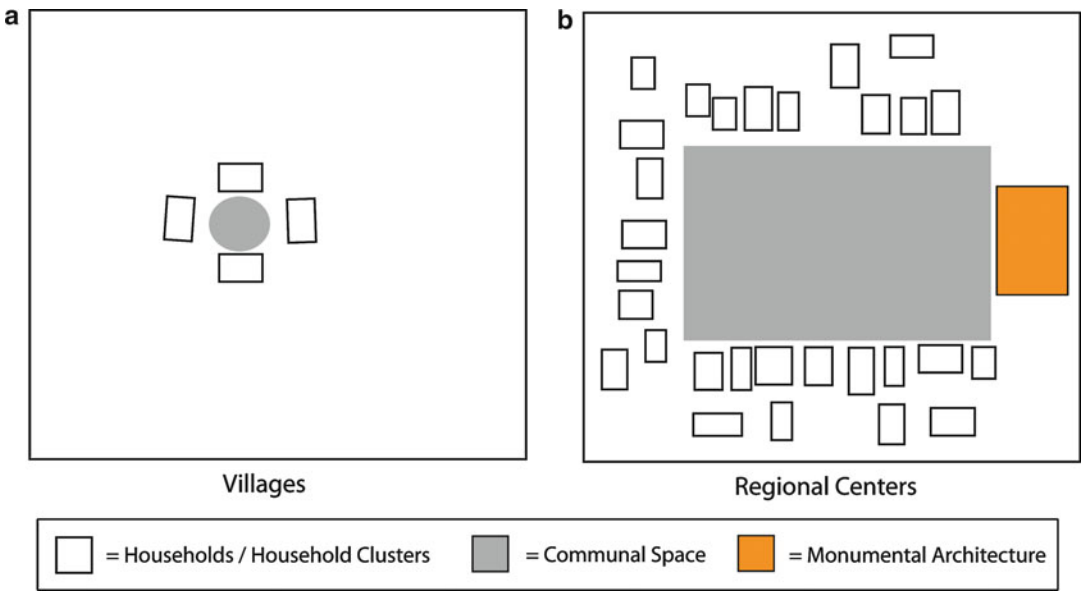

Early Regional Centers: Evolution and Organization, Fig. 3 Idealized schematic of intra-site organization and interaction in (**a**) villages and (**b**) early regional centers. Population growth, large communal space, and monumental architecture are important characteristics of most early regional centers

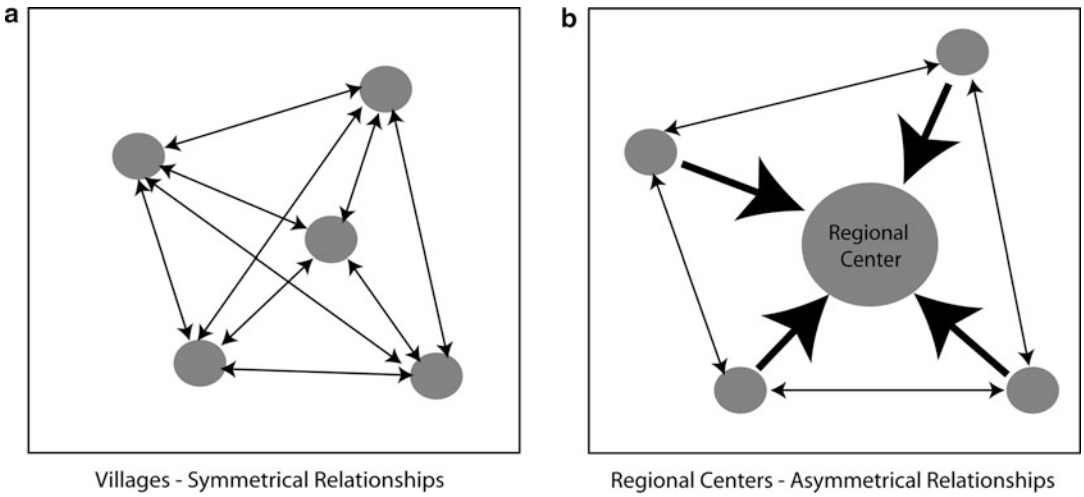

Early Regional Centers: Evolution and Organization, Fig. 4 Idealized schematic of regional organization and interaction in (**a**) village-level societies and (**b**) contexts where early regional centers develop. A primary characteristic in the emergence of early regional centers is the development and expansion of asymmetric regional interactions

network involving people in surrounding settlements (Fig. 4). Because this centrality can take on economic, ideological, or political qualities, regional-scale organization can vary significantly.

Prominent settlements that organized key portions of the economy will show material evidence of their elevated economic standing. This could include signs that people in regional centers had greater or privileged access to exotic goods and craft items or maintained storage facilities for surplus foods shipped in from outlying settlements. Regional centers could also have assumed prominence through ideological means and thus become centralized settlements that structure the flow of people and ideas through ritual and religious networks. Archaeologists see evidence for this type of situation when centers contain spaces for ritual performances, buildings for housing ritual specialists and ceremonies, and relatively greater amounts of ritual paraphernalia.

Commonly, central settlements assumed their position through political means. Archaeologists have shown that regional centers are often the seat of elite personnel that asserted political authority region-wide. In a politically centralized system, outlying villages lost autonomy when decision-making power was co-opted by, or transferred to, a prominent leader, a process that has been linked to the emergence of chiefdoms (Marcus and Flannery 1996). Interestingly, studies of chiefdoms from around the world have demonstrated that substantial variation existed even within this type of politically centralized network. This highlights the importance of understanding a settlement system on a regional scale to better understand how political centralization developed and changed through time.

As people became attracted to a regional center's prominence, whether because of primarily economic, political, or ideological reasons, these emerging settlements would grow at the expense of neighboring settlements (Clark et al. 2010). The positive feedback between continued population growth and the regional importance of a center persists until these settlements and their regional networks decline and break apart, or take on new lives as even bigger, urban centers. Thus, regional demographic shifts are necessary components of the study of emergent regional centers (Barrier 2017).

Once regional centers emerged, it was often the case that important leaders developed interaction networks with leaders in centers from neighboring regions. In Mexico, for example, the early centers of San Lorenzo, San José Mogote, and Tlapacoya appear to have engaged in an exchange network of

prestige goods including obsidian, marine shell, iron ore mirrors, turtle shell, and several types of fineware ceramics (Flannery and Marcus 2000). These elite-centric prestige economies may have played a key role in negotiating elite identities across regions as well as the relationships between the elite and the non-elite within the respective settlements themselves.

Trajectories and Dynamics of Early Regional Centers

Understanding early regional centers requires investigating the dynamics of social organization prior and subsequent to their emergence. After decades of research, archaeologists have increasingly emphasized that their rates of development and subsequent histories followed a series of different paths, marked by distinct patterns of emergence and change.

Although much of this discussion has focused on the emergence and organization of centers, archaeologists have shown that these settlements and their regional networks changed over time. After a few generations, most experienced significant declines in population, were taken over by other emerging centers, or were abandoned outright. People were not always able to solve the novel problems arising from how these new social contexts were structured. For example, the kinds of social evolutionary changes associated with centralized regional developments only rarely directly led to the changes that spurred the development of social organizational forms like the state. Thus, it may be that the various forms of institutional life that developed with early regional centers often led to other and divergent evolutionary paths (Yoffee et al. 1999).

The prehistoric Mississippian period of the Southeastern United States provides numerous examples of regional center growth and decline (Fig. 2). Across this macroregion from about A.D. 1000 and up through European contact in the sixteenth century, several dozens to hundreds emerged as central nodes that organized regional populations through various means. Some of the earliest developed in the American Bottom portion of the Central Mississippi River Valley, near the modern-day US city of St. Louis, Missouri (Fig. 5). By A.D. 900, a few local villages showed signs of growth as several small family groups moved to these settlements. Although each family group built their houses around small courtyards, it was not until sometime in the tenth century that there is evidence for centralizing public spaces and specialized buildings more indicative of larger and more integrative institutions. The best excavated example of this type of settlement is the Range site (Kelly 1990). At Range, distinct families constructed their own house-courtyard groups around two, small central plazas and a handful of specialized buildings and ritual features. Archaeologists are unsure of the exact mechanisms of integration at this time, but the kinds of buildings, features, and artifacts recovered through excavations hint at the importance of ideological institutions involving new forms of religious symbolism and ritual adherence.

Growth at Range was not sustained, however, as archaeologists have documented a decline in population by sometime in the early eleventh century (Kelly 1990). This population decline appears to have resulted from the fissioning off of several individual family groups that ushered in a reorganization of the settlement newly focused upon only one central plaza. Concurrently, a series of other local settlements appear to have experienced rates of growth and changes unseen at Range (Barrier and Horsley 2014). Sites like Cahokia, Pulcher, Washausen, and a few others have evidence of new, larger-scale integrative social institutions. It is at these settlements during the eleventh century that people in the region first began constructing monumental earthen mounds around large open plazas. Data show that by A.D. 1050 these nucleated settlements served to integrate outlying populations scattered throughout the region living in smaller villages and farmsteads. Again, archaeologists are still weighing evidence to see exactly what kinds of integrative mechanisms were active, but asymmetrical regional networks were in place that served to organize agricultural production and bring together regional populations at centers for large ceremonies and rituals.

By the end of the late eleventh century, however, some of these centers were abandoned,

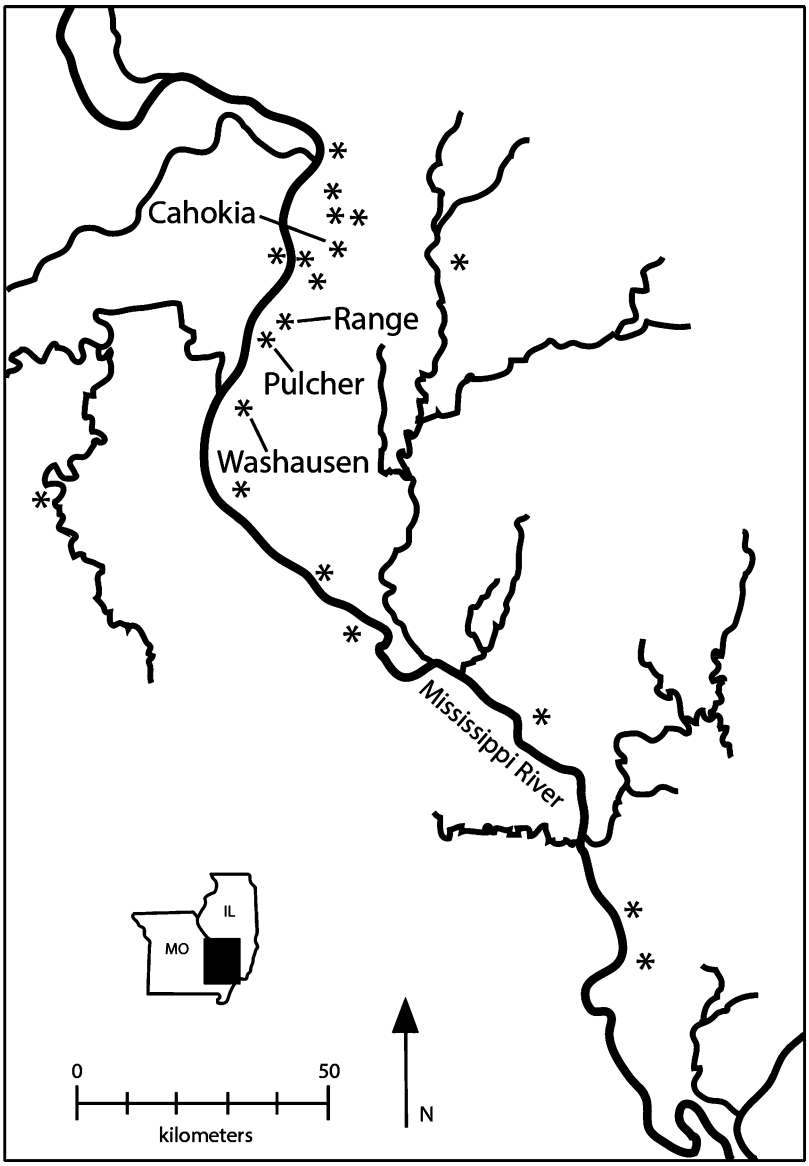

Early Regional Centers: Evolution and Organization, Fig. 5 Map of the greater American Bottom region showing the location of several Mississippian period settlements, with sites mentioned in text highlighted

others saw continued growth, and even newer regional centers were founded. What is particularly interesting about this example of multiple center growth and decline is that throughout each transformative case of aggregation and dispersal, a more protracted process of larger-scale integration accrued. In fact, the settlement at Cahokia grew so large that it may have been something more akin to an urban center (Kelly and Brown 2014; Pauketat 2009). The institutions structuring the Cahokian society took on a political nature not yet witnessed regionally. Residential neighborhoods at Cahokia were now larger, maintained their own institutional facilities and plazas, and were perhaps aligned according to a settlement-wide grid. The dominating feature of Cahokia was the largest prehistoric monument constructed north of Central Mexico, an earthen mound (named Monks Mound) that eventually stood around 100 feet in height. An extremely large open space marked the central point of the settlement (aptly called the Grand Plaza by archaeologists), which was ringed by smaller mound-and-plaza complexes. However, despite

the fact that Cahokia outpaced neighboring settlements to become the de facto regional center, by A.D. 1200, signs of stress are evident as competition between population segments at Cahokia and throughout the region emerged. By the end of the A.D. 1300s, the Cahokia site and much of the American Bottom region were abandoned.

What this regional case demonstrates is (1) that early regional centers can be centralized along one or more dimensions, (2) that the institutions for integration were often insufficient for long-term and sustained success, (3) that the direct evolutionary development into larger and more regionally integrative centers may not often occur, and (4) that the cultural knowledge of successful and failed institutional arrangements may make it possible for later regional centralization processes to spur the development of more complex organizational formations.

International Perspectives

As a process that occurred in many places across the globe, the emergence of regional centers provides opportunities for cross-cultural comparisons. Identifying the organizational mechanisms, institutions, and tempos by which regional centers emerged and changed through time allows archaeologists to build context-specific models of social, economic, political, and ideological change. Comparing trajectories of the origins and evolution of regional centers allows for archaeologists to identify and better understand the differences between global and local processes.

Tempo of Early Regional Center Development

The tempo of change is a critical attribute of the emergence of early regional centers that varies from case to case. Archaeological research on the emergence of novel forms of social organization has placed renewed emphasis on the importance of chronology, timing, and tempo of human action and systemic change (Prentiss et al. 2009). The emergence of early regional centers in the Americas is an ideal context for highlighting the diversity in tempos of continuity and change in human social systems. Among the numerous ways central settlements can (and do) emerge, two alternative models for the tempo and social context of their emergence are highlighted. These models, linked with specific case studies, underscore the importance of analytical approaches to trajectories of human social organization that are nonlinear, dynamic, and embedded within both human agency and system-level perspectives.

Model 1: Regional Centers Emerge Slowly: A Consideration of Paso de la Amada

In this model, one existing village among many interacting villages gradually assumes a more central role within the regional network. Economic, political, and ideological institutions emerge separately, over a period of time, as the village grows (Lesure and Blake 2002). In Chiapas, Mexico, archaeologists working at Paso de la Amada have suggested this type of development. The village at Paso de la Amada was founded by 1900–1700 B.C. Within the early village, ceramic evidence suggests special-purpose vessels were used for drinking either corn beer or chocolate during festive occasions, and there is evidence that nonlocal obsidian was imported into the site (Clark and Blake 1994; Clark et al. 2010). It was not until almost 300 years after the initial founding of the site that some of the institutional changes in settlement, such as the presence of public architecture in the form of elevated platform mounds and plazas, were seen. Other evidence, from variability in settlement size within the region to differences in domestic house size, location, and complexity, suggest that Paso de la Amada became a regional political center, with some form of inequality. In this case, Paso de la Amada existed for a period of time, with some evidence of centralization emerging throughout the development of the village. Finally, by 1700–1500 B.C., the role of Paso de la Amada within the region had resulted in a qualitative change in its relationship to other villages in the area.

Model 2: Regional Centers Transformed Rapidly: A Consideration of Real Alto

In this model, one existing village within a regional network undergoes significant and rapid

changes in economic, ideological, and/or political organization. Human agents play a vital role in the shift, as an institutional "package" associated with regional centralization is adopted. In this scenario, a more rapid demographic reorganization at the site and regional levels plays an important role in both necessitating and precipitating changes in the institutional mechanisms by which people and communities become integrated. This tempo of development and centralization can be seen at the site of Real Alto along the Pacific Coast in Southern Ecuador. Real Alto was initially settled as a small village around 4400 B.C., but it was not until circa 2900 B.C., when a reorganization of the site layout, regional economy, and demographic distribution quickly changed, that the settlement was transformed (Clark et al. 2010). The emergence of Real Alto as a regional center coincided with a quadrupling in site size, as much as a doubling of on-site population, the construction of a central ceremonial precinct, and diversity in residential structures suggesting the presence of status differences.

Future Directions

Future research into early regional centers will benefit from an investment in three directions:

1. *Theoretical advancements*. Archaeologists can develop additional and more complex models for the emergence and development of early regional centers. These include integrating agency and system-level perspectives and designing research that can better identify and measure processes of institutionalization and interaction.
2. *Methodological advancements*. The study of early regional centers will continue to require a wide range of methodologies. An understanding of the regional context of these types of settlements will be advanced as more data and instruments become widely available and utilized, including the integration of satellite data (such as ASTER) and LIDAR imagery alongside more traditional survey approaches. Geophysical survey, including the use of magnetometry, resistivity, and ground-penetrating radar, may provide minimally invasive and cost-effective methods for understanding the layouts of large settlements and the makeup of regional settlement patterns. The integration of new methodological approaches to artifact studies, including the sourcing of materials through XRF and pXRF, can provide comparative data at both intra-site and regional scales. Perhaps most importantly, techniques for refining and generating more precise chronologies, including more accurate dating techniques, are needed both to ensure synchronic comparisons are warranted and to track diachronic changes in central settlements and their regional networks. The employment of Bayesian statistical methods for modeling site and regional chronologies is significantly aiding archaeologists' abilities to know the timing of historic events (Bayliss 2015).
3. *More case studies and comparative frameworks*. New case studies of early regional center emergence and evolution, designed to integrate multiple scales (from houses to macroregions), are needed. Differing historical trajectories identified with new case studies can be integrated into comparative global frameworks. Comparative projects will allow researchers to discuss early regional centers as a general phenomenon, perhaps with some modal organizational attributes, without requiring that early regional centers all looked the same or were the result of homogeneous social processes.

Cross-References

- ▶ Aerial Archaeology
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Authority and Legitimacy in Political and Social Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Chaco Canyon, Archaeology of
- ▶ Dating Techniques in Archaeological Science
- ▶ Demographic Transitions
- ▶ Earle, Timothy

▶ Excavation Methods in Archaeology
▶ Flannery, Kent Vaughn
▶ Fortifications, Archaeology of
▶ Marcus, Joyce
▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
▶ North American Mound Builders: Hopewell, Natchez, Cahokia
▶ Processualism in Archaeological Theory
▶ Southwest United States and Northwestern Mexico: Geography and Culture
▶ Spatial Analysis in Field Archaeology
▶ Surface Survey: Method and Strategies
▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Arnold, J.E. 1996. *Emergent complexity: The evolution of intermediate societies*. Ann Arbor: International Monographs in Prehistory.

Bailey, G. 2007. Time perspectives, palimpsests and the archaeology of time. *Journal of Anthropological Archaeology* 26: 198–223.

Bandy, M.S. 2004. Fissioning, scalar stress, and social evolution in early village societies. *American Anthropologist* 106: 322–333.

Barrier, C.R. 2017. Town aggregation and abandonment during the era of urban transformations in the Cahokia region: Bayesian modeling of the Washausen mound-town. *Journal of Archaeological Science: Reports* 11: 523–535.

Barrier, C.R., and T.J. Horsley. 2014. Shifting communities: Demographic profiles of early village population growth and decline in the Central American Bottom. *American Antiquity* 79: 295–313.

Bayliss, A. 2015. Quality in Bayesian chronological models in archaeology. *World Archaeology* 47: 677–700.

Birch, J., ed. 2013. *From prehistoric villages to cities: Settlement aggregation and community transformation*. New York: Routledge.

Blitz, J.H. 2008. *Moundville*. Tuscaloosa: University of Alabama Press.

Brughmans, T. 2013. Thinking through networks: A review of formal network methods in archaeology. *Journal of Archaeological Method and Theory* 20: 623–662.

Chesson, M.S., and N. Goodale. 2014. Population aggregation, residential storage, and socioeconomic inequality at Early Bronze Age Numayra, Jordan. *Journal of Anthropological Archaeology* 35: 117–134.

Clark, J.E., and M. Blake. 1994. The power of prestige: Competitive generosity and the emergence of rank societies in lowland Mesoamerica. In *Factional competition and political development in the New World*, ed. E.M. Brumfiel and J.W. Fox, 17–30. Cambridge: Cambridge University Press.

Clark, J.E., J.L. Gibson, and J. Zeidler. 2010. First towns in the Americas: Searching for agriculture, population growth, and other enabling conditions. In *Becoming villagers: Comparing early village societies*, ed. M.-S. Bandy and J.R. Fox, 205–245. Tucson: University of Arizona Press.

Duffy, P.R. 2015. Site size hierarchy in middle-range societies. *Journal of Anthropological Archaeology* 37: 85–99.

Earle, T. 1997. *How chiefs come to power: The political economy in prehistory*. Stanford: Stanford University Press.

Fish, S.K., and J.F. Scarry. 1999. How great were the polities of the Southwest and Southeast? Areas of comparison and contrast. In *Great towns and regional polities in the prehistoric American Southwest and Southeast*, ed. J. Neitzel, 75–80. Albuquerque: University of New Mexico Press.

Flannery, K.V. 1976. Evolution of complex settlement systems. In *The early Mesoamerican village*, ed. K.-V. Flannery, 162–172. New York: Academic.

Flannery, K.V., and J. Marcus. 2000. Formative Mexican chiefdoms and the myth of the "Mother Culture". *Journal of Anthropological Archaeology* 19: 1–37.

Haas, J. 2001. Warfare and the evolution of culture. In *Archaeology at the millennium: A sourcebook*, ed. G.-M. Feinman and T.D. Price, 329–350. New York: Kluwer Academic/Plenum Publishers.

Kelly, J.K. 1990. Range site community patterns and the Mississippian emergence. In *The Mississippian emergence*, ed. B.D. Smith, 67–112. Washington, DC: Smithsonian Institution Press.

Kelly, J.E., and J.A. Brown. 2014. Cahokia: The processes and principles of the creation of an early Mississippian City. In *Making ancient cities: Space and place in early urban societies*, ed. A.T. Creekmore III and K.D. Fisher, 292–336. Cambridge: Cambridge University Press.

Knappett, C. 2013. *Network analysis in archaeology: New approaches to regional interaction*. Oxford: Oxford University Press.

Knight, V.J. 2010. *Mound excavations at Moundville: Architecture, elites, and social order*. Tuscaloosa: University of Alabama Press.

Kowalewski, S.A. 2013. The work of making community. In *From prehistoric villages to cities: Settlement aggregation and community transformation*, ed. J. Birch, 201–218. New York: Routledge.

Lesure, R.G., and M. Blake. 2002. Interpretive challenges in the study of early complexity: Economy, ritual, and architecture at Paso de la Amada, Mexico. *Journal of Anthropological Archaeology* 21: 1–24.

Marcus, J., and K.V. Flannery. 1996. *Zapotec civilization: How urban society evolved in Mexico's Oaxaca Valley*. London: Thames & Hudson.

Pauketat, T.R. 2009. *Cahokia: Ancient America's great city on the Mississippi*. New York: Viking.

Peterson, C.E., and R.D. Drennan. 2005. Communities, settlements, sites, and surveys: Regional-scale analysis of prehistoric human interaction. *American Antiquity* 70 (1): 5–30.

Plunket, P., and G. Uruñuela. 2002. Shrines, ancestors, and the volcanic landscape at Tetimpa, Puebla. In *Domestic ritual in ancient Mesoamerica*, Monograph 46, ed. P. Plunket, 31–42. Los Angeles: Cotsen Institute of Archaeology, University of California.

Prentiss, A.M., I. Kuijt, and J.C. Chatters. 2009. *Macroevolution in human prehistory: Evolutionary theory and processual archaeology*. New York: Springer Press.

Quinn, C.P., and H. Ciugudean. 2018. Settlement placement and socio-economic priorities: Dynamic landscapes in Bronze Age Transylvania. *Journal of Archaeological Science: Reports* 19: 936–948. https://doi.org/10.1016/j.jasrep.2017.05.046.

Yoffee, N., S.K. Fish, and G.R. Milner. 1999. Comunidades, ritualities, chiefdoms: Social evolution in the American Southwest and Southeast. In *Great towns and regional polities in the prehistoric American Southwest and Southeast*, ed. J.A. Neitzel, 261–271. Albuquerque: University of New Mexico Press.

Pauketat, T.R. 1994. *The ascent of chiefs: Cahokia and Mississippian politics in native North America*. Tuscaloosa: University of Alabama Press.

Powis, T.G., W.J. Hurst, M. del Carmen Rodriguez, M. Blake, D. Cheetham, M.D. Coe, and J.G. Hodson. 2008. The origins of cacao use in Mesoamerica. *Mexican* 30 (2): 35–38.

Stein, J.R., and S.H. Lekson. 1992. Anasazi ritual landscapes. In *Anasazi regional organization and the Chaco system*, Anthropological papers no. 5, ed. D.E. Doyel, 101–122. Albuquerque: Maxwell Museum of Anthropology.

Wilson, G.D. 2008. *The archaeology of everyday life at early Moundville*. Tuscaloosa: University of Alabama Press.

Yoffee, N. 1993. Too many chiefs? (or safe texts for the '90s). In *Archaeological theory: Who sets the agenda?* ed. N. Yoffee and A. Sherratt, 60–78. Cambridge: Cambridge University Press.

Further Reading

Anderson, D.G. 1994. *The Savannah River chiefdoms: Political change in the late prehistoric Southeast*. Tuscaloosa: University of Alabama Press.

Anderson, D.G. 1996. Fluctuations between simple and complex chiefdoms: Cycling in the late prehistoric Southeast. In *Political structure and change in the prehistoric southeastern United States*, ed. J.F. Scarry, 231–252. Gainesville: University Press of Florida.

Beck, R.A., Jr. 2003. Consolidation and hierarchy: Chiefdom variability in the Mississippian Southeast. *American Antiquity* 68: 641–661.

Birch, J. 2012. Coalescent communities: Settlement aggregation and social integration in Iroquoian Ontario. *American Antiquity* 77: 646–670.

Blitz, J.H. 1999. Mississippian chiefdoms and the fission-fusion process. *American Antiquity* 64: 577–592.

Blitz, J.H., and K.G. Lorenz. 2006. *The Chattahoochee chiefdoms*. Tuscaloosa: University of Alabama Press.

Carneiro, R.L. 1981. The chiefdom: Precursor to the state. In *The transition to statehood in the New World*, ed. G.-D. Jones and R.R. Kautz, 37–79. Cambridge: Cambridge University Press.

Connolly, R.P. 2006. An assessment of radiocarbon age results from the Poverty Point site. *Louisiana Archaeology* 27: 1–14.

Flannery, K.V., ed. 1976. *The early Mesoamerican village*. New York: Academic.

Flannery, K.V., and J. Marcus. 2003. The origin of war: New ^{14}c dates from ancient Mexico. *Proceedings of the National Academy of Sciences* 100: 11801–11805.

Hally, D.J. 1996. Platform-mound construction and the instability of Mississippian chiefdoms. In *Political structure and change in the prehistoric southeastern United States*, ed. J.F. Scarry, 92–127. Gainesville: University Press of Florida.

Neitzel, J., ed. 1999. *Great towns and ancient polities in the prehistoric American Southwest and Southeast*. Albuquerque: University of New Mexico Press.

Early State Formation in China

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Introduction

Until recently, the study of state formation in China has not concentrated on identifying political institutions, social classes, or military expansions common in other regions. As is the case for many other facets of Chinese archaeology, research on the earliest states is one deeply rooted within the traditional historical narratives of China's past. In fact, much of the debate on the earliest states in China still revolves around the identification of markers that denote the development of those cultural elements that can be identified as hallmarks of Chinese Civilization (Allan 2007; Liu 2009; Shelach and Jaffe 2014).

Mostly, the identification of the earliest states in China is one tied into connecting the historical past – a narrative compiled and canonized during the imperial periods and retold for thousands of years thereafter – with the prehistoric remains archaeology has unearthed. Thus, the question of state emergence in China is one traditionally entangled with the development of the earliest

historical dynasties: the Xia (ca. 2070–1600 BCE) Shang (ca. 1600–1046 BCE) and the Zhou (ca. 1046–221 BCE). The rulers of these dynasties are seen as both the founders of government institutions as well as paragons of righteous rule. Since these dynasties, as well as other earlier mythological figures, are believed to have inhabited the Yellow River Valley Plains, they have fostered a view in traditional scholarship where the development of Chinese civilization began in this general area as well. Later it would spread into subsequent regions of modern day China. Consequently, the earliest states and polities are purported to be found in this region as well. Indeed, much of the early archaeological efforts were concentrated here.

Earlier in the twentieth century, the very historicity of the traditional dynasties was questioned, but Li Ji' excavations in Anyang firmly established the Shang as a factual dynasty. Johan Gunnar Andersson's study of the early Yangshao culture (5000–3000 BCE) laid the foundations for the origins of Chinese civilization as he considered it to be the earliest agriculture society in China and as such also the inception point for what would later develop into Chinese civilization (Fiskesjö and Chen 2004).

The missing connection between the early Neolithic communities Andersson found and the later Shang was a problem for Chinese archaeologists, but the 1940s excavations at Chengziya in Shandong, dated to the third millennium BC Longshan culture (ca. 3000–1900 BCE), had finally made that link. The dig yielded a layer of black pottery that could be correlated to ceramic styles from Anyang found in a layer directly under the Shang materials (Liu and Chen 2012: 6–7). In the 1950s, the Erligang culture, under the modern day city of Zhengzhou, was discovered with material culture elements of both bronze and ceramics, which were, stylistically, clear precursors of the Anyang site (aka the Late Shang). Zhengzhou was quickly identified as the capital of the early Shang period. Following these discoveries, many Chinese scholars hoped archaeology would be able to reconstruct more of the traditional narrative recorded in known historical texts and present material evidence proving the existence of the Xia dynasty as well. Then, in the 1960s, excavations at the Erlitou village in Henan revealed a massive site, which predated both the Shang remains of Yinxu and Zhengzhou. It was seen by many as the capital of the Xia dynasty.

Current Debates: Erlitou

Erlitou is a large Bronze Age site located in the Yilou basin of the Yellow River, about 10 km southwest of Yanshi City in Henan Province. The earliest occupation phases at Erlitou date to the Neolithic Yangshao and Longshan periods followed by a 600 year occupational gap. The large Erlitou settlement was established at ~1900 BC and underwent four major settlement phases until 1600 BC when it was finally abandoned. The phase I settlement has been estimated at 100 ha. While the remains of this period have been severely disturbed, a number of prestige items have been unearthed and include ivory and torques artifacts, white pottery, and several bronze tools reflecting an elite element at the site (Liu and Xu 2007: 888). During Erlitou phase II and later in phase III, the site was expanded to its largest extent of 300 ha and its population estimates range from 18,000 to 30,000 inhabitants (Liu and Chen 2012: 270). At the center of the site an architectural complex comprised of 30 structures and platforms has been excavated. Of note are a large compound built in phase II (0.75 ha) and two more built during phase III. Due to their size and design, these structures are identified as important palatial/temple complexes. Elite burials of these phases are associated with most of the same phase I prestige items and bronze vessels. One of the high-ranking burials contained a dragon-shaped artifact, which was made of ~2000 pieces of turquoise and jade (Liu 2009: 226). A group of bronze workshops has been found as well as workshops of pottery, bone, and turquoise.

Even though the very historicity of the Xia dynasty is still a matter of much debate, where scholars outside China see very little evidence to connect the Erlitou site finds to the Xia dynasty (see in Liu and Xu 2007), Chinese archaeology has, nevertheless, generally viewed the Erlitou

site as the manifestation of the earliest state in China. Xia Nai (1910–1985), one of China's first Western trained archaeologists, defined the state as characterized by class differentiation, urban political and economic centers, and the existence of metallurgy and writing. Xia argued that only Erlitou satisfied these criteria (see in Liu 2009: 220–221).

The most detailed argument for the Erlitou site being China's earliest state is presented by Liu Li and Chen Xingcan (2012) who employ Neo-evolutionary models in their research. Their arguments, representing a large part of the current scholarship on early state formation in China, can be summarized as follows: (1) Erlitou is a large site of 300 ha, one of the largest early Bronze Age sites known. (2) Elite bronze ritual vessels were constructed for the first time reflecting state-level symbolic and ideological info-structures. (Bronze vessels would become the containers of authority during the Zhou dynasty and credited their holders with office and political power.) (3) Erlitou was an expansionary state and military controlled strategic locales were set up to extract resources needed to fuel their polity. (4) Erlitou presided over a four-tiered settlement hierarchy of similar material culture sites. (5) The existence of a high elite stratum is reflected by palaces, prestigious items, and burials.

Critique

Not everyone is convinced by the arguments presented above, and critiques revolve around questioning the identification of certain elements as reflecting state-like societies, as well as whether these are in fact their earliest examples in the archaeological record. It is unclear, for example, if the large complexes identified as palaces served as elite residences or administration compounds. In fact, very little can be said about the function of these compounds, as few artifacts have been found in them. While these structures are certainly impressive in regards to both size and planning, they might have served as public buildings or temples and, thus, should not be unquestionably identified as seats of government (Thorp 1991: 14–16). In fact, evidence for elites at the site comes from the excavated cemetery. Yet unlike other prehistoric settlements, Erlitou did not have a separate area of burial and the many unearthed graves (168 in total) were found scattered among its ruins. Most all graves are small or medium in size (1 × 2 m), the majority of which contained no grave goods. Several of the richer graves that were found intact contained artifacts of jade and other hard stones. Some were found with bronzes and others with the remains of wooden caskets (Thorp 2006: 32–33).

Bronze artifacts and ritual vessels are indeed a splendid achievement of periods II–III at Erlitou and evidence for the actual practice of metallurgy is unknown from earlier periods in this region (however, a number of small metal object have been found in Northwestern China dating to earlier periods). Of all the workshops at Erlitou only the bronze workshops were found next to the speculative palatal compound, taken to indicate again the importance of bronze artifacts for the elites at Erlitou and their significance to their power base and status (Liu 2009: 226).

In fact, Allan (2007) views the production of bronze vessels at Erlitou as artifacts crucial for the creation of a cultural hegemony, which empowered elites who controlled and used them. Yet it is only during the subsequent Erligang period (ca. 1600–1350 BCE) when bronze vessels are distributed in vast quantities in far flung regions, that this claim can be forcefully made. The quality and amount of bronze vessels found at Erlitou (17 small drinking cups) is smaller and inferior to the Erligang period sites that number in the thousands. Certainly, for the creation of such a small number of bronze vessels, the Erlitou rulers hardly needed to obtain, let alone control or dominate, the production or trade of copper ore (Shelach and Jaffe 2014: 355–356). Thus, the reconstructions of an Erlitou state ruling a large territory, exacting tribute from its hinterland, and controlling vast lands, resources, and peoples seem to be tangential at best.

In contrast, production at Erligang was centered at Zhengzhou, a large 1500 ha. walled site with bronze foundries found along with a great amount of bronze slag and raw material. Erligang

period vessels are homogenous in shape and character and point to a single site of production. The fact that such a large quantity of bronze vessels was found outside of Zhengzhou symbolizes the spread of the political influence and, more importantly, the spread of a political ideology via a standardized artifact type (Bagley 1999: 156–157).

Longshan Incipient States and Cities

For those following strict neo-evolutionary models for the study of the development of the state and its identification in the archaeological record (themselves not without their problems, see Yoffee 2005), Erlitou does in fact seem to fit the bill, at least partially. Yet other scholars (e.g., Shelach and Jaffe 2014; Campbell 2014) have noted that earlier period sites, notably those of the Longshan period, display the same characteristics that are used to identify Erlitou as a state, the foremost example being Taosi in Shanxi province.

The site of Taosi is the largest Neolithic site found to date in China. Wide pounded earth walls enclosed an area of more than 300 ha (He 2013). At earlier Neolithic sites, stratification is only tentatively derived from the existence of large monuments, but at Taosi a marked separation between elite and commoner is found. During the early phase of the site, its extent was 56 ha, and a palatial section, elite residential area, and cemetery were all separated by internal walls restricting access to them. In its later phases the site grew to a maximum extent of 300 ha. During this period the site was entirely walled and a second elite cemetery was established and separated by an additional wall (He 2013: 261–263).

More than 600 graves were found from the early period and over 80% contained no burial artifacts. Only 1% of the graves can be defined as rich and were found furnished with almost 200 artifacts each, including items such as crocodile skin drums, jade pendants, and copper bells. During the later period the second elite cemetery grew in size, and grave goods of jade, lacquer, and painted pottery vessels were more commonly added to the burial assemblages (He 2013: 266–267). Sophisticated ceramic workshops with attached cooling wells were found along with a number of copper artifacts. Not far, a number of stone workshops were found as well. Recent excavations have suggested that several of the rammed earth platforms were possibly used for ritual sacrifices connected with important dates. Owing to the design and placement of a semicircular foundation of a raised platform and the markings found on it, it is possible that the elite at Taosi were engaged in the practice of solar observations (Pankeiner 2009: 144–145).

Note that the Longshan landscape was dotted with many sophisticated walled settlements, Taosi being one of the largest and best documented of them. Like Taosi, many of these sites displayed complex social organization, class stratification, a proto-urban landscape, specialized craft production, and perhaps even evidence of record keeping and writing. Prestigious items moved at an extraordinary scale both in quantity and distance, reflecting the existence of a complex trade network as well. Elite burials found at Taosi, for example, contained Dawenkou pottery from the east, Liangzhu ritual stone and jade artifacts from the southeast, Qujialing pottery from the south, as well as unique ceramics from the west (Shao 2000: 203).

Future Directions

The archaeological study of ancient states is, to be sure, a debate between minimalists and maximalists. That is to say, it is a discussion that revolves around whether the kernels of social differentiation, economic growth, and technological developments constitute the evidence of the earliest states or rather only their more mature manifestations and developments. In other words, do the Longshan sites of the third millennium BCE suffice our definitions for the earliest states or should we 'postpone their arrival' to the later second millennium?

As noted above, other than minor technological advances, namely bronze production on a small scale, little change can be actually documented at the Erlitou site in comparison to the previous Longshan period. In fact, Erligang period Zhengzhou represents a far larger leap

from previous periods, given its unprecedented size, production scale, and technological advancements (Bagley 1999; Campbell 2014; Shelach and Jaffe 2014). Hence, the continued insistence on Erlitou being the earliest state in China must be seen to reflect a view still rooted in the desire to recognize the Xia dynasty as a seminal stage in the development of Chinese civilization and culture.

More recently, sites from regions beyond the traditional zones of the development of Chinese civilization have begun to shed new light on the formation of states and complex political entities (Xu 2014). The site of Shimao, rediscovered in 2012 in northern Shaanxi province, has revealed massive stone structures and walls encompassing an area of 400 ha (Sun et al. 2017). Impressive guard towers, jade blades, and large public structures represent just some of the extraordinary finds at Shimao. While only a portion of the site has been excavated, if the dates are correct (ca. 2350–1800 BCE), they would make Shimao the largest site in China until Erligang.

The temptation to rush and identify Shimao as China's earliest state has proven too great, and recent publications have, predictably, suggested that Shimao now be seen as China's first state (see in Jaang et al. 2018). While most of these arguments rest on the same neo-evolutionary criteria (namely Shimao's vast size), it is its location, far to the north of the Central Plains, rather than the limitations of these models, that has made the identification of Shimao as China's earliest state difficult for many to accept.

Instead of signaling out a specific site or point in time and debating over the merits of identifying it as China's earliest state – itself an exercise in subjective categorization – what is needed is a study of long-term trajectories of socio-cultural developments, and how they bring about political, social, and cultural change (e.g., Campbell 2014; Shelach and Jaffe 2014; Shelach-Lavi 2015; Liu and Chen 2012; Flad and Chen 2013). Consequently, the unique role social institutions, kinship relations, bureaucracy, government, ritual, and religion have played in the development of complex polities should continue to be a central aspect of scholarship in the study of the development of early states in China (e.g., Chang 1983; Li 2008).

References

Allan, Sarah. 2007. Erlitou and the formation of Chinese civilization: Toward a new paradigm. *Journal of Asian Studies* 66: 461–497.

Bagley, Robert. 1999. Shang archaeology. In *The Cambridge history of ancient China*, ed. Michal Loewe and Edward L. Shaughnessy, 124–231. Cambridge, UK: Cambridge University Press.

Campbell, Roderick B. 2014. *Archaeology of the Chinese Bronze Age: From Erlitou to Anyang*. Los Angeles: Cotsen Institute of Archaeology Press.

Chang, Kwang-Chih. 1983. *Art, myth, and ritual: The path to political authority in ancient China*. Cambridge, MA: Harvard University Press.

Fiskesjö, Magnus, and Xingcan Chen. 2004. *China before China: Johan Gunnar Andersson, Ding Wenjiang, and the discovery of China's prehistory*. Stockholm: Museum of Far Eastern Antiquities.

Flad, Rowan K., and Pochan Chen. 2013. *Ancient Central China: Centers and peripheries along the Yangzi River*. Cambridge, UK: Cambridge University Press.

He, Nu. 2013. The Longshan period site of Taosi in southern Shanxi province. In *A companion to Chinese archaeology*, ed. Anne P. Underhill, 255–277. Malden: Wiley-Blackwell.

Jaang, Li, Zhouyong Sun, Jing Shao, and Min Li. 2018. When peripheries were centres: A preliminary study of the Shimao-centred polity in the Loess Highland, China. *Antiquity* 92: 1008–1022.

Li, Feng. 2008. *Bureaucracy and the state in early China: Governing the Western Zhou*. Cambridge, UK: Cambridge University Press.

Liu, Li. 2009. State emergence in early China. *Annual Review of Anthropology* 38: 217–232.

Liu, Li, and Xingcan Chen. 2012. *The archaeology of China: From the Late Paleolithic to the Early Bronze Age*. Cambridge, UK: Cambridge University Press.

Liu, Li, and Hong Xu. 2007. Rethinking Erlitou: Legend, history and Chinese archaeology. *Antiquity* 81 (314): 886–901.

Pankeiner, David W. 2009. The Xiangfen, Taosi site: A Chinese Neolithic observatory? In *Archaeologia Baltica: Astronomy and cosmology in folk traditions and cultural heritage*, ed. J. Vaisˇkunas, 141–148. Klaipeda: University of Klaipeda Press.

Shao, Wangping. 2000. The Longshan period and incipient Chinese civilization. *Journal of East Asian Archaeology* 2 (1): 195–226.

Shelach, Gideon, and Yitzchak Y. Jaffe. 2014. The earliest states in China: A long-term trajectory approach. *Journal of Archaeological Research* 22 (4): 327–364.

Shelach-Lavi, Gideon. 2015. *The archaeology of early China: From prehistory to the Han dynasty*. Cambridge, UK: Cambridge University Press.

Sun, Zhouyong, Jing Shao, Li Liu, Jianxin Cui, Michael F. Bonomo, Qinghua Guo, Xiaohong Wu, and Jiajing Wang. 2017. The first Neolithic urban center on China's north Loess Plateau: The rise and fall of Shimao. *Archaeological Research in Asia* 14: 33–45.

E

Thorp, Robert L. 1991. Erlitou and the search for the Xia. *Early China* 16: 1–38.
Thorp, Robert L. 2006. *China in the early Bronze Age: Shang civilization*. Philadelphia: University of Pennsylvania Press.
Xu, Hong. 2014. *China 2000 BC [in Chinese]*. Beijing: SDX Joint Publishing Company.
Yoffee, Norman. 2005. *Myths of the archaic state*. Cambridge: Cambridge University Press.

Earthen Architecture in Archaeological Conservation and Preservation

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Introduction

Earth has been used as a building material for at least the last twelve millennia with the earliest evidence for earth as a building material coming from sites within Western Asia. Later, structures were built using both hand-shaped mud blocks and rammed earth, for example, at Çatalhöyük (Turkey) and Carchemish (Turkey). However, earthen architecture is not restricted to hot, desert climates, and archaeologically and historically, it is distributed throughout the world. From the characteristic "tell," sites comprised of the multiple and varied stratigraphies of abandoned and rebuilt earth structures, through to vernacular, secular, religious, and monumental buildings in urban and rural settings, and earthworks in temperate climates. As such the distribution and variety of earthen architecture and construction spans both continents and millennia with evidence within archaeological contexts and extant structures, alongside still-used earth structures throughout the world.

Definition

The term *earthen architecture* is loosely used to refer to a broad range of structures found in archaeological contexts including earthworks (Fig. 1) and those structures comprised of earth (subsoil) dug from the ground and shaped by the hand or machine and used in a number of different ways – most commonly mudbricks (adobe) (Fig. 2), rammed earth (pise), placed earth (cob), alongside earthen mortars, plasters, and the use of earth within timber-frame structures.

Key Issues/Current Debates/Future Directions/Examples

The identification and excavation of earthen architecture is complex with much anecdotal evidence of archaeologists "missing" earth structures as the material of construction is so very similar to surrounding nonstructural archaeological strata. The failure to identify earth structures during their excavation alongside the poor interpretation of archaeological evidence has a net result that the scale and complexity of excavated earth structures has probably been hopelessly underrepresented.

The identification of earth structures in archaeological contexts has improved with better knowledge of earth as a building material, alongside the application of allied disciplines of remote sensing (aerial photography and geophysical surveying) and ground-based observations (Fig. 3). Moreover, the growing awareness of earth structures in living contexts throughout the world has increased knowledge and understanding of earth as a building material across different disciplines, with archaeologists working alongside anthropologists and engineers (among many others) to better understand performance and significance of earthen architecture.

The longevity of earth structures is dependent on their maintenance through the annual reapplication of protective earth plasters – this occurs most famously at the iconic Great Mosque in Djenne, Mali, where an annual festival involves teams of local masons competing to complete the replastering of the exterior of the mosque. More commonplace everyday maintenance alongside annual repair of earth structures comprises reapplication of surface plasters and recompacting of floors and roofs.

When earth buildings fall out of use, they are no longer subject to maintenance and can rapidly fall into disrepair and subsequently erode, initiating the formation and deformation processes creating the archaeological record. Today, there are many

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 1 Earth-built field monument (Silbury Hill, Avebury, UK). (Photo: D. Powlesland)

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 2 Mudbricks (adobe) (Nisa, Turkmenistan). (Photo: L. Cooke)

social-economic, cultural, and legal reasons for the abandonment of traditional practices of earthen architecture, often in favor of those perceived to embody development and modernity and fit within an industrialized and commercial building industry. The loss of the intangible heritage (rituals, traditions, and local knowledge and practice) of building with earth is one of the greatest challenges for earthen architecture in conservation and preservation. This is particularly as local knowledge, such as sourcing of local soils, is vital for conservation and maintenance in both historical and archaeological contexts.

The material properties of earth-building materials mean that once they are abandoned or exposed through archaeological excavation, the greatest threat is their erosion as a result of exposure to the damaging effects of weather. Damage as a result of falling water, rising water, and (among many others) freeze-thaw results in the characteristic erosion patterns found on most archaeological examples of earthen architecture. The combined effect of moisture on earthen architecture is erosion to the surface, base, and walls. Rising water, alongside salt crystallization, results in erosion to wall bases, and surface erosion at wall tops results in the

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 3 Earth walls exposed through differential drying (Hili 17, Al Ain, UAE). (Photo: D. Powlesland)

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 4 Earth-built monument with characteristic erosion at the wall base (Great Kyz Kala, Merv, Turkmenistan). (Photo: L. Cooke)

characteristic "upside-down carrot" appearance of upstanding walls (Figs. 4 and 5).

Erosion is also caused by vegetation; animal, insects and birds; and human-induced loss such as agricultural damage, theft, inappropriate development, and a failure to valorize (and thus protect) local vernacular heritage. Given contemporary geopolitical tensions, earth structures have also been damaged as a result of human conflict in Mali, Iraq, and Syria.

Debate is still ongoing as to the best means of conserving, presenting, and managing earth structures. Given the material qualities of earthen architecture, the essential conservation in situ can be complex, and a number of approaches for protection from the damaging effects of weather have been used.

In those contexts where conservation "as found" is preferred (and "seeing" original archaeological and historical earth structures is stressed), numerous materials for consolidation have been used. In other cases, the use of shelter structures to protect exposed earthen architecture from the damaging effects of weather (primarily falling water and wind damage) is preferred (Fig. 6). In other cases, original archaeological and historical

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 5 Characteristic appearance of excavated and exposed earthen architecture (Hili 14, Al Ain, UAE). (Photo: D. Powlesland)

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 6 Earthen architecture conserved through shelter structures (El Brujo, Peru). (Photo: L. Cooke)

earth structures can be backfilled using appropriate separation layers to ensure the protection of the original fabric in situ (Fig. 7). Other approaches to conservation of earthen architecture can include reconstruction and restoration. As such, the approaches adopted for the conservation of earthen architecture can pose significant practical, ethical, and philosophical challenges.

Many of the approaches to the conservation of earth structures have been developed since the 1960s, initiated by projects in the Middle East under the auspices of ICCROM and the universities of Turin and Pennsylvania (among many others). These approaches are largely consolidated within the proceedings of the series of conferences organized by ICOMOS and now known as ISCEAH (International Scientific Committee on Earthen Architectural Heritage). The most recent in the series of conferences, Terra 2016, the 12th International Conference on the Study and Conservation of Earthen Architectural Heritage, was held in Lyon, France. There are numerous individuals and

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 7 Conservation backfilling of excavated earth structure (Merv, Turkmenistan). (Photo: L. Cooke)

institutions involved in research into the various different aspects of earthen architecture around the world.

Since the 1970s, significant emphasis has been placed on better understanding of the seismic performance of earth structures, with lessons learned from structural engineering for new buildings with earth transferred to historical buildings and earthen architecture in archaeological contexts, alongside understanding of empirical ancient systems and techniques. The development of better knowledge and practices appropriate for earthen architecture for retrofitting in advance of, and repair in response to, seismic events has been prompted by the damage to earth structures following earthquakes in Bam (Iran) and in Peru, Turkey, China (Sichuan), and the USA.

Currently, there is a growing awareness of the needs to better understand and respond to the complex effects of climate and ongoing changes as a result of climate change. For example, more frequent extreme weather events such as flooding or extreme diurnal and annual temperature and humidity fluctuations will have a significant negative impact on the survival of earthen architecture.

The interplay between heritage and sustainability is well demonstrated by current research into earthen architecture. Significant research is being undertaken to understand and promote the use of earth as a low-carbon (and environmentally friendly and responsive) building material. This is important as raising awareness and increasing the profile and status of earth as a building material is widely acknowledged as the best way in which earthen architecture can be retained in different contexts around the world. As such, the research undertaken in new build contexts is important in influencing the retention of both tangible and intangible heritage of earthen architecture around the world.

The conservation and preservation of earthen architecture have proved itself to be immensely complex. There is evidence of repair and maintenance from archaeological contexts from the early uses of earth structures. Today, the ongoing development of multidisciplinary approaches to the material will significantly aid our understanding and response to complexities faced throughout the twenty-first century.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Bam: Archaeological and Social Investigations after the Earthquake
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century

▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
▶ Near East (Including Anatolia): Origins and Development of Agriculture

Further Readings

Cooke, L. 2010. *Conservation approaches to earthen architecture in archaeological contexts*, British archaeological reports international series. Vol. 2116. Oxford: Archaeopress.

ICOMOS International Committee on Earthen Architecture Heritage (ISCEAH). n.d Available at: http://isceah.icomos.org/

Ranier, L., A. Bass Rivera & D. Gandreau. 2008. *Terra 2008.10th International Conference on the Study and Conservation of Earthen Architecture,* 1st–5th Feb 2008. Bamako, Mali. Los Angeles: Getty Conservation Institute.

The Earthen Mounds (*Cerritos*) of Southern Brazil and Uruguay

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State of Knowledge and Current Debates

On the southernmost lowlands of South America, there are earthen mounds studied since the nineteenth century and known as "*aterros*" or "*tesos*" (in Portuguese) and "*cerritos de indios*" (in Spanish). These sites, comprised predominantly by earth, are articulated to other built structures as microreliefs (mounds with less than 30 cm in height), elongated platforms, borrow pits, tracks, pathways, and artificial lakes that compose archaeological complexes situated in flooded environments in the Pampa biome, among Uruguay, Argentina, and southern Brazil. The Pampa biome is located in the lowlands of South America among the Atlantic coast on the East, the Atlantic Forest biome on the North, the Grasslands of Argentina on the West and South. This bioma is part of the provinces of the Paraná-Paraguay basin with approximately 750,000 km^2, within the South Temperate Zone, and has both subtropical and temperate climates with four well-characterized seasons. Grasslands, with sparse shrub and tree formations, are the dominant vegetation. The average temperature in the biome is 18° and the climate is warm and humid (Roesch et al. 2009). The archaeological studies have surveyed more than 1500 earthen mounds in a wide polygon encompassing the low Paraná and low Uruguay rivers, plus Jacuí, Vacacaí and Ibicuí river valleys, the middle Negro river, and the basin of Patos and Mirim lagoons (see Figs. 1 and 2) (Bracco et al. 2005; Bonomo et al. 2011; López Mazz 2001, 2010; Cabrera 2013).

The *cerritos* are earthen mounds comprised by anthropic soils with polished and knapped lithic instruments, faunal and botanical remains, ceramic shards, and sometimes human remains. These archaeological structures dated between 4700 and 200 years BP and are found both isolated or in clusters – up to a hundred in number – upon the landscape. Their spatial distribution, although it occurs in environments of different altitudes along flat and undulating terrain of the lowlands, is always linked to edaphic units as flooded and swampy environments regionally known as "*banhados*" and "*charcos*" (Bracco et al. 2000, 2008; Gianotti 2000; López Mazz and Bracco 2010; Bonomo et al. 2011) (see Figs. 3 and 4).

Definition

The category of *cerritos* includes a wide variety of sizes and architectural structures that require more studies to be precisely defined. However, in general terms *cerritos* has been defined as

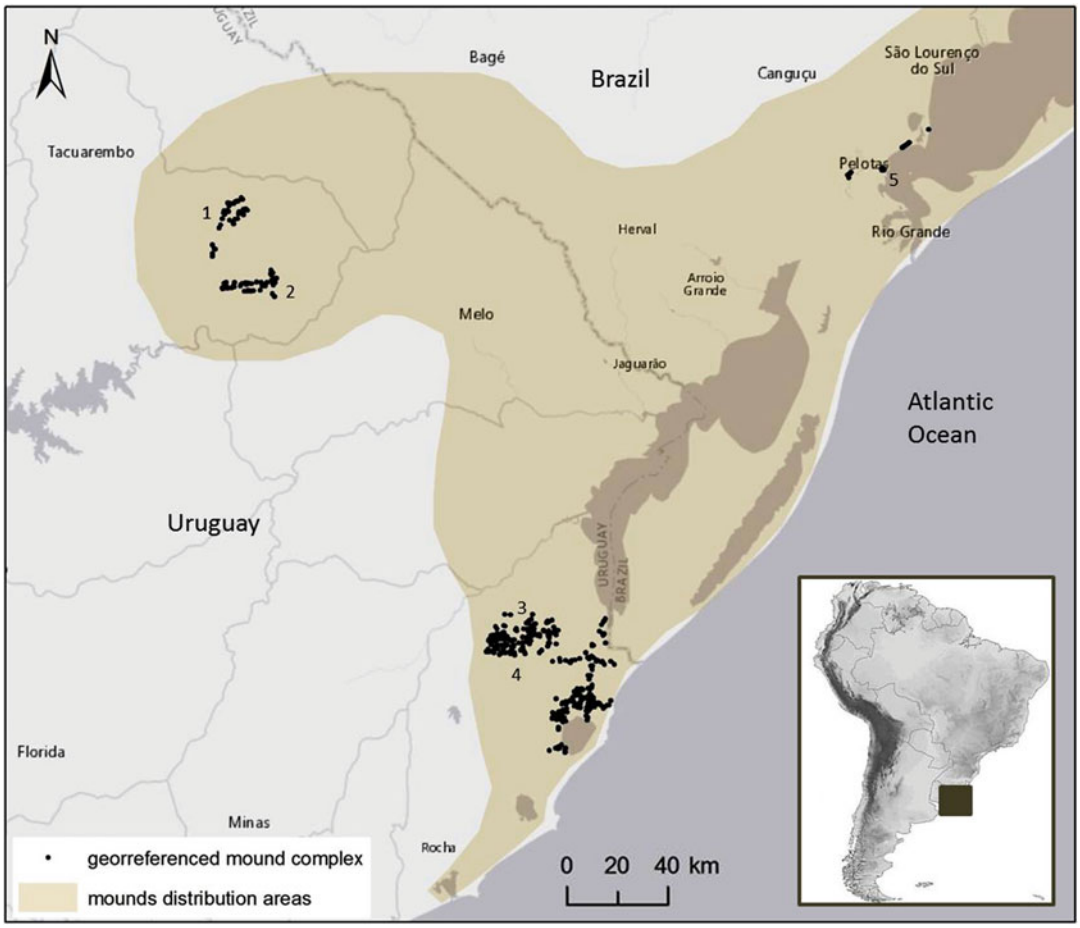

The Earthen Mounds (*Cerritos*) of Southern Brazil and Uruguay, Fig. 1 Map of cerritos in southern lowlands of Brazil and Uruguay, pointing out the mentioned areas in the text: (1) Yaguari valley, (2) Caraguata Valley, (3) India Muerta wetlands, (4) Los Ajos site, and (5) Pavão 01 site in the basin of the Patos lagoon as well as the Pampa biome in South America

archaeological structures built with mostly earth, but containing also other materials, located in wetland environments in the Pampa biome. They are comprised by anthropogenic organic sediments deposited in planes whose diameter oscillates between 30 and 60 m. Their height varies from just a few centimeters to more than 7 m and their chronology reaches as far as the mid-Holocene (Bracco et al. 2000, 2005; Iriarte 2006; López Mazz 2001).

In the northeast of Uruguay, at the valleys of *Yaguarí* and *Caraguatá* streams, there are sites with elliptical or elongated dimensions that vary between 70–150 m along the major axis and 25–40 m in the minor axis (Gianotti 2004, 2005; Gianotti and Bonomo 2013). Inside regional clusters, architectonical diversity appears in the same space forming a very heterogeneous complex of sites. There are even cases of earthen structures in a "ring" format, and even in a "boomerang" shape, suggesting the association between two different mounds after an earth moving, as in the case of *Los Ajos* and *Pago Lindo* (both in the lowland of Uruguay) (Fig. 5) and the Pavão 01 (in the basin of Patos lagoon, Brazil) (Fig. 6) (Gianotti and Bonomo 2013; Iriarte 2006; Bracco et al. 2008; Milheira et al. 2017).

The mounds are distributed along clusters containing several of them around the streams and the wetlands, or occurring isolated on the top of the hills. Larger clusters can contain as many as a hundred *cerritos* within it, while the

The Earthen Mounds (*Cerritos*) of Southern Brazil and Uruguay, Fig. 2 Round mound (cerrito) in the India Muerta wetlands, Uruguay

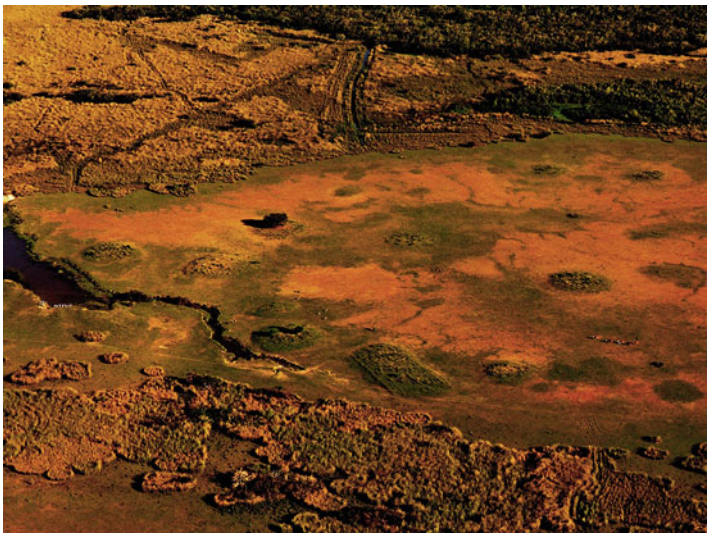

The Earthen Mounds (*Cerritos*) of Southern Brazil and Uruguay, Fig. 3 Aerial partial view of a Lussich mound complex located in Yaguari valley, Uruguay

smaller ones have only two to three mounds cerritos (Bracco et al. 2000; Gianotti 2005; López Mazz and Pintos 2000).

The oldest *cerritos* are situated in the Uruguayan territory, at the wetland of *India Muerta* wetland and along the tributaries of the *San Luis* river, which led to the proposition that this cultural phenomenon would have started in this region and then expanded to other lagoon and coastal regions (Bracco et al. 2005; Gianotti 2015). That expansion would coincide with the stabilization of the sea level around 2500 years BP, which gave the actual shape to the lowlands, allowing the formation of new continental areas available for human settlement (del Puerto 2015; Bracco et al. 2000, 2005). Also, the highest *cerritos* can be found in the region of *India Muerta*, such as *La Viuda* and *Isla de Alberto*, measuring 7.20 and 6.40 m, respectively (Fig. 7).

Key Issues and Current Debates

Since the nineteenth century, the lowland prehispanic architecture of southern Atlantic has caught the attention of many researchers. The *Cerritos* was firstly interpreted as burial mounds in comparison with Mississipian mounds (Arechavaleta 1892; Figueira 1892). Years later, Ferrés (1927) argued that the *cerritos* were,

indeed, domestic spaces resulted from adaptive ways of living in flooded environments. That theory would be reaffirmed in the 1970s with the first and widely spread theoretical model that consider the *cerritos* as settlement areas occupied systematically by indigenous people in a high mobility social system. According to Schmitz (1976), the *cerritos* of Patos lagoon were fishing campsites focused on lagoon exploitation occupied mainly in springer and summer.

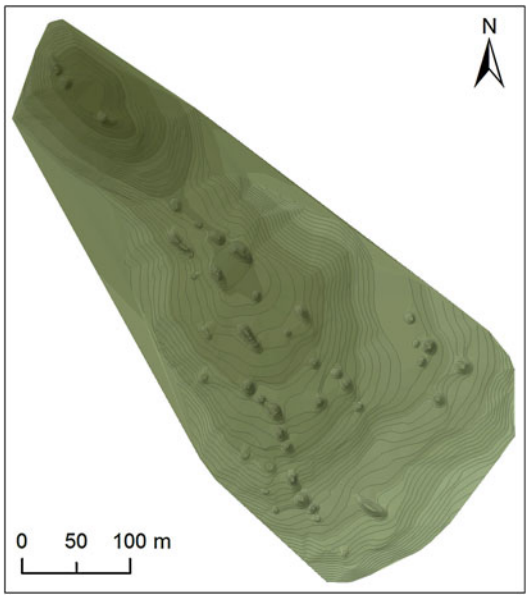

The Earthen Mounds (*Cerritos*) of Southern Brazil and Uruguay, Fig. 4 Digital Terrain Model (MDE) of Lemos mound complex in Yaguari valley, Uruguay

The material culture of these mounds would corroborate such an interpretation. In the case of ceramic technology, the evidence shows preeminence of simple shape ceramic vessels inferred as "utilitarian ceramic" that served to prepare fish – the base of the diet of those indigenous people. The pottery would have been used in an speed up way without the necessity of technological and/or aesthetical improvements of the vessels, characterized through reduced firing, thin walls, high frequency of sandy temper, and vessels of small and medium size of simple shape that would define the "Vieira tradition" (Schmitz 1976). The lithics were mainly made with bipolar techniques using local raw materials as different varieties of quartz. It was also interpreted by the same functionalist view, which the technological simplicity would corroborate the inference of a pattern of expedite use linked to the manipulation of gathered plant resources, fishing, and hunting practices (Schmitz 1976).

The systematical reoccupation of the same places where were built the *tolderias* (huts made

The Earthen Mounds (*Cerritos*) of Southern Brazil and Uruguay, Fig. 5 Ring-shaped mound in Paso de los Ladrones complex mound located in the Caraguatá valley, Uruguay

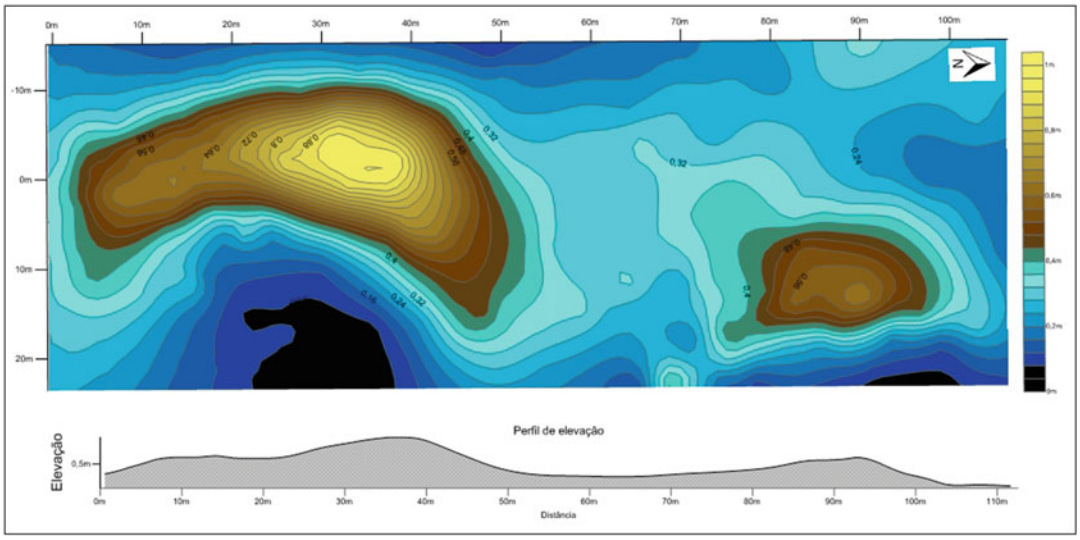

The Earthen Mounds (*Cerritos*) of Southern Brazil and Uruguay, Fig. 6 Topography of site Pavão 01 with "boomerang" shape associated mound, located in the basin of Patos lagoon, Brazil

The Earthen Mounds (*Cerritos*) of Southern Brazil and Uruguay, Fig. 7 *Cerritos* in Talitas mound complex located in the wetlands of India Muerta, Uruguay

with a straw roof and wooden posts) should generate an accumulation of sediments as well as disposed materials. In this way, the height and volume of *cerritos* would be related to the number of reoccupation and, consequently, to its age. In short, *cerritos* were inferred as archaeological remains raised passively by "hunter-gatherers bands," resulted from "seasonal occupations." Such groups would belong to "marginal tribes," owners of a "simple technology," very "dependent on the environmental resources" and with a "highly mobility system" (Schmitz 1976).

However, this functional paradigm started to change after the 1980s, when a new interpretive model based on an ecological-adaptive perspective allowed to see the mound builders societies as groups of complex hunter-gatherers of high efficiency. These groups usually lived in a high productive environment with an economic organization based on the seasonal optimization

of different environments engaged in a cycle of year round mobility (López Mazz and Bracco 1994). In this context, the *cerritos* were mainly interpreted as burial sites, whereas the presence of *cerritos* in the sierra could not be explained by the same logic of those situated in the flooded plains. Just after years of research, evidencing archaeological remains as postholes, house floors, reassembly of ceramics, and so on became possible to recognize that the *cerritos* were, indeed, built for multiple functions as living spaces used continuously and, occasionally, also used as cemeteries (Gianotti 2005; Iriarte 2006; López Mazz and Bracco 2010).

In this way, the *cerritos* would not have been the result of seasonal and occasional occupations raised passively as consequence of a wide system of mobility. Actually, these mounds would have been built as planned earthen structures resulted from funerary activities (López Mazz 2001, López Mazz and Bracco 2010), domestic areas (Bracco et al. 2008; Gianotti 2005; Iriarte 2006), and multifunctional spaces, used systematically to live, to bury, and to crop (Villagran and Gianotti 2013).

According to López Mazz and Bracco (2010), during almost 5000 years of history, the mound builders have experimented profound changes in social and economic aspects that coincide with the wide range of domesticated and transformed spaces. Their population would have grown in demography; the settlements would have multiple in quantity and function (seasonal, circumstantial, semi-permanent) and would have display a larger internal complexity (as domestic spaces, ceremonial platforms, and planting and disposal areas). In general, these changes and the consequential territorial adjustments can be observed on a large scale over 2500 years BP, as well as the creation of new settlements in different regions, what suggests a process of colonization of other areas (Bracco et al. 2000, 2005; López Mazz 2001).

The management and use of native and domesticated vegetal resources as maize (*Zea mays*), squash (*Cucurbita* sp.), beans (*Phaseolus* sp.), tubers (*Canna* sp. and *Calathea* sp.), and palm nuts (*Butia odorata* and *Siagrus romanzoffiana*) – especially after 2500 years BP, but more intensively after 1600 years BP – would have allowed new economic practices (Iriarte 2006; del Puerto 2015; del Puerto and Campos 1999; del Puerto and Inda 2008). It also allowed the occupation of new settlements, the emergence of new productive spaces in the territory (Gianotti et al. 2013), and the origin of new forms of social and political organization (the *chieffdoms*) (López Mazz and Bracco 2010). Also, between 1000 and 800 years BP, the evidence of built areas for farming in specific mounds dedicated to maize cultivation (Gianotti et al. 2013).

The first mound builders groups explored a wide range of animal and vegetable resources through hunting, fishing, and gathering. From 2500 years BP, there are traces of animal specialization in hunting – cervids and a small rodent as the *Cavia aperea* – coincident with some incipient experiences of domestication and farming (Moreno 2014). Changes in economic strategies and in the resources management, according to Moreno (2014), would have been connected with transformation in territorial property and general resources management. Pottery technology was another important improvement originated around 3000 years BP that reflected new ways of processing, cooking, consuming, and stocking the food. The lithic technological system reinforces the progressive loosing of regional mobility, characterizing an expedite technological production based on local raw material (Gascue et al. 2009; López Mazz 2001; Iriarte and Marozzi 2009).

Along the last period, there was a process of territorial contestation materialized in distinct forms of social appropriation of the territory, based in the ascendency and ancestrally. Since 1600 years BP the *cerritos* become ceremonials. The funeral burial practices of different human individuals inside the same mound become generalized (Bracco et al. 2000, 2005), involving, eventually, the presence of domestic dog (*Cannis lupus familiaris*) (Moreno 2014) within the burials. These funeral practices coincide with a variation in the standards, including, at least, three patterns of inhumation: primarily burial, secondary burial (in packs), and burial of isolated skeletal parts, such as cranium, fingers, legs, and ribs

(Pintos and Bracco 1999; Femenías et al. 1990; Gianotti and López Mazz 2009). These isolated human bones buried appear sporadically, associated and mixed to the sediments of constructive material that comprises the mound and are common that they have cut marks or even burning traces on them (Gianotti and López Mazz 2009; Figueiro 2004; Moreno 2006; Moreno et al. 2014; Pintos and Bracco 1999). These findings illustrates the discussion about ritual cannibalism, a question that needs more systematic information and case studies to be precisely understood and addressed (Gianotti and López Mazz 2009; Moreno 2006).

Concomitantly, the internal growing of mound clusters presents a regular pattern indicating communal spaces for public activities (*plazas*) as well as constructive events that increase height and resistance, transforming some *cerritos* in monuments. New smaller earthen structures seem to develop, articulated to domestic activities also used for crop, situated in the margin of sites (López Mazz and Gianotti 1998; López Mazz 2001; Iriarte 2006). That space formatting of the settlement, according to Iriarte (2006), is in line with the increase in political activity and the consolidation of the community as an organizational structure. The micro- and macroregional clusters of mounds clearly denote a process of constant landscape fragmentation as strategies for resources management as well as social and territorial control. "This process illustrates one of the first and clearest steps in the intentional building of a 'territory' (. . .) with the geographical space economically managed, symbolically marked, politically delimited and socially defended" (López Mazz and Bracco 2010, p. 257).

With regard to historical continuity, the *cerritos* situated in Brazil and Uruguay were interpreted as mounds built by Charrua and Minuano native groups (Serrano 1946; Basile Becker 2002). On the other hand, in the Argentinian Delta of the Paraná river, the *cerritos* were probably built by the Chaná-timbú people (Bonomo et al. 2011). Charrúa, Minuanos, and Chaná-timbú are indigenous groups historically known by abundant reports of travelers and chroniclers from the sixteenth century. However, for Uruguayan and Brazilian lowland areas, this ethnographical correlation is not consensual for two reasons: (1) according to López Mazz and Bracco (2010), it would be coherent to assert that the region of the Patos and Mirim lagoons, as well as the northeast of Uruguay – the main dispersion area of the *cerritos* – would have been occupied only by Minuano groups, the traditional enemies of the Charrúas. (2) It is always dangerous, from a historiographical point of view, to extrapolate colonial historic and ethnic categories to the long-term prehispanic past, making simple analogies with a society with approximately 5000 years of history (Basile Becker 2002; López Mazz 2001).

In sum, in the last 25 years of archaeological research, interpretations were matured that allowed to think the *cerritos* not more like archaeological remains resulted from "simple hunter-gatherers societies," but as "monumental structures" built by "complex fishers, hunter-gatherers, and agriculturalist societies" agents of a long-term history that encompass domestication, building, and control of the *Pampa* landscapes. Belonging to groups extremely articulated to flooded environments, practitioners of an economy involve fishing, hunting, gathering, production, and management of plant resources, as well as complex ways of managing both wild and domesticated resources, what characterizes as a "mixed economy" (Iriarte 2006; del Puerto 2015; Gianotti 2015; Moreno 2014). These earthen-engineered buildings, besides referring to other manners of landscape contestation and as evidence to a community way of life, would contemplate the mythic memory and the millenary history of mound builders as structures that aggregated people, reflected social hierarchies, demarked landscapes, and materialized the territorial reclamation. In this way, the *cerritos* must be understood as political phenomenon that comprises ideological landscapes and can be thought as generational monuments (that refers to the past, to the present, and to the future of mound builders societies), orientational monuments (that mark territories and landscapes and helps the individual circulation through the lands), and ontological monuments (that congregates cosmologies and historical

myths) (Bracco et al. 2000; Dillehay 2000; Gianotti 2000, 2005, 2015; López Mazz 2001, López Mazz and Bracco 2010; Cabrera 2013; Pintos 1999).

Cross-References

- ▶ Agricultural and Social Earthworks in the Guianas
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Earthworks of the Amazon
- ▶ Earthworks of the Llanos de Mojos
- ▶ Geometric Earthworks of Western Amazonia
- ▶ Mound Building, Social Complexity and Horticulture in the Lower Paraná River
- ▶ Recent Advances in the Archaeology of the Southern Proto-Jê People

References

Arechavaleta, J. 1892. Viaje a San Luis. En *El Uruguay en la Exposición Histórico Americana de Madrid. Montevideo*. Montevideo: Imprenta Artística de Dornaleche y Reyes.

Basile Becker, I.I. 2002. *Os Índios Charruas e Minuanos na Antiga Banda Oriental do Uruguai*. São Leopoldo: Editora Unisinos.

Bonomo, M., G. Politis, and C. Gianotti. 2011. Montículos, jerarquía social y horticultura en las sociedades indígenas del delta del Río Paraná (Argentina). *Latin American Antiquity* 22 (3): 297–333.

Bracco, R., L. Cabrera, and J.M. López Mazz. 2000. La prehistoria de las Tierras Bajas de la Cuenca de la Laguna Merín. In *Arqueología de las Tierras Bajas*, ed. A. Coirolo and R.B. Bracco, 13–38. Montevideo: Ministerio de Educación y Cultura.

Bracco, R., L. del Puerto, H. Inda, and C. Castiñeira. 2005. Middle-late Holocene cultural and environmental dynamics in the east of Uruguay. *Quaternary International* 132 (1): 37–45.

Bracco, R., L. del Puerto, and H. Inda. 2008. Prehistoria y Arqueología de la Cuenca de Laguna Merín. In *Entre la Tierra y el Agua. Arqueología de Humedales de Sudamérica*, ed. D. Loponte and A. Acosta, 1–60. Buenos Aires: AINA.

Cabrera, L. 2013. Construcciones en tierra y estructura social en el Sur del Brasil y Este de Uruguay (Ca. 4.000 a 300 a. A.P.). *Techné* 1: 25–33.

del Puerto, L. 2015. Interrelaciones humano-ambientales durante el Holoceno tardío en el este del Uruguay: cambio climático y dinámica cultural. PhD thesis, PEDECIBA-Biología, Facultad de Ciencias, Universidad de la República.

del Puerto, L., and S. Campos. 1999. Silicofitolitos: un abordaje alternativo de la problemática arqueobotánica del Este de Uruguay. In *En los tres reinos: prácticas de recolección en el Cono-Sur de América*, ed. C.-A. Aschero, M.A. Korstanje, and P.M. Vuoto, 141–150. Tucumán: Ediciones Magna.

del Puerto, L., and H. Inda. 2008. Estratégias de Subsistencia y Dinámica Ambiental: Análisis de silicofitolitos en sítios arqueológicos de la cuenca de Laguna de Castillos, Rocha, República Oriental del Uruguay. In *Fitolitos: estado actual de su conocimiento en América del Sur*, ed. A.F. Zucol, M. Osterrieth, and M. Brea, 221–236. Mar del Plata: Universidad Nacional de Mar del Plata.

Dillehay, T. 2000. El Paisaje Cultural y Público: el monumentalismo holístico, circunscripto de las comunidades araucanas. In *Arqueología de las Tierras Bajas*, ed. A. Coirolo and R.B. Bracco, 449–466. Montevideo: Ministerio de Educación y Cultura.

Femenías, J., J.M. López Mazz, R. Bracco, L. Cabrera, C. Curbelo, N. Fusco, and E. Martínez. 1990. Tipos de Enterramiento en estructuras monticulares cerritos, en la región de la cuenca de la Laguna Merín. (R.O.U). *Revista do Cepa* 17 (20): 345–356.

Ferrés, C. 1927. Los terremotos de los indios. *Revista de la Sociedad Amigos de la Arqueología* 1: 139–149.

Figueira, J.H. 1892. *Los Primitivos Habitantes del Uruguay. Uruguay en la exposición Histórico–Americana de Madrid*. Montevideo: Imprenta Artística de Dornaleche y Reyes.

Figueiro, G. 2004. Aproximación a los entierros parciales del Este uruguayo. In *X Congreso Nacional de Arqueología: La Arqueología Uruguaya ante los desafíos del nuevo siglo*, ed. L. Beovide, I. Barreto, and C. Curbelo. Montevideo: Asociación Uruguaya de Arqueología.

Gascue, A., J.M. López Mazz, E. Villarmarzo, V. de León, M. Sotelo, and S. Alzugaray. 2009. La organización de la tecnología lítica de los pobladores tempranos del este de Uruguay. *Intersecciones en Antropología* 10: 63–73.

Gianotti, C. 2000. Paisajes monumentales en la región meridional sudamericana. *Gallaecia* 19: 43–72.

Gianotti, C. 2004. La prospección como estrategia metodológica para el estudio del paisaje monumental en las tierras bajas uruguayas. *Arqueología Espacial, SAET* 24–25: 259–282.

Gianotti, C. 2005. Arqueología del Paisaje en Uruguay: origen y desarrollo de la arquitectura en tierra y su relación con la construcción del espacio doméstico en la prehistoria de las tierras bajas. In *America Latina: realidades diversas*, ed. L. Mameli and E. Muntañola, 104–123. Barcelona: Instituto Catalán de Cooperación Iberoamericana – Casa de América.

Gianotti, C. 2015. Paisajes Sociales, Monumentalidad y Territorio en las Tierras Bajas de Uruguay. PhD thesis, Departamento Historia I, Universidade de Santiago de Compostela, Santiago de Compostela.

Gianotti, C., and M. Bonomo. 2013. De montículos a paisajes: procesos de transformación y construcción

de paisajes en el sur de la cuenca del Plata. *Comechingonia* 17 (2): 129–163.

Gianotti, C., and J.M. López Mazz. 2009. Prácticas mortuorias en la localidad arqueológica Rincón de los Indios, Departamento de Rocha. In *Arqueología Prehistórica Uruguaya en el Siglo XXI*, ed. J.M. López Mazz and A. Gascue, 151–197. Montevideo: Biblioteca Nacional y FHCE.

Gianotti, C., L. del Puerto, H. Inda, and I. Capdepont. 2013. Construir para producir. Pequeñas elevaciones en tierra para el cultivo del maíz en el sitio Cañada de los Caponcitos, Tacuarembó (Uruguay). *Cuadernos del Instituto Nacional de Antropología y Pensamiento Latinoamericano* 1 (1): 12–25.

Iriarte, J. 2006. Transformation, mounded villages and adopted cultigens: The rise of early formative communities in south-eastern Uruguay. *World Archaeology*, Debates in "World Archaeology" 38 (4): 644–663.

Iriarte, J., and O. Marozzi. 2009. Análisis del material lítico del sitio de Los Ajos. In *XI Congreso Nacional de Arqueología*, ed. L. Beovide, C. Erchini, and G. Figueiro, 183–199. Salto: Asociación Uruguaya de Arqueología.

López Mazz, J.M. 2001. Las estructuras tumulares (cerritos) del Litoral Atlántico uruguayo. *Latin American Antiquity* 12: 1–25.

López Mazz, J.M., and R. Bracco. 1994. Cazadores-Recolectores de la Cuenca de la Laguna Merín: Aproximaciones teóricas y modelos arqueológicos. In *Arqueología de Cazadores-Recolectores. Límites, Casos y Aperturas*, ed. J.L. Lanata and L.A. Borrero, 51–64. Buenos Aires.

López Mazz, J.M., and D. Bracco. 2010. *Minuanos. Apuntes y notas para la historia y la arqueología del territorio Guenoa-Minuan (Indígenas de Uruguay, Argentina y Brasil)*. Montevideo: Linardi y Risso.

López Mazz, J.M., and C. Gianotti. 1998. Construcción de espacios ceremoniales públicos entre los pobladores de las tierras bajas de Uruguay. *Revista de Arqueologia* 11: 87–105.

López Mazz, J.M., and S. Pintos. 2000. Distribución Espacial de Estructuras Monticulares en la Cuenca de la Laguna Negra. In *Arqueología de las Tierras Bajas*, ed. A. Coirolo and R.B. Bracco, 49–58. Montevideo: Ministerio de Educación y Cultura.

Milheira, Rafael Guedes, Kita Macario, Ingrid Chanca e Eduardo Alves. 2017. Archaeological earthen mound complex in Patos Lagoon, Southern Brazil: chronological model and freshwater influence. *Radiocarbon* 59 (1): 195–214.

Moreno, F. 2006. Arqueología y etnografía del canibalismo en Sudamérica. In *América Latina, realidades diversas. Aula oberta 2001–2005*, ed. L. Mameli and E. Muntañola, 137–155. Barcelona: Casa América de Catalunya. Universitat Autònoma de Barcelona.

Moreno, F. 2014. La gestión de los recursos animales en la Prehistoria del Este de Uruguay (4000 AP – siglo XVI). PhD thesis, Departament of Prehistoria Universidad Autónoma de Barcelona, Barcelona.

Moreno, F., G. Figueiro, and M. Sans. 2014. Huesos mezclados: Restos humanos de subadultos en el conjunto arqueofaunísitico de un sitio prehistórico en el este de Uruguay. *Revista Argentina de Antropología Biológica* 16 (2): 65–78.

Pintos, S. 1999. Túmulos, caciques y otras historias. Cazadores recolectores complejos en la Cuenca de la Laguna de Castillos, Uruguay. *Complutum* 10: 213–226.

Pintos, S., and R. Bracco. 1999. Modalidades de enterramiento y huellas de origen antrópico en especímenes óseos humanos – tierras bajas del este del Uruguay (R.O.U). In *Arqueología y Bioantropología de las Tierras Bajas*, ed. J.M. López Mazz and M. Sans, 63–78. Montevideo: Facultad de Humanidades y Ciencias, Universidad de la República.

Roesch, L.F.W., F.C.B. Vieira, V.A. Pereira, A.L. Schünemann, I.F. Teixeira, A.J.T. Senna, and V.M. Stefenon. 2009. The Brazilian Pampa: A fragile biome. *Diversity* 1: 182–198.

Schmitz, P.I. 1976. Sítios de Pesca lacustre em Rio Grande, RS, Brasil. PhD thesis, UNISINOS, São Leopoldo.

Serrano, A. 1946. The Charrua. In *Handbook of South American Indians: The marginal tribes*, org. J. Steward, 191–196. Washington, DC: Smithsonian Institution.

Villagran, X., and C. Gianotti. 2013. Earthen mound formation in the Uruguayan lowlands (South America): Micromorphological analyses of the Pago Lindo archaeological complex. *Journal of Archaeological Science* 40: 1093–1107.

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Earthworks of the Amazon

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Introduction

Amazonian Indians have been leaving marks of their activities for the last 13 thousand years. In this long history of interaction, significant marks were printed in the territory. Here will be presented a series of positive and negative topographical modifications that, in some cases, after millennia of its construction, still remain visible.

These anthropogenic and long-lasting topographical modifications will be classified as "earthworks." The term encompasses different categories of structures, with distinct functionalities, not necessarily related in time and space.

Definition

Earthwoks are positive (when there is an accumulation of earth) and negative (when the earth was dug out) topographical interventions done by people in the past with sufficient intensity to be recognizable today. In the Amazon, Earthworks include different categories of structures with distinct features, most commonly related to water management, aquatic wildlife management, mobility, defense, human burials, housing, and cultivation. Several authors mention that, among the functions of these structures, are the imposition and demonstration of regional chiefs power in networks of precolonial political relations in ancient Amazonia.

So far, the identified categories are: residential and funerary mounds, funerary chambers, raised fields, ditches, moats, geoglyphs, wells, canals, roads, paths, and dams.

Residential and Funerary Mounds

In South America, there are several examples where the association of earth mounds and occupation sites has already been verified. Mounds or platforms associated with residential structures have been documented in Suriname and Guyana (Rostain 2008; Versteeg 2008), in Ecuador (Salazar 2008; Masucci 2008; Rostain 2008), in Colombia (Oyuela-Caycedo 2008), in Peru (Pozorski and Pozorski 2008), in Uruguay (Iriarte et al. 2004), and in the llanos de Mojos area of Bolivia (Prümers 2014); in Brazil they have been documented in Marajó Island, at the mouth of the Amazon (Meggers and Evans 1957; Roosevelt 1991; Schaan 2012), and in the Pantanal region near the headwaters of the Paraguay river. These contexts range from preceramics sites, such as the *cerritos* of Uruguay, to sites associated with deposits of the so-called Barrancoid Series in northern South America. In some cases, as in the Brazilian examples cited above, the construction of mounds seems to have had a practical function, since the sites are in seasonally floodable areas.

In other cases, like in Central Amazonia and in Ecuador, the mounds were built in flood-free areas, suggesting that in addition to the practical functions there may have been some symbolic reasons for building these platforms.

The first archaeologists to work on Marajó island considered mound building societies of Marajoara phase as completely different from other Amazonian populations classified as *Tropical Forest Culture* by Robert Lowie in 1948 because of the sophistication of the ceramics they produced, but mainly because they build mounds with ceremonial and residential purposes (Schaan 2012).

Marajó mounds are known locally as *tesos*. They were usually built with the surrounding sediments with the addition of layers containing archaeological objects during subsequent construction events.

Archaeological research has suggested that two types of *tesos* existed: residential and ceremonial. Residential *tesos* are always associated with complexes containing one or more ceremonial *tesos*. Ceremonial *Tesos* are preferably implanted where secondary water courses meet the main rivers and they were built of naturally elevated levees of Holocene age (Fig. 1).

Schaan (2012) suggests that normally only one longhouse with the size of 30 × 20 meters was built on the top of each large teso, even if their surface areas were much larger, ranging from 1100 m^2 for the smaller mounds and 13,500 m^2 for the largest and varying from 2 to 8 meters in height.

It is necessary to consider that there are controversies about the formation process of the Marajó mounds. In Santa Luzia, which has an elevation of about 20 m, researchers have identified that only 2.5 m of the structure can be attributed to human action. Another example, from the 8 m of the Teso dos Bichos site (Roosevelt 1991), only the first 4 m showed evidence of anthropic

Earthworks of the Amazon, Fig. 1 Teso dos Bichos mound, Marajó Island, Brazil. (Photography: © Wagner Souza e Silva. © Antiga Amazônia Presente (amazoniantiga.tv.br))

activities. Therefore, mound builders would have taken advantage of the elevated features naturally present in the landscape.

The construction of the *tesos* were related to a complex system of water and aquatic fauna management, and it is possible that even parts considered by Rossetti and his collaborators as natural were in fact managed during the construction of the channels.

In Suriname, Boomert (1978) describes elevated structures associated with dwelling areas near raised fields dating from between 700 and 900 CE. In this case, mounds were necessary for occupants to have a flood-free surface in the middle of their raised gardens. The largest of the residential mounds reported by Boomert is about 200–320 m in diameter and about 2.5 m in height.

At the mouth of the Negro River, near the present city of Manaus, several archaeological sites present mounds (in Portuguese these structures are known as *montículos*) constructed with accumulation of earth and ceramic fragments. These structures measure about 20–30 m of length by 10–20 m of width and have between 1–3 m of height. The most important sites in the region exhibit large amounts of these *montículos;* the mounds were elevated platforms on which the houses were built. At Hatahara site, about 20 mounds were identified.

Archaeological research associated these *montículos* with Paredão phase, dating from 700 to 1300 CE. The mapping of different archaeological sites has shown that mounds were always placed in a circular or semicircular position, which represents the distribution of the houses inside villages (Fig. 2).

Unlike the previous examples, in the region of Manaus mounds were built in areas that are permanently free of flooding, even during the most severe floods.

Dozens of burials were recovered in excavations on some of these *montículos*, demonstrating that they may have been concomitantly used as residential structures and cemeteries, as it is not uncommon among contemporary Amazonian populations who bury their deaths inside their houses.

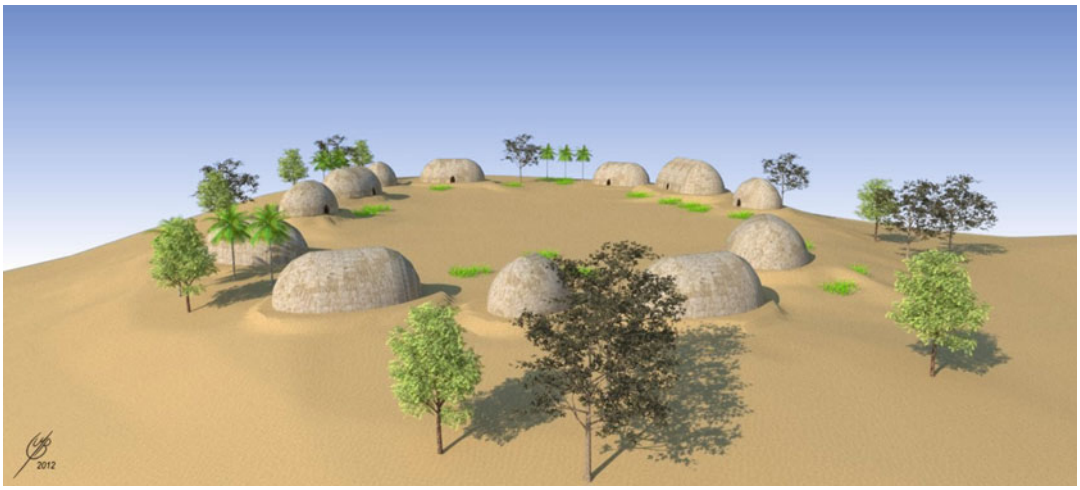

Earthworks of the Amazon, Fig. 2 Hypothetical reconstruction of a ring village during the Paredão phase (1200 CE) with houses built on platforms (*montículos*). Reconstruction based on topographic data from Antonio Galo site, Iranduba, Amazonas, Brazil. (Graphic art by Marcos Brito Castro)

Mounds can reach up to 2000 m^2 in the Manaus area (Moraes and Neves 2012). On a much smaller scale, it is possible to perceive a process very similar to that identified in the Marajó island, where places chosen for building the mounds were already naturally elevated parts in the settlements.

In Bolivia, in the region known as Llanos de Mojos, in a large seasonally flooded area, mounds are documented in proportions similar to those found on Marajó island (Fig. 3). Such large land platforms, locally known as *lomas*, began to be built around 500 CE and continued being erected until around 1400 CE. Throughout 800 years of occupation, these platforms were used for various domestic and rituals activities. Archaeological work undertaken in these sites mention the existence of cemeteries with hundreds of individuals buried directly in the ground or in large ceramic funerary urns. In addition to the cemeteries, the *lomas* were also used as residential platforms where a varied range of domestic activities, such as processing of fermented beverages, fauna management, and tool making, were documented (Prümers 2014). As in the case of Marajó, these mounds are also associated with a series of other earthworks that will be described below.

In the Upano valley of the Ecuadorian Amazon, not far from the Andes, hundreds of earth mounds were built between from 500 BCE and 600 CE along alluvial terraces above the high flood levels. Upano mounds had a spatial pattern composed by a square or rectangular, low, and flat plaza surrounded on four sides by mounds, modified slopes, banks or pathways. In several complexes, a central mound was built in the center of the plaza with four or six peripheral elevations (Rostain 2008; Salazar 2008). Moundbuilind was abandoned after the eruption of the neighboring Sangay volcano, whose record can be seen in the regional stratigraphy.

Raised Fields

These earthworks have been documented in various parts of the Amazon, but the largest concentrations were found in the Bolivian Llanos and the coastal areas of French Guiana and Suriname, normally in association with residential mounds (Erickson 2006; Rostain 2008). Raised fields include platforms of varied forms, as well as the adjacent flooded channels, where a varied range of plants were cultivated. In both Bolivia and the Guianas, they were built on areas of seasonally flooded savannas (Fig. 3).

Building technique consisted in the construction of mounds of varied forms (squares, rectangular, oval, elongated), with great variation of number, height, and size. According to the information

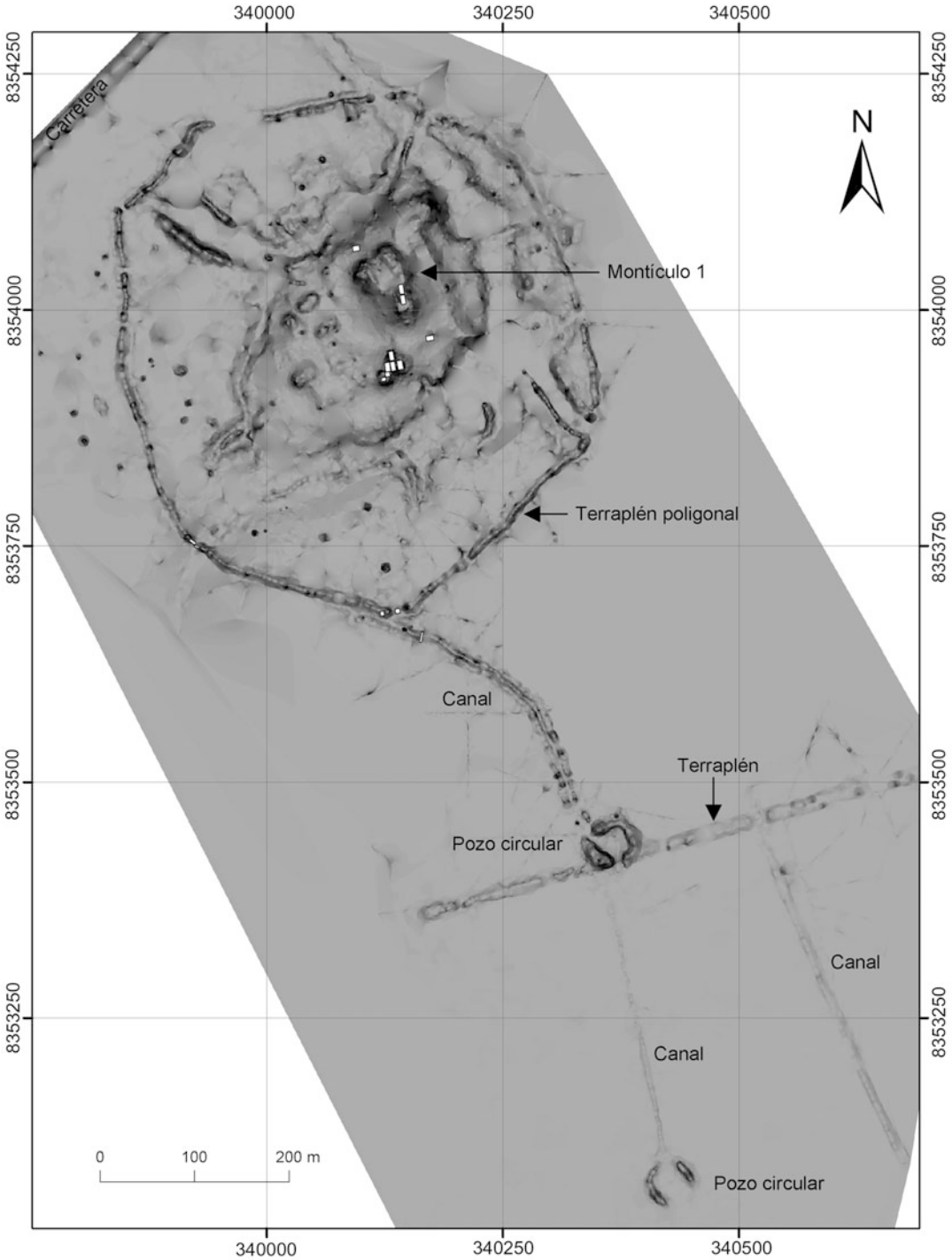

Earthworks of the Amazon, Fig. 3 Loma Mendoza site, Llanos de Mojos, Bolivia, where it is possible to observe a mound (loma) and several other structures such as wells, canals, and embankments. (Source – Prümers and Jaimes Betancourt. 2014). (Courtesy of Carla Jaimes Betancourt)

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gathered from the archaeological surveys, smaller fields may have been about 50 cm in length with 30 cm in height, while the largest had tens of meters in extension and up to one meter of elevation above the water level. Hundreds of hectares were cultivated using this technique.

In the Guianas, raised fields began to be constructed around 650 CE and could be dated until 1400 CE (Rostain 2008). In addition to the construction of elevated fields, a composite network of canals, dikes, and dams was built to deal with impoundment and drainage of water as well as with the aquatic fauna of these environments (Erickson 2006). New layers of organic matter were periodically added to the raised fields to ensure their continuous fertility.

Ditches

Associated to the Paredão and the Axinim phase occupations in the vicinities of Manaus and the lower Madeira River, respectively, there are structures whose construction demanded considerable labor mobilization. In the Vila Gomes site, in the lower course of the Madeira river, a trench with about 1100 m length by 15 m wide and 3 m deep was dug around 1.000 CE. Near the mouth of the Negro river, in places where mounds were also documented, trenches with proportions similar to those observed on the Madeira River were also documented in several sites (Moraes and Neves 2012). In these cases, archaeological research suggests that the purpose of the construction would be defensive (Fig. 4).

Alfred Métraux (1942) documents similar structures among the villages of the Baure Indians in Bolivia. "Baure villages were surrounded by palisades with loopholes for archers, and a ditch; for further protection pitfalls were concealed in the paths.".

Defensive trenches are also found in the upper Xingu region associated with precolonial Arawak

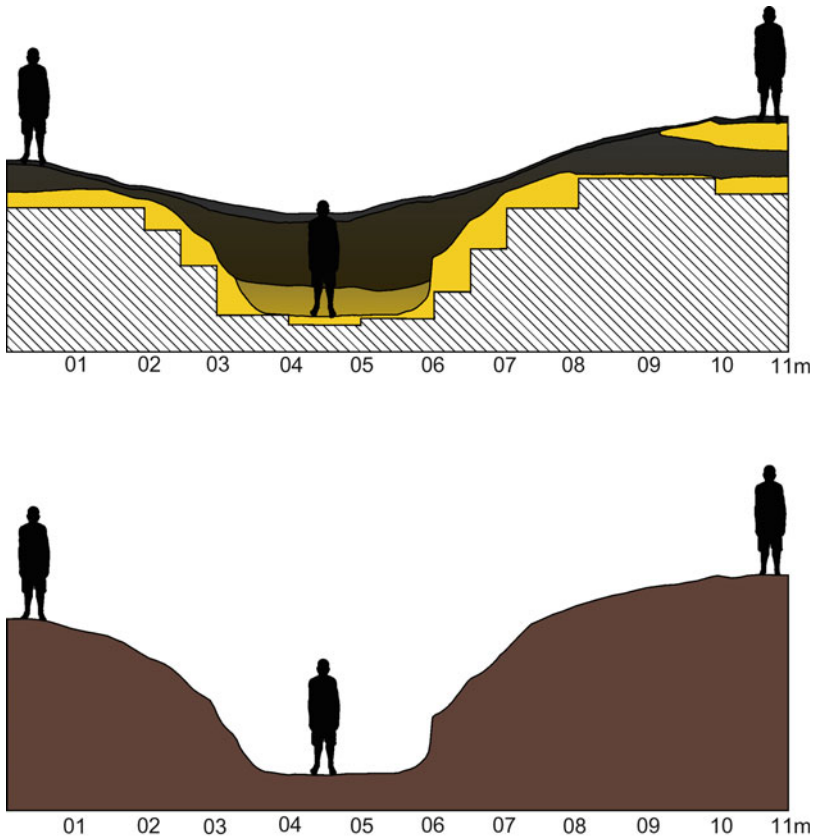

Earthworks of the Amazon, Fig. 4 Cross-section of a defensive trench of 1100-m long (1000 CE) Vila Gomes site, Borba, Amazonas, Brazil. (Drawing – Claide de Paula Moraes)

occupations (Heckenberger 2005). According to Heckenberger, the trenches of the upper Xingu were excavated in the surroundings of the ancient villages, mostly semicircle or raised linear mounds forming a continuous curb defining the edges of circular central plazas. The excavated trenches are about 1–4 m in height, 15 m wide, and up to 2.5 km long. The raised ones can reach up to 2 m in height. Radiocarbon dates suggest that in the Xingu, these earthworks were built between 1250 CE and 1350 CE.

Similar geometric features are found on hundred hilltops in the extreme north of Brazil, in the Amapá state, as well as in French Guiana and Surinam. In this case, the archaeological sites are known as "crowned mountains."

Geoglyphs

In the southwestern Brazilian Amazon, mainly in the State of Acre, hundreds of sites were formed by the reshaping of tons of sediments, forming circular and/or quadrangular geometric features defined as geoglyphs (Fig. 5). In the same region, in neighboring countries, especially in Bolivia, contemporary sites with similar features are defined as Zanjas (Erickson 2006).

In some cases, these geometric structures can be connected by lowered or elevated paths recognizable by the movement of earth involved in their construction. In minor frequency, these geometric features were also found in positive topography, as in the case of the Espinhara site.

According to, geoglyphs are found mainly in interfluvial regions and on plateaus tops. It is not uncommon that one of the quadrants is placed near a spring or a periodically flooded area. Some of those sites were formed by one or more geometric structures, sometimes associated with mounds and bermed roads. The trenches forming the circular geoglyphs are about 11 m wide, with the depth varying between 1 m and 4 m and diameter between 100 m and 200 m. The quadrangular structures have approximately the same dimensions. It is common that two parallel trenches were dug to define the geometric shape.

Schaan suggests defensive and/or symbolic religious functions involving the construction of geoglyphs, since few objects are normally found in them. Currently there are more than 500 of such structures found in Amazonas, Acre, and

Earthworks of the Amazon, Fig. 5 Double moated square geoglyph – Purus basin, SW Amazon. (Photo Mauricio de Paiva)

Rondônia states in Brazil, as well as Beni province in Bolivia. Although most of these sites have been found because of the increasing deforestation taking place in SW Amazonia, a recent study shows that at the time of their construction, which peaked at the first millennium CE, there is no visible evidence of the intense use of fire and of deforestation associated with geoglyphs (Watling et al. 2017).

Wells

On the top of the Belterra plateau in the Santarém area at the mouth of the Tapajós River, there are structures dug in the ground known as wells. Associated with archaeological sites from the late Tapajonic occupation (1000–1700 CE), they were documented since the 1920s by Curt Nimuendajú (2004). These artificially dug structures are mainly elongated or circular, with the borders raised by the addition of the internal sediment excavated (Figs. 3 and 6). A layer of clay was described in the bottom of these wells and probably had a waterproofing function. Their diameters range from 15 m to 30 m and their depth between 1 m and 3 m. Little has been researched regarding the function of these structures. However, the main hypotheses are related to water and aquatic fauna storage (Troufflard 2016).

Paths, Roads, Canals, and Dams

Often the different societies of the Amazon are referred to as "the people of the waters." In fact, until today one of the main means of getting around in the Amazon is using the huge network of rivers and lakes that drain the region. A considerable part of the Amazon basin is composed of plains or hills with very small elevation in relation to sea level. Manaus, distant 1100 km west of where the Amazon river meets the sea, is only 40 m above sea level. This immense plain, associated to the gigantic drainage basin and the large quantities of rain that falls annually in the Amazon, create flooded savannas, rivers with many meanders, and a complex chain of lakes

Earthworks of the Amazon, Fig. 6 Well at an archaeological site in the Belterra plateau, Pará, Brazil. Some of the wells like this one are still efficient to retain water, even in the dry season. (Photo courtesy of Anderson Marcio Amaral Lima)

and lagoons. The seasonal variation of floods is very significant. In the port of Manaus, floods and drains of the Negro River have been being monitored for more than a century. The average difference between the peak of the flood and the ebb is about 10 m. In extreme periods, this difference has reached more than 16 m.

This seasonal difference significantly transforms the landscape. Rivers, meanders, navigable lakes are connected in one season but become isolated bodies in another. Flooded plains (*varzea*) and savannas become extensive dry prairies in the dry season.

The long history of human occupation of the Amazon shows that its inhabitants have learned to control and manage these different landscapes. The mounds described above were in many cases raised to provide surfaces free from floods. But the dry period also required handling. In Marajó, Bolivia, on the coast of the Guianas and in several other places, the settlements became distant from the waterways in the dry season. In these places, canals, dams or even roads were constructed to provide means of transport, water supply, aquatic fauna, and irrigation or drainage of agricultural fields.

In Bolivia, according to, causeways were constructed with the sediment removed from the construction of channels and could reach up to a meter of elevation, 6 m wide and several kilometers in length. The channels followed approximately the same proportions and could have been used for transportation in small boats. Hundreds of other structures have already been documented connecting rivers to each other or linking settlement areas, forest islands, and raised fields.

In Marajó, Denise Schaan (2008) mentions the existence of artificially constructed canals connecting one settlement to the other (Figs. 1 and 3). The construction of dams would prolong the period of water supply and fishing during the dry season.

In both cases, these earthworks are chronologically associated with residential and funerary mounds.

Several human settlements have been documented in areas far from the great rivers of the Amazon. In the region of Santarém, in the same plateau where Curt Nimuendajú (2004) mentioned the presence of wells, the same author mentions the presence of several kilometers of roads connecting the settlements to each other and these with the banks of the Tapajós River.

Elevated or lowered roads are also mentioned connecting geoglyphs or ditches in Acre and Bolivia (Schaan 2012; Prümers 2014).

Funerary Chambers

Unlike the other categories of earthworks, funerary chambers are sometimes difficult to perceive in surface surveys. The funerary pits are underground chambers shaped like a boot (a cylindrical well with a chamber in the shape of a quarter of a sphere) (Fig. 7). A funerary pit documented by Emilio Goedi was about 1 m in diameter and 2.5 m deep. Within these chambers, there were richly decorated funerary urns associated with the Aristé phase, dated around 1.000 CE. These chambers were used for successive funerary events, in some cases with clear disturbance of the previous burials. Most of these burial chambers are marked on the surface by large granite plates weighing more than one tonne and some were placed vertically while a second plate served as a burial chamber cover. These constructions can be found individually or in large groups, such as the Rego Grande site in Calçoene, Amapá, where several aligned stones disposed circularly marked chambers with various funerary urns.

Archaeologists mention that in addition to marking the funerary pits, some of the aligned stones mark astronomical events such as the solstices (Saldanha and Cabral 2010).

Historical Background

The earliest mentions of earthworks in the Amazon are related to the chronicles of the first Spaniards who descended the Amazon River in 1542. The friar Gaspar de Carvajal is the first to mention the existence of roads connecting the settlements on the banks of the Amazon River with other settlements of the mainland.

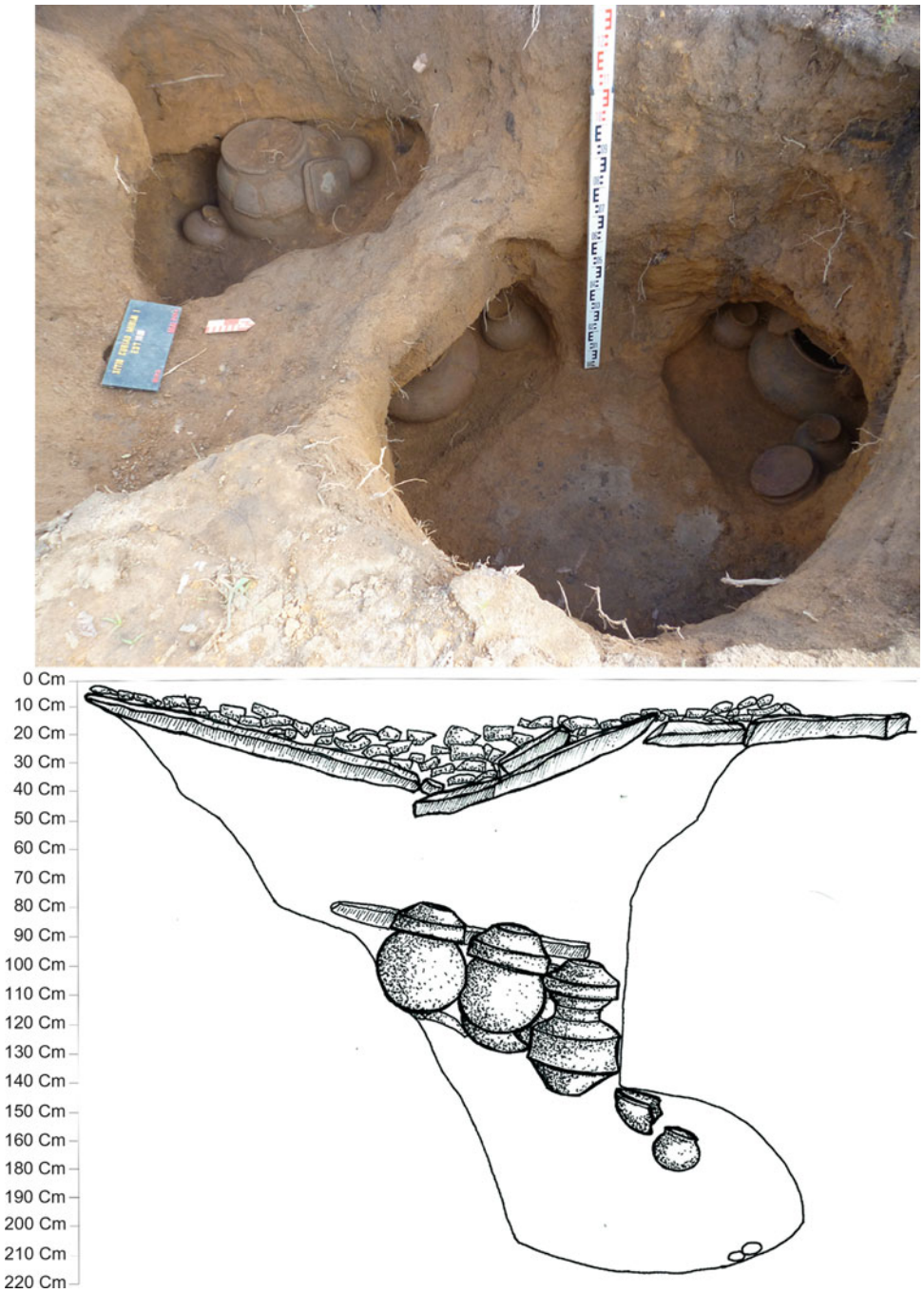

Earthworks of the Amazon, Fig. 7 Funerary chambers at the Curiau Mirim site, Amapá, Brazil, where it is possible to observe the borders of holes with the urns and the funerary accompaniments (photo). Profile of a funerary chamber on the CA18 site, Amapá, Brazil, showing the limits of the chamber, the granite plates used as cover, urns, and funerary accompaniments. (Photo and drawing – courtesy of João Saldanha)

The advances of the colonizing settlements lead several missionaries and scholars (naturalists) to have contact with several archaeological sites in the Amazon. Earthworks, as the Marajó *tesos*, were first excavated by Charles Frederick Hartt in 1871. From 1948 to 1950, Betty Meggers and Clifford Evans excavated a number of tesos and stone alignments around the mouth of the Amazon (Meggers and Evans 1957).

In 1905, the Swiss zoologist Emilio Goeldi presented the first descriptions of the funerary chambers of Amapá.

One of the main pioneers in documenting earthworks from the Brazilian Amazon was Curt Nimuendajú. In the 1920s, he identified and researched the Marajó *tesos*, documented several of the alignments of granite slabs that mark the funerary chambers in Amapá. In Santarém, he was the first to mention the existence of the wells and the roads that connected the old settlements and the Tapajós river (Nimuendajú 2004).

One of Nimuendajú's contemporary and a sponsor of his researches on Amazonian ethnology and archaeology was Erland Nordenskiold, who was also the first to work and document the Llanos de Mojos earthworks in Bolivia around 1910 (Erickson 2006).

The mounds near Manaus were first recorded by Peter Hilbert in the 1950s, but systematic surveys in these earthworks were only carried out from the 1990s, with the Central Amazon Project coordinated by Eduardo Neves. Claide Moraes directed many excavations on these mounds as well as on the trenches at the lower Madeira river.

Acre geoglyphs, although recorded by Ondemar Dias since the 1970s, were only observed and recorded from the sky in the 2000s, when Brazilian palaeontologist Alceu Ranzi spotted them on a commercial flight to the city of Rio Branco (Schaan 2012). Denise Schaan, Mati Pärsinnen, and Sanna Saunaluoma performed excavation in several of these sites.

The mounds on the French Guiana Coast were excavated by Stéphen Rostain, who established their anthropic origin, as well as by Aad Versteeg.

Earthworks of Bolivia were first identified by William Denevan and later excavated and mapped by Clark Erickson, Heiko Prümmers, Carla Jaimes Betancourt, John Walker, and Eduardo Machicado.

The first Spanish explorers who descended the Amazon River also mentioned the existence of fortified villages with palisades and trenches, but mapping of defensive trenches at archaeological sites is the result of recent research that were intensified by the use of precision tools for the production of topographic maps of archaeological sites.

E

Key Issues

Most of the earthmovers had disappeared before any contact with Europeans, who produced the first written documents which can be translated and used in current scientific research. In this way, these large constructions challenge researchers in the attempt to understand their technology of construction, the necessary manpower, and the time spent to build them. More so since in the precolonial Amazon there is no evidence of metallurgy, the artifactual set used for solving all the tasks of this period involved mainly tools constructed with wood, bones, carapaces, horns, and a varied range of rocks and minerals. To make things even more difficult, of these materials, only stone tools are easily preserved in the Amazonian archaeological record.

Much of the earthworks were built around the year 1000 of our era. There is an intense debate in Amazonian archaeology pointing to this period as being the one with the highest population density before present times and that it reached an extremely high level of political complexity and relations of power in the Amazon. Often earthworks are mentioned as an example of the magnitude of human action in precolonial Amazon. Understanding the particularities involved in their construction becomes then a key issue for this debate.

International Perspectives

The Amazon rainforest occupies a large portion of South America. According to the current political geography, the territory is distributed in nine countries. The importance of the Amazon and its conservation is fundamental for entire life on the

planet. Understanding the history of human occupation in this region and how the relationship between the environment and people provided what we know as the Amazon rainforest today is an important step in thinking about what will be the future of this region. The study of earthworks is an important step in this process of understanding.

Future Direction

Remote sensing, paleoecological analyses using micro-vestiges such as phytoliths, starch grains, and the use of experimental archaeology are research topics that are growing in Amazonian archaeology; the development of these areas will be fundamental to broaden the understanding of earthworks in the Amazon.

For instance, when the GOOGLE provided free high-definition images of various parts of the Amazon, the number of new geoglyphs recorded in deforested areas of the Acre region increased exponentially (Schaan 2012). Although not very accessible, due to the application costs, the use of LIDAR is very promising for the identification of new earthworks, even in areas with dense vegetation cover (Prümers 2014).

Paleoecological analyses were able to identify some of the plants that were grown in the raised fields of the Guianas (Rostain 2008). A paper by Jennifer Watling and collaborators has recently been published (2017), analyzing micro-vestiges of sediments collected from geoglyph excavations in Acre and attempting to reconstruct the landscape in which these earthworks were constructed. The results show that the geoglyphs were constructed in an area with dense vegetation and low deforestation, but in forests with intense management for at least the last 6 thousand years.

Using a real time GPS tracking, the Kuikuro Indians of the upper Xingu mapped tens of kilometers of paths and trenches in an ethnoarchaeological project led by Michael Heckenberger (2005). Heckenberger's work has shown that earthworks delimit precolonial villages which are much larger than historically documented ones.

Clark Erickson (2006) and his team have been producing very informative data to understand the technology of construction and use of raised fields with the construction of experimental raised fields in Bolivia.

Moraes and Neves (2012) used experimental archaeology parameters to think about the necessary workmanship and the time spent to construct the defensive structures of the Madeira River region.

And finally, in South America there is an increasing interest in archaeological studies, a growing number of young people are seeking training in archaeology. Increasing the number of researchers is key to identifying new archaeological sites and perhaps new categories of earthworks.

The association of these different research strands is very promising for the future study of earthworks in the Amazon.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Aerial Archaeology
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Earthworks of the Llanos de Mojos
- ▶ Geoglyphs
- ▶ Geometric Earthworks of Western Amazonia
- ▶ Landscape Archaeology
- ▶ The Earthen Mounds (*Cerritos*) of Southern Brazil and Uruguay
- ▶ The Guianas: Pre-Columbian Heritage
- ▶ The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast

References

Boomert, A. 1978. Prehistoric habitation mounds in the Canje River area. *Journal of Archaeology and Anthropology* 1 (1): 44–51.

Erickson, C. 2006. The domesticated landscapes of the Bolivian Amazon. In *Time and complexity in historical ecology: studies in the Neotropical lowlands*, 235–278. New York: Columbia University Press.

Heckenberger, M.J. 2005. *The ecology of power: Culture, place, and personhood in the Southern Amazon, A.D. 1000–2000*. New York: Routledge.
Iriarte, J., I. Holst, O. Marozzi, C. Listopad, E. Alonso, A. Rinderknecht, and J. Montaña. 2004. Evidence for cultivar adoption and emerging complexity during the mid-holocene in the La Plata basin. *Nature* 432: 614–617.
Masucci, M.A. 2008. Early regional polities of coastal Ecuador. In *The handbook of south American archaeology*, 489–503. New York: Springer.
Meggers, B., and C. Evans. 1957. *Archeological investigations at the mouth of the Amazon*. Washington, DC: Smithsonian Institution.
Métraux, A. 1942. The native tribes of eastern Bolivia and western Matto Grosso. *Bureau of American Ethnology Bulletin* 134: 1–182.
Moraes, C.P., and E.G. Neves. 2012. O Ano 1000: Adensamento Populacional, Interação e Conflito na Amazônia Central. *Amazônica-Revista de Antropologia* 4 (1): 122–148.
Nimuendajú, C. 2004. *In Pursuit of a Past Amazon – Archaeological Researches in the Brazilian Guyana and in the Amazon Region*. Translated by S. Rydén and P. Stenborg. Göteborg.
Oyuela-Caycedo, A. 2008. Late pre-Hispanic chiefdoms of northern Colombia and the formation of anthropogenic landscapes. In *The handbook of south American archaeology*, 405–428. New York: Springer.
Pozorski, S., and T. Pozorski. 2008. Early cultural complexity on the coast of Peru. In *The handbook of south American archaeology*, 607–631. New York: Springer.
Prümers, H. 2014. Sitios prehispánicos con zanjas en Bella Vista, Provincia Iténez, Bolivia. In *Memorias de las conferencias magistrales del 3.er Encuentro Internacional de Arqueología Amazónica*, ed. S. Rostain, 73–85. Quito: MCCTH, Senescyt, 3EIAA.
Roosevelt, A.C. 1991. *Moundbuilders of the Amazon: geophysical archaeology on Marajo Island, Brazil*. San Diego: Academic Press.
Rostain, S. 2008. The archaeology of the Guianas: An overview. In *The handbook of south American archaeology*, 279–302. New York: Springer.
Salazar, E. 2008. Pre-Columbian mound complexes in the Upano River valley, lowland Ecuador. In *The handbook of south American archaeology*, 263–278. New York: Springer.
Saldanha, J.D.M., and M.P. Cabral. 2010. A Arqueologia do Amapá: reavaliação e novas perspectivas. *Arqueologia Amazônica* 1: 95–112.
Schaan, D.P. 2012. *Sacred geographies of ancient Amazonia: Historical ecology of social complexity*. London: Routledge.
Troufflard, J. 2016. Well Builders of the Belterra Plateau, Lower Tapajós: Preliminary Data. In *Beyond Waters: Archaeology and Environmental History of the Amazonian Inland*, ed. P. Stenborg. Gothenburg Sweden: University of Gothenburg.
Versteeg, A.H. 2008. Barrancoid and Arauquinoid mound builders in coastal Suriname. In *The handbook of south American archaeology*, 303–318. New York: Springer.
Watling, Jennifer J., J. Iriarte, F.E. Mayle, D. Schaan, L.C.R. Pessenda, N.J. Loader, F.A. Street-Perrott, R.E. Dickau, A. Damasceno, and A. Ranzi. 2017. Impact of pre-Columbian "geoglyph" builders on Amazonian forests. *Proceedings of the National Academy of Sciences* 114: 1–6.

Earthworks of the Llanos de Mojos

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State of Knowledge

Introduction

The Llanos de Mojos (or Mojos) is a seasonally inundated tropical savanna, about 140,000 km^2 in extent, located between the Beni, Mamoré, and Iteñez/Guaporé Rivers, in the Bolivian Amazon. Long recognized as the setting for complex archaeological cultures, in the early 1960s, Mojos became better known as an example of an anthropogenic landscape in the Amazon and in the Americas. Countering expectations that tropical forest environments determined that Amazonian societies had always been nonagricultural, and small in scale, the earthworks of Mojos made it clear through their extent, diversity, and monumentality that Mojos did not conform to these larger expectations.

The documentation of these earthworks was part of a larger trend examining pre-Columbian anthropogenic environments in Mexico, Colombia, Venezuela, the Guianas, Chile, Brazil, and as far north as the US states of Georgia and Wisconsin (Denevan 1966, 2001). These landscapes (of raised fields and other earthworks) have changed the general impression of how pre-Columbian societies interacted with the environment, at different scales. The question is reversed, to ask to what extent Amazonians in particular and pre-Columbian communities in general changed the environment to suit their purposes (Erickson 2008). But as the necessary resources to study earthworks

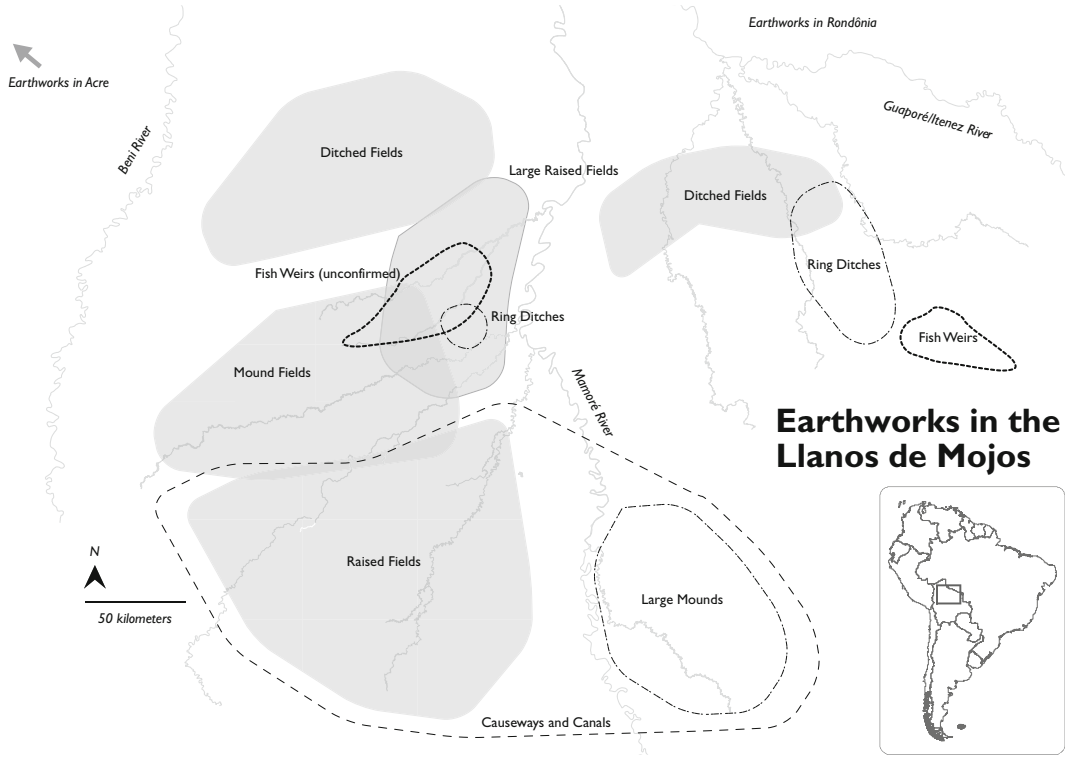

Earthworks of the Llanos de Mojos, Fig. 1 Location of different types of earthworks within the Llanos de Mojos, in reference to South America

(such as satellite imagery) enter the public domain, a third possibility is engaging more scholars: that these landscapes may reflect cultural concepts that do not categorize and divide nature from culture in the same way that geographers, anthropologists, and governments have done (Fig. 1).

History of Study

Despite some excellent early sources on the indigenous peoples of Mojos, beginning in the Jesuit period, historical records of earthworks are very sketchy (Eder 1985; Metraux 1942). There is little information before the arrival of the Jesuits in the 1660s, and in later sources, Nordenskiöld is the first eyewitness to ponder the extent and origin of Mojos earthworks (1913). Among the observers of the 1960s, William Denevan stands out, for his excellent monograph which brings together the available historical and geographic knowledge, and includes careful documentation of earthworks both on the ground and from aerial photography (Denevan 1966). This book is the starting point for all geographic and archaeological research on Mojos.

Beginning in the 1980s, a generation of archaeologists began to answer Denevan's call for more research, and some details of chronology and archaeological association have now been developed. These archaeological efforts have recently been reviewed (Erickson 2006; Prümers and Betancourt 2014; Walker 2008b).

An important source of information on earthworks and the landscape comes from open access satellite imagery, which as of this writing can be accessed through several platforms including Google Earth and ArcGIS Earth. This imagery, while it varies in precision and accuracy, represents an expanding historical record of landscape change. These resources make the information once available only to a few specialists much more easily viewed, discussed, and analyzed. The interested reader is referred to any of these widely available platforms for viewing satellite

imagery, which allow the exploration of earthwork patterns while moving easily between scales.

Typology

Earthworks in Mojos can be sorted into several discrete categories, some of which are well known, and also several transitional or distinctive forms, which invite further study.

The seasonality of flooding and drought is part of the annual cycle in Mojos. The same tree roots used to tie up a canoe in August are below the branches where fishing hooks are tangled in the treetops as wet season fishers catch palometa for dinner in January. During the wet season, forest islands often become actual islands, as even a meter of two of elevation places them above floods. All earthworks were built, maintained, and used in this seasonal context and must be considered from both the standpoint of flooding and drought. The highest points in Mojos are still affected by flooding and the lowest parts by drought. Because of local, regional, and systemic variation in the river system, flood waters vary considerably from year to year, throughout the use-life of earthworks and the lifetime of an inhabitant, a village, or a cultural tradition. It is difficult to overemphasize the importance of seasonality to all of the different types of earthworks.

Describing the earthworks by sorting them into types takes the emphasis off of geographic areas and places it on the actions of earthwork construction and use. No single type of earthworks is found throughout Mojos, and the larger, regional pattern is complicated. Many earthwork types, including ditched fields, mounds, ring ditches, causeways, and perhaps fish weirs, are all found on both sides of the Mamoré River. Although most raised fields are found west of the Mamoré, earthworks are ubiquitous.

Raised fields comprise a variety of distinctive types, varying considerably in form, context, distribution, and presumably in function and meaning. The largest categories of these earthworks are raised fields and can be considered in four types, called (1) raised fields, (2) large raised fields, (3) ditched fields, and (4) mound fields.

Raised fields Figure 2 are found most commonly in the southern half of Mojos, to the west of the Mamoré River. They may be the most widespread of the raised fields, although they are the smallest and therefore least visible on aerial photographs and satellite images. They take the form of earthen platforms with ditches directly associated on both sides, usually in strictly parallel blocks, and usually accompanied by causeways. They might be 5 m wide and 50 m long and form discrete blocks of about a hectare. These fields are accessed by the San Borja – San Ignacio road – and also have been found under old-growth forest to the south of this road. They clearly filled an agricultural function, and crops that were grown on raised fields include cocoyam (*Xanthosoma sagittifolium*), urucu (*Bixa orellana*), and yerba mate (*Ilex paraguariensis*) (Erickson 1995). It is likely that maize, manioc, and sweet potato were grown on raised fields as well, although there is as yet no direct evidence. Because of their association with long causeways and canals, raised fields could have benefited from the manipulation of water, especially to retain water longer into the dry season (Rodrigues et al. 2015, 2016). Raised fields of this type are also associated with a wide variety of mounds and earthen constructions, and in some cases, these other earthworks are found under the mature forest. These fields are spread across an area of about 20,000 km^2.

Large raised fields Figure 3 are found in the center and north of Mojos, to the west of the Mamoré River. In particular, the Iruyañez, Omi, Yacuma, and Rapulo rivers have about 40,000 large raised fields associated with them over an area of about 10,000 km^2 (Walker 2017). Large raised fields have a very different morphology from raised fields, being about 15–20 m wide, about 200 m long, and on the order of 40–50 cm difference between the top of the platform and the bottom of the adjacent canal or negative space. A more significant difference is perhaps that each platform seems to have a spatial independence from its neighbors: although fields are arranged close to one another, neighbors differ significantly in terms of orientation and size. Some fields are as large as 2 or 3 hectares and can be as long as 1,100 m. With a few exceptions at the edges of the

Earthworks of the Llanos de Mojos, Fig. 2 Oblique view of raised fields and causeways near San Ignacio de Mojos, Beni, Bolivia. Imagery from Google Earth and DigitalGlobe

geographic distribution, large raised fields are not found near either causeways, mound fields, or raised fields. They are sometimes found near forest islands, many of which contain habitation mounds and ring ditches. Direct botanical evidence for the cultivation of maize and sweet potato establishes that these fields had an agricultural purpose (Whitney et al. 2014). Improvements in satellite imagery have revealed about a tenfold increase in the number of visible fields since Denevan's 1966 counts (Walker 2004, 2017). Although many large fields are found on the high ground near to the Iruyañez and Omi, Yacuma, and Rapulo, this is not true for all large raised fields. They have been found in association with a sequence of inhabited forest islands over about 2000 years. Although they appear to have gone out of use sometime near the initial contact with Europeans (ca. 1500 C.E.), some could have been abandoned before or after this key moment.

Ditched fields Figure 4 are more difficult to circumscribe. Found to the north of large raised fields, they form a clear landscape pattern, distributed on both sides of the Mamoré River. Each of these small ditch networks cover about a hectare, with many small ditches dividing the area into spaces of several hundred square meters each. These areas of ditched fields are normally found directly adjacent to large forest islands, some of which (in the northeast) contain ring ditches and connecting canals (Lombardo and Prümers 2010). Similar ditched fields to the west of the Mamoré are only known from imagery but are spread across about 10,000 km^2.

Another type of ditched field or gridiron field (so named by Denevan (1966)) is also found in association with, and perhaps in some cases underneath, the raised fields of southwestern Mojos. These ditches are roughly parallel, sometimes form a perpendicular grid and can be spaced between 10 and 20 m apart. Although the general pattern of a ditch as opposed to a platform is present, these fields differ from the northern ditched fields because of the parallel and sometimes gridiron pattern. Many fields of this general type are found along the Apere River (Walker 2011b; Erickson and Walker 2009).

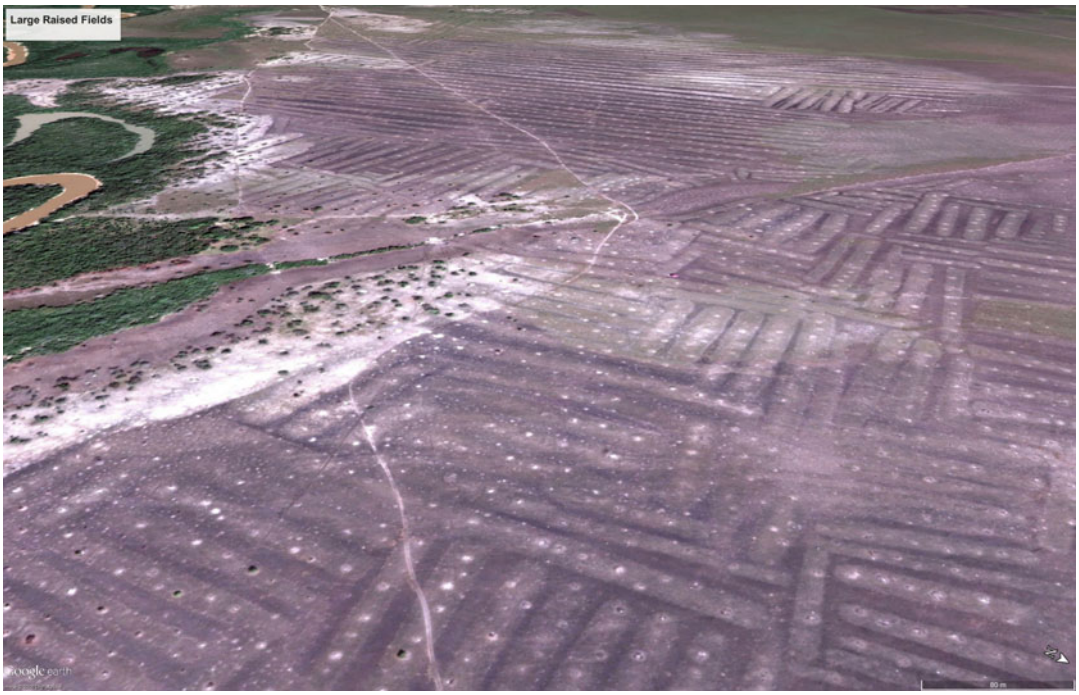

Earthworks of the Llanos de Mojos, Fig. 3 Oblique view of large raised fields along the Iruyañez River, Beni, Bolivia. Imagery from Google Earth and DigitalGlobe

Earthworks of the Llanos de Mojos, Fig. 4 Oblique view of ditched fields, east of the Mamoré River, Beni, Bolivia. Imagery from Google Earth and DigitalGlobe

Earthworks of the Llanos de Mojos, Fig. 5 Oblique view of mound fields, Beni, Bolivia. Imagery from Google Earth and DigitalGlobe

Mound fields Figure 5 are the subject of a set of archaeological and ecological studies in the western part of Mojos, near Santa Rosa del Yacuma. These fields are much smaller, consisting of circular mounds about 5 m across. They often appear in small blocks, with three or four rows of perhaps ten mounds. But in several places, (using DigitalGlobe imagery), continuous areas of mounds covering several square kilometers are visible, some of which seem to be situated as conglomerates of small blocks and others that seem to be lines of mounds outlining rectilinear areas, much like the areas outlined elsewhere by ditches. These mound fields, although previously mentioned, have not been well studied (Denevan 1966). Their spatial pattern is not unlike earthworks found elsewhere, in particular the raised fields of the coastal Guianas (Rostain 2008). This type of fields is spread over an area of at least 8,000 km^2.

In addition to the four categories of raised fields, which seem to have a clear if not exclusive agricultural function, at least six other types of earthworks have been classified to date: (1) causeways, (2) canals, (3) fish weirs, (4) ring ditches, (5) reservoirs or ponds, and (6) mounds.

Causeways Figure 6 are another earthwork type that spans both sides of the Mamoré River. Linear features might better be used as a broader covering term, to subsume causeways, canals, and fish weirs (which are also referred to as zigzag causeways). These earthworks are associated because of their similarity in form but because the act of construction makes causeways and canals mutually dependent. When building a causeway, the raw material taken from alongside necessarily creates a canal, on either one or both sides. Conversely, the excavation of a canal necessitates the disposal of the fill, which in many cases creates a causeway. The different forms can therefore be thought of as variations on the same kind of linear features, some of which reflect more clearly the construction of the causeway (or causeways) and others of which the excavation of the canal (or canals).

Causeways and **canals** are found more in the southern half of Mojos, both west of the Mamoré

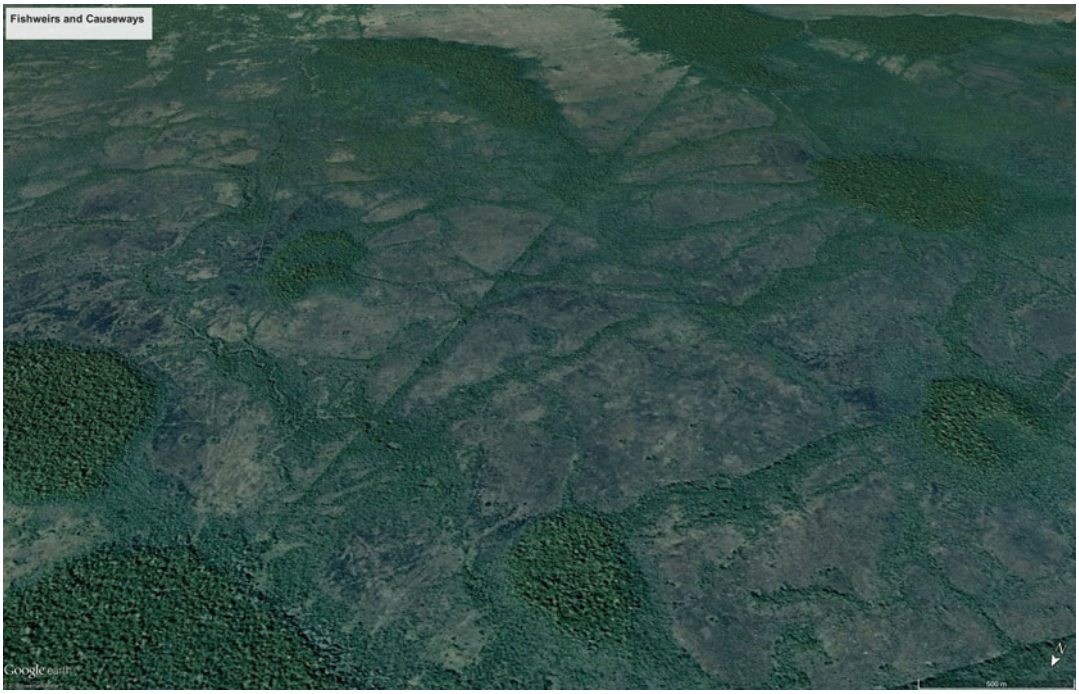

Earthworks of the Llanos de Mojos, Fig. 6 Oblique view of causeways and fishweirs near Baures, Beni, Bolivia. Imagery from Google Earth and DigitalGlobe

in association with raised fields, forest islands, and inhabited mounds and also to the east of the Mamoré River, in association with the many large mounds in that region. Long straight causeways also characterize the Baures Hydraulic Complex to the northeast, where many linear features link large forest islands together. Many ring ditches are found within these large forest islands (Erickson 2010; Prümers et al. 2006), and in turn, the ring ditches are connected by both straight and curving linear ditches.

The marked seasonality of the Mojos forces a wide variety of interpretation on causeways and canals (Erickson and Walker 2009). Because water is retained on the heavy clay soils for so long after a rain or flood, any linear feature necessarily modifies the flow of water across the landscape. For this reason, modern construction includes massive drains, without which roadways would be cut after only a year or two. Pre-Columbian causeways and canals therefore had the potential to drain water away, to encourage it to flow, to impound it, or to mark it. It is probably the case that all of these functions were important in Mojos and more small-scale studies are certainly needed, of how the earthworks affected and were affected by flows of water.

Linear features could also have been used to facilitate travel and communication. In western Mojos, long causeways and sets of causeways link across more than 20 km in one example, and causeways more than 1 km in length are not rare (Denevan 1966). To the east of the Mamoré, causeways connect large mound sites to one another, making a stronger argument of the importance of transportation and communication.

To the west, in many cases forest has covered the causeways, and they are sometimes visible only as thick lines of trees, or as straight edges of large areas of forest. West of the Mamoré, raised fields seem to be directly associated with causeways. In most areas, raised field are found next to causeways, either perpendicular or parallel. In many locations west of the Mamoré, two, three, or four causeways are found in exact parallel, almost suggesting a transitional form between causeways and raised fields.

Many causeways are truly monumental. In addition to routinely surpassing 1 km in length, they are typically much taller and broader than raised fields, from 1–3 m higher than the surrounding pampa, sometimes 5–10 m across, and with a ditch that could add another 1 m of difference between the highest part on the causeway and the lowest part of the canal. In an open, savanna landscape, such a construction made the presence of the builders clear for generations.

Between the larger causeways of the Baures Hydraulic Complex lie the shorter zigzag causeways which Erickson interprets as **fish weirs**, an interpretation recently strengthened by comparison with current fishing traditions that use fish weirs in Zambia (Erickson 2000; McKey et al. 2016). Fish weirs have also been sighted on satellite imagery within the area marked by large raised fields, although they have not been surveyed on the ground. This adds another potential dimension to the spatial and chronological pattern of both fish weirs and large raised fields.

Ring ditches Figure 7 are among the more unusual earthworks in Mojos and have become best known through the aforementioned work of Erickson and Prümers (See also Carson et al. 2015). Ring ditches have also been found in west-central Mojos, and comparable constructions have been published from nearby regions: Acre and Rondonia in Brazil (Saunaluoma 2010), as well as in the Xingu, far to the east. By analogy with ethnohistorical records, a defensive function has been inferred, although there is no direct evidence yet of wooden palisades accompanying the ring ditches. As with causeways, the construction and maintenance of earthworks have an inevitable, hydrological consequence. In some cases ring ditches may have been used or modified to control or make use of water as it flowed into and out of the rivers.

Whatever other function ring ditches may have had, it is certainly the case that the intentional continuation of the ring ditch makes a clear spatial distinction between inside and outside the circle.

Earthworks of the Llanos de Mojos, Fig. 7 Oblique view of ditched fields and ring ditches near Baures, Beni, Bolivia. Imagery from Google Earth and DigitalGlobe

Ring ditch builders inscribed a place, distinguishing it from everything else on the landscape.

Some **reservoirs** or **ponds** could be considered a sort of transitional form of ring ditch. Along the large permanent wetland between the Omi and Yacuma Rivers, reservoirs a few meters across and a meter or two deep occur in circles around mounded, inhabited parts of forest islands (Walker 2008a, 2011a, 2017). Such reservoirs can hold water into July and presumably in some years can hold water year-round. Across the entire region, Denevan noted that many of the forest islands present throughout Mojos had a reservoir or pond immediately adjacent to them. These features await further exploration, especially in light of their potential as reservoirs for artifacts and paleoethnobotanical evidence.

The category of **mounds** encompasses a very wide range of variation, from the monumental mounds described by Denevan, Erickson, and Balée and excavated by Nordenskiöld and then Prümers, to the more modest but widespread mounds that are found throughout Mojos (Nordenskiöld 1913; Erickson 2006; Balée and Erickson 2006; Prümers 2015; Betancourt 2012). Mounds are landscape features that highlight the interpretive contradiction of a distinction between "nature" and "culture." For example, although 75% or more of visited forest islands in west-central Mojos are "artificial," in the sense that they contain ceramics, dark soils, and scorched clay (all indicators of human habitation), they are also "natural" in that they supported communities of plant and animals over the thousands of years that they were used and reused, built, and modified by generations of Mojeños. Of the 52 forest islands on mounds within west-central Mojos, 38 showed evidence of habitation, and it is not unreasonable to suggest that 75% of the other forest islands in that area will also show similar evidence of inhabitation. Forest islands suggest the need for a different categorization of the landscape and landscape features. For example, an island of forest located on the levee of a fossil river which rises about 2 m above the surrounding savanna and which is covered by about 2 m of dark soils with ceramics and burned clay throughout is both a natural and a cultural phenomenon.

East of the Mamoré, the mounds near Trinidad can cover several hectares and can range up to 18 m in height. Much more in line with earlier archaeological expectations, these mounds have drawn archaeological attention for 100 years. They show evidence of an elaborate funerary tradition centered on urn burial, sophisticated ceramic assemblages, and thanks to the work of Prümers and Jaimes-Betancourt, continuous occupation of at least 1,000 years (Mendoza book). Currently, mounds seem to be largely accretionary, in that the bulk of the volume of the mound fill is the result of long-term habitation, rather than a short-term construction event. The results from Loma Mendoza are not representative of all mounds in Mojos, but they do argue for long-term, continuous occupation.

Equally important are the connections between mounds and the landscapes they integrate, which are highlighted by Erickson and Balée's work at Ibibate/Eviato (Erickson 2006; Erickson and Balée 2006). This monumental mound, located inside of a forest, and invisible on satellite imagery and air photos, is associated with a forest vegetation that is clearly marked as artificial through an analysis of the species composition and distribution. This historical-ecological study makes plain that the forests of Mojos are fully as "cultured" as tag more obviously modified savannas. A compilation of recent research from across the Amazon Basin confirms the importance of anthropogenic forestry and concludes that "Domestication shapes Amazonian forests" (Levis et al. 2017: 931).

Finally, the presence of shell, carbon, and tools is suggestive of much older inhabitation of these locations that later became forest islands and mounds. There is a strong spatial momentum to the inhabitation of mounds and other earthworks. The shell mound phase of forest island habitation, which may extend back to 10,000 years ago, suggests that the domestication of the landscape is a long-term process (Lombardo et al. 2013b).

These categories of earthworks are analogous to the letters of the alphabet or the thematic elements in a picture or illustration, but the spatial arrangement of such elements adds another order of complexity to the language. The way that

communities of people created and used individual elements of the landscape varies with the spatial context of those elements. For example, a group of raised fields must be interpreted differently if it surrounds a forest island next to the river or if it stands in the savanna, far from the river, and any forest island.

Landscapes as Composites

Of this wide variety of different earthwork types, not all appear in all possible combinations. There are 11 combinations present out of a possible 127. Four out of 7 singles are represented, 7 out of a possible 21 pairs are represented, 1 out of 35 possible triples are represented, and no combinations of 4, 5, 6 or 7 elements for a total of 12 out of 127 combinations, or less than 10%. The most ubiquitous earthwork type is formed by causeways and canals (considered together) which are found in association with ring ditches, mound fields, raised fields, and fish weirs. Equally ubiquitous are ring ditches, which have been found in association with causeways/canals, fish weirs, large raised fields, and ditched fields. At the other end of the spectrum, the least connected types of earthworks are ditched fields, found only in association with ring ditches, and raised fields, which are found only in association with causeways and canals.

Setting aside the distribution of mounds, which may co-occur with all other earthwork types, only four types of earthworks appear in isolation: ditched fields, mound fields, large raised fields, and canals/causeways. One combination of earthwork types includes three elements: the ring ditches, causeways, and fish weirs of the Baures Hydraulic Complex. There are additionally six other combinations of two kinds of earthworks, all of which beg further investigation, and several of which are known only from remote sensing. As imagery improves, it is possible that other combinations of elements will emerge.

Of these composites, the pairing of raised fields and causeways is perhaps the best known, covering more than 10,000 km^2, centered on San Ignacio de Moxos. Raised fields of this type (which here includes both the tall 5 m by 50 m by 1 m fields as well as shallower gridiron fields) seem to appear only with causeways nearby and usually directly associated.

The combination of mound fields and linear features can be seen in several locations and seems to be characteristic of the center of the overall distribution of mound fields. This composite pattern is known only from satellite imagery.

The conjunctions of large raised fields with each of mound fields (to the west) and ditched fields (to the north) are a function of the "frontier" or boundary zone between the large spatial distribution of each of these three distinct categories of agricultural fields. These zones of contact are not at all larger but could be indicative of chronological relationships.

The relationships between large raised fields and ring ditches are clear in the southern part of the distribution of large raised fields, but not in the northern half. These ring ditches seem to be significantly older than those found to the east of the Mamoré River (Walker 2008; Erickson 2010; Prümers et al. 2006).

The combination of between large raised fields and fish weirs has not been verified on the ground, although the visual evidence is clear. The putative fish weirs west of the Mamoré are laid out between areas of high ground covered with raised fields, rather than the forest islands of the Baures Hydraulic Complex.

Finally, the combination of ring ditches and ditched fields likewise awaits archaeological fieldwork, although the visual evidence is clear. Some investigations have already been made for ditched fields in this area, although not in direct association with ring ditches.

Current Debates

Agriculture and Population

A wide variety of different types of agricultural earthworks spread across tens of thousands of square kilometers raises questions about the relationship between agriculture and population. The question might be thought about both as a matter of how many people could a landscape of raised fields support and also how many people such a landscape required in order to be sustained.

An earlier study (Walker 2004) of a study area in one of the more densely packed areas of large raised fields in Mojos, near the confluence of the Iruyañez and Omi Rivers, it was argued that the population was on the order of 100 times greater than the population living in that area in 1996–1997. This estimate was based on the number and size of raised fields present in the area and also the number of forest islands with evidence of pre-Columbian habitation. Continued test excavation in forest islands along the Yacuma and Rapulo Rivers suggests that the pattern of inhabited forest islands continues throughout the area characterized by large raised fields. Although not all areas of Mojos have the same density of earthworks, the archaeological evidence in west-central Mojos, throughout the lower Iruyañez Omi, Yacuma, and Rapulo Rivers, is compatible with dense populations.

The enduring difficulty with interpreting archaeological landscapes is the problem of chronology. Dating earthworks conclusively requires excavation and analysis, and with more than 40,000 large raised fields in west-central Mojos (as only one example), it is not feasible to date all of them. On the other hand, it is clear that the current landscape of earthworks has endured for at least several centuries, since abandonment. Paleoethnobotanical evidence suggests that raised fields came into use no later than AD 300 in west-central Mojos. Rather than showing a snapshot of agriculture at any single point in the past, extant spatial patterns are instead a palimpsest indicative of the agricultural landscape at the time of abandonment. The connections between raised fields and associated population are complicated by the impossibility of knowing if all the fields were in use at any one time. Spatial analysis helps to supplement direct dating of earthworks.

If west-central Mojos was home to something on the order of 100,000 people, similar ranges of variation might obtain for the other combinations of earthworks in Mojos. An overall estimate for the entire region might range above 200,000 but perhaps not as high as 1,000,000 people at any one time. It is unwise to specify a more exact estimate, based on currently available archaeological evidence. The combination of earthwork mapping with forest island excavation and testing suggests that such a range is reasonable. It is not clear that the Mojos farmers were near to any kind of a carrying capacity, since many areas suitable for raised field construction do not appear to have been used for that purpose. A large, seasonally mobile population, perhaps with great mobility over longer periods of time, presents an interesting set of implications for the region and for neighboring regions.

If Mojos included several successful agricultural economies, perhaps in association with related hunting and fishing practices, connected not only through overland but riverine routes, Mojos communities may have had a significant effect on neighboring highland communities, as well as other Amazonian regions. At a regional scale, Mojos could have served as a refuge for populations from neighboring regions, similar to the relationship between the highlands of Southeast Asia in relationship to neighboring states in lowland valleys (Scott 2009). Little direct archaeological and ethnohistorical information is available, but the relationship between the Inca and cultures in the Amazonian lowlands suggests that although the Inca were interested in contact with Mojos, they did not extend control over the region.

A more positive statement is that the evidence from the archaeological landscape establishes that productive and varied agricultural practices were developed and sustained over a time span of centuries, perhaps millennia. Although Mojos earthwork builders undoubtedly moved between different fields and forest islands throughout the year, and across the decades, Mojos was not an isolated zone but a place that supported a variety of people, plants, and animals, gathered into communities and practicing traditions that were created and expressed through diverse material, botanical, and linguistic practices.

Paleoethnobotany and Domestication

If our understanding of the composition of Mojos as a landscape or a set of landscapes is improved through analysis of remote sensing data, then the best prospects for future work require the integration of paleoethnobotanical data, to understand

the palette of plants that gave color to these sketches. Pollen cores, phytolith analyses, and the recovery of starch grains have given us valuable clues from several locations, but we have yet to assemble these clues into more comprehensive histories of earthworks, either in isolation at the minimal level, or in combination at larger spatial scales.

The combination of cutting edge paleoethnobotanical research and landscape archaeology is beginning to blossom, and the prospects for continued integration are very bright. Paleoethnobotanists use pollen, phytoliths, and starch grains, in addition to macro remains such as gourd fragments or corn cobs, to characterize and analyze plant communities that grew in different contexts (Brugger et al. 2016; Bruno 2010; Bush et al. 1989; Dickau et al. 2012, 2016; Iriarte et al. 2012; Rodrigues et al. 2015; Watling et al. 2015; Whitney et al. 2013, 2014). To date, this has established connections between raised fields and inhabited forest islands, mounds, and ring ditches and outlined the suite of plants that may have been cultivated in several cases. Because paleoethnobotanists have good reason to believe that several plants, including manioc (*Manihot esculenta*) and peanut (*Arachis* sp.), may have been domesticated in the Southwest Amazon (Clement et al. 2016; Isendahl 2011; Oliver 2008; Piperno and Pearsall 1998), the continued integration of paleoethnobotany into archaeological research will help establish the chronology of agriculture in Mojos, including the potential role of maize-based and bitter-manioc-based agriculture (neither of which seem central to local cuisine or ethnohistory), which are important in many other regions of South and Central America. In comparison to other examples of long agricultural sequences in the Americas and around the world, Mojos contains (1) clear evidence of domesticated landscapes (at least in later times) and (2) long-term use of maize and potentially manioc.

The conjunction of the southwestern Amazon as a potential locus of plant domestication, and Mojos as a set of agricultural landscapes, raises the question of how the domestication of plants articulated with the domestication of the landscape.

Evidence from pollen cores as well as phytoliths and starch grains suggest that Mojeño peoples were cultivating a wide variety of crops and taking advantage of an even wider spectrum of plants. Maize (*Zea mays*), an important food crop whose microbotanical remains have been well studied, appears in Mojos in recent paleobotanical studies (Whitney et al. 2014; Dickau et al. 2012). Maize phytoliths have also been recovered from raised field contexts, so it seems clear that maize was part of raised field farming. From pollen cores nearby, evidence of sweet potato and the tree crop ice cream bean (*Inga* sp.) suggest a wide range of consumed plants. Microbotanical remains from other locations to the south and east suggest a range of crops, including manioc. An early study of botanical remains showed the presence of huallusa (*Xanthosoma sagittifolium*), guayusa (*Ilex paraguariensis*), and urucu (*Bixa orellana*), a root crop, a stimulant, and a colorant or condiment (Erickson 1995). The overall picture is one of diversity in domesticated and cultivated plants. Further research is necessary, but it seems likely that the diversity of earthwork types is matched by a diversity of useful plants and perhaps a comparable diversity of cuisines based on those plants.

Different plants have different requirements from the soil, and raised fields (originally defined as constructions that improve the quality of soil for agricultural purposes) had different effects on soil that could have been useful in different ways. Manioc, an exceptional source of carbohydrates and a staple food for hundreds of millions today, requires good drainage but can grow in poor soils. In order for manioc to be continually harvested, the plants need to protected from flooding, which rots the tubers. Many raised fields clearly work to improve drainage, which would make them suitable for manioc. Maize, another staple, has stricter requirements for soil nutrients. The crop must be harvested all at once, but agricultural fields do not have to remain in use for the entire year. Other plants of course have their own drainage and nutritional requirements, as well as annual or perennial life cycles. Denevan posited that maize was probably not important in savanna cultivation, because of the quality of the soil, but recent

paleoethnobotanical evidence establishes that maize was present. Differences at a smaller scale could be decisive, however, for example, if fields are near or far from the river, or near or far from forest islands, where presumably food processing and cooking took place and houses were inhabited. It is likely that raised fields were home to many different plants over their use-lives.

Another category of plant use in Mojos is the industrial use of plants, for many purposes, including house construction, spinning and weaving, tools, canoes, and basketry. Although baskets have not been recovered in excavation and are unlikely to preserve, their impressions are often found on ceramics, confirming the presence of a strong basketry tradition in the past. An example from the ethnohistoric literature also confirms the importance of plants for Mojos toolmaking: the "Cayuvava" basket is a hand-carried woven fish trap that used both slats of palm wood and basketry for joining. The Mojo and Baure were famous to the Jesuit missionaries as weavers of cotton cloth, and wore large cotton tunics or *tipoy*, which suggests the importance of weaving, as does the ubiquity of spindle whorls in some parts of Mojos (along the Apere River, for example; see also Betancourt 2012).

It is possible that different types of earthworks were associated with different sets of crops or with different plants at different times in the flood cycle. Connections across Mojos by land and water suggest that these differences might have contributed to the exchange of plants, both harvested products but also seeds and cuttings, this could have made Mojos a test garden for the modification and domestication of a wide range of plants, not only those that might have first been domesticated in the Southwest Amazon but also a range of others from around the Americas.

Language and Ethnicity

The association of specific spatial patterns with cultural and linguistic groups like the Mojo, Baure, Movima, Cayuvava, Itonama, and Canichana is intriguing, particularly as linguistic evidence suggests a long tenure for the contact between these language groups as part of the Guaporé/Mamoré linguistic area. There can be no doubt that the ancestors of these contemporary communities build the pre-Columbian earthworks. But the historical complexity of 300 years of post-colonial history, on top of perhaps 200 years of post-Columbian history, without any written records, makes direct associations problematic at this time.

The Amazon in general encompasses a high level of linguistic diversity, with several "hot spots" or areas where this diversity is as high as anywhere in the world. In the Xingu, the Vaupes and the Guaporé/Mamoré region, anthropological linguists have identified communities of speakers of diverse languages. These situations of language contact and interaction appear to have been relatively stable over many hundreds or thousands of years. Some linguistic research suggests that these areas of linguistic diversity have a character distinctive to Amazonia. In the Vaupes, and to an extent in Mojos as well, it is possible to characterize the long-term relations between languages found within the same area (Crevels and Van der Voort 2008; Michael and Epps 2016). The Guaporé/Mamoré linguistic area, of which Mojos forms about half, contains more than 50 distinct languages, from 8 stocks, with 11 isolates. Isolates are languages which after linguistic study cannot be classified with other languages into a taxonomic relationship.

Mojo and Baure are the two Mojos language classified with the Arawak language family. Much of the ethnohistoric literature focuses on the speakers of these languages, in particular the account of Eder, from whom we have the best ethnohistoric descriptions, which focus on the Baure, from the early 1700s (Eder 1985). These Arawak speakers were of interest to the Jesuits because of their practice of wearing cotton tunics and eventually becoming more acclimated to life in the Missions. Van Valen (2013) documents some of the conflicts in the early colonial period, including a rebellion by the Cayuvava, in which the mission records for that group were entirely destroyed. The ethnohistoric record has obviously been shaped by history. Even as we take advantage of the available descriptions, the bias of the sources toward the Arawak-speaking Mojo and Baure should not obscure the importance of other groups in pre-Columbian Mojos.

In the Guaporé/Mamoré region, languages show signs of having been in contact for at least several centuries, not through shared vocabulary, but because they share distinctive grammar structures (Michael and Epps 2016). Although people might have heard or spoken several languages, they did not use words from one language while speaking another. "Spanglish," to use a common expression for this kind of linguistic mixing, would not have been approved of in pre-Columbian Mojos. Perhaps this set of relationships between languages and speakers of languages was associated not only with many languages existing within a small space but also with individual speakers using several languages. From other Amazonian examples, it seems that multilingual settlements, even at a small scale, are not only viable but sustainable.

Although the spatial patterns of different kind of earthworks are distinct, in an analogous way to the clear distinctions made between Mojo, Baure, Movima, Cayuvava, Itonama, and Canichana in the nineteenth and twentieth century, at this time it is not clear that any language can be connected to a kind of earthworks. Two avenues of research should address this question. First, continued investigation of the paleoethnobotany and experimental archaeology of each of the different kinds of earthworks. Causeways and ditched fields, for example, cut across the traditional territories of modern indigenous groups, but it may be possible to connect those earthworks to particular kinds of agriculture, particular plants, or other distinctive practices. Focusing more on particular traits, like the Cayuvava *covó* or fishing basket, differences between *chicha moreno* and *chicha de maní*, or different ways of preparing manioc (*chivé* in Santa Ana or *aruchipava* in Exaltación), could help establish more connections between the archaeological record and the historical record. There is no reason to assume that these connections cannot one day be established.

Another starting point is to examine the archaeological record for correlates for the kind of cosmopolitan, multilingual mix of cultural traditions suggested by the combination of the record of landscape diversity, and the pattern of linguistic diversity. Because groups of people were capable of moving across the landscape, they could have alternated between seasons of concentration along the rivers, taking advantage of the ability to bring together people, but also food and drink, and seasons of dispersal, perhaps up the rivers and wetlands farther from the main tributaries, onto smaller forest islands or into the larger forests. The period of time during which such a multilingual ecumene was present is perhaps difficult to date, but correlations with other kinds of diversity would be revealing. Such studies would necessarily include comparisons with areas outside Mojos.

Mojos in Amazonia

Fieldwork and scholarship in other parts of the Americas show that Mojos is not unique in having widespread evidence of anthropogenic landscapes (Erickson 2008). Mojos may seem a unique expression of a sort of hybrid identity, part Andean and part Amazonian, combined in a unique and nonrepresentative savanna environment, but pre-Columbian communities across the Americas used fire, earth, and water to build and maintain landscapes over thousands of years. Their ideas about their relationships with plants and animals were part of decisions they made to improve the soil for farming and gather together certain kinds of plants and animals (and fish). Mojo is distinctive because earthworks are more visible there. Throughout the Americas and the world, indigenous communities created the landscape by inhabiting it. Not just modifying it on some technical criteria but also by expressing or evading their own meanings.

Mojos is both archaeologically distinct and part of a larger Amazonian world. On the other hand, it has been and remains in contact with Andean peoples to the south and west, with the Altiplano only a few hundred kilometers away. Rather than analyze Mojos as either an exception to or the epitome of a theoretical expectation for the Amazon, it is better seen as the product of a unique history that combines natural and cultural categories.

Mojo has been presented as a unique region, one that, because of raised fields and other earthworks, is exceptional and not representative of Amazonian landscapes in general. An example

of this interpretation of Mojos' exceptionalism are (McMichael et al. 2017; Levis et al. 2017) in which Mojos is scored as an entirely anthropogenic landscape in a continental model for pre-Columbian land use. The model uses archaeological "sites" as points with a value of 1, and an area in Mojos covering more than 100,000 km^2 is also designated as a 1 within the geospatial modeling. In sum, Mojos is taken to be different from all other areas in the Amazon, because of its unique, human-created landscape. In other examples, Mojos is defined out of the Amazon, as an area that is more closely related to the Andes, because the ethnographically and archaeological known cultures are sufficiently different from other Amazonian cases so as to warrant an entirely different designation.

Another reason that Mojos is sometimes excluded from consideration as part of Amazonia is that it lies upstream of the Madeira-Mamoré rapids, which prevent navigation by large river boats, and, in the nineteenth century, were a significant barrier for upstream travel into the region. These rapids do have an effect on river travel, as well as the biogeography of fish, for example. But the rapids can be and were traveled in the nineteenth century, and the presence of a wide variety of language groups upstream of the rapids indicates that travel into and out of Mojos from adjacent areas did in fact occur in the pre-Columbian past.

This characterization of Mojos as unique is less useful for three reasons. First, the region is unequivocally part of the Amazon basin in a hydrological, climatic, and geographic sense. Second, it is demonstrably false that Mojos was continuously covered with inhabited space, at least in the way suggested by outlining it as a single "site." A more nuanced approach than the splitting of space between nature and culture is required. Third and most important, the archaeological record demonstrates significant continuities between Mojos and nearby regions, as well as other locations with Amazonia more generally.

Geoglyphs found in the nearby departments of Acre and Rondônia in Brazil show that similar earthwork building activities were spread across the southwestern Amazon, from Acre to Amazonas department (Pärssinen et al. 2009). Further to the east, circular earthworks and possibly managed forests have also been documented in the Xingu (Heckenberger 2008). In the initial rush of documentation of raised fields in the neotropics, Ecuador, Colombia, Venezuela, the Guianas, and highland Peru and Bolivia were all noted as parallel cases, in South America. Since that time, more fields have been found, and existing areas have been understood to be larger and more densely farmed. It is certainly the case that Mojos is a uniquely complicated and large-scale example of landscape engineering, but this may have more to do with the visibility of fields in the savanna. Similar landscapes have been found and continue to be documented across the Americas.

The archaeological landscapes of Mojos are clearly a unique combination of earthwork types, assembled into different patterns over many centuries. The ethnohistoric record shows that Mojos is a distinctive area with a very high diversity of language groups. The material culture record shows that a wide variety of material cultures are present across the region. Mojos is a diverse and distinctive place, but it is not unconnected to regions that surround it, in particular the neighboring Amazonian regions.

Blueprints for the Future

The restoration, rehabilitation, or reactivation of pre-Columbian agricultural technology is a goal that has interested inhabitants and scholars for many years. Although the political, environmental, and economic challenges facing such an effort are serious, tremendous potential for economic development remains. The potential is great for a fruitful connection between the ecological, archaeological, and agronomic study of agricultural techniques and the economic development of eastern Bolivia (Lombardo et al. 2011, 2012; Renard 2012a, b; McKey et al. 2010).

One of the greatest attractions of raised field agriculture as a development alternative is the low-technology methods which the farmers originally used to create and maintain the raised fields. Agricultural strategies which are less land intensive, but with higher inputs, are currently coming

into play in eastern Bolivia and Amazonia more generally. Cattle ranching has the longest post-Columbian tenure and takes advantage of a very large area with minimal labor. During the Jesuit period, a sizable herd of feral cattle represented the main human impact on the savanna, a herd that was used both by the mission residents, and most likely by groups outside the mission system. Cattle ranching continues today as the main agricultural strategy in Mojos. The form of agriculture which seems most likely to replace ranching is soy farming, which dominates in Santa Cruz province to the south. The techniques used by soy farmers, working for a global market, include tractors, seed varieties, and all the other correlates of mechanized, global agriculture.

Raised field agriculture clearly stands in a different trajectory from either of these two alternatives, but the most important difference may not be the distinct and more expensive inputs. A more significant pair of differences is probably that agricultural systems based on earthworks probably took place with more locally dense populations and certainly with different concepts of relating people and land. Because pre-Columbian societies operated without money, their economic systems, which presumably surrounded, created, and depended on raised field agriculture, were different from the current economy, within which any restored raised field agriculture would have to thrive.

Efforts to study raised fields with an eye to rebuilding and reusing them are underway. Local agronomic and ecological studies continue to document and analyze the processes that create and affect raised field soils, plant, and animal communities. Several locations around Mojos have seen the creation of experimental raised fields, including the Biological Research Station of the Beni, near Totaizal; Comunidad Bermeo, along the San Borja-Trinidad road; the Museo Etnoarqueologico "Kenneth Lee" in Trinidad; and the Comunidad San Lorenzo near Santa Ana del Yacuma. In each case, raised fields were built on a modern plan derived from pre-Columbian models. Field dimensions, crops, and fertilizers have been tested and compared. However, an important variable that has yet to be fully recognized is to consider the original placement of pre-Columbian raised fields.

If pre-Columbian raised fields were renovated and recreated in place, it would tackle the question of whether and how the original raised field farmers solved their own agricultural problems and how the original field locations and dimensions were part of these solutions. Field height on a particular landscape can be recovered through careful excavation, even if it is not archaeological excavation, and at least in some places, a doubling of topsoil can be easily created. The locations of archaeological raised fields are now easy to pinpoint using satellite imagery that has been published into the public domain, and with internet access increasing throughout the Amazon, the technical resources are in place to assist interested parties in renovating earthworks.

Political and economic challenges are much more significant than the technical ones. Most raised fields are on private land, and indigenous communities in Mojos do not usually have access to the large areas of open savanna where many raised fields are found. The cases mentioned above have found creative solutions. To build and maintain fields, a way reminiscent of how they were used in the past requires more labor per hectare than is usually available in the countryside. If many ranches cover about 10–50 km^2, and they are usually inhabited by 1–10 cowboys, and perhaps 50–500 cattle, this might correspond to the same 10–50 km^2, which about 0.1–5 km^2 of raised fields, and 100–1000 people, with no cattle, and many more deer, capybara, agouti, and other animals.

It is unlikely that Bolivians will adopt a pre-Columbian lifestyle in the early twenty-first century, so for raised field agriculture to become a part of development, a different set of relationships between landscape and society will have to emerge. This will call for communication between different stakeholders and creative ways to make raised field agriculture profitable. Although the forms of those solutions are not clear, one idea might be a link between pre-Columbian agriculture and the creation of a regional cuisine. Links between cuisine, agriculture, archaeology, and ecology could function through the strengthening of tourism in Mojos.

Cross-References

- ▶ Agricultural and Social Earthworks in the Guianas
- ▶ Earthworks of the Amazon
- ▶ Geometric Earthworks of Western Amazonia

References

Balée, William L., and Clark L. Erickson. 2006. *Time and complexity in historical ecology: studies in the neotropical lowlands*. Columbia University Press: New York.

Brugger, Sandra O., Erika Gobet, Jacqueline F.N. van Leeuwen, Marie-Pierre Ledru, Daniele Colombaroli, W.O. van der Knaap, Umberto Lombardo, Leonor Rodrigues, and A. Giesche. 2016. Long-term man–environment interactions in the Bolivian Amazon: 8000 years of vegetation dynamics. *Quaternary Science Reviews* 132: 114–128.

Bruno, Maria C. 2010. Carbonized plant remains from Loma Salvatierra, department of Beni, Bolivia. *Zeitschrift für Archäologie Außereuropäischer Kulturen* 3: 153–208.

Bush, Mark B., D.R. Piperno, and P.A. Colinvaux. 1989. A 6,000 year history of Amazonian maize cultivation. *Nature* 340: 303–305.

Carson, John F., Jennifer Watling, Francis E. Mayle, Bronwen S. Whitney, José Iriarte, Heiko Prümers, and J.D. Soto. 2015. Pre-Columbian land use in the ring-ditch region of the Bolivian Amazon. *The Holocene* 25 (8): 1285–1300.

Clement, Charles R., R.D. Picanço, A. Alves-Pereira, G.S. Mühlen, M. Cristo-Araújo, A. Moreira Priscila, J. Lins, and V.M. Reis. 2016. Crop domestication in the upper Madeira River basin/Domesticação de plantas cultivadas na bacia do alto rio Madeira. *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* 11 (1): 193.

Crevels, Mily, and Hein van der Voort. 2008. The Guaporé-Mamoré region as a linguistic area. In *From linguistic areas to areal linguistics*. Studies in language companion series (SLCS). Vol. 90, ed. Pieter Muysken (ed. and introd.), 151–179. Amsterdam: Benjamins.

Denevan, William M. 1966. *The aboriginal cultural geography of the Llanos de Mojos of Bolivia*, Ibero-Americana. Vol. 48. Berkeley: University of California Press.

Denevan, William M. 2001. *Cultivated landscapes of native Amazonia and the Andes*. Oxford: Oxford University Press.

Dickau, Ruth, Maria C. Bruno, José Iriarte, Heiko Prümers, Carla Jaimes Betancourt, Irene Holst, and Francis E. Mayle. 2012. Diversity of cultivars and other plant resources used at habitation sites in the Llanos de Mojos, Beni, Bolivia: Evidence from macrobotanical remains, starch grains, and phytoliths. *Journal of Archaeological Science* 39 (2): 357–370.

Dickau, Ruth, J. Iriarte, T. Quine, D. Soto, and F. Mayle. 2016. Reconstructing pre-Colombian agricultural practices in the Bolivian savannah: Stratigraphic and phytolith evidence from raised fields at Campo España, Western Llanos De Moxos. *Cadernos do LEPAARQ* 13 (25): 224–267.

Eder, Francisco Javier. 1985. *Breve Descripción de Las Reducciones de Mojos* (trans: Barnadas, Josep María). Cochabamba: Historia Boliviana.

Erickson, Clark L. 1995. Archaeological methods for the study of ancient landscapes of the Llanos de Mojos in the Bolivian Amazon. In *Archaeology in the lowland American tropics: Current analytical methods and applications*, ed. Peter W. Stahl, 66–95. Cambridge: Cambridge University Press.

Erickson, Clark L. 2000. An artificial landscape-scale fishery in the Bolivian Amazon. *Nature* 408 (6809): 190–193.

Erickson, Clark L. 2006. The domesticated landscapes of the Bolivian Amazon. In *Time and complexity in historical ecology*, ed. William L. Balee and Clark L. Erickson, 235–278. New York: Columbia University Press.

Erickson, Clark L. 2008. Amazonia: The historical ecology of a domesticated landscape. In *The handbook of South American archaeology*, ed. Helaine Silverman and William H. Isbell, 157–183. New York: Springer.

Erickson, Clark L. 2010. The transformation of environment into landscape: The historical ecology of monumental earthwork construction in the Bolivian Amazon. *Diversity* 2 (4): 618–652.

Erickson, Clark L., and W. Balée. 2006. The historical ecology of a complex landscape in Bolivia. In *Time and complexity in historical ecology*, ed. William L. Balée and Clark L. Erickson, 187–234. New York: Columbia University Press.

Erickson, Clark, and John Walker. 2009. Precolumbian causeways and canals as Landesque Capital. In *Landscapes of movement: Trails, paths, and roads in anthropological perspective*, ed. James Snead, Clark Erickson, and Andrew Darling, 232–252. Philadelphia: University of Pennsylvania Press.

Heckenberger, Michael J., J. Christian Russell, Carlos Fausto, Joshua R. Toney, Morgan J. Schmidt, Edithe Pereira, Bruna Franchetto, and Afukaka Kuikuro. 2008. Pre-Columbian urbanism, anthropogenic landscapes, and the future of the Amazon. *Science* 321 (5893):1214–1217.

Iriarte, José, Mitchell J. Power, Stéphen Rostain, Francis E. Mayle, Huw Jones, Jennifer Watling, Bronwen S. Whitney, and Doyle B. McKey. 2012. Fire-free land use in pre-1492 Amazonian savannas. *Proceedings of the National Academy of Sciences of the USA* 109 (17): 6473–6478.

Isendahl, Christian. 2011. The domestication and early spread of manioc (*Manihot esculenta crantz*): A brief synthesis. *Latin American Antiquity* 22 (4): 452–468.

Betancourt, Carla Jaimes. 2012. *La Ceramica de la Loma Salvatierra*. La Paz: DAI.

Levis, C., F.R.C. Costa, F. Bongers, M. Peña-Claros, C.R. Clement, A.B.. Junqueira, E.G. Neves, E.K. Tamanaha, F.O.G. Figueiredo, R.P. Salomão, C.V. Castilho, W.E. Magnusson, O.L. Phillips, J.E. Guevara, D. Sabatier, J.-F. Molino, D. Cárdenas López, A.M. Mendoza, N.C.A. Pitman, A. Duque, P. Núñez Vargas, C.E. Zartman, R. Vasquez, A. Andrade, J.L. Camargo, T.R. Feldpausch, S.G.W. Laurance, W.F. Laurance, T.J. Killeen, H.E. Mendonça Nascimento, J.C. Montero, B. Mostacedo, I.L. Amaral, I.C. Guimarães Vieira, R. Brienen, H. Castellanos, J. Terborgh, M. de Jesus Veiga Carim, J.R. da Silva Guimarães, L. de Souza Coelho, F.D. de Almeida Matos, F. Wittmann, H.F. Mogollón, G. Damasco, N. Dávila, R. García-Villacorta, E.N.H. Coronado, T. Emilio, D. de Andrade Lima Filho, J. Schietti, P. Souza, N. Targhetta, J.A. Comiskey, B.S. Marimon, B.-H. Marimon, D. Neill, A. Alonso, L. Arroyo, F.A. Carvalho, F.C. de Souza, F. Dallmeier, M.P. Pansonato, J.F. Duivenvoorden, P.V.A. Fine, P.R. Stevenson, A. Araujo-Murakami, C.G.A. Aymard, C. Baraloto, D.D. do Amaral, J. Engel, T.W. Henkel, P. Maas, P. Petronelli, J.D. Cardenas Revilla, J. Stropp, D. Daly, R. Gribel, M. Ríos Paredes, M. Silveira, R. Thomas-Caesar, T.R. Baker, N.F. da Silva, L.V. Ferreira, C.A. Peres, M.R. Silman, C. Cerón, F.C. Valverde, A. Di Fiore, E.M. Jimenez, M.C. Peñuela Mora, M. Toledo, E.M. Barbosa, L.C. de Matos Bonates, N.C. Arboleda, E. de Sousa Farias, A. Fuentes, J.-L. Guillaumet, P. Møller Jørgensen, Y. Malhi, I.P. de Andrade Miranda, J.F. Phillips, A. Prieto, A. Rudas, A.R. Ruschel, N. Silva, P. von Hildebrand, V.A. Vos, E.L. Zent, S. Zent, B.B.L. Cintra, M.T. Nascimento, A.A. Oliveira, H. Ramirez-Angulo, J.F. Ramos, G. Rivas, J. Schöngart, R. Sierra, M. Tirado, G. van der Heijden, E.V. Torre, O. Wang, K.R. Young, C. Baider, A. Cano, W. Farfan-Rios, C. Ferreira, B. Hoffman, C. Mendoza, I. Mesones, A. Torres-Lezama, M.N.U. Medina, T.R. van Andel, D. Villarroel, R. Zagt, M.N. Alexiades, H. Balslev, K. Garcia-Cabrera, T. Gonzales, L. Hernandez, I. Huamantupa-Chuquimaco, A.G. Manzatto, W. Milliken, W.P. Cuenca, S. Pansini, D. Pauletto, F.R. Arevalo, N.F. Costa Reis, A.F. Sampaio, L.E. Urrego Giraldo, E.H. Valderrama Sandoval, L. Valenzuela Gamarra, C.I.A. Vela, and H. Ter Steege. 2017. Persistent effects of pre-Columbian plant domestication on Amazonian forest composition. *Science* 355 (6328): 925.

Lombardo, Umberto, and Heiko Prümers. 2010. Pre-Columbian human occupation patterns in the eastern plains of the Llanos de Moxos, Bolivian Amazonia. *Journal of Archaeological Science* 37 (8): 1875–1885.

Lombardo, Umberto, Elisa Canal-Beeby, Seraina Fehr, and Heinz Veit. 2011. Raised fields in the Bolivian Amazonia: A prehistoric green revolution or a flood risk mitigation strategy? *Journal of Archaeological Science* 38 (3): 502–512.

Lombardo, Umberto, Jan-Hendrik May, and Heinz Veit. 2012. Mid-to late-Holocene fluvial activity behind pre-Columbian social complexity in the Southwestern Amazon basin. *The Holocene* 22 (9): 1035–1045.

Lombardo, Umberto, Sebastian Denier, Jan-Hendrik May, Leonor Rodrigues, and Heinz Veit. 2013a. Human–environment interactions in pre-Columbian Amazonia: The case of the Llanos de Moxos, Bolivia. *Quaternary International* 312: 109–119.

Lombardo, Umberto, Katherine Szabo, José M. Capriles, Jan-Hendrik May, Wulf Amelung, Rainer Hutterer, Eva Lehndorff, Anna Plotzki, and Heinz Veit. 2013b. Early and middle Holocene hunter-gatherer occupations in Western Amazonia: The hidden shell middens. *PLoS One* 8 (8): 1–14.

McKey, Doyle, Stéphen Rostain, José Iriarte, Bruno Glaser, Jago Jonathan Birk, Irene Holst, and Delphine Renard. 2010. Pre-Columbian agricultural landscapes, ecosystem engineers, and self-organized patchiness in Amazonia. *Proceedings of the National Academy of Sciences* 107 (17): 7823–7828.

McKey, Doyle B., Mélisse Durécu, Marc Pouilly, Philippe Béarez, Alex Ovando, Mashuta Kalebe, and Carl F. Huchzermeyer. 2016. Present-day African analogue of a pre-European Amazonian floodplain fishery shows convergence in cultural niche construction. *Proceedings of the National Academy of Sciences* 113 (52): 14938–14943.

McMichael, Crystal N.H., Frazer Matthews-Bird, William Farfan-Rios, and Kenneth J. Feeley. 2017. Ancient human disturbances may be skewing our understanding of Amazonian forests. *Proceedings of the National Academy of Sciences* 114 (3): 522–527.

Metraux, Alfred. 1942. *Native tribes of eastern Bolivia and western Matto Grosso*. Bureau of American Ethnology Bulletin 134. BAE, Washington, DC.

Michael, Lev David, and Patience Epps. 2016. The areal linguistics of Amazonia. In *The handbook of areal linguistics*, 1–28. Berkeley: University of California Press.

Nordenskiöld, Erland. 1913. Urnengraber und mounds im Bolivianischen Flachlande. *Baessler Archiv* 3 (5): 205–255.

Oliver, José R. 2008. The archaeology of agriculture in ancient Amazonia. In *The handbook of South American archaeology*, ed. Helaine Silverman and William Isbell, 185–216. New York: Springer.

Pärssinen, Martti, Denise Schaan, and Alceu Ranzi. 2009. Pre-Columbian geometric earthworks in the upper Purus: A complex society in Western Amazonia. *Antiquity* 83 (322): 1084–1095.

Piperno, Dolores R., and Deborah M. Pearsall. 1998. *Origins of agriculture in the lowland neotropics*. San Diego: Academic.

Prümers, Heiko. 2015. *Loma Mendoza: Las Excavaciones de los años 1999–2002*. La Paz: Deutsches Archäeologiches Institut.

Prümers, Heiko, and Carla Jaimes Betancourt. 2014. 100 Años de Investigación Arqueológica En Los Llanos de Mojos. *Arqueoantropológicas* 4 (4): 11–54.

Prümers, Heiko, Carla Jaimes Betancourt, and Ruden Plaza Martínez. 2006. Algunas Tumbas Prehispánicas de Bella Vista, Prov. Iténez, Bolivia. *Zeitschrift Für Archäologie Aus Sereuropäischer Kulturen* 1: 251–284.

Renard, Delphine, José Iriarte, Jago J. Birk, Stephen Rostain, Bruno Glaser, and Doyle McKey. 2012a. Ecological engineers ahead of their time: The functioning of pre-Columbian raised-field agriculture and its potential contributions to sustainability today. *Ecological Engineering* 45: 30–44.

Renard, Delphine, Jago J. Birk, Bruno Glaser, José Iriarte, Gilles Grisard, Johannes Karl, and Doyle McKey. 2012b. Origin of mound-field landscapes: A multi-proxy approach combining contemporary vegetation, carbon stable isotopes and phytoliths. *Plant and Soil* 351 (1/2): 337–353.

Rodrigues, Leonor, Umberto Lombardo, Seraina Fehr, Frank Preusser, and Heinz Veit. 2015. Pre-Columbian agriculture in the Bolivian lowlands: Construction history and management of raised fields in Bermeo. *Catena* 132: 126–138.

Rodrigues, Leonor, Umberto Lombardo, Elisa Canal Beeby, and Heinz Veit. 2016. Linking soil properties and pre-Columbian agricultural strategies in the Bolivian lowlands: The case of raised fields in Exaltación. *Quaternary International* 2016: 1–13.

Rostain, Stéphen. 2008. The archaeology of the Guianas: an overview. In *The Handbook of South American Archaeology*, pp. 279–302. Springer: New York.

Saunaluoma, Sanna. 2010. Pre-Columbian earthworks in the Riberalta region of the Bolivian Amazon. *Amazônica-Revista de Antropologia* 2 (1): 106–138.

Scott, James C. 2009. *The art of not being governed: An anarchist history of upland Southeast Asia*. New Haven: Yale University Press.

Van Valen, Gary. 2013. *Indigenous agency in the Amazon: The Mojos in liberal and rubber-boom Bolivia, 1842–1932*. Tucson: University of Arizona Press.

Walker, John H. 2004. *Agricultural change in the Bolivian Amazon. Memoirs in Latin American archaeology.* Vol. 13. Pittsburgh: University of Pittsburgh Department of Anthropology.

Walker, John H. 2008a. Pre-Columbian ring ditches along the Yacuma and Rapulo Rivers, Beni, Bolivia: A preliminary review. *Journal of Field Archaeology* 33 (4): 413–427.

Walker, John H. 2008b. The llanos de Mojos. In *The handbook of South American archaeology*, ed. Helaine Silverman and William H. Isbell, 927–939. New York: Springer.

Walker, John H. 2011a. Amazonian dark earth and ring ditches in the central Llanos de Mojos, Bolivia. *Culture, Agriculture, Food and Environment* 33 (1): 2–14.

Walker, John H. 2011b. Social implications from agricultural taskscapes in the Southwestern Amazon. *Latin American Antiquity* 22 (3): 275–295.

Walker, John H. 2017. *Island, river, and field*. Albuquerque: University of New Mexico Press.

Watling, Jennifer, Sanna Saunaluoma, Martti Pärssinen, and Denise Schaan. 2015. Subsistence practices among earthwork builders: Phytolith evidence from archaeological sites in the Southwest Amazonian interfluves. *Journal of Archaeological Science: Reports* 4: 541–551.

Whitney, Bronwen S., Ruth Dickau, Francis E. Mayle, J. Daniel Soto, and José Iriarte. 2013. Pre-Columbian landscape impact and agriculture in the Monumental Mound Region of the Llanos de Moxos, lowland Bolivia. *Quaternary Research* 80 (2): 207–217.

Whitney, Bronwen S., Ruth Dickau, Francis E. Mayle, John H. Walker, J. Daniel Soto, and José Iriarte. 2014. Pre-Columbian raised-field agriculture and land use in the Bolivian Amazon. *The Holocene* 24 (2): 231–241.

East Africa: Historical Archaeology

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Introduction

For almost four decades, Africanist archaeologists have expressed dissatisfaction with the more dominant definitions of historical archaeology – as either the study of time periods and events for which written sources are available and of societies that have developed a literate tradition (e.g., Deetz 1977) or the era of European expansion and exploration from the fifteenth century onwards (e.g., Hall 1993) or even of the emergence of the modern world (e.g., Orser 1996). Their primary objection to these alternative definitions, most of which originally developed in North America, has been that from the perspective of the African continent, these offer only a partial indication of the potential scope of "historical archaeology," given the existence of a rich legacy of diverse oral sources and the activities of a range of non-European yet external actors at different times both prior to and after CE 1500. Aside from the often Eurocentric bias of several of the more prominent definitions of historical archaeology, concern has also been expressed over the legitimacy and need for the distinction between

"historical" and "prehistoric" archaeology, with some scholars arguing for complete abandonment of these terms and the division of intellectual labor they promote. One consequence of this dissatisfaction is that it has generated a rather diverse range of approaches to and definitions of historical archaeology in different parts of the continent and among different scholars, underlining Hall and Silliman's observation that "historical archaeology means different things to different people" (2006: 1). This entry reviews some of these issues and illustrates the changes in approach and theoretical frameworks that have shaped historical archaeology in eastern Africa since the 1950s.

Historical Background

Initially, the practice of historical archaeology in East Africa, as was the case for most parts of the continent, followed the textual model. Publication by Freeman-Grenville (1962) of documents dating from the first to early nineteenth century CE concerning the east coast of Africa made these sources more accessible to archaeologists. However, it is the work of James Kirkman (1959) and Neville Chittick (1974) on East African coastal sites that is more usually considered as representative of the first examples of historical archaeological study in the region. Kirkman, in particular, was one of the first scholars working in the region to explicitly define his investigation of coastal Islamic sites such as Gedi and Ungwana in Kenya, as "historical archaeology," largely because these initial investigations were guided by existing Classical and early Islamic textual sources. The former include the first- to second-century CE Greco-Roman texts, the *Periplus of the Erythrean Sea* (~CE 100) and Ptolemy's *Geography* (~CE 150), while the latter comprise diverse geographies such as Al-Ma'sudi's reports in the tenth century and that by Ibn Battuta, based on his travels on the continent during the fourteenth century. The various Swahili Chronicles are another much used set of historical texts. These are locally written documents that record the history of Swahili towns from their foundation to the beginning of the Portuguese period but which were penned much later. There are also a number of relevant Chinese textual accounts from the early second millennium CE, some of which may be based on firsthand observations and are currently guiding efforts to locate possible shipwrecks off the north Kenya coast.

Like many of the first generation of historical archaeologists in North America, Kirkman and Chittick paid more attention to the most visible monumental ruins such as forts and large stone-built towns, rather than on the less obvious archaeological remains, thereby prioritizing the sites that they assumed were associated with "outsiders." In doing so, Kirkman (1959), for example, associated all of the Swahili stone towns as having been founded by Arab "invaders" that he believed once settled along the coast of East Africa. Likewise, Chittick's excavations at Kilwa and Manda relied heavily on the Swahili Chronicles to inform his research. Like Kirkman, Chittick (1974) tended to associate the origins of Swahili coastal stone towns with Arab immigrants, who likely began arriving from the eighth to ninth century.

This tendency to focus more on visible monuments rather than on less obvious archaeological remains, as well as overreliance on written texts, not only excluded indigenous Africans from their own history but also distorted the historical facts. Since the mid-1980s, however, archaeologists working on these Swahili period sites have typically downplayed the "foreign" element to their formation, emphasizing instead local dynamics and contributions. More recently, several research projects undertaken by African archaeologists (e.g., Chami 1999) at Kilwa Kisiwani and other coastal sites including Mafia, Kwale, and Koma and in the Rufiji Delta have overturned most of the original models proposed by Chittick and Kirkman. In particular, these later studies have revealed that at many of these sites there is evidence of pre-Islamic settlements dating as far back as the Stone Age periods. These findings thus contrast with those of scholars who asserted on the basis of written records and a specific focus on the visible archaeological remains that the ninth century was the date for the beginning of settlements along the East African coast, these being established by Arab-Persian immigrants.

As the subdiscipline of historical archaeology has continued to grow and expand geographically, scholars working in sub-Saharan Africa (e.g., Reid and Lane 2004; Schmidt 2006) have criticized the narrow focus on "the spread of European culture, practices and peoples to other parts of the world" that characterized the historical archaeology in its earlier, largely North American phase. Schmidt (2006: 4), in particular, has argued forcefully that such an understanding needs "repair" because its Eurocentric focus excludes other research areas of significant interest to non-European communities. Methodologically, earlier definitions of historical archaeology have also been criticized for considering the presence of written records as central to the practice of historical archaeology, a perception that implies an absence of any historical processes and events in the non-Western/nonliterate world prior to the advent of a literary tradition. Reid and Lane (2004: 7) argue that this approach obscures the study of extended periods of the past in areas where literacy appeared relatively late, as was typically the case for much of sub-Saharan Africa and many other parts of the world. Schmidt (2006), meanwhile, has highlighted the potential offered by oral sources to access much "deeper" time periods well before a European presence and which are more conventionally understood to be the realm of prehistorians.

Additionally, the earlier definitions of historical archaeology failed to recognize the existence of "other" non-Western written texts that were produced well before the era of European expansion (Reid and Lane 2004). In Africa, for example, these include ancient Egyptian, Arabic, Chinese, and Amharic texts, all of which recorded the history of indigenous Africans, and in some cases these texts predate the advent of Western literacy. Finally, the temporal range of more dominant definitions is another major problem. Specifically, the onset of European expansion into other parts of the world (from 1498 – when Christopher Columbus first sailed to the Americas) has often been regarded as the date for the beginning of historical archaeology. This seems to imply that there cannot be anything termed as "historical archaeology" prior to the late fifteenth century. Contrary to this idea, however, there have been several studies termed as historical archaeology, particularly along the coast of East Africa, that have extended beyond this temporal boundary, due to their use of both textual and material sources. In short, the older definitions of historical archaeology seem to imply that non-European communities only began making their histories with the arrival of Western writing traditions, something that is manifestly untrue.

E

Key Issues

Definitions and Methods

Responding to calls to refine earlier definitions and perceptions of historical archaeology, Africanist archaeologists (e.g., Reid and Lane 2004; Pikirayi 2006; Schmidt 2006) have found it more helpful to define their field on the basis of methods used rather than the period and subject of study. Pikirayi (1993: 36), for example, has proposed that historical archaeology in Africa is essentially "the study of sites which can be interpreted with the aid of historical sources such as written documents, oral traditions and historically datable artefacts." His approach is thus one in which the material record is used to test written or oral records to reveal changes within communities who have not necessarily been represented in recorded history. Pikirayi goes on to identify two categories of historical sources that can be integrated in historical archaeology studies, namely, "external" and "internal" sources (2006: 230–232). The former are those produced by "outsiders as direct observers, transcribers (for the case of Africa), and copiers of verbal accounts provided by various visitors to foreign lands" (Pikirayi 2006: 230). Thus, the published first-hand accounts by Europeans in Africa since c. 1500 CE onwards fall within what Pikirayi calls "external sources," as would late first millennium CE and early second millennium accounts compiled by Arab geographers and the early first millennium Classical texts such as the *Periplus*.

On the other hand, internal sources include a range of broadly historical accounts produced by

different African societies, such as "oral tradition and histories, myths and personal anecdotes transcribed by professional historians and anthropologists" (Pikirayi 2006: 232). Regardless of which definition is preferred, there is general consensus among Africanist archaeologists that historical archaeology should seek to integrate and interrogate archaeological types of sources such as artifactual, ecofactual, structural, and architectural remains and their contextual, spatial, and temporal associations and characteristics, with other non-archaeological sources that can broadly be defined as "historical."

Escaping Ethnocentrism: Alternatives in Non-Western Settings

The realization of the potential of non-written sources in historical scholarship began in the 1960s, notably through the use of oral traditions to document the histories of those Africans (who constituted the majority of the continent's population) whose histories had never been textually documented. Oral information has been utilized in many ways by archaeologists working in the region, including, for example, for locating and interpreting archaeological sites and materials, in aiding an understanding of potting techniques and functional categories, and in explaining the techniques and symbolism associated with iron production. More generally, archaeologists working in east Africa and elsewhere on the continent began to integrate non-written sources into their works in a range of contexts as part of a broader goal aimed at rewriting the histories of African people.

Initially, much of this work aimed at either verifying or "fleshing out" the oral sources. During the 1950s–1960s, for instance, various archaeological campaigns were undertaken to locate archaeological sites in Uganda, such as Bigo, Munsa, Kibengo, and Kasonko, mentioned in the oral traditions concerning an elite known as the Bacwezi, so as to get a better idea of their function and date of construction. This lead to the proposal by Posnansky (1969) that Bigo was the capital of the pastoral Bacwezi kingdom and that the other sites were part of the same political system. More recent field investigations by Robertshaw (1999) at Munsa and Kibengo, however, suggest that rather than there having been a single mega-state, there were a number of smaller polities each administered from a capital encircled by a complex of ditched earthworks.

Schmidt (1978) also drew on the oral sources concerning the Bacwezi to develop an alternative, structural approach to the study of the region's historical traditions and to extend their application to consideration of a deeper time depth. In particular, he brought together archaeological methods and oral traditions to explain the development and flux of African Iron Age culture from its earliest beginnings (around 500 BCE) in the Buhaya region of Tanzania to contemporary times. Through oral traditions, Schmidt explored several aspects of Haya culture, ranging from the economic systems of iron working and agriculture, to mythology and local spirit mediums, in order to inform his archaeological interpretations. Interestingly, Schmidt found that the Bahaya's conceptualizations of the past clearly related to the patterns and distribution of material remains left by Iron Age peoples some 2500–2000 years ago. A similar study by Mapunda (1995) is another excellent case demonstrating the value of oral tradition and ethnography in archaeological research. In his research on iron-smelting practices and symbolism in the southern highlands along the shore of Lake Tanganyika in Tanzania, Mapunda engaged with the oral tradition and histories of people in the region to identify and locate iron-smelting sites, where he found the remains of bowl furnaces (*Katukutu*) that are, in most cases, invisible on the ground surface.

More recently, the incorporation of non-written sources such as oral traditions and ethnographic information in archaeological studies has gone even further by helping to challenge elements of "received wisdom" concerning the causes of contemporary problems, much of which originated from the "colonial library." One case to demonstrate this concerns the alleged impacts of pre-colonial African subsistence strategies on the environment. A study by Lane and his colleagues on soil erosion in the Haubi Basin, north central Tanzania, for example, aimed at delineating the link between soil erosion, iron smelting, and human settlement in the area (e.g., Mapunda 2003; Lane 2009) from the perspective of historical

ecology. Colonial and postcolonial narratives had pointed to local iron-smelting practices in the region as the main cause of soil erosion, assuming that this practice involved the mass harvesting of fuel wood that led to deforestation. Contrary to this idea, oral traditions and ethnographic data collected by Mapunda, coupled with the results of archaeological survey and excavation (Lane 2009) and metallurgical analysis of iron-smelting remains (Mapunda 2003), revealed that the smelting technology practiced in the area was fuel efficient and was unlikely to be the primary cause of deforestation since smelters used only three to four tree species of hardwoods for charcoal and these made up only a fraction of local forests that existed prior to soil erosion (cf. Schmidt 1997).

A more recent historical archaeology study by Bignagwa (2012) examined aspects of the animal economies practiced by local communities inhabiting the Lower Pangani River Basin in Tanzania, to discern whether any changes to these economies could be plausibly linked to the expansion of the caravan trade in the nineteenth century. The study aimed at recovering archaeological evidence from a sample of settlements known to have been involved in the nineteenth-century caravan trade. Analysis of the faunal remains sought to determine whether herd management strategies and culling practices had been modified so as to generate a surplus supply of meat that could be sold to the passing caravans. The study relied on multiple sources of information, including written and cartographic nineteenth-century European sources, oral traditions and histories, and archaeological data encompassing artifactual, structural, stratigraphic, and faunal remains, in order to address those objectives. The existing archaeological records and written and oral historical accounts were used to help locate settlements that had *direct* contact with trading caravans, while oral information and ethnographic studies were used to help explain some of the patterning in the zooarchaeological record – such as the high presence of rodents in the faunal assemblages – and also to help identify different fishing practices. Artifactual evidence recovered from these settlements was cross-referenced and analyzed, and as with the faunal remains, oral traditions were used to aid interpretation of cultural materials and to help understand local practices surrounding those materials.

By cross-referencing oral historical and archaeological data, it became clear, for example, that many of the primary and secondary written sources either underestimated or overestimated (and in some cases overlooked completely) important aspects of the trade and social lives of the community under study. For example, hunting is not given much attention in the historical texts, yet the zooarchaeological data obtained by this study indicates that hunting of wild animal species formed an important aspect of the subsistence strategies of nineteenth-century Zigua communities in the Lower Pangani. Additionally, while the dominance of smaller mammals such as rodents and elephant shrews in the faunal assemblage could be misinterpreted (based on the Prey Choice Model derived from Foraging Theory) as an indicator of subsistence stress, the Zigua oral traditions consistently claimed that inclusion of smaller mammals in the diet was due to their palatability, and not because of shortages of meat supply. Another example concerns the misperception of the Zigua island settlements. These have long been regarded in the primary historical sources as having originated in the nineteenth century as refuges, built in response to the increasing threat of cattle raiding by neighboring pastoralists, which is known to have intensified during this period. On the contrary, both absolute and relative dates from these sites indicate that these settlements predate the nineteenth century (Bignagwa 2012), suggesting that some other cause lay behind their creation. Generally, it can be said that most of the written texts consulted for this study tended to lack sufficient spatiotemporal specificity of historical events against which the archaeological data could be tested and cross-referenced, making it even more critical to also incorporate the oral evidence.

International Perspectives

Current historical archaeological research is well placed to contribute to ongoing debates on the

framing of capitalist global relations, which is currently receiving considerable scholarly attention. Specifically, research findings from several studies in the region help assessments of the place and status of indigenous Africans within the nineteenth-century world economic system that ringed the Indian Ocean. For example, given the evidence for localized selectivity in the type of imported trade goods found on nineteenth-century sites in different areas and used to procure ivory and other key raw materials, it can be argued that local consumers were not simply passive receivers of "trinkets." Instead, as argued by Croucher (2011), these commodities were actively desired by nineteenth-century East African consumers and like any fashionable commodity were highly subject to shifting fashions and cultural recontextualization.

For example, in her work on nineteenth-century Zanzibar clove plantations, Croucher notes the dominance of mass-produced European ceramics on such plantations, which contrasts with their virtual absence on settlements outside the plantations. In interpreting these in the context of the development of consumer culture and identity during the nineteenth century, Croucher argues that the imported wares had social functions, such as for reinforcing social bonds between groups of plantation residents and bridging the gap between plantation owners, enslaved laborers, and others living upon plantation sites. She further argues that neighborliness, which was a crucial part of Zanzibari plantation society, was cemented through reciprocal obligations of lending goods that had acquired social value (including those mass-produced imported ceramics) to those in need. After all, residents on plantations shared a common cultural understanding that such dishes were to be used at particular social occasions. Thus, Croucher (2011: 180) is of the view that the social norms of reciprocity not only worked to cement social unity and community cohesion but also served to highlight wealth disparities and unequal relations between those who had and those who did not have such socially valued goods.

Moreover, as Croucher (2011: 184) argues, acceptance or rejection of European manufactured goods was likely predicated on preexisting patterns of taste in the new markets to which these goods were taken by the passing caravans. Along the Lower Pangani River (northern Tanzania), for example, the use of pre-European contact shell beads (obtained from the coast) would have helped to shape the variety of beads desirable in local markets during European contact period, such that changing densities of beads of a particular color and/or shape in particular assemblages better reflect the manner in which commodity exchange was incorporated into local cultural contexts than shifts in the direction or scale of international bead supply. Thus, for example, at former settlements along the nineteenth-century northern caravan route in the Pangani Basin, cylindrical white glass beads dominate the imported glass bead assemblage throughout their occupation, which ended in the early twentieth century. Despite other shapes and colors of beads being readily available, oral histories indicate that the local Zigua occupants chose white beads because of the significance of the color white in a variety of cultural practices. For instance, the beads were used as charms to protect children from being seen by witches. They were also worn by young men when wooing women, by all participants in clan rituals, and by those attending cultural ceremonies to enshrine someone to a traditional title like chieftainship. Even though these beads were cheap and easy to acquire, so were other types, and the archaeological evidence suggests that Wazigua were highly selective in their consumer choices, even when presented with a wide range of global commodities. Contemporary historical sources support this and suggest that bead manufacturers in Europe adjusted their production strategies to take into account such variations in "taste" and cultural preference (Palaver 2009), underlining Croucher's observation that "capitalist forms and processes are continually made and unmade" (2011: 186).

Future Directions

Recent archaeological work undertaken in East Africa serves to demonstrate how historical archaeology studies can and should be designed with a view to interrogating multiple sources, both written and non-written. In doing so, such studies

will serve to supplement, cross-reference, and/or correct oral and written sources, thus bringing a new understanding of the society under study. It was through a combination of multiple sources, for instance, that the Lower Pangani historical archaeology study discussed above was able to develop new understanding of several issues pertaining to the status and general lives of Africans as they were steadily integrated into the global nineteenth-century economic system. Other studies are now starting to explore the nature of the colonial encounters that followed and in particular how European powers used space and architecture to exert and express their authority. Others still have begun to explore the changes in the nature of slavery and especially the shift from a "domestic"-oriented system with a limited export component to one dominated by larger-scale export coupled with the growth of local plantation-based chattel slavery. There is also growing interest in the underwater heritage of the coastal zone, both in terms of shipwrecks and the extraction of marine resources.

There are many gaps, however, partly because it is in only recent decades that the archaeology of the last c. 500 years has become a legitimate field of study. Topics that would warrant further investigation include investigating responses by African societies to the opportunities and constraints introduced by the arrival of non-African groups, and subsequent repercussions of these in creation or destruction of ethnic identities; research on the perceptions, valuation, and processes of integration and consumption by African groups of a variety of exotic imported commodities in the region; and the nature of land use, subsistence base, and settlement pattern of African groups prior to, during, and after contacts with non-African groups.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Connah, Graham
- ▶ Kirkman, James
- ▶ Oral Sources and Oral History
- ▶ Posnansky, Merrick
- ▶ Schmidt, Peter R.
- ▶ Southern Africa: Historical Archaeology
- ▶ Trade Beads in Historical Archaeology
- ▶ West and Central Africa: Historical Archaeology

References

Bignagwa, T.J. 2012. *Historical archaeology of the nineteenth-century caravan trade in North-Eastern Tanzania: A zooarchaeological perspective*. Unpublished Ph.D. dissertation, University of York.

Chami, F. 1999. Roman beads from the Rufiji delta: First incontrovertible archaeological link with Periplus. *Current Anthropology* 40 (2): 239–241.

Chittick, N. 1974. *Kilwa: An Islamic trading city on the East African coast*. British Institute in Eastern Africa Memoir 5. Nairobi: British Institute in Eastern Africa.

Croucher, S. 2011. Exchange value: Commodities, colonialism, and identity in nineteenth century Zanzibar. In *The archaeology of capitalism in colonial contexts*, ed. S. Croucher and L. Weiss, 165–191. New York: Springer.

Deetz, J. 1977. *In small things forgotten: An archaeology of early American life*. New York: Anchor Books.

Freeman-Grenville, G. 1962. *The East African coast: Select documents from the first to the earlier nineteenth century*. Oxford: Clarendon.

Hall, M. 1993. The archaeology of colonial settlement in southern Africa. *Annual Review of Anthropology* 22: 177–200.

Hall, M., and S. Silliman. 2006. Introduction: Archaeology of the modern world. In *Historical archaeology*, ed. M. Hall and S. Silliman, 1–19. Malden: Blackwell.

Kirkman, F. 1959. Excavation at Ras Mkumbuu on the island of Pemba. *Tanganyika Notes and Records* 53: 16–78.

Lane, P. 2009. Environmental narratives and the history of soil erosion in Kondoa district, Tanzania: An archaeological perspective. *International Journal of African Historical Studies* 42: 457–483.

Mapunda, B.B.B. 1995. *An archaeological view of the history and variation of iron working in southwestern Tanzania*. Unpublished Ph.D. dissertation, University of Florida, Gainesville.

Mapunda, B.B.B. 2003. Iron technology and deforestation: Myths and realities. In *Second PLATINA workshop 17–19 October 2002, Usa River, Arusha, Tanzania*. EDSU 46, ed. A. Dahlberg, H. Öberg, S. Trygger, K. Holmgren, and P. Lane, 42–43. Stockholm: University of Stockholm.

Orser, C. 1996. *A historical archaeology of the modern world*. New York: Plenum.

Palaver, K. 2009. 'A recognized currency in beads'. Glass beads as money in 19th-century East Africa: The central caravan road. In *Money in Africa*. British Museum Research Publication 171, ed. C. Eagleton, H. Fuller, and J. Perkins, 20–29. London: British Museum.

E

Pikirayi, I. 1993. *The archaeological identity of the Mutapa state: Towards an historical archaeology of northern Zimbabwe.* Studies in African Archaeology 6. Uppsala: Societas Archaeologica Uppsaliensis.

Pikirayi, I. 2006. Gold black ivory and houses of stone: Historical archaeology in Africa. In *Historical archaeology*, ed. M. Hall and S. Silliman, 230–250. Oxford: Blackwell.

Posnansky, M. 1969. Bigo bya Mugenyi. *Uganda Journal* 33: 125–150.

Reid, A., and P. Lane. 2004. An introductory consideration of scope and potential. In *African historical archaeologies*, ed. A. Reid and P. Lane, 1–32. New York: Plenum/Kluwer Academic.

Robertshaw, P. 1999. Seeking and keeping power in Bunyora-Kitara, Uganda. In *Beyond chiefdoms: Pathways to complexity in Africa*, ed. S. McIntosh, 124–135. Cambridge: Cambridge University Press.

Schmidt, P.R. 1978. *Historical archaeology: A structural approach in an African culture*. Westport: Greenwood.

Schmidt, P.R. 1997. Archaeological views on a history of landscape change in East Africa. *Journal of African History* 38: 393–421.

Schmidt, P.R. 2006. *Historical archaeology in Africa: Representation, social memory, and oral traditions*. Lanham: Altamira.

Further Reading

Breen, C.P., and P. Lane. 2003. Archaeological approaches to East Africa's changing seascape. *World Archaeology* 35: 469–489.

Chami, F. 1994. *The Tanzanian coast in the first millennium AD*. Studies in African Archaeology 7. Uppsala: Societas Archaeologica Uppsaliensis.

Chami, F., and P. Msemwa. 1997. The excavation at Kwale Island south of Dar es Salaam, Tanzania. *Nyame Akuma* 48: 45–56.

Chami, F., S. Odunga, J. Kessy, and E. Maro. 2004. *Historical archaeology of Bagamoyo: Excavations at the caravan-Serai*. Dar es Salaam: Dar es Salaam University.

Chittick, N. 1984. *Manda: Excavation at an Island port on the Kenyan coast*. British Institute in Eastern Africa Memoir 9. Nairobi: British Institute in Eastern Africa.

Connah, G. 1996. *Kibiro: The salt of Bunyoro, past and present*. British Institute in Eastern Africa Memoir 13. London: British Institute in Eastern Africa.

Connah, G. 2007. Historical archaeology in Africa: An appropriate concept? *African Archaeological Review* 24: 35–40.

Connah, G., and D. Pearson. 2002. Artefact of empire: The tale of a gun. *Historical Archaeology* 36: 58–70.

Croucher, S. 2007a. Facing many ways: Approaches to the archaeological landscapes of the East African coast. In *Envisioning landscape: Situations and standpoints in archaeology and heritage*, ed. D. Hicks, L. McAtackney, and G. Fairclough, 55–74. Walnut Creek: Left Coast Press.

Croucher, S. 2007b. Clove plantations on nineteenth-century Zanzibar: Possibilities for gender archaeology in Africa. *Journal of Social Archaeology* 7: 302–324.

Deetz, J. 1991. Archaeological evidence of sixteenth and seventeenth century encounters. In *Historical archaeology in global perspective*, ed. L. Falk, 1–9. Washington: Smithsonian Museum Press.

Doran, M., A. Low, and R. Kemp. 1979. Cattle as a store of wealth in Swaziland: Implications for livestock development and overgrazing in eastern and southern Africa. *American Journal of Agricultural Economics* 61: 41–47.

Dunn, R.E. 2005. *The adventures of Ibn Battuta: A Muslim traveler of the fourteenth century.* Berkley: University of California Press.

Feierman, S. 1974. *The Shambaa kingdom: A history.* Madison: University of Wisconsin Press.

Horton, M. 1996. *Shanga: The archaeology of a Muslim trading community on the coast of East Africa*. British Institute in Eastern Africa Memoir 14. London: British Institute in Eastern Africa.

Horton, M. 1997. Eastern African historical archaeology. In *Encyclopedia of precolonial Africa: Archaeology, history, languages, cultures, and environments*, ed. J.-O. Vogel, 549–554. Walnut Creek: AltaMira Press.

Insoll, T. 1997. Ngandu and Ngambezi: Sites on the nineteenth-century trade route around Lake Victoria, and Speke's expedition of 1861–63. *Azania* 32: 109–112.

Kimambo, I. 1969. *A political history of the Pare of Tanzania, c. 1500–1900*. Nairobi: East African Publishing House.

Kinhahan, J. 2000. *Cattle for beads: The archaeological of historical contacts and trade on the Namib coast*. Studies in African Archaeology 17. Uppsala: Societas Archaeologica Uppsaliensis.

Kirkman, J. 1954. *The Arab city of Gedi*. Oxford: Oxford University Press.

Kirkman, J. 1964. *Men and monuments on the East African coast*. New York: Praeger.

Kirkman, J. 1974. *Fort Jesus, a Portuguese fortress on the East African coast*. British Institute in Eastern Africa, Memoir 4. Oxford: Clarendon Press.

Kusimba, C. 2004. Archaeology of slavery in East Africa. *African Archaeological Review* 21: 59–88.

LaViolette, A. 2004. Swahili archaeology and history of Pemba, Tanzania: A critique and case study of the use of written and oral sources in archaeology. In *African historical archaeologies*, ed. A. Reid and P. Lane, 125–162. New York: Plenum/Kluwer Academic.

Lane, P. 2007. Whither historical archaeology in Africa? *The Review of Archaeology* 28: 1–20.

Lane, P. 2012. Maritime and shipwreck archaeology in the western Indian Ocean and southern Red Sea: An overview of past and current research. *Journal of Maritime Archaeology* 7: 9–41.

Pouwels, R.L. 2002. Eastern Africa and the Indian Ocean to 1800: Reviewing relations in historical perspective. *International Journal of African Historical Studies* 35: 385–425.

Rhodes, D. 2010. *Historical archaeologies of nineteenth-century colonial Tanzania: A comparative study*. British Archaeological Reports International series 2075. Oxford: Archaeopress.

Robertshaw, P. 2000. Sibling rivalry? The intersection of archaeology and history. *History in Africa* 27: 261–286.

Robertshaw, P. 2004. African historical archaeology(ies): Past, present and a possible future. In *African historical archaeologies*, ed. A. Reid and P. Lane, 375–389. London: Plenum/Kluwer Academic.

Schmidt, P.R. 1981. *The origins of iron smelting in Africa: A complex technology in Tanzania*. Research Publications in Anthropology 1. Providence: Brown University.

Schmidt, P.R. 1983a. An alternative to a strictly materialist perspective: A review of historical archaeology, ethnoarchaeology and symbolic approaches in African archaeology. *American Antiquity* 48: 62–79.

Schmidt, P.R. 1983b. Cultural meaning and history in African myth. *International Journal of Oral History* 4: 167–183.

SiiriÄinen, A. 1973. The Gumba and Athi of Central Kenya: Archaeology and oral tradition. *Suomen Museo* 80: 105–117.

Vansina, J. 1965. *Oral tradition: A study in historical methodology*. Chicago: Aldine.

Walz, J., and S. Brandt. 2006. Toward an archaeology of the other Africa diaspora: The slave trade and dispersed Africans in the western Indian Ocean. In *African re-genesis: Confronting social issues in the diaspora*, ed. J.B. Haviser and K.C. MacDonald, 246–268. Walnut Creek: Left Coast.

Wynne-Jones, S., and B.B.B. Mapunda. 2008. This is what pots look like here: Ceramics, tradition and consumption on Mafia Island, Tanzania. *Azania* 43: 1–17.

East Africa: Museums

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Introduction and Historical Background

The first East African museums, like other early museums in Africa, were introduced during colonial times. They were started either by amateurs or professionals interested in particular scientific disciplines such as earth sciences, botany and zoology, archaeology and paleontology, and ethnography or by colonial governments as places of study, collecting and exhibiting nature, and/or local people's cultural heritage.

The museums in East Africa were at the beginning all located in the big capital cities notably Nairobi in Kenya, Dar es Salaam in Tanzania, and Kampala in Uganda. These often took the form of natural history museums with strong ethnographic component to depict "the natives and their cultures," the geology and land forms, and nature in "its raw form" of animals and plants. This was mostly for the colonialist administration and settler communities' consumption and enjoyment.

The museum was seen as a mirror of local traditional society and nature. To Africans, their culture, and their imaginary natural environment he coexisted with that was portrayed as a "unique jungle" with its "Big Five". The museum also provided an excellent research space and a facility for international partnerships in many scientific disciplines for amateurs, and enthusiasts, as well as well-established researchers of European and North American extraction of whom many were from the elite families of colonial-settler background.

Until the early 1980s, East African museums were therefore nongovernmental organizations that provided entry points to the unlimited research opportunities within East African countries. They attracted partnerships with Western researchers eager to establish a foothold in the continent, renowned for its rich heritage, including evidence of human origins. This made the museums in East Africa an exclusive property of the privileged white elite, who even after independence continued to ensure that their interests remained intact through ensuring powerful patronage structures both at local/political and international levels.

The museums in this context were therefore divorced from the common person, the African majority who were part of the objects on display. More so, the museums they were located in areas where Africans were rarely allowed to venture during the colonial periods except as servants. When they were, it was within very specific days

and times. School children were transported in and out by buses. Like Western museums, most remained places of curiosities with little to do with national identity and community ownership.

With independence and the subsequent development of African heritage professionals, who began to question the status quo, changes came slowly but steadily. Kenya, in particular, with the interest and energy of the renowned Leakey family who collectively ran its museums for over 30 years, and who used their name and international contacts to promote the museum, developed a complex and elaborate museum system with strong research capabilities comparable to any major museum in the world.

Key Issues

The National Museums of Kenya, the name the museum came to adopt at the independence in 1963, grew to become possibly the most complex, most diversified, and most research-endowed museum institution in the whole of Africa up to the present. Today, the National Museums of Kenya (NMK) is the government custodian of cultural heritage with a chain of regional museums all over the country. It hosts the East African Herbarium, the nation's Centre for Biodiversity, and world-class centers of paleontology, archaeology, and entomology, among others. The museum is also a host to the world-re-known Institute of Primate Research, a World Health Organization affiliate that carries out research on malaria and HIV pandemic, among others.

The National Museums of Kenya had the upper hand in sourcing funding, developing networks of international partnerships, and creating up-to-date research and museological facilities that up to now are incomparable with the other East African museums. Thus, as much as Dar es Salaam was reasonably developed because of the interest of the Leakeys in the study of human origins and the role of Olduvai Gorge and the Laetoli footprints, it appears that there was a conscious decision on their part to ensure Nairobi remained the center of excellence in East Africa.

This is explained by the fact that all the important finds from the Tanzanian sites including the human-origin-related materials were all kept at the National Museums of Kenya. This was possibly due to Tanzanian's socialist approach to governance and the authorities' nationalistic tendencies as opposed to Kenya that embraced the Western capitalist system with people in authority willing to provide patronage to the dominant white elites within the museum and their international partners; it was perceived as a safer ground to invest and carry out research compared to other East African museums.

Uganda, on the other hand, seemed to have not prioritized the role of the museum despite the museum having been established there in a custom-built modern architectural structure of the 1950s. Thus, coupled with its early history of turmoil and coups, Uganda Museums stagnated for a long time partly because they were part of the underprivileged departments of the government. This was demonstrated as recently as 2011 when the government contemplated demolishing the museum, building a commercial complex, and then allocating the Uganda Museums a few rooms to operate from.

With the Africanization of the museums from the 1990s, the East African museums have come to play crucial roles within their communities. The National Museums of Kenya and the National Museums of Tanzania have significantly restructured and reformed incorporating in their programs the needs of the various communities, listening to and admitting many voices into their spaces and therefore becoming places of dialogue.

Today the museums can be said to be an embodiment of the cultures of people in their respective countries, the representation of the identity or identities of the nations and their achievements. The museums have become forums for dialogue and critical thinking and at times even providing spiritual spaces where communities rally around shared heritage. The village museum in Dar es Salaam, for example, brings the villages of Tanzania with their architecture, cuisine, art and music, rhythms, smells, and sounds to the city by providing opportunities for the various ethnic groups to reenact their cultural heritage in the city setting including in building construction, culinary, and other artistic activities.

These early and major East African museums have today moved away from the confines of their grand walls as houses of wonder, collections of

the "rare," and fortifications of the untouched, depicting "traditional peoples in their natural environment" to open friendly spaces of memories, shared experiences, cultural activities, and representation of many voices, that are included in the thinking and production of the heritage.

This development of the East African museums can be categorized into roughly four phases:

Phase one was the colonial-built monumental natural history museums with a rich ethnographic component depicting the "innocent traditional African" and his material culture in his natural environment. These were the "do not touch and curator knows it all" type of museums similar to many in the West. They had a selected community of viewers who were otherwise nonparticipants in the making of the museum or their exhibitions. However, they also had a strong and heavily patronized community of elite researchers who ensured its status quo. They were therefore more elitist institutions with interests in research and the provision of platforms for international researchers to work in East Africa, in addition to their resident community.

Phase two came with independence and saw the slow opening up of these museums to others, mostly locals, who for years were not considered stakeholders, hand in hand with the training and absorption of African heritage professionals into positions of responsibility. It was a phase that lasted from the 1960s to the beginning of the 1990s. It also saw the expansion of the museums from the capital cities to the regions to try to diversify museum benefits. However, even at this stage, the initiative to have the museums in the regions still emanated from the top down, from the big city museums to the regions. It is a period that saw the construction of a number of museums in provinces and the slow involvement of communities.

Phase three was from the 1990s to the beginning of the 2000s. This saw a conscious effort on the part of the museums administration to restructure and meet some of the needs of their communities, by involving the communities much more in museum activities. It saw the mushrooming of museums including the involvement of communities in the development of some exhibits. The museum went into partnerships with communities and other bodies including the private sector and NGOs, to create programs beneficial to their communities' well-being. It saw a relationship developing between museums and communities. Training centers for young people in craft as part of saving the heritage as well as to economically empower communities developed in places like Fort Jesus, Mombasa; Gede in Malindi; and Lamu Museums in Kenya. It is also a period that saw communities seeking East African museums' support for the establishment of museums and other cultural institutions in local areas starting a bottom-up approach in heritage relations.

Phase four saw the continuation of phase three but also the introduction of community museums. The community museums are developed either in partnerships with the mainstream government museums, with other NGOs, or purely through community initiatives. There are some however that have been collectively started by the three bodies. The phase has also seen the introduction of *culture houses* that possibly respond to community needs that have not been addressed by mainstream museums in the past.

This latest phase has also seen some governments start to vigorously establish museums dealing with issues of politics and memory. Rwanda, for example, where genocide had taken place during this time has not only started memorial museums for the victims in various parts of the country but also the Presidential Palace Museum shows political atrocities of the past regime. It has planned a Liberation Museum to showcase the role of the liberating army at the time of the genocide. This however is not uncommon in the region as in 1977 the government of Tanzania established the Arusha Declaration Museum that celebrated the country's new socialist political vision.

Both Rwanda and Burundi have joined the regional body, the East African Community, and as such could be considered under this regional survey. There are also other countries within the Eastern African region with museums that could

also be considered and that have had museums within their boundaries. These include Ethiopia and Eritrea. There are also some that have either lost museums through wars such as Somalia or which have no museums such as South Sudan or have little documentation on the same such as Djibouti. The countries and their respective museums are summarized below.

Kenya

National Museum of Kenya

Founded in 1910 as a Natural History Museum, it was later named the Coryndon Museum after Sir Robert Coryndon and moved to its present location where it was officially opened on 22 September 1930. It was renamed the National Museum of Kenya after independence in 1963 and today is called National Museums of Kenya, Nairobi Museum, after the restructuring in the 2000s.

Fort Jesus Museum

Built by the Portuguese in 1593, it became one of the most important military positions on the western Indian Ocean. It changed hands many times in its 400-year history becoming a museum just at independence. It is both a monument and a museum. Today, Fort Jesus is a world heritage site, one of the six currently found in Kenya.

Lamu Museum

Lamu Museums are located in the Lamu Archipelago, in the historic Swahili town with the same name. Founded in the 1970s, the Lamu Museum is one of the most important museums depicting the Swahili heritage and its rich history. There are also the Swahili House Museum, the German Post Office, and the Lamu Fort, all of which together with the old Lamu stone town comprise the Lamu World Heritage property. Lamu is well known for its architecture, the Maulidi religious festival, and the Lamu cultural festival, in which all of which the Lamu Museums are involved.

Kitale Museum

This was the first of the inland museum to be developed in Kenya, and its initial acquisitions were comprised of collections of insects, other animals, and books collected by Col. Hugh Stoneham (1894–1966). The museum has a rich ethnographic collection from surrounding ethnic groups and is also known for its environmental conservation.

Kisumu Museum

Opened in 1980, this lakeside museum mostly houses cultural and scientific material exhibits on issues on western Kenya. It comes together with a complete Luo homestead and a snake park.

Meru Museum

Located close to the foothill of Mt. Kenya, the Meru Museum was created to conserve the cultures and traditional practices of the local Meru-speaking people. The museum was founded in 1974 in an old historic building and today, among other activities, carries out educational programs mostly for schools.

Karen Blixen Museum

This is the former house of Danish author Karen Blixen, whose life story was made into a movie that became the Oscar award–winning film *Out of Africa*. Built in 1910, it was later donated by the Danish Government to the then newly independent Kenya in the 1960s. It was made a museum in the 1980s.

Kapenguria Museum

Located in the Rift Valley of Kenya, this is the prison in which the six Kenyan freedom fighters deemed most dangerous, including Mzee Jomo Kenyatta, the first president of Kenya, were detained at the beginning of the 1950s. It was opened in 1993 to preserve the memories of these influential leaders in their role in the struggle for independence. The museum houses books and documents in a memorial library.

Other museum sites include:

Hyrax Prehistoric Site and Museum

This is an archaeological site of the Late Iron Age/Late Stone Age in which a small museum was established in 1965. This was further expanded in 2000.

Desert Museum

The Desert Museum is cultural museum opened in 2008 on the shore of Lake Turkana and dedicated to the unique culture of this region.

Kariandusi Museum
This museum is located in the Rift Valley near Nakuru where an archaeological site with the first discoveries of Lower Paleolithic sites in East Africa were first found.

Narok Museum
Located in Narok town, the museum preserves the beauty and rich traditional culture of the Maasai and other speakers of the Maa language.

Rabai Museum
Founded by the first missionaries to Kenya and built in 1846, the Krapf Memorial Museum was founded in 1994 to provide formal and perpetual reminder of monumental events during the advent of early missionaries. It was built with the permission and good will of the local community elders who continued to practice their traditional religion including maintaining their old Kaya settlements and cultures, now listed under two world heritage conventions, the 1972 and the 2003.

Wajir Museum
Located on the dry northeastern part of Kenya, the museum was opened in 2011 to give visitors a glimpse of the rich cultural, historical, and natural heritage of northeastern Kenya. Northeastern Kenya is a dry land with mostly pastoralist Somali whose territories expand to cover a major part of northeastern Kenya and southeastern Ethiopia.

Tambach Museum
This museum is located in the Rift Valley in Tambach, one of the oldest towns in the interior of Kenya established in the 1920s as a British colonial center of administration. Opened in 2011 to safeguard the Tambach heritage and the culture of the Keiyo and Marakwet, it is located in the unique mountainous landscape of the rift valley.

Malindi Museum
This is an ethnographic museum which showcases the Mijikenda cultures of the coastal and the immediate hinterland of Kenya.

Gede Museum
Locate about 16 km from Malindi, Gede is one of the most important old Swahili settlements. Founded around the eleventh century, it reached its Golden Age in the nineteenth century. Today it is represented by monumental structures in a forest setting. A museum to exhibit this rich Swahili heritage was funded by the European Union in the 2000s. Gede is also the host of a butterfly exhibition as well as a very successful museum/community joint project on butterfly farming and bee keeping.

Tanzania

Dar es Salaam National Museum
One of the first museums to be founded in East Africa, it was established in 1934 and open to the public since 1940. It was originally conceived as a memorial museum dedicated to King George V but with independence changed to articulate the history of Tanzania. It houses some of the findings by the Leakeys from Olduvai Gorge as well as the site of Kilwa. Recently it went through a restructuring and rebuilding period supported by the Swedish government and today hosts what has been referred as the House of Culture.

Village Museum
This is a unique open-air museum that was established in 1996 in Dar es Salaam and showcases among other activities traditional architecture from various peoples and various parts of Tanzania. Its activities include dances, food and food preparation, poetry and oral tradition, art, and craft. It brings together Tanzanians of all cultures, ages, and upbringing and offers opportunities to experience home away from home for many Tanzanians with rural backgrounds in Dar es Salaam.

Natural History Museum
This museum was opened in 1987 and is dedicated to human evolution and entomology.

Arusha Declaration Museum
Arusha Declaration is one of the most important episodes in the history of Tanzania as a country. It was the time that the founding father of the country, Mwalimu Julius Kambarage Nyerere, and his colleagues decided that Tanzania would become socialist. Referred to as Ujamaa, or family/

community, the declaration that took place in the town of Arusha changed the course of Tanzania. It became a socialist in a manner referred to as African socialism. To remember this, a museum was constructed and opened in 1977. It exhibits among others documents of the colonial history of Tanzania, the fight for independence, and the Arusha declaration where Julius Nyerere outlined his political vision.

Nyerere Museum

This museum commemorates the life and contribution of the first president of Tanzania, Mwalimu Julius Kambarage Nyerere. Established in 1999, it is located in Butiama, the birth place of Mwalimu Nyerere. On exhibition are items related to Nyerere's personal and political life. Like the other heritage places of memory and politics, this is one of the spaces that speak to the people in the voice of struggle, liberation, and independence, something the museums have come to be closely associated with in postcolonial Africa.

Uganda

Uganda Museum

Uganda Museum is one of the oldest in East Africa and yet one of the most challenged. Founded in 1908, it still pretty much retains its twentieth-century atmosphere with artifacts that include musical instruments, hunting equipment, weaponry, and archaeological and entomological materials. As noted above, the museum is fully government controlled, giving it little leeway to innovate and move forward as the other East African museums.

There are other private as well as community museums in Uganda including one that commemorates the death of so many in the north of the country due to the rebel army called the Lord's Resistance Army.

Burundi

There is little information concerning the Burundi museums. This is a country that has also undergone wars over the years although now there is relative peace. Burundi has three recorded museums, namely, Burundi Geological Museum, Burundi Museum of Life, and Burundi National Museum.

Burundi Geological Museum

Located in Bujumbura, the capital of the country and as the name suggests was founded to showcase the geology of the country.

Burundi Museum of Life

The Burundi Museum of Life is located in the city of Gitega.

Burundi National Museum

The National Museum of Burundi like the Burundi Life Museum is located in the city of Gitega and not the capital Bujumbura. It was founded in 1955 and showcases the country's heritage.

Rwanda

Rwanda, despite its relatively small size, has many museums. The museums are organized under a centralized system called the Institute of Rwanda Museums. This country that underwent political turmoil and genocide has recovered to put in place museums of memory that are meant to remind people of these unfortunate events with a view to avoid repeating them. Here many museums have been put up as remembrance as well as healing spaces. It shows how museums can play roles that traditional museum practice never envisaged.

The current president of Rwanda, Paul Kagame, has a particular interest in museums and while officiating at the launch of the Liberation Museum in Mulindi, Rwanda, was quoted as telling the residents that "we must know where we come from to know where we are going and what we must do to get there. Today it is your responsibility to work hard to ensure the seed sown by the liberation struggle continues to benefit all Rwandans. I am confident that building on our history, we will accomplish even more in the coming years." He further stated that "this museum becomes part of other museums in the country that have a lot to teach us when it comes to Rwandan history. It will always be a memorial for RPF liberation struggle."

Ethnographic Museum

This museum is located in Huye and was built in 1987. It houses ethnographic, historical, artistic, and archaeological collections.

National Art Gallery

The National Art Gallery is located in Nyanza District and originally was built as a palace for King Mutara III Rudahigwa. It displays contemporary artwork that Rwanda is so well known for and has exhibition on traditional life style and national history.

Kings Palace Museum

This is located in Nyanza Residence of King Mutara III Rudahigwa that was restored to its nineteenth-century state.

Presidential Palace Museum

The Presidential Palace Museum is located in Kigali and served as the home to the former Presidents Juvenal Habyarimana who served before the genocide and Pasteur Bizimungu who served after the genocide period ranging from the 1970s till late 1990s. It provides a glimpse how the former lived.

National History Museum

This museum was dedicated to Dr. Richard Kandt, a German doctor and explorer who embarked on an exploration of Rwanda in 1897, searching for the source of the Nile River. The National History Museum aims to explain the richness of Rwanda's nature.

The Environment Museum

Being built currently in Karongi, this museum may be the only museum of the environment in Africa. Thus, while there are environmental exhibitions in most natural history museums in the continent, there is none that is dedicated totally to the subject of environment alone.

Liberation Museum

This is the most recent museum in Rwanda, and the foundation stone was laid in December 2012 in Mulindi, Rwanda, on which occasion President Kagame stated that the Liberation Museum will serve as a memorial for the 1990–1994 liberation struggle mainly for Mulindi residents and for Rwandans in general. He further observed that the museum will always tell the liberation story and explain to younger generations the role it played toward achieving the developments that are currently taking place in the country.

Ethiopia

Ethiopia is a large country with extremely rich history and rich heritage founded in its long Christian, Islamic, as well as traditional cultures. There are numerous museums, but most of these are church run and owned. Thus, in every region where there are the orthodox churches, one finds a collection of church materials organized in museum form that include textiles, manuscripts, musical instruments, and even past royal regalia. These church museums are found in Addis Ababa, Aksum, Gondar, Lalibela and many other places where the church has had a strong foothold and constructed cathedrals.

Ethiopia however is also known for its hominid finds and has contributed immensely to the understanding of human origins study and debate. In addition to this, Ethiopia was for centuries a great empire with centralized governments that left their marks behind in terms of material culture. It is a diversified country with a population of over 85 million people and tens of ethnic groups, each with their material culture. These are displayed mainly in two museums: the National Museums of Ethiopia and the Ethnographic Museum in Addis Ababa University.

National Museum of Ethiopia

The National Museum of Ethiopia was founded in 1958 to promote and facilitate archaeological research mission in the northern part of Ethiopia by French archaeologists.

The museum started its activities by exhibiting objects from these excavation missions. With the establishment of the Ethiopian Cultural Heritage Administration in 1976, the idea to open a national museum was mooted and supported by the government. Today, there is a well-established museum with exhibition of various kinds including the numerous hominid finds that Ethiopia is so rich in.

The Ethnographic Museum

Ethiopia's imperial past is very rich and the country was ruled until the mid-1970s by emperors who had immense power and wealth in a feudal system of government. Emperor Haile Selassie, the last in a long line of emperors, donated most of the imperial items exhibited in the museum. The museum is located within Addis Ababa University and also acts as a teaching museum.

The Red Terror Museum

This museum is located in the city of Addis Ababa in the Bole area. It represents the period commonly referred to as the Red Terror, during the administration of the military or the Dergue. It was a period of oppression, jailing, and killings, and the museum depicts the excesses of this particular period.

Eritrea

Located on the Red Sea, the country of Eritrea was a gateway to the northeastern part of Africa. Both the mega sites of Quito and the seaport of Adulis are located here. The country has a rich heritage but was colonized by the Italians, the British, and the Ethiopians, all of whom left some mark in its history. It shares the great depression of Afar with Ethiopia, an area that has produced early hominid evidence in both countries.

Eritrea has two major museums under the National Museums of Eritrea, namely, the National Museum of Eritrea in Asmara and the one in the port city of Massawa.

National Museum of Eritrea, Asmara

This museum was inaugurated in 1992 at the governor's palace in the capital Asmara. It was however moved to its present location at the former Comboni Sisters School for Women in 1997. Its main functions are to promote Eritrean history both within the country and abroad, to investigate new archaeological sites, and to explore and exhibit the history of Eritrea.

The National Museum of Eritrea, Massawa

This museum, located in the port city of Massawa, is rich in archaeological, ethnographic, and historical materials that are well exhibited. As a port city museum, it has in its exhibition a rich representation of marine life, particularly on the marine life of the very long coastal area of Eritrea. The museum is however well known for its exhibition of the war of independence from Ethiopia that demonstrates the life, tribulations, and successes of the freedom fighters against the Ethiopian army. It has a huge collection of weapons some captured from the enemy side and then reworked to create different types of weaponry. It also shows the struggle of life in the trenches where everything was made by the fighters ranging from guns and shoes to medical equipment.

Djibouti

There is no known museum at the moment in Djibouti although it is an interesting little country on the western seaboard of the Indian Ocean and popular with military. There are many foreign military bases there. There is a plan through the presidency to start a museum that will showcase the people and heritage of Djibouti.

Somalia

Somalia had a national museum with rich collections of ethnographical, archaeological, and other materials, but all these were looted and some destroyed during the overthrow of the dictator Siad Barre in the early 1990s. Since then, Somalia has remained without a working government and has no museum. The breakaway Somaliland that is also very rich in heritage including rock art has no functioning museum but has within its Ministry of Culture a Department of Museums and Sites.

Cross-References

- ► Heritage Museums and the Public
- ► Museums and Memory Experiences
- ► Museums and the Distortion of Archaeology for Political Purposes

Further Reading

Abungu, G.H.O. 1996. Forte Jesus de Mombaça: Poder, autoridade e conflito. *Oceanos* 28: 96–102.

Abungu, G.H.O. 1997. Museums, archaeology and the public in Kenya. In *Museums & archaeology in West Africa*, ed. C. Ardouin, 142. Washington, DC: Smithsonian Institution Press.

Abungu, G.H.O. 2001a. Museums: Arenas for dialogue or confrontation? *ICOM News* 54 (3).

Abungu, G.H.O. 2001b. Cambiamenti in atto limiti e tendeze della museologia Africa. In *Etnosistemi, Processi e Dinamiche Culturali*, vol. VIII (8). Roma: Centro d'Informazione e Stampa Universitaria (CISU).

Abungu, G.H.O. 2002. Opening up new frontiers: Museum of the 21st century. In *Museum 2000: Contribution or challenge?* ed. P. Agren and S. Nyman, 37–43. Stockholm: ICOM Sweden and Swedish Museum Association.

Abungu, G.H.O. 2004a. Universal museums. *ICOM News* 57 (1).
Abungu, G.H.O. 2004b. Democratising museums and heritage: Ten years on. *SAMAB* 30: 3–5.
Abungu, G.H.O. 2006. Africa and its museums: Changing of pathways? In *Arts and cultural heritage law for the 21st century*, ed. B. Hoffman, 386–393. Cambridge: Cambridge University Press.
Abungu, G.H.O. 2008. Universal museums: New contestations, new controversies. In *Utimut. Past heritage – Future partnerships*, ed. M. Gabriel and J. Dahl. Copenhagen: IWGIA/NKA.
Abungu, G.H.O. 2011. Africa's rich intangible heritage: Managing a continent's diverse heritage. In *Safeguarding intangible heritage*, ed. P. Davis et al., 57–70. Newcastle: University of Newcastle.
Abungu, G.H.O., and L. Abungu. 1998. Saving the past in Kenya: Urban and monument conservation. *African Archaeological Review* 15: 4.
Abungu, G.H.O., and L. Abungu, eds. 2006. *Africa: A continent of achievements*, UNESCO Museum International, 229–230. Paris: UNESCO.
Abungu, G.H.O., L. Abungu, D. Coulson, N. Pavitt, A. Fisher, and C. Beckwith. 2009. *Lamu. Kenya's enchanted island*. New York: Rizzoli.
Ardouin, C., and E. Arinze. 1995. *Museum and the community in West Africa*. Oxford: James Currey.
Ardouin, C., and E. Arinze. 2000. *Museums and history in West Africa*. Oxford: James Currey.
Farah, I. 2006. National museums of Kenya. In *Africa: A continent of achievements*, UNESCO Museum International, ed. G.H.O. Abungu and L. Abungu, 229–230. Paris: UNESCO.
Konare, A.O. 1995. The creation and survival of local museums. In *Museums and the community in West Africa*, ed. C. Ardouin and E. Arinze. Oxford: James Currey.

East and Southern African Neolithic: Geography and Overview

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State of Knowledge and Current Debates

The Neolithic period of eastern and southern Africa was a form of niche fulfillment when viewed within the context of its origins and distribution. In Africa, Neolithic cultures include those groups who herd domesticated animals, use stone tools and ceramics as part of their subsistence package. Climatic and demographic pressures after 6000 BP pushed Neolithic pastoralists living in the Nile River Valley southward, and the savanna habitats of eastern and southern Africa that these migrants encountered were attractive ecosystems rife for herding. The early Neolithic pastoralists in eastern Africa tended to be less mobile and had a broad-based subsistence compared to later pastoral groups, who colonized southern Africa after 2000 BP. When placed within the larger paleoenvironmental and cultural context, pastoralists adapted their subsistence to specific ecosystems based on the potential of the land to provide adequate sustenance for themselves and their livestock, but there are constant demographic pressures facing pastoralists who have low productive yields per unit of land compared to sedentary farmers.

In this entry, the Neolithic period in eastern and southern Africa will be reviewed from the perspective of how animal herders occupy distinct niches on a landscape. The current state of archaeological evidence for early pastoral cultures in the subcontinent will be examined to evaluate how prehistoric people may have opportunistically exploited specific ecological niches in the landscape. The present-day mosaic of genetic and linguistic groups across the subcontinent is used to fill in the gaps of knowledge where archaeological data is insufficient to chronicle the demographic and subsistence shifts throughout the late Holocene. The arrival of Iron Age agropastoralists in southern Africa will also be explored in order to attempt a clarification what the Neolithic entailed in this specific context. African Neolithic contexts are not a uniform culture or subsistence adaptation, and people have remained flexible in the ways they procure food, water, and shelter from the land into the modern era.

The Neolithic in Eastern and Southern Africa

It is easier to define the beginnings of the Neolithic period of eastern and southern Africa than the end. Traditionally, archaeologists ascribe the term "Neolithic" to the time period when food production techniques begin in an area where hunting and gathering had been exclusively

practiced in the past. Archaeobotanical research now suggests that domesticated plants and animals were introduced simultaneously in northern Africa (Out et al. 2016), but domesticated animals, not plant cultivation, are the hallmark of the Neolithic in eastern and southern Africa (Marshall and Hildebrand 2002). The origins of domesticated animals in Africa lie in the north and the demic routes of introgression into eastern and southern Africa extend from these homelands (Fig. 1). The near simultaneous arrival of Iron Age and Neolithic pastoralists into southern

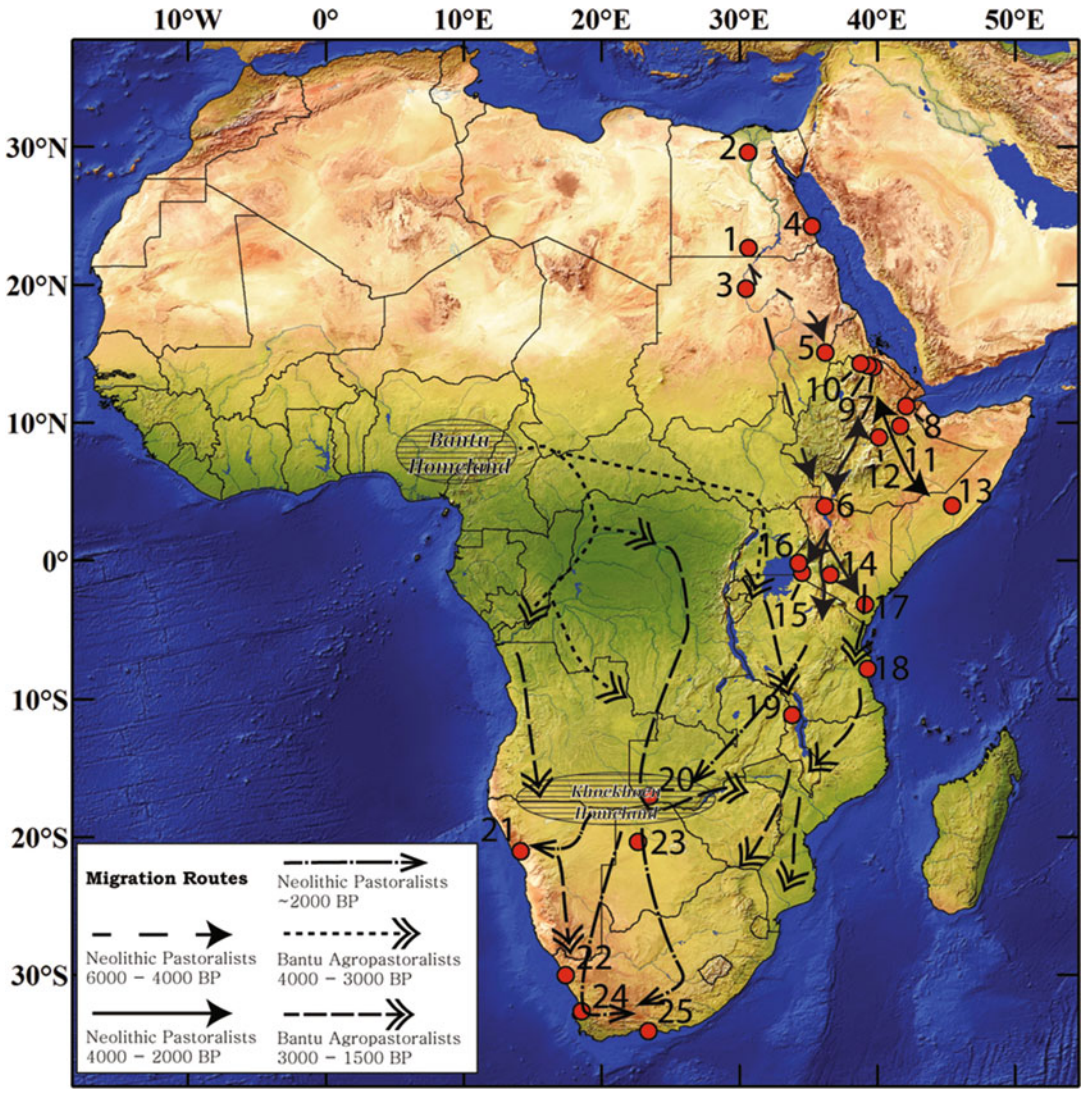

East and Southern African Neolithic: Geography and Overview, Fig. 1 East and Southern African Neolithic: Geography and Overview, Fig. 1 Natural Earth Map (http://www.naturalearthdata.com) of Africa showing routes of demic migration and archaeological sites mentioned in the text. *1* Nabta Playa, *2* Fayum, *3* Kerma, *4* Sodmein Cave, *5* Western Gash River, *6* Koobi Fora/Turkana Basin, *7* Quiha, *8* Asa Koma, 9 Danei Kawlos, *10* Gobedra, *11* Laga Oda, *12* Lake Besaka, *13* Gogoshiis Qabe Rockshelter, *14* Enkapune ya Muto, *15* Gogo Falls, *16* Usenge 3, *17* Galana River sites, *18* Rufiji River Delta, *19* Fingira and Hora, *20* Kunyengenya, Galumano, Luso, *21* Snake Rock, *22* Spoegrivier Cave, *23* Toteng, *24* Kasteelberg and Elands Bay, *25* Robberg Peninsula (Migration routes are primarily constructed from Russell et al. (2015) and archaeological data)

Africa and their side-by-side survival with foragers and farmers into modern times are the basis for shifting settlement and subsistence practices through the Late Holocene. In order to understand the roots of the eastern and southern African Neolithic, the evidence for the origins of pastoralism in northern Africa will be briefly reviewed.

North Africa

The roots of animal herding cultures of eastern and southern Africa are found in the now desiccated landscape of the eastern Sahara. Genetic data supports the notion that a rapid demographic expansion of the genetic forebears of the Niger-Kordofanian (Bantu), Nilo-Saharan (Nilotic), and Afroasiatic (Cushitic) language families (broadly falling in the L2 mtDNA haplotype) occurred at the end of the Younger Dryas between 10,000 and 12,000 years BP (Trombetta et al. 2015). It was during this period that experimentations with domesticating cattle (*Bos taurus*) are thought to have occurred in the eastern Sahara (Jórdeczka et al. 2013), although this view is not universally accepted (Linseele et al. 2014; Stock and Gifford-Gonzalez 2013).

At 10,000 years BP, the Sahara was a very different ecosystem than it was during the previous stadial period or what it is like today. The zenith of the so-called African Humid Period (AHP) saw the Sahara transform into a vast network of lakes and swamps that hosted hippos, crocodiles, a wide array of bovids and communities of hunter-gatherers who lived adjacent to the water bodies and had broad-based subsistence patterns. Pan-African distributions of "wavy line" and "dotted wavy line" ceramics in conjunction with bone harpoons and evidence for high predation on fish and riparian resources is evidence for a transcontinental movement of people during the early Holocene, occurring in tandem with population growth (Manning and Timpson 2014).

As climate conditions began to dry out, productive ecological biomes contracted around permanent sources of water. At archaeological sites adjacent to Nabta Playa in the southwestern Egyptian Sahara and further north in the Fayum region, there is evidence that animals and people were tethered to the same resources. It is during this period that the earliest domesticates appear to have been introduced into northern African from southwestern Asia (Barich 2016). Leaving contentious claims of cattle in Nabta Playa, the earliest, unambiguous domesticated animals date to "ca. 5600 cal BC" (7550 cal. years BP, if taken sensu stricto) in the form of goats (*Capra hircus*) from the site of Fayum (Linseele et al. 2016) and within 200 years at Kerma in Upper Nubia (Honegger and Williams 2015). Sheep (*Ovis aries*) were present in the Nile Delta, eastern Sahara, and Red Sea region by 7000 years BP (Muigai and Hanotte 2013). Goat and/or sheep remains have been recovered in contexts dating to ca. 7250 years BP in Sodmein Cave in the Red Sea Hills (Vermeersch et al. 2015). Current scholarship indicates that donkeys (*Equus asinus*) were domesticated in the Nile Valley between 7000 and 6000 years BP (Kimura et al. 2013). However, domesticates remain scarce in the archaeozoological record relative to wild animals (and fish) for the next 1500 years. During this period, the relationship between humans and these animals transformed into one of co-dependency. As lakes were drying up, humans needed a dependable food source and cattle had been bred to the point where their natural foraging instincts had disappeared.

Early domesticates were probably part of an integrated exchange system spanning the Sahara and Nile River Basin into southwestern Asia in which complex foragers/pastoralists maintained close technological and cultural networks over vast territories. These networks involved seasonal mobility in which riparian areas were utilized extensively during the dry season and grasslands were exploited in the rainy season. As riparian woodlands turned into grasslands by 6000 years BP and grasslands turned into scrubland and sand by 4000 years BP, settlement in the eastern Sahara was abandoned and the extensive exchange network collapsed (Hoelzmann et al. 2001).

Prior to the introduction of domesticated animals, the primary (archaeologically visible) subsistence strategy in the eastern Sahara and Nile Basin was fishing using barbed bone points (a.k.a. "bone harpoons"). Archaeological sites in the Nile Basin have increasing numbers of

domesticated animals represented in their faunal assemblages between 6000 and 4000 years BP indicating the importance livestock was gaining as a resource that was depended upon (Sadig 2010). Settlements with evidence for uses of aquatic, wild terrestrial, and domesticated resources also appear along the Gash River at the western foot of the Ethiopian Highlands around 5000 years BP (Gautier and Van Neer 2006), trickling into the Ethiopian Highlands after 3000 years BP (Lesur et al. 2014). Cultivation of sorghum along the banks of the Nile River also intensified by 5000 years BP (Haaland 1995) and may have further enticed people to accelerate settlement within riparian regions. Cultivated food was only one component of a very broad subsistence strategy practiced in the riverine regions of northeastern Africa, and long-distance exchange networks were maintained with foragers living in the Ethiopian Highlands (Fernández et al. 2007) and Turkana Basin (Wright et al. 2015).

East Africa and the Horn

Shortly after 5000 years BP, Neolithic pastoralists reached the Turkana Basin (Grillo and Hildebrand 2013). In the Koobi Fora region on the northeastern shore of Lake Turkana, harpoon fishing and riparian foraging was replaced with livestock husbandry and intensive riparian foraging. Stylistic commonalities between Nderit tradition (Turkana) and Shaheinab tradition (Sudanese Nile) ceramics (Barthelme 1985), similar subsistence patterns (Marshall et al. 1984), and linguistic reconstructions (Ehret 1998) have been used to argue that there was a middle Holocene migration of Sudanese (Afroasiatic/Cushitic) pastoralists into the Lake Turkana region. This marks the beginning of the "Pastoral Neolithic" (PN) period in eastern Africa, which is defined as animal herding cultures who used ceramics and Later Stone Age (LSA) tools (Bower et al. 1977).

However, the arrows of pastoral diffusion are difficult to untangle during the middle Holocene. Teeth of domesticated cattle have been unearthed from Quiha in northeastern Ethiopia with a stratigraphic date of ~5000–6000 years BP (Barnett 1999). Domesticated animals are found at other sites such as Asa Koma in Djibouti (Lesur 2004), Danei Kawlos in northeastern Ethiopia (Marshall and Negash 2002), Gobedra Rock Shelter in northern Ethiopia (Phillipson 1977), and Laga Oda (Clark and Prince 1978) and Lake Besaka (Brandt 1984) in the northeastern Rift Valley. At the Gogoshiis Qabe Rockshelter in southern Somalia, domesticated goats and cattle were recovered from pre-3500 year BP contexts (Brandt 1986). There is virtually no evidence to suggest a stylistic replacement of indigenous ceramic or lithic traditions in the Horn of Africa such as what is presumed to have occurred in the Turkana Basin (Lesur 2004).

For approximately 1000 years, occurrences of livestock in eastern Africa remain restricted primarily to the Turkana Basin and the Horn. Analyses of obsidians from the Turkana Basin suggest that once pastoralism was established in the region, exchange networks were intense but localized (Nash et al. 2011). There were only small "trickles" of pastoralists south of 3°N prior to 3000 years BP (Bower 1991). There are four published archaeological site locations with domesticated animals south of Lake Turkana prior to 3000 years BP: Enkapune ya Muto in the central Rift Valley (Ambrose 1998), Gogo Falls (Karega-Mũnene 2002) and Usenge 3 (Lane et al. 2007) near Lake Victoria, and Kahinju in the Kenyan Coastal Plains (Wright 2007). All of these sites have evidence for minimal reliance on domesticated animals, but instead show foraging-based adaptations in which domesticated animals became one (relatively minor) subsistence component.

It is likely that the recorded drops in lake levels and increases in xeric plant species documented across equatorial Africa between 4000 and 3000 years BP impeded the spread of transhumant pastoralists beyond predictable resource bases. The environments in which domesticated animals are found during this time period are areas with high topographic relief or are close to permanent water bodies. Furthermore, domesticated animals are found in very low numbers relative to wild taxa during this period from sites outside the Turkana Basin and Horn. It is a distinct possibility that livestock in these settings were rustled from established herds elsewhere and not kept for extensive periods prior to slaughtering (Marshall

2000). In that case, the presence of domesticated animals in equatorial Africa prior to 3000 years BP represented an additional resource within the broad-based foraging complex of those who possessed them and was neither culturally transformative nor even necessarily permanent.

From 3000 to 2000 years BP, a drastic shift in the relationship between humans and domesticated animals occurred among people living in the grasslands of eastern Africa and in the Rift Valley. The number of known PN sites from this period grows to several dozen and there are enough pastoralists on the landscape to form patterned cultural differences between different site types.

- *Eburran 5* sites are those where there is evidence for a limited acquisition of domesticated stock, used ceramics, but maintained the same general stone tool traditions (long, narrow blades and microliths, narrow endscrapers, sidescrapers, and microburins) and a broad-spectrum foraging patterns from preceding periods (Wilshaw 2016). These sites are located on savanna and forest ecotones and are mostly known from the Central Rift Valley.
- Most *Kansyore* sites are restricted to the areas adjacent to fluvial systems and Lake Victoria and are delayed-return hunter-fishers-gatherers who adopted domesticated animals by as early as 4500 years BP (Prendergast 2010b). The Kansyore ceramic tradition dates to as early as 6000 years BP and includes hemispherical bowls that are highly decorated with circular bands of rocker stamp and punctate impressions (Dale and Ashley 2010). The lithic traditions are not uniform, which reflects the LSA traditions of each locale rather than being a widely distributed cultural entity (Seitsonen 2010). Domesticated animals were incorporated into an indigenous foraging economy that involved seasonal residential mobility to exploit aquatic resources and access wild terrestrial game available at different times of the year.
- *Elmenteitan* sites were first described by Louis Leakey (1931) and are found in more closed habitat locations along the western Rift Valley above 1900 m. These sites have a higher percentage of ovicaprids compared to cattle and have a distinct lithic industry comprised of large, backed blades, long endscrapers, and large sidescrapers (Ambrose 1984). Elementeitan sites are also characterized as having a distinct pottery style (globular vessels with vertical lugged handles) and using stone bowls as mortuary artifacts.
- *Savanna Pastoral Neolithic (SPN)* sites are distributed throughout eastern Africa and were predominantly cattle pastoralists who supplemented their diets with plains game or, in the case of Lake Turkana, fish (Ambrose 1984). This archaeological entity has also been called "Wilton" (Leakey 1931) referring to the short, broad blades and convex endscrapers that characterize the lithic industry. However, there is considerable diversity in the lithic technologies used, which have stylistic continuity from LSA traditions predating pastoralism. Four named ceramic traditions called Nderit, Narosura, Akira, and Maringishu have been described from SPN sites as well as a distinct herringbone-motif decorated vessel. Stone bowls and other ground stones are commonly found on these sites.

The period from 3000 to 2000 years BP is known as the so-called splash of pastoralism into equatorial eastern Africa (Bower 1991). This has also been conceptualized as the period when pastoralism incubated in the whole of eastern Africa, as opposed to the preceding frontier phase when pioneers ventured into uncharted territories to search for new pastures or escape demographic pressures in their ancestral lands (Lane 2004). During "consolidation phases" of human frontier expansion, intensification and specialization of agricultural production techniques occurs (Alexander 1980; Lane 2004). Indeed, many archaeological sites with high proportions (>90%) of domesticated animals in faunal assemblages are found in the central Rift Valley and portions of the savannas of Kenya and northern Tanzania from this time period. However, many contemporaneous archaeological sites across eastern Africa have evidence that people were non-specialists, maintaining small herds of animals

that supplemented their diets which primarily revolved around foraging of which Eburran and Kansyore forager-(fisher)-pastoralists are good examples. In the case of the inhabitants along the Galana River in the Kenyan Coastal Plains, there is little evidence of significant changes in settlement or technology from 6000 to 1300 years BP (Wright 2007).

The precipitation regime of eastern Africa is bimodal with rainy seasons dictated by the movement of the Intertropical Convergence Zone (ITCZ). However, there is significant spatial and temporal variability in the distribution of rainfall based on global and regional differences in the distribution of solar heat and sea surface temperatures. Generally, eastern equatorial Africa has been wetter in the last 4000 years than during the middle Holocene (Verschuren et al. 2009), while the western portion of the region was driest around 2000 years ago with gradually increasing precipitation thereafter (Nash et al. 2016). In general, rainfall patterns in the late Holocene have been unpredictable on the decadal scale relative to the earlier Holocene (Plisnier et al. 2000), which appears to have pushed people toward exploiting a more predictable resource base. The opening up of a grassy corridor by 2000 years BP in the Lake Victoria region (Chritz et al. 2015) and in south-central Africa (Castañeda et al. 2009; Robinson and Rowan 2017) enabled pastoralists to move into the region without fear of encountering swarms of tsetse flies (*Glossina* sp.), which carry the disease trypanosomiasis (Gifford-Gonzalez 2017).

The use of Y-chromosome and mtDNA genetic markers is used in southern Africa to disentangle the history of population movements over the last several 1000 years (see discussion below). However, using these tools is a much more difficult task in eastern Africa where genetic admixture has been more thorough despite the retention of four language families and over 200 self-identified ethnic groups. One example of this is the Luo ethnic group from western Kenya who speak a Nilo-Saharan language but have shown predominantly Kordofanian/Bantu ancestry (Scheinfeldt et al. 2010). A classic ethnographic analysis tracing the movements of material culture items and marriage partners across ethnic boundaries in the Lake Baringo region of Kenya illustrates that ethnically diverse landscapes necessitate the presence of strong cooperative networks in order to function well (Hodder 1977). There is also evidence of admixture of genes from southwest Asian populations introduced into East Africa between 3300 and 2700 years ago (Pickrell et al. 2014). Cohesive social networks built on complex social values, kinship, and exchange patterns are crucial components of niche fulfillment in precarious ecological settings and have deep roots in African prehistory.

Demic Routes of the Neolithic to Southern Africa

The most commonly accepted demic route of the first livestock into southern Africa holds that a small group of migrants left the Great Lakes region of Uganda around 2000 years BP and settled in Okavango River Basin of what is now northern Botswana and the Caprivi Strip of Namibia. From there, the agro-pastoralists came into contact with Khoe-Kwadi speaking hunter-gatherers, some of whom rapidly adopted a pastoral lifestyle themselves, and went on to colonize vast tracts of southern Africa by 1800 years BP. (The linguistic distinction of the Khoe-Kwadi language family(-ies) is the subject of some debate among linguists (Ehret 2008; Güldemann 2008; Mitchell 2010). One common heuristic device, though not linguistically or biologically accurate, is to refer to pastoral communities of southern Africa as "Khoe" and the hunter-gatherers as "San" (Scheinfeldt et al. 2010; Soodyall et al. 2008).)

Separate migrations of Bantu-speaking agropastoralists occurred down the Atlantic and Indian Ocean coasts between 1800 and 1600 years BP (de Filippo et al. 2012), but there are many potential memes that remain undefined in this explanation of livestock diffusion. It is clear that the spread of domesticated animals did not occur as a coherent population expansion of one culture group from eastern to southern Africa. There has been considerable debate regarding the degree to which livestock herding techniques were adopted by indigenous foragers or whether pastoral people who entered southern Africa settled alongside foragers and there was a gradual melding of

subsistence and culture systems via intermarriage and intercommunity trade. The picture is further complicated by the fact that Bantu-speaking agropastoralists enter southern Africa within 200 years of the non-Bantu-speaking populations ("Khoekhoen"). In the end, there are three primary lines of evidence that can be used to retrace the spread of pastoralism out of eastern Africa: archaeology, genetics, and linguistics. In this entry, these data sets (that are not always in total agreement with one another) will be reviewed to evaluate the current state of knowledge surrounding the origins of Neolithic pastoral economies in southern Africa.

The lack of archaeological evidence for a southward expansion of Neolithic pastoralists from 3000 to 2000 years BP into in the areas that now include southern Tanzania, northern Malawi, northern Mozambique, and eastern Zambia may be as a result of the dearth of well-dated archaeological assemblages from this time period. The majority of archaeological finds in the Rufiji River Delta and surrounding areas (Chami and Kweksason 2003) most likely date to after 3000 years BP rather than before, as the authors suggest. The artifacts, including numerous Narosura ceramic tradition sherds, broad blades, and groundstones, are all suggestive of a well-developed SPN demic expansion from 3000 to 2000 years BP. Ancient DNA analyses from Figira and Hora rockshelters in Malawi show complete genetic replacement of indigenous populations by modern-day Bantu-speaking populations, while genetic succession was less complete among populations in the modern day countries of Kenya and Tanzania (Skoglund et al. 2017).

Early Iron Age settlement of the region adjacent to the Zambezi and Machili Rivers in southwestern Zambia has been reported during the time period when Neolithic pastoralists had likely reached points south of the Zambezi. The sites of Kunyengenya, Salumano, Lusu, and Situmpa have Iron Age ceramic assemblages, evidence for domesticated sheep and radiocarbon ages clustering around 2200 years BP (Katanekwa 1978; Phillipson 1989). The so-called Situmpa Ware is documented across Zambia and Zimbabwe and has radiocarbon ages dating to around 2000 years BP (Clark and Fagan 1965). In the Namib Desert, the site of Snake Rock has ceramics and sheep bones dating to 2000 years BP (Kinahan 2016). Despite intensive investigations, evidence of Neolithic pastoralists have yet to be located in this region from this time period, so other forms of data must be explored to identify the routes by which the Neolithic moved from eastern into southern Africa.

Y-chromosomal genetic evidence shows that pastoralists from eastern Africa en route to southern Africa passed through Tanzania estimated at ca. 2000 years BP (Henn et al. 2008) and shortly thereafter made their way down a corridor along the Zambezi River (Russell et al. 2014). Direct dating of archaeological materials from this region is scant and DNA evidence has a large range of associated error in its clock, so there is much room for speculation regarding who the first pastoralists were, the routes they took to pass into southern Africa, and when it occurred.

Linguistic analyses provide an interpretive framework for understanding the migration of pastoralists and farmers into southern Africa. Early Neolithic groups from southern Africa spoke Khoe-Kwadi languages, which originated from Okavango River Basin. However, Khoe-Kwadi languages also have eastern African links to root words like "year," which have similar cognates in Cushitic and eastern Bantu languages (Güldemann 2008). More tellingly, the overlap of cognates between East African languages associated with Sandawe hunter-gatherers (northern Khoe family) and Khoe-Kwadi are numerous (Ehret 2008; Güldemann 2008). The genetic divergence dates of click-speaking populations in Tanzania (e.g., Sandawe, Hadzabe) from southern Khoe-San populations are estimated to be older than 35,000 years (Tishkoff et al. 2007), so one should expect that proto-Khoe-Kwadi speaking migrants to southern Africa were conversant with animal husbandry as well as foraging subsistence prior to their exodus. When the immigrant northern Khoe speakers reached southern Africa, both genetic and linguistic analyses indicate that the proto-Khoe-Kwadi language family diversified enormously as intercommunity exchange

networks developed (Güldemann 2008; Salas et al. 2002; Soodyall et al. 2008). As will be demonstrated in the following section, the archaeological evidence reflects the diversity of subsistence adaptations that accompanied the movement of people and technological ideas after 2000 years BP.

Southern African Neolithic?

Insofar as it is understood, the southern African Neolithic consists of two facies: herders who hunted and gathered and hunter-gatherers who kept small amounts of livestock (Sadr 2003). As during the pioneer phases of agricultural expansion in many other places in Africa, pastoralism entered South Africa after 2000 years BP as an experimental concept that indigenous hunter-gatherers integrated into their subsistence economies. In the years that succeeded the introduction of Neolithic and Iron Age lifeways into southern Africa, the ecology of the landscape was impacted by the demographics of settlement and non-anthropogenic changes to the climate, which pushed people into narrower subsistence niches.

The earliest securely dated archaeological finds of domesticated animals in southern Africa are comprised of sheep remains at Spoegrivier Cave in Namaqualand dated to 2105 ± 65 ^{14}C years BP (1990–2300 cal. years BP; Sealy and Yates 1994). In archaeological sites studied across Namaqualand, there is no discernable material culture distinction between archaeological assemblages prior to and immediately following 2000 years BP, suggesting that pastoralism in this region was not introduced by a separate, immigrant pastoral group (Webley 2007). Following the introduction of ceramic technology into the region after 1900 years BP, incremental changes to lithic assemblages and ostrich eggshell bead production could represent the evolution of a "herder-forager" culture, distinct from those groups who did not adopt domesticated animals (Sadr 2003).

Sheep and cattle are found at Toteng in northern Botswana directly dated with radiocarbon ages of 2020 ± 40 and 2070 ± 40 ^{14}C years BP (1900–2040 cal. Years BP and 1990–2110 cal. Years BP, respectively; Robbins et al. 2005). In both cases, the vast majority of the faunal remains were from wild animals, with domesticated stock comprising <5% of the total diagnostic NISP assemblage (Robbins et al. 2008). Settlement of the Toteng sites correlates to higher lake levels of Lake Ngami and archaeological materials recovered reflect that subsistence had a distinctly riparian resource predation strategy (Robbins et al. 2008). Occupation of the site throughout the late Holocene conforms to the hunters-who-kept-livestock model advanced by Sadr (2003).

The first livestock economies to enter southern Africa are argued to have preferred sheep as opposed to cattle (Smith 1992). However, Thomas Huffman (2001, 2007) argues that archaeofaunal assemblages from the southern African Iron Age underrepresent the numbers of cattle people actually kept because African pastoralists usually use cattle byproducts (milk, blood) and rarely eat their cattle. He calls this the "Central Cattle Pattern," which is documented in numerous ethnographic examples from across the continent. Subsequent analysis of Early Iron Age phytolith assemblages from dung deposits in southern Africa reflect taxa consumed by small stock and not cattle confirming the hypothesis that early Neolithic pastoralism was centered on tending small stock (Badenhorst 2009). Middle and Late Iron Age agropastoralists were more reliant on cattle and the faunal assemblages from across the region reflect this trend.

Using linguistics, the earliest cattle herding cultures of southern Africa are thought to have been Khoe-Kwadi speakers who settled in the Limpopo Valley approximately 2000 years ago (Ehret 2008; Güldemann 2008). Tom Güldemann (2008) sets the homelands for the Khoe-Kwadi language family in the northeastern Kalahari along what is today the northern borders of Namibia and Botswana. However, the archaeological association between Khoe-speakers and pastoralism between 2000 and 1000 years BP is shaky (Sadr 2008b). Khoekhoen people were known as highly mobile, lugged-ceramic using pastoralists living in the western Cape of South Africa (Sadr 2003). However, none of the antecedent material culture features associated with ethnographic accounts of Khoekhoen

pastoralists (Bollong et al. 1997) are apparent from archaeological sites prior to 1000 years BP. When lugged ceramics first appear in the archaeological record at Kasteelberg in the southern Cape after 1000 years BP, residue analysis from the vessels indicates that they were used to process seal blubber, not milk as would be expected from people who were dependent on livestock (Patrick et al. 1985).

Neolithic pastoralists arrived in the western Cape approximately 2000 years BP and the eastern Cape and western coast regions of South Africa by 1800 years BP and shared the low-altitude plains with hunter-gatherers through the late Holocene (Lewis 2002; Sadr 2015). The site of Kasteelberg has been interpreted as supporting two types of populations: mobile, herder-foragers who subsisted on inland resources and another population of semi-sedentary herder-foragers who exploited coastal ecosystems (Sadr et al. 2003). Small-stock herding at the site is dated to prior to ca. 2000 years BP and shows continuity in the overall archaeological assemblage with previous nonlivestock tending occupations of the site (Sadr et al. 2003).

After the arrival of pastoralism in the Elands Bay region, hunter-gatherers appear to have continued to practice a highly mobile, flexible, opportunistic foraging strategy, which suggests noncompetitive interactions between groups with different subsistence practices (Jerardino et al. 2009). Stable isotope analysis performed on human skeletal materials from the southwestern Cape indicates that the diets of coastal inhabitants had $\delta^{13}C$ values that strongly indicate a very limited mobility range and focus on marine resources (Sealy and Merwe 1988). The persistence of hunter-gatherers into the late Holocene at sites in the southern Natal (Cable 1984) and the northern Cape (Parsons 2003) further confirms variability in the settlement patterns along ecological gradients between highland, fluvial riparian, and coastal lowland settings.

Bone chemistry of two contemporaneous burial sites located within 13 km of one another in the Robberg Peninsula along the southern Cape coast show that there is strong differentiation of dietary patterns between the two populations (Sealy 2006). Individuals buried at Plettenberg Bay show consumption of high trophic marine animals, whereas individuals from Matjes River had a much more broad-based diet with lower trophic marine and terrestrial resources (Sealy 2006). Combined with other archaeological data, the implication of this finding is that there was clear differentiation of subsistence strategies, territories, and cultural practices among late Holocene hunter-gatherers of southern Africa. Therefore, as Neolithic pastoralism spread along the coasts and hinterlands of southern Africa, the perceived usefulness of the resource appears to have varied among the indigenous inhabitants of the region.

The timing and degree of exogenous genetic introgression into indigenous southern African pre-agricultural populations would be helped by detailed genetic studies of living populations across the southern Cone. Unfortunately, most genetic analyses of hunter-gatherer and agricultural populations of southern Africa has been restricted to the geographic outskirts of the region. Y-chromosome and mtDNA analysis of modern Khoe-San populations show deep ancestral links to the L0 haplotype (which is the base of the African population tree according to Gonder et al. 2007) due to intermarriage of the Khoekhoen with indigenous hunter-gatherer populations after 2000 years BP, but there is no genetic discrimination between ethnic groups presently designated as "Khoe" (Khoe-Kwadi language family) and "San" (Ju-ǂHõa language family) (Schlebusch et al. 2012; Soodyall et al. 2008). In contrast, Bantu-speaking populations bear distinct mutations that separate their lineages from the Khoe-San clade and haplotypes (Gonder et al. 2007; Henn et al. 2008; Pickrell et al. 2014; Tishkoff et al. 2009), but these are generalizations to which one cannot ascribe a tight chronology. Linguistically, the same basic relationships bear out unevenly as there is significant linguistic borrowing between the language families although distinct language families can be discriminated between Khoe, Bantu, and other non-Khoe speakers (Güldemann 2008; Hammond-Tooke 2004).

The combined archaeological, genetic, and linguistic evidence from southern Africa supports

the notion that exploitation of ecological niches diversified following the introduction of domesticated stock. There is continuation of the LSA Wilton lithic traditions from the early Holocene into the historic period (100 years BP) with only modest changes in tool frequencies and morphology alongside communities heavily dependent on using copper, tin, and iron (Duncan 2002; Mitchell 2005). The evolution of the Smithfield LSA large endstruck scrapers and distinct pottery tradition of the eastern Karoo after 800 years BP shows evolution of formalized stone tool production techniques despite the presence of iron throughout the region (Mitchell 2005). Due to the high amount of regional subsistence diversity, the separation of Neolithic from Iron Age settlements is not straightforward in southern Africa. The overlap of timing and material cultures of the two archaeologically distinguished groups is the result of similar demographic and ecological pressures, but differences in the migration and settlement patterns are worth noting to contextualize modes of early food production in Africa.

Iron Age Pastoralism. Previous models advanced in linguistics supported the notion of a "bow-wave" expansion of Bantu-speaking, iron-using agropastoralists originating from the West Africa via western Lake Victoria who territorially replaced indigenous hunting (Khoekhoen) and pastoral (Nilo-Saharan and Afro-Asiatic) populations (e.g., Vansina 1995). Although the extent to which there was replacement of indigenous hunter-gatherers varies by geography, this theory has been revised with a nuanced view of incremental movements and intermixing of members of the Kordofanian/Bantu language family as they migrated across other portions of the subcontinent (Eggert 2005). Studies of the distribution of African genetic markers clearly demonstrate the migration of two separate, Bantu clades into southern Africa approximately 2000 years ago, but the lineages are hybridized, as is the archaeological evidence of stone versus iron using and hunting versus pastoral versus farming subsistence patterns (Mitchell 2010).

Gross analyses of ceramic assemblages from southern Africa offer a complex view of culture change in the South African Neolithic period. After 2300 years BP, a few thick-walled ceramics (e.g., Situmpa, mentioned above) and thin-walled variants appear within LSA sites associated with mixed foraging-herding economies for about 600 years (Sadr 2008a). The archaeological site of Bambata and toponymically derived ceramic tradition known from western Zimbabwe is argued to have the earliest occurrence of cattle on the Zimbabwe Plateau and is argued to have predated Iron Age settlement of the area (Walker 1983). However, the clear association between domesticated animals and the 2100 years BP radiocarbon date has been questioned because an older radiocarbon date comes from above the Bambata lens (Huffman 2005). Thomas Huffman (2005) also places thin-walled Bambata pottery within the Kalundu ceramic tradition, which is a subvariant of the Chifumbaze Complex, and associated with Bantu-speaking populations. The other subvariant of the Chifumbaze Complex is recognized as Urewe ceramic tradition, which is an East African Early Iron Age ware from western Lake Victoria occurring after 2500 years BP and spread down the Indian Ocean coast after 2000 years BP in a modified form called "Kwale Ware" or "Early Iron Ware." In Huffman's (2005) analysis, Bambata pottery was first produced by Iron Age farmers in Angola and transported by (Khoe-speaking) foragers (who probably kept some domestic stock) into southeastern Africa around 1750 years BP. The style was later adopted by Bantu-speaking agropastoralists of eastern Botswana and western Zimbabwe around 1600 years BP (Huffman 2005). By 2000 years BP, Bambata ceramics and a lithic scraper tradition spread along the Atlantic seaboard to the southern tip of Africa, but disappeared from the archaeological record in the Zambezi and Limpopo watersheds by 1500 years BP (Sadr 2015).

Settlement data indicates that village-dwelling Iron Age agropastoralists who farmed yams and millet entered southern Africa between 1800 and 1400 years BP (Vogel and Fuls 1999). Phytoliths recovered from one of the earliest occupied of such sites, Broederstroom, include wetland species of sedges and herbaceous grasses indicating wetter than present conditions (Huffman 1996). The immigrating Iron Age people were clearly

attracted to southern Africa because of its agricultural potential. Pulses of expansion of Iron Age agropastoralists into new niches in southern Africa generally correlates with wetter and warmer conditions than are presently found (Huffman 1996). The presence of the newcomers would have presented a source of resource competition for pastoral populations. However, the linguistic evidence indicates that Khoekhoe-speaking pastoralists remained in northern and northeastern South Africa for at least 1000 years after the arrival of Bantu-speaking populations (Ehret 2008).

Early Iron Age farmers who settled in southern Africa after 1800 years BP appear to have kept sheep, but there is only limited evidence for cattle and goat husbandry. Throughout the Iron Age, farming communities on the Zimbabwe Plateau grew increasingly invested in participating in the trans-Indian Ocean exchange networks, and their settlements were located near stone-walled enclosures that grew into loosely organized states. Between 1400 and 1000 years BP, the distribution of Bambata Ware and other thin-walled ceramics becomes increasingly restricted and thick-walled vessels associated with crop-raising/iron-producing communities is widely distributed throughout southern Africa (Sadr 2008a). Butchering cattle became increasingly important to these farming communities by the Late Iron Age (ca. 700–200 years BP), which has been attributed to the arrival of Nguni and Sotho-Tswana speakers from northeastern South Africa (Badenhorst 2010).

Successive waves of Bantu-speaking migrants into southern Africa during the Middle and Late Iron Ages (Hammond-Tooke 2004) as well as indigenous changes in niche fulfillment strategies resulted in a complex cultural mosaic at the time of European colonization. For at least the last 270,000 years, rainfall in eastern and southern Africa has been antiphasing, meaning that as rainfall decreased in eastern Africa, it was simultaneously increasing in southern Africa, and vice versa (Simon et al. 2015). Such climatic factors have catalyzed interregional migrations of agropastoral people throughout the late Holocene seeking good pasture and farmland. With the immigration of new populations into southern Africa, subsistence and settlement patterns of indigenous Khoekhoen changed – in some cases moving toward a foraging-intensive exploitation pattern (Wilmsen 1994) or, in other cases, they moved to a livestock-intensive exploitation pattern (Kinahan 1991).

Discussion of the Evidence

Neolithic pastoralists entering East Africa entered into new niches at the same time ecological conditions in their homelands were desiccating. It is likely that pastoralists entered the Ethiopian Highlands for the same reasons at approximately the same time, but they are less archaeologically visible than in Lake Turkana. Pastoralism took shallow roots south of Lake Turkana as a seemingly minor compliment to indigenous foraging systems. Marshall (2000) has suggested that raiding of herds may have been the mechanism in which livestock appear in new niches. In any event, the evidence is relatively clear that early pastoralism had little effect on indigenous settlement and subsistence practices. Livestock were incorporated as just one more resource within a broad-base subsistence regime.

Given the evidence for antiphasing climates between eastern and southern Africa in the late Holocene, livestock husbandry in southern Africa may have arisen from small populations of environmental refugees leaving East Africa around 2000 years ago and settling in the greener pastures of southern Africa (Scott et al. 2012). The low archaeological visibility of these migrants is typical of itinerant pastoralists, who tend to leave few traces on the landscape due to the fact that having copious amounts of material culture is antithetical to a mobile lifestyle (Shahack-Gross et al. 2003). As in the pioneer phases of livestock introgression in eastern Africa, some southern African foragers recognized the newcomers as bringing an innovation that could be useful if resources became scarce.

Changing environments and cultural practices in eastern and southern Africa during the late Holocene incubated livestock husbandry until it began to assume an ever-more important role in dictating settlement and subsistence practices. In the savanna plains and Rift Valley, there is strong evidence for the development of a "cattle-first"

economy after 3000 BP. However, there remained many foraging-first communities across eastern and southern Africa interacting with their agricultural and pastoral neighbors into modern times. From a cultural ecology perspective, the degree to which people relied on domesticated and wild resources will vary by geography and time, depending on the ability of different communities to feed themselves from the land or subsist through trade with their neighbors.

In East Africa, late Holocene economies of the Highlands and Coastal Plains continue to practice the broad-based subsistence regimes inherited from middle Holocene foraging-herders. Elmenteitan communities in the Highlands were vertically transhumant, but had a broad subsistence base. In the Coastal Plains and Lake Victoria region, pastoralists were tethered to resource-rich riparian areas, but little is known of how they lived in the immediate coastal hinterlands. Evidence from Galana River in southeastern Kenya and the Lower Rufiji River in Tanzania show that there are cultural connections to livestock-dependent pastoralists living in the interior, but the indigenous subsistence economy and lithic traditions remain constant throughout the Later Stone Age Neolithic period. A similar pattern is followed among Kansyore sites in the Lake Victoria region, albeit with varying degrees of integration of PN subsistence and tool production techniques (Prendergast 2010a). In these lacustrine and fluvial settings, domesticated animals were integrated into riparian foraging strategies, which included hunting, fishing, and collecting edible plants and invertebrates that grew in aggrading floodplains.

Immigration of Bantu-speaking populations who raised yams and millet and introduced iron production represented a new subsistence niche, which may have clashed with transhumant pastoralism. Until recently, most scholars believed that approximately at 2000 years BP, a unified Bantu cultural complex immigrated to the northern Lake Victoria region from western Africa bringing Urewe tradition ceramics, iron working and sedentary farming with them (Vansina 1995). However, well-dated archaeological data sets from Lake Victoria (Lane et al. 2007), archaeogenetics (Pickrell et al. 2014; Skoglund et al. 2017) and revised linguistic analyses (Ehret 1998) indicate that the introduction of these cultural features were asynchronous. Regardless, the overall effect of these new cultural features realigned subsistence practices in the region with some pastoral groups eschewing cultivation altogether, while others (particularly in the Lake Victoria Basin, Highlands and Coastal Plains of the Indian Ocean) adopted plant cultivation as yet another resource that could be utilized as needed.

The impact of agricultural/grazing practices and iron production significantly altered the distribution of woody and grassy taxa across eastern Africa after 5000 years BP. Burning and tree coppicing were intentional landscape management tools undertaken during the Neolithic across the African continent (Boivin et al. 2016). After 2000 years BP, significant shifts in the distribution of grasslands at the expense of primary-growth forests found in lakes all across the western Rift Valley are evidence of increasing proprietorship of land. Intensive management of patches of land would result in circumscription of territories that was not necessarily beneficial to unrestricted movement of transhumant pastoralists. In this case, the indigenous populations were forced to adopt aspects of the new economy, move to a new area, or attempt to maintain a transhumant pastoral lifestyle in an increasingly territorially-circumscribed landscape.

Some groups clearly remained rooted in the Neolithic pattern practicing transhumant pastoralism as evidenced by sites dating to after 3000 years BP on the Mara Plains and Laikipia Plateau of the Central Rift Valley and in the East African Highlands. It is likely that these pastoralists traded animal products and byproducts with their farmer/forager neighbors, but there were also likely clashes over access to land in which different cultural groups competed for resources. Such clashes were commonly documented in the ethnographic record beginning in the nineteenth century. Maa-speaking pastoralists frequently fought with Kikuyu and Luo groups in an attempt to gain pasture in the fertile Central Highlands and Lake Victoria Basin, respectively (Galaty 1993). During the nineteenth century, the highly fatal cattle

disease rinderpest had devastated Maasai herds and severely stressed intergroup relations in the form of rampant livestock raiding (Sobania 1993). A further climatic stress is also possible occurring during the end of the Little Ice Age (AD 1300–1850) in which wetter precipitation regimes gave way to much more arid conditions than had been witnessed in several 100 years (Verschuren 2001). A cultural antipathy developed amongst the Maa for their neighbors, and vice versa in which neither group viewed the others as humans (Berntsen 1979). Such a cultural proclivity is common amongst groups who compete for a common resource pool. For the purposes of the present discussion, it is significant to the extent that niche fulfillment under mutually symbiotic conditions can quickly be thrown off-balance when resource bases become strained.

The move of pastoralism across the Zambian and Zimbabwe plateaus into southeastern Africa was rapid and features of the Bantu expansion can be interpreted as a having immigrated as a "package." When viewed through the lens of John Alexander's (1980) and Paul Lane's (2004) analyses of Neolithic frontiers, the colonization of this broad area occurred so rapidly that the "settling in" phase of frontier expansion had little time to occur. In this sense, the moving frontiers of incipient East African pastoralism (ca. 4000–3000 years BP), eastern equatorial Africa (3000–2000 years BP) and southern African pastoralism (2000–1500 years BP) shared some common aspects (Sadr 2003). The initial spread of domesticated animals into eastern equatorial Africa between 4000 and 3000 years BP have many of the characteristics of Sadr's (2003) "foragers who herd." There is no evidence for radical changes in indigenous tool technologies, and hunting and gathering seems to persist in much the same way that it did before livestock were introduced (Dusseldorp 2016). After a period of incubation in the Turkana Basin, pastoral occupation of eastern equatorial Africa after 3000 years BP diversifies into a range of niche fulfillment specialists, which adapted further after the arrival of Bantu agro-pastoralists after 2000 years BP. Likewise, after incubating in eastern equatorial Africa from 3000 to 2000 years BP, the spread of pastoralism into southern Africa was initially limited, but diversified over time as niches filled and complex exchange networks evolved.

New demographic pressures faced after sedentary farmers circumscribed access to pasture lands encouraged some of these pastoral communities to look for new pastures elsewhere. The expansion southward represented the only possible route for expansion given the dense stands of rainforest located to the west, established and entrenched pastoral communities to the north and ocean to the east. By 1600 years BP, pastoralism had reached the southern tips of Africa, but the migrations left little obvious archaeological footprint on the landscape that would separate them from the indigenous economies. In this regard, despite genetic and linguistic evidence for a demic expansion of Khoekhoen at the same approximate time that small domestic stock begin appearing at a few sites in southern Africa, the overall subsistence economy remained weighted toward hunting and gathering for several 100 years until the arrival of the Bantu speaking agro-pastoralists. As in the East African case, the abundance of wild resources in the wetter-than-present southern Africa at around 2000 years BP provided many subsistence options, and keeping and culling numerous quantities of domesticated animals does not appear to have been culturally preferred.

Within 200 years of the initial appearance of livestock in southern Africa, farming communities expanded into the region. This migration further filled the ecological niches on the African subcontinent, so new relationships between pastoral, farming and foraging communities were forged. As Andrew Smith (1992) states, there were three choices left for indigenous hunter-gatherers who were in southern Africa as pastoralists filled their niches: (1) adopt a pastoral lifestyle themselves, (2) enter into a subservient patronage relationship with food producers, or (3) move into marginal environments and exploit lower-ranked resources. Based on the present-day archaeological evidence, it seems that there was a combination of all three factors amongst the populations of eastern and southern Africa between 2000 and 1600 years BP.

In many other regions of the world, the Neolithic was a transformative event in which agriculture permanently so radically changed the landscape that foraging was no longer possible. However, this was not the scenario in eastern and southern Africa. The subsistence practices of individual communities were and remain fluid to this day. Many! Kung of the Central Namib Desert have shifted between foraging-and pastoral-dependent economic strategies for hundreds of years (Kinahan 1991). Domesticated animals in eastern and southern Africa represented just one more subsistence choice in a quiver holding many arrows.

Conclusion

The eastern and southern African Neolithic is diverse and has evolved throughout the Holocene to incorporate many different subsistence and settlement practices. Early pastoral communities in eastern Africa from 5000 to 3000 BP had broad-based subsistence strategies and remained tethered to localized resource bases. After 3000 BP, pastoralists on the grassland plateaus and Rift Valley were seasonally mobile and appear to have restricted their diets to meat, animal byproducts and probably other foods, which do not leave traces in the archaeological record. Pastoralists living in the East African Highlands and Coastal Plains of the Indian Ocean continued to subsist on a wide array of wild products, and continued to use domesticated animals as a secondary food source.

Experimentation with small-scale horticulture is possible prior to the emergence of intensive yam and millet cultivation after 2000 BP. It is likely that demographic pressures placed restricted access on transhumance after sedentary farming took hold in the fertile regions of East Africa. Mobile pastoralists chose to migrate south into the Zimbabwe Plateau, Miombo Woodlands, Mozambiquan Coastal Plains and southern African Highveld, filling most of the viable pastoral niches within 400 years subsequent to leaving East Africa. The archaeological invisibility of the Neolithic (Khoekhoen) herders suggests that the pastoralists who entered southern Africa were highly mobile—carrying only the bare essentials, which would have left a small footprint on the landscape. The southern African Neolithic manifested in the form of foragers who kept some domesticated animals, and, as Bantu Iron Age agropastoralists entered the region, limited plant cultivation was practiced as well.

The beginning of the Iron Age in southern Africa after 2000 years BP reconfigured niche fulfillments and subsistence choices, but the ethnic legacies of these migrations endure genetically and linguistically into the present day. The persistence of foraging and herding subsistence strategies across eastern and southern Africa into modern times as well as the continued use of stone tools despite the presence of metal technologies attests to the success of these adaptations in these settings. To this extent, the end of the Neolithic is diffuse and cannot be ascribed on the basis of the beginning of the Iron Age. Iron Age and Neolithic lifeways were operating in tandem throughout the late Holocene with people shifting subsistence strategies regularly, entering into new exchange relationships or fighting for land with other communities based on what they needed to do to survive that particular year. This legacy persists to the present day as flexible modes of subsistence remain critical aspects of modern farming systems in Africa.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Asses/Donkeys: Domestication
- ▶ Cattle: Domestication and Development
- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances
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- ▶ Goat: Domestication
- ▶ Nabta Playa: Agriculture and Domestication

▶ North and Saharan Africa: Geography and Chronology
▶ Southern Africa: Origins and Development of Agriculture
▶ Southern and East African Middle Stone Age: Geography and Culture
▶ West and Central African Neolithic: Geography and Overview

References

Alexander, J. 1980. The spread and development of iron-using in Europe and Africa. In *Proceedings of the 8th Panafrican congress of prehistory and quaternary studies*, ed. R.E. Leakey and B.A. Ogot, 327–330. Nairobi: The International Louis Leakey Memorial Institute for African Prehistory.

Ambrose, S.H. 1984. The introduction of pastoral adaptations to the highlands of East Africa. In *From hunters to farmers: The consequences of food production in Africa*, ed. J.D. Clark and S.A. Brandt, 212–239. Berkeley: University of California Press.

Ambrose, S.H. 1998. Chronology of the Later Stone Age and food production in East Africa. *Journal of Archaeological Science* 25: 377–392.

Badenhorst, S. 2009. Phytoliths and livestock dung at Early Iron Age sites in southern. *Africa South African Archaeological Bulletin* 64: 45–50.

Badenhorst, S. 2010. Descent of Iron Age farmers in southern Africa during the last 2000 years. *African Archaeological Review* 27: 87–106.

Barich, B.E. 2016. The introduction of Neolithic resources to North Africa: A discussion in light of the Holocene research between Egypt and Libya. *Quaternary International* 410: 198–216. https://doi.org/10.1016/j.quaint.2015.11.138.

Barnett, T. 1999. *The emergence of food production in Ethiopia*, Cambridge monographs in African archaeology 45, BAR international series S763. Oxford: Archaeopress.

Barthelme, J.W. 1985. *Fisher-hunters and Neolithic pastoralists in east Turkana, Kenya*, BAR international series 254. Oxford: British Archaeological Reports.

Berntsen, J.L. 1979. Pastoralism, raiding, and prophets: Maasailand in the nineteenth century. Ph.D., University of Wisconsin-Madison.

Boivin, N.L., et al. 2016. Ecological consequences of human niche construction: Examining long-term anthropogenic shaping of global species distributions. *Proceedings of the National Academy of Sciences* 113: 6388–6396. https://doi.org/10.1073/pnas.1525200113.

Bollong, C., A.B. Smith, and G. Samson. 1997. Khoikhoi and Bushman pottery in the cape colony: Ethnohistory and Later Stone age ceramics of the south African interior. *Journal of Anthropological Archaeology* 16: 269–299.

Bower, J.R.F. 1991. The pastoral Neolithic of east Africa. *Journal of World Prehistory* 5: 49–82.

Bower, J.R.F., C.M. Nelson, A.F. Waibel, and S. Wandibba. 1977. The University of Massachusetts' Later Stone Age/pastoral 'Neolithic' comparative study in Central Kenya: An overview. *Azania* 12: 119–146.

Brandt, S.A. 1984. New perspectives on the origins of food production in Ethiopia. In *From hunters to farmers: The causes and consequences of food production in Africa*, ed. J.D. Clark and S.A. Brandt, 173–190. Berkeley: University of California Press.

Brandt, S.A. 1986. The Upper Pleistocene and early Holocene prehistory of the Horn of Africa. *African Archaeological Review* 4: 41–82.

Cable, C. 1984. *Economy and technology in the Late Stone Age of southern Natal*, Cambridge monographs in African archaeology 9. British archaeological research international series 201. Oxford: British Archaeological Reports.

Castañeda, I.S., J.P. Werne, T.C. Johnson, and T.R. Filley. 2009. Late quaternary vegetation history of southeast Africa: The molecular isotopic record from Lake Malawi. *Palaeogeography, Palaeoclimatology, Palaeoecology* 275: 100–112. https://doi.org/10.1016/j.palaeo.2009.02.008.

Chami, F.A., and A. Kweksason. 2003. Neolithic pottery traditions from the islands, the coast and the interior of East Africa. *African Archaeological Review* 20: 65–80.

Chritz, K.L., F.B. Marshall, M.E. Zagal, F. Kirera, and T.E. Cerling. 2015. Environments and trypanosomiasis risks for early herders in the later Holocene of the Lake Victoria basin, Kenya. *Proceedings of the National Academy of Sciences* 112: 3674–3679. https://doi.org/10.1073/pnas.1423953112.

Clark, J.D., and B.M. Fagan. 1965. Charcoals, sands, and channel decorated pottery from northern Rhodesia. *American Anthropologist* 67: 354–371.

Clark, J.D., and E.R. Prince. 1978. Use wear on Later Stone Age microliths from Laga Oda, Haraghi, Ethiopia and possible functional interpretations. *Azania* 13: 101–110.

Dale, D., and C.Z. Ashley. 2010. Holocene hunter-fisher-gatherer communities: New perspectives on Kansyore using communities of western Kenya. *Azania: Archaeological Research in Africa* 45: 24–48. https://doi.org/10.1080/00672700903291716.

de Filippo, C., K. Bostoen, M. Stoneking, and B. Pakendorf. 2012. Bringing together linguistic and genetic evidence to test the bantu expansion. *Proceedings of the Royal Society of London B: Biological Sciences* 279: 3256–3263.

Duncan, M. 2002. Smelter and smith: Iron Age metal fabrication technology in southern Africa. *Journal of Archaeological Science* 29: 1083–1131. https://doi.org/10.1006/jasc.2001.0758.

Dusseldorp, G.L. 2016. Faunal assemblage structure suggests a limited impact of the introduction of domestic stock on Later Stone Age subsistence economies in South Africa. *African Archaeological Review* 33: 363–383. https://doi.org/10.1007/s10437-016-9229-8.

Eggert, M.K.H. 2005. The bantu problem and African archaeology. In *African archaeology. Blackwell studies*

E

in global archaeology, ed. A.B. Stahl, 301–326. Malden: Blackwell.

Ehret, C. 1998. *An African classical age: Eastern and southern Africa in world prehistory history, 1000 BC to AD 400*. Charlottesville: University Press of Virginia.

Ehret, C. 2008. The early livestock-raisers of southern Africa. *Southern African Humanities* 20: 7–35.

Fernández, V.M., Torre Idl, L. Luque, A. González-Ruibal, and J.A. López-Sáez. 2007. A Late Stone Age sequence from West Ethiopia: The sites of K'aaba and Bel K'urk'uma (Assosa, Benishangul-Gumuz regional state). *Journal of African Archaeology* 5: 91–126.

Galaty, J.G. 1993. Maasai expansion and the new east African pastoralism. In *Being Maasai: Ethnicity and identity in East Africa*, ed. T. Spear and R. Waller, 61–86. London: James Currey.

Gautier, A., and W. Van Neer. 2006. Animal remains from Mahal Teglinos (Kassala, Sudan) and the arrival of pastoralism in the southern Atbai. *Journal of African Archaeology* 4: 223–233.

Gifford-Gonzalez, D. 2017. "Animal disease challenges" fifteen years later: The hypothesis in light of new data. *Quaternary International Part A* 436: 283–293. https://doi.org/10.1016/j.quaint.2015.10.054.

Gonder, M.K., H.M. Mortensen, F.A. Reed, SousaA de, and S.A. Tishkoff. 2007. Whole-mtDNA genome sequence analysis of ancient African lineages. *Molecular Biology and Evolution* 24: 757–768.

Grillo, K.M., and E.A. Hildebrand. 2013. The context of early megalithic architecture in eastern Africa: The Turkana Basin c. 5000–4000 BP. *Azania: Archaeological Research in Africa* 48: 193–217. https://doi.org/10.1080/0067270x.2013.789188.

Güldemann, T. 2008. A linguist's view: Khoe-Kwadi speakers as the earliest food-producers of southern Africa. *Southern African Humanities* 20: 93–132.

Haaland, R. 1995. Sedentism, cultivation, and plant domestication in the Holocene Middle Nile Region. *Journal of Field Archaeology* 22: 157–174.

Hammond-Tooke, W.D. 2004. Southern Bantu origins: Light from kinship terminology. *Southern African Humanities* 16: 71–78.

Henn, B.M., et al. 2008. Y-chromosomal evidence of a pastoralist migration through Tanzania to southern Africa. *Proceedings of the National Academy of Sciences* 105: 10693–10698.

Hodder, I. 1977. The distribution of material culture: Items in the Baringo district, western Kenya. *Man* 12: 239–269.

Hoelzmann, P., B. Keding, H. Berke, S. Kropelin, and H.J. Kruse. 2001. Environmental change and archaeology: Lake evolution and human occupation in the eastern Sahara during the Holocene. *Palaeogeography, Palaeoclimatology, Palaeoecology* 169: 193–217.

Honegger, M., and M. Williams. 2015. Human occupations and environmental changes in the Nile valley during the Holocene: The case of Kerma in Upper Nubia (northern Sudan). *Quaternary Science Reviews* 130: 141–154. https://doi.org/10.1016/j.quascirev.2015.06.031.

Huffman, T.L. 1996. Archaeological evidence for climatic change during the last 2000 years in southern Africa. *Quaternary International* 33: 55–60.

Huffman, T.N. 2001. The Central Cattle Pattern and interpreting the past. *Southern African Humanities* 13: 19–35.

Huffman, T.N. 2005. The stylistic origin of Bambata and the spread of mixed farming in southern Africa. *Southern African Humanities* 17: 57–79.

Huffman, T.N. 2007. *Handbook to the Iron Age: The archaeology of precolonial farming societies in southern Africa*. Pietermaritzburg: University of Kwa-Zulu Natal Press.

Jerardino, A., G. Dewar, and R. Navarro. 2009. Opportunistic subsistence strategies among late Holocene coastal hunter-gatherers, Elands Bay, South Africa. *Journal of Island and Coastal Archaeology* 4: 37–60. https://doi.org/10.1080/15564890802390997.

Jórdeczka, M., H. Królik, M. Masojć, and R. Schild. 2013. Hunter–gatherer cattle-keepers of early Neolithic El Adam type from Nabta Playa: Latest discoveries from site E-06-1. *African Archaeological Review* 30: 253–284. https://doi.org/10.1007/s10437-013-9136-1.

Karega-Mũnene. 2002. *Holocene foragers, fishers and herders of western Kenya*, BAR international series 1037, Cambridge monographs in African archaeology. Oxford: Archaeopress.

Katanekwa, N.M. 1978. Some early iron age sites from the Machili Valley of south western Zambia. *Azania* 13: 135–166. https://doi.org/10.1080/00672707809511636.

Kimura, B., F. Marshall, A. Beja-Pereira, and C. Mulligan. 2013. Donkey domestication. *African Archaeological Review* 30: 83–95. https://doi.org/10.1007/s10437-012-9126-8.

Kinahan, J. 1991. *Pastoral nomads of the central Namib Desert*. Windhoek: New Namibia Books.

Kinahan, J. 2016. Archaeological evidence of domestic sheep in the Namib Desert during the first millennium AD. *Journal of African Archaeology* 14: 7–17. https://doi.org/10.3213/2191-5784-10280.

Lane, P. 2004. The 'moving frontier' and the transition to food production in Kenya. *Azania* 39: 243–264.

Lane, P., C. Ashley, O. Seitsonen, P. Harvey, S. Mire, and F. Odede. 2007. The transition to farming in eastern Africa: New faunal and dating evidence from Wadh Lang'o and Usenge, Kenya. *Antiquity* 81: 62–81.

Leakey, L.S.B. 1931. *Stone age cultures of Kenya colony*. Cambridge: Cambridge University Press.

Lesur, J. 2004. *Exploitation de la diversité faunique et début du pastoralisme dans la corne de l'afrique à l'Holocène*. Paris: Université de Paris I.

Lesur, J., E.A. Hildebrand, G. Abawa, and X. Gutherz. 2014. The advent of herding in the Horn of Africa: New data from Ethiopia, Djibouti and Somaliland. *Quaternary International* 343: 148–158. https://doi.org/10.1016/j.quaint.2013.11.024.

Lewis, C.A. 2002. Radiocarbon dates and the Late Quaternary palaeogeography of the Province of the Eastern Cape, South Africa. *Quaternary International* 89: 59–69.

Linseele, V., W. Van Neer, S. Thys, R. Phillipps, R. Cappers, W. Wendrich, and S. Holdaway. 2014. New archaeozoological data from the Fayum "Neolithic" with a critical assessment of the evidence for early stock keeping in Egypt. *PLoS One* 9: e108517. https://doi.org/10.1371/journal.pone.0108517.

Linseele, V., S.J. Holdaway, and W. Wendrich. 2016. The earliest phase of introduction of southwest Asian domesticated animals into Africa. New evidence from the Fayum Oasis in Egypt and its implications. *Quaternary International* 412: 11–21. https://doi.org/10.1016/j.quaint.2015.12.028.

Manning, K., and A. Timpson. 2014. The demographic response to Holocene climate change in the Sahara. *Quaternary Science Reviews* 101: 28–35. https://doi.org/10.1016/j.quascirev.2014.07.003.

Marshall, F. 2000. The origins and spread of domestic animals in East Africa. In *The origins and development of African livestock: Archaeology, genetics, linguistics and ethnography*, ed. K.C. MacDonald and R.M. Blench, 191–221. London: UCL Press.

Marshall, F., and E. Hildebrand. 2002. Cattle before crops: The beginnings of food production in Africa. *Journal of World Prehistory* 16: 99–143.

Marshall, F., and A. Negash. 2002. Early hunters and herders of northern Ethiopia: The fauna from Danei Kawlos and Baati Ataro rockshelters. In: *Society of Africanists archaeologists 16th Biennial conference*, University of Arizona, Tucson, 18–21 May 2002.

Marshall, F., K. Stewart, and J.W. Barthelme. 1984. Early domestic stock at Dongodien in northern Kenya. *Azania* 19: 120–129.

Mitchell, P. 2005. Modeling Later Stone Age societies in southern Africa. In *African archaeology. Blackwell studies in global archaeology*, ed. A.B. Stahl, 150–173. Malden: Blackwell.

Mitchell, P. 2010. Genetics and southern African prehistory: An archaeological view. *Journal of Anthropological Sciences* 88: 73–92.

Muigai, A.W.T., and O. Hanotte. 2013. The origin of African sheep: Archaeological and genetic perspectives. *African Archaeological Review* 30: 39–50. https://doi.org/10.1007/s10437-013-9129-0.

Nash, B.P., H.V. Merrick, and F.H. Brown. 2011. Obsidian types from Holocene sites around Lake Turkana, and other localities in northern Kenya. *Journal of Archaeological Science* 38: 1371–1376.

Nash, D.J., et al. 2016. African hydroclimatic variability during the last 2000 years. *Quaternary Science Reviews* 154: 1–22. https://doi.org/10.1016/j.quascirev.2016.10.012.

Out, W.A., P. Ryan, J.J. García-Granero, J. Barastegui, L. Maritan, M. Madella, and D. Usai. 2016. Plant exploitation in Neolithic Sudan: A review in the light of new data from the cemeteries R12 and Ghaba. *Quaternary International* 412: 36–53. https://doi.org/10.1016/j.quaint.2015.12.066.

Parsons, I. 2003. Lithic expressions of Later Stone Age lifeways in the Northern Cape. *South African Archaeological Bulletin* 58: 33–37.

Patrick, M., A.J. de Koning, and A.B. Smith. 1985. Gas liquid chromatographic analysis of fatty acids in food residues from ceramics found in the southwestern Cape, South Africa. *Archaeometry* 27: 231–236.

Phillipson, D.W. 1977. The excavation of Gobedra rockshelter, Axum: An early occurrence of cultivated finger millet in northern Ethiopia. *Azania* 12: 53–82.

Phillipson, D.W. 1989. The first south African pastoralists and the Early Iron Age. *Nsi* 6: 127–134.

Pickrell, J.K., et al. 2014. Ancient west Eurasian ancestry in southern and eastern Africa. *Proceedings of the National Academy of Sciences* 111: 2632–2637. https://doi.org/10.1073/pnas.1313787111.

Plisnier, P.D., S. Serneels, and E.F. Lambin. 2000. Impact of ENSO on east African ecosystems: A multivariate analysis based on climate and remote sensing data. *Global Ecology and Biogeography* 9: 481–497.

Prendergast, M.E. 2010a. Diversity in east African foraging and food producing communities. *Azania: Archaeological Research in Africa* 45: 1–5. https://doi.org/10.1080/00672700903291674.

Prendergast, M.E. 2010b. Kansyore fisher-foragers and transitions to food production in East Africa: The view from Wadh Lang'o, Nyanza Province, western Kenya. *Azania: Archaeological Research in Africa* 45: 83–111. https://doi.org/10.1080/00672700903291765.

Robbins, L.H., A.C. Campbell, M.L. Murphy, G.A. Brook, P. Srivastava, and S. Badenhorst. 2005. The advent of herding in southern Africa: Early AMS dates on domestic livestock from the Kalahari Desert. *Current Anthropology* 46: 671–677.

Robbins, L.H., et al. 2008. Recent archaeological research at Toteng, Botswana: Early domesticated livestock in the Kalahari. *Journal of African Archaeology* 6: 131–149.

Robinson, J.R., and J. Rowan. 2017. Holocene paleoenvironmental change in southeastern Africa (Makwe Rockshelter, Zambia): Implications for the spread of pastoralism. *Quaternary Science Reviews* 156: 57–68. https://doi.org/10.1016/j.quascirev.2016.11.030.

Russell, T., F. Silva, and J. Steele. 2014. Modelling the spread of farming in the Bantu-speaking regions of Africa: An archaeology-based phylogeography. *PLoS One* 9: e87854. https://doi.org/10.1371/journal.pone.0087854.

Sadig, A.M. 2010. *The Neolithic of the Middle Nile Region: An archaeology of Central Sudan and Nubia*. Kampala: Fountain Publishers.

Sadr, K. 2003. The Neolithic of southern Africa. *Journal of African History* 44: 195–209.

Sadr, K. 2008a. An ageless view of first millennium AD southern African ceramics. *Journal of African Archaeology* 6: 103–129.

Sadr, K. 2008b. Invisible herders? The archaeology of Khoekhoe pastoralists. *Southern African Humanities* 20: 179–203.

Sadr, K. 2015. Livestock first reached southern Africa in two separate events. *PLoS One* 10: e0134215. https://doi.org/10.1371/journal.pone.0134215.

E

Sadr, K., A.B. Smith, I. Plug, J. Orton, and B. Mütti. 2003. Herders and foragers on Kasteelberg: Interim report on excavations 1999–2002. *South African Archaeological Bulletin* 58: 27–32.

Salas, A., et al. 2002. The making of the African mtDNA landscape. *American Journal of Human Genetics* 71: 1082–1111.

Scheinfeldt, L.B., S. Soi, and S.A. Tishkoff. 2010. Working toward a synthesis of archaeological, linguistic, and genetic data for inferring African population history. *Proceedings of the National Academy of Sciences* 107: 8931–8938.

Schlebusch, C.M., et al. 2012. Genomic variation in seven Khoe-San groups reveals adaptation and complex African history. *Science* 338: 374.

Scott, L., F.H. Neumann, G.A. Brook, C.B. Bousman, E. Norström, and A.A. Metwally. 2012. Terrestrial fossil-pollen evidence of climate change during the last 26 thousand years in southern Africa. *Quaternary Science Reviews* 32: 100–118.

Sealy, J. 2006. Diet, mobility, and settlement pattern among Holocene hunter-gatherers in southernmost Africa. *Current Anthropology* 47: 569–595.

Sealy, J.C., and NJVd Merwe. 1988. Social, spatial and chronological patterning in marine food use as determined by δ^{13}C measurements of Holocene human skeletons from the south-western cape, South Africa. *World Archaeology* 20: 87–102.

Sealy, J., and R. Yates. 1994. The chronology of the introduction of pastoralism to the cape, South Africa. *Antiquity* 68: 58–58.

Seitsonen, O. 2010. Lithics use at Kansyore sites in East Africa: Technological organisation at four recently excavated sites in Nyanza Province, Kenya. *Azania: Archaeological Research in Africa* 45: 49–82. https://doi.org/10.1080/00672700903291740.

Shahack-Gross, R., F. Marshall, and S. Weiner. 2003. Geo-ethnoarchaeology of pastoral sites: The identification of livestock enclosures in abandoned Maasai settlements. *Journal of Archaeological Science* 30: 439–459.

Simon, M.H., Ziegler, M., Bosmans, J., Barker, S., Reason, C.J.C., and Hall, I.R. 2015. Eastern South African hydroclimate over the past 270,000 years. *Scientific Reports* 5. https://doi.org/10.1038/srep18153.

Skoglund, P. et al. 2017. Reconstructing prehistoric African population structure. *Cell* 171(1): 59–71. https://doi.org/10.1016/j.cell.2017.08.049

Smith, A.B.. 1992. *Pastoralism in Africa: Origins and development ecology*. London: Hurst & Company.

Sobania, N. 1993. Defeat and dispersal: The Laikipiak and their neighbours at the end of the nineteenth century. In *Being Maasai: Ethnicity and identity in East Africa*, ed. T. Spear and R. Waller, 61–86. London: James Currey.

Soodyall, H., H. Makkan, P. Haycock, and T. Naidoo. 2008. The genetic prehistory of the Khoe and San. *Southern African Humanities* 20: 37–48.

Stock, F., and D. Gifford-Gonzalez. 2013. Genetics and African cattle domestication. *African Archaeological Review* 30: 51–72. https://doi.org/10.1007/s10437-013-9131-6.

Tishkoff, S.A., et al. 2007. History of click-speaking populations of Africa inferred from mtDNA and Y chromosome genetic variation. *Molecular Biology and Evolution* 24: 2180–2195. https://doi.org/10.1093/molbev/msm155.

Tishkoff, S.A., et al. 2009. The genetic structure and history of Africans and African Americans. *Science* 324: 1035–1044. https://doi.org/10.1126/science.1172257.

Trombetta, B., et al. 2015. Phylogeographic refinement and large scale genotyping of human Y chromosome Haplogroup E provide new insights into the dispersal of early pastoralists in the African continent. *Genome Biology and Evolution* 7: 1940–1950. https://doi.org/10.1093/gbe/evv118.

Vansina, J. 1995. New linguistic evidence and "the bantu expansion". *Journal of African History* 36: 173–195.

Vermeersch, P.M., V. Linseele, E. Marinova, W. Neer, J. Moeyersons, and J. Rethemeyer. 2015. Early and Middle Holocene human occupation of the Egyptian Eastern Desert: Sodmein Cave. *African Archaeological Review* 32: 465–503. https://doi.org/10.1007/s10437-015-9195-6.

Verschuren, D. 2001. Reconstructing fluctuations of a shallow East African lake during the past 1800 yrs from sediment stratigraphy in a submerged crater basin. *Journal of Paleolimnology* 25: 297–311.

Verschuren, D., J.S. Sinninghe Damste, J. Moernaut, I. Kristen, M. Blaauw, M. Fagot, and G.H. Haug. 2009. Half-precessional dynamics of monsoon rainfall near the East African Equator. *Nature* 462: 637–641. http://www.nature.com/nature/journal/v462/n7273/suppinfo/nature08520_S1.html.

Vogel, J.C., and A. Fuls. 1999. Spatial distribution of radiocarbon dates for the Iron Age in southern Africa. *South African Archaeological Bulletin* 54: 97–101.

Walker, N.J. 1983. The significance of an early date for pottery and sheep in Zimbabwe. *South African Archaeological Bulletin* 38: 88–92.

Webley, L. 2007. Archaeological evidence for pastoralist land-use and settlement in Namaqualand over the last 2000 years. *Journal of Arid Environments* 70: 629–640.

Wilmsen, E.N. 1994. The creation of subsistence foraging in the colonial era. In *Pastoralists at the periphery: Herders in a capitalist world*, ed. C. Chang and H. Koster, 140–158. Tucson: University of Arizona Press.

Wilshaw, A. 2016. The current status of the Kenya Capsian. *African Archaeological Review* 33: 13–27. https://doi.org/10.1007/s10437-016-9211-5.

Wright, D.K. 2007. Tethered mobility and riparian resource exploitation among Neolithic hunters and herders in the Galana River Basin, Kenyan coastal lowlands. *Environmental Archaeology* 12: 25–47.

Wright, D.K., S.L. Forman, P. Kiura, C. Bloszies, and A. Beyin. 2015. Lakeside view: Sociocultural responses to changing water levels of Lake Turkana, Kenya. *African Archaeological Review* 32: 335–367. https://doi.org/10.1007/s10437-015-9185-8.

Further Reading

Barham, L., and P.M. Mitchell. 2008. *The first Africans: African archaeology from the earliest toolmakers to most recent foragers*. Cambridge: University of Cambridge Press.

Crowther, A., Prendergast, M.E., Fuller, D.Q., and Boivin, N. 2017. Subsistence mosaics, forager-farmer interactions, and the transition to food production in eastern Africa. *Quaternary International*. https://doi.org/10.1016/j.quaint.2017.01.014.

Ehret, C. 2013. Sub-Saharan Africa: Linguistics. In *The global prehistory of human migration*, ed. P. Bellwood, 96–106. Malden: Wiley.

Heyer, E., and J. Rocha. 2013. 14 Sub-Saharan Africa: Human genetics. In *The encyclopedia of global human migration,* ed I. Ness. Oxford: Blackwell. https://doi.org/10.1002/9781444351071.wbeghm814.

Lane, P.J. 2013. Trajectories of pastoralism in northern and central Kenya: An overview of the archaeological and environmental evidence. In *Pastoralism in Africa: Past, present and future*, ed. M. Bollig, M. Schnegg, and H.-P. Wotzka, 104–144. Oxford: Berghahn Books.

Marshall, F., and L. Weissbrod. 2011. Domestication processes and morphological change: Through the lens of the donkey and African pastoralism. *Current Anthropology* 52: S397–S413.

Mitchell, P. 2017. Why the donkey did not go south: Disease as a constraint on the spread of Equus asinus into southern Africa. *African Archaeological Review* 34: 21–41. https://doi.org/10.1007/s10437-017-9245-3.

Mitchell, P.M. 2016. Later Stone Age hunter-gatherers and herders. In *Quaternary environmental change in southern Africa: Physical and human dimensions*, ed. J. Knight and S.W. Grab, 385–396. Cambridge: Cambridge University Press.

Orton, J. 2015. The introduction of pastoralism to southernmost Africa: Thoughts on new contributions to an ongoing debate. *Azania: Archaeological Research in Africa* 50: 250–258. https://doi.org/10.1080/0067270X.2015.1019262.

Parsons, I. 2015. Is niche construction theory relevant to the proposed adoption of domesticates by hunter-gatherers in southern Africa? *African Archaeological Review* 32: 35–47. https://doi.org/10.1007/s10437-015-9182-y.

Phillipps, R., S. Holdaway, J. Emmitt, and W. Wendrich. 2016. Variability in the Neolithic settlement patterns of the Egyptian Nile Valley. *African Archaeological Review* 33: 277–295. https://doi.org/10.1007/s10437-016-9224-0.

Phillipson, D.W. 2005. *African archaeology*. Cambridge: Cambridge University Press.

Russell, T., and F. Lander. 2015. 'What is consumed is wasted': From foraging to herding in the southern African Later Stone Age. *Azania: Archaeological Research in Africa* 50: 267–317. https://doi.org/10.1080/0067270X.2015.1079082.

Sadr, K. 2013. A short history of early herding in southern Africa. In *Pastoralism in Africa: Past, present and future*, ed. M. Bollig, M. Schnegg, and H.-P. Wotzka, 171–197. Oxford: Berghahn Books.

Vogelsang, R., and B. Keding. 2013. Climate, culture, and change: From hunters to herders in northeastern and southwestern Africa. In *Comparative archaeology and paleoclimatology. Socio-cultural responses to a changing world*, ed. M.O. Baldia, T.K. Perttula, and D.S. Frink, 43–62. Oxford: Archaeopress.

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East Asia: Early *Homo* Fossil Records

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Introduction

Early *Homo* fossil records of East Asia are attributed to those within the Early Pleistocene, represented by the following specimens found in China only. Those are identified as Asian *Homo erectus*; thus, their physical characteristics and geocultural context are described below.

Key Issues/Current Debates/Examples

Yuanmou

The human fossils were found in 1965 in brown clay of fluvial deposits between Shangnabang and Danawu Villages, Yuanmou County, Yunnan Province, in southwestern China. The fossils are represented by left and right upper median incisors. The incisors are large, indicative of a male individual. The teeth are moderately worn (Fig. 1a, b). The crown is rather thick and swollen. On the upper part of the lingual surface, there is a prominent basal tubercle. Three fingerlike processes diverge from the lower margin of this tubercle. The middle process is the thickest and longest of the three; it extends almost to the biting edge of the crown. Prominent ridges appear along the medial and lateral borders of the lingual

East Asia: Early *Homo* Fossil Records, Fig. 1 Two Homo erectus teeth of Yuanmou (**a**) back view and (**b**) frontal view

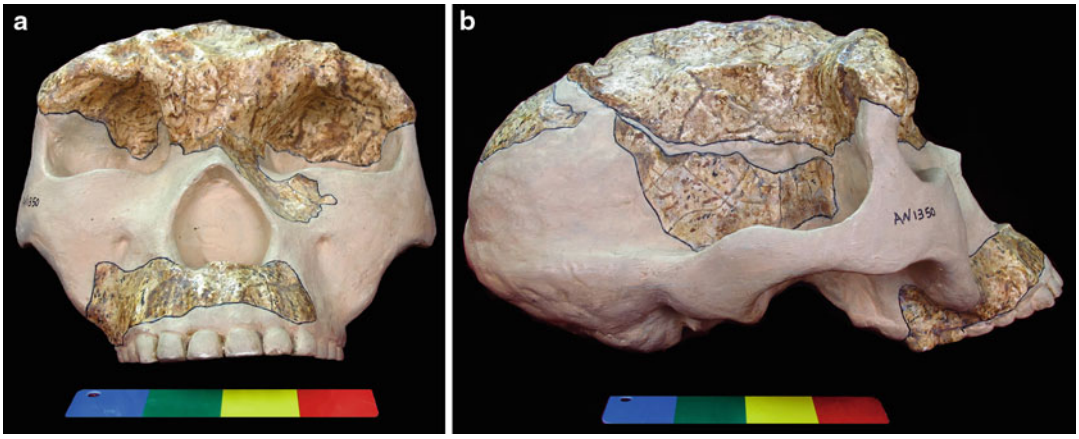

East Asia: Early *Homo* Fossil Records, Fig. 2 Gongwangling cranial reconstructions (**a**) frontal view and (**b**) side view

surface of the crown. The lateral one is more prominent. The lower part of the root of left incisor was preserved. Its cross section is ellipsoid and slightly flattened anteroposteriorly. The site has yielded mammalian fossils of Early Pleistocene. The paleomagnetic date of the stratum yielding the human fossils is around 1.7 mya. The ESR date recommended by the chronologists is earlier than 1.1 mya and later than 1.6 mya.

Gongwangling

Homo fossils were found in 1964 and include a few cranial fragments based on which Wu Rukang made a reconstruction. The fossils are embedded in light yellow loess-like silty clay with many concretions at north slope of a hill named Gongwangling near Gongwang Village, about 17 km east of Lantian City, Shaanxi Province, Central China. The supraorbital torus is very robust. Its medial part is thicker than the lateral part (Fig. 2a, b). Trace of frontal notch exists on each side. The glabella region is very robust. The postorbital constriction is much exaggerated. There is no posttoral groove; this is similar to that from Trinil, Java. Trace of midsagittal ridge and bregmatic eminence could be seen on the eroded external surface of frontal. X-ray shows no frontal sinus. Temporal line appears as a prominent ridge. Both anterior and posterior surfaces of the pyramid are steeper than that in *H. erectus*

from Zhoukoudian; the upper border of the pyramid is more acute than the latter. The arcuate eminence of Gongwangling temporal is more similar to that in modern humans than to Zhoukoudian *H. erectus*. A small facet on the posterior surface of the pyramid lateral to the internal auditory meatus is more similar to the latter specimen than to modern humans. Frontonasal and frontomaxillary sutures of both sides form a slightly curved line. The central part of this line is slightly convex upward. The upper part of nasal bones is broader than that of modern humans. The nasal saddle is flatter than that in modern Mongoloids. Nasion region is not depressed. The orbital roof is flat. The median sagittal contour of maxilla is convex as in modern apes and shows alveolar prognathism. This contour forms almost a right angle with the floor of nasal cavity, with an obvious demarcation in between. A small but distinct anterior nasal spine exists clearly. A fairly marked canine jugum could be seen on right maxilla. The lower border of the zygomatic process of maxilla is not curved. The point where it joins the maxillary body is close to alveolar border. Exposed maxillary sinus extends between the levels of the canine and the anterior surface of third molar. Its medial border corresponds to the lateral border of the palate instead of protruding into the palatal process of maxilla.

The right third upper molar has much smaller crown length than that of second one. Its occlusal surface is nearly triangular. The root of this molar has three branches as shown in second upper molar, but the bifurcation angle between the buccal and lingual branches is smaller than that of the upper second molar. The length between the point of bifurcation and the neckline is shorter in the root of third upper molar than that in the second one. The size and attrition of teeth and condition of sutures suggest the individual belonging to a female around 30 years old.

A few artifacts have been found at the site. Paleomagnetic date is 1.15 mya or 800–750 ka. Associated mammalian fauna corresponds to that of Early Pleistocene and included tropical and subtropical species, indicating that the environment was warmer than today.

Quyuanhekou Yunxian

Human fossils were found on a small hill named Xuetang Liangzi at the mouth of Quyuan River near Mituosi Village of Yunxian County, Hubei Province, Central China. Different names affiliated with these fossils have been once used in various articles. Two human crania had been heavily deformed and damaged in certain degree by pressing in the stratum of grayish yellow clay layer and/or grayish white sand layer of the fourth terrace of Hanjiang River. Judging from the closure of sutures both skulls may represent middle-aged individuals.

Skull EV9001

The vault is low and flat with receding frontal. The supraorbital tori are thick. There is trace of metopic suture on the glabellar torus. The supraorbital groove is shallow and wide. There is no distinct median sagittal ridge. Postorbital constriction is obvious. There is an occipital torus. The superior temporal line of the left side is distinct. The preserved part of the root of the mastoid process suggests a large mastoid process. The tympanic plate is concave; its long axis is transversely oriented. The mandibular fossa is deep. The nasion is deeply indented below the glabella. The orbit is quadrangular with the inferolateral margin somewhat blunt. The anterolateral surface of the sphenofrontal process of zygomatic bone faces more forward. The lower border of the zygomatic process of maxilla is curved. The point where it joins the maxillary body is above the point between the first and second molars, with a long distance from the alveolar margin. Reconstructed zygomatic arch is below the level of Frankfurt plane. A buccal exostosis exists between the positions corresponding to first and second molars. There is no canine jugum. The midsagittal contour of the anterior surface of the alveolar process is convex. The palatal vault is much longer and deeper than that in modern humans. Large part of the dental arch is preserved; it is close to U shape. The teeth are robust especially for the buccolingual diameter. The size of the molars increases from anterior to posterior. The contour of the occlusal surface of left third molar is nearly pear-shaped. A large cusp exists at the distobuccal part of the crown.

Skull EV9002

Top view of this cranium is ovoid with an obvious postorbital constriction. The glabellar torus is slightly depressed and with trace of a metopic suture. The supratoral groove is distinct and the frontal squama is flat. Parietal tuberosities of both sides are distinct. An atypical angular torus seems to be present. The superior and anterior margins of the temporal squama are curved and straight, respectively. The parietal notch between the squamosal and mastoid portions of the temporal is rather deep. The external auditory orifice is deeply located; the distance from it to the sagittal plane passing the auriculare is 17.2 mm on the left side which is deeper than those in *Homo erectus* specimens from Hexian and Zhoukoudian. The mastoid process is large. The mandibular fossa is wide and shallow. The postglenoid process is low. The tympanic plate is thick and concave; its long axis is oriented in transverse direction. The angle formed by this axis and the sagittal plane is much larger than that in modern humans. The occipital torus is well developed, with the central part thicker, and attenuates toward both lateral ends. It fails to continue with the supramastoid crest. The torus marks an angular turn from the occipital to nuchal plane of the occipital bone. A short and distinct supratoral groove exists above the central part of the occipital torus. Orbit is rectangular with rounded angles. The inferolateral margin of the left orbit is blunt instead of being sharp. Infraorbital foramen of both sides is distinct. Reconstructed pyriform aperture is higher and narrower than that of Skull EV9001. The root of the zygomatic process of the maxilla is highly located. The canine fossa is shallow. A prominent canine jugum exists in the right side. There are buccal exostoses at the position corresponding to M2 and P2 on left and right sides, respectively. A lingual exostosis exists at the position corresponding to right M1–M2. The palatal vault is much longer and deeper than that in modern humans. There is a palatine torus and a deep palatine sulcus as well as an anterior palatine foramen. The dental arch is close to a parabolic curve. The dentition is incomplete, but all preserved teeth are in their original position. The second molar is obviously larger than the first one. The crown of left third molar is very small and was worn with exposure of the dentine. The thickness of the vault is close to that of *Homo erectus* from Zhoukoudian.

The human fossils are in association with a lot of mammalian fossils of Early Pleistocene and stone artifacts. The site was dated by Paleomagnetism to 870–830 ka and by ESR date on the mammalian fossils to 565 ka.

Meipu, Yunxian

Human left upper incisor, found at Meipu of Yunxian County, Central China, is almost complete and slightly worn. It is shovel-shaped, with a prominent basal tubercle and fingerlike process not well developed near the cutting edge. The length of the crown is close to the average for *Homo erectus* from Zhoukoudian. The left lower incisor is heavily worn. There is the basal tubercle appearing as a smooth eminence. The cervix is not constricted. The left upper second premolar is complete and slightly worn; the root is lost. The buccal half of the crown is slightly wider than the lingual half. The buccal cusp is larger and higher than the lingual one. A trace of the cingulum appears as a triangular eminence at the basal part of the buccal surface and as two small ridges on both sides. The left upper first molar is rather complete and slightly worn. The distolingual angle is more rounded than the mesiobuccal one. The protocone and paracone are slightly higher than the distal two cusps. The protocone is the largest cusp, and the hypocone is the smallest. Each cusp possesses several fine ridges. There is no Carabelli cusp, but there is a very small fovea on the lingual surface near the marginal ridge. A trace of a cingulum can be discerned. The lingual branch of the root does not bifurcate. A longitudinal deep groove exists toward the middle of the lingual surface. The buccal branches are lost.

From the deposits transported by the farmers from the cave to the outside, a pebble nucleus showing traces of striking by a stone hammer has been reported. Associated mammalian fossils belong to *Ailuropoda-Stegodon* fauna, probably of Early Pleistocene.

Jianshi

The human fossils, recovered from the excavation of Longgudong Cave, near Gaoping Town, Jianshi

County of Hubei Province, are identified as three lower (second?) molars found in 1970 and a premolar, an upper molar, and a lower molar in 1999–2000. Besides, a right first lower molar was found from a drug store of Badong City about 42 km northeast of the Longgudong site in 1968. Two of the three molars found in 1970 are from right side; one is from left. Occlusal surface of one specimen is elliptical; two are nearly quadrangular. Well-developed protoconid cingula exist in two specimens; that in another molar is less developed. All three molars have tuberculum sextum, which deviates slightly to the lingual side from the median line of the occlusal surface in two of them; this small cusp locates on the median line in another specimen. Main furrows on occlusal surface of two molars arrange in a reverse T pattern instead of a Y or plus pattern. The following three teeth are found in 1999–2000 excavations:

PA1278

Right upper first premolar is complete and has two roots. The mesiodistal and buccolingual diameters are within the range of those in *Homo erectus* from Zhoukoudian and *Australopithecus africanus*. But the length-breadth index and morphological details are different from those in the latter. There is no cingulum and molar tubercle. It is considered that this premolar is close to S-4 from Java in morphology, but slightly longer in mesiodistal diameter.

PA1279

Left upper third molar is complete and much worn. The occlusal surface is nearly square. A cingulum exists at buccal and mesial surfaces. The three branches of the root do not show inclination toward combination. The mesiodistal and buccolingual diameters are much larger than that of *Homo erectus* from Zhoukoudian and larger than that of specimens S-17 and S-4 from Java; it is within the range of *Homo habilis* in these diameters, but is different from the latter in morphology. Longgudong specimen is within the range of *Australopithecus* in size and length-breadth index, but is different from the latter in morphology.

PA1277

Right lower first molar is well preserved and much worn. A cingulum exists on the buccal surface. The root has two branches. Mesial branch has two tips; distal branch has only one tip. The size and length-breadth index of the crown is well within the range of *Homo erectus* from Zhoukoudian, *Australopithecus africanus*, *and A. robustus*. Size of Longgudong specimen is close to *Meganthropus* (S-6).

The lower molar collected from the drug store has protoconid cingulum on buccal surface. The furrows on occlusal surface arrange as a "plus pattern". A small cusp corresponding to tuberculum sextum appears in the middle of distal margin.

Guojiabao

This site is about 250 m south of Shangnabang Yuanmou site (see above). The human fossil is a fragment of mid-shaft of the tibia. This fragment is 227 mm long and rather gracile, without any robust ridges. At what is assumed to be the middle point of the shaft, the circumference, transverse, and longest sagittal diameters are 78 mm, 17 mm, and 29 mm, respectively. The bone wall is thick. The anterior border of the fragment is rounded at the upper part and becomes thinner at the middle part and more rounded at the lower segment. The S-shaped curve of the anterior border is weaker than that in modern humans. Reconstructed stature of this individual is 130.4–123.6 cm. The provenance of this fragment is in doubt. It was first described as being found in the bottom layer of slope materials which include deep brown silty clay and stones of different size. These overlie a layer of brownish-red silty clay. However, the tibia was later described as coming from the superficial part of the brownish-red silty clay layer. The slope material was estimated to be correlated with the 26th layer of fourth member of the Yuanmou Formation, so to consider the tibia to be in the late Early Pleistocene, and in excess of 1 mya.

Cross-References

- ▶ East Asia: Paleolithic
- ▶ *Homo erectus*
- ▶ Wu, Rukang
- ▶ Yuanmou
- ▶ Zhoukoudian, Archaeology of

E

Further Reading

de Lumley, H., and T.Y. Li. 2006. *Le site de l'homme de Yunxian*. Paris: CNRS editions.

Huang, P.H., and R. Grün. 1998. Study on burying age of fossil teeth from Yuanmou Man site, Yunnan Province, China. *Acta Anthropologica Sinica* 17: 165–170 (in Chinese with English abstract).

Qian, F., Q. Li, P. Wu, S. Yuan, R. Xing, H. Chen, and H. Zhang. 1991. Lower Pleistocene, Yuanmou formation. In *Quaternary geology and paleoanthropology of Yuanmou, Yunnan, China*, 17–50. Beijing: Science Press (in Chinese with English abstract).

Wu, X.Z., and F.E. Poirier. 1995. *Human evolution in China: a metric description of the fossils and a review of the sites*. New York: Oxford University Press.

Zhu, R.X., R. Potts, Y.X. Pan, H.T. Yao, L.Q. Lu, X. Zhao, X. Gao, L.W. Chen, F. Gao, and C.L. Deng. 2008. Early evidence of the genus *Homo* in East Asia. *Journal of Human Evolution* 55: 1075–1085.

East Asia: Paleolithic

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Introduction

East Asia conventionally refers to the countries of China, Japan, and Korea; but in a broad geo-cultural sense, the region includes all types of landscapes in today's Mainland China, Mongolia, islands of Taiwan, Japanese Archipelago, Korean Peninsula and its associate islands, as well as the Russian Far East in the north end and the northern part of Indochina Peninsula in the south end.

Our current understanding of the Paleolithic in East Asia has been based on isolated fossils and lithic data separately from China, Japan, and Korea. Until recently primary interpretations of Paleolithic technology and hominid behaviors have been built upon Chinese data with some from Japanese materials. Only during the last decade have collaborative efforts been made to consolidate the data from the three countries plus Russia via the annual meetings of the Asian Palaeolithic Association (APA) and their proceedings; however, only few thematic syntheses in East Asia have been available in Western literature. This introduction is an update on the current research progress in this region, with focus on lithic technological comparisons across these countries. We will try not to place heavy emphasis on Chinese materials, as studies of such are available in recent publications (Shen 2007, 2011). By no means is this introduction meant to present a comprehensive view of Paleolithic research in these three countries during the past decades; however, we will provide balanced interpretations and overviews of current issues and debates in Paleolithic cultures within the entire region.

Definition

In general the lithic industries of the East Asian Paleolithic, represented by accumulated data from thousands of sites, do not present their regional and temporal variations as much as those in the west side of the Old World. Only after roughly 40,000 years ago, dramatic changes occurred, and lithic technologies became diversified and complicated when modern humans occupied most landscapes of East Asian including the Japanese Archipelago. Therefore, many East Asian scholars have abandoned the three divisions of Paleolithic – Early, Middle, and Late – that are commonly used in other regions. Instead two divisions of both Early Paleolithic and Late Paleolithic were proposed to uniquely represent the technological development of East Asian lithic industries during an approximate 1.7 Ma time span (e.g., Gao and Norton 2002). In some publications, the defined "Middle Paleolithic" sites, which are few and mostly in China, are clearly indistinctive from those of the Early Paleolithic in terms of raw material procurement, core reduction, tool blanks, retouch techniques, etc. The transition to Late Paleolithic around 50,000–40,000 BP is obvious in Mainland China, but natures of such transition were still unclear due to a lack of solid data and

sites during this time frame. The fact is that after 40,000 BP, a dramatic increase of Late Paleolithic occupations occurred in both Japan Archipelago and the Korean Peninsula. The emergence of modern humans and their associated behaviors may be largely attributed to these cross-ocean migrations in East Asia.

In most cases, a common way to place Paleolithic lithic industries in East Asia into a time frame is to refer to their distinctive geological chronology. The unique East Asian loess stratigraphic formations can reliably place dates of a site or sites into Lower, Middle, and Upper Pleistocene brackets in the mainland, verified with various absolute dating methods for remote ages. Japanese sites were referred temporally with sequences of marine isotope stage (MIS) as well as tephra-stratigraphy.

Loess is a very fine-grained silt or clay, created from grinding by glaciers, that accumulate in layers of distinctive colors and textures evenly spread out across the landscape. These layers are deposited by winds during different Pleistocene epochs from areas of land covered by glaciers and from desert surfaces. They are quite unique and therefore can form the references to geological time frames for East Asian Paleolithic sites.

Marin isotope stage (MIS), or oxygen isotope stage (OIS), is a timescale sequence deduced from oxygen isotope data from coring samples from deep sea, which would reflect changes in temperatures – dividing periods of alternating warm and cool periods of the Earth paleoclimate. The MIS timescale, starting backward from MIS 1 and representing between the present time and 11,000 BP, was developed to mark the dating in the quaternary period (around 2.6 million), which would give a relatively fine scale with each epoch of Pleistocene period when Paleolithic sites were identified.

Tephra, unique to Japanese Archipelago but also having an impact on coastal lines of the continent, is a layer of air-fall materials produced by a volcanic eruption, events of which can set an absolute time indicator for sites beneath or above the layer. One of the most famous Japanese tephra – Aira-Tanzawa, resulting from a massive eruption that occurred between 26,000 and 29,000 BP at the island of Kyushu – has become the reliable time marker for dating Late Paleolithic sites in East Asia.

Early Paleolithic refers to cultural remains of archaeological sites falling within periods between the Lower Pleistocene to the Early Upper Pleistocene, or timescale MIS 62–MIS 3, from c. 1.7 Ma ago to 40,000 BP. The Early Paleolithic of East Asia is primarily represented by lithic industries in China, which consists of pebble-core tools from South China and flake tools from North China (Shen 2007). A few sites of the Middle Pleistocene yielded Acheulean-type large cutting tools (e.g., hand axe) or biface tools both in China and in Korea (see below). In China, approximately a thousand sites of the Early Paleolithic are recorded, spreading out temporally through the Lower Pleistocene (65), Middle Pleistocene (655), and Early Upper Pleistocene (230) (Xu 2012). Only a handful of assemblages of Early Paleolithic sites in Korea and Japanese are dated to the Middle Pleistocene. Pebble-core tools and flake tools were homogenously predominant in this period.

Late Paleolithic refers to cultural reminds of archaeological sites roughly dated younger than 50,000 years ago in China, slightly later in time for those assemblages in Korea and even younger in Japan. The sites are associated with modern human occupations and migrations representing a variety of new lithic technologies on the continent, which include blade technology, bifacial technology, and microblade technology (Shen 2011). Numbers of Late Upper Pleistocene sites in China increased to near one thousand. Over 5000 Late Paleolithic assemblages are registered in Japan and more than 100 known sites in Korea (Ikawa-Smith 2007; Bae 2010a). Japanese Late Paleolithic can be further divided into Late Paleolithic I (35,000–28,000 BP), Late Paleolithic II (28,000–20,000 BP), and Late Paleolithic III (younger than 20,000 BP).

Historical Background

When Eugene Dubois (1858–1940) discovered a skull fossil in 1891 on the banks of the Solo River

in East Java, Indonesia, one of the first known specimens of *Homo erectus*, academic world had turned their interests to East Asia searching for fossils of remote linkages to modern human beings. Shortly after another famous skull fossil of the Peking Man (*Homo erectus or Sinanthropus pekinensis*) was found in 1929 by Davidson Black and his team at Zhoukoudian (aka Choukoutien). Following the discovery of the Shuidonggou and Salawusu sites in Northwest China, the lithic industry at Zhoukoudian was recognized by Henri Breuil (1877–1961) in 1931. The continuous excavation at Zhoukoudian in the subsequent years until 1937 yielded one of the richest lithic assemblages in East Asia. The early knowledge about the East Asian Paleolithic based on the "Peking Man" site was disseminated among students and scholars in Western universities. Hallam Movius (1907–1987) from Harvard was the first scholar who attempted a comparison between East Asian and European Paleolithic lithic technologies and later proposed the famous "Movius Line" in the 1940s, which is still an influential theory in the study of East Asian Paleolithic today (see the entries on Movius Line and Movius, Jr., Hallam L. in this encyclopedia).

While newly excavated Paleolithic data from China was not accessible to scholars outside of China until the mid-1980s, the search for Paleolithic culture in Japan started in 1949, when the Iwajuku site (about 90 km north of Tokyo) was excavated. The accumulation of Paleolithic data increased rapidly: nearly 100 sites were identified in 10 years after the discovery of Iwajuku and jumped up over 5,000 sites in the archipelago over half a century. There was a series of reports in 1970s–1990s on the discoveries of Japanese Early Paleolithic sites in Japan, which turned out to be a scandal of human falsehood. It is in general agreement among Japanese scholars that reports on these Early Paleolithic sites in publications should be dismissed, except those identified prior to 1973 should be counted for.

Similar to what happened in China between the 1950s–1980s, Paleolithic data from North Korea is very limited and incomplete. The first Paleolithic site was excavated at Donggwanjin along the Duman River during 1933–1935, and only 12 Paleolithic sites including those in North Korea were reported before the 1960s. Today, there are about 200 Paleolithic sites throughout the Korean Peninsula, but only 30 sites are being systematically investigated (Choi 2004).

During the past three decades, thousands of Paleolithic sites and assemblages have been identified in the countries of China, Japan, and Korea and placed within the Pleistocene time frame based on Loess formation sequences or marine isotope stage, separately according to their own paradigms (e.g., Wu and Oslen 1985). Except Japan, whose data were made well known in Western languages in earlier days, only recently the accumulated and integrated data from China, Japan, and Korea have been summarized and interpreted in English or other foreign languages (Shen and Keates 2003; Kuzmin et al. 2007; Shen 2007, 2011; Norton and Braun 2010).

Key Issues/Current Debates

Earliest Hominid Occupations and Migrations

The earliest hominid occupations in East Asian are known to be Nihewan in northern China. Nihewan is referred to here as a cluster of Early Pleistocene lithic industries represented by flake tools, which were located in the Nihewan Basin, Hubei province (Fig. 1). Over three decades of investigations, sites such as Goudi (aka Majuangou III), Xiaochangliang, and Donggutuo, among more than a dozen of others, all within 2 km radiation, yielded rich lithic assemblages and fossil remains embedded with the Early Pleistocene loess stratified formations in the Basin. Unfortunately no hominid fossils have been found yet. The analyses of lithic refitting and lithic use-wear demonstrate clear evidence of hominid behaviors involving procurement and modification of local raw materials (Gao et al. 2005; Shen et al. 2010). The Goudi site was dated to 1.7–1.6 mya by the paleomagnetic method, and recent investigation could reveal even earlier Nihewan sites such as Hetugou. It remains a strong interest to find paleobiological evidences to suggest who (*Homo habilis, Homo erectus*, or *unknown?*) were the creators of the Nihewan industries and how they arrived in East Asia.

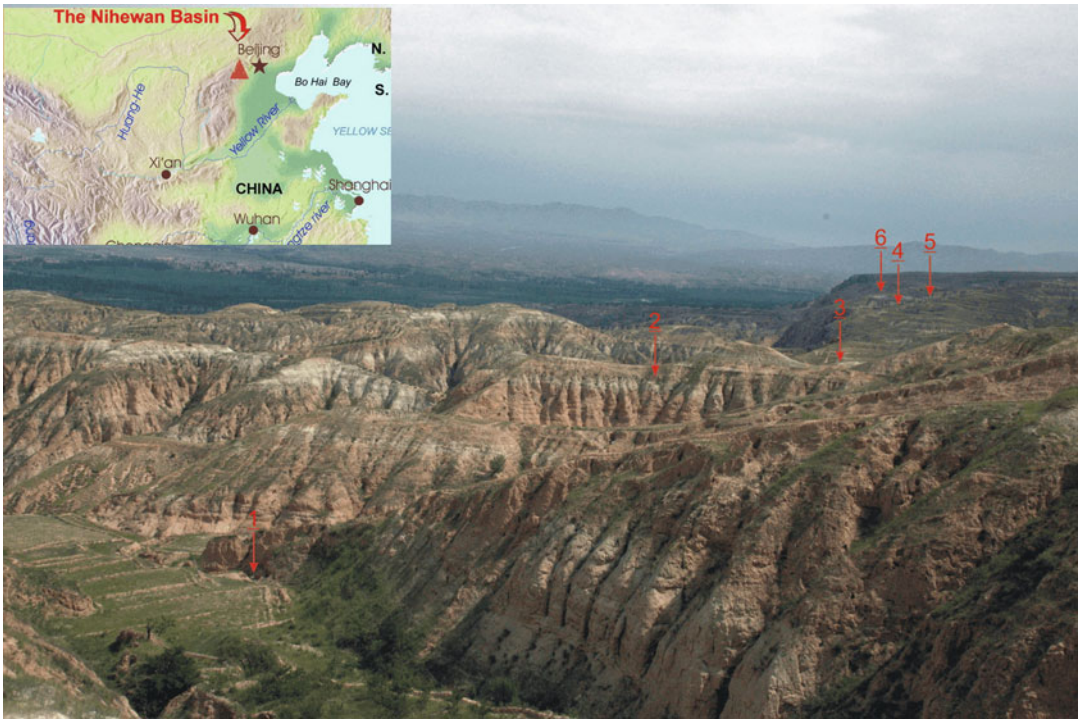

East Asia: Paleolithic, Fig. 1 The Nihewan Basin of North China showing some of Early Pleistocene sites. 1. Hetugou, 2. Dachangliang, 3. Xiaochangliang, 4. Putaoyuan, 5. Madigou, 6. Feiliang

It should be noted that other locations in South China have yielded *Homo erectus* fossils from the Early Pleistocene, such as Yuanmou, Gongwangling, Quyuankekou, and Meipu. Yuanmou *Homo erectus* are regarded as the earliest fossil record in East Asia, with paleomagnetic dates pointing to as early as 1.7 mya. However, the dates associated with the teeth discovered in 1965 are weak in connection with hominid behavioral evidence, as their original context was not clear when the teeth were removed. There are similar debates on the discovery of Renzidong in South China and Xihoudu in North China, both dated to the range of 2.0–1.7 mya, but the natures of lithic assemblages are not accepted as hominid modification; thus, their roles to be one of the earliest hominid occupations paralleling to those sites in the Nihewan Basin are still under debate (Shen 2011).

One of the earliest well-known sites in Korea is Chongokni (aka Jeongikri), dated to 350–300 kya. Recent studies suggest that other sites such as Komunmoru, Sokchangni, and Keum cave could be earlier than Chongokni; thus, it may push back the first appearance of hominid occupations as early as 400 kya in the Peninsula (Bae 2010b). The natures of site formation and cultural context of the latter sites are still poorly understood, leaving Chongokni lithic assemblages to be the best representation of Middle Pleistocene occupations so far. The Chongokni industry is dominated by flake-core assemblages with presences of Acheulean-like hand axe. Early hominid fossils, including molars and incomplete fragments of skulls, come from Dokchon, Daehyundong in Pyongyang, and Ryonggok cave. Researchers tend to assign these Middle-to-Upper Pleistocene fossils into the category of archaic form of *Homo sapiens*, but cannot be confirmed before more substantial fossils come to light.

The earliest hominid occupations appeared in Japanese Archipelago much later, around the Middle Upper Pleistocene. No hominid fossil older than 35 kya were identified. The majority

of hominid fossils are found in the islands of Ryukyu, but without the association of stone tools. The Ryukyu fossils are identified as modern human forms of *Homo sapiens sapiens*, dated within the range of 33,000–14,000 BP (Matsufuji 2010). The oldest stone industry in Japan so far is known from Layer IV of Kanedori, dated to 80 kya by tephrochronology, one of the most reliable methods in Paleolithic archaeology. The Kanedori IV lithic industry was represented by large flakes with irregular bifaces, which are superimposed by small flakes and large bifaces of Kanedori III dated to 67 kya. Matsufuji argued that, even though the dates of the oldest Japanese occupations known so far fall within MIS 5 (127–71 kya), there is no evidence that the hominids could have had the capacity of ocean-crossings during this warm period. Instead, he suggests that East Asian hominids would have migrated to Japanese islands through the last land bridge during MIS 6 (186–127 kya), implying even older hominids evidence is yet to be found. A common use of hornfels for making flake tools, similar to that at Kanedori IV, was found at Xianrendong in Northeast China's Jilin province, adjacent to the Korean Peninsula. The uranium-series date of Xianrendong is 160 kya, which suggests the possibility for Northeast China origins of Kanedori IV occupations.

Flake Tools Versus Pebble-Core Tools

The prolonged periods of Early Paleolithic in East Asia are represented by two main lithic technologies as evidence of hominid's adaptive behaviors: flake tools in northern and southwestern China and pebble-core tools in southern China. As previously mentioned few Early Paleolithic sites are present in Japan and Korea; however, their technological presences are also either flake tool industries or pebble-core tools or a combination of both industries. Flake tools were produced by direct percussion or bipolar percussion through amorphous core reduction, no standard core platform preparation has been detected so far. Predominant flake blanks were modified into scrapers, notches, and burins. Raw materials mainly consisted of poor-quality quartz and quartzite, which were common locally available resources. Good-quality cherts were also selected during the later period at some sites. One of the most important Middle Pleistocene sites is the Zhoukoudian Locality 1 cave near Beijing. Studies of the lithic industries at Zhoukoudian Locality 1 and Early Upper Pleistocene Locality 15 demonstrate systematic strategy in the making and use of flake tools. Gao (2000) noted that the majority of tool types are scrapers of different types, including the straight sidescraper, convex sidescraper, concave sidescraper, end scrapers, thumbnail scraper, double-edged scrapers, and multi-edged scraper, which all together account for 93% of the 1,283 total tool assemblage. Although in general the tool kits are similar to those found at Locality 1, retouched tools at Locality 15 are more elaborate. Some specimens exhibit well-controlled fine retouch. At Nihewan, making and use of flake tools continued from that of the Lower Pleistocene sites in the region. A study of Maliang lithic artifacts, recovered from 1984 excavation season, suggests that Maliang hominids had developed more skilful tool-making capacities than their predecessors, for example, the increased sophistication of multidirectional core reduction. Flake tools were modified into standard shapes of scrapers and noteches, not seen in other earlier assemblages (Fig. 2). Use-wear analysis indicates that tools used at Maliang probably emphasized bone scraping/shaving functions (Fig. 3) (Shen and Wei 2004). Fine-made flake tools were employed continuously into the terminal Pleistocene period in North China.

Pebble-core tools were made bifacially or unifacially on cores or on large flakes attached from nodules, often found by riverbeds. The pebble-core tool industries in East Asia continued in most of southern regions throughout the Pleistocene until the end of Last Glacial Maximum (LGM) around 20,000 BP. The tool types include large cutting implements – like choppers, large points, or other heavy-duty tools (e.g., spheroids). The earliest known pebble-core tool industry is from Quyuanheko in Yunxian country of the Middle Changjiang (aka Yangtze) river valley, dated to 1.2–1.1 million ago (Fig. 4). One of the best examples of the pebble-core industry in the later Upper Pleistocene is the Jigongshan site, where the trend of pebble-core tools being replaced by flake tools was present. During the Upper

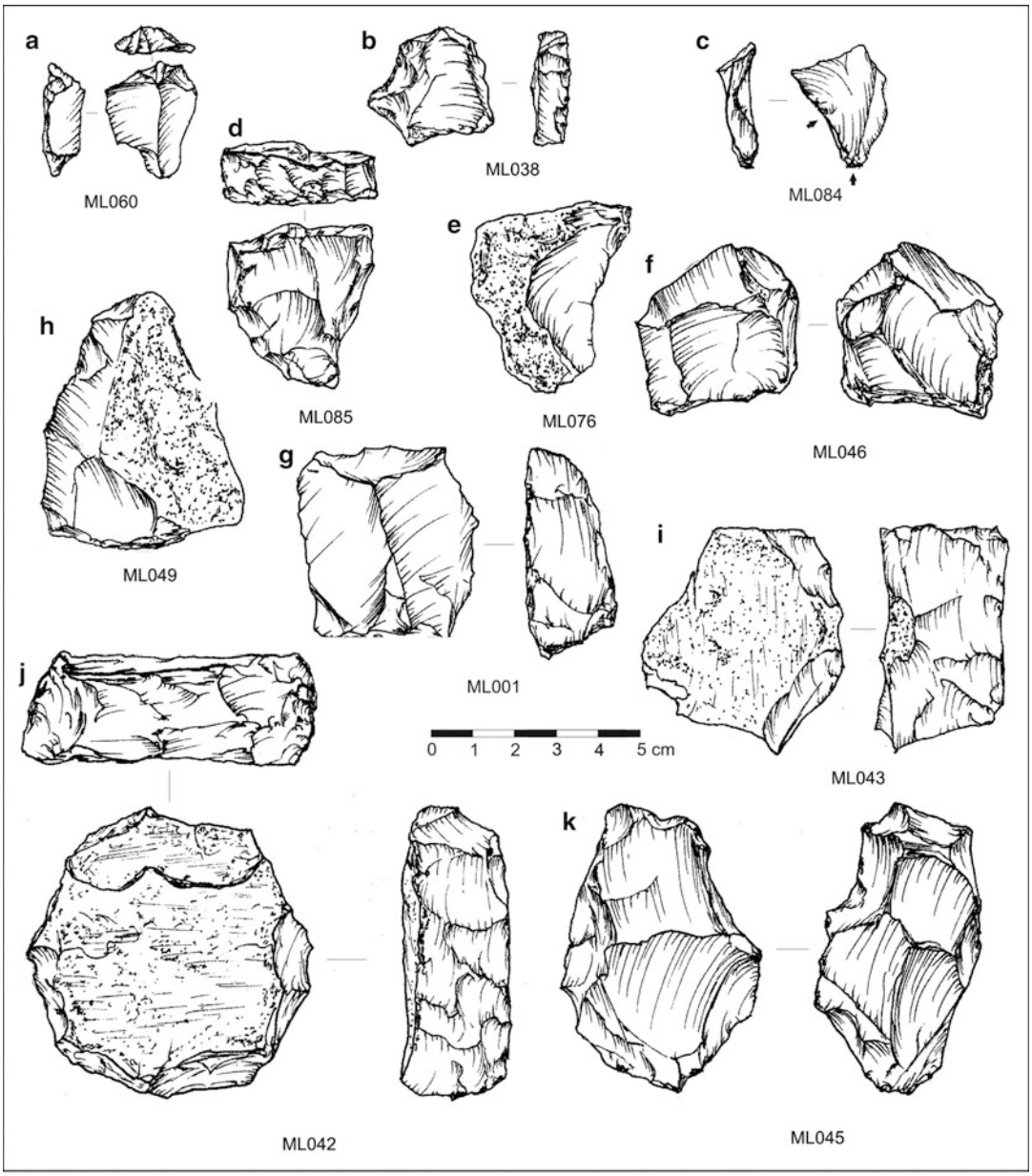

East Asia: Paleolithic, Fig. 2 Lithic artifacts recovered from the Maliang site, representing the flake tool industries at the Nihewan Basin, North China

Pleistocene, sites in the middle of the Changjiang Valley had a clear shift from predominantly pebble-core tools to flake tools. This could be an implication of possible cultural interactions or a southward movement from the north populations with flake tool traditions. A similar line of evidences was also found in Zhijidong near Zhengzhou City, during 50,000–35,000 BP. The shift may also be related to the dreadful cold and dry climate change in North China.

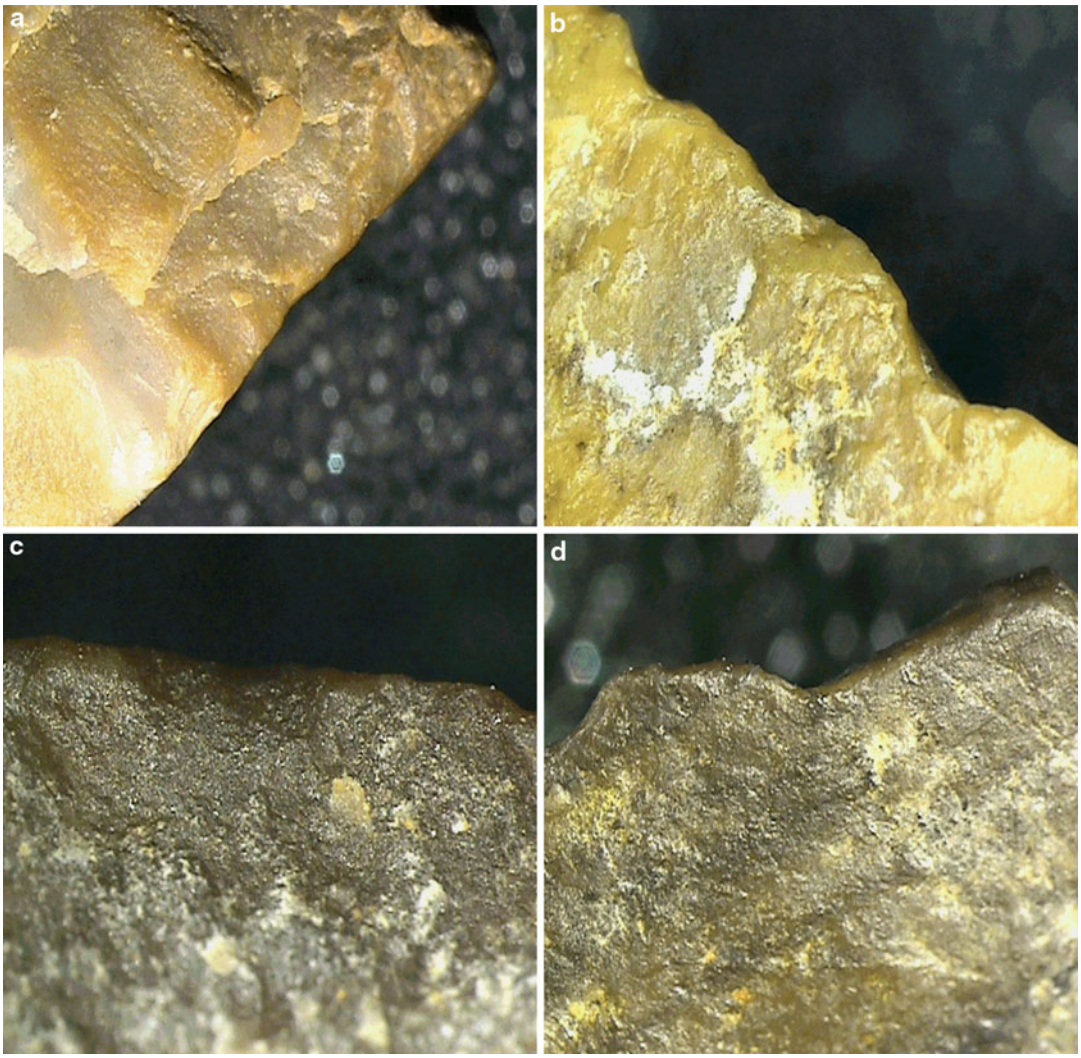

East Asia: Paleolithic, Fig. 3 Flake tools with evidence of use-wears from Maliang site, the Nihewan Basin. (**a**) ML085,14x. heavily rounded edge with use polish along the working edge, scatted scars are moderate to large in size with stepped and hinged termination, unifacially distributed on the dorsal surface. The wear type is indicative of scarping hard bone. (**b**) ML001, 28x. moderate to large scars bifacially distributed along the edgeof 10–15 mm. Scars are directional but most are vertical to the edge, heavy rounding and rare polish. Interpreted as cutting/sawing hard bones use-wear. (**c**) ML060, dorsal side, 56x. small to moderator sized feathered or hinged scars, unifacially distributed along the edge on dorsal side. (**d**) ML060, ventral side, 28x. heavy rounding and polish along ventral sided working edge (as opposite to that in previous photo). A few striation parallel or perpendicular to the edge are noted. The combination of wear patterns are suggestive of scarping wood use-wear

Industries of Hand Axes

Hand axes, thinned bifacially and symmetrically into a triangular-shaped point, were regarded as diagnostic large cutting tools for the Lower to Middle Pleistocene lithic industries named Acheulea in Africa and Europe. For a long time, scholars followed the "Movius Line" theory for interpretation of cultural manifestations in the East Asia where there were no Acheulean-like hand axe but chopper-chopping tools instead. Only in the recent two decades have extensive surveys and field investigations revealed evidence for the existence of hand axe technology which has quickly changed many perceptions. The first recognitions of hand axe were spotty specimens

East Asia: Paleolithic, Fig. 4 A pebble-core chopping tool recovered from the Quyuanhekou site, Yuanxiang County, Hubei province

in North China, most without clear chronological data and substantial cultural contexts. The discovery of the Chongokni site in Korea in 1978 with hand axe did not make its data available until recently. In the mid-1990s, a surfaced collection of hand axe from the Early Middle Pleistocene formation at Baise (aka Bose) was reported. In the following years, over 200 hand axe were recovered in the Luonan base, yielding the largest clusters of hand axe in China. Today, hand axe are excavated with chronological data and contextual association from Baise, Luonan and Danjiangkou reservoir areas. A few samples of Luonan hand axe have been studied, showing that they were distributed over a wide space in different altitudes (2nd to 6rd terrace) and time (from 800 to 100 kya). Without detailed study, functions and social cultural implications of the hand axe from the Luonan Basin are yet to be understood; the same holds true for the other two regions, as the initial research on hand axe has been just unfolded.

It is suggested that both the Luonan and Baise hand axe exhibit diagnostic traits of the Acheulean technology from western Eurasia/Africa, although regional variations are also strongly present (Fig. 5). These hand axe were made on pebble cores, bifacially chipped to straighten the working edge toward the tip but leaving cortex and rough working surface near the proximal (butt) end. It is also evident that hand axe with similar morphological traits have been found at the Chongokni site in the Hantan river valley, South Korea, assigned to the Middle Pleistocene. Compared to the Mousterian classic Acheulean hand axe in the West, these East Asian versions seem to be crudely made prototypes; however, from the overall technological point of view, they share attributes of human modification similar to the Western hand axe. The difference in their appearance might be due to different raw materials and possibly to different functions as a result of adaptive behaviors to the East Asian environment. These observations led to some scholars who advocate local development of the bifacial technology (Gao 2012).

The discovery of hand axe has always stirred sensational discussions focusing on the concept of the "Movius Line" that drew developmental differences between elaborate hand axe culture in the West and crude chopper-chopping culture in the east. Since the first identification of hand axe from the Dingcun site, southern Shanxi province, in 1954, Chinese scholars have claimed that eastern Paleolithic cultures were not cultural backwaters as implied by H. Movius' syntheses. Today, it is clear that East Asia hominids produced cultures quite different from their counterparts in Europe and Africa. Regardless of whether the large cutting tools (including hand axe, cleavers, and picks) are similar or dissimilar to those in the West in term of measurements or attributes, the reasons why hand axe in such shapes appeared in the East Asia will be of interest to Paleolithic studies for years to come. For example, archaeologists working on the Baise assemblages believe that production of hand axe could be a behavioral adaptation to an episode of woody plants burning and widespread forest destruction that resulted in local cobble outcrops becoming available due to tektite events. According to Korean archaeologist

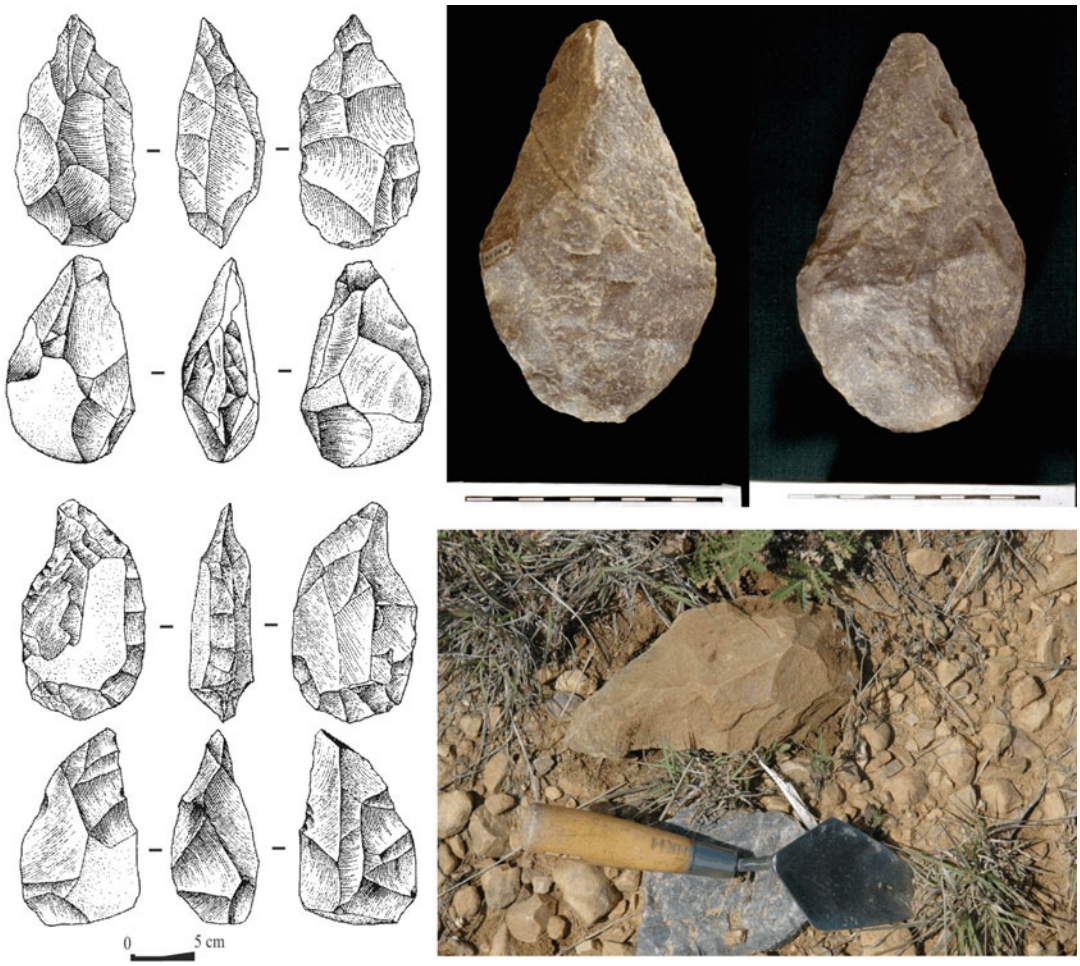

East Asia: Paleolithic, Fig. 5 Hand axe collected the surveys in the Luonan Basin, Shaanxi province

Choi (2004: 49), botanical evidence from Chongokni also points to a relatively warm climatic period, possibly in the interglacial Riss-Würm I–II.

Blade Technology

One of the first two Paleolithic sites known in the 1920s is a Late Paleolithic Shuidonggou (SDG), located in the southwestern Ordos region, about 18 km east of the Yellow River. The site was first excavated by French paleontologists E. Licent and P. Teilhard de Chardin, who reported five localities (Loc. 1–5) near Yingchuan (Ningxia province). Their investigations identified blade industries that were immediately assumed to have Western origins. Later on, the site had become the focus of study in 1960, 1963, and 1980 and ongoing investigations since 2003. The Shuidonggou lithic assemblage is dominated by blade cores and blades, made on local cherts and quartzite. Core platforms were well prepared before blade removal, indicating standard reduction procedures. Notably, 21.9% of cores recovered from the 1980 excavation season were classified as Levallois cores, more were also found from other excavation seasons.

A geological study at Shuidonggou suggests most occupations were situated on the second terrace of the Biangou River, and their cultural remains were buried within fluvial-shallow lake-alluvial sediment. Samples of U-series dating and conventional C^{14} dating indicate the age of Shuidonggou falls between 38,000 and 15,000 BP; however, recent AMS C^{14}dating suggests a narrower range of

between 29,000 and 24,000 BP. According to faunal analysis, pollen, and sediment studies, Shuidonggou was part of a cool and dry semi-steppe and prairie environment during this time; thus, the site might have served as a base camp for specialized hunters.

The recent field investigations, which produced surprising new data, allow us to reconsider our previous perception of the Shuidonggou complex. First, they have disclosed a highly populated occupation of the valley, lasting from the end of the Pleistocene to the beginning of the Holocene. Second, the sites yield many fired-clay floors and ash deposits indicative of purposeful fire use and/or areas of on-site activities. Third, and most importantly, a large number of finely perforated and polished ostrich eggshell ornaments (small beads) were recovered at SDG02, SDG07, and SDG08. The presence of such standardized craftsmanship indicates some level of organizational production in acquiring raw materials as well as in production itself. In addition, purposefully carved and decorated bones were identified at SDG02, possibly suggesting that the objects might have been used in relation to special functions or elite activities.

Shuidonggou blade technology seemed to remain the sole manifestation in China of its kind until the middle of 1980s, when the Youfang site was excavated (Fig. 6). Youfang is located in the east side of the Nihewan Basin and is slightly later in age than Shuidonggou. Youfang blade technology coexisted with microblade technology; however, most of the flake tools were made on classic blade blanks. Single platform cores display parallel long- and narrow-blade flaking scars, some with evidences of direct percussion. The discovery of the Youfang lithic industry suggests that this blade technology continued to spread eastward in northern China at the end of Pleistocene.

Data from Korea suggest that the appearance of blade technology could have been as early as 35,000 BP. The Sokchangni site, excavated in 1963, was the first site where blade technology was observed and the site was dated by radiocarbon C14 to 30,690 BP (Bae 2010a). These dates suggest Korean blade technology being parallel in

East Asia: Paleolithic, Fig. 6 Blade technology from the Shuidonggou site, Northwest China

timescale with Shuidonggou in China. According to Bae, blade technology was introduced to the Korean Peninsula via Shuidonggou from Siberia where blade industries, such as Ust-Karakol 1 and Kara-Bom in the Altai region dated to older than 40,000 BP, are predominant. This hypothesis may be also applied to explaining the emergence of blade technology to Japanese Archipelago, as the route of migration would continue from the Peninsula to islands during the cool and dry periods over land bridges. In Japan, blade industries appeared rapidly and blade-using populations might have migrated into the region after a massive volcanic eruption at the southern end of Kyushu at around 28,000 BP settled down (Ikawa-Smith 2007a). It was suggested that Late Paleolithic II in Japan is represented by blade technology, associated with a number of other technological variations including flake-core tools. The increase in the site numbers and the diversity of lithic technologies may be due in part to the population shift out of continental Northeast Asia.

Microblade Technology

Microblades, small bladelets as a truly compositional tool type, appeared as a result of sudden technological innovation and/or adaptation. The last stage of Late Paleolithic in East Asia has interestingly been homogenous technologically, represented by microblade industries. Although in China microblade sites appeared frequently compared to that of blades, numbers of microblade sites (about 50) and distributions are still limited (mostly to North-central China) in the context of Chinese Late Paleolithic materials. Even though the data of Chinese microblades are accumulated and summarized, detailed studies pertaining to their technological attributes and social-economic contexts are still lacking. On the other side, studies on Japanese wedge-shaped microblade technology have a long precedent, producing a number of publications in the English language. And precise accounts on microblade assemblages in Japan are amazingly recorded and worth noting: as of 2003, the 50 year investigation after the first discovery at the Yadegawa site, the total of 1792 microblade sites yield 83,137 microblades and 8,225 microblade cores (Sato and Tsutsumi 2007). The oldest microblade sites appeared in Hokkaido as early as 20,000 BP at the Kashiwadai 1 site. The date marks the onset of Japanese Late Paleolithic III. In Korea most lithic assemblages dating to the terminal Pleistocene are associated with microblade technology. At present, the record of microblade sites in Korea counts to 17 sites, with the earliest dated site at Jangheungni with a C14 date of 24,000 +/− 600 BP. Seong (2007) further divided the Korea microblade sites into two phases: earlier sites between 24,000 and 17,000 BP contain both tanged points (a diagnostic Late Paleolithic projectile points common in Japan and Korea) and microblade, and later sites younger than 17,000 are dominated by microblade without tanged points.

Chinese examples of microblade technology have been discussed with sites from Nihewan, Xiachuan, Xueguan, and Shizhitan. Both Dingcun 77:01 and Xiachuan sites were regarded as the earliest examples of microblade technology, dating to around 26,000 BP and 24,000–16,000 BP, roughly parallel with those earliest dated sites in both Korea and Japan. The Xiachuan lithic assemblage is represented by finely categorized flake tools made on fine black cherts. The tool types include burins, backed bladelets, projectile points, drills, and end scrapers, which were not common in the Early Paleolithic sites in North China. Recent studies on microblade industries in the Shandong Peninsula of East China suggests there were more regional variations indicative of high frequency of cultural interventions in North China (Fig. 7).

However, the reason for the sudden emergence of such technological-complicated microblade tools is still unclear. As far as the origin and spread of microblades in northern China are concerned, most Chinese scholars tend to support a "North China origin" model. Some suggest an eastward spread of microblade technology that originated at Xiachuan, through northern and southern routes into the Korean Peninsula, and proposed that boat-shaped microblade industries (China west) developed from wedge-shaped microblade industries (China east and Korea), but this hypothesis is not yet tested. However, data from other newly excavated sites in northern China – like Shizitan, Youfang, Jiqitan, and especially Qingfengqing and Fenghuangling in Shandong province – might challenge traditional views on the local

East Asia: Paleolithic, Fig. 7 Microblade artifacts from Shandong Peninsula, China, (**a**) and (**b**) microblades, (**c**) and (**d**) microblade cores

development of microblade technology in China. On the Japanese Archipelago, scholars tend to agree that the appearance of microblade technology was associated with migrations or diffusion from the mainland in two routes: north at Sakhalin-Hokkaido and south at Kyushu via Korea. Korean scholars do not claim the indigenous origins of microblade industries in Korea either.

Recent collective efforts on the study of origins and spread of microblade technology in Northeast Asia demonstrate that data from the region clearly indicates technological similarities among assemblages of northern China, Japan, Korea, eastern Siberia, and even to those from northwestern North America (Kuzmin et al. 2007). These studies reveal chronological data suggesting that the earliest use of microblade tools occurred in Central Asia, especially in Altai mountain regions. Microblade assemblages at Ust-Karakol 1, layers 10 and 9c, are dated to about 35,000–30,000, predated any sites with microblade in China, Korea, and Japan. As Ikawa-Smith correctly noted: "the Gorny Altai area, then, is more likely to be part of the general area in Eurasia where blade-based technologies developed, rather than the direct ancestral homeland of the microblade industries of Northeast Asia and northern North America" (Ikawa-Smith 2007b: 191). It is worth noting that based on new comparative studies, some scholars in China have started to hypothesize that microblade technology might have first emerged in Siberia and later spread southward into northern China.

Future Directions

With data becoming more accessible, in-depth research on the Paleolithic of East Asia is just unfolded. One of the current pressing issues in Paleolithic technology in this region is, as demonstrated above, the Acheulean industries in East Asia. Whenever studies are involved in the discoveries of hand axe, interpretations always center on the "Movius Line" theory known for more than half a century ago. This exemplifies a problem, that is, the research of East Asian Paleolithic needs to further develop its own paradigms based on what unique data this region can offer and how the data can first contribute to our understanding of its own remote cultural manifestations. Comparative studies are necessary, but data from the East Asian Paleolithic should not be treated as supplementary to arguments on prevailing theories that are of interests to the West. It cannot be denied that some Western scholars are only interested in the data that favors the theories and model-building that they advocate, especially regarding human evolution, resulting in the biased applications of out-of-context materials. Thus, it is of the foremost urgency to evaluate in full measures the East Asia data, which of course are still far from completed. Only with reliable time-scaled data can our future studies be truly placed into the syntheses of theory-buildings for distributions, migrations, and origins of technologies and human adaptations in East Asia.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Archaic *Homo sapiens*
- ▶ Asian Paleolithic Association (APA)
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ Handaxes and Biface Technology
- ▶ *Homo erectus*
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Lithic Technology, Paleolithic
- ▶ Movius Line
- ▶ Movius, Jr., Hallam L.
- ▶ Siberia: Paleolithic
- ▶ South Asia: Paleolithic
- ▶ West Asia: Paleolithic
- ▶ Yuanmou
- ▶ Zhoukoudian, Archaeology of

References

Bae, K. 2010a. Origin and patterns of the Upper Paleolithic industries in the Korean Peninsula and movement of modern humans in East Asia. *Quaternary International* 211 (1–2): 103–112.

Bae, K. 2010b. Peopling in the Korean Peninsula. In *Asian paleoanthropology: From Africa to China and beyond*, ed. C.J. Norton and D.R. Braun, 181–190. New York: Springer.

Choi, M.-C. 2004. *The Paleolithic period of Korea*. Gyeonggi-do and Edison: Jimoondang International.

Gao, X. 2000. Core reduction at Zhoukoudian locality 15. *Archaeology, Ethnology & Anthropology of Eurasia* 3 (3): 2–12.

Gao, X. 2012. Characteristics and significance of Paleolithic handaxes from China. *Acta Anthropologica Sinica* 31 (2): 97–112.

Gao, X., and C.J. Norton. 2002. A critique of the Chinese "Middle Palaeolithic". *Antiquity* 76: 397–412.

Gao, X., Q. Wei, C. Shen, and S. Keates. 2005. New lights on the earliest hominids in East Asia. *Current Anthropology* 46 (Suppl): 115–120.

Ikawa-Smith, F. 2007a. Palaeolithic cultures of Japanese Archipelago. In *Encyclopedia of archaeology*, ed. D.-M. Pearsall, 632–637. New York/London: Academic Press.

Ikawa-Smith, F. 2007b. Conclusion: in search of the origins of microblades and microblade technology. In *Origin and spread of microblade technology in northern Asia and North America*, ed. Y.V. Kuzmin, S.G. Keates, and C. Shen, 189–198. Burnaby: Archaeology Press Simon Fraser University.

Kuzmin, Y.V., S.G. Keates, and C. Shen, eds. 2007. *Origin and spread of microblade technology in northern Asia and North America*. Burnaby: Archaeology Press Simon Fraser University.

Matsufuji, K. 2010. When were the earliest hominin migrations to the Japanese islands. In *Asian paleoanthropology: From Africa to China and beyond*, ed. C.J. Norton and R. Braun, 191–200. New York: Springer.

Norton, C.J., and D.R. Braun, eds. 2010. *Asian paleoanthropology: From Africa to China and beyond*. Vertebrate Paleobiology and Paleoanthropology series. New York: Springer.

Sato, H., and T. Tsutsumi. 2007. The japanese microblade industries: Technology, raw material procurement, and adaptations. In *Origin and spread of microblade technology in northern Asia and North America*, ed. Y.-V. Kuzmin, S.G. Keates, and C. Shen, 57–83. Burnaby: Archaeology Press Simon Fraser University.

Seong, C. 2007. A review of Korean microlithic industries. In *Origin and spread of microblade technology in northern Asia and North America*, ed. Y.V. Kuzmin,

S.G. Keates, and C. Shen, 103–114. Burnaby: Archaeology Press Simon Fraser University.
Shen, C. 2007. The Palaeolithic cultures of China. In *Encyclopedia of archaeology*, ed. D.M. Pearsall, 570–596. New York/London: Academic Press.
Shen, C. 2011. Le fondamenta paleolitiche. In *Prestoria e origini della civilta cinese*, ed. R. Ciarla and M. Scarpari, 5–89. Torino: Giulio Eindaudi editore.
Shen, C., and S. Keates, eds. 2003. *Current research in Chinese Pleistocene archaeology*. BAR International series 1179. Oxford: Archaeopress.
Shen, C., and Q. Wei. 2004. Lithic technological variability of the Middle Pleistocene at the eastern end of Nihewan Basin, northern China. *Asian Perspectives* 43 (2): 281–301.
Shen, C., X. Gao, and Q. Wie. 2010. The earliest hominin occupations in the Nihewan Basin of northern China: Recent progress in the field investigations. In *Asian paleoanthropology: From Africa to China and beyond*, ed. C.J. Norton and D.R. Braun, 169–181. New York: Springer.
Wu, R., and J.W. Oslen, eds. 1985. *Palaeoanthropology and Palaeolithic archaeology in the People's Republic of China*. Orlando: Academic Press, Inc.
Xu, X. 2012. Data analyses of Paleolithic sites in China. Unpublished M.A. dissertation, Department of Palaeoanthropology, Beijing, Graduate School of Chinese Academy of Sciences.

East Asia: Rock Art

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Introduction

Rock art in East Asia is an archeological material found predominantly on open-air rock faces in mountain environments. Subjects range from distinctive anthropomorphic faces – seen at Helankou in northern China (Fig. 1), along the Ussuri and Amur rivers at the far eastern Sino-Russian border, and at Oponoho (Wanshan) in southern Taiwan – to whales – as at Bangudae in South Korea – to abstract and geometric symbols. This entry generally follows the United Nations Statistics Division's definition of East Asia, in which countries are grouped for statistical convenience rather than political or cultural affiliation. (See "Standard country or area codes for statistical use (M49)," available at https://unstats.un.org/unsd/methodology/m49/, accessed 14 June 2018.) East Asia thus denotes the geographical regions of mainland China, the Japanese islands, the Korean Peninsula, Hong Kong, Macau, and Mongolia, as well as the Taiwanese islands. (As of June 2018, Taiwan Republic of China is not a member of the United Nations, so is excluded from their statistical lists; however the region exists archeologically, so is included here.) Though most countries use regional period names to denote dates, terms like "Bronze Age" can refer to vastly different periods depending on the region. For the reader's convenience, all period names have been converted to numerical dates in this entry based on general academic consensus regarding periodization within each country. All dates are given in the BCE/CE system, with BP dates converted on the assumption that BP refers to 1950 CE. For further details, the reader is encouraged to pursue the literature cited.

Definition

Rock art throughout the vast region of East Asia is found in the form of rock-pecked images (petroglyphs), painted figures, and combinations thereof, where abraded areas of rock have been filled with red pigment (Jeon 2017; Ogawa 2014; Zhang Wenjing 2013; Jacobson-Tepfer and Meacham 2010). Rock art in East Asia is often considered to have been created by people who did not belong to the hypersedentary agricultural societies that dominate historical textual traditions, like early dynastic China (*c.* 1200–221 BCE) or Three Kingdoms of Korea (*c.* 1–688 CE). Rock art is, instead, considered intricately linked with either nomadic peoples (Tsakhilgaan 2016, 10–13) or hunter-gatherers (Dematté 2015, 615), though people from sedentary societies sometimes made additions to rock art panels, as in the case of a South Korean textual carving dated 525 CE that records successive ritual visits by royal clan members to the petroglyph site. Rock art through East Asia, however, attests to a diversity of environments, cultures, and traditions behind its creation. For instance, two major concentrations of petroglyphs

along the Daegok stream on the Korean Peninsula have vastly different foci: of 296 petroglyphs featuring identifiable subjects at Bangudae (2000–400 BCE), 58 (30%) are cetaceans, specifically whales, whereas at Cheonjeon-ri (*c.*2000 BCE–668 CE), 123 (57%) of 216 figures are ungulates, and there are only 5 (2%) cetaceans (Cultural Heritage Administration 2010). There is not space enough here to describe the traditions of each area in detail, so this section presents a brief overview of dating frameworks and methods to simultaneously highlight peculiarities in each of their rock art traditions.

East Asian rock art has been created over an extensive period, from at least as early as 10,050 BCE to the present day, though the intensity of making rock art varied by period. A general outline of deductive methods commonly used to date rock art – when the lack of organic material or projected expense eliminates radiocarbon dating as an option – can be given using the relatively thorough procedure used in the Altai mountains of western Mongolia. Jacobson-Tepfer (2015, 371–372) describes dating petroglyphs in this region as a subjective process reliant on deduction and discrimination. One indicator of a petroglyph's date can be the discoloration of the rock originally exposed to make an image, i.e., patina (Fig. 2). Though the rate of color change depends on a rock surface's location – which determines the weathering processes it undergoes – in addition to the chemical composition of the rock itself, older petroglyphs have accrued, in general, more patina than newer images (Jacobson-Tepfer 2015, 378). Other deductive methods include that petroglyphs formed of uneven marks made through direct pecking with a stone tool differ from ones with clearly incised or engraved outlines, as such marks were likely created with metal tools (Jacobson-Tepfer 2015, 372). As metal only appears in the Altai toward the end of the 3rd millennium BCE, the latter, clearly incised petroglyphs likely post-date this. Generally, however, direct pecking is the most common form of making petroglyphs in this region, with incising only increasing notably after *c.* 500 CE.

The subject matter of rock art can also be useful for dating; for example, horses (*Equus ferus*) are likely only ridden after 1300 BCE, but archeological evidence for the social reliance on horses and cultural expressions of this manifest after 1000 BCE; thus this serves as a likely *terminus post quem* for petroglyphs of anthropomorphs riding horses. Similarly, short, recurved bows appear in the archeological record predominantly after 1300 BCE, whereas, prior to this, a type of

East Asia: Rock Art, Fig. 1 Faces or masks carved in the Helan mountains, Ningxia, China. Photograph by the author

East Asia: Rock Art, Fig. 2 A petroglyph of a Eurasian elk (*c.* 2nd millennium BCE) that has been overlain by a modern carving of a personal name. The modern carving is bright white and visible from a distance, whereas the exposed rock of the elk has turned very dark. Biluut, Bayan-Ulgii, Mongolia. Photograph by the author

longbow was probably more common (Jacobson-Tepfer 2015, 374). Animal species can serve a similar role, as at Aral Tolgoi, Bayan Ulgii aimag, where many animal subjects that became extinct in the Altai are depicted, providing multiple dates before which petroglyphs of them were likely made, for example, ostrich (*Struthio* spp.), which disappeared from the region before 7050 BCE; rhinoceros (*Coelodonta antiquitatis*), which disappeared before 9750 BCE; and aurochs (*Bos primigenius*), which were present until *c.* 3050 BCE (Jacobson-Tepfer 2015, 118–119). Another technique for assessing the date of a petroglyph is to examine the style, or way a subject is depicted, as distinct differences are apparent between the "real-world" style common prior to 1000 BCE and later depiction of animals that refer to parallels in carved or cast portable art. Jacobson-Tepfer (2015, 378) describes the animals depicted in this later style as highly stylized, with unnaturally arched bodies, "twisted as if exploding" (Fig. 3).

The deductive reasoning highlighted above for dating rock art in the Mongolian Altai case study can be found throughout East Asia. For petroglyphs in the Yinshan of northern China's Ningxia and Inner Mongolia provinces, a broad dating framework based on rock art subjects was developed in the 1980s by Gai Shanlin and was heavily influenced by cultural evolutionary understandings of the past. Gai identifies an early hunting period (*c.* 8000–4000 BCE), the petroglyphs of which include extinct fauna like megaloceros (*Megaloceros luochuanensis*), ostrich, and Père David's deer (*Elaphurus davidianus*); a developed hunting and early farming period (*c.* 4000–2000 BCE), when anthropomorph petroglyphs increase in frequency, as well as representations of ibex (*Capra ibex*), sheep (*Ovis* spp.), and red deer (*Cervus elaphus*); early pastoralism (*c.* 2000–1000 BCE), which sees the appearance of horse, cattle (*Bos taurus*), sheep, and donkey (*Equus africanus asinus*) in the rock art corpus; a marked deviation in rock art methods after *c.* 1000 BCE; and a more modern period of rock art post *c.* 500 CE (Dematté 2004, 7–8). Though the date limits for the appearance of certain species have been altered, this framework is still generally adhered to by many Chinese researchers within and without the Yinshan area – indeed, the lack of any substantial, critical reevaluation of this framework is palpable. Gai also suggested that

East Asia: Rock Art, Fig. 3 Stone stele (deer stone) with multiple, stylized deer encircling it. The antlers run parallel to the deer bodies in a wavelike style and their muzzles are elongated. Jargalantym Am, Arkhangai, Mongolia, eighth to seventh centuries BCE. Photograph by the author

parallels for 1st millennium BCE Yinshan rock art could be found in the bronze artifacts of the Tagar culture (seventh to third centuries BCE) in southern Siberia (Dematté 2004, 7–9). Similar to the framework used for rock art in the Mongolian Altai, the Yinshan periodization reflects the fact that the majority of rock art in northern East Asia was created prior to *c.* 500 CE, with distinct changes in both visual and compositional styles *c.* 1000 BCE and 500 CE. On the Korean Peninsula, researchers consider a shield-shaped motif as paralleling artifacts excavated from archeological contexts dating to *c.* 1500–400 BCE, though most have been excavated from sites dating after 600 BCE (Jeon 2017, 218). Similarly, parallels between patterns found in petroglyphs at Oponoho, southern Taiwan, and pottery excavated from the site of Old Xianglan (*c.* 630–710 CE) in nearby Taimali township have been used to suggest a potential date for the images (Guoli taiwan shiqian wenhua bowuguan 2011).

Aside from subject matter, the two rock art sites on Hokkaido Island, Japan, have been dated according to geological processes. Fugoppe Cave was formed during a global warm period when the sea levels rose, which could potentially be either *c.* 2000 or 0 CE (Ogawa 2014, 48–49). As radiocarbon dates from material excavated inside the cave only attest to human presence *c.* 50 CE, researchers suggest the petroglyphs were created between *c.* 0–50 CE. Geological and environmental processes can also be used to provide a *terminus ante quem* for images, as was done along the Zuo River, Guangxi. Where researchers took two samples from the edge and interior of a stalactite covering an image, which returned radiocarbon dates of 2250 BCE, while another stalactite returned a date of 270 BCE (Demattè 2015, 622; Wang et al. 1988, 208). (The original publication by Wang et al. (1988, 208) does not state that the radiocarbon dates were calibrated or give the precise dates for each sample. Dematté's (2015, 622) description of their results, however, includes sample numbers, dates, and error margins for each of the four samples. Though she identifies the 1988 publication as her source, this information is not included by Wang et al., so it is possible that she retrieved her figures from the Heritage Department of the Guangxi Department of Culture or the Guangxi Museum directly.)

Historical Background

Rock art has been observed by various people throughout history, sometimes being reinterpreted by different cultures with no rock art-making tradition of their own. One example of this is the Daegok-ri petroglyphs on the Korean Peninsula, which were integrated during the Three Kingdoms period into historical records to form a founding narrative for the Great Gaya Kingdom (Jeon 2017, 139–140). The continuous reintegration of rock art into the immediate culture is part of the process of people constructing histories, cultures, and worldviews that Jeon (2017) calls "storytelling."

Alongside this continuous incorporation of rock art into contemporary culture, people have

similarly recorded its presence in a detached manner that many consider a precursor to modern research methods, such as the description in the fifth century CE Chinese text *Shuijingzhu*. This example has become significant in particular to modern Chinese research wherein researchers look for autochthonous precursors to modern research methods, which are commonly associated with European colonial activity in the eighteenth to twentieth centuries CE. Though the Temiya Cave petroglyphs on Hokkaido were, however, first recorded by Japanese researchers in 1866 (Ogawa 2014, 52), most trace early research on petroglyphs to European or Russian surveys of the nineteenth to twentieth centuries. Rock art in Tibet, for instance, was first mentioned in Francke's 1902 report on the Ladakh regional survey, which described petroglyphs west of Pangong Tso, while, in 1935, Tucci mentioned rock art near Gyantse town on the Myang Chu River (Zhang Yasha 2007, 45). Mongolian rock art, in contrast, was more the focus of Russian explorers, with Borovka making the first attempt to classify Mongolian rock-pecked images in 1927 based on petroglyphs along the Tuul Gol and Ulaan Khad (Tserendagva 2009, 55), though writings from the late nineteenth century make mention of petroglyphs earlier (Tserendagva and Tseveendorj 2016, 9). He distinguished two major groups that differed in content, style, and thus date: Scytho-Siberian petroglyphs, i.e., highly stylized animals seen on *c.* 1st millennium BCE portable objects and stele throughout southern Siberia, Central Asia (Fig. 3), and northern China (Jacobson-Tepfer 2015, 303), and Turkic-style petroglyphs, which are incised and commonly feature horse-riding anthropomorphs (Tserendagva 2009, 55). A major survey called the Historical-Ethnographic Expedition of the Russian Academy of Sciences was conducted in 1948, which revisited many known rock art complexes in western Mongolia (Tserendagva 2009, 56). Particularly in China, most major rock art surveys from the 1950s onward were conducted by local researchers, though most were only published in the 1980s–1990s, including multiple volumes on the vast regions of Xinjiang, Tibet, and Qinghai (see Further Reading). Similarly, South Korea's Yeoncheon Alteo petroglyphs were discovered in 1971 and were made the subject of particular national focus by the designation "national treasure" in 1976 (Jeon 2017, 128).

Following developments in archeological theory, which, during the 1950s–1970s, relied heavily on Marxist and Maoist thought, Chinese rock art research dated many sites according to the cultural-evolutionary framework of history, with particular emphasis placed on identifying supposed worship of male or female genitalia. The reasoning being that worship of male genitalia, as is argued for Kangjia shimenzi in Xinjiang's Qutubi county, would indicate that the rock art was made after the supposed transition from matrilineal/matriarchal societies to patrilineal/patriarchal ones *c.* 1000 BCE. Though some researchers acknowledge the issues with this, they simultaneously argue that a relative date provides a basis from which to explore an absolute date. The concept that history developed along a strict trajectory from least complicated to more complicated societies persists in Chinese academia, with many researchers conceptualizing rock art as the hallmark of a "primitive" peoples and traditions, that is, as a crude precursor to art. Despite broadening of the theoretical field over the past few decades, it is still common to link rock art to Western and Chinese aesthetics or use it to demonstrate that "primitive" peoples were equally capable of imaginative and abstract thinking (Zhu 2013, 153). Such attitudes run parallel, however, to varied approaches to rock art research appearing over the past decades, such as Matsumoto's (1997) cognitive approach to the petroglyphs of Inner Mongolia.

More recently, rock art research in China has been described as divisible into three types: surveys and reports that describe and date rock art content; analysis of the aesthetics of particular figures, their structure, artistic expression, and technique used to make them, a more art historical approach; and examinations of the rock art's context to reconstruct ancient societies – a more ethnographic or anthropological approach (Ren and Wang 2013, 67). An increasing number of digital methods have also been applied, including the digitization of Oponoho petroglyphs. The

isolation and inaccessibility of the mountain's four sites, even for local Rukai, formed the impetus for creating a 3D model of the site. Local Rukai were hired as guides and equipment porters, "to enhance the involvement of the aborigines in preserving the site," (Tseng et al. 2014, 483). The models were reportedly made openly available online (Tseng et al. 2014, 487–488), however, the publication provides no web address, and, as of May 2018, neither the models nor panorama photographs were found on the Oponoho website hosted by the National Museum of Prehistory (Guoli taiwan shiqian wenhua bowuguan 2011).

Key Issues/Current Debates

Current debates in East Asian rock art research revolve primarily around its purpose, connections between regions and across borders, and relationship to ethnic groups identified in modern times.

One of the most frequent explanations for the creation of rock art in East Asia is that it relates to ritual practice and human beliefs, though more nuanced interpretations of its role in societies and cultures also exist. In the Mongolian Altai, many petroglyphs are found in isolation on peaks, with certain ones having been re-pecked over time. Such attention and care for particular images suggests that they were the foci of worship, potentially locations where kin or cultural ancestors were celebrated and offerings made (Tsakhilgaan 2016, 10–13). Additionally, it has been suggested that a fundamental impetus for worshipping petroglyphs was a belief in protective magic, i.e., that honoring it could ward off disasters. Similarly, particularly large concentrations of rock art, like Cheonjeon-ri (*c.* 2000 BCE – 668 CE) in South Korea, are interpreted as sanctuaries for religious or spiritual activities (Lee 2011). It has been noted, however, that such rituals concerning East Asian petroglyphs likely served a variety of purposes, including the creation of boundaries between groups and the maintenance of cultural differences. Additionally, meanings of motifs were potentially revised over time, even between generations (Ponomareva 2018, 43–44). The interpretation that rock art was mainly created due to spiritual reasons has led researchers to link it with beliefs identified formally in the anthropological record, including animist ontologies like shamanism, with some arguing that shamans are represented in a variety of time periods, particularly in Northeast Asia (Jang 2005, 201). In some cases, the "shaman" depicted is purely an anthropomorph lacking in distinguishing figures, as at Bangudae, whereas the anthropomorphs in Fugoppe cave (Fig. 4), Hokkaido, are depicted as if wearing horns, feathers, or other accoutrements thought to indicate a merger of human and animal features associated with shamanistic rituals (Jang 2004, 216–218). Though its applicability as an interpretive framework is debated (Demattè 2004), the interpretation of an anthropomorph at Bangudae as a shaman dancing is reactive against entrenched attitudes in Korean academia that a protrusion near its crotch means it reflects worship of the male genitalia (Jang 2005, 204), and even those who put forward the shamanism interpretation remain cautious (Jang 2004, 222).

At a more refined level of analysis, debates on how and why specific rock art images were

East Asia: Rock Art, Fig. 4 A horned anthropomorph on a loose rock. The horns, or feathered clothing, are suggested to be evidence of shamanic ritual. Fugoppe cave, Hokkaido, Japan, *c.* 0–50 CE (After Ogawa 2014, Fig. 7)

created are far less united. Despite general attitudes that rock art was the product of past peoples' spiritual worldviews, individual images have been suggested as originating in daily life. From this perspective, past peoples saw a subject, created a visual expression of it in their mind according to the contemporary cultural ideology, then arranged these images according to their culture's visual principles, and pecked them into the rock (Zhu 2013, 152). Suggestions for what the image meant after its creation range from the idea that an image of an animal indicates that it was not a danger to humans, or that it served as a guide for how to distinguish it from other species (Shi 2012, 171). A common theme is, however, that rock art is by no means an "art" as understood by Western cultures. Shi (2012, 171) argues that the Western overreliance on phonetic scripts relegates everything pictorial to the field of "art" in the Western mind, whereas East Asia's historical familiarity with ideographic scripts allows researchers to understand imagery beyond the passive categorization of "art." In addition, he argues that presuming rock art served as "art" imbues it with aesthetic value and significance that it potentially never had. Consequently, Matsumoto (1997, 91) summarizes the situation succinctly when she emphasizes that researchers still do not know what the intentions of the rock art's creators were, regardless of the extent of speculation, as components of rock art are produced through unconscious decisions related to functions in the brain, as well as culturally derived knowledge and behaviors. Abstract symbols, in particular, have fallen afoul of such speculation, as Chinese researchers have alternatingly attempted to link them to precursors of the Shang Oracle Bone script (*c*. 1200–1045 BCE) of dynastic China, as well as astronomical phenomena (Zhu 2013, 153), which would presumably indicate a sophisticated precursor to scientific understandings of the world.

Despite prevalent ideas that rock art is a universal phenomenon, the sheer size of modern China within East Asia prompted a discussion in the 1980s of connections between rock art traditions of different regions. This manifested in Chinese research as the "northern" and "southern" categories, with the former represented by carved petroglyphs on open-air rock faces and the latter featuring red painted images. This has been refined by Zhang (2013, 59–61), who divides the country into three major rock art regions: the north, comprising predominantly animal images created through abrading or chiseling; the southwest, which features mainly anthropomorphic figures painted using red pigment on riverside cliff faces; and the southeast, comprising predominantly chiseled images of boats, wave patterns, and anthropomorphs. Rock art on Taiwan Island and Hong Kong is included in the southeast group, while rock art in Japan and Korea is increasingly linked to petroglyphs in Mongolia and, consequently, China's north. At a museum showcasing the petroglyphs of Fugoppe and Temiya caves in Hokkaido, the imagery was set among photographs of petroglyphs at the Amur River, Sino-Russian border, and the Daegok stream, South Korea (Jang 2004, 224), situating them within the context of Northern Asian rock art. In combination with the lack of other rock art sites in Japan, the similarity of the Fugoppe petroglyphs to examples from the Eurasian continent has led Ogawa (2014, 52) to suggest that those who made it originated from outside of the Japanese archipelago, while Jang (2005, 201) argues that the anthropomorphs along the Daegok stream and throughout Northern Asia demonstrate the existence of universal spiritual beliefs and a, "homogeneity in the fundamental culture." Alternatively, though from these macroscopic perspectives Mongolia's rock art is linked to that of China's north (Jacobson-Tepfer 2015, 302–303), more refined regional groupings are commonly used to identify differences in Mongolia's particularly rich rock art record, such as petroglyphs of the Altai as opposed to those of the Gobi (Tsakhilgaan 2016).

International Perspectives

Similar to other parts of the world, East Asian rock art studies have been strongly influenced by the shamanism paradigm, with researchers interpreting rock art *a priori* as showing shamanic rituals. As, for many researchers, shamanism is a

religion of Siberia and the Eurasian Steppe, this interpretation allows them to link rock art with broader Eurasian belief systems, but such a relationship is often questionable. International critiques of its usage in East Asia are that the paradigm relies on preconceptions of "primitive" vs "civilized" societies, wherein the latter are considered highly complex but the former are broadly similar worldwide (Dematté 2004, 11). This allows researchers to utilize modern ethnographies to explain prehistoric remains, with little justification of their applicability. As shamanism was first documented among the Evenk, it has been suggested that it be treated as a Siberia-specific system in appropriate contexts only, such as for archeological remains along the Ussuri and Amur rivers. Other international researchers have, however, noted tendencies in East Asia toward beginning with the visual evidence before working toward broader interpretative frameworks (Bale 2015, 230), demonstrating that the shamanism paradigm is, in some cases, losing ground.

Regional nationalism is a concern for rock art research in East Asia, as it encourages interpretations relating to the origins of modern ethnic groups, mass migration, and cultural diffusion. Though this is an issue for all archeological fields, these interpretations are considered outdated in Anglophone research (Bale 2015, 230; Dematté 2004). Collaborative international projects can also be drawn into nationalist frameworks, in which cases the research aim becomes the validation of a political agenda. An example of this is an English article on the rock art of Yunnan, southwest China, which explores the likelihood that the images represent an autochthonous tradition rather than the influence of European painted rock art (see Further Reading). Conversely, a volume on the Bangudae petroglyphs of South Korea suggests that the images' creators migrated from the Altai Mountains (Bale 2015, 230). In these two examples, the researcher is attempting to prove or deny long-distance relationships that validate specific sociopolitical agendas (Bale 2015, 230) and what the evidence shows can be changed according to what one wants to find. Similar to interpretations of shamanism, nationalist-related arguments typically lack analytical justification (Dematté 2004, 10). Though nationalism's effects can be far more radical than simply coloring interpretations of the past, the examples presented here demonstrate how popular nationalism can permeate every aspect of society and prevent archeological evidence from being examined on its own terms.

Finally, an interpretative framework gaining in popularity among international researchers is the landscape approach, which essentially manifests as increased consideration for the landscape's role in the past. The argument is made that the landscape played a major role in people's decisions to create open-air rock art, and it refers to factors like travel routes and topographical landmarks (Dematté 2015, 616). This approach does not rely on environmental factors as explanations for archeological remains but portrays rock art as a process enacted within a space comprising other structures (human-made and natural), histories, and societies (Jacobson-Tepfer and Meacham 2010). Identifying that rock art along the Zuo River is primarily found on river bends, for instance, leads Dematté (2015, 625) to suggest that the rock art was designed to be visible from nearby villages, as the particularly steep rock surfaces were themselves very visible, whereas previous interpretations rely on historical ethnographic parallels. The landscape approach familiar to Anglophone research is not, however, unheard of in East Asian research; a landscape study has been published for rock art in northern China's Badain Jaran, but similar studies are lacking.

Future Directions

Digital methods are increasingly being used to improve the level of detail in rock art studies. The application of simple methods, such as altering image tone digitally, is allowing researchers to more accurately identify badly damaged figures and the sequence of figure overlap, which has significant implications for our understanding of dates and the process of building up panels with

East Asia: Rock Art, Fig. 5 The petroglyphs on this panel all have the same patina colour due to their age, however, each one may have been made weeks, months, or years apart by different people. Bayan-Ulgii, Mongolia, precise date unclear. Photograph by the author

multiple, varied images. It is still relatively common to encounter researchers who treat all rock art on one panel as a single set, regardless that each image may have been made on a different date by different people (Fig. 5) (Ren and Wang 2013, 67). Consequently, rock art "stratigraphies" represented through manipulated photographs are becoming increasingly common in publications (Ren and Wang 2013, 71). The technique is described as a means to improve objective recording of rock art, which will make the discipline more scientific (Ren and Wang 2013, 73). Alternatively, other researchers are using digital technologies to make rock art more accessible to nonacademics and enhance public engagement. Tseng et al. (2014, 488) express the hope that a digital, visual database of Oponoho will be used to create 3D, interactive exhibitions that will be more interesting to the public.

Simultaneously, there is an ever-growing trend among international researchers toward understanding rock art as a process enacted within various social, cultural, and political activities. Whether the aspect of past society being explored is belief or cultural interaction (Jacobson-Tepfer 2015, 351–368), researchers are increasingly approaching East Asian rock art as an active agent that played a role in creating human societies, rather than a passive reflection of their attitudes and economies (Ponomareva 2018). This requires, however, greater engagement with contemporary archeological remains, which has not been supported until relatively recently (Ogawa 2014, 51). What this entry has highlighted, however, is continuously increasing transnational collaboration, as well as diversification of the methods used to study rock art throughout East Asia, which will hopefully also lead to more productive cross-disciplinary approaches.

Cross-References

- ▶ Huashan Mountain Petroglyphs
- ▶ Nationalism and Politics in Chinese Archaeology
- ▶ Rock Art of Siberia: Baikal and Transbaikal Regions
- ▶ Taiwan: Archaeological Museums

References

Bale, M.T. 2015. Bangudae: Petroglyph panels in Ulsan, Korea, in the context of world rock art ed. by Ho-tae Jeon and Jiyeon Kim (review). *Journal of Korean Studies* 20 (1): 229–232.

Cultural Heritage Administration. 2010. Daegokcheon stream petroglyphs. World Heritage Centre, UNESCO. https://whc.unesco.org/en/tentativelists/5486/. Accessed 18 Apr 2018.

Demattè, P. 2004. Beyond shamanism: Landscape and self-expression in the petroglyphs of Inner Mongolia and Ningxia (China). *Cambridge Archaeological Journal* 14(1): 5–23. https://doi.org/10.1017/S0959774304000010.

Demattè, P. 2015. Travel and landscape: The Zuo river valley rock art of Guangxi Zhuang autonomous region,

China. *Antiquity* 89 (345): 613–628. https://doi.org/10.15184/aqy.2014.49.

Guoli taiwan shiqian wenhua bowuguan 國立台灣史前文化博物館. 2011. Rock art. Yandiao. Yanhui. Rock art 岩雕 岩繪 [Rock art. Petroglyphs. Rock paintings]. http://special.nmp.gov.tw/2011rock_art/taiwan02.html. Accessed 10 May 2018.

Jacobson-Tepfer, E. 2015. *The hunter, the stag, and the mother of animals: Image, monument, and landscape in ancient North Asia*. New York: Oxford University Press.

Jacobson-Tepfer, E., and J.E. Meacham. 2010. *Archaeology and landscape in the Mongolian Altai: An atlas*. Redlands: ESRI Press.

Jang Seok-ho. 2004. Ilbon hotkaido-ui hugotpe dong-gul byeokwae daeha yeo [On the Fugoppe cave petroglyphs, Hokkaido, Japan]. *Dongbuga Yeoksa Nonchong* 1: 209–228.

Jang Seok-ho. 2005. Dongbugasia sogui daegok-ri amgakwa – Syameon hyeongsangeul jungsimeuro [Daegok-ri petroglyphs in Northeast Asia: Focussing on the shaman figure]. *Dongbuga Yeoksa Nonchong* 5: 199–230.

Jeon Ho-tae. 2017. Hangug-ui geompahyeong amgaghwawa munhwayusan seutolitelling [Dagger motif petroglyphs of Korea and cultural heritage story-telling]. *Yeoksawa Gyeong-gye* 105: 125–151.

Lee, S., ed. 2011. *Chasseurs de baleines: la frise de Bangudae (Corée du Sud)*. Paris: Errance.

Matsumoto Naoko 松本直子 (Songben zhizi). 1997. Guanyu zhongguo beifang diqu yanhua zhong huihua fangxiang de pianxiangxing wenti 关于中国北方地区岩画中绘画方向的偏向性问题 [On the issue of painting orientation bias in petroglyphs of China's northern zone]. Trans. Huang Jianqiu 黄建秋. *Neimenggu Wenwu Kaogu* 1(16): 91–96 & 104.

Ogawa, M. 2014. Dating petroglyphs from Fugoppe cave, Japan. *Art* 3: 46–53. https://doi.org/10.3390/arts3010046.

Ponomareva, I.A. 2018. Continuity in the rock art tradition of the Siberian lower Amur Basin. *Rock Art Research* 35 (1): 35–46.

Ren Meng 任萌, Wang Jianxin 王建新. 2013. Yanhua yanjiu de kaoguxue fangfa 岩画研究的考古学方法 [Archaeological methods for rock-art research]. *Wenwu* 2013(3):67–73.

Shi Hualong 石华龙. 2012. Shiqian yanhua shi tushi jiaoliu de wenben yicun 史前岩画是图式交流的文本遗存 [Prehistoric rock-art is the textual remains of a pictorial communication method]. *Xibei Daxue Xuebao (Zhexue Shehui Kexueban)* 42(1):171–172. https://doi.org/10.16152/j.cnki.xdxbsk.2012.01.017.

Tsakhilgaan, D., ed. 2016. *Mongol altain chuluun shastir*. Ulaanbaatar: Rock Art Research Center.

Tseng, Y., T. Wu, and S. Hsu. 2014. Integrated application of digital technologies for transmitting values of cultural heritage in remote mountains. In *Proceedings of 5th international conference on Digital heritage. Progress in cultural heritage: Documentation, preservation, and protection, Euromed 2014, Limassol, November 3–8, 2014*, ed. M. Ioannides, N. Magnenat-Thalmann, E. Fink, R. Žarnić, A.Y. Yen, and E. Quak, 482–489. Cham: Springer.

Tserendagva, Ya. 2009. Introduction into the rock art of Mongolia. In *Current archaeological research in Mongolia: Papers from the first international conference on 'archaeological research in Mongolia' held in Ulaanbaatar, August 19th–23rd, 2007*, ed. J. Bemmann, 55–65. Bonn: Vor- und Frühgeschichtliche Archäologie Rheinische Friedrich-Wilhelms-Universität Bonn.

Tserendagva, Ya, and D. Tseveendorj. 2016. *Dalan türgen khos tolgoin khadny zürag*. Ulaanbaatar: Institute of History and Archaeology of the Mongolian Academy of Sciences.

Zhang Yasha 张亚莎. 2007. Gu xiangxiong de "niao tuteng" yu xizang de "niao zang"' 古象雄的"鸟图腾"与西藏的"鸟葬" ["Bird totems" of the ancient Zhang-zhung and Tibetan "sky burials"]. *Zhongguo Zangxue* 2007(3):45–54.

Zhang Wenjing 张文静. 2013. Zhongguo yanhua de quyu fenbu ji tedian bijiao 中国岩画的区域分布及特点比较 [Regional distributions of Chinese rock art and comparison of their characteristics]. *Neimenggu Shehui Kexue (Hanwen Ban)* 34(3):59–62. https://doi.org/10.14137/j.cnki.issn1003-5281.2013.03.005.

Zhu Yuan 朱媛. 2013. Lun zhongguo yanhua de quxiang guize 论中国岩画的取向规则 [On the principles of image orientation in Chinese rock-art]. *Beijing Ligong Daxue Xuebao (Shehui Kexue Ban)* 15(6):152–156.

Further Reading

Chen Zhaofu 陈兆复. 2008. *Zhongguo yanhua faxian shi* 中国岩画发现史 *[A history of Chinese rock-art discoveries]*. Shanghai: Shanghai Renmin Chubanshe.

Chen Ziyu 陈子玉., and Xu Min 许民. 2006. Badanjilin yanhua de diyuxing tantao 巴丹吉林岩画的地域性探讨 [Investigation of regionalism in the rock art of Badain Jaran]. *Chifeng Xueyuan Xuebao* 22(4):38–39.

Gai Shanlin 盖山林. 1986. *Yinshan yanhua* 阴山岩画 *[Petroglyphs in the Yinshan mountains]*. Beijing: Wenwu Chubanshe.

Gai Shanlin 盖山林. 1997. *Badanjilin shamo yanhua* 巴丹吉林沙漠岩画 *[Rock art of the Badain Jaran desert]*. Beijing: Beijing Tushuguan Chubanshe.

Jeon, H., M. Jang, J. Gang, Y. Nam, and H. Yoon. 2013. *The Cheonjeon-ri petroglyphs in Ulsan*. Seoul: Hollym.

Kim, C. 2013. *Bangudae: Petroglyph panels in Ulsan, Korea, in the context of world rock art*. Seoul: Hollym.

Li Hongfu 李洪甫, and Wu Kerong 无可荣. 1990. *Haizhou shike–Jiangjun ya yanhua yu kongwang Shan Moya zaoxiang* 海州时刻–将军崖与孔望山摩崖造像 *[Carvings of Haizhou: The Jiangjun precipice rock art and Kongwang mountain cliff-carved statues]*. Beijing: Wenwu Chubanshe.

Li Yongxian 李永宪, and Huo Wei 霍巍. 1994. *Xizang yanhua yishu* 西藏岩画艺术 *[Arts of Tibetan rock paintings]*. Chengdu: Sichuan Renmin Chubanshe.

Liang Zhenhua 梁振华., ed. 1998. *Zhuozi Shan yanhua* 桌子山岩画 *[Rock art of Zhouzi mountain]*. Beijing: Wenwu Chubanshe.

Liu Wu 刘五., ed. 2010. *Juci Shan yanhua* 具茨山岩画 *[Rock art of Juci mountain]*. Zhengzhou: Zhengzhou Guji Chubanshe.

Liu Qingyan 刘青砚, and Liu Hong 刘宏., eds. 1998. *A'ertai yanhua yishu* 阿尔泰岩画艺术 *[Art of rock art in the Altai]*. Jinan: Shandong Meishu Chubanshe.
Shu Xihong 束锡红, and Li Xiangshi 李祥石. 2007. Yanhua yu youmu wenhua 岩画与游牧文化 [Rock-art and nomadic culture]. Shanghai: Shanghai Guji Chubanshe.
Sichou zhi lu yanjiu congshu 絲綢之路研究叢書. 1993. *Sizhou zhi lu yanhua yishu* 絲綢之路岩畫藝術 *[Rock-carving painting arts on the Silk Road]*. Urumqi: Xinjiang Renmin Chubanshe.
Su Beihai 苏北海. 1994. *Xinjiang yanhua* 新疆岩画 *[Rock-art in Xinjiang]*. Urumqi: Xinjiang Meishu Sheying Chubanshe.
Taçon, P.S.C., G. Li, D. Yang, S.K. May, H. Liu, M. Aubert, X. Ji, D. Curnoe, and A.I.R. Herries. 2010. Naturalism, nature and questions of style in Jinsha River rock art, Northwest Yunnan, China. *Cambridge Archaeological Journal* 20 (1): 67–86. https://doi.org/10.1017/S0959774310000053.
Tang Huisheng 汤惠生, and Zhang Wenhua 张文华., eds. 2001. *Qinghai yanhua – Shiqian yishu zhong eryuan duili siwei ji qi guannian de yanjiu* 青海岩画–史前艺术中二元对立思维及其观念的研究 *[Qinghai rock art: Binary opposite thinking in prehistoric art and the ideology]*. Beijing: Kexue chubanshe.
Wang Liangfan 王良范, and Luo Xiaoming 罗晓明. 2010. *Zhongguoyanhua Guizhou* 中国岩画 贵州 *[Chinese rock art: Guizhou]*. Beijing: Zhongguo Guoji Guangbo Chubanshe.
Wang Kerong 王克荣, Qiu Zhonglun 邱钟伦, and Zhang Yuanzhang 张远璋. 1988. *Guangxi zuojiang yanhua* 广西左江岩画 *[The Zuo River rock art of Guangxi]*. Beijing: Wenwu Chubanshe.
Zhang Yasha 张亚莎. 2006. *Xizang de yanhua* 西藏的岩画 *[Rock art of Tibet]*. Xining: Qinghai Renmin Chubanshe.
Zhou Qingbao 周箐葆., ed. 1993. *Sichou zhi lu yanhua yishu* 絲綢之路岩畫藝術 *[Rock arts of the Silk Road]*. Urumqi: Xinjiang Renmin Chubanshe.

Eastern North America: An Independent Center of Agricultural Origins

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Introduction

As early as the 1930s, a group of native seed-bearing plants excavated from dry rockshelter sites in Kentucky and the Ozarks of Arkansas, and Missouri presented themselves as candidates for a possible indigenous eastern North American crop complex. Not until fairly recently, however, have archaeological and genetic techniques – especially AMS radiocarbon dating, scanning electron microscopy, flotation recovery of charred plant remains, and analysis of both modern and ancient DNA – convinced all researchers that eastern North America is a legitimate, independent center of plant domestication. Peter Bellwood (2005: 158) described this discovery as "one of the major recent achievements of U.-S. archaeological research. . .."

Domestication in this region contrasts with agricultural origins in some other parts of the world. Selection for useful crops took place after the early Holocene Neolithic time frame of southwestern and eastern Asia, for example, and it does not appear to have been motivated by climatic stress, regional population pressure, or the desires of aggrandizing elites for surplus or luxury foods. Still, the pre-maize Eastern Agricultural Complex (EAC) of North America became a widespread and entrenched economic system concurrent with increasingly long-term occupation of rich riverine zones and with an upswing in long-distance trade among groups who practiced elaborate rituals that probably included feasting and seed exchange.

Key Issues/Current Debates/Future Directions/Examples

The Indigenous Eastern Crops

Eastern Squash/Gourd (*Cucurbita pepo* ssp. *ovifera*)

A native subspecies closely related to the Mesoamerican pumpkin (*Cucurbita pepo* ssp. *pepo*), the eastern *ovifera* squash/gourd was cultivated as early as 7,000 years ago in Illinois and 1,000 to 2,000 years later in Pennsylvania, Maine, and probably many other places. By 2500 BCE, selection for larger fruits and seeds and thicker rind can be detected archaeologically, establishing this species as one of the earliest domesticates of the Eastern Woodlands. The seeds and flowers would have been valued for food, and the hard-shelled

fruits had multiple uses: containers, rattles, and fish-net floats, among others (Asch and Asch 1985; Fritz 1999). Varieties with non-bitter flesh were also bred during this process. Molecular biologists have determined that modern commercial cultivars including yellow crooknecks, pattypans, and acorn squashes – as well as many of the seasonally popular ornamental gourds – are descended from this lineage now known to have been domesticated in eastern North America (Decker-Walters 1990).

Sunflower *(Helianthus annuus* var. *macrocarpus)*
Sunflowers were grown by indigenous eastern North American farmers at the time of European contact and therefore accepted by scholars as having been a native domesticate long before other members of the EAC joined them in that category (Heiser 1955). The earliest domesticated seeds and fruits – those that are larger than their wild counterparts – come from the Hayes site in eastern Tennessee, dating to 2300 BCE in the Late Archaic period (Crites 1991). Selection for larger and larger seeds and for monocephalic plants (those having a single large flower head rather than many smaller side branches) continued during subsequent millennia, although in some regions such as the Iroquoian area of the Northeast, relatively small-sized seeds were favored, perhaps due to high-quality oil. Sunflower seeds were eaten in porridges, stews, and breads, and the seed oil was used cosmetically.

Sumpweed *(Iva annua* var. *macrocarpa*)
Sumpweed or marshelder (Fig. 1), which is closely related to sunflower, was also domesticated during the Late Archaic period (3000–1000 BCE), with the earliest larger-than-wild-sized specimens coming from the Napoleon Hollow site in west central Illinois and also, like sunflower, dating to 2300 BCE (Asch and Asch 1985). Human paleofeces from Salts and Mammoth Caves in Kentucky, left by cavers between 2,000 and 2,500 years ago, contain irrefutable evidence that people ate the unshelled kernels of sumpweed along with sunflower and other native crops, but because sumpweed had disappeared as a cultigen before Europeans described its uses in writing, we have no recipes or descriptions of how it was cooked.

Chenopod or Goosefoot *(Chenopodium berlandieri* ssp. *jonesianum*)
One of the most important native North American crops was a close relative of the now-popular Andean grain called quinoa (*Chenopodium quinoa*), and it shared quinoa's high protein composition and other advantages such as prolific productivity. Rather than having been bred for larger seeds, cultigen chenopod seed coats became thinner and smoother, resulting in at least one variety with very thin, black seed coats and another variety similar to modern quinoa that had pale-colored seeds. Both of these crop types were found at the Riverton site in southern

Eastern North America: An Independent Center of Agricultural Origins, Fig. 1 Domesticated sumpweed (*Iva annua* var. *macrocarpa*) specimens from Alum Cave, Arkansas Ozarks

Eastern North America: An Independent Center of Agricultural Origins, Fig. 2 Dark-seeded cultigen chenopod (*Chenopodium berlandieri* ssp. *jonesianum*) specimen from Edens Bluff, Arkansas Ozarks

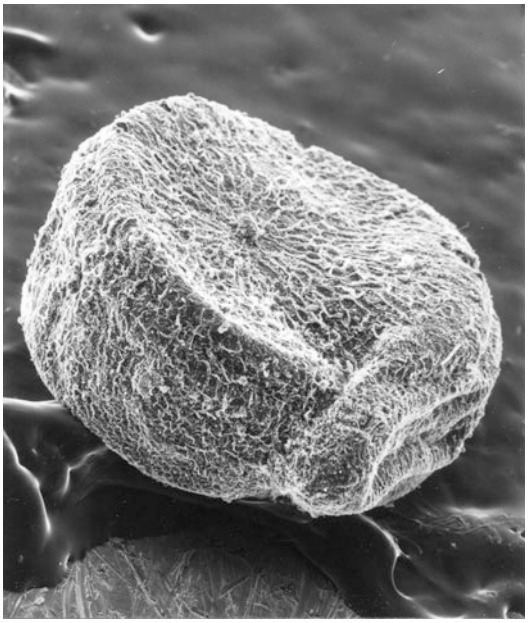

Eastern North America: An Independent Center of Agricultural Origins, Fig. 3 Pale-seeded cultigen chenopod specimen from Whitney Bluff, Arkansas

Indiana, dating to 1800 BCE, along with squash rind and domestic-sized sunflower and sumpweed seeds (Figs. 2 and 3). Riverton is currently the earliest site at which most EAC crops have been found together (Smith and Yarnell 2009).

Erect Knotweed (*Polygonum erectum*)

A member of the same family as buckwheat (*Fagopyrum esculentum*, a Eurasian crop), erect knotweed was clearly a member of the EAC by 500 BCE. It was stored along with the known domesticates in rockshelter sites and caches (Fig. 4). This species did not initially change dramatically in size or shape from its wild ancestral form and therefore is referred to as "cultivated," meaning intentionally propagated but not necessarily fully dependant on farmers for its survival. By CE 1000, however, a few sites in Arkansas and Illinois held concentrations of knotweed specimens slightly larger and with smoother fruit coats than any known wild populations (Fritz 1990). Stands of erect knotweed are rare today, so insufficient comparative research has been carried out, and more measurements and detailed scrutiny are needed.

Maygrass (*Phalaris caroliniana*) and Little Barley (*Hordeum pusillum*)

Two small-seeded native grasses are frequently found in depositional contexts along with other crops, although they, like erect knotweed, are usually classified as "cultivated" rather than domesticated due to doubts about the degree to which they were altered genetically or phenotypically. Maygrass has been recovered from sites well outside its modern geographical range, as far north as southern Wisconsin (Fritz in press). Today, wild maygrass (Fig. 5) does not grow in the Mississippi River Valley north of the Missouri Bootheel. Numerous bundles of maygrass seed heads from storage contexts in Ozark rockshelters and thousands upon thousands of maygrass seeds recovered by flotation from pits dating between CE 100 and CE 1300 in Illinois, Missouri, Arkansas, and Tennessee constitute strong evidence that this species was highly valued across the Midwest Riverine area. Like little barley, maygrass ripens in the early summer, a time when stored grains are depleted and other crops are not yet producing seeds. Concentrations of maygrass seeds occur in association with unusually high numbers of tobacco seeds at sites in Missouri, Alabama, and

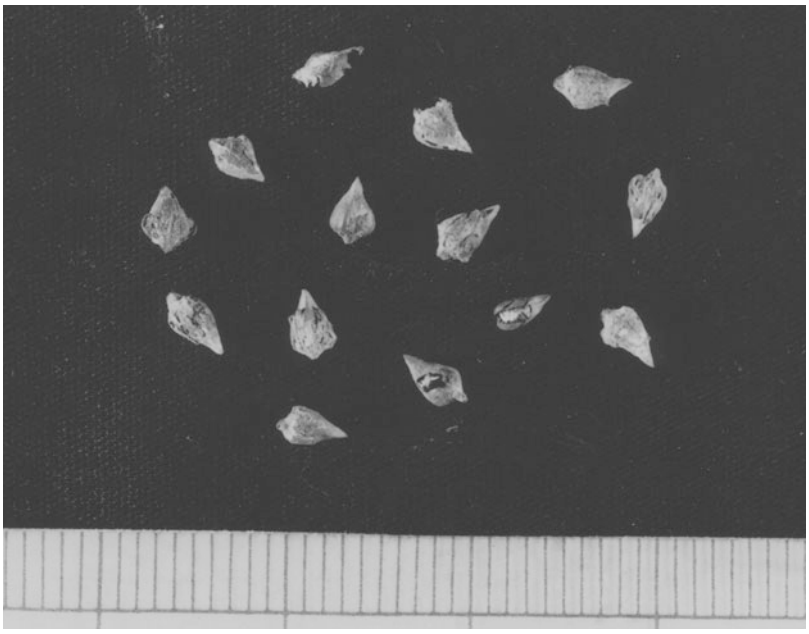

Eastern North America: An Independent Center of Agricultural Origins, Fig. 4 *Polygonum erectum* from stored seed cache found at Whitney Bluff, Arkansas

Eastern North America: An Independent Center of Agricultural Origins, Fig. 5 Modern maygrass (*Phalaris caroliniana*) growing in Bolivar County, Mississippi

Illinois, including Cahokia Mounds (Fritz in press). In Wisconsin, maygrass was found at sites where Mississippian colonists from the Cahokia region apparently carried it with them when they moved north (Egan-Bruhy 2003). This raises the possibility that as a first fruit, maygrass held a special status in rituals or that it was a key component of identity associated with ancient foodways before maize became the dominant staple.

Unlike maygrass, little barley's natural range today corresponds to its archaeological range, and little barley has not been found stored in sheaves in dry rockshelters or in special contexts. Still, very high frequencies of little barley seeds are commonly found in pits and middens along with the other EAC crops, especially in Illinois, Missouri, and eastern Arkansas, and morphological hints of selection for free-threshing grains have been described (Hunter 1992).

Discussion: Pre-maize Eastern Agriculture

Cultivation and domestication of squash and seed plants in eastern North America was initially conducted by members of social groups who were adapting to stabilization of floodplain regimes and becoming increasingly effective managers of temperate forest resources. A combination of factors can be implicated in the process. Conscious human selection entailed the isolation of types of plants with particular traits by planting seeds in new places and choosing seeds from the most desirable plants to serve as future seed stock. At the same time, unconscious selection operated when the seeds best adapted to enhanced competition outgrew their neighbors in plots where humans had disturbed the soil, fertilized it organically, and opened it up to sunlight through clearing. This evolutionary advantage favored larger-than-average seeds and those with thinner coats that promoted early germination.

By the end of the first millennium BCE, the suite of crops discussed above was widely grown across the Midwest Riverine area. Paleofecal studies at Salts and Mammoth Caves, Kentucky, demonstrate that up to two-thirds of observable dietary remnants were contributed by these native seed crops between 200 and 500 BCE (Yarnell 1974). However, the diet of Early Woodland cavers, who spent many hours deep underground in pursuit of minerals, might not represent the typical subsistence economy. Flotation recovery of charred plant remains has yielded great numbers of EAC seed types from settlements dating to the first millennium CE (Middle and Late Woodland periods) across this same zone. Opinions differ as to how large a part of the diet came from native agricultural products as opposed to wild plants and animals, and it is likely that the amount of time and effort devoted to farming varied considerably from place to place and perhaps even from year to year. Researchers such as Bruce Smith (2001) describe these groups as low-level food producers for whom domesticates constituted less than 50% of the caloric intake but who nevertheless depended heavily and successfully on the native crops over an extended time period.

Addition of Maize and Other Mesoamerican Crops

Maize (*Zea mays* ssp. *mays*) was domesticated before 4300 BCE in Mexico, and it spread into the US Southwest by 2100 BCE (Browman et al. 2009). The earliest evidence so far for maize in eastern North America dates to 350 BCE, based on phytoliths extracted from charred cooking residues on pots from New York and Michigan (Hart et al. 2012). Genetic studies of modern maize indicate that eastern North American varieties of maize have their roots in the Southwest (Matsuoka et al. 2002), so maize seems to have spread eastward across the plains during the Early Woodland period (1000–100 BCE). Archaeological visibility in the east remains very low until approximately CE 800, when the abundance of charred cob and kernel fragments increased dramatically in the central Mississippi River Valley (Simon and Parker 2006). During the next few centuries, maize was fully incorporated into farming systems based on the indigenous seed crops, and it was also adopted to the south, east, and north of the Midwest and Midsouth zones where the EAC had flourished for more than 1,000 years and in places for more than 2,000 years.

A satisfactory explanation is still being sought for why it took so long for maize to become a staple rather than minor food source even though most modern Americans view it as clearly superior to the "weedy" EAC crops. Suggestions involve its possibly restricted use early on to ceremonial occasions or its hypothetical lack of productivity until varieties that were bred were well adapted to eastern environments (Hart 1999). The scanty and fragmentary evidence for maize cobs or kernels predating CE 800 makes this mystery extremely difficult to solve. Eventually, of course, maize was grown successfully in large quantities, and many different methods for preparing and serving it became central to the foodways of Native eastern North American societies, as did its role in harvest rituals and world view in general.

By CE 1000, a species of Mesoamerican squash – the green striped cushaw (*Cucurbita argyrosperma* ssp. *argyrosperma*) – had also been carried across the plains, joining the native *ovifera* pepo squash. Common beans (*Phaseolus vulgaris*) were the last pre-Columbian addition to eastern farming systems, arriving perhaps no earlier than CE 1200 (Hart and Scarry 1999).

The indigenous crops were not immediately replaced by maize, although only sunflower and

the eastern squash were still grown when Europeans began recording their observations of Native American farming systems. As a group, chenopod, maygrass, erect knotweed, and little barley outnumber maize fragments in many Emergent and Early Mississippian (CE 800–1200) pit features in the Central Mississippi Valley (Simon and Parker 2006). The native cultigens contributed in a key way to agricultural strategies in the fertile American Bottom area surrounding Cahokia Mounds, the largest population center north of Mesoamerica, where together with maize, they afforded biodiversity, stability, and resilience.

Conclusion

Agricultural fields in eastern North America came to be dominated by corn, beans, and squash, but the system based on these "Three Sisters" developed only a few hundred years before European colonists arrived. Across the interior of the Eastern Woodlands, maize-based farming was preceded by a long tradition of indigenous crop production that persisted and was even intensified in some regions after maize became a major food item. All of the native crops except sunflower and *ovifera* squash, however, were either no longer planted after CE 1500 or had become too casually cultivated to be documented securely in historical archives. Because their wild relatives are viewed by Americans today as weeds, pre-maize agriculture was slow to receive the recognition it deserves. It now stands as a fascinating example of a productive and seemingly sustainable component – together with hunting, fishing, and wild plant harvesting – of a mixed and flexible economic strategy that nourished generations of Native Americans including complex mound builders and their neighbors.

Cross-References

- ▶ North American Mound Builders: Hopewell, Natchez, Cahokia
- ▶ Paleoethnobotany
- ▶ Phillips Spring: Agriculture and Domestication
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Quinoa: Origins and Development
- ▶ Squash: Origins and Development
- ▶ Woodland and Mississippian Cultures of the North American Heartland

References

Asch, D.L., and N.B. Asch. 1985. Prehistoric plant cultivation in west-central Illinois, In *The nature and status of ethnobotany*. Anthropological Papers 75, ed. R.I. Ford, 149–203. Ann Arbor: Museum of Anthropology, University of Michigan.

Bellwood, P. 2005. *First farmers: The origins of agricultural societies*. Oxford: Blackwell.

Browman, D.L., G.J. Fritz, and P.J. Watson. 2009. Origins of food producing economies in the Americas. In *The human past: World prehistory and the development of human societies*, ed. C. Scarre, 306–349. London: Thames and Hudson.

Crites, G.D. 1991. Investigations into early plant domesticates and food production in Middle Tennessee: A status report. *Tennessee Anthropologist* 16: 69–87.

Decker-Walters, D.S. 1990. Evidence for multiple domestications of *Cucurbita pepo*. In *Biology and utilization of the Cucurbitaceae*, ed. D.M. Bates, R.W. Robinson, and C. Jeffrey, 96–101. Ithaca: Cornell University Press.

Egan-Bruhy, K.C. 2003. You are what you eat: Diet as an indicator of cultural identity. Paper presented at the 68th annual meeting of the society for American Archaeology, Milwaukee.

Fritz, G.J. 1990. Multiple pathways to farming in precontact eastern North America. *Journal of World Prehistory* 4: 387–435.

Fritz, G.J. 1999. Gender and the early cultivation of gourds in eastern North America. *American Antiquity* 64: 417–430.

Fritz, G.J. in press. Maygrass: Its role and significance in native eastern North American agriculture. In *New lives for ancient and extinct crops*, ed. P.E. Minnis. Tucson: University of Arizona Press.

Hart, J.P. 1999. Maize agriculture evolution in the eastern Woodlands of North America: A Darwinian perspective. *Journal of Archaeological Method and Theory* 6: 137–180.

Hart, J.P., and C.M. Scarry. 1999. The age of common beans (*Phaseolus vulgaris*) in the northeastern United States. *American Antiquity* 64: 653–658.

Hart, J.P., W.A. Lovis, R.J. Jeske, and J.D. Richards. 2012. The potential of bulk $\delta^{13}C$ on encrusted cooking residues as independent evidence for regional maize histories. *American Antiquity* 77: 315–325.

Heiser, C.B., Jr. 1955. The sunflower among the North American Indians. *Proceedings of the American Philosophical Society* 95: 432–448.

Hunter, A.A. 1992. Utilization of *Hordeum pusillum* (Little Barley) in the Midwest United States: Applying Rindos' co-evolutionary model of domestication.

Unpublished Ph.D. dissertation, University of Missouri, Columbia.
Matsuoka, Y., Y. Vigouroux, M. Goodman, G. Jesus Sanchez, E. Buckler, and J. Doebley. 2002. A single domestication for maize shown by multilocus microsatellite genotyping. *Proceedings of the National Academy of Sciences* 99: 6080–6084.
Simon, M.L., and K.E. Parker. 2006. Prehistoric plant use in the American Bottom: New thoughts and interpretations. *Southeastern Archaeology* 25: 212–257.
Smith, B.D. 2001. Low-level food production. *Journal of Archaeological Research* 9: 1–43.
Smith, B.D., and R.A. Yarnell. 2009. Initial formation of an indigenous crop complex in eastern North America at 3800 B.P. *Proceedings of the National Academy of Sciences* 106: 6561–6566.
Yarnell, R.A. 1974. Plant food and cultivation of the Salts cavers. In *The prehistory of Salts Cave, Kentucky*, ed. P.-J. Watson, 113–122. New York: Academic.

Eastern Provinces of the Roman Empire, Archaeology of the

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Introduction

The eastern provinces of the Roman Empire were those situated in the regions of Asia Minor, Mesopotamia, Syria and Palestine, Northwest Arabia, and Egypt. This large swathe of territory had long been contested by past empires (Egyptian, Neo-Babylonian, Neo-Assyrian, Hittite, Persian, Macedonian) and fragmented into a number of rival kingdoms during the Hellenistic period. The Roman East is a study in diversity; the landscapes, ethnicities, cultural norms, and historical traditions vary widely. Much recent work in Roman archaeology explores the interaction between Rome and her subject populations, measuring how Roman power and culture were experienced and expressed in local contexts. Given its multicultural and multiethnic composition, the eastern provinces offer a number of compelling case studies relevant not only to the study of Roman archaeology but archaeology as a global discipline.

Definition

Description of the Provinces

The boundaries and administrative designations of the provinces changed several times during the course of the empire, which is broadly defined as the period beginning in 31 BCE (Octavian's victory at Actium) and ending, at least as a viable entity in the East, with the decisive Muslim victory at the Battle of Yarmouk in 636 CE. In the High Empire of the second century CE, there were 13 provinces in the East: *Bithynia et Pontus*, *Asia*, *Galatia*, *Cappadocia*, *Cilicia*, *Lycia et Pamphylia*, *Armenia*, *Assyria*, *Mesopotamia*, *Syria*, *Iudaea*, *Arabia Petraea*, and *Aegyptus* (Fig. 1). In the Late Empire, the number increased dramatically; for example, the province of Palestina (itself a subdivision of Syria) was split into *Palestina Prima*, *Palestina Secunda*, and *Palestina Tertia*. For description of the administration of the provinces and their historical developments, see Sipilä (2009).

Historical Background

The Roman history of the Eastern Mediterranean really begins with Alexander the Great (r. 336–323 BCE), whose policy of veteran settlement drastically transformed the political and cultural landscape of the region. Cities were founded or resettled throughout Asia Minor, the Near East, and Egypt and were invested with Greek infrastructure including theaters, temples, and administrative centers. Veterans were given land grants and encouraged to marry into the local population. During the Hellenistic period, the entire Eastern Mediterranean was subjected to a continuous negotiation of cultural reassessment; the populations ultimately encountered by Rome were inconsistent and diverse.

In the late third century BCE, Rome's eastward expansion began in earnest. Following victories over Philip V in the Macedonian Wars (214–148 BCE), Rome pushed into Syria, conclusively defeating Antiochus III. Under the terms of the Treaty of Apamea in 188 BCE, Rome was awarded control of Asia Minor. The new territories

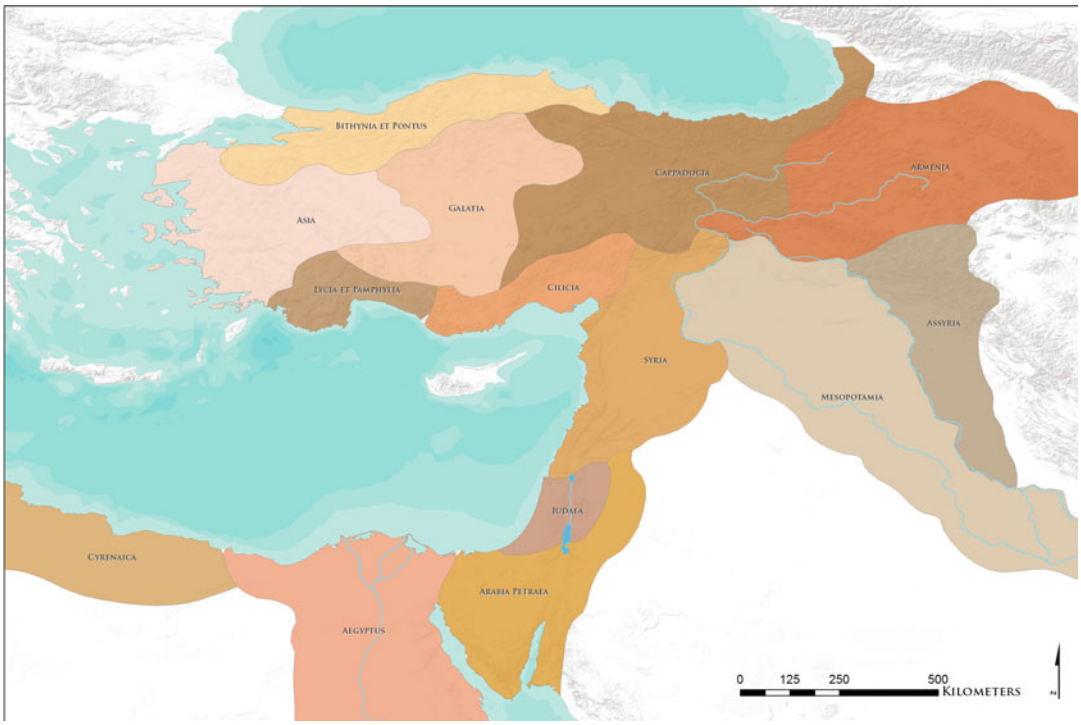

Eastern Provinces of the Roman Empire, Archaeology of the, Fig. 1 The Eastern Provinces in the 2nd c. CE (approximate boundaries)

were temporarily ceded to the client kingdom of Pergamon, but following the death of Attalos III, all Pergamene holdings were transferred again to direct Roman administration. Confrontations with Mithridates VI of Pontus proved a temporary setback, but following his defeat at the hands of Pompey the Great, Roman hegemony in Asia Minor was never again seriously questioned. Pompey's campaign in the East struck at Syria and Judea as well. In short order, Pompey absorbed the remainders of the now-fragmentary Seleucid Empire, also adding Judea and Armenia as client states. By 63 BCE, Roman hegemony in the East was well established; only Parthia, Arabia, and Egypt lay outside Rome's control (Ball 2000: 8–19).

In the middle of the first century BCE, Rome's civil wars drew in the entire Mediterranean. The conflict between Cleopatra VII, Marc Antony, and Octavian culminated in the Battle of Actium (31 BCE), marking a final and conclusive victory for Rome over Egypt. Soon after, Egypt was added as a personal possession of the young *princeps*. In 25 BCE, Aelius Gallus conducted a campaign in Arabia that was, according to Strabo, a near-total disaster; nevertheless, Rome claimed victory. Throughout the first century CE, Rome was content to allow the kingdom of Nabataea, centered at Petra in Jordan, relative autonomy in Arabia, but in 106 the region was formally annexed as *Arabia Petraea*.

Over the duration of the empire, the wealth and large population of the Eastern Mediterranean made it the consistent center of attention. Numerous wars were fought in the East, either against external threats, such as the Parthians, or internal rebellions – the Jewish revolt (66–73 CE) among the most significant. The number of Roman soldiers stationed in Syria meant that generals there had considerable power, and some mustered the support of these troops in order to lay claim to the imperial mantle. For this reason, the provinces of the Near East were subdivided by Septimius Severus; this was part of a long-running tradition of imperial redistricting in the East.

Parthia, a rival of Rome since the Republic, was finally and completely subjugated by Severus. The Sassanians, the next major Iranian dynasty, continued to wage war with Rome during the troubled third century CE, culminating in the capture and apparent execution of Valerian in 260 CE. Zenobia of Palmyra revolted against Rome in 269, briefly seizing control of most of the Eastern Mediterranean. Rome's grip on the East was weakening, and it was partially for this reason that Diocletian's political reforms shifted the seat of power to Nicomedia in Turkey. This change in focus was affirmed by Constantine's relocation of the imperial court to Constantinople. Despite these moves, however, the growing Sassanian Empire continued to absorb Roman holdings in the East. The Byzantine Empire maintained a presence in the Middle East until the Muslim conquests of the seventh century CE. Constantinople itself would not fall until the fifteenth century, but for all intents and purposes, the Rashidun and Umayyad conquests brought an end to the last remnants of the Roman Empire in the Middle East and Egypt.

Key Issues/Current Debates

Archaeology in the Eastern Provinces

The Fertile Crescent and the Nile Valley are among of the most important archaeological contexts for the rise of civilization, and unsurprisingly Roman archaeology has often been overshadowed by investigations into the ample and dazzling remains of Pharaonic Egypt or the great city-states and empires of Mesopotamia. Leonard Wooley's excavations at the Royal Cemetery of Ur and Howard Carter's discovery of Tutankhamen's tomb captured the public imagination in a way that the familiar colonnades and temples of Roman cities never could.

Even so, the remains of Roman cities are among the most iconic symbols of the region. The great cities of Mesopotamia and Egypt, built largely out of mudbrick and in the proximity of rivers, are largely gone. Roman cities, on the other hand, were substantial stone constructions and remain visible across the landscape to this day. Powerful earthquakes leveled the urban infrastructure of much of the region in the late Byzantine Empire, which led to widespread urban abandonment. As a result, major sites are preserved in often spectacular condition. The allure of these cities (Palmyra and Ephesos but two representative examples) attracted the attention of European explorers and travelers in the seventeenth–nineteenth centuries, and unsurprisingly the bulk of early archaeological work in the region was focused on these major urban centers.

Given the breadth of Rome's eastern provinces, it is impossible to offer any sort of comprehensive catalogue of archaeological work. What follows is a brief synopsis of some major sites in the region; the list is meant to be representative rather than comprehensive (Fig. 2).

Asia Minor

Aphrodisias: Excavations in Aphrodisias in Caria have revealed a prosperous city centered around the Temple of Aphrodite, including a number of civic buildings and a well-preserved theater. Most notable is the *Sebasteion*, a large temple complex dedicated simultaneously to Aphrodite and the Roman emperors. Numerous sculptural fragments have been recovered from the porticoes flanking the processional way, which depict both mythological figures, heroizing portraits of the Julio-Claudian emperors, and personifications of the various ethne of the empire. As such, it is an essential document for the study of the nature and impact of the imperial cult (Smith 1987).

Ephesos: Ephesos was one of the largest cities of the Roman world, famed for its storied Temple of Artemis. Little remains of the temple today, but the ruins of the Roman town are extensive. Typical of major cities in the East, Ephesos boasted multiple temples (one dedicated to Domitian and another to Hadrian), fountains, colonnaded streets, a theater, a stadium, and at least one agora. The Library of Celsus, constructed from 114 to 135 CE, with a façade resembling a theater's *skene*, was decorated in a Hellenistic-Baroque revival style and adorned with numerous statues.

Pergamon: The center of power for the Attalid dynasty, Pergamon was gifted to the Romans in 138 BCE. An excellent example of the

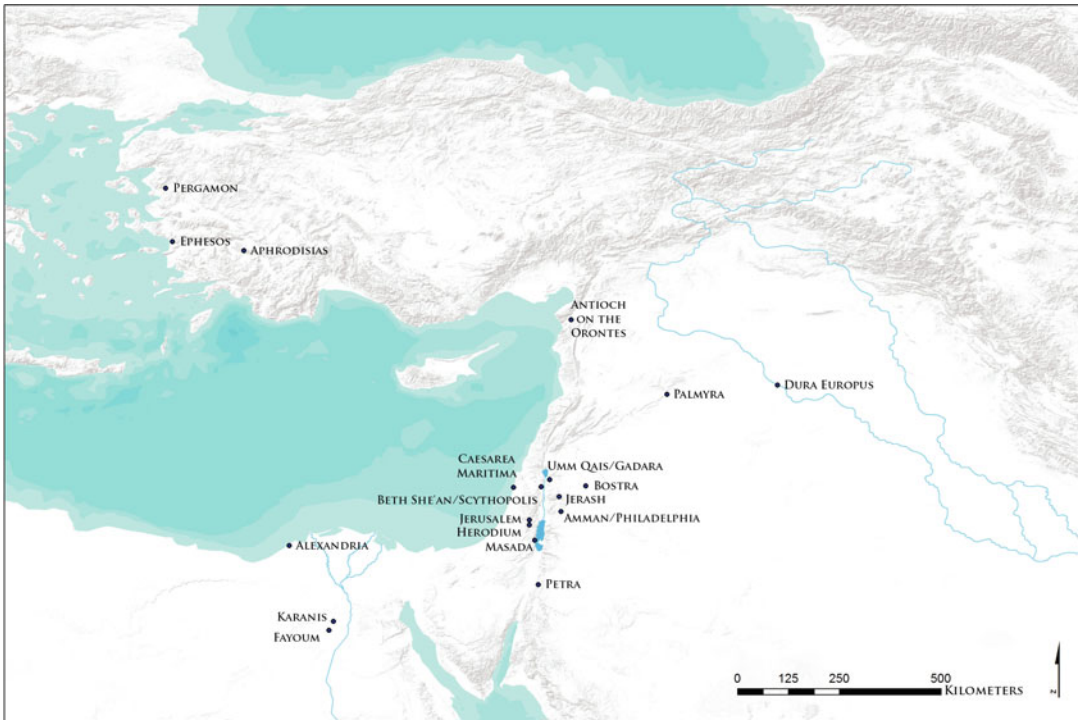

Eastern Provinces of the Roman Empire, Archaeology of the, Fig. 2 Sites referenced in the text

development of Hellenistic architecture, Pergamon retained the majority of its structural character during the Roman period. Notable additions to the city include the Temple of Trajan and infrastructure such as baths and aqueducts. The theater was also remodeled in the Roman period.

Syria/Palestine

Antioch on the Orontes: Antioch is known to us primarily from literary sources and little remains of the ancient city. Sartre (2005: 163–165) lists no less than 25 imperial building projects in the city, including numerous baths, temples (some to the imperial cult), theaters, stadia, aqueducts, and arches. It was an extremely important city in terms of Roman administration of the East, serving as the capital of the province of Syria. Like Ephesos, it boasted a population estimated at 250,000 and later became an important center of the emerging Christian church.

Dura-Europos: Less monumental than Antioch, Dura-Europos was located on the eastern frontier of Syria. The Romans seized it from the Parthians in 165 CE, but in 265 the Parthian king Shapur I besieged the city and drove out the Romans. It was subsequently abandoned, and for this reason, it has become immensely significant archaeologically. Excavations have revealed a number of public and private buildings in the city, none more important than the preserved church, synagogue, and mithraeum. All three structures, located in close proximity, were adorned with figured frescoes and offer important insight into the character of these three religions in the third century CE. The synagogue frescoes are particularly fine and anticipate many developments later seen in Late Antique and Byzantine painting and sculpture (Dirven 1999; Chi and Heath 2011).

The Decapolis: A loose grouping of cities clustered near the modern confluence of Syria, Jordan, and Israel, the Decapolis figures prominently in the gospels. Included in the ancient designation were the excellently preserved cities of Beth Shean/Scythopolis, Gadara, Gerasa, Bostra, Amman/Philadelphia, and several others. These

cities, which had majority Greek populations, were affiliated culturally rather than politically. Indeed, they seem to have competed with one another for imperial attention, and their massive building programs intensified in anticipation of Hadrian's tour of the provinces. Consistent features in these cities include monumental colonnaded streets, agoras, theaters, hippodromes, nymphaea, and gateways, and indeed they have a certain uniformity about them (Segal 1997).

Herod's Judea: Herod the Great (74/3–4 BCE), one of the more complex figures from the Roman period, initiated a number of monumental building projects throughout Judea. These were intensely political structures, as Herod sought to placate his Jewish subjects while simultaneously currying favor with Augustus. On the one hand, he rebuilt the Temple of Solomon in Jerusalem in grand, lavish style. On the other, he constructed a monumental harbor named Sebaste (Greek for "Caesar") at Caesarea Maritima and built temples of Roma and Augustus throughout the region. He also built a number of remote palaces that integrated an architectural bravado with the best Roman engineering. The palace at Masada was built on the side of a cliff that at Caesarea projected out into the sea, and at Herodium, Herod built an artificial mountain that completely enclosed his palace. All of this was surely intended to create a positive impression among the Romans (Netzer and Laureys-Chachy 2008).

Palmyra: The best-preserved Roman city in the East is doubtless Palmyra, which became the major center of Roman trade in the second century CE. The seat of Zenobia's revolt in 269 CE, Palmyra was an extremely wealthy city and had an architectural program to match. It boasts the same typical features as other large Roman cities in the East, including colonnaded streets, an agora, a theater, a nymphaeum, baths, and a number of civic buildings (Browning 1979). All of these were lavishly constructed and decorated. What sets Palmyra apart from similar cities in the Decapolis is the nature of its religious buildings. There are three major temples that have been excavated at Palmyra, and all three evidence a clear fusion of Hellenistic/Roman and Semitic sacred architecture. Peristyle colonnades and Corinthian columns are combined with crenelations, rooftop shrines, and raised adyta. Several hundred funerary busts, both of men and women, also survive from Palmyra, grounded in the fashion of Roman funerary busts but with distinctive local characteristics (Heyn 2010). The art and architecture of Palmyra, like that at Baalbek, is therefore important to the consideration of religious syncretism and cultural integration in Rome's eastern provinces.

Petra: Capital of the Arabian kingdom of the Nabataeans, Petra was the major hub for the overland transport of the luxury aromatics frankincense and myrrh. Petra is most famous for the several hundred rock-cut tombs that adorn the cliff walls that surround the city center but also boasts several temples, a theater, a nymphaeum, an arch to Trajan, and a building (the Great Temple) that probably appropriated both religious and civic functions (Weber and Wenning 1997; Joukowsky 2009). Hillside mansions were decorated with wall paintings in Pompeian style. As is the case at Palmyra, Petra's architectural and artistic inconsistencies are evidence of the ongoing negotiations of identity that occurred during the Roman period. Ostensibly an independent kingdom until Trajan's annexation in 106 CE, the architecture of temples and tombs is characterized by the inconsistent coexistence of Hellenistic/Roman and Near Eastern elements. Depictions of the gods vary as well, with numerous aniconic betyls balanced by full busts of Greek deities.

Egypt

Alexandria: Second in size only to Rome, with an estimated population in the vicinity of 500,000 inhabitants in the Roman period, Alexandria was of critical importance to the Roman economy and administration of Egypt (Greene 1986: 28–30). Captured by Octavian following the Battle of Actium, the fabled city of Alexander was already a major economic, political, and scholastic center. Most of its antiquities have been destroyed, including the library and the lighthouse, but the Roman catacombs (Kom al-Shoqafa) are well preserved and offer insight into Romano-Egyptian funerary practices. A 30-m honorific column dating to the reign of Diocletian still

stands today, as does the theater. Although free-standing architecture in the city is otherwise lost, McKenzie (1990, 2007) has suggested that the wall paintings from Pompeii and certain tomb façades from Petra are representative of a particular Alexandrian style, characterized by heavy baroque embellishment.

The Fayoum: Augustus settled a large number of veterans in the Fayoum, a fertile area surrounding Lake Moeris, and a series of Romano-Egyptian towns sprung up there as result. Excavations at Karanis have revealed a large number of artifacts tied to daily life, as well as a wealth of documentary papyri. Studies of this material have allowed for detailed demographic studies on the population of Roman Egypt (Bagnall and Frier 1994). Numerous painted mummy portraits have also been recovered from the Fayoum (ancient *Crocodilopolis*); these serve as significant examples of ancient painted funerary portraiture. Whether they are generic or specific remains an open question (Riggs 2002).

Not everyone lived in large urban centers, of course. The landscape was dotted with smaller towns, villages, and farms, and the rural economy was of critical importance. Indeed, Rome herself relied on shipments of Egyptian grain. Regional surveys, hinterland studies, and excavations of small settlements have become increasingly common in recent years. Major research themes in these studies include the relationship between major urban centers and their surrounding hinterlands; the nature of frontiers, marginal zones, and rural economies; and the ethnic and cultural diversity of the region (see, e.g., Barker et al. 2007; Smith 2010).

The geographical and temporal extent of Rome's eastern provinces, coupled with the number of cultures and ethnicities it encompassed, has engendered several important academic debates. There is a series of general theoretical issues that arise from the intersection of cultures and of which the Roman East provides a number of excellent case studies. In addition, there are historical questions that tie specifically to the nature and development and maintenance of the Roman Empire. Finally, there are issues concerning the contemporary management and deployment of archaeological sites.

Theoretical Issues and Debates

Orientalism/Colonialism

Edward Said's 1978 monograph *Orientalism* gave voice to a growing discontent in scholarship regarding the remnants of colonialism in scholarly approaches to the Near East. Though not specifically directed at Roman archaeology, his points certainly exposed a widespread tendency to view the East from a decidedly Eurocentric perspective. The heavy-handed European involvement in the Middle East, especially during the first half of the twentieth century, reinforced ideas of Western political and ideological supremacy. New archaeology and processualist thinking contributed to this mode of thinking, as large states and empires were characterized as more evolved and civilized than "primitive" formations like nomadic tribal confederacies or chiefdoms. The very idea of the Roman East is problematic, as it reifies the region in Roman terms and through Roman eyes. Scholarship from the last three decades has labored to undo the legacies of colonialist thinking in regard to the Roman provinces, with more and more attention being paid to local contexts, cultures, and perspectives.

Biblical Archaeology

A major factor shaping the development of Roman archaeology in the eastern provinces is the entanglement of Rome with Jewish and Christian history. Herod the Great was a client king of Rome, and his monumental building projects resulted directly from his engagement with Antony and Augustus. The nativity of Christ is dated to the final year of Herod's life (4 BCE), and his ministry, trial, and crucifixion took place under the administration of the famous procurator Pontius Pilate. The First and Second Jewish Revolts pitted Jewish partisans and Zealots against Roman troops, and the archaeological evidence for the wars is plentiful. In the fourth century CE, Constantine the Great, the first Christian Roman emperor, established a series of monumental churches in Palestine, developing the Holy Land as part of campaign to increase the visibility and stature of Christianity (Parker 1999). Indeed, Biblical archaeology can be said to begin with the explorations of Constantine's

mother, Saint Helena (patron saint of archaeologists), who journeyed to Palestine and discovered the relics of the True Cross.

As much early, Greek archaeology was tied to elucidating the historical background of Homer, so too has the history of archaeological research in Palestine been tied to sites, events, and people of the Bible. Many of the early archaeologists working in the Holy Land were devoutly religious and saw archaeology as an opportunity to illuminate, if not validate, the historicity of the Bible. W.F. Albright's legacy is emblematic; on the one hand, he is rightly praised for his groundbreaking work in clarifying stratigraphy and ceramic typologies, for applying rigorous scientific criteria, and for generally and substantially improving the professionalism of archaeological practice in the Near East, but on the other hand, his positivism, empiricism, and objectivity have all been called into question (Dever 1990, 1993).

Beginning in the 1960s and 1970s, Biblical archaeology proved divisive in academic circles, as several scholars attacked what they considered a methodology driven by ideology (Thompson 1974; Finkelstein 2007). It should be observed, however, that the majority of criticism against Biblical archaeology has been directed toward studies of early Israel and the narratives of the Old Testament. The Roman period is much better attested, both historically and archaeologically, and, with the exception of Masada (see below), also less entangled in narratives of the formation of Jewish identity and religion. Indeed, Roman-era Biblical archaeology has had a positive impact on the discipline of Roman archaeology, for the search for Jesus' historical context resulted in an emphasis on daily life in the countryside and greater consideration of everyday objects.

The huge popular interest in the archaeology of the Biblical world creates an appetite for sensationalism, and finds of debated pedigree (e.g., the Jesus Family Tomb, the James ossuary) are promoted with huge fanfare. Such media events tend to be surrounded by scholarly backlash and claims of fabrication.

Romanization

"Romanization" has been an important issue in Roman studies for two decades now, and several studies have illustrated that the spread of Roman imperialism did not elicit a wholesale adoption of Roman cultural practices (Woolf 1998; Webster 2001). To be sure, there is an observable general trend of incorporating Roman behavior and ideology, clearly demonstrable in the archaeological record via the widespread construction of baths, theaters, and temples dedicated to the imperial cult. At the same time, however, indications of the intentional maintenance of indigenous cultural practices are also evident, especially in areas of religion, art, and language (Millar 1987). The debate, therefore, centers on how best to understand the interaction between the powerful push of Roman culture and the deeply rooted traditions of Asia Minor, the Near East, and Egypt. Social stratification plays an especially important role in this regard, as the priorities and identities of the elite class often differed widely from those of the middle and lower classes. This interplay between subject and ruler is of paramount importance throughout Roman provincial archaeology, and the Roman East has provided a number of fruitful case studies.

Cultural Identity

Hellenistic and Roman expansion into the East resulted in dramatic political, cultural, and demographic changes. Cultural identities, both individual and collective, were necessarily called into question as new alignments and opportunities presented themselves. Intermarriages changed the ethnic makeup of the region, integration of new cults shifted traditional religious expressions, and provincial organization altered access to power and status. As a result, cultural identity was constantly negotiated and contested. Recent scholarship (Gruen 2011) explores the nuances of these shifting conceptions of self and group throughout the ancient Mediterranean; the multicultural character of the Roman East affords several excellent case studies.

Imitation/Acculturation

This intersection of cultures had a major impact on art and architecture. Long-standing traditions of visual expression, based largely on Mesopotamian, Persian, and Egyptian precedents, came under revision through exposure to Hellenistic and Roman

forms and motifs. In many cases, the general Semitic avoidance of graven images was relaxed; at Petra busts of gods began to appear alongside aniconic betyls, and Palmyrene gods were depicted in the garb of Roman soldiers. Roman architecture, indebted as it was to Hellenistic predecessors, dominated the urban landscape. Through triumphal arches, theaters, fountains, colonnaded streets, temples, statuary mosaics, etc., Rome left a lasting imprint on the visual culture of the East. The penetration of Roman art is seen throughout the region, and even small towns and villages often boasted imperial statue busts or colonnaded buildings. Nevertheless, scholars have taken pains to point out that this was not a simple case of imitation or assimilation, arguing rather that it resulted from a dynamic dialogue of incorporation and adaptation. Many Near Eastern motifs and expressions were often retained alongside Roman ones, and Egypt maintained an especially strong tie to its artistic heritage even as it drew on Roman forms.

Religious Syncretism The impact of Roman expansion is especially measurable in the environment of cult practice. Local or regional deities such as Baal or Dushares were regularly conflated with Greek and Roman gods like Zeus and Dionysus. Imperial patronage promoted the construction of sanctuaries dedicated to these divine pairings. The great complex at Baalbek, Lebanon, is the most expansive and well known of these cult centers, and the main temple was dedicated to the god Jupiter-Hadad. Architecturally, many temples in the East incorporate features from both Roman and Semitic practice; examples of the latter include stairs to rooftop platforms, enormous temenos courtyards, and raised lateral adyta. In Nabataean Arabia, several temples preserve raised central platforms that accommodate circumambulation, and the plan of these temples is distinctly non-Roman. At the sanctuary of Khirbet Tannur in Jordan, temples of this type were decorated with a sculpted zodiac frieze and reliefs of deities such as Helios and Tyche, illustrative of the much wider phenomenon. Zodiacs also found favor in synagogues of the fifth and sixth century CE, although the interpretation of these zodiacs in a Jewish context is much disputed (Magness 2005).

Key Historical Issues

Roman Imperial Strategy

The impetus for Roman expansion in the East and the character of its subsequent spread has sparked lively debate. The central issue is whether Roman expansion was essentially an ad hoc process, spurred by immediate fiscal and political concerns, or whether there was in fact a broader, far-reaching plan in effect. Using Roman Arabia as a case study, Freeman (1996) argued that wars, annexations, and the defining of provincial boundaries were essentially reactionary acts undertaken by an emperor under political or economic duress. Sipilä (2009) has countered in favor of a more logical, if not planned, approach to provincial administration, using qualitative comparison models to identify particular factors that played a key role in determining the outcome of imperial decision-making.

Roman Frontiers

Udruh, Lejjun, and Qasr Bshir are but a few of the large number of well-preserved Roman forts and watchtowers that dot the deserts of Syria, Jordan, and Saudi Arabia (Kennedy 2004). The forts were situated to the east of the main north/south artery in Transjordan, the Via *Traiana Nova*, and seem to have formed a loose but interconnected line. Known as the *limes Arabicus*, it is clear that the forts at very least marked the eastward extend of Roman expansion (Parker 1987). Some are large legionary fortresses; others are smaller *castra*. The function, administration, and organization of the forts changed through the empire; Diocletian invested especially heavily in the expansion and strengthening of the fortification system.

The question raised by these forts is whether they, like Hadrian's Wall, represented an actual boundary or border. Their practicality in suppressing raids has been disputed, given the distance of their spacing and the difficulty Roman soldiers would face in pursing nomads into the desert. The forts may have been as symbolic as they were functional, showing that Rome ruled even into the empty desolation of the desert.

Other Key Issues

Conservation and Cultural Heritage Management

The number of archaeological sites in the eastern provinces of the Roman Empire is staggering. As such, conservation is a critical issue in the region. Several important sites lie in the middle of large cities (e.g., Beirut, Jerusalem), and urban expansion places significant pressure on them. A far greater proportion of sites lie in remote areas, exposed with little protection from the elements. Looting is a major problem, especially in zones of economic and political turbulence. The resources and infrastructure required to oversee and manage sites are substantial, often exceeding government capabilities. Sustained international investment in heritage management is of critical importance.

In several regional countries, Departments of Antiquities are associated with or overseen by Ministries of Tourism. When the priorities of these agencies come into conflict, touristic development often has the upper hand. Given the economic importance of tourism, conservation emphasis continues to be placed on well-known sites that occupy typical tourist itineraries. In Jordan, for example, Jerash is the focus of considerable development, including a handicraft bazaar at the entrance to the site, reenacted gladiator fights, and chariot races. However, sites off the major tourist routes are not afforded the same degree of investment nor protection. This problem is not confined to Jordan, of course – the same can be seen in every country in the region (Brodie et al. 2006).

One area of recent progress in cultural heritage management is the development of national databases and registries for archaeological sites. The Getty Conservation Institute and the World Monuments Fund recently sponsored the creation of the Middle East Geodatabase for Antiquities, or MEGA. Intended for use throughout the Middle East, it is currently being piloted in Jordan. The geodatabase tracks sites across the country, their preservation status, and threat levels. The Israel Antiquities Authority has a similar in-house system, and others are in use or in development in other regional countries.

Politics and Archaeology

The archaeology of Rome's eastern provinces is deeply entangled in national and regional political discourses. The picturesque ruins draw large numbers of visitors, and the economies of several Middle Eastern countries depend heavily on tourism. Roman period remains tend to survive better than those from earlier periods, thanks to the widespread use of monumental stone architecture. As a result, it is the colonnades and crumbling façades of the temples, aqueducts, and for a that leave their stamp on the public imagination. Antiquity is a regular part of political discourse, as the monumental legacy of the past is stirred to legitimize current policies or rulers (Meskell 1998). Saddam Hussein and the Shah of Iran actively promoted themselves as heirs to the great empires of the past, and such linkages are also seen in several current contexts. It is very common, for example, for images of archaeological sites to grace coins and paper bills, often in conjunction with the face of the king or president. Utilizing past glories to promote current dynasties is nothing new nor is it isolated to the Eastern Mediterranean (cf. Mussolini and the Roman Empire, for example), but it is nevertheless widespread in the region.

Israel, Palestine, and Roman Archaeology

The most politically charged arena for the use and abuse of Roman archaeology is doubtless Israel and Palestine. Laying claim to heritage and ancestry is of critical importance to all parties contesting ownership of the land. Sites that give evidence of past presence and past legitimacy are taken as justification for current claims. Both Israeli and Palestinian politicians deploy antiquity as justification in their discourse, although Palestinians lean more toward either Bronze and Iron Age sites (Canaanite and Philistine) or Islamic sites. Roman sites, especially those tied to the First and Second Jewish Revolts against Rome, are more often used to illustrate Israeli rights and prerogatives.

The First Jewish Revolt of 66–73 CE was a bloody and protracted war. The Roman army, under the leadership of Titus and Vespasian, was heavy-handed in its suppression of the rebellion.

According to Josephus' account, Roman soldiers killed at least one million Jews during the course of the conflict. Josephus records some particularly gruesome sieges; the inhabitants of Yodfat, Gamla, and Jerusalem were said to have been executed en masse when their defenses finally fell. Most famous is the legend of the siege of Masada, the hilltop fortress built a century before by Herod the Great, which was the final rebel stronghold. As Flavius Josephus (*Bell. Iud.* 7.389–406) recounts, when the Romans finally broke through the defenses of the citadel, 960 of the 967 inhabitants had put one another to the sword, preferring death at their own hands to execution or enslavement by the Romans. Whatever the truth behind the text, the legacy of these sites has become embedded in the ideology of Israeli statehood and nationalism. The slogan "Masada shall not fall again," sworn by new soldiers in a ceremony at the site, has become synonymous with Israeli independence. Masada has become a symbol of defiance, resistance, and determination, even a pilgrimage site of sorts. Of all the Roman archaeological sites in the Middle East, Masada has the greatest political significance (Elon 1997). By creating such narratives of national identity, archaeology is inextricably entangled in the Israeli-Palestinian conflict, as it is a powerful way to legitimize ancestral claims to contested spaces (Abu el-Haj 2001; de Vries 2010). In addition, the current (2012) "Price Tag" campaign has had a direct impact on the archaeological record, as ultranationalist groups within Israel have vandalized several sites in retribution for government dismantling of illegal settlement outposts.

International Perspectives

Scholarly interest in the archaeology of the eastern provinces of the Roman Empire has increased dramatically in the United States and Europe in the past two decades. Work on the Roman East is becoming more and more common, and the wealth of material and visual culture in the East is transforming Roman studies. The multicultural nature of the region has raised the importance of cross-cultural analyses, as well as explorations of the mechanics of identity, the reception of Roman visual and material culture, and the administration of empire. Even as the East has become accepted as a mainstream part of Roman studies, however, it retains something of a foreign quality within the discipline. Even now, many of the large and well-preserved Roman sites in the Middle East, places like Umm Qais (Gadara), Umm el-Jimal, or even Herodium, are still relatively unknown by Romanists who do not work in the East. This likely owes to the different languages, religious practices, and cultural or artistic traditions of the inhabitants of the eastern provinces, which pose a barrier of entry for many scholars.

Future Directions

The most pressing archaeological needs in the eastern provinces are conservation and publication. Excavations remain important, of course, but given the number of sites under threat of looting or destruction, preservation should take precedence. Public information and education sources, especially ones that cross modern political boundaries, are also needed. Coordinated databases and websites will do much to make the massive swathe of the eastern provinces more manageable and accessible. Finally, the need to make archaeological sites meaningful and relevant to local inhabitants has been recognized as a critical priority.

Cross-References

- ▶ Aphrodisias, Archaeology of
- ▶ Dura-Europos, Archaeology of
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of
- ▶ Post-Second Temple Judaism Archaeology
- ▶ Western Roman Provinces, Archaeology of the

References

Abu el-Haj, Nadia. 2001. *Facts on the ground: Archaeological practice and territorial self-fashioning in Israeli society*. Chicago: The University of Chicago Press.

Bagnall, R., and B. Frier. 1994. *The demography of Roman Egypt*. Cambridge: Cambridge University Press.

Ball, W. 2000. *Rome in the East: The transformation of an empire*. London/New York: Routledge.

Barker, G., D. Gilbertson & D.J. Mattingly. 2007. *Archaeology and desertification: The Wadi Faynan landscape survey, southern Jordan*. Wadi Faynan series 2. Oxford: Council for British Research in the Levant: Oxbow Books.

Brodie, N., C. Luke, M. Kersel, and K.W. Tubb, eds. 2006. *Archaeology, cultural heritage, and the antiquities trade*. Gainesville: University Press of Florida.

Browning, I. 1979. *Palmyra*. Park Ridge: Noyes Press.

Chi, J.Y., and S. Heath, eds. 2011. *Edge of empires: Pagans, Jews, and Christians at Roman Dura-Europos*. Princeton: Princeton University Press.

De Vries, B. 2010. Archaeology. In *Encyclopedia of the Israeli-Palestinian conflict*, ed. C.A. Rubenberg. Lynne Rienner: Boulder.

Dever, W. 1990. *Recent archaeological discoveries and biblical research*. Seattle: University of Washington Press.

Dever, W. 1993. What remains of the house that Albright built? *The Biblical Archaeologist* 56.

Dirven, L. 1999. *The Palmyrenes of Dura-Europos: A study of religious interaction in Roman Syria*. Religions in the Graeco-Roman World 138. Leiden/Boston: E.J. Brill.

Elon, A. 1997. Politics and archaeology. In *The archaeology of Israel: Constructing the past, interpreting the present*, ed. N.A. Silberman and D.B. Small, 34–47. Sheffield: Sheffield Academic Press.

Finkelstein, I. 2007. *The quest for the historical Israel: Debating archeology and the history of early Israel*. Atlanta: Society of Biblical Literature.

Freeman, P.W. 1996. The annexation of Arabia and imperial grand strategy. In *The Roman army in the East*. Journal of Roman Archaeology Supplementary series 18, ed. D. Kennedy, 91–118. Ann Arbor: Cushing-Malloy, Inc.

Greene, K. 1986. *The archaeology of the Roman economy*. London: B.T. Batsford.

Gruen, E.S., ed. 2011. *Cultural identity in the ancient Mediterranean*. Los Angeles: Getty Research Institute.

Heyn, M.K. 2010. Gesture and identity in the funerary art of Palmyra. *American Journal of Archaeology* 114: 631–661.

Joukowsky, M.S. 2009. Surprises at Petra Great Temple: A retrospective. *Studies in the History and Archaeology of Jordan* 10: 291–310.

Kennedy, D. 2004. *The Roman army in Jordan*. British Academy Monographs in Archaeology. London: Council for British Research in the Levant.

Mckenzie, J. 1990. *The architecture of Petra*. British Academy Monographs in Archaeology. Oxford: Oxford University Press.

Mckenzie, J. 2007. *The architecture of Alexandria and Egypt, c. 300 B.C. to A.D. 700*. Yale University Press Pelican History of Art. New Haven: Yale University Press.

Magness, J. 2005. Heaven on earth: Helios and the Zodiac Cycle in ancient Palestinian synagogues. *Dumbarton Oaks Papers* 59: 1–52.

Meskell, L., ed. 1998. *Archaeology under fire: Nationalism, politics, and heritage in the eastern Mediterranean and Middle East*. London/New York: Routledge.

Millar, F. 1987. Empire, community and culture in the Roman Near East: Greeks, Syrians, Jews and Arabs. *Journal of Jewish Studies* 38: 143–164.

Netzer, E., and R. Laureys-Chachy. 2008. *The architecture of Herod, the Great Builder*. Grand Rapids: Baker Academic.

Parker, S.T. 1987. The Roman *Limes* in Jordan. *Studies in the History and Archaeology of Jordan* 3: 151–164.

Parker, S.T. 1999. An empire's new Holy Land: The Byzantine period. *Near Eastern Archaeology* 62: 134–180.

Riggs, C. 2002. Facing the dead: Recent research on the funerary art of Ptolemaic and Roman Egypt. *American Journal of Archaeology* 106: 85–101.

Sartre, M. 2005. *The Middle East under Rome*. Translated by C. Porter & E. Rawlings. Cambridge, MA: The Belknap Press.

Said, E.W. 1978. *Orientalism*. 1st ed. New York: Pantheon Books.

Segal, A. 1997. *From function to monument: Urban landscapes of Roman Palestine, Syria, and Provincia Arabia*. Oxbow Monographs 66. Oxford: Oxbow Books.

Sipilä, J. 2009. *The reorganisation of provincial territories in light of the imperial decision-making process: Later Roman Arabia and Tres Palaestinae as case studies*. Commentationes Humanarum Litterarum 126. Helsinki: Societas Scientiarum Fennica.

Smith, A.M. 2010. *Wadi Araba in classical and late Antiquity: An historical geography*. BAR international series 2173. Oxford: Archaeopress.

Smith, R.R.R. 1987. The imperial reliefs from the Sebasteion at Aphrodisias. *The Journal of Roman Studies* 77: 88–138.

Thompson, T.L. 1974. *The historicity of the patriarchal narratives*. Berlin: de Gruyter.

Weber, T., and R. Wenning, eds. 1997. *Petra: antike Felsstadt zwischen arabischer Tradition und griechischer Norm*. Mainz: Philipp von Zabern.

Webster, J. 2001. Creolizing the Roman provinces. *American Journal of Archaeology* 105: 209–225.

Woolf, G. 1998. *Becoming Roman: The origins of provincial civilization in Gaul*. Cambridge: Cambridge University Press.

Further Reading

Ball, W. 1994. *Syria: A historical and architectural guide*. Essex: Scorpion Publishing House and MCS.

Burns, R. 1992. *Monuments of Syria: A historical guide*. New York: New York University Press.

Butcher, K. 2003. *Roman Syria and the Near East*. Los Angeles: J. Paul Getty Museum Publications.

E

Chancey, M., and A. Porter. 2001. The archaeology of Roman Palestine. *Near Eastern Archaeology* 64: 164–203.
Elsner, J. 2003. Archaeologies and agendas: Reflections on late ancient Jewish art and early Christian art. *Journal of Roman Studies* 93: 114–128.
Fine, S. 2005. *Art and Judaism in the Greco-Roman world: Toward a new Jewish archaeology.* Cambridge, UK: Cambridge University Press.
Greatrex, G. 2007. Roman frontiers and foreign policy in the East. In *Aspects of the Roman East: Papers in honour of Professor Fergus Millar FBA*, ed. R. Alston and S. Lieu, 103–173. Turnhout, Belgium: Brepols.
Isaac, B.H. 1990. *The limits of empire: The Roman army in the East*. Oxford/New York: Clarendon Press/Oxford University Press.
Jones, A.H.M. 1937. *The cities of the eastern Roman provinces*. Oxford: Clarendon.
Kennedy, D.L. 1996. *The Roman army in the East*. Journal of Roman Archaeology. Supplementary series 18. Ann Arbor: Journal of Roman Archaeology.
Kennedy, D.L. 2007. *Gerasa and the decapolis: A 'virtual island' in northwest Jordan*. London: Duckworth.
Koester, H., ed. 2008. *Ephesos, metropolis of Asia: An interdisciplinary approach to its archaeology, religion, and culture*. Cambridge, MA: Harvard Divinity School.
Luttwak, E. 1976. *The grand strategy of the Roman empire from the first century A.D. to the third*. Baltimore: Johns Hopkins University Press.
Luttwak, E. 2009. *The grand strategy of the Byzantine empire*. Cambridge, MA: Belknap Press of Harvard University Press.
Millar, F. 1993. *The Roman Near East: 31 BC – AD 337*. Cambridge, MA: Harvard University Press.
Raja, R. 2012. *Urban development and regional identity in the eastern Roman provinces, 50 BC – AD 250: Aphrodisias, Ephesos, Athens, Gerasa*. Copenhagen: Museum Tusculanum Press.
Schmid, S.G. 2001. The Nabataeans: Travellers between lifestyles. In *The archaeology of Jordan*, ed. B. Macdonald, R. Adams, and P. Bienkowski, 367–426. Sheffield: Sheffield Academic Press.
Woolf, G. 1994. Becoming Roman, staying Greek: Culture, identity, and the civilizing process in the Roman East. *Proceedings of the Cambridge Philological Society* 40: 116–143.

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Basic Biographical Information

Historian, writer, and artist Roger Clay Echo-Hawk entered this world in Pawnee, Oklahoma, on September 15, 1954. Born to US Air Force boom operator Walter R. Echo-Hawk, Sr., and housewife Ruby J. Echo-Hawk, he is the youngest of four children. A citizen of the Pawnee nation, his indigenous American ancestors include three of the four autonomous Pawnee bands (Chaui, Kitkahahki, Skidi) and Buffalo Clan Otoe, while other ancestors came from England, France, Germany, Spain, and Switzerland. His youth was spent on Air Force bases throughout Missouri, Nebraska, North Dakota, and Puerto Rico, during which time he came to identify strongly with the ideals of the hippie movement. Writing, and poetry specifically, emerged as his primary interests in the late 1960s, with Richard Brautigan, Lord Dunsany, and J. R. R. Tolkien being especially influential. He took courses at the University of New Mexico but in 1973 moved to Boulder and attended the University of Colorado (CU) at the urging of his eldest brother, Walter, Jr. In 1975 he entered the new Creative Writing Program at CU but left a year later. Upon receiving training as a Heliarc welder, he worked for Beech Aircraft from 1978 to 1985. Echo-Hawk served for 11 years (1981–1992) as correspondent on Native American Affairs for the cultural and literary journal *Rolling Stock*, which was then edited by renowned poet and CU faculty member Ed Dorn. In 1989 he married software engineer Linda J. Ross, originally of Kansas City, Missouri, by which point he had returned to CU to study anthropology and history. He earned his bachelor's degree in history in 1990. Echo-Hawk's study of Pawnee history, focusing initially on the Echo-Hawk family, began in earnest in 1979 and resulted in his pursuing graduate work under Vine Deloria, Jr., Patricia Limerick, and Douglas Bamforth at CU. Echo-Hawk ultimately received his master's degree in history with an emphasis on ancient Indian history from CU under Philip J. Deloria in 1994. During the late 1980s, Echo-Hawk was affiliated with the Native American Rights Fund (NARF) through his brother Walter, Jr., and in his capacity as tribal historian, Echo-Hawk assisted his brother and served as a consultant on repatriation-related issues for NARF until 1995. These efforts resulted in the repatriation and reburial of many Pawnee ancestors held by the Nebraska State Historical Society and

Smithsonian Institution, as well as the passage of Nebraska bill LB-340, a precursor to the NAGPRA (Echo-Hawk and Echo-Hawk 1994). In the early 1990s, Echo-Hawk also worked occasionally as an archaeological survey crew member and site monitor. From 1995 to 2001, he served as repatriation coordinator for the Colorado Historical Society and the Denver Art Museum and was assistant curator in the Native Arts Department at the latter institution from 2001 to 2003. Echo-Hawk's extended reflection on repatriation (2002) precipitated his critique of race and racialism, the idea of race put into daily practice, and in 1998 he gave up his racial Indian identity entirely. Frequently contributing to the Closet Chickens online group, he is known as "Sweet & Sour Chicken," which is an apt metaphor for his prosodic missives that provide support for its members and incisive critique of the flock's use of race. A passionate thinker, generous, and kind of heart, Echo-Hawk today works as a writer and artist from his home in Longmont, Colorado, where he continues to interrogate dreams and challenge us to reject the racial status quo.

Major Accomplishments

Echo-Hawk's most significant contributions are his writings on the value of oral tradition to archaeology and critiques of race. His Master's thesis took an innovative approach to deep history by exploring connections between Pawnee oral tradition, ancestral populations, and archaeological data. The published version (2000) remains influential for presenting a method for treating oral traditions as evidentiary according to the NAGPRA. Stimulated by this and his work on repatriation, his focus shifted to race (2002), culminating in his book-length treatments (2010, 2011) and an exploration of racial thinking and elements of Pawnee mythology found in Tolkien's writings (2016). Reading Echo-Hawk is always rewarding but often challenging owing to the positions that he takes and a tendency for his terms and references to be highly recursive. Likely an intentional literary device, this style forces a close reading with attentiveness to word meaning and context, but it can be frustrating for casual readers. His writings, which are often very personal, probe connections between dreams, the past, and the present (2016, 2017) and underscore the lived experience of race, and ideas are sometimes presented in the form of Socratic debate in which he adopts different personae (Dongoske and Zimmerman 2010; Echo-Hawk and Zimmerman 2006). Echo-Hawk's (2010) account of his graduate training highlights academics' general unwillingness to support young scholars interested in developing innovative methodologies to bridge archaeology and oral tradition, specifically, and more generally to ask different questions with value to readers beyond the profession. He thus exemplifies the structural problem that persists today for many Indians studying history, anthropology, and archaeology.

Echo-Hawk's ruminations on race make several key points: (1) race is a discredited pseudoscientific concept that should be wholly rejected, (2) ethnicity should replace race because it is grounded in culture and abandons illusions of race as justification for oppression, and (3) race is too rarely addressed in archaeological discourse, and academics have a responsibility to rethink race studies more broadly. From his discussions, we learn that understanding race as a cultural invention is not simply about fighting racism but altogether abandoning race as a concept and investigating the behaviors that perpetuate it at an individual, subjective level. To do so requires analysis of intersecting and overlapping social identity markers such as ethnicity and nationality.

Echo-Hawk's critics variously point to a lack of empirical data to support some of his assertions and argue that he conflates race, culture, and ethnicity. Substituting ethnicity for race, for example, runs the risk of neglecting race as a central social, political, and historical category with direct links to contemporary inequalities and also sidesteps the fact that many Indians are binational. Indian nations, like all nations, deploy intersecting racial and ethnic ideologies with homogenizing effects. While it is debatable whether Echo-Hawk truly conflates race and ethnicity, it is clear that both concepts lack specificity in public discourse, which only complicates one's ability to understand the rationale or position that an individual

is speaking from when they invoke a multivalent label such as "Indian." Because not everyone self-identifies with a racial or ethnic identity, it is often difficult to be sure whether someone is deploying one or the other. Notably, critics of indigenous and decolonized archaeologies often misread his criticism of race as a mainstay of these programs as opposition. However, close reading shows that he supports their goals but prefers that they develop strategies that do not rely on explicit or implicit assumptions of dehumanizing racial ideologies. His writings caution that the repatriation movement's invocation of race runs the risk of failing to challenge essentializing discourse about identity and instead merely shift power to a new author and narrative. Echo-Hawk's overarching goal is to "spark communal discourse on the problem of race, rather than unilaterally craft solutions, believing that solutions should follow most naturally from social dialog" (Fig. 1) (*pers. comm.* 1/10/2012).

Echo-Hawk, Roger C., Fig. 1 Roger Echo-Hawk, at home on the far western edge of the ancient Pawnee homeland, north of the Mountain That Touches the Sky. (Photo by Linda Echo-Hawk, May 2008)

References

Dongoske, K., and L.J. Zimmerman, eds. 2010. Working together on race and racialism in American archaeology. *The SAA Archaeological Record* 10: 3–25.

Echo-Hawk, R.C. 2000. Ancient history in the New World: Integrating oral traditions and the archaeological record. *American Antiquity* 65: 267–290.

Echo-Hawk, R.C. 2002. Keepers of culture: Repatriating cultural items under the Native American Graves Protection and Repatriation Act. Available at: https://denverartmuseum.org/sites/all/themes/dam/files/nagpra.pdf. Accessed 24 May 2018.

Echo-Hawk, R.C. 2010. *The magic children: Racial identity at the end of the age of race*. Walnut Creek: Left Coast Press.

Echo-Hawk, R.C. 2011. *NAGPRA and the future of racial sovereignties*, Kindle ed. Self-published. Available at: http://amazon.com/. Accessed 24 May 2018.

Echo-Hawk, R.C. 2016. *Tolkien in Pawneeland: Essays on the inner secrets of Middle-earth*, 2nd ed. Self-published. Available at: http://amazon.com/. Accessed 24 May 2018.

Echo-Hawk, R.C. 2017. *Floating worlds*, 2nd ed. Self-published. Available at: http://amazon.com/. Accessed 24 May 2018.

Echo-Hawk, R.C., and W.R. Echo-Hawk. 1994. *Battlefields and burial grounds: The Indian struggle to protect ancestral graves in the United States*. Minneapolis: Lerner Publications.

Echo-Hawk, R.C., and L.J. Zimmerman. 2006. Beyond racism: Some opinions about racialism and American archaeology. *American Indian Quarterly* 30: 461–485.

École française de Rome

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Basic Information

The École française de Rome, founded in 1873, is an offshoot of the École française d'Athènes (founded in 1846), which became fully independent in 1875. It is a research institution, located in Rome's Palazzo Farnese, which devotes its work to history, archaeology, and the social sciences. The school is administered by a director (currently Professor Catherine Virlouvet) and three research

supervisors, respectively in charge of Antiquity (currently Nicolas Laubry), the Middle Ages (currently Pierre Savy), and the moderne and contemporary periods (currently Fabrice Jesné). It hosts 18 members, doctoral or postdoctoral students, for a period of 3 years, as well as research associates and scholarship holders, for a fixed period, and has an archaeology laboratory on the grounds of the *Crypta Balbi* in Rome. The field of operation of the school includes Italy, the Maghreb, and the countries bordering the Adriatic Sea (including Croatia and Albania). Its research findings are published in three scientific reviews (*Mélanges de l'École française de Rome – Antiquité/Moyen Âge/Epoque moderne et contemporaine*), as well as in the form of monographs in several collections (including *Bibliothèque des Écoles françaises d'Athènes et de Rome*). The school also maintains a rich library collection with more than 180,000 volumes, including 2000 periodicals for consultation.

Major Impact

Since its early years, under the leadership of its director Auguste Geffroy (1820–1895), members of l'École française de Rome have dedicated themselves to the reassembling of inscriptions in Central Italy and to the study of archaeological sites and remains. Emmanuel Fernique was thus one of the first to gather inscriptions from the territory of the Marsi (Italic people centered at Marruvium on the Fucine Lake), to study the Capua's museum collections (1874), the remains of Praeneste (1880), and finally to conduct surveys in the Praenestine countryside. Right after him, René de La Blanchère dedicated himself to the study of remains in Terracina and the Pontine Marshes, while in 1889, Stéphane Gsell (1864–1932) excavated a portion of the Etruscan necropolis of Vulci on the estate of the Torlonia family. Soon after, Albert Grenier (1878–1961) dedicated himself to a large study of Villanovan and Etruscan cultures in Bologna.

After the establishment of the French protectorate over Tunisia in 1881, the members of the École française de Rome began to shift their archaeological activity toward North Africa. La Blanchère inaugurated the Department of Antiquities of Tunisia and opened the Bardo Museum in Tunis in 1888. In 1890–1891, Jacques Toutain dedicated his work to the worship of Saturn and Auguste Audollent (1864–1943) gathered inscriptions from the region of Constantine in Algeria. In 1893, Henri Graillot discovered some unprecedented monuments in the vicinity of Timgad and Khenchela, before Stéphane Gsell devoted himself to the study of the region and wrote his monumental book (Gsell 1893). In addition to these historical and epigraphic studies, the members of the EFR conducted research operations in North Africa, such as in 1897 Maurice Besnier in the Lambèse camp, Léon Homo and Alfred Merlin in Dougga from 1899, Jacques Zeiller in Thignica in 1906, and Jacques Heurgon and Jean Lassus in Tipaza. This activity in North Africa has continued to this day, especially with the excavations of the hill of Byrsa in Carthage, of Sufetula, of Bulla Regia, of Cherchell, of Volubilis, of the necropolis of Pupput (Ben Abed-Ben Khader and Griesheimer 2004), of the thermal complex and monumental hill of Jebel Oust, and of the settlement of Sidi Jdidi (Ben Abed-Ben Khader et al. 2004; Fixot 2011).

In Italy itself, it was after the Second World War that the archaeological activity conducted by foreign institutes resumed. From 1946, Raymond Bloch (1914–1997) directed the excavation of the city of Bolsena, which led to the discovery of the forum and adjacent dwellings (Bloch 1972). From 1949, under the direction of François Villard and Georges Vallet, the excavation of the Megarian colony of Megara Hyblaea began, on the eastern coast of Sicily, which lasted up until 1992 (Vallet et al. 1983–); the excavation resumed in 2006 under the direction of Henri Tréziny. In subsequent years, the EFR launched numerous research projects in Italy. These included excavations at Rome on the Pincian Hill (1982–2005) and the Palatine Hill (1985–1998), a resumed excavation of the river port of Aquileia (1991–2005), and excavation of the Lucanian site of Civita di Tricarico in Basilicata and of the Greek and Lucanian city of Poseidonia/Paestum. In Etruria, the EFR has investigated Musarna, a purported colony of

the city of Tarquinia, and its necropolis. The EFR has also participated in the excavation of the Celto-Etruscan necropolis of Monterenzio Vecchio (2000–2005), as well as in projects in the Balkans (Sirmium, Salone, Caričin Grad).

Currently, the École française de Rome is continuing its archaeological activity in Italy. This includes work on pre-Roman populations, for example, excavation and survey at the fortified settlements of the Vestini and Paelignians in the Abruzzo region. The EFR is also carrying out projects focused on the Roman period, including study of the remains of the Domitianic stadium known as the *Circus Agonalis* (the present Piazza Navona in Rome) and excavations of the Loron villa in Croatia, of the township of Kouass in Morocco, of the catacombs of Saints Peter and Marcellinus in Rome, and of the Vigna Barberini on the Palatine Hill in Rome (Villedieu 1997–2007). Additional fieldwork has been carried out at Pompeii with the investigation of ancient bakeries and geophysical and paleoenvironmental studies at Portus with the collection of core samples and the study of the warehouses of Trajan. Medieval archaeology has been investigated at Sabra al-Mansuriya in Tunisia, in the baths of Cefalà Diana in Sicily, and at the cemetery and dwelling of Lezha in Albania. In a collaboration with the EFA, L'École française de Rome is also involved in the excavation of the Greek city of Apollonia in Illyria (Albania) and in excavation of Paleolithic sites in Valle Giumentina and Atella.

The Jean Bérard Center in Naples (http://www.centre-jean-berard.cnrs.fr/), which is involved in joint research with the CNRS and the Ecole française de Rome, is also organizing archaeological research, particularly in the necropolis of Cumae, at Pompeii and Herculaneum in Campania, and in Laos, in Calabria, and in Arpi, in Puglia.

Thus, for more than 140 years, the École française de Rome has been a major player in archaeological research in the western Mediterranean region. Currently, it aims to strengthen its partnerships with international teams and to be ever more open to the contribution of archaeometry and related disciplines, with the aim to enhance over the long term (from prehistory to the end of the Middle Ages) an understanding of ancient societies of the Mediterranean basin, while contributing to the research training of young archaeologists and widely disseminating its findings in publications or on its website (www.efrome.it).

Cross-References

- ▶ American Academy in Rome
- ▶ Archaeology and Anthropology
- ▶ Architecture, Roman
- ▶ Archival Research and Historical Archaeology
- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Deutsches Archäologisches Institut (DAI), Rome Department
- ▶ Economy, Roman
- ▶ Epigraphy, Imperial Latin
- ▶ Epigraphy, Latin: Early Through Late Republican
- ▶ Italy: Medieval Archaeology
- ▶ Latium Vetus, Latium Adjectum
- ▶ North Africa, Roman
- ▶ North Africa: Historical Archaeology
- ▶ Numismatics, Roman Imperial
- ▶ Numismatics, Roman Republican
- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Survey Archaeology in the Roman World

References

Ben Abed Ben Khader, A., and M. Griesheimer. 2004. *La nécropole de Pupput*. Vol. I. Ecole française de Rome: Rome.

Ben Abed-Ben Khader, A., M. Fdcot, M. Bonifay, and S. Roucole. 2004. *Sidi Jdidi I. La basilique sud*. Rome: Ecole française de Rome.

Bloch, R. 1972. *Recherches archéologiques en territoire volsinien de la protohistoire à la civilisation étrusque*. Paris: De Boccard.

Fixot, M. 2011. *Sidi Jdidi. IL Le groupe episcopal*. Rome: Ecole française de Rome.

Gsell, S. 1893. *Recherches archéologiques en Algérie*. Paris: E. Leroux.
Vallet, G., F. Villard, and P. Auberson. (éd.) 1983–. *Megara Hyblaea*. Rome: École française de Rome.
Villedieu, F. 1997–2007. *La Vigna Barberini* (Roma antica 3, 6). 2 vols. Rome: École française de Rome.

Further Reading

Fernique, E. 1880. *De Regione Marsorum, thesim proponebat Facultati litterarum Parisiensi ad gradum doctoris promovendus Emmanuel Fernique*. Paris: E. Thorin.

Economic Valuation of Heritage

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Introduction

The "value" of heritage has long been the subject of a discourse among academics engaged with heritage resources (Lafrenz Samuels 2008), primarily either from a situational context (which sites are "significant" and therefore valuable) or from an anthropological perspective (what is the source of "value" to begin with?). That there is value in the stock of tangible, intangible, and built heritage, together referred to as heritage resources in this entry, has been uncontested. This is true even though there is disagreement over what constitutes "heritage," over which heritage matters, and over whom should be authorized to decide those matters, and despite the reality that these values themselves can be highly subjective.

In recent decades, however, heritage has come to play a significant role in economic life, largely through economic value created through global tourism and the regeneration of historic urban centers. The resulting high level of public and private spending has made the "value" of heritage a natural subject for economists. Creating justifications for that spending and providing a basis for choices about which heritage resources should be preserved and presented to the public are natural and conventional applications of economic theories and methods. Inevitably, the "commodification" implied in the economic valuation of heritage resources has been challenged on ethical and philosophical grounds. Nonetheless, funding pressures introduced by government austerity programs, changing perspectives in the philanthropic community, and the sheer increase in demand for support of heritage resources driven by tourism and urban renewal keep economic considerations at the center of debates around heritage. Therefore, it is important to explore critically the theories, methods, and limitations of economics as they are applied to the valuation of heritage resources.

Definition

To an economist, heritage resources are merely goods or services consumed by members of society, albeit resources that have multiple, often intangible valences giving rise to an array of valuation categories (Klamer 2014; Throsby 2001, chapter 2). At the most abstract level, economists distinguish between the "instrumental" and the "intrinsic" values of heritage. Instrumental values include "use" values, derived from market-based measures or proxies, that emulate prices individuals or societies would be willing to pay to consume heritage goods and services. Use values include "actual use," the monetary value consumers would pay, for example, to visit a museum or archaeological site or to acquire and restore an historic property. Use values also include "option" values, the monetary amount consumers may be willing to pay in order to preserve the opportunity for themselves to visit a place in the future, and "bequest" values, amounts they would pay to ensure that future generations may visit even if they themselves cannot. Instrumental values also include "passive" or "nonuse" values, such as monetary amounts consumers or societies may be willing to pay to preserve a heritage resource that they or their progeny may never use, its "existence value." Finally, instrumental values also include amounts the public at large would

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be willing to pay to ensure that the beneficial "externalities" of a heritage resource are available even if its use values are insufficient to justify sustaining it. Externalities, in economics, are consequences of economic activity that markets do not properly restrict or supply. Pollution is an example of a negative externality. The benefits in socialization and personal well-being that accrue when citizens visit museums, or the contribution to the collective stock of knowledge when archaeological sites are explored, illustrate positive externalities. The positive externalities of heritage resources are a central justification used by economists to declare them "public" or "merit" goods that deserve, and indeed must have, some form of public support.

Economists also acknowledge the "intrinsic" values of heritage resources. These include such characteristics as the aesthetic value of sites and objects; their spiritual value to communities of faith; their value as historical, social, or cultural symbols; or their uniqueness and authenticity as exemplars of past or present cultural accomplishments. Economists do not assert that intrinsic values can be measured directly in monetary terms. They would argue that some valuation techniques can capture proxies for those values, enabling intrinsic and instrumental values to be melded into a comprehensive perspective on the "benefits" of heritage resources. The measurement of heritage "benefits" is important to economists because their primary decision rule for determining the economic merit of a good or service is whether its private or social benefits exceed the costs to produce and deliver it (Brent 2017). In cultural terms, this suggests that the instrumental and intrinsic values ascribed to, for example, museums or archaeological research and site preservation, should exceed the costs to produce and deliver those places, goods, and services to the public. The challenge, as is obvious, is to find ways to quantify these benefits – in monetary or other terms – so that a benefit/cost calculation can be performed.

Historical Background

Markets for products of artists and artisans have existed since time immemorial, and important religious, social, and political monuments and structures have been erected, maintained, and conserved for centuries by the societies that built them. Until recent times, however, once those monuments or structures fell into disuse, their social and cultural value eroded, and they themselves were abandoned. In Europe, this only began to change in the fifteenth and sixteenth centuries in the wake of the scavenging of Rome's forum and other sites for marble to build St. Peter's Basilica and other church monuments (Stubbs 2009, chapter 13). By the eighteenth century in Europe, however, consciousness that the residue of the past had some resonance in the present gave rise to debates about whether, and how, to conserve or display heritage resources. Nineteenth-century debates between William Morris and Eugene Viollet-le-Duc about the proper management of ancient buildings carried forward to Alois Riegl's early twentieth-century articulation of the instrumental and intrinsic values of monumental heritage. They echo today in the scholarly discourse around the distinction between the scientific significance and the social or economic value of heritage resources. This long period of debate over significance, value, and preservation coincided with the growth of public museums, national archaeological services, and state-driven initiatives to explore, preserve, and present heritage resources. The justification for those activities rested heavily on their intrinsic value or on perceived beneficial externalities – such as preparing the emerging middle and working classes to participate in political society – that justified investing public and private resources in heritage. During the period of Europe's colonial expansion, European concerns for preservation and conservation were exported through legislation and practice to much of the colonized world.

Within the field of economics, concern with the value of heritage resources has more recent roots. Until the mid-twentieth century, economic theory largely presumed that markets, if left largely unfettered, would deliver the quantities of good and services required by society. The government's role was limited to activities such as the raising of armies and some clear public needs, such as sanitation systems and roads. This

changed in the 1950s when Samuelson articulated the economic argument for "public goods," followed shortly by Musgrave's description of "merit goods." Both concepts endorse government intervention to provide services and goods that, due to "market failures," otherwise will be provided in quantities short of public desires. The ensuing literature on public finance and the role of government in providing and protecting public goods, including heritage resources (Mazzanti 2002), is vast. The public good rationale became a rallying cry for heritage advocates, who called for government support of archaeological research and exploration, historical site and museum presentation, and artifact preservation and conservation. In much of the world today, with the prominent exceptions of the United States and the United Kingdom, members of the public and heritage practitioners largely accept the view that these activities are a primary responsibility of public bodies and should be funded with public resources (Frey 2011).

Tourism also has generated interest by economists in heritage resources. More than one billion people travel internationally each year, and billions more travel domestically. Heritage resources drive much of that travel. Tourism's benefits include business investments to support tourist visitation; jobs, income, and profits generated in the tourist trade; and foreign exchange earnings and tax revenues delivered to governments. In countries where tourism has become a major source of economic activity, and today this encompasses much of the world, the economic contribution made by heritage tourism further encourages government intervention.

Political support for heritage resources has resulted in substantial commitments of tax and other government revenues. In many countries, the heritage sector itself is almost totally dependent on government funding and thus constitutes a significant drain on public resources. This is a serious issue in a time of aging populations, a global drive to eradicate poverty, growing military spending, and rising health-care and educational needs. After government finances were sent reeling in many countries by the austerity regimes imposed in the aftermath of the Great Recession of 2007–2009, the consensus around financing heritage resources has come under pressure. The competition for scarce government resources requires decisions on how much money to devote to the sector, which elements of the national patrimony should be explored or conserved, and which cannot be preserved. Economists worry whether the intrinsic or instrumental benefits of heritage-related programs exceed the direct costs in government spending and the costs to businesses and individuals of regulations designed to protect heritage resources. In other words, the justification for spending on heritage resource-related education, research, conservation and presentation is no longer a foregone conclusion.

The challenge is that no clear consensus exists on how to measure either the instrumental or the intrinsic benefits of the heritage sector. In an era that emphasizes evidence-based spending by both governments and philanthropists, the lack of clear measures of the benefits of heritage resources means heritage-related spending is at a continuing disadvantage compared to education, health care, and other fields where both metrics and methods are far better developed. These realities have given rise to interest in using economic techniques to quantify the benefits of heritage resources and so to make the case that heritage-driven benefits exceed the private and public costs of generating them, thus justifying continued government and philanthropic funding.

Key Issues/Current Debates

Economists have developed a range of techniques for quantifying the value of nonmarket resources, including heritage resources (Champ et al. 2017; Snowball 2008). Three issues arise from the application of those techniques in the heritage field. The first is to understand the methodologies, and their limitations, involved in each technique for monetizing those values and to recognize appropriate and inappropriate uses of each approach. The second is to acknowledge generalized practical and technical issues that affect any effort to place an economic value on heritage resources. The third is to recognize that non-monetary

approaches to defining value exist but entail conceptual, technical, and practical issues of their own.

Valuation of nonmarket resources has become a central activity of both cultural and environmental economists due to the recognition that the resources they study are scarce, even unique and irreplaceable, and thus unlikely to be correctly allocated through market mechanisms. As a result, political pressure groups can play an outsized role in government budget and regulatory agencies, leading to policies that may either fail to protect heritage resources or do so at unnecessary costs in terms of actual outlays or regulatory burdens placed on the private sector. Underlying the discourse is the economists' principle of efficiency, which requires that any good or service, including a public good, should be provided at the lowest possible cost, measured either in funds expended or other resources used. For any particular policy objective, economists further argue that before adopting a policy, it is essential to ensure that more cost-effective alternatives to achieving the goal do not exist. In other words, benefits must exceed costs, and the lowest cost solution should prevail. Costs are straightforward, generally. The challenge is to identify feasible methods to measure benefits. Broadly speaking, there are three categories of techniques used to measure economic benefits: economic impact analysis, revealed preference techniques, and stated preference techniques.

Economic Impact Studies

Economic impact studies (Crompton et al. 2001; Snowball 2008, chapters 2 and 3) seek to measure the macroeconomic benefits of investments made in local or national economies. They do not capture, either directly or indirectly, the intrinsic benefits of heritage resources. Rather, they attempt to estimate concrete consequences of heritage activities measured by changes to the macroeconomy (gross domestic product, or GDP), employment levels, and government revenues. Such studies are conducted using econometric "input-output" models of the economy that endeavor to capture the interrelationships among the productive and consuming sectors of the economy. Thus, as a simple example, tourists visiting a foreign country to explore archaeological sites purchase airline tickets, local transportation, hotel rooms, meals, and souvenirs. These are so-called "direct" effects. Those purchases trigger payments, known as "indirect" effects, to the employees and vendors supporting tourist hotels, restaurants, shops, and so forth. The recipients of indirect payments in turn pay their own employees and vendors or buy food, pay rent, and otherwise consume goods and services, creating a third category of "induced" effects from this infusion of funds into an economy.

These three effects are known to economists as the direct, indirect, and induced "multiplier" effects of an injection of money into an economy. Such effects can occur at the national level when tourists enter from abroad or at the local level when funds from outside the area are infused into a local economy through, for example, domestic travel to visit a museum or outside funding for conservation work on an archaeological site. Economic impact studies are widely used in Europe and the United States to justify investments in heritage resources because they attempt to demonstrate the increase in local or national economic activity attributable to particular heritage-related activities (CHCfE 2015; Gangloff 2014; Oxford Economics 2016). Governments use these studies to prove to voters that there is a payback on investments in the sector, while cultural organizations use them to argue for government or private support based on the job-creating or tax revenue-generating potential of investments in heritage.

Impact studies come with numerous caveats (Crompton 2006). The most important is that the multiplier effect only occurs if the new funds are injected from outside of the economic region under analysis. Foreign tourists can lift the domestic economy, but domestic tourists are simply spending their money on heritage rather than on something else, resulting in no net economic gain. The input-output models of the economy themselves also are at best approximations of the real economic outcomes. The economic data used to generate the models is collected at an industry level, making precise estimates of specific

impacts virtually impossible. Moreover, all economies have "leakages" – funds spent outside of the local economy that offset the positive multiplier impact of infusions from elsewhere. The positive impacts of tourism, for example, may be offset by the need to import foreign goods or services or to remit profits to foreign hotel groups and similar organizations. Though measurable to some degree within input/output models, leakages are an inevitable offset to the positive economic impact of heritage tourism or investments in heritage sites. The problem of measuring leakages becomes most acute when impact studies are done at the local level, where the models and multipliers are least reliable. Frequently, however, the shortcomings of impact analyses are ignored by governments and private organizations eager to use them to justify investments that are politically desirable, if economically questionable.

Revealed Preference Studies

Revealed preference studies attempt to extrapolate from the actual behavior of economic actors – consumers or investors, primarily – in order to evaluate the economic contribution of particular heritage sites or interventions. There are two broad categories of revealed preference studies, hedonic pricing and travel cost analyses, each of which has distinctive uses and limitations.

Hedonic pricing studies distinguish the key characteristics of an economic resource and attempt to identify the contribution each characteristic makes to the ultimate market value of that resource (Baranzini et al. 2008, Introduction). In the heritage field, these studies are used primarily in urban contexts, where historic preservation of important buildings, the designation of historic districts, or the establishment of cultural centers (e.g., museums) are important elements of public policy (Lazrak et al. 2014). Hedonic pricing studies draw upon public records to identify the characteristics of properties in or adjacent to areas with heritage interventions and then accumulate property values from records of property sales over time or from government tax records that indicate changes in appraised value. Typically, these studies involve large databases charting the history of property transactions or tax assessments and require sophisticated econometric analysis to generate meaningful results. Such studies can impute an economic contribution to heritage-related investments or regulations by comparing changes in property values over time attributable to interventions related to heritage or by comparing the property value trajectory over time of otherwise similar districts of the city, only one of which has had a heritage-related intervention.

There are numerous technical challenges in constructing hedonic studies, and the findings of such studies are impossible to extrapolate beyond the specific location in which the study was conducted. The value of any property reflects both its use values, such as the rental value of an office building or home; its intrinsic values, such as its aesthetic or historic qualities; and external considerations, such as neighborhood ambiance and amenities, safety, proximity to transportation or recreational services, school quality, lifestyle choices, and similar factors. Thus, historic preservation may be associated with increases in real estate value in a region, but heritage values are imbricated with other economic and noneconomic considerations in a manner that makes it challenging to disentangle the effects. The urban regions studied may have arbitrary borders, and the data itself is laborious to collect and can be distorted if there are not frequent property transactions or tax reassessments. Perhaps unsurprisingly, conclusions from the hedonic pricing literature about the value resulting from urban heritage redevelopment vary from positive to negative depending on the study. Furthermore, the physical resurrection of urban neighborhoods often is accompanied by a process of gentrification in which impoverished original residents are gradually pushed out of the community in favor of those who can afford the rising costs of housing and property taxes. The social and economic costs of gentrification are never captured in hedonic pricing studies.

The second revealed preference method is the travel cost study (Parsons 2017). Generally, economists view the amounts that tourists are willing to spend on a heritage-related trip as a measure of the use value they place on their experience. Travel cost studies accumulate data on the spending by visitors for a site – both out of pocket costs,

such as airfares, gasoline purchases, entrance fees, and the like, and "opportunity costs" such as income tourists could earn by working rather than visiting a heritage site. By accumulating the amounts paid by a sample of tourists that visit a site, large databases can be assembled that, when subjected to econometric analysis, yield estimates of average amounts travelers pay to visit a site and the distribution of those amounts. By projecting those values to the entire attendance at a site, travel cost studies can be used to estimate their value to the public on a basis that can be compared to the cost to run the site (Melstrom 2014). Such studies also are subject to numerous limitations. Determining which costs to include in the study requires judgments. The data used in travel cost studies are extremely difficult to acquire and frequently must be based on visitors' memories or on the analyst's estimates. Free or nearby venues may be undervalued relative to those that charge admission or are far away from visitors' homes, while trips involving multiple venues may overvalue individual sites. Finally, the intrinsic values of a site are impossible to capture independently in a travel cost study, even though historical, spiritual, or educational importance may be the actual motivation for the trip.

Stated Preference

Revealed preference methodologies attempt to infer the value placed on heritage resources from the spending behavior of real estate buyers or travelers – a "count what I do, not what I say" approach to valuation. Stated preference techniques take the opposite tack, asking specifically for responses to value questions while taking due care to avoid the consequences of misleading statements. There are two basic stated preference approaches. One, choice modeling, seeks only to rank preferences among choices offered in the study. The other, contingent valuation (CV), takes a further step and attempts to understand actual amounts interviewees would be willing to pay for some specific activity related to heritage. Each will be considered in turn.

Choice modeling, as the name implies, involves presenting interviewees with a range of optional actions or situations and asking them to express their preferences for one versus another (Hanley et al. 2008; Snowball 2008, chapter 6). In the simplest form, this could merely involve asking a relevant group to rank-order a set of policy options relating, for example, to potential structures of admission fees and services offered at an archaeological site. The result would not be an expression of value in monetary terms, but it would generate a relative ranking of preferences that can guide decision-making. Such simple formulations of choice modeling, however, would be subject to objections relating to method and interpretation. Therefore, robust choice modeling experiments tend to present options in various combinations or otherwise test interviewees' priorities by offering a range of scenarios designed to flush out either contradictory sentiments or misleading responses. Using econometric techniques to analyze the resulting data, economists can produce rankings of preferences with a suitable degree of statistical precision. In heritage, such studies can be useful to identify preferences among either visitors or experts for policy choices in areas as diverse as the selection of conservation strategies or the selection among ancillary services available to museum visitors. Design of the study – the selection of options, the survey questionnaire, and the sampling technique – is critical to the integrity of the results. Moreover, choice modeling is not suitable for a study seeking to value an activity or a place in monetary terms.

Contingent valuation studies (Snowball 2008, chapters 4 and 5) have been developed to attempt to achieve that goal. In essence, a CV study seeks to understand consumers' willingness to pay for a specified outcome through direct questioning. This method can, if properly designed, yield an estimate of the demand curve for that outcome. There are three types of CV studies: "willingness to pay" studies, which ask how much an individual would be willing to pay in money to obtain something; "willingness to avoid" studies that ask how much an individual would be willing to pay to prevent something from occurring; and "willingness to accept" studies that ask how much an individual would be willing to be paid in order to accept an otherwise undesirable outcome. CV methods were deployed most prominently in the

wake of the Exxon Valdez shipwreck and oil leak in Prince William Sound, Alaska, in 1989. The results of a CV study of that accident were used to determine the amount of damages to be paid by Exxon for loss of local residents' use of the beaches, environmental damage, and wildlife losses. Subsequently, CV studies have been used to evaluate myriad environmental and heritage-related scenarios.

The Exxon Valdez case led the National Oceanic and Atmospheric Administration (NOAA) in the United States to commission a study by prominent economists that codified the essential elements of a credible CV analysis (Arrow et al. 1993). Among the key conclusions was that analysts should use willingness to pay, not willingness to avoid or accept, studies because behavioral economists have determined the former will yield a more conservative price estimate. Essential to CV studies is that each interviewee be presented with a clear scenario on which to base a response (hence the idea that the valuation is "contingent" on the scenario presented). Further, the NOAA panel stipulated numerous methodological details required if the study is to sidestep confusions arising from ambiguous questions or statistical bias. Sophisticated econometric and statistical analysis often is required to reach conclusions. CV studies are subject to numerous biases, including respondents' observed tendencies to overweight risky scenarios (e.g., events to avoid), to give interviewers the answer they believe is desired ("warm glow" effect), or to respond with extreme views ("protest bids") (Cuccia 2011). Nonetheless, properly conducted CV studies do offer policy makers a means to measure the public's monetary valuation of heritage.

Economic Value vs. Heritage Value

The economists' methods recounted here are limited in their application. Hedonic pricing studies are most valuable in urban regeneration and are not believed to capture effectively nonuse or intrinsic values of historic properties. Economic impact analyses usually are applied to demonstrate the contributions to employment, incomes, and tax revenues that accrue from tourist activities, from attendance at specific cultural institutions, or from proposed spending on capital projects. Aside from their vulnerability to political abuse, GDP impact studies do not capture instrumental or intrinsic values of heritage resources, only the impact on macroeconomic variables. Choice models deliver only relative valuations, not absolute monetary valuations, and so are ill-suited to policy decisions requiring benefit/cost assessments. Contingent valuation and travel cost studies are deployed to address a broad range of policy questions. A consumer's willingness to pay, expressed in either type of study, may reflect both the respondent's instrumental and intrinsic values for the place. However, travel cost studies are subject to so many qualifications that the results cannot be considered definitive. Citing the NOAA panel's conclusions, Snowball (2008, 78) argues that only contingent valuation studies are capable of reflecting, through the consumer's declared willingness to pay to preserve or avoid destruction, both the instrumental (use and nonuse) and the intrinsic values of heritage resources. Yet, even CV methods yield only a single monetary metric for the diverse values of heritage resources. Thus, no economic method today resolves the need to delineate and monetize separately the instrumental values of heritage resources – those most appropriately reducible to financial assessment – from the intangible intrinsic values and benefits of heritage that animate both professionals and broad swathes of the public.

Future Directions

In the face of expanding pressures on government and philanthropic funding for heritage and archaeological exploration and in an evidence-based era where quantifying benefits is central to policy makers' willingness to dedicate funding, there remains much work to be done to demonstrate that the benefits – instrumental and intrinsic – of heritage resources warrant the costs incurred by those who fund them. In particular, evidence-based policy analysis has come to dominate policy design in the sciences and health policy and in social policy realms such as education, social

services, and criminal justice. Increasingly, cost-effectiveness in delivering demonstrated social impact is the touchstone for public policy. Austerity policies in many European countries have led to sharp reductions in government funding for heritage agencies and museums, reductions in staff and hours, and on occasion outright closure of cultural institutions. The creation of the Heritage Lottery Fund (HLF) in the United Kingdom in 1994 was a direct response to politicians' belief that funding for heritage would inevitably decline in the face of more urgent demands from other public sectors. That problem has only become more acute in the wake of the Great Recession.

Each of the techniques developed by economists to place absolute or relative values on non-market goods, such as heritage resources, is designed largely to meet the needs of policy makers who seek to justify devoting public resources – both personnel and funding – to matters that politicians and their constituents may find of marginal importance in comparison to funding national defense, education, health care, and social services. The fact that the HLF (Oxford Economics 2016) and European Union agencies (CHCfE 2015) are conducting impact studies of heritage programs is evidence that government funding for heritage is persistently imperiled. Even in countries where spending on culture has been increased, as in Canada in recent years, government agencies are investing after the fact to present solid social impact justification for their decisions.

Exacerbating these trends, especially in the United States where private philanthropy is vital to funding US culture and heritage, is the growing demand from donors for evidence of social impact in exchange for funding support. The trend, inspired by evidence-based thinking in other spheres, is particularly propelled by philanthropists made wealthy in financial services and technology industries who favor market-based solutions to problems, suspect government programs of ineffectiveness and inefficiency, and seek to ensure that their philanthropy has broad positive consequences for important social problems. These "impact philanthropists'" attitudes are reinforced by the growing prominence of the philosophical school of "effective altruism," which argues that ethical behavior demands eschewing spending on matters such as culture in favor of solving social problems.

The challenges for the heritage professions are many. Defining the "social impact" of heritage projects, museums, or research in a quantitative fashion – as can be done for health care or educational outcomes – requires new perspectives on the purposes of heritage-based organizations. Efforts to define the social impacts of heritage – a museum's contributions to educational outcomes or the emotional well-being of visitors, for example – founder on definitions, methods, and data availability. Furthermore, cultural institutions may have only limited direct impact on any particular social metric, even though institutions may contribute in small but cumulatively important ways to many different social goals. For example, an archaeological site may contribute to student educational outcomes, to visitor well-being from being outdoors, and to social cohesion by sharing history and values, and make a modest economic contribution to the community. Yet investing in that site may not be the most cost-effective policy to deliver any one of those benefits. Hence, the search to justify public or private spending based on a "portfolio" of partial but important social impacts may be the next frontier in the debate over the value of heritage.

Cross-References

- ▶ Community Economic Development and Archaeology
- ▶ Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Management: Cost and Benefit of Change
- ▶ Heritage and Public Policy
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ Modern Ruins: Remembrance, Resistance, and Ruin Value

▶ Privatization, Public-Private Partnerships, and Innovative Financing for Archaeology and Heritage
▶ Sustainable Cultural Tourism Policies: Overview

References

Arrow, K., R.M. Solow, P.R. Portney, E.E. Leamer, et al. 1993. *Report of the NOAA panel on contingent valuation*. Washington, DC: National Oceanic and Atmospheric Administration.
Baranzini, A., J.V. Ramirez, C. Schaerer, and P. Thalmann. 2008. *Hedonic methods in housing markets: Pricing environmental amenities and segregation*. New York: Springer.
Brent, R.J. 2017. *Advanced introduction to cost-benefit analysis*. Cheltenham/Northampton: Edward Elgar.
Champ, P.A., K.J. Boyle, and T.C. Brown. 2017. *A primer on nonmarket valuation*. Dordrecht: Springer.
CHCfE. 2015. *Cultural heritage counts for Europe*. Krakow: CHCfE Consortium.
Crompton, J.L. 2006. Economic impact studies: Instruments for political shenanigans? *Journal of Travel Research* 45 (1): 67–82.
Crompton, J.L., S. Lee, and T.J. Shuster. 2001. A guide for undertaking economic impact studies: The Springfest example. *Journal of Travel Research* 40 (1): 79–87.
Cuccia, T. 2011. Contingent valuation. In *Handbook of cultural economics*, ed. R. Towse, 90–99. Cheltenham/Northampton: Edward Elgar.
Frey, B.S. 2011. Public support. In *Handbook of cultural economics*, ed. R. Towse, 370–377. Cheltenham/Northampton: Edward Elgar.
Gangloff, D. 2014. Towards a cultural economy: Lessons from the American southwest. *Public Archaeology* 13 (1–3): 250–261.
Hanley, N., S. Mourato, and R.E. Wright. 2008. Choice modelling approaches: A superior alternative for environmental valuation? *Journal of Economic Surveys* 15 (3): 435–462.
Klamer, A. 2014. The values of archaeological and heritage sites. *Public Archaeology* 13 (1–3): 59–70.
Lafrenz Samuels, K. 2008. Value and significance in archaeology. *Archaeological Dialogues* 15 (1): 71–97.
Lazrak, F., P. Nijkamp, P. Rietveld, and J. Rouwendal. 2014. The market value of cultural heritage in urban areas: An application of spatial hedonic pricing. *Journal of Geographical Systems* 16 (1): 89–114.
Mazzanti, M. 2002. Cultural heritage as multi-dimensional, multi-value and multi-attribute economic good: Toward a new framework for economic analysis and valuation. *The Journal of Socio-Economics* 31 (5): 529–558.
Melstrom, R. 2014. Valuing historic battlefields: An application of the travel cost method to three American Civil War battlefields. *Journal of Cultural Economics* 38 (3): 223–236.
Oxford Economics. 2016. *The impact of heritage tourism for the UK economy*. London: Heritage Lottery Fund.
Parsons, G.R. 2017. Travel cost models. In *A primer on nonmarket valuation*, ed. P.A. Champ, K.J. Boyle, and T.C. Brown, 187–234. Dordrecht: Springer.
Snowball, J. 2008. *Measuring the value of culture*. Berlin/Heidelberg: Springer.
Stubbs, J.H. 2009. *Time honored: A global view of architectural conservation*. Hoboken: Wiley.
Throsby, D. 2001. *Economics and culture*. Cambridge, UK: Cambridge University Press.

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Economy, Roman

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Introduction and Definition

The Roman economy was the economic system created by the geographical expansion of the political power of Rome over the Mediterranean and Europe between the third-century BCE and the first-century CE and maintained during the first centuries of our era until its gradual decline in late antiquity. The Roman economy can be seen as the acme of a long period of technological development and economic growth in the Mediterranean, which began in the early first millennium BCE and led to population increase, intensification of land use, economic and political integration, and urbanization. Its decline in late antiquity marks the beginning of a long period of transformation and urban regression in Europe as well as in large parts of the Mediterranean.

Historical Background

Academic History

The history, structure, and performance of the Roman economy have been hotly debated issues since the late nineteenth century. Debate about the Roman economy has long been characterized by a strong emphasis on the differences or similarities between the Roman economy and the economy of

the industrializing world and by an opposition between optimists, who are inclined to emphasize Roman achievement, and pessimists, who are inclined to emphasize Roman shortcomings.

The debate originated in late nineteenth-century Europe, with a big controversy between Karl Bücher and Eduard Meyer being a first major milestone. Bücher argued that the ancient economy was a household economy characterized by self-sufficiency. Meyer attacked this view and maintained that the Roman Empire saw the growth of "big business" and a full development of capitalism.

In the core decades of the twentieth century, a "modernist" paradigm dominated the field. It was most forcefully articulated by Mikhael Rostovtzeff, who argued that the Roman economy was structurally similar to the modern economy but only differed in that it operated on a much smaller scale. Romans had well-developed entrepreneurial mentalities, there was considerable long-distance trade, and the economic fate of cities depended on the degree to which they were able to develop large-scale, export-oriented production.

The 1970s saw a true paradigm shift, basically caused by the work of Moses Finley, who was strongly influenced by both the work of Max Weber and Karl Polanyi and who argued that the ancient economy was, in general, a primitive affair. Long-distance trade was restricted to luxury goods, while bulk demand was satisfied through locally produced wares. Moreover, cultural and societal structures impeded large-scale elite investment in manufacturing and held back economic growth. Cities were centers of consumption (Weberian "consumer cities") and display whose economic fate depended on the presence of a landowning elite, and not on market-oriented export production.

Finley's work proved highly provocative and was subsequently refined, adapted, and contested. Especially in the 1980s and 1990s, Finley's ideas were at the center of a fierce academic debate between "modernists" and "primitivists" – with archaeologists generally opting for the modernist side of the debate. Key issues in the debate were the economic role of cities, the existence of long-distance trade, and the presence or absence of technological development.

After the turn of the millennium, the debate moved beyond the Finleyan paradigm and has begun to explore the relative position of the Roman economy compared to other preindustrial economies, particularly Medieval and Early Modern Europe. In the debate, there is an increasing emphasis on historical change and, particularly, economic growth, issues that had traditionally been absent from both primitivist and modernist accounts of the Roman economy.

Evidence

Debates about the Roman economy are based on a variety of datasets that can be divided into two groups: texts and material remains. There are three groups of textual sources: literary texts, inscriptions, and documentary texts. Roman literary texts (including the law codes) provide snippets of information about economic practice, though they are strongly biased towards the elite point of view and are not necessarily reliable when it comes to understanding the details of everyday economic processes – particularly if these took place beyond the world of the literary and political elites. Secondly, inscriptions incidentally reveal information about urban economic life, particularly in Italy and Asia Minor, and particularly about the social dynamics that surrounded urban manufacturing and commerce. Epigraphically preserved government decrees incidentally shed light on the impact of local and supra-local governments on economic life. Thirdly, documentary texts, including papyri and writing tablets, provide detailed information about all kinds of transactions, including loans, tax payments, sales, and orders, though they are only available for a limited number of areas and sites (e.g., Egypt, Pompeii, Vindolanda).

Archaeological evidence used in the Roman economy debate includes remains of infrastructure and buildings, transport containers, products, coins, and iconographic representations of economic processes. Remains of port and road infrastructure give clear indications about not only the geography of trade routes but also the investment involved in constructing and maintaining the trade

network. Similar information can be derived from the remains of commercial facilities and manufacturing establishments. Transport containers, particularly amphorae, can generally be provenanced and tend to give an indication of the products they contained. Finished products themselves reveal information about provenance and production technology, and through the emerging practice of "stamping," they inform scholars about their makers as well. Coins and coin hoards allow scholars to discuss monetization and coin circulation, which is fundamental to understanding the dynamics of trade and transactions. Iconography plays key roles in debates about the technology of production processes, showing depictions of work equipment that has not been preserved archaeologically. However, archaeological data are biased and unequally divided over the Roman world, both in time and space, and their interpretation is often complicated by their inaccessibility and by varying standards of publication.

While the Roman economy debate until the late 1970s was characterized by an overwhelming emphasis on textual evidence, and particularly on literature, the 1980s and 1990s saw a clear increase in the use of material remains in discussing economic issues. Quantitative analyses of dated Mediterranean shipwrecks and of the geographical spread of terra sigillata pottery from the imperial period had a deep impact on the debate, as had the results of field survey projects. An increased focus on urban production facilities in the late 1990s changed the dynamics of the debate about urban economies. After the turn of the millennium, archaeologists increasingly started to explore the possibilities of scientific analysis, including isotopic and DNA analysis on organic remains, which is now enabling to include material categories into the debate that hitherto had little to offer, such as animal bones and human remains.

Historical Context

The emergence of Rome as a local power in the seventh and sixth centuries BCE was related to its proximity to the major crossing of the Tiber and, thus, to the flow of people and goods between Etruria and southern Latium and Campania. As a consequence, trade and transport were at the heart of the Roman economy right from the start, and the subsequent expansion of Rome, from early on, was characterized not only by the spread of political power but also by the emergence of a tightly knit network of economic connections – partially created by government policy and partially emerging through market interaction. Politics and the economy were closely related: economic integration in many cases preceded and/or fostered political integration, which would then further enhance economic integration. Where this was not the case, Romans sometimes appear to have had clear economic motives for expansion, such as the presence of metal ores that could be mined (e.g., Spain, Dacia).

The city of Rome emerged as the center of gravity of this economic network early on, and the volume of demand generated by the city would become a defining feature of the Roman economy as it developed from a regional center into a metropolis of hitherto unknown proportions. From the middle republic to late antiquity, metropolitan demand was a key driving force behind the Roman economy and, to a certain extent, behind the Roman political system. The Roman metropolis is a feature that sets the Roman economy clearly apart from all its Mediterranean predecessors and separates it from most of the preindustrial economies of Medieval and Early Modern Europe.

The historical development of the Roman economy was closely related to and to a considerable extent conditioned by developments in the Mediterranean of the first millennium BCE. These include, firstly, the colonization of the western Mediterranean by the Greeks and the Phoenicians from the early eighth-century BCE onwards and the subsequent increase in contacts between Etruscans, Italians, and Greeks, which transformed the economic landscape of central Italy and the Tyrrhenian Sea and created long-distance trade routes between Latium and the Eastern Mediterranean. Secondly, an intensification of Aegean and Eastern Mediterranean trade in the second half of the first millennium BCE, and the Hellenization of the East and Egypt after Alexander,

created an intensive trade network that the Romans could easily tap into. A similar network was created by Carthaginian expansion in North Africa and Spain, though this was initially less readily accessible to the Romans. These developments were basic requirements for the much more far-reaching economic integration of the Mediterranean which took place under Roman leadership from the last centuries BCE onwards.

Yet besides economically integrating the Mediterranean to an extent hitherto unseen, the Roman economy also integrated, unlike Greek and Hellenistic economies had done, the European continent into Mediterranean networks of trade and exchange and saw the development of intensive trade and exchange with regions beyond the political boundaries of the Roman world, including Europe and Scandinavia, the Near East, and, particularly, India, which developed a trade connection with Roman Egypt through the desert, the Red Sea, and the Indian Ocean. Further, there were indirect trading connections with China, probably both over land, via the Silk Route, and by sea, via India.

Key Issues/Current Debates

Integration

A key aspect of the Roman economy was the integration of an enormous area into what was, essentially, one economic system – even though the extent of regional fragmentation is not to be underestimated. Economic integration was based on the political unity of the Roman world, which brought advanced, often state-sponsored, transport infrastructure; unity in laws and currency; and the spread, throughout the empire, of large groups of people with good long-distance connections and of two languages that together sufficed to conduct business throughout large parts of the Roman world. All these phenomena were unique, and had not been seen before on this scale and over such a large area. Together, they brought about a dramatic decrease in transaction costs which made long-distance transport and trade more feasible than ever before.

Fundamental to the integration of the Roman economy was the large network of roads, which was created and maintained by the state and which connected inland regions with each other and with the sea. There is debate as to whether these roads were specifically created to foster land transport, but there is no debate about the fact that they dramatically lowered its costs. Though land transport still was much more expensive than river or sea transport, the vast road network allowed traders to penetrate areas that hitherto had been inaccessible at a relatively low cost. Comparable investment is visible in port facilities in the Mediterranean, which became more numerous and also larger.

The establishment of colonies and the settlement of Romans throughout the Roman world, but particularly in Roman Europe, also contributed to the integration of the Roman economy, as Roman communities retained close contact with Italy and the Mediterranean. As a result, much more accurate information about faraway markets would have been available throughout the empire. The spread of Mediterranean culture and consumptive patterns over Roman Europe created considerable markets for Mediterranean products, including wine, olive oil, and fish sauce, that were not available locally. Integration of taste also fostered standardization. Especially in the imperial period, certain products (e.g., shoes) were standardized to an extent that empire-wide trends in design can be perceived.

Agriculture

Agriculture was the basis of the Roman economy and occupied, probably, over 80% of the population. Key crops included the traditional Mediterranean triad of olives, grapes, and cereals. While evidence for agricultural practice is extremely scarce, it is usually assumed that there was relative technological stability in farming methods. Yet Mediterranean farming methods and plant species did disseminate over a large area, including Europe, and there were major developments in the organization of rural space, particularly around colonies. The rationalized organization of the countryside resulting from centuriation lowered overhead costs by improving the accessibility of land and making the organization and planning of agriculture easier. In general, there is a clear increase in the total area used for intensive

agriculture, with intensification being particularly remarkable in the Latin-speaking west. In Roman Africa, field survey has shown an increased use of even rather marginal lands for oleiculture.

While in many parts of the Roman world the small- to medium-sized farmstead was the standard unit in agriculture, there is a clear emergence of farms operating on a much larger scale, including large *villae rusticae* owned by the elite, which came to control significant parts of the countryside (e.g., Settefinestre). There also appears to be an accumulation of estates (*latifundia*) in the hand of increasingly wealthy landowners, some of whom would own a rich portfolio of estates in various parts of the Roman world. It is assumed that this large-scale landowning also fostered new agricultural strategies, including monoculture, and large-scale clusters for processing. Nevertheless, mixed agriculture remained the norm on most farmsteads and *villae*.

The Roman world also saw a clear increase in the amounts of agricultural yields that were consumed at long distances from the place of production. Metropolitan and army demand fostered agriculture throughout the empire, as is attested by literary sources and by the amphora remains from the Monte Testaccio, which show that, especially in the Imperial period, an overwhelming amount of the olive oil consumed in Rome came from Southern Spain. A defining element of the Roman cereal economy was the *annona*, through which the emperor divided grain among the population of the Roman metropolis. Most of this grain came from Egypt and Africa. Other large cities in the empire seem to have had similar vast areas from which they drew their basic foodstuffs, though their economic hinterland is less well studied. Large-scale fish processing and garum production on the coast of Roman Africa and Spain, particularly around the Straits of Gibraltar, was similarly aimed at a vast imperial market.

Raw Materials

As far as the non-food economy is concerned, it is important to distinguish extraction from manufacturing. Raw materials for which there was large-scale and empire-wide demand include a wide range of metals (gold, silver, tin, lead, copper, iron, zinc), stone and marbles, wood, clay, wool, and flax. The availability of these materials differed – some, such as wool, iron, clay, and wood, were widely available, but others, particularly coin metals and marbles, were only found in specific regions or places.

In the case of coin metals, high-quality marbles, and colored stone, there seems to be a direct involvement of the government in extraction: large mines and quarries were generally owned and run by the state, and especially in the case of the important mining regions of Dacia and Spain, the presence of mineable gold and silver seems to have played an important role in conquest. In mining, Romans used advanced hydraulic technologies to get out the metal ores in large quantities, which also involved large-scale investment in aqueducts. They also used Archimedes' screws and water wheels to drain underground mines, so that they were able reach a much greater depth than in earlier periods. Ores were smelted on or near the mining site and then turned into bars or ingots, which were stamped and transported throughout the Roman world. When the imperial government was not directly involved, the evidence suggests more locally oriented extraction through traditional methods and on a much smaller scale. This goes for mining as well as quarrying.

There is clear evidence that materials were transported and traded in more or less raw form over long distances. This included wood, raw wool, flax fibers, stone, and all metals, though trade was much less intensive when materials were widely available. The only real exception is clay, which was generally turned into its final product in a location close to the pit. Glass, dependent on the availability of *natron*, was produced in a limited number of locations – particularly in the Near East – and then transported in raw form to the place where it was turned into a final product, as is indicated by the discovery of raw glass in several shipwrecks. Trade in raw wool and linen was probably limited to the finer qualities from certain regions and to some bulk trade for the metropolitan market of large cities, including Rome itself. Nevertheless, the general picture suggests intensification and integration compared to earlier periods.

Processing and Manufacturing

In processing materials and foodstuffs, and in manufacturing consumer goods, small-scale establishments remained the norm. The typical workshop was situated in one or two small rooms and operated by a small work group organized around a (male) skilled artisan. Investment in production facilities in such workshops was low, and while the workspace was well-organized, the success of the workshop mainly depended on the artisanal and organizational skills of the work group and, particularly, its leader. In an urban context, workshops would be situated in or attached to a house, and members of the (family) household would form the core of the work group. Most of this production also seems to have been directly oriented towards private customers rather than traders and thus towards local consumption: many workshops had a shop or were situated in one, and iconographic representations of craftsmen show their interaction with customers as well as their work on the products.

Yet alongside this traditional, small-scale manufacturing world, there also is an emergence of manufacturing or processing establishments operating on a much larger scale. More often than not, these also were related to long-distance trade. Imperial period fish-salting establishments in North Africa and Southern Spain could reach vast dimensions, and their products were consumed throughout the empire. High-quality tableware pottery (terra sigillata) was produced in a limited number of production sites where kilns and workshops would operate on a large scale, such as at La Graufesenque or Scoppietto. Fulling factories at Ostia and Rome employed up to 100 people and stood at the end of long-distance clothing trade catering for the metropolitan market. Large-scale workshops could be highly rationalized and use a strict division of labor and rudimentary materials handling. Literary texts further suggest the existence of cities producing large amounts of textiles, though here, individual production units may have remained small.

Commerce

Roman cities were centers of consumption-oriented commerce, and commercial facilities played a highly visible role in the urban landscape. Streets, especially in and around city centers, tended to be lined with shops. These had wide openings on the street that fostered interaction between retailers and passersby. This is a big development from the Greek and Hellenistic world, in which shops were much less common and had less wide openings. Here, commerce was more focused on the agora and private houses. There is a clear change in the commercial articulation of cities in the Roman world, particularly, but not exclusively, in Roman Italy.

Most shops were related to houses. Medium-sized atrium houses in Italy would have one or two shops next to their main entrance; larger houses could have up to ten. The strip buildings dominating the cities of Roman Europe also often would have a shop in front. Besides these privately managed commercial facilities, there also is a spectacular proliferation of market facilities, such as *macella* and *fora*, and other buildings with a (partially) commercial function, such as *basilicae*. Most of this was the result of either state-sponsored initiatives or, more frequently, euergetism or investment by members of local elites. In cities with larger consumer markets, purpose-built shop complexes emerge, as happened in Pompeii from the second c. BCE onwards; the exceptional consumer market of Rome saw the construction of true shopping malls, such as, most dramatically, Trajan's Markets.

This formalization of commercial space occurred, however, against a background in which informal commerce also played a key role. There is considerable evidence for street sellers and itinerant merchants, who operated on the street rather than in shops or visited their customers in their homes. Epigraphic evidence points to the existence, in many cities, of periodic markets taking place on fixed days and following a fixed schedule within a certain region. This also emphasizes the economic role of cities as central places where people from the surrounding countryside could go to get goods and products that were not available in or around their villa or village.

Technology

Technological innovation is a hotly debated issue among scholars. It is uncontroversial that the spread of the Roman economic network over Europe brought a spread of established, more advanced Mediterranean technology over a large

area that technologically had been less well developed and that this had some economic effect. Yet, beyond that basic tenet, opinions diverge sharply: some argue in favor of significant technological advance, while others argue in favor of technological stagnation. There is, in fact, something to say for both sides.

In general, stability was the norm, and production processes technologically tend not to differ radically from earlier periods. A key example is textile production: spinning and weaving were done with traditional instruments like the spindle and the warp-weighted loom. While there is evidence for the emergence of the more advanced horizontal loom in late antiquity, it does not seem to have become widespread very quickly. A similar picture emerges from blacksmithing and bronze working. While pottery production saw a clear increase in the use of molds for high-quality tableware, this must be seen as a change of strategy rather than as technological innovation: the technology had been around as early as the Bronze Age and was widely used already before the Roman period.

This is not however the whole story of Roman technological progress: there are several key technologies that found their first widespread application in the Roman world. Important is the material revolution caused by the spread of glassblowing in the first-century AD: glass vessels quickly began to compete with their terracotta and metal equivalents, transforming the dynamics of the tableware and storage ware economies. The invention of the screw press, presumably in the late first-century BCE, had an impact on olive and wine production as well as on the textile economy.

Yet the technological development that is most radical and most hotly debated is the application of water power in several manufacturing processes in the imperial period. While few scholars doubt that the principles of mechanical water power were understood in elite circles, it was long disputed to which extent these principles actually were applied in everyday economic life; however, archaeological work has now confirmed that water power was not only much more common than was assumed in the past but also was a clear development of the Roman imperial period. Attested are water-powered installations for milling flour (e.g., at Barbegal and in Rome) but also to saw stone (e.g., at Ephesos).

Growth

Since the turn of the millennium, the Roman economy debate has developed a strong focus on understanding the scale and nature of economic growth. Most scholars now believe that there was at least some form of aggregate growth in the Roman economy in the late republic and the early empire. It is believed that maritime transport reached a high peak in this period and that this is somehow reflected in the chronological spread of Mediterranean shipwrecks, which shows a clear peak between 100 BCE and 100 CE. Several other datasets have been thought to show similar peaks, including air pollution levels as recorded in the Greenland ice cap. All these data are, however, controversial, so while the general picture of growth is not in doubt, it has not yet been possible to map its precise chronological development or its geographical dimensions.

However, the issue at stake is not so much the occurrence of economic growth in itself but rather the relation between growth and demographic expansion: if the economy grew faster than the population, GDP per capita would rise, and living standards would increase. If this was not the case, GDP per capita would be stable or decline and so would living standards. The question thus is to what degree the Roman economy was able to improve average living standards. The way to do this would be through technological innovation and lower transaction costs, which would enhance productivity. While it is acknowledged that Roman economic integration lowered transaction costs and that there was innovation in some sectors of the economy, it is controversial as to whether these developments really led to sustained per capita growth. Some scholars have embraced the Malthusian model of economic growth, which predicts that, in pre-industrial economies, the improved living standards generated by per capita growth directly lead to population increase, which eats away the positive effect, so that living standards will have remained approximately at the same low level. Other scholars point to the boom in investment in public monuments and urban leisure facilities such as baths, theaters, and amphitheaters and to the increasingly wide diffusion

of luxury goods and domestic decoration throughout the Roman world, both of which suggest that average living standards were raised to considerably above subsistence level in the early empire. However, this was not necessarily reflected in health and life expectancy, both of which, as analyses of skeletal remains and epigraphy suggest, seem to have remained at levels that are roughly typical for the preindustrial world.

Decline

The strong focus on late republican and early imperial growth in the scholarly debate has not yet been matched by an equally strong focus on the economic history of the Roman world after the second century, when growth evidently came to a halt, and the empire and its economy ran into trouble. Traditional accounts saw the late second century as the beginning of a sharp decline that in the end inevitably led to the collapse of the Roman economic system. Current views are more nuanced and emphasize the dynamic and unpredictable nature of developments and the different fates of different regions, with the Eastern Mediterranean enjoying sustained stability for much longer than the rest of the Empire and economic changes in the Latin-speaking part of the Roman world not only starting earlier but also being more drastic. While for the Eastern Mediterranean it is, in certain ways, possible to speak of a "transition," for the western half of the empire and specifically Europe, "decline" seems a more appropriate term.

The symptoms of decline become first visible towards the end of the second century. The large-scale imperial mines and quarries are deserted in the last quarter of the second century, which is followed by a strong debasement of fine metal in coinage. Investment in large-scale processing and manufacturing plants is severely reduced, with few new constructions, and some going out of use or continuing on a smaller scale. There also seem to be maintenance difficulties in the road network; silting problems in harbors are less rigorously tackled than had been done before, with some notable exceptions. This points to a decline in long-distance trade, which also may be reflected in the decrease in shipwrecks from this period (though this also may be related to a partial replacement of amphorae by barrels). Monumental construction – both imperial and euergetic – declines strongly, especially after the Severan period, taking away one of the motors of early imperial Roman urban economies. Price inflation and state attempts to control the market under Diocletian point to a perception of serious economic turmoil by the imperial elite.

As to what caused the changes after the second century, there is a range of possible causes. They can, roughly, be divided into external causes and internal ones. External causes contributing to economic turmoil include several epidemics that hit the empire in the late second and third centuries, including the devastating Antonine Plague, which raged for 20 years and caused a significant decrease in population. Moreover, the third century brought intensive warfare at the frontier and several massive invasions from non-Roman Europe. Some scholars have also suggested that the early imperial economy was brought into trouble by climate change. Internal factors contributing to decline may include political unrest and the long political crisis of the mid-third century. Further, a fallout in investment may have led to consumer economies coming to a standstill, while increasing economic inequality caused more and more wealth to be concentrated in the hands of the elite, which has been thought to affect the buying power of the rest of the population. Some have argued that early imperial economic prosperity simply was not sustainable, so that part of the process taking place in the third century would be a natural correction. Yet, it is sometimes hard to distinguish causes from effects, and in reality, many of the abovementioned factors may have contributed to decline and transformation; the debate on this issue has not yet produced a dominant theory.

Cross-References

- ▶ Infrastructure in the Roman World: Roads and Aqueducts
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ Villas and Farms in the Mediterranean World

Further Reading

Bang, P. 2008. *The Roman bazaar*. Cambridge: Cambridge University Press.
Bowman, A., and A. Wilson, eds. 2009. *Quantifying the Roman economy. Methods and problems*. Oxford: Oxford University Press.
Finley, M.I. 1973. *The ancient economy*. London: Chatto and Windus.
Greene, K. 1986. *The archaeology of the roman economy*. Berkeley: University of California Press.
Greene, K. 2000a. Technological innovation and economic progress in the ancient world: M.I. Finley re-considered. *The Economic History Review* 53 (1): 29–59.
Greene, K. 2000b. Industry and technology. In *Cambridge ancient history XI. The High Empire: A.-D. 70-192*, ed. A. Bowman, P. Garnsey, and D. Rathbone, 741–768. Cambridge: Cambridge University Press.
Harris, W. 2000. Trade. In *Cambridge ancient history XI. The High Empire: A.D. 70-192*, ed. A. Bowman, P. Garnsey, and D. Rathbone, 710–740. Cambridge: Cambridge University Press.
Harris, W. 2011. *Rome's imperial economy. Twelve essays*. Oxford: Oxford University Press.
Hopkins, K. 1980. Taxes and trade in the Roman Empire. *Journal of Roman Studies* 70: 101–125.
Horden, P., and N. Purcell. 2000. *The corrupting sea*. Oxford: Blackwell.
Kehoe, D. 2007. The early Roman Empire: Production. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 543–569. Cambridge: Cambridge University Press.
Morley, N. 1996. *Metropolis and hinterland*. Cambridge: Cambridge University Press.
Morley, N. 2007. The early Roman Empire: Distribution. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 570–591. Cambridge: Cambridge University Press.
Rostovtzeff, M. 1957. *The social and economic history of the Roman Empire*. Oxford: Clarendon Press.
Scheidel, W. 2009. In search of Roman economic growth. *Journal of Roman Archaeology* 22: 46–70.
Scheidel, W., and S. Friesen. 2009. The size of the economy and the distribution of income in the Roman Empire. *Journal of Roman Studies* 99: 61–91.
Wilson, A. 2002. Machines, power and the ancient economy. *Journal of Roman Studies* 92: 1–32.
Wilson, A. 2008. Large-scale manufacturing, standardization, and trade. In *Oxford handbook of engineering and technology in the classical world*, ed. J.P. Oleson, 393–417. Oxford: Oxford University Press.
Wilson, A. 2009. Indicators for Roman economic growth: A response to Walter Scheidel. *Journal of Roman Archaeology* 22: 71–82.

Educational Tools and Techniques in Archaeology: Overview

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E

Introduction

The teaching of and about archaeology is a subject of global interest. As a subject, archaeology has the potential to both engage the public in the study of the past and to also increase awareness of environmental and cultural heritage preservation. As a mode of teaching, archaeological thinking is an educational tool in itself, creating a learning environment which is instantly engaging (Bartoy 2012: 558) and introducing subject matter which is broadly relatable. Several educational tools and techniques are used in archaeology to enhance its educational role (Ducady et al. 2016), including teaching reasoning ability in combination with an understanding of, and respect for, cultural diversity and tolerance. Notwithstanding these significant benefits, archaeology remains underutilized within a global context within both secondary and tertiary teaching, with many archaeologists underestimating its educational role (Henson 2004).

Definition

According to SALTO (Support, Advanced Learning and Training Opportunities) for Youth – the European Union program for education, training, youth, and sport – an educational tool could be defined as "an instrument to transfer and implement educational objectives into a practice which engages participants in the complete learning process" (SALTO Newsletter n.d.). In this regard an educational tool should be self-sustaining and may be of a range of lengths. An educational technique is defined as "the method of doing

something using a special skill that you have developed" (Macmillan Dictionary), further described by the Council of Europe as being closely related to experiential learning. Educational programs and techniques ensure equal opportunities for all, and they must be designed in order not only to transfer knowledge but also to support training and raise public awareness (Mackay and Bilton 2003: 48–49).

When educational objectives specifically relate to the teaching of archaeology, appropriate tools and techniques must be developed to complement the wide range of skills and subdisciplines within the field. The teaching of archaeology may occur in a range of formal and informal settings, including universities, schools, and community groups. Further, location-based training is a critical component in archaeological education, which can occur in a range of settings from classroom or museum venues to programs focused on site- and landscape-based learning.

Key Issues/Current Debates/Future Directions/Examples

The educational tools and techniques used in archaeology derive from the field of pedagogy and didactics. Vygotsky's social constructivism is the main learning theory followed by the current museum or archaeological educational programs. As a result, it determines their design, objectives, and application. Via educational tools and techniques, archaeology is "recontextualized" (Bernstein 1996) into learning material for all students regardless of gender, nationality, and religion (Croucher and Romer 2015), either in schools (Smardz and Smith 2000) or colleges and universities (Burke and Smith 2007).

The purpose of educational tools and techniques is also to teach archaeology to the wider public (AAP 2016). A critical issue in the context of public archaeology is whether the aim is not only to teach the theoretical and practical sides of archaeology but whether to teach through archaeology (Bartoy 2012). Therefore, the use of educational tools and techniques in archaeology could be classified into three categories: those that treat archaeology as the ***object*** of learning about the practice of archaeology, those which use it as a ***source*** for enhancing knowledge about the past and finally, and those that use archaeology as a mode of learning. All of these categories can utilize lectures, practical demonstrations, the construction of narratives, and printed material including lesson plans, pictures, illustrations, slides, posters, brochures, and handouts. These forms of learning can take place both within the classroom and during outdoor activities including fieldwork training, hands-on activities using objects and artifacts, place-based activities, and problem-solving or simulation exercises and through gaming.

Archaeology has, and continues to be, taught using a combination of tools and educational techniques. Theoretical content has traditionally been taught through the use of lectures and narratives. Additionally, since archaeology also has a material dimension, hands-on teaching is widely used, implemented as early as the time of the well-known educator John Dewey and his Laboratory School. This approach –learning by doing – is fundamental within the teaching of archaeology. Thus, lectures describe the subject of archaeology, while narratives create representations and constructions of the past based on archaeological finds without the participation of the learner. On the other hand, the direct contact of students with the findings and techniques of archaeology ensures the success of learning in an experiential setting. In this context, simulations of archaeological excavations, role plays, or storytelling by the students themselves offer credible and constructive contacts with the world and thinking of archaeology.

The participation of a broad demographic through excavation simulations is a popular and effective mode of teaching archaeology. A usual simulation dig process is as follows. Participants "excavate" and discover buried copies of artifacts. These finds are then processed as they normally would on a professional excavation – they are cleaned, measured, sketched, and described. Field workers also keep a trench diary and undertake artefact analysis, simulating the role of the professional archaeologist. Finally, especially in museum educational programs, they connect their

finds with exhibits in real museum exhibitions. Hands-on activities or exploratory games, often in the form of a detective story or a treasure hunt, are very common in schools and museum settings.

Another mode of archaeology engagement in teaching is "museum kits," primarily designed for use within the classroom. Each of these kits contains copies of artifacts, replicas, photographs, booklets, and other teaching materials on a particular archaeological subject. In Greece, for example, there are museum kits designed by the Acropolis Museum, the Cycladic Museum, and other cultural organizations on themes including the Parthenon frieze and aspects of ancient life, like clothing, nutrition, or games. These kits are also targeted at a broad range of users within the community, including multisensory kits for the disabled.

In choosing existing tools and in developing new techniques for the teaching of archaeology, it is critical that we also consider inherent biases. Each has, or will, be based on national and international education policy as well as existing courses and curricula. Further, parameters such as learning theories, educational practices, as well as the actual and sought teacher and student identities are relevant for the realization of the educational objectives. The identification of these biases can serve to highlight the dominant perceptions about the meaning of the past in the present, especially if we accept that "teaching is a field of cultural politics" (Hamilakis 2004: 294). In doing so, we aim to minimize our own biases within our teaching, built on our existing assumptions and beliefs about the past.

Modern pedagogy emphasizes the contribution of three factors which are critical to the success of an educational tool or technique (Lankshear and Knobel 2011). Firstly, there is a direct correlation between student participation and the quality of the learning experience. Secondly working in groups, or collaborative learning, is recognized as a highly successful mechanism for the transfer and creation of knowledge. Finally, the incorporation of information and communication technologies (ICT) into the learning framework, and the new knowledge environment which is created, should be taken seriously in today's digital age. The relationship of archaeology as a discipline with each of these factors is apparent through the focus on student engagement, collaborative learning, and the use of ICT. Subsequently, teaching through archaeology not only enriches educational experiences but also makes them creative and innovative.

The project method seems to be one of the most accurate pedagogical tools to develop creative individuals (Nikonanou et al. 2004) and could be highly effective when applied to the field of archaeology. The major advantages of using this method include experiential and social learning, working in groups, problem-solving, cross-thematic and cross-curricular approaches and, above all, the active participation of the students, in equal collaboration with the teacher, in the selection, organization, and design of learning materials. Another teaching tool with great potential for application within the field of archaeology is the use of teaching scenarios (Allen 2007). In combination with the use of ICT, scenarios can include archaeological inquiry and interpretation, the ethics and politics of archaeology, public perception of the discipline, values about cultural heritage management, and the understanding of cultural diversity.

Undoubtedly, all the above traditional or innovative tools are further enriched today by the use of ICT. Online lectures and narratives, images and videos, 3D representations and virtual reality constructions, educational robotics, digital surrogates of archaeological objects, online knowledge, and investigation games create a new digital experience that transforms traditional activities into visual and digital immersive experiences. This innovation also requires the development of new teaching and learning skills, particularly in the sphere of digital literacy. Educational activities within this area are broad ranging, with user preference identified for six specific activity types – creative plays, guided tours, interactive references, puzzle/interactive mysteries, role-playing stories, and simulations (Schaller et al. 2002). The British Museum's site "Ancient Greece" (http://www.ancientgreece.co.uk/) is a good example of the use of these innovative teaching and learning methods.

It is expected that educational tools and techniques in archaeology will have a significantly higher digital dimension in the future. The increasing spread of the Semantic Web, the availability of open digital content, and the increased development of e-learning will create new learning and learner participation conditions. Moreover, emerging ultramodern digital technologies like wearable computing, mobile and pervasive computing, ubiquitous computing, augmented reality, quick response (QR) codes, and intelligent environments or intelligent intuitive interfaces will alter human experience. In the future human-computer interaction, on brain computer interfaces and vision-based interfaces, will ensure that educational tools and techniques will be different in critical ways. Learning experiences without the need of a traditional computer ("disappearing computer"), the need for contextual information and ambient intelligence, and the mixture of natural interfaces and embodied cognition with evocative/smart objects will transform the whole educational environment.

Subsequently, the educational tools and techniques should seek to embrace these new developments. A simulated dig, for example, enhanced by QR Codes and augmented reality could be a combination of physical and digital interactive experiences. The ability to visit archaeological sites around the world could be similarly experienced as a daily activity within the classroom through the use of augmented reality. The current challenge is, and will remain, how to ensure that the use of appropriate educational tools and techniques empower learners to build their own learning environments, enabling them to investigate the past and the present through the application of archaeology. In this new digital knowledge environment, the intended learning goals are associated with multiliteracies and making meaning in multimodal ways, while students are regarded as active producers and not passive consumers of knowledge. New learning theories, such as *Learning by Design* (Cope and Kalantzis 2000), take into account this new context. The challenge will be, finally, to help learners create critical awareness about the past both within local and global contexts, as modern citizens of the world. The appropriate incorporation of archaeology into teaching scenarios could be a very effective educational tool in this case (Touloumis 2008).

Cross-References

- ▶ Adult Education in Archaeology
- ▶ Constructivism in Archaeology Education
- ▶ Formal Education Up to Age 18, Archaeology in
- ▶ Heritage Values and Education
- ▶ Internet Use for Archaeological Education
- ▶ Material Culture and Education in Archaeology
- ▶ Museum Education and Archaeology
- ▶ Narrative and Storytelling for Archaeological Education
- ▶ Public Archaeology and Education: Present Relevance to the Past
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

References

AAP. 2016. Designing and assessing public education programs in archaeology. *Advances in Archaeological Practice* 4(4). Published on behalf of the Society for American Archaeology. Cambridge University Press.

Allen, M. 2007. Scenarios for archaeologists: A teaching tool. In *Archaeology to delight and instruct: Active learning in the university classroom*, One World Archaeology Series, 49, ed. H. Burke and C. Smith , 245–252. Walnut Creek: Left Coast Press.2007

Bartoy, K. 2012. Teaching through rather than about: Education in the context of public archaeology. In *The Oxford handbook of public archaeology*, ed. R. Skeates, C. McDavid, and J. Carman, 552–565. Oxford: Oxford University Press.

Bernstein, B. 1996. *Pedagogy, symbolic control and identity. Theory, research, critique*. London: Taylor and Francis.

Burke, H., and C. Smith, eds. 2007. *Archaeology to delight and instruct: Active learning in the university classroom*, One World Archaeology Series, 49. Walnut Creek: Left Coast Press.

Cope, B., and M. Kalantzis, eds. 2000. *Multiliteracies: Literacy learning and the design of social futures*. London: Routledge.

Croucher, K., and W. Romer. 2015. Inclusivity in teaching practice and the curriculum. Guides for teaching and

learning in archaeology 6. Higher Education Academy. Available online at https://www.heacademy.ac.uk/knowledge-hub/number-6-guide-teaching-and-learning-archaeology

Ducady, G., M. Lefas-Tetenes, S. Sharpe, and M. Rothenberg. 2016. Archaeology and the common core: Using objects and methodology to teach twenty-first-century skills in middle school. *Advances in Archaeological Practice* 4 (4): 517–536. https://doi.org/10.7183/2326-3768.4.4.517.

Hamilakis, Y. 2004. Archaeology and the politics of pedagogy. *World Archaeology* 36 (2): 287–309.

Henson, D. 2004. Archaeology in schools. In *Education and the historic environment,* ed. Henson, D., P. Stone, and M. Corbinshley, 24–32. English Heritage. London: Routledge.

Lankshear, C., and M. Knobel. 2011. *New literacies. New literacies: Everyday practices and social learning*. Maidenhead: Open University Press.

Mackay, F., and K. Bilton. 2003. *Learning from experience: Lessons in mainstreaming equal opportunities*. Edinburgh: University of Edinburgh, Scottish Executive Social Research. Available online at https://www.gov.scot/Resource/Doc/47095/0025589.pdf.

Nikonanou, N., K. Kasvikis, and E. Fourliga. 2004. Alternative ways into teaching archaeology: Design, implementation, and evaluation. *Museology, 2. International Scientific Electronic Journal* 51–62. Department of Cultural Technology and Communication, University of the Aegean.

SALTO Newsletter n.d. SALTO Newsletter on Educational Tools. Available online at https://www.salto-youth.net/about/newsletters/nl-tools/nl-tools-1/.

Schaller, D.T., S. Allison-Bunnell, M. Borun, and M. B. Chambers. 2002. *How do you like to learn? Comparing user preferences and visit length of educational web sites. Museums and the web.* Available online at http://www.archimuse.com/mw2002/papers/schaller/schaller.html

Smardz, K., and J.S.H. Smith, eds. 2000. *The archaeology education handbook. Sharing the past with kids*. Walnut Creek: Society for American Archaeology, Altamira Press.

Touloumis, K. 2008. Digital heritage as a dynamic source in the school of information and knowledge: Teaching scenarios and applications using information and communication technologies. In *Digital heritage in the new knowledge environment: Shared spaces & open paths to cultural content,* ed. M. Tsipopoulou, 85–88. Proceedings of the International Conference held in Athens 31.10.2008–2.11.2008.

Further Readings

Archaeology Lesson Plans and Activities from SAA. Available at http://www.saa.org/publicftp/PUBLIC/resources/SAAlessons.html

Bender, S.J., and G. Smith, eds. 2000. *Teaching archaeology in the twenty-first century*. Washington, DC: Society for American Archaeology.

Galanidou, N., and L.H. Dommasnes, eds. 2007. *Telling children about the past: An interdisciplinary perspective*. Ann Arbor: International Monographs in Prehistory.

Henson, D., P. Stone and M. Corbinshley 2004. *Education and the historic environment*. English Heritage. London: Routledge.

Egypt: Islamic Archaeology

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Introduction

Egypt holds a key strategic location at the conjunction of several important waterways: the eastern end of the Mediterranean Sea, the River Nile, and the Red Sea. In addition, the rich agricultural resources of the Nile Valley and Delta, sustained until the twentieth century by the annual flood of the Nile, have enabled the country's population to produce agricultural surpluses that were used throughout classical and medieval times to support other areas of the polities of which Egypt formed a part. These factors gave Egypt considerable economic and political importance that is reflected in its position as a key province in the Islamic world. The nature and distribution of (historic and modern) settlement in the country, however, and associated issues regarding the preservation and accessibility of archaeological remains have created considerable challenges for archaeologists. Much less research on medieval heritage has thus taken place here in general than is the case for countries such as Syria and Jordan, where settlement was and is more spread out across the landscape. Nonetheless, the sometimes exceptional nature of archaeological preservation in Egypt's dry environment has yielded results of considerable significance including organic remains such as textiles and documents, and the importance of the country should not be overlooked despite the limits of our current archaeological knowledge.

Definition

Around 95% of the surface of the modern nation-state of Egypt is desert, historically occupied only by sparse nomadic populations, for the exploitation of mineral resources and for the transit of people and trade goods along particular routes. Throughout the country's history, the vast majority of its occupants have clustered together in the Nile Valley and Delta and in the nearby Faiyum Oasis; there are a handful of additional, smaller, oases lying further into the Western Desert (including Siwa, al-Bahariya, al-Farafra, al-Dakhla, and al-Kharga). During the medieval period, there was some penetration from Egypt southward into Nubian territory, and the conversion of Nubian populations to Islam in the later medieval period led to the development of new Muslim-controlled territories in the northern part of the modern state of Sudan that have some cultural and archaeological synergies with southern Egypt. The construction of the High Dam at Aswan in the mid-twentieth century, however, and the associated creation of Lake Nasser submerged almost all archaeological resources in Lower Nubia; medieval remains were not entirely overlooked but were in general poorly served during the campaigns of survey and rescue excavation that accompanied this massive engineering project in comparison with in particular Pharaonic sites.

Medieval Egypt was occupied by a population with diverse identities and in particular religious affiliations. In the early Islamic period, Muslims were a ruling minority, with conversion to Islam gathering pace through the ninth and tenth centuries. Today, Egypt still has a Christian (largely Coptic) minority of perhaps 10%; its modern Jewish population is tiny but was significant in medieval times as evidenced by the Geniza archive from Old Cairo. Conceiving of "Islamic Archaeology" in the broadest terms (as many scholars do) as relating to the study of territories and peoples under Muslim rule, we can see that a diverse range of sites and lifestyles, including those typically investigated by the field of Coptic Archaeology, will be of relevance to our understanding of medieval Egypt.

Historical Background

Significant damage had already been done to many of Egypt's post-Pharaonic archaeological sites prior to the emergence of archaeology as a modern discipline. Many of the country's important Pharaonic temples became the foci of classical and medieval settlements, often remaining occupied until relatively recently. In the nineteenth and early twentieth century, many of these sites, including Luxor Temple and Medinet Habu in Luxor and Philae Temple in Aswan, were cleared of these later mud-brick phases, usually with little recording (Hölscher 1954 provides the most detailed record of one such clearance). An additional cause of damage to medieval sites during this period was the practice of *sibakh* digging: the extraction of archaeological deposits rich in organic material and silt from mud-bricks for use as fertilizer, which was conducted at an industrial scale. Artifacts of value that were uncovered during *sibakh* digging (e.g., sites in the Faiyum Oasis yielded a wealth of papyri) were usually sold on the open market.

One such commercial *sibakh* extraction took place among the mounds of al-Fustat, now in the south of modern Cairo. Al-Fustat was Egypt's early Islamic capital city, founded in 641-2 following the conquest of Egypt. It rapidly became a large and important center, remaining so until the eleventh century. In the late nineteenth and early twentieth century, the expansion of Cairo's population brought settlement into the area of the archaeological mounds, giving rise to intensive digging for construction purposes, for *sibakh* mining, and to retrieve saleable artifacts. Decontextualized objects from the mounds of al-Fustat appearing on the antiquities market attracted the attention of Ali Bahgat Bey and Albert Gabriel, who worked in conjunction with commercial diggers as a form of salvage excavation for more than a decade, ending in 1924 (Fig. 1). An extensive area of early Islamic housing and streets was uncovered and recorded to the standards of the time (Bahgat and Gabriel 1921–1928; Bahgat 1923). Archaeological work continued sporadically through the 1930s–1960s under the auspices of Cairo's Museum of Islamic

Art, and the finds recovered by all these scholars formed the basis of that institution's collections.

The Bahgat and Gabriel excavations of al-Fustat triggered or reflected a growing interest in Egypt's medieval material culture, long overshadowed by the country's Pharaonic past. Scholarly interest in historic Christian architecture in the region had begun toward the end of the nineteenth century (see, e.g., Butler 1884), but structures other than churches and monastic buildings were slower to attract the attention they undoubtedly deserved. Starting in the 1920s, wider studies of extant medieval architecture appeared, including Islamic monuments, with the publication of multiple works by scholars such as Ugo Monneret de Villard (1930, 1935–1957, inter alia) and K.A.C. Creswell (1932–1940, 1952–1959). The development of Islamic archaeology in Egypt can thus be seen to parallel the wider emergence of the discipline, under the early influence of art and architectural history and the antiquities market, and in the shadow of the study of the ancient Near East.

It was again at al-Fustat that more modern archaeological work on Islamic Egypt was undertaken. As had been the case at the time of Bahgat and Gabriel's excavations, a construction boom and the ongoing expansion of housing into the area of the site created a need for urgent salvage archaeology. A project was thus initiated by George Scanlon and Władysław Kubiak in 1964 and continued until 1980, excavating in diverse parts of the site and uncovering significant areas of the city's residential quarters. Regular preliminary reports were published throughout this period, primarily in the *Journal of the American Research Center in Egypt*. However few syntheses have appeared (an exception is Kubiak and Scanlon 1989; see also Kubiak 1987), and thus, although the preliminary reports include a wealth of detail, the earlier ones in particular have to be read in light of the inevitable subsequent development of the excavators' interpretations, especially as regards chronology.

Scanlon and Kubiak's work at al-Fustat substantially moved forward scholarly understanding not just of medieval urbanism and material culture in Egypt but within the wider region. As an early Islamic urban foundation, the site had (and still has) much to contribute to debates on the development of inherited urban forms in comparison to newly created foundations. Some slight traces of

Egypt: Islamic Archaeology, Fig. 1 Fertilizer extraction among the mounds of al-Fustat. (Bahgat and Gabriel 1921–1928, vol. 2: Plate 2; image courtesy of the Warburg Institute, accessible at: http://catalogue.ulrls.lon.ac.uk/record=b2458219~S12)

the earliest phases of the town were uncovered, mainly as deposits in refuse pits and the lowest street levels; the relative scarcity of levels from the seventh and eighth centuries was largely due to their destruction during later rebuildings. The majority of the architecture recorded on the site was of ninth- to eleventh-century date, and domestic structures varied considerably in size, quality, and by association also in terms of the wealth of their occupants. Complex systems of waste disposal were commonly cut into the bedrock. Following the end of the heyday of al-Fustat, which burned in 1168, much of the site was used for industrial activity, in particular ceramic manufacture, and Scanlon and Kubiak uncovered kilns and associated infrastructure overlying the domestic levels. The diversity of the built city that was uncovered and the range and quality of finds (echoes of the art-historical origins of the discipline remained in the treatment of these, with only glazed and decorated wares from the total assemblage of pottery being published) created continuing interest in Egypt's Islamic archaeology.

Al-Fustat was not the only medieval site undergoing excavation at this time. To the south in Lower Nubia, the site of Qasr Ibrim – the only site to survive the rising waters of Lake Nasser due to its location high on a cliff – underwent excavation by the Egypt Excavation Society from 1963, continuing intermittently until 1998 (Adams 1996, 2010; Aldsworth 2010). Despite the rising water table, conditions at Qasr Ibrim allowed astonishing organic preservation, including textiles, papyrus, parchment and paper documents, leather, wood, and plant and animal remains (Fig. 2). All these artifacts shed much light on conditions of occupation at the site, from an eighth-century letter to the Nubian king regarding the *baqt* treaty with Egypt, via the burial of a fourteenth-century bishop through to evidence for the domestic conditions of the nineteenth-century Ottoman garrison. The location of the site beyond medieval Egypt's southern border provides opportunities to investigate political, economic, and cultural interactions between Egypt and Nubia at both the formal and informal level. Again, although some preliminary publications appeared through the course of the excavations, broader syntheses have appeared only recently; perhaps the impact of both the al-Fustat and the Qasr Ibrim excavations outside Egypt has been somewhat reduced by these delays in the dissemination of the results from their early seasons.

Egypt: Islamic Archaeology, Fig. 2 Late medieval Old Nubian manuscript fragment found on the floor of the cathedral at Qasr Ibrim during the 1963–1964 season of excavations, depicting an archbishop, now held in the British Museum (accession number EA82963). (Image courtesy of Pamela Rose and the Egypt Exploration Society)

In 1959 excavations had commenced at the site of Kom al-Dikka in Alexandria, better known for its extensive Roman archaeology than for its medieval strata. Classical levels, in particular the theatre, were, however, overlain with a Muslim cemetery, in use intermittently from the seventh to the early twelfth century, which was excavated during the late 1960s and early 1970s by a Franco-Polish team, the human remains being analyzed by Elżbieta Promińska (1972). This is still the only significant body of osteoarchaeological data from medieval Egypt. A decade

later, on the Red Sea coast, excavations were conducted by Donald Whitcomb and Janet Johnson of Chicago's Oriental Institute at the late Ayyubid to Mamluk port of Qusayr al-Qadim between 1978 and 1982 (Whitcomb and Johnson 1982), a project that again saw the retrieval of important organic artifacts including paper documents and that arguably provided the springboard for a series of more recent Red Sea excavations focusing on Egypt as one end of an extended network of maritime Indian Ocean trade (see below).

The projects outlined above created the foundations for more recent work, which has built on them in various ways. The focus on Cairo, and on sites located toward the maritime and riverine frontiers of Egypt, can certainly be traced into the present. Some new strands of research have developed, while some older ones have fallen by the wayside.

Key Issues/Current Debates

Islamic archaeology as a discipline has historically focused on urban centers, and this largely remains the case for Egypt. Archaeological work has been and is still dominated by results from Cairo, initiated by the large-scale excavations of al-Fustat by Bahgat and Gabriel and Scanlon and Kubiak discussed above. More recent and current work at al-Fustat includes the French excavations at Istabl Antar, directed by Roland-Pierre Gayraud between 1985 and 2005; Japanese excavations of the central quarter of al-Fustat, directed by Kiyohiko Sakurai and Mutsuo Kawatoko between 1978 and 1985, more recently revisited in 1998; unpublished Egyptian excavations in the area of the Sabaʿa Banaat mausolea, directed by Ibrahim ʿAbd al-Rahman and Mamdouh al-Said in the late 1990s/early 2000s; and American/British excavations of Islamic-era and earlier occupation within and around the Roman fort of Babylon, Old Cairo, directed by Peter Sheehan (Gayraud 1998; Kawatoko 2005: 846–8; Sheehan 2010) (Fig. 3). Further north, French excavations directed by Stéphane Pradines have investigated the northeast corner of the city walls of the Fatimid suburb of al-Qahira since 2000 (Pradines et al. 2009). The numerous architectural studies and heritage management projects in historic Cairo, the most notable additions to which in the last few years have been by Nicholas Warner (2005) and the Aga Khan Development Network, will not be discussed here. Due to twentieth-century population expansion and the built-up nature of the

Egypt: Islamic Archaeology, Fig. 3 Brick and stone structures of Fatimid and Ayyubid date, respectively, forming part of the complex archaeological sequence at Dayr al-Banaat, Old Cairo, excavated during archaeological monitoring by the American Research Center in Egypt of the USAID-sponsored Contract 102 Old Cairo Groundwater Lowering Project. (Image courtesy of Peter Sheehan)

modern city, however, our knowledge remains greater for the southern and eastern fringes of the historic settlement, rather than uncovering the wider urban landscape. A city-wide program of archaeological monitoring, similar to that directed by Sheehan in Old Cairo or Wolfgang Müller in Aswan (see below), seems unlikely to take place in the near future; but this is what would be needed to improve the state of our knowledge in this respect.

It is not only in Cairo that accessibility of urban archaeological resources is a problem, and only in a handful of places have excavation strategies been implemented to address this. A program of archaeological monitoring of urban development has been ongoing in Aswan since 2000, undertaken by the Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo in collaboration with the Egyptian Supreme Council for Antiquities and directed by Wolfgang Müller, Cornelius von Pilgrim, and Muhammad al-Bialy (Schweizerisches Institut n.d.). To date, more than 90 separate areas in the central part of the city have been investigated, shedding light on features including the riverfront, civic structures, and settlement extent (Fig. 4). The extramural cemetery, to the east of the medieval center, was the subject of a further project, directed by Philipp Speiser, which recorded architecture and burial practices with a view to understanding changing activity through time. Alexandria has also received similar attention from archaeologists at the Centre d'Études Alexandrines. However there remain many significant urban centers of medieval importance – for example, Minya in Middle Egypt – that are almost entirely overbuilt and where no archaeological research has yet taken place. Even those urban sites that are not altogether overbuilt are problematic. The activities of the *sibakh* diggers badly damaged the uppermost levels of many of the large Roman, late Roman, and early Islamic archaeological sites, to the point where their stratigraphy is seriously compromised. Examples of such sites include Elephantine in Aswan and Antinoopolis and Ashmunein in Middle Egypt.

The accessibility of much of Egypt's medieval archaeology is thus inherently problematic, and the logistical and methodological challenges this poses go much of the way to explaining the reduced levels of archaeological activity in comparison with the more extensive fieldwork that has taken place in, for example, Syria and Jordan. These taphonomic processes have shaped our understanding more than they ought to have done. The existence on the one hand of great

Egypt: Islamic Archaeology, Fig. 4 Aswan's riverfront wall, preserved to some 8 m in height with a possible water-wheel emplacement, in area 52 of the Swiss-Egyptian Joint Mission at Old Aswan; the wall seems to have fallen out of use in the second half of the fourteenth century. (Image by Axel Krause courtesy of the Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo)

classical sites with damaged early medieval levels, and on the other of medieval centers with their early development obscured by modern settlement, has led to a perception of settlement dislocation at or around the time of the Muslim conquest (Gascoigne 2005). Although discourse has in general moved away from the view that the conquest was destructive and disruptive – assumptions historically rooted in outdated colonialist views of Arab culture as uncivilized – it has been difficult to investigate the development of early medieval urbanism in Egypt in any detail, and interpretative frameworks have been limited, often focusing on influences from outside Egypt (e.g., the Samarra-style houses of al-Fustat, the introduction of the *iwan*, the influence of Chinese porcelain on early glazed wares).

There are exceptions to the accessibility issues outlined above. Sites on some stretches of Egypt's coast have not been completely overbuilt, although many (e.g., Alexandria, Dumyat, Suez) are almost entirely so. The Red Sea coast in particular, in addition to the north-east Delta edge and Sinai, contains several medieval sites of considerable interest, which have seen some investigation in recent years. Of the Red Sea ports, Qusayr al-Qadim is arguably most well known; following the American excavations discussed above, further work was undertaken by David Peacock and Lucy Blue between 1999 and 2003 (Peacock and Blue 2006–2011). The Ottoman-Napoleonic fort in the town of Qusayr has also been the subject of archaeological investigation (Le Quesne 2007). A Japanese team has excavated the medieval settlements at Raya and al-Tur on the Red Sea coast of Sinai (Kawatoko 2005: 851–5). The important southern Egyptian Red Sea port of ʿAydhab, however, is not easily accessible due to its militarily sensitive location on the Egypt-Sudan border and in recent times has been analyzed only through satellite imagery (Peacock and Peacock 2008). On Egypt's Mediterranean coast, the ports/fortified urban centers at al-Farama (Pelusium) and Tinnis have undergone some archaeological investigation. Al-Farama has been the subject of Egyptian, French, and most recently Polish projects, the latter undertaking geophysical survey (Fig. 5). Focus has tended to be on the classical phases of occupation; the medieval settlement is not well investigated, and a misconception concerning the date of the rectangular enclosure (which is early Islamic, as are the walls of Tinnis, and not Roman as often stated) lingers in the literature. At Tinnis, a program of topographical and geophysical survey directed by Alison Gascoigne (since 2011 with John Cooper) has clarified the urban layout, identifying and recording features including the city enclosure wall, canals, the town's citadel, industrial complexes, and a street layout that appears sub-rectilinear in places (Gascoigne et al. 2020) (Fig. 6). A series of sites including forts and water infrastructure associated with

Egypt: Islamic Archaeology, Fig. 5 One of the gateways into the early Islamic-era walled city at Al-Farama, following restoration. (Image courtesy of John Cooper)

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Egypt: Islamic Archaeology, Fig. 6 View along the line of the enclosure walls at Tinnis. (Image by the author)

Egypt: Islamic Archaeology, Fig. 7 The early Islamic-era fortress of Hisn al-Bab, overlooking the First Cataract of the Nile. (Image courtesy of Pamela Rose, 2006)

routes across Sinai have also been preliminarily investigated (Mouton et al. 1996). Also on the fringes, if not the coast, of Egypt lies the well-preserved Roman and medieval fortress of Hisn al-Bab on the First Cataract of the Nile, subject of excavations directed by Pamela Rose of the Austrian Archaeological Institute (Fig. 7).

A second group of medieval archaeological sites that has seen considerable attention in recent years is associated with late antique and medieval Coptic monasticism. As with some of the sites discussed previously, this is due to their locations, in these cases often set back from the cultivation on the desert edge. Themes emerging from current projects include lived monastic experience (use of domestic architecture, diet, lifestyle, daily routine, etc.) and its embedding within a wider cultural context; the enmeshing of monastic institutions within the regional economy; and an increasing emphasis on continuity of late Roman to post-conquest monastic prosperity. There is not space here to present an exhaustive list of the numerous

projects behind these developments, which are spread widely across Egypt: only a few are noted here. In the Wadi Natrun, excavations at the Monastery of John the Little have been undertaken since 2006 by the Yale University Monastic Archaeology Project, overseen by Stephen Davis and directed in the field initially by Darlene Brooks Hedstrom (2006–2010) and currently by Gillian Pyke (2011–present) (Brooks Hedstrom et al. 2011; Davis et al. 2012) (Fig. 8). The World Heritage Site of Abu Mina, c. 45 km southwest of Alexandria, was investigated by a team under the direction of Peter Grossmann from the 1980s onward; Grossmann has also published details of many of Egypt's medieval churches (2002). In Middle Egypt, surveys and excavation have been undertaken at the historic monasteries in Sohag. At the Red Monastery, this work has been directed by Elizabeth Bolman and Michael Jones. At the White Monastery, work has been conducted under the auspices of the American Research Center in Cairo and Yale University, directed in stages by Bolman, Sheehan, and Brooks Hedstrom (2002–2008) and by Davis and Pyke (2008–present) (Davis et al. 2010; Brooks Hedstrom et al. 2011–2012; Davis et al. 2012). Near Edfu, the site of Hagr Edfu has been under investigation by a team from the British Museum directed by Vivian Davies and Elisabeth O'Connell since 2001 (O'Connell 2013). Other sites of importance, many of which are subject to ongoing archaeological intervention, include the Red Sea complexes of St Paul and St Anthony; Dayr al-Naqlun in the Faiyum Oasis; and complexes at Ansina, Bawit, Akhmim, Athribis, Nagada, on the West Bank of the Nile at Luxor (Dayr al-Bahri, the Monastery of Epiphanius, Dayr al-Bakhit), Esna (Dayr al-Shuhada and Dayr al-Fukhari), and Aswan (the Monastery of St Simeon, Qubbat al-Hawa), inter alia. There is more to be done in terms of integrating the evidence from such projects with those from the sites discussed previously, and comparative material studies focusing on connections, lived experience, and identity may yield results of interest in the future.

Egypt: Islamic Archaeology, Fig. 8 View west across kitchen emplacements in Room 19 of a ninth- to tenth-century residence in the Monastery of John the Little, Wadi al-Natrun, excavated in 2009–2010 by the Yale Monastic Archaeology Project. (Image courtesy of Gillian Pyke and Stephen Davis)

International Perspectives

It is sadly true of Egyptian archaeology of all periods that meaningful intellectual collaboration between Egyptian and foreign archaeologists is still the exception rather than the norm. Explanations for this can be sought in the lingering echoes of the colonial origins of archaeology in the area, for example, in the use of European languages, rather than Arabic, for the majority of archaeological publications. The internal organization of the country's own archaeological services is another significant factor. The situation has improved in recent years, although progress remains slow, with initiatives such as field schools, and the publication of the journal *Mishkah*, an outlet for research on Egyptian Islamic archaeology with papers in various languages. Participation of Egyptian scholars in conferences held in Cairo's various national research institutes has also become standard, although few are able to travel easily to events outside Egypt. Many nationalities are active in Egyptian Islamic archaeology, with France, Britain, and America particularly well represented.

Future Directions

Two aspects of archaeological research are particularly poorly represented within the field of Islamic archaeology in Egypt, both in fact reflecting the situation of archaeology in Egypt more generally. These spring from the geographical configuration and politico-administrative realities of the country, respectively. First is a lack of archaeological research into rural landscapes; and second is the difficulty in applying laboratory techniques of modern archaeological science that have become standard practice in many other parts of the world.

The intensive nature of Egyptian agriculture is inevitably destructive of archaeological traces of earlier rural settlements, field systems, and irrigation channels. Following construction of the Aswan High Dam (completed in 1971), land use in Egypt is now so intensive as to remove almost all traces of earlier activity. Some features of the countryside, however, might yield some information about earlier landscapes, if studied using geoarchaeological and geomorphological approaches; examples might include routes and roads, canals, channels, and dykes. Some attempts to reconstruct medieval landscapes have been made on the basis of historical sources (e.g., al-Nabulsi's account of the organization of late medieval al-Faiyum). The work of scholars such as Judith Bunbury and John Cooper on waterways, however, has indicated the promise of on-the-ground approaches (although Bunbury does not focus exclusively on Islamic-era landscapes). The expansion of settlements, intensification of agriculture, and subsidence of the northern Delta combine to make such research pressing. Diachronic study of Egypt's landscape might also allow critique of assumptions – on the basis of perceived rural conservatism and in the absence of direct evidence – of continuity of practice over long time periods.

In terms of the application of approaches from archaeological science, Egyptian excavation has yet to benefit from the widespread application of modern techniques. Carbon dating has been available through the laboratories of the Institut Français d'Archéologie Orientale in Cairo since 2006, but many other dating and analytical techniques are not easily achieved in the country due to a lack of facilities, nor is the export of archaeological material from Egypt currently permitted. The potential value of the application of scientific techniques to artifacts, osteoarchaeological remains, environmental samples, etc., is clear, and it may be that greater scientific collaboration between international institutions, the Egyptian Antiquities Service, and Egyptian universities is the best way to develop the possibilities for these sorts of analyses in the immediate future.

Cross-References

- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic and Crusader Archaeologies
- ▶ Islamic and Maritime Archaeologies
- ▶ Islamic Archaeology
- ▶ Islamic Archaeology and Art History
- ▶ Military Activity in Islamic Archaeology
- ▶ Orientalism: Islamic Archaeology and its Colonial Context
- ▶ Ottoman Archaeology: Localizing the Imperial
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology
- ▶ Spain and North Africa: Islamic Archaeology
- ▶ Swahili Archaeology
- ▶ West Africa: Islamic Archaeology

References

Adams, W.Y. 1996. *Qasr Ibrim: The late medieval period*. London: Egypt Exploration Society.

Adams, W.Y. 2010. *Qasr Ibrim: The earlier medieval period*. London: Egypt Exploration Society.

Aldsworth, F. 2010. *Qasr Ibrim: The cathedral church*. London: Egypt Exploration Society.

Bahgat, A. 1923. Les fouilles d'al-Foustat. *Syria* 4 (1): 59–65.

Bahgat, A., and A. Gabriel. 1921–1928. *Fouilles d'al-Foustat* (Vol. 1: text, Vol. 2: photograph album). Cairo/Paris: Musée National de l'Art Arabe.

Brooks Hedstrom, D.L., E.S. Bolman, M.A. Rahim, S. Mohammed, D. McCormack, T. Herbich, G. Pyke,

L. Blanke, T. Musacchio, and M. Khalifa. 2011–2012. The White Monastery Federation Project: survey and mapping at the monastery of Apa Shenoute (Dayr al-Anba Shinūda), Sohag, 2005–2007. *Dumbarton Oaks Papers* 65/66: 333–364.

Brooks Hedstrom, D., S.J. Davis, T. Herbich, S. Ikram, D. McCormack, M.-D. Nenna, and G. Pyke. 2011. New archaeology at ancient Scetis: Surveys and initial excavations at the monastery of St. John the little in Wādī al-Naṭrūn. *Dumbarton Oaks Papers* 64: 217–227.

Butler, A.J. 1884. *The ancient Coptic churches of Egypt*. Oxford: Clarendon Press.

Creswell, K.A.C. 1932–1940. *Early Muslim architecture*. Oxford: Clarendon Press.

Creswell, K.A.C. 1952–1959. *The Muslim architecture of Egypt*. Oxford: Clarendon Press.

Davis, S.J., L. Blanke, E. Bolman, D. Brooks Hedstrom, M. Burgoyne, T. Herbich, B. Layton, S. Mohammed, G. Pyke, and P. Sheehan. 2010. Archaeology at the white monastery, 2005–2010. *Coptica* 9: 25–58.

Davis, S.J., E. Bolman, D. Brooks Hedstrom, and G. Pyke. 2012. Life and death in lower and upper Egypt: A brief survey of recent monastic archaeology at Yale. *Journal of the Canadian Society for Coptic Studies* 3-4: 9–26.

Gascoigne, A.L. 2005. Dislocation and continuity in early Islamic provincial urban centres: The example of Tell Edfu. *Mitteilungen des Deutschen Archäologischen Instituts Abteilung Kairo* 61: 153–189.

Gascoigne, A.L., Al-Sayyid ʿAgamī ʿArafa, J.P. Cooper, H. Fenwick, M.J. Harrison, Ṭāriq Ibrāhīm Ḥusaynī, B.T. Pennington, G. Pyke, ʿAbbās al-Shināwī, C. Stephens, K. Strutt, and N.J. Warner. 2020. *The island city of Tinnis: A postmortem*. Cairo: Institut Français d'Archéologie Orientale.

Gayraud, R.-P. 1998. Fostat: évolution d'une capitale arabe du VIIe au XIIe siècle d'après les fouilles d'Istabl ʿAntar. In *Colloque international d'archéologie islamique*, 435–460. Cairo: Institut Français d'Archéologie Orientale.

Grossmann, P. 2002. *Christliche Architektur in Ägypten*. Leiden: Brill.

Hölscher, U. 1954. *The excavation of Medinet Habu 5: Post-Ramessid remains*. Chicago: University of Chicago Press.

Kawatoko, M. 2005. Multi-disciplinary approaches to the Islamic period in Egypt and the Red Sea Coast. *Antiquity* 79: 844–857.

Kubiak, W. 1987. *Al-Fustat: Its foundation and early urban development*. Warsaw: Warsaw University Press.

Kubiak, W., and G.T. Scanlon. 1989. *Fustat expedition final report vol. 2: Fustat-C*, American Research Center in Egypt reports. Vol. 11. Winona Lake: Eisenbrauns.

Le Quesne, C. 2007. *Quseir: An Ottoman and Napoleonic fortress on the Red Sea coast of Egypt*. Cairo: American University in Cairo Press.

Monneret de Villard, U. 1930. *La necropoli musulmana di Aswan*. Cairo: Imprimerie de l'Institut d'Archéologie Orientale.

Monneret de Villard, U. 1935–1957. *La Nubia medioevale*. Cairo: Imprimerie de l'Institut d'Archéologie Orientale.

Mouton, J.-M., S.Ṣ. ʿAbd al-Mālik, O. Jaubert, and C. Piaton. 1996. La Route de Saladin (ṭarīq Ṣadr wa Ayla) au Sinaï. *Annales Islamologiques* 30: 41–70.

O'Connell, E.R. 2013. Christian Hagr Edfu. In *Christianity and monasticism in upper Egypt in Aswan and Nubia*, ed. G. Gabra and H.N. Takla, 237–248. Cairo: American University in Cairo Press.

Peacock, D.P.S., and L.K. Blue, eds. 2006–2011. *Myos Hormos – Quseir al-Qadim: Roman and Islamic ports on the Red Sea*. Oxford: Oxbow Books/Archaeopress.

Peacock, D.P.S., and A. Peacock. 2008. The enigma of ʿAydhab: A medieval Islamic port on the Red Sea Coast. *International Journal of Nautical Archaeology* 37 (1): 32–48.

Pradines, S., D. Laville, M. Matkowski, J. Monchamp, N. O'Hora, M. Sulayman, and T. Zurrud. 2009. Excavations of the archaeological triangle: 10 years of archaeological excavations in Fatimid Cairo (2000 to 2009). *Mishkah* 4: 177–219.

Promińska, E. 1972. *Investigations on the population of Muslim Alexandria: Anthropological-demographic study*, Travaux de Centre d'archéologie méditerranéenne de l'Académie polonaise des sciences. Vol. 12. Warsaw: Éditions scientifiques de Pologne.

Schweizerisches Institut. n.d. Syene/Aswan. Available at: http://www.swissinst.ch/html/forschung_neu.html. Accessed 4 November 2019.

Sheehan, P. 2010. *Babylon in Egypt: The archaeology of Old Cairo and the origins of the city*. Cairo: American University in Cairo Press.

Warner, N.J. 2005. *The monuments of historic Cairo: A map and descriptive catalogue*. Cairo: American University of Cairo Press.

Whitcomb, D., and J. Johnson. 1982. *Quseir al-Qadim 1980: Preliminary report*, American Research Center in Egypt reports. Vol. 7. Malibu: Undena.

E

Egyptian Rock Art

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Introduction and Definition

Egypt is a land with an immense density of archaeological remains spanning hundreds thousands of years, from the Paleolithic onward. The most recognizable is the Pharaonic heritage, but a rich material legacy comes also from the

Neolithic and the Predynastic times, as well as from post-dynastic periods such as the Roman, Byzantine, and Islamic Period. Within extremely abundant archaeological findings, rock art can be easily overlooked, even though this category of remains constitutes a highly diversified and large assemblage. No doubt, rock art studies are still situated in the shadow of Egyptology, but they surely benefit from very rich contextual information provided by numerous archaeological and textual sources.

Rock art in Egypt is diversified as regards technique, subject matter, placement, and chronology. Most of rock art is either pecked or engraved onto rock surface, and only in selected areas, paintings and stencils have been recorded. Here, a very substantial distinction must be made between petroglyphs and *graffiti*, as well as paintings and *dipinti*. *Graffito* is a term used in Egyptian archaeology for a long time, referring in most cases to figural depictions and/or inscriptions executed in/on buildings (cf. Huyge 2009). However, it is not unusual for also depictions and inscriptions produced on natural surfaces to be termed as *graffiti*, which may cause a great deal of confusion. Following Dirk Huyge (2009), rock art will be understood here as depictions executed on rock surfaces, and a large corpus of *graffiti* produced on buildings is to be distinguished from them. This is also how *dipinti* should be separated from paintings, the former being placed upon man-made features whereas the latter on rocks. It is, however, of importance to note that such a division into markings executed on natural surfaces (rock art) and markings produced on man-made features (*graffiti*, *dipinti*) is a matter of convention, for it is not unusual that the same motifs occur in both contexts. It is thus possible that for ancient Egyptians such a differentiation did not exist at all. A seemingly obvious difference between rock art and inscriptions may become blurred as well. It concerns especially individual hieroglyphs and signs based on the hieroglyphic script, which have been recorded in numerous contexts, including rock art assemblages and *graffiti* on man-made surfaces. A selection of studies on such "non-textual marks" has been recently published by Haring and Kaper (2009).

Rock art in Egypt spans at least 15,000 years and was created in virtually all periods since the terminal Pleistocene (see below). Although we cannot speak about any living tradition of rock art in modern times, petroglyphs were still occasionally produced by Bedouins in the twentieth century, and quite possibly, some are still being added. Most of petroglyphs are drawn on rocks in open landscapes, usually on sandstone, but likewise on limestone and different volcanic rocks. Although caves are rare in Egypt, rock art has been also found in them, for instance, in Djara, Wadi el-Obeiyid, and the Cave of Hands (Classen et al. 2009; Lucarini 2014; Darnell 2009). Petroglyphs predominate, and there are almost no paintings reported from the Nile Valley and the Eastern Desert. The only area in which rock paintings are abundant is the SW corner of the Western Desert, where in the massifs of Gebel Uweinat and Gilf Kebir, hundreds of sites with such paintings have been discovered (Zboray 2009; Kuper 2013). We can distinguish four main rock art areas (Fig. 1):

- The Nile Valley: particularly in the Upper Egypt
- The Eastern Desert
- The Western Desert: both the oases and desert interior
- Gebel Uweinat and Gilf Kebir massifs

Rock art in each of these areas shares many commonalities with rock art corpora from other regions, but also in each of these areas, some local features can be distinguished (see below). Because it is not possible to refer to all publications reporting the Egyptian rock art in this essay, the reader is encouraged to consult other overviews (e.g., Le Quellec and Huyge 2008; Huyge 2009; Riemer 2009).

Historical Background

Rock art in Egypt has only recently started to gain scholarly attention, although its presence has been noted for 200 years. In the nineteenth century, it was usually only mentioned in reports of early

Egyptian Rock Art, Fig. 1 A map of Egypt with the rock art localities/complexes mentioned in the text

travelers and scholars journeying to different, often secluded locations (for more references, see Huyge 2009). One of the first archaeologists who turned his attention toward petroglyphs was Sir W.M.F. Petrie (1888). It was, however, the first half of the twentieth century which witnessed a gradual growth of interest in this research subject. The presence of rock art was reported, for instance, from the Eastern Desert, where it had been encountered by Arthur Weigall (1909). He found there some petroglyphs depicting boats, which, taking into consideration their desert location, was an exciting discovery. Further findings from the Eastern Desert were just a matter of time, and many more petroglyphs were shortly reported also from the interface area between the desert and the Nile Valley.

Very important research was conducted in 1926 by Leo Frobenius and his *Deutsche Inner-Afrikanische Forschungs-Expedition* to the Eastern and Nubian Deserts and the Upper Egyptian Nile Valley (DIAFE VIII). The expedition had recorded a very rich corpus of rock art, which was later analyzed and published by Pavel Červíček (1974). The Upper Egyptian Nile Valley witnessed in those times a gradual increase of known rock art sites, but most of them were discovered accidentally and usually treated as secondary to the main areas of interest of Egyptian archaeology. It was the Eastern Desert in particular which was increasingly surveyed in search of various archaeological sites (e.g., epigraphic sites, mines, ancient routes, etc.) and where petroglyphic localities were often registered as an additional element. In the early 1930s, also the Western Desert became a focus for rock art surveying, and two expeditions, again led by Frobenius, reached the isolated territories of Gebel Uweinat and Gilf Kebir (DIAFE XI and XII; 1933–1935). During one of them, the famous

Cave of Swimmers was discovered. Full of paintings, it contained anthropomorphic figures apparently depicting swimming humans. The history of one of the discoverers, László Almásy – a Hungarian aristocrat and one of the then leading experts in desert traveling – was dramatized in the movie *The English Patient* in 1996.

The first grand project (financed by Sir Robert Mond) fully dedicated to rock art was instigated by Hans Alexander Winkler who was active in Egypt in the 1930s. In 1936, Winkler (1938, 1939), interested in ethnography, religion and magic, begun his rock art survey which covered large areas in the Nile Valley (from the Qena bend southward), Eastern Desert (mainly Wadi Hammamat and Wadi Baramiya), and the Western Desert (mainly environs of the Kharga and Dakhleh oases and Gebel Uweinat). He discovered rock art representing various traditions from prehistoric, through dynastic, to Arab times, and we owe to him not only a big collection of documentation but also the first attempts at rock art periodization and interpretation. Winkler attempted at reading social and religious meanings, allegedly represented in different rock art styles. He, apparently, equaled such styles with particular societies and ethnic groups and understood rock art as kind of a self-portrait of these communities. No doubt, many of the methodological procedures behind his reasoning may be put into question today (e.g., loosely applied ethnographic analogy), but his pioneering work on both interpretation and dating of rock art has to be acknowledged. Were it not for his tragic death during the Second World War, he would have most probably published much more than his extensive reports from 1938 and 1939 and would have been able to verify some of his ideas.

After the war, the attention shifted first from the Eastern to the Western Desert. Hans Rhotert, who had taken part in the DIAFE expeditions to the Western Desert (known also as the Libyan Desert) in the 1930s, published an important book in 1952. His *Libysche Felsbilder* (Rhotert 1952) was the first comprehensive monograph dedicated to rock art and certainly contributed to elevating rock art studies to a more recognizable position in the Egyptian archaeology. The next rock art expedition to Gebel Uweinat was launched by Francis Van Noten in the winter of 1968/1969 (Van Noten 1978). His mission managed to add more rock art sites to the already known localities discovered previously by Winkler and Frobenius in the valley of Karkur Talh.

In the 1960s and 1970s, the attention of scholars was redirected toward the endangered monuments of the Lower Nubia – the land encompassing the southern limits of Egypt and the northern province of the Sudan. Rock art documentation was certainly among the priorities and has resulted in publishing several extensive catalogues (e.g., Almagro Basch and Almagro Gorbea 1968; Váhala and Červíček 1999). Although the Lower Nubian rock art is highly related to Egyptian rock art corpora, it deserves a separate entry and thus will not be discussed here.

It has been already mentioned that the documentation of 1926 Frobenius' expedition was published later by Pavel Červíček in 1974. He analyzed also part of the research material collected by Winkler, and in addition to interpretative attempts, he proposed a new periodization of Egyptian rock art (Červíček 1986). Although this chronology is disputable at some points, it still holds value and may provide a reference for any regional rock art studies. Further, however, Červíček employs an interpretative method which he calls "isochronological." The main assumption of the method is the contention that in order to interpret rock art, one should refer only to contemporary media and not to those dated from other periods. Equipped with such methodology, Červíček interpreted rock art from various (pre-)historical stages, linking it almost entirely with religious meanings and motivations. His reasoning, however, is supported also by ethnography, often fairly distant, and local archaeological sources, not necessarily contemporaneous with analyzed rock art. It may be, thus, concluded that Červíček was not rigorous enough to follow his own method. His total "religious" interpretation of Egyptian rock art met later with some criticism as being too extreme (Huyge 2009).

From the 1970s till 1990s, not many rock art expeditions were organized, and although new

findings were still reported occasionally, rock art fieldwork was relatively rare. Among the exceptions, one can count in the works of Gerald Fuchs (1989) and Lech Krzyżaniak (1990), in the Eastern and the Western Desert, respectively. Moreover, the area between Gebel Uweinat and the Dakhleh Oasis was explored by the German expedition *Besiedlungsgeschichte der Ost-Sahara* (B.O.S.) led by Rudolph Kuper. During the life of the project, many rock art sites were discovered and recorded, for instance, in the Abu Ballas and Mudpans areas (cf. Riemer 2009).

It was not until the beginning of the 1990s that rock art research in Egypt had entered a new era, marked by the increased number of projects and growing general interest in rock art studies among other scholars. In the Nile Valley itself, a very important study of prehistoric and dynastic petroglyphs was carried out near Elkab by Dirk Huyge (1995). He also conducted research on one of the Winkler's sites in the area of el-Hosh, where the first attempts at direct dating of rock art were undertaken (Huyge et al. 2001). Krzyżaniak's research in the Dakhleh Oasis continued for the whole decade, as well as the works conducted by the B.O.S. project, which was further followed by the *Arid Climate, Adaptation and Cultural Innovation in Africa* (ACACIA) project (Riemer 2009). At the turn of the century, new initiatives were undertaken in the Eastern Desert as well. The purpose was to survey vast territories between the valleys of Hammamat and Baramiya. The *Rock Art Topographical Survey* (Desert RATS) and the *Eastern Desert Survey* (EDS) resulted in publishing two volumes cataloguing hundreds of rock art sites, many previously unknown (Rohl 2000; Morrow and Morrow 2002). Although the standard of these publications is sometimes questioned, doubtlessly they still have a value as rich sources of raw rock art data, with many sites known only from these two books.

The twenty-first century has witnessed a significant increase in rock art research. András Zboray's continuous work in the Gebel Uweinat region enriched our knowledge of rock paintings tremendously (Zboray 2009, 2012). In nearby Gilf Kebir, the *Wadi Sura Project* of the Cologne University fully recorded the site of the Cave of Beasts and its environs. The applied laser scanning made it possible to publish the highest-quality catalogue documenting the entire "cave" with its ca. 8000 figures (Kuper 2013). Projects fully dedicated to rock art studies have been operating in the biggest oases of the Western Desert, for instance, in Dakhleh (Polkowski et al. 2013) and Kharga (Ikram 2009). In addition, new rock art sites were studied again by the Cologne University team of Rudolph Kuper in the Chufu area (Kuper 2014/2015) and further to the SW – in the Meri's sites (Riemer 2011) and the so-called Abu Ballas Trail. It is to be acknowledged that many of these sites were discovered by Carlo Bergmann, a solo desert wanderer (Bergmann 2011). Closer to the Nile Valley, but still in the desert, very important work was conducted by John Darnell (2002). This epigraphic research at the interface of Egyptology and rock art studies brought to our knowledge a huge number of sites located in the hinterlands of the ancient Thebes. The Western Desert rock art research has been elegantly summarized by Heiko Riemer (2009) a couple of years ago, although since then many new rock art sites have already been discovered.

At the same time, rock art findings from the Eastern Desert were more thoroughly analyzed and eventually published. Tony Judd (2009) has provided a comparative overview of the Eastern Desert petroglyphs, whereas Francis Lankester (2013) focused on analyzing particular categories of motifs, for instance, boats. A huge amount of work has been done in the Nile Valley and adjoining wadis on both banks of the river. Extremely valuable research was conducted by Per Storemyr (2009) on the so-called geometric rock art on the west bank of the Nile, in Gharb Aswan. A little bit further to the north, in Wadi Abu Subeira, multi-period rock art sites have been discovered and thoroughly recorded by the members of the *Aswan-Kom Ombo Archaeological Project* (Gatto et al. 2009). On these sites, as well as on the sites near Naq el-Hamdulab on the opposite side of the river (Hendrickx and Gatto 2009), new recording techniques have been implemented (laser scanning, photogrammetry) with a great success. Wadi Abu Subeira has been also intensively investigated by the French-Egyptian

mission headed by Gwenola Graff and Adel Kelany. During six fieldwork campaigns, they managed to record over 500 rock art stations, ranging from Epi-Paleolithic times to recent Bedouin inscriptions (Graff et al. 2015, 2018). Rock art research is still continued in the Elkab area, as well as in Hierakonpolis where a very scrupulous survey continues (Hardtke 2012). One of the biggest achievements in the Egyptian rock art studies belongs to Dirk Huyge from the *Royal Museums of Art and History in Brussels* whose research confirmed Late Paleolithic origin of the zoomorphic and anthropomorphic petroglyphs in Qurta (Huyge et al. 2011). These images, mostly "wild cattle" (aurochs), share stylistic similarities with some rock art corpora known from Ice Age Europe and for now can be considered as the oldest known petroglyphs from the entire Sahara.

State of Knowledge and Current Debates

Main Geographical Areas

Rock art has been registered in four main geographical areas, i.e., in the Nile Valley, the Eastern Desert, and the Western Desert; however within the latter, it seems reasonable to separate out two huge massifs of Gilf Kebir and Gebel Uweinat as a fourth region. All these areas differ both in terms of geography and archaeology, although they are certainly culturally related at many points, and therefore they should not be treated as archaeologically autonomous, which concerns also rock art traditions. Perhaps only the Gebel Uweinat/Gilf Kebir area can be considered as largely unrelated to the rest of Egyptian territory, as its rock art (paintings) seems to be affiliated mainly with the Central Saharan traditions.

The prehistoric rock art of the Nile Valley and both grand deserts share many similarities, although the former area is known from certain petroglyphic motifs unattested for the deserts (e.g., the Late Paleolithic imagery). The Nile Valley contains also the largest numbers of the Predynastic rock art assemblages. These, however, have been found in substantial amounts also in the Eastern Desert, and more recently they have been reported from various Western Desert sites as well (e.g., Darnell 2009; Hendrickx et al. 2009). It is the Pharaonic and Late Antiquity rock art which is widely known from all three areas; in addition the Christian and Islamic petroglyphs can be encountered there. In the deserts, these later rock art traditions are often associated with routes and related places, unless found in oases and settlements, where they can be associated also with more stationary contexts. It seems that the Gebel Uweinat/Gilf Kebir area shares with the rest of Egypt some rock art features only as regards the prehistoric traditions of petroglyphs. Rock art from later periods is largely absent there, which points to a restricted accessibility of the region after the prehistoric times (although the recently found inscription of the king Mentuhotep II Nebhepetre proves that Gebel Uweinat was known and visited by Egyptians).

Chronology

The oldest rock art in Egypt is the zoo- and anthropomorphic imagery from Qurta, el-Hosh, and Wadi Abu Subeira (Huyge et al. 2011; Storemyr et al. 2008; Kelany 2014). The main motif within this category of depictions is a auroch, but it can be accompanied by birds, fish, hippopotami, gazelles, hartebeests, wild dogs, and ibexes (Fig. 2). Animals are depicted in a very naturalistic way, which does not find parallel in later rock art traditions of the Nile Valley. In turn, some anthropomorphic figures depicted in profile are highly stylized and simplified. Many of these petroglyphs are pecked, although incised specimens also occur. They are all heavily patinated. Some of them were found as being covered by sandy eolian deposits, from which samples were obtained and OSL dated to the Late Paleolithic period, i.e., older than ca. 15,000 calendar years. Most of these depictions were found high above the current Nile level, which also points to their early dating and the so-called "Wild Nile" period, when the river was much higher than today. This category of rock art is highly distinguishable from other petroglyphic traditions and possibly related to a broader Late Paleolithic rock art phenomenon within the Old World. At the current state of research, it can be associated mostly with the Nile Valley, although a site with similar findings has been reported also from Sinai in Egypt.

Egyptian Rock Art, Fig. 2 A detail of a rock art panel at the Qurta II site, showing two superb drawings of wild bovids (*Bos primigenius* or aurochs) with forward pointing horns. (Photo by D. Huyge. © RMAH, Brussels)

The earliest Holocene rock art is related mostly to desert areas, but sites situated close to the Nile Valley occur as well. Again, the environs of el-Hosh and Aswan seem to contain the large amounts of the petroglyphs which are usually labeled as geometric or abstract (Storemyr 2009). Among these, circles, semicircles, concentric circles, ovals, spirals, net-like patterns, and many other designs can be distinguished. This category of images contains also animal tracks and some of the meandering lines. Shapes of many figures are difficult to define, and even if they can be named, their identification remains very difficult. A very specific group of pictures consists of mushroom-shaped petroglyphs (Fig. 3) which have been identified as fish traps (Winkler 1939; Huyge 1998a). The geometric rock art can be also associated with figurative depictions, although their chronological relations are often difficult to establish. The whole group of geometric/abstract petroglyphs is considered to be dated mainly from the Epi-Paleolithic, approx. 9000 BP (Huyge et al. 2001). Similar forms have been reported from other regions as well, especially from Lower Nubia where they are considered as representing the oldest rock art horizon. They (except fish traps) are known from the Western and the Eastern deserts; however it is difficult to unequivocally deem them as Epi-Paleolithic.

Neolithic depictions constitute a large body of images, although the term "Neolithic" should not imply here agricultural societies, for between the early seventh and the fourth millennium BC, the Egyptian deserts were inhabited by (semi-)nomadic groups of "pastro-foragers." This rock art tradition is largely dominated by zoomorphic imagery (Fig. 4). In the Western Desert prehistoric rock art, known from the oases but also from much more remote places, giraffe depictions clearly prevail (Riemer 2009; Polkowski et al. 2013). These animals are usually relatively big in size (often more than a meter high), and the selected body features are usually exaggerated (neck, tail, legs). They are found both as isolated specimens and in herd-like scenes. Besides giraffes other zoomorphs are frequently encountered, such as oryx antelopes, ostriches, and gazelles. Elephants are not so common, as is the case also with other species, for instance, Addax, hartebeest, or carnivores. Some animals are depicted as associated with anthropomorphic figures. One of such archetypal motifs is a tethered giraffe which can be dated, however, also from the younger periods (e.g., Predynastic; cf. Ikram 2009). The hunting scenes are known as well (Krzyżaniak 1990), although they are rarely found. The Eastern Desert zoomorphic rock art shares many similarities with the Western imagery, but in the former area, the ratio between giraffe and elephant figures seems to be in favor of the latter species (Judd 2009).

Egyptian Rock Art, Fig. 3 Typical curvilinear "fish trap" designs and associated scenery at el-Hosh, Gebelet Jussef, Locality 1, Panel 1. The (Predynastic) animal figures located in the upper right corner are more recent in age than the rest of the panel. (Tracing by E. Marchi and I. Regulski. © RMAH, Brussels)

This mid-Holocene rock art comprises also anthropomorphs. The already mentioned human figures holding ropes attached to giraffes are usually of a very simple form. They can be stick-like figures with a few features indicated. Some of them have long penises dangling between the legs (Polkowski et al. 2013) or wield objects such as bow and arrow (Winkler 1939; Krzyżaniak 1990). A unique kind of anthropomorph is known from the area of the Dakhleh and Kharga oases and their environs (e.g., Meri, Chufu) (Winkler 1939; Ikram 2009; Polkowski et al. 2013; Riemer 2011; Kuper 2014/2015). These figures are usually shown in profile and have asymmetrical body proportion (Fig. 4). The lower parts are normally exaggerated, whereas the upper section is typically simplified or even brought to a single line. Some specimens have arms, but often these are just signaled. The same applies to the head, which can be sometimes elaborately depicted, but in most cases consists only of a simple oval element. The most intricate feature is the lower body which can be sometimes decorated with various minute geometric designs. However, the most intriguing feature is an oval element protruding from the belly, perhaps indicating pregnancy. It was already noticed by Winkler (1939) who considered these figures as representing female deities possibly related to a fertility cult. Certain scholars question this interpretation (James 2012), as some specimens do not have any features indicating sex and some are also much thinner than the rest, which may possibly refer to sex differentiation between these images.

The prehistoric rock art of the Libyan-Egyptian-Sudanese border is of a completely different character. Most of this rock art comprises of paintings, although petroglyphs have been recorded as well. Two main complexes with paintings are located in the massifs of Gebel Uweinat (Van Noten 1978; Zboray 2009, 2012) and Gilf Kebir (Kuper 2013). Although most of the imagery can be ascribed to a few motif types, such as hand stencils, human figures, wild animals, or cattle, it seems that several styles can be distinguished, and these styles may potentially bear a chronological value (Zboray 2012; Riemer et al. 2017). The most ancient style is called "Uweinat elongated roundhead" and contains anthropomorphic figures with characteristic oval-shaped heads. This feature links them with the Central Saharan rock art of Tassili n'Ajjer region, although except for some formal resemblance, further associations are rather speculative.

Egyptian Rock Art, Fig. 4 Giraffes and other wild animals depicted, most probably, between the sixth and fifth millennium BC. Some later dynastic figures, including the Seth animal, have been added to the prehistoric composition. Dakhleh Oasis. (The drawing by E. Kuciewicz and E. Jaroni. © The Petroglyph Unit of the Dakhleh Oasis Project)

This style is associated with the seventh millennium BC and was apparently succeeded by a very similar "Uweinat roundhead" style. The main difference lies in the way the human body is rendered, in the later style being of fairly natural proportions. With the advent of the fifth millennium BC, two more styles are believed to have been used at the same time, namely, the "Wadi Wahesh style" and the "Miniature style." The first one refers to a group of human figures characterized by the presence of such features as all digits shown on the hands. The latter style, in turn, can be defined as depicting anthropomorphs drawn in much smaller dimensions, with some of the figures being of 20–30 mm height.

These styles are mostly known from the mountains of Gebel Uweinat, whereas Gilf Kebir is largely dominated by the "Wadi Sura" style paintings (Fig. 5). Named after the valley where two main (Wadi Sura I and II) and dozens of smaller sites have been discovered, this style encompasses richly decorated human figures, hand stencils, and wild animals, but also a motif not confirmed elsewhere than Gilf Kebir – the "headless beast." It was this motif which gave a name to the "Cave of Beasts" (Wadi Sura II) and which was found there in relatively big numbers. These fantastic(?) animals are characterized by having a composite body consisting of feline and possibly human body parts. The most intriguing is the lack of the head, although some of the beasts seem to devour humans. They are always depicted in profile and apparently as running. All these figures are usually involved in large compositions, in which mostly anthropomorphs are shown. These can be variously depicted and in the whole array of poses and activities. The large panel in the "Cave of Beasts" contains over 8000 figures, mostly humans, being a huge palimpsest of images, extremely difficult to interpret (cf. Förster 2013). It is believed that the "Wadi Sura style" was utilized throughout the sixth millennium BC, but its beginnings can perhaps reach also the seventh millennium BC. It is equally unclear when this style terminated, although it is fairly certain that it must have happened before the introduction of the "Cattle pastoralists" style in the late fifth millennium BC.

The "cattle pastoralists" style is the last distinctive style throughout the entire Uweinat/Gilf Kebir region (Fig. 6). The way in which human figures are rendered clearly differs from the older styles, and we witness a shift in subject matter. From now on, "cattle" is a dominant motif, and its relation with humans forms the key concept of this rock art tradition. It seems that the last paintings of this style were created approx. 3500 BC, when the environmental conditions became so harsh that breeding cattle and dwelling in this region were no longer possible. The whole stylistic division of

Egyptian Rock Art, Fig. 5 One of the most intriguing motifs belonging to the Wadi Sura style is "headless beast." Many depictions of these beasts are shown as interacting with humans, some apparently devouring the latter. (Gilf Kebir. © The Wadi Sura Project, University of Cologne)

Egyptian Rock Art, Fig. 6 With the changes in economy, the past societies of Gebel Uweinat developed also a new rock art tradition, usually called the "cattle herders style." As its name indicates, the main motif of the style is cattle – depicted both in paintings and petroglyphs. (Gebel Uweinat. © András Zboray)

rock art has been recently corroborated by a thorough analysis of settlement patterns, artifact distribution, and geoarchaeological research in Wadi Sura (Riemer et al. 2017). Although some issues are still blurred, it is one of the, so far, most elaborate regional rock art periodizations, combining big amounts of data from various sources. This periodization links rock art styles with particular archaeological cultural manifestations and provides a context for rock art production in the region. It also takes into account environmental dynamics, thus providing a very broad picture of the Gilf Kebir area.

The fourth millennium BC is strongly associated with rock art production. This concerns both great deserts but even more the Upper Egyptian Nile Valley. Along with the development of the sedentary societies of the Naqada culture, petroglyphs were broadly utilized within a multitude of socioreligious contexts (Fig. 7). Doubtlessly, one of the trademarks of the Predynastic rock art is the boat motif (e.g., Winkler 1939; Červíček 1986; Huyge 1995; Darnell 2009; Lankester 2013). It has been widely recorded especially within the complex network of valleys of the Eastern Desert, in particular between Wadi Hammamat in the north and Wadi Baramiya in the south (Lankester 2013). Variability of forms is considerable. One of the main typological features is the shape of the hull, and most of the Predynastic boats can be ascribed to one of the two major categories: sickle-shaped or square-shaped types (for a more detailed typology, see Lankester 2013). Other frequently encountered features of boats include cabins, oars, standards, fronds, as well as animal-headed prows. It is not uncommon that anthropomorphic figures are depicted as crew. Among them the "dancing" figures constitute one of the most intriguing types. Such figures hold their bent arms above their heads and are often depicted as the only individual on deck. On some boats, figures interpreted as "chieftains" are also present. Sometimes they have feathers stuck in their hair, and usually they are bigger than the rest of the crew. Although several Predynastic types of human figures are known (cf. Lippiello and Gatto 2012), most of them are rather simple, often stick-like in form.

Boats can be also associated with various animal species, and some of the latter are even depicted as being transported. Among the Predynastic zoomorphic images, one can mainly distinguish the following: cattle, hippopotami, crocodiles, elephants, giraffes, asses, ibexes, antelopes, dogs, and barbary sheep. In some cases, hippopotami are depicted as being hunted from boats (Winkler 1939; Lankester 2013). Dogs chasing antelopes/barbary sheep constitute another archetypal motif of the Predynastic

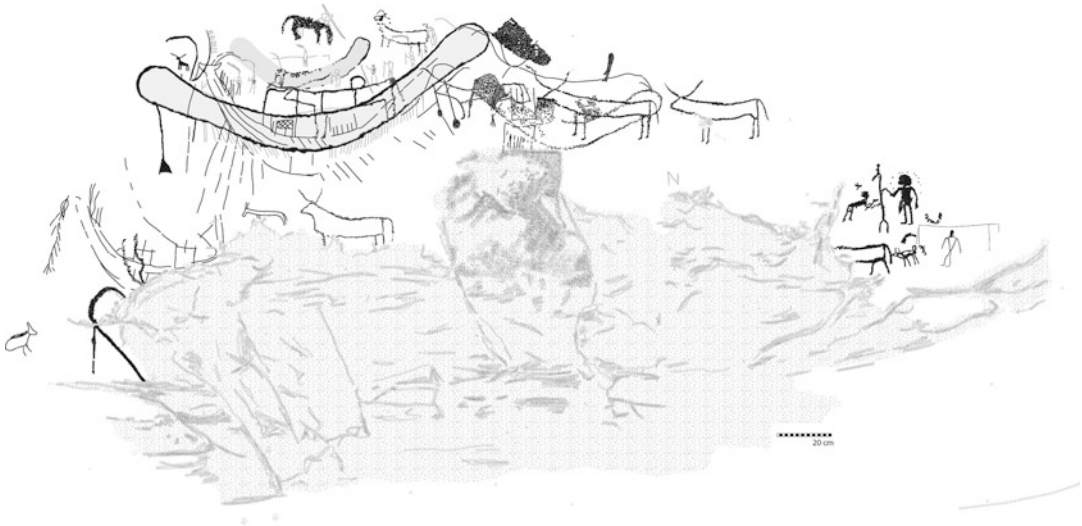

Egyptian Rock Art, Fig. 7 Predynastic rock art is dominated by boat depictions. In this case, several vessels are superimposed on each other, forming a complex palimpsest. Other zoomorphic and anthropomorphic images complete the scene. (Site EK48, Wadi Hilal near Elkab. The drawing is by J.C. Darnell and C.M. Darnell, with A. Urcia,. © J.C. Darnell, and the Yale Elkab Desert Survey)

corpus. Fine examples of it are known also from the Western Desert (Darnell 2009; Hendrickx et al. 2009). Besides the deserts, large Predynastic rock art complexes are situated in the Nile Valley, for instance, near Aswan (Storemyr 2009), Wadi Abu Subeira (Lippiello and Gatto 2012), Elkab (Huyge 2002), and Hierakonpolis (Hardtke 2012). Many of these findings are of utmost importance for understanding the social transformations which took place at the end of the fourth millennium BC. For instance, the elaborate scenes discovered on rocks in the vicinity of Naq el-Hamdulab belong to the oldest representations of royal activities (Hendrickx and Gatto 2009) and provide a unique piece of a non-formalized visual culture of the late Predynastic times.

With the advent of the third millennium BC and the unification of the Egyptian state, rock art gradually underwent a transformation in both style and subject matter. Moreover, formalization of both the hieroglyphic script and the art canon strongly influenced the way in which the more informal rock art was executed. What is important, rock depictions can now be more clearly divided into official (e.g., monumental inscriptions) and unofficial imagery. Customarily, the former belong to the domain of Egyptology, whereas the latter should constitute the object of rock art studies. Sometimes it is, however, difficult to draw a precise line between these two pictorial phenomena. For instance, many of the private depictions can be executed in a style resembling the formal iconography known from temples, tombs, or official inscriptions on rocks. Such a dilemma can occur relatively often, and it is perhaps reasonable not to adhere too strongly to such rigid divisions but rather approach the imagery, respecting the overall context of findings, even if private depictions are accompanied by official depictions and texts.

Rock art produced between the third and the first millennium BC is usually called "dynastic" (Fig. 8). Some motifs known from the earlier times are still present in the corpora, but at the same time, they seem to have undergone a kind of formal transformation. An example of such a motif is the boat, which is still frequently depicted in the deserts and the Nile Valley, but it is also relatively easy to distinguish it from the Predynastic types. Most of the dynastic boat depictions are based on real-life ship constructions, known otherwise either from the official iconography or as excavated objects. The Old Kingdom boats, for instance, usually have a steering oar at

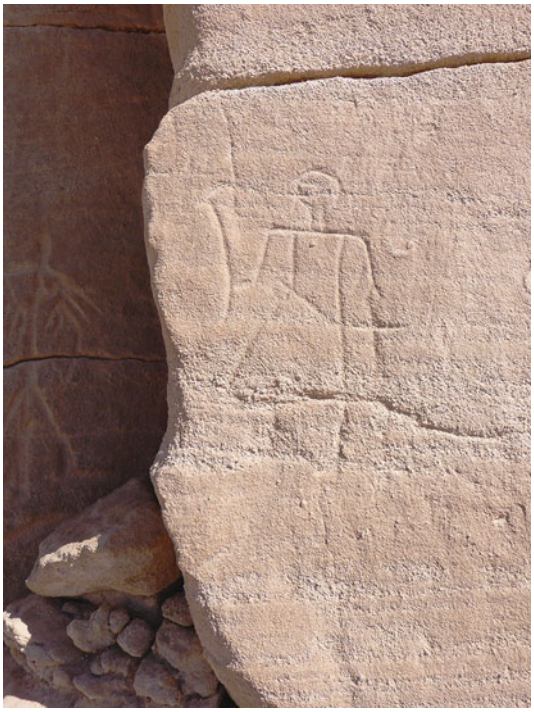

Egyptian Rock Art, Fig. 8 An anthropomorph holding symbols of *ankh* and *was*. This piece of unofficial dynastic drawing is depicted in a characteristic style, clearly related to more formal Pharaonic iconography. (Dakhleh Oasis. © The Petroglyph Unit of the Dakhleh Oasis Project)

the back of a hull, but the shape of the oar changes with time from oval to triangle in the Middle and the New Kingdom. One of the main features distinguishing dynastic boats from the older ones is the presence of mast and/or sail, and often the most elaborate rigging and masts mark the late dynastic or even post-dynastic images. Dynastic boats occur in the Eastern Desert, although in much smaller numbers than the Predynastic vessels (Lankester 2013). They have been found in the Nile Valley as well (e.g., Huyge 1995) and also in the Western Desert, as far as the Dakhleh Oasis area. The boats can be depicted with or without a crew, often have a row of oars indicated, and similarly to the older types can have cabins or other elements on deck. Many represent river vessels, but some rock art depictions show sacred barques. Both types may be related to some actual phenomena (e.g., transport, funerals, festivals) and "mystical" meanings, such as a journey of soul after death (cf. Huyge 2002).

The repertoire of dynastic rock art is rich. We encounter depictions of various gods (e.g., Seth, Min; Polkowski et al. 2013), animals (e.g., cattle, birds; Huyge 2002), feet and sandals (Castiglione 1970; Polkowski 2018), hieroglyphs acting as various symbols (cf. Förster 2015), pubic triangles (Winkler 1939), and scenes involving anthropomorphs. Human figures have often triangular or hourglass-shaped bodies, which makes them easily distinguishable from anthropomorphs from other periods. They can be depicted as isolated figures, sometimes holding various objects or, for instance, as seating beside an offering table in an apparent funerary scene. A unique portrait of an Old Kingdom Egyptian soldier has been found in Dakhleh. The soldier is depicted along with his equipment and smelling a long lotus flower (Kaper and Willems 2002). Generally, most of dynastic anthropomorphs are stylistically referring to more official iconography, utilizing a profile view of figures and the way the body is usually rendered.

Although the transition from the Late Period to the Ptolemaic and Roman periods is very clear in terms of sociopolitical dimension, it is not so obvious within the domain of rock art. In the last centuries of the first millennium BC and the first centuries of the first millennium AD, some motifs, such as foot and/or sandal, were still produced on rocks and in even larger amounts than before (Castiglione 1970; Polkowski 2018). It is a good example of a motif which was utilized as both a temple graffito and a petroglyph, which gives scholars some possibilities to date it but also opens certain interpretative avenues due to rich contextual data originating from temples. In case of rock art, we deal with a whole variety of forms, from naturalistic representations of feet with fingers, toenails, and sandal straps to very simplified or even crude specimens. Many of the latter are depicted only in outline, devoid of any internal features, and their overall shape may be far from naturalistic or even oval. Such examples are usually considered as sandals only due to the context and accompanying figures. They can be found as isolated pictures, but often also in larger groups, which points to a repetitive usage of particular places. Sandals are nearly always executed on

horizontal surfaces, be it as rock art specimens or as graffiti on temple rooftops and pavements. Examples furnished with inscriptions can usually be dated, but because most of the petroglyphs are found without additional texts, their chronology is difficult to establish. By comparison with temple findings, it seems that most of the feet and sandals should be considered a rather late phenomenon, associated with the Late and the Graeco-Roman periods. Some examples are, however, securely dated to earlier dynastic times as well (e.g., Kaper and Willems 2002).

The Graeco-Roman and the Late Antiquity rock art is still somewhat marginalized in rock art studies (cf. Huyge 1998b). It is true that petroglyphic forms become simplified and there are fewer themes in narrative compositions, but the repertoire of depictions is still richly differentiated and the numbers of depictions considerable (Fig. 9). Anthropomorphic figures are usually reduced to a handful of lines ("match-like figures"), as are camel and horse riders, depicted in a similar way (Huyge 1998b). Some of these figures are involved in fight scenes, which was already noted by Winkler. Much of such rock art found in the Eastern Desert was attributed by him to the Blemmyes tribes (Winkler 1938, 1939).

Rock art of this time introduces also many motifs of a symbolic character, some of them pagan, like the horned altar motif, some of Christian origin, particularly crosses of various shapes. Beside the characteristic horned altars, we find offering tables and, for example, numerous signs used and executed in the Roman quarries contexts, such as in Gebel Silsila (Nilsson 2015) or in the Aswan region. This rock art horizon contains also pentagrams and swastikas, the latter in particular being related to the early Christian symbolism. Other Christian symbols, such as fish, palm frond, or *crux ansata*, belong to fairly common types of petroglyphs (Červíček 1986). Rock art of this type is well attested in the Western Desert (Kharga, Dakhleh), but it is also widely represented in other areas of Egypt. Much of the rock art is spatially related to routes linking desert localities with the Nile Valley. This also concerns some pre-Islamic Bedouin marks, which are known especially from the Eastern Desert (Huyge 1998b).

Islamic (including modern times) rock art constitutes the last stage of producing

Egyptian Rock Art, Fig. 9 Graeco-Roman rock art is a mixture of certain dynastic motifs and new influences from the Hellenistic world. On this panel from the area of Kanais (the Eastern Desert), anthropomorphs and animals, as well as Greek inscriptions, have been carefully engraved. Of particular interest is a figure of elephant – animal which used to be imported from south of Egypt in the Ptolemaic times due to its battle value. (Kanais, Wadi Abbad. Photo by Dirk Huyge)

Egyptian Rock Art, Fig. 10 Bedouin rock art of the Late Antiquity and the Islamic Period is dominated by depictions of camels and horses, often with riders. Here, a rider has been depicted as wielding a long lance and equipped with a shield(?). (Wadi Abu Wasil, Eastern Desert. © Anthony Judd)

petroglyphs in Egypt (Fig. 10). Such images are often less patinated, if at all, and were often produced with sharp tools. The figurative rock art is mostly limited to camel depictions and anthropomorphic figures (Winkler 1938, 1939). Some Bedouin petroglyphs from the Western Desert have a clear sexual character, showing humans with genitals (especially females), and even some coital scenes (Colin and Labrique 2001). Anthropomorphs are often shown with weapons, sometimes riding camels or horses. Some of such figures can be depicted as transported by ships (Winkler 1939). Narrative compositions are rather scarce, albeit scenes of fight or traveling caravans have been noted at a number of sites. Figurative rock art is often accompanied by more abstract petroglyphs – tribal marks. Such signs can have a pre-Islamic origin (Huyge 1998b), but most can be attributed to Islamic Bedouins roaming the Egyptian deserts (Harding King 1925). *Wusum*, as they are called, usually have a fairly simple form, often utilizing oval elements and linear features. However, more elaborate shapes have also been noted. Some tribal marks are identical in form to signs known from other chronological horizons, be it a six-pointed star or a cross. It is the state of preservation and accompanying features, such as Arabic inscriptions, which can ease the identification of *wusum* within the complex rock art compositions.

Key Issues and Current Debates

Egyptian rock art studies have been always preoccupied with the questions of classification and chronology, and these issues are still firmly present on the rock art research agenda. The question of chronology is approached in many ways – from subsuming rock depictions under stylistic divisions (Zboray 2012), through contextual dating (Riemer et al. 2017), and comparing imagery between different media (Hardtke 2017), to direct dating (Huyge et al. 2011). Although many rock art motifs and assemblages are still only vaguely dated, rock art chronology is much better recognized than it was only 20 years ago. Moreover, a secure chronology of rock art can potentially translate into more grounded and reliable interpretative attempts. For a long time, such efforts at interpretation of Egyptian rock art were rarely undertaken (cf. Huyge 2002), but recent years have witnessed various debates discussing other aspects of rock art than just their formal and chronological facets.

One of the most influential papers on Egyptian rock art has been published by Dirk Huyge (2002). It is a complex study of motivations directing ancient artists and meanings they invested in rock art of various periods. The strength of this work lies in its attempt at discussing some universal aspects of rock art production and appreciating at the same time the potential differences between rock art traditions of distinct times. Huyge's approach links rock art

imagery with social, political, religious, and cultural aspects of past societies and puts emphasis on historical context of any petroglyphic tradition. In that he is much more reliable than Červíček. With the help of statistical analyses, and employing some structural thinking, Huyge proposes original interpretation of (Predynastic) rock art, not only in its pictorial dimension but also within the context of its composition, placement, and socioreligious function and meaning (case study of the "Rock of the vultures"). He also suggests versatile motivations to execute rock depictions, from cosmological function of the Predynastic rock art, through more personalized, but still religious in character, dynastic imagery, to increasingly more secular rock art of later periods.

The large part of the rock art corpus analyzed by Huyge comprises of Predynastic images. In order to date and interpret them, he refers to other contemporary media, for instance, pottery decorative patterns. This method of interpreting rock art through comparison with imagery from other sources (pottery, palettes, figurines) has been used especially for the Predynastic rock art, as the Predynastic material culture offers an extremely rich and complex visual content. The method itself is not new (cf. Hardtke 2017), but it is being employed more and more often, not only for dating purposes but also in order to gain some insight into potential meanings of rock depictions. Such highly comparative study has been published by Hendrickx et al. (2009). There, they analyzed a specific motif of barbary sheep hunted by dogs, discovered on several rock art sites in the Western Desert and other media from the Nile Valley. Hendrickx et al. provided a very elaborate iconographic scrutiny, directing their interpretation toward social values of rock art in the Predynastic/Early Dynastic periods, i.e., significance connected with hunting and its role in the elites' social networks. This study not only searches for chronological links between various imageries but also recognizes a common sociocultural context in which they were utilized.

Social values of rock art production are also sought out by Francis Lankester (2016), whose case study concerns the Eastern Desert Predynastic rock art. He also is focused on linking the activities of the Predynastic elites in the desert and the phenomenon of rock depictions, especially boats and animals. In his research, Lankester refers to the anthropological notion of *rites de passage*, arguing that rock art production could have been an element of ritualistic actions performed in the liminal zones – far away from the river. Participation in such efforts would result in legitimization of the elites' status. Moreover, it would explain the presence of the specifically Nilotic imagery found deep in the desert.

The abovementioned studies pay great attention to the ideological dimension of Predynastic rock art. Furthermore, a symbolic function of images is considered especially by Dirk Huyge (2002) and John Darnell (2009). Huyge develops the concept of the solar symbolism of giraffe representations, interpreting them as the "sun bearers." Thus, for him rock art actively participated in visualization of certain cosmogonic myths and effectively contributed to the maintenance of the divine order. Darnell (2009), analyzing the Theban Western Desert petroglyphs, also distinguishes the solar ideology of giraffes and argues that it was later (during the Late Predynastic/Early Dynastic) substituted by boat imagery and linked with the royal ideology. His exegesis of the royal tableaux in the Wadi of the Horus Qa-a emphasizes the ideological dimension of rock art just before the onset of the dynastic formal iconography.

Other authors postulate also different approaches to rock art. For instance, to contest purely religious or ideological interpretation of Predynastic rock art, Rebecca Döhl (2013) proposed a functional approach. She linked environmental and climate changes in the Eastern Desert with potentially mobile character of the societies inhabiting this area. The assumed environmental and demographic pressures would be responsible for the evolvement of new ways of communication between different groups of people. Hence, rock art would become a cultural device needed, for instance, to mark special places (e.g., with resources). Such a concept does not provide, however, an answer as to why particular motifs were utilized and not the other.

Egyptian rock art has been also interpreted within the broadly understood concept of landscape archaeology. One can distinguish the contextual approach applied by Rudolph Kuper

(2013) and Heiko Riemer et al. (2017), in which landscape analysis of the Gilf Kebir rock art is equaled with studying of a distribution of other archaeological sites and artifacts, geomorphological aspects of the terrain, and overall dynamics of cultural and natural phenomena accompanying rock art in the past. A slightly different approach was presented by Per Storemyr (2009) who analyzed the prehistoric geometric rock art of Gharb Aswan in terms of its presence in various landscape contexts, not necessarily physical. He distinguished, for instance, the contexts of traveling, and special places, pointing thus toward more holistic definition of landscape. Landscape is also seriously considered by Darnell (2009) in his concept of "Niloticizing the desert." In this view, the Predynastic Nilotic themes of petroglyphs, placed upon rocks of the desert behind Thebes, served as a tool to influence the otherwise marginal landscape and its symbolic incorporation into the domain of the riverine world. Dakhleh Oasis petroglyphs have been, in turn, interpreted recently from the theoretical perspective of "rock art biography" (Polkowski 2015). In this approach, petroglyphs become analyzed diachronically, and the main focus is on their potential changeability of meanings. It helps to appreciate rock art as an enduring element of landscape and to shift attention from its primary significance toward reinterpretations in later periods.

One more type of approach to Egyptian rock art demands a brief discussion. It concerns comparative work involving two pictorial traditions clearly separated in time. Usually, it is the fourth millennium BC Predynastic rock art which is compared to visual culture of the dynastic times (an example in Hendrickx et al. 2009). Recently, however, another rock art tradition has become a subject of scrutiny involving such a comparison with dynastic iconography and textual sources – the Gilf Kebir prehistoric paintings. Several papers have been published so far in this spirit, and two of them seem to be particularly influential. In the first one, Jean-Loïc Le Quellec (2008) presents a theory that the origins of Ancient Egyptian mythology can have their roots in Wadi Sura rock art. He analyzes three categories of motifs: hand stencils, "swimming" anthropomorphs, and "headless beasts" and compares them with dynastic notions and entities related to death. He argues that Egyptian belief in caves being places for the dead people concurs with the type of localities in which the mentioned rock art motifs are usually found (such as the "Cave of Beasts"). Moreover, he likens the "swimming" figures to Ancient Egyptian *nni.w* – dead people floating in the waters of the ocean. Finally, by linking the fantastic beasts with mythical "devourers," he builds a hypothesis of the fifth millennium BC mythology expressed in Gilf Kebir rock art and still detectable in the Nile Valley in the third and second millennia BC.

The second publication is Miroslav Barta's book entitled "Swimmers in the sand" (Barta 2010). The applied methodology is here similar to le Quellec's in that he selects certain motifs or groups of motifs and compares their visual characteristics with (Pre-)dynastic iconography and textual sources. He is, however, interested not only in mythological aspects of this intercultural link but also in recognizing sociopolitical similarities in both iconographies. In that way, he is able to detect an assumed very early attestation of the "pharaoh smiting the enemies" motif in Gilf Kebir rock art, naming it a "chieftain with a mace." Barta builds upon this and other motifs a specific vision of the Wadi Sura society at the time, which was responsible for rock art production, and tries to pinpoint its similarities with the Egyptian kingdom's ruling system. By analyzing other compositions, such as the one involving a "headless beast" and anthropomorphs, he suggests also the earliest attestations of myths similar to Geb and Nut (Earth and Sky) cosmological myth. All these parallels serve as arguments in discussing the role of the Gilf Kebir communities in the genesis of the Ancient Egyptian civilization after severe climatic changes in the Sahara. Barta argues that they could have played a role in co-constituting the Badarian culture, and ideas detectable in Wadi Sura rock art could survive until the dynastic times.

These interpretations have received considerable scholarly attention and supplementary works recognizing some further potential links of a similar kind. They have also met with criticism – especially on grounds of the applied methodologies (Förster and Kuper 2013). The object of

criticism concerns mostly the lack of a rigorous comparison between different iconographies, a selective choice of motifs instead of the whole assemblages, as well as ignoring the space and, particularly, the time span between the compared image repertoires (even 4000 years). The critics signalize also that the alleged common motifs do not find their attestation in visual cultures of the fourth millennium BC, which would be expected if the concept of transferring certain images and ideas across time and space is to be regarded as plausible (Förster and Kuper 2013; Hendrickx 2015). A particularly important phenomenon has been stressed by Stan Hendrickx (2015) who has noticed that a cautious theory of Le Quellec's has been followed by a number of scholars whose approach is far from circumspect. A lack of methodological rigor in such works provokes, often justified, refutation of these concepts (Figs. 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10).

Cross-References

- ▶ Archaeology of Ancient Egypt
- ▶ Graffiti Archaeology
- ▶ North American Rock Art
- ▶ Rock Art, Semiotics and Meaning of

References

Almagro Basch, M., and M. Almagro Gorbea. 1968. *Estudios de Arte Rupestre Nubia. Yacimientos situados en la orilla oriental del Nilo, entre Nag Kolorodna y Kasr Ibrim (Memorias de la Misión Arqueológica X)*. Madrid: Ministerio de Asuntos Exteriores, Dirección de Relaciones Culturales, Ministerio de Educación Nacional, Dirección General de Bellas Artes.

Bárta, M. 2010. *Swimmers in the sand*. Prague: Dryada.

Bergmann, C. 2011. On the origins of the hieroglyphic script. In *Times, signs and pyramids. Studies in honour of Miroslav Verner on the occasion of his seventieth birthday*, ed. V.G. Callender, L. Bareš, M. Bárta, J. Janák, and J. Krejčí, 65–100. Prague: Charles University in Prague.

Castiglione, L. 1970. Vestigia. *Acta Archaeologica Academiae Scientiarum Hungaricae* 22: 95–132.

Červíček, P. 1974. *Felsbilder des Nord-Etbai, Oberägyptens und Unternubiens: Ergebnisse der VIII. DIAFE nach Ägypten 1926*. Wiesbaden: Franz Steiner Verlag.

Červíček, P. 1986. *Rock pictures of upper Egypt and Nubia*. Napoli: Herder-Roma.

Classen, E., K. Kindermann, and A. Pastoors. 2009. Djara – Cave art in Egypt's Western Desert. *Archéo-Nil* 19: 47–66.

Colin, F., and F. Labrique. 2001. Recherches archéologiques dans l'Oasis de Bahariya (1997–2000). *Dialogues d'histoire ancienne* 27 (1): 159–192.

Darnell, J.C. 2002. *Theban desert road survey in the Egyptian Western desert. Gebel Tjauti rock inscriptions 1–45 and Wadi el-Hôl rock inscriptions 1–45*. Vol. 1. Chicago: The Oriental Institute of the University of Chicago.

Darnell, J.C. 2009. Iconographic attraction, iconographic syntax, and tableaux of royal ritual power in the pre- and proto-dynastic rock inscriptions of the Theban Western Desert. *Archéo-Nil* 19: 83–107.

Döhl, R. 2013. Rock art in Egypt: Visual communication in the Eastern Desert in the early to mid-holocene. In *Neolithisation of northeastern Africa*, ed. N. Shirai, 193–212. Berlin: ex oriente.

Förster, F. 2013. Figuring out: Computer-aided rock art recording and analysis. In *Wadi Sura – The Cave of Beasts*, ed. R. Kuper, 50–53. Köln: Heinrich-Barth-Institut.

Förster, F. 2015. *Der Abu Ballas-Weg. Eine pharaonische Karawanenroute durch die Libysche Wüste*, Africa Praehistorica 28, Köln 2015.

Förster, F., and R. Kuper. 2013. Catching the beasts – Myths and messages in rock art. In *Wadi Sura – The Cave of Beasts*, ed. R. Kuper, 24–27. Köln: Heinrich-Barth-Institut.

Fuchs, G. 1989. Rock engravings in the Wadi el-Barramiya, Eastern Desert of Egypt. *The African Archaeological Review* 7: 127–153.

Gatto, M.C., S. Hendrickx, S. Roma, and D. Zampetti. 2009. Rock art from West Bank Aswan and Wadi Abu Subeira. *Archéo-Nil* 19: 151–168.

Graff, G., A. Kelany, and M. Bailly. 2015. Prospections dans le secteur Est du Wadi Abu Subeira: Premiers résultats et perspectives. In *From the delta to the cataract. Studies dedicated to Mohamed el-Bialy*, ed. A. Jimenez-Serrano and C. Pilgrim, 48–63. Leiden: Brill.

Graff, G., M. Bailly and A. Kelany. 2018. In: *What Ever Happened to the People? Humans and Anthropomorphs in the Rock Art of Northern Africa*, ed. D. Huyge and F. Van Noten, 461–474. Brussels: Royal Academy for Overseas Sciences.

Harding King, J.W. 1925. *Mysteries of the Libyan desert*. Philadelphia: J.B. Lippincott Company.

Hardtke, F. 2012. Rock art around settlements: The boats & fauna at Hierakonpolis, Egypt. In *The signs of which times? Chronological and palaeoenvironmental issues in the rock art of Northern Africa*, ed. D. Huyge, F. Van Noten, and D. Swinne, 327–348. Brussels: Royal Academy for Overseas Sciences.

Hardtke, F. 2017. Rock art interpretive approaches – Devising frameworks to maximally utilise independent lines of evidence. *Journal of Arid Environments* 143: 22–27.

Haring, B.J.J., and O.E. Kaper, eds. 2009. *Pictograms or pseudo script? Non-textual identity marks in practical use in ancient and elsewhere*. Leuven: Peeters.

Hendrickx, S. 2015. Kuper, R. – Wadi Sura. The Cave of Beasts. A rock art site in the Gilf Kebir (SW-Egypt). *Bibliotheca Orientalis* 72 (5–6): 661–664.

Hendrickx, S., and M.C. Gatto. 2009. A rediscovered late predynastic-early dynastic royal scene from Gharb Aswan (Upper Egypt). *Sahara* 20: 147–150.

Hendrickx, S., H. Riemer, F. Förster, and J.C. Darnell. 2009. Late predynastic/early dynastic rock art scenes of Barbary sheep hunting in Egypt's Western Desert. From capturing wild animals to the women of the 'Acacia House'. In *Desert animals in the eastern Sahara: Status, economic significance, and cultural reflection in antiquity*, ed. H. Riemer, F. Förster, M. Herb, and N. Pöllath, 189–244. Köln: Heinrich-Barth-Institut.

Huyge, D. 1995. *De rotstekeningen van Elkab (Boven-Egypte): registratie, seriatie en interpretatie*. Unpublished PhD thesis. Leuven: Katholieke Universiteit Leuven.

Huyge, D. 1998a. Hilltops, silts and petroglyphs: The fish hunters of El-Hosh (Upper Egypt). *Bulletin van de Koninklijke Musea voor Kunst en GeschiedenisBulletin des Musées royaux dArt et* 69: 97–113.

Huyge, D. 1998b. Art on the decline? Egyptian rock drawings from the late and Graeco-Roman periods. In *Egyptian religion, the last thousand*, ed. W. Clarysse, A. Schoors, and H. Willems, vol. II, 1377–1392. Leuven: Peeters.

Huyge, D. 2002. Cosmology, ideology and personal religious practice in ancient Egyptian rock art. In *Egypt and Nubia: Gifts of the desert*, ed. R. Friedmann, 192–206. London: The British Museum Press.

Huyge, D. 2009. Rock art. In *UCLA encyclopedia of egyptology*, ed. W. Wendrich, 1–13. Los Angeles: UCLA.

Huyge, D., A. Watchman, M. De Dapper, and E. Marchi. 2001. Dating Egypt's oldest 'Art': AMS 14C age determinations of rock varnishes covering petroglyphs at El-Hosh (Upper Egypt). *Antiquity* 75: 68–72.

Huyge, D., D.A.G. Vandenberghe, M. De Dapper, F. Mees, W. Claes, and J.C. Darnell. 2011. First evidence of Pleistocene rock art in North Africa: Securing the age of the Qurta petroglyphs (Egypt) through OSL dating. *Antiquity* 85: 1184–1193.

Ikram, S. 2009. Drawing the world: Petroglyphs from Kharga Oasis. *Archéo-Nil* 19: 67–82.

James, D. 2012. Ambiguous images: The problems and possibilities of analysing rock-art images in the Egyptian Western Desert. In *Egyptological research in Australia and New Zealand 2009: Proceedings of the conference held in Melbourne, September 4th–6th*, ed. C.M. Knoblauch and J.C. Gill, 71–84. Oxford: Archaeopress.

Judd, T. 2009. *Rock art of the eastern desert of Egypt. Content, comparisons, dating and significance*, BAR International Series 2008. Oxford: Archaeopress.

Kaper, O.E., and H. Willems. 2002. Policing the desert: Old kingdom activity around the Dakhleh Oasis. In *Egypt and Nubia: Gifts of the desert*, ed. R. Friedmann, 79–94. London: The British Museum Press.

Kelany, A. 2014. Late Palaeolithic rock art sites at Wadi Abu Subeira and el-'Aqaba el-Saghira, Upper Egypt. *Cahiers de l'AARS* 17: 105–115.

Krzyżaniak, L. 1990. Petroglyphs and the research on the development of the cultural attitude towards animals in the Dakhleh Oasis (Egypt). *Sahara* 3: 95–97.

Kuper, R., ed. 2013. *Wadi Sura – The Cave of Beasts*, Africa Praehistorica 26. Köln: Heinrich-Barth-Institut.

Kuper, R. 2014/2015. Mefat für Memphis: Cheops' Expeditionen in die Libysche Wüste. *Mitteilungen des Deutschen Archäologischen Instituts, Abteilung Kairo* 70/71: 285–299.

Lankester, F. 2013. *Desert boats-predynastic and pharaonic era rock-art in Egypt's Central Eastern Desert: Distribution, dating and interpretation*, BAR International series 2544. Oxford: Archaeopress.

Lankester, F. 2016. Predynastic Egyptian rock art as evidence for early elites' rite of passage. *Afrique: Archéologie & Arts* 12: 81–92.

Le Quellec, J.-L. 2008. Can one 'read' rock art? An Egyptian example. In *Iconography without texts*, ed. P. Taylor, 25–42. London: Warburg Institute.

Le Quellec, J.-L., and D. Huyge. 2008. Rock art research in Egypt, 2000–2004. In *News of the world volume 3*, ed. P. Bahn, N. Franklin, and M. Strecker, 89–96. Oxford: Oxbow Books.

Lippiello, L., and M.C. Gatto. 2012. Intrasite chronology and palaeoenvironmental reconstruction at Khor Abu Subeira South 1 (Aswan, Egypt). In *The signs of which times? Chronological and palaeoenvironmental issues in the rock art of Northern Africa*, ed. D. Huyge, F. Van Noten, and D. Swinne, 267–291. Brussels: Royal Academy for Overseas Sciences.

Lucarini, G. 2014. The boats arch: A new rock art site in Wadi el Obeiyid. In *From lake to sand: The archaeology of Farafra Oasis (Western Desert, Egypt)*, ed. B.-E. Barich, G. Lucarini, M.A. Hamdan, and F.A. Hassan, 406–410. Florence: All'Insegna del Giglio.

Morrow, M., and M. Morrow. 2002. *Desert RATS. Rock art topographical survey in Egypt's Eastern Desert*. London: Bloomsbury Summer School, University College London.

Nilsson, M. 2015. Non-textual marking systems at Gebel el-Silsila: From dynastic signifiers of identity to symbols of adoration. In *Non-textual marking systems in ancient Egypt (and elsewhere)*, ed. J. Budka, F. Kemmerzell, and S. Rzepka, 81–105. Hamburg: Widmaier Verlag.

Petrie, W.M.F. 1888. *A season in Egypt: 1887*. London: Field and Tuer.

Polkowski, P.L. 2015. The life of petroglyphs: A biographical approach to rock art in the Dakhleh Oasis, Egypt. *American Indian Rock Art* 41: 43–55.

Polkowski, P.L. 2018. In: *What Ever Happened to the People? Humans and Anthropomorphs in the Rock Art of Northern Africa*, ed. D. Huyge and F. Van Noten, 371–395. Brussels: Royal Academy for Overseas Sciences.

Polkowski, P.L., E. Kuciewicz, E. Jaroni, and Michał Kobusiewicz. 2013. Rock art research in the Dakhleh Oasis, Western Desert (Egypt). Petroglyph unit, Dakhleh Oasis project. *Sahara* 24: 101–118.

Rhotert, H. 1952. *Libysche Felsbilder*. Darmstadt: Wittich.

Riemer, H. 2009. Prehistoric rock art research in the Western Desert of Egypt. *Archéo-Nil* 19: 31–46.

Riemer, H. 2011. *El Kharafish. The archaeology of the sheikh Muftah pastoral nomads in the desert around Dakhla Oasis (Egypt)*, Africa Praehistorica 25. Köln: Heinrich-Barth-Institut.
Riemer, H., S. Kröpelin, and A. Zboray. 2017. Climate, styles and archaeology: An integral approach towards an absolute chronology of the rock art in the Libyan desert (Eastern Sahara). *Antiquity* 91 (355): 7–23.
Rohl, D. 2000. *The followers of Horus. Eastern desert survey report*. Vol. 1. Basingstoke: ISIS.
Storemyr, P. 2009. A prehistoric geometric rock art landscape by the first Nile cataract. *Archéo-Nil* 19: 121–150.
Storemyr, P., A. Kelany, M.A. Negm, and A. Tohami. 2008. More 'Lascaux along the Nile'? Possible late Palaeolithic rock art in Wadi Abu Subeira, Upper Egypt. *Sahara* 19: 155–158.
Váhala, F., and P. Červíček. 1999. *Katalog der Felsbilder aus der tschechoslowakischen Konzession in Nubien*. Prag: Verlag Karolinum.
Van Noten, F. 1978. *The rock paintings of Gebel Uweinat*. Graz: Akademische Verlag.
Weigall, A.F.P. 1909. *Travels in the upper Egyptian deserts*. Edinburgh: Blackwood.
Winkler, H.A. 1938. *Rock-drawings of Southern Upper Egypt: Sir Robert Mond desert expedition 1: Season 1936–1937. Preliminary report*. London: The Egypt Exploration Society and Humphrey Milford.
Winkler, H.A. 1939. *Rock-drawings of Southern Upper Egypt: Sir Robert Mond desert expedition 2: Season 1937–1938. Preliminary report*. London: The Egypt Exploration Society and Humphrey Milford.
Zboray, A. 2009. *Rock art of the Libyan desert*. DVD ed. Newbury: Fliegel Jezerniczky Expeditions.
Zboray, A. 2012. A revision of the identified prehistoric rock art styles of the Central Libyan Desert (Eastern Sahara) and their relative chronology. In *The signs of which times? Chronological and palaeoenvironmental issues in the rock art of Northern Africa*, ed. D. Huyge, F. Van Noten, and D. Swinne, 217–255. Brussels: Royal Academy for Overseas Sciences.

El Born, Barcelona: Archaeology, Heritage, and Politics in Action

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Introduction

El Born, in its Catalan form, or simply Born, is one of the biggest and best-preserved European archaeological sites from the early modern period situated in an urban context and open to the public. It covers 8000 m^2 of the late-mediaeval and early modern city of Barcelona (Catalonia, Spain). This archaeological site has been preserved because after the War of the Spanish Succession (1701–1714), involving the Bourbon and the Habsburg dynasties in Europe and where Barcelona was the last military place to fail, the area was covered over and levelled in order to build an esplanade that connected the nearby (at that time) new Spanish citadel and the rest of the city of Barcelona. In the nineteenth century, when the citadel was not in use anymore, the original area of the old esplanade was developed with the construction of several buildings and a cast iron and glass Art Nouveau market. This market was in use until the 1970s. In 1997 the city council decided to build a semipublic library inside the market. The rescue archaeological works undertaken, however, unexpectedly uncovered a whole neighborhood in a surprisingly well-preserved state, offering a snapshot of the city in 1714. The transformation of the archaeological site into an open museum as it is now was not free from controversy. Between 2000 and 2002, the city of Barcelona had a vigorous public and media debate on whether to preserve the archaeological site in situ and open it to the public or to remove it and have the library or to have both in the same place. Later on, the debate also expanded to include the politics of nationalism, because the site is the best architectural and urban landscape record of the defeat and the consequences of the fall of Barcelona to Spain during the War of Spanish Succession, which basically meant the end of the political independence of modern Catalonia. As a consequence, the transformation of El Born into an open-site museum (2002–2013) involved the use of archaeology in an urban development environment and nationalism forces defined as in Barcelona, Catalonia, Spain.

Historical Background

By the late seventeenth century, Barcelona had consolidated a decisive economic transformation of its region toward a proto-capitalist system of

production. In general terms, Barcelona was a prosperous, diverse, economically dynamic city connected to the world, thanks to busy trade, not only with the rest of Catalonia but also with the center of the Iberian Peninsula, the Mediterranean region, Northern Europe, and the colonies in the Americas, and through these contacts with much of the rest of the world. It was a diverse society in its origins, where it lived, and in social status and keen on imported products (especially tobacco and chocolate), religion, and festivities. In urban development terms, the city was a mixture of a trade guild-based structure side by side with the emergence of new forms of production and commerce, and within this fabric, civil authorities rubbed shoulders with religious powers and people of high social status. This is very clear in the urban fabric uncovered in El Born, where there were prosperous houses, workers' houses, small palaces, workshops, and shops belonging to a wide range of trades.

The big change to the city's makeup was caused by the War of the Spanish Succession, in which much of Europe fought for political control of the continent and consequently of trade with overseas colonies, pitting the supporters of the Austrian Habsburg dynasty (Austria, England, Portugal, and Catalonia) against those of the Bourbons (France and Spain). The final stage of this conflict was decided in Barcelona, with a siege that lasted 2 years. The besieging troops finally broke into the city through the Born neighborhood. In fact, the architectural site still contained large numbers of bombs and other Bourbon projectiles. The end of the war and the victory of the Bourbon troops led, among other things, to the physical disappearance of much of the Ribera district to build a citadel there, designed in the style of the time by the military engineer Prosper de Verboom. The fortress resulted from an intention to improve the city's defenses, but above all it was an assertion of military control of Barcelona: two of the bastions looked out of the city, one toward the sea and two into the city itself. The military complex was complemented by a surrounding area free from buildings, known as the Esplanada, which was created by demolishing a part of the Ribera neighborhood – what is known today as the Born neighborhood. Between April 1716 and July 1718, the owners of the houses situated in the area where the esplanade was to be created were forced by a royal decree to leave and destroy their own homes and to help to build the fortress. In urban terms this meant the demolition of over 1200 houses and the disappearance of 42 streets and the eviction of 20% of the population of Barcelona to other parts of the city or else outside it. The clearance also affected, on the one hand, basic city infrastructures such as the western mills and the diversion of the main water channel, so affecting the future craft possibilities of the district dependent on these infrastructures, and also the city's trade and recreational activities, of which the square known as the Plaça del Born was the nerve center. In summary, the area affected by the clearing of the Esplanada had significant repercussions on the functioning of the city of Barcelona as a whole (Garcia Espuche 2009) (Fig. 1).

Thus, the area of which the buildings preserved in the archaeological site of El Born formed part was therefore buried underneath the esplanade, which was declared to be for military use and therefore excluded from any urban development. This use was revoked in 1802, when the citadel, or Ciutadella, ceased to have any strategic military purpose, and the esplanade was gradually turned into an avenue. From the nineteenth century onward, Barcelona began a process of modernizing the mediaeval streets of the city, demolishing the mediaeval and early modern walls (from 1854 onward) and culminating in the construction of the Eixample district. One of the basic pillars of this process was the demolition of the citadel (1841), which became a large, open public park, redevelopment and building around it, and the construction of the Born market in 1878. All these changes had an enormous impact on the area's subsoil, except under the market itself, as the architecture of its structure is based on separate foundations (columns) only 60 cm deep, which did not affect the subsoil or the "fossilized" city of 1717 (Fig. 2).

In 1921 the Born market was transformed into the wholesale fruit and vegetable market of the city and remained as a wholesale market until 1971. In 1971, when the central market was moved to a bigger wholesale and distribution

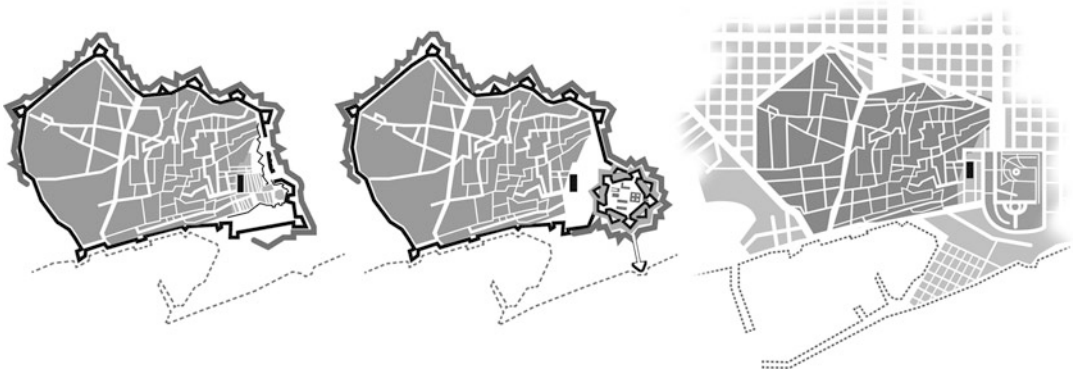

El Born, Barcelona: Archaeology, Heritage, and Politics in Action, Fig. 1 Three urban and historical moments of modern and contemporary Barcelona. On the left, before 1714. In the center, mid-seventeenth century, with the citadel. On the left, mid-nineteenth century, with the Eixample district and Ciutadella Park. Marked in black is the location of Born market/archaeological site. (Author: A. Colomer-Puntés)

El Born, Barcelona: Archaeology, Heritage, and Politics in Action, Fig. 2 Interior of the Born as a wholesale fruit and vegetable market, 1930s. (Author and source: © Josep Domínguez, Arxiu Fotogràfic de Barcelona – ICUB)

center outside the city, the plan was to demolish the old Born market and build a car park. In 1977 several campaigns were launched by residents and arts associations to prevent the demolition of the Born market by stopping the market being turned into a car park and instead making it into a space for public use. This was without a doubt the greatest victory of the social movements among the citizens of Barcelona over post-Francoist town planning policies (Hernández Cordero 2017). The first democratically elected city council (1979) bowed to public demands to preserve the market, and the first architectural restoration work was carried out in 1981, though not to convert it into a center for popular culture. From this point the market hall was put to various, intermittent uses (as a venue for public concerts, popular festivities, exhibitions, and fairs) without Barcelona

City Council really knowing what to do with it in the long term. Faced by further protests and occupations of the site by residents, in 1997 Barcelona City Council finally decided, together with the Catalan government and the Spanish Ministry of Culture, to make it the home of the provincial library. This cultural equipment involved renovating and adapting the old market building and constructing three underground levels, and therefore a phase of rescue archaeology started (2001–2002) with the aim of recording and removing the site. Instead, it made even more clear the archaeological, historical, and ideological importance of the Born site. After a year of public debate over its future and 10 years of architectural rehabilitation and archaeological preservation works, in September 2013, the former Born market once more opened its doors, this time transformed into a cultural and exhibition space with the remains of the city of 1714 restored and open to the public.

The Archaeological Site

The current site has made it possible to unearth just 5% of what was lost to the Ribera neighborhood in 1717. Sixty-three houses, ten streets, the end of the water channel (known as the Rec Comtal), and a bridge, plus large numbers of sewers, have been found on the site. On the basis of the archaeological evidence, together with documentary sources, the form and content of the upper floors of the houses have been pieced together. Part of the area excavated also includes workshops and industrial establishments (tanners, furriers, dyers, weavers, and others), taverns, shops, and public gaming establishments. Chronologically, while the origin of the houses dates from the late thirteenth and early fourteenth century (though the Rec Comtal dates from the tenth century), most of the structures to be found on the site can be situated between 1650 and 1717 (Artigues and Fernández 2003). In the final phase of the site, the last 17 years, the effects of the various sieges and bombardments suffered by the city can be plainly seen, together with the rebuilding – often precarious – that took place. Finally, the site provides a highly graphic illustration of the destruction involved in creating the Esplanada: all the buildings are levelled to the same height, cut off at ca. 1.5/2 m of ground floor level. Because of this delivered destruction of the neighborhood, most valuable construction features – lintels, decorative features, grilles, doors, and so on – as well as domestic equipment still in use, do not appear in the archaeological record: residents carried off all the valuable materials to rebuild their houses and their lives elsewhere. Nevertheless, thousands of objects have been recovered and studied, mainly pottery, locally made or imported from elsewhere in the Mediterranean region, the Iberian Peninsula, Central Europe, or China. Also found were tools and equipment for farming and stockbreeding; personal items such as scissors, thimbles, earrings, rings, and the like; and craft tools such as compasses and military materials such as cannonballs, muskets, swords, and so on (Beltrán de Heredia 2014; Beltrán de Heredia and Miró 2007) (Fig. 3).

El Born, Barcelona: Archaeology, Heritage, and Politics in Action, Fig. 3 Pottery recovered in the archaeological site of El Born. (Image source: © Toni Fernández – El Born CCM)

In parallel to the archaeological site, municipal archives still preserve administrative and legal documentation dating back to mediaeval times. This has made it possible to compare all the archaeological remains and the thousands of artefacts unearthed in detail with documentary sources (Garcia Espuche 2009). It is therefore known who lived in the Hostal de l'Alba, the string makers' guild house, the apothecary Benet Mollar's shop, Josep Duran's grocery shop and what they did every day, as well as the large property owned by the Baron de Sant Vicenç, divided into four homes with the families that lived in them, and the town houses of Marianna Rosa Boixadors of Montoliu, one of them with a splendid installation for distilling spirits and rented to the Dutch consuls to Catalonia. In this respect, El Born is the finest historically documented early modern archaeological site in Europe (Fig. 4).

Key Issues/Current Debate

The importance of El Born lies primarily in the fact that the archaeological remains are unique in Europe in the way they illustrate the history of a city between the sixteenth and eighteenth century. However, the process of turning the market into a cultural center with a museum site is also of special relevance to the current debates on public archaeology in Europe and its political use. In fact, El Born is a clear example of the controversy, on the one hand, between the social and economic use of an archaeological site in a "brand" city like Barcelona, inserted in a particular model of cultural governance, heavily affected by tourism and gentrification, and on the other in the extent to which a heritage site has been the subject of ideological discourses.

When a decision was taken in 1997 to house the Barcelona Provincial Library there, a restricted architectural competition was called, and the winner was a design by the architects Enric Sòria and Rafael de Cáceres. In view of the first proposed substantial architectural changes to the original scheduled building and the insights and values of the archaeological site, it is to be asked whether the Born market was really the best place for a library (see also Riu-Barrera 2002) or whether there was an institutional interest in installing a library there while undervaluing archaeology as a tool for cultural, social, and economic development in an urban context. In fact, the 1990s and 2000s were a time marked by the creation of the so-called Barcelona model, the speculation in property development, and the exponential growth in tourism (Balibrea

El Born, Barcelona: Archaeology, Heritage, and Politics in Action, Fig. 4 The Boixadors house. (Image source: © Jordi Puig – El Born CCM)

2001; Degen and García 2012). In this context, there was a widespread view that the archaeological find was a disruptive factor in the city's economic growth and cultural development. Archaeology was an obstacle to be overcome, and rescue archaeology is the legal and proper way to remove this obstacle. The argument over the preservation or otherwise of El Born was simply a further example of this local understanding on the use of archaeology as a source for culture policy, with the peculiarity that the scale and the historical and political value of El Born reshaped the debate. Professional groups – but also municipal institutions like the Museum of History of the City of Barcelona – faced a difficult task in convincing local politicians and town planners of the economic and social value of archaeological practice (e.g., Nicolau 2002).

By 2001, as excavations progressed, the local authorities began to realize that the remains were more important than they had expected, and doubts started to emerge over whether they could be compatible with the library project. This was the origin of the idea of cohabitation between the library and the archaeological site, whereas the site was going to be the background of the library equipment. Menéndez and Pastor (2002) explain very well the correlation of forces within Barcelona City Council and the Catalan government regarding this compatibility and how their opinions were expressed in local newspapers, turning the issue of the preservation of the archaeological remains of El Born into a matter for public debate, leading to hundreds of letters to the editor. In fact, the press played a key role in this political and public debate by publishing opinion pieces by intellectuals, architects, historians, and politicians. This is a debate where party interests on the city council are openly or covertly mixed with municipal and private town planning interests, in which archaeology is always seen as an obstacle to development in the city. On the other hand, professionals in the historical field, on the other hand, see the preservation of El Born as the way to create a scientific space in which to find out more about the early modern city. Professional groups working in archaeology, conservation, museums, and mediaeval history in Catalonia called unanimously for the remains to be preserved in situ, restored, and turned into a museum site and the library to be relocated somewhere else in the city. The architects, on the other hand, were divided between those arguing for cohabitation and those preferring to relocate the library. Finally, the librarians intervened in the public debate, not to rate the architectural remains but to give their evaluation of the efficiency, or rather the inefficiency, of having a shared site. Gauging the opinions of local residents is more complex, because there are various resident associations by neighborhoods, sectors, and streets, as well as those made up of long-term residents and those of newcomers resulting from recent processes of gentrification and property speculation in the district. The final blow to cohabitation came in October 2002, when Barcelona City Council decided to conserve the whole architectural site in situ and make it into a museum space, therefore moving the provincial library to another location. This was the beginning of 10 years of building and engineering work, conservation of the site, archaeological research, and production of future exhibition spaces and equipping the site for visits by the public (Fig. 5).

During the phase of public debate about the future of El Born, a document produced by leading archaeologists, historians, architects, and museum experts proposed a particular way to present the finds by creating a new kind of cultural center, "El Nou Born" ("The New Born"), based on three principles: it should be an urban history center; it should be of a symbolic nature as a monument and memorial to urban populations who suffer wars; and it should become a cultural center (Albareda et al. 2002). The first point ties in with the desire to turn the site into a modern history center catering for new lines of research that finally discount the traditional idea of Catalonia under the Bourbons undergoing a time of economic decadence, political decline, and cultural darkness. The second thread running through El Nou Born is directly linked to the intention of the Catalan socialist party and many Catalan intellectuals to stop El Born being turned into a "mausoleum of Catalanism" (Muñoz 2002: 35) which glorified the victims of the Catalan defeat. In order

El Born, Barcelona: Archaeology, Heritage, and Politics in Action, Fig. 5 Interior of El Born CCM. (Image source: Author – © Pere Virgili – El Born CCM)

to avoid this patriotic direction, El Nou Born was to be conceived as a place to remember the everyday life in Barcelona in 1700, leaving the siege of 1713–1714 in the background. However, in order not to forget the impact of war on the site, El Nou Born was to recall what urban populations have to undergo when they are besieged and bombarded in war (e.g., Gernika 1937, the London Blitz in 1940–1941, the Sabra and Shatila massacre in 1982, and the siege of Sarajevo in 1992–1996). Finally, the third thread of the project was to define El Born as a multipurpose center for cultural activities, including commercial ones if necessary, to justify opening it to the public, hence the name "El Born Cultural Centre" (El Born CC). Under this proposal, the archaeological remains would become the setting (the backdrop) for other cultural and intellectual activities seen as more relevant to the cultural development of Barcelona. This paradox of the marginal role of the archaeological remains in the management of urban and cultural development in Barcelona once they had been saved from cohabitation was added to the fact that the promotion and conversion of El Born into a museum were to be implemented without much real regard for the site itself and the historic knowledge it offers and generates, other than to use it just to illustrate documentary sources (Hernàndez Cardona 2015; Gallego and Romero 2016: 136–138).

In the middle of the implementation of this cultural project, the 2011 municipal elections moved the administration of the city council into the hands of a center-right party professing Catalan nationalist ideas. The effect of this change was soon visible in the Born project: a new director brought a new museum discourse aiming to turn the new center into a space devoted to the Catalan patriotic epic. In fact, the ideological significance of El Born is nothing new. During the debates prior to its preservation, some intellectuals and politicians posed the patriotic value of the site as sufficient reason for its conservation (Menéndez and Pastor 2002; Gallego and Romero 2016). Now, however, the political climate had changed, and El Born became the setting of Catalan nationalism and pro-independence feeling and a place to re-establish the founding myth of the Catalan

nation (Breen et al. 2016; Gallego and Romero 2016; Hernández Cordero 2017). In this context, the resignation of the chief curator and ideologist behind El Nou Born in October 2012 also ushered in a political management of the center interested in turning El Born into the "ground zero of the Catalans" from an epic and telluric point of view (Torra 2013a, b). The signs were clear and immediate: the planned opening temporary exhibition about cast iron markets was replaced with one on the final battle and the fall of the city in 1714, entitled "Until We Prevail! The Siege of 1714"; changes were made to the panels on the rail running around the site to give more attention to the Catalans' struggle to defend their freedoms, without any direct relationship with the site itself; the exhibition and function rooms in the center were named after patriots who died on or after 11 September 1714 (e.g., Villarroel, Casanovas, and Moragues); a pole 17.14 m high with a Catalan flag was installed in front of the center; and the opening of El Born CC in September 2013 was staged to coincide with the beginning of the institutional commemorations of the tercentenary of the defeat on 11 September 1714 (see also Gallego and Romero 2016) (Fig. 6).

In 2015 the municipal elections again brought about major changes with the victory of a new left-wing political party, which rejected both Catalan and Spanish nationalism discourses. Consequently, El Born saw another ideological turnaround: new management and this time a new name, too, "El Born Cultural and Memorial Center" (El Born CCM). El Born CCM ceased to be devoted to the historical memory of the War of the Spanish Succession, now commemorating the "presence of radical movements, cultures, ethics and projects with a popular base," i.e., the people and groups who fought for democratic freedoms in the course of the twentieth century (Ricard Vinyes, in Marimon 2016). As a result of this, the first temporary exhibitions were "Franco, Victory, and Republic: Impunity and the City" and "Born Demanded, 1971–2001." In this new framework of local contemporary history, the archaeology of 1714 remains in the background, the accidental theatrical setting for other memories and other historical facts linked to political

El Born, Barcelona: Archaeology, Heritage, and Politics in Action, Fig. 6 El Born main façade. (Author: © Pere Virgili – El Born CCM)

destruction and repression in Barcelona but actively ignoring the early modern past that made it an archaeological and heritage site.

Future Directions

What makes El Born archaeologically distinctive is that it preserves a sector of the eighteenth-century city without later features to distort its conservation, destroy it, or hide the way it originally looked. Another distinctive feature is the extensive, detailed archive documentation on all parts of the area, making it possible to identify landlords and tenants by name, with details of family life, work, and trade in the neighborhood, domestic items and inventories of the shops, and so on. As well as being a place where everyday life went on, El Born is a setting affected by a long battle of historical significance for the fate of Spain and Europe and an archaeologically unique example of the subsequent repression of its new subjects ordered by the Bourbon monarchy, all in an 8000 m^2 archaeological site open to the public.

The case of El Born also adds a new factor to the public view of archaeology, as the debate on its preservation initially arose within the scope of municipal policy but was finally decided in the public arena. In this way a decision that would normally be made behind closed doors came out of the council offices to be discussed in the public context appropriate to any measures affecting heritage. However, while making El Born into a heritage site for the city was decided in the public arena, what was not discussed in public were the details of the resulting cultural project: how it was to be used as a heritage site for the city, what was to be explained there and how, and what social, cultural, and public use was to be made of it. In fact, the way it has been made into a cultural project for Barcelona has been decided in the ideological circles of the different political parties that have controlled the city council. This is why El Born suffered – and still suffers – so directly from the divisions in local and national policy: it was the subject of political debate in 1716, 1979, 2002, 2013, and 2015. Paradoxically in such an ideological context, archaeologists in Barcelona opted for a neutral, professional, and academic output, and in so doing, the archaeological site of 1714 as a heritage project today has been exploited by all city actors, those who clearly saw heritage and places for memory as the social settings for cultural and political outputs in the present.

Cross-References

- ▶ Archaeology and Politics
- ▶ Conservation and Management of Archaeological Sites
- ▶ Heritage Museums and the Public
- ▶ Museums and the Distortion of Archaeology for Political Purposes
- ▶ Nationalism and Archaeology: Overview
- ▶ Spain: Archaeological Heritage Management

References

Albareda, Joaquim, Julia Beltrán De Heredia, Magda Bernaus, Josep Bohigas, Juli Capella, Xavier Dupré, Josep Fontana, Ricardo García-Cárcel, Albert Garcia-Espuche, Josep Maria Muñoz, Antoni Nicolau, Jordi Pardo, Maria Rupert De Ventós, and Lina Ubero. 2002. El nou Born. Ciutat, memòria i vida. *L'Avenç* 273: 78–81.

Artigues, Pere-Lluís, and Antoni Fernández. 2003. *Memòria de la intervenció arqueològica en l'Antic Mercat del Born de Barcelona, novembre 2001-abril 2002 (Servei d'Arqueologia de Barcelona, codi 074–05)*. Barcelona: SAPIC-CODEX.

Balibrea, Mari Paz. 2001. Urbanism, culture and the post-industrial city: Challenging the "Barcelona Model". *Journal of Spanish Cultural Studies* 2 (2): 187–210. https://doi.org/10.1080/14636200120085174.

Beltrán De Heredia, Julia. 2014. El Born i la cultura material de 1700. *Quaderns d'Arqueologia i Història de la Ciutat de Barcelona* 10: 56–68.

Beltrán De Heredia, Julia, and Núria Miró. 2007. *The ceramics trade in Barcelona in the 16th–17th centuries*. Barcelona: MuHBa.

Breen, Colin, Sara McDowell, Gemma Reid, and Wes Forsythe. 2016. Heritage and separatism in Barcelona: The case of El born cultural centre. *International Journal of Heritage Studies* 22 (6): 434–445.

Degen, Mònica, and Marisol García. 2012. The transformation of the Barcelona model?: An analysis of culture, urban regeneration and governance. *International Journal of Urban and Regional Research* 36 (5): 1022–1038.

Gallego, Laia, and Judith Romero. 2016. La arqueología en la conmemoración del Tricentenari, usos y abusos. *ArqueoWeb* 17: 128–143.
Garcia Espuche, Albert. 2009. *La ciutat del Born. Economia i vida quotidian a Barcelona (segles XIV a XVIII)*. Barcelona: Ajuntament de Barcelona.
Hernàndez Cardona, Francesc Xavier. 2015. El Born de Barcelona: exposiciones commemorativas, límites, problemas y desafíos. In *El desafío de exponer: procesos y retos museográficos*, ed. I. Arrieta, 103–128. Euskal Herriko Unibertsitatea: Bilbao.
Hernández Cordero, Adrián. 2017. La intervención y disputa por el patrimonio en Barcelona. Del Mercado del Born al Born Centre Cultural. *Anales de Geografía de la Universidad Complutense* 37 (1): 161–181.
Marimon, Sílvia. 2016. *Entrevista a Ricard Vinyes: "Voldríem suprimir la nefasta dinastia Borbó del nomenclàtor"*. Comissionat de Programes de Memoria de l'Ajuntament de Barcelona, Ara. 16 febrer 2016.
Menéndez, Francesc Xavier, and Isidre Pastor. 2002. El futur del Born. Una polèmica ciutadana a l'entorn del patrimoni. *L'Avenç* 273: 66–77.
Muñoz, Josep Maria. 2002. El futur del passat. *L'Avenç* 273: 34–35.
Nicolau, Antoni. 2002. El debat sobre la conservació de les restes arqueològiques. *Barcelona Cultura. Revista de l'Institut de Cultura de Barcelona* 3: 4–7.
Riu-Barrera, Eduard. 2002. Arqueologia i conflicte urbà. *L'Avenç* 273: 60–65.
Torra, Quim. 2013a. El Born: punt de trobada de la cultural i la història catalanes. *Serra d'Or* 645: 16–32.
Torra, Quim. 2013b. El Born: la zona zero dels catalans. *Via21. Revista del Centre d'Estudis Jordi Pujol* 4: 96–107. Online resource: https://www.yumpu.com/es/document/view/36239560/quim-torra-el-born-la-zona-zero-dels-catalans-jordi-pujol.

El Mirón Cave: Geography and Culture

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Introduction

El Mirón is a large cave that dominates a stretch of the upper Asón River valley at the eastern end of the province of Cantabria in northern Atlantic Spain, near the border of the Basque Country (Fig. 1). Discovered at the same time in 1903 and by the same amateur archaeologists (Hermilio Alcalde del Río and Lorenzo Sierra) as the adjacent and stylistically identical cave art sites of Covalanas and La Haza, El Mirón is at the center of a major cluster of Upper Paleolithic art and living sites that also includes such loci as Venta Laperra and other caves along the Carranza Gorge, El Horno, La Luz, and Cullalvera. The famous Magdalenian and Azilian site of El Valle, excavated by Sierra, H. Breuil, J. Bouyssonie, and H. Obermaier in 1909–1911, is about 5 km downstream. Despite its obvious potential, El Mirón was largely forgotten and was not systematically excavated until 1996, when the authors of this entry began the research in the cave. The excavations have continued ever since, revealing one of the longest cultural sequences in or near the Cantabrian region, rivaled only by sites such as El Castillo (three valleys to the

El Mirón Cave: Geography and Culture, Fig. 1 Photo of the mouth of El Mirón Cave (Ramales, Cantabria, Spain). L.G. Straus

E

west in Cantabria) or Isturitz (in the French Basque Country) (Straus and Gonzalez Morales 2012a).

Definition

Located at c. 260 m above present sea level and c. 100 m above the Asón at the town of Ramales, El Mirón is only 20 km from the Holocene shore (and c. 25 km from the Ice Age shore) but is surrounded by peaks and ridges of the second chain of the Cantabrian Cordillera that reach or exceed 1000 m. It is near strategic natural avenues of communication between Cantabria and the Basque County (via the Carranza Valley) and between Cantabria and the *meseta* of Old Castile (via the low [920 m] Los Tornos Pass). Access to the central sector of Cantabria, with its concentration of Upper Paleolithic sites on the coastal plain near Santander (e.g., Morín, El Pendo, El Juyo, La Garma) and in adjacent montane valleys (e.g., El Rascaño, El Salitre, Monte Castillo), is also relatively easy via 675 m Alisas Pass between the Asón and Miera valleys – visible from El Mirón. There is a cluster of Upper Paleolithic and Mesolithic sites near the present mouth of the Asón, El Otero, La Chora, Cobrante, El Perro, and La Fragua, plus several sites (notably Cofresnedo, Cubio Redondo, Patatal, and Los Emboscados) in the polje of Matienzo that lies not far inland. El Mirón faces due west and looks out from a steep cliff side at the pyramid-shaped San Vicente Peak (reminiscent of Monte Castillo, which contains the cave sites of El Castillo, La Pasiega, Las Chimeneas, Las Monedas, and La Flecha). The accessible part of this simple, straight, single-chamber cave is some 130 m deep. Although there are archaeological remains (including Magdalenian evidence) in the dark inner cave, the excavations have concentrated on the rich deposits in the sunlit vestibule, which measures 30 m deep × 8–10 m wide and 12–13 m high (with the mouth itself being 19 m high and 16 m wide). The sedimentary infilling (up to 9 m deep according to ground-penetrating radar and other remote sensing methods and coring) records a very long sequence of depositional agencies and late Pleistocene climate changes (Courty and Valleverdu 2001; Ellwood et al. 2001; Straus et al. 2001).

Key Issues

González Morales and Straus have conducted excavations in El Mirón since 1996, mainly in the vestibule (although they also found traces of early Magdalenian occupations in the dark cave interior and in the narrow ramp gallery that connects it with the vestibule). The vestibule excavations have consisted of two 9–10 m^2 block excavations (the outer vestibule cabin and inner vestibule corral areas) connected by a 9 × 1 m trench with a deep 1 × 1 m *sondage* at its midpoint, plus a 4 × 1 m trench dug below the base of a looters' crater at the base of the ramp at the vestibule rear that is connected to the NE corner of the corral area, and a 2.5 m^2 excavation area that is connected to the SE corner of the corral area between a huge decorated block and the rear wall of the cave vestibule. There are now 90 radiocarbon dates (AMS and conventional) from the site (Straus and Gonzalez Morales 2003, 2007a, 2010, 2016; Straus et al. 2015b).

The composite cultural sequence revealed by these excavations in various sectors of the cave and dated by radiocarbon is as follows:

Late Mousterian, >45,000, 48,200 ± 3300, 41,280 ± 1120 BP (all dates, uncalibrated): ramp base
Gravettian, 27,580 ± 210 BP: ramp base
Solutrean, 20,440–18,390 BP: corral and ramp base
Initial Magdalenian, 17,400–16,080 BP: ramp, corral, mid-vestibule, cabin
Lower Magdalenian, 15,700–14,600 BP: inner cave, corral, behind block, mid-vestibule, cabin
Middle Magdalenian, 14,850–13,490 BP: corral, behind block, mid-vestibule, cabin
Upper Magdalenian, 12,970–12,460 BP: corral, mid-vestibule, cabin
Final Magdalenian/Early Azilian, 11,950–11,205 BP: corral, mid-vestibule, cabin
Azilian, 10,740–10,270 BP: ramp, mid-vestibule, cabin
Mesolithic, 9550–8380 BP: corral, mid-vestibule, cabin
Neolithic, 5790–4680 BP: mid-vestibule, cabin
Chalcolithic, 4120–3820 BP: cabin
Early Bronze Age: 3700–3230 BP: inner cave, cabin

In addition, there are traces (torches?) of Medieval visits to the cave (CE 1100–1400), as well as ample evidence of recent occupations by humans and/or their livestock up until the time the excavation began.

The Mousterian and Gravettian are attested by very small numbers of scattered, banal lithic artifacts (flakes and a few notches/denticulates in the former; flakes and blades – including a few retouched ones – in the latter), together with dispersed charcoal fragments and faunal remains (essentially red deer and ibex, plus lion identified by A.B.. Marín in the Gravettian). Hominin visits to the cave (or at least to the vestibule rear) were ephemeral, but carnivore activity was significant.

The cold, dry conditions that developed during the course of the Gravettian-age deposit (evidenced by pollen analyzed by M.J. Iriarte (Straus et al. 2011b) and rodents studied by G. Cuenca-Bescós (2008)) continued into the overlying Solutrean sequence, with open landscapes dotted only with some pine trees. Humidity increased in the later Solutrean levels with the addition of birch and more heaths, grasses, and ferns. The light-colored clayey/sandy silt Solutrean levels, banked up against the base of the colluvial-alluvial erosional ramp that leads up to the inner cave, show some increase in the intensity of use of the cave by humans but probably for very limited purposes. The density of artifacts and bones is low, and there are no hearths or other features in the 4–5 m^2 in which the Solutrean has been excavated. There are relatively few lithic debris (especially cores and other primary débitage items, although micro-débitage is abundant), limited numbers of retouched tools (notably continuously retouched pieces, denticulates/notches, sidescrapers, simple angle burins, and backed bladelets), but relatively many Solutrean points (almost all broken) of various types and made on diverse raw materials, some rather colorful and from nonlocal sources probably near the Vizcayan and/or Santanderine shores. Alongside the points (shouldered, laurel, and willow leaf, unifacial, and concave base), there are consistently perforated objects, especially marine shells, but also teeth (red deer canines) and bones. A few *sagaies* have been found, including one with a long bevel or tip decorated by numerous, fine, oblique engraved lines. In addition to remains of red deer and ibex, there are also fish bones and a few unperforated mollusk shells. A plausible hypothesis is that the cave was used for repeated hunting expeditions in the montane zone under still-rigorous, though attenuating climatic conditions apparently right before, during, and right after Greenland Interstadial 2 within the Last Glacial Maximum in sensu lato (Straus and Gonzalez Morales 2009; Straus et al. 2011b).

The transition to the Initial Magdalenian occurred sometime around 17,000 BP (uncal.) during early Oldest Dryas (Straus and Gonzalez Morales 2012b). The most notable change within the context of El Mirón is the fact that these dark gray-brown silty loam levels (richest by far at the foot of the ramp) now lie relatively flat and are dense in lithic and osseous artifacts of many kinds, faunal remains, remnants of hearths (abundant charcoal, burnt flints and bones, actual fire pits, fire-cracked rocks), thin patches of pigment. *Sagaies* are numerous and include a wide range of sizes and sections. The lithic assemblages include both large flakes and flake tools (scrapers, denticulates, notches) on local raw materials (quartzite, mudstone, limestone) and smaller implements (including backed bladelets) made on good-quality flint, apparently from nonlocal, coastal sources. Assemblages characterized by macroliths on non-flint materials have been found in other early Magdalenian (and Solutrean) contexts in Cantabria and Asturias. There are several large, round-section antler points along with oval-section ones (Straus et al. 2014). Classic diagnostic "fossil director" artifacts of the French Badegoulian are very rare or absent. Remains of red deer, ibex, and salmon are abundant. The basal Initial Magdalenian level yielded a broken (unfinished?) pendant with a fine engraving of a horse head on a slate-like rock of possibly local provenance (González Morales and Straus 2013).

The classic Lower Cantabrian Magdalenian is extremely well represented in El Mirón. Still cold, the landscape was dominated by grasslands and heaths, with scattered pines, junipers, birches, and some hazels in the latest times (Iriarte et al. 2015). The cave seems to have been entirely and intensively used by humans during repeated, relatively long-term, multifunctional occupations, possibly

during the warm season. The deposit is a veritable horizon of dark chocolate brown color, rich in charcoal and other organic matter, hearths with fire-cracked rocks (attesting to stone-boiling and probably bone grease extraction as part of hearth-centered activities; Straus and Gonzalez Morales 2007b; Nakazawa et al. 2009), vast quantities of red deer, ibex, and salmon remains (Consuegra et al. 2002; Cuenca-Bescos et al. 2012), lithic debris and retouched tools, antler *sagaies* (round, quadrangular, oval, centrally flattened sections, single-bevel base, sometimes geometrically decorated), bone needles, perforated animal teeth and shells, etc. The lithic tools are heavily dominated by backed bladelets (presumed projectile weapon elements), but there are also many so-called nucleiform endscrapers (bladelet cores for prolific bladelet production that may occasionally have also been used as scrapers (Straus et al. 2016) and the usual retouched blades, notches, denticulates, and sidescrapers, plus smaller numbers of perforators and burins (Straus et al. 2008). High-quality flints from Upper Cretaceous flysch sources along the present shore near Bilbao and Santander dominate the lithic assemblages and attest to visits, stays, and/or social contacts at the coast. However there are also flints from more distant outcrops in extreme SW France and the trans-Cordilleran interior Basque region/Navarra, suggesting long-distance trade and/or collection trips (Fontes et al. 2015, 2017). Together with several engraved fragmentary pieces, an essentially whole, large red deer stag scapula with the striated engraving of a red deer hind head and neck followed by the engraved outline of a possible bovine was found in this horizon (Gonzalez Morales et al. 2007). It is almost identical to other such pieces that have been found since 1902 (first by Alcalde del Rio) at other Lower Magdalenian sites in Cantabria and eastern Asturias (notably at El Castillo, Altamira, and El Juyo). As first noted by Breuil, these images bear strong technical and stylistic similarities to striated engravings (especially of hinds) on the cave walls of caves such as Altamira, El Castillo, Llonín, etc. The Lower Magdalenian horizon also yielded an iron oxide pebble with a fine reticulate engraved design and *Homalopoma sanguineum* and *Cyclops* shells from the Mediterranean, as well as relatively numerous shells from the Cantabrian Sea (Gutiérrez-Zugasti and Cuenca 2015). Despite the presence of regional territorial stylistic markers (the engraved scapulae), this horizon yielded another possible piece of evidence of participation in long-distance social contacts: a distinctive, thin spear-thrower that is almost identical in its size, shape, and proportions to three others of similar age from the sites of Le Placard and Roc de Marcamps in west-central France (Gonzalez Morales and Straus 2005, 2009). A grooved reindeer incisor (at this time the only evidence of *Rangifer* at El Mirón according to J.M. Geiling) also suggests ties to reindeer-rich Roc de Marcamps, where there are several such ornaments.

It was near the beginning of this period that a very large block fell from the ceiling of the vestibule rear, landing with its eroded outer surface atop Level 110. The flat, sheared-off inner surface, oriented toward the cave mouth and hence the sunlight, was engraved soon thereafter with two series of (deep and wide, shallow, and narrow) lines (some of which might represent hands and fingers) (Gonzalez Morales and Straus 2015). (There are other fine engravings – including one of a horse – on the rear wall of the vestibule, probably also dating to the Lower-Middle Magdalenian; Garcia Diez et al. 2012.) Behind this block, in the c. 1 m space between it and the rear cave wall, partly atop a bedrock ledge that had been hit by the fallen block and partly in a pit dug into a preexisting Lower Magdalenian level, the remains of a partial human skeleton (notably lacking its cranium and most major long bones) were buried (Straus et al. 2015a). The bones (including a complete mandible with teeth and one maxillary incisor) are stained with red ocher, the back (eastern) face of the block adjacent to the burial is also so stained, and the level in which the human remains were buried was also stained red and speckled with hematite crystals probably from a source on the present coast at the mouth of the Asón (Seva et al. 2015). The burial level is under- and overlain by fire lenses. This burial – the first one of Magdalenian age to be found on the Iberian Peninsula – was a reworked primary interment apparently done in a highly ritualized context, as manifested notably by the engraved and painted block which may have served as a grave marker (Straus et al. 2011a, 2015; Gonzalez

Morales and Straus 2015). Analysis of the skeletal remains reveals that the individual ("the Red Lady of El Mirón") was a robust female, 35–40 years old, in good health (Carretero et al. 2015) who had a diet of mostly terrestrial mammals (mainly ibex and red deer) but also c. 20% marine foods, plus some plant seeds and mushrooms (García-González et al. 2015; Power et al. 2015; Marín and Geiling 2015). Mitochondrial and nuclear DNA analyses have shown that this individual was part of a human population that had abandoned northern Europe during the Last Glacial Maximum and then recolonized it during Oldest Dryas and the Tardiglacial (Fu et al. 2016), in support of long-standing archaeological arguments by Straus (e.g., 1991, 2000, 2013) and others. The El Mirón stratigraphic sequence also provided evidence that the Cantabrian region was a refugium for both salmon and red deer during the pleniglacial period (Consuegra et al. 2002; Stevens et al. 2014).

The Lower Magdalenian levels grade rather imperceptibly into layers that are dated to the Middle Magdalenian time range. The lithic and osseous artifact assemblages are generally similar, but there are markers of neither the Cantabrian Lower Magdalenian nor the classic Pyrenean Middle Magdalenian (notably *contours découpés* or perforated bone disks) which have been appearing with increasing frequency in recent excavations of Cantabrian sites (e.g., Las Caldas, La Viña, Llonín, Tito Bustillo, El Juyo, El Linar, La Garma, Ekain). Somehow El Mirón (or at least the small part of the site that has been excavated) failed to receive such "calling cards" from the wider Magdalenian world at this time. However there is a short, longitudinally grooved antler point with a single-bevel base that resembles a Lussac-Angles *sagaie* – an artifact type diagnostic of the early Middle Magdalenian of France. People repeatedly and intensively occupied the cave (as before) mainly during the warm months, hunting red deer and ibex (according to analyses by A.B.. Marin 2010) and fishing salmon. The artifact assemblages contain abundant backed bladelets and *sagaies*. Periods of abandonment are suggested by rodent and raptor activity.

The Upper Magdalenian represents a significant break in the nature of human use of El Mirón. The levels are thinner, poorer, and discontinuous. The Late Glacial trend toward increased woodlands and humid meadows in the vicinity of the cave began at this time would be briefly interrupted during Youngest Dryas (corresponding to the Azilian), and mixed deciduous forestation would become dominant in the early postglacial (Cuenca-Bescós et al. 2008). The red deer- and ibex-dominated faunal assemblages attest warm-season visits to the cave, now without the abundant hearths of the earlier Magdalenian levels. The artifacts continue to include many backed bladelets and backed micropoints, as well as *sagaies*. There is one fragment of a unilaterally barbed antler harpoon closely associated with charcoal dated to 12,970 ± 70 BP (uncal.). During the terminal Late Glacial, human settlement in the Upper Asón seems to have been concentrated in caves at the base of this valley and that of its Río Calera tributary immediately east of El Mirón: El Valle, Cullalvera, and El Horno, all with Upper Magdalenian and/or Azilian materials.

The following Upper Paleolithic levels are difficult to assign to either the Terminal Magdalenian or Azilian. They date between 11,950 and 11,650 BP but with some incoherency. True "fossil directors" are absent from the small assemblages, but there are curved backed "Azilian" points, thumbnail endscrapers, and an elongated pebble stained with red ocher (Gonzalez Morales and Straus 2012). These levels are thin and discontinuous, with evidence of warm-season hunting of red deer and ibex according to A.B.. Marin (2009, 2010). Levels with unambiguously Azilian-age dates are unfortunately even less well defined in terms of artifacts, although lithic Azilian points and thumbnail endscrapers are also present. The presence of c. 10,500 BP dates in a small remnant of breccia (with only a few visible flakes and bones) under a travertine adhering to the cave wall at the top of the ramp suggests that there may have been a more extensive Azilian occupation at the western edge of the inner cave that was lost to erosion (possibly including the movement of humans and livestock) during the Holocene. This Azilian episode seems to have been followed by virtual abandonment of the cave, with only occasional, ephemeral visits by humans who left scattered flakes and faunal remains during the course of the Preboreal. Mesolithic occupation of the region was highly concentrated along the shore as this

essentially reached its present position and as the interior became densely forested. El Mirón only became a significant human residence again in the Early Cantabrian Neolithic, c. 5700 BP, with evidence of domesticated wheat (Peña-Chocarro et al. 2005), sheep/goats, cattle, and pigs (Altuna and Mariezkurrena 2012), along with locally made, high-quality ceramics (Vega 2012). Intensive occupation by people and their livestock continued throughout the Chalcolithic and early Bronze Age, with many hearths, pits, and other anthropic features (Straus and Gonzalez Morales 2012c).

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Art, Paleolithic
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Geoarchaeology
- ▶ *Homo sapiens*
- ▶ Human Evolution: Use of Fire
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ La Riera Cave: Geography and Culture
- ▶ Lithic Technology, Paleolithic
- ▶ Radiocarbon Dating in Archaeology

References

Altuna, J., and K. Mariezkurrena. 2012. Macromammalian remains from the Holocene levels of El Mirón Cave. In *El Mirón Cave, Cantabrian Spain*, ed. L.G. Straus and M. González Morales, 288–318. Albuquerque: University of New Mexico Press.

Carretero, J.M., R. Quam, A. Gómez-Olivencia, M. Castilla, L. Rodríguez, and R. García-González. 2015. The Magdalenian human remains from El Mirón Cave (Cantabria, Spain). *Journal of Archaeological Science* 60: 10–277.

Consuegra, S., C. Garcia Leaniz, A. Serdio, M. Gonzalez Morales, L.G. Straus, D. Knox, and L. Verspoor. 2002. Mitochondrial DNA variation in Pleistocene and modern Atlantic salmon from the Iberian glacial refugium. *Molecular Ecology* 11: 2037–2048.

Courty, M.A., and J. Valleverdu. 2001. The microstratigraphic record of abrupt climate changes in cave sediments of the western Mediterranean. *Geoarchaeology* 16: 467–500.

Cuenca-Bescos, G., L.G. Straus, M. Gonzalez Morales, and J. Garcia Pimienta. 2008. Paleoclima y paisaje del final del Cuaternario en Cantabria: Los pequeños mamíferos de la Cueva del Mirón (Ramales de la Victoria). *Revista Espanola de Paleontologia* 23: 91–126.

Cuenca-Bescos, G., A.B. Marin, I. Martinez, M. Gonzalez Morales, and L.G. Straus. 2012. Relationship between Magdalenian subsistence and environmental change: The mammalian evidence from El Miron (Spain). *Quaternary International* 272–273: 125–137.

Ellwood, B., F. Harrold, S. Benoist, L.G. Straus, M. Gonzalez Morales, K. Petruso, N. Bicho, J. Zilhao, and N. Soler. 2001. Paleoclimate and intersite correlations from late Pleistocene/Holocene cave sites: Results from southern Europe. *Geoarchaeology* 16: 433–463.

Fontes, L.M., L.G. Straus, and M. González Morales. 2015. Lithic and osseous artifacts from the Lower Magdalenian deposit in El Mirón Cave, Cantabria, Spain. *Journal of Archaeological Science* 60: 99–111.

Fontes, L.M., L.G. Straus, and M. González Morales. 2017. Lower Magdalenian lithic raw material provisioning: A diachronic view from El Mirón Cave (Ramales de la Victoria, Cantabria, Spain). *Journal of Archaeological Science: Reports*. https://doi.org/10.1016/j.jasrep.2017.03.015.

Fu, Q., C. Posti, M. Hajdinjak, et al. 2016. The genetic history of Ice Age Europe. *Nature* 534: 200–205.

Garcia Diez, M., M. Gonzalez Morales, and L.G. Straus. 2012. Datación estratigráfica del grafismo rupestre paleolítico de la Cueva de El Mirón. *Trababjos de Prehistoria* 69: 21–36.

García-González, R., J.M. Carretero, M.P. Richards, L. Rodríguez, and R. Quam. 2015. Dietary inferences through dental microwear and isotope analyses of the Lower Magdalenian individual from El Mirón Cave (Cantabria, Spain). *Journal of Archaeological Science* 60: 28–38.

Gonzalez Morales, M., and L.G. Straus. 2005. The Magdalenian sequence of El Mirón Cave (Cantabria, Spain): An approach to the problems of definition of the Lower Magdalenian in Cantabrian Spain. In *Industrie osseuse et parures du Solutréen au Magdalénien en Europe (Mémoires de la Société Préhistorique Française 39)*, ed. V. Dujardin, 209–219. Paris: Societe Prehistorique Francaise.

Gonzalez Morales, M., and L.G. Straus. 2009. Extraordinary early Magdalenian finds from El Mirón Cave, Cantabria (Spain). *Antiquity* 83: 267–281.

Gonzalez Morales, M., and L.G. Straus. 2012. Terminal Magdalenian/Azilian at El Mirón Cave (Ramales de la Victoria, Cantabria) and the Río Asón Valley. In *Ad*

Orientem. Del Final del Paleolítico en el Norte de España a las Primeras Civilizaciones del Oriente Próximo, ed. J.R. Muñoz, 189–215. Oviedo: Ménsula.

Gonzalez Morales, M., and L.G. Straus. 2013. Colgante decorado con una cabeza de caballo de la Cueva de El Mirón. In *Homenaje a F. Javier Fortea Pérez*, ed. M. de la Rasilla, 225–235. Oviedo: Ménsula.

Gonzalez Morales, M., and L.G. Straus. 2015. Magdalenian –age graphic activity associated with the El Mirón Cave human burial. *Journal of Archaeological Science* 60: 125–133.

Gonzalez Morales, M., L.G. Straus, and A.B. Marin. 2007. Los omóplatos decorados magdalenienses de la Cueva del Mirón y su relación con las cuevas del Castillo, Altamira y El Juyo. In *Miscelánea en Homenaje a Victoria Cabrera, I. Zona Arqueológica*, ed. J.M. Maillo and E. Baquedano, vol. 7, 482–494. Alcalá de Henares: Museo Arqueológico Regional.

Gutiérrez-Zugasti, I., and D. Cuenca. 2015. Ornaments from the Magdalenian burial area in El Mirón Cave (Cantabria, northern Spain). *Journal of Archaeological Science* 60: 112–124.

Iriarte, M.J., A. Arrizabalaga, and G. Cuenca-Bescós. 2015. The vegetation and climatic conditions of the Lower Magdalenian human burial in El Mirón Cave (Cantabria, Spain). *Journal of Archaeological Science* 60: 66–44.

Marin, A.B.. 2009. Exploitation of the montane zone of Cantabrian Spain during the Late Glacial: Faunal evidence from El Miron Cave. *Journal of Anthropological Research* 65: 69–102.

Marin, A.B.. 2010. *Arqueozoología en el Cantábrico Oriental durante la Transición Pleistoceno/Holoceno: La Cueva del Mirón*. Santander: Ediciones de la Universidad de Cantabria.

Marín, A.B.., and J.M. Geiling. 2015. Archeozoological study of the macromammal remains stratigraphically associated with the Magdalenian human burial in El Mirón Cave. *Journal of Archaeological Science* 60: 75–83.

Nakazawa, Y., L.G. Straus, M. Gonzalez Morales, D. Cuenca, and J. Caro. 2009. On stone-boiling technology in the Upper Paleolithic: Behavioral implications from an early Magdalenian hearth in El Mirón Cave, Cantabria, Spain. *Journal of Archaeological Science* 36: 684–693.

Peña-Chocarro, L., L. Zapata, M.J. Iriarte, M. Gonzalez Morales, and L.G. Straus. 2005. The oldest agriculture in northern Atlantic Spain: New evidence from El Mirón Cave (Ramales de la Victoria, Cantabria). *Journal of Archaeological Science* 32: 579–587.

Power, R., D. Salazar-García, L.G. Straus, M. González Morales, and A. Henry. 2015. Microremains from El Mirón Cave human dental calculus suggest a mixed plant-animal subsistence economy during the Magdalenian in northern Iberia. *Journal of Archaeological Science* 60: 39–46.

Seva, R., C. Biete, and M.D. Landete. 2015. Analysis of the red ochre of the El Mirónburial. *Journal of Archaeological Science* 60: 84–98.

Stevens, R., X. Hermoso-Buxán, A.B. Marín-Arroyo, M. González Morales, and L.G. Straus. 2014. Investigation of Late Pleistocene and Early Holocene palaeoenvironmental change at El Mirón Cave (Cantabria, Spain): Insights from carbon and nitrogen isotope analyses of red deer. *Palaeogeography, Palaeoclimatology, Palaeoecology* 414: 46–60.

Straus, L.G. 1991. Human geography of the late Upper Paleolithic in Western Europe. *Journal of Anthropological Research* 47: 259–278.

Straus, L.G. 2000. A quarter-century of research on the Solutrean of Vasco-Cantabria, Iberia and beyond. *Journal of Anthropological Research* 56: 39–58.

Straus, L.G. 2013. After the deep freeze: Confronting "Magdalenian" realities in Cantabrian Spain and beyond. *Journal of Archaeological Method and Theory* 20: 236–255.

Straus, L.G., and M. Gonzalez Morales. 2003. El Mirón Cave and the 14C chronology of Cantabrian Spain. *Radiocarbon* 45: 41–58.

Straus, L.G., and M. Gonzalez Morales. 2007a. Further radiocarbon dates for the Upper Paleolithic of El Mirón Cave. *Radiocarbon* 49: 1–10.

Straus, L.G., and M. Gonzalez Morales. 2007b. Early Tardiglacial human uses of El Mirón Cave (Cantabria, Spain). In *On shelter's ledge (British Archaeological Reports International series 1655)*, ed. M. Kornfeld, S. Vasil'ev, and L. Miotti, 83–93. Oxford: Hadrian Books.

Straus, L.G., and M. Gonzalez Morales. 2009. A preliminary description of Solutrean occupations in El Mirón Cave (Ramales de la Victoria, Cantabria). *Munibe* 60: 117–137.

Straus, L.G., and M. Gonzalez Morales. 2010. The radiocarbon chronology of El Mirón (Cantabria, Spain): New dates for the initial Magdalenian occupations. *Radiocarbon* 52: 33–39.

Straus, L.G., and M. Gonzalez Morales, eds. 2012a. *El Miron Cave, Cantabrian Spain: The site and its Holocene record*. Albuquerque: University of New Mexico Press.

Straus, L.G., and M. Gonzalez Morales. 2012b. The Magdalenian settlement of the Cantabrian regions (northern Spain): The view from El Miron Cave. *Quaternary International* 272-273: 111–124.

Straus, L.G., and M. Gonzalez Morales. 2012c. Descriptions of the post-paleolithic pit and hearth features of El Mirón Cave. In *El Mirón Cave, Cantabrian Spain*, ed. L.-G. Straus and M. González Morales, 319–331. Albuquerque: University of New Mexico Press.

Straus, L.G., and M. Gonzalez Morales. 2016. El Mirón Cave (Ramales, Cantabria, Spain) date list V: Middle Paleolithic and Lower Magdalenian. *Radiocarbon* 58: 943–945.

Straus, L.G., M. Gonzalez Morales, W. Farrand, and W. Hubbard. 2001. Sedimentological and stratigraphic observations in El Mirón, a late Quaternary cave site in the Cantabrian Cordillera, northern Spain. *Geoarchaeology* 16: 603–630.

Straus, L.G., M. Gonzalez Morales, and E. Stewart. 2008. Early Magdalenian variability: New evidence from El Mirón Cave (Cantabria, Spain). *Journal of Field Archaeology* 33 (197–218): 367–369.

E

Straus, L.G., M. Gonzalez Morales, and J.M. Carretero. 2011a. Lower Magdalenian secondary human burial in El Mirón Cave, Cantabria, Spain. *Antiquity* 85: 1151–1164.
Straus, L.G., M. Gonzalez Morales, I. Gutierrez Zugasti, and M.J. Iriarte. 2011b. Further Solutrean evidence in El Mirón Cave (Ramales de la Victoria, Cantabria). *Munibe* 62: 117–133.
Straus, L.G., M. González Morales, and L. Fontes. 2014. Initial Magdalenian artifact assemblages in El Mirón Cave (Ramales de la Victoria, Cantabria, Spain): A preliminary report. *Zephyrus* 73: 45–65.
Straus, L.G., M. Gonzalez Morales, and J.M. Carretero. 2015a. Special issue: "The Red Lady of El Mirón Cave": Lower Magdalenian human burial in Cantabrian Spain. *Journal of Archaeological Science* 60.
Straus, L.G., M. González Morales, T. Higham, M. Richards, and S. Talamo. 2015b. Radiocarbon dating the Late Upper Paleolithic of Cantabrian Spain: El Mirón Cave date list IV. *Radiocarbon* 57: 183–188.
Straus, L.G., L. Fontes, R. Domingo, and M. González Morales. 2016. Cores, core-scrapers, and bladelet production during the Lower Magdalenian occupations of El Mirón Cave, Cantabrian Spain. *Lithic Technology* 41: 212–235.
Vega, C. 2012. The ceramics of El Mirón Cave: Production, morphology and discard. In *El Mirón Cave, Cantabrian Spain*, ed. L.G. Straus and M. González Morales, 372–425. Albuquerque: University of New Mexico Press.

El Pilar

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Introduction

El Pilar is a major Classic Maya center situated on an elevated limestone escarpment in western Belize, comprising a monumental architectural core and surrounding zone of dense residential occupation. The rediscovery of El Pilar in 1983 provides an opportunity to evaluate ancient Maya settlement hierarchies in the eastern Maya Lowlands (Fig. 1), challenging prevailing assumptions of a ribbon-like settlement pattern – matching the sinuous Belize River system (Flannery 1972; Hammond 1981) – and the importance of rivers in determining site location in western Belize. The ribbon settlement model derives from the work of Willey et al. (1965) in the 1950s, which documented the distribution of residential units and small ceremonial centers along the Belize River. The idea that proximity to water provided households with advantages to fulfill subsistence and transportation needs was central to the river-focused view of settlement in western Belize. Nevertheless, many major centers were located far from perennial water sources, and proximity to water was not a requisite for permanent settlements. proximity to water is not a requisite.

Archaeological surveys located sites along the Belize River (Willey et al. 1965), yet no surveys had systematically investigated the northern ridge-lands, which were strikingly similar to environments of the greater Petén surrounding Tikal 50 km to the west. The noted lack of surface water did not deter the ancient Maya from establishing numerous settlements and centers around Tikal, and this landlocked interior area shows evidence of occupation spanning the entire sequence of Maya social development from c. 800 BCE to 1000 AC and beyond (Table 1; Puleston 1973; Ford 1986). The question of whether interior settlement patterns prevailed in the ridge-lands east of Tikal, or if settlement patterning was noticeably affected by proximity to the Belize River, remained unanswered for decades. The idea that surface water flows may well be an obstacle to settlement in the Maya Lowlands – an area that receives an average of 2000 mm of rain per year and experiences tropical storms and hurricanes on a regular basis – remained largely overlooked.

Survey has been aided by the fact that the Maya forest has seen little infrastructural development since the neglect of Maya centers around 1000 years ago. While historic activities such as lumbering, chicle sap extraction, and xate palm collection, along with sporadic agricultural pursuits and looting, have impacted natural resources in the area, the marks of these activities on the terrain are slight. Surveyors in the Maya

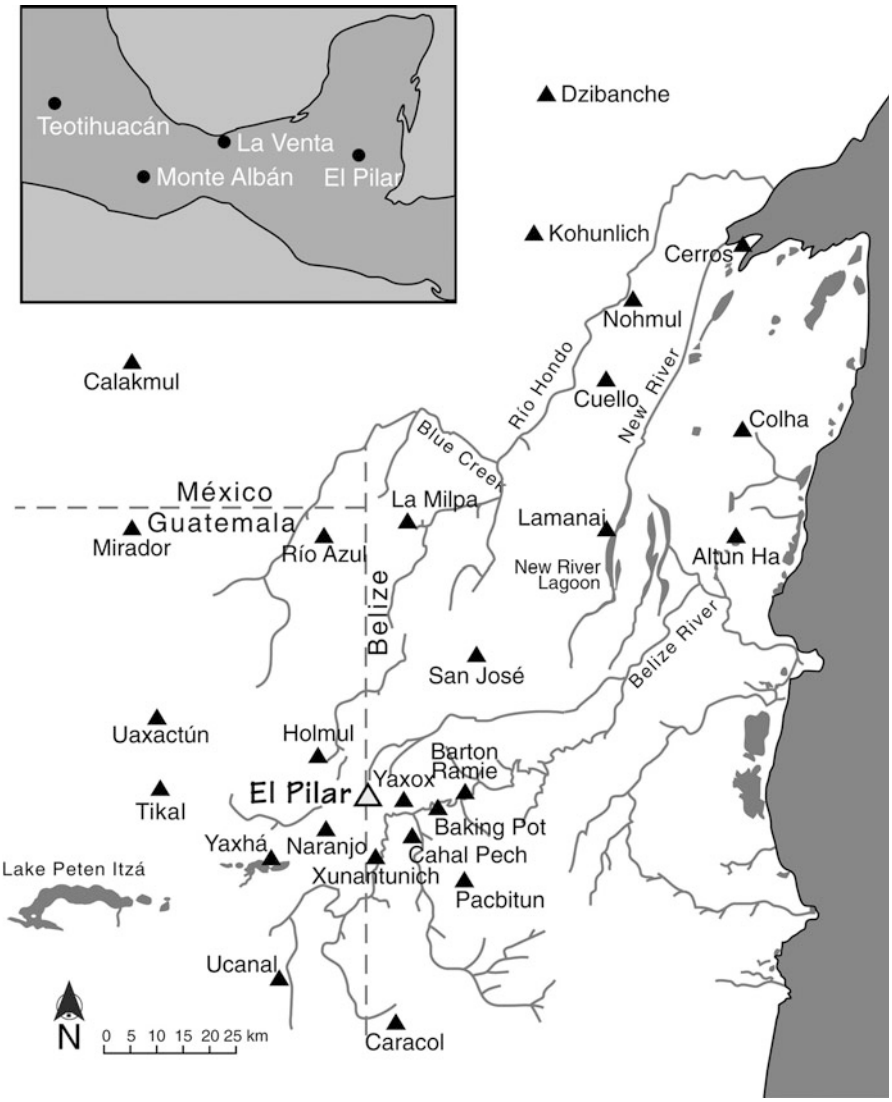

El Pilar, Fig. 1 Central Maya Lowlands with El Pilar indicated

El Pilar, Table 1 Occupation chronology: El Pilar of the Maya Forest

Common era	2000–1000 BCE	1000–250 BCE	250 BCE–250 CE	250–600 CE	600–900 CE	900–1100 CE	1100–1500 CE
Human ecology	Early settlement	Emergent Preclassic centers	Civic center expansion	Center and settlement stability	Civic center growth	Civic center demise	Settlement refocus
Land use	Initial Settled forest gardens	Established forest gardens	Expanding milpa forest gardens	Stable milpa forest gardens	Intensification of milpa forest gardens	Retreat to milpa forest gardens	Dispersed milpa forest gardens
Cultural period	Formative Preclassic	Middle - Late Preclassic	Late Preclassic	Early Classic	Late Classic	Terminal Classic	Early Postclassic

forest will encounter remains of the ancient Maya in all the well-drained zones. Today, LiDAR coverage is revealing large and small settlements throughout the region.

Archaeological survey north of the Belize River was certain to encounter El Pilar, now known as the dominant Maya center in the area. The Belize River Archaeological Settlement Survey (BRASS) sought to examine settlement patterns and household belongings between the river and the northward limestone ridges, thereby assessing the influence of river and ridge-land on ancient occupation (Horn and Ford 2018). El Pilar dispels the myth of river attractions with its ridge-land location, but this does not undermine the importance of water for the Maya (Ford 1996). The Maya developed sophisticated methods for harvesting water and managing its flow, as revealed by reservoirs systematically associated with monumental architecture and complex drainage systems across the region (Ford 1986; Scarborough 1998). Flooding would have been a problem for settlements near small or large waterways, however, which is attested in the predictive model of Maya settlement developed from BRASS survey data (Fig. 2): residential units were rarely closer than 500 m from any drainage (Ford et al. 2009).

Background

The core area of El Pilar comprises greater than 150 ha of architectural monuments distributed over 2 km of eastern Belize to western Guatemala (Fig. 3), demonstrating the international quality of these ancient monuments in the contemporary world. Ongoing, detailed field surveys aim at identifying minor monumental architecture in the peripheral areas surrounding the center. Situated at the eastern edge of the uplifted limestone ridgelands that typify the interior of the greater Petén, El Pilar sits about 265 msl on a 400-meter escarpment that rises north from the Belize River and dominates the horizon from the north and east. Today, it lies beneath a verdant canopy and is dramatically visible from the foothill community of Spanish Lookout to the east.

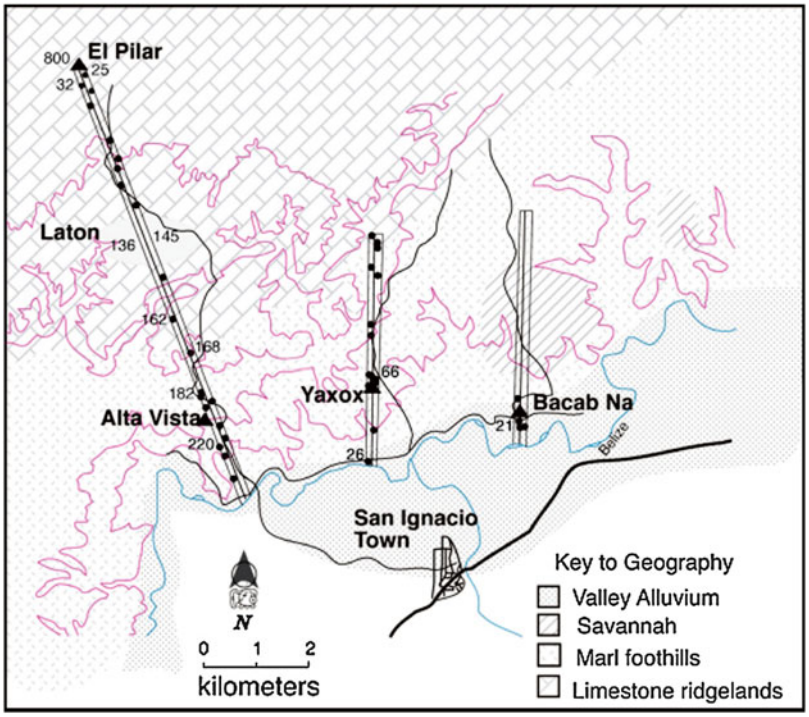

El Pilar, Fig. 2 The Belize River area showing the BRASS Transect Surveys that located El Pilar

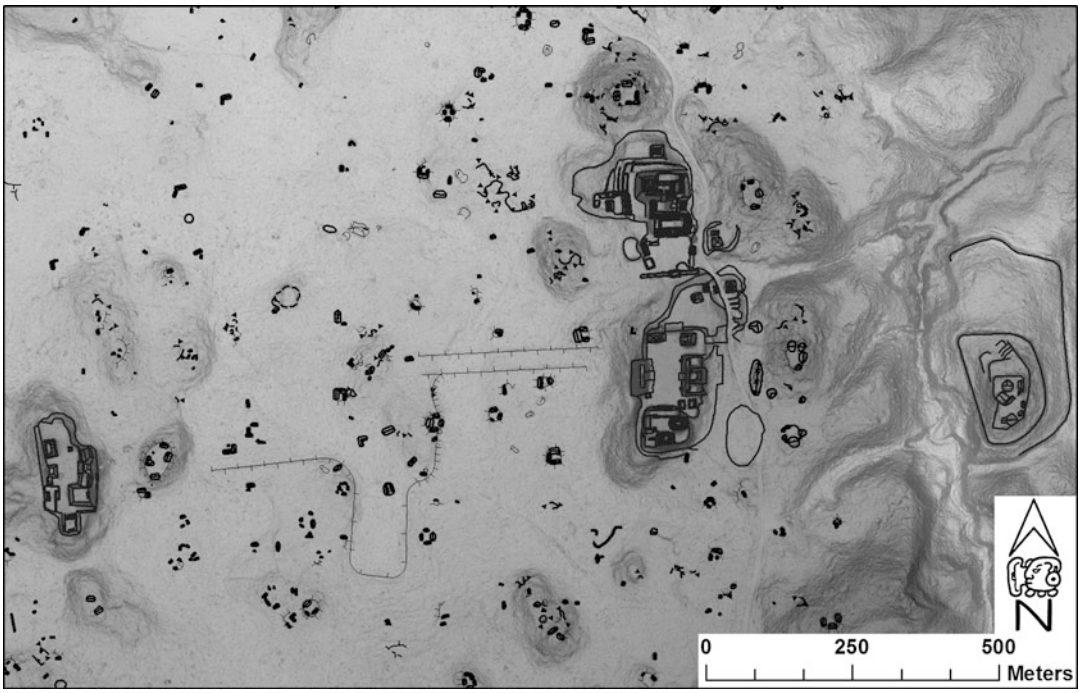

El Pilar, Fig. 3 Core area of El Pilar from the Citadel on the East to Pilar Poniente on the West

Massive in presentation, the monumental core of El Pilar is a mere 10 km from the Belize River and less than 50 km from Tikal. The first maps from 1984–1986 registered 65 looter's trenches, some of which were expanded before intensive archaeological fieldwork began in 1993. Subsequently, it was declared a reserve in Belize and Guatemala.

The El Pilar program, directed by Anabel Ford from the University of California Santa Barbara, assessed the extent of the site for 12 years, determining that an offset causeway linked the east and west monumental architectural areas that lie in contemporary Belize and Guatemala. The acquisition of LiDAR (Light Detection and Ranging) data in 2013 revealed details of this causeway system (Ford 2014) and facilitated the recording of extensive monumental architecture beyond the original mapped areas, particularly to the northwest in Guatemala.

Decades of research at El Pilar fostered several partnerships between archaeologists and local organizations. Critical alliances with the Belize Tourism Industry Association, a Non-Government Organization (NGO), and the Government of Belize were developed to define the reserve boundaries on the east and protect significant monuments. These partnerships set the stage for the unique conservation program called *Archaeology Under the Canopy*: an important initiative that incorporates the environmental context of monumental architecture and engages with the Maya forest to safeguard its unique qualities and the culture of its inhabitants.

The essential need for collaboration with the governmental and nongovernmental agencies, community-based organizations, and archaeologists in Belize and Guatemala led to the creation of the Mesa Redonda El Pilar. The Mesa Redonda process was designed to establish a foundation for binational cooperation and promote the importance of the culture and nature of the Maya forest. Government authorities and nongovernmental agencies, as well as community members in both Belize and Guatemala, together engaged in a management-planning process designed to be implemented in both countries (MARC 2016). This process engendered an inclusive community participation program that continues to grow today.

Archaeological fieldwork at El Pilar encompasses a multiyear survey and excavation program that has produced significant results for understanding the local and regional development of Classic Maya society. Chronologies from ancient monuments at El Pilar and local residences provide a solid foundation for exploring regional-scale settlement patterns (Egerer 2008; Ford 1985, Lucero 2001; Pagliaro 2011), but the impact of developments at El Pilar, a large and powerful center, and its relationships to smaller Belize River sites has not been fully explored.

El Pilar Excavation Overview

Survey, mapping, and looter's trench investigations in the 1980s was followed by excavations at El Pilar from 1993 to 2005. Excavations in the site core focused on monumental architecture – the plazas, temples, palaces, and causeways – as we worked with the Belize Institute of Archaeology to open the area for visitors (Fig. 4). Surveys to define the civic center dimensions and locate distant monumental groups were incorporated into the research program, with fieldwork concentrated in Belize and more limited investigations in Guatemala. Settlement surveys led to the rediscovery of El Pilar, and the project has continued to investigate surrounding settlements to understand the residential sustaining areas of the city.

Excavations in 1993/94 investigated accessways, stairs, and corners of monumental structures, producing a detailed map of the El Pilar epicenter. Field operations in 1995/96 concentrated on the major public Plaza Copal (see Fig. 4, south), comprising a tunnel through the eastern winged temple (EP7) and excavations into the corners and stairs of major buildings around the plaza. Investigations from 1997 to 1999 included a Maya household group, called Tzunu'un (see Fig. 4, east), to the east of Plaza Copal, as well as the north acropolis Xaman Pilar (see Fig. 4, north); building consolidation followed excavations in both areas. From 2000 to 2004, our attention shifted from architectural monuments to the city residents, and we developed a settlement study and excavated two domestic areas to investigate questions of daily life in the El Pilar site core. Consolidation of the Tzunu'un house provided public access to residential architecture so that the ancient populace that once surrounded and supported the center could be appreciated. Guatemalan archaeologists consolidated the looter's trench and façade of the main eastern temple at Pilar Poniente (Fig. 3, east), bringing western El Pilar into the interpretive realm and expanding the example of archaeology under the canopy.

The governments of both Belize and Guatemala committed to a series of investments, beginning in 1995, which were implemented over the course of a decade. In Belize, this took the form of a Statuary Instrument establishing the El Pilar Archaeological Reserve for Maya Flora and Fauna in 1998, which followed the declaration of the Monumento Cultural El Pilar by the Guatemalan Consejo Nacional de Areas Protegidas (CONAP) in 1997. A sequence of Mesa Redonda El Pilar meetings, inaugurated to build confidence in the international planning process, resulted in the establishment of common management principles. These principles formed the basis of the parallel plans approved by Belize and Guatemala.

By 2005, El Pilar was established as a contiguous park stretching across the Belize/Guatemala border, with similar management plans approved for 808 ha in Belize and 1202 ha in Guatemala, bringing the total protected area to 20 km around the core of El Pilar. The main site, with ranger housing in Belize, boasts about 10 km of interpretive trails with signage, consolidated areas that showcase the magnificent architecture, rest stops and picnic areas, and the three lavatories across the binational space.

Following the management planning process, the project once again shifted to the community and traditional "▶ Maya Forest Garden", who practice a cyclic agricultural system that enriches forest biodiversity with useful plants. This outreach involved identification of and inventorying economic plants in the village communities of Santa Familia and Bullet Tree in Cayo, Belize, and Santa Teresa La Zarca in Melchor, Guatemala. This endeavor resulted in the development of a school garden program. Beginning with a

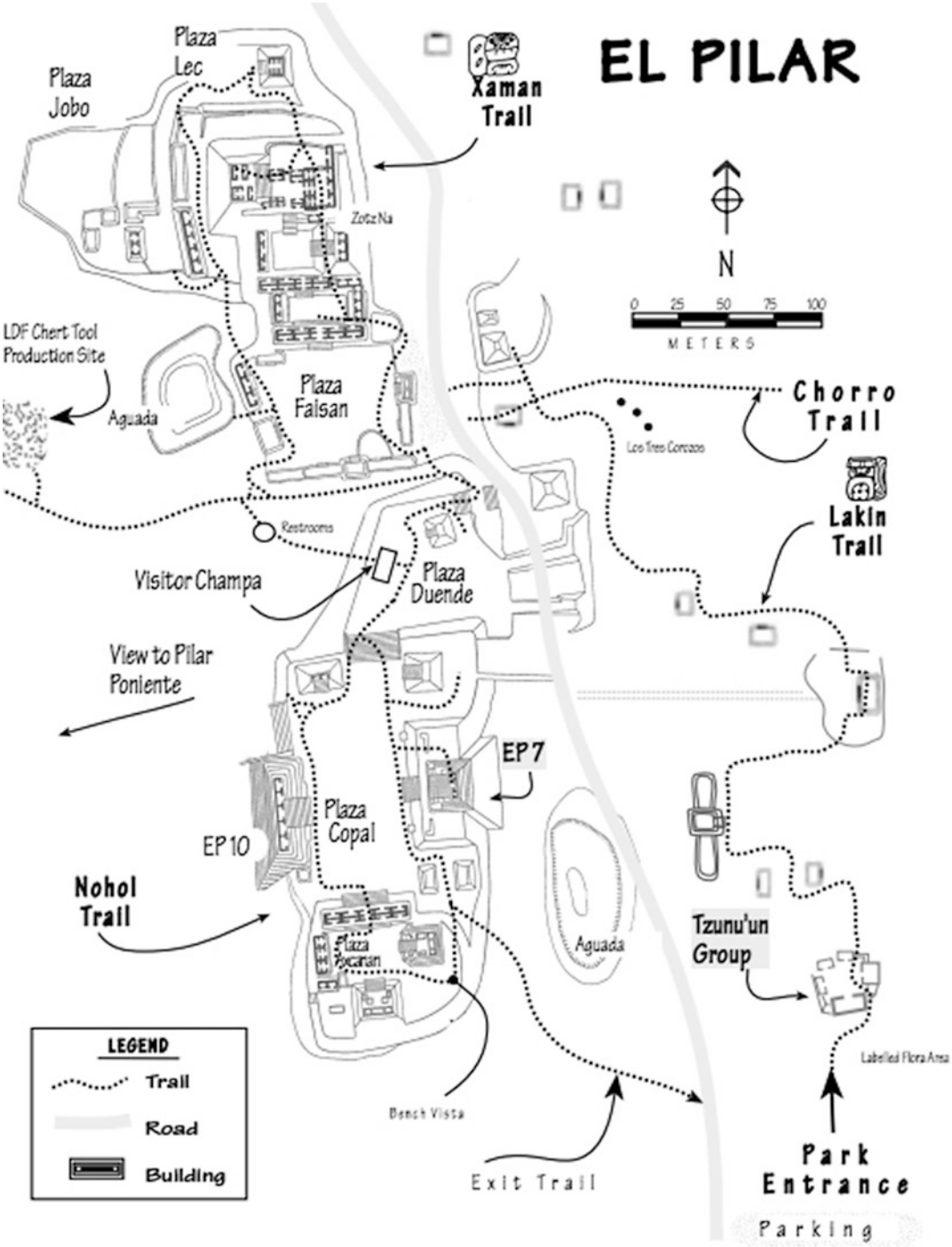

El Pilar, Fig. 4 Trail guide to the main monuments of El Pilar

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group of local farmers and the recognition of the fleeting quality of local landscape knowledge, the Maya forest garden has become institutionalized in Santa Familia Primary School with an active garden named Känan K'aax ("well managed forest" in Mayan). Established in 2009 by the El Pilar Maya Forest Garden Network, a registered Community Based Organization in Belize, the local group began the selective clearing, identification, and planting of important plants for instruction at the primary school. This collective work produced the El Pilar Forest Garden Color Book, which is published by the Belize National Institute of Culture and History and distributed to all Standard 4 students in Belize (Ford 2006, 2012).

Avid work continues with Maya forest gardeners, and they are incorporated into the current thrust of the El Pilar research program, which is focused on the assessment of cultural and natural resources in the El Pilar Archaeological Reserve for Maya Flora and Fauna. The appreciation of natural and cultural resources encompassed in the reserve area is critical to our management plan. With the acquisition of LiDAR data for the 20 km^2 reserve area, we now have a means of assessing the topography and features of the El Pilar city and its immediate surroundings. Survey of the center is in progress and scheduled to be complete by 2020.

The landscape encountered by archaeologists today retains the signatures of Classic Maya land use, ranging from the largest temples to the smallest quarry. These features must be recorded to understand Maya settlement patterns, and we have developed a protocol to validate features identified in LiDAR imagery through targeted archaeological survey. Project members first analyze LiDAR images in a Geographic Information System (GIS) and identify possible features for investigation. We explore the areas around identified targets and accept or reject them as cultural features, using traditional survey and mapping techniques, aided by handheld Global Positioning System (GPS) units, to identify all cultural features. We record the dominant trees of the Maya forest present around each mapped feature as these plant communities bear the signature of their long relationship with the ancient Maya (Campbell et al. 2006; Ross 2011). The final database incorporates field maps of Maya features in an interactive GIS format (Ford 2014, 2016; Ford et al. 2013; Ford and Horn 2017).

The initial El Pilar surveys concentrated around the area of major architectural monuments and have been guided by LiDAR imagery as the survey area expanded. Our earliest surveys proceeded from minimal knowledge of the surrounding area and were essentially designed as a *tabula rasa*, setting out mapped traverses and strategically covering the area based on cardinal directions. With LiDAR imagery, however, we have gained a powerful tool for understanding surface geography and cultural modifications. The images provide *a priori* information on general topography, target features, and anomalies worthy of further investigation. We can compare interpretations of LiDAR imagery to our traditional surveys, validate the presence of potential architectural features, and confirm the absence of other features in different areas of the landscape.

Our recent mapping efforts at El Pilar started in the core of the ancient center, where traditional surveys were previously completed. We have directed attention to areas that were previously surveyed, areas with few LiDAR elements, and areas with significant LiDAR features. In this manner, we have been able to verify the accuracy of traditional survey methods, validate the relationship of elements and features in the LiDAR with those observed in the field, and build a replicable survey protocol to collect, digitize, and compile mapping and GPS data in the GIS.

Our final maps register a range of cultural features, including residential architecture, *chultuns* (storage pits), quarries, reservoirs or aguadas, terraces, rock alignments or berms, historic sites, and other anomalous landscape modifications. Investigation of low-lying areas without major LiDAR features revealed a general concordance between the absence of features and the lack of residential settlement, although evidence of features not recognized in LiDAR images has also been recorded in these areas. Cultural remains in the low-lying areas appear as rock alignments and linear features that may relate to water management or agriculture; they are narrow

in width and do not conform to residential architecture common in the area. Surveys in areas where large features were identified in LiDAR imagery have discovered complex structures, plazas, temples, and palaces. Fieldwork in 2017 also revealed over 100 quarries, presenting a complicated picture of resource extraction and local land-use strategies in the El Pilar settlement zone.

The process of validating features from LiDAR imagery indicates the totality of cultural remains in the area is much more complex than what the sensor detects. These results suggest a measure of caution when moving from LiDAR returns to settlement models, and that archaeological survey remains an indispensable tool for investigating settlement patterns in the tropical forest of the Maya Lowlands. Nevertheless, LiDAR images of topography, watersheds, and large architectural features provide significant targets for mapping and important guides for archaeological survey. Once complete, the map of the entire 20 km^2 area of the El Pilar Archaeological Reserve will be an important foundation for resource management and a fundamental platform for future research.

Highlights of Investigations at the Major Maya City of El Pilar

Nohol Pilar, focused around the massive Plaza Copal in the south, was clearly a significant civic area in the ancient city center (Fig. 4). Excavations concentrated on the eastern temple EP7, called XikNa for the platform wings that flank the central temple. A center-line tunnel and deep pit were the main efforts of this investigation. Other excavations included tests units placed across the plaza, excavations into the corners of the two temples that frame the northern entrance to Plaza Copal, and exposure of the stairs of the western temple (EP10; see Fig. 3), called Nohoch Aak for its massive size.

These excavations revealed the deep history of occupation and construction at El Pilar (Wernecke 2005; Egerer 2008). Surface and collapse deposits yielded diagnostic ceramics indicative of vibrant Terminal Classic activities. The EP7 tunnel, which probed the center of the eastern temple for 35 m, revealed a complex construction history spanning the entire sequence of occupation from the Middle Preclassic to the Terminal Classic (Fig. 5, Table 1). Construction began with two successive plaza floors and a low, stone-faced platform built during Middle Preclassic times. These early structures were covered by a massive clay platform later in the Middle Preclassic, which was made from distinctive black clay unlike other early building materials (Ford and Horn 2017). This large platform provides clear evidence of community monument construction dating to the founding of El Pilar as a civic center, and its location beneath a Classic-period E-Group further suggests its early ceremonial significance. The relatively narrow window provided by the tunnel leaves many questions about the interpretation of this early structure, and the possibility that it functioned as part of an early E-Group assemblage remains open. Middle Preclassic architecture was also discovered below EP9 on the north side of the plaza in the form of a small, rounded platform covered with a thick coat of plaster. Late Preclassic through Terminal Classic occupation was evident in all excavations around Plaza Copal and Plaza Axcanan, the latter located further to the south within the site core. Architectural features beneath Plaza Copal indicate a considerable time depth of construction spanning at least 1800 years.

Research in northern El Pilar (Xaman Pilar), clearly the seat of power within the city center, included excavations in most plazas. This work documents a long architectural sequence beginning by the Late Preclassic at the latest and ending in the Terminal Classic/Postclassic. The size of the Xaman acropolis area precluded probes into the earliest constructions. Investigations concentrated in the Zotz Na corridor, the Jobo patio complex (Fig. 6), and the façade and roof of EP25 on the east side of the northernmost Plaza Lec. This fieldwork allowed us to consolidate the three main target areas, to control the escalation of damage, and to promote the visual experience of Archaeology Under the Canopy for visitors.

Archaeological investigations were also conducted outside the major Classic-period monuments of El Pilar. We excavated three exemplary domestic areas to compare aspects of everyday life among different groups of El Pilar residents:

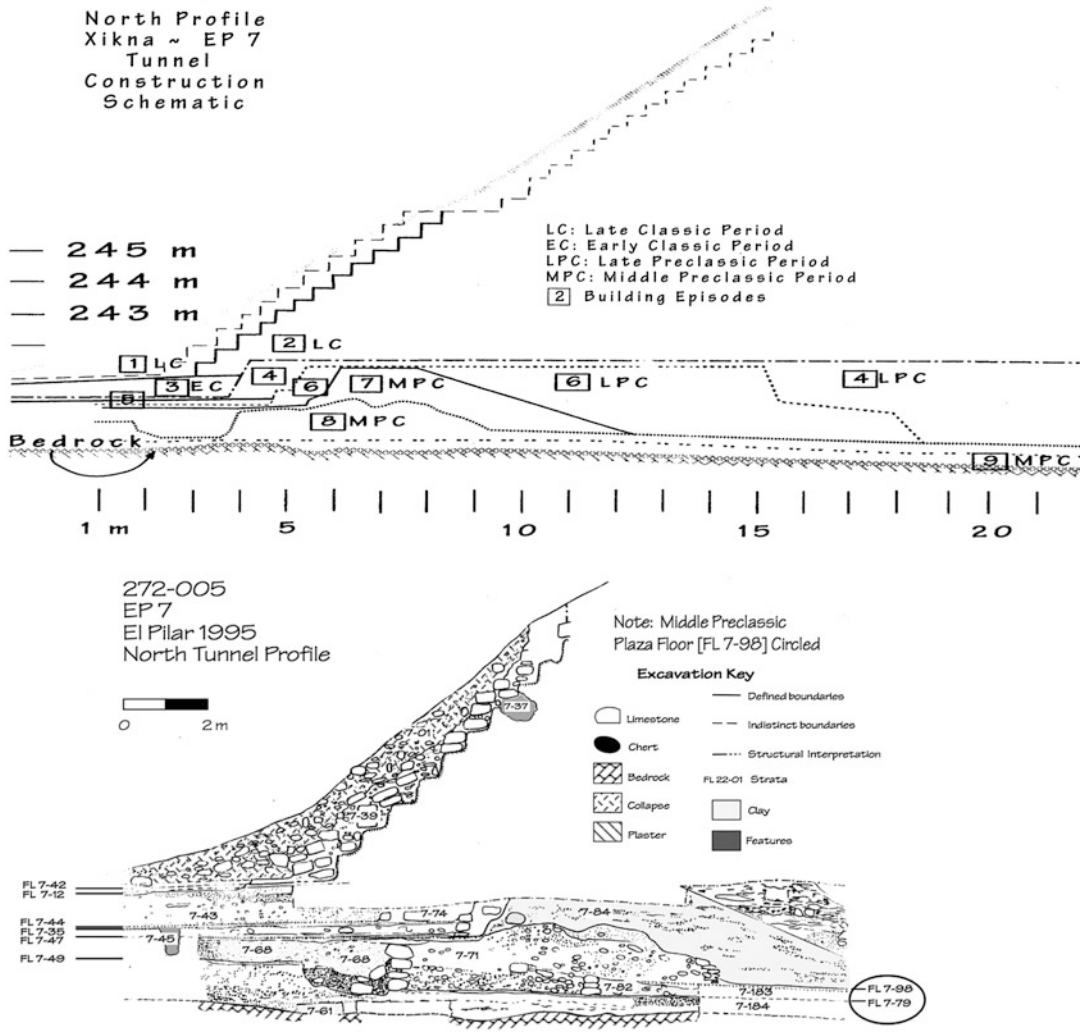

El Pilar, Fig. 5 The long construction chronology begins with the Middle Preclassic and ends in the Terminal Classic as shown form the XikNa profile of EP7

(1) the elite Maya house and forest garden 272-025 (Tzunu'un); (2) a small domestic structure, 272-032 to compare with the larger Tzunu'un residence; and (3) the LDF Chert site, comprising a chert tool working platform and adjacent 50 m^2 debitage dump (Fig. 4 east). The elite household group, Tzunu'un, was mapped, excavated, and consolidated as the first ancient Maya residence open to visitors (Fig. 7). The chronology of Tzunu'un spans the Late Preclassic to the Terminal Classic, with construction concentrated in the Late Classic, the time of greatest activity at El Pilar. Tzunu'un has a high density and variety of domestic artifacts, as might be expected at a wealthy or elite household. Occupation at the small domestic site dated to the Late Classic, and this residence appears to be a secondary domestic site with a low density and variety of artifacts. The LDF Chert tool production site is characterized by an extremely high density of chert debitage, the byproducts of bifacial tool production dating to the Late Classic. This site contained a platform that was the focus of tool production and excavations in an adjacent 50-by-50-m area revealed a massive dump of manufacturing debris. Chipped stone debitage

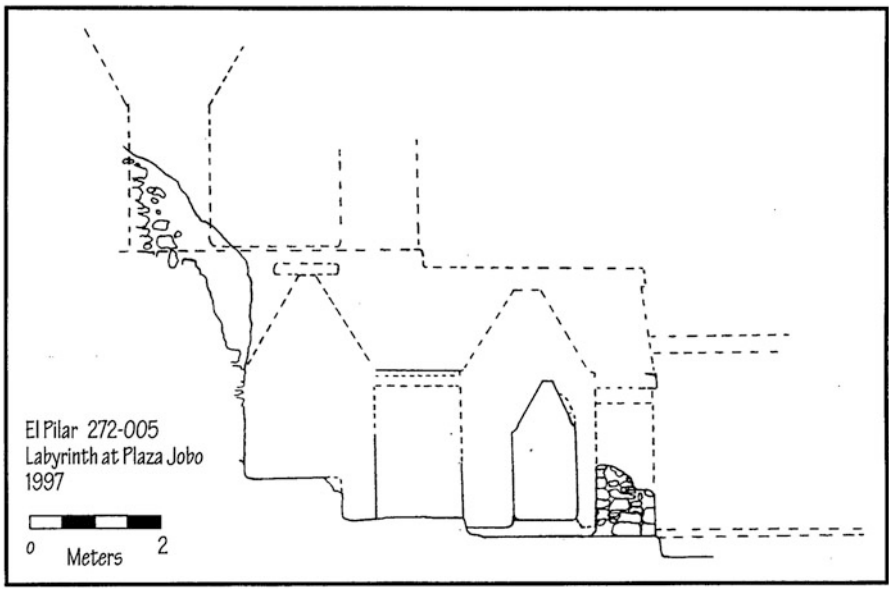

El Pilar, Fig. 6 Cross-section of Plaza Jobo at the top of the H'Mena acropolis is a labyrinth

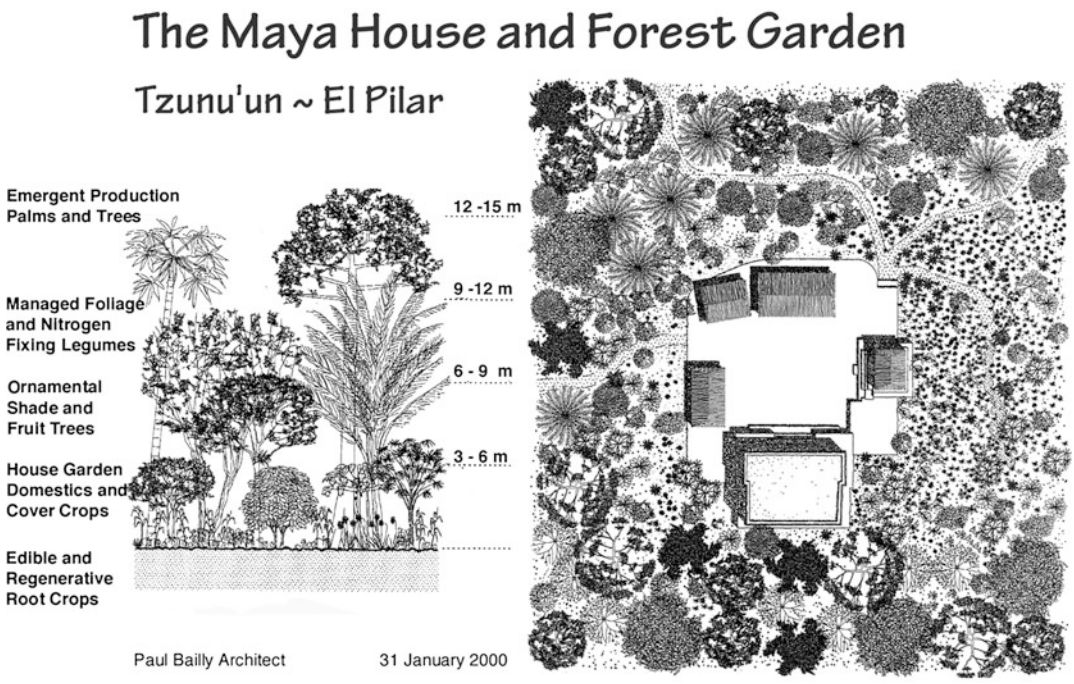

El Pilar, Fig. 7 The Elite house of Tzunu'un now open for visitors

was deposited to a height of 2 m in this midden, and an average density of 800,000 flakes/m^3 was recorded by the excavators (Whittaker et al. 2009). This concentrated stone tool production debris suggests some formalized waste-management procedures were developed, either

by the producers themselves or the administrators of El Pilar, to minimize contact with hazardous debris in the form of sharp-edged chert flakes.

In addition to investigating domestic architecture within the El Pilar site core, the discovery of the Citadel (Fig. 3, east) in LiDAR imagery required detailed structure mapping and profiling of two looters trenches dug into the main temples atop the complex. The illicit excavations damaged the temples but allowed us to examine their construction histories. Building sequences were dynamic and extensive, but construction efforts were largely restricted to Late Presclassic times. This complex was established early in the history of the El Pilar site center, yet unlike the rest of the El Pilar monuments and, in fact, most Maya structures, the Citadel temples were completed before the Early Classic and were not covered or expanded by subsequent Classic-period construction. Determination of the reasons behind this curious treatment of monumental structures awaits future investigations.

Pilar Poniente, the western component of El Pilar, is linked with the southeastern Nohol Pilar complex via an offset causeway and sunken plaza containing a ball court. Pilar Poniente is composed of three main plazas and an eastern temple that was heavily looted before the establishment of the reserve. Major rescue work was conducted by Guatemalan archaeologists to stabilize the temple and provide visitors access to the area. The rescue excavations support the long chronological sequence developed for El Pilar, with substantial construction in the Late Preclassic through the Late Classic and a notable presence of constructions during the Terminal Classic period. This parallels the temporal developments in the eastern plaza complexes.

Mapping the Great Maya City of El Pilar

The mapping of El Pilar is a work in progress, designed to create a complete map of the 20 km^2 of the El Pilar Archaeological Reserve for Maya Flora and Fauna in Belize and Guatemala. We covered most of the central area and identified features linked to the causeway system with traditional transect survey methods begun in 2000–2001. Survey baseline transects were established running east to west, and traverses from those baselines identified and mapped ancient remains and tied them into the master El Pilar map. This technique has been employed successfully for regional and local surveys in the Maya lowlands since the work of Bullard (1960).

These maps were integrated into the Maya Atlas (http://marc-ucsb.opendata.arcgis.com/) and, with the acquisition of the LiDAR imagery, we were able to validate the survey and compare mapping strategies. Comparisons between the traditional and LiDAR surveys have been revealing. First and foremost, the traditional surveys were entirely successful in locating and mapping ancient Maya features. Mapped areas of structures, quarries, alignments, and depressions could be identified in LiDAR imagery, relocated, and validated in the field. We noted a displacement of several meters between the traditional surveys and the LiDAR, but this variance did not hinder the relocation of mapped remains and brings up issues of precision and accuracy that are often not well understood (Carr et al. 2015). Standard GPS devices, such as the Garmin 62s used in the El Pilar surveys, report error in the range of a 7-meter radius (Ford et al. 2013). Only field mapping with a Plane Table Alidade, not well-adapted to our technology-driven approaches today, or the use of a survey-grade GPS would bring precision and accuracy to the level revealed in LiDAR imagery.

The use of LiDAR, field mapping with GPS units, and the integration of data into a GIS required the development of the mapping protocol described in the preceding sections. This included a system for validating identified features in LiDAR images and the effectiveness of different surface visualizations of LiDAR return data. The El Pilar Archaeological Reserve area was divided into quads of 200 by 250 meters (printable at 1:1500), and we have covered 263 of a total of 445 quads at the close of fieldwork in 2018. In the 13 km^2 of surveyed area, we have documented 821 residential units, 81 underground storage *chultuns*, 255 quarries, 86 aguadas or depressions, as well as 71 berms, linear features that are clustered in the central north of the reserve. We have identified large, monumental complexes in the

LiDAR images and have investigated a substantial fraction of them. Several satellite groups, or minor ceremonial centers, have been mapped and georeferenced in the project GIS, including: the causeways and sunken plaza connecting Pilar Poniente to Nohol Pilar; the Citadel east of the monumental core; the Amatal and Kum groups in the northwest of the reserve, along a small arroyo that runs toward the Holmul drainage; and Chorro in the far east, adjacent to another arroyo running toward the upper reaches of the Belize River.

El Pilar and the Maya Forest

Our research at El Pilar suggests its significance within the ancient Maya social landscape. El Pilar is a major center with more than 30 plazas and monumental structures spread across more than 150 ha within the 20 km^2 reserve (Fig. 8). On the east, the Preclassic Citadel stands alone without a clear connection to the Classic period monumental architecture (see Fig. 3). El Pilar has three major monumental groups of structures and plazas: Nohol in the south, Xaman in the north, and Poniente to the west. Nohol and Xaman are closely integrated (see Fig. 4) and Poniente is linked to them via a complex causeway system. Construction at the monumental core of El Pilar demonstrates a consistent and continual building sequence that began in the Middle Preclassic (c. 800 BCE), blossomed in the Late Preclassic (c. 250 BCE), and was continuously expanded and renovated into the Terminal Classic (after 1000 CE).

The role of El Pilar is clearly that of a local power, occupying an escarpment between the central ridgelands of Tikal to the west and the descending foothills and valley to the east. This location united influence spreading from the interior of the Petén into the Belize River Valley. Large- and medium-size neighboring sites, such as Naranjo and Holmul to the north and west, and Xunantunich, Cahal Pech, and Baking Pot to the south and east all lie with 10–20 km, indicating El Pilar's strategic position in the Late Classic regional settlement hierarchy. El Pilar's setting, atop a ridge at the edge of a limestone escarpment,

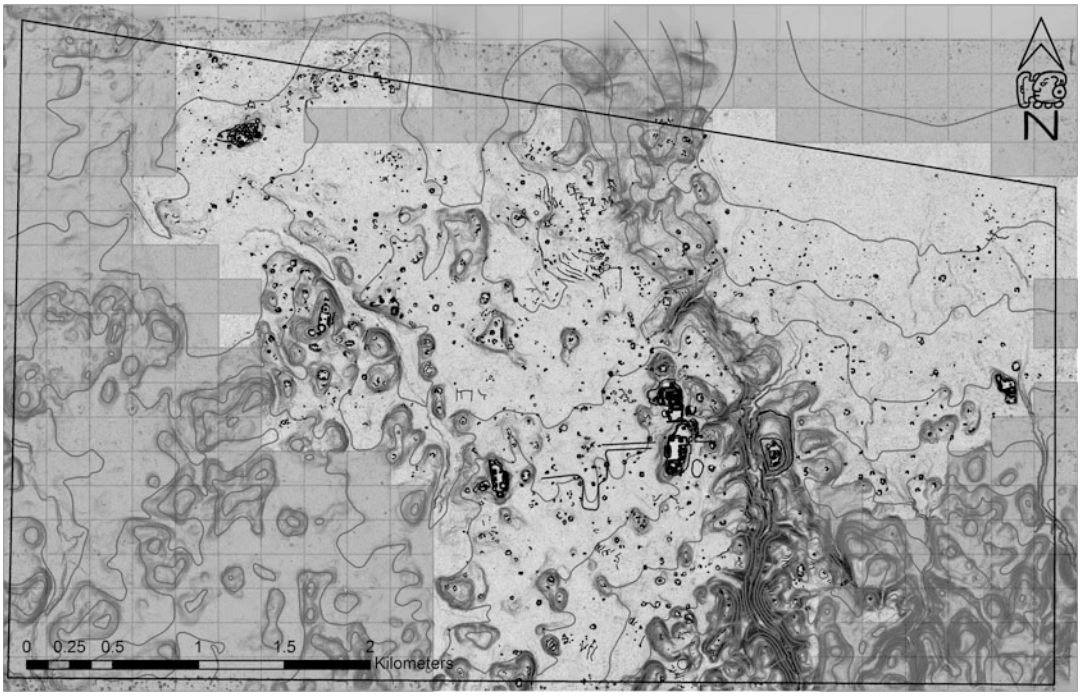

El Pilar, Fig. 8 The total area of the El Pilar Archaeological Reserve for Maya Flora and Fauna

geographically dominates the open plains north of the Belize River. This ecotone setting puts El Pilar in a pivotal point of control associated with both the central core area west to Tikal and south/east into the Belize River drainage. As the story of the Central Maya Lowlands unfolds, the critical position of El Pilar and its inhabitants will take on greater importance.

References

Bullard, William R., Jr. 1960. Maya settlement pattern in northeastern Petén, Guatemala. *American Antiquity* 25 (3): 355–372.

Campbell, David G., Anabel Ford, Karen Lowell, Jay Walker, Jeffrey K. Lake, Constanza Ocampo-Raeder, Andrew Townesmith, and Michael Balick. 2006. The feral forests of the eastern Petén. In *Time and complexity in the Neotropical lowlands: Studies in historical ecology*, ed. W. Balée and C. Erickson, 21–55. New York: Columbia University Press.

Carr, Christopher, Eric Weaver, Nicholas P. Dunning and Vernon L. Scarborough 2015. Bringing the university of Pennyslvania maps of tikal into the Era of electronia GPS. In: D. L. Lentz, N. P. Dunning and V. L. Scarborough, (eds.), Tikal: Palaeoecology of an Ancient Maya City. pp. 59–86. Cambridge University Press, New York.

Egerer, Christian Thomas. 2008. The ancient Maya ceramics of El Pilar – Characteristics and comparison. Master's thesis, Philosophy, University of Bonn, Bonn.

Flannery, Kent V. 1972. The cultural evolution of civilizations. *Annual Review of Ecology and Systematics* 3:399–426.

Ford, Anabel 1985. Maya Settlement Pattern Chronology in the Belize River Area and the Implications for the Development of the Central Maya Lowlands. *Belcast Journal of Belizean Affairs* 2:13–32.

Ford, Anabel. 1986. *Population growth and social complexity: An examination of settlement and environment in the Central Maya Lowlands*. Anthropological research papers no. 35. Arizona State University, Tempe, AZ.

Ford, Anabel. 1996. Critical resource control and the rise of the classic period Maya. In *The managed mosaic: Ancient Maya agriculture and resource use*, ed. S. L. Fedick, 297–303. Salt Lake City: University of Utah Press.

Ford, Anabel 2006. The maya forest garden and El pilar: A coloring book. National Institute of Culture and History, Belize.

Ford, Anabel 2012. Jardinería Forestal Maya de El Pilar: The Maya Forest Garden of El Pilar. Exploring Solutions Past: The Maya Forest Alliance.

Ford, Anabel. 2014. Using cutting-edge LiDAR technology at El Pilar, Belize-Guatemala, in discovering ancient Maya sites: There is still a need for archaeologists. *Research Reports in Belizean Archaeology* 11: 270–280.

Ford, Anabel. 2016. Unexpected discovery with LiDAR: Uncovering the citadel at El Pilar in the context of the Maya Forest. *Research Reports in Belizean Archaeology* 13: 87–98.

Ford, Anabel, and Sherman Horn III. 2017. El Pilar monuments retrospective & prospective: Re-discovering El Pilar. *Research Reports in Belizean Archaeology* 14: 87–95.

Ford, Anabel, Keith C. Clarke, and Gary Raines. 2009. Modeling settlement patterns of the late classic Maya with Bayesian methods and GIS. *Annals of the Association of American Geographers* 99 (3): 496–520.

Ford, Anabel, Hugo Bihr, and Paulino Morales. 2013. Usando Metodos Vanguardistas LiDAR en El Pilar, Guatemala-Belice: Cambiando la Arquelogia en la Selva Maya. *XXVII SImposio de Investigaciones Arqueologicas en Guatemala* 27 (1): 8.

Hammond, Norman. 1981. Settlement patterns in Belize. In *Lowland Maya settlement patterns*, ed. W. Ashmore, 1st ed., 157–186. Albuquerque: University of New Mexico Press.

Horn, Sherman, and Anabel Ford. 2018. What is a household? Chronology and inventory and the ceramic belongings of the ancient Maya. *Research Reports in Belizean Archaeology* 14: 53–64.

Lucero, Lisa Joyce 2001. Social Integration in the Ancient Maya Hinterlands: Ceramic Variability in the Belize River Area. Anthropological Research Paper no. 53. Arizona State University, Tempe, Arizona.

MesoAmerican Reserch Center (MARC). 2016. Adaptive management. MesoAmerican research center, University of California, Santa Barbara. http://www.marc.ucsb.edu/research/conservation-philosophy/adaptive-management.

Pagliaro, Jonathan B. 2011. Rethinking thinking: an ecological based consideration of contextual diversity in late classic ceramic assemblages from the upper belize river area, Belize. Ph.D. thesis, Anthropology, Southern Methodist University, Dallas, Texas.

Primack, Richard, David Bray, Hugo Galleti, and Ismael Ponciano, eds. 1998. *Timber, tourists, and temples: Conservation and development in the Maya Forest of Belize, Guatemala, and México*. Washington, D.C: Island Press.

Puleston, Dennis Edward. 1973. Ancient Maya settlement patterns and environment at Tikal, Guatemala: Implications for subsistence models. Ph.D. thesis, Department of Anthropology, University of Pennsylvania, Philadelphia, PA.

Ross, Nanci J. 2011. Modern tree species composition reflects ancient Maya "forest gardens" in Northwest Belize. *Ecological Applications* 21 (1): 75–84.

Scarborough, Vermon L. 1998. Ecology and ritual: Water management and the Maya. *Latin American Antiquity* 9 (2): 658–662.

Wernecke, D. Clark. 2005. A stone canvas: Interpreting Maya building materials and construction technology.

Ph.D. dissertation, anthropology, University of Texas, Austin, TX.
Whittaker, J.C., Kathryn A. Kamp, Anabel Ford, Rafael Guerra, Peter Brands, Jose Guerra, Kim McLean, Alex Woods, Melissa Badillo, Jennifer Thornton, and Zerifeh Eiley. 2009. Lithic industry in a Maya Center: An axe workshop at El Pilar, Belize. *Latin American Antiquity* 20 (1): 134–156.
Willey, Gordon R., William R. Bullard Jr., John B. Glass, and James C. Gifford. 1965. *Prehistoric Maya settlements in the Belize Valley*. Cambridge, MA: Peabody Museum.

Electron Spin Resonance (ESR) Dating in Archaeology

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Introduction

Electron spin resonance (ESR) has been used for absolute dating of archaeological materials such as quartz, flints, carbonate crystals, and fossil remains for nearly 50 years. The technique is based on the fact that certain crystal behaves as natural dosimeters. This means that electrons and holes are accumulated over time in the crystal lattice induced by surrounding radiation. The age is obtained by calculating the dose received compared to the dose rate generated by the surrounding environment, mainly radioisotopes K, U, and Th. The dating range is dependent on the nature and state of conservation of the sample and the surrounding environment but is between a few thousands and a couple of million years. Since, ESR dating is best and most commonly applied to tooth enamel in archaeology, this paper predominantly focuses on its direct application to fossil remains.

Definition

ESR Basic Principle

In solid-state physics, trapped electrons and holes can be represented with the band model, where electrons are localized by pair of opposite spins on the bands and define the possible energy level they can reach (Fig. 1). The difference between the valence and the conduction band is the energy needed to break a bond in the crystal.

When a bond is broken, the electron has absorbed enough energy to leave the valence band and to be transferred into the conduction band. Near the valence band remain positively charge holes; most of the time electrons will recombine with the holes, returning the crystal back to an electrically neutral state. Crystals, such as hydroxyapatite, which forms tooth enamel crystal, for example, contain defect sites (vacancies, impurities, interstitial atoms) where electrons and holes can be trapped (e.g., Grün 2006).

In Fig. 1 we can see that the amount of trapped electrons and holes is linked to the amount of radiation received by the crystal. The activation energy E_a characterizes the traps and its stability and represents the required energy to free the electron from the trap. At the same time, ionizing radiation can split molecular bonds, leading to the formation of free radicals (e.g., CO_2- radical in the hydroxyapatite crystal in tooth enamel, Callens et al. 1987).

The stability (or life expectancy) of traps or radicals is proportional to the value of the activation energy E_a, the thermal stability increases with the E_a. The life expectancy τ_e of an electron trapped or of an unpaired electron associated with an organic radical can be estimated using the Arrhenius equation:

$$\frac{1}{\tau_e} = v_0 . e^{\left(\frac{Ea}{KT}\right)} \quad (1)$$

where k is the Boltzmann constant, T the temperature, ν_o the frequency, and E_a the activation energy.

The life expectancy of an electron trapped in a crystal can vary greatly from a few seconds to a few million years, depending on the material, the trap, and environmental conditions. ESR dating consists of measuring the amount of paramagnetic centers created by natural or laboratory irradiation. The intensity measured is proportional to the amount of radioactivity received by the material over time, the amount of traps or radicals available (sensitivity), and the exposition time (age of the material).

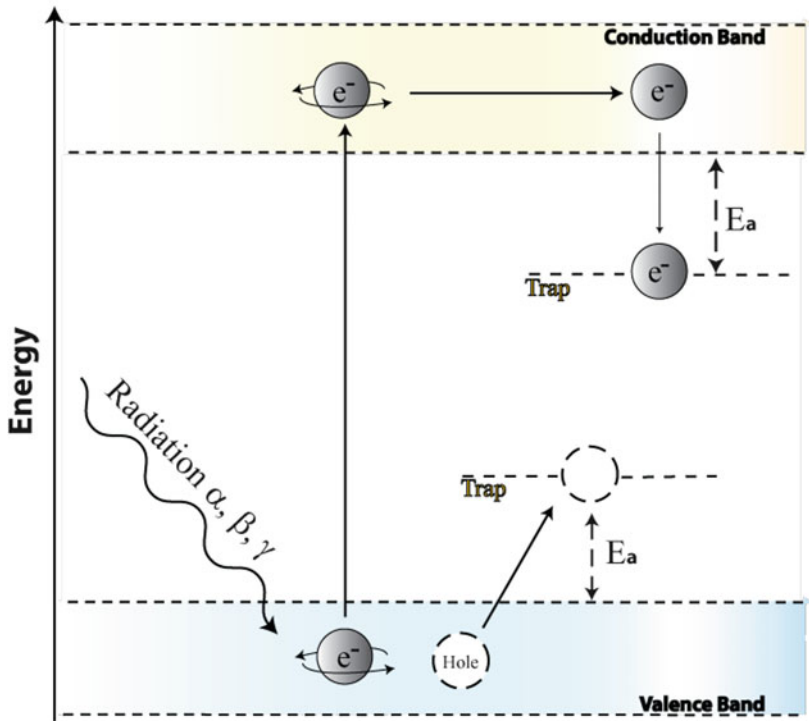

Electron Spin Resonance (ESR) Dating in Archaeology, Fig. 1 Band model of trapping charges processes under radiation. (Adapted from Ikeya 1993)

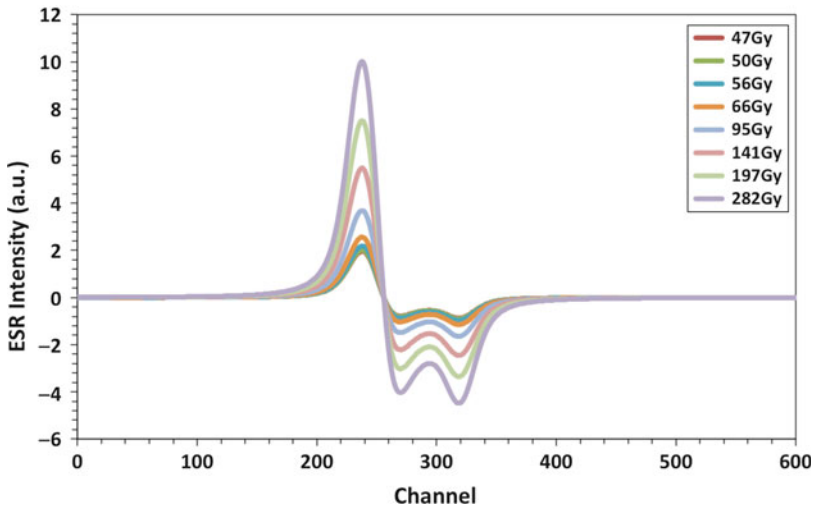

Electron Spin Resonance (ESR) Dating in Archaeology, Fig. 2 Influence of laboratory γ-irradiation on the ESR signal of fossil tooth enamel. ESR spectra of fossil tooth enamel are increasing with irradiation; however, the signal remains qualitatively the same

Assessing the Dose

ESR dating is only possible when materials behave as a natural dosimeter, meaning that the sample records radiation over time (Fig. 2). The palaeodose corresponds to the dose that the sample has received over time and is directly related to the age. The common method for determining the palaeodose is the additive dose system, where the sample is successively irradiated with incrementing dose and then the intensity measured is plotted versus the irradiation steps (Fig. 3). The dose–response curve, by extrapolation, will indicate the D_E (equivalent dose), which corresponds to the dose the sample has received

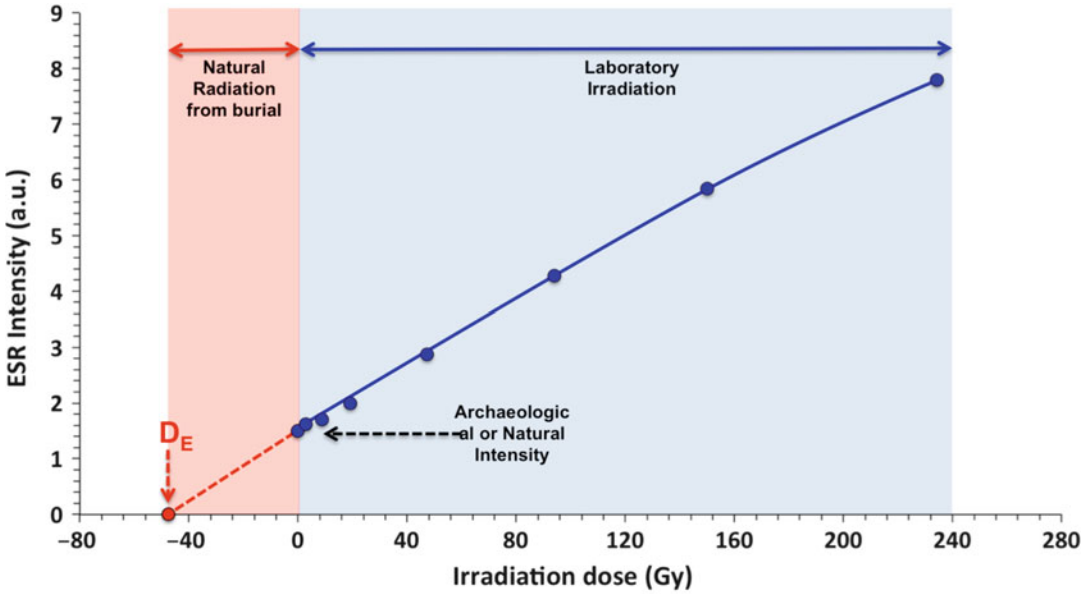

Electron Spin Resonance (ESR) Dating in Archaeology, Fig. 3 Determination of the equivalent dose D_E. Dose–response curve of the ESR intensity (au) signal against the dose received. The De is obtained by extrapolation of the curve to cross the x-axis

over time. The dose is described as *equivalent* since it is determined using laboratory gamma irradiation, while the actual dose received in nature is the sum of all radiations from multi-energetic emissions α, β, γ, and cosmic rays.

To obtain a dose–response curve, intensities measured are plotted against a laboratory irradiation dose. The estimated dose–response curve can be best fitted with an exponential curve or single saturating function. The trapping is constrained by the limited number of traps available in the crystal, as well as an ability to trap more electrons, which is inversely proportional to the number of electron already trapped. Exponential fitting is more accurate than a linear fitting; however, it may only be an approximation of the curve that actually occurs. Grün (1989) defined six basic properties that the ESR measurement must satisfy to provide reliable D_E estimation and to avoid large systematic errors: (i) the initial signal (at t_0) is either zero or can be experimentally determined; (ii) the signal intensity grows proportionally to the dose received; (iii) the signals must have a thermal stability, which is at least one order of magnitude higher than the age of the sample; (iv) the number of traps is constant (Recrystallization, crystal growth, or phase transitions must not have occurred.); (v) the signals should not show anomalous fading; and (vi) the signals are not influenced by sample preparation (grinding, exposure to laboratory light, etc.).

The dose that has been absorbed by the sample during the burial time is the D_E and can be written as

$$D_e = \int_{t=0}^{t=T} D(t)dt \qquad (2)$$

where D is the dose rate and T the time of exposure, which correspond to the age of the sample.

The dose rate $D(t)$ corresponds to the amount of radiation received by the sample. If we assume that the dose rate is constant, the age of the sample will be

$$T = \frac{D_E}{D}. \qquad (3)$$

where T is the age of the sample and D is the dose rate.

Internal and External Dose

The external dose is derived from the environment surrounding the sample, including from cosmic rays (Fig. 4). Radioelements taken into account in the calculation of the external dose rate are thorium, uranium, and potassium. Different techniques can be used to identify the concentration of these elements, either by counting the number of particles emitted (e.g., spectrometry α) or by measuring directly the isotopic concentration (e.g., mass spectrometry).

The external dose is expressed by the following equation:

$$d_{(external)} = (kd\alpha_{ext} + d\beta_{ext} + d\gamma_{ext} + d_{\cos})t \quad (4)$$

where $kd\alpha_{ext}$ is the alpha dose rate and k the α-efficiency; $d\beta_{ext}$, beta dose rate; $d\gamma_{ext}$, gamma dose rate; and d_{cos}, the cosmic ray dose rate.

The internal dose is expressed by the following equation:

$$d_{(\text{internal})} = (kd\alpha_{\text{int}} + d\beta_{\text{int}})t \quad (5)$$

where $kd\alpha_{\text{int}}$ is the alpha dose rate and k, the α-efficiency and $d\beta_{ext}$, beta dose rate.

The internal dose rate is calculated from the radioelement emission of α and β particles within the sample (5) (Fig. 4). In the case of fossil remains, tooth enamel is usually free of K and Th; therefore, only U-isotopes have to be considered. The internal dose rate adds further complexity, as the amount of U-isotopes in the tooth may vary through time. Therefore, the uranium uptake history plays an important role in the calculation of the average dose rate. In the past, uranium uptake was often assumed, and conventionally two models were used: the early uptake and the linear uptake. In the first model, uranium was modelled as being incorporated within the tooth after a short time; in the second model, uranium uptake was modelled as being continuously diffused during burial at a linear rate. The differences in these models may cause extremely large uncertainties (Grün et al. 2006).

The alpha efficiency corresponds to the ability of alpha particles to create an ESR signal. Because alpha particles have an important ionization energy, a significant local saturation can be observed, inducing fewer paramagnetic centers to be created. The k factor in front of $d\alpha_{ext}$ in the equation is calculated in order to correct for the attenuation of alpha source within the material.

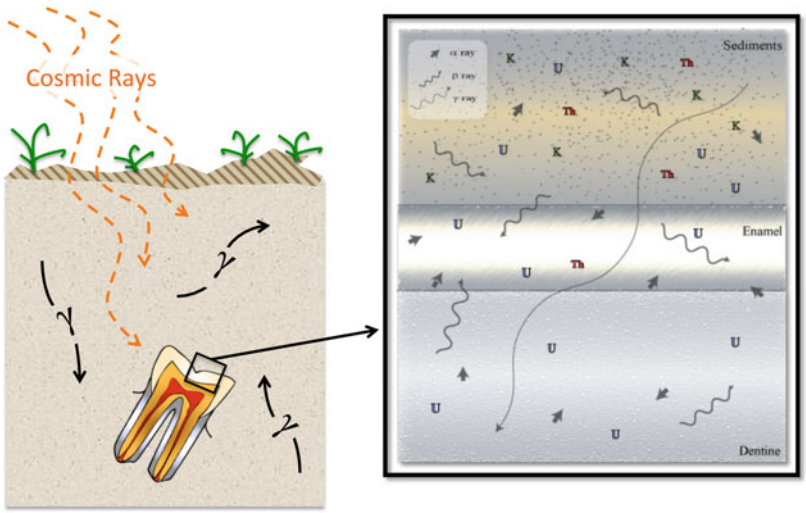

Electron Spin Resonance (ESR) Dating in Archaeology, Fig. 4 Schematic representation of the surrounding environment of a fossil tooth in an archaeological site. (*Left*) Cosmic ray influences vary depending of the depth of the sample and the nature of the sediment layers. Gamma rays from surrounding elements and sediment layers for up to 30 cm away from the sample can still potentially reach the fossil. (*Right*) Detail of the immediate external dose and the internal dose contribution

The factor varies depending on the material. For example, the alpha efficiency was estimated at 0.13 ± 0.2 in fossil tooth enamel (Grün and Katzenberger-Apel 1994).

The annual dose, which corresponds to the dose that the sample has received over a year, can be written:

$$D_{annual} = d_{(external)} + d_{(\mathrm{internal})} \quad (6)$$

The external α contribution in the total dose rate is only a few percent and can often be negligible. In contrast to α particles, the influence of β and γ rays in the electron trapping process is significant. The external β dose rate must be calculated from sediments directly surrounding the sample being dated. The external dose is derived from the chemical analysis of U, Th, and K of the sediment. The water surrounding the sample has to also be included in the calculation of the β and γ dose rates. γ rays are usually measured in situ, when possible; otherwise the external γ dose rate is derived from the chemical analysis of sediments. The amount of cosmic rays received by the sample will depend on the altitude, latitude, and the depth of the sample within the sediment, as well as the nature of sediment.

Errors and Uncertainties

The ESR dose estimation error is estimated with the equation described by Yokoyama (Yokoyama et al. 1985).

$$\Delta T = T\sqrt{\left(\frac{\Delta D_E}{D_E}\right)^2 + \left(\frac{\Delta D}{\Delta}\right)^2}. \quad (7)$$

Random error is considered to be in the range of 5–7%. In ESR dating, systematic errors are usually unknown and therefore cannot be corrected. The systematic calibration errors can be sometimes as high as 5%. The largest error in ESR dating of tooth enamel is usually associated with the unknown U uptake. When using parametric models, such as early or late uptake, errors in the 50% range are often found. A common mistake is the negligence of errors. However, this should be considered as important as the dose calculation itself.

Key Issues/Current Debates/Future Directions/Examples

ESR dating is most commonly applied to fossil remains from animal or human. Nevertheless, other materials have been dated by ESR with different level of success.

Carbonate crystal, such as corals, speleothems, calcites, travertine, and mollusc shells, can be dated by ESR; however, the complexity of the signal and doses calculation constrained severely the accuracy. U-series dating and radiocarbon dating are usually the preferred methods, especially for corals and speleothems.

Cherts and quartz are other materials that give a datable signal by ESR. Nonetheless, other techniques such as TL and OSL, respectively, are generally more reliable.

The main advantage of ESR dating remains its ability to date directly the sample, especially fossils. Unfortunately, bones are not suitable for age assessments by ESR dating. This is because complex diagenetic processes occur during burial, leading to the destruction of some bone structures. Only fossil enamel appears to be suitable for direct dating with ESR.

Far too many studies have been carried on tooth enamel to be reported in this entry, but the successful application on archaeological and paleoanthropological sites has been reported for fossils ranging from a few thousands (e.g., Grün et al. 1996) to about a million years (e.g., Han et al. 2012) and exceptionally to a few millions of years (Curnoe et al. 2001). A strong limitation lies in the destructive nature of ESR dating of fossil remains. Commonly, fossil enamel was crushed into powder; nevertheless, recent advance in ESR dating (Joannes-Boyau and Grun 2009, 2011a, b; Joannes-Boyau et al. 2010a, b) allows now the direct nondestructive dating of fossil enamel fragment. The initial step of sample preparation requires a fragment to be removed from the tooth. The use of natural cracks in the enamel offers the best opportunity to separate the fragment, causing minimal damage to the remaining tooth. Small fractures frequently occur on fossil tooth enamel caused by environmental processes during burial. When all experimentation has been completed, the fragment

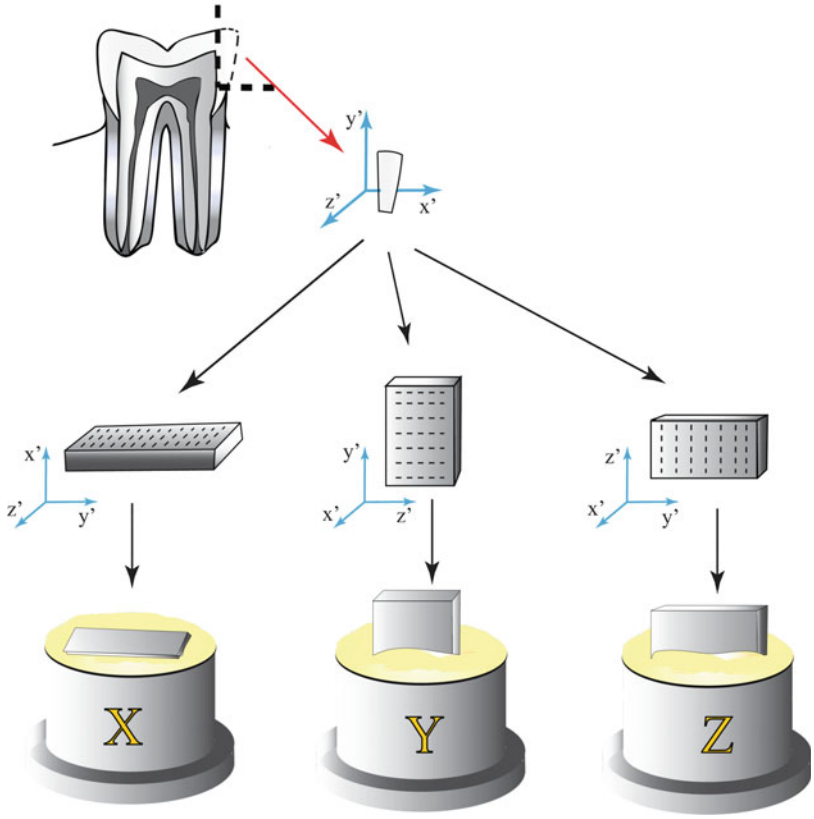

Electron Spin Resonance (ESR) Dating in Archaeology, Fig. 5 Measurements configuration for nondestructive analyses of fossil tooth enamel fragments. The holders are inserted in an ESR spectrometer fitted with a goniometer to allow the rotation of the fragment over 360°

can be reattached to the tooth, with little visible damage. As the impact on the fragment itself is minimal, this protocol is considered to be virtually nondestructive. The tooth is then measured in all configurations to simulate powder analyses (Fig. 5). ESR dating of fragment not only permitted a non-destructive approach but also highlighted errors and underestimation of powder dating (Joannes-Boyau and Grün 2011a, b), enhancing the accuracy and precision of direct dating.

Cross-References

- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Techniques in Archaeological Science

References

Callens, F.J., R.M.H. Verbeeck, P.F.A. Matthys, L.C. Martens, and E.R. Boesman. 1987. The contribution of CO33- and CO2- to the ESR spectrum near g = 2 of powdered human tooth enamel. *Calcified Tissue International* 41: 124–129.

Curnoe, D., R. Grün, L. Taylor, and F. Thackeray. 2001. Direct ESR dating of a Pliocene hominin from Swartkrans. *Journal of Human Evolution* 40: 379–391.

Grün, R. 1989. Electron spin resonance (ESR) dating. *Quaternary International* 1: 65–109.

Grün, R. 2006. A simple method for the rapid assessment of the qualitative ESR response of fossil samples to laboratory irradiation. *Radiation Measurements* 41: 682–689.

Grün, R., and O. Katzenberger-Apel. 1994. An alpha irradiator for ESR dating. *Ancient TL* 12: 35–38.

Grün, R., J.S. Brink, N.A. Spooner, L. Taylor, C.B. Stringer, R.G. Franciscus, and A.S. Murray. 1996. Direct dating of Florisbad hominid. *Nature* 382: 500–501.

Grün, R., J. Maroto, S. Eggins, C. Stringer, S. Robertson, L. Taylor, G. Mortimer, and M. McCulloch. 2006. ESR and U-series analyses of enamel and dentine fragments of the Banyoles mandible. *Journal of Human Evolution* 50: 347–358.

Han, F., J.J. Bahain, E. Boëda, Y. Hou, W. Huang, C. Falguères, M. Rasse, G. Wei, T. Garcia, Q. Shao, and G. Yin. 2012. Preliminary results of combined ESR/U-series dating of fossil teeth from Longgupo cave, China. *Quaternary Geochronology* 10: 436–442.

Ikeya, M. 1993. *New applications of electron spin resonance. Dating, dosimetry and microscopy.* Singapore: World Scientific Publishing.
Joannes-Boyau, R., and R. Grün. 2009. Thermal behavior of oriented and non-oriented CO2- radicals in tooth enamel. *Radiation Measurements* 44: 505–511.
Joannes-Boyau, R., and R. Grün. 2011a. A comprehensive model for CO2- radicals in fossil tooth enamel: Implications for ESR dating. *Quaternary Geochronology* 6: 82–97.
Joannes-Boyau, R., and R. Grün. 2011b. Decomposition of β-induced ESR spectra of fossil tooth enamel. *Radiation Physics and Chemistry* 80: 335–342.
Joannes-Boyau, R., T. Bodin, and R. Grün. 2010a. Decomposition of the angular ESR spectra of fossil tooth enamel fragments. *Radiation Measurements* 45: 887–898.
Joannes-Boyau, R., R. Grün, and T. Bodin. 2010b. Decomposition of the laboratory irradiation component of angular ESR spectra of fossil tooth enamel fragments. *Applied Radiation and Isotopes* 68: 1798–1808.
Yokoyama, Y., C. Falguères, and J.P. Quaegebeur. 1985. ESR dating of quartz from quaternary sediments: First attempt. *Nuclear Tracks and Radiation Measurements* 10: 921–928.

Elgin, Lord Thomas Bruce

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Basic Biographical Information

The name of Lord Elgin (1766–1841), Scottish peer and British diplomat, 7th Earl of Elgin and 11th Earl of Kincardine, will forever be linked to the classical sculptures he removed from the Parthenon and Acropolis in Athens and to the cultural property controversy that his actions spawned. The fate of the "Elgin Marbles," sold by Elgin to the British Museum in 1816, continues to spark discussion and debate. Those who believe the museum should retain the marbles view Elgin as the man who rescued them from likely vandalism and destruction. Proponents who seek the return of the marbles to Greece regard Elgin as a plunderer (Byron's "worst, dull spoiler") who abused his political authority to mutilate and cart off one of the world's greatest cultural treasures.

In late 1798, after serving in diplomat postings to Vienna, Brussels, and Berlin, Elgin was named Ambassador Extraordinary and Minister Plenipotentiary to the Sublime Porte of the Turkish Sultan at Constantinople. Elgin's appointment to the Ottoman court followed hard upon Napoleon's invasion of Egypt earlier in the year. The new ambassador's mission was to develop an alliance with Turkey in order to expel the French from Egypt, which was nominally under Turkish rule, and to consolidate British interests in the region.

Major Accomplishments

Before setting out for Constantinople, Elgin decided to undertake an ambitious project to draw, record, and model the sculptural and architectural monuments of classical Athens with the goal of improving the arts in Britain. At this stage of the endeavor, there was apparently no intention of collecting original antiquities; Elgin's interest, typical of his era, was to provide exemplars of classical masterworks for imitation by contemporary artists, for which measured drawings, plans, and plaster molds would suffice. Elgin requested, and was refused, a government subvention for his project, but he persevered using his own funds. After setting out in September 1799 to take up his embassy, Elgin assembled his team for Athens, including the artist Giovanni Battista Lusieri, recommended by that famous collector of ancient pottery, Sir William Hamilton, the British minister at Naples; and a group of draftsmen, architects, and modelers, hired in Italy by Elgin's private secretary, William Richard Hamilton (Smith 1916: 164–77; St. Clair 1998: 6–10, 20–7).

Lord Elgin arrived in Constantinople in November 1799. His artistic team did not arrive in Athens until July 1800. There they encountered a series of difficulties that stymied their efforts. Ottoman political authority was divided between the local governor and the military commander, and the Acropolis was a fortress and occupied by the commander, his garrison, and their families. Elgin's men had to pay a fee each time it entered the Acropolis, and access to the upper reaches of the Parthenon was strictly forbidden. It was clear to Philip Hunt, Elgin's staff chaplain and diplomatic agent, who visited Athens in May 1801, that a written authorization (*firman*) from Constantinople

was necessary, and he drafted a memorandum requesting permission not only to draw and model but also to erect scaffolding, dig the foundations, and to take away sculptures or inscriptions that were not part of the fortifications (St. Clair 1998: 65–7, 86–8). Fortunately for Elgin, at this very time British forces in Egypt had thoroughly defeated the French and were on their way to expelling them from the country. Cairo capitulated on 17 June 1801, and Elgin's *firman* was signed on 6 July (Williams 2009: 67). The connection between the two events cannot be doubted, as Elgin himself testified in 1816, "the whole system of Turkish feeling met with a revolution, in the first place, from the invasion by the French, and afterwards by our conquest;" and "about the middle of the summer of 1801 all difficulties were removed" (Michaelis 1871: 348, 350).

The 1801 *firman*, preserved only in an Italian translation, granted the rights requested in Hunt's earlier recommendation, including access to draw and model the remains, to dig the foundations to obtain inscriptions, and to take away "some pieces" of stone with inscriptions and figures. Now began a wholesale campaign of removals. Elgin's men collected inscriptions, cleared foundations, recovered fallen sculptures, and even convinced the Ottoman governor to allow the dismantling of several metopes that were still attached to the Parthenon, which even Hunt acknowledged was an extension of the terms of the *firman*. Lusieri and his workers also removed large, in situ sections of the Parthenon's continuous Ionic frieze. Marble was sawn away from sculpted blocks to lighten their weight for transport or to take away small pieces as exemplars. A Caryatid was removed from the Erechtheion and replaced by a column of bricks (St. Clair 1998: 92–110, 135).

Elgin thoroughly approved of this work and later testified that he was motivated to collect by the rampant destruction of antiquities that was going on all around him: Wanton vandalism by the Turks, destruction of statuary for making lime, and even the random pickings of foreign tourists were all causing a steady attrition of the ancient monuments. Other contemporaries deprecated Elgin's actions, including English visitors such as Edward Dodwell and Edward Daniel Clarke, who witnessed the heavy-handed dismantling of the fabric of the Parthenon in 1801. Byron's invectives in *Childe Harold's Pilgrimage* intensified (and personalized) contemporary criticism of Elgin and continue to provide poetic fodder for his critics (St. Clair 1998: 96, 102–3).

With the bulk of removals completed by the end of 1802, the difficult task of transporting Elgin's marbles back to England began. Between 1800 and 1825, more than two dozen ships, including both privately contracted carriers and British naval vessels, ferried Elgin's collections home. One ship, the *Mentor*, carrying Elgin's agent William Richard Hamilton and ten crates of sculptures and molds from the Parthenon, was wrecked off the island of Kythera in 1802; Hamilton spent months on the scene and was eventually able to recover most of the sunken antiquities (Smith 1916: 197–8, 231–52).

Lord Elgin left Constantinople for home in January 1803 but was imprisoned by the French when war broke out with England while he was in France; he did not return to England until June 1806. He spent much of his time during the next 10 years assembling his collection, making it accessible for viewing, and trying to persuade the British government to purchase it. He first installed the marbles in a house in Park Lane, London, in 1807, later moving them to a shed at Burlington House in 1811. He suffered from the debts he had incurred in Athens, which he estimated in excess of 62,000 £. In 1816 a select committee of the House of Commons considered the question of purchasing the Elgin collection, and after hearing testimony by Elgin and his associates, as well as by artists, sculptors, and connoisseurs, the committee upheld both Elgin's authority to acquire the marbles and their outstanding value as artistic masterpieces. After a lively debate, the House of Commons voted to purchase the collection for the nation for the sum of 35,000 £, far below Elgin's stated expenses, and by a vote of Parliament, the collection, to be known as "The Elgin Collection," was vested in perpetuity to the trustees of the British Museum (Smith 1916: 294–351; St. Clair 1998: 245–60). The collection includes, from the Parthenon, 15 of 92 metopes, 17 pedimental figures, and 247 ft. of the original 524 ft. of the Ionic frieze; from the Erechtheion, a Caryatid, a column, and other

architectural pieces; four slabs of the frieze of the Temple of Athena Nike; and architectural pieces from the same temple and from the Propylaia (British Museum Website n.d.).

Lord Elgin never escaped the pressures of the debts he incurred acquiring his famous collection. He died in France in 1841, leaving a substantial family debt, a remarkable collection of classical Greek art in London, and an ongoing controversy that has become the quintessential cultural property debate: Was Elgin a rescuer or plunderer? Did he overstep his authority? Should the celebrated marbles remain in the British Museum or return to Greece?

Cross-References

- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)

References

British Museum. n.d. The British Museum, the Parthenon sculptures: facts and figures. Available at: www.britishmuseum.org/the_museum/news_and_debate/debate/parthenon_sculptures/facts_and_figures.aspx. Accessed 31 Dec 2011.

Michaelis, A., ed. 1871. *Der Parthenon*. Leipzig: von Breitkopf und Hartel.

Smith, A.H. 1916. Lord Elgin and his collection. *Journal of Hellenic Studies* 36: 163–372.

St. Clair, W. 1998. *Lord Elgin & the marbles: The controversial history of the Parthenon sculptures*. 3rd rev. ed. Oxford: Oxford University Press.

Williams, D. 2009. Lord Elgin's firman. *Journal of the History of Collections* 21 (1): 49–76.

Empire in the Ancient Near East, Archaeology of

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Introduction

The ancient Near East was home to the world's earliest empires emanating from the great centers of civilization in Egypt, Mesopotamia, and Anatolia. The earliest empires date to the end of the third millennium BCE when Sargon of Akkad and his dynasty (c. 2350–2193 BCE), and later the kings from the Third Dynasty of Ur (2111–2004 BCE), integrated large parts of Mesopotamia and projected their influence even further. The second millennium BCE saw the rise and fall of a number of smaller empires that were often vying for political, military, and economic advantage. The Late Bronze Age (c. 1550–1200 BCE) in particular saw continuous competition for territory and power between the Hittites, Assyrians, Babylonians, Mitanni, and Egypt. The collapse of the economic and political system at the end of the Late Bronze Age brought a period of economic and political reshuffling that would eventually give way to the classic "world empires" of the first millennium BCE: the Neo-Assyrian (744–612 BCE), Neo-Babylonian (612–539 BCE), and Achaemenid Persian (538–331 BCE) empires. These three empires were highly complex and incorporated vast areas of the modern countries of Iran, Iraq, Turkey, Syria, Lebanon, Israel, Jordan, and at times Egypt. Given the political, military, economic, and cultural power of the empires of the ancient Near East, archaeological investigation has the potential to illuminate human life and society on several levels, from the major monuments and treasures of imperial capitals to life in lands that were incorporated into these empires.

Definition

An empire is a large conquest state that incorporates various geographical regions and sociopolitical groups under its control (Sinopoli 1994: 160, 2001: 444). The Archaeology of Empire is a broad approach to the archaeological record that seeks to understand the processes involved in the creation, consolidation, and decline of empires as well as their impact on the physical and human landscapes of the territories under their control. The large geographical spread of empires means that archaeological study must combine a variety of theoretical perspectives and methodologies and also be in conversation with other relevant disciplines such as history and epigraphy that provide

data not available from archaeology (Sinopoli 1994, 2001). As a subset of the broader investigation of empires, the Archaeology of Empire in the ancient Near East attempts to understand the particular ways that empire left its mark on the lands and peoples of the ancient Near East.

Key Issues/Current Debates/Future Directions/Examples

World Systems

One approach to the Archaeology of Empire adapts the concept of core and periphery from Wallerstein's world-systems theory for use in precapitalist societies (Chase-Dunn and Hall 1991; Sinopoli 1994: 161). The concept of core and periphery includes the spatial relationship as well as the differences in political, military, and economic power between the imperial core and lands outside the imperial core designated as peripheries. The domination found in the relationship between core and periphery is what Chase-Dunn and Hall call "core/periphery hierarchy" (Chase-Dunn and Hall 1991: 36). While the domination of an empire over a periphery is often massive, the response of the periphery to imperial forces often affects the strategies the empire chooses in its efforts to dominate. Thus, attention to the relationship between the core and the periphery is crucial for understanding the course of the empire.

The Imperial Core

At the center of ancient Near Eastern empires stood one or more major cities that served as loci of political, economic, military, and ideological power. Land surrounding the cities provided agricultural goods and other resources and sometimes experienced changes that can be traced in the archaeological record (Altaweel 2008). Sites such as Hattusa in central Anatolia; Nimrud, Nineveh, Assur, and Khorsabad in northern Mesopotamia; Babylon and Ur in southern Mesopotamia; and Susa and Persepolis in southern Iran come to mind when speaking of imperial cores. Each new ruler built or rebuilt capital cities including palaces, gardens, temples, massive fortifications, irrigation systems, roads, and in some cases libraries such as the famed library of the Assyrian king Assurbanipal (668–627 BCE) uncovered at Nineveh. Along with military conquests, building projects played a major role in the communication of the king's splendor in his royal annals. Some of the palaces, such as those at Nineveh from Sennacherib (704–681 BCE) and Khorsabad from Sargon II (721–705 BCE), had orthostats carved with military and hunting scenes and inscribed with texts repeating the grandeur of the king (Russell 1991). The palaces established visually the power of the king to the court as well as to visiting foreign dignitaries (Winter 1997). Beyond building projects, the economic reach of these imperial centers can be detected in the nonlocal luxury objects and materials found in them. For example, excavations at the site of Nimrud, an Assyrian city in northern Mesopotamia, uncovered a large collection of engraved ivories (Mallowan 1978). Many of these ivories were imported or brought to Nimrud on other terms. In either case, they illustrate the interest in luxury goods and the access to the nonlocal natural resource (elephant ivory) and artistic skill needed to turn the raw material into a finished product. Excavations at the site of Nimrud have also proved valuable because they have provided a relatively full view of an imperial capital (Oates and Oates 2001). While the elite and public aspects of imperial centers (fortifications, palaces, temples) have been explored reasonably well, the non-elite areas of imperial capitals have not been explored extensively and may in the future reveal more about daily life in these major centers (Matthews 2003: 142).

The Imperial Periphery

The imperial periphery is the area outside the core over which the empire maintains some level of control, typically related to the extraction of wealth. Ancient Near Eastern empires incorporated different lands along a continuum of control from direct rule (provincialization) to little or no rule ([buffer states/zones] Parker 2001: 249–250). The archaeological manifestation of imperial control varies widely depending on where the control falls on this continuum and what the extractive goals were for any particular area. For example, in areas close to the core of the Neo-Assyrian Empire, provinces with provincial capitals were created to administer these

areas effectively. In areas further out, the use of local rulers was common as was the threat or actual application of military force. Destruction layers and sites where the Assyrians had direct control materialize important aspects of imperial practice. Imperial texts recovered in excavations in the periphery also aid in understanding the role of imperial officials and administrative techniques throughout the empire. Monumental inscriptions left by empires in places they have conquered or subjugated, such as Nabonidus' as-Silaʿ rock inscription in southern Jordan (Dalley and Goguel 1997), make imperial ideology and military domination visible to the dominated.

Areas incorporated into an empire may experience a variety of interconnected changes depending on an array of contextual factors. These can include economic, technological, social, political, religious, dietary, and material cultural changes, among others. Some changes may result directly from imperial practices, while others may be the by-products of two-way interactions between local and "global" or imperial traditions (Sinopoli 2001: 445). Tracing and explaining such changes in the imperial periphery is an important emerging area of research. The three most prominent areas of change in the periphery are settlement intensification and complexity, economy, and social and political complexity.

Changes in settlement and subsistence patterns related to the economy are one important type of change that may occur with the onset of imperial control. These may include changes in the location and nature of settlement, type of crops cultivated, land management and reclamation practices, land tenure, intensification and standardization of craft production, storage practices, and specialization (Matthews 2003: 143–145). Parker describes a striking example of such changes along the upper Tigris River in southeastern Turkey. There, in an area under direct Neo-Assyrian control, the settlement system and pottery traditions underwent relatively rapid changes between the ninth and seventh centuries BCE as a result of an Assyrian program of resettlement and development (Parker 2001: 266–270). To some extent, these changes were an extension of similar changes visible around the major cities of the Neo-Assyrian imperial core (Wilkinson et al. 2005; Altaweel 2008). Shifts in settlement patterns are also apparent in areas further from imperial cores. Such is the case for much of the southern Levant where increased settlement intensity and complexity peak under the Neo-Assyrian, Neo-Babylonian, Roman, and Byzantine empires.

Economic changes in peripheral regions can be related to the demand for tribute and other material support by the empire (Sinopoli 2001: 456). They can also be related to the expansion of international trade along old and new trade routes and the development of specific resource areas such as the development of mining. Tribute lists in Neo-Assyrian texts highlight the kinds of materials that were exchanged in the ancient Near East. Prominent are metals (bronze, tin, copper, iron, gold, and silver), dyed wool, camels, horses, and other animals. While archaeological remains rarely uncover large caches of metals or other exotic items, finds of luxury items in tombs and other contexts reveal an expanded economy during periods of imperial power (e.g., Tyson 2014: 58–63).

The kinds of social and economic changes mentioned here are also often associated with increased social ranking, the creation or expansion of a local elite, and the creation of new polities or secondary states (Sinopoli 2001: 454). The appearance of the state of Urartu in the ninth and eighth centuries BCE is explicable as a direct result of pressure from the emerging Neo-Assyrian Empire (Zimansky 1985: 3). The patchwork of small polities covering the Levant during the rule of the Neo-Assyrian Empire fits a similar pattern (Joffe 2002). Damascus, Israel, Judah, Ammon, Moab, Edom, and the cities along the coast of the Eastern Mediterranean all found themselves under military and economic pressure from the Neo-Assyrian Empire. In this situation, the local elites capitalized on their associations with the empire to enhance their local prestige and power. This becomes visible in the material culture through the appearance of imported luxury goods, as well as architecture, iconography, and other items that emulate imperial styles (Matthews 2003: 143–144; Tyson 2014: 217–219). Emulation of imperial styles in order to articulate local power is a common pattern; however, possible instances of emulation should be analyzed with careful attention to their find

spots and place within the broader archaeological assemblage (Cifarelli 2018; Marcus 1996: 49–50). The spread of Mesopotamian-style open-court architecture to many places in the Neo-Assyrian Empire is one example of such dynamics and highlights how local elites sought to enhance their own position by association with international styles.

Beyond the Periphery

Other areas lay beyond the control of empires but were influenced by their development nonetheless because of opportunities for trade. Cyprus (ancient Alashiya) was an important supplier of copper to the ancient Near East in the Bronze Age and benefitted from the markets available for their goods. The Late Bronze Age Uluburun shipwreck off the coast of Turkey demonstrates the quantities of metal and other precious goods that were traded by sea during the Late Bronze Age and highlights the demand for such metals driven by the Hittite and Egyptian empires. In a similar way, demand for spices and aromatics during the Neo-Assyrian and Neo-Babylonian periods spurred the development of trade with the Arabian Peninsula. In these cases, it was not direct or indirect imperial control that spurred developments but the economic demand that provided opportunities for distant lands.

Future Directions

As a multidisciplinary area of research, the Archaeology of Empire in the ancient Near East will benefit as archaeologists and historians increasingly work together to understand the patterns left behind by vast imperial systems. While some of the main sites in the imperial cores and in the imperial periphery shed light on local cultures and histories, efforts at understanding the relationships between them will illuminate more precisely the ways that empires dominated their worlds and how the cultures and societies that they dominated responded. One area of research that has not yet made a significant impact on ancient Near Eastern archaeology or history is that of postcolonial studies. Postcolonial approaches to the archaeological record have been applied in other areas (e.g., Dietler 2010) and will undoubtedly be applied to cases from the ancient Near East as scholars seek to explain the encounter between empires and local cultures.

Cross-References

► Ideology and Materiality in Archaeological Theory
► Mediterranean Sea: Maritime Archaeology

References

Altaweel, M. 2008. *The imperial landscape of Ashur: Settlement and land use in the Assyrian heartland*. Heidelberg: Heidelberger Orientverlag.

Chase-Dunn, C., and T.D. Hall. 1991. Conceptualizing core/periphery hierarchies for comparative study. In *Core/periphery relations in precapitalist worlds*, ed. C. Chase-Dunn and T.D. Hall, 5–44. Boulder: Westview Press.

Cifarelli, M. 2018. East of Assyria? Hasanlu and the problem of Assyrianization. In *The periphery in the Neo-Assyrian Period,* ed. C.W. Tyson and V.R. Herrmann. Boulder: University of Colorado Press.

Dalley, S., and A. Goguel. 1997. The Sela sculpture: A neo-Babylonian rock relief in southern Jordan. *Annual of the Department of Antiquities of Jordan* 41: 169–176.

Dietler, M. 2010. *Archaeologies of colonialism: Consumption, entanglement, and violence in ancient Mediterranean France*. Berkeley: University of California Press.

Joffe, A.H. 2002. The rise of secondary states in the Iron Age Levant. *Journal of the Economic and Social History of the Orient* 45: 425–467.

Mallowan, M.E.L. 1978. *The Nimrud ivories*. London: British Museum Publications Ltd..

Marcus, M.I. 1996. *Emblems of identity and prestige: The seals and sealings from Hasanlu, Iran: Commentary and catalog (Hasanlu special studies 3)*. Philadelphia: The University Museum.

Matthews, R. 2003. *The archaeology of Mesopotamia: Theories and approaches*. London: Routledge.

Oates, J., and D. Oates. 2001. *Nimrud: An Assyrian imperial city revealed*. London: British School of Archaeology in Iraq.

Parker, B.J. 2001. *The mechanics of empire*. Helsinki: Neo-Assyrian Text Corpus Project.

Russell, J.M. 1991. *Sennacherib's palace without rival at Nineveh*. Chicago: University of Chicago Press.

Sinopoli, C.M. 1994. The archaeology of empires. *Annual Review of Anthropology* 23: 159–180.

Sinopoli, C.M. 2001. Empires. In *Archaeology at the millennium: A sourcebook*, ed. G.M. Feinman and T.D. Price, 439–471. New York: Kluwer Academic.

Tyson, C.W. 2014. *The ammonites: Elites, empires, and sociopolitical change (1000–500 BCE)*. London: Bloomsbury T & T Clark.
Wilkinson, T.J., J. Ur, E.B. Wilkinson, and M. Altaweel. 2005. Landscape and settlement in the Neo-Assyrian empire. *Bulletin of the American Schools of Oriental Research* 340: 23–56.
Winter, I.J. 1997. Art in empire: The royal image and the visual dimensions of Assyrian ideology. In *Assyria 1995*, ed. S. Parpola and R.M. Whiting, 359–381. Helsinki: Neo-Assyrian Text Corpus Project.
Zimansky, P.E. 1985. *Ecology and empire: The structure of the Urartian state (Studies in ancient oriental civilization 41)*. Chicago: The Oriental Institute of the University of Chicago.

Further Readings

Alcock, S.E., T.N. D'Altroy, K.D. Morrison, and C.M. Sinopoli, eds. 2001. *Empires: Perspectives from archaeology and history*. Cambridge, UK: Cambridge University Press.
D'Altroy, T.N. 1992. *Provincial power in the Inka empire*. Washington, DC: Smithsonian Institution Press.
MacGinnis, J., D. Wicke, and T. Greenfield, eds. 2016. *The provincial archaeology of the Assyrian empire*. Cambridge, UK: MacDonald Institute for Archaeological Research.
Morris, I., and W. Scheidel. 2010. *The dynamics of ancient empires: State power from Assyria to Byzantium*. Oxford: Oxford University Press.
Smith, M.E., and L. Montiel. 2001. The archaeological study of empires and imperialism in pre-Hispanic central Mexico. *Journal of Anthropological Archaeology* 20: 245–284.
Tyson, C.W. and V.R. Herrmann. 2018. *The periphery in the neo-Assyrian period*. Boulder: University of Colorado Press.
Van De Mieroop, M. 2007. *A history of the ancient near east ca. 3000–323*. 2nd ed. Malden: Blackwell Publishing.

Emporion

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Introduction

An emporion, usually translated into English as commercial settlement, trading post, or port-of-trade, was a location where commercial exchange took place. Archaic and classical sources name 24 Greek emporia and Hellenistic and Roman sources mention over 100 different sites that they call emporia. The sites can be found throughout the Mediterranean basin and the Black Sea region. Ancient sources do not provide a great deal of information on what emporia were and few named emporia have been excavated extensively. Consequently, it has been difficult to define the term "emporion."

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Definition

The most comprehensive analysis thus far compares the language ancient sources used to describe emporia with what we know about these settlements from other literary, epigraphic, and archaeological sources (Hansen 2006). This interdisciplinary approach has shown that an emporion was a coastal location where commercial exchange took place in self-governing *poleis* (city-states). When located in the non-Greek world, these self-governing *poleis* were usually dependent on another authority. When located in the Greek peninsula, these *poleis* were autonomous. It is also generally accepted that emporia were multiethnic settlements (Demetriou 2011, 2012).

Key Issues and Current Debates

Emporia have been typically discussed in two different fields. At first, they appeared in discussions on the ancient economy because of their role in long-distance trade. These studies were influenced by the work of Karl Polanyi (1886–1964), who identified ancient Greek emporia with an ideal model of an economic institution called "port-of-trade" (Polanyi 1963). Ports-of-trade were defined as coastal or riverine locations, situated at a neutral checkpoint or interface of two groups with differing economic organizations. This model has been criticized successfully by pointing out that emporia were neither neutral nor marginal and that the trading partners' economic systems were similar (Figueira 1984).

Scholars who study ancient Greek colonization and the establishment of new settlements also discuss emporia. The traditional narrative of Greek colonization opposes an emporion and an *apoikia* (colony). According to these accounts, *apoikiai* were political foundations established as agrarian colonies that slowly acquired a territory in the hinterland, which they exploited for the production of agricultural products. One such example would be the colony of Syracuse, whose foundation is traditionally dated to 734 BCE (Thucydides 6.3). In contrast, emporia were established with a commercial purpose in mind, and neither developed extensive relations with the hinterland nor exercised control over a territory (Gwynn 1918; Lepore 1968; Vallet 1968). In this scheme, emporia were not political entities and were smaller in area than *apoikiai*. The most frequently cited examples of commercial colonies without a hinterland are several foundations attributed to Phokaia (Strabo 4.1.5) along the Gulf of Lion on the coasts of France and Spain, such as Olbia, founded in the fourth century BCE, Agathe (Agde), a sixth-century establishment, and Emporion, also founded in the sixth century BCE (e.g., Vallet 1968). These assumptions about the distinction between emporia and *apoikiai* has further led to discussions about whether specific settlements were political or commercial in nature. For example, what is usually called the first Greek settlement in the western Mediterranean, Pithekoussai has suffered especially from this question (Greco 1994).

Recent work has questioned the validity of the false dichotomy between agrarian colonies with a hinterland and commercial colonies without one. On the one hand, archaeological and cadastral studies on the topography of several emporia, typically considered to have been small in size and to have had no relations with the surrounding territory, such as Agathe, Olbia, and Emporion, have shown that the extent of their hinterland and the degree of interaction between the settlement and the territories surrounding it have been vastly underestimated (see Demetriou 2011 for a discussion and full bibliography). Studies of sites usually called *apoikiai*, such as Megara Hyblaia, on the other hand, suggest that it is likely that agriculture and trade were complementary rather than mutually exclusive (De Angelis 2002).

Questions about the political nature of emporia have also dominated the scholarship because, on the surface, ancient sources seem to make a distinction between communities that were emporia and communities that had an emporion. For example, Athens (e.g., Demosthenes, *Against Apatourios, Against Phormio, Against Lakritos, Against Dionysodoros*), Corinth (Thucydides 1.13), and Byzantion (Theopompos *FGrH* 115 F62) are said to have had an emporion, whereas Borysthenes on the Black Sea (Herodotus 4.17), Emporion in Spain (ps. Skylax 2), and Naukratis in Egypt (Herodotus 2.178-9) are called emporia. Based on this superficial distinction in the ancient sources, scholars have presented various models to describe emporia. Bresson (1993) understood an emporion to be either an administered part of a *polis* where commerce took place – e.g., Piraeus in Athens – or a polity that was dedicated to commercial exchange, such as Naukratis. Wilson (1997) argued that emporia developed over time: in the Archaic period any community involved in commerce was an emporion but did not necessarily have a political character until the Classical period (e.g., Naukratis), and by the Late Classical and Hellenistic periods, an emporion was a geographically distinct community with its own administrators and judicial apparatus, as in the case of Piraeus, the fifth-century BCE emporion of Athens. Based on his examination of settlements on the Black Sea littoral, Petropoulos (2005) instead saw an emporion as an intermediate stage in the development of an *apoikia*, namely, a settlement founded with the ultimate purpose of becoming a proper *polis*. A closer examination of the literary sources cited above, however, shows that ancient authors use the term emporion to describe self-governing *poleis* when these are located in non-Greek lands – e.g., Borysthenes on the Black Sea, Emporion in Spain, and Naukratis in Egypt – whereas they say that *poleis* had an emporion when they were located in the Greek peninsula or Asia Minor, as in the case of Athens, Corinth, Byzantion (Hansen 2006). The ancient sources, therefore, do not make a distinction between two types of emporia. Rather, they

reflect the development of the Greek world: they called emporia newer settlements founded on the Black Sea coast and the western Mediterranean whose most important function was commercial, whereas when referring to the older Greek world of the Aegean circle they called an emporion the space in a *polis* dedicated to commercial exchange (Demetriou 2011).

Emporia had various sophisticated political, administrative, and judicial mechanisms put in place in order to facilitate commerce in emporia (Bresson 2016). Although most of the evidence comes from Piraeus, the emporion of Attica (Wilson 1997; Garland 2001), there also exist epigraphic and literary sources that are informative about other emporia (Vélissaropoulos 1977; Mossé 1983; Bresson 2016). From these sources it emerges, first, that an emporion typically had some degree of autonomy, even when it was dependent on another authority. Second, emporia had their own administrators and other officers who ran commercial operations. For example, both Naukratis (Herodotus 2.178), from the sixth century BCE, and Piraeus, from the fifth century BCE onward (e.g., *IG* II^2 1607, 1609, 1611, 1622, 2336), had *prostatai* (guardians) or *epimeletai* (curators), who were probably in charge of the administration of the emporion. Piraeus, the best-known Greek emporion, had an *agora* (market-place) supervised by five *agoranomoi* (market officials), who regulated commerce (*IG* I^2 896; ps.-Aristotle, *Athenian Constitution* 51.1), as well as several other officers, such as the *metronomoi*, who were in charge of weights and measures (ps.-Aristotle, *Athenian Constitution* 51.2), the *sitophylakes,* who regulated the export and import of grain (ps.-Aristotle, *Athenian Constitution* 51.3), the *dokimastes* (examiner), who tested silver currency (*Agora Inventory* I 7180), the *neoroi* (dockyard officials), who supervised the docks (*IG* I^3 73, *IG* II^2 1, 1607, 1609, 1611, 1622, 1623, 1627, 1628, 1631), supervisors of the harbor (*IG* II^2 1012, 1013, 2336), and the *pentekostologoi*, who were responsible for collecting the 2% tax on all imports (Demosthenes, *Against Midias* 133 and *Against Phormio* 34.6). Third, commercial trials were instituted in emporia to expedite procedures that involved traders.

In the Late Classical and Hellenistic periods, emporia experienced further economic and socio-cultural developments. The island of Delos, for example, prospered especially after the Roman Senate granted it a "tax-free" status in 167 BCE and placed it under Athens' control (Polybius 30.20-21; Strabo 10.5.4). Earlier, in 227 BC, King Seleukos II granted a similar tax exemption to all traders based on Rhodes, as did several other rulers and cities (Polybius 5.88.7; 5.89.8; 21.43.17; Diodorus Siculus 16.8). Delos and Rhodes consequently attracted traders from all over the Mediterranean and became cosmopolitan centers of commerce. In the same period, associations of traders appeared in emporia which had political, social, economic, and religious functions. These were usually grouped according to the traders' city-state of origin, centered on the worship of a divinity, and represented their members' interests abroad. Examples of these professional associations are known especially from Delos, Rhodes, and Athens, but are also attested in other emporia (Vélissaropoulos 1977; Kloppenborg and Ascough 2011; Steinhauer 2016). Greek commercial centers declined in the Roman period, after 30 BCE.

Future Directions

With few exceptions, emporia have not attracted as many excavations as other *poleis*. The sites that have been excavated extensively are emporia that are relatively well known in ancient sources, such as Naukratis in Egypt (Möller 2000), Emporion in Iberia (see the Monografies Emporitanes series published by the Museu d'Arqueologia de Catalunya, Empúries), Piraeus in Athens (Garland 2001; Lovén 2011), Corinth (see the Corinth monograph series published by the American School of Classical Studies in Athens), and Delos (see the Exploration Archéologique de Délos series, published by the École Française d'Athènes), among others. Given that the main function of an emporion was to facilitate trade, it is not surprising that what are often detected in the archaeological record of an emporion are: an excellent harbor, a greater variety in the

provenance of pottery, a high volume of transport amphorae, a multiethnic population, and religious sanctuaries. Still, there exists no systematic overview of the archaeology of emporia as a category. Further studies could create a model out of the existing archaeological record based on a variety of criteria: quantity and diversity of imports, evidence of mixed cohabitation, presence and extent of relations with the hinterland, etc. Such an exercise will allow scholars to identify emporia in the archaeological record, especially when no other evidence, written or epigraphic, exists for them. For example, the site of Gravisca in Tarquinia (Italy), with an excellent harbor, a mixed population, and ceramic evidence of a high volume of trade, can safely be called an emporion, even though no ancient source uses that term to describe it (Torelli 1988; Hansen 2006). Since emporia developed in different geographical and historical contexts, a useful comparison will be one that takes into consideration sites located in a single region and the relations among them (one example is Gailledrat 2015), and then extending the study to take into account the whole Mediterranean and Black Sea regions.

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Islands (Excluding Crete), Archaeology of
- ▶ Sicily and Magna Graecia, Archaeology of
- ▶ Polis
- ▶ Trade and Transport in the Ancient Mediterranean

References

Bresson, A. 1993. Les cités grecques et leurs emporia. In *L'emporion*, ed. A. Bresson and P. Rouillard, 163–226. Paris: Diffusions de Boccard.

Bresson, A. 2016. *The making of the ancient Greek economy: Institutions, markets, and growth in the city-states* Trans. Steven Rendall. Princeton: Princeton University Press.

De Angelis, F. 2002. Trade and agriculture at Megara Hyblaia. *Oxford Journal of Archaeology* 21 (3): 299–310.

Demetriou, D. 2011. What is an emporion? A reassessment. *Historia* 60 (3): 255–272.

Demetriou, D. 2012. *Negotiating identity in the ancient Mediterranean: The archaic and classical Greek multiethnic emporia*. Cambridge: Cambridge University Press.

Figueira, T.J. 1984. Karl Polanyi and ancient Greek trade: The port of trade. *Ancient Word* 10: 15–40.

Gailledrat, E. 2015. New perspectives on *emporia* in the Western Mediterranean: Greeks, Etruscans, and native populations at the mouth of the Lez (Hérault, France) during the sixth-fifth centuries BC. *Journal of Mediterranean Archaeology* 28 (1): 23–50.

Garland, R. 2001. *The Piraeus: From the fifth to the first century BC*. 2nd ed. Ithaca: Cornell University Press.

Greco, E. 1994. Pithekoussai: empório o apoikía. *Annali dell'Istituto universitario orientali di Napoli (Archeology)* 1: 11–18.

Gwynn, A. 1918. The character of Greek colonisation. *Journal of Hellenic Studies* 38: 88–123.

Hansen, M.H. 2006. Emporion: A study of the use and meaning of the term in the archaic and classical periods. In *Greek colonisation: An account of Greek colonies and other settlements overseas*, ed. G. Tsetskhladze, vol. 1, 1–39. Leiden: Brill.

Kloppenborg, J.S., and R.S. Ascough. 2011. *Greco-Roman associations: Texts, translations, and commentary. Vol. 1. Attica, Central Greece, Macedonia, Thrace*. Berlin: Walter de Gruyter.

Lepore, E. 1968. Per una fenomenologia storica del rapporto città-territorio in Magna Grecia. In *La città e il suo territorio. Atti dal VII convegno di studi sulla Magna Grecia*, 29–66. Naples: L'Arte Tipogragfica.

Lovén, B. 2011. *The ancient harbours of the Piraeus. Vol. 1.1. The Zea shipsheds and slipways: Architecture and topography*, Monographs of the Danish Institute at Athens 15.1. Aarhus: Aarhus University Press.

Möller, A. 2000. *Naukratis: Trade in Archaic Greece*. Oxford: Oxford University Press.

Mossé, C. 1983. The 'World of the *Emporium*' in the private speeches of Demosthenes. In *Trade in the ancient economy*, ed. P. Garnsey, K. Hopkins, and C.R. Whittaker, 53–63. Berkeley/Los Angeles: University of California Press.

Petropoulos, E.K. 2005. *Hellenic colonization in Euxeinos Pontos: Penetration, early establishment, and the problem of the "emporion" revisited*, BAR international series 1394. Oxford: Archaeopress.

Polanyi, K. 1963. Ports of trade in early societies. *Journal of Economic History* 23: 30–45.

Steinhauer, J. 2016. *Religious associations in the post-classical polis*. Stuttgart: Franz Steiner Verlag.

Torelli, M. 1988. Riflessioni a margine dell'*emporion* di Gravisca. *PACT* 20: 181–190.
Vallet, G. 1968. La cité et son territoire dans les colonies grecques d'Occident. In *La città e il suo territorio. Atti del VII Convegno di studi sulla Magna Grecia*, 67–142. Naples: L'Arte Tipografica.
Vélissaropoulos, J. 1977. Le monde de l'emporion. *Dialogues d'histoire ancienne* 3: 61–85.
Wilson, J.-P. 1997. The nature of Greek overseas settlements in the archaic period. In *The development of the polis in archaic Greece*, ed. L.G. Mitchell and P.J. Rhodes, 199–207. London/New York: Routledge.

Encyclopedic Museum

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Introduction

The concept of the "encyclopedic" or, as it is sometimes known, "universal" museum has been around for a long time, certainly since the sixteenth and seventeenth centuries, and it provided a reference point for much museum collecting subsequently, especially in the nineteenth century. The concept came to renewed prominence in 2003 with the "Declaration on the Importance and Value of Universal Museums" by the directors of a self-selected group of big European and US museums (The Art Institute of Chicago et al. 2003). This Declaration was fairly explicitly represented by the directors as the views of the "international museum community." Actually, this is far from the truth, and there has been intense debate about the concept and the Declaration ever since.

Key Issues/Current Debates/Future Directions/Examples

The Declaration, actually, did not use the term "universal museum," except in its title. Instead, the terms "major museums" and "museums whose collections are diverse and multifaceted" were used. Nonetheless, it is clear that the intention of the 18 signatories was to define such museums (especially, though presumably not exclusively, those run by themselves) as "universal museums." The term "universal museum" appears to have been abandoned somewhat later, after a number of attacks were made upon the concept, and today the museums that were signatories of the Declaration seem to prefer the term "encyclopedic museum."

It is worth noting that the Western world actually has very many "encyclopedic" museums, far more than the 18 which signed the Declaration, even if few are comparable in scale and quality to the 18 Declaration signatories. Virtually every sizable municipal museum service in the UK, for example, is encyclopedic in scope. These museums usually have their origins in the nineteenth century, and at that time, they collected everything they found of interest. What they found of interest was virtually anything antique, British or foreign, as well as art, science, material from "exotic" cultures, and the natural world. As it happened, this period of collecting coincided with the great age of the British Empire, so the opportunities for British museums to amass material culture from around the world were plentiful. Other European museums had similar opportunities.

Somewhat later, American economic power meant that many American museums were able to build collections to match those of the great European museums, sourced from different countries around the world: a form of commercial imperialism rather than military, but collecting based on an imbalance of power all the same. The trouble is these imbalances may be long term, but they are always temporary. The time comes, inevitably, that redress is sought for what can be seen as the plundering by a strong nation of a weaker nation's culture.

Encyclopedic museums therefore contain a wide variety of material; as Cuno puts it, "they comprise collections meant to represent the world's diversity" (Cuno 2008: 140). He goes so far as to differentiate between encyclopedic museums and national museums, which, he says, are merely "of local interest. They direct attention to a local culture," whereas encyclopedic museums "direct attention to distant cultures,

asking visitors to respect the values of others and seek connections between cultures." The argument, as promulgated by all supporters of the encyclopedic concept, is that only by assembling encyclopedic collections in one place (the encyclopedic museum) can their full importance be revealed, through their allowing comparisons to made, and global contexts to be explained.

The Declaration on the Importance and Value of Universal Museums arose out of a meeting of the "Bizot Group" of museums in October 2002, which had been convened to discuss the growing "problem" of requests for the "repatriation" of items being made to some European and American museums. While many claims for repatriation come from outside the Western world, often from parts of the world that were exploited by European imperial powers, the meeting and subsequent Declaration seem to have been preoccupied with the movement to repatriate or reunite the Parthenon (or "Elgin") marbles in Athens. This is demonstrated by the use of the example within the Declaration of "the sculpture of classical Greece" as to why the artifacts of "ancient civilizations" should be "widely available to an international public in major museums."

The Declaration therefore demonstrates a close link between the encyclopedic museum notion and resistance on the part of some Western museums to repatriation claims. It might be suggested that the Declaration was in reality little more than a fairly crude attempt to justify the refusal by some big European and American museums to repatriate items acquired through imperialistic and colonial or other questionable means.

What arguments have been deployed by the self-styled universal or encyclopedic museums to justify their resistance to repatriation?

Many arguments have their origin in the eighteenth-century Enlightenment era thinking about the necessity of an encyclopedic approach to understanding – and in the case of museums, representation – of the world. Importantly for these arguments, the notion of encyclopedic museums predates the growth of nationalistic thought in the nineteenth century, and some of these museums predate the modern nation-states that find themselves in the position of making repatriation claims, either on their own behalf or on behalf of indigenous groups within their nations. The global dimension of encyclopedic museums is crucial; nationalistic perspectives, the kind that gives rise to modern requests for the repatriation of museum collections, are narrow and proprietorial. Indeed, there is more than a whiff of contempt towards claims made by modern governments – Egyptian, Greek, and whoever – because, the argument goes, they are motivated merely by political perspectives, which are transcended by scholastic or archaeological perspectives. Moreover, the nations of these modern governments did not exist when the collections in question were taken into Western encyclopedic museums – so how can the collections possibly belong to these nations? National claims on antiquities "serve the purpose of the modern, claiming nation," as though the purpose of a modern nation, as expressed through its government, is of little consequence (Cuno 2008: 11).

There are a number of justifications for the encyclopedic museum:

- Museums provide a "valid and valuable context for objects that were long ago displaced from their original source" (The Art Institute of Chicago et al. 2003).
- The presence of objects from a civilization, such as the sculpture of classical Greece (in a universal museum), marks its "significance. . . for mankind as a whole and its enduring value for the contemporary world" (The Art Institute of Chicago et al. 2003).
- The aesthetic of works, such as the sculpture of classical Greece, "appears all the more strongly as the result of their being seen and studied in direct proximity to products of other great civilizations" (The Art Institute of Chicago et al. 2003).
- ". . .museums serve not just the citizens of one nation but the people of every nation. Museums are agents in the development of culture, whose mission is to foster knowledge

by a continuous process of reinterpretation. Each object contributes to that process. To narrow the focus of museums whose collections are diverse and multifaceted would therefore be a disservice to all visitors" (The Art Institute of Chicago et al. 2003).

- Universal museums play a role in "cultivating a better comprehension of different civilisations and in promoting respect among them" (Schuster 2004).
- Universal museums allow cultures to be compared. They "offer us the chance to forge the arguments that can hope to defeat the simplifying brutalities of politics all round the world." They have a "worldwide civic purpose" and show the world that "it is one" (McGregor 2004). They can promote tolerance.
- Encyclopedic museums offer access for all, in big centers of population, whereas if collections were to be repatriated to source nations, fewer people would be able to "access" them.

According to these arguments, the importance of visitors being able to compare and contrast cultural items in encyclopedic museums outweighs all other considerations.

Then there are the legal justifications: what was once acquired by a museum legally cannot now be challenged legally. So, Cuno argues that because permission to remove sculptures from the Parthenon in Athens was granted to the Earl of Elgin by the (then) governing Ottoman authorities, "no legal case can be made against Britain's ownership of the (Parthenon) marbles" by the modern government of Greece or, indeed, by anyone else (Cuno 2008: ix).

The conclusion we can draw from these arguments is that proponents of encyclopedic museums reject any notion that their collections should be subject to any reassessment in the light of modern political perspectives. What these museums have, they will continue to hold, and they will resist any claims for repatriation. These museums carry their own authority, and they refuse to recognize the legitimacy of any attempts to challenge this authority, no matter who makes them.

Among the arguments that have been deployed against the view that encyclopedic museums should be allowed to keep all their collections regardless of repatriation claims are these:

- Ideas originating in the Enlightenment cannot be reconciled with scholarship in the fields of postmodernism and postcolonial theory and are too inflexible to accommodate claims on modern museums by modern, diverse communities, socially inclusive practices, and democratic impulses (Flynn 2003).
- Items are ripped from their context, and some should be returned to that context, depending upon the resulting cultural benefits (which include an increase in knowledge and understanding).
- This approach is culturally insensitive, selfish, and arrogant.
- There is no evidence that the encyclopedic museums actually do attempt to show the world that it is one that they engage with contemporary politics or generate tolerance and understanding (O'Neill 2007).
- Encyclopedic museums tend to emphasize the distinctiveness and separateness of cultures rather than the universal. They minimize the impact of interactions between peoples and change. They have usually communicated messages of imperial, white, male, and national superiority, in a world ruled (appropriately) by the West (O'Neill 2007).
- Encyclopedic museums tend to be detached, academic, decontextualized, and hierarchical, privileging a Western aesthetic. They have fed the rationale for colonial domination (O'Neill 2007).
- Museums in Africa and other parts of the world from which material culture was removed by Western nations when they were in a position, militarily or economically, to do so, should be able to represent their own culture, and they do not require the job to be done on their behalf by encyclopedic museums in Western countries. Indeed, many people in source nations are grossly offended by how the culture of their nation is represented in encyclopedic museums.

- It is nonsense to claim that collections are more accessible in big European or American cities than elsewhere – they may be more accessible to some, but obviously not to others.

It has to be remembered that all museums remove items from their context (except in a few cases when an item has been specially commissioned for the museum context), so arguments that universal museums are guilty of removing items from their context are by themselves unconvincing. The issue, surely, is what should happen when the possession of an item is *contested*. Dispute might arise for any number of reasons: because the item was stolen from its rightful owner, because it was trafficked illicitly, and because it is important in terms of identity, national, or otherwise.

As far as encyclopedic museums are concerned, though, all arguments in favor of repatriation are subservient to the argument that encyclopedic museums enable the comparison of cultures from around the world.

Cross-References

- ▶ Authenticity and the Manufacture of Heritage
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Museums and the Distortion of Archaeology for Political Purposes
- ▶ Nationalism and Archaeology

References

Cuno, J. 2008. *Who owns antiquity?* Princeton: Princeton University Press.

Cuno, J. 2009. *Whose culture?* Princeton: Princeton University Press.

Flynn, T. 2003. The universal museum: A valid model for the 21st century? Available at http://tom-flynn.blogspot.com/p/universal-museum-valid-model-for-21st.html

McGregor, N. 2004. The British museum. *ICOM News* 57 (1): 7.

O'Neill, M. 2007. Enlightenment museum – universal or merely global. Available at http://www.elginism.com/20071012/826/

Schuster, P.-K. 2004. The treasures of world culture in the public museum. *ICOM News* 57 (1): 4–5.

The Art Institute Of Chicago et al. 2003. Declaration on the Importance and Value of Universal Museums. Available at www.thebritishmuseum.ac.uk/newsroom/current2003/universalmuseums.html

Engaged Archaeology

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Introduction

In 2007 Paul Mullins made the following observation:

> The distinction between serving the interests of the state and conducting an engaged archaeology is more complicated than it might initially appear, but archaeology can emphasize that poverty and racist stereotypes simply rationalize continuing government, institutional and ideological interests. The question for many archaeologists examining inequality is not really how we can make constituent communities civically engaged; instead, the issue is how we can work alongside existing community politics and address long-standing social justice issues like color-line inequalities. (Mullins 2007: 105)

This passage is from *Archaeology as a Tool of Civic Engagement*, one of the first studies to undertake a detailed analysis of how to use archaeology to address issues of social justice and civic responsibility. This book was part of a general trend toward greater political engagement in archaeology. In 2010, Setha Low and Sally Merry investigated the notion of engaged anthropology as the subject of a special issue of *Current Anthropology*. They argued that:

> A diversity of engaged anthropologies emerged from this ferment. Some are forms of support, teaching, and communication; others are social critique – the scholarly pursuit of uncovering the bases of injustice and inequality; and some concern the collaborative approach to research by working with research subjects through collaborative and equal relationships. Some are more radical forms of engagement centered on advocacy and activism.

> These divisions and categories are not rigid or static, but we use them to provide a sense of the diversity of engagements practiced in the United States today. (Low and Merry 2010: S207)

In this entry we discuss the subsequent emergence of, and trends in, an engaged archaeology in terms of the forms of engagement Low and Merry (2010) identified in anthropology: (1) sharing and support, (2) teaching and public education, (3) social critique, (4) collaboration, (5) advocacy, and (6) activism. In doing so, we are able to identify current trends in engaged archaeology.

Definition

Archaeology has a direct impact on groups ranging from farmers and developers to local historical societies and Indigenous peoples. In recent years, archaeology has increasingly intersected with matters relating to social justice and human rights, such as decolonization, ethics, structural violence, cultural and intellectual property, and repatriation. This shift intersects with a concern with ethical globalization, in which human rights are applied in fields beyond their more traditional political and legal realms. As part of this process, non-archaeologists are shaping archaeological practice according to their own priorities and agendas. This change can be encompassed in the term "engaged archaeology."

Engaged archaeology is "shaped by the social and political concerns of the people with whom archaeologists intersect" (Smith 2015). While it is closely aligned to activist archaeology, the principal difference between the two lies with their aims. Activist archaeology is the use of archaeology to support direct action in support of, or in opposition to, a cause or issue (Zimmerman 2014: 19). Engaged archaeology, however, may or may not be informed by any particular cause. Its overriding characteristic is that it is shaped by the communities with whom archaeologists work. Engaged archaeology has three overarching characteristics:

1. It actively engages with the social, cultural, and political dimensions of the lives of the people with whom archaeologists work.
2. It is shaped by the community's wishes.
3. It aims to make a practical difference to people's lives.

Engaged archaeology is a practice that encompasses many kinds of archaeologies. It is most evident in those parts of the discipline that clearly intersect with the contemporary world, such as community archaeology, activist archaeology, archaeologies of internment, cultural heritage management, ethnoarchaeology, and Indigenous archaeology (Fig. 1). Against a background of archaeology that is directed and informed by the community, the methods and practice of engaged archaeology differ according to the particular situation. In addition to variation according to archaeological sub-discipline, they also differ according to country, community, and other social groupings.

The critical difference between engaged archaeology and other forms of archaeology concerns the changing role of archaeologists. Archaeologists who take an engaged approach are likely to concentrate on long-term relationships with specific communities and to develop deeper knowledge of fewer places. The test of whether archaeological practice is truly engaged is the degree to which the research or project is initiated and shaped by community people to address their non-archaeological concerns.

Engaged Archaeology, Fig. 1 Model of engaged archaeology

Historical Background

Within archaeology, an engaged approach has arisen from the confluence of several movements, particularly post-processualism, gender archaeology, Indigenous empowerment, and globalization. The theoretical and methodological shifts inherent in an engaged archaeology encompass both processual and post-processual archaeology and intersect with a growing concern with ethical globalization. Within this development archaeologists have moved beyond recognition of the social and political contexts of archaeological interpretations to shaping archaeological practice according to the values, visions, and agendas of stakeholder groups, such as descendent and Indigenous communities, and to actively engaging with other groups such as journalists, politicians, and multinational corporations (see Endere et al. 2018; Mizoguchi and Smith 2019; Nicholas 2016).

Engaged archaeology is a natural progression from the intersection of public archaeology, gender archaeology, community archaeology, and activist archaeology. The emergence of socio-politics in archaeology during the 1980s and 1990s (e.g., Gathercole and Lowenthal 1990) critiqued the notion that archaeological research is of inherent benefit to humanity, setting the scene for a more politically engaged public archaeology. At the same time, archaeologists working with Indigenous people began to support the reburial of Indigenous human remains and, through that, the rights of Indigenous people to control their cultural heritage in the present. Taken together, these diverse threads engendered a "turn" in archaeology toward an engagement with the present and consideration of the role of archaeology as a tool of civic engagement (see Little and Shackel 2007). In the 1990s and early 2000s, this trend was reinforced by the emergence of community archaeology, which developed new partnerships between archaeologists and communities (see Marshall 2002), and activist archaeology, in which the tools of archaeology are used to support or oppose an issue in an effort to promote change (e.g., Zimmerman 2014; Atalay et al. 2014).

Key Issues and Current Debates

In this section we analyze key issues and current debates in engaged archaeology in terms of the forms of anthropological engagement identified by Low and Merry (2010). These are (1) sharing and support, (2) teaching and public education, (3) social critique, (4) collaboration, (5) advocacy, and (6) activism. It is possible to identify these trends in archaeological practice.

Sharing and Support

The first form of engaged anthropology that Low and Merry (2010) highlight is sharing and support. They note that "anthropological field research typically includes everyday practices of sharing, support, and personal interaction. Such relationships, which include friendship and even forms of kinship, can be thought of as a form of engagement" (2010: S207).

Archaeologists have been practicing this aspect of engagement for a number of decades, particularly in settler/colonial nations. Like anthropologists, archaeologists who work with Indigenous communities can be incorporated into kinship systems, as part of a deepening of relationships and recognition of shared responsibilities and mutual support. In addition, the idea of sharing and support is enmeshed in the practice of community archaeology, which is a disciplinary norm in some parts of the world, such as in the United Kingdom, where archaeologists work closely with historical societies. In other parts of the world, this remains either a developing practice or a future aspiration. Ichikawa (2018) highlights the work he has been doing to develop community archaeology in El Salvador, particularly around the reciprocal nature of archaeological work. He writes that while community archaeology has developed in other parts of the world, it still needs to be further developed in Central America. His recent work in El Salvador (Ichikawa 2018: 223) has focused on two issues:

1. How archaeological findings and collaborative archaeological practices impacted the community residents living at the site
2. How the community's collaboration impacted the archaeologist's work

In observing this process as an outsider, Ichikawa (2018: 232) writes that this engagement strengthens the social relationships of participants, both community members and

archaeologists, arguing that "archaeology changes the attitudes of different actors." In this case, archaeologists tended to disregard the community as unimportant, and in this process, the community was excluded from encounters with their own cultural heritage. In recent years, community members have been allowed to volunteer on excavations, whereby the sharing and support have led to "creating collective memory and cultural identities, reinforcing social relationships between participants who have different interests, and transforming archaeological practice or archaeology itself" (Ichikawa 2018: 234).

In a more general sense, closer relationships between archaeologists and communities morphed into ethical responsibilities toward the end of the twentieth century and further developed not only into standard practice but a benchmark aspiration in more recent years.

Teaching and Public Education

The second form of engaged anthropology described by Low and Merry (2010) is teaching and public education. They write that "instruction in classrooms, in training programs in the context of practicing anthropology, and in individual advising and mentoring constitute another form of engagement" (Low and Merry 2010: S208).

Archaeologists engage in the above range of activities. In addition, both archaeologists and anthropologists organize public engagement campaigns. Archaeologists organize the National Archaeology Week in Australia, the National Heritage Week in Ireland, and Heritage Open Days in the United Kingdom. In addition, there is a World Anthropology Day in the United States, and in 2014, the Committee on Public Policy for the American Anthropological Association raised the idea of a National Anthropology Week. Supported by volunteers, these events aim to increase public understandings of the discipline.

The integration of archaeology into school curricula has the potential to give archaeological concepts and knowledge broad research and long-term sustainability. This has occurred in many countries with varying degrees of success. An outstanding example, however, is Ireland, where archaeology has been taught as a subset of history in the primary school curriculum for many years. In 2005, the It's About Time! resource pack was launched, as part of a joint initiative between the Department of Environment, Heritage and Local Government and the Department of Education, to incorporate Archaeology. There are three themes: worship and commemoration, lifestyle and living, and archaeology at work. In 2018, this program is still running strong (Limerick Education Centre 2018). Sustainability and reach were also the focus of curriculum reforms at primary school level in the Petén region of Guatemala, where Patricia McAnany and Sarah Rowe have partnered with education and ecology specialists to develop new content and activities that met the standards of the Guatemalan Ministry of Education. The materials they developed emphasize conservation and respect for the rich natural and cultural heritage in the region and for the traditions and knowledge of Indigenous Maya peoples. Archaeological approaches to Maya cultural heritage are presented as one way of learning about the past. McAnany and Rowe observe that archaeologists and the people they collaborate with need to think carefully about how to match the scale and scope of educational programs to the type of collaborative project. In addition, they note that educational programs about the goals, methods, and discipline of archaeology are often required, at the same time that archaeologists must educate themselves about the local context and concerns of the community (McAnany and Rowe 2015).

Field schools that involve public education are another example of engaged archaeology. In North America, and elsewhere, there is a long tradition of archaeological field schools taken for credit at universities, aimed at teaching the methods of field archaeology. Recently, these offerings have been augmented by field schools that take an engaged approach. Such field schools offer a two-way engagement: teaching university students how to work appropriately and ethically with Indigenous and community groups and at the same time assisting those groups to achieve their research goals. One example is the field school on Field Methods in Indigenous Archaeology which is convened by the University of Washington in collaboration with the Confederated Tribes of Grand Ronde. In addition to imparting skills

from a community archaeology toolkit onto its students, this field school "seeks to strengthen the tribe's capacity to care for cultural resources, to recover histories of survivance on the Grand Ronde Reservation, and to develop a low-impact, Grand Ronde archaeological methodology" (González et al. 2018: 85).

The longest-running field school in Australia is the Barunga Community Archaeology Field School. It has been held at the community of Barunga, Northern Territory, annually since 1998. While it is led by Claire Smith, Gary Jackson, and Jordan Ralph, the individual teachings are given by community people. The aim of the field school is for students to experience working with Aboriginal people from remote communities and to learn how to produce a research product that is wanted by the community. The products range from reports on rock art sites and cemeteries to recording the sporting achievements of local people and oral histories. Students have to work closely with their Aboriginal teachers to achieve the research outcomes required to pass this topic. In addition, they are encouraged to share their own background with community people, bringing the wider world a little closer to a remote community (Fig. 2). Though it is much wanted by the community, each year convening this field school is a challenge (see Smith et al. 2020). The difficulties involved in field schools undertaken with Aboriginal peoples are discussed by May et al. (2018), who discuss some of the complexities of training students to work in Indigenous communities where cultural belief systems are still strongly linked to sites and landscapes. The central challenge they identify is a challenge for engaged archaeology in general:

Engaged Archaeology, Fig. 2 Nell Brown and Meghan Di Vito from New York. Barunga, Northern Territory, Australia. July, 2019

> In essence, the question remains – are community archaeology field schools worth the effort? In our opinion they are of immense benefit to students and can help prepare them for a career in archaeology. However, the pressure faced by communities and staff running the field schools is great and, with ever-increasing demands from universities to teach and publish, the biggest obstacle to make these programmes a success is the time needed. (May et al. 2018: 13)

Social Critique

Low and Merry (2010: S209) identify social critique as a form of engaged anthropology, which "refers to anthropological work that uses its methods and theories to uncover power relations and the structures of inequality" (see also Low 2016).

An outstanding archaeological example of social critique as a form of engaged archaeology is the work being undertaken on the archaeology of homelessness. In the United States, Zimmerman and Welch's (2011) Homelessness Project uses archaeology to understand the lifeways of homeless people. They found that the movement of homeless people across a landscape produces reasonably predictable patterning in material culture. This led to an understanding that populations often thought of as itinerant were actually settled long-term within a particular area and that homeless people create communities with recognizable settlement patterns. This study shed new light on those on the margins society, upon whom government policy and police attention are often focused, yet little is known about day-to-day lives. The researchers observe that "the problems caused by well-meaning parishioners or exasperated city officials are based on assumptions about the material culture of homelessness that archaeological approaches can at least clarify" (Zimmerman and Welch 2011: 81). In this sense, the ways in which groups and lawmakers have interacted with and imposed upon homeless people are based on

creating equality through the distribution of material culture (which may not be suitable for homeless people, but fits what the donor may see as befitting a "homed" person); or the removal of what might look like "trash" to local government officials might be a prized possession or necessary medications (in which case, the ramifications could be dire, if, e.g., the medications were required to sustain life or maintain "psychological balance") (Zimmerman and Welch 2011: 82). This type of engagement makes it possible to illuminate the multifaceted narratives of homeless people, including the forces that result in their homelessness, as well as those that keep them there. In all, the Homelessness Project is engaged in making the lives of homeless people better in a modern world. As Zimmerman and Welch (2011) state, archaeology can clarify the judgments brought upon homeless people. Moreover, policies around homelessness can be informed by this new information and clarity, which can, in turn, effect real change for homeless people.

In Australia, Kellie Pollard found that homelessness in the urban, rural, and hinterland areas of Darwin, Northern Territory, left distinct patterns in material culture due to the traditional living practices of Aboriginal people whose communities of origin are remote from major metropolitan centers. In Darwin, homeless Aboriginal people live on the fringes of society in a space colloquially referred to as "the long grass." The long grass in urban and rural areas is buildings, reserves, recreation parks, creeks, rainforests, and coastlines, extending to inland waterways and uninhabited bush in the hinterland. Aboriginal homelessness in the long grass shares some features in common with other countries, such as the recycling of charitable or discarded goods by citizens and the reuse of these goods in new and innovative ways. This suggests Aboriginal people who are homeless seek an enhanced quality of life as much as housed people do. However, homelessness in the long grass has some unique aspects – Pollard (2018) demonstrates that the material remains of Aboriginal people in the long grass reflect a cultural epistemology that encompasses land use and settlement and dietary patterns. Unlike homeless people in Zimmerman and Welch's (2011) study in the United States, or Kiddey and Schofield's (2011) study in the United Kingdom, Aboriginal people in the long grass practice hunting and gathering in a metropolitan context as a continuity of customs and traditions. In the long grass, Pollard found evidence of a diverse range of bush foods (terrestrial and marine) that testify to Aboriginal ecological knowledge and how homelessness correlates with traditional land use and settlement patterning. This knowledge and life skills assist homeless Aboriginal people, who are overwhelmingly on welfare support, to not starve and to eat healthy bush foods instead of highly processed carbohydrates. The studies of the material aspects of homelessness deeply interrogate the "structures of inequality" identified by Low and Merry (2010).

Collaboration

Low and Merry (2010: S209) identify collaboration as another element of engaged anthropology that "ranges from participation in the research site to collaborative leadership through action research." The authors stress that collaboration depends on the researcher assuming a supporting role, rather than a leadership role. While in anthropology this requires the researcher to fit in with a community to understand how it functions, it is possible to conduct archaeology without actively collaborating with a community. In current practice, collaboration is a thread that crosses all categories (but not all examples) outlined in this entry. It can broaden the intellectual richness of a project at the same time that it addresses issues that are of importance to local communities. Collaborations produce changed relationships, which engender their own challenges. Low and Merry (2010) comment on the trend from people being the subjects of research to becoming collaborators, co-researchers, and colleagues. This is certainly true of archaeology, and this collaboration has engendered profound changes, not only in practice but also in aspirations and community expectations. Isaacson and Ford (2005), for example, call for archaeologists to commit to a shared future by engaging with the daily challenges that face the people with whom they work:

> If archaeologists can bridge the barriers that traditionally separate private and professional lives, the

> future of the Indigenous community in which they work becomes a future in which they have a vested personal interest. If archaeologists see the Indigenous people with whom they work as more than just subjects of research, then archaeologists can no longer be silent observers to the problems Indigenous communities face every day. (Isaacson and Ford 2005: 361–362)

Today, collaboration is a disciplinary standard in the conduct of social archaeology in many parts of world, not only during fieldwork, but in identifying key aims, developing a research project and during analysis and reporting. As Chip Colwell writes:

> in the past half-century, archaeology's relationship with the public has dramatically shifted, from a scientific enterprise with modest concerns about its relationship with the public, to a view of public education as an obligation but one-directional, to a form of fully engaged community-based action. (Colwell 2016: 113)

The engaged archaeology that we conduct with the Barunga community in the Northern Territory, Australia, produces collaborations, and research products move beyond pure archaeology, or even anthropology, to encompass a wide range of issues relating to community health, well-being, and education. At the time of writing, our core research includes a burgeoning collaboration with then Royal Flying Doctor Service around culturally informed dental health (Fig. 3), while our community service includes surmounting the many, many, many hurdles involved in the renewal of a community member's passport (Fig. 4). Increasingly, we find ourselves taking on the role of culturally informed facilitators of better health care, education, and employment.

Advocacy

Low and Merry (2010) identify advocacy as another form of engaged anthropology. This includes "working to assist local communities in organizing efforts, giving testimony, acting as an expert witness in court, witnessing human rights violations, serving as a translator between community and government officials or corporations, and helping local groups use international principles such as human rights by working to vernacularize them" (2010: S210).

Engaged Archaeology, Fig. 3 Visit by the Royal Flying Doctor Service to Barunga, Northern Territory, Australia. July, 2018

Engaged Archaeology, Fig. 4 The number of people directed involved in obtaining the renewal of Adam Macale's passport. Front row (left to right): Jordan Ralph, Lily Friday, Jessala McCale, Adam Macale, Claire Smith. Back row (left to right): Mia Dardengo, Gary Jackson. Mel Rosso from Melbourne and Jo Smith from Newcastle are represented by express post envelope held by Claire Smith. Katherine, Northern Territory. July, 2019

Within the context of Indigenous archaeologies, Wobst (2005) calls for the empowerment of Indigenous voices and perspectives. The need applies more generally, especially in relation to colonized peoples or those with a history of enslavement. The work undertaken by Edward González-Tennant (2010) addresses this challenge in terms of African Americans. His Rosewood Heritage and Virtual Reality Project (González-Tennant 2010, 2018) highlights the capacity of engaged archaeology to make a difference to areas that have received little archaeological attention, such as that of race riots, and through this, to give voice to people whose voices have been dismissed or overlooked. This project engaged a variety of community-centered strategies as forms of truth-telling. These included a website, public talks, and immersive experiences. Working with a heterogeneous group of survivors, descendants, and interested parties, the descendants of the Rosewood Massacre and their advocates embraced the potential offered by new media and helped design new applications. González-Tennant records that by partnering with redress groups at the University of Florida, it was possible to raise awareness of ongoing social inequalities (including other violent, ongoing chapters of Florida's white supremacist history). One aim of the project was to provide a suite of techniques that could be transplanted to other contexts and aid reparations activists with new forms of persuasive data for their social justice work (González-Tennant 2010: 48).

Effective advocacy allows peoples to express their views themselves, rather than through a third party, and can be enhanced through the targeted analysis of material culture. Working with Aboriginal communities of Barunga, Manyallaluk, Beswick, and Werunbun in the Northern Territory, Australia, Ralph and Smith (2014) analyze the effects of a major government intervention on community health and well-being. The Northern Territory Emergency Response, known as the Intervention, was so radical that the government had to lift the protections of the Racial Discrimination Act. It included blanket bans on alcohol and pornography; a reduction and quarantining of welfare payments; the removal of customary law and cultural practice considerations from bail applications and sentencing within criminal proceedings; removal of the permit system which stopped non-Indigenous people entering Indigenous land; and abolishing the Community Development Employment Project, which employed hundreds of Indigenous people. At the request of the community, Claire Smith, Gary Jackson and Jordan Ralph

helped to coordinate and assess Aboriginal responses to the Intervention. In 2007, Smith and Jackson worked closely with Barunga community to organize a series of public forums across Australia, in which community speakers spoke directly about the impact of the Intervention on the physical and mental health of community members (Fig. 5). In 2010, Jordan Ralph conducted research on the impact of the Intervention in relation to road signs. While protest signs might have been expected, Ralph found that no instance of the new Intervention signs being defaced. To the contrary, he found that signs relating to the government intervention had minimal graffiti compared to other road signs. Given that graffiti is common on other forms of signs, interpret this as indicating that Aboriginal people felt unsafe writing graffiti on government signs. This, in turn, suggested that cross-cultural encounters, especially encounters with government agencies are viewed as unsafe by Aboriginal people, a finding that has "clear policy implications . . . for a government that is encouraging Aboriginal people to integrate more fully with the wider Australian society" (Ralph and Smith 2014: 82).

Motivated by a shared concern with social justice and human rights, another, slightly more indirect, use of archaeology is to advocate for the protection of the heritage places of colonized peoples, particularly in the face of industrial or urban development. Two Australian examples of archaeological advocacy are McDonald and Veth's (2009) work on the rock art of the Dampier Archipelago in Western Australia and Cole and Buhrich's (2012) work on the Quinkan rock art, near Laura on the Cape York Peninsula, QLD, Australia. The rock art of both regions was under threat from mining operations and, to a varying extent, tourism. In the Dampier, McDonald and Veth (2009) provided the first thorough analysis and contextualization of petroglyph sites across the Archipelago, which they compared to other art style provinces in the Pilbara. Their research was undertaken in support of the nomination of the Dampier Archipelago to the National Heritage List, achieved in 2007, and the current positioning

Engaged Archaeology, Fig. 5 Irene Fisher, CEO of Sunrise Health Services Aboriginal Corporation speaking at a public forum in Melbourne, Australia, 2007

of this region for World Heritage nomination. In terms of Quinkan Country, Cape York, Cole and Buhrich (2012) discuss the complexities and pitfalls of heritage legislation in Australia, writing that "it can be difficult for people who are not members of a registered native title application or a registered Aboriginal cultural heritage body, and who are unresourced, to be proactive in attending to their rights and responsibilities under the [Aboriginal Cultural Heritage Act 2003 (Qld)]" (Cole and Buhrich 2012: 73). Their advocacy highlights a culturally harmful situation, in which the protection of Aboriginal places from development depends upon being part of a formally registered, well-resourced group. In November 2018, the researchers' collaborative efforts with the Ang-Gnarra Aboriginal Corporation resulted in Quinkan Country on Cape York Peninsula being added to the Australian National Heritage register on the basis of its distinctive rock art and habitation over at least 34,000 years.

Activism

The final form of engaged anthropology identified by Low and Merry (2010) is activism. They write that "advocacy is not easily distinguished from activism. Both can draw on a person's knowledge and commitments . . . but activism also builds on commitments as a citizen or as a human confronting the violations or suffering of other humans" (Low and Merry 2010: S211).

One way in which archaeology engages with communities to redress the suffering and violations inflicted upon others is by shedding new light on Eurocentric, androcentric, xenophobic, and racist ways of thinking. Locating their work within the framework of a social justice-oriented public archaeology, Westmont and Antelid (2018) provide an inspiring demonstration of how archaeology can be used to enhance the social integration of migrants. They outline two community archaeology case studies in Sweden and the United States in which interpretations that emphasized participants' connections to lived experiences within places were prioritized over interpretations that favored biological connections to previous populations. They identify methods, observations, and approaches that can be adapted for other projects aimed at contributing to more cohesive societies. In the process, they demonstrate how community archaeology can be adapted to address contemporary social issues. The authors conclude that:

> When properly framed, public archaeology can be a force for reckoning with the historical exclusivity of archaeological interpretations. Our projects illustrate the ways that public archaeology can be a means for encouraging integration efforts by providing migrants with a sense of belonging. Archaeological narratives have the potential to change identities derived from heritage from people-focused to ones that are place-focused instead. This shift in emphasis can be used to integrate disparate populations through encouraging collaborative and inclusive versions of the past. If public archaeologists can successfully demonstrate the ability of archaeology to bring people together to overcome their social differences and see each other as equals with equal claims to an area's heritage, as we sought to do in our work, the value of heritage will be upgraded for society's purposes. (Westmont and Antelid 2018: 246–247)

International Perspectives

From an international perspective, how has engaged archaeology developed over the last decade or so? Internationally, engaged archaeology covers the full spectrum of practices outlined by Low and Merry (2010). Most examples are individual studies. Most examples of engaged archaeology are community-based. There are few broad, thematic approaches which deal with issues that are important to many communities or aim to address broad or overarching problems. A significant example of a thematic approach to engaged archaeology is the Intellectual Property Issues in Cultural Heritage project, which was directed by George Nicholas, of Simon Fraser University, in British Columbia. This collaboration of scholars, students, heritage professionals, community members, policy makers, and Indigenous organizations was funded from 2008 to 2016 by the Social Sciences and Humanities Research Council of Canada. Over this period this group intensively explored a range of case studies in relation to the rights, values, and responsibilities of material culture, cultural knowledge, and the practice of heritage research (IPinCH 2018). The focus on collaboration made it possible to address pressing cultural heritage challenges in specific contexts. The research themes were

Bioarchaeology, DNA, and Indigeneity; Commodifications of Cultural Heritage; Community-Based Cultural Heritage Research; Cultural Tourism; Safeguarding Indigenous Heritage; Indigenous Peoples, Cultural Heritage, and the Law; and Indigenous Research Ethics.

Around the globe, the emergence of an engaged archaeology has coincided with increased recognition of the urgent need to preserve oral histories as well as the capacity of oral histories to inform archaeological research and reorient archaeological thinking toward new research questions. The potential for core aspects of oral traditions to endure through time is highlighted in a recent study by Patrick Nunn and Nick Reid that identifies congruences between Aboriginal oral traditions and scientific evidence of sea level rises from 7,250 to 13,070 years ago at 21 sites around the Australian coastline (Nunn and Reid 2016). Sometimes, oral histories can identify new research questions. Pig Island (Nimowa) in the Massim island region of eastern Papua New Guinea, for example, is named after an oral history that refers to when Indigenous people arrived on the island to find it uninhabited by people but overrun by pigs, which must have been introduced to the island by people at a prior time in the past. This oral history traces the lasting impact of changing sea levels on the later dispersal of people into island regions and highlights the process of abandonment and resettlement in these regions (Ben Shaw email comm. 30 October, 2018).

The critical role that archaeologists can play in preserving oral histories in situations of social change is clear in Peter Schmidt's book *Community-Based Heritage in Africa* (Schmidt 2017), which describes the circumstances in which he was requested to undertake oral history research. The importance of preserving oral traditions has informed other archaeological work in Africa and elsewhere. Working closely with Indigenous communities on the Makgabeng Plateau in South Africa, Catherine Namono has used digital technologies to collect and document the oral heritage of previously marginalized voices and used this information to shape in heritage and historical narratives for rock art heritage tourism (see Namono 2018). She sees this as one way of redressing the dominance of literary heritage narratives of African heritage that marginalize the African cosmologies and oral traditions which are the intangible values of place that attract visitors to heritage sites. An addition value of this project is that "oral heritage narrated through stories, songs, dances and poetry and collected using digital technologies will help preserve African values threatened by the onslaught of Western ones, especially through written European languages and social media" (Namono 2018). We anticipate that the collection of oral histories will grow in importance as archaeology becomes more fully engaged with producing outputs that are sought by communities.

In Latin America, the trend toward an engaged archaeology is exemplified in a project in Olavarría, Buenos Aires province, Argentina, run by María Luz Endere, María Gabriela Chaparro and María Eugenia Conforti (2018). An itinerant exhibition was developed to promote public access to scientific knowledge and community awareness of the significance of the natural and cultural heritage of Olavarría. Though the program continued successfully over 7 years, the researchers highlight the need to increase stakeholders' participation in such projects and to explore new communication strategies to engage different segments of the public. Elsewhere, McAnany and Rowe (2015) discuss examples of the forms that an engaged archaeology can take from the Maya region in Guatemala. They point out that collaborative research poses new challenges as relationships change and communities become research partners and archaeologists have abandon their role as sole architects and stewards of the past. However, the difficulties that arise are more than offset by dramatically improved prospects for conservation and the enhanced relevance that accompanies this transformation. They argue that "it is a challenge – perhaps the grandest of all – to shape the study of humankind into an endeavor of unquestionable relevance" (McAnany and Rowe 2015: 7).

Future Directions

In many ways an engaged archaeology mirrors developments in social and cultural anthropology. This comparison of engaged archaeology in terms

of the categories outlined by Seth and Low (2010) shows that all of these categories have clear examples in archaeology. The examples discussed in this chapter demonstrate some of the ways that engaged archaeology can produce a richer, broader experience – for both archaeologists and communities.

What might be the future for engaged archaeology? Firstly, we expect that it will become increasingly interdisciplinary. Engaged archaeology often entails stepping beyond disciplinary boundaries in response to the priorities and agendas of different stakeholders. This involves breaking down barriers between archaeology and cognate disciplines such as history and anthropology, critiquing the distinction between researcher and subject and between professional and personal lives. Often, it involves archaeologists using their disciplinary skills for purposes that are not strictly archaeological, such as using their grant writing skills to raise funds for community projects. Moreover, archaeologists may have to acquire a suite of non-archaeological skills to address the issues facing the communities with whom they work.

Secondly, we anticipate that archaeological practice will continue to be shaped by the communities with whom archaeologists work. The examples discussed in this chapter demonstrate how archaeology can be enriched by its intersecting communities and how they can shape archaeological practice without compromising robust interpretations of the past. The major change is that archaeologists have moved beyond recognizing the social and political contexts of archaeological interpretations to shaping archaeological practice according to the values, visions, and agendas of those with whom they engage.

Thirdly, there is likely to be a greater emphasis on the co-production of shared knowledge, with archaeologists having less overt control over the direction and day-to-day practice of engaged archaeological projects. The benefit from this is that increased engagement with communities will highlight the value of archaeology to those communities, providing long-term protection of sites and long-term relevance for the discipline.

Fourthly, the broadening and deepening of experience that comes from actively engaging with another's concerns will continue to enrich relationships between archaeologists and community members, offerring new opportunities for knowledge production and intellectual service (e.g. Chesson et al. 2019).

Finally, since engaged archaeology is intimately involved with the social and political issues of the day, it will continue to intersect with social justice and human rights issues.

E

Cross-References

- ▶ Applied Archaeology (Including Activist Archaeology)
- ▶ Community and Archaeology
- ▶ Community Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Engagement in Archaeology
- ▶ Homelessness, Archaeology of
- ▶ "Public" and Archaeology
- ▶ Public Archaeology, The Move Towards

References

Atalay, S., L.R. Clauss, R.H. Mcguire, and J.R. Welch. 2014. *Transforming archaeology: Activist practices and prospects*. Walnut Creek: Left Coast Press.

Chesson, M.S., I. Ullah, G. Iiriti, H. Forbes, B. P. Lazrus, N. Ames, Y. Garcia, S. Benchekroun, J. Robb, N.P.S. Wilff, M.O. Squillaci. 2019. Archaeology as intellectual service: engaged archaeology in San Pacquale Valley, Calabria, Italy. Archaeologies 15(2).

Cole, N., and A. Buhrich. 2012. Endangered rock art: Forty years of cultural heritage management in the Quinkan region, Cape York peninsula. *Australian Archaeology* 75: 66–77.

Colwell, C. 2016. Collaborative archaeologies and descendant communities. *Annual Review of Anthropology* 45: 113–127.

Endere, M.L., M.G. Chaparro, and M.E. Conforti. 2018. Making cultural heritage significant for the public. The role of researchers in encouraging public awareness and local pride. *Public Archaeology* 17. https://doi.org/10.1080/14655187.2018.1499390.

Gathercole, P., and D. Lowenthal. 1990. *The politics of the past*. London: Routledge.

González, S., I. Kretzler, and B. Edwards. 2018. Imagining indigenous and archaeological futures: Building capacity with the confederated tribes of Grand Ronde. *Archaeologies: Journal of the World Archaeological Congress* 14: 85–114.

González-Tennant, E. 2010. Community-centred praxis in conflict archaeology. Creating an archaeology of redress with the 1923 race riot in rosewood, Florida. *The SAA Archaeological Record* 10 (4): 46–49.

González-Tennant, E. 2018. Virtual Rosewood research project. Available at: http: //www.virtualrosewood.com/. Accessed 16 Dec 2018.

Ichikawa, A. 2018. Strengthening social relationships through community archaeology at Nueva Esperanza, El Salvador: Challenges and lessons. *Journal of Community Archaeology and Heritage* 5: 222–236.

Intellectual Property Issues in Cultural Heritage (IPinCH). 2018. Available at http://www.sfu.ca/ipinch/. Accessed 15 Dec 2018.

Isaacson, K., and S. Ford. 2005. Looking forward, looking back: Shaping a shared future. In indigenous archaeologies: Decolonising theory and practice. In *Indigenous archaeologies: Decolonising theory and practice*, ed. C. Smith and H. Wobst, 352–366. London: Routledge.

Kiddey, R., and J. Schofield. 2011. Embrace the margins: Adventures in archaeology and homelessness. *Public Archaeology* 10 (1): 4–22.

Limerick Education Centre. 2018. Archaeology in the classroom. It's about Time! Available at: http://www.itsabouttime.ie/home.aspx. Accessed 16 Dec 2018.

Little, B., and P. Shackel. 2007. *Archaeology as a tool of civic engagement*. Lanham: AltaMira Press.

Low, S. 2016. *Spatializing culture. The ethnography of space and place*. London: Routledge.

Low, S. and S. Merry 2010 Engaged anthropology: Diversity and dilemmas *Current Anthropology*. Special issue on engaged anthropology: Diversity and dilemmas. Wenner Gren symposium supplement 2. 51(S2)1–24.

Marshall, Y. 2002 What is community archaeology. World Archaeology 34 (2): 211–219.

May, S., M. Marshall, I. Domingo Sanz, and C. Smith. 2018. Reflections on the pedagogy of archaeological field schools within indigenous community archaeology programmes in Australia. *Public Archaeology* 17. https://doi.org/10.1080/14655187.2018.1483123.

McAnany, P.A., and S.M. Rowe. 2015 Re-visiting the field: collaborative archaeology as paradigm shift. Journal of Field Archaeology 40 (5): 499–507.

McDonald, J., and P. Veth. 2009. Dampier archipelago petroglyphs: Archaeology, scientific values and national heritage listing. *Archaeology in Oceania* 44 (S1): 49–69.

Mizoguchi, K., and C. Smith. 2019. *Global social archaeologies: Making a difference in a world of strangers*. London: Routledge.

Mullins, P. 2007. Politics, inequality and engaged archaeology. In *Archaeology as a tool of civic engagement*, ed. B. Little and P. Shackel, 89–108. Lanham: AltaMira Press.

Namono, C. 2018. Digital technology and a community framework for heritage rock art tourism, Makgabeng plateau, South Africa. *African Archaeological Review* 35: 269–284.

Nicholas, G. 2016. *Being and becoming indigenous archaeologists*. Walnut Creek: Left Coast Press.

Nunn, P., and N. Reid. 2016. Aboriginal memories of inundation of the Australian coast dating from more than 7000 years ago. *Australian Geographer* 47 (1): 11–47.

Pollard, K. 2018. Archaeology in the long grass: A study of aboriginal fringe camps in Darwin, Australia. Doctoral thesis, Flinders University.

Ralph, J., and C. Smith. 2014. We've got better things to do than worry about whitefella politics': Contemporary indigenous graffiti and recent government interventions in Jawoyn country. *Australian Archaeology* 78: 75–83.

Schmidt, P. 2017. Community-based heritage in Africa. In *Unveiling local Research and Development initiatives*. London: Routledge.

Seth, S., and S. Low. 2010. Engaged anthropology: diversity and dilemmas. Current Anthropology 51 (2): S203–S226.

Smith, C. 2015. Engaged archaeology: Thinking outside the box, in R. Crooke, K. Edwards and C. Hughes (eds), Breaking barriers. Proceedings of the 47th annual Chacmool conference: 2–18. Calgary: The Archaeological Association of the University of Calgary.

Westmont, V.C. and A. Antelid The place to be: Community archaeology as a tool for cultural integration. Journal of Community Archaeology and Heritage 5(4): 237–249.

Wobst, H.M. 2005. Power to the (indigenous) past and present! Or: The theory and method behind archaeological theory and method. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 189–206. London: Routledge.

Zimmerman, L. 2014. Activism and archaeology. In *Encyclopedia of global archaeology*, ed. C. Smith, 18–20. New York: Springer.

Zimmerman, L., and J. Welch. 2011. Displaced and barely visible: Archaeology and the material culture of homelessness. *Historical Archaeology* 45: 67–85.

Further Reading

Apaydin, V. 2016. Economic rights, heritage sites and communities: Sustainability and protection. *Complutum* 27 (2): 369–384.

González-Tennant, E. 2018. *The rosewood massacre: An archaeology of history and intersectional violence*. Gainesville: University of Florida Press.

Little, B., and P. Shackel. 2014. *Archaeology, heritage, and civic engagement: Working toward the public good*. Walnut Creek: Left Coast Press.

Matsuda, A. 2004. The concept of 'the public' and the aims of public archaeology. *Papers from the Institute of Archaeology* 15: 66–76.

Schmidt, P., and I. Pikirayi, eds. 2016. *Community archaeology and heritage in Africa: Decolonizing practice*. London: Routledge.

Simms, C.R., and J. Riel-Salvatore. 2016. Occupy archaeology! Towards an activist ethnoarchaeology of occupy Denver. *The SAA Archaeological Record* 16 (3): 33–39.
Smith, C., H. Burke, J. Ralph, K. Pollard, A. Gorman, C. Wilson, S. Hemming, D. Rigney, D. Wesley, M. Morrison, D. McNaughton, I. Domingo, I. Moffat, A. Roberts, J. Koolmatrie, J. Willika, I. Pamkal, and G. Jackson. 2019. Pursuing social justice through collaborative archaeologies in Aboriginal Australia. *Archaeologies* 15: 3.
Thomas, S. 2015. Collaborate, condemn, or ignore? Responding to non-archaeological approaches to archaeological heritage. *European Journal of Archaeology* 8 (2): 312–335.
Zimmerman, L. 1989. Made radical by my own. An archaeologist learns to accept reburial. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 88–95. London: Unwin Hyman.

Engendered Archaeologies

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Introduction

Feminist principles made a formal entry into archaeology in the late 1970s, as scholars – the majority of whom were women – began to draw attention to the androcentric biases implicit in archaeological interpretations of the past. Further, these writers noted the degree to which similar patriarchal biases shaped the political economy of the discipline itself, to the general disadvantage of women. In the years to come, these early socio-political concerns would be expanded upon by subsequent feminist and queer archaeologists, who in addition identified heterosexist biases in the discipline. These authors called for a better representation of women, men, and others in the past (which had its own political implications in the present) and a commitment to improving the presence of women and sexual minorities among the practitioners of archaeology. This "double politics of representation" has often been acknowledged as the main – or even the only – contribution of these archaeologies. Yet, without downplaying the importance of representation, it should be noted that engendered archaeologies have significantly improved archaeology in general through the provision of alternative historical interpretations, the promotion of self-criticism and reflexivity within the discipline, and the development of new practices and fields of inquiry.

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Definition

The term "engendered archaeologies" designates all those archaeologies that explicitly problematize sex, gender, and/or sexuality in interpretations of the past and/or in the practice of the discipline itself. This term, therefore, encompasses the complex spectra of feminist, gender, and queer archaeologies. Although these archaeologies may overlap frequently in terms of theory, practice, and/or politics, it would be wrong to think that they always do so, as will be discussed below.

Historical Background

The Development of Feminist Archaeologies

During the final years of the 1970s, a significant number of archaeologists entered into the debate on discrimination against women, and programs were developed to provide a better representation of women, both in the past and in the discipline itself. These developments were associated with the near-simultaneous arrival of "second-wave" feminism in the archaeological communities of Norway, Britain, and the United States and its rapid spread to other areas of the globe. In Europe, the Norwegian workshop "Were they all men?" (convened in 1979, though only published in 1987 (Bertelsen et al. 1987)), the journal and network K.A.N., and the TAG session "Feminist Perspectives on the Past," celebrated in 1982, were among the first avenues for such objectives. In the United States, the authors of the "Woman the gatherer" movement in anthropology, in direct response to the success of the landmark 1966 "Man the

hunter" conference and later book of the same name, identified sexist biases behind scientific production and pioneered the study of the female role in the history of humankind.

In the 1970s, it was salient to recognize that prevailing conceptions of the past reflected particular researchers' perspectives, disfavored women, and legitimated hegemonic gender ideologies. Following the emergence of feminist women's studies, many archaeological works aimed to make women visible, a logical effort to reestablish balance after several decades of neglect and stereotyping of women in the past. But also from the outset – at the height of processualism and with culture history as a predominant background – the critique of patriarchal bias brought to the fore the "science question" in our discipline, initiating a debate that would find its full force from the 1980s onward in the heterogeneous perspectives of postprocessual archaeology.

Gender as a Concept in Archaeology

Fundamental to the advancement of feminist archaeologies was the incorporation of gender as an analytical category for the study of the past. Strongly rooted in feminist gender and women's studies in 1970s sociocultural anthropology, the concept of gender first entered archaeology in the 1980s, both in the United States (Conkey and Spector 1984) and the United Kingdom (see 1988 volume 7 (2) of the *Archaeological Review from Cambridge*). In previous years, gender had provided a term to disentangle the biological from the sociocultural, allowing one to refer explicitly to the interpretation – cultural, historical, and constructed – of sexual difference, which was seen as natural, fixed, and inevitable. On one hand, the study of women was released from essentialist background assumptions about "human nature." On the other hand, since gender was not biological and invariable, it offered a proper subject for archaeological research.

When archaeologists first began to discuss gender, the general goal was to engender the discipline (Conkey and Spector 1984). The critique of sexism and androcentrism continued, widening paths opened in previous years. Equity issues and gender roles in professional archaeology came to occupy positions of prominence on the research agenda (Gero 1983) and have continued to be highly relevant since (see, for instance, Bardolph 2014; Dıaz-Andreu and Sørensen 1998; Lazar et al. 2014). Likewise, additional male biases in archaeological interpretation and presentation – verbal and nonverbal – were scrutinized (e.g., Gifford-González 1993; Fries et al. 2017 for a recent one). As a result, women have been portrayed as active agents in many domains previously considered exclusively male. By the same token, traditional female activities have come to be considered fundamental to understandings of historical dynamics (Brumfiel 1991; Monton-Subıas and Sanchez-Romero 2008). Also important from the outset, early gender archaeologists recognized that reflection on what the concept of gender might mean for archaeological interpretation was a prerequisite to any progress, as were questions concerning epistemology and the production of archaeological knowledge (Spector 1993; Wylie 1992).

Following the precedent set by the 1979 Norwegian conference, the 1980s and early 1990s witnessed the first gender- and/or woman-focused meetings in several different countries. In England, following TAG sessions in 1982, 1985, and 1987, the Cambridge Feminist Archaeology Workshops took place in 1987–1988. The conference "Women and Production in Prehistory" – foundation for the groundbreaking volume Engendering Archaeology (Gero and Conkey 1991) – took place in the United States in 1988. The German Tübingen seminar was convened in the same year. These early meetings were followed in 1989 by the XXII Chacmool Conference in Canada, in 1991 by "Women in Archaeology" in Australia, and in 1992 by a R.A.T. session on "Archaeology and Women" in Spain. Although contextually situated in specific and substantially different academic environments, all of these meetings originated from the experience of being female in archaeology and confronted dominant archaeologies. They acted as "standpoints," where scrutiny and reflection on androcentrism were transferred from individuals and local groups to wider national and/or international communities. They were often the

first among a series of meetings, providing much-needed reference – both within the countries where the sessions convened and around the world – for many women archaeologists who had personal experience of sexism.

Since the 1980s, numerous authors have illustrated, revised, and put forward increasingly more nuanced views of gender in archaeology. Some of these scholars have been significantly influenced by developments in American third-wave feminism and have built substantially upon earlier themes, often related to the shifting and intersecting elements of personal identity in the past. Among these elements is sexuality, and one of the major contributions of third-wave feminism to archaeology has been a critique of heterosexism, another form of patriarchal bias.

Archaeologies of Sexuality and Queer Archaeologies

Issues of sexuality have long been on the feminist agenda. Important events of the 1960s – from the near-simultaneous approval of oral contraceptives for use in the United States, the United Kingdom, and West Germany in 1960–1961 to the police raid of New York's Stonewall Inn in late-June 1969 – thrust sexual desire and practice (both heterosexual and homosexual) to the forefront of public debate. Yet, while some authors of the 1970s, like Kate Millet, Carla Lonzi, Gayle Rubin, and Michel Foucault, among others, did address issues of sexuality, sustained discourse on the topic would not develop within academic feminism until the 1980s.

Within the discipline of archaeology, sexuality has always been implicitly programmed into interpretations of the past, and most archaeologists recognize sexual activity as an essential feature of past societies. Despite its importance to the reproduction of both bodies and cultures, sexuality has been largely absent from archaeological discourse until recently. In the introduction to *Archaeologies of Sexuality*, Schmidt and Voss (2000, following Rubin 1984) identified several factors that have significantly impeded sexuality research within archaeology. These include the assumptions that sexual behavior is biological and, as such, both invariable and ahistorical; that discussions of sex are bad or inappropriate; that monogamous, heterosexual sex is more legitimate than other forms of sex; and that the sexual mores of past cultures were identical to those of the researcher's own culture. Unspoken behind these assumptions is the notion that sexual activity in the past was always primarily procreative that it was, therefore, above all else, heterosexual. In the age of social media, the continued allure of these assumptions is made clear on a regular basis. Every few months (it seems), the popular media highlights an expert's "new find," the interpretation of which suggests some kind of lustful or nonnormative activity in the past, and the general public attaches itself in puerile fascination.

In the 1960s and 1970s – closely paralleling broader debates about homosexuality initiated by the Stonewall riots – classical scholars in philology and history began to address culturally sanctioned male homosexual relations, a common feature of ancient Greek and Roman societies about which they had remained relatively silent for more than a century. Yet, despite the potential of classical and other material culture to support an "archaeology of homosexuality" which might challenge the heterosexism implicit in mainstream archaeology, early attempts to do so often fell into the trap of reinforcing contemporary Western sexual politics, either associating past homosexuality with deviance or searching too hard to demonstrate a long history for the existence of homosexual identities similar to those of today.

Recognizing the degree to which attempts at an archaeology of homosexuality naturalize contemporary Western social values, a number of scholars (e.g., Dowson 1998) have called for the development of a "queer archaeology" that aims to break away from the essentialist and normative heterosexist constructions employed in traditional archaeological interpretations and from normative structures that guide the discipline itself. Over the past 20 years, such efforts have resulted in several published papers, conference sessions, and even dedicated queer archaeology interest groups within national and regional professional associations. Many of these efforts to apply queer theory to the study of the past have nothing to do with sexuality (see Blackmore 2011).

Key Issues/Current Debates

During the 1980s and 1990s, gender archaeologists generally accepted the sex-gender dichotomy. Studies aimed at investigating how gender systems were constructed and organized and how gender acted in structuring societies. Separate case studies highlighted the different – though interrelated – aspects of multifaceted gender systems: from gender relations (gendered roles and activities) to gender identity, through gender symbolism and ideology. The interest in such topics has continued and even grown since that time.

In light of ethnographic and ethnohistoric data, including studies of Native North American two-spirits, Indian hijras, and eunuchs, archaeologists have noticed that societies may have existed in the past with more than two gender identities (for instance, see Hollimon in Nelson 2006). The focus on gender identity has also fostered insights into the intersection of gender with other types of social ascription, mainly age, race, class, ethnicity, faction, and sexuality (Meskell 2002; Wilkie and Howlett Hayes 2006: 248–250). An incipient concern with intersectionality in archaeology gained greater attention in response to developments outside the discipline, as third-wave black feminists in the United States claimed that gender needed to be analyzed alongside other forms of identity (see Franklin 2001; Battle-Baptiste 2011; Battle-Baptiste 2011 for archaeology). Of these, studies of age – particularly of childhood – have been especially common in archaeology. The early feminist agenda to include "small issues" in archaeology, and so individual human beings, already embraced the study of children in the past (see Lillehammer in Bertelsen 1987). Since that time, numerous works have followed, even leading to the development of an independent field of inquiry – sometimes without reference to feminism or gender – with an organization of its own: the Society for the Study of Childhood in the Past (http://www.sscip.org.uk/).

Over time, reflexivity about gender identity has also come to include explicit reflections on the construction of the masculine self. More and more men have discovered that they also have gender. They have manifested an open discomfort with – and even an active rejection of – the gender roles attributed to them by contemporary patriarchal hegemonic masculinity. In response to this development, and with the inspiration of sociologists like R.W. Connell and V. Seidler, discussions of masculinity have appeared in archaeology (Knapp 1998; Spencer-Wood 2006: 319–321). Some authors have focused on how specific forms of dominant masculinity – usually associated with violence and warfare – were constructed in the past, while others have questioned the very existence of these forms of masculinity in light of archaeological data (for instance, Alberti in Nelson 2006). Such cases provide increasing evidence of how contemporary gender assumptions are read onto the past, impacting not only our understandings of women but also of men and of the broader societies in which they both participated. With each new study, it becomes clearer that the condition deplored by the first feminist archaeologists is pervasive, with more far-reaching effects than originally imagined.

Since the mid-1990s, scholars have started to reevaluate the sex-gender dichotomy. While many continue to accept the distinction as originally formulated, some archaeologists have begun to complicate the sex-gender dyad. Such efforts are guided mainly by the biomedical critique of binary sexual systems provided by Fausto-Sterling and by the notion – advanced by scholars like Laqueur, Wittig, and Butler – that there is no distinction between sex and gender, given that Western notions of sex and sexual difference are also socially constructed and contextually dependent. It is important to distinguish these treatments of sex and gender from another tendency that remains common in archaeology as well as in other disciplines: to use the terms "sex" and "gender" interchangeably while leaving the relationship between the two undertheorized. Here, gender becomes a proxy for the traditional notion of woman (and sometimes also of man).

The influence of poststructural theory on archaeology is perhaps best seen in studies questioning the idea that a stable gender is constructed upon a stable sex and highlighting the remarkable variation in human sex-gender systems (Yates 1993). Many of these studies have further introduced a theoretical interest in the body, embodiment, and sexual identity (see

Joyce 2005) and have yielded alternative interpretations, as is particularly evident in the study of iconography.

As might be expected, archaeologists hoping "to queer" the discipline have also demonstrated marked interests in the body, embodiment, and sexual and gender identities and have reexamined a number of traditional topics. For example, in the issue of *World Archaeology* (32[2]) dedicated exclusively to queer archaeology (published in October 2000 with Thomas Dowson as guest editor), contributors discussed homophobia within the practice of archaeology itself; new ways of seeing, reading, and/or experiencing the iconography of past cultures (especially with regard to understanding sexuality in the past) and of presenting such alternative readings and experiences to the broader public; the possibilities of identifying past sexual relationships from nonrepresentational artifactual material; and the relationship between archaeology and other disciplines that take an interest in the materiality of the human body (e.g., biotechnology and genetic engineering). What became clear from many of these papers – mirroring earlier feminist critiques – is that the physical body of the archaeologist is often as important to his/her interpretations of the past as are the bodies of the long-dead people he/she studies. Subsequent work, both published and presented at major conferences (including those of the Society for American Archaeology, the American Anthropological Association, and the European Association of Archaeologists), has kept the contemporary politics of the discipline in focus and continued to advance "alternative ways of seeing" iconographic and artifactual material. In addition, queer archaeologies have expanded to include critical examinations of subjects as diverse as relations between the living and the dead, the gendered division of labor in the past, and consequent impacts on the use of the landscape by individuals of different genders (as can be seen in *World Archaeology* 37 (4) and Meyer forthcoming). Notably, the destabilization of the polarity between biology and culture (provided by both gender and queer archaeologies) has stimulated important reflection in bioarchaeology. For example, Geller (2009) has drawn attention to the degree to which the practice of sex determination – whether from the gross examination of skeletal remains or, more recently, from studies of ancient DNA – has tended to read cultural meaning onto past biological difference, effectively conflating "sex" with "gender" and generally reinforcing the dominant sexist, cisgendered, and heteronormative discourses of the present. Recent efforts to craft a "transgender archaeology" (e.g., Weismantel 2013) have carried all of these reflections even further.

The 1979 Norwegian workshop called for an individual-inclusive archaeology in contradistinction to dominant archaeologies that were either artifactualist or focused mainly on abstract social categories and broad processes (Bertelsen 1987). Subsequent feminist inquiry in archaeology has continued to emphasize the importance of human agency and other variables to understandings of historical dynamics in the past (Dobres and Robb 2000). These other variables are best viewed at the local scale, often through a focus on daily life and quotidian activities (Brumfiel 1991; Spencer-Wood 2006: 307–310; Wilkie and Howlett Hayes 2006: 250–251). Spanish feminist archaeologists, for example, have put forward the concept of "maintenance activities" to highlight the structural and foregrounding nature of a set of daily repetitive tasks required for the short-, medium-, and long-term reproduction, sustenance, and welfare of any human group (Montón-Subías and Sánchez-Romero 2008). These activities have been analyzed in a framework that articulates long-term cultural sequences with a focus on the structures of daily maintenance, thus intending to fill the mismatch between the level of macrosocial, economical, political, and ideological structures and that of specific agency. In 2000, volume 31, 3 of *World Archaeology* also proposed the study of the human life cycle to redress this mismatch.

The spotlight placed on human agency, quotidian activities, and the local scale also fostered interest in the analysis of those spaces considered to be the stage upon which everyday life was enacted in the past. Initially, this research was mainly driven by a renewed interest in the study of households. Unlike previous processual treatments of the topic, this new research saw households as pivotal to understandings of historical

dynamics, rather than as neutral spaces that simply reflected the changes occurring simultaneously in other social spaces. Through time, this revised household archaeology has come to incorporate many of the concerns raised in the broader theoretical discourse of engendered archaeologies, such as relationality and intersectionality (for a discussion, see Hendon in Nelson 2006; Spencer-Wood 2006: 312–314; Wilkie and Howlett Hayes 2006: 250–252), and has even expanded its mandate to include other similarly delimited and intimate social spaces including brothels, plantations, and farmsteads (Wilkie and Howlett Hayes 2006: 251–252). Queer archaeologies have expanded this research further through a focus on homosocial spaces, pioneered in 1994 by Roberta Gilchrist's study of medieval convents. Critical to these latter studies is the understanding that archaeologists need not necessarily – and, in fact, should not – assume that all households in the past were spaces in which social reproduction and sexual reproduction intertwined in the context of heterosexual family life.

The advancement of the themes addressed above has sparked debate about the explicit political commitment appropriate to archaeology. "Engendered archaeologies" is an eclectic term that includes feminist, gender, and queer studies in archaeology. Feminist and queer archaeologies should not simply be understood as theoretical currents within a single, bounded discipline but rather as movements that question the situation of women and sexual minorities in the broader context of contemporary society. The pursuit of an end to patriarchy – which often finds legitimation in the images of the past created by archaeology – has been a driving force in the history of these movements. This is not necessarily the case with gender archaeologies that may be disengaged from feminism, aiming instead to provide another theoretical corpus from which to gain knowledge about the past and, thus, having very different potential implications.

Although gender archaeology was born out of feminist reflections on the discipline and continues to be driven forward by feminist archaeologists, from the moment that gender became a concept in archaeology, some authors have sought to disconnect gender archaeology from feminism. The reasoning behind this disconnection has been both scientific (expressing a belief that science has to be unbiased) and strategic (in line with a belief that gender separated from feminism is less controversial and will more easily enter the disciplinary mainstream). But, ironically, those features of feminist archaeologies that these authors have held up as flawed and/or controversial might also be counted among the most important contributions of these archaeologies to the broader discipline, significantly enriching its scientific debate. An engagement with feminism has forwarded reflection on precisely what "doing archaeology as a feminist" means, following the lead proposed by Alison Wylie in the introductory article of a *Journal of Archaeological Method and Theory* (2007) special issue dedicated to the topic. The work of feminist philosophers like Sandra Harding, Helen Longino, Nancy Hartsock, Donna Haraway, and – of course – Alison Wylie has provided inspiration to a generation of researchers who seek to address interpretation in archaeology and has in turn sparked a number of important epistemological reflections on the production and transmission of knowledge in the discipline.

Some authors, for example, have explored alternative textual forms for conveying archaeological knowledge. Concerns about writing archaeology as a feminist have included more personalized ways of writing about the past, including archaeobiographies (especially in historical archaeology) and storytelling (for an overview, see Wilkie and Howlett Hayes 2006: 252). Of these, storytelling, in particular, offers suitable means to narrate the past, allowing for both the transmission of archaeological (i.e., "scientific") knowledge and the more humanistic "peopling of the past." Janet Spector's *What This Awl Means*, published in 1993, is among the most commonly cited examples of this genre, not only because Spector adopted an autobiographical tone in her narration but also because her work initiated an involvement with descendant communities (a concern also raised by indigenous archaeologies). Elsewhere, an emphasis on multivocality has led other practitioners of engendered archaeology to explore the possibilities of writing with hypertext (Joyce and Tringham 2007) and of

working with nonprofessional communities who, nonetheless, have interests in archaeological production (e.g., Bender 1998). Still other work (e.g., Tringham in Meyer forthcoming) endeavors to translate complex archaeological data into serious games for consumption by the general public, creating digital landscapes and characters that give new life to the past. In the future, it seems likely that engendered archaeology will explore these possibilities further and continue to test the boundaries of knowledge production and transmission within the discipline.

As suggested previously, the relationship between engendered archaeologies and the academic mainstream is complex and nuanced (for instance, Engelstad 2007; Montón-Subías and Lozano 2012). While some desire engendered archaeologies to be part of the mainstream and others do not (see below), such archaeologies are nonetheless subject to the perceptions and opinions of the whole archaeological community. Part of this community seems to be disinterested in engendered archaeologies. Contrary to the expectations of some gender archaeologists, obscuring ties to political feminism has done little to ameliorate this disinterest and may result in undertheorized uses of "gender" in which the concept loses its critical nature and becomes shorthand for "women." Trying to "do" gender archaeology, while stripping the term of its original theoretical and political influences, runs the risk of drawing on the same interpretive paradigms against which engendered archaeologies initially reacted.

For many practitioners of engendered archaeologies, what is fundamental is that these approaches were conceived to change the mainstream, not to be part of it. The discussion is not so much how they might be brought into the mainstream but how they might continue to change the mainstream. Many engendered archaeologies were developed with a desire to permeate the archaeological community as much as possible, altering the mainstream and building a new disciplinary culture. In this, engendered archaeologies share common goals with other archaeological movements, including Marxist Latin American Social Archaeology and postcolonial and indigenous archaeologies.

International Perspectives

Engendered archaeologies, especially archaeologies of gender, have steadily gained recognition since the 1970s. In the process, a number of gender-focused archaeology textbooks have been published (Gilchrist 1999; Nelson 2015; Sørensen 2000), journals have devoted complete issues to the subject (for instance, *Historical Archaeology* (1991) 25; *World Archaeology* (2000) 32(2); *J Archaeol Method Theory* (2007) 14 (3) and (2016) 23 (3); *Archaeologies* (2011) 7(1)), and key papers have been compiled into readers (Hays-Gilpin and Whitley 1998). Publications have covered broad geographic and temporal spectra (see part IV in Nelson 2006 and part II in Bolger 2012).

The extent to which engendered archaeologies have been adopted into local academies, however, is still restricted in terms of global geography. Differences in content and degree of acceptance vary with factors like national history, the position of feminism, and/or movement to recognize sexual minorities in society, local histories of archaeology and its dominant paradigms, academic structures, the nature of research teams, and, importantly, the efforts of individual scholars to introduce engendered perspectives into the discipline. Thus, in some regions, engendered archaeologies have already established themselves firmly, while in others they remain marginalized or simply do not exist. Having been recognized as major topics in Canada, the United States, Australia, and a few European countries (e.g., Germany, Spain, Sweden, Norway, and England), in most other places, engendered archaeologies retain a novel status and/or have not as yet made a solid impact. In many European countries, for instance, engendered archaeologies are now becoming more common (see Dommasnes and Montón-Subías 2012). But even this observation requires qualification as queer archaeologies – among the most recent forms of engendered archaeology – continue to be isolated primarily to the anglophone and Scandinavian academies. Outside of Europe, despite early contributions in the 1990s, engendered archaeologies have not yet gained a position of prominence in South and Central America. The number of gender-related

contributions is increasing, however, in the local archaeological academies of countries as diverse as Venezuela, Mexico, Argentina, Ecuador, and Colombia, among others (Navarrete 2010). Aside from South Africa, engendering archaeology has not been a priority in Africa (Folorunso 2007: 358), and, although Asian scholars are working on gender archaeology in universities in North America and the United Kingdom (see chapter 19 and 20 in Nelson 2006), its presence is much more restricted in the local academies of Asia (for instance, Dezhamkhooy 2011).

Future Directions

Engendered archaeologies have profoundly scrutinized the epistemological, methodological, and ontological foundations of archaeology and confronted sociopolitics in the discipline. In so doing, they have promoted new professional practices and offered alternative interpretations of the past based on previously neglected material culture and on new readings of well-known materials (such as art and iconography). To date, however, these archaeologies have unevenly impacted specific local academies and traditions. Consequently, engendered archaeologies face unequal challenges in the different parts of the world, and the "future directions" taken by these perspectives will vary markedly depending on the different academic contexts where they have appeared or are appearing.

The promotion of multilateral, international contacts is one avenue that might make engendered archaeologies richer in different parts of the world. Such contacts could lead to a better knowledge of and access to this kind of work at the regional level. For instance, the predominance of anglophone voices in the international discourse could lead to the wrong impression that, after the 1980s, all feminist archaeology has used gender as an analytical category. An examination of some perspectives with less global "visibility" demonstrates that this has not always been the case. For instance, Marxist feminist archaeologies have followed an alternative and independent path in Spain, drawing primarily on French and Italian feminist conceptions of sexual difference. In much of the world, discussions with the anglophone archaeological community have been the norm, often to the exclusion of connections with other active academies. Despite the geographical proximity of Spain and Germany, for example, Spanish and German gender scholars have long fostered contact with their colleagues in the UK and North America but remained mutually ignorant of one another. With this history in mind, it is important to recognize that efforts are being made to promote multilateral contacts between the practitioners of engendered archaeologies. One such effort is the Archaeology and Gender in Europe (AGE) working party of the European Association of Archaeologists (http://www.archaeology-gender-europe.org/). While AGE is primarily focused on drawing together members of the European archaeological community, it should be noted that in many areas, locally developed engendered archaeologies are now ripe enough to substantially augment intercontinental networks as well as to benefit from them.

One of the main challenges that engendered archaeologies will continue to face is in finding ways to further deepen the implications of politically committed positions and scholarship within the practice of archaeology. In the year 2018, the dominant sex-gender system in most parts of the world is still characterized by heterosexism and androcentrism, as well as by trans- and homophobia. In archaeology, the term "gender" has been adopted with much less reluctance in some circles than the terms "feminist" and "queer." Such reluctance stands as a self-evident example of how patriarchal biases continue to operate, presenting feminism and sexual identity movements as paranoid, unfashionable, no longer necessary, radical, and aggressive. Feminist and queer archaeologists know these perceptions quite well, and many decide to avoid such terms for strategic motives in grant requests, job applications, promotion-related self-evaluations, and even in their scholarly writing. In response to continued (if not always explicit) pressure, many practitioners of engendered archaeology significantly downplay the relationship of their own work to feminist studies. That so many feminist and queer scholars should feel obliged to dissimulate in this manner demonstrates the continued influence of patriarchy on the academy and suggests that engendered

archaeologies will be necessary for the foreseeable future. Last, but by no means least, a focus on the gender and sexual identities of *archaeologists as researchers* – as well as on the political, economic, and social inequalities that accompany these identities – continues to be necessary. As we move through the second decade of the twenty-first century, the gender equity papers referenced above (and others, like Geller 2016) are joined by new actions and new literature on the impact of sexual harassment and abuse in archaeology and other field sciences (e.g., Clancy et al. 2014; Muckle 2014; https://grupoarqueologiasocial.wordpress.com/2017/11/22/todas-sabemos-lo-que-pasa-en-bilbilis-el-machismo-el-acoso-sexual-y-el-abuso-de-poder-en-la-arqueologia/). The study published by Clancy and her colleagues indicates that as many as 75% of female scientists experience sexual harassment and even assault as they undertake fieldwork (including field training); and most do not know how to report this harassment. The grey literature of conference papers and PhD dissertations suggests this experience crosses identity categories, often affecting the members of sexual minorities regardless of gender. It is also commonly experienced by those with nonnormative bodies (i.e., the disabled), despite the fact that legislation in many countries explicitly aims to curb discrimination, harassment, and assault in the workplace (see, e.g., Clarke and Phillips 2011). It seems likely that these reports represent the tip of a much larger iceberg: one that no doubt affects who chooses to enter the discipline and who does not, who feels they have a voice in the archaeological community, and who remains voiceless. It must be recognized that any attempt to strip the political overtones of feminism or the queer movement (s) out of gender archaeology compromises the ability of engendered archaeologies to recognize and act against these continuing inequalities and injustices.

Cross-References

- ▶ Engendering Historical Archaeology
- ▶ Gender, Feminist, and Queer Archaeologies: A Spanish Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: European Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective

References

Bardolph, D.N. 2014. A critical evaluation of recent gendered publishing trends in American archaeology. *American Antiquity* 79 (3): 522–540.

Battle-Baptiste, W. 2011. *Black feminist archaeology*. Walnut Creek: AltaMira Press.

Bender, B. 1998. *Stonehenge: Making space*. Oxford: Berg.

Bertelsen, R., A. Lillehammer and J.R. Naess. (ed.) 1987. *Were they all men? An examination of sex roles in prehistoric society*. Stavanger: Arkeologisk museum I Stavanger.

Blackmore, Ch. 2011. How to queer the past without sex: Queer theory, feminisms and the archaeology of identity. *Archaeologies* 7 (1): 75–96.

Bolger, D. 2012. *A companion to gender prehistory*. Chichester: Wiley-Blackwell.

Brumfiel, E. 1991. Weaving and cooking: women's production in ancient Mexico. In *Engendering archaeology. Women and prehistory*, ed. J. Gero and M. Conkey, 224–251. Oxford/Cambridge: Basil Blackwell.

Clancy, Kathryn B.H., Robin G. Nelson, Julienne N. Rutherford, and Katie Hinde. 2014. Survey of academic field experiences (SAFE): Trainees report harassment and assault. *PLoS One* 9 (7): e102172. https://doi.org/10.1371/journal.pone.0102172.

Clarke, Amanda, and Tim Phillips. 2011. Archaeology for all? Inclusive policies for field schools. In *Global perspectives on archaeological field schools*, ed. H. Mytum, 41–59. New York: Springer.

Conkey, M., and J. Spector. 1984. Archaeology and the study of gender. *Advances in Archaeological Method and Theory* 7: 1–38.

Dezhamkhooy, M. 2011. The interaction of body, things and the others in constituting feminine identity in lower socioeconomic ranks of Bam, Iran. *Archaeologies* 7: 1–15.

Diaz-Andreu, M., and M.L. Sørensen, eds. 1998. *Excavating women: A history of women in European archaeology*. London/New York: Routledge.

Dobres, M.A., and J. Robb, eds. 2000. *Agency in archaeology*. London/New York: Routledge.

Dommasness, L.H., and S. Monton-Subias. 2012. European gender archaeologies in historical perspective. *Journal of European Archaeology* 15 (3): 367–391.

Dowson, T.A. 1998. Homosexualitat, teoria queer i arqueologia. *Cota Zero* 14: 81–87. (Translated into English and published in J. Thomas (ed.) 2000. *Interpretive archaeology: a reader*, 283–289. London: Leicester University Press.)

E

Engelstad, E. 2007. Much more than gender. *Journal of Archaeological Method and Theory* 14: 217–234.

Folorunso, C.A. 2007. Ethnoarchaeological studies in parts of Nigeria. In *Archaeology and women. Ancient and moderns issues*, ed. S. Hamilton, R.D. Whitehouse, and K.I. Wright, 353–372. Walnut Creek: Left Coast Press.

Franklin, M. 2001. A black-feminist inspired archaeology? *Journal of Social Archaeology* 1: 108–125.

Fries, J.E., D. Gutsmiedl-Schümann, J.Z. Matias, and U. Rambuscheck, eds. 2017. Images of the past. Gender and its representations. Frauen – Forschung Archäologie 12, Waxmann Münster-New York.

Geller, Pamela L. 2016. This is not a manifesto: Archaeology and feminism. In *Meta-philosophical reflection on feminist philosophies of science. Boston studies in the philosophy and history of science*, ed. M. Amoretti and N. Vassallo, vol. 317, 151–170. Cham: Springer.

Geller, P. 2009. Bodyscapes, biology and heteronormativity. *American Anthropologist* 111 (4): 504–516.

Gero, J. 1983. Gender bias in archaeology: A cross-cultural perspective. In *The socio-politics of archaeology*, ed. J. Gero, D.M. Lacy, and M.L. Blakey, 51–57. Amherst: University of Massachusetts.

Gero, J., and M. Conkey, eds. 1991. *Engendering archaeology. Women and prehistory.* Oxford/Cambridge: Basil Blackwell.

Gifford-Gonzalez, D. 1993. You can hide, but you can't run: Representations of women's work in illustrations of Paleolithic life. *Visual Anthropology Review* 9 (1): 23–41.

Gilchrist, R. 1999. *Gender archaeology. Contesting the past*. London/New York: Routledge.

Hays-Gilpin, K., and D.S. Whitley, eds. 1998. *Reader in gender archaeology.* New York: Routledge Press.

Joyce, R., and R. Tringham. 2007. Feminist adventures in hypertext. *Journal of Archaeological Method and Theory* 14: 328–358.

Knapp, B. 1998. Who's come a long way, baby? *Archaeological Dialogues* 5: 91–104.

Lazar, I., T. Kompare, H. van Londen, and T. Schenk. 2014. The archaeologist of the future is likely to be a woman: Age and gender patterns in European archaeology. *Archaeologies* 10 (3): 257–280.

Meskell, L. 2002. The intersections of identity and politics in archaeology. *Annual Review of Anthropology* 31: 279–301.

Meyer, W., ed. Forthcoming. *Engendering landscape & landscaping gender.* Albany: State University of New York Press.

Monton-Subias, S., and M. Sanchez-Romero, eds. 2008. *Engendering social dynamics: The archaeology of maintenance activities*, British Archaeological Reports International series 1862. Oxford: Archaeopress.

Montón-Subías, S., and S. Lozano. 2012. La arqueología feminista en la normatividad académica. *Complutum* 23 (2): 163–176.

Muckle, Robert J. 2014. On sexual harassment and abuse in archaeology. *The SAA Archaeological Record* 14 (5): 32–33.

Navarrete, R. 2010. Excavando mujeres en y desde el sur: aproximaciones a la arqueología feminista en Latinoamérica. *Revista Venezolana de Estudios de la Mujer* 15 (34): 75–104.

Nelson, S.M., ed. 2006. *Handbook of gender in archaeology.* Lanham/New York/Toronto/Oxford: Altamira Press.

Nelson, S.M. 2015. *Shamans, queens and figurines: The development of gender archaeology.* Walnut Creek: Left Coast Press.

Rubin, 1984. Thinking Sex: *Notes for a Radical Theory of the Politics of Sexuality. In C.S. Vance ed. Pleasure and Danger. Exploring Female Sexuality.* Bonton: Routledge and Kegan Paul. Pp. 267–319.

Schmidt, R.A., and B.L. Voss, eds. 2000. *Archaeologies of sexuality.* London: Routledge.

Sørensen, M.L. 2000. *Gender archaeology.* Cambridge: Polity Press.

Spector, J. 1993. *What this awl means: Feminist archaeology at a Wahpeton Dakota village*. St. Paul: Minnesota Historical Society Press.

Spencer Wood, S.M. 2006. Feminist gender research in classical archaeology. In *Handbook of gender in archaeology*, ed. S.M. Nelson, 295–329. Lanham/New York/Toronto/Oxford: Altamira Press.

Weismantel, M. 2013. Towards a transgender archaeology: A queer rampage through prehistory. In *The transgender studies reader 2*, ed. S. Stryker and A. Aizura. London: Routledge.

Wilkie, L.A., and K. Howlett Hayes. 2006. Engendered and feminist archaeologies of the recent and documented pasts. *Journal of Archaeological Research* 14: 243–264.

Wylie, A. 1992. The interplay of evidential constraints and political interests: Recent archaeological research on gender. *American Antiquity* 59: 15–35.

Yates, T. 1993. Frameworks for an archaeology of the body. In *Interpretive archaeology*, ed. C. Tilley, 31–72. Oxford: Berg.

Further Reading

Conkey, M. 2005. Dwelling at the margins, action at the intersection? Feminist and indigenous archaeologies. *Archaeologies* 1: 9–59.

Geller, P.L. 2017. *The bioarchaeology of socio-sexual lives: Queering common sense about sex, gender, and sexuality*, Bioarchaeology and social theory series. Cham: Springer.

Hays-Gilpin, K. 2000. Feminist scholarship in archaeology. *The Annals of the American Academy of Political and Social Science* 571: 89–106.

Joyce, R. 2005. Archaeology of the body. *Annual Review of Anthropology* 34: 139–158.

Lozano, S. 2011. Gender thinking in the making: Feminist epistemology and gender archaeology. *Norwegian Archaeological Review* 44 (1): 21–39.

Nelson, S.M., ed. 2006. *Handbook of gender in archaeology.* Lanham/New York/Toronto/Oxford: Altamira Press.

Tomas Kova, S. 2011. Landscape for a good feminist. An archaeological review. *Archaeological Dialogues* 18 (1): 109–136.

Engendering Historical Archaeology

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State of Knowledge and Current Debates

Gendered social relations are fundamental to the human experience. The ways in which individuals understand their roles as gendered beings and their relationships to other gendered beings both shape and are shaped by factors internal and external to the individual and the family/social/economic unit to which humans belong. Gender is also codified and experienced at multiple scales – from the household to the community to the nation (Rotman 2015) – and "rarely works in isolation from other identifying markers and means of acquiring power and status" (Jacobs 2011: 303). Colonialism, patriarchy, the capitalist mode of production, as well as other ideological, economic, and political forces have also shaped gender through time and across space. Specifically, the power relations embedded within them intersect with gender and, therefore, structure social relations in significant ways (Voss 2006: 111).

Gender is dynamic, fluid, contextual, contingent, and ever-changing. Identity, sexuality, cultural proscriptions for social roles, socioeconomic class, ethnic heritage, life cycle, and other dimensions of the cultural world create tensions between societal structures, gender ideals, and individual choices that require continual negotiation, interpretation, and actualization. Gender is endlessly complex with a myriad of material and spatial expressions – precisely why it is a worthy and fascinating subject of historical and archaeological study.

Understanding Human Experiences Through the Materiality of Gender

What exactly *is* gender? Gender is a complex biological, social, and political dimension of human experience. Indeed, "the fundamental categories we use to understand 'human being' – like man or woman – are not ontologically given, but rather are themselves historically and culturally variable and contingent" (Stryker and Aizura 2013).

Gender is the cultural interpretation of perceived biological differences. Many cultural systems, particularly those of Western origin, construct roles and relations of women and men (i.e., gender) predicated on observable anatomical differences (i.e., biological sex). There are also often clear cultural expectations that all women and men will marry heterosexually and have children. In this rigid binary system, biological sex (female/male), cultural gender (woman/man), and heteronormative sexuality are all inextricably intertwined. Although gender *is* about sexuality and social roles, it also about embodiment and identity – as well as the ways in which human experience articulates with the political, cultural, and economic discourses of their time and location (Stryker and Aizura 2013). Therefore, a biological basis for a binary gender system belies the diversity of both the human species and the human experience.

While many Western cultures give primacy to biology and the outward appearance of genitalia, other societies use different means of assigning gender. For the Bugis in Indonesia, for example, "numerous factors go into constituting an individual's gendered identity" (Davies 2007: 19–20). Biological sex is certainly one of those factors, but so too are notions of spirituality, role in sexual relationships, the work one performs, and how one dresses – all of which "foster a system where gender multiplicity is accommodated" (Davies 2007: 29). Indeed, Bugis culture has five possible genders, including feminine females and masculine males as well as biological males who perform culturally as women (*calabai*), biological females who perform culturally as men (*calalai*), and androgynous individuals who perform spiritual functions (*bissu*). In this way, Bugis culture acknowledges a wide range of human biological and cultural variation as well as allows for a broad spectrum of gendered performance and experience.

There are other cross-cultural examples of gender systems that move beyond a binary and oppositional construct of woman-man. In Native North America, for instance, there were and are First

Nation cultures in which more than two gender categories are marked (Rifkin 2011). Other well-documented examples include the *hijras* of India (Nanda 1986) and Samoan *fa'afafine* (Munroe and Munroe 1987). In these and other cultural contexts, gender mixing represents a combination of masculine and feminine gender statuses, not a change from "one" gender into "the" other within a binary system.

Historical archaeology is a terrific tool for exploring gendered human experiences. As a discipline, it utilizes multiple lines of evidence – archaeology, architecture, oral history, folklore, and documentary records, among many other resources – to elucidate the past. It is critical to recognize, however, that archaeological practice can reinforce, homogenize, naturalize, and project onto human history models of heteronormative nuclear families (Voss 2006). Consequently, gender variation is obscured. By adopting gender as an explicit conceptual and analytical category, women, men, and other gendered beings "are brought into view as active producers, innovators, and contextualizers of the very material world by which we know the past" (Gero and Conkey 1991: 23). Importantly, gendered interpretations of human experiences are not an end in themselves, but are part of a broader project of studying "personhood" archaeologically (Wilkie 2003). Historical archaeology also studies "the ways that material practices are used to mediate the tensions between gendered difference and interdependence in social life" (Voss 2006: 123).

An individual's gender structures her or his interactions and connections to other people (including kinship and marriage) as well as access to economic resources and social power, among many other things. Gender "manifests itself in production (economics and labor) and reproduction (both physical and social)" (Jacobs 2011: 303). Therefore, gender is central to human experiences as a social force that shapes one's roles and relationships.

Gender shaped human relationships, both within the family and within the larger community as well as was reflected in the institutions of society. The dynamic social relations of gender were created, codified, and reproduced through the spatial organization of houses, the objects used in cultural rituals, and the demographic structure of the population. Furthermore, gender often facilitated or constrained access to power, status, economic resources, authority, and prestige as illustrated in the case studies that follow.

Gender in the Domestic Arena

Households correspond to a nexus of social reproduction and production in the form of practice and represent "small landscapes" for analyzing social relations (Barile and Brandon 2004). The activities within households "serve to 'produce' material things (such as food, clothing, and shelter), but they do so in a way that both reifies and transforms social structure – along with such things as gender constructions and power relations" (Barile and Brandon 2004: 8). As such, households are important units of analyses in historical archaeology and essential to understanding gendered lived experiences.

As Native American peoples adjusted to the changing economic, demographic, economic, and social circumstances of the colonial period, new gender roles were negotiated and reconfigured. For example, the Pequot in Connecticut underwent transformation through culture contact with European American settlers. Although the Pequot held reservation land, it was corruptly managed by colonial overseers (Silliman and Witt 2010). Consequently, Indigenous peoples were increasingly pushed to the literal and metaphorical edges of colonial society, existing on lands of marginal quality and engaging in subsistence agriculture and game hunting. As a result, the Pequot became inextricably bound to colonial settlers through wage labor, exchange, and indebtedness.

George Toney, for instance, moved between the reservation, where his wife Mary maintained their residence, and worked for Jonathan Wheeler, a nearby European-American farmer and merchant. On the whole, reservation lands were "largely inhabited and strongly guarded by Eastern Pequot women, who saw their male partners, children, siblings, and other relatives depart elsewhere for labor and economic resources" (Silliman and Witt 2010: 57). Importantly,

however, both men and women exchanged labor with local merchants in return for credit on food, clothing, or tools. Women often sold baskets, brooms, and other material goods in nearby towns, which took them away from the reservation and traditional spheres of interaction (Silliman and Witt 2010: 53). In addition, these objects were material representations of the displacement Pequot women, men, and families experienced and symbolic of the negotiation of the social order under colonial rule in southern New England.

The negotiation of gender roles and relations within this colonial framework found other expressions archaeologically and illustrated the complex economic networks of which Indigenous people were a part. European and locally manufactured ceramics, such as redware, replaced traditional native-produced vessels since consumer choices within this context of racism, disenfranchisement, and marginalization were significantly limited (Silliman 2009). Rather than interpret this material change as evidence of acculturation, however, Silliman (2009: 225) asserts that "when used on the reservation and in Native American community life, *these items become Eastern Pequot objects*" (emphasis in the original). Choosing to buy consumer goods that were both available and affordable "did not translate directly into the dilution of Native cultural practices, attachment to Indigenous communities, or connections to reservation land. These choices represented strategies of survival" (Silliman and Witt 2010: 62).

Whereas ceramic usage significantly changed over time in Pequot households and communities, the archaeobotanical data from reservation homelots illustrates the persistence of traditional ecological knowledge of medicinal plants from the precolonial era, an arena of expertise strongly correlated with women. These botanical practices further support the evidence that Indigenous women were central to maintaining households and sustaining the community as well as "fostering a sense of continuity and managing change" (Kasper 2012: 284). Colonial authorities, guided by patriarchal and ecclesiastical ideals of "proper" gender roles, interacted primarily with Native men. Indigenous women "were rarely acknowledged as actors in the eyes of the male colonial politicians and other observers" (Kasper 2012: 284). Consequently, gendered prescriptions were not imposed upon individual households on the reservation, and Native women remained the community's primary agriculturalists even under colonial rule. So while inequality between Native men and women increased as men participated in colonial economic activities, continuity in some aspects of Indigenous lifeways was actually facilitated by the patriarchal mind-set of colonial overseers. At least for the Pequot, traditional ecological knowledge, for example, endured despite other cultural changes under colonialism.

Interestingly too, women *and* men in both Indigenous kin groups and European-American families contributed to the domestic economy of the household and were integrated into complex webs of social and economic interaction in the colonial world of the Northeastern United States. Yet structural similarities belie significant differences in social power and access to resources, especially for women (Silliman 2009). While similar material culture may have been utilized in both Indigenous and European-American households, the meaning and cultural significance of refined earthenware vessels was by no means identical. Individuals within these households were differentially positioned to not only the material world, but the complex and interdependent arrangements of which they were a part.

The racism, disenfranchisement, and cultural persecution of the European-American colonial enterprise affected not only Indigenous peoples, but enslaved Africans as well (Fennell 2011). "Household" and "family" were not coterminous, however, as kinship was not necessarily an organizing principle around which enslaved households were structured. The conditions of slavery generally did not allow for the social configuration of nuclear families. Consequently, gendered social relations were not organized around the ideals of families seen in other colonial settings. Rather, households were social units "that worked cooperatively in production, distribution, and social reproduction activities within the domestic

context" (Mrozowski et al. 2008: 707), such as the pooling of labor and resources. Enslaved African men and women were often perceived as having different but complementary natures, which was "etched into the spatiality and temporality of daily life" (Wilkie 2003: 77). House compounds were highly gendered as men and women occupied different household spaces. Exterior areas such as yards, for example, were highly utilized by women collaborating on domestic chores, including laundry or sewing and food preparation (Battle-Baptiste 2011; Wilkie 2003). The archaeology of the domestic spaces of slavery, therefore, has yielded material culture associated with these complex households.

By examining dozens of archaeological contexts associated with enslaved Africans on plantations in the Chesapeake region of Virginia, Galle (2010) determined that men and women adopted material strategies that correlated with gender, age, and marital status. Households that consumed large quantities of metal buttons, for example, were those comprised of men who were unmarried or perhaps married to a woman on another plantation, who may have invested in stylish clothing as a display of their personalities and abilities to acquire such goods. Conversely, households with large quantities of refined ceramics were more often "kin-based households anchored by successful enslaved women who worked extraordinarily hard to achieve and maintain an economic position that allowed them to move outside the bounds of their owner's provisioning system" (Galle 2010: 37). Households with neither buttons nor ceramics appeared to represent individuals who are unable to participate in the market economy, such as women and children separated from husbands or large households for whom all resources were required for survival. Objects of personal adornment, such as buttons, therefore, were excellent material expressions of gender, age, ethnicity, and life cycle in these domestic arrangements.

By the late nineteenth century, consumption of material goods was linked to the emergence of an industrial democracy as well as the spread and significant intensification of mass production, which made conspicuous consumption possible for a larger segment of the socioeconomic spectrum (Mullins 2011). Rather than representing simply an ideological shift, the material conditions of the working class were also transformed through shorter work days, more leisure time, higher pay, and the extension of credit – all of which facilitated increased consumption by working-class laborers and challenged social ideals of class status. This rising consumerism was rooted in white racial privilege. The material disparities of America's consumer culture "were minimized, ignored, and legitimized by pervasive discourses on affluence that trumpeted the accessibility of consumer goods, hyperbolized consumer culture's ever-expanding capacity to provide goods and services, and brazenly heralded the civil and moral benefits of prosaic commodities" (Mullins 2011: 39). Consequently, consumption by the marginalized – women, people of color, and working-class individuals and families – may have been a form of empowerment and a means for actively participating in the larger cultural milieu.

The domestic and work lives of free African-Americans at the W.E.B. DuBois site in Great Barrington, Massachusetts, for instance, were very different from those of the Anglo-European families in nearby Deerfield, where the cult of domesticity was the dominant ideology structuring gendered social relations (Battle-Baptiste 2011). The ideals of a "woman's place in the home" was problematic, since the legacy of enslavement had largely limited women's labor to domestic and institutional service or arduous manual labor outside of their homes. In addition, "the inability of captive African men to actively pursue their patriarchal destiny was controlled in very dehumanizing ways by plantation owners and overseers" (Battle-Baptiste 2011: 40–41). Therefore, cultural constructions of Black womanhood and motherhood were not simply in opposition to European-American models of domesticity, but rather occurred at the multifaceted intersection of domestic ideals, post-emancipation oppression, emerging class distinctions within African-American communities, and other social, political, economic, and ideological forces of the time.

W.E.B. DuBois, the African-American writer and civil rights activist, spent his boyhood in Great Barrington embedded in the significant maternal kinship of the Burghardts. Through property ownership and other economic transactions, the Burghardt women – his mother, maternal grandmother, and other maternal kin – wielded uncommon power for the time and created a *homeplace* as the sphere of their interactions with family and community, the labor they undertook to support themselves, and the goods they purchased for consumption (Battle-Baptiste 2011: 158). Although the archaeological record yielded fragments of dishes, clothing, agricultural implements, and other vestiges of daily life, it is the land and house – "sturdy, small, and old fashioned" (Battle-Baptiste 2011: 139) – that were the most significant artifacts from this site. Landownership refuted the myth of the inferiority of the African-American family. While the men were selling their labor to more distant markets, the Burghardt women were creating their own unique position in a changing economic world. In a myriad of ways, the Burghardt women were at the epicenter of navigating the complex social worlds in which they lived and the forging of identities for themselves, their children, and their grandchildren in the post-emancipation period. Their homeplace elucidated the ways in which domesticity was significantly shaped at the intersection of race, ethnicity, and class.

The domestic residence of another freed African-American family associated with Van Winkle's Mill in northwest Arkansas provides an additional glimpse into the ways in which toys in particular highlight Victorian ideologies and social relations of class, ethnicity, race, and gender (Brandon 2013). A variety of children's items were recovered, including doll parts and marbles. These artifacts in postbellum contexts may be "seen as a mark of upward mobility and increased humanization through the consumption of increasingly frivolous goods" (Brandon 2013: 44). Parents may have purchased dolls for their daughters, for example, as a way of expressing these aspirations for ascendant social status.

Most poignant from Van Winkle's Mill, however, were the fragments of children's plates with the alphabet encircling the rim. These were typical vessels for children in middle-class homes and meant to aid in teaching the ABCs. Literacy was discouraged among enslaved Africans, and, following emancipation, education was stressed as a path to equality (Brandon 2013). As with the W.E.B. DuBois site, mainstream Victorian ideals of domesticity within white, middle-class families were not implemented in the same ways in free African-American households. Alphabet plates were used in Victorian America to signal particular class and gender ideals. For freed slaves Aaron Anderson and Jane Van Winkle, these children's plates were used to "imagine new social possibilities, mediate lived contradictions, and envision new personal pleasures, posing new relationships between consumers and society and portraying who we wish to be" (Mullins 2011: 28). With the rise of industrial capitalism, additional vectors of social inequality emerged (Orser 2010: 129). Gendered social relations were profoundly influenced by an increase in differentiation socioeconomically and racially.

The gender ideologies that structured social roles within households were not confined only to that arena of cultural engagement. Community-level social interaction was also both shaped and shaped by gender ideologies as they were practiced within domestic units. The dynamic relationship between household and community profoundly affected both of these spheres of human interaction.

Beyond the Household: Gender in the Community

Gendered social relations were codified and reproduced outside the domestic sphere at the level of the community. Domestic units do not exist in isolation, but in *relation* to one another within their larger social, political, and economic contexts and elucidate the ways in which they were connected to wider cultural processes. Community-level analyses also facilitate the investigation of cultural groups that are not visible at the scale of an individual household, such as nineteenth-century Irish immigrants living in tenements in the Five Points Neighborhood of New York City (Brighton 2011). Furthermore, a

household-level view often belies the integrated and interdependent nature of households within communities, such as in utopian societies (Nickolai 2003).

The ideologies that operated within families and households – and which were visible in the material records of those domestic spaces – significantly shaped notions of "proper" gender roles, relations, behavior, dress, and other aspects of social conduct beyond the domestic arena (Rotman 2015). The foundational gendered ideals of families permeated all levels of interaction and often reproduced patriarchal authority and inequality in both domestic entities and their larger communities. Thus, the social relations enacted within homes were replicated outside of it, just as the ideals that structured social relations within communities were enacted within individual families, households, and economic units. These spheres of interaction were mutually reinforcing, transcending the physical boundaries of individual homelots.

Occasionally, however, community-level social engagement was used to *challenge,* rather than reproduce, gender roles and relations within the home. Domestic reform was one such powerful counter-narrative in historic America, particularly during the late nineteenth and early twentieth centuries. This alternative ideal sought to redefine relationships between men, women, and others as well as expand the range of culturally accepted gender roles and behaviors within society.

Domestic reformers extended women's domestic roles into community spaces – such as parks, playgrounds, children's gardens, and other urban green spaces – which were designed to "improve urban morality by bringing people into contact with the purifying influence of God's nature" (Spencer-Wood 2003: 32; Brück 2013). Significantly, these forms of community organization and the material outcomes (parks, playgrounds) illustrate that women were active social agents in their communities and not solely relegated to the domestic sphere. Normative gender roles and relations in domestic reform movements incorporated both households *and* the communities in which they were situated. As such, the gender ideals within these two realms of social interaction were mutually reinforcing as well as simultaneously challenging and expanding gender roles and relations within individual households.

Many intentional communities emerged as alternatives to mainstream nineteenth-century American society. The Shakers were a utopian society who settled in a variety of places in the Eastern United States and whose membership was derived through recruitment and conversion. Known as the United Society of Believers in Christ's Second Appearing, the group was founded by Ann Lee, a member of a dissenting Quaker sect (Savulis 2003). The group believed in a dual-gender god, which was mediated by celibacy. As such, the Shakers' way of life deliberately eschewed heteronormative gender relations that emphasized marriage, reproduction, and patriarchal authority as key features (e.g., the cult of domesticity), providing a counter-narrative to the gender roles associated with the capitalist ideology that dominated nineteenth-century social discourse.

Gender and spiritual hierarchy within Shaker communities were reinforced through behavioral regulations, architecture, and landscape design. Those spaces that were "utilized simultaneously by men and women incorporated architectural elements that reinforced gender separation such as separate doorways, hallways, stairs, and bedrooms" (Savulis 2003: 165). Specifically, the structure of the material world was organized to promote celibacy, which was the path to salvation. The highly differentiated spaces of Shaker buildings may have significantly resembled the sexually segregated places of mainstream American architecture that was designed to isolate women in kitchen ells at the back of the home and constrain their movements to the domestic sphere as much as possible. Shaker spaces reveal once again that similarities in structural forms served very different ideological purposes in practice.

Religious ideology – beliefs and behaviors – was part of a dialogue with other secular and religious objects and ideas (Nickolai 2003), particularly during the Second Great Awakening that swept through the Eastern United States in the first half of the nineteenth century. The houselot occupied by Ellen White, a main prophet of the Seventh-Day Adventists, for example, illustrated

the interesting ways in which households engage – or not – with the communities in which they were situated. Although the small rural village of Battle Creek, Michigan in which she resided in the mid-nineteenth century was well connected to global markets, the archaeological record of her home expressed the ideological separation that belied the physical proximity to her neighbors. Thus, gender ideologies, roles, and relations must be assessed at the level of both individual households and within their local communities in order to fully understand the ways in which cultural norms are negotiated, accepted, or rejected.

White and her family embraced healthful eating as a spiritual act, eschewing alcohol, coffee, tea, and tobacco and embracing vegetarianism. Consequently, the faunal remains and artifacts associated with food preparation and storage included "few or no [meat] remains or oyster shells or cans from tinned fish and meats" (Nickolai 2003: 155), an archaeological signature very different from her farming neighbors. Rather than simply an idiosyncrasy or perhaps sampling error, the material record of one household relative to its community illustrates the varied responses of different families within a single context. Therefore, it is critical to be mindful of religion as a potentially "important aspect of the social positions and relationships of past people, and an important component in the formation of some aspects of the archaeological record" (Nickolai 2003: 157).

Significantly, the study conducted by Nickolai (2003) highlights that the location of a household in a rural, urban, or other setting is only one factor to shape uses of the material world. The relative physical isolation or integration of a site cannot be utilized as an indicator of the degree of connectedness for site residents to its community context. Often, families in rather remote locations – such as the Burghardt family of Great Barrington – are intimately connected to the outside world in important social and economic ways, while other households – such as the home of Ellen White – are proximal to their physical neighbors, but very much ideologically separate. That is not to suggest that "ruralness" or "urbanness" or "suburbanness" plays no role in the formation of the archaeological records of households and communities; rather, it is imperative that the local context for each site be carefully examined and understood in order to fully elucidate nuances in social relations.

Urban contexts provide additional interesting loci for examining households and communities as well as the dynamic interactions between these two spheres of human interaction. Immigrants and emancipated slaves flooded into America's industrializing cities during the late nineteenth century. Differences in class, race, and ethnicity often resulted in significant tensions between established economic/political structures and ideologies and those of in-migrating individuals and families.

Archaeological features on Overseas Chinese sites in the San Francisco Bay region often cannot be associated with specific households. In Chinese communities, "residential arrangements were shaped by institutionalized discrimination, racial violence, labor practices, economic relations, and culturally-specific strategies" that resulted in domestic configurations very different from their non-Chinese neighbors (Voss 2008a: 42). Indeed, the archaeological unit of analysis of the "household" is not particularly applicable to these communities in which social collectivity was so important to survival. A wide range of social units were relevant to the Overseas Chinese, including the individual, family, kin network, district association, temple membership, occupational groups, and the community at large. Movements of Chinese peoples are a global phenomenon that cannot be understood in strictly local terms. Many Chinatowns were linked not only to each other but to European-American communities through business relationships, labor practices, district associations, political organizing, and kinship ties. Since most Overseas Chinese in the nineteenth century were men, the material culture from sites dating to this period reflects their behaviors, dispositions, activities, and identities.

Excavation of wood-lined rectangular pits at the Market Street Chinatown site in San Francisco illustrated that "good sanitation was a prominent concern in this densely populated community, both for the residents' own health and comfort [but also] to counter racial stereotypes that

portrayed the Chinese people as filthy and unclean" (Voss 2008a: 45). Western discourse also emasculated Asian men. Traditional Chinese garments along with the customary long braid (or queue), for example, confounded Western ideals of gender and appropriate dress and were used to perpetuate a feminized image of Chinese men. The chinoiserie tea cups and tea bowls documented in great numbers in the archaeological record of the Market Street Chinatown were perceived by Westerns as "dainty cups," and the Chinese men who used them were emasculated in particularly *racialized* ways (Williams 2008: 60). As such, the material record reflects the complex intersection of class, racism, and ethnicity with gender in these community contexts.

Examining gender roles and ideologies within communities requires a cognizance of materiality and spatiality beyond the scale of individual households. It is critical to move between these two levels of analyses for the richest interpretation of gendered human experience. Community organizations also elucidate and reinforce cultural norms and the ways in which individuals and families negotiate and context them.

Institutions and Social Relations of Gender

Institutions often functioned (and still do) as mechanisms for social reproduction and social control. Particularly in the late eighteenth and early nineteenth centuries, the Western world redefined the social and economic order, morality, sexuality, crime, and punishment. As a result, a variety of entities emerged as part of domestic reform activities. These institutions both reflected and imposed community attitudes and identities as well as structured human life in a myriad of ways (Beisaw and Gibb 2009).

As with the mutual interaction between households and communities, institutions were another dynamic multiscalar dimension of social interaction. The Presidio in San Francisco, for example, consisted of individual domestic residences, the community of colonial residents and Native Californians, *and* was a governmental institution as a military outpost on the frontier. Similarly, utopian societies, particularly those with religious foci as their structuring principles, were both communities and representative of ecclesiastical institutions. Therefore, as with households and communities, it is imperative to consider institutions within the context of the communities of which they are a part and the ways in which they amplify ideologies operating within households.

The Presidio of San Francisco was not yet officially part of the United States when it was founded by Spain during the colonization of California's coast in the late eighteenth century. The identities of occupants of the San Francisco Presidio were quickly transformed from military settlers to that of Californios, however, through several interrelated phenomena (Voss 2008b). The emergence of a ranchero culture, a system of land grants, facilitated the accumulation of enormous landholdings in the form of cattle ranches that concentrated wealth, property, and power among a relatively few military families. This in turn facilitated the exploitation of Native Californians as labor for managing large herds and converting cattle into marketable hides and tallow. Attendant with the ranchero culture was the emergence of a seigniorial society that placed an increased emphasis on relationships over individualism and created a complex web of obligations and authority that extended across the entire social order. A white or European racial identity also became increasingly important as a means of claiming social power, wealth, and privilege in nineteenth-century California. In these complex ways, Californios simultaneously forged new identities while also naturalizing their dominance over Native Californians (Voss 2008b).

This ethnogenesis (the formation of new cultural identities) was visible in changes to the landscape, architecture, ceramics, and clothing, among other artifact classes. Several interrelated trends were observable in the material record. A collective colonial identity emerged, and the once diverse society of the San Francisco Presidio became more homogeneous, particularly in terms of internal representation (Voss 2008b). In addition, there was an increasing distinction between the homogeneity of colonial society and Native Californians. This "othering" was accompanied by the rejection of colonial settlers of their own Indigenous and African ancestries. Adobe became

the preferred building material and form as the residents of the Presidio of San Francisco articulated a shared colonial identity. This architectural style materialized a very clear distinction between military settlement and the local Indigenous peoples.

Gendered social relations were at the center of daily life at this military colonial outpost (Voss 2008b). In addition, "although sexuality is sometimes treated as a trivial or private aspect of social life, the archaeology and ethnohistory of Spanish-colonial San Francisco demonstrates that sexual politics were central, rather than incidental, to the imperial project" (Voss 2008b: 200). The Quadrangle of the San Francisco Presidio was one particularly important gendered space. In the 1810s, the Quadrangle was "redesigned, eliminating private yards. Instead, the central plaza was expanded and protected by a narrow gate. The plaza became a visually protected interior space where household activities could be undertaken by the community as a whole, rather than by each family in a private yard" (Voss 2008b: 199–200). These changes to community architecture correlated with intensifying regulation of women's sexuality during the period of increased contact with Europeans and rising concerns about ethnic propriety and respectability.

The landscape surrounding the colonial outpost was also gendered and sexualized. Colonial women rarely traveled outside the securely colonized area of the Presidio. Therefore, in their absence, "the eastern inland areas were masculinized through colonial men's military expeditions and sexualized through interethnic sexual violence perpetrated by some colonial men on Native Californians" (Voss 2008b: 289). Identities, including gendered identities, at the San Francisco Presidio were shaped and negotiated at the intersection of class, ethnicity, race, and sexuality, among other social relations. Ethnogenesis at the Presidio can be traced through changes to "material and spatial practices that occurred during the shift from a pluralistic, multiracial, colonial population to one defined by its common status as colonizers and by a regional and ethnic Californio identity" (Voss 2008b: 115). In particular, gendered social relations at the Presidio of San Francisco elucidated the complexities of negotiating gender identities, roles, and relations under colonialism.

Camp Nelson in Kentucky is another military context where gender was a dynamic dimension of lived experiences. The camp was one of the largest recruitment and training centers for African-American soldiers during the Civil War (McBride 2010). Excavations of tent sites, mess houses, and barracks revealed material culture and foodways similar to European-America soldiers at other camps, affirming some degree of standardization across military. Soldiers' diets, for example, consisted of primarily beef and beans.

The archaeology of Camp Nelson also reveals that soldiers cohabitated with their wives and children even though it was against army regulations. Fragments of dolls, glass beads, a hair barrette, and women's clothing buttons from the allegedly all-male barrack sites clearly illustrate these family living arrangements. Camp leadership provided rations only to the soldiers, but food remains illustrate that the women were quite resourceful in provisioning themselves and their children in the absence of military support. Animal bones from pork, chicken, and wild game demonstrate a diverse diet acquired through trade or purchase. The archaeological record of Camp Nelson "showed the independence, ingenuity, and entrepreneurial skill of the women and certainly contradicts stereotypes of slaves' intelligence and individual initiative" (McBride 2010: 77). The archaeological record of Camp Nelson illustrates the degree to which the army was not successful in controlling the behaviors of its soldiers nor those of the families that accompanied them.

The Johnson's Island Prison in Lake Erie, Ohio, was another gendered military context from the Civil War (Bush 2009). The island was a Union-designed prisoner-of-war camp for Confederate officers and, thus, housed men only. Incarceration in the facility was marked by overcrowding as well as limited rations, clothing, and communications. Imprisonment challenged these Southern gentlemen in a variety of ways. Many of the captured officers "had never cooked their own food, mended their own clothes or cleaned their

own room, having always lived with servants, mothers, sisters, and/or wives. Even in the military, others often addressed their personal care" (Bush 2009: 164).

The privilege these European-American men had enjoyed as officers (accorded to them through both their ethnicity *and* gender) was denied them as prisoners of war. Cooking, setting the table, washing dishes, laundry, sewing, and other daily chores had to be completed by the prisoners and were features of life in this institutional context. These tasks significantly opposed Southern folk culture that emphasized "a hierarchical social structure, ascribed status, patterns of deference, and masculine codes of honor" (Bush 2009: 24). Thus, the material record of the Johnson's Island Military Prison – refined earthenwares, buttons, and needles – represented the prisoners' negotiation of gender roles within this single-gendered environment.

Military encampments and prisons are constructed with specific governmental standards of social interaction. The actual utilization of those spaces by human agents, however, often went beyond that which the institution envisioned. Reform organizations are similarly dynamic, particularly when reform ideas are contested by those they were meant to "help."

The Magdalen Society of Philadelphia (1800–1850) "reflected not only contemporary concerns about social order, it also expressed fears about environmental decay, disease, war, natural disasters, and economic fluctuations in the gendered language of religious belief" (DeCunzo 1995: 4). The female body, sexuality, and physical and moral pollution were the specific foci of the Society and its Asylum. Women's sexual activity outside of marriage was deemed immoral, yet many of these "fallen" women were supporting themselves financially through prostitution. Therefore, Magdalens "received training in spinning yarn, sewing, laundry, and other domestic skills," all of which were consistent with the gendered occupational ideals of the time and deemed essential for becoming wives of Christian men and mothers to their children (DeCunzo 1995: 126).

The setting of the Asylum, its architecture, and landscape were all designed to enclose the women in a morally pure, garden-like environment that would protect them from the evils of the city beyond its walls. Plain, functional furnishings and dress curbed one's social and economic aspirations, and the refined ceramics were decorated with patterns that conveyed moral purity and nature (such as floral hand-painted or transfer-printed decorations) (DeCunzo 1995: 62–63, 87–89).

Most of the "fallen" women who utilized the Asylum did so for their own purposes. They did not see themselves as immoral or polluted, but sought the services of the institution because "it offered a respite from cold, hunger, life in the streets, and abusive family members and associates" (DeCunzo 1995: 127). Indeed, the women who came to the Asylum often stayed for only a short time and returned to their previous lives upon leaving.

The Magdalen Reform Society illustrates the ways in which institutions were sometimes utilized as a mechanism of social control in an effort to get community members to conform to particular ecclesiastical and patriarchal ideals of gender. Regardless of the actual success of such institutions, where they occurred, these community entities were critical components of the cultural landscape of historic America and central to society's negotiation of the changing economic and social order of their times.

Mental institutions also emerged at this time as a societal mechanism for managing "deviant" behavior in the late eighteenth and nineteenth centuries. With the emergence of psychiatry as a profession, new models for "othering" emerged. Mental illness was widely thought to be the result of hereditary or immoral living (Psota 2011). Thus, mental illness was defined not so much as a medical condition as a social one in which individuals exhibited some kind of inappropriate behavior. Those considered "insane," for example, were "that group of unproductive, bothersome defectives who, though they had committed no crime, required an indefinite and involuntary program of 'treatment and confinement,' whereas the 'mentally ill' were those moderately disturbed whose *productive potential* had yet to be determined" (Psota 2011: 17; emphasis added). Conformity to social standards was expected, uniting the ideals of domesticity and

the Protestant work ethic. Women were frequently targeted for compliance with social ideals in many ways that men were not.

Under domesticity, women were responsible for their children's care and education, while fathers were the primary financial support for the family. By the 1890s, however, mothers of special needs children were told by physicians that they needed specialized, professional, institutional care, and mothers were often blamed for their children's conditions. That is, their overprotecting and spoiling of their children created many mental illnesses, such as autism (Psota 2011: 23), resulting even more pressure on Victorian mothers to produce "perfect" children. Institutions for the treatment of mental illness were constructed in the second half of the nineteenth century, such as the Agnews State Hospital near San Francisco in 1886.

Many families sought to care for ill loved ones as long as possible, and decision making was motivated by complex variables, such as the significant social stigma of mental illness and the overcrowded conditions of many mental health facilities. Otillia "Tillie" Sengstacken's mother Mary and aunt Margaritha cared for her for many years in their home in San Jose (Psota 2011). The archaeological assemblage from their residence consisted of a disproportionately high percentage of grooming and health-product bottles relative to other domestic objects (Psota 2011: 20). Medicines included those for constipation, sedation, and pain relief and clearly illustrate the efforts Tillie's family made to care for her at home.

As her mother and aunt got older, however, effectively managing intense episodes of psychosis may have become more difficult, and, in 1920, at 43 years of age Tillie was admitted to Agnews State Hospital. Unfortunately, abuse at the institution was commonplace, and, shortly after her admission, Tillie developed abscesses on her wrists, hips, and ankles, consistent with restraints (Psota 2011: 32). She developed septicemia and died a few weeks later.

What is significant about Tillie's story is the impact that mental health institutions had on the behavior of families within households, particularly women. The conflation of mental illness with social deviance and the blaming of mothers for their children's illnesses created very dynamic and particularly gendered approaches to managing the afflicted. Thus, social ideals of communities created institutions (mental hospitals) that defined deviant behaviors as illness (particularly when one was not able to fulfill one's expected role as a productive member of society) (Psota 2011). Those institutional ideals in turn shaped behaviors at all levels of society, including the choices made by families – especially mothers – regarding the care of their children and loved ones.

Educational institutions were particularly important loci for examining the codification and reproduction of gendered social relations as schools are explicitly about training its members to function within their particular cultural setting. Children acquire "their identities through formal and informal education and usually have to reconcile input from their families, neighbors, and religious and social leaders" (Lindauer 2009: 86). While the mission of all schools is to enculturate children into socially proscribed roles, some of these institutions were more pernicious than others.

Native American children who were students at the Phoenix Indian School (1891–1990) were forcibly removed from reservations and subjected to involuntary assimilation (Lindauer 2009). The curriculum of the boarding school sought to teach boys trades, such as carpentry, blacksmithing, wagon making, and tin working, while girls were instructed in housekeeping skills, sewing, cooking, and laundry. The goals of such schools were for Indians to "assimilate, acculturate, and become Anglicized; they were to speak only English, learn a trade, dress as other Americans, and practice Christianity" (Lindauer 2009: 94). The instruction provided strongly reflected the highly segregated gender roles of domesticity that dominated the larger American cultural milieu, particularly during the late nineteenth and early twentieth centuries.

Pupils were stripped of all outward signs of their Indigenous identity. They were also forbidden to speak their Native language, practice their religion, or wear Indigenous clothing (Lindauer 2009). A school identity was imposed upon them through practices such as cutting of their hair and

wearing of a school uniform. The steam whistle was used to divide the day into different activities, teaching Native children the unfamiliar rigors of time discipline. Dishes and eating utensils as well as regimented meals three times a day instilled ideas of individuality, order, courtesy, and health awareness. Finally, the objects for play not only reinforced gender roles but also lessons of self-sufficiency and responsibility (Lindauer 2009: 95). Artifacts associated with these cultural practices illustrated the ideals with which students were indoctrinated.

The Phoenix Indian School and similar institutions, furthermore, taught self-reliance and individualism, concepts that were very challenging for Indigenous children who had been raised in a society where communal ownership and interdependence were stressed (Lindauer 2009: 96). Items such as toothbrushes and combs were used to teach cleanliness, germ transmission, and personal property. Few of these objects were inscribed or marked with the owner's name, suggesting that the ideas of individualism were not widely internalized in the student population.

Practicing of Indigenous religion was explicitly forbidden at the school and thus a form of resistance. Oral history and documentary evidence confirms that children would sneak off campus to perform Native ceremonies, dances, and prayers. Two clay figures – a miniature bird and a four-legged animal – were recovered archaeologically, which may have "provided a sense of security and connection to the customs and traditions of home as effigy representations or clan symbols" (Lindauer 2009: 99). These objects would have been perceived as contraband and thus confiscated by school staff.

The archaeological record of the Phoenix Indian School exemplifies that the social relations operating at the site were not always mutually supportive. The children's resistance to acculturation, furthermore, attests to the ways in which they fought to maintain traditional identities through their engagement with the material world. The differential positioning of the administration and students at the school meant that very different meanings were assigned to the objects used, such as an effigy figure being perceived as either contraband (administration) or a powerful symbol of home and community (children).

The institutions of society expressed (and still do) dominant cultural ideals, including those of gender. They were also instruments of power as they have the capacity to enforce hegemonic views and penalize those who failed to conform. On the surface, the military, reform institutions, and schools may appear to have had very different missions; however, a deep interrogation of their policies and practices reveals many common goals. Patriarchal authority and differential gender roles, for example, were codified and reproduced in all of these contexts. In addition, those ideals permeated all levels of social engagement within the contexts in which institutions were situated, transcending the boundaries between household and community.

Examining the archaeological and historical records of these various arenas through a multiplicity of lenses reveals the complexity of human experience as well as the ways in which individual agents reconcile the ideals being communicated. Dominant ideologies structure cultural discourse, and institutions are the most visible mechanism for their conveyance. Ideologies are rarely adopted wholesale, however, as individuals negotiate the cultural landscapes of which they are a part. That is, human beings engage aspects of ideologies – class, gender, and other – that are meaningful to them, reject or subvert other dimensions, and otherwise create amalgamations of those ideals and identities that are significant to them.

Summary: Engendering Gender in Historical Archaeology

The social and historical *context* for interpreting gendered social relations is critical. Historical archaeologies of gender have moved beyond "women's objects" and "men's objects" to understand how space and the material world represent the creation, codification, and negotiation of gendered roles and relations. Dialectics is an ideal tool in these analyses as it explores the *web* of social relations of which gender was a part (Ollman 1993). The interpenetration of opposites elucidates that objects, how anything functions,

and how people perceive them are largely due to their surroundings. Similarly, the abstraction of vantage point facilitates the examination of different sides of the same relation, while the dialectical relation of contradiction highlights interactions and negotiations within relations. Collectively, these tools allow for dynamic and nuanced examinations of social relations as they shaped human experiences.

Households and domestic spaces are particularly important loci of gendered social relations. The activities within households reify and transform social structure, notably gender constructions and power relations (Barile and Brandon 2004). Therefore, domestic residences as dynamic social entities are both the medium and outcome of social practices.

The gendered uses of space – as well as lived experiences – were more complex than simple dichotomies of production/reproduction, public/private, agricultural/domestic, male/female, and elite/non-elite would suggest (Gero and Conkey 1991; Wurst 2003). While these distinctions were real, they did not always produce mutually exclusive spaces (Hautaniemi and Rotman 2003). A binary view distorts social reality and belies the fact that an artifact can be an aspect of production *and* consumption, public *and* private, or male *and* female (Wurst 2003: 227) and, thus, utilized to perform or reinforce a particular gendered identity. Rejecting a rigid binary structure "allows us to conceptualize more than two genders and to see age, marital status, class, and race as key aspects of gendered social relations" (Wurst 2003: 230).

Although domestic units are critical units of analysis in historical archaeology, they do not exist in isolation. Rather, households are situated in *relation* to one another within their larger social, political, and economic contexts. Examinations of communities, therefore, elucidate the ways in which they were connected to wider cultural processes. Since gendered social relations within communities operate at a different scale than households do, so too are their archaeological, material, and spatial correlates.

Reformers also frequently used formal community institutions as mechanisms for social reproduction and social control (DeCunzo 1995). These institutions reflected and imposed community attitudes as well as structured human life in a myriad of ways (Beisaw and Gibb 2009), albeit with varied degrees of success.

The case studies presented illustrate a broad spectrum of gendered social relations through time and across space. They have highlighted the multiscalar nature of gender as it has operated in households, communities, and institutions as well as some the material and spatial correlates of gendered engagement. The metaphor of the kaleidoscope characterizes the complex and ever-changing meaning and practice of gendered social relations – including, but not limited to, competing ideologies, socioeconomic class, political agendas, race and ethnicity, sexuality, and developmental cycles – to create complex patterns of identities and relationships.

Importantly, dominant gender discourses often focused largely on white, urban, middle-class (and often Protestant) women in their peak reproductive years. Masculinity was frequently assumed, and women were thus habitually defined as "not male" (Jacobs 2011: 303). People outside the parameters of biological reproduction (i.e., children, the elderly, those who chose celibacy, gay and lesbian individuals) as well as the poor and those racialized as non-white (such as many immigrants and enslaved Africans) were also often excluded from prevailing gender ideals (Paynter 2000). Critical analyses of gender seek to examine both similarity and difference as well as its close intertwining with other vectors of social inequality (Orser 2010: 129). Historical archaeologists will continue to elucidate gendered social relations at the intersection of many social prisms (e.g., class, ethnicity, sexuality, religion) and the multiplicity of human experiences preserved in the archaeological record.

Cross-References

- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Gender, Feminist, and Queer Archaeologies: A Spanish Perspective

▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
▶ Gender, Feminist, and Queer Archaeologies: European Perspective
▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
▶ Households and Domesticity: Historical Archaeology
▶ Interculturality and Archaeology
▶ Social Archaeology
▶ Social Identity in Historical Archaeology

References

Barile, Kerri S., and Jamie C. Brandon, eds. 2004. *Household chores and household choices: Theorizing the domestic sphere in historical archaeology*. Tuscaloosa: University of Alabama Press.

Battle-Baptiste, Whitney. 2011. *Black feminist archaeology*. Walnut Creek: Left Coast Press.

Beisaw, April, and James Gibb. 2009. *The archaeology of institutional life*. Tuscaloosa: University of Alabama Press.

Brandon, Jamie C. 2013. Reversing the narrative of hillbilly history: A case study using archaeology at Van Winkle's Mill in the Arkansas Ozarks. *Historical Archaeology* 47 (3): 36–51.

Brighton, Stephen A. 2011. Middle-class ideologies and American respectability: Archaeology and the Irish immigrant experience. *International Journal of Historical Archaeology* 15 (1): 30–50.

Brück, Joanna. 2013. Landscapes of desire: Parks, colonialism, and identity in Victorian and Edwardian Ireland. *International Journal of Historical Archaeology* 17 (1): 196–223.

Bush, David R. 2009. Maintaining or mixing southern culture in a northern prison: Johnson's island military prison. In *The archaeology of institutional life*, ed. A. Beisaw and J. Gibb, 153–171. Tuscaloosa: University of Alabama Press.

Davies, Sharyn Graham. 2007. *Challenging gender norms: Five genders among the Bugis in Indonesia. Case studies in anthropology*. Belmont: Thomson Wadsworth.

DeCunzo, LuAnn. 1995. Reform, respite, ritual: An archaeology of institutions; the Magdalen Society of Philadelphia, 1800–1850. *Historical Archaeology* 29 (30).

Fennell, Christopher C. 2011. Early African America: Archaeological studies of significance and diversity. *Journal of Archaeological Research* 19: 1–49.

Galle, Jillian E. 2010. Costly signaling and gendered social strategies among slaves in the eighteenth-century Chesapeake: An archaeological perspective. *American Antiquity* 75 (1): 19–43.

Gero, Joan M., and Margaret W. Conkey. 1991. *Engendering archaeology: Women and prehistory*. Oxford: Basil Blackwell.

Hautaniemi, Susan I., and Deborah L. Rotman. 2003. To the hogs? Or to the homestead?: Municipal water and gender relations at the moors site in Deerfield, Massachusetts. In *Shared spaces and divided places: Exploring the material and spatial dimensions of gender relations and American historical landscapes*, ed. D.-L. Rotman and E.R. Savulis, 135–159. Knoxville: University of Tennessee Press.

Jacobs, Margaret. 2011. Western history: What's gender got to do with it? *The Western Historical Quarterly* 42 (3; Autumn): 297–304.

Kasper, Kimberly. 2012. Seeds for the future: The materialities of traditional ecological knowledge. *Archaeologies: Journal of the World Archaeological Congress* 8 (3): 269–292.

Lindauer, Owen. 2009. Individual struggles and institutional goals: Small voices from the Phoenix Indian school track site. In *The archaeology of institutional life*, ed. A. Beisaw and J. Gibb, 86–104. Tuscaloosa: University of Alabama Press.

McBride, W. Stephen. 2010. African-American women, power, and freedom in the contested landscape of camp Nelson, Kentucky. In *Archaeology and preservation of gendered landscapes*, ed. S. Spencer-Wood and S. Baugher, 95–112. New York: Springer Academic.

Mrozowski, Stephen A., Maria Franklin, and L. Hunt. 2008. Archaeobotanical analysis and interpretations of enslaved Virginian plant use at rich neck plantation. *American Antiquity* 73: 699–728.

Mullins, Paul. 2011. The archaeology of consumer culture. In *The American experience in archaeological perspective*, ed. M.S. Nassaney. Tallahassee: University of Florida Press.

Munroe, Robert L., and Ruth Munroe. 1987. *Samoan time allocation*. New Haven: HRAF Press.

Nanda, Serena. 1986. The Hijras of India: Cultural and individual dimensions of an institutionalized third gender role. In *The many faces of homosexuality: Anthropological approaches to homosexual behavior*, ed. E. Blackwood, 35–54. New York: Harrington Park Press.

Nickolai, Carol. 2003. The relevance of nineteenth-century religion to the archaeological record: An example from the home of Ellen White, prophetess of Seventh-Day Adventism. *International Journal of Historical Archaeology* 7 (2): 145–159.

Ollman, Bertell. 1993. *Dialectical investigations*. London: Routledge.

Orser, Charles E., Jr. 2010. Twenty-first-century historical archaeology. *Journal of Archaeological Research* 18: 111–150.

Paynter, Robert. 2000. Historical archaeology and the post-Columbian World of North America. *Journal of Archaeological Research* 8 (3): 169–217.

Psota, Sunshine. 2011. The archaeology of mental illness from the afflicted and caretaker perspective: A Northern California family's odyssey. *Historical Archaeology* 45 (4): 20–38.

Rifkin, Mark. 2011. *When did Indians become straight?: Kinship, the history of sexuality, and native sovereignty.* Oxford: Oxford University Press.

Rotman, Deborah L. 2015. The archaeology of gender in historic America. In *The American experience in archaeological perspective*, ed. M.S. Nassaney. Tuscaloosa: University Press of Florida.

Savulis, Ellen-Rose. 2003. Zion's zeal: Negotiating identity in shaker communities. In *Shared spaces and divided places: Material dimensions of gender relations and the American historical landscape*, ed. D.L. Rotman and E.R. Savulis, 160–189. Knoxville: University of Tennessee Press.

Silliman, Stephen. 2009. Change and continuity, practice and memory: Native American persistence in Colonial New England. *American Antiquity* 74 (2): 211–230.

Silliman, Stephen, and Thomas A. Witt. 2010. The complexities of consumption: Eastern Pequot cultural economies in eighteenth-century New England. *Historical Archaeology* 44 (4): 46–68.

Spencer-Wood, Suzanne. 2003. Gendering the creation of green urban landscapes in America at the turn of the century. In *Shared spaces and divided places: Material dimensions of gender relations and the American historical landscape*, ed. D.L. Rotman and E.R. Savulis, 24–61. Knoxville: University of Tennessee Press.

Stryker, Susan, and Aren Z. Aizura. 2013. Transgender studies 2.0. In *The transgender studies reader 2*, ed. Susan Stryker and Aren Z. Aizura, 1–12. New York: Routledge.

Voss, Barbara L. 2006. Engendering archaeology: Men, women, and others. In *Historical archaeology*, Blackwell Studies in Global Archaeology, ed. M. Hall and S.W. Silliman, 107–127. Malden: Blackwell Publishing.

Voss, Barbara L. 2008a. Between the household and world system: Social collectivity and community agency in overseas Chinese archaeology. *Historical Archaeology* 42 (3): 57–52.

Voss, Barbara L. 2008b. *The archaeology of ethnogenesis: Race and sexuality in colonial San Francisco*. Berkeley: University of California Press.

Wilkie, Laurie. 2003. *The archaeology of mothering: An African-American Midwife's tale*. New York: Routledge.

Williams, Bryn. 2008. Chinese masculinities and material culture. *Historical Archaeology* 42 (3): 53–67.

Wurst, LouAnn. 2003. The legacy of separate spheres. In *Shared spaces and divided places: Material dimensions of gender relations and the American historical landscape*, ed. D.L. Rotman and E.R. Savulis, 225–237. Knoxville: University of Tennessee Press.

Further Readings

Arkush, Brooke S. 2011. Native responses to European intrusion: Cultural persistence and agency among mission neophytes in Spanish Colonial Northern California. *Historical Archaeology* 45 (4): 62–90.

Barile, Kerri S. 2004. Hegemony within the household: The perspective from a South Carolina plantation. In *Household chores and household choices: Theorizing the domestic sphere in historical archaeology*, ed. K.-S. Barile and J.C. Brandon, 121–137. Tuscaloosa: University of Alabama Press.

Barton, Christopher P., and Kyle Somerville. 2012. Play things: Children's racialized mechanical banks and toys, 1880–1930. *International Journal of Historical Archaeology* 16: 47–85.

Baxter, Jane E. 2008. The archaeology of childhood. *Annual Review of Anthropology* 37: 159–175.

Boag, Peter. 2011. The trouble with cross-dressers: Researching and writing the history of sexual and gender transgressiveness in the nineteenth-century American West. *Oregon Historical Quarterly* 112 (3; Fall): 322–339.

Casella, Eleanor C. 2009. On the enigma of incarceration: Philosophical approaches to confinement in the Modern Era. In *The archaeology of institutional life*, ed. A.-M. Beisaw and J.G. Gibb, 17–32. Tuscaloosa: University of Alabama Press.

Delle, James. 2000. Gender, power, and space: Negotiating social relations under slavery on coffee plantations in Jamaica, 1790–1834. In *Lines that divide: Historical archaeologies of race, class, and gender*, ed. J.A. Delle, S.A. Mrozowski, and R. Paynter, 168–204. Knoxville: University of Tennessee Press.

Dierkes-Thrun, Petra. 2014. Transgender studies today: An interview with Susan Stryker. *Boundary 2: An International Journal of Literature and Culture*, August 20. Blog accessed online at http://boundary2.org/2014/08/20/transgender-studies-today-an-interview-with-susan-stryker/.

Fausto-Sterling, Anne. 2000. *Sexing the body: Gender politics and the construction of sexuality.* New York: Basic Books.

Gellar, Pamela. 2009. Identity and difference: Complicating gender in archaeology. *Annual Review of Anthropology* 38: 65–81.

Herbert, Christopher. 2011. "Life's prizes are by labor got": Risk, reward, and white manliness in the California Gold Rush. *Pacific Historical Review* 80 (3): 339–368.

Kruczek-Aaron, Hadley. 2002. Choice flowers and well-ordered tables: Struggling over gender in a nineteenth-century household. *International Journal of Historical Archaeology* 6 (3): 173–185.

Kruczek-Aaron, Hadley 2013 Making men and women blush: Masculinity, femininity, and reform in nineteenth-century Central New York. Historical and archaeological perspectives on gender transformations: From private to public, S. M. Spencer-Wood, 307–336.

E

Contributions to a Global Historical Archaeology, C. E. Orser, Jr. Springer Academic Publishing, New York.
Lamb Richmond, Trudie, and Amy E. Den Ouden. 2003. Recovering gendered political histories: Local struggles and native women's resistance in colonial Southern New England. In *Reinterpreting New England Indians and the colonial experience*, ed. C.G. Calloway and N. Salisbury, 174–213. Boston: Colonial Society of Massachusetts.
Little, Barbara. 2007. *Historical archaeology: Why the past matters*. Walnut Creek: Left Coast Press.
Ludlow Collective. 2001. Archaeology of the Colorado coal field war 1913–1914. In *Archaeologies of the contemporary past*, ed. V. Buchli and G. Lucas, 94–107. London: Routledge.
Nanda, Serena. 2000. *Introduction. Gender diversity: crosscultural variations*. Long Grove: Waveland Press.
Rose, Chelsea. 2013. Lonely men, loose women: Rethinking the demographics of a multiethnic mining camp, Kanaka Flat, Oregon. *Historical Archaeology* 47 (3): 23–35.
Rothschild, Nan A. 2006. Colonialism, material culture, and identity in the Rio Grande and Hudson River Valleys. *International Journal of Historical Archaeology* 10 (1): 73–108.
Russell, Lynette. 2005. "Either, or, Neither Nor": Resisting the production of gender, race, and class dichotomies in the pre-colonial period. In *The archaeology of plural and changing identities: Beyond identification*, ed. E. Casella and C. Fowler, 33–54. New York: Springer Academic Publishing.
Spencer-Wood, Suzanne. 2012. Commentary: How feminist theory increases our understanding of the archaeology of poverty. *Historical Archaeology* 45 (3): 183–193.
Spencer-Wood, Suzanne M., Stacey L. Camp 2013 Introduction. Historical and archaeological perspectives on gender transformations: From private to public, S. M. Spencer-Wood, 1–22. Contributions to a Global Historical Archaeology, C. E. Orser, Jr. Springer Academic Publishing, New York.
Swietz, Sam R. 2012. Consumer strategy and household consumption in the Cripple Creek Mining District, Colorado, USA. *International Journal of Historical Archaeology* 16: 227–266.
Tomášková, Silvia. 2007. Mapping a future: Archaeology, feminism, and scientific process. *Journal of Archaeological Method and Theory* 14 (3): 264–284.
Towle, Evan B., and Lynn M. Morgan. 2002. Romancing the transgender native: Rethinking the use of the "Third Gender" concept. In *The transgender studies reader*, ed. Susan Stryker and Stephen Whittle, 666–684. New York: Routledge.
Voss, Barbara. 2005. Sexual subjects: Identity and taxonomy in archaeological research. In *The archaeology of plural and changing identities: Beyond identification*, ed. E. Casella and C. Fowler, 55–78. New York: Springer Academic Publishing.
Youngberry, April, and Jonathon Prangnell. 2013. Fences, boats, and teas: Engendering patients lives at Peel Island Lazaret. *International Journal of Historical Archaeology* 17 (3): 445–464.

Environmental Archaeological Evidence: Preservation

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Introduction

Evidence for the nature of past environments can take many forms and occur in many different situations. For archaeological timescales, such evidence is generally plant or animal material identified to some level (usually genus or species), and the environmental conditions suitable for a similar modern population are then assumed to have pertained at the time of preservation. As with any archaeological find, some form of dating or stratification is essential to provide a temporal context.

If one component of an assemblage is better preserved than another, a false picture could be built up of the past conditions. Awareness of the preservation trajectory since burial is, therefore, essential for an understanding of the material's true environmental significance. This entry is intended to summarize the characteristics of the main materials used for environmental reconstruction as well as the burial environments in which they are preserved or destroyed.

Key Issues

Types of Biological Materials

The fairly limited range of materials used by plants and animals to build their bodies makes it possible to derive a simple classification.

Polysaccharides

Cellulose, starches, and many sugars are polysaccharides, which simply mean sugar units bonded together in different ways. Most plant matter is formed of cellulose. This is a polysaccharide made up of glucose units whose linkage makes them indigestible to higher animals. Cellulose is abundant in nature and only broken down by lower organisms such as bacteria, fungi, protozoans, and amoebae (Bear 1964).

Starches, on the other hand, are easily broken down by animal digestion and would, therefore, be expected to break down quickly in the soil. However, they are preserved in some archaeological situations as a result either of physical protection within artifacts or by soil aggregates, by chemical protection, or even by simple weight of numbers (see Haslam 2004).

Many insect parts are formed of chitin which is structurally a polysaccharide, although taphonomically it is more like a protein.

Proteins

Two main protein groups, collagen and keratin, form the basis of most biological constructions. Collagen is the structural framework of bone and tooth matrix. Keratin is a fibrous protein, forming the skin, horn, hoof, hair, and nail.

Miscellaneous Biopolymers

Sporopollenin forms the outer coating of the pollen grain and is, therefore, highly significant to environmental archaeology. It is a biopolymer of very high preservation potential isolated as a residue after repeated chemical dissolution. The structure is unknown.

Lignin's structure is also poorly understood, but its function is well known. Older and stronger plant matter is often impregnated by lignin, rendering it more refractory. Lignin derivatives have even been recorded from 200-My-old silicified wood (Sigleo 1978).

Biominerals

Calcium Phosphate Calcium phosphate in different forms (typically Ca_3PO_4, with variable hydrogen, fluorine, carbonate, and/or H_2O bonded) is the mineral basis of the bone and tooth. This makes it probably the most important biomineral for environmental archaeology as these remains are found on so many sites, and the evidence that can be derived from the assemblages is so large and diverse (Davis 1987).

Calcium Carbonate Calcium carbonate ($CaCO_3$) is the main mineral component in mollusk shells, ostracods, and many foraminiferans (Brasier 1980).

Silica Silica (SiO_2), in an amorphous form, is the basis of diatoms, phytoliths, and some foraminiferans.

Combinations of Materials

It is common for whole biological structures to be formed out of more than one material, combining properties in a similar way to industrial laminates or fiberglass moldings. Most plant remains, for example, consist of cellulose fibers which provide the tensile strength, with the spaces taken up by lignin acting as a filler. The lignin is extremely resistant (see above) but would be brittle if it occurred on its own.

The majority of mineralized animal body parts consist of calcified keratin or chitin, with the organic component forming variable proportions of the final material. In many cases, it is a tiny percentage. Thus, for example, eggshell and mollusk shell protein contents are commonly 0.03% (Addadi et al. 1991), while earthworm calcium carbonate granules are 0.2% (Canti 2007). In some other materials, the percentage is higher, conferring greater flexibility. In bone, for example, the percentage of collagen is as high as 35%.

The preservation characteristics of these mixed materials have variable trajectories, with different stratigraphic situations promoting preservation of different components. In many cases, the protein content is too small to be of analytical significance. However, some systems will leave visibly different remains in different types of stratigraphy. Probably the best-known example of this phenomenon is the two-part structure of the bone, based on collagen and calcium phosphate. Under neutral and alkaline conditions, preservation is mineral rich and sometimes described as "chalky," whereas under acidic conditions, the mineral material largely disappears and the preserved protein structure is sometimes referred to as "jelly bone."

Taphonomic Factors

Kinetic Factors

Although many of the materials described above have theoretically predictable decay pathways in a defined burial environment, the reality of

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assemblage preservation is often more messy and difficult to explain. A major reason for this disparity must arise from the events occurring during the latter parts of life, immediately on death, and at the time of burial. Did plant material accumulate by floating, or was it deposited in waste dumps? Were animal parts scavenged for a period at the surface or deeply buried with soft tissue still attached? The precise individual details of these factors significantly affect the later preservation morphology of some classes of environmental remains.

Some pre-burial effects are of major importance to the preservation of environmental evidence. Soft plant material will decay rapidly in moist soils, but if it is charred and buried without damage, it can be retained in archaeological stratigraphy for very long periods of time. Charred plant remains are a mainstay of environmental archaeology.

Equilibrium Factors

Once buried, and assuming a stable stratigraphy, the decay of most materials will conform more to the established trends. The burial environment may not be suitable for biological or dissolution processes due to freezing or to drying. In both situations, degradation can be held up almost indefinitely (see, e.g., Spindler 2001). However, these circumstances either are rare or tend to contain relatively few environmental remains. The large part of our knowledge of past environments comes from moist stratigraphy at temperatures between about 0° and 30° centigrade, where biological and dissolution processes can be highly effective.

Among the mineral materials, the pH of the burial stratigraphy (which is really the pH of the interstitial water) is probably the main indicator of likely preservation in leaching environments. For calcium carbonates, the equilibrium pH is 8.4 (Rowell 1994), so dissolution will be negligible above that value but occur faster as the pH decreases. Calcium phosphates are more complex because of the different species and also the fact that their solubility increases in both the acid and alkaline directions (see Fig. 1).

Amorphous silica dissolution is pH dependent, being more soluble under alkaline than acidic conditions. However, the extent of that solubility variation across the pH range is not really significant below about pH 10 (see Fig. 2), which means that silica in most leached stratigraphy will not be affected.

The pH of stratigraphy is a bulk measure, representing a useful shorthand for the likely concentrations of common ions in the interstitial solution. It is not, however, a precise universal indicator applicable equally across the globe. The actual dissolving power of the liquid surrounding a particular material is dependent on the concentration (in solution) of the target material's component ions. Calcium is the commonest cation in temperate climate (leached) stratigraphy and the commonest soluble element of biomaterials. As a result, pH is at its most useful in these types of stratigraphy. Nearer to the equator, particularly in more arid regions, some of the more soluble ions such as sodium and potassium start to become more significant, and the pH will be influenced by these non-calcium ions.

The pH is also only one measurement within the dissolution dynamic. The rate at which the interstitial water passes over and around the target material is also highly significant. Remains constantly washed through by underground water, for example, in floodplain gravels, will be far more rapidly dissolved than if they were trapped in dense clays or deposited in topographic low points where groundwater movement is sluggish. This is due simply to the nature of dissolution. As described above, dissolution potential is governed by the concentration of the target ions in solution. If the recently dissolved ions are taken away rapidly, their concentration in the contact solution remains low; if the groundwater only moves slowly, however, a gradient of concentrations can develop around the target, such that the contact solution is almost saturated and can therefore dissolve it only slowly.

For the organic materials, dissolution is not the major destruction process. Instead, biological breakdown plays the large role, consisting essentially of the microbiological oxidation of carbon and hydrogen (in the polysaccharides, proteins, and biopolymers discussed above) to produce energy, carbon dioxide, and water. As with most biological

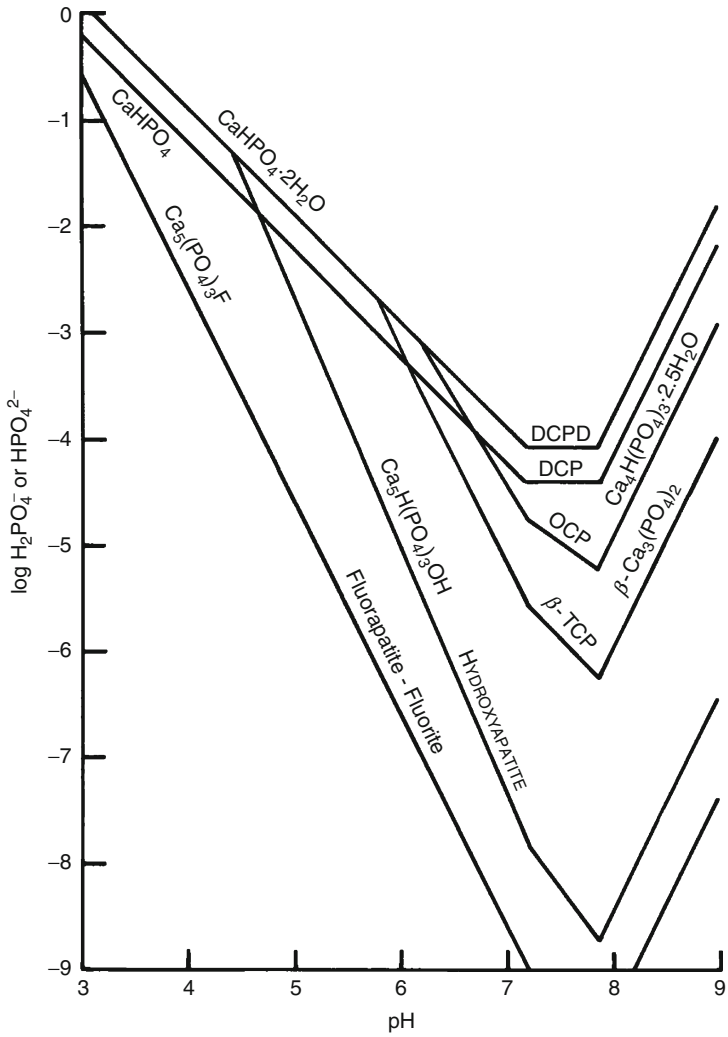

Environmental Archaeological Evidence: Preservation, Fig. 1 Solubility diagram of some calcium phosphates in soils. (Adapted from Lindsay et al. 1989 © Soil Science Society of America)

processes, this can only take place where water and oxygen are available and where the product carbon dioxide can escape to prevent a toxic buildup. At one end of the moisture scale, therefore, completely dry organic materials, although perhaps rendered brittle (and certainly rendered difficult to identify due to desiccation), do not actually break down. In the middle of the scale, moist, porous stratigraphy promotes rapid breakdown processes, and few materials can last any length of time. At the wettest end of the scale, where moisture is extreme, the requirement for good gaseous exchange is increasingly not met, and reducing conditions start to pertain (Canti 2003).

The importance of reducing conditions for preservation of organic remains in archaeology cannot be overstated. They are the basis of all the waterlogged wood discoveries such as the Swiss lake villages and the UK trackways; they are the main reason for the existence of the north European bog bodies. In these and many other examples, the associated wood remains, pollen, and plant macrofossils have provided a wealth of evidence for environmental reconstruction (Godwin 1960; Glob 1969; Coles and Orme 1986).

Reduction is often referred to as "anoxia" or "anoxic conditions." It occurs wherever oxygen can be only slowly replenished on being used up

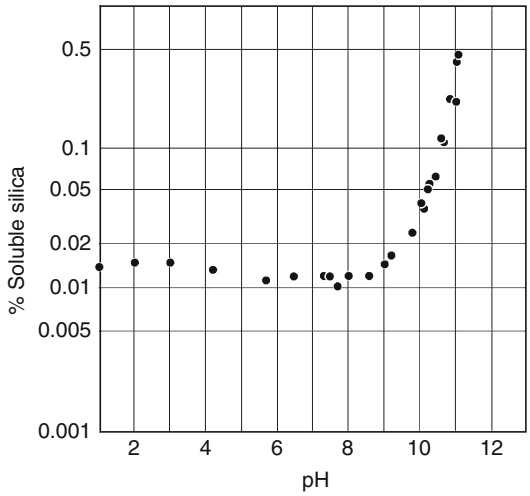

Environmental Archaeological Evidence: Preservation, Fig. 2 Solubility diagram of amorphous silica. Based on a series of experiments dissolving silica in water buffered to different pH values for a fixed time period and then measuring the concentration. (Adapted from Alexander et al. 1954 © American Chemical Society)

by microbiological action. This could as much be in a sealed plastic bag as in the more classical situation of dense waterlogged sediments; the same process is at work, because oxygen diffuses through water about 10,000 times slower than through air. As the free oxygen moves into shorter and shorter supply, microorganisms generating methane start to become dominant, producing one of the characteristic smells of reducing conditions. Under this type of regime, the decay rate of the polysaccharides, proteins, and biopolymers is greatly lowered.

One of the best-known archaeological examples of reduction-based preservation is the South Scandinavian barrows with still-intact Early Bronze Age oak coffins maintained by reducing conditions resulting from water trapped by a thick impermeable iron pan. The coffins contained well-preserved organic remains including textiles, skin, and hair (Holst et al. 2001). A research program was instigated to understand the detail of how reduction started. The work showed that anoxic conditions rapidly built up where turf was laid over modern oak coffins containing animal bodies, which could thus be preserved for months or even years (Breuning-Madsen et al. 2001).

Reducing conditions can, however, have some unexpected detrimental side effects. If sulfate (SO_4) is present in the interstitial water, specialized bacteria will strip out the oxygen (four atoms of which are available for each sulfur atom) and use it for respiration. This leaves a sulfur atom free to bond with the hydrogen from water to make hydrogen sulfide (H_2S or rotten eggs) – another well-known smell of reduced stratigraphy. The sulfur will also form pyrite or marcasite (Fe_2S) with free iron in the stratigraphy, crystallizing in tiny spheres (framboids) made up of numerous minute individual crystals. These can encrust organic remains to the point where they become fossilized. Because seawater is sulfate rich, this pyritization process is most commonly found in estuarine or marine wetland stratigraphy (Berner 1985), but it sometimes occurs inland as well. From the preservational point of view, pyrite is less of a problem, while the conditions remain waterlogged; the real damage occurs if the site, after many years of pyrite accumulation, then becomes free draining again. On oxidation, the Fe_2S rapidly decays into a mass of free iron oxides and sulfuric acid:

$$Fe_2S + H_2O = Fe(OH)_3 + H_2SO_4.$$

encrusting artifacts and ecofacts with red iron ochre and making it possible for the stratigraphic acidity to reach as low as pH 2, with extremely detrimental effects on many biominerals (Canti 2000; Boreham et al. 2011).

Unified Preservation Diagram

The numerous factors affecting preservation of environmental materials across different parts of the globe make a unified theory, taking in all of the variables, impossibly complex. Multidimensional graph axes would be required to draw up an all-inclusive environmental envelope. Many of the kinetic factors described above are episodic rather than scalable and can operate in nonlinear combinations that defy analysis. Furthermore, even setting kinetic factors aside, the value of an all-inclusive model is debatable. Some

environmental factors are so rare that they can be considered as one-offs, for example, the toxicity introduced by copper artifacts or the biocidal effects of salt which has produced such extraordinary preservation in the Hallstatt mines (Grömer 2005).

A generalized diagram for the most widespread preservation conditions (i.e., non-arid, nonfrozen, nontoxic stratigraphy) is, nevertheless, valuable at least as a conceptual aide-memoire, but also to provide some basis for planning programs of environmental archaeology in the commonest geochemical situations. A two-dimensional reduction vs. pH diagram was fully explored for a range of environmental conditions by Baas-Becking et al. (1960). Their method was to collate measurements made from numerous different investigations in order to set limits for the reduction (on the Eh scale, measured in millivolts) and pH fields in all natural environments, including peat bogs, freshwater sediments, marine sediments, and evaporites. Figure 3 shows their summary of world soils (which, although not a perfect match, is strongly equated with world archaeological stratigraphy).

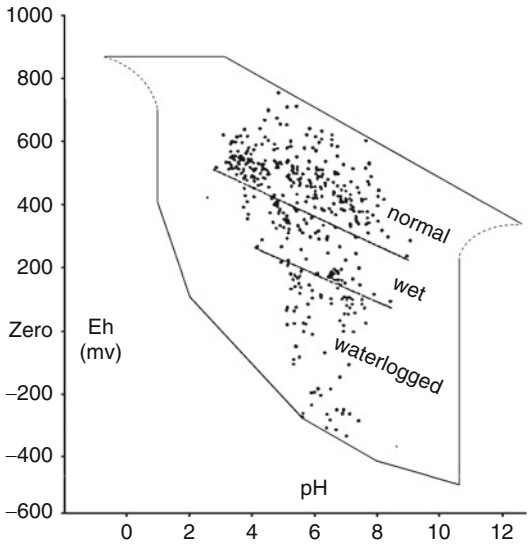

Environmental Archaeological Evidence: Preservation, Fig. 3 Measurements of Eh and pH in 414 soils from around the world. The envelope is the limits of the natural environment. (Adapted from Baas-Becking et al. 1960 © University of Chicago Press)

Baas-Becking et al.'s (1960) diagram was adapted by Retallack (1984) to produce a conceptual basis for consideration of a range of common environmental indicators. It should be emphasized that Retallack's diagram was developed for paleopedological investigations, rather than archaeological stratigraphy; the inclusion of calcareous phytoliths is not normally relevant to archaeological investigations, and the absence of insects is notable from a temperate-zone stratigraphic perspective (Fig. 4).

A further version of this diagram has been produced for UK conditions (English Heritage 2011), including insect remains as well as some less common additions, namely, parasite eggs, diatoms, ostracods, and forams (Fig. 5). It probably represents the most complete attempt to date on this type of simplification and would need little modification to be used in other moist climate situations.

Future Directions

Dissolution processes have been researched in considerable detail, so the mineralogical end of the preservation spectrum is well enough understood for all practical archaeological purposes. However, the microbiological element of preservation dynamics is still an area of some uncertainty, for example, the importance of water circulation for bacterial decay (Huisman and Klaasen 2009) and the fundamental tolerance levels of chemical parameters such as Eh, pH, H_2S, and ethylene among the fungi (Holden et al. 2006). This additional level of precision will be needed in the future for the refinement of heritage protection priorities and preservation in situ methodologies. In particular, general agricultural drainage, quarry dewatering, and water abstraction programs will have to be set against the need for preservation of environmental remains. Detailed plans for the various types of development cannot be argued through without having a complete understanding of the microbiological dynamics, even allowing for the unpredictabilities inherent in complex systems.

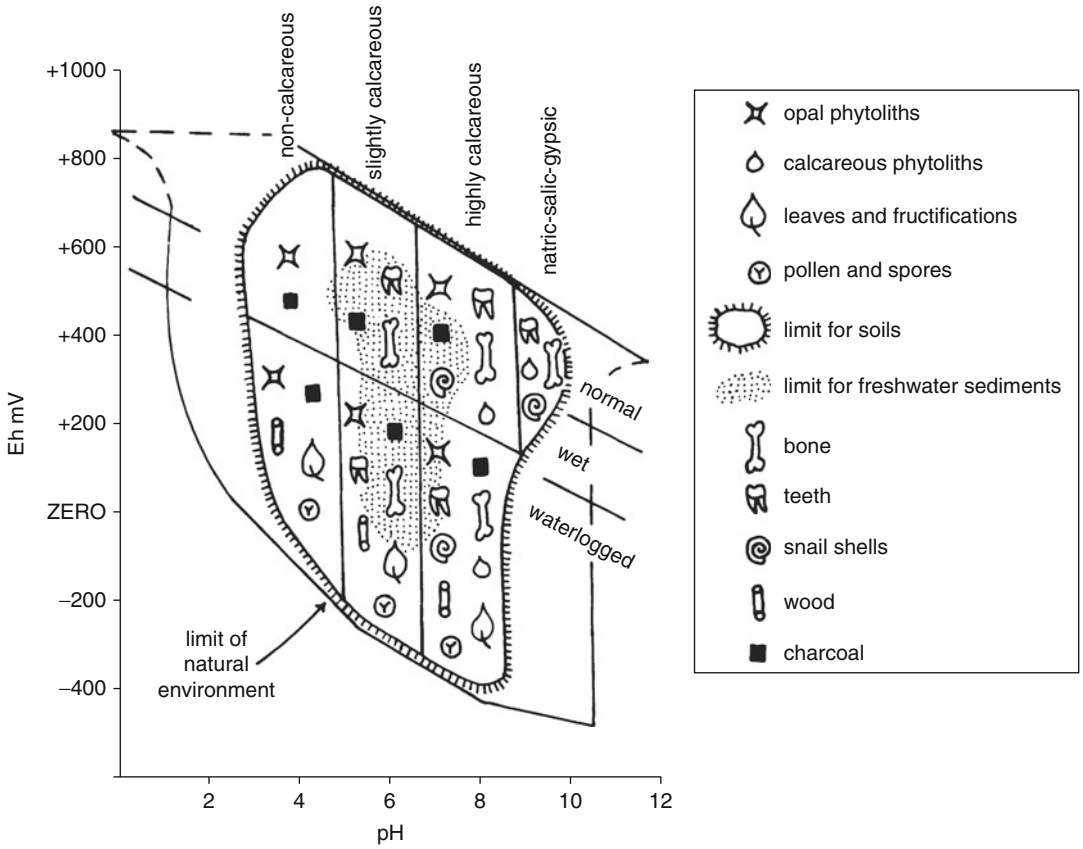

Environmental Archaeological Evidence: Preservation, Fig. 4 Retallack's (1984) Eh-pH stability fields for microfossils found in paleosols. (Modified from Retallack 1984 © The Palaeontological Society)

Cross-References

- ▶ Bones: Preservation and Conservation
- ▶ Charcoal: Preservation and Conservation
- ▶ Environmental Archaeology and Conservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Phytolith Studies in Archaeology
- ▶ Submerged Prehistoric Landscapes
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

Addadi, L., A. Berman, and S. Weiner. 1991. Intracrystalline proteins from a sea urchin and a mollusc; a comparison. In *Mechanisms and phylogeny of mineralisation in biological systems*, ed. S. Suga and H. Nakahara, 29–33. Tokyo: Springer.

Alexander, G.B., W.M. Heston, and R.K. Iler. 1954. The solubility of amorphous silica in water. *Journal of Physical Chemistry* 58: 453–455.

Baas-Becking, L.G.M., I.R. Kaplan, and D. Moore. 1960. Limits of the natural environment in terms of pH and oxidation-reduction potentials. *Journal of Geology* 68: 243–284.

Bear, F.E. 1964. *Chemistry of the soil (American Chemical Society Monograph 160)*. New York: Reinhold Publishing Company.

Berner, R.A. 1985. Sulphate reduction, organic matter decomposition and pyrite formation. In *Geochemistry*

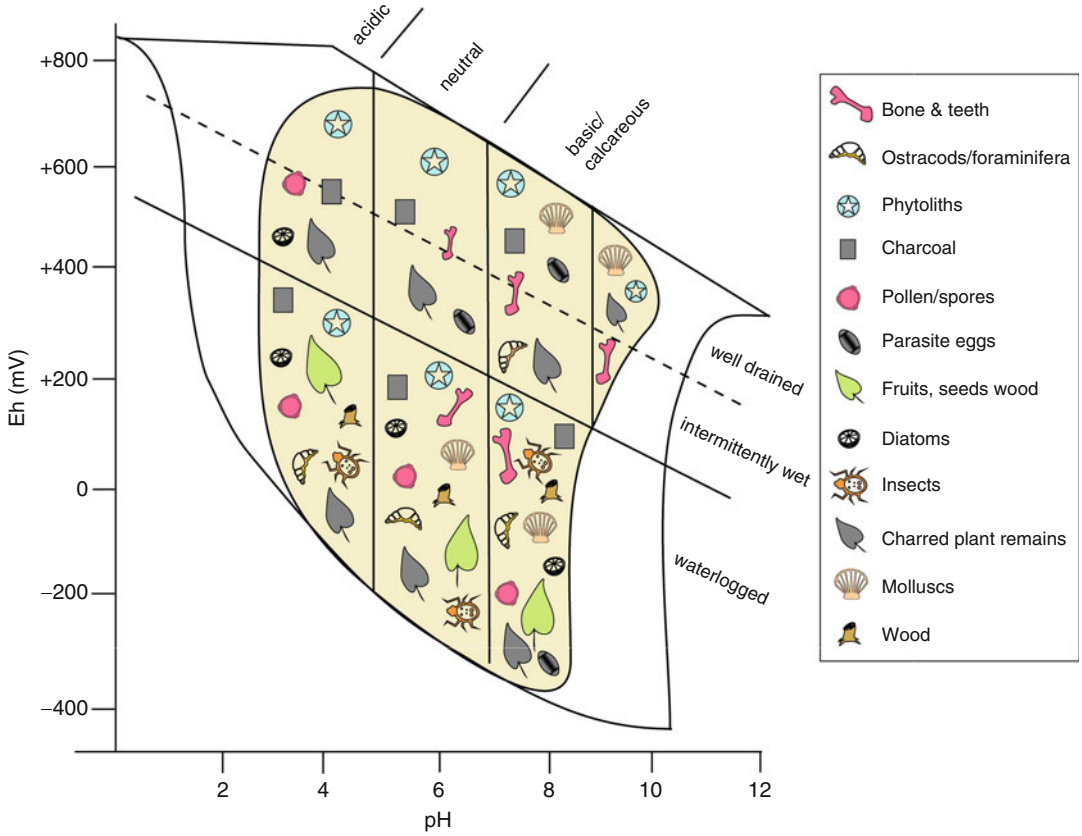

Environmental Archaeological Evidence: Preservation, Fig. 5 Modified Eh-pH stability fields for microfossils found in UK stratigraphy. (From English Heritage 2011, figure 2. © English Heritage)

of buried sediments, ed. G. Eglington, C.D. Curtis, D.P. McKenzie, and D.G. Murchison, 25–37. London: The Royal Society.

Boreham, S., C. Conneller, N. Milner, A. Needham, J. Boreham, and C.J. Rolfe. 2011. Geochemical indicators of preservation status and site deterioration at Star Carr. *Journal of Archaeological Science* 38: 2833–2857.

Brasier, M.D. 1980. *Microfossils*. London: Unwin Hyman.

Breuning-Madsen, H., M.K. Holst, and M. Rasmussen. 2001. The chemical environment in a burial mound shortly after construction – An archaeological-pedological experiment. *Journal of Archaeological Science* 28: 691–697.

Canti, M.G. 2000. Mineralogical analysis of buildings 1, 6, and surroundings. In *Prehistoric intertidal archaeology in the Welsh Severn Estuary (CBA Research Report 120)*, ed. M. Bell, A. Caseldine, and H. Neumann , 269–270. York: Council for British Archaeology.2000

Canti, M.G. 2003. Aspects of sediment diagenesis and taphonomy. Specialist report (p. 41–42). In *The survey and excavation of a Bronze Age timber circle at Holme-next-the-Sea, Norfolk, 1998–9*, Proceedings of the Prehistoric Society, ed. M. Brennand and M. Taylor, vol. 69, 1–84.

Canti, M.G. 2007. Deposition and taphonomy of earthworm granules in relation to their interpretative potential in Quaternary stratigraphy. *Journal of Quaternary Science* 22: 111–118.

Coles, J.M., and B.J. Orme. 1986. *Sweet track to Glastonbury*. London: Thames & Hudson.

Davis, S.J.M. 1987. *The archaeology of animals*. London: B.T. Batsford.

English Heritage. 2011. *Environmental archaeology: A guide to the theory and practice of methods from sampling and recovery to post-excavation*. Swindon: English Heritage.

Glob, P.V. 1969. *The bog people: Iron Age man preserved*. London: Faber & Faber.

Godwin, H. 1960. Prehistoric wooden trackways of the Somerset Levels: Their construction, age and relation to climate change. *Proceedings of the Prehistoric Society* 26: 1–36.

Grömer, K. 2005. The textiles from the prehistoric salt-mines at Hallstatt (Die Textilien aus dem Prähistorischen Salzbergwerk von Hallstatt). In *Hallstatt textiles: Technical analysis, scientific investigation and experiments on Iron Age textiles*, ed. P. Bichler, K. Grömer, R. Hofmann-de Keijzer, A. Kern, and H. Reschreiter, 11–16. Oxford: Archaeopress.
Haslam, M. 2004. The decomposition of starch grains in soils: Implications for archaeological residue analyses. *Journal of Archaeological Science* 31: 1715–1734.
Holden, J., L.J. West, A.J. Howard, E. Maxfield, I. Panter, and J. Oxley. 2006. Hydrological controls of in situ preservation of waterlogged archaeological deposits. *Earth Science Reviews* 78: 59–83.
Holst, M.K., H. Breuning-Madsen, and M. Rasmussen. 2001. The south Scandinavian barrows with well-preserved oak-log coffins. *Antiquity* 75: 126–136.
Huisman, D.J., and R.K. Klaasen. 2009. Wood. In *Degradation of archaeological remains: 17–32*, ed. D.J. Huisman. Den Haag: Sdu Uitgevers B.V.
Lindsay, W.L., P.L. Vlek, and S.H. Chien. 1989. Phosphate minerals. In *Minerals in soil environments*, ed. J.B. Dixon and S.B. Weed, 2nd ed. Madison: Soil Science Society of America.
Retallack, G. 1984. Completeness of the rock and fossil record; some estimates using fossil soils. *Paleobiology* 10: 59–68.
Rowell, D. 1994. *Soil science methods and applications*. Harlow: Longman.
Sigleo, A.C. 1978. Organic geochemistry of silicified wood. Petrified Forest National Park Arizona. *Geochimica et Cosmochimica Acta* 42: 1397–1405.
Spindler, K. 2001. *The man in the ice: The preserved body of a Neolithic man reveals the secrets of the Stone Age*. London: Phoenix.

Environmental Archaeology and Conservation

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Introduction

Archaeology has an established role in heritage management, focusing on the built environment and monuments and, increasingly, on the management of archaeological landscapes, but contributions from environmental archaeology to conservation are less well established in conservation policy and practice. Growing awareness of intensified human impacts on Earth's resources and ecosystems has created increased impetus to understand the interactions between society and environmental processes in order to anticipate future system responses (Dearing et al. 2010). Many of these ecosystem responses emerge over decades and centuries, well beyond the scope of most ecological records and misconceptions about the drivers underpinning ecosystem function and conservation values can result in misguided and ineffectual management practices and policies. Historical effects are embedded in the structure, biodiversity and function of ecosystems (Foster et al. 2003). Paleoecology and environmental archaeology therefore have relevance beyond the study of past ecosystem dynamics or past human-environmental interactions: they can contribute important insights into the complex interactions between natural and anthropogenic drivers and their impacts on long-term ecosystem dynamics (Willis et al. 2010). This is essential for understanding what shapes current landscapes and conservation values and making management decisions that support the ecological processes on which we depend within a changing environment.

Definition

This entry focuses on the main contributions of environmental archaeology to the management and conservation of ecosystem processes, biodiversity, and cultural landscapes. This includes the implications of land-use legacies for current management and predicting species responses to future environmental change. The role of the past in conservation is more often associated with paleoecology than with environmental archaeology since sediment archives are often "off-site," that is, not directly associated with archaeology, and additional drivers to human agency, such as climatic and other disturbance factors (e.g., disease), are also relevant. However, understanding long-term relations between culture and conservation and between management and ecology – which form the basis for environmental archaeology – is vital for improving our ability to

manage cultural landscapes and habitats and to adapt management in response to changing climatic and anthropogenic pressures (Foster et al. 2003).

Key Issues and Current Debates

The strongest contributions of environmental archaeology to conservation are in understanding the extent to which existing ecosystems have been affected by long-term changes in human activities, establishing management baselines for restoration and management implications for maintaining cultural values, restoring ecosystem function, and supporting biodiversity and ecosystem processes.

The most common and best-established contribution from paleoecology and environmental archaeology to conservation is to provide baselines for management and restoration. Often this involves defining conditions predating significant human impact to create more "natural" ecological conditions. This is best established in the European Union Water Framework Directive, where CE 1850 has been selected as a representative baseline for managers seeking to restoring "good ecological quality" to freshwater bodies. This date marks the onset of large-scale industrialization, agricultural intensification, and atmospheric pollution which caused water acidification and deterioration in ecological and hydrological status in many catchments, as recorded in a range of proxies, including diatoms, aquatic plant macrofossils, and chironomids (e.g., Bennion and Battarbee 2007). A single reference baseline is not wholly adequate or representative, as "pre-impact" dates and conditions will vary with ecology and history, but defining a common target provides a measureable and cost-effective baseline for lake restoration that recognizes land-use legacies and allows records of past human impacts to suggest management activities that may provide conditions that allow the recovery of particular species (Froyd and Willis 2008).

Conservation planning decisions have often tended to emphasize "naturalness," as indicated in the example above. However, environmental archaeology and paleoecology reveal that many "pristine" and "ancient" habitats in tropical and temperate biomes have in fact been modified by humans over substantial time periods. Paleoecological and archaeological studies demonstrate that human impacts on "virgin" rainforest may be more extensive than has been thought, and this has significant implications for understanding ecosystem resilience and rates of recovery from human disturbance (Willis et al. 2004). These impacts can have persistent legacies: most fertile species-rich lowland rainforests in central Amazonia occur on anthropogenic "terra preta" soils which originated from agriculture and burning around 2500 years ago, for example. The high species diversity of these soils has led to increased interest in indigenous practices to reduce the rate of deforestation and find more sustainable land-use practices.

Misconceptions over the extent and role of human impacts may lead to inappropriate management being applied, particularly in cultural landscapes where biodiversity values are a legacy of historic management. Attempts to restore "natural" habitats may lead to the attrition of biodiversity by misunderstanding formative processes. Examples include policy-driven efforts to reduce the fragmentation of woodland at the expense of the more diverse landscapes created by historic nonindustrial farming in Tuscany (Agnoletti 2007) and habitat losses in high conservation value coastal habitats in NE America due to scrub invasion following a decline in the agricultural management which has largely been responsible for creating and maintaining these species-rich communities (Foster and Motzkin 2003). Increasing recognition among ecologists that current biodiversity patterns often reflect past land use more strongly than recent management may provide opportunities for greater application of environmental histories in management.

Knowledge of long-term interactions between natural variability and cultural impacts can indicate the range of appropriate management options, define an envelope of "acceptable" variability for monitoring ecological change, and test ecological assumptions (Froyd and Willis 2008). Heathland communities are often recognized as cultural landscapes, particularly in Europe, where

the dominance of grasses is considered to be an indicator of degradation. Pollen and macrofossil analyses from several English moors suggest that grass dominance is a relatively recent and unprecedented trend, but grasses were present as part of cyclical heather-grass dynamics over the last 1000 years, and heather-dominated moors are similarly uncharacteristic in the long term (Chambers et al. 1999). Grasses should therefore be considered a "natural" part of the ecosystem rather than purely an indicator of degradation, and a preference for restoring heather-dominated communities should also be tempered by knowledge that these also have no long history. By identifying the range of "normal" variability and indicating which characteristics are long-standing and which are atypical, the results provide a wider range of restoration options than often envisaged for heather moorland.

Environmental archaeology and paleoecology can make important contributions to conservation by assessing the interplay between human and natural drivers of ecological change, both of which need to be understood to predict and manage future population resilience. For instance, Hughes et al. (2008) use pollen, plant macrofossil, and geochemical data to document the decline and localized extinction over the last 2000 years of *Sphagnum austinii*, a key peat former on many raised bogs in NW Europe. By establishing critical thresholds of atmospheric nitrogen for the growth of this moss, they conclude that although it was able to reestablish itself during periods of reduced human activity in the past, contemporary levels of atmospheric pollution mean that this is unlikely to occur in the near future. Climate controlled the broad-scale dynamics of many European tree populations, but human activity has introduced considerable regional and temporal variability. For example, intensified land use over recent centuries has led to significant reductions in the abundance of oak and beech in Scandinavia and silver fir in the Carpathians. As a result, changes in current management will be needed to ensure that human activities do not override the resilience of these species to predicted future climatic shifts (Feurdean and Willis 2008; Lindbladh and Foster 2010). Environmental archaeology provides many additional examples that human activities and a preference for conserving idealized "natural" habitats in culturally shaped woodlands (Grant and Edwards 2008) are threatening the ability of many species to cope with climate change.

The history of species introductions by humans provides another example of the contribution of environmental archaeology to conservation. The introduction of alien or nonnative species poses a significant threat to conservation values and ecological resilience in many ecosystems, particularly on islands where geographical isolation over evolutionary timescales has resulted in high levels of endemism and adaptation among the indigenous flora and fauna. Paleoecological and archaeological data, including rat bones and gnawing marks on seeds, suggest that rats arriving with sailors and settlers contributed to the dramatic decline of lowland forests in Hawaii (Athens 2009), thus providing data to inform ecosystem restoration. The long duration of human influence may make it difficult for ecologists to differentiate between native and nonnative plant species. In the Galápagos, pollen and plant macrofossil evidence has identified that several plants considered "doubtful native" or introduced are actually part of the native flora (van Leeuwen et al. 2008). Such information can be used to manage nonnative species by indicating the ecological effects of long-established introductions on local ecosystems and revealing how climate and management affect susceptibility to invasion (Willis and Birks 2006). This knowledge can, however, pose additional challenges for conservation, particularly where presumed native species which are valued as part of "traditional" arable biodiversity, for example, are discovered to be "archaeophytes," that is, plants that were introduced by humans over 500 years ago.

Future Directions

Paleoecological contributions to conservation have increasingly framed long-term messages around current issues in ecology and conservation management, notably climate change, biodiversity, and resilience. The increasing emphasis in

policy and ecology on a more integrated ecosystem approach to management provides opportunities for paleoecologists and environmental archaeologists to draw on additional archival sources in order to consider socioeconomic as well as environmental dimensions of conservation. Environmental archaeology and paleoecology can provide a long-term understanding of how economic development affects the regulating services which underpin ecological resilience (Dearing et al. 2012). For instance, Hanley et al. (2008) found a negative relationship between historical livestock prices and pollen diversity from farming areas in upland Scotland over the last 400 years. This not only indicates the importance of grazing for biodiversity management but also highlights the enduring influence of economic drivers and incentives on local land manager decisions. In cultural landscapes, biodiversity and ecosystem services have been shaped by a long and complex history of settlement and land use. Environmental archaeology can make strong contributions to understanding processes and values involved in cultural ecosystem services provision. For example, the inclusion of a review of the current state of knowledge regarding the historic environment (Gearey et al. 2010) as part of the recent International Union for Conservation of Nature inquiry into the state of UK peatlands illustrates the potential for environmental archaeology to form part of an integrated approach to ecosystem management and restoration. An ecosystem service framework could allow more explicit consideration of the impacts of management on the in situ preservation of environmental and archaeological records and thus address the lack of protection afforded to many sedimentary archives.

To build on these opportunities and increase the relevance of environmental archaeology to conservation, achieving closer interdisciplinary working will remain a key goal for long-term researchers (Froyd and Willis 2008). The development of socio-ecological frameworks may aid the integration of long-term and social dimensions of environmental change with ecology and conservation management (e.g., Dearing et al. 2010). Identifying common questions that need to be addressed to improve the relevance of research to environmental management practice and policy can also improve the effectiveness of long-term contributions to conservation by engaging more with strategic and applied aspects of conservation management. This has recently become an established practice in ecology and conservation (e.g., Sutherland et al. 2011) but has yet to include long-term environmental insights.

E

Cross-References

- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Historical Ecology and Environmental Archaeology
- ▶ People as Agents of Environmental Change

References

Agnoletti, M. 2007. The degradation of traditional landscape in a mountain area of Tuscany during the 19th and 20th centuries: Implications for biodiversity and sustainable management. *Forest Ecology and Management* 249: 5–17.

Athens, J.S. 2009. *Rattus exulans* and the catastrophic disappearance of Hawai'i's native lowland forest. *Biological Invasions* 11: 1489–1501.

Bennion, H., and R.W. Battarbee. 2007. The European Union Water Framework Directive: Opportunities for palaeolimnology. *Journal of Palaeolimnology* 38: 285–295.

Chambers, F.M., D. Mauquoy, and P.A. Todd. 1999. Recent rise to dominance of *Molinia caerulea* in environmentally sensitive areas: New perspectives from palaeoecological data. *Journal of Applied Ecology* 36: 719–733.

Dearing, J.A., A.K. Braimoh, A. Reenberg, B.L. Turner, and S.E. van der Leeuw. 2010. Complex land systems: The need for long time perspectives in order to assess their future. *Ecology and Society* 15: 21. Available at: http://www.ecologyandsociety.org/vol15/iss4/art21/. Accessed 6 Apr 2012.

Dearing, J.A., X. Yang, X. Dong, E. Zhang, X. Chen, P.G. Langdon, K. Zhang, W. Zhang, and T.P. Dawson. 2012. Extending the timescale and range of ecosystem services through paleoenvironmental analyses, exemplified in the lower Yangtze basin. *Proceedings of the National Academy of Sciences* 109: E1111–E1120.

Available at: http://www.pnas.org/content/109/18/E1111.full.pdf+html. Accessed 12 June 2012.
Feurdean, A., and K.J. Willis. 2008. The usefulness of a long-term perspective in assessing current forest conservation management in the Apuseni Natural Park, Romania. *Forest Ecology and Management* 256: 421–430.
Foster, D.R., and G. Motzkin. 2003. Interpreting and conserving the openland habitats of coastal New England: Insights from landscape history. *Forest Ecology and Management* 185: 127–150.
Foster, D., F. Swanson, J. Aber, I. Burke, N. Brokaw, D. Tilman, and A. Knapp. 2003. The importance of land-use legacies to ecology and conservation. *BioScience* 52: 77–88.
Froyd, C.A., and K.J. Willis. 2008. Emerging issues in biodiversity & conservation management: The need for a palaeoecological perspective. *Quaternary Science Reviews* 27: 1723–1732.
Gearey, B., N. Bermingham, D. Charman, W. Fletcher, R. Fyfe, J. Quartermaine, and R. Van de Noort. 2010. Peatlands and the historic environment. Scientific review. IUCN UK Peatland Programme Commission of Inquiry on Peatlands. Available at: http://www.iucn-uk-peatlandprogramme.org/sites/all/files/Review%20Peatland%20Historic%20Environment,%20June%202011%20Final.pdf. Accessed 25 Aug 2012.
Grant, M., and M. Edwards. 2008. Conserving idealized landscapes: Past history, public perception and future management in the New Forest (UK). *Vegetation History and Archaeobotany* 17: 551–562.
Hanley, N., A. Davies, K. Angelopoulos, A. Hamilton, A. Ross, D. Tinch, and F. Watson. 2008. Economic determinants of biodiversity change over a 400 year period in the Scottish uplands. *Journal of Applied Ecology* 45: 1557–1565.
Hughes, P.D.M., S.H. Lomas-Clarke, J. Schulz, and K.E. Barber. 2008. Decline and localized extinction of a major raised bog species across the British Isles: Evidence for associated land-use intensification. *The Holocene* 18: 1033–1043.
Lindbladh, M., and D.R. Foster. 2010. Dynamics of long-lived foundation species: The history of *Quercus* in southern Scandinavia. *Journal of Ecology* 98: 1330–1345.
Sutherland, W.J., E. Fleishman, M.B. Mascia, J. Pretty, and M.A. Rudd. 2011. Methods for collaboratively identifying research priorities and emerging issues in science and policy. *Methods in Ecology and Evolution* 2: 238–247.
van Leeuwen, J.F.N., C.A. Froyd, W.O. van der Knaap, E.E. Coffey, A. Tye, and K.J. Willis. 2008. Fossil pollen as a guide to conservation in the Galápagos. *Science* 322: 1206.
Willis, K.J., and H.J.B. Birks. 2006. What is natural? The need for a long-term perspective in biodiversity conservation. *Science* 314: 1261–1265.
Willis, K.J., L. Gillson, and T.M. Brncic. 2004. How 'virgin' is virgin rainforest? *Science* 304: 402–403.
Willis, K.J., R.M. Bailey, S.A. Bhagwat, and H.J.B. Birks. 2010. Biodiversity baselines, thresholds and resilience: Testing predictions and assumptions using palaeoecological data. *Trends in Ecology and Evolution* 25: 583–591.

Further Reading

Buckland, P.C. 1993. Peatland archaeology: A conservation resource on the edge of extinction. *Biodiversity and Conservation* 2: 513–527.
Hayashida, F.M. 2005. Archaeology, ecological history, and conservation. *Annual Review of Anthropology* 34: 43–65.
Schaich, H., C. Bieling, and T. Plieninger. 2010. Linking ecosystem services with cultural landscape research. *Gaia* 19: 269–277. Available at: http://www.ingentaconnect.com/content/oekom/gaia/2010/00000019/00000004/art00009. Accessed 14 June 2012.
Swetnam, T.W., C.D. Allen, and J.L. Betancourt. 1999. Applied historical ecology: Using the past to manage for the future. *Ecological Applications* 9: 1189–1206.

Environmental Archaeology in the Commercial Context

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Introduction

Environmental archaeology is the study of past human environments, using earth and life sciences to examine the archaeological record. Like many areas of archaeological science, environmental archaeology developed in the 1960s and 1970s as North American and western European archaeologists embraced ecological principles in their work, with the analysis of environmental remains now recognized as an important constituent of archaeological investigations. Environmental archaeology covers a wide range of topics often based on the subdivisions within earth and life sciences, with archaeobotanists, geoarchaeologists, osteoarchaeologists, paleoentomologists, palynologists, and zooarchaeologists all existing within the wider sphere of environmental archaeology. As commercial archaeological organizations have developed in certain countries in response to historic environment legislation, a market for environmental

archaeological work has developed, with resulting growth and expansion of the discipline, creation of new datasets, and emergence of new problems.

Definition

Environmental archaeology is a subdiscipline of archaeology, involving the study of environmental remains – for example, pollen, seeds, insects, and animal bone – recovered during archaeological excavation to elucidate a wide range of archaeological topics and themes. Like other archaeological subdisciplines, environmental archaeology has expanded and developed through the commercialization of archaeology in certain countries. This has resulted in a market for environmental archaeological analysis, in which a large proportion of environmental archaeologists are now employed.

Key Issues

Environmental archaeology, like other subdisciplines, is greatly affected by changes and trends that affect archaeology in general. One such trend has been the commercialization of archaeology in certain countries, which has occurred due to public pressure regarding the protection of archaeological heritage, resulting in government legislation. Within Europe this has essentially developed into two different approaches: a "socialist" model in which it is the central or local government's responsibility to protect and excavate threatened archaeological heritage and a "capitalist" model in which it is left to a free market to carry out excavations and heritage work (Willems and van den Dries 2007; Kristiansen 2009). The first model could be seen to operate in France and Denmark, for example, whereas the United Kingdom and the United States of America operate a free market model, although Carver (2007) has noted there are degrees of variation, with "unregulated," "regulated," and "deregulated" practices. Environmental archaeology, therefore, takes place within these larger systems of archaeological practice.

In the "free market" countries, this has led to a rise in the number of archaeological and, consequentially, the number of environmental archaeological positions. This has been well studied in the United Kingdom with the number of archaeologists rising from 1614 in 1979 to 4425 by 1998, and peaking at 6865 in 2007 (Aitchison and Edwards 2008). This corresponded with the creation of a market-driven developer-funded structure through government legislation, the Town and Country Planning Act and associated guidance, primarily Planning Policy Guidance 16 (PPG16) (Department of the Environment 1990), resulting in commercial archaeological organizations accounting for 89% of archaeological investigations between 1990 and 1999 (Darvill and Russell 2002). Although data is limited to a small number of surveys, there appears to have been a corresponding rise in the number of environmental archaeologists, for example, at least 50 commercially active zooarchaeologists were identified in a 2009 survey of the United Kingdom (Morris 2010), the majority based either within commercial organizations or as self-employed freelance specialists.

Countries with a "market-driven" commercial archaeology structure have further developed an internal market for environmental archaeological analysis, with the development of self-employed freelance specialists. Commercial organizations without an in-house specialist may therefore place work out for tender, with different specialists bidding for a specific piece of work. However, reciprocal relationships will often be formed between organizations and individual specialists. Within the United Kingdom freelance specialists are now important agents in the creation of new datasets. Morris's (2010) survey of zooarchaeologists indicates that a minimum of 506 zooarchaeological projects resulting from commercial developments were undertaken within the United Kingdom in 2009, with freelance specialists accounting for 30% of the projects and commercial in-house specialists 64%. In comparison, university-based specialists conducted only 5% of the projects.

One of the problematic factors associated with the increase in commercial environmental work is a lack of dissemination, which is an issue affecting archaeology as a whole. Within the United Kingdom reports are usually produced by commercial

units to allow their client (often a developer) to discharge a planning condition. These are unpublished and are often referred to as "grey literature." Bradley (2006) and Fulford (2011) have shown how this literature has great potential for expanding archaeological knowledge but requires synthesis. Organizations such as the Archaeology Data Service in the United Kingdom and Digital Antiquity in the United States have started to disseminate such information. However, the environmental archaeology sections in many "gray literature" reports have often been summarized with the detailed datasets only available from specific archives or the original author. In part this is a specific problem with market-driven archaeology where the emphasis is often on pricing and documentation rather than research quality and interpretation (Kristiansen 2009).

The rise in the amount of environmental archaeological work has also resulted in an emphasis on assessment rather than complete analysis. In the United Kingdom, this developed from English Heritage's guidelines "Management of Archaeological Projects 2" which was superseded by Management of Research Projects in the Historic Environment (MoRPHE) (English Heritage 2006). The principles of assessment are for an assemblage to be quickly scanned by the specialist to ascertain the potential for further work, based on the local, regional, and national significance of the assemblage. This often results in assemblages of a perceived "lower" significance not being fully analyzed or only part of an assemblage being subject to further work. The emphasis on assessment within a commercially tender-driven background could also result in poor-quality work being undertaken by inexperienced environmental archaeologists. However, this problem has been recognized by a number of quasi-governmental bodies and specialist associations. Within the United Kingdom, for example, English Heritage has released a number of guidance notes covering aspects of environmental archaeology for specialists and archaeologists who commission specialist work (English Heritage 2011), and it has also supported the setting up of working groups to support individuals within a commercial context (e.g., the Professional Zooarchaeology Group). The Association of Environmental Archaeologists, International Council of Archaeozoologists, and British Association for Biological Anthropology and Osteoarchaeology have also all published guidance notes to their members; however, there is still little or no peer review of commercial environmental archaeological reports in most countries. The development of guidance documents and procedure has resulted in a certain standardization of aspects of environmental archaeology, such as sample sizes and specialist procedures, by commercial organizations. Although this could be argued to stifle creativity within projects, it may in the long term be conducive to data synthesis.

In summary, environmental archaeology as a subdiscipline within archaeology is subjected to the same outside forces that affect archaeology as a whole. The commercialization of archaeological practices in some countries has resulted in a market for environmental archaeological work, resulting in an increase in new datasets, greater employment opportunities, and an expansion of the discipline. However, in such a situation, archaeology and environmental archaeology are not immune to general economic trends; therefore, a downturn in economic conditions in a country where archaeological work is governed by "capitalist" free market principles often results in a downturn in environmental archaeological work and a loss of positions and subsequently skills. However, countries where the state maintains control appear to be less affected (Aitchison 2009). The separation of processes within a commercial context can also make the integration of archaeological results from different material specialists harder to achieve, although this is an issue that effects all environmental archaeologists. Finally, within a free market system often based on price, standards must be considered to be an issue: organizations are working to maintain and improve standards of environmental archaeology, but in a market economy, this is also reliant on environmental archaeologists continuing to raise the profile and importance of such work to the consumer (other archaeologists and archaeological organizations).

Cross-References

- ▶ Archaeology Data Service (ADS)
- ▶ Association for Environmental Archaeology (AEA)
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data

References

Aitchison, K. 2009. After the 'gold rush': Global archaeology in 2009. *World Archaeology* 41: 659–671.

Aitchison, K., and R. Edwards. 2008. *Archaeology labour market intelligence: Profiling the profession 2007–08*. Reading: Institute of Field Archaeologists.

Bradley, R. 2006. Bridging the two cultures: Commercial archaeology and the study of prehistoric Britain. *Antiquaries Journal* 86: 1–13.

Carver, M. 2007. The profession and the academy: Common objectives. In *Archaeology in Ireland: A vision for the future*, ed. G. Cooney, 115–126. Dublin: Royal Irish Academy.

Darvill, T., and B. Russell. 2002. *Archaeology after PPG16: Archaeological investigations in England 1990–1999,* School of Conservation Science Research Report 10. London and Bournemouth: English Heritage and Bournemouth University.

Department Of The Environment. 1990. *Planning policy guidance 16: Archaeology and planning*. London: HMSO.

English Heritage. 2006. Management of research projects in the historic environment. *The MoRPHE project manager's guide*. Swindon: English Heritage.

English Heritage. 2011. *Environmental archaeology. A guide to the theory and practice of methods, from sampling and recovery to post-excavation*. 2nd ed. London: English Heritage.

Fulford, M. 2011. The impact of commercial archaeology on the UK heritage. In *History for the taking? Perspectives on material heritage*, ed. J. Curtis, M. Fulford, A. Harding, and F. Reynolds, 33–53. London: British Academy.

Kristiansen, K. 2009. Contract archaeology in Europe: An experiment in diversity. *World Archaeology* 41: 641–648.

Morris, J. 2010. Commercial zooarchaeology in the United Kingdom. *Environmental Archaeology* 15 (1): 81–91.

Willems, W., and M. van den Dries. 2007. The origins and development of quality assurance in archaeology. In *Quality management in archaeology*, ed. W. Willems and M. van den Dries, 1–12. Oxford: Oxbow Books.

Environmental Assessment in Cultural Heritage Management

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Brief Definition of the Topic

An environmental assessment (EA) is an important, though preliminary, part of the planning process for proposed developments that may directly or indirectly affect the environment. In application, the "environment" of a project area is broadly defined. It includes not only natural resources, such as plant and animal species native to the area of potential effect, but also the immediate and long-term social and economic consequences that a proposed undertaking may have upon people living in or near the development zone. Moreover, the likely impacts on any significant archaeological and historic architectural resources or cultural landscapes that might be present in the project area also will be taken into account. Consequently, an EA is a critical element in conducting responsible cultural heritage management in the public interest.

Evaluations of this kind began to be used some 40 years ago and were first formalized in the United States under the National Environmental Policy Act (NEPA) of 1969. Since that time, many nations around the globe have adopted similar laws, regulations, and governmental policies to help inform decision makers about the results, both positive (e.g., local economic stimulus or transportation system enhancement) and negative (e.g., degradation of a wetland ecosystem or destruction of a significant archaeological site), that would likely be obtained if a proposed action were to be implemented.

A formal EA report is prepared to document the study, and public input is generally solicited as part of the planning process. Such a study first identifies the perceived need for a proposed undertaking and outlines what is to be accomplished. Often several alternative approaches to

solving the perceived problem are enumerated, and for each alternative, the potential detrimental or beneficial consequences are identified. A thorough EA typically includes a so-called no-action alternative, defining the likely outcomes that would result if nothing were to be done.

Analysis usually arrives at the elimination of certain alternatives from further consideration, and frequently a preferred alternative will be identified in the report. The study may issue a Finding of No Significant Impact (FONSI) for the preferred alternative, in which case the project may proceed toward realization if that finding is upheld. The FONSI may also stipulate certain actions that parties to the proposed action have agreed to follow while implementing the project in order to ensure that environmental impacts are kept below a minimum level.

On the other hand, perhaps one EA out of ten will determine that a more detailed Environmental Impact Statement (EIS) is necessary before proceeding further with project planning. An EIS centers on location and design specifications of the viable alternative(s), and it generally requires intensive investigation of the project area by teams of subject-matter experts. Cultural resources in the Area of Potential Effect (APE) are among the many environmental elements studied in depth as part of the EIS process. Accordingly, this highly focused by-product of an EA provides the baseline inventory data and evaluations of significance that are essential to informed cultural heritage management.

It should be noted, in conclusion, that the completion of an environmental assessment does not ensure a particular outcome, such as the preservation of an important archaeological site, nor does it guarantee that all concerns about the probable effects of a proposed undertaking will be resolved before the development can proceed. Rather, the EA process aims to make certain that decision makers will be reasonably knowledgeable about the full range of environmental consequences associated with a proposed action in order to weigh the relative costs and benefits of the undertaking in question from an informed basis. Its purpose is to ensure that decision makers take into consideration cultural resources, among the many other environmental factors studied, when deciding how best to achieve a desired end. The principal objectives of cultural heritage management are thus served.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management: Project Management
- ▶ Heritage and Public Policy
- ▶ Heritage Areas
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ United States: Cultural Heritage Management

Further Reading

Eccleston, C.H. 2011. *Environmental assessment: A guide to best professional practices*. Boca Raton: CRC Press.

Eccleston, C.H., and F. March. 2010. *Global environmental policy: Concepts, principles, and practice*. Boca Raton: CRC Press.

King, T.F. 2008. *Cultural resource laws and practice: An introductory guide*. 3rd ed. Walnut Creek: AltaMira Press.

King, T.F. 2009. *Our unprotected heritage: Whitewashing the destruction of our cultural and natural environment*. Walnut Creek: Left Coast Press.

Environmental Education and Archaeology

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Introduction

A few years ago, near the dawn of the twenty-first century, the French philosopher and sociologist Edgar Morin proposed seven necessary kinds of

knowledge for the education of the future. Among them was the need to know about earth identity, e.g., knowledge of current planetary developments that will accelerate in the twenty-first century, and recognition of our earth citizenship (Morin 1999). In 1977, in the Tbilisi Declaration, which adopted by the world's first intergovernmental conference on environmental education organized by UNESCO, the role of education "in the face of environmental problems and opportunities" was recognized as "crucial" (UNESCO 1978: 12). After that, reinventing the interactive human-natural relationship – the environmental settings of human habitation together with the plant and the animal environment – is seen as an important part of a future society suited to sustainability and development. To understand this important relationship, however, we need to approach it in its historical dimension as well. Therefore, the study of the environment and the environmental change has always been one of the most important fields of archaeological research. Thus, the birth of environmental archaeology in the 1960s was a rather expected development. Today, the investigation of the ancient environment and especially of the relationship between ancient societies and their environment together with the clarification of their ecological context is at the heart of any archaeological research.

Definition

The natural environment is not only a physical landscape or a food and shelter provider. It also determines who we are, our individual national, local, and global identities. Consequently knowing and understanding it critically is substantial for our being. This is the role of environmental education, and in this role, we must look for the contribution of archaeology.

The idea of environmental education has been defined in several ways since the first systematic conjunction of education with environmental studies. A classic definition, formulated by the International Union for Conservation of Nature in 1970 describes it as ". . . the process of recognizing values and clarifying concepts to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture, and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulating of a code of behavior about issues concerning environmental quality" (IUCN 1970: 11). In the "Belgrad Charter" which was the final statement of an essential international workshop held in Belgrad, the participants adopted a framework for environmental education. They define its goal as: "To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones" (Belgrad Charter 1975: 3).

According to the late 1990 studies (Sauvé 2002: 1–4), environmental education considers the environment as:

- Nature to be appreciated, respected, and preserved
- Resource to be managed or to be shared
- A problem to be avoided or to be solved
- A system to understand for improving decision-making
- A place to live
- The biosphere in which we live, and we develop an earth consciousness
- A community project to become actively involved
- The territory of indigenous peoples in which they construct and attest their cultural identities
- The landscape which incorporates historical development and symbolic components

Environmental education is also linked, in the 1990s, to the concept of sustainability. This connection gives to the discipline a critical perspective for the future (UNESCO 1997). It makes it also more substantive since it takes into account the need to "combine environment and development concerns," and "for reconciliation between economic development and environmental conservation," "within a socio economic and political context" (Tilbury 1995: 197). Furthermore, the need for expanding the field through multidisciplinary frameworks enriching it from critical pedagogy's point of view of the environmental justice movement, while the principles of place-based education were expressed in the twenty-first century (Cole Gahl 2007).

On the other hand, environmental archaeology is the study of human interaction with the natural world (Renfrew and Bahn 2016). Major humanity's issues are intimately related to the modification of the environment). The domestication of plants and animals, the use of fire, field cultivation and field creation even with deliberate deforestation, the pollution of air and water, etc., are crucial aspects of the human culture history (Renfrew and Bahn 2016: 272). Besides, it is essential to understand "the role of the cognitive matrix of environmental perception and decision-making" for the relationship between culture and environment (Hassan 2006: 328). It is easy to conclude that environmental archaeology could be a handy educational tool for environmental education in general and even more so if the purpose of this education is to acquire environmental literacy. Environmental literacy "is the capacity of an individual to act successfully in daily life on a broad understanding of how people and societies relate to each other and natural systems, and how they might do so sustainably. The accomplishment of this requires sufficient awareness, knowledge, skills, and attitudes to incorporate appropriate environmental considerations into daily decisions about consumption, lifestyle, career, and civics, and to engage in individual and collective action" (Campaign 2007).

Historical Background

Archaeology's interest for the environment as the scene of human action and the provider of the means of survival begins in the nineteenth century. Today, in the context of environmental archaeology, the interactive relationship between humans and nature is an essential field of archaeological research (Reetz and Shackley 2012). A brief reference to some key points of the involvement of archaeology's interest in the environment with education is useful to understand their engagement (Fig. 1).

In 1943, during the Second World War, the prehistoric archaeologist Grahame Clark wrote an article in the 67th issue of the journal *Antiquity* under the title "Education and the Study of Man." There, for the first time, some principles, which are later found in the theory and practice of environmental education, have been put forward. He proposed, under the influence of the results of WWII war, the use of anthropology and prehistoric archaeology to make education more man-centered and oriented towards a shared future. This view is reflected from the experiences of the war and expresses the necessity of realizing the unity of the human race and its common origin through anthropological and archaeological education. G. Clark argued this way against an education that adds to the competition and the individuality of professional specialization and has the painful side effects that people experienced during the war in the early 1940s. Following the scientific facts and the archaeological theory of his time, the need for multidisciplinary interaction of various sciences and the study of man's position in nature in this context are the pillars of G. Clark's thinking.

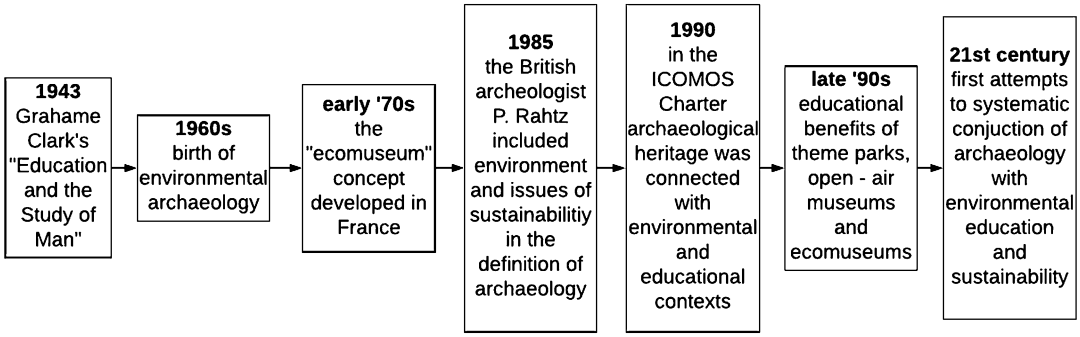

Environmental Education and Archaeology, Fig. 1 Steps in the history of the engagement of Environmental Education with archaeology

Nevertheless, modern environmental education and the systematic interdisciplinary interest of archaeology for the ancient environment, e.g., environmental archaeology, were born almost together in the 1960s. In the early 1970s, the "ecomuseum" concept has also been developed in France. In 1985 the British archaeologist P. Rahtz included in his definition of what archaeology is the environment as one of its main concerns: "in which (environment) mankind has developed and in which man still lives," a statement that also raised issues of sustainability (Henson 2004: 28). However, the use of archaeological record as educational data was and still is, sometimes, not self-evident. Archaeologists have largely ignored environmental education, while environmental educators are, often, not equipped with a solid background in sociology or cultural history (Reetz and Quackenbush 2016: 500). In the late 1990s, for example, the educational benefits of experimental archaeology reconstructions, theme parks, open-air museums, ecomuseums, etc., in particular environment settings, worldwide, like the Butser Farm in the UK or Lake Dwellings in France, were already highlighted (Stone and Planel 1999). It is noteworthy, although, that there was not, still, any reference to environmental education.

The absence of any mention to archaeology in the declarations of the international meetings concerning environmental education is also quite revealing to this direction. In the IUCN Final Report, there is not any direct reference to archaeology. It was noted that environmental education should be spread across all school subjects as a multidisciplinary science-centered subject. Furthermore, it was agreed that ecology, conservation, geography, geology, hydrology, agriculture, botany, zoology, chemistry, physics, etc., should be used as subject matter areas, while elements of mathematical reasoning should be utilized in the educational process of decision-making. Historic sites and battlefields, though, were between the selected for outdoor study sites. (IUCN 1970: 11–12, 15).

In the Belgrad Charter (1975: 4) is proclaimed that "environmental education should consider the environment in its totality" including its cultural dimension. In the Final Report of the Tbilisi Declaration, in 1977, a particular reference to the value of monuments and sites was made for the first time: "the Conference recommends to Member States that: environmental education should aim at creating awareness, behavioral attitudes and values directed towards preserving the biosphere, improving the quality of life everywhere as well as safeguarding ethical values and the cultural and natural heritage, including, holy places, historical landmarks, works of art, monuments and sites, human and natural environment, including fauna and flora and human settlements" (UNESCO 1978: 30). Finally, in the International Council on Monuments and Sites' (ICOMOS) Charter (1990) is stated, in the second Article, that "Policies for the protection of the archaeological heritage should constitute an integral component of policies relating to land use, development, and planning as well as of cultural, environmental and educational policies." Despite the increasing recognition of the importance of archaeology for education, its relationship to environmental education cannot yet be considered as a regular one. Besides, environmental education has not been of concern to archaeologists and archaeology has not been of interest to environmental educators till recently.

Key Issues/Current Debates

Environmental education is a political action in the present (Hakansson et al. 2018). It involves state and community politics, policy and social ideas, decision-making, and appropriately designed curricula with specific goals and objectives. In this context and based on the relevant international research on environmental education (Sauvé 2002; Stevenson et al. 2013) and environmental archaeology (Carman 2016; Hassan 2006; Reetz and Shackley 2012), the interconnection between environmental education and archaeological theory and data could be sought on five interdepended and interactive levels: the ecological, the economic, the social, the symbolic, and the cultural (Fig. 2).

The understanding of the dialectic relationship between man/woman and natural environment and of the historicity of this relationship is at the core of the ecological level. In this case, the study, through environmental archaeology, of how he/she exploited the land, plants, animals, and other natural resources in antiquity creating at

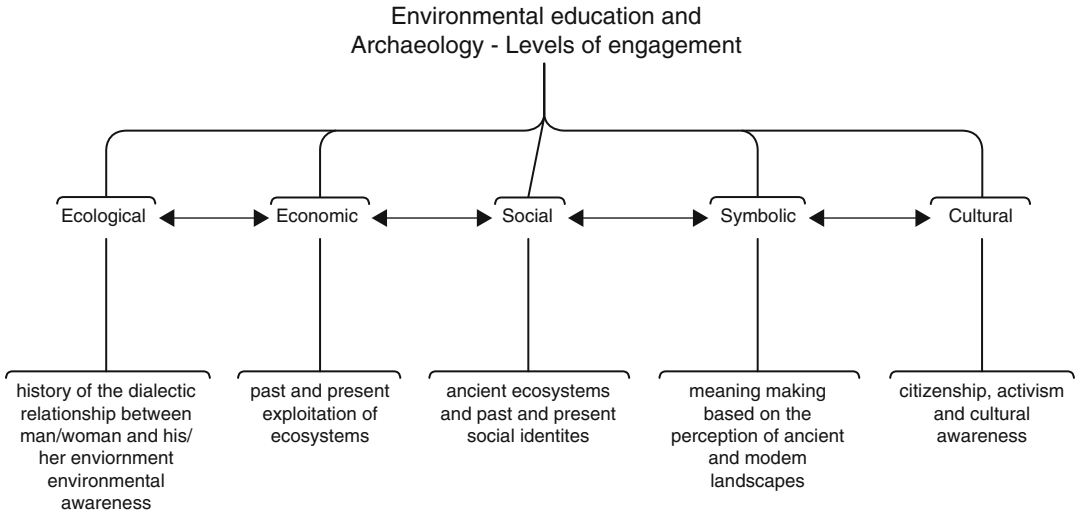

Environmental Education and Archaeology, Fig. 2 Engagement levels between environmental education and archaeology

the same time his/hers social landscape is of great importance. A critical aspect of this level is also the fact that ancient social landscapes are integrated today, as archaeological or historic sites, into modern landscapes. Therefore, the determination of their perception by the wider public as part of the contemporary environment is also needed. Ancient landscapes acquire added value and particular meaning in these circumstances. Statements about the need of protection and preservation of these almost sanctified landscapes are then commonplace, and they are also more readily accepted as cultural resources by the residents and the wider public.

The economic level refers to the study of how people survive in antiquity and how the humankind exploits the various ecosystems and their changes over time. It emphasizes the importance of the environment as the leading provider of natural resources in ancient civilizations also making the necessary projections about the same necessities today. It helps, finally, to realize the new exploitation possibilities of archaeological sites, which can be, due to their potential touristic value, areas of economic and sustainable development for the local communities.

The social level consists of two parameters. The determination of the form of the ancient social relations in a particular environmental setting is the first one. The second is about the way in which an ancient monument or an archaeological site as part of the modern landscape can affect and formulate the modern social environment. This landscape is part of a visible and instantly present past. It is also so familiar and so unknown to manage in the particular socio-economic and political context of modern communities. Besides, many times these communities are on the periphery, away from the administrative centers of a country where the decisions about the exploitation, the preservation, and heritage management protection of these landscapes are made. This management of monuments and archaeological sites sometimes causes local social changes considering, for example, the various possible interpretations and the touristic uses of a particular natural and cultural environment.

The symbolic level is also twofold. It concerns the determination of the ancient societies' symbolic representations based on the reception of the natural environment and the construction of collective memory. It is also related to the symbolic meaning making and the sense of place by the contemporary local communities. This meaning is created while the locals are dealing with the visible and continuously present ancient monuments and sites in their surrounding environment, and it is possible to be transformed during and after the archaeological interpretation management of this heritage.

Landscapes reflect cultural meaning. Thus, concerning the cultural level, archaeology and environmental education are related to each other not only by the general appreciation of the ancient heritage or by the knowledge about it. They are connected principally by the activism of citizens who are ready to participate in preserving and protecting the cultural environment, part of which are the archaeological sites and monuments. This activism requires the cultivation of cultural consciousness, spirit, and awareness by emphasizing the role that could be played by the local communities enhancing their activism associated with contemporary cultural and ecological problems.

As a result of this mixture of perspectives, archaeology could contribute significantly to the goals of environmental education and to creating environmental literacy. This contribution may be associated with the cultivation of the five essential components of environmental literacy – awareness, knowledge, attitudes, skills and collective action – outlined in the Campaign's Environmental Literacy Ladder (Campaign 2007). Archaeology-based thinking can undoubtedly increase awareness of the human life–natural environment relationship. It also provides knowledge about ancient ecosystems and their evolution which ensures the concern for the historic environment. It contributes to the creation and reinforcement of attitudes and values for it. Personal and collective action and civic participation, finally, are popular requests to achieve the objectives of public archaeology and cultural heritage management.

For example, archaeological sites are suitable for place-based education (Sgouros and Stirn 2016). Archaeological parks open-air museums and ecomuseums are the appropriate places for educational programs aimed both at acquaintance and understanding of the natural environment and of the anthropogenic interventions in it, while they also enhance the local communities' participation and their ecological consciousness. These activities highlight not only the historical dimension in the shaping of the environment but also develop an essential relationship of modern local societies with it fostering a sense of belonging (Reetz and Quackenbush 2016: 498–501), influencing the creation of individual social identities.

The success of environmental education concerning archaeology, however, depends also on the implementation of the appropriate learning theories, teaching methods, and processes. Some of the main pedagogical principles governing environmental educational actions (Stevenson et al. 2013) could be combined with archaeological theory and practice. Problem-solving and critical thinking are both necessary skills for the confrontation with the puzzles of archaeological inquiry and issues concerning the educational use of archaeology. Constructivism and the pursuit of critical thinking, together with experiential learning, are, for example, already applied in museum education and educational programs in archaeology. The active participation of the learners and working in groups are also prerequisites for successful educational activities and actions.

The objective of establishing environmental literacy can be integrated into the more general educational goals of teaching. It focuses on multiliteracies – e.g., on meaning making in different cultural, social, and specific domain contexts in a multimodal way – and in the pursuit of reinforcement citizenship, that is, the need to being active as a citizen confronting the different and complex, local and global, today's challenges. The use of the appropriate didactic approach is a matter of great importance. Teaching scenarios based on the principles of environmental education enriched with archaeological content and thinking, the use of the Project methodology, the learning by design and the problem-solving pedagogical methods aiming at decision-making, and producing knowledge by the students may be an appropriate learning environment (Touloumis 2008). In this context, the students work in groups and make use of all available resources including on-site, place-based study, and they discover the old knowledge and produce the new one and, finally, they make their decisions offering their responses and solutions to environmental problems. The whole approach is based on the student's groups' communication and collaboration since their groups feedback each other. The notification of the above activities results to the public is a crucial element for the success of the whole educational approach. In this way, archaeology is not limited only to the provision of the relevant to the problem knowledge, but it contributes to the awareness and the suggested solution for the under environmental discussion problem.

Summing up, archaeology can

- Introduce the content, the principles, and the methodology of environmental archaeology in environmental education
- Emphasize on the cultural heritage management dimension of the environment as well
- Help to understand the historical aspect of the human-environment relationship, its social, economic, cultural, and symbolic parameters
- Highlight the importance of environmental change for through time.

It is crucial to realize, though, that this contribution is not another way to strengthen national identities or cultural supremacy based on antiquity. Instead, it is a way to be aware of the global human fate through the study of how ancient societies exploited, shaped, and gave meaning to their physical environment, while they also care for its protection and preservation as it was their primary productive force. It is critical so to detect the sociopolitical discourses which are behind the design of environmental education programs. It is crucial to reveal the social and cultural values and the attitudes concerning the ancient and the modern environment which is encouraged by the environmental education programs in any case and to determine how archaeological theory and thinking can affect their final formulation.

International Perspectives

Although the role of archaeology in regular education is not yet well defined and much has to be done in the future in this direction, there is a strong tendency various archaeological issues to be included in environmental educational programs designed by specialists, educators, and archaeologists. The latter increasingly recognize the importance of combining archaeology with environmental education and sustainability as a means of acquainting archaeology with the public (Carman 2016; Reetz and Quackenbush 2016). The Greek case may be a good example for the whole topic. Environmental education was introduced in the Greek school system for the first time in the late 1970s (1977) as an arbitrary or voluntary action. In the 1990, it was incorporated by legal authorization in the Greek educational system (Flogaitis and Alexopoulou (1991: 341). Today it is integrated in the Greek school curricula both as a formal course in the first 4 years (ages 6–10) of primary education – in the classes textbooks titled *Environmental Study* there are separate chapters about Culture including monuments but in a sense of knowing Greece as a country or even fatherland – and as a rather optional semi-formal or informal activity mainly, in the secondary education.

Today, apart from the official bodies of the Greek Ministry of Education and its local administrators, the providers of environmental education in Greece include environmental education consultants of the Greek Ministry of Education, nongovernmental organizations, the National Association of Teachers for Environmental Education, and the management boards of natural parks. Moreover, several University departments have established graduate and postgraduate programs dedicated to environmental education. The Environmental Education Centers all over the country, where specialized staff prepares environmental educational programs in which teachers and students of different schools participate producing a strong collaborative network, are of essential importance despite the problems they face due to financial difficulties in recent years (Yanniris 2015).

Even there is not an official specific study or survey to prove it, a quick review of the existing educational, environmental programs in Greece shows that they are mainly science-oriented and that their objectives are acquiring knowledge and attitudes about the environment and environmental problems as such. Until recently, there were not many programs that involved archaeology. In recent years, however, several similar programs have been developed by the Greek Ministry of Culture, as part of its educational programs in museum settings. In schools, however, environmental projects involving archaeology are still relatively few and are being developed mainly by teachers who have studied archeology. However, the trend of producing such projects is increasing.

The implementation of larger programs such as the designed and organized since 2012 by the Greek Ministry of Culture "Green Cultural Routes," in the

context of its participation in the National Project for Education and Sustainable Development, or the European Ecological Network for the nature protection "Natura 2000" helped a lot in this direction. These projects facilitated the creation of synergies between the Environmental Education Centers, museums, Greek Ephorates of Antiquities, cultural organizations, and local cultural societies. They include activities like walks in nature, virtual art, lectures, and thematic guided tours to archaeological sites, to museums, and to landscapes of natural beauty, alongside with educational programs for school groups, families, specific audiences, people with disabilities, and other communities (Department of Education 2018).

When students are actively involved in these projects, they usually observe and concentrate data about the archaeological sites, they compare the ancient with the modern landscape, and they make their own narrations about the history of certain archaeological sites and places. Theatrical plays and other games are very often essential parts of these projects. The titles of some of the recent years respective programs which were carried out by the Greek Ephorates of Antiquities are characteristic for their goals: "Pottery: Art from soil and water," "Recognizing the flora of an ancient site," "Green trips in time: Walking at the castle," "Archaeological tours in the Ancient and Byzantine monuments," "Natural landscapes, cults and ancient cities," "Crops and seed treatment: from the past to the present," "Histories with plants. Plants with History," "The caves and their role in building the natural and cultural environment."

This kind of activities creates an interesting connection between archaeology and environmental education in Greece that could be further developed. The bond they create between the public, the archaeology, and environmental issues is an opportunity for archaeology to become more prestigious and important to the public's consciousness and to cause wider cultural and environmental awareness. To verify it, however, more surveys are needed to investigate whether this connection contributes to and enhances the apprehension of archaeology by the public or it only concerns fun and entertainment without any long-lasting impact on the uptake of archaeology's environmental dimensions.

Future Directions

According to a rather recent reference manual about environmental archaeology "environmental archaeologists are in unique positions to provide historical and global perspectives on environmental issues to the public, community leaders, conservation biologists, resource managers, and policy makers" (Reetz and Shackley 2012: 475). This declaration also indicates the remarkable prospects for the future relations of environmental education with archaeology.

Two parameters appear to be decisive for the future directions of this relationship. Firstly, it is necessary to incorporate archaeology into the academic curricula of environmental education and to reinforce at the same time the existing links between archaeology and formal environmental education in schools. Besides, it is important more professional archaeologists engage in education and particularly in environmental education. It would be worthwhile too to incorporate archaeological terminology into the vocabulary of environmental school and academic curricula. By doing this, archaeology can be fully integrated into the formal educational tools of environmental education. It will contribute so to the construction of the environmental education's "grammar" and "syntax," also taking into account the new challenges – like the use of Information and Communication Technologies (ICT), or the rapid ecological transformations, for example – faced by all academic disciplines, including archaeology, for an effective global sustainability science (Hudson 2013).

Secondly, since environmental education is increasingly linked to sustainability, it is inevitable that the contribution of archaeology to it will also be driven by this axis in the future. Despite any doubts concerning if archaeology as a discipline is amenable to sustainability – which raise the question as to whether archaeological record or process is finite or renewable as an academic discipline and a set of practices – the close connection between archaeology and heritage management, regarding, in particular, the preservation of historic sites, is a matter of significant "public value" (Carman 2016, 138–139, 145, 147). After this connection, archaeology can be linked to sustainability and develop in this direction its educational objectives and practices using the

appropriate educational tools and techniques. It could, thereby, contribute to creating the conscious and active citizen of the future as a science that studies the past without being disconnected from the present and its challenges.

Cross-References

- ▶ Adult Education in Archaeology
- ▶ Constructivism in Archaeology Education
- ▶ Environmental Archaeology and Conservation
- ▶ Formal Education up to Age 18, Archaeology in
- ▶ Heritage Values and Education
- ▶ Material Culture and Education in Archaeology
- ▶ Museum Education and Archaeology
- ▶ Narrative and Storytelling for Archaeological Education
- ▶ Public Archaeology and Education: Present Relevance to the Past
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Sustainability and Cultural Heritage
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

References

Belgrad Charter. 1975. *The Belgrad Charter: A framework for environmental education*. Available at http://unesdoc.unesco.org/images/0001/000177/017772eb.pdf. Accessed 31 July 2018.

Campaign for Environmental Literacy. 2007. *What is environmental literacy*? Available at http://www.fundee.org/facts/envlit/whatisenvlit.htm. Accessed 31 July 2018.

Carman, J. 2016. Educating for sustainability in archaeology. *Archaeologies: Journal of the World Archaeological Congress* 12 (2): 133-152. https://doi.org/10.1007/s11759-016-9295-1. Available at https://link.springer.com/article/10.1007/s11759-016-9295-1. Accessed 31 July 2018.

Cole Gahl, A. 2007. Expanding the field: Revisiting environmental education principles through multidisciplinary frameworks. *The Journal of Environmental Education* 38 (2): 35–45.

Departrment of Education and Communication. 2018. *Exploring Green cultural routes*. Hellenic Ministry of Culture and Sports. Available at https://www.culture.gr/DocLib/PPD_entypo_2018_en.pdf. Accessed 31 July 2018.

Flogaitis, E., and I. Alexopoulou. 1991. Environmental education in Greece. *European Journal of Education* 26 (4): 339–345.

Hakansson, M., L. Ostman, and K. Van Poeck. 2018. The political tendency in environmental and sustainability education. *European Educational Research Journal* 17 (1): 91–111.

Hassan, F.A. 2006. Ecology in archaeology: From cognition to action. In *A companion to archaeology*, ed. J. Bintliff, 311–333. Malden (USA), Oxford (UK) and Carlton, Victoria (Australia): Blackwell.

Henson, D. 2004. Archaeology in schools. In *Education and the historic environment*, ed. D. Henson, P. Stone, and M. Corbinshley, 24–32. London: English Heritage/Routledge.

Hudson, M.J. 2013. Navigating disciplinary challenges to global sustainability science: An archaeological model. *Documenta Praehistorica XL* 40: 219–225.

I.U.C.N. 1970. *International working meeting on environmental education in the school curriculum*. Carson City/Nevada, June/July. Available at https://portals.iucn.org/library/sites/library/files/documents/Rep-1970-001.pdf. Accessed 31 July 2018.

Morin, E. 1999. *Seven complex lessons in education for the future. Education on the move*. Paris: UNESCO.

Reetz, E.J., and W. Quackenbush. 2016. Creating collaborative learning opportunities for indigenous youth with archaeology – Based environmental education. *Advances in Archaeological Practice* 4 (4): 492–502. The Society for American Archaeology. https://doi.org/10.7183/2326-3768.4.4.492.

Reetz, E.J., and M. Shackley. 2012. Environmental archaeology. In *Manuals in archaeological method, theory and technique*. New York/London: Springer.

Renfrew, C., and P. Bahn. 2016. *Archaeology: Theories, methods and practice*. Seventh ed, 233–272. London: Thames and Hudson.

Sauvé, L. 2002. Environmental education: Possibilities and constraints. *Connect, v. XXV11* 1 (2): 1–4.

Stevenson, R.B., M. Brody, J. Dillon, and A.E.J. Wals, eds. 2013. *International handbook of research on environmental education*, American Educational Research Association. New York/London: Routledge.

Sgouros, R.A., and M.A. Stirn. 2016. Community heritage and place-based learning at the Linn site, Idaho. *Advances in Archaeological Practice* 4 (4): 479–491.

Stone, P.G., and P.G. Planel. 1999. *The constructed past. Experimental archaeology, education and the public*, One world archaeology series 36. London/New York: Routledge.

Tilbury, D. 1995. Environmental education for sustainability: Defining the new focus of environmental education in the 1990s. *Environmental Education Research* 1 (2): 195–212.

Touloumis, K. 2008. Digital heritage as a dynamic source in the school of information and knowledge: Teaching scenarios and applications using information and communication technologies (ICT). In *Digital heritage in the new knowledge environment: Shared spaces and open paths to cultural content*, ed. M. Tsipopoulou, 85–88. Athens: Directorate of the National Archives of Monuments. Hellenic Ministry of Culture.

UNESCO. 1978. *Intergovernmental conference on environmental education, final report*. Paris. Available

online at http://unesdoc.unesco.org/images/0003/000327/032763eo.pdf. Accessed 31 July 2018.
UNESCO. 1997. *Educating for a sustainable future. A transdisciplinary vision for concerted action*. Available at http://www.unesco.org/education/tlsf/mods/theme_a/popups/mod01t05s01.html. Accessed 31 July 2018.
Yanniris, C. 2015. 20+ years of environmental education centers in Greece: Teachers' perceptions and future challenges. *Applied Environmental Education and Communication* 14: 149–166.

Further Readings

Guttmann-Bond, E. 2010. Sustainability out of the past: How archaeology can save the planet. *World Archaeology* 42 (3): 355–366.
Palmer, J. 2002. *Environmental education in the 21st century: Theory, practice, progress and promise*. London/New York: Routledge.
Tainter, J.A. 2010. A framework for archaeology and sustainability. In *Archaeology. Encyclopedia of life support systems*, ed. D.L. Hardesty, 425–453. United Kingdom: EOLSS Publishers/UNESCO.

Environmental Reconstruction in Archaeological Science

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Introduction

Environments are the totality of biological and physical variables that impinge upon an organism. Most archaeological research requires some knowledge of the environmental contexts in which humans or our ancestors made decisions, performed activities, and engaged with each other and their surrounding world. Therefore, many, if not most, archaeologists require some knowledge of past environments to address questions about past societies.

Whether driven by climate, population dynamics, disturbances, or other agents, environments are constantly changing, thereby altering organism-environment relationships. Humans and other organisms may alter properties of their environments through their decisions, movements, consumption, and other behaviors. Such alterations can have long-term evolutionary legacies (Odling-Smee et al. 2003). To disentangle these relationships and understand their consequences, archaeologists must take advantage of environmental reconstructions.

Definition

Archaeologists cannot directly observe past environments. Rather, they must reconstruct properties of past environments on the basis of indirect evidence or proxy data. *Environmental reconstruction* is the process through which archaeologists assemble relevant evidence from biological, geological, historical, or archaeological sources to infer properties of past environments. These reconstructions can be qualitative or quantitative and are constructed from archaeological and non-archaeological records. Reconstructions often emphasize properties of the local or regional biological communities but may also focus on inferring properties of past climates.

There are diverse strategies for reconstructing paleoenvironments in archaeological research. Projects might include environmental archaeologists or paleoenvironmental specialists as part of the research team or utilize a wealth of paleoecological reconstructions that have been produced by other scientists. For example, publicly available paleoclimate datasets can be accessed through the National Oceanic and Atmospheric Administration's Climate Data Center (http://www.ncdc.noaa.gov/paleo/paleo.html). Within the NOAA web portal, climate reconstructions as well as databases for charcoal, pollen, speleothems, and other proxy records are available. Regardless of the particular research strategy, all interpretations of past environmental data rely on the strength of stratigraphic and chronological control over the contexts from which the material has been collected and on uniformitarian assumptions that provide environmental meaning for biogeophysical data.

Biological Sources of Environmental Information

Biological proxy data used to reconstruct past environments broadly conforms to one of three types: (1) indicator taxa, (2) assemblage analysis, and (3) biophysical responses. Indicator taxa are used

to reconstruct particular environmental properties – usually microclimatic properties – on the basis of the presence or absence of particular taxon that has a narrow range of suitable habitat conditions. Insect remains (e.g., *Coleoptera* or beetle remains) have proven extremely useful in reconstructing rapid, microclimate changes (Lowe and Walker 1997; Egan and Howell 2001). In other cases, indicator taxa may be used to identify the timing of human impacts, particularly in island environments (Redman 1999), based on the presence of translocated species.

Plant, animal, and palynomorph assemblages are used qualitatively to identify particular ecological communities by comparison to modern analogs. Paleoecological assemblage analysis can be used to reconstruct the structure and composition of biotic communities, or it can be used for climatic inferences. For example, the movement of biotic communities identified in pollen assemblages is a proxy for climatic shifts by using their modern climatic tolerances as a basis for analogy. Quantitative reconstructions convert the proportions of taxa represented in the paleoecological assemblage to proportions of those taxa within the ancient environment. The taphonomy of these assemblages means that this process is never straightforward (see section "Key Issues" below). However, when one can control for taphonomic processes, quantitative algorithms or *transfer functions* convert quantitative paleoecological assemblage data for quantitative paleoenvironmental reconstructions.

In addition to looking at the presence or absence of a particular taxon, or the proportions of associated taxa in an assemblage, paleoecologists also measure the biophysical responses of individual organisms. Perhaps the best-known technique for analyzing biophysical responses in environmental reconstruction is dendrochronology – the study of precisely dated annual growth structures in woody plants (Speer 2010). The principle behind biophysical response analysis is that organism growth is affected by the most limiting factor in the environment. For example, in semiarid environments, moisture is the key growth-limiting factor. Therefore, patterns of standardized ring widths from trees growing in such environments can be used to quantitatively reconstruct past moisture patterns.

Geological Sources of Environmental Information

Sediments and soils are geological archives from which biological proxies may be collected, but they also serve as proxy records themselves. Geological proxy data are derived from the stratigraphy, morphology, mineralogy, and chemistry of landforms, soils, and sediments. Soils are the dynamic products of physical, chemical, and biological processes that alter sediments at and near the surface of the earth (Holliday 2004). Distinctive features of soils are reflective of the environments under which they formed. Specifically, soils are a product of the (1) climate, (2) biota that live in and on them, (3) topography, (4) the bedrock or sediment that is the parent material for soil formation, and (5) the time over which the other factors have been allowed to operate. These processes are not static. As a result, soils are often *palimpsests* of the processes that have acted upon them during the course of their formation.

Soils that retain properties from ancient but no longer active soil-forming factors are *paleosols*. Paleosols may be *buried soils* if they are no longer a part of active soil-forming processes due to subsequent burial. They may also be *relict soils* if they have been exhumed by subsequent erosion or were never buried. Properties of paleoenvironments may be inferred from soil chemistry (e.g., macronutrients, isotope composition), mineralogy, (macro-) morphology, and micromorphology (Holliday 2004; Goldberg and Macphail 2006).

In addition to serving as contexts for the accumulation of biological materials (see above) and as parent materials upon which soils may form, sediments may also be used to generate environmental proxy data. For example, the thickness of rhythmic variations in lake deposits (i.e., *varves*) can be used as a proxy for winter precipitation in some environments (Lowe and Walker 1997). Chemical sediments are minerals that are formed when ions precipitate out of solution. Chemical sedimentary proxies include evaporite minerals in paleolakes, laminated carbonates in speleothems, and biogenic carbonates in corals. Speleothems have become particularly attractive for paleoclimatic reconstructions, wherein the width of laminated bands and their isotopic composition appear to record varying amounts and sources of precipitation. Some

speleothems may preserve annual or quasi-annual banding and can often be dated directly using the uranium decay series (Lowe and Walker 1997).

Geomorphology, the study of landforms and their origin, is one of the oldest approaches to reconstructing past environments. Certain landforms only develop as a consequence of particular sedimentary processes that occur under certain climatic conditions (e.g., moraines will only form along the margins of an active glacier). Anachronistic landforms indicate paleoenvironmental conditions that contrast with contemporary ones. Stratigraphic relationships between landforms also preserve evidence of environmental changes and their relative chronology (Goldberg and Macphail 2006).

Historical Sources of Environmental Information

Historical records are a valuable source of paleoenvironmental information for certain times and certain places. Like other records, historical documents are subject to varying forms of bias in their formation. Unlike biological, geological, and archaeological biases, which are taphonomic (see section "Key Issues" below), biases in historical documents originate with the author of the documents. Recorder reliability, motivation, and conflicts of interest must always be taken into consideration when interpreting historical documents. However, historical observations can yield invaluable clues to the structure and composition of past environments (Russell 1997). Seemingly mundane, economic observations of planting and harvesting dates, for example, have been used to reconstruct paleotemperature changes (Egan and Howell 2001). Visual depictions of past landscapes and biota, which include rock art, landscape paintings, and early photographs, and ancient maps are also sources of information on past environments. Maps and written records of historical property surveys, for example, are samples of past forest composition that have been used for semiquantitative reconstructions of species changes in recent centuries (Russell 1997; Egan and Howell 2001).

Archaeological Sources of Environmental Information

Archaeological sites are archives for biological and geological proxies linked directly to human-related environmental contexts. Care is required in the use of these records because the unique formation processes of paleobiological assemblages at archaeological sites affects the relevance of archaeological proxy data for landscape reconstructions (Dincauze 2000). Archaeological deposits are particularly valuable for paleoenvironmental reconstructions because they provide opportunities for age control through archaeological cross dating. Archaeological deposits are also locations of anthropogenic sedimentation that may bury paleobiological remains that might not otherwise be preserved (Lyman and Cannon 2004).

Historical Background

By the middle of the nineteenth century, Charles Lyell and Louis Agassiz demonstrated that the Earth had great antiquity. Their writings also indicated that the Earth had experienced climates and biota that were extinct or were no longer representative of contemporary environments. Ultimately, it was the stratigraphic relationship between Paleolithic artifacts and Ice Age deposits, landforms, and biota that unequivocally demonstrated the antiquity of human cultures in Europe and North America (Meltzer 2009).

The late nineteenth and early twentieth century was a period of methodological development in the study of ancient environments. Much of this initial work was dedicated to chronology, including Gerard De Geer's pioneering varve chronology that estimated the duration of the Holocene epoch and the development of dendrochronology by A. E. Douglass (Speer 2010). The study of pollen assemblages extracted from the varves described by De Geer was used to generate the first four-part environmental subdivision of the Holocene, now known as the Blytt-Sernander periodization (Lowe and Walker 1997). Although Douglass recognized that variability in ring width was related to past climates, it was not until the 1960s that the potential of tree rings as quantitative proxies for annually resolved paleoclimate reconstructions was developed (Speer 2010).

In 1937, American anthropologist Julian Steward advocated that archaeologists understand each

culture – and culture change over time – in its ecological context. This position ultimately became influential for the generation of "new" archaeologists in the 1960s and 1970s. In the late 1940s and early 1950s, the pioneering excavations of Grahame Clark at the Mesolithic site of Star Carr contributed to the changing perspectives of Anglophone archaeologists from an emphasis on culture history and artifact taxonomy to the ecological and economic study of past societies. The Star Carr project, as well as the research of Robert Braidwood in Iraq, demonstrated the value of interdisciplinary collaborations in both fieldwork and analysis that produced environmental reconstructions at appropriate scales and resolutions for addressing human-environment research questions (Fagan 2001).

By the 1970s, quantitative analysis of pollen assemblages was being used to track the geographic patterns of dispersal and migration of plant taxa after deglaciation as well as to identify paleoenvironments that have no modern analog (Lowe and Walker 1997; Egan and Howell 2001). By this time, quantitative methods were developed to transform tree-ring width measurements and statistically calibrate them to historic climate observations to retrodict annual climate properties over multiple centuries or longer (Speer 2010). In recent decades, techniques for collecting starch grains and plant opal phytoliths from soils and sediments and the increasing accessibility of mass spectrometers have improved the range of independent proxies for environmental reconstruction. Analyses of light isotopes (carbon, nitrogen, and oxygen) from bones and shells to reconstruct paleoenvironments and paleo-diets have also become more commonplace (Dincauze 2000).

Key Issues

All environmental reconstructions rely on the interpretation of proxy records. Therefore, it is critical that all paleoenvironmental studies are conducted with explicit concern for (1) how the proxy records form or the *taphonomy* of the proxies and (2) the nature of the space-time relationships between proxies and their related environmental variables. Mismatches in spatiotemporal scale can undermine comparative analyses. Variance in the spatiotemporal scales and resolutions of archaeological and environmental records will become increasingly salient as global-, hemispheric-, and continental-scale environmental records are used by archaeologists to understand their local or regional archaeological records.

- *Taphonomy, Spatiotemporal Scale and Resolution, and Lagged Responses*

  All biophysical and geological proxies must be interpreted with an understanding of how the record formed. Some biological remains, particularly some wind-borne pollen grains, can be transported great distances before they are deposited. Others, such as microfaunal remains from archaeological contexts (Dean 2005), are unlikely to move far from where they lived. In the case of palynological analyses, the nature of the sedimentary basin has implications for the spatial scale at which the assemblage is representative. Large lakes trap airborne pollen from a larger area than small lakes (Lowe and Walker 1997). Pollen from alluvial deposits originates primarily from the alluvial watershed but may be also contain pollen reworked from older deposits and wind-borne pollen from wider areas. Pollen of some taxa travels further than others and postdepositional weathering may add further bias by differentially degrading pollen (Egan and Howell 2001).

  Similar issues are pertinent for the *temporal* scale and resolution of sedimentary proxies. Discontinuous sampling of sediments for analysis can affect the inferred timing of paleoenvironmental changes. In the case of episodic records (e.g., sedimentary charcoal records), discontinuous sampling may entirely miss key events. Additionally, the size of the sampling interval in continuous samples limits the temporal resolution of the resulting record in ways that vary based on the rate of sediment accumulation. Bioturbation and pedoturbation may homogenize materials of different ages, further reducing the precision and resolution of proxies derived from such records.

  The issue of scale and relevance is important for paleobiological records from archaeological sites, as well. Whether they represent food remains or not, small mammals are less likely to be transported long distances from their

habitat by ancient hunters than large mammals, thereby making them more reliable proxies for local paleoenvironments (Dean 2005). Cultural formation processes further complicate the interpretation of paleobiological archives from archaeological deposits (Schiffer 1996). Because of differentiation in taphonomy, scale, and resolution, care must be taken when comparing environmental reconstructions using different proxies from different contexts.

Finally, different biota will respond to paleoclimate changes at different rates, related to their mobility and lifespan. Mobile and short-lived insect populations respond much more quickly to climate changes (see the entry on "▶ Paleoentomology: Insects and Other Arthropods in Environmental Archaeology" in this encyclopedia) than long-lived and immobile tree species that must rely on seed dispersal to "migrate" to new environments (Lowe and Walker 1997). The nature of the temporal response to environmental stimuli is the *lagged response* for a particular proxy. Lagged responses affect the temporal resolution and precision of paleoecological proxies and must be considered in the course of building environmental reconstructions.

- *Human Impacts on Ancient Environments*

Beyond descriptive accounts of past environments, scientists reconstruct paleoenvironments to identify causes of environmental changes. Testing causal explanations involves chronological comparisons of hypothetical cause and response variables. Demonstrations of correlation are not sufficient to infer causation, however. It is necessary to demonstrate that (1) changes in the causal factor precede the response and (2) to specify the mechanisms by which the hypothesized causal factor would drive the observed changes. The causal mechanism should be amenable to testing with additional paleoenvironmental or archaeological data.

Human impacts on ancient environments have long been controversial, but they have never been more visible in the academic literature than they are today (Redman 1999). Scientists recognize that humans, like all organisms (Odling-Smee et al. 2003), impact their environments (Redman 1999; Dincauze 2000) and that the likelihood of ancient human impacts is high, albeit variable in space and time. This does not necessitate that all environmental changes on human timescales were caused by ancient societies, however. Attribution of anthropogenic causes to environmental degradation in the past is particularly challenging because it is often used for political purposes. In light of the far-reaching implications and visibility of some human-environment impact narratives, archaeologists should be particularly careful to be rigorous, explicit, and precise in their use of paleoenvironmental, paleoclimatic, and archaeological evidence.

The interpretive challenges and political pitfalls of human-impacts research are well illustrated by the decades-old debate concerning the mass extinctions in the Late Pleistocene. The apparent chronological correlation between the colonization of North America and Australia and the extinction of most large terrestrial fauna has been used to implicate human predation or "overkill" as the cause of the extinctions. Beyond poorly resolved chronologies (Grayson 2007), however, there is very little direct evidence to support direct predation or "overkill" as a mechanism. Alternative explanations of climate-driven or human-induced habitat changes are also plagued by poor chronological resolution and poorly supported evidence for the causal mechanisms.

A novel study by Gill et al. (2009) demonstrates the value of using multiple, independent proxies at appropriate temporal and spatial scales to identify the relationships between key processes and test alternative hypotheses of "overkill" and climate change as causes of the extinction. Gill et al. (2009) estimated megaherbivore biomass through a palynological proxy (the dung fungus *Sporormiella*), infer past vegetation communities through pollen assemblages, and use micro-charcoal as a proxy for biomass burning. By measuring each proxy from the same samples, the authors built robust estimates of the temporal associations between proxies for key response and causal variables. These records indicate that herbivore populations began declining 1,000 years before major changes

in fire activity and vegetation occurred. Therefore, climate-driven habitat change and fire-driven habitat change can be excluded as causal factors because both vegetation and fire activity postdate the decline in herbivore populations. Even with the uncertainty of the radiocarbon chronology for these cores, the relative relationship of events is securely known because of the stratigraphic relationships between the samples. In the absolute chronologies, the decline in herbivore populations precedes the archaeological evidence for local human populations, thus rejecting the "overkill hypothesis" (Meltzer 2009).

- *Scale Mismatches in Environmental Analysis*

  The abundance of paleoclimatic reconstructions at the continental to hemispheric scales offers a wealth of analytical opportunities for reconstructing human-environment relationships. Careless comparisons of coarse-grained archaeological chronologies with hemispheric climate reconstructions, however, can lead to spurious conclusions. Given chronological uncertainties in archaeological datasets, one can find a reconstructed climate change that will roughly correlate with the culture change of interest. If the large-scale climatic phenomenon cannot be demonstrated to have local environmental impacts that affected the lives of human residents, however, such correlations are meaningless. For example, the Younger Dryas Chronozone was a period when many, but not all, Northern Hemisphere paleoclimate records indicate rapid cooling before the onset of the Holocene. It has been suggested that environmental changes during the Younger Dryas transformed Paleoindian cultures across North America, although given environmental variability across the continent, it is unlikely that it could have done so uniformly (Meltzer and Holliday 2010).

  Mismatches in scale must be carefully considered in large-scale *meta-analyses* that combine local records into regional- or continental-scale aggregates to identify emergent properties. Such meta-analyses reduce variance between records, thus enhancing the shared signal between them, presumably because of shared causal factors acting at the same spatial scale. With few exceptions, human activities are time transgressive and variable in space. Any influence that human activities may have had on local records would likely be removed from records aggregated in this way. Although archaeological records could be similarly aggregated at a large spatial scale, mismatches in the representativeness of meta-records from archaeology and paleoecology could lead to spurious conclusions.

  A recent effort to compare meta-analyses of charcoal records and radiocarbon-dated archaeological sites in the Australasian region illustrates the problems of mismatched scales and resolutions. Although both the aggregated fire history and archaeological datasets cover overlapping areas, the ecological zones represented by each dataset are not precisely the same (e.g., the western semiarid interior is well represented in the archaeological record and poorly represented in the fire record). When both datasets are aggregated, the lack of apparent correlation between the records led the authors to suggest that aboriginal Australians must have had no impact on past fires (Mooney et al. 2011). This conclusion is inconsistent with historical, ethnographic, and other paleoecological observations and is not warranted by the analytical methods because the datasets are mismatched in spatiotemporal scale. Such meta-analyses are likely to become more common in the future. Collaboration with archaeologists that includes appropriate scalar relationships between the datasets and their relevance to particular research questions will improve the quality of such endeavors.

Future Directions

Increasingly, environmental reconstructions are central components of archaeological research programs. These efforts improve our understanding of past societies, their legacies on their surroundings, and their responses to environmental changes. Environmental archaeology has an important role to play in addressing outstanding questions of human impacts on environments that have had evolutionary consequences for humans and other organisms. Recent hypotheses about the role of ancient land use affecting Holocene climates will also require archaeological testing. These are not exclusively academic endeavors.

Environmental archaeology has begun to contribute to discussions about solving modern social-environmental problems. Progress on these fronts will likely continue in the foreseeable future.

- *Human Contributions to Ancient Climate Change*

  Human agency in global warming since the industrial era is not in dispute among scientists. Paleoclimatologist William Ruddiman (2005), however, has provocatively suggested that human impacts on Earth's climate system long predate the industrial era. Ruddiman suggests (1) that deforestation for agriculture in temperate forests altered global carbon cycling beginning 8,000 years ago and (2) that the development of paddy rice agriculture increased tropical methane releases over the last 5,500 years. These greenhouse gas emissions stabilized Holocene climates and delayed the start of the next glacial period. From an atmospheric perspective, these hypotheses explain the anomalous relationships between carbon dioxide and methane concentrations in the Holocene relative to previous interglacial periods. At present, however, these hypotheses lack sufficient archaeological support. Archaeologists will play a key role in testing the Ruddiman hypotheses in the future with important implications for contemporary policy discussions regarding global warming.
- *Niche Construction and Human Biological and Cultural Evolution*

  Evolutionary biologists are increasingly turning their attention to the role of niche construction as an evolutionary process. *Niche construction* is the process by which organisms alter the selective pressures on themselves, their descendants, and other organisms in their environment (Odling-Smee et al. 2003). All organisms affect their environments, but humans are quintessential niche constructors. Explicit study of the evolutionary legacies of human behaviors and their environmental impacts is lacking, however. In the future, archaeologists and paleoenvironmental specialists will begin to untangle the role of niche construction in hominin evolutionary history.
- *Applied Research for Biodiversity Conservation or Ecological Restoration*

  Modern environments are a product of their history. Land managers and conservation biologists increasingly recognize the need to understand the history of a particular landscape to ensure its sustainability in an ever-changing world. Data about the variability in structure, composition, and key ecological processes of past environments are key to this type of management known as *applied historical ecology* (Swetnam et al. 1999). Archaeologists have been late to recognize their importance to this field but increasingly recognize that applied historical ecology needs archaeology to understand how humans contributed to past ecological structures, compositions, and dynamics (van der Leeuw and Redman 2002). Zooarchaeologists have spearheaded archaeological research that is relevant for contemporary environmental problems (Lyman and Cannon 2004), but other environmental archaeologists are poised to contribute as well. Archaeological contributions to applied historical ecology will require increased collaboration with non-archaeologists and, in most cases, will require research designs that are driven by non-anthropocentric questions and goals. This may be an uncomfortable future for archaeologists from anthropological traditions, but by emphasizing the social dimensions that are necessary to understand social-ecological sustainability, it is distinctly anthropological. Perhaps, in the future, environmental archaeology will be recognized as a cornerstone field within applied anthropology.

Cross-References

- ▶ Braidwood, Robert John
- ▶ Clark, John Grahame Douglas
- ▶ Dating Techniques in Archaeological Science
- ▶ Molluscs (Isotopes): Analyses in Environmental Archaeology
- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ North American Megafauna Extinction: Climate or Overhunting?
- ▶ North American Terminal Pleistocene Extinctions: Current Views
- ▶ Paleoentomology: Insects and Other Arthropods in Environmental Archaeology

▶ People as Agents of Environmental Change
▶ Phytolith Studies in Archaeology
▶ Soil Pollen Analyses in Environmental Archaeology
▶ Star Carr: Environmental Archaeology

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References

Dean, R.M. 2005. Site-use intensity, cultural modification of the environment, and the development of agricultural communities in southern Arizona. *American Antiquity* 70: 403–431.
Dincauze, D.F. 2000. *Environmental archaeology: Principles and practice*. Cambridge: Cambridge University Press.
Egan, D., and E.A. Howell, eds. 2001. *The historical ecology handbook: A restorationist's guide to reference ecosystems*. Washington, DC: Island Press.
Fagan, B. 2001. *Graham Clark: An intellectual biography of an archaeologist*. Boulder: Westview Press.
Gill, J.L., J.W. Williams, S.T. Jackson, K.B. Lininger, and G.S. Robinson. 2009. Pleistocene megafaunal collapse, novel plant communities, and enhanced fire regimes in North America? *Journal of Archaeological Science* 31: 133–136.
Goldberg, P., and R.I. Macphail. 2006. *Practical and theoretical geoarchaeology*. Oxford: Blackwell Science.
Grayson, D.K. 2007. Deciphering North American Pleistocene extinctions. *Journal of Anthropological Research* 63: 185–213.
Holliday, V.T. 2004. *Soils in archaeological research*. Oxford: Oxford University Press.
Lowe, J.J., and M.J.C. Walker. 1997. *Reconstructing Quaternary environments*. 2nd ed. London: Prentice Hall.
Lyman, R.L., and K.P. Cannon, eds. 2004. *Zooarchaeology and conservation biology*. Salt Lake City: University of Utah Press.
Meltzer, D.J. 2009. *First peoples in a new world: Colonizing Ice Age America*. Berkeley: University of California Press.
Meltzer, D.J., and V.T. Holliday. 2010. Would North American Paleoindians have noticed Younger Dryas age climate changes? *Journal of World Prehistory* 23: 1–41.
Mooney, S.D., S.P. Harrison, P.J. Bartlein, A.-L. Daniau, J. Stevenson, K.C. Brownlie, S. Buckman, M. Cupper, J. Luly, M. Black, E. Colhoun, D. D'Costa, J. Dodson, S. Haberle, G.S. Hope, P. Kershaw, C. Kenyon, M. McKenzie, and N. Williams. 2011. Late Quaternary fire regimes of Australia. *Quaternary Science Reviews* 30: 28–46.
Odling-Smee, F.J., K.N. Laland, and M.W. Feldman. 2003. *Niche construction: The neglected process in evolution*. Princeton: Princeton University Press.
Redman, C.L. 1999. *Human impacts on ancient environments*. Tucson: University of Arizona Press.
Ruddiman, W.F. 2005. *Plows, plagues, and petroleum: How humans took control of climate*. Princeton: Princeton University Press.
Russell, E.W.B. 1997. *People and the land through time: Linking ecology and history*. New Haven: Yale University Press.
Schiffer, M.B. 1996. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico Press.
Speer, J.H. 2010. *Fundamentals of tree-ring research*. Tucson: University of Arizona Press.
Swetnam, T.S., C.D. Allen, and J.L. Betancourt. 1999. Applied historical ecology: Using the past to manage the future. *Ecological Applications* 9: 1186–1206.
van der Leeuw, S., and C.L. Redman. 2002. Placing archaeology at the center of socio-natural studies. *American Antiquity* 67: 597–605.

Environmental Sampling in Mediterranean Archaeology

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Introduction

The Mediterranean region today possesses a large number of heterogeneous microenvironments. Hot, dry summers and wet, cool winters are common, but by no means invariable, while a high degree of variation in lithology, surface geology, and topographic relief produces fragmented vegetation zones ranging from desert to alpine, with abundant interfaces between zones. Overall, there is a pronounced altitudinal climate gradient, with upland regions often cooler and wetter. There is good reason to believe that environmental parameters had a strong influence on where ancient people chose to settle, the strategies they pursued in their management of crops and domestic animals, and the long-term success of these symbiotic human/plant/animal communities.

By definition, the process of environmental sampling involves taking samples, characterizing them according to certain parameters (size, age, species), and extrapolating from them to a larger population, in order to permit the identification of

variation on scales commensurate with archaeological data and questions, for example, the identification of wet and dry phases within the Holocene or a change in the relative representation of pine and oak pollen over the course of a site's occupation. Important variables such as temperature and rainfall may be attempted to be measured indirectly, through the use of proxy variables thought to have a predictable relationship to them. Since global climate also necessarily has an effect on local and regional environments, research into ancient environments also involves the use of world-level climate data.

Definition

Environmental sampling in the Mediterranean world encompasses a wide range of techniques for recovering and characterizing physical evidence that may yield information about the ancient environment at multiple scales, temporal and spatial. Categories of evidence routinely sampled include sediments, either derived directly from archaeological contexts or having the potential to give information about conditions in the past, and the physical remains of plants, animals, and humans. Since, as with other categories of evidence, it is impossible to recover all the material that was deposited, it is necessary to take samples that can be used to characterize the population from which they were drawn. Such sampling allows archaeologists to place ancient people's behavior and strategies in context and to understand better the complex, mutual relations between human communities and the environment. While specialties have developed independently, environmental research is increasingly collaborative, relying on multiple lines of evidence.

Historical Background

The investigation of ancient environments in the Mediterranean is nearly as old as the study of antiquity. A number of ancient authors recorded information about weather conditions, vegetation, and human interactions with the environment, for example, the presence of great forests in areas no longer wooded and summer rainfall in places which now seldom receive rain in summer. For a long time, ancient historians and archaeologists tended to accept the testimony of these ancient authors uncritically, inferring that the landscapes they observed had "deteriorated" since antiquity due to deforestation, erosion, and grazing (Grove and Rackham 2003). However, in contrast to narratives of the destruction of stable climactic vegetation regimes, erosion, and accelerated aridification, recent literature tends to characterize local environments as responsive to human action but also complex, robust, and naturally dynamic.

In the late nineteenth century, archaeologists undertaking large-scale excavations at major classical sites observed evidence of significant geomorphological changes. At the sanctuary site of Olympia in the Greek Peloponnese, buildings were found to be buried under up to 8 m of silt. This fill has traditionally been identified as alluvial deposits from the Kladeos river, though more recently it has been suggested that high-energy sediments support catastrophic flooding caused by the ingression of seawater from tsunami waves striking the coast (Vött 2011). Elsewhere, as at the Roman ports of Ostia and Portus, topographers and archaeologists found that coastlines had eroded or insilted. Occasionally, changes in sedimentary geology cast light on important historical events, such as the Battle of Thermopylae (Kraft et al. 1987). In part because the sedimentary geology of archaeological sites was important for understanding cultural sequences and historical events, the geomorphology of ancient sites and regions developed into an important area of study (for general sources see Rapp and Hill 1998, Stein and Farrand 2001).

The mid-twentieth century saw increasing interest in environmental questions in Mediterranean archaeology, particularly in the archaeology of prehistoric periods. This can be attributed to a combination of factors including the notable success of environmental research in adjacent disciplines, a host of new or newly refined scientific techniques; the growth of interdisciplinary regional projects, which focused on landscape use at the regional level, rather than sites; and, on the historical side, the influence of the Annales school, which dealt with long-term history of human/environment interactions, among other

subjects. In the Near East, research on the origins of agriculture pointed to the importance of post-Pleistocene climate change. The British School at Rome, the Minnesota Messenia project in the eastern Peloponnese of Greece, and the Department of Antiquities in Cyprus all undertook major archaeological surveys and inventories of archaeological sites, and in 1949 Fernand Braudel published his enormously influential history of the Mediterranean in the reign of Philip II, which included long sections on geography and environment as they figured in human history of the region. All of these turned scholarly attention to landscapes as dynamic and fitting subjects of study within archaeology.

In 1969, the geographer Claudio Vita-Finzi proposed that the sedimentary geology of the Holocene had been radically altered by human action in the late Holocene, in particular a "Younger Fill" laid down by erosion in the aftermath of major deforestation and land clearances. While he was not the first to propose that the Mediterranean landscape had been degraded (see Grove and Rackham 2003; Butzer 2005), his model gained widespread attention, and though few would now endorse it, it had an enduring legacy in encouraging classical archaeologists to pay attention to local geomorphological histories. Subsequent work by Paepe et al. (1980), John Bintliff (1992), and many others problematized Vita-Finzi's model and, in encouraging regional approaches to sedimentary geology, led to the production a much higher-resolution picture of stability and change in the surface geology of the circum-Mediterranean. Nearly all excavations and regional projects now devote at least some attention to local sedimentary geology.

With Willard Libby's pioneering work on radiocarbon in the late 1940s and 1950s, organic materials could be assigned absolute dates (albeit at wide ranges of error initially), a milestone as much for environmental science as for archaeology. The utility of the technique was greatly improved through the construction of calibration curves which allowed researchers to correct for different proportions of the isotopes of carbon in the atmosphere at different times in the past. Meanwhile, the principles of dendrochronology and dendroclimatology had been articulated by A.E. Douglass in the 1920s and refined by Harold Fritts in the 1950s. The science developed along with radiocarbon as dendrochronological data was used to construct calibration curves for the correction of radiocarbon determinations, with synergetic improvement in the resolution of both methods. Dendrochronology is not only a dating method with exceptionally high precision under good conditions but one of the most useful sources of evidence for environmental change in the ancient Mediterranean world. The dendrochronological record is uneven, however, both in space and time, with some regions and periods represented by hundreds of samples and others virtually undocumented. Glacial ice and foraminifera data sets are not only used to calibrate radiocarbon determinations but major sources of information in their own right regarding atmospheric conditions and therefore global temperatures in the past, against which locally derived vegetation sequences and sedimentary geology can be interpreted.

In the decades after the middle of the twentieth century, the identification of seeds and animal bones began to be considered an important category of archaeological evidence in the Mediterranean world. The identification of both botanical and faunal remains was made possible with recourse to large comparative collections assembled in the nineteenth century. The application of statistical methods, pioneered in the Near East by investigators working on animal management and domestication, made the study of faunal remains a far more rigorous and informative discipline. Age/sex mortality curves allowed faunal specialists to adduce hunting and herd management strategies (Payne 1973), and the general approach of using taphonomy to track human relationships with animal populations has been more widely generalized. Fluctuation in average body size, proportional representation of game species, or treatment can be observed and examined as possible indicators of environmental stress or abundance.

Turning to paleobotany, an equally important development came with experiments in water sieving. Early pioneers of the technique in the late 1960s and early 1970s included Kent Flannery, George Willcox, and Gordon Hillman, all of whom were concerned with the origins of

agriculture. As flotation came to be applied more widely, it quickly developed from a procedure that could be performed by "an illiterate with a bucket" (Flannery 2009 (1976)) to a sophisticated technique for the separation of light and heavy fractions of the micro-archaeological record from the sedimentary matrix.

Despite issues of selective deposition, preservation, paleobotany remains a critical and underutilized source of information. Especially where large volumes of excavated sediments are tested, paleobotany can interface with faunal data to provide a remarkably detailed picture of ancient environments, human strategies, and lifeways and their change over time.

Palynology, the study of preserved airborne spores and particles (not only pollen), was initially developed in Scandinavia and Northern Europe, where lake sediments preserved long records of stratified arboreal pollen, permitting the identification of changes in the relative abundance of different species. Pioneering work by Gunnar Erdtman in the early to mid-twentieth century led to the wider application of the science and refinement of its methods; radiometric dating permitted pollen cores more readily to be placed within an absolute chronological framework and compared with other sources of evidence. In the Mediterranean region, lacustrine deposits have provided critical information about regional vegetation histories in the Quaternary (Bottema et al. 1990; Jalut et al. 2009). It is also possible to recover pollen from dry and non-lacustrine sediments, including archaeological deposits. One of the most important challenges workers face in the interpretation of pollen data is to come to an assessment of how well the recovered sample reflects the plant population that produced it. Since not all kinds of vegetation and not all areas in the vicinity of the sampled site will be equally well represented, it is desirable to model pollen transport. While care is required in their use, long pollen sequences documenting local vegetation change are particularly important sources of environmental information.

Anthracology, the specialist study of wood charcoal, involves the identification of different woody taxa preserved by burning. In archaeological contexts, charcoal does not usually represent a random sample of trees existing in the environment, but rather reflects human choices and action at every stage from collection of wood to deposition of charcoal. That said, it is highly informative about people's use of available resources, especially where it can be compared against other sources of environmental information.

The above are by no means the only available sources of information about ancient Mediterranean paleoenvironment, and the development and application of a wider range of environmental studies can be expected to expand the tool kit still further. The use of geographic information systems and computer modeling deserves mention, however brief, as increasingly indispensable technologies that have enhanced the management, analysis, and presentation of data. Meanwhile, new sources of environmental information continue to be developed. For example, phytoliths, distinctive silicaceous, or other residues produced in plant tissue, and which survive the death and decay of the plant (Piperno 2006), are as yet understudied in Mediterranean archaeological contexts but have the potential to make significant contributions to the reconstruction of ancient environments (Tsartsidou et al. 2007).

Key Issues and Current Debates

Current work on environmental sampling in Mediterranean archaeology includes not only the continued application of all the techniques reviewed above in collaborative archaeological and environmental research but attempts at large-scale synthesis and comparison. Two key questions for every researcher and end user of environmental data are how well samples reflect the populations from which they were drawn and how far the results are to be extrapolated in space and time. Different categories of evidence reflect processes at different scales, from global (e.g., climate change) to regional (e.g., geomorphological changes related to widespread erosion), to site level (e.g., agricultural intensification), and to household level (increased storage), and these are not always

easily distinguished. In a landmark paper now more than a decade old, Robinson et al. (2006) concluded that different lines of proxy evidence for paleoclimate in the Eastern Mediterranean including Dead Sea levels and pollen cores generally agreed with evidence from Northern Europe on the timing of major changes in paleoclimate. Similarly, Jalut et al. (2009) argue that local vegetation changes throughout the circum-Mediterranean and over the course of the Holocene can be shown to reflect global climate. They distinguish three phases: the lower Holocene (11,500–7000 BP), a long wet phase interrupted by several arid intervals, followed by an intermediate phase in which changes in global atmospheric circulation assumed new importance, succeeded by a phase (5500 BP–present) characterized by increasing aridification (Jalut et al. 2009). Such large-scale changes had different effects in different regions, however. Present-day Mediterranean landscapes can exhibit marked variation in such variables as the quantity and timing of rainfall, both from year to year and from place to place. Since seasonality and risk of harvest failure or resource shortage in bad years are likely to have been critically important for all past societies, better understanding of these environmental parameters is essential (Halstead and O'Shea 1989). Changes in the ancient environment were also subject to the effects of human action on the landscape: the distribution of settlement, use of different agricultural and pastoral strategies, resource procurement (logging, mining), as well as actions taken to retard or offset the local effects of environmental change – agricultural terracing to counteract the effects of erosion, irrigation to offset drought, dredging to combat the insiltation of watercourses, and deliberate burning to encourage the production of browse for animals.

At a larger scale, successful human systems necessarily adapt to a more or less predictable range of environmental variation. It is not possible to provide here a systematic overview of large-scale Quaternary climate affecting the Mediterranean area, human/environment interactions, and anthropogenic landscape modification (see suggested further readings below for general sources). The following is therefore a very general but current outline of large-scale environmental and human changes within which more specific environmental investigations are situated. Late Pleistocene postglacial warming and the retreat of sheet ice in Northern Europe beginning ca. 15 k cal BP fundamentally altered the landscapes of the Mediterranean littoral on a scale not seen since. Where previously this change was generally viewed as a gradual process, in the last 10 or 15 years, a combination of higher-resolution climate data and sophisticated modeling has been used to suggest that past changes in climate may have been sudden, even abrupt, on a decadal scale. The rise in global temperatures manifests itself in dramatic change in sea level, fauna, sedimentary geology, and vegetation regimes across the entire Mediterranean region. The effects on human foragers were dramatic. Both "push" and "pull" effects operated as humans expanded into newly habitable areas. In contrast to the warmer conditions of the Bølling-Allerød interval, the Younger Dryas, between about 12,800 and 11,600 cal BP, represents a late glacial reversion, a return of cold and dry conditions. Significantly, some human groups in the Levant increased their exploitation of the wild ancestors of wheat, barley, and rye; suids, ovicaprines, and bovines; as well as other species which proved less susceptible to selection for the modified behaviors that resulted in domestication (Bar-Yosef and Belfer-Cohen 2002). The Early Holocene Wet Phase (EHWP) 10,000–7000 kcal BP coincides with the Neolithic in much of the Mediterranean basin. A return to wetter conditions after the Younger Dryas, it provided favorable conditions for the dispersal of these newly domestic species to areas outside their original range. The period 7000–5000 cal BP witnessed a remarkable range of adaptations to mid-Holocene environments. In the period since ca. 5000 cal BP, human action had ever more potent effects on local landscapes in the Mediterranean. Karl Butzer has proposed (2005) three sustained episodes of intensification of anthropogenic landscape modification: around 3000 BCE, 1300 BCE, and 100 CE,

corresponding, respectively, with the widespread adoption of Mediterranean polyculture and a range of associated agricultural strategies partially offsetting more arid conditions in many parts of the Eastern Mediterranean, the flourishing of redistributive palace economies and long-distance trade in the Late Bronze Age, and Roman imperial expansion, coinciding with the second half of a climatic optimum, a wetter period from ca. 500 BCE to 500 CE. This is obviously a very general framework, and the histories of individual regions vary considerably. The nature and causes of that variation at different scales, spatial and temporal, continue to be subjects for research and debate.

International Perspectives and Future Directions

Both paleoecology and Mediterranean archaeology are inherently international and collaborative disciplines, and knowledge production has to some extent tended to follow the model of the hard sciences (collaborative research, multiple authorship, publication in specialist journals). Most of the scientific literature is in English, German, and French. Initially, archaeologists working in prehistory were the most avid consumers of environmental data, while those dealing with the first millennium BCE and later have too often tended to disregard environmental components of the archaeological record, but increasingly environmental studies are regarded as valid lines of investigation.

To some extent it is difficult to forecast any direction for such a diverse group of scientific fields and techniques. However, the collection of different kinds of environmental data, and the continuing refinement of analytical methods makes invaluable contributions to understanding individual archaeological sites and regions. Specialized laboratories and "centers for the study of" contribute a growing volume of research, and as understandings of the various categories of environmental record improve, so will researchers' ability to design sampling strategies and interpret rich, high-resolution data. At the same time, the integration and comparison of disparate data sets will become correspondingly important for understanding human responses to, and anthropogenic impacts on, the environment at all different scales. Particularly important are changes in the structure of variation – the understanding of "normal parameters" on which all human subsistence strategies are based. Many archaeologists have been able to identify cases of anthropogenic landscape alteration through evidence of erosion, changes in representation of important plant species, aridification, and other indicators of stress. These cases are an important part of the record, but it is equally important for archaeologists to seek to understand how people managed Mediterranean environments to support big increases in human and domestic animal populations, vast accumulations of stored surplus, and the extraction of resources.

The study of Mediterranean environments is a dynamic and expansive field. Plagued in the past by simplistic and overgeneralized explanation, models of the relationship between people and the environment are in the process of shifting from a search for simplistic, straightforward cause/effect relationships between two variables, to integrative and complex, using more analytically sophisticated approaches to interrogate a growing number of data sets.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany
- ▶ Cultural Ecology in Archaeology
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Paleoethnobotany
- ▶ People as Agents of Environmental Change
- ▶ Radiocarbon Dating in Archaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

References

Bintliff, J. 1992. Erosion in the Mediterranean lands: A reconsideration of pattern, process, and methodology. In *Past and present soil erosion: Archaeological and geographical perspectives*, ed. M. Bell and J. Boardman, 125–131. Oxford: Oxbow.

Bottema, S., G. Entjes-Nieborg, and W. van Zeist, eds. 1990. *Man's role in the shaping of the eastern Mediterranean landscape. Proceedings of the INQUA/BAI symposium on the impact of ancient man on the landscape of the eastern Mediterranean region and the near east, Groningen, Netherlands, 6–9 March 1989*. Rotterdam: A.A. Balkema.

Butzer, K.W. 2005. Environmental history in the Mediterranean world: Cross-disciplinary investigation of cause-and-effect for degradation and soil erosion. *Journal of Archaeological Science* 32: 1773–1800.

Flannery, K.(ed.) 2009 (1976). *The early Mesoamerican village*. Walnut Creek: Left Coast Press.

Grove, A.T., and O. Rackham. 2003. *The nature of Mediterranean Europe: An ecological history*. New Haven: Yale University Press.

Halstead, P., and J. O'Shea, eds. 1989. *Bad year economics: Cultural responses to risk and uncertainty*. Cambridge, MA: Cambridge University Press.

Jalut, G., J.J. Dedoubat, M. Fontugne, and T. Otto. 2009. Holocene circum-Mediterranean vegetation changes: Climate forcing and human impact. *Quaternary International* 200: 4–18.

Kraft, J.C., G. Rapp Jr., G.J. Szemler, C. Tziavos, and E.W. Kase. 1987. The pass at Thermopylae, Greece. *Journal of Field Archaeology* 14: 181–198.

Paepe, R., M.E. Haziotis, and J. Thorez. 1980. Geomorphological evolution in the eastern Mediterranean belt and Mesopotamian plain. Report for the International Geological Correlation Programme Project 146: River Flood and Lake Level Changes.

Payne, S. 1973. Kill-off patterns in sheep and goats: The mandibles from Asvan Kale. *Anatolian Studies* 23: 281–303.

Piperno, D.R. 2006. *Phytoliths: A comprehensive guide for archaeologists and paleoecologists*. Lanham: AltaMira Press.

Rapp, G.R., Jr., and C.L. Hill. 1998. *Geoarchaeology: The earthscience approach to archaeological interpretation*. New Haven: Yale University Press.

Robinson, S., S. Black, B. Sellwood, and P. Valdes. 2006. A review of palaeoclimates and palaeoenvironments in the Levant and eastern Mediterranean from 25,000 to 5000 years BP: Setting the environmental background for the evolution of human civilisation. *Quaternary Science Reviews* 25: 1517–1541.

Stein, J.K., and W.R. Farrand, eds. 2001. *Sediments in archaeological context*. Salt Lake City: University of Utah Press.

Tsartsidou, G., S. Lev-Yadun, R. Albert, A.M. Rosen, N. Efstratiou, and S. Weiner. 2007. The phytolith archaeological record: Strengths and weaknesses evaluated based on a quantitative modern reference collection from Greece. *Journal of Archaeological Science* 34 (8): 1262–1275.

Vött, A. 2011. Die Olympia-Tsunami-Hypothese – Neue sedimentologische und geoarchäologische Befunde zur Verschüttung Olympias (Peloponnes, Westgriechenland). *Antike Welt* 5: 4.

Further Readings

Bar-Yosef, O., and A. Belfer-Cohen. 2002. Facing environmental crisis. Societal and cultural changes at the transition from the younger Dryas to the Holocene in the Levant. In *The dawn of farming in the near east*, Studies in early near eastern production, subsistence and environment 6, ed. R.T.J. Cappers and S. Bottema, 55–66. Berlin: Ex oriente.

Blondel, J. 2006. The 'design' of Mediterranean landscapes: A millennial story of humans and ecological systems during the historic period. *Human Ecology* 34: 713–729.

Christie, N., ed. 2004. *Landscapes of change: The evolution of the countryside in late antiquity and the early middle ages*. Burlington: Ashgate.

Cook, E.R., and L.A. Kairiukstis, eds. 1990. *Methods of dendrochronology. Applications in the environmental sciences*. Dordrecht: Kluwer Academic Publishers.

Davis, S.J.M. 1995. *The archaeology of animals*. New Haven: Yale University Press.

Faegri, K., J. Iversen, P.E. Kalanad, and K. Krzywinski. 1989. *Textbook of pollen analysis*. 4th ed. New Jersey: Blackburn.

Fouache, É. 2006. *10000 ans d'évolution des paysages en Adriatique et en Méditerranée Orientale. Géomorphologie, paléoenvironnements, histoire*, Travaux de la Maison de l'Orient et de la Méditerranée 45. Paris: De Boccard.

Fouache, É., and M. Rasse. 2007. Geoarchéologie. Avant-propos. *Bulletin de l'Association des Géographes Français* 1: 115–118.

Foxhall, L., M. Jones, and H.A. Forbes. 2007. The human ecology of ancient Greece and Italy. In *Classical archaeology*, ed. R. Osborne and S. Alcock, 89–117. Oxford: Blackwell.

Kuniholm, P.I., B. Kromer, S.W. Manning, M. Newton, C.E. Latini, and M.J. Bruce. 1996. Anatolian tree rings and the absolute chronology of the eastern Mediterranean, 2220–718 BC. *Nature* 381: 780–783.

Leveau, P., and P. Populus. 1999. *Environmental reconstruction in Mediterranean landscape archaeology*. Oxford: Oxbow.

Lowe, J.J., and M.J.C. Walker. 1984. *Reconstructing quaternary environments*. London: Longman.

Reale, O., and P. Dirmeyer. 2000. Modeling the effects of vegetation on Mediterranean climate during the Roman classical period. Part I: History and model sensitivity. *Global and Planetary Change* 25: 163–184.

Sonnabend, H., ed. 1999. *Mensch und Landschaft in der Antike: Lexikon der historischen Geographie*. Stuttgart: J.B. Metzler.

Zangger, E. 1992. Neolithic to present soil erosion in Greece. In *Past and present soil erosion: Archaeological and geographical perspectives*, ed. M. Bell and J. Boardman, 133–147. Oxford: Oxbow.

Ephemeral Art

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Introduction

The archaeology of art is a term that includes a wide range of artworks. One of the most challenging is ephemeral art. This term hides a complex reality that encompasses different understandings of art: from body painting to temporary housing or furniture created for special occasions such as pilgrimages or coronation ceremonies. In fact, studying ephemeral art from an archaeological point of view seems contradictory because something ephemeral does not leave material traces. However, material culture gives us some clues to understand the presence of the ephemeral in artworks. The following sections address how archaeologists can investigate this type of art not only through ethnoarchaeological case-studies but also through the material culture left behind in the production of ephemeral art.

Definition

From an archaeological point of view, ephemeral art deals with temporary artworks and performances that have archaeologically low visibility. However, they can be reconstructed not only through direct remains, if conservation conditions allow it (traces of makeup for instance), but also by indirect or secondary sources (musical instruments, masks, containers of pigments used as makeup, written sources, or images). Generally speaking, ephemeral artworks are related to all kinds of rites and performances (political, religious, and so on) and, thus, this art is somehow cyclical. In this entry, the terms ephemeral and temporary are used as interchangeable concepts.

Ephemeral art includes different forms. The clearest example of temporary artworks are the performing arts, including music, and its related concepts of sound and acoustics, dance, and drama, such as recitation, theatre, or poetry. Body and facial painting and hairdos are also forms of ephemeral art as are some objects worn on the body, especially crafted for a particular event such as paraphernalia used in dances or other performances. The venues where performances have been enacted can also be studied as indirect evidence of ephemeral events. Furthermore, ephemeral installations or objects for temporary gatherings or ceremonies have been recorded.

This archaeological definition clearly differs with the one proposed by contemporary art history. This definition describes ephemeral art as only lasting for a short period of time, and the term is normally used to describe a work of art that only occurs once and cannot be embodied in any durable object to be shown in a museum or gallery. However, ephemeral art must be treated differently when dealing with archaeological remains due to the peculiarities of the materiality of the ephemeral. Firstly, the duration of the artwork is uncertain for most cases; time can be understood differently in differing periods and places. Secondly, the ephemeral from a material cultural perspective has demonstrated that it occurs more than once and, fortunately, is embodied or materialized in durable objects. The concept of ephemeral artworks emerges from the mid 1960s in connection to a wave of criticism from western artists and art critics dissatisfied with the so-called establishment artists and with the commodification of art pieces. Indeed, throughout the twentieth century, performance was often seen as a nontraditional way of making art. In order to break with the traditional art market, artists explored other venues and methodologies to create their pieces with no financial value. One of the best strategies to put the artworks outside of the market was to create ephemeral events that could neither be sold nor exhibited. Thus, artists were more interested in the process and the action of the artwork rather than the objects themselves. The so-called action art includes different types of ephemeral expressions like body art, Land art, or actions like Happenings or Performances.

Historical Background

The archaeologies of art are strongly based on morphological and stylistic aspects, and as a consequence, ephemeral artworks have not been considered proper materials to analyze by the above mentioned approaches. Visual and representational arts have been the focus of morphological and stylistic studies and neglect other types of artworks which go beyond the pre-eminence of the visual and the study of forms. However, this approach is changing because more comprehensive and multisensorial studies of artworks are being undertaken. The emergence of post-processual approaches to the past drew attention to the intangibles such as emotions, senses, music, or sound, all of them connected to the ephemeral.

The commonest approach for the study of the ephemeral is through indirect or secondary material, and textual, resources. Interestingly, most of the objects used to study the traces of the ephemeral are by themselves artworks because they consist on reliefs, depictions, sculptures, or musical instruments that represent temporary events or ephemeral materials. This circumstance provokes the interest of the researchers in – more often than not – the formal and stylistic features of these pieces of art rather than the temporary events that these pieces of art show. It is certainly true that iconographic studies focus on the significance of what is being represented (dancing and music scenes, enthronement ceremonies) but all these temporary events and the material and corporeal traces are not studied independently as ephemeral artworks.

However, material-based disciplines, such as ethnography or archaeology, have not neglected ephemeral art. Due to the richness of sources and, sometimes, direct observation, the complexity of the ephemeral art has been recorded. For example, two case-studies are worth mentioning: first, body painting among the inhabitants of Tierra del Fuego (Argentina), specifically the Selk'nam and Yámana, have been studied using photographs, drawings, and texts. This study shows the complexity of body painting in creating multiple identities (gender, age, myth, and kinship) during the performance of rites of passage that brought young men into spirit-initiated adulthood (Fiore 2005).

A second example is based on Yolngu art (Australia), more specifically on chest-paintings that boys receive during circumcision ceremonies (Morphy 2009: 14–22). Because these body paintings seldom last for more than a few days, this case nicely exemplifies to what extent ephemeral artworks are meaningful in the broader social context. The paintings are performed in semi-restricted spaces to which only a few people are allowed entry. Equally, this temporary body painting is stage-managed by ritual experts, members of the clan, who sing songs connected to the paintings and the ancestors manifested in the images. In addition, the paintings have aesthetic qualities (shimmering brilliance) and create social and spiritual links between the boy, his family, their ancestors, the artists, and other households of the community. In all, the temporary paintings "exists as a much more widely connected and durable object than the instances of its production allow" (Morphy 2009: 16).

Thus, anthropological and ethno-archaeological approaches make clear that ephemeral works of art have a strong social significance and participated actively in the ceremonies of identity creation. Paradoxically, some of these non-lasting artworks have been collected by Western collectors for display in museums and become permanent artworks. This is also the case of the Malanggan statues which were meant to decay in funerary ceremonies in order to strengthen and secure the memory of the deceased (Küchler 1988).

Key Issues/Current Debates

A wide range of case-studies provide examples of how archaeology can be used to examine aspects of ephemeral arts. Luckily, the archaeological methods allow the recovery of temporary performances and events. Beyond the iconographic analyses and the indirect materials already mentioned above, archaeometric studies like, the analysis of pigments and contents deposited on vessels or computational programs to recover the acoustics

of special settings, are providing considerable data about ephemeral artworks and their social role. In this section, I will analyze ephemeral body art, which is probably the most well-known instance of temporary artworks. Then, performative arts will be covered indepth: music, dance, and acoustics. Furthermore, ephemeral events and temporary gatherings will be also considered.

Studies about the social role of bodies have recently highlighted their active role in creating and participating in social dynamics, because bodies mediate our relationship with the world around us. These premises are based on the phenomenology of Merleau-Ponty that expresses how our bodies are the medium for having a world, and Bourdieu's notion that the body structures both how we act and how we perceive. Within this framework, a self that acts on the world necessarily does so through the medium of the body and, thus, are active participants in social and cultural constructions (Robb and Harris 2013). Archaeologists have used embodiment insights especially in examining the representations of bodies from an art-historical perspective. Indeed, iconographical studies have largely studied how corporeal representations show a wide variety of bodies portrayed (from stone anthropomorphized stele to clay figurines), and this heterogeneity highlights how the body is a cultural construct.

Bodies have been throughout history one of the most well-recorded arenas to install art. In fact, among the diversity of modes of body art, the ephemeral corporeal art has been a constant: body and facial paintings are the clearest examples. Ochre pieces recovered from the Porc-Epic Cave, Ethiopia, dated at Middle Stone Age (MSA) have been analyzed by microscopic identification for traces of modification, morphological, and morphometric analysis or surface texture analysis, amongst others. The results show patterns of continuity in ochre acquisition as well as traces of ochre modification by grinding and scraping to produce a red powder. These materials have been interpreted as proofs for body painting imbued not only with symbolic meaning but also with practical functions like insect repellent, antiseptic treatments, or sun protection. Equally, the existence of different shades and colors of ochre have been inferred by the variety of ochre types and the identification of different processing techniques (Rosso et al. 2017).

As direct material traces are scarce, iconographical approaches are a basic tool to reconstruct these phenomena. Moreover, materials that participated in the corporeal art that outlast bodies are paint residues, pigments, painting tools, or the container used to store the paint. The material record of corporal paint appears in highly ritualized scenes such as public enthronement ceremonies, enactments like music, dances, competitions, playing, different kinds of parades, and funerary rites among others. Although, the participants of these rites are, in the vast majority of cases, members of social elites, it is worth mentioning how in some representations commoners showing body decoration appear. Furthermore, paint containers and tools to apply the colors have been recorded, whether in houses or in tombs, without any traces of a social range. Interpreting body decoration, in this case the ephemeral one, as a privileged material strategy in the construction of the social-self has been stressed. The consideration of this bodily art in its transmitting personal and social information to intimate or distant audiences and, thus, contributing to the construction and maintenance of social networks, is worth recalling.

Studies of the pre-Hispanic Maya society deal with a comprehensive approach to ephemeral body painting. A combination of archaeometric studies applied to define the raw materials used in the preparation of pigments, together with iconographical studies with scenes of humans and divinities decorated with this ephemeral art, sheds light on to the complexity of this phenomenon. Analytics to the residues found in several containers show that the substances used to prepare body painting were based on organic material and from animal origins. The analyses show that most of the iron-based colorants were highly available from cultivation areas of Maya agriculture and were nontoxic. In addition, a combination of cinnabar and hematite has also been recorded. Other mineral colors have been identified, like limenite or ilmenite, both available locally and with good coating capacities. Interestingly, the

presence of animal fat as an excipient in some of the pigments suggests the existence of scented body colors, especially to embalm royal and aristocratic corpses. Iconographical studies show how important body painting was for the Maya elite, especially on the whole head, face, and the upper torso. Significantly, the act of being painted by servants provides information about the tools and the containers used to apply the paint, such as clay vessels or stamps that, luckily, have also been recovered in archaeological excavations (Vázquez de Ágredos Pascual et al. 2018.

Moving to the next case-study, performative arts are by definition ephemeral. Several studies provide us with information about ephemeral events, activities, and materials. Music is probably the most studied. In fact, the interest in musical activities from an archaeological point of view deals with the relationship between music, human cognition, and the complexity of ancient cultures. The role of music in human evolution is a current debate being investigated by a great diversity of fields beyond archaeology and anthropology like neuroscience and psychology. It is generally agreed that our ability to perform and enjoy music was an important step in early human evolution, and it was a fundamental communicative strategy that created outstanding emotional and social bonds (Morley 2013).

As already noted (see Types of Arts), archaeomusicology is the methodology by which archaeologists and musicologists recover the sound of the past; also known as "music archaeology." This study researches the sounds and the musical cultures through the examination of archaeological events, and it is closely connected to ethnomusicology, acoustics, experimental archaeology, ethnoarchaeology, iconography, and organology (García Benito and Jiménez Pasalodos 2011).

A key issue in the archeomusicology is the study of musical instruments and sonorous artifacts recovered from archaeological excavations. Although a great number of potential instruments – or some parts of them – have been lost because they were made of perishable materials or were bad preserved, some methodological proposals have been created to classify these artifacts. Paleo-organology is the subdiscipline devoted to the study of sonorous objects and instruments. Experimental archaeology is fundamental in discerning if the sonorous objects were intended to perform music, to analyze the production processes and their morphology, and determine their musical and acoustical properties as well as their uses and functions (García Benito and Jiménez Pasalodos 2011). The earliest musical instruments so far documented are from the Geissenklösterle Cave (Germany). They are three pipes from Aurignacian contexts (36, 800 BP): two are made of swan bone and another was carved from mammoth ivory (Morley 2006: 318).

One of the key publications that sets the frame of the discipline was World Archaeology (1981, volume 12, issue 3) devoted to music. In this volume a major contribution by the Scandinavian archaeologist Cajsa Lund (1981: 246–248) proposed a methodology and classification to identify musical instruments. It is based on a probability-grouping system. This a classification of sonorous artifacts which goes beyond the definition of instruments and introduces objects not intended exclusively in performing music but with sonorous properties. This proposal has become an alternative or a method to combine, where possible, with the traditional type-classification of musical instruments by Hornbostel and Sachs (1961): idiophones, membranophones, aerophones, and cordophones.

Additionally, the so-called sounding stones, rock gongs, or lithophones are also worth mentioning. They are rocks interpreted to be instruments. C. Fagg states that they are "naturally situated and naturally tuned rocks, boulders, exfoliations, stalactites and stalagmites which resonate when struck and show evidence of human use as idiophones" (quoted by Díaz-Andreu and Mattioli 2017: 9). It is attested in contemporary African societies but also among the European Upper Palaeolithic and the Bronze Age, in the form of stones at open-air Scandinavian sites (see Díaz-Andreu and Mattioli 2017: 11–12 for more worldwide case-studies with specific references).

A case study that shows the potentialities of this methodology has been recently undertaken to study the organological possibilities and musical

performance of the most complete gravettian aerophone from the site of Isturitz (France) (Mazo Pérez et al. 2015). The study is based on two replicas of the original made from the ulna of a Griffon Vulture and have been obtained through a "chaîne opératoire" of very simple actions. The main result of this project has been to demonstrate that these objects could have produced sound in three ways: obliquus flute, horn, or clarinet (Mazo Pérez et al. 2015: 84 and Fig. 10, see especially the QR code that allow the reader to listen the music of the instruments). Therefore, it has been argued that these instruments made from bird bones cannot be defined as flutes because they produce sounds in other positions. Thus, the study proposes to label these instruments as aerophones.

Iconographic studies applied to musical scenes shed light onto organological aspects of instruments (number of strings or hands position when performing; amongst others) as well as social aspects such as the gender of the musicians, their status through their appearance, or the contexts where music was played (e.g., funerary processions, royal ceremonies, banquets or myths). This methodology has been applied to proof the use of membrane drums in pre-Columbian Mississippian Culture (Rees 2013). This case-study presents a re-examination of iconographic images engraved on some marine shell artifacts found on the Spiro Mounds (eastern Oklahoma). In addition, it is also argued that the drums and their sound were considered sacred objects related to shamanic practices.

Moreover, ancient texts are valuable sources in providing musical theories and even the lyrics of the songs. Indeed, the most ancient written sources about music and the musicians' era are dated at the third millennium BC in Mesopotamia. Stunning examples are the ancient Egyptian love songs, mostly dated between 1292–1070 BCE. They were recorded on papyri and ostraca and are short texts with a maximum of seven stanzas; some of them explicitly state that the texts recorded had to be sung. Interestingly, some of these songs are currently performed using a replica of an ancient Egyptian lute from the Dynasty 18 (Köpp-Junk 2018).

The study of sound is also a relevant methodology to recover the ephemeral in archaeology. Archeoacustics is the discipline that refers to the study of the effects of sound in past societies. This research highlights how acoustics can be a key element in deciding the location of artworks. In this sense, some case-studies have demonstrated that exceptional acoustics would have been selected and/or created to undertake and to perform not only artistic creations but also ritual activities. Thus, sounds and acoustics can be labeled as ephemeral arts as they are closely associated to types of art (rock art, portable or architectural). As stated by Díaz-Andreu and Mattioli (2017: 1) "scholars interested in acoustics try to understand the human past beyond its materiality by recovering a set of less evident, less tangible cultural signs relating to the sense of hearing."

The interest in archeoacoustics was initiated by a connection with Prehistoric rock art. The pioneering studies of Reznikoff and Dauvois (1988) highlighted the relationship between fixed art in European caves and the cave's acoustic properties. In their interpretation, some signs, such as points, were interpreted as marks on rocks with such properties. Waller (1993) related the contents of the panels with acoustics: carnivore animals are painted on rocks with low acoustics because these animals are quiet. On the contrary, ungulates are represented on panels with high acoustic properties as trying to reproduce their sounds. In all, it is likely that echoes, resonances, and reverberations are desirable acoustic effects in connection to location of different types of artworks.

This type of research has also been applied to megalithic architecture. Research conducted in the hypogeum Hal Saflieni (Malta) has revealed that the best resonance occurs in the Oracle room, precisely the only one with decoration (see Díaz-Andreu and Mattioli 2017: 15–16). Acoustic tests have been used to examine if the primary resonant frequencies are suited to a male or female voice. For example, results on Gravrinis cairn (Brittany, France) using the human voice and a low-frequency generator show that female voices were heightened in some orifices on orthostat 18, located at the end of the chamber (Manaud and Barrandon 2015).

Archeoacoustics in much modern monumental art have also been tested. For instance, the late antique Basilica of San Vitale at Ravenna (sixth cent AD) (Italy) presents an acoustic that facilitated and enhanced the liturgical function of the building as a congregational church. Sound propagation, reverberation, and clarity was measured to prove the direct relationship between ritual vocal sound making and the response of the acoustic features of the space. This study has concluded that the play between vocalization and architectural ritual structure were closely related to provoking a multisensory experience (Knight 2013).

Closely connected to music and sound is dance. Certainly, dancing is an activity that does not leave direct visible remains and can be defined as a purposeful, intentionally rhythmical, and culturally patterned sequences of nonverbal body movements. Dancing – patterned movement – is a multisensorial experience with a prevalence of kinetic features (Garfinkel 2003; Soar and Aamodt 2014). Dances are relevant social activities that entail multiple cultural meanings according to each social group. Among the diverse functions of dancing stands out its role in creating a sense of community, as a means of social control, as medium for competition, and so on. Dancing is frequently connected to religious ceremonies because dancing can be a spiritual practice to get in touch with divinities or other-worldly beings. Several ethnographic studies have analyzed the role of ecstatic dances to achieve altered states of consciousness (Garfinkel 2003).

There are numerous and varied artworks that refer to dancing scenes. The range of supports where dancing scenes are identified include terracotta figurines of a groups of dancers, paintings on vases or walls, architectural engravings, and large sculptures. Generally speaking, it is not easy to interpret the figures as dancers due to the technical problems of representing movement in static supports (Garfinkel 2003: 18). However, there are some methodological suggestions to allow the interpretation of some performances as balls (partially based on Garfinkel 2003). These include:

- Figures follow patterned body gestures that express their kinetic features. They present a dynamic gesture, sometimes with their legs or their arms bent.
- Overrepresentation of hand and fingers due to the communicative capacity of these parts of the body.
- Group scenes reflecting interaction between people. Sometimes the figures in any particular scene are normally identical or combine patterned body positions.
- Outstanding body decoration like facial makeup, masks, or elaborate hairdos and dresses.
- Presence of musicians or dancers themselves playing instruments, clapping hands or with the mouth open indicating that they are simultaneously singing.

The prehistory of Asia shows dancing scenes in an array of different supports like jade pendants or bronzes vessels. This activity was not only performed by the elites but also was an element of popular culture and entertainment. For example, the funerary art of the Han dynasty (202 BC-220 AD) records reliefs representing different kinds of dances (Zuchowska 2014). These performances were incorporated in banqueting scenes and were not only intended to entertain the deceased during the afterlife but also to display the social importance of this activity for the Han's elites. In these artworks, the limits between dances, acrobatics, and martial arts are blurred and most of the features mentioned above to identify the patterned movements are identified by features such as the coexistence of musicians or special outfits.

Theatrical performances and some public events are ephemeral types of art. Their political implications in creating, maintaining and disrupting asymmetrical power relations has been analyzed in depth by multiple case-studies (some examples in Inomata and Coben 2006). As already noted by the same authors (2006: 29) the analysis of theatrical performances poses a challenge to archaeologists as we cannot observe them directly. Nevertheless, they can be satisfactorily recovered by analyzing the venues and the stages, the images in these events, and the objects used in the performance. Monumental architectures such

as theatrical spaces, plazas, some temples, or palaces are the stages where such performances took place. In addition, dramatic landscapes have also been used to locate enactments, although their archaeological visibility is lower in terms of installations but they can be rich in terms of objects, some artworks, deposited in such areas.

Research to uncover the features of such performances try to reconstruct the visual and acoustic features of the performances from the double perspective of the "actors" and the observers. Three-dimensional reconstructions of the venues and spatial analysis help to elucidate the distance between performers and audiences, the kind of communicative acts within the capability of human perception (facial expressions, verbal, musical performance, etc.), or the estimated number of participants. Images of performances give us information on the aesthetics of the performers or the objects involved. In addition, they can also be used as sources to remember former performances and can constitute the visual basis for rehearsals in preparing future ceremonial acts (Inomata and Coben 2006: 30–31). Some of these images, as well as the written descriptions of the performances, illuminate the existence of ephemeral artworks to decorate the settings such as banderols, tapestries hanging on the buildings, or furniture created purposely. This avenue of research has been undertaken especially in historical archaeology.

An archaeological study of ephemeral events and temporary gatherings in the contemporary world can be beneficial in recovering all the steps that occur in an ephemeral ceremony, from the study of the preparation, the performance and the afterwards. Equally, research on current temporary festivals can provide insights into the material culture and the practices of participants in the events and the sites created and destroyed by the participants. White (2013) analyzed the "Burning Man Festival," organized in northwestern Nevada, which occurs annually and entails the construction of an effigy of a man that is burnt at the end of the festival. Equally, the organizers and participants build and remove the ephemeral city, the Black Rock City, where they stayed during the festival. This city holds upwards of 50,000 participants and the setup phase of the city began with a ceremony to mark the placement of the man. Its location marks the placement of the city centre and, then, the rest of the city is laid out. The climax of the festival is the burning of the man in a huge pyrotechnic bonanza. Remarkably, the end of the festival is hardly the end of the event because it takes two weeks to remove all the structures and objects used during the gathering.

Another relevant methodology in recovering the ephemerality of material culture has been undertaken in ritual sites of Australia and Papua New Guinea. More concretely, archaeological fieldwork has recovered how some ritual activities of the islands of Torres Strait were inscribed at *kod* sites (ceremonial men's meeting places) through distribution of clan fireplaces, mounds of stone/bone, and shell. The ceremonial sites are located within spectacular natural landscapes with the central area dominated by large granite boulders. The disposition of a series of materials, which can be labelled as artworks, such as a network stone arrangements, stone-lined structures and the presence of shells and large dugong bone mounds, would have been the setting to enact the rites. Furthermore, the microscopic analysis of lithics and dugong bones suggest bone-working activities (Wright et al. 2016.

International Perspectives

A number of studies carried out by European scholars are challenging the stylistically/typological and iconographic approaches to the archaeologies of art. They open up new avenues of research based regarding the process of creating artworks, and the emotional and sensorial consequences. Recently, material-based studies on art are more interested in the processes of formation rather than with the final object being or not art. They focus on so-called ephemeral technological innovations, which revolve around signaling "moments of technological experimentation and innovation that may have been culturally significant even if they were not widely accepted or shared" (Farbstein 2013: 26). The same author exemplifies this approach on prehistoric Pavlonian art (Czech Republic at c. 30,000 BP).

The ceramic figurines of these sites have been interpreted as intentionally made to be broken. Intentional thermal shock was purposely done to have a loud noise when they exploded and, thus, an ephemeral pyrotechnic performance took place. However, this "action art" was not crafted in all the sites with Pavlovian ceramics. The key element of the analysis are the legs of the clay figurines representing animals: whereas at the site of Dolni Vestonice legs are compressed, a technical feature that promotes stability and not fracture when exploding. At the site of Pavlov I they do not present compressed limbs thus facilitating their breakage. Therefore, analyzing the process of crafting an artwork show how ephemeral local innovations are key elements to consider when facing artistic materials (Farbstein 2013).

Secondly, the materialization of states of being through visual and performative arts presents a close link with the ephemeral as a priori emotions are temporal. The avenues of research connecting emotions and artworks are twofold: the emotional content of the art pieces and the emotions created by artworks. Iconographical studies have disclosed the array of emotions according to the facial expressions and body gestures. Interestingly, sensorial analysis of artworks also show how artworks created sensorial connections between the objects of art, their users, and viewers and their emotions through the exploitation of senses. Jo Day (2013) nicely illustrates the entanglement of artworks and the senses, which is a temporary experience. She studies stone blossom bowls and ceramics with reliefs of flowers and petals from Minoan Crete and argues that both artworks were intended to enhance real aromas and caused metaphorical olfactory responses.

Future Directions

Recovering the ephemeral is a stimulating task that all archaeologist interested in art should consider in order to have a comprehensive approach to the creation, meaning, and understanding of artworks in the past. It is a wide label encompassing a diversity of artistic creations and approaches. Although some caution is required when dealing with secondary or indirect sources as any representation involve elements of idealized and stereotyped notions that may hinder our access to such phenomena. Approaching temporary creations with this methodology may provide clues to cultural notions in this matter. In addition, archeometric analyses and computational programs will be essential methods to improve our knowledge of ephemeral arts like body painting, the sounds of past music or the acoustics, and visibility of architectures where performative arts were enacted.

Cross-References

- ▶ Archaeology and Art
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art, Types of
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Pigment Analysis in Archaeology
- ▶ Sensory Archaeology
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Techniques of Paleolithic Art

References

Day, J. 2013. Imagined Aromas and Artificial Flowers in Minoan Society. In *Making senses of the past. Toward a sensory archaeology*, Centre for archaeological investigation, occasional paper, ed. J. Day, vol. 40, 286–309. Carbondale: Southern Illinois University Press.

Díaz-Andreu, M., and T. Mattioli. 2017. Rock art, music, and acoustics: A global overview. In *The Oxford handbook of the archaeology and anthropology of rock art. Oxford handbooks online*, ed. B. David and I.J. McNiven. https://doi.org/10.1093/oxfordhb/9780190607357.013.8.

Farbstein, R. 2013. Making art, making society: The social significance of small-scale innovations and experimentation in Palaeolithic portable art. *World Art* 3 (1): 23–39. https://doi.org/10.1080/21500894.2013.773935.

Fiore, D. 2005. Social images through visual images: the use of drawings and photographs in the Western representation of the aborigines of Tierra del Fuego (southern South America), Public Archaeology, 4:2–3, 169–182. https://doi.org/10.1179/pua.2005.4.2-3.169.

García Benito, C., and R. Jiménez Pasalodos. 2011. La música enterrada: historiografía y metodología de la arqueología musical. *Cuadernos de Etnomusicología* 1: 80–08.

Garfinkel, Y. 2003. *Dance at the dawn of agriculture*. Austin: Texas University Press.
Hornbostel, E., and C. Sachs. 1961. Classification of musical instruments. *The Galpin Society Journal* 14: 3–29.
Inomata, T., and L.S. Coben. 2006. Overture. In *Archaeology of performance: Theaters of power, community, and politics*, ed. T. Inomata and L.S. Coben, 9–44. Lanham: Altamira Press.
Knight, D.J. 2013. The Archaeoacoustics of sixth-century Christian structure: San Vitale, Ravenna. In *Music and ritual. Bridging material & living culture*, Publications of the ICTM study group on music archaeology, ed. R. Jiménez, R. Till, and M. Howell, vol. 1, 133–146. Berlin: Ekho Verlag.
Köpp-Junk, H. 2018. Textual, Iconographical, and Archaeological Evidence for the Performance of Ancient Egyptian Music. In *The study of musical performance in antiquity. Archaeology and written sources*, ed. A. Garcia-Ventura, C. Tavolieri, and L. Verderame, 93–120. Cambridge: Cambridge Scholars Publishing.
Küchler, S. 1988. Malanggan: Objects, sacrifice and the production of memory. *American Ethnologist* 15 (4): 625–637.
Lund, C. 1981. The archaeomusicology of Scandinavia. *World Archaeology* 12 (3): 246–265.
Manaud, O., and C. Barrandon. 2015. "Echo-graphie" intérieure du cairn de Gavrinis. Etude exploratoire des caractéristiques acoustiques et lecture symbolique. *Archéothéma* 39. http://lespierresquichantent.over-blog.com/2014/10/echo-graphie-du-cairn-degavrinis.html.
Mazo Pérez, C., C. García Benito, and M. Alcolea Gracia. 2015. Un caso de Arqueología Experimental aplicado a la Arqueología Musical. *SALDVIE* 15: 65–91.
Morley, I. 2006. Mousterian musicianship? The case of the middle Palaeolithic Divjebabe I bone. *Oxford Journal of Archaeology* 25: 317–333.
Morley, I. 2013. *The prehistory of music. Human evolution, archaeology, and the origins of musicality.* Oxford: Oxford University Press.
Morphy, H. 2009. Art as a mode of action. Some problems with Gell's *Art and Agency*. *Journal of Material Culture* 14 (1): 5–27.
Rees, J.A. 2013. Membrane drums as cosmic symbols and shamanic portals in the Shell art of Spiro, a Mississipian mound site in Oklahoma. In *Music and ritual. bridging material & living culture*, Publications of the ICTM study group on music archaeology, ed. R. Jiménez, R. Till, and M. Howell, vol. 1, 189–208. Berlin: Ekho Verlag.
Reznikoff, I., and M. Dauvois. 1988. La dimension sonore des grottes ornées. *Bulletin de la Société Préhistorique Française* 85 (8): 238–246.
Robb, J., and O.J.T. Harris. 2013. Body worlds and their history: Some working concepts. In *The body in history. Europe from the Palaeolithic to the future*, ed. J. Robb and O.J.T. Harris, 7–31. Cambridge: Cambridge University Press.
Rosso, D.E., F. d'Errico, and A. Queffelec. 2017. Patterns of change and continuity in ochre use during the late middle stone age of the horn of Africa: The Porc-epic cave record. *PLoS One* 12 (5): e0177298. https://doi.org/10.1371/journal.pone.0177298.
Soar, K., and C. Aamodt. 2014. Introduction. In *Archaeological approaches to dance performance*, BAR international series, ed. K. Soar and C. Aamodt, vol. 2622, 3–15. Oxford: Archeopress.
Vázquez de Ágredos Pascual, M.L., C. Vidal Lorenzo, and P. Horcajada Campos. 2018. Face painting among the classic Maya elites: An iconographic study. In *Social skins of the head body beliefs and ritual in ancient mesoamerica and the andes*, ed. V. Tiesler and M.C. Lozada, 93–108. Albuquerque: University of New Mexico Press.
Waller, S.J. 1993. Sound reflection as an explanation for the content and context of rock art. *Rock Art Research* 10 (2): 105–113.
White, C.L. 2013. The burning man festival and the archaeology of ephemeral and temporary gatherings. In *The Oxford handbook of the archaeology of the contemporary world*, ed. P. Graves-Brown and R. Harrison, 596–609. Oxford: Oxford University Press.
Wright, D., B. Stephenson, P.S.C. Taçon, R.N. Williams, A. Fogel, S. Sutton, S. Ulm, and the Goemulgal of Mabuyag. 2016. Exploring ceremony: The archaeology of a Men's meeting house ('*Kod*') on Mabuyag, Western Torres Strait. *Cambridge Archaeological Journal* 26 (4): 721–740. https://doi.org/10.1017/S0959774316000445.
Zuchowska, M. 2014. Dancer's representation and the function of dance in Han dynasty (202 BC-220 AD) Chinese society. In *Archaeological approaches to dance performance*, BAR international series, ed. K. Soar and C. Aamodt, vol. 2622, 67–73. Oxford: Archeopress.

E

Epigraphy, Greek

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Introduction

Scholars of the ancient world are often frustrated in their endeavors by the vast amount of material which has been lost due to the passage of time. One area of ancient scholarship in which the amount of available sources continues to increase is in the field of epigraphy, or the study of inscriptions. For this and other reasons, epigraphic anal-

ysis is proving to be of increasing value in the study of virtually all aspects of the ancient world, including social issues, religious aspects, political and economic decision-making, and social connections between groups or individuals.

Definition

Greek epigraphy is generally defined as the study of writings in the Greek alphabet which are inscribed upon durable artifacts. The materials on which the inscriptions are placed include not only stone (although the majority of epigraphic documents are indeed inscribed on stone) but also bronze, pottery, and other objects. Inscriptions may be movable, such as those on pottery, gems, weights and measures, tesserae, bricks, and tiles, or they may be immovable, such as graffiti and other inscriptions found on walls. Inscriptions on coins are properly the domain of numismatists, while texts on less durable materials belong to the field of papyrology; paleographists study ancient handwriting. The length of an epigraphic text may vary from a single grapheme to an extensive document, such as laws, oaths, or catalogues.

Even in antiquity there was interest in studying and collecting inscriptions. As early as the third century BCE, Krateros, the brother of the Macedonian king Antigonos Gonatas, published a collection of decrees relating to the history of Attica, known as the Ψηφισμάτων συναγωγή. Although this work is lost, it is regularly referred to by later authors including Harpokration. In later periods, a long series of travelers, including Cyriac of Ancona, included inscriptions in their descriptions of ancient sites.

Key Issues and Current Debates

Epigraphy is generally considered an auxiliary science and increasingly has become an important tool for archaeologists and historians of the ancient world. However, the study of inscriptions can be a difficult skill to master, due both to the presence of some complicated technical conventions observed within the discipline as well as organizational issues in the publication and dissemination of inscriptional evidence.

Most inscriptions from antiquity which have survived are damaged in one manner or another, either from the simple passage of time and exposure to the elements or through other methods including accidental breakage, vandalism, or wear arising from the reuse of ancient blocks as construction materials. Many inscriptions are found in the course of systematic excavations of important ancient sites, but many others come to light by accident, through rescue excavations or through the demolition of older buildings and modern construction work which may uncover ancient remains.

After the discovery and cleaning of an inscription, the task of the editor is to decipher what remains and, in the case of damaged or broken texts, to estimate, as closely as possible, how much of the original inscription has been preserved and to make an attempt to restore what has been lost. Greek inscriptions are engraved in unbroken lines of capital letters, without spaces and with virtually no punctuation to indicate the beginnings and ends of words; the lack of spaces and punctuation, combined with the damage or wear on most inscriptions, complicates the task of the epigraphist, who must produce a text in which word divisions, punctuation, and diacritical marks are present. In deciphering an inscription, therefore, it is often helpful to use such tools as photographs taken in various degrees and at various angles of light or through the production of a squeeze, which generates a reversed, three-dimensional copy of the text. Increasingly, advances in technology are allowing epigraphists to recover lost portions of text from very damaged areas of inscriptions; such tools include the use of three-dimensional white light scanners and infrared light to reveal letter traces that cannot be seen with the naked eye.

In addition to the difficulties presented by the manner in which inscriptions were carved and the damage wrought by the passage of time to many of the texts, the study of Greek epigraphy is complicated by the fact that the inscriptions display specific characteristics which directly relate to the area and era in which they were originally

produced and erected. Regional differences in dialect and alphabets abound; the orthography, language, use of abbreviations, and other aspects of inscriptional texts also vary depending upon the region in which the inscription was produced and the historical circumstances of the time period in question.

The earliest Greek inscriptions date to the early Archaic period (eighth and seventh centuries BCE). The Greek script had Semitic origins, and early inscriptions often are written from right to left, in imitation of the manner of writing common in areas using Semitic scripts; different Greek communities also began to develop their own sets of letters, known as epichoric alphabets. Some early inscriptions also demonstrate a style of writing known as boustrophedon, or "ox-turning"; in boustrophedon inscriptions, alternating lines of text read from right to left and then left to right, often with the letter forms in each alternate line also being reversed. As time went on, increasingly a more general alphabet began to be used, and the orientation of the script settled into a left to right direction. In the sixth century BCE, the stoichedon style of inscription developed; in stoichedon inscriptions, the letters are aligned in rows both vertically and horizontally, as if on a grid. In the fifth and fourth centuries BCE, stoichedon inscriptions were the dominant form of official documents in Attica and were also widely used in other areas of the Greek world. The use of the stoichedon style began to decline in the third century BCE, and it was virtually abandoned by the end of the century. It was replaced with a more naturalistic style in which the letters are proportionately spaced rather than each letter being assigned a space of the same height and width regardless of its size; later inscriptions also have a tendency to observe syllabic or word distinctions, so that lines often begin or end with complete words or syllables.

Letter forms also developed over time, and more experienced epigraphists can often offer an estimated date for an inscription simply by examining the stylistic characteristics of the text. Epichoric alphabets had virtually died out by the fourth century BCE; an Athenian decree of 403/2 BCE made the use of the Ionian alphabet compulsory in all official Athenian inscriptions, and other states followed Athens in adopting the Ionian alphabet, so that it became the standard script of Greek inscriptions in the Hellenistic and Roman eras. However, there was a wide variety of variability in the Ionic script, and over the centuries the letter forms evolved in certain ways; it will suffice here to point to the development of broken-bar alpha; the development of lunate sigma and epsilon; the replacement of the letter pi, written with unequal hastae during the Classical period, with a pi in which the hastae are equal; and the addition of apices as decoration on the ends of letters. Some scholars, most notably S. V. Tracy, have been able to trace the hands of various letter cutters by closely analyzing the style of the letters in various inscriptions, and this has allowed epigraphists to date numerous inscriptions which were fragmentary and therefore undatable by other means.

The restoration of missing portions of epigraphic texts must be carried out with reference to the reconstruction of the proportions of the original monument, since the physical dimensions of the surface on which the inscription was engraved has a direct bearing upon any proposed textual restorations. Restorations of illegible passages in Greek inscriptions are often offered on the basis of textual parallels from other similar inscriptions in which the missing portion of text is preserved. Early epigraphists used a variety of methods for restoring texts and a variety of editorial indications to point out places in the document where restorations or other editorial interpolations had been made. The Leiden system of editorial conventions was introduced in 1931 in an attempt to introduce a uniform system of *sigla* to the editing process of ancient texts, and the Leiden editorial conventions have been widely, if not completely universally, adopted by epigraphists since.

Access to the ever-increasing number of Greek inscriptions is complicated by the complex nature of the organization and publication of the texts. The first systematic attempt to publish Greek inscriptions took place in Berlin between 1828 and 1877, under the direction of A. Boeckh, J. Franz, E. Curtius, and A. Kirchhoff. The result

was the publication of the *Corpus Inscriptionum Graecarum*, a four-volume attempt to publish all of the Greek inscriptions from the entire geographic spread of the ancient world. *CIG* arranged inscriptions by geographical area and within each region through the application of general categories, including public decrees, epitaphs, dedications, and religious texts. Unfortunately, even before *CIG* was completed, it was already out of date; the continuous discovery of more and more epigraphic texts meant that the stated goal of publishing all known Greek texts from the ancient world in these volumes could not be achieved.

The main source for Greek inscriptions is now the *Inscriptiones Graecae*, on which work began at the beginning of the twentieth century. *Inscriptiones Graecae* is geographically much less ambitious than *CIG* and focuses on Greece, the Black Sea littoral, and the Aegean islands. Although originally 15 volumes were planned in the series, some never appeared. *IG* suffers from the same difficulty as *CIG*; the continuous discovery of inscriptions has ensured that *IG* is not a complete collection, and many volumes are woefully out of date.

Collections such as *Inscriptiones Graecae* have been supplemented by regional corpora of inscriptions, often published by individual excavators or archaeological schools. For example, the French excavations at Delphi and Delos have produced the volumes of the *Inscriptiones de Delos*, the *Fouilles de Delphes*, and the *Corpus des Inscriptions de Delphes*, while the excavations at Rhamnous, in Attica, under the direction of V. Petrakos have produced their own volumes of inscriptional evidence not contained in *IG*. Some thematic corpora, such as F. Sokolowski's *Lois Sacrées des cités Grecques*, have also been produced to supplement the existing collections in *CIG* and *IG*.

Other efforts to fill in the gaps in publication in the main epigraphic corpora include the *Bulletin Epigraphique* and the *Supplementum Epigraphicum Graecum*. The *Bulletin Epigraphique* publishes the new inscriptions discovered in a given year geographically; while the material is discussed briefly, the texts themselves are not presented in a complete manner. The *Supplementum Epigraphicum Graecum* varies from the *BE* in that it presents the complete texts of all new epigraphic discoveries, including an *apparatus criticus* and brief editorial remarks on the inscriptions. In earlier volumes of the *SEG* series, the editorial language used was Latin, but more recent volumes appear in English. The *SEG* is particularly useful in that it presents complete texts of the epigraphic discoveries of a given year, new readings or restorations that have been suggested in that year for previously known inscriptions, and bibliographical references to new works published by scholars of the ancient world that are concerned with epigraphic materials, as well as useful indexes. Unfortunately, the increasing number of epigraphic finds, and the time necessary to produce the volumes of *SEG*, means that the editors of *SEG* are now several years behind in publishing.

Digital and electronic collections of epigraphic materials are now beginning to be more widely produced and increasingly provide a useful tool for scholars. The Centre for the Study of Ancient Documents (CSAD) at Oxford University is in the process of building an online database of images of its vast squeeze collection of Greek inscriptions. The Packard Humanities Institute (PHI), a nonprofit foundation dedicated to archaeology, music, film preservation, historic conservation, and early education, is developing an online database of searchable Greek inscriptions. This site includes the volumes of *IG* (although the apparatus criticus for each inscription has not been included, only the text of the inscription itself), as well as texts contained in regional and site corpora (e.g., the Athenian Agora inscription volumes); miscellaneous books and collections useful to epigraphists, such as Reinmuth's work on late fourth-century BCE ephebic inscriptions; and links to inscriptions published in scholarly journals and *SEG*. A useful concordance for the inscriptions contained within *IG* and *SEG* has been developed by the Berlin-Brandenburgische Akademie der Wissenschaften and the Seminar für Alte Geschichte at Münster University. Dr. Jürgen Malitz at the Katholische Universität Eichstätt developed the *Inscriptiones Graecae*

Eystettenses, a CD-ROM database for the inscriptions of Asia Minor, one region not covered by the volumes of *IG*. The Center for Epigraphical and Paleographical Studies at the Ohio State University has posted an impressive collection of digital images from their collection of squeezes. The U.S. Epigraphy Project aims to gather and distribute information about ancient inscriptions collected in the United States, and the American Society of Greek and Latin Epigraphy maintains a page with numerous useful links for scholars.

Epigraphy is a valuable tool for scholars of the ancient world because of the vast number and type of inscriptions that exist for study. There is virtually no facet of life in antiquity on which epigraphic documents have no bearing, although they are particularly valuable for shedding light on the social history of the ancient world. Although the content of Greek inscriptions is extremely variable, even very short inscriptions can provide valuable insights when studied as part of a larger group or in conjunction with other types of source materials. Epigraphic materials are especially useful for the study of areas in which the surviving literary sources provide little to no detail. For example, the distribution of funerary inscriptions provides scholars with some insights into patterns of settlement and habitation, while religious texts make available information about the observance of cultic activities and even the existence of smaller, local religious associations or cults unattested by our surviving Greek sources. In recent years, increasing attention has been paid to other facets of ancient Greek life on which epigraphy has some bearing, including the relationship between the vast number of inscriptions and ancient literacy and the connection between an epigraphic text and its place of erection in the physical fabric of a city.

The bibliography concerning Greek epigraphy is far too vast to be adequately covered here, and the sources provided below should be viewed as little more than a convenient starting point. References are provided below to some general works and corpora, to some useful works on specific issues in epigraphic studies, and to other resources mentioned above.

Cross-References

- ▶ American School of Classical Studies at Athens (ASCSA)
- ▶ Archaeological Record
- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Classical (Greek) Archaeology
- ▶ Papyrology in the Greco-Roman World

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Further Reading

The American Society of Greek and Latin Epigraphy. n.d. Available at: http://www.case.edu/artsci/clsc/asgle/

Austin, R.P. 1938. *The stoichedon style in Greek inscriptions*. London: Oxford University Press.

Bourguet, E., and G. Colin. 1929–43. *Fouilles de Delphes*. Vol. 3. Paris: E. de Boccard.

The Center for Epigraphical and Paleographical Studies. n.d. Available at: https://epigraphy.osu.edu/

The Centre for the Study of Ancient Documents. n.d. Available at: http://www.csad.ox.ac.uk/

Cook, B.F. 1987. *Greek inscriptions*. London: British Museum.

Dow, S. 1969. *Conventions in editing: a suggested reformulation of the Leiden System*. Greek, Roman and Byzantine Studies Scholarly Aids, Vol. 2. Durham: Duke University.

IG/SEG Concordance. n.d. Available at: http://www.ig.uni-muenster.de/igseg.dll/EXEC/0/0hvp1nx001ueo218hrugy0is7zgp

Inscriptiones Graecae Eystettenses: A database for the study of the Greek inscriptions of Asia Minor. n.d. Available at: http://www.gnomon.ku-eichstaett.de/LAG/datenbank.html.

Jeffery, L.H. 1990. *The local scripts of archaic Greece*. 2nd ed. Oxford: A.W. Johnston.

Klaffenbach, G. 1966. *Griechische Epigraphik*. 2nd ed. Göttingen: Vandenhoeck & Ruprecht.

Lawton, C.L. 1995. *Attic document reliefs: art and politics in ancient Athens*. Oxford/New York: Oxford University Press.

Maier, F.G. 1959–60. *Griechische Mauerbauinschriften*. 2 vols. Heidelberg.

McLean, B.H. 2002. *An introduction to Greek epigraphy of the Hellenistic and Roman periods from Alexander the Great down to the reign of Constantine (323 B.C.–A.D. 337)*. Ann Arbor: University of Michigan Press.

The Packard Humanities Institute Searchable Greek Inscriptions. n.d. Available at: http://epigraphy.packhum.org/inscriptions/

Petrakos, V. 1999. *Ὁ δῆμος τοῦ Ραμνοῦντος, I-II*. Athens.

Plassart, A., and F. Durrbach. 1926–1972. *Inscriptions de Délos*, 7 vols. Paris: Champion.

Raubitschek, A.E. 1949. *Dedications from the Athenian Akropolis*. Cambridge, MA: Archaeological Institute of America.

Reinmuth, O. 1971. *The Ephebic inscriptions of the fourth century B.C.* Mnemosyne Supplement, Vol. 14. Leiden: Brill.
Rhodes, P.J., and R. Osborne. 2003. *Greek historical inscriptions 404–323 B.C.* Oxford: Oxford University Press.
Robert, L. 1940. *Les gladiateurs dans l'Orient grec*. Paris: Champion.
Rougemont, G., J. Bousquet, A. Bélis, and F. Lefèvre. 1977–2002. *Corpus des inscriptions de Delphes*, 1–4. Paris.
Sokolowski, F. 1969. *Lois sacrées des cités Grecques*. Paris: E. de Boccard.
Tracy, S.V. 1990. *Attic letter-cutters of 229–86 BC*. Berkeley: University of California Press.
Sokolowski, F. 1995. *Athenian democracy in transition: Attic letter-cutters of 340 to 290 B.C.* Berkeley: University of California Press.
Sokolowski, F. 2003. *Athens and Macedon: Attic letter-cutters of 300 to 229 B.C.* Berkeley: University of California Press.
Threatte, L. 1980. *The grammar of Attic inscriptions: Phonology*. Berlin/New York: de Gruyter.
Sokolowski, F. 1996. *The grammar of Attic inscriptions: Morphology*. Berlin/New York: de Gruyter.
U.S. Epigraphy Project. n.d. Available at: http://usepigraphy.brown.edu/
Woodhead, A.G. 1981. *The study of Greek inscriptions*. 2nd ed. Cambridge: Cambridge University Press.

Epigraphy, Imperial Latin

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Introduction

Inscriptions are a vital source of information for the politics, society, culture, and religion of the Roman world. This entry examines Latin epigraphy in the age of imperial Rome, from the reign of Augustus (31 BCE–CE 14) to the fall of the empire in western Europe (CE 476).

Definition

The study of Latin epigraphy encompasses a range of different types of inscriptions, such as marble statue bases, milestones, bronze military discharge certificates, brick stamps, and engraved household objects. The one common factor is that they were all inscribed, etched, carved, or painted with some sort of text, whether it was a personal name, a dedication, a letter, or a law. This act of inscribing has been dubbed the "epigraphic habit" (MacMullen 1982). Some 250,000 Latin inscriptions have been published to date, with more examples discovered each year. Approximately half of these inscriptions are included in the monumental *Corpus Inscriptionum Latinarum* (*CIL*), a project initiated in the late nineteenth century by Theodor Mommsen. The majority of new inscriptions are published in scholarly journals, such as *Zeitschrift für Papyrologie und Epigraphik* (*ZPE*), but are collected together for ease of reference each year in *L'Année épigraphique* (*AE*).

Historical Background

The age of Augustus (r. 27 BCE–CE 14), the first emperor, witnessed a dramatic increase in the number of inscriptions throughout the Roman world (Bodel 2001: 7–8). This was undoubtedly prompted by Augustus' own transformation of the city of Rome through the construction of new temples and public amenities built with marble imported from North Italy. Many of the new monuments were inscribed with texts in honor of Augustus or members of his family. When Augustus was awarded the title of "father of the fatherland" (*pater patriae*) in 2 BCE, the honor was inscribed in no less than three locations in Rome: the entrance to Augustus' house on the Palatine Hill, the senate house (*Curia senatus*), and on the podium of the emperor's statue in his new forum (*Res Gestae* 35.1). As the emperor made his mark on the city's public spaces, there were fewer opportunities for senatorial aristocrats to be honored in Rome. All public statues in honor of senators, equestrians, or other officials had to be officially authorized lest any private citizen be seen to rival the emperor (Eck 1984). The situation was quite different outside Rome itself: in towns and cities throughout the empire, prominent nobles and patrons were honored with statues and inscriptions proclaiming their virtues and achievements.

Emperors and elites were not the only individuals commemorated with inscriptions in the Roman imperial period. Just over two-thirds of all extant Latin inscriptions are epitaphs, many of which were erected for freedmen, slaves, or ordinary citizens. The texts themselves were carved on tombs, sarcophagi, and funerary urns on the orders of family and friends and often paid tribute to the personal qualities of the deceased. This form of funerary commemoration has been used to explain why the number of inscriptions in the Roman world rose steadily throughout the first and second centuries CE before peaking in the early third century. Meyer (1990) proposed that the relatives of the deceased wanted to record that their loved ones were Roman citizens. This theory helps to explain why there was a dramatic decline in the number of inscriptions after Roman citizenship was granted to all free inhabitants of the empire in CE 212. The crucial concept here is that inscriptions were used as a way of expressing one's status and identity to the outside world. Mouritsen's (2005) study of epitaphs in Ostia and Pompeii has demonstrated how freedmen continued to be honored with funerary monuments even as members of the local town councils abandoned the practice. This peculiarity of the epigraphic habit seems to have been the result of the freedmen wishing to commemorate their emancipation from servile status.

Yet funerary commemoration cannot be the only reason for the rise of the epigraphic habit in the Roman world. We need to consider other forms of inscriptions, such as texts carved on honorific statue bases, milestones, military camps, and public amenities such as baths (Woolf 1996). In particular, it is important to think about the ways in which inscriptions were used to express power. Milestones attesting the construction or repair of roads were inscribed with the extravagant titulature of the emperor and his family members, as a way of marking distances and demonstrating the personal interest of the imperial administration in a specific region (Keppie 1991: 65–9). On a much larger scale, imperial edicts or senatorial decrees were often inscribed on stone or bronze in public places such as military camps or on the walls of temples. These documents were usually first posted in temporary form on a whiteboard, but they could be engraved on the order of the issuing authority or as a result of a decision by provincial communities. The most famous examples of these included "The Achievements of the Divine Augustus" (*Res Gestae divi Augusti*), several copies of which have been found in Asia Minor; "The Decree of the Senate concerning Gnaeus Piso the elder" (*Senatus consultum de Cn. Pisone patre*), known from several bronze copies from the province of Baetica; and Diocletian's "Edict of Maximum Prices" (*Edictum de pretiis rerum venalium*), which was publicly displayed in Egypt, Greece, and Asia Minor. Self-governing communities throughout the empire could likewise order that their decrees be erected in public spaces. This naturally raises questions of literacy, given that it is unlikely that more than 10% of Romans could actually read these texts (Bodel 2001: 15–6). But it is important to emphasize that the act of inscribing decrees and laws in public places served as a powerful reminder of government authority. The visual impact formed part of the message.

The distribution of Latin inscriptions was not spread evenly throughout the empire: each region had its own epigraphic culture. In Spain, inscriptions were concentrated in the southern region of Baetica and the coastal regions of Hispania Citerior, though there were pockets of epigraphic activity in the cities of central Spain (Kulikowski 2004: 34–48). There is also a marked difference in the spread of inscriptions in Britain, with greater numbers being found in the northwest regions, compared to the southeast. This can be explained by factors such as the types of stone suitable for building and carving and the concentration of soldiers along areas such as Hadrian's Wall (Mann 1985). In Gaul, the epigraphic habit was particularly strong in major towns and cities and in regions closest to Italy, such as *Gallia Narbonensis*. Detailed analysis of distribution patterns has shown that settlements on major road networks or those closely connected with the military featured higher rates of epigraphic commemoration than more isolated communities (Woolf 1998: 82–91). These geographic trends show that although the precise distribution of inscriptions was determined by a number of

factors, the epigraphic habit was closely connected to the spread of Roman culture by institutions such as the army.

After the early third century CE, there is a sharp decline in the number of inscriptions, a change which may at least partially be the result of the economic and political crises which plagued the empire in this period, though this view has been nuanced in recent years. There was something of a revival in the fourth century CE, with approximately 50,000 Latin inscriptions dated to the period of Late Antiquity (Trout 2009). The majority of these are Christian epitaphs from the city of Rome, illustrating the way in which the renewal of the epigraphic habit mirrored the formation of new religious communities. However, the number of honorific and building inscriptions declined throughout the Latin west, and many were reused for statue bases or as building materials.

Key Issues/Current Debates

Inscriptions serve as a primary source of evidence for the government of the Roman Empire, as they provide information concerning the administrative posts held by senators, equestrians, freedmen, and slaves. Tabulation and analysis of these positions has enabled scholars to trace changes in the Roman government hierarchy throughout the imperial period. Recent work has shown how inscriptions recording the careers of these officials can serve as valuable sources of evidence for the self-representation of Roman elites (Eck 1997). Scholars have also devoted attention to establishing the reasons for the public display of imperial letters, laws, and edicts in monumental form. The language of these documents, especially the series of edicts surviving from the Tetrarchic period (CE 284–324), can provide important information about the relationship between government policies and imperial ideology (Corcoran 2000: 205–33).

Latin inscriptions have opened up new avenues in the social history of the Roman world, particularly in the study of marginalized groups such as women, children, and slaves (Saller 2001). For example, large-scale statistical analysis of epitaphs has demonstrated the cohesiveness of the nuclear family unit in the imperial period (Saller and Shaw 1984). There are methodological problems in using the ages recorded on Latin tombstones to reconstruct the age profile of the Roman population, given doubts about the accuracy of the figures. The majority of demographic historians now prefer to use model life tables and papyrological evidence in preference to inscriptions. However, epigraphic records can still serve some statistical purposes, as in the case of military diplomas (bronze discharge certificates issued to veterans from the praetorian guard, auxiliaries, and the fleet). These documents have proved useful in determining changes in the ethnic composition of Roman army units throughout the imperial period (Roxan and Holder 1978–2006).

Detailed studies of the text and language of inscriptions can yield valuable insights for social historians. The fragmentary inscription known as the *Laudatio Turiae* (*CIL* 6.41062) preserves the funeral oration delivered in honor of an aristocratic woman (called "Turia," though her real name is a mystery) who lived during the civil wars of the late first century BCE. The eulogy provides important information on marriage and women's inheritance rights. The virtues such as chastity and modesty, for which "Turia" is praised, also feature prominently in epitaphs and honorific inscriptions for other Roman women at all social levels. Given their formulaic nature, the inscriptions do not provide any real insights into the character of the individuals, but they are useful for examining the social expectations placed on women (Riess 2012). Inscriptions on children's tombstones are also often predictable in the way in which they describe the deceased as "sweetest" or "dearest." But the artistic representations of childhood life that accompany the inscriptions can tell us much about the Romans' views of their children and their place in society (Rawson 2003: 336–63).

There are a wide range of Latin inscriptions that illuminate the religions of the empire and its inhabitants. These include a series of inscribed calendars from Italy, such as the *Fasti Praenestini* (*Inscriptiones Italiae* 13.2: 107–145), which mark the dates of festivals and sacred days; the majority of these are dated to the Augustan and Julio-Claudian period. The workings of a senatorial priesthood, the Arval Brethren (*Fratres Arvales*), are revealed by a series of inscriptions detailing their activities at their

sacred grove just outside of Rome. The spread of emperor worship throughout the western provinces of the empire can also be traced through inscriptions, such as monuments in honor of the *Augustales*, freedmen who served as official priests of the state cult. In recent years, epigraphic evidence, including votive dedications and curse tablets, has been used to demonstrate the vitality and variety of religious life in the Roman world (Haensch 2007). This has encouraged scholars to consider the significance of rituals in people's lives rather than dismissing religion, especially state religion, as an empty gesture.

Finally, epigraphic material is one of the most valuable sources of evidence for the development of the Latin language itself, especially when used in conjunction with literary texts such as poems and plays. For example, Adams (2007: 624–83) has analyzed the misspellings in inscriptions to show that the Latin spoken and written in Africa, Rome, and southern Italy was quite different from that in Gaul. Curse tablets discovered at Bath (*Aquae Sulis*) in southwest England reveal the idiosyncrasies of British Latin; they help to demonstrate that the language in the island province was not especially archaic, as once thought. New finds of writing tablets from the fort at Vindolanda near Hadrian's Wall have also shed light on the use of Latin in military contexts (Bowman 1994). One of the most celebrated documents in this collection is a letter sent by the wife of a cavalry officer, Claudia Severa, inviting a friend to her birthday party (*Tab. Vind*. II.291) (http://vto2.classics.ox.ac.uk/index.php/tablets/search-for-tablets?tablet=291).

International Perspectives

There are a number of international projects devoted to collecting and publishing Latin and Greek inscriptions online. The *Electronic Archive of Greek and Latin Epigraphy* (EAGLE) project (http://www.edr-edr.it/Italiano/index_it.php) has several constituent databases, including the *Epigraphische Datenbank Heidelberg* (http://www.uni-heidelberg.de/institute/sonst/adw/edh/). This currently contains some 65,000 inscriptions from the provinces of Dacia, Dalmatia, Macedonia, Moesia Inferior, Moesia Superior, and Thrace, with further regions in progress. A team of researchers at King's College London has created new online editions of *The Inscriptions of Aphrodisias* (http://insaph.kcl.ac.uk/index.html) and *The Inscriptions of Roman Tripolitania* (http://irt.kcl.ac.uk/irt2009/), with *The Inscriptions of Roman Cyrenaica* (http://ircyr.kcl.ac.uk/) currently under development. These online resources have been prepared using EpiDoc Extensible Markup Language (XML) to ensure that epigraphic conventions are accurately represented on the web (http://epidoc.sourceforge.net/). Online resources have also been developed to make specific regional collections available to the public. Images and texts of inscriptions from Spain originally published in *CIL* II can be found at the Universidad de Alcalá website (http://www2.uah.es/imagines_cilii/). The US Epigraphy Project (http://usepigraphy.brown.edu/) contains over 1,500 Latin inscriptions in universities, museums, and other collections throughout the United States. A second, online edition of the Vindolanda Tablets (VTO II) has been developed using EpiDoc XML and features a new word search engine, APELLO (http://vto2.classics.ox.ac.uk/).

Future Directions

The continued development of online databases for the study of inscriptions, featuring images, texts, translations, and commentaries, remains an imperative. Such initiatives will provide scholars worldwide with open access to information on these monuments and their archaeological context. They will be vital in conducting large-scale statistical analyses of the material in order to trace changes in the epigraphic habit over time and its use by different social groups. There is especially wide scope for developing these approaches in the period of Late Antiquity, in which there have been several important developments in recent years. These include the publication of a major work on epitaphs in early medieval Gaul and Spain (Handley 2003), a conference on epigraphic "cultures" held in 2009 (http://www.h-net.org/reviews/showrev.php?id=27361), and the Oxford-based

"Last Statues of Antiquity" project, which examines the decline of the statue habit from c. 280 CE (http://www.ocla.ox.ac.uk/statues/).

Cross-References

- ▶ Aphrodisias, Archaeology of
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Epigraphy, Greek
- ▶ Epigraphy, Latin: Early Through Late Republican

References

Adams, J.N. 2007. *The regional diversification of Latin*. Cambridge: Cambridge University Press.

Bodel, J., ed. 2001. *Epigraphic evidence: Ancient history from inscriptions. London*. New York: Routledge.

Bowman, A.K. 1994. *Life and letters on the Roman frontier. Vindolanda and its people*. London: British Museum Press.

Corcoran, S. 2000. *The empire of the Tetrarchs: Imperial pronouncements and government, A.D. 284–324,* Revised edition. Oxford: Oxford University Press.

Eck, W. 1984. Senatorial self-representation: Developments in the Augustan period. In *Caesar Augustus: Seven aspects*, ed. F.G.B. Millar and E. Segal, 129–167. Oxford/New York: Oxford University Press.

Eck, W. 1997. Rome and the outside world: Senatorial families and the world they lived in. In *The Roman family in Italy: Status, sentiment, space*, ed. B. Rawson and P. Weaver, 73–99. Oxford: Oxford University Press.

Haensch, R. 2007. Inscriptions as sources of knowledge for religions and cults in the Roman world of imperial times. In *A companion to Roman religion*, ed. J. Rüpke, 176–187. Oxford/Malden: Blackwell.

Handley, M.A. 2003. *Death, society and culture: Inscriptions and epitaphs in Gaul and Spain, AD 300–750*, British archaeological reports international series 1135. Oxford: Archaeopress.

Keppie, L. 1991. *Understanding Roman inscriptions*. Baltimore: The Johns Hopkins University Press.

Kulikowski, M. 2004. *Late Roman Spain and its cities*. Baltimore: The Johns Hopkins University Press.

MacMullen, R. 1982. The epigraphic habit in the Roman empire. *American Journal of Philology* 103: 233–246.

Mann, J.C. 1985. Epigraphic consciousness. *Journal of Roman Studies* 75: 204–206.

Meyer, E.A. 1990. Explaining the epigraphic habit in the Roman Empire: The evidence of epitaphs. *Journal of Roman Studies* 80: 74–96.

Mouritsen, H. 2005. Freedmen and decurions: Epitaphs and social history in imperial Italy. *Journal of Roman Studies* 95: 38–63.

Rawson, B. 2003. *Children and childhood in Roman Italy*. Oxford: Oxford University Press.

Riess, W. 2012. *Rari exempli femina*: Female virtues on Roman funerary inscriptions. In *A companion to women in the ancient world*, ed. S.L. James and S. Dillon, 491–501. Oxford/Malden: Blackwell.

Roxan, M.M., and P. Holder. 1978–2006. *Roman military diplomas I-IV*. London: The Institute of Classical Studies.

Saller, R. 2001. The family and society. In *Epigraphic evidence: Ancient history from inscriptions*, ed. J. Bodel, 95–117. London/New York: Routledge.

Saller, R.P., and B. Shaw. 1984. Tombstones and Roman family relations in the principate: Civilians, soldiers and slaves. *Journal of Roman Studies* 74: 124–156.

Trout, D.E. 2009. Inscribing identity: The Latin epigraphic habit in Late Antiquity. In *A companion to Late Antiquity*, ed. P. Rousseau, 170–186. Oxford/Malden: Blackwell.

Woolf, G. 1996. Monumental writing and the expansion of Roman society in the early empire. *Journal of Roman Studies* 86: 22–39.

Woolf, G. 1998. *Becoming Roman: The origins of provincial civilization in Gaul*. Cambridge: Cambridge University Press.

Further Reading

The best general introduction to the field of ancient epigraphy is Bodel (2001), which contains a number of thematic essays on both Greek and Latin inscriptions written by leading experts in the field. Keppie (1991) focuses on the Roman period, with particularly helpful sections on the carving of inscriptions and the process of reading, interpreting, and dating epigraphic texts. For Late Antiquity, Trout (2009) provides an authoritative summary of recent work.

Epigraphy, Latin: Early Through Late Republican

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Introduction

Roughly in the same period when the last king was expelled from Rome, the Latin epigraphic habit lost its strict dependence on the Etruscan one, which had fostered its development in the preceding centuries. During those same decades,

Etruscan epigraphy itself was undergoing major changes, mainly propelled by scribal schools linked with the great sanctuaries, which precisely at this time began to play a crucial role in Etruscan civic life. Latin epigraphy was far from uniform in this early period, with almost every center boasting its own epigraphic habit as part of a strictly local identity. The city of Tibur, which shared many cultural features with the Italic world (although characterizing itself unequivocally as a Latin city), even introduced the typically middle-Italic letter-rotations. The preeminence of Rome in Latin epigraphic culture was a relatively late phenomenon, clearly accelerated by the suppression of the Latin League in 338 BCE, which led to outright Roman hegemony in all the Latin-speaking region.

Only Praeneste showed a remarkable independence in its epigraphic habit, down to its destruction by Sulla in 82 BCE. Praenestine epigraphy had a distinct late-Etruscan flavor, consisting as it did mainly of captions on bronze mirrors (and less extensively on bronze *cistae*) and of funerary inscriptions on *cippi*. Both epigraphic classes had no parallels in Rome and the other Latin towns (where funerary inscriptions remained highly uncommon until around 100 BCE) but were on the contrary commonplace in most Etruscan cities. The century of the Roman Republic witnessed major changes in the Latin epigraphic habit; numbers increased dramatically, leading to a mass epigraphic production, which was one of the most outstanding features of late Republican Roman culture. Inscriptions emanating from any sort of public institution (the central government in Rome, local governments, magistrates on duty, any kind of commission or body of officials with political as well as religious purposes, etc.) multiplied in a period of unprecedented political struggle (punctuated by at least four outright civil wars), which went alongside an increased competition for power between elites and emerging social groups (and between individuals within each of these groups), an overall strong economic growth, and a general increase in literacy.

Inscriptions became one of the most important media of political propaganda and a product of highly specialized workshops. At the same time, these entirely new conditions fostered the emergence of private epigraphy, almost nonexistent in previous centuries, with the only exception of few votive texts: a feature that sharply distinguished the epigraphic culture of Rome and most of Latium from habits prevailing elsewhere in Italy, especially in the Etruscan world (actually, it was the huge number of private – mainly funerary – inscriptions that made the Etruscan epigraphic corpus one of the largest in the entire Mediterranean area in the first millennium BCE).

In the last decades of the Republican period, almost all features that will be characteristic of Latin epigraphic culture in the Imperial period were already in place; inscriptions belonging to this period are largely undistinguishable from slightly later ones, in their outlook as well as in their content. This is why, in absence of independent dating elements, many chronological uncertainties will inevitably persist, and it is often impossible to tell apart late Republican inscriptions from early imperial ones.

Definition

Epigraphy is by no means a necessary and immediate consequence of the acquisition of writing skills; its development follows the establishment of a set of shared forms of expression which we call *epigraphic habit*.

Messages delivered by inscriptions are only understandable combining text content and material aspects, like the kind of object on which the text itself is inscribed, its shape, dimensions, the context into which it was placed, and so on. An epigraphic culture is the result of a series of choices and can change through time. Latin Republican epigraphic culture was elaborated from the final decades of the fourth century BCE onwards; before that date, less than 50 inscriptions are known (with the exclusion of isolated letters), most of them brief texts scratched on vases.

The birth of this new epigraphic culture is marked by a significant change in quality, rather than in numbers. Even if a significant group of the about 50 inscriptions dated between the end of the fourth and the beginning of the third century are captions on Praenestine mirrors and cistae (more than half of the total number of 28, dated about

380–250 BCE), a couple of dozen inscriptions on stone (only four of them from the city of Rome itself) show almost all the features that will be typical of Latin inscriptions in the centuries to come.

At the beginning of the third century, a major reform in writing took place, showing the involvement of public authorities in matters of written expression that clearly matches the contemporary emergence of epigraphy; the letter Z was suppressed (to be reintroduced around the end of the Republican period in Latin transcriptions of Greek words), and its place was occupied by the G, a C with a diacritical mark. Alteration of alphabetical sequences is a very uncommon choice and shows the high degree of sophistication Roman culture had reached in this period.

In the third century BCE, inscriptions were made either on behalf of individuals, more often than not for religious purposes, or by the state or its magistrates, mostly commemorating public works; the total number of inscriptions on stone belonging into this century barely surpasses the 300, including a great number of Praenestine *cippi* (in fact, about two thirds of the 347 funerary inscriptions on *cippi* from Praeneste seem to belong to the third century; this peculiar local tradition does not survive beyond the second century BCE; Franchi De Bellis 1997). The period immediately following the end of the Second Punic War was another major turning point; in the following two centuries, numbers increased tenfold.

Although the best part of them belong to the period after 120/110 BCE, second-century inscriptions are consistently more frequent than third-century ones. A wide variety of people began to use inscriptions as a media for political or personal propaganda: Roman magistrates are now outnumbered by municipal ones, alongside a number of magistrates of lesser administrative units, officials of cultural associations, private individuals, freedmen and freedwomen, and even slaves.

At least two thirds of the about 3,200 inscriptions on stone dated between 200 and 40 BCE belong into the first century. The epigraphic habit remained mostly the same, although some changes did occur. The main reason for the steep increase in epigraphic production was the introduction of funerary inscriptions (almost nonexistent outside Praeneste until the end of the second century) which opened stonecutters' workshops to a wide range of customers.

Historical Background

Until the very end of the fourth century BCE, Latin inscriptions are found almost only in Rome and Latium. In the last decades of the century, Roman colonization began to create Latin-speaking communities in territories inhabited by peoples who spoke a variety of different languages; Latin epigraphy spread consequently, following not only the foundation of Roman or Latin coloniae (either as entirely new cities or inside already existing ones, like at Poseidonia-Paestum) but also the settling of Roman colonists in conquered territories which took place independently from a colonial foundation.

The impact of Latin epigraphy was very different from place to place. In some regions of Italy, local epigraphic cultures were significantly stronger than the Latin one and remained long unaffected, even when confronted with official documents from the Roman state. This is the case especially of Etruria, but also of the Oscan-speaking word, and of the most relevant cities of Venetia. In Etruria, outside Roman and Latin colonies and territories, Etruscan was the only language used in inscriptions until 90 BCE, the few Latin texts being convincingly attributed to immigrants; somewhere it was used even later, as in inner northern Etruria, where a robust tradition of funerary epigraphy persisted until around 50 BCE, with some documents dating as late as the age of Augustus (a bilingual inscription from Arretium, dated to c. 15–30 CE, provides the latest evidence for epigraphic use of Etruscan).

Nevertheless, the influence of Latin epigraphy became evident in Etruria from the beginning of the second century BCE, through a series of public inscriptions which, though always written in Etruscan language, depended plainly upon Latin models. Etruscan public inscriptions are as good

as nonexistent, before this late reception of Roman habits: there was no local tradition which could be referred to. In Venetia, although Latin inscriptions reporting the decrees of Roman magistrates arbitrating about the boundaries between the allied cities of Ateste, Patavium, and Vicetia reveal the intrusive presence of Latin epigraphy (and the Roman state) already in the second half of the second century BCE, funerary inscriptions, especially in Ateste, follow local traditions until the Imperial age (with a use of the Venetic language until at least the end of the first century BCE); this resulted in a massive epigraphic overrepresentation of colonists settled in the city by Augustus, whose funerary inscriptions on stone monuments greatly outranked the graffiti on cinerary ollae long preferred by the local aristocracy.

In the Oscan-speaking world, a robust local tradition of public epigraphy successfully resisted the pressure of Roman models; it was not the same for funerary inscriptions, completely lacking in Oscan epigraphy until a very late period (100–90 BCE), when they finally appeared following a genuinely Roman fashion. Other regions of Italy behaved differently. In the middle-Italic area, where local populations spoke a mosaic of closely related albeit different languages, the use of Latin in inscriptions spread quickly, independently from the political status the various communities enjoyed. Umbria adopted Latin in public inscriptions before its cities became Roman *municipia*, and the peoples of the Abruzzi were even more ready to accept the language of Rome for their private inscriptions as well (although in a strongly dialectal variety, interspersed with occasional words from the local languages), lacking as they did an epigraphical tradition, after the end of the South Picene experience in the late Archaic period.

From the second century onwards, Latin inscriptions appear even in areas of Italy where other languages were commonly spoken or written. Latin was not only the language of the state of Rome; it had also become the common language which allowed all inhabitants of Italy to understand each other. Outside Italy, on the contrary, Latin inscriptions in the Republican period appear almost only in towns and cities housing Latin-speaking communities (or, at least, groups of individuals, large or small alike) or as markers of the active presence of the Roman state (decrees concerning foreign communities or individuals, milestones, etc.).

In some areas, like the regions of northern Spain inhabited by Celts (the so-called Celtiberians), the development of an epigraphic culture employing the Latin alphabet to write down the local language is a clear consequence of contact with the Romans and knowledge of Roman epigraphic habit.

E

Key Issues

Legal Documents

One of the most characteristic features of Roman epigraphy is the use of bronze tablets for legal documents of various types (*leges*, *senatus consulta*, *decreta*, *edicta*, *foedera*, etc.). The public inscription of laws and decrees is a typical behavior of democracies first introduced by Greek *poleis* in the Classical period; in the Greek world, however, bronze is very rarely used (and inscriptions on bronze are mostly votive ones, on goods presented to gods in sanctuaries), the most frequent medium for legal documents being stone stelae or cippi (or, sometimes, the very walls of public buildings).

The Roman Republic follows the Greek experience in requiring a public display of acts from the government and the people (although literary tradition records a public display on leather-covered wooden shields even of decrees from the kings). We do not know exactly on what kind of media documents of the first century of the Republic were inscribed, whose existence is attested by ancient historians (like the treaties between Rome and Carthage or the laws of the 12 Tables); actually, the most ancient Roman legal documents on bronze tablets so far known are a decree by a proconsul of Spain (189 BCE; *CIL* I^2, 614) and the *senatus consultum de Bacchanalibus* (186 BCE; *CIL* I^2, 581).

Inscriptions on bronze tablets in other languages of Italy can be older than the Latin ones; although the evidence refers mostly to the

religious or the private sphere (as is the case of the Greek records of loans from the sanctuary of Zeus to the city of Locri or the Marrucinian inscription from Rapino, the Oscan one from Agnone, the Umbrian *tabulae Iguvinae*, the Etruscan *tabula Cortonensis*, which seems to witness a private negotium, even if a public magistrate of the city is named), at least the Osco-Lucanian tablet from Roccagloriosa, dated between the fourth and the third centuries BCE, seems a legal document very similar to the Roman ones. The use of bronze tablets, as a consequence, is probably to be viewed as a product of the wider Italic culture of the fourth and the third centuries BCE rather than a purely Roman invention.

At present, 36 Republican period legal documents on 32 bronze tablets are known (four of them being inscribed on both sides); half of them are preserved only in a small portion (few lines, or even few words, enough only to understand that the text concerned is a law, or a decree, or something related to the legal sphere). Reemployment of bronze tablets is attested six times: in two of these cases, one of the inscriptions is in a language different from Latin (the *tabula Bantina*, *CIL* I^2, 197, carrying a legal document in Oscan language, later than the Latin one, and the *fragmenta Clusina*, *CIL* I^2, 597, with a list of names in Etruscan).

Only a small part of these documents (7, plus 3 of unconfirmed provenance) have been found in the city of Rome; the majority of them came to light in Italian towns and in Spain. Sometimes (especially if a text is preserved extensively enough), it is possible to appreciate a connection between a legal document and the place where it has been found: this is the case, for example,

- The *lex municipi Tarentini* (*CIL* I^2, 590, found in Taranto)
- The *lex de Gallia Cisalpina* (*CIL* I^2, 592, from Veleia)
- The *lex coloniae Genetivae Iuliae seu Ursonensis* (*CIL* I^2, 594 cf. I^2, 1022, from Osuna)
- The *senatus consultum de Tiburtibus* (*CIL* I^2, 586, from Tivoli)
- The *sententia Minuciorum* (*CIL* I^2, 584, from Serra Riccò)
- The two documents concerning political relations between Rome and some peoples of Spain (the *tabula Alcantarensis*, *AE* 1984, 45, and the decretum proconsulis of 189 BCE from Alcalá de los Gazules)
- And others

It is likely that local communities (and sometimes individuals) cared for the inscription of documents which suited their own interest; this is also the case, for example, of Roman legal documents translated into Greek and inscribed in Greek cities (on stone, as local tradition required: in the Greek-speaking world, even legal documents in Latin were inscribed on stone, as is the case – for example – of the *lex Gabinia Calpurnia de insula Delo*, *CIL* I^2, 2500, or the *foedus Callatinum*, *CIL* I^2, 2676).

In other cases, the inscription on bronze was required by the Roman state itself; the public display of laws and decrees on bronze tablets is repeatedly referred to as normal practice in Roman legal sources of the Republican period, even if never explicitly stated on the tablets themselves, as far as our evidence goes.

Other Inscriptions Emanating from Public Authorities

A great number of different categories of Latin inscriptions were put up on behalf of public authorities and were intended as permanent markers of political action.

The Roman state in particular had a huge epigraphic visibility, which dramatically increased though time; its expressions were manifold. Milestones are one particularly striking example of this wide group, their presence ubiquitous in everyday life of many citizens. Although only few of them survive from the Republican period (dating from the third century BCE onwards), as public roads were continuously restored, evidence is enough to understand that they marked every mile, making the travelers remember the author(s) of the enterprise. Since road building had a very deep impact on Italy and the wider Roman(ized) world, the propaganda effect milestones could deploy and can be hardly overestimated. Another category of public inscriptions which had a deep impact

in everyday life of people directly involved were boundary markers, for example, those referring to allotment of public land to colonists (land often obtained through expropriation from conquered communities).

Other kinds of boundaries defined by the Roman state were, for instance, those between allied cities (probably following a request for arbitration; see *CIL* I^2, 633–4 and 2501, between Ateste and Patavium of 141 or 116 BCE, and *CIL* I^2, 636, between Ateste and Vicetia, 135 BCE), the limits of public land not to be built up (e.g., *CIL* I^2, 2516, from the colony of Ostia), the pomerium of Rome where burials were not allowed (*CIL* I^2, 838–9), or the area around the Tiber to be kept clear (*CIL* I^2, 766). Local authorities followed the Roman example in making their presence being felt in similar circumstances.

Votive Inscriptions

The proportion of votive inscriptions in Latin epigraphy of the Republican period (c. 15%) is consistently higher than in the imperial age (4%). The bare percentage conceals the fact that their incidence is even higher in the first two centuries of regular epigraphic production, from the end of the fourth to the last decades of the second centuries BCE, especially when Praenestine cippi (which are a strictly local phenomenon) are excluded from the general count. Religion appears to have been crucial in the development of Latin epigraphy from its very beginnings: the largest inscriptions on stone of the first centuries, from the lapis niger cippus (*CIL* I^2, 1) to the altars or bases from Tivoli (*CIL* I^2, 2658) and Corcolle (*CIL* I^2, 2833a; a recently discovered early inscription from Gabii is too poorly preserved to allow for an understanding of its significance; Fortson and Potter 2011), are all understandable as *leges sacrae* or *leges arae*: a type of epigraphic text which is found almost continuously throughout the Republican period and later.

The most outstanding examples of republican age leges sacrae are two almost identical cippi from Spoletium and Trevi (*CIL* I^2, 366 and 2872), a very ancient one from Luceria (*CIL* I^2, 401), the two later but more extensive inscriptions from Furfo and Tarentum, respectively (*CIL* I^2, 756 and 590, first century BCE), and the short but equally significant fragment from Amiternum (*CIL* I^2, 2545).

Leges sacrae very similar to the Roman ones are found also in Republican age inscriptions in other languages of central and southern Italy, like the Oscan *cippus* from Abella, a Volscian inscription on a tiny bronze tablet (originally nailed on some stone monument, maybe an altar) from Velletri or its surroundings, and the largest bronze tablets cited above. A characteristic feature of the most ancient period (fourth/third centuries BCE) are the series of *cippi* dedicated to various gods and inscribed with texts often reduced to the bare theonym. The most famous examples are the four cippi from Tor Tignosa (*CIL* I^2, 2843–6, end of the fourth – beginning of the third century BCE), the 14 from Pisaurum (*CIL* I^2, 368–81, end of the third century), the six from Veii, sanctuary of Macchia Grande (*CIL* I^2, 2628–32, plus one newly discovered inscription; end of the third or second century BCE), and other less preserved series.

It is possible that six small bronze tablets recently come to light (and said to have been found near Posta di Mesa, in southern Latium), bearing simple dedications to gods and goddesses, were originally set on stone bases of the same kind. Simultaneous dedications of groups of altars to one or more gods are well documented from archaeological as well as epigraphical evidence: this is why it is now thought that these stone cippi could best be interpreted as altars.

The use of inscribing votive texts on small bronze tablets is relatively common between the third and second centuries BCE, in Rome (see, e.g., *CIL* I^2, 34, 361, 973, 2675b–c, 2991), Latium (*CIL* I^2, 40, 42, 47, 60, 359–62, 2864, 2847) and other regions (*CIL* I^2, 364, 383, 385, 397, 2764, 2874). Equally almost confined to the period before the first century BCE are votive inscriptions on bronze vases, statuettes, or implements of various types, an epigraphic tradition shared with other cultures of Italy, especially the Etruscan one. It is probably no accident that some of the most ancient Latin inscriptions from outside Latium belong to this type, from the much discussed dedication by the soldier Caso Cantovio (on a

plaque cut out from a bronze belt and found in the area of the Lake Fucino, *CIL* I^2, 5) to *CIL* I^2, 580, said to have been found at Cortona, and 546, from Volsinii (a cosmopolitan city, which attracted significant numbers of immigrants after its refoundation in a new locality, specially chosen for its unique position across crucial communication routes, following the destruction of the ancient Volsinii by the Roman army in 264 BCE).

It is certainly of some interest that the votive inscription from Capena *CIL* I^2, 2435 (cf. *AE* 2008, 520), on a late third-century bronze oinochoe, was actually found inside a tomb: a circumstance unparalleled in Latin epigraphy (it has been supposed that the vase had been originally dedicated in the nearby sanctuary of Lucus Feroniae, pillaged by Carthaginian troops in 211 BCE) but well known in the Etruscan one. Etruscan epigraphic habit did survive Latinization, as is clearly shown by some oddities, like the inscription on a bronze tablet from a Volsinian tomb reporting a gift between individuals (*CIL* I^2, 1998). One of the latest instances of a dedication inscribed directly on a bronze object is found on the so-called Magdalensberg youth (actually, a life-size statue dated into the first half of the first century BCE: *CIL* I^2, 3467), a lavish gift to a deity identified only through its initial letter (*M*) by a group comprising one slave, three freedmen, and one noncitizen: a unique association, probably connected with the exploitation of the iron mines of the area (the Noricum, at that time an independent kingdom allied with the Roman state) and with trade between that region and Aquileia.

From the second century onwards, votive texts are inscribed almost only on stone: most usually altars, bases (which could emphasize the gift placed upon themselves or refer either to immaterial gifts such as public meals, ceremonies, sums of money, or construction or restoration activities paid for by the dedicant), and architectonical elements (columns, lintels, etc.). Dedicatory inscriptions on mosaic floors of temples and cult places form a small but conspicuous group belonging in these same centuries.

About one third of the c. 600 Republican period votive inscriptions so far known to us refer to the dedication of architectonical structures (temples, altars, columns, etc.) or furnishings (statues, bases, thesauri, etc.) in temples and sanctuaries: this is a consequence of the intermingling of this category with the following one, typical of the period after c. 200 BCE.

Inscriptions Recording Acts of Munificence

These inscriptions are one of the most characteristic features of Roman epigraphy, their number following the increased level of competition of the later republic: while only about 10% of the evidence refers to the third century, 40% belongs into the II and about 50% to the first six decades of the first century BCE. About 400 texts, out of the total number of slightly more than 500, record explicitly what had been done by the benefactor(s) – or, alternatively, the object(s) of their action can be deduced by other, material aspects of the inscriptions themselves (e.g., statue bases, lintels, columns).

Although stemming from the Hellenistic tradition of euergetism, Roman-style munificence was conspicuously different, as people involved were mostly magistrates of the central or local governments; private individuals appear later (and in a far lesser scale until the imperial age), often as members or representatives of associations, the most of them involved in cultural practices. Little more than half of the acts of munificence were constructions or restorations of temples or other buildings devoted to cult activities or dedications of statues, altars, or other furnishings or implements inside sanctuaries: this can hardly be a surprise, since pious foundations and dedications were for many centuries the only way to bypass the severe restrictions Roman law and custom imposed on personal propaganda.

This behavior imposes itself especially after the Second Punic War, as a consequence of the increased number of individuals struggling for public visibility; the few oldest inscriptions belonging into this wider category seem in fact more concerned with other kinds of public works. The most ancient one is possibly *CIL* I^2, 1710, recording the construction of the city walls of the colony of Luceria by (at least) three praefects; unfortunately, the inscription itself is lost, and its dating at precisely the time of the colonial

foundation (315/4 BCE) cannot be taken for granted; around the middle of the third century, it is dated *CIL* I^2, 3152, from Paestum, the first of a series of inscriptions commemorating some of the works which reshaped the ancient Greek (and later Lucanian) city into a Roman one (actually, a Latin colony since 273 BCE).

CIL I^2, 2836, referring to a gift by the consul M. Fulvius Flaccus in the sanctuary of Fortuna and Mater Matuta in Rome's Forum Boarium after the capture of Volsinii (264 BCE) is the first epigraphical evidence of the well-documented Roman custom of offering to the gods a share of the booty, either as such (e.g., statues) or by employing the money resulting from the sale of the plundered goods. Later examples of this practice abound, the perceived recipients of the munificence acts shifting gradually from the gods to the citizens attending sanctuaries, until an outright public space (e.g., the forum) was finally preferred for display of booty.

The increasing scale of Rome's wars and the wider participation of allies promoted an equally wider circulation of dedications from war booty by Roman commanders; the most striking example is the series set up by Lucius Mummius after the siege of Corinth in 146 BCE, which encompassed the city of Rome, other communities of Roman citizens, and even allied communities (*CIL* I^2 626–30, plus an inscription in Oscan language from Pompeii). Even if Mummius cared for his dedications throughout the Romano/Italic world as a censor, in 142 BCE, in all inscriptions, he appears as consul. Censors, though formally in charge of the most important public works, are conspicuously absent from inscriptions recording acts of munificence. Magistrates of any level, from the consuls in Rome to the lesser, local *magistri vici*, form by far the greatest part of the donors; priests are equally well documented.

Private individuals are far less common; the presence of women is limited only to the latest period, and some of them (like the *Octavia M. f. Gamalai* [sc. *uxor*] of *CIL* I^2, 3025, from Ostia) owe their role to a particularly prominent position of their husbands or families. Freedmen and male slaves appear most commonly as members of religious associations (while, at present, freedwomen and female slaves are never attested as donors) and only very rarely can act as individuals: one particularly striking example is the Faustus Versenni P. s(ervus) who concluded his dedication of a temple to Priapus (*CIL* I^2, 3391) with the astonishing formula *d(e) s(uo) pecul(io) f (aciendum) c(uravit)*, directly borrowed from the monumental dedications of public works by prominent magnates, who never missed to remember readers that they paid for them from their own pocket (*de sua pecunia*).

E

Funerary Inscriptions

Apart from the Praenestine *cippi* and other sparse evidence from outside Rome (e.g., Tusculum: *CIL* I^2, 50–8, 2848–54), the only Latin funerary inscriptions so far known belonging to the period up to the very end of the second century BCE are the epitaphs from the two tombs of the Cornelii Scipiones at Rome (*CIL* I^2, 6–16, 2660, p. 718, 739, 831, 859–60; *CIL* I^2, 2834–5). These tombs are in many ways exceptional, in their architectural setting, in the shape of the sarcophagi within them, and in the inscriptions carved on their front sides and lids. Some of these inscriptions are limited to the bare name of the deceased, but the most famous ones are the large poetic texts reporting the deeds of the most prominent men deposed into the larger of the two tombs and conveniently referred to as *elogia Scipionum*. In fact, given the lack of any tradition in Latin funerary epigraphy, these inscriptions (probably carved all at the same time, some decades after the death of some of the personalities involved) were conceived like public elogia.

Some elements in the name formulae are also very similar to the ones sometimes employed in magniloquent funerary inscriptions celebrating contemporary Etruscan aristocrats. Roman tombs of the early and middle Republican periods were usually simple pits or trenches, sometimes containing sarcophagi or cinerary urns; the less common chamber tombs, probably owned by the most prominent families, could sometimes be decorated by paintings: anyway, every kind of decoration was limited to the interior of the tomb itself. We do not know what kind of markers were put on the ground to signal the existence of these tombs, but they should not have

had a monumental appearance, since no traces of them survive. There should be no surprise, therefore, that funerary epigraphy emerges in connection with a wide reception of east-Mediterranean funerary monuments in the late second century BCE (in Campania, where these architectural types appeared earlier, slightly older Latin funerary inscriptions are known, e.g., *CIL* I^2, 2874b, from Cales).

In the same decades, land plots surrounded by walls and employed for underground burials (ash urns, *fossa* tombs, etc.) began to be marked by inscribed *cippi* with the name of the families who owned them. In some regions of Italy (most notably, in northeastern Etruria) some local forms of funerary epigraphic culture persisted until the early Imperial period; it is actually thanks to the huge number of funerary inscriptions from Chiusi and Perugia (which follow the local tradition requiring an extensive use of epitaphs, especially on cinerary urns) that Etruria boasts one the largest Latin epigraphic corpora in Italy in the second and first centuries BCE (almost 500 inscriptions, about the same number as in Latium – with the exclusion of the approximately 750 inscriptions from the city of Rome, sharply outdistancing all other regions).

Instrumentum

This category encompasses all inscriptions put on objects of current use in everyday life, like vases, pottery or metal implements, bricks, and tiles; it can be broadly divided into two subcategories: inscriptions directly related with production or trade of goods (e.g., stamps on pottery, amphorae, and tiles) and graffiti scratched on these objects, often referring to their owners.

The latter may be interesting for the reconstruction of a vulgar language; the former, on the contrary, can provide plentiful information about production and trade of many goods. The most ancient stamps appear on black-gloss vases; some workshops from Cales producing a unique series of relief-decorated vases, signed them with unconcealed proud. Stamps disappear when, in the second century BCE, mass production of black-gloss wares leads to a significant decrease in their quality; they will only reappear later. The most significant series of stamps of the Republican period is that found on amphorae; their huge number (several hundred, mostly dated from the late second century onwards) and diffusion give an insight in the world of production and trade of common goods, like wine and olive oil.

Names of slaves appearing on stamps provide plentiful information about the organization of kilns; names of landowners, traders, and entrepreneurs on stamps and other categories of inscriptions on amphorae (the so-called *tituli picti*, painted on the neck and shoulder, or the stamps on pozzolana seals) allow to reconstruct a complex network of relations between landed aristocracy, long-distance traders, and kiln owners. Some kilns are involved at the same time in amphorae, brick and tile production. In international perspectives, Latin epigraphy is a consistently international field of research; this is especially true for Republican period epigraphy, whose diffusion, limited almost entirely to Italy, does not allow the regional studies typical of the evidence from the Imperial period. There are no significant discrepancies in methodological approach between scholars from different countries; the only (lesser) distinction between Italian and non-Italian studies can be recognized in the focus on the archaeological and topographical context of inscriptions, for Italian scholars are often more directly involved in discoveries in the field or in specific studies about history of single ancient towns, but the overall approaches are consistent all over the world.

Future Directions

The 1990s have witnessed a renewal of interest about Republican Latin inscriptions; the state of knowledge in this field of study has changed significantly. The last decade has been devoted mostly to studies aimed at refining chronologically, geographically, or thematically defined topics, and at present, it is highly likely that this will be the case for at least the next few years.

Cross-References

▶ Epigraphy, Greek
▶ Epigraphy, Imperial Latin

References

AE L'Année Épigraphique. Available at: http://www.anneeepigraphique.msh-paris.fr/

CIL Corpus Inscriptionum Latinarum. Available at: http://cil.bbaw.de/cil_en/dateien/forschung.html

Fortson, B.W., and D.S. Potter. 2011. A fragmentary early republican public inscription from Gabii. *Zeitschrift für Papyrologie und Epigraphik* 178: 255–260.

Franchi De Bellis, A. 1997. *I cippi prenestini*, Pubblicazioni dell'Università di Urbino. Scienze Umane. Serie di linguistica, letteratura, arte. Vol. 13. Urbino: Università degli Studi di Urbino.

Further Reading

Lassère, J.-M. 2005. *Manuel d'épigraphie latine*. Paris: Picard.

Nonnis, D. 2003a. Dotazioni funzionali e luoghi di culto dell'Italia repubblicana. L'apporto della documentazione epigrafica. In *Sanctuaires et source dans l'antiquité: les sources documentaires et leurs limites dans la description des lieux de culte (Actes de la table-ronde, Naples 2001)*, Collection du Centre Jean Bérard, ed. O. De Cazanove and J. Scheid, vol. 22, 25–54. Naples: Centre Jean Bérard.

Nonnis, D. 2003b. Le implicazioni socio-politiche della produzione e della distribuzione nell'Italia repubblicana. L'apporto della documentazione epigrafica. In *Mercanti e politica nel mondo antico (Atti del convegno, Roma 2000)*, Saggi di storia antica, ed. C. Zaccagnini, vol. 21, 245–264. Rome: "L'Erma" di Bretschneider.

Panciera, S. 1989–90. Le iscrizioni votive latine. *Scienze dell'antichità. Storia, archeologia, antropologia* 3: 905–914.

Panciera, S. 1997. L'evergetismo civico nelle iscrizioni latine di età repubblicana. In *Actes du Xe congrès international d'épigraphie grecque et latine, Nîmes 1992*, Série Histoire Ancienne et Médiévale, ed. M. Christol and O. Masson, vol. 42, 249–290. Paris: Publications de la Sorbonne.

Panciera, S. 1998. Epigrafia. Una voce soppressa. *Archeologia Classica* 50: 313–330.

Panciera, S., and C. Pietri, eds. 1991. *Epigrafia: actes du colloque international d'épigraphie latine en mémoire de Attilio Degrassi, Rome 1988*, Collection de l'École Française de Rome. Vol. 143. Rome: École Française de Rome.

Schmidt, M.G. 2004. *Einführung in die lateinische Epigraphik*. Darmstadt: Wissenschaftliche Buchgesellschaft.

Solin, H. 1999. Epigrafia repubblicana. Bilancio, novità, prospettive. In *XI Congresso internazionale di epigrafia greca e latina (Roma 1997). Atti*, ed. S. Panciera, 379–404. Rome: Quasar.

Epigraphy: The Palaeohispanic Languages

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E

Introduction

At least four writing systems, in addition to the Phoenician, Greek, and Latin ones, were used between the fifth century BCE and the first century CE to write the indigenous languages of the Iberian Peninsula (collectively known as the Palaeohispanic languages): Tartessian, Iberian, Celtiberian, and Lusitanian. In total over 3000 inscriptions are preserved in what is certainly the largest corpus of epigraphic expression in the western Mediterranean world with the exception of the Italian peninsula.

Our knowledge of these languages remains unequal. In some cases, as with Tartessian, the writing system is not yet decoded, which makes it impossible to determine the linguistic family to which it belongs. In other cases, our knowledge of the writing system is much greater – as with Celtiberian – or even total, as in the case of Lusitanian, a language that uses the Latin alphabet, and, since the language belongs to a Celtic branch of Indo-European, it can be studied with the tools and techniques of comparative linguistics. Iberian stands somewhere between these two extremes. As a language, it is non-Indo-European and typologically agglutinative (for Indo-European and non-Indo-European languages in Hispania, see Villar 2000). Our knowledge of Iberian has increased substantially in recent years, but the

language still remains largely undeciphered. To all this should be added the fact that, for an extensive part of the Iberian Peninsula, there is no other evidence than the place- and personal-name elements recorded in indirect sources. Described in this way, the situation might appear disappointing. Yet, in the last few decades, there have been modest but unquestionable advances that enable us to understand somewhat better the uses to which writing was put among the different peoples inhabiting the pre-Roman Iberian Peninsula.

The study and understanding of these languages is essential to achieve a better appreciation of the social, economic, and cultural history of Hispania and the ancient western Mediterranean. They are also key to our comprehension of colonial Phoenician and Greek literacy, which lies at the root of the spread of these languages, and also of the diffusion of Roman literacy, which played an important role in the final expansion of what are known as the Palaeohispanic languages.

Definition

Strictly speaking, the Palaeohispanic languages were those spoken between the fifth century BCE and the first century CE in what today are the territories of Spain and Portugal. In the widest sense, however, Phoenician and Greek should also be included among the Palaeohispanic languages, as they were spoken by colonists born in Hispania between the ninth and sixth centuries BCE. Therefore, no fewer than six varieties of epichoric signaries and several adaptations of the Greek and Latin alphabets make up the complex mosaic of scripts and languages recorded in the Iberian Peninsula. In standard usage, however, the term is only applied to the languages that were not spoken outside Hispania, an area in southern France that extends from the River Hérault toward the west – culturally inseparable from Spain in Antiquity and where the northeastern Iberian script is predominant – being included for practical and historical reasons as part of this definition. It is important to bear in mind that there is no absolute correspondence between the Palaeohispanic languages and the scripts that these languages used over time, since the latter originated in the Iberian Peninsula itself although in response to external stimuli.

Today, when we speak of Palaeohispanic studies, most scholars understand or refer to the study of the languages and writing systems used in ancient Hispania prior to the generalization of Latin. Therefore, this is a well-established academic field in which several disciplines play a fundamental role; the subject deals with a complex range of cultural contexts covering an extensive geographical area as well as a huge chronological scope, almost a millennium of history. Despite that, the academic field of Palaeohispanic studies is a recent one, and it is convenient to have some idea of its development as a discipline if we aim to understand what Palaeohispanic studies really are.

Historical Background

Even though the field of Palaeohispanic studies is a discipline that has developed relatively recently, it nevertheless can trace its origins and roots back to the Renaissance. Two main lines of research have contributed to creating the modern field of Palaeohispanic studies. On the one hand, humanists and numismatists have long been concerned with and interested in collecting and cataloguing ancient coins. In Spain, however, some of these coins were written in an incomprehensible script and swiftly provoked great interest (for the coins using Palaeohispanic languages, see Ripollès and Sinner 2019). As a consequence, a line of research that aimed to decipher these coin legends started to develop. On the other hand, classicists interested in the study of Greek and Latin texts as well as Latin epigraphy aimed to achieve a greater understanding of and to reconstruct the ancient history of Hispania. To do so, they retrieved substantial amounts of information concerning different peoples and cultures, including in many cases native onomastics and linguistic information (De Hoz 2019 with bibliography).

From the sixteenth century onward, when Antonio Agustín first identified some syllabograms, but especially during the eighteenth and nineteenth centuries, when numismatists catalogued, translated, and tried to assign values to those

incomprehensible signs, a greater understanding of the script was increasingly sought. During this long process, both pioneering scientific ideas that had never been applied to the subject before – such as the importance of a Celtic stratum in the linguistic panorama of Hispania – and also highly speculative theories, in many cases unfounded, such as the Vasco-Iberian theory, a belief in the linguistic unity of ancient pre-Roman Spain, where a language that was the ancestor of modern-day Basque was thought to have been spoken, were developed; these were extremely influential both inside and outside Spain.

It was not until 1920 that there was a noticeable change in the situation thanks to the contributions of Gómez-Moreno. He first conceived and fully developed the idea of a semi-syllabic script in which the representation of stop consonants was always accompanied by a vowel (<da>, <de>, <di>, <do>, <du>, etc.). This was a groundbreaking thesis and led to the relationship long desired by Spanish numismatists between the coin legends written in Iberian script and their equivalent Latin forms being established. For most scholars, Gómez-Moreno's work marked the beginning of modern Palaeohispanic studies since, after his decipherment of the alphabet, it was possible to distinguish more than one language (Iberian and Celtiberian) in the epigraphic corpus.

Initially the field of Palaeohispanic studies was a regional field of limited impact outside the Iberian Peninsula. It was only thanks to A. Tovar's linguistic works and J. Untermann's epigraphic corpus (1975–2001) that Palaeohispanic studies truly started to flourish. Unfortunately, Untermann's death prevented the publication of his *Supplementa*, including all the recently appeared inscriptions. All these data are now collected, including those in *MLH*, in the Hesperia database (*BDHesp*), which is an ongoing project and certainly one of the future pillars for Palaeohispanic studies.

Key Issues/Current Debates

In the field of Palaeohispanic studies, there are currently many unresolved debates, and positions are sometimes remarkably disparate. For this reason, in the following lines we have tried to be meticulous when expounding the state of the question in each area of study. The aim is to make clear the difference between those hypotheses that can count on broad acceptance and those that are still currently under evaluation and debate.

The Earliest Indications of Epigraphy

Writing is not a locally born phenomenon in the Iberian Peninsula, but rather it is closely linked to the presence of Phoenician and Greek epigraphic cultures (for a linguistic history of the Iberian Peninsula in antiquity, see De Hoz 2010, 2011). Both groups introduced certain uses of writing through their colonial settlements, uses that served as a stimulus and in many cases as models for the native populations. Bearing this in mind, it is not surprising that the first manifestations of writing in the Iberian Peninsula occurred precisely around those places where Greeks and Phoenicians had a more stable presence. As early as the late eighth century BCE (or perhaps the early seventh century BCE), the impact of Greek and Phoenician culture can be demonstrated in southern Andalusia by the finding of scratched graffiti on pottery vessels in both languages (Zamora 2019 with bibliography). Actually, it is the coexistence of these two scripts that seems to have created a suitable background for the birth of the first epichoric script to be recorded in Iberia. The scarcity of recorded examples, however, does not affect its significance, which lies in the fact that all the other Palaeohispanic scripts that were used in the Iberian Peninsula were derived from this initial script (Ferrer and Moncunill 2019). Most of its signs are morphologically similar to those of the Phoenician alphabet. In addition to that, in the two inscriptions reproducing a complete or incomplete signary (Espanca and Villasviejas del Tamuja), the order of the first signs coincides exactly with those of the Phoenician alphabet, thus proving that the latter was the model used for the elaboration of the first Palaeohispanic writing system. In all probability, this early writing system was not conceived to scratch the few modest graffiti on pottery sherds that have come down to us; its main use should be related to the intense trading activity that is well documented in this region. Nevertheless, due to the limitations of our current sample, any hypothesis formulated cannot be considered other than mere speculation.

Epigraphy in the Southwest

A region in the Algarve (Portugal) adapted the early Palaeohispanic script during the seventh century BCE. About a hundred inscriptions on stone, probably funerary steles (Fig. 1), have been discovered in this area. Most of them are undecorated, but a few show a schematic figure, possibly a heroic warrior. These monuments may belong to a tradition of Bronze Age origin of which ample proof has been found in Alentejo and Extremadura. Recently found Phoenician steles from Lisbon datable to the eighth century BCE could also have been used as models. Apart from the steles, only some graffiti, probably personal names, on pottery vessels are known. The possibility of attributing a votive function to the signary from Villasviejas de Tamuja, recently reinterpreted as an *ostrakon*, cannot be discarded.

The majority of the texts are written from right to left, at times adopting a spiral layout following the edges of the pottery sherd. This writing is known as the southwestern, south Lusitanian, or Tartessian script (Correa and Guerra 2019 with bibliography). It is a semi-syllabary in which each vowel and continuous consonant is attributed a graphic symbol, as in alphabets, with stop consonants being indicated in a syllabic form, as in syllabaries. This characteristic was to become a shared property of all Palaeohispanic writing systems, an especially relevant aspect when it is taken into account that the main model for the script's creation was the Phoenician alphabet. In addition, the southwestern system has another specific characteristic: each stop syllabogram is followed by a vowel for the same sound, *ta*^{a}, *te*^{e}, *ti*^{i}, etc., an unnecessary procedure, redundancy, normally accepted as proof that the script had indeed not been created for writing the language in question. Regrettably, the degree of decipherment is not as advanced as might be desirable. At present, there is no consensus among specialists regarding the value of many signs. In addition, most texts are written in *scriptio continua*, with the resulting difficulty in dividing the texts into words. Therefore, the southwestern language remains undeciphered. The proposal that this southwestern language should be considered a Celtic language has not been accepted among specialists, who are mostly still skeptical about its typology and possible relationships. In chronological terms, the dating of the southwestern inscriptions is very complex, especially since a great number of steles

Epigraphy: The Palaeohispanic Languages, Fig. 1 The stele from Mesas do Castelinho. (Photograph: A. Guerra)

have been found in reused contexts. Despite these difficulties, most scholars would agree that this particular outburst of inscription production and its disappearance may have taken place in the second half of the seventh century BCE, and no subsequent written culture has been found in the area. The next inscriptions to be engraved were Roman and must be dated to the late republican period.

Iberian Epigraphy

The Iberian language (Moncunill and Velaza 2017; Velaza 2019 with bibliography) is doubtless the best attested among all the Palaeohispanic languages. More than 2200 inscriptions can be located in a wide geographical area between Roussillon (France), coexisting there with the Gallic language, and Andalusia. Its chronological framework covers from the fifth century BCE until a moment of time after the reign of Augustus. The acquisition of writing by the Iberians can be considered a consequence of their contact with the Greek colonies in southern France and northeastern Spain. The earliest securely dated examples are graffiti on Attic pottery found in the excavations carried out at the *oppidum* of Ullastret (Girona). From this same period, inscriptions have also been found on lead tablets (Fig. 2), similar to those from Pech Maho or Ampurias, and in which Iberian names appear as participants in trade transactions. Nevertheless, the Iberian language remains essentially undeciphered, a handicap that makes it difficult to achieve a good understanding of these texts. Despite this problem, the Iberian lead tablets of this initial period basically seem to contain texts related to commercial activities and the distribution of goods. Stamps on *dolia* or amphorae can also be found, proving the use of epigraphy in productive activities. In short, the earlier Iberian inscriptions, between fifth and third centuries BCE, can mainly be categorized as colonial epigraphy. There were still no funerary inscriptions in this period. The cemeteries known exhibit iconographic forms of ancient tradition or oriental influence (via southern Spain) and, more than anything else, funerary steles without inscriptions (Ensérune). By the middle of the third century, the introduction of the epigraphic habit seems to have been extended into the religious sphere. The use of writing is gradually adopted in the rock-face sanctuaries in Cerdanya (Campmajó and Ferrer 2010), and writing seems to be an important aspect of ritual with the signary as a votive element. Painted Iberian pottery was produced around the same time, in which ritual was mixed with ethnic and elite self-representation, and writing played a leading role. During the second century BCE, a far-reaching change occurred in Iberian epigraphic culture as a consequence of the Roman presence. With the influence of Roman public writing models, new categories of epigraphy and inscriptions on

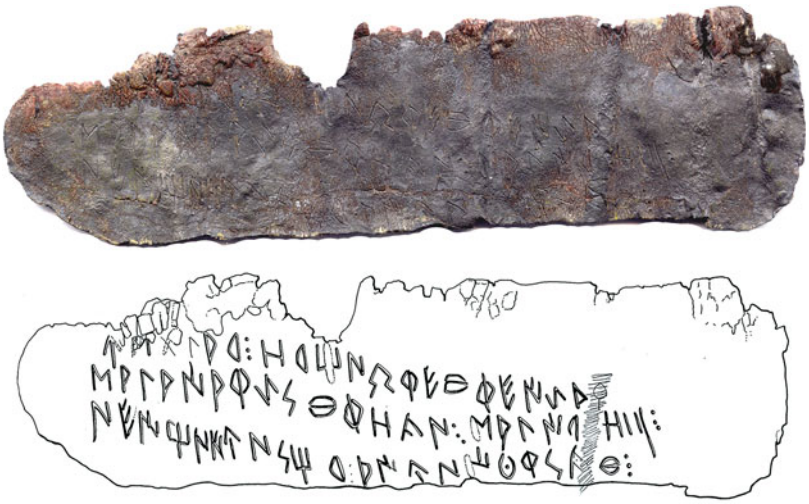

Epigraphy: The Palaeohispanic Languages, Fig. 2 Lead sheet from Tivissa. (Photograph: D. Asensio)

different materials appear, as well as the development of carving techniques and the use of new palaeographic forms and formulae. At this moment tomb inscriptions started to be engraved. In the first instance, the epigraphic language coexisted with the iconographic language, subsequently giving way to a gradual disappearance of decoration in favor of textual predominance. Votive inscriptions mainly associated with rock faces became sanctuary epigraphy at a time when sacred spaces were monumentalized. Perhaps the best example of these practices can be seen at the sanctuary of *Liber Pater* in Muntanya Frontera. A form of Iberian epigraphy that can be described as public emerged. Some inscriptions interpreted as honorific or monumental appear at this moment, especially in the forum or public buildings, as in *Emporiae, Tarraco* or *Saguntum*, showing the clear influence of contemporary Roman epigraphic habits. In the ambit of public and civic epigraphy, mention must be made of Iberian coin inscriptions. While the earliest examples can be dated to the end of the third century BCE, the peak of the phenomenon took place in the second century BCE and lasted until well into the first century BCE. In the same way, in some specific places like *Saguntum*, the continued use of Iberian writing into the imperial period must have arisen from a desire to maintain the features of an ancient epigraphic tradition as part of a civic or elite identity. To summarize, the history of Iberian written culture, from a diachronic perspective, can be understood as a process of expansion that starts with colonial epigraphy in the fifth-third centuries BCE and develops into a more extended written culture, with extensive public and private use of writing in the second-first centuries BCE. The enormous quantity and variety of materials that were inscribed, as well as the broad time span for which evidence is available, suggest a more socially widespread use of writing than scholars are often willing to accept. The fact that several writing systems were used to write the Iberian language seems to reinforce this conclusion. The northeastern semi-syllabary and the southeastern script (Ferrer and Moncunill 2019) are derived from or descendants of the ancient Palaeohispanic script, but they suppose a new adaptation with special features. What is known as the Greco-Iberian script is indeed an alphabet adapted around the fourth century BCE from Ionic Greek. In fact, Greek and Latin characters were also used to write texts in Iberian, but to a far lesser extent. Such a wide variety of graphic systems seems to reflect a plurality of needs and writing traditions rather than the supposedly limited literacy usually attributed to the Iberian world, where in many cases writing has been restricted to an elite.

Celtiberian Epigraphy

As ancient historians clearly state, the Celtiberians were peoples composed by different tribal groupings, such as the Arevaci, Lusones, Belli, and Titii, that inhabited an area of the central Meseta and the Ebro valley. The language they spoke and wrote, however, was a variety of Peninsular Celtic, also shared by other neighboring peoples, for instance, the Berones and Carpetani. Therefore, when Celtiberian epigraphy is mentioned, reference is not being made to the tribal name or ethnic grouping, but to broader linguistic criteria (Beltrán and Jordán 2016, 2019). Despite being a geographical neighbor of the Iberian culture and obviously interrelated with it in many aspects, Celtiberian epigraphy displays a very different character, function, and development when compared with the former. A quick look at a chart comparing Iberian and Celtiberian epigraphy (Fig. 3) allows us to appreciate the quantitative differences that exist between them, which doubtlessly reflect the gap in territorial distribution and chronological time span. In addition to that, differences regarding the penetration of literacy and, especially, a significant divergence as concerns the most commonly used material supports and epigraphic functions can also be detected. As mentioned above, in the Iberian sphere, there are many inscriptions on lead plaques and tablets, often reflecting commercial transactions or curses, but in the Celtiberian area we only know one single letter on lead, which comes from a site located in the epigraphic frontier region with the Iberian epigraphic area. While the Iberians made little use of bronze as a material support, in contrast the Celtiberians made much greater use of it

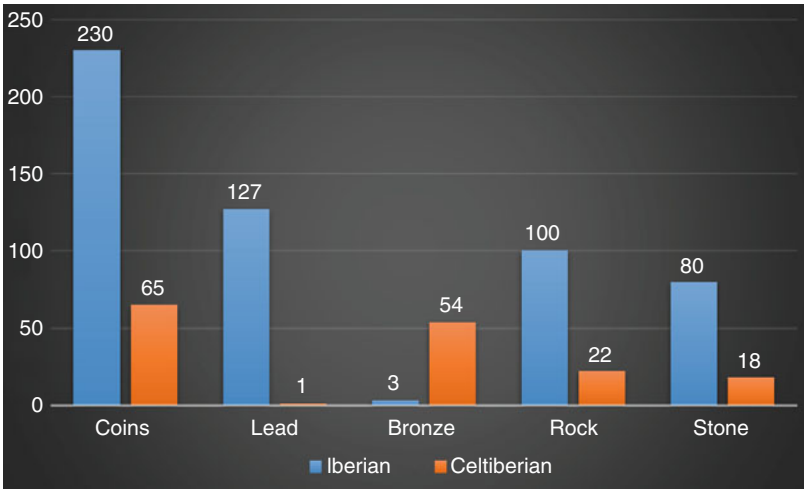

Epigraphy: The Palaeohispanic Languages, Fig. 3 Chart comparing Iberian and Celtiberian epigraphy

and in different contexts. How and why the Celtiberians adopted writing is a question that remains unanswered. Only a few years ago, scholars would have agreed that this process took place as a consequence of the Roman arrival in the Peninsula. Recent research, however, together with our current knowledge of the scripts, encourages us to think that the Celtiberians most probably started writing before that date, although perhaps not long before. Therefore, around the mid-third century BCE, the Celtiberians adapted two variants of the Iberian script in order to write their language, a practice that lasted until about the change of the era. From the first century CE on, Latin characters were introduced into the Celtiberian writing system with a few small adaptations, for example, the adding of an extra stroke to the S, indicating the second sibilant in Celtiberian. This procedure cannot be understood as a localized palaeographic feature since it is documented in both the rock face and bronze inscriptions. With the currently available evidence, it is possible to say that the Celtiberian epigraphic culture was largely inspired by Roman inscriptions (Beltrán and Jordán 2008). This phenomenon is particularly obvious for the more than 30 *tesserae hospitales* on bronze, which exhibit numerous parallels with comparable Latin examples. Their morphology is diverse, but they can basically be classified in three groups: the hand-shaped ones, those in the form of animals, and those of geometrical shape. The bronze plaques are also of clear Roman influence. Some are medium-sized, but there are also others of much larger sizes, like the large bronze plaques from Botorrita (Fig. 4), for which there are Latin parallels from the same site. Our current knowledge of the Celtiberian language is fragmentary and therefore too poor to fully understand these large inscriptions. In many cases, it is difficult for scholars to agree on basic aspects of the text, such as the type of message they contain. Despite all these difficulties, in some cases we have quite reliable indications that their contents were of juridical nature and that they were probably issued by municipal authorities. This would be a shared characteristic between the bronze plaques and coin issues, another epigraphic category among the Celtiberians with no less than 47 known mints. Beside these categories of inscriptions, the Celtiberians seem to have used others as well. Funerary epigraphy is little represented in the corpus, perhaps due to its merely sporadic use although it is documented in some of the steles of local tradition found in cities like Clunia. Surely the reason why votive or religious epigraphy, beyond the scratched graffiti in the rock face sanctuaries like Peñalba de Villastar, failed to develop was the lack of monumental cult spaces in the Celtiberian world until well into the Roman period. Chronologically speaking, Celtiberian texts were written in Latin characters at Peñalba

Epigraphy: The Palaeohispanic Languages, Fig. 4 First bronze from Contrebia Belaisca (Botorrita, Zaragoza). (Photograph: Museo de Zaragoza)

de Villastar at a time that was contemporary with or slightly earlier than Virgil's verses, in what we should perhaps consider to have been the final expression of the native epigraphy of Celtiberia.

Lusitanian Epigraphy

The Lusitanian epigraphic corpus is composed of a total of six, possibly seven, inscriptions in Latin characters (Fig. 5) (Luján 2019 with bibliography), distributed in a small area in modern-day Portugal and Extremadura. It seems clear, however, that the linguistic territory where the Lusitanian language was used was much larger than the area suggested by these six inscriptions and should be extended to the rest of the Roman province of Lusitania and perhaps to part of *Gallaecia*, as indicated by the frequency of personal names and theonyms in Roman inscriptions (Vallejo 2016). The inscriptions in this limited corpus share certain common features. All use Latin characters, without introducing variations to fit the particular features of the language. All the texts are of religious content, related, as far as we are able to understand them, to rituals (involving animals) dedicated to certain gods. Furthermore, two of the inscriptions share another particular feature: the Lusitanian part of the text is headed by two brief sentences in Latin. These phrases indicate who the authors of the inscriptions were by using the formula *Ambatus scripsi* and *Rufus et Tiro scripserunt*. In short, all of them reflect the wish to monumentalize a rock-face sanctuary and therefore may be, to a certain extent, considered official epigraphic documents. The absolute lack of other inscriptions in Lusitanian would point toward a very limited epigraphic phenomenon, if it were not for the dating of the inscriptions. Traditionally, scholars have dated this corpus to the first and even second century CE. The appearance of the inscriptions from Arronches and Arroyo de la Luz III, however, introduced an additional palaeographic variable that could change this chronology: the archaic form of the P and linguistic arguments. The panorama of Lusitanian epigraphic culture would become more complicated if these inscriptions really should be dated to the republican period. If this were the case, the six inscriptions, despite being homogeneous in form and content, would nevertheless be spread over the time span of two

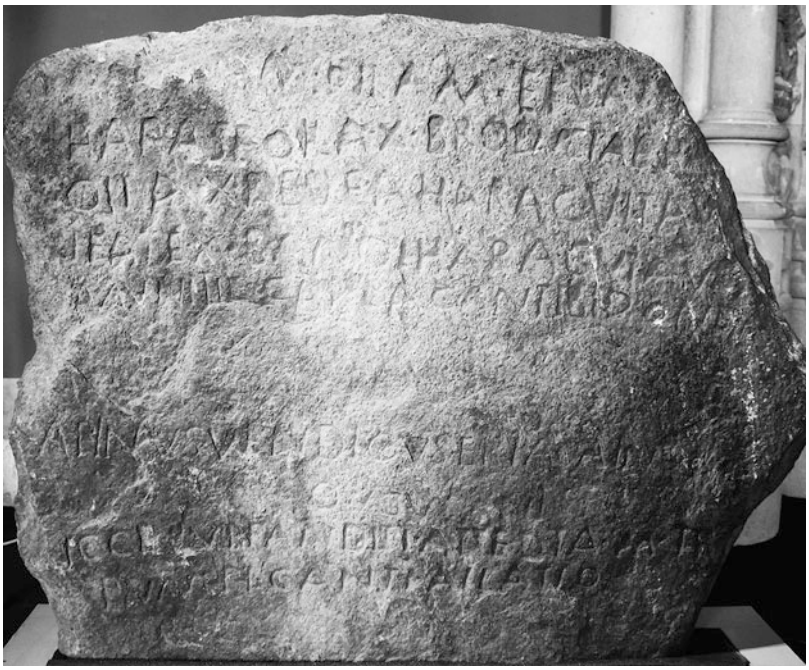

Epigraphy: The Palaeohispanic Languages, Fig. 5 Lusitanian inscription from Arronches, Assunçâo

centuries or more. Perhaps palaeography cannot be our only argument in this case, as we might be facing the survival of an alphabet with archaizing features. With all the evidence currently available, the most feasible scenario is one in which the Lusitanians did not record their language in a written form prior to the Roman period. Therefore, the Lusitanians never developed a true epigraphic culture, not even as a consequence of the implantation of Latin epigraphic models. The written form was used for texts only on an occasional basis, and within a ritual context. Whether the texts were in some way stereotyped before being carved and whether all of them belonged to a limited time span or were spread out in time are aspects that will still have to be elucidated in the future.

Vascon Epigraphy?

The Vascones were a group of peoples who, based on what is known from the ancient sources and the archaeological record, inhabited the modern territories of Navarre with some inroads into modern La Rioja (*Calagorri*, *Graccurri*) and Aragón (*Segia*, *Iaca*). Until a few years ago, the Vascones were considered to be an anepigraphic culture (for the territories of Hispania without epigraphy, see Gorrochategui and Vallejo 2019). However, today the situation is slightly different, and some of their cities are known to have issued coinage with legends in a script that is undoubtedly related to the Iberian script but which includes a particular set of graphic elements that can set this script apart. Some of these signs are completely unknown in any other Palaeohispanic script, mostly perhaps being imitations of Latin characters, and others are only rarely documented in the Iberian script. In general, these texts are exclusively known thanks to the survival of a small number of coins, which does not mean that some of these issues were not substantial or significant at their time (as is shown by the fact that imitations from Belgic Gaul are known). In addition to the public and civic nature of these epigraphic documents, other finds can help us to contemplate a more widespread use of writing among the Vascones: the most important of all is the inscription on the *opus signinum* pavement from *Andelo.* Although there is some controversy around this particular document – some scholars consider the text to be written using the Iberian language – there is a degree of consensus that the text uses

the Celtiberian script to write what could be an ancient form of Basque, the vernacular language in the region (for ancient languages in the Pyrenees, see Gorrochategui 1995 with bibliography). In addition to this extraordinary document, a new inscription engraved on stone from Olite and some graffiti using the Palaeohispanic script recovered in the territory of modern Pamplona should be added, completing what today is a very small corpus of inscriptions. Based on all this evidence, it seems obvious the Vascones undertook, around the mid-second century BCE, some writing experiments. To do so, sometimes they used the Celtiberian script, while on other occasions they adapted the Iberian one. It seems clear, however, that as in the case of the Lusitanians, they never developed a true epigraphic culture. An interesting difference between the Vascones and other groups discussed in this text (such as the Celtiberians) is that the former seem to have suffered "truncated epigraphization" as a consequence of Roman cultural influence. Such a phenomenon shows that in some cases Roman influence could stimulate local epigraphic habits, as in the case of the Celtiberians, while in others, the generalized use of Latin was able to eradicate early forms of local epigraphic expressions, as happened with the Vascones.

Conclusions

Maps can accurately synthesize the evolution of writing in the Iberian Peninsula between the fifth and the first centuries BCE. Inscriptions prior to the fourth century BCE follow a very clear pattern distributed in a coastal strip defined by the leading Greek and Phoenician colonies and their limited areas of influence. This pattern can be completed by the addition of the few southwestern inscriptions, which can be traced along the Rivers Guadiana and Guadalquivir (Fig. 6). A very different

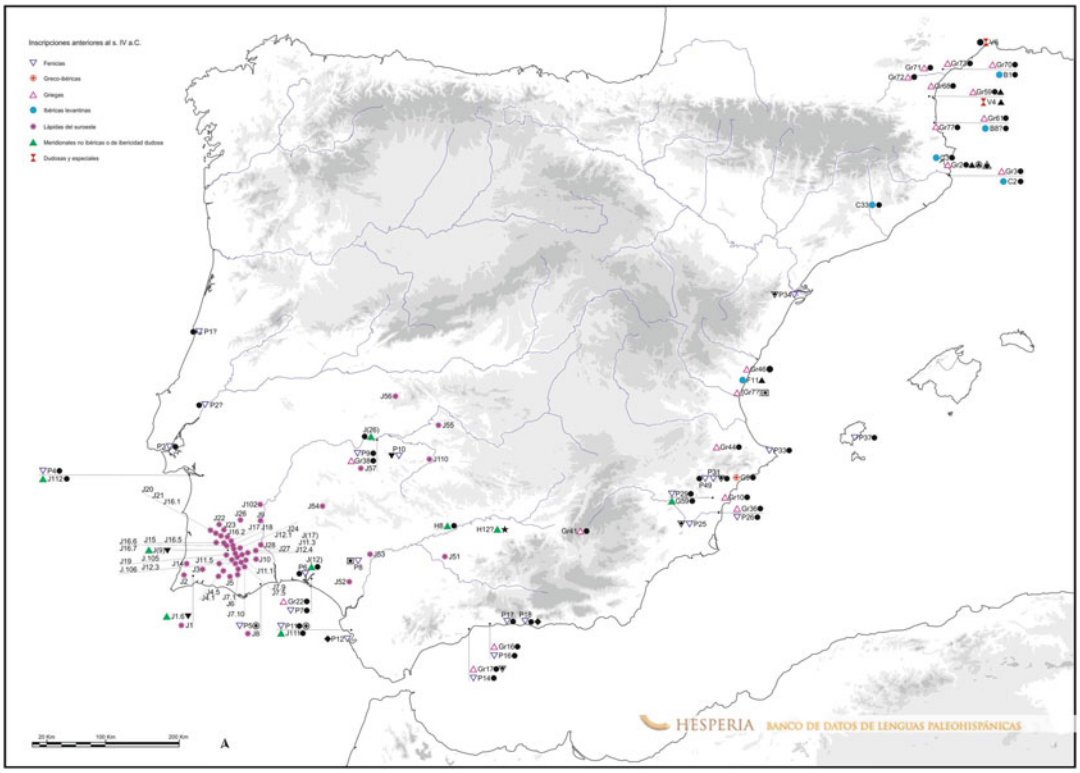

Epigraphy: The Palaeohispanic Languages, Fig. 6 Map including Palaeohispanic inscriptions prior to the fourth century BCE

scenario can be presented by looking at a map including inscriptions from the fourth and third centuries BCE. Here, the southwestern inscriptions disappear, and epigraphic evidence does not reappear until the Roman imperial period (Fig. 7). In contrast, inscriptions in the coastal Mediterranean territories increase in number and show a progressive penetration inland following the River Ebro. A map focusing on inscriptions dated between the second and first centuries BCE – including republican inscription using Latin – (Fig. 8) will immediately be characterized by the density of material in the territories along the Ebro valley and in the modern area of Andalusia. The opposite picture comes from the northwestern quarter of the peninsula, which remains anepigraphic, and its central areas, where the density is still quite low (for the relation between writing and colonization, see Díaz Ariño et al. 2019). This situation, which preludes the disappearance of the native epigraphic cultures to the advantage of Latin, arose around the end of the first century BCE and in the early first century CE, the few Iberian inscriptions after this date being considered residual phenomena.

Future Directions

It is difficult to foresee the future directions of a field that depends heavily on uncovering new finds. That said, it is feasible that, as has happened in the last few decades, the lines of research will follow three fundamental directions:

1. The first of these research lines should move toward the consolidation of knowledge of the graphic systems used to write the Palaeohispanic languages. The studies conducted over the last years have renewed this area considerably, demonstrating that there are a greater variety of systems, or

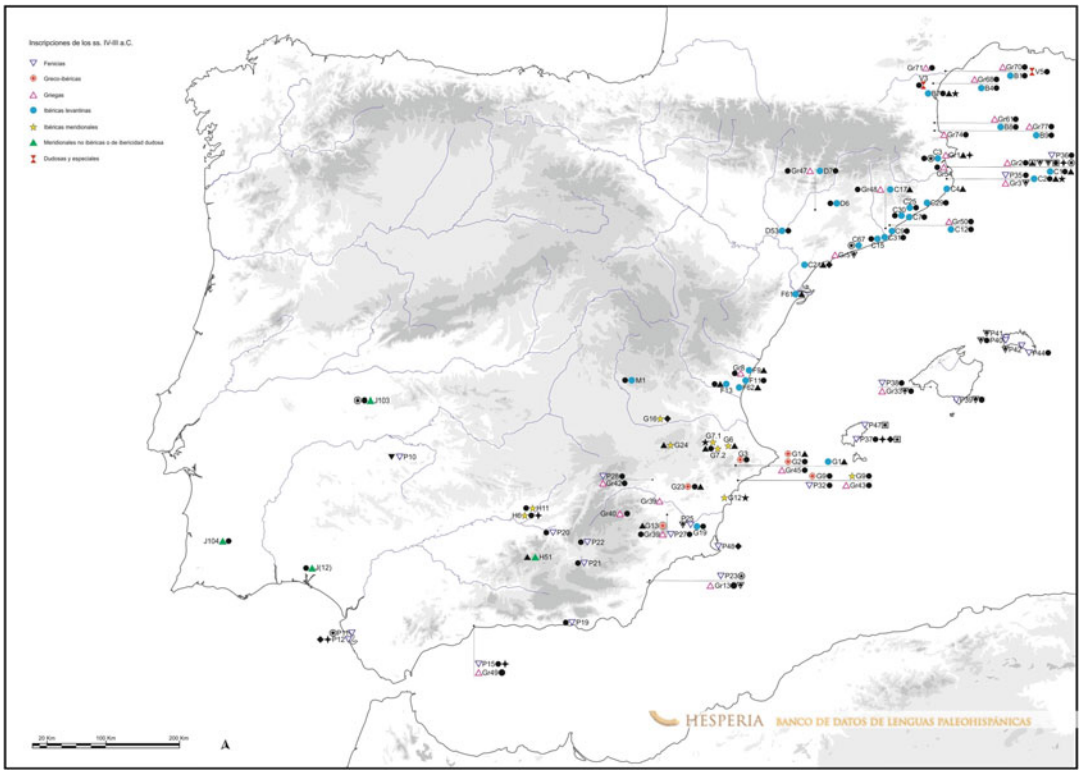

Epigraphy: The Palaeohispanic Languages, Fig. 7 Map including Palaeohispanic inscriptions from the fourth and third centuries BCE

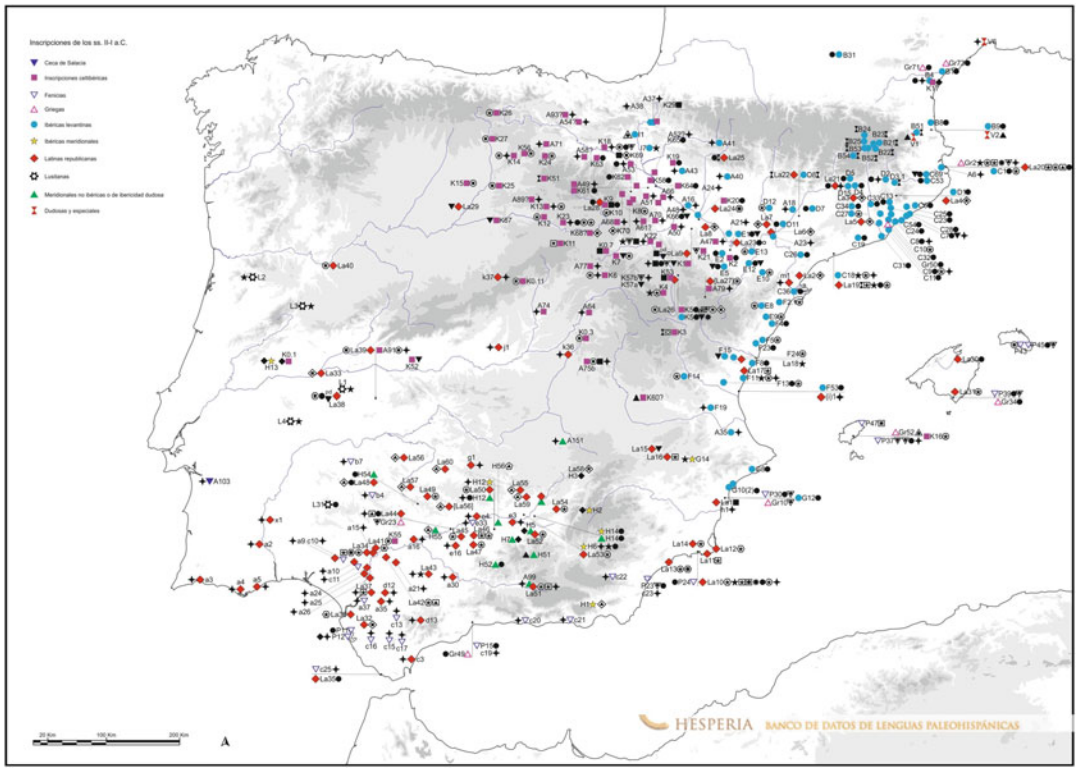

Epigraphy: The Palaeohispanic Languages, Fig. 8 Map including Palaeohispanic and Latin inscriptions from the second and first centuries BCE

subsystems, of writing than was traditionally thought. Nevertheless, there is no consensus among scholars about how many systems existed and how some of their signs should be transcribed.

2. The second line should focus on the detailed study of each of the aforementioned epigraphic corpus, paying special attention to the methodological particularities that each of them imposes. In the case of the Indo-European languages, Celtiberian and Lusitanian, it is necessary to fine-tune the tools of analysis provided by comparative linguistics through the intensification of the internal analysis of the texts and the contribution of external epigraphic parallels. In the case of the non-Indo-European languages, Tartessian and Iberian, the combinatory analysis established by Untermann could be challenged in the future as the most suitable method to approach these languages, thanks to the use of new tools facilitated by innovatory techniques such as segmentation and frequency analysis, but also by the application of paradigms from linguistic typology. In both cases, however, it is fundamental to have an up-to-date open-access epigraphic corpus that is soon going to be available for the first time thanks to the Hesperia project (*BDHesp*). Finally, in the case of the languages for which there is very limited evidence, such as proto-Basque, or in the case of those only attested by onomastics, our reliance on new finds is even more pronounced.
3. The last of the three research lines must be concerned with promoting further in-depth comparative studies between the different Palaeohispanic epigraphic cultures. It is necessary to extend this type of studies into a broader field such as the pre-Roman epigraphies in the ancient Mediterranean. To do so, the AELAW project (Ancient European Languages and Writings) is currently working on a data bank

for the ancient languages and epigraphies in the Mediterranean area that will undoubtedly become the point of reference for multiple future studies.

Cross-References

- ▶ Epigraphy, Greek
- ▶ Epigraphy, Imperial Latin
- ▶ Epigraphy, Latin: Early Through Late Republican

References

Beltrán, F. and Jordán, C. 2008. La epigrafía pública celtibérica. In *Las culturas del Próximo Oriente Antiguo y su expansión mediterránea*. eds. J.J. Justel, J.P. Vita and J.A. Zamora. Zaragoza: 289–320.

Beltrán, F., and C. Jordán. 2016. *Celtibérico. Lengua. Escritura. Epigrafía*. Zaragoza: Prensas de la Universidad de Zaragoza.

Beltrán, F., and C. Jordán. 2019. Writing and language in Celtiberia. In *Palaeohispanic languages and epigraphies*, ed. A.G. Sinner and J. Velaza. Oxford: Oxford University Press.

Campmajó, P., and J. Ferrer. 2010. Le nouveau corpus d'inscriptions ibériques rupestres de la Cerdagne 1: premiers résultats. *Palaeohispanica* 10: 249–274.

Correa, J.A., and A. Guerra. 2019. The linguistic situation in the South-West of the Iberian Peninsula. In *Palaeohispanic languages and epigraphies*, ed. A.G. Sinner and J. Velaza. Oxford: Oxford University Press.

De Hoz, J. 2010. *Historia lingüística de la península ibérica en la Antigüedad. I: Preliminares y mundo meridional prerromano*. Madrid: Consejo Superior de Investigaciones Científicas.

De Hoz, J. 2011. *Historia lingüística de la península ibérica en la Antigüedad. II: El mundo ibérico prerromano y la indoeuropeización*. Madrid: Consejo Superior de Investigaciones Científicas.

De Hoz, J. 2019. Method and methods: Studying Palaeohispanic languages as a discipline. In *Palaeohispanic languages and epigraphies*, ed. A.G. Sinner and J. Velaza. Oxford: Oxford University Press.

Díaz Ariño, B., M.J. Estarán, and I. Simón. 2019. Writing, colonization and Latinization in the Iberian Peninsula. In *Palaeohispanic languages and epigraphies*, ed. A.G. Sinner and J. Velaza. Oxford: Oxford University Press.

Ferrer, J., and N. Moncunill. 2019. Writing systems. In *Palaeohispanic languages and epigraphies*, ed. A.G. Sinner and J. Velaza. Oxford: Oxford University Press.

Gorrochategui, J. 1995. Los Pirineos entre Galia e Hispania: las lenguas. *Veleia* 12: 181–234.

Gorrochategui, J., and J.M. Vallejo. 2019. The parts of Hispania without epigraphy. In *Palaeohispanic languages and epigraphies*, ed. A.G. Sinner and J. Velaza. Oxford: Oxford University Press.

Luján, E. 2019. Language and writing among the Lusitanians. In *Palaeohispanic languages and epigraphies*, ed. A.G. Sinner and J. Velaza. Oxford: Oxford University Press.

Moncunill, N., and J. Velaza. 2017. *Ibérico. Lengua. Escritura. Epigrafía*. Zaragoza: Prensas de la Universidad de Zaragoza.

Ripollès, P.P., and A.G. Sinner. 2019. Coin evidence for ancient Hispanic languages. In *Palaeohispanic languages and epigraphies*, ed. A.G. Sinner and J. Velaza. Oxford: Oxford University Press.

Untermann, J. 1975–2001. *Monumenta linguarum Hispanicarum*. Wiesbaden: Reichert.

Vallejo, J.M. 2016. *Onomástica paleohispánica. I Antroponimia y teonimia. 1 Testimonios epigráficos latinos, celtibéricos y lusitanos, y referencias literarias*. Universidad del pais Vasco. http://hesperia.ucm.es/presentacion_onomastica.php

Velaza, J. 2019. Iberian writing and language. In *Palaeohispanic languages and epigraphies*, ed. A.G. Sinner and J. Velaza. Oxford: Oxford University Press.

Villar, F. 2000. *Indoeuropeos y no indoeuropeos en la Hispania prerromana: las poblaciones y las lenguas prerromanas de Andalucía, Cataluña y Aragón según la información que nos proporciona la toponimia*. Salamanca: Ediciones de la Universidad de Salamanca.

Zamora, J.A. 2019. Phoenician epigraphy. In *Palaeohispanic languages and epigraphies*, ed. A.G. Sinner and J. Velaza. Oxford: Oxford University Press.

Erasure of the Past

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Introduction

Functional societies, like functional individuals, engage in a selective winnowing of past events in the creation of their identities. They do this by both remembering and forgetting, partly out of necessity in order to manage an overwhelming amount of information and partly to minimize or

mitigate traumatic experiences. At the group level, this process takes place in two ways: selective editing of the past in the form of preservation of only some parts of the archaeological or textual record (what in German is referred to as "Totschweigen," literally to kill by silencing) and selective destruction of heritage. The preservation of the past is a form of selective editing at several levels – not all sites are chosen for excavation and only a small number of those that are excavated are highlighted in publications, heritage tourism, or museum exhibits, for example – while the destruction of the past literally erases sites or evidence and thereby ensures that it will not be available in physical form for study or symbolic manipulation by potentially hostile interest groups.

Definition

Erasure of the past takes many different forms, but the oldest, best preserved, and most visible is the selective destruction of monuments, cultural artifacts, or inscriptions. This activity may be primarily religious or primarily political in nature; often it is both (Flood 2002: 642; Sauer 2003: 46). In the former case, it is referred to as iconoclasm, defined as the destruction of images, from the Greek eikon (image) + klan (to break); in the latter case, it depends on the context, but the Romans referred to it as "damnatio memoriae," or damning the memory of a person or group by erasing all traces of their names and/or images from public monuments and documents (Sauer 2003). Even in cases where religious motivations can be assumed to have been the primary reason for the destruction, it is not always possible to determine this with certainty. Eberhard Sauer's complex list of criteria for defining particular instances of cultural heritage destruction as religious iconoclasm makes this clear:

1. Exceptionally laborious and thorough modes of destruction without any obvious practical purpose like reuse of stone
2. Cases where pagan images appear to have been targeted but other artwork spared
3. Cases where naked deities were more thoroughly destroyed than their modestly dressed counterparts
4. Temples in which items of value, notably coins or other metal items, were deliberately left behind
5. Iconoclasm in temples which soon thereafter were consecrated as churches or built over by churches (Sauer 2003: 38)

Sauer notes that hostility toward certain kinds of images characterizes all three of the major monotheistic religions (Christianity, Islam, and Judaism), so it is not surprising that acts of destruction focused on religious images of polytheistic traditions constitute a significant percentage of known examples of iconoclasm (2003: 161). Flood points out that the iconoclastic practice of deanimating images by depriving them of a soul often involves rendering them powerless by targeting the parts of the body that were perceived to be the most potent, especially the face and sensory organs (2002: 648). Pollini and Flood both note the apparent contradiction inherent in the mutilation of images belonging to alien religious traditions: by attempting to render such representations harmless, the iconoclasts imbue them with potency (Flood 2002: 647–8; Pollini 2006: 590). Significantly, the toppling and destruction of statues of deposed rulers, an apparently political act, follows virtually identical patterns of mutilation and desecration, further blurring the line between religious and political iconoclasm.

Recent manifestations of erasure of the past include the targeted bombing of culturally significant monuments such as the bridge at Mostar during the Balkan conflict (Cameron 2008) as well as the repatriation and reburial of human remains and cultural artifacts, even though destruction through reburial may be motivated by indigenous groups in contemporary societies for whom it represents a way of regaining control of their past. For the purposes of this definition, motivations are secondary; what matters is that the action permanently removes material traces of past peoples or cultures from future contemplation, study, or manipulation. This may extend to

the representation of past cultures in written form or in museum contexts; what no longer exists cannot be displayed, and by simply not including any mention of a particular group or culture in a national museum, as in the case of the Saami people in some parts of Scandinavia (Levy 2006), they can be effectively erased from the official record. Sauer notes that secular iconoclasm, such as that accompanying the French revolution, used image destruction in order to "break off the people's link with the past" (2003: 162); this is the common denominator in all forms of erasure of the material remains of past traditions, whether through Totschweigen, as in the case of the non-representation of the Saami people in Scandinavian national museums, or through active destruction of culturally significant monuments, as in the case of the Mostar bridge.

Historical Background

Not all examples of the erasure of the past involve active destruction, as the Saami example illustrates. The cooption or transmutation of sites or traditions is a universal phenomenon that is rarely mentioned in discussions of more obviously negative examples of heritage destruction, perhaps because the objects or monuments themselves survive, although in an altered state. Places that are imbued with special significance are often subjected to this kind of successive erasure, as later structures are built on top of earlier ones in order to appropriate the potency of these places. While this phenomenon can be found worldwide, in Europe, it is exemplified by the many Celtic temples that are found under Roman temples which in their turn were built over by early Christian churches in a kind of architectural palimpsest that preserved the significance of the location while largely destroying the physical remains of previous cultural and religious traditions. The recutting of a marble bust of the Emperor Nero into a portrait of Vespasian (Pollini 1984) and the transformation of the church of Hagia Sophia in Christian Constantinople into a mosque in Muslim Istanbul are both examples of this type of transformative repurposing. Other examples involve more permanent destruction, as in the case of the recent erasure of the largest and most important Muslim cemetery in Palestine by the construction of a Museum of Tolerance in Jerusalem, dedicated (rather ironically) to promoting the principles of mutual respect and social responsibility in the face of a "rising crescendo of ethnic tensions" (Makdisi 2010: 519). The message in these otherwise disparate cases is simple and brutal: When it comes to the selective erasure of the past, the agendas of the living invariably trump those of the dead, and those in power decide whose past is preserved or enshrined and whose will be destroyed or denied expression.

The process of transmutation of one past into another occurs in oral and written traditions as well, as exemplified by the repurposing of pagan mythology in northern European fairy tales transcribed and translated by the Brothers Grimm and by the pre-Christian epics of the Irish and Welsh oral traditions that were selectively edited by the monks in their monastic scriptoria. The fictional and pseudo-historical depictions of the English King Richard III as a hunchbacked monster are another example of this phenomenon; Sir Thomas More and Shakespeare between them did such a good job of character assassination on this historical figure that most people are unaware that alternative interpretations exist or that contemporaries would have had a very different impression of this much maligned monarch. All cultures are continually recycling, repurposing, and stitching together fragments of collective memories; physical manifestations of those memories have special significance as mnemonic devices because they are more tangible and have a permanence that makes them valuable in identity politics. This is also why they are often the target of destructive acts that strike at the heart of a group's sense of itself (Adams 1993). More than 2000 people died in the riots following the destruction of the Babri Masjid Mosque in Ayodhya, India, in 1992. Many Hindus believe that the mosque was built in 1528 over the tomb of the god Rama and the archaeological excavations carried out at the site subsequent to the destruction of the mosque became a flash point for Muslims and Hindus with international repercussions (Ratnagar 2004).

Clearly, such sites have a symbolic power that goes well beyond their physical remains.

So why is cultural heritage, especially its material remains, so contested? Sites, monuments, artifacts, and texts are the functional equivalent, at the group level, of individual memory and identity; just as individuals cannot function without memory, group identity is also bound up in the tangible as well as intangible artifacts and expressions of its past. This is why both history and archaeology have been subject to such intense pressure by various interest groups ever since emerging as distinct disciplines, and it is also why it is so important for those fields of research to maintain some degree of political autonomy (Arnold 1999). Archaeology in particular has been the target of political manipulation, by nation-states and other interest groups, largely because it provides a greater time depth than written records and so can be appealed to in claims to territory and/or sovereignty (Arnold 2002).

Acts of erasure in more recent times have occurred under the corrosive combined influences of colonialism and racism. Examples include the case of the North American Mound Builder cultures whose native origins were denied by European colonists until mounting evidence of continuity with living Indian groups led to the official recognition of the construction of impressive sites like Cahokia in Illinois by indigenous peoples (Arnold 2002: 106–7). In the parallel case of Great Zimbabwe, where massive stone enclosures and structures were attributed to non-African groups by the white colonizers of Zimbabwe, virtually all archaeological traces of indigenous African activity at the site were removed in order to preserve the myth of white superiority. As a result, later excavators were left with only trace evidence of the artifacts that once abounded at the site, the capitol city of a vibrant culture that flourished between 1290 and 1450 CE (Hall and Steffof 2006).

Politically and religiously motivated iconoclasm in the ancient world has a long history, from the selective excision of the names and faces of pharaohs such as Akhenaten, also known as the Heretic King, at Amarna in the fourteenth century BCE (Sauer 2003: 46; Varner 2004: 13–4), to the destruction by Greek Christians of idolatrous images on the Parthenon. Roman portrait busts were frequently recut, partly to save on the costs of acquiring new marble but most often to erase the image of an individual who had suffered *damnatio memoriae*; the infamous Roman emperor Nero is a good example (Pollini 1984). Historically, religious hatred and iconoclasm are well documented, from the Puritan destruction of Catholic statues and stained glass windows in seventeenth-century England and Ireland to the bombing of the famous bridge (built by the Turkish engineer Hajrudin for the Ottoman Emperor Süleyman I in 1566) across the Neretva River in Mostar's Stari Grad (Old Town) in 1993 during the war in Bosnia (Adams 1993). The Bosnian conflict was unusual in its relentless and comprehensive targeting of architecture, as if, as Adams eloquently puts it, "the protagonists, unable to strangle the last living representatives of an alien culture. . .think that with the destruction of place, an architectural cleansing, as it were, they can eradicate the people who inhabit that place" (1993: 389). Such destruction casts long shadows, as exemplified by a nineteenth-century headstone in the churchyard of the friary of Murrisk in Co. Mayo, destroyed in the seventeenth century by English Puritans, or "heretics," as a nearby plaque erected in 1942 proclaims. Someone, in a retaliatory act of erasure at least two centuries after the destruction of the friary, chiseled out the name of HRH Queen Victoria on George Patrick O'Malley's headstone, during whose reign he had served in the British Army (Fig. 1a, b). Even such apparently clear-cut examples of destruction and erasure in religious contexts (mosques, churches, temples) are often accompanied by a political or economic subtext, however. For example, while the Babri mosque was being demolished by mobs in 1992, the houses of hundreds of poor Muslim residents of Ayodhya also were destroyed; as Ratnagar notes, we should not overlook the appropriations of real estate, the business rivalries, and the electoral calculations that typically accompany such events (2004: 242).

The destruction in 2001 of two enormous Buddhist statues cut out of the living rock in the

Erasure of the Past, Fig. 1 (**a**) Headstone of George Patrick O'Malley at Murrisk Friary, Co. Mayo, Ireland. (Photo: Author). (**b**) Plaque at Murrisk Friary, Co. Mayo, Ireland. (Photo: Author)

Bamiyan Valley in Afghanistan is an especially good illustration of the ambiguity of so-called religious iconoclasm. Images of the explosions set off by the Taliban in the valley flashed around the globe, and the destruction was decried in the Western media as an example of the medieval mind-set of fundamentalist Islam (Flood 2002: 641). The fact that the two statues, classic examples of sixth-century CE Gandhara-style sculpture, 120′ and 180′ high (Fig. 2), had survived since the ninth century CE, when Buddhism was supplanted by Islam in the region, suggests that something else must have motivated the timing of the destruction. A closer examination of the events leading up to the edict issued by the Islamic State of Afghanistan on February 26, 2001, which ordered the destruction of all such idols, suggests that "their obliteration indexed not a timeless response to figuration but a calculated engagement with a culturally specific discourse of images at a particular historical moment" (Flood 2002: 642). The intended audience of the message sent by the Taliban was more global than local, an act that referenced archaic rhetoric but was carried out according to contemporary motivations and targeted the Buddhas less as religious than as cultural icons of particular value to the West (Flood 2002: 651).

Politically expedient erasure of the past often takes the form of selective representation motivated by nationalism, exaggerating or even fabricating evidence that is perceived as positive and downplaying or denying evidence that is not seen as supportive of the political regime or special interest groups with political influence. In Nazi Germany, this involved a range of selective erasures, from destroying archaeological deposits of "non-Germanic" occupations of settlements to focus on those of interest to the state to using material culture evidence to justify territorial expansion by military occupation (Arnold 1999). In Washington, DC, in 1995, a controversial exhibit intended to commemorate the 50th anniversary of the end of World War II was replaced by a display of the *Enola Gay*, the plane that dropped the atomic bombs on Hiroshima and Nagasaki; this was due to the pressure put on the museum by politicians and veteran's groups more concerned with image than with accuracy (Nobile 1995; Goldberg 1999). What makes the manipulation of the past in Nazi Germany and the 1995 Enola Gay exhibit at the Smithsonian's Air and Space Museum comparable to one another is their politically expedient treatment of historical facts. The parallels can be found in the emphasis placed on a usable past, by which governments or special

Erasure of the Past, Fig. 2 Large Buddha at Bamiyan, Afghanistan. (Photo: Courtesy of ARTstor, ACSAA_MICHIGAN_1039425966)

interest groups generally mean a past that is useful to them; the phrase "a past that the (American/German) people can be proud of" appears in the press releases of Newt Gingrich in connection with the Enola Gay exhibit as well as in the speeches of Heinrich Himmler on archaeology in the service of the state (Arnold 1999: 1).

Key Issues/Current Debates

Identity politics, often presented as a positive force, can be a major factor in the creation of the kind of divisive climate in which the erasure of the past becomes justifiable: The moment a monument, site, or other categories of material culture is singled out as culturally important for one group, it becomes a potential target for destruction by another (Adams 1993). Cultural relativism and political correctness, both of which appear initially to be about inclusiveness, have the potential to create deep divisions when conflicting value systems are involved in a struggle for hegemony. Shrinking funding for heritage preservation is another major challenge; paradoxically, as the archaeological past has become less politically useful to nation-states in areas like the EU, state support for site protection and maintenance has also dwindled. Military conflict continues to cause both direct and indirect damage to cultural heritage around the globe, as the massive losses in the Middle East in the wake of the two Iraq wars have clearly demonstrated; in addition to the destruction of sites through military installations and conflict-related damage, looting of unprotected archaeological sites has permanently affected Iraq's ability to reconstruct its own past (Rothfeld 2008).

International Perspectives and Future Directions

The most important take-home message related to the topic of the erasure of the past is the recognition that it is not a culturally specific phenomenon and cannot be associated with any particular area of the world, religious tradition, or period of time. Education is one of the best ways to combat the increasingly powerful forces of cultural polarization, especially education focused on celebrating difference rather than demonizing it; fostering in the young a willingness to engage in honest confrontation of all aspects of the past, even those that may not cast our particular in-group in a wholly positive light, is another. We should also recognize that the erasure of the past can be a creative force as well as a destructive one and that it is an inevitable part of the many densely layered human experiences that have been inscribed on the landscape in the form of monuments, structures, and artifacts over many generations.

Definitions of authenticity also may need to be redefined in light of new criteria. It is telling that the International Council on Monuments and Sites (ICOMOS) determined the authenticity of the reconstructed Old Bridge at Mostar on the grounds that it is a "place of memory" even if

the original fabric of the monument has been destroyed. The 2005 World Heritage inscription citation for the Mostar bridge sends the message that destroying the physical remains of cultural heritage does not destroy the cultural memory with which the place itself is imbued, citing its symbolic power and meaning as an exceptional and universal symbol of coexistence of communities from diverse cultural, ethnic, and religious backgrounds as the basis for the listing (Cameron 2008: 23).

We would do well, however, to remember that heritage preservation and the presentation of the past are processes that erase the past just as surely as warfare, looting, or development do. Providing support, both financial and in terms of preservation expertise, to developing nations facing unprecedented destruction of cultural heritage must be part of the equation. Deciding which cultural monuments or artifacts to preserve or display and which not inevitably leads to the exclusion, and possibly destruction, of those not chosen. The goal must be to ensure that such selective erasure, while it may be unavoidable, is at least mindful and based on some degree of consensus among stakeholders. Even in the interests of inclusiveness, however, bowing to the majority opinion is not necessarily always the best approach to take when making culturally sensitive decisions about interpreting the past. As Goldberg notes in the wake of the Enola Gay debacle, "While objectivity cannot be a matter of political will and discipline, it can be attained through a social process – one which requires forums for the free flow and exchange of ideas for its successful implementation" (1999: 181). Scholarly expertise is a valuable commodity that has come under attack of late, especially in the United States (Nichols 2017); we should put more trust in the voices whose authority is derived from such sources rather than privileging those that are motivated by political expedience. On January 30, 1995, with the Smithsonian's announcement of the withdrawal of the controversial exhibit on the bombings of Hiroshima and Nagasaki, political expedience won the day. Perhaps by the time of the next major anniversary of the end of World War II, the United States will have matured enough as a nation to face its own past squarely and will not need to engage in such acts of selective erasure.

Cross-References

- ▶ Activism and Archaeology
- ▶ Archaeological Stewardship
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Authority and Legitimacy in Political and Social Archaeology
- ▶ Bamiyan Buddhas
- ▶ Collaborative for Cultural Heritage Management and Policy (CHAMP)
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Contemporary Past, Archaeology of the
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Legislation, the Introduction of: Disciplining Through Law
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ International Conventions Pertaining to Heritage Policy: Introduction
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Kosova: Archaeological Heritage
- ▶ Landmarks Foundation: Protecting Sacred Sites Globally

- ▶ Lawyers' Committee for Cultural Heritage Preservation (LCCHP)
- ▶ Local Populations and Global Heritage
- ▶ Military Activity in Islamic Archaeology
- ▶ Modern Ruins: Remembrance, Resistance, and Ruin Value
- ▶ Nationalism and Archaeology
- ▶ Organization of World Heritage Cities (OWHC)
- ▶ Preserving Heritage: The Role of the Media
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ SAFE/Saving Antiquities for Everyone
- ▶ Society for Historical Archaeology (SHA) (Cultural Heritage Management)
- ▶ Stakeholders and Community Participation
- ▶ Statues and Monumental Art in Archaeology
- ▶ Sustainability and Cultural Heritage
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past
- ▶ World Heritage Education, Training, and Capacity Building
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes

References

Adams, N. 1993. Architecture as the target. *Journal of the Society of Architectural Historians* 52: 389–390.

Arnold, B. 1999. The contested past. *Anthropology Today* 15: 1–4.

Arnold, B. 2002. Justifying genocide: Archaeology and the construction of difference. In *Annihilating difference: The anthropology of genocide*, ed. A.L. Hinton, 95–116. Berkeley: University of California Press.

Arnold, B. 2015. Archaeology and politics in the 21st century: Still Faustian, but not much of a bargain. In *Paradigm found: Archaeological theory, past, present and future. Essays in honor of Evžen Neustupný*, ed. K. Kristiansen, L. Smejda, and J. Turek, 178–185. Oxford: Oxbow.

Cameron, C. 2008. From Warsaw to Mostar: The world heritage committee and authenticity. *APT Bulletin* 39: 19–24.

Flood, F.B. 2002. Between cult and culture: Bamiyan, Islamic iconoclasm, and the museum. *The Art Bulletin* 84: 641–659.

Goldberg, S. 1999. The Enola gay affair: What evidence counts when we commemorate historical events? *Osiris* 14: 176–186.

Hall, M., and R. Steffof. 2006. *Great Zimbabwe*. Oxford: Oxford University Press.

Levy, J.E. 2006. Prehistory, identity and archaeological representation in Nordic museums. *American Anthropologist* 108: 135–147.

Makdisi, S. 2010. The architecture of erasure. *Critical Inquiry* 36: 519–559.

Nobile, P., ed. 1995. *Judgement at the Smithsonian: The bombing of Hiroshima and Nagasaki*. New York: Marlowe & Company.

Nichols, T. 2017. *The Death of Expertise*. Oxford: Oxford University Press.

Pollini, J. 1984. Damnatio memoriae in stone: Two portraits of Nero recut to Vespasian in American museums. *American Journal of Archaeology* 88: 547–555.

Pollini, J. 2006. Review of E.R. Varner mutilation and transformation: Damnatio memoriae and roman imperial portraiture. *The Art Bulletin* 88: 590–597.

Ratnagar, S. 2004. Archaeology at the heart of a political confrontation: The case of Ayodhya. *Current Anthropology* 45: 239–259.

Rothfeld, L. 2008. *Antiquities under siege: Cultural heritage protection after the Iraq war*. Lanham: Altamira Press.

Sauer, E. 2003. *The archaeology of religious hatred in the roman and early medieval world*. Stroud: Tempus.

Varner, E.R. 2004. *Mutilation and transformation: Damnatio memoriae and roman imperial portraiture*. Leiden: Brill.

Erim, Kenan

Ece Birçek
Istanbul, Turkey

Basic Biographical Information

Kenan Tevfik Erim was born in 1929 in İstanbul. He started his education in Sweden, and in 1948 continued in the USA at New York University. After graduating from the Classical Archaeology Department of New York University, he received his M.A. and Ph.D. at Princeton University. He served as assistant to Professor Karl Erik Sjoquist during the excavations of Morgantina, Sicily.

Major Accomplishments

Kenan Tevfik Erim's name is associated with excavation of the ancient Aphrodisias settlement, located in Geyre, Aydın. The ancient city of Aphrodisias was a magnificent city which

displays evidence of ancient Greek and Roman occupation in Turkey. The city has seen continuous habitation which has contributed to its importance of establishing the developmental sequence of the period. Besides the nearby marble quarries, the settlement was noted for a local sculptural tradition which eventually spread all over the Mediterranean.

Erim, who visited the site in 1959 for the first time, decided to reveal this remarkable settlement after seeing the remains of the city. In 1961, Erim raised funds from several private foundations and New York University, and obtained permits to begin excavations in Aphrodisias.

He continued to serve as a professor in the Classical Archaeology Department in New York University, and as head of the excavations in Aphrodisias until his death. He provided the largest contribution by publishing articles and conducting seminars all around to world in order to create an international reputation for Aphrodisias and raised funds, especially from US foundations. He set up associations for Aphrodisias in New York, Paris, London, Izmir, and Istanbul.

Kenan Erim was awarded the Liberty Medal of New York City in 1986, the Commendatore Merit of Italy in 1987, and the National Geographic Society Centennial Medal in 1988. He passed away in 1990. His grave, which is in Aphrodisias City, is located on the south side of the monumental ceremonial gate. Excavations are still continuing in Aphrodisias.

Cross-References

► Aphrodisias, Archaeology of
► Classical (Greek) Archaeology

Further Reading

Erim, K. 1958. Morgantina. *American Journal of Archaeology* 62: 79–90.
Erim, K. 1969. Two inscriptions from Aphrodisias. *Papers of the British School at Rome* 37: 92–95.
Erim, K. 1972. Aphrodisias, awakened city of ancient art. National Geographic Magazine, June.
Erim, K. 1973. A portrait sculpture of Domitian from Aphrodisias. *Opuscula Romana* 9: 135–142.
Erim, K., and J. Reynolds. 1969. A letter of Gordian III from Aphrodisias in Caria. *Journal of Roman Studies* 59: 56–58.
Erim, K., and J. Reynolds. 1970. The copy of Diocletian's edict on maximum prices from Aphrodisias in Caria. *Journal of Roman Studies* 60: 120–140.
Erim, K., and J. Reynolds. 1973. The Aphrodisias copy of Diocletian's price edict. *Journal of Roman Studies* 63: 99–110.
Erim, K., J. Reynolds, and M. Crawford. 1971. Diocletian's currency reform, a new inscription from Aphrodisias. *Journal of Roman Studies* 61: 171–177.
Erim, K., J. Reynolds, and M. Crawford. 1979. Aphrodisias. In *Römische und frühbyzantinische Porträtplastik aus der Türkei*, ed. J. Alföldi, J. Reynolds, et al., 173–209. Mainz: Von Zabern.
Erim, K., J. Reynolds, and M. Crawford. 1982a. A relief showing Claudius and Britannia from Aphrodisias. *Britannia* 13: 277–281.
Erim, K., J. Reynolds, and M. Crawford. 1982b. Sculptors from Aphrodisias: Some new inscriptions (C. Rouechéilebirlikte). *Papers of the British School at Rome* 50: 102–115.
Erim, K., J. Reynolds, and M. Crawford. 1986. *Aphrodisias, city of Venus Aphrodite*. London: Muller, Blond and White.
Erim, K., J. Reynolds, and M. Crawford. 1991. Sculptors of Aphrodisias in the inscriptions of the city. In *Festschrift für Jale Inan*, ed. N. Basgelen, and M. Luga, 517–38. Istanbul.

Erkanal, Hayat

Ece Birçek
Istanbul, Turkey

Basic Biographical Information

Hayat Erkanal was born in 1959 in İzmir, Turkey. He completed his education, which he started in the Protohistory and Near Eastern Archaeology Department and Faculty of Languages, History and Geography, of Ankara University, in 1959, with his undergraduate thesis entitled *Goddess Ea on Babylonian Cylinder Seals* in 1964.

After serving in several roles in the Ankara Museum of Anatolian Civilizations from 1963 to 1964, Erkanal went to Germany to undertake his Ph.D. studies in 1966. He was lectured by professors including Kurt Bittel, Einer von Schuler and Barthel Hrouda. After receiving his Ph.D. for

his dissertation entitled *Central Anatolian Metal Weapons in the Second Millennium*, he returned to Turkey in 1973.

Afterward, Erkanal worked as a specialist in the archaeology museums of İstanbul and in the same year, he was appointed in Erzurum Ataturk University as assistant until 1976. Later he continued as an assistant in the Faculty of Languages, History and Geography of Ankara University and with the approval of his thesis entitled *Cutting Tools in Anatolia During Bronze Ages*, Erkanal became assistant professor in 1979 and professor in 1988.

Major Accomplishments

Beginning as an undergraduate, Erkanal constantly attended excavations such as Kültepe, Altıntepe, Maşathöyük, and Samsat until 1979. From 1980, he started to conduct projects mostly about survey studies and excavation content. The excavations that he carried out in Girnavaz–Mardin resulted in a better understanding of the effects and distribution of Mesopotamian culture over Anatolia.

Erkanal served as assistant dean of the faculty from 1986 to 1990 and lectured at Munich Ludwig Maximilian's University on southeast Anatolian archaeology for a semester. Starting in 1992, he conducted the Liman Tepe excavation which is a part of the Klazomenai ancient site in Urla, İzmir. In 1992, while examining the aerial photos of the site taken for a municipal plan, he noticed some traces related to the coastal plain and identified that the part of the settlement was underwater. This was the beginning of the first underwater excavation of Turkey. Initially, because of the lack of equipment and experience, the excavation was started with the cooperation of Israel's Haifa University. Then Erkanal and his team took over and carried out the studies. Erkanal, to ensure the smooth progress of the excavation, learned to scuba dive after the age of 60 and led the studies.

With his work, he effectively exposed the cultural and chronological development of Western Anatolia related with Aegean world and Levant. This work paved way for the understanding of the early cultural history of Western Anatoliaon on a large scale. By establishing the Research and Application Centre of Underwater Archaeology, hosted by Ankara University, he opened a new field for students and researchers.

Cross-References

- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Underwater Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

Further Reading

Erkanal, A. 1988. Çağdaş Müzecilik Anlayışı Yönünden Münih Müzelerinden Üç Örnek. *Türk Arkeoloji Dergisi* XXVII: 1–14.

Erkanal, A. 1989a. 1988 Panaztepe Kazısı Sonuçları. XI. Kazı Sonuçları Toplantısı I, 255–60.

Erkanal, A. 1989b. Mezar Tahripleri. In *Eski Eser Tanımıve Kaçakçılığının Önlenmesi Seminer Notları*, 84–88. Ankara: T.C. Kültür Bakanlığı, Kültürve Tabiat Varlıklarını Koruma Başkanlığı.

Erkanal, A. 1995a. Mühür Boyamasıve Ocker Kullanımı Üzerine Bazı Düşünceler. In *In memoriam İ. Metin Akyurtve Bahattin Devam Anı Kitabı*, Studies for ancient near eastern cultures, ed. A. Erkanal et al., 113–118. İstanbul: ArkeolojiveSanat Yayınları.

Erkanal, A. 1995b. Bir Kült Kabı Üzerine Düşünceler I, *Gedanken über ein Kultgefäss I*.

Erkanal, A. 1998a. Bir Kült Kabıüzerine Düşünceler. In *Evrenselliğe Yolculuk-Hacettepe Üniversitesi'nin Emel Doğramacı'ya Armağanı*, ed. G. Büken et al., 331–336. Ankara: Hacettepe Üniversitesi.

Erkanal, A. 1998b. 1996 Yılı Panaztepe Kazıları Sonuçları. *XIX. KazıSonuçları Toplantısı* I, 455–66.

Erkanal, A. 1999. 1997 Panaztepe Kazıları. XX. *Kazı Sonuçları Toplantısı* I, 371–81.

Erkanal, A. 2000. 1998 Panaztepe Kazıları. *XXI. Kazı Sonuçları Toplantısı* I, 279–86.

Erkanal, A. 2008. The significance of the lead ingot/weight from Panaztepe within the context of metallurgy. *Anatolian Metall* 4: 1–9.

Erkanal, A., and H. Erkanal. 1983. Vorbericht über die Grabungen 1979 im praehistorischen Klazomenai/Liman Tepe. *Hacettepe Üniversitesi Edebiyat Fakültesi Dergisi* 1 (1): 163–183.

Erkanal, A., and H. Erkanal. 1989. Archaeologischer Überlick über die Provinz. In *Anatolia and the ancient Near East*, ed. K. Mardin, K. Emre, et al., 129–134. Ankara: Türk Tarih Kurumu.

Erkanal, A., and K. İren. 2006. Güney Aiolis Yüzey Araştırması 2004. 23. Araştırma Sonuçları Toplantısı 1: 105–10.
Erkanal-Öktü, A. 1979. Ein Rollsiegel aus der Naehe von Gerçüş. *Zeitschrift für Assyriologie* 69 (2): 234–243.
Erkanal-Öktü, A. 2000a. Ein Kultgefaess aus Girnavaz-Höyük bei Nusaybin/Mardin. *Istanbuler Mitteilungen* 50: 141–154.
Erkanal-Öktü, A. 2000b. Überblick über die Siegelfunde von BaklaTepe, Liman Tepe und Panaztepe. In *V. Internationales Siegel-Symposium. Minoisch-Mykenische Glyptik. Stil, Sonuçları Toplantısı*, vol. 1, 191–204.
Erkanal-Öktü, A., and N. Çınardali-Karaaslan. 2009. Panaztepe Kazıları 2007 YılıÇalışmaları *30.* Kazı Sonuçları Toplantısı 1: 471–96.

Esin, Ufuk

Ece Birçek
Istanbul, Turkey

Basic Biographical Information

Ufuk Esin was born in 1933 in İzmir, Turkey. She went to Arnavutkoy fifth Elementary School, Bosphorus High School, and the Austrian High School. In her youth, she was interested in pursuing a career as an amateur actor. She also undertook administrative duties in plays. In 1954, she commenced her studies with the Archaeology Department, Istanbul University, which had Halet Çambel and Kurt Bittel as lecturers at that time.

She participated in the excavations of Boğazköy ve Fikirtepe during 1952–1954. She went to USA in 1961 under Fullbright scholarship and completed her dissertation by novel methods alien to the world of archaeology in 1966.

Major Accomplishments

The construction of dams as a part of the economic development of Turkey in the 1960s and 1970s prompted the need for salvage excavations in order to document settlements that were likely to be submerged. Ufuk Esin conducted important work this context. She began to excavate Tepecik in 1968, Tülintepe in 1971–1974, and Değirmentepe in 1978–1986. She became the head of Archaeology Department at Istanbul University in 1984.

Ufuk Esin pioneered establishment of the Archaeometry Unit which combines natural sciences and archaeology in TÜBİTAK (The Scientific and Technological Research Council of Turkey). Furthermore, even though Turkey was not accustomed to interdisciplinary team work culture consisting of scientists and specialists from different work fields at that point of time, she led the integration of this approach, by using all of the facilities available in the Archaeology Department during her tenure as Head as well as through the Aşıklı Höyük salvage excavations that she started in 1989. She was one of the founder members of TÜBA (Turkey Academy of Sciences), which was constituted in 1993. She retired in 2000 but continued with her scientific activities in TÜBA. Under the title of the "Culture Sector of Turkey," she executed a quite comprehensive inventory study that includes both written and oral history. This provided a major contribution to establishment of the concept of cultural heritage in a holistic manner.

Cross-References

► Archaeometry: Definition
► Çambel, Halet

Further Reading

Esin, U. 1969. *Kuantitatif Spektral Analiz Yardımıyla Başlangıcından Asur Koloni Çağlarına Kadar Bakır ve TunçMadenciliği*, İ. Ü. Yayınları. Vol. 1427. İstanbul: Taş Matbaası.
Esin, U. 1978. Makedonya Ovası'nda Nea Nikomedeia'nın Doğal Çevre ve Kültür İlişkileri Açısından Durumu. Güneydoğu Avrupa Araştırmaları Dergisi 6/7: 27–46.
Esin, U. 1979. *İlk Üretimciliğe Geçiş Evresinde Anadolu ve Güneydoğu Avrupa (G.Ö. 10500–7000 Yılları Arası) I: Doğal Çevre Sorunu*, İstanbul Üniversitesi Edebiyat Fakültesi Yayınları. Vol. 2507. İstanbul: İstanbul Üniversitesi.

E

Esin, U. 1981. *İlk Üretimciliğe Geçiş Evresinde Anadolu ve Güneydoğu Avrupa (G.Ö. 10500–7000 Yılları Arası) II: Kültürler Sorunu*, İstanbul Üniversitesi Edebiyat Fakültesi Yayınları. Vol. 2681. İstanbul: İstanbul Üniversitesi.

Esin, U. 1993. Copper beads of Aşıklı. Aspects of art and iconography: Anatolia and its neighbors. *Studies in Honor of Nimet Özgüç*, 179–83.

Esin, U. 1994. Zum Ursprung der Kastenbauweise in Anatolia. *Istanbuler Mitteilungen* 43: 123–128.

Esin, U. 1995. Aşıklı Höyük ve Radyo-Aktif Karbon Ölçümleri, İ. Metin Akyurt – Bahattin Devam Anı Kitabı. In *Eski Yakın Doğu Kültürleri Üzerine İncelemeler*, ed. A. Erkanal, H. Erkanal, H. Hüryılmaz, and A.T. Ökse, 135–146.

Esin, U. 1996. On Bin Yıl Öncesinde Aşıklı: İç anadolu'da Bir Yerleşim Modeli, Tarihten Günümüze Anadolu'da Konut ve Yerleşme. *Habitat* II, 31–42.

Estate Landscapes in Historical Archaeology

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Brief Definition of the Topic

The structure and impact of land ownership on the character of the European post-medieval landscape and its colonial territories have been relatively neglected compared to the emphasis placed upon comparable structures in earlier periods, such as the medieval manor. The landed estate – an extensive and largely contiguous block of land under the private ownership of an individual – is a product of the modern era following the decline of absolute monarchies and the Church from the sixteenth century. However, the extent and chronology of change over the transition from the medieval landscape varied widely across Europe. More significantly perhaps, the extent to which the landscape was owned by a relatively small group of wealthy owners remained largely obscure until the late-eighteenth and nineteenth centuries, when waves of radical opposition questioned the power of the traditional elites.

Landed estates are made up of recognizable and recurrent features. At their core is the family dwelling or seat which was distinguished from other houses in terms of scale and ornamentation. It was often surrounded by or adjacent to a designed landscape, often incorporating a water feature, such as a moat, canal or artificial lake. The house and its immediate landscape have been well studied by art historians and the biographies of key artists, architects, and landscape designers, and the chronologies of style are well documented, though overly dependent on a handful of larger examples. A kitchen garden and "home farm" supplying the victuals needed by the owner's household were also core features. The surrounding landscape of farmland, woodland, villages, and farmsteads was an important foundation from which the owners drew income and exercised a considerable degree of social and political control. The architecture of the farm buildings, farm houses, and domestic houses in villages was an important medium through which the extent of the estate and the social identity of the owners were expressed.

The size and distribution of estates have been a matter of considerable debate among historians as well as contemporary observers. From the late-nineteenth century, when reliable statistics become available in the UK, the most common division was between the "great landowners" who owned over 10,000 acres and were nationally significant and the local gentry who might own between 3,000 and 10,000 acres and whose influence was more regionally defined. The situation elsewhere is less clear, particularly in Continental Europe, while in colonial contexts, where income from cash crops such as sugar was far higher per acre, and labor was enslaved, the units of landownership were initially on a much smaller scale. Plantations were, on average, larger than English tenanted farms but much smaller than gentry estates.

The distribution of estates tends to be biased toward areas of poor light soils where smaller owners found it difficult to sustain a living, and so estates grew larger and held a greater proportion of the agricultural land. This is true of eastern England, southern Sweden, and eastern Denmark,

for example. Government or royal proclamations could either restrict or promote land sales and land accumulation, affecting the land market and the ability to establish large blocks of land. Inheritance patterns could also have a dramatic effect on land ownership and the ability to pass estates on across the generations. In Britain the whole estate passed to the eldest son under primogeniture, whereas in the northern Germanic regions land was shared between all sons, and in Scandinavia it was divided between all offspring.

The study of estates as cultural landscapes is in its infancy but it has the potential to provide a greater understanding of the form, typology, and extent of estates as well as their impact on the landscape character from the sixteenth century to the present day. Estates were often marked out in the landscape by the higher proportion of woodland and forest, or by features such as roadside tree planting to afford shade and a degree of status to the approach. Milestones or boundary markers might also mark the extent of the estates. As centers of private wealth and symbols of political and social power, landed estates created a distinct form of cultural landscape that was ubiquitous and integral to the globalization of the modern era.

Cross-References

- ▶ Agrarian Landscapes of the Historic Period
- ▶ Capitalism: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Landscape Archaeology
- ▶ Post-Medieval Archaeology

Further Reading

Clemenson, H. 1982. *English country houses and landed estates*. London: Croom Helm.

Finch, J., and K. Giles, eds. 2007. *Estate landscapes: Design, improvement and power in the post-medieval landscape*. Woodbridge: Society for Post-Medieval Archaeology/Boydell and Brewer.

Finch, J., K. Dyrman, and M. Frausing, eds. 2019. *Estate landscapes in northern Europe*. Aarhus: Aarhus University Press.

Estrada, Emilio

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Basic Biographical Information

Emilio Estrada Icaza was born in Guayaquil, Ecuador on June 22, 1916. As the son of a prominent business family, Estrada spent his childhood in his native city, but as a teenager, he frequently moved to Europe due to his father's diplomatic appointments. After living in Italy and France, he returned to Ecuador and eventually attended the Baylor Military Academy in Chattanooga. He continued his studies at the Wharton School of Economics at the University of Pennsylvania after which he returned to administer the family business in Guayaquil. When his father, Emilio, and his brother Julio became members of the board of Banco la Previsora, Emilio founded Ecuacolor and other entrepreneurial projects.

Estrada was a renowned athlete, specializing in the hammer toss and javelin while at college. In later years, he became an important figure on the national Ecuadorian sailing team, earning a bronze medal at the 1960 Pan-American games in Chicago. He introduced lighting boats to Ecuador, became president of the lighting boat society, and represented the yacht club and the National Soccer Federation. Although not regarded as a politician, he was a grandson of Emilio Estrada Carmona, President of Ecuador, and could not escape public service. He served as Mayor of Guayaquil from 1954 to 1956. Refusing the presidential candidacy, he served as Ecuador's delegate to the United Nations General Assembly.

While frequently hunting ducks, he started collecting pottery fragments, then entire pots, and eventually carried out his own excavations. In roughly 10 years, he undertook more than 1500 excavations with the help of his field director, Julio Viteri Gamboa. Seeking interpretations of his sherd collections he met *Diario la Nación*

Estrada, Emilio,
Fig. 1 Emilio Estrada at Víctor Emilio Estrada Museum (National Library)

journalist Francisco Huerta, who first supplied him with books on archaeology and later became his mentor, along with Carlos Zevallos Menéndez (Fig. 1).

Major Accomplishments

In 1953, at the age of 37, Estrada visited Betty Meggers and Clifford Evans at the United States National History Museum and invited them to Ecuador. Through the recommendation of Huerta, they excavated Hacienda la Chorrera and Tejar, resulting in Evans and Meggers' report, *Preliminary Report on Archeological Investigations in the Guayas Basin, Ecuador* (Evans and Meggers 1955). At the same time, Estrada published his first monograph, *Ensayo Preliminar Sobre la Arqueología de Milagro* (Estrada 1954), after which he published *Balsa and Dugout Navigation in Ecuador* (Estrada 1955), which, although not strictly archaeological, combined his knowledge as a sailor and a historian.

After serving as Guayaquil's Mayor, Estrada published the monograph *Valdivia, un sitio Arqueológico Formativo en la Provincia del Guayas, Ecuador* (Estrada 1956). Although Valdivia pottery had already been discovered, it was Estrada who first recognized its significance. He used C14 dating to conclude that Valdivia was, at that time, the earliest known ceramic assemblage of the Americas. In 1957, during a meeting held at the Casa de la Cultura Ecuatoriana, with the assistance of Meggers, Evans, Mathew and Marion Sterling, Pedro Armillas, Francisco Huerta, and Olaf Holm, Estrada presented the "Cronología de la Cuenca del Guayas"(Estrada 1957a). That same year, he published *Los Huancavilcas*: *Ultimas Civilizaciones Prehistóricas en la Cuenca del Rio Guayas* (Estrada 1957b) and *Prehistoria de Manabí* (Estrada 1957c) and a short essay titled "Sumario de Características Milagro-Quevedo" (Estrada 1957d). In 1958 following his interest on the costal Ecuadorian formative, he published *Las culturas pre-clásicas, formativas o arcaicas del Ecuador* (Estrada 1958) (Fig. 2).

In 1959 and 1960, Estrada published *Arte aborigen del Ecuador, sellos y pintaderas* (Estrada 1959), a photo album *El Arte prehistórico de Manabí norte y Esmeraldas*, newspaper articles on "Guayaquil y su prehistoria" and *Cultura Valdivia,* with Evans and Meggers (Evans et al. 1959). In the 1960 edition of *Vistazo*, assembling data from Manabí and Guayas, Estrada published one of his most controversial articles, "Asiáticos desembarcaron hace 2.000 años en el Ecuador" (Asians arrived by boat in Ecuador 2000 years ago). In 1961, he co-authored a paper with Meggers that studied traits of probable transpacific origin (Estrada and Meggers 1961).

At the age of 45, Emilio Estrada suffered from a heart attack. His sudden death was a great loss to the archaeology of Ecuador. His postmortem publications include "Arqueología de Manabí Central" (Estrada 1962) and *The Jambelí Culture* (Estrada

Estrada, Emilio, Fig. 2 Roundtable on the Archaeology of Coastal Ecuador, organized by Carlos Zevallos Menéndez at the Casa de la Cultura Ecuatoriana, Estrada is first on the left. (Photo; Carlos Zevallos Menéndez Museum)

et al. 1964). However, his most controversial piece of work was without doubt *Early Formative Period of Coastal Ecuador: the Valdivia and Machalilla Phases* where he appears as the third author. In that publication, Meggers, Evans, and Estrada claimed that Valdivia was derived from the Japanese Jomón Culture (Meggers et al. 1965). This idea was met with excitement and disagreement, and some scholars doubted that Estrada agreed with this claim, since the book appeared 4 years after his death. When he died, Emilio Estrada was only 45 years of age and planning a new expedition to Esmeraldas in northwest coastal Ecuador. In only 11 years of active research, he produced an outstanding record of quality publications, as evidenced by the fact that most of his interpretations are still current.

Cross-References

► Evans, Arthur
► Meggers, Betty Jane

References

Estrada, Emilio. 1954. *Ensayo preliminar sobre Arqueología del Milagro*. Guayaquil: Publicaciónes del Archivo Histórico del Guayas.

Estrada, Emileio. 1955. Balsa and dugout navigation in Ecuador. *The American Neptune* XV (2): 1–17.

Estrada, Emilio. 1956. *Valdivia, un sitio arqueológico formativo en la provincia del Guayas, Ecuador*. Publicación del Museo Arqueológico Victor Emilio Estrada. Guayaquil.

Estrada, Emilio. 1957a. Cronología de la Cuenca del Guayas y Sumario de las características Milagro-Quevedo. *Cuadernos de Historia y Arqueología, VII*, 232–239.

Estrada, Emilio. 1957b. *Los Huancavilcas: Ultimas Civilizaciones Pre-Historicas de la Costa del Guayas*. Publicación del Museo Victor Emilio Estrada. Guayaquil.

Estrada, Emilio. 1957c. *Prehistoria de Manabí*. Publicación del Museo Victor Emilio Estrada. Guayaquil.

Estrada, Emilio. 1957d. Sumario de caracteristicas Milagro—Quevedo. *Cuadernos de Historia y Arqueología* 7: 237–239.

Estrada, Emilio. 1958. *Las culturas pre-clásicas, formativas o arcaicas del Ecuador*. Guayaquil: Museo Victor Emilio Estrada.

Estrada, Emilio. 1959. *Arte aborigen del Ecuador: sellos o pintaderas*. Guayaquil: Museo Victor Emilio Estrada.

Estrada, Emilio. 1962. *Arqueologia de Manabí Central*. Guayaquil: Museo Victor Emilio Estrada.

Estrada, Emilio, and Betty Meggers. 1961. A complex traits of probable transpacific origin on the coast of Ecuador. *American Anthropologist* 63: 913–939.

Estrada, Emilio, Betty Meggers, and Clifford Evans. 1964. *Meggers, E, C Evans and "The Jambelí culture of south-coastal Ecuador"* no. 3942. Washington, DC: Smithsonian Institute Press.

Evans, Clifford and Betty Meggers. 1955. Preliminary Report on Archeological Investigations in the Guayas Basin, Ecuador. *Cuaderno de Historia y Arqueología, IV*(12), 1–12.

Evans, Clifford, Betty Meggers, and Emilio Estrada. 1959. *Cultura Valdivia*. Publicación del Museo Víctor Emilio Estrada. Guayaquil.

Meggers, Betty, Clifford Evans, and Emilio Estrada. 1965. *Early FormativePeriod of Coastal Ecuador: The Valdivia and Machalilla Phases. Contributions to Antrhopology* (Vol. I). Smithsonian Institution Press. Washigton.

Ethics and Human Remains

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> . . . due dignity and respect should be afforded in the recovery, storage, investigation and reburial of human remains regardless of their context. (Hunter et al. 2001: 176)

Ethics is a branch of philosophy concerned with the evaluation of the principles and standards of human conduct that govern the behavior of individuals and groups (Bottorff 2005). Most professions adhere to an agreed code of conduct, commonly referred to as a "code of ethics," with the intention being that all practitioners should undertake "best practice." In reality, however, definitions of "best practice" vary because different cultures, societies, and groups have diverse value systems, namely, their own definitions of what is considered right (*appropriate*) and wrong (Walker 2000: 20; White 2000: 319). Because of the emotive nature of death, the treatment of human remains is often contentious and poses many ethical dilemmas.

Locating and Recovering Human Remains: Digging Up the Dead

While human remains may be located accidentally (e.g., washed up on a beach, eroded out of a riverbed, etc.), there are a number of situations where human remains are intentionally recovered. Human remains may, for example, be excavated as part of a planned university archaeology research project investigating subjects such as past burial practices or changes in diet. It has been argued that the antiquity and lack of personal identification of the individuals justifies this endeavor.

Increasingly, the need for land in urban areas with expanding populations (e.g., in the UK or Portugal) results in the exhumation of known burials and cemeteries (Sayer 2010). In some instances building continues over the cemetery (e.g., a car park was constructed over some 9000 burials at the Queen Victoria Markets, Australia – Cooper 2011). In other cases funding is provided for a salvage recovery of the remains prior to development (e.g., the recovery, analysis, and relocation of the remains of some 260 children buried in a cemetery at the former Randwick Children's Asylum, Sydney, Australia, prior to development of a new hospital facility – Anon 1997). The ethical questions that arise from deciding whether or not to salvage human remains include: Why, in some instances, should human remains be left in situ and built over, while, in other cases, the remains are exhumed, curated, and stored as part of a salvage operation? Should the antiquity of the remains or whether the individuals are identified play a part in the decision to salvage human remains?

There are situations where communities have argued they have ancestral links to the human remains (see below for further discussion) and either demand to be included in the excavation to appease the spirits of the dead or object to the excavation and analysis of remains altogether (see examples cited in Sayer 2010: 70–74).

The location and recovery of human remains may also be undertaken as part of forensic investigations either to provide evidence for courts in prosecuting, for example, genocide and/or crimes against humanity, or to identify individuals to return the remains to their families (e.g., Blau 2015). One of the ethical quandaries is why evidence in the form of human remains is collected for identification (usually undertaken as part of a humanitarian investigation) and becomes secondary to evidence collected for formal prosecution (e.g., Fondebrider 2002: 889; Skinner and Sterenberg 2005: 231 cf. Burns 1998: 82). While resemblance is enough for some (e.g., Kadhim 2006), positive identification is given to others (e.g., Budimlija et al. 2003).

Each scenario raises questions about the ethics of digging up the dead. Such questions pose ethical dilemmas for those involved in the recovery and analysis of human remains.

Analyzing Human Remains

While death is biological, it is also an inherently social process (McEvoy and Conway 2004: 541; Prior 1989: 13), particularly given the "premise that human rights continue at death" (Vizenor 1996: 653). It is the dichotomy between human remains as utilitarian objects of scientific interest and human remains important for their cultural, symbolic, and spiritual value that raises many ethical questions for those studying or working with human remains, whether from archaeological or forensic contexts.

Sociocultural attitudes toward the dead should be considered by practitioners dealing with the deceased (e.g., Hunter and Cox 2005). While the living body is usually regarded as a person, it has sometimes been argued that after death the body becomes merely an object (e.g., McEvoy and Conway 2004: 540). In the forensic context, the body (object) is regarded at one level as empirically unchallengeable evidence (The idea of the corpse as an object is, however, in contrast to the interpretation of a corpse under Anglo-Australian law, where the corpse "cannot be the subject of property so cannot be stolen" (Frekelton 1988: 259) and is, therefore, not considered an object (Hubert 1992: 119).). This is particularly relevant to those dealing with human skeletal remains.

An anecdotal survey of forensic and biological anthropology students' attitudes to human skeletal remains showed that only half of the cohort ($n = 16$) who had excavated human skeletal remains identified with them as once being a living person (Blau 2016: 594; see also McEvoy and Conway 2004: 540). Such views, however, contradict the fundamental ethical principle for modern research in the biomedical and social sciences: respect for human dignity based on "the belief that it is unacceptable to treat remains solely as . . . objects or things" (Walker 2000: 20).

Depending on the context of the location and recovery of human remains, a number of different types of analyses are possible. Attitudes toward studying (and displaying and storing – see below) human remains are greatly influenced by attitudes of the living toward the dead. In some cases, the political and religious beliefs of communities result in rulings to prevent archaeologists and anthropologists from studying human remains (e.g., the case of Jewbury in York, UK – Sayer 2010: 79–82).

Osteologists and forensic anthropologists perform a range of analyses that may include determining whether the material is actually osseous, the bone is human or nonhuman, and/or the human remains are of forensic significance. Analyses may also include describing the condition and preservation of skeletal remains; developing an inventory of recovered remains; determining the ancestry, sex, age, and stature of the individual; and describing any individualizing characteristics and any pathological and/or traumatic injuries. Each of these specific practices, including the formation of the final report, has associated ethical considerations.

In the analysis of skeletal trauma, for example, how invasive should a forensic anthropologist be? In the case of a 35-year-old female homicide victim who exhibited extreme peri-mortem soft tissue trauma to the head and neck, how much more information will be gained from decapitating the head and macerating and cleaning the remains (e.g., Marks et al. 1999: 263)? Is it necessary to have a code of practice which stipulates the extent to which the practitioner can be invasive, or "is it just better to let the . . . anthropologist work to their conscience on the principle of "best practice" (Hunter and Cox 2005: 220)?

Much has been written about the politics associated with indigenous human remains (e.g., Cantwell 2000; Hubert 1992; Jones and Harris 1998; McEvoy and Conway 2004: 542–547; Pardoe 1992; Vizenor 1996; White 2000: 323–326). It is important that people dealing with human remains, particularly in countries with a colonial history, be aware of the potential social and political concerns and debates surrounding indigenous remains. It is important to appreciate

that the results of, for example, an ancestry determination may have serious political, social, and ultimately economic implications (Cantwell 2000).

Undertaking Research Using Collections of Human Remains

Some argue that undertaking research using collections of human remains is vital. For those undertaking research on archaeological remains, it provides the opportunity to gain a detailed understanding of past human lifestyles and activities. Consideration, however, must be given to the ethics surrounding research using human remains.

Consider, for example, the analyses of the human skeletal remains recovered from Spitalfields, the site of a former medieval priory and hospital in London. The individuals recovered were of known age and sex and often had living relatives (Molleson and Cox 1993). In such cases, who authorizes whether or not the remains should be studied?

Is it appropriate for practitioners to base their research on collections of human skeletal remains curated in museums, particularly when such collections are viewed as a violation of fundamental human rights by some indigenous groups (Walker 2000: 19)? Many indigenous groups promote reburial of what they perceive as ancestral remains. When the remains are archaeological and are of some antiquity, researchers argue that the ancestral links of living groups who promote reburial of the remains are tenuous (e.g., Afrasiabi 1997): how does one group of people prove a long ancestral relationship with ancient skeletal remains (Webb 1987; Donlon 1994; Thompson 2003)? Even if/when a link can be established, the question remains about whose past it is anyway – who "owns" the past?

The majority of techniques used by osteologists and forensic anthropologists today were developed using descriptions and measurements collected either from archaeological collections where age and sex were unknown (e.g., Molleson and Cox 1993) or from anatomical samples (e.g., The Huntington, Terry and Hamann-Todd Collections) where independent records of these biological attributes exist (Hunt and Albanese 2005). It has been argued the research on contemporary human remains is important because of the need to improve population-specific techniques with which to analyze forensic cases (see Ubelaker, this volume on Osteology Reference Collections).

Given the sensitive nature of the material archaeologists and forensic anthropologists examine, and to avoid notions that practitioners can undertake any research they feel is appropriate (See Beloff 2003 for a discussion on notions of appropriateness cf. Bahn's conclusions "archaeologist have the right to do just about anything in the name of scholarship" (Bahn 1984: 127). Bahn's conclusions differ little from some medical practitioners in the nineteenth century who believed "they were entitled to make whatever uses of the dead they wished" (MacDonald 2005: 189).), all research or publication using skeletal material must be undertaken with the appropriate ethics research committee approval. It is not, however, enough to "do the paperwork": the broad ethical implications must be considered during and beyond the lifespan of the project (Loff and Black 2004).

Is it appropriate to undertake research based on human remains exhumed for evidence in war crime trials? If it is considered appropriate, has consent from the relatives of victims been sought and given (Hunter and Cox 2005: 215)? While assessment of the utility of forensic anthropology methodologies as applied to specific populations certainly has a place in terms of addressing the relevance of standards (e.g., Schaefer and Black 2005), exactly how data are collected to develop population-specific standards must be scrutinized (e.g., examples cited in Hunter and Cox 2005: 215). Consider research aimed at using cranial morphology to differentiate between a Croatian and a Bosnian (Griffis 2001). Does such research take into account the complicated politics resulting in the 1992–1995 Bosnian war? Such questions raise the importance of the need for cultural and ethical awareness and invite the larger question: what limits should one put on the expert's right to information (Meskell and Pels 2005: 5)?

Is it ethical to undertake research but never publish the findings? For example, one of the issues raised by some Australian Aboriginal groups in discussions about the return of a prominent skeletal collection was the fact that despite the museum in

question having held the remains for over 70 years, the researchers had published relatively little on their findings (Associate Professor Chris Briggs, The University of Melbourne, personal communication 2005; see also Hubert 1992: 116). What benefits, therefore, could be gained from the continued curation of these remains?

Displaying and Storing Human Remains

Differences in attitudes to death, the deceased, and human skeletal remains have a significant impact on ethical issues related to the display and storage of human remains. In many contemporary Western societies, there is a lack of familiarity with the dead (e.g., Adams 2000; Baudrillard 1993: 181–182; Richardson 1987; Walker 2000: 5): death is seen as a clinical process, and physical contact with the deceased is rejected as events surrounding death and dying are often suppressed (e.g., Blaauw and Lahteenmaki 2002: 772). In contrast, in other cultures, families choose to have physical contact with their dead relatives as part of the grieving process. While some societies actively and openly display human remains, as in the case of the Cemetery Church of All Saints in the Czech Republic, other cultures are highly offended by the display of their ancestors, as with some indigenous Australian and Maori communities from New Zealand (for further discussion on the different values placed on human skeletal remains, see Hubert 1992: 117–118; and Walker 2000: 12–18).

Repatriation and Reburial

There are strong differences of opinion between indigenous groups and professionals involved in dealing with human skeletal remains about repatriation and reburial (Ubelaker and Grant 1989). The process of repatriation and reburial is seen by many indigenous groups as a vital part of their cultural traditions and/or religious beliefs requiring the spirits of their ancestors to be laid to rest through respectful burial. Other groups, typically associated with universities, museums, and professional organizations, argue that reburial results in the loss of important scientific knowledge and is the death of bioarchaeology (e.g., Donlon 1994; Weiss 2008: 48). While many osteologists have been critical of repatriation and reburial, some practitioners from the USA argued that the passing of the 1990 Native American Graves Protection and Repatriation Act (NAGPRA) actually increased the number of skeletons studied and funds required for the analyses (Rose et al. 1996).

In 1995 skeletal remains of a teenage girl dated to the Roman period were discovered in the city of London during commercial development. The remains were housed at the Museum of London for 12 years, and following a Christian church service in 2007, the remains were re-interred near the original place of discovery (Anon. 2007). Questions that then arose included: why, of all the individuals recovered in the city of London, were the remains of this one individual chosen to be reburied? Was it appropriate to have a Church of England ceremony for this individual? Such questions clearly illustrate the complex politics of the dead.

There are numerous important questions to be addressed in the process of deciding whether or not to repatriate and rebury human remains. These questions include: how are human skeletal remains attributed an affiliation to a living human group? Does the antiquity of the human skeletal remains affect the rigor of claims of affiliation? At what point do oral traditions support affiliation? Are oral traditions or physical evidence more important in "proving" affiliation, and "more important" to whom? What happens in situations where human skeletal remains cannot be attributed an affiliation?

The recovery, analysis, and storage of human skeletal remains raise a number of complex questions. Practitioners dealing with human remains have an ethical responsibility to be aware of the myriad of different responses to such questions.

Cross-References

- ▶ Ethics of Collecting Cultural Heritage
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Repatriation: Overview

References

Adams, P. 2000. Death and contemporary popular culture. In *Death and dying in Australia*, ed. A. Kellehear, 105–115. Oxford: Oxford University Press.

Afrasiabi, P.R. 1997. Property rights in ancient human skeletal remains. *Southern California Law Review* 70: 805–840.

Anon. 1997. Prince of Wales Hospital Randwick Destitute Children's Asylum Cemetery Excavation Project, 1995–1996. Final report; volume 3 Physical Anthropology (Call No.: MLMSS 6684/10).

Anon. 2007. Remains of Roman teenager buried. http://news.bbc.co.uk/2/hi/uk_news/england/london/6563909.stm. Accessed 25 Apr 2007.

Baudrillard, J. 1993. *Symbolic exchange and death*. London: Sage.

Bahn, P. 1984. Do not disturb? Archaeology and the rights of the dead. *Oxford Journal of Archaeology* 3 (2): 127–139.

Beloff, H. 2003. Medical ethics in professional conduct. *International Journal of Human Rights* 7 (1): 9–15.

Blaauw, M., and V. Lahteenmaki. 2002. 'Denial and silence' or acknowledgement and disclosure. *International Review of the Red Cross* 84: 767–783.

Blau, S. 2015. Working as a forensic archaeologist and/or anthropologist in post-conflict contexts: A consideration of professional responsibilities to the missing, the dead and their relatives. In *Ethics, archaeology and violence*, ed. A. González-Ruibal and G. Moshenska, 215–228. New York: Springer.

Blau, S. 2016. More than just bare bones: Ethical considerations for forensic anthropologists. In *Handbook of forensic anthropology and archaeology*, ed. S. Blau and D.H. Ubelaker, 2nd ed., 593–606. New York: Routledge.

Bottorff, D.L. 2005. What is Ethics? http://www.ethicsquality.com/about.htlm. Accessed 12 Feb 2002.

Budimlija, Z.M., M.K. Prinz, A. Zelson-Mundorff, J. Wiersema, E. Bartelink, G. MacKinnon, B.L. Nazzaruolo, S.M. Estacio, M.J. Hennessey, and R.C. Shaler. 2003. World trade center human identification project: Experiences with individual body identification cases. *Croatian Medical Journal* 44 (3): 259–263.

Burns, K.R. 1998. Forensic anthropology and human rights issues. In *Forensic osteology: Advances in the identification of human remains*, ed. K. Reichs, 63–85. Springfield: Charles C. Thomas.

Cantwell, A. 2000. "Who knows the power of his bones": Reburial redux. *Annals of the New York Academy of Sciences* 925: 79–119.

Cooper, M. 2011. Bodies under Queen Vic haunt market revamp. The Age March 11. http://www.theage.com.au/victoria/bodies-under-queen-vic-haunt-market-revamp-20110311-1bqsp.html. Accessed 27 Sep 2011.

Donlon, D. 1994. Aboriginal skeletal collections and research in physical anthropology: An historical perspective. *Australian Archaeology* 39: 73–82.

Fondebrider, L. 2002. Reflections on the scientific documentation of human rights violations. *International Review of the Red Cross* 84 (848): 885–891.

Frekelton, I. 1988. Identification and the law. In *Craniofacial identification in forensic medicine*, ed. J.G. Clement and D.L. Ranson, 257–265. London: Arnold.

Griffis, L. 2001. Investigating bones: The work of the C.A. pound human identification laboratory. *CLASnotes* 15(3). http://clasnews.clas.ufl.edu/news/clasnotes/0103/pound/html. Accessed 07 Feb 2006.

Hubert, J. 1992. Dry bones or living ancestors? Conflicting perceptions of life, death and the universe. *International Journal of Cultural Property* 1 (1): 105–127.

Hunt, D.R., and J. Albanese. 2005. History and demographic composition of the Robert J. Terry anatomical collection. *American Journal of Physical Anthropology* 127 (4): 406–417.

Hunter, J.R., M.B. Brickley, J. Bourgeois, W. Bouts, L. Bourguignon, F. Hubrechts, J. de Wine, H. van Haaster, T. Hakbijl, H. de Jong, L. Smits, L.H. van Wijngaarden, and M. Luschen. 2001. Forensic archaeology, forensic anthropology and human rights in Europe. *Science and Justice* 41 (3): 173–178.

Hunter, J., and M. Cox. 2005. Social and intellectual frameworks. In *Forensic archaeology: Advances in theory and practice*, ed. J. Hunter and M. Cox, 204–225. London: Routledge.

Jones, D.G., and J.R. Harris. 1998. Archaeological human remains: Scientific, cultural and ethical considerations. *Current Anthropology* 39 (2): 253–264.

Kadhim, A. 2006. Painful archaeology: Excavating Saddam's mass graves. *Strategic Insights* 5(3). http://www.ccc.nps.navy.mil/si/2006/Mar/kadhimMar06.pdf. Accessed 10 June 2006.

Loff, B., and J. Black. 2004. Research ethics committees: What is their contribution? *Medical Journal of Australia* 181 (8): 440–441.

MacDonald, H. 2005. *Human remains: Episodes in human dissection*. Melbourne: Melbourne University Press.

Marks, M.K., J.W. Hudson, and S.K. Elkins. 1999. Craniofacial fractures: Collaboration spells success. In *Broken bones: Anthropological analysis of blunt force trauma*, ed. A. Galloway, 258–286. Springfield: Charles C. Thomas.

McEvoy, K., and H. Conway. 2004. The dead, the law, and the politics of the past. *Journal of Law and Society* 31 (4): 539–562.

Meskell, L., and P. Pels. 2005. Introduction: Embedding ethics. In *Embedding ethics*, ed. L. Meskell and P. Pels, 1–26. Oxford: Berg.

Molleson, T.I. and Cox, M.J. 1993. *The spitalfields project vol 2. The anthropology – The middling sort*. Research report 86. York: Council for British Archaeology.

Pardoe, C. 1992. Arches of radii, corridors of power: Reflections on current archaeological practice. In *Power, knowledge and aborigines*, ed. B. Attwood and J. Arnold, 132–141. Melbourne: La Trobe University Press.

Prior, L. 1989. *The social organisation of death: Medical discourse and social practice in Belfast*. London: Macmillan Press.

Richardson, R. 1987. *Death, dissection and the destitute*. London: Routledge and Kegan Paul.
Rose, J.C., T.J. Green, and V.D. Green. 1996. NAGRPA is forever: Osteology and the repatriation of skeletons. *Annual Review of Anthropology* 25: 81–103.
Sayer, D. 2010. *Ethics and burial archaeology*. London: Duckworth Publishers.
Schaefer, M.C., and S.M. Black. 2005. Comparison of ages of epiphyseal union in North American and Bosnian skeletal material. *Journal of Forensic Sciences* 50 (4): 777–784.
Skinner, M., and J. Sterenberg. 2005. Turf wars: Authority and responsibility for the investigation of mass graves. *Forensic Science International* 151: 221–232.
Thompson, T. 2003. The quality and appropriateness of forensic anthropological education in the UK. *Public Archaeology* 3: 88–94.
Ubelaker, D.H., and L.G. Grant. 1989. Human skeletal remains: Preservation or reburial? *American Journal of Physical Anthropology* 32: 249–287.
Walker, P.L. 2000. Bioarchaeological ethics: A historical perspective on the value of human remains. In *Biological anthropology of the human skeleton*, ed. M.A. Katzenberg and S.R. Saunder, 3–39. New York: Wiley-Liss.
Webb, S. 1987. Reburying Australian skeletons. *Antiquity* 61: 292–296.
Weiss, E. 2008. *Reburying the past: The effects of repatriation and reburial on scientific inquiry*. New York: Nova Science Publishers.
White, T. 2000. *Human osteology*. 2nd ed. New York: Academic.
Vizenor, G. 1996. Bone courts: The rights and narrative representation of tribal bones. In *Contemporary archaeology in theory: A reader*, ed. R.W. Preucel and I. Hodder, 652–663. Cambridge: Blackwell.

Ethics in Archaeology

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Introduction

Regardless of location, specialty, rank, heritage, gender, or age, ethics is an important part of the practice of every archaeologist. Archaeologists learn about, apply, and debate ethics in formal and informal contexts: college classrooms, staff meetings, publications, field-research sites, and at the bar (or metaphorical watercooler) during professional meetings. Long ago, the discipline of archaeology abandoned the idea that archaeologists practice in isolation a value-free science, free from interactions with modern peoples. Ethnic conflict, colonialism (and post-colonialism), globalization, structural inequalities, illicit markets, development, nationalism, imperialism, and terrorism – these realities of the world are all directly or indirectly connected to the global practice of archaeology.

Archaeology is the systematic study of past cultures and peoples based on analysis of recovered material evidence. Archaeologists reveal, interpret, and preserve parts of our global past – but, as noted by Pyburn and Wilk (2000: 83): "If archaeology is to survive. . .its practitioners must forfeit the luxury of burying themselves in the past." In performing their duties, archaeologists frequently confront ethical decisions and responsibilities concerning interactions with various publics, the collection, use, curation, or disposal of material evidence and responsibilities within the profession regarding safety, publication, or other professional standards. Archaeologists may be asked to determine the significance of someone else's history, test the validity of an Indigenous group's land claim, teach about evolution and human origins, or provide locations of cultural heritage sites to military during times of armed conflict. More frequently, narratives archaeologists write are used to guide development initiatives, influence public policy concerning preservation of "significant" historical properties, and instruct the public on the diversity of human practices in an increasingly globalized world. Thus, archaeologists play many roles and hold many responsibilities. Archaeology, therefore, is a relevant and applied science in the modern world, one that makes real impacts on living people and, thus, one that requires professional ethics.

Above all, ethics in archaeology is about the relationships that define the scientific discipline – relationships with colleagues, students, governments, Indigenous people, local communities, the general public, and people and objects of the past – the principles that guide actions, and the methods of ethical decision-making when relationships, principles, and practices are not in

harmony. Below, definitions and histories of ethics in archaeology are provided, along with a summary of major ethical issues and debates in global archaeology today. This entry will conclude by looking forward and speculating on the future of ethics in archaeology.

Definition

What Is Ethics?

Ethics is the study of standards or ideals that guide everyday behaviors, as well as the behaviors themselves. Ethics also refers to the standards, principles, and concepts of right and wrong behavior that are derived from moral reasoning and debate and are often discussed as rights, obligations, responsibilities, virtues, and/or benefits to others (Fig. 1). Many people confuse personal feelings and values, religious teachings, laws, and cultures (i.e., learned behaviors that are found to be "acceptable" in society) with ethics – none of these, in fact, are studies of standards that guide behavior. For example, laws may be based in ethical reasoning, but may be found to be unethical, such as former apartheid laws in South Africa. Laws also may not exist for some ethical principles such as honesty in reporting archaeological finds. Ethics is also not the same as religion because religious people are not the only ones with ethics. And, religious teachings, like cultural behaviors, are context dependent, meaning what is acceptable behavior in one religion/society at one time may not be acceptable in another (e.g., the practice of cannibalism or the imprisonment of Jewish people in Nazi Germany). However, personal feelings, religions, laws, and culture each have some bearing on the development of ethical behavior and ethical principles, demonstrating the complicated multifaceted process of studying ethics.

Ethics in Archaeology, Fig. 1 Word cloud generated from definitions of "ethics"

What Are Archaeological Ethics?

Archaeological ethics is composed of standards and principles that guide archaeologists and is used to judge the professional behavior of archaeologists (Fig. 2). Wylie (2003: 4) defines archaeological ethics as "a set of ideals that can give us leverage in judging existing practices as well as in making decisions about how to go on when conflicts arise or conventions are problematic" (see Table 1 for other recent statements on archaeological ethics). Simply stated, archaeological ethics is the study and discussion of how archaeologists *ought* to behave to meet professional and societal goals and exceed "typical behavior." Professional archaeological ethics is different than personal values and society's moral code, which prescribes "good" behavior of citizens, as some responsibilities of archaeologists are unique to members of the profession. For example, preservation and publication of research records are considered ethical tenets of archaeology, but few societies would argue it is unethical to destroy or refuse to publicly publish personal tax or citizenship documents.

Archaeologists interested in studying ethics, or who are facing ethical dilemmas, may approach the subject by a variety of means, including laws,

Ethics in Archaeology, Fig. 2 Word cloud of 100 frequently occurring words in archaeological ethics codes

Ethics in Archaeology, Table 1 Recent statements on archaeological ethics

"Today, ethical questions and dilemmas are more about relations among people than about things"	McGuire (2003: vi)
"Ethics are guidelines to assist professionals in meeting the specialized goals of their profession within the more complex circumstances of the greater society in which they live and work"	Lynott (2003: 25)
"Ethics in archaeology. . .are historically contingent and based on moral arguments, world views, and goals founded in certain ways of relating to the past that may or may not have a sound foundation or be shared by everyone"	Colwell-Chanthaphonh et al. (2008: 4)
"Archaeologists should be seeking to realise the highest gods of their profession, whatever these may be. Deciding what they are is one important part of archaeological ethics; determining how they may *legitimately* be achieved is another"	Scarre and Scarre (2006: 3)
"Ethics principles and codes of conduct should be treated as works in progress; they are never final, never written in stone. . .It is only through such a process of active, reflective debate that archaeologists can be accountable for their practice"	Wylie (2003: 13)
"In order for this discussion of [archaeological] ethics to be meaningful to everyone, we must look beyond archaeology as only a series of methods driven by a set of theories. . .the ethical practice of science must involve a thorough examination of the relationship between [scientists] and those with claims on the information so carefully sought by the scientist. In the case of archaeology, it is imperative for archaeologists to be aware that American Indians are one of the primary stakeholders in a complex and multifaceted past owned by no one but controlled by many"	Watkins (2003: 129)

schools of moral philosophy, professional societies' statements, and social conventions. For example, an archaeologist questioning "good behavior" related to publishing archaeological data may discover that (a) no laws exist requiring the publication of scientific data; (b) statements of professional societies argue sharing data with colleagues and the public is ethical, based on moral reasoning related to public responsibility and beneficence; (c) the same statements dictate that site locations should not be published and data derived from non-archaeological excavations (i.e., "looted" data) should not be used, based on professional valuing of preservation of archaeological sites and the assumed connection between these actions and increased commercialization of the past; and (d) a social convention exists among archaeologists not to share certain research data until it has been published by the discover/analyst.

Many local and national laws and international conventions apply to the ethical practice of global archaeology, including those centered on historic preservation, the prohibition of illicit trafficking of antiquities, and Indigenous peoples' rights (for further reading on cultural heritage laws, see Gerstenblith 2008; King 2008). For an excellent

summary of the "schools" of moral philosophy and of applied professional ethics, see Rachels 1998 or, for archaeological examples, see Colwell-Chanthaphonh et al. 2008. Finally, Wylie (1997) has identified different types and purposes of professional statements on archaeological ethics, including professional standards of conduct, general statements of goals, and special statements outlining responsibilities to Indigenous or other local peoples. Colwell-Chanthaphonh et al. (2008: 133–186) provide a compilation of 12 professional statements on archaeological ethics, many of which are also available online. While many common themes persist in such statements (e.g., the preservation of the "archaeological record"), there are no universally held ethics in archaeology. Each professional organization's statements reflect its positionality in the world, its history and place in time, and the core ethical values of its members.

Historical Background

> Ethics used to be simple in archaeology. . .Ethical questions were all about things: Did the person use up-to-date scientific methods to dig things up and adequately document the process? . . . Did the things end up in a museum and not for sale at Sotheby's? . . .Did the archaeologist publish what he learned? . . . However, at the dawn of the twenty-first century ethics in archaeology are not simple. They are very complex, conflicted, and confusing. Today, ethical questions and dilemmas are more about relations among people than about things (McGuire 2003: vii).

Ethics in archaeology has been, and forever will be, context dependent and the subject of great debates, both within the profession and society. New methodologies, scientific instruments, societal perspectives on "science," and stakeholders have led to reexaminations of what archaeologists *ought* to do. Though some early principles of archaeological ethics have persisted over time (e.g., the importance of discovering and documenting new cultural traditions), archaeological ethics is not now and never has been universally held. Though the first codified statements on ethics in archaeology were not written until the mid-twentieth century, by examining theoretical and methodological practices of past archaeologists, ethical values and principles may be inferred. For a summary of the history of ethics in global archaeology, see Colwell-Chanthaphonh et al. 2008 (especially Table 1.1, p. 19).

Early Ethics in Archaeology

Archaeology began as antiquarianism in most areas of the world, when scholar-adventurers sought to discover and collect relics from ancient "lost" civilizations. Over time, antiquarianism developed into material culture analysis, leading to the fields of Classical Studies, Egyptology, Assyriology, and archaeology (for more details, see Trigger 1989). Often working as part of the colonial structure in occupied places like Egypt, Cambodia, India, and the Americas, many early archaeologists felt little ethical responsibility to local people; their ethical obligations were instead focused on an assumed universal ethos relating to the discovery, collection, and display of archaeological objects.

As the scientific methodology of archaeology developed, new ethics arose, including the documentation of contextual information from in situ excavation and the preservation of archaeological sites. These changes led to the development of professional standards, including ethics of scholarship and professional accountability. In the United States, as early as 1906, legislation was passed that recognized damage done to sites of national cultural heritage by unscientific excavation and established the authority of archaeologists as professionals charged with protecting and studying evidence of the past (Harmon et al. 2006). The growth of archaeology programs in universities, codification of further laws defining archaeologists' roles to the past, and the creation of professional archaeological societies all acted to further separate scientific archaeologists from the public and define professional archaeological ethics. Early ethical statements of societies (e.g., Champe et al. 1961; see Colwell-Chanthaphonh 2008: 180–181) included principles such as sharing and publishing data, refraining from the buying and selling of artifacts, receiving proper training, and protecting archaeological sites and

data. As mentioned in the opening quote by McGuire, early archaeological ethics was primarily object centered.

"Modern Era" Ethics in Archaeology

In the last 50 years, a number of pressing issues have elevated ethics into a prominent part of global archaeological practices. Beginning in the 1960s, and stemming from recognition of the destructive nature of development projects and archaeological excavation, archaeologists argued for a professional conservation ethic. Mitigation and minimally intrusive excavation became standard practices to address research questions, especially in the newly created private sector of archaeology, often called cultural resource management (CRM). The quick growth of CRM inspired calls to define professional standards in archaeology that outlined traditional ethics of conservation and scientific practice but also new responsibilities to clients, employees, employers, competing and cooperating businesses, and the public (now a funder of archaeology through taxes) (Register of Professional Archaeologists 2012).

As CRM was booming, the global antiquities market (fueled by illicitly acquired "looted" objects) was burgeoning. Archaeologists called for international protections of archaeological sites and objects (i.e., "cultural property" or "cultural heritage"), arguing that ethos of "stewardship" and "appreciation of the past" were universal, as the past belonged to humankind. In an attempt to stem the looting of archaeological sites, archaeologists reiterated an anti-commercialization ethic, stating archaeologists should not participate in monetary valuation of the archaeological record. Additionally, archaeologists called for an ethic of public outreach and education, both to fulfill a previously defined ethic of data sharing and to solicit help in "saving the past for the future."

As archaeology became increasingly diverse in the modern era, globally and locally, new people introduced new perspectives, again changing archaeological ethics. This diversity, with influences from the postmodern reflexive "turn" in anthropology and international Indigenous rights movements, questioned the primacy and subjectivity of Western science and encouraged alternative epistemologies, which in turn has inspired ethics of collaboration, reciprocity, and stakeholder dialogue in modern archaeology (as discussed below) and led to greater acknowledgement of the inseparability of politics from scientific practice. Armed with greater knowledge of the modern social contexts of archaeological research, archaeologists have begun to transform their ethics to increasingly focus on people, rather than objects. This transformation has been noted in statements and codes of ethics of professional archaeological societies, such as the World Archaeological Congress (WAC n.d.).

Key Issues/Current Debates

As discussed above, archaeological ethics used to play a minor role in the practices of archaeologists as well as the archaeological literature. Once focused on rules governing the collection and analysis of artifacts, ethics in archaeology is now a major focus of the discipline. Local, national, and international archaeological societies are seeking to engage their members in discussions of ethics, and numerous books have been written on the subject (e.g., Lynott and Wylie 2000; Zimmerman et al. 2003; Scarre and Scarre 2006; Vitelli and Colwell-Chanthaphonh 2006; Colwell-Chanthaphonh et al. 2008).

In this section, key issues and current debates in ethics of archaeology will be presented, organized into a "trinity of responsibilities" first proposed by McGuire (2003: xiii): accountability to the material evidence of the past, to various publics associated with archaeological practice, and to the discipline and colleagues. Quotes from professional archaeological organizations on these responsibilities are provided in Tables 2, 3, and 4.

These responsibilities are not mutually exclusive (see Fig. 3) – they intersect in some of the most crucial modern archaeology debates, including the collection, analysis, and preservation of human remains, the ownership and control of cultural heritage, and the struggle to make archaeology applicable in the twenty-first century and beyond.

Ethics in Archaeology, Table 2 Responsibilities to the archaeological record

Archaeological Institute of America	"As primary stewards of the archaeological record, [archaeologists] should work actively to preserve that record in all its dimensions and for the long term"
Australian Archaeological Association	"Members will advocate the conservation, curation and preservation of archaeological sites, assemblages, collections and archival records. . . [Members] support and advocate the necessity to properly manage archaeological materials in accordance with agreements with communities of concern"
Canadian Archaeological Association	"We expect [members] will exercise respect for archaeological remains and for those who share in interest in these irreplaceable and nonrenewable resources now and in the future"
European Association of Archaeologists	"It is the duty of every archaeologist to ensure the preservation of the archaeological heritage by every legal means"
Japanese Archaeological Association	"Members recognize that the sites, features, and artifacts which archaeology takes as its objects of study are the precious heritage of human history and culture, and strive to preserve and utilize these materials"
Society for American Archaeology	"It is the responsibility of all archaeologists to work for the long-term conservation and protection of the archaeological record by practicing and promoting stewardship of the archaeological record"
World Archaeological Congress	"[Members] acknowledge the importance of protecting indigenous cultural heritage to the well-being of indigenous peoples"

Ethics in Archaeology, Table 3 Responsibilities to associated publics

Archaeological Institute of America	"It is the responsibility of professional archaeologists to communicate with the general public about the nature of archaeological research. . .Archaeologists should be sensitive to cultural mores and attitudes, and aware of the impact research and fieldwork may have on a local population, both during and after the work"
Australian Archaeological Association	"Members will negotiate and make every reasonable effort to obtain the informed consent of representatives of the communities of concern who cultural heritage is the subject of investigation. Members cannot assume that there is no community of concern"
Canadian Archaeological Association	"[Members] acknowledge that Aboriginal people have a fundamental interest in the protection and management of the archaeological record, its interpretation and presentation"
European Association of Archaeologists	"Archaeologists will whenever possible. . .carry out prior evaluations of the ecological and social implications of their work for local communities"
Japanese Archaeological Association	"In the conduct of investigation and research, JAA members respect the local history, culture, and natural environment, and give consideration to their relations with the local community"
Society for American Archaeology	"Responsible archaeological research. . .requires an acknowledgement of public accountability and a commitment to make every reasonable effort, in good faith, to consult actively with affected group(s)"
World Archaeological Congress	"Members agree that they have obligations to indigenous peoples and that they shall. . .acknowledge the importance of indigenous cultural heritage. . .to the survival of indigenous cultures"

Responsibilities to the Past

Because archaeological research depends on the availability of archaeological sites and artifacts, and archaeologists believe they make positive contributions to society through their work, archaeologists have long felt an obligation to preserve cultural heritage. Threats to cultural heritage come in many forms, including natural and human forces, such as erosion, flooding, development efforts, armed conflict, and tourism. Most archaeological organizations have statements supporting the protection of the past (Table 2). The Society for American Archaeology (SAA) (Lynott and Wylie 2000: 30, 35) notes that "Stewardship" is

Ethics in Archaeology, Table 4 Responsibilities to colleagues and the discipline

Archaeological Institute of America	"Professional archaeologists owe consideration to colleagues, striving at all times to be fair, never plagiarize, and give credit where due"
Australian Archaeological Association	"Members will treat each other in a professional manner. . .[and] disseminate the results of their work as widely as possible"
Canadian Archaeological Association	"[Members] must keep abreast of developments in their specializations; possess adequate training. . .produce an adequate document. . .respect colleagues and cooperate with them"
European Association of Archaeologists	"Archaeologists will carry out their work to the highest standards recognized by their professional peers"
Japanese Archaeological Association	"[Members] strive to advance their professional capabilities. . .and to conduct their work to the best of their abilities. . .members take every measure to assure safety and hygiene, and respect human rights"
Society for American Archaeology	"Archaeologists must ensure that they have adequate training, experience, facilities, and other support necessary to conduct any program of research. . .consistent with. . .contemporary standards of professional practice"

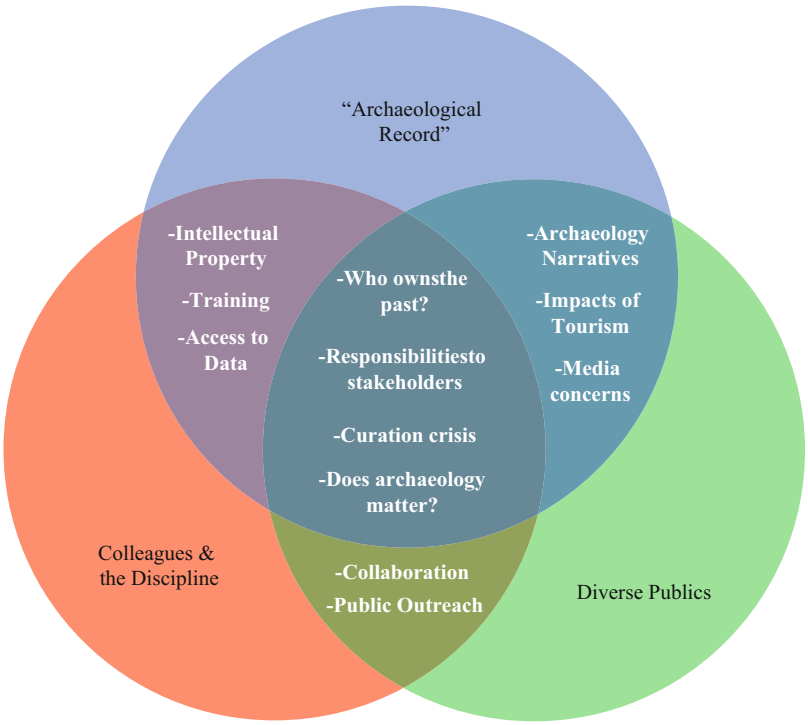

Ethics in Archaeology, Fig. 3 The "trinity of responsibilities" of archaeologists, with intersecting issues

the "central principle of archaeological ethics," "from which all the other ethical principles are derived."

Responsibilities to the past include a number of key issues and debates. First, increasing numbers of international archaeological projects have led to escalating numbers of sites and objects in need of conservation. This fact has led to a "curation crisis," as infinite space and resources are not available to fulfill this ethical obligation. What should be done to resolve this issue? The continuing responsibilities and behaviors of archaeologists towards currently curated objects also invoke debate. What are the best practices for preserving objects and other forms of data? Who has the right to own or control cultural heritage? When should cultural heritage be removed from museum conservation and repatriated to

descendant or other communities? These questions have led to significant debates over whether the primary ethical obligations of archaeologists should be to objects or people and if all people in the world share an ethic of stewardship defined as preservation of the past. Recent case studies suggest that Indigenous and other communities do not value archaeological sites and objects the same as archaeologists. For example, Zuni Ahayu: da (also called "war gods"), once objects of archaeological and art fascination and study, are meant to decay naturally and not be preserved according to the Zuni – here, the ethical responsibility felt by archaeologists to preserve objects is in direct violation of the wishes of a local affected community.

Responsibilities to Associated Publics

Archaeology is of interest to, and itself affects, a diverse range of publics, including government officials, educators, developers (as employers), Indigenous communities, local communities, and the public (Table 3). Since early in the discipline's history, archaeologists have felt an obligation to share their findings and interpretations with the public, following Santayana's (1905) adage: "Those who cannot remember the past are condemned to repeat it." Indeed, Watkins et al. (2000: 40) go as far as to say that "the products of our research belong to the public." These recognitions have inspired archaeologists not only to publish their findings in a timely manner but also to write for broad audiences. The content of publications and even museum displays is also a subject of archaeological ethics, as archaeological interpretations may have unintended consequences (such as denying the origin story of an ethnic group).

As the Zuni Ahayu: da example above shows, the actions and ethos of archaeologists are not always shared by all publics. Over the last 20 years, archaeologists have increasingly recognized, and themselves studied, the ways archaeology and cultural heritage affect people spiritually, economically, politically, socially, etc. Archaeology today is often as much a process of ensuring and actively creating open dialogue and collaborative engagements with communities as it is excavating and interpreting ancient objects. Collaboration and public accountability are especially central to archaeologists' responsibilities towards Indigenous, minority, and descendant communities. Watkins et al. (2000: 41) note:

> It should not be up to the people we study to ask us to consult with them. Rather, it should be a part of our everyday procedures and pre-research checklist to see to it that we approach those affected groups.

Responsibilities to Colleagues and the Discipline

> Archaeology is a profession, and the privilege of professional practice requires professional morality and professional responsibility, as well as professional competence, on the part of each practitioner. Register of Professional Archaeologists Code of Conduct (2012)

Like any profession, archaeology includes a diverse range of practitioners, as well as complicated issues relating to the definition of professional practice (Table 4). Today, there are recognized standards and behaviors related to being a professional archaeologist and working with colleagues. These include responsibilities to acknowledge the work of others (i.e., do not plagiarize); make findings and data accessible to colleagues in a timely manner (no data hoarding); study and comply with local, national, and international laws; ensure the safety and well-being of colleagues (especially students in field-research contexts); and be properly trained and informed. Part of proper training includes recognition of what resources are necessary to ethically complete an archaeological project (e.g., curation space). The dramatic increase in the number of archaeologists practicing in the private sector has led to new efforts to ensure these ethical obligations are met and to provide professional competency training and oversight.

Adding to the complexity of ethical responsibilities to colleagues and the discipline is the increased diversity of archaeological practitioners in the world today. Many archaeologists feel a

responsibility to make the discipline more diverse and to ensure there is no discrimination in hiring practices, work environments, or educational scholarships. Archaeology is performed on six continents by tens of thousands of people, each with personal value systems and visions of what archaeology's disciplinary foci and ethics should be. New cultural identities, ontologies, and epistemologies in the discipline add depth and complexity to ethical issues.

International Perspectives

> If archaeologists—of all people—can draw some lessons from the past, perhaps we can rediscover a more human side to our science and come to value once again the importance of face-to-face relationships with those whose ancestors we wish to study (Thomas 2000: 276).

Much of the archaeological literature on ethics is written by, or discusses examples from ethical issues including, North American archaeologists. These individuals are not inherently more ethical than archaeologists elsewhere in the world. Rather, as noted by Colwell-Chanthaphonh et al. (2008: 54–55): "Our ethically turbulent present is the result of a history of practice that often ignored – or mistreated – stakeholders, participated in colonial enterprises, and assumed control and ownership of cultural properties."

Ethical issues in American archaeology reflect those in global archaeological practice. Reviewing current news articles and statements of archaeological organizations shows the ubiquity of ethics. Archaeologists responding to looting of and damage to the Baghdad Museum and Iraqi archaeological sites during the recent Iraq War, trying to stop the destruction of the sixth-century Bamiyan Buddhas by the Taliban government of Afghanistan in 2001, testifying before governments to argue for stronger laws to protect and mitigate damage to archaeological sites, rushing to save archaeological sites to be submerged by the Three Gorges Dam in China, and writing letters to protest the sale of human remains and other archaeological objects on online auction websites are all examples of archaeologists enacting their perceived ethical responsibilities to the past and to the people.

Perhaps no ethical case study in American archaeology is more well known than that of Kennewick Man (or "the ancient one") and the related US legislation, the 1990 Native American Graves Protection and Repatriation Act (NAGPRA). Kennewick Man is the name given to a set of approximately 9,000-year-old human remains discovered in Kennewick, Washington, USA, in 1996 (for a detailed history, see Thomas 2000). The discovery of Kennewick Man led to a nearly decade-long legal battle involving many stakeholders, including a coalition of Native American tribes, archaeologists, anthropologists, government officials, local communities, and the general public. The battle centered over whom (if anyone) should have the right and obligation to control Kennewick Man and similar individuals and associated objects from the past. Kennewick Man also fomented extant divisions with American archaeology concerning ethical principles, especially accountability to affected publics and definitions of terms such as "artifact" and "stewardship." Kennewick Man currently resides in the University of Washington's Burke Museum of Natural History and Culture. For some, this result was seen as a victory; others stated that more was lost in the struggle to control Kennewick Man than could have ever been gained through scientific study. Both NAGPRA and Kennewick Man were signs of changing ethos, theories, and practices, among archaeologists, Indigenous communities, and the American public.

North American archaeology has changed dramatically since the passing of NAGPRA. While before, American archaeology was suffering from a myopic focus on stewardship and preservation of the "archaeological record" (an object-based epistemology), today, due to NAGPRA and cases like Kennewick Man, ethos in American archaeology are increasingly people-centered. Kennewick Man reminded archaeologists that many "archaeologies" exist in the world and that

the past has real impacts on people's lives in the present. Discussions concerning stakeholders and these impacts have led to many new principles and spirits in American archaeology, including collaboration, social justice, and reciprocity.

Naturally, there are many other ethical issues and debates about proper practices American archaeology. For example, in February 2012, three archaeological organizations based in the United States joined in writing letters to protest two new television shows ("Diggers" and "American Diggers") that showed excavation as treasure hunting and violated a long-standing archaeological ethic of non-commercialization by discussing the monetary values of excavated "finds." The organizations worried that the television shows would promote looting of archaeological sites, rather than instill an ethic of preservation and stewardship in the viewing public. The "Diggers" shows also reflect ongoing concern amidst American archaeologists for how accurately the media portray scientific archaeology and people of the past.

Future Directions

> The ability to sustain an ongoing process of critical reflection on difficult and ever-changing ethics issues is crucial to the future of archaeology as a profession (Lynott and Wylie 2000: 10).

New trends in archaeological ethics can already be seen by observing the practices of archaeologists in various global contexts. Collaboration with local communities is more frequent today than it has ever been in the past. At professional meetings in the United States, archaeologists often acknowledge the traditional Indigenous people of the land where the meeting takes place and offer warnings before human remains are displayed in presentations. Curators and directors of archaeological laboratories and museums are adapting to include nontraditional and Indigenous curation practices. Archaeological publications increasingly include statements of gratitude to local communities for their support and are beginning to be seen in open-source formats rather than traditional print journals. These are all small signs of what may come in archaeological ethics.

In the future, archaeological ethics is likely to be framed such that archaeologists practice in accordance to societal norms, such as honesty, fidelity, and respectfulness, to the best of their abilities, and to work towards both beneficence ("do good") and nonmaleficence ("do no harm"). In other words, archaeology, like all sciences, should benefit people in the world. The teleological goal of beneficence is likely already shared by all archaeologists. It can be seen in existing ethical norms requiring public reporting of data and interpretations and public outreach. Nonmaleficence is a goal not currently stated in many archaeological principles or ethical codes. Nonmaleficence can only be practiced when one understands the consequences of archaeological courses of actions on all those living today.

In deciding how beneficence and nonmaleficence are reached, archaeologists should recognize that scientific practices, cultural heritage, and ethics are all contextually dependent. Thus, to do good and prevent harm, archaeologists must be aware of the stakeholders affected by their work and recognize that aspects of cultural heritage (including tangible and intangible elements) are ends in themselves and not means to an archaeological end. Many objects and sites have agency – they are ancestors, or signs of ancestors, or they are a part of living people. Their meanings are not defined by archaeologists alone. Also, archaeologists should recognize that existing ethics such as the preservation of sites and objects may not be universally held. While preservation helps ensure future archaeological investigation and knowledge production, if ever people are in some way harmed by "archaeological" preservation methods, preservation would be found to be unethical. Perhaps, then, the focus of archaeological ethics should be an appreciation of an argument for the view that it is important and valuable to modern society to learn about (and from) the past, in all its versions, using any methods deemed appropriate by those involved (Zimmermann 2006).

Inevitably, there will be ongoing conflicts and disagreements over how "best" to practice archaeology in the future. As the quote above suggests, ethics is mutable and will change. Thus, ethical practice of archaeology requires ongoing

discussion, debate, and compromise among all those who participate in global archaeology.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage Management and Native Americans
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Field Method in Archaeology: Overview
- ▶ Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Sacred Site Conservation and Preservation
- ▶ Sacred Sites in Indigenous Archaeology

References

Champe, J.L., S.B. Douglas, E. Clifford, A.K. Guthe, W.H. Henry, B.J. Edward, W.M. Clement, O. Sigfus, I.Q. George, S. Watson, and W. Fred. 1961. Four statements for archaeology. *American Antiquity* 27 (2): 137–138.

Colwell-Chanthaphonh, C., J. Hollowell, and D. McGill. 2008. *Ethics in action: Case studies in archaeological dilemmas*. Washington, DC: Society for American Archaeology.

Gerstenblith, P. 2008. *Art, cultural heritage, and the law*. 2nd ed. Durham: Carolina Academic Press.

Harmon, D., F. McManamon, and D. Pitcaithley, eds. 2006. *The Antiquities Act: A century of American archaeology, historic preservation, and nature conservation*. Tucson: University of Arizona Press.

King, T. 2008. *Cultural resources law and practice*. Walnut Creek: AltaMira Press.

Lynott, M. 2003. The development of ethics in archaeology. In *Ethical issues in archaeology*, ed. L. Zimmerman, K. D. Vitelli, and J. Hollowell-Zimmer, 17–27. Walnut Creek: AltaMira Press.

Lynott, M., and A. Wylie, eds. 2000. *Ethics in American archaeology: Challenges for the 1990's*. 2nd ed. Washington, DC: Society for American Archaeology.

McGuire, R. 2003. Foreword. In *Ethical issues in archaeology*, ed. L. Zimmerman, K.D. Vitelli, and J. Hollowell-Zimmer, vii–ix. Walnut Creek: AltaMira Press.

Pyburn, K.A., and R. Wilk. 2000. Responsible archaeology is applied anthropology. In *Ethics in American archaeology*, ed. M. Lynott and A. Wylie, 78–83. Washington, DC: Society for American Archaeology.

Rachels, J. 1998. *Ethical theory*. Oxford: Oxford University Press.

Register of Professional Archaeologists. 2012. Register of Professional Archaeologists code of conduct. Available at: http://www.rpanet.org

Santayana, G. 1905. *Life of reason: Reason in common sense*. New York: Charles Scribner's Sons.

Scarre, C., and G. Scarre, eds. 2006. *The ethics of archaeology: Philosophical perspectives on archaeological practice*. Cambridge: Cambridge University Press.

Thomas, D.H. 2000. *Skull wars: Kennewick Man, archaeology, and the battle for Native American identity*. New York: Basic Books.

Trigger, B. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.

Vitelli, K.D., and C. Colwell-Chanthaphonh, eds. 2006. *Archaeological ethics*. 2nd ed. Walnut Creek: AltaMira Press.

Watkins, J., L. Goldstein, K.D. Vitelli, and L. Jenkins. 2000. Accountability: Responsibilities of archaeologists to other interest groups. In *Ethics in American archaeology*, ed. M. Lynott and A. Wylie, 40–44. Washington, DC: Society for American Archaeology.

World Archaeological Congress. n.d. World Archaeological Congress code of ethics. Available at: http://www.worldarchaeologicalcongress.org

Wylie, A. 1997. Contextualizing ethics: Comments on ethics in Canadian archaeology by Robert Rosenswig. *Canadian Journal of Archaeology* 21 (2): 115–120.

Wylie, A. 2003. On ethics. In *Ethical issues in archaeology*, ed. L. Zimmerman, K.D. Vitelli, and J. Hollowell-Zimmer, 3–16. Walnut Creek: AltaMira Press.

Zimmerman, L., K.D. Vitelli, and J. Hollowell-Zimmer, eds. 2003. *Ethical issues in archaeology*. Walnut Creek: AltaMira Press.

Zimmermann, L. 2006. Sharing control of the past. In *Archaeological ethics*, ed. K.D. Vitelli and C. Colwell-Chanthaphonh, 2nd ed., 170–175. Walnut Creek: AltaMira Press.

Further Reading

Brodie, N.M., M. Kersel, C. Luke, and K.W. Tubb, eds. 2006. *Archaeology, cultural heritage, and the antiquities trade*. Gainesville: University Press of Florida.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2007. *Collaboration in archaeological practice: Engaging descendant communities*. Lanham: AltaMira Press.

Dongoske, K., M. Aldenderfer, and K. Doehner, eds. 2000. *Working together: Native Americans and archaeologists*. Washington, DC: Society for American Archaeology.

Fluehr-Lobban, C., ed. 2003. *Ethics and the profession of anthropology: Dialogue for ethically conscious practice*. Walnut Creek: AltaMira Press.

Little, B., ed. 2002. *Public benefits of archaeology*. Gainesville: University Press of Florida.

Meskell, L., and P. Pels, eds. 2005. *Embedding ethics: Shifting boundaries of the anthropological profession*. Oxford: Berg.
Silliman, S., ed. 2008. *Collaborating at the trowel's edge: Teaching and learning in indigenous archaeology*. Tucson: University of Arizona Press.

Ethics of Collecting Cultural Heritage

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Introduction

Perspectives on rights and responsibilities related to studying, collecting, and owning cultural artifacts, or objects of cultural heritage, are at the heart of many debates among scholars, collectors, descendant communities, institutions, and governments. The loss of cultural heritage due to looting, war, development, and other destructive forces has led to a body of laws, international conventions, and other protective measures, particularly since the mid-twentieth century, and has helped shape the codes of ethics that inform how archaeologists, museum professionals, and heritage managers do their work (Lynott 2003).

Definition

Cultural objects from the past are variously referred to as "antiquities," "cultural property," "cultural resources," and "cultural heritage," with usage changing over time and often weighted with political and social subtext. These terms reflect different understandings of ownership, value, and meaning. They suggest whether we think first of preservation or ownership, culture or aesthetics, science or humanism. These concepts, and their relationship to archaeology and the ethics of collecting artifacts representing past times and – usually – the "other," are discussed by many scholars, including Vitelli (1996), Messenger (1999), Hoffman (2006), and Robson et al. (2006).

The term "antiquities" refers to objects or relics dating from ancient times, originally thought of as preceding the Middle Ages. These were generally the things that antiquarians studied, collected, and dealt in. Over time, the terms for both the objects and the people who study them have become more nuanced as specialized fields of study, including archaeology and art history, have developed.

The term "cultural property," widely used in legal and political discussions, is generally considered to include objects of an archaeological, ethnological, and artistic nature, with cultural or historical significance. Use of the term "property" suggests a Western perspective that ownership can be established, either as favoring a particular "source" nation, such as Mexico, Peru, or Cambodia, or the entity best suited to conserve an object for humanity, often – at least until recently – a "market" nation, such as the United States, the United Kingdom, or Japan. This is often referred to as the cultural nationalism versus the cultural internationalism argument. Numerous authors, including Merryman (2005), Carducci (2006), Gerstenblith (2007), Bauer (2010), and Forrest (2010), present legal perspectives on the debate, including discussions of the interplay between national and international laws. Carman (2005) and Renfrew (2000), among others, discuss the intersection of value, ownership, property, and archaeological categories.

The term "cultural resources" has been used commonly since the 1970s, especially in the United States, in the context of the management of archaeological sites. The field of cultural resource management, or CRM, grew out of the specialized practices developed to comply with national laws designed to protect archaeological and historic sites. The term "cultural heritage," introduced in the 1972 UNESCO World Heritage Convention, has gained favor as a broader and more inclusive term that seeks to avoid connotations of exploitation and extraction, as discussed by Burke & Smith (2010). This term is also used increasingly in the texts of international conventions and agreements. The more neutral term, "cultural objects," has also been used to emphasize the ability of objects to be physically possessed, moved, and returned, as discussed by Vrdoljak (2006: 7–8).

The way we identify the trail of possession of an object is also weighted with meaning. The art world typically uses the term "provenance" to document the authenticity and ownership chain of a work of art from the point of creation or discovery to acquisition by a museum or collector, whereas archaeologists use the term and its variant, "provenience," to emphasize the object's original context, which is an essential component of the archaeological record. Robson et al. (2006) discuss this issue from multiple perspectives.

When we consider the "ethics" of collecting, we think in terms of a set of moral principles or values that guide our actions. Wylie (2003) describes the ideas and processes underlying the development of ethical standards, in contrast to legal standards. An ethic articulates a set of ideas that allow us to judge existing practices, usually to even tighter standards than a law might do. Because ethical principles and codes of ethics are based on ethical intuitions and moral judgments, Wylie argues they must be seen as works in progress that involve active, ongoing reflective debate.

Historical Background

History of Collecting and the Development of Laws

Objects that are made or used by a particular cultural group become part of a collection when someone – often from a different cultural group – makes subjective choices about acquiring and sorting them and gives them value and meaning beyond their original intention. Thomason (2005) discusses the theoretical underpinnings and definitions of collecting, which she places at the intersection of archaeology and material culture studies. The human impulse to collect objects from other cultures, and even to exhibit them in a sort of museum, goes as far back as ancient Mesopotamia, some five millennia ago, she argues. Other cultures, from the Greeks to the Aztecs, also left evidence of their fascination with past cultures in their own caches and collections of venerated objects from the ancestors.

Hoffman suggests that Western origins of the idea of art and cultural heritage preservation as a matter of public concern can be traced back at least to late-eighteenth-century France when the revolutionary government wrestled over whether to destroy all traces of Latin inscriptions on monuments and other "tainted art" (Hoffman 2006: 1). Asked to create the argument for preservation, Abbe Gregoire identified the existence of a "national patrimony" that was represented in part by artifacts and monuments of antiquity as examples of the genius and talents of their creators. With this focus more on the creators than on the patrons of the time, he argued that these works should be preserved – not destroyed or sold abroad. Hoffman brings this argument that "culture matters" to the concept of "common interests" that are widely shared globally.

Many countries have developed laws protecting their national heritage. In the United States, the 1906 Antiquities Act was the first federal policy to preserve historic and prehistoric sites on federal lands. Soderland (2010) provides an overview of the first century of US laws to protect archaeological and historic sites, including the 1966 National Historic Preservation Act, the Archaeological Resources Protection Act of 1979, and the 1990 Native American Graves Protection and Repatriation Act (see also Messenger 1999; Zimmerman et al. 2003). US regulations also address international cultural resources, such as the National Stolen Property Act, and regulations on smuggling or transporting stolen goods into the country, all of which have been used to prosecute cases involving movable archaeological materials. Other countries have similar sets of laws and regulations that have grown out of particular political, cultural, and intellectual traditions, as discussed by Brodie et al. (2001), Hoffman (2006), and Messenger and Smith (2010).

During the nineteenth and early twentieth centuries, museums became the repositories of the ancient objects that represented earlier human achievement, both utilitarian and artistic, as discussed by Vrdoljak (2006: 47–72) and Roberts (2006). Early archaeologists, probably as much the antiquarian and collector as anyone else, pored over glass cases of objects seeking to

develop typologies that would show the gradual and systematic development of human civilization. From the 1930s to 1960s, archaeology was in transition from a largely amateur pastime, in which famous archaeologists such as Graham Clark found themselves drawn to the archaeological study of the past as "passionate connoisseurs" of objects, into a highly specialized scientific discipline (Fagan 2001: 1). The first two-thirds of the twentieth century saw major expeditions and excavations of sites by universities and museums, often with the backing of wealthy donors, in such places as Angkor Wat, the Maya lowlands, and Machu Picchu. There was a strong emphasis on building the collections of major museums as repositories of world heritage, as discussed by Forrest (2010) and others.

After World War II, as the field of archaeology developed into a scientific discipline, the emphasis shifted away from expeditionary artifact collecting to the systematic study of sites and contexts. With a myriad of interdisciplinary research strategies at hand, archaeologists increasingly realized the promise of using the archaeological record to reconstruct the story of the past – learning about diet, climate, trade, migrations, and much more, through residues in pots; soils in the matrix around artifacts; the context of objects and buildings, in particular, landscapes; and chemical analysis of bones and teeth, in addition to the systematic analysis of artistic styles and inscriptions. Being able to carry out archaeological research in a given country depended on a complex network of governmental permits and support from universities and foundations as well as the ability to prove competency through research reports and publications in an increasingly professionalized field.

As this potential for expanded scientific analysis grew, the levels of site destruction, looting, and the international trade in antiquities were reaching crisis proportions around the world, despite the existence of many national laws designed to protect sites and artifacts. The damage to cultural heritage as a result of looting is discussed by Elia (1996) and Brodie et al. (2001).

The emergence of UNESCO in the 1950s as a forum for international cooperation through its social and cultural programs provided new opportunities for addressing these concerns, according to Long and Labadi (2010), especially through the five conventions focused on protecting world heritage. The 1954 Hague Convention established recognition of the universal importance of cultural heritage (Forrest 2010: 406). The 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property established a protocol for international cooperation to address this crisis. As individual nations ratified the 1970 convention, they could request assistance from other States Parties. The United States ratified the convention in 1983 with the US Convention on Cultural Property Implementation Act, which provides mechanisms for bilateral agreements to restrict the import of endangered cultural materials from other countries. With the subsequent ratification by other countries considered to be major destinations for international art and objects of cultural heritage, the 1970 UNESCO Convention now has considerably more potential to be effective. Other conventions, laws, and agreements have been developed to further clarify and strengthen the legal protections available, as discussed by Robson et al. (2006) and others. The 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage established the World Heritage List, along with the protocols and procedures for selecting, preserving, and protecting cultural and natural sites considered to have outstanding universal value. It is one of the most widely accepted conventions with 186 States Parties supporting it, in part for the opportunity to promote nationalist agendas at sites designated as World Heritage Sites. By 2011, there were more than 900 sites on the list, with many more nominations being developed at the regional and national levels. The concept of a shared world heritage that led to the World Heritage List and that is at the core of the argument for universal museums is critiqued by Scarre and Scarre (2006), Labadi and Long (2010), and Forrest (2010).

The UNESCO cultural heritage conventions are important within their spheres of influence, yet are limited by uneven acceptance by

individual States Parties and by differing interpretations and enforcement of their norms. Nevertheless, as Forrest concludes (2010: 422–423), their emphasis on education and international cooperation has made significant contributions to the protection of cultural heritage through development of international laws and the increased diffusion of knowledge about our shared world heritage.

Codes of Ethics

It is not surprising that codes of professional ethics for archaeologists have undergone significant revisions and updates in order to address issues related to the ethics of collecting, including stewardship of cultural heritage, the commercialization of objects, the need for more extensive communication, and closer scrutiny of ethical issues in research and publication, including guidelines regarding the use of unprovenienced objects. Archaeology as a profession needed a new set of normative principles that clearly laid out what archaeologists' responsibilities should be to the archaeological record, to diverse publics, and to colleagues, employees, and students, as discussed by Lynott and Wylie (2000) and Zimmerman et al. (2003: xiii-xvi). Examples of codes of ethics revised in the 1990s and early 2000s as the result of long consultative processes can be found on the websites of the Society for American Archaeology, the Archaeological Institute of America, and the European Archaeological Society, among others. And as Wylie has discussed, they will continue to evolve as professional practices related to objects of heritage change and mature.

Current Debates and Future Directions

While laws and conventions provide legal frameworks for protection and ownership of objects, the ethical debates continue, addressing issues related to multiple stakeholders, including indigenous and descendant communities, the use and treatment of objects and control over them, repatriation of human remains and sacred objects, changing authority over objects in museums and collections, and economic issues ranging from subsistence digging to curation to valuation of cultural objects. Professional archaeologists continue to debate ethical issues related to the use of undocumented and unprovenienced objects in their research, and museum curators wrestle with making ethical choices related to acquisitions and possible restitution of objects to their country or culture of origin.

Professional organizations and international bodies are working to find new models to address ethical issues beyond the scope of laws. The International Council of Museums (ICOM), for example, in its 2007 general assembly passed resolutions, including Resolution No. 4, "Preventing Illicit Traffic and Promoting the Physical Return, Repatriation and Restitution of Cultural Property." This resolution urged all countries to make the fight against the increasing illicit traffic of cultural and natural resources a priority. The International Council on Monuments and Sites (ICOMOS), one of three nongovernmental organizations that serve as advisors for the UNESCO conventions, plays an ongoing role in monitoring sites on the World Heritage List and reviewing requests for assistance among States Parties to the conventions. ICOMOS also promotes discussions of emerging issues, such as the protection of intangible heritage in addition to tangible heritage.

Another perspective on the seemingly unresolvable differences related to collecting and owning objects of cultural heritage came from C. Brian Rose, president of the Archaeological Institute of America, in a 2007 letter published in *Archaeology Magazine*. Acknowledging the different perspectives that many in the museum community have from many archaeologists relative to the purchase or analysis of undocumented artifacts, he called for finding, if not a common course of action, then consensus on programs aimed at preventing the plundering of artifacts and their illegal removal from the countries of origin.

Perhaps collaborative work on such programs might lead to an ethical standard that all could agree on.

Cross-References

- ▶ Cambodia: Cultural Heritage Management
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Ethics in Archaeology
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ International Conventions Pertaining to Heritage Policy: Introduction
- ▶ United States: Cultural Heritage Management
- ▶ Vandalism and Looting (Ethics)

References

Bauer, A.A. 2010. Cultural property: Internationalism, ethics & law. In *Handbook of postcolonial archaeology*, ed. J. Lydon and U.Z. Rizvi, 285–294. Walnut Creek: Left Coast Press.

Brodie, N., J. Doole, and C. Renfrew, eds. 2001. *Trade in illicit antiquities: The destruction of the world's archaeological heritage*. Cambridge: Oxbow Books.

Burke, H., and C. Smith. 2010. Vestiges of colonialism: Manifestations of the culture/nature divide in Australian heritage management. In *Cultural heritage management: A global perspective*, ed. P.M. Messenger and G.S. Smith, 21–37. Gainesville: University Press of Florida.

Carducci, G. 2006. The growing complexity of international art law: conflict of laws, uniform law, mandatory rules, UNSC resolutions and EU regulations. In *Art and cultural heritage: Law, policy and practice*, ed. B.T. Hoffman, 68–85. Cambridge: Cambridge University Press.

Carman, J. 2005. *Against cultural property: Archaeology, heritage and ownership*. London: Duckworth.

Elia, R. 1996. A seductive and troubling work. In *Archaeological ethics*, ed. K.D. Vitelli, 54–62. Walnut Creek: AltaMira Press.

Fagan, B. 2001. *Grahame Clark: An intellectual biography of an archaeologist*. Cambridge: Westview Press.

Forrest, C.J.S. 2010. *International law and the protection of cultural heritage*. New York: Routledge.

Gerstenblith, P. 2007. Controlling the international market in antiquities: Reducing the harm, preserving the past. *Chicago Journal of International Law* 8: 1.

Hoffman, B.T., ed. 2006. *Art and cultural heritage: Law, policy and practice*. Cambridge: Cambridge University Press.

Labadi, S., and C. Long, eds. 2010. *Heritage and globalization*. London: Routledge.

Long, C., and S. Labadi. 2010. Introduction. In *Heritage and globalization*, ed. S. Labadi and C. Long, 1–16. London: Routledge.

Lynott, M.J. 2003. The development of ethics in archaeology. In *Ethical issues in archaeology*, ed. L.J. Zimmerman, K.D. Vitelli, and J. Hollowell-Zimmer, 17–27. Walnut Creek: AltaMira Press.

Lynott, M.J., and A. Wylie, eds. 2000. *Ethics in American archaeology*. 2nd rev ed. Washington, DC: Society for American Archaeology.

Merryman, J.H. 2005. Cultural property internationalism. *International Journal of Cultural Property* 12 (11): 23.

Messenger, P.M., ed. 1999. *The ethics of collecting cultural property: Whose culture? Whose property?* 2nd ed. Albuquerque: University of New Mexico Press.

Messenger, P.M., and G.S. Smith, eds. 2010. *Cultural heritage management: A global perspective*. Gainesville: University Press of Florida.

Renfrew, C. 2000. *Loot, legitimacy and ownership*. London: Duckworth.

Roberts, P. 2006. Barriers or bridges? Museums and acquisitions in the light of new legal and voluntary codes. In *Who owns objects? The ethics and politics of collecting cultural artefacts*, ed. E. Robson, L. Treadwell, and C. Gosden, 47–60. Oxford: Oxbow Books.

Robson, E., L. Treadwell, and C. Gosden, eds. 2006. *Who owns objects? The ethics and politics of collecting cultural artefacts*. Oxford: Oxbow Books.

Rose, C.B. 2007. From the president: Common ground. *Archaeology Magazine* 60: 5.

Scarre, C., and G. Scarre, eds. 2006. *The ethics of archaeology: Philosophical perspectives on archaeological practice*. New York: Cambridge University Press.

Soderland, H.A. 2010. Values and the evolving concept of heritage: The first century of archaeology and law in the United States (1906–2006). In *Heritage values in contemporary society*, ed. G.S. Smith, P.M. Messenger, and H.A. Soderland, 129–143. Walnut Creek: Left Coast Press.

Thomason, A.K. 2005. *Luxury and legitimization: Royal collecting in ancient Mesopotamia*. Burlington: Ashgate Publishing.

Vitelli, K.D., ed. 1996. *Archaeological ethics*. Walnut Creek: AltaMira Press.

Vrdoljak, A.F. 2006. *International law, museums and the return of cultural objects*. Cambridge: Cambridge University Press.

Wylie, A. 2003. On ethics. In *Ethical issues in archaeology*, ed. L.J. Zimmerman, K.D. Vitelli, and J. Hollowell-Zimmer, 3–16. Walnut Creek: AltaMira Press.

Zimmerman, L.J., K.D. Vitelli, and J. Hollowell-Zimmer, eds. 2003. *Ethical issues in archaeology*. Walnut Creek: AltaMira Press.

Further Reading

Archaeology Magazine for discussions of recent court cases and examples of restitution of cultural objects.

Codes of ethics on websites of professional archaeological organizations (including Society for American Archaeology, Archaeological Institute of America), and

international organizations, such as the International Council of Museums (ICOM) and the International Council on Monuments and Sites (ICOMOS).
International Journal of Cultural Property
Journal of Field Archaeology
Publication series, including Duckworth Debates in Archaeology; Perspectives on Collecting, Ashgate Publishing Co.; Key Issues in Cultural Heritage, Routledge; Research in Museum Studies, Routledge; One World Archaeology Series; World Archaeological Congress Research Handbooks in Archaeology.
Websites for UNESCO conventions on cultural property, tangible and intangible heritage.
Website of U.S. Department of State Cultural Property Advisory Committee and corresponding governmental agencies of other countries.
Writings of foundational leaders in the field, including Henry Cleere, Clemency Coggins, David Lowenthal, Patrick O'Keefe, Lyndel Prott, Colin Renfrew.

Ethics of Commercial Archaeology: Australia

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Introduction

Having recently returned to full-time employment in commercial archaeology after a period of 7 years in academia, the ethics of commercial archaeology is a subject at the forefront of my mind. A lot has been written about the ethical issues involved in indigenous heritage especially the scenario where non-indigenous practitioners and regulators are making decisions regarding the heritage of indigenous people (e.g., Langford 1983; Byrne 1993, 1996; Smith 2004). The ethical dilemmas are obvious in that context; however, while this entry touches on this area, it focusses more broadly on a range of ethical issues including those relevant to the often less-critiqued area of non-indigenous heritage also referred to as historical heritage or the heritage of settler societies. In such fields the archaeologist is often of the same cultural (or a derivative) background as the people who created the heritage. They therefore have a privileged role in studying the cultural remains as insiders, but to some extent since archaeologists are dealing with the heritage of past societies, are we not always at a fundamental level "outsiders"? This entry adopts a consciously provocative stance in highlighting many of the issues that face those working in commercial archaeology in Australia; while doing this I acknowledge that there are archaeologists in Australia who are conscious of many if not all of the issues raised and who attempt to address these in their daily practice, and I also acknowledge that we are all to a greater or lesser extent constrained by the economic and regulatory framework in which the industry operates.

Definition

Commercial archaeology is not a term widely used in the Australian context. It is used here to encompass all areas of archaeology with a commercial basis. By extension this includes the consultant archaeologists, the archaeologists employed by the regulating government authorities whose work is now in most states largely to service the development driven consulting field, and those archaeologists employed directly by companies, agencies, and government corporations that have a development focus. I have further extended it to include the parts of the academy that are increasingly constraining their academic offerings to those which are commercially popular and defining their degree content to provide fodder for the consulting industry.

Key Issues/Current Debates/Future Directions/Examples

In Australia the ethical dilemmas for commercial archaeologists have been discussed since the emergence of the consulting field in the early 1980s (Smith 2004). However, the industry itself, largely via the Australian Association of Consulting Archaeologists Inc., has been from the start

highly self-reflective with debates about ethics and standards, especially throughout the 1980s and 1990s through an active program of lively debates at occasional meetings and a regular newsletter. However, the late 1990s and the first decade of the 2000s have seen a rapid increase in the number of archaeologists in Australia largely linked to the development boom. Most of these have not joined the professional association established specifically for consulting archaeologists and while there are other relevant associations such as the International Council for Monuments and Sites (Australia ICOMOS), the Australian Archaeological Association (AAA), most have not joined these either. Where then are these practitioners finding the mental space to appraise their practice let alone opportunities to engage in the big ethical debates?

In the Australian context the big ethical debates have been largely sidelined in favor of recipe-driven methodologies and business-like expediency. This is generally true throughout Australia despite the variation in heritage legislation across the states. Several questions need to be constantly addressed by archaeologists working in the commercial area. The first big ethical question is still: *What's it all about Alfie*? (Bacharach and Hal 1965). What is the purpose of archaeology in Australia? Are we here to attempt to answer (or contribute to answering) the big questions about our past, and the settlement of the continent, or is our purpose to collect data and compile large collections of gray literature reports about places that we have helped destroy? This leads to the second big question for archaeologists in Australia: *Do we ever save anything anymore*? Around 85% of all the places that are excavated and recorded by commercial archaeologists are subsequently destroyed, the destruction sanctioned by the very government agencies charged with the protection of heritage in each state. While this then means that around 15% are "saved," it is not necessarily clear that these are the most significant sites rather than just the ones that the developer did not need to destroy. Perhaps archaeology graduates spill out of the academic floodgates understanding that their rightful place is as a cog in the wheel of the planning and development process, but for some of us this is a question that weighs heavily on our minds. The third big question has existed in Australia since the emergence of the discipline and is not restricted to the area of commercial archaeology: *How is the information that we generate used*, *by whom is it used*, *and to what end*? This has long been a concern of Aboriginal Australians and advocates who have argued that Aboriginal people need to retain control over archaeological information relating to their past (Langford 1983; Byrne 1996). However, it is increasingly obvious that it is not only Aboriginal Australians whose history is at risk of manipulation (Ireland 2003). Whoever controls information can "construct" the past of their choosing. The idea in Australia of a government-sanctioned past has in recent years gained notoriety with the Australian "History Wars" reported widely in the media. Combatants in these wars have included past Prime Ministers Howard and Keating and a range of historians and prominent public figures.

Backpacker Archaeology

Over the past decade a subfield of archaeologist has emerged in Australia consisting of archaeologically trained personnel who refer to themselves as "diggers." In the past working on other people's large excavations was something one did partially for the experience of working on a large site but also to gain experience with the idea that one might one day be responsible for such an excavation. However, now there are large pools of people who eschew the responsibility of running any archaeological projects and move from dig to dig like itinerant fruit pickers. This seems to have developed from European models especially the United Kingdom and Ireland, from where some archaeologists emigrated when the development boom began to slow there. Of course in itself this is not necessarily an ethical problem, but it does give rise to several questions of ethics that need further thought. What responsibility do individual archaeologists bear for the conservation of heritage places in this scenario? And what mechanisms are in place to ensure that we are not all unconsciously working to maintain an industry that serves no higher purpose for society. Is there

a shared "archaeological ethic" across this archaeological workforce? Perhaps employers and those who control permits should make membership of one or more of the major associations mandatory to ensure that archaeologists commit to a relevant code of ethics.

The idea of pool of archaeological "diggers" is made plausible by the belief that archaeology can be reduced to a technical science model (see the discussion below regarding processual archaeology). The ultimate extension of this is the abandonment of the requirement for university degrees and the development of technical short-course qualifications. Unfortunately, this would mean that the complex research questions and philosophical frameworks that archaeological research can contribute to would ultimately be ignored.

A Fourth "Voice": The Voice for Archaeological/Heritage Places

An archaeologist working in the commercial archaeology field can often find themselves adopting a stance (or being accused of doing so) that aligns them with one or other of the sides of the development and heritage triangle, i.e., the developer or the regulator and – in case of indigenous heritage – the Aboriginal community. In 1985, Isabel McBryde edited a collection of papers under the title, *Who Owns the Past*? 27 years later a Google search of that term reveals that this question is still being asked of archaeologists and by them. In regard to Australian Aboriginal archaeological sites, it is a question that has often been answered by acknowledging that Aboriginal people should own and control the relics of their past. In the case of our more recent colonial past, where the question is asked at all, the assumption is often that the heritage agencies represent the interests of the community and therefore can legitimately speak for these sites. In reality where they have the opportunity to express opinion this is often contested by local communities or interest groups.

I fear we have taken an easy road. Who speaks for the dead and their legacy to our society? Surely archaeologist should represent a fourth "voice" and speak for the relic, the site, and the legacy. This is not necessarily to say that this voice would have any primacy over the others, and certainly it should not be equated with some outdated notion of antiquarian ownership, but it should be voice that is projected loud and clear and a voice for research and conservation. It is the voice that is largely silent in Australian archaeology subjugated beneath the weight of economic rationalism and ultraconservatism. As resources are progressively withdrawn from heritage agencies and fewer staff are retained to struggle with large regulation-based workloads, there is little time and few opportunities for staff archaeologists to sit back and think about different approaches. It is therefore especially important that all archaeologists involved in commercial archaeology resist and challenge the new orthodoxy – the guidelines, standards, and proformas that are developed to improve archaeological outcomes across a broad range of circumstances but over time often stagnate and stifle creative new methodologies and options for research and conservation. It is essential that this resistance and challenge is a positive process and that it generates new, improved solutions, ideas, and outcomes.

The Stagnation of Community-Based Approaches

In 1996 Greer developed the concept of community-based archaeology. Over the next decade Australia became something of a leader in this area (Marshall 2002), but we now have to ask ourselves, has the application of this approach stagnated into a recipe of public open days on excavations and the routine production of brochures and websites? Edwards-Ingram (1997: 27), although speaking in the US context, comments on the public's misunderstanding of what archaeologists do but nevertheless describes the relationship between archaeologists and the public as "interactive and increasingly reflexive." Fifteen years on, archaeologists in Australia as elsewhere are still complaining that the public does not understand them, laying the blame at the feet of romantic sensational portrayals of archaeologists via Hollywood figures such as Indiana Jones. If the discipline had embraced the community-based approach, then the "community" would be a partner in the archaeological

enterprise. As recently as 2002 (Greer et al.) I, along with colleagues, espoused a positive view of the future of community-based approaches, although we carefully differentiated such approaches from "consent-based" community involvement in archaeology. Today, however, little progress in this area is evident.

The Dominance of Processual Theory and Practice in Commercial Archaeology

The ethical dilemmas inherent in the unthinking adoption of a processual archaeological framework are myriad (see Smith 2004). Firstly, the adoption of the processual approach would not in itself be problematic if archaeologists at least understood that this was what they were doing and were aware that other theoretical frameworks exist which merited consideration. However, most practitioners cannot even articulate this theory (or any alternative theoretical framework). The blame for this I lay squarely at the feet of our academic institutions and their conscious or unconscious alignment with commercial archaeology which has led many of them down the path of feeding the current system.

The dominance of this theory which embraces positivist logic and an unthinking adoption of scientific (like) methods has led to some alarming decrees. For example, NSW Requirement 16 of the Archaeological "Code of Practice" developed by the Office of Environment and Heritage (DECCW 2012) specifies the use of 50 × 50 cm squares for test pits for all Aboriginal heritage test excavations. Further, it specifies that these have to be placed on a systematic grid across the landscape or site and that any test excavation point must be separated from another by at least 5 m. No explanation is provided as to how this promotes a good outcome for the archaeological site or why it has merit over other testing methodologies. Many years ago Mulvaney (1981: 25) cited the even older source (Collingwood 1944: 85) as an illustration that "the problem of research design is not a new one," and he went on to say that "It is encouraging that problems have been recognized so early in the development of public archaeology in our region" (p. 26). The issue of research design in commercial archaeology remains problematic with regulatory control ranging between Australian states from absolutely no control to overly restrictive limitations that obstruct scholarly practice.

The Role of Universities

In the past the academe has been one of the places where the philosophy and history of the discipline have been reflected on and discussed. In the past two decades, it has developed into another branch of commercial archaeology, one where students are increasingly seen as consumers (Colley 2005) or customers that need to be "satisfied." This is response to increasing pressure on departments to attract more students to maintain basic funding levels as well as demonstrating direct connectivity between courses offered and post-university employment. One of the outcomes of this is that one can no longer assume that critical scholarship within the academe will generate the theoretical and philosophical debates that can inform the development of an ethical industry. Some would argue that the concept of the academe as a place where ideas can be developed, debated, and challenged is outdated and has been replaced by "Edutainment" where students determine what they want and can buy it off the shelf. The ethical issues embedded in a higher education system that focusses on the commercial and devalues the humanities and social sciences are a major discussion outside the scope of this entry.

Most archaeologists working in Australia today are "commercial" archaeologists in the sense that their work, opportunities, and funding area are somehow dependent on a paying clientele and subject to market forces. This is true of archaeologists working in consulting companies, heritage agencies, corporations, and those teaching in universities. Archaeologists with full-time research positions are increasingly rare. To date the development of commercial archaeology sector in Australia has not resolved any of the major ethical dilemmas that it faced at its inception. To some extent resolving them may not be as important as the practicing of reflection, recognition, and debate through which we try to resolve them – a disciplinary state of "mindfulness" (cf. the Buddhist principle). The question is do we still have an environment in Australia that is conducive to such reflective practice?

Cross-References

- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethics of Commercial Archaeology: Brazil
- ▶ Ethics of Commercial Archaeology: Japan
- ▶ Ethics of Commercial Archaeology: Nigeria
- ▶ Ethics of Commercial Archaeology: Southern Africa
- ▶ Ethics of Commercial Archaeology: USA

References

Bacharach, B., and D. Hal. 1965. *What's it all about Alfie?* Song lyrics © Sony/ATV Music Publishing LLC, Universal Music Publishing Group.

Byrne, D. 1993. *The past of others: Archaeological heritage management in Thailand and Australia*. Unpublished Ph.D. dissertation, Australian National University.

Byrne, D. 1996. Deep nation: Australia's acquisition of an Indigenous past. *Aboriginal History* 20: 82–107.

Colley, S. 2005. 'Consumer choice' and public archaeology in and beyond the academy. *Australian Archaeology* 61: 56–63.

Collingwood, R.G. 1944. *An autobiography*. Harmondsworth: Penguin.

Department of Environment Climate Change and Water. 2012. Code of practice for archaeological investigation of Aboriginal objects in NSW under part 6 NPW Act, 1974. DECCW NSW Sydney.

Edwards Ingram, Y. 1997. "True acts of inclusion": The 'here' and 'out there' concepts in public archaeology. *Historical Archaeology* 31 (3): 27–35.

Greer, S. 1996. *The accidental heritage: Archaeology and identity in Northern Cape York*. Unpublished Ph.D. dissertation, Department of Anthropology and Archaeology, James Cook University, Townsville.

Greer, S., R. Harrison, and S. McIntyre-Tamwoy. 2002. Community-based archaeology in Australia. *World Archaeology* 34 (2): 265–287.

Ireland, T. 2003. The absence of ghosts: Landscape and identity in the archaeology of Australia's settler culture. *Historical Archaeology* 37 (1): 56–72.

Langford, R. 1983. Our heritage – Your playground. *Australian Archaeology* 16: 1–6.

Marshall, Y., ed. 2002. What is community archaeology? *World Archaeology* 34 (2): 211–219.

McBryde, I. 1985. *Who owns the past? Papers from the annual symposium of the Australian Academy of the Humanities*. Melbourne/New York: Oxford University Press.

Mulvaney, D.J. 1981. What future for our past archaeology and society in the eighties. *Australian Archaeology* 13: 16–27.

Smith, L. 2004. *Archaeological theory and the politics of cultural heritage*. Oxfordshire/New York: Routledge.

Further Reading

Harrison, R., and C. Williamson. 2004. *After Captain Cook: The archaeology of the recent indigenous past in Australia*. Walnut Creek: Altimira Press.

Smith, L. 2000. Doing archaeology: Cultural heritage management and its role in identifying the link between archaeological practice and theory. *International Journal of Heritage Studies* 6 (4): 309–316.

Torrence, R., and A. Clarke. 2000. Negotiating difference: Practice makes theory for contemporary archaeology in Oceania. In *The archaeology of difference: Negotiating cross-cultural engagements in Oceania*, ed. R. Torrence and A. Clarke, 1–31. London: Routledge.

Ethics of Commercial Archaeology: Brazil

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Introduction

There are two distinct speeches in Brazilian archaeology, an official discourse and an unofficial discourse. In the official discourse, spoken at conferences, in publications, and in classrooms, everything is fine. There are jobs for everyone, archaeological work is being performed, and cultural heritage is protected. Unofficial discourse, comprised of informal conversations that take place in the corridors of Congress, outside the classroom, during the fieldwork, says just the opposite, i.e., that chaos is installed in Brazilian archaeology. The chaos in this case has a name, Contract Archaeology or Commercial Archaeology.

As happened in many other countries, the growth of commercial archaeology in Brazil also resulted in a change in archaeological practice; the difference is that in the Brazilian case, the change was radical. The numbers are impressive. It is estimated that commercial archaeology in Brazil represents about 90% of all archaeology practiced in the country, handling more than 70 million dollars per year and using more than 3,000

professionals, directly or indirectly (Zanettini 2009). We talk about continental numbers in a continental country. To understand the gravity of the problem of commercial archaeology in Brazil. Just think that while about 30 permits for archaeological research were issued per year in the 1990s, in 2011, more than 900 permits for archaeological research were granted. And the numbers tend to increase, especially with the works associated with the Economic Acceleration Plan of the Federal Government, with the World Cup in 2014, and with the 2016 Olympics.

But despite all this growth, most archaeologists in Brazil have given little attention to discussions of the ethics associated with archaeological practice. To understand this apparent disinterest, we first need to understand that what motivated this significant increase in archaeological research was not an awareness of the importance of archaeological heritage, but changes in environmental legislation, which since the late 1980s have forced entrepreneurs to license works that will potentially modify the environment. In a country like Brazil that is in the process of economic growth, with infrastructure works scattered throughout the national territory, forcing entrepreneurs to conduct archaeological licensing so that they might obtain authorization for the installation and operation of projects resulted in an explosion in the amount of archaeological work. Was Brazilian archaeology prepared for this radical change? The answer is no, it was not. The problem is that the change in environmental legislation that forces developers to perform archaeological licensing was done without serious consideration of three basic aspects: regulation of the profession of archaeologist; minimum criteria required for each stage of licensing archaeological work; and infrastructure of government agencies to oversee the archaeological work and law enforcement.

Key Issues and Current Debates

A detailed analysis of the structure of Brazilian archaeology shows us that the government agencies responsible for management of the archaeological heritage, in this case the Institute of National Historical and Artistic Heritage (IPHAN), was not and is still not prepared for the growing amount of research. The lack of Federal Government support has led to the IPHAN failing to meet its obligations, especially with regard to the monitoring and preservation of archaeological heritage. There is an insufficient number of professionals to analyze research projects, a lack of professionals to oversee the implementation of the work, missing cars, and even a lack of gasoline. Given the lack of resources and IPHAN omission of the Federal Government, many archaeological sites throughout the country are being destroyed. The fact that many entrepreneurs are still disrespecting legislation is precisely due to this lack of infrastructure of the Federal Government. The Government created the archaeological licensing law, but forgot to provide IPHAN with conditions to monitor compliance of the law.

At the same time, archaeology as a profession is not regulated in Brazil. This is due not only to the large bureaucracy involved in the process, but also to the lack of organization and interest of archaeologists at many moments. As there is no regulation, we don't know who is or isn't an archaeologist in Brazil. Thus, any Brazilian citizen may apply for a permit for archaeological research. Often we see lawyers and businessmen asking for permission to search. Evidently, the IPHAN tries to prevent this practice by requiring minimal academic background, but in principle, the law guarantees equality to all citizens. At the same time, the lack of regulation of the profession allows large archaeological companies to hire archaeologists while paying ever lower wages and submitting them to increasingly stressful work schemes.

Another problem is the lack of minimum criteria for the execution of the work and archaeological research. In Brazil, there is not a minimum code of conduct that could be used to guide the research. So every archaeologist does what he wants when he wants, in the name of scientific freedom. As there are no basic rules for archaeological procedures in commercial archaeology, the market that dictates the rules, and the rule of the market is clear: cost versus benefit. Thus,

fieldwork practices are reduced to simple collection, and laboratory practices are reduced to analysis on the production line. Most archaeological companies pay for each shovel test in the field and for each artifact in the laboratory. Part of this problem is associated with a patrimonial vision of archaeology, and in particular, Brazilian archaeology that focuses on material remains above community and knowledge. If we think that the record itself does not exist, that material remains of fragmented social practices of the past are re-appropriated and re-assigned significance, we see traces of the past that have no intrinsic value, but a value that is built through the practice of archaeological science, social practices, and cultural policies of the present. As emphasized Hamilakis (1999), we should be more concerned with the remnants of the social memory of humanity and with respect for those who are gone, than with the physical trace itself. Considering the physical preservation of remains to be most important, above accountability to the present and the communities at present, is quite problematic. We must not forget that as archaeologists, we are producers of culture and have contributed directly to the establishment of "systems of absolute truths." Truths are buildings that meet a specific purpose or interest. Since many archaeologists today believe that the record is not a truth that is given (Edgeworth 2003), or something pre-existing that is just waiting to be discovered (Lucas 2001; Tilley 2004), but is something constructed through the practices of science and discourses of identity and power, we recognize that our responsibility goes beyond the physical safeguarding of material evidence (Hamilakis 1999). This patrimonialist vision of archaeology also features the Brazilian IPHAN, which works more like a notary than as a managing agency of archaeological heritage. For IPHAN, a way to certify the quality of a work is to verify the numbers: the numbers of soil surveys and interventions that were carried out in a survey, the number of material remains collected from an excavation, the amount of archaeological remains analyzed, etc. At the end, the numbers and not the quality of interpretation assign credibility to the work.

This concern with the quantitative aspect of research resulted in the development of a very specific literature: research reports. Chadwick (2003) and Bradley (2006) have discussed how the practice of contract archaeology led to the creation, both in England and in the United States, of a very specific literature with its own rules, called project reports. This is a reality that also applies in Brazil. In the reports, detailed narratives and interpretive constructs were replaced by summary descriptions. The narrative takes the position in the third person, not by a stylistic issue, but a by legal one, since the third-person discourse prevents the assigning of ethical and legal responsibilities. There is no correlation between the data. There is no attempt to build knowledge. On the other hand, there are numbers, lots of numbers.

Part of the problem with commercial archaeology may be associated with the formation of professionals in archaeology. In many countries, much attention is given to teaching techniques and practical field knowledge, while little attention is paid to discussions on the ethical responsibilities of this practice (Beaudry 2009). In Brazil, the situation is more problematic, since the vast majority of undergraduate courses in archaeology were created precisely to meet market demands. The teaching of ethics in archaeology in Brazil gets diluted in the different subjects, according to the willingness of different teachers. In undergraduate courses, fieldwork learning is often impaired by the lack of structure of the courses. In Brazil, the vast majority of graduate students in archaeology learn archaeological practice within the commercial archaeology taking place at the school's archaeological sites. Thus, a practice that is based on cost-benefit ratios, standardization and widespread indiscriminate collection perpetuated. There are profound ethical issues in this relationship between universities and businesses contracts. Firstly, because it ensures supply of trained manpower to the archaeological companies, and at the same time, companies pay cheaper salaries to the students, and so have more profit. Students are trained by the companies, since most universities do not have funds for fieldwork for academic training, and do not question the practice of commercial archaeology, considering this

natural. So there is not much space for discussion and criticism of the responsibilities and ethics associated with this practice.

In Brazil, too little is said about the fact that about 70% of all commercial archaeology contracts are concentrated in the hands of only four archaeological companies, some of which do not have archaeologists as owners. By having a greater economic capital, these companies can manipulate the market by controlling and even preventing access and growth of other archaeological companies. At the same time, to be able to compete with large companies, small companies lower the cost of projects, thus impairing performance of the work. The creation of a code of conduct could solve this problem, but unfortunately the Code of Conduct following debate still has not been implemented (Lima 2002). The only reference Brazilian archaeology has for the ethics of archaeological practice is the Code of Ethics of the Brazilian Society of Archaeology, but this does not specifically mention the work of commercial archaeology.

Future Directions

Two aspects need further discussion: public involvement in archaeological research and the ethical commitment of the archaeologists involved in the work of commercial archaeology.

As evidenced by Funari et al. (2008), in the Brazilian case, one of the major ethical issues is related to the inclusion of the public in archaeological practice. Cutting costs and tighter times resulted in the exclusion of researchers, local communities and volunteers in archaeological projects (Bradley 2006). Activities with the cooperation of local communities, alternative sectors of society and other researchers are usually the first cut during the rationalization of financial costs of projects (Chadwick 2003). Society cannot be seen as a passive agent; the public is not just waiting for our theoretical knowledge about its historical and socio-political situation. These things are directly intertwined in his the public's own critical reformulation ofin political negotiation and in its formulation of theories and interpretations. Thus, exclusion of formation processes of knowledge is especially damaging to archaeological practice. At the same time, how can we expect knowledge to be passed to the public, if the archaeological community does not have access to reports produced within commercial archaeology?

One final question remains. To what extent do the archaeologists involved with commercial archaeology have autonomy and the right to criticize the projects they are working on? Does any archaeologist feel free and able to prevent the installation of an enterprise? This question arises from a simple observation: while the archaeologists involved with commercial archaeology are defending the cultural and archaeological heritage, they are paid to defend the interests of the different companies seeking environmental licenses to carry forward their ventures. At the same time, to accept the terms of market competition, most archaeologists are subject to practices that they recognize themselves recognize as unfit. To what extent should we submit to market practices? Moreover, is the concentration of many contract projects in the hands of a few not damaging to knowledge? Does anyone really believe that a company that manages 20, 30, or 50 archaeology projects per year is actually doing science? Obviously, there are serious research projects in commercial archaeology in Brazil, but these are not yet the majority.

Today, we are living in a period of transition. In the governmental sphere, creation of the National Centre of Archaeology aims to facilitate the monitoring and surveillance of archaeological research. At the same time, conferences and forums have recently been created to discuss the regulation of the profession of archaeologist, as well as the practice of commercial archaeology in Brazil. This shows that there is a light at the end of the tunnel.

Cross-References

- ► Archaeological Licenses
- ► Brazil: Cultural Heritage Management Education
- ► Cultural Heritage Protection: The Legal Sphere

▶ Indigenous Peoples, Working with and for
▶ Public Archaeology, The Move Towards

References

Beaudry, M. 2009. Ethical issues in historical archaeology. In *The international handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 17–29. New York: Springer.

Bradley, R. 2006. Bridging the two cultures: Commercial archaeology and the study of British prehistory. Paper presented to the Society of Antiquaries of London. Available at: www.sal.org.uk/downloads/bridging-two-cultures

Chadwick, A. 2003. Post-processualism, professionalisation and archaeological methodologies. Towards reflexive and radical practice. *Archaeological Dialogues* 10: 97–118.

Edgeworth, M. 2003. *Acts of discovery. An ethnography of archaeological practice*. BAR International series 1131. Oxford: Archaeopress.

Funari, P.P.A., and E. Robrahn-González. 2008. Ética, capitalismo e arqueologia pública no Brasil. *História* 27: 13–30.

Hamilakis, Y. 1999. La trahisondes archéologues? Archaeological practice as intellectual activity in postmodernity. *Journal of Mediterranean Archaeology* 12: 60–79.

Lima, T., org. 2002. *Atas do simpósio: aarqueologia no meio empresarial. Goiânia, 28 a 31 de agosto de 2000*. Goiânia: Instituto Goiano de Pré-História e Antropologia/Sociedade de Arqueologia Brasileira.

Lucas, G. 2001. *Critical approaches to fieldwork*. London: Routledge.

Tilley, C. 2004. *The materiality of stone. Explorations in landscape phenomenology*. Oxford: Berg.

Zanettini, P. 2009. Projetar o futuro para a arqueologia Brasileira: desafio de todos. *Revista de Arqueologia Americana* 27: 71–87.

Ethics of Commercial Archaeology: Japan

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Introduction

At present, Japan, a country inhabited by 128 million people, has over 440,000 registered archaeological sites (Agency for Cultural Affairs 2001: 36). The growth of archaeological survey in Japan was underpinned by postwar economic development and a national imperative for salvage excavations. Since the economic slowdown in the mid-1990s, many critical questions about Archaeological Heritage Management (AHM) and public archaeology have emerged. The subsequent long-term economic slump and expanding neoliberalism in politics have further complicated the situation, and as a result Japanese archaeology today seems to be at a stalemate.

Definition

There are no terms in Japanese equivalent to "commercial archaeology" or "contract archaeology" as used in the UK, the USA, and other countries. Perhaps many Japanese archaeologists, who are accustom to a "socialist" model in contract archaeology (Kristiansen 2009: 643) and a notion of heritage as the preservation and use of buried cultural properties, would frown upon those terms as well as heritage "industry," as ones associated with the marketing of archaeology found in countries where private land ownership is strong. However, "commercial archaeology," as it is meant in other countries, does actually exist in Japan and has become influential in Japanese archaeological heritage management. It is often examined within the administrative heritage sectors but is rarely discussed as an archaeological agenda.

Key Issues/Current Debates/Future Directions/Examples

In Japan, it is conventionally accepted that the cost of archaeological investigation prior to construction of private homes is borne by the state. However, when rescue excavation takes place as a result of construction work for commercial purposes, the cost is paid by the "polluter," namely, the developer, be it a public or private body. The principle of "polluter pays" was first adopted in 1958, when rescue excavation required in

advance of the construction of the Meishin Expressway was financed by the developer: the Japan Highway Public Corporation. The same principle was repeated in protocols the Agency for Cultural Affairs exchanged with other bodies in charge of public works, such as Japan Housing Corporation and Japan Railway Construction Public Corporation. Thereafter, the principle came to be applied, conventionally, to private development companies as well.

In 1965, there were only eight experienced field archaeologists employed by regional boards of education (Tsuboi 1992: 3). As archaeologists were increasingly employed and positioned at the local government level, an administrative system for managing buried cultural properties and conducting rescue excavations was gradually established, first at prefectural and then municipal levels, under the national government's supervision. Local authorities began setting up their own units to look after cultural properties and, in some cases, instituted "semipublic" (nonprofitable) self-governing foundations specializing in archaeological investigation. The number of specialists in charge of buried cultural properties employed in local governments or semipublic foundations rose to a maximum of 7,111 in 1997 (Seino 2009: 41). Today, even during a recession, approximately 8,000 rescue excavations are still carried out yearly across the country. These rescue excavations account for approximately 95% of all archaeological excavations conducted in Japan. All 47 of prefectural governments and over 65% of municipal governments (1,192 out of 1,834) employ archaeologists in charge of buried cultural properties. On the prefectural level, 1,120 archaeologists work for local governments and 1,122 for semipublic foundations. At the municipal level, 3,095 archaeologists work for local governments and 918 for semipublic foundations (Seino 2009: 41–44). These figures attest to the nationwide AHM operation today.

How has AHM been able to develop so rapidly in Japan? An important factor is the "polluter pays" principle that originated in the period when the Japanese economy was growing fast. Although the polluter pays principle has not been clearly stipulated in the Law for the Protection of Cultural Properties (Tanaka 1984: 84), it has guaranteed a source of financial support for AHM in Japan and has fundamentally helped its development. It is interesting to note that the notion of buried cultural properties as the "common property of the nation," as defined by the Law for the Protection of Cultural Properties, has been adopted by both the government and the developers in their cooperation in rescue excavations. For the government, it has been important to preserve archaeological materials – albeit mostly by record only – on the grounds that they are legally relevant to us, namely, all Japanese. The developers, on the other hand, have been funding rescue excavations not only for the promotion of a socially committed corporate image of themselves but also because of the need to understand and respect the past and our ancestors. Financially supported by the polluter pays principle and technically aided by state-of-the-art techniques of excavation, such as the use of conveyer belts and aerial survey, AHM in Japan has developed into a system of prompt and efficient excavations; it has produced a massive amount of archaeological data, including up to some thousand site reports a year.

The Impact of "Privatization"

The biggest challenge the current AHM system is faced with is the growth and expansion of private archaeological units. Private archaeological units have already been in operation for a few decades, particularly in the Kanto region (including Tokyo and Yokohama), but most of them were small in size and led by professional archaeologists. In contrast, newly emergent private units are established at the initiative of, and more significantly, "within," building or engineering companies and are now mainly large enterprises. These units gained momentum for expansion particularly under the Koizumi cabinet (2001–2006), which pursued privatization and budget cuts in various aspects of public works under slogans such as "From public, to private" and "What the private can do must be entrusted to the private." Private units waged lobbying campaigns for privatization of salvage excavations and, to further pursue this objective, established in 2005 their

own business association Nihon Bunkazaihogo Kyoukai, in which about 70 units participate.

This association started administering their own qualification examinations, particularly in archaeological technical field, which prompted serious discussions on the issues of quality assurance and standardization in contract archaeology. They have been successful in increasing the number of excavations they undertake and are today aiming to further expand their areas of activity, including active trials to increasingly involve themselves in rescue archaeological practices in the area affected by the Great Eastern Japan Earthquake of 2011. It should be noted that major construction companies such as Obayashi Corporation, Kajima Corporation, and Shimizu Corporation are "supporting members" of Nihon Bunkazaihogo Kyoukai. This means that for these construction companies – private developers – rescue excavations present a new attractive business market for profit, particularly to counteract the effect of the recent recession in the construction industry. Naturally, the developer tends to be far less interested in the quality of excavation than effective management. It is feared that the partnership between developers and private archaeological units might lead to the deterioration of the quality of excavation, publication of its results, and succession of archaeological heritage to local communities. As a result, the geographical gaps in AHM are likely to expand. Privatization of rescue excavations would only contribute to further widening of these gaps, as larger private archaeological units, usually based in big cities in economically powerful prefectures, would be able to undertake rescue excavation in other prefectures and regions. At worst, it is feared that archaeology might come to be dominated by a limited number of large private units, thus weakening the activity of smaller and more locally based archaeological units.

When contract archaeology prior to development for public works and private house is funded by public money (tax), ethical issues, such as who benefits from the excavation, are not so serious as long as research standards are maintained. However, when it comes to development by private companies for commercial purposes, the asymmetrical relationship between the fund payer (the individual) and reward/benefit (shared by the public, including the individual) will give rise to a sense of unfairness. This will cause ethical dilemmas for heritage managers too. The only way to discourage this change in situation is through speedy (i.e., inexpensive) excavations.

Commercial archaeology need not cause serious problems if heritage managers hold enough power to check and control the research of commercial units and are capable of appreciating and presenting their results. In practical, however, it is not easy to ensure such conditions. The quicker research is done, the more profitable commercial units are. They might avoid taking enough time to research complicated features and fragile finds in time critical (e.g., urban) sites or difficult (e.g., wetland) sites. It could be difficult to ensure that all units behave in good conscience. Particularly, it is probable that units originating from the building or engineering companies (unique and characteristic of Japanese commercial archaeology) to shake hands with developers under the table. In terms of benefits for local communities, compared to experienced and engaged local units which are familiar with the past of the area, large-scale private units with no particular regional background tend to be insufficient at interpreting and appreciating their finds. This lack of contextual information for finds would lead to a poor presentation of the past.

So far, I have deliberately focused on the negative aspects of commercial archaeology, but when we compare the results from experienced professional units with those of inexperienced heritage managers, the former will undoubtedly get more information from a site. It is also true that those units provide both jobs and good training to inexperienced young archaeologists. However, generally speaking, this matter of an increasing number of inexperienced heritage managers and/or the retirement of experienced archaeologists needs to be examined first in terms of the sustainable handing down of local heritage. In the long run, the commercialization of archaeology in Japan will increasingly go against the public interest. Quality excavation and the preparation of reports are crucial but are even more valuable

when available for use in presenting the past and education. Neoliberalism involves anything in a field of competition. But, the world of archaeological heritage often never fit to calculative and and/or dichotomized way of thinking. Commercialization in archaeology is a global issue. Archaeologists, across the country, should become involved in this discussion in order to explore the public benefit of archaeology and heritage management.

Cross-References

► Cultural Heritage and Communities
► Ethics in Archaeology

References

Agency for Cultural Affairs. 2001. *Bunkazaihogohou Gojyunenshi* [*Fifty years of history of the law for the protection of cultural properties*]. Tokyo: Gyousei.

Kristiansen, K. 2009. Contract archaeology in Europe: An experiment in diversity (Debates in World Archaeology). *World Archaeology* 41 (4): 641–648.

Seino, T. 2009. Maizou Bunkazai Kankei Toukei Shiryou No Kaisetsu To Bunseki: Heisei 20 Nendo Ban [Statistical data on buried cultural properties in 2008: Commentary and analysis]. *Gekkan Bunkazai* [*Cultural Properties Monthly*] 548: 41–46.

Tanaka, M. 1984. Japan. In *Approaches to the archaeological heritage: A comparative study of world cultural resource management systems*, ed. H. Cleere, 82–88. Cambridge: Cambridge University Press.

Tsuboi, K. 1992. Issues in Japanese archaeology. *Acta Asiatica* 63: 1–20.

Further Reading

Okamura, K. 2012. From object-centered to people-focused: Exploring a gap between archaeologists and the public in contemporary Japan. In *New perspectives in global public archaeology*, ed. K. Okamura and A. Matsuda, 77–86. New York: Springer.

Okamura, K., and A. Matsuda. 2010. Archaeological heritage management in Japan. In *Cultural heritage management: A global perspective*, ed. P.M. Messenger and G.S. Smith, 99–110. Gainsville: University Press of Florida.

Okamura, K., A. Fujisawa, Y. Kondo, Y. Fujimoto, T. Uozu, Y. Ogawa, S. Kaner, and K. Mizoguchi, eds. 2013. The great East Japan earthquake and cultural heritage: Towards an archaeology of disaster. *Antiquity* 87: 258–269.

Ethics of Commercial Archaeology: Nigeria

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Introduction

The discussion of ethics in archaeology has assumed a contentious dimension with different segments within the discipline waging intellectual war on who is ethically correct or wrong. It has been observed that though archaeology may be dealing with lifeless, static, materials of the past, it still requires adopting certain cultural standards to maintain suitable ethics that would include a number of important moral issues (Johnston 2012). The issue of ethics in archaeology is not new; what is new is the frequency and necessary passion of ethical discussions. In the past two decades, archaeology has changed so much that it seems like a new discipline. Many past archaeological works lacked sound ethical considerations such that they are today regarded as little more than tomb-robbing debacles. In the United States, it has been observed that "the most dramatic ethical vacillations are a result of the emergence of contract and conservation archaeology." These developments "have delivered archaeologists from their insular academic world to a broad spectrum of professional and political communities" (Joukowsky 1991).

Definition

The Webster's Dictionary defines ethics both as a system of moral values governing a profession and an individual's moral code. Archaeological ethics are prescribed guidelines in which archaeologists are to conduct each phase of their responsibilities. Archaeologists are bound by a code of conduct that includes observing intellectual property rights, scientific credibility, and territorial legal obligations.

Archaeologists are required to preserve and manage the archaeological record with all due diligence to include treating human remains with dignity and permitting the local authorities to manage their preservation in an appropriate manner. The principles of archaeological ethics adopted in 1996 by the Society for American Archaeology "outlined stewardship, accountability, commercialization as well as public reporting and preservation" (Stambaugh 2012).

Commercial archaeology may have two meanings, the first being the archaeology concerned with the material culture aspects of commerce and transportation. It refers to the study of structures and artifacts created in connection with popular commercial activity, such as diners, motels, gasoline stations, and signs, and also focuses on the effects of a market economy on cultures and the use of space (Hirst 2012). In the United States, the Society for Commercial Archaeology is a national organization devoted to the buildings, artifacts, structures, signs, and symbols of the twentieth-century commercial landscape. The second meaning of commercial archaeology is what concerns we have, and it is sometimes called contract archaeology, rescue archaeology, salvage archaeology, or preventive archaeology which is archaeological survey and excavation carried out in areas threatened by, or revealed by, construction or other land development. These could be the case in highway projects, major construction, and the floodplain of a proposed dam and the laying of oil pipelines. In essence, commercial archaeology is conservation archaeology, and it is included in the broader category of cultural resource management, and unlike traditional survey and excavation, it is undertaken at speed. In terms of the definition of research and selection of site, conservation is problematic as sites are not selected or excavated to answer particular research questions, but they are excavated because of their location in threatened areas. Conservation archaeology like all archaeology destroys sites, and in the situation where the highest research standards are lacking, the site is lost forever (Joukowsky 1991).

Key Issues/Current Debates/Future Directions/Examples

The practice of commercial archaeology, rescue archaeology or whatever terminology, is largely restricted to North America, South America, Western Europe, and East Asia, especially the United States, Canada, the United Kingdom, Korea, and Japan (Rescue archaeology-Wikipedia). The passage of environmental protection laws in the United States in the 1970s led to the growth of this kind of archaeology which could also be termed "business archaeology- in which archaeology is ordered by private consulting firms working for profit under contract to developers or governmental agencies who are required to conduct archaeological research in compliance with environmental protection laws" (Joukowsky 1991). In the United Kingdom, RESCUE: The British Archaeological Trust was formed in 1971 to address the problem of the destruction of archaeological resources occasioned by the widespread redevelopment of historic towns and cities which had started in the 1950s running through the 1960s. A priority for RESCUE was the need to get government subsidies to support archaeological rescue work ahead of large-scale development projects (Everill 2012). In the text of the European Archaeological Association's Principles of Conduct for archaeologists involved in contract archaeological work, an earlier phrase "commercial archaeological work" was replaced with "contract archaeological work" before it was approved in 1998. This reflects the view that archaeology is not a commercial activity though it is often carried out under various kinds of contracts (European Archaeological Association 1998).

Commercial archaeology as elucidated above does not exist in Nigeria, and it is paradoxical that the history of the practice of archaeology in Nigeria is traceable to salvage archaeological works. Archaeological finds of terracotta objects in the tin mines on the Jos Plateau in 1928 and of bronze objects in Benin, Ife, and Igbo Ukwu in 1938 through activities such as digging foundations for houses and public buildings marked the beginning of conscious efforts to document and

preserve archaeological resources in Nigeria. The Nigerian Department of Antiquities was established in 1943, and archaeologists were engaged to investigate sites where there had been accidental discovery of archaeological materials and also monitor where public works were being undertaken. When the Kainji Dam was conceived, the Department of Antiquities commissioned an archaeological survey of the area to be flooded, and preliminary survey work was done in 1962–1963 and was followed by limited uncoordinated salvage work in 1968 few months before the area was flooded. Since then, rescue archaeology had been in the cooler despite the high incidence of construction works that involved urban renewal, development of a new capital city, and facilities development (see Folorunso 2008).

It has been noted that "the emergence of contract and conservation archaeology have delivered archaeologists from their insular academic world to a broad spectrum of professional and political communities" and that the traditional academic values of archaeology "are brought to clash with the less supportive, more profit-oriented ethics of the business world" (Joukowsky 1991). The archaeologists had ceased to be a part of a small community with homogenous values and now work with heterogeneous value systems, faced with people and institutions with discordant agenda with that of the academy and deal with value systems inherent in business, government, and the nonacademic public. Archaeologists now deal with the business ethic as well as the traditional academic value system. They are responsible to the public, their profession, and their own clients (Joukowsky 1991).

In Nigeria, contract archaeology is not mandatory, and when a semblance of contract archaeology is envisaged, it is within the confines of Environmental Impact Assessment (EIA) required for projects financed by the World Bank as formulated in 1999 and revised in 2011.

> The World Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sustainable, and thus to improve decision making. EA takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and transboundary and global environmental aspects. EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The Bank favors preventive measures over mitigatory or compensatory measures, whenever feasible. (World Bank 2012)

The policy further elaborates on what concerns archaeology under physical cultural resources which became operational in 2006 and updated in 2007:

> This policy addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources are important as sources of valuable scientific and historical information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices. The Bank assists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances. (World Bank 2012)

One important issue that seems to occupy discussions on contract archaeology has centered on the question of who controls the process of archaeological investigations. Agencies and developers typically would want to spend minimally when it comes to archaeology, and this usually has great consequence on the quantum and quality of the archaeological work that is done. It has been noted that a "client can be unwilling to protect sites from collectors or can threaten to sue the archaeologists if excavation inhibits heavy machinery." The clients may also fail to promptly notify archaeologists of subsurface destruction for the archaeologist to react, such that the archaeologists sometimes cannot even fulfill their own contracts. They are then left to decide if the responsibility is to the client, the actual resource, the public, or the regulatory

agency that ordered the work in the first place (Joukowsky 1991). In the end, even the most ethical archaeologist cannot contend against the power of the state governments, and archaeological morality often would suffer at the hand of economic development or national ideologies. An obvious example was the London rail link for the Channel Tunnel, where important human remains at St Pancras Cemetery were hastily dug up and mistreated in order to maintain the schedule of the infrastructure project (Johnston 2012).

For a long time, the process of the implementation of the EIA requirements in Nigeria had been under the control of developers as they commission consultants from the universities who are mainly biological and physical scientists to conduct impact assessment studies. The archaeological aspects of the studies are usually ignored, and where they are included, the individual archaeologists selected by the main consultants are made to write reports just to make the assignment of the consultants to look somehow complete. No single serious archaeological survey or rescue/salvage work is known to have been done through the numerous EIA studies that had been executed in the country. The process can therefore be judged to lack transparency and fraught with corruption. However, a recent development arising from a probable query of a suspicious EIA archaeological report that had ignored the significance of archaeological features located on plots of land earmarked for the siting of a power plant in Benin provided some rays of hope for commercial archaeology in Nigeria. An international consultancy firm for EIA with experience and expertise in archaeological impact assessment, specifically Environmental Resources Management (ERM) of the United Kingdom and United States, was brought in to reassess the plots of land in 2014. ERM handled its assignment professionally, sought, and got the collaboration of the author of this chapter to execute the reassessment of the plots of land in Benin.

The experience gained doing commercial archaeology work in Benin has provided insight into the disposition of developers and the locals (traditional rulers, landowners, and opinion leaders) to archaeological assessment of lands earmarked for development. As usual in land matters in Nigeria, there was legal dispute over the ownership of the plots of land in question between two neighboring communities. The community which finally gained control over the land claimed that there was no moat on the land that would require archaeological investigation. A community opinion leader, specifically the principal of the community secondary school, stated that the features the archaeologists were referring to as moats were constructed to check erosion in the early 1960s when he was a young boy. Simply put, the community did not want any archaeological survey that would suggest that moats existed on the plots of land because in Benin traditions, moats in the past marked boundaries. For them the suggestion of the existence of moats would be against their interest. Expectedly, the representative of the developers on his part allied with the position of the community and considered archaeological investigations unnecessary apparently because of the cost that would be involved and the delay that would intervene in the processes of perfecting agreements with the funding bodies. This was more so because there was another completed power plant on adjacent plots of land which apparently might not have undergone the rigors of archaeological investigations before its construction. At the end, the argument that prevailed was to allow archaeology to establish if the features were recent or ancient moats particularly since Benin was well known for ancient landmarks on its landscape.

The Benin episode definitely marked the beginning of the practice of commercial archaeology in Nigeria. A team of archaeologists consisting of two parts was constituted: one part consisted of an archaeologist from ERM (UK) and two archaeologists from Wessex Archaeology (UK), and the second part consisted of six Nigerian archaeologists from the University of Ibadan (Fig. 1). The necessary permission was obtained from the National Commission for Museums and Monuments (NCMM), and an archaeologist from the Commission at the National Museum in Benin represented the NCMM on the team of archaeologists. Considering the stage the power plant project had reached, all engineering proposals had

Ethics of Commercial Archaeology: Nigeria, Fig. 1 Team of archaeologists on commercial archaeology at Benin

Ethics of Commercial Archaeology: Nigeria, Fig. 2 Setting up Total Station for mapping in Benin

been perfected, compensations were being paid to the landowners, and final approval was being expected from the funding bodies, we decided to undertake conservation work by recording. The site was surveyed using total station to map features (Figs. 2 and 3), while portions of the moats and ditches were mechanically excavated (Fig. 4) and a small test pit was manually dug at a spot within the plot. Materials (potsherds, pollen, and charcoal) had been analyzed and the whole work fully reported to the client (developer).The archaeological investigations showed that the plot of land was an ancient landscape consisting of two moats and associated ditches. The recommendation was that the client should ensure the presence of archaeologists on the site when the bush clearing was to be done.

The bush clearing was in two phases; the first phase was the preparation of a portion of the land in the second half of 2014 for the official

Ethics of Commercial Archaeology: Nigeria, Fig. 3 Mapping of archaeological features at Benin

groundbreaking ceremony. An archaeologist was invited to the site after the clearing had already started. The cleared areas were examined, and materials, mainly potsherds, were collected for the study. The second phase was more than mere bush clearing as actual construction works started along with bush clearing in January 2016. The client again set the terms and specified 6 days for the duration the archaeologists would be required on the field. The construction firm however could not say when it would complete the bush clearing. The representative of the client was obviously always thinking of cutting the cost on anything archaeology; in the end two archaeologists were kept on the site for 3 weeks basically following the machines as they cleared the bush to collect surface materials and record features with GPS receivers and camera. One could probably state that the practice of commercial archaeology which hitherto was not known in Nigeria in its strict sense was done in 2014 and 2016 though in an environment that could not be described as free will. We might have therefore seen the beginning of commercial archaeology in Nigeria and hope that it would not end with the episode in Benin.

Contract archaeology and contract archaeologists have come under strong criticism on the issues of ethics. For example, in Ireland, headlines such as "Archaeology needs to recover its core principles and ethics" have appeared in some print media as archaeology has been described to be currently in the throes of growing commercialization, and it is being ill served by corrupt semi-state/technocrat archaeologists, conspiring with under-scrutinized consultants to undermine and cajole staff into underplaying the significance or importance of the archaeological resource encountered on national road schemes and other developments to ensure that the proposed developments proceed as required by the government (Moore Group 2008). Critics have also defined contract archaeology differently, as the way the discipline of archaeology engages capitalist expansion, sacrificing its critical stance. Archaeologists are said to be mass-produced by laying emphasis on technical training within shorter periods to meet the contractual needs arising from the aggressive capitalist expansions in transport infrastructure and mining. Contract archaeologists are accused of abandoning any possible intervention in contemporary issues in order to dance to the rhythm of money and have turned the past into a commodity.

The aforementioned ethical issue to my mind would be applicable to places where there are strong national legislations, regulations, and institutions for the protection of cultural resources. In other places like Nigeria where such national legislations, regulations, and institutions are very weak or nonexistent, the issue of ethics becomes very different. For example, in Nigeria, despite the fact that the cultural legislations are weak, the institutions to regulate on archaeological matters also fail to fulfill their mandate because such institutions are not well constituted for the assignments. Archaeological impact studies as explained above are therefore done on the benevolence of the developer as a requirement by the project financiers and not by any national regulation. Since there are no enforceable regulations,

Ethics of Commercial Archaeology: Nigeria, Fig. 4 Mechanical trench excavation of a moat at Benin

the question of ethics becomes more of moral rather than legal issue. Underplaying the significance or importance of the archaeological resources to be impacted by the development project which was the case in Benin before a reassessment was undertaken was more of a moral issue since no regulation was breached. Recommending conservation by recording was the best deal archaeology could get in a very hostile environment where the developer calls the shot and considers the cost of archaeological investigations as unnecessary.

Another ethical issue with contract archaeology which is also applicable to Nigeria has to do with the dissemination of findings. It is known that within the accepted archaeological ethic, it is considered wrong to excavate and not disseminate information through publication. This is denying the public the right to know as many business organizations who order the excavations consider the resulting work their own property, and thus, archaeologists are barred from publishing the results (Joukowsky 1991). This negates the stewardship principle which is current in archaeology today and which sees archaeologists as caretakers of and advocates of the recording of archaeological data and that archaeologists must use the knowledge they gain from sites in order to promote public understanding and support. Frustration had been expressed with contract archaeology as to how the archaeological community as a whole has no means of knowing of or accessing a contractor's work results. It seems to be part of the contract that there should be no publication and no report. It has been noted that the inability for the contractor's archaeological work to see the light of day seems to be in direct disagreement with the principle of stewardship. It has therefore become pertinent to ask the questions of how beneficial are the projects, "if archaeologists are restricted by their reporting methods and if their actual reports are not released to the public or the archaeological community in some researchable system" (Stambaugh 2012).

The criticism of contract archaeology should not imply jettisoning it but how to make it more transparent and more ethical. Some critics may however imply that the ethical considerations of archaeology are not compatible with commercial ethics; they have not proffered solutions or alternatives than to do away with the capitalist's incursion. There is more destruction of archaeological resources and more unethical practices in heritage issues in countries like Nigeria where contract archaeology is not being practiced than in the countries where it is practiced. At least the

infractions on ethics have been raised, discussed, and debated as in the case of the M3 highway in Ireland. The reports of contract archaeologists, where they have been accessed by academics, have contributed to the production of archaeological knowledge. Therefore, the debate should go on to make contract archaeology more transparent and ethical as the alternative may be non-engagement which takes archaeology back to the era of helplessness in the face of wanton destruction in the process of land modification.

References

European Archaeological Association. 1998. The EAA principles of conduct. Available at: http://e-a-a.org/princond.htm.

Everill, P. 2012. British commercial archaeology: Antiquarian and labourers, developers and diggers. Available at: http://www.academia.edu/172318/BRITISH_COMMERCIAL_ARCHAEOLOGY_ANTIQUARIANS_AND_LABOURERS_DEVELOPERS_AND_DIGGERS. Accessed 25 Nov 2012.

Folorunso, C.A. 2008. Archaeological sites and heritage in the face of socio-economic development in Nigeria since independence. In *L'Archéologie Préventive en Afrique: Enjeux et Perspectives*, ed. B.O.M. Naffe, R. Lanfranchi, and N. Schlanger, 135–141. Saint-Maur-des Fossés: Editions Sépia.

Hirst, K.K. 2012. Commercial archaeology. Available at: http://archaeology.about.com/od/cterms/g/commercial.htm. Accessed 25 Nov 2012.

Johnston, G. 2012. Ethics and morals. Available at: http://www.archaeologyexpert.co.uk/ethicsandmorals.html. Accessed 25 Nov 2012.

Joukowsky, M.S. 1991. Ethics in archaeology: An American perspective. *Berytus* X: xxix. Available at: http://almashriq.hiof.no/ddc/projects/archaeology/berytus-back/berytus39/ethics/index.html. Accessed 25 Nov 2012.

Moore Group. 2008. Archaeology, ethics, corruption & the M3. Available at: http://mooregroup.wordpress.com/2008/07/17/archaeology-ethics-corruption-the-m3/. Accessed 25 Nov 2012.

Stambaugh, S. 2012. Ethical challenges and principles in the field of archaeology. Available at: http://www.mansfield.edu/_art/Papyrus2StephanieStambaughethical_challenges_and_principle.htm. Accessed 25 Nov 2012.

World Bank. 2012. Safeguard policies. Available at: http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,,menuPK:584441_pagePK:64168427_piPK:64168435_t-heSitePK:584435,00.html. Accessed 2 Dec 2012.

Further Readings

Dunnell, R.C. n.d.. The ethics of archaeological significance decision. Available at: http://mendel.cla.csulb.edu/rcd/papers/Dunnell-TheEthicsOfArchaeological-SignificanceDecisions.pdf. Accessed 25 Nov 2012.

Wikipedia. n.d.. Rescue archaeology. Available at: http://en.wikipedia.org/wiki/Rescue_archaeology. Accessed 25 Nov 2012.

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Ethics of Commercial Archaeology: Southern Africa

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Introduction

As far as the discipline of archaeology is concerned, few areas evoke mixed responses as much as the issue of ethics in the subfield of commercial archaeology. To some in southern Africa, as in other places around the globe, commercial archaeology is an opportunity for archaeology to contribute to job creation, policy interventions, and sustainable heritage stewardship (Hall 1989), while to others, it sides with developers in destroying other people's irreplaceable heritage. Not surprisingly, the rise of commercial archaeology has raised a number of ethical dilemmas – the Hamlet's to be or not to be moments. Pro-commercial archaeology moral arguments stress the fact that commercial archaeology represents the last opportunity to save archaeological heritage in record before it is destroyed (Deacon 1992; Goudswaard et al. 2012). If archaeologists do not do it, then the heritage will be lost. This is a very appealing moral argument. However, often the very poor-quality commercial archaeology reports which are supposed to achieve preservation by record spectacularly fail to accomplish this goal. Furthermore, commercial archaeology is difficult to police and regulate in terms of quality. Heritage agencies in southern Africa such as the National Museums and Monuments of Zimbabwe and the

South African Heritage Resources Agency lack the capacity and resources to verify the truth of the recommendations of archaeologists on the ground. This means that a lot is now depending on the ethical position of archaeologists involved.

To make matters worse, commercial archaeologists, particularly in southern Africa, are increasingly arguing that they are in business and have to earn a living while being competitive. Fair enough, the only problem is that recently, there has been a rise in the use of proprietary tools, resulting in the copyrighting of commercial archaeology reports. This has placed restrictions on use. Therefore, commercial archaeology in southern Africa is now more of a compliance requirement than a real method of salvaging an accessible past. Furthermore, in southern Africa, local communities have always played a peripheral role in the discipline of archaeology (Chirikure et al. 2010). Often, commercial archaeology does not give anything back to the community through corporate social responsibility programs. This creates one of the most important unforeseen moral dilemmas of commercial archaeology – it exploits other people's heritage and yet fails to plow back into communities like what other businesses do. Commercial archaeologists therefore cannot have their pie and enjoy it alone. The only impediment, however, maybe that often, the fees charged are not high enough to allow generous investments in communities like what big mining corporations such as Rio Tinto and BHP Billiton can manage. This requires a rethinking of the philosophical basis of what commercial archaeology is and what it must do. Otherwise, it risks becoming one of those unwanted evils that neither preserves the past nor benefits communities but only feeds the pockets of a few.

Background to Southern African Commercial Archaeology

Southern African archaeology is now just over a century old. As in most former colonized regions, the discipline has a western ancestry (Chirikure and Pwiti 2008). It was transplanted to the region in the late nineteenth century by early travelers, missionaries, geologists, and other peripatetic scholars who were enchanted with the past of the newly colonized territories. The colonial legacy of the discipline of archaeology in southern Africa dictated that archaeology emerged as a western affair without much involvement of the locals. Colonial legislation such as the archaic Rhodesian (Zimbabwe) 1902 and the South African Bushmen Relics Ordinance of 1912 had no regard for local communities just as their successors, respectively, the National Museums and Monuments Act of 1972 and the National Monuments Act of 1969 (Pwiti 1996).

The roots of commercial archaeology in southern Africa can be traced infamously to the notorious Ancient Ruins Company formed by Cecil John Rhodes to explore for gold in the ruined monuments of Rhodesia (Hall 1990). Richard N. Hall was employed as the "excavator" of Great Zimbabwe where he looted an unknown number of gold and other objects. The atrocious methods of Hall and his denial of an African authorship for Great Zimbabwe raised ethical considerations and led the British Association for the Advancement of Science to dispatch a professional archaeologist Randall MacIver (1906), who was a professionally trained archaeologist, to excavate at Great Zimbabwe. MacIver concluded that Great Zimbabwe was local in origin but he could not sway established settler opinion. Throughout the colonial period in southern Africa, archaeology neither had a place for local communities nor how the same communities felt about the desecration of their heritage (Chirikure et al. 2010).

Not surprisingly, by the time commercial archaeology emerged in the late 1980s and early 1990s, it emerged of a background of alienation of local communities (Sheperd 2006). As such, it inherited the ethical dilemmas of the discipline of archaeology which had no place for local communities. The legislation empowered archaeologists to desecrate sacred places against local people's wishes under the name of science. Commercial archaeology in southern Africa started sporadically from the 1960s. The proposed construction of the Kariba Dam in the 1950s

prompted an impact assessment of the area to be flooded, and after that a number of dam projects witnessed archaeological impact assessments. In South Africa, commercial archaeology *sensu stricto* began in 1989 with the establishment of the National Environmental Act which called for pre-development impact assessments to be carried out (Deacon 1992). In 1999 when South Africa had obtained independence, the new National Heritage Resources Act borrowed from international best practice and local needs. It made archaeological impact assessments mandatory resulting in an upsurge of contract archaeology. Nowadays, there are many archaeologists employed as contract archaeologists, a development which is very positive for the discipline. Although legislation in other southern African countries varies in terms of degrees of effectiveness, commercial archaeology is now strong in Botswana, Mozambique, Namibia, Zimbabwe, and other places. This has been precipitated by the fact that IMF- and World Bank-funded projects require environmental and heritage impact assessments to be carried out. There is no doubt that commercial archaeology represents a step in the right direction for archaeology. It has opened up job opportunities beyond the traditional university and museum openings. However, because the field is relatively new, it is often confronted by a number of ethical challenges such as quality control, significance assessment, and even the recommendations by archaeologists themselves (Scarre and Scarre 2006). All these challenges put spotlight on the question of ethics and make commercial archaeology a necessary but uncontrolled evil in the eyes of some people.

Definition

From a generalist point of view, ethics are partly an individual belief system that consists of making distinctions between the right and the wrong (Kintigh 1996; Wylie 1996) and partly an ability to analyze decisions, beliefs, and actions. Ethics are concerned with the critical appraisal of human conduct and character (In 1992; Scarre and Scarre 2006). Therefore, ethical issues vary from discipline to discipline and context to context. In commercial archaeology, ethics refer to morality issues that are raised by the business of salvaging the past in the face of development (Dunnell 1984; Hall 1989). Within the commercial context, businesses are expected to have good ethical values and to act in a socially responsible way. Commercial archaeology thrives on making profit out of "priceless" objects and commodifies a resource known as the past. This presents a moral dilemma because an individual's pursuit of fortune through exploiting the past must be done in a way that is responsible to the archaeological record and its multiple stakeholders. Therefore, commercial archaeologists run businesses but retrieve invaluable data to preserve the past by record. They also make decisions on the future of heritage recommending no go for development in the case of sites with high significance and recommending mitigation in cases where significance is low. This requires good ethics from individuals concerned. Where they exist as in the case of the Unites States, professional associations require that their members adhere to good ethics (Kintigh 1996). The Association of Southern African Professional Archaeologists has a code of ethics and conduct for commercial archaeologists. However, there are no sanctions for those who breach ethics. Also, because the body is not a legal entity, membership of ASAPA is not necessary for one to practice commercial archaeology. Furthermore, ASAPA is strong in South Africa and weak in other southern African countries. A lot of bad practices are carried out without impunity. Commercial archaeologists must embrace the duty of care principle which obliges them to treat the archaeological record and the host communities with respect. Yes, they are in the business to make money but they must not do so at the expense of the archaeological record.

Key Issues/Current Debates/Future Directions/Examples

Commercial archaeology occupies an important interstitial space between studying the past through material remains and the need for people

to earn a living. In fact, most other disciplines such as psychology and economics, among others, now also have commercial arms (Wylie 1996). However, strong ethics are needed to steer commercial archaeology into the future. Bad ethics will alienate stakeholders and are thus unwelcome. There are a number of key areas where strong ethics are needed in southern African archaeology. The first and perhaps most important one is that archaeologists have a primary responsibility for the past on behalf of society. As such, their actions must be guided by the need to preserve and communicate the past. All businesses need to make profit but they must not lose sight of core values. By affirming their allegiance to the archaeological record for present and future generations, commercial archaeologists must make professional and informed recommendations that result in the protection of significant heritage while allowing development to proceed. There are archaeologists who are known for not finding any significant sites. Commercial archaeology must improve standards of fieldwork and data collection to ensure that it creates a usable archive for others. Current attempts to copyright information from reports while making business sense ultimately mean that new protocols must be developed to access information for studying the past. Heritage Western Cape, the provincial arm of the South African Heritage Resources Agency, has in the last few years encountered situations where the issue of copyright was debated. The heritage authority recognized the rights of authors of reports but also determined that it must be able to use part of the reports to fulfill its legislative mandate. One way to solve this copyright issue is for archaeologists to publish their reports to make them publicly accessible. There are some commercial archaeologists who believe that commercial archaeology is all about data gathering. However, it is not clear what the data will be used for since often the quality is not good some of the time. This means that the data from commercial archaeology is not usable defeating the whole purpose of conserving by record. In countries such as Australia and the Netherlands, commercial archaeologists publish works based on their experience which also helps in the evolution of the discipline. This is not yet the case in southern Africa where the belief that commercial archaeology is either a business or all about data gathering is strong. Intellectual property issues relating to data ownership are not yet resolved. It is the archaeologist who would have produced the report, but having been paid by the developer to fulfill a legal requirement, the issue gets convoluted if the archaeologist also subcontracts another archaeologist. Therefore, there is an urgent requirement to consider these ethical issues to create a more usable commercial archaeology outcome.

The other ethical issue of strong relevance is the need to regulate commercial archaeologists. Most of them operate independent small companies that are registered with the registrar of companies. However, it is difficult to enforce standards and accountability because administrative organizations are short staffed. While the South African Heritage Resources Agency has always complained about poor-quality reports, nobody has been sanctioned for poor work. Equally, the Association of Professional Archaeologists has no penalties for members who produce substandard reports. Thus, a code of practice without consequences becomes gatekeeping another morally undesirable thing (Hall 2005). Thus, while commercial archaeologists are making money out of studying the past, their responsibility to the archaeological record is often suspected. Strong ethics are needed to ensure that it is not just the archaeologists who benefit but also the past.

The other issue requiring ethical consideration is the issue of how local communities are often sidelined in commercial archaeology. Very few legal instruments in southern Africa have a provision for community consultation in archaeology. As such, archaeologists make decisions about insignificance and significance of other people's heritage based on their expert training. If ethics are adhered to, there is no problem. However, there are cases in which ancestral graves have been forcibly relocated against the wishes of local communities. Even in South Africa where the legislation calls for community participation, the consultation is often left till the end of the

projects when all the major decisions would have been made. Perhaps, this ethical dilemma would be less of a problem if commercial archaeologists invest in the local communities through corporate social responsibility programs. However, the funds are often very small and do not allow generous investments by archaeologists into the communities. One way of solving this problem would be for the archaeologists to make their clients uplift communities. For example, the South African Department of Environmental is insisting that companies operating around the Mapungubwe World Heritage site must devise public beneficiation programs. The archaeologists who carry out the impact assessments are supposed to come up with suggestions. While it is still early days, it is hoped such an intervention may result in more communities benefitting from their heritage.

Finally, commercial archaeology seems to be enjoying the best from two worlds. In the first instance it is still archaeology which is about a people's legacy and all the responsibilities that come with that. In the second one, it is a business and yet does not adhere to ethics in the business world. The corporate environment has strong and established ethics. For example, the Institute of Directors of South Africa came up with the King's Code II for corporate governance and social responsibility. It would be good for commercial archaeologists to implement accountability standards enshrined in this document. This will ensure that they are fully commercial and regulated by the stronger ethics that govern the business world.

In summary, the opportunities associated with commercial archaeology are massive. Commercial archaeology occupies an important interstitial space between archaeology and what society needs. However, strong ethics must be adhered to for society fully benefit. There is need for systems of quality control and accountability to ensure that the profit motive does not disadvantage the past. Also, commercial archaeology must be regulated to ensure that data quality is high. Intellectual property issues must also be resolved to ensure access to information for all. Commercial archaeologists have a duty to communicate the results of their work beyond the mandatory reports. It is simply not enough to state that commercial archaeology is all about data gathering when the data is not usable and the quality of reports leaves a lot to be desired. Furthermore, multiple voices must be heard in the decision-making processes associated with commercial archaeology (Hodder 2002). Lastly, archaeologists in southern Africa must take the issue seriously if they are to make good contribution to society and to shake off the colonial baggage of the discipline.

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Cross-References

- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Ethics of Commercial Archaeology: Australia
- ▶ Ethics of Commercial Archaeology: Brazil
- ▶ Ethics of Commercial Archaeology: Japan
- ▶ Ethics of Commercial Archaeology: Nigeria
- ▶ Ethics of Commercial Archaeology: USA
- ▶ Ethnic Identity and Archaeology
- ▶ Stakeholders and Community Participation
- ▶ Vandalism and Looting (Ethics)

References

Chirikure, S., and G. Pwiti. 2008. Community involvement in archaeology and heritage management: Case studies from southern Africa and elsewhere. *Current Anthropology* 49 (3): 467–485.

Chirikure, S., M. Manyanga, W. Ndoro, and G. Pwiti. 2010. Unfulfilled promises: Community participation at some of Africa's World Heritage sites. *International Journal of Heritage Studies* 16 (1 & 2): 30–44.

Deacon, J. 1992. *Archaeology for planners, developers and local authorities*. Cape Town: National Monuments Council.

Dunnell, R.C. 1984. The ethics of significance decisions. In *Ethics and values in archaeology*, ed. E.L. Green, 62–74. New York: Free Press.

Goudswaard, B., J. Bos, S. Van Roode, and H. Pape. 2012. Forward with reverse archaeology on a new method for utilizing the past in spatial planning. *Heritage & Society* 5 (1): 137–144.

Hall, M. 1989. Contract archaeology in South Africa. *South African Archaeological Bulletin* 44: 63–64.

Hall, M. 1990. Hidden history: Iron Age archaeology in southern Africa. In *A history of African*

archaeology, ed. P. Robertshaw, 59–77. London: James Currey.
Hall, M. 2005. Situational ethics and engaged practice: The case of archaeology in Africa. In *Embedding ethics: Shifting boundaries of the anthropological profession*, ed. L. Meskell and P. Pels, 169–196. Oxford: Berg.
Hodder, I. 2002. Ethics and archaeology: The attempt at Catalhoyuk. *Near Eastern Archaeology* 65 (3): 174–181.
In, J.R. 1992. Without ethics and morality: A historical overview of imperial archaeology and American Indians. *Arizona State Law Journal* 24: 11–34.
Kintigh, K.W. 1996. SAA principles of archaeological ethics. http://www.saa.org/Portals/0/SAA/publications/SAAbulletin/14-3/SAA9.html
MacIver, R. 1906. *Medieval Rhodesia*. London: Macmillan.
Pwiti, G. 1996. Let the ancestors rest in peace? New challenges for cultural heritage management in Zimbabwe. *Conservation and Management of Archaeological Sites* 1: 151–160.
Scarre, C., and G.F. Scarre. 2006. *The ethics of archaeology: Philosophical perspectives on archaeological practice*. Cambridge: Cambridge University Press.
Sheperd, N. 2006. What does it mean to give the past back to the people? Archaeology and ethics in the postcolony. In *Archaeology and capitalism: From ethics to politics*, ed. Y. Hamilakis and P. Duke, 99–114. London: UCL Press.
Wylie, A. 1996. Ethical dilemmas in archaeological practice: Looting, repatriation, stewardship, and the (trans) formation of disciplinary identity. *Perspectives on Science* 4 (2): 154–194.

Ethics of Commercial Archaeology: USA

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Introduction

Once upon a time, most archaeologists were employed by academic institutions and museums. Today in the United States and other countries, most archaeologists – and many historians, architectural historians, historical architects, and a few cultural anthropologists and geographers – are employed by profit-making commercial companies engaged in work on behalf of government agencies and private development interests. Working in this context can present ethical challenges for which many archaeologists (among others) are ill prepared.

Definition

As used here, "commercial archaeology" means archaeology conducted by profit-making commercial entities such as consulting firms. Some such firms are purely archaeological in character; others work more broadly with "heritage" or "cultural resources," variously defined. Others are more generalized still, engaging in broad-scoped environmental impact assessment (EIA). Many are architect/engineer firms organized to support the design, construction, and operation of dams and reservoirs, pipelines, energy production schemes, irrigation and agriculture programs, mineral extraction, logging, protected area management, housing schemes, urban development, military base management, and other rearrangements of the earth's surface to accommodate perceived modern human needs. A few specialize in the recovery of commercially valuable objects from shipwrecks and similar contexts.

"Ethics" as used here refers to the moral principles governing or guiding an individual or group – in this case archaeologists who practice in commercial contexts.

Key Issues/Current Debates

Although there have been commercial aspects to archaeology since the field's inception (see, e.g., the wheeling and dealing in early Egyptology documented by Noel Hume (2011)), the development of a self-consciously commercial archaeology sector began in the 1970s, at least in the United States. This sector arose in response to the enactment of laws requiring EIA (notably the National Environmental Policy Act of 1969) and providing for special attention to be paid to historic places including archaeological sites (notably Section 106 of the National Historic Preservation Act of 1966). Agencies of the US government, and by extension those seeking financial assistance or permits from such agencies, now (in theory) had to ascertain

what impacts their planned actions might have on archaeological sites, among other aspects of the environment, and they often had to do things – like excavation of such sites – to avoid, reduce, or otherwise mitigate project impacts. These requirements created a market for archaeological survey and excavation that quickly became too big for the universities and museums to satisfy. Moreover, agency planning schedules could not easily accommodate the leisurely pace of academic-/museum-based archaeological research and often required that attention be paid to places and research problems in which academic- and museum-based archaeologists had little interest. As a result, the traditional archaeological institutions tended (and tend) to disdain commercial work. The commercial archaeology sector arose to fill the gap.

In 1979, a debate between James Fitting and Albert Goodyear in the *Journal of Field Archaeology* highlighted the central ethical issue that confronts commercial archaeologists: Whose interests are they to serve? Fitting, an early lion in the field, argued that the commercial archaeologist's primary obligations are to his or her client. Commercial archaeology, he said, must be "client oriented" and is incompatible with the academic model of archaeology as knowledge production. Goodyear, based in an academic research institute, warned that client-oriented archaeology tempts archaeologists to "write off" sites that lie in the way of a client's project, as "a profit- maximizing strategy that minimizes the costs of field work, analysis, and writing, and.. can engender a good business relationship with clients" (Fitting and Goodyear 1979: 355).

It should be noted that neither Fitting nor Goodyear expressed interest or concern for the value an archaeological site (or other piece of "heritage") may have for purposes other than archaeological research. This was characteristic of the times.

As commercial archaeology has developed, Fitting's model has been implicitly accepted by virtually everyone. Like it or not, commercial archaeology is not directed toward learning about the past for its own sake, for the sake of scientific and humanistic research, for sustaining a community's heritage, or even for the sake of enlightening and entertaining the public. Rather, it is directed toward compliance with laws and regulations that government agencies enforce with widely varying degrees of rigor and intelligence and that clients typically regard as costly nuisances. Archaeologists and their historical, architectural, anthropological, and geographic colleagues must perforce orient their work with reference to – though not necessarily in sympathy with – their clients' interests and needs.

This results in a range of common ethical dilemmas. For instance, what is the ethical course of action for an archaeologist in each of the following cases?

1. The client's project will destroy a number of archaeological sites. The archaeologist is charged with evaluating them. If she evaluates them as significant, it will be costly for the client, who will be expected by government regulators to protect them or subject them to expensive, time-consuming excavation. The client may well fire the archaeologist and hire another who will say the sites are not significant. How should she evaluate the sites?
2. The client needs for surveys of potentially threatened sites to be done quickly, in order to meet project planning and financing schedules. The client also wants the work to be done as inexpensively as possible. The archaeologist thinks that the nature of the area and its sites demand more time-consuming and costly studies. The archaeologist stands to gain financially from conducting such studies. What should he propose and how?
3. The client's project will destroy places – maybe archaeological sites but perhaps simply natural landscapes (such as mountains or rivers) or landscape features like rock outcroppings or groves of trees – to which a local community may ascribe cultural or spiritual significance. The community is not skilled in interpreting the environmental and historic preservation laws. The client feels no obligation to attend to the community's interests and expects the r archaeologist to concern herself only with places that she, the archaeologist, thinks have research value. What should the archaeologist do?
4. The client's project will destroy places – maybe archaeological sites, maybe indigenous

spiritual places, and maybe historic buildings, landscapes, or whole communities – in whose evaluation and management the archaeologist has no expertise. The client expects the archaeologist, as their cultural heritage expert, to help them solve whatever problems these places present for the project, despite the archaeologist's lack of qualifications to do so. How should the archaeologist respond?

5. The client's project will destroy archaeological sites that could be preserved in place for perpetuity, but excavating them will simplify the client's development. The client is willing to pay well for the excavation, which itself will destroy the sites. Should the archaeologist agree to excavate the sites or argue for their preservation?
6. The client funds an expensive excavation that produces a large collection of objects and records. No nearby institution is equipped to care for this collection in perpetuity. The client plans to sell the collection after analysis and reportage is complete. Assume that no law forbids this. How should the archaeologist respond to the client's plan?
7. Or the client negotiates an arrangement with the putative descendants of a 4000-year-old site's residents to rebury everything excavated, without analysis and reportage. Again, assume that no law forbids this. Should the archaeologist, who will be paid well to do so, excavate the site?

These are only a few simplified examples of the ethical conundrums that commercial archaeologists routinely face; there are many others and many permutations on each. There are often no obviously right or wrong answers.

Many such conundrums result simply from the economic relationship between the client and the commercial archaeologist. As long as clients hire, and hence can fire, commercial archaeologists, it will be difficult if not impossible for archaeologists to adhere to ethical standards that do not very powerfully take the client's priorities into account. Some (like Fitting) argue that the commercial archaeologist is ethically obligated to accept and seek to advance the client's interests, as a member of the client's team. Others (like Goodyear) propose that the commercial archaeologist's core ethical obligation is to archaeological resources themselves – to sites, to their contents, and to the information they contain. Still others hold that one's primary obligation is to descendant or putatively descendant communities, where they exist, or more generally to the public interest, which may have many facets and internal contradictions. Ethical codes promulgated by archaeological organizations (cf. Register of Professional Archaeologists n.d.) provide only generalized guidance and affect only archaeologists willing to accept them; they have no effect on clients. In the end, they who pay the piper call the tune, and in commercial archaeology, it is the client who pays the piper. Some question whether this is a good model for archaeological – or more broadly for cultural or environmental – resource management (cf. King 2009), but as of 2017, it is the model with which commercial archaeologists work.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Management: Cost and Benefit of Change
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Ethics in Archaeology
- ▶ Ethics of Commercial Archaeology: Australia
- ▶ Ethics of Commercial Archaeology: Brazil
- ▶ Ethics of Commercial Archaeology: Nigeria
- ▶ United States: Cultural Heritage Management
- ▶ US Domestic Archaeological Heritage Law
- ▶ Stakeholders and Community Participation

References

Fitting, J.E., and A.C. Goodyear. 1979. Client-oriented archaeology: An exchange of views. *Journal of Field Archaeology* 6: 352–360.

King, T.F. 2009. *Our unprotected heritage: Whitewashing destruction of our natural and cultural environment*. Walnut Creek: Left Coast.

Noel-Hume, I. 2011. *Belzoni: The giant archaeologists love to hate*. Charlottesville: University of Virginia Press.

Register of Professional Archaeologists. n.d. Codes and standards. Available at: http://rpanet.org/?page=CodesandStandards. Accessed 1 Apr 2017.

Further Reading

Garrow, P.H. 1993. Ethics and contract archaeology. *Practicing Anthropology* 15 (3): 10–13.

King, T.F. 1983. Professional responsibility in public archaeology. *Annual Review of Anthropology* 12: 143–164. Available at: http://www.annualreviews.org/doi/abs/10.1146/annurev.an.12.100183.001043. Accessed 1 Apr 2017.

Stapp, D.C., and J. Longnecker. 2009. *Avoiding archaeological disasters: Risk management for heritage professionals*. Walnut Creek: Left Coast Press.

U.S. National Park Service. n.d. Archeology law and ethics. Available at: http://www.nps.gov/history/archeology/public/publicLaw.htm. Accessed 1 Apr 2017.

Ethics of the Archaeological Record

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Introduction

Why Digging Could Be Seen as a Problem in Archaeology

"Archaeologists dig; whatever the variation in methodology, at least archaeology involves digging." Ian Hodder already objected to this notion because of the complexity of the digging process (Hodder 1999: 18). That process is indeed complex on its own, and within the present day situation of it being subdued to the context of heritage management, we pose the question: Why dig at all? What is the goal of archaeology, and are we reaching it by digging?

Some scholars have already stated that digging is not necessarily synonymous with archaeology (Lucas 2001: 2). However, the daily reality is different as it is also reflected in how staff and students view the role of fieldwork in their academic curricula (Croucher et al. 2008). Archaeologists are intervening more, being more present during fieldwork, preserving more in situ, and digging "better" (according to the current logic of professionalization and of standardization of procedures), and this has become a generally accepted guarantee for the quality of archaeologists' work. As such, digging has been presented as a positive development for archaeology, cultural heritage management (CRM), and for the protection and understanding of the past in general.

In many cases, this assertion was and is true, and some archaeological sites were and are excavated, preserved, and studied in a really efficient and productive way (Demoule 2004; Bradley 2006). Over the past four decades, national and international regulations (including charts, codes, and treaties such as the Malta Convention in Europe (European Convention on the Protection of the Archaeological Heritage 1992)) have encouraged archaeological activities. This has included two different functions:

1. Preserving heritage in situ, when this did not compromise development
2. Digging and removing the remains of the past to save them before destruction

As Pearson or Shanks highlighted, "[from the 1970s] after a flush of enthusiasm for digging, I was left profoundly disappointed by a discipline that seemed simply obsessed with a set of techniques (and not particularly good ones) for supposedly recovering the past" (Pearson and Shanks 2001: 6). Thus, what could be seen now as obvious practices for archaeology – digging or preserving – still requires further scrutiny and challenge.

Archaeologists do not necessarily support these current practices, but they do defend them,

or participate in their application because this is the only activity understood and recognized by authorities, developers, and often the public (Lipe 1996: 26; Zorzin 2010: 189). This activity also guarantees the very existence of archaeology and defends archaeologists' career opportunities and salaries (Shanks and McGuire 1996: 79). Moreover, it was and is what archaeologists identify themselves with. Digging up artifacts was the core business of the first archaeologist, and it still forms a major attraction for (potential) students (Croucher et al. 2008: 29–30).

In our opinion, these developments need to be regarded as problematic. Because of the absence of an interpretative stage and a dissemination phase in the archaeological process (Lipe 1996: 24; Cumberpatchm and Blinkhorn 2001: 39; Bradley 2006: 8; Willems 2009: 91), accumulation of artifacts and of data is what is now the present day reality expected from archaeologists. It should also be noted that archaeologists too have contributed to this expectation and therefore should take their own responsibility in this matter. Within this logic, archaeologists are technicians of the past. The reality is, however, that archaeological activities are mostly based on an accumulation process that primarily serves the interests of a client by removing the problematic remains/structures as quickly and as cheaply as possible (Everill 2009: 2; Demoule 2010: 13–14). As such, we want to argue that nobody is benefitting from the accumulation of data and artifacts.

Furthermore, the world has been experiencing an economic crisis since 2007–2008 and it is likely that this will affect all sectors of archaeological practice (Schlanger and Aitchison 2010: 10), another reason for challenging current practices.

Archaeology matters, as Sabloff (2008) pointed out, and we do not wish to debate the importance of archaeology within present day society. On the contrary, we would like to state that by marginalizing the role of archaeological digging, we can actually focus on the production of knowledge rather than data and *improve* our contribution to society.

It is our belief that reflexive thinking should generate new questions about the nature of archaeological practice, its products, and its public, and these questions deserve to be formulated within the frame of ethics, because no ethical decisions can be made about archaeology without a critical approach to its aims and practices. We think an ethical archaeological practice should not be framed and limited by codes and regulations but on the contrary, permanently evolve and adapt to every situation and location where archaeologists are active.

Now, the question is, is digging in itself an ethical action? Does it answer the aims we have set ourselves?

Definition

Commercial Archaeology: Commercial archaeology, referred to as "developer-funded" archaeology, mostly developed in the western world, since the end of the 1970s, and defined as a service to a client. Most commercial archaeological activity relates to a specific area threatened by or uncovered by construction or development, and as such often equates with salvage archaeology. Commercial archaeology operates as a preservation device by record.

Archaeological Heritage Management: Policies of systematic protection of the past (Lowenthal 1998) have been transposed into the world we are living in – that is, in a capitalist organizational structure – through various legal tools and management concepts, from one of which is particularly active and gaining in popularity: Cultural Resource Management or Archaeological Heritage Management (CRM & AHM). In archaeology, CRM or AHM could be defined as a process consisting of the protection and the management of a large range of cultural heritage material, aiming to give the past some importance in the present and particularly in the present where urban growth and fast development are putting more and more pressure on material heritage.

Neoliberalism: This theory of political economic practices proposes that "human well-being can best be advanced by liberating individual entrepreneurial freedoms and skills within an institutional framework characterized by strong

private property rights, free markets, and free trade" (Harvey 2005: 2).

Since the 1970s, during a long period of elaboration of laws and regulations concerning archaeology, a process proper to neoliberal ideology affected the way archaeology was conceived and organized (Zorzin 2011).

Public Archaeology: A term that has been extensively debated over the last decade because of its wide-ranging consequences for the archaeological practice and its multidisciplinary approach. We argue that it is much more than a tool to achieve the goal of bringing the past to the public; it is also about democratizing the past through research and social action.

Historical Background

The nature of archaeological practice has been very much centered around the focus on digging up material remains; a large factor in the development of archaeology as a science (Lucas 2001: Introduction; Dyson 2006). As shown in many studies, within the framework of capitalistic thinking, this has led to a commodification of these material remains (Hamilakis and Duke 2007). According to this logic, material remains were not only our main source of information, but they also became our "capital." As such, it was natural that the more we saved of it, the better. Digging them up, saving them from destruction or oblivion, studying them, and protecting them, are all acts that we perform as archaeologists. We study the relationship between human beings and objects in the past while developing our very own relationship with these objects in the present, going as far as acting as though we possess them (Fouseki 2009). We would like to argue that recovering material remains has changed from being a professionalized hobby to a form of sacred mission ("saving our capital," as a goal per se), under the present day circumstances.

Over the past 50 years, archaeology in the western world has slowly been enforced in developers' planning processes (Willems 2009: 89). Activities were framed by laws and regulations and accompanied by self-regulatory codes of ethics and guidance for good practice created by archaeologists themselves (e.g., Society for American Archaeology – USA 1996, World Archaeological Congress – USA 1990, The Institute for Archaeologists – UK 2010 (revised), European Association of Archaeologists 2009). During this period, archaeologists struggled to impose the intervention of archaeologists every time the past was threatened (Lipe 1996), and it was generally agreed that the survival of the past depended on digging and/or preserving, and accumulating records (Lynott 1997: 593). Soon, these developments were perceived as potentially problematic, especially the concept that presented archaeologists as "stewards of the record" (Hamilakis 2003: 107; Hamilakis and Aitchison 2009 April 4th, on Radio 4 – UK, online; Carver 2010: 935). This was because, in commercial archaeology, the saving of the "record" involves using most exclusively a technically formatted report (Bradley 2006: 6).

Now, to explain and justify their activities to the public, archaeologists have often claimed that they preserve the material remains of the past for the common good and for future generations (King 2005: 28; Global Heritage Fund 2010: 11–12; Carver 2010: 935). This is a clear and simple objective, which defines a logical mission for professional archaeologists that can be understood by all.

As such, definitions of archaeological heritage management (or CRM) seem to describe a universal protective mission for archaeology, dedicated entirely to the salvation of the remains of the past.

As argued by Ferris and Cannon:

> the rise of CRM archaeology [in Ontario (Canada), is] borne of an urgency to document and recover – accumulate – the archaeological record threatened by the largely unintentional destructive forces of land use development and resource extraction [. . .] (Ferris and Cannon 2009: 2).

In commercial archaeology, this mission had been widely accepted because it simply makes sense on the daily basis, and it gives jobs and incomes to many archaeologists (Dries 2010: 57). Even if jobs are precarious and even if they involve difficult living and work conditions, archaeologists still do archaeology because they

believe in this mission that often consists uniquely of saving what can be saved (Everill 2009: 159–61; Zorzin 2010: 4, 157, 161–2).

Yet, behind this positive and virtuous frontage which gives an obvious role in society to archaeology, CRM is also a highly political device which translates the dominant preoccupations, ideologies, and thoughts of the present into the choices made for and of a past. CRM is also involved in the interpretations of a selected past (McManamon et al. 2008: 17), while it might occasionally reinforce identity and enrich the present in various ways (Holtorf 2005a: 1–15). In doing so, the individuals involved in CRM are in fact "setting the agenda" for archaeology and for national communities by facilitating or denying access to archaeological products – products standardized in various ways to echo the expectations of different clients/publics/scientists.

An Accumulative Archaeological Practice, Born Out of Capitalist Logic

According to King: "Salvage [archaeology is made] to save information for future use" (2005: 28), but this often commonly accepted goal for archaeology seems nowadays unsatisfying.

It does so because this process of accumulation allows the postponement or the discharge from all other implications that the digging can and should involve, which also entails postponing or avoiding costs. It could be emphasized here that, in terms of costs, archaeology represents a very small part of developers' budgets (Zorzin 2010: 104). The real cost of archaeology for developers is the unplanned loss of time, which might provoke an increase in costs due to material and workforce standby. In the end, because of this time and money pressure exerted by developers, it might also and simply prevent archaeology to be performed in accordance with the basics standards of archaeological or preservation practices.

This process of accumulation was created under the pressure of various cultural politics – the intermediary between the neoliberal economic logic and the practice of archaeology; archaeological activities resulted in the application of the following concepts as the right thing to do or "common sense" (Harvey 2005: 68): (1) fragmentation, (2) standardization of actions, and, most of all, (3) demonstration of profitability and quantifiability. In the short term, this resulted in a major increase in the quality and traceability of archaeological work (Bradley 2006; Willems 2009: 90), but it also came with major unexpected and long-term complications.

First, archaeological products were fragmented into different actions, by different people or organizations. Specializations appeared in archaeology, and new professions emerged with more and more specific skills, often focused on scientific data collection, analyses, and preservation (involving physics, biology, chemistry, geophysics, and computer sciences). This process resulted in a fantastic increase in the accumulation of data and artifacts, (Ferris and Cannon 2009). Moreover, fragmentation of the discipline has also led to fragmented and highly specialized knowledge that fewer people are interested in or want to pay for (Hodder 1999: 17). As a matter of fact, specialization could be seen in this case as a form of professional fetishism or as "commodity fetishism" (Marx 1867: Chapter 1 section 4). This means that a value has been given to this fragmented knowledge and recognized by all (including archaeologists) through its objective and materialistic characteristics. As such, the pieces of the puzzle (which is the past) have been multiplied but not always by keeping in mind why they were used, which questions they were intended to answer, and what problematic they hoped to resolve. As an example, many costly technologies have been introduced into commercial archaeology, such as topographical technology, which provides high accuracy in plan making, drawings, and the localization of artifacts. However, what is the point of such an accumulation of precise data without a larger theoretical questioning or simply a more global framework for archaeology? In this sense, we regard fragmentation within archaeology as a potentially fetishist feature, or as self-indulgency within the archaeologist community, to simply multiply jobs in a sector without ensuring career prospects.

Second, archaeology was standardized under more and more complex ethics codes and charts of practice, precisely defining and framing every archaeological act into a "systematic" (to use a

biochemical term, which refers to a repetitive operation that has to be performed in exactly the same way every time it is done). This "systematization" accumulated all sorts of data from sites, without any differentiation between periods, material, time frame, budgets, and most of all, without any consideration of a problematic. The virtue of such an approach is of course to avoid missing any data and preserve potential unknown data for the future. . . but it also generated a massive flow of data that we are not able to deal with and unable to hierarchize in the bigger picture.

Finally, archaeology was asked to provide quantifiable results (i.e., measurable results, numbers of m^2 excavated or protected, numbers of pits, numbers of pictures and drawings) that could justify its costs to the clients and/or to the citizens. Through this rigorous process developed in the last decades, archaeology succeeded in demonstrating its value and ability to adjust to an organization of work based on capital. CRM, clients, developers, and (sometimes simultaneously) funders were able to see and understand what archaeologists were doing. Thus, archaeologists finally gained the professional and social recognition they had been seeking since the beginning of professionalization in the 1970s. Nevertheless, this development came with a dark side. By accepting the rules of the neoliberal economy, archaeologists ended up compulsively collecting archaeological records. The result has been a routinization of work with obligations of immediate and quantifiable results, which are in fact disappointing in serving archaeology and archaeologists' interests.

Current Debates

What Is the Product, Who Is the Client?

The CRM agenda tended to convert archaeological production, initially conceived for the scientific community, for the state (by law), and in the end for the public, into an archaeological product made for developers. It should also be noted that these products are increasingly produced by private units and in smaller and decreasing proportions by universities and public services of the state (Willems 2009: 90–1).

McManamon et al. also focus on another opposed phenomenon defined by the term "community archaeology," which is characterized by an emphasis on how archaeology impacts upon people (2008: 19). This opposition between professionalization and "community archaeology" resulted in a dichotomy within archaeology. This dichotomy is problematic in archaeology caused by the impossibility for archaeologists to define a stable client for their product (as the market economy suggests). This situation leaves archaeologists torn between their own scientific interests – supporting the interests and needs of specific corporate clients or supporting the interests of the public and specific communities, interests which are often in opposition to each other. In the end, this results in archaeologists serving neither their own needs nor the ones of other clients. In all cases, it brings little satisfaction to all.

When the client/developer is paying for the archaeological act, the combination between archaeological units and clients' requirements seems incompatible. This is the case because the relationship between the two actors is unbalanced and archaeology is not in position to impose an ethic work and the highest standards of practice when the interests of the clients are in complete contrast to this. As an example, in Australia in 2011, a journalist from a *The Sydney Morning Herald* wrote: "An archaeologist claims she deleted key sections of a survey of Aboriginal heritage sites commissioned by *Fortescue Metals Group* (FMGL) [A corporation essentially extracting iron] because she feared she would not be paid for the work if she did not" (Mayman 2011).

Because of this unbalanced relation between the client and the archaeological firm, the possibility of financial pressure exists, and this is problematic enough to be emphasized. Also, in these conditions, the results of the digging process only seem to serve client interests, which are "cleaning the soil" (Demoule 2010: 14) and going against the basic objectives and codes of ethics and practice of archaeology.

This rather pessimistic situation is being countered by an initiative that was taken up some 2 years ago by a Dutch commercial archaeological company, who labeled it "Reverse Archaeology"

and whose aim is to create a win-win situation for all the parties involved – the developer, the archaeological company, the public, and local government. The idea is that archaeological practice and products could be seen as an important additional "value" to landscape and spatial planning (within the CRM logic that we referred to before), but to achieve this, one needs to reverse the archaeological process. That is, thinking about a favorable outcome before the shovel hits the soil. The idea is that the attention should be shifted from fieldwork to research goals, and one of the major key points of reverse archaeology is that we should not dig for the sake of digging alone. Location is a key factor in this process, since the outcome is connected to specific local needs – histories, communities, and economy. Because of this, in theory useful outcome, the process, could be described as "capitalizing the past," in the sense that it makes the past economically and socially "profitable" and valuable (Goudswaard et al. 2010).

Owning the Past

So far, Dutch academic archaeology has been neglecting or even mocking this initiative and accusing archaeological units of "selling out the agenda of scientific archaeology" (Holtorf 2010: 26). Academics seem to have difficulties with these ways of making the past "profitable," neglecting the fact that they are also making a living out of archaeology themselves. Besides, are academic archaeologists acting any differently? Do they not contribute in their own ways to the capitalization of the past by accumulating archaeological data and sometimes jealously withholding it from others by stacking it away in depots, turning the archaeological objects into highly wanted and valuable goods for collectors and museums?

> What is the psychology of collecting? What is it that impels people to transform their fascination with the past into a lust to own it? (Fagan 1996: 241).

Who owns the past and its remains (Gibbon 2005)? This is a subject that has been debated by many scholars lately (Cartman 2005; Duineveld 2006; Hamilakis 2007) and that has to some extent been aroused (at least in some countries) by the Faro convention of 2005 (Council of Europe Convention on the Value of Cultural Heritage for Society 2005; Article 2-*definitions* and article 12 – *Access to cultural heritage and democratic participation*). According to this convention, which has been ratified by several European countries, the past belongs to everybody and *everybody* should have some say in what (archaeological) heritage is and what we should do with it. As mentioned earlier, in the present situation, the public does not benefit directly from archaeology. Numerous material remains never make it out of the depots to be put on display for the public and for analyses, and research is not elaborated (Ferris and Cannon 2009) or often specifically produced for peer reviewing (Holtorf 2005b: 546).

So it has been suggested lately that the (research) agenda might be defined by the public, or by archaeologists in collaboration with the public, and with specific communities (Holtorf 2005b). Archaeology should adapt research agendas to a bigger public and connect to a larger public in order to be "in" the society while adopting a more pro-"-geschictscultur" (Holtorf 2010: 26). Archaeology should have a social relevance, and this can be economic and scientific, but it should be, above all, about giving meaning to the past of *everybody*.

Future Directions

What Should Be Done to Change This Situation?

By summing up the situation in Ontario, Canada, Ferris and Cannon have actually said it all:

> In short, given the scale of CRM and scale of material accumulation, the degree of degradation to existing collections occurring now, and the inability for that accumulated material to be accessed, let alone facilitate research, the status quo is simply not sustainable (Ferris and Cannon 2009: 10).

We would like to take this discourse one step further and ask the question: What would happen if we stop digging altogether? Let us pause for a second and reflect on this possibility. As archaeologists, we have been drawn into the

Archaeological Heritage Discourse (Waterton and Smith 2009) by being appointed as stewards of the remains of the past, thus *creators* of heritage. This has led us to a point where we believe that what lies beneath the soil is *potentially* valuable and thus worth conserving. Because of this, we dig. But our attachment to this materiality may lead to an unnecessary preservation and overvaluing of these "goods," producing, in the end, nothing more than a commodity (Hamilakis 2007: 16–18) while trying to cope with the effects of these objects and heritage sites on present day society. Waterton and Smith made a good point when they stated that archaeology as a discipline does not have all the answers when it comes to issues of heritage (Waterton and Smith 2009: 10). Moreover, it may actually have hindered the intellectual growth of the discipline (Waterton and Smith 2009: 5).

If archaeologists stop digging, much potential information would be lost, and we would seriously jeopardize our carefully constructed authority. The risk would be that others would take over this task without possessing the proper training-background or even affinity with the past. Needless to say, many jobs would be lost. Another risk could be that we would withdraw into our depots and libraries to dust off our previously acquired goods in order to play the role of antiquarians once again, producing specialized knowledge for the elite.

Alternatively we could maintain our presence in society and invest more time, money, and efforts in regional mapping (land-use planning, with archaeological expectations defined on a detailed level) or in preventive archaeology (by considering archaeology in a very early stage of the planning process). This would save resources on the long run and responds to one important goal of the Malta Convention: Conservation of archaeological remains in situ (Verslag 2011: 1; Reijden et al. 2011: 9–12). The present day situation of digging overly has passed by this important element of heritage management, which could be considered as an extreme form of protection. The retrieval of data and the protection "ex situ" has up to now been the cheaper solution (Verslag 2011: 9). However, it should be noted that with space being scarce in, for example, the Netherlands, the value of material remains in the soil will be viewed very critically, so records might be lost forever. Working with and for the public could make a difference in our lobby, but it may also present the possibility that some remains will be lost because the general public simply does not pay attention or is not well informed. Are we ready to accept this possibility? Especially after all our struggles preceding the Malta treaty? Is all that has been gained then lost (Newman 2009)? This is worth debating and preferably not solely in the form of a scientific and theoretical discourse but rather *within* society.

Leaving to one side for a moment our responsibility as agents of archaeological heritage, what would it mean for scientific research if we did not dig anymore? Certainly with what we've dug up so far, we could proceed for quite some time with the production of lots of interesting new facts or "old facts" updated with new knowledge. As Lucas showed, many advantages were gained in the past by those who studied material that was collected by others (Lucas 2001: 3–5). Advantages will be for example:

1. To stop or drastically reduce digging will force us to come up with new methods of producing knowledge.
2. It will stimulate more creativity in communicating knowledge to a larger public.
3. It will force us to cooperate on a global level with data comparison and data sharing.
4. It will create new scientific crossovers and stimulate interdisciplinary research projects with multiple research goals.
5. Other ways of producing science that is more community based will develop.
6. It will produce more efficient and innovative methods of storing and protecting our archaeological data.
7. It will produce new methods of more efficient data analysis.

An important additional benefit will be that by digging less, we are acting in a more sustainable way, taking thus our responsibility in a society that is increasingly troubled by environmental

and financial crises that strain all our resources. A sustainable archaeology would mean:

- Exploring and publishing already dug up material that is now lying unused in numerous depots
- Giving this back to the public, who financed it in previous years
- Letting the public determine new research questions
- Developing prospects for a collaborative archaeology between archaeologists and communities
- Stepping away from the logic of the commodification of the past by a redefinition of the concepts of values in heritage, redirecting this notion towards knowledge production, and social involvement instead of data and artifacts accumulation

Now, according to our arguments, the performance of an ethical archaeology could be accomplished by the following general agenda – an agenda only conceivable by taking some distance from the present economic corporate model. This agenda can be presented as follows:

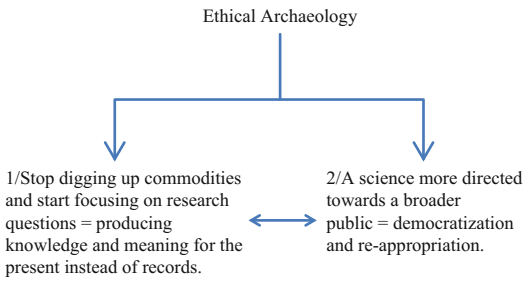

In the end, to the question "is digging in itself an ethical action today?," the answer seems to be that archaeology is not in a position to create an ethical product, given the organizational or ideological constraints it has to deal with nowadays. Economic market and competitive tendering seem to have redirected and focused the interests of archaeologists on the process of digging while we argue that, nowadays, in the interests of all, digging should be limited or avoided in the long term, in order to readdress archaeological activities towards public interests.

In this entry we made an attempt to start the debate about one of the *core* activities of archaeologists. As we have tried to show, there are other archaeological activities that can be practiced as satisfying alternatives. The option of *not* digging should be sometime seriously considered by commercial archaeological companies as well as by the academic world.

Cross-References

- ▶ Archaeological Resource Management: The Changing Role of the State
- ▶ Archaeological Stewardship
- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Avocational Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Community Engagement in Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Ethics of Commercial Archaeology: Australia
- ▶ Global Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage: Public Perceptions
- ▶ Journal of Cultural Heritage Management and Sustainable Development
- ▶ Materiality in Archaeological Theory
- ▶ Media and Archaeology
- ▶ Multivocality and Archaeology
- ▶ Nationalism and Archaeology
- ▶ Netherlands: Cultural Heritage Management
- ▶ Pragmatism in Archaeological Theory
- ▶ "Public" and Archaeology
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Stakeholders and Community Participation

References

Bradley, R. 2006. Bridging the two cultures. Commercial archaeology and the study of prehistoric Britain. *The Antiquaries Journal* 86: 1–13.

Cartman, J. 2005. *Against cultural property: Archaeology, heritage and ownership*, Duckworth Debates in archaeology. London: Duckworth.

Carver, M. 2010. Editorial. *Antiquity* 84: 935–938.
Croucher, K., H. Cobb, and A. Brennan. 2008. *Investigating the role of fieldwork in teaching and learning archaeology*. Liverpool: The Higher Education Academy's Subject Centre for History, Classics and Archaeology.
Cumberpatchm, C., and P. Blinkhorn. 2001. Clients, contractors, curators and archaeology: Who owns the past? In *The responsibilities of archaeologists – Archaeology and ethics*, Lampeter Workshop in Archaeology 4; BAR International series 981, ed. M. Pluciennik, 39–45. Oxford: Archaeopress.
Demoule, J.-P. 2004. *La France archéologique: Vingt ans d'aménagements et de découvertes*. Vanves: Hazan.
Demoule, J.-P. 2010. The crisis – economic, ideological, and archaeological. In *Archaeology and the global economic crisis*, ed. N. Schlanger and K. Aitchison, 13–18. Tervuren: Culture Lab Editions.
Duineveld, M. 2006. *Van oude dingen en mensen die voorbij gaan. Over de voorwaarden meer recht te kunnen doen aan de door burgers gewaardeerde cultuurhistorie*. Proefschrift Universiteit van Wageningen.
Dyson, S. 2006. *In pursuits of ancient pasts. A history of classical archaeology in the nineteenth and twentieth centuries*. New Haven/London: Yale University Press.
European Convention on the Protection of the Archaeological Heritage. 1992. Valletta, 16 Jan 1992. Available at: http://conventions.coe.int/Treaty/en/Treaties/Html/143.htm. Accessed 26 Nov 2011.
Everill, P. 2009. *The invisible diggers – A study of British commercial archaeology*, Heritage Research Series 1. Oxford: Oxbow Books.
Fagan, B. 1996. The arrogant archaeologist. In *Archaeological ethics*, ed. K.D. Vitelli, 238–243. Lanham: Altamira Press.
Ferris, N., and A. Cannon. 2009. *Capacities for a sustainable archaeology*. Conference held at the Ontario Archaeological Society Annual Meeting, Waterloo, 17 Oct 2009.
Fouseki, K. 2009. "I own, therefore I am": Conflating archaeology with heritage in Greece – A possessive individualism approach. In *Taking archaeology out of heritage*, ed. E. Waterton and L. Smith, 48–66. Newcastle upon Tyne: Cambridge Scholars Publishing.
Gibbon, K. 2005. *Who owns the past? Cultural policy, property and the law*. New Brunswick/London: Rutgers University Press.
Global Heritage Fund. 2010. Saving our global heritage for future generations, 2009–2010 Biennial Report. Available at: http://globalheritagefund.org/docs/GHFAnnualReport2010.pdf
Goudswaard, B., S. Van Roode, and A. Goudswaard. 2010. Kapitaliseren op het verleden met 'reverse archaeology'. *Ruimtelijke Ontwikkeling Magazine* 7 (8).
Hamilakis, Y. 2003. Irak, stewardship and 'the record' – An ethical crisis for archaeology. *Public Archaeology* 3: 104–111.
Hamilakis, Y. 2007. From ethics to politics. In *Archaeology and capitalism: From ethics to politics*, ed. Y. Hamilakis and P. Duke, 15–40. Walnut Creek: Left Coast Press.
Hamilakis Y., and K. Aitchison. 2009. Archaeology in crisis. Making history – BBC 4, Radio Program, 28 Apr 2009. Available at: http://www.bbc.co.uk/programmes/b00jxfqn
Hodder, I. 1999. *The archaeological process – An introduction*. Oxford: Blackwell Publishers.
Holtorf, C. 2005a. *From Stonehenge to Las Vegas – Archaeology as popular culture*. Lanham: Altamira Press.
Holtorf, C. 2005b. Beyond crusades: How (not) to engage with alternative archaeologies. *World Archaeology* 37 (4): 544–551.
Holtorf, C. 2010. *Search the past, find the present*. C.J.C. Reuvenslezing 22 presented at the 'Reuvensdagen', 40th annual conference on Dutch Archaeology, 11 and 12 Nov 2010.
King, T.F. 2005. *Doing archaeology – A cultural resource management perspective*. Walnut Creek: Left Coast Press.
Lipe, W.D. 1996. In defence of digging: Archaeological preservation as a means, not an end. *CRM* 19 (7): 23–27.
Lowenthal, D. 1998. *The heritage crusade and the spoils of history*. Cambridge: Cambridge University Press.
Lucas, G. 2001. *Critical approaches to fieldwork. Contemporary and historical archaeological practice*. London/New York: Routledge.
Lynott, M.J. 1997. Ethical principles and archaeological practice: Development of an ethics policy. *American Antiquity* 62 (4): 589–599.
Marx, K. 1867. *Capital*, Vol. 1. Available at: http://www.marxists.org/archive/marx/works/1867-c1/
Mayman, J. 2011. Miner 'demanded change to survey'. *The Sydney Morning Herald*, November 23, 2011. Available at: http://www.smh.com.au/national/miner-demanded-change-to-survey-20111122-1nszc.html. Accessed 26 Nov 2011.
McManamon, F.P., et al., eds. 2008. *Managing archaeological resources – Global context, national programs, local actions*. Walnut Creek: Left Coast Press.
Newman, M. 2009. Devil's advocate or alternate reality? Keeping archaeology in heritage. In *Taking archaeology out of heritage*, ed. E. Waterton and L. Smith, 170–192. Newcastle upon Tyne: Cambridge Scholars Publishing.
Pearson, M., and M. Shanks. 2001. *Theatre/archaeology*. London/New-York: Routledge.
Schlanger, N., and K. Aitchison. 2010. *Introduction. Archaeology and the global economic crisis*, 9–12. Tervuren: Culture Lab Editions.
Shanks, M., and R.H. McGuire. 1996. The craft of archaeology. *American Antiquity* 61 (1): 75–88.
Van den Dries, M.H., et al. 2010. A crisis with many faces. The impact of the economic recession on Dutch archaeology. In *Archaeology and the global economic crisis*, ed. N. Schlanger and K. Aitchison, 55–68. Tervuren: Culture Lab Editions.
Van Der Reijden, H., K. Geurts, and H. Van Rossum. 2011. Ruimte voor archeologie. Synthese van de themaveldrapportages. Available at: http://www.cultureelerfgoed.nl/Archeologie/Archeologie/Wetten%20en%

E

20regelingen/Evaluatie%20archeologiewet/Voortgang%20evaluatie/Definitiev
Verslag van de tweede veldbijeenkomst in het kader van de evaluatie van de archaeologie wetgeving op donderdag 9 juni 2011. Georganiseerd door de Rijksdienst voor Cultureel Erfgoed te Amersfoort. Available at: http://www.cultureelerfgoed.nl/sites/default/files/u6/Verslag%20tweede%20bijeenkomst%20evaluatie%20Malta.pdf
Willems, W.J.H. 2009. Archaeological resource management and academic archaeology Europe: Some observations. In *Quale Futuro per l'archaeologia?* ed. A.L. D'Agata and S. Alaura, 89–115. Roma: Dipartimento Patrimonio Culturale, Consigno Nazionale delle Ricerche.
Zorzin, N. 2010. *The political economy of a commercial archaeology – A Quebec case-study*. Unpublished dissertation, University of Southampton.
Zorzin, N. 2011. Contextualising contract archaeology in Quebec: Political-economy and economic dependencies. *Archaeological Review from Cambridge* 26 (1): 119–136.

Further Reading

Appadurai, A. 2001. The globalization of archaeology and heritage. *Journal of Social Archaeology* 1 (1): 35–49.
Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2008. *Collaboration in archeological practice*. Lanham: Altamira Press.
Hamilakis, Y., and P. Duke, eds. 2007. *Archaeology and capitalism: From ethics to politics*. Walnut Creek: Left Coast Press.
Harvey, D. 2005. *Brief history neoliberalism*. Oxford: Oxford University Press.
Matthews, C.N. 2010. *The archaeology of American capitalism – The American experience in an archaeological perspective*. Gainesville: University Press of Florida.
McGuire, R.H. 2008. *Archaeology as political action*. Berkeley/Los Angeles/London: University of California Press.
Okamura, K., and A. Matsuda, eds. 2011. *New perspectives in global public archaeology*. New York: Springer.
Peacock, A., and I. Rizzo. 2008. *The heritage game: Economics, policy, and practice*. Oxford: Oxford University Press.
Sabloff, J.A. 2008. *Archaeology matters – Action archaeology in the modern world*. Walnut Creek: Left Coast Press.
Schlanger, N., and K. Aitchison, eds. 2010. *Archaeology and the global economic crisis – Multiple impacts, possible solutions*. Tervuren: Culture Lab Editions.
Wainwright, G. 2000. Time please. *Antiquity* 74 (286): 909–943.
Waterton, E., and L. Smith, eds. 2009. *Taking archaeology out of heritage*. Newcastle upon Tyne: Cambridge Scholars Publishing.

Ethnic Identity and Archaeology

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Introduction

Of all forms of identity, ethnicity is possibly the one that has received attention in archaeology for the longest time. In fact, from its inception as an academic discipline in the late nineteenth century, one of the main goals of archaeology was the identification of ethnic groups in the past. In Gustaf Kossinna's words, "sharply defined archaeological cultures correspond unquestionably with the areas of particular peoples or tribes" (Kossinna 1911: 3). Many advocates of the archaeological approach to the past known as culture-history still adhere to those principles. In doing so, they turn the search for ethnic identities in the past into the primary goal of archaeology, to the point that some would now argue that to abandon the search for ethnicity is tantamount to denying archaeology its quality of a historical discipline (Bierbrauer 2008: 6). By contrast, proponents of the processualist approach to the past associated with the New Archaeology had little interest in ethnic (or any other form of) identity, as their goal was to move archaeology away from history and to bring it closer to science. Instead of answering the normative question "What do cultures relate to?," processualist archaeologists of the 1960s and 1970s concentrated on the adaptive role of the components of cultural systems, even if they still continued to accept the idea that some bounded archaeological distributions (if only in the domain of stylistic variation) correlated with past ethnic groups. A revival of interest in ethnic identity coincides with post-processualist concerns with context, symbols, agency, and history (Hodder 1982; Jones 1997). However, because in Central and Eastern Europe the culture-historical approach is still predominant, some have adopted

a completely agnostic approach, according to which ethnicity in the past is beyond the reach of archaeology, because the meaning initially attached to material culture symbols used for building ethnic boundaries will forever remain unknown (Brather 2004). Archaeologists should refrain from doing any research on ethnicity, and in the meantime focus on what they can really do, namely, study economic and social structures, social rank, religious behavior, and the like. At the root of this skepticism verging on nihilism seems to be a theoretical malaise and a profound misunderstanding of what ethnic identity is and how it works.

Definition

In the early twenty-first century, ethnicity has become the politicization of culture, a decision people take to depict themselves or others symbolically as bearers of a certain cultural identity. In the 1960s and 1970s, the debate was between those who argued that ethnicity was a matter of primordial attachments (primordialists) and those who regarded it as a means of political mobilization (instrumentalists). Today, very few would disagree with Max Weber's definition of ethnic groups as "human groups that entertain a subjective belief in their common descent because of similarities of physical type or of customs or of both, or because of memories of colonization and migration; conversely, it does not matter whether or not an objective blood relationship exists" (Weber 1922: 219). Ethnicity is not innate, but individuals are born with it; it is not biologically reproduced, but individuals are linked to it through cultural constructions of biology; it is certainly not just cultural difference, but no ethnic identity can be sustained without reference to an inventory of cultural traits. As the Norwegian anthropologist Thomas Hylland Eriksen put it, ethnicity must be regarded as the "collective enaction of socially differentiating signs" (Eriksen 1991: 141). Such an approach is largely due to the extraordinary influence of another Norwegian anthropologist – Fredrik Barth. He shed a new light on subjective criteria (ethnic boundaries) around which the feeling of ethnic identity of the member of the group is framed (Barth 1969). He also emphasized the transactional nature of ethnicity, for in the practical accomplishment of identity, two mutually interdependent social processes are normally at work – internal and external definition (the latter also known as categorization). Barth's approach embraced a predominantly social interactionist perspective derived from the work of the American social psychologist Erving Goffman. Objective cultural difference was thus viewed as epiphenomenal, subordinate to, and largely to be explained with reference to, social interaction. Studies of ethnic identity inspired by Barth thus suggest that an ethnic group is more an idea than a thing. It is not as much the group that endures as the *idea* of the group. It has been noted that cultural traits by which an ethnic group defines itself never comprise the totality of the observable culture, but are only a combination of some characteristics that the actors ascribe to themselves and consider relevant. People identifying themselves as an ethnic group may in fact identify their group in a primarily prototypic manner, with some recognizable members sharing some but not all the traits, and different traits being weighted differently in people's minds. How is this specific configuration structured and what mechanisms are responsible for its reproduction?

Attempts to answer this question resurrected the idea that ethnic groups are bounded social entities internally generated with reference more to commonality than to difference. Such an approach draws heavily from the French sociologist Pierre Bourdieu's theory of *habitus*, a system of durable, transposable dispositions, "structured structures predisposed to function as structuring structures" (Bourdieu 1990: 53). According to Bourdieu, those durable dispositions are inculcated into an individual's sense of self at an early age and can be transposed from one context to another. Ethnic identity is therefore the result of the intersection of one's habitual dispositions and the social conditions in existence within a particular historical context. That is why, once in action,

an ethnic group operates as a type of status group, the existence of which is represented through primordial attachments. In practice, ethnicity results from multiple transient realizations of ethnic difference in particular contexts of production and consumption of distinctive styles of material culture. Ethnic identity cannot be conceived without the manipulation of material culture. Ethnicity can be, and truly is, represented by such things as dress elements, speech forms, lifestyles, food ways, and the like. However, the ethnic group is not made up of the symbols used to mark it as distinct from others. Selecting symbols to mark ethnic boundaries is a political strategy in the same way that choosing a certain dress style may be for the construction of social status. Material culture with symbolic meaning is therefore an integral part of power relations, as symbols of ethnic identity appear primarily in contexts of collective rituals and other social activities aimed at group mobilization. Paul Brass even defined ethnic identities as "creations of elites who draw upon, distort, and sometimes fabricate materials from the cultures of the groups they wish to represent, in order to protect their well being or existence, or to gain political and economic advantage for their groups and for themselves" (Brass 1993: 111). Material culture is therefore not a passive reflection of ethnic identity, but an active element in its negotiation.

Historical Background and Key Issues

This idea is in fact in direct contradiction with the basic tenets of the culture-historical approach. Leaving aside the primordialist understanding of the ethnic group (to which Kossinna and his followers constantly referred as *Volk*), much more problematic from a strictly archaeological point of view is the understanding of material culture. To be sure, attempts to identify ethnic groups in material culture date back to early nineteenth-century Romanticist obsessions with finding primordial languages and homelands. Because of the Romantic concept of culture as reflecting the national soul (*Volksgeist*) in every one of its elements, Kossinna's idea was to bring to light one of those elements – the material culture – bearing the "imprint" of the ethnic group responsible for its production. Like many others in the early twentieth century, he defined (material) culture in monothetic terms on the basis of the presence or absence of a list of traits or types, which he had previously and intuitively considered as the most appropriate attributes for the definition of the culture. He stressed the use of maps for distinguishing between trait distribution patterns, which he typically viewed as highly homogeneous and sharply bounded cultural provinces. He then equated those cultural provinces with ethnic groups known from historical sources. Kossinna and his followers regarded archaeological cultures as actors on the historical stage, playing the role for prehistory which known individuals or group have in documentary history. Archaeological cultures were thus equated to ethnic groups, for they were viewed as legitimizing claims of modern groups to territory and influence. Because culture was regarded as a homogeneous, bounded whole, a direct consequence of the culture-historical approach to ethnic identity was the idea that "diagnostic" types were in fact ethnic badges. Ethnic groups could be recognized in the archaeological record by their specific *Volksgeist*, particles of which had been turned into particular types of pottery, tools, brooches, or houses. Searching for ethnic groups was thus reduced to typology, under the assumption that the classifications introduced by archaeologists approximated the categories producers and consumers in the past had in their minds. Because culture was understood as normative, wherever they would go, bearers of a certain (archaeological) culture will almost unknowingly reveal their ethnic identity to others (as well as to the archaeologist discovering their remains) by means of using specific brooches, axes, or types of pottery. Ethnicity, in other words, was all about culture, and culture operated from "behind the backs" of the people in the past (Veit 1989).

The first critique of the idea that archaeological cultures represent ethnic groups came from within the framework of culture-history, and consisted of cautionary tales, which often attributed difficulties either to the complexity or to the incomplete

character of the archaeological record (Wahle 1941). Meanwhile, by the late 1920s, the very concept of "archaeological culture" was banned from Soviet archaeology, along with "migration" and "typology." Marxism in its Stalinist version was brutally introduced in archaeology and, because of being so closely associated with nationalism, the culture-historical paradigm was replaced with internationalism that required scholars to study only global universal regularities that confirmed the inevitability of socialist revolutions outside Russia. However, following the introduction of Stalinist nationalist policies in the late 1930s, an interest in the ethnic interpretation of the archaeological record was revived, and the concept of "archaeological culture" was rehabilitated. Like Kossinna, Soviet archaeologists of the 1950s and 1960s believed that archaeological cultures reflected groups of related tribes in their specific historical development. Some even claimed that ethnic identity remained unchanged through historical change (Curta 2002).

Nor was the culture-historical approach fundamentally changed in Central and Western Europe at the end of the World War II, despite the grotesque abuses of Kossinna's theories under the Nazi regime. "Archaeological cultures" were now employed as a quasi-ideology-free substitute for "ethnic groups," without calling into question the key assumption of an intrinsic link between artifacts and groups. Barth's ideas had very little impact on the archaeological understanding of ethnicity, because his social interaction model was based on the assumption that stylistic characteristics would diffuse or be shared among social entities to an extent directly proportional to the frequency of interactions between those entities, such as intermarriage, trade, or other forms of face-to-face communication (the so-called Deetz-Longacre hypothesis). In other words, the closer two ethnic groups are to each other, the greater the probability of them sharing the same culture, without any ethnic boundaries, and thus slowly becoming one, single ethnic group. In order to verify that assumption, Ian Hodder undertook an ethnoarchaeological study in the Baringo district of Kenya, in order to understand how spatial patterning of artifacts could relate to ethnic boundaries (Hodder 1982). He found that, despite proximity and intense cultural interaction, clear material culture distinctions were maintained in a wide range of artifact categories. In his view, distinct material culture boundaries were foci of interaction, not barriers. In fact, material culture distinctions between neighboring groups were maintained in order to justify between-group competition and negative reciprocity, which considerably increased in times of economic stress. However, boundaries did not restrict the movement of cultural traits, and the diffusion of cultural styles was at times be used to disrupt ethnic distinctions. Hodder thus suggested that the use of material culture in distinguishing between self-conscious ethnic groups would lead to discontinuities in material culture distributions, which at least in theory may enable the archaeologist to recognize such groups. Moreover, the form of intergroup relations is usually related to the internal organization of social relationships within the group. Between-group differentiation and hostility may be linked to the internal differentiation of age sets and the domination of women and young men by older men (Larick 1991). Different groups may thus manipulate material culture boundaries in different ways depending upon the social context, the economic strategies chosen, the particular history of the socioeconomic relations, and the particular history of the cultural traits which are chosen to mark the ethnic boundaries.

This conclusion has been at the center of the "style debate" of the 1980s, in which a number of archaeologists argued over the communicative role of material culture. The traditional approach borrowed from art history held that each (ethnic) group had its own style, which it had preserved through history, given that cultures were assumed to be extremely conservative. In their criticism of this culture-historical approach, processualist archaeologists argued that style was a "residue," i.e., properties of material culture not accounted for in functional terms. They also argued that material culture is primarily practical and only secondarily expressive (Wobst 1977). However, style and function are not distinct, self-contained, mutually exclusive realms of form in themselves, but complementary dimensions or aspects of

variation which coexist within one and the same form. If both style and function are simultaneously present in the artifactual form, then how can one tell when, and to what extent, the observed makeup of an assemblage reflects ethnicity, and when, and to what extent, it reflects activity? James Sackett attempted to make a radical break with the residual view of style by invoking "isochrestic variation," which he defined as the practical or utilitarian variation in objective properties of material culture things that makes no functional mediation difference (Sackett 1977). To Sackett, style was an intrinsic, not added-on, or adjunct, function. As an intrinsic function of artifacts, the isochrestic variation was to be found in all aspects of social and cultural life, an idea remarkably similar to the notion of *Volksgeist* which had inspired the culture-historical approach. The isochrestic variation was the attribute of material culture through which members of an ethnic group expressed their mutual identity, coordinated their actions, and bound themselves together. Polly Wiessner argued that style was a form of nonverbal communication through doing something in a certain way that communicated about relative identity. In identity displays, efficiency of message is not a major concern. On the contrary, identity displays are often extravagant, the resources and effort expended being an index of ability and worth. Moreover, style is an intentional, structured system of selecting certain dimensions of form, process or principle, function, significance and affect from among known, alternate, possibilities to create variability. When style has a distinct referent and transmits a clear message to a defined target population, it is "emblemic style," not isochrestic variation. Given that emblemic styles are supposed to carry distinct messages, they must be consistently uniform and clear in order to make recognition and understanding possible. Since they are typically used to mark and maintain boundaries of group membership, they should be therefore relatively easy to recognize in the archaeological record (Wiessner 1983). Emblemic styles often appear at critical junctures in the regional political economy, namely, at times of changing social relations, which call for stronger or broader displays of group identity. Emblemic styles are typically associated with attempts to mobilize members of an ethnic group in situations of competition for resources with members of other groups.

Material culture is therefore fundamentally social, and artifacts are rendered "appropriate" for use only in social context. Decisions about the use of artifacts are embodied in the artifacts in terms of conventions of culture. Artifacts are not properties of a society, but part of the life of that society. They cannot and should not be treated as "phenotypic" expressions of some preformed identity. In other words, what should concern archaeologists is not so much what people do, what kind of pots or brooches they make, what shape of houses they build, but the way they go about it.

International Perspectives and Future Directions

The second decade of the twenty-first century finds the archaeological research on ethnic identity in good shape. Ethnicity in the past has frequently mobilized and divided scholarly opinion. Despite a phase of devastating post-war and more recent critique, and the reticence on the part of some archaeologists, as to whether ethnicity can be recognized in the archaeological record, the topic experienced a remarkable comeback in recent years. This may be in part because scholars can now distinguish between the archaeological study of ethnicity in the past and the historiographic study of the uses and abuses of ethnicity in more recent times. While much has been written on the influence of nationalist ideologies on the development of the discipline, there has been comparatively less preoccupation with how archaeologists participate in the production of the nationalist discourse. After all, land, when imbued with symbols, intensifies ethnic identification by means of the reclamation of archaeological sites and the repatriation of ancestral remains. The debates in the United States surrounding the Native American Graves Protection and Repatriation Act and its application in the case of the Kennewick Man have shed a new light on issues

of legitimacy associated with scientific research. Yannis Hamilakis and Eleana Yalouri have applied Bourdieu's concept of "symbolic capital" to the treatment of antiquities in modern Greece (Hamilakis and Yalouri 1996). Maintaining that the acquisition of undocumented antiquities by museums encourages the looting of archaeological sites, countries such as Italy, Greece, Turkey, Egypt, Peru, and China have claimed ancient artifacts as state (or even national) property, while calling for their return from museums all around the globe. Meanwhile, the deliberate destruction of historical monuments and archaeological sites during the military conflicts in former Yugoslavia or under the fundamentalist regime of the Taliban in Afghanistan has brought the issue of cultural heritage to the center of the archaeological debates surrounding ethnicity. In such cases, it is not only a question of global cultural heritage, but also a matter of the meaning of "other" attached to those monuments and sites by the perpetrators of destruction, who perceive them as different in ethnic terms without or with very little consideration for the distance in time separating them from past populations on that same territory (Stone 2011). Conversely, there is so far very little research on the relatively widespread phenomenon of inventing archaeological cultures to serve the nationalist propaganda, although several cases have been now recorded in Eastern Europe, Central Asia, and Latin America. The transfer of ethnic meaning from artifacts in a (national) museum to architectural monuments and archaeological sites raises the equally unexplored issue of how ethnicity participates in shows of "staged authenticity" – contrived presentation of sites as if they were authentic – which are the substance of heritage tourism. It has been noted, for example, that tourists visiting the Jorvík Viking Center in York do not contrast the staging of authenticity against direct experience of the original, but rather with a mental template of the past, which is largely shaped by mediating influences. Very little is known about the contribution of archaeology to those mediating influences.

After dwelling for years upon the mistakes of the past, especially the tendency in mortuary archaeology to "read" in ethnic terms what could otherwise be interpreted as symbols of gender identity, scholars are now beginning to realize that just as in the modern world, women in the past often symbolized ethnic collectives and were regularly regarded as biological reproducers of ethnic groups, since the ethnic group's culture is commonly structured around gendered institutions such as marriage, family, and sexuality. As ethnic identity remains a topic associated more often with research on cemetery, not settlement sites, new studies have pointed out that emblemic styles appear more often with the funerary dress of women of marriageable age. This has recently prompted a shift in research emphasis to burial assemblages which stand out from their local and regional context by cultural elements – pottery or dress accessories – apparently signaling a different ethnic background. In principle, if emblemic styles may be identified on the basis of their repetitive nature at the level of the site, then anomalies may equally be interpreted as stylistic variation in sharp contrast to the uniform background of the majority. Finally, it has become clear that the most appropriate perspective for understanding how ethnicity worked in the past is the (micro-)region (Hakenbeck 2011). By working at a local level, and with complex tools for teasing out discrete differences in material culture items which may signal emblemic styles and ethnic boundaries, and for mapping distribution patterns within and between sites, archaeologists have begun to identify the contexts of social action in which ethnic identities in the past may have been created through everyday practices.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Archaeology and Anthropology
- ▶ Authenticity and the Manufacture of Heritage
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ Cultural Heritage Management and Native Americans
- ▶ Greece: Cultural Heritage Management
- ▶ Histories of the Archaeological Discipline: Issues to Consider

▶ Hodder, Ian (Modern World)
▶ Jorvik Viking Centre
▶ Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues
▶ Nationalism and Archaeology
▶ Style: Its Role in the Archaeology of Art
▶ Wobst, H. Martin

References

Barth, F., ed. 1969. *Ethnic groups and boundaries. The social organisation of culture difference*. Bergen/London: Universitets Forlaget/George Allen & Unwin.

Bierbrauer, V. 2008. *Ethnos und Mobilität im 5. Jahrhundert aus archäologischer Sicht. Vom Kaukasus bis Niederösterreich*. Munich: Verlag der Bayerischen Akademie der Wissenschaften.

Bourdieu, P. 1990. *The logic of practice*. Stanford: Stanford Univeristy Press.

Brass, P. 1993. Elite competition and the origins of ethnic nationalism. In *Nationalism in Europe. Past and present*, ed. J.G. Berameni, R. Maiz, and X. Nuñez, 111–126. Santiago de Compostela: University of Santiago de Compostela.

Brather, S. 2004. *Ethnische Interpretationen in der frühgeschichtlichen Archäologie. Geschichte, Grundlagen und Alternativen*. Berlin/New York: Walter de Gruyter.

Curta, F. 2002. From Kossinna to Bromley: Ethnogenesis in Slavic archaeology. In *On Barbarian identity. Critical approaches to ethnicity in the early Middle Ages*, ed. A. Gillett, 201–218. Turnhout: Brepols.

Eriksen, T.H. 1991. The cultural context of ethnic differences. *Man* 26: 127–144.

Hakenbeck, S. 2011. *Local, regional, and ethnic identities in early medieval cemeteries in Bavaria*. Florence: All'Insegna del Giglio.

Hamilakis, Y., and E. Yalouri. 1996. Antiquities as symbolic capital in modern Greek society. *Antiquity* 70: 117–129.

Hodder, I. 1982. *Symbols in action. ethnoarchaeological studies of material culture*. Cambridge/New York: Cambridge University Press.

Jones, S. 1997. *The archaeology of ethnicity. Constructing identities in the past and present*. London/New York: Routledge.

Kossinna, G. 1911. *Die Herkunft der Germanen. Zur Methode der Siedlungsarchäologie*. Würzburg: C. Kabitzsch.

Larick, R. 1991. Warriors and blacksmiths: Mediating ethnicity in East African spears. *Journal of Anthropological Archaeology* 10: 299–331.

Sackett, J. 1977. The meaning of style in archaeology. A general model. *American Antiquity* 42 (3): 369–380.

Stone, P., ed. 2011. *Cultural heritage, ethics, and the military*. Woodbridge/Rochester: Boydell Press.

Veit, U. 1989. Ethnic concepts of German prehistory: A case study on the relationship between cultural identity and archaeological objectivity. In *Archaeological approaches to cultural identity*, ed. S. Shennan, 35–56. London/Boston/Sydney: Unwin Hyman.

Wahle, E. 1941. *Zur ethnischen Deutung frühgeschichtlicher Kulturprovinzen. Grenzen der frühgeschichtlichen Erkenntnis*. Vol. 1. Heidelberg: C. Winter.

Weber, M. 1922. *Grundriss der Sozialökonomik. III. Abteilung. Wirtschaft und Gesellschaft*. Tübingen: J. C. B. Mohr.

Wiessner, P. 1983. Style and social information in Kalahari San projectile points. *American Antiquity* 48 (2): 253–276.

Wobst, M. 1977. Stylistic behavior and information exchange. In *For the director: Research essays in honor of James B. Griffin*, ed. C.E. Cleland, 317–342. Ann Arbor: University of Michigan Press.

Further Reading

Bálint, C.S. 2009. A contribution to research on ethnicity: A view from and on the east. In *Archaeology of identity – Archäologie der Identität*, ed. W. Pohl and M. Mehofer, 145–182. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.

Bentley, G.C. 1987. Ethnicity and practice. *Comparative Studies in Society and History* 29: 25–55.

Bierbrauer, V. Zur ethnischen Interpretation in der frühgeschichtlichen Archäologie. In *Die Suche nach den Ursprüngen. Von der Bedeutung des frühen Mittelalters*, ed. W. Pohl, 45–84. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.

Brather, S. 2008. *Archaeology and identity. Central and east central Europe in the earlier Middle Ages*. Bucharest: Editura Academiei Române.

Comaroff, J.L., and J. Comaroff. 2009. *Ethnicity, Inc*. Chicago/London: Chicago University Press.

Gassowski, J. 2003. Is ethnicity tangible? In *Inventing the pasts in north central Europe. The national perception of early medieval history and archaeology*, ed. M. Hardt, C. Lübke, and D. Schorkowitz, 9–17. Bern: Peter Lang.

Hakenbeck, S. 2007. Situation ethnicity and nested identities: New approaches to an old problem. *Anglo-Saxon Studies in Archaeology and History* 14: 19–27.

Härke, H. 2007. Ethnicity, "race" and migration in mortuary archaeology: An attempt at a short answer. *Anglo-Saxon Studies in Archaeology and History* 14: 11–18.

Lindstrom, R.W. 2001. Soviet ethnogenetic theory and the interpretation of the past. In *Archaeology, language, and history. Essays on culture and ethnicity*, ed. J.-E. Terrell, 57–78. Westport/London: Bergin & Garvey.

Lucy, S. 2005. Ethnic and cultural identities. In *The archaeology of identity. Approaches to gender, age, status, ethnicity, and religion*, ed. M. Díaz-Andreu and S. Lucy, 86–109. London/New York: Routledge.

Malešević, S. 2004. *The sociology of ethnicity*. London: Sage.

Mamzer, H. 2004. Ethnischer Mythus in der Archäologie. In *Zbornik na počest Dariny Bialekovej*, ed. G. Fusek, 223–227. Nitra: Archeologický ústav Slovenskej akadémie vied.
Müller, K.E. 2000. Ethnicity, Ethnozentrismus und Essentialismus. In *Wir, ihr, sie. Identität und Alterität in Theorie und Methode*, ed. W. Essbach, 317–343. Würzburg: Ergon.
Prezely, I.M. 2000. Re-thinking ethnicity in archaeology. In *Slovenija in sosednje dežele med antiko in karolinško dobo. Začetki slovenske etnogeneze*, ed. P. Kos, 581–603. Ljubljana: Narodni muzej Slovenije.

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Ethnicity and Identity in the Ancient Mediterranean World

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Introduction

Ethnicity and identity are important fields of research within the study of the ancient Mediterranean world. They are crucial social issues within the modern world, and it seems that they were also vital in Classical antiquity. Many different types of identity are evident in the ancient Mediterranean world – gender, age, religion, rank status, legal status, professional, regional, ethnic and cultural identities being perhaps the most notable. This entry will focus on the last two forms of identity in this list, ethnic and cultural. Ethnic and cultural identities are closely linked, and it is easy to get them confused. Yet they are distinct from each other, and constitute two separate types of social categorization.

Definition

Ethnicity is generally understood as a form of large-scale social group identity, where it is believed that group members share a common descent or ancestry (Emberling 1997: 307; Hall 1997: 19-33). It is important to note that it is *belief* in a shared ancestry that is important, rather than the facts of genetic descent. Ethnicity is a social rather than a biological phenomenon, and this distinguishes it from the concept of race. Distinctions drawn along racial lines are often made with reference to biological phenomena, including physiognomic features such as skin color, physical build, and structure of facial features. Ethnicity, in contrast, is concerned with the socially meaningful distinctions between identity groups. The determining factor is not so much whether people share a genetic link, but rather whether they think of themselves as a collective and believe that they have a shared history. For example, there are relatively few biological distinctions to be made between the various Iban peoples of Borneo. However, groups such as the Undup, the Balau, and the Ulu Ai consider themselves to be ethnically distinct, and these separate ethnic identities translate into practical and political distinctions within society. Ethnicity, then, is about the differences between identity groups recognized on a social level, rather than the differences that might be detected on a biological one. Indeed, people may ascribe to an ethnic identity (or have it ascribed to them) without any accurate knowledge about their own genetic origins.

The belief about a common descent is the crucial factor distinguishing ethnicity from other forms of group identity, and it is the essential criterion that defines an ethnic identity. Other forms of group identity can also offer a basis for collective belonging, such as local village identity, professional identity, and identity associated with supporting a particular sports team. It is the concept of a shared ancestry and history that makes ethnicity distinct from these other types of group identity. It has sometimes been suggested that other factors (such as language, customs, religion, physical features, homeland, etc.) should also be considered as a part of ethnic identity. However, while these factors do often coincide with ethnicity and can be used to express and negotiate ethnicity, they do not define it. They are secondary aspects of ethnicity, and will be discussed in more detail in the following paragraph.

Cultural identity frequently overlaps with ethnicity, and in many cases, an ethnic group will develop a shared set of traditions and cultural

traits that become closely associated with their ethnicity. These might include: speaking a particular language or dialect; wearing certain types of clothing or bodily adornment; engaging in specific types of ritual or cult practice; cooking and eating particular types of food; organizing families or the household in a certain way; and using particular objects or specific forms of material culture. Although not exhaustive, this list suggests a range of different cultural factors that may become associated with group identity. These cultural factors are indeed often linked to ethnicity, and can be used as outward signs expressing or indicating ethnicity. For example, an individual living in twenty-first century France, who cooks and eats French food, speaks French, and follows in a characteristically French lifestyle, may well indeed be French in ethnicity as well. However, while these cultural factors can indeed sometimes express ethnicity, they do not always align with ethnic identity. The same individual in twenty-first century France may, for example, be ethnically Chinese, Polish, or Pakistani. The figure of Tiberius Claudius Cogidubnus presents a good ancient example of the same principle. Cogidubnus was a king of the Regnenses tribe in Britain in the late first century BCE. Cogidubnus was described by Tacitus as an especially loyal client ruler (*Agricola* 14), and a contemporary inscription from Chichester suggests that he also adopted several Roman customs (*RIB* 91). Not only did he assume three names in the Roman style, but he also dedicated a temple to the Roman gods Neptune and Minerva, and engaged in the Roman practice of erecting public inscriptions in Latin. Cogidubnus, then, seems to have embraced a Roman cultural identity in many respects, making certain Roman lifestyle choices. It seems likely however that he retained a British ethnicity, linked to his tribe, the Regnenses.

Ethnicity and cultural identity are therefore connected but distinct. Cultural factors can contribute to a sense of ethnicity, and are often an important way that ethnicity is communicated and negotiated. But they do not constitute ethnicity. Instead, the crucial factor underpinning ethnic identity is the belief in a common origin or ancestry. Although racial and biological distinctions are also often invoked as a way of articulating ethnicity, these need not have any grounding in actual fact for an ethnic identity to have social meaning.

Historical Background

Ethnicity and cultural identity are relatively new areas of study for both the Classical disciplines and mainstream archaeology. In the early and mid-twentieth century, it was generally assumed that ethnic and cultural groups were equivalent to each other, and were also straightforwardly determined by actual biological origins and race. For example, it was thought that the "Greeks" were a racially distinct population, bound together not only by blood but also by shared cultural features such as language, religion, and social norms. Certain types of object, styles of material culture, and social practices were categorized as being "Greek." For example, the Wild Goat and Fikellura styles of ceramic decoration produced in Archaic period western Anatolia are widely referred to as "East Greek" pottery styles (e.g., Cook and Dupont 1998). It was assumed that since these styles were produced in the Greek-speaking cities of the Anatolian coast, they should be understood as an eastern regional version of "Greek" ceramic types. Ethnic labels were attached to artifacts on the assumption that language, material culture, and ethnicity necessarily came together in a neat package. When applied in contexts such as this, the term "Greek" is being used as a category in a rigid system of cultural classification.

In adopting this positivist approach to identity, the Classical disciplines were in line with contemporary practice in other areas of archaeology. The Culture Historical school dominated archaeology, and the concept of discrete and bounded "cultures" was also important in anthropology (Trigger 1989: 148-206). The idea of "cultures" fell out of favor with the rise of the Processual school of archaeology in the mid-twentieth century, and there was relatively little interest in either ethnicity or cultural identity for some decades.

It was not until the late twentieth century that scholars began to reconsider the issue of ethnicity

in antiquity. In both archaeology (e.g., Emberling 1997; Jones 1997) and Classical studies (e.g., Hall 1997; Mattingly 1997), new approaches were developed for studying ethnicity and cultural identity which avoided the pitfalls and atheoretical assumptions of the Culture History school. Recent developments in anthropology and social theory have contributed to this, and the work of postmodern thinkers such as Bourdieu (e.g., 1977) and postcolonial scholars such as Said (e.g., 1978) has had a major impact on archaeologists and classicists. It was recognized that ethnicity and cultural identity were indeed distinct from each other, and the often cited equation between pots and people was broken down. It was no longer assumed, for example, that the presence of Greek and Etruscan amphorae and drinking vessels in Iron Age Gaul implied the presence of Greeks or Etruscans. Instead, scholars considered how indigenous groups could adapt both objects and social practices for their own specific ends (Yntema 2000), and new insights have been gained into the power dynamics fuelled by imported goods and social drinking in Iron Age Gaul (Dietler 1990). The distinction between ethnicity and cultural traits began to be explored. Around the same time, it was recognized that both ethnicity and culture were different from race. The notion of racial purity within ethnic or cultural groups was discredited, as increasing evidence was found for intercultural marriages and social mobility. Overall, in the late twentieth century, classicists and archaeologists came to understand ethnicity, culture, and identity in a completely new way. Ethnicity is no longer thought of as being determined by either externally visible cultural traits, or the facts of biology. Instead, it is now understood as a form of social identity, constrained by biology but not defined by it, and actively constructed using cultural traits but not predetermined by them.

These new insights resulted in a renaissance in the study of ancient ethnicity, and a widespread reevaluation of how identities in the ancient Mediterranean are conceptualized. To return to the example of "East Greek" pottery styles, these ceramics are now increasingly viewed in their local context. Stylistic relationships with inland Anatolian pottery from Lydia and Phrygia are now recognized, and the ceramic styles are now considered to be the unique products of a hybridized local "East Aegean" ceramic tradition that includes the "indigenous" areas of Lydia and Caria as well as the "Greek" regions of Ionia, Doria and Aeolis (Kerschner and Schlotzhauer 2005: 4). Similar reevaluations have been undertaken of numerous other artifact types, regions, time periods, sites, and population groups. These new ideas about ethnicity and cultural identity have allowed scholars to open up new fields of research, as well as to shed new light on old questions.

Key Issues/Current Debates

While applicable in a wide range of ancient and Classical contexts, the study of ethnicity and cultural identity has made a particularly significant impact in some specific areas of study within Classical archaeology: colonization and imperialism; cultural exchange and contact; and political rhetoric and diplomacy. Each of these areas will be discussed briefly in the following section.

The phenomenon of Phoenician, Greek, and Etruscan colonization in the Iron Age has attracted considerable academic attention in recent decades. Postcolonial approaches and the new disciplinary insights into ethnicity and cultural identity have been crucial in this. Attempts have been made to theorize the various colonization movements of the Iron Age, identifying different motivations for migration and settlement by different groups in different contexts. Colonization is rarely now thought of as a deliberate strategy on the part of mother territories for the expansion of commercial networks or the easing population pressure. It is now more frequently explained as the consequence of innumerable independent decisions made by individuals and families for personal reasons. These could include a search for private betterment and profit; disenfranchisement following political restructuring in the mother territories; or even simply wanderlust. Relationships between migrants and indigenous groups have also been rethought. They are no

longer considered to have followed the strictly asymmetrical patterns of modern European colonialism, with the colonizer dominating the colonized and imposing their culture on them. Instead, it is recognized that these relationships were often more complex than has been initially thought, with cultural influences working in both directions and new hybrid cultural forms being created from the mixing and interaction (e.g., van Dommelen 1998, 2012; Yntema 2000; Malkin 2004; Hurst and Owen 2005; Hodos 2006; Tsetskhladze 2008). Similar ideas are emerging in the context of ancient imperialism, especially with respect to the Roman and Achaemenid Empires (e.g., Mattingly 1997; Briant 2002 for Roman and Achaemenid imperialism respectively). For example, scholars no longer believe in the straightforward "Romanization" of subject populations in the Roman Empire. It is no longer thought that subject groups passively adopted Roman customs and practices, becoming "more civilized" as they did so. Rather, it is recognized that different social practices were used by different groups for different reasons, that cultural influences once more worked in both directions, and that the concept of Roman identity is in itself complex and disputed (Dench 2005; Wallace-Hadrill 2008). Unlike in the case of Iron Age colonization, the existence of asymmetrical power relations is significant, and it is recognized that subaltern experiences and resistance also offer us important perspectives on ancient imperialism (Woolf 1998; Revell 2008; Mattingly 2011). Colonization, migration, and imperialism are therefore one important area of current research.

Cultural exchange and cultural contact is another area where the study of ancient ethnicity and cultural identity has yielded especially exciting results (e.g., Riva and Vella 2006; Ulf 2008; Hales and Hales 2009; Knapp and Van Dommelen 2010). We now recognize that cultural traits do not "belong" to discrete cultures or ethnicities. Rather, they are merely objects, styles, and practices which can be used and modified to suit different social functions and different historical contexts. The presence of one particular cultural trait in an unexpected social context is no longer interpreted as evidence for one population group dominating or imposing their culture on another. For example, the presence of large amounts of Classical Athenian painted pottery in Etruria is not taken to imply the "Hellenization" of the Etruscans. Instead, we now acknowledge that the exchange of objects and ideas was often accompanied by a shift in social meaning, and that ancient cultural contact was less about the passive reception of influences and more about the active appropriation of ideas and dynamic innovations. In the Etruscan example, we now realize that the preference for Athenian decorated ceramics can tell us more about political strategies among the Etruscan elites than it can about Athenian expansionism. Using these advances in theory, it has become possible to understand phenomena such as religious syncretism or the development of creole dialects in much greater detail. For example, we have learnt much about the development of the cult of Magna Mater at Rome by understanding the processes of cultural interaction and exchange which introduced the Phrygian goddess Cybele into a Greco-Roman cultural milieu (e.g., Roller 1999). Connected to this is the question of individual identities in Classical antiquity. Individuals such as the second century CE writer Lucian of Samosata defy categorization by more traditional ethnic typologies. A Syrian by birth, Lucian was also a Roman citizen and an accomplished sophist, writing in polished Classical Greek (Mestre and Gómez 2010). In the figure of Lucian, we can see that cultural traits associated with "Greekness" and "Romanness" do not necessarily imply Greek or Roman ethnicity. Using the Greek language, engaging in Greek *paideia* (education/culture), living a Roman lifestyle, and becoming involved in Roman political debate – none of these choices prevented Lucian from claiming a Syrian ethnicity and Syrian ancestry. By unyoking cultural identity from ethnicity, and by gaining a better understanding of the relationship between the two, we have been able to take important steps forward in the study of ancient cultural contact and cultural exchange. Mixed and multiple identities, like that of Lucian, appear to be far more common than we once thought (for a variety of examples, see Goldhill 2007;

Knapp and Van Dommelen 2008; Derks and Roymans 2009; Gruen 2011a). Cultural exchange and the fluidity of individual identities are therefore another key theme in recent research.

Another important area is the issue of political rhetoric and diplomacy in Classical antiquity. The recent theorizations of ethnicity and cultural identity have generated important new insights into ancient politics and political history. In the past, scholars tended to assume that wars and alliances were conducted along ethno-cultural lines. The Persian Wars, for example, were often characterized as a "clash of civilization" between the Asian barbarian despots of the Achaemenid Empire and the freedom-loving European Greeks. However, as we now know that ethnicity is socially constructed, it is generally recognized that the conflict was far more complex than this. We have been able to identify the deliberate strategy on the part of the Athenians in particular of using ethnic ideology and rhetoric to create an image of the stereotypical Barbarian. Art, literature, and political discourse were all employed to promote this ideology of ethnic essentialism and opposition (Hall 1987; Lissarrague 2002). This ideology was part of an Athenian strategy for maintaining their own hegemony over other Greek *poleis* (city-states) through the Delian League, as they could argue that the cities should stay inside the League and submit to Athenian leadership in the face of the Persian threat. This anti-barbarian rhetoric, however, can be revealed as just that – rhetoric – given the evidence for real engagement with Persian culture on a practical level (Miller 1997). Ethnicity, we have realized, was not something essential and inborn, but rather something that can be manipulated for strategic and political ends. Important work has been done on the way that ethnic rhetoric has been used and abused in the ancient world in the pursuit of political ends. Good examples of this can be found in the use of foundation myths in kinship diplomacy. Individual cities used stories about their foundation to create links between themselves and other cities, paving the way for political alliances. During the first two centuries BCE, for example, many independent *poleis* in Anatolia claimed an ancient kinship with the Romans, on account of Rome's Trojan ancestry (Erskine 2001: 168). At the time, Rome was in the political ascendancy, and its power in the eastern Mediterranean was increasing. There were therefore many political advantages of aligning oneself with Rome, and myths of shared ancestry were a good way of achieving this. The political and strategic uses of cultural and ethnic identities, therefore, are yet another key area of current research.

There are many areas within Classical archaeology and ancient history, then, where the re-theorization of ethnicity and cultural identity has brought real changes in the way we understand the ancient world. This section has considered only a few of the most important and intensively researched of these. Many more areas are currently opening up for future research, and these will be discussed below.

International Perspectives

The study of ancient ethnicity and cultural identity is undoubtedly a vital area within the Classical disciplines. However, it has been pursued differently in different scholarly traditions. Scholars of all nationalities working in Britain, the USA, and Canada have been most active in the area to date, and have produced much of the theoretical works on the subject. This is perhaps linked to contemporary political issues in these countries, as multiculturalism, ethnicity, and identity have constituted an important part of the political discourse in these countries for some decades. Scholars working elsewhere have, of course, also contributed greatly to the study of ancient ethnicity. French scholarship, for example, has been especially important in highlighting the use of literary and visual representation in the construction of ethnicity, and for highlighting the potential for anthropological approaches to shed light on antiquity (e.g., Hartog 1980; Detienne 1990; Lissarrague 2002).

In recent years, there has been something of a reaction against the high profile of ethnicity and cultural identity within archaeology and the Classics. Some scholars have voiced the opinion that we may be in danger of overemphasizing the strategic

aspect of identity, and that while identities can indeed be manipulated and created, it is also often true that they can command considerable emotional attachment and popular belief (e.g., Kerschner 2006; Zurbach 2012). In other words, although ethnicity may not be essential and inborn, people often feel as though it is. This critique parallels discussions that have also been happening in other social sciences such as anthropology and sociology, and archaeologists and Classical scholars are increasingly taking belief and emotional attachment into account when considering ancient ethnicity.

Another critique of the study of ancient ethnicity has recently emerged, warning against the tendency to view all group identities in the past as necessarily being ethnic. The study of ancient ethnicity has been so successful, and our modern interest in ethnicity has been such a significant factor, that we perhaps assume ethnicity is important in situations where it was not. It has already long been recognized that group identities can take many different forms, and that cultural identities are distinct from ethnicity. Despite our enthusiasm to make use of the valuable new theories we have developed therefore, we should avoid the temptation to assume that all group identities are ethnic. Instead, it has been argued that other forms of group identity need to be more carefully theorized, such as local community identity (Mac Sweeney 2011).

A third major critique concerns the current tendency to conceptualize ancient ethnicity and cultural identities in terms of binary opposites, such as Greek and barbarian, Roman and barbarian, and Roman and Greek. The current established approaches to ancient identities (for which, see above) tend to privilege the view that identities were polarized into categories of "Self" and "Other." The reasons for this, it is argued, can largely be found in the historiographical and anthropological trends of the 1970s and 1980s. Specifically, structuralist approaches based on anthropology were particularly influential. It is suggested that the study of ancient identities has been overly constrained by such structuralist approaches, and that it may instead be fruitful to conceptualize identity beyond merely the opposite of the "Other" (Gruen 2011b).

These three major critiques of the study of ancient ethnicity have most often been made by scholars based outside the Anglophone academy. However, this is no longer the case, and scholars working in British and North American universities have increasingly taken up these comments, incorporating them into new models and approaches. The study of ancient ethnicity and cultural identities is a discourse which moves back and forth and where scholars of all background and nationalities are making valuable contributions (for examples, see the suggestions listed under "Further Reading," in particular, the papers in Derks and Roymans 2009, and Gruen 2011a).

Future Directions

As mentioned in the section above, three major critiques have been made of the study of ethnicity and cultural identity in Classical antiquity. This has meant that in the last few years, new directions are emerging and new research questions are being asked. Three of these new directions will be discussed here, each stemming from one of the critiques identified above: the relationship between popular and elite perceptions of identity; the interaction between ethnic and other forms of identity; and post-structuralist conceptions of identity.

Many of the Classical sources that we have for ancient ethnicity were produced by social elites. Literary texts, official inscriptions, and public iconography are the most common ancient sources used by scholars to establish as basis for an ethnic identity. These sources are most usually produced by elites, either for an elite audience or to communicate an elite viewpoint to a non-elite audience. They cannot, therefore, be taken as evidence for the views of the general populace about ethnicity or identity. For example, a Hellenistic inscription from Magnesia on the Maeander commemorated the establishment of an alliance with Phocis on the basis on ancestral kinship (Patterson 2010: 131). This inscription would have been set up in a public space, and the alliance negotiations would have been conducted by the *polis* authorities. It is not possible to be sure, therefore, what

the inhabitants of Magnesia would have thought about this. Did they believe they were ethnically linked to Phocis? Did they see the alliance as a cynical manipulation of myth for political ends? Did they consider a Phocian connection to be a plausible way of explaining their international relations? Increasingly, scholars are beginning to consider how we can explore popular ideas about ethnicity, rather than just focusing on the perspectives of elites. Necessarily, archaeological evidence has an important part to play. Archaeological material allows us to consider social practices which go unmentioned in texts and which have little impact on the public discourse. The remains of cult activities are potentially a fruitful area of investigation in this respect. Popular engagement with certain cults, and the manner of that engagement, might indicate a sense of ethnic affiliation. Exactly how this might happen, and other avenues for identifying popular conceptions of ethnicity are important new directions for future research. In order to tackle this new research direction, however, we will need to address the question of how far archaeological evidence can be used to infer ethnicity in the absence of any textual source material whatsoever. In Classical antiquity, this question is of less immediate import than in other areas of archaeology. However, it is nonetheless still a vital issue which remains to be resolved. If the essential criterion for ethnicity is the belief in shared ancestry and origins, how can this be manifested in the material record? Can the material record only show us the cultural expressions of identities, and not internalized identities themselves? Is archaeological evidence better suited for the study of cultural identity rather than ethnicity? These questions are hotly debated, with strong arguments made on both sides.

Arguing that archaeological evidence cannot illuminate ancient ethnicity in the absence of texts is not, it should be noted, a criticism of archaeology itself. Rather, this ties into the second new direction of research highlighted here. As has been already mentioned, ethnicity is one among many different types of group identity. Different types of identity come to the fore at different historical moments for different social reasons. We cannot, therefore, assume that ethnicity is always the most important type of identity. We cannot even assume it is always important at all – there may have been many situations in the ancient world where ethnicity was simply not relevant. For example, in the context of military occupation on the Roman frontier, the various collective military identities binding the soldiers together in different configurations may have been more important that any ethnic distinctions between them (Gardner 2007). Given the conditioning of contemporary society, where ethnicity and identity are burning social issues, and given the expectations we might have from textual sources, we may be tempted to assume that ethnicity is salient in contexts where it is not. Archaeological evidence, then, potentially offers scholars of ancient identities the opportunity to approach identity in an especially open way, and to investigate the way different types of identities might interact. A particularly interesting avenue for future research is this interaction between different types of identities, and the idea of slippage in the meanings of an identity. For example, a Roman identity may at different times convey ideas about ethnicity, legal citizen status, moral standing and cultural norms, or geographical location. The interplay between these various aspects of identity – the ethnic, the geographic, the legal, and the cultural – is relatively under-theorized and ill-understood.

A third new direction for future research is the reconceptualization of ancient identities in a way which does not depend so strongly on the binary opposition of Self and Other. Instead of viewing identity in terms of structuralist models of polar opposites, we will hopefully develop more complex and nuanced ideas about ancient identities, where plurality and ambiguity take the place of rigidly defined binary categories. While such ideas are generally accepted as being desirable however, it remains to be seen how new frameworks and models for conceptualizing ancient identities will be developed. Overall therefore, while we have a good understanding of the basics of ethnicity and cultural identity in the ancient Mediterranean world, we still need to move forward with more research to gain a more complex and nuanced view.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology as Anthropology
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Community and Archaeology
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Culture in Archaeology
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Emporion
- ▶ Ethnic Identity and Archaeology
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Islands (Excluding Crete), Archaeology of
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Iconography in the Roman World
- ▶ Lydia, Archaeology of
- ▶ Multicultural Archaeology
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Processualism in Archaeological Theory
- ▶ Race in Archaeology
- ▶ Romanization
- ▶ Sicily and Magna Graecia, Archaeology of
- ▶ Visualizing Mediterranean Archaeology

References

Bourdieu, P. 1977. *Outline of the theory of practice*. Cambridge: Cambridge University Press.

Briant, P. 2002. *From Cyrus to Alexander. A history of the Persian empire*. Winona Lake: Eisenbrauns.

Cook, R.M., and P. Dupont. 1998. *East Greek pottery*. London/New York: Routledge.

Dench, E. 2005. *Romulus' asylum: Roman identities from the age of Alexander to the age of Hadrian*. Oxford: Oxford University Press.

Derks, T., and N. Roymans, eds. 2009. *Ethnic constructs in antiquity. The role of power and tradition*. Amsterdam: Amsterdam University Press.

Detienne, M. 1990. *Tracés de fondation*. Louvain/Paris: Peeters.

Dietler, M. 1990. Driven by drink: The role of drinking in the political economy and the case of early Iron Age France. *Journal of Anthropological Archaeology* 9: 352–406.

Emberling, G. 1997. Ethnicity in complex societies: Anthropological perspectives. *Journal of Archaeological Research* 5: 295–344.

Erskine, A. 2001. *Troy between Greece and Rome: Local tradition and imperial power*. Oxford: Oxford University Press.

Gardner, A. 2007. *An archaeology of identity: Soldiers and society in late Roman Britain*. Walnut Creek: Left Coast Press.

Goldhill, S., ed. 2007. *Being Greek under Rome: Cultural identity, the second sophistic, and the development of empire*. Cambridge: Cambridge University Press.

Gruen, E., ed. 2011a. *Cultural identity in the ancient Mediterranean*. Los Angeles: The Getty Institute.

Gruen, E. 2011b. *Rethinking the other in antiquity*. Princeton: Princeton University Press.

Hales, S., and T. Hodos, eds. 2009. *Material culture and social identities in the ancient world*. Cambridge: Cambridge University Press.

Hall, E. 1987. *Inventing the barbarian*. Oxford: Clarendon Press.

Hall, J.M. 1997. *Ethnic identity in Greek antiquity*. Cambridge: Cambridge University Press.

Hartog, F. 1980. *Le Miroir d'Hérodote. Essai sur la representation de l'autre*. Paris: Gallimard.

Hodos, T. 2006. *Local responses to colonization in the Iron Age Mediterranean*. London: Routledge.

Hurst, H., and S. Owen, eds. 2005. *Ancient colonization: Analogy, similarity and difference*. London: Duckworth.

Jones, S. 1997. *The archaeology of ethnicity. Constructing identities in the past and the present*. London/New York: Routledge.

Kerschner, M. 2006. Die Ionische Wanderung im Lichte neuer archäologischer Forschungen in Ephesos. In *"Troianer sind wir gewesen" – Migrationen in der antiken Welt. Stuttgart Kolloquium zur historischen Geographie des Altertums 8, 2002*, ed. E. Olshausen and H. Sonnabend, 364–382. Stuttgart: Franz Steiner Verlag.

Kerschner, M., and U. Schlotzhauer. 2005. A new classification system for East Greek pottery. *Ancient West and East* 4 (1): 1–56.

Knapp, B., and P. Van Dommelen. 2008. Past practices: Rethinking individuals and agents in archaeology. *Cambridge Archaeological Journal* 19: 15–34.

Knapp, B., and P. Van Dommelen, eds. 2010. *Material connections in the ancient Mediterranean: Mobility, materiality and Mediterranean identities*. London: Routledge.

Lissarrague, F. 2002. The Athenian image of the foreigner. In *Greeks and barbarians*, ed. T. Harrison, 101–126. New York: Routledge.
Mac Sweeney, N. 2011. *Community identity and archaeology: Dynamic communities at Aphrodisias and Beycesultan*. Ann Arbor: University of Michigan Press.
Malkin, I. 2004. Postcolonial concepts and ancient Greek colonisation. *Modern Language Quarterly* 65: 341–364.
Mattingly, D.M., ed. 1997. *Dialogues in Roman imperialism: Power, discourse, and discrepant experience in the Roman Empire*, JRA supplementary series 23. Portsmouth: Journal of Roman Archaeology.
Mattingly, D.M. 2011. *Imperialism, power and identity: Experiencing the Roman Empire*. Princeton: Princeton University Press.
Mestre, F., and P. Gómez, eds. 2010. *Lucian of Samosata, Greek writer and Roman citizen*. Barcelona: Publicacions i edicions de la Universitat de Barcelona.
Miller, M.C. 1997. *Athens and Persia in the fifth century BC. A study in cultural receptivity*. Cambridge: Cambridge University Press.
Patterson, L.E. 2010. *Kinship myth in ancient Greece*. Austin: University of Texas Press.
Revell, L. 2008. *Roman imperialism and local identities*. Cambridge: Cambridge University Press.
Riva, C., and N. Vella. 2006. *Debating orientalization: Multidisciplinary approaches to change in the ancient Mediterranean*. London: Equinox.
Roller, L.E. 1999. *In search of God the mother: The cult of Anatolian Cybele*. Berkeley: University of California Press.
Said, E. 1978. *Orientalism*. London: Vintage Books.
Trigger, B.G. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.
Tsetskhladze, G.R. 2008. *Greek colonisation: An account of Greek colonies and other settlements overseas*. Leiden: Brill.
Ulf, C. 2008. Rethinking cultural contacts. *Ancient West & East* 8: 81–132.
Van Dommelen, P. 1998. *On colonial grounds. A comparative study of colonialism and rural settlement in first millennium BC west central Sardinia*. Leiden: Archaeological Studies Leiden University.
Van Dommelen, P. 2012. Colonialism and migration in the ancient Mediterranean. *Annual Review of Anthropology* 41: 393–409.
Wallace-Hadrill, A. 2008. *Rome's cultural revolution*. Cambridge: Cambridge University Press.
Woolf, G. 1998. *Becoming Roman: The origins of provincial civilisation in Gaul*. Cambridge: Cambridge University Press.
Yntema, D. 2000. Mental landscapes of colonization: The ancient written sources and the archaeology of early colonial Greek south-eastern Italy. *Bulletin Antieke Beschaving* 75: 1–49.
Zurbach, J. 2012. In *Mobilités grecques – Mouvements, réseaux, contacts en Méditerranée, de l'époque archaïque à l'époque hellénistique*, ed. Z. Capdetrey and J. Zurbach. Bordeaux: Ausonius.

Further Reading

Hall, J.M. 2002. *Hellenicity. Between ethnicity and culture*. Chicago/London: The University of Chicago Press.
Harrison, T., ed. 2001. *Greeks and barbarians*. London/New York: Routledge.
Jones, C.P. 1999. *Kinship diplomacy in the ancient world*. Cambridge, MA: Harvard University Press.
Laurence, R., and J. Berry, eds. 2001. *Cultural identity in the Roman Empire*. London/New York: Routledge.
Lucy, S. 2005. Ethnic and cultural identities. In *The archaeology of identity: Approaches to gender, age, status, ethnicity and religion*, ed. M. Diaz-Andreu, S. Lucy, S. Babic, and D.N. Edwards, 86–109. London/New York: Routledge.
Malkin, I., ed. 2001. *Ancient perceptions of Greek ethnicity*. Cambridge, MA: Harvard University Press.
Mattingly, D.M. 2011b. *Imperialism, power and identity: Experiencing the Roman Empire*. Princeton.
Mitchell, S., and G. Greatrex, eds. 2000. *Ethnicity and culture in late antiquity*. London: Duckworth.
Zacharia, K., ed. 2008. *Hellenisms: Culture, identity, and ethnicity from antiquity to modernity*. Aldershot: Ashgate.

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Ethnoarchaeology

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Introduction

Ethnoarchaeology is a subdiscipline of anthropology placed in what Binford called actualistic studies (see also the entry on "▶ Taphonomy: Definition"). Ethnoarchaeology is differentiated from other actualistic studies in that it includes the systematic observation of living societies and from other types of ethnography through its explicit focus on the intention to identify the archaeological – material – implications of human behavior. During the last 40 years, archaeologists have carried out fieldwork in traditional societies to help answer certain questions regarding the interpretation of the archaeological record and to develop and refine analogies. This research strategy has been labeled as ethnoarchaeology, and it transformed in one of the main sources of analogies. Analogy can be broadly defined as the transferal of information from one object or

phenomenon to another based on certain relations of compatibility between them. Although the use of analogical reasoning in archaeology has been subject of debates (Wylie 1985), it is a current consensus that it is necessary in every step of the archaeological interpretation (for a reborn debate about this subject, see Ravn (2011)). In the framework of analogical argumentation, ethnoarchaeology provided information from a source better known as the living societies in order to transfer this information to another less known subject – the extinct societies.

Definition

There are many definitions of the subdiscipline of ethnoarchaeology, but it can simply and basically be summarized as the acquisition of original ethnographic data to help the archaeological interpretation. There are a wide range of synonyms such as "action archaeology," "living archaeology," "archaeoethnography," and "ethnographic archaeology." It can also be defined as the study of the relationship between human behavior and its archaeological consequences in the present; it is concerned with the investigation of material culture and the built environment among living people in relation to the process which effect and affect their conversion to archaeological context (Lane 2006: 402). Among the variety of definitions and characteristics of ethnoarchaeology, one of the most comprehensive is the one provided by B. Sillar, "the study of how material culture is produced, used and deposited by contemporary societies in relation to the wider social, ideological, economic, environmental and/or technical aspects of the society concerned, and with specific reference to the problems of interpreting archaeological material" (Sillar 2000: 6). The use and application to the archaeological record of published ethnographic data (what is usually called ethnographic parallels) are not considered ethnoarchaeology, neither is the study of ethnographic collection from museum took on for archaeological interpretations in mind (David and Kramer 2001: 11; Politis 2015: 44–45).

Ethnoarchaeology has been looked upon with a degree of mistrust due to the difficulties that exist in extrapolating from contemporary information to past societies, starting with the fact that the epistemological bases of how to conduct such extrapolations are not sufficiently developed. This has generated doubts and criticism of analogical reasoning. Currently, despite certain inherent and difficult-to-resolve problem, the great majority of researchers recognize the usefulness of analogical arguments in the process of interpretation or explanation of the archaeological record and consider them as indispensable tools (David and Kramer 2001; Lyons 2013; Ravn 2011).

Another point that has generated mistrust is that to a greater or lesser degree, present-day indigenous societies – the source of analogies – have all had contact with western society and are integrated in one form or another into the process of "globalization," being part of the capitalist world. It has been proposed, consequently, that present-day societies cannot serve as analogical references for past societies because most – if not all – of them are a product of the postcolonial impact (for the Pacific archaeology, see critics in Spriggs 2008). This criticism, however, is unjustified and basically refers to the bad use of analogy rather to the analogy as way of approaching the study of the past societies. Ethnoarchaeological research operates under the principles of analogical reasoning, and therefore the two elements of analogy (the source and the subject) need not be the same (in the contrary case analogical reasoning would not be necessary), but rather there should be certain conditions of comparability between terms. Analogy's strength does not lie in the degree of similarity between source (in this case, the present-day society) and subject (the past society as perceived through the archaeological record), neither in the degree of isolation of a given society, but rather in the logical structure of the argument and the similarity between the terms of the relation (Wylie 1985). Obviously, the greater the similarity between source and subject, the greater the potential of the analogical argument, but the degree of similarity alone in no way guarantees the strength of the argument or the veracity of the statements. Moreover, it is

recognized that the power of a given analogy does not depend upon the delimitation of which traditional or "pristine" group is the source of the analogy, but rather upon its logical structure and the conditions of comparability.

As such, the subdiscipline attempts to formulate models that permit the better understanding of the cultural patterns of human societies, both in the present and the past. Essentially, ethnoarchaeology is a form of ethnography that takes into consideration aspects and relationships not approached in detail by traditional ethnographies; in some way, it is a look of contemporary societies with archaeological eyes and with archaeological questions in mind.

Historical Background

The attempt to use ethnographic information to interpret the archaeological record is neither new nor the exclusive domain of ethnoarchaeology. In the past, this use was named "ethnographic parallel," a method of using already existing ethnographic data, without defining criterion and limitation for this use and projecting or imposing it into a given archaeological case. What was new was that ethnoarchaeological information has been obtained by archaeologists themselves with the central objective of aiding comprehension of the archaeological record. At the same time, it was a great effort to make explicit the observed variables and the context of these observations. These facts make the analogical reasoning more viable and the results more accurate.

Although the term ethnoarchaeology was used for the first time in the 1900s by Jesse Fewkes in relation to the use of local knowledge of the North American Indians (David and Kramer 2001: 6), it was in the 1960s, upon the advent of processual archaeology, that archaeologists became interested in ethnographic analogy in a systematic way, realizing at the same time that ethnographers were not given proper attention to the study of material culture. In these early years, archaeologists such M. R. Kleindiest and Patty Jo Watson among the Pueblo Indians in the 1950s, Robert Asher among the Seri Indian of Mexico, and Peter White in the Highlands of New Guinea (Fig. 1) generated the first ethnographic set of data obtained with the specific purpose to aid the interpretation of the archaeological record.

Subsequently, Lewis Binford developed his ethnoarchaeological approach theoretically and conceptually in *Nunamiut Ethnoarchaeology* (Binford 1978), based on his research among the Nunamiut people in Alaska (Fig. 2). These contributions, together with Richard Gould (1980), who also performed pioneer work in the Western Desert in Australia, and John Yellen (1977)

Ethnoarchaeology, Fig. 1 J. Peter White taking notes during pioneer ethnoarchaeological research in 1964 when he was a graduate student working in Legaiyu village, Asaro Valley, Eastern Highlands of New Guinea. The people would identify themselves as Gahuku-Gama. In the picture, bamboo arrows are being made. (Photo courtesy of J. Peter White)

Ethnoarchaeology, Fig. 2 Lewis Binford and research team during field work among the Nunamiut. (Photo from the 1971 field season at Tulugak Lake, Alaska). *Left to right*: Richard Workman, Charles Amsden, Don Campbell, and Lewis Binford. On the back of the original, there is a more recent note in Binford's writing identifying it as Tulugak Lake Alaska 1971, "It snowed for 26 days." (Photo courtesy of Amber Johnson)

among the Kalahari Kung, established the foundations of ethnoarchaeology within the processual paradigm and transformed the subdiscipline into one of the most important producers of the operational models to interpret the archaeological record of the past societies.

Contemporary ethnoarchaeology emerged as a direct result of developing actualistic studies and optimism generated by the potential for such studies to explain the archaeological record everywhere. It was also an outcome of the need to construct middle-range theory in order to bridge the gap between the dynamics of the living systems and the static of the archaeological record. Consequently, from the late 1970s, and especially during the 1980s, specific studies of living traditional societies by archaeologists were carried on in several parts of the world, such as Western Iran, Alaska, Tanzania, the Kalahari Desert, India, and the Andes. Among them, some long-term, multistage enterprises, such as the Kalinga Project in the Philippines directed by William Longacre, the Coxoh Ethnoarchaeological Project in the Maya Highlands in Mexico conducted by Brian Hyden, the Mandara Project in Cameroon and Nigeria headed by Nicholas David, and the research carried by Valentine Roux and collaborators in Uttam Nagar and Haryana in India, deserved mention. As such, a new approach was developed – the search for general principles that connected human behavior to material culture and the obtaining of conclusions that did not depend exclusively on sociocultural anthropological theory.

The initial optimism of processual archaeology in the belief that human behavior was subject to laws (more or less similar to those of biology) pervaded ethnoarchaeology and oriented its conceptual development in the 1970s (a perspective still present today, Roux 2007). During these early years, there was also an underlying conviction that universal laws could be generated that related human behavior to material remains. In fact, archaeologist Michael Schiffer presumed that, together with experimental archaeology, ethnoarchaeology would be the principal source for the production of these laws. Consequently, between the mid-1960s and the mid-1980s, a great attention was given to identify and describe the process that contributes to the formation of the archaeological deposits (i.e., bone breaking and discard, use of domestic space, camp construction, and abandonment) and in the mechanisms and the physical procedures related to the production of different kind of artifacts (especially pottery and lithic tools) (Lane 2006). The research done by Susan Kent (1984) in the USA and of James O'Connell (1987) in Australia are good

examples of the mainstream of ethnoarchaeology in those times. In this period, a few local archaeologists, such as Irmhild Wüst or Tom Miller Jr., started ethnoarchaeological projects in South America (Politis 2015), although their opened research has been overlooked.

In the 1980s and 1990s, ethnoarchaeology broadened its focus and began to be included within a post-processual agenda as well. The leader of this renovation was Ian Hodder, who, after his vital ethnoarchaeological experience in the late 1970s in Kenya in the Lake Baringo area, developed a new theoretical approach (Hodder 1982). The new paradigm emphasized reflexivity and hermeneutics and was based in Bourdieu's theory of practice, all of which permeated the post-processual ethnoarchaeology fieldwork, and data collection took a more emic character (as opposite of the externalism and quantitative methodology which characterized the processual ethnoarchaeology) and resulted in a greater effort to know the *meaning* of the material culture. From within post-processualism, the range of interests that ethnoarchaeology incorporated was expanded, especially as it widened its focus beyond techno-economic aspects – which dominated the previous years – to understanding greater levels of complexity, attempting to discern material correlates of the social and ideational. Principally, this new approach reconceptualized material culture, seeking to determine the multiple dimensions in which it operates. In this sense, certain aspects are emphasized that were barely touched upon in previous research, such as symbolism and the study of non-utilitarian dimensions of material culture within society. Ethnicity, gender, style, power, resistance, and so on were among the themes boarded by this new trend.

In parallel with these main trends, basically from Anglo-Saxon origins, there is a Francophone ethnoarchaeology which has its antecedents in the classic French ethnographic studies in material culture (González Ruibal 2003: 21–22; Roux 2013). This trend is oriented toward the identification of technological procedure (pottery, metallurgy, etc.) paying attention to the broader social context and to the learning processes.

Pioneer research in this trend was made by Allan Gallay and E. Huysecom (1989) in West Africa in relation to pottery technology. Pierre Lemonier and Olivier Gosselain, both representants of the *technique et culture* school, have made significant contributions, especially the former who described and contributed to understand the *chaine operatoire*. Also, Valentine Roux (2007), with a more positivist and nomothetical approach (which is in accord with the French logicism), has been studying ceramic and bead production in India giving special attention to the learning and specialization process. She and Daniela Corbetta, a cognitive psychologist, have established transcultural standards in terms of how a particular kind of specialization can be defined and relating these standards to material signatures (David and Kramer 2001: 230). The ethnoarchaeological studies of Anne-Marie and Pierre Petrequin have also made significant contributions; their research has been done in relation to village construction around the Lake Nokoué in Benin and later on in East and Central Irina Jaya (Indonesia) where they studied, among other relevant themes, the *chaine operatoire* of two ancient traditions of ground-polished stone tools.

Finally, an emergent ethnoarchaeological Spanish tradition should be mentioned, although it does not have yet the impact of the previous ones. Spanish ethnoarchaeology has focused mainly in Eastern Africa and in South America; inside Spain rural Galicia was the place of major research interest (see summary in Politis 2015:50–53). This tradition is formed by several different lines (among many others, Domingo 2011). One is developed by the team directed by Victor Fernandez Martínez in Ethiopia which was followed by Alfredo González Ruibal (Fig. 3), which is framed in the critical theory. The ethnoarchaeological project carried out by Almudena Hernando among the Q'eqchí in Guatemala is also part of this tradition although following an original poststructuralist approach (Hernando 1997).

Although the theoretical and methodological debates have been dominated by Anglo-American and francophone voices, in the last two decades or so, several regional research traditions emerged, and pioneer works have been recognized (see,

Ethnoarchaeology, Fig. 3 The research team directed by Victor Fernandez Martinez is interviewing some Mao people (slash agriculturalists of Ethiopia). In the picture, Alfredo González Ruibal and Derrib Worku are sitting on the fiber mat talking with the Mao in 2007. (Photo courtesy of Álvaro Falquina Aparicio)

e.g., Marciniak and Yalman 2013; Biagetti and Lugli 2016). These trends, although somewhat away from the mainstream of the discussion, do refresh and stimulate the subdiscipline and expand the research, and political, agenda.

Current Debates and Future Directions

Currently, ethnoarchaeological studies had multiplied and encompassed the analysis of all types of societies, and in all the major regions of the world, long-term ethnoarchaeological projects were initiated. In recent years, ethnoarchaeological studies have been carried out in the Americas, Africa, Asia, Oceania, and Europe. Furthermore, these studies have not been limited to indigenous groups but have also included Creole peoples, peasants, and western urban societies. For some authors, such as Alfredo González Ruibal, the study of western societies should include among other subdiscipline – detached from ethnoarchaeology – named "archaeology of the present." In the same vein, it has been proposed a reassignment of the subdiscipline under the name of "archaeological ethnography" which is defined as a highly contested, cross-disciplinary, transcultural, and politically loaded space, in which the distinction between past and present and diverse public and researchers should be downplayed (Hamilakis and Anagnostopoulos 2009).

As it has been mentioned, during the 1990s and especially in the 2000s, ethnoarchaeology began to be developed by local researchers in many regions of the world. This includes Latin America, where since the 1990s several ethnoarchaeological projects, basically by Brazilians and Argentineans, are in process (see review in Politis 2015) (Fig. 4). Main areas of interest in the Andes (following the work of George Miller) are pastoralist societies and ceramic production (Fig. 5), while in the tropical lowlands, the two main subjects are hunter-gatherers and village horticulturalists, such as the Guaraní. Among others, the Africanist ethnoarchaelogy has made also significant contributions, one of which is to the understanding of how social identities are materialized at different scales, an always latent question in the archaeological interpretation (Fig. 6). Other main research subjects in this continent are the relation between space and gender, the symbolic and material practices integrated in the ironworking and the organization of craft production (Lyons 2013; Lyons and David 2019).

Hunter-gatherers have been an important focus from the beginning of systematic ethnoarchaeological research (Yellen 1977; Binford 1978;

Ethnoarchaeology, Fig. 4 A couple of Hotï Indians visiting the ethnoarchaeologists' camp and drinking their beverages. High Parucito River, Estado Amazonas, Venezuela, 2002 fieldwork. (Photo by Gustavo Politis)

Ethnoarchaeology, Fig. 5 Peruvian ethnoarchaeologist Gabriel Ramón Joffré recording pottery production in Lanche Bajo, Piura, Northern Perú in 2004. (Photo courtesy of Gabriel Ramón Joffré)

Gould 1980). More recently, these societies have been approached from a variety of theoretical frameworks, from those linked with behavioral ecology (see recent review in Bird and O'Connell 2006) to others related to historical ecology (i.e., Politis 2007) or to nonmaterialistic issues such as gender and symbolic power (i.e., Hernando et al. 2011; see also review in Lane 2014) (Fig. 6). Paradoxically, as interest grows in these studies and their contributions are valued as means of archaeological inference, "traditional" societies are diminishing, especially and dramatically hunter-gatherers, and the range of variation of analogous referents is consequently reduced. Consequently, the westernization of indigenous societies notably diminishes the availability of contemporary analogous referents that reflect some of the conditions of past societies or that are comparable in some way.

Ethnoarchaeology has been active in the more general anthropological goal of understanding and exploring other forms of thought or cosmologies, which is of great importance also to archaeology. Within this field, patterns of rationality and logical structures are looked for that differs from western patterns of rationality. This kind of research, basically proposed by Spanish archaeologist

Ethnoarchaeology, Fig. 6 Diane Lyons working with a Tigrayan potter during the Tigray Pottery Project field study in 2009, Eastern Tigray, Ethiopia. (Photo courtesy of Diane Lyons)

Almudena Hernando, is framed within post-structuralism. In this use of ethnoarchaeology, the correlation with material culture is secondary to the attempt to understand alternative cosmovisions and different logics independently of their material correlates. Some recent and provocative papers (i.e., Gosselain 2016) have criticized several dimensions of ethnoarchaeology, from the methodological shortcomings (the flaws of analogy) to the colonial ideology that permeates the subdiscipline. For Gosselain, who contrasts the current situation with the enthusiasm and optimism of the early 1990s, "The times have changed, the excitement has dropped, the magic doesn't work anymore." Although some of the critics raised by Gosselain might be true and would invite to profound reflection, most of them are made against an old-fashion, out-of-date, and politically naïve mode of doing ethnoarchaeology. The paper from Gosselain does not encompass the complexities and heterogeneity of current ethnoarchaeology, neither the ongoing methodological, theoretical, and political debates inside the subdiscipline (see, e.g., the articles from *World Archaeology*, 2016 48 (5)). A complete and well-informed answer to Gosselain can be found in Lyons and David (2019).

In spite of same pessimist forecasts and against the argument that ethnoarchaeology has little impact on "real archaeology" (see discussion in Skibo 2009) and that the application of the generated models is limited (Hegmon 2000; González-Ruibal 2008), the subdiscipline is increasingly influencing the archaeological reasoning and is occupying a central place in the theoretical debate (see *World Archaeology*, 2016 48 (5)). More and more, archaeologists are using the results of ethnoarchaeological research to generate hypothesis, to build interpretative models, and to test the validity of their assumptions. The reduction of traditional societies, and/or modes of life, is compensated with the redirection of the ethnoarchaeological study toward segments or subgroups of contemporary western societies, orienting the research toward a sort of "ethnoarchaeology of us." However, the methodological procedure to integrate this new set of results into the interpretation of the archaeological record of past societies still needs to be properly developed. There is a methodological gap in the analogical reasoning that needs to be covered.

As a corollary, it should be noted that, besides providing analogues in an operative way to be applied in the interpretation of the archaeological record, one of the main contributions of ethnoarchaeology is the mitigation of the ethnocentrism that permeates the archaeological view of the people in the past and the interpretation of the long-term human experience. The subdiscipline is also helping in creating the history of the "others," in their own terms, as much as this is possible, and in the long term. Finally, ethnoarchaeology, with its particular look upon contemporary societies, both traditional and western, is making a great input not only in the understanding of present and past human behavior but also in archaeological theory building.

Cross-References

- ▶ Binford, Lewis R. (Theory)
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Hodder, Ian (Theory)
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Hypothesis Testing in Archaeological Theory
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Middle-Range Theory in Archaeology
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory

References

Biagetti, S., and F. Lugli, eds. 2016. *The intangible elements of culture in the ethnoarchaeological record*. New York: Springer.

Binford, L. 1978. *Nunamiut ethnoarchaeology*. New York: Academic.

Bird, D., and J. O'Connell. 2006. Behavioral ecology and archaeology. *Journal of Archaeological Research* 14: 143–188.

David, N., and C. Kramer. 2001. *Ethnoarchaeology in action*. Cambridge: Cambridge University Press.

Domingo, I. 2011. The rock art scenes at Injalak Hill: Alternative visual records of indigenous social organization and cultural practices. *Australian Archaeology* 72: 15–22.

Gallay, A., and E. Huysecom. 1989. *Ethnoarchéologie africaine*. Documents du Département d'Anthropologie et d'Écologie 14. Genève: Université de Genève.

González Ruibal, A. 2003. *La experiencia del otro. Una introducción a la etnoarqueología*. Madrid: Editorial Akal.

González Ruibal, A. 2008. De la etnoarqueología a la arqueología del presente. In *Mundos tribales. Una vision etnoarqueológica*, ed. J. Salazar, I. Domingo, J.M. Azkárraga, and H. Bonet, 16–27. Valencia: Museu de Prehistòria de València.

Gosselain, O. 2016. To hell with ethnoarchaeology! *Archaeological Dialogues* 23 (2): 215–228.

Gould, R. 1980. *Living archaeology*. Cambridge: Cambridge University Press.

Hamilakis, Y., and A. Anagnostopoulos. 2009. What is archaeological ethnography? *Public Archaeology: Archaeological Ethnographies* 8 (2–3): 65–87.

Hegmon, M. 2000. Advances in ceramic ethnoarchaeology. *Journal of Archaeological Method and Theory* 77: 129–138.

Hernando Gonzalo, A. 1997. La identidad Q'eqchi. Percepción de la realidad y autoconciencia de un grupo de agricultores de roza de Guatemala. *Revista Española de Antropología Americana* 27: 199–220.

Hernando, A., G. Politis, A. González-Ruibal, and E. Beserra Cohelo. 2011. Gender, power and mobility among the Awá-Guajá (Maranhão, Brazil). *Journal of Anthropological Research* 67 (2): 189–211.

Hodder, I., ed. 1982. *Symbols in actions: Ethnoarchaeological studies of material culture*. Cambridge: Cambridge University Press.

Kent, S. 1984. *Analyzing activity areas*. Alburquerque: University of New Mexico.

Lane, P.J. 2014. Hunter-gatherer-fishers, ethnoarchaeology and analogical reasoning. In *The Oxford handbook of the archaeology and anthropology of hunter-gatherers*, ed. V. Cummings, P. Jordan, and M. Zvelebil, 104–150. Oxford: Oxford University Press.

Lyons, D. 2013. Ethnoarchaeological research in Africa. In *The Oxford handbook of African archaeology*, ed. P. Mitchell and P.J. Lane. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199569885.013.0007.

Lyons, D., and N. David. 2019. To hell with ethnoarchaeology . . . and back! *Ethnoarchaeology* 11 (2): 99–133. https://doi.org/10.1080/19442890.2019.1642557.

Marciniak, A., and N. Yalman, eds. 2013. *Contesting ethnoarchaeologies. Traditions, theories, prospectus*. New York: Springer.

O'Connell, J.F. 1987. Alyawara site structure and its archaeological implications. *American Antiquity* 52: 74–108.

Politis, G. 2015. Reflections on contemporary ethnoarchaeology. *Pyrenae* 41 (1): 41–83.

Ravn, M. 2011. Ethnographic analogy from the Pacific: Just as analogy as any other analogy. *World Archaeology* 43 (4): 716–725.

Roux, V. 2007. Ethnoarchaeology, a non-historical science of reference necessary for interpreting the past. *Journal of Archaeological Method and Theory* 14 (2): 153–178.

Roux, V. 2013. Ethnoarchaeology in France: Trends and perspectives. In *Contesting ethnoarchaeologies. Traditions, theories, prospectus*, ed. A. Marciniak and N. Yalman, 17–34. New York: Springer.

Sillar, B. 2000. *Shaping culture: Making pots and constructing households: An ethnoarchaeology study of pottery production, trade and use in the Andes*. BAR international series 883. Oxford: Archaeopress.

Skibo, J. 2009. Archaeological theory and snake-oil peddling. The role of ethnoarchaeology in archaeology. *Ethnoarchaeology* 1 (1): 27–55.

Spriggs, M. 2008. Ethnoarchaeological parallels and the denial of history. *World Archaeology* 40 (4): 538–552.

Wylie, A. 1985. The reaction against analogy. *Advances in Archaeological Method and Theory* 8: 63–111.

Yellen, J.E. 1977. *Archaeological approaches to the present*. New York: Academic.

Further Reading

Hodder, I., ed. 1986. *Reading the past: Current approaches to interpretation in archaeology*. Cambridge: Cambridge University Press.

Lane, P. 2006. Present to past. Ethnoarchaeology. In *Handbook of material culture*, ed. C. Tilley, W. Keane, S. Kuechler, M. Rowlands, and P. Spyer, 402–424. London: Sage.

Politis, G. 2007. *Nukak. Ethnoarchaeology of an Amazonian people (University College London Institute of Archaeology Publications)*. Walnut Creek: Left Coast Press.

Ethnoarchaeology of Pastoral Societies

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Introduction

Ethnoarchaeological research programs on pastoral societies have been relatively few in number, yet many of them have had a tremendous impact. The archaeology of pastoralism has enormously benefited from the studies carried out throughout the last 50 years among current herders, inspiring and orienting archaeological research on a variety of past systems based on animal husbandry. The alleged "invisibility" of archaeological pastoral sites has been challenged precisely on the basis of ethnoarchaeological research, and nowadays archaeologists are able to tackle and decode ancient pastoral landscapes, no matter their geographic or chronological context. More sophisticated reconstruction of ancient nomad-sedentary interactions, on past mobility and settlement patterns, and on the formation processes of the archaeological pastoral sites is currently performed, thanks to the pivotal role played by a set of ethnoarchaeological research that paved the way to a more nuanced understanding of pastoral systems. The ethnoarchaeology of pastoralism has not only provided invaluable support to archaeology but has also contributed in designing suitable strategies to deal with mobile systems both in the present and in the past, configuring approaches to landscapes, sites, and artifacts related to non-sedentary societies.

Definition

Ethnoarchaeology became part of current archaeological practices in the 1950s (David and Kramer 2001). Encompassing research carried out on present-day communities with archaeological purposes, ethnoarchaeology revolutionized archaeological theory and practice from the late 1960s under the advent of the so-called New Archeology. Either considered as a research strategy, a sub-discipline of archaeology, or even a discipline on its own, the many definitions of ethnoarchaeology that have been proposed through the years (David and Kramer 2001: 12, Table 1.1) testify to the pluralism of perspectives that characterizes this line of studies. In recent years, an effective contribution toward the outlining of ethnoarchaeology's scope and functions has been traced by Skibo (2009: 47), who emphasizes how ethnoarchaeology can contribute in building theoretical models to be used by archaeologists who are seeking to make more sophisticated inferences about the relationships between material remains and human behavior. In this entry, "ethnoarchaeology" is defined as the study of the present to generate interpretive models for the understanding of the past.

The term "pastoralism" has been variably used to define socioeconomic systems based on animal husbandry in ethnohistorical literature from the twentieth century onward. Classificatory and normative typologies (e.g., Khazanov 1984) have proven not very useful to frame the debate around pastoralism, universally characterized by a large degree of intrinsic flexibility (Salzman 2002). Strict typologies are largely ideal and poorly suited to approach extremely nuanced and opportunistic systems, where different variables are continually recombined. In this entry, pastoralism

is defined as a socio-ecological system based upon animal husbandry, characterized by the predominant role of the stock from the economic, ideological, cultural, and social points of view.

Historical Background

Early Stage: The Ethnography of Pastoralism (1920s–1960s)

From its inception, archaeology focused and developed around the concept of site, in relation with the excavation of classical and historical settlements in the Old World. Monumental, massive, and recognizable vestigial of ancient civilization were the hallmark of the birth of Archaeology in the nineteenth century. As a result, more ephemeral forms of human frequentations were simply out of the scope of archaeology. Those interested in the study of mobile pastoral societies were not provided of any robust methodological nor theoretical framework to support their investigations. The study of prehistoric and historical pastoralisms has traditionally posed serious challenges for archaeologists. Highly mobile and lightly equipped, ancient pastoralists remained a "problem" in the archaeological literature for a long time. Scholars have long been questioning the possibility of finding the remains of ancient herders, due to the elusive and ephemeral character of pastoral campsites.

Partially due to the abovementioned reasons, ethnography has always been a major source of data for those interested in the study of the ancient pastoralism. In their encounters with pastoral societies in the Old World, Westerner ethnographers from the early and mid-twentieth century have made large use of typologies and labels. Due to the necessity of pinning down such different socio-ecological and political systems, and fueled by the debate around the existence of pure pastoral societies (i.e., societies whose food production and consumption were predominantly or almost exclusively based upon livestock and its by-products), ethnographers built ideal frames of reference to approach non-sedentary societies. Comparative studies of pastoralism took into account the geographic constraints to elaborate a narrative around stock-keeping in ancient times in a very prescriptive way. From the 1940s to 1960s and onward, seminal ethnographies were published. Those works represent milestones in the anthropology of pastoralism and share a structural functional approach, where regular patterns of production, seasonal movement, and modes of resource exploitation were portrayed. As a result, seemingly unvarying cycles were described in details, leaving little room to anomalies or divergences with respect to those patterns. However, the severe droughts that hit Africa in the 1970s–1980s with the consequent dramatic effects on pastoral economies generated a renovated interest by social anthropologists toward herding societies. In the postcolonial era, new investigations were carried out among pastoralists in the Old World, which were often characterized by a shift in the theoretical background and a progressive abandonment of strict deterministic positions. As such, the debate focused on the relations between ecology, society, policies, and adaptation (Salzman 2002, therein references) and assumed more complex nuances. The variability and the opportunism of pastoral societies were recognized as key elements of this livelihood, and the discussion was therefore framed also around them.

The Birth and Development of the Ethnoarchaeology of Pastoralism (1970s)

The wave of the New Archaeology, and the widespread feeling for a more anthropologically oriented archaeology, fostered the first explicitly ethnoarchaeological research programs on pastoral societies. In the 1970s a series of papers reflect the need and the interests by archaeologists in getting more precise data about material culture, sites, and land use in pastoral communities. It is well known that, beside the detailed description of a given society, in fact, traditional ethnography does not take into account the material dimension of human behavior, and thus quantitative information about artifacts, architecture, and landscape are generally limited. Unfortunately, this is precisely what archaeologists need in order to make inferences about the past societies based on the recovered material evidences of human occupations, which often result in mere scatters of artifacts and ecofacts. One of the earliest works focusing on material culture is that from Robbins (1973),

providing us with the first ethnoarchaeological study on the Turkana, a pastoral society from East Africa. In his "Turkana Material Culture Viewed from an Archaeological Perspective," Robbins noted all the type of artifacts recorded at selected Turkana campsites, their position, their uses, and their perishability and ultimately discussed the implications of his observations under an archaeological perspective. In the same years, Nicholas David (Fig. 1) published his "The Fulani Compound and the Archaeologist" (1971), where he explored present-day compounds inhabited by settled pastoral Fulani in Cameroon, with the aim of illustrating how an ethnoarchaeological approach can lead to more refined interpretation of archaeological households. To understand the degree of fit between households and their buildings, David (1971: 111) stresses that "...we must seek for analogies from ethnography and (...) test their appropriateness and generate new models when these are required to fit the excavated data. The available ethnographic models are unfortunately quite inadequate" (Fig. 2). The quest for the identification of pastoral sites was further developed by Frank Hole (Fig. 3), one of the earliest ethnoarchaeologist dealing with herders' settlement pattern. In his research in Luristan (Iran), he identified the main factors driving the selection of settlements in relation to pasture and water and their relationship with a set of other physiographic variables (Hole 1979). The importance of his work lies in pinpointing a number of useful observations to design research programs on pastoral societies worldwide, overcoming the supposed "invisibility" of pastoral sites due to the high mobility and light equipment of herders.

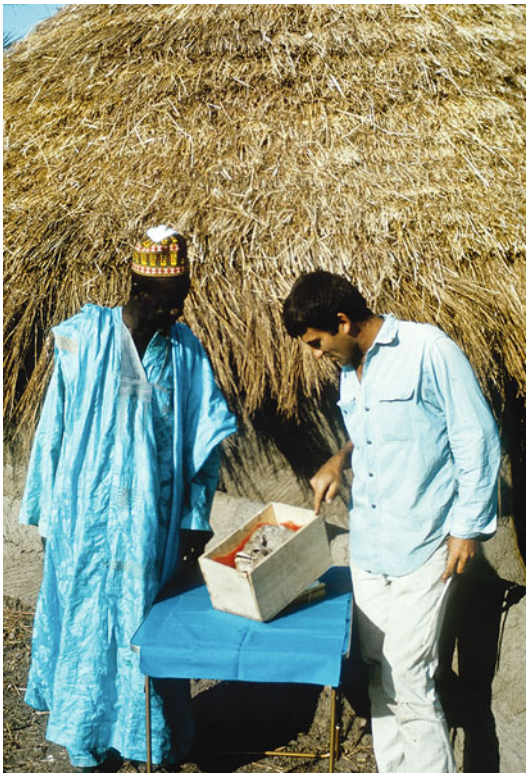

Ethnoarchaeology of Pastoral Societies, Fig. 1 Nicholas David and the Lamido (chief) of the settled Fulani of the village of Bè, N. Cameroon. (Courtesy Nicholas David, picture taken in 1968)

The Age of Maturity (1980–1990s)

Hole's work influenced the research by Roger Cribb, who studied nomadic societies in Cilicia (Turkey) in the 1980s. Cribb's main publication *Nomads in Archaeology* was later issued in 1991 and highlights the migratory and settlement patterns, along with nomadic architecture and intra-site spatial observations, including notes on the abandonment and reuse of campsites, plus a rich collection of maps, plans, and photographs. He significantly compares (1991: 5) the ethnographic present to a laboratory in which phenomena can be studied under controlled conditions. He continues (1991: 5) stressing that "...In documenting the spatial organization of contemporary nomads I am not attempting to map this organizational structures onto ancient nomads" and that "...it is the tools forged in the ethnographic setting which are imported into the past, not that setting itself." In the 1980s–1990s, a number of scholars carried out research programs on the ethnoarchaeology of pastoral societies, following the path opened in the 1970s, from North, South, and East Africa to Southern Europe, to the Andes, the Levant, and the near East, and Central Asia, exploring also less tangible aspect of material culture (Hodder 1982). Another similar piece of research to Cribb's is the book *Nomads in the Archaeological Records* by Rebecca Bradley (1992), where the author presents her archaeological and ethnoarchaeological fieldwork carried out in Sudan in 1979–1980. Bradley reinterprets the

Ethnoarchaeology of Pastoral Societies, Fig. 2 Fulani pastoralists taking care of cattle belonging to settled Fulani of the village of Bè, N. Cameroon. (Courtesy Nicholas David, picture taken in 1970)

Ethnoarchaeology of Pastoral Societies, Fig. 3 Frank Hole in the field (courtesy Frank Hole)

archaeological evidence from the Kushite age in the Butana region under her direct ethnoarchaeological observations from contemporary nomadic pastoralists and sedentary agriculturalists from the same area and argues that – contrary to mainstream theory that leaves no place to pastoralists in the Kushite state – nomadic pastoralism was likely an important component in Kush society. The edited volume

Pastoralism in the Levant: Archaeological Materials in Anthropological Perspective (Bar-Yosef and Khazanov 1992) includes a number of relevant papers aimed at identifying tangible and visible traces of pastoral campsites. Claudia Chang's long-term research in Greece and the Balkans represents another outstanding example of the application of ethnoarchaeology to a wide array of aspects of pastoral societies (e.g., Chang and Tourtellotte 1993). All those publications also engage with the issue of the abandonment of pastoral campsites and explore what is left at the settlements once the pastoralists have gone. This is one of the fields where, in my opinion, ethnoarchaeology of pastoralism has deeply enhanced the archaeology of mobile societies. Along with the above mentioned publications, a 14-month ethnoarchaeological research on a southwestern Bolivian agropastoral society was published in the early 1990s (Tomka 1993). Although focused on a community practicing a mixed economy, the study largely explores the abandonment of pastoral sites, where the author identifies a peculiar mechanism operating, which he calls "delayed curation." According to his observations, even the abandonment of sites is a dynamic and continuous process and does not merely consist in a non-occupation of a previously frequented settlement. Rather, under the "delayed curation" perspective, previous inhabitants keep collecting usable artifacts that had been cached in view of potential future reoccupations. Delayed curation is ". . .the mechanism by which elements of these cached assemblages are slowly withdrawn from these residences as the length of episodic abandonment increases and the probability of future reoccupation diminishes and finally becomes unlikely." There is little doubt that similar phenomena are to be recorded in other cases (e.g., Biagetti 2014: 99–142; Fig. 4) and constitute recurrent and peculiar characteristics of pastoral landscapes.

Ethnoarchaeology of Pastoral Societies, Fig. 4 Interviewing and visiting at a recently abandoned Kel Tadrart campsite, SW Libya. (Photo Stefano Biagetti, courtesy Archive of The Italian Libyan Archaeological Mission in the Sahara)

Key Issues/Current Debates

The Advent of Geo-Ethnoarchaeology

It is not by chance that the term geo-ethnoarchaeology was used for the first time with reference to the study of a system of prehistoric caves frequented by pastoralists. In the early 1990s, Jacques Brochier and colleagues (Brochier et al. 1992) published "Shepherds and Sediments: Geo-ethnoarchaeology of Pastoral Sites," pointing out a so far unexplored set of indicators to be taken into account in the study of ancient pastoralism. Their paper clearly illustrates how mineral residues of dung represent diagnostic and likely universal non-faunal criteria for the identification of herding activities at archaeological sites. Brochier and colleagues devise a geo-ethnoarchaeological approach to dung, the most ubiquitous and unambiguous proxy of pastoral frequentation, and resume (Brochier et al. 1992: 47): "... that the most important durable indicators are the mineral residues of manure accumulated in sheep/goat pens and other physical traces of animal enclosures, namely: (1) spherulites, microscopic crystals of a calcium salt, diagnostic indicators of ovicaprine dung; (2) layers of burnt dung; and (3) rock polish produced by sheep/goat fleece and hooves on cave walls and stone blocks." Ten years later, the results from a research program carried out in East Africa were published in a series of papers (Shahack-Gross 2017 and references therein). Shahack-Gross and colleagues identified the mechanisms of degradation of dung deposits and their markers, thanks to the observation and analysis of samples from contemporary and early campsites. The procedure therein adopted allowed the authors to build general laws related to the formation of pastoral archaeological sites (sensu Skibo 2009) on the basis of the geo-ethnoarchaeological study of microremains included in dung deposits. The importance of those methodologies lies also in shifting the focus of research away from bones, architecture, and artifacts and targeting the most unequivocal by-product of pastoral occupations. Current research (Égüez et al. 2018 and references therein) is focusing on the recognition of proxies suitable for geo-ethnoarchaeological analyses (Fig. 5), with the aim of exploring the potential of pastoral deposits in the present in order to drive archaeological research and interpretation.

Pastoral Landscapes, Resources, and Resilience

Since Hole's research (1979), ethnoarchaeologists realized that a full understanding of any pastoral societies should embrace a landscape approach. Recent developments in Geographic Information System allow exploring the relationships between human communities and their territories and resources at large scale. The availability of (also free) high-resolution satellite imagery, which can even by obtained free of costs, provides an

Ethnoarchaeology of Pastoral Societies, Fig. 5 Stefano Biagetti and Andrea Zerboni collecting geo-ethnoarchaeological samples at a contemporary corral from the area of Omdurman, Sudan. (Photo and courtesy Carla Lancelotti)

unprecedented support for territorial research on mobile populations. Previously hardly accessible landscapes can now be visually inspected in short time through Earth observation, and a variety of projects include the remote monitoring of land use and the tracking of changes in the availability of natural resources. In this frame, the study of "regions" is being carried out under fresh perspectives. Instead of adhering to strict ecological determinism, ethnoarchaeologists are demonstrating that the adoption of the concept of resilience (i.e., the capacity of a system to withstand change without modifying its characteristics) is rather suited to frame the investigation around pastoralism, focusing on its multifaceted and flexible patterns of mobility and use of resources. Opportunism is the hallmark of pastoralism, and ethnoarchaeology has shed light on it. For instance, the study of current resilience of pastoral communities in hyper-arid environment is demonstrating that variability and flexibility can characterize pastoral lifestyle also in deserts, escaping an ecologically deterministic perspective, with relevant feedback on the reconstruction of past cultural trajectories as well (Biagetti 2014). The application of advanced geostatistical techniques and modelling is also being used to study European pastoralism. In the study of pastoral landscapes, Carrer (2013) proposes an ethnoarchaeological inductive model for predicting archaeological sites in the western Italian Alps (Fig. 6). The novelty of his approach lies in the adoption of quantitative ethnoarchaeology to successfully predict the location and the function of a number of archaeological sites. Both authors publish a number of maps and sketches (Fig. 7), often missing from papers on ethnoarchaeology of pastoralism. Increasing use of remote sensing, coupled with geostatistics and quantitative approaches, represents a promising avenue for the development of GIS-based ethnoarchaeology of pastoralism.

Pastoral Material Culture Reloaded: Biochemistry

The study of organic residues in archaeological artifacts represents one of the most rapidly growing fields of archaeological sciences. In the last 20 years, a series of study has stressed the potential of the analyses of absorbed residues in ancient pottery, shedding light on diet and subsistence practices of early pastoralists worldwide. Dunne, Grillo, and colleagues (2018) have recently explored the advantages of carrying out such chemical analyses from potsherds whose lifetime use is known, in likely the first (and so far, only) ethnoarchaeological study on organic residues carried out among current pastoral communities (Fig. 8). In their research carried out in Samburu region (Kenya), the authors stress that the results from chemicals analyses of organic residues do not reflect the relative importance of all the various types of food processed in vessels and that

Ethnoarchaeology of Pastoral Societies, Fig. 6 Recently abandoned dry-stone structure used up to few years ago to make cheese in the area of Monregalese, Cuneo, Western Italian Alps. (Photo and courtesy Francesco Carrer)

Ethnoarchaeology of Pastoral Societies, Fig. 7 Plan of a Kel Tadrart inhabited campsite in 2007, SW Libya. (Elaboration by Stefano Biagetti)

Ethnoarchaeology of Pastoral Societies, Fig. 8 Samburu woman preparing a pot for use by smearing it with wet cow dung, Rift Valley province, N-Central Kenya. (Photo and courtesy Katherine M. Grillo)

some foods result as hidden in terms of residue analyses. A very fresh study has been looking to contemporary dung deposits from Eastern Mongolia to identify their molecular and isotopic fingerprints, in order to build a reference for identifying evidence of patterns of stock management and animal diet (Égüez and Makarewicz 2018). Considering the growing importance in isotopic studies in archaeology, that paper represents an important ethnoarchaeological work providing insights on the isotopic signatures left at present-day pastoral campsites. In both case studies mentioned, the role of the present is therefore pivotal to orient archaeological research also in the case of its hard science applications.

International Perspectives

The recording and preservation of a body of intangible knowledge related to animal husbandry is a widespread and international concern. Supranational organizations are claiming for the integration of local knowledge and indigenous perspectives in the designing of sustainable strategies of development. Ethnoarchaeology is uniquely placed to bridge the intangible knowledge of pastoral societies with the tangible body of their artifacts, settlements, and landscapes. Being focused on both material and nonmaterial

aspects of cultures, ethnoarchaeology is ideally suited to mediate between stakeholders and local communities when some kind of intervention is planned. Pastoralism is likely declining everywhere, as a result of the global trends toward urbanizations and sedentarization. Nevertheless, many societies keep living in a set of regions where animal husbandry is certainly the most productive and sustainable form of food production. Ethnoarchaeological research programs have been contributing in unveiling the facets of pastoral adaptation to regions generally considered as marginal or hostile, such as arid lands or uplands. Ethnoarchaeological studies in pastoral adaptation and resilience hold the merit of highlighting the most relevant characteristics of pastoral adaptation and lifestyle in many regions of the world, (re-)orienting archaeological investigations to less evident – though not less recognizable – features of the archaeological landscape.

Future Directions

In spite of the overall decline of pastoralism, the ethnoarchaeology of pastoral societies will likely represent a vibrant field of research in the next decades. Advances in remote sensing techniques, geo-ethnoarchaeology, and chemistry will likely play a major role in the ethnoarchaeology of pastoral societies A remarkable and relatively recent phenomenon is represented by the inclusion of other pastoral contexts that have raised little or no ethnoarchaeological interest to date. Among those, fresh ethnoarchaeological literature on pastoralists and reindeer herders from Mongolia is definitely worthy of note (see further readings). On broader level, the study of resilience and adaptation of current pastoral societies under an ethnoarchaeological perspective is contributing to challenge the general perception about herders and their settings. Far from being peripheral communities characterized by variable degree of contact with sedentary hotspots (villages, oases, cities), ethnoarchaeological studies of pastoralists around the world are demonstrating how allegedly "marginal" areas (e.g., hot and cold drylands, mountains) and its inhabitants can play an active role in the historical and cultural trajectories. In fact, those regions are home to original and creative developments that ethnoarchaeological approaches are unveiling, opening thus new windows on more inclusive and elaborated reconstruction of past dynamics, where pastoral societies are a non-secondary component. Current ethnoarchaeology of pastoral societies is therefore not only shedding new light on past herding communities, but it is configuring as a key approach to understand the complex network of social, ecological, and economic factors that drive the interactions between pastoralists and the outer world in a historical perspective, taking into account both the material and the intangible domain.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Building Frames of Reference for Research

References

Bar-Yosef, O., and A. Khazanov, eds. 1992. *Pastoralism in the levant: Archaeological materials in anthropological perspective*. Madison: Prehistory Press.

Biagetti, S. 2014. *Ethnoarchaeology of the Kel Tadrart Tuareg. Pastoralism and resilience in Central Sahara*. New York: Springer International Publishing.

Bradley, R. 1992. *Nomads in the archaeological record. Case studies in the northern provinces of the Sudan (Meroitica)*. Berlin: Akademie.

Brochier, J.E., P. Villa, M. Giacomarra, and A. Tagliacozzo. 1992. Shepherds and sediments: Geo-ethnoarchaeology of pastoral sites. *Journal of Anthropological Archaeology* 11: 47–102. https://doi.org/10.1016/0278-4165(92)90010-9.

Carrer, F. 2013. An ethnoarchaeological inductive model for predicting archaeological site location: A case-study of pastoral settlement patterns in the Val di Fiemme and Val di Sole (Trentino, Italian Alps). *Journal of Anthropological Archaeology* 32: 54–62. https://doi.org/10.1016/j.jaa.2012.10.001.

Chang, C., and P.A. Tourtellotte. 1993. Ethnoarchaeological survey of pastoral transhumance sites in the Grevena region, Greece. *Journal of Field Archaeology* 20: 249–264. https://doi.org/10.1179/009346993791549192.

Cribb, R. 1991. *Nomads in archaeology*. Cambridge: Cambridge University Press.
David, N. 1971. The Fulani compound and the archaeologist. *World Archaeology* 3: 111–131.
David, N., and C. Kramer. 2001. *Ethnoarchaeology in action*. Cambridge: Cambridge University Press.
Dunne, J., K.M. Grillo, E. Casanova, et al. 2018. Pastoralist foodways recorded in organic residues from pottery vessels of modern communities in Samburu, Kenya. *Journal of Archaeological Method and Theory*. https://doi.org/10.1007/s10816-018-9384-0.
Égüez, N., and C. Makarewicz. 2018. Carbon isotope ratios of plant n-alkanes and microstratigraphy analyses of dung accumulations in a pastoral nomadic winter campsite (eastern Mongolia). *Ethnoarchaeology* 10: 141–158.
Égüez, N., A. Zerboni, and S. Biagetti. 2018. Microstratigraphic analysis on a modern central Saharan pastoral campsite. Ovicaprine pellets and stabling floors as ethnographic and archaeological referential data. *Quaternary International* 483: 180–193. https://doi.org/10.1016/j.quaint.2017.12.016.
Hodder, I. 1982. *Symbols in action*. Cambridge: Cambridge University Press.
Hole, F. 1979. Rediscovering the past in the present: Ethnoarchaeology in Luristan, Iran. In *Ethnoarchaeology: Implications of ethnography for archaeology*, ed. C. Kramer, 192–218. New York: Columbia University Press.
Khazanov, A.M. 1984. *Nomads and the outside world*. Madison: University of Wisconsin Press.
Robbins, L.H. 1973. Turkana material culture viewed from an archaeological perspective. *World Archaeology* 5: 209–214.
Salzman, P.C. 2002. Pastoral nomads: Some general observations based on research in Iran. *Journal of Anthropological Research* 58: 245–264.
Shahack-Gross, R. 2017. Archaeological formation theory and geoarchaeology: State-of-the-art in 2016. *Journal of Archaeological Science* 79: 36–43. https://doi.org/10.1016/j.jas.2017.01.004.
Skibo, J. 2009. Archaeological theory and snake-oil peddling: The role of ethnoarchaeology in archaeology. *Ethnoarchaeology* 1: 27–56.
Tomka, S.A. 1993. Site abandonment behavior among transhuman agro-pastoralists: The effects of delayed curation on assemblage composition. In *Abandonment of settlements and regions: Ethnoarchaeological and archaeological approaches*, ed. C.M. Cameron and S.A. Tomka, 11–24. Cambridge: Cambridge University Press.

Further Readings

Aurenche, O. 1984. *Nomades et sedentaires: Perspectives ethnoarchéologiques*. Paris: Editions Recherchés sur les Civilisations.
Barth, F. 1961. *Nomads of South Persia. The Basseri tribe of the Khamseh confederacy*. Prospect Heights: Waveland Press.
Chang, C., and H.A. Koster. 1986. Beyond bones: Toward an archaeology of pastoralism. *Advances in Archaeological Method and Theory* 9: 97–148.
Chapelle, J. 1957. *Nomades noirs du Sahara*. Paris: Plon.
Dupire, M. 1962. *Peuls nomades: Etude Descriptive des Wodaabe du Sahel Nigérien*. Paris: Institut d'Ethnologie.
Dyson-Hudson, R., and N. Dyson-Hudson. 1980. Nomadic pastoralism (Africa). *Annual Review of Anthropology* 9: 15–61.
Ecologie, E., ed. 1979. *Pastoral production and society/Production pastorale et société*. London: Cambridge University Press.
Elliott, S., R. Bendrey, J. Whitlam, et al. 2015. Preliminary ethnoarchaeological research on modern animal husbandry in Bestansur, Iraqi Kurdistan: Integrating animal, plant and environmental data. *Environmental Archaeology* 20: 283–303. https://doi.org/10.1179/1749631414Y.0000000025.
Evans-Pritchard, E.E. 1940. *The Nuer: A description of the modes of livelihood and political institutions of a Nilotic tribe*. Oxford: Clarendon Press.
Gamble, C.S., and W.A. Boismier, eds. 1991. *Ethnoarchaeological approaches to mobile campsites*. Ann Arbor: International monographs in prehistory.
Kuznar, A.L. 2001. *Ethnoarchaeology of Andean South America. Contributions to archaeological method and theory*. Oxford: Berghahn.
Lugli, F. 2016. Mongolian nomads and their dogs. In *The intangible elements of culture in the ethnoarchaeological records*, ed. S. Biagetti and F. Lugli, 125–139. Switzerland: Springer International Publishing.
Monod, T., ed. 1975. *Pastoralism in tropical Africa*. Oxford: Oxford University Press.
O'Brien, M.J., and T.A. Surovell. 2017. Spatial expression of kinship among the Dukha reindeer herders of northern Mongolia. *Arctic Anthropology* 54: 110–119.
Palmer, C., H. Smith, and P. Daly. 2007. Ethnoarchaeology. In *Archaeology and desertification: The Wadi Faynan landscape survey, southern Jordan*, ed. G. Barker, D. Gilbertson, and D.J. Mattingly, 369–395. Oxford: Council for British Research in the Levant.
Portillo, M., S. Kadowaki, Y. Nishiaki, and R.M. Albert. 2014. Early Neolithic household behavior at tell Seker al-Aheimar (upper Khabur, Syria): A comparison to ethnoarchaeological study of phytoliths and dung spherulites. *Journal of Archaeological Science* 42: 107–118. https://doi.org/10.1016/j.jas.2013.10.038.
Stenning, D.J. 1959. *Savannah Nomads: A study of the Wodaabe pastoral Fulani of western Bornu Province, northern region, Nigeria*. London: Oxford University Press.
Tripcevich, N. 2016. The ethnoarchaeology of a Cotahuasi salt caravan: Exploring Andean pastoralist movements. In *The archaeology of Andean pastoralism*, ed. J.M. Capriles and N. Tripcevich, 211–230. Albuquerque: UNM.

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Ethnoarchaeology of Salt in Romania

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Introduction

Hallstatt, Vallée de la Seille, and Halle/Saale have been, for more than a century, famous European archaeological sites connected to the prehistoric exploitation of salt. The number of such sites has gradually increased, with the last three to four decades witnessing an unprecedented research impetus across all continents, which consolidated the syntagma Archaeology of Salt. Starting in the 1970s, Southeastern Europe became the spotlight in this regard, producing evidence of the worlds' oldest (Neolithic and Chalcolithic) production of recrystallized salt from salt springs (Bosnia-Herzegovina, Romania, and Bulgaria).

Southeastern Europe is one of the rare areas of the continent with considerable ethnoarchaeological potential. It began to be valued through significant approaches beginning in the 1980s (Nandris 1985, 1987). Despite the progress, this potential is still far from being exhausted (Zidarov and Grębska-Kulow 2013). The importance of ethnoarchaeological research in these resilient areas is enormous for the proper understanding of many archaeological situations in Europe and beyond. This transgressive assertion is justified by the appeal to the classic distinction between the two types of ethnographic analogies. The first operates in the conditions where the two sets of data – archaeological and ethnographic, respectively – are very disparate in time or space or in both and no connection can be demonstrated between the culture that produced the archaeological traces and the culture that provides the ethnographic analogies (Stiles 1977). The second type of analogy is practiced when it is possible to attest a connection in time and/or space between archaeological and ethnographic cultures; in this situation, a degree of continuity can be assumed between past and present. This latter kind of analogy was the basis for the definition of the direct historical method (Ascher 1961). Thus, most researchers believe that this type is most likely to be correct because the time, space, and cultural affinity conditions that produced the two sets of data under comparison are almost analogous.

Romania's ethnoarchaeological potential for salt was highlighted in the last decade of the last century by a pioneering study (Alexianu et al. 1992). In many mountain and hill micro-areas, Romania meets the ideal conditions for undertaking ethnoarchaeological research focused on investigating the role of salt in the evolution of prehistoric communities. This is because this country:

(a) Is very rich in salt deposits and various saline manifestations.
(b) Shows a remarkable density of archaeological sites, close to some salt springs, the oldest evidence for salt production in Europe, and probably worldwide (Weller and Dumitroaia 2005). Here is the so-called trough technique, first investigated in Transylvania (Harding 2013, 63–66; Harding and Kavruk 2013, 47–94).
(c) Still has a number of resilient areas where traditional salt production, distribution, and rituals in rural, and sometimes even urban, areas continue to this day at an unexpected degree of intensity for an EU member country (from 2007).

In the following, I expand on these three characteristics:

(a) Salt deposits on the Romanian territory (Romanescu et al. 2014, 2015) are found in two large areas: the Subcarpathians and the Transylvanian Depression. The area of Romanian sub-Carpathians unfolds along the external margin of Eastern and Southern Carpathians. In terms of altitude sub-Carpathians are hills, while in terms of genetics they are mountains. Salt deposits were created in the lagoon areas situated near the mountain frame. The chemical differences between salt deposits in the sub-Carpathians and in Transylvanian Depression are due to local conditions. Salt

deposits within the sub-Carpathians are mixed with carbonates and sulfates, while the salt within the Transylvanian Depression is pure (only halite). The lack of magnesium and potassium salts in the Transylvanian Depression is due to the existence of connection pathways with the open ocean (waters with high concentration of magnesium and potassium are evacuated from the Transylvanian lagoon). In the sub-Carpathians, there are 2–4 layers with different ages, while in the Transylvanian Deposits, there is only one, with a thickness of 400 m. Considering an average seawater concentration of 35%, the following salts are deposited: 78% halite, 17.7% complex potassium and magnesium salts (chlorides, sulfates, etc.), 3.6% gypsum, 0.4% dolomites, and tiny amounts of bromides, iodides, etc. The different percentages of these elements determine the differentiation of salt deposits in Romania. In Romania there are approximately 200 salt massifs and around 2000 salt springs. As far as saline springs are concerned, their accessibility throughout the prehistory and history is obvious, while only a small part of the salt masses could be exploited in pre- and proto-history depending on the depth at which they were located.

(b) The archaeological discoveries on the territory of Romania cover all pre- and proto-historical periods. Some of the archaeological cultures are considered landmarks for European prehistory (e.g., Starčevo-Criş and Cucuteni-Trypillia). In the last half century, the research on the archaeology of salt has boomed in Romania (Alexianu et al. 2011; Harding 2013; Harding and Kavruk 2013). At least two areas are of maximum relevance: the sub-Carpathian area of Moldova, where the oldest traces worldwide of saline springs exploitation were discovered (Weller and Dumitroaia 2005), and the Băile Figa area (Transylvania), where a new technique was discovered for the exploitation of salt and salt sludge deposits – the "trough technique" (Harding and Kavruk 2013).

(c) After World War II, Romania came into the Soviet Union sphere of influence. Even the introduction of the Soviet-inspired kolkhoz system only partially destroyed the ethnographic fabric of the rural Romanian communities, since this system was inapplicable in the mountainous areas of the country that lacked large surfaces suitable for agriculture. After the changes in the political and economic system in Romania in 1989, private initiatives in the rural areas developed as the process of reconveying the lands subjected to collectivization was in full swing. Independent from the great agricultural exploitations, individuals and families still possessed small farms with a pronounced autarchic character, based on agricultural production and animal husbandry. Even today, although they benefit from modern amenities and facilities (good roads, mobile phones, electricity, television, etc.), many Romanian villages still practice an ancestral form of subsistence economy, sometimes even employing caballine and bovine methods for agricultural work or transportation. These particularities of the Romanian villages clearly set them apart from those of Western Europe, with the Romanian villages maintaining direct, organic relations with the natural environment. This phenomenon of the organic integration of the villages with the environment led to a resurgence of traditional behaviors and the practices of direct exploitation of all the available ecological resources. There is, however, a natural element, which, even when found on private property, is accessible to the entire community; salt springs or salt outcrops are considered a "gift from God" (Alexianu et al. 2007). The change in the economic system in 1989 encouraged private initiatives related to animal breeding (animals need large quantities of salt, including liquid dispersal) and to production and conservation of food. Another element which facilitates the salt springs' exploitation is the fact that these are generally situated on lands belonging to the state or are owned as common property. Consumers can therefore decide to access them freely without the slightest financial, legal, or administrative restrictions or regulations. In a certain sense, one can speak oxymoronically about an unprovoked ethnoarchaeological experiment taking place, as the presence of such community access offers the possibility of investigating at firsthand resurrected traditional behaviors and practices that supply all

the elements necessary for the proper functioning of an autarchic economy. In other words, we are witnessing a phenomenon of resiliency unfolding as we speak, which, in a certain way, is somewhat atypical.

A Brief History of Research

Earliest Literary Sources

The traditional exploitation of salt springs in Romania which is mentioned is a work almost 250 years old. The oldest evidence is found in a record of the salt deposits of Transylvania. Its author, part of the Austrian administration who spent most of his life in the region, mentions an unusual technique for obtaining salt crystals by splashing red hot embers with salt spring brine (von Fichtel 1780). The veracity of the account was confirmed by a 1783 manuscript by an Austrian functionary, who conducted a field investigation of the salt springs of Bukovina (Ceausu 1982, 379). The same technique was further described in a travel journal of an English natural historian, mineralogist, and medical man: "It is worth remarking, that the present rude inhabitants of Moldavia and Transylvania, who live in the neighbourhood of salt spring, have the same method of procuring salt which was common amongst the ancient Gauls and Germans; this was to pour gradually the salt water upon a wood fire" (Townson 1797, 395).

Prehistoric Archaeology of Salt

The research on the links between the prehistoric communities and the salt springs began as late as the 1960s. The first study in the Romanian literature concerned the archaeological discoveries from Solca (Suceava county), dating from the Neolithic (Starčevo-Criş culture) to the Middle Ages (Ursulescu 1977). The discovery of a Chalcolithic tell at Poduri (Bacău county) in an area rich in salt springs convinced a group of archaeologists to initiate research on the possible relations between these natural springs and the complex dwellings of the tell (Monah et al. 1980; 1991). The importance of the saliferous Moldavian sub-Carpathian area for the multiple development of the famous Cucuteni-Trypillia Chalcolithic complex was recognized by Linda Ellis (1984, 205). In a memorable statement she said: "It is also no accident that the longest area of occupation for the Cucuteni-Trypillia culture (i.e., the Eastern Carpathians and sub-Carpathians) happens to be a region noted for one of the largest salt formations in Eastern Europe. Exploitation of, control over, and trading of this essential resource no doubt contributed to the stability of Cucuteni-Trypillia village life in the face of cultural contact with Eastern steppe pastoralists, as well as enhancing the quality of food, storage, food consumption, and animal and human health." Notable is that the problematics of salt is also found in an ethnoarchaeological study: "One of the most interesting developments recently in Moldavian archaeology has been the emergence of evidence for sites functionally specialised in the exploitation of salt as far back as the early Neolithic; and a corresponding realisation of the importance of salt in the organisation of Cucuteni society" (Nandris 1987, 209).

This hypothesis was reconfirmed by subsequent discoveries in an impressive site of exploitation at the *Poiana Slatinei*-Lunca salt spring (Neamt county), where the prehistoric exploitation stratum, starting with the Starčevo-Criş culture, is up to 2.65 m thick (Dumitroaia 1987). The rate of such discoveries was intensified by subsequent finds, which led to the first synthetic archaeological studies about the exploitation of salt springs (Monah 1991; Ursulescu 1995; Weller 2000). Taking into account the fact that the archaeological data looked promising, mainly in regard to their antiquity, researchers in international programs came to study the problems of salt exploitation in Romania. Among these, we may mention the following: (1) three British-Romanian projects, *The prehistoric exploitation of salt in Transylvania*, from 2000 until the present, *Research on trade and exchange in the Cucuteni-Tripolye Network* from 2001 until 2005, and *Prehistoric salt exploitation in Romania and Anatolia* from 2002 until 2005, and (2) two French-Romanian projects: *Aux origines de la production du sel en Europe: préhistoire et écologie des Carpates Orientales*, from 2003 until 2004, and, from 2004 until 2016, *Les eaux salées*

de la Moldavie roumaine: archéologie, histoire et écologie d'une ressource structurante du territoire. The results of this complex research were emphasized in important studies focused especially on the archaeology of salt in Neolithic, Chalcolithic, and Bronze Age (e.g., Brigand and Weller 2018; Harding and Kavruk 2013).

Ethnoarchaeological Investigations on Salt

Many traditional applications are specific to the area where were identified the oldest traces of salt exploitation in Europe. This constitutes a great opportunity for new ethnoarchaeological research. This statement was recently made: Ethnoarchaeology becomes "a real science of reference for interpreting the past, if focused upon well-founded cross-cultural correlates, which link material culture with static and dynamic phenomena" (Roux 2007). As early as 1992, there was a focus on the importance of systematic ethnoarchaeological research on salt springs in the area under discussion, where there are also elements of continuity in the chrono-topical system. This study took into account over 30 salt springs from Neamt and Bacău counties, among others, which incorporated the idea of checking whether there were traces of exploitation from early archaeological times in their proximity (Alexianu et al. 1992, 160–161). We want to emphasize that this ethnological research was not conceived ab initio in terms of the site catchment area theory, but in the completely opposite perspective, namely, the importance of a salt spring for human communities: "We believe that the distribution scheme (of brine from the salt springs, A/N), of a radial nature, is likely, of course on other spatial proportions, to have also worked for habitations detected archaeologically" (Alexianu et al. 1992, 162). I cautiously assumed at that moment that the scheme was currently available to a distance of about 10 km.

Addressing the ethnoarchaeology of the exploitation of salt sources in the resilient areas of Romania, I have concluded that we are in a privileged situation, of the second type of ethnographic analogy.

The ethnoarchaeological studies on this topic were additionally strengthened, thanks to three large research grants from the Romanian government through the National Research Council (CNCS), in particular, the projects *The salt springs of Moldavia*: *ethnoarchaeology of a polyvalent natural resource* (2007–2010), *The ethnoarchaeology of salt springs and salt mountains from the extra-Carpathian area of Romania* (2011–2016), and *The ethnoarchaeology of salt in the inner Carpathian areas of Romania* (2017–2019 — CNCS-UEFISCDI project PN-III-P4-ID-PCE-2016-0759, no 151/2017) all directed by M. Alexianu (Fig. 1a, b).

The main objectives of the Ethnoarchaeology of Salt project are:

1. To record the different human behaviors from the historical present concerning the salt resources
2. To identify on the ground the salt springs with archaeological evidence for the production of recrystallized salt in their proximity (Fig. 2)
3. To determine the non-industrial use of salt originating from salt springs and salt outcrops in the historical present (i.e., the past century)
4. To determine the distribution area of non-industrially exploited salt springs and salt outcrops
5. To model the distribution network of salt water (spatial information concerning the distribution of salt arising from salt springs and salt outcrops)
6. To critically apply an ethnographic analogy in order to explain the archaeological situations and phenomena related to salt

The first project benefited from a particularly useful tool, in the form of an original questionnaire (authors: O. Weller, M. Alexianu, L. Nuninger) that combined the traditional ethnographic approach with the archaeological perspective. The point of departure was the definition of a set of issues to be investigated, which, however, remained open to further clarifications and completions.

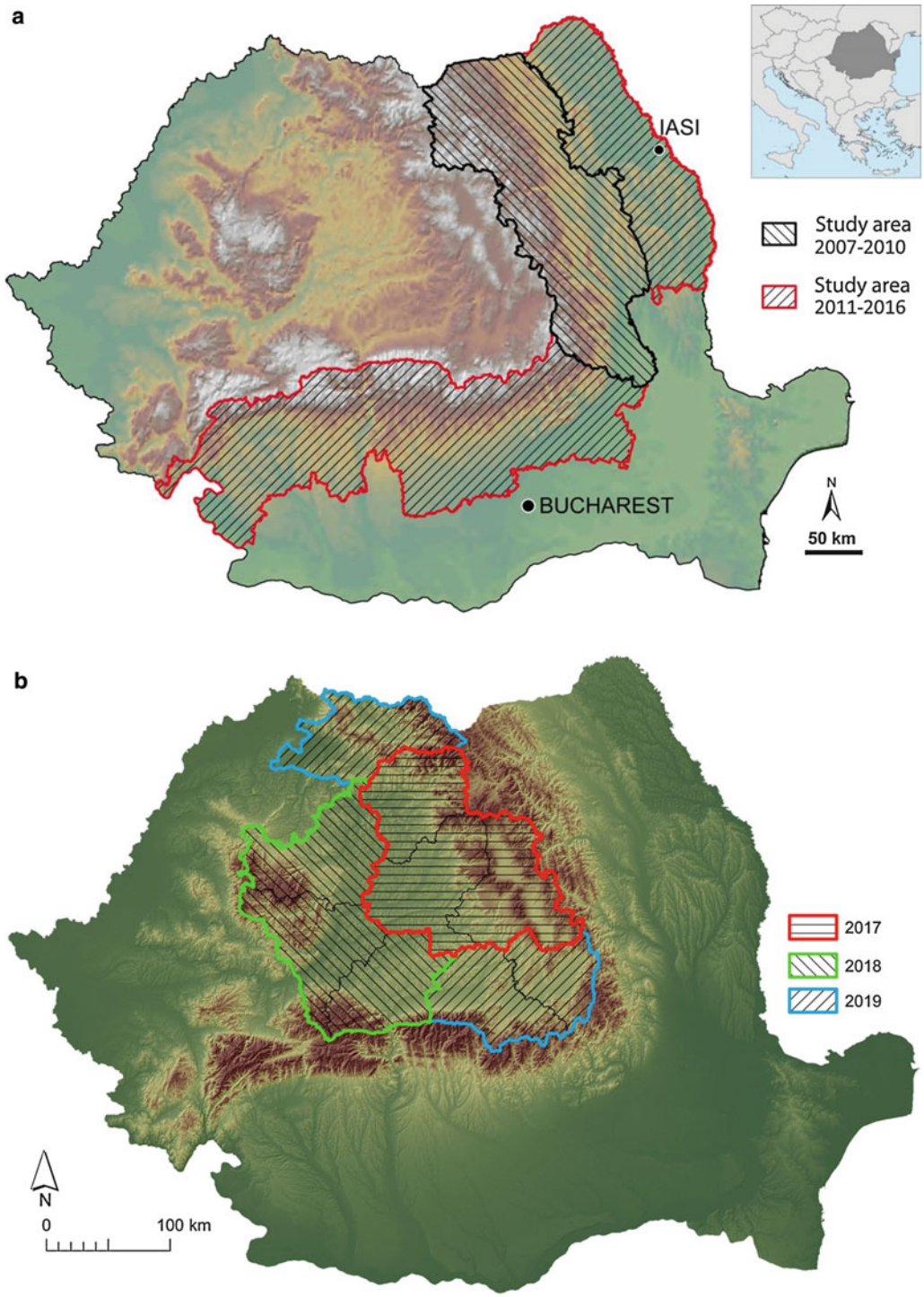

Ethnoarchaeology of Salt in Romania, Fig. 1 (**a**) Study areas of the first two projects on the ethnoarchaeology of salt in Romania. (Map by R. Brigand). (**b**) Study areas of the 2017–2019 ethnoarchaeological project on salt in Romania. (Map by R. Brigand)

Ethnoarchaeology of Salt in Romania, Fig. 2 Brine catchment systems. ((**a**–**d**) Moldova; photos by O. Weller; (**e**, **f**) East Transylvania; photos by V. Kavruk)

Ethnographic investigations of the salt springs have been conducted near the salt springs, at the seasonal animal-breeding settlements, and in the localities that exploit the salt springs. Generally, the salt springs are easily visible on the field from the various brine catchment systems, which are either open (Fig. 2a–d) or inside small wooden buildings (Fig. 2e–f). The oldest system is represented by tree-trunk segments carved on the inside (Rmn. *buduroi*), which protect the outlet of the spring (Fig. 2a). Analogies of this system have been recorded in France and dated to the twenty-third century BC (Dufraisse et al. 2004). The questionnaires address complex themes: the localization of the salt springs and the identification of the exploitation settings, transport, use, frequency, (re) distribution networks, trade and barter transactions, gifts, hunting, extracting methods, symbolism, ethnoscience, ethno-gastronomy, behavior, toponymy, and anthroponomy related to salt. Other specific methods comprise the geo-referential localization of the salt springs and global positioning systems (GPS); the spatial analysis method applied to the salt springs (habitat implementation relationship); an archaeological survey in the areas surrounding the salt springs, encompassing a range of 500 m around the salt springs; and the use of a chorographic method related to the concentration of the human habitation areas around the salt springs in archaeological and ethnographical time frames.

After the collection of over 500 completed questionnaires, the project found the results of around 20–25% of them to be entirely surprising. We discovered a genuine universe revolving around salt, one which archaeologists could have never imagined.

Different Ages of the Contemporary Informants and Different Diachronic Realities

Special consideration was given to the informants, who, unlike those from the so-called living societies, have lived in a Romanian societal context that has witnessed tremendous changes since the end of the nineteenth century. Accordingly, the informants contacted during the ethnological surveys were divided into three main categories.

The smallest one in terms of quantity, but the most valuable with respect to the information provided, is that of individuals aged over 70; they know *de visu* a variety of aspects related to the situation of the second half of the twentieth century. However, the most important information regarded the situations recorded during World War II and afterward. At that time, because the regular salt distribution commercial networks had been destroyed, and because of the great grain crisis of 1945–1946 in Romania, the traditional salt supply behaviors re-emerged and even intensified. People brought brine from springs, or they recrystallized salt by boiling brine. These phenomena were described by the informers as some kind of pattern with re-activating potential whenever the need arose, taking into account that some of our informers had personally used such subsistence strategies.

A second category is represented by adults aged 30–60, who know *de visu* the situation after the 1950s when, as has already been stated, salt spring exploitation activities were already established; it can be called a genuine "ethno-management." Incidentally, the informers also know indirectly (from the stories of relatives, friends, and acquaintances) relevant aspects for the period of the war and after it.

The last category – from children aged 5–6 to adults aged approximately 30 – is defined by the progressive knowledge of essential aspects related to the exploitation of brine from springs, mostly in the case of people actually involved in the process. However, no one who knew the situation from before the 1950s could be found.

All these rural inhabitants, and sometimes even the urban ones, are contemporary. But the elements of intangible cultural heritage that they possess sometimes has a considerable chronological stratification, in some cases going back a century. The parameters of the salt exploitation (spatial-temporal parameters of salt supplying, quantities, distances, uses, etc.) increase in number and magnitude as the informants' data concern older contexts.

Ethnoarchaeology of Salt in Romania, Fig. 3 (**a**) Salt vegetables, leaves, meat, and mushrooms. (**b**) Rock salt exploited for animal food. (Photos by O. Weller)

Pragmatic Uses of Salt

Ethnographic research has produced important insights regarding the use of natural brine and salt in general. There are more uses than has been generally considered by archaeologists. Firstly, we would like to emphasize the fact that salt water is still used in large proportions by adding it directly into different dishes and foods. Salt water is used both for family and collective (in some restaurants, monasteries, etc.) consumption.

For human consumption, salt water is generally used mostly for the conservation of bacon (Rmn. *slănină*) and pork, of various types of cheeses, and of various vegetables or greens (Fig. 3a). Important quantities (500–3000 l) are used by microenterprises, mostly by cheese factories which produce feta-type cheese (Rmn. *telemea*).

The salt boulders are licked by sheep and cattle (Fig. 3b). Salt water has a generalized use in different mixtures of food, particularly for pig fodder. Forage given to cattle is sprinkled with salt water.

Very rare were documented uses of salt in crafts. Even though now only sporadic, the use of natural brine for working sheep and cattle hides was generalized up until 2000. The natural brine is used by villagers for building fireplaces or ovens. One liter of brine added to 2–3 kg of clay renders it resistant to cracks at high temperatures, with the surfaces becoming vitrified and acquiring a whitish hue.

Some surprising results have been the use of salt water and salt as a remedy in various diseases. Peasants in the Moldavian sub-Carpathians use a wide variety of procedures using brine (e.g., mouth rinsing, inhallation of vapors, rubbing, etc.), some of which are rather singular in the European space (such as heating stones for salt water in the case of treatment of rheumatism in large wooden baths). Recent research has shown that a considerable part of halotherapeutic practices identified by ethnographic inquiries carried out in Moldavia are to be found in the Greek and Latin world. The common clinical specter of ancient and modern (but traditional) therapies includes gum and dental diseases, skin burns, headaches, angina, tonsillitis, boils, inflammations of the skin and dermatosis, kidney and stomach pains, lumbar and leg pains, joint pains, dog or cat bites, frostbite, mouth and ear diseases, and bleeding (Curcă 2007; Sandu et al. 2010). The existence of some common therapies in such different chronological and cultural spaces implies that salt has had a strong therapeutic dimension in prehistory, a reality commonly neglected by archaeologists. Recent ethnoarchaeological investigations in Transylvania (2018–2019), in the Inner-Carpathian area of Romania, have revealed the wide-scale ethno-treatment with salt mud (Rmn. *nămol sărat*) collected from the salt lakes or saltpans, in the latter case involving shallow excavation by hand (Fig. 4a, b). Salt-mud treatments in Transylvania were first mentioned 240 years ago (von Fichtel 1780).

Salt Boulders and the Control of Sheep Mobility

When the flocks go grazing in spring to the area found suitable by the shepherd, namely, to the *târla* (an unenclosed and open area where the sheep rest and sleep over night), the shepherd first places 6–7 rock-salt boulders in a semicircle at 10 m intervals. The sheep ascend to the area to freely lick the boulders, making a *târla*. They are then left in free stabulation, roaming the pastures, and after grazing they return on their own to the place with the boulders. When the shepherd wants to change the location of the *târla*, he moves the boulders to the new selected place. I have first recorded this grazing system in the summer of 2018 from the shepherds around Pata, near Cluj-Napoca (Transylvania), where recently there was discovered an archaeological site with wooden structures specific to the mining exploitation of salt deposits since the Bronze Age.

This is a textbook example of control, of manipulating the behavior of the sheep using salt. The ethnographic situation from Pata allows advancing the hypothesis that one of the ways by which sheep were domesticated involved the controlled consumption of salt in places specially selected by humans.

Hunting at Salt Springs

The salt springs and the proximate areas exert stable attraction for wild animals (particularly roe deer, red deer, and boars) and birds (doves, cranes, storks). The deer lick the dry and damp salted microzones. Boars bathe in the mud to protect against skin parasites. Similarly, storks are attracted to the area not by the salt, but by the micro-fauna living in the salt-mud microzones. Often, the frequent visits to the salt spring areas by some animals and birds raised the attention of hunters, who then improvise shelters for facilitating stalking there.

Symbolic Uses of Salt

In the Romanian rural world, the informants of the first two categories showed equal and detailed knowledge of the symbolic uses of salt. There is a certain spatial variability and dynamic in the relationship between tradition and innovation. Because of its multiple symbolic valences, salt is part of all key moments of life in Romanian folk culture, and it has almost exclusively positive connotations. In many rural areas of Moldavia, when building a new house, salt, along with other elements (e.g., grains, bread, incense, coins, holy water, or basil), is placed in the eastern corner or in all four corners or in small holes made in all four corners of the house. In these situations, salt symbolizes "peace and prosperity." The importance of these practices is crucial for reopening the discussion on the well-known European Chalcolithic foundation rites where salt – by its nature – is condemned to being an "invisible element" (Alexianu et al.

Ethnoarchaeology of Salt in Romania, Fig. 4 (**a**) Ethno-treatment with salt mud at the Aluna (or Puturoasa) Lake near Târnăveni-Transylvania. (**b**) Salt mud collected by a villager from Gădălin (Cluj county). (Photos by St. Caliniuc)

2007). Furthermore, salt is put under the doormat of the house "to chase all evil away." When a newborn is left in a room, salt is put on the window sill to scare the devil away. Salt is used during various phases of the wedding ceremony, symbolizing richness and wealth, harmony between spouses, and "the good luck of the house." When a housewarming ceremony takes place, the friends of the owner must bring salt and bread, which symbolize abundance and prosperity; a lack of salt in the house means poverty. A surprising element is salt symbolism for predicting the gender of the future child: "somebody puts some salt on the top of the head of a pregnant woman, without her knowledge. If she puts her hand to her mouth, it is a girl, and if she puts her hand elsewhere, it is a boy."

Salt Springs and Settlements

One of the important accomplishments of the first two projects was the achievement of an original classification of settlements according to salt springs (Alexianu et al. 2012) (Figs. 5 and 6). They vary according to the main forms of exploitation:

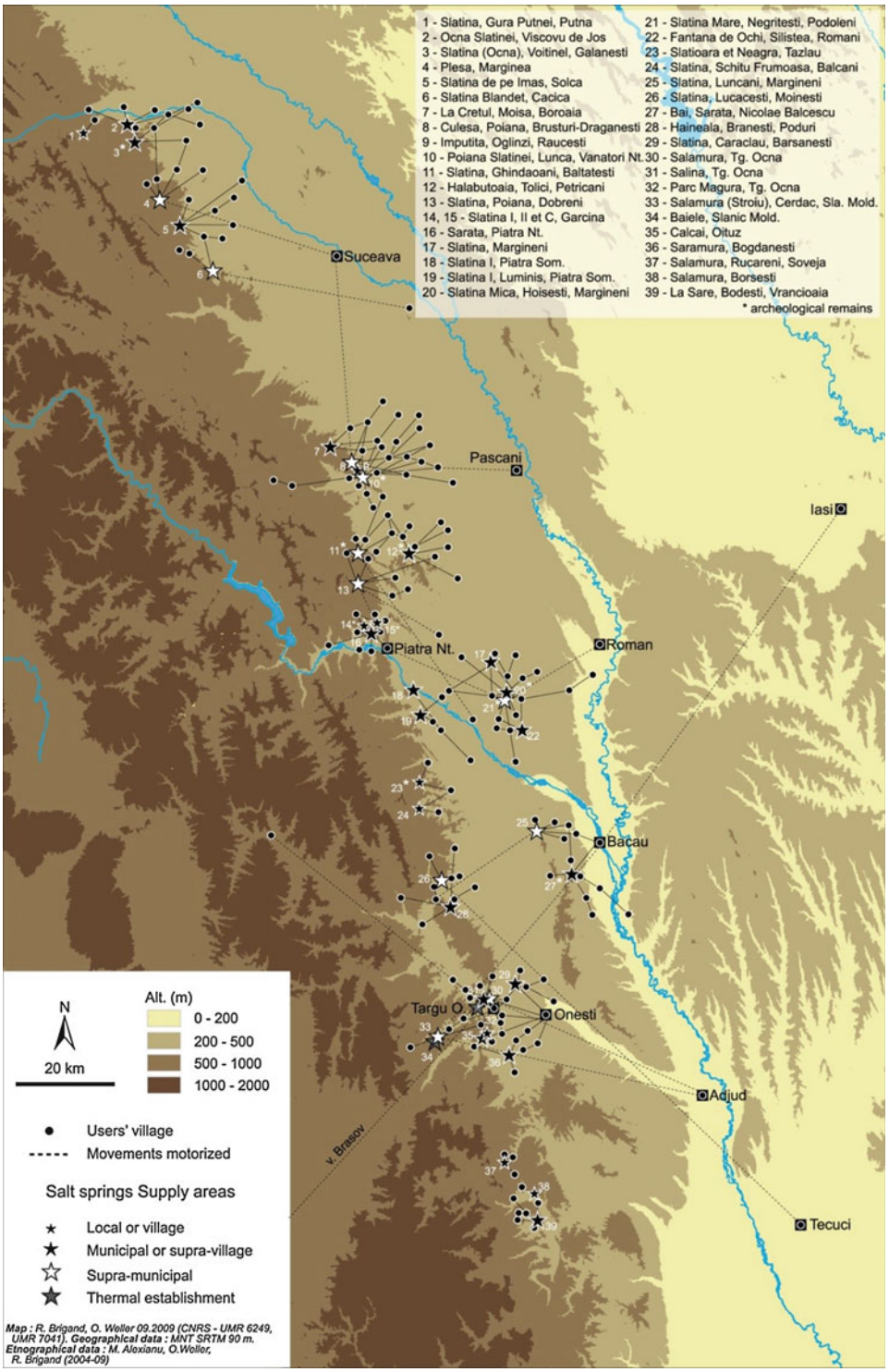

Ethnoarchaeology of Salt in Romania, Fig. 5 Use and supply areas of salt springs. (Map by R. Brigand, M.A. Alexianu, and O. Weller)

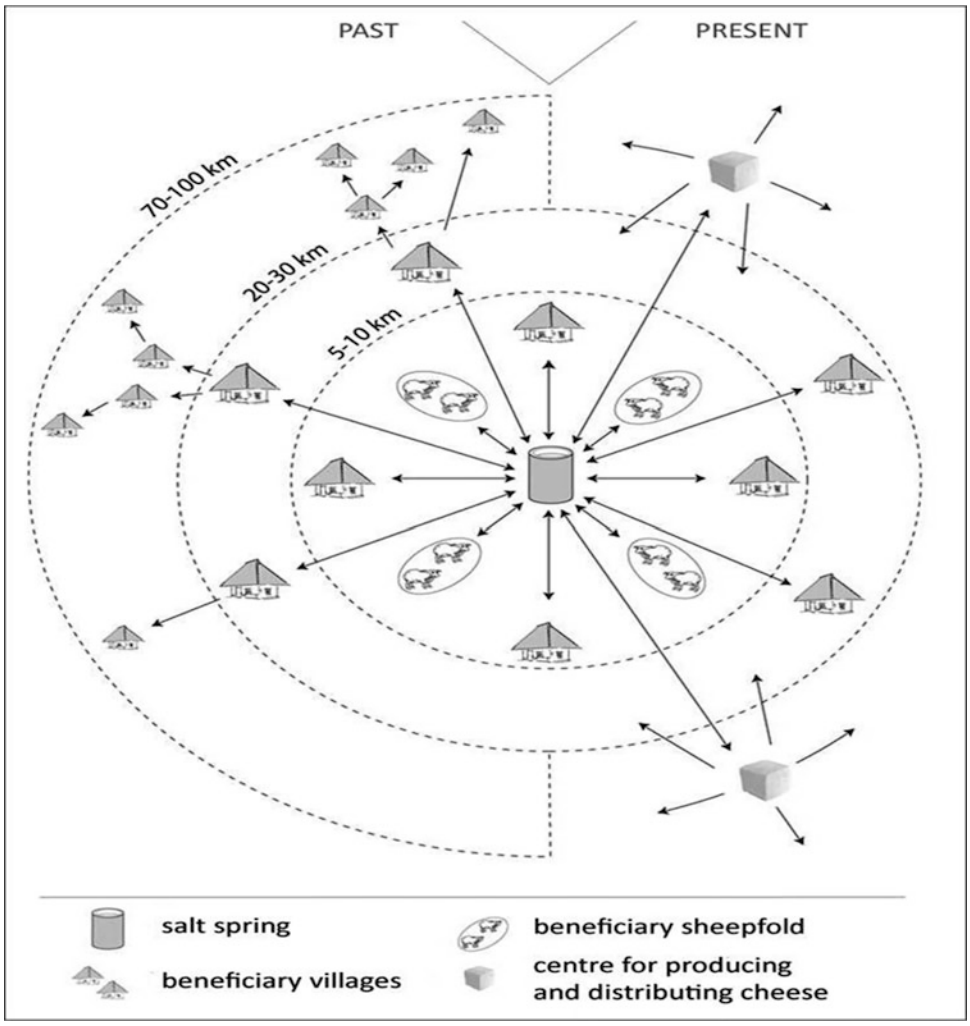

Ethnoarchaeology of Salt in Romania, Fig. 6 Modelization of the historical and current data on supplying with brine. (R. Brigand, M. Alexianu, O. Weller)

1. Collection, transport, and uses of salt water as such
2. Collection, transport, and thermal treatment of salt water to obtain crystallized salt and uses
3. Collection, transport, and use of naturally crystallized salt around the salt spring

Saltwater Supply

Our classification consists of:

1. Saltwater supply point which practically corresponds with the area in direct proximity of a salt spring: supply is short-term and depends on the total capacity of recipients used for transportation, on the flow of salt spring, on the volume of salt spring catchment, and on the number of persons involved in taking out salt water and pouring it into the receptacles for transportation. It is a human activity which does not generate or leave traces, with the exception of some sherds from accidentally broken recipients (or now plastic bottles). In this category, there are salt springs where sporadically fragments of archaeological ceramics have been found on the surface from one or several periods. This area is not actually inhabited; it is only occasionally visited.

2. Dwellings/settlements which are supplied directly from a salt spring:

2.a. Seasonal dwellings of the sheepfold (Rmn. *stână*) type; the salt spring is sometimes used to prepare sweet cheese, only as a foodstuff for shepherds; especially savory are the pieces of sweet sheep cheese (Rmn. *cas*, from Lat. *caseus*) dipped in salt water for a short time before they are consumed. Identification of seasonal locations of this type when archaeological research takes place most certainly represents a very difficult task, but archaeologists must be warned about the possibility of the existence of such locations. Some agglomerations of ceramic fragments identical to those by a salt spring, situated at a distance of about 1 km from a spring, could indicate this kind of seasonal settlement for ovines and bovines. It is possible to demonstrate that areas near salt springs are frequented by sheep or cattle herds, as is often the case today, through paleoenvironmental analyses. For example, at the Hălăbutoaia salt spring, Tolici-Neamt, non-polinic microfossils (coprophilous mushroom spores) showed the existence of pastoral activities synchronous with a Neolithic salt exploitation (Danu et al. 2010); the same could be noticed in the case of the salt spring at Poiana Slatinei (Lunca, Neamt), where the choice of fuels used for the exploitation of salt in the early Neolithic seems to be complementary to animal feeding (Dufraisse et al. 2010).

2.b. The settlements as such; ethnographic inquiries have noted that all villages around a spring use salt water. Two distinct situations could be identified.

(1) With a single salt spring in a given area or with a salt spring of superior taste qualities, great flow, and easy access in an area with several salt springs. Usually, saltwater supply today is carried out from settlements situated at a distance of about 10–15 km from the respective spring; distances may reach 25–30 km (Alexianu et al. 2007, 144).
(2) When there are several salt springs of similar taste, flow, and access possibilities, situated at a distance of 5–6 km between each other, each of them is used in groups of two to three villages situated at a distance of two to three kilometers from the spring (Monah 1991). In this case the distance of supply from each spring decreases, but the supply area has parameters comparable with the previous situation.

3. Settlements supplied indirectly with salt water, located between 40 to 50 and approximately 100 km from a salt spring. The distribution direction is from direct users to settlements located in remote areas. Accordingly to inquiries carried out so far, saltwater transport to settlements which are located so far away is more rarely attested; only in exceptional cases (the end of World War II and the following years), was salt water transported from the salt spring alongside recrystallized salt, in the same wagon.

To conclude, use of salt water involves only the act of supply and generated a distribution network, more rarely a redistribution network. Today saltwater supply is practiced on a relatively large scale and does not represent an indicator of poverty: it is used by different categories of economic and social status, mostly due to the quality of vegetable, cheese product, and bacon conservation. With cheese conservation, even some (feta) cheese (Rmn. *telemea*) micro-production units use water from salt springs intensively.

Production and Supply of Ignigenous (Direct Heat-Evaporated) Salt

Before the modern production of crystallized salt (*huscă*), it is advisable to underline the very probable chronological continuity of the choices which led to salt exploitation of one spring rather than another one. Indeed, salt springs with archaeological evidence for the Neolithic and the Chalcolithic exploitation are systematically an important water flow (or a well with a big capacity) and a very high salinity. It is for these same reasons that these springs were, even recently, exploited for crystallized salt.

The practice used for recrystallization of salt by boiling natural brine, which usually ceased around the middle of the 1990s, involved the following three main strategies: (1) production of recrystallized salt (popularly known as *huscă*) in the proximity of the salt spring; (2) production

of *huscă* in seasonal habitats such as isolated sheepfold in the mountains (Rmn. *stână*); and (3) production of *huscă* in villages (in the courtyard or more rarely inside the houses). A cauldron on a support, sometimes suspended, was used for the brine evaporation.

The following three stages in the use of recrystallized salt from salt springs can be listed mostly in the northern half of the area investigated: (1) saltwater supply, (2) production of recrystallized salt, and (3) its (re)distribution.

The relationship between human communities and the salt spring becomes more complex. We can distinguish the following situations:

(1) Salt spring – point of saltwater supply; the salt water was transported across very short or long distances. Ethnographic inquiries have shown that water taken from the spring was boiled either in the immediate proximity of the salt spring or at a short distance (30–50 m), or in seasonal dwellings such as *stână*, or in villages situated at a distance of 5–7 km from the salt spring.

(2) Point of production of recrystallized salt by boiling natural brine, located near a salt spring, generally upstream, with a seasonal character. More information has been obtained about this kind of production. This is a significant fact. The duration of the stay of a person or persons who produced *huscă* varied according to several factors (distance, accessibility, and others). Most significantly it depended on the quantity of recrystallized salt which was supposed to be obtained. The most common duration of stay took place in daylight. Otherwise, peasants might have stayed for 2–3 days, with a plan for each partner to obtain about 100 kilos of *huscă*, considering the fact that complete recrystallization of brine (Rmn. *slatină*, *saramură*) in a cauldron needed 6 to 7 hours of boiling. In one recorded instance, a family stayed to obtain *huscă* for 2 to 3 weeks, living in an improvised seasonal dwelling in the vicinity of the salt spring.

With respect to the number of people involved in the production of *huscă* in the proximity of the salt spring, it depends on the distance at which the user settlement is located. If the village was located relatively close to the spring, two to three people have been attested, as in Rucăreni-Soveja, as involved in the production of *huscă* at the spring. With localities farther from the spring, groups of producers of *huscă* have been found to be more numerous, as in the salt spring (Rmn. *slatină*) of Râsca, which shows concern over the economic profitability. But the existence of several *huscă*-producing groups at Neagra shows a constant micro-production carried out in the interwar period by the villagers of Tazlău located close to the respective spring, for trade reasons and selling in some villages and towns in Neamt and Bacău counties. In the case of the same spring, inquiries have shown that *huscă* was produced both close to the spring and in the villages. *Huscă* producers are aware of the advantages and disadvantages of each production locality. With *huscă* production at the spring located at a more remote distance from the user settlement, the advantages involved the presence of fuel in that precise place and the transport of a larger quantity of recrystallized salt; the disadvantage consisted of a longer stay, difficulties in supply, and diseases generated by the low comfort of seasonal settlements. When *huscă* was produced in the user localities, the advantage was that comfort specific to stable settlements could be organized, while the disadvantage lay in the transport of larger quantities of salt water and in the additional effort for fuel transportation.

The *huscă* was mainly destined to be bartered or sold in localities within a distance of 20–30 km or at 70–200 km (Figs. 7 and 8).

(3) Point of recrystallized salt production by a seasonal settlement *stână* (sheepfold) type: the salt is used exclusively for the local needs, mostly for sheep.

(4) Point of production of recrystallized salt in a settlement, as follows: (a) the salt is destined exclusively for the household needs; (b) the salt is destined for partial household needs; and (c) the salt is destined partially for barter or sale in localities situated within up to 20–30 km or localities at a distance of 70–200 km.

Generally, we can conclude that the distribution territories of recrystallized salt (Fig. 7) are considerably larger than those of saltwater distribution, as a rule, up to 80–100 km; but inquiries

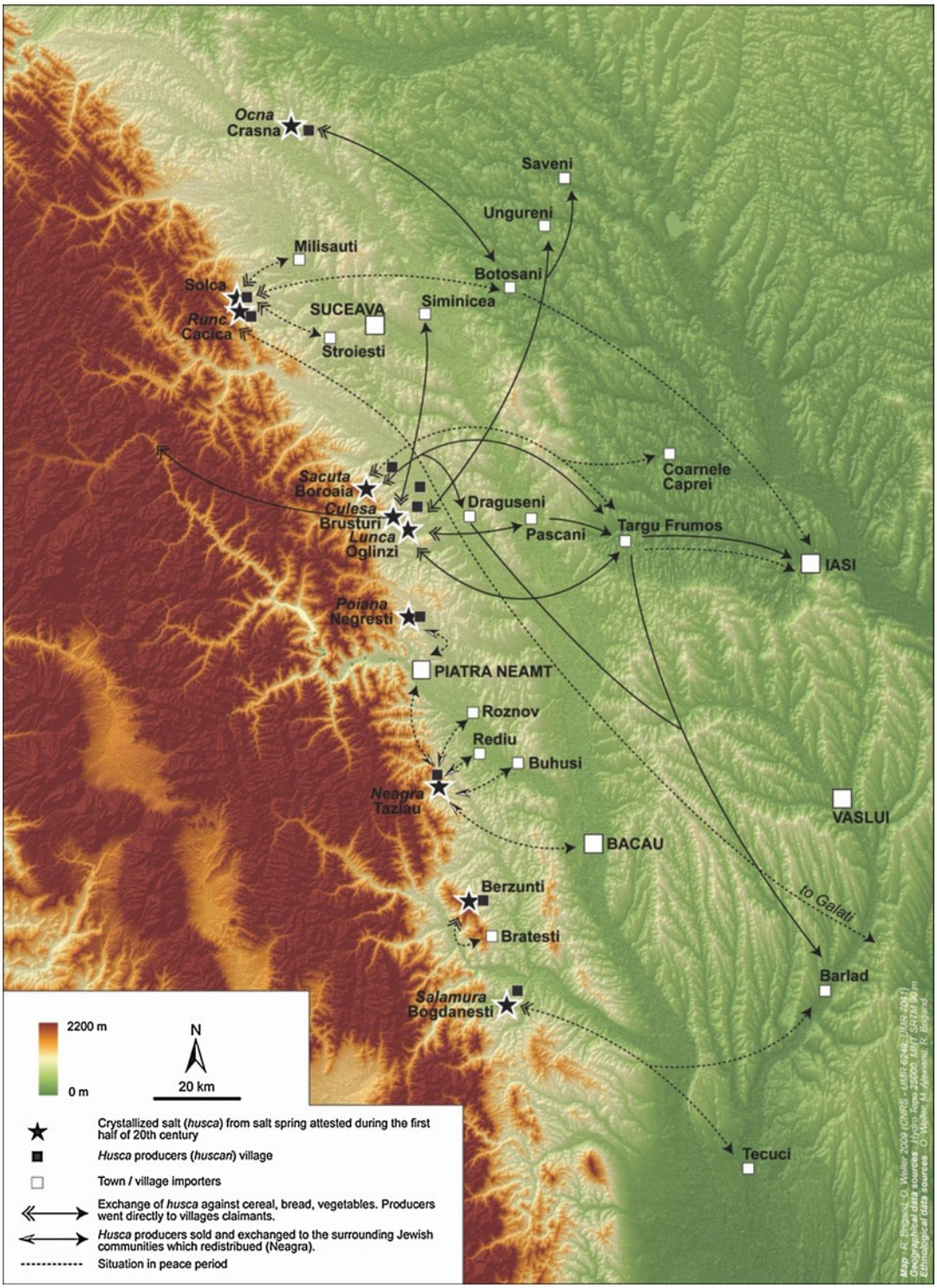

Ethnoarchaeology of Salt in Romania, Fig. 7 Salt crystallized production and barter during peace and war periods in the twentieth century. (Map by R. Brigand)

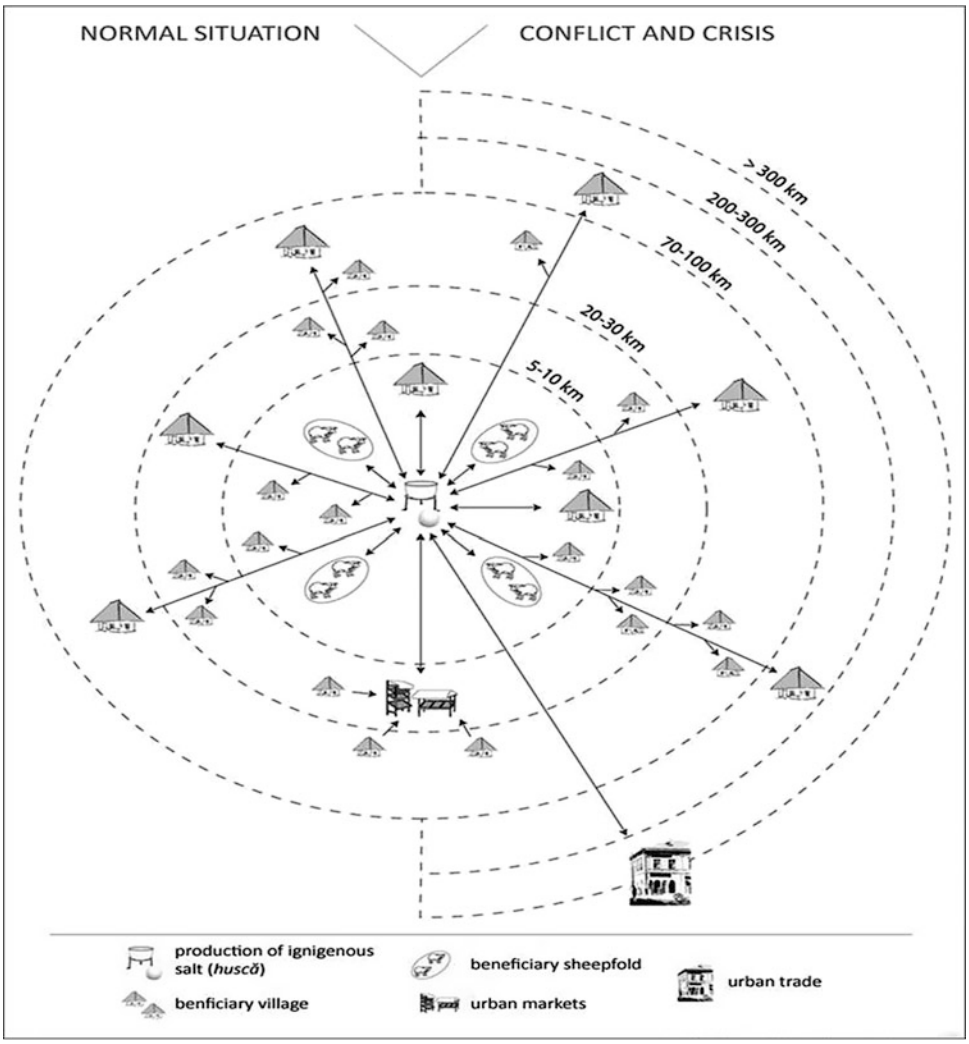

Ethnoarchaeology of Salt in Romania, Fig. 8 Model for supplying with crystallized salt during normal times and periods of crisis. (R. Brigand, M. Alexianu, O. Weller)

conducted in 2009 have shown longer routes of approximately 300 km (e.g., Suceava-Galati).

As to the distribution of *huscă* for various exchange or sales, there are two situations depending on the permanent or sporadic character of *huscă* production.

In the first case, under normal (until WW2), when *huscă* is produced constantly, it was transported with a relatively regular frequency at short distances of 15–40 km. So, inhabitants of Poiana-Negresti who produced *huscă* would go to exchange "salt-clods" (Rmn. *boturi*/*bulgări de huscă*) with the Jewish merchants in the *Strada Mare* (i.e., the main street) in Piatra Neamt. In exchange they would get olives, fish, carobs, or peasant sandals (Rmn. *opinci*). *Huscă* was also sold directly in the market in Piatra Neamt. Producers of *huscă* in Poiana-Negresti would exchange cereals at the commission of settlers in neighboring villages. As a rule, producers of *huscă* would transport it themselves and carry out the transactions. Specialized producers were both transporters and business people, a circumstance which contributed to increasing their profit. In one case *huscă*, this time as powder, obtained in the vicinity of *slatina* in Neagra and Slătioara (Tazlău)

was usually sold; it was also bartered for oil with Jewish merchants in Piatra Neamt, Buhuşi, and Bacău towns and in the villages of Rožnov and Rediu, which in their turn would trade them.

In the second case, under exceptional conditions, such as the disorganization of supply with common salt at the end of World War II or during the drought in 1945–1946, we witness an intensification of recrystallized salt production and a considerable extension of the distributional areal up to 100 km and even as far as 300 km. Fortunately, we were able to obtain information about the quantitative aspects of the barter. So, one kilo of *huscă* could be bartered for 2–3 kg of wheat or 4–5 kg of corn. But the circuit did not stop here at all, as sometimes a part of the quantity of wheat obtained in this way was sold in mountain areas in Valea Bistritei, where cultivation of cereals was almost impossible. In fact, the need for wheat and maize was satisfied by the exploitation of free natural resources, which also brought in the money necessary for other needs. We should underline the fact that the carts transported brine in barrels of a total capacity of 1000 or even 2000 l.

The inquiries brought evidence of a similar model in several locations in the Moldavian sub-Carpathians. The barter with *huscă* had stopped in 1946 during the great famine, as, on the one hand, there were no cereals for barter and, on the other, the import from USSR of reddish common salt cake (5 kg) began. Even the transport by train of small quantities of *huscă* (approximately 20 kg), for very long distances during the drought, in order to solve by barter the needs of wheat and maize at the level of one family, has a certain relevance for archaeological time; an illustrative example in this respect can be the transport from Cucuieţi-Solonţ (via the railway station in Moineşti, Bacău, Eastern Romania) to the Banat (Southwestern Romania) or from Solca in the north down to Constanta in the southeast (Black Sea coast).

Use of Naturally Recrystallized Salt

During the last period of ethnographic inquiries, another salt exploitation technique was brought to light: the "harvesting" of naturally recrystallized salt around and downstream salt springs and its use as such in human and animal food, conservation, etc. Even though the last century has not been in any way significant, this type of exploitation is extremely suggestive for the understanding of prehistoric situations. Our hypothesis is that prehistoric man first exploited salt water, and only later naturally recrystallized salt, in the proximity of salt springs. Naturally recrystallized salt offered a model for obtaining large quantities of salt by natural (solar) or artificial evaporation, by boiling. In other words, the ignigenous process of obtaining salt results from the natural process of evaporation without any human intervention.

Generalizing, the ethnographic database on *huscă*-cereal exchange indicates that the crystallized salt production in the sub-Carpathian area of Moldova used to meet the salt needs of communities in the territories located to the east of the Carpathians up to the present frontier of Romania. The *huscă* supply model at such a large distance has important interpretive implications for prehistoric times. This model supports, albeit only partially, the hypothesis that part of the crystallized salt production was destined to long-distance exchange (Monah 1991), especially if this salt was made in the form of tough, compact blocks which were easy to carry, as suggested by the appearance of briquettes in the Cucuteni culture (Weller 2002).

Archaeological Experiments

In the historical present, salt recrystallization by boiling brine has generally been made using metallic recipients, either inside the house (in cauldrons of up to 5 l) or outside (in cauldrons between 30 and 50 l). In the eastern part of Romania, so far there have been found 21 sites near salt springs with briquetage fragments. In this respect, in order to better understand the process of obtaining salt cakes using briquetage, we resorted to experimental archaeology. Up to that moment, no complete briquetage had ever been discovered, and all previous experiments to produce tronconical salt cakes had failed. The approach was based on the existing

archaeological data – descriptions of briquetage sherds and their discovery contexts – as well as on ethnoarchaeological accounts and previous experimentations. The experiments, initiated and conducted by project member Felix-Adrian Tencariu, allowed some valuable observations on the distinct aspects of this *chaîne opératoire*: modelling and firing the briquetage vessels; exposure to fire of the recipients filled with brine or a salt slurry of varied concentrations; the amount of time needed for crystallization and hardening of the salt, dependent on the fuels used and temperatures reached; ways of extracting the salt cakes from the ceramic coat; and assessment of the effort (i.e., labor and raw materials) involved by the whole process. All the failures, challenges, and eventual successes encountered during the experiments granted an insight into an ancient technique, described mainly a priori in the archaeological literature (Fig. 9). Also, it gives a hint in understanding the appreciable importance and value of salt in times when this essential mineral was not available as it is today.

What is notable is that this was the first such experiment to successfully obtain unfragmented salt cakes after breaking the briquetage. Previous attempts failed foremost because the recrystallized salt adhered to the ceramic walls. This was mitigated by covering the walls with burdock leaves, thus separating the wet salt paste from the pot (Tencariu et al. 2015).

The Exploitation of Salt Outcrops

Methodological Aspects

Immediately after the EthnosalRo project commenced, M. Alexianu elaborated a new questionnaire concerning the salt outcrops. The main themes concern the identification of the salt outcrops in the studied microzone, including microtoponymic aspects; the harvesting of the salt (extraction periods and parameters, tools employed); spatial analysis (the settlements and sheepfolds supplied, the time required for reaching the salt outcrop on foot or by various transportations means); transportation (transportations means, packaging); uses – human consumption (private, collective, commercial), animal feeding, preservation (cheese, meat and fat, vegetables), halotherapy, etc.; the ratio between the use of rock salt, natural brine from salt springs, and artificial brine (obtained by dissolving rock salt into the water); the attraction exerted by the salt outcrop on wild animals and hunting; frequency of salt supplying; trade and barter; behaviors/ethnoscience; and symbolism of salt.

In order to understand more thoroughly the role of salt in animal husbandry, it is necessary to turn to the ethnological research into this issue. The pastoralism practiced nowadays in the area is sedentary (or so-called village pastoralism), which involves the movements of animals for grazing at a few days distance from the human settlement. In the cold season, the flocks are kept in the village.

Among all salt outcrops investigated, the area around the Alghianu creek provided particularly complete information (Alexianu et al. 2015). With respect to the exploitation of salt from Alghianu, it should obviously be ascribed to a phase preceding the actual mining exploitation, respectively the quarrying of rock salt (Harding 2013, 34, 61). Even if it constitutes quarrying, this type of exploitation of the rock salt during prehistoric times required, as evinced from our investigations, particularly hard tools (at least axes, chisels, and hammers fashioned from stone or metal). From another point of view, this type of exploitation of rock salt involves a variety of activities (extracting, transporting, and crushing the salt) much more labor-intensive than those of the exploitation of the salt springs. The ethnographic investigations have nonetheless revealed that this activity is not too complex for the shepherds, who become quarry-miners for 1 or 2 days each year. The existence in the area of the Alghianu outcrop of rural communities with quasi-autarchic economies centered on animal husbandry (cattle, ovicaprids, swine) allowed us to highlight the role held by salt in animal feeding (Fig. 10). The herdsmen provided precious information regarding the quantities of salt needed for cattle and sheep. Thus, a cow needs around 20–30 kg of salt per year, while a sheep consumes approx. 1.5 kg of salt per year. Both species consume

Ethnoarchaeology of Salt in Romania, Fig. 9 The experiment on briquetage and salt production. Preparing the insulating layer, filling the recipients, breaking the ceramic recipient, and the resulting complete salt cake. (Photos by F. A. Tencariu)

more salt in wintertime than during the warm season. The consumption of salt by the animals increases the quantity and the quality of the milk. With respect to the precise quantities consumed, the numbers provided by the herdsmen should be taken with a grain of salt, since they are approximations.

The transport of the salt to the consumer settlement is usually done with the wagon. Conversely, transport from the consumer settlement to the consumer sheepfold is done either with the horse or with the wagon, according to the difficulty of reaching the sheepfold. We can conclude that the supplying with salt of the flocks is one of the mandatory conditions for transhumance. As the quantity of available salt to a certain number of sheep increases, so does the mobile pastoralism extends to greater distances and for longer periods of time, with increased yield of milk and a better general health of the animals.

Ethnoarchaeology of Salt in Romania, Fig. 10 Field images of the ethnoarchaeological campaigns conducted in the microzone of the Alghianu salt outcrop. (Photos by A. Asăndulesei and F.-A. Tencariu)

In this context, it was possible to develop new models of salt supplying of the settlements and sheepfolds from this area witnessing intensive animal husbandry: (1) supplying with salt boulders strictly for the needs of the inhabitants and the animals from private homesteads (for human and animal consumption, for preserving foods and fodder); (2) supplying with salt boulders of the settlements in the sense of point 1, to which is added the supplying for sheepfolds located within the boundaries of the settlements; (3) supplying with salt boulders for the settlements in the sense of point 1, to which is added the supplying for isolated sheepfolds located in mountainous areas; and (4) direct supplying with salt boulders for the sheepfolds located in

mountainous areas (when they have exhausted the initial salt reserves), as well as of the sheepfolds found near the salt outcrop.

Archaeological Experiments

The Inner-Carpathian regions of the present-day Romania and Ukraine witnessed the discovery in salt production contexts of troughs made of hollowed out tree trunks dating from the Middle and Late Bronze Age (ca. 1600–800 BC). The troughs were perforated along the median line of their bases by several orifices with the longitudinally perforated pegs inserted in them. Sometimes, wooden nails and/or twisted cords were found inserted in the pegs' orifices. Most scholars consider troughs as the devices used for drilling the extremely hard rock salt, while others tend to favor their use in the increasing salinity of brine. Since this was not attested by the investigations carried out in our project, for a more thorough understanding of this system, our colleagues D. Buzea and V. Kavruk resorted to archaeological experimenting. The experiments, which involved replicas of various types of troughs, concerned both the drilling of the rock salt with jets of fresh water and various methods of increasing the salinity of salty mud and brine (Fig. 11).

The decisive role in the interpretation of the troughs must play into further research of the archaeological contexts and the taphonomy of the sites (Kavruk 2018).

The Radial Model of Salt Supply

The study of maps (Alexianu et al. 2011, Fig. 2) reveals a variety of situations; thus, the area of distribution of salt springs occupies fractions of a circle, semicircle, or more, while the area of distribution of other springs (less numerous) shows a completely radial aspect (Fig. 12). In fact, the complete radial aspect represents the reference model; other sub-models are due to the absence of human communities in certain areas (usually mountain areas not adequate for human settlements).

The EthnosalRo ethnological research project on the distribution of salt boulders from salt outcrops points to the same complete radial distribution model (Alexianu et al. 2015).

Very significant is the situation of the Alghianu deposit which, in a first phase, presented a semi-radial distribution model, and in a second phase, determined by the ceasing of the exploitation of another nearby salt deposit, the distribution model of salt boulders from Alghianu becomes complete.

Another situation when the distribution model is always semi-radial is that when the distribution of salt boulders accompanies shepherding movements toward sheepfolds situated far away, in which case the distribution is necessarily from the villages to the mountainous areas, i.e., from the east to west.

Regarding the distances for which the radial model of brine from salt spring distribution is observable, ethnological research revealed that, in recent years, they usually vary from a few kilometers to a maximum of 30 km, while, at the end of and right after World War II, they could reach up to 100 km. In the case of the distribution of ignigenous salt obtained from salt spring brine, the distances reach up to 300 km and more.

Depending on several important factors cumulatively – discharge, salinity, and taste – the area of attractiveness of saltwater springs varies from a strictly local level (1–3 villages) to a microzonal level (villages located up to 30 km away). The area of direct attractiveness of saltwater springs has to be differentiated from the area of distribution of salt water, which, in exceptional circumstances (war, drought), can reach approx. 100 km and, in the case of ignigenous salt, up to 300 km and more (regional level).

Regarding the direction of movement for the supply of salt water, at the local level, it is done from the human settlements to the spring, while at a regional level, we can speak of a two-way direction, the initial movement from the settlement (located a few kilometers from the spring) to the source and the subsequent movement from the spring to the carrier's village and from here to the supplied localities situated at distances up to 100 km.

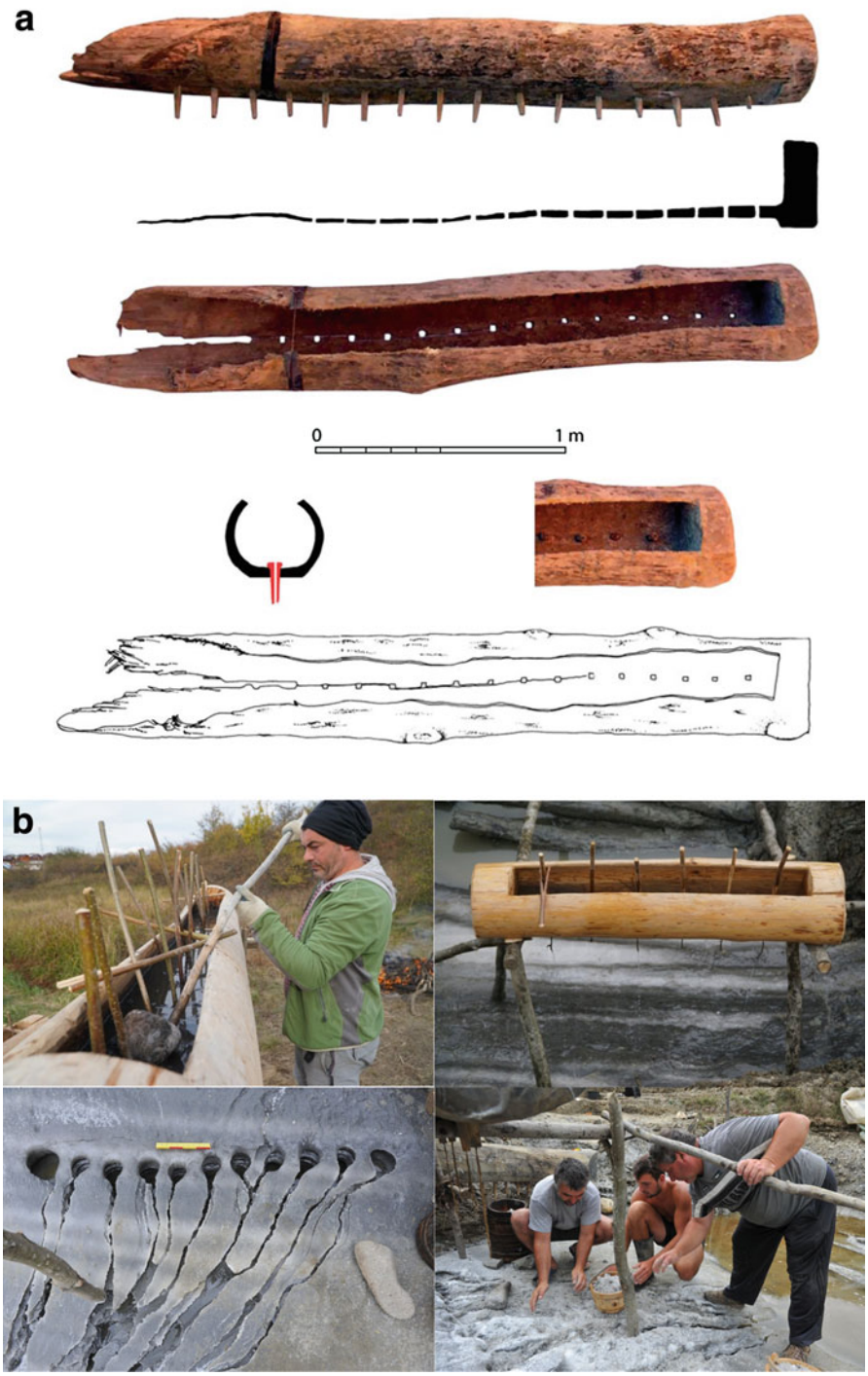

Ethnoarchaeology of Salt in Romania, Fig. 11 (**a**) The first trough discovered at Băile Figa. (After Harding and Kavruk 2013). (**b**) The "trough technique" experiment. (Photos by D. Buzea)

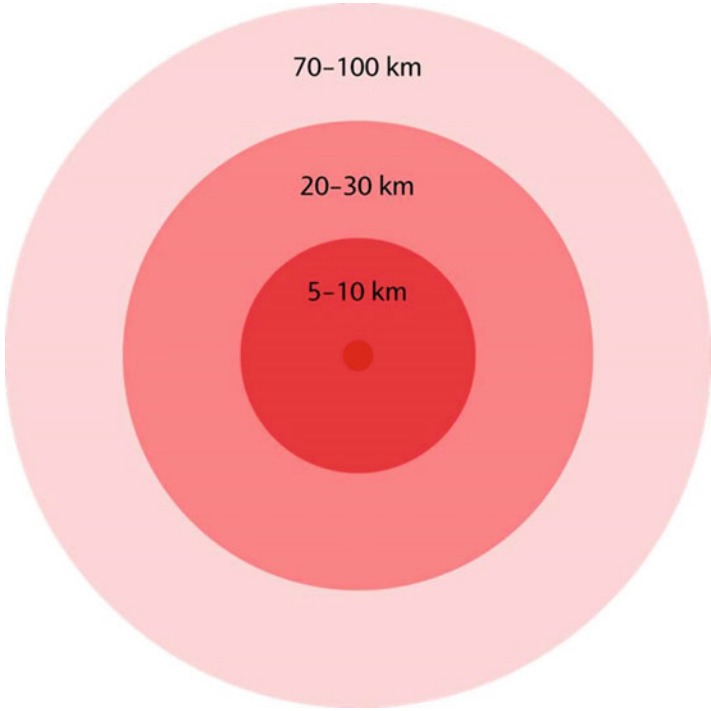

Ethnoarchaeology of Salt in Romania, Fig. 12 Areas of supplying with brine from one salt spring: direct supplying up to 20–30 km and indirect supplying to 70–100 km. Supplying frequency: frequent (darker shades) to once or twice a year (lighter shades)

In conclusion, based on the over 500 ethnological investigations carried out so far within the framework of two extensive projects on the salt springs and salt deposits from Romania, we were able to build a radial supply model for brine from salt springs, ignigenous salt obtained from salt spring brine, and salt boulders from salt outcrops (Alexianu 2015). The complete radial model is available when all around the salt spring or the salt deposit, there are human settlements. We can speak of an incomplete radial model where human settlements (permanent and seasonal) are located only in certain areas compared to a salt spring or a salt deposit.

The ethnoarchaeological approach must be considered to be completed only in cases where ethnographic knowledge and/or models have been applied to different artifacts and/or situations in the archaeological past. Here we present the current radial supply model with brine from two important salt springs (Weller et al. 2008; Dumitroaia et al. 2008) in the Moldavian Subcarpathians (Romania) applied to the Neolithic and Chalcolithic periods (Fig. 13).

The analysis of the generated imagery and the statistical data in the tables offer the first clues regarding the habitation model of the Neolithic and Chalcolithic communities all around Lunca-*Poiana Slatinei* and Tolici-*Hălăbutoaia* salt exploitation key points (Asăndulesei et al. 2014). As a preliminary conclusion expressed in relative terms, it can be said that the closer a site is to a major salt spring, the more the salt (brine) factor establishes itself as relevant for the settling selection process. As the distance from such a salt spring increases, other factors gradually take precedence. The results offer a sufficiently detailed image of the constant interactions between the first prehistoric human communities and their surrounding environment, underlying, alongside the other variables specified, the importance of the salt resources for the prehistoric human communities living in the piedmont areas of the Eastern Carpathians. The maps above present synchronic representations for the Neolithic and Chalcolithic settlements, with the diachronic dimension only partially discernible. But, as the simple comparison of the two maps shows, the role of the salt springs in increasing the density of the human occupation is substantially incontestable. In a temperate continental area as Romania, salt has

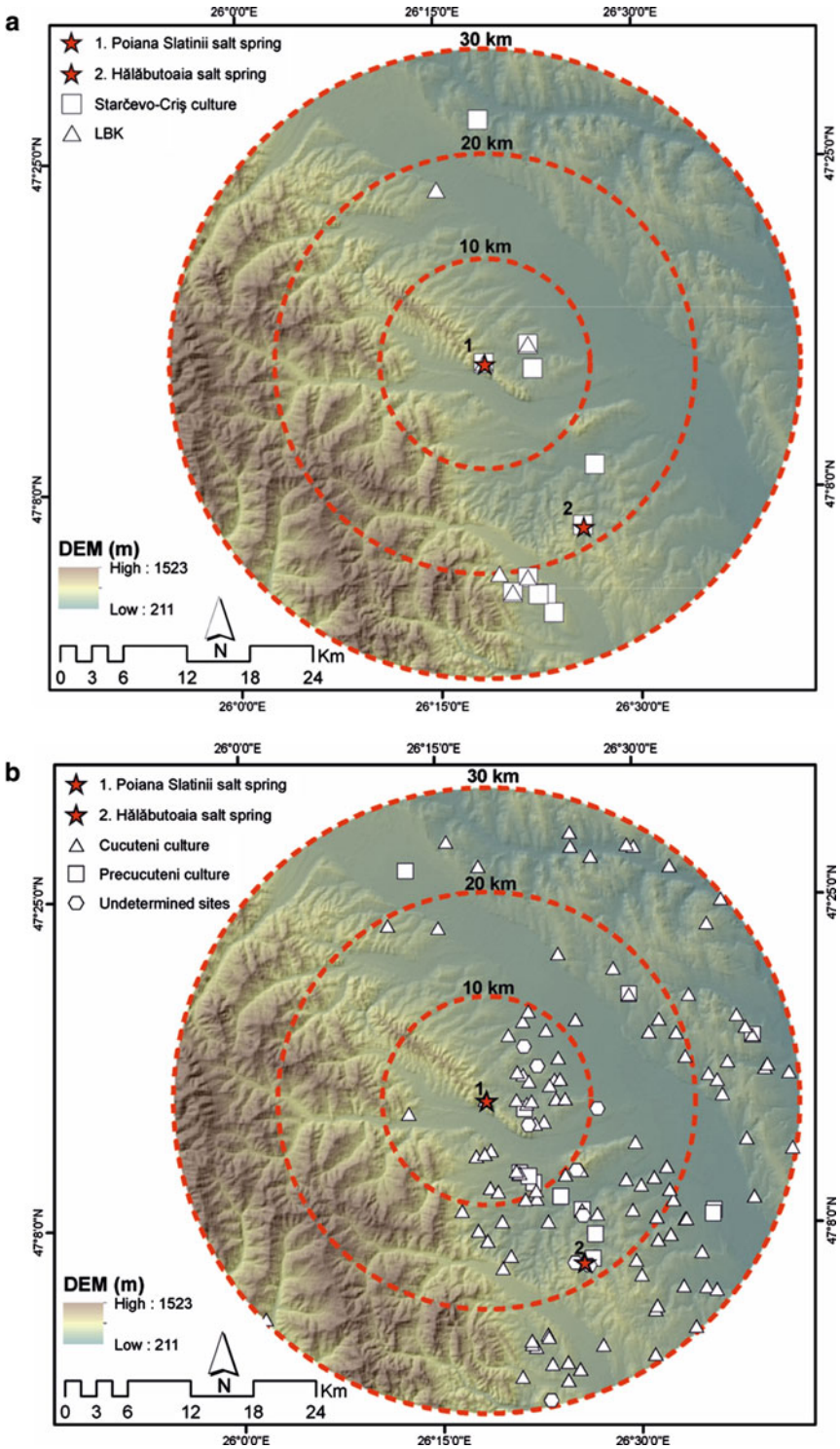

Ethnoarchaeology of Salt in Romania, Fig. 13 (**a**) Salt springs and first Neolithic settlements. (Map by A. Asandulesei). (**b**) Salt springs and chalcolithic settlements. (Map by A. Asandulesei)

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always played a crucial role in preserving food (meat, bacon, cheese, vegetables, etc.) for use during the unproductive seasons. Thus, it is thus entirely appropriate to define the salt springs as salt attractors for human communities. This capacity as attractors seen in the archaeological time is a substantive argument for their role as key factors in the process of sedentarization. The problem of meeting the nutritional requirements for the human groups engaged in mobile hunting throughout the year – and critically in wintertime – was alleviated by using brine for preserving the meat.

This methodological approach requires amendments (e.g., a digital elevation model with a higher resolution), additions, and calibration, but it establishes itself as a starting point for future similar research in this area and, moreover, can serve as the basis of a predictive model suitable to be applied to other similar chronological or geographical settings.

International Perspectives

This current 12-year project provides a solid reference and unique approach keys for understanding the exploitation of salt in the archaeological past and, in a broader sense, for understanding the impact of salt on pre- and proto-historical societies. Ethnographic models on the exploitation of salt springs and salt deposits open the way for new interpretative hypotheses on many inland European and global reference sites. At the same time, the research models proposed by this project itself can be tested at other interior continental areas worldwide where there are archaeological traces but the exploitation of salt has not survived.

Future Directions

Given the complexity of the research carried out within this project, many aspects have only been tangential or insufficiently studied. Therefore, it is necessary to expand the research on at least the following topics:

- Experimental archaeology of salt exploitation; the future experiments will focus on the production of on-site structures, installations, and tools related to the exploitation of salt, similar to those found in archaeological deposits, and testing their functionality.
- Spatial analysis method applied to the salt resources-habitat implementation relationship.
- Systematic research of numerous halotherapeutic practices at local and global level in order to highlight the medical dimension of salt for the prehistoric archaeological sequences.
- Implications of studying the intangible heritage of salt on archaeological research.
- Testing the ethnoarchaeological models produced by this type of projects, in areas rich in salt from across the world, with archaeological evidence but no surviving practices of exploiting the brine or the salt outcrops.

Conclusions

The resilient areas of Romania have the highest potential in Europe for ethnoarchaeological research on the preindustrial civilization of salt. The area harbors some of the most representative European archaeological sites related to the continuous exploitation of salt spring brine and rock salt from 6050 BC until present. Of major ethnoarchaeological relevance is that villagers and even some city-dwellers maintain to this day traditional behaviors related to the exploitation of salt springs and salt outcrops.

The EthnosalRo project series has produced a complete ethnoarchaeological referential on salt, which meets the exigencies of a saturated model (Alexianu 2013). In terms both of the consistent methodology and of the area with salt resources present and covered, this project constitutes a one-of-a-kind ethnoarchaeological research endeavor. The results of the research open unexpected opportunities to capitalize the ethnoarchaeological potential of other resilient areas in emergent or even developed countries. The complete ethnoarchaeological referential provided by these projects can challenge the paradigms in the fields of world archaeology and ethnoarchaeology of salt.

From among the concrete results, notable is that the systematic ethnographic and surface archaeological research carried out in the proximity and vicinity of the salt springs from the eastern extra-Carpathian area of Romania since 2004 has increased twofold the number of prehistoric sites with evidence of brine exploitation, to a total of 21 sites (Brigand and Weller 2018). Recently, research of this type conducted in 2019 has revealed the oldest (Neolithic) exploitation of salt spring brine in Transylvania (Kavruk et al. 2019). The series of ethnoarchaeological projects developed in Romania between 2007 and 2019 has fundamentally changed the strict archaeological perceptions of the exploitation of salt resources primarily in Europe. The resulting image is highly complex, impossible to be imagined by archaeologists before this work. It turned out that besides the human and animal food and food preservation purpose, there is a whole series of other uses of salt, among which a very important role is played by medical practices.

Completely surprising was the use of brine from salt springs directly in human and animal nutrition, without any other intervention. It follows that the exploitation of salt springs does not involve as a rule the presence of specific archaeological remains. A salt spring can even be exploited intensively without any archaeological trace, if the brine transportation vessels were made of wood or they were ceramic but did not break.

This stunning situation has nothing to do with inferior social status or poverty, it being explained by the special flavor given to the various dishes or the bacon or the preserved vegetables and herbs.

Ethnographic research has led to the construction of original models. We highlight here the radial model of brine distribution from salt springs and salt boulders from exploiting salt outcrops, as well as a classification of human settlements according to salt exploitation points. The first applications of these models to the archaeological past have proven their validity, contributing to a better understanding of the complex role played by salt in the evolution of human communities from anywhere and anytime. Obviously, the relevance of the ethnographic analogies for reconstituting archaeological situations is a crucial problem for ethnoarchaeology. The analogies must not be applied mechanically, *tel quel* and in details, to the archaeological past. My conviction is that these investigations have revealed dimensions of a general nature (e.g., the use of brine directly for human and animal alimentation, without any intervention, spatial distribution, uses, religion, superstitions, symbolism), which were generally overlooked by archaeologists. Strictly for Romania, the relevance of ethnoarchaeological research of this type is enhanced by the fact that they were carried out under the conditions of the unity of place and the continuity of the exploitation of the salt resources.

Cross-References

- ▶ Archaeology of Salt in China
- ▶ Archaeology of Salt in Japan
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology of Pastoral Societies
- ▶ Ethnoarchaeology of Salt in Romania
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Ethnoarchaeology: Learning from Potters in Gilund
- ▶ Foodways in Historical Archaeology
- ▶ South Africa: Maritime Archaeology

References

Alexianu, M.T. 2013. The saturated model. A first application in world and Romanian ethno-archaeology. In *Contesting ethnoarchaeologies. Traditions, theories, prospects*, ed. A. Marciniak and N. Yalman, 211–225. New York: Springer.

Alexianu, M. 2015. The radial model of salt supplying. Preliminary remarks. In *Salt effect. Second Arheoinvest symposium: From the ethnoarchaeology to the anthropology of salt, 20–21 Apr 2012, 'Al. I. Cuza' University, Iasi*, ed. M. Alexianu, R.-G. Curcă, and V. Cotiugă, 229–235. Oxford: Archaeopress.

Alexianu, M., Gh. Dumitroaia, and D. Monah. 1992. Exploatarea surselor de apă sărată în Moldova: o abordare etnoarheologică. *Thraco-Dacica* 13: 159–167.

Alexianu, M., O. Weller, and R. Brigand. 2007. *Izvoarele de apă sărată din Moldova subcarpatică. Cercetări etnoarheologice*. Iasi: Casa Editorială Demiurg.

Alexianu, M., O. Weller, R. Brigand, R.-G. Curcă, V. Cotiugă, and I. Moga. 2011. Salt springs in present rural world. An ethnoarchaeological approach in Moldavia (Romania). In Archaeology and anthropology of salt. A diachronic approach, ed. M. Alexianu, O. Weller, and R.-G. Curca, 7–23. Oxford: Archaeopress.

Alexianu, M., O. Weller, R. Brigand, and R.-G. Curcă. 2012. Ethnoarchéologie des sources salées de la Moldavie précarpatique: Une taxonomie des habitats. *Thraco-Dacica S.N., II-III (XXV–XXVI)* 2010–2011: 141–150.

Alexianu, M., F. Tencariu, A. Asăndulesei, O. Weller, R. Brigand, I. Sandu, R.-G. Curcă, St. Caliniuc, and M. Asăndulesei. 2015. The salt from Alghianu Beck Vrancea county, Romania, a multifaceted ethnoarchaeological approach. In *Archaeology of Salt. Approaching an invisible past*, ed. R. Brigand and O. Weller, 47–63. Leiden: Sidestone Press.

Asăndulesei, A., M. Alexianu, R.-G. Curcă, St. Caliniuc, and M. Asăndulesei. 2014. Settling selection patterns in the subcarpathian areas of Romania. Salt resources as a determining factor for prehistoric occupation. In *14th international multidisciplinary scientific geoconference SGEM 2014 conference proceedings*, Book 2, vol. 3, 829–840.

Ascher, R. 1961. Analogy in archaeological interpretation. *South-western Journal of Anthropology* 17: 317–325.

Brigand, R., and O. Weller. 2018. Neo-Eneolithic settlement pattern and salt exploitation in Romanian Moldavia. *Journal of Archaeological Science Reports* 17: 68–88.

Ceausu, St. M. 1982. Contributii la istoricul exploatării sării la sfârsitul secolului al XVIII-lea si in prima jumătate a secolului al XIX-lea in Bucovina. Suceava, Anuarul Muzeului Judetean, IX: 377–392.

Curcă, R.-G. 2007. La halothérapie – textes antiques et pratiques actuelles dans la Roumanie orientale. In *L'exploitation du sel à travers le temps*, ed. D. Monah, Gh. Dumitroaia, O. Weller, and J. Chapman, 259–269. Piatra Neamt: Constantin Matasă.

Danu, M., E. Gauthier, and O. Weller. 2010. Human impact and vegetation history on salt spring exploitation (Hălăbutoaia–Tolici, Petricani, Neamt, Romania). *International Journal of Conservation Science* 1 (3): 167–173.

Dufraisse, A., E. Gauthier, A.-M. Pétrequin, P. Pétrequin, and O. Weller. 2004. Techniques d'exploitation préhistorique du sel en Franche-Comté et en Bourgogne. In *Approches fonctionnelles en Préhistoire, actes du XXVe Congrès préhistorique de France, 2000*, ed. P. Bodu and C. Constantin, 427–444. Nanterre: SPF.

Dufraisse, A., D. Sordoillet, and O. Weller. 2010. L'altération des charbons de bois néolithiques de la source de Poiana Slatinei à Lunca (Neamt, Roumanie): Évolution naturelle ou conséquence des techniques d' exploitation? In *Taphonomie des résidus organiques brûlés et des structures de combustion en contexte archéologique. Actes de table ronde, 27–29 mai 2008, Valbonne*. P@alethnologie, ed. I. Thery-Parisot, L. Chabal, and S. Costamagno, vol. 2, 121–132.

Dumitroaia, Gh. 1987. La station archéologique de Lunca–Poiana Slatinei. In *La Civilisation de Cucuteni en contexte européen*, ed. M. Petrescu-Dimbovita, N. Ursulescu, D. Monah, and V. Chirica, 253–258. Iasi: Université "Al. I. Cuza".

Dumitroaia, Gh., R. Munteanu, O. Weller, D. Garvăn, V. Diaconu, and R. Brigand. 2008. Un nou punct de exploatare a sării în preistorie: Tolici–Hălăbutoaia, jud. Neamt. In *Sarea, de la prezent la trecut*, ed. D. Monah, Gh. Dumitroaia, and D. Garvăn, 203–224. Constantin Matasă: Piatra Neamt.

Ellis, L. 1984. *The Cucuteni-Tripolye culture. A study in technology and the origins of complex society*. Vol. 217. Oxford: British Archaeological Reports.

Harding, A. 2013. *Salt in prehistoric Europe*. Leiden: Sidestone.

Harding, A., and V. Kavruk. 2013. *Explorations in salt archaeology in the Carpathian zone*. Budapest: Archaeolingua.

Kavruk, V. 2018. Reconstructing the "trough technique" of the Bronze Age salt production in the Inner-Carpathian Romania and Ukraine. In *Third international congress on the anthropology of salt, Gesaltza Añana/Salinas de Añana 12–15 Sept 2018*. Book of abstracts, 40–42.

Kavruk, V., D. Stefan, M. Alexianu, and V. Vasilache. 2019. A salt exploitation site at Gherla – Valea Sărată (Transilvania). Preliminary report. Studia Antiqua et Archaeologica 25 (1): 17–47.

Monah, D. 1991. L'exploitation du sel dans les Carpates orientales et ses rapports avec la culture de Cucuteni-Tripolye. In *Le Paléolithique et le Néolithique de la Roumanie en contexte européen*, ed. V. Chirica and D. Monah, 387–400. Iasi: Bibliotheca Archaeologica Iassiensis.

Monah, D., S. Antonescu, and M. Bujor. 1980. Raport preliminar asupra cercetărilor arheologice din comuna Poduri, jud. Bacău. *Materiale și Cercetări Arheologice* 14: 86–99.

Nandris, J.G. 1985. The stîna and the katun: Foundations of a research design in European highland zone. *World Archaeology* 17 (2): 256–268.

Nandris, J.G. 1987. Romanian ethnoarchaeology and the emergence and development of Cucuteni in the European context. In *La civilisation de Cucuteni en contexte international*, ed. M. Petrescu-Dîmbovita, V. Chirica, and D. Monah, 201–222. Iasi: Bibliotheca Archaeologica Iassiensis.

Romanescu, Gh., M. Alexianu & A. Asăndulesei. 2014. The distribution of salt massifs and the exploitation of ancient and current reserves of mineralized waters within the Siret hydrographical basin (Romania). Case study for the eastern area of the Eastern Carpathians. In *International multidisciplinary scientific geoconferences, 17–26 June 2014, Bulgaria. 14th geonference on water resources, forests, marine and ocean ecosystems. Conference proceedings, vol. I, hydrology and water resources*, 731–746.

Romanescu, Gh., R.-G. Curcă, and I. Sandu. 2015. Salt deposits in the Romanian Subcarpathians – Genesis, repartition and Ethnomanagement. *International Journal of Conservation Science* 6 (3): 401–410.

Roux, V. 2007. Ethnoarchaeology: A non historical science of reference necessary for interpreting the past. *Journal of Archaeological Method and Theory* 14 (2): 153–178.

Sandu, I., A. Poruciuc, M. Alexianu, R.-G. Curcă, and O. Weller. 2010. Salt and human health: Science,

archaeology, ancient texts and traditional practices of eastern Romania. *Mankind Quarterly L(3)* 50: 225–256.
Stiles, D. 1977. Ethnoarchaeology: A discussion of methods and applications. *Man* 12: 87–103.
Tencariu, F., M. Alexianu, V. Cotiugă, V. Vasilache, and I. Sandu 2015. Briquetage and salt cakes: An experimental approach of a prehistoric technique. Journal of Archaeological Science 59: 118–131.
Townson, R. 1797. *Travels in Hungary with a short account of Vienna in the year 1793*. London: Paternoster-Row.
Ursulescu, N. 1977. Exploatarea sării din saramură în neoliticul timpuriu, în lumina descoperirilor de la Solca (jud. Suceava). *Studii si cercetări de istorie veche* 28/3: 307–317.
Ursulescu, N. 1995. L'utilisation des sources salées dans le néolithique de la Moldavie (Roumanie). In *Nature et Culture*, ed. M. Otte, vol. 68. Liege: ERAUL.
von Fichtel, I.E. 1780. Geschichte des Steinsalzes und der Steinsalzgruben im Grossfuerstenthum Siebenburgen, mit einer, das Streichen des unterirrdischen Salzstockes, durch mehrere Lander andeutenden Karten, und andern Kupfern. Nürnberg: Verlag der Kaspichen Buchhandlung.
Weller, O. 2000. Produire du sel par le feu: Techniques et enjeux socio-économiques dans le Néolithique européen. In *Arts du feu et productions artisanales. XXe Rencontres Internationales d'Archéologie et d'Histoire d'Antibes, 1999*, ed. P. Pétrequin et al., 565–584. APDCA: Antibes.
Weller, O. 2002. Aux origines de l'exploitation du sel en Europe. Vestiges, fonctions et enjeux archéologiques. In *Archéologie du sel: Techniques et societies dans la Pré- et Protohistoire européenne*, ed. O. Weller, 163–175. Rahden–Westfalen: Marie Leidorf.
Weller, O., and Gh. Dumitroaia. 2005. The earliest salt production in the world. An early Neolithic exploitation in Poiana Slatinei–Lunca, Romania. *Antiquity* 79: 306. http://antiquity.ac.uk/ProjGall/weller/index.html.
Weller, O., Gh. Dumitroaia, D. Sordoillet, A. Dufraisse, E. Gauthier, and R. Munteanu. 2008. Première exploitation de sel en Europe. Techniques et gestion de l'exploitation de la source salée de Poiana Slatinei à Lunca (Neamt, Roumanie). In *Sel, eau et forêt. D'hier à aujourd'hui*, ed. O. Weller, A. Dufraisse, and P. Pétrequin, 205–230. Besançon: Presses universitaires de Franche-Comté.
Zidarov, P., and M. Grębska-Kulow. 2013. Ethnoarchaeology in the Balkans. A view from Bulgaria. In *Contesting ethnoarchaeologies. Traditions, theories, prospects*, ed. A. Marciniak and N. Yalman, 95–123. New York: Springer.

Further Reading

Alexianu, M., O. Weller, and R.-G. Curcă (eds.). 2011. *Archaeology and anthropology of salt: A diachronic approach (Proceedings of the International Colloquium, 1–5 Oct 2008, Al. I. Cuza University, Iaşi)* (BAR International series 2198). Oxford: Archaeopress.
Alexianu, M., R.-G. Curcă, and V. Cotiugă (eds.). 2015. *Salt effect. Second arheoinvest symposium: From the ethnoarchaeology to the anthropology of salt 20–21 Apr 2012, Al. I. Cuza University, Iaşi* (BAR International series S2760). Oxford: Archaeopress.
Alexianu, M., O. Weller, R. Brigand, M. Asăndulesei, and R.-G. Curcă (eds.). 2016a. *White gold. French and Romanian Projects on Salt in the extra-Carpathian areas of Romania*. Kaiserslautern–Mehlingen: Parthenon Verlag.
Alexianu, M., O. Weller, and R. Brigand. 2016b. Romanian Salt Springs, intangible cultural heritage, archaeological reconstruction: A variable geometry. In *The intangible elements of culture in ethnoarchaeological research*, ed. S. Biagetti and F. Lugli, 231–240. Milan/New York: Springer.
Brigand, R., and O. Weller, eds. 2015. *Archaeology of salt. Approaching an invisible past*. Leiden: Sidestone Press.
Castellón Huerta, B.R. 2016. *Cuando la sal era una joya. Antropología, arqueología y tecnología de la sal durante el Posclásico en Zapotitlán Salinas, Puebla*. Ciudad de México: Instituto Nacional de Antropología e Historia.
Flad, R. 2011. *Salt production and social hierarchy in ancient China: An archaeological investigation of specialization in China's three gorges*. Cambridge: Cambridge University Press.
McKillop, H. 2019. Maya Salt Works. Gainsville: University Press of Florida.
Monah, D., G. Dumitroaia, O. Weller, and J. Chapman. 2007. *L'exploitation du sel à travers le temps*. Piatra Neamţ: Editura Constantin Matasă.
Weller, O., A. Dufraisse, and P. Pétrequin (eds.). 2008b. *Sel, eau et forêt. D'hier à aujourd'hui*. Presses Universitaires de Franche-Comté.
Williams, E. 2015. *The salt of the Earth: Ethnoarchaeology of salt production in Michoacan, Western Mexico*, BAR international series. Vol. 2725. Oxford: Archaeopress.

Ethnoarchaeology: Approaches to Fieldwork

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Introduction

Field methods of ethnoarchaeology are based on those of ethnography, but because of the type of information that is sought, there are some record

types that are more specific to archaeology. In other words, fieldwork in ethnoarchaeology is also based on participant observation in living societies, with an attitude of minimal interference in the community under study and a clear research design. However, little has been written and reflected on ethnoarchaeological fieldwork (for exceptions, see David and Kramer 2001: 63–90; Arthur and Weedman 2005), and in general, it is not clearly specified in the reports. There are three defining elements of ethnoarchaeology that have implications in their field methods: *the study of a living culture*, with reference to the *material derivatives of human behavior*, and (when it is in traditional society) the *postcolonial context*.

Key Issues/Current Debates/Future Directions/Examples

The ethnoarchaeological fieldwork has some peculiarities. First, the overall goals are more limited than those of classical ethnography, since they are usually related to material culture, with the settlement and with the exploitation of the environment and landscape changes. This makes ethnoarchaeological work generally more specific and shorter than those of classical ethnography (although there are exceptions like the research of John Yellen (1977) among the Kung or those of Russell Greaves (2006) among the Pumé). Although post-processual ethnoarchaeology – more hermeneutic – has looked for understanding the cultural context of production of material culture and has paid more attention to emic category, this has not resulted in a substantial increase in the duration of fieldwork campaigns.

Usually, ethnoarchaeology fieldwork is solitary and includes the researcher and eventually an assistant (sometimes a local collaborator or a student) or a translator (not always available). In this way, a closer relationship with the studied community is achieved, a more personal feeling with the informants is developed, and the impact in the community caused during the field work by the researchers is mitigated. Small communities may feel easily invaded by the arrival of several ethnoarchaeologists and collaborators at the same time. This would undoubtedly transform researchers into an uncomfortable presence. However, it would be unfair to consider ethnoarchaeologists as being always disruptive or bothering visitors. In most cases, ethnoarchaeologists are welcome, are a novelty, and a source of entertaining (Fig. 1); in remote communities, they are also a contact with the outside world, and in many instances, they help to make people's problems visible and can be transformed into spokespersons for political demands.

Some long-term projects have required the participation of several researchers at the same time, as seems to have been the case with Binford's work among the Nunamiut (Fig. 2 and also see Fig. 5.3 in David and Kramer 2001). There is also, a long-term, trans-generational research such as the Kalinga Ethnoarchaeology Project (KEP) in Philippines developed since 1973 by Willam Longarce and collaborators. They undertook a ceramic ethnoarchaeological research that explored the intergenerational transmission of style with a focus on ceramic decoration (Stark and Skibo 2007). Given the ambitious objectives of the project, it required multistage research designs which encompass both the record of data throughout several generations of potters and the articulation of the field work of different waves of ethnoarchaeologists. Taken into account the complexity and the duration, this project is unique in the subdiscipline.

Gender bias is an aspect usually overlooked in the ethnoarchaelogical field work (see Weedman 2006). There are many documented cases in which there are activities and rituals forbidden for men, and vice versa, which skews the more or less complete registration of behavioral pattern of a community. Also, assistant or translator can also deepen this bias. Ideally, it would be best if the ethnoarchaeological research teams are composed of researchers and collaborators of both sexes, which is not always possible.

Since ethnoarchaeologists study living cultures with archaeological eyes, they record data such as places for garbage disposal, marks and breaks on a bone and its dispersion in domestic spaces and in the landscape, operational chains and sequence of artifact production, plant, and location of households and villages (Fig. 3). Thus, ethnoarchaeologists

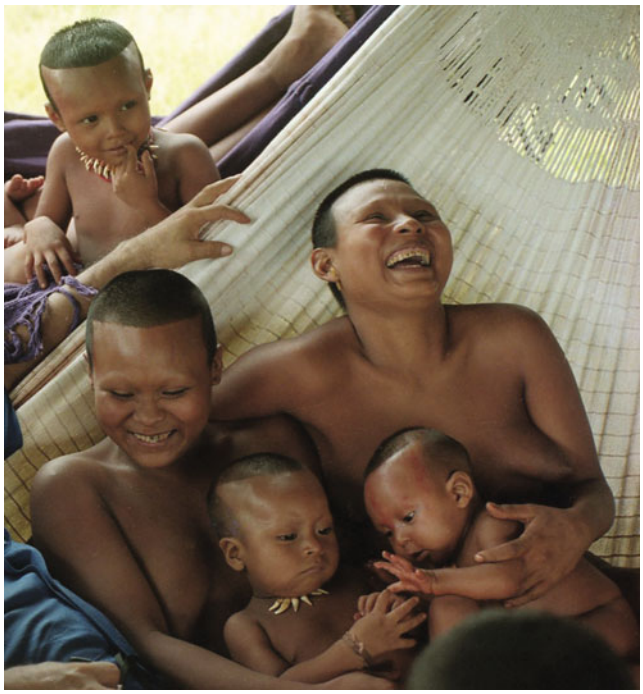

Ethnoarchaeology: Approaches to Fieldwork, Fig. 1 Nukak women laughing at ethnoarchaeologists at the end of a fieldwork at Guaviare Colombian Amazone 1995. (Photo Gustavo Politis)

Ethnoarchaeology: Approaches to Fieldwork, Fig. 2 Lewis Binford (second form the left) and two collaborators going off camp with a Nunamiut man and his dogs. Alaska 1971. (Photo courtesy Amber Johnson)

draw plans, analyze bones, record artifacts, and make maps with the skills that are specific to archaeology. Ethnoarchaeological work often includes the collection of objects and debris, such as faunal remains, the debris of a sequence of stone flaking, or broken pottery sherds, for further study in the laboratory, following analytical techniques from archaeology or taphonomy (see, e.g., O'Connell 1987; Lupo and O'Connell 2002). Likewise, information is often quantified, especially in terms of size, distance, weight, and time (see, e.g., the study of Bird et al. 2009, on daily foraging trips and hunting strategies of the Martu, see also Politis 2007). Francophone ethnoarchaeology has been very much oriented toward the documentation of the technological processes and in the identification

Ethnoarchaeology: Approaches to Fieldwork, Fig. 3 J. Peter White in 1964 in the Legaiyu village, Asaro Valley Eastern Highlands, New Guinea: ethnicity is identified as Gahuku-Gama. White had asked the Indians to carve some nucleus to make some observations controlling some variables. (Photo courtesy of J. Peter White)

of the *chaîne opératoire*, within the anthropological matrix (the "anthropology of techniques," see Pétrequin and Pétrequin 1993). With the advent of post-processual ethnoarchaeology (Hodder 1982), there has been a greater emphasis on understanding the context of material cultural. The article on pottery decoration by David et al. (1988) is a good example of this trend. Moreover, from post-processualism onwards, a more emic perspective has been developed, and efforts have been put into trying to understand how the same people conceptualized and thought about their objects and their behavior and to understand its causes and motivations. Basically, post-processual and hermeneutic ethnoarchaeologists intend to recover the different meanings of material culture and how it operates into several dimensions (beyond the techno-functional).

To simplify something much more complex, it is important to differentiate ethnoarchaeological observations from ethnoarchaeological projects. The former generally occur during a campaign of archaeological fieldwork. Observations made on these occasions are very useful in interpreting a specific context but cannot always elucidate more complex systems or generate more general models. These observations are also frequent producers of "cautionary tales," which help mitigate the ethnocentrism of archaeologists and overthrow assumptions based solely on common sense. Furthermore, ethnoarchaeological projects have an agenda and specific designs and seek to transcend the regional application; generally, they seek to create general models which allow for the connection between human behavior and material culture (the classic studies of Binford 1978, on Nunamiut are a good example of this; see also discussion in Roux 2007) or for understanding the meaning of material production within its social and cultural context (see, e.g., Gosselain 2000).

There are two main types of ethnoarchaeological projects. Those incorporated within archaeological projects and those undertaken on their own account, without direct links to local archaeological research (although these may have originally served as inspiration). Carol Kramer's study (1982) on a vernacular architecture of Iran and Warren DeBoer work (1974) on the pottery from Peru Conibo are classic examples of the former. Ethnoarchaeological studies on Pumé conducted by Greaves (2006) or Kelly (2006) and collaborators of Mikea of Madagascar exemplify the second type.

Although less frequent, ethnoarchaeological research can also be conducted within the framework of ethnographic/social anthropology projects. The famous work of John Yellen among the Kung is one of the exceptions, as it was done as part of the Harvard University Bushman Studies project, led by Richard Lee and Irven DeVore.

In general, the methods and techniques of data record in ethnoarchaeology have three variants. The first is the record of the daily activities as they happen, with special attention to the materials derived from them and the social and ideational framework within which they occur (see, e.g., Politis 2007). This is the ideal case and should be the most successful for generating analog models. The second variant is when the ethnoarchaeologist requests or promotes the execution of specific activities in order to obtain certain types of information. This variant may allow for a better control of observation, as in experimental archaeology, with the difference that the one holding the experiment is the cultural "other." This situation is common, for example, when the researcher wants to record the making of some artifacts that are no longer made or that were not made during the period of fieldwork. The visit to a stone quarry with three Alyawara men performed by Lewis Binford and James O'Connell (1984) in the early 1980s is a good and well-known example of this variant. The weakness of this second strategy is that it is more difficult to frame the phenomenon in its original cultural context (and so understand its causes and motivations), since induction is applied by the researcher. In both variants, ethnoarchaeologists are making increasingly frequent use of film in addition to graphic and sound recording (Fig. 4), especially taking advantage of digital cameras (Fig. 5).

The third variant uses previous knowledge about the societies to make broader ethnoarchaeological models, spatially and temporally. In this case, the ethnoarchaeologist does not directly "observe" anything but receives oral information about some aspects of the behavior of people in the past and their material implications. Models of residential mobility among Nunamiut made by Binford (1978) are good examples of this third strategy as it incorporates the memory of traditional territories of this people. The study of Mendoza (2003/2004) about the range area and the seasonal campsites of the Toba bands form Western Chaco (Argentina) also nicely illustrate this research strategy. In practice, two or three of these variants are combined in the field. In all three variants, key informants are also used (Fig. 6).

Ethnoarchaeology: Approaches to Fieldwork, Fig. 4 Recording Nukak voices in the Colombian Amazone in 1996. (Photo Gustavo Politis)

Despite the relatively widespread belief that ethnoarchaeologists also dig sites on their field work locations (see for example Laming-Emperaire et al. 1978), this happens rarely now. In general, ethnoarchaeologists generate the models that serve as analogies for human behavior but are not primarily interested in recovering what is left after a place was abandoned. The generation of "archaeological record" is usually observed in real time during the fieldwork and is the interface between the living culture dynamic and static registration, which focuses the ethnoarchaeologists. Thus, the excavation of a site where observations of the living culture have been made does not have much relevance for ethnoarchaeology; the study of differential preservation of the remains belongs to the field of taphonomy and the study of the natural processes of site formation.

Ethnoarchaeology: Approaches to Fieldwork, Fig. 5 Young Awa browsing the digital film machine, during night filming of a Juriti village ritual (Brazil), 2008. (Photo courtesy of Almudena Hernando and Alfredo Gonzalez Ruibal)

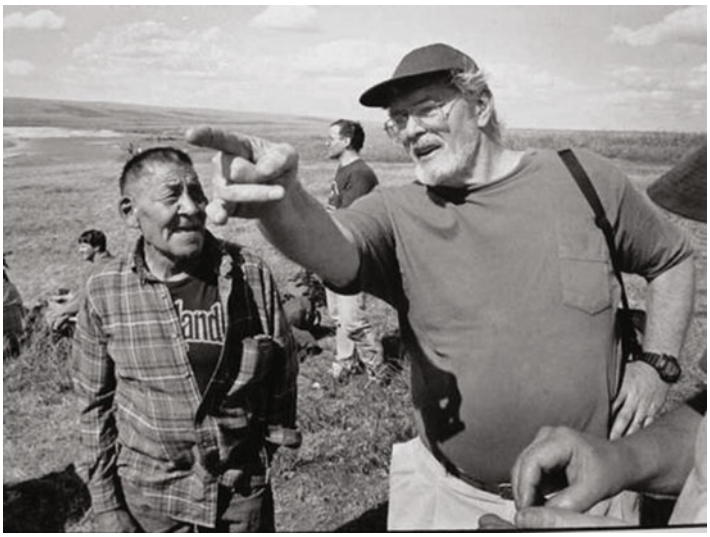

Ethnoarchaeology: Approaches to Fieldwork, Fig. 6 Lewis Binford visiting Anaktuvuk Pass in 1999. He is talking to Johnny Rulland who was his "brother" and one of his primary informants. (Photo taken by Grant Spearman. Courtesy of Amber Johnson)

The asymmetrical relation in the field between the "other" that is being studied and the ethnoarchaeologist is another important issue that has been hardly discussed. The selection of key informants or "focal persons" is always problematic and is plagued with scientific and ethical dilemmas (see Fewster 2001; Politis 2015). Moreover, in the common cases of the emergence of leaders that embrace the values of modern society at the expense of their own traditions, the result still generates unbalanced situations. Also, the Westerners' interaction with the traditional societies created or reinforced gender differences that may have not existed before, or not in that degree (Hernando Gonzalo et al. 2011). In fact, not only are many of the accounts supported by allegedly objective observations biased but they also reflect behavior and relationships conditioned by the Western researcher's very presence (Flanagan 1989: 252). It is highly probably that part of the observed actions and answers obtained during this fieldwork is biased due to this asymmetrical situation and/or the gender of the researcher. And this is probably recurrent to all ethnoarchaeological scenarios in the world.

The ethical aspect of fieldwork is crucial (Hodder 1982: 39; Fewster 2001; Davis and Kramer 2001: 84–90). The governing ethical standards and good practice applied to general anthropological research have first priority: this includes

full respect for the community and its customs, minimal interference, and informed consent. This last is sometimes difficult to obtain in its entirety, due to both linguistic and cultural differences. It is often difficult to explain the ethnoarchaeologists' passion for systematically recording (sometimes obsessively) everyday behaviors and conserving what the people studied consider junk. This is of course related to the degree of "Westernization" of the ethnic group in question, but for many traditional societies, the activities carried out by ethnoarchaeologists remain incomprehensible: why pick up and put in bags a lot of dirty bones which do not have any meat? Why draw and map the sherds of broken pottery? Why ask obvious questions all the time? Full and real informed consent can be obtained quite easily in some cases, but it is unrealistic, for example, in the case of more recently contacted or very isolated communities such as the Colombian Amazon Nukak or the Upper Orinoco Hotï. What it is obtained is the agreement for the ethnoarchaeologist to accompany, join, and "observe" in a particular way some people in their everyday activities, but this by no means implies that the observed are fully aware of what the ethnoarchaeological research in question means (Politis 2015). This is an ethical dilemma that is hard to solve.

One of the topics discussed recently is the post-colonial nature of ethnoarchaeological research and the legitimacy of studying a "cultural other" whose current situation is the result of colonial practices along several centuries. This is related to the colonial heritage of anthropology, and ethnoarchaeology does not escape this sin of origin. Field methods are impregnated with this critique and every effort should be made to decolonize the practice of ethnoarchaeology (Cunningham and MacEachern 2016; Weedman Arthur 2018). One of the strategies that are being carried out is to make an ethnoarchaeology *with* people, through which the "other" studied has a more active role in the research process, in the design of the project and that somehow participates in the profit of the results, This kind of de-colonial practice has a very strong impact on fieldwork and forces the creation of specific methods and techniques, so that without losing some rigor in the investigation, other patterns of rationality and other cosmologies can be incorporated. This challenge implies a new type of field work that is currently in early stages of development. In Brazil, this kind of research is becoming frequent under the label of collaborative ethnoarchaeology (Silva 2009) (Fig. 7). This also would drive to some phenomenological approaches which have been

Ethnoarchaeology: Approaches to Fieldwork, Fig. 7 Brazilian ethnoarchaeologist Fabiola Silva among the Asurini in the Kwatinemu village. She is organizing a trip in 2010 with Asurini people. (Photo courtesy of Fabiola Silva)

criticized since the inception of ethnoarchaeology: Watson (1979) was worried that the temptation of "going native" would produce the loss of analytical perspective.

Finally, the continual disruption of traditional or preindustrial lifestyles, the growing processes of ethnogenesis, and the steady advance of globalization are leading to the demise of practices which help observers interpret the past. Within this orbit, ethnoarchaeology is reorienting its strategies and objects of study, and some variants of this new trend are turning to what has been called the archaeology of the present (González Ruibal 2009) or archaeological ethnographies (Hamilakis and Anagnostopulos 2009). This has led to a redesign of a new methodology in the field methods.

Cross-References

▶ Binford, Lewis R. (Theory)
▶ Ethnoarchaeology

References

Arthur, J., and K. Weedman. 2005. Ethnoarchaeology. In *Handbook of archaeological methods*, ed. H.D. Maschner and C. Chippindale, vol. 1, 216–269. Lanham: AltaMira Press.

Binford, L. 1978. *Nunamiut ethnoarchaeology*. New York: Academic.

Binford, L., and J. O'Connell. 1984. An alyawara day: The stone quarry. *Journal of Anthropological Research* 40: 406–432.

Bird, D.W., R. Bliege Bird, and B.F. Codding. 2009. In pursuit of mobile prey: Martu hunting strategies and archaeofaunal interpretation. *American Antiquity* 74: 3–29.

Cunningham, J., and S. MacEachern. 2016. Ethnoarchaeology as Slow Science. *World Archaeology* 48 (5): 628–641.

David, N., and C. Kramer. 2001. *Ethnoarchaeology in action*. Cambridge: Cambridge University Press.

David, N., A. Sterner, and K.B. Gauva. 1988. Why pots are decorated. *Current Anthropology* 29: 365–389.

DeBoer, W. 1974. Ceramic longevity and archaeological interpretation: An example of the Upper Ucayali, Peru. *American Antiquity* 39: 335–343.

Fewster, F. 2001. The responsibilities of ethnoarchaeologists. In *The responsibilities of archaeologists: Archaeology and ethics*, British Archaeological Reports international series 981, ed. M. Pluciennik, 65–73. Oxford: Archaeopress.

Flanagan, J.G. 1989. Hierarchy in simple 'egalitarian' societies. *Annual Review of Anthropology* 18: 245–266.

Gonzalez Ruibal, A. 2009. De la etnoarqueología a la arqueología del presente. In *Mundos Tribales. Una visión etnoarqueológica*, 16–27. Madrid: Museu de Prehistoria de Valéncia. Diputació de Valencia.

Gosselain, O. 2000. Materializing identities. An African perspective. *Journal of Archaeological Methods and Theory* 7: 187–218.

Greaves, R. 2006. Use and residential landscape. Foragers organization. In *Archaeology and ethnoarchaeology of mobility*, ed. F. Sellers, R. Greaves, and P.-L. Yu, 127–152. Gainesville: University Press of Florida.

Hamilakis, J. and A. Anagnostopulos. 2009. What is Archaeological Ethnography? In J. Hamilakis and A. Anagnostopulos (eds.), *Public Archaeology: Archaeological Ethnographies* 8 (2–3), 65–87.

Hernando Gonzalo, A., G. Politis, A. González Ruibal, and E. Beserra Cohelo. 2011. Gender, power and mobility among the Awá-Guajá (Maranhão, Brazil). *Journal of Anthropological Research* 67 (2): 189–211.

Hodder, I. 1982. *The present past: An introduction to anthropology for archaeologists*. London: Batsford.

Kelly, R., L. Poyer, and B. Ticker. 2006. Mobility and houses in southwestern Madagascar. Ethnoarchaeology among the Mikea and their neighbors. In *Archaeology and ethnoarchaeology of mobility*, ed. F. Sellers, R. Greaves, and P.-L. Yu, 75–107. Gainesville: University Press of Florida.

Kramer, C. 1982. *Village ethnoarchaeology: Rural Iran in archaeological perspective*. New York: Academic.

Laming-Emperaire, A., M.J. Menezes, and M. Davina Andretta. 1978. O trabalho da pedra entre os Xetá da Serra dos Dourados, Estado do Paraná. In *Coletânea de Estudos em Homenagem a Anette Laming-Emperaire*, Coleção Museu Paulista, Série Ensaios, vol. 2, 19–82. São Paulo.

Lupo, K., and J. O'Connell. 2002. Cut and tooth mark distribution on large animal bones: Ethnoarchaeological data from the Hadza and their implications for current ideas about early human carnivory. *Journal of Archaeological Science* 29: 85109.

Mendoza, M. 2003/2004. Range área and seasonal campsites of Toba bands in Western Chaco. *Before Farming* 2: 1–12.

O'Connell, J. 1987. Alyawara site structure and its archaeological implications. *American Antiquity* 52: 74–108.

Pétrequin, P., and A.M. Pétrequin. 1993. *Ecologie d'un outil: la hache de pierre en Irian Jaya (Indonésie)*, Monographie du CRA 12. Paris: CNRS Éditions.

Politis, G. 2007. *Nukak. Ethnoarchaeology of an Amazonian people*, University College London Institute of Archaeology publications. Walnut Creek: Left Coast Press.

Politis, G. 2015. Reflections on contemporary ethnoarchaeology. *Pyrenae* 41 (1): 41–83.

Roux, V. 2007. Ethnoarchaeology: A non-historical science of reference necessary for interpreting the past. *Journal of Archaeological Method and Theory* 14 (2): 153–178.

Silva, F. 2009. A etnoarqueologia na Amazônia: contribuções e perspectivas, *Boletim do Museu Paraense Emílio Geoldi* 4 (1), 27–37.
Stark, M., and J. Skibo. 2007. A history of the Kalinga ethnoarchaeological project. In *Archaoelogical anthropology. Perspective in methods and theory*, ed. J. Skibo, M. Graves, and M. Stark, 40–56. Tucson: University of Arizona Press.
Watson, P.J. 1979. *Archaeological ethnography in Western Iran*. Tucson: University of Arizona Press.
Weedman, K. 2006. Gender and ethnoarchaeology. In *Handbook of gender in archaeology*, ed. M. Nelson, 247–294. Lanham: AltaMira Press.
Weedman Arthur, K. 2018. *The lives of stone tools: Crafting the status, skill, and identity of flintknappers*. Tucson: The University of Arizona Press.
Yellen, J.E. 1977. *Archaeological approaches to the present*. New York: Academic.

Ethnoarchaeology: Building Frames of Reference for Research

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Introduction and Definition

Ethnoarchaeology is a powerful strategy for structuring archaeological research questions that uses ethnographic information to make inferences about the material residues of past human activities. Ethnoarchaeology is not a theoretical approach per se, so it can investigate research questions generated from a wide variety of theoretical perspectives. Ethnoarchaeological scopes and scales of research are expanding rapidly in geography, chronology, method, and theoretical stance, from variables conditioning the manufacture of traditional technology to the evolution of symbolic expression and ritual behaviors.

Ethnoarchaeologists are uniquely positioned to construct frames of reference to aid archaeological inquiry. In this entry, "frame of reference" is defined as a *research strategy that makes projections from a better-known domain of knowledge to a less-well-known domain*. Ethnoarchaeologists examine variation in characteristics of an independent, related body of knowledge (ethnographic data) to generate frames of reference for testing and refining research about less well-known phenomena (the ways that human activities are expressed in the archaeological record and implications of the archaeological record for past activities).

Ethnoarchaeology has been described as a subset of actualistic archaeology, but unlike experimental archaeology, which is conducted under acultural, controlled laboratory conditions, ethnoarchaeology documents and analyzes behaviors that are observed or described in ethnographic settings. Unlike ethnographic analogy, which identifies similarities and infers similar causal mechanisms, and the direct historical approach, which imposes traits of present-day material culture directly onto the archaeological record, ethnoarchaeology usually takes the intermediate step of developing frames of reference to investigate the archaeological record. Human behavioral ecology and biosocial anthropology also employ real-time observations of human societies as means to structure research problems but are more narrowly concerned with biologically expressed evolutionary aspects of human behavior (Fig. 1).

There is some overlap between ethnoarchaeology and actualistic research strategies, but ethnoarchaeology does have important characteristics that define it as a separate subdiscipline of archaeology: the most significant being the conceptual linkage between the two domains of ethnography and archaeology. This entry begins with a summary of the history of ethnoarchaeology (for a more detailed review, see David and Kramer 2001) and moves on to describe functions of ethnoarchaeology in various arenas of method and theory; explore key issues, current debates, and critiques; and discuss future trends and opportunities.

Historical Background

The history of ethnoarchaeology can be summarized in four main periods of growth, drawn loosely from David and Kramer (2001). Like the archaeological record itself, the history of

Ethnoarchaeology: Building Frames of Reference for Research, Fig. 1 Quechuan woman deploys a sling, Central Peru, observed by members of her community and Margaret Brown Vega. (Photo: Nathan Craig)

ethnoarchaeology is a palimpsest; traces of early tactics and perspectives can still be discerned in ethnoarchaeological research today, although they may be situated in new geographic or culture-historical contexts.

Initial Period, 1956–1967

The term "ethnoarchaeology" was first coined in 1900 by Jesse Fewkes, who was describing the direct application of present-day cultural phenomena to materials left behind by past behavior. In 1948 Walter Taylor advocated the need for a "conjunctive archaeology" that brought anthropological techniques of observation and categories of data into archaeological research. Female researchers were proponents of ethnoarchaeology early on, evidenced by Patty Jo Watson's 1950s work in Iraq, Iran, and Turkey and Maxine Kleindienst's interest in the African Paleolithic (Kleindienst and Watson 1956). The call of Taylor, Watson and Kleindienst, and others to integrate ethnographic and archaeological patterning grew from dissatisfaction with the "mainstream" strategy in the early to mid-twentieth century, which emphasized analytical categories. Culture-historical archaeology mostly involved excavating sites with relatively rich, well-stratified arrays of material remains; grouping their stylistic elements into formal artifact types; tracing the distribution of those types through time and space; identifying bounded, co-occurring sets of types as archaeological "cultures"; and explaining changes in composition and distribution by reference to past movements of people or ideas or both (O'Connell 2011).

Most early ethnoarchaeological approaches superimposed cultural phenomena observed in the present directly onto material traces of the past, and this had some success in cases where cultural continuity was strong. Analogical approaches during this time largely explored the parameters of artifact manufacture, focusing on characteristics that are visible in the archaeological record. Spatial analyses of living spaces at that time were scarce and served mostly as cautionary tales against unwarranted inferences about site structure and function (Heider 1961). This early role of ethnoarchaeology as a check and balance against "just-so stories" is still relevant today (Gifford-Gonzales 2010).

New Ethnoarchaeology, 1968–1981

The emergence of ethnoarchaeology as a major subdiscipline was linked with the advent of cultural ecology studies that documented human subsistence, technology, and mobility as essential indicators of the dynamic relationship between societies and their home environments (cf. Steward 1955). Archaeologists, moving from discernment of categories of artifacts toward descriptions of dynamic adaptive systems, realized that frames of reference were needed to explain the relationships between properties of the archaeological record and behaviors that condition for those properties. Lewis Binford's series of publications in the 1960s asserted that archaeologists must not only use anthropological information but become proficient in anthropology in order to build frames of reference for

archaeological research problems. The groundwork for ethnoarchaeological fieldwork among the Nunamiut in the 1970s grew from his doubts about F. Bordes's "ethnic geography" of Mousterian tools; Binford felt that Mousterian technological variation could be functional, but realized that he needed a frame of reference about arctic hunting tools and lifeways (Binford, personal communication). In the 1960s and 1970s, most proponents of the New Archaeology focused on adaptive systems and processual change rather than ideology and symbolic thought, and they found a ready source of baseline information in ethnoarchaeology. At about the same time, Richard Gould was conducting ethnoarchaeological fieldwork among the Ngatadjara peoples of the Australian Western Desert. His interests in symbolic and ideational behaviors led him to assert that these behaviors could be discerned in the archaeological record by identifying the anomalies between archaeological expectations and ethnographic observations.

Ethnoarchaeology underwent a brisk self-examination in the 1970s and early 1980s in a series of debating articles between Gould and Binford: Gould (1980) asserted that the proper research objectives of anthropology are symbolism and meaning, thereby confining ethnoarchaeology to the more humble realms of behavior that generate archaeologically visible material residues (e.g., cooking, toolmaking, and house construction). The danger of investigating *only* materially significant behaviors was a uniformitarian, determinist view of human culture as materially dictated. Binford countered that culture mediates human interactions with the world, and variability in those culture-environment interactions are patterned, with material signatures that are observable anthropologically (Binford 1989). This back-and-forth discussion, never "resolved," foreshadowed the vigorous processual/post-processual debates that began in the mid-1980s and continue today (see below).

The geographic scope of ethnoarchaeology expanded during the 1960s and 1970s to include nearly every region of the world, with particularly active research programs in sub-Saharan Africa and Australia. Nearly every level of societal organization was investigated with emphasis on foraging peoples, but industrialized or "state"-level societies were underrepresented during this period. Not surprisingly, accumulating ethnoarchaeological data led to the realization that linkages between behaviors and their archaeological consequences are complex. New archaeologists who sought large generalizations felt that ethnoarchaeological data were sometimes too particularistic due to the "embedded" nature of the data collection process. The 1980s arrived with no grand unifying theory of archaeology in place, but the wealth of data generated by pioneering ethnoarchaeological fieldwork during this time period remains highly influential to archaeological and anthropological research today.

Expansive Period, 1982–1999

With the advent of post-processual archaeology in the 1980s and 1990s, Hodder (1982), David et al. (1988), and others employed ethnographic information to argue that symbolism, ideation, meaning, and identity are active formative agents in the archaeological record and that material culture is itself an active agent of communication. Ethnoarchaeology was now called upon to document the social, ritual, and geopolitical contexts within which behaviors play out and the ways that materials are made, used, and employed as social and ritual symbols. Along with reflexive anthropology, which reoriented the object of inquiry from observed to the observer by making explicit the observer's sociopolitical position, post-processual archaeology focused on subjective interpretations of the textual or narrative aspects of the material record, which was described as a series of symbols. The persons conducting ethnoarchaeology were viewed as active agents of communication who influence research outcomes in non-replicable ways. Although post-processual approaches may have influenced ethnoarchaeology less than other research strategies, post-processualism addressed ritual and ideational behavior in a more robust manner than the "new ethnoarchaeology" and led to a growth of interest in complex, sedentized societies with a more robust material record of symbolic and textual expression.

Recent Diversifying Period, 2000–2011

Ethnoarchaeology in the 2000s has expanded to include processual, science-oriented forms of inquiry about variability and evolution that involve explanation of differences and similarities as well as post-processual explorations of the ways that researcher and researched explore meaning and reify their own connections to the past: for a good cross section of current variability in ethnoarchaeological research problems, see the SAA Archaeological Record, Volumes 9(5) and 10(1). Ethnoarchaeology contains enormous potential to contribute fine-grained, reliable information to heritage and identity studies, which has captured the interest of scholars associated with descendant communities. Ethnoarchaeology has become a major contributor to intangible archaeology by documenting spiritual implications of seemingly utilitarian objects and helping to document and pass on key language terms and traditional skills to the next generation. The social systems studied in ethnoarchaeology now include foragers, horticulturalists, pastoralists, industrialized urban peoples, as well as occupational specialists from every socioeconomic status and corner of the globe. Research topics range from lithic tool production to the study of material expressions in urban Middle America. In the past three decades, the transformation of the main job market from academia to cultural resources management and other forms of public archaeology – particularly in North America – has given rise to the citation of ethnoarchaeological research for rapid diagnostic ascriptions of archaeological materials, features, and settlement complexes. Women researchers, always well represented in ethnoarchaeology, are growing in number; in the recent double issue of the Society for American Archaeology's Archaeological Record in 2009 and 2010, women authors outnumbered men by eight to two.

Key Issues and Current Debates

Functions of Ethnoarchaeology

Ethnoarchaeology as a research strategy is a chameleon, taking on different shades from the contexts of its use. Gifford-Gonzales (2010) notes that ethnoarchaeology has functioned in the larger landscape of anthropology as

- A category checker for implicit assumptions or analytic categories of archaeological materials
- A prediction tester for hypothetical statements drawn from a formal body of theory
- A middle-range theory builder that defines relational analogies in ways that are relevant to the formation of the archaeological record

These functions are generally "built in" by researchers during the formulation of research designs. Other important functions of ethnoarchaeology may become apparent after the conclusion of research, sometimes many decades afterward. In these cases, people come to realize that ethnoarchaeology has also served as

- A spoiler to received wisdom, disproving generalizations and revealing unanticipated variability
- A heritage keeper for descendant groups who have inhabited a region for long periods
- A public relations bridge builder that shows archaeologists engaging directly with living people and societies

Sometimes unintentionally, the ethnoarchaeologist may find herself or himself acquiring bodies of knowledge that are outside the "traditional" confines of archaeology; these could range from proficiency in indigenous languages to an ability to identify dozens of species of fish to competency in traditional skills like weaving, butchering, or home construction. Thus an important "after-the-fact" function of ethnoarchaeology is to broaden the experiential, intellectual, and ethical repertoire of archaeologists (Fig. 2).

Ethnoarchaeological Research Problems and Strategies

When these many functions are overlaid with different theoretical perspectives, the variation in uses of ethnoarchaeological research questions can be breathtaking, reflecting a very broad spectrum of anthropological and archaeological

Ethnoarchaeology: Building Frames of Reference for Research, Fig. 2 Claudia Chang talking to a Greek woman herder in Grevena in the late 1980s. (Photo: Perry A. Tourtellotte)

research domains. The below categories are derived from David and Kramer (2001), in approximate chronological order of appearance and emphasis. Ethnoarchaeology has been, and is, employed to study

1. The ways that residues of human activities enter archaeological contexts
2. Mobility, at varying temporal, spatial, and organizational scales
3. Subsistence, including procurement and processing
4. Artifacts, including functions, as elements of technological systems; operating sequences; and taxonomic categories
5. Style and the marking of boundaries including regional studies
6. Settlement systems and patterns
7. Site formation and structure
8. Architecture, including form, construction, function, and context
9. Specialist craft production and apprenticeship
10. Trade and exchange
11. Systems of thought such as status, ideology, and mortuary practices

This list is evolving with each passing day. Emphasis in the 1960s and 1970s centered on foraging and small-scale horticultural societies with a focus on hunting and processing of game animals, production of lithic tools, and frequent mobility. Over the decades, ethnoarchaeological research has diversified to agriculturalists, pastoralists, fishing societies, and urban settings; craft specializations such as ceramics, weaving, and metallurgy are well represented.

There are very few people who identify themselves as full-time ethnoarchaeologists; rather, ethnoarchaeology is conducted by researchers trained as archaeologists in the broader sense. Whether a student or an "old hand," identifying the best data to collect – and the means to collect them – is a major challenge to the ethnoarchaeological researcher. Simple questions such as "Where should I go, and how long should I stay? Whom should I talk to? What should I observe?" can generate complex research logistics. In the field, duration of the research can play a key role in the applicability of data to the research problem; seasonal, interannual, or long-term variation is unlikely to be reflected in a 2-week field stay. But a researcher interested in manufacture of a specialized artifact type can focus field time and target observations more narrowly.

Techniques for collection of quantified data might include item counts, identifications (of species, material types, methods, architectural traits, etc.), weights, durations, measures of distance, and demographic

information. Archaeologists' proficiency at map-making and visual data collection like photography is very useful. Methods borrowed from the field of human ecology have proven quite transferable and include "scans" (cyclical observations of varied phenomena, such as walking through a camp and recording all activities at hourly intervals) and "focals" (targeted on individuals or activities and collected in a continuous stream for the duration of the activity, such as observing a man making a mask or following a woman on a trip to gather weaving materials). Scans provide low-resolution data at large spatial and temporal scales that offer opportunities for pattern recognition and generalizations, and focals generate high-resolution information at smaller scales that illuminate the ways that individuals operationalize bodies of knowledge in specific contexts.

The role of qualitative data is complementary and essential. Interviews and direct participation in activities (nearly always as a clumsy acolyte) can capture nuances and variability that do not manifest in quantitative data. Children and teenagers who are still in the learning phases, and enjoy interacting with unusual grown-ups, can be particularly effective language coaches, teachers, and informants. Photographs, video, and audible recordings are precious forms of documentation that can be referenced in the remote future for a wide variety of research questions. When considering ethnoarchaeological research design, it is important to consider the comfort level of the study community and its individual members with the presence of a researcher. Techniques that require prolonged observation periods in houses, or focal follows of individuals, are obviously invasive, especially early in the acquaintance between the researcher and the community. These techniques are best undertaken after a preliminary adjustment period in which the researcher becomes a known, and hopefully trusted, entity (also see Critiques, below).

Although the most visible and charismatic form of ethnoarchaeological data collection is direct engagement with traditional peoples in the field, background information collected in library settings is an essential pre-field step for structuring and refining research questions. Consulting library sources post-field will likely provide insights in the light of the ethnoarchaeologists' newly acquired knowledge. Too, traditional experts are not always available to the researcher; lifeways may have changed or vanished. In these cases, collection and analysis of ethnographic library sources alone can also contribute to original and useful hypothetical statements about material correlates of behavior and organization that can be assessed with archaeological data.

Critiquing Goals of Ethnoarchaeology

Because ethnoarchaeological research comes in every theoretical stripe, it is subject to an equally wide spectrum of critique. Ethnoarchaeology has been called particularistic by processualists, deterministic by post-processualists, and colonialist and reductive by descendant communities. This entry focuses on critiques of ethnoarchaeology as a research strategy and the ways that ethnoarchaeologically derived arguments about key linkages can lead to weak or inaccurate inferences. Wobst (1978) makes a strong case against directly superimposing ethnographic observations, which are localized and temporally narrow, to archaeological data, which reflect long periods of time and/or clusters of sites or regional scales. This could be read as a critique of ethnoarchaeology, particularly in its early career as a fairly direct means of comparison. The intervening step of deriving a hypothesis from appropriately scaled ethnographic observations (e.g., numerous comparable observations on similar subject matter or observations taken from a large spatial area) that can be tested using archaeological data should, in most cases, alleviate the issue raised by Wobst.

Obviously, the successful application of ethnoarchaeological observations to archaeological problems requires the researcher to understand the context and applicability of observations, and a reasonable critique is that ethnographic techniques can never "perfectly" capture phenomena. If an observed behavior or relationship is anomalous, or observed/interpreted in error, the usefulness of the research is lost or reduced. This can result from insufficient consideration of variability (such as overstating the applicability of a small-scale observation) or observations never

made (a researcher cannot be everywhere at once and may miss important facets or variations of systemic relationships). Something as simple as unwillingness of a host community or informant to discuss a sensitive subject, or insufficient control of the language by the researcher, can also compromise the accuracy of observations. Addressing this critique requires careful attention to the context and applicability of observations to one's research problem, adjusting as needed, and acknowledging data gaps and future research needs.

A related critique of ethnoarchaeology as a research strategy is insufficient integrity or "authenticity" of the traditional nature of the study culture (e.g., Belcher 2009; Jones 2009; Hudson 2010). The excitement and controversy generated by discoveries of the Tasaday and other small, allegedly pristine "Stone Age" groups highlight the hunger of the academy and the larger public for cultures unaltered by the modern world. Once more, ethnoarchaeologists must emphasize the role of the intermediary role of the frame of reference, which requires that the research question specify scales of observation, and exercise control over properties that vary and those that are held constant. For example, an ethnoarchaeological investigation of wild plant gathering might note that women climbed through barbed wire fences and carried metal machetes. This does not compromise the value of observations of, say, the number and type of plants gathered, the decision when to leave a patch, the relative contribution of young girls and a blind woman in the group, and distribution of raw and cooked plant foods to family members back at camp. However, if the women hitch a ride to the gathering site on a friendly rancher's truck, this obviously reduces this trip's explanatory power for patterns of mobility. A similar issue is lack of control over context: no field conditions today can approach the conditions encountered by foragers colonizing the Australian Western Desert in the Pleistocene, for example. No people (or animals) resemble Pliocene hominids today, so using ethnographic information to explore Pliocene behaviors is risky according to paleoanthropologists (Liebermann et al. 2007). Addressing conditions for which there is no modern comparative context requires close control over variables and clear, defensible rationales for the derivation of ethnoarchaeological frames of reference and their application to archaeological questions (Fig. 3).

Related to the above is inadequate applicability or "fit" of ethnographic observations to the archaeological record, a very common critique. Ethnoarchaeologists frequently find themselves explaining to a variety of audiences why motorized transportation, modern tools, wage labor, loss of language, participation in the national education system, nontraditional clothing, manufactured items and commodity foods, and other influences of the globalized culture and economy do not *necessarily* compromise the value of ethnoarchaeological observations. Global influences cannot be ruled out in most ethnoarchaeological field contexts, and (as with the Pliocene case above) ethnoarchaeologists must maintain good control over variables, describe defensible rationales for deriving ethnoarchaeological frames of reference, and explain clearly their application to archaeological questions. This is no reason to cease the practice of ethnoarchaeology: indeed, the continual influence of industrialized, globalized society and its material forces on traditional life and culture enhance the research utility and heritage value of ethnoarchaeological observations.

The uneven use of ethnoarchaeological concepts in public archaeology has received its share of criticism. Few archaeologists working in public archaeology have not seen the forager/collector dichotomy (Binford 1980) invoked to explain everything from site distribution and structure to lithics, along with curated/expedient tools, and MNI/NISP for faunal remains, particularly in dealing with foraging cultures. Simplistic application of ethnoarchaeological categories can be a cost-effective way to "interpret" the archaeological record, leading to hasty assignment of archaeological materials to established, prescriptive categories. This is reminiscent of culture-historical taxonomics and forecloses the strength of ethnoarchaeological research, which lies in the formation of frames of reference prior to data analysis. However, ethnoarchaeology has an

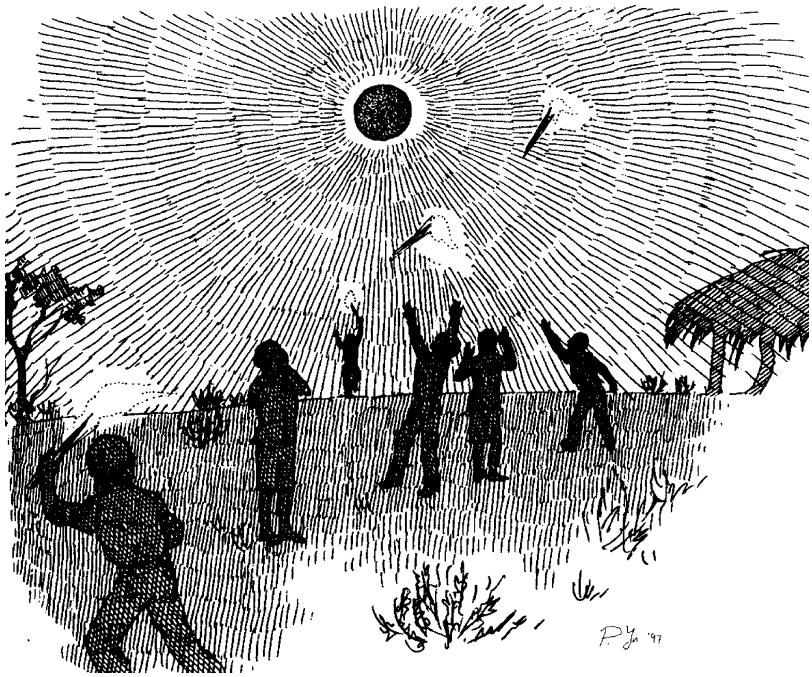

Ethnoarchaeology: Building Frames of Reference for Research, Fig. 3 Illustration of rituals associated with lunar eclipse, Doro Ana community of Pumé Indians, Venezuela, 1993. (Illus. by Pei-Lin Yu)

important role to play in public sector archaeology; data can contain information of immense value in hypothesis generation and testing for cultural resources-related research. In the past 20 years, descendant communities have become professionally involved with the practice and goals of public archaeology and are recruiting ethnoarchaeological information for the preservation, protection, and perpetuation of cultural heritage in both tangible and intangible realms.

Critiquing Methods of Ethnoarchaeology

The unpredictability of fieldwork is particularly high in ethnoarchaeology; a reasonable critique is the likelihood that unanticipated field conditions will compromise a research agenda. If ethnographic background data used to structure the research question are not adequate or field conditions (geopolitical, socioeconomic, environmental, climatic, etc.) are dramatically different from those anticipated, the researcher must be prepared to adjust data collection methods or even research questions, all while living under conditions that are challenging in and of themselves. For this reason, many ethnoarchaeological research programs build in a brief reconnaissance prior to the main body of fieldwork, to assess conditions and make adjustments. Failing to account for the influence of a researcher in the community and resulting compromise in the validity of observations constitutes another basis for methodological critique; the immediate local economy is altered by trade relationships or provision of goods or wages, and the status of the community relative to neighbors and the government will almost certainly change. Researchers bringing food or tools for themselves or the community, or providing medicines or trade goods, can have a huge influence on a small traditional community – sometimes leading to undesirable impacts. These considerations should be front and center when planning for ethnoarchaeological research.

Critiquing Ethics of Ethnoarchaeology

The ethical landscape affects how ethnoarchaeological research is structured, carried out, interpreted, applied, and referenced. More importantly, ethical decisions that a researcher must make on a daily basis can have a disproportionate effect on the economic, physical, emotional, and spiritual health of the community and its members. Many ethical issues echo those of ethnographic fieldwork: how should the researcher reimburse people for information? If yes, how?

For shouldering the burden of a naïve anthropologist living in their midst who often must be fed, protected, housed, and instructed? Is it appropriate to enter into wage relationships for services like laundry, housecleaning, and food? Should an ethnoarchaeologist interfere in situations like the perceived mistreatment of a child or a helpless person? What about reporting abuses or crimes perpetrated by neighbors, local military, or local governments? How should the ethnoarchaeologist best protect sacred or other sensitive information? What about personal involvement with a community member? Each situation will require careful, and sometimes very rapid, decision-making – and "one size does not fit all." One guarantee in ethnoarchaeological fieldwork is that the ethnoarchaeologist will be called upon to deal with ethical situations that she or he has not anticipated, which increases the value of a short reconnaissance before major fieldwork.

Critiques from within and without have strengthened and refined this uniquely productive and powerful research strategy and are worth careful consideration by practicing ethnoarchaeologists, students of ethnoarchaeology, and scholars who use ethnoarchaeological data collected by others. Taking steps to avoid, offset, or remedy theoretical, methodological, and ethical pitfalls involves background research, discussions with experienced field researchers, and excellent communication skills with communities in which researchers live and study.

International Perspectives

As the theoretical stage of ethnoarchaeological practice has broadened, so has its use by non-Western researchers from all over the globe. Some areas of emphasis are listed in Table 1 below, summarized from David and Kramer (2001) and a survey of recent journal articles in international ethnoarchaeology.

Ethnoarchaeology: Building Frames of Reference for Research, Table 1 A sampling of topics in non-Western ethnoarchaeological research

Research subject	Geographic area
Ceramic-making and its larger role in society	Philippines, Mexico
Settlement patterns as they relate to house construction, agricultural practices, ethnohistory, ethnogenesis, and community interactions	Africa, China, Palestine
Material expression of symbolic behavior, including animal sacrifice and mask design/construction	Africa
Metallurgy	India, Africa
Agropastoralism	India
Post-disaster recovery subsistence and exchange	Iran
Tropical mobility and technology, architecture and settlement	South America

Underrepresented in this listing are South America, North America, and Australia. Although robust ethnoarchaeological research has been carried out in these countries, researchers are usually of Western European or Euro-American origin. This situation likely reflects low numbers of archaeologists of non-European descent in nations with colonial pasts. However, the growth of legislation mandating cultural resources management-related archaeology is fostering the growth of Native American archaeology programs and students in North and South America. Increasing research partnerships between archaeologists and Australia's First Peoples are gradually integrating scientific and cultural heritage perspectives on the goals and techniques of research about ancient peoples.

Regardless of the ethnicity of the person collecting the information, there is considerable overlap in the value of ethnoarchaeological data to both scientific and traditional domains of knowledge. "Salvage ethnoarchaeology" can help document and perpetuate lifeways that are in danger of being overwhelmed by global culture and economies. This contributes to the stewardship of heritage both tangible and intangible. Ethnoarchaeology carried out "of the people, by the people, for the people" can provide data that are simultaneously

- Germane to archaeological inquiry
- Relevant to heritage resource managers, museums, and heritage tourism
- Essential to descendants striving to maintain and transfer traditional knowledge, skills, techniques, materials, and worldviews (also see Conte 2006)

Future Directions

Ethnoarchaeology is maturing as a research strategy. David and Kramer (2001) describe maturity as "progressive incorporation into the discipline from a variety of viewpoints within a broadly agreed philosophical framework, a range of lively approaches to diverse subject matter, and the appearance of second generation studies that group and synthesize individual case studies" (31). There is no doubt that ethnoarchaeological data will continue to inform and structure archaeological research far into the future; the value of these data grows daily as traditional knowledge becomes transformed by global culture and economy. When combined with expansion of the research enterprise to archaeologists from increasingly diverse cultural backgrounds, the scope, depth, and societal value of ethnoarchaeological research will continue to broaden (although the data collected may become less obviously generalizable, at least in the short run).

That said, the boundary between "scientific/theoretical" and "heritage" ethnoarchaeology is porous and mutually beneficial. Lewis Binford noted that members of the Nunamiut community felt his research was very important and directed children to watch elders as they demonstrated traditional hunting, butchering, and construction techniques for anthropologists. Children followed Binford and his crew around on their mapping trips (Binford, personal communication 2006). The author of this entry was recruited as a "teaching tool" by Pumé parents and grandparents during fieldwork in Venezuela, and educating the anthropologist in traditional skills and knowledge provided one more way for the Pumé to maintain continuity and integrity for the next generation (Yu 1997). Ethnoarchaeological data collected and used for research purposes have irreplaceable, and growing, value for other anthropologists and the traditional peoples of the world. The ethnoarchaeological data collected today certainly possess scientific and heritage value that may not be obvious today.

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Archaeology as Anthropology
- ▶ Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology: Learning from Potters in Gilund
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Indigenous Peoples, Working with and for
- ▶ Middle-Range Theory in Archaeology
- ▶ New Archaeology, Development of
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory

References

Binford, L.R. 1980. Willow smoke and dogs tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45: 4–20.

Binford, L.R. 1989. The 'new archaeology', then and now. In *Archaeological thought in America*, ed. C.-C. Lamberg-Karlovsky, 50–62. Cambridge: Cambridge University Press.

Conte, E. 2006. Ethnoarchaeology in Polynesia. In *Archaeology of Oceania: Australia and the Pacific Islands*, ed. I. Lilley, 240–258. Oxford: Blackwell Publishing.

David, N., and C. Kramer. 2001. *Ethnoarchaeology in action*. New York: Cambridge University Press.

David, N., J.A. Sterner, and K.B. Gavua. 1988. Why pots are decorated. *Current Anthropology* 29: 365–389.

Gifford-Gonzales, D. 2010. Ethnoarchaeology – Looking back, looking forward. *The SAA Archaeological Record* 10: 22–25.

Gould, R.A. 1980. *Living archaeology*. New York: Cambridge University Press.

Heider, K.G. 1961. Archaeological assumptions and ethnographic fact: A cautionary tale from New Guinea. *Southwestern Journal of Anthropology* 23: 52–64.

Hodder, I. 1982. *Symbols in action: Ethnoarchaeological studies of material culture*. Cambridge: Cambridge University Press.

Jones, S., ed. 2009. Ethnoarchaeology part I. *The SAA Archaeological Record* 9.

Kleindienst, M.S., and P.J. Watson. 1956. Action archaeology: The archaeological inventory of a living community. *Anthropology Tomorrow* 5: 75–78.

Liebermann, D.E., D.M. Bramble, D.A. Raichlen, and J.J. Shea. 2007. The evolution of endurance running and the tyranny of ethnography: A reply to Pickering and Bunn (2007). *Journal of Human Evolution* 53: 434–437.

O'Connell, J. F. 2011. Remembering Lew Binford. *Mitteilungen der Gesellschaft fürUrgeschichte*. Tübingen: University of Tübingen.

Steward, J.H. 1955. *Theory of culture change: The methodology of multilinear evolution*. Urbana: University of Illinois Press.
Taylor, W.W. 1948. *A study of archaeology*, American Anthropological Association Memoir 69. Washington, DC: American Anthropological Association.
Wobst, H.M. 1978. The archaeo-ethnology of hunter-gatherers or the tyranny of the ethnographic record in archaeology. *American Antiquity* 43: 303–309.
Yu, P. 1997. *Hungry lightning: Field notes of a woman anthropologist in Venezuela*. Albuquerque: University of New Mexico Press.

Further Reading

Belcher, W.R. 2009. Understanding ancient fishing and butchery strategies of the Indus Valley civilization. *The SAA Archaeological Record* 9: 10–14.
Binford, L.R. 2001. *Constructing frames of reference*. Berkeley: University of California Press.
Flores, C. 2009. Shell middens in a Pacific Island village: Barulu, Roviana Lagoon, Western Salomon Islands. *The SAA Archaeological Record* 9: 19–21.
Hudson, J. 2010. Ethnoarchaeology in personal context. *The SAA Archaeological Record* 10: 8–12.
Jones, S. 2009. Sailing at once in several seas: Digging and I-witnessing in Lau. *The SAA Archaeological Record* 9: 15–18.
Jones, S., ed. 2010. Ethnoarchaeology part II. *The SAA Archaeological Record* 10: 8–25.
Kelly, R.L. 1997. *The foraging spectrum*. Washington, DC: Smithsonian Institution.
Kus, S. 2010. Observing the past, participating in the present: Archaeologically informed ethnography. *The SAA Archaeological Record* 10: 13–16.
Millerstrom, S. 2009. Fishermen's shrines in the northern Marquesas islands, French Polynesia. *The SAA Archaeological Record* 9: 22–25.

Ethnoarchaeology: Learning from Potters in Gilund

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Introduction and Definition

Ethnoarchaeology is an ever-expanding sub-discipline within archaeology, and pottery undoubtedly gets more than its fair share of attention. But with recent social and economic trends, it can be seen that opportunities of undertaking certain kinds of ethnoarchaeological study are themselves diminishing. By an interesting coincidence, the village of Gilund in Rajasthan, NW India, was host to an important early third millennium BCE, Chalcolithic settlement of Ahar-Banas Complex (Sankalia et al. 1969; Shinde and Possehl 2005), and at the same time to some of the last indigenous potters still working in the twenty-first century CE. The modern village of Gilund is located approximately 1.5 km from the archaeological site of Gilund, northeast of the modern village. The potters are locally called *Kumhar*. According to the potters and their family members, use of earthenware or ceramic vessels is no longer profitable because of modernization and the popularity of stainless steel vessels. None of their children have taken up this tradition, which is therefore likely to disappear with the present generation of adults. These potters will be the last to practice, and in this respect ethnoarchaeology is itself under threat (Fig. 1).

Key Issues/Current Debates/Future Directions/Examples

All the potters in Gilund obtain clay from the same source, named Soniana, which lies approximately 8 km to the northwest of the village. On rare occasions, usually for emergency purposes when demand is higher than expected, the potters get clay from a location much closer to the village named *taknivali nadi*. In this case, the clay is transported to their homes by donkey which is owned by them. Pottery produced in Gilund is customarily ornamented with red and white pigment. The red pigment locally called *harmachh* and the white pigment locally called *Khadi* are brought from a market in Gangapur, which is approximately 25 km from Gilund. The potters purchase one year's worth of pigment at a time.

Potters in Gilund usually prepare their clay 2–3 h before they plan to make vessels. The raw clay is first pounded to reach to a finer consistency and then sometimes sieved in order to remove large impurities. Water is then added to the crushed clay and wedged until it has a sticky yet elastic consistency. Some potters add ash or dried donkey dung to their clay as tempering material.

Ethnoarchaeology: Learning from Potters in Gilund, Fig. 1 Women carrying both earthen ware vessels and steel vessels during a marriage ceremony in Gilund village (Sarkar 2011)

After a vessel is shaped on the wheel and dried to leather-hard condition, it is then carefully beaten to achieve the required shape by using a marble dabber – *pindi* in the local Mewari dialect – and the other implement used is a wooden tool called *thapa*, which looks like a table tennis bat.

After the vessel is made on the wheel and then beaten to its required shape, the outer surface is rolled in ash, locally called *bani*. Once dried in the sun, the vessel is then dipped into a liquid of dissolved red pigment. The most common surface treatment is painting. The pots are painted in both geometric and naturalistic designs. These include straight and wavy lines, dots, and leaf and peacock designs. Most of the surface treatment and design is done by women of the family, both old and young, using a paint brush of donkey tail hair. Pots are open fired in fields close to the potters' houses or in the workshops themselves. Generally, cow dung, wood, and twigs are used as fuels.

The modern pottery of Gilund village (Sarkar 2011a, b) can be classified into types used for storage, cooking and food processing, eating and drinking, ceremonial, and miscellaneous, following the typology designed by Dr. Malti Nagar at Parla (Nagar 1967). *Storage and cooking vessels* include the *matka*, a big globular pot with broad mouth, round belly, and base. It is used for fetching water and for liquid storage, particularly for water and butter milk. *Matki* is a smaller version of the matka with the same function. *Pauni* is a *tawa* (slightly concave disk-shaped griddle) for making *chapatti* (flat bread made of whole wheat flour). A *Kelaria* is similar to a *pauni* but comparatively deeper. *Kala handi* or *munho* is narrow-mouthed carinated cooking pot mostly used for making butter milk. They are burnished on the outer surface. *Chuklio* and *nani chuklio* are small globular pots used for drinking water or transferring water from larger pot.

Ceremonial vessels include *dhupania* which are incense stands used in worship and in rituals. *Karva* are small globular spouted pots used by married Hindu women during *Karvachaut* (a festival celebrated by Hindu married women where they keep fast that ensures the well-being, prosperity, and longevity of their husbands). *Dela* is similar to *karva* without the spout and is used by the Hindus to proffer offerings in death rituals. A similar vessel is used by Muslims in the village to drink water. *Bijora*, *dhakno*, *dhakni*, and *dhankan* take the form of small goblets with narrow mouths and pointed bases. *Miscellaneous vessels* include the *gurga* – a stand. A handi-like vessel is made first; it is then separated along the line of carination. The upper part is used as stand for seating cooking vessels over chulhas, and the

lower portion is used as tawa. A *galla* is a coin box, for collecting money. *Deepak* are lamps.

The prehistoric Chalcolithic people at Gilund seem to have used narrow-mouthed and wide-mouthed globular jars in coarse red ware and thick red slipped ware which are very similar to modern *matka* and *matki*. Similarly, the carinated wide-mouthed cooking vessels in gray ware recall present-day *handi* produced in Gilund Village (Fig. 2).

Another remarkable resemblance is found between the present-day *dhupania*, which are incense stands used in worship, with dishes-on-stands and bowls-on-stands retrieved from Ahar-Banas Complex sites (Sankalia et al. 1969) (Fig. 3).

Further striking similarity may be noted between a vessel from the Ahar excavation described as "crucible-like with slightly sloping sides, bulbous at the belly, rimless" to that of the vessel in which *lassi* (butter milk) is sold on trains in Rajasthan. There is even similarity in the painted decorations. Present-day potters in Gilund village use painted motifs such as groups of straight or wavy lines, dots, and hatched diamonds, which parallel Chalcolithic buff ware and BRW's groups of straight or wavy lines, spirals, dots, hatched diamonds, concentric circles, and chevrons filled with dots and circles (Sankalia et al. 1969: 88–98) (Fig. 4).

Thus, ethnographic data gathered from the present village potters of Gilund has been able to

Ethnoarchaeology: Learning from Potters in Gilund, Fig. 2 (*Left*) Chalcolithic, narrow-mouthed, globular pot in thick red slipped ware from Gilund; (*right*) modern day matka (Sarkar 2011)

Ethnoarchaeology: Learning from Potters in Gilund, Fig. 3 (*Left*) Modern day dhupania manufactured in Gilund village; (*right*) Chalcolithic bowl-on-stand reported from Ahar (courtesy of Deccan College) (Sarkar 2011)

Ethnoarchaeology: Learning from Potters in Gilund, Fig. 4 (*Left*) Example of Chalcolithic painting on buff ware reported from Ahar; (*right*) similar painting executed on present-day pots in Gilund (Sarkar 2011)

throw some light on the Chalcolithic pottery of Ahar-Banas Complex including likely methods of manufacture and the possible functions of certain ancient vessel forms. This shows that ethnographic data helps us in providing insights into the technology and behavior of prehistoric people.

Cross-References

- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology: Building Frames of Reference for Research

References

Nagar, M. 1967. *The Ahar culture: An archaeological and ethnographic study*. Unpublished PhD dissertation, Poona University.

Sankalia, H.D., S.B. Deo, and Z.D. Ansari. 1969. *Excavation at Ahar (Tambavati)*. Pune: Deccan College.

Sarkar, A. 2011a. Chalcolithic and modern potting at Gilund, Rajasthan: A cautionary tale. *Antiquity* 85: 994–1007.

Sarkar, A. 2011b. *A study of cultural development from early to mature Chaleotithic in Mewar region of Rajasthan*. Unpublished dissertation, Deccan College, Pune, India.

Shinde, V., and G.L. Possehl. 2005. A report on the excavations at Gilund. In *South Asian archaeology, 2001: Proceedings of the 16th International Conference of the European Association of South Asian Archaeologists held in College de France, Paris, 2–6 July 2001*, ed. C. Jarrige and V. Lefèvre, 292–302. Paris: Recherche sur les Civilisations.

Further Reading

Kramer, C. 1997. *Pottery in Rajasthan: Ethnoarchaeology in two Indian cities*. Washington, DC: Smithsonian Institution Press.

Mishra, V.N. 2007. *Rajasthan: Prehistoric and early historic foundations*. New Delhi: Aryan Books International.

Mishra, A. 2008. *Beyond pots and pans: A study of Chalcolithic Balathal*. New Delhi: IGRMS & Aryan Books International.

Saraswati, B., and N.K. Behura. 1966. *Pottery techniques in peasant India*. Anthropological Survey of India Memoir 13. Calcutta: Anthropological Survey of India.

Shinde, V. 2002. The emergence, development and spread of agricultural communities in South Asia. In *The origins of pottery and agriculture*, ed. Y. Yasuda, 89–115. New Delhi: Roli Books.

Ethnomuseology

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"Ethnomuseology" is a relatively new term that refers to the emerging knowledge and use of culturally-appropriate forms of curation and conservation of objects and archival materials that

incorporate traditional care methods and protocols associated with their cultural, religious, or spiritual significance. It is informed by the knowledge systems, world views, religious beliefs, or spiritual values of the source communities, the people who are the users of cultural materials, descendants of the original users, or religious adherents or devotees. These objects and archival materials may be held in secular mainstream or public museums, in museums or cultural centers operated by Indigenous, ethnic, or religious communities, or traditional storage facilities such as Australia Aboriginal Keeping Places.

There are few references to the term "ethnomuseology" in museological literature prior to 2000. Early uses of the term ethnomuseology in the 1980s and early 1990s referred in general terms to the curation and conservation of ethnographic materials – those materials that were considered to be from "non-Western," "foreign," or "other" cultures, as opposed to the material culture of dominant, European cultures which was classified by subdisciplines such as local or social history, art, archaeology, and so on. Despite the application of the term ethnomuseology to this specific area of museum collections, there was little to differentiate the curation and display of ethnographic material from any other types of museological practice, other than an emphasis upon the conservation of organic materials, from which many ethnographic objects are made.

During the twentieth century, evolving anthropological studies in contemporary societies across the world led to the emergence of culturally diverse forms of many disciplines, such as ethnobotany, ethnoastronomy, ethnomusicology, ethnomathematics, and ethnoarchaeology. The use of the prefix "ethno," from the Greek word "ethnos" meaning "people," indicates culturally diverse aspects of a discipline. The development of these subdisciplines emphasizes the shift toward more inclusive practices that incorporate emic perspectives rather than relying primarily upon the etic, and which have resulted from decolonization and diversification of academic research methods, increasing collaboration between researchers and communities and an increase in the number of Indigenous people entering disciplines such as archaeology, anthropology, history, and museology.

Recognizing the intangible and spiritual dimensions of objects, and the importance of the cultural values and beliefs that accord them meaning within source communities, has been changing heritage management, museum curation, and conservation practices over the past 40 years. Contemporary use of the term ethnomuseology moves from the etic approach of curating ethnographic collections within a Western frame of knowledge to an emic approach which perceives museological praxis as situated knowledge informed by, and culturally-appropriate to, the values, meanings, and protocols attached to cultural materials by the communities from which objects originate. It is based on recognition that knowledge is a social construction and that the values, meanings, and methods of care of cultural heritage are diverse. Even though a concept develops as a global phenomenon, it is adapted, reinterpreted, and manifest in local forms according to the system of knowledge in any particular cultural setting.

In practical terms, ethnomuseology refers to the inclusion of emic perspectives in the management, conservation, and curation of cultural heritage and museum collections and is often most relevant to objects and practices that have religious, spiritual, sacred, or ceremonial significance. It reflects the intangible aspects of heritage that illuminate the meaning of objects and provide context by highlighting their relationship to people and other, intangible aspects of culture. It is an approach that recognizes the authority of traditional owners, their knowledge systems, and religious perspectives and affords artifact care and respect according to traditional protocols that reflect historical and contemporary cultural associations, religious expression, and concepts of the sacred. It is part of the new museology which has seen changes in many aspects of museum work.

Approaches to care and conservation of objects in museums have shifted from the purely physical aspects to concern for also understanding and responding to intangible dimensions and the concerns of traditional custodians. Museum curators and conservators are now more likely to involve

members of source communities or faith groups in establishing and applying protocols and traditional methods required for the culturally-appropriate care of objects, especially those of religious, sacred, or ceremonial significance. In some institutions and some countries, shared custodianship is now accepted. The museum conservator's work has developed to be much more than purely scientific and technical; it is also concerned with using methods that preserve the integrity of religious or spiritual dimensions and help to maintain links between the cultural materials, the communities from which they originate, and the associated cultural expressions and activities.

Definition

Ethnomuseology involves the application of culturally-appropriate and culturally-sensitive methods of collection management, curation, and conservation that draw upon customary methods used within a particular cultural or religious setting or faith and apply these to objects in museums, cultural centers, and other collecting institutions devoted to preserving cultural heritage materials and, in the case of museums, to display and interpretation. It may be applied in museums by curators and conservators working in consultation with representatives of a specific cultural or religious group and is also practiced by community members who are adopting museum-based collection management methods to care for cultural heritage in community settings (Simpson 2002; Clavir 2003; Kreps 2003; Pepper Henry 2004; Clavir and Moses 2015).

Conventional museum conservation has been based upon standardized methods related to the materiality of objects and informed by Western scientific principles and methods. Ethnomuseology is a context-specific approach that draws upon community-based conceptions of cultural heritage management, care, and preservation, by applying customary methods and protocols of handling, access, and care. These are determined primarily by the intangible dimensions of objects – the values, beliefs, functions, meanings, significance, relationships, authority and power that the objects hold for traditional owners, and the protocols that are associated with objects. In many cases, the protocols are associated with sacred, ceremonial, or religious artifacts, or objects that are considered to have innate power or to be animate beings, and the culturally determined forms of care may be considered to be providing spiritual care (Haakanson and Steffian 2004; Schorch and Hakiwai 2014).

As culturally determined methods, they vary according to the beliefs, customs, and practices of the specific source community, traditional owners, and religious community from which the object originates. This avoids the application of rigid Eurocentric disciplinary practices and allows for flexible approaches to curation and conservation practices that balance conventional scientific methods with those that reflect the cultural and spiritual values of local communities.

Historical Background

Ethnomuseological practices began to evolve in the 1980s and 1990s, reflecting changing attitudes toward heritage and culture. Decolonization, cultural diversity and inclusivity, the role of heritage in maintaining a sense of identity, and the need for the protection of cultural heritage in all its forms became key issues in the forum of the United Nations and the subject of many international academic and professional organizations and conferences. This followed over a decade of increasing protests by Indigenous peoples and minority groups on many issues relating to civil and human rights; part of the broader civil rights movement in western nations, particularly the USA and Australia; and the global movement toward the dismantling of the legacies of colonialism and imperialism.

The concerns of Indigenous peoples are related to a wide range of issues including land rights, exploitation of natural resources, self-determination, religious freedom, and intellectual property rights. In regard to cultural heritage management, their concerns related to the activities of archaeologists and anthropologists – in particular the excavation of burial sites and the collection of

human remains and sacred objects for research purposes – and to practices of museums which displayed items inappropriately interpreted Indigenous cultures and historical events from the perspective of Western historians and curators and claimed legal ownership of materials removed from source communities, including items that are required for religious practices.

In the USA, archaeological sites became a focus for protests by Indigenous peoples who highlighted the differing treatment that was accorded to the burial sites and remains of Indigenous peoples in comparison with those of Western people. They called for greater respect of their religious and spiritual beliefs and values and respectful treatment of ancestral remains. Members of the American Indian Movement, the International Indian Treaty Council, and the Native American Rights Fund began actively opposing archaeological practices, demonstrating against the excavation of Indian burial sites, research on human remains, and the public display of human remains in museum exhibitions and in archaeological heritage sites.

There were complaints from source communities concerning the loss of cultural heritage and its holding in museums, emphasizing ongoing links between people and their cultural heritage and the effects of its removal from source communities. Objects were often in collections far from source communities and therefore largely inaccessible, and in many instances their presence in collections was unknown to source communities. They challenged the authority of western historians and museum curators to control the interpretation of their histories and cultures and criticized the inappropriate handling and display of culturally-sensitive materials such as sacred, ceremonial, or restricted objects and information and the practices of museum conservators and curators which were based upon Western scientific principles that preserved the materiality but failed to recognize religious and cultural significance and spiritual dimensions. As communities gained knowledge of the extent and location of museum holdings, some requested the repatriation of materials. Responses from museums were usually to refuse such requests, with arguments based on claims that objects had been legally acquired and were therefore owned by the museum.

Changing perceptions of cultural heritage and the rights of source communities were becoming a focus for meetings that brought together participants from across the world, highlighting the importance of cultural diversity and new approaches to heritage protection as global concerns. Dialogue among Indigenous peoples at an international level led to the production of statements asserting cultural identity and calling for recognition of Indigenous rights, including the *Kari-Oca Declaration* (1992), *The Indigenous Peoples' Earth Charter* (1992), and the *Mataatua Declaration on Cultural and Intellectual Property Rights of Indigenous Peoples* (1993). These – and other statements by Indigenous peoples – emphasized the need for the protection of and access to traditional lands and sacred sites, reflecting the links between peoples, place, culture, and identity. The intangible and spiritual aspects of heritage were common themes in these statements, increasingly being framed within discourse concerning religious freedom, intellectual property rights, and other human rights issues.

The Mataatua Declaration on Cultural and Intellectual Property Rights of Indigenous Peoples is one of the most significant Indigenous Statements concerning cultural property rights. The Declaration asserts that "Indigenous Peoples of the world have the right to self determination, and in exercising that right must be recognized as the exclusive owners of their cultural and intellectual property." It arose out of discussions among delegates at the First International Conference on Cultural and Intellectual Property Rights of Indigenous Peoples held in Whakatane, Aotearoa, New Zealand, in June 1993. The Declaration called for states and national and international agencies to develop policies and practices that "Recognise that indigenous peoples are the guardians of their customary knowledge and have the right to protect and control dissemination of that knowledge."

The issues concerning intangible heritage and spiritual aspects of culture are part of a broader discourse concerning Indigenous cultural and intellectual property rights and the roles played

by archaeologist, anthropologists, and museum anthropologists in acquiring cultural materials and controlling their interpretation. A number of references were made to cultural property and museums in the 1993 Mataatua Declaration on Cultural and Intellectual Property Rights of Indigenous Peoples. It emphasized the inadequacies of existing mechanisms for protecting the Intellectual and Cultural Property Rights of Indigenous Peoples; established the actions and protocols that are expected of museums holding collections of Indigenous human remains, funerary items, and cultural objects; and proposed that such materials held in museums should be offered back to their traditional owners.

Indigenous peoples became active participants in international dialogue through the actions and programs of international organizations such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Council on Monuments and Sites (ICOMOS), and the World Archaeological Congress (WAC). Their involvement reinforced the need for archaeologists, museum anthropologists, conservators, and others involved in cultural heritage management to recognize Indigenous rights and employ respectful practices, a process that can be seen as decolonization of archaeology and the museum and which required some significant changes in western concepts of heritage.

The conflict over archaeological sites, human remains, and cultural property induced re-examination of the roles and changing relationships between anthropologist, archaeologists, museum anthropologists, and Indigenous peoples. The World Archaeological Congress (WAC) held an Inter-Congress at Vermillion, North Dakota, in 1989 to debate the issues of "Archaeological Ethics and the Treatment of the Dead." It brought together individuals and groups with a diverse and opposing range of views about the importance of scientific research and the cultural, religious, and spiritual rights of Indigenous peoples and included a significant number of Indigenous participants. While it highlighted the extent of divided opinions, even among archaeologists and other scientists, it resulted in the adoption of the Vermillion Accord on Human Remains, by WAC in 1990. This landmark agreement called for respectful treatment of the dead and for the wishes of the dead concerning disposition. In 2006, the Tamaki Makau-rau Accord was adopted by the World Archaeological Congress and extended similar principles to display of human remains and sacred objects, establishing the requirement for members to consult with and seek permission from associated communities before displaying such materials in any form.

Intangible Heritage and Spiritual Values

Definitions of heritage have undergone significant changes over the past 40 years, particularly in terms of understanding the diversity of values and concepts attached to both cultural and natural heritage, the importance of intangible heritage and its role in giving meaning to objects and places, and the relevance of cultural heritage – in all its forms – to contemporary cultures. In particular, recognition of the importance of intangible heritage and the diverse manifestation and expressions of culture that are attached to objects have highlighted the importance of relating heritage management to people, understanding the complex histories and relationships associated with heritage, and recognizing the cultural and spiritual rights of communities to have define and control their cultural heritage.

Cultural values and the importance of intangible dimensions of heritage have become key aspects of the discourse surrounding heritage, its importance to communities, and the need for measures to protect it in all its forms (Alivizatou 2012). This is reflected in various international agreements and programs related to heritage and cultural diversity. These include revisions to the 1972 Convention on World Cultural and Natural Heritage to include cultural landscapes; the Australian ICOMOS Charter for the Conservation of Places of Cultural Significance (known as the Burra Charter) in 1979, with revisions in 1999; the Mexico City Declaration on Cultural Policies in 1982; the UNESCO Recommendation on the Safeguarding of Traditional Culture and Folklore in 1989; the UNESCO Programme of the

Proclamation of Masterpieces of the Oral and Intangible Heritage of Humanity (1998); the Vermillion Accord in 1990; the Nara Declaration on Authenticity in 1994; the Tokyo Declaration on Cultural Diversity and Heritage in 2000, the UNESCO Universal Declaration on Cultural Diversity (2001), the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (2003), the UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions (2005), the Faro Convention on the Value of Cultural Heritage for Society (2005), and the United Nations Declaration on the Rights of Indigenous Peoples (2007).

The UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (UNESCO 2003) emphasized the dynamic nature of intangible heritage and its importance for cultural continuity and diversity, referring to it as "living cultural heritage." The Convention sets out objectives relating to the documentation, preservation, and protection of intangible heritage with the participation of source communities, while "respecting customary practices governing access to specific aspects of such heritage" (Article 13 (d) (ii)). State parties are required "to ensure the widest possible participation of communities, groups, and where appropriate individuals that create, maintain and transmit such heritage and to involve them actively in its management" (Article 15).

These principles were central concepts in the drafting of the United Nations Declaration on the Rights of Indigenous People (UNDRIP), which was adopted by the UN General Assembly in September 2007 (United Nations 2007). The Declaration states that:

> Indigenous peoples have the right to practise and revitalize their cultural traditions and customs . . . to maintain, protect and develop the past, present and future manifestations of their cultures, such as archaeological and historical sites, artefacts, designs, ceremonies, technologies and visual and performing arts and literature. 2. States shall provide redress through effective mechanisms, which may include restitution, developed in conjunction with indigenous peoples, with respect to their cultural, intellectual, religious and spiritual property taken without their free, prior and informed consent or in violation of their laws, traditions and customs. (Article 11)

> Indigenous peoples have the right to manifest, practise, develop and teach their spiritual and religious traditions, customs and ceremonies; the right to maintain, protect, and have access in privacy to their religious and cultural sites; the right to the use and control of their ceremonial objects; and the right to the repatriation of their human remains. (Article 12)

In the UN Declaration on the Rights of Indigenous Peoples and other statements, the United Nations Permanent Forum on Indigenous Issues and the UN Human Rights Council have continued to exhort states and museums to develop mechanisms to facilitate access to and repatriation of ceremonial objects and human remains at national and international levels and recommended that governments should provide funding for these purposes.

Indigenous people continue to seek ways in which they can fully participate in the management and protection of their heritage, tangible and intangible, through various means. The emphasis upon intangible heritage and the importance of cultural heritage to living peoples has become an important component of international discourse concerning heritage research and management.

Museums and intangible heritage was the theme for the International Council of Museums' (ICOM) annual meeting held in Seoul in 2004, providing an opportunity for museum staff from across the world to discuss ways in which museums might face these new challenges. In the past, those involved in archaeology, museums, and other areas of heritage management were primarily concerned with the tangible aspects of culture, the physical evidence associated with artifacts, artwork, buildings, and monuments. The growing emphasis on intangible aspects of culture challenged the existing notions of heritage shifting the emphasis from past cultures to consideration of contemporary peoples and living cultures and from a focus on the materiality of tangible heritage to growing interest in the associated values, beliefs, and cultural expressions. For collecting institutions this presents significant changes, requiring new ways of perceiving the role of the museum and the methods of its practice, which present both challenges and opportunities for understanding Western cultures as well as non-Western (Alivizatou 2012).

The emergence of the concept of spiritual heritage also presents a challenge for museums, which have traditionally been secular spaces. Yet, in many ways it is the spiritual dimensions of heritage that are most significant in the development of ethnomuseology, both in terms of recognition of the significance of the spiritual significance and also in relation to the methods required to address spiritual heritage needs in the museum. Spirituality is an important part of the process of decolonization and Indigenous self-determination. As Māori academic Linda Tuhiwai Smith emphasizes:

> The values, attitudes, concepts and language embedded in beliefs about spirituality represent, in many cases, the clearest contrast and mark of difference between indigenous peoples and the West. It is one of the few parts of ourselves which the West cannot decipher, cannot understand and cannot control. (Smith 2000: 74)

Museum Policy Developments

Although these developments were part of a worldwide movement by peoples asserting their cultural identity, heritage claims, and intellectual property rights, Māori, Indigenous Australian, Native American, and First Nations peoples were among the most vocal in criticizing Western science, research, and museum practices. Consequently it is in the settler societies of New Zealand, Australia, Canada, and the USA that the most significant signs of change in heritage research and management policies have taken place at a national level. Significant legislation or policies relating to Indigenous peoples and their cultural heritage in museums were introduced in each of these countries in the early 1990s, although it should be noted that some museums were already working closely with Indigenous peoples and implementing innovative programs prior to that. While the legislation and policies are based upon recognition of cultural heritage rights and the intangible dimensions of culture that provide the context and meaning for objects, none of these countries are states parties to the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage.

In the USA, two pieces of legislation had significant and far-reaching effects on museums holding collections of Native American materials. The National Museum of the American Indian Act (1989) established a new National Museum of the American Indian (NMAI) comprising the former Museum of the American Indian, Heye Foundation in New York (now the George Gustav Heye Center), the new museum on the Mall in Washington, D.C., and a Cultural Resources Centre for the collections. The Act also established responsibilities for the NMAI to address issues concerning ownership and repatriation of ancestral remains, funerary items, and sacred objects originating from Native American and Native Hawaiian communities, and the 1990 Native American Graves Protection and Repatriation Act (NAGPRA) applied the same requirements to all other federally funded museums in the USA. Museums were to generate inventories, inform tribes of holdings, and respond to any repatriation request by considering the rights of claimants, a process requiring museums to consult with source communities. This dialogue has enhanced understanding within the museum sector of the customary laws associated with sacred and ceremonial objects and highlighted the diversity of traditional care methods applied by different tribes to objects that might seem similar.

The building of the National Museum of the American Indian (NMAI) in Washington, D.C., created various mechanisms for engagement between the Museum and Native American communities in fulfillment of its mission of enhancing the development, maintenance, and perpetuation of Native culture and community. It also provides some of the most extensive and well-documented examples of ethnomuseology in practice. In addition to collaborative research and exhibition development, the vast collections of cultural materials are held in the Cultural Resources Centre (CRC) in Suitland, Maryland, where they are stored, managed, catalogued, and conserved. As part of the architectural planning of the CRC, consultants were hired to assess the space and storage needs that would be required to ensure that traditional care methods could be accommodated in the facility. While recognized that far more extensive

consultation would be required, the report identified three significant areas that needed to be addressed: that objects are alive and must be handled with respect; taboos and restrictions, including those based on gender, must be respected; and respectful treatment may require specific positioning (Cited in Rosoff 2003: 77–78).

After the CRC opened, information about customary care often resulted from discussions with Native delegations visiting the CRC on matters related to repatriation. Many of these relate to the religious and spiritual beliefs associated with sacred and ceremonial objects and illuminate the relationship between the objects and the related forms of intangible heritage, such as dances and rituals. Every tribe has different requirements, and extensive consultation with diverse tribal groups is required – it is a long-term and ongoing process. Native American staff members, frustrated with the slow progress of gathering information, formed an informal Traditional Care Committee in 1995 (Rosoff 2003: 78). Over time, tribal consultations resulted in the compilation of a large body of information regarding the values and protocols attached to objects and the preferred methods of traditional care. The extent and diversity of the information required the development of a database to ensure that the 300+ staff members involved in collection management had access to the information. The database provides layered levels of access, further reflecting Indigenous requirements for knowledge management and the protection of aspects that are restricted (Pepper Henry 2004).

The outcomes of NAGPRA have been profound in terms of its impact across the museum sector. The research and consultation required by museums to fulfill the requirements of NAGPRA has illustrated the intertwined histories of objects and the multiple meanings that they hold and how the concerns of museums and Indigenous people can be merged in heritage management practices informed by cultural values and traditions. The NAGPRA claims process has provided many examples that demonstrate the significance that sacred and ceremonial objects can have for contemporary peoples and the important role that access to or repatriation of such items can play in cultural revitalization.

Nearly three decades later, attention to intangible dimensions of cultural heritage and consultation with traditional owners are recognized necessities for museum conservation to ensuring that the integrity of museum objects is preserved (Clavir 2003). The changes are clearly evident in some institutional policies such as the *Guidelines for the Spiritual Care of Objects* at the Alutiiq ***Museum*** and Archaeological Repository in Kodiak, Alaska. Spiritual care is central to the museum's role as "a modern-day steward of ancestral objects." According to Alutiiq belief, "everything in the universe [. . .] has a *sua*, human-like consciousness, and therefore requires special care." This is achieved "by combining the best Western conservation techniques (for physical stability) with practices that reflect Alutiiq values (for spiritual care). . . . When treated appropriately, Alutiiq artifacts cease to be historical curiosities. . . .Culturally-appropriate care reunites the objects with their cultural context, honors their *sua*, and gives the objects life . . . by honoring the cultural perceptions that existed when artifacts were made, we maintain their integrity in the modern world" (Haakanson and Steffian 2004: 1).

In contrast to the legislative direction taken in the USA, the rights of Indigenous people in relation to museum collections in Australia and Canada are promoted by policies developed by the peak museum organizations, which provide guidelines for museums but are not enforceable by law. In 1989, the Canadian Museums Association established a Task Force on Museums and First Peoples which undertook extensive consultation within the museum sector and with First Nations communities, resulting in a report "*Turning the Page: Forging New Partnerships between Museums and First Peoples*" (Hill and Nicks 1992). It emphasized the need for museums to recognize the cultural heritage rights of Canada's First Nations peoples and develop processes for involving them in management and interpretation. A broad-ranging report of the Royal Commission on Aboriginal Peoples also addressed cultural heritage issues and reinforced the importance of cultural heritage to maintaining the unique identities of Aboriginal peoples and contributing to cultural continuity. Museums were again urged to collaborate with Aboriginal communities.

Cultural property issues have been included in Treaty negotiations, in some cases resulting in repatriation. The enactment of the First Nations Sacred Ceremonial Objects Repatriation Act by the Government of Alberta related specifically to Blackfoot sacred objects in the collections of the Provincial Museum of Alberta and the Glenbow-Alberta Institute in Calgary (aka Glenbow Museum). The bundles are sacred objects that are intrinsic to traditional knowledge transfer and are cared and used in the community context according to strict protocols. For some years prior to this legislation, both museums had been lending medicine bundles to bundle keepers for use in ceremonies (Conaty 2008). The legislation provided a mechanism for the repatriation of sacred objects, if they are essential to the practice of ceremonies, and paved the way for their permanent return to the Blackfoot.

In Australia, some major museums, such as the South Australian Museum, the Australian Museum, and the National Museum of Australia, began undertaking consultations with Indigenous communities in relation to Aboriginal Australian ancestral remains and sacred and ceremonial objects as early as the 1980s. Over the next few years, they developed policies that are specifically related to these collections and included removing ancestral remains from display, undertaking research into collections to identify descendant communities and the traditional custodians of sacred objects, engaging in discussions with the appropriate community members concerning future care or repatriation, applying traditional care methods, and restricting storage facilities in the museums (e.g., see Sullivan and Edwards 2004: 185–206; Kaus 2008).

These early initiatives were initially driven by a small number of museum anthropologists and Indigenous staff who were committed to changing the relationship between museums and Indigenous people. The UNESCO Regional Seminar on the Role of Museums in Preserving Indigenous Cultures, held in Adelaide in 1978, was a significant event which provided a venue for museum anthropologists and Indigenous Australians to meet and present their views on museums and Indigenous collections. This was followed in 1979 by the inaugural meeting of the Conference of Museum Anthropologists. It attracted museum anthropologists and community representatives from across Australia, as well as New Zealand, Papua New Guinea, and New Caledonia (Stanton 2011).

In 1993, *Previous Possessions, New Obligations*, a national policy to guide museums in developing their relationships with Indigenous Australians, was launched by the Council of Australian Museums Associations. It was adopted in the same year as a key policy of the newly formed national body, Museums National Inc. (now Museums and Galleries Australia), and then revised as Continuing Cultures, Ongoing Responsibilities in 2005, following a review and consultation process (Sullivan et al. 2003; Museums Australia 2005). The guidelines recognize the moral rights and customary laws of Aboriginal and Torres Strait Islanders (ATSI) with respect to their cultural heritage and provide direction for all Australian museums that hold collections of ATSI cultural materials, encouraging the establishment of institutional policies and procedures to better address the cultural heritage rights of Indigenous Australians.

Evaluation of the implementation of *Previous Possessions, New Obligations* (PPNO) found that the guidelines had been effective in museums in a number of aspects, particularly in recognition of the primary rights of Indigenous people to control their cultural material in museum collections and encouraging collaborations. It noted that implementation was primarily in major museums, however, rather than in the many small museums in regional and remote areas, that are often volunteer-run (Sullivan et al. 2003). The review identified areas that still needed particular attention, in particular to ensure that more Indigenous people were employed in museums and served on boards, and that protocols relating to Indigenous Australian cultural materials were extended to include collection management in libraries and archives and were also applied to digitized collections and documentation.

In parallel with the activities of individual museums and the development of national professional guidelines by Museums Australia, the Cultural Ministers Council introduced and funded the Return of Cultural Property Program (1993–1997).

This developed into the ongoing Return of Indigenous Cultural Property (RICP) Program, introduced in 1999–2000. The program applies only to Aboriginal and Torres Strait Islander ancestral remains, secret sacred objects, and associated materials in the collections of the National Museum of Australia and the state and territory museums (eight museums in total). The Program provides funding for museums and communities with the aims of identifying the origins of all ancestral remains and the rightful custodian(s) of secret/sacred objects, according to Aboriginal and Torres Strait Islander law. The RICP National Principles reiterate those of Continuing Cultures, Ongoing Responsibilities and stipulate that "ancestral remains and secret sacred objects will be returned unconditionally" if requested by the source community (Cultural Ministers Council).

If communities prefer that museums retain the objects, ownership is transferred to the community custodians while the objects remain in the museum, sometimes in a separate area called a Keeping Place (Simpson 2007). According to the RICP Principles:

> Storage and access to secret sacred collections shall be informed by Aboriginal and Torres Strait Islander law. Men's sacred objects must be separated from women's sacred objects, with neither to be accessible to the public . . . Access to secret sacred collections shall be limited to the traditional custodian/s, their representatives and designated officers with the appropriate authority. (Cultural Ministers Council n.d.)

The principles also state that "it is important that museums offer communities support for the care of returned material. This is particularly relevant to secret sacred objects." This includes offering advice or providing training "in areas such as conservation, preservation and collections management wherever possible." Materials repatriated to traditional owners are often housed in community storehouses, Keeping Places, and cultural centers where sacred and ceremonial objects and other culturally-sensitive objects and archives can be preserved, protected, and used, in ways that draw upon a combination of customary care and Western conservation (Simpson 2007; Wallace and Akerman 2008; Stanton 2011).

Until the 1980s, cultural material in museums in New Zealand had been controlled and interpreted by curators with little involvement of Māori, and museums had been "largely mono-cultural and unwelcoming to Māori" (Hakiwai in Schorch and Hakiwai 2014: 194). Now the enduring relationship of Māori people to *taonga* (cultural treasures) is recognized and forms the basis for shared custodianship in museums. Māori cultural values, knowledge, and *tikanga* (customs) are applied in decision-making concerning the treatment and care of *taonga*, and Māori are actively engaged with museums in various capacities, including hiring of staff and collaborative strategies for local iwi to be involved as custodians and interpreters (Clavir 2003, McCarthy 2011; Tapsell 2012; Schorch and Hakiwai 2014).

Changes in relationships between museums and Māori have been attributed to the political climate in New Zealand in the 1980s and *Te Māori,* a major exhibition of Māori cultural material that toured the USA and New Zealand from 1984 to 1987. It was described by Arapata Hakiwai, a Māori scholar and museum specialist, as "the result of a groundbreaking collaboration and co-operation between museums, government agencies, sponsors and Māori people." In Hakiwai's view, one of *Te Māori's* legacies was the acknowledgement and recognition of cultural ownership:

> *Te Māori* was transformational and it awoke the spirit of our ancestors on distant shores and stirred the imagination and minds of those working in museums. Its influence and legacy has been profound. It changed the lives of people and museums, it involved our people in ways never before undertaken, and it said to the world here are our taonga and we are its people. The world saw the magnificence of our art traditions and the presence of our people and our rituals and *tikanga* (customs). People saw that there was a *living* relationship between the *taonga* and their descendant kin communities. (Hakiwai in Schorch and Hakiwai 2014: 196.

When the National Museum of New Zealand Te Papa Tongarewa (Te Papa) was created by an act of parliament in 1992, biculturalism was conceived as the basis for its governance, management structure, and operation and the inclusion of an active marae within the museum, *Te Marae o Te Papa Tongarewa*. The concept of Mana Taonga

was a central principle in planning Te Papa. It recognizes Māori people's "spiritual and cultural ownership rights conferred through the *whakapapa* in respect of the traditions and histories that taonga represent, as well as the *whakapapa* of the creator of the *taonga"* (Cited in Schorch and Hakiwai 2014: 205). Hakiwai describes it as "a dialogue between Indigenous Māori practice and Western theory leading to a refined understanding of performative democracy within a museum as forum, or public sphere" . . ."In a practical sense Mana *taonga* provides iwi and communities with the right to define how *taonga* within Te Papa should be cared for and managed in accordance with their *tikanga* or custom" (Hakiwai in Schorch and Hakiwai 2014).

Although initially perceived as a successful model, the effectiveness of biculturalism Te Papa has been questioned by some observers including academic Paul Williams, whose critique of the bicultural practices of Te Papa identified problematic aspects in the interpretation strategies and in compromises made in relation to the protocols normally applied to a marae and meeting house (Williams 2005).

Museum Conservation

Since the 1980s, there has been growing interest among individuals and professional organizations in the subject of customary care methods and their application within museums. This is reflected in the number of specialist professional meetings and conferences that have specifically examined the care of religious, sacred, and ceremonial objects. Papers focusing upon the subject were presented at annual conferences of national and regional museum and conservation organizations and published special issues of journals such as the Journal of the American Institute for Conservation (JAIC) and the Western Association for Art Conservation Newsletter and in conference proceedings.

The Canadian Conservation Institute held a symposium in 1986 examining the care and preservation of ethnological materials (Barclay et al. 1988). The Plains Indian Museum's Ninth Annual Plains Indian Seminar, in the USA, examined The Concept of Sacred Materials and Their Place in the World (Horse Capture 1989). In 1991, the 19th Annual Meeting of the American Institute for Conservation considered the topic of Conservation of Sacred Objects and published several papers in an issue of the journal devoted to the subject (American Institute for Conservation 1992). The Conservator's Approach to Sacred Art was the subject of a special issue of the Study Series of the ICOM-CC and was published in the Western Association for Art Conservation Newsletter (Heikell et al. 1995). In 1994, a special conference was organized by the Canadian Museum of Civilization (now known as the Canadian Museum of History), the Commonwealth Association of Museums, and the University of Victoria, and papers were presented in *Curatorship: Indigenous Perspectives in Post-Colonial Societies* (Canadian Museum of Civilization & University of Victoria 1996). In 2001, the Religion and the Arts Initiative at the Center for the Study of World Religions, at Harvard University, convened a conference to examine issues associated with religious objects in museums, entitled "Stewards of the Sacred: Sacred Artifacts, Religious Culture, and the Museum as Social Institution" (Sullivan and Edwards 2004).

Many of the contributions to these discussions relate to cultural materials that originate from North America, Australia, and New Zealand, and authors were often conservators and curators who worked in institutions, such as the National Museum of the American Indian, the University of British Columbia, and the National Museum of New Zealand Te Papa Tongarewa, who had taken a lead in creating more consultative and collaborative relationships with source communities. There were also some conservators who were concerned with the application of religious protocols that apply to objects from other cultures including Jewish, African, and Tibetan Buddhist religious objects and materials (see article by Greene, Mellor, and Reedy 1992 in American Institute for Conservation 1992).

Over the past 15 years, international meetings of conservators have extended the discourse and literature into other cultural arenas including Africa, Asia, and the Pacific (Jones 2003; Kreps 2003;

Stovel et al. 2005). In 2003, the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) in Rome, Italy, held a forum to discuss "Living Religious Heritage: conserving the sacred." A conference in Munich, organized by the International Institute for Conservation of Historic and Artistic Works in 2006, examined The Object in Context: Crossing Conservation Boundaries. The Canadian Conservation Institute held an international symposium in 2007, which brought together Indigenous people and professional conservators to discuss "traditional, technical, ethical and intangible aspects of the conservation of Indigenous material culture," and following this produced a publication of papers (Dignard et al. 2008). The Committee for Conservation of the International Council of Museums (ICOM-CC 2008) devoted its 15th Triennial Conference in India in 2008 to the subject of Diversity in Heritage Conservation: Tradition, Innovation and Participation.

The ICCROM forum in Rome, "Living Religious Heritage: conserving the sacred," brought together international conservation specialists from many countries in discussion of museum collections and heritage sites of religious and sacred significance. The presentations provided examples from various parts of the world and from major faiths as well as Indigenous cultures. These included papers discussing the conservation of Jewish sacred materials according to the strict requirements of Jewish Law codified in the Halacha (Maggen 2005) and the introduction in the Islamic Arts Museum Malaysia of collection management practices based upon Islamic values (Zekrgoo and Barkeshli 2005).

Ethnomuseology in Practice

In the application of ethnomuseology, Western museum methodologies and philosophies of care and preservation established over the past 100 years and more are applied in parallel with cultural protocols of care and use which have been practiced and evolving within the originating communities or faith groups for hundreds or thousands of years.

The international interest in cultural heritage rights and integrated methods of collection management and other museological roles has also influenced community approaches to heritage management. Ethnomuseological practices are now used in the care of objects in museums in many contexts, not just museums holding ethnographic collections but also community-run facilities, such as Aboriginal Australian Keeping Places, community museums, and cultural centers in North America and the Pacific (Simpson 2001, 2007; Clavir 2003; Kreps 2003; Alivizatou 2012).

It is part of a two-way process in which museums are adopting cultural practices from traditional custodians, and communities are adopting and adapting museum practices to assist them in achieving their cultural heritage preservation goals. These include preserving tangible and intangible heritage, reconnecting objects with people and associated activities, as well as engaging in cross-cultural dialogue with non-Indigenous people by taking control over the display and interpretation of material culture, where it is appropriate to do so.

Reflecting the specifics of the local community, these are highly varied in form, including models based upon sacred storehouses found in various locations in Indonesia and the Pacific; Keeping Places used in Aboriginal communities to safely store secret-sacred objects; tribal museums and cultural centers in North America; wat or monastery museums in Thailand; and temple museums in India. In these varied settings, ethnomuseology is evident in the adoption by culturally diverse peoples of Western conservation and other museological functions, applied within the Indigenous knowledge framework, so replacing the traditional Eurocentric model of the Museum with new, culturally specific models. What is important is the emic perspective that is applied to the museological processes reflecting cultural, spiritual, and ethnoscientific principles of direct relevance to the original cultural context of specific objects.

Traditional care methods are being incorporated into museum practices by staff in many museums in North America, Australia, New Zealand, and in other countries. There are also many more Indigenous people working in the cultural heritage sector

in fields such as archaeology, anthropology, and museum curation and collection management. The emic nature of their cultural knowledge and perspectives can create opportunities for invaluable new approaches to research, preservation, and interpretation and for democratization of the museum. Their direct relationships to communities can open new avenues for museum-community engagement. The intangible and spiritual aspects of cultural heritage with which they have practical and authentic cultural knowledge inform their practice and provide clear examples of the significant changes that are occurring in heritage management in museums (Rosoff 2003; Haakanson and Steffian 2004; Pepper Henry 2004; Kaminitz and West 2009; Tapsell 2012; Schorch and Hakiwai 2014). While museums such as the NMAI and Te Papa have featured prominently in professional and academic literature, there are many other museums in which Indigenous staff have contributed to the evolution of ethnomuseology, and the inclusion of intangible and spiritual aspects of heritage have become integral aspects of the care and interpretation of tangible heritage.

Storage and Display

Storage and display of sacred objects can include specific positioning. Statues of the Buddha should be handled and stored respectfully. They should never be placed on the floor, as it is considered unclean, and when placed in storage or on display, the Buddha's head should be higher than surrounding objects.

Jim Pepper Henry, formerly the Repatriation Program Manager at the National Museum of the American Indian, has listed a number of traditional care constraints that are frequently requested by representatives of American Indian tribes, including requests for sacred objects to be positioned with a particular orientation, placement on higher shelves, the use of wooden shelving, and the separation of culturally-sensitive materials from other objects or from materials from other tribes. There are also requests to ensure that sacred bundles are not opened and disassembled and that ceremonial pipes are stored with the bowl disconnected from the stem (Pepper Henry 2004).

As part of the care provided in Alutiiq Museum combining Western conservation and Alutiiq spiritual care, "Like Alutiiq people of all eras, we use the best technologies available in ways that are uniquely Alutiiq. For example, we store stone lamps in seats of archival-quality foam on non-off gassing, baked enamel, space-saver shelving, but they are stored upside down, a practice that keeps their spirits from departing" (Haakanson and Steffian 2004).

Continued Use of Objects

In the interests of preservation and conservation, conventional museum practices protect objects from handling and use. In some cultures, however, the continuing authority and efficacy of ceremonial objects or those with spiritual power may depend upon people using and performing them. To facilitate this, some museums have lent objects to authorized community members for use in ceremonies and other cultural activities or allowed items to be used in the museum setting. This arrangement requires conservators to balance concerns for the physical condition and preservation of the object itself, with consideration of the cultural and religious needs and rights of the community, and the growing awareness of the responsibilities that conservators now have to preserving the integrity of the objects (Clavir 1996, 2003; Jones 2003; Rosoff 2003; Conaty 2008; Haakanson and Steffian 2004; Kamintz and West 2009; Pepper Henry 2004: 111; Simpson 2001). While loans to Indigenous communities are a new consideration for most conservators, these initiatives echo long-accepted practices in Christian ecclesiastical museums and cathedral treasuries which protect and preserve precious liturgical objects, but still allow some of these to be used for worship or ceremonial functions.

Materials Used in Conservation Treatments

Islamic values applied to religious objects and documents include the need to show respect for the Quran as well as any objects on which Quranic verses or other sacred texts appear, such as garments. Conservation of both Jewish and Islamic objects must take account of concepts of the pure and impure. In both faiths, pigs are considered to

be impure so conservators are required to avoid using brushes made from pig bristle when carrying out restoration work on a holy text and to avoid the use of pig skin in materials or tools (Maggen 2005; Zekrgoo and Barkeshli 2005). Jewish law proscribes appropriate treatment of Jewish religious objects associated with a Torah scroll. This requires conservators to have received appropriate training in religious law, consequently limiting those who have the required knowledge. Maggen (2005: 106) notes that while "most of the suggested treatments would be feasible . . . [if] the conservator is not Jewish, the conservation cannot be done in conformity with a Jewish rabbinical Halacha point of view."

Restrictions on Access and Display

In some cultures, protocols require the separation of sacred objects from secular materials, or restrictions on who can view or handle sacred objects. Restricted access is one of the most common concerns relating to the management of collections of Aboriginal Australian and Native American material culture. In museums, this requires the adoption of protocols in the care of restricted materials that includes providing separate storage and restricting access, often on the basis of gender; such materials cannot be placed on display in exhibitions. Some cultures also place restrictions on women handling or having access to certain objects at a time when they are menstruating, resulting either from the idea that at this time women are impure or they may emit a power themselves which can adversely impact on sacred and ceremonial objects (Drumheller and Kaminitz 1994; Jones 2003; Pepper Henry 2004: 107; Zekrgoo and Barkeshli 2005: 102–106).

Most national, state, and university museums in Australia store secret/sacred materials in restricted areas, which may be a section of the main collection store, suitably marked and screened, or in some cases placement in a separate room, sometimes referred to as a Keeping Place. Access is restricted to the community custodians and to curatorial staff who have been given the authority to view such items.

Some Native American and First Nations communities have requested that museums do not display certain sacred objects, such as Plains Indian medicine bundles and kachina figures and masks of some Pueblo Indian groups of the Southwest of the USA.

The Baule of the Ivory Coast consider some carvings and masks to be inhabited by potentially dangerous spirits, and these are restricted on the basis of gender. In the exhibition "Baule: African Art/Western Eyes" (1997–1998), these were presented in their cultural context in spaces that reflected these gender restrictions. Visitors were provided with insights into the spiritual dimensions of the objects as perceived in Baule culture and the significance attached to looking, where "seeing something is potentially more significant, more dangerous and contaminating, than touching or ingesting something." Visitors were then able to decide whether or not to view them (Vogel 1997: 110).

For some communities even replicas made by museum exhibition staff may be considered sacred and inappropriate for display purposes because they have been made by people with access to sacred knowledge. The replicas may therefore embody power and knowledge that should not be revealed to those who are uninitiated (Simpson 2001: 203, 217).

The accommodation of gender-specific restrictions is not a simple matter, as these may well conflict with gender equity legislation and institutional policy. Sometimes traditional custodians are pragmatic about objects in museums and may be less rigid in applying such restrictions to staff, while still maintaining strict protocols in relation to individuals who are members of the community from which the restricted items originate. In some museums, gender restrictions are simply regarded as unenforceable and staff members are requested to voluntarily observe such protocols (Pepper Henry 2004: 111).

Rituals of Care and Protection

The performance of rituals in museums may fulfill a number of functions. Certain categories of objects, such as images of gods and deities, may be considered powerful or be seen as animate beings or living spirits and require considerations that are beyond the concerns of conventional

Western technical and scientific conservation practices. Care and preservation practices that reflect the status of these types of sacred objects may include the performance of rituals.

Those associated with spiritual care of sacred objects include ceremonial feeding by dusting with corn pollen or other materials or providing offerings of braids of sweet grass, cornmeal, feathers, sage brush, and so on. Ritual feeding can be accommodated by the museum by providing plant materials that have been treated to kill any insects that could pose risks to objects in the collection that are made from organic materials.

The National Museum of the American Indian has also received requests from community representatives for conventional museum preventative conservation treatments to be omitted. This includes extended freezing of an object, placing the object in a low oxygen or CO^2 chamber, or wrapping in a non-permeable material, treatments that they believe are potentially harmful to living objects. Pepper Henry notes that pest infestations were seen by some community representative as "part of an object's 'normal' life cycle" that should be allowed to occur. Requests such as these posed a greater challenge for museum staff when having to balance community perceptions of "cultural risks" with the need for treatments necessary for pest management that would threaten the preservation of the object as well as posing a risk to other items in the collections (Pepper Henry 2004: 108). Likewise, some Indigenous people have expressed concern that conservation results in the artificial preservation of sacred objects which would naturally deteriorate (Clavir 2003; Kreps 2003).

Ceremonies, such as blessings and cleansing ceremonies, may also be performed to purify objects, a space, or the people who enter and may be held when a new museum, gallery, or exhibition is being opened. In some religions, certain objects contain a life force or spiritual power that may require special spiritual care or maybe potentially dangerous to those coming in close contact with them (Kreps 2003: 147–148). Ritual cleansing may be required for purification or for the protection of spaces or people to contain the powers associated with objects which may otherwise be harmful to museum staff or visitors. In North America and Australia, these are usually smudging or smoking ceremonies. In Māori culture, cleansing or purification ceremonies involve ritual washing. Museums may provide facilities for use by staff and visitors entering or leaving galleries or storage areas, so that they can wash off that which is *noa* (mundane, nonsacred), of everyday life before entering an area where *tapu* or sacred items are stored. When leaving, they again wash their hands to rinse of anything *tapu*. In the working areas of the museum, this may be a sink, while galleries may incorporate washing facilities that are more aesthetically pleasing, such as the bowl of water positioned outside a temporary exhibition at Rotorua Museum, or the stone water feature at the entrance to the Māori galleries in Auckland War Memorial Museum.

The increasing emphasis upon intangible aspects of the heritage upon marks a significant change and challenge in heritage management and especially for museums, whose primary role until the late twentieth century was to preserve objects. It requires greater attention to be given to relationships between objects and the various people who have encountered them throughout their lives and to give particular consideration to the role of intangible and tangible heritage in sustaining living cultural practices and expressions. As Miriam Clavir has noted, this means a significant change in perspective for museums, requiring them to accept their new role in "facilitating the preservation of indigenous cultures through supporting their living expression rather than through preserving their material culture" (Clavir 1996: 101). She also notes that requests for certain procedures raise ethical concerns for conservators, such as when asked "to put objects at physical risk in order to facilitate the preservation of conceptual integrity or cultural significance" (Clavir 1996, 2003).

The inclusion of diverse cultural protocols in the care and conservation practices employed in museums is not without its critics. British social theorist Tiffany Jenkins has criticized the adoption of cultural protocols that conflict with conventional museum practices, such as restricting access or screening sensitive objects from view, referring to

this as "censorship." She has argued that "there should be no restrictions on the pursuit of intellectual inquiry" and asserted that "The pursuit of truth is sacrificed on the altar of veneration."

Museums are not just concerned with preserving objects of material culture or tangible heritage but have broader concerns that include preserving and communicating their cultural integrity and aspects of culture that give them meaning: the intangible forms of heritage – knowledge, skills, practices, and expressions of culture such as ceremonies, songs, stories, dances, etc. The performance of rituals and ceremonies associated with artifacts serves as a mechanism for helping to preserve the intangible forms of heritage. These practices are a means of preserving the objects, as well as showing respect for their spiritual dimensions.

Miriam Clavir observes that "It is the role of museums to research and recognize the cultural and spiritual value of objects in their care and to implement the necessary protocols for culturally-sensitive objects, allowing their collections to both present the diversity of the societies they represent and to show the respect that such diversity requires" (Clavir in Clavir and Moses 2015). As Rosoff (2003: 75) emphasizes, this is a process that is based on mutual trust requiring the establishment of long-term relationships.

Ethnomuseology enables source communities to continue to engage with objects by performing some of the associated, intangible aspects of culture; it is therefore also an active form of preservation and interpretation of intangible heritage. Jim Pepper Henry, formerly Assistant Director for Community Services at the National Museum of the American Indian, explains that having Native American priests and ceremonialist regularly perform rituals is seen as preserving and perpetuating "living culture," a central philosophy of the NMAI (Pepper Henry 2004: 105).

Jenkins has also argued that "Museum directors must not act as priests" and "idolatry has no place in museum policy" (Jenkins 2005). However, the adoption of culturally-appropriate protocols of care in museums does not require curators to perform the roles of priests, but rather to adopt respectful methods that reflect the status of religious, ceremonial, and sacred objects. Respectful treatment should not be mistaken for the act of worship. In museums in New Zealand, it is not uncommon for museum staff, Pakeha (non-Māori) as well Māori, to place a piece of green foliage in front of Māori artifacts or taonga. This is not an act of worship but a demonstration of respect by museum staff who understand the Māori view of the sacred nature of the objects, rather than seeing them merely as objects of academic interest.

> "Respect is the watchword in the care of culturally-sensitive materials in museum collections. Ideally, standards of best conservation practice work with cultural standards defined by the originating community, in this way achieving a type of care based on partnership that protects both the tangible and intangible attributes of the heritage objects." . . . "Respecting cultural protocols, though, is not asking people to believe, but asking them to respect those who do." (Clavir in Clavir and Moses 2015)

Likewise, public programs may invite visitors to observe organized ceremonies or rituals performed by priests or other qualified individuals, which can enhance their understanding of the meaning of objects and their relationships to people. Visitors are not asked to participate in ceremonies of worship, although staff and visitors may be offered the opportunity to participate in a cleansing ritual, such as smudging or handwashing. Understanding and observing cultural protocols gives greater meaning to objects by emphasizing the contexts in which objects were used and the relationships between objects and peoples.

Dialogue and collaboration between museum staff and source communities can facilitate greater understanding among curators and conservators of the contextual background of objects and their meanings and significance to contemporary source communities. Through sensitive and creative approaches to the care, display, and interpretation of cultural materials, this can also be communicated to visitors, with the potential to enhance inter-cultural understanding as a key part of the educational function of the museum.

By focusing on intangible dimensions of objects and their significance to source communities, meanings, values, and practices associated

with the objects become a central concern for those who study and manage cultural heritage. The application of ethnomuseology to religious, sacred, and ceremonial objects is of particular importance for source communities, as it marks a significant step forward in regaining rights to cultural heritage, and is a key area in which the adoption of respectful and culturally-appropriate methods can be demonstrated by museums and others involved in heritage management. It is also an area of professional practice that is rich in potential for research into the effectiveness of culturally-appropriate museum display and interpretation and its potential to build bridges between cultures.

Due to the sensitive nature of some of the objects and associate knowledge, future questions concerning ethnomuseology will no doubt focus on who undertakes research to identify the status of objects in collections and the cultural protocols associated with their care. As well, the management of that information will itself require the application of protocols to ensure that customary protocols concerning access rights are observed and applied to all types of collecting institutions including museums, art galleries, libraries, and archives.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Australia: Indigenous Cultural Property Return
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Conservation in Museums
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Decolonization in Archaeological Theory
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Intangible Cultural Heritage
- ▶ Postcolonial Archaeologies
- ▶ Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)
- ▶ World Heritage and Human Rights

References

Alivizatou, M. 2012. *Intangible heritage and the museum: New perspectives on cultural preservation*, UCL Institute of Archaeology Critical Cultural Heritage Series (Book 8). London: Routledge.

American Institute for Conservation. 1992. Conservation of Sacred Objects and Other Papers from the General Session of the 19th Annual Meeting of the American Institute for Conservation of Historic and Artistic Works. Albuquerque, New Mexico, 1991. *Journal of the American Institute for Conservation* 31 (1): 3–8.

Barclay, R., M. Gilberg, J.C. McCauley, and T. Stone, eds. 1988. Symposium 86: *The care and preservation of ethnological materials*. Proceedings. Ottawa: Canadian Conservation Institute.

Canadian Museum of Civilisation, University of Victoria (B.C.). n.d. *Cultural Resource Management Program and Commonwealth Association of Museums, 1996*. Curatorship: Indigenous Perspectives in Post-Colonial Societies. Mercury Series Directorate, Paper 8. Ottawa: Canadian Museum of Civilization with the Commonwealth Association of Museums and the University of Victoria.

Clavir, M. 1996. Reflections on changes in museums and the conservation of collections from indigenous peoples. *Journal of the American Institute for Conservation* 35 (2): 99–107. http://cool.conservation-us.org/jaic/articles/jaic35-02-002.html.

Clavir, M. 2003. *Preserving what is valued: Museums, conservation and first nations*. Vancouver: University of British Columbia Press.

Clavir, M., and J. Moses. 2015. *Caring for sacred and culturally sensitive objects*. Ottawa: Government of Canada, Canadian Conservation Institute.

Conaty, G.T. 2008. The effects of repatriation on the relationship between the Glenbow Museum and the Blackfoot people. *Museum Management and Curatorship* 23 (3): 245–259. https://doi.org/10.1080/09647770802234037.

Cultural Ministers Council. n.d. Return of indigenous cultural property (RICP) Program national principles, Chapter 12. In *2009, Collections law: Legal issues for Australian archives, galleries, libraries and museums*. Repatriation of Cultural Material, ed. S. Simpson. Available online: http://simpsons.com.au/wp-content/uploads/12-repatriation-of-cultural-material.pdf.

Dignard, C., K. Helwig, J. Mason, K. Nanowin, and T. Stone, eds. 2008. *Preserving aboriginal heritage: Technical and traditional approaches*, Proceedings of Symposium 2007. Ottawa: Canadian Conservation Institute.

Drumheller, A., and M. Kaminitz. 1994. Traditional care and conservation, the merging of two disciplines at the National Museum of the American Indian. In *Preventive conservation: Practice, theory and research*, ed. R. Ashok and P. Smith, 58–60. London: International Institute for Conservation of Historic and Artistic Works.

Haakanson, S., Jr., and A.F. Steffian. 2004. The Alutiiq Museum's guidelines for the spiritual care of objects. In *Stewards of the sacred*, ed. L.E. Sullivan and A. Edwards, 155–165. Washington, DC: American Association of museums in cooperation with the Center for the Study of World Religions, Harvard University. Available online at: http://www.wipo.int/export/sites/www/tk/en/databases/creative_heritage/docs/alutiiq_guidelines.pdf.

Heikell, V., D. Whiting, M. Clavir, N. Odegaard, M. Kaminitz, and J. Moses. 1995. *The conservator's approach to sacred art*. Western Association for Art Conservation Newsletter 17(3), September 1995, pp. 15–18.

Hill, T., and T. Nicks. 1992. *Turning the page: forging New partnerships between museums and first peoples*. Task force report on museums and First Peoples, Assembly of First Nations and the Canadian Museums Association, Ottawa.

Horse Capture, G.P., ed. 1989. *The concept of sacred materials and their place in the world*. Cody: The Buffalo Bill Historical Center.

Jenkins, T. 2005. *The censoring of our museums'*. New Statesman, 11 July 2005.

Jones, H. 2003. *Gamelan and spirits: Developing a protocol for their care*. AICCM National Newsletter, no.87, June 2003, pp. 1–4.

Kaminitz, M.A., and W.R. West Jr. 2009. Conservation, access and use in a museum of living cultures. In *Conservation: Principles, dilemmas, and uncomfortable truths*, ed. Alison Richmond and Alison Bracker, 197–209. Abingdon: Routledge.

Kaus, D. 2008. The management of restricted aboriginal objects by the National Museum of Australia. *reCollections* 3 (1): 88–95.

Kreps, C. 2003. *Liberating culture: Cross-cultural perspectives on museums, curation, and heritage preservation*. London: Routledge.

Maggen, M. 2005. The conservation of sacred materials in the Israel museum. In *Conservation of living religious heritage*, Papers from the ICCROM 2003 Forum on Living Religious Heritage, Conserving the Sacred, ed. Herb Stovel, Nicholas Stanley-Price, and Robert Killick, 102–106. Rome: ICCROM.

McCarthy, C. 2011. *Museums and Māori: Heritage professionals, indigenous collections, current practice*. Walnut Creek: Left Coast Press.

Museums Australia. 2005. *Continuing cultures, ongoing responsibilities: Principles and guidelines for Australian museums working with aboriginal and Torres Strait Islander cultural heritage*. Canberra: Museums Australia.

Pepper Henry, J. 2004. Challenges in managing culturally sensitive collections at the national museum of the American Indian. In *Stewards of the sacred,* ed. Lawrence E. Sullivan and Alison Edwards. Harvard University: AAM and Center for the Study of World Religions.

Rosoff, N.B. 2003. Integrating native views into museum procedures: Hope and practice at the National Museum of the American Indian'. In *Museums and source communities*, ed. L. Peers and A.K. Brown. New York: Routledge.

Schorch, P., and A. Hakiwai. 2014. Mana Taonga and the public sphere: A dialogue between indigenous practice and western theory. *International Journal of Cultural Studies* 17 (2): 191–205.

Simpson, M.G. 2001. *Making representations: Museums in the postcolonial era*, 2nd edn. Routledge, London and New York.

Simpson, M.G. 2002. *Introducing Ethnomuseology: issues in the management of culturally-sensitive artefacts in museum collections*. UNCOVER. Vol. 1 Proceedings 24 May 2002. L. Kelly, Barrett, J., Sydney, pp. 109–117.

Simpson, M.G. 2007. Charting the boundaries: Indigenous models and parallel practices in the development of the post-museum. In *Museum revolutions: How museums change and are changed*, ed. S.J. Knell, Suzanne MacLeod, and Sheila Watson, 74. Leicester: University of Leicester Press.

Smith, L.T. 2000. *Decolonizing methodologies: Research and indigenous peoples*. New York: Zed Books.

Stanton, J.E. 2011. Ethnographic museums and collections: From the past into the future. In *Understanding museums: Australian museums and museology*, ed. Des Griffin and Leon Paroissien. Canberra: National Museum of Australia. Published online at www.nma.gov.au/research/understandingmuseums/.

Stovel, H., N. Stanley-Price, and R. Killick, eds. 2005. *Conservation of living religious heritage*, Papers from the ICCROM 2003 Forum on Living Religious Heritage, Conserving the Sacred. Rome: ICCROM.

Sullivan, L.E., and A. Edwards, eds. 2004. *Stewards of the sacred*. Washington, DC: American Association of Museums and Center for the Study of World Religions, Harvard University.

Sullivan, T., L. Kelly, and P. Gordon. 2003. Museums and indigenous people in Australia: A review of previous possessions, new obligations: Policies for museums in Australia and aboriginal and Torres Strait islander peoples. *Curator: The Museum Journal* 46: 208–227.

Tapsell, P. 2012. Aroha mai: Whose museum?: The rise of indigenous ethics within museum contexts: A Maori-tribal perspective. In: *Routledge companion to museum ethics: Redefining ethics for the twenty-first century museum,* ed. J. Marstine, 85–111. London.

UNESCO. 2003. *Convention for the safeguarding of the intangible cultural heritage*, MISC/2003/CLT/CH/14, Paris 17 October 2003. Available online at: https://ich.unesco.org/en/convention http://unesdoc.unesco.org/images//0013/001325/132540e.pdf.

United Nations. 2007. United Nations Declaration on the Rights of Indigenous People (UNDRIP) Available online at. http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf.

Vogel, Susan Mullin. 1997. *Baule: African art/Western eyes*. Yale University Press, New Haven, CT.

Wallace, G., and K. Akerman. 2008. *For now and forever: An analysis of current and emerging needs for aboriginal cultural stores and repositories in Western Australia*. Perth: Western Australian Museum.

Williams, P. 2005. A breach on the beach – Te Papa and the fraying of biculturalism. *Museum and Society* 3 (2): 81–97.

Zekrgoo, Amir H., and M. Barkeshli. 2005. Collection management of Islamic heritage in accordance with the Worldview and Shari'ah of Islam. In *Conservation of living religious heritage*, Papers from the ICCROM 2003 Forum on Living Religious Heritage: conserving the sacred, ed. Herb Stovel, Nicholas Stanley-Price, and Robert Killick, 102–106. Rome: ICCROM.

Further Readings

Battiste, Marie, and James Sákéj Youngblood Henderson. 2000. *Protecting indigenous knowledge and heritage: A global challenge*. Saskatoon: Purich Press.

Bell, Catherine, and Val Napoleon, eds. 2008a. *First nations cultural heritage and law: Case studies, voices, and perspectives*. Vancouver: UBC Press.

Bell, Catherine, and Val Napoleon, eds. 2008b. *First nations cultural heritage and law: Case studies, voices, and perspectives*. Vancouver: UBC Press.

Bell, Catherine, and Robert Paterson. 2009. *Protection of first nations cultural heritage: Laws, policy, and reform*. Vancouver: UBC Press.

Buggeln, Gretchen, Crispin Paine, and S. Brent Plate. 2017. *Religion in museums: Global and multidisciplinary perspectives*. Bloomsbury Academic, London, Oxford, New York, New Delhi, Sydney.

Minucciani, Valeria. 2013. *Religion and museums: Immaterial and material heritage*. Turin: Umberto Allemandi.

Paine, Crispin, ed. 2000. *Godly things: Museums, objects, and religion*. New York: University Press.

Paine, Crispin. 2013. *Religious objects in museums: Private lives and public duties*. London: Bloomsbury Academic.

Sleeper-Smith, ed. 2009. *Contesting knowledge. Museums and indigenous perspectives*. London: University of Nebraska Press.

Sullivan, Bruce. 2015. *Sacred objects in secular spaces: Exhibiting Asian religions in museums.* Bloomsbury Academic, London, Oxford, New York, New Delhi, Sydney.

Sully, D. 2007. *Decolonising conservation: Caring for Maori meeting houses outside New Zealand*, UCL Institute of Archaeology Critical Cultural Heritage Series. Walnut Creek: Left Coast Press.

Europe Incastellated: Medieval Archaeology

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Introduction

The castle is perhaps the signature building of the European Middle Ages. Whether surviving as earthworks, ruined masonry or, in a minority of cases, still inhabited, castles are a testament par excellence to the ambition and achievements of the landed aristocracy that ruled Europe from the eleventh to the fifteenth centuries. The castle's origins, longevity, and decline were intimately bound up with the European system of social relations and landholding conventionally defined as feudalism. In the popular imagination, the castle is associated primarily with its military function, but equal weight should also be given to its more domestic aspects and role as a residence. The subject has seen considerable revision in the past two decades, and debate has chiefly focused on the martial character of the castle, with a strong tendency to emphasize the role of the castle as an icon of lordship and as a visual projection of seigniorial power, as much as a tool of war.

Definition

The term "castle" derives from the Latin *castrum*, "fortification," and took a variety of vernacular forms across Europe, such as *chastel* in French, *castillo* in Spanish, *castello* in Italian, and *Berg* in German. The classic definition of a castle is that of "the fortified residence of a lord," which neatly encapsulates the idea that in essence, it is a fusion of both fortification and residence. Such a definition has the utility of distinguishing the medieval castle from those fortifications such as Roman forts and Iron Age hill forts which, although sharing some of these attributes (and confusingly also

sometimes referred to as castles during the Middle Ages and beyond), did not combine both and so never constituted the private residences of individuals. In castle studies, the emphasis has traditionally been placed on the fortified element of buildings, as the presence of battlements, arrow loops, and other defenses marked out a castle from the unfortified manor or palace.

In almost every other way, the definition of the castle is problematic. In particular, arriving at a clear definition is bedeviled by the fact that during the Middle Ages, the word *castrum*, or its diminutive *castellum*, was not only a term applied to fortified residences but numerous other structures, such as chambers, urban defenses, the fighting platforms of ships, and sometimes the precinct walls of monastic houses. Especially in modern English usage, the word "castle" has lost the more wide-reaching medieval definition and refers chiefly to its function as a fortification. A closer medieval approximation is found in the modern French use of the word "chateau," which can apply equally to buildings of the twelfth or eighteenth century, inasmuch as it refers primarily to the noble status of the lordly residence.

A further complication is that even if used in a restricted sense and applied only to the fortified homes of the medieval aristocracy, definitions are hampered by the sheer range of fortified buildings constructed in Europe from the tenth to the fifteenth century. Royal castles, as both residences and centers of administration, were often monumental in design, and castles such as Windsor in England and Vincennes in France were occupied and redeveloped over several centuries. The majority of castles were the residences of the feudal aristocracy, but again, the scale and nature of buildings varied enormously, from the masonry castles of major magnates down to more humble knightly families dwelling in fortifications made of earth and timber. Some, but not all, of these castles also played a part variously in manorial, local, or sometimes national administration.

In addition were the more temporary fortifications built by armies during campaigns or as "counter castles" during the course of sieges. Although these latter castles are more ephemeral structures, some do survive as archaeological monuments, for example, at Burwell and "The Rings" at Corfe in England.

A further complication is that the modern emphasis on the fortification tends to privilege the purely military dimension of castles and focus attention on the defensive elements – battlements, gatehouses, and arrow loops – that are themselves interpreted as purely utilitarian in function. In the past two decades, castle studies has, however, seen a move towards emphasizing the social role of crenellation which stresses that equal consideration be given to the symbolism inherent in building in a military architectural style. In part down to this shifting historiographical climate, more holistic definitions of castles are now employed, such as that used in one recent major survey, which defines the castle as "the residence of a lord made imposing through architectural references to fortification" (Goodall 2011: 6). Such a definition has the advantage of neatly sidestepping the issue over the utilitarian purpose of the defenses but keeps at its heart the idea that the castle was a private fortification.

Historical Background

The overarching characteristic feature of castles is their sheer variety of form. No two castles are identical, and while certain common principles underpin their design and constituent structures at any given point in time, it is their individuality as archaeological monuments that resonate today. When viewed across the Middle Ages as a whole, however, the key elements were the hall, the private chamber, the kitchen, and the chapel, with each structure relating closely either to the demands of noble living or the nature of the noble household. How these building blocks related to each other varied from site to site, but enduring themes were to combine all or some of them into a tower or to arrange them around a courtyard.

For the purposes of analysis, a useful distinction can be made between those castles built of earth and timber and those with masonry

buildings. Earth and timber castles chiefly comprised two forms: the motte and bailey and the ringwork castle (Figs. 1 and 2). In the former, the artificial mound of earth (the motte) was crowned with a timber tower with one or more enclosures (bailey) to one side which housed the ancillary buildings. The ringwork was a simple ditch and bank topped with a wooden palisade with the castle buildings within, but here too it was not uncommon for there to be one or more baileys. It was castles of these types that dominated the early centuries of European castellation.

The principal building of early masonry castles was the central tower today normally called a keep or, as it was known to contemporaries, the great tower or *donjon*. In its early form, the keep represented the traditional elements of the Carolingian palace, the hall, chamber, and chapel,

Europe Incastellated: Medieval Archaeology, Fig. 1 Rathmore Motte, County Kildare, Ireland. Originally the mound would have been topped by a wooden tower

Europe Incastellated: Medieval Archaeology, Fig. 2 Caesar's Camp, Kent, England. A ringwork and bailey castle

integrated into a single structure. Other elements frequently built in stone at early date were the entrance tower or gatehouse and sometimes the curtain walls. From the late twelfth century, there was a general move towards constructing castles (or at least their major elements) from stone, and from c. 1200, the history of castle development is usually discussed in terms of the evolution of masonry buildings. This said, in practice, masonry and earth and timber fortifications coalesced, and it was not uncommon for masonry castles to retain at least some wooden defenses well into the fourteenth century.

The Origins and Development of the Castle

The origins of the castle lay in the collapse of Carolingian kingship and with the resultant power vacuum filled by a dynamic warrior aristocracy, who controlled their fiefdoms from their own fortified bases. In the tenth century, the castle emerged as an expression of the authority of the feudal magnate and the place from which he exercised lordship. The cradle of the European castle is often held to be post-Carolingian France, particularly Anjou where a group of early towers such as Doué-la-Fontaine, Beaugency, and Loches, herald the beginning of the idea of the private fortified residence. A particularly clear case is Doué-la-Fontaine in the Loire valley, where an early tenth-century hall was transformed c.950 into a more defensible tower, itself later embanked by a motte and cut off from the immediate surroundings by a bank at ditch.

The situation in the Loire valley is particularly clear but should be seen as part of a more generalized growth in private fortification across Europe. The rise of the "new" aristocracy about the year 1000, together with economic expansion and improved technological skill in building, ensured that Europe became "incastellated" over the course of the tenth to the twelfth centuries. This process was often, but not always, linked directly to politico-military events. Although private fortification was known in Anglo-Saxon England, it was the Norman Conquest of 1066 that brought about castle-building on a rapid and unprecedented scale and also saw the introduction of new elements of fortification such as the motte and the stone keep. Subsequent Norman campaigns saw the castle brought to Wales, Scotland, and Ireland, and the Crusades saw European forms of castle architecture exported to the Holy Land. Although definitive numbers for the total number of castles built in Europe over the course of the Middle Ages is not known, one estimate puts the figure at a massive 75–100,000, a total that is based upon a wide-ranging definition, some five hundred years of cumulative building and includes both northern and southern Europe (Thompson 1987: 4). More closely defined estimates of numbers for individual areas are predictably lower; in the case of England, a figure just under 2,000 sites is probably realistic (Cathcart King 1983). But this represents total numbers of sites; in reality those in residential use at any one time was much less. In England it has been estimated that during the heavily militarized period at the end of the eleventh century, some 500 castles were occupied (Eales 1990).

Up to about the year 1200, the majority of castles at any one time would have been constructed principally of earth and timber, as either ringworks or motte and bailey castles, although the chronology is subject to considerable variation across Europe. Archaeological excavation has shed considerable light on the nature of these fortifications and done much to dispel the idea that they were the poor relation of their masonry counterparts. At Hen Domen (Wales), excavations of the bailey revealed a series of phases dating from the eleventh to the thirteenth century. During the mid-twelfth century, the impression is one of a cramped enclosure crammed with earth and timber buildings, something that befits a fortress built on the English-Welsh border. Excavated postholes on such sites belie a greater sophistication of the timber castle as a whole, however, which proved extremely durable and was the dominant form in Europe for at least two centuries.

It is against this earth and timber background that the masonry castles that tend to dominate writing should be seen. The late eleventh, twelfth, and early thirteenth centuries were the classic age of the castle keep, with some of the finest examples surviving at Trim in Ireland, Dover in

Europe Incastellated: Medieval Archaeology, Fig. 3 Dover Castle, Kent, England. The donjon of Henry II behind the castle's inner curtain wall

England (Fig. 3), Peñafiel in Spain, and Coucy in France. Such buildings still impress today though their solid massive walls and their design ensured that they were difficult to capture, but donjons also served an important ceremonial role and acted variously as symbols of lordly authority whether or not the lord was in residence.

The thirteenth century witnessed considerable developments in castle design, with larger curtain walls, elaborate gatehouses and increased domestic provision. Castles such as Caerphilly in Wales exemplify these trends, with substantial water defenses, concentric curtain walls, and twin-towered gatehouses. The string of castles built in North Wales by the English king Edward I after his conquest of Gwynedd exemplifies developments up to this time, with Beaumaris often cited as something of the perfect medieval castle, while the twelfth- and thirteenth-century works at Krak de Chevaliers in modern Syria represent something of the high point of medieval military engineering.

The fourteenth and fifteenth centuries were also periods of considerable change in design, with residential considerations and the demands of high-status living coming to the fore. The hallmark of new castles in this period was an increasing sophistication in the spatial planning and the integration of domestic ranges of buildings into the overall design. The advent of gunpowder weapons in the fourteenth century was ultimately to lead to the end of the castle as a military building, but this process was drawn-out and did not happen overnight. Early adaptations for the use of gunpowder weapons are found in the fourteenth century, and by the fifteenth century, gun ports were a familiar part of new castle-building. Developments in artillery had, by the early sixteenth century, rendered medieval fortifications effectively obsolete, and the introduction of the Italianate bastion marked the end of the castle as a military building.

The Castle and War

During military campaigning, the principal role of the castle was to hold up advancing armies and buy the time necessary for a relieving army to be assembled and put into the field. As an immovable defense, the castle also had the advantage of hindering conquest. In order to be successful, the subjugation of any territory by a medieval commander required the reduction or surrender of all castles before any conquest could be considered complete. There were occasions when sieges were important events in national and international politics. The fall of Château Gaillard in Normandy (Fig. 4) in 1204 by Philip II of France precipitated the loss of Normandy by the Angevin kings of England, while the successful siege of Rochester in England in 1215 by King John sent out such a

Europe Incastellated: Medieval Archaeology, Fig. 4 Château Gaillard, Eure, France. During the early thirteenth century, the castle was the scene for one of Europe's most famous sieges

strong message to his rebel barons that a contemporary chronicler wrote that "our age has not known a siege so hard pressed nor so strongly resisted . . . Afterwards few cared to put their trust in castles."

Castles in the Postmedieval Period

The redolence of crenellation as a sign of lordship and noble status continued however; in areas such as Scotland, castles in medieval style continued to be built into the seventeenth century. Arguably it was only with the rise of Palladian architecture that crenellation lost its association with noble status that the true "medieval" castle ceased to exist. The ruins of castles evoked fascination with postmedieval artists and builders alike and were a common subject for painting and illustrations. During the nineteenth century, medieval fortifications again became the focus of architectural projects either in terms of restoration, as at Carcassonne (France), or for new building projects, such as Neuschwanstein Castle (Germany) and Castell Coch (Wales).

Key Issues/Current Debates

The key issue in castle studies since about 1990 has concerned military function. While the importance of castles as symbols of lordship has always been recognized, the orthodoxy up to this date had been one primarily centered on castle architecture and taken a "form follows function" approach: the evolution of castles, together with the design of their constituent buildings, was driven by the demands of war. According to this approach, the castle underwent a military "rise" up to about the year 1300, with a protracted "decline" thereafter.

Problems with this overarching interpretation were voiced by Coulson in an important article in 1979, which suggested that the placing of fortifications on the homes of the medieval aristocracy may have had as much to do with the expression of social rank and chivalric culture as it did with aiding an active defense by the garrison. The implications of this observation were twofold. Firstly, it suggested that the trappings of fortifications on castles were part of a noble style and not a utilitarian response to the demands of warfare. Secondly, in proposing that war was not necessarily the engine of change in the development of castle architecture, the rationale for the "rise and fall" thesis was effectively removed. Nowhere, it should be noted, is the basic defensibility of the castle denied; rather, there is an acceptance that a military purpose should not be automatically assumed on the basis of the architectural presence of fortification.

In English castle studies, the debate crystallized around the fourteenth-century castle at

Europe Incastellated: Medieval Archaeology, Fig. 5 Bodiam Castle, Sussex, England. The castle was the subject of a major historiographical debate in the 1990s over the military role of such buildings

Bodiam (Fig. 5) with arguments over whether the castle was primarily one connected with the defense of southern England against the French during the 100 Years War or something akin to an "old soldier's dream house," with the trappings of defensive display. Subsequent case studies, such as that at Orford in Suffolk extended this thinking back into the twelfth century, in this case arguing that the form of Henry II of England's idiosyncratic great tower was inspired by nostalgia and ideas of Byzantine palaces, rather than a building constructed at the cutting edge of military design. Such new ideas have been exported across the whole subject. The donjon, for example, is now chiefly interpreted primarily as a vehicle for lordly display and a place of ceremony and ritual, rather than the place built to provide the final refuge in the event of siege. The late Middle Ages too have been subject to redefinition and in place of decline instead seen as a period that sees a continuation of the ideals and ethos of castle-building that were formed in earlier centuries. Moreover, overarching explanations for castle development often take their lead from a small number of buildings built by those at the top of medieval society; those buildings built by those lower down the social scale often exhibit different characteristics. Later medieval Scotland, Ireland, and Northern England is a case in point as this period saw the development and proliferation of fortified towers called "tower houses," which continued to be built into the seventeenth century.

Allied to the questioning of the military role of the castle is the move towards a more holistic approach to the castle, both in terms of the physical buildings and also their place in medieval society. Central to this has been the "landscape approach," which emphasizes the broader geographical context of castles and how the building of castles impacted upon the wider environment. Studies have shown how the majority of castles reflected local conditions such as ease of access to estates, communication networks, and a range of natural and seminatural resources. In turn, the arrangement of estate assets, such as churches, ponds, mills, deer parks, markets and settlements, and sometimes monastic foundations around the castle site not only reflected the demands of economics but also reflected the broader social standing and ambition of the builder. At their most developed, there is evidence that these landscapes structured the approach of visitors to the castle, an observation which only heightens the status of the castle as an icon of lordship.

International Perspectives

When viewed in an international context, castles are one the most important elements in the built

environment from the European Middle Ages. As buildings they not only reflect the warrior ethos of the ruling aristocracy but the social organization of society. The large-scale survival of archaeological and architectural remains represent an important archaeological resource of a society in which land was held in return for military service and, as such, invite comparisons with analogous cultures, such as feudal Japan. European earth and timber castles belong both to an earlier tradition of fortification dating back to the Bronze and Iron Ages and also share affinities with some later bastion forts in which earthworks were the principal defense, for example, the fort of Ninety-Six in South Carolina in the United States, constructed during the American War of Independence. Comparisons can also be drawn with other cultures where earth and timber defenses were the norm, such as Maori *pa* villages in New Zealand and Native American stockades in North America. Masonry fortifications characterize the great civilizations and empires of human history from Antiquity, but the castle retains its distinctive character, in part due to the duality of its status as a fortified residence.

Future Directions

The past 20 years has seen a great deal of academic research on castles, with much of it taking a "revisionist" standpoint. The debate over the military role of the castle has sometimes generated more heat than light, but there are a number of key areas for future work.

The castles built by those at the highest end of the social spectrum have tended to frame wider debates, as have those castles that are well documented (chiefly royal castles) and those that are in state or public guardianship and where consequently structural remains tend to survive relatively intact. Future work is likely to be directed at those sites at the lower end of the range, particularly those that could be termed "sub-baronial" fortifications that lie on the cusp of castle-building threshold.

The place of the castle within the medieval imagination remains understudied. It has become clear from several studies that there is a tendency for castle-builders to look to the past for inspiration as much as taking advantage of new designs, both in terms of architecture and for inspiration for grand projects. For example, in England, Henry II's keep at Dover looked back to an earlier generation of great towers, while Edward I's Caernarfon (Fig. 6) and Thomas of Lancaster's Dunstanburgh both drew inspiration from Arthurian legend. How common examples such as these may have been and to what extent they permeated down the castle-building class are important questions for the future.

The future for castle studies lies in coupling subject specialisms with broader interdisciplinary

Europe Incastellated: Medieval Archaeology, Fig. 6 Caernarfon Castle, Gwynedd, Wales. Together with being a monument to the English conquest of North Wales, the castle also embodied elements of chivalric culture

study. In medieval Europe, the castle was a multifunctional institution that seamlessly blended aspects of fortification, residency, estate management, iconography, and the cultural imagination. It is unrealistic to expect a rounded picture of the castle and its development to emerge without reference to a broad constituency of academic disciplines.

Cross-References

- ▶ Fortifications, Archaeology of
- ▶ France: Medieval Archaeology
- ▶ Hillfort Investigations in the Czech Republic
- ▶ Iberia: Medieval Archaeology
- ▶ Italy: Medieval Archaeology
- ▶ Medieval Archaeology
- ▶ New Spain: Forts and Transport Archaeology

References

Cathcart King, D.J. 1983. *Castellarium Anglicanum*. New York: Kraus International.

Eales, R. 1990. Royal power and castles in Norman England. *Medieval Knighthood* 3: 49–78.

Goodall, J. 2011. *The English castle, 1066–1650*. London/Newhaven: Yale.

Thompson, M.W. 1987. *The decline of the castle*. Cambridge: Cambridge University Press.

Further Reading

Allen Brown, R.A. 1976. *English castles*. London: Batsford.

Böhme, H.W. 1999. *Burgen in Mitteleuropa. Ein Handbuch*. Sigmaringen: Theiss.

Cooper, E. 1991. *Castillos señoriales de Castilla*. Salamanca: Junta de Castilla y León.

Coulson, C. 1979. Structural symbolism in medieval castle architecture. *Journal of the British Archaeological Association* 132: 73–90.

Coulson, C. 2003. *Castles and medieval society*. Oxford: Oxford University Press.

Creighton, O.H. 2002. *Castles and landscapes*. London: Continuum.

Creighton, O.H. 2012. *Early European castles*. London: Duckworth.

Creighton, O.H., and R. Higham. 2003. *Medieval castles*. Princes Risborough: Shire.

Higham, R., and P. Barker. 1992. *Timber castles*. London: Batsford.

Liddiard, R. 2005. *Castles in context*. Macclefield: Windgather.

McNeill, T. 1997. *Castles in Ireland: Feudal power in a Gaelic world*. London: Routledge.

Mesqui, J. 1991. *Châteaux et enceintes de la France médiévale: de la défense à la résidence*. Paris: Picard.

Pringle, D. 2006. Castellology in the Latin East: An overview. *Château Gaillard* 23: 361–377.

Tabraham, C. 1986. *Scottish castles and fortifications*. London: Her Majesty's Stationary Office.

Europe: Early *Homo* Fossil Records

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Introduction

Research during the last decades on the first human dispersal out of Africa, into Eurasia, has changed the ideas on the chronology of this event, providing also new data on the ecological scenery that allowed humans to colonize new territories with different environments and climates from those in subtropical Africa, sometimes subject to inhospitable marked seasonality.

The origin of the genus *Homo* is directly related to a radical change in dietary behavior from its mostly vegetarian ancestors, the australopithecines, to more systematic carnivorous activities. This change in diet runs in parallel to an increase in encephalization, which resulted in greater cognitive abilities, and a decrease in gut size (Aiello and Wheeler 1995), thus allowing the emergence of a more intelligent and ubiquitous hominin. Meat is a food resource available everywhere inhabited by large mammals living and dying, which means that the genus *Homo* was

not constrained to only exploiting soft vegetables, eggs, insects, and a few other food stuffs. For this reason, the *change in food behavior* is not only a key issue for explaining the major patterns of biological and social evolution in the human lineage but also helps to explain the dispersal and colonization of new territories around the Earth, especially in the middle and high latitudes, where vegetables are scanty in seasonal climates, particularly in winter, and a substantial part of the feeding resources must be obtained from other animals (Martínez-Navarro 2010).

Definition

There is no evidence outside Africa of the presence of *Homo* without flaked stones. It is probable that our ancestors developed in Africa an unprecedented pattern of dispersals, unusual in the previous related species. So, the presence of *Homo* remains outside Africa implies also the use of technological tools. At this sense, earliest *Homo*, or its ancestor, developed a new kind of non-genetic transmission system, which allowed an unprecedented geographical expansion by increasing its ecological ubiquity during the dispersals across Eurasia. Therefore, the early *Homo* fossil records of Europe are a consequence of different achievements in the development of the genus, modifying forever the basic patterns of biological dispersal among primates.

Historical Background

There has been a persistent debate on the first human peopling of Europe until the middle 1990s. A number of researchers argued for a *Short Chronology*, as they claimed that humans did not colonize the continent before half million years ago, when evolved Acheulian tools associated with remains of *Homo ergaster* appeared in the European archaeological record (Roebroeks and Kolfschotten 1994). However, the finding of (1) a human mandible together with a huge assemblage of Oldowan (Mode 1) lithic artifacts at the Caucasian site of Dmanisi (Georgia), placed at the gates of Europe and dated ~1.8 Ma; (2) Oldowan tools at the sites of Fuente Nueva 3 and Barranco León (Orce, southern Spain), dated 1.3–1.4 Ma; (3) Oldowan lithic artifacts associated with human remains at the site of Atapuerca TD6 (northern Spain), dated 0.8–0.9 Ma; and (4) other findings of lithic artifacts at Early Pleistocene southern European sites in France (Vallonnet, 1.0 Ma) and Italy (Monte Poggiolo, 0.85 Ma; Isernia La Pineta, 0.6 Ma) helped to change the views of prehistorians and paleoanthropologists, considering a *Long Chronology* for the first human colonization of the continent.

Later, the new findings of human cranial and postcranial remains at Dmanisi (Lordkipanidze et al. 2007), a mandibular symphysis and more lithic artifacts at the site of Sima del Elefante (Atapuerca, Spain), dated to 1.2 Ma (Carbonell et al. 2008), and a human tooth and more tools at the site of Barranco León (Orce, Spain), dated to 1.4 Ma (Toro et al. 2013) – as well as new Oldowan lithic artifacts at Pirro Nord (Italy), dated 1.3–1.6 Ma; at Lézignan-la-Cébe and Pont-de-Lavaud (France), 1.57 and 1.1 Ma, respectively at Kozarnika (Bulgaria) 1.6–1.4 Ma; Vallparadís (Spain), 0.9 Ma; and in England at Pakefield, 0.7 Ma, and Happisburgh, 0.8–1.0 Ma – have definitely convinced researchers that humans inhabited Europe as early as one and a half million years ago (Figs. 1 and 2).

At the base of the middle Pleistocene, the arrival into the continent of hominins that developed Acheulian tools is generalized everywhere in most of southern and central Europe, informing on the important demographic increase of human populations.

Key Issues/Current Debates

The oldest records of hominins with carnivorous habits, making and using lithic artifacts, are documented at Kada Gona (Ethiopia) at around 2.6 Ma. Curiously, these findings are chronologically coincidental with the Gauss/Matuyama paleomagnetic transition and also with the onset of the "Glacial Plio/Pleistocene" climatic cooling, resulting from bipolar glaciations, which led to the

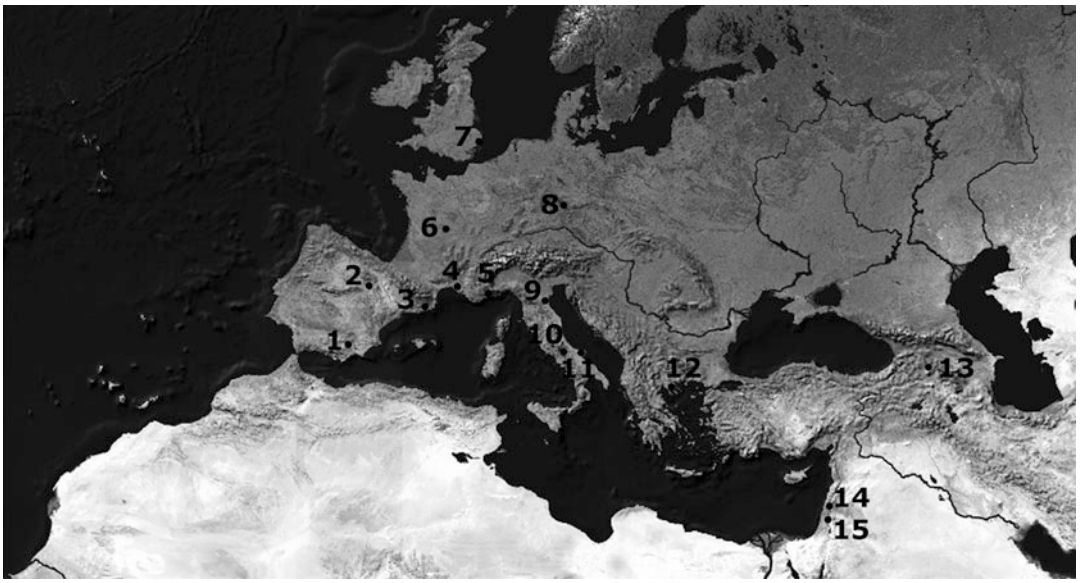

Europe: Early *Homo* Fossil Records, Fig. 1 Geographical location of some of the most important Early Pleistocene archaeological and paleontological sites of Europe, the Caucasian Region, and the Levantine Corridor: (*1*) Orce (including Barranco León, Fuente Nueva 3, and Venta Micena), (*2*) Atapuerca (including Sima del Elefante and Gran Dolina), (*3*) Vallparadís, (*4*) Lézignan-la-Cébe, (*5*) Vallonnet, (*6*) Pont-de-Lavaud, (*7*) Pakefield and Happisburgh, (*8*) Untermassfeld (only paleontological record), (*9*) Monte Poggiolo, (*10*) Isernia La Pineta, (*11*) Pirro Nord, (*12*) Apollonia (only paleontological record), (*13*) Dmanisi, (*14*) Gesher Benot Ya'aqov, and (*15*) 'Ubeidiya

transition to cooler, drier, and more seasonal climates in the temperate latitudes during the Pleistocene epoch. Glacial ice rafting was produced periodically in the glacial–interglacial fluctuations, being caused by the 41-ka cycle of variations in obliquity of the Earth axis during the interval comprised between 2.8 and 1.6 Ma and by higher-amplitude cycles of 100 ka resulting from variations in orbital eccentricity at 1.2–0.8 Ma (Shackleton 1995).

In Europe, as in Africa, an important faunal turnover is detected around 2.5–2.6 Ma. It is known as the so-called Elephant–*Equus* event, and it is coincidental with the Early–Middle Villafranchian faunal transition. This event is characterized by the arrival in Europe of the first one-toed horses, *Equus livenzovensis*, and the spread of *Mammuthus meridionalis* originated in Africa, although the record of both genera seems to take place somewhat earlier. The same faunal turnover is also detected in Asia, both in the Upper Siwaliks in the Tatrot Formation and Central Asia.

Although there are some references that point to a possible human dispersal into Eurasia older than 2.0 Ma, the oldest clear human record out of Africa is found in Dmanisi during the Olduvai normal paleomagnetic chron, where a very good collection of fossil hominins (crania, mandibles, and postcranial bones) together with Oldowan primitive lithic artifacts has been unearthed. The fossil record of Eurasia reveals an important faunal turnover at this moment, which is coincidental with the Middle–Late Villafranchian transition (Rook and Martínez-Navarro 2010, and references there in), and was called *the Wolf event* after Azzaroli (1983). Recently, this episode has been renamed as "the *Pachycrocuta brevirostris* event" by Martínez-Navarro (2010), because of the deep impact of this giant, hyperscavenger hyaenid of African origin in most of the Eurasian fossil assemblages during the rest of the Early Pleistocene (which is coincidental with the Late Villafranchian), from the Iberian Peninsula through to eastern and southern Asia (Palmqvist et al. 2011). This event is also followed by the

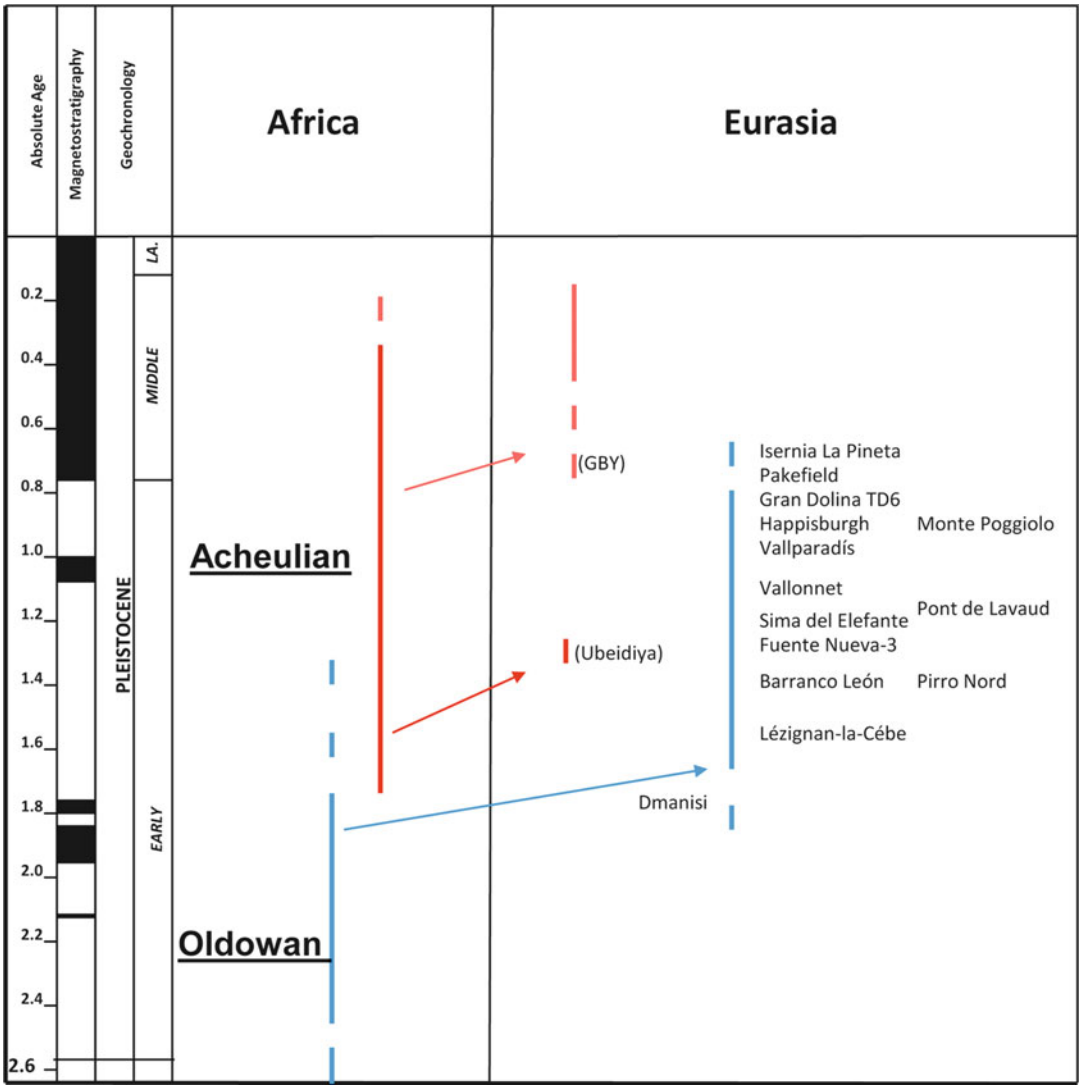

Europe: Early *Homo* Fossil Records, Fig. 2 Chronologic chart of some of the most important Early Pleistocene European archaeological and paleoanthropological localities of Europe, the Caucasian Region, and the Levantine Corridor

arrival of other several large mammal species of African origin, most of them chronologically coincidental with this human dispersal, such as the sabertooth tiger *Megantereon whitei*, the giant gelada baboon *Theropithecus oswaldi*, and the aquatic megaherbivore *Hippopotamus antiquus*, which is a sister species, if not the same, of the giant African hippo *H. gorgops*.

At around 1.3–1.4 Ma, a new wave of dispersal is detected, but it is only well recorded in southwestern Asia at the Levantine Corridor, especially at the site of 'Ubeidiya (Israel), where primitive Acheulian tools have been found together with some large mammals originating in Africa, such as the giant African buffalo *Pelorovis oldowayensis*, the giraffe *Giraffa camelopardalis*, the pig *Kolpochoerus olduvaiensis*, the hippo *Hippopotamus gorgops*, the scavenger and social hunting hyena *Crocuta crocuta*, the sabertooth tiger *Megantereon whitei*, and the giant monkey

Theropithecus oswaldi. These species are mixed with others of Asian origin, such as the giant deer *Praemegaceros verticornis*, the buffalo *Bison* sp., the spiral horned antelope Antilopini indet. (*Spirocerus* sp./*Pontoceros ambiguus*), or the bear *Ursus etruscus* (Tchernov 1986; Martínez-Navarro et al. 2009, 2012). A primitive Acheulian record is also detected in southern India in a chronology close to 'Ubeidiya at the site of Attirampakkam, dated 1.51 Ma.

A new and mostly pan-Eurasian dispersal event coming from Africa is detected during the Early–Middle Pleistocene transition (~0.8–0.6 Ma). Hominins coming with Acheulian (Mode 2) tools colonize the Levantine Corridor, with the best example at Gesher Benot Ya'aqov (Israel) (0.7–0.8 Ma), bringing the domestication of fire with them and a high degree of socialization (Alperson-Afil 2008). The arrival of this developed tool technology is coincidental with the colonization of Europe by *Homo heidelbergensis* and the arrival into the continent of several large mammals of African origin, such as the bull *Bos primigenius*, the elephant *Elephas* (*Palaeoloxodon*) *antiquus* (evolved from *Elephas recki*), the hyenas *Crocuta crocuta* and *Hyaena* sp., the lion *Panthera leo*, and the leopard *Panthera pardus* (Martínez-Navarro and Rabinovich 2011). The arrival of this African fauna is part of the important Galerian faunal turnover, and it is coincidental with the long transition between climates forced by the 41-ka cycles and the later accentuated glacial climate characterized by the alternation of pronounced glacial–interglacial periods modulated by the 100-ka periodicity (Shackleton 1995). This dispersal event has recently been named "the *Crocuta crocuta* event" (Martínez-Navarro 2010).

Climate changes, faunal turnovers, and human dispersals into new continents seem to be coincidental. There is no doubt that climate and climate change interact with the biosphere and can therefore be expected to influence also on human activity, either directly or through paths leading from climate to plant cover to faunal resources. What is not so clear is how and to what degree the social and cultural human evolution interacted with these changes. At this sense, an important question is to explain the effects of increasing sociality in early and more recent humans in order to be more successful during the global dispersal process, in competence with other faunal species and/or human populations.

International Perspectives

Ecological Landscape of the First Human Dispersal Out of Africa

The study of the extraordinary collection from the southern Spanish Early Pleistocene site of Venta Micena (Orce, southern Spain), dated ~1.5 Ma, with more than 17,000 fossil remains corresponding to a large mammal taphocoenosis unearthed from 350 m^2 of excavation (but with a potential of more than one million m^2 to be excavated), has provided interesting information on the paleobiology and paleoecological preferences of the most important species related with the Early Pleistocene human ecological scenario in Europe. Although no human remains have been unearthed for the moment at Venta Micena, all taxa recorded there are found also in assemblages with lithic artifacts and/or human remains from other archaeopaleontological localities on the continent.

These studies were firstly performed with the African origin sabertooth tiger *Megantereon whitei*, which earliest record outside Africa is at the site of Dmanisi at 1.8 Ma, together with the earliest hominins of Eurasia. It was an ambush, super-predator felid which inhabited mixed habitats and had powerful forelimbs, elongated and non-crenulated upper canines, and a short mandible with reduced precarnassial cheek teeth. It was well adapted to hunt medium- to large-sized ungulates, but its masticatory structure only allowed it to eat the softer parts of its prey, leaving most of the carcass intact for scavengers (see Palmqvist et al. 2007, and references there in; Martínez-Navarro 2010), especially for the giant hyena *Pachycrocuta brevirostris*, but probably also for hominins.

Similar studies were performed with the Early Pleistocene painted dog *Lycaon lycaonoides* thanks to the finding of a pathologic skull preserved complete at Venta Micena, specimen VM

7000. This fossil corresponds to an old individual, 6–7 years old, and shows several pathologies: it is bilaterally asymmetric and, after a radiologic analysis, it was possible to demonstrate that, during its life, it never had the right upper canine (C) and the right third molar (M_3). These pathologies were, probably, the consequence of a high degree of endogamy in the populations of this carnivore species, which resulted in an increase of the level of genetic homozygosis and thus a loss of developmental homeostasis. The canine is a crucial element for a predatory carnivore, but this specimen survived to an old age without it and with a pronounced asymmetry in the skull. The survival of such a pathologic individual suggests that collaborative social behavior helping sick, disabled, and/or old individuals by the other members of the family, as seen in extant *Lycaon pictus*, was already developed as early as the Early Pleistocene (Palmqvist et al. 1999). Similar social behavior, helping an old and toothless human individual, has been detected at the site of Dmanisi thanks to the finding of skull D3444 and jawbone D3900 (Lordkipanidze et al. 2005), showing convergent behavior among social large carnivores and early humans with developed carnivorous habits. Curiously, painted dogs dispersed into Africa coming from Eurasia at the same time (1.9–1.8 Ma) as hominins went out of Africa following the same route, the Levantine Corridor, but in the opposite direction (Martínez-Navarro 2010).

Another example is the paleobiological study of the ethology of the superscavenger that lived in Europe during the Early Pleistocene, the giant, short-faced hyena *Pachycrocuta brevirostris*. It was the largest bone-cracking hyaenid that ever existed. With the mass of a lioness, it had massive limbs with shortened distal bones and a heavy, powerfully built mandible with robust, well-developed premolars. All these features reflect its adaptation for dismembering ungulate carcasses, transporting large pieces of them without dragging to the denning site and fracturing bones. The relative contribution of hunting and scavenging to the diet of this extinct hyena was estimated using combined biomechanical, biogeochemical, and taphonomic approaches. Analysis of the bone-cracking behavior of *P. brevirostris* was based on the abundance of skeletal elements in the large mammal assemblage from Venta Micena. Results obtained showed that the bones with greater marrow contents (femur, humerus, and tibia) were preferentially fractured by the hyenas, while those others with less nutritional value (radius and metapodials) were better represented as complete elements in the assemblage. The quantitative analysis of the preservational state of skeletal elements allowed testing specific patterns of bone modification by the giant hyenas, such as a proximo-distal sequence of consumption for humerus and tibia, thus revealing the highly specialized bone-cracking behavior of *P. brevirostris*. Regression equations adjusted with modern carnivores for body size on craniodental and postcranial measurements provided an average estimate of mass of more than 110 kg for the giant hyena. The high moment arms for masseter and temporalis muscles indicated a substantial strength for bone fracturing with the well-developed premolar teeth. Jaw depth provided resistance against dorsoventral loads during bone-cracking activities. However, the moment arm of resistance for an object positioned at the canines revealed a loss of bite strength compared with spotted hyenas and thus less predatory abilities. These results are in agreement with the scavenging niche deduced for *P. brevirostris* from taphonomic analysis (see Palmqvist et al. 2011 and references therein). After this work at Venta Micena, the direct competence between the giant hyenas and hominins for the exploitation of an elephant carcass (*Mammuthus meridionalis*) has recently been described at the Orce archaeopaleontological site of Fuente Nueva 3 (Espigares et al. 2013) (Fig. 3).

Current work is also in progress with other species, such as the giant African origin hippo *Hippopotamus antiquus* (Palmqvist et al. 2008), showing that this megaherbivore is an aquatic better than amphibious species. The evidence comes from a biogeochemical analysis of bone collagen remains preserved in Venta Micena, which showed that, compared to other ungulates, the hippo $\delta^{15}N$ values were extremely high, even more than in the sabertooth tigers *Homotherium*

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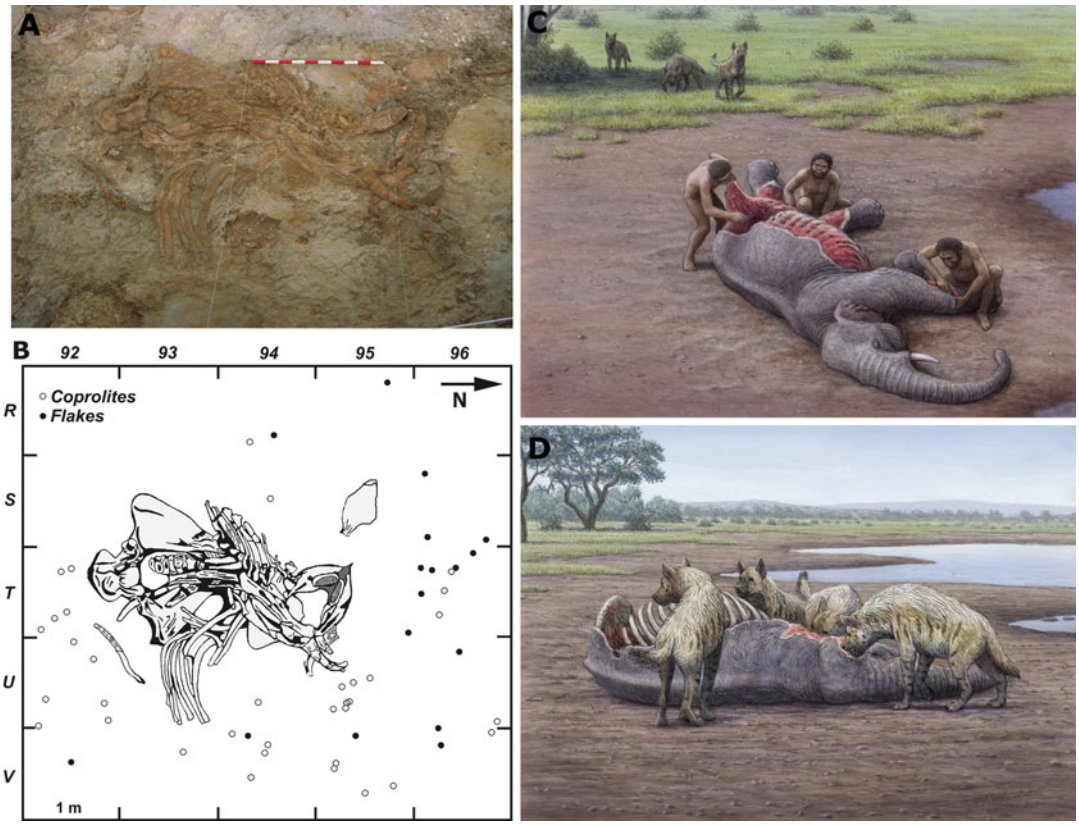

Europe: Early *Homo* Fossil Records, Fig. 3 (**a**) Partial skeleton of *Mammuthus meridionalis* unearthed at the Early Pleistocene site of Fuente Nueva 3 (Orce, southern Spain), (**b**) spatial distribution of coprolites and flint flakes surrounding it, and reconstruction of the possible sequence of interaction between hominins (**c**) and hyenas (**d**) during the exploitation of the elephant carcass (Drawings by M. Antón)

and *Megantereon* from the same faunal assemblage. These results showed that this hippo species did not eat terrestrial grasses, as do modern hippos, but was limiting its alimentary income to only aquatic plants such as macrophytes, which do not fix atmospheric N_2. Elevated $\delta^{15}N$ values resulted from the high saline contents (strontium sulfates) of the paleolake waters in the surroundings of Venta Micena, contributed by hydrothermal vents. This inference on the paleobiology of the extinct hippo is also confirmed by skull anatomic adaptations to water living, with more elevated orbital and nasal cavities, and a more elongated muzzle than in the extant, less aquatic and more amphibious species *Hippopotamus amphibius*. In addition, ecomorphological studies have shown that *Hippopotamus antiquus* was 2.2 times heavier than modern hippos and showed shortened limbs, which resulted in less ability for moving on land. The finding of these aquatic megaherbivores in the European Pleistocene sites is very significant and informative, because they need to live in big rivers or lake biotopes and cannot survive in cold waters, under 0 °C, when water became ice. In the case of Venta Micena, contribution of thermal waters resulting from tectonic activity in the Guadix–Baza basin during Early Pleistocene times resulted in a milder environment than today, which made possible the colonization by hippos. Curiously, these ecological and climatic conditions are the best for hominin survival. One interesting data is that

Early Pleistocene African origin hippos are recorded in the Levantine Corridor, the Caucasus, Anatolia, and Central and Southern Europe, but they are not found in other regions of Asia, probably because there were not rivers (waterways) to disperse into the eastern continent. Finally, we can say that the finding of hippos is a good track to try to find hominins (Martínez-Navarro 2010).

Future Directions

Human Autoecology: Tool Typology and Technology and Their Importance in the Food and Social Behavior

Lithic tools are a key question. Although human teeth are bunodont and polyvalent, they are not adequate to cut the animal skin, dismember a carcass, and eat the meat. Our ancestors became systematic carnivores only thanks to the use of artifacts. Without the lithics, the access to animal resources would have been impossible for Early Pleistocene hominins. But thanks to this change in our food behavior, we are finally humans. Thus, the extrasomatic cultural/technical evolution prompted a direct biological evolution.

The access to meat and other more energetic animal foodstuffs, such as the marrow and the brain, changed our anatomy and physiology. Our digestive system, starting from the teeth, became shorter, and our abdomen reduced the volume; the neurocranium and brain grew, increasing the intelligence and, of course, the social skills. Humans became able to move and colonize a latitudinal wide spectrum of environments, only constrained by the need of water, the presence of potential food resources (especially animal carcasses), and, of course, the impossibility of surviving in seasonal climates with very cold winters. Social hominins with primitive Oldowan tools and a scavenging behavior colonized the favorable biotopes of the middle latitudes of Eurasia, around 1.8–1.9 Ma (Lordkipanidze et al. 2007), but they were not able to survive in continental and cold climates until one million years later. At the Early–Middle Pleistocene transition, around 0.7–0.8 Ma as documented at Gesher Benot Ya'aqov, Israel (Goren-Inbar 2011), a new hominin coming from Africa with a new technology, the evolved Acheulian, was able to colonize the territories formerly occupied by the Oldowan hominins in Europe and Asia, probably in direct competition with the previous populations, which were less culturally evolved. Most probably, humans with evolved Acheulian tools were able to hunt and did not depend on the scavenging of the prey left abandoned by the large carnivores, as it was the common behavior of the Oldowan hominins. One of the most important data in support of this hypothesis is that in Oldowan and primitive Acheulian assemblages, large carnivores are abundantly preserved, as it is recorded in Dmanisi (Georgia), the Orce sites of Fuente Nueva 3 and Barranco León (Spain), or 'Ubeidiya, (Israel). However, in the evolved Acheulian assemblages, fossils of large carnivores are usually scanty, as in Buia (Eritrea) at 1.0 Ma, Gesher Benot Ya'aqov (Israel) at 0.7–0.8 Ma, or La Polledrara (Italy) at 0.4 Ma. The possibility of hybridization of Acheulian hominins coming from Africa with local Oldowan hominins living in Eurasia cannot be discarded, as it is evidenced in modern human populations by data on haplotype trees for mitochondrial DNA, Y-chromosomal DNA, two X-linked regions, and six autosomal regions, which suggest a major expansion event out of Africa at 0.84–0.42 Ma, characterized by interbreeding and not replacement of earlier populations (Templeton 2002).

Then, future research has to affect the improvement of the archaeological and paleontological record around the continent, the paleoecological studies of the fossil human environments, and the cultural and social evolution of the early paleolithic societies.

Cross-References

- ▶ Fossil Records of Early African *Homo*
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ West and Central Asia: Early Homo Fossil Records

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References

Aiello, L.C., and P. Wheeler. 1995. The expensive tissue hypothesis: The brain and the digestive system in human and primate evolution. *Current Anthropology* 36: 199–221.

Alperson-Afil, N. 2008. Continual fire-making by hominins at Gesher Benot Ya'aqov, Israel. *Quaternary Science Reviews* 27: 1733–1739.

Azzaroli, A. 1983. Quaternary mammals and the 'end-Villafranchian' dispersal event – A turning point in the history of Eurasia. *Palaeogeography, Palaeoclimate, Palaeoecology* 44: 117–139.

Carbonell, E., J.M. Bermudez De Castro, J.M. Pares, A. Perez-Gonzalez, G. Cuenca-Bescos, A. Olle, M. Mosquera, R. Huguet, J.V.D. Made, A. Rosas, R. Sala, J. Vallverdu, N. Garcia, D.E. Granger, M. Martinon-Torres, X.P. Rodriguez, G.M. Stock, J.M. Verges, E. Allue, F. Burjachs, I. Caceres, A. Canals, A. Benito, C. Diez, M. Lozano, A. Mateos, M. Navazo, J. Rodriguez, J. Rosell, and J.L. Arsuaga. 2008. The first hominin of Europe. *Nature* 452: 465–469.

Espigares, M.P., B. Martínez-Navarro, P. Palmqvist, S. Ros-Montoya, I. Toro, J. Agustí, and R. Sala. 2013. *Homo* vs. *Pachycrocuta*: Earliest evidence of competition for an elephant carcass between scavengers at Fuente Nueva-3 (Orce, Spain). *Quaternary International* 295: 113–125.

Goren-Inbar, N. 2011. Culture and cognition in the Acheulian industry: A case study from Gesher Benot Ya'aqov. *Philosophical Transactions of the Royal Society London B: Biological Sciences* 366 (1567): 1038–1049.

Lordkipanidze, D., A. Vekua, R. Ferring, G.P. Rightmire, J. Agusti, G. Kiladze, A. Mouskhelishvili, M. Nioradze, M. Ponce De Leon, M. Tappen, and C.P.E. Zollikofer. 2005. The earliest toothless hominin skull. *Nature* 434: 717–718.

Lordkipanidze, D., T. Jashashvili, A. Vekua, M.S. Ponce De León, C.P.E. Zollikofer, G.P. Rightmire, H. Pontzer, R. Ferring, O. Oms, M. Tappen, M. Bukhsianidze, J. Agustí, R. Kahlke, G. Kiladze, B. Martínez-Navarro, A. Mouskhelishvili, M. Nioradze, and L. Rook. 2007. Postcranial evidence from early *Homo* from Dmanisi, Georgia. *Nature* 449: 305–310.

Martínez-Navarro, B. 2010. Early Pleistocene faunas of Eurasia and hominid dispersals. In *The first hominin colonization of Eurasia. Contributions from the Second Stony Brook Human Evolution Symposium and Workshop, September 27–30, 2005*, ed. J.G. Fleagle, J.J. Shea, F.E. Grine, A.L. Baden, and R.E. Leakey, 207–224. New York: Springer.

Martínez-Navarro, B., and Rabinovich. 2011. The fossil Bovidae (Artiodactyla, Mammalia) from Gesher Benot Ya'aqov, Israel: Out of Africa during the Early-Middle Pleistocene transition. *Journal of Human Evolution* 60: 375–386.

Martínez-Navarro, B., M. Belmaker, and O. Bar-Yosef. 2009. The large carnivores from 'Ubeidiya (early Pleistocene, Israel): Biochronological and biogeographical implications. *Journal of Human Evolution* 56: 514–524.

Martínez-Navarro, B., M. Belmaker, and O. Bar-Yosef. 2012. The Bovid assemblage (Bovidae, Mammalia) from the early Pleistocene site of 'Ubeidiya, Israel: Biochronological and paleoecological implications for the fossil and lithic bearing strata. *Quaternary International* 267: 78–97.

Palmqvist, P., A. Arribas, and B. Martínez-Navarro. 1999. Ecomorphological study of large canids from the lower Pleistocene of southeastern Spain. *Lethaia* 32: 75–88.

Palmqvist, P., V. Torregrosa, J.A. Pérez-Claros, B. Martínez-Navarro, and A. Turner. 2007. A re-evaluation of the diversity of *Megantereon* (Mammalia, Carnivora, Machairodontinae) and the problem of species identification in extinct carnivores. *Journal of Vertebrate Paleontology* 27: 160–175.

Palmqvist, P., J.A. Pérez-Claros, C.M. Janis, B. Figueirido, V. Torregrosa, and D.R. Gröcfke. 2008. Biogeochemical and ecomorphological inferences on prey selection and resource partitioning among mammalian carnivores in an early Pleistocene community. *PALAIOS* 23: 724–737.

Palmqvist, P., B. Martínez-Navarro, J.A. Pérez-Claros, V. Torregrosa, B. Figueirido, J.A. Jiménez-Arenas, M.P. Espigares, S. Ros-Montoya, and M. De Renzi. 2011. The giant hyena *Pachycrocuta brevirostris:* Modelling the bone-cracking behavior of an extinct carnivore. *Quaternary International* 243: 61–79.

Roebroeks, W., and T.V. Kolfschotten. 1994. The earliest occupation of Europe: A short chronology. *Antiquity* 68: 489–503.

Rook, L., and B. Martínez-Navarro. 2010. Villafranchian: The long story of a Plio-Pleistocene European large mammal biochronologic unit. *Quaternary International* 219: 134–144.

Shackleton, N.J. 1995. New data on the evolution of Pliocene climatic variability. In *Paleoclimate and evolution, with emphasis on human origins*, ed. E.S. Vrba, G.H. Denton, T.C. Partridge, and L.H. Burckle, 242–248. New Haven/London: Yale University Press.

Tchernov, E., ed. 1986. *The lower Pleistocene mammals of 'Ubeidiya (Jordan Valley)*. Association Paléorient 5. Paris: Memoires et Travaux du Centre de Recherche Français de Jerusalem.

Templeton, A.R. 2002. Out of Africa again and again. *Nature* 416: 45–51.

Toro, I., B. Martínez-Navarro, J. Agustí, C. Souday, J.M. Bermúdez De Castro, M. MartinÓn-Torres, B. Fajardo, M. Duval, C. Falguères, O. Oms, J.M. Parés, P. Anadón, R. Julià, J.M. García-Aguilar, A.-M. Moigne, M.P. Espigares, S. Ros-Montoya, and P. Palmqvist. 2013. The oldest human fossil in Europe dated to ca. 1.4 Ma at Orce (Spain). *Journal of Human Evolution* 65 (1): 1–9.

Europe: Early Upper Paleolithic

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State of Knowledge and Current Debates

The transition from the Middle to the Upper Paleolithic is a period of the most vital changes in the evolution of population and European cultures when Neanderthals had been replaced by Anatomically Modern Humans and the Middle Paleolithic cultures (Mousterian and Micoquian) were replaced by the Upper Paleolithic cultures. The process of changes that were taking place in Europe between 45 and 30 Kyr BP was not uniform it is nature, but complex and multilinear (Mellars and Stringer 1989; Mellars 1990; Mellars et al. 2007; Kozłowski and Sacchi 2007). In terms of physical anthropology, the concepts of local evolution of Neanderthals into Anatomically Modern Humans have to be rejected on the basis of recent palaeogenetic analyses. Neanderthals evolved locally in western Eurasia beginning from more than 200 Kyr until their extinction between about 30 and 28 Kyr BP (Stringer and Gamble 1993). These populations created a variety of Middle Paleolithic cultures. The Anatomically Modern Humans evolved in eastern Africa more than 250 Kyr and, from northeastern Africa spread first to Eurasia, subsequently to other continents. These populations created a gamut of different Upper Paleolithic cultures (Boyle et al. 2010).

This model is today commonly accepted on the basis of the evidence of fossil mt DNA. Most reports on the first identifications of fossil sequences of mt DNA seem to support the view that mt DNA of Neanderthals is totally unlike that of mt DNA of European Modern Humans. The final split between DNA of the ancestors of the two populations is assumed to have taken place at about 325,000 years ago, still in Africa. Consequently, a model should be accepted of total replacement of Neanderthals by Modern Humans in the effect of the second "out of Africa" migration via the Near East to Europe and to western, possibly also central, Asia (Caramelli et al. 2003; Currat and Excoffier 2004; Serre et al. 2004).

Recently, however, arguments have appeared in support of some contribution of Neanderthals to the formation of the genome of European Modern Humans. S. Paabo et al. (2004) suggested that Archaic Modern Humans had intermingled with Neanderthals; later, however (2008), he admitted that this could have been contamination of fossil Neanderthal DNA by recent human DNA. This issue still remains highly controversial. Some arguments point to genetic differentiation of Neanderthal populations in the period when they cohabited with Modern Humans (Schmitz et al. 2002; Lalueza-Fox et al. 2006); some others point to more divergent Neanderthal haplotypes before 45 Kyr BP (Orlando et al. 2008). Effectively the hypothesis about the total replacement has to be reassessed. Moreover, the fact should be taken into account that the identification of mt DNA of European Modern Humans is based on bone remains from the period as late as 28–25 Kyr BP (i.e., from the period of the Gravettian, when in Europe founder haplogroups I, U, and H were forming – Forster 2004), whereas we do not know mt DNA sequences of early Homo sapiens from the period of Neanderthal/Modern Man cohabitation.

Prior to the beginnings of the Upper Paleolithic in Europe, Archaic Anatomically Modern Humans had appeared in the Middle East about 120–100 Kyr, where, initially, they had been the sole population; it is only about 60 Kyr BP that European Neanderthals arrived to this territory. The two populations co-occur in the Near and Middle East until the first migrations of Anatomically Modern Humans to Europe about 45–42 Kyr BP.

In the Near East taxonomic differences between Archaic *Homo sapiens* of Qafzeh type

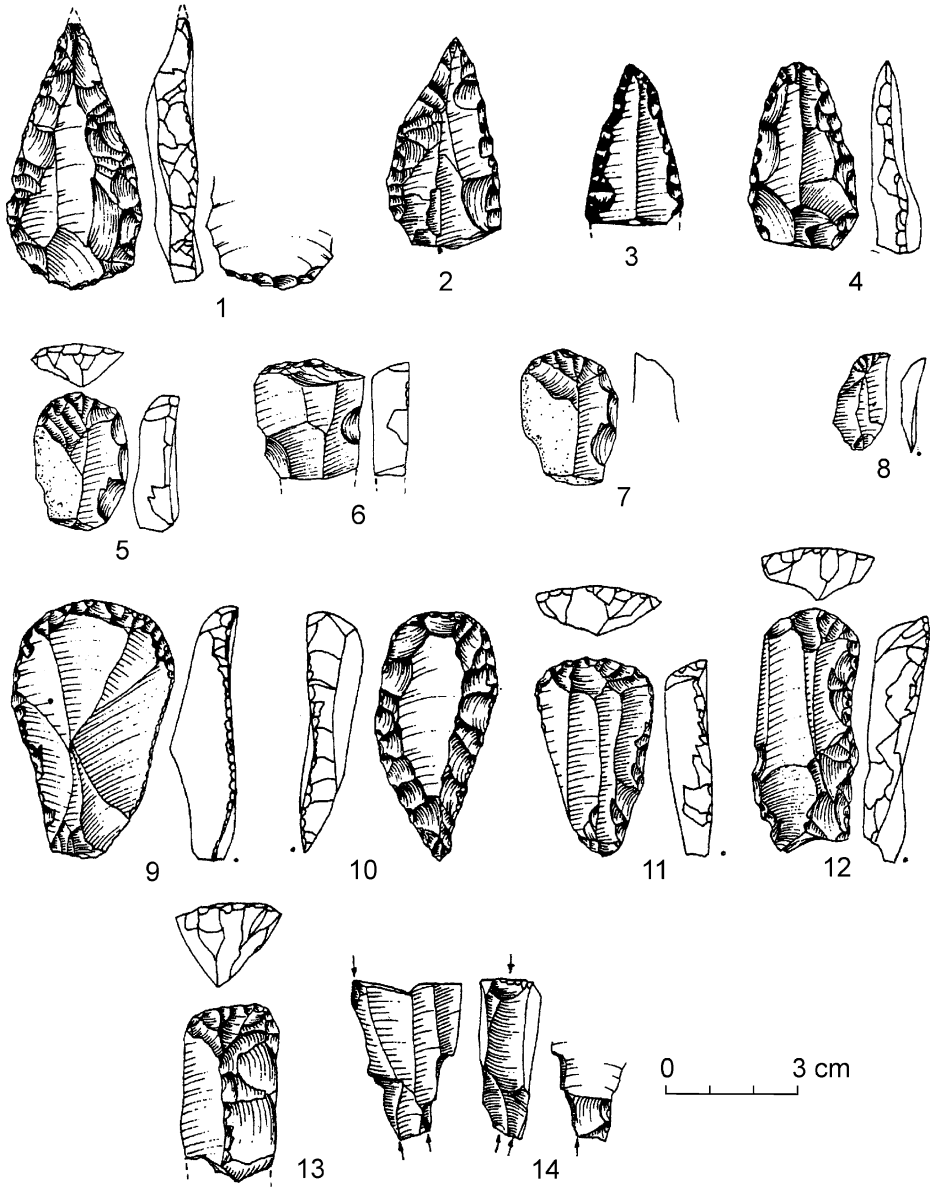

Europe: Early Upper Paleolithic, Fig. 1 Bacho Kiro, layer 11, Bulgaria. Bachokirian lithic implements: *1–8* – retouched Levallois points, *5–13* – end scrapers, *14* – burin

(also Tabun II and Skhul) and Neanderthals from Amud and Kebara are, to put it simply, as those between Levallois–Mousterian type Tabun D and C and the industry of Tabun B (Meignen and Bar-Yosef 2005). Despite taxonomic differences, Archaic Modern Humans and Neanderthals in the Near East are behaviorally similar. Minor differences are in hunting strategies, carcass processing, some aspects of diet reconstructed on the basis of stable isotopes, and in settlement mobility (Stiner 1993; Lieberman 1998). The differences between Archaic Modern Humans and Neanderthals can be seen first of all in the sphere of symbolic culture (e.g., appearance of incised ornaments, grave furnishings – Bar-Yosef and

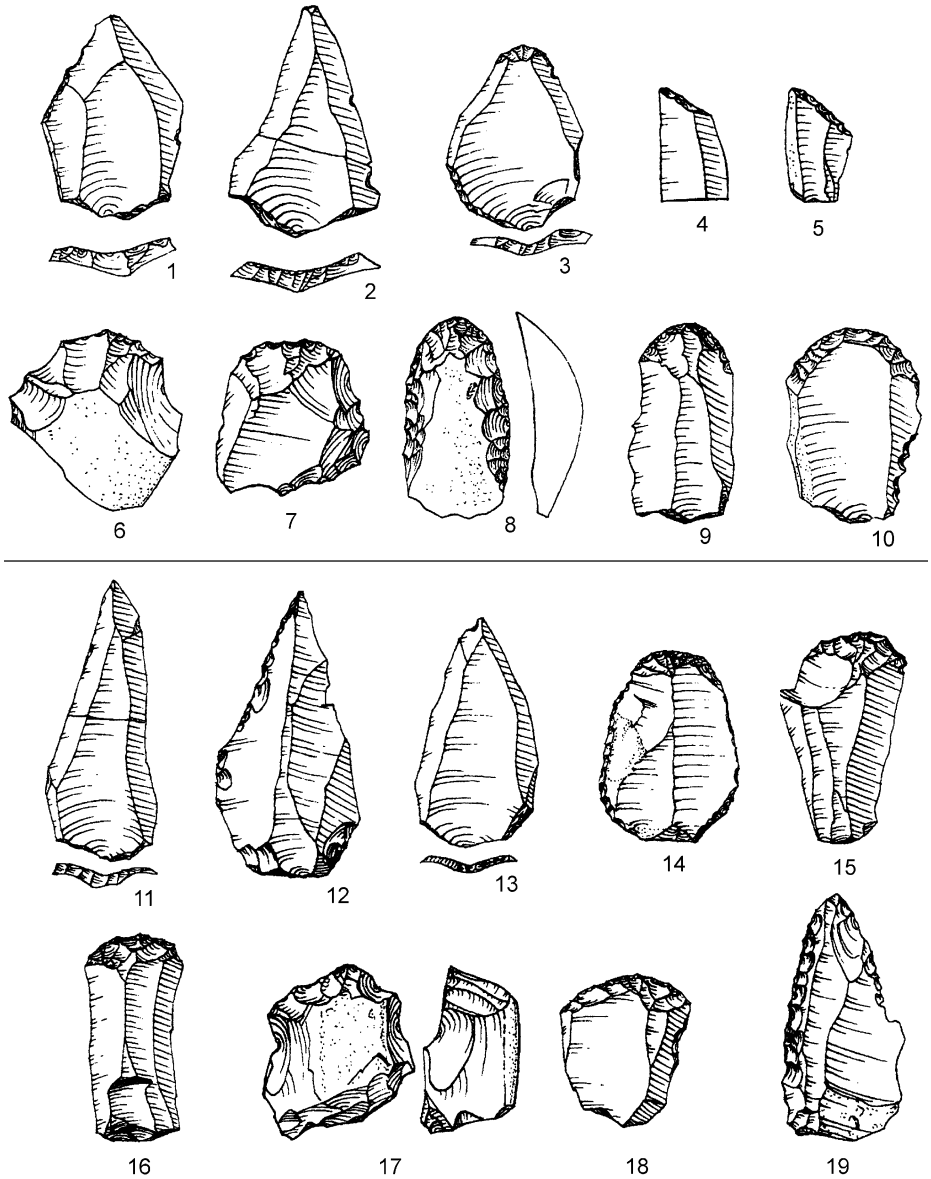

Europe: Early Upper Paleolithic, Fig. 2 Brno-Stranska skala IIIa, Moravia, Czech Republic. Bohunician lithic implements from layer 4: *1–3* – Levallois points, *4*, *5* – retouched truncations, *6–10* – end scrapers; from layer 5: *11–13* – Levallois points, *14–18* – end scrapers, *19* – sidescraper. (After J. Svoboda)

Vandermeersch 1993; Marshack 1997). In the Near East the cultural evolution leading to the Initial Upper Paleolithic began about 50–40 Kyr BP together with the formation of the Emirian – the unit characterized by the evolution of Levallois technique, which was the most important technique in the Middle Paleolithic Mouster–Levalloisian, into blade technique. As the new technology evolved, other innovations appeared such as the use of the soft hammer which replaced the hard hammer in production of blanks. Several sequences show local evolution from the Levallois–Mousterian to the Emirian, most importantly Boker Tachtit

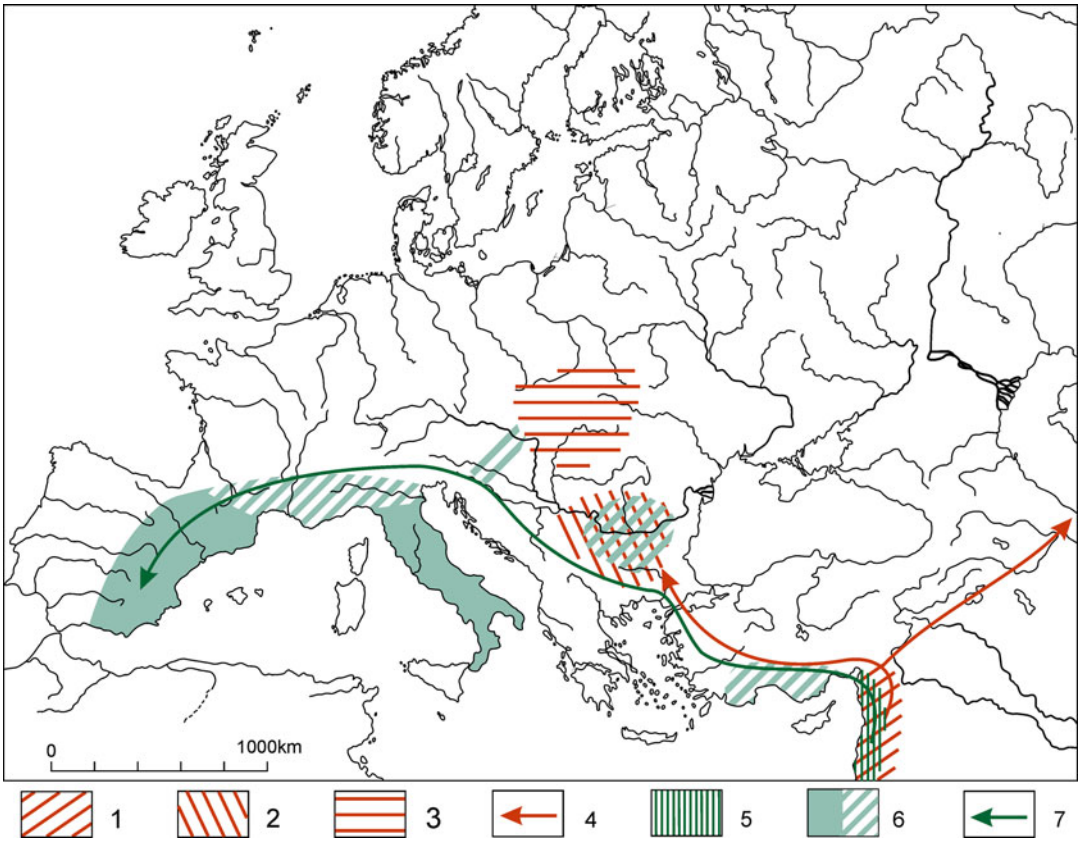

Europe: Early Upper Paleolithic, Fig. 3 Map of the first weaves of Anatomically Modern Humans migrations to Europe: *1* – area of the Emirian, *2* – Bachokirian, *3* – Bohunician, *4* – first migration weave, *5* – area of the Ahmarian, *6* – Proto-Aurignacian/Fumanian, *7* – second migration weave

in the Neguev (layers 1–3) and Ksar Akil in the Lebanon (Bar-Yosef 1998; Bar-Yosef and Pilbeam 2000; Marks 2003).

In Southeastern and Central Europe, similar elements appear of new blade technologies whose presence cannot be accounted for by the evolution of a local Mousterian. We can, therefore, assume that the formation of European Initial Upper Paleolithic cultures such as the Bachokirian in Bulgaria and the Bohunician in the Middle Danube Basin was the result of migrations of Anatomically Modern Humans from the Near East between 45 and 42 Kyr BP (Svoboda and Bar-Yosef 2002; Kozłowski 2004).

The first unit – the Bachokirian – known from layer 11 of the Bacho Kiro Cave and layer VI (trench TD-II) and layer 4 (trench TD-I) of the Temnata Cave (Bulgaria) was characterized by the use of Levallois technique based on the reduction of single- and double-platform cores, which evolved toward the volumetric Upper Paleolithic blade cores. The types of retouched tools include forms representing Middle Paleolithic tradition, but most tools are end scrapers, burins, and retouched blades of Upper Paleolithic type (Fig. 1). It should be stressed that raw material economy, especially in Bacho Kiro Cave, is highly specific based on the exploitation of extra-local siliceous rocks. The occurence at sites of mainly blanks and retouched tools points to the segmentation of reduction process in time and place, thus making the Bachokirian different from local Middle Paleolithic industries (Kozłowski 2004; Tsaneva 2007).

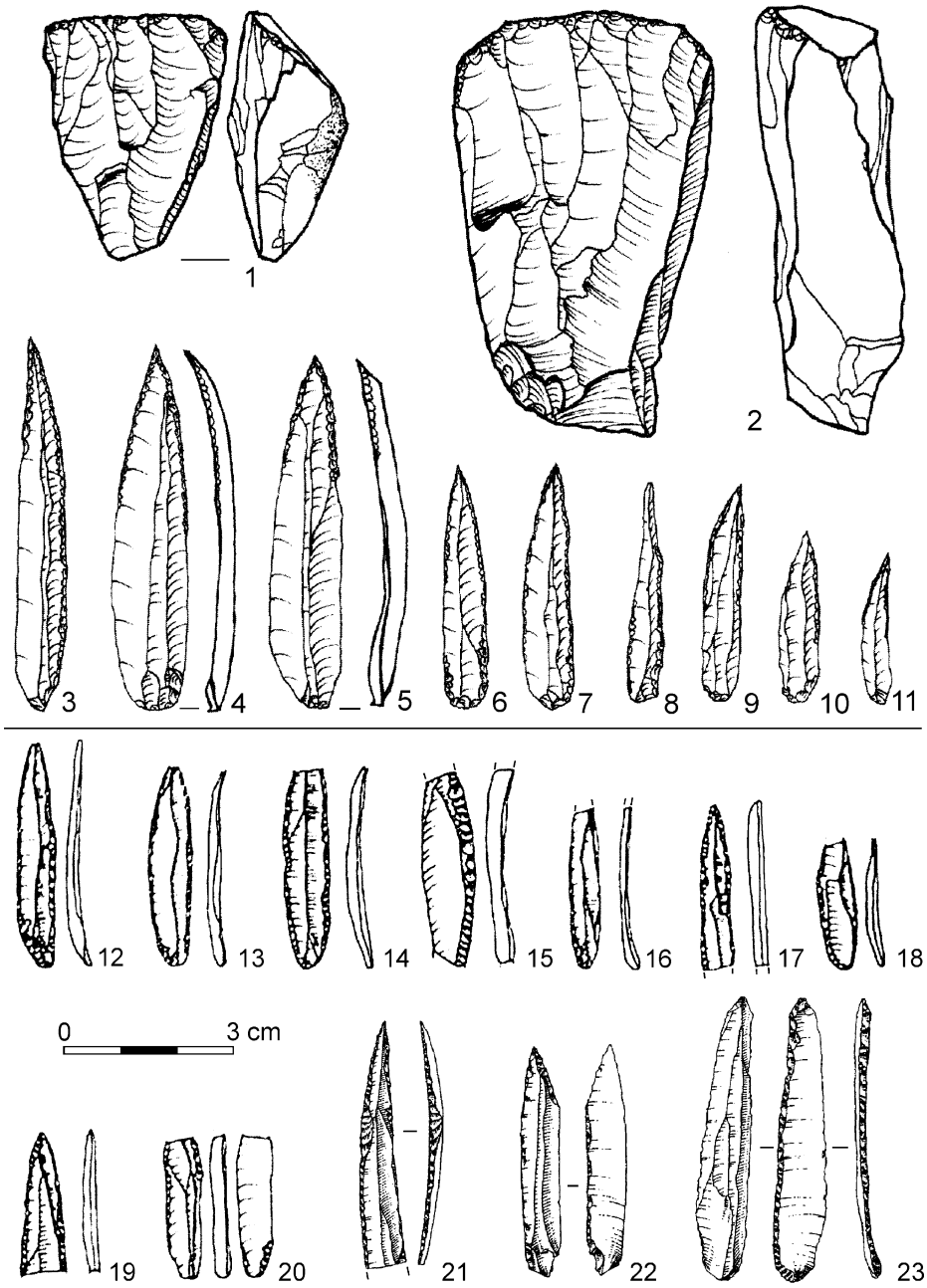

Europe: Early Upper Paleolithic, Fig. 4 Lithic artifacts of the Early Ahmarian in the Near East (*1*, *2* – cores, *3–11* – retouched bladelets after A. Belfer-Cohen and N. Gorring-Moris) and the European Proto-Aurignacian from the Fumane Cave, Northern Italy (*12–23* – microretouched bladelets, after A. Broglio)

The second unit, similar to the Bachokirian, is the Bohunician, known from southern Moravia (Brno-Bohunice, Brno-Stranska skala). This unit exploited mainly south Moravian siliceous rocks that were worked on-site in a full reduction cycle. Blank production, first of all points and blades, was based on Levallois technique; however – parallel to it – the Upper Paleolithic technology of

Europe: Early Upper Paleolithic, Fig. 5 Fumane Cave, Northern Italy: painted rock fragments from the Proto-Aurignacian layer. (After A. Broglio and G. Dalmeri)

volumetric blade cores was also used. Among tools, too, there are both Middle Paleolithic sidescrapers and points, as well as Upper Paleolithic end scrapers and burins (Fig. 2). The sites of the Bohunician were situated on the Loess Plateaux in the tundra and steppe environments. Except the hearths habitation structures have not been registered (Svoboda 2003). The range of the Bohunician extended further north to southern Poland (Dzierzyslaw) and probably to Volhynia (Kulitchivka).

After the first expansion of Anatomically Modern Humans, represented by the Emirian from the cradle area in the Near East, further leptolithization (transformation into the Upper Paleolithic) continues (Fig. 3). The process gave rise to the Early Upper Paleolithic, most importantly represented by the Ahmarian on the Syro-Palestinian coast (Fig. 4: 1–11), whose characteristic feature are microretouched bladelets (Bar-Yosef and Belfer-Cohen 2010). From the Early Upper Paleolithic, industries like this are known along the entire northern coast of the Mediterranean where they are described as the Proto-Aurignacian or the Fumanian (Broglio and Dalmeri 2005). Similar industries of the Early Upper Paleolithic are also known from the Middle East (Baradostian in Iraq and Iran – Otte and Kozłowski 2009).

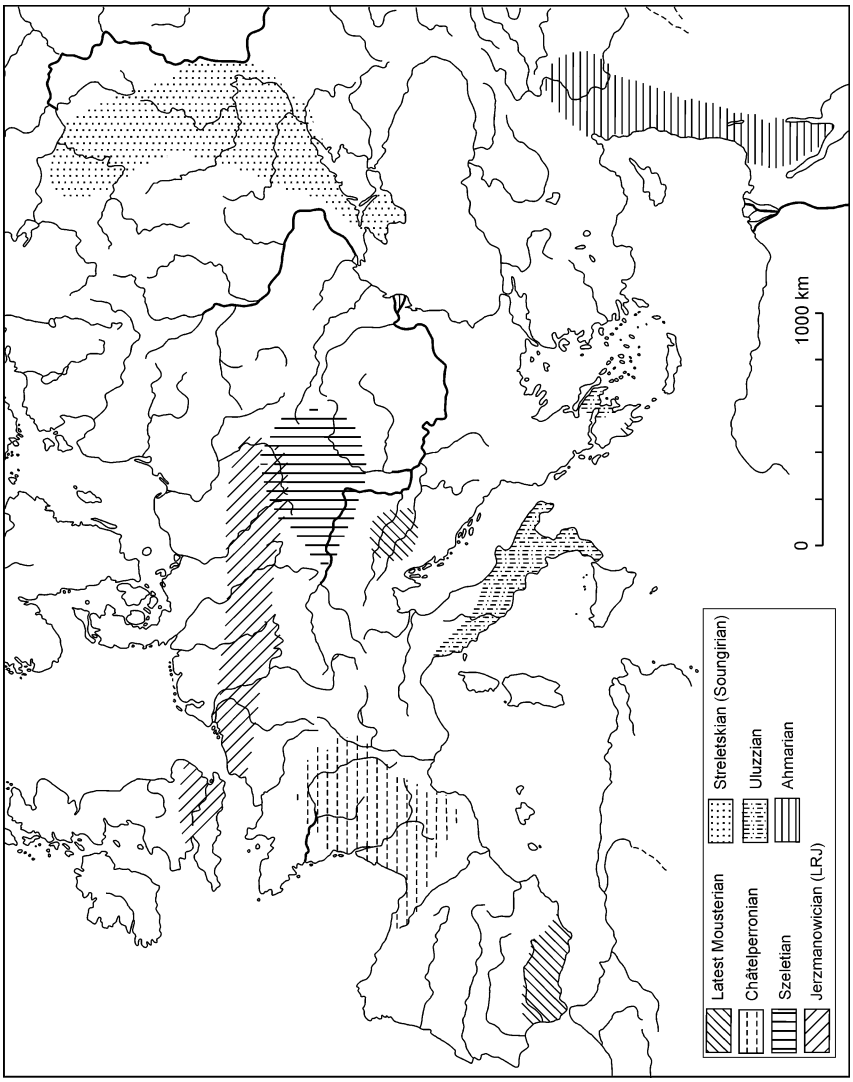

Europe: Early Upper Paleolithic, Fig. 6 Map of the "transitional cultures" and the last Mousterian

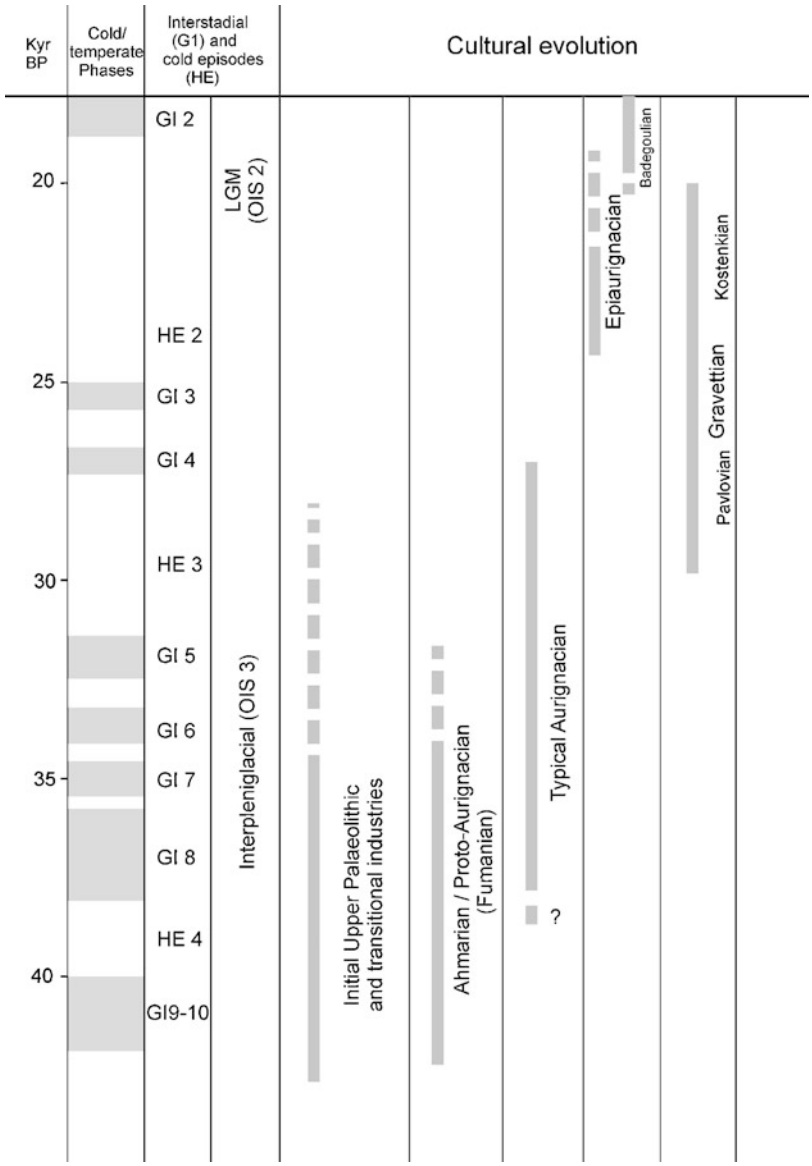

Europe: Early Upper Paleolithic,
Fig. 7 Chronological table of the Initial and Early Upper Palaeolithic

Diffusion via Anatolia and the Balkans is documented by Fumanian assemblages in the eastern Balkans (Kozarnika Cave – Tsaneva 2007), in the Northern Italy (Fumane Cave – Fig. 4: 12–23; Riparo Mochi), in Southern Italy (Paglici, Castelcivita), southern France (the southern facies of the Aurignacian acc. to Bon 2002), and in Catalonia (Arbreda, Raclau, Viver, Mollet I, etc. Fullola i Pericot, Soler i Masferrer 2003–2004). The Fumanian displays a fully developed blade and bladelet technique based – among others – on carenoidal cores, also with Aurignacian bone points, numerous shell decorations, with structured layout of camps, and incipients of figural rock paintings (Fig. 5) (Broglio and Dalmeri 2005). Most components of the "Upper Paleolithic" revolution were introduced in the Fumanian; many of these innovations became later a component of the typical Aurignacian – a unit that for several millennia dominated western Eurasia.

Most of the radiocarbon dates for the Fumanian are in the interval between 30 and 33 Kyr BP

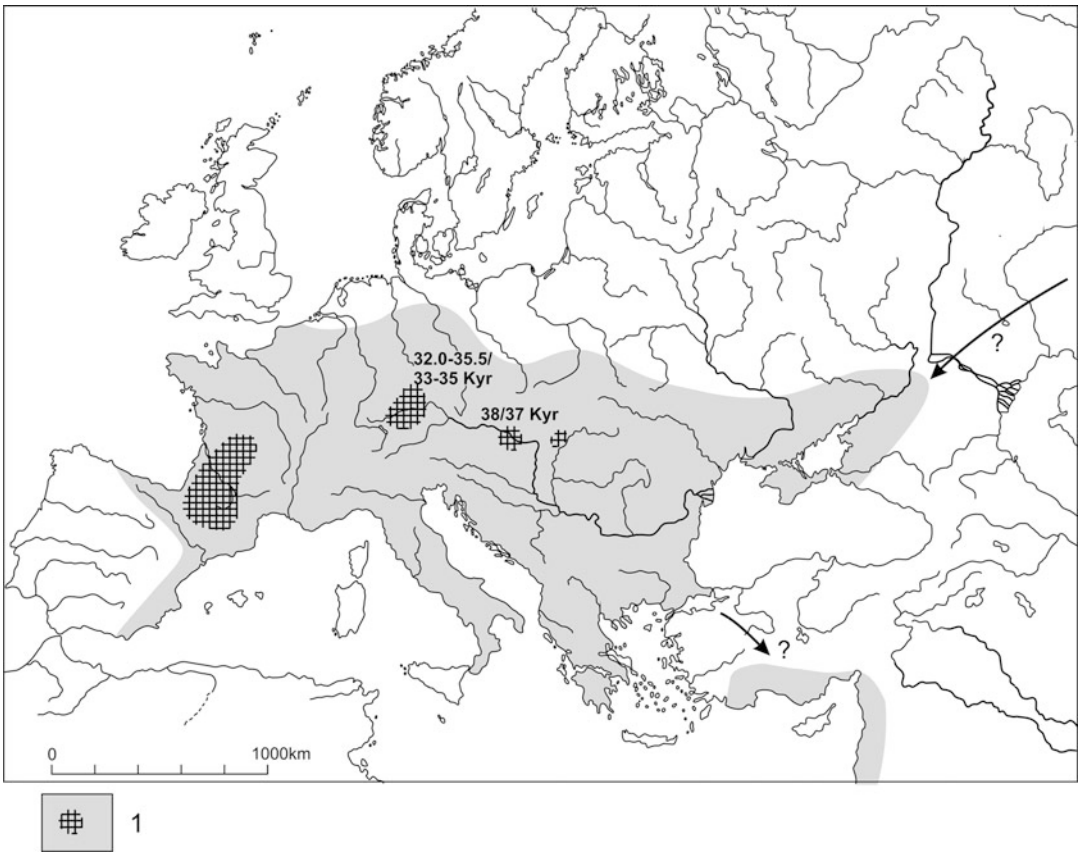

Europe: Early Upper Paleolithic, Fig. 8 Map of the typical Aurignacian (*1*) with primary centers in the middle and upper Danube Basin and in France

(Higham et al. 2009). But at some sites in Italy (Castelvicita, Paglici, Serino – Giaccio et al. 2008), also in the Russian Plain (Kostenki 14 – Sinitsin 2003), Fumanian levels are sealed by Campanian Ignimbrite tephra which is the effect of the volcanic eruption of Phlegraean Fields today dated at 39.3 Kyr BP. This age of the eruption has been confirmed by recent AMS determinations (using ABA and ABOX methods) for Upper Paleolithic levels covered by Campanian Ignimbrite from Italy as far as the Russian Plain. It should be added that the Bachokirian in the Temnata Cave is too sealed by tephra from the same CI eruption in Central Italy.

Besides these two units (Levallois-derived and Proto-Aurignacian/Fumanian), alien in Europe, some units developed on local substratum of Middle Paleolithic traditions. "Transitional units" emerged in Europe in the period of cohabitation of Neanderthals and Anatomically Modern Humans; it is difficult to decide whether "transitional units" are the effect of exclusively local, autonomous evolution of Middle Paleolithic tradition or the effect of contacts with and "borrowings" from the first Homo sapiens. "Transitional units" evolved from the Mousterian as well as the Micoquian; besides technological traditions of the Middle Paleolithic, "transitional units" display, too, in a various degree, Upper Paleolithic technologies and stylistics (Fig. 6).

From the Mousterian evolved units using blade technique and steep retouch shaping backed pieces: in Western Europe this is the Chatelperronian (Pelegrin 1995) and in central Mediterranean the Uluzzian (Palma di Cesnola 1993). In both units blade technique was used to produce blanks retouched into backed points.

From the Micoquian evolved industries with bifacially retouched leaf points, technologically highly advanced; in Central Europe this is the Szeletian and in Eastern Europe the Streletskian/Sungirian. In these units the Upper Paleolithic component is represented by mainly end scrapers, but basic tool kit is on flakes.

Unfortunately, we have very little data on the biological nature of the populations of "transitional units." We know that at least the early phases of the Chatelperronian and the Szeletian can be ascribed to the Neanderthals (compare remains from layer EJOP at St. Cesaire, also – in all likelihood – from the lower Szeletian layer from the Szeleta Cave in Hungary). If we take into account the long duration of the functioning of these units (e.g., Szeletian and Streletskian/Sugirian until the middle phase of the Upper Paleolithic 27/25 Kyr BP), we can assume that late populations of these units were already Anatomically Modern Humans. It should be stressed that one of the individuals from the relatively late graves from Sungir in the central Russian Plain (dated to about 27 Kyr BP) shows – as some anthropologists claim – some Neanderthaloid features, while the second individual is typically modern. This interpretation is, however, still controversial (Mednikova 2005).

The period when Neanderthals vanished and the Anatomically Modern Humans expanded saw rapid climatic changes (RCC) with large amplitudes (Dansgaard/Oeshger fluctuations, between subsequent Heinrich 4 and 2 cold events). The environmental changes, rhythmically repeated, could not have major influence on the recession of the Neanderthals and the expansion of Anatomically Modern Humans. Rather it was the competition for ecological niches, to which Neanderthals had been adapted, that was the main cause of the extinction of Neanderthals before the Glacial Maximum when this population was pushed into enclaves in Andalusia, Croatia, and Crimea (Fig. 7).

The final stage of the formation of the Upper Paleolithic in Europe is represented by the typical Aurignacian (Fig. 8), mostly dated after 36 Kyr BP (Kozłowski and Otte 2000; Otte 2010). The origin of the typical Aurignacian is the subject of discussions, but it seems most probable that the Proto-Aurignacian/Fumanian was its ancestor. Some centers of the early phase of the typical Aurignacian were situated more to the north from the Proto-Aurignacian, i.e., in the middle and upper Danube Basin and in southern France (Teyssandier 2007).

Cross-References

- ▶ Art, Paleolithic
- ▶ Bone Tools, Paleolithic
- ▶ Lithic Technology, Paleolithic

References

Bar-Yosef, O. 1998. On the nature of transitions: The Middle to Upper Palaeolithic and the Neolithic revolution. *Cambridge Archaeological Journal* 8: 141–163.

Bar-Yosef, O., and A. Belfer-Cohen. 2010. The Middle to Upper Palaeolithic transition in Western Asia. In *The Upper Palaeolithic revolution in global perspective*, ed. K. Boyle, C. Gamble, and O. Bar-Yosef, 85–102. Cambridge: McDonald Institute Monographs.

Bar-Yosef, O., and D. Pilbeam, eds. 2000. *The geography of Neanderthals and modern humans in Europe and the Greater Mediterranean*. Peabody Museum Bulletin 8.

Bar-Yosef, O., and B. Vandermeersch. 1993. Modern humans in the Levant. *Scientific American* 268: 94–100.

Bon, F. 2002. *L'Aurignacien entre mer et ocean. Reflexion sur l'unite des phases anciennes de l'Aurignacien dans le Sud de la France*. Mémoire 29. Paris: Société Préhistorique Française.

Boyle, K., C. Gamble, and O. Bar-Yosef, eds. 2010. *The Upper Palaeolithic revolution in global perspective*. Cambridge: McDonald Institute Monographs.

Broglio, A., and G. Dalmeri. 2005. Pitture palaolitiche nelle Prealpi Veneti. *Memorie del Museo Civico di Storia Naturale* 9.

Caramelli, D., C. Lalueza-Foc, C. Vernesi, M. Lari, M. Casoli, F. Mallegni, B. Chiarelli, I. Dupanloup, J. Bertranpetit, G. Barbujani, and G. Bertorelle. 2003. Evidence for genetic discontinuity between Neanderthals and 24,000-year-old anatomically modern European. *Proceedings of the National Academy of Sciences of the United States of America* 100: 6593–6597.

Currat, M., and L. Excoffier. 2004. Modern humans did not admix with Neanderthals during their range expansion into Europe. *PLoS Biology* 2: 2264–2274.

Forster, P. 2004. Ice Ages and the mitochondrial DNA chronology of human dispersals, a review. *Philosophical Transactions of the Royal Society of London B* 359: 255–264.

Fullola-Pericot, J.M., and N. Soler. 2003–04. El Palaeolithic superior a Catalunya. *Fonaments* 10/11: 97–132.

Giaccio, B., I. Hajdas, M. Peresani, F. Fedele, and R. Isaia. 2008. The Campanian Ignimbrite (ca 40 Kyr BP) and its relevance for the timing of the Middle to Upper Palaeolithic shift: Timescales and regional correlations. Neanderthals and modern humans meet? International Workshop Tubingen 2004.

Higham, T., F. Brock, M. Peresani, A. Broglio, R. Wood, and K. Douka. 2009. Problems with radiocarbon dating the Middle to Upper Palaeolithic transition in Italy. *Quaternary Science Review* 28: 1257–1267.

Kozłowski, J.K. 2004. Early Upper Palaeolithic Levallois-derived industries in the Balkans and in the Middle Danube basin. *Anthropologie* 42: 263–280.

Kozłowski, J.K., and M. Otte. 2000. The formation of the Aurignacian in Europe. *Journal of Archaeological Research* 56: 513–535.

Kozłowski, J.K., and D. Sacchi. 2007. Looking the origin of modernity. *Diogenes* 214: 134–147.

Lalueza-Fox, C., M.L. Sampietro, D. Caramelli, Y. Puder, M. Lari, F. Calafeil, and C. Martinez-Masa. 2006. Neanderthal evolutionary genetics; mitochondrial DNA data from the Iberian Peninsula. *Molecular Biology and Evolution* 22: 1077–1081.

Lieberman, D.E. 1998. Neanderthal and early modern human mobility patterns: Comparing archaeological and anatomical evidence. In *Neanderthals and modern humans in western Asia*, ed. T. Akazawa, K. Aoki, and O. Bar-Yosef, 263–275. New York: Plenum Press.

Marks, A.E. 2003. Reflections on the Levantine Upper Palaeolithic studies: Past and present. In *More than meets the eye: Studies on Upper Palaeolithic diversity in the Near East*, 106–117. Oxford: Oxbow.

Marshack, A. 1997. Palaeolithic image making in Europe and in the Middle East: A comparative review. In *Beyond art: Pleistocene image and symbol*, ed. M. Conkey, O. Soffer, D. Stratmann, and N.G. Jablonski, 53–91. San Francisco: California Academy of Sciences.

Mednikova, M.B. 2005. Middle to Upper Palaeolithic transition in Europe: Issues in the assessment of the biological affinities of Upper Palaeolithic skeletal remains. In *The Middle to Upper Palaeolithic transition in Eurasia: Hypotheses and facts*, 144–156. Novosibirsk.

Meignen, L., and O. Bar-Yosef. 2005. Lithic industries of the Middle and Upper Palaeolithic of the Levant: Continuity or break? In *The Middle to Upper Palaeolithic transition in Eurasia: Hypotheses and facts*, 166–175. Novosibirsk.

Mellars, P., ed. 1990. *The emergence of modern humans: An archaeological perspective*. Edinburgh: Edinburgh University Press.

Mellars, P., and C. Stringer. 1989. *The human revolution: Behavioural and biological perspectives on the origin of modern humans*. Edinburgh: Edinburgh University Press.

Mellars, P., K. Boyle, O. Bar-Yosef, and P. Stringer, eds. 2007. *Rethinking the human revolution: New behavioural and biological perspectives of the origin and dispersal of modern humans*. Cambridge: Mc Donald Institute.

Orlando, L., P. Darlu, M. Toussaint, D. Bonjean, M. Otte, and C. Hanni. 2008. Revisiting Neanderthal diversity with a 100,000 year old mtDNA sequence. *Current Biology* 16: 400–401.

Otte, M., ed. 2010. *Les Aurignaciens*. Paris: Errance.

Otte, M., and J.K. Kozłowski. 2009. Origines du Paleolithique superieur en Asie Occidentale. In *Le Paleolithique d'Iran*. British Archaeological Reports International series 1968, 57–72. Oxford: Archaeopress.

Paabo, S., H. Poinar, D. Serre, V. Jaenicke-Despres, J. Hebler, N. Rohland, M. Kuch, J. Krause, I. Vigilant, and M. Hofreiter. 2004. Genetic analyses from ancient DNA. *Annual Review of Genetics* 38: 645–679.

Palma di Cesnola, P. 1993. *Il Paleolitco Superiore in Italia*. Firenze: Garlatti & Razzai.

Pelegrin, J. 1995. Technologie lithique: le Chatelperronien du Roc de Combe. *Cahiers du Quaternaire* 20: 297.

Schmitz, R.W., D. Serre, O. Bonani, S. Feine, F. Hillgruber, H. Krainitzki, S. Paabo, and F.H. Smith. 2002. The Neanderthal type site revisited: Interdisciplinary investigation of skeletal remains from the Neander valley, Germany. *Proceedings of the National Academy. of Sciences of the United States of America* 99: 13342–13347.

Serre, D., A. Langaney, M. Chech, M. Tescher-Nicola, M. Paunovic, P. Mennecier, M. Hofreiter, O. Possnert, and S. Paabo. 2004. No evidence of Neanderthal mtDNA contribution to early modern humans. *PLoS Biology* 2: 313–317.

Sinitsin, A. 2003. A Palaeolithic "Pompei" at Kostenki. *Antiquity* 77: 9–14.

Stiner, M.C. 1993. Modern human origins. Faunal perspective. *Annual Review of Anthropology* 22: 55–82.

Stringer, C., and C. Gamble. 1993. *In search of the Neanderthals*. London: Thames and Hudson.

Svoboda, J. 2003. Continuities, discontinuities and interactions in the early Upper Palaeolithic technologies. A view from the Middle Danube. In *The early Upper Palaeolithic beyond western Europe*, 30–49. Los Angeles: University of California Press.

Svoboda, J., and O. Bar-Yosef, eds. 2002. *Stranska skala. Early Upper Palaeolithic occupations in the Brno Basin, Czech Republic*. Cambridge: Peabody Museum.

Teyssandier, N. 2007. *En route vers l'Ouest: les debuts de l'Aurignacien en Europe*. British Archaeological Reports International series 1638. Oxford: Archaeopress.

Tsaneva, T. 2007. *Les debuts du Paleolithique superieur dans l'Est de Balkans. Reflexions a partir de l'etude taphonomique et techno-economique des ensembles lithiques des sites de Bacho Kiro (couche 11), Temnata (couches VI et 4) et Kozarnika (niveau VII)*. British Archaeological Reports International series. Oxford: Archaeopress.

Further Reading

Broglio, A. 1996. Le punte a dorso del protoaurgnaziano mediterraneo i reperti della grotta di Fumane. In *UISPP XIII Congres*, *Colloquium XII*, 237–248. Forli.

Broglio, A. 2006. Piture aurignaziane nella grotta di Fumane. *Memorie del Museo Civico di Storia Naturale di Verona* 9: 11–63.

Stiner, M. 1994. *Honor among thieves: A zooarchaeological study of Neanderthal ecology*. Princeton: Princeton University Press.

Europe: Mesolithic-Neolithic Transition

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Introduction

As is known, the Mesolithic is not distinguished by striking specific traits in the archaeological record: it is actually defined as the age of the "middle" Stone Age, halfway between the "early" Stone Age, or Paleolithic, and the "new" Stone Age, or the Neolithic. In addition, it is the last prehistoric period recognized as such (Rowley-Conwy 1986: 17), and its origin seems to be vitiated by errors of assessment. The first and chief student of European Mesolithic, Grahame Clark (1980), who has also recounted the history of the emergence and development of that concept, concludes that it was defined by the so-called hiatus theory, based first on the belief that there were few archaeological traces of this period (occupation gap), and later also on the belief that the cultures of that period were of minor importance (cultural gap). The theory of discontinuity, according to Clark, "can be shown to have warped much of our thinking" (quoted in Rowley-Conwy 1986: 17). There were additional difficulties later: the introduction of the term Epipaleolithic, used to designate the end of the Paleolithic and superimposed ambiguously upon the Mesolithic, and the occasional use of the term Neolithic to indicate not only the new economy but also those hunting cultures which are still Mesolithic, but which already use pottery.

Definition

What is then the modern meaning of the concept of the Mesolithic? From the chronological point of view, it is easy to describe, since it coincides with the end of the glaciation in Europe and the beginning of the postglacial period, that is, of the climatic conditions of the Holocene. In this sense, it is possible to argue that the Mesolithic is the first archaeological period of the Holocene, which began about 11,000 years ago, and comprised the last European fishing and hunting cultures, highly specialized and extremely productive particularly in the area of northern Europe, recently freed from ice. In fact, agriculture emerges as the dominant economy immediately after the Mesolithic cultures.

Key Issues/Current Debates

Nevertheless, the problem of the Mesolithic is not in its chronology, but in the evaluation of its role. Therefore, some fundamental questions have to be asked: Is the Mesolithic merely a period of highly specialized postglacial fishers, or something much more? Is it simply a continuation of the Upper Paleolithic (Gamble 1986), somewhat more advanced in some western parts of northern Europe, but static in central Europe (Vencl 1986), or a period of major innovations leading to the development of agriculture and facilitating its adoption? What was the role of the Mesolithic in the transition to agriculture: a passive role in face of invasion and colonization, or an active role, involving contribution and collaboration?

Seen within the framework of current archaeological research, the transition from the Mesolithic to agriculture can be explained in two radically different ways: by giving western Asia, as the fountainhead of agriculture, the chief role in this transition, effected in the course of the colonization of Europe, or by assigning that role to Europe and assuming that the transition was the result of a supposed process of adoption and/or active development by European Mesolithic hunters and gatherers. According to the former view, the cultivators migrated from east to west

and colonized Europe, and the European hunters and gatherers were mere survivors, destined to be absorbed by the newcomers; according to the latter view, the cultivators and the hunters-gatherers were the same persons, and agriculture emerged as a result of an active process during the transition from one economy to another. In the former case, all the innovative developments took place in western Asia, and the role of the Mesolithic hunters and gatherers of Europe was limited to that of assisting the inexorable advance of the oriental Neolithic civilization. In the latter case, the autochthonous hunters and gatherers were the principal factors responsible for the transition, which was carried out with an equipment of the do-it-yourself type, adapted to intensify the practices of the management of groups of animals, practices which, according to this view, can be traced back to the Upper Paleolithic and which had been experimented with in connection with all animals, from snails to sheep, well before the Neolithic (Zvelebil 1986b: 175).

At the center of this ongoing controversy concerning the Mesolithic and its role in the transition to the Neolithic is the thought of an entire archaeological school, represented by scholars like Clarke, Ashbee, Dennell, and Price (Vencl 1986: 43), which maintains that the Mesolithic hunters and gatherers made a fundamental contribution to the process leading to the emergence of agriculture in Europe and which arrives at the conclusion that there was not a break but only, or at least predominantly, continuity. Typical of this school is the assertion: "In virtually every area of Europe, the transition from Mesolithic foragers to Neolithic farming witnesses distinct aspects of continuity in human adaptation… The end of the Mesolithic is not brought about by an advance of invading farmers but rather reflects a period of readaptation and adjustment to changing environment and new subsistence practices, often within the context of existing societies" (Price 1983: 771).

It is quite clear that the new view of the Mesolithic is a typically processual one, which opposes continuity and processes of local development to the hypothesis of an invasion from the east. As an archaeologist has said: "continuity, rather than contrast, is the fashion of the day" (Zvelebil 1986b: 168).

The study of continuity, naturally, leads to two different results depending on the context. Where continuity is an already existing phenomenon, that is, in the substantially unitary long periods of prehistory (Paleolithic, Neolithic, the Metal ages), the tendency is to find elements which anticipate the next period and prepare the transition to it. Where discontinuity is implicit, that is, in the transition from one period to another, the tendency is to look for continuity and downgrade the disruptive elements.

As regards the transition from Upper Paleolithic to Mesolithic, for example, research has brought to light numerous traits which link these two periods in spite of their discontinuity. The technological ones include the bow and arrow, harpoons, and tools made of polished stone. Among the traits concerning the use of resources are fishing, gathering of sea food, and, possibly, domestication of the dog. The organizational traits include logistic mobility, storage of products for later use, tendency toward sedentarism, and specialization of labor.

As regards the Mesolithic, the traditional view, which interprets the postglacial socioeconomic developments as a later elaboration of patterns already emergent in the Upper Paleolithic and postulates a neat break only at the beginning of the Neolithic, is opposed, as I have already said, by scholars who see the postglacial period as an age of such fundamental innovations that it led inevitably to the agriculture of the Neolithic (Zvelebil 1986b: 168).

The Neolithization of Europe: Zvelebil's Theory

Confronted with the two opposed theories of Mesolithic – either exclusively indigenous development or exclusively external colonization – one may naturally ask: Is it really necessary to adopt one of these two models? Would it not be possible to take a less clear-cut view, without abandoning completely the model of colonization and also leaving place for local processes (Zvelebil 1986b: 167–168)?

A major representative of the innovating school, Marek Zvelebil, who has recently been

defined "as being among the most important and influential archaeological thinkers of his generation" (Lillie 2011), stands out as both editor of a fundamental collection of studies (Zvelebil 1986) and author of two major articles (Zvelebil 1986a, b), in which he advocates a position of the above mentioned type, which seems to me particularly congruent with facts and free from apriorism.

Zvelebil directs his criticisms primarily against the traditional invasionist approach, which is in his view impaired by too reductive a view of the hunting-gathering cultures. Actually, Zvelebil, too, shares what is today the common view of archaeologists and historians of archaeology: the identification of colonialism as the source of many ideas, ideological rather than scientific, which persist in archaeology to the present day. To him, the endurance "of prejudices towards recent hunters-gatherers [is] itself a consequence of the European colonial expansion" (Zvelebil 1986b: 6–8).

This constant emphasis on ideology as an explanatory factor is in my view one of the major merits of modern archaeology. According to Zvelebil, it was only with the publication of *Man the Hunter* (Lee and De Vore 1968), which introduced the conception of the affluent forager, that an approach not vitiated by ideology was adopted in the study of hunter-gatherer cultures. The discovery of the economic prosperity of the forager of Upper Paleolithic and Mesolithic led to the discovery of his social complexity and to the emergence of the notion of the complex forager and that in turn was followed by the resumption – after a long interval – of comparative studies of ethnographic and archaeological cultures of hunters and gatherers. These studies gave rise to a new conception of hunting-gathering cultures, the basic traits of which are (1) a remarkable degree of sedentarism, (2) increase in demographic density, (3) socioeconomic differentiation with consequent division of labor, (4) development of trade, (5) emergence of war, and (6) intensification of social and ritual life (Zvelebil 1986b: 8). In other words, traits previously attributed solely to the revolutionary cultivators of the Neolithic were now recognized as existing also in the immediately preceding societies of hunters and gatherers. Seen in this light, the postglacial hunters and gatherers represent, needless to say, the necessary "prelude" to the cultivators.

Zvelebil then makes some lucid comments on certain factors of innovation which emerge as a result of the great ecological changes at the end of the glacial: the awareness of the seasonal availability of resources, the risk and effort involved in the exploitation of resources within such seasonal limits, and the development of important technical innovations for the more efficient use of the time available for exploitation. The new implements for fishing (ditches, traps, dams, and nets) can be in fact seen as means of saving time and ensuring storage (Zvelebil 1986b: 169–170), serving the same purpose as composite tools (microliths set into wooden or bone handles) (Zvelebil 1986b: 168–169).

The relationship between the increase of sedentarism and the increase of population is also important. Among the modern ethnographic populations, the demographic increase of fishers, leading a sedentary life and using storage of resources typical of the Mesolithic, is equal to that of the simple farming populations, and it is much higher than the increase in the hunting-gathering societies (Zvelebil 1986b: 172).

Recent research has identified some Mesolithic technical innovations which were unknown in the Upper Paleolithic but are common in the Neolithic: new flint working techniques; some types of bone and antler tools such as axes and sickles; nets, fish traps, and other sophisticated implements for fishing and hunting; pottery; means of transportation like sledges and skis; the majority of objects of adornment; new burial rites; etc. (Zvelebil 1986b: 168).

Other scholars (e.g., Higgs and Coles 1969) have identified pre-Neolithic forms of managing herds of ungulates, which show that it may be possible to trace the beginnings of the techniques of domestication to the early postglacial, and even to the late glacial, in geographical areas which include the Mediterranean and parts of temperate Europe (cf. Zvelebil 1986a: 9; Forni 1990).

Accordingly, European agropastoralism might represent a continuation of tendencies which

asserted themselves in the Mesolithic. This is particularly apparent in southeastern Europe and in the western Mediterranean, where it assumed the form of a replica and development of the already existing systems of the exploitation of resources (Zvelebil 1986b: 181).

The transition to agriculture took place against this complex and innovative background. Zvelebil distinguishes a number of approaches to this problem, which, for convenience sake, can be reduced to the two already mentioned opposite views: the traditional invasionist model and the innovative model based on the principle of continuity.

The traditional diffusionist and invasionist model is based on the idea of the absolute superiority of agriculture, as an economic system, to hunting and gathering, and, consequently, of the invaders to the natives. The adoption of agriculture is seen as a more or less automatic process, followed, after the conversion, by the colonization of new areas by the neo-agricultural communities and by the dislocation and assimilation of the surviving groups of hunters (Zvelebil 1986a: 8–9).

Zvelebil is critical of this model of the Neolithization of Europe and particularly of that based on the so-called wave of advance, proposed by Ammermann and Cavalli Sforza (1973, 1984), which has also inspired Renfrew (1987). According to these authors, the wave-like spread of agriculture is compatible with the real dates of the diffusion of agriculture as established by archaeology, as well as with the patterns of genetic variation of the European population, as established by geogeneticists. Zvelebil considers this as a more sophisticated variant of the traditional model insomuch as it assumes a uniform diffusion of agriculture in Europe from its center in western Asia, with a gradual colonization of areas increasingly remote from the original source of diffusion. His objection is that this model is too reductive as regards the hunting-gathering cultures and that it assumes a "normal" (instead of "exceptional") discontinuity between the Mesolithic and the Neolithic, in spite of the fact that there are many evident forms of overlapping and continuity between the cultures belonging to these periods (Zvelebil 1986a: 10–11).

It may be useful to enumerate at this point both the responses of the supporters of the invasionist model and Zvelebil's counterarguments (Zvelebil 1986b: 177–178).

I. The wave of advance of agriculture clearly spreads from the eastern Mediterranean northward and westward, which proves the eastern provenance of the colonizers.
   1. Counterargument: the diffusion might have been a diffusion of new traits of economy, not necessarily of people.

II. There are notable similarities between the material culture of the cultivators from western Asia and that of European cultivators, particularly in pottery and stone technology.
   2. Counterargument: there are equally numerous proofs of continuity between the material culture of the European Mesolithic and the Neolithic. One thing does not exclude the other.

III. It may be expected that the superior numbers of the farming populations led to the assimilation and disappearance of the less numerous autochthonous communities.
   3. Counterargument: the Neolithic demographic potential has been overestimated and that of the Mesolithic underestimated.

   Zvelebil adds to these three counterarguments two arguments of a different kind but in my opinion of considerable weight.

   4. It has been established that the wild ancestors of some species domesticated later were present in the Mediterranean, too, so that it is possible that there was a local development of the process of domestication.
   5. There is no proof of demographic pressure in western Asia which might have driven colonizers to migrate, and there is little proof of early Neolithic settlements in western Turkey, supposed to be the base for the colonization of Europe (Zvelebil 1986b: 178).

Further elaborating his model, Zvelebil (1986b: 178–179) distinguishes four types of habitats in Europe:

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A. Areas ideal for agriculture and not suitable for hunting and gathering: the Thessalian plain, the Tavoliere in Puglia, the loess regions of central Europe, and the basins of great rivers such as the Danube, the Rhine, or the Seine. It is not by chance that these were the first areas to be cultivated.
B. Areas suitable for both farmers and hunters-gatherers: river valleys and large coastal plains. These areas witnessed the introduction of agriculture immediately afterward.
C. Areas very suitable for hunting and gathering but rather unsuitable for cultivation: the coastal zones of Scotland, estuaries, river gorges, and lakes. They were the last to adopt agriculture in the initial period.
D. High and mountainous zones, which were cultivated or exploited for stockbreeding only in the stage of the secondary expansion of agriculture, in the late Neolithic.

Hence, Zvelebil's important conclusion: the expansion of agriculture did not follow the wave model but had a mosaic-like pattern.

Natural factors, on the other hand, do not explain everything: the boundary of agriculture remained stationary in the north European plain for a long time, as might be expected, but there was a long delay in the adoption of the new economy even in some areas suitable for cultivation, like the river valleys and the terraces of Ukraine and the southern Urals. Variations of this type can be explained only by assuming that they were caused by local factors, such as the favorable socioeconomic conditions of the local hunters and gatherers (Zvelebil 1986b: 180).

The originality of this analysis consists in the new general interpretation of the Mesolithic and Neolithic economy: the highly specialized Mesolithic hunting and gathering and the Neolithic agriculture are no longer seen as "stages" of an evolutive sequence with a predictable outcome but as specialized systems of exploitation, alternative and parallel, and both conditioned by the varying ecological factors prevailing in the difficult postglacial conditions: in western Asia, there was genetic domestication of mutually complementary animal and plant species, while moderate Europe saw only an advance in technological specialization and intensification of exploitation, without any form of animal or plant domestication (Zvelebil 1986b: 173–174). In western Asia, there were both wild cereals and gregarious ungulates, amenable to domestication; in Europe, on the other hand, there lived red deer, roe deer, the stag, the moose, and the gazelle, none of them responsive to domestication. The only European animals which could be domesticated were the wild pig, the wild ox, and the goat. Hence the hypothesis of a limited domestication of the goat, bovine cattle, and the pig in eastern Europe and on the southern fringes of central Asia. The picture is not different as regards the domestication of plants.

On the basis of this, Zvelebil argues that agriculture could not have developed in temperate Europe. Besides, agriculture had a decidedly minor role in the European areas where the hunting-gathering economy attained a high level of productivity (i.e., along the Atlantic coast and the ice cap, as well as in the valleys of great rivers and lakes – all habitats rich in aquatic resources), because the level of prosperity achieved by the Mesolithic economy favored the continuation of specialized hunting and gathering (Zvelebil 1986b: 181). Nevertheless, there were always contacts and mutual influences between the two systems, since the boundary between the two areas was not closed, but "porous" (Zvelebil 1986b: 182–183).

To conclude, Zvelebil (1986b: 175) advocates a regional model of transition to agriculture, which combines and integrates the invasionist and evolutionist approaches, and leaves the determination of their respective contributions to the interpretations of objective archaeological data. As a result, we have the following situation.

I. In the eastern Mediterranean (Greece), in the Balkans and central Europe, archaeological evidence indicates that the introduction of agriculture was a rapid process developing on the foundation of a complete "package" of cultivated plants and domesticated animals, with the appertaining techniques of exploitation, introduced from the outside.

Consequently, the Neolithic cultures of Tripolye in Ukraine, the Linear Bandkeramik (LBK) in central Europe, the Funnel-Beaker culture (TRB) of Scandinavia, and the Impressed Ware culture of southern Italy are seen as intrusive cultures and products of colonization (Zvelebil 1986b: 184).

II. The archaeological documentation for the second group of areas shows that a rapid process of local adoption took place, that is, that agriculture was taken up by the indigenous populations in a local Mesolithic context. The most likely area in this group is the western Mediterranean, where agriculture appeared too soon to be a result of migration (Zvelebil 1986b: 175, 184).

III. In the two lateral areas, on the shores of the Atlantic and in eastern Europe, archaeological evidence indicates a much slower process of local adoption, protracted over millennia.

Besides, in the areas where archaeological evidence indicates colonization, the most likely explanation is not a wave-like invasion, but a limited, regional immigration, followed by the adoption of agriculture by local hunters and gatherers (Zvelebil 1986b: 185). There is in fact much more archaeological evidence of population movements in temperate Europe and Asia during the late Neolithic, Eneolithic, and the Bronze Age than at the beginning of the Neolithic. The processes of proper colonization seem to begin only after the initial period (Zvelebil 1986b: 186).

To sum up, the Mesolithic can no longer be considered as a lull, as maintained by the traditional theory, nor, as the most radical innovating school asserts, as an epoch which saw a uniform and smooth development of the Neolithic from a Mesolithic base (Zvelebil 1986b: 167). It is rather a period of transition, which lasted much longer than was thought previously and which was of an extremely complex nature. The hunters-gatherers of the Mesolithic adopted cultivation selectively and not indiscriminately and not everywhere.

Accordingly, the general principle of continuity remains valid: the Mesolithic "prepared" the Neolithic, just as the Upper Paleolithic "prepared" the Mesolithic. But Zvelebil also admits, and that seems to me the principal contribution of his theory, the possibility of intrusive ethnic contributions, limited to certain areas, which were reabsorbed by autochthonous populations.

Zvelebil's model is superior to the exclusively migratory model of Neolithization, adopted by Renfrew; it is also more plausible than the model based on a radical conception of the role of the autochthonous population. It does not reject a priori either migration or autonomous development, and it makes use of both processes only when this is warranted by archaeological documentation and a careful study of evidence.

Linguistic Evidence of Continuity from Mesolithic to Neolithic

Language also confirms the continuity model of the transition from Mesolithic to Neolithic, as can be shown, for example, by the common origin of the name of "tar" in three different linguistic areas of Europe. As is known, the extraction of tar from trees has been dated to Mesolithic by prehistorians (e.g., Clark 1975: 127, 140, 171). And in fact, (1) the English word *tree* (from Proto-Indo--European root **deru* "tree, wood") is akin to the northern European words for "tar": Icel. *tjara*, Norw. *tjøra*, Swed. *tjära*, Dan. *tjøre*, Old Engl. *tierwe* (f.), *teoru* (n.), Old Fris. *tera*, Middle Low Gm. *tere*, Middle Dutch *ter(re)*, *tarre*, Germ. Du. *teer*, Engl. *tar*, Lith. *dervà* "pitch, tar," Lett. *darva* "tar," Finn. *terva* (Pokorny 1969: 214–217). (2) In the Alpine region, the Latin word *bitumen* "tar" comes from the Latin word *betulla* "beech" (cf. Germ. *Birkenteer*) (Ernout and Meillet 1959–1960 s.vv. *betulla*, *bitumen)*. And (3) in the Mediterranean area, the Latin word *pix* "pitch" comes from *pinus* "pine tree" (Pokorny 1969: 794).

Cross-References

▶ European Mesolithic: Geography and Culture
▶ Foraging to Farming Transition: Global Health Impacts, Trends, and Variation

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References

Am Merman, A.J., and L.L. Cavalli-Sforza. 1973. A population model for the diffusion of early farming in Europe. In *The explanation of the culture change*, ed. C. Renfrew, 343–357. London: Duckworth.

Am Merman, A.J., and L.L. Cavalli-Sforza. 1984. *The Neolithic transition and the genetics of population in Europe*. Princeton: Princeton University Press.

Clark, G. 1975. *The earlier Stone Age settlement of Scandinavia*. Cambridge: Cambridge University Press.

Clark, G. 1980. *Mesolithic prelude. The Palaeolithic-Neolithic transition in Old World prehistory*. Edinburgh: University Press.

Ernout, A., and A. Meillet. 1959–1960. *Dictionnaire étymologique de la langue latine histoire des mots*, 2 vol. Paris: Librairie C. Klincksieck.

Forni, G. 1990. *Gli albori dell'agricoltura. Origine ed evoluzione fino agli Etruschi ed Italici*. Roma: Reda.

Gamble, C. 1986. *The Palaeolithic settlement of Europe*. Cambridge: Cambridge University Press.

Higgs, E., and J. Coles. 1969. *The archaeology of early man*. London: Faber and Faber.

Lee, R.B., and I. De Vore, eds. 1968. *Man the hunter*. New York: Aldine De Gruyter.

Pokorny, J., ed. 1969. *Indogermanisches etymologisches Wörterbuch*. Vol. 2. Bern: Francke Verlag.

Price, T.D. 1983. The European Mesolithic. *American Antiquity* 48: 761–778.

Renfrew, C. 1987. *Archaeology and language. The puzzle of Indo-European origins*. London: Pimlico.

Rowley-Conwy, P. 1986. Between cave painters and crop planters: Aspects of the temperate European Mesolithic. In *Hunters in transition. Mesolithic societies of temperate Eurasia and their transition to farming*, ed. M. Zvelebil, 17–32. Cambridge: Cambridge University Press.

Vencl, S. 1986. The role of hunting-gathering populations in the transition to farming: A central-European perspective. In *Hunters in transition. Mesolithic societies of temperate Eurasia and their transition to farming*, ed. M. Zvelebil, 43–51. Cambridge: Cambridge University Press.

Zvelebil, M., ed. 1986. *Hunters in transition. Mesolithic societies of temperate Eurasia and their transition to farming*. Cambridge: Cambridge University Press.

Zvelebil, M. 1986a. Mesolithic prelude and Neolithic revolution. In *Hunters in transition. Mesolithic societies of temperate Eurasia and their transition to farming*, ed. M. Zvelebil, 5–15. Cambridge: Cambridge University Press.

Zvelebil, M. 1986b. Mesolithic societies and the transition to farming: Problems of time, scale and organisation. In *Hunters in transition. Mesolithic societies of temperate Eurasia and their transition to farming*, ed. M. Zvelebil, 167–188. Cambridge: Cambridge University Press.

Europe: Middle to Upper Paleolithic Transition

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Introduction

This "transition" condenses in fact an extreme variety of cultural factors dispersed across all continents but especially in the "Old World": Africa, Europe, and Asia. Within each of these continents, these factors and processes interacted constantly. We focus here only on the apparently fundamental elements in each region. In terms of technology, China and the Far East shift in particular from the use of bamboo and cobbles to light blade blanks. During this phase, the general gracilization of the human skeleton and anatomic uprightness, observed simultaneously everywhere, are the result of bipedalism. In Africa an avalanche of autonomous technical inventions took place: from cobbles to bifaces, Levallois to blade production, up to agropastoral Neolithic civilizations and metallurgy. The immensity of this continent made it a sort of laboratory in which innovations and convergences emerged. But, leaving to one side these fabulous and exotic territories, we now focus on an overview of the transition in Europe, itself already quite complex.

Key Issues

For hundreds of thousands of years, the Middle Paleolithic existed in Europe, in an infinite range of environmental contexts depending on time, space, latitude, and solar exposure. However, human populations were continually present, diversifying their cultures, refining their rites, customs, and beliefs. The most extraordinary aspect is the anatomical coherence presented by this enormous fossil population. Abundant in Europe, Neandertals are also found in Asia. They thus appear to have had varied origins probably

combining African and Asian components. Regardless, the biological form of Neandertals is quite uniform. It is identified both by bone morphology and by recent ancient DNA studies. Yet these populations, so homogeneous physically, possessed infinite varieties of cultural traditions, extending from Portugal to the Caucasus. They are differentiated by "styles," or variability in their diet, hunting strategies, and modes of shelter. In a word, the European Mousterians had abstract and metaphysical mental structures equivalent in their refinement to those of later or external populations. It must thus be accepted that a broad ethnic diversity divided Europe, although the demographic and biological basis remained identical. If we consider the vastness of the region, countless cultural phenomena can be observed, simultaneously in their integration and evolution. Europe constitutes a repertory of all human innovations and their dissolution, as much as "progress" as we define it today. Considered retrospectively, we could also argue that these variations (spiritual or technological) were so subtle and so well elaborated that they led to unequaled human survival, a persistence depending on the equilibrium between human needs and natural resources.

This force of equilibrium and this aptitude for permanent renewals can be seen in what appears to be both harmonious and in perpetual balance. Isotopic analyses of fossil proteins demonstrate the importance of meat in the diet, while dental enamel shows the importance of plants, more similar to the diet of primates in general (including humans). Neandertals lived in perfect coherence with nature because nature was never disrupted as a result of their subsistence practices. But social rules imposed during these millennia enabled both the cohesion and articulation of human groups. Human burials and burned, dispersed, and broken bones broadly demonstrate the importance of the subtle and elaborate metaphysical relationship; these rituals illustrate the capacity of thinking, language, and especially a form of conciliation between natural forces and human society. This unprecedented diversification between needs, means, and ethnicities in Europe leads to an essential consequence: the history of the continent is extremely subtle and of extreme complexity. However, the differences seen between them has still allowed the general use of "Mousterian" as an overall term for Middle Paleolithic cultures. Yet this is only a functional, inoffensive, and universal category. Countless cultural traditions succeeded on another over tens of thousands of years and over an immense territory and can be distinguished only by the flexibility in a style, by the inflection of a handle, or simply by systems of sharing food and the social networks in which they existed. Thousands of stone flakes found throughout Europe in extremely varied contexts form the background of a real composite technology, functions, and traditions over time. However, tools, veritable both in its use and in its mythical scope, resulted in contrast from complex assemblages, twisted branches, arm movements, and modes of hafting. Motions are also endlessly varied, both in the sense given to the human action in the different environments they were carried out. Such capacities rapidly became traditions through the interplay of social gratification. But only working edges in hard and brittle materials (stone, shell, antler) alone do not constitute an essential cultural category. Other elements of social behavior must be added, such as habitat, hunting strategies, mythology, and rituals, in order to reconstruct a sort of history of Paleolithic peoples, probably of an extreme fineness since it appears uniform over a very long time.

Changes in the use of stone create reflections and shadows of this constant revolution in concepts.

The simplest flakes (e.g., at the site of Hoxne) demonstrate the broad range of uses for which they were used prior to their abandon: splitting, cutting, sawing, scraping, etc. Countless components were also present in ongoing operation in relation to the rhythms of festivities, ceremonies, traditions, and values. The loss in the historical period is only a drop of water in the ethnic ocean of Europe over hundreds of thousands of years. So, the colored feet of dancers, ceremonies around domestic hearths, decorations of leaves, flowers, tattoos, songs, and dances. A thousand times

dispersed, a thousand times lost. A Paleolithic "history" would be made up of a superposition of "symbolic systems" described by ethnology but here spread over an enormous range of time because all of these populations knew one another, influenced one another, and continuously evolved following certain axes and according to the importance accorded to different elements. Populations, traditions, and periods are distinguished by elements in stone materials grouped under the term "flint." But the general impression offered from stone artifacts leads to the greatest confusion since they are considered out of context and are only incomplete "vestiges." Conversely, evidence exists to indicate organized social life: charred human bones, colorants, etc. One can imagine a swarm of ethnicities spread out across all environments and in constant collective exhibition (arts, games, weapons).

Around 100,000 years ago, the entire world was covered with fossil humans following the same convergent anatomical trends and linked to general uprightness. This process, absolutely generalized, took place everywhere and in the same direction. But very schematically, the universal evolutionary trend varied depending on the isolation of the group, its density, and its demography. Neandertals are only one example among a thousand others where, like polar bears or varieties of horses, the species remained intact, while the morphology (its external aspect) became specialized due to the rate of reproduction and isolation. In other terms, Neandertals were created by extremely long isolation in a backdrop of a huge global population in which all other anatomical forms within the modern human species developed, e.g., Chinese, Kenyans, and Australians.

On these general "mechanical" bases, the human form changed abruptly in Europe between 40 and 35,000 years ago. This was due to the arrival of one of the other human populations to occupy Europe (modern humans or Cro-Magnon). Different non-European anatomical forms had thus followed identical laws of biological evolution, but at different rates, probably due to the lack of geographic isolation (e.g., the steppes of Central Asia) where gene flow was greater than in Europe, such that contrasts were more rapid and more striking. These very early observations, made in the nineteenth century, were particularly striking in academic settings at the time, but the stigma of an opposition between two different populations remains today.

On the margins of Europe, all other populations were in general advancing toward modernity, especially in these regions because population density was higher, spread out, and in constant and distant exchange such that any population could be seen as "modern" if its anatomy had advanced beyond the Neandertals remaining in Europe. This is nothing other than degrees on a biomechanical scale, but there were no biological differences to separate them into different species.

All of these populations were "modern" as a function of their technological development.

From all sides, new population waves penetrated Europe. From the Maghreb (Gibraltar and Sicily), obvious influences can be seen on both sides of the straits: the Aterian ending in the extreme west around 28,000 years ago and the Iberomaurusian in Sicily, identical to that found in Tunisia. Much later, around 12,000 years ago, this invasion of modern humans into Europe is also seen by art, techniques, and navigation.

In Eastern Europe, direct Paleolithic relationships are observed nowhere, despite the geographic proximity of Greece and Turkey. The Aurignacian lithic industry is also present (around 30,000 years ago), but no longer corresponds to the early penetration or pioneer phase (between 40 and 35,000 years ago) and is not associated with a modern form of humanity. This southeastern region should remain an important region for research, not only because excavations are still in progress but also because this transition appears "logical." The Italian industries on curved flakes (Uluzzian) are also found in western Greece and may have had a part in such kinds of movements, if human remains were discovered.

In the question of the MP-UP transition, Asia played an enormous role, probably many times, with several migration routes and different cultural traditions.

The earliest tradition, but the least well known, is called the "Streletskian-Sungirian." Since 40,000 years ago, refined toolmaking techniques

from Central Asia spread directly along the same latitudes to the west. Their expansion, however, remained limited to the current Russian Plain (Sungir, near Moscow; Beroutcha Balka near the south of Russia; and Buran Kaya in Crimea). The associated human remains are clearly modern and are burials. Rituals, weapons, and the bone and ivory industry indicate that they belong to the European Upper Paleolithic. But, although very evolved, these traditions remained exclusively eastern. The rest of Europe was occupied by Neandertals and their Mousterian culture, with immense regional variation reflecting cultural traditions.

The essential axis for total and definitive migration of modern humans into Europe is "oblique": from Iran to Great Britain. All the other coasts, rivers, and valleys seem to have depended strictly on this axis. Art is present in abundance: it shows a seeking for beauty and the incarnation of mythologies, previously mute. Inhabitation sites are very common, with a few burials and bone remains spread across the sites proving the high density of the new population, which probably arrived in successive waves.

This would have been a real colonization on the model of historical societies. Weapons, following the symbol of the image, killed at distance by propulsion (unique to humans) and thus imposed a new symbolism on both reality and the dream world.

This particular "metaphysical" relationship is fundamental to explain the prosperity and permanence of modern humans from then on in Europe. Man sought to impose his will on nature by his spirit (figured mythology), by the conquest of hunting at distance (using spears and bows), and by deregulating the natural biological rhythm of reproduction (less chance for prey, more for humans). Once begun, this cycle is unceasing and exponential: we are today on the threshold of a definitive change with the extinction of everything that is wild (ourselves included) and the definition of increasingly constraining normative rules. Equilibrium thus unbalanced explains current processes. Even if we accord a stronger natural visibility to it, its origin is always and especially spiritual: in the challenges launched by humans to make their own destiny.

Conclusion

The transitions in Europe took place due to the relative isolation of the continent, on which the different Mousterian traditions persisted in complete equilibrium with a changing environment and climate. Conversely, all other regions of the Old World (from Tangiers to Beijing) more readily exchanged techniques, values, and genes. Thus, the "modern" migratory movement, here from Central Asia, is seen in Europe as an abrupt phenomenon in which propulsion techniques, new myths, and gracile anatomy. This was not reflected in specific variations but rather genetic associations oriented toward bipedalism that had begun three million years before. Depending on demographic density, displacements, and contacts, this speed of anatomic evolution varied more or less rapidly although always in the same direction across the world (even today). Only "isolates" such as Australia and Europe followed regional evolution, with an archaic tendency anatomically.

The most curious phenomenon in human history is linked to the intense concentration of these new populations, their density, and then their rapid expansion across all of Europe. Conditions, one could term "triangular," were thus necessary. The new peripheral populations had a very particular relationship with the universe and destiny: they sought to master it. New mythologies were constructed that "enabled" humans to break the sacred link with nature (increased consumption due to thrown weapons), thus leading to increased population size, and to have a tendency for geographic expansion, which explained their rapid mass displacements toward the west. The relationship fundamental to this "transition" is thus found in the way people lived.

This new "self-reading" is evidenced as much in cave art (where myth is embodied), in precise, rapid, and long-distance weapons (spears, bows), in the now extremely abundant and varied burials, and especially by the repulsion of natural forces by "shamans" (tombs, decorations). With the European Upper Paleolithic, people fought against the absurd and forged their own destinies. The difference between such achievements and

those of Neandertals is not in kind but in speed. In a dense and sedentary population, innovations are absorbed into the set of traditional practices (Neandertals). Among modern humans, the population dispersal was much larger (hundreds versus thousands of kilometers), and variations are more common and more diversified. These scattered attempts of singular combat against nature could then be crystallized in a strong and coherent metaphysics in which the place of humans was consolidated, as much by thrown weapons as by mystical images.

At this stage, migrations took place more rapidly and violently as the terrain thus conquered participated in a slow, permanent, and fixed mythology. It was thus fairly simple, by the influx of ideas brought by more "victorious" populations, to weaken the honor render to the animal until it disappeared. Only this spiritual force distinguishes modern humans. This is a solidly structure metaphysical development, of which the population was capable, on the condition that it was rewarded collectively and put into action, as the Bible does today. The spirit justifies all "sacrilege," breaks old laws that held them in another form of equilibrium in a harmonious web of physical and spiritual relationships with a world become "savage" that shifted from the status of partner to that of objects. Once this spiritual crisis was overcome, it offered humanity a new daring and thus a stronger demographic, the "right" to new inventions and the possibility of unlimited expansion. Indeed, the essence of this early modern humanity was the search for cultural inventions (technological, mythological, economic) suitable for overcoming new natural challenges. Such formidable freedom was made for humans out of their own minds. But it is also this freedom that forces us to be responsible for our own destiny and to change it. Finally, it causes the rip (which we still suffer today) between our own natural component and our need for a humanity made by thought. In this direction, modern humans tilted the scales a little more in favor of the mind and a little less for the animal side.

The difference between these two metaphysics was so strong that, in the nineteenth century, the first archaeologists immediately identified the two worlds, either by technology or by art. The metaphysics are as clearly opposed as between, for example, Roman civilization and the Bororos of Amazonia: no spiritual superiority but different scaffolding employed to justified one's place in the universe and to thus authorize all forms of conquest, over nature, other human beings, and finally ourselves.

Between the hasty rummaging in the nineteenth century and the logical coherence now acquired in the historical sciences, the opposition between Neandertals and modern humans can be understood in terms of opposition between value systems. From this depends all other behaviors: displacements, techniques, metaphysics, hunting practices, diet, social distribution, habitat, and education, for example. The operation of all human society possesses a constructive, implacable, and perpetual logic. But the inertia of the history of populations transforms these innovations into a sort of nebulous lineage that characterizes its trajectory. Encounters between populations with profoundly different values, such as Neandertals and modern humans, would cause enormous spiritual shocks, both sides at once and by way of reciprocity and multiplication. While the Aurignacian with Asian origins differs from that in the Dordogne, this difference is less pronounced than within the Mousterian that "absorbed" innovations, integrating them into their own traditions without weakening their specific way of life. All of the potential of modern humans can be already found in other forms during the Middle Paleolithic. What appears vague and disparate among the Neandertals (tools, habitats, burials) becomes clearly defined in a single package along modern humans. This focus and concentration would give them the force and determination to follow this path until the final break with preceding metaphysical systems (Neandertal). This new cohesion would immediately begin an evolutionary line that was chosen and determined and, especially, in perpetual competition with itself. History was born.

Cross-References

- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Demographic Transitions

▶ Europe: Early Upper Paleolithic
▶ Europe: Mesolithic-Neolithic Transition
▶ European Middle Paleolithic: Geography and Culture
▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
▶ Middle East Middle to Upper Paleolithic Transitional Industries
▶ Northern Europe: Middle to Upper Paleolithic Transition

Further Reading

Dutour, O., J.-J. Hublin, and B. Vandermeersch, eds. 2005. *Origine et évolution des populations humaines*. Paris: CTHS.

Kozlowski, J.K.K., dir. 1988. *L'homme de Néandertal, volume 8: la mutation. Proceedings of the Liège International Symposium 4–7 December 1986*. ERAUL 35. Liège: Université de Liège.

Mellars, P., ed. 1990. *The emergence of modern humans, an archaeological perspective*. Edinburgh: Edinburgh University Press.

Otte, M. 2008. *Cro Magnon*. Paris: Perrin.

Europe: Paleolithic Art

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Introduction

In the western peninsula of Eurasia, Paleolithic art is particularly concentrated and is the earliest. It would appear that the migrations of modern humans from the East had to "mark" the geographic extremity and their new territories. Such materialization of oral myths guaranteed their reality and performance by adding the harmony of plastic forms. Based on the opposition between two systems of thought (Neandertal and Cro-Magnon), graphic imagery rendered this difference in supernatural substance and accentuated the two metaphysical worlds. "Images" are not absent during the Middle Paleolithic (Neandertals) in Europe, but follow entirely different paths from that of plastic illusion. Their burials and habitats have remains with a natural connotation, much more realistic than any later images: horns, antlers, skulls, and mandibles, isolated in tombs, designated the animal symbol, status, and the perpetuity of the deceased, like nature itself to which humanity associates its own destiny. "Hyperrealistic" images are also included in the inhabited areas via isolated bones or exotic minerals such as colorants, sparkling minerals, and mineralized marine shells in early geological deposits.

With the Upper Paleolithic in Europe, a profound separation is made between animal trophies and their "illustrations," being the extraction of their real contour put to the service of mythical thought. This is a deep and moreover irreversible spiritual change: the entire history of art begins here, between 40 and 35,000 years ago, and continues today. So, Paleolithic art first sheds light on the power, cohesion, and harmony of thought. Even if these codes remain nearly indecipherable, their importance is demonstrated by the works produced. Not only do these series of images evolve, by becoming rooted in turn to each other, each phase in this history of forms presents obvious coherence, attesting to highly coercive laws governing the most precious collective thought and its different modes of expression. From time immemorial, human societies were (and remain) united due to a metaphysical explanation that justifies their presence in the eternal reign of the universe.

Everywhere applicable, these spiritual operational rules for humanity are expressed through an extreme variety of formulas, across space and time, but according to constant mechanisms. The laws of the image, freed from the relationship to oral myths, then reflect autonomous histories, where art and artists follow an increasingly independent lineage in relation to the theoretical concepts that they created. The reproductive process is thus reversed: from producer of images that the mind envisioned first, it becomes determined by their harmony and coherence. This occurs as for writing: starting with letters formed by schematic images, which lose their meaning, later the most sublime texts are produced, from Aristotle to

Balzac, without anyone having the idea to reduce these works to the structure of the schema of the images that were originally realistic (e.g., the letter A is an inverted steer head).

A similar trajectory animates the entire history of plastic forms, increasingly dissociated from the original mythological abstraction, as if this history of form tended to orient ideas rather than to illustrate them. For example, the introduction of realism in animal images, then human silhouettes, guided the spirit of man to be more daring by forging their own destiny: this is the Neolithic. As art introduced humanity into the supernatural forces that determine us, craftsmen, peasants, and herders became masters materially of the earthly life as well. This final part of the history of art (extending until 1850), relative to producing and conquering peoples, will not be discussed here.

Paleolithic art is in effect limited to the periods and situations (even today) in which human societies were intimately integrated with nature, by limited plant gathering, occasional hunting, light shelter, regular movement of ethnic groups in the landscape, and, principally, the arts and dreams that they evidence. Paleolithic art thus responds to this situation of harmony with nature by adding its uniquely human dimension: plastic beauty. For us as well, only such extreme sensitivity of the disappeared artists still "speaks": their creations were spiritual vectors prior to their creation, becoming carriers of aesthetic messages and magical power to fascinated humans today.

Thus this spontaneously felt emotion immediately classifies them in the domain of the arts, although the initial assumptions considered this early humanity as cave dwellers, mammoth hunters, and competitors of hyena and bear.

Key Issues/Current Debates/Future Directions/Examples

Distribution

On a global scale, all of the regions that experiences or are still experiencing hunting ways of life also show artistic activities. They are presented in varied forms but always evidence the same fundamental tripartite relationship: integration with nature, oral myths that justify such integration, and plastic expressions occurring at the intersection of the first two, like harmonic evidence of these articulations. The arts of hunters are recognized so surely that their radiometric dates appear unnecessary. Because they immediately reveal this form of tension between assumed natural constraints and the flexibility of spiritual means used by the artist to harmonize human society and the part of the universe with which it is confronted.

For Europe, evidence of mobile art was spread everywhere man had access, being the territory of the continent and less so the areas covered by glaciers (Scandinavia) and more the marine expanses that were exposed by the low sea level (North Sea). These mobile arts accompanied humans as they moved across the landscape, from habitat to burial, where their symbolic values took their power.

But parietal art, the most sumptuous, is found particularly in southwest Europe (Spain, France, Italy), very curiously concentrated in rocky regions, although the rest of Europe also had countless caves and intense human occupations. Some parietal art has been found in the Ural Mountains and the Carpathians, considered quite important as it was isolated and reflects regional plastic codes. The painted cave recently discovered at Coliboaia (in the western part of the Romanian Carpathians) exactly reproduces the figures proper to the Western Aurignacian. It thus proves once again the extreme geographic extension of European civilizations during the Upper Paleolithic.

Categories

The Paleolithic images were above all mental creations, produced by a single mind, in response to social functions of a sacred nature. We can readily see mythological expression, magic, and initiations, for example. The plastic "images" were therefore probably accompanied by ephemeral events, as what took place around the world and through time: dance, music, song, disguises, masks, tattoos, and body painting. It remains however that to survive, the plastic work must create

emotion as much as it was the product of emotion: Lascaux "speaks" to us as much in the absence of its original mythic context as through mythical fragments. The fact alone that these Paleolithic works of art number today among our cultural monuments demonstrates the power of this fascinating mystery that plunges us to the depths of our own self-questioning.

Nonetheless, like modern populations who remain in harmony with nature, indirect evidence of personal decorations sheds light on the opacity imposed by the passage of time. The preserved statuettes open perspectives on the emphasis given to ritualized costumes: belts, hair styles, and disguises. Such mobile art thus constitutes both tridimensional plastic realizations, essentially feminine, and evidence of ritual values. In parallel, some decorative objects were also found, either scattered across an occupation site or preserved in original position with the dead. Countless "pendants," colorants, and animal trophies indicate the complexity of dress codes. Similarly, we have a new series of works of art, sometimes tiny but very carefully engraved and sculpted: animal heads, striated and perforated teeth, beads, discs, and rings made of mammoth ivory. The intrusion of the natural mythology is also seen in zoomorphic statuettes: horses, bison, mammoths, and lions, for example. The symbolic possession imposed on living nature takes all its power here via the reduction of the real model to small dimensions, manipulable, transportable, and extracted from its wild context to become part of the ritualized domain. These images, in three dimensions, were chosen and reproduced and then spread across social space and in the claimed places, forming from then on an element of the message between man and the absurdity of his destiny.

This mythic veil is also imposed on craft objects whose utilitarian function would seem to be predominant: knives, spatulas, lamps, and spear throwers, for example. With these, we simultaneously have two complementary means of accessing mythical thought: changing the world via the mechanical laws defied and the abstract component with which this act is invested due to the superimposed image. On a purely plastic plan, a strict harmony joins form and function: the bison head wrapped spontaneously around a perforation hole, fish aligned with handles. Sometimes certain mythical elements (mythemes) are concentrated on the massive ends of spear throwers (the "bird fawn" of the Pyrenees). Such formal play, in which dream is associated with action, is found in all societies where motions remain free and where the two fundamental human functions have not been separated, that is, everyone except our own. In traditional societies, there is no tool, however humble, from a hollowed bowl to a decorated shelter that is not touched by this tripartite equilibrium, instituted between the technological formula determined by tradition, the spiritual function justified by metaphysics, and the natural context in which the two functional modes are fulfilled. Bags, quivers, basketry, village structure, or religious delegation all respond to a single metaphysical formula with which a given population identifies and is reassured.

Physically intermediary between the statuette and the decorated cave wall, engraved stone or bone plaquettes are found in shelters, organized like transportable scenes. Their thematic specialization is added to a relative stylistic autonomy vis-à-vis the monumental "life of forms." They have more liberty perhaps because there is less seriousness in the weight of this art, somewhat like decorated tools or our country chapels in comparison with the dogmatic coercion corseting our city cathedrals. To the unusual animation, the engraved plaquettes at Gönnersdorf (Germany) respond the circulation distribution of painted plaquettes at Dalmieri (Italy), prolonged by the entire range of human illustrations; the most prosaic on the engraved plaquettes at La Marche (France); or the countless plaquettes decorated by the liveliest imagination at Enlène (Pyrenees) to the plaquettes at Parpalló (Spain) with marked Solutrean spirit. The monumental bones at Mézine (Ukraine) have schematic painted decorations, forming an authentic "parietal art" in the strict sense, that is, structured by the wall of the shelter, this time built rather than chosen, like a cave or rockshelter. Mobile art, made on transportable plaquettes, presents a total intellectual

revolution vis-à-vis sculptures because the reduction to only two dimensions forces the spirit to use one's imagination in order to reconstruct the whole volume of the being suggested by its contour alone.

These different formulas, from flat to three-dimensional, were then transposed to selected fixed locations on cliff faces, rocky overhangs, and caves. There we find the entire range of plastic modes of expression: clay models (bisons at Montespan); stone bas-reliefs barely connected to the walls (horses at Cap Blanc); fine engravings like nervous lines of an artist (Les Combarelles); flat paintings, like the colored spots giving substance to contours (Cosquer); gradations creating volume (Font-de-Gaume); contours drawn in red or black (Pasiéga, Covalanas, Niaux); and up to the majestic polychrome frescos (Lascaux, Altamira, Chauvet).

The rocky supports themselves vary from slabs facing the landscape (Foz Coa, Siega Verde), rockshelters in which daylight animates the reliefs (Le Roc-aux-Sorciers, Angles, Gorge d'Enfer), and the innermost depths of mysterious chambers, formidable, damp, cold, and completely dark, where the loss of landmarks upsets the spirit and disposes it to receive sacred myths (Niaux, Chauvet, Cosquer, Lascaux).

All of these formulas, along with their infinite varieties, express both the religious complexity, irreducible to a single story, and the proliferation of artistic modes of expression, combined in strict coherence. From the tool made sacred as much by its decoration as its function to profound sanctuaries, cadenced by the successive chambers, rocky accidents, and messages grafted by progressive rhythms, the entire Paleolithic soul is inspired, expressed, and based on the same spiritual lineage: that of an attempt to obtain harmony with nature, slowly shifting to an ambitious desire to place humans, increasingly conquering by technology, migrations, and especially his influence, through realistic imagery, above the world of creative forces that he believes dominate. The end of the history of forms, tens of thousands of years later, sees indeed the trend to realism, i.e., disembodied, return, and be confirmed; the increasingly animated figures being of animals made banal, while allusions to humans themselves appear frozen and exposed (Figs. 1, 2, 3, 4, and 5).

Iconography and Schematization

The range of images in the European Paleolithic focuses especially on the large glacial fauna, essentially horse, aurochs, reindeer, bison, mammoth, woolly rhinoceros, and bear. These species were chosen from the natural environment, but were not always those actually consumed. Their choice reflects rather their ability to reconstruct a mythical world clearly based on the relationships between animal and human societies. The species selected and represented also vary more and differently than the environment itself, either according to the periods considered or the geographic areas where art developed. This is really the embodiment of the unreal, with distant and distorted relationship to the lived reality. Similarly other more recent forms of art, where the symbolic role played by allusion to forms extracted from lived experience, place them in an entirely different sphere of thought, like the Athena's owl, Diana's deer, Hercules's feline, or the Christian lamb.

During the European Paleolithic, certain animal species dominated depending on the stories they offered, including the felines at Chauvet, the mammoths at Rouffignac, the bisons at Font-de-Gaume, and the aurochs-horse pairs at Lascaux. These preferential representations cross technical constraints, from sculpture to painting passing by drawing and engraving, and the vastest regions having a single cultural tradition. Spatial and mechanical challenges always give way before the gravity of the religious schema to which the consciousness of a group is attached.

Alongside animals appear rare human figures, mainly in two forms. Feminine representations are found sporadically in Paleolithic aesthetic-religious fields as sculptures, paintings, or engravings. The most spectacular and most widespread are found in the Gravettian tradition in which images of seated women were made in the form of statuettes across Eurasia from the Pyrenees to Irkutsk near Lake Baikal in Eastern Siberia (Malta). The opulent forms (breasts, hips, thighs)

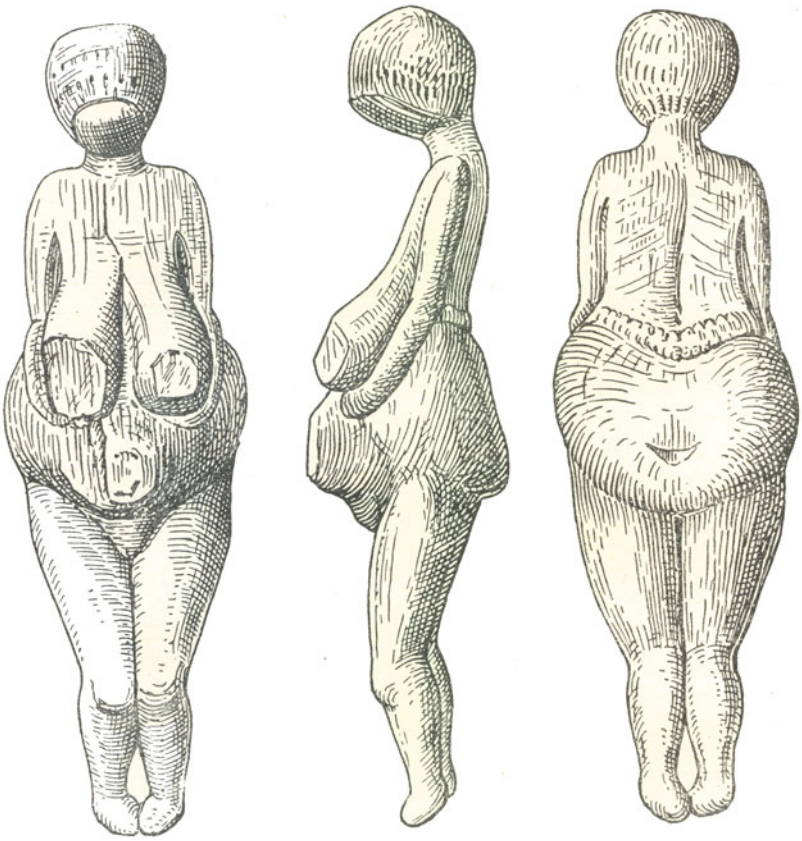

Europe: Paleolithic Art, Fig. 1 Feminine figures appear regularly during the European Paleolithic, but according to highly stereotypes plastic formulas. By waves, they periodically submerge the Eurasian steppes, manifestly carriers of distinct meanings since the graphic formulas continually change. Here, at the start of the period, these "women" are obese, naked, and without faces. This iconographic model crosses all mechanical laws imposed by the different supports: modeled clay, soft rock, ivory, calcitic crust, bas-reliefs, paintings, and sculptures. The "laws" of style were also the most constraining (Kostienki, European Russia, Gravettian, c. 23,000 years ago)

and the lack of facial representation suggest the existence of a clear stereotype defined by religious thought and may indicate preoccupations linked to the fertility of the group and its resources. A second series of feminine images developed during the Late glacial (15–12,000 years ago). These are rather curved contours and profiles of young women, even as statuettes reduced to a limited contour (Nebra, Gönnersdorf, Monruz). Since these silhouettes are also known on cave walls in Aquitaine (e.g., Les Combarelles), their extension as mobile art across Europe seems to follow the movements of territorial reconquest by Magdalenian populations in rapid demographic expansion after the Last Glacial Maximum. Whatever the meaning, these silhouettes clearly evidence the importance of this symbol during expansion, somewhat like we see the symbols of the Christian cross "come down" from churches to be carried as a crucifix, as mobile as the missionaries themselves.

Masculine forms increase in frequency but are masked, transfigured, strange, or hidden beneath animals. These ambiguous appearances are related to the fear of magical influence exerted by the image on its real model. Regardless of the meaning of these representations, they could not affect the existence of their own creator, who appears there in a protected, hidden, and allusive aspect. Animal disguises that they seem to wear directly reflect shamanic practices in which some beings could enter the supernatural world of the spirits where their will affects fundamental natural forces and where they can influence action. Such practices and concepts, universal among peoples in harmony with nature, often involve plastic expressions intermediary between humanity and animals. Indeed, any animal embodies, in the mind of humans, the essence of vital strength because their reactions, as in physiology, have powerful similarities with ours. The feeling of opening toward these deep abysses would be

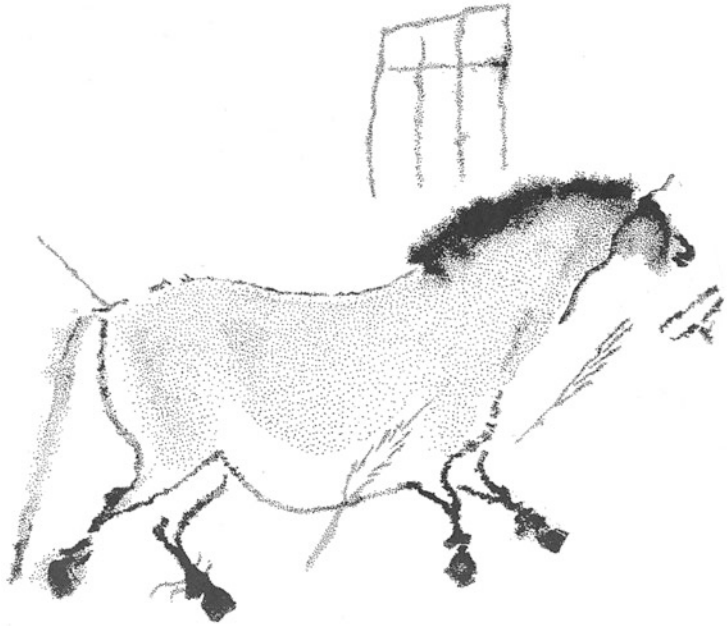

Europe: Paleolithic Art, Fig. 2 Natural forms undergo distortion due to the laws of dreams. The "real" animal is that which takes its source in the myth and conforms to it. The interplay of signs, encoded with meaning, is assembled in perpetual arrangement, from the image to the schema (Lascaux, Dordogne, France, Magdalenian, 18,000 years ago)

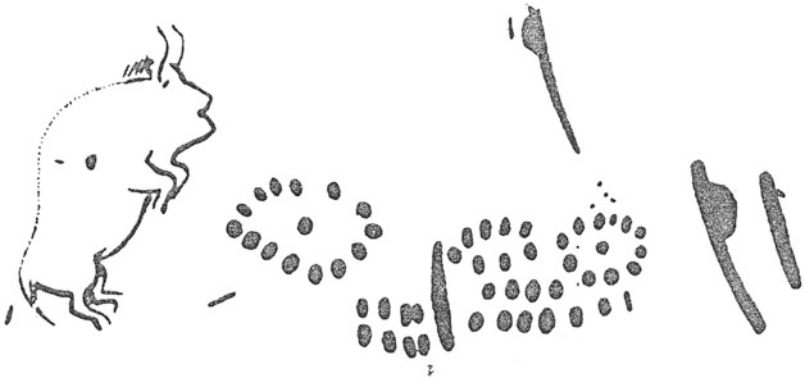

Europe: Paleolithic Art, Fig. 3 The "plastic phases" present a prodigious complexity during the European Paleolithic. Abstract signs (*points*, *lines*), schemas (women), and ambiguous representations (bison upright like a human) are associated to create syntactic groups on rocky reliefs at strategic points. Here, all these indications were brought in to highlight a deep gallery at the beginning of the decorated areas, thus sanctified by mythic processes (Niaux, Ariège, France, Magdalenian, 14,000 years ago)

clearer and stronger when the image in which it is found enters in proximity and esteem. The lion man of Höhlensteinstadel (Southern Germany) or the bison at Trois-Frères (French Pyrenees) summon as much the idea of formidable but mastered power as that of a physical analogy with humans, thus assumed by the image embodying this complicity.

As for the Paleolithic "life of forms" (H. Focillon), this does not always tally with a realistic illusion, but holds a subtle dialogue with the visual suggestion, passing by the schema, an extreme graphic reduction, like our alternative transitions of an alphabet in capital letters or in cursive. There is not progression from one form to another in the chronology, but we note concomitant use of one or another form of plastic expression corresponding to expressive mode, qualifying the visual discourse. These contractions of signs, illustrated in our original

Europe: Paleolithic Art, Fig. 4 The thematic associations were loaded with evocation resulting from dreaming, never from observed reality. The fundamental theme illustrated here groups bison and horse, like the ass and cow in the Christian nativity scene, also charged with strong symbolism (Le Gabillou, Dordogne, France, Magdalenian, 18,000 years ago)

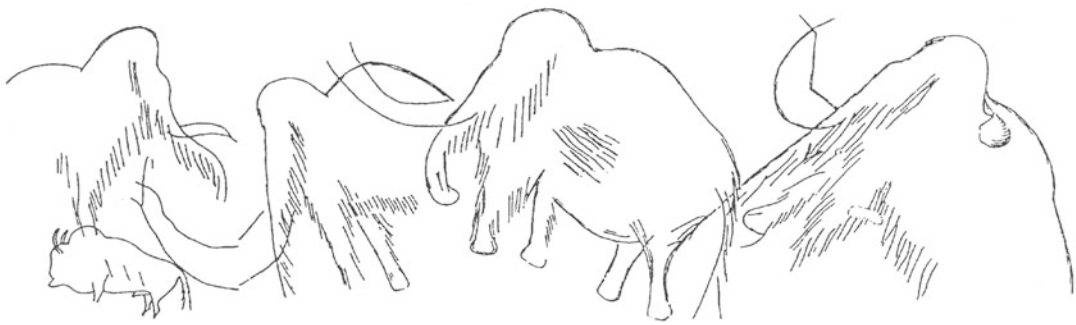

Europe: Paleolithic Art, Fig. 5 Parades, barely evoked, suggest a moving mass, as if through a mist. But the code appears suddenly by the frontal opposition of an individual walking away and by the introduction, drawn from dreams, of a bovid filled with lines. All mythical thought is contained here, by a vague illusion to a reality employed as a pretext, immediately transposed into a supernatural world, the extreme reference to material life

pictographic alphabet (the letter A is an inverted steer head), enrich and condense considerably the semantic variations of Paleolithic art. The values of genres slide from a sexual representation to schemas of an extreme sobriety due to which they enter into easy dialogue with all other forms of images, as today we have hearts pierced by arrows or medical signs with distant allusions to men and women. Bison heads, associated with perforations (dual feminine value), are maintained in a given place, but they lose their plastic substance, become distanced from the analogy with reality but manifestly preserve their symbolic value. This is similar to the sign of the cross in Christian gestures, an extremely abstract codification that carries with the same force as its distant model in Golgotha, the redemptive power to which the believer aspires and can attain by the humble hand movement. Such processes of iconic reduction also affect, for example, images of horses (reduced to a succession of right angles), ibex (series of interlocked V's), and bovids (horns only in the form of a U) and introduce a dense and structures dialectic used simultaneously as a formal condensation on small tools and on huge wall compositions (Lascaux).

Morphemes

The plastic images of the European Paleolithic play and utilize frequent formal games in textural, spatial, and temporal domains. The texture of the images derives from the fineness of the engraved line and the voluptuous models provided by graduated tones, the harmony between colors, and reflections of sparkling light. Fundamentally, the Paleolithic images hold a subtle dialogue with the underlying stone on which they are made: the support gives these forms their grain, velvety texture or hardness, their contour, curves, and movements.

Animal parades, with careful structuring, extend along the walls, benefiting from the natural architecture, reliefs, crevices, and flaws. We thus see the articulation of the mythical message combined with that of the cave. The chambers are opened, shrink, plunge, or climb by offering life to the images that they transport. Manifestly, the relationship between the plastic sign and the support on which it is made was so strict that we can no longer distinguish one from the other, as if the message of the whole is validated only by this dynamic equilibrium between the mystical and the cavern, definitively joined.

Morphemes in which images were immersed in time abound, during certain periods, in certain messages, to end by dominating at the end of this series of aesthetic-religious experiences, when desanctified art became oriented toward the accurate reproduction of reality in both details and movements. Time was injected by attitudes, raised hooves, turned heads, moving tails, alignments, falls, and flowing blood. Many times, the contraction of time is expressed by the superimposition of successive movements made in real time. A shift then took place between the contraction in a single space of action in successive times (Chauvet, Foz Coa, Lascaux). Close to the lived reality, the animation from the real world does not meet the authentic aspirations of Paleolithic art, always oriented toward the evocation of another world, situated beyond and above the real world. In its essence, art was thus used for the imaginary in which humanity was projected and where the immobility of living beings participated in the persistence of this daring by which, once again, humanity defies its own condition and biological destiny. By these means and through time, awareness has led humans to disengage from their nature toward sources of change where his arts are emerging and seek to appease him.

Composition and Semiotics

The organization of aligned figures gives the key to the structures dreamed by Paleolithic man. Most of the time, the articulation of mythical messages remains clearly susceptible, even if reduced to a binary disposition. Often it is found organized around natural rocky elements, such as a fissure, protuberance, or an alcove. The intimacy between natural contexts and added motifs is again powerfully felt. The scene uniting the deer of Lascaux crossing a river with their necks held high takes its meaning once created on the rocky gorge on which the gaps suggests the torment of the water. The simple choice of panels, for their brightness, exposure, delimitation, position and texture, forms the first step in this structuring approach.

These interpretive lines, imposed on the eye by the spatial organization of their themes, force thought to follow its own story imprinted in plastic arts, images, and rock combined. The sequence of chambers, their distance from daylight, total obscurity, oppressive dampness, and low temperature condition are the soul for the reception of founding myths as to the justification of the group and the mysteries with which all conscious existence is confronted. The solutions were there, revealed as soothing, real with respect to the dangers of the path taken into the cave, and unreal with respect to the secrets of life, all combined in a dazzling of physical and spiritual senses. Gothic windows do nothing other than seduce in order to convince. And the temples of Science are even more suspect of soliciting, with their columns, tympanums, porticos and statues from Antiquity.

The revelations contained in the depths of damp dark caves harnessed the suspended conscience, by adolescence as much as by the dangers overcome. But the solutions were there, in the trembling illumination on the damp walls with bright vivid colors. Their harmony, linked to the scale of forms, gigantic and dancing figures, came

literally out of the darkness and anguish. The revelation of the mysteries of existence was accorded by the seduction stimulated by the rhythms, color, and strangeness. Paleolithic art, like man who overcame the challenges of earthly life, also contributes one of the culminating points in the spiritual adventure of civilization.

Cross-References

► European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism

Further Reading

Clottes, J. 2008. *L'art des cavernes préhistoriques*. Paris: Phaidon.
Leroi-Gourhan, A. 1965. *Préhistoire de l'art occidental*. Paris: Mazenod.
Lorblanchet, M. 1995. *Les grottes ornées de la préhistoire. Nouveaux regards*. Paris: Errance.

Europe: Prehistoric Rock Art

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Introduction

In its broadest sense, the term prehistoric rock art covers the whole of graphic manifestations affixed by prehistoric humans on rock surfaces of all kinds. The surfaces can be rocks out in the open air, walls protected by shallow rockshelters, or deep cave walls in total darkness. For deep cave situations, the term "parietal art" is often used, but these two terms cover the same reality. The phenomenon is widespread throughout the world, as it meets the basic needs of preliterate human societies. In Europe, prehistoric rock art extends from northern Norway to Andalusia and covers more than 30,000 years, from the Upper Paleolithic to the Roman conquest. As a result, it responds to an infinite number of motivations depending on beliefs, systems of social organization, and types of subsistence economies. In formal terms, it uses a wide range of techniques (engraving, sculpture, finger strokes in clay, line drawings, monochrome or polychrome painting) and a wide range of styles (from figurative naturalist art to schematic and to geometric abstraction). Although the word art is sometimes criticized because of its contemporary connotation, it is difficult to escape the idea that the human groups who made rock art were pursuing, in addition to the basic motivations that animated them, an undeniable aesthetic quest, even if it sometimes diverges from our own criteria.

Historical Background

In the nineteenth century, there was little acceptance of the aptitude of prehistoric people to paint and engrave images onto rock. The idea of the "primitive savage" perpetuated for a long time and prevented the acceptance of the full intellectual capacities of societies before history. The remarkable bison paintings on the ceiling of Altamira, discovered in 1879, were not officially recognized as a prehistoric work until 1902. There is no doubt that the aesthetic, naturalism, and polychrome character of these figures impeded this recognition. It was not until the second half of the twentieth century that paleoanthropological approaches to rock art meant that rock art study could acquire the status of a scientific discipline within prehistoric archaeology. Today, rock art is considered a precious tool with which to address the cultures and the ideological and symbolic universe of hunter-gatherer, then herders and

farmers societies who succeeded on the European territory. The need to leave a lasting mark of one's culture on monumental mediums is universal. Only the forms and locations that were selected to practice this exercise change with the subsistence economy and the prevailing systems of thought.

In a report presented to UNESCO in 1984, the number of individual rock art graphics in Europe was estimated at four million (Anati 2003). This number has easily been surpassed today. Paleolithic art alone counts for more than 360 sites, with recent discoveries of major scientific interest in France (Chauvet in 1994), Portugal (Foz Côa in 1994), and Spain (La Garma in 1995). The debate is no longer about the authenticity but rather about the chronocultural attribution of these works, given the difficulty of absolute dating.

Key Issues

Paleolithic Rock Art

General Points

Paleolithic rock art occurs throughout the Upper Paleolithic, beginning c. 35,000 BP (or earlier) (with the arrival of *Homo sapiens sapiens* in Europe) and ending around 12,000 BP, shortly before the end of the glacial period. The oldest figurative works, attributed to the "Aurignacian" culture, are the statuettes of Swabian Jura (Germany) and the parietal paintings and engravings on the caves of Fumane (Italy), dated between 32,000 and 36,500 14C BP, and of Chauvet (France), between 30,000 and 32,000 14C BP (radiocarbon dating strongly underestimates calendar ages).

Paleolithic art is fundamentally an art of animals: human representations are rare and are most often caricature-like, in contrast to animals which achieve a sometimes striking realism. Numerous nonfigurative drawings or "signs" complete the iconography. Deep caves, invested since the beginning of the period, remained the most popular places until the end, to the extent that we sometimes speak of "cave art," even though engravings and sculptures also decorated occupied rockshelters, and that rocks exposed to the open air have also recently been discovered in Spain and Portugal.

An in-depth examination reveals deep regional thematic and stylistic differences and significant changes over time across Europe. Several models of relative chronology, based on archaeological data, superpositions, and stylistic sequences, have been proposed. Those of Henri Breuil (1952) and André Leroi-Gourhan (1965) are the better well known, but new methods for direct dating by accelerator mass spectrometry and also recent discoveries like the Chauvet Cave have forced a reconsideration of the chronostylistic models based on the assumption of a linear evolution leading from an original schematic form toward better controlled realism. Some advances and setbacks, phases of invention, and regression have crisscrossed over these 20,000 years and provided a more complex schema.

Iberian Peninsula

In the extreme southwest of Europe, the Iberian Peninsula retains evidence of intense graphic activity during the Upper Paleolithic, with more than 200 parietal assemblages distributed in all regions, not including the many portable art objects (Bicho et al. 2007). The most important concentration is that in the Cantabrian region, a narrow strait between sea and mountain, open at its eastern point toward the southwest French region, which contains around 120 decorated caves covering all the periods of the Upper Paleolithic (Collective 2002; González Sainz et al. 2003; Ríos González et al. 2007). Centers, such as Peña Candamo, Altamira, El Castillo, and La Pasiega, have played an important role in the history of research on Paleolithic rock art. Other regions on the peninsula, which had practically no parietal evidence around 30 years ago, today present important concentrations. We can cite among others the spectacular rock outcrops in open air in the Duero valleys (Domingo Garcia, Siega Verde, Mazouco, and specially the 27 sites along the Côa River), Tagus (Ocreza), and Guadiana (Molino Manzánez) (Baptista 2009). To these open-air sites, several caves need to be added: Escoural in Portugal, Maltravieso in Extremadura, and in the

interior of the peninsula, some cavities in the foothills of the Central and Iberian systems (La Griega, Los Casares, La Hoz, El Reno, etc.). In the Mediterranean area, today several small ensembles can be counted (Meravelles, Cova Fosca, the group of Cieza, El Niño) and isolated parietal representations (Parpalló, Reinós), without forgetting the engravings in daylight of the En Melià shelter (Castellón) (Mártinez-Valle 2006). Finally, in the extreme south, Andalusia has about twenty parietal sites in caves or rockshelters: La Pileta, Ardales, Malalmuerzo, El Morrón, Ambrosio in the interior; El Moro and Palomas near Tarifa; Nerja, Navarro, Victoria on the coast of Málaga; and a single open-air site (Piedras Blancas).

Figurative graphic activity spread in the Iberian Peninsula like an oil stain, affecting diverse territories and subject to highly variable environmental conditions and resources. The phenomenon began with the Aurignacian (at least in the north: La Viña rockshelter, early phases of Castillo) and is present at the southern end (Tarifa group) from the Gravettian (Fig. 1). Paleolithic art from the Iberian Peninsula is fully integrated with that of Western Europe and presents the same two formal conceptions of the animal figure, a conceptual naturalism, minimalist, in the early phases (figures reduced to a contour with very few details and internal elements) and, from 17,000 BP, a more visual naturalism, attentive to anatomical details, with a more successful treatment of volume (infills and internal details, correct perspectives of limbs and horns). However, art from the Iberian Peninsula shows notable singularities such as engraved rocks in open air in the valleys of Atlantic rivers with large-size figures produced by pecking (Fig. 2). With few exceptions, paintings are only preserved in deep caves. Additionally, more temperate climatic conditions than in the northern regions of Europe brought about a distribution of rich fauna including horses, aurochs, stags, does, and ibex with a gradient from north to south: in the Cantabrian region, in addition to this fauna, bison and reindeer (mostly during the Magdalenian) and some very rare mammoths and megaloceros can be found. By contrast, bison and reindeer are exceptional in the two sub-plateaus and completely absent from Levant and Andalusia.

The strong compartmentalization of the territory due to the mountainous character of the peninsula presents other differences that cannot be explained by climatic reasons, such as the distribution of abstract signs (particularly abundant in the Cantabrian region and Andalusia) or the proportion of stags and does, which is very contrasted depending on the region. Similarly, the stylistic changes during the Upper Paleolithic do not follow the same models in all regions. The case of the Cantabrian region is very distinct in this respect because of its interactions with southwestern France, particularly intense during certain periods (central and final phases of the Magdalenian; cf. Fig. 3), and more restrained during others (during the glacial maximum and its extension in the older Dryas where the Cantabrian region showed a high artistic personality). Other peninsular regions (Levant, Atlantic face, and even Andalusia) present a greater continuity from the graphic point of view, with less modification over time. In these regions, the Gravettian and Solutrean conceptions continued with very little change in the Magdalenian. These regions show some similarity in the graphic conventions, which indicate real interactions between them. These are also confirmed by the extension of some elements of the lithic weapons such as the stemmed and eared arrowheads, which are known in the Solutrean of Levant and Portugal.

Decorated objects (portable art), during the Upper Paleolithic, are strongly associated to rock art but their distribution is strongly conditioned by the conservation of organic material, more favorable in caves (Cantabrian region, Ebro valley, and north of Catalonia) where a diversified and conventional portable art is known. On the Atlantic coast, in the northern sub-plateau and on all the Mediterranean coast, mostly objects in stone can be found such as the collection from Parpalló (Valencia) including thousands of engraved and painted plaquettes distributed throughout a long sequence going from the Gravettian to the Magdalenian and, consequently, with a great interest to conduct a diachronic and comparative analysis with the regional rock art (Villaverde 1994).

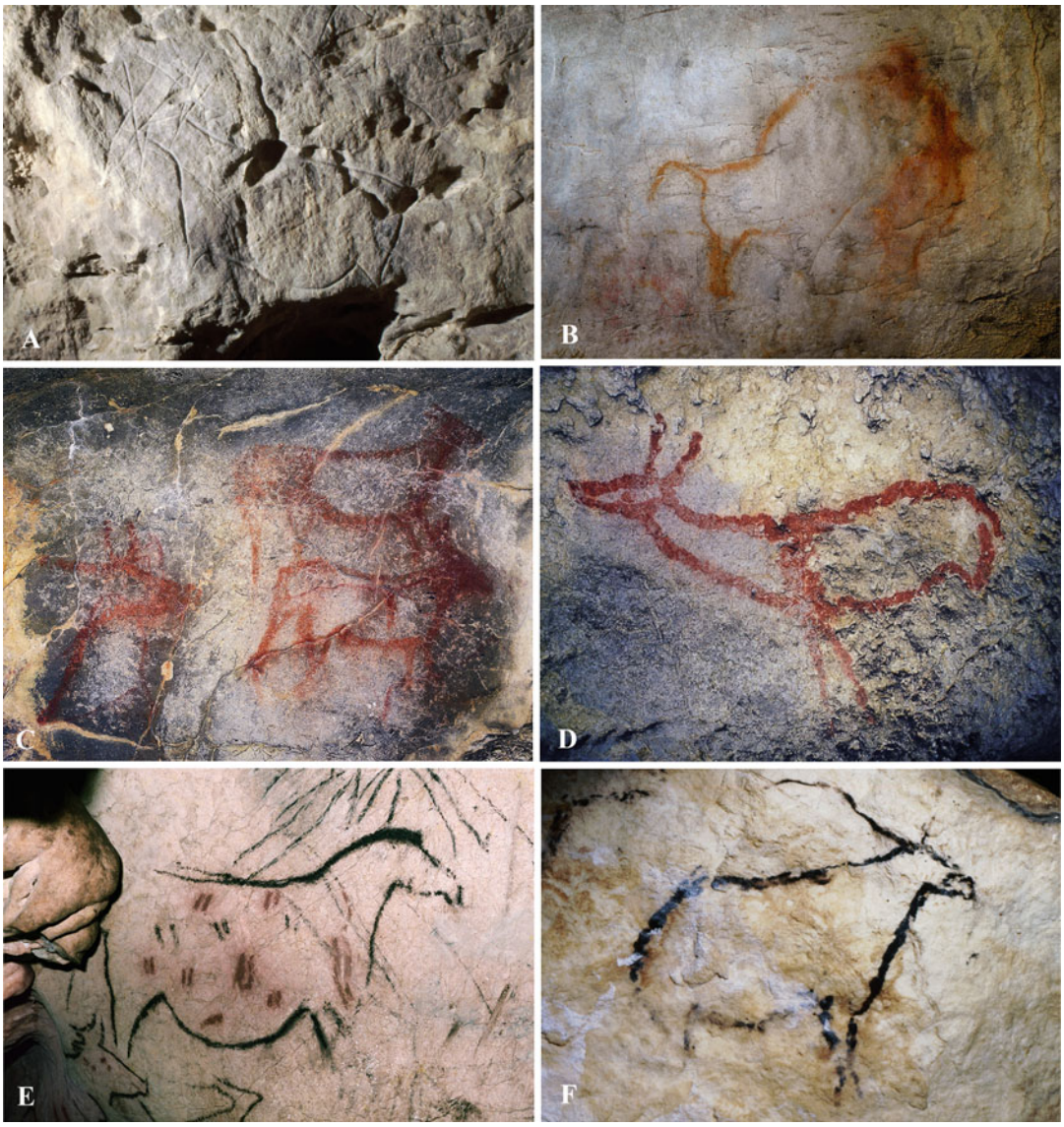

Europe: Prehistoric Rock Art, Fig. 1 Parietal art of the Upper Paleolithic in Spain. (**a**) Santo Adriano (Asturies). (**b**) Castillo (Cantabrie). (**c**) La Garma (Cantabrie). (**d**) Covalanas (Cantabrie). (**e**) La Pileta (Málaga). (**f**) Nerja (Málaga). (Photos: G. Sauvet (**a**, **f**); C. Fritz and G. Tosello (**b**); C. González Sainz (**c**, **d**); J.L. Sanchidrián (**e**))

France

France is home to 167 caves and shelters attributed to the Upper Paleolithic. Animal motifs constitue the larger group of representations. In general, herbivores dominate (equines, bovines, caprine, cervid); carnivores (bears and felines) are more rare as are humans and anthropomorphic figures. The proportions vary from those of consumed fauna, as it involves iconography linked to myths and beliefs and not directly related to daily life.

The sites related to the first culture of the Upper Paleolithic, Aurignacian, are very rare and often reduced to a state of relics. This makes the discovery of the Chauvet Cave (Ardèche) even more exceptional. The technical quality and the conservation of these painted and engraved representations (felines, rhinos, mammoths, horses, bison,

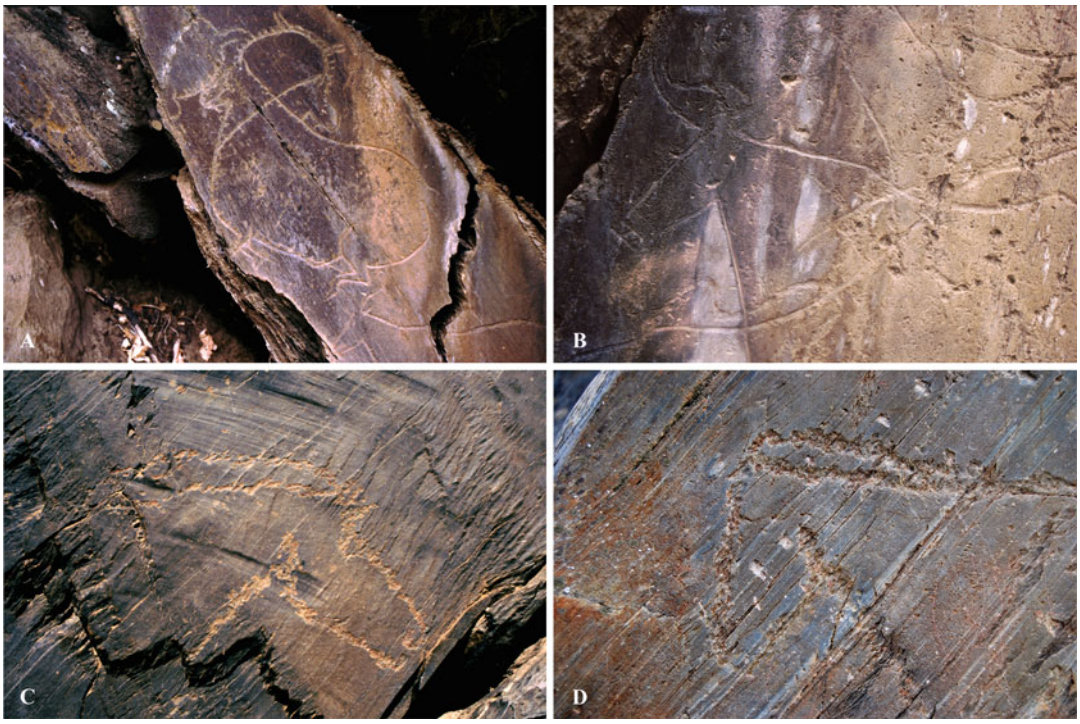

Europe: Prehistoric Rock Art, Fig. 2 Paleolithic art on rocks in daylight on the Iberian Peninsula. (**a**–**b**) Foz Côa (Portugal). (**c**–**d**) Siega Verde (Salamanque). (Photo: G. Sauvet)

ibex, bears, etc. in descending order) have cast doubt on their age despite the argument of the eight consistent direct radiocarbon datings. In Dordogne, it is more than likely that parietal art must have flourish in shelters that have unfortunately collapsed (Blanchard and Castanet rockshelters).

The following period, known as Gravettian, sees the rock art phenomenon increase and extend from the north of the Loire (Mayenne-Sciences, Arcy-sur-Cure) to the Pyrenees (Gargas) passing by Dordogne (Cussac) and Quercy (Pech-Merle, Cougnac) (Fig. 4a–d). The Cosquer cave, today immerged under 30 m of water near Marseille, belongs to this formal universe. The represented fauna are again more or less the same as in Aurignacian: mammoths and megaloceros are omnipresent. Apart from exceptional representations of "wounded" men struck by multiple strokes (Pech-Merle, Cougnac, Cosquer), humans are represented by the bas-reliefs of Laussel, with the famous "woman with a horn" which is related to the immense trend of feminine representations with opulent forms whose hundreds of statuettes have circulated in Europe between 25,000 and 23,000 BP. Another original theme, typical to this period, is that of negative hand stencils produced by blowing pigment around the hand applied to the wall. This motif saw a considerable expansion from the Yonne valley (Arcy-sur-Cure) to Andalusia (Ardales), through Extramadure (Maltravieso), the Cantabrian region (Castillo, Fuente del Salín), the northern and southern slopes of the Pyrenees (Gargas, Tibiran, Fuente del Trucho), Quercy (Pech-Merle), Provence (Cosquer), and even Italy (Paglicci), to name only a few major sites.

The Solutrean, the culture following the Gravettian, is very original in terms of lithic industries, but left few unmistakable traces in terms of parietal creation. The most remarkable are sculptures in bas-relief (Le Roc de Sers, Charente and Le Fourneau du Diable, Dordogne). Several caves in the Rhone valley have been attributed to this period but without certainty (Chabot, Ebbou, Oulen, Les Deux-Ouvertures).

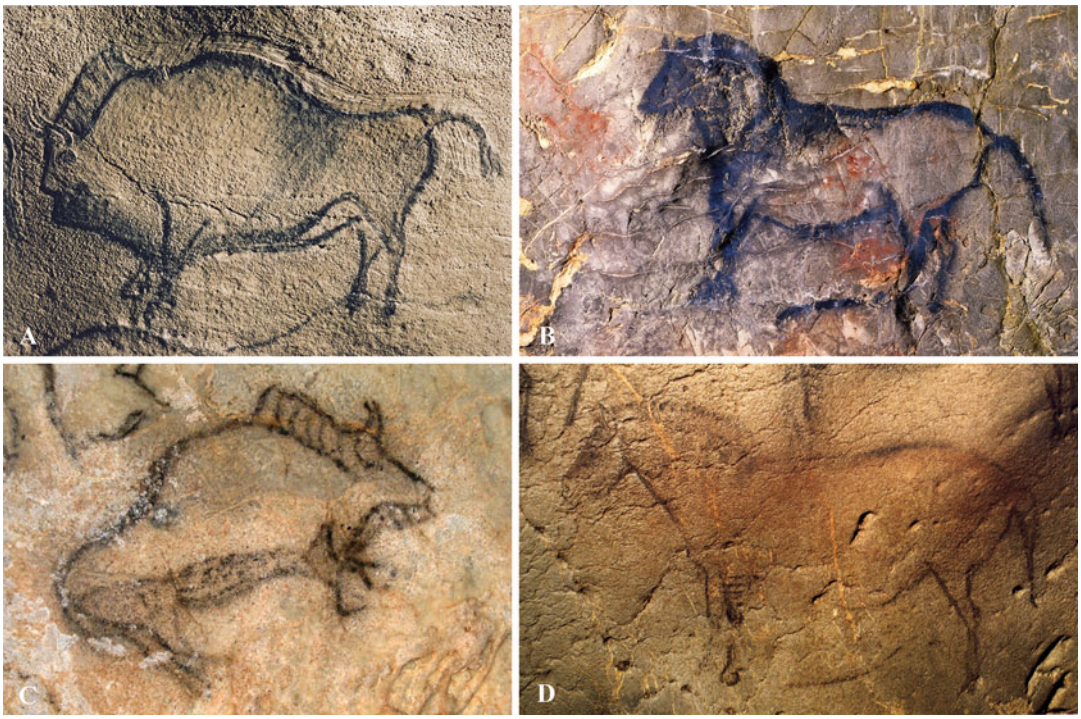

Europe: Prehistoric Rock Art, Fig. 3 Parietal Paleolithic art in Spain, attributed to the Magdalenian. (**a**) Covaciella (Asturies). (**b**) La Garma (Cantabria). (**c**) Santimamiñe (Viscaye). (**d**) Ekain (Guipúzcoa). (Photos: J. Fortea Pérez (**a**); C. González Sainz (**b**, **c**); P. Diaz de González (**d**))

The Magdalenian, the last material culture of the Upper Paleolithic, saw a real explosion in rock art and portable art (Fig. 4e–f). In France, Lascaux is certainly the most famous Paleolithic cave because of its monumental polychrome frescos and its thousands of entangled engravings, but its belonging to the Magdalenian world is still debated (without doubt Lascaux belongs to a very early stage of the Magdalenian or even previous to this one). In the area of line drawings and paintings, authentic works of art were produced in many Magdalenian sites (Font-de-Gaume in Dordogne, Niaux in the Pyrenees). At the same time, the art of engraving reached its heights as much in Dordogne (Les Combarelles, Teyjat) as in the Pyrenees (Les Trois-Frères, Le Tuc-d'Audoubert, Fontanet). Sculpture in rockshelters also reached a remarkable level (Angles-sur-l'Anglin in Vienne, Cap-Blanc in Dordogne); it finds an equivalent no less remarkable in the Pyrenees in the form of a sculpture in the round modeled in clay (bison from Tuc-d'Audoubert, bears from Montespan). Among the original motifs from Magdalenian in its final phase, it is appropriate to signal the new type of female representations, reduced to a simplified outline with no head or extremities. This model known in several caves in Dordogne and Quercy (Pestillac, Carriot, Fronsac, Les Combarelles) saw many transpositions in portable art. These female silhouettes were also engraved on plaquettes (Lalinde in Dordogne, Gönnersdorf in Germany) and exported all over Europe in the form of figurines and pendants carved in stone, bone, antler wood, lignite, and even flint. This shows the difficulty in separating rock art from portable art for this period in prehistory.

Along with figurative motifs, the Paleolithic artists elaborated multiple conventional forms, which are called "signs." These drawings range from simple (punctuation fingerprints, large blown discs, alignment of sticks) to complex forms with evocative, but simplistic names: tectiforms (roof shaped), claviforms (club shaped), aviforms (bird shaped), etc. These signs

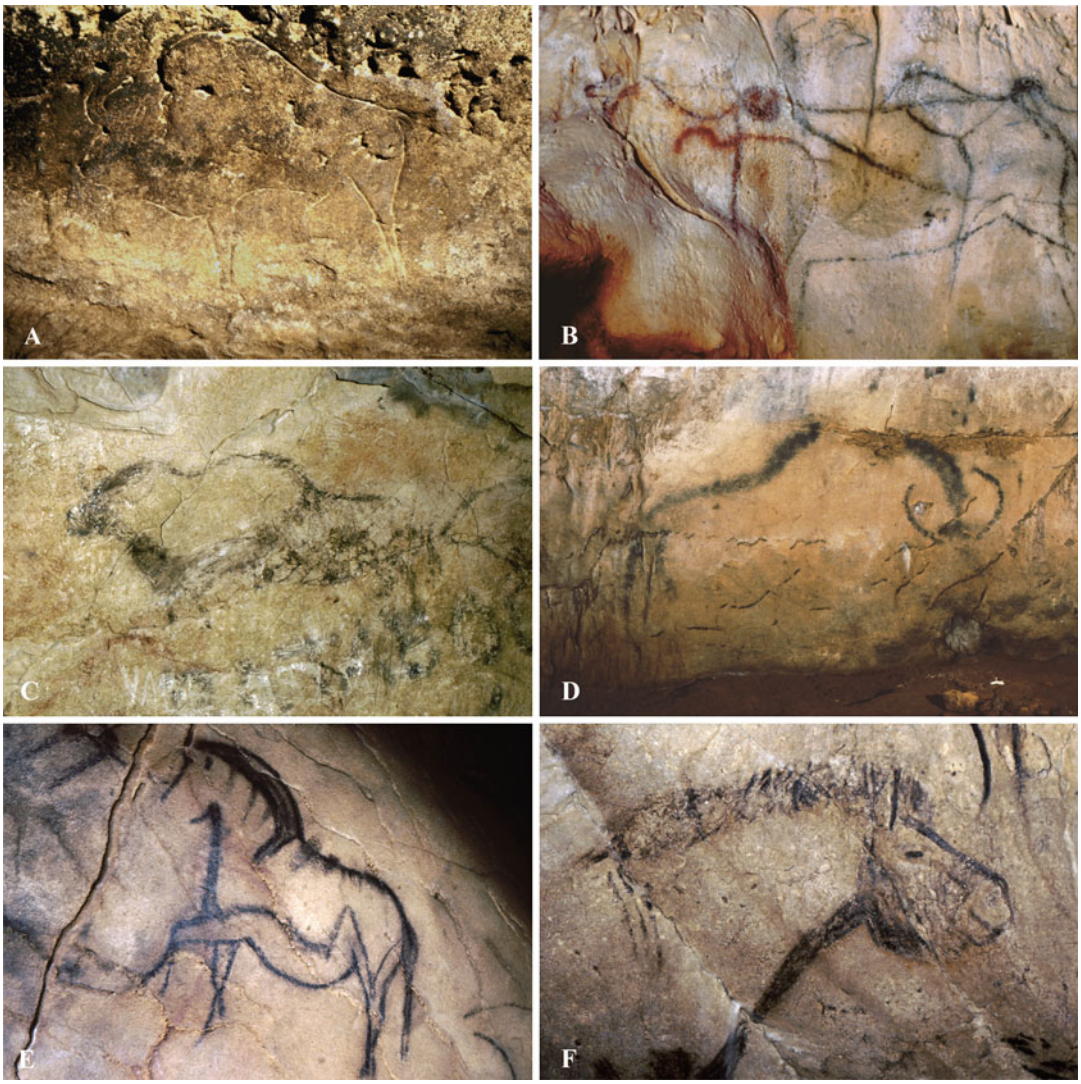

Europe: Prehistoric Rock Art, Fig. 4 Paleolithic parietal art in France attributed to the earliest periods (**a**–**e**) and to the Magdalenian (**e**–**f**). (**a**) La Grèze (Dordogne). (**b**) Cougnac (Lot). (**c**) Mayrière supérieure (Tarn-et-Garonne). (**d**) Marcenac (Lot). (**e**) Le Portel (Ariège). (**f**) Niaux (Ariège). (Photos: G. Sauvet)

were sometimes considered as territorial markers representative of human groups despite their vast dispersion.

The Rest of Europe

For a long time, Paleolithic rock art was circumscribed to the "French-Cantabrian" domain, and this remains the reference point today, even if caves in Andalusia like La Pileta and Ardales have been known since 1911 and 1918 respectively.

Nonetheless, a comparable art is known in the south of Italy (Romito, Romanelli) and Sicily (Addaura, Niscemi, Levanzo). Animal art in these rockshelters, most of them discovered in the 1950s, recalls by its formal characteristics the art of the final Magdalenian on the Mediterranean border, which confirms the dating of neighboring archaeological sites belonging to the final Epigravettian and the Romanellian. The Paglicci cave (Puglia) deserves a special mention, as it is probably the oldest decorated cave in Italy (apart

from Fumane in Venetia), its belonging to the Gravettian world being confirmed by the presence of negative hands.

Much more recent discoveries have considerably extended the domain of Paleolithic parietal art in Europe. This is the case for the Church Hole cave in Creswell (Derbyshire, England) in 2003. Despite some uncertainty about its iconography, it seems that there are several animal engravings of Paleolithic type, which is not surprising given that several final Paleolithic deposits, named here Creswellian, are known in this region.

In 2006, some engravings were observed for the first time in a German cave (Mäanderhöhle, Bavaria). While not figurative, their association with speleothems evoking breast or phallus brings them closer to the Paleolithic way of doing. Even more recently (2009), the site of Coliboaia in Romania was signaled. This extremely important site is similar to Chauvet in its bestiary (rhinoceros, feline, bear, bison, horse) and by its style. A recent dating confirms an age close to that of Chauvet, which is not surprising as Aurignacian settlements are abundant in Romania. It is only a matter of time before other discoveries are made in this region of Europe.

The Meaning of Paleolithic Art

At the beginning of the twentieth century, bathed as we were in ethnographic accounts, we imagined the "primitives" randomly drawing on the walls of caves the image of their game to kill them in effigy. Fortunately, the majority of specialists today recognize that rock art is the fruit of coherent and structured thought which expressed a "symbolic construction" (D. Vialou) complemented by a "figurative syntax" (A. Leroi-Gourhan). Some people think that Paleolithic thought has remained relatively constant for all its duration and others that it has been affected by a profound evolution. Without entering into this debate, we rightfully note that, despite its longevity and expansion, and despite its formal diversity, Paleolithic rock art presents undeniable structural constants which confer upon them some unity. Among these is the expert use of the irregular morphology of the walls of caves. In addition to the fact that these reliefs increase the visual salience of these works, they establish a close relationship between the underground mineral world and the animals depicted by man. This sought-after osmosis may in part explain the preference for caves. Another motif that seems a constant in Paleolithic thought is female sexual signs, which have played an important role since the Aurignacian (Chauvet, Castanet, La Ferrassie), and continues without interruption to the Magdalenian (Bédeilhac) through the Solutrean (Micolón, Spain). To this can be added the very significant tendency concerning the assemblages of distinct animal species, which persist throughout the Paleolithic.

These formal constants must correspond to ideological constants. Over time, all kinds of theories, more or less inspired by ethnology and drawn from the history of religions, followed one another, periodically resurfacing due to lack of consensus. Art for art's sake, hunting and fertility magic, totemism, and shamanism have in turn been highlighted. Given the difficulties of ethnographic comparative method and the impossibility to interpret works coming from another culture of which we know nothing, the tendency among specialists of prehistoric art is currently to divert questions of interpretation to make rock art a tool in the service of social and cultural paleoanthropology.

Post-Paleolithic Rock Art

At the end of the Paleolithic, with a change in the conditions of life, the form and function of rock art changed. It is difficult to link with certainty rock manifestations with the Mesolithic period (such is the case of geometric signs engraved in sandstone massifs in Fontainebleau, France) and to set apart local innovations from various influences coming from the east Mediterranean and the North Atlantic coast. During the Neolithic and in the zones under the influence of megalithism, a trend in schematic and geometric art developed and became the dominant form with the introduction of metallurgy (Chalcolithic, Bronze Age, Iron Age). Thousands of rock works are known in rockshelters and caves, but mostly on rocks in the open air. Only the most important sites, the most original, and the most representative ones

will be mentioned here. Their relative chronology and their reciprocal influences are very difficult to establish.

Levantine and Macroschematic Art

Levantine art is a manifestation of rock art whose center is located on the Spanish Mediterranean side (Beltrán Martínez 1968). The most significant sites are Prado de Las Olivanas, Val del Charco del Agua Amarga in Aragon, El Cogul in Catalonia, Cavalls, Civil, Remigia, La Araña in Valencia, La Sarga in Alicante, Minateda, Torcal de las Bojadillas in Albacete, and La Fuente del Sabuco in Murcia (Fig. 5). These are rockshelters exposed to daylight and rain as well as to contact with animals that used these shelters as protection, which explains why the conservation is unequal and some rockshelters are sometimes very faded and deteriorated.

The main color is red, with various hues. Black and white paint also exists, but white is only important in some regions like the Albarracín sector (Teruel). In the majority of cases, the pigments employed are iron oxides or manganese. Some examples of engravings are also known to exist.

Generally, we associate Levantine art with representations of archers, who are often illustrated in hunting scenes. However, humans appear in a wide variety of themes including representations of groups in movements, scenes of collecting honey, and executions or warlike confrontations.

In terms of style, the human figure is more useful to conduct classifications than animals. Indeed, the human figure presents marked differences allowing the definition of different graphic horizons succeeding one another in the whole domain of Levantine art. Among others these differences concern the proportions of the body; the degree of naturalism, movement, decorations; the way to represent weapons; and the type of scene in which figures are involved. In general, archers are dominant and definite representations of women are rare. The naturalism of the human representation extends from figures with legs and arms modeled with certain anatomical details, even though these are subject to marked conventions with respect to bodily proportions, to linear figures, very simplified and devoid of individuality.

Only a few animal species are represented. Basically, these are deers and wild goats and some bulls, horses, and wild boars, but these latter species are concentrated in certain regions, which allows for some regionalization to be established. Other species such as canidae, birds, or insects are in very small number.

Pictorial painting techniques used for animals range from solid infill with biangular perspective formulae for the legs and horns to parallel lines infill or simple linear contours, with the exception of the head, but this latter technique is very underused.

In some sites, notably in Sarga (Alicante), Levantine art appears superimposed to other graphic manifestations called *macroschematic* which presents a clear relationship with figurative motifs of Neolithic ceramic, thus enabling the establishment of a Neolithic chronology of Levantine art. Macroschematic art is characterized by the absence of figurative zoomorphic motifs and the predominance of human representations of a relatively large size, created with the help of wide red strokes. They frequently show lifted arms and are associated with meander-like motifs finishing with some kind of hands. The range of macroschematic art is limited to the north of the Alicante province, a major focus of the early Neolithic.

Schematic Art

The so-called schematic rock art comprises paintings under rockshelters and exceptionally in caves and engravings on rock surfaces in the open air. This art spans more than three millennia, from the early Neolithic to the Bronze Age. Its duration and geographic extension explains the large diversity in technique, style, and form (Fig. 6).

Schematic Rock Paintings Schematic rock painting is a figurative phenomenon that occupies practically all of the Iberian Peninsula and even extends to the southeast of France (Acosta 1968). The latest research suggests that these graphic manifestations have a chronocultural framework beginning in the early Neolithic (c. 6,500 BP) and finishing in the Chalcolithic (c. 4,000 BP).

Schematic rock painting essentially consists of drawings created with the help of liquid paints. The dominant colors are in descending order: red, black,

Europe: Prehistoric Rock Art, Fig. 5 Post-Paleolithic art of Levantine Spain. (**a**) Cinto de Las Letras (Valencia). (**b**, **c**, **d**) Cingle de la Mola Remigia (Valencia). (**e**) Prado de las Olivanas (Teruel). (**f**) Solana de las Covachas (Albacete). (Photos: V. Villaverde (**a**–**e**); G. Sauvet (**e**–**f**))

and white, with different hues caused by conservation issues and/or saturation of the pigments used. White is only used as a supplement to illustrate certain details. To apply paints, any instrument producing broad strokes a centimeter wide can be used (the crushed plant sprig, small wad of hair, or just a fingertip end). The loading capacity of these technical processes is very limited, making it difficult to make lines of a certain length; this determines the form and conditions the usual sizes to around 10–30 cm, the largest figures not exceeding 50 cm.

With these techniques and figurative means peculiar to schematism, highly stereotyped patterns based on simple linear features were represented: full-frontal human figures and side-on quadruped animals, that is, minimal elements of identification. Next to these anthropomorphic figures of varied typology and the animals often appear drawings resembling suns (stelliforms) in ancient phases and the so-called *oculated idols* (idols with eyes) in the later phases.

Europe: Prehistoric Rock Art, Fig. 6 Post-Paleolithic schematic art in Europe. (**a**) Los Letreros (Almeria, Spain). (**b**) Porto Badisco (Pouilles, Italy). (**c**) Campo Lameiro (Galicia, Spain). (**d**) Naquane (Valcamonica, Italy). (**e**) Domingo Garcia (Ségovia, Spain). (**f**) Tanum (Bohuslän, Sweden). (Photos: G. Sauvet (**a**–**e**); Sven Rosborn (**f**). (Figure is licensed under the Creative Commons Attribution 2.0 Generic license))

We most often find schematic paintings in the rockshelters, which easily allows daylight, or simply on unprotected vertical crags, standing out in the landscape. The lithology of mediums is very diverse: limestone and sandstone are predominant, but examples in the quartzite or granite outcrops are also known. Much more exceptional are paintings in deep caves in complete darkness like the Spanish cave of La Pileta (Malaga) or the Italian cave of Porto Badisco (Otranto) with black figures (coal in the first case or bat guano in the second). However, the specificities of these two cavities attributed to the Bronze Age mean that we must consider them as marginal in comparison to schematic paintings treated here.

Engraved Rocks from the Metal Age With the diffusion of metals, we encounter across Europe large concentrations of rocks in the open air

engraved by pecking, probably corresponding to places of cultural significance.

Mont Bego (Alpes-Maritimes, France), more than 2,000 m above sea level, was a place of pasture between 2,500 and 1,700 BCE (the Chalcolithic and Early Bronze Age). Agricultural activities are illustrated (plots, plows, schematic bovines called *corniforms (horn shaped*) and metal weapons (daggers, axes, halberds)). These very stylized and repetitive graphic representations (nearly 40,000 counted engravings) are probably related to the seasonal cycle of transhumance, through sun worship or worship of the bull (De Lumley 2011).

In Valcamonica (Lombardy, Italy), on the sides of a 70 km long valley, rock art was practiced for over 4,000 years, which explains its wide variety found in over 250,000 engravings. The earliest phase refers to the Neolithic scenes of everyday life. A second phase seems contemporary to Mont Bego with similar motifs to the exclusion of *corniforms*. The greatest number of figures belongs to the most recent periods (Late Bronze Age, Iron Age, and even Roman epoch) and consists mainly of dynamic human representations (dancing and fighting, etc.).

Another very rich zone in rock art is in Scandinavia. In the region of Tanum (west coast of Sweden), rich in megalithic relics, nearly 10,000 engravings, engraved on slabs of granite, are attributed to the Bronze Age, from the second millennium BCE. Hunting scenes, agricultural scenes, ships, and men armed with swords and spears constitute most of the iconography with signs (cups, suns, spirals). Along the Norwegian coast and close to the Arctic Circle (Alta), there are also many engravings. An early phase abundant in animals (elk, reindeer, bears, whales) is attributed to a culture of hunters, while the most recent phase is comparable to that found in Sweden and Denmark.

All along the Atlantic coast, from Ireland to the Portuguese coast, a megalithic phenomenon has developed which is largely widespread in the interior; it is, in this sense, difficult to separate it from Iberian schematic art, as shown by some motifs (axes, daggers, halberds, sun signs, snakes) that are found in both the megalithic funerary monuments, rocks in the open air, caves, and shelters.

The Atlantic coast in the Iberian Peninsula has large concentrations of engravings in the open air. More than 500 such sites are known in the region of Pontevedra (Galicia). There are granite rocks with schematic engravings attributed for the large part to an early phase in the Bronze Age. The main motifs are geometric signs (cup marks, concentric circles, spirals, zigzag) and schematic animals among which the deer plays an essential symbolic role (male cattle, bellowing males, hunted animals, etc.). Men and weapons (spears and daggers typical to the Early Bronze Age) are rare. Some swastikas and horse riders could indicate a long stretch in the Late Bronze Age.

Schematic rock carvings attributed to the Bronze Age also exist in caves in Spain (Flint Gallery, in Atapuerca, Kaite II in the karst complex of Ojo Guareña) and in France (Les Fraux, Dordogne).

Current Debates and Future Directions

Prehistoric Rock Art and the Evolution of Research

The study of rock art has long been restricted to establishing patterns of evolution of forms and styles from a cultural-historical perspective, most often based on linear trajectories taken from the History of Art (formative period, maturity, degeneration). Almost all theories responsible for explaining the place of rock art in prehistoric societies have a functionalist background, because they view art as designed to solve problems related to the functioning of society. As the processes that manage and change cultures rely on communication tools, of which graphic arts form part, their study easily came under the processual paradigm of New Archaeology in the 1950s. In the 1990s, post-processualism, born in reaction to the excesses of processualism, had the main effect of bringing archaeology and cultural anthropology together and taking into account human beings. In the field of art, the individual artist, the creator, has finally been fully acknowledged.

Conservation and World Heritage

Prehistoric rock art is an extremely fragile world heritage. Many European sites have been

classified by UNESCO as having outstanding universal values (1979, Valcamonica and decorated caves in the valley of Vézère; 1985, Altamira; 1994, Tanum; 1998, the Côa valley (and subsequently Siega Verde) and rock art in the Mediterranean basin of the Iberian Peninsula; 2008, 17 caves in the Cantabrian region). Cultural parks and the setting-up of similar replicas today enable the control of public access to their exceptional heritage, but irreversible damage has been committed by vandalism and urbanization. The conservation of the Côa valley, threatened by the construction of a dam, is a remarkable example, but cannot counter other irredeemable losses. In 1974, tens of thousands of engravings belonging principally to the Bronze Age, but some could have belonged to the Epipaleolithic, were drowned by the waters of a hydroelectric dam in Fratel in the Tagus valley (Portugal). More recently, the same drama has been repeated in the Guadiana valley (Alqueva dam) on the Spanish-Portuguese border.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art Studies: Normative Approaches
- ▶ Côa Valley Rock Art Sites
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Mobiliary Art, Paleolithic
- ▶ Portable Art Recording Methods
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art, Forms of
- ▶ Siega Verde Rock Art Sites
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Techniques of Paleolithic Art
- ▶ Valcamonica Rock Art

References

Acosta, P. 1968. *La pintura rupestre esquemática en España*. Salamanca: Facultad de Filosofía y Letras de la Universidad de Salamanca.

Anati, E. 2003. *Aux origines de l'art. 50000 ans d'art préhistorique et tribal*. Paris: Ed. Fayard.

Baptista, A.M. 2009. *O paradigma perdido. O Vale do Côa e a arte paleolítica de ar livre em Portugal [Paradigm lost. Côa Valley and the open-air palaeolithic art in Portugal]*. Porto: Ed. Afrontamento.

Beltrán Martínez, A. 1968. *Arte rupestre Levantino*, Monografías Arqueológicas. Vol. IV. Zaragoza: Universidad de Zaragoza.

Bicho, N., A.F. Carvalho, C. González Sainz, J.L. Sanchidrián, V. Villaverde, and L.G. Straus. 2007. The Upper Paleolithic rock art of Iberia. *Journal of Archaeological Method and Theory* 14 (1): 81–151.

Breuil, H. 1952. *Quatre cents siècles d'art pariétal*. Montignac: Centre d'Etudes et Documentation préhistoriques (réédition fac-similé 1974).

Collectif. 2002. *Las cuevas con arte paleolítico en Cantabria*. Asociación Cántabra para la Defensa del Patrimonio Subterráneo (Segunda edición, 2010).

de Lumley, H. 2011. *La Montagne sacrée du Bego*. Paris: CNRS Ed.

González Sainz, C., R. Cacho Toca, and T. Fukazawa. 2003. *Arte paleolítico en la región Cantábrica. Base de datos multimedia Photo VR*. Santander: Universidad de Cantabria y Gobierno de Cantabria.

Leroi-Gourhan, A. 1965. *Préhistoire de l'art occidental*. Paris: Ed. Mazenod (édition revue et augmentée par B. et G. Delluc, Citadelles et Mazenod, 1995).

Martínez Valle, R., coord. 2006. *Arte rupestre en la Comunidad Valenciana*. Valencia: Generalitat Valenciana.

Ríos González, S., C. García de Castro Valdés, M. de la Rasilla Vives, and F.J. Fortea Pérez. 2007. *Arte rupestre prehistórico del Oriente de Asturias*. Oviedo: Consorcio para el Desarrollo rural del Oriente de Asturias.

Villaverde Bonilla, V. 1994. *Arte paleolítico de la cova del Parpalló*. Valence: Diputació de València.

Further Reading

Lorblanchet, M. 1995. *Les grottes ornées de la préhistoire. Nouveaux regards*. Paris: Ed. Errance.

European Association of Archaeologists (EAA)

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Basic Information

The European Association of Archaeologists (EAA; http://www.e-a-a.org) is a membership-based, not-for-profit association which is open to all archaeologists and other related or interested

individuals or bodies. It is fully democratic, and is governed by an Executive Board elected by full members of the Association. A Nomination Committee ensures that the Board is representative of the different regions of Europe and the different sectors of the profession. Its membership covers most European countries, but also includes residents of all other continents interested in European Archaeology.

The EAA was established in 1994 at an Inaugural Meeting in Ljubljana, Slovenia, where its Statutes were formally approved (Cleere 1995; http://www.e-a-a.org/statutes.htm). These stipulate that the EAA was created:

- To promote the development of archaeological research and the exchange of archaeological information
- To promote the management and interpretation of the European archaeological heritage
- To promote proper ethical and scientific standards for archaeological work
- To promote the interests of professional archaeologists in Europe
- To promote cooperation with other organizations with similar aims

The EAA has held Annual Meetings since the first conference in 1994; sessions cover topics varying from the interpretation of material culture through theoretical perspectives to cultural heritage management. These conferences have been held in a range of different European cities: Santiago de Compostela, Spain (1995); Riga, Latvia (1996); Ravenna, Italy (1997); Göteborg, Sweden (1998); Bournemouth, UK (1999); Lisbon, Portugal (2000), Esslingen am Neckar, Germany (2001), Thessaloniki, Greece (2002), St. Petersburg, Russia (2003), Lyon, France (2004), Cork, Ireland (2005) Cracow, Poland (2006), Zadar, Croatia (2007), Valletta, Malta (2008), Riva del Garda, Italy (2009), The Hague, Netherlands (2010), Oslo, Norway (2011) and Helsinki, Finland (2012).

The EAA has published a journal since 1993: originally the Journal of European Archaeology 1993–1997, since 1998 the European Journal of Archaeology (EJA) (Chapman 1995; Pearce 2002). It also publishes The European Archaeologist (TEA) electronic newsletter (http://www.e-a-a.org/tea/).

Major Impact

Since 1999, the Association has awarded the annual European Archaeological Heritage Prize to an individual, institution, or to a local or regional government for an outstanding contribution to the protection and presentation of the European archaeological heritage (http://www.e-a-a.org/prizes_awards.htm). A Student Award was instituted in 2002 and is awarded annually for the best paper presented at the EAA Annual Meeting by a student or an archaeologist working on a dissertation.

The Association creates Working Parties for a limited period in order to achieve a particular result (formulate policy, develop a standard, create an inventory, etc.), while Committees are established where an issue is considered to be of permanent concern to the EAA (http://www.e-a-a.org/working_groups.htm). EAA Committees include the Committee on the Trade in Cultural Material, the Committee on the Teaching and Training of Archaeologists, and the Professional Associations in Archaeology Committee.

The Association promotes ethical professional behavior through its Code of Practice, Principles of Conduct for Contract Archaeology, and Code of Practice for Fieldwork Training (http://www.e-a-a.org/codes.htm). The EAA acts as an advisory body on all issues relating to the archaeology of Europe, and is affiliated to major institutions active in cultural heritage protection and management. In 1999, the EAA was granted consultative status with the Council of Europe, which in 2003 was upgraded to participatory status.

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Ethics in Archaeology
- ▶ Heritage and Archaeology

References

Chapman, J. 1995. Editorial. *Journal of European Archaeology* 3: iv–x.
Cleere, H. 1995. The EAA is up and running. *The European Archaeologist* 3: 1–3.
Pearce, M. 2002. Editorial. *European Journal of Archaeology* 5: 5–7.

Further Reading

Renfrew, C. 1995. The identity of Europe in prehistoric archaeology. *Journal of European Archaeology* 2 (2): 153–173.
Rowlands, M. 1995. Why do we need a European association of archaeologists? *Journal of European Archaeology* 2: 175–178.
The European Archaeologist. 10th anniversary conference issue, 21A. Available at http://e-a-a.org/tea/archive.htm

European Contact and Global Expansion (Post-CE 1500): Historical Archaeology

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Introduction

The mass movement of Europeans outside their continent, beginning in the fifteenth century and the experiences of the native peoples with whom they came into contact, is one of the most important narratives of world history. Historical archaeologists have been engaged in understanding, interpreting, and explaining cross-cultural contact and interaction, especially as it pertains to the post-CE 1500 world, since their field was first formalized as a subfield within archaeology in the late 1960s. Since then, historical archaeologists' views on cultural contact have changed along with the general theoretical trends of anthropological archaeology and as greater amounts of information have been collected from across the globe.

Historical archaeologists originally tended to interpret cultural contact rather simplistically using acculturation as their guiding theory. Using this perspective, they tended to view the contact process as overwhelmingly unidirectional, meaning that indigenous peoples simply accepted foreign products and eagerly incorporated them into their ways of life. This process was observable, thought archaeologists, through the presence and abundance of foreign objects within indigenous settlements. Thus, a high percentage of European objects such as copper pots, silver bracelets, and glass beads – when compared against "traditional" objects such as stone tools and clay pottery – could be interpreted as representing a high degree of acculturation. Fewer foreign materials would imply less acculturation. With time, and using anthropological ideas as a guide, historical archaeologists began to appreciate the complexity of culture contact, realizing it to be a two-way process. In this new model, Europeans and natives learned from one another, as both were acculturated into elements of the other's culture.

The more refined understanding of cross-cultural engagement moved archaeology away from facile concepts of superiority and inferiority (where "inferior" native cultures readily accepted the "superior" products of the Europeans) and demonstrated the complex social and cultural factors that influenced the many cultural contact situations that had taken place as a result of post-CE 1500 European global expansion. An interest in the development of new cultures from a blending of two or more cultural traditions was one outcome of acknowledging the complexities of cultural contact. These new cultures – frequently termed "hybrid" or "creole" – developed around the globe as one result of culture contact. Observers can see their expressions in many places today, including throughout the Caribbean, South America, and everywhere that diverse cultures have been in contact for generations.

Since the 1990s, historical archaeologists have almost completely abandoned the acculturation model and are now conducting some of the most important and interesting research in the field of cultural contact. In the process, they are adding to the general storehouse of anthropological information concerning what happens when peoples of vastly different cultures come together and

exchange material culture. This research has developed in tandem with the general maturation of historical archaeology and has spread throughout the globe as indigenous archaeologists are adding their own perspectives about cultural contact and European expansion. Researchers investigating the cultural contacts between native peoples and Europeans have explored a huge array of complicated subjects, including the roles that gender, race, and class play, the significance of ecological variables in shaping cross-cultural encounters, and strategies of accommodation and resistance. Much of this research has become the centerpiece of study within contemporary historical archaeology because of its anthropological and historical importance to understanding post-CE 1500 global history.

Definition

The term "European contact" refers to a situation where people of European culture and heritage encounter people of non-European culture and heritage in the latter's homeland. Historical archaeologists typically reserve the term for post-CE 1500 history, but it can also be used for earlier eras as well.

Contact itself can be "direct" or "indirect." Direct contact involves a face-to-face meeting between at least two people of different heritages, backgrounds, traditions, or cultures. Indirect contact involves a minimum of three people, one of whom serves as an intermediary for the other two. Let us imagine three people in an indirect contact situation, two indigenous individuals (A and B) and a European (E). In an indirect contact situation, the European and one indigenous person will be in direct, face-to-face contact (A and E). The third individual (B) is in direct contact with the other indigenous person (A) but not with the European (E). Rather, the second indigenous person (B) is thus only in indirect contact with the European (E) through the other indigenous person (A). Indirect contact occurs between the European (E) and the indigenous person (B), even though they have never actually met face to face. The two indigenous people (A and B) can exchange European objects, ideas, or even harmful pathogens long before direct contact has occurred between the European (E) and the second native person (B).

Communities and entire cultures can equally stand in for the individuals in this simple example. And knowing this, we can easily imagine how complex and nuanced any single contact situation can be when the number of people and communities is expanded. For example, if we think about eight Europeans in contact with just 100 native people, we can see that a vast number of direct and indirect contact situations are possible. The shear number of likely contacts makes it possible to imagine the variability of circumstances that may result in real historical situations.

Some archaeologists have found the term "cultural contact" problematic for several reasons, one of which is that the concept tends to imply more interest in short-term encounters than in long-term "entanglements" (e.g., Silliman 2005). This problem is easily solved by understanding that both "short-term" and "long-term" contacts have occurred in history. A short-term contact would be represented by Martin Frobisher's meeting native people on Baffin Island in 1576, whereas a long-term contact is exemplified by the multi-year interactions between European missionaries and Maoris in nineteenth-century New Zealand. The cultural impacts of a contact situation may be small or great depending upon the precise circumstances. Frobisher may have handed out European artifacts to the Baffinland Eskimo (Nunatsiaqmiut) he met, but this encounter had little lasting impact on them. Conversely, the missionary contacts in New Zealand drastically altered traditional patterns of life as various individuals accepted the entire foreign Christian religion.

"European global expansion" refers to the historical process whereby various continental nation-states traveled far beyond their homelands in search of riches, religious converts, and new markets. The identification and exact dates of the first European encounters outside Europe remain a matter of considerable speculation, but the overall goals of European expansion were well established by CE 1500. For historical

archaeologists, one of the key factors of this process is to discover where each European colonial power built fortifications, trading posts, religious missions, industrial facilities, and settlements. These places constitute a major focal point of much research in the historical archaeology of European contact and global expansion. The history of exploration is complex, and only a brief overview can be presented here.

Historical Background

The expansion of European nation-states outside their continental homelands began long before CE 1500, as Norse, Hanse, Venetian, and Genoese traders established contacts with peoples outside Europe (Scammell 1981: 1–224). Opinions vary widely concerning the distinctions between the pre-CE 1500 and the post-CE 1500 trading networks, but historical archaeologists who accept the principles of world-systems analysis understand that the post-CE 1500 era was markedly different from what had gone before. The essential difference is that post-CE 1500 European expansions were rooted in the creation, maintenance, and expansion of a capitalist world-economy that sought to link peoples around the world into a global system of economic and political exploitation. This system funneled wealth to the capitalist cores (e.g., Lisbon, London) while creating dependencies across the globe in what came to be called the Third World (Wallerstein 2004).

Pre-CE 1500 trading networks did not have the same overarching goals as the later capitalist networks and did not include a comprehensive theory of imperialism (Abernethy 2000: 24–29). After about CE 1500, each European nation-state engaged in transoceanic exploration had the same general goals, even though the precise histories of each nation's efforts are unique. As participants in the capitalist world-economy, their basic goals were to funnel riches to the financial centers of their respective countries through extractive industries – such as gold and silver mining using the enforced labor of slaves and indentured servants – and to ship furs, spices, and other sought-after commodities to Europe. The Spanish were the first to send explorers across the Atlantic Ocean with Columbus' voyage of 1492. A protracted series of follow-up explorations took them to the coasts of both the Atlantic and the Pacific, where they established outposts throughout the Caribbean and in Mexico, Peru, and what is today the American Southwest and California (Eakin 2007: 62–87). Another colonial superpower to seek transoceanic riches was Portugal, the other great Iberian power. The Portuguese began their voyages of exploration as early as 1419, heading south rather than west. By 1500, they had visited most of the African coast, reached India, located Brazil, and traveled throughout Indonesia (Russell-Wood 1998). The Dutch, British, French, and others (such as the Swedish) soon followed on the heels of the Iberians and sought their own colonial bases of operation that they hoped would challenge the growing wealth of their Spanish and Portuguese rivals. The Dutch began their maritime trade in 1590 and soon had outposts in North and South America, the Caribbean, Indonesia, and Africa, all places that they could directly defy the economic supremacy of the other Europe powers (Boxer 1973). The French and British adopted much the same strategy in their efforts to carve out their own overseas markets, with their greatest colonial conflicts playing out in the seventeenth- and eighteenth-century wars of eastern North America (Hart 2008: 48–91).

Native peoples were continually caught in the midst of the European search for economic domination, and frequently with devastating consequences. The development of African slavery represents a glaring example because a number of the Europeans' cultural contacts were with the African peoples they enslaved as part of the burgeoning Atlantic slave trade that involved all the major European superpowers. This trade helped to shape the history of the world after CE 1500 in ways that are still being experienced today (Nimako and Willemsen 2011). Many indigenous people and communities often played the Europeans against one another in a series of clever manipulations designed to forestall their cultural destruction and physical decimation or to eliminate the European threat altogether. Trigger's

(1987: 461) account of Amantacha, the seventeenth-century Huron man who was adept at convincing both the French and the British of his good intensions, provides a poignant example of indigenous intercultural understanding.

Though similar in structure, every single contact situation experienced by indigenous peoples and Europeans throughout the world was unique. In some cases, the contact situations involved hostility and in other cases cooperation. Some involved both conflict and acquiescence as the circumstances of contact evolved. The singularity of events and processes has meant that historical archaeologists have had to adopt research strategies that are sensitive enough to identify local characteristics, yet robust enough to capture the true nature of European global expansion. It would make little sense for an archaeologist to investigate a local contact situation while ignoring the larger cultural frameworks at work, such as Eurocentrism. Similarly, it would be unwise for an archaeologist to examine the forced inequalities of Eurocentric attitudes and practices without explaining their impacts on an identifiable indigenous people. The investigation of European expansion and cultural contact allows archaeologists to study the interplay between the local and the global in interesting and enlightening ways.

Key Issues

Some of the key issues that historical archaeologists face when attempting to understand and interpret the material, social, and cultural aspects of European contact and global expansion involve creating a narrative of a particular contact situation itself. Archaeologists create these ethnohistories after carefully studying the available primary and secondary historical sources and comparing this information with the archaeological evidence. Some of their primary concerns are to understand the duration of the contact, its characteristics, the people and communities involved, and how the artifacts left behind by both indigenous peoples and Europeans can provide information that may not be available in any other source. Thus, like most historical archaeology, the archaeology of European contact and global expansion is pursued in a multidisciplinary manner, with the archaeologist drawing upon a number of diverse sources.

Archaeologists can often identify the key actors in a contact situation by the artifacts that are present at a contact-period site. Using porcelain as an example, in the fourteenth century, Marco Polo (Marsden 1818: 560) mentioned that anyone with Venetian coins could purchase porcelain cups in the Chinese city of Hangzhou. This simple reference suggests the early European interest in these exotic ceramics, and the acquisition of porcelain soon became an obsession for many Europeans. The discovery of porcelain bowls and other vessels in archaeological contexts in European cities documents some measure of contact between European traders and Chinese potters (e.g., Vermeulen et al. 2006). The discovery of shipwrecks laden with thousands of pieces of blue-and-white Chinese export porcelain indicates the strength of the continuing contacts between Europe and Asia (e.g., van der Pijl-Ketel 1982). European trade items at native sites throughout the world perform the same function of signaling that cross-cultural contact has occurred in the past (e.g., Quimby 1966).

As noted above, however, the contemporary examination of cultural contact involves much more than simply identifying the dates, duration, and characteristics of contact situations. Today's analyses are far more nuanced, as a number of historical archaeologists are engaged in unraveling the material, social, and cultural complexities of actual contact situations using archaeological research as a primary tool. Just two examples will indicate some of the complexity that is entailed in the historical archaeology of European contact and global expansion in real archaeological situations.

The area called the Flatts (also called Schuyler Flatts) was located in Colonie, New York, north of the colonial Dutch settlement of Beverwijck (later Albany). In 1643, Kiliaen van Rensselaer, the Dutch-based owner of the vast region around Beverwijck, ordered the construction of a stockaded farmhouse there. This residence/trading post was home to Arent van Curler, widely regarded as

one of the most effective Dutch diplomats in New Netherland. His primary task was to establish cordial ties with Mohawk and Mahican fur trappers in the Hudson River valley. After the British took control of New Netherland in 1664 and renamed it New York, a prominent member of the Albany aristocracy named Philip Pieterse Schuyler bought the land and constructed a new house on the site of van Curler's now-collapsed outpost. Like van Curler, Schuyler maintained friendly ties with the local Native Americans. Because the Mohawks and the Mahicans engaged in frequent hostilities, however, he, like van Curler before him, was often forced into the role of cultural mediator.

Archaeologists excavating at the Flatts between 1971 and 1974 discovered a large collection of European artifacts there, including many objects one would expect to find within any Dutch house in the Netherlands or within a Dutch colonial house in New Netherland. Familiar European artifacts included leaded window glass, fragments of drinking glasses called roemers, white clay smoking pipes, and pieces of ceramic vessels made of faience, majolica, red earthenware, and stoneware. The archaeologists also found objects useful to the local Native Americans: wampum, glass beads, glass bottles, lead shot, and gunflints (Huey 1998).

In this case, the artifacts are interpreted as objects that assisted in creating peaceful trading relations between the Europeans and the Native Americans living in the region. The reason for this interpretation rests on the reality that "with nearly constant warfare between the Dutch and native people in the lower Hudson Valley [south of the Flatts], good relations with the Mohawk were essential" (Bradley 2005: 7). Objects offered in trade – made in Europe and processed through cross-cultural transportation and social networks – thus serve as tangible markers for the social relations enacted in this particular contact situation. Elsewhere, however, the presence of similar artifacts may have a completely different meaning.

Two hundred years later and thousands of miles away in Tasmania, the Van Diemans Land Company built Burghley. Their plan was to develop a large sheep-grazing and wool-producing concern on pastureland that they judged to be of exceptional quality. The first hut at Burghley was perhaps built in 1827, but only 2 years later, the residents had constructed several wooden houses. In the end, however, the settlement was a failure, and by the late 1830s, almost everyone had abandoned it.

Relations between the Aboriginal Tasmanians and the Europeans were hostile throughout Burghley's tense history. The placement of the buildings and fences needed for the wool industry disrupted the time-honored routines of the Aboriginals, and frequent violent confrontations occurred. The Australian authorities' solution was to capture and remove the entire indigenous population from Tasmania, and in 1842, they had accomplished their goal. The one pertinent fact that stands out in this particular contact situation is that "it is clear from the historical records that Aboriginal and European people did not coexist at Burghley" (Williamson 2002: 79).

Archaeologists excavated at Burghley during two seasons in 1990s and discovered both Aboriginal and European artifacts. Many of the same kinds of artifacts found at the Flatts in New York were present at the site, including musket balls, lead shot, pieces of clay smoking pipes, and gunflints. In this particular case, however, the archaeologists interpreted the musket balls, the lead shot, and the gunflints as evidence of the violent nature of the cultural contact situation.

These extremely brief examples demonstrate at least two important points about the archaeology of European expansion and culture contact. First, every contact situation has its own history and its own narrative of intercultural association. Some situations might involve conflict and violence, whereas others exhibit collaboration and cooperation. Other contact situations might involve conflict and cooperation at different times in their histories. Although the overall plans of the various European nations were similar, their precise strategies for carrying them out could be quite distinct, often based on the actions of the indigenous peoples they encountered. No contact situation ever occurred within a cultural or historical vacuum; every instance was rooted in history and cultural tradition. Second, every historical

archaeologist examining culture contact understands that they must adopt a fully multidisciplinary approach and use whatever sources they can locate, from tiny artifacts to entire landscapes. Only in this way will they ever begin to understand both the true nature of culture contact as an overarching, post-CE 1500 process and the infinite variation in the many unique cultural encounters that have taken place throughout the world over the past 500 years.

Future Directions

The historical archaeology of European expansion and culture contact will continue to expand in the twenty-first century, and archaeologists will discover new topics to explore and new theoretical perspectives to employ. One of the most exciting areas of research involves the union of traditional knowledge with archaeological research, as historical archaeologists interact with descendant communities and begin to include traditional knowledge in their research strategies. Historical archaeologists are learning to incorporate personal interviews and ethnographic materials in their efforts to understand indigenous perspectives and insights. For example, the oral history provided by a man named M. Kennedy helped archaeologists in north-central Australia to develop a strong sense of daily life in stock-raising camps in a way that was not possible with either the archaeological or the historical information (Paterson 2008). Instead, the orally provided information was another data set that the archaeologists could combine with the other amassed evidence to provide a richer understanding of cross-cultural engagement in twentieth-century Australia.

The knowledge of post-CE 1500 European contact and global expansion will continue to grow because so much historical archaeology is now being conducted around the world. Historical archaeologists are today conducting research in regions that were left unstudied just 10 years ago. This knowledge, when amassed, evaluated, and combined, will provide important new understandings of one of the most significant processes of global history. At the same time, this concerted effort will demonstrate the importance of research in historical archaeology and the ways that historical archaeologists can contribute to knowledge on both local and global levels.

Cross-References

- ▶ Atlantic Ocean: Maritime Archaeology
- ▶ Atlantic World: Historical Archaeology
- ▶ Australasian Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Hispanic South America: Historical Archaeology
- ▶ Mexico: Historical Archaeology
- ▶ Mission Archaeology in North America
- ▶ Missionization and Mission Archaeology in New Zealand and Australia
- ▶ Modern World: Historical Archaeology
- ▶ North Africa: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Pacific Ocean: Maritime Archaeology

References

Abernethy, D.B. 2000. *The dynamics of global dominance: European overseas empires, 1415–1980*. New Haven: Yale University Press.

Boxer, C.R. 1973. *The Dutch seaborne empire, 1600–1800*. London: Penguin.

Bradley, J.W. 2005. Visualizing Arent van Curler: A biographical and archaeological view. *De Halve Maen* 78: 3–14.

Eakin, M.C. 2007. *The history of Latin America: Collision of cultures*. New York: Palgrave Macmillan.

Hart, J. 2008. *Empires and colonies*. Cambridge: Polity.

Huey, P.R. 1998. Schuyler Flatts archaeological district national historic landmark. *New York State Archaeological Association Bulletin* 114: 24–31.

Marsden, W., ed. 1818. *The travels of Marco Polo, a Venetian, in the thirteenth century*. London: Cox and Baylis.

Nimako, K., and G. Willemsen. 2011. *The Dutch Atlantic: Slavery, abolition, and emancipation*. London: Pluto.

Paterson, A.G. 2008. *The lost legions: Culture contact in colonial Australia*. Lanham: AltaMira.

Quimby, G.I. 1966. *Indian culture and European trade goods: The archaeology of the historic period in the western Great Lakes region*. Madison: University of Wisconsin Press.
Russell-Wood, A.J.R. 1998. *The Portuguese empire, 1415–1808: A world on the move*. Baltimore: Johns Hopkins Press.
Scammell, G.V. 1981. *The world encompassed: The first European maritime empires, c. 800–1650*. London: Methuen.
Silliman, S. 2005. Culture contact or colonialism? Challenges in the archaeology of Native North America. *American Antiquity* 70: 55–74.
Trigger, B.G. 1987. *The children of Aataentsic: A history of the Huron people to 1660*. Kingston: McGill-Queens University Press.
Van der Pijl-Ketel, C.L., ed. 1982. *The ceramic load of the Witte Leeuw (1613)*. Amsterdam: Rijksmuseum.
Vermeulen, B., H. Nalis, and G. Havers. 2006. *Razende mannen, onrustige vrouwen: Archeologisch en historisch onderzoek naar de vroegmiddeleeuwse nederzetting, een adellijke hofstede en het St. Elisabethsgasthuis te Deventer*. Deventer: Snipperlingsdijk Rapportages Archeologie.
Wallerstein, I. 2004. *World-systems analysis: An introduction*. Durham: Duke University Press.
Williamson, C. 2002. Finding meaning in the patterns: The analysis of material culture from a contact site in Tasmania. In *After Captain Cook: The archaeology of the recent indigenous past in Australia*, ed. R. Harrison and C. Williamson, 75–101. Walnut Creek: AltaMira.

European Convention on the Protection of Archaeological Heritage (1992)

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Introduction

The 1992 Council of Europe Convention on the Protection of the Archaeological Heritage (Council of Europe 1992a), known as the Valletta Convention after the city in which it was signed, is a revision of the 1969 Convention with the same title (Council of Europe 1969). Following ratification by four Member States, it came into force on 25 May 1995. At the time of writing (June 2011), it has been ratified by 40 of the Member States of the Council of Europe (the States that have so far not ratified it are Austria, Iceland, Italy, Luxembourg, Montenegro, San Marino, and Spain).

The major threat to the archaeological heritage was seen in the immediate postwar period as resulting principally from clandestine excavation, and as a result, the 1969 Convention was concerned principally with the regulation of archaeological excavations and the dissemination of the results of those excavations. By the 1980s, it was recognized that a far more destructive menace had arisen as Europe entered into a period of massive development for the rehabilitation and expansion of Europe – large-scale construction projects such as motorways, high-speed trains, housing, industry, and airports, along with the loss of great expanses of land hitherto devoted to agriculture and forestry. The impact of these forces on the fragile archaeological heritage was enormous, calling for more effective protective legislation, aiming wherever possible to preserve the fragmentary evidence of Europe's past and at the same time to set up specialized archaeological teams to investigate archaeological sites and monuments before they were destroyed and to develop intensive professional survey and inventory systems. The education of the public in the value of the archaeological heritage was also identified as a major component in the recognition of the cultural identity of Europe.

Of considerable importance in the discussions that led up to the start of work on revising the 1969 Convention were a number of professional conferences and meetings during the 1980s. The most significant of these were those in Florence in 1984 (Council of Europe 1987) and in Nice in 1987 (Council of Europe 1989) on *Archaeology and Planning* and *Archaeology and Major Public Works*, respectively.

In 1988 the Council of Europe received a recommendation from its Select Committee of Experts on Archaeology and Planning, composed of professionals from all the Member States (Council of Europe 1989), that the 1969 Convention should be revised in the light both of the threats to the heritage that had developed since 1969 and of the significant new techniques for

archaeological survey and analysis, such as geophysical prospecting, satellite imagery, and laboratory analysis, that had become available. The draft Convention prepared by the Select Committee over more than 2 years' work was approved by the Committee of Ministers and opened for signature in 1992.

Key Issues/Current Debates/Future Directions/Examples

The Valletta Convention

The preamble to the 1992 European Convention on the Protection of the Archaeological Heritage (Revised) places it in the broader framework of the activities of the Council of Europe in the field of the cultural heritage that had been established by the European Cultural Convention (Council of Europe 1954). It emphasizes the problems facing the archaeological heritage, which is deemed to be "essential for a knowledge of the history of mankind." It concludes by stressing the necessity for joint action by the European States.

Article 1 begins by stating that the aim of the Convention is to protect the archaeological heritage "as a source of the European collective memory and as an instrument for historical and scientific study." Its elements are considered to be all remains and objects and other traces of mankind from past epochs, defined as including structures, constructions, groups of buildings, developed sites, movable objects, and monuments of other kinds, as well as their contexts.

In Article 2, State Party to the Convention is required to have in place a legal system for the protection of the archaeological heritage that includes the inventorization of its archaeological heritage and the designation of protected monuments and areas; the creation of archaeological reserves, even when there are no visible remains on the ground or underwater; and the mandatory reporting to the competent authorities by finders of chance discoveries of elements of the archaeological heritage.

States are required in Article 3 to apply procedures for the authorization and supervision of excavations and other archaeological activities in order to prevent illicit excavation. They should ensure that archaeological excavation and prospecting are undertaken in a scientific manner, employing nondestructive techniques wherever possible and making provision for proper preservation, conservation, and management. All excavations and other potentially destructive interventions may be carried out only by qualified and authorized personnel. Metal detectors and similar equipment may only be used after prior authorization.

Article 4 specifies that measures must be implemented for the physical protection of areas intended to become archaeological reserves, for the conservation and maintenance of the archaeological heritage (preferably in situ), and for the provision of appropriate storage facilities for archaeological materials that have been removed from their original locations.

The integrated conservation of the archaeological heritage is dealt with in Article 5, which specifies that States must seek to reconcile and combine the respective requirements of archaeology and development planning. This should entail archaeologists participating in developing planning policies designed to ensure and formulate well-balanced strategies for the protection, conservation, and enhancement of sites of archaeological interest. Archaeologists must be involved in the various stages of development schemes and systematically consult planners so as to make possible the modification of plans likely to have an adverse impact on the heritage and also to obtain the allocation of sufficient time and resources for the appropriate scientific studies to be carried out. Environmental impact assessments should be carried out so as to ensure that decisions are made that take account of archaeological sites and their settings.

The important aspect of financing archaeological research and conservation is dealt with in Article 6. States are required to arrange for public financial support to be available for this purpose from national, regional, or local authorities, in accordance with their respective competences. They are further required to increase the material resources for archaeology by ensuring that provision is made in major public or private

development schemes for covering the total costs of any necessary archaeological operations. The budgets for such schemes must provide for preliminary study and prospecting as well for eventual full publication and recording of the findings.

The Convention requires States to create or update surveys, inventories, and maps of archaeological sites and to take all practical measures to ensure the drafting, following archaeological operations, of a publishable scientific summary record before the essential comprehensive specialized studies are published (Article 7). Article 8 requires States to facilitate the national and international exchange of elements of the archaeological heritage for professional scientific purposes and to promote the pooling of information on archaeological research and excavations, as well as to contribute to the organization of international research programs.

The importance of developing public awareness of the significance of archaeological research and conservation is recognized in Article 9. States are required to conduct educational activities with a view to arousing and developing this awareness of the heritage in understanding the past and also of the threats to it. This field of activity should include promoting public access to important elements of the heritage, particularly sites, and encouraging the display to the public of suitable selections of archaeological objects.

In order to prevent the illicit circulation of elements of the archaeological heritage (Article 10), States are required to arrange for the relevant public authorities and scientific institutions to pool information on illicit excavations. They shall also undertake to inform the competent authorities in the State of origin which is a Party to the Convention of any offer suspected of coming either from illicit excavations or unlawfully taken from official excavations. Steps should be taken to ensure that museums and similar institutions whose acquisition policy is under State control do not acquire archaeological material suspected of coming from illicit excavations or unlawfully from official excavations. The attention of museums where the acquisition policy is not under State control should be drawn to the provisions of this Convention, and no effort should be spared to ensure their respect for its principles. Every effort should be made through education, information, vigilance, and cooperation to restrict the transfer of elements of the archaeological heritage obtained from uncontrolled finds, illicit excavations, or unlawfully from official excavations.

The basic legal and practical problems involved in preventing unlawful trade in elements of the cultural heritage are acknowledged to be complex and lying outside the scope of the present Convention. As a result, Article 11 States that nothing within the Convention may be taken as affecting existing or future bilateral or multilateral treaties dealing with these problems: this Convention cannot be used to interpret, minimize, or expand such treaties.

Article 12 requires States to afford mutual technical and scientific assistance through the pooling of experience and exchanges of experts in matters concerning the archaeological heritage. Furthermore, they should encourage, under the relevant national legislation or international agreements that bind them, exchanges of specialists in the preservation of the archaeological heritage, including those responsible for further training.

Explanatory Report and Commentaries

Simultaneously with the approval of the Convention in 1992, the Council of Europe issued an Explanatory Report (Council of Europe 1992b). This document puts professional flesh on the legislative bones of the Convention proper and is essential reading for archaeologists, planners, and administrators concerned with the protection of those elements of the European archaeological heritage located within the frontiers of their own countries.

The promulgation of the draft Convention and its progressive ratification by Council of Europe Member States have resulted in the publication of a considerable number of papers and articles. One of the key papers is that by a prominent member of the Council's Select Committee of Experts on Archaeology and Planning (Willems 2007). This traces the evolution of the Convention and the reactions to it by archaeologists and heritage

managers in Council of Europe Member States. Early reactions to the Convention and its implication were presented in a series of papers in *Antiquity* in 1993, covering aspects such as the legal aspects (O'Keefe 1993) and the task of achieving agreement on the often complex problems of a common nomenclature for archaeology and archaeological heritage management and conservation (Trotzig 1993). Of special interest is a review of the degree of success achieved in the interpretation and application of the Convention 10 years after it came into force by the chairman of the Select Committee of Experts on Archaeology and Planning (Trotzig 2003).

Cross-References

- ▶ Cleere, Henry
- ▶ Conservation and Management of Archaeological Sites

References

Council of Europe. 1954. *European Cultural Convention* (CETS, 18). Strasbourg: Council of Europe.

Council of Europe. 1969. *European Convention on the Protection of the Archaeological Heritage* (European Treaty series, 66). Strasbourg: Council of Europe.

Council of Europe. 1987. *Archaeology and Planning. Report of the Florence Colloquy* (Architectural Heritage Reports and Studies, 5). Strasbourg: Council of Europe.

Council of Europe. 1989. *Archaeology and Major Public Works. Report of the Nice Colloquy* (Architectural Heritage Reports and Studies, 12). Strasbourg: Council of Europe.

Council of Europe. 1992a. *European Convention on the Protection of the Archaeological Heritage (Revised)* (European Treaty series, 143). Strasbourg: Council of Europe.

Council of Europe. 1992b. *European Convention on the Protection of the Archaeological Heritage (Revised): Explanatory report* (European Treaty series, 143). Strasbourg: Council of Europe.

O'Keefe, P.J. 1993. The European Convention on the Protection of the Archaeological Heritage. *Antiquity* 67 (255): 406–413.

Trotzig, G. 1993. The new European Convention on the Protection of the Archaeological Heritage. *Antiquity* 67 (255): 414–415.

Trotzig, G. 2003. Ten years of protection of the archaeological heritage. *Naturopathy* 99: 20.

Willems, W.J.H. 2007. The work of making Malta: The Council of Europe Archaeology and Planning Committee 1988–1996. *European Journal of Archaeology* 10 (1): 57–71.

European Mesolithic: Geography and Culture

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State of Knowledge and Current Debates

Introduction

Holocene hunter-gatherers define the European Mesolithic. The beginning of the Mesolithic is marked by the transition from Pleistocene to Holocene, which has been dated to 11,700 cal. BP (Walker et al. 2009). The end of the Mesolithic is marked by the transition from hunting and gathering to agriculture. There is no firm date for the end of the Mesolithic because agricultural transitions occurred at different times in different regions throughout the continent. This variability, however, is not restricted to the end of the Mesolithic. From subsistence to ritual, the Mesolithic was a period of enormous diversity. The evidence for sociocultural diversity during the Mesolithic was largely due to the increasing diversity of regional landscapes caused by the amelioration of climate during the Early Holocene. The Mesolithic is a very important period for our understanding of humanity because it represents the first evidence for human occupation of the postglacial environments in Europe that have been continuously inhabited through contemporary times.

The variability of the Mesolithic archaeological record has caused a number of different subperiod designations between different regions. At a continental scale, archaeologists have

traditionally separated the Mesolithic into two subperiods (Early and Late Mesolithic) based on changes in ecology, stone tool technology, and a range of other aspects of life (Jochim 2011). This entry uses this bipartite division of the Mesolithic in Europe.

Early Mesolithic

The Early Mesolithic starts with the massive appearance of microlithic armatures made according to the microburin technique, a technique aiming at producing oblique fractures on bladelets. Although microliths already existed during the Final Paleolithic, for example, within the (Epi)Ahrensburgian culture of northern Europe (Deeben 1988) and the (Epi)Laborian culture of southern Europe (Naudinot 2008), from the early Holocene they become a standard tool all over Europe.

The Early Mesolithic roughly spans the Preboreal and Boreal periods, which occurred between 11,000 and 9000 cal. BP. It thus coincides with the period immediately following the last extensive glacial stadial, known as the Younger Dryas. The rapidly increasing temperature in the early Preboreal led to an acceleration in the melting of glaciers. Melting glaciers caused an abrupt rise of sea levels, with the impacts being more drastic in northern Europe, particularly in the North Sea and western Baltic Sea, than along coasts of the Mediterranean Sea (Fig. 1). The northern Adriatic Sea region, however, also experienced considerable coastline change due to rising sea levels. The inundation of former coastlines and land bridges, which continued into the Late Mesolithic, resulted in a considerable loss of lowland occupation and hunting grounds and the drowning of Early Mesolithic settlements. Many ongoing underwater survey projects using scuba diving in shallow waters and acoustic methods are starting to reveal offshore remains of Mesolithic settlements, burials, fishing installations (weirs, platforms), and implements (harpoons, hooks), albeit so far most of these seem to belong to the Late Mesolithic (Benjamin et al. 2011). The bias in the recovery of these sites thus far is likely due to Early Mesolithic sites being buried at deeper levels that have rendered them much more difficult to detect.

In northern circum-Baltic Europe (Norway, northern and central Sweden, Finland), sea-level changes were outpaced by isostatic rebound of land freed from ice. This situation therefore caused land to be uplifted and newly habitable landscapes to become available for colonization by animals and humans. Based on similarities in stone technology and raw materials, it is believed that hunter-gatherers ("Fosna-Hensbacka," "Komsa," and "Kunda" cultures) colonized these northern regions both from the south (northern Germany, Denmark) and the east (upper Volga river, NW Russia) (Rankama and Kankaanpää 2008; Bjerck 2009). The overwhelming concentration of Early Mesolithic sites along former, now elevated shorelines in southern Sweden and Norway suggests that initial colonization of these regions was organized by societies that had developed an advanced maritime technology (Bjerck 2009). Boats allowed these Early Mesolithic hunter-gatherers to settle on virgin coasts, islands, and archipelagos that were newly born out of the sea by isostatic uplift.

Despite climate during the Preboreal and Boreal being substantially more temperate compared to the preceding Younger Dryas, these periods were characterized by notable climatic instability. According to the high-resolution paleoclimate records from the Greenland ice cores, there were at least two abrupt, short-term cooling events during the Early Mesolithic that caused mean annual temperatures to drop by around 1 °C to 2 °C (Rasmussen et al. 2014). A first one, called the Preboreal oscillation (PBO), happened right at the start of the Mesolithic around 11,300 cal. BP and was characterized by a more continental climate with dry, warm summers and cold winters (Bohncke and Hoek 2007). A second cooling event is dated around 9300 cal. BP. According to recent radiocarbon evidence, this "9.3 event" had a considerable impact on Early Mesolithic hunter-gatherers, especially in the southern North Sea area, which is reflected by changes in sociocultural territory demarcation, raw material distribution, and projectile technology (Robinson et al. 2013; Crombé 2018). Even though there has been initial evidence yielded for the impacts of short-term

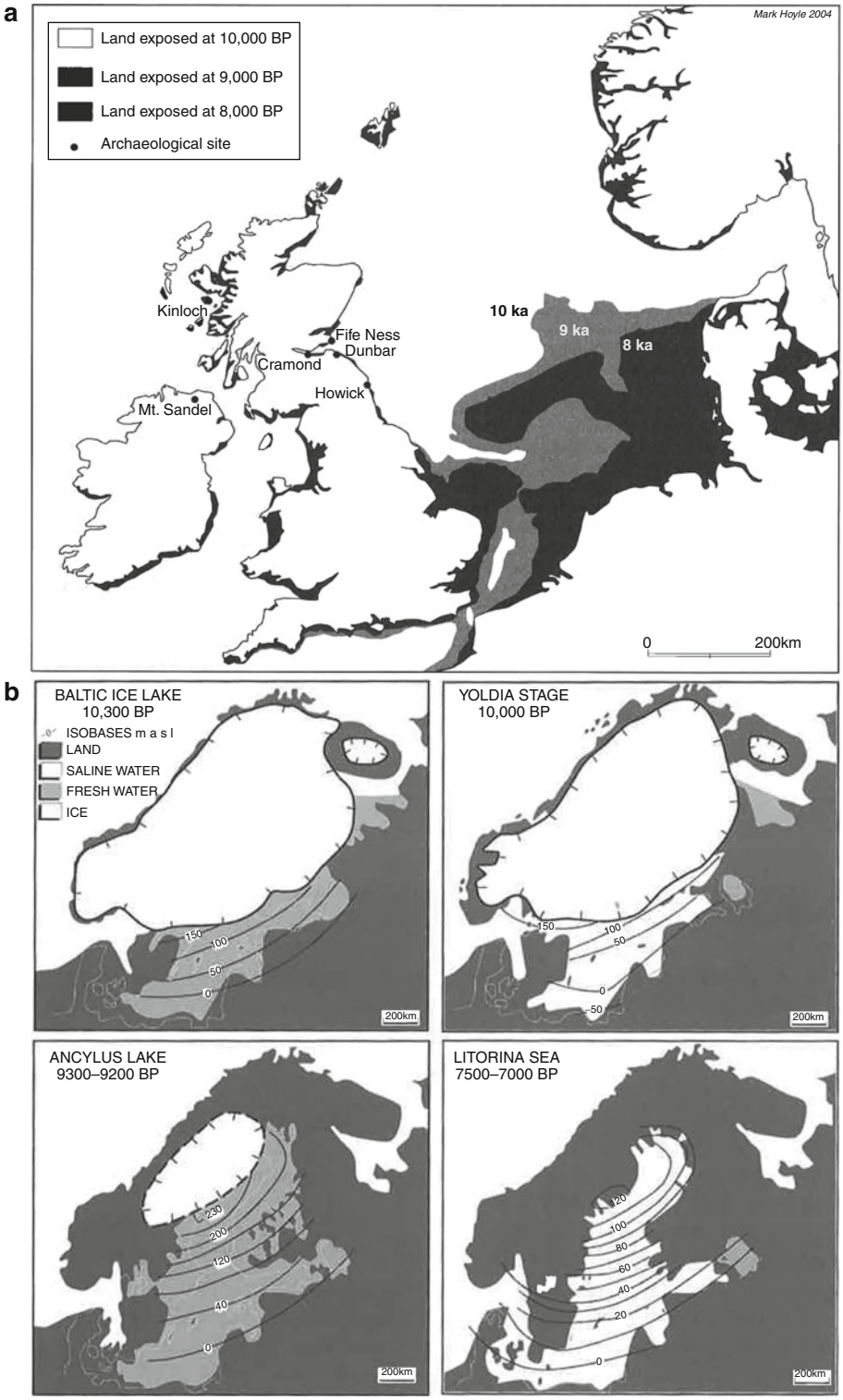

European Mesolithic: Geography and Culture, Fig. 1 Progressive inundation of (**a**) the North Sea basin (Bailey 2007) and (**b**) the Baltic Sea basin (Eronen et al. 2001)

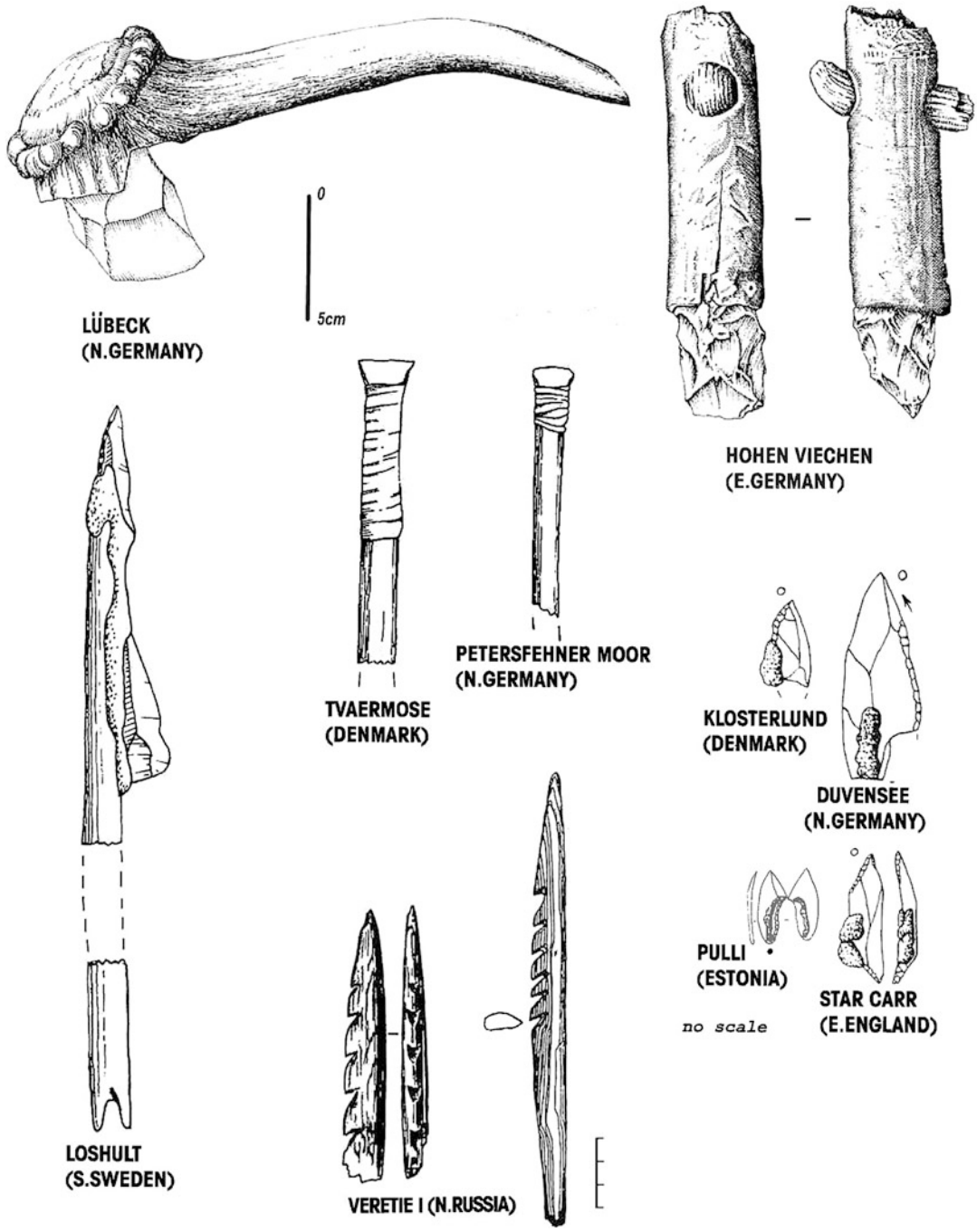

European Mesolithic: Geography and Culture, Fig. 2 Composite technologies (from Kozlowski 2009)

cooling events on Mesolithic ecosystems and societies, there is much research to be done in the future that will deepen our understanding of the complexities of ecosystem and Mesolithic responses to paleoclimate change at diachronic, interregional scales of analysis.

Vegetation during the Early Mesolithic shifted from an overall open grass and shrub vegetation in

the Preboreal to a more closed birch/pine forest landscape in the Boreal. From the early Boreal onward, hazel colonized large parts of Europe and in some areas constituted a major part of the vegetation.

Early Mesolithic Technology

Throughout Europe, the Early Mesolithic is best documented by its lithic industries, which were mostly made on local flints. Standard tools are microliths, end scrapers, borer, and simply retouched bladelets and flakes. Burins, a typical tool of the Final Paleolithic, however, decreased in importance, albeit antler and bone working is still well represented in the Early Mesolithic. Microliths, which were mostly used as barbs and points on arrow shafts, include various types with unretouched bases, retouched bases, crescents, and triangles (Fig. 2). The ratio between these different types varies regionally; crescents, points with retouched base, and isosceles triangles, for example, are characteristic mainly for southern and central European traditions such as "Sauveterrian," "Beuronian," and "Tardenoisian," while points with unretouched bases and scalene triangles occur in large numbers within assemblages from northern European traditions such as the Maglemosian and (Epi) Ahrensburgian techno-complexes. In some regions of Europe, these broader traditions are further separated by more localized traditions. For example, within the Rhine-Meuse-Scheldt region of northwest Europe, new types of microliths characterized by flat, partially bifacial retouch appear during the last centuries of the Boreal. Also, in certain regions of northern Europe, macrolithic tools such as flake and core adzes are frequently found in Early Mesolithic contexts (Fig. 2). These tools were typically associated with various wood-working activities such as tree-felling, debarking, and likely the construction of wooden dugout canoes. Tool type designations are not the only more regionalized demarcations during the Early Mesolithic. The blades used to produce most Early Mesolithic stone tools were also knapped in different ways in different regions of Europe. For example, while blades in most regions of Europe were produced by direct percussion techniques, there appears to be a distinct change in northeastern Europe within which blades were produced by pressure knapping techniques. Pressure knapping techniques appear to be transmitted from the "Butovo culture" of the upper Volga river region of Russia to the "Kunda culture" of the eastern Baltic and finally to the Maglemosian of southern Scandinavia (Sørensen 2012). This has recently been supported by aDNA research (Günther et al. 2018), which suggests two different early post-glacial migrations into Scandinavia: initially form the south, and later, from the northeast.

In wetland environments, such as peat bogs, river floodplains, and inundated coasts, excavations also revealed a wide range of tools and objects made of organic materials, such as bone, antler, and wood (Fig. 2). Interesting Early Mesolithic contexts are the sites of Star Carr (Clark 1971), Amsterdam "Europoort" (Verhart 1988), Friesack (Gramsch and Kloss 1989), Mullerup I (Brinch Petersen 1973), and Zamostje II (Lozovski 1996), among others. Perforated mattocks, barbed points or harpoons, fishhooks, and axe-sleeves were made from either antlers from red deer and elk or bone. Long bones from large mammals, mainly aurochs and red deer, were also used to make awls, adzes, needles, daggers, and hide-working tools. The techniques used to make these different organic tools have been studied in detail by David (2003). Wood served for the manufacturing of arrow shafts, bow, paddles, and also dugout canoes. The oldest canoes within Europe were found at Pesse in the Netherlands (Fig. 3).

Early Mesolithic Subsistence

The profound environmental changes that occurred at the transition from the Late Glacial to the Holocene necessitated changes in the lifeways of Early Mesolithic hunter-gatherers. The progressive reforestation and resulting installation of a temperate-boreal type of fauna caused changes in hunting strategies from an intercept-based "specie-specialized" and "group-organized" strategy during the Final Paleolithic to an encounter-based "broad-spectrum" and "small-group or individual-organized" strategy

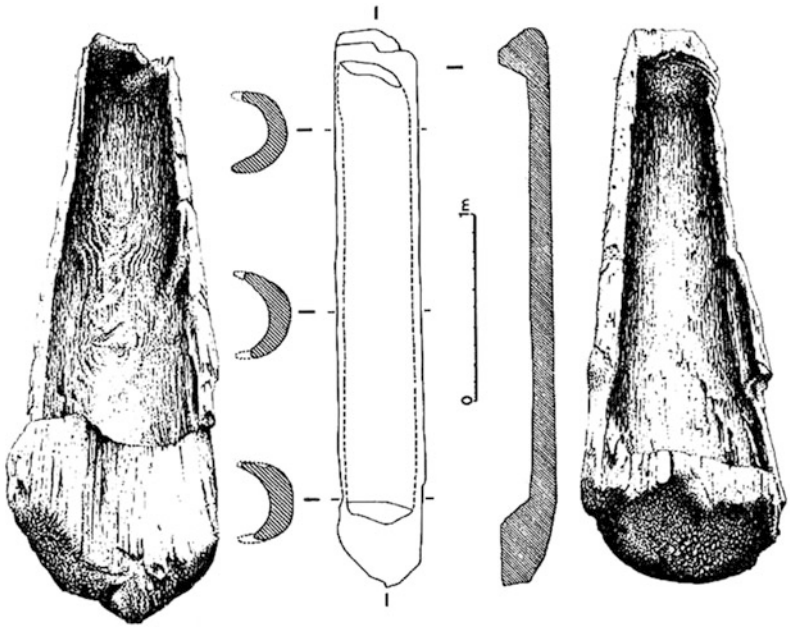

European Mesolithic: Geography and Culture, Fig. 3 Aquatic technology. Dugout canoe from Pesse, the Netherlands (Kozlowski 2009)

during the Early Mesolithic. In most parts of Europe, large herds of migratory animals (horse, reindeer) were no longer present from the Late Glacial onward. In southern Europe, reindeer were no longer present in faunal records at the start of the Allerød, while in the hilly upland of western and central Europe, they temporarily reappeared during the Younger Dryas. Reindeer migrated further north and survived in Scandinavia well into the late Preboreal (Aaris-Sørensen et al. 2007), where they were hunted by survivors of the Tanged Point Traditions ("Fosna-Hensbacka" and "Komsa" cultures). The large reindeer herds were replaced by small- to medium-sized herds of widely dispersed and less-mobile thermophilous game. Large- to medium-sized animals (red deer, boar, roe deer, auroch, and also ibex and chamois in mountainous areas of southern and central Europe) were hunted by means of bow and arrow, while smaller species were probably trapped. Especially in the Mediterranean area (Portugal, southern France, Italy, Greece), smaller animals, such as lagomorphs, rabbits, and hare, became important meat suppliers from the Early Mesolithic onward (Bicho et al. 2000), while in northern Europe, fur-bearing animals such as beaver, otter, pine marten, and wild cat were frequently killed, mainly for their hides. Although on most Early Mesolithic sites a broad range of game is present, there are also sites that provide evidence for more specialized hunting, such as chamois, ibex, or marmot hunting sites in the Pyrenees and Alps (Barbaza 1999).

Data from across Europe also indicate that the exploitation of marine and riverine resources intensified at the transition from the Late Glacial to the Early Holocene. The first evidence of coastal exploitation has been dated to the Middle Paleolithic (e.g., at Gorham's cave in Gibraltar) but still remains scarce. Evidence of a systematic exploitation of the Atlantic shore comes from Portuguese and northern Spanish sites dated to the Late Paleolithic (c. 40,000–10,900 cal. BP) (Gutiérrez-Zugasti et al. 2011). These sites yielded accumulation of shells, however, without forming true middens. The latter first appeared during the Early Mesolithic, albeit they usually remained smaller and less dense compared to the typical Late Mesolithic shell middens (cf. below). Yet, these Early Mesolithic shell middens prove an intensification of the marine exploitation at the onset of the Holocene. Again, Early Mesolithic shell middens so far have been found only in Portugal and northern Spain, sometimes as far as 60 km away from the former coastline. The marine remains indicate the consumption of

mollusks such as limpets (*Patella vulgate* and *Patella intermedia*), top shell (*Osilinus lineatus*), mussels (*Mytilus galloprovincialis*), and common cockles (*Cerastoderma edule*); marine fish such as tope shark (*Galeorhinus galeus*) and sea bream species (*Diplodus vulgaris*, *Sparus aurata*); as well as crustaceans. Similar species have also been exploited along the Mediterranean coast of Italy and Greece (Pluciennik 2008), although not resulting in true shell middens.

Early shell middens are also absent further north along the Atlantic coast, but this certainly does not imply that marine resources were not important in northern and western Europe; their apparent absence is most likely a result of a bias due to sea-level changes, which had a much stronger impact in northern and western compared to southern Europe. However, in northern Europe, there is other evidence which supports the importance of marine resources from the start of the Mesolithic. Stable isotope analysis on skeletons from Wales (Schulting and Richards 2002) and southern Sweden (Lidén et al. 2004) gives a clear marine signal with an intake of >50% of marine resources for some individuals, clearly pointing to the existence of a specialized coastal economy already during the early stages of the Mesolithic. Furthermore, in Scandinavia, there is increasing evidence of intense and perhaps even specialized hunting of sea mammals, in particular seals, from the Early Mesolithic onward (Bjerck 2009). On the other hand, stable isotope data from skeleton remains found on the North Sea bed (van der Plicht et al. 2016) point to only minor marine consumption before and during Early Holocene sea-level rise. The diet of the last "Doggerland" occupants seemingly consisted of a combination of terrestrial and freshwater food.

The exploitation of freshwater environments has also been attested at numerous inland sites situated in major river valleys. Substantial evidence, such as large amounts of fish bones (pike, tench, bream, and eel), barbed bone projectiles, fishhooks, and fish equipment, has been reported on numerous Early Mesolithic sites especially in the Rhine and upper Danube valley (Svoboda 2008), while in other areas such as the Iron Gates in the lower Danube (Bonsall 2008) and southern Scandinavia (Boethius and Ahlström 2018), heavy reliance on freshwater fish has been deduced from isotopic evidence. In many other, mostly smaller river valleys, the evidence is less conclusive, while often (burnt) fish remains are found; their frequency is generally too low to conclude important freshwater consumption. This is also confirmed by stable isotope data from areas such as the Belgian Meuse valley (Bocherens et al. 2007) and French Charente-Maritime (Schulting et al. 2008), which indicate a strongly terrestrial diet dominated by animal protein with just a possibility of a slight contribution of marine-derived protein.

Besides aquatic and animal resources, plants (tubers, roots, mushrooms, various fruits) also became increasingly important within Mesolithic diets (Zvelebil 1994), as confirmed by numerous finds of mostly charred plant remains and vegetative plant tissue, called *parenchyma*, the latter detected by means of scanning electron microscopy (Kubiak-Martens 2016). The Early Mesolithic provides the first clear evidence for the regular gathering of plants and their central component in human diets (Jochim 2011). However, the exact contribution of plants often remains difficult to assess due to the bad preservation of plant remains. On northern European sites, carbonized shells of hazelnuts are frequently encountered in association with open fireplaces, sometimes even in large quantities. Either hazelnuts were roasted in these hearths for preservation purposes and/or destroying contaminants (Holst 2010) or they were dumped as waste in hearths after consumption (Sergant et al. 2006). According to recent estimates (Holst 2010), this high-quality, easy to store and digest resource could have covered 44% of human energy demands. In the Mediterranean region, remains of wild legumes (vetch, pea, lentil), nuts (acorn, walnut, pistachio), and seeds are frequently found (Pluciennik 2008). Besides plant macroremains, there is also indirect evidence of plant gathering during the Early Mesolithic, especially in northwestern Europe. Recent microwear analyses (Beugnier 2007) have revealed traces of plant processing on many unretouched artifacts, connected with the scraping and splitting of

nonwoody, silica-rich soft plants such as reeds. Albeit these tools were clearly not involved in plant harvesting for consumption, they prove that from the Early Mesolithic, plants started to play a significant role in the production of fibers, for example, for making basketry and nets. Small fragments of vegetal cords and nets have been found in the bog site of Friesack (Gramsch and Kloss 1989) in NE Germany.

To summarize, Early Mesolithic subsistence varied considerably on a local and regional scale. Along the former coasts, communities mainly focused on the exploitation of marine resources, with an emphasis on mollusks and fish in southern Europe and sea mammals (seals) in northern Europe. In the interior, subsistence heavily relied on game hunting and trapping combined with plant gathering, except for the main river valleys where the consumption of freshwater resources was also very important. The frequent discovery of marine shells on inland sites, in particular used as beads in burials, possibly indicates contact and exchange between coastal and inland communities. At the French site of La Vergne (Schulting et al. 2008) c. 3300, marine shell beads, originating from the former coast 60–80 km from the site, were found in three grave structures. The near absence of marine isotopes in the skeletal material clearly proves that these individuals did not exploit nor consume marine resources at all, but just exchanged shells.

Early Mesolithic Settlement, Land Use, and Territories

The unpredictable, dispersed character of resources, in particular of wild game and edible plants, must have forced Early Mesolithic hunter-gatherers to move almost continuously through the landscape, in particular those groups that occupied the forested interior of Europe. A high residential mobility can be deduced from both the considerably larger number of sites compared to the Late Mesolithic and the generally small size of the seasonal campsites. Early Mesolithic settlements tend to cluster along open water systems, such as rivers, lakes, and fens, sometimes forming extensive site-complexes covering several hectares (Barton et al. 1995). These latter kinds of site-complexes likely represent cumulative and/or spatial palimpsests (Bailey 2007), resulting from repeated reoccupation of the same locations. Extensive radiocarbon dating of some of these palimpsests has shown that reuse sometimes spanned several centuries or even millennia, in a continuous or discontinuous way (Crombé et al. 2012). Within these Early Mesolithic settlements, lithic concentrations, probably corresponding with former dwelling spaces (Grøn 2003), are usually rather small, covering less than 20–30 m^2. The few preserved remains of Early Mesolithic superstructures, such as at Howick (Waddington 2007) or Mount Sandel (Woodman 1985) (Fig. 4), indicate that these living spaces were sometimes covered by subcircular or sub-rectangular tents or timber huts and had a shallow dugout floor that might have been covered with organic material. At Howick, high-resolution radiocarbon dating points to a temporary use of these dwellings over several generations up to 150–200 years. On dry-land sites with bad organic preservation, however, it remains unclear whether dwelling tents or huts have ever been present; some archaeologists believe that daily activities such as cooking, stone knapping, and hide-working were carried out in open air. At best, superstructures were erected just for sleeping in areas free of settlement waste, making them almost archaeologically invisible. In wetland environments, such as the Duvensee peatland in northern Germany (Bokelmann 1971), dwellings consist of an organic flooring made of layers of pine, birch bark, and/or bundles of twigs and branches. These "bark floors" probably formed a kind of foundation for settling in a wet and damp peat area. An exceptional wooden construction was found at the lake site of Star Carr (Clark 1971), where on this lake shore settlement, a wooden platform was made presumably to stabilize the edge of what would have been a muddy area.

Most Early Mesolithic dwelling spaces, both open air and sheltered, were provided with one or more central fireplaces which based on the often abundant presence of burnt bones and hazelnut shells served mainly for cooking and heating. On several wetland sites, sand was imported to the

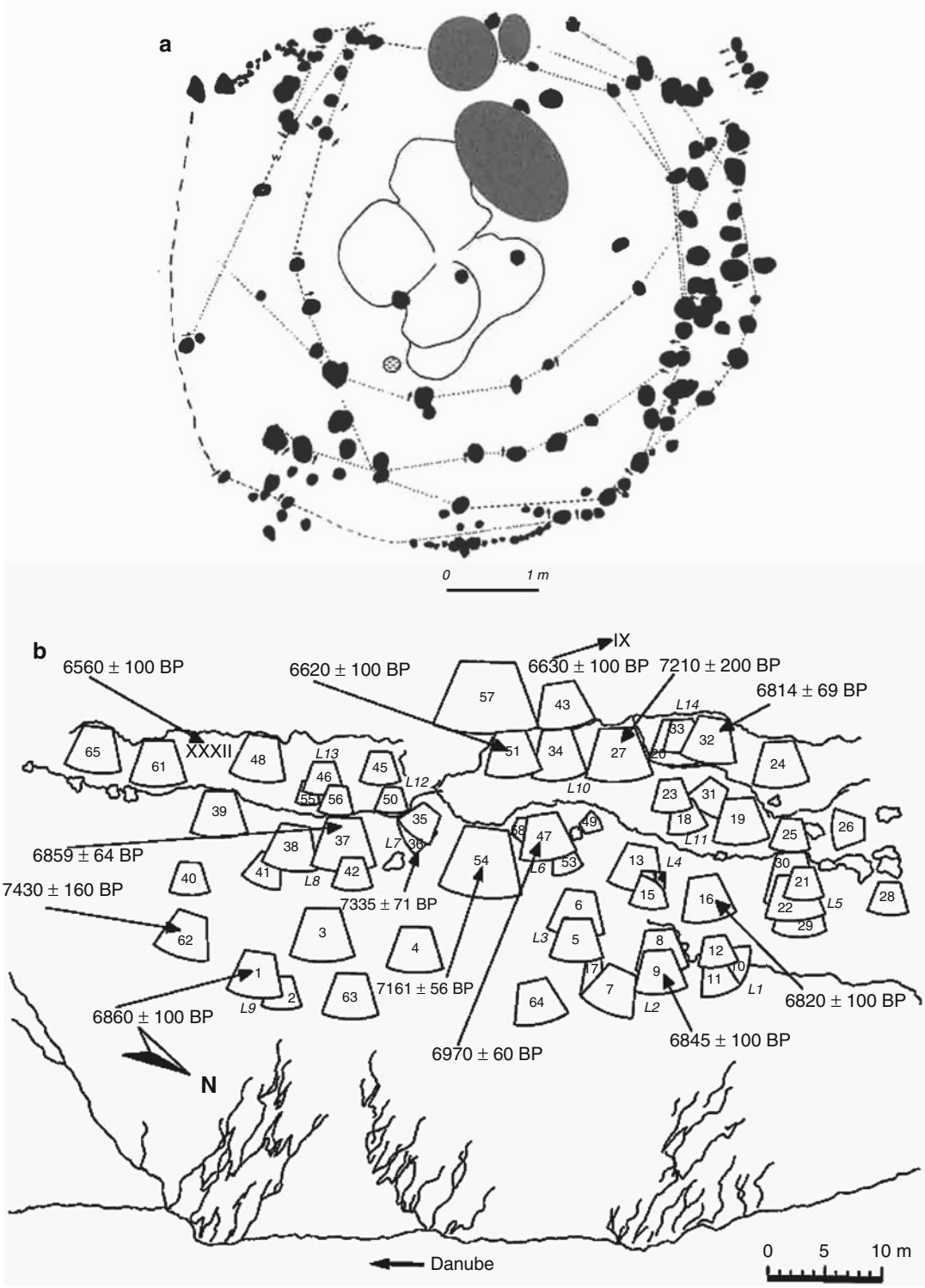

European Mesolithic: Geography and Culture, Fig. 4 Dwelling structures. (**a**) Mount Sandel (Woodman 1985) and (**b**) Lepenski Vir 1 (Bonsall et al. 2000)

site in order to construct these hearths; at Duvensee, for example, considerable amounts of white sand most likely served as a heat conductor for roasting hazelnuts (Holst 2010). Based on the distribution of small flint implements (mainly microliths) combined with the presence of hearths, Grøn (2003) has attempted to reconstruct the social composition and positions of individuals within Early Mesolithic ("Maglemose culture") dwellings in southern Scandinavia. According to his analyses, repeated patterning in the spatial distribution of lithics and features leads to the identification of single and two-family dwellings, with a gradual increase of the latter toward the end of the Early Mesolithic. Judging by the small size of the dwellings, the limited (lithic) waste, and the weakly developed wear-traces on the lithic tools, it is generally assumed that most inland Early Mesolithic campsites were used for relatively short stays of small "residential" groups such as nuclear families or small microbands. Special purpose "logistical" sites, such as small hunting camps characterized mainly by a predominance of microliths within the lithic toolkit, are also regionally known, though microliths alone are not sufficient to determine such sites. Studies of microwear traces (Beugnier 2007) and/or faunal remains (Valdeyron et al. 2011) on some of these alleged hunting sites have shown that often a much wider range of activities, including domestic ones (consumption, plant processing), have been carried out. Examples of potential hunting camps can be found, for example, in the Duvensee peat area (Bokelmann 1971) and the Alpine region (Fontana 2011). In the latter region, many high mountain open-air sites and rockshelters covering areas of less than 50 m^2 have yielded evidence of specialized provisioning and exploitation of animal resources such as red deer, ibex, and chamois. These small sites were probably used during summer by small groups living in the surrounding valley in the context of vertical seasonal transhumant migration between uplands and lowlands. The recent discovery of sites with numerous pits (sometimes >100 pits), especially in northern France (Achard-Corompt et al. 2017), has led some archaeologists to suggest the existence of inland communities with a reduced mobility during the Boreal. At Auneau (Verjux 2003), for example, altogether more than 60 pits have been excavated next to a number of burials. These pits can be classified in five types: rubbish and cooking pits, cylindrical (plant?) storage structures with vertical walls, postholes with stones, and pits with intentional faunal deposits (aurochs, deer antler). These kinds of sites possibly represent so-called aggregation sites, as known from (sub)recent hunter-gatherer, where large groups met in order to exchange goods, raw materials, ideas, and mating partners, as well as for feasting and shared ritual activities. However, some pit-sites possibly should be interpreted as specialized hunting sites; based on ethnographical parallels and faunal remains, pits with a Y or V-profile might have been used as game traps.

Settlement of upland mountainous regions is also one of the most noteworthy aspects of Early Mesolithic settlement. Early Mesolithic settlements have been found as high as 2400 m above sea level in northern Italy and as high as 2200 in the Austrian and Swiss alps (Jochim 2011). Settlement of these high-altitude regions was not confined to particular kinds of sites but rather ranged from caves and rockshelters to open-air sites, often near lakes.

Contrary to the inland occupants, Early Mesolithic groups living along former coastlines and perhaps also major rivers might have known a more restricted residential mobility. The existence of shell deposits in Portuguese caves and rockshelters at a distance of 60 km from the ancient coastline suggests mobility in a relatively small strip along the coast (Gutiérrez-Zugasti et al. 2011). Similar conclusions have been drawn from raw material studies (Marchand et al. 2011) and stable isotope analyses (Schulting et al. 2008) along the west coast of France. In south Wales, stable isotopes demonstrate the existence of coastal communities which focused almost entirely on coastal resources year-round (Schulting and Richards 2002).

By analogy with recent hunter-gatherers occupying forested environments, it may be assumed that Early Mesolithic groups had to cover large territories within yearly cycles. Lithic raw

material procurement analyses (Gendel 1984; Jochim 2011) point to yearly territories of minimal 80–100 km in diameter. Similar studies also show that these local groups were part of larger cultural units, so-called dialectic tribes, which had extensive social territories. Geographical analyses of specific objects and raw materials, such as Wommersom/Tienen quartzites and flat retouched microliths in the Rhine-Meuse-Scheldt area (Gendel 1984; Robinson et al. 2013); personal ornaments, for example, pendants and beads (Newell et al. 1990); bone points and harpoons (Verhart 1988); or decorated bone and antler objects (Terberger 2006), all point to social territories covering >50,000 km^2, sometimes even attaining 230,000 km^2.

Early Mesolithic Burials and Rituals

Compared to the Late Mesolithic, Early Mesolithic burial practices are not extensively documented; however, in recent years, an increasing number of burials have been discovered. These recent discoveries have been recorded throughout the continent, from northwest Europe (Cauwe 2001; Conneller 2006) to the lower Danube (Bonsall 2008) and Dnieper (Dolukhanov 2008) basins. Early Mesolithic burials occur in both caves/rockshelters and open-air sites. The most common burial rite is inhumation. Cremation burials do begin to appear in some regions of Europe in the later parts of the Early Mesolithic (Toussaint et al. 2009; Niekus et al. 2016). Burials occur both on settlements and in separate locations.

Inhumation practices are very diverse, ranging from individual burials to multiple burials, collective burials, and secondary burials (Meiklejohn et al. 2009). In single burials, the deposition of the dead occurs mostly either stretched out on the back or in sitting position. Grave goods are generally restricted to personal ornaments (perforated animal teeth, shells), faunal remains (mainly deer antler, auroch horns), and ochre. Some graves (e.g., at the French site of Chaussée-Tirancourt), however, contain only parts of an individual and should hence be considered as secondary burials. Single graves are found either isolated (e.g., in caves) or in usually small groups of 5–10 pits.

Eastern Europe has yielded some very large communal cemeteries at sites such as Vasylievka and Volos'ke on the Danube-Dniester interfluve in Ukraine, which indicate a homogeneity of burial rites (Dolukhanov 2008). Many of these burials also yield evidence for bodies penetrated by flint arrowheads that suggest that these people died by violent encounters (Dolukhanov 2008). Combined with the evidence from northern and western Europe, it is clear that there was not a linear progression from single burials to cemeteries from the Early to Late Mesolithic but rather a complex mix of various burial rites throughout the entire Mesolithic (Meiklejohn et al. 2009).

The burial of multiple individuals within the same structure or locality also seems to be a common trait for the Early Mesolithic. In several caves, mainly in Belgium (Cauwe 2001) and the UK (Conneller 2006), and a few burial pits on open-air cemeteries (e.g., La Vergne; Schulting et al. 2008), remains of up to 11 individuals have been discovered. The famous British cave of Aveline's Hole even contained remains of 50–100 individuals, making these burial places real cemeteries which were probably reused over several generations. However, some graves at open-air sites, such as La Verge, probably need to be interpreted as real multiple graves given the fact that different individuals have been interred simultaneously. The way the deceased are treated within these "multiple and collective" burials is very diverse and complex. A common trait, however, is in the disarticulation of bones and partial internment of skeletons, leading to the conclusion that part of the treatment was done outside the burial place. In some caves (Autours, Aveline's Hole), both articulated and disarticulated skeletons have been observed. In addition, some bones display traces of cut and burning marks, pointing to excarnation. At La Verge, a burial pit even combined the remains of an inhumation and cremation grave. All this points to the existence of very complex and individualized rituals during the Early Mesolithic, at least along the Atlantic coastline.

Remains of rituals early during the Mesolithic are very scarce and often difficult to determine. Perhaps one of the clearest evidence are the finds

of stag headdresses, made out of the skulls and antlers of red deer, smoothed out inside and pierced, presumably for wearing on the head. The most important findspot of such headdresses is Star Carr, where 21 of these were found (Clark 1971). Other European sites (e.g., Bedburg) usually only yield one or two of these finds. There are various interpretations as to how they were used, including perhaps worn during stag hunts or perhaps in "ritual" ceremonies, as is known in the ethnographic record. The latter hypothesis is further strengthened, especially at Star Carr, by the high numbers of barbed points (191 specimens) made of antler splinters. According to some, Star Carr is therefore "a site where hunter-gatherer's relationship with red deer are negotiated" (Warren 2006).

In recent years, some of these Mesolithic remains have been studied on mtDNA and aDNA suggesting the existence of at least two genetically distinct Mesolithic population groups (Fu et al. 2016): a Western European (W, S, and Central Europe) and an Eastern European hunter-gatherer group (NE and E Europe). The former were most probably characterized by blue/green eyes, dark brown (possibly black) hair, and dark to black skin (Brace et al. 2019), while the latter, in particular the Mesolithic hunter-gatherers of Scandinavia, show patterns of genetic adaptation to high latitude environments, such as low pigmentation and physiological adaptation to cold (Günther et al. 2018).

Late Mesolithic

The Late Mesolithic roughly coincided with the Atlantic period, which occurred between 9000 and 6000 cal. BP. The Atlantic period witnessed the highest temperatures throughout the entire Holocene, as well as an increase in rainfall. Vegetation change was the hallmark of the Atlantic, wherein much of Europe open coniferous forests were replaced by closed, mixed deciduous forests primarily comprised of elm and oak. In mountainous regions, tree lines rose considerably. Continued increase in sea levels during this period led to the complete inundation of the North Sea basin, thus separating Britain from the continent and flooded regions of the northern Adriatic Sea. This rise in sea level promoted the development of numerous coastal estuaries that were rich in aquatic and marine resources (Jochim 2011). Another major influence on sea-level rise and aquatic and terrestrial ecology during the Atlantic period was a glacier meltwater outburst from the Laurentide Ice Shield over North America, which altered thermohaline circulation over the North Atlantic Ocean and caused an abrupt climate change event around 8200 cal. BP (Barber et al. 1999). Recent evidence suggests that this cooling event had impacts on Late Mesolithic hunter-gatherer societies. In Portugal (Bicho et al. 2010; Fernández and Jochim 2010), this climatic event and related decline in the availability of marine resources triggered a human settlement shift from the outer coast to the protected and stable inland lower Tage Valley. In northern Britain, on the other hand, some scholars (Wicks and Mithen 2014; Waddington and Wicks 2017) claim a significant and dramatic decline in the Mesolithic population as a result of the 8.2 event. During the course of this "8.2 event," another abrupt environmental change in northwest Europe was caused by the Storegga tsunami, which led to the final drowning of the Dogger Bank in the middle of the North Sea basin and was detrimental to populations settling in the coastal areas of Britain, the Netherlands, Denmark, and Norway (Weninger et al. 2008).

One of the largest challenges currently facing Mesolithic archaeologists is to understand the different impacts that these gradual and abrupt environmental changes might have had on hunter-gatherer societies across the continent (Robinson et al. 2013; Crombé 2018, 2019). There is a possibility that regional resource productivity thresholds were not passed in some regions, and therefore, Late Mesolithic populations were not impacted by these events, whereas in other regions thresholds were passed, and these events had major impacts that are reflected by changes in the archaeological record. The impact of the environment on these Early Holocene hunter-gatherer societies was undoubtedly most complex at the local and regional level (Spikins 2008), and an important area for future research will be teasing apart these various scales of complexity and their

possible influence on changes recorded in the Late Mesolithic archaeological record.

The overall increasing productivity and diversity of natural landscapes during the Atlantic period allowed for a wide range of sociocultural adaptations that are reflected in increasingly differentiated archaeological assemblages from one region to the next. The Late Mesolithic also witnessed a rise in regionally differentiated cultural groupings that were most identifiable in the preference for specific stone raw materials and microlithic armature types.

Late Mesolithic Technology

At a continental scale, one of the diagnostics of the transition to Late Mesolithic is the introduction of new stone blade knapping techniques that produced larger blades with more regular shapes in order to produce trapeze-shaped microlithic armatures (Fig. 2). The chronological variability of the transition from Early to Late Mesolithic is largely based on the different times at which regular blade and trapezoidal armatures appear throughout the continent. There is little consensus at present on whether both spread from a specific origin region or whether they entered Europe through two corridors from North Africa into the western Mediterranean (Marchand and Perrin 2017) and/or from (south) western Asia (Binder et al. 2012). Evidence indicates that these industries were accompanied by two different kind of knapping techniques. Work in the Mediterranean region indicates that they were accompanied by pressure knapping techniques (Marchand and Perrin 2017; Binder et al. 2012), whereas in areas of northwest and central Europe, they were accompanied by indirect percussion techniques (Allard 2017). The issue of the introduction of regular blades and trapeze industries to Europe is a good example of the major social organizational changes that were occurring during the Late Mesolithic period. During the Late Mesolithic period, people were becoming more settled in regional and local landscapes, and rather than ideas and technical innovations spreading by the movement of people to new landscapes, they were rather spread by social networks and a complex range of cultural transmission processes. A further example of the importance of these more regionally restricted social networks during the Late Mesolithic is yielded by the absence of regular blade and trapeze industries in Britain and Ireland.

Increasing regionalization of stone technologies is further exhibited by other innovations that were developed in a limited number of regions. This is evidenced in northern Europe, for example, by the increasing prominence of flake axes. Flake axes likely became more prominent due to a combination of their roles in dugout canoe construction and landscape clearance as populations grew. Likewise, in northwest Spain and Scotland, chipped stone picks were made that seem to support the evidence for increasing reliance on shellfish in these regions.

Other developments in stone technology are indicated by finds of perforated mace head that possibly indicate the growing role of tubers and roots in Late Mesolithic diets (Jochim 2011). Further related to changing diets during the Late Mesolithic, grinding stones and slabs have been recorded at various sites across Europe. Ground stone is also indicated by finds of ground slate points and polished axes and chisels in northern Europe.

Bone and antler technologies continue to increase in importance during the Late Mesolithic period. A new innovation in northern Europe during this time was bone points that were slotted in order to set in place various combinations of microlithic armatures. However, despite these new slotted-bone points, there are few innovations in bone and antler technologies during this period. A more prominent feature is the increasing importance of these raw materials during the Late Mesolithic. This increasing importance is evidenced by greater finds of barbed harpoons, perforated antler mattocks, and axes across Europe.

A key feature of Late Mesolithic technology is the continued development and expansion of wood and other plant technologies. In northern Europe, a complex range of fishing technologies such as nets, weirs, and traps have been recorded at sites such as Tybrind Vig (Andersen 1985) (Fig. 3). These fishing technologies were often constructed out of dogwood, alder, or birch

branches. Numerous finds of wooden hooks and net floats have also been recorded. The development of these technologies indicates the intensive fishing activities of these northern Mesolithic societies through the course of the Atlantic period.

Further evidence of the increasing role of aquatic activities and exploration comes from finds of dugout canoes in northern Europe. The most impressive finds of this technology have come from the site of Tybrind Vig (Andersen 1985), where decorated paddles have been found alongside a large 9.5 m-long dugout canoe made from a linden tree.

Pottery appeared in some regions of northern and western Europe during the Late Mesolithic. There appears to be two possible sources for the spread of pottery technology to these regions. The first source is from the steppe zone between the Volga and Ural rivers in eastern Europe, wherefrom pottery technologies spread to the Baltic and North Sea basins by around 5500 cal. BCE (Dolukhanov et al. 2005). The second possible source is from neighboring Early Neolithic farming societies in the Danube, Rhine, and/or Paris basins (Crombé 2009). Each of these possible sources of pottery technology had different economies; the eastern source was hunter-gatherers, whereas the southern/southwestern source was the earliest farmers in the region. The transmission of pottery technologies to northern hunter-fisher-gatherers was therefore a variable process from one region to the next that was based on specific local social and ecological factors. Stable carbon and nitrogen isotope analyses of lipid residues on pottery from these northern Late Mesolithic sites have indicated that some pottery vessels were utilized for the processing of marine products and freshwater fish (Craig et al. 2007). Thus, while pottery technology was adopted from both hunter-gatherer and early farming societies, the adoption of this technology by northern hunter-fisher-gatherers was incorporated into ongoing subsistence systems.

Late Mesolithic Subsistence

In terms of terrestrial animal and plant species exploited, there was little change between the Early and Late Mesolithic. A key difference from the Early Mesolithic, however, is the increasing regional differentiation of Late Mesolithic diets. The most distinctive subsistence change during the Late Mesolithic was the increased dietary role of a diverse range of aquatic fauna, both freshwater and marine. Extensive shell middens develop for the first time during the Late Mesolithic and are found across the Atlantic coastline from Portugal to Scotland and across the North and western Baltic Sea basins (Fig. 5). A wide variety of shellfish species were exploited, such as clams, cockles, mussels, and oysters. Shellfish were exploited alongside a variety of marine fish such as cod, eel, mackerel, salmon, and even deepwater species such as tuna. An important change in the increase of marine components of Late Mesolithic diets in northern Europe, particularly in the Baltic Sea area, was the exploitation of marine mammals such as seals and whales. The role of aquatic resources in Late Mesolithic diets varied considerably throughout Europe. Assessment of rates of caries in human teeth found that caries rates were low in areas such as southeast (specifically, Greece and the Iron Gates area) and northern Europe due to a relatively high consumption of fish and other aquatic resources, whereas in the western Mediterranean, the higher incidence of caries provided evidence for the higher consumption of carbohydrate-rich plants alongside meat (Meiklejohn and Zvelebil 1991). Variability of the relative components of aquatic versus terrestrial resources becomes even greater when approached from local and regional perspectives.

In parts of northern and western Europe, the uptake of an entire coastal component alongside continued freshwater and terrestrial resource exploitation is one of the main features that delineates the Early from Late Mesolithic. Shellfish undoubtedly comprised an important element of Late Mesolithic subsistence, as indicated by the large size of some shell middens, but shellfish gathering represents just a part of this entire coastal component. Coastal exploitation not only enabled shellfish gathering but also the exploitation of a wide range of fish, sea mammals, and waterfowl (cranes, ducks, eagles) (Blankholm 2008). In these regions, there is evidence for

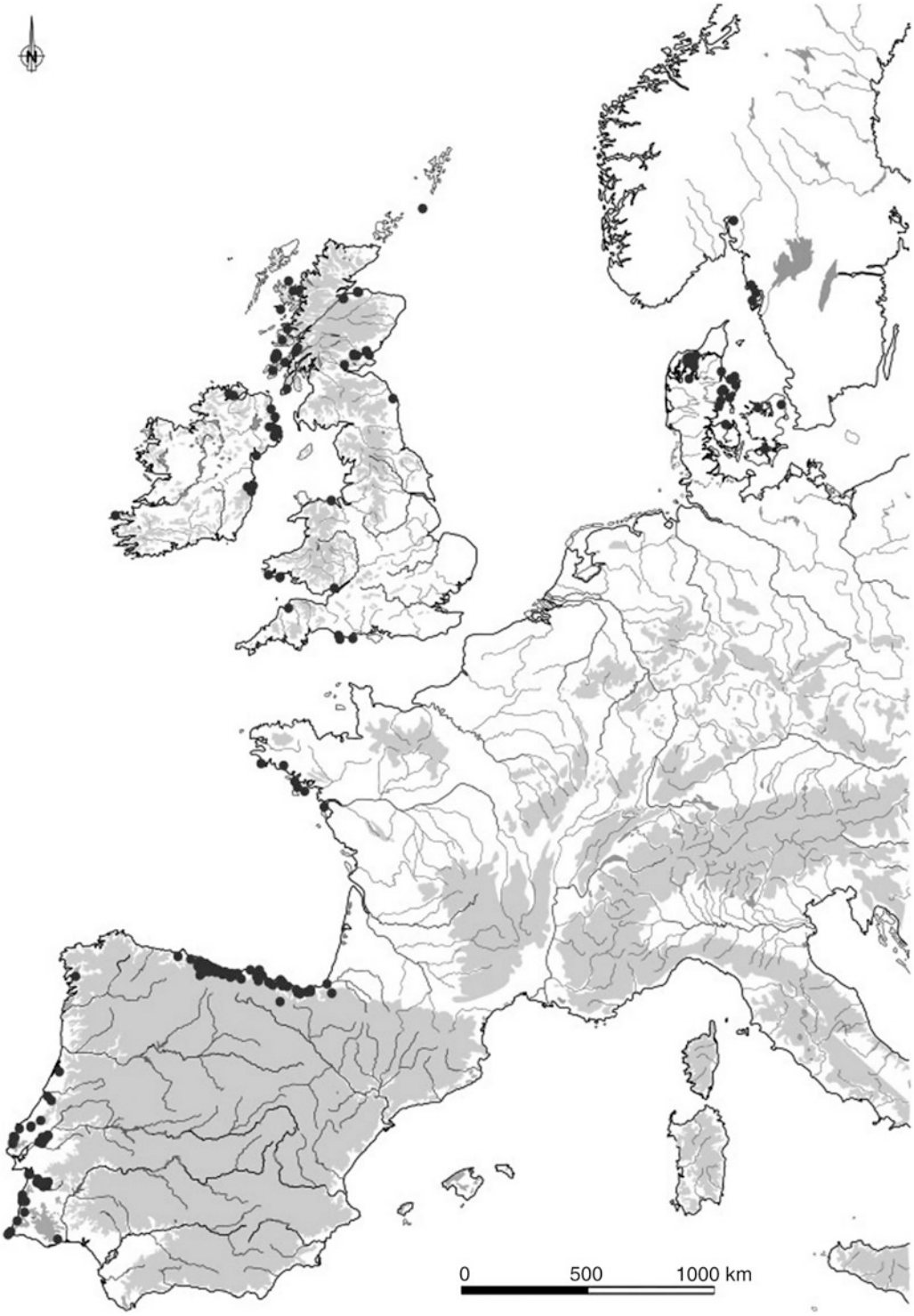

European Mesolithic: Geography and Culture, Fig. 5 Distribution map of shell middens in western Europe (Gutiérrez-Zugasti et al. 2011: 239)

smaller more specialized procurement sites both along the coasts and in inland regions. This evidence shows that there were smaller specialized sites along coastal zones for waterfowling and sea mammal hunting and in inland zones for pig hunting and pine marten trapping (Blankholm 2008). These sites indicate that during the Late Mesolithic, they were utilized in combination with larger procurement sites that were occupied over many generations, as indicated by the evidence for long-term accumulation of shell middens. Subsistence strategies were thus highly variable and in close relationship with local and regional differences in seasonal coastal and inland resource availability. A good example of the scale of local variability comes from Portuguese shell middens, which indicate differences in the shellfish species that were exploited between neighboring middens. In this region, there is evidence for the prominence of different shellfish species between different middens within the same coastal estuary, which was due to variability in local aquatic habitats (Straus 2008).

While the uptake in the coastal component of Mesolithic diets occurred earlier in the Mesolithic in southern Europe, there is evidence for an increase during the Late Mesolithic in this coastal component at some sites in the Mediterranean. This increase in a coastal component was, however, highly variable from one local context to the next. For example, at the Grotto dell'Uzzo in Sicily, there is evidence for a change in the dominance of wild boar and red deer during the Early Mesolithic to a much more diverse diet during the Late Mesolithic that added an entire coastal component of birds, fish, sea urchins, and shellfish alongside an increase in the gathering of a wide range of plant species such as olive, pea, wild strawberry, wild grape, and pulses (Pluciennik 2008). On the other hand, at the Franchthi Cave site in the Argolid of Greece, there is evidence for shellfish exploitation from the late Upper Paleolithic, and the major changes that occurred during the Late Mesolithic were the dominance of bluefin tuna bones and the increasing utilization of a broad range of plant resources (Pluciennik 2008). These contrasting sites provide good evidence for the scale of variability in the coastal component of Late Mesolithic diets in the Mediterranean.

Subsistence evidence from Lepenski Vir in the Iron Gates region of SE Europe indicates that carp and sturgeon were major components of Late Mesolithic diets at this site. Both of these species have periods of large runs up and down the river during and after spawning. Late Mesolithic hunter-gatherers likely took advantage of these seasonal fish runs, which enabled them to maintain a more sedentary lifestyle compared to hunter-gatherers in other inland regions of Europe (Radovanovic 1996). Despite this probably heavy seasonal reliance on fish, Late Mesolithic hunter-gatherers at Lepenski Vir also had very diverse diets that included large terrestrial food components. These terrestrial foods include aurochs, wild boar, domestic dog, and various bird species. The particular aquatic species that were exploited by the inhabitants of Lepenski Vir and neighboring sites of the Iron Gates region were available in abundance at a specific time, which enabled relatively intensive exploitation, but throughout the rest of the year, diets had to be sustained by a range of terrestrial species.

Further evidence of the increasing seasonal variability of Late Mesolithic diets and the relative proportions of aquatic versus terrestrial resources in diets come from wetland sites in the Rhine-Meuse-Scheldt area of the southern North Sea basin. The Hardinxveld sites (Louwe Kooijmans 2001a, b) in the Rhine-Meuse delta of the Netherlands indicate seasonal exploitation of wetlands for hunting and fishing. There is evidence from these sites for particular concentration on trapping species such as beaver and otter and fishing for pike (Verhart 2008). At these sites, wide variety of different freshwater species such as bream, carp, eel, perch, and roach were consumed alongside wild boar and red deer and waterfowl such as ducks, geese, and swans.

The diversity of Late Mesolithic diets and the evidence for specialized plant and/or animal procurement have had implications for interpretations of the transition to agriculture. Evidence for the intensive gathering of plants on some sites has led to the proposal of plant husbandry, which has been interpreted as setting the

foundations for the incorporation of domestic plants into Late Mesolithic subsistence (Zvelebil 1994). Despite growing evidence for domestic cereal pollen in pre-Neolithic contexts in a few regions of Europe, there is still too little evidence to reliably confirm this hypothesis (Price 2000). There have been proposals of local domestication of both cattle and pigs in different areas of Europe. Analyses of mitochondrial DNA have provided clear evidence for the Near Eastern origin of domestic cattle in Europe and therefore the lack of a role played by indigenous European aurochs to domestication (Edwards et al. 2007). Evidence from wild boar and pig mtDNA, on the other hand, does suggest a much more complex situation in which there were different independent domestication events in a few areas of Europe and that the appearance of domestic pigs was caused by both indigenous and introduced animals (Larson et al. 2007).

Late Mesolithic Settlement, Land Use, and Territories

As with subsistence, Late Mesolithic settlements are characterized by a higher amount of inter- and intraregional variability compared to the Early Mesolithic. The Atlantic period witnessed higher temperatures, precipitation, and dense deciduous forests that created increasingly patchy resource niches and caused a greater differentiation between inland and upland landscapes and those along coasts and rivers. Coastal and riverine sites increased considerably during the Late Mesolithic. Coastal sites have been recorded from Sweden, Denmark, Norway, Britain, France, Spain, Portugal, and Italy. While many of these coastal sites were large and had shell middens, they should not bias our understanding of the variability of coastal and inland settlements during the Late Mesolithic. For example, in southern Scandinavia inland sites of the Early Mesolithic ("Maglemose" and "Kongemose" cultures) have often been contrasted with large coastal midden sites of the Late Mesolithic ("Ertebølle" culture) in order to argue for intensive coastal settlement at the expense of inland settlement during the Late Mesolithic. This interpretation is biased due to both taphonomy and specific histories of research. Early Mesolithic coastal sites are deeply submerged and have not been recorded, and Late Mesolithic survey has been traditionally biased toward coastal areas, leaving inland settlement during the Late Mesolithic heavily underinvestigated (Blankholm 2008). Furthermore, while shell middens are a defining feature of the Late Mesolithic in these regions, the number of coastal sites without shell middens is still higher than sites with shell middens (Blankholm 2008). In recent years, the accumulation of evidence from this region has indicated that the relationship of coastal to inland settlements during the Late Mesolithic was much more complicated. For example, a model has been developed for Ertebølle settlement systems in Denmark in which larger base camps were combined with small seasonally inhabited satellite sites in the coastal surroundings (Andersen 1995). This specific model of late Mesolithic settlement has recently been extended to other areas of the western Baltic (Terberger 2006). Certain large sites with shell middens were permanent fixtures in cultural landscapes and were inhabited by a large number of family units over many generations, whereas other sites attest to more ephemeral habitation by small family units for no more than a few select seasons. Dwelling structures had variable layouts that included oval, rectangular, and trapezoidal huts/tents, some with internal platforms. Comparative analysis of Early and Late Mesolithic dwelling structures across southern Scandinavia has highlighted important changes in the internal organization of larger multiple family unit dwelling structures and continuity in the organization of smaller dwellings (Grøn 2003). Large Late Mesolithic dwellings were constructed closer to each other and had no limits on the total number of units that could be included within a single structure, which has been interpreted as an increase in the number of nuclear families that comprised a household (Grøn 2003).

The continental interior of Europe witnessed an increase in river and streamside settlements during the Late Mesolithic. This was likely due to the increasingly closed forest canopy that developed during the Atlantic period, which decreased species richness and productivity in

inland areas and increased species richness and productivity in areas beside watercourses. This situation is both good and bad for Late Mesolithic archaeology: on one hand, sites buried by alluvial sediments possess higher organic preservation potential and can yield rich material culture and subsistence data; on the other hand, sites near rivers or streams could be rendered archaeologically invisible due either to sites being buried deep beneath alluvial sediments or entirely eroded due to fluvial activity.

One of the most remarkable riverside Late Mesolithic sites is Lepenski Vir (Fig. 4), which was rescue excavated in the 1960s due to the construction of a reservoir in the Iron Gates region of the Danube River (Serbian-Romanian border). Lepenski Vir is a special Late Mesolithic site, but in the Iron Gates is just one of many Late Mesolithic sites with house structures and a variety of formal burials. This site, located on a narrow terrace sheltered in a cove along the right bank of the Danube, yielded a complex arrangement of 95 superimposed trapezoidal-shaped houses constructed over different building subphases (Radovanovic 1996). The houses faced the river and were half-buried or dug-in to the natural hollows of the terrace slope, where wooden posts were slotted in back foundation ditches to support a tentlike construction (Radovanovic 1996). House floors were plastered with a red limestone mixture, and hearths lined with limestone slabs were constructed near the fronts of the houses. Sandstone alters, sculptures of human or fishlike figures, and ornamented portable artifacts are found within houses. The different arrangements of alters and sculptures from one phase to the next indicate that changes were made in the internal spatial organization of houses through time.

The high resource productivity of coastal and riverside sites, and the corresponding suite of material culture and subsistence data found on these sites, had led to interpretations of the relatively sedentary nature of Late Mesolithic settlement in some areas of Europe. The evidence, however, possesses a high amount of local and regional variability which indicates that there are not clear one-to-one relationships between particular site types and sedentarily settled populations. A good example is provided by coastal settlement in the Mediterranean. At Franchthi Cave in Greece, there is evidence for decreasing presence on the site through the Mesolithic, and during the Late Mesolithic, there was only sporadic habitation of the site (Pluciennik 2008). On the other hand, Grotto dell'Uzzo in Sicily shows an increasing presence on the site through the course of the Mesolithic, wherein during the Late Mesolithic, there were a wide variety of marine, terrestrial animal, and plant species procured across different seasons that has led to an interpretation of lengthy seasonal occupation and possibly year-round occupation on the site (Pluciennik 2008).

On the whole, Late Mesolithic settlement can be characterized by increasing variability of settlement types, locations/concentrations, and regional site densities. There were important changes in the organization of settlement within local and regional landscapes during this period. In many areas of the continent, larger sites that were inhabited over multiple generations are surrounded by smaller more ephemerally inhabited sites. The remarkable coastal sites of southern Scandinavia or riverside sites of the Iron Gates region get the most attention, but our understanding of the realities of Late Mesolithic settlement is based on other less spectacular inland sites and smaller more ephemerally inhabited coastal or riverside sites. By placing these less spectacular sites within the context of the major coastal and riverside sites that had multiple generations of occupation, we are able to gain a more holistic understanding of the complex variability of Late Mesolithic settlement systems in different areas across the continent.

Late Mesolithic Burials and Rituals

Late Mesolithic burials were comprised of a wide variety of different burial types, including cremations, single inhumations, multiple burials, burials of dismembered heads, dog and bear burials, and cemeteries. Cemeteries and burials of dismembered heads are two remarkable characteristic of Late Mesolithic burial practice. However, as mentioned earlier in the discussion of Early Mesolithic burials, cemeteries should not be viewed as a new practice confined to the Late Mesolithic

(Meiklejohn et al. 2009). What sets these Late Mesolithic burials apart from the Early Mesolithic is their size, internal complexity and diachronic development, and spatial distribution across many regions of Europe.

Late Mesolithic cemeteries were constructed in a range of different settings. Cemeteries were built within settlements or on sites nearby settlement locations. At Lepenski Vir burials have been recorded inside houses. Burials were placed inside houses in a variety of ways, from under the house floors before the construction of the house, dug underneath already existing floors, on the floors of already abandoned houses, and the secondary placement of different body parts such as ribs and skulls throughout the houses. During the early phases of settlement, burials are orientated perpendicular to the river, but through time they are solely orientated parallel to the river (Radovanovic 1996). The change to the orientation of burials parallel to the river and the fishlike motifs of some of the sandstone sculptures indicates the major importance of the river not only for resource procurement but also for the identity or cosmology of the people who inhabited this site (Radovanovic 1996).

In some regions, such as southern Scandinavia, researchers have noted the difficulty of actually being able to demarcate settlement and burial places in the landscape, which has led to a rejection of the concept of cemetery as a formal and delimited burial ground (Blankholm 2008). Numerous burials have been recorded from shell middens across Europe, from Denmark to Portugal. On some sites, such as Skateholm in Sweden, multiple cemeteries were constructed. These cemeteries varied considerably in size. Some cemeteries contained around 10 burials, whereas others, such as Olenii Ostrov in Russia, contained an estimated 400 total burials (O'Shea and Zvelebil 1984). At cemeteries across Europe, men, women, and children are found, and there is evidence for the differentiation of individuals based on familial or clan lines, gender, and status/prestige. As in the Early Mesolithic, burials, whether they be isolated, multiple, or in cemeteries, were often sprinkled with red ochre. In terms of variability of mortuary treatment, grave goods vary significantly both within cemeteries and between different regions. In some regions, there does appear to be some patterning in the differentiation of people within cemeteries, notably along gender lines. At some sites, female graves have been recorded with goods such as jewelry, whereas male graves have been recorded with bone daggers and projectile points and stone blades and axes. On the whole, an enormous amount of variability is recorded for grave goods during the Late Mesolithic. Some of these notable goods are pendants of bone and stone, perforated animal teeth from a variety of species, carved figurines of bone, teeth or antler, and various stone and bone tool types. One of the most remarkable grave good finds in all of Europe is the famous burial at Vedbaek-Bogebakken in which a child's head was placed on the wing of a swan.

In eastern France and Germany, numerous finds have been made of Late Mesolithic burials with multiple decapitated human heads, which has led some researchers to hypothesize the presence of a "skull cult" during this period. The most remarkable of these skull finds comes from Ofnet cave in southeast Germany, where two shallow pits were found that contained multiple jawbones, skulls, and vertebrae. Around 34 or 38 skulls were found in these two pits, where they all faced west and were covered with ashes and red ochre (Jochim 2011). Analyses of the Ofnet finds have indicated that women outnumbered men and children outnumbered adults and that many of the deaths were due to blunt trauma to the head and the skulls were later defleshed and decapitated. The Ofnet finds, coupled with various other skull burials in neighboring regions and evidence of bones with projectiles imbedded in them from other regions of Europe, have led many researchers to suggest that there was a high rate of violent conflict during the Late Mesolithic (Jochim 2011).

Cross-References

► Cattle: Domestication and Development
► Clark, John Grahame Douglas

▶ Europe: Mesolithic-Neolithic Transition
▶ Lepenski Vir: Geography and Culture
▶ Star Carr, Archaeology Of
▶ Star Carr: Environmental Archaeology
▶ Submerged Prehistoric Landscapes
▶ Zvelebil, Marek

References

Aaris-Sørensen, K.A., R. Mühldorff, and E. Brinch Petersen. 2007. The Scandinavian reindeer (*Rangifer tarandus* L.) after the last glacial maximum: time, seasonality, and human exploitation. *Journal of Archaeological Science* 34 (6): 914–923.

Achard-Corompt N., E. Ghesquière, and V. Riquier. (eds.) 2017. *Creuser au Mésolithique/Digging in the Mesolithic*. Actes de la séance de la Société préhistorique française de Châlons-en-Champagne (29–30 mars 2016). Séances de la Société préhistorique française, vol. 12, Société préhistorique française, Paris, 282 p.

Allard, P. 2017. Variabilité des débitages laminaires au Second Mésolithique et au Néolithique ancient dans le nord de la France (VIIe et VIe millénaire BCE). *Journal of Lithic Studies* 4 (2): 75–103.

Andersen, S.H. 1985. Tybrind Vig. A preliminary report on a submerged Ertebølle settlement on the west coast of Fyn. *Journal of Danish Archaeology* 4: 52–69.

Andersen, S.H. 1995. Coastal adaptation and marine exploitation in late Mesolithic Denmark – with special emphasis on the Limfjord region. In *Man and the sea in the Mesolithic*, ed. A. Fischer, 41–66. Oxford: Oxbow Press.

Bailey, G. 2007. Time perspectives, palimpsests and the archaeology of time. *Journal of Anthropological Archaeology* 26: 198–223.

Barbaza, M. 1999. *Les civilisations postglaciaires. La vie dans la grande forêt tempérée*. Paris: Éditions la Maison des Roches, Histoire de la France Préhistorique.

Barber, D.C., A. Dyke, C. Hillaire-Marcel, A.E. Jennings, J.T. Andrews, M.W. Kerwin, G. Bilodeau, R. McNeely, J. Southon, M.D. Morehead, and J.-M. Gagnon. 1999. Forcing of the cold event of 8,200 years ago by catastrophic drainage of Laurentide lakes. *Nature* 400: 344–348.

Barton, R.N.E., P.J. Berridge, M.J.C. Walker, and R.E. Bevins. 1995. Persistent places in the Mesolithic landscape: An example from the Black Mountain uplands of South Wales. *Proceedings of the Prehistoric Society* 61: 81–116.

Benjamin, J., C. Bonsall, C. Pickard, and A. Fischer, eds. 2011. *Submerged prehistory*. Oxford: Oxbow Books.

Beugnier, V. 2007. Préhistoire du travail des plantes dans le nord de la Belgique. Le cas du Mésolithique ancien et du Néolithique final en Flandre. In *Plant processing from a prehistoric and ethnographic perspective/Préhistoire et ethnographie du travail des plantes*. Proceedings of a workshop at Ghent University (Belgium) November 28, 2006. British Archaeological Reports International series 1718, ed. V. Beugnier and P. Crombé, 23–40. Oxford: John & Erica Hedges Ltd.

Bicho, N., B. Hockett, J. Haws, and W. Belcher. 2000. Hunter-gatherer subsistence at the end of the Pleistocene: Preliminary results from Picareiro Cave, Central Portugal. *Antiquity* 74 (3): 500–506.

Bicho, N., C. Umbelino, C. Detry, and T. Pereira. 2010. The Emergence of Muge Mesolithic Shell Middens in Central Portugal and the 8200 cal yr BP Cold Event. *Journal of Island & Coastal Archaeology* 5: 86–104.

Binder, D., A. Collina, R. Guilbert, T. Perrin, and O. Garcia-Puchol. 2012. Pressure-knapping blade production in the north-western Mediterranean region during the seventh millennium cal B.C. In *The emergence of pressure blade making: From origin to modern experimentation*, ed. P.M. Desrosiers, 199–217. New York: Springer.

Bjerck, H.B. 2009. Colonizing seascapes: Comparative perspectives on the development of maritime relations in Scandinavia and Patagonia. *Arctic Anthropology* 46 (1–2): 118–131.

Blankholm, H.P. 2008. Southern Scandinavia. In *Mesolithic Europe*, ed. G. Bailey and P. Spikins, 107–132. Cambridge: Cambridge University Press.

Bocherens, H., C. Polet, and M. Toussaint. 2007. Palaeodiet of Mesolithic and Neolithic populations of the Meuse Basin (Belgium): Evidence from stable isotopes. *Journal of Archaeological Science* 34: 10–27.

Boethius, A., and T. Ahlström. 2018. Fish and resilience among Early Holocene foragers of southern Scandinavia: A fusion of stable isotopes and zooarchaeology through Bayesian mixing modelling. *Journal of Archaeological Science* 93: 196–210.

Bohncke, S.J.P., and W.Z. Hoek. 2007. Multiple oscillations during the Preboreal as recorded in a calcareous gyttja, Kingbeekdal, The Netherlands. *Quaternary Science Review* 26: 1965–1974.

Bokelmann, K. 1971. Duvensee, ein Wohnplatz des Mesolithikums in Schleswig-Holstein, und die Duvenseegruppe. *Offa* 28 (1): 5–26.

Bonsall, C. 2008. The Mesolithic of the Iron Gates. In *Mesolithic Europe*, ed. G. Bailey and P. Spikins, 238–279. Cambridge: Cambridge University Press.

Bonsall, C., G. Cook, R. Lennon, D. Harkness, M. Scott, L. Bartosiewicz, and K. McSweeney. 2000. Stable isotopes, radiocarbon and the Mesolithic-Neolithic transition in the Iron Gates. *Documenta Praehistorica* 27: 119–132.

Brace, S., et al. 2019. Ancient genomes indicate population replacement in Early Neolithic Britain. *Nature Ecology & Evolution* 3: 765–771.

Brinch Petersen, E. 1973. A survey of the Late Paleolithic and Mesolithic of Denmark. In *The Mesolithic in Europe*, ed. S.K. Kozlowski, 77–129. Warsaw: Warsaw University Press.

Cauwe, N. 2001. Skeletons in motion, ancestors in action: Early Mesolithic collective tombs in southern Belgium. *Cambridge Archaeological Journal* 11 (2): 147–163.

E

Clark, J.G.D. 1971. *Excavations at Star Carr. An early Mesolithic site at Seamer near Scarborough, Yorkshire*. Cambridge: Cambridge University Press.

Conneller, C. 2006. Death. In *Mesolithic Britain and Ireland: new approaches*, ed. C. Conneller and G. Warren, 139–164. London: Tempus.

Craig, O.E., M. Forster, S.H. Andersen, E. Koch, P. Crombé, N.J. Milner, B. Stern, G.N. Bailey, and C. Heron. 2007. Molecular and isotopic demonstration of the processing of aquatic products in northern European prehistoric pottery. *Archeometry* 49 (1): 135–152.

Crombé, P. 2009. Early pottery in hunter-gatherer societies of Western Europe. In *Ceramics before farming: The dispersal of pottery among prehistoric Eurasian hunter- gatherers*, ed. P. Jordan and M. Zvelebil, 477–498. Walnut Creek: Left Coast Press.

Crombé, P. 2018. Abrupt cooling events during the Early Holocene and their potential impact on the environment and human behaviour along the southern North Sea basin (NW Europe). *Journal of Quaternary Science* 33: 353–367.

Crombé, P. 2019. Mesolithic projectile variability along the southern North Sea basin (NW Europe): Hunter-gatherer responses to repeated climate change at the beginning of the Holocene. *PLoS One* in press (release Jul 17, 2019).

Crombé, P., E. Robinson, M. Van Strydonck, and M. Boudin. 2012. Radiocarbon dating of Mesolithic open-air sites in the coversand area of the north-west European plain: problems and prospects. *Archaeometry* 55: 545. https://doi.org/10.1111/j.1475-4754.2012.006 93.x.

David, E. 2003. The contribution of the technological study of bone and antler industry for the definition of the early Maglemose culture. In *Mesolithic on the move: papers presented at the Sixth International Conference on the Mesolithic in Europe, Stockholm 2000*, ed. L. Larsson, H. Kindgren, K. Knutsson, D. Loeffler, and A. Akerlund, 649–657. Oxford: Oxbow Books.

Deeben, J. 1988. The Geldrop sites and the Federmesser occupation of the southern Netherlands. In *De la Loire à l'Oder. Les civilisations du Paléolithique Final dans le Nord-Ouest Européen*, British Archaeological Reports International series, ed. M. Otte, vol. 444, 357–398. Oxford: Archaeopress.

Dolukhanov, P. 2008. The Mesolithic of European Russia, Belarus, and the Ukraine. In *Mesolithic Europe*, ed. G. Bailey and P. Spikins, 280–301. Cambridge: Cambridge University Press.

Dolukhanov, P., A. Shukurov, D. Gronenborn, D. Sokoloff, V. Timofeev, and G. Zaitseva. 2005. The chronology of Neolithic dispersal in central and eastern Europe. *Journal of Archaeological Science* 28 (7): 1441–1458.

Edwards, C.J., R. Bollongino, A. Scheu, A. Chamberlain, A. Tresset, J.-D. Vigne, J.F. Baird, G. Larson, S.Y.W. Ho, T.H. Heupink, B. Shapiro, A.R. Freeman, M.G. Thomas, R.-M. Arbogast, B. Arndt, L. Bartosiewicz, N. Benecke, M. Budja, L. Chaix, A.M. Choyke, E. Coqueugniot, H.-J. Döhle, H. Göldner, S. Hartz, D. Helmer, B. Herzig, H. Hongo, M. Mashkour, M. Özdogan, E. Pucher, G. Roth, S. Schade-Lindig, U. Schmölcke, R. Schulting, E. Stephan, H.-P. Uerpmann, I. Vörös, B. Voytek, D.G. Bradley, and J. Burger. 2007. Mitochondrial DNA analysis shows a Near Eastern Neolithic origin for domestic cattle and no indication of domestication of European aurochs. *Proceedings of the Royal Society Series B* 274: 1377–1385.

Eronen, M., G. Glückert, L. Hatakka, O. Van de Plassche, J. Van der Plicht, and P. Rantala. 2001. Rates of Holocene isostatic uplift and relative sea-level lowering of the Baltic in SW Finland based on studies of isolation contacts. *Boreas* 30: 17–30.

Fernández, J., and M. Jochim. 2010. The impact of the 8,200 cal. BP climatic event on human mobility strategies during the Iberian Late Mesolithic. *Journal of Anthropological Research* 66: 39–68.

Fontana, F. 2011. From season to season: A revision of the functional status of Sauveterrian sites in the north eastern sector of the Italian Peninsula and implications for the mobility of human groups. *Palethnologie* 3: 291–308.

Fu, Q., et al. 2016. The genetic history of Ice Age Europe. *Nature* 534: 200–205.

Gendel, P. 1984. *Mesolithic social territories in northwest Europe*, British Archaeological Reports International series. Vol. 218. Oxford: Archaeopress.

Gramsch, B., and K. Kloss. 1989. Excavations near Friesack: An early Mesolithic marshland site in the northern plain of central Europe. In *The Mesolithic in Europe: Proceedings of the 3rd International Symposium*, ed. C. Bonsall, 313–324. Edinburgh: John Donald.

Grøn, O. 2003. Mesolithic dwelling places in south Scandinavia: Their definition and social interpretation. *Antiquity* 77 (298): 685–708.

Günther, T., et al. 2018. Population genomics of Mesolithic Scandinavia: Investigating early postglacial migration routes and high-latitude adaptation. *PLoS Biology* 16 (1): e2003703.

Gutiérrez-Zugasti, I., S.H. Andersen, A.C. Araújo, C. Dupont, N. Milner, and A.M. Monge-Soares. 2011. Shell midden research in Atlantic Europe: state of the art, research problems, and perspectives for the future. *Quaternary International* 239: 70–85.

Holst, D. 2010. Hazelnut economy of early Holocene hunter-gatherers: A case study from Mesolithic Duvensee, northern Germany. *Journal of Archaeological Science* 37: 2871–2880.

Jochim, M. 2011. The Mesolithic. In *European prehistory: A survey*, ed. S. Milisauskas, 2nd ed., 125–151. New York: Springer.

Kozlowski, S.K. 2009. *Thinking Mesolithic*. Oxford: Oxbow Press.

Kubiak-Martens, L. 2016. Scanning electron microscopy and starchy food in Mesolithic Europe: The importance of roots and tubers in Mesolithic diet. In *Wild Harvest:*

Plants in the Hominin and Pre-Agrarian Human Worlds, ed. K. Hardy and L. Kubiak-Martens, 113–133. Oxford: Oxbow Books.

Larson, G., K. Dobney, U. Albarella, M. Fang, E. Matisoo-Smith, J. Robins, S. Lowden, H. Finlayson, T. Brand, E. Willerslev, P. Rowley-Conwy, L. Andersson, and A. Cooper. 2007. Ancient DNA, pig domestication, and the spread of the Neolithic into Europe. *Proceedings of the National Academy of Sciences* 104: 15276–15281.

Lidén, K., G. Eriksson, B. Nordqvist, A. Götherström, and E. Bendixen. 2004. "The wet and the wild followed by the dry and the tame" – or did they occur at the same time? Diet in Mesolithic-Neolithic southern Sweden. *Antiquity* 78 (299): 23–33.

Louwe Kooijmans, L.P. 2001a. *Hardinxveld-Giessendam De Bruin: een kampplaats uit het Laat Mesolithicum en het begin van de Swifterbant- cultuur (5500–4500 v. Chr.)*. Amersfoort: Raportage Archeologische Monumentenzorg.

Louwe Kooijmans, L.P. 2001b. *Hardinxveld-Giessendam Polderweg: een mesolithische jachtkamp in het riviergebied (5500-5000 v. Chr.)*. Amersfoort: Raportage Archeologische Monumentenzorg.

Lozovski, V.M. 1996. *Zamostje 2: les derniers chasseurs-pêcheurs préhistoriques de la plaine russe*. Treignes: Editions du CEDARC.

Marchand, G., and T. Perrin. 2017. Why this revolution ? Explaining the major technical shift in Southwestern Europe during the 7th millennium cal. BC. *Quaternary International* 428: 73–85.

Marchand, G., M. Le Goffic, and N. Marcoux. 2011. Elusive Mesolithic occupants in the Pont-Glas rockshelter: An analysis of the spatial segmentation of production sequences in relation to the mobility of prehistoric groups in Brittany. *Palethnologie* 3: 309–329.

Meiklejohn, C., and M. Zvelebil. 1991. Health status of European populations at the agricultural transition and the implications for the adoption of farming. In *Health in past societies*, British Archaeological Reports International series, ed. H. Bush and M. Zvelebil, vol. 567, 129–145. Oxford: Archaeopress.

Meiklejohn, C., E. Brinch Petersen, and J. Babb. 2009. From single graves to cemeteries: An initial look at chronology in Mesolithic burial practices. In *Mesolithic horizons*, ed. S.B. McCartan, R. Schulting, G. Warren, and P. Woodman. Papers presented at the Seventh International Conference on the Mesolithic in Europe, Belfast 2005, 639–645. Oxford: Oxbow Press.

Naudinot, N. 2008. Les armatures lithiques tardiglaciaires dans l'ouest de la France (régions Bretagne et Pays de la Loire): proposition d'organisation chrono-culturelle et chaîne opératoire de fabrication. *Paléthnologie* 1: 1–28.

Newell, R.R., D. Kielmann, T.S. Constandse-Westermann, W.A.B. Van der Sanden, and A. Van Gijn. 1990. An inquiry into the ethnic resolution of Mesolithic regional groups. In *The study of their decorative ornaments in time and space*. New York: Brill Academic Publishing.

Niekus, M.J.L.Th, P.H.J.I. Ploegaert, J.T. Zeiler, and L. Smits. 2016. A small Middle Mesolithic cemetery with cremation burials from Rotterdam, the Netherlands. In *Mesolithic burials – Rites, symbols and social organisation of early postglacial communities*, ed. J.M. Grünberg, B. Gramsch, L. Larsson, J. Orschiedt, and H. Mellerpp, 569–592. Halle: Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt.

O'Shea, J., and M. Zvelebil. 1984. Oleneostrovski mogilnik: Reconstructing the social and economic organization of prehistoric foragers in northern Russia. *Journal of Anthropological Archaeology* 3: 1–40.

Pluciennik, M. 2008. The coastal Mesolithic of the European Mediterranean. In *Mesolithic Europe*, ed. G. Bailey and P. Spikins, 328–356. Cambridge: Cambridge University Press.

Price, T.D. 2000. Europe's first farmers: An introduction. In *Europe' s first farmers*, ed. T.D. Price, 1–18. Cambridge: Cambridge University Press.

Radovanovic, I. 1996. *The Iron Gates Mesolithic*. Ann Arbor: International Monographs in Prehistory.

Rankama, T., and J. Kankaanpää. 2008. Eastern arrivals in post-glacial Lapland: The Sujala site 10,000 cal BP. *Antiquity* 82: 884–900.

Rasmussen, S.O., et al. 2014. A stratigraphic framework for abrupt climatic changes during the Last Glacial period based on three synchronized Greenland ice-core records: refining and extending the INTIMATE event stratigraphy. *Quaternary Science Reviews* 106: 14–28.

Robinson, E., M. Van Strydonck, V. Gelorini, and P. Crombé. 2013. Radiocarbon chronology and the correlation of hunter-gatherer sociocultural change with abrupt palaeoclimate change: The Middle Mesolithic in the Rhine-Meuse-Scheldt area of northwest Europe. *Journal of Archaeological Science* 40: 756–763.

Schulting, R.J., and M.P. Richards. 2002. Finding the coastal Mesolithic in southwest Britain: AMS dates and stable isotope results on human remains from Caldey Island, South Wales. *Antiquity* 76: 1011–1025.

Schulting, R.J., S.M. Blockley, H. Bocherens, D. Drucker, and M.P. Richards. 2008. Stable carbon and nitrogen isotope analysis on human remains from the early Mesolithic site of La Vergne (Charente-Maritime, France). *Journal of Archaeological Science* 35 (3): 763–772.

Sergant, J., P. Crombé, and Y. Perdaen. 2006. The 'invisible' hearths: A contribution to the discernment of Mesolithic non-structured hearths. *Journal of Archaeological Science* 33: 999–1007.

Sørensen, M. 2012. The arrival and development of pressure blade technology in southern Scandinavia. In *The emergence of pressure blade making: From origin to modern experimentation*, ed. P.M. Desrosiers, 237–259. New York: Springer.

Spikins, P. 2008. Mesolithic Europe: Glimpses of another world. In *Mesolithic Europe*, ed. G. Bailey and

P. Spikins, 1–17. Cambridge: Cambridge University Press.

Straus, L.G. 2008. The Mesolithic of Atlantic Iberia. In *Mesolithic Europe*, ed. G. Bailey and P. Spikins, 303–327. Cambridge: Cambridge University Press.

Svoboda, J.A. 2008. The Mesolithic of the Middle Danube and Upper Elbe Rivers. In *Mesolithic Europe*, ed. G. Bailey and P. Spikins, 221–237. Cambridge: Cambridge University Press.

Terberger, T. 2006. The Mesolithic hunter-fisher-gatherers on the Northern German Plain. In *Across the western Baltic. Proceedings of the Conference The Prehistory and Early Medieval Period in the Western Baltic, Vordingborg, Denmark, March 27–29, 2003*, ed. K. Møller Hansen and K. Buck Pedersen, 111–184. Vordingborg: Sydsjaellands Museum.

Toussaint, M., L. Brou, F. Le Brun-Ricalens, and F. Spier. 2009. The Mesolithic site of Heffingen-Loschbour (Grand Duchy of Luxembourg). A yet undescribed human cremation possibly from the Rhine-Meuse-Scheldt culture: Anthropological, radiometric, and archaeological implications. In *Chronology and evolution of the Mesolithic in Northwest Europe. Proceedings of an international meeting, Brussels, May 30–June 1 2007*, ed. P. Crombé, M. Van Strydonck, J. Sergant, M. Boudin, and M. Bats, 239–260. Newcastle-upon-Tyne: Cambridge Scholars Publishing.

Valdeyron, N., T. Briand, L. Bouby, A. Henry, R. Khedhaier, B. Marquebielle, H. Martin, A. Thibeau, and Bosc-Zanardo. 2011. The Mesolithic site of Les Fieux (Miers, Lot): a hunting camp on the Gramat karst plateau? *Palethnologie* 3: 331–341.

van der Plicht, J., L.W.S.W. Amkreutz, M.J.L.Th. Niekus, J.H.M. Peeters, and B.I. Smit. 2016. Surf'n Turf in Doggerland: Dating, stable isotope and diet of Mesolithic human remains from the southern North Sea. *Journal of Archaeological Science: Reports* 10: 110–118.

Verhart, L.B.M. 1988. Mesolithic barbed points and other implements from Europoort, the Netherlands. *Oudheidkundige Mededelingen uit het Rijksmuseum van Oudheden Leiden* 68: 145–194.

Verhart, L.B.M. 2008. New developments in the study of the Mesolithic of the low countries. In *Mesolithic Europe*, ed. G. Bailey and P. Spikins, 158–181. Cambridge: Cambridge University Press.

Verjux, Ch. 2003. The function of the Mesolithic sites in the Paris basin (France). New data. In *Mesolithic on the move: Papers presented at the Sixth International Conference on the Mesolithic in Europe, Stockholm 2000*, ed. L. Larsson, H. Kindgren, K. Knutsson, D. Loeffler, and A. Akerlund, 262–268. Oxford: Oxbow Books.

Waddington, C. 2007. Rethinking Mesolithic settlement and a case study from Howick. In *Mesolithic studies in the North Sea basin and beyond. Proceedings of a conference held at Newcastle in 2003*, ed. C. Waddington and K. Pedersen, 101–113. Oxford: Oxbow Books.

Waddington, C., and K. Wicks. 2017. Resilience or wipe out? Evaluating the convergent impact of the 8.2 ka event and Storegga tsunami on the Mesolithic of north-east Britain. *Journal of Archaeological Science: Reports* 14: 692–714.

Walker, M., S. Johnsen, S.O. Rasmussen, T. Popp, J.-P. Steffensen, P. Gibbard, W. Hoek, J. Lowe, J. Andrews, S. Björck, L.C. Cwynar, K. Hughen, P. Kershaw, B. Kromer, T. Litt, D.J. Lowe, T. Nakagawa, R. Newnham, and J. Schwander. 2009. Formal definition and dating of the GSSP (Global Stratotype Section and Point) for the base of the Holocene using the Greenland NGRIP ice core, and selected auxiliary records. *Journal of Quaternary Science* 24 (1): 3–17.

Warren, G. 2006. Technology. In *Mesolithic Britain and Ireland: New approaches*, ed. C. Conneller and G. Warren, 13–34. Stroud: Tempus.

Weninger, B., R. Schulting, M. Bradtmöller, L. Clare, M. Collard, K. Edinburough, J. Hilpert, O. Jöris, M. Niekus, E.J. Rohling, and B. Wagner. 2008. The catastrophic final flooding of Doggerland by the Storegga Slide tsunami. *Documenta Praehistorica* 35: 1–24.

Wicks, K., and S. Mithen. 2014. The impact of the abrupt 8.2 ka cold event on the Mesolithic population of western Scotland: A Bayesian chronological analysis using "activity events" as a population proxy. *Journal of Archaeological Science* 45: 240–269.

Woodman, P. 1985. *Excavations at Mount Sandel 1973–1977*, Northern Ireland Archaeological Monographs 2. Belfast: Department of the Environment for Northern Ireland.

Zvelebil, M. 1994. Plant use in the Mesolithic and its implications for the transition to farming. *Proceedings of the Prehistoric Society* 60: 95–134.

European Middle Paleolithic: Geography and Culture

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State of Knowledge and Current Debates

Introduction

The Middle Paleolithic, in Europe, comprises an archaeological period between 250,000/300,000 and 35,000 years BP. This period corresponds to several climatic, anthropological (in a biological sense), and techno-cultural events.

From a climatic perspective, the Middle Paleolithic can be merged with the Saalian (Riss in Alpine terminology, Wolstonien in Britain) and Weichselian (Devensian and Würm, respectively) glaciations. Between the two is a brief temperate episode: the Eemian (Riss-Würm; Ipswichien). In isotopic chronology, the Middle Paleolithic generally extends from stages 10 to 3.

A human type is traditionally associated with the European Middle Paleolithic: Neanderthals. This is a typical European hominin species, even though its maximum extent reached the Middle East and the Altai Mountains in southwest Siberia.

The appearance of a new system of stone flake production, the Levallois technique, traditionally marks the beginning of the Middle Paleolithic. However, the limits with the Acheulean of the preceding Lower Paleolithic are not clear; this transition involves a slow continuum rather than an abrupt break. Some bifacial industries of the Final Acheulean are in fact contemporaneous industries with Levallois production (thus Middle Paleolithic in the strict sense). The limits are even more blurred in regions where Levallois production is absent (i.e., much of southern and eastern Europe); in the absence of human fossils, the academic tradition thus relies on dating for a Middle Paleolithic attribution.

The European Middle Paleolithic is nearly synonymous with the Mousterian, a techno-complex for which a range of different expressions are encountered across the same territory (from the Atlantic to the Ural Mountains). The Mousterian is a paradox: it is at once a period of great technological and economic stability lasting over more than 200,000 years and of great variability in its different cultural features. This variability has for years been the subject of heated debates within the Paleolithic scientific community, even creating "schools" of thought (for a history of research, see Jaubert 1999).

While the limit with the Lower Paleolithic is unclear, that between the Middle and Upper Paleolithic is by contrast much clearer. A change in the type of human (anatomically modern humans – AMH – replacing Neanderthals) is also associated to profound technological innovations (use of animal bones and antlers, different lithic techno-complexes with no continuity with the Middle Paleolithic, the appearance of highly developed nonutilitarian behaviors including parietal and portable art).

The European Middle Paleolithic is thus defined by the combination of several parameters:

A human type: Neanderthal
A main cultural system, but with many variations: the Mousterian, produced either by Neanderthals or by AMH as in the Middle East
A new technical system: the Levallois production
A temporal span: from 300,000 to 35,000 years BP

Yet a clear definition remains an instrument of comfort and covers realities that are much more complex and difficult to understand: the exploitation of territories, modes of habitat, symbolic behaviors, etc.

History of Discoveries and Evolution of Concepts

More than any other human fossil, Neanderthals have sparked intense debates and polemics; thousands of pages have been written on the subject and no doubt as much nonsense. This is because Neanderthals, more than any other human fossil, urge us to question our human uniqueness. Moreover, it is the hominin whose remains are the most abundant: around 400 Neanderthals have been discovered to date, admittedly more or less fragmentary.

The first Neanderthal was discovered in 1828 in Belgium, at Engis, by Doctor Philippe-Charles Schmerling; another was found in 1848 in Gibraltar, but neither were initially identified as such. It was in 1856 that a German anthropologist, Hermann Schaaffhausen, studied the skeletal remains entrusted to him by a naturalist, following their discovery in a cave in the Neanderthal Valley near Dusseldorf (Germany). The skull presented very strange characteristics: sloping forehead and a pronounced bulge above the eye sockets, and Schaaffhausen attributed it to a primitive man antedating the Germans. But he did not convince everyone and, although in 1864 William King proposed the denomination *Homo neanderthalensis*,

recognizing in the fossil a new hominin, many contested its status and antiquity. For some it was an idiot suffering from rickets, and for others it was a Cossack deserter from the Russian army during the Napoleonic wars. It was not until the discovery in 1886 of two skeletons in Spy (Belgium) presenting the same characteristics and accompanied by the bones of fossil animal and stone tools that ended the discussion. Scientific attitudes were probably better prepared for this discovery; the second half of the nineteenth century was a time of fantastic upheaval challenging millennia of beliefs: Darwin published *On the Origin of Species by Means of Natural Selection* in 1859 and Pasteur his discoveries against the theory of spontaneous generation in 1862, and so on.

However another, much longer, debate then began: that of the primitive nature of Neanderthals. In 1908, a Neanderthal was discovered in the cave of La-Chapelle-aux-Saints (France). Marcellin Boule, a paleontologist at the Natural Museum of Natural History, described the remains in great detail. But some errors resulting from problems of interpretation and the pathological state of the skeleton (this Neanderthal was notably suffering from arthritis and a hip deformation) led to an apelike reconstitution: curved spine and semiflexed lower limbs making it appear closer to the gorilla. This first representation would make a lasting impression in people's minds and mark our imagination, even up to the present, with the concept of Neanderthals as a thick brute, narrow minded behind a low forehead and with a hairy body: in short, an apelike being.

Antiracist movements in the 1970s caused us to consider Neanderthals much closer to us. However, it should not be forgotten that many elements still elude us: pigmentation, hair, eye color, and type of clothing, which are so far only speculation. Close to us, but despite everything still anatomically different. In the 1930s, Carleton Coon published its portrait, shaved, wearing hat, and tie, and claimed that, in a subway, nobody would pay attention to him. This statement has since been reconsidered many times. Could this hold true?

The first thing that would impress us about a dressed-up Neanderthal would be his corpulence: rather small in height, about 1 m70 for men and 1 m60 for women, and sturdy and solid, weighing, respectively, around 90 kg and 70 kg. This anatomy and muscle attachments suggest great physical strength, useful for hunting. But this size also presents another advantage: better resistance to the cold. The anatomist Carl Bergmann proposed a rule in the nineteenth century which correlated the mass of the body with the temperature of the environment: the more body mass increases, the more the relationship between body mass and the skin surface diminishes, which limits the loss of heat. Similarly, Allen's law, described in 1877 by Joël Asaph Allen, specifies that the size of bodily appendages (limbs, ears, and tail) of animals living in cold climates is smaller than that of those living in hot climates, the advantage being less heat loss. Among current populations, the proportion of the leg compared to the thigh and the forearm compared to the arm decreases from the equator toward the poles. The proportions found among the Neanderthal are even lower than among the Inuits. We would also be struck by his face, with a sloping forehead, no chin, and strong supraorbital ridges.

Biological Anthropology: Elements of Social Anthropology

The first physical Neanderthal characteristics appeared between 500,000 and 400,000 years ago (Hublin 2008). Discrete marks can be noted on the skulls of Petralona (Greece), Sima de Los Huesos in Atapuerca (Spain), and Tautavel (France). These *Homo heidelbergensis* appear to be the ancestors of Neanderthals. This is also true for Swanscombe Man (Great Britain), dated around 400,000 BP. The first skull from Bilzingsleben (Germany, between 400,000 and 300,000 BP), by contrast, presents few Neanderthal characteristics, whereas the second one is much similar to it. As can be seen, these features do not appear simultaneously in all subjects; the difficulty is obviously to take into account changes in comparison with a successful type such as classic Neanderthals. The fossils from Biache-Saint-Vaast (France), around 200,0000 BP, are much closer to these classic Neanderthal forms.

Two factors led to the development of these genetic traits. The first is the isolation of the European peninsula during the glacial phases,

being the major part of its history during the Middle Pleistocene. During these periods the advancement of Finnoscandian glaciers and massifs of the Alps and the Caucasus, as well as the extension toward the north of the Caspian Sea, opened up only a narrow corridor between the Mediterranean and the Black Sea; the connection between Europe and the Middle East or Africa, and thus to other groups of people, was, if not impossible, at least difficult. Such geographic isolation led to genetic isolation. The second factor concerns the demographic weakness of populations. The density of Neanderthal population is estimated, depending on the calculations methods used, between 0.5 and 10 inhabitants for every 100 km ^{2}, or a total, for a territory like today's France, varying between 3,000 and 50,000 inhabitants. In these conditions, "extreme" genetic characteristics are not lost in the population and can be perpetuated.

Neanderthals are the best represented human fossil (close to 400 individuals), and physical characteristics are well known (Maureille 2007). He is robust and stocky in appearance (see above) and has strong muscle attachments (Fig. 1). He is small in size: around 1 m65; nevertheless, these characteristics fall within the range of current human variability. By contrast, some characteristics are unique to Neanderthals: brain volume is the same or higher than that of AMH, but the encephalization coefficient (ratio of brain mass and body mass) is lower; the brain of Neanderthals also shows a different organization of its lobes. The skull is long, wide, and low; the chin is absent; and the supraorbital ridges are developed. The teeth are also different, as well as the forearms and the legs, whose relationship to the arms and thighs is comparatively lower than that of AMH.

In the last several years, paleogenetic studies have contributed significant new data for the study

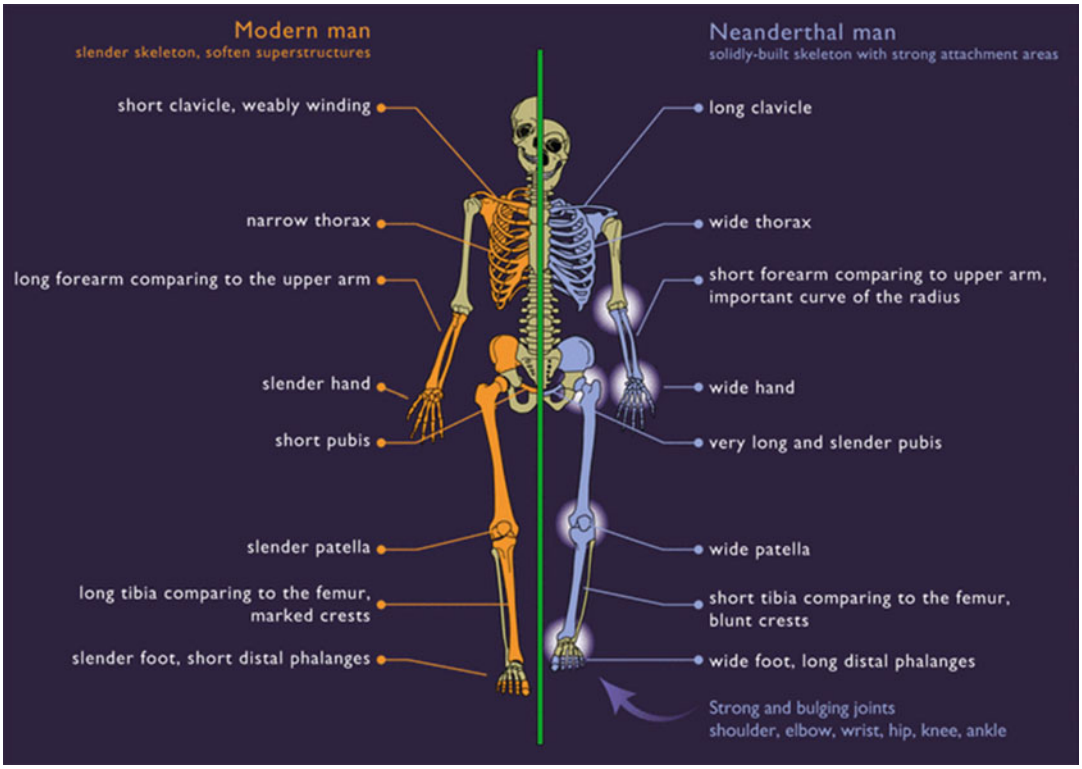

European Middle Paleolithic: Geography and Culture, Fig. 1 Anatomic difference between an anatomically modern human and a Neanderthal (After Depaepe 2009b; Archéosphère SARL – graphics F. Lacrampe-Cuyaubère, database B. Maureille)

of the physical characteristics of Neanderthals (for a bibliography on the subject, see http://www.eva.mpg.de/neandertal/index.html). The presence of some genes in the genetic sequence of Neanderthals gives some indications regarding their capacities and potential: for example, presence of the FOXP2 gene which is associated with voice and language in man. Conversely, mutations in modern humans genes linked to autism (CADPS2, AUTS2) and schizophrenia (NRG3) seem to be absent from Neanderthals. The increasingly advanced sequencing of nuclear DNA also shows a genetic exchange between Neanderthals and AMH. This exchange seems to have taken place in the Middle East, after AMH exited from Africa between 100,000 and 60,000 BP; the genome of current African peoples does not have this 1–4% Neanderthal origin that is found in other populations in the world. Archaeological and paleoanthropological data are consistent with this genetic data: Neanderthals and AMH shared the same culture (the Mousterian) in this region, and according to some anthropologists, the Neanderthals in these regions have physical characteristics that are less marked than in European Neanderthals, signaling the possibility of cross-breeding.

DNA analysis of a tiny bone fragment discovered in Denisova Cave (Altaï, Russia) has proved the existence of a new species of the *Homo* genus: Denisova Man, who contributed for 4–6% to the genome of current Melanesians. The Denisovans were derived from a common ancestor with the Neanderthals, from whom they are separated by around 0.6 Ma and would have populated a large part of Asia. This contribution to the genetic heritage of modern man, while modest, may, according to some researchers, prove to be important: variations in the human leukocyte antigen (HLA), whose function is to help the immune system detect faulty cells, would, for half in Europe, and nearly 70% in Asia, come from the DNA of Neanderthals or Denisovans.

Paleogenetic analyses of 12 Neanderthals from El Sidrón Cave (49,000 BP, Spain; Lalueza-Fox et al. 2011) led to the reconstitution of a familial history of this group formed of three men, three women, three adolescents (of which two were boys), and three children between 2 and 9 years of age (undetermined gender). All seem to have been killed and skinned simultaneously; the bones show signs of flesh removal. The study of lineages (using mitochondrial DNA and Y chromosomes) highlighted kinship links between members of the group: the three men are of the same lineage (brothers, uncles, or nephews), while two of the women are from different lineages, the third was from the men's line (sister or niece). Such patrilocal behavior, in which it is the women who change groups to join their spouses, is common in today's hunter-gatherer societies. The analysis also highlighted a gap of about 3 years between births, which is also frequent behavior among contemporary hunter-gatherers.

Neanderthal Ecumene

Neanderthals are above all a product of Europe (for a synthesis of the settlement of Europe during the Pleistocene, see Depaepe 2009a, 2012). But some of them also the Eurasian peninsula for other territories (Fig. 2). Thus we find Neanderthals in the Middle East around 60,000 BP (see above). Perhaps they were driven by important drops in temperature relating to isotopic stage 6 of the Saalian glaciation and stage 4 of the Weichselian glaciation. They were contemporaneous with the first AMH, present in the region since 120,000 BP. But Neanderthals also benefited from temperate phases to expand out of Europe. Recent DNA sequencing of a bone fragment discovered in Okladnikov Cave in the Altaï Mountains in south-central Siberia showed that it belonged to a Neanderthal, pushing their territory more than 2,000 km toward the east. It seems that the occupation of the vast Russian plain and Siberia and incursions was contemporary or subsequent to the last interglacial, the Eemian (c. 125,000 BP). Neanderthals are also known from Shanidar (northern Iraq) and reached the south of Finland, at Wolf Cave, undoubtedly during a warm period, perhaps the Eemian.

Very recently a Mousterian site was excavated in Byzovaya, in the north of Russia (Slimak et al. 2011). Located near the Arctic Circle, at 65° north latitude, this site pushes the limit of the Neanderthal habitat 1,000 km northward, if we consider

the lithic industry that has been discovered there to be their work (no human fossils were present). Moreover, the date for this site is very recent: between 29,000 and 33,000 BP, that is, after the disappearance of Neanderthals in the major part of Europe. The discoverers see there an area of refuge for the last Neanderthals who were pushed into these remote and inhospitable regions by AMH.

These vast territories were not continuously populated. According to climatic variations, immense regions were inaccessible, covered by ice or too inhospitable (cold, extreme drought, lack of game). On the other hand, during the glacial phase, lowering of the global sea level exposed thousands of square kilometers. But rare are the regions which could be continuously populated; the Périgord (France) is probably one of them which explains its nickname of the Eden of prehistory. The north of France, by contrast, is a region where settlement was very dependent on climatic conditions. Archaeological data collected

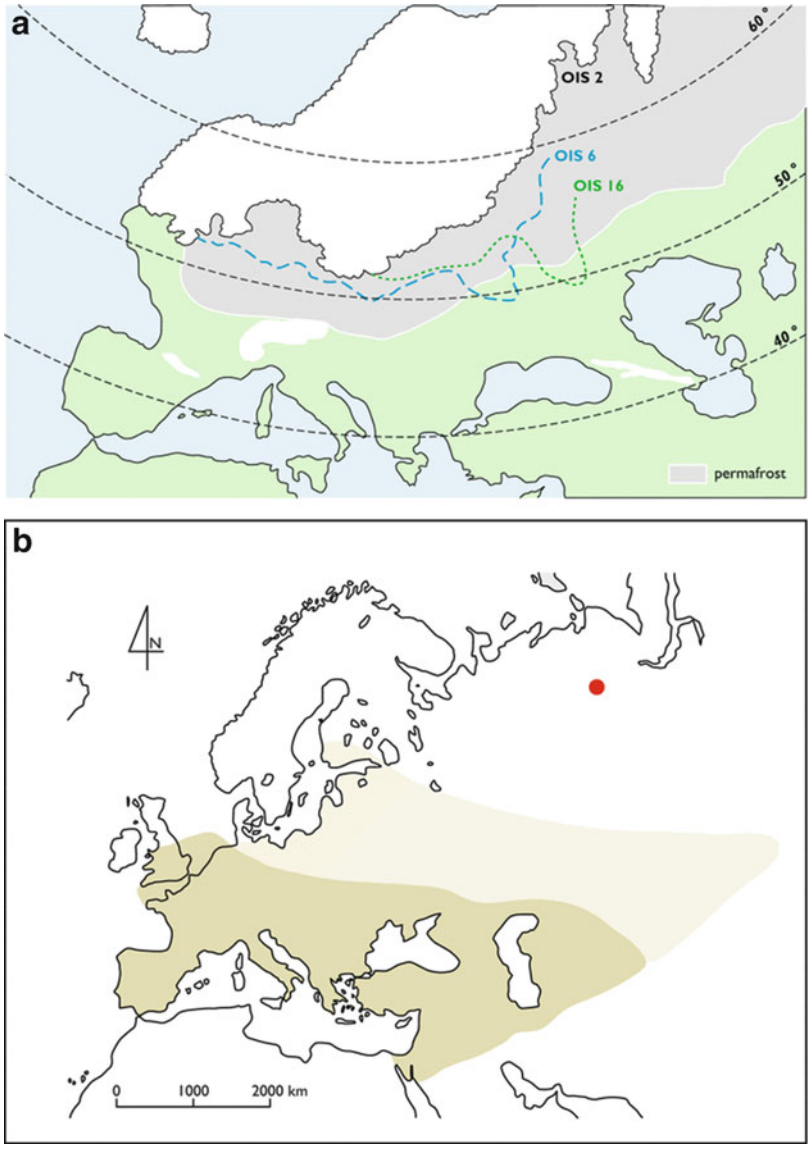

European Middle Paleolithic: Geography and Culture, Fig. 2 (continued)

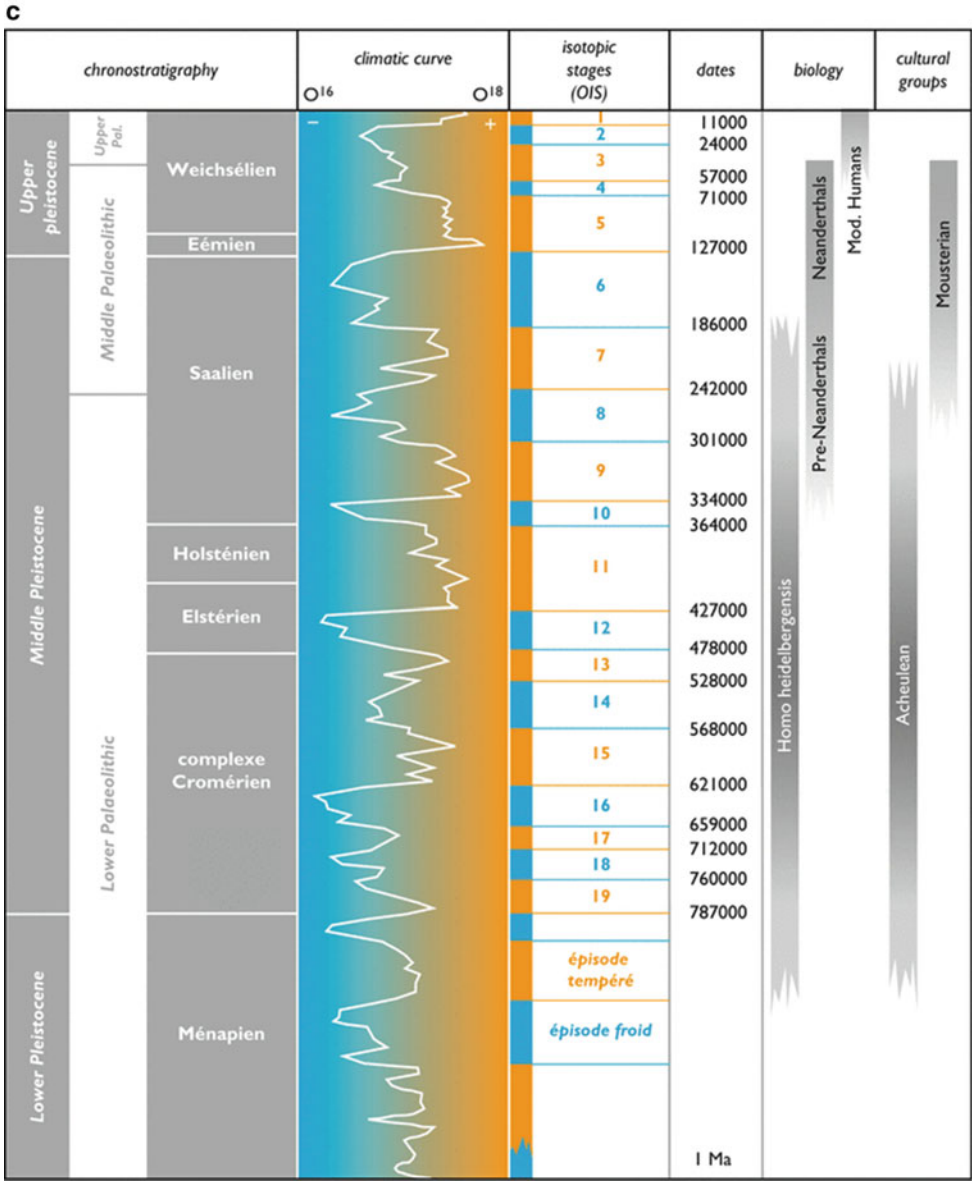

European Middle Paleolithic: Geography and Culture, Fig. 2 (**a**) Extension of a glacial calotte in isotopic stage 2 (around 20,000 BP), stage 6 (around 150,000 BP), and stage 16 (around 630,000 BP); during glaciations, water trapped in the icecaps exposes vast areas covered by the sea during temperate episodes. (**b**) The Neanderthal ecumene: in plain English, the occupied territories in the Late Middle Palaeolithic and in *red*, site position in Byzovaya (Russia). (**c**) General chronology of last million years in Europe (**a**: After Hublin 2008, DAO S. Eusèbe, Inrap. **b**: DAO S. Eusèbe/P. Depaepe, Inrap. **c**: after Depaepe 2009b, DAO P. Depaepe, Inrap)

during recent years show that its occupation was important around 70,000 BP during a temperate-cold climate that favored large mammals and therefore their predators, the Neanderthals. Subsequently, a sudden cooling period (Weichselian Glacial Maximum) forced hominins to completely abandon the region and take refuge in other more welcoming places such as southwest France, unless they purely and simply disappeared locally (see below). The region would subsequently be

regained during a return to warmer conditions, but certainly by different human groups, holders of another lithic technology (Depaepe 2007). This case, which is now attested in northern France thanks to the multiplication of excavations and research, is certainly not unique, and many regions have known these comings and goings of populations.

However, it is possible that these populations did not migrate southward in search of more favorable conditions (Hublin and Roebreoks 2009). Neanderthal populations could have become locally extinct due to the reduction of animal biomass, itself reduced by the disappearance of the "mammoth steppe," a very favorable environment for the development of large mammals, the preferred prey of Neanderthal hunters. From a strictly archaeological perspective, it is indeed troubling to note that the cultural traditions seem to have suddenly disappeared, in situ, and replaced a few 1,000 years later by other traditions, therefore most probably by other human groups.

Britain is a particularly interesting case of successive occupations and abandonments of a region. Occupations are very early (Happisburgh, around 0.85 Ma at minimum; Parfitt et al. 2010). Subsequently, England was occupied until isotopic stage 7 (or the beginning of 6), with perhaps a few interruptions. The glacial maximum of the Saalian (isotopic stage 6) led to abandonment of the territory, but the sudden warming of Eemien, around 125,000 BP, creating the Channel by the sudden upwelling, formed a barrier to the expansion of Neanderthals from the continent to England, and this up until isotopic stage 4. This finding also raises questions about the inability of Neanderthals to cross the sea, and it is worth noting the absence of Neanderthal fossils in the Mediterranean islands.

Habitats and Land Use

Knowledge of Neanderthal habitats (in its broadest sense) remains limited for many reasons: firstly, taphonomic factors which, in caves just as in open-air sites, disrupt to varying degrees the organization of an occupation as it originally was when abandoned. A prehistoric Pompeii does not exist, at least not yet, and the multiple alternating freezing and thawing phases of the ground have blurred the relationships between artifacts left by men by rearranging them. These are valuable relationships that allow the archaeologist to reconstruct a site and move beyond the simple collection of material. In addition to these inherent difficulties, there is a very small amount of available data, which prevents comparisons especially when dealing with long periods of time (the Middle Paleolithic counts 10,000 generations in comparison, e.g., with the duration which separates us from the first farmers in France, less than 350 generations, or that of the Christian Era, barely 80). Finally, our own perception of things, an unconscious search that drives us to want to make comparisons according to our own modern criteria, influences interpretation. And yet, we know that we do not have exactly the same brain structure as Neanderthals, which may lead to different conceptions.

Most often cave sites deliver little information on their organization; in general, there have been many successive occupations within a confined space, each one destroying and mixing with the previous one, known as the "palimpsest" effect. In open-air sites, these problems do not occur as often. In recent years, several prehistorians have undertaken the search for open-air sites extending over large areas, up to 6,000 m^2 (it should be noted that large-scale excavation areas were undertaken in Central and Eastern Europe before Western Europe). The results are quite surprising. Artifact densities are highly variable, ranging from less than one piece per square meter to several dozen, but rarely uniform; high concentration areas can be adjacent to areas with almost no artifacts. These zones reflect different activities: knapping, butchery, etc. (Fig. 3). At the site of Lailly (France, c. 65,000 BP; Depaepe 2007), two flintknapping clusters have been found next to each other, the first showing confident mastery of knapping, the other some inexperience, which perhaps reveals apprenticeship by imitation.

The sizes of these sites are also quite variable, reflecting different types of occupations as well as perhaps environmental constraints; the installations could be in fact potentially different

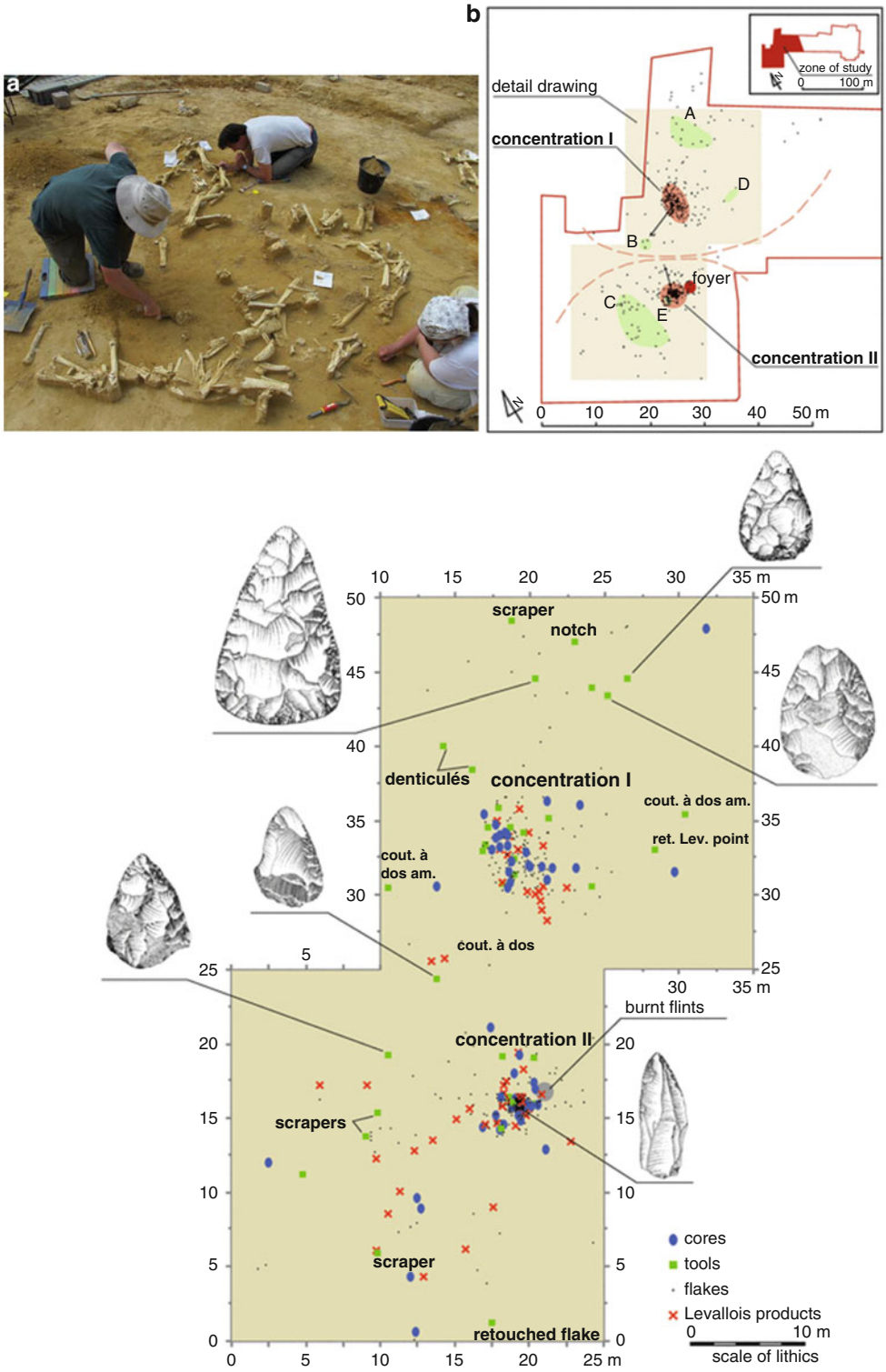

European Middle Paleolithic: Geography and Culture, Fig. 3 (continued)

depending on whether one finds oneself in a clearing or an open plain. Data provided by the study of faunal remains on sites show that these occupations were certainly seasonal. But their actual duration is often a question for archaeologists: while it is clear that some of them were very short, such as a butchery site after a hunt, for other occupations it is difficult, or even impossible, to estimate, especially as we also do not know the number of occupants; an extended family and a group of 50 people do not produce the same amount of artifacts. And yet it is often difficult to determine the function or functions of the site.

Preventative archaeological operations have demonstrated the phenomenon of successive occupations at a number of open-air sites (Depaepe 2007). In contrast to caves which are clearly welcoming structures, no topographic constraints exist for open-air sites. When occupations spread out over long periods, with intervals of many millennia between them, we can assume that the area was of particular interest, bringing people back to the same place and that its attractions were perennial: waterhole, flint sources, etc. It may also be possible that it is only due to chance that people become established in the same place as others did 10,000 years before them. But at some open-air sites, we find successions of occupations most certainly quite close in time: within a year, maybe less. The similarities between these occupations suggest that it is the same group of people who periodically returned to this place, probably as part of a pattern of land use.

While we can assume that the hearth would have been a structuring element of a habitat, particularly in cold, even periglacial climates, the traces that remain are tenuous. In cave sites, hearths are sometimes discovered, in the form of a few blocks arranged in a circle to delineate the heating area. Outdoors, hearths are extremely rare, while elements which were heated, such as bones and flint, are more frequent. One is tempted to believe that the homes were only rudimentary and that the covering of sites led to their destruction. It is also possible that for some occupations of short duration, men were not bothered to make fire. Curiously, the traces of hearths outdoors are more frequent in Central and Eastern Europe than in Western Europe.

Evidence of organization of the living space is even rarer than for hearths: for the whole of France, we count only a few post holes at Combe-Grenal rockshelter, several hollows devoid of all archaeological material, which could perhaps have been used for storing meat, at La Quina rockshelter, Le Moustier, or even La Ferrassie. In Poitiers (France), a recent excavation revealed what could have been a windbreak (Bourguignon et al. 2003, Fig. 4). Internal structuring may also be perceived: sleeping areas, knapping areas, etc.

By contrast, in Central and Eastern Europe, traces of domestic organization are more abundant. Large pits have been found in Rheindahlen (Germany), with traces of hearths, knapping areas, and stone blocks arranged in a ring (rigging walls?). Structured habitats are also evident at Ripiceni-Izvor (Romania): groups of pits with hearths and lithic artifacts; stone blocks and mammoth tusks perhaps contributed to the construction of superstructures. This site may have been a place dedicated to seasonal mammoth hunting (Paunescu 1993), like the one at Molodova (Ukraine). However, for some researchers, these structures would be either natural or wrongly dated and actually much more recent (15,000 BP like the most of these types of sites in Eastern Europe).

At Abric Romani (Spain), combustion areas within the J level form real domestic zones around

European Middle Paleolithic: Geography and Culture, Fig. 3 (**a**) Tourville-la-Rivière site (France), view of fauna processing zone (J.P. Faivre, Inrap). (**b**) One of the sites from the Molinons site complex (France). Below, distribution plan of the material; above, interpretation. Zones of concentration I and II are dedicated to reduction, with secondary reduction in concentration II (zone E). The Levallois tools and blanks are grouped around the periphery (zones A–D). Some pieces were exported from the reduction zone toward the periphery zone. No refits link concentrations I and II, no doubt the work of the same group at different times (After Depaepe 2009b, DAO P. Depaepe)

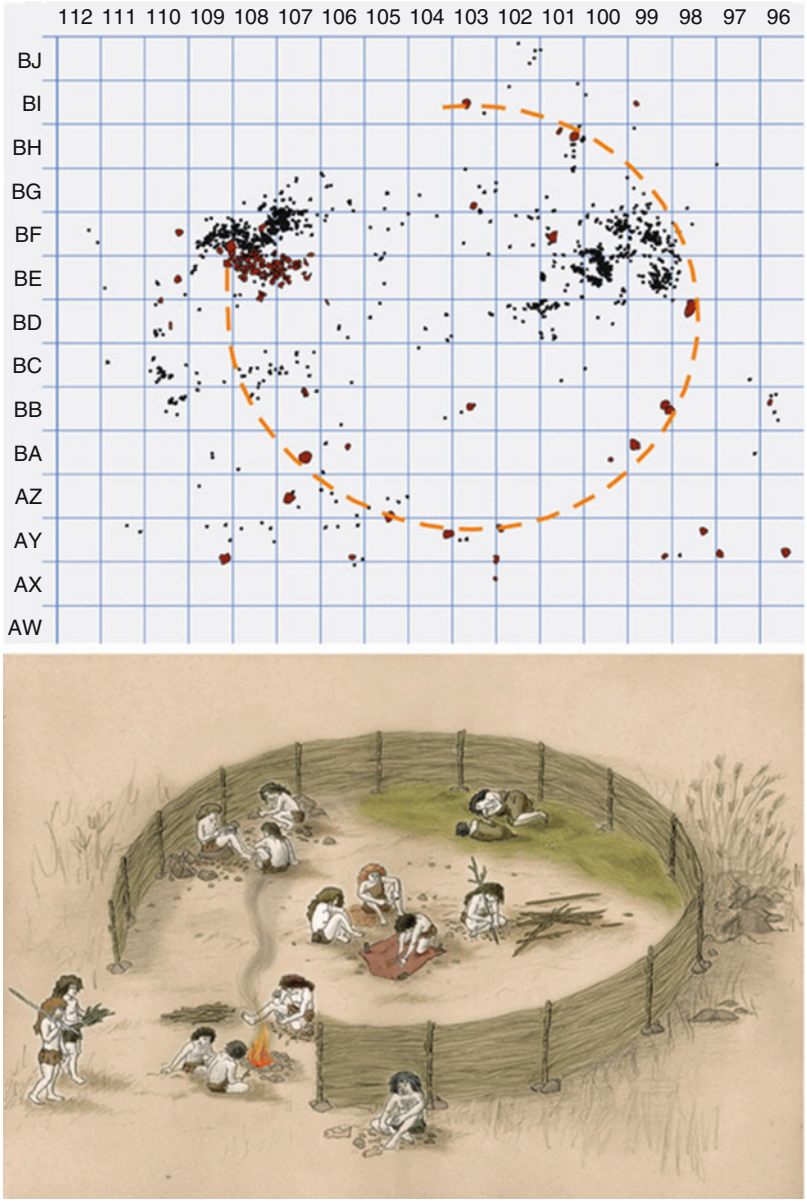

European Middle Paleolithic: Geography and Culture, Fig. 4 Plan of Poitiers "La Folie" site (After Bourguignon et al. 2003) and attempt to reconstruct the site (P. Galibert, Inrap)

which revolved the activities of the group, with possible exchanges and sharing of food between hearths, which could reflect different family units. In level H, wooden plates of homogenous size have been discovered close to the hearths; their function is unknown, but a relationship with fire is obvious.

The activities practiced in these habitats varied: knapping flint, making tools, preparing skins, and butchery. But also the transmission of knowledge, learning, stories being shared, projects to discuss, and perhaps joys and sorrows to share, that is to say, everyday life.

Territories and the Environment

A hypothesis has often been invoked linking the difficulty of Neanderthal to adapt to a temperate climate: such a climate would have deprived it of the large herbivores to which he devoted his hunts. Rare indeed are the sites which can be

dated to the Eemien interglacial (around 130,000 to around 115,000 BP; in a climate similar to the present day; 15 sites, for the most part in Germany: Lehringen, Taubach, Gröbern, Burgtonna, Neumark-Nord, e.g., Roebroeks et al. 1992; Speleers 2000). In France, these Eemian occupations are quasi absent in the south, and in the north, it is only at the site of Caours (where five archaeological levels are preserved; Antoine et al. 2006) that these can be unambiguously dated to the interglacial. These occupations are mostly preserved in lake sediments (travertine), and the scarcity of datable sites of the Eemian is certainly due in part to poor preservation conditions of human settlements.

However, it may well have been that Neanderthal inhabited forests to a lesser extent than the shrub-steppes where large mammals were plentiful. This seems to be confirmed by the rarity of Eemian occupations in caves.

The wooded plains environment specific to the Eemian certainly conditioned the size and location of human occupations (Fig. 5). These are in general small areas, often located at the edge of

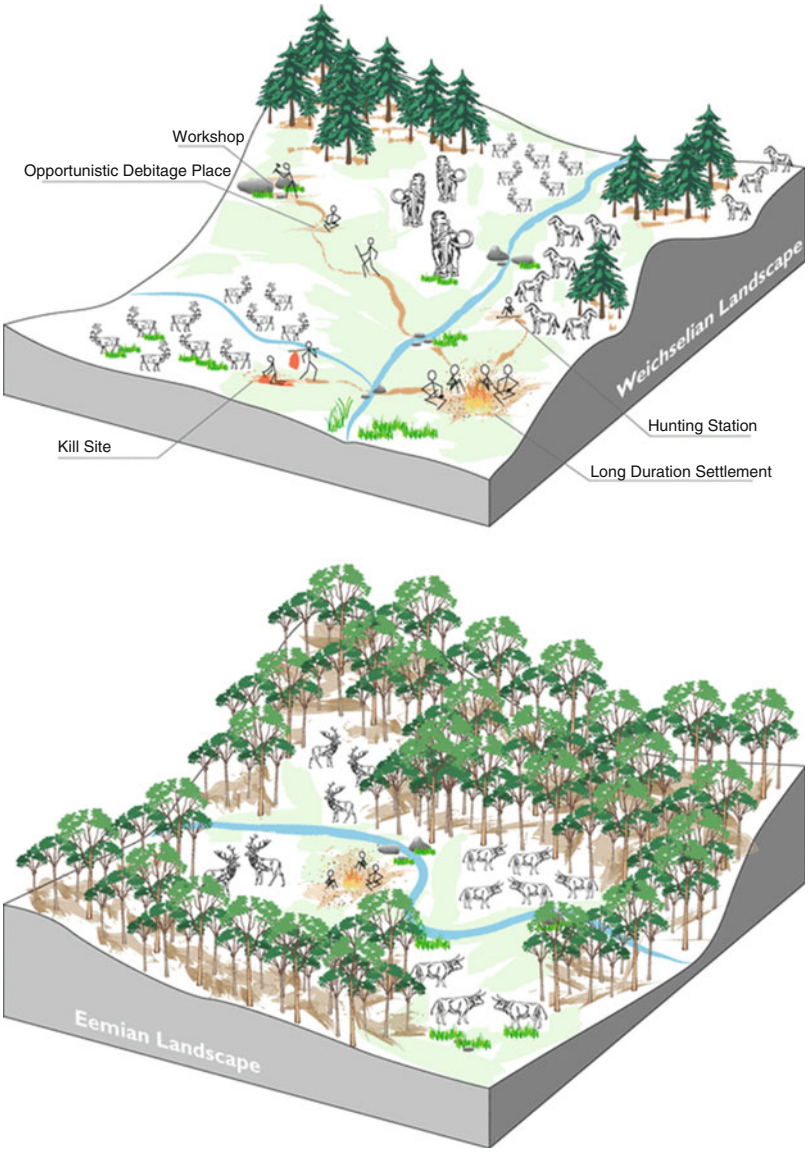

European Middle Paleolithic: Geography and Culture,
Fig. 5 Reconstructions of human occupations in cold (above, Weichselien landscape around 70,000 BP) and temperate environments (below, Eemian interglacial, around 125,000 BP – after Depaepe 2009b, DAO S. Eusèbe/P. Depaepe, Inrap)

water holes – lakes, rivers, etc. It is important, however, to take into account taphonomic factors of the erosive phase following the Eemian which could explain the disappearance of occupations in other contexts. These Eemian occupations seem to present a large range of functions: knapping, tool use, etc. These may have been short duration occupations, providing evidence of a model of land occupation of high residential mobility.

Just as the forest environment of the Eemian determined the size and location of sites, it is likely that subsequent environmental changes had an impact on the size of occupations and their functions.

In regions where excavations are sufficiently numerous and large scale to allow for this type of analysis (France, Belgium; Depaepe 2010), it appears that it is mostly the slopes and plateaus that were occupied and that the size of the occupations increased in parallel with the progressive continentalization of the climate, generating more open steppe-like environments. In these landscapes, small or medium size occupations of short duration with specialized and sometimes unique functions (e.g., biface shaping, slaughter of a large herbivore, and initial butchery) seem to be related to more important sites, in terms of size and duration, with varied activities and from which a territory could be exploited (base camps called "residential site" linked to comings and goings to associated specialized sites called "logistical sites").

But this distinction is certainly not as dichotomous as that. During the Eemian, very brief and single-task occupations also existed: sites for processing large game, lithic raw material procurement sites, short-term knapping workshops, etc. Unfortunately, these sites are very difficult to discover, because of their very small footprint and the few artifacts needed for the activities to be performed. Among these, hunting is fundamental.

Food and the Acquisition of Food Resources

The anatomy of Neanderthals required substantial energy intake, particularly in cold climates: 6,000 kcal per day according to several researchers. Chemical analyses performed on Neanderthal bones have shown that they were large consumers of animal proteins: their diet approached that of the wolf.

Animal food resources were varied. Herbivores of medium size are very often represented: reindeer, bison, and horse; in temperate periods the Neanderthals hunted deer, wild boar, and cervids. Very large mammals were also hunted: in Lehringen (Germany) a spear was found stuck in the chest of an elephant. Nevertheless, we still do not know all the hunting methods of the Neanderthals. It seems that they used pole arms, like spears with a fire-hardened tip or a flint point (the French sites of Bettencourt-Saint-Ouen, Combe Brune, and Angé each yielded one Levallois flint point with wear showing their use as a weapon). Traces from hunting activities are thus evident, which does not preclude scavenging. The presence of an herbivore at many sites, overrepresented in comparison to others, points to evidence of hunting oriented toward this species (e.g., bison at the sites of La Borde, Mauran, and Puycelsi, France). The reason for this selection escapes us: opportunism, hunting strategies, cultural practices, or worship?

Small animals were also hunted: hare, birds, and terrestrial mollusks.

Recently, a traceological study showed actions of scaling fish with some lithic tools. It seems, however, that fishing was relatively rare, but this may perhaps be because of problems involving the preservation of fish remains. Marine shells were consumed (Bajondillo Cave, Spain, around 150,000 BP), and at Gibraltar, mussels were cooked and seals consumed.

Very recently traces of cooked plant foods have been documented at sites as distant as Shanidar (Iraq) and Spy (Belgium) (Henry et al. 2011); since then studies have been extended to other sites and have confirmed preliminary data (Henry, personal communication). This is an important element in the understanding of Neanderthal food consumption practices in comparison to those of AMH. Nevertheless, these studies cannot as yet provide an estimation of the respective proportions of animal and plants resources in the Neanderthal diet.

Industry: Raw Materials

Comprehensive understanding of their territory allowed Neanderthals to acquire the raw materials

needed to make tools. They mainly worked with hard stone; tools made of perishable materials such as wood were no doubt frequent but have mostly disappeared. Some traces, however, still exist: spears or lances at Lehringen, pointed sticks at Königsaue (Germany) and Krapina (Croatia), and plaquettes placed near hearths at Abric Romani (Spain). The Königsaue site has also yielded evidence of hafting systems of a bifacial piece on a wooden handle using birch resin (Grünberg 2002). These few elements are certainly only a pale reflection of the use of wood in Middle Paleolithic technology, which is also shown by use-wear studies on flint, although traces of woodworking can sometimes be confused with taphonomic phenomena caused by burial in periglacial context (Caspar et al. 2003). It is important to note that wood is found at sites during the Lower Paleolithic in Clacton (England), Schöningen, and Bilzingsleben (Germany), also showing the continuum between the Middle and Lower Paleolithic.

By contrast, the explanation for disappearance due to taphonomic reasons does not hold for bone, frequently preserved on sites as consumption waste but, for reasons that escape us, rarely used by Neanderthals (some retouchers and bifacial pieces in bone or ivory, as at Rhede, Germany). Some authors have postulated cultural taboos and rituals, taboos prohibiting the use of tools made of bone, wood, tusks, and horns of killed animals, although their presence is attested in graves.

Studies of lithic raw materials are based mostly on their provenance, defining local or exotic materials based on the distance from the site where they were found. Mousterian groups had a very opportunistic behavior in relation to raw materials: they mainly use local materials, even if their quality was not the best. In relation to a site, the provenances of the raw materials used (the sources) were often nearby, rarely more than a 100 km away. The Mousterians were certainly among the prehistoric humans those who used the broadest diversity of stone to make their tools.

Flint is undoubtedly the most common material used. If we take the example of the French territory, it largely dominates the lithic industries in the north, the Paris and Rhodanian Basins, Burgundy, the north Aquitaine basin, part of Provence, and the Alpine foothills. Quartzites were taken from the Pyrenees to the Garonne, quartz from Quercy, basalt from Auvergne, dolerite in Britain (with phtanite) and in the Massif Central, etc.

Proximity of the raw materials appears to have been an important criterion: in the very heart of flint-rich regions (e.g., the north of France), some sites show dominant use of sandstone, a local material, over flint of better quality but whose deposits were a bit further away.

Despite this, artifacts of nonlocal materials are nearly always present at sites, but in small quantities. These artifacts are for the most part retouched tools or unretouched flakes with a cutting edge, and thus usable as such for cutting, or destined to be transformed into a tool; they are in this case considered as a material reserve. Two observations have been made about these pieces: firstly, their proportion within the totality of material decreases with the distance from the source; next, these are nearly always pieces showing high technical investment, and not flakes from core preparation (such as cortical flakes and flakes produced during maintenance of flaking surfaces). These particular pieces probably constitute individual equipment, transported from one place to another, and sometimes abandoned to be replaced by new tools when their use became obsolete. These tools sometimes have a complicated "life": a flake may well be revived several times during its existence as a tool, each time adopting a new form, more reduced than the preceding one (Fig. 6).

Lithic Technologies

Several flake production systems were employed by the Neanderthals. The most famous is the "Levallois" method, named after the municipality close to Paris where flakes and cores of this type were discovered in the nineteenth century. This system was described at the beginning of the twentieth century by Victor Commont, then by François Bordes in the 1960s, and Eric Boëda in the 1980s, who clarified the concept, the latter identifying several methods within the Levallois system in order to obtain different products. The

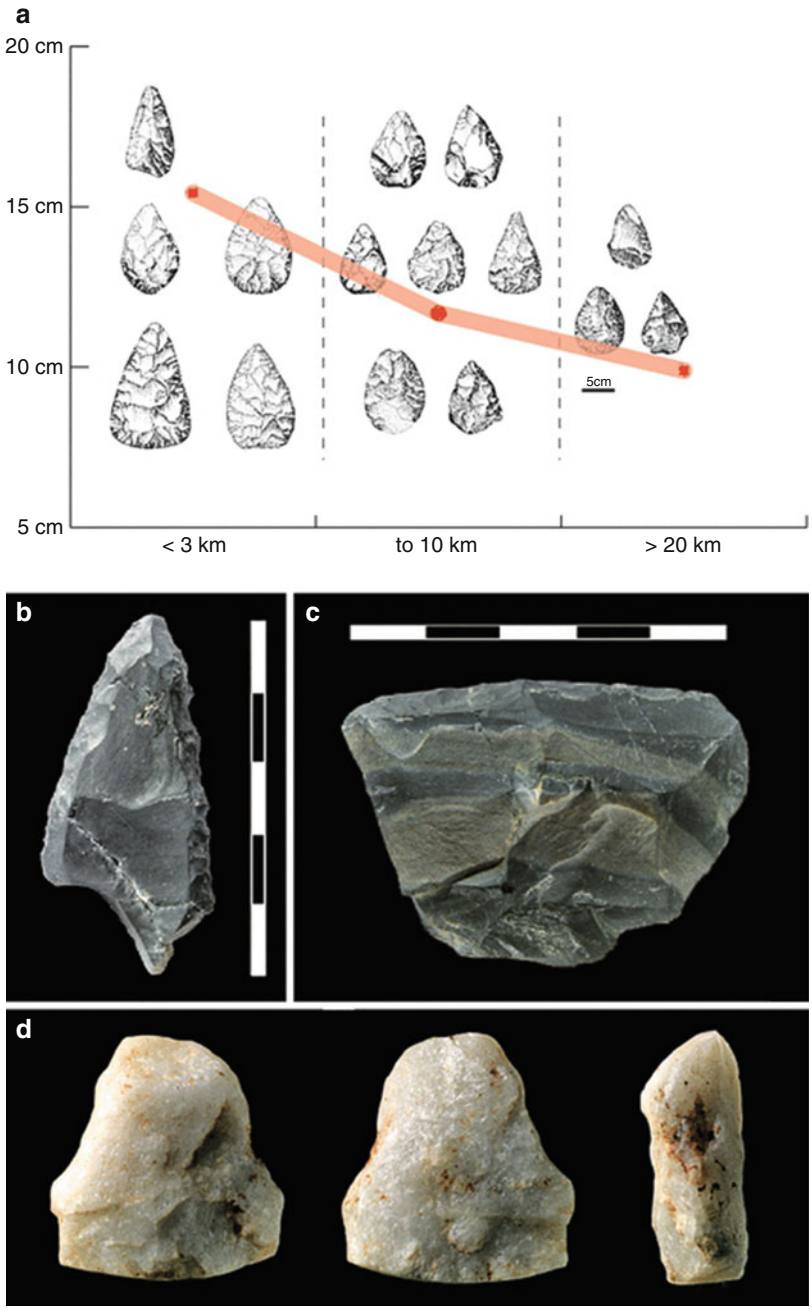

European Middle Paleolithic: Geography and Culture, Fig. 6 (**a**) The size of these bifaces decreases with increasing distance to the raw material source, as they have been reknapped several times during their use at different locations before being abandoned (After Depaepe 2009b, DAO P. Depaepe, Inrap). (**b–d**) Examples of raw materials (**b**: lydian point, **c**: quartzite scraper) (these two last from the Grotte du Noisetier, France, photo J. Viguier). (**d**) Quartz notch (4.9 cm; Fieux site, France, photo Vincent Mourre)

Levallois production systems first appeared around 300,000 BP and became widespread during the Middle Paleolithic where it is a characteristic element. Levallois reduction is based on a concept of predetermination, which illustrates the mental capacities of the users: the

core is prepared in such a way that its volume has two complementary surfaces, one destined for preparation and the other for the production of flakes (Fig. 7). Among the different production systems used by the Mousterians, Levallois is the one that offers the widest range of products: flakes, points, and blades can be produced depending on the method used. Even if it was used at other times and in other places, the Levallois system constitutes the common base of Mousterian technology and its distribution covers almost the whole of the Old World.

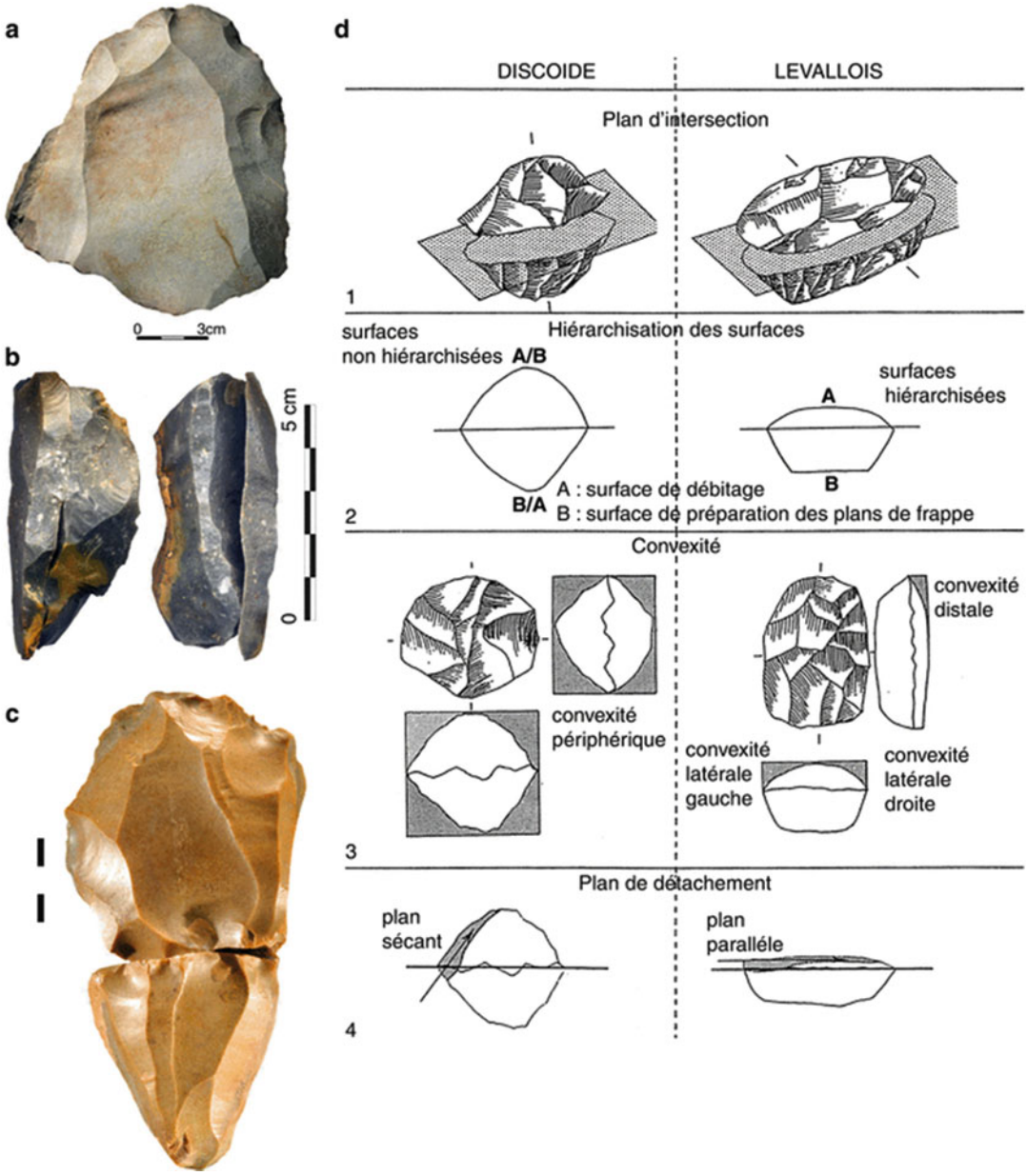

European Middle Paleolithic: Geography and Culture, Fig. 7 (**a**) Preferential Levallois core (Garris II, France, L. Bourguignon, Inrap). (**b**) Refit on a blade core (Saint-Hilaire-sur-Helpe, France, P. Feray, Inrap). (**c**) Levallois and blade core on the same block (Cantalouette IV, France, L. Bourguignon, Inrap). (**d**) Levallois and discoidal reduction (After Boëda 1993)

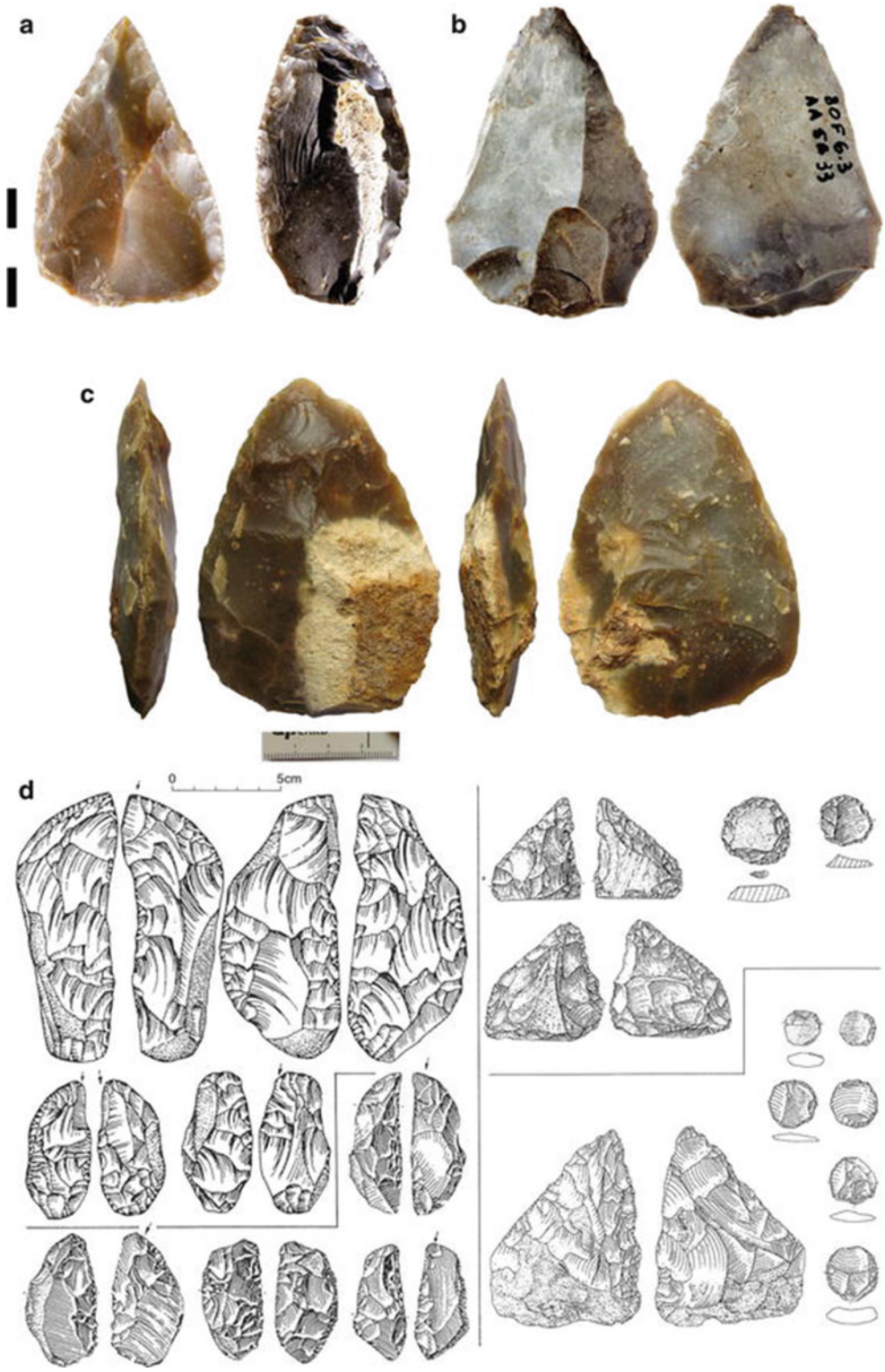

European Middle Paleolithic: Geography and Culture, Fig. 8 (continued)

Discoidal reduction appears to have been older than Levallois reduction, its presence attested in Africa a million years ago. During the Middle Paleolithic, it occupied a large geographical and chronological range. Discoidal reduction produced short and wide-backed flakes, due to the alternation of knapping on the two equally important surfaces of the core. Another reduction system called Quina produces thick flakes of triangular section that has a sharp retouched edge opposite an unretouched back. Quina reduction is quite recent in the Middle Paleolithic, between 70,000 and 35,000 BP, and is more geographically limited than the discoidal technique.

Volumetric blade production consists in exploiting the volume of the block, in contrast to Levallois which exploits the surface. It was long considered to be exclusive to the Upper Paleolithic, and thus "modern." The quite recent discovery of blade production in the Middle Paleolithic therefore compelled the revision of the dogma surrounding its modernity. In our present state of knowledge, blade production is limited in time and space: it made its appearance appeared in isotopic stage 6 (around 180,000 BP) in the north of France and became quite common during isotopic stage 5, between 115,000 and 70,000 BP. It suddenly disappeared never to return along with the abandonment of this region during the glacial maximum of MIS 4. Blade production existed in Poland between 60,000 and 35,000 BP, as well as in other regions such as southwest France.

Other reduction systems, more limited in time and space, are also used, including reduction on anvil, the Le Puchueil type, Kombewa, and SSDA, among others. It is also important to take into consideration unorganized reduction, frequent but much less commonly described in the study of lithic industries (note that lithic studies are not typically focused on how reduction techniques are learned and archaeological evidence of such apprenticeship).

Finally, the shaping of bifaces is also present in the Mousterian, although to a lesser degree than during the Acheulean. Mousterian bifaces are different in their concept from their predecessors: the Acheulean biface is a tool in itself; the Mousterian biface is an object supporting tools. The structure of the Mousterian biface gives it the double advantage of having edges that could be retouched and hence transformed into sidescrapers, due to its plano-convex and not biconvex profile like Acheulean bifaces and its ability to be transformed many times. This characteristic means that bifaces could be mobile objects, transported, used and transformed from one point to another, and finally abandoned when they no longer met the needs of their owners.

The range of blanks designed to be transformed into tools is thus vast (Fig. 8). Yet all tools are not retouched: traceology has shown that a number of unretouched flakes were also used, essentially for cutting. Retouching allows resharpening of its edges, as well as strengthening and smoothing, but the absence of retouch thus does not mean lack of use. Tools called "domestic" are largely dominant compared to objects that could serve as weapons like some Levallois points. In the domestic tool kit, sidescrapers are the most common. These tools are flakes where one or both sides are retouched and designed to deflesh, cut, and process hides for tanning reinforced by the action of mineral substances like ochre, in order to prevent rotting. The many kinds of sidescrapers, which vary according to the location of retouch, form, etc., define many types often used as cultural markers. Notches and denticulates are also frequent tools, at least in some regions; the north of France, for example, is basically devoid of them. Such tools with retouched edges in the shape of a rudimentary saw may have been used to process wood; they were also very effective in the disarticulation of limbs (cutting of tendons).

European Middle Paleolithic: Geography and Culture, Fig. 8 (**a**) Mousterian sidescrapers (Cantalouette II, France, L. Bourguignon, Inrap). (**b**) Levallois point used as a lance point (Bettencourt-Saint-Ouen, France, J.L. Locht, Inrap). (**c**) Mousterian biface (Combe Brune II, France, M. Brenet, Inrap). (**d**) Micoquian tools (Sesselfelsgrotte, Germany; Kulna, Hungary; after Richter 2000)

Industries and Cultures

Concepts

Due to their preservation, knapped stone tools were used as the basis for the definition of "cultural systems." This approach is obviously simplistic, a bit as if our current "culture" was studied only through the tools of a handyman in his workshop. Nevertheless, they serve as the basis for the definition of "cultures" in the Middle Paleolithic, which thus must be considered with caution.

In the 1950s, François Bordes developed a statistical method, based on the typology of Mousterian tools, allowing for the classification of industries into four or five groups in order "to reorganize the Mousterian morass." According to him, the differences recorded between the industries were cultural, applicable to the last glaciation (between 125,000 and 35,000 BP, or the recent Middle Paleolithic) and thus correspond to as many human groups.

Other archaeologists have, however, proposed different interpretations for this observed variability. Since 1916, Victor Commont contrasted the open-air sites in northern France, in close proximity to raw material sources and with often non-retouched flakes with the sites of the Périgord caves, located far away from the raw material sources and where tools were intensively retouched. In the 1970s, Lewis Binford hypothesized that the Mousterian facies were in fact a reflection of different activities, while Paul Mellars saw in these a chronological sequence, at least among some of them.

The archaeological truth, provided one can ever get near it, is most probably a combination of all three. Some features are more recent than others or limited to specific regions. Their distance vis-à-vis raw material sources leads to more intensive use of tools, which are thus both reduced and more retouched. Some sites are oriented toward particular functions and this specialization can have an impact on tools. Finally, it is undeniable that cultural aspects had an important influence on the composition and the typology of lithic assemblages, influenced by stylistic traditions.

Cultural Systems

The Middle Paleolithic can be divided into two major phases. The first is called the Early Middle Paleolithic and ranges from around 300,000 BP to the beginning of the Eemian Interglacial (around 125,000–115,000 BP, isotope stage 5e). The second, the Late Middle Paleolithic, goes from the Eemian to the disappearance of the last Neanderthals, around 35,000–30,000 BP depending on the region. The second phase corresponds largely to the Weichselian glaciation (isotopic stages 5–3). This subdivision is questioned by some authors but nevertheless presents the advantage of simplifying the vision of these 250,000 years of the Middle Paleolithic.

The cultural systems of the Early Middle Paleolithic are not clearly defined as sites still remain relatively rare for this period. Since isotopic stage 10, tools of Mousterian style appear (e.g., thick sidescrapers from La Micoque, France), accompanied by Acheulean bifaces. During isotopic stages 9 and 8, Levallois production is present, and its flakes serve as blanks for typically Mousterian sidescrapers; some bifaces persist. During isotopic stages 7 and 6, blade production appears; Levallois flakes are retouched into Mousterian points, sidescrapers, etc., and large Levallois points complete the tool kit. Some industries still have an Acheulean bifacial element.

The Late Middle Paleolithic is better known, with the exception of the Eemian (isotopic stage 5e poor in archaeological sites). Its premises are firmly in the early phase (reduction methods, tool types), but most sites have led to a multiplication of "cultures."

For this recent phase, François Bordes thus defined five main Mousterian groups: the Mousterian of Acheulean tradition characterized by the presence of bifaces; the Denticulate Mousterian; the Mousterian of Quina type, very rich in sidescrapers intensively retouched but without Levallois reduction; the Mousterian of Ferrassie type which resembles that of Quina, but with Levallois reduction; and finally the Typical Mousterian with the different types of tools in a "harmonious" balance. Defined from sites in southwest France, this classification had a resounding success, leading many archaeologists from other regions, and even other countries, to assimilate their findings with one or other of these groups, with varying success and some exaggerations. It now appears that these features have

nearly no validity outside their zone of origin, which moreover only increases the variability of Mousterian expressions.

Thus, a number of "cultures" are defined, usually with a regional recognition (stylistic traditions). In Central and Eastern Europe (from Germany to Volgograd, Russia) several groups generically coming together under the term Micoquian become individualized by the presence of bifacial pieces (Keilmesser, Prondnikmesser, Faustkeilblätter, etc. – Fig. 8d). The first Micoquian phase, sometimes called "Keilmessergruppen" (around 60,000, perhaps earlier, to 40,000 BP), is followed by a second phase, the "Blattspitzengruppen" (leaf points), considered Late Micoquian. Contrary to popular belief, some of these groups employed Levallois reduction (Richter 2014). The Hungarian Babonyen appears to be connected with the Micoquian in its first phase, and the Szeletian (northern Hungary, Slovakia, Moravia, Southern Poland) later includes foliate tools similar to the Final Micoquian (the Altmühlian seems to correspond to the equivalent of the Szeletian in Bavaria).

An earlier industry, the Taubachian in Central Europe, characterized by thick flakes produced from small pebbles and used tools with deep retouch and by some microlithization, would be for some authors a survival of archaic traditions. Nevertheless, its near systematic association with interglacial contexts and lake environments (lake banks) suggests rather an adaptation to a particular context. This could also be valid for the Pontinian at Latium (Italy).

The period around 38,000–30,000 BP saw the appearance of "transitional" industries (from the Middle Paleolithic to the Upper Paleolithic – Fig. 9). These are industries in the final phase of the Middle Paleolithic, which for some researchers include Upper Paleolithic traits (blades, burins, end scrapers, etc.). This does not necessarily mean that they were influenced by the Upper Paleolithic industries that originated outside Europe. A common characteristic of these industries is the production of armatures for projectiles (points).

From around 38,000–30,000 BP, the industries grouped under the term Lincombian-Ranisian-Jerzmanowician (LRJ – see Flas 2008 for a

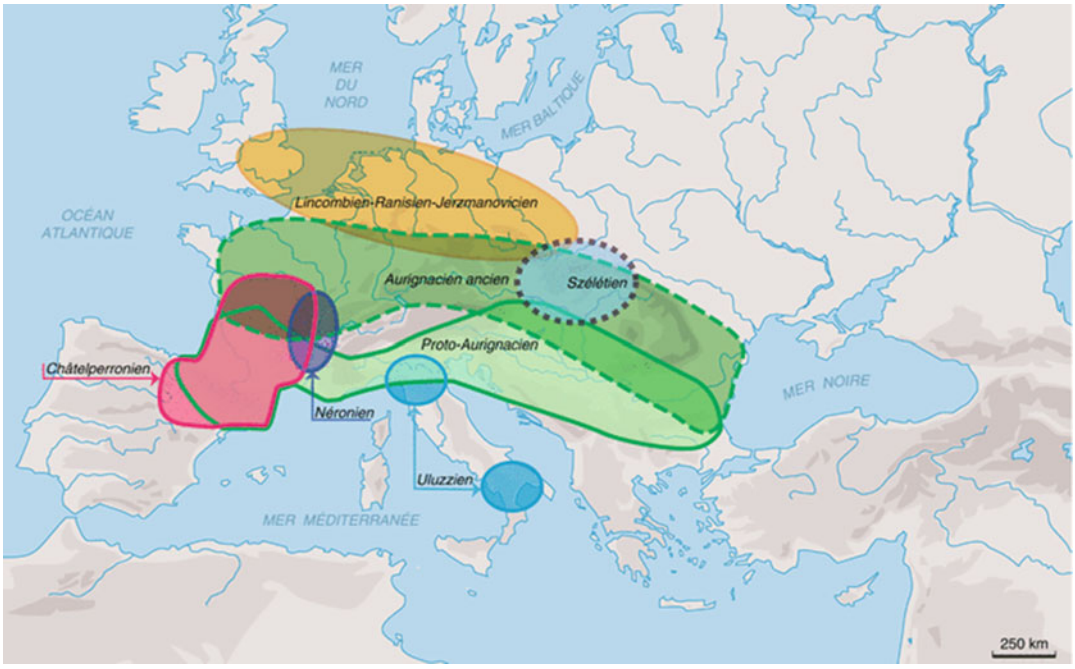

European Middle Paleolithic: Geography and Culture, Fig. 9 Europe between 38,000 and c. 33,000 BP (DAO AFDEC, after P. Depaepe 2009b, modified)

detailed approach) occupied a vast area across the northern plains of Europe, from Wales to Poland. These "transitional" industries are characterized by a particular type of leaf point made on blades. A few Polish industries like the Zwierzyniecien show blade production (laminar industries existed since the beginning of isotopic stage 3 in the south of Poland, at Piekary and Krakow "Ksiecia Jozefa"). Further east, the Streletskian, with bifacial points, sometimes with a concave base, sees its origin in the Late Middle Paleolithic of the Crimea or the Russian plain.

The Châtelperronian developed in southwest France and northern Spain, of which the characteristic tool is the Châtelperron point (armature on blade, with a curved back created by abrupt retouch). In Italy, the Uluzzian presents similarities with the Châtelperronian, albeit less strongly laminar. But there are strong probabilities that Uluzzian is an AMH industry, not a Neanderthal one (Benazzi et al. 2011.

Nonutilitarian Preoccupations

Evidence of symbolic expression in the Middle Paleolithic is rare: a few cases, less than 30 (Otte 1996; Jaubert 1999, 2010; Soressi and D'Errico 2007; Soressi 2009.). Indeed, extensive taphonomic studies have led to the elimination of many artifacts that were found to be natural products, such as the "Neanderthal flute" of Divje Babe, Slovenia, which is still the subject of intense debate within the scientific community, and many bones whose "engravings" are actually signs of vascularization.

In Europe, some evidence linked to the Neanderthal sphere are essentially made up of incisions on stone artifacts or bones, traces of pigment use, collections of odd pieces, and some jewelry in the Chatelperronian levels.

A few flint artifacts and pebbles have incisions that are not structured (flint from Champlost and pebbles from Chez-Pourré-Chez-Comte, France; Tata fossil, Hungary; shale plaquettes from Temnata, Bulgaria). Again on stone, the famous slab from the Ferrassie burial (France) should be mentioned, with shallow depressions on its underside (see below), likewise the scratched floor of Gorham's Cave (Gibraltar; Rodríguez-Vidal et al. 2014). On bones, a severe taphonomic revision has left only the rarest elements, the most compelling being an engraved bone with zigzag signs at Bacho Kiro (Bulgaria).

A few fossils were discovered in some habitats (polypus and gastropod fossils from Hyena Cave, Arcy-sur-Cure; brachiopods at Pech de l'Aze I and Chez-Pourré-Chez-Comte, France). In some cases these fossils were transported from many kilometers away, but the reasons for this collection elude us: symbolism attached to "stone animals," simple curiosity, and playful approach?

The use of natural pigments is clearly evident at more than 70 archaeological sites during the Middle Paleolithic. These are mainly manganese and ochre; blocks show very clear traces of abrasion on the surfaces which reveal intentional usage (e.g., at Pech de l'Aze I and IV, Fig. 10), in some cases perhaps functional (ochre has an antiseptic function in addition to its coloring component). At Néron Cave (France), a color container (hematite) was found arranged in a pebble. At Cueva de Aviones (Spain), marine shells impregnated with dyes have been discovered.

The register of ornaments is also very poor: some pierced teeth and bone pendants in Chatelperronian levels (Grotte du Renne at Arcy-sur-Cure, Grotte Quincay, France). In the Uluzzian pierced shells have been discovered.

But the lack of traces of symbolic expressions should not obscure a potential taphonomic problem. In fact, we cannot rule out the possibility of symbolic expressions that are now invisible in the archaeological record, such as tattoos, body painting, drawings on sand or perishable materials (bark, skins, etc.), masks, or jewelry. Thus, at Abri Fumane, raptor bones show signs suggesting the removal of feathers, in an esthetic intention according to the authors (Peresani et al. 2011). Despite the controversy concerning the "flute" of Divje Babe, the manufacture of nonutilitarian objects (in the strict sense of the term) remains conceivable (whistles, flutes, rhombs, percussion, or other musical instruments are no longer present due to the conditions of preservation of their supports in organic material).

It should be noted that as far as we know, these traces of nonutilitarian expressions are

European Middle Paleolithic: Geography and Culture, Fig. 10 Blocks of colorant (Pech de l'Azé I; left block measures 27 mm; photo M. Soressi, Inrap)

attributable to the final stage of the European Middle Paleolithic, after 60,000 BP. They could thus be the result of local evolution of Neanderthal societies, also linked with the appearance of burials, again around 60,000 BP in Europe.

Similarly, such traces of expression remain modest in comparison to the extraordinary artistic flowering of anatomically modern humans (parietal art, portable art). These findings should be taken into consideration when discussing the abstract capacities of Neanderthals, while trying to retain a balance between an overvaluation and a denial of these capabilities, these extremes being untestable and emerging from dubious comparisons with our own abilities.

Outside the Neanderthal sphere, there is evidence of expression which seem older (at least 80,000 BP) as, for example, pierced shells in Morocco and Israel, engraved ostrich eggs (Diekploof, South Africa), and engraved stones (Blombos, also South Africa).

Death and Then? Funerary Practices in the Middle Paleolithic

Around 20 Neanderthal burials have been discovered so far, of which a third are found in southwest France (Maureille 2004; Vandermeersch et al. 2008). Their recurrence in certain sites suggests the existence of necropolises, sites favored for the burial of members of the same group (e.g., seven subjects at La Ferrassie, France). These remains include both men and women and neither does there seem to be a selection linked to age.

These burials dug within habitats themselves were not intensively structured: generally shallow vaguely rectangular or oval pits sometimes protected with a cover (stone blocks or slabs, as at La Ferrassie (France) where a slab with shallow depressions covers a child's grave). The corpse was placed directly in the grave together with an occasional piece of burial goods (flint tools, bones, deer antlers, etc.). The presence of some bedding is hypothesized at Shanidar 4. In certain cases of constrained disposition, bonds may have possibly secured the corpse.

Secondary funerary practices are also likely to have taken place: multiple reburial of the corpse, removing the skull after the disappearance of flesh; similarly, isolated skulls are sometimes discovered at the sites. These elements suggest a form of religion. Traces on some skulls also show the removal of the scalp.

Cut marks appear on some bones, indicating removal of flesh, but the intentions of this practice remain unknown: endocannibalism for food or

ritual purposes, cleaning the bones of the deceased, and food cannibalism (El Sidrón cave, Spain; Lalueza-Fox et al. 2011). The comparison with cut marks from animal bones invokes the recovery of meat for consumption, without it being possible to determine whether such a practice was integrated within a ritual. It is important to note that in southwest France, such practices concern Mousterian sites of Quina type, which suggests a cultural component to this practice.

Neanderthal burials can be dated within a range between 60,000 and 40,000 BP, that is, in the final phase of the European Middle Paleolithic. Burial practices, however, are known earlier, around 100,000 BP in the Middle East (Qafzeh and Skhul, Israel), but these were anatomically modern humans with a Mousterian industry. However, recent evidence suggests an earlier date than what is generally accepted for some burials in southwest France (Jaubert 2010); if confirmed, these new dates are important to the debate on the originality of the sepulchral act, between Neanderthals and anatomically modern humans.

Toward a New World: The End of the European Middle Paleolithic

Neanderthals disappeared from the European scene between 35,000 and 28,000 BP depending on the region in Europe, where he was replaced by anatomically modern humans (AMH) who reached the European continent around 37,000 BP (Proto-Aurignacian in southern Europe). However, Neanderthals and AMH had already crossed paths in the Middle East, at least around 60,000 BP (perhaps earlier): they shared the same culture (Mousterian), buried their dead (see above), and analyses of the human genome show cross-breeding.

Until 37,000 BP, the Neanderthal was the only human to occupy Europe. Then, over a few 1,000 years, he disappeared, at the same time that AMH made its entry, which is rather late compared to other regions in the world which they seemed to have reached earlier, around 60,000 BP, for example, in Australia. In Europe, the oldest AMH fossil is the one discovered in Oase (Romania); it dates from around 35,000 BP, but unfortunately is not clearly associated with archaeological material, which prevents it from being associated with a specific cultural current.

Modern humans reached a Europe which seemed to be in great turmoil. Indeed, from about 38,000 BP, the world of the Neanderthals went through several currents which, although based on a Mousterian substrate, significantly altered the cultural landscape of the Late Middle Paleolithic: the "transitional" industries (cf. above). These millennia are marked by the climatic warming of Les Cottés interstadial (or Hengelo depending on terminologies used) (between 38,000 and 35,000 BP), succeeding a brief, but very cold, climatic episode (the Heinrich 4 event). Benefiting from this warming, Neanderthal populations were able to significantly expand their territories, but since their overall population size remained stable, the density of the population would de facto have dropped (Maureille 2008). This dispersion led to a reduction, or even a discontinuation, of contacts previously maintained between groups, which would have been a factor for cultural stability. This would have resulted in this incredible disparity, some groups developing a new cultural system on a Mousterian substrate, others preserving Mousterian traditions.

The extreme end of the Middle Paleolithic seems thus to correspond to the Neanderthal world experiencing a rupture in their cultural balance, with groups sharing less or not at all, and therefore becoming culturally and demographically weakened. The last Neanderthals disappeared from France around 35,000 BP, possibly 32,000 BP, in the southwest. In remote areas (refugia), they persisted later: southern Spain and Portugal until 28,000 BP or for some authors 24,000 BP (Gibraltar, but this date is disputed), perhaps also in some areas of the Balkans or in Byzovaya (see above).

There was therefore on the European scale a coexistence between Neanderthals and AMH, for varying periods depending on the region, but this cohabitation does not necessarily mean contacts: the weak genetic contribution of Neanderthals in current European and Asian genomes seems to derive from encounters which occurred in the Middle East, not more recent ones. It is possible that Neanderthals had already undergone a phase of demographic reflux and that entire regions had been abandoned, AMH therefore arriving in a human desert. In other places, the two groups may have occupied the same territory and

competition for food resources may have well been fierce between AMH and Neanderthals (Banks et al. 2008), these resources remaining identical for an overall increased population. For reasons which elude us (better social cohesion? better technology? better demography?), AMH won this competition. Other hypotheses, which may also be cumulative, have also been put forward: epidemics, conflicts, etc. (see Depaepe 2009b for different scenarios). Regardless, Neanderthals were definitively replaced by AMH after –30,000 BP.

Conclusion: Neanderthal Heritage

Who, therefore, was the Neanderthal? A typically European human, having only expanded slightly beyond this continent. A man perfectly adapted to his environment, withstanding important climatic changes for more than 200,000 years. A man with a culture, the Mousterian, which even if shared with anatomically modern humans in the Middle East, is no less a very European culture, with regional specificities. It is during the Mousterian, indeed, that Europe constructed an identity different from other regions of the world. A man whose clans roamed varied landscapes, hunted for big and small game, and made tools developed by complex and diverse systems. A man who no doubt questioned himself, who buried his own, who may have developed a mythology, rituals, and beliefs. A man who took care of his relations, as is shown by some skeletons with such pathologies that the survival of these individuals without the help of their relatives would certainly have been impossible. Another man, a cousin, at once so close to us and so far away, who left a little of himself in our genome.

References

Antoine, P., N. Limondin-Lozouet, P. Auguste, J.-L. Locht, B. Galheb, J.-L. Reyss, E. Escudé, P. Carbonel, N. Mercier, J.-J. Bahain, C. Falguères, and P. Voinchet. 2006. Le tuf de Caours (Somme, France): Mise en évidence d'une séquence eemienne et d'un site paléolithique associé. *Quaternaire* 17: 281–320.

Banks, W.E., F. d'Errico, A.T. Peterson, M. Kageyama, A. Sima, and M.-F. Sánchez-Goñi. 2008. Neanderthal extinction by competitive exclusion. *PLoS One* 3: e3972.

Benazzi, S., et al. 2011. Early dispersal of modern humans in Europe and implications for Neanderthal behaviour. *Nature* 479 (7374): 525–528.

Boëda, É. 1993. Le débitage discoïde et le débitage Levallois récurrent centripète. *Bulletin de la Société Préhistorique Française* 90: 392–404.

Bourguignon, L., F. Sellami, V. Deloze, N. Sellier-Segard, S. Beyries, and A. Emery-Barbier. 2003. L'habitat moustérien de "La Folie" (Poitiers, Vienne): Synthèse des premiers résultats. *Paléo* 14: 29–48.

Caspar, J.-P., B. Masson, and L. Vallin. 2003. Poli de bois ou poli de glace au Paléolithique inférieur et moyen? Problèmes de convergence taphonomique et fonctionnelle. *Bulletin de la Société Préhistorique Française* 100: 453–462.

Depaepe, P. 2007. *Le Paléolithique moyen de la vallée de la Vanne (Yonne, France): Matières premières, industries lithiques et occupations humaines*, Mémoire de la société préhistorique française XLI. Paris: Société Préhistorique Française.

Depaepe, P. 2009a. The settlement of Europe during the Pleistocene: Breaks and continuities. In *Proceedings of the international conference first great migrations of peoples*, 163–168. Paris: UNESCO.

Depaepe, P. 2009b. *La France du Paléolithique*. Paris: Ed. La Découverte.

Depaepe, P. 2010. L'apport des fouilles de grande superficie sur la connaissance du Paléolithique moyen. In *Settlement dynamics of the Middle Paleolithic and Middle Stone Age II*, ed. N.J. Conard and A. Delagnes, 357–372. Tübingen: Publications in Prehistory.

Depaepe, P. 2012. *La conquête des hautes latitudes par les hommes fossiles. Actes du Colloque Archéologie et Climat*, 95–106. Paris: Cité des Sciences.

Flas, D. 2008. La transition du Paléolithique moyen au supérieur dans la plaine septentrionale de l'Europe. *Bulletin de la Société Royale Belge d'Anthropologie et de Préhistoire* 119: 254.

Grünberg, J.M. 2002. Middle Palaeolithic birch-bark pitch. *Antiquity* 76: 15–16.

Henry, A., A. Brooks, and D. Piperno. 2011. Microfossils in calculus demonstrate consumption of plants and cooked foods in Neanderthal diets (Shanidar II, Iraq; Spy I and II, Belgium). *Proceedings of the National Academy of Sciences of the United States of America* 108: 486–491.

Hublin, J.-J. 2008. *Quand d'autres hommes peuplaient la Terre*. Paris: Nouvelle Bibliothèque Scientifique, Flammarion.

Hublin, J.-J., and W. Roebreoks. 2009. Ebb and flow or regional extinctions? On the character of Neandertal occupation of northern environments. *Comptes Rendus Palevol* 8: 503–509.

Jaubert, J. 1999. *Chasseurs et artisans du Moustérien*. Paris: La Maison des Roches.

Jaubert, J. 2010. Le Moustérien ou les sociétés néandertaliennes du Paléolithique moyen en France. In *La France préhistorique*, ed. J. Clottes, 64–92. Paris: Gallimard.

Lalueza-Fox, C., A. Rosas, A. Estalrrich, E. Gigli, P. Campos, A. García-Tabernero, S. García-Vargas,

E

F. Sánchez-Quinto, O. Ramírez, S. Civit, M. Bastir, R. Huguet, D. Santamaría, T. Gilbert, E. Willerslev, and M. de la Rasilla. 2011. Genetic evidence for patrilocal mating behavior among Neandertal groups. *Proceedings of the National Academy of Sciences of the United States of America* 108: 250–253.

Maureille, B. 2004. *Les premières sépultures: Les origines de la culture*, Les petites pommes du savoir. Paris: Le Pommier.

Maureille, B. 2007. Portrait d'un Néandertalien d'Europe de l'Ouest. In *Les Néandertaliens biologie et cultures*, Documents préhistoriques 23, ed. B. Vandermeersch and B. Maureille, 53–67. Paris: Éd. du CTHS.

Maureille, B. 2008. *Qu'est-il arrivé à l'homme de Neandertal?* Les petites pommes du savoir. Paris: Le Pommier.

Otte, M. 1996. *Le Paléolithique inférieur et moyen en Europe*. Paris: Armand Collin/Masson.

Parfitt, S., N. Ashton, S. Lewis, R. Abel, G. Coope, M. Field, R. Gale, P. Hoare, N. Larkin, M. Lewis, V. Karloukovski, B. Maher, S. Peglar, R. Preece, J. Whittaker, and C. Stringer. 2010. Early Pleistocene human occupation at the edge of the boreal zone in northwest Europe. *Nature* 466: 229–233.

Paunescu, A. 1993. *Ripiceni-Izvor Paleolithic si Mezolitic*, Biblioteca di arheologie 52. Bucarest: Edeitura Academiei Romane, Institutul de Arheologie Vasile Parvan.

Peresani, M., I. Fiore, M. Gala, M. Romandini, and A. Tagliacozzo. 2011. Late Neandertals and the intentional removal of feathers as evidenced from bird bone taphonomy at Fumane Cave 44 ky B.P., Italy. https://doi.org/10.1073/pnas.1016212108.

Richter, J. 2000. Social memory among late Neanderthals. In *Neanderthals and modern humans – Discussing the transition. Central and eastern Europe from 50.000–30.000 B.P.*, ed. J. Orschiedt and G.-C. Weniger, 123–132. Mettmann: Neanderthal Museums.

Richter, J. 2014. L'impact environnemental sur la formation des assemblages lithiques unifaciaux et bifaciaux "micoquiens" ou "MMO" d'Europe centrale. In J. Jaubert, N. Fourment, and P. Depaepe dirs. Transitions, ruptures et continuité en Préhistoire, vol. 2 : Paléolithique et Mésolithique. Actes du XXVIIe Congrès de la Société préhistorique française, Bordeaux-Les Eyzies-de-Tayac, juin 2010. Paris, SPF, 2014, pp. 195–205.

Rodríguez-Vidal, J., et al. 2014. A rock engraving made by Neanderthals in Gibraltar. *Proceedings of the National Academy of Sciences of the United States of America* 111 (37): 13301–13306.

Roebroeks, W., N.J. Conard, and T. Van Kolfschoten. 1992. Dense forests, cold steppes and the Palaeolithic settlement of northern Europe. *Current Anthropology* 33: 551–586.

Slimak, L., J.I. Svendsen, J. Mangerud, H. Plisson, H. Heggen, A. Brugère, and P. Pavlov. 2011. Late Mousterian persistence near the Arctic Circle. *Science* 332 (6031): 841–845.

Soressi, M. 2009. Neandertal et l'art. In *La France du Paléolithique*, ed. P. Depaepe, 108–109. Paris: Ed. La Découverte.

Soressi, M., and F. D'Errico. 2007. Pigments, gravures, parures: Les comportements symboliques controversés des Néandertaliens. In *Les Néandertaliens: Biologie et culture*, Documents préhistoriques 23, ed. B. Vandermeersh and B. Maureille, 297–309. Paris: Èd. du CTHS.

Speleers, B. 2000. The relevance of the Eemian for the study of the Palaeolithic occupation of Europe. *Geologie en Mijnbouw* 79: 283–291.

Vandermeersch, B., J.-J. Cleyet-Merle, J. Jaubert, B. Maureille, and A. Turq, eds. 2008. *Première humanité. Gestes funéraires des Néandertaliens*. Paris: Réunion des Musées Nationaux.

European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach

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State of Knowledge and Current Debates

Introduction

It is generally assumed by most scholars that the European Middle Paleolithic (MP) to Upper Paleolithic (UP) transition is the result of the arrival of modern men groups in Europe and replacing the Neanderthals. Since 20 years, scholars have tried to identify the way of circulation of the first Aurignacian groups inside Europe from the east (e.g., Djindjian 1993). More recently, in the first general synthesis on European Upper Paleolithic (Djindjian et al. 1999), the chapter concerning this question has been opened with two different hypotheses, the first one with the arrival of the modern man with the Aurignacian material culture and the second one with a systemic change due to the context of the interpleniglacial of OIS 3. For the readers unfamiliar with that question, a history of the last 150 years of researches on the beginning of European Upper Paleolithic has been recently

given (Djindjian 2006). More recently, a method has been proposed to reconstitute the mobility inside the territory of European Upper Paleolithic human groups using data from site mapping, raw material procurement circulation, dwelling seasonality, and food resource management inside the annual cycle (Djindjian 2009a). The method is applied here to the period 75,000–34,000 BP (OIS 4 and OIS 3). It is then possible to argue a new model, based on the explanation of systemic changes in the economic and social organization of human groups and then their material culture, due to the adaptation to a changing environment. The model has the virtue to be independent of the eventual actors of the material culture, whatever they are.

The European Middle Paleolithic (MP)

The studies of the European Middle Paleolithic are limited since 100 years by several major difficulties:

- The lack of absolute dating before 40,000 BP, over the range of the radiocarbon method, which has been slowly improved by the use of alternative techniques like thermoluminescence, uranium-thorium, or ESR, which have unfortunately a reliability and a precision much weaker than radiocarbon dates
- The data of lithic assemblages based on the Bordes typology (Bordes 1961), which are showing a lack of space and time structures at the origins of the famous historical controversy between Bordes (1953) promoting some kind of undefined Mousterian groups, Binford and Binford (1966) promoting a mistaking functional site analysis, and Mellars (1969) trying unsuccessfully to extract a chronological structure from the nonchronological Bordes typology
- The data of lithic assemblages based on a core reduction sequence analysis, which are renewing insufficiently the results of Breuil and Kozlowski (1931–1934) in the beginning of twentieth century, because they consider them as a technical typology (replacing the Bordes morphological typology) and not as a manufacturing process

Nevertheless, the previous contradictions may be revisited by several new approaches like:

- The raw material procurement studies, which are showing in Middle Paleolithic industries the use of raw material of very various quality of stone (flint, radiolarite, quartzite, etc.) collected at very short distances from the dwellings
- The core reduction sequence analysis, viewed as a manufacturing process, focusing on the very early emergence of blade and bladelet technologies and the strong correlation with the raw material procurement
- The stratigraphic correlations at a regional scale, revisited by new environmental analyses and better absolute dates

It is not possible, here in a limited space, to propose a new chronostratigraphy of the Middle Paleolithic European industries and to argue it in an enough detailed approach, site by site. Based on Middle Paleolithic data assemblages using a simplified typo-technological list and revised chronostratigraphic site sequences, new results are used to argue the present analysis.

The Middle Paleolithic Assemblages

The revision of the famous typology of François Bordes (1961) is revealing that the decomposition of types in subtypes is, in most of cases, artificial (e.g., for scrapers and hand axes) involving in a much more limited number of types than the hundred types of the reference list: points, side scrapers, notches, denticulate and other retouched pieces, knives, hand axes, and Upper Paleolithic types.

At the opposite, the technological information is not complete, individualizing only the Levallois technique and neglecting other well-known Middle Paleolithic techniques like discoid, Quina, bifacial, blade prismatic, and bladelet prismatic manufacturing processes, without forgetting the use of multi-integrated manufacturing process ("ramification").

In a very interesting paper, Callow and Webb (1981) have processed a PCA (principal

component analysis) of 96 Mousterian assemblages from southwestern France, described by 15 ratios elaborated directly from the types and the technical indices of the Bordes list.

The first factorial axis is opposing the assemblages rich in side scrapers to those rich in notches and denticulate. The second axis is ordering the assemblages by the abundance of Levallois artifacts. The third axis is ordering the assemblages by the abundance in Upper Paleolithic types and hand axes. The point diagram in the two first axes is showing a continuum (and not a partition) of the classical Bordes Mousterian facies: denticulate, typical, Ferrassie, and Quina. The so bad named "Mousterian of Acheulean tradition," which is, chronologically, the latest Mousterian of the area, is individualized on the third axis. These results, though limited to the southwestern France, are very important:

- Firstly, they are showing a chronological component in the Mousterian assemblages, as supposed by Mellars, but unfortunately masked by other structures, when processing Mousterian assemblages.
- Secondly, they are showing that the main variability of the assemblages is based on the opposition between side scrapers and notches/denticulate. Such variability has no any spatial or chronological links, but is correlated with the raw material procurement (see below).
- Thirdly, the important role of the Levallois technique variability has to be pointed out, anticipating the role of the variability of the different core reduction sequences. Unfortunately, the abundance of the Levallois technique cannot be correlated here with the other core reduction sequences and separated between flake Levallois and blade Levallois techniques.

Compared with the Upper Paleolithic stone industry, the Middle Paleolithic lithic industry is characterized by a strong individual variability. A part of this variability is due to intrinsic factors which allow, at several scales (individual, group), a large liberty of manufacturing inside the choice of one or more among the set of known core reduction technologies. But it is also possible to affirm that a part of the variability of the Mousterian assemblages may be explained by other extrinsic processes. To identify them, the only method is the correlation between techno-morphological studies of the artifact assemblages and extrinsic data like chronology, territory, environment, and raw material procurement distance, able to reveal other processes at the origin of the variability.

It is then an illusion to conclude to the superiority of the Upper Paleolithic stone technology over the Middle Paleolithic lithic technology. The internal dynamism of various techniques is characteristic of the Middle Paleolithic manufacturing, while the standardization is characteristic of the Upper Paleolithic manufacturing.

A Chronological Structure in Middle Paleolithic Assemblages

There is a chronological structure in the variability of the Mousterian assemblages:

- Isotopic stage 7 (250,000–200,000 BP) corresponding to an interglacial phase. The assemblages are showing the apparition of the Levallois technique (defining the beginning of Middle Paleolithic) in a general flake core production industry. But blade technology is also known.
- Isotopic stage 6 (200,000–135,000 BP) corresponding to a glacial phase. The assemblages are showing the importance of the Quina technology (side scrapers).
- Isotopic stage 5 (135,000–75,000 BP) corresponding to an interglacial phase. The assemblages are showing the abundance of the Levallois technique. The blade prismatic core technology is present.
- Isotopic stage 4 (75,000–60,000 BP) corresponding to a pleniglacial period. The assemblages are showing a dominance of side scrapers and/or notches/denticulate types. The Levallois technique is decreasing progressively at the transition between the isotopic stages 5 and 4.
- Isotopic stage 3 (60,000–34,000 BP) corresponding to a interpleniglacial phase:

At the beginning of OIS 3, the assemblages are defined by a new development of the Levallois

technique; the apparition of bifacial points, hand axes, and knives; and the apparition of a blade Levallois technique and of a blade prismatic technique, anticipating the rapid emergence of the transition industries during the second part of the OIS 3.

Raw Material Procurement and Middle Paleolithic Assemblage Variability

The researches of the outcrops of raw material for Paleolithic sites have been multiplied since the last 20 years. There is globally a main opposition between Middle Paleolithic and Upper Paleolithic raw material procurement for lithic industry. The Upper Paleolithic raw material is quite totally flint, while Middle Paleolithic raw material has been made from various stone materials including local flint.

For example, in the Armorican Massif (western France), the raw material list includes flint, various sandstone, dolerite, phtanite, quartz, and tuff (Monnier 1991). In Liguria (Italy), Middle Paleolithic industries are using local quartzite, siliceous limestone, rhyolite, and jasper (Negrino and Starnini 2003). In central Europe, region where the flint is rare, the material used is quartzite, opal, jasper, radiolarite, and porphyry.

Recent studies are confirming that the procurement distance for Middle Paleolithic sites is less than about 20 km or equivalent to a day walking (Feblot-Augustins 1997), revealing the weak mobility of Middle Paleolithic groups. Nevertheless, the sample of Middle Paleolithic sites concerned by such a synthesis is mainly western and central Europe sites dated from OIS 4 and few from OIS 6 pleniglacial periods. We have quite no information concerning OIS 5 Middle Paleolithic sites.

The difference in the quality of the raw material explains a correlation between raw material quality and tool type. For example, in the Middle Paleolithic site of Karreg-ar-Yellan (Brittany, France), side scrapers, points, and hand axes are made for 65% with flint and 35% with microgranite; notches and denticulate and other retouched flakes are made for 65% with microgranite and 35% with flint (Huet et al. 2003). Such a variability is enough to create the first factorial axis opposing side scrapers to notches/denticulate in the PCA discussed before (§ 3). Generalizing such examples, it is possible to conclude that the variability of the ratio "side scraper/notches + denticulate" may be associated with the raw material variability and no longer with culture (Bordes), function (Binford), or chronology (Mellars).

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The European Middle Paleolithic to Upper Paleolithic Transition and the Early Upper Paleolithic

Several important changes have been recorded during the isotopic stage 3:

- An important change of the Mousterian assemblages as defined previously: the Mousterian of Acheulean tradition in western Europe, the Micoquian industries in central and eastern Europe, the Levallois blade technology industries like the Bohunician (Oliva 1984) in central Europe and the Kremenician (Stepanchuk and Cohen 2000–2001) in eastern Europe.
- And then, after 40,000 BP, the apparition of the so-called "transition" industries, some of them correlated with the reoccupation of the central and northern European territories: southern Italy (Uluzzian), western Europe (Chatelperronian), central Europe (Szeletian), eastern Europe (Streletian, Gorotsovian), southeastern Europe (Bacho-Kirian), west-northern Europe (Lincombian), northern Europe (Jerzmanowician), and east-northern Europe (Ouralian). At the same time, in the upper Danube basin and along the western Mediterranean coast, the first stage of the Aurignacian industry (Very Early Aurignacian) is emerging. But simultaneously, in the southern Iberia and in Crimea, the late presence of Middle Paleolithic assemblages is actually showing no process of transition until a Late Aurignacian.

During the isotopic stage 4, the glacial climate reduced the peopled areas to southern and middle Europe through closed areas, increasing

endogamous reproduction, at the origins of the accentuation of the west European Neanderthal morphocranial features. During the isotopic stage 3, Europe is opening again, helping the repopulation of middle and northern Europe, and then crossing populations and accentuating the mobility of the human groups. At the beginning of the isotopic stage 2, from 34,000 BP, the climatic variability is announcing after a succession of oscillations, the progressive come back of the pleniglacial climate. Between 34,000 and 21,000 BP, all Europe is seeing a process of standardization of the lithic industries at the origin of a blade and bladelet Upper Paleolithic industry starting with the Early Aurignacian and finishing with the Late Gravettian, balanced by the progressive closing of the European space.

The Territory Management During Late Middle Paleolithic and Early Upper Paleolithic

For Middle Paleolithic sites, the distance of raw material procurement from the site of about 20 km defines the size of the territory of traveling of an Middle Paleolithic human group (1000 km^2) and then their food resource management. When the food resources, mainly herbivores (aurochs, bison, horse, deer, reindeer, ibex, etc.), are being exhausted by hunting, the group is obliged to leave its dwelling and to move elsewhere. Such a type of territory resource management is called "Local Opportunist Strategy" (Djindjian 2009a).

During the stage of polymorphic diversification of the "transition" industries (Djindjian et al. 1999), the actual data are showing a progressive change in the territory resource management, from a "Local Opportunist Strategy" towards a "Restricted Planed Strategy" with territories growing until 10,000 km^2 and more (Djindjian 2009a). This is then the emergence of the territory in the sociology of the hunter-gatherer groups.

A major change occurred with the Early Upper Paleolithic, the stage I (Early) of the Aurignacian after 34,000 BP. The procurement of flint, often at long distances (several hundred kilometers) depending of the availability of outcrops of good flint in the territory (and also sea or fossil shells); the specialization in the hunting of herbivores; and the spatial organization of seasonal dwellings are argumenting the evidence of a large territory until 100,000 km^2, where the groups are circulating in and meeting altogether. Such a type of territory resource management is called "Extensive Planed Strategy" (Djindjian 2009a).

The "Extensive Planed Strategy" is known in the European Upper Paleolithic with Aurignacian, Gravettian, and Magdalenian, corresponding to large territories, with high mobility of human groups and consequently a general uniformity of the material culture. In a recent paper (Djindjian 2009a), we have defined several types of territory resource management in association with the main European cultural facies:

Middle Paleolithic industries	"Local Opportunist Strategy"
Transition industry	"Local Opportunist to Restricted Planed Strategy"
Aurignacian	"Extended Planned Strategy"
Pavlovian	"Semisedentary Strategy"
Gravettian	"Extended Planned Strategy"
Lower Solutrean	"Local Opportunist Strategy"
Upper Solutrean	"Summer Mobility Strategy"
Early Badegoulian	"Local Opportunist Strategy"
Late Badegoulian	"Summer Mobility Strategy"
Sagvarian	"Summer Mobility Strategy"
Steppe zone Industries	"Summer Mobility Strategy"
Magdalenian	"Extended Planned Strategy"
Mezinian	"Semisedentary Strategy"
Southern Epigravettian	"Restricted Planed Strategy"
Epipaleolithic	"Restricted Planed Strategy"

The identification of a territory management strategy is a new approach in Paleolithic studies, based on the superposition of the circulation of groups due to raw material procurement, food resource management, and seasonal site locations, registrated in the annual cycle. If the data are now more and more available to identify the Upper Paleolithic strategies, it is not the case for Middle Paleolithic strategies where the researches have started since very few years. With better dated Middle Paleolithic sites, it would then be possible to confirm the evidence of a "Local Opportunist

Strategy" for OIS 4 Middle Paleolithic sites and to look at, as expected here as a consequence of our model, different strategies for Middle Paleolithic sites in the OIS 5.

The Material Culture Contradictions of the Standard Model

The change of the material culture of the Lower and Middle Paleolithic is generally studied as a general technological evolution model of stone knapping (Leroi-Gourhan 1964–1965) based on progressive efficiency in producing more numerous blanks to make tools. Recent data have supported contradictions to this model.

The first apparent contradiction is the evidence of blade and bladelet core technology in the Middle Paleolithic industries at various times, from OIS 7 to OIS 3.

The first blade technology in an Middle Paleolithic industry is the well-known Tabun D type, in the Levant, dated essentially from OIS 7 to 8 between 260,000 and 180,000 BP. No human remains are associated with such an industry (Bar-Yosef and Kuhn 1999; Bar-Yosef and Meignen 2001). Blade industries are also appearing in northwestern Europe during OIS 7–8 (Saint-Valery-sur-Somme).

During OIS 5, blade industries are now well known all over Europe: France, Belgium, Rhineland, and Poland (Tuffreau and Révillon 1994; see also the workshop of 6–7 April 2006 in Bordeaux ("The laminar phenomena during Middle and Upper Palaeolithic in Eurasia"): Riencourt les Bapaume, Seclin, Bettencourt Saint-Ouen, Rocourt, Vanne river in Yonne region, Bergeracois, etc.).

At the beginning of OIS 3, the development of a Levallois technique may be adapted to a production of blades and bladelets, associated sometimes with a blade and bladelet prismatic core production. In the Levant (Boeda and Bonilauri 2006; Pastoors et al. 2008; Otte and Kozlowski 2009), after the OIS 4 Tabun B Middle Paleolithic industry, are known industries showing a strong dynamic of technical innovations: a mix of Levallois technology and blade prismatic technology or bladelet knapping on Levallois technology. A similar process appears in eastern and central Europe with the development of Levallois laminar technology: Bohunician and Kremenician, participating to the reoccupation of the middle and northern Europe. Alternative technologies using bifacial points and bifacial knives are also participating to the same process (MTA, Micoquian), reinventing the features of the multi-use portable hand axe of the Acheulean (see below).

Another interesting example is the lower Rhone basin where a local industry around 40,000 BP, the Neronian, is characterized by the production of blades and bladelets, and the development of microliths made on a good quality flint procured at a distance more than 100 km. The Neronian is superposed by a Late Mousterian and then by a Very Early Aurignacian (Slimak 2008).

The second apparent contradiction is the comeback of a flake core industry made on various raw material procurement during Upper Paleolithic, at the time of the maximum ice age in the periods called Lower Solutrean and Early Badegoulian in western Europe. It is interesting to point out here the archaic features of the Lower Solutrean industry which are at the origins of a hypothesis about the origins of the Solutrean directly from a Very Late Mousterian in the lower Rhone basin (Smith 1966). It is also interesting to remember the Badegoulian has often been considered as the "ugly" Upper Paleolithic industry, coming just after the Upper Solutrean leaf points, considered as the Upper Paleolithic "most esthetic" industry (Bordes 1968). The real reason of such a change is the withdrawal of the territories of the middle Europe by the Gravettian groups when the climate is at the maximum ice age around 21,000 BP. Going down to the southern Europe, the groups have lost all the knowledge about flint raw material outcrops and specialized herbivore hunting and have been obliged to regress to a "Local Opportunist Strategy" and various bad quality raw material procurement like the Mousterian during OIS 4 but with a long tradition of blade prismatic core technology they have not forgotten. When the climate has changed towards

a more humid but always very cold period first between 20,000 and 19,000 BP (Upper Solutrean) and second between 18,000 and 16,500 BP (Late Badegoulian), then the groups have moved towards a "Summer Mobility Strategy" which allows them to circulate to the north, during the summer, to exploit again the good flint outcrops and the resource of the migrating herbivores (reindeer). It is the case in western Europe (Upper Solutrean, Late Badegoulian), in central Europe (Sagvarian, Epigravettian), and in eastern Europe (walking up the Dniester, the Dnepr, and the Don valleys).

A Mobility Process Is Explaining Also the Material Culture Variability

We are introducing here an explaining variable, the mobility, which is playing a major role in the process of adaptation of the human groups with their environment, at a given time, in a given physical geography and under a given climate. The mobility of the human groups is associated with the size of a territory in which the network of the human groups is circulating and meeting altogether, during the annual cycle and with their food resource management strategy, as those we have defined above.

The mobility process is involving all the technical, organizational, and social solutions which may get easier the mobility of the human groups. At the level of the material culture, they concern mainly the toolkit and the dwelling architecture.

The toolkit needs to be easily portable. The technical solution of the blade and bladelet prismatic core allows producing standardized and numerous blanks more easily than an Middle Paleolithic flake core. The invention of the blade and bladelet production is due to a functional need and not to the evolutionist model proposed by A. Leroi-Gourhan (1964–1965). It is because the invention has already been made before (OIS 5 and 7) for certainly the same reasons and because a regression has also occurred during the Upper Paleolithic at the maximum ice age of OIS 2.

The spatial distribution of the tool manufacturing process is very different between the Middle Paleolithic and Upper Paleolithic industries. In the Middle Paleolithic industries of OIS 4, the raw material origin is very near from the permanent dwelling, and all the products of the core reduction sequence are generally found inside the site. In the Upper Paleolithic industries of OIS 2, where the raw material outcrops are often very far from the site (until several hundred kilometers), the cores are prepared directly at the outcrop, they may be stored in a cave or rockshelter bivouac easy to be found again, and they are carried by hunters who can produce blanks when they need it during the travel or in a seasonal site, until complete exhaustion.

It could be untimely to suggest some kind of analogous process for Acheulean during the temperate period OIS 12 to 9, with the hand axes. Such a portable artifact may be considered both as a multiuse tool for chopping and a core to produce flakes for cutting. Their comeback during the beginning of OIS 3 (MTA, Micoquian) may be considered as an alternative to blade solutions.

In conclusion, during the temperate periods, the increasing of the mobility of human groups has for consequences the long-distance circulations, the Extended Planned Strategies over large territories and portable tools. During the cold periods, the decreasing of the mobility of human groups has for consequences the short-distance circulations, the Local Opportunist Strategies over small territories and tools produced and used inside the permanent dwelling.

Then we may change the proposal of A. Leroi-Gourhan (1964–1965: 192, Fig. 64) who sees an optimization of the production (number) of blanks (cutting edge length for 1 kg of material) inside an evolutionist model, by an optimization of the lightness of the blanks inside an adaptation to the environment. Consequently, the technical evolution of the knapped stone industry, which is traditionally seen as a long cognitive process, must be revisited as a serendipity process. Such a conclusion is not so surprising when, by experience, it is easy to understand how to pass from a chopper or a chopping tool to a hand axe (by flaking all around the piece), from a hand axe to a Levallois flake (by knapping on the butt of the hand axe to obtain a Levallois flake), from a Levallois core to a prismatic core (by pivoting 90° the core and using the lateral edge as a crest blade), from a Quina side scraper to a bladelet prismatic core, etc. Then, the

invention of the blade or bladelet prismatic core may be seen not as a technical revolution but just as an invented and reinvented technical potential for a functional need.

The Emergence of "Art"

The evolutionist theory of Paleolithic art proposed by A. Leroi-Gourhan (1965) has been refuted by the recent discoveries of caves and radiocarbon dates made on progressive more numerous paintedly figures. It appears that cave art, like portable art, emerged very quickly with the beginning of Aurignacian (Early or phase I) around 34,000 BP (for a detailed discussion of data, see Djindjian 2004a). There is actually no evidence of animal figurative or schematic representations in the previous period during the "transition industries" or with the Very Early Aurignacian (phase 0), but only few ornament objects (if they are not coming from an upper Aurignacian layer like in the case of the reindeer cave in Arcy-sur-Cure).

When it emerged in the Early Aurignacian, the technical control of the animal figurative representations seems to have been immediate both in cave art like in the Chauvet cave in the Rhone basin and in the portable art like in the Geissenklosterle rockshelter in the upper Danube basin. This means that the emergence of this so-called art was not a cognitive question but an invention corresponding to the need for a function (to be discovered) inside the human group.

A new explanation for the variability of animal species figurations in the both cave and portable art has been recently proposed (Djindjian 2004b, 2009b). It is based on a correlation, at the scale of territory, between the regional mammal zoocenoses, the bone taphocenoses of the Paleolithic campsites, and the cave iconocenoses (bestiaries). The conclusions of the studies are revealing several types of bestiaries for each period (Aurignacian/Gravettian, Solutrean/Badegoulian, and Magdalenian). A type of bestiary is identifying a territory, and the cave is a symbolized representation of the territory through the zoocenoses living in. The caves, often located in the frontiers of the territory, are marking the territory of the hunter groups. The animal representations in the cave and portable Paleolithic art have then a function associated with the territory of the network of human groups, marking and symbolizing their territory.

It is certainly the reason for which there is no portable and cave art in the European MP, because there is no defined territory associated with a "Local Opportunist Strategy." The MP groups are leaving their dwellings when they have exhausted the food resource of their small 1000 km^2 area and they are searching for a new location elsewhere. The links between groups are then much weaker and the meeting of two groups is more randomly than planned. The difference between Middle Paleolithic and Upper Paleolithic systems is then also a difference of social organization.

Change of System or Change of Peopling?

The argumentation we have developed previously has concluded that the material culture change between Middle Paleolithic and Upper Paleolithic industries may be explained by mobility changes associated with different territory management and social organization of the human group network.

Consequently, it is not possible to use those differences as arguments to conclude that Middle Paleolithic industries are made by Neanderthals and Upper Paleolithic industries by modern men. We also point out that in Middle East, both Neanderthals and modern humans are responsible for making Middle Paleolithic industries. It is also the case in Africa, where modern humans are making Middle Paleolithic industries (Middle Stone Age, Aterian).

Results of genetic studies are more confusing. A difference of 99.5–99.9% between the genome of Neanderthals and modern humans has been published argumenting the absence of interbreeding aptitude, and then they are contributing to the hypothesis of the arrival of modern men and the extinction of Neanderthals (Krings et al. 1997). But more recent studies are informing us there is a common genetic stock of 1–4% between the two genomes (Green et al. 2009). It involves a greater complexity of the anthropological model where

the replacement hypothesis could be challenged by an interbreeding hypothesis including or not a local evolution model, in which the role of the archaic features is much more emphasized.

But the definitive arguments for elaborating the models may only be based in the discovery of sufficient human bone remains in reliable stratigraphic sequences and associated with industries. Such data are lacking today in Aurignacian sites (Churchill and Smith 2000; Henry-Gambier 2002). Either we have very few bone remains, difficult to attribute definitively to the modern man, or we have intrusive bones into the Aurignacian layers like in Vogelherd (Conard et al. 2004), Velika Pecina (Smith et al. 1999), Hahnöfersand 1, and Zlaty Kun (most of them have played an important role in the thesis of the arrival of the modern man), or owning to uppermost Gravettian layers like in Cro-Magnon (Djindjian et al. 1999; Henry-Gambier 2002), or we have unquestionable modern man bone remains but in a questionable stratigraphic context like in Mladec (Wild et al. 2005; Teschler-Nicola 2006) or we have radiocarbon dated bone remains but without archaeological context like in the cave bear of Pestera cu Oase in Romania (Trinkaus et al. 2003). The human remains coming from Late Aurignacian remains (e.g., Les Rois or La Crouzade), considered as modern men, are nevertheless indicating that around 30,000 BP, the process of modernization (whatever the model) is progressing rapidly. Perhaps, such a position would be considered too pessimistic. Looking at the last inventory of human remains in an Aurignacian context, favorable to the hypothesis of the replacement of Neanderthal by the modern man (Hublin 2010, in Otte), it is always not totally convincing they are proving such hypothesis, due to a lack of definitive evidence like that given by an adult burial found in a Aurignacian layer. The archaic features of various limited and often juvenile bone fragments, of which the interpretations are often different among the specialists, are always opening the way to alternative explanations.

Conclusions

The Middle Paleolithic to Upper Paleolithic transition in Europe may be interpreted as a change in the economic and social organization of groups of hunter-gatherers, independent of the actors involved by the transition. The key to understanding such a transition is a better knowledge of the Middle Paleolithic system at the same level of information we have actually for the Upper Paleolithic system: chronology, thin climatic changes, food resource management system, raw material procurement, and mobility in association with the material culture. We need also to make some methodological revolution in trying to think process and no longer to classify data, either through a morpho-typology like in the fifties or trough a techno-typology since the eighties. In archaeology, the research for origins somewhere or elsewhere is always like the "Tartar desert" syndrome. The discovery of a successful process does not need to find its initial "big bang" but only its significant effect.

Cross-References

- ▶ Central Asia: Paleolithic
- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Crimean Middle Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ European Middle Paleolithic: Geography and Culture
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ Middle East Middle to Upper Paleolithic Transitional Industries
- ▶ Northern Europe: Middle to Upper Paleolithic Transition

References

Bar-Yosef, O., and S.L. Kuhn. 1999. The big deal about blades. Laminar technologies and human evolution. *American Anthropologist* 101: 322–338.

Bar-Yosef, O., and L. Meignen. 2001. The chronology of the Levantine middle Palaeolithic period in retrospect. *Bulletin et Mémoires de la Société d'Anthropologie de Paris, N. S.* 13: 269–289.

Binford, L.R., and S.R. Binford. 1966. A preliminary analysis of functional variability in the Mousterian of Levallois facies. *American Anthropologist* 68: 238–295.

Boeda, E., and S. Bonilauri. 2006. The Intermediate Paleolithic: the first bladelet production 40,000 years ago. *L'Anthropologie* 44: 75–92.

Bordes, F. 1953. Essai de classification des industries moustériennes. *Bulletin de la Société Préhistorique Française* 50: 457–466.

Bordes, F. 1961. *Typologie du Paléolithique ancien et moyen (Publications de l'Institut de Préhistoire de l'Université de Bordeaux Memoire 1)*. Bordeaux: Imprimeries Delmas.

Bordes, F. 1968. *Le Paléolithique dans le monde*. Paris: Hachette.

Breuil, H., and L. Kozlowski. 1931–34. Etudes de stratigraphie paléolithique dans le Nord de la France, la Belgique et l'Angleterre. *L'Anthropologie* XLI: 449–488; XLII: 27–46, 291–314; XLIV: 473–83.

Callow, P., and R.E. Webb. 1981. The application of multivariate statistical techniques to Middle Palaeolithic assemblages from southwestern France. *Revue d'Archéométrie* 5: 330–338.

Churchill, S.E., and F.H. Smith. 2000. Makers of the early Aurignacian of Europe. *Yearbook of Physical Anthropology* 43: 61–115.

Conard, N.J., P.M. Grootes, and F.H. Smith. 2004. Unexpectedly recent dates for human remains from Vogelherd. *Nature* 430: 198–201.

Djindjian, F. 1993. Les origines du peuplement Aurignacien en Europe. In *Aurignacien en Europe et au Proche Orient. Actes du XII Congrès International des Sciences Préhistoriques et Protohistoriques, l'UISPP, Bratislava, 1–7 Septembre 1991*, ed. L. Bánesz and J.K. Kozlowski, 136–154. Nitra; Bratislava: Institut d'Archéologie de l'Académie Slovaque des Sciences.

Djindjian, F. 2004a. *L'Art paléolithique dans son système culturel. II. De la variabilité des bestiaires représentés dans l'art pariétal et mobilier paléolithique. Colloque la spiritualité, Liège, 10–12 Décembre 2003 (ERAUL 106). 127–52.* Liège: Université de Liège.

Djindjian, F. 2004b. L'Art paléolithique dans son système culturel: essais de corrélation. I. Chronologie, styles et cultures. In *L'Art du Paléolithique supérieur, colloques 8.2 & 8.3 du XIV Congrès International des Sciences Préhistoriques et Protohistoriques, UISPP, Liège, Septembre 2001 (ERAUL 107)*, ed. M. Lejeune and A.C. Welté, 249–259. Liège: Université de Liège.

Djindjian, F. 2006. 150 years of researches on the beginning of upper Palaeolithic in western Europe. Colloque international du 125 anniversaire de la découverte du site de Kostienki, Kostienki, 23–26 Août 2004. In *The early Upper Paleolithic of Eurasia: General trends, local development*, ed. M. Anikovitch, 245–262. Saint-Petersbourg: Nestor-Historia Publishers.

Djindjian, F. 2009a. Le concept de territoires pour les chasseurs cueilleurs du Paléolithique supérieur européen. In *Le concept de territoires pour les chasseurs cueilleurs du Paléolithique supérieur européen. Actes du XV Congrès UISPP, Lisbonne, Septembre 2006, session C16, volume 3*, BAR International series 1938, ed. F. Djindjian, J. Kozlowski, and N. Bicho, 3–25. Oxford: Archaeopress.

Djindjian, F. 2009b. L'art pariétal et l'art mobilier pour l'identification des territoires de peuplement dans le Paléolithique supérieur européen: l'approche par les bestiaires. In *Espaces symboliques dans l'art préhistorique. Actes du XV Congrès UISPP, Lisbonne, 4–9 Septembre 2006, Session C28, volume 40*, BAR International series 1999, ed. F. Djindjian and L. Oosterbeek, 3–20. Oxford: Archaeopress.

Djindjian, F., J. Kozlowski, and M. Otte. 1999. *Le Paléolithique supérieur en Europe*. Paris: Armand Colin.

Feblot-Augustins, J. 1997. *La circulation des matières premières au Paléolithique (ERAUL 75)*. Vol. 2 vols. Liège: Liège Université de.

Green, R.E., A.W. Briggs, J. Krause, K. Prüfer, H.A. Burbano, M. Siebauer, M. Lachmann, and S. Pääbo. 2009. The Neanderthal genome and ancient DNA authenticity. *EMBO Journal* 28: 2494–2502.

Henry-Gambier, D. 2002. Les fossiles de Cro-Magnon (Les Eyzies-de-Tayac, Dordogne): nouvelles données sur leur position chronologique et leur attribution culturelle. *Bulletins et Mémoires de la Société d'Anthropologie de Paris, N. S.* 14: 89–112.

Hublin, J.J. 2010. Les restes humains. In *Les Aurignaciens*, ed. M. Otte, 95–112. Paris: Errance.

Huet, B., J.L. Monnier, T. Rouxel, and J.C. Sangleboeuf. 2003. Economie des matières premières au paléolithique moyen dans le massif armoricain: Apport de l'étude des propriétés mécaniques des matériaux. Collectif: les matières premières lithiques en préhistoire. Table-ronde d'Aurillac, 20–22 Juin 2002. *Préhistoire du Sud-Ouest, Supplément* 5: 199–206.

Krings, M., A. Stone, R.W. Chmitz, H. Krainitzki, M. Stoneking, and S. Pääbo. 1997. Neanderthal DNA sequences and the origin of modern humans. *Cell* 90: 19–30.

Leroi-Gourhan, A. 1964–1965. *Le geste et la parole. volume 1: Techniques et langage* (1964); *volume 2: Les mémoires et les rythmes* (1965).

Leroi-Gourhan, A. 1965. *Préhistoire de l'art occidental*. Paris: Mazenod.

Mellars, P. 1969. The chronology of Mousterian industries in the Perigord region of south-western France. *Proceedings of Prehistoric Society* 35: 134–171.

Monnier, J.L. 1991. *La préhistoire de Bretagne et d'Armorique*. Paris: Editions Jean-Paul Gisserot, Les Universels Gisserot.

Negrino, F., and E. Starnini. 2003. Patterns of lithic raw material exploitation in Liguria from the Palaeolithic to the copper age. Collectif: les matières premières lithiques en préhistoire. Table-ronde d'Aurillac, 20–22 Juin 2002. *Préhistoire du Sud-Ouest, Supplément* 5: 235–244.

Oliva, M. 1984. Le Bohunicien, un nouveau groupe culturel en Moravie: quelques aspects psychotechnologiques du développement des industries paléolithiques. *L'Anthropologie* 88: 209–220.

Otte, M., and J. Kozlowski. 2009. Origines du Paléolithique supérieur en Asie occidentale. In *Le Paléolithique d'Iran, XV congrès UISPP, Lisbonne 2006, volume 28*, BAR International series 1968, ed. M. Otte, 57–72. Oxford: Archaeopress.

Pastoors, A., G.C. Weniger, and J.F. Kegler. 2008. The Middle-Upper Palaeolithic transition at Yabroud II

E

(Syria). *A re-evaluation of the lithic material from the Rust excavation. Paléorient* 34: 47–65.
Slimak, L. 2008. The Neronian and the historical structure of cultural shifts from Middle to Upper Palaeolithic in Mediterranean France. *Journal of Archaeological Science* 2008 (under corrected proof), 1–11.
Smith, P.E.L. 1966. *Le Solutréen en France (Publications de l'Institut du Quaternaire de l'Université de Bordeaux 5)*. Bordeaux: Delmas.
Smith, F., E. Trinkaus, P.B. Pettitt, I. Karavanic, and M. Paunovic. 1999. Direct radiocarbon dates for Vindija G1 and Velika Pecina hominid remains. *Proceedings of the National Academy of Sciences of the United States of America* 96: 12281–12286.
Stepanchuk, V.N., and V.Yu. Cohen. 2000–2001. Kremenician, Middle to Upper Palaeolithic transitional industry in the western Ukraine. *Préhistoire Européenne* 16–17: 75–100.
Teschler-Nicola, M., ed. 2006. *Early modern humans at the Moravian Gate*. Wien: Springer (eBooks).
Trinkaus, E., Ş. Milota, R. Rodrigo, M. Gherase, and O. Moldovan. 2003. Early modern human cranial remains from the Peştera cu Oase, Romania. *Journal of Human Evolution* 45: 245–253.
Tuffreau, A., and S. Révillon, eds. 1994. *Les industries laminaires au Paléolithique moyen. Actes de la table ronde internationale organisée par l'ERA 37 du CRA-CNRS à Villeneuve-d'Ascq 13 et 14 Novembre 1991*, Dossier de Documentation archéologique 18. Paris: CNRS.
Wild, E.M., M. Teschler-Nicola, W. Kutschera, P. Steier, E. Trinkaus, and W. Wanek. 2005. Direct dating of early Upper Palaeolithic human remains from Mladec. *Nature* 435: 332–335.

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian

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State of Knowledge and Current Debates

About 45,000 years ago, anatomically modern humans migrated into Europe, and a few thousand years later Neanderthal populations had completely vanished from Europe. This replacement of the local populations by anatomically modern humans also happened in the rest of Eurasia. It explains why today we are the only human species on the planet when Hominin groups flourished for several million years.

The Châtelperronian industry (*Châtelperronien* or *Castelperronien* in French) is considered to be the very last behavioral testimony of Neanderthals in France and northern Spain. For a few millennia, Neanderthals switched to systematic blade production, focused on stone knives that could also be used as projectile points, and in some instances produced domestic bone tools and used black and red pigments as well as personal ornaments.

What appears to be a brief episode, compared to other Late Pleistocene industries, is indeed often considered as a Neanderthal *"swan song."* Châtelperronian behaviors are actually part of a more global industrial change and evolutionary trajectory. This global industrial change would have been driven by the search for stone-tipped weapons, and possibly correlated with new organic and lithic material procurement strategies as well as a new social network organization (Bon 2010). The model of a clear-cut revolution with the arrival of modern Humans in Europe (Mellars and Stringer 1989) was put forward in the mid-1980s. At that time, it was grounded on available data on Neanderthal behavior, which were a compilation of Neanderthal behavior over the Middle and the Late Pleistocene. During the last decade, new data on Neanderthal behavior during the last glacial cycle (including Neanderthals right before the peopling of Europe by modern humans) nuanced this model. In fact, almost every behavior previously thought to be unique to anatomically modern humans was shared, at least occasionally, by Neanderthals; image production on durable support is still one major difference (d'Errico 2003; Soressi 2005; Peresani et al. 2011). The Châtelperronian no longer appears as an *"avatar of a dying middle Paleolithic but [indeed] as the first machinery of an Upper Paleolithic to become"* (Bon 2010: 139).

Because the Châtelperronian is in a stratigraphic position at the crossroads of the Middle and Upper Paleolithic, because it is of Upper Paleolithic type, and because only Neanderthal

remains were discovered associated with it, the Châtelperronian is often called a "transitional industry." Even if Mousterian "souvenirs" had been actively searched within Châtelperronian industries, they are almost nonexistent (see below). It is indeed clear that the Châtelperronian is neither an intermediate between the Middle and the Upper Paleolithic nor a mix of Middle and Upper Paleolithic behaviors. On the contrary, it is a unique set of behaviors that shares commonalities with contemporaneous industries.

It is interesting to note that the use of contemporary ideological construction is sometimes pleaded for (e.g., Zilhão et al. 2008) to contest interpretative models of the Middle to Upper Paleolithic transition. This passion is also visible in popular science movies and journals, and certainly illustrates how much Paleolithic archaeology can be a popular topic grounded on an ongoing debate. This entry aims to summarize the current state of understanding on a highly debated topic: the nature and significance of the Châtelperronian.

The Recognition and the History of the Châtelperronian

The Châtelperronian was originally defined by H. Breuil after the lithic industry found at the cave of fairies ("la grotte des Fées") in Châtelperron, a small village in central France. This industry contained a specific blade and point with a back shaped with abrupt retouches, the back of the point type being curved. Breuil emphasized the similarities between the Châtelperronian and the Abri Audi type industry, later attributed to the Mousterian of Acheulean Tradition (MTA), especially the high frequency of backed blades and poorness of bone tools. For Breuil, the Châtelperronian as well as the Mousterian of Acheulean Tradition were the first stage of the Upper Paleolithic. At the time, the Upper Paleolithic was divided into "Lower Aurignacian" (MTA and Châtelperronian), "Middle Aurignacian" (the actual early Aurignacian), and "Upper Aurignacian" (the actual Gravettian); these were all clustered within pre-Solutrean sites (Breuil 1909–1911).

Twenty-five years later, D. Peyrony put the emphasis on what he called the Perigordian complex (*Périgordien complex* in French). He suggested that the Châtelperronian and the Gravettian were part of the same phylum, as they shared an emphasis on backed pieces with abrupt retouches. The "Middle Aurignacian" would be indeed intrusive in southwestern France and would have developed there, while the Perigordian would have found refuge in remote places and would be indeed only exceptionally visible in the archaeological record (Peyrony 1936).

With the start of the second half of the twentieth century, Peyrony's theory and the Perigordian phylum started to be disputed, first by H. Delporte. From his excavation and study of Châtelperron and La Gravette, Delporte advocated that these industries are not genetically related and should be named Châtelperronian and Gravettian (Delporte 1954). D. Sonneville-Bordes argued that the second stage of the Perigordian complex, the "Périgordien II," results from mixing the Aurignacian with some intrusive backed pieces (Sonneville-Bordes 1955). However, Sonneville-Bordes as well as others (including F. Bordes and L. Pradel), were convinced of the evolutionary link between what they renamed the Lower Perigordian (equivalent of the former Perigordian I, i.e., the Châtelperronian) and the Upper Perigordian (actual Gravettian). They used the interstratification Châtelperronian and Aurignacian recognized in 1967 at Le Piage and Roc-de-Combe as evidence of contemporaneity of the two industries (see references to original publications in Bordes 2003). And, they indeed supported Peyrony's view that the Aurignacian episode was caused by the intrusion of a non-local group into the Perigordian territory.

The debate went on through the 1960s but lost some of its interest during the following two decades. It eventually shifted towards the independence between the Châtelperronian and Gravettian when the first radiometric dates showed that the two industries were separated by about 10,000 years (Mellars et al. 1987). The interstratification between the Châtelperronian and Aurignacian were also shown to be not of anthropic origin and related to geological disturbance (Bordes 2003). Finally, another attempt to support potential interstratification (Gravina et al. 2005), or at least evidence for contemporaneity between the Aurignacian and Châtelperronian, was recently put forward but seems to suffer from insufficient demonstration (see Zilhão et al. 2008).

In fact, the major change of perspective on the Châtelperronian came at the end of the 1970s and was caused by the unexpected discovery of Neanderthal remains, and noticeably an almost complete skeleton, in a Châtelperronian context (Lévêque and Vandermeersch 1980). The Gravettian, Aurignacian, and Châtelperronian were not only technically different industries but were also generated by two biologically different human populations. The equation between the Middle Paleolithic type industry and Neanderthals, or Upper Paleolithic type industry and anatomically modern humans, then started to be questioned in Europe, as it had already been questioned in the Near East.

The Makers of the Châtelperronian

Châtelperronian human remains (some of which are illustrated in Fig. 1) are overwhelmingly more abundant than human remains found in the late Mousterian or in early phases of the Aurignacian. There are 29 isolated teeth, one temporal bone, and other fragmentary remains in the Châtelperronian from Grotte du Renne at Arcy-sur-Cure. All the teeth but one were assigned to the reference Neanderthal group with posterior probabilities ranging from 59% to 99.9% (Bailey and Hublin 2006). The morphology of the Grotte du Renne inner ear preserved in the temporal bone is typical of Neanderthal morphology (Hublin et al. 1996). Châtelperronian human remains also include one nearly complete skeleton and some extra isolated teeth found at Saint-Césaire (Lévêque and Vandermeersch 1980). Taxonomic attribution for the Saint-Césaire skeleton has been confirmed by several authors, and the Saint-Césaire isolated teeth also display a Neanderthal morphological pattern (Bailey and Hublin 2006). By comparison, the number and quality of human remains attributed to the Protoaurignacian are much lower, only some fetal remains and one deciduous tooth, and none of them are diagnostic (Hublin in press).

Nevertheless, the view that the Châtelperronian was made by Neanderthals was recently challenged, primarily by questioning the stratigraphic integrity

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 1 Châtelperronian human remains from Grotte du Renne at Arcy-sur-cure (**a**: teeth and **b**: temporal bone), and from Saint-Césaire (**c**: in-situ skeleton and **d**: close up of the skull of the skeleton after reconstruction) (After Bailey and Hublin 2006; Hublin et al. 1996; photo of the cast of the in-situ skeleton © Soressi)

of key sites, rather than discovering new human remains that would have directly challenged the Neanderthal signal for the Châtelperronian. It was suggested that Neanderthal remains found at the Grotte du Renne result from contamination from underlying Mousterian layers. This conclusion was reached thanks to the analysis of a series of ^{14}C AMS dates that were inconsistently variable in the Châtelperronian layer (Higham et al. 2010). However, 31 new ^{14}C measurements falsify the notion that large-scale movements of archeological material occurred between the Mousterian, Châtelperronian, and Proto-Aurignacian layers at the Grotte-du-Renne and questioned the sampling methodology in the first study (Hublin et al. 2012; see details below in the chronology section). Reworking of the Neanderthal remains from the underlying Mousterian layers is inconsistent with the fact that these Mousterian layers contained very few human remains, and last but not least Neanderthal remains were found throughout the four Châtelperronian layers at Grotte du Renne, not only the lowermost one (Hublin et al. 2012).

The Neanderthal nature of the makers of the Châtelperronian was also indirectly challenged by criticizing the local origin of the Châtelperronian. If the origin of the Châtelperronian is not within the local Mousterian of Acheulean Tradition type B, as put forward first by H. Breuil (1909–11), it opens the door for a non-Neanderthal origin. This hypothesis is also intriguing inasmuch as anatomically modern human remains had been recently published in another so-called "transitional" industry: the Uluzzian from Italy (Benazzi et al. 2011). Yet, arguments for a local Mousterian of Acheulean Tradition origin for the Châtelperronian are as follows:

1. The Mousterian of Acheulean Tradition and the Châtelperronian share a unique interest for backing tools and for unretouched backed blanks,
2. They also share a unique combination of elongated and backed blanks or retouched tools, which does not exist in any other contemporaneous industry,
3. The necessity to obtain backed artifacts (retouched and unretouched) is actually guiding the production of Mousterian of Acheulean Tradition elongated flakes (Pelegrin and Soressi 2007; Soressi 2005) as well as the production of Châtelperronian blades (Roussel 2011 and in press). Backed elongated flakes and backed blades (i.e. with an asymmetrical transversal section) are obtained directly during the production. The method used to produce blanks within the two industries is relying on the obtainment of a high quantity of backed blanks, some of which will be retouched. Some extra backed artifacts, retouched backed knifes and châtelperron points, are obtained through a-posteriori retouch of blanks symmetric in section.
4. Geographic distribution of the Châtelperronian matches outstandingly that of the Mousterian of Acheulean Tradition (Fig. 2), and they are chronologically compatible (Soressi 2005).

Geographic Distribution

The Châtelperronian point or knife is quite distinctive from other Paleolithic retouched artifacts and allows for a quite easy diagnosis of Châtelperronian sites (Pelegrin and Soressi 2007). The map of Châtelperronian sites is indeed reliable. In contrast to other industries of the Middle or Upper Paleolithic, the geographic distribution of Châtelperronian sites is relatively small (Fig. 3). A little more than 40 sites have been recognized on an arch about 300 km wide, which fits closely the west half of the Massif Central. They are found from Burgundy, with the famous site Grotte du Renne at Arcy-sur-Cure, extending through the Dordogne Valley, down to Cantabria, with Cueva Morin, and the Oriental Pyrenees with Le Portel (Fig. 3). No Châtelperronian sites were found in the Rhone valley, in southeastern France, or in northeastern France, in the heart of the Parisian basin or in Brittany.

Dating

The Châtelperronian is always interstratified between Mousterian and Aurignacian layers (see details about putative stratification Châtelperronian/Aurignacian/Châtelperronian above). If this stratigraphic position is clear, precise dating of

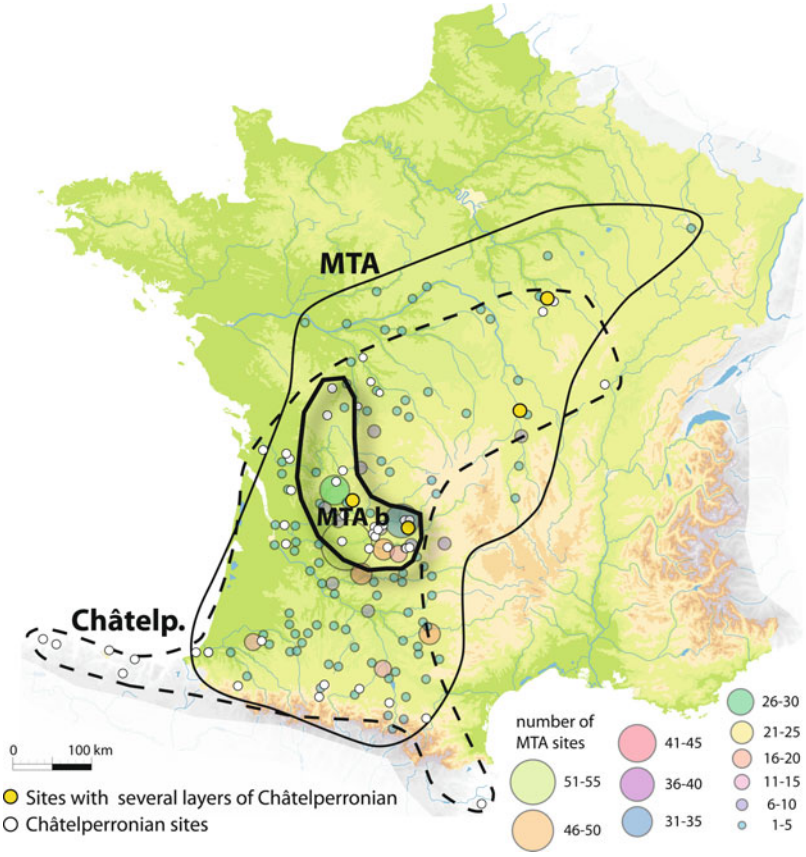

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 2 Map of the distribution of the Mousterian of Acheulean Tradition (MTA; *bolded line*), the Mousterian of Acheulean Tradition type b (*shaded line*) and the Châtelperronian (*dotted line*)

the Châtelperronian with radiometric methods is nonetheless difficult. The ^{14}C method is at the edge of its time range, and the radiocarbon community agreed only recently on a calibration curve for the time range covered by the Châtelperronian. Specific methods were recently developed to cope with the very low percentage of carbon 14 contained in such old samples as well as with contamination issues (Higham et al. 2010; Hublin et al. 2012).

How to properly date Châtelperronian samples is intensely debated, as illustrated by a series of papers published on the Grotte du Renne deposits. First, 31 accelerator mass spectrometry (AMS) ultrafiltrated dates on bones, antlers, bone artifacts, and teeth indicated that the Châtelperronian from Grotte du Renne was 44 to 40,000 years old (cal. BP). The high degree of intralayer variation in the radiometric dates obtained was used by the authors to support admixture between the Châtelperronian, Mousterian, and Protoaurignacian (Higham et al. 2010). It is interesting to note that this latter conclusion was put forward assuming that enough progress has been made within ^{14}C dating to make it totally reliable and to become a piece of data supporting site integrity on its own. This former conclusion was first contested and discussed in a series of papers that showed that there were several arguments grounded on the study of the archaeological material to show that there was no major mixing between layers at the Grotte du Renne. Also, 35 new measurements were recently performed with a different sampling strategy aiming at the acquisition of well-preserved collagen, by selecting bigger and thicker samples of cortical bone (Hublin et al. 2012). These have shown that:

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 3 Map of Châtelperronian sites (sites with several layers of Châtelperronian are indicated in *yellow*) (modified from Pelegrin and Soressi 2007 and from Roussel 2011)

1. younger ages obtained by the first study were certainly related to a low collagen content
2. no mixing could be deduced from new AMS ^{14}C measurements done on bone with high percentage of collagen content,
3. the age of the Châtelperronian at the site fits between 45,000 and 40,500 years cal. BP with a 2 sigma range. This fits with other ages obtained at other sites with the same method (Fig. 4).

Characteristics of the Châtelperronian Lithic Industry

The first extensive study of Châtelperronian lithic industries was done by F. Harrold (1978), who studied 19 Châtelperronian assemblages from France and northern Spain (after having reviewed more than 100 potential Châtelperronian assemblages). Using Sonneville-Bordes and Perrot stone-tool type lists, Harrold highlighted the

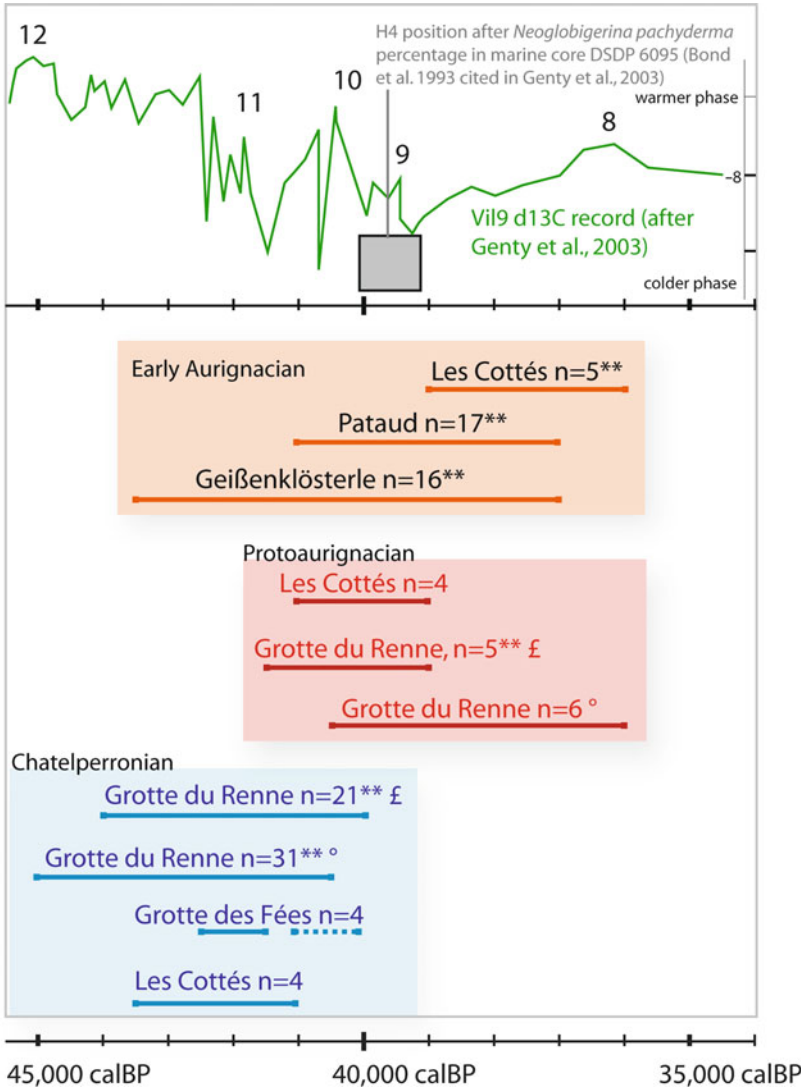

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 4 Two sigma intervals for ages obtained using AMS and ultrafiltrated ^{14}C samples and calculated using a Bayesian model of Châtelperronian and other western European contemporaneous Early Upper Paleolithic industries. Les Cottés: see Talamo et al. 2012; Grotte de Fées: see Gravina et al. 2005; Grotte du Renne: see Higham et al. 2010; Hublin et al. 2012; Pataud: see Higham et al. 2011 cited in Higham et al. 2012; Geißenklösterle: see Higham et al. 2012. The number of samples is indicated. ** indicates that more than one level was studied. D13C record from the Villars stalagmite indicates a probable warm short event as recorded on the continent in the north of the Aquitaine basin (see Genty et al. 2003). The position of the Heinrich event 4 is also indicated after Bond et al. 1993, cited in Genty et al. (2003)

recurrent features of the Châtelperronian. He showed that the Châtelperron points/knives are typical of the Châtelperronian, and they count for up to 60% of the typological count. Châtelperron points or knives go with end-scrapers and burins. The typological spectra of these Châtelperronian assemblages allowed Harrold to conclude that the Châtelperronian is a *"distinct lithic tradition of the earliest Upper Palaeolithic"* (Harrold 1978: 435).

A new approach to the Châtelperronian lithic industry was brought in by J. Pelegrin in the mid-1980s (Pelegrin 1995). From his analysis of cores, stone-tools, and by- and end-products found at two Châtelperronian sites in southwestern France (Roc-de-Combe and La Côte), he provided the first description of the Châtelperronian "*chaîne opératoire*." For a long time, his study was in fact one of the rare detailed *chaîne opératoire* analyses available for the Late Pleistocene. Pelegrin showed that Châtelperronian cores are aimed toward the production of rectilinear blades, and that they are organized with a narrow and wide surface, the narrow surface being a maintenance surface. Blades obtained on the wide surface and with regular edges are selected to be retouched into Châtelperron knives or points. Larger and thicker blades are retouched into end-scrapers, burins, or retouched blades. End-scrapers are also made out of flakes produced during the shaping of the core.

From a detailed analysis of blade platforms, Pelegrin argued for the use of a soft hammer or a soft stone hammer during Châtelperronian blade production (Pelegrin 1995: 252). Scarce bladelet production was observed in both sites, but without any evidence of retouched bladelets.

Pelegrin argued that Châtelperronian lithic production is specific and shows strong differences from that of the Early Aurignacian. He indeed concluded that differences between Châtelperronian and early Aurignacian debitage did not support the hypothesis of an acculturation of the last Neanderthals by the first anatomically modern Humans (d'Errico et al. 1998). However, Pelegrin actually brought new data supporting a link between the Mousterian of Acheulean Tradition type B and the Châtelperronian. From his analysis of two MTA B assemblages, he showed that the MTA B and the Châtelperronian shared an emphasis on backed pieces made on elongated flakes or blades. This was later one confirmed by extensive analysis of several other MTA B assemblages (Soressi 2005). Pelegrin main point was that this peculiar retouched tool should be linked to a specific kind of hafting, and indeed reflects a similar technical answer to comparable needs (Pelegrin 1995; Pelegrin and Soressi 2007).

Building on Pelegrin's pioneering work, a detailed analysis of the Grotte du Renne at Arcy-sur-Cure began. The totality of this abundant collection was studied by N. Connet (2002). She refined the understanding of variations through time and showed an increasing use of flint relative to other raw materials, coupled with an increasing use of blades. Backed pieces are more elongated and less curved toward the top of the sequence. Connet (2002) also insisted on the fully "Upper Palaeolithic character" of the Châtelperronian from the Grotte du Renne. There is no elaborated flake production at Grotte du Renne, as already seen in other Châtelperronian assemblages by Pelegrin (1995), and recently confirmed by Roussel (2011) and Bachellerie (2011).

The first use-wear analysis of Châtelperronian points/knives from Grotte du Renne showed that they were used as knives and also certainly as projectile tips (Plisson and Schmider 1990).

A more refined description of Châtelperronian blade production, as well as a precise first description of the bladelet production, was recently done from first-hand analysis of three Châtelperronian layers from Quinçay (Roussel and Soressi 2010; Roussel 2011). At Quinçay, the Châtelperronian sequence is sealed by a large roof fall and there is no other Upper Paleolithic layer documented in stratigraphy: contamination from more recent Upper Paleolithic industry is indeed improbable. The recent technological analysis showed that blades are removed by independent series on narrow and on wide surfaces of the core (Roussel in press). Each surface of a blade core is an independent flaking surface (Fig. 5). Blade cores show mainly a triangular section. Blades symmetrical in section as well as blades asymmetrical in section are produced. The latter are obtained at the intersection of two angular surfaces (Fig. 6). Châtelperronian blade production is qualified as a *"two step rhythm on an angular flaking surface."* Blades with strong metrical norm, noticeably minimum thickness and minimum width, as well as technical norm are selected for Châtelperron points/knives. The size of Châtelperronian points ranges between fixed minimum and maximum dimensions. This norm is constant throughout the sequence at Quinçay (Roussel and Soressi 2010; Roussel 2011) and appears to be similar to the one in southwestern France (Bachellerie 2011: 351–354). Quinçay analysis also suggests that semi-circular end-scrapers retouched on large cleaning flakes removed at the end of the blade production on blade core might be another type fossil for the Châtelperronian (Fig. 7: o and p). The blank seems to be specific to Châtelperronian blade production, as well as to the location of the retouch (Roussel 2011, in press).

Bladelet production is documented in the three Châtelperronian layers from Quinçay and follows a method similar to the one used for the blade production. However, bladelet cores are not reduced blade cores. Bladelet production is independent from blade production, and is done on already small blocks. Bladelets are long and slightly curved and are mainly retouched with marginal and inverse retouches on one edge only (Roussel 2011). Bladelet production would also be documented in southwestern France, but the rarity of retouched bladelets as well as potential

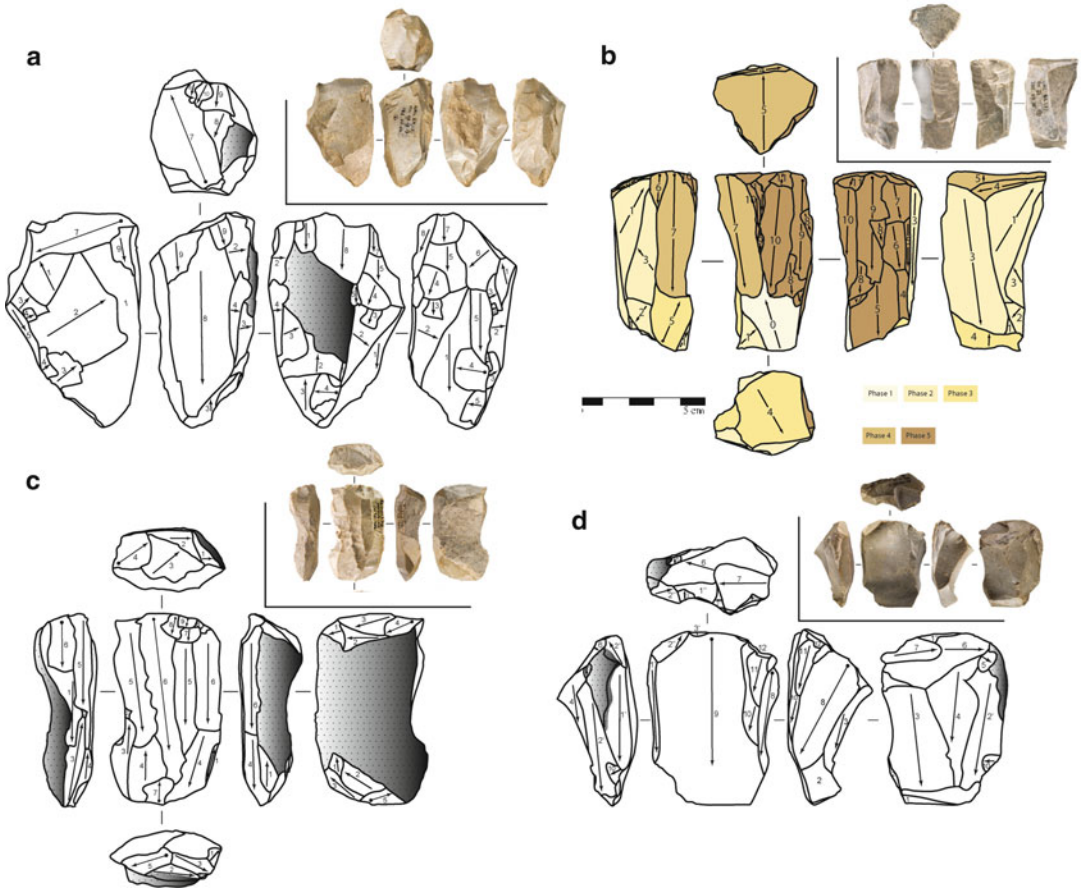

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 5 Châtelperronian blade cores from Quinçay (After Roussel in press) abandoned at different stages. (**a**) Initialized core with a dissymmetrical volume, (**b**) Core exploited on two surfaces with a triangular section, (**c**) Core exploited on the wider surface with a testimony of a previously exploited narrow surface, on the right, (**d**) Core with a large cleaning flake on the wider surface

biases in assemblages excavated before the systematization of fine screening make it difficult to interpret (Bachellerie 2011: 367–368). Comparison with the Protoaurignacian production allows the suggestion of stimulus diffusion between Protoaurignacian and Châtelperronian groups (Roussel 2011; and see below).

Personal Ornaments, Bone-Tools, and Pigments in the Châtelperronian

Personal ornaments and bone-tools are rare within the Châtelperronian, but one site, Grotte du Renne, revealed a significant collection (Hublin et al. 1996; d'Errico et al. 1998, 2001; Carron et al. 2011; Fig. 8). About 40 personal ornaments were found at Grotte du Renne, and 6 pierced teeth were also found at Quinçay (Granger and Lévêque 1997). Some of the bone-tools from Grotte du Renne are decorated. At first, they were interpreted as resulting from exchange with Aurignacian groups because they show some similarities with personal ornaments discovered in the above Protoaurignacian layer (Hublin et al. 1996). Later, it was shown that bone tools manufacturing waste are present at the site during the Châtelperronian, which does not support the exchange hypothesis for the bone-tools (d'Errico et al. 2001). It was also shown that the highest number of bone-tools is

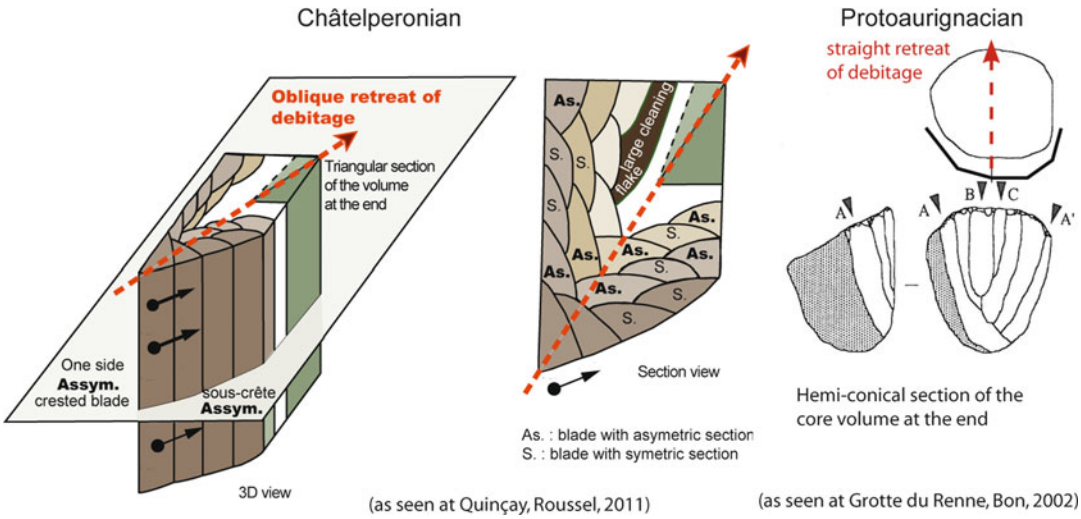

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 6 Schematization of blade production in the Châtelperronian and in the Protoaurignacian (After Roussel in press)

found in the lower and richest Châtelperronian layer at the Grotte du Renne, and that they are found in areas that do not correspond to areas where the Aurignacian bone-tools are found in overlying deposits. Contamination from the above Aurignacian layers is indeed unlikely (d'Errico et al. 2001; Caron et al. 2011). Study of perforation techniques has shown that pressure or percussion techniques after thinning by scraping were preferentially used at Quinçay (Granger and Lévêque 1997). Meanwhile, percussion techniques seem more variable at Grotte du Renne and are similar to the perforation techniques used during the Aurignacian (White 2001).

More than 20 kg of pigment, as well as pigment grinding tools, have been discovered at Grotte du Renne. Black and red pigments had been used (without heating), mostly as coarse powder to cover large surface areas, soils, or hides, and also as fine and highly coloring powder (Salomon 2009).

Contacts with Contemporaneous Groups

The existence of contacts between Châtelperronian and Aurignacian groups was intensely debated during the late 1990s. The lithic industry was quickly identified as being clearly different from the Aurignacian (Pelegrin 1995; d'Errico et al. 1998). Nonetheless, the fact that bone-tools and personal ornaments were not intrusive (d'Errico et al. 1998; Carron et al. 2011) seemed irreconcilable with the fact that some of them looked like the Aurignacian specimens and used techniques similar to the Aurignacian techniques (White 2001). Also, the development of these behaviors in indigenous groups when Aurignacian groups were entering Europe appeared to be an *"impossible coincidence"* (Mellars 2005).

The recent analysis of Quinçay bladelet production as well as a precise comparison of the blade production within the Protoaurignacian shed new light on the question of contacts. The method, as well as the goals, of the Châtelperronian blade production is clearly different from that of the Protoaurignacian. For the Protoaurignacian, the core volume is symmetric instead of being asymmetric in section, the flaking surface is large and integrates edges of the core, and the blade production is continuous all over the surface and is divided in series on each side of the core. The production rhythm is continuous on a large and curved surface and is in essence very different from the *"two step rhythm on an angular flaking surface."* Moreover, the Protoaurignacian blades do not show any asymmetrical section, and they are removed from a platform that is more oblique relatively to the debitage surface than the

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 7 **a** to **l**: Châtelperronian knives/points; **m**: Audi type knife; **n** to **r**: semi-circular end-scrapers, including two (**o** and **p**) which were manufactured on a large cleaning flake extracted at the end of the blade production, and which might be another type fossil of the Châtelperronian. All artifacts are from Quinçay (After Roussel and Soressi 2010)

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 8 Châtelperonian personal ornaments, bone-tools and pigments from La Grotte du Renne at Arcy-sur-Cure (Reproduced after Carron et al. 2011)

Châtelperronian one (Roussel 2011, in press). Bladelets are obtained following a method similar to the one used for blades in both industries; they are indeed different in the Châtelperronian and in the Protoaurignacian. However, the goal is similar: obtaining bladelets with marginal and inverse retouches on one edge, i.e., Dufour sub-type Dufour bladelets (Roussel 2011).

According to the theoretical model put forward by G. Tostevin (2007), sharing a common goal and using a different method of production can be interpreted as a testimony of the effects of stimulus diffusion. Stimulus diffusion implies that ideas are diffused inside a territory of one group from an adjacent one. These ideas are reinterpreted by the borrower group, depending on the contact type between the two groups, and noticeably depending on the level of social intimacy. Episodic contacts at places with a low degree of social intimacy, like along the pathways, are opposite to intimate contact at residential sites where not only the end-product can be observed but also the process of manufacturing it can be observed, learned, and reproduced. Depending on the degree of social intimacy and social organization of each group, the results of contact would vary from conservatism up to total integration of procedures (Tostevin 2007). Given the geography and the age of the Châtelperronian and of the Protoaurignacian (see above), given the similarity between Protoaurignacian retouched bladelets that could have been lost during the hunt along pathways, and given the fact that they were produced using different processes, it is indeed probable that the idea of Dufour bladelets diffused from one group to the other. This could have been the case on pathways, for instance, and would then imply a low degree of social intimacy between the two groups (Roussel 2011). The nature and style of personal ornaments could also be explained by a similar process.

Conclusions

The Châtelperronian is an early Upper Paleolithic industry with blade and bladelet production, personal ornaments and bone-tool production and use,

and without any formal flake production. The debate around it fundamentally changed when an almost complete Neanderthal skeleton was discovered and associated with it at Saint-Césaire, confirming the earliest discoveries of Neanderthal remains made at Grotte du Renne. From then on, what was initially considered as a fully Upper Paleolithic industry started to be called a "transitional industry" in order to reconcile the archaic biology of the authors and the advanced nature of the industry. Nonetheless, except at some exceptional sites, the Châtelperronian is a well-defined and fully Upper Paleolithic industry that is neither a mix nor an intermediary between industries, as suggested by the unfortunate term "transitional." It is only transitional because it is in stratigraphic sequences after the Mousterian and before any other Upper Paleolithic industry.

The Châtelperronian is always replaced by the Aurignacian: the stratigraphic position of the Châtelperronian suggests a global shift. Still, this does not preclude contemporaneity and long-distance contact between the Neanderthal makers of the Châtelperronian and other groups, especially with anatomically modern humans using Protoaurignacian technology. The diffusion of the idea of Dufour bladelets from one group to the other, in the absence of diffusion of the process used to manufacture them, would imply a low degree of social intimacy and only episodic contacts on non-residential sites.

Cross-References

- ▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
- ▶ *Homo neanderthalensis*
- ▶ Neanderthals and Their Contemporaries

References

Bachellerie, F. 2011. Quelle unité pour le Châtelperronien? Apport de l'analyse taphonomique et techno-économique des industries lithiques de trois gisements aquitains de plein air: le Basté, Bidart (Pyrénées-Atlantiques) et Canaule II (Dordogne). Unpublished PhD dissertation, Bordeaux I (France) University.

Bailey, S.E., and J.-J. Hublin. 2006. Dental remains from Grotte du Renne at Arcy-sur-Cure (Yonne). *Journal of Human Evolution* 50: 485–508.

Benazzi, S., K. Douka, C. Fornai, C.C. Bauer, O. Kullmer, J. Svoboda, I. Pap, F. Mallegni, P. Bayle, M. Coquerelle, S. Condemi, A. Ronchitelli, K. Harvati, and G.W. Weber. 2011. Early dispersal of modern humans in Europe and implications for Neanderthal behaviour. *Nature* 479: 525–528.

Bon, F. 2010. Les aurignaciens et l'émergence du Paléolithique supérieur. In *La France préhistorique. Un essai d'histoire*, ed. J. Clottes, 116–141. Paris: Gallimard.

Bond, G., W. Broecker, S. Johnsen, J. McManus, L. Labeyrie, J. Jouzel, and G. Bonani. 1993. Correlations between climate records from North Atlantic sediment and Greenland ice. *Nature* 365: 143–147.

Bordes, J.-G. 2003. Lithic taphonomy of the Châtelperronian/Aurignacian interstratifications in Roc de Combe and Le Piage (Lot, France). In *The chronology of the Aurignacian and of the transitional technocomplexes: dating, stratigraphies, cultural implications*, Trabalhos de Arqueologia 33, ed. J. Zilhão and F. d'Errico, 223–244. Lisboa: Instituto Português de Arqueologia.

Breuil, H. 1909–1911. Études de emorphologie paléolithique. *Revue de l'École d'Anthropologie de Paris* 19: 320–340. 21, 29–40; 21, 66–76.

Carron, F., F. D'Errico, P. Del Moral, F. Santos, and J. Zilhão. 2011. The reality of Neandertal symbolic behavior at the Grotte du Renne, Arcy-sur-Cure, France. *PLoS One* 6: e21545. https://doi.org/10.1371/journal.pone.0021545.

Connet, N. 2002. Le Châtelperronien: Réflexions sur l'unité et l'identité techno-économique de l'industrie lithique. L'apport de l'analyse diachronique des industries lithiques des couches Châtelperroniennes de la Grotte du Renne a Arcy-sur-Cure (Yonne). Unpublished PhD dissertation, Lille 1 (France) University.

de Sonneville-Bordes, D. 1955. La question du Périgordien II. *Bulletin de la Société préhistorique française* 52: 87–203.

Delporte, H. 1954. Le Périgordien. *Bulletin de la Société préhistorique française* 51: 44–48.

D'Errico, F. 2003. The invisible frontier: a multiple species model for the origin of behavioral modernity. *Evolutionary Anthropology* 12: 188–202.

D'Errico, F., J. Zilhão, M. Julien, D. Baffier, and J. Pelegrin. 1998. Neanderthal acculturation in western Europe? A critical review of the evidence and its interpretation. *Current Anthropology* 39: S1–S44.

D'Errico, F., M. Julien, D. Liolios, D. Baffier, and M. Vanhaeren. 2001. Les poinçons en os des couches châtelperroniennes et aurignaciennes de la grotte du Renne (Arcy-sur-Cure, Yonne): Comparaisons technologiques, fonctionnelles et décor. In *Approches fonctionnelles en préhistoire*, ed. P. Bodu and C. Constantin, 45–66. Paris: Société préhistorique française.

Genty, D., D. Blamart, R. Ouahdi, M. Gilmour, A. Baker, J. Jouzel, and S. Van-Exter. 2003. Precise dating of Dansgaarde Oeschger climate oscillations in western Europe from stalagmite data. *Nature* 421: 833–837.

Granger, J.-M., and F. Lévêque. 1997. Parure castelperronienne et aurignacienne: étude de trois séries inédites de dents percées et comparaisons. *Comptes Rendus de l'Académie des Sciences de Paris* 325: 537–543.

Gravina, B., P. Mellars, and C. Bronk Ramsey. 2005. Radiocarbon dating of interstratified Neanderthal and early modern human occupations at the Châtelperronian type-site. *Nature* 438: 51–56.

Harrold, F.B. 1978. *A study of the Châtelperronian*. Unpublished PhD dissertation, Chicago Faculty.

Higham, T., R. Jacobi, M. Julien, F. David, L. Basell, R. Wood, W. Davies, and C. Bronk Ramsey. 2010. Chronology of the Grotte du Renne (France) and implications for the context of ornaments and human remains within the Châtelperronian. *Proceeding of the National Academy of Science* 107: 20234–20239.

Higham, T.F.G., R.M. Jacobi, L. Bassell, C. Bronk Ramsey, L. Chiotti, and R. Nespoulet. 2011. Precision dating of the Palaeolithic: a new radiocarbon chronology for the Abri Pataud (France), a key Aurignacian sequence. *Journal of Human Evolution* 61: 549–563.

Higham, T., L. Basell, R. Jacobi, R. Wood, C. Bronk Ramsey, and N.J. Conard. 2012. Testing models for the beginnings of the Aurignacian and the advent of figurative art and music: The radiocarbon chronology of Geißenklösterle. *Journal of Human Evolution* 62: 664–676.

Hublin, J.-J. in press. The makers of the Early Upper Paleolithic in western Eurasia. In *Origins of modern humans: Biology reconsidered: 223–52*, ed. F.H. Smith and J.C.M. Ahern. Wiley-Blackwell: West Sussex.

Hublin, J.-J., F. Spoor, M. Braun, F. Zonneveld, and S. Condemi. 1996. A late Neanderthal associated with Upper Palaeolithic artefacts. *Nature* 381: 224–226.

Hublin, J.-J., S. Talamo, M. Julien, F. David, N. Connet, P. Bodu, B. Vandermeersch, and M.P. Richards. 2012. Radiocarbon dates from the Grotte du Renne and Saint-Césaire support a Neandertal origin for the Châtelperronian. *Proceedings of the National Academy of Sciences*. www.pnas.org/cgi/doi/10.1073/pnas.1212924109

Lévêque, F., and B. Vandermeersch. 1980. Découverte de restes humains dans un niveau castelperronien à Saint-Césaire (Charente-Maritime). *Comptes Rendus de l'Académie des Sciences de Paris* 291: 187–189.

Mellars, P. 2005. The impossible coincidence. A single-species model for the origins of modern human behavior in Europe. *Evolutionary Anthropology* 14: 12–27.

Mellars, P., and C. Stringer. 1989. *The human revolution: Behavioural and biological perspectives on the origins of modern humans*. Edinburgh: Edinburgh University Press.

Mellars, P., H.M. Bricker, A.J. Gowlett, and R.E.M. Hedges. 1987. Radiocarbon accelerator dating of French Upper Palaeolithic sites. *Current Anthropology* 28: 128–133.

Pelegrin, J. 1995. *Technologie lithique: le Châtelperronien de Roc-de-Combe (Lot) et de La Côte (Dordogne)*. Paris: CNRS.

Pelegrin, J., and M. Soressi. 2007. Le Châtelperronien et ses rapports avec le Moustérien. In *Les Néandertaliens. Biologie et cultures*, ed. B. Vandermeersch and B. Maureille, 297–309. Paris: CTHS.

Peyrony, D. 1936. Le Périgordien et l'Aurignacien (Nouvelles observations). *Bulletin de la Société préhistorique française* 33: 616–619.

Peresani, M., I. Fiore, M. Gala, M. Romandinin, and A. Tagliacozzo. 2011. Late Neandertals and the intentional removal of feathers as evidenced from bird bone taphonomy at Fumane Cave 44 ky B.P., Italy. *Proceeding of the National Academy of Science* 108: 3888–3893.

Plisson, H., and B. Schmider. 1990. Étude préliminaire d'une série de pointes de Châtelperron de la grotte du Renne à Arcy-sur-Cure. Approche morphométrique, technologique et tracéologique. In *Paléolithique moyen récent et Paléolithique supérieur ancien en Europe. Ruptures et transitions: examen critique des documents archéologiques*, ed. C. Farizy, 313–318. Nemours: Association pour la Promotion de la Recherche Archéologique en Ile de France.

Roussel, M. in press. Méthodes et rythmes du débitage laminaire au Châtelperronien: comparaison avec le Protoaurignacien. *Comptes Rendus Palevol*.

Roussel, M. 2011. Normes et variations de la production lithique durant le Châtelperronien: la séquence de la Grande-Roche-de-la Plématrie à Quinçay (Vienne). Unpublished PhD dissertation, Paris Ouest Nanterre – La Défense (France) University.

Roussel, M., and M. Soressi. 2010. La Grande Roche de la Plématrie à Quinçay (Vienne). L'évolution du Châtelperronien revisitée. In *Préhistoire entre Vienne et Charente - Hommes et sociétés du Paléolithique*, ed. J. Buisson-Catil and J. Primault, 203–219. Chauvigny: Association des Publications Chauvinoises.

Salomon, H. 2009. Les matières colorantes au début du Paléolithique supérieur: sources, transformations et fonctions. Unpublished PhD dissertation, Bordeaux I (France) University.

Soressi, M. 2005. Late Mousterian lithic technology. Its implications for the pace of the emergence of behavioural modernity and the relationship between behavioural modernity and biological modernity. In *From tools to symbols*, ed. L. Backwell and F. d'Errico, 389–417. Johanesburg: University of Witswatersand Press.

Talamo, S., M. Soressi, M. Roussel, M.P. Richards, and J.-J. Hublin. 2012. A radiocarbon chronology for the complete Middle to Upper Palaeolithic transitional sequence of Les Cottés (France). *Journal of Archaeological Science* 39: 175–183.

Tostevin, G.B. 2007. Social intimacy, artefact visibility and acculturation models of Neanderthal-Modern Human interaction. In *Rethinking the human revolution. New*

E

behavioural and biological perspectives on the origin and dispersal of modern humans, ed. P. Mellars, K. Boyle, O. Bar-Yosef, and C. Stringer, 341–357. Cambridge: McDonald Institute for Archaeological Research.

White, R. 2001. Personal ornaments from the Grotte du Renne at Arcy-sur-Cure. *Athena Review* 2: 41–46.

Zilhão, J., F. D'errico, J.-G. Bordes, A. Lenoble, J.-P. Texier, and J.-P. Rigaud. 2008. Grotte des Fées (Châtelperron): History of research, stratigraphy, dating, and archaeology of the Châtelperronian type-site. *PaleoAnthropology* 2008: 1–42.

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism

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Introduction

Where, Why, and How

In this entry, I discuss, albeit briefly, the evolutionary development and research history relating to Upper Paleolithic parietal rock art in Europe which, based on current research, probably represents more than 30,000 years of artistic endeavor. The physical act of producing art is not confined to engravings and paintings on static surfaces; a significant portable art assemblage comprising engraved antler, bone, and ivory, and often occurring alongside cave and rock-shelter rock art, is also attested over the same period. Cave contexts have, in addition, revealed sculptures (e.g., *finger flutings*) and bas-relief images carved from clay, such as the two clay bison at Tuc d'Audoubert (Ariége), the sculpted head of a horse at Camargue in the Dordogne, and plaquettes – simple animal- and human-engraved images on stone and clay tablets. In the past labeling, these assemblages as "art" have proved contentious (see Ucko and Rosenfeld 1967); it is my view that these aesthetically potent artistic forms represent a visual communication but, at the same time, that it was probably restricted to certain members of a stratified society, possibly as part of a process of initiation or a way of a community communicating with the spirit world, deep within the recesses of a cave (Clottes 2004).

A quarter of a century ago, research was focused on two areas: southwest France and northern Spain, that is, the Franco-Cantabrian region. However, during the early 1990s following a number of major dam projects affecting several major river systems in northern and central Portugal, engraved Upper Paleolithic rock art was discovered on a large number of open-air rock panels within the Douro, Tejo, and Tagus Basins and, in particular, in the Cô a, Ocreza, and Zezere Valleys and along the Guadiana River.

Based on discoveries elsewhere, it was becoming clear that the phenomenon of carving and painting reached well-beyond the Franco-Cantabrian region, extending into areas of Atlantic, Mediterranean, and southeast Europe and as far north as the British Isles. More significant (and indeed controversial) is the recent use of chronometric dating at a number of rock-art sites, including the famous Altamira and El Castillo caves in northern Spain, the results of which place the art in an almost inconceivably early time frame, contemporary with the presence of Neanderthals in southern Europe (Pike et al. 2012).

The geographical range of Upper Paleolithic rock art remains a major source of contention among specialists. However, recent years have witnessed the discovery of painted and engraved imagery of this period in the British Isles (Bahn and Pettitt 2009; Nash et al. 2012), Hungary, Germany (Bahn and Vertut 1988), and Romania (Clottes et al. 2011), extending considerably the known geographic range (Fig. 1).

Until the mid-1990s around 300 parietal art sites were known, mostly within the limestone

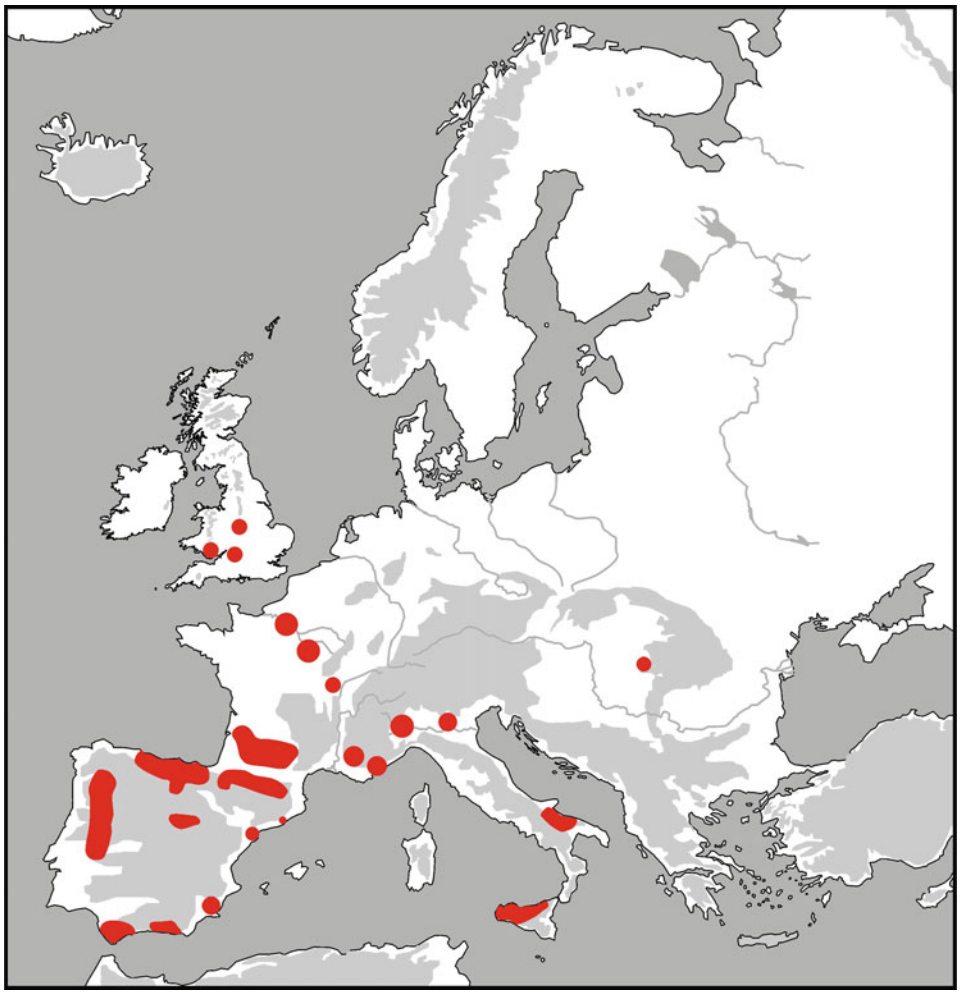

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 1 The rock-art core areas of Upper Paleolithic Europe

gorges and deep river valleys of the Dordogne, Loire, and Pyrenees regions of southwest France and the limestone mountain cliffs of northern coastal Spain (Bahn and Vertut 1997). The last century saw the discovery of a spectacular repertoire of images, mainly comprising vibrant and naturalistic depictions of animals and utilizing a variety of ingenious techniques.

The techniques employed by the artiest varied from region to region. The Franco-Cantabrian region is characterized largely by the use of organic or inorganic pigments applied to mainly smooth contoured panels on cave walls or ceilings using fingers, sticks, or feathers. Shades of red ochre (or hematite) or charcoal are commonly used, and it is from minute fragments of charcoal within the pigment that scientists have obtained dating evidence using chronometric methods (e.g., Accelerator Mass Spectrometry [AMS]). Caves possessing paintings may also contain engravings and examples of finger fluting (created onto wet or soft clay), suggesting the cave was frequented by different artists at different times. Pecking was evidently the preferred engraving technique on open-air panels, used especially in northern and central Portugal and Spain, where large superimposed images of animals such as bison and horse are found. The

topography of the panel was also widely used (e.g., at Chauvet Cave), enabling the artist to create sometimes three-dimensional figures.

Historical Background: You Reap What You Sow

The initial period of discovery and interpretation spanned the late nineteenth/early twentieth century and focused principally on Upper Paleolithic cave art; however, this period coincided with a number of important archaeological discoveries elsewhere in the world relating in particular to portable (or mobiliary) art. The scientific community at this time, reinvigorated by Darwin's revolutionary ideas, found itself locked in battle with the various religious orders of Europe. Furthermore, intense rivalries between European universities and individuals vying for academic supremacy tended to cloud judgment and led to the persistence of some entrenched and timeworn ideas. Doubt was therefore cast on many of the major discoveries in France and Spain in the belief that early modern humans were incapable of producing elaborate narratives on rock surfaces. Even if these images were authentic, it was held, they represented nothing more than idle doodling "art for art's sake."

The first discoveries of parietal art were met with skepticism and, in some cases, outright rejection, the most infamous being Europe's first scientific discovery at the cave of Altamira in northern Spain. The site and its wealth of art were made public in 1880, but controversy soon followed. The cave was discovered by Marcelino Sanz de Sautuola and his daughter in 1879. Before this, the cave entrance had been blocked by a landslide that occurred around 13,000 years ago. Later that year, the cave floor was excavated by Sautuola and academic archaeologist Juan Vilanova y Piera from the University of Madrid. Following publication of the excavation, French scientific verifiers Emile Cartailhac and Gabriel de Mortillet completely rejected the authenticity of the rock art, intimating that it was a forgery. As a result, Sautuola and Piera were scorned at the International Congress for Prehistoric Anthropology and Archaeology held in Lisbon in 1880. Rejection was based on the excellent state of preservation of the rock art and the notion that such complex art could not have been produced by such primitive people. Rumors within Spain suggested that Sautuola had actually commissioned artists to produce the paintings.

Following the Altamira debacle, a number of high-profile rock-art discoveries were made, suggesting that Paleolithic people were indeed capable of producing complex forms of artistic endeavor, which led to Sautuola and Piera being finally vindicated in 1902. Emile Cartailhac made a formal and open apology to Sautuola's daughter (Sautuola had died in 1888) and published Mea culpa d'un sceptique, wherein he admitted he had been wrong and had held back the science and study of Paleolithic rock art for many years. The public outpouring of guilt and apology appears to have benefited Emile Cartailhac, allowing him to accompany French cave expert the Abbé Henri Breuil on a number of expeditions in the Franco-Cantabrian region. This collaboration resulted in the discovery of 150 painted rock-art images in the Grotte de Niaux in the Pyrenees (Fig. 2).

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 2 Painted ibex from Grotte de Niaux (Image: Courtesy of Jean Clottes)

The Floodgates Open

Most discoveries in the core areas of Europe, particularly in Franco-Cantabria and southern Italy, were made during the first part of the twentieth century. Henri É douard Prosper Breuil, often referred to as the Abbé Breuil, began his adult life as a priest (ordained in 1900) but soon developed a keen interest in prehistory. He was responsible for the discovery and authentication of a number of important Upper Paleolithic rock-art cave panels in the early twentieth century, including red-ochre decoration in Bacon Hole, on the South Wales coast. Breuil's influence spanned some 60 years until his death in 1961. His early travels took in most of the prehistoric world and involved him either in discovery or in verification. Much of what he said was widely accepted by academic colleagues and the general public. Breuil took the stance that rock art was part of a ritual package, the ultimate objective of which was the successful hunting of large animals. Based on direct observation of the Arunta people of Central Australia, Breuil proposed that Upper Paleolithic hunting parties would don masks and animal pelts to perform ceremonies in the guise of their quarry. They would then paint images of the animal on the walls of a cave. The ceremonial performance and the act of depiction created a potent source of magic that would, it was believed, guarantee a successful hunt. Ceremonial performances may have incorporated the act of killing an animal – involving the use of sympathetic magic – and this act would also have assisted in the ritual act of the hunt. Breuil further suggested that the multiple images found on cave walls represented attempts to increase the fertility of the herds, with each generation of artists adding their signature to an increasingly complex and potent narrative (Breuil 1952). Though plausible, Breuil's interpretations have been heavily criticized since his death. Many of the animals depicted are seldom found in the archaeological record of Upper Paleolithic habitation sites, and furthermore, animals such as the bear, felines, hyena, and rhino probably formed no part of the hunters' diet, so why are they depicted? The ferocity of such predators may have served as some form of totemic identity, giving the artist and his or her respective clan potency and power over others.

Arguably, one of the most influential theorists of the twentieth century was the French anthropologist André Leroi-Gourhan, who defined a series of stylistic stages within the development of Upper Paleolithic art (styles I–IV) (Leroi-Gourhan 1982). These styles coincided with successive cultural periods within the Upper Paleolithic and suggested that rock art evolved from primitive to complex compositions over a period of some 20,000 years, from the Aurignacian and Gravettian (style 1) to the later Magdalenian (style IV). This attempt to develop a hierarchal artistic chronology was met with considerable opposition, although it did gain momentum outside the rock-art world as a plausible hypothesis. Critics were concerned with the rigidity of Leroi-Gourhan's model, suggesting that the development of a complex art form from simple motifs to high artistic achievement was far too simplistic. Although this hypothesis was largely acknowledged, advancements in chronometric techniques, particularly the development of AMS and uranium-series dating during the latter part of the twentieth century, suggested a more complex picture. Many rock-art panels included within Leroi-Gourhan's stages III and IV, for example, which he dated to the latter part of the Upper Paleolithic, are now considered much earlier (e.g., Clottes and Geneste 2012; Pike et al. 2012).

Key Issues/Current Debates: A Plethora of Images in a Multitude of Places

The archetypal Upper Paleolithic cave site is Lascaux, located near the town of Montignac in southwest France. Discovered in September 1940 the cave system is currently closed to the public and scientific community alike due to the formation of fungal molds that have been affecting the paintings for some time. The access restrictions have curtailed scientific work, and until opportunities arise for further research.

The consensus view based on analogy elsewhere places the rock art at around 17,000–18,000 years

BP. However, based on the results of chronometric dating elsewhere within the Franco-Cantabrian region, the Lascaux assemblage could be much earlier. The dominant theme of the panels in this cave is the depiction of large animals such as bison, bovines, horse, and red deer. Each category of animal comprises a thematic area within the cave, these areas being aptly named the Great Hall of the Bulls and the Chamber of Felines for example.

The cave was accidentally stumbled upon by four teenagers and a dog and was opened to the public in 1948. However, by the mid-1950s the carbon dioxide expelled by over 1,000 visitors a day had taken its toll on the paintings, and the cave was closed in 1963. An extensive conservation program ensued and the cave was strictly monitored for atmospheric and temperature changes. In order to fulfill the public's overwhelming desire to see these amazing works of art, the French heritage authorities in 1983 commissioned several facsimile sections of the cave – Lascaux II – to be constructed close by. In spite of the restrictions on entry to the cave, monitoring has, since 1998, revealed an aggressive fungus that is attacking the fragile pigments. This fungal infestation was caused by a recently installed air-conditioning system and by heat emitted from a lighting system. Since 2008, atmospheric monitoring has been tightened.

One of the most intriguing caves within southwest France is, in my view, the example of Rouffignac (within the commune of Rouffignac-Saint-Cernin-de-Reilhac). Known as the Cave of the Hundred Mammoths, the back section of the cave contains over 220 engravings and paintings/drawings, including 158 mammoths, 28 bison, 15 horses, 12 goats, 10 woolly rhinoceros, and one brown bear. In addition to the painted imagery, the cave also has 17 tectiforms and 6 serpentine forms, as well as finger flutings and finger meanders, thought to have been executed by children. The majority of the art is located some 2 km inside the deep recesses of the cave, within an area called Le Grand Plafond chamber. More than 60 animals, mainly mammoth, are painted/drawn (sketched) on the ceiling using mainly charcoal with some drawn as a black outline. Interestingly, the artistic repertoire omits red deer and aurochs. Based on Leroi-Gourhan's stages, the rock art of Rouffignac falls within style IV and, therefore, dates to the Middle Magdalenian period (c. 13,000 years BP). Unfortunately, very little archaeology survives, except for a very small lithic assemblage. In the recent past, the authenticity of the art has been questioned and subsequently denounced by some. In common with other caves in the region, parts of it were periodically occupied by European brown bear, probably during periods of hibernation.

Within the entrance to the cave, archaeologists have found evidence of Mesolithic and Neolithic activity consisting of hearths, animal bone, and a small diagnostic lithic assemblage. The earliest date for this activity is c. 9,200–7,800 years BP. In terms of stratigraphy, this material was sealed later by Iron Age activity.

Also within southern France is probably one of the most important discoveries of recent years. The cave site of Chauvet, located in the Ardéche southeast France, sits within a limestone cliff face overlooking the former course of the Ardéche River and was discovered on December 18, 1994 by a group of speleologists, including Jean-Marie Chauvet. Following discovery, French rock-art specialist Jean Clottes conducted a detailed study of the cave and its spectacular rock art. Chauvet is one of many hundreds of caves that sits within the deep gorges of the Ardéche region.

Chronometric dating of the rock art and archaeological deposits has revealed two distinct periods of use. To date, over 120 samples have been taken by Clottes' team from pigments that include charcoal. This sampling has revealed that Chauvet was in use during the Aurignacian period, the earliest confirmed date being 32,900 ± 490 years BP (Gifa 997776). Archaeological evidence, in the form of children's footprints, hearths, and fire torches, suggests that the cave was also in use during the latter part of the Gravettian, between 25,000 and 27,000 years BP. A landslide appears subsequently to have sealed the cave entrance until its discovery in 1994. During these periods of Early Upper Paleolithic (EUP) occupation, the cave appears to have been utilized as a hibernation den for brown bear, with both skeletal remains and hibernation nests being found. Despite the widely

accepted radiocarbon dates for Chauvet, several archaeologists have questioned the dating (Pettitt and Bahn 2003). Their concerns have been based on potential surface contamination and the link between charcoal deposits on the floor of the cave and those used within the composition of the painting. However, Pettitt and Bahn's concerns have now been dispelled, as, by 2011, more than 80 additional radiocarbon samples were taken from torch marks, floor deposits, and the paintings unequivocally push the dates of the rock art to between 35,000 and 30,000 years BP. Furthermore, chemical analysis on deposits within the only entrance area of the cave revealed that this was sealed by a landslide around 25,000–29,000 years BP and that the main occupation was between 30,000 and 35,000 years BP (Clottes and Geneste 2012).

The rock art includes many hundreds of painted polychrome and monochrome animal figures representing at least 13 generic species depicted in a naturalistic style, many of which are now extinct. In addition to the usual range of herbivores, such as bison, horse, and mammoth, are certain predatory species, the presence of which is, arguably, unique to the cave; these include brown bear, cave lion, hyena, and panther (Fig. 3). Many animal figures are grouped to form herds of bison, horse, panther, and rhinoceros; each group is enhanced by use of the panel/surface topography to create three-dimensional imagery and the illusion of movement across the panel.

Although complete human figures are virtually absent, sexual attributes, including vulvae, are present, along with body parts, such as legs and hand stencils. These figures may represent personal signatures of the artists or special people who witnessed the art being executed. David Lewis-Williams and Jean Clottes (1998) have further argued that the combination of subject and location, that is, within the deep recesses of the cave, suggests a ritual significance and that these images evoked possible shamanic and magical powers. Unlike Upper Paleolithic rock art elsewhere, a great deal of panel preparation appears to have taken place, with the rock surface being scraped clean of mold debris and flowstone concretions. This cleaning resulted in a notably near-smooth white "canvas" on which to paint the images.

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 3 The wealth of animal depictions in Chauvet Cave (Image: courtesy of Jean Clottes)

Still within the Franco-Cantabrian region is the cave that started all the interest in Paleolithic rock art – Altamira, sitting within limestone rock outcropping on Mount Vispieres, along the northern Spanish coast. The cave is noted for its fine polychrome paintings of bulls and for hand stencils. The cave entrance formed by a major rock collapse from above the cave was discovered in 1880. The cave extends some 270 m in length and comprises a series of distorted passages and chambers. Following discovery, a section of the cave floor was excavated to reveal a rich stratigraphic sequence dating to a period spanning the Upper Solutrean (c. 18,500 years BP) to the Lower Magdalenian (c. 16,500 and 14,000 years BP). The cave was also intermittently occupied by hibernating animals. At round 13,000 years BP, a rock fall sealed the entrance, around which, according to archaeologists, most human occupation was concentrated. The rock art, though, extends right along the length of the cave.

Charcoal and hematite were used to create the polychrome images. Sometimes these natural

pigments were mixed with water to create shading and to vary the intensity of color (referred to as chiaroscuro). Polychrome images are strategically painted to take advantage of the natural contours and topography of the panel. The cave contains a plethora of images and features the famous polychrome ceiling depicting a herd of extinct steppe bison (*Bison priscus*) arranged in a number of poses. Other animals include horse, deer, and a wild boar. In 2008, uranium-thorium series dating was applied to samples of calcite covering some of the rock art. The results indicated that the art spanned 10,000 years, between 25,000 and 35,000 years BP (Pike et al. 2012). Similar to Lascaux, Altamira is now closed to the public due to concentrations of carbon dioxide produced by large numbers of visitors damaging the microclimate of the cave.

Moving West: The Engraved Rock Art of Central and Northern Portugal

Before 1991, it was considered that Upper Paleolithic rock art was concentrated within two areas of southwest Europe. However, in advance of a highly controversial dam project in the Douro Basin, significant engraved open-air rock art was discovered, in particular within the Côa Valley (a tributary of the Douro) in northeast Portugal. In addition to the Upper Paleolithic assemblage, later prehistoric engravings were also found in association with carvings dating from the seventeenth century. From this initial discovery, archaeologists began to look elsewhere and as a result both Upper Paleolithic and later prehistoric rock art were found in the Sabor, Agueda (both Portugal and Spain), and Tua Valleys. Within the central eastern part of Portugal, further Upper Paleolithic rock-art discoveries were made within the Tejo/Tagus Basin, particularly in the Ocreza and Zezere Valleys and also within the Guadiana River.

Most of the engraved art within the Côa Valley extends along 17 km of vertical schist outcropping and comprises mainly large naturalistic zoomorphic images, such as horse, auroch, caprid, cervid (red deer), a rare occurrence of fish, and a small assemblage of geometric/abstract forms (Fig. 4). Much of the imagery is superimposed (over 1,000 engraved images on 137 panels). Several engraved panels also occur on granite. On the panel of Faia are engravings that have evidence of image enhancement through the application of red ochre (hematite). On both geologies, artists appear to be concerned with the vibrancy of the animal through movement and physical interaction. The engraving techniques include incised pecking, which produces fine linear imagery (Zilhão 1995).

The dating of this assemblage, probably the largest concentration of early prehistoric open-air rock art in Europe, is potentially difficult to assess. However, broad dating based on artistic style and complexity places much of the imagery between 22,000 and 10,000 years BCE.

During the so-called Battle of the Côa, both the Portuguese Government and the energy company EDP played down the international significance and dating of this assemblage. Experts employed by EDP applied a controversial unproven direct dating technique which dated the imagery to the later prehistoric period. Fortunately, a change of government in 1995 reversed

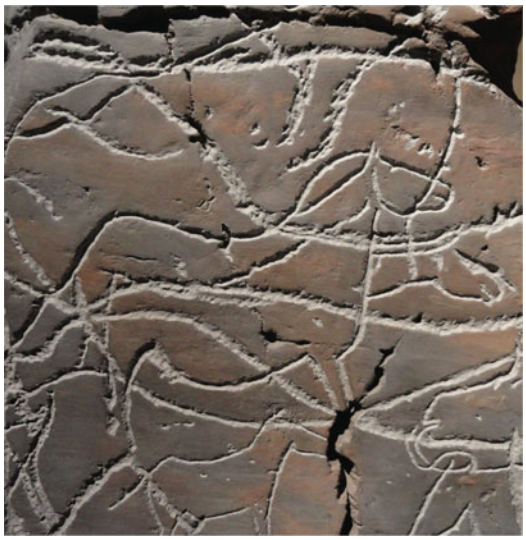

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 4 A plethora of wild animal engravings from the Fariseu 1 panel, Côa Museum (Author)

the decision to dam this and other valleys in this part of Portugal, and as a result, the Côa Valley was designated a World Heritage Site in 1998.

Moving North to a Very British Assemblage

Until 2003 and the sensational discovery of engraved imagery at Church Hole Cave near the mining village of Creswell, it was considered by many that a human presence in the British Isles between 12,000 and 27,000 years BP was, at best, limited to a few seasonal hunting visits in southern Britain. However, the famous early Upper Paleolithic burial at Paviland Cave on the Gower Peninsula, in South Wales, contradicts this assumption. The burial, originally thought to be a Roman prostitute and known as the "Red Lady of Paviland," was excavated by the geologist and creationist William Buckland in 1823. By the time of the second investigation of the cave in 1912–1913, a comparison had been made between the finds and deposition at Paviland and Upper Paleolithic discoveries in other European caves. Following a series of successive radiocarbon dates from the 1960s until the present, the date of this remarkable site has been advanced from Kenneth Oakley's date of 18,460 ± 340 years BP to 33,000 years BP, based on recalibrated test results by Thomas Higham and the late Roger Jacobi.

Prior to a recent discovery of an engraved reindeer in a cave in South Wales, only one other authenticated discovery had been made, at Church Hole and Robin Hood Caves, Creswell Crags, on the Derbyshire/Nottinghamshire border in April 2003 (Bahn and Pettitt 2009). These figures are considered to be Europe's most northerly Paleolithic rock art. This discovery included a small number of anthropomorphic and zoomorphic engravings and bas-relief figures, including a bison, red deer, and several avian species (Fig. 5). The engravings were overlain by a thin veneer of calcium carbonate flowstone and were ascribed a minimum age of 12,800 BP using the uranium-series disequilibrium dating method (Pike et al. 2005). Several of these figures, including the red deer, used the natural topography of the cave wall to construct or enhance various parts of the animal, a common theme running throughout European Upper Paleolithic and Mesolithic rock art.

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 5 Probable head and neck of two cervids, located deep within a recess of Church Hole Cave, Creswell, England (author)

Associated with the Creswell discovery, and recovered from other nearby caves within the gorge, were a number of Upper Paleolithic engraved mobile artifacts discovered during the course of late nineteenth and early twentieth century excavations (Bahn and Pettitt 2009). These included Creswell's infamous horse, which had been carved on a piece of rib bone and discovered in 1876, and a bird-like head on a human torso, which had been carved on a piece of bone from a woolly rhinoceros (Coelodonta antiquitatis), a species considered to have become extinct in Britain by around 15,000 BCE. The presence of these exotic artifacts, along with a handful of other portable "valuables" from other Upper Paleolithic core areas of Britain, including perforated shell and stone made for garment decoration, necklaces, and pendants, is set against a backdrop of sometimes rapid climatic amelioration.

Prior to the Creswell discoveries, there had been several "false dawns," where Upper Paleolithic rock art had been discovered and authenticated but later rejected. One of these so-called discoveries occurred at Bacon Hole on the Gower Coast in 1912, when experts of the day – the French prehistorian and verifier, Abbé Henri Breuil, and W. J. Sollas – reported in *The Times*

(14 October) the discovery of 10 parallel red streaks of hematite within one of the recesses of the cave. The Times reported it as "the first example in Great Britain of prehistoric cave painting." However, this discovery turned out to be either natural hematite secretions or paint, possibly from a sailor merely cleaning his brushes, and was subsequently rejected by 1928. A second discovery, made in the Wye Valley of South Herefordshire in 1982, was claimed as Britain's first representative Paleolithic rock art and included the outline of a bison and a red deer, among other animals, from Cave 5615, located high above a deep gorge known as Symonds Yat. The discovery was duly reported in the popular press and later the academic world but lacked any expert validation, and, following a series of personal attacks, rebuffals, and a confession or two, the discovery was soon rejected.

In September 2010, the author was exploring the rear section of Cathole Cave, a limestone cave that stands within the eastern part of an inland valley on the Gower Peninsula. The cave had been first excavated during the latter part of the nineteenth century. An array of flint tools, metal implements, and pottery dating from the Upper Paleolithic to the Bronze Age were recovered, plus a significant Pleistocene faunal assemblage that included (extinct) elephant, giant deer, hyena, woolly rhinoceros, wolf, and reindeer. Further two excavations outside the cave were made by Charles McBurney and John Campbell in 1958–1959 and 1977, respectively. Recovered from these two excavations were more than 300 lithics, many of which were diagnostically similar to flint blades and points found at other so-called Creswellian cave sites at Creswell Crags and within Cheddar Gorge.

The engraving of a stylized cervid, possibly a reindeer, was on a small vertical niche. This side-on view figure, measuring approximately 15 × 11 cm, was created using a sharp pointed tool, probably made of flint (Fig. 6). The elongated torso was infilled with irregular-spaced vertical and diagonal lines. Several internal diagonal lines extended below the lower section of the torso, merging to form three of the four legs, the longest measuring 4.5 cm. Incorporated into the left side of the torso is the head (or muzzle) comprising a semicircular snout, chin, and mouth. Above the muzzle was a thin rectangular block on which three lines extend to the right forming a stylized antler set. The various engraved lines were cut into a weakly botryoidal calcite flowstone surface. In April 2011, members of the NERC-Open University Uranium-Series Facility extracted samples from the surface on which the engraving was located for uranium-series dating, along with a sample from a section of flowstone that covered a section of the reindeer's muzzle. Two minimum dates from the flowstone of 12,572 ± 600 years BP and 14,505 ± 560 years BP were revealed, making this engraving Britain's earliest rock art (Nash et al. 2012).

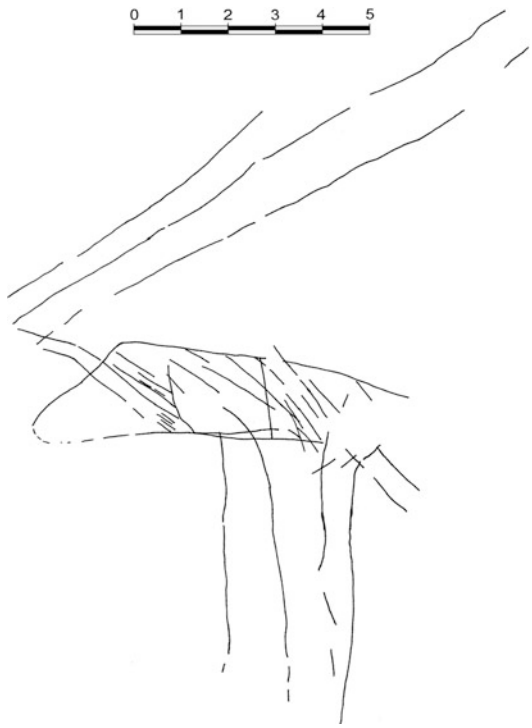

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 6 Tracing and image of a cervid, possibly a reindeer from Cathole Cave, South Wales

Future Directions

Over the past 65 years and since the death of Abbé Breuil and Leroi-Gourhan, Paleolithic rock-art

research has come of age and is now incorporated into mainstream archaeology. Following the sometimes novel ideas and concepts of late nineteenth and twentieth century archaeologists and scientists engaged in the study of Paleolithic art, a new chapter has emerged which includes the pioneering and polemic work of Paul Bahn, Robert Bednarik, Michel Lorblanchet, Jean Clottes, David Lewis-Williams, David Whitley, and Joao Zilhão (to name but a few), each scholar adding new ideas to an otherwise healthy rock-art debate. Foremost in this revolution are the groundbreaking and sometimes controversial approaches of Jean Clottes, David Lewis-Williams, and Thomas Dowson and their ideas on how Paleolithic rock art formed part of a shamanistic performance (Lewis-Williams and Dowson 1988; Lewis-Williams and Clottes 1998; Lewis-Williams 2002, 2003). It is clear from these principal scholars that rock art is polysemic and once formed part of a much wider ritual-symbolic package that was probably initiated and controlled by the hierarchical will of clan elites. The animal-bias may suggest some form of totemic relationship between the individual artist, the hunter, and the hunting community alike.

Current ideas, now supported by hard science, consider earlier dates of an otherwise entrenched chronology (e.g., Pike et al. 2012). Through direct dating methods, Bahn and Vertut (1988: 75) clearly show a spread of chronometric dates taken from pigments from a number of caves from the Franco-Cantabrian region, the most recent being Le Portel (Ariége) at 11,600 ± 150 years BP (AA 9766), to the earliest, Chauvet 32,410 ± 720 years BP (Gif A 95132). Since the publication of this summary, further, more refined dates have been accomplished (Clottes and Geneste 2012).

In June 2012, a British-Spanish scientific team revisited 11 caves with Upper Paleolithic rock paintings and engravings in northern Spain (part of the Franco-Cantabrian area of Upper Paleolithic southwest Europe). Many of the sites, including Altamira, El Castillo, and Tito Bustillo, had been previously dated based on artistic style and indirect dating methods. Using uranium-series disequilibrium dating on calcite deposits overlying and underlying the paintings, the team was able to date the rock art

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 7 Dated hand stencils from the cave of El Castillo, Northern Spain (Image: Marcos García Diez)

(Fig. 7). The results revealed that the art, which included a painted red disk, a hand stencil, and a claviform symbol, dated to the Early Aurignacian period, with a minimum age range for the art of between 35,600 and 40,800 years BP, a time when either the first wave of anatomically modern humans moved into Europe or maybe when Neanderthals were involved in artistic endeavor.

A few months earlier, within the cave of Nerja, near Malaga, in southern Spain, further probable painted rock art of Neanderthal date was discovered; I say "probable" as the dating material from a floor deposit was indirectly associated with the actual rock art that was until recently believed to be Upper Paleolithic.

Where next? Attention once focusing entirely on the traditional centers of southwest Europe appears to be shifting further east and north. Over the past 10 years, significant discoveries have been made in Italy, Romania, and the British Isles. This, along with the recent dating program within the 11 caves in northern Spain, extends the work of the Paleolithic artist geographically and deeper into our distant past. Just a few years ago, who could have conceived the idea that the painted rock art could have possibly been executed by Neanderthals?

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Art, Paleolithic
- ▶ Bednarik, Robert G.
- ▶ Côa Valley Rock Art Sites
- ▶ Europe: Paleolithic Art
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Lewis-Williams, James David
- ▶ Siega Verde Rock Art Sites

References

Bahn, P., and P.B. Pettitt. 2009. *Britain's oldest art: The Ice Age cave art of Creswell Crags*. London: English Heritage.

Bahn, P.G., and J. Vertut. 1988. *Images of the Ice Age*. London: Weidenfeld & Nicolson.

Bahn, P.G., and J. Vertut. 1997. *Journey through the Ice Age*. London: Weidenfeld & Nicolson.

Breuil, H. 1952. *Four hundred centuries of cave art*. Montignac, Dordogne: Centre D'études et de Documentation Préhistorques.

Clottes, J. 2004. *The mind in the cave: Consciousness and the origins of art*. London: Thames and Hudson.

Clottes, J., B. Gély, C. Ghemis, É. Kaltnecker, V.-T. Lascu, C. Moreau, M. Philippe, F. Prud'Homme, and H. Valladas. 2011. Un Art trés ancien en Roumanie. Les dates de Coliboaia/A very ancient art in Rumania. The Coliboaia dates. INORA, No. 61.

Clottes, J., and J.-M. Geneste. 2012. Twelve years of research in Chauvet cave: Methodology and main results. In *A companion to rock art*, ed. J. McDonald and P. Veth, 583–604. West Sussex: Blackwell.

David, B. 2017. *Cave art*. London: Thames and Hudson.

Leroi-Gourhan, A. 1982. *The dawn of European art: An introduction to Palaeolithic cave painting*. Cambridge: Cambridge University Press.

Lewis-Williams, J.D. 2002. *The mind in the cave: Consciousness and the origins of art*. London: Thames and Hudson.

Lewis-Williams, J.D. 2003. *A cosmos in stone: Interpreting religion and society through rock art*. Walnut Creek: Altamira Press.

Lewis-Williams, J.D., and J. Clottes. 1998. *The shamans of prehistory: Trance magic and the painted caves*. New York: Abrams.

Lewis-Williams, J.D., and T.A. Dowson. 1988. The signs of all times: Entoptic phenomena in Upper Palaeolithic art. *Current Anthropology* 29: 210–217.

Nash, G.N., P. Van Calsteren, L. Thomas, and M.J. Simms. 2012. A discovery of possible Upper Palaeolithic parietal art in Cathole cave, Gower Peninsula, South Wales. *Proceedings of the University of Bristol Spelaeological Society* 25: 327–336.

Pettitt, P., and P. Bahn. 2003. Current problems in dating Palaeolithic cave art: Candamo and Chauvet. *Antiquity* 77: 134–141.

Pike, A.W.G., M. Gilmour, P. Pettit, R. Jacobi, S. Ripoll, P. Bahn, and F. Muñoz. 2005. Verification of the age of the Palaeolithic cave art at Creswell Crags, UK. *Journal of Archaeological Science* 32: 1649–1655.

Pike, A.W.G., D.L. Hoffmann, M. García-Diez, P.B. Pettitt, J. Alcolea, R. De Balbín, C. González-Sainz, C. De Las Heras, J.A. Lasheras, R. Montes, and J. Zilhão. 2012. U-series dating of Paleolithic art in 11 caves in Spain. *Science* 336: 1409–1413.

Ucko, P.J., and A. Rosenfeld. 1967. *Palaeolithic cave art*. London: Weidenfeld & Nicolson.

Zilhão, J. 1995. The age of the Cô a Valley Portugal. Rock-art: Validation of archaeological dating to the Palaeolithic and refutation of scientific dating to historic or proto-historic times. *Antiquity* 69: 883–901.

Further Reading

Chippindale, C., and G.H. Nash, eds. 2004. *Figurative landscapes of rock-art*. Cambridge: Cambridge University Press.

Chippindale, C., and P. Taçon. 1998. *The archaeology of rock-art*. Cambridge: Cambridge University Press.

Graziosi, P. 1960. *Palaeolithic art*. London: Faber & Faber.

Leroi-Gourhan, A. 1965. *Préhistoire de l'art occidental*. Paris: Mazenod.

Whitley, D., ed. 2001. *Handbook of rock art research*. Walnut Creek: Altamira Press.

Evans, Arthur

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Basic Biographical Information

Arthur John Evans was born on 8 July 1851 at the Red House, Nash Mills, Hertfordshire (Brown 1993: 11). He died at the age of 90, on 11 July 1941, but not before he became a well-known archaeologist for his discovery and excavation of the Palace of Minos at Knossos (Ashmolean Museum 2012). Evans was the eldest child of John Evans' who was also a well-known archaeologist as well as a numismatist, geologist, and collector of antiquities (Brown 1993: 11). As a result of his fathers occupation, Arthur Evans was brought up

surrounded by archaeology and history-related subjects. This sparked his interest in such a career at a young age. Starting at the age of 9, Evans accompanied his father on expeditions where his interests in archaeology grew (Brown 1993: 11).

Arthur Evans was educated at Harrow School and went on to study at Brasenose College in Oxford. Even though his schooling achievements were academically modest, Evans won prizes for his English poems and Greek epigrams (Brown 1993: 11). In 1874 he graduated from Brasenose College and was awarded first-class honors in Modern History (Ashmolean Museum 2012). In 1884 Evans was appointed the role of a Keeper at the Ashmolean Museum (Ashmolean Museum 2012). During the 25 years that he worked as a Keeper at the museum, he was able to successfully and drastically increase the archaeological collections and transform the Ashmolean into an archaeological museum that garnered international recognition as a first-rate research institution (Ashmolean Museum 2012). Including his work at the Ashmolean Museum, Evans was known to be a pioneer in the identification of Roman cities and roads in Bosnia and Macedonia as well as mapping the Roman road system and leading smaller excavations in the Balkans (Ashmolean Museum 2012). Prior to his excavations at Knossos, Evans carried out an illicit excavation of a Roman cemetery near Trier where he found lamps and broaches (Brown 1993: 17). At this time he was working as a journalist while also pursuing his interests within archaeology (Brown 1993: 21). At Canali, Evans started an excavation of a large barrow, but this was interrupted by the war that broke out between the Turkish and Montenegrins. Later, he was able to continue the excavation (1993: 21).

Even though he was travelling through different countries and working as a Keeper at the Ashmolean Museum, from 1893 onwards his interests in Greece, mainly Crete, grew (Ashmolean Museum 2012). Between the years of 1894 and 1899, Evans travelled extensively through Crete in search of evidence pertaining to pre-alphabetic writing in the Aegean (Ashmolean Museum 2012). This search led him to identify three systems of writing: Cretan Hieroglyphic, Linear A, and Linear B (Ashmolean Museum 2012).

Major Accomplishments

Arthur Evans is best known for his excavations of the Palace of Minos at Knossos, Crete, which he started on 23 March 1900 at Kefala Hill in Knossos (Brown 1983: 15). Evans interests in Crete began after visiting an antiquities shop in Athens in 1893, where he noticed an unidentifiable writing system on small three or four-sided Cretan stoned seals (Stiebing 1993: 135). The following year, 1894, would be when he visited the island of Crete for the first time where he noticed surface indications of preclassical occupation at the site of Knossos (Stiebing 1993: 135). Even though the war between Greece and Turkey did not allow Evans to return to Crete until 1899, he was still able to acquire title to the site of Knossos, and he began to draft his plans for excavation (Stiebing 1993: 135). When he began the excavation in 1900, even though he had very little experience, Arthur Evans was joined by more experienced researchers which included Duncan Mackenzie and D. G. Hogarth (Brown 1983: 15). Between 1900 and 1905, the majority of the Palace of Minos was found and excavated (Stiebing 1993: 135). The walls of the structure were located just below the surface as Evans was uncovering parts of frescoes and a stucco relief that decorated the palace walls, while many pieces of pottery and oblong clay tablets were also found during this excavation (Stiebing 1993: 135). At first, the artifacts that Evans discovered were thought to be "Mycenaean"; however, as he continued to uncover underlying strata, he came to realize there had already been a high level of cultural development among the occupants of Knossos prior to the Mycenaean Age that he named "Minoan" (Stiebing 1993: 135). Evans distinguished many different pottery types as well as styles of decoration at Knossos. On the basis of these finds, he created a chronology for the prehistory of Crete (1993: 139). Subsequently, the presence of datable Egyptian objects in some of the Minoan strata allowed Evans to provide approximate absolute dates for his sequence (Stiebing 1993: 139).

As well as excavating the palace at Knossos, Evans also extensively restored the remains of the site (1993: 136). Once the palace had been excavated as well as restored, Evans published his findings in four volumes, as *The Palace of Minos*

at Knossos (Scarre and Stefoff 2003: 6). There has been extensive criticism of Evans' excavations and restorations due to the personal nature of the site (Stiebing 1993: 136). While the visitor at this site is able to form a great mental picture of the Palace of Minos in comparison to other Cretan sites, it has been argued that this picture is seen largely through Arthur Evans's eyes (Stiebing 1993: 136).

Cross-References

- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Crete, Archaeology of

References

Ashmolean Museum. 2012. *Sir Arthur Evans*. Available at: http://sirarthurevans.ashmus.ox.ac.uk/biography/. Accessed 31 Mar 2013.

Brown, A.C. 1983. *Arthur Evans and the Palace of Minos*. Oxford: Ashmolean Museum.

Brown, A.C. 1993. *Before Knossos… Arthur Evans's travels in the Balkans and Crete*. Oxford: The University of Oxford.

Scarre, C., and R. Stefoff. 2003. *The Palace of Minos at Knossos*. Oxford: Oxford University Press.

Stiebing, W.H. 1993. *Uncovering the past: A history of archaeology*. New York: Prometheus Books.

Evolutionary Anthropology: Issues, News, and Reviews

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Brief Definition of the Topic

Evolutionary Anthropology is a peer-reviewed journal focusing on current issues in biological anthropology, paleontology, archaeology, primatology, genetics, human ecology, and other areas pertinent to understanding human evolution in a broad perspective. It is designed to provide researchers, educators, and students in anthropology and related disciplines with reviews of recent research, discussions of theoretical issues, and changing perspectives on human evolutionary biology in a concise, readable format. It was founded in 1992 by Dr. John Fleagle and appears in six bimonthly issues each year. *Evolutionary Anthropology* normally publishes four types of articles:

1. *News Articles* are brief reports on recent professional meetings, symposia, workshops, and other events of general interest to the anthropological community.
2. *Issues Essays* are articles on subjects of broad interest to topical interest and are designed to raise awareness of important topics in the study of human evolution that have perhaps been overlooked or not widely known, but are not suitable for a major review. Issues Essays can take more of a personal or adversarial approach rather than offering a scholarly review.
3. *Articles* are minireviews of up to 10,000 words that provide an overview of the current state of knowledge on a topic of general interest to a wide audience of students, teachers, and researchers in the broad area of human evolution. They should provide a balanced treatment of current literature and views.
4. *Book Reviews* are designed to discuss recently published books in the broader context of current research in the area to which the book contributes.

In addition to the above, *Evolutionary Anthropology* also publishes obituaries of prominent figures in the field of human evolution and sometimes publishes essays from regular contributors. In the 1990s, the journal published a series of debates between Ian Tattersall and Milford Wolpoff on topics in human evolution. In the early part of the twenty-first century, Dr. Kenneth Weiss contributed a regular series of essays on aspects of genetics and evolution entitled *Crotchets and Quiddities*. Beginning in 2008, *Evolutionary Anthropology* published one special issue a year devoted to a

single topic. The first of these were Modern Human Origins (2008), The Evolution of Human Behavior (2009), and Genetics and Human Evolution (2010).

In 2018, Dr. Jason Kamilar assumed the position of journal editor. In addition, the editorial board was expanded from 11 to 30 members, all who are leaders in the field.

Articles in *Evolutionary Anthropology* are commissioned by the editor in conjunction with the associate editors and are subject to editorial review prior to acceptance and publication. *Evolutionary Anthropology* is published and distributed by John Wiley & Sons, Inc. and is available in both electronic and paper formats.

Cross-References

► Journal of Human Evolution

References

Evolutionary Anthropology: Issues, News, and Reviews. n.d. Available at http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1520-6505

Excavation Methods in Archaeology

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Introduction and Definition

Archaeological excavation is the procedure by which archaeologists define, retrieve, and record cultural and biological remains found in the ground. Past activities leave traces in the form of house foundations, graves, artifacts, bones, seeds, and numerous other traces indicative of human experience. These *strata* survive vary variously, depending on the type of location and geology (hilly, lowland, wet, dry, acid, etc., known as the *terrain*). Survival and visibility also depend on how far the remains of the past have already decayed or been disturbed by later activities, such as cultivation or building. These *site formation processes* give a site its modern character, and this has a strong influence on the excavation method that is used.

Excavation usually (but not always, see below) requires the removal and permanent dispersal of strata so they can never be reexamined. So the method is also influenced by the need to conserve cultural strata as far as possible – never dig more than you need to understand the site. Many sites are situated in socially sensitive areas, where excavation (particularly the removal of skeletal remains) is to be avoided or kept to a minimum.

Successful excavation depends on our ability to see or detect these traces, so that they can be measured and sampled, and this in turn depends on the *techniques* and the skilled workforce available. Like other sciences, excavation requires us to devise new techniques that enable us to see more, so that excavation method is in a state of continual development.

The way an excavation is done is therefore determined by what you want to know, the state of preservation of the site, the techniques and skills available, and the social context of the country in which the excavation takes place. In best practice, these are brought together and balanced in a program specially designed for each project. Contrary to popular belief, success is much less dependent on the application of a standard method (or *default system*) to every situation (Carver 2011).

Key Issues/Current Debates/Future Directions/Examples

Excavation Areas

The type of area opened in an excavation is determined by its purpose. Small-scale excavations, such as *shovel tests* and *test pits* and *trenches*, are used in the reconnaissance stage to locate sites or in the evaluation stage to help assign their current value. Shovel tests are the size of a shovel blade say 15 × 15 cm, test pits are 1 × 1 to 4 × 4 m, and test trenches are 1–3 m wide and can

be very long (100 m or more). They are especially valuable for testing deep strata, since the sides can be held up by shoring, so protecting the excavators from the danger of collapse (Fig. 1).

Sets of test pits and trenches also have a wide application in addressing particular research questions over a wide area. In this case the pits and trenches are distributed over the landscape with a view to obtaining examples (*samples*) of assemblages and local sequences from which an occupation or behavior can be generalized (see Hester et al. 1997, 58–74; and the entry on American Pioneers and Traditions, Fig. 3 in this encyclopedia). *Box excavation* consists of a number of test pits (up to 5 × 5 m in area) set adjacent to each other in a grid, each separated from the other by a *balk* (about half a meter wide) along which excavators can walk and earth be removed. The balk also serves to retain a *section*, a vertical slice of strata, drawn by excavators to record the sequence of layers at that point. Box excavation was pioneered in Russia and adopted in China, and a version was also enthusiastically promoted in England by Mortimer Wheeler (see the entry on British Pioneers and Fieldwork Traditions in this encyclopedia).

Area excavation refers to an excavation where the area opened is continuous (Fig. 2). In research

Excavation Methods in Archaeology, Fig. 1 Excavation through part of the tell settlement at Catal Hoyuk, Turkey, showing edges protected from collapse by sandbags and a deeper trench supported by timber shoring (M. Carver)

Excavation Methods in Archaeology, Fig. 2 Area excavation at Portmahomack, Scotland. The horizon is being exposed by a troweling line and will be recorded with the assistance of observation from a tower (M. Carver)

excavations, the size of the area is closely connected to the questions addressed: early pioneers in Denmark used areas of up to 3 ha to reveal the shallow but extensive traces of Iron Age villages consisting only of pits and postholes. In CRM excavations the size is related to the area to be affected by development; these are often very extensive, such as the Framework Excavations in advance of London's Fifth terminal at Heathrow, or the excavations by the National Road Authority in Ireland (see the entry on Ireland: Investigations in Advance of Motorway Construction in this encyclopedia).

Excavation Techniques

Archaeological strata are defined in the horizontal plane by scraping the surface until boundaries (anomalies) are seen in the soil. These denote the edges of *contexts*, deposits that are made at different times (Fig. 3). The object of excavation is to define contexts and put them in order to produce the story of the site. Initial definition of a deposit is often achieved with a mechanical excavator with a front bucket or backhoe, used for example to remove topsoil or a concrete platform. The surface may then be cleaned with a shovel and further defined with a trowel, a tool which archaeologists have adopted from the building trade (a pointing trowel) and made especially their own (Fig. 4). The ability to define strata and to see objects depends on the technique and the intensity of

Excavation Methods in Archaeology, Fig. 3 The dark curved patterns of post pits and ditches revealed by troweling. On this sandy terrain, the edges are rendered more visible for visible with the aid of a light spray (M. Carver)

effort applied. For example, clearance of the topsoil with a back-actor is fast but visibility is sacrificed – smaller objects and more subtle edges in the soil will not be noticed. By contrast, to ensure that everything is noticed in a feature of

Excavation Methods in Archaeology, Fig. 4 Trowels in use. (**a**) The pointing trowel favored in Europe. (**b**) The handpick favored in East Asia (M. Carver)

special importance, such as furnished grave, the excavator will proceed with the greatest caution, not only taking care to define every tiny anomaly in the ground, but *screening* (sieving) all the waste soil (*spoil*) to make sure nothing escapes.

These different levels of digging at which excavation may operate also imply the application of different levels of *recording*. For example, the character and location of a wall exposed by a bulldozer will not be as accurately known as one carefully revealed by the trowel and brush. Accordingly, the more detailed the excavation, the more detailed should be the records. It can be seen too, that the more detailed the digging, the

longer it will take and the more it will cost. The question of how much trouble to take is therefore a vital one to consider at the design stage. One useful way of controlling the application of appropriate level of digging and recording is to use *Recovery Levels*, lettered A–F (Fig. 5), a handy template which lays down in advance the minimum recording required for each type of digging. This ensures not only that the full record is made but that features excavated at the same level can be compared: the assemblages of two garbage pits excavated at the same recovery level are comparable, since they were retrieved at the same level of intensity and subjected to the same screening regime.

Recovery levels are decided in the design stage. In general, Level A is used for the clearance of the top of a site by machine: Level B usually refers to tidying with a shovel and Level C to preliminary definition with a trowel. The vast majority of features are excavated at Level D or its equivalent. Here definition is as good as can be achieved by the naked eye, each context is recorded individually, 25% of the spoil is screened, and there are detailed written and photographic records of all features. Level E tends to be applied to features of special importance like an undisturbed floor or a furnished grave. Here the tools used are the dental pick or the scapula, rather than the trowel, and the excavator works very slowly and close to the ground. There will be occasions when a feature is so unusual, and in such good condition, that the excavators cannot do justice to it on site. In this case (Level F) it is boxed and lifted and taken to the laboratory, where it can be slowly dissected in controlled conditions. A pioneering example was the lifting of an entire burial chamber at Högom in Sweden. At Monruz in Switzerland, an Upper Paleolithic floor was defined on site and then lifted and put on permanent display – a combination of Levels E and F excavation.

Nano-Excavation

Recent technical advances have further enlarged the ambitions of excavators to detect, and record in ever more detail, the phenomena encountered on archaeological sites. Archaeologists started screening and taking bags of soil (*context samples*) back to the laboratory since decades ago, in order to extract material that was suspected of being there, but not visible to the naked eye. Examples are grains of pollen or the husks (carcasses) of insects, which give information about the vegetational resources and the local environment, respectively.

Further developments, which might be termed Level G, use chemical and geophysical readings taken on site, to infer the former presence of certain activities. ICP analysis was used at Sutton Hoo to detect traces of iron and copper from a vanished cauldron and the residue of bones from a burial chamber that had been scoured by tomb robbers. Minute traces of bone can now be identified to species by *proteomics*, using the weight of specific proteins. In Greenland, an archaeological team described 500-year sequence of animal farming, using DNA drawn from a sequence of samples taken from a vertical core driven down into an open field (Hebsgaard et al. 2009). Magnetic instruments have proved revealing on site, for example, at Pinnacle Point where Paleolithic hearths have been detected using magnetic susceptibility measurements. Perhaps the most interesting advances, from the excavators' point of view, are the results of using geophysical and geochemical techniques in combination. An example is Karen Milek's analysis of the floor of Viking houses in Iceland where magnetometer readings and chemical readings allowed her to infer the presence of wool washing, latrines, and beds and map their location (Milek 2006; Fig. 6).

Arbitrary and Stratigraphic Excavation

Since the basic sequence of an archaeological site is given by the contexts (layers), the ideal is to record each of these in the order in which it was deposited. This is *stratigraphic excavation*, which, in its simplest form, maps each layer separately (Roskams 2001) and in more sophisticated schemes records all the layers but also higher-order concepts like features and structures (Carver 2009; and see the entry on Recording in Archaeology in this encyclopedia). The order of deposition may be partially captured in *section* and is worked out for the site as a whole with the aid of *stratification diagrams*.

LEVEL	COMPONENT	FIND	CONTEXT	FEATURE	STRUCTURE	LANDSCAPE	e.g.
A	(not recovered)	Surface finds PLOT 2-D	Inferred by sensor OUTLINE PLAN	Inferred by sensor OUTLINE PLAN	Inferred by sensor OUTLINE PLAN	Inferred by sensor	Field walking
B	(not recovered)	Large finds RECORD EXAMPLES KEEP EXAMPLES	Defined by shovel DESCRIBE	Defined by shovel SHORT DESCRIPTION. OUTLINE PLAN	as features	PLOT STRUCTURES on OS	19th C House
C	(not recovered)	All visible finds. RECORD ALL. KEEP EXAMPLES. MAY PLOT BY m^2	Defined by coarse trowel DESCRIPTION (Munsell for mortars and natural)	Defined by coarse trowel FULL DESCRIPTION. DETAILED PLAN HEIGHT	Defined by coarse trowel EXCAVATE AS ONE. PHOTOGRAPH	1:100 PLAN PROFILE	16th C Pits
D	SAMPLE SIEVING of spoil on site for presence of specified material (spoil not kept)	All visible finds PLOT 3-D and KEEP ALL	Defined by fine trowel DESCRIPTION (Incl. Munsell) PLAN 1:20	Defined by fine trowel FULL DESCRIPTION. DETAILED PLAN 1:20 (colour coded) CONTOURS PHOTOGRAPH (B/W)	Defined by fine trowel EXCAVATE AS ONE. PHOTOGRAPH by PHASE	1:100 PLAN CONTOUR SURVEY	Timber trace building
E	TOTAL SIEVING of spoil on site for presence of specified material and KEEP SPOIL	All visible finds PLOT 3-D and KEEP ALL	Defined minutely DESCRIPTION (Incl. Munsell). PLAN (natural colour) 1:10 or 1:5 contour	Defined minutely FULL DESCRIPTION. PLAN (colour) 1:10 or 1:5 CONTOUR. PHOTOGRAPH	Defined minutely EXCAVATE AS ONE. PHOTOGRAPH by PHASE	(as LEVEL D) CONTOUR SURVEY	Skeleton
F	MICRO SIEVING soil block in laboratory	(as component)	(as LEVEL E) and LIFT AS BLOCK	(as LEVEL E)	(as LEVEL E)	(as LEVEL D)	Storage pit fill

Excavation Methods in Archaeology, Fig. 5 Recovery levels used to control the levels of precision applied to digging and recording in excavation (M. Carver)

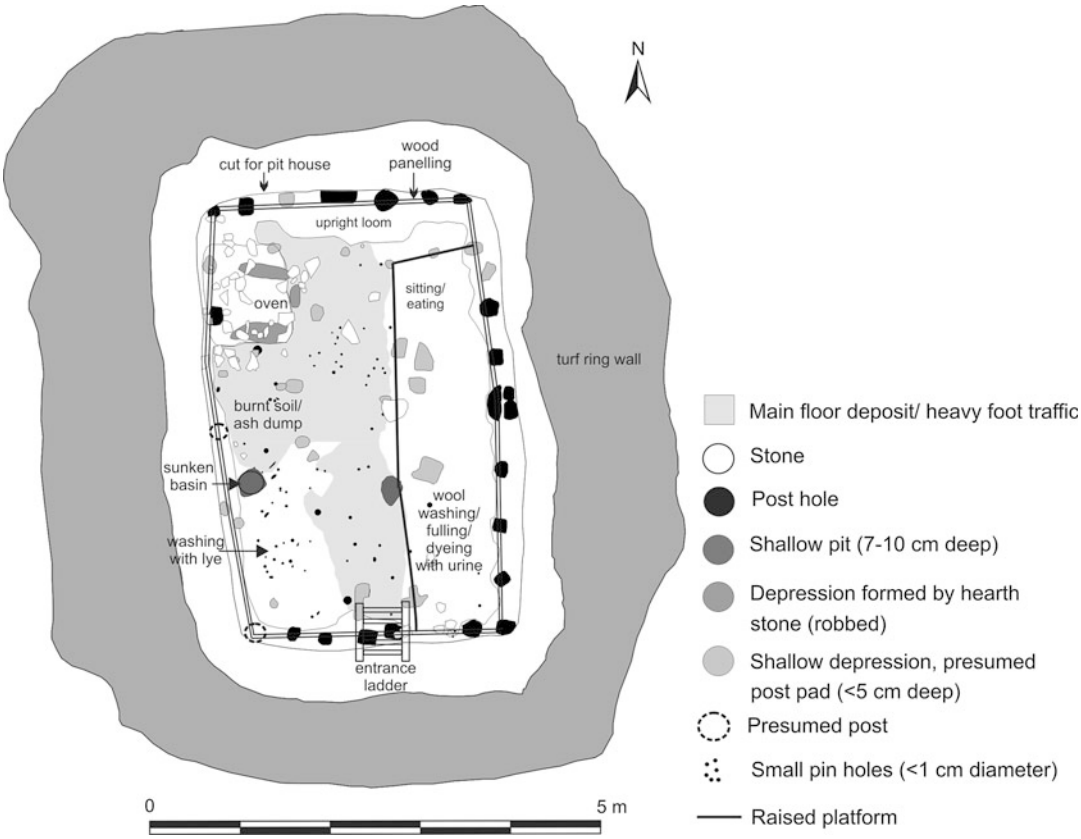

Excavation Methods in Archaeology, Fig. 6 An interpretation of Hofstadir pit house G, owed to microchemical and geophysical mapping. (Courtesy of Karen Milek)

Arbitrary excavation divides the deposit into horizontal slices 5–10 cm thick, known as *arbitrary levels* (or spits). This is naturally a much faster method of digging than defining each original cultural layer in three dimensions. It is often justifiable in the case of deposits where stratification is extremely difficult to see, for example, in *cave sites* or *LBK settlements*. Even when layer interfaces are visible, it is sometimes championed as more scientific than the definition of individual contexts, which is subject to the variable skills of excavators. If a deposit is precisely sliced, horizontally and vertically, the records of these surfaces provide an unequivocal, and checkable, account of where interfaces were located and what layers looked like.

Analysis and Publication of Excavations

The minimum duty of every excavator is to conserve the records made in a publically accessible archive (see the entry on Publication in Field Archaeology in this encyclopedia) and provide an account of the sequence of activities encountered on the site. Many thousands of CRM excavations are conducted each year that meet these minimum requirements on behalf of clients. The full yield of research requires a comprehensive program of analysis, in which all the artifacts and biota (the *assemblages*) are studied and the *use of space* is analyzed and the *sequence* and date determined. In general the assemblages indicate the activities on site; the spatial analysis discovers the shape of buildings and how floors, yards, and routes were used. The sequential analysis puts the structures and activities in order and gives them a date. These results are synthesized to give a documented account of the events that occurred in order of date, often divided for convenience into phases or periods. What every excavation should offer is a strong, evidence-based local

story, which can then be deployed to understand bigger questions couched in more generalized theoretical frameworks.

Cross-References

- ▶ American Pioneers and Traditions
- ▶ British Pioneers and Fieldwork Traditions
- ▶ Burial Excavation, Anglo-Saxon
- ▶ Publication in Field Archaeology
- ▶ Recording in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology

References

Carver, M. 2009. *Archaeological investigation*. Boca Raton: Taylor & Francis.

Carver, M. 2011. *Making archaeology happen*. Walnut Creek: Left Coast Press.

Hebsgaard, M.B., M.T.P. Gilbert, J. Arneborg, P. Heyn, M.E. Allentoft, M. Bunce, K. Munch, C. Schweger, and E. Willeslev. 2009. The farm beneath the sand' – an archaeological case study on ancient 'dirt' DNA. *Antiquity* 83: 430–444.

Hester, T.R., H.J. Shafer, and K.L. Feder. 1997. *Field methods in archaeology*. 7th ed. Mountain View: Mayfield Publishing.

Milek, K.B. 2006. Houses and households in early Icelandic society: Geoarchaeology and the interpretation of social space. Unpublished Ph.D. dissertation, University of Cambridge.

Roskams, S. 2001. *Excavation*, Cambridge manuals in archaeology. Cambridge: Cambridge University Press.

Experiencing Cultural Heritage

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Introduction

The experience of cultural heritage is varied according to the person's realm of experience, the setting of the experience, and the intent of the experience from the point of view of the participator and the provider. The most readily accessible experience of cultural heritage is in the realm of tourism, whereby tourist motivation can be explicitly linked to cultural heritage resources and locations. Notable in European countries, and borne out in global tourism statistics, the cultural heritage tourist has particular motivations, allied to education and cultural improvement, is looking for authentic experiences of cultural traits allied to distinct geographic locations, visits particular sites, spends more at a location in both time/duration, and money/investment in the leisure activity. Figures produced by other national tourism organizations (NTOs) around the globe tend to concur with this trend too: Experience of cultural heritage is a popular leisure motivation on an international scale as well as a local driver for economic and social development.

Definition

Heritage tourists can be readily identified in demographic studies of leisure activities, and for tourism, businesses are a sought-after group who will often act as repeat visitors to an area. Heritage tourists can therefore be categorized as a sector of the visitor population who desire to engage in and respond to an immersive experience associated with *genius loci*, or the "spirit of place," comprising all aspects of the built, natural, cultural, and social environment. Studies in tourism management which have created typologies of visitor according to motivation and behavior continue to subdivide and refine the form of the heritage tourist, according to specialized area of business/activity focus, but the general principle of this type of tourist can be understood distinctly alongside categories such as cultural tourist, or eco-tourist. Associated variables in the types of tourist and form of encounter can be analyzed by the origin of the visitor, local, domestic, or overseas; the duration of stay, as a day visit or longer; and by the visitor context, staying with friends or relatives, within a family group, or on business.

The different types of tourist unsurprisingly take part in different types of heritage tourism,

and the form of experience is molded by where the encounter with cultural heritage takes place. The most readily understood and studied form of heritage experience can be found at sites operated as visitor attraction. It should be remembered that many sites operated as heritage visitor attractions were not designed for the purpose of tourism (e.g., castles, country houses, and battlefields), and therefore can be argued to provide the most accessible authentic form of encounter, albeit requiring further interpretation for visitors through guidebooks, display materials, and other visitor service functions. The further major locations for a definable cultural heritage experience can occur within a museum or gallery, which display specific aspects of a community's history or types of artform, and the function, form and operation of museums and galleries have a well-established literature and philosophy of museology (Bennett 1995). Recognition of the cultural heritage aspects of the wider tourism environment beyond the defined site or building is seen through increasing prominence of heritage-themed events (associated with folk customs, historical or geographical traditions, and established calendar events); wider forms of "heritage" hospitality via distinct types of food and beverage (regional or historical foodstuffs), or locations for visitors to stay, such as historic buildings converted into self-catering accommodation or hotels. Broader cultural experiences, allied to the wider tourism field of cultural tourism, can also have distinct characteristics allied to cultural heritage, and the resurgence of the civic trust or main street movement in Europe and North America capitalizes on areas of towns expressing their historic/cultural character to attract visitors, and support regeneration of local economies. The growth in interpretative technologies deployed in the tourism field, as part of the overall marketing and visitor strategy for a location, provides a newly distinct facet of the cultural heritage experience, with "apps" and websites developing rapidly to provide rich content and information about pin-pointed historic locations, and additional layers of encounter which reach beyond the site itself.

The actual encounter with cultural heritage is itself obviously an intensely personal experience, and study within the fields of tourism studies draw readily on psychological and psychogeographic technique, allowing the ontology of the encounter to be closely analyzed. The experience of cultural heritage is thus deeply influenced by personal and cultural psychologies (education, upbringing, religion, culture, personal association, interests and so on); extraneous experiential factors (location; symbols, aesthetics, societal behaviors); and practical physical factors (such as site operations; visitor management; interpretative engagement). The visitor journey to and encounter of cultural heritage has come to be recognized as a complex set of circumstances, and ever more so when understood within what American business academics Pine and Gilmour (1998) believe to be the growth of the "experience economy." This work has significantly influenced tourism studies' approach to studying the visitor experience, noting that forms of behavior, communication and interpretation, and transaction change over time as the level of sophistication in the management of the visitor experience increases.

Key Issues/Current Debates/Future Directions/Examples

Worth noting in the cultural heritage experience is the level of implicit and explicit communication between the managers "staging" the experience and the receivers or participants in the encounter. Heritage, as considered elsewhere, can be heavily laden with political and social resonance, and the visitor experience may also be influenced from the point of view of educational, cultural, political, or environmental message. This has been most readily studied within the museological field, but is also significant in areas such as World Heritage Site designation, the interplay of environmental protection and heritage preservation seen in the work of the varied National Trusts in different parts of the world, and Governmental heritage agencies with education as a part of their strategic mission. The range of locations where an encounter can occur, and the ambient environment for that encounter, be it a sense of place, a distinct historic location, or an activity explicitly

associated with tangible or, indeed, intangible expression of cultural heritage, means that the experience is a rich field of study. This has led to a welcome growth in academic study and critique from different subject origins, such as geography, archaeology, and business management and tourism. A strong publication stream is developing in journals such as *the Journal of Heritage Tourism; the International Journal of Heritage Studies; and the Journal of Public Archaeology*, among others.

The practicalities of the visitor experience of cultural heritage are important considerations in the management of the built environment in locations wanting to attract tourism more generally. Cultural heritage plays a distinct role in the development of the tourist destination image (TDI) of a location, and even entire country: Scotland is a good example of this, where an interesting juxtaposition is navigated between the country's tourism infrastructure development requiring to be competitive and by necessity up-to-date, and at the same time incorporating the key tourism attractiveness factors of iconic historic sites and culture (Edinburgh Castle, bagpipes, tartan, and whisky being the recognized stereotypical heritage symbols). At a city-scale, a similar tension can be seen playing out in the visitor management within the city of Venice, balancing very practical conservation pressures on the built environment, and the increasing tourist demand, leading to sometimes drastic management measures of capacity management when the pressure on numbers gets too high for facilities to cope in peak season. Equally, the "Outstanding Universal Values" (OUV) of World Heritage Sites represented through monumental sites such as the Great Wall of China, or wider cultural landscapes such as the recently inscribed World Heritage Coffee Cultural Landscape of Colombia can iconically represent a nation's cultural wealth and by consequence its attractiveness to tourists through the location's TDI.

The experience of cultural heritage will continue to develop in complexity, as the types of transaction and encounter with forms of tangible, intangible, and technological representations and interpretations of heritage increase. Leask (2010) provides the best recent account of the state of research into the management of visitor attractions, noting that many of those management aspects are intimately tied into the effective production and enhancement of the visitor experience. The use of cultural heritage as a factor in leisure and tourism activity, as well as a context for the management and development of the built and natural environment will also increase the pressure on cultural heritage advocates and protectors – and the tension between heritage and development in its broadest sense will lead to ever more complex debates in divergent situations around the world. Equally, the opportunity for a visitor to encounter rich cultural heritage experiences may be a positive tool for intercultural dialogue.

Cross-References

- ▶ Authenticity and the Manufacture of Heritage
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Heritage Research and Visitor Planning
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

References

Bennett, T. 1995. *The birth of the museum*. London: Routledge.

Leask, A. 2010. Progress in visitor attraction research: Towards more effective management. *Tourism Management* 31: 155–166.

Pine, B.J., and J.H. Gilmour. 1998. *The experience economy – Work is theatre and every business a stage*. Boston: Harvard Business School Press.

Further Reading

Chahabra, D. 2010. *Sustainable marketing of cultural and heritage tourism*. London: Taylor & Francis.

International Journal of Heritage Studies. n.d.. http://www.tandf.co.uk/journals/rjhs

Journal of Heritage Tourism. n.d.. http://www.tandf.co.uk/journals/rjht

Public Archaeology. n.d.. http://maney.co.uk/index.php/journals/pua/

Timothy, D. 2011. *Cultural heritage and tourism: An introduction*. Bristol: Channel View.

Timothy, D., and S. Boyd. 2002. *Heritage tourism*. London: Prentice Hall.
Weaver, S. 2007. *Creating great visitor experiences: A guidebook for museums and other cultural institutions: A guidebook for museums, parks, zoos, gardens and libraries*, Experienceology Guides. Walnut Creek: Left Coast Press.

Experimental Maritime Archaeology

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Introduction and Definition

Experimental archaeology has been variously defined, early examples being Ascher (1961) and Coles (1966). Broadly, one may say that experimental archaeology involves recreating material aspects of technology or modes of production of the past, based on archaeological and historical evidence. If the experiment is based on good evidence and is conscientiously conducted, it will likely increase our understanding of the technology investigated.

Maritime or nautical experimental archaeology usually involves building and sailing a replica or recreation of a ship or boat of the past. Experimental maritime archaeology can be seen as having started in Spain when the impending 1892 quatro-centenary of Columbus's first voyage to the Americas prompted the construction of a Columbus ship reconstruction. In 1893 a replica Gokstad ship built in Norway was sailed across the Atlantic to the Exposition at Chicago. Neither of these projects was explicitly experimental archaeology and the term had not yet been coined.

Key Issues/Current Debates/Future Directions/Examples

A notable attempt to formulate "right principles and methods" of experimental ship and boat archaeology was made in Coates et al. (1995). The ten authors clearly had a range of opinions, and while some sections impose a rigid scheme analogous to scientific laboratory experimentation with data collection, formulating a hypothesis, testing the hypothesis, presenting the whole process for criticism, and finally reassessment, there is acknowledgement that the hypothesis will "almost invariably fail to comprehend the whole extent of the matter in question." Watercraft, in the interplay of their construction and the dynamic environments in which they operate, are very complex artifacts. Coates et al. (1995) provide a good overview of how nautical experimental archaeology should be done. They note the need for careful and rigorous work, good recording, involvement of wide interdisciplinary expertise, and the proper publication of aims, hypotheses, methods, and results. But this is true of archaeology and other academic work in general. Some sense of differing attitudes to theory and philosophy can be gained from the published transcripts of discussions at The International Ship Replica Seminar, Roskilde 1984 (Crumlin-Pedersen and Vinner 1986).

Experimental archaeology is often interesting to the public and the media. The recreation of ships and boats of the past and recreation of voyaging has considerable romantic appeal. As a form of purely academic research, it is expensive and time-consuming, but replica ships and boats are funded and created for reasons other than pure academic research, including the enhancement of national identity and prestige. Academics should work with such projects and aim for maximum practicable authenticity.

A distinction between replica watercraft and reconstructions of watercraft is useful. A replica, as defined by Fenwick (1993), is only possible where shipwreck archaeology provides near complete data about the design of a vessel from a substantially intact shipwreck or there are good archived records of the design. Replicas built from shipwreck data include the Kyrenia ship (third century BCE) (Katzev 1987) and the several replicas based on the Viking ships at Skuldev (eleventh century CE). The *Endeavour* replica was built on the basis of the plans of James Cook's most famous ship which were drawn when the ship was purchased by the Royal Navy

and converted for exploration. The *Endeavour* replica was not conceived as experimental archaeology and only recently has been published as experimental archaeology (MacArthur 2009), but the ship, now owned by the Australian National Maritime Museum, could be used for programs of experimental archaeology. All replicas involve some conjecture because the archaeological and historical data are never completely comprehensive. The several recreations of Columbus's ships are examples of "reconstructions." The designers have attempted to reconstruct the design of typical Spanish vessels c. 1490 because data about Columbus's ships is limited to the ship types (e.g., *caravela redonda*) and some indication of the sizes. The Columbus ship reconstructions have served to demonstrate our imperfect understanding of the original designs because the reconstruction ships have been unable to average more than about half the speed under sail that Columbus achieved.

Scandinavian experimental maritime archaeology is widely regarded as the best. There is an excellent resource of shipwreck archaeology of substantially intact vessels from the Viking period and later, and there has been rigorous determination to recreate the appropriate tools and woodworking techniques, particularly by the Danish National Museum's Institute for Maritime Archaeology at the Viking Ship Museum at Roskilde, Denmark, under the leadership of the late Ole Crumlin-Pedersen. A Viking replica vessel made from cleft (split) oak logs is very much stronger than a replica made from sawn planks. Indeed, the light and flexible structure of Viking ships is only possible with cleft planks (Johansen 2009). The most spectacular of the Roskilde-Skuldev Viking replica ships is the 30 m longship *Sea Stallion from Glendalough*, launched in 2004. She was sailed to Dublin and back to Denmark in 2007–2008 making nearly 14 knots at best (Johansen 2009, http://www.vikingeskibsmuseet.dk/en/the-sea-stallion-past-and-present/).

It might be argued that the experimental archaeology based on replica watercraft is potentially more valid than that based on reconstructions. However, reconstruction watercraft – "floating hypotheses" as Sean McGrail (2009) has called them – can be used to test important hypotheses and even resolve important questions. Two or three centuries of debate as to how classical era triremes were propelled were effectively resolved by the Hellas reconstruction. It had long been argued that the geometry of three separate banks of oars at different levels and of different lengths was impracticable to the point of impossibility; that triremes were propelled like more recent galleys with three men to each oar but a single bank of oars. The Hellas replica has demonstrated that three banks of oars can be arranged to provide functional and effective propulsion for an entirely plausible warship design (Rankov 2009).

The construction of the "Duyfken replica," a reconstruction of a Dutch *jacht* of appropriate date (early seventeenth century) and size, was an opportunity to test the practicality and effectiveness of the Dutch system of plank-first construction. The idea that the European age of discovery and subsequent domination of much of the world's maritime trade was made possible, in part, by the switch to frame-first construction of ships is undermined by the Dutch retention of plank-first construction at a time when Dutch shipping was superior to that of the rest of Europe in terms of tonnage, volume of cargoes carried, and successful execution of the long voyages to and from East Asia. The Duyfken replica has made long voyages demonstrating maneuverable and seaworthy performance.

Cross-References

- ► Crumlin-Pedersen, Ole
- ► Maritime Iconography
- ► McGrail, Seán
- ► Ship Archaeology
- ► Steffy, J. Richard

References

Ascher, R. 1961. Experimental archaeology. *American Anthropologist* 63 (4): 793–816.

Coates, J., S. McGrail, D. Brown, E. Gifford, G. Grainge, B. Greenhill, P. Marsden, B. Rankov, C. Tipping, and E. Wright. 1995. Experimental ship and boat

archaeology: Principles and methods. *International Journal of Nautical Archaeology* 24 (4): 293–301.
Coles, J.M. 1966. Experimental archaeology. *Proceedings of the Society of Antiquaries of Scotland* XCIX: 1–20.
Crumlin-Pedersen, O., and M. Vinner, eds. 1986. *Sailing into the past. Proceedings of the International Seminar on Replicas of Ancient and Medieval Vessels, Roskilde 1984*. Roskilde: Viking Ship Museum.
Fenwick, V. 1993. Editors note. *International Journal of Nautical Archaeology* 22 (2): 197.
Johansen, R. 2009. The Viking ships of Skuldev. In *Sailing into the past: Learning from replica ships*, ed. J. Bennett, 52–69. Barnsley: Seaforth.
Katzev, M. 1987. The Kyrenia Ship restored. In *History from the sea: Shipwrecks and archaeology*, ed. P. Throckmorton. London: Mitchell.
MacArthur, A. 2009. HM Bark endeavour. In *Sailing into the past: Learning from replica ships*, ed. J. Bennett. Barnsley: Seaforth.
McGrail, S. 2009. Experimental archaeology: Replicas and reconstructions. In *Sailing into the past: Learning from replica ships*, ed. J. Bennett, 6–7. Barnsley: Seaforth.
Rankov, B. 2009. The Trireme. In *Sailing into the past: Learning from replica ships*, ed. J. Bennett, 34–51. Barnsley: Seaforth.

Extreme Environments Archaeology: Climate

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Introduction

There is no complete agreement on how to define an extreme environment. The term is frequently used for any setting that exhibits life conditions unfavorable or fatal to certain organisms with respect to its physicochemical properties. Major classes of extreme environments include acidic (pH < 5), alkaline (pH > 9), hypersaline (salinity $>35\%$), pressurized (>0.1 MPa), hot (>40 °C), cold (<5 °C), dry (aw < 0.80), and high-radiation environments (Thiel 2011). They can be natural and/or artificial, permanent, episodic, or temporary. Hence, an environment could be extreme or not, depending on the organism implied and the physical boundaries within which they can thrive. Since humans are terrestrial, subtropical, air-breathing, low-altitude homeotherms (Cotter and Tipton 2014), most of the world represents a challenge for us. Given that 2/3 of the world is covered by oceans and humans are not biologically aquatic animals, we have to focus on the remnant terrestrial third to find out our ideal environment. If in that third, we look for climate and topography temperate enough for the kind of subtropical primate we are, we will keep only one-sixth of the planet (Piantadosi 2003). This leaves us with a narrow part (see shadowed area in Fig. 1). Consequently, it is logical to think that we humans had to overcome our limitations, if not by natural means at least by cultural ones, in order to multiply and prosper. Cultural adaptations, ultimately, allowed us to inhabit not only extreme climate regions but also, more recently and for limited amount of time, even the outer space. Having acknowledged the wide variety of extreme environments that exist, in the rest of this article, we will deal only with arid, cold, and high-altitude environments. Also just as climatic extremes can be spatial, they can also be temporal. In this latter case, we speak of extreme events. They include droughts, floods, wet periods, warm periods, cool periods, and high-variance periods. But since they are unpredicted and there are no widespread conventions for how these events are defined, we will not refer to these events in this entry (but check cross-references for more on this subject).

Definition

The range of body temperatures compatible with human life is relatively narrow and contrasts with the wide climatic variability that the Earth shows. The first quantitative classification of world climates was elaborated by Wladimir Köppen. As a plant physiologist, he had differentiated five vegetation groups including plants of the equatorial zone (A), the arid zone (B), the warm temperate zone (C), the snow zone (D), and the

E

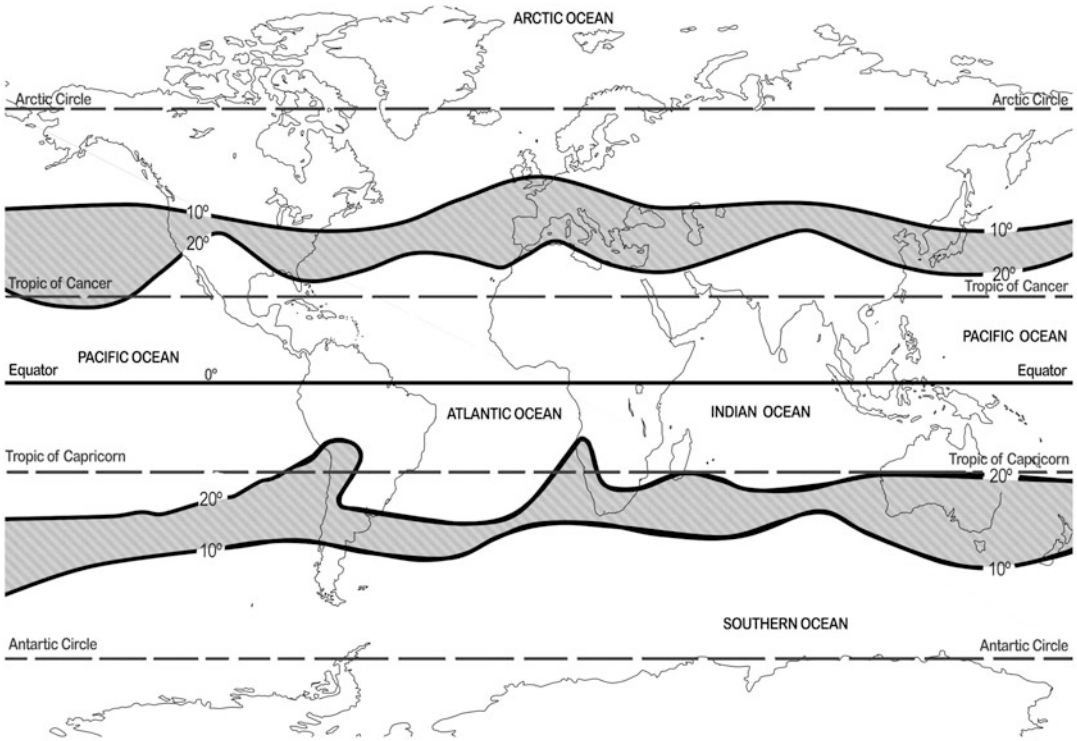

Extreme Environments Archaeology: Climate, Fig. 1 World map with the area between the isotherms of 10 °C and 20 °C shadowed. Credit: Ana Fondebrider

polar zone (E). A second letter in the classification considers the precipitation and a third letter the temperature (e.g., Dfc for snow, fully humid with cool summer; see Kottek et al. 2006). Hence, there exist at least 31 types of climates (Kottek et al. 2006).

As said above, extreme is a relative term but habitats are multidimensional. Hence while some habitats could be considered extreme in terms of mean temperature, they can have other features judged to be favorable. For instance, if we consider as extreme climate the ones in which the mean annual temperature is either less than 10 °C or above 20 °C (not shadowed area in Fig. 1), we can see that most of the world falls under this category. Nevertheless altitude, topography, precipitation, latitude, continentality, and oceanity are factors that should be contemplated. In that sense, other measures such as effective temperature, a concept designed by Bailey (1960) that Binford (1980, 2001) has utilized as an operational definition of growing season, could be a more synthetic way of establishing extreme environments.

Historical Background

From the nineteenth century on, we can consider that archaeology has been established as a discipline. Since its onset, climate was important in its development. First, the direct experience of - climate during fieldwork suggested to the first archaeologists the importance of climate in human life, past and present. But also, climate began to be part of different theoretical frameworks, which considered it as conditioning or even determinant. After World War II, recognition of the environmental effects increased, and archaeologists were of the first to provide evidence of environmental disasters generated by humans that ultimately led to abandonment of sites or the collapse of political systems (Dean 2015). Possibly this awareness allowed Julian Steward's ecological perspective to emerge. Steward

(1955) advocated that anthropologists should understand each culture in its ecological context, giving rise to cultural ecology (Dean 2015). Since then, climate change has been proposed as one of the prime movers for explaining social change. Cultural ecology eventually influenced processual archaeology, the dominant theoretical movement of the 1960s and 1970s in the USA. One of its founders, Lewis Binford, in his monumental analysis of hunter-gatherer behaviors in a global scale, defined environmental variables as his frame of reference (Binford 2001: 50).

Also it should be noticed that environment and climate have been related with the level of complexity that certain societies could achieve. For instance, Diamond (1997) has proposed that societies developed in a different way on different continents because environmental differences. Complex societies could emerge only in dense sedentary populations capable of accumulating food surpluses, and they depended on the rise of agriculture for doing so. But domesticable wild plant and animal species were distributed very unevenly and concentrated in only nine areas of the globe, which thus became the earliest homelands of agriculture (Diamond 1997: 100). Some of those homelands are located in what we can consider arid (and hence extreme) regions (see below).

Given the importance of climate for archaeological theory in general, it is strange that extreme climates did not achieve special attention until very recently. In the review volume of *American Antiquity* in which a group of archaeologists identified the 25 grand challenges that archaeology has to face, among them figured how do humans occupy extreme environments and what cultural and biological adaptations emerge as a result (Kintigh et al. 2014). This means that although certain international efforts are beginning to gain momentum (see below), the archaeology of extreme environments is still rising.

Key Issues/Current Debates

Arid Environments

Aridity could be defined as a deficit of moisture in the environment. But aridity is a complex concept, and its environmental manifestations vary from place to place and through time. Although aridity is equated normally with deserts (defined as an area with a moisture deficit where rainfall is less than 20% of potential moisture loss through evaporation; see Smith et al. 2005), there is a great diversity within, and between, arid environments going far beyond deserts (Thomas 2011: 3).

Deserts cover around 25,500,000 km^2, approximately 20% of the terrestrial world, being present in both Northern and Southern Hemispheres. They present patchy, variable, and frequently unpredictable resources. Therefore, patches where water is available are key to human exploitation, providing access to the arid hinterland and means of traversing the land like navigating through "islands on the sea" (cf. Veth 1993). For humans, arid environments could be areas to avoid, but they are also environments that can be successfully exploited. Lack of surface water, limited food, and climatic extremes have generally made think that arid areas are unfavorable places for habitation, though hunter-gatherer and pastoral-nomadic peoples, living at low population densities, managed to thrive there (Thomas 2011).

Archaeological evidence indicates that people have a long presence in African deserts. Early Stone Age or Acheulian sites are reported from the Namib, Kalahari, and the eastern Sahara, but it is not clear whether this reflects exploitation of certain patches within an arid environment or whether these areas were semiarid savannas at that time (Smith et al. 2005). In Australia, the most arid continent ever occupied by humans (Veth et al. 2015), groups entered Sahul c. 50,000 years ago in favorable conditions. In what has been labeled the "desert transformation model," groups first adapted to more benign climates and, given shifting conditions, have to made changes in their settlement behavior, technology, economy, etc. (Veth et al. 2015). Prehistoric population grew slowly until the Last Glacial Maximum, when evidences of abandonment of large parts of the arid interior, population decline, and surviving populations retreating at refugia are recorded (Veth et al. 2015). By the time Europeans arrived in Australia, the deserts were more densely packed, a process that, in

the late Holocene, produced the desert societies known by early ethnographers (Veth et al. 2015).

In the Americas, human exploration and colonization of deserts occurred very early in terms of its peopling: either in South (around 12,000 years BP; see Borrero 2015) and in North America (around 11,000 BP although settlement probably did not occur until early Archaic; see Smith et al. 2005).

Arid regions of the world have a special role in human evolution. They have funneled early human dispersal, representing alternatively barriers or corridors (Smith et al. 2005). Some of them, showing more favorable conditions, had allowed the domestication of plants and animals (cf. Diamond 1997). And also studies of desert societies have provided the most fertile debates about human adaptability, how societies cope with extreme environments, and their effects on human land use, mobility, and dispersal (Smith et al. 2005).

Cold Environments

Humans tolerate cold quite poorly compared to other mammals. Survival in the cold is limited primarily by hypothermia, defined by a core temperature of less than 35 °C (95 °F) when body's defenses against cold (shivering and constriction of blood vessels) reach maximal response. If the body cools further, at 30 °C (86 °F), shivering ceases, and at 27–29 °C (80–85 °F), coma occurs. Hence, people can only survive in cooler climates by behavioral adaptations, which include wearing clothing, building shelters, and maintaining sources of external heat (Piantadosi 2003).

Since the first use of fire, dated as early as 800,000 years ago (Walker et al. 2016), people have regulated the temperatures of their dwellings. While fire and shelter facilitated hominin presence in cooler climates, only the use of clothes, an efficient and flexible strategy to stay warm, could sustain occupation of cold climates (Gilligan 2016). There is archaeological evidence indicating that hominins began to use simple clothes (animal skins and furs) by Middle Pleistocene. Scrapers to work hides became more frequent in middle latitudes as hominins occupied colder environments from 400,000 years ago (Gilligan 2016). These northern and colder areas were abandoned during the peak of the Last Glacial Maximum (LGM, 20,000–18,000 years ago). But only the development of complex clothes (fitted garments with the option of multiple layers, Gilligan 2016) allowed the occupation of the Arctic. Complex clothes required new tools such as stone blades, bone awls, and bone-eyed needles developed first in Africa during a cold phase (75,000–60,000 years ago; Gilligan 2016). These tools and clothes accompanied modern humans when they spread into northern Eurasia (45,000–25,000 years ago) and explored Siberia during the climatic amelioration following LGM (Rogers and Anichtchenko 2015). Complex clothing gave to *Homo sapiens* an advantage over Neanderthals (whose scraper-dominated toolkits suggest they had only simple clothes, Gilligan 2007) and finally, along with technologies related with maritime subsistence such as skin boats and toggling harpoons (Rogers and Anichtchenko 2015), facilitated the occupation of the Arctic.

In the Americas, the oldest archaeological sites in Alaska date to c. 15,000 BP, and by c. 4500 BP, Paleo-Eskimo peoples had settled in North Greenland (Rogers and Anichtchenko 2015). The most recent human occupation of extreme cold climate was that of the Antarctica which occurred very recently (since all Antarctic archaeology is historical archaeology) being brief, infrequent, and scattered (Pearson and Senatore 2015).

High-Altitude Environments

High-altitude environments are defined as those at and over 2500 m above sea level (Aldenderfer 2015). It has been estimated that 150 million people live permanently at high altitude. Most of these permanent high-altitude residents live in the Andes between 2700 and 4500 (9000 and 15,000 ft; Piantadosi 2003). Physiological adaptation to hypoxia (low oxygen density) was critical for the establishment of permanent habitation at elevations above 2500 m. This adaptation (based upon selection for alleles identified as promoting improved oxygen transport) probably took some time in developing (Aldenderfer 2015) acting as a constraint on the earliest inhabitants of these environments. Also at

high elevations, even in tropical mountains, cold is a constant problem (see above). The combination of cold, hypoxia, and aridity creates a context of low primary productivity in which high-altitude inhabitants has to survive (Aldenderfer 2015).

Although evidence for the occupation of high-altitude environments is relatively recent in human history, it is possible that some of our hominid ancestors may have used zones above 2500 masl (as the southern margin of the Ethiopian plateau) as early as 1.5 mya (Aldenderfer 2015).

In South America, highland occupation appears after 10,500 BP, a very early occupation taking into account South American peopling (although there is controversial evidence of earlier sites; see Dillehay 2000; Aldenderfer 2015). It was initiated by foragers moving from low-elevation sites into the Andean highlands to procure resources such as obsidian and animals (Aldenderfer 2015). Some of the high-altitude environments of the Puna of the South-Central Andes witnessed the early Holocene process of domestication of camelids (Yacobaccio 2007; Mengoni Goñalons 2008), a process related with year-round occupations (Borrero 2015). Aschero (2000) suggested that Puna occupation may have optimized the use of resources from Puna (highlands), *quebradas* (canyons) and valleys located at different altitudes. Resources from valleys and forests were recorded in various archaeological Puna sites, in spite of the lack of sites in those areas where these resources came from (Aschero 2000).

In Asia, although there has been speculation that the Tibetan Plateau was occupied as early as 50,000 years ago, more recent research suggests that it is no earlier than 30,000 years ago and could be much later in time (Aldenderfer 2015; Borrero 2015).

Hence, although it is probable that humans made seasonal forays into high-elevation environments perhaps from the Lower Paleolithic, the permanent occupation of high-elevation environments occurred relatively late. The adoption and spread of plant and animal cultigens, along with acquired genetic adaptations, allowed high-elevation inhabitants to create complex polities (Aldenderfer 2015).

International Perspectives

As extreme environments are distributed all over the world, they have been archaeologically researched in different countries, but they have not been considered in a global scale. Some efforts are conveyed right now in order to amend this need.

At the Southern Hemisphere, the Southern Deserts Conference has given a new impulse to desert archaeology. It is an interdisciplinary meeting that promotes a comparative perspective on the Quaternary evolution of desert landscapes and peoples from the Southern Hemisphere (Oceania, Africa, and South America). It proposes a fluid dialogue between paleoecology, geology, and archaeology. Four successful conferences had been held: Canberra (Australia, 2003), Arica (Chile, 2005) Kalahari (South Africa, 2008), and Uco Valley (Argentina 2014). Also the ICOMOS International Polar Heritage Committee had very recently constituted a Polar Archaeology Working Group which held its first meeting at 2017.The purpose of the PAWG is to work toward developing and delivering a set of principles for polar archaeology, with best practice guidelines to subsequently be developed. Finally archaeologist Brian Stewart is working to develop a comparative focus group on high-altitude archaeology. Hopefully, in the future, more international-scale efforts directed to extreme environments will be developed.

Future Directions

The archeology of extreme environments is still in early stages of development, probably because of the challenges that extreme climate-related environments posed to archaeology. Technical advances, as new and cheaper means of transports and even drones, should facilitate fieldwork. But in some countries, to afford these new technologies makes climate-related extreme environment archaeology prohibiting. More international conferences and networks are needed to overcome the research challenges of unequal national research funding. Archaeological research in extreme environments

offers the opportunity to test theories of cultural adaptation at the limits of viability. Its need is evident, and today we have the best conditions ever to accomplish it.

Cross-References

- ▶ Altitude Environments in Archaeology
- ▶ Antarctica: Historical Archaeology
- ▶ Arctic Ocean and Bering Sea: Maritime Archaeology
- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Extreme Environments in Archaeology: Disaster
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Glacial Advances in Asia, Europe, and North America
- ▶ Glacial Landscapes: Environmental Archaeology
- ▶ Greenland, Archaeology of
- ▶ Greenland: Approaches to Historical Norse Archaeology
- ▶ Polar Expeditions (South) in Archaeology
- ▶ Polar Exploration Archaeology (North)
- ▶ Puna, Archaeology of
- ▶ Scandinavia/Northern Europe: Historical Archaeology
- ▶ Tibetan Plateau, Archaeology of

References

Aldenderfer, M. 2015. Altitude environments in archaeology. In *Encyclopedia of global archaeology*, ed. C. Smith. New York: Springer.

Aschero, C. 2000. El poblamiento del territorio. In *Los Pueblos Originarios y la Conquista, Nueva Historia Argentina, Tomo I*, ed. M. Tarragó, 17–60. Buenos Aires: Sudamericana.

Bailey, H.P. 1960. A method of determining the warmth and temperateness of climate. *Geografiska Annaler* 42 (1): 1–16.

Binford, L.R. 1980. Willow smoke and dogs' tails: Hunter gatherer settlement systems and archaeological site formation. *American Antiquity* 45 (1): 4–20.

Binford, L.R. 2001. *Constructing frames of reference: An analytical method for archaeological theory building using hunter-gatherer and environmental data sets*. Berkeley: University of California Press.

Borrero, L.A. 2015. Glacial landscapes: Environmental archaeology. In *Encyclopedia of global archaeology*, ed. C. Smith. New York: Springer.

Cotter, J.D., and M.J. Tipton. 2014. Moving in extreme environments: What's extreme and who decides? *Extreme Physiology & Medicine* 3: 11.

Dean, R. 2015. The archaeology of anthropogenic environments. In *The encyclopedia of global archaeology*, ed. C. Smith, 272–279. Dordrecht: Springer.

Diamond, J. 1997. *Guns, germs, and steel: The fates of human societies*. New York: W.W. Norton.

Dillehay, T.D. 2000. *The settlement of the Americas*. New York: Basic Books.

Gilligan, I. 2007. Neanderthal extinction and modern human behaviour: The role of climate change and clothing. World Archaeology 39: 419–514.

Gilligan, I. 2016. To afford protection against climate and weather. In *Encyclopedia of evolutionary psychological science*, ed. T.K. Shackelford and V.A. Weekes-Shackelford, 1–4. Dordrecht: Springer International Publishing.

Kintigh, K.W., J. Altschul, et al. 2014. Grand challenges for archaeology. *American Antiquity* 79 (1): 5–24.

Kottek, M.J., C. Grieser, et al. 2006. World Map of the Köppen-Geiger climate classification updated. *Meteorologische Zeitschrift* 15: 259–263.

Mengoni Goñalons, G.L. 2008. Camelids in ancient Andean societies: A review of the zooarchaeological evidence. *Quaternary International* 185: 59–68.

Pearson, M., and M.X. Senatore. 2015. Antarctica: Historical archaeology. In *Encyclopedia of global archaeology*, ed. C. Smith. New York: Springer.

Piantadosi, C. 2003. *The biology of human survival: Life and death in extreme environments*. Oxford: Oxford University Press.

Rogers, J., and E. Anichtchenko. 2015. Arctic Ocean and Bering Sea: Maritime archaeology. In *Encyclopedia of global archaeology*, ed. C. Smith. New York: Springer.

Smith, M., P. Veth, P. Hiscock, and L.A. Wallis. 2005. Global deserts in perspective. In *Desert peoples. Archaeological perspectives*, ed. P. Veth, M. Smith, and P. Hiscock, 1–14. New York: Blackwell Publishing.

Steward, J. 1955. *Theory of culture change: The methodology of multilinear evolution*. Urbana: University of Illinois Press.

Thiel, V. 2011. Extreme environments. In *Encyclopedia of geobiology*, Encyclopedia of earth sciences series, ed. J. Reitner and V. Thiel, 362–366. Dordrecht: Springer.

Thomas, D. 2011. *Arid zone geomorphology process, form and change in drylands*. Oxford: Wiley-Blackwell.

Veth, P.M. 1993. *Islands in the interior: The dynamics of prehistoric adaptations within the Arid Zone of Australia*, Archaeological series no. 3. Ann Arbor: International Monographs in Prehistory.

Veth, P., A. Williams, and A. Paterson. 2015. Australian deserts: Extreme environments in archaeology. In *Encyclopedia of global archaeology*, ed. C. Smith. New York: Springer.

Walker, M.J., D. Anesin, et al. 2016. Combustion at the late Early Pleistocene site of Cueva Negra del Estrecho del Río Quípar (Murcia, Spain). *Antiquity* 90: 571–589.
Yacobaccio, H.D. 2007. Andean camelid herding in the South Andes: Ethnoarchaeological models for archaeozoological research. *Anthropozoologica* 42 (2): 143–154.

Extreme Environments in Archaeology: Disaster

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Introduction

Historically, the so-called "natural disasters" have been considered an important study object among archaeologists, such as the case of the renowned localities of Pompeii and Herculaneum (Italy), excavated since the eighteenth century. However, the explanation of the disaster has increased throughout the twentieth century, since it has been invoked as the cause of various social transformations, especially because of their effects on complex societies (Sheets 1980; Buren 2001). Currently, it is also claimed that natural hazards and disasters are among the great challenges of twenty-first century archaeology by the growing interest on this issue (Kintigh et al. 2014; d'Alpoim Guedes et al. 2016).

However, it is noteworthy that archaeology does not have yet a complete documentation regarding localities, theoretical and methodological approaches, or disciplinary collaborative agreements. Unlike what it has been done from the anthropological and historical perspective (Brown 2017), where various natural phenomena have been documented in a long chronology, such as: El Niño/La Niña events; droughts, hurricanes, earthquakes, floods, vulcanisms, among others. The aim of this work is reviewing the protocols for the study of disasters from an archaeological perspective and the impulse that has received from other disciplines, for its characterization and explanation.

Definition: The Disaster Is Social and the Phenomenon Is Natural

Human populations on the planet have colonized and occupied a diversity of environments, from the tundra and the desert to the tropical forests, arising a large diversity of economies going from the hunter-gatherers to the most sophisticated urban populations. All of this produces a great cultural diversity and generate a myriad of attitudes toward to nature (Ramos Roca and Corona 2017; Cooper and Sheets 2012). Then, in human and nature relationships, nothing is static, everything is constantly changing, but also some aspects have persistence. The relationship that societies establish with nature is seen at the same time as an ideological perspective, material reality, and scenario of human activity, where is an increased concern about the dangers of sudden environmental changes or the presence of episodic events that affect them (Arnold 1996; Cooper and Sheets 2012). A central element in the analysis of these phenomena is the tension that exists between the natural and the cultural, since this defines the role of each of them in the social construction of risk, in the accumulation of vulnerability or in the disaster itself. Natural phenomena are described according to the scale of affectation, the location and its area of influence. That is, they can be classified according to their etiology, but also by their scale, in episodic and short- or long-term events (Cooper and Sheets 2012; García Acosta 2005).

Because of its scale, short-term events are related to changes in climate and seasonality, but also to biological events, such as pests and epidemics, would also be located; while the long-term ones are linked mainly to temperature, such as changes in marine currents that affect climate (El Niño/La Niña event), desertification, and environmental erosion, among others. On all of them, societies tend to adapt, but also affect the soils, flora, and fauna, sometimes irreversibly, so that

can lead to profound changes in populations and societies, which also increases the risk survival. Others are episodic, high-energy events that affect landscapes and human populations, such as: volcanism, earthquakes, hurricanes, droughts, frosts, uncontrolled fires, and floods. Finally, another category of dangers may be related to a natural event, but they are more linked to management from the social sphere, such as famines, arson, and social conflicts, including war, which increase both levels of human mortality, as well as those of environmental impact (Cooper and Sheets 2012).

This type of studies considers two premises: societies are not passive recipients of a phenomenon or natural event, therefore, the interaction between society and phenomenon must be considered, characterizing each of them specifically. The episode or incidence of an adverse natural phenomenon is accompanied by other social, political, economic, and cultural facts, which must be assessed to understand the phenomenon and its context, determining its scope, results, and consequences.

For archaeology, that usually has incomplete and interpretative evidence, it can start from the basic proposal to characterize a disaster, which is summarized in Table 1.

Extreme Environments in Archaeology: Disaster, Table 1 Basic characteristics of natural disasters (after Shimoyama in Torrence and Grattan 2002)

Characteristics	Definition
Initiation	The original process or event that set the scene for the disaster, e.g., extreme natural events such as volcano, flood, earthquake, and tsunami
Immediate causes	Specific aspects of the event, which have direct effects on human life and property
Local conditions	Natural and sociocultural variables that establish the local setting at the time of the event
Damages	Concrete negative effects
Assessment	Process in which victims and observers assess the extent and repercussions of the damages
Actions	Acts carried out following the disaster. These include both short-term actions, such as abandonment and cleaning up, etc., and long-term adaptations, such as moving to a new area, collapse of social system, institution of preventive measures, adoption of ritual practices to avoid further occurrence of disasters, etc.

Natural events can be triggers of a disaster or are threats when they are considered risk agents, based on the probability that it manifests itself in a period of time and in a specific site. Therefore, a risk equation must integrate both the threat and vulnerability, understood as the inability of a human community to respond adequately to the phenomenon. Consequently, disaster, although linked to a natural phenomenon, has a character and a social definition, which must be explored and understood as a whole (Torrence and Grattan 2002; García Acosta 2005).

Historical Background: Key Issues/ Current

Although studies on natural phenomena have been recurrent in geography, geology, and other physicochemical and natural disciplines, they considered the societies as passive elements facing the power of nature. In the 1980s, the "alternative model" emerged (Maskrey 1993), which represented the most important effort made up to the moment, in order to integrate a social theory about disasters. This was the first text that systematically presented a radical and integral critique of the dominant physicalist paradigm. Hewitt's essay was decisive in locating vulnerability, not only as a feature of different threats but, above all, originated by economic, political, and social processes (Buren 2001).

From this, we know, but do not follows, the perspective that addresses the archeology of the disaster, such as that dealing with the urgent requirements of identification of victims and research scenarios, after mass death events, since they were considered more linked to forensic processes (Gould 2013; Harrison 2016).

From the anthropology, it was observed then that there are disasters with a long-term development, those that are manifested after a sustained cultural use of the environment, produced by the population growth and the landscape modification, where some cases are: the urbanization

processes, the impact of the infrastructure, the systems of social organization, all of them inserted in the relation of the societies with the environment. At the beginning, researchers proposed that disasters were "natural" and privileged their study in "high-risk societies," establishing an equation, where the disaster is equal to the risk of occurrence of a phenomenon due to the vulnerability of the affected society. Currently, the concept of risk and its management are linked, so that the disaster is definitely located in the social sphere, which are influenced as much by the threats, i.e., the physical events that may happen, as well as for vulnerability (Maskrey 1993).

In the 1990s, there is the "vulnerability approach" or "vulnerability paradigm," which makes the analysis of disasters explicit from the perspective of the families and human communities involved. Then, the historical evidence shows that the risk and disaster are multidimensional and multifactorial processes, which is the result from the association between threats from natural phenomena and certain conditions of vulnerability, which are built and reconstructed over time (Blaikie et al. 1994).

From an archaeological perspective, then it must be considered that natural phenomena have an important role as a trigger of a disaster, but they are not the cause. This is of multiple nature and is found more in the socioeconomic and environmental characteristics of the impacted region (Van Buren 2001; Campos Goenaga 2016; Cooper and Sheets 2012).

Debates

The study of disasters and natural phenomena is in principle multidisciplinary, involving fields, such as meteorology, geology, and geography, and includes social sciences, such as anthropology and psychology, but up to the end of the twentieth century, they did not have a paradigm in common and each one emphasized some particular natural, social or cultural aspects. Buren (2001) highlights that geography was one of the disciplines where disaster research was developed and of great influence in archaeology, for the emphasis on human populations; however, it had a greater biases and funding towards the technological and physical science aspects, in general, aspects that are related to the economic-industrial impact that these activities could generate, an were debated at these time (Buren 2001).

Perhaps the most complicated issue is how archaeology could characterize and explain the disaster from a social perspective. There are several examples where, although a series of hazard events are documented, but the effects on the populations that inhabited the region are not investigated, as can be observed on volcanism in Central America (Torrence and Grattan 2002) and México (Barrera Rodriguez 1997); floods, plagues, and other events in the European Middle East (Brown 2017); earthquakes, tsunamis, and coastal subsidence in the American Northwest (Losey 2005). In most of all of those cases, a prediction menu was assumed for the situation of the human populations: the destruction of the settlements, the migration, and in the best scenario the adaptation and the environmental resiliencies, with which an image of cultural stability was offered. The prevailing hypothesis was that "simple" societies seemed to be more resilient than complex societies, since the latter relied on a built environment and economies based on labor specialization, redistribution, and extensive trade routes (Torrence and Grattan 2002).

It appears that the researchers concentrated on particular cases of episodic phenomena, which were commonly assigned as "disasters" because their inhabitants could not be facing nature. Therefore, a diversity of variables and situations were omitted, especially with regard to the long-term effects of the event and the possibilities of recovering the environment, human populations, the settlements, and particular habitat that constitutes their environment. It even obscures the discussion about the particularities of the natural event that triggered the disaster, for example, the intensity of the earthquakes, the scope of volcanism, which today anthropology has shown to be key parts to understand as part of the equation that includes vulnerability, risk and disaster itself (Torrence and Grattan 2002; García Acosta 2005; Campos Goenaga 2016).

The methodological aspect is one of the most developed in recent years, where it has been

observed the effectiveness of incorporating various sources to analyze these human-nature interactions, considering that archaeology should have the tools for the study of social decline and collapse, since that long-term chronologies could be achieved, and are a central part of the archaeological record. In most cases, where in the absence of written materials, the material remains of societies and stratigraphic contexts are evidences most important to study these phenomena (Brown 2017).

However, the practice to retrieving environmental and socials information through the revision of historical, ethnohistorical, and even ethnographic evidence is practically the most frequent and allows to establish long chronological sequences, related to changes of local or regional landscapes, sociocultural practices, impact and presence of episodic events or events biological as the presence of pests and epidemics. These aspects provide to archaeology with a series of alternative evidences to construct or discuss the hypotheses that are formulated regarding the study of natural phenomena and disasters (Torrence and Grattan 2002; García Acosta 2005; Campos Goenaga 2016.

In that context, an emerging discipline is archaeo-seismology, which although initiated as a "curiosity" collecting data on sources and contrasted with field data, became a multidisciplinary collective effort to obtain the greatest amount of information from ancient earthquakes records, which can be assessed by the growing number of catalogues and the regional and intensity information contained in each one of them. In some cases, this information is the basis for establishing regional cultures for the prevention of earthquake damage (Sintubin 2011).

International Perspectives: What Is the International View From Where the Author Is?

In the light of above process and discussions, various scholars interested in promoting interdisciplinary research have emerged, promoting collaborations with colleagues from the physical-natural fields and the social sciences, either through periodic academic events or establishing research networks.

One of the first experiences in Latin America was the *Red de Estudios Sociales en Prevención de Desastres en América Latina* (Social Studies Network on Disaster Prevention), which work from 1992 to 2015 (http://www.desenredando.org/). Another one with mainly Ibero-American scope and influence is the *Red Temática de Estudios Interdisciplinarios sobre Vulnerabilidad, Construcción Social del Riesgo y Amenazas Naturales y Biológicas* (Thematic Network of Interdisciplinary Studies on Vulnerability, Social Construction of Risk and Natural and Biological Threats) (http://sociedadyriesgo.redtematica.mx/). Most recently was announced the work of the Global Human Ecodynamics Alliance (http://www.gheahome.org/).

These are some of the collective academic efforts that offer ongoing dialogue between researchers (Symposium, Congress, Seminars, Workshops), outreach actions (courses, brochures, articles, books, social networks, and mass media), as well as Internet portals for free access to written and multimedia files on all aspects related to risk, vulnerability, disasters, and, in general, perspectives on human-environment interactions.

These efforts are supported by international foundations, by public and private organizations, both at national and international levels. One of the most notable organisms is the United Nations Office for Disaster Risk Reduction (https://www.unisdr.org/), where it can be found an up-to-date statistics to measure risk and vulnerability in current societies. However, it is worth highlighting the limited and marginal collaboration of archaeology in this growing field of research.

Future Directions

The apparent dominance of humans over nature is daily tested, as populations are increasingly vulnerable to natural phenomena and disasters, among other causes due to the increased rate of population growth, the loss of habitats, and the

intensive use of natural resources, including the nonrenewable. In this context, it is reiterated that archaeology can make key contributions to the interdisciplinary study of the disaster in various aspects (Torrence and Grattan 2002; Cooper and Sheets 2012), here is commented some emerging and promising issues in the current literature.

One is filling the gap between salvage archaeology after a disaster, and its later contributions both to the recovery of the spaces of daily life prior to the disaster, and in the understanding of the symbols of loss and, in general, to collaborate in creating a collective memory (Bagwell 2009). A close collaboration with anthropologists and in general with civil and governmental organizations involved in the processes can be made.

The combination of geoscientific and archaeology studies could help to reinterpret the episodic natural phenomena of the past allows providing data and time series in the establishment of patterns that are useful for the establishment of public policies and for outreach processes (Riede 2017).

The archaeology could document the circumstances in which humans adapted to the particular environments that are generated by climatic changes. In several regions the data, however, may be scarce, so it is possible to alternately work in the construction of computational models that allow to recreate in a reliable way the environmental scenarios and thus establish more refined hypotheses about the adaptive strategies used by human populations (d'Alpoim Guedes et al. 2016). It should be noted that those models could be adjusted to include the variables referring to natural phenomena, especially in those regions that are susceptible to the presence of episodic phenomena, such as coasts, seismic, hydrographic, volcanic regions, among others.

Recognizing the importance that disasters and natural phenomena have had and have in the daily life of human populations, it cannot be ignored that these can also influence the survival of a series of symbolic elements, either sites or objects, several of them considered as cultural heritage, protected by local, regional or world-wide legislation. Development of methodologies to measure the vulnerability of these elements is important to establish measures of protection or mitigation of risks applied by civil or governmental agencies, responsible for the preservation of those sites (Minos-Minopoulos et al. 2017).

Since the study of disasters is located in the sphere of interactions between humans and the environment, this implies revising the theoretical aspects that allows clarifying its dynamics from other perspectives, especially if the humans were a particular element of the environment, belonging to the past and present biodiversity.

The human is also a species with a sophisticated scientific knowledge, that includes the so-called ethno-knowledge as part of the scientific thinking (Ramos Roca and Corona 2017; Fitzhugh et al. 2018). Then, the research from ethnobiological and biocultural spheres highlights the importance and influence of those local knowledge on the use of humanized landscapes at rural localities and how also that modifies the influence of globalization in the cities of the planet. That understanding of different perspectives may be necessary to address the complex problem of the disaster in a diachronic way, since that affects to all the biodiversity, but also to a particular species, which is human, and whose survival depends on their intuition and ability to dialogue. Our opportunity to continue the hominization process depends, perhaps, on our ability to continue understanding, and of build societies based on collective knowledge with quality of life and sustainable for the planet.

References

Arnold, David. 1996. *The Problem of Nature: Environment, Culture and European Expansion*. Oxford, UK: Blackwell.

Bagwell, Margaret. 2009. After the storm, destruction and reconstruction: The potential for an archaeology of hurricane Katrina. *Archaeologies* 5 (2): 280–292. Springer US. https://doi.org/10.1007/s11759-009-9102-3.

Barrera Rodriguez, Raul. 1997. Arqueología de Los Asentamientos Humanos Sepultados Por Las Erupciones Volcánicas En México. *Ciencia y Desarrolo* 136: 42–51.

Blaikie, Piers, et al. 1994. *At Risk: Natural Harzards, People's Vulnerability, and Disasters*. London: Routledge. https://doi.org/10.1109/TVCG.2008.63.

Brown, Peter J. 2017. The contribution of archaeology to the study of historical disasters. In *Archaeological approaches to breaking boundaries: Interaction, integration and division: Proceedings of the graduate archaeology at Oxford conferences 2015–2016*, ed. Rebecca O'Sullivan, Marini Christina, and Julia Binnberg, vol. 44, 0–6. Oxford: BAR Publishing.

Van Buren, Mary. 2001. The archaeology of El Niño events and other 'Natural'Disasters. *Journal of Archaeological Method and Theory* 8 (2): 129–149. https://doi.org/10.1023/A:1011397001694.

Campos Goenaga, Isabel. 2016. Entre La Vulnerabilidad y El Riesgo Análisis de Los Procesos Históricos de La Península de Yucatán Desde Las Crisis Epidémicas. (Siglos XVII y XVIII). In *Clima, Desastres y Convulsiones Sociales En España e Hispanoamérica, Siglos XVII-XX*, ed. Luis Alberto Arrioja Díaz Viruell and Armando Alberola Romá, 323–344. Alicante: Universidad de Alicante & El Colegio de Michoacán.

Cooper, Jago, and Payson Sheets. 2012. *Surviving sudden environmental change. Answers from archaeology.* Boulder: University Press of Colorado.

d'Alpoim Guedes, Jade A., Stefani A. Crabtree, R. Kyle Bocinsky, and Timothy A. Kohler. 2016. Twenty-first century approaches to ancient problems: Climate and society. *Proceedings of the National Academy of Sciences* 113 (51): 14483–14491. https://doi.org/10.1073/pnas.1616188113.

Fitzhugh, Ben, Virginia L. Butler, Kristine M. Bovy, and Michael A. Etnier. 2018. Human Ecodynamics: A perspective for the study of long-term change in socioecological systems. *Journal of Archaeological Science: Reports*. https://doi.org/10.1016/j.jasrep.2018.03.016.

García Acosta, Virginia. 2005. El Riesgo Como Construcción Social y La Construcción Social de Riesgos. In *Desacatos*, vol. 19, 11–24. Centro de Investigaciones y Estudios Superiores en Antropología Social.

Gould, Richard A. 2013. Disaster. In *The Oxford handbook of the archaeology of the contemporary world*, ed. Paul Graves-Brown, Rodney Harrison, and Angela Piccini. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199602001.013.018.

Harrison, Rodney. 2016. Archaeologies of emergent presents and futures. *Historical Archaeology.* 50: 165. https://doi.org/10.1007/BF03377340.

Kintigh, Keith W., Jeffrey H. Altschul, Mary C. Beaudry, Robert D. Drennan, Ann P. Kinzig, Timothy A. Kohler, W. Fredrick Limp, et al. 2014. Grand Challenges for Archaeology. *Proceedings of the National Academy of Sciences of the United States of America* 111 (3): 879–880. National Academy of Sciences. https://doi.org/10.1073/pnas.1324000111.

Losey, Robert J. 2005. Earthquakes and tsunami as elements of environmental disturbance on the northwest coast of North America. *Journal of Anthropological Archaeology* 24 (2): 101–116. Academic Press. https://doi.org/10.1016/J.JAA.2005.02.001.

Maskrey, A (Comp.). 1993. *Los Desastres No Son Naturales/*. 1st ed. Panamá: Red de Estudios Sociales en Prevención de Desastres en América Latina.

Minos-Minopoulos, Despina, Dale Dominey-Howes, and Kosmas Pavlopoulos. 2017. Vulnerability assessment of archaeological sites to earthquake Hazard: An Indicator based method integrating spatial and temporal aspects. *Annals of Geophysics* 60 (4). https://doi.org/10.4401/ag-7157.

Ramos Roca, Elizabeth, and Eduardo Corona. 2017. La Importancia de Las Diversas, Complementarias y Comparativas Miradas En La Investigación de Las Interacciones Entre Los Humanos y La Fauna. *Antipoda* 28 (May): 13–29. https://doi.org/10.7440/antipoda28.2017.01.

Riede, Felix. 2017. Past-forwarding ancient calamities. Pathways for making archaeology relevant in disaster risk reduction research. *Humanities* 6 (4): 79. https://doi.org/10.3390/h6040079.

Sheets, Payson. 1980. *Archaeological studies of disaster: Their range and value*. Boulder: Institute of Behavioral Science, University of Colorado.

Sintubin, Manuel. 2011. Archaeoseismology: Past, present and future. *Quaternary International* 242 (1): 4–10. Pergamon. https://doi.org/10.1016/J.QUAINT.2011.03.056.

Torrence, Robin, and John Grattan, eds. 2002. *Natural disasters and cultural change. One world archaeology.* New York: Routledge. https://doi.org/10.1002/gea.10110.

Eyo, Ekpo Okpo

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Basic Biographical Information

Professor Ekpo Okpo Eyo was an eminent Nigerian scholar of many parts known to people as an Archaeologist, art historian, and museologist. He was regarded as a giant pillar, on which the growth of Nigeria's museums, was establishment in Nigeria.

Ekpo Okpo Eyo was born on 28 July 1931 at Creek Town, Odukpani Local Government Area, of the present-day Cross River State, Nigeria. He began his early education at the Creek Town School and subsequently at the Duke Town

School, Calabar. His secondary education was at the Evening Secondary Continuing School, Calabar between 1937 and 1947. In 1960, he proceeded to the Institute of Archaeology, London, and Pembroke College, Cambridge University, where he spent the next three years (1960–63). It was at the Institute of Archaeology, London, that Eyo began to chart a path for the journey he was to take for life. However, it was in Ibadan that his intellectual maturity blossomed. Having obtained a B.A. (Cantab.) in Social Anthropology in 1963, and an M.A. (Cantab.) in 1967, he earned his Ph. D. in Archaeology in 1974 from the University of Ibadan, the first Nigerian to ever achieve this feat.

As a scholar, he garnered several awards including those received during his early years: School Prize in English and Mathematics at his Duke Town School, Calabar, in 1947; *Silver cup in Broadcasting* at the "All Nigeria Festival of the Arts" in 1956. The following year, he was awarded a Certificate in Conservation and Restoration of Archaeology and Ethnographical Specimens at the University of London in 1957. In 1962, he earned the Gordon Childe Prize for the best student of the year in Archaeology at the University. The same year, Professor Eyo was offered an associateship of the Museum Association of Great Britain and Ireland, and was awarded a Professional Diploma in Museology.

Major Accomplishments

He distinguished himself as the first and only Nigerian Director of the Federal Department of Antiquities (1968–1979), and first Director General (DG) of the National Commission for Museums and Monuments (NCMM) between 1979 and 1986. During his stint as a Director for 18 years, Ekpo Eyo laid the foundation of NCMM and made it a success. In the following years, Professor Eyo became an authority in Archaeological research, particularly African arts. His passions for archaeology and the arts were inseparable. It was once said that it was to the arts that he devoted more love and attention. However, Prof Eyo opined that it was Archaeology that opened his eyes to the arts. Thus, among the several positions he held, between 1963 and 1973, he was the President of the Museum Association of Tropical Africa (1963–73) and Vice President of the Advisory Council of the International Council of Museums (ICOM) (1965–74). Between 1976 and 1980, he became the chairman of the West African Archaeological Association; Vice Chairman of the World Heritage Committee of UNESCO; and Chairman, Organization of Museums, Monuments and Sites in Africa (OMMSA) from 1976 to 1978.

Ekpo Eyo: A Blend of Archaeology and the Arts

His passion for the arts was legendary that, Prof Ben Enwonwu, one of Nigeria's finest Artists, described him as a great man of Antiquities (Adaka 2012). This passion culminated in the exhibition "Treasures of Ancient Nigeria: Legacy of 2000 Years." It successfully put an end to the concept that the African continent lacked any civilization until contacts with Europe. The exhibition was a major instrument that made Nigeria more respected around the world. The exhibition was later to tour Britain, USA, and Canada between 1980 and 1986 (Archibong 2011). The exhibition had been published into a book, with the same title, coauthored by Frank Willet in 1980. Other books written by him included *2000 Years of Nigerian Art* and *From Shrines to Showcases: Masterpieces of Nigerian Art*.

After retirement from the NCMM, Eyo was appointed Professor of African Arts and Archaeology at the Department of Art History and Archaeology, University of Maryland, College Park, USA, in 1986. There he spent the latter part of his life researching and teaching. During this time, Professor Ekpo Eyo often carried out archaeological excavations in Calabar. One of the major results of these excavations was *The Terracottas of Calabar*, published in 2008. Professor Eyo published over 25 scholarly articles in learned journals and delivered about 30 lectures in museums and top universities in America Europe and Nigeria. He was, in 1975, admitted into the *"Ordre des Arts et des Lettres"* by the French

Government. In 1980, he bagged the Officer of the Federal Republic (OFR) award by the Federal Government of Nigeria. In 1989, he was conferred with an Honorary Degree of Doctor of Letters by the University of Calabar, Nigeria. Five years later, he was presented with the Art Council of African Studies Association (ACASA) Leadership Award at the 13th Triennial Symposium on African Art at Harvard University.

†On May 28, 2011, Professor Ekpo Okpo Eyo passed away in Maryland, USA, at the age of 80. A former Secretary General of the Commonwealth, Chief Emeka Anyaoku, said of him: "a true icon of Nigerian Archaeology, Anthropology and Museums, and an outstanding scholar of Nigeria's cultural heritage (Adaka 2012)." However, a succinct description of him was given by a former director of heritage, monuments, and sites in Nigeria that Prof Eyo, even in death, is "a priceless museum piece (Archibong 2011)."

Cross-References

- ▶ West Africa: Museums
- ▶ West and Central Africa: Historical Archaeology

References

Adaka, S. 2012. Citation on late Professor Ekpo Okpo Eyo (OFR). A report of the National Museum, Calabar.

Archibong, M. 2011. Nigeria legendary museologist, Ekpo Eyo, is dead. Available at: http://www.mauricearchibongtravels.blogspot.com/2011/05/nigeraias-legendary-museologist-ekpo-eyo.html. Accessed 20 Sept 2012.

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Facial Approximation and Craniofacial Superimposition

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Introduction

When concerns exist as to the identity of a set of remains and when DNA, dental, and radiographic comparisons are not possible, the morphology of the skull can be used in conjunction with the biological profile to help provide answers (İşcan and Helmer 1993). These methods consequently hold special pertinence to medicolegal cases, and they take two forms: craniofacial superimposition and facial approximation (see the section "Definition" and Fig. 1). Unlike its counterpart method, facial approximation is also routinely used for paleoanthropological (Balter 2009) and archaeological purposes (Prag and Neave 1997).

Craniofacial superimposition typically enables the determination of persons to whom the skull *does not* belong via image comparison, i.e., exclusion of individuals whose facial anatomy is inconsistent with that of the skull (Ubelaker 2002). Where multiple photographs and views of the face exist, and/or the teeth are visible, increased weight to positive matches may be assigned. On the other hand, facial approximation is used to predict the facial appearance from a skull (Gerasimov 1955). In medicolegal contexts, correct recognition of the publically advertised facial approximation is ideal; however, successes may also be attained via facial approximation's ability to capture public attention and focus it on the jointly advertised case details that, in turn, provide the stimulus for recognition (Stephan 2009). In non-forensic contexts, facial approximation may be employed to illustrate the potential facial appearance of the individuals to whom the recovered remains belong (Prag and Neave 1997; Balter 2009), and it is largely used in this context to boost public interest in archaeological finds. In these circumstances, facial approximations are typically constructed with greater detail and greater artistic license because the faces serve educational/entertainment purposes whose accuracy is impossible to verify (Montagu 1947).

Historically, superimposition and facial approximation coevolved from early attempts to authenticate the identities of skeletons thought to represent well-known historical figures (İşcan and Helmer 1993). The implementation of facial approximation methods predates, however, that of craniofacial superimposition (see Kollmann and Büchly 1898; Pearson and Morant 1934). In terms of medicolegal work, the first published use of facial approximation for homicide case investigation comes from the USA in 1916 (Wilder and Wenworth 1918) while that for craniofacial superimposition comes from Scotland in 1937 (Glaister and Brash 1937). While His (1895) is routinely

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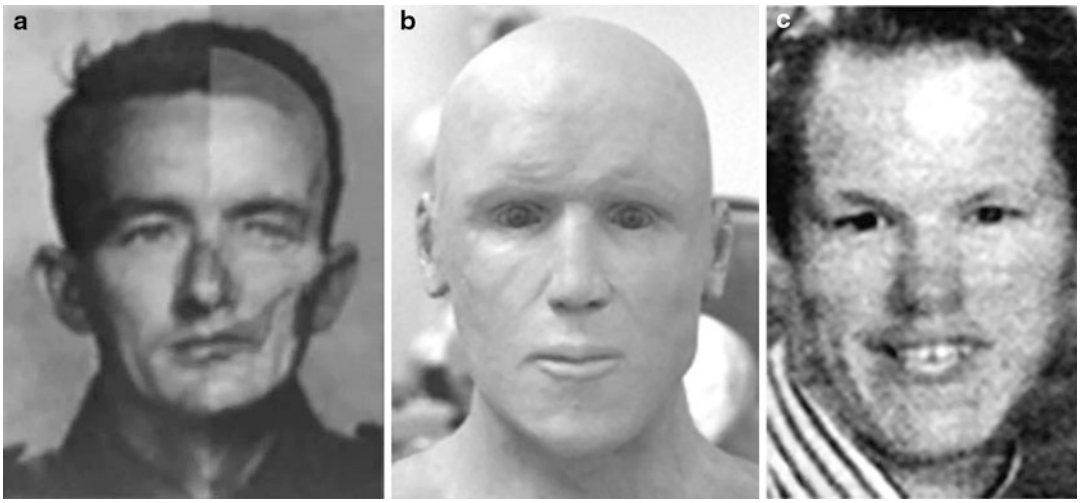

Facial Approximation and Craniofacial Superimposition, Fig. 1 Craniofacial superimposition and facial approximation: (**a**) semitransparent vertical skull wipe during video superimposition to compare the skull and face (the skull in this case belongs to the person depicted in the facial photograph); (**b**) a facial approximation that was constructed without a priori knowledge of the facial appearance of the correctly matching individual depicted in (**c**). (Parts (**b**) and (**c**) are reprinted from Stephan and Henneberg (2006), with permission from Elsevier)

cited in the scientific literature for first implementing facial approximation techniques, Sefner's attempt to construct Bach's face was not undertaken in the blind and so it does not qualify as face prediction (His 1895).

Of the two methods, craniofacial superimposition is widely recognized to be the more reliable, and should always be given precedence if a short list of potential candidates for a match, and antemortem photographs of the decedent, exist (Stephan 2009). Where this is not the case, facial approximation is warranted. Note here that facial approximation has been cautiously regarded in the broader anthropological realm due to its weak scientific foundations (Tyrrell et al. 1997; Stephan 2009). Even greater skepticism has been directed toward paleoanthropological approximations due to their larger degrees of subjectivity (Montagu 1947).

Typically, anthropologists or anatomists should be employed to execute the methods because of the method's anatomical underpinnings. However, where the anatomist/anthropologist does not possess the requisite knowledge/skills in photography (craniofacial superimposition) or dexterity for modeling (facial approximation), collaborations should be pursued with other relevant parties (photographers and artists) as appropriate.

Definition

Craniofacial superimposition (also known as photo superimposition, video superimposition, and supraprojection) is the simultaneous comparison of skull and face anatomy via the mixing of photographic or video images to determine their degree of correspondence (see Fig. 1).

Facial approximation (also known as facial reconstruction, facial reproduction, and forensic sculpture) is the prediction of a face from a skull without a priori knowledge of the decedent's true antemortem facial appearance (see Fig. 1).

Key Issues

Craniofacial Superimposition

Superimposition progressed from the overlay of tracings of the skull and face to the overlay of photographic still images and then to motion pictures in the 1970s (Taylor and Brown 1998). The latter method, which largely remains unchanged

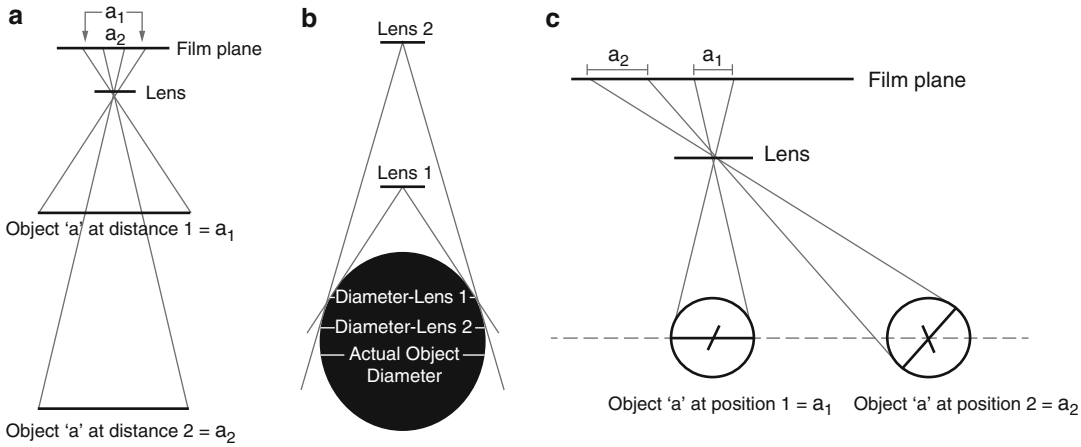

Facial Approximation and Craniofacial Superimposition, Fig. 2 Some properties of rendering a 3D scene to a 2D photographic plane: (**a**) at short subject-to-camera distances, parts of objects closer to the lens are magnified; (**b**) an object's profile depends on the subject-to-camera distance used; and (**c**) spherical objects are broadened when they fall toward the edges of the camera's field of view. (Parts (**a**) and (**b**) are redrawn after Gavan et al. (1952))

up until the time of this writing, requires two video cameras: one to film the 3D skull and one to film the 2D facial photograph. The two acquired 2D images (one of the skulls and one of the photographs) are then mixed together and viewed on a single screen for the craniofacial alignment to be assessed.

It is crucial to understand that the raw anatomies of the skull and the face are not compared in craniofacial superimposition. Instead, it is the rendering of these 3D structures onto two 2D planes (i.e., their point projections) that form the platform for the comparison. Thus, the photography conditions used to capture the 2D images must be very nearly the same for a valid superimposition to be made.

Since specific settings have normally been used to acquire the preexisting 2D facial image, the task for the superimposition analyst is to recreate the photographic conditions for the skull recording (Taylor and Brown 1998). Modern video superimposition holds a major advantage above its older still-frame counterparts in this respect because the skull can be moved, with real-time superimposition viewing, for fast and correct placement relative to the face. Of course, the superimposition procedure is most accurate and expedient if the photographic conditions are known and can be set prior to skull alignment (e.g., Glaister and Brash 1937). This is best attained by asking the photographer, who took the original antemortem photograph, what photographic settings were used. If the photographer cannot be consulted, trial and error is usually pursued to approximate (as closely as possible) the photographic settings used for facial image capture (Taylor and Brown 1998). These photographic variables include the following:

- *Subject-to-Camera Distance*: The subject-to-camera distance must be replicated so that (1) parts on the 3D object closer (or further) from the camera are not differentially magnified between the comparison images (Fig. 2, or for real-life examples Fig. 3 – Panel 1), and (2) the camera does not record different edges of the same three-dimensional object (Fig. 2, or for real-life examples Fig. 3 – Panel 2). This is especially important when small subject-to-camera distances (<5 m) are employed.
- *Film Plane Relative to the Subject*: The angle of the film plane relative to the subject (i.e., camera tilt) must be replicated so that the degree to which the top or bottom of the subject vanishes (= keystone distortion) is the same. This factor also helps to determine the vertical height at which the camera is placed relative to the subject and vice versa.

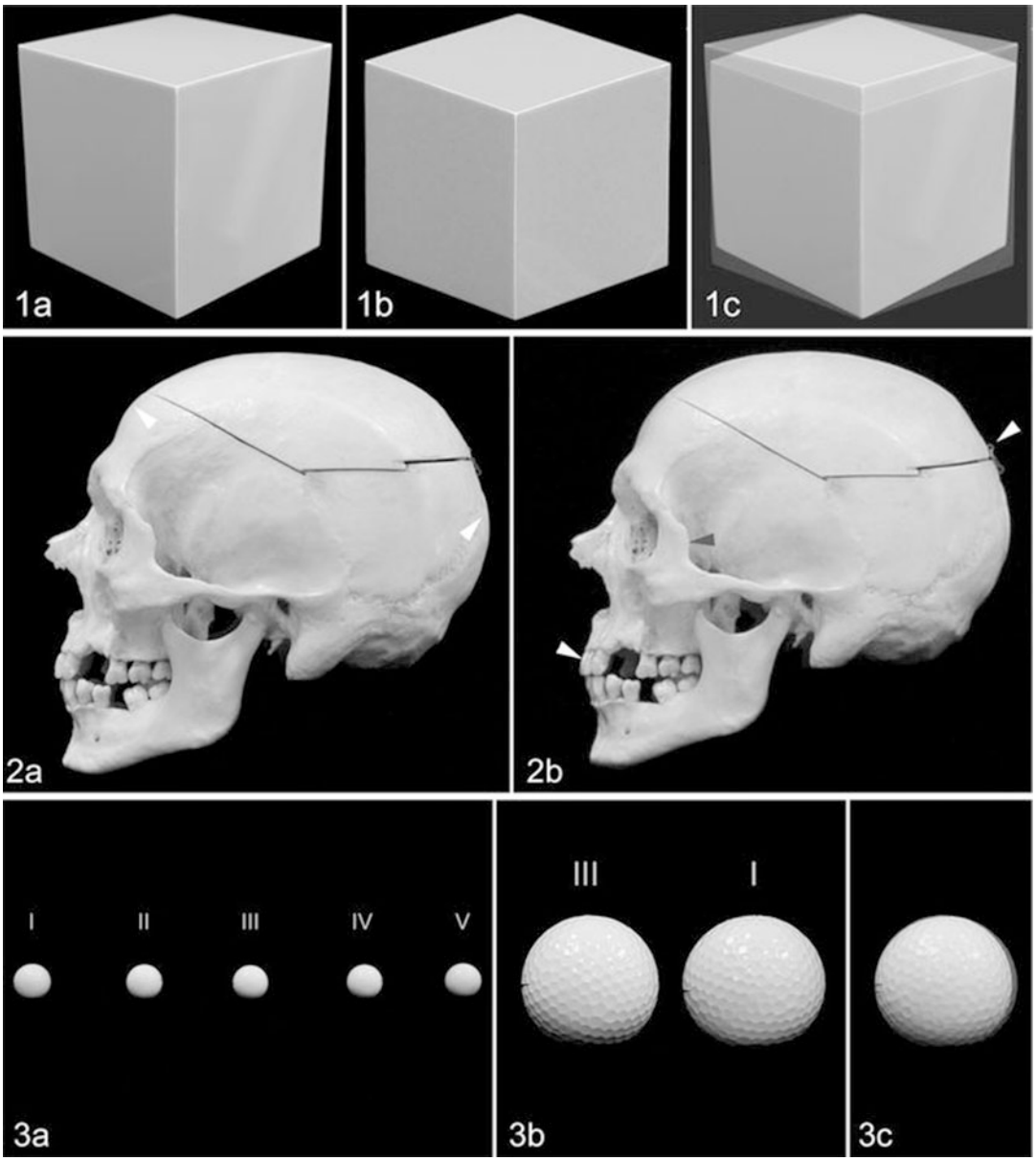

Facial Approximation and Craniofacial Superimposition, Fig. 3 Changes in object appearance with photographic factors. **Panel 1** – change in object shape due to differential magnification as a result of subject-to-camera distance: (*1a*) a cube photographed with a Nikon D700 camera body fitted with a Nikon 60-mm 2.8 speed lens at a distance of 0.7 m; (*1b*) the same cube photographed with the same camera and lens, but with a camera-to-subject distance of 4.0 m (cube is rescaled for size); and (*1c*) superimposition of the two photographs, aligned on the cube's leading inferior corner. **Panel 2** – change in a spherical object profile due to change in subject-to-camera distance: (*2a*) skull shot with a Nikon D700 camera body fitted with a Nikon 60-mm 2.8 speed lens at 0.6 m; and (*2b*) the same skull photographed with the same camera and lens, but at a subject-to-camera distance of 3.0 m. Note: (i) the marked contribution of the frontal eminence and the occipital bun to the skull outline in *2a* but not *2b* (*white arrows* in *2a*); (ii) the left maxillary central incisor and the superior hinge for the calotte, which is visible in *2b* but not *2a* (*white arrows* in *2b*); and (iii) the more posterior placement of the zygomatic region in *2b* compared to *2a* (*grey arrow*). **Panel 3** – elongation of an object at the edge of the field of view, due to point projection onto a 2D plane: (*3a*) photograph of five identical spheres (*golf balls*) spread across the field of view of a Nikon D700 camera body

- *Position of the Subject in the Field of View*: The position of the skull in the field of view must reflect that of the face because the point projection of a 3D scene to a 2D plane results in the elongation of objects if they are located far from the center of the field of view (Fig. 2, or for real-life examples Fig. 3 – Panel 3).
- *Camera Equipment*: It is helpful to use the same or similar camera equipment for consistency of images (e.g., Glaister and Brash 1937). Note here that using different focal length lenses does not affect the perspective of the object at a given camera-to-subject distance, but does affect the zoom of the object and thus the resolution on the recorded image.

In terms of method accuracy, the most comprehensive study of craniofacial superimposition was undertaken by Austin-Smith and Maples (1994) who found a false-positive match rate of 9% when three skulls were compared to c. 100 facial photographs in either frontal or profile view. When both front and profile skull-face views were simultaneously used for comparison by these same authors, the false-positive rate was reduced to <1%.

Facial Approximation

Face prediction from the skull is a challenging task that requires a high degree of dexterity when the face is manually constructed (Gerasimov 1955). For this reason, anthropologists have often collaborated with artists and computer automated methods have been pursued to reduce the subjectivity of the methods (Tyrrell et al. 1997). While statistics and computer automation hold many advantages for standardizing methods, decreasing subjectivity, and increasing replicability (Tyrrell et al. 1997), obstacles remain and most of these methods have not been validated or made publicly available. As a result, manual facial approximation methods (clay-based sculpting and/or drawing) continue to be popular.

A replica of the skull is often used as a scaffold for facial approximation so that the original is spared of any damage and can be used as a reference during the face construction process (Fig. 4). Mean soft tissue depths are normally represented on the replica skull to indicate the amount of soft tissue typically overlaying the skull (Figs. 4 and 5). Methods for face construction vary according to the degree of weight that an analyst chooses to award to mean facial soft tissue depths or individualized face anatomy (Prag and Neave 1997). It is common for the temporalis and masseter muscles to be constructed (Fig. 4), or at least considered, in the face construction process according to the rugosity of their bony attachments. The muscles of facial expression may also be added (Prag and Neave 1997), but their construction according to stereotypical anatomical patterns should not be mistaken for scientific derivation of individualized face anatomy. A multitude of soft tissue prediction guidelines exists for face modeling (Gerasimov 1955); however, many have not been empirically derived or tested, and those that have been subject to validation tests do not often stand up to scrutiny. Space does not permit for a complete listing of these soft tissue prediction guidelines; however, some that have been recently analyzed and verified include:

Setting the:

- Eyeballs so that the corneal apex is c.16 mm anterior to the lateral orbital wall and its edges are closer to the orbital roof and lateral orbital wall
- Inner corner of the eye fissure c. 5 mm lateral to the medial orbital wall, and the lateral corner of the eye c.4.5 mm medial to the lateral orbital wall
- Level of the eye fissure c.10 mm below the frontozygomatic suture or at the level of the malar tubercle
- Nose width to 167% of the nasal aperture width

Facial Approximation and Craniofacial Superimposition, Fig. 3 (continued) fitted with a Nikon 60-mm 2.8 speed lens at a distance of 2.1 m; (*3b*) close up view of the center ball (III) and the left most lateral ball (I; note the elliptical shape of I in contrast to III); and (*3c*) superimposition of the center ball and the left most lateral ball, aligned at their left margin, to illustrate differences (Thanks go to T. Nguyen for photography support)

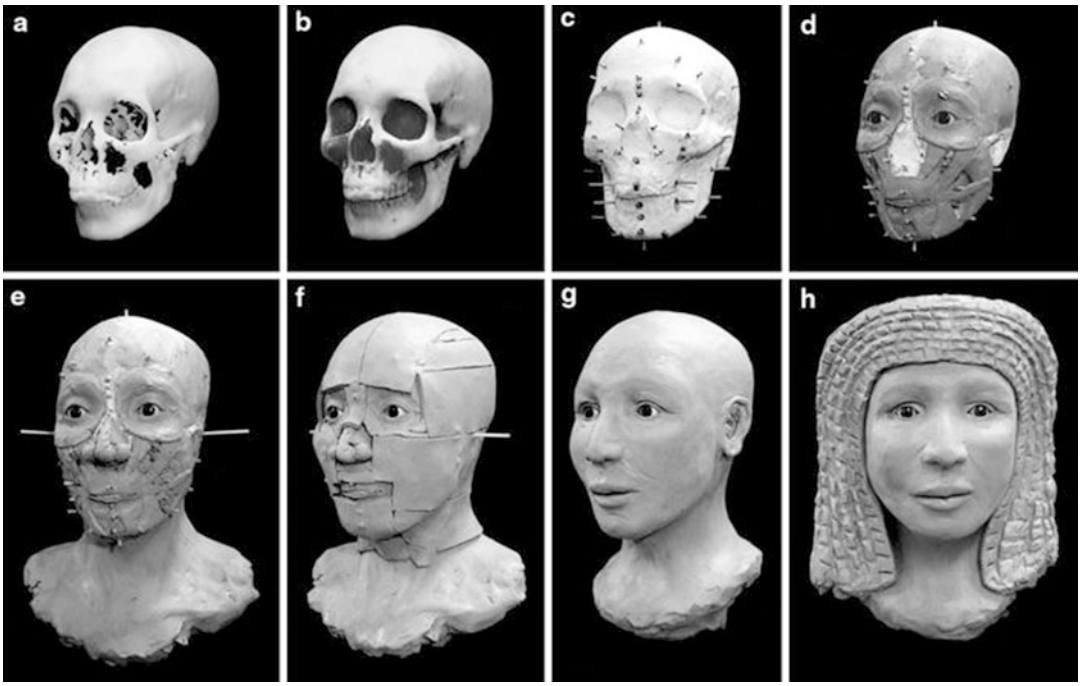

Facial Approximation and Craniofacial Superimposition, Fig. 4 Time-lapse sequence of the facial approximation of Renpit-Nefert (one of the Egyptian Mummies at the South Australian Museum, Australia): (**a**) laser-sintered skull from CT data; (**b**) laser-sintered skull with voids and undercuts filled using dental-modeling wax); (**c**) plaster skull cast with mean soft tissue depth markers in place; (**d**) skull with eyes and facial muscles added; (**d**) partially completed facial approximation (dowels track the location of the external auditory meatus); (**f**) addition of clay sheets to simulate the skin and subcutaneous structures; (**g**) the facial approximation after refinement of the nose, smoothing of the skin surface, and addition of lips and ears; and (**h**) completed facial approximation

- Height of nose wing to the height of the crista conchalis on each side
- Mouth width to 133% of the distance between the lateral most aspects of the canines
- Heights of the lips to approximate the height of the enamel of the font teeth
- Lip closure line to one third of the way up the central incisors
- Bony meatus of the ear c.5 mm anterior and inferior to the soft tissue meatus of the ear

In medicolegal contexts, atypical skull anatomy should be represented in the facial approximation wherever possible since it may trigger recognition. This includes atypical dental features, which may mandate the face to be set with an open smile. For casework, the completed facial approximation should be photographed in black and white so as to play down color that cannot be predicted from the skull (e.g., eye color). Advertisements of the facial approximation should be made on a "slow media day" when other major news events do not detract from the facial approximation advertisement. Additionally, the analyst should retain control over what images of the face are released so as to maximize opportunities for recognition success. In archaeological and paleoanthropological contexts, the faces are typically given full expressions, decorated and dressed consistent with the time period, and are photographed and/or displayed in full color (see, e.g., Prag and Neave 1997; Balter 2009).

The accuracy of archaeological and paleoanthropological facial approximations is difficult, if not impossible, to assess because antemortem facial records for these individuals rarely exist. In the historical context, comparison to artistic portraits holds severe limitations since these portraits represent the artist's rendered perception of the subject (Gerasimov 1955). Despite numerous small sampled studies in the medicolegal context, no consensus on the method's accuracy is held

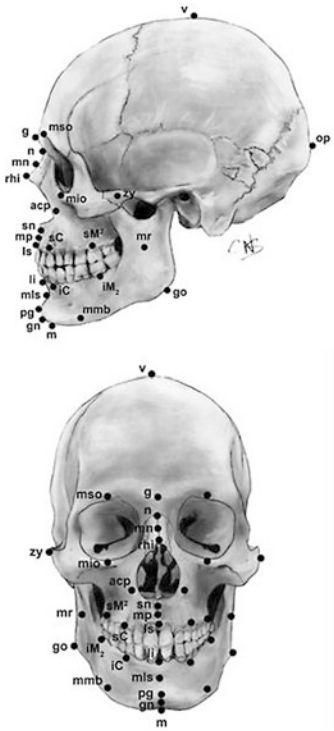

Soft Tissue Depths	0-11 years		12 - 17 years		18+ years	
	Mean	n	Mean	n	Mean	n
Median points						
op (opisthocranion)	-	-	-	-	6.5	1152
v (vertex)	-	-	-	-	5.0	1055
g (glabella)	5.0	2116	5.5	1558	5.5	5791
n (nasion)	8.0	4088	8.0	2754	6.5	6159
mn (mid-nasal)	4.0	433	4.0	472	4.0	1272
rhi (rhinion)	2.5	1064	2.5	719	3.0	5511
sn (subnasale)	10.0	1447	12.0	1233	13.0	1768
mp (midphiltrum)	11.5	3671	15.0	2485	11.5	5508
ls (labrale superius)	13.5	1675	14.5	1798	11.5	5106
li (labrale inferius)	14.5	1493	15.5	1639	13.0	4886
mls (mentolabial sulcus)	10.0	1884	11.0	1687	11.0	5792
pg (pogonion)	10.5	4285	11.5	3020	11.5	6786
gn (gnathion)	6.5	1062	7.5	679	8.5	545
m (menton)	9.0	160	9.0	103	7.0	4475
Bilateral points						
mso (mid-supraorbital)	5.0	469	6.0	246	6.0	2225
mio (mid-infraorbital)	6.0	521	7.0	521	7.0	2298
acp (alare curvature point)	7.5	410	8.0	104	9.5	1511
go (gonion)	13.0	575	17.0	109	10.0	4168
zy (zygion)	7.5	110	8.0	147	6.0	4390
sC (supra canine)	-	-	11.0	104	9.5	3138
iC (infra canine)	-	-	10.5	104	10.5	1184
sM^2 (supra maxillary 2nd molar)	-	-	27.0	104	25.5	1405
iM_2 (infra mandibular 2nd molar)	-	-	23.0	104	19.0	1344
mr (mid-ramus)	18.0	108	19.5	142	17.5	2858
mmb (mid-mandibular border)	10.5	411	12.5	104	10.5	935

Facial Approximation and Craniofacial Superimposition, Fig. 5 Mean soft tissue thicknesses, at craniometric landmarks, as collated from the literature for adults and subadults. (Illustrations and data reprinted from Stephan and Simpson (2008a, b), with permission from Blackwell-Wiley)

since there are as many papers reporting poor success as there are studies reporting high success (Stephan 2009). Note that casework success rates cannot be used as a measure of facial approximation's accuracy due to confounding factors (e.g., facial approximations are accompanied by written case details, and analysts define and record successes in different manners) and that in this applied field, greater motivation exists for analysts to report their successes than to publically disclose their failures. Recent research on the anatomical validity of the guidelines used for face prediction have found considerable errors and much of the research effort now focuses on the production of more accurate face prediction rules, including computer automated statistical methods for face prediction. In terms of replicability, there is unanimous agreement that facial approximation's is poor (Tyrrell et al. 1997; Stephan 2009). Despite these limitations, previous successful employment of the method in forensic casework justifies its future use.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Osteology: Definition
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition

References

Austin-Smith, D., and W.R. Maples. 1994. The reliability of skull/photograph superimposition in individual identification. *Journal of Forensic Sciences* 39: 446–455.

Balter, M. 2009. News focus – Bringing hominins back to life. *Science* 325: 136–139.

Gavan, J.A., S.L. Washburn, and P.H. Lewis. 1952. Photography: An anthropometric tool. *American Journal of Physical Anthropology* 10: 331–353.

Gerasimov, M.M. 1955. *Vosstanovlenie lica po cerepu*. Moskva: Izdat. Akademii Nauk SSSR.

Glaister, J., and J.C. Brash. 1937. *Medico-legal aspects of the Ruxton case*. Baltimore: William Wood and Co.

His, W. 1895. Anatomische Forschungen über Johann Sebastian Bach's Gebeine und Antlitz nebst Bemerkungen über dessen Bilder. *Abhandlungen der mathematisch-physikalischen Klasse der Königlichen Sächsischen Gesellschaft der Wissenschaften* 22: 379–420.

İşcan, M.Y., and R. Helmer. 1993. *Forensic analysis of the skull*. New York: Wiley-Liss.

Kollmann, J., and W. Büchly. 1898. Die Persistenz der Rassen und die Rekonstruktion der Physiognomie prähistorischer Schädel. *Archiv für Anthropologie* 25: 329–359.

Montagu, M.F.A. 1947. A study of man embracing error. *Technology Review* 49: 345–347.

Pearson, K., and G.M. Morant. 1934. The Wilkinson head of Oliver Cromwell and its relationship to busts, masks and painted portraits. *Biometrika* 26: 18–378.

Prag, J., and R. Neave. 1997. *Making faces: Using forensic and archaeological evidence*. London: British Museum Press.

Stephan, C.N. 2009. Craniofacial identification: Techniques of facial approximation and craniofacial superimposition. In *Handbook of forensic anthropology and archaeology*, ed. S. Blau and D.H. Ubelaker, 304–321. Walnut Creek: Left Coast Press.

Stephan, C.N., and M. Henneberg. 2006. Recognition by facial approximation: Case specific examples and empirical tests. *Forensic Science International* 156: 182–191.

Stephan, C.N., and E.K. Simpson. 2008a. Facial soft tissue depths in craniofacial identification (part I): An analytical review of the published adult data. *Journal of Forensic Sciences* 53: 1257–1272.

Stephan, C.N., and E.K. Simpson. 2008b. Facial soft tissue depths in craniofacial identification (part II): An analytical review of the published sub-adult data. *Journal of Forensic Sciences* 53: 1273–1279.

Taylor, J.A., and K.A. Brown. 1998. Superimposition techniques. In *Craniofacial identification in forensic medicine*, ed. J.G. Clement and D.L. Ranson, 151–164. London: Hodder Arnold.

Tyrrell, A.J., M.P. Evison, A.T. Chamberlain, and M.-A. Green. 1997. Forensic three-dimensional facial reconstruction: Historical review and contemporary developments. *Journal of Forensic Sciences* 42: 653–661.

Ubelaker, D.H. 2002. Cranial photographic superimposition. In *Forensic sciences*, ed. C.H. Wecht, 3–38. New York: Matthew Bender.

Wilder, H.H., and B. Wenworth. 1918. *Personal identification: Methods for the identification of individuals, living or dead*. Boston: Gorham Press.

Further Reading

Clement, J.G., and M. Marks. 2005. *Computer graphic facial reconstruction*. Boston: Academic.

Taylor, K.T. 2001. *Forensic art and illustration*. Boca Raton: CRC Press.

Vandermeulen, D., P. Claes, D. Loeckx, S. De Greef, G. Willems, and P. Suetens. 2006. Computerized craniofacial reconstruction using CT-derived implicit surface representations. *Forensic Science International* 159S: S164–S174.

Webster, W.P., W.K. Murray, W. Brinkhous, and P. Hudson. 1986. Identification of human remains using photographic reconstruction. In *Forensic osteology: Advances in the identification of human remains*, ed. K.J. Reichs, 256–276. Springfield: Charles C. Thomas.

Wilkinson, C. 2004. *Forensic facial reconstruction*. Cambridge: Cambridge University Press.

Falabella, Fernanda

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Basic Biographical Information

Fernanda Falabella is a South American archaeologist. She was born and grew up in Santiago de Chile. After high school, she attended a course given by a university professor to a group of volunteers in archaeology who were doing fieldwork along the coast near Santiago, and recognized immediately a passion for the questions being asked and the potentials of the answers being explored. She enrolled in the Licenciatura of Anthropology program at the Universidad de Chile, studying archaeology. She obtained the title of archaeologist in 1979. Her thesis focused on pre-Hispanic horticultural societies in Central Chile starting a long-term research of cultural processes in this region. She has conducted research on various topics related to the cultural practices and the social organization of these groups, such as dietary patterns, ceramic technology, resources circulation, settlement patterns, and identities. Parallel to these academic and scientific activities, she got married and raised three children.

Currently, she is a professor at the Universidad de Chile, where she has been a faculty member of the Department of Anthropology since 1977, involved in the formation of many generations of archaeologists in Chile. In the last years, she has given mainly courses in methods and theory of ceramic analysis and courses in technology and style in archaeology.

She was member of the board of directors of the Chilean Society of Archaeology for 15 years, being its president from 1991 to 1997, and has actively participated, until present, in various editorial, academic, and governmental agencies scientific committees dealing with the field of Archaeology.

Major Accomplishments

Fernanda Falabella's career in archaeology, spanning four decades, has been focused in understanding pre-Hispanic societies in Central Chile. Her pioneering research in the coastal area, near the banks of the Maipo River, resulted in a new local cultural sequence and introduced a new explanation for the social developments that superseded up to then accepted traditional diffusionist theories. In collaboration with archaeologist M. Teresa Planella, they identified the different cultural contexts in the area, describing their contexts and introducing new interpretations. Their studies on Llolleo and Bato cultural units brought about a new approach that emphasized diversity. During the decade of 1980 she did research in line growth and in oxygen isotope analyses in mollusks in collaboration with other researchers, and with the support of FONDECYT (a program of the Chilean Science Foundation). In the 1990 she was involved in studies of ichthyo-archaeology that concluded in the publication of an ichthyo-osteoarchaeology of fishes from Central Chile.

In the last 15 years, she has conducted and participated in several research projects supported by FONDECYT on the same horticultural groups of Central Chile in the inland valleys, searching to understand cultural patterns, mobility, interaction networks, and exploring how these societies configured their social relations at different spatial and social scales. Basic to these questions were the settlement pattern data, a product of projects conducted in the basins of Santiago, Rancagua, and along the Maipo River in collaboration with archaeologists Lorena Sanhueza and Luis Cornejo. Her research on stable isotopes in pre-Hispanic populations from Central Chile contributed to the understanding of maize introduction and how its dietary importance changed through time in this area; provided information on the contribution of marine resources, as food, in coastal groups; and offered new insights on mobility patterns. In the last years, she has been conducting research focused on studying social relations at the local level, with an emphasis on communities of practice.

Fernanda Falabella has a special dedication to ceramic studies. She received a grant in the 1990 for a comparative investigation on mechanical and morphological properties of pottery from the Early, Intermediate, and Late Ceramic periods, and she has participated in several national and international collaborative projects to study clay sources and the provenience of ceramics from archaeological sites.

Cross-References

- ► Ceramics: Majolica in Colonial Latin America
- ► Ceramics: Scientific Analysis
- ► Ichthyoarchaeology
- ► Isotope Geochemistry in Archaeology

Further Reading

Cornejo, L., F. Falabella, and L. Sanhueza. 2003–2004. Patrón de asentamiento y organización social de los grupos Aconcagua de la cuenca del Maipo. *Revista Chilena de Antropología* 17: 77–104.

Cornejo, L., F. Falabella, L. Sanhueza, and I. Correa. 2012. Patrón de asentamiento durante el período Alfarero en la cuenca de Santiago, Chile central. Una mirada a la escala local. *Intersecciones en Antropología* 13 (3–4): 449–460.

Falabella, F., and O. Andonie. 2011. Análisis por activación neutrónica instrumental de alfarería Aconcagua en el valle del río Maipo, Chile. In *II Congreso Latinoamericano de Arqueometría*, ed. L. Vetter, R. Vega-Centeno, P. Olivera, and S. Petrick, 215–228. Lima: IPEN, UNI, OEI.

Falabella, F., and M.T. Planella. 1988–1989. Alfarería temprana en Chile central: Un modelo de interpretación. *Paléo* 5: 41–64.

Falabella, F., and L. Sanhueza. 2005–2006. Interpretaciones sobre la organización social de los grupos alfareros tempranos de Chile central: Alcances y perspectivas. *Revista Chilena de Antropología* 18: 105–133.

Falabella, F., and R. Stehberg. 1989. Los inicios del desarrollo agrícola y alfarero: Zona central (300 a.C. a 900 d.C.). In *Prehistoria (Cap. XIV)*, ed. J. Hidalgo, V. Schiappacasse, H. Niemeyer, C. Aldunate, and I. Solimano, 295–311. Santiago: Editorial Andrés Bello.

Falabella, F., A. Deza, A. Román, and E. Almendras. 1993. Alfarería Llolleo: Un enfoque funcional. *Boletín Museo Regional de la Araucanía* 4 (2): 327–354.

Falabella, F., L. Vargas, and R. Meléndez. 1994. Differential preservation and recovery of fish remains in central Chile. In *Fish exploitations in the past*, Annales du Musée Royal de l'Afrique Centrale, Sciences Zoologiques, ed. W. Van Neer, vol. 274, 25–35. Tervuren: Musée Royal de l'Afrique Centrale.

Falabella, F., R. Meléndez, and L. Vargas. 1995. *Claves osteológicas para peces de Chile central*. Santiago: Artegrama Ltda.

Falabella, F., M.T. Planella, and B. Tagle. 2001. Pipe e tradizione di fumare nelle societa preispaniche del periodo agroceramicolo precoce nella regione centrale del Cile. *Eleusis Nuova Serie* 5: 137–152.

Falabella, F., L. Sanhueza, and E. Fonseca. 2002. Una propuesta sobre la naturaleza de las materias primas de la cerámica Aconcagua Salmón. *Chungara* 34 (2): 167–189.

Falabella, F., M.T. Planella, E. Aspillaga, L. Sanhueza, and R.H. Tykot. 2007. Dieta en sociedades alfareras de Chile central: Aporte de análisis de isótopos estables. *Chungara, Revista de Antropología Chilena* 39 (1): 5–27.

Falabella, F., M.T. Planella, and R.H. Tykot. 2008. El maíz (*Zea mays*) en el mundo prehispánico de Chile central. *Latin American Antiquity* 19 (1): 25–46.

Falabella, F., L. Sanhueza, I. Correa, M.D. Glascock, T.J. Ferguson, and E. Fonseca. 2013. Studying technological practices at a local level: Neutron activation and petrographic analyses of early ceramic period pottery in central Chile. *Archaeometry* 55 (1): 33–53.

Planella, M.T., and F. Falabella. 2008. La mujer en el Chile prehispano: Un acercamiento desde los estudios arqueológicos en la zona central. In *Mujeres Chilenas: Fragmentos de una historia*, ed. S. Montecino, 23–30. Santiago de Chile: Catalonia.

Planella, M.T., F. Falabella, and B. Tagle. 2010. Reconstruyendo cocinas y recuperando sabores de Chile central prehispano. In *Historia y cultura de la alimentación en Chile*, ed. C. Sciolla, 63–85. Santiago: Editorial Catalonia.

Sanhueza, L., and F. Falabella. 2009. Descomponiendo el complejo Llolleo: Hacia una propuesta de sus niveles mínimos de integración. *Chungara Revista de Antropología Chilena* 41 (2): 229–239.

Sanhueza, L., and F. Falabella. 2010. Analyses of stable isotopes: From the archaic to the horticultural communities in central Chile. *Current Anthropology* 51 (1): 127–136.

Tykot, R.H., F. Falabella, M.T. Planella, E. Aspillaga, L. Sanhueza, and C. Becker. 2009. Stable isotopes and archaeology in central Chile: Methodological insights and interpretative problems for dietary reconstruction. *International Journal of Osteoarchaeology* 19 (2): 156–170.

Farming-Language Dispersals (1): Principles

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Introduction and Definition

Among various potential "windows on our past," one rich seam of data is all too often overlooked: the linguistic record. Above all, much of the world is so dominated by just a handful of vast language lineages as to cry out for explanation. That explanation, moreover, can only lie in the same contexts and processes that shaped humanity's cultural and population (pre)history more widely. Indeed, of all attempts to account for these broadest of patterns in the linguistic panorama, one of the most ambitious generalizations is the "farming-language dispersals hypothesis." Most simply put, this proposes that many of the most significant language families – in both geographical range and speaker numbers – dispersed along with, and primarily thanks to, the spread of agriculture. If so, then the modern panorama of linguistic relationships and diversity across the world would in effect still reflect, at least on the very broadest scale, the impact of the "Neolithic Revolution."

The basic mechanism invoked by the farming-language hypothesis is population growth and expansion. This is clearest where developed, sedentary farming comes to be contiguous with mobile hunting and gathering. For in favorable environments, at least, agriculture can support far greater population densities; the farmer population, then, is assumed to grow and spread geographically at the expense of the forager one. This outcome is then taken to be mirrored in the fates of the respective languages they speak. As the agriculturalists disperse, they take with them their language, and as it spreads it naturally diverges, ultimately into a broad family of related languages. The hunter-gatherers' languages, meanwhile, if they survive at all, end up cantoned into inhospitable areas of little value to agriculturalists.

As one instance, such has been the fate of most of the languages once spoken across southern Africa. Just a handful of languages of the foraging San and pastoralist Khoi peoples have survived here, and ever more perilously now, against the tide of the Bantu family (e.g., Zulu and Xhosa) arriving with incoming farming populations originally from further north. This conspicuously one-sided outcome is duly invoked as a paradigm case of the farming-language dispersal hypothesis. Many scenarios worldwide are much less straightforward, of course, although much of the debate has nonetheless unhelpfully polarized around all-or-nothing stances either for or against the hypothesis, as if it were valid for almost all major language dispersals, or none.

Here, we are at pains to avoid any such all-or-nothing visions, hence the qualifications already built into the working definition just given: *many of the most significant language families*. That is, this formulation refers to the dispersals of language *families*, not just single languages, and makes no claim to explain *all* language families, particularly not the more minor ones. Moreover, this working definition is in any case taken only as a useful starting point from which to explore a range of refinements and challenges to the hypothesis (hence also various alternative formulations of it, by both advocates and critics). Much hangs in particular on just *how many* language dispersals are attributed to farming, and *how uniquely*, given that languages can clearly also be spread by many other factors.

Historical Background

Among the first to set out the hypothesis was Renfrew (1987), who applied it to the one language family that has long accounted for the native tongues of a far larger share of the world's population and land area than any other: Indo-European. Renfrew assumed a genetic signal too, for his model calls directly upon Ammerman and Cavalli-Sforza's (1984) vision of farming spreading by "demic diffusion" in a "wave of advance."

From the start, controversy has surrounded the hypothesis. For Indo-European, it directly challenged traditional thinking among specialists in the family's language prehistory and among those archaeologists who had built such linguistic interpretations into how they read the material culture record too (e.g., Mallory 1989). Undaunted, Renfrew (1989, 1991) soon sought to generalize the hypothesis, stoking a debate embodied particularly in the many contributions to Bellwood and Renfrew (2002), ranging across much of the world. Diamond and Bellwood (2003) and Bellwood (2005: ch. 10), moreover, specifically explore how the hypothesis might apply on a worldwide scale. The attendant controversy, meanwhile, is neatly summed up by Golla et al.'s (2003) riposte that the hypothesis "more frequently distorts than illuminates the histories of the speakers of the world's languages." For a more extensive skeptical response from linguists, see also Campbell and Poser (2008: 337–50).

Both as a general principle, then, and in a host of individual cases worldwide, it remains hotly disputed whether the farming-language dispersal equation is a valid, fundamental insight into human prehistory or a simplistic and unproven generalization. One can be forgiven for coming away from the debate in the literature with the impression of a sterile standoff between those who would overegg the role of agriculture and those who would unduly minimize it. (As an example, see some of the commentaries published with Heggarty and Beresford-Jones 2010).

For its part, this contribution seeks above all to clear a path through the traditional all-or-nothing stances – or at least the mutual accusations painted

in such stark terms. It explores the general issues of principle that attend the hypothesis, illustrated from among the ongoing debates on the various claims to apply it to many a language family around the globe. A fuller and more systematic worldwide survey, continent by continent, is provided in the next entry in this encyclopedia, ► "Farming-Language Dispersals (2): Worldwide Survey."

Key Issues/Current Debates

The hypothesis can certainly benefit from important qualifications and refinements on a number of levels. Once these are borne in mind, though, many objections and apparent counterexamples lose their edge, and much of the controversy is defused. This entry will now summarize in turn each of these key limitations and refinements to the hypothesis. For a fuller treatment, see Heggarty and Beresford-Jones (2010).

All, Some, or Which Language Families?

The first essential qualifications are those already built into the working definition of the hypothesis as followed here: *many* of the world's *most significant* language families.

Firstly, most obviously and most crucially, *many* does not mean *all*. Even the most ardent advocates of the hypothesis explicitly acknowledge (e.g., Bellwood 2005: 2) a good number of language families to which it patently does not – indeed cannot – apply, and which were evidently spread by *non*-agricultural societies, as we shall shortly see. There *can be* no claim to universal and unique validity, then. That said, in the eyes of some critics, many proponents of the hypothesis do nonetheless err in that direction: imputing far too exclusively to farming many a language dispersal that evidently relied heavily on other factors.

The second qualification – the most significant language families – is usually tacit. The hypothesis was first conceived especially for a number of the most widespread and populous language families, dispersed long before the modern era, and indeed thus proposed to date back to the "Neolithic Revolution." Some criterion of scale, both in chronology and internal diversity, is inherent in the specification *families* (rather than single languages), but that too is often not clarified. Here, both qualifications are made explicit, particularly since criticism is often strongest and most telling when the hypothesis is "pushed" to apply even to very recent dispersals of single languages, especially out of Europe during the ages of colonialism and imperialism.

All or Nothing? Importance Relative to Other Factors

For a language replacement to happen, some factor(s) must be decisive enough to confer upon one human group – or at least upon its language, usually as part of a broader cultural complex – some greater impulse, ability, or propensity to expand, at the expense of others. Or to see this from another perspective, a language dispersal may in principle be driven by *any* process able to confer such greater expansive propensity.

There are of course many plausible candidate demographic and sociocultural processes with the potential to precipitate language expansions. The "coming of agriculture" is just one of the possible players, then. In principle, any given language dispersal might be attributable to any one such process or any *combination* of them. So the real question is just how significant farming was vis-à-vis other processes in any given case.

It is only the polarization of the debate that deforms this into a false all-or-nothing question. Take the settlement of Micronesia and Polynesia. For Diamond and Bellwood (2003: 598), this is one of their "two clearest examples" of a farming-language dispersal. Golla et al. (2003), meanwhile, retort that it "was driven by the development of sophisticated seafaring technology, not farming success." Note that neither party disputes the linguistics – an expansion of the corresponding subbranch(es) of the Austronesian language family – nor the chronology, nor even that the settlers were both farmers and great seafarers. They in fact disagree only on which of those two attributes essentially accounts for the expansion.

Yet there is no justification in any case for framing the question in exclusive terms either way ("by seafaring . . . not farming"). More to

the point is what was the *respective* significance of one factor as opposed to the other(s). This entails also thinking in terms of sufficient conditions and limiting factors. In this case, it seems obvious that neither farming nor seafaring technology alone was a *sufficient* condition. Without farming, the populations that settled the remote Pacific islands could not have flourished as they did. But equally, they could not have reached those islands in the first place without great seafaring skills.

Nonetheless, the *limiting* condition was not agriculture. Many other populations in the wider surrounding region (East and South Asia and the Pacific Rim) were farmers, without this having enabled them to colonize Micronesia and Polynesia. That could be achieved only by those who developed the necessary seafaring prowess. Only that can complete the explanation of why the region's languages are of *Austronesian* lineage, rather than stemming from one or more of the many other language lineages spoken by other "surrounding" agriculturalist populations. In any case, the particular ("Oceanic") subbranch of Austronesian spread across the furthest-flung islands of the Pacific is hardly a paradigm instance of the hypothesis as Diamond and Bellwood (2003: 598) themselves define it. For in all of Remote Oceania, this was no "replacement of local hunter-gatherers by expanding farmers" but a first settlement – another reminder of the range of contexts to be borne in mind.

Simply to *identify* the speakers of a language lineage as farmers, then, is by no means to demonstrate that it was *because* of farming that they and/or their language lineage were able to expand. Similarly, simply desiring or needing land for farming is no explanation, since that alone does not entail enjoying the wherewithal actually to take it, at the expense of others. As explored below and in the entry on ▶ "Farming-Language Dispersals (2): Worldwide Survey" in this encyclopedia, alternative and additional factors were evidently also at play in many language family expansions worldwide. Even the classic instance of the Bantu dispersal proceeded *pari passu* not just with farming but with ironworking too.

The farming-language dispersal hypothesis has come in for particular criticism when applied to the spread of European languages across the globe during the periods of colonialism and imperialism. Again, it is certainly not agriculture that can explain *which* particular languages spread (and which did not), across which regions, and at which times. Why was it specifically English, Spanish and Portuguese that became the languages spoken by most people in the Americas today, for example, rather than French, German, or indeed Hindi or Chinese, also spoken by farmers? What does explain this straightforwardly, of course, is a combination of well-known demographic, social, political, cultural, and technological factors and indeed historical happenstances. Whatever ultimate causation those factors might themselves eventually be traced back to on the grandest scale, as a practical, direct explanation for the dispersal of any *particular* language lineage, one must in the first instance invoke any evident proximate factors and historical contingencies. To see language expansions of the modern era, in particular, as driven *primarily* by agriculture rather than by a host of other relevant factors, is greatly to overstate the case.

Farming as a Special Case?

Since so many factors may in principle be involved in spreading a language family (for a survey see Heggarty 2014; Heggarty and Renfrew 2014), the real judgment of the value of the farming-language dispersal hypothesis hangs on whether the advent of farming was just one contributing factor among many equals, or whether there is anything special about it as unusually powerful vis-à-vis most others.

The tendency to overegg how widely the hypothesis applies, especially in recent historical cases, is unfortunate and does a disservice to what is nonetheless a significant insight. For the general principle does still stand: it is expansive processes in the real world that shape the dispersals of our language lineages. Given this cause-and-effect relationship, it would be curious if such a defining, cardinal change in the trajectory of human societies as the transition to agriculture had somehow left precious little imprint in the fates of the language lineages that those societies spoke. On

the contrary, it is only to be expected that the Neolithic should have impacted upon the human linguistic panorama too.

Again, then, the question is most sensibly seen as a matter of degree: Just how significant a role may the spread of farming have played in how many of the world's major language expansions?

Genes and Language

On another level too – that of human genetics – things are often far less straightforward than in the paradigm instance of the hypothesis, which pits hunter-gatherers against a demographic "wave of advance" of faster-growing and much denser farming populations.

For language expansions may come about by either of two very different mechanisms (or indeed by any complex of both). On the one hand, a speaker population itself may expand territorially, taking its language with it into ever more extensive territories, largely ousting any population there previously and their language(s). Linguistic lineages thus remain in step with genetic ones. On the other hand, speakers may largely stay put, but switch to speaking another language – usually one to which some distinct (social) utility attaches, thanks to its association with some prestigious cultural complex that is doing the expanding in this case (rather than an actual population). The outcome this time is that linguistic and genetic lineages no longer match.

It makes a great deal of difference, then, whether the language spoken in a given territory changed either because the people who spoke it were themselves largely swamped by incomers (as in much of North America in the last few centuries) or because significant native populations remained, but switched to an outside language (as continues today in parts of Mesoamerica and the Andes).

The demographic logic at the core of the farming-language dispersal hypothesis entails essentially the former: farmers spread largely by outpopulating the hunter-gatherers, so there should be a human genetic expansion in step with the linguistic one. There is little doubt that in appropriate environments agriculture can support population densities an order of magnitude greater than hunting and gathering can. Yet in several cases where a given language family is argued to have dispersed in tandem with agriculture out of the same "homeland," the genetic lineage of many of its speakers in fact points elsewhere. Almost all of Island Southeast Asia, for example, is dominated by languages of the Austronesian family that hail ultimately from (pre-Han) Taiwan; whether their speakers' genes majoritarily do, however, is more contentious (see, e.g., Donohue and Denham 2010).

Yet one must be clear on exactly what the "wave of advance" model predicts in any case, which is not the *entire* replacement of hunter-gatherer populations by expanding farmers. On the contrary, it accommodates both interbreeding and some adoption of farming by hunter-gatherers on the advancing farming "frontier," and thus actually predicts that the proportion of "farmer" to "hunter-gatherer" genes should progressively decrease with distance from the agricultural homeland. In the case of the Indo-European-speaking populations of Europe, some early studies (e.g., Balaresque et al. 2010 on paternal lineages) do indeed reveal genetic clines away from the family's putative "farming homeland" in Anatolia – although there is no lack of counterclaims too. Further complexities are that the Y-chromosome and mtDNA genetic lines often give quite different results, indicative of different histories for male and female populations, respectively (see, e.g., Forster and Renfrew 2011), while autosomal results can be different again.

The advent of both full-genome and ancient DNA analyses is now revolutionizing the field in any case. Earlier genetic results are rapidly being superseded with far greater resolution and fast-improving coverage over geographical space and through time. Ancient DNA brings obvious potential to advance the unsettled debates on farming/language dispersals as hypothesized for many an individual language family, and in some cases may in time help settle the issue. Major findings already bear very directly on the case of Indo-European, for instance (see under "Farming-Language Dispersals (2): A Worldwide Survey"). More generally, ancient DNA has already shown its power to bring big surprises that call for

significant rethinking of the contexts in which farming arose and spread in any case. Early farming populations from three different parts of the Fertile Crescent have turned out unexpectedly distinct from each other genetically, taken to attest to population splits dated back tens of millennia (Lazaridis et al. 2016). In fact, the strongest claims for farming/language dispersals have long proposed that not just one language family spread with farming out of the Fertile Crescent, but three: Bellwood (2005) argues for Indo-European, Afro-Asiatic, and even a hypothetical "Elamo-Dravidian." Orthodox linguistic classifications do not accept that the last of those ever actually existed, however, and the ancient DNA data by no means clearly support Indo-European as the language lineage that dispersed with farming out of central/eastern Anatolia. In short, ancient DNA is fast bringing plenty new fuel and new thinking to the debate on the farming-language dispersal hypothesis, but overall, for now, the geneticist jury is still out.

Hunter-Gatherer Language Expansions

And what of those major, expansive language families first spread and still spoken by populations not of farmers but of hunter-gatherers? Prime examples are three families of North America, particularly the far north, namely, Eskimo-Aleut, Algic (mostly Algonquian), and "Na-Dene" (alias Athabaskan-Eyak-Tlingit). These three, along with Pama-Nyungan in Australia (at least on the standard view that it is a true family), are repeatedly cited by critics who interpret them as disqualifying the hypothesis: language dispersals, but without farming.

Yet that is again entirely to misconstrue the claim, as if farming can or even must account for *all* language expansions. It obviously does not and cannot, as is nowhere clearer than in the particular parts of the world where these major "hunter-gatherer language families" are (or at least were) spoken. For large parts of their territories are Arctic, subarctic, or arid regions where farming is essentially not viable at all, or only marginally so. Whatever happened here can hardly undermine a hypothesis about the impact of farming, which by definition is simply not applicable in those regions. To be crystal clear, then, one might even preface the definition of the hypothesis with a further explicit qualification, namely, that "*across those parts of the world where agriculture became established before the Modern Era*, many of the most significant language families – in both geographical range and speaker numbers – dispersed along with, and primarily thanks to, the spread of agriculture *there*." Strictly, of course, such a qualification is redundant, because "the spread of agriculture" by definition limits the claim to only those regions and periods through which farming could and did indeed spread. Nonetheless, since this issue has generated so much misunderstanding and polarization, it is still valuable to spell out the qualification explicitly.

It is clear to all sides in the debate, then, that hunter-gatherer language expansions unquestionably have taken place. The hypothesis hardly denies that; on the contrary, it is best understood from precisely this perspective. For what it actually claims is effectively just this: *only* (by definition) in those regions of the world where original hunting and gathering has since been *replaced* by farming, that very process of agricultural expansion may offer a plausible account for a number of major language family expansions also visible across such regions.

In this perspective, the relevance of known hunter-gatherer language dispersals is simply as evidence of the obvious: that there are certainly other factors besides farming that can lead to language expansions and, more specifically, that those factors may even include the other basic mode of subsistence that farming itself has since so often replaced. These most widespread of all hunter-gatherer language families are thus in fact perfectly consistent with the even more general framework to which the farming-language hypothesis belongs: the subsistence/demography model (for discussion, see Heggarty and Renfrew 2014: 39–40). On that broader logic, all that matters is that a given set of subsistence technologies – whether for hunting, farming, pastoralism, or any other subsistence regime – confers on the population that uses it, and/or on their cultural package (language included), markedly greater expansive

potential over other populations/languages in a given region.

Differences in subsistence technology can be just as acute between two groups who both practice hunting and gathering – as per the scenario in which the Eskimo-Aleut language family, for instance, spread to replace the preceding "Dorset culture" and whatever language(s) they spoke. Indeed, in Greenland the Inuits' successful hunter-gatherer subsistence contrasts just as starkly with the ill-fated Norse *farming* settlements, in the face of a changing climate. Such cases are far removed from the prototypical instance of the hypothesis, and they fail to meet the obvious precondition that the environments must be amenable to farming in the first place.

It may be no coincidence, then, that the most striking expansions of hunter-gatherer language families played out in large part across extreme, marginal environments such as the Arctic, subarctic, or the arid interior of Australia. It is precisely where conditions are so harsh that the net gain conferred by specific innovations in subsistence technologies can be all the greater and more exclusive, as in the case of the Inuits. In less inhospitable regions, meanwhile, hunter-gatherer language lineages (where they survive at all) more often present smaller-scale, more fragmented, and less exclusive distributions. (See the coverage of Amazonia under ▶ "Farming-Language Dispersals (2): Worldwide Survey.")

Farming Versus Foraging or Farming and Foraging?

In other respects too, many contexts are by no means so clear-cut as in the prototypical vision of the hypothesis. So it can hardly be expected to apply straightforwardly across all such contexts.

In practice, few subsistence regimes fall neatly into exclusive categories of either sedentary farming or mobile hunting and gathering. How much a population lives off food they produce rather than procure is no all-or-nothing contrast but a sliding scale. Along Peru's north-central Pacific coast, for instance, complex societies arose in the third millennium BCE based initially upon gathered maritime resources (uniquely rich here) more than upon farming. Is a language dispersal to be expected in such an intermediate case? It turns out that there is no evidence for any at this time depth here. In northern Europe, too, can we expect a straightforward farming-language dispersal, when coastal hunting and gathering (notably fishing) remained a rich subsistence resource long after the Mesolithic? On many scales, the "Neolithic Revolution" is of course better seen as a gradual *transition* between subsistence regimes (for many examples, see Barker 2006).

Different Forms of Farming

Agriculture itself, moreover, comes in a range of very different forms, which have by no means always been equal worldwide. In much of Amazonia, farming takes the form of slash-and-burn, shifting territory frequently along the region's great watercourses. Might this help explain the wide but unusually scattered distributions of language families there?

Meanwhile, and as in many parts of the world, farming in Island Southeast Asia is widely seen not as stemming from just one single and exclusive origin point but as having come together as a package of crops and livestock from various geographical sources (see Donohue and Denham 2010). So even in this case, where the claim for a farming-language dispersal is relatively strong and broadly accepted, it might enjoy greater consensus by conceding that it does nonetheless need to be qualified: the key components in the archaeological package were not *all* brought out of Taiwan by Austronesian speakers. Indeed, quite what proportion of them was, and just how critical they were, remains in debate.

In fact, many languages expand in encounters between two populations that *both* practice agriculture, albeit in different forms. In principle the basic hypothesis might make no prediction in such cases. Yet enthusiasts have nonetheless interpreted such encounters as farming-language dispersals, attributed now just to qualitative differences between the different forms of farming, one of them taken to confer some "superiority" in subsistence/demography terms. That vision would have the spread of European languages across the Americas, for instance, as reflecting some putative superiority of the Old World's

agricultural package over that of the New World. Yet that interpretation is in itself highly debatable, at least for crops if not livestock. Europe today lives on potatoes, maize, beans, and tomatoes, for example, just as much as the Americas live off European crops. The New World hearths of agriculture in Mesoamerica and the Central Andes are also precisely where indigenous languages have bucked the trend and *resisted* European ones in greatest numbers. And in any case, as already observed above, a host of other historical factors were in play in shaping Europe's impact on the Americas, in language as in so much besides.

Intensification Thresholds

That all farming is not equal also applies on the time dimension, of course, entailing another key consideration. Even within the same region, agriculture can have a significant impact on demography (and indeed culture), and with it possibly also on language, at more than one stage in time. Step-changes in technology and productivity (thanks to the development and spread of new crop strains or animal breeds, for instance) can take even established farming across successive "intensification thresholds." These may help account for certain language family trees that are disproportionately dominated by individual subbranches, which underwent later great dispersals of their own. Might this explain, for instance, the successive expansions of Sino-Tibetan and then of its main Sinitic subbranch; or of the Niger-Congo family and then its most famous subbranch, Bantu?

Sherratt and Sherratt (1988) even suggest that the Indo-European family might be the result not of the initial "Neolithic Revolution" at all, but of a following revolution a few millennia later, in "secondary products" such as wool and milk. This attempts also to bridge the chronological gap to the time depth traditionally assumed for Proto-Indo-European, three millennia or so after the Neolithic began here. Intensification thresholds have been invoked especially where farming (of some form) began before the first major language dispersals detectable in a given territory. One example would be the Japonic family (Bellwood 2005: 114); others include both the main families of the Andes, where it was not until relatively late that some large animals (camelids) were domesticated and a true cereal crop (maize) became ubiquitous (Heggarty and Beresford-Jones 2010).

Intensification thresholds might also be crossed thanks to critical new technologies or human transformations of the landscape on grand scales: terracing in Southeast Asia or the Andean highlands, for example, or great canals for irrigation and water control in Mesopotamia, China, or on the arid coast of Peru. These transformed agricultural productivity and thus population sizes, again with potential for concomitant linguistic impacts. This only serves to recall, though, that farming *per se* is not a full explanation, for it may in itself be shaped by other factors and in turn fed back positively into them. Only once complex societies grew to sufficient scale and levels of organization could huge labor forces be directed to vast public works for agricultural ends.

Language Dispersals Through Time

On each of the levels just explored, then, the farming-language hypothesis is subject to a series of qualifications, and agriculture competes with a range of alternative processes that can equally well underlie language dispersals. Among these many candidate "driving forces," though, can one still make some useful distinctions and generalizations?

One crucial perspective is the time dimension, and specifically the trajectory of the development of human societies. For the various expansive processes impacting on human populations have hardly kept the same significance relative to each other over the fluctuating course of prehistory. The fates of our language lineages are determined by causes that lie in the nature of human societies, but those societies themselves have been anything but constant through (pre)history. On the contrary, most have changed radically on a number of defining levels: in their ways of subsistence, in mobility or sedentism, in the scale and complexity of societal units, and so on.

Among key shapers of the *recent* linguistic past (as well as the present and immediate future) are

the rise of the nation state – and with it mass education, literacy, and language "standardization" – as well as long-distance mass transport and telecommunications. It is particularly because these phenomena are so far removed from any farming-language logic that critics have duly decried the hypothesis when invoked for relatively *recent* language dispersals that were clearly shaped by these much more immediate forces and by historical contingency. On the other hand, many of these forces so powerful today were simply absent for most of history, let alone prehistory. Before them, great complex societies nonetheless also drove spectacular language dispersals, not least the Romance (i.e., "Neo-Latin") family spread by Rome, or the more complex linguistic legacy of the Incas (see Heggarty 2008).

Rolling back further millennia still, the story is one of many individual "ups and downs" and societal collapses, but the long-term trend, at least, remains clear: human societies tended overall to be of lesser demographic scale and complexity. Also less acute, then, was the scope for disparities between societies in political and social organization, economic and military technologies, and so on. Ever fewer processes were yet in play that might so sharpen the disparities between human groups as to propel just a privileged few of them – and their languages – to expand dramatically at the expense of their neighbors. Except, that is, for the contrasts in subsistence regimes, and thus also in demography, that emerged in particular with the dawn of the Neolithic. Certainly, the advent of agriculture remains the single most significant transformation of human society and ecology, upon which so many subsequent transformations rest. It seems only logical that its linguistic impact too should have weighed heavy.

Indeed, to respect a principle of commensurate scale in cause and effect, the most potent linguistic impacts we see – that is, the most spectacular language family expansions, in territorial and above all demographic terms – demand explanation in terms of correspondingly powerful processes affecting the fates of human societies. Agriculture does stand out, then, as a uniquely plausible candidate for language expansions at this scale and at this early stage in the trajectory of human societies.

In chronology too, many of the deepest language families that we can detect appear to go back to timescales very roughly consistent with the "Neolithic Revolution" in their respective parts of the world. Such claims hold, though, only to the limited extent that one can trust in the controversial and inexact enterprise of "linguistic dating" at all, for it is necessarily attended by many grave caveats. In part this reflects how quickly languages naturally change, which also obscures their own origins and ensures that our ability to reconstruct language relationships back into the past ultimately fades and fails completely, at a ceiling usually estimated as of the order of ten millennia or so ago.

The great language expansions that we *can* detect, though, are also a function of those that ever took place at all. That we cannot reliably uncover any episodes of language (family) dispersal back before the Neolithic may not be coincidental, given the limitations on the nature and scale of human societies before then. For those limitations arguably entailed that it was less likely that any one group could enjoy some exclusive propensity to expand much more than others. For as far back as we can tell, the count of language *lineages* across the world appears to have progressively declined over recent millennia and at an ever-accelerating rate. Projecting back, at the dawn of the Neolithic, the picture may well have been one of a great diversity of language lineages, arisen over the tens of millennia since the first human settlement of most continents. (This necessarily refers to "effective diversity," i.e., of lineages independent at least as far back as language relationships can be identified. All lineages may in principle ultimately go back to a monogenesis of human language before *Homo sapiens* spread across the globe, but linguistic data certainly cannot aspire to reconstruct remotely so far back.)

Such a vision would fit with the general ethos of the farming-language dispersal hypothesis, but meets with objections in its turn. Hunter-gatherer language dispersals unquestionably have occurred, as we have seen. Nonetheless, the classic examples are largely limited to relatively

recent millennia and to extreme environments (to which hunter-gatherers have been restricted precisely by the demographic expansion of agriculturalists). On both grounds, such cases do not by any means necessarily offer robust analogies for hunter-gatherer groups in pre-Neolithic times and in more productive landscapes and temperate climes.

Another rider is the claim for putative "macro-families" of languages, such as those dubbed "Nostratic" or "Eurasiatic," that would go back to earlier dispersals still. These are rejected as but "faces in the fire" by linguistic orthodoxy, which disqualifies the methodology the claims are founded upon. They have nonetheless been entertained by some enthusiasts for the farming-language hypothesis (e.g., Bellwood 2005: 217), even if this seems rather ironic. For if such putative macro-families existed, then they would have to go back to dispersals at least several millennia *before* those attributed to agriculture. So to account for them would require some other, *pre*-agricultural transformation, that is, some rival expansive process(es) that would only undermine the claim that farming was a uniquely significant and powerful driver at great time depths.

To recap, then, the generalization suggested here focuses on the cumulative nature of developments in technology and social organization over the millennia (and even more so across the 1492 watershed). Over time, contrasts between one human population and/or cultural package and another – even where both had farming – became increasingly acute, not least in their propensity to spread at others' expense. And as they did so, the earlier great significance of agriculture per se diminished in relative terms, along with any ability to explain and identify *which* language families expanded where and when. This raises obvious parallels with the traditional concept of a scale from ultimate to proximate causation. On how this might usefully be adapted specifically to language dispersals, and for further exploration of this possible generalization, see Heggarty and Beresford-Jones (2010: 165–9).

The generalization just proposed radically reins in the ambition of how much of language (pre)history the farming-language dispersal hypothesis might be pushed to explain. That has the virtue, though, of thereby sidestepping many of the most persuasive recent "counterexamples" and focusing the hypothesis where its logic has most to offer: on the very broadest and deepest language expansions that we can detect, commensurate in scale and broad chronology with the key threshold stages in the transition from hunting and gathering to full-blown intensive farming. Just how, when, and whether such stages came to pass varied enormously from one part of the globe to the next, however, according to local cultural trajectories and timescales. So as with any such generalization, quite how this one might apply will likewise depend heavily on context, on all the levels explored here. This is precisely the lesson that duly emerges from how the farming-language dispersal hypothesis has fared across the world – as surveyed in more detail under ▶ "Farming-Language Dispersals (2): Worldwide Survey."

Future Directions

As that survey duly reveals, across many cases worldwide, our understanding of human prehistory does in principle have much to gain from the farming-language dispersals debate and the extent to which the hypothesis fares well or ill from one case to the next. This holds from both perspectives: how much of a role agriculture may have played in shaping the broad panorama of human language relationships and diversity, and how those language data might in turn contribute to assessing the impact of farming vis-à-vis the many other processes that shaped our cultural and population prehistory.

Besides the obvious potential of ancient DNA prospects for progress lie first in crossing the fault lines between the different disciplines involved, along which much of the dispute has aligned. For notwithstanding all the caveats that attend the idea of the "Neolithic Revolution," among archaeologists there is wide recognition of the scale of the impact of agriculture and its defining role, through the many changes that it ultimately set in train for the nature of human societies and the disparities

between them. Among linguists, however, there seems little recognition of what this entails: at least in principle, good reason to expect commensurate impacts in the linguistic record too. Rather, it is often specialists in the language families in question who have objected most strongly to any association with agriculture, particularly in those cases where the language data have hitherto traditionally been interpreted as setting a given family's first dispersal into a real-world context in prehistory very different to that entailed by any association with the spread of farming (see, e.g., Campbell and Poser 2008: 337–50).

Yet much linguistic commentary still betrays a rather simplistic vision of "the coming of agriculture," insensitive to the various key issues and refinements covered here. Moreover, many historical linguists' counterarguments have failed to convince in their turn, for relying so heavily on their own traditional techniques for seeking to identify those real-world contexts – techniques that themselves face heavy criticism as unreliable and too open to subjective interpretation. All too often, similar or even the same language data are interpreted by different linguists as implying quite opposite conclusions. "Linguistic paleontology," in particular, is often invoked as if it "proved" that the speakers of a given family's ancestor language either must or must *not* have been farmers, or collectors of wild grains, or indeed nomadic pastoralists, as in the debates on Indo-European, Afro-Asiatic, Dravidian, and Uto-Aztecan (see ► "Farming-Language Dispersals (2): Worldwide Survey"). Too much faith also continues to be placed in the supposed linguistic dating technique of glottochronology, when it has already been widely discredited for decades. For a survey of all such techniques (and their weaknesses), see Heggarty and Renfrew (2014).

Meanwhile, novel quantitative and phylogenetic approaches to language data, inspired by analysis techniques drawn from the biological sciences, are opening up new perspectives on some major language family expansions, on both the chronological and geographical levels (e.g., Bouckaert et al. 2012 on Indo-European). Results have more often than not supported associations with farming dispersals, although the methods continue to face objections from many linguists who hold to established, more qualitative interpretations of language data.

Linguistics and archaeology aside, we can look forward also to the revolutionary new potential of ancient DNA. This obviously has great power to inform on and test a farming/language hypothesis founded on a logic that is above all demographic. Even ancient DNA analyses, though, have in some respects remained contingent on presumptions of existing hypotheses, and the modelling choices they may dictate.

So above all, the best prospects for future progress would seem to lie simply in a greater balance in the debate, pulling back from polarized, all-or-nothing interpretations on either side. On each of the levels explored here, the farming-language dispersal hypothesis requires significant refinements and qualifications. Those duly rein in any overambitious claims for quite how much of our linguistic origins it might really explain. Equally, though, they serve to reconfirm that behind the complexities there nonetheless lies a fundamental logic. If the coming of agriculture was such a defining step that molded so much else of human cultural and population prehistory, it would seem all the more curious if our languages had largely escaped its otherwise pervasive impacts.

Cross-References

► Farming-Language Dispersals (2): Worldwide Survey

References

Ammerman, A.J., and L.L. Cavalli-Sforza. 1984. *The Neolithic transition and the genetics of populations in Europe*. Princeton: Princeton University Press.

Balaresque, P., G.R. Bowden, S.M. Adams, H.-Y. Leung, et al. 2010. A predominantly Neolithic origin for European paternal lineages. *PLoS Biology* 8 (1): e1000285. https://doi.org/10.1371/journal.pbio.1000285.

Barker, G. 2006. *The agricultural revolution in prehistory: Why did foragers become farmers*. Oxford: Oxford University Press.

Bellwood, P. 2005. *First farmers: The origins of agricultural societies*. Oxford: Blackwell.

Bellwood, P., and C. Renfrew, eds. 2002. *Examining the farming/language dispersal hypothesis*. Cambridge: McDonald Institute for Archaeological Research.

Bouckaert, R., et al. 2012. Mapping the origins and expansion of the Indo-European language family. *Science* 337 (6097): 957–960. https://doi.org/10.1126/science.1219669.

Campbell, L., and W.J. Poser. 2008. *Language classification: History and method*. Cambridge: Cambridge University Press.

Diamond, J.M., and P. Bellwood. 2003. Farmers and their languages: The first expansions. *Science* 300 (5619): 597–603. https://doi.org/10.1126/science.1078208.

Donohue, M., and T. Denham. 2010. Farming and language in Island Southeast Asia: Reframing Austronesian history. *Current Anthropology* 51 (2): 223–256. https://doi.org/10.1086/650991.

Forster, P., and C. Renfrew. 2011. Mother tongue and Y chromosomes. *Science* 333: 1390–1391. https://doi.org/10.1126/science.1205331.

Golla, V., R.S. Malhi, and R.L. Bettinger. 2003. Distorting the histories of the first farmers: eLetter response to Diamond and Bellwood (2003). *Science* 300 Available at: http://science.sciencemag.org/content/300/5619/597/tab-e-letters.

Heggarty, P. 2008. Linguistics for archaeologists: A case-study in the Andes. *Cambridge Archaeological Journal* 18 (1): 35–56. https://doi.org/10.1017/S0959774308000036.

Heggarty, P. 2014. Prehistory through language and archaeology. In *Routledge handbook of historical linguistics*, ed. C. Bowern and B. Evans, 598–626. London: Routledge. https://www.academia.edu/3687718.

Heggarty, P., and D. Beresford-Jones. 2010. Agriculture and language dispersals: Limitations, refinements, and an Andean exception? *Current Anthropology* 51 (2): 163–191. https://doi.org/10.1086/650533.

Heggarty, P., and C. Renfrew. 2014. 1.3 Introduction: Languages. In *The Cambridge world prehistory*, ed. P. Bahn and C. Renfrew, 19–44. Cambridge: Cambridge University Press.

Lazaridis, I., D. Nadel, G. Rollefson, D.C. Merrett, et al. 2016. Genomic insights into the origin of farming in the ancient Near East. *Nature* 536 (7617): 419–424. https://doi.org/10.1038/nature19310.

Mallory, J.P. 1989. *In search of the Indo-Europeans*. London: Thames & Hudson.

Renfrew, C. 1987. *Archaeology and language: The puzzle of Indo-European origins*. London: Jonathan Cape.

Renfrew, C. 1989. World languages and human dispersals: A minimalist view. In *Transition to modernity*, ed. J.-A. Hall. Cambridge: Cambridge University Press.

Renfrew, C. 1991. Before Babel: Speculations on the origins of linguistic diversity. *Cambridge Archaeological Journal* 1 (1): 3–23. https://doi.org/10.1017/S0959774300000238.

Sherratt, A., and S. Sherratt. 1988. The archaeology of Indo-European: An alternative view. *Antiquity* 62 (236): 584–595. https://doi.org/10.1017/S0003598X00074755.

Farming-Language Dispersals (2): Worldwide Survey

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Introduction

The farming/language dispersal hypothesis, most simply put, proposes that many of the world's most significant language families – in both geographical range and speaker numbers – dispersed along with, and primarily thanks to, the spread of agriculture. The entry on ▶ "Farming-Language Dispersals (1): Principles" in this encyclopedia explores the range of issues and qualifications that attend this general hypothesis, to clarify those cases in which one might in principle expect that it would or would not hold true. Much necessarily hangs on the particular "real-world" contexts – cultural, chronological, and geographical – through which each of the world's major language families dispersed. Given the great diversity in those variables in the human story worldwide, the hypothesis duly does not play out consistently from case to case, or in others simply does not apply at all. Such is what this contribution now aims to survey, across the globe.

The first main exposition of the hypothesis already explored possible instantiations on four different continents – see Renfrew (1987: Chapter 11). Especially in the early 2000s, however, attempts have been made to apply it more comprehensively still on a worldwide scale. What follows here can but briefly survey, compare, and contrast the main debates from continent to continent. As well as the specific references given below in each case, further key sources include the dozens of contributions collected in Bellwood and Renfrew (2002). Note also Bellwood (2005: esp. Chapter 10), who pushes the strongest

interpretation of the hypothesis worldwide, but remains very far from commanding broad support – especially among historical linguists, notably Campbell and Poser (2008: 337–350). Finally, claims for farming/language dispersals are repeatedly debated, and set within a much broader survey of the many other aspects of language prehistory, in the eight continent-by-continent chapters by Heggarty and Renfrew, within Renfrew and Bahn (2014).

Key Issues and Current Debates

See the sister entry to this one: ▶ Farming-Language Dispersals (1): Principles.

Eurasia

East Asia enjoys the status of one of the world's rare hearths of agriculture and "pristine" civilization, home to vast populations since far back in (pre)history. The general subsistence/demography model (see under ▶ "Farming-Language Dispersals (1): Principles") – and more specifically, farming/language dispersals – might thus seem an obvious candidate explanation for this region's major language expansions.

Across *Inner China* particularly, language expansions have indeed often been imputed to farming, spreading southward out of the core domestication region (of cereals *other* than rice) in the North China Plain, along the Yellow River and immediately to its south. The linguistic story, though, is actually of *more* than one major expansion, but all usually taken to have begun out of this same general homeland area. The spread of Mandarin specifically, out of its northern origins, dates largely to recent centuries and is still ongoing. This expansion has clearly been determined by historical and political factors that bear only the most indirect of relationships to the rise of farming many millennia ago – indeed the languages that Mandarin has been replacing were also those of developed farming populations.

Stepping further back in time, however, Mandarin and its many sister languages within the Chinese (or "Sinitic") family only arose in the first place thanks to an earlier and wider expansion of (Proto-)Chinese as a whole. This most plausibly began some three to four millennia ago, out of the heartland region where the Yellow River runs through the North China Plain. Earlier still, by another couple of millennia or so, must have been the dispersal even further afield of the putative "Sino-Tibetan" family, which alongside Sinitic would include the Tibeto-Burman languages (a standard hypothesis, even if it does not quite command unanimity among linguists of the region).

Of these three expansions, only Sino-Tibetan would make for a rough fit with the chronology of initial farming expansion. A good number of scholars (e.g., Janhunen 1996: 222) have duly proposed a linguistic homeland in the middle Yellow River region, identified with the Neolithic Yangshao culture in the fifth and fourth millennia BC. Even that, however, is but a default starting hypothesis, given how many uncertainties remain in linguistic prehistory here.

As for the later and specifically Sinitic expansion, to entertain some link with farming would entail looking to some step-change(s) in agricultural intensification and productivity (see under ▶ "Farming-Language Dispersals (1): Principles"), perhaps thanks in part to grand-scale public works such as the great canal network. This intensification might thus have propelled another wave of demographic (and linguistic) expansion. But if so, this scenario only reinforces how by this stage farming alone is hardly the proximate explanation: it was only the growing scale and political control of complex societies here that could direct the great labor forces required for such intensifications in the first place.

On a much smaller scale – arguably a function of inherent geographical constraints – the independent *Korean* and *Japanese* language lineages are also often associated with farming expansions/intensifications. That said, each today shows far less internal diversity than would be expected to have arisen since the initial spreads of farming, or even intensive rice-farming specifically, to Korea and Japan. So the full explanation has also to include recent unifying sociopolitical conditions overwriting presumed greater original diversity – as hinted at, for example, by the Ryukyuan

languages surviving in the southernmost islands of Japan.

South of Sinitic, meanwhile, *southernmost China and Mainland Southeast Asia* are home to various language families, much smaller but still significant regionally. These too are routinely (if also rather vaguely) attributed to the spread of agriculture – although here with rice as the key crop and putative homelands thus all within the wider Yangtze region instead. Again, however, the main expansion phases of most families of Mainland Southeast Asia are too recent for a direct association with the *first* spread of farming here – just as with the Sinitic and Mandarin expansions, and in fact not unconnected with them. For the general trend here is of expansion southward from homelands assumed to have been in southern China, whose now minority populations speak languages of the same lineages found across much of Mainland Southeast Asia, particularly Tai-Kadai (including Thai/Lao) and Tibeto-Burman. As so often, however, it remains unclear precisely what role was played by agriculture, among various other factors. Rich (rice-) farming lands such as the Mekong Delta may have been a key attraction, but that does not explain which particular populations (and their languages) came to enjoy the *wherewithal* to occupy them, at the expense of others pushed aside to become the "hill peoples" (notably the speakers of Hmong-Mien languages). In any case, perhaps more powerful than any such pull of the south was the push from the north: the pressure of a powerful and expansive Chinese culture and population.

The one family in Mainland Southeast Asia that does not seem intrusive from further north is Austroasiatic (including Khmer and Vietnamese). Estimates of its greater time depth are also rather more compatible with the *first* spread of agriculture here. Proponents of a farming/language dispersal (e.g., Higham 2002; Bellwood 2005: 214–216) even hypothesize that Austroasiatic enclaves as far west as the Munda languages in central *India* may be a linguistic footprint of how *rice* farmers expanded westward into the subcontinent, out of Indochina, or perhaps specifically along the course of the Brahmaputra, once across the watershed with the Yangtze. In India, they would ultimately be surrounded and far outnumbered, though, by speakers of the Indic branch of Indo-European, which that same general hypothesis identifies – very controversially – with cultivators of other cereals arriving from the northwest, ultimately from the Fertile Crescent (Renfrew 1987), as we shall shortly see.

Indic intruded also on the other main language lineage of the subcontinent, Dravidian, ousting it from much of its original range to confine it now largely to the southernmost third of India (save for a few intriguing outliers further north). That is, Dravidian is widely accepted as predating the arrival here of Indic. Much else about its prehistory remains unclear, however, not least whether and how Dravidian's expansion may itself in some way have been "driven" by agriculture. It has been variously attributed to local processes of domestication, or to a preceding stage of merely foraging for wild grains, or even to already developed farming arriving ultimately from the Fertile Crescent (for a discussion, see Fuller 2002). The "evidence" and interpretations behind each proposal remain questionable and much disputed. In particular, a link back to the Fertile Crescent is built upon a putative relationship of Dravidian to ancient Elamite, a claim generally dismissed by linguists. In short, we still know too little of Dravidian prehistory to tell whether it stands more as an illustration of a farming/language dispersal or a counterexample.

Most of *Northern Asia*, meanwhile, has over recent millennia been exploited by subsistence regimes very different to sedentary agriculture. In the far north and Siberia, hunting and gathering predominate, not least fishing and some domestication of reindeer (from perhaps around 3000 BP), albeit still principally to aid in tracking wild herds for meat. The Eurasian Steppe, meanwhile, formed the quintessential environment for nomadic pastoralism based around domesticated horses, although only reaching its famous heights in the last two to three millennia.

The linguistic picture across Northern Asia, too, is radically different to the rest of Asia. Arrayed very roughly from east to west – although also widely interspersed among each other – are first a cluster of minor "Paleosiberian" lineages

and then the four rather larger families of Tungusic, Mongolic, Turkic, and Uralic. Siberia and Central Asia do, then, attest to language expansions, and ones that over this vast landmass can appear impressive in their territorial ranges, at least. Yet in crucial respects – in speaker populations and time depth – they do not remotely approach the scale of the language families spoken across the agricultural heartland regions to their south and west. Alongside those, Mongolic and Turkic are of particularly shallow time depths of just a millennium or two. Moreover, for all their terrorizing of Europe and "elite dominance" conquests of China (the Yuan dynasty) and India (the Mughals), the *language* lineages of these steppe populations never significantly broke into those farming regions. Apparent minor exceptions turn out to be largely limited to similar steppe-type biomes in any case: the Great Hungarian Plain and the highlands of Anatolia.

Rather, the extreme mobility of these nomadic populations has left across Northern Asia a linguistic signal of a very different form. The "linguistic area" of North Asia attests not to a great expansion out of a single origin (the "Altaic" hypothesis, now increasingly discounted in linguistics), but to all but the reverse: intense interaction and *con*vergence between groups originally of different origins (Janhunen 1996: 237–242). Much of Northern Asia is home to environments where farming is either not viable at all (over much of Siberia) or only marginally so, at least for most of prehistory, and especially by comparison to the great success of horse-borne pastoralism on the steppe. In this sense, these regions fall by definition outside the scope of the farming/language dispersal hypothesis in any case, since agriculture did not generally become the dominant subsistence mode here until the modern period. This is also clear from these regions' relatively very low population density and thus the relatively small demographic scale of the language expansions here, however geographically extensive they may be.

The steppe does nonetheless bear directly on the farming/language dispersal debate in one sense, and indeed in one of the first and most controversial claims of all: Renfrew's (1987) invocation of the hypothesis to account for the existence of the Indo-European family, which includes the native tongues of a far larger share of the world's population and land area than any other. The leading traditional theory (see Mallory 1989) had instead long imputed Indo-European's expansion to warlike, horse-borne and (semi-) nomadic populations spreading out of the steppe, and specifically in this case from the Pontic-Caspian area. The estimated time frame was around the sixth millennium BP, that is, at least three millennia earlier in the trajectory of pastoralism than any of the known historical conquests. Most language data have traditionally been held to support such a vision, in geography, chronology, and even a supposedly key role for the horse. Yet the "laws" that allow us to reconstruct the ancestor language on the level of sound do not extend so reliably to precise meanings, so any supposed referents in "Proto-Indo-European culture," such as the wheel or *domesticated* horse, are much more a matter of subjective interpretation. Recent (and likewise disputed) Bayesian analyses of the Indo-European family's linguistic phylogeny, meanwhile, favor an origin in central/eastern Anatolia – that is, the northern arc of the Fertile Crescent – and at an earlier time depth in line with the expansion of agriculture (Bouckaert et al. 2012). Moreover, as just observed, the many historical cases of elite dominance by steppe pastoralists all signally failed to carry their *languages* durably into neighboring farming lands. And where they failed, it may seem questionable that "Kurgan" pastoralists of the fourth millennium BC could on the contrary have succeeded so spectacularly, to impose their speech across so much of Europe, India, and many lands between. Expansion by demic diffusion with the spread of farming at least seems an explanation more commensurate with the scale of the striking linguistic outcome that Indo-European calls upon us to explain.

Indo-European is an early test case and illustration of how ancient DNA can transform our understanding of how the genetic, linguistic, and archaeological records relate to each other through prehistory. The first major results supported a large-scale demographic replacement

(70% or more) into the Corded Ware regions of Northern Europe in the early Bronze Age, by an incoming population from the Yamnaya culture on the Pontic-Caspian steppe (Haak et al. 2015). This was initially taken as strongly favoring the steppe pastoralist hypothesis for Indo-European, although now by "massive" demographic impact rather than by elite dominance, as previously argued. Further findings suggest that the demographic turnover may reflect not (just) subsistence factors, but the concomitant introduction of an early form of the plague pathogen (Rasmussen et al. 2015).

The date range for this migration from the steppe is 4800–4500 BP, however, uncomfortably shallow for the Indo-European family as a whole. Indeed the actual claim was that it may explain "at least some" branches of Indo-European "in Europe" (geographically, the most straightforward candidates would be the Balto-Slavic and/or Germanic branches). Moreover, steppe ancestry is equally high in speakers of Uralic languages (unrelated to Indo-European), also in northeastern Europe. In many other branches of Indo-European, meanwhile, the steppe component turns out to be very low or absent. Mycenaean Greeks were still, in genetic terms, very dominantly of the "European first farmer" type (Lazaridis et al. 2017), as were the best candidate populations for having spoken languages of the extinct Anatolian branch of Indo-European. On the Zagros side, meanwhile, the "Eastern Fertile Crescent" genetic type is significantly different, but has been tentatively identified with the Iranic and Indic branches of Indo-European spread eastward with farming (Broushaki et al. 2016). Intriguingly, this "Eastern Fertile Crescent" genetic profile is a good candidate also for the component that spreads onto the Pontic-Caspian steppe during the seventh millennium BP, to make up roughly half of the genetic profile that later spread from there into the Corded Ware region of Europe. In sum, ancient DNA has significantly advanced the debate between the rival farming and pastoralist hypotheses for Indo-European – but it brings support only for parts of each hypothesis and full support for neither. As outlined here for several other language families worldwide, Indo-European too may turn out to be a complex hybrid story that includes major secondary developments and expansion stages, within the overall story of the spread of food production in its various forms (Heggarty forthcoming).

Island Southeast Asia and the Pacific

Ever since the early days of the hypothesis, *Island Southeast Asia and the Pacific Islands* have been hailed as a prime illustration of a farming/language dispersal. It is certainly striking how just a single-language family – Austronesian – is so disproportionately dominant here. No less conspicuous, though, are the glaring exceptions to that dominance: New Guinea and various neighboring islands in Melanesia, not to mention Australia.

There is now little dispute that Austronesian dispersed out of a homeland in Taiwan, through the Philippines and across Island Southeast Asia, and ultimately throughout Polynesia as far as New Zealand, Hawaii and Easter Island. The broad direction, scale and time depth of the *language* expansion are clear and cannot be overturned by the original arguments from genetics for a "slow boat" expansion out of Wallacea instead, some ten millennia earlier – a scenario that fits neither the time depth nor the structure of the Austronesian family. Those do indeed seem to fit only with a "fast boat" out-of-Taiwan model – see, for example, Gray et al. (2009). In archaeology, meanwhile, Taiwan is widely claimed as at least the main source from which farming too, over similar timescales, spread into Island Southeast Asia and the Pacific. Many have made the direct match with Austronesian, and the general hypothesis has fared relatively well here.

That said, lively debate continues on quite how significant was the contribution from Taiwan on levels other than the linguistic. How important to the overall agricultural "package" here were other plants (and animals) domesticated elsewhere in the region (Donohue and Denham 2010)? How much did Austronesian spread by immigrant farmers outpopulating the locals, or by native populations simply switching language to it? And agriculture aside, how critical too was the development of very sophisticated seafaring

technology and navigational skills? Were not these, more than farming, the limiting factor in determining which particular population group (i.e., speakers only of the Proto-Malayo-Polynesian sub-lineage of Austronesian) would expand so spectacularly, when other nearby farming populations did not?

The hypothesis also seems to leave unexplained the case of *New Guinea*: for agriculture did develop here, yet the island ranks as the most diverse place on earth in its count of independent language lineages. Much remains unclear, however, not least on the nature of early farming here, how and when it arose, and on putative "big picture" classifications of these most under-researched languages of the world. The "Trans-New Guinea" hypothesis, notably, would bring a significant proportion of the island's language lineages, especially through its mountainous interior, into one large family (though still leaving dozens of others). Advocates of "Trans-New Guinea" as a linguistic construct, and of the general farming/language dispersal model, have accordingly both seized on the potential match between the linguistic "effect" and the rise of agriculture as its potential cause: see, for instance, Pawley (2005: 95–102) and Bellwood (2005: 231–232), respectively. Just how much the New Guinea case may either challenge or even support the farming/language dispersal hypothesis, then, hangs on many unresolved issues. The mix of potential explanations for language prehistory here includes a host of other factors too, not least on the environmental and cultural levels: for instance, the long isolation between human groups here, given the tortured mountain topography and apparently endemic warfare.

Australia is entirely different again, for here farming never arose in any case. The continent is thus relevant to the debate only in a negative or indirect sense and from either of two very different perspectives. On the standard majority view, almost all indigenous languages of Australia form a single large family, dubbed "Pama-Nyungan." This covers the entire continent save for most of the "Top End" of northernmost Northern Territory, which is much more linguistically diverse, and perhaps Tasmania, whose vanished native tongues are simply too little known to classify at all. Pama-Nyungan would thus imply a territorially significant language family expansion, estimated to date back five millennia or more, only here without farming (and thus relatively small in demographic scale). This is sometimes invoked as if to challenge the idea of farming/language dispersals, yet that is greatly to misconstrue a hypothesis that by definition simply cannot apply to regions and time periods without agriculture in any case, and can make no claim to explain language dispersals there.

On a minority alternative view, meanwhile, the linguistic panorama of Australia is not to be interpreted in terms of one dominant and *di*vergent "Pama-Nyungan" language family at all, but as an area of long-standing linguistic *con*vergence instead. Dixon (1997) sets this also within his wider "punctuated equilibrium" model of language prehistory. The "punctuations" are episodes in which just a few major language families were somehow propelled to expand across large parts of the world, overwriting a greater underlying linguistic diversity. Farming would rank among the plausible causes of such punctuations (Dixon 1997: 77–78). Australia, then – in Dixon's minority view – would then be an instance of the linguistic outcome *without* the "punctuation" impact of the Neolithic.

Africa

In Africa, agriculture is invoked to account for the two main language family dispersals, independently across the north and sub-Saharan parts of the continent – though in the former case, the proposal remains much disputed.

Berber, ancient Egyptian, and many languages of the Horn of Africa all go back to the dispersal of the "Afro-Asiatic" language family. The *Asiatic* half of its name, meanwhile, refers to the family's lone branch outside Africa, confined moreover to *Western* Asia, in the form of the "Semitic" languages, today most notably Arabic. The Levant is also where the farming/language hypothesis puts the origin of the entire Afro-Asiatic family, with the Natufian and Pre-Pottery Neolithic B populations (Militarev 2002). Not that this hypothesis enjoys any consensus; it is but one of

a number of equally disputed proposals (e.g., Ehret 2002: 35–39), which point instead to homelands in various regions beyond the Red Sea in Africa itself, and to a range of time frames before farming here. Without agriculture, though, these alternative hypotheses do struggle to find plausible explanations commensurate in impact with the scale of the vast linguistic legacy that is Afro-Asiatic.

The Bantu language lineage, by contrast, is often held up as a paradigm case of a farming/language dispersal, more widely accepted even than in the case of Austronesian. Certainly, much of the linguistics is undisputed: out of a homeland in the Nigeria/Cameroon region, Bantu has over the last three millennia or so spread to dominate most of southern and eastern Africa. Zulu and Swahili, for instance, are just two among hundreds of related languages within a vast Bantu "dialect continuum." Correlations have been widely proposed with the spread of farming and ironworking, and indeed with signals in human population genetics. Data from these various disciplines have increasingly been brought together (e.g., by Filippo et al. 2012) to argue even for particular paths of expansion and for "demic diffusion" as the mechanism by which it proceeded, as per the initial formulation of the farming/language hypothesis (Renfrew 1987: Chapter 6).

The few other and much smaller language lineages found in southern and eastern Africa – particularly San and Khoi in the far southwest and Hadza and Sandawe in Tanzania – are now largely isolated and endangered and seem clearly to represent rare survivals of whatever language lineages were spoken before Bantu spread into the region. Contrary to early, outdated hypotheses, there is no good case at all that these various "click" language lineages are related to each other, whatever their speakers' deep genetic inheritances may be. For a survey of these questions and the exact nature of the impact of the Bantu advance on the Khoi pastoralists and their own migrations, see Güldemann (2008).

Yet while Bantu seems a clear-cut case, again it remains just one part of a far wider dispersal, beginning some millennia earlier: that of the great "Niger-Congo" family to which Bantu belongs. What drove that initial dispersal? If that too was farming, then how could that one explanation account for these two dispersals at very different time depths? Do they represent different stages of intensification? Or rather, was it not farming alone that lay behind the Bantu spread, but the crucial extra ingredient of ironworking?

The Americas

The far north of *North America*, where farming was not viable at all, is nonetheless filled by three language families spoken by hunter-gatherer groups, and certainly widespread, albeit demographically very thinly: Eskimo-Aleut, Algic (mostly Algonquian) and Na-Dene. Any candidates for farming dispersals can only lie further south. Bellwood (2005: 244–250) does venture claims to this effect over parts of the eastern USA, but our knowledge of pre-Columbian language distributions here is very patchy and suggests a relatively fragmented pattern of various language lineages, rather than any single predominant one. Moreover, farming itself here developed relatively late and never became so intensive as in the two main and much earlier hearths of agriculture in the Americas, both further south.

In *Mesoamerica*, the hypothesis has often been invoked but remains highly controversial, especially in the case of the Uto-Aztecan family. As its name embodies, this has one foot in the Mesoamerican heartland (not least in the form of Nahuatl or "Aztec") but another in southwestern USA (e.g., as Ute, whence also the name Utah). Standard linguistic thinking (see, e.g., Kaufman and Justeson 2009) has long assumed that the family's ancestral language was spoken by originally forager populations along the western reaches of what today is the US-Mexico border, though without a convincing explanation of how they also came to penetrate deep into the Mesoamerican heartland. One rival (though much disputed) interpretation of the language data, however, fits instead with a dispersal northward out of a Mesoamerican homeland, together with maize farming (Hill 2002). It thus has also to envisage Uto-Aztecan speakers ultimately reverting to foraging as they spread northward into environments much less suited to farming.

For the other main language families of Mesoamerica, firmly within the core farming region, the hypothesis is rather more widely entertained (for references, see Bellwood 2005: 237–239), notwithstanding continuing objections (Campbell and Poser 2008: 345–346). Certainly, the Mayan and Otomanguean families appear to go back to quite different time depths, so if both were farming dispersals, then some explanation is required (again, perhaps different stages in intensification). Also, although the main language families of Mesoamerica (and indeed the Andes, see below) remain significant in speaker numbers by the standards of most indigenous language lineages of the Americas, they still pale alongside the vast Old World language families. In large part this reflects the devastating mortality wrought on their speaker populations by Old World pathogens in the decades after 1492, and centuries of language shift in favor of European tongues ever since. Yet even allowing for this, at their peak the main indigenous language families of Mesoamerica were still minnows in Old World terms, not only in demographic but also in geographical scale. The farming/language dispersal hypothesis would presumably have to impute this to the much more gradual way in which agriculture came to be incorporated into subsistence regimes here, together with other peculiarities such as the lack of large domesticated animals, and indeed environmental constraints. For agricultural expansion out of Mesoamerica clearly did face considerable obstacles: in the arid climates immediately to its north and the constriction of the isthmus of Panama to the south.

Amazonia constitutes, after New Guinea, the world's other main hotspot of language lineage diversity, also all too thinly researched and sketchily understood. Far from presenting some single-language family expansion able to exclude all others, the region presents a striking linguistic mosaic. There were certainly some major family expansions here – Arawak, Carib, and Tupí, as well as Jê more in the savannah zone to the southeast – but each far less continuous than the great Old World spreads like Indo-European, Sinitic or Bantu. The main Amazonian families do range far and wide, but their distributions are unusually fragmented, scattered, and interspersed both with each other and with many other minor families and isolate lineages. Many hypotheses on where the main families originate point to the upper reaches of the Amazon Basin, that is, the foothills of the Andes where farming too is widely taken to have originated. For Arawak and Tupí particularly, farming/language dispersals are regularly invoked (see, e.g., Dixon and Aikhenvald 1999: 16–19) – farming, that is, at least in one form or another, given how agriculture here followed a very different trajectory to the Old World. It often took the form of shifting slash-and-burn, and in many regions such farming continued to coexist with hunter-gatherers, often occupying riverside territories vs. the rainforest interior, respectively. Moreover, complementary or rival explanations are also invoked, not least one factor promoting mobility over great distances here: the relative ease of moving along the region's great watercourses – and especially *down*river, i.e., ultimately also from (farming) homelands around the periphery of Amazonia.

In the (Central) *Andes*, a particular set of environmental constraints again shaped the very independent development of farming and civilization here. This key hearth of agriculture (not least of tubers) seems at first sight a counterexample to the farming/language hypothesis, for it conspicuously fails to exhibit any major language expansions at a time depth commensurate with the very early beginnings of agriculture here. On closer inspection, however, the Andean case tends rather just to underline the refinements and qualifications that must attend the hypothesis if it is to be applied across regions of the world where farming itself arose so differently and over such contrasting trajectories through time. In the Old World, farming is effectively defined by certain key components present right from the start: cereals and large domesticated animals for both traction and (mobile) protein. Both were glaringly absent in the Andes until millennia after agriculture first began here. Environmental hyperdiversity through 6500m of altitude variation, and within the tropics, also much delayed crop adaptations, while on the Pacific coast the world's richest seafood resources underpinned subsistence so reliably that societies

here were raising monumental architecture even before they were heavily reliant on farming at all. Thresholds in the *intensification* of farming and their concomitant demographic and sociocultural impacts followed a chronology quite unlike that of the Old World and may not after all be so incompatible with the relatively recent major language family expansions here (Aymara and Quechua). The Andes are a good illustration of how the wider debate on the farming/language dispersal hypothesis would do well to be sensitive to a range of necessary refinements – as summarized in ▶ "Farming-Language Dispersals (1): Principles" and explored in more depth in Heggarty and Beresford-Jones (2010).

Cross-References

▶ Farming-Language Dispersals (1): Principles

References

Bellwood, P. 2005. *First farmers: The origins of agricultural societies*. Oxford: Blackwell.

Bellwood, P., and C. Renfrew, eds. 2002. *Examining the farming/language dispersal hypothesis*. Cambridge, UK: McDonald Institute for Archaeological Research.

Bouckaert, R., P. Lemey, M. Dunn, S.J. Greenhill, A.V. Alekseyenko, A.J. Drummond, R.D. Gray, M.A. Suchard, and Q.D. Atkinson. 2012. Mapping the origins and expansion of the Indo-European language family. *Science* 337 (6097): 957–960. https://doi.org/10.1126/science.1219669.

Broushaki, F., M.G. Thomas, V. Link, S. López, et al. 2016. Early Neolithic genomes from the eastern Fertile Crescent. *Science* 353 (6298): 499–503. https://doi.org/10.1126/science.aaf7943.

Campbell, L., and W.J. Poser. 2008. *Language classification: History and method*. Cambridge, UK: Cambridge University Press.

Dixon, R.M.W. 1997. *The rise and fall of languages*. Cambridge, UK: Cambridge University Press.

Dixon, R.M.W., and A.Y. Aikhenvald. 1999. *The Amazonian languages*. Cambridge, UK: Cambridge University Press.

Donohue, M., and T. Denham. 2010. Farming and language in Island Southeast Asia: Reframing Austronesian history. *Current Anthropology* 51 (2): 223–256. https://doi.org/10.1086/650991.

de Filippo, C., K. Bostoen, M. Stoneking, and B. Pakendorf. 2012. Bringing together linguistic and genetic evidence to test the Bantu expansion. *Proceedings of the Royal Society B: Biological Sciences*. https://doi.org/10.1098/rspb.2012.0318.

Ehret, C. 2002. *The civilizations of Africa: A history to 1800*. Oxford: James Currey.

Fuller, D.Q. 2002. An agricultural perspective on Dravidian historical linguistics: Archaeological crop packages, livestock and Dravidian crop vocabulary. In *Examining the farming/language dispersal hypothesis*, ed. P. Bellwood and C. Renfrew, 191–213. Cambridge, UK: McDonald Institute for Archaeological Research.

Gray, R.D., A.J. Drummond, and S.J. Greenhill. 2009. Language phylogenies reveal expansion pulses and pauses in Pacific settlement. *Science* 323 (5913): 479. https://doi.org/10.1126/science.1166858.

Güldemann, T. 2008. A linguist's view: Khoe-Kwadi speakers as the earliest food-producers of southern Africa. *Southern African Humanities*, 20: 93–132. http://www.sahumanities.org/ojs/index.php/SAH/article/view/231

Haak, W., I. Lazaridis, N. Patterson, N. Rohland, et al. 2015. Massive migration from the steppe was a source for Indo-European languages in Europe. *Nature* 522 (7555): 207–211. https://doi.org/10.1038/nature14317.

Heggarty, P. forthcoming. Indo-European and the ancient DNA revolution. *Journal of Indo-European Studies*. Special issue on Indo-European and Farming, eds. G. Kroonen and B. Comrie.

Heggarty, P., and D. Beresford-Jones. 2010. Agriculture and language dispersals: Limitations, refinements, and an Andean exception? *Current Anthropology* 51 (2): 163–191. https://doi.org/10.1086/650533.

Higham, C. 2002. Languages and farming dispersals: Austroasiatic languages and rice cultivation. In *Examining the farming/language dispersal hypothesis*, ed. P. Bellwood and C. Renfrew, 223–232. Cambridge, UK: McDonald Institute for Archaeological Research.

Hill, J.H. 2002. Proto-Uto-Aztecan cultivation and the northern devolution. In *Examining the farming/language dispersal hypothesis*, ed. P. Bellwood and C. Renfrew, 331–340. Cambridge, UK: McDonald Institute for Archaeological Research.

Janhunen, J. 1996. *Manchuria: An ethnic history*. Helsinki: Finno-Ugrian Society.

Kaufman, T., and J. Justeson. 2009. Historical linguistics and pre-Columbian Mesoamerica. *Ancient Mesoamerica* 20 (2): 221–231. https://doi.org/10.1017/S0956536109990113.

Lazaridis, I., A. Mittnik, N. Patterson, S. Mallick, et al. 2017. Genetic origins of the Minoans and Mycenaeans. *Nature* 548 (7666): 214–218. https://doi.org/10.1038/nature23310.

Mallory, J.P. 1989. *In search of the Indo-Europeans*. London: Thames & Hudson.

Militarev, A. 2002. The prehistory of a dispersal: The proto-Afrasian (Afroasiatic) farming lexicon. In *Examining the farming/language dispersal hypothesis*, ed. P. Bellwood and C. Renfrew, 135–151. Cambridge, UK: McDonald Institute for Archaeological Research.

Pawley, A. 2005. The chequered career of the Trans New Guinea hypothesis: Recent research and its implications. In *Papuan pasts: Cultural, linguistic and biological histories of Papuan-speaking peoples*, ed. A. Pawley, R. Attenborough, J. Golson, and R. Hide, 67–107. Canberra: Pacific Linguistics.

Rasmussen, S., M.E. Allentoft, K. Nielsen, L. Orlando, et al. 2015. Early divergent strains of Yersinia pestis in Eurasia 5,000 years ago. *Cell* 163 (3): 571–582. https://doi.org/10.1016/j.cell.2015.10.009.

Renfrew, C. 1987. *Archaeology and language: The puzzle of Indo-European origins*. London: Jonathan Cape.

Renfrew, C., and P. Bahn, eds. 2014. *The Cambridge world prehistory*. Cambridge, UK: Cambridge University Press.

Farmsteads and Rural Life in the United States, Archaeology of

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Introduction

The historical archaeology of farmsteads and rural life investigates the development of agriculture in North America from the 1500s to the 1900s. The topic emerged in the 1970s due to the large number of rural sites and farmsteads routinely encountered during cultural resource management (CRM) archaeology projects in the United States. Rural sites are important archaeologically from a cultural and historical perspective because the majority of North American households practiced farming until the twentieth century. A rapidly declining way of life, today a small proportion of the American population pursues farming as an occupation. Consequently, archaeologists emphasize that it is important to materially document the cultural trajectory of this significant aspect of American life.

Definition

The archaeology of rural life and farmsteads examines the material culture and social history of farms from the 1500s to the 1900s in North America. Several relevant topics are typically addressed archaeologically at farmsteads, such as the landscape and architectural history of the farm, the standard of living that the residents experienced based upon the type of agriculture they practiced, and the types of economic strategies pursued at farms. The ways that production regimes over time may have influenced the built environment and household material life, such as the transition from subsistence to commercial farming, are often addressed in farmstead research. The influence of progressive, modern farming practices upon rural life is also explored in farm studies, in addition to the effects of consumerism upon farm households. Social and cultural questions are also explored in farmstead studies, such as the effects of place of origin, nationality, and ethnicity upon agricultural practices. Changing gender roles in farm families and the effects of race and inequality in rural contexts are also addressed.

Historical Background

The archaeology of farmsteads and rural life examines material culture trends that occurred during the colonial, antebellum, and post-bellum/modern periods in US history. Paralleling this time span, the transition from folk, vernacular-based regional cultures to national-level industrially influenced consumer culture is a major topic of inquiry in material culture research. Consequently, farm studies and the examination of rural life in general are well suited for exploring the timing and extent of this transition from folk to industrially based culture in different parts of the United States between the 1500s and the 1900s. The transition from producer-consumer households to predominantly consumer households can also be addressed via archaeological studies of rural life. The archaeology of colonial period farms (c. 1500s to 1780s) often focuses upon small, vernacular-oriented settler farms that practiced self-sufficiency and subsistence-level agriculture. Log houses and timber frame post-in-ground dwellings were prevalent during this

period in eastern North America. Artifact assemblages from farms of this period often contain kitchen and food related items and a much smaller amount of personal or household-related artifacts. Between the late 1700s through the mid-1800s, farms became increasingly profit-oriented and emphasized efficiency in farming and production maximization. Consequently, the domestic landscape and built environment at antebellum farms (c. 1790s to the 1860s) are usually more structured and planned than farms dating to the preceding colonial era or settler periods in different regions (Groover 2008). Likewise, as farms began to practice commercial production, the amount of factory-manufactured consumer goods recovered from farm sites often increases dramatically. During the post-bellum/modern period from the 1870s to the 1900s, farms increasingly incorporated new technology into their operation, revolutionizing agricultural production and rural life in many regions of the United States. Likewise, consumerism that began in the 1800s continued in rural locations during the twentieth century. The challenge for contemporary historical archaeologists is to effectively reconstruct the primary material trends that occurred among rural households as the transition from noncommercial to commercial-level farming transpired in different regions of the United States.

Key Issues and Current Debates

Key issues and debates in farmstead archaeology center upon interpreting the significance of rural sites encountered during CRM archaeology projects. Since the 1970s, a minority of archaeologists have argued that farmstead sites represent a very prevalent, redundant, and hence expendable type of archaeological resource that consequently should not be preserved or studied archaeologically, given the amount of written information regarding farm life in the United States. In contrast, most contemporary historical archaeologists recognize that farmsteads are a very important research topic and type of cultural resource. The archaeological research significance of farmstead sites is based upon the information potential that farmsteads offer to archaeologists. Significance is also based upon the current state of knowledge related to farmsteads in a specific region, depending upon the types of farm sites previously investigated and the range of questions addressed at these sites.

An important element of farmsteads in the significance debate is that farmsteads, often occupied by several generations in the same extended family, usually possess considerable time depth, having been occupied for at least a century or more. Because of their characteristic time depth, farms represent relevant "time laboratories" where archaeologists can explore long-term material trends related to the archaeological dynamics of continuity and change in domains such as the domestic landscape, architecture, economic strategies, foodways, and household material culture within an extended family. Previous studies have demonstrated that landscape change and material consumption and deposition, particularly of foodways related items, are significantly influenced by the life history and family cycles of the farm residents (Groover 2003, 2008). Due to the time depth often associated with farms, they represent significant archaeological resources and an important context for exploring medium-term material trends.

International Perspectives

The systematic study of farmsteads internationally is beginning to develop in different parts of the globe. International studies of farming households and landscapes (e.g., Morrison 1991; MacDonald Lake and Edwards 2006; Tarlow 2007; Carroll 2011; Prossor et al. 2012) dating to the past 500 years are very relevant and valuable because they illustrate the range of variation in agriculture throughout the world. Archaeological studies have been conducted in England, Ireland, and Australia at farmstead sites dating from the late medieval period to the nineteenth century (e.g., Barnwell and Giles 1997; Brunskill 1999; Dalglish 2003; Atkinson 2010; Orser 2010). For American archaeologists, international farm

studies can highlight the origins of farming practices that were transplanted to and modified in the United States. Using migration as a primary analysis topic, farm studies in the United States often emphasize the ethnic practices and place of origin of farm residents. Origin studies attempt to establish what material practices were reestablished in the New World and how agricultural practices and material traditions may have changed over time.

Future Directions

As the number of farmstead studies increases in the United States and elsewhere, a pressing challenge for historical archaeologists is to systematically synthesize new information into a coherent state of knowledge regarding the trajectory of rural life in different regions over time. This task is particularly necessary for future archaeology projects supported by public funds. Evaluating the significance of farmstead sites is based on establishing the context of the site and determining the research potential of encountered farmsteads. The research potential of specific farms can be established through reference to a current state of knowledge in a given region. Simply put, the current state of knowledge, especially in cultural resources management, refers to the existing body of information related to a topic and existing questions that should be addressed by future site studies. Unfortunately, in the United States, an overarching, systematic synthesis of farmstead archaeology based on previous studies is yet to be conducted. However, many archaeologists have conducted regional-level studies of rural trends in specific geographic areas over time.

Cross-References

- ▶ Buildings Archaeology
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Finch, Jonathan
- ▶ North America (USA): Historical Archaeology
- ▶ Plantation Archaeology
- ▶ Tarlow, Sarah

References

Atkinson, J.A. 2010. Settlement form and evolution in the Central Highlands of Scotland, ca. 1100–1900. *International Journal of Historical Archaeology* 14: 316–334.

Barnwell, P., and C. Giles. 1997. *English farmsteads 1750–1914*. Swindon: RCHME.

Brunskill, R.W. 1999. *Traditional farm buildings of Britain and their conservation*. London: Victor Gollancz.

Carroll, L. 2011. Building farmsteads in the desert: Capitalism, colonialism, and the transformation of rural landscapes in Late Ottoman period Transjordan. In *The archaeology of capitalism in colonial contexts: Contributions to global historical archaeology*, ed. S.K. Croucher and L. Weiss, 105–120. New York: Springer.

Dalglish, C. 2003. *Rural society in the age of reason: An archaeology of the emergence of modern life in the southern Scottish Highlands*. New York: Springer.

Groover, M.D. 2003. *An archaeological study of rural capitalism and material life: The Gibbs farmstead in southern Appalachia*. New York: Springer.

Groover, M.D. 2008. *The archaeology of North American farmsteads*. Gainesville: University Press of Florida.

Lake, J., and B. Edwards. 2006. Buildings and place: Farmsteads and the mapping of change. *Vernacular Architecture* 37: 33–49.

Morrison, B. 1991. The story site: An early nineteenth century homestead in Brant County, Ontario. *Kewa* 91 (2): 2–26.

Orser, C. 2010. Three 19th-century house sites in rural Ireland. *Post-Medieval Archaeology* 44: 81–104.

Prossor, L., S. Lawrence, A. Brooks, and J. Lennon. 2012. Household archaeology, lifecycles and status in a nineteenth-century Australian coastal community. *International Journal of Historical Archaeology* 16: 809–827.

Tarlow, S. 2007. *The archaeology of improvement in Britain, 1750–1850*. Cambridge: Cambridge University Press.

Further Reading

Baugher, S., and T. Klein. 2002. Introduction to the archaeology of nineteenth-century farmsteads in northeastern Canada and the United States. *Northeast Historical Archaeology* 30-31: 1–8.

Brunskill, R.W. 1976. Recording the buildings of the farmstead. *Transactions of the Ancient Monuments Society* 21: 115–150.

Cabak, M., M. Groover, and M. Inkrot. 1999. Rural modernization during the recent past: Farmstead archaeology in the Aiken plateau. *Historical Archaeology* 33: 19–43.

Chapman, V. 1967. Recording farm buildings. *Industrial Society for the North-East Bulletin* 3: 7–11.

De Cunzo, L.A., and A.M. Garcia. 1992. *Historic context: The archaeology of agriculture and rural life, New Castle and Kent Counties, Delaware, 1830–1940*.

Newark, Department of Anthropology, Center for Archaeological Research, University of Delaware.
Gaskell, P.T. 2002. Historic farmsteads: Audit and evaluation. In *Rural regeneration: A sustainable future for farm buildings*, ed. Historic Farm Buildings Group, 35–38. Norfolk: Historic Farm Buildings Group.
Hart, J., and C. Fisher, eds. 2000. *Nineteenth-and early twentieth-century domestic site archaeology in New York State*, New York State museum bulletin 495. Albany: New York State Museum.
Jarrett, M.G., and S. Wrathmell. 1977. Sixteenth- and seventeenth-century farmsteads: West Whelpington, Northumberland. *The Agricultural History Review* 25: 108–119.
Kissock, J., and R. Johnston. 2007. Sheephouses and sheepcotes: A study of the post-medieval landscape of Cefn Drum, Gower. *Studia Celtica* 41: 1–23.
MacDonald, E. 2004. Towards a historical archaeology of the German-Canadians of Markham's Berczy settlement. *Northeast Historical Archaeology* 33: 13–38.
McCann, K.D., and R.L. Ewing. 2002. Recovering information worth knowing: Developing more discriminating approaches for selecting nineteenth-century rural domestic sites and farmsteads. *Northeast Historical Archaeology* 30–31: 15–22.
Mires, P.B. 1993. The importance of aspect to historic farmstead site location in the Green Mountains of Vermont. *Historical Archaeology* 27: 82–91.
Scholl, M.D. 1998. "In Delaware the millennium has begun": Nineteenth-century farmstead archaeology and the Methodist discipline. *Northeast Historical Archaeology* 27: 12–32.
Stothers, D.M., and P.M. Tucker. 2002. The Dunlap Farmstead: A market-dependent farm in the early history of the Maumee Valley of Ohio. *Archaeology of Eastern North America* 30: 155–188.
Wade Martins, S. 1981. *Historic farm buildings*. London: Batsford.
Wilson, J. 1990. We've got thousands of these! What makes an historic farmstead significant? *Historical Archaeology* 24: 23–33.

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Basic Biographical Information

German A. Fedorov-Davydov was born on July 17, 1931 and died on April 23, 2000. He was a doctor of historical sciences, a professor, a corresponding member of the German Archaeological Institute (1983), a member of Academy of Natural Sciences (1993), and the winner of the Lomonosov Award of the first degree of Moscow State University (1998).

His father was a professor at Moscow State University and a famous Soviet art historian. His mother was an artist.

After leaving school in 1949, he joined the history department of Moscow State University, where he majored in the department of archaeology. As a student, he participated in the Khorezm expedition and wrote a thesis on "The Mint minted Khorezm in XIII-XIV centuries" (head – Professor S.P. Tolstov).

From 1954 to 1956, he was a postgraduate of Moscow State University Department of Archaeology (supervisor – known Soviet archeologist A.P. Smirnov). In 1957 he defended his thesis on "The Treasures of Coin the Golden Horde (main stages of development of currency and monetary-weight systems in the Golden Horde XIII-XIV centuries)."

In 1956–1960 G.A. Fedorov-Davydov worked in the Institute of History of Material Culture – Institute of Archaeology of Academy Science of the USSR (in 1958–1960 he was executive secretary of the journal "Soviet Archeology"). From 1960 until his death, he was working at the Department of Archaeology of the History Department of Moscow State University (since 1960, the assistant; since 1962, associate professor; since 1969, professor). G.A. Fedorov-Davydov defended his doctoral thesis entitled *Nomads of Eastern Europe in the X-XIV Centuries* in 1966 at Moscow State University.

Major Accomplishments

The scientific interests of G.A. Fedorov-Davydov were extremely wide: medieval archaeology of the Eurasian steppes; history, archaeology, and numismatics of the Golden Horde; the ancient and medieval art of the Eurasian steppes; ancient and medieval culture of the Volga; currency and trade in the Northeast; statistical methods in archaeology; and relationships and civilizations of the East and West in the context of the history of the Silk Road.

He lectured on "Fundamentals of Archaeology" and "The Historiography of Archaeology" and conducted special courses: "Archaeology of the Volga Region," "Archaeology of Central Asia," "Archeology and Culture of the Muslim Countries," and "Statistical Methods in Archaeology" at the Department of Archaeology of the Moscow State University. Among G.A. Fedorov-Davydov's students, there are known archeologists of Moscow, including Kazan, Saransk, Volgograd, Astrakhan and Dagestan, Azerbaijan, Uzbekistan, and Tajikistan.

G.A. Fedorov-Davydov participated in many archeological expeditions that took place from 1950 to 1990 (Central Asia, Ukraine, the Middle and Lower Volga Region, Mongolia, Tunisia). In 1970–1990 he led the Institute of Archaeology of Academy of Sciences and Moscow State University expedition in the Volga Region.

The most significant scientific accomplishments of G.A. Fedorov-Davydov concerned research related to the Golden Horde city. Since 1959, he led the research in Tsarevskoe, Selitrennoye, and Vodyanskoe sites. He detailed stratigraphy of the excavated sites and specified the time of death of the Golden Cities. The archeological materials were summarized in the monograph "Golden Horde cities of the Volga region" and in his books and articles published abroad.

One of the most striking episodes in the career of G.A. Fedorov-Davydov was the discovery of the burial ground with masterpieces of ancient art at Kosik in 1984.

His theoretical works, illustrated by methods of mathematical statistics, were of great importance for the development of Russian archaeology.

G.A. Fedorov-Davydov did a lot of research, organization, and socializing; he is the author of about 230 scientific and popular-scientific works, including 26 books.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Central–Eastern Europe: Historical Archaeology
- ▶ Medieval Archaeology
- ▶ Medieval Russia (Rus'), Archaeology of

Further Reading

Fedorov, G.A., and M.D. Poluboyarinova. 1976. Die Städte der Goldenen Horde. *Das Altertum* 3 (22): 171–178.

Fedorov-Davydov, G.A. 1966. *East European nomads under rule of Altyn Orda Khans*. Moscow: Nauka. (in Russian).

Fedorov-Davydov, G.A. 1972. *Die Goldene Horde und ihre Vorgänger*. Leipzig: Koehler und Amelang.

Fedorov-Davydov, G.A. 1976. *Art of nomads and golden horde*. Moscow: Iskusstvo.

Fedorov-Davydov, G.A. 1983. *Az Aranyhorda foldgen [The gloden horde]*. Budapest: Zinat Press. (in Hungarian).

Fedorov-Davydov, G.A. 1984a. *The culture of the golden horde cities*. Oxford: Archaeopress.

Fedorov-Davydov, G.A. 1984b. *Städte der Goldenen Horde an der unteren Wolga*. München: Beck.

Fedorov-Davydov, G.A. 1987. *Statistical methods in archaeology*. Moscow: Nauka.

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Basic Biographical Information

T. J. Ferguson (b. 1950) is a luminary in the global movement to make archaeology more relevant to and respectful of Native American communities. He has been particularly instrumental in issues surrounding repatriation, the development of tribal cultural resource management (CRM) programs, and the advancement of an applied archaeological paradigm that bridges different elements of anthropology and the humanities to understand native peoples past and present.

The son of a career military officer, Ferguson spent his high school years in Oahu, Hawaii, and graduated with a bachelor's degree in anthropology from the University of Hawaii at Hilo in 1973. Ferguson went immediately into graduate school. After receiving his master's degree in

anthropology from the University of Arizona in 1976, he planned to return to Polynesia but instead accepted a job at the Pueblo of Zuni in New Mexico. Through that work he became interested in historic and cultural preservation, and land claims, and would come to spend his career (to date) focused predominately on the American Southwest. After the position at the Pueblo of Zuni, Ferguson went back to graduate school to pursue a master's of community and regional planning, which he received in 1986 from the University of New Mexico. He would later earn a Ph.D. from the University of New Mexico in 1993 – with a dissertation using an archaeological application of space syntax to illuminate historic Zuni architecture (Ferguson 1996a) – while also working as the Director of Southwest Programs at the Institute of the North American West. Following this position, Ferguson established his own companies (first with Roger Anyon) in which he could pursue applied research. He is currently the owner of Anthropological Research, LLC, and a Professor of Practice at the University of Arizona.

While working for the Pueblo of Zuni, in 1978, Zuni religious leaders decided to seek the return of stolen *Ahayu:da* (War Gods). Ferguson became part of the Zuni team that eventually would recover virtually every known War God in a US public institution (Ferguson et al. 1996). Their success helped lay the groundwork for US repatriation law and the global repatriation movement. In the years since, Ferguson has worked for both tribes and US federal agencies to conduct cultural affiliation studies, which provide a vital legal pathway for cultural items to be returned from museum repositories and archaeological sites. He has actively contributed to the academic and intellectual debates about cultural affiliation and other issues relating to repatriation (e.g., Ferguson 2003, 2004). He has also served as a member (2005–2013) of the Smithsonian Institution's Repatriation Review Committee.

In 1976, Ferguson became the Assistant Director of the Zuni Archaeological Enterprise – the first tribally run cultural resource management firm in North America. The next year, when the program reorganized, he became the Director of the Zuni Archaeology Program. Through these efforts, Ferguson and his colleagues demonstrated the value of archaeology for tribes and thus established a framework for heritage management conducted by tribes (Ferguson 1984). Since then, dozens of tribal CRM programs have been established, as well as more than 100 Tribal Historic Preservation Offices.

Major Accomplishments

The experiences at Zuni provided a basis for Ferguson to build a career around using archaeology to serve tribal needs and interests. He has developed a unique brand of archaeology that spans an array of anthropological and humanistic approaches that include ethnohistory, ethnography, and geography (e.g., Ferguson and Hart 1985). Many of his projects have directly supported tribal welfare in the domains of cultural preservation and land and water rights. For example, he has served as an expert witness for the Pueblo of Zuni, successfully helping them in their decade-long land claims case as well as their efforts to protect the sacred Zuni Salt Lake; he has conducted research for the Pueblo of Taos to successfully prevent the impacts of a proposed airport expansion on the tribe; and he has helped the Pueblo of Laguna successfully have the sacred Mount Taylor acknowledged as a traditional cultural property under New Mexico state law. Much of his applied work involves the documentation of traditional cultural properties that are potentially threatened by development projects through the Section 106 process of the National Historic Preservation Act, but he has also collaborated on projects that proactively study tribal histories, such as a National Science Foundation study to document Hopi place names.

Over a three-decade plus career, Ferguson has thus shaped a research agenda that demonstrates how archaeology can be conducted by, for, and with Native Americans. While much of his applied work has led to a long list of technical reports, Ferguson has been a regular, vocal, and intelligent contributor to the discipline's ongoing discussion about its relationship with

indigenous peoples (e.g., Ferguson et al. 1993; Ferguson 1996b, 2009). He has also greatly advanced these efforts through service to the discipline, holding a range of positions in professional organizations, most notably serving on the Executive Board of the American Anthropological Association (2007–2010). His contributions to archaeology have been recognized through numerous awards, including the Society for American Archaeology Presidential Recognition Award in 1997 for his work bridging archaeology and Native views and the Solon Kimball Award for Public and Applied Anthropology in 2006 for developing models of mutually beneficial collaboration between American Indian communities and archaeologists in field research, museum practice, and assessments of cultural landscapes.

Cross-References

- ▶ Collaborative for Cultural Heritage Management and Policy (CHAMP)
- ▶ Indigenous Archaeologies
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice
- ▶ Repatriation: Overview
- ▶ Sacred Site Conservation and Preservation
- ▶ Society for American Archaeology (SAA)
- ▶ Southwest United States and Northwestern Mexico: Geography and Culture

References

Ferguson, T.J. 1984. Archaeological values in a tribal cultural resource management program at the Pueblo of Zuni. In *Ethics and values in archaeology*, ed. E.L. Green, 224–235. New York: Free Press.

Ferguson, T.J. 1996a. *Historic Zuni architecture and society: An archaeological application of space syntax*. Tucson: University of Arizona Press.

Ferguson, T.J. 1996b. Native Americans and the practice of archaeology. *Annual Review of Anthropology* 25: 63–79.

Ferguson, T.J. 2003. Anthropological archaeology conducted by tribes: Traditional cultural properties and cultural affiliation. In *Archaeology is anthropology*, ed. S.D. Gillespie and D.L. Nichols, 137–144. Washington, DC: American Anthropological Association.

Ferguson, T.J. 2004. Academic, legal, and political contexts of social identity and cultural affiliation research in the southwest. In *Identity, feasting, and the archaeology of the Greater Southwest*, ed. B.J. Mills, 27–41. Boulder: University Press of Colorado.

Ferguson, T.J. 2009. Improving the quality of archaeology in the United States through consultation and collaboration with Native Americans and descendant communities. In *Archaeology and cultural resource management: Visions for the future*, ed. L. Sebastian and W.D. Lipe, 169–193. Santa Fe: School for Advanced Research Press.

Ferguson, T.J., and R.E. Hart. 1985. *AZuni atlas*. Norman: University of Oklahoma Press.

Ferguson, T.J., K.E. Dongoske, L. Jenkins, M. Yeatts, and E. Polingyouma. 1993. Working together: The roles of archeology and ethnohistory in Hopi cultural preservation. *CRM* 16: 27–37.

Ferguson, T.J., R. Anyon, and E.J. Ladd. 1996. Repatriation at the Pueblo of Zuni: Diverse solutions to complex problems. *American Indian Quarterly* 20: 251–273.

Field Method in Archaeology: Overview

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Introduction

Most archaeological research depends, directly or indirectly, on information recovered in the field, primarily as a result of campaigns of *survey* and *excavation*. The way field projects are designed, implemented, analyzed, and published is summarised here and reviewed in a number of case studies (see "Cross-References").

Much of the *archaeological resource* is vulnerable to disturbance from the exigencies of modern life, and may be destroyed through the construction of roads (motorways) and buildings, especially in towns. Even in open country and desert, the surface is subject to continual attrition. Archaeological

investigation therefore demands work to be of the highest quality and precision, designed to maximize information while it is still detectable and wherever possible to conserve deposits in the ground. While much field method is directly applied to research questions, much more effort goes in recording archaeological sites that are likely to be damaged by modern construction or clearance. This work is undertaken by the rescue or commercial profession (said to be engaged in *CRM* or Cultural Resource Management). At the present time, CRM activity greatly outnumbers university activity in both in its staff and their budgets.

Definition

Field archaeologists explore the past at a number of different scales and use a basic vocabulary to designate what they find. The basic unit of past activity is the *object*, which might be an *artifact* (man-made – e.g., a brooch) or an *ecofact* or biota (natural- e.g., a seed). A collection of such objects is an *assemblage*. The earth or mineral *deposit* from which an assemblage is retrieved is a *context* (also called a stratum, a stratigraphic unit, or a cultural layer). Any set of contexts which offers evidence for past activity is a *feature* – a general term of great use in archaeology since it so often happens that we find something but do not yet know what it is. A wall, a grave, a path are examples of features. A set of features, like four walls, can be designated as a *structure* (e.g., a building). A *site* is the term used for a concentration of features, which imply former human occupation. It is also used to denote a place at which archaeologists have focused their investigations. A *landscape* (or *historic landscape* or *historic environment*), in archaeological terms, is compounded of the detected parts of ancient land use, particularly sites.

Key Issues/Current Debates/Future Directions/Examples

Archaeological investigation is a science that responds to the needs of research, to the way that information has survived in the ground and to the present ownership and stakeholders of the site or landscape in question. Research objectives, terrain, and the social context therefore have to be matched for every field project in a *project design*. The best known methods of field investigation are survey, which reviews large areas on the surface (extensive investigation); excavation, which examines a constricted piece of ground by dissecting it (intensive investigation); and building recording, which deduces the history of buildings that are still standing. Modern projects, whether applied for pure research or for CRM, use all these in combination in rigorously planned programs (Carver 2009, Chap. 14).

Investigative Procedure

Field investigation typically takes place in six consecutive stages, each of which deploys a range of different methods, described in more detail below (see Table 1).

1. The object of *RECONNAISSANCE* is to explore ancient landscapes and identify sites, the site used in this case to denote areas likely to contain concentrated remains of earlier human activity. Methods of finding sites include *aerial archaeology*, using satellites, airplanes, or balloons as platforms to capture images of features that are often only visible or most visible from the air. *Surface investigation* involves walking over the surface of the ground and recording the artifacts that lie on the surface. Sites are located by mapping concentrations of objects as they lie. *Subsurface investigations* use geophysical or geochemical prospection, where anomalies picked up in, or under, the surface are mapped to show the traces of now vanished walls, roads, pits, and an increasing variety of other features.
2. An area suspected of containing buried information is designated as a site and then subject to *EVALUATION* to determine the best course of further action. The object of the evaluation is to supply as much information as possible to the design (which constitutes the subsequent stage). Predicting what lies under the ground is the first task, the result being reported as *deposit model*, showing the depth and character, and if possible the date, of the strata

Field Method in Archaeology: Overview, Table 1 Field work design stages, *left to right: FRP* Field Research Procedure (Carver 2009), *CRM* Cultural Resource Management (Neumann and Sanford 2001), *MAP* Management of Archaeological Projects (Andrews and Thomas 1995)

FRP	CRM	MAP
Reconnaissance	Background	
Inventory survey	Surface survey (Phase 1)	
Evaluation	Evaluation (Phase 2)	*Appraisal*
Desktop assessment		
Resource modeling		Field evaluation
Research agenda		
Project design	Memorandum of agreement	Project specification
Research programmed	Scope of work/data recovery plan	
Management programmed		
Investigation	Data acquisition (Phase 3)	Fieldwork
Analysis		*Post-excavation assessment*
Programmed design: analyses		
Publication		
Programmed design:		
Reports		
Exhibition		
Site presentation		

encountered. The research objectives and the social factors affecting further investigation are also assembled at the evaluation stage. This part of the investigation is undertaken inflicting as little damage as possible, using the techniques of *subsurface investigation*. But many sites require small-scale digging to give a preview of what lies beneath; these include *shovel testing* (small shovel sized pits), *test pits* (square pits, usually 1 × 1 m in plan), or *test trenches* (cuttings between 1 and 2 m wide) (Hester et al. 1997).

3. *DESIGN* is the principal stage of field procedure, because it is at this point that the future of an identified site is decided. The importance of design is threefold – first it determines the agreed purpose of research and its outcome; secondly it determines the desired measures for the conservation of the site; and thirdly decisions taken at the design stage are often irreversible, particularly those that involve digging. A project design is a comprehensive document that incorporates and justifies a research program, a conservation program, and a program for continuing interaction with the public and stakeholders. The research program includes costed plans for survey, excavation, building recording, their anticipated outcome, the likely program of analyses (see below), and the plans for publication. Within this program are included the sampling strategies, itemizing the number, size, and location of areas to be surveyed and excavated. The conservation program includes measures for the long-term protection and management of the resource. The program of public interaction includes plans for display of the site and for serving the requirements of local ownership.

The project design provides the basis for funding and for permissions as well as the document that shows how the academic research agenda is to be addressed. Since there are many interested parties here, not only local, it follows that in modern professional practice, the project design will be published before implementation, allowing "multi-vocal" responses from a wide constituency. These responses will be incorporated into the agreed programs confirmed by the representative and funding bodies.

Since the project design is intended as an agreed contract between the field researcher and society, it is generally not varied until it has run its course, when another agreed

program may supersede it. In some parts of the world, the old "seasonal" system still endures, whereby the archaeologist redesigns the project every year. However, this would now be considered as less ethical than conforming to an agreed design-led package. The procedure for reviewing and accepting designs is appropriate to both university research and CRM reactive fieldwork, though there will be some variations between them. For example, while both should have research and management plans, CRM will often omit plans for public display.

4. *IMPLEMENTATION* is the active execution of the agreed programs. Using *survey*, *excavation* and *building recording*, and other bundles of techniques where appropriate, the implementation stage is usually performed in intensive seasons of fieldwork, using a range of crews stretching from two or three professional surveyors to a workforce of 50 or more volunteer excavators. The business of this workforce is to execute the study of the landscape or site on the ground and create records of what was measured, seen, or sensed, together with samples of materials encountered. The strategy for *Recording and Sampling* is laid out in project design, and is determined by the research objectives and terrain (see below). Many countries have laid down standard procedures for surveying, digging, and recording, although these are not helpful when they reduce creative observation, and thus the potential of the fieldwork to generate new knowledge. Site records have evolved over the last 20 years to capture observations at a number of different levels: primary data, agreed in advance and captured on proformae (for example, context records), interpretative definitions, using common vocabulary to describe interpretations on the ground (for example, using feature records) and metadata, which record the course of the field work, the circumstances of locality and weather, the crew, interim assessments, and numerous other matters; this information is traditionally captured in journals, photographs, and audio and video files.
5. *ANALYSIS*. Records made during fieldwork are examined at the analysis stage, with a view to understanding the results. Both survey and excavation usually generate large assemblages of objects, and detailed spatial records relating to objects, contexts, and features. The three main parts of the analytical program are: assemblage, *space*, and *sequence*, which together result in a narrative of what happened in the area examined.

The *assemblage* comprises all the objects and materials that are kept for analysis. The yield of an assemblage has been greatly increased by screening (sieving) the dirt, which helps to capture small objects that may be missed. Dry soil may be dry-sieved, and wet cloddy soil wet-sieved, i.e., broken up with water. The size of the mesh depends on what we want to find and varies from 1 mm for beads and potsherds to a few microns for pollen. New science is hugely increasing the range of what we can learn from the ground, by examining microscopic remains such as seeds, pollen, insects, and residues in pots. The study of *artifacts* usually requires the determination of its fabric (what it is made of), its form (implying its use), and its style (suggesting its cultural affiliations). Routine study of *stone, metal, ceramic, wood, leather*, and *textile* objects is well developed. The biota (biological fraction of the assemblage) includes the *soil, animal* and human remains, *seeds, pollen, phytoliths*, and other plant remains and insects. Parts of the assemblage are particularly valuable for their indications of date, for example, coins, which are provided with a date of minting and circulation by *numismatics*. The single most important method of scientific dating used routinely by field archaeologists is *radiocarbon dating*, which determines the date at death of organic materials, such as wood or bone. Details of all these methods, shown in italics, will be found elsewhere in this encyclopedia.

The *use of space* is fundamental to the understanding of human activity, and is recorded on a wide range of scales – at the level of a landscape, a settlement a cemetery, a house, a room, or a hearth. Much of field archaeology is taken up with measuring location, usually in three dimensions and archaeologists produce some of the most precise and

fastidious of all land surveys. The use of space is analyzed by *plotting* objects, and *planning* features and structures. Details of the use of space inside a building may also be determined by chemical and geophysical mapping (Carver 2011, Chap. 2). The many kinds of result include the determination of activities, routeways (paths, tracks), social hierarchies (from room and house size), and sequence (by comparing alignments).

On excavated sites, the *sequence* is worked out by stratigraphy – the order that contexts and features succeeded each other in the deposit. Their relationships (which came first, which came after) are recorded on site and drawn up in comprehensive *stratification diagrams*. Archaeologists also record sample sequences by cutting a slice through a deposit and drawing the set of layers seen from the side and shown in *section*. Sequence may also be informed by absolute dates of material in the assemblage and by relationships in space (see above). Spatial analysis also plays a role in determining sequence.

Sequence, space, and assemblage together produce the site model or site narrative – our best archaeological account of events that occurred at a place. There will be more research to come – placing these events alongside others near and far, and making better sense of them in human and historical and environmental terms. In this process, a vital ally is *ethnoarchaeology*, which provides analogies from ancient practice and behavior drawn from observations made in modern communities.

6. *PUBLICATION*. Drawing on the analyses, the results of fieldwork are modeled or synthesized, and are then distributed to the people who need them. *Through different kinds of publication* in the modern profession, the range of users is considerable. CRM archaeologists have to report their findings rapidly clearly and succinctly in Client Reports. Researchers will look to outlets in journals and monographs appropriate to the research community. The public are served by exhibitions and displays supported by popular summaries. And all the records made are deposited in an archive (often digital) for the long-term curation of information for the use of future generations.

Terrain

Procedures for survey and excavation are greatly varied the world over, since the character of archaeological sites, and what we want to know from them, both vary. The geology and topography of the land, and the way it has been treated by humans (quarried, cultivated, built on) has the collective term *terrain*. In general, the terrain is the greatest influence on the way archaeological information has been captured, and thus how it can be accessed and understood through investigation. Broad flat sites with little stratification in open country can be best examined in wide areas, and their rewards are to offer comprehensive plans of a settlement or cemetery, while deeply stacked strata under a modern town is much less accessible but offers excellent accounts of historical sequence using stratification. At each site, local events will have influenced the way that archaeological strata have built up and survived. Frost or flood may crack or disperse strata. Organic materials may decay, so that structures of wood become barely visible. A waterlogged site, on the other hand, preserves wood; but if the water flows, objects may migrate out of their original layers and be redeposited in much earlier (or later) contexts. These are *processes of site formation* which deserve to be studied both in general terms and site by site (Schiffer 1987; Goldberg and Macphail 2006).

A number of case studies are given in this encyclopaedia to illustrate different responses to different challenges the world over (see "Cross-References"). From England, we have an example of *landscape mapping* applied to a favorable terrain, using surface collection and geophysics deployed as far as possible to give total coverage. *Motorway construction* in Ireland gives an example where very comprehensive coverage was again achieved, both in survey and excavation, in advance of motorway construction. Stark contrasts in terrain are provided by the struggle to investigate *permafrost sites* in Siberia and sites embraced by *jungle* in Belize (Chan). Particular site types also provoke certain kinds of practice. *Klithi* (Greece) shows an exemplary approach to rockshelters in

the 1980s, while the *Pinnacle Point* cave site is deploying advanced methods of remote sensing. Three examples show how information can be won by careful excavation from sites where stratified layers are sparse: an *upper palaeolithic floor* in Switzerland, a *Lapita settlement* in the Mariana Islands (Pacific Ocean), and a Neolithic, *linearbandkeramik settlement* in Germany.

Specially revealing sites demanding particular approaches are the well-preserved wetland *crannog*, a type of artificial island in Scotland; the *tell*, a large mound created by the decay of a long sequence of mud-brick structures (the example is from Syria); and a *terp*, artificially raised settlement mounds in the Netherlands. An alluvial site in Italy Terramara and hillforts in the *Czech Republic* likewise require their own procedure. *Human burials* are rich sources of demographic information, and need to be dug with an enhanced care. A pioneering example of a *burial mound dissection* from central Sweden included the lifting of the entire burial chamber for study in the laboratory. A *mining site in Spain* and an *urban site in New York City* show something of the ingenuity required from excavators wishing to profit to the maximum from what terrain and opportunity offer.

An example of a project mainly dedicated to building recording is seen at *Bam* in Iran, where an archaeological team was faced with the challenge of recording of the buildings of a famous historic town severely destabilized by an earthquake. Our last example is of *ethnoarchaeology* in action: a record of the Gilund potters, themselves now under threat of economic extinction.

There is archaeology in every country and every country's archaeology is of equal value to the world as a whole. There is a world agenda, which seeks to understand the stories of every land and draw general conclusions from them, and there are local agendas in which the local heritage is paramount. These tensions between the values of scientific research and the values of cultural property result in different national strategies and attitudes toward the past. The values may change through time and sometimes look outward to international goals and sometimes inward to the national social mission. There are pioneers of field archaeology who have achieved some prominence but they are usually the instruments rather than the causes of particular forms of practice. For these reasons, rather than credit selected great figures with making all the advances, we have thought it more interesting to study the circumstances in which some of the more widespread *traditions* have developed: the American, Polish, British, Scandinavian, French, Australian, Chinese, and Japanese experience is considered in a number of brief contributions.

Cross-References

- ▶ Aerial Archaeology
- ▶ American Pioneers and Traditions
- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Bam: Archaeological and Social Investigations after the Earthquake
- ▶ British Pioneers and Fieldwork Traditions
- ▶ Buildings, Archaeological Study of
- ▶ Burial Excavation, Anglo-Saxon
- ▶ Burial Mound Dissection in Sweden
- ▶ Chan: A Tropical Rain Forest Site in Belize
- ▶ Chinese Field Methods
- ▶ Crannog Investigations in Scotland
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology: Learning from Potters in Gilund
- ▶ Excavation Methods in Archaeology
- ▶ France: Field Method Origins
- ▶ Gavà Mining Site: Fieldwork
- ▶ Hillfort Investigations in the Czech Republic
- ▶ Inner Ionian Sea Archipelago: Archaeological Survey
- ▶ Japan: Field Archaeology
- ▶ Klithi Site: Excavating a Rockshelter in Northwest Greece
- ▶ Landscape Mapping at West Heslerton
- ▶ Linearbandkeramik Site Excavation
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Pacific Islands: Finding the Earliest Sites
- ▶ Permafrost Digging
- ▶ Pinnacle Point: Excavation and Survey Methods
- ▶ Polish Pioneers and Traditions
- ▶ Publication in Field Archaeology
- ▶ Recording in Archaeology

▶ Scandinavia: Field Methods
▶ Sequence and Date in Field Archaeology
▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
▶ Spatial Analysis in Field Archaeology
▶ Surface Survey: Method and Strategies
▶ Switzerland: Upper Paleolithic Living Floor Investigations
▶ Tells in Archaeology
▶ Terp Excavation in the Netherlands
▶ Terramara Santa Rosa di Poviglio Alluvial Site
▶ Urban Archaeology at Five Points

References

Andrews, G., and R. Thomas. 1995. The management of archaeological projects: theory and practice in the UK. In *Managing archaeology*, ed. M. Cooper, A. Firth, J. Carman, and D. Wheatley, 184–202. London: Taylor and Francis.
Carver, M. 2009. *Archaeological investigation*. Boca Raton: Taylor and Francis.
Carver, M. 2011. *Making archaeology happen*. Walnut Creek: Left Coast Press.
Goldberg, P., and R.I. Macphail. 2006. *Practical and theoretical geoarchaeology*. Oxford: Blackwell.
Hester, T.R., H.J. Shafer, and K.L. Feder. 1997. *Field methods in archaeology*. 7th ed. Mountain View: Mayfield Publishing Company.
Neumann, T.W., and R.M. Sanford. 2001. *Cultural resources archaeology: an introduction*. Walnut Creek: AltaMira Press.
Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico Press.

Field Schools, Archaeological

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Introduction

Although widely recognized as fundamental to the discipline, the provision of practical skills training in archaeology is currently a cause for concern, particularly in the UK, in response to continuing changes in the structure and funding of archaeological activity. A divergence has grown between training needs in the strong independent sector and the requirements of increasingly "professionalized" developer-funded units. In addition, a gulf has grown between field schools that provide training as part of an academic degree and the need for vocational training in support of a career in commercial archaeology (Aitchison 2004). Behind these issues lies a concern about the finite nature of archaeological evidence and the inevitably destructive nature of skills training "on the job." A rise in community archaeology projects funded through the Heritage Lottery Fund also represents a shift in emphasis which, despite the best intentions, has raised concerns about training needs in the light of an enthusiasm for invasive research (Thomas 2010). Despite these concerns, field schools continue to provide opportunities for people of all ages and abilities to acquire skills in the practice of archaeology and frequently also in their own personal development: the social aspects of field schools and their role in the development of the discipline as a whole should not be underestimated (Schofield 2011).

Definition

The term "Archaeological Field School" covers a wide variety of practical training opportunities, mostly but not exclusively associated with an educational institution. It may relate principally to an annual field course run by a university or college as part of an archaeology program, but in a few cases, field schools are run by independent organizations and are open to anyone who wishes to take part; assessment and accreditation are occasionally available, either through a formally recognized system or as ad hoc records of achievement.

Field schools provide training and experience in archaeological fieldwork skills, usually in the techniques of excavation, but also sometimes covering other practical skills such as topographical and geophysical survey, the recording of standing buildings and finds analysis. They are usually residential, and minimum periods of attendance may be specified. Costs can vary enormously

depending on the quality of the residential component (from "squatting" in borrowed buildings to camping, hostels, or study centers) and the degree of subsidy that might be available.

Key Issues/Current Debates/Future Directions/Examples

Field schools exist at one end of a spectrum in a discipline which has a very mixed approach to practical skills training. At the opposite end of this spectrum, excavation skills are picked up by default on projects where the overriding emphasis is on getting the job done. This need not be restricted to developer-funded projects, but the pressures of commercial archaeology are often perceived as running counter to any substantial training input. "Training excavations" exist somewhere in the middle of the range of training opportunities, with more or less priority being given to instruction while ensuring that progress overall is not unduly delayed. The majority of university-based undergraduate field experience falls into this category, with students working on excavations in support of the research goals of staff or postgraduates. The quality of training provided in these circumstances may be highly variable, with some excellent reports but also a less than satisfactory learning experience in some cases as reported in a recent survey (Croucher et al. 2008: 30).

Currently, there is little coherence to the provision of training in practical archaeological skills through field schools, despite the development of National Occupational Standards as a benchmark for vocational training by the Archaeology Training Forum (2007). University-based field schools are more likely to adhere to their own internal accreditation requirements, and with a general maximum period of 4–6 weeks spent on fieldwork training, this element is in practice a relatively minor component of a 3-year degree program (Everill and Nicholls 2011). Concerns within the HE sector focus on the impact of the introduction of tuition fees and students' abilities to support themselves financially, with previous years being presented as a "Golden Age" for fieldwork training (ibid. 8). Although most HE institutions provide some form of financial support, there are concerns about the ability of students in the future to meet the extra costs usually implicit in attending a Field School and the conflict with increasing pressures to obtain paid employment during the summer vacation or to uphold existing commitments to part-time employment.

Fieldwork training has, in the past, been the focus of some notable field schools or dedicated training excavations, and university extramural departments (more recently re-branded as continuing education) have made a major contribution. Among the most significant of the early training excavations were those run by Philip Barker at Wroxeter in the late 1970s/early 1980s for Birmingham University Extramural Department. These field courses have epitomized the spirit of university extramural teaching, being open to all and providing the highest quality of instruction. They have inevitably suffered as a consequence of changing patterns in university-based adult education, and the disappearance of this active support structure is of great concern (Lee 2009).

Other field schools in the UK have been run by organizations outside the formal education system; early examples include excavations at Bryn y Castell run by the Snowdonia National Park, at Strageath run by the Scottish Field School of Archaeology, and residential courses run at the Kindrogan Field Center. In many cases these have been inspired by the presence of individual archaeologists within these organizations, but recent economic trends have tended to curtail these opportunities significantly as the jobs supporting them have been cut back. In some cases, however, new training opportunities are being developed, for example, through the Dales Heritage Field School run by the Yorkshire Dales Landscape Research Trust (http://ydlrt.co.uk), which was created following the closure of the School of Continuing Education at the University of Leeds. The Kent Archaeological Field School (www.kafs.co.uk) is another independent organization which has now been offering a wide variety of training opportunities for 10 years.

A major strand which is increasingly taking up the role of providing "on-the-job" training and practical experience arises from the strong tradition in the UK of public or community archaeology, organized by local archaeological societies and more recently by community groups with funding

from the Heritage Lottery Fund. Some local society projects have been set up as field schools, and "learning" and "participation" are two key themes for HLF-funded projects. The training needs in these circumstances are many and varied – some archaeological societies have developed a wealth of in-house expertise which can be passed on to new members, while HLF funding supports the contracting-in of specialist expertise and "mentors." However, major concerns have been expressed with this type of project-specific funding (Thomas 2010), including the ability of groups to maintain activities in the long term and the lack of progression routes by which people can continue to develop their skills outside an increasingly expensive formal education system.

Practical experience in archaeological fieldwork skills can increasingly be acquired through field schools that recognize the widespread public interest in the past and are happy to welcome absolute beginners. Opportunities to suit a wide range of interests and pockets can be found through websites such as the directory of digs published by the popular magazine *Current Archaeology* (http://digs.archaeology.co.uk), the regular briefings published by the Council for British Archaeology (http://www.britarch.ac.uk), and on a worldwide basis through organizations such as the American Anthropological Association (http://www.aaanet.org/profdev/fieldschools/) or ShovelBums (http://www.shovelbums.org/index.php?option=com_sobi2&Itemid=100). All of these organizations provide directory listings and disclaimers about the actual experience and quality of training on offer: it remains to be seen whether field schools can build on current foundations to develop a more coherent approach towards training in the essential practical skills of archaeology.

Cross-References

- ▶ Avocational Archaeology
- ▶ Clubs and Societies Promoting Archaeology (National and Local)
- ▶ Community Archaeology
- ▶ Volunteers in Archaeology

References

Aitchison, K. 2004. Supply, demand and a failure of understanding: Addressing the culture clash between archaeologists' expectations for training and employment in 'academia' versus 'practice'. *World Archaeology* 36: 203–219.

Archaeology Training Forum. 2007. National occupational standards in archaeological practice. Available at: http://www.torc.org.uk/index.asp. Accessed Aug 2011.

Croucher, K., H. Cobb, and A. Brennan. 2008. *Investigating the role of fieldwork in teaching and learning archaeology*. Liverpool: HE Academy's Subject Centre for History, Classics and Archaeology. Available at: http://www.heacademy.ac.uk/hca/archaeology/fieldwork. Accessed Aug 2011.

Everill, P., and R. Nicholls. 2011. *Archaeological fieldwork training: Provision and assessment in higher education*. Liverpool: HE Academy's Subject Centre for History, Classics and Archaeology. Available at: http://www.heacademy.ac.uk/hca/resources/detail/Arch_Resource_Fieldwork_Training_Everill_Nicholls. Accessed Aug 2011.

Lee, R. 2009. *Engaging with the historic environment: Continuing education*. York: Council for British Archaeology. Available at: http://www.britarch.ac.uk/sites/festival.britarch.ac.uk/files/node-files/EHE%20CE%20Report%202009_Draft%201.0.pdf. Accessed Aug 2011.

Schofield, J., ed. 2011. *Great excavations: Shaping the archaeological profession*. Oxbow Books: Oxford.

Thomas, S. 2010. *Community archaeology in the UK: Recent findings*. York: Council for British Archaeology. Available at: http://www.britarch.ac.uk/research/community. Accessed Aug 2011.

Field Stabilization of Immovable Heritage

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Introduction

In recent decades, conservation professionals have been increasingly involved in field excavations in order to stabilize materials during the critical moment when they are most susceptible to rapid and severe deterioration due to the radical change in the environment from buried to exposed

states. While it is more common for archaeological objects removed from a site to be subject to stabilization treatments during the excavation process, similar measures are now more frequently being planned and carried out in the field also on immovable heritage, namely, the architectural remains of a site, and the site itself, to prevent their deterioration or loss. Both preventive conservation measures and remedial interventions to stabilize sites during excavation, followed by monitoring and maintenance programs, are essential components of conservation and management planning for archaeological sites (Fig. 1).

Definition

In situ stabilization interventions, whether they are remedial treatments to correct damage or preventive measures to limit future deterioration and whether they are carried out during or long after the site's excavation, can encompass temporary or emergency measures, as well as complete and planned conservation programs. The variety of intervention options should be undertaken in the context of site-wide conservation and management planning and, on the basis of an assessment of condition, significance and degree of exposure (risk) of all site remains. Site assessments and conservation intervention planning involve professionals from different disciplines in addition to archaeology, such as architects, engineers, and conservators, as well as from allied fields such as soil science and hydrology. All stabilization interventions, whether they address deterioration at a structural level or on surfaces, should follow the conservation principles of documentation, reversibility, and minimum intervention to preserve the physical integrity and authenticity of sites. An effective and increasingly practiced preventive measure to stabilize sites and their excavated

Field Stabilization of Immovable Heritage, Fig. 1 Preventive measures to stabilize and protect sites: temporary seasonal covering to protect an excavated pavement (foreground), wall capping intervention to stabilize and protect wall tops, and a permanent shelter to protect decorative surfaces (background). (Photo: Livia Alberti, J. Paul Getty Trust)

remains is reburial. Yet it remains an option that is often considered as a last resort rather than an essential tool to preserve our archaeological heritage.

Key Issues/Current Debates/Future Directions/Examples

Reburial and Other Preventive Measures to Stabilize Sites

The creation of the professional journal "*Conservation and Management of Archaeological Sites*" (James and James, then Maney) in 1995 has played a significant role in drawing attention to site stabilization by greatly expanding the literature focused on conservation activities on archaeological sites. One of the journal issues has published the proceedings of an international colloquium on the reburial of archaeological sites (Stanley-Price and Burch 2004), an important preventive stabilization intervention option but a controversial one still among many archaeologists and national authorities. The introductory paper of the colloquium provides a general argument for the reburial of archaeological sites by examining the rationales for reburial, and the objections to it, while taking into consideration stakeholder, technical, and management needs (Demas 2004). Despite the convincing rationale and motivations for reburial, tourism, political pressures, and archaeological constituencies can still work against the conservation and management needs of a site, as one of the better-known case studies of site stabilization through reburial, the Laetoli Hominid Trackway site, revealed (Demas and Agnew 2006). In this case, the site is regrettably being pushed by the national authority to be uncovered and presented to the public, despite its remote location.

Without the institution of national policies to rebury sites or parts of sites, while presenting to the public those sites or parts thereof where the resources are available to protect and maintain them, more and more of our archaeological heritage will be lost (Caple 2000). Part of raising awareness about reburial as a conservation option is the need to document the positive results of reburial and to learn from the mistakes of past practice (Roby et al. 2010). Reburials have often been carried out in an ad hoc manner without sufficient planning and understanding of the type of new reburial environment to be created or the properties of the materials used, either fill materials or separation membranes. Lack of subsequent maintenance of reburials has also contributed to their poor performance in some cases. Yet experience has shown that when properly designed and executed (Fig. 2), the cost of maintenance of a site or site element is significantly reduced after

Field Stabilization of Immovable Heritage, Fig. 2 Preventive measures to stabilize and protect sites: an example of a reburial regime for an excavated pavement using a fill layer of sand, a separation membrane, and a covering layer of gravel to inhibit weed growth. (Photo: Thomas Roby, J. Paul Getty Trust)

reburial, which more than compensates for the initial cost of the reburial (Roby et al. 2014). A recent review of the literature on the reburial of mosaics in particular provides a summary of many of the issues pertinent to the reburial of sites in general (Roby and Demas 2012b).

In addition to reburial, there are a number of other preventive conservation measures that can be employed to stabilize sites and protect them from a variety of environmental causes of deterioration (Corfield 1996a; Stewart 2013).

Landscape stabilization measures, such as the installation of geogrids or nets, slope modification, and pinning, as well as revegetation can be used to prevent slope erosion, either soil or rock, and balk erosion.

Water management measures, such as dikes or diversion walls and drainage channels and pits, can be carried out to prevent damage from flooding and to evacuate water from sites when it accumulates. Shelters can also be constructed to prevent water erosion and flooding of elements of sites. In recent decades, shelters have been increasingly employed to mitigate the principal cause of deterioration of ancient monuments and excavated sites – water. They also provide shade which can create a more stable environment and at the same time can positively affect visitor comfort and site interpretation. However, if not designed in response to design criteria regarding the new sheltered environment, a shelter can adversely affect the conservation of a site. The causes of deterioration to the site that a shelter aimed to address can be exacerbated, and new unforeseen causes of deterioration can be created by shelters. For example, by concentrating rainwater at the perimeter of a shelter, erosion and salt crystallization phenomena can be worsened by a shelter if not designed with adequate drainage measures.

If shelters are to perform their primary purpose of protection, the architect designing a shelter needs to work with other disciplines and conservation professionals and be provided with and respond to a conservation brief with specific performance criteria coming from an assessment of the site and collection of local environmental data (Demas 2001; Stanley-Price and Matero 2001; Roby and Demas 2012a).

In addition, other preventive measures, such as regular maintenance and revegetation, can be employed to control vegetation and prevent site damage from plant and tree root growth.

Limiting access by animals, whether they burrow, graze, or roost, such as by exclusionary fencing or netting or by altering their habitat, can also prevent damage to sites.

Remedial Interventions to Stabilize Sites

Although preventive conservation measures should be considered first in any site conservation and management planning before, during, and after the excavation process, remedial interventions also play a major role in stabilizing sites. These interventions should be limited to the minimum required to re-establish structural integrity of the site or site element.

Another key conservation principle to follow in planning site stabilization interventions is the use of appropriate, compatible materials which are also capable of being removed at a later date without causing damage to the original material.

In the past, inexpensive modern materials, such as reinforced concrete and cement, have often been used to stabilize site elements, which over time have led to accelerating deterioration of the adjacent original material, due to their very different physical/chemical and mechanical properties. The original materials should be identified and their basic properties assessed in order to identify the most compatible repair material, which in general will be as similar to the original material as possible, whether the site elements are constructed of masonry bonded with lime or gypsum mortars or of earthen materials.

Prior to undertaking any stabilization interventions, recording should be carried out to document both the condition of the site or site element and the interventions themselves. This recording will be critical to effective monitoring and maintenance in the future (Corfield 2003).

Interventions can be grouped by those carried out to stabilize the structure of an element and those to stabilize the surface. Structural interventions on site elements, which generally consist of masonry structures but also rock-cut or earthen materials, include filling of areas of loss with

Field Stabilization of Immovable Heritage, Fig. 3 Remedial interventions to stabilize sites: structural repair of an architectural element using multiple carbon fiber strapping around the architrave blocks and a tie beam inserted above them. (Photo: Livia Alberti, J. Paul Getty Trust)

like material; grouting of deep voids and fractures with mortar; insertion of structural pins, ties, or bolts, or the use of strapping, to keep elements together (Fig. 3); and application of a layer of mortar or earth as a protective capping for wall tops.

Stabilization of surfaces, sometimes of a decorative nature, carved stone, stucco, wall painting, and mosaics, to mention a few, includes filling of areas of loss with like material, micro-grouting of voids behind the surface (Fig. 4), and mortar edging repairs to contain and protect areas adjacent to loss. Friable surfaces can also be stabilized with the application of consolidant materials, often synthetic in nature, both inorganic and organic. Consolidation treatments will change the properties of the treated material and will generally not be reversible and will affect the retreatment of materials, so such treatments should be undertaken by professionally trained conservators or specially trained architects (Stewart 2013).

In principle, remedial interventions should employ materials that are reversible, namely, that can be removed at a later date without causing damage to the original material. For this reason, and also due to their compatibility with most ancient porous building materials, lime- or earth-based mortars are generally preferred for most

Field Stabilization of Immovable Heritage, Fig. 4 Remedial interventions to stabilize sites: stabilization of a mosaic surface through grouting with lime-based liquid mortar. (Photo: Sebastiaan Godts, J. Paul Getty Trust)

treatments of architectural elements. For certain structural repairs, however, drilling into a material for the insertion of reinforcement elements, like pins, may be needed, as well as structural adhesives which are generally not reversible (Ashurst 2007). In such cases, intervention layers of a reversible material or adhesive may be applied between the original material and irreversible material to make the operation less irreversible.

Cleaning is an operation which is generally carried out before stabilization interventions in order to insure a successful treatment, as soil or dust present on or below surfaces will prevent the proper adhesion of mortars or other repair materials. Otherwise, cleaning with the aim simply of making the surfaces more visible should be avoided unless the presence of an accretion or film is helping to provoke the deterioration of the surface.

Levels of Intervention

Whether preventive or remedial, there are basically three levels of intervention that can be undertaken. First-aid or emergency treatments represent the first level, which aim to quickly prevent loss or collapse of site or architectural elements until sufficient time and funding are available to plan and implement a more complete conservation program for their long-term stabilization. For preventive measures, such interventions include temporary reburial or sheltering, while for remedial interventions, first-aid treatments could consist of shoring or propping of structures or balks. Regarding decorative surfaces of structures on site, facing with a tissue or fabric and a reversible adhesive or protecting broken edges from loss with mortar edging repairs can be considered part of this first level of intervention.

While publications exist which address this level of intervention for archaeological objects or movable heritage (see the entry on ▶ Field Stabilization of Movable Heritage in this encyclopedia), there are no similar texts addressing emergency treatments of immovable heritage. However, there are articles in the conservation literature which report on emergency treatments carried out during excavations, demonstrating that increasingly conservation professionals are present during excavation, not only those with training in objects conservation but also those with training in architectural and site conservation.

The second level of intervention is complete conservation treatment, which ideally should be based on a thorough condition assessment of the site, including both the characterization of constituent materials and their properties and the identification of prevailing causes of deterioration. An example of a preventive measure at this level of intervention would be the installation of new drainage systems for rainwater at a site or the cleaning of the ancient drainage system to make it functional again. The various remedial stabilization treatments mentioned above, both structural and superficial ones, are considered part of the conservation process and should be carried out in a management framework to stabilize and protect the site and its elements.

The third level is restoration or reconstruction, which aims to go beyond the minimum intervention required to stabilize the element and instead to add new material to the original in order to complete the element and render it more understandable to the visitor. This level of intervention has frequently been carried out in the past on archaeological sites. Some would argue that, if the interventions of restoration or reconstruction are well-documented to international standards, and therefore what is not original material is recognizable in the future by consulting the documentation, these types of intervention should be acceptable. However, this level of intervention is not consistent with recent and current international conservation charters and guidelines because it compromises the authenticity of the site or element (Jokilehto 2006) and can provoke damage to the original material over time.

Maintenance and Monitoring

All stabilization interventions, particularly those carried out in uncontrolled environments on sites, require monitoring of condition followed by maintenance operations as needed in order for the interventions to continue to be effective. Depending on the aggressive nature of the environment and the fragile nature of the site or its elements, the frequency of condition inspections will vary. Maintenance operations can consist of

vegetation removal, repair of previous stabilization interventions, repair of new areas of damage or loss, and repair of protection interventions such as shelters, reburials, or barriers. These operations require trained if not professional personnel and a consistently applied methodology of documentation of both inspections and interventions in order to determine the required interval of maintenance cycles to avoid future deterioration. An example of such a methodology has been developed recently for the training of technician-level personnel for the maintenance of mosaics on archaeological sites (Alberti et al. 2013) (Fig. 5), but the methodology could be adapted and applied for the maintenance of a variety of site elements to ensure that they are regularly and sufficiently inspected and kept in stable condition.

Field Stabilization of Immovable Heritage, Fig. 5 Maintenance and monitoring: documented regular inspections followed by remedial repairs with compatible lime-based mortars, as needed, will keep excavated site remains in stable condition. (Photo: Elsa Bourguignon, J. Paul Getty Trust)

Cross-References

- ▶ Architectural Sites: Monitoring
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Documentation of Treatment and Intervention in Archaeological Conservation and Preservation
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Field Stabilization of Movable Heritage
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Mosaics: Conservation and Preservation
- ▶ Stone Treatments in Archaeological Conservation and Preservation
- ▶ Stone: Preservation and Conservation
- ▶ Trackways in Archaeological Conservation and Preservation
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Alberti, Livia, Elsa Bourguignon, and Thomas Roby. 2013. *Technician training for the maintenance of in situ mosaics*. 2011th ed. Los Angeles: Getty Conservation Institute and Tunis: Institut National du Patrimoine. http://hdl.handle.net/10020/gci_pubs/tech_training_english.

Ashurst, John, ed. 2007. *Conservation of ruins*. Oxford: Butterworth-Heinemann.

Caple, Chris. 2000. *Conservation skills: Judgement, method and decision making*. New York: Routledge.

Corfield, Mike. 1996a. Preventive conservation for archaeological sites. In *Preprints of the contributions to the Copenhagen Congress, 26–30 August 1996: Archaeological conservation and its consequences*, Studies in Conservation 41 (Supp1), ed. Ashok Roy and Perry Smith, 32–37. London: International Institute for Conservation of Historic and Artistic Works.

Corfield, Mike. 2003. A framework for the documentation of in situ mosaic conservation projects. In *Mosaics make a site: The conservation in situ of mosaics on archaeological sites: VIth Conference of the International Committee for the Conservation of Mosaics, Nicosia, Cyprus, 24-28 October 1996 = Mosaïques, âme d'une site: La conservation in situ des mosaïques sure les sites archéologiques, VIiéme conférence du Comité international pour la conservation des mosaïques, Nicosie, Chypre, 24-28 octobre 1996*, ed. Demetrios Michaelides, 123–48. Rome: International Committee for the Conservation of Mosaics.

Demas, Martha. 2001. Annotated bibliography on protective shelters for archaeological sites. *Conservation and Management of Archaeological Sites* 5 (1–2): 91–105.

Demas, Martha. 2004. "Site unseen": The case for reburial of archaeological sites. *Conservation and Management of Archaeological Sites* 6 (3–4): 137–154.

Demas, Martha, and Neville Agnew. 2006. Decision making for conservation of archaeological sites: The example of the Laetoli Hominid trackway, Tanzania. In *Of the past, for the future: Integrating archaeology and conservation, proceedings of the conservation theme at the 5th World Archaeological Congress, Washington, D.C., 22–26 June 2003*, Getty Conservation Institute Symposium Proceedings Series, ed. Neville Agnew and Janet Bridgland, 64–72. Los Angeles: Getty Conservation Institute. http://www.getty.edu/conservation/publications_resources/pdf_publications/of_past_for_future.html.

Jokilehto, Jukka. 2006. Considerations on authenticity and integrity in world heritage context. *City & Time* 2 (1): 1–16. http://www.ceci-br.org/novo/revista/docs2006/CT-2006-44.pdf.

Roby, Thomas, and Martha Demas. 2012a. Protective shelters for archaeological sites. In *Mosaics in situ: An overview of the literature on conservation of mosaics in situ*. Los Angeles: Getty Conservation Institute. http://hdl.handle.net/10020/gci_pubs/lit_review.

Roby, Thomas, and Martha Demas. 2012b. Reburial and protective covering of mosaics. In *Mosaics in situ: An overview of the literature on conservation of mosaics in situ*. Los Angeles: Getty Conservation Institute. http://hdl.handle.net/10020/gci_pubs/lit_review.

Roby, Thomas, Livia Alberti, and Aïcha Ben Abed. 2010. A preliminary assessment of mosaic reburials in Tunisia. In *Conservation and the eastern Mediterranean: Contributions to the Istanbul Congress, 20–24 September 2010*, Studies in Conservation 55 (Suppl. 2), ed. Christina Rozeik, Ashok Roy, and David Saunders, S207–S213. London: International Institute for Conservation of Historic and Artistic Works.

Roby, Thomas, Livia Alberti, Aïcha Ben Abed. 2014. Costs and benefits of in situ mosaic conservation: An analysis of technician training and conservation work in Tunisia 2001–2008. In *10a Conferenza del Comitato Internazionale per la Conservazione dei Mosaici (ICCM) = The 10th Conference of the International Committee for the Conservation of Mosaics (ICCM): La conservazione: Uno strumento di conoscenza = Conservation: An act of discovery [Palermo, Italy, October 20-26, 2008]*, ed. D. Michaelides, A.-M. Guimier-Sorbets and R. Nardi, 284–95. Palermo: Centro Regionale per la Progettazione e il Restauro.

Stanley-Price, Nicholas, and Rachel Burch. 2004. Special issue on site reburial. *Conservation and Management of Archaeological Sites* 6 (3–4).

Stanley-Price, Nicholas, and Frank Matero. 2001. Special issue on protective shelters. *Conservation and Management of Archaeological Sites* 5 (1–2).

Stewart, John. 2013. The stabilization and protection of archaeological sites from natural processes. In *Conservation of cultural heritage in the Arab region: Issues in the conservation and management of heritage sites*, ed. Zaki Aslan, 91–99. Rome: ICCROM and Sharjah: ATHAR Programme (Conservation of Cultural Heritage in the Arab Region). http://athar-centre.org/wp-content/uploads/2013/11/ICCROM_book_rola-Revised-Final-lores-for-web.pdf.

Further Readings

Adam, Jean Pierre, and Anne Bossoutrot. 1990. Restauration architecturale et préservation des sites archéologiques. In *La Conservation en archéologie: Méthodes et pratique de la conservation-restauration des vestiges archéologiques*, ed. M.C. Berducou, 333–366. Paris: Masson.

Agnew, Neville, and Janet Bridgland, eds. 2006. *Of the past, for the future: Integrating archaeology and conservation, proceedings of the conservation theme at the 5th World Archaeological Congress, Washington, D.C., 22–26 June 2003*. Los Angeles: Getty Conservation Institute. http://www.getty.edu/conservation/publications_resources/pdf_publications/of_past_for_future.html.

Barnard, H., W.Z. Wendrich, A. Winkels, J.E.M.F. Bos, B.L. Simpson, and R.T.J. Cappers. 2016. The preservation of exposed mudbrick architecture in Karanis (Kom Aushim), Egypt. *Journal of Field Archaeology* 41 (1): 84–100.

Caple, Chris. 2016. *Preservation of archaeological remains in situ*. New York: Routledge.

Cassar, J., M. Galea, R. Grima, K. Stroud, and A. Torpiano. 2011. Shelters over the megalithic temples of Malta: Debate, design and implementation. *Environmental Earth Sciences* 63 (7–8): 1849–1860.

Charnov, Avigail A. 2011. 100 years of site management and repair: Conservation of earthen archaeological sites in the American Southwest. *Journal of Architectural Conservation* 17 (2): 59–75.

F

Corfield, M.C. 1996b. *Preserving archaeological remains in situ: Proceedings of the conference of the 1st–3rd April 1996*. London: Museum of London Archaeology Service.

Demas, Martha, ed. 2003. *Conservation and management of archaeological sites: Select annotated bibliography*. Los Angeles: Getty Conservation Institute. http://hdl.handle.net/10020/gci_pubs/conserv_mngmnt_arch_sites_biblio.

Doumas, Christos G. 2013. Managing the archaeological heritage: The case of Akrotiri, Thera (Santorini). *Conservation and Management of Archaeological Sites* 15 (1): 109–120.

Feilden, Bernard M., and Jukka Jokilehto. 1998. *Management guidelines for world cultural heritage sites*. 2nd ed. Rome: ICCROM.

Godts, Sebastiaan, Roald Hayen, and Hilde De Clercq. 2014. Grouting mortars for fragmented bricks and repair mortars for tiles in the archaeological site Coudenberg. *Conservation and Management of Archaeological Sites* 16 (1): 85–98.

Gregory, D., and H. Matthiesen, eds. 2012. The 4th International Conference on Preserving Archaeological Remains In Situ (PARIS4): 23–26 May 2011, the National Museum of Denmark, Copenhagen Special issue. *Conservation and Management of Archaeological Sites* 14 (1–4).

Henry, Alison, and John Stewart, eds. 2012. *Practical building conservation: Mortars, renders and plasters, practical building conservation*. Farnham: Ashgate Publishing.

Historic England. 2016. *Preserving archaeological remains: Decision-taking for sites under development*. Swindon: Historic England. https://historicengland.org.uk/images-books/publications/preserving-archaeological-remains/.

ICAHM Comité international de gestion du patrimoine archéologique de l'ICOMOS. 1996. *Vestiges archéologiques, la conservation in situ: Actes du deuxième Colloque international de l'ICAHM, Montréal, Québec, Canada, 11–15 octobre 1994 = Archaeological remains, in situ preservation: Proceedings of the Second ICAHM International Conference, Montréal, Québec, Canada, October 11–15, 1994* Ottawa, Ont.: Publication de l'ICAHM = ICAHM Publication.

ICOMOS. 1964. International charter for the conservation and restoration of monuments and sites (The Venice Charter 1964). http://www.icomos.org/charters/venice_e.pdf.

ICOMOS. 1990. Charter for the protection and management of the archaeological heritage. http://www.icomos.org/images/DOCUMENTS/Charters/arch_e.pdf.

ICOMOS. 1994. The Nara document on authenticity. http://www.icomos.org/charters/nara-e.pdf.

Jones, Kevin L. 1994. *Archaeological site stabilisation and reconstruction in the United States: Winston Churchill memorial fellowship report 1993*, Science & Research Internal Report, no. 145. Wellington: Head Office, Dept.4 of Conservation. http://www.doc.govt.nz/documents/science-and-technical/SRIR145.pdf.

Kars, Henk, and Robert M. van Heeringen, eds. 2008. *Preserving archaeological remains in situ: Proceedings of the 3rd conference 7–9 December 2006, Amsterdam, Geoarchaeological and bioarchaeological studies*. Amsterdam: Institute for Geo and Bioarchaeology, VU University.

Letellier, Robin, Werner Schmid, and François LeBlanc. 2007. *Recording, documentation, and information management for the conservation of heritage places: Guiding principles*. Los Angeles: Getty Conservation Institute. http://hdl.handle.net/10020/gci_pubs/recordim.

Leuzinger, Urs, Jane Sidell, Tim Williams, eds. 2016. The 5th International Conference on Preserving Archaeological Remains In Situ (PARIS5): 12–17 April 2015, Kreuzlingen (Switzerland) Special issue. *Conservation and Management of Archaeological Sites* 18 (1–3).

Lim, Alex B., Frank G. Matero, and Michael C. Henry. 2013. Greening deterioration: Soft capping as preventive conservation for masonry ruin sites. *APT Bulletin* 44 (2–3): 53–61.

Lourenço, P.B. 2006. Structural restoration of monuments: Recommendations and advances in research and practice. In *Proceedings of the First International Conference on Restoration of Heritage Masonry Structures: Cairo, Egypt, April 24–27, 2006*. Cairo: Supreme Council of Antiquities. http://hdl.handle.net/1822/6512.

Matero, Frank. 2006. Loss, compensation and authenticity in architectural conservation. *Journal of Architectural Conservation* 12 (1): 71–90.

Nickens, Paul R. 1999. Technologies for in-place protection and long-term conservation of archaeological sites. In *Science and technology in historic preservation*, Advances in Archaeological and Museum Science, ed. Ray A. Williamson and Paul R. Nickens, vol. 4, 309–332. New York: Kluwer Academic/Plenum.

Nixon, Taryn, ed. 2004. *Preserving archaeological remains in situ? Proceedings of the 2nd conference, 12–14th September 2001*. London: Museum of London Archaeology Service.

Pedeli, Corrado, and Stefano Pulga. 2013. *Conservation practices on archaeological excavations: Principles and methods*. Trans. E. Risser. Los Angeles: Getty Conservation Institute.

Pesaresi, Paola, and Monica Martelli Castaldi. 2007. Conservation measures for an archaeological site at risk (Herculaneum, Italy): From emergency to maintenance. *Conservation and Management of Archaeological Sites* 8 (4): 215–236.

Sassu, Mauro, Marco Andreini, Claudia Casapulla, and Anna De Falco. 2013. Archaeological consolidation of UNESCO masonry structures in Oman: The Sumhuram citadel of Khor Rori and the Al Balid fortress. *International Journal of Architectural Heritage: Conservation, Analysis, and Restoration* 7 (4): 339–374.

Sullivan, Sharon. 1997. A planning model for the management of archaeological sites. In *The conservation of archaeological sites in the Mediterranean region: Report on an international conference, 6–12 May 1995*, ed. Marta de la Torre, 15–26. Los Angeles: Getty Conservation Institute. http://www.getty.edu/conservation/publications_resources/pdf_publications/conserv_sites_mediterranean.html.

Sullivan, Sharon, and Richard Mackay, eds. 2012. *Archaeological sites: Conservation and management, readings in conservation*. Los Angeles: Getty Conservation Institute.
Sweek, Tracey, Julie R. Anderson, and Satoko Tanimoto. 2012. Architectural conservation of an Amun Temple in Sudan. *Journal of Conservation & Museum Studies* 10 (2): 8–16.
Torraca, Giorgio. 2009. *Lectures on materials science for architectural conservation*. Los Angeles: Getty Conservation Institute. http://hdl.handle.net/10020/gci_pubs/materials_science_architectural_conserv.

Field Stabilization of Movable Heritage

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Introduction

The conservation of sites and artifacts is an integral and important part of the archaeological process. Conservation has a role to play in the elucidation of the site and of the material recovered from it, and the process often starts with field stabilization and even before that with the planning process.

Definition

Field stabilization (also often referred to as "first aid for finds") aims to prevent objects from deteriorating both chemically and physically by using correct lifting, recovering, packaging, transportation, and storage procedures. Not all objects require intensive conservation treatment in a lab-based setting, but all objects require field stabilization.

Key Issues/Future Directions

During burial, objects are prone to biological, chemical, and physical decay. They are affected by a number of environmental factors including the following: the presence of water and oxygen, the degree of acidity or alkalinity, the temperature and redox potential (oxidative or reductive power of the environment), the depth of the soil overburden, the presence or absence of salts, their proximity to other objects and the materials from which those objects are made, and the condition of the object before it was buried. Organic materials, for example, may totally disappear in damp aerated soils but survive beautifully in anaerobic conditions (such as waterlogged deposits), in very dry conditions (such as the Southwestern United States or the Near East), and in close proximity to certain metals and their alloys (due to the toxicity of these materials to many microorganisms) (Chen et al. 1998). Unfortunately, the physical and chemical integrity of an object can be severely affected, while the object itself continues to look much the same. An example of this is waterlogged wood. The cellulose and hemicellulose in the wood are easily lost, leaving behind a fragile lattice of lignin that can collapse on drying, resulting in dramatic dimensional changes unless something is done to stabilize the wood. Another example are metal artifacts where salts absorbed during burial can contribute to the rapid corrosion of the metal once it is excavated.

Most objects deteriorate rapidly when they are first buried. Those that survive do so because they reach equilibrium with the burial environment; their deterioration progresses to a certain point and then either stops or drastically slows to a more sustainable rate. Once these artifacts are excavated, they are subjected to a new environment, which may be radically different from the burial environment, and they begin to deteriorate again unless a new equilibrium can be reached. The goal of field stabilization therefore is to move the object to a new state of equilibrium. This can be achieved by recreating aspects of the burial environment, for example, keeping waterlogged materials wet. Or it may be achieved by creating an entirely new environment, for example, using materials such as the Escal film® and the Revolutionary Preservation System®, to create very dry, oxygen-free environments aimed at preventing iron from corroding further, prior to more interventive forms of treatment (Mathias et al. 2004).

Occasionally objects cannot be removed from the ground safely without the application of an external support. This may be necessary because of the size of an object and the condition of the piece or to maintain the associations between multiple related components until there is more opportunity to understand them. Support may take the form of a consolidant that is applied directly to the object to help strengthen it internally, or it may take the form of an external support such as plaster bandages, steel lifting frames, or even freezing the object and the soil around it and lifting it as a block. The term "lifting" is most frequently used to denote a situation where an object is removed from its context after a support has been added.

There are several important points to consider prior to lifting any object. Lifting is a temporary stabilization technique that mandates future work on an object in order for it to be studied, exhibited, and understood. It is important to be clear as to why the object is being lifted and what will happen to it afterward. Museum storage units are littered with objects that have been lifted but never excavated or worked on further, either because interest or funding evaporated. It is best to have a plan in place that includes who will do the post-lift work, when the work will occur, what the end goals of the work are, and how it will be funded. If this is not in place and it is at all possible, it is better to rebury the object and return to it once suitable arrangements have been made. If the decision is made to lift an object, it is important to remember that excavation conditions are seldom ideal. In the field, it is rarely possible to get an object clean enough for study or exhibit. Further work will be needed to clean the object, provide permanent support for it, and stabilize it for the long term. The consolidants or supports applied in the field may need to be removed during this process and new ones applied. It is important to think about the reversibility (or removability) of the materials being used. Some materials are easily removed, while others, such as epoxy resins, can rarely be removed successfully. It should be noted that even when a consolidant is reversed, small amounts are almost always left behind, often in cracks or pores. These trace remnants can affect later analysis, so if analysis is planned, it is best to sample the piece before any consolidation is undertaken.

Documentation is an important part of the field stabilization process, and there are a number of forms it can take, including but not limited to written documentation, photography, and three-dimensional scans. It is important to document the actions taken and the materials used as thoroughly as possible, as they can impact both future treatment and analysis. It is much easier and less time-consuming for a conservator to reverse a consolidant if she/he knows what it is and does not have to test all the possible materials it could be. Similarly, a scientist wishing to analyze certain materials may be able to use an object's treatment history to determine which objects are suitable (or not) for analysis. For these reasons, conservation documentation should be integrated into the main excavation archive. Additionally, if field stabilization or later conservation has occurred, it should be noted and summarized in the overall project publication.

Planning is a key component of any form of field stabilization. There are three models that are often adopted for the involvement of conservation on a site. The first is to have the conservator working on the site full time; the second is to have a conservator on call who can visit the site frequently and help stabilize fragile materials, and the third is to have a member of the team who oversees the welfare of the finds with advice from a conservator. In this last scenario, the conservator may only visit the site for emergencies and complex conservation problems, or if the site is remote, all stabilization activities may be carried out by a member of the excavation staff. The choice of which level of involvement is appropriate for the site should, ideally, be made in conjunction with a conservator and should consider factors beyond the mere budget implications of each scenario; for example, thought should be given to what sort of artifacts are likely to be recovered, the conditions they are likely to be recovered from, the size of the excavation, whether a conservation lab is available near the site, and what the conservation capacity of the receiving institution or museum is. The more thought is given to these matters up front, the more successful the outcomes are likely to be. Field situations are unusual – no site ever presents the same exact problems as another site – and stabilization activities can be hampered

by additional constraints, such as weather and the availability of products or materials.

In some ways, field stabilization is one of the more conservative aspects of archaeological conservation, a fact which is reflected in the literature on the topic. This is due in part to the variables in sites, artifact materials and condition, and the availability of stabilization materials; what worked beautifully in one location may be less successful at another site or difficult to replicate. Additionally, field stabilization labs are often quite basic, and few are furnished with the equipment necessary to scientifically test new materials, a prerequisite for publishing in most conservation journals. As a result, many of the newest developments in the field are focusing on documentation techniques, particularly 3D scanning (Karas et al. 2010; Logan et al. 2010) and the application of 3D computed tomography to visualize archaeological objects in blocks of soil (Stelzner et al. 2010). This is a trend that is likely to continue as these imaging techniques become more powerful and more affordable.

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Bones: Preservation and Conservation
- ▶ Conservation in Museums
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Field Stabilization of Immovable Heritage
- ▶ Glass: Conservation and Preservation
- ▶ Leather, Archaeological: Conservation and Preservation
- ▶ Parchment: Preservation and Conservation
- ▶ Stone: Preservation and Conservation
- ▶ Waterlogged Finds: Conservation
- ▶ Wood: Conservation and Preservation

References

Chen, H.L., K. Jakes, and D. Foreman. 1998. Preservation of archaeological textiles through fibre mineralization. *Journal of Archaeological Science* 25: 1015–1021.

Karas, B., H. Beaubien, and W. Fitzhugh. 2010. Documenting Mongolia's deer stones: Application of 3D laser scanning technology to archaeological conservation. In *Conservation of archaeological materials: Current trends and future directions*, BAR International Series, ed. E. Williams and C. Peachey, vol. 2116. Oxford: Archaeopress.

Logan, J., R. Barclay, P. Bloskie, C. Newton, and L. Selwyn. 2010. Saving the Ferryland cross: 3D scanning replication and anoxic storage. In *Conservation of archaeological materials: Current trends and future directions*, BAR International Series, ed. E. Williams and C. Peachey, vol. 2116. Oxford: Archaeopress.

Mathias, C., K. Ramsdale, and D. Nixon. 2004. Saving archaeological iron using the revolutionary preservation system. In *Metal 04: Proceedings of the International Conference on Metals Conservation*, ed. J. Ashton and D. Hallam. Canberra: National Museum of Australia.

Stelzner, J., N. Ebinger Rist, C. Peek, and B. Schillinger. 2010. The application of 3D computed tomography with X-rays and neutrons to visualize archaeological objects in blocks of soil. *Studies in Conservation* 55 (2): 95–106.

Further Reading

Brady, C. M. Gleeson, M. Myers, C. Peachey, B. Seifert, H. Wellman, E. Williams & L. Young. 2006. *Conservation FAQs and Facts.* Available at https://sha.org/conservation-facts/. Accessed 30 Aug 2017.

Cronyn, J. 1990. *The elements of archaeological conservation*. London: Routledge.

Payton, R., ed. 1992. *Retrieval of objects from archaeological sites*. London: Archetype Publications, Ltd.

Robinson, W. 1998. *First aid for underwater finds*. London: Archetype Publications, Ltd., & the Nautical Archaeology Society.

Sease, C. 1994. A conservation manual for the field archaeologist. archaeological research tools 4. 3rd. Los Angeles: Institute of Archaeology. Available at http://www.ioa.ucla.edu/press/conservation-manual-field-archaeologist. Accessed 30 Aug 2017.

Watkinson, D., and V. Neal. 1998. *First aid for finds*. 3rd ed. London: RESCUE/UKIC Archaeology Section.

Figs: Origins and Development

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Basic Species Information

Ficus carica, fig, common fig. The fig tree has a short, branched trunk, which creates a broad crown with rather large and usually emarginated,

deciduous leaves. Its life span is short (decades) in comparison to that of an olive tree. The fig protects itself against ruminants by producing bitter latex found in its leaves and young branches. It is dioecious, i.e., the species produces male and female trees.

The flowers are tiny, grouped by the hundreds in a closed inflorescence called a syconium, which develops into a fruit of almost spherical to pear shape, with a somewhat rounded apex and a narrow base. An opening, called ostiole, is located at the center of the fig's apex (Fig. 1). Pollination is carried out by a tiny wasp (*Blastophaga psenes*) that develops inside the male syconium, which is dry, is spongy, and has uncomfortable taste. The wasp, which lives in symbiosis with the fig, exits the male syconium and flies to find a female tree; it then penetrates through the ostiole of the female syconium. When ripe, the 3–7 cm long fruit contains up to 1,000 fertile nutlets, each with a diameter of approximately 1 mm and containing a single seed (Fig. 2). Because the fig is fleshy and sweet, it attracts birds and bats, which eat them and disseminate the seeds, the natural reproduction scenario of this species.

The fig is one of the major traditional fruit-bearing trees in the Mediterranean and Middle Eastern regions. In countries surrounding the Mediterranean Sea, wild fig distribution largely overlaps that of the grapevine and olive (Zohary et al. 2012).

Figs: Origins and Development, Fig. 1 Ripe fruits of a common fig variety, Brown Turkey. (Photo by Dr. O. Simchoni)

The fig has been grown for many thousands of years for fresh as well as dried fruits. In ancient records, including the Bible, there are numerous references to the fig being eaten and grown by humans. In fact, one opinion in Jewish tradition claims that the Tree of Knowledge was the fig and not the apple, a fact derived from Adam and Eve's sewing fig leaves together to cover them following their eating of the Tree (Condit 1947; Flaishman et al. 2008).

It was generally accepted that horticulture started much later than grain crop agriculture, because cereals and pulses are "short investment" annual crops, while fruit trees are perennials and begin bearing fruit some years after planting. However, recent archaeological findings have pushed back fig horticulture by several thousand years. Charred fig nutlets and fruit fragments were retrieved from some early sites in southwest Asia, such as the Pre-Pottery Neolithic A (PPNA) sites Gilgal and Netiv Hagdud, Lower Jordan Valley,

Figs: Origins and Development, Fig. 2 Half fleshy fig showing the nutlets. (Photo by Dr. O. Simchoni)

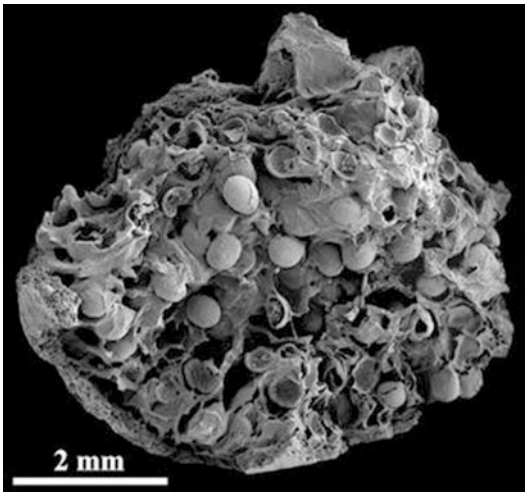

Figs: Origins and Development, Fig. 3 Charred fruit fragment from early Neolithic Gilgal (Kislev et al. 2006a). (SEM photo by Dr. Y. Langsam)

Israel, dated to the 12–11th millennia BP (Fig. 3). Fig trees may therefore have been the first domesticated plant of the Neolithic revolution, which preceded cereal domestication by about a thousand years (Kislev 1997; Kislev et al. 2006a, b).

It is suggested that the first step of domestication was unintentional (later intentional) planting of branches of a selected female fig in the mother-tree habitat. Indeed, vegetative propagation by Neolithic people was the first step of domestication, because it preserved exactly the qualities of the mother plant. Apparently, the Neolithic gardener discovered that a fig branch driven into the ground would root and start to grow. The second step was an expansion of the female fig orchard to additional fields and eradication of unwanted female figs and other trees to make room for the preferred females. The third step was the residents noting parthenocarpic mutations in their fig trees. These novel fig plants produced fruits without wasp fertilization and had a much longer fruiting season than their non-parthenocarpic varieties. They were then chosen for vegetative propagation. Since these female trees were independent of the presence of male figs, they were ready for expansion to new regions where figs did not grow naturally.

The fig crop would be extremely valuable to Neolithic farmers, who, upon occasion, had no winter reserves of wild cereals and pulses. This could occur if the seeds were eaten throughout the summer and all the rest had to be sowed at the beginning of winter for the next year's crop. However, by planting a fig branch in the ground for receiving a fruit tree in the near future, even after a few years, they took nothing away from their dietary reserves.

The fruit ripening is not uniform and a small number of figs ripen every day. The inhabitants could have enjoyed fresh or dry sweet figs throughout the year, and they seem to have even grown them near their homes. The fig was relatively more important during Neolithic and Chalcolithic periods, because grapevine and olive were mainly cultivated for fruits and not for their liquid products – wine and oil. This lack of production may have resulted from the lack of suitable vessels for large-scale production (Garfinkel 1999).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Date Palm: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Grapes: Origins and Development
- ▶ Olives: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Condit, I.J. 1947. *The fig*. Waltham: Chronica Botanica Co.

Flaishman, M.A., V. Rodov, and E. Stover. 2008. The fig: Botany, horticulture, and breeding. *Horticultural Reviews* 34: 113–196.

Garfinkel, Y. 1999. *Neolithic and Chalcolithic pottery of the southern Levant*. *Qedem* 39.

Kislev, M.E. 1997. Early agriculture and paleoecology of Netiv Hagdud. In *An early Neolithic village in Jordan Valley, Part 1: The archeology of Netiv Hagdud*, ed. O. Bar-Yosef and A. Gropher, 201–236. Cambridge, MA: Peabody Museum of Archaeology and Ethnology.

Kislev, M.E., A. Hartmann, and O. Bar-Yosef. 2006a. Early domesticated fig in the Jordan Valley. *Science* 312: 1372–1374.
Kislev, M.E., A. Hartmann, and O. Bar-Yosef. 2006b. Response to comment on "Early domesticated fig in the Jordan Valley". *Science* 314: 1683a.
Zohary, D., M. Hopf, and E. Weiss. 2012. *Domestication of plants in the Old World*. 4th ed. Oxford: Oxford University Press.

Figueiredo, Silvério

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Basic Biographical Information

Silvério Manuel Domingues Figueiredo (Fig. 1) is a Portuguese archaeologist. He grew up in Lisbon and graduated in history from Universidade Lusíada in Lisbon in 1994. In 1995, Figueiredo studied paleontology made, as an external student, with the Faculdade de Ciências, Universidade de Lisboa. He was awarded a Ph.D. in prehistory archaeology from Universidad de Salamanca in 2010, on the basis of his research into Pleistocene birds in their paleontological and archaeological contexts.

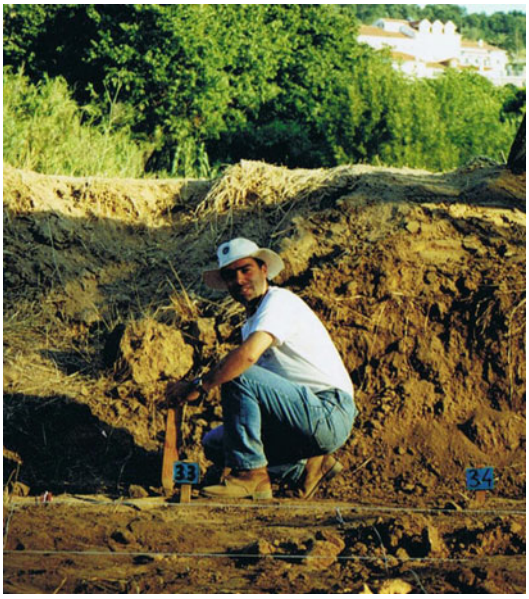

Figueiredo, Silvério, Fig. 1 Silvério Manuel Domingues Figueiredo. (Photography by Edmundo Rijo)

In 1993 Figueiredo established, with some colleagues, the Centro Português de Geo-História e Pré-História, a research association in paleontology and prehistoric archaeology. Since 1991 he has participated in and directed several archaeological excavations. In 2000 he began teaching at the Instituto Politécnico de Tomar in the areas of archaeology, paleontology, and history. In 2009 he established the Laboratório de Arqueozoologia e Paleontologia at the Instituto Politécnico de Tomar and Centro Português de Geo-História e Pré-História.

Major Accomplishments

Silvério Figueiredo has been dedicated to archaeology since 1991. He participated in the excavations of several important Middle Paleolithic sites in Portugal, such as Foz do Enxarrique, Conceição and Casal do Monte. Since 1996 he has organized, within the framework of Centro Português de Geo-História e Pré-História, various congresses, seminars, and lectures on paleontology and archaeology. He has conducted lectures and participated in national and international congresses on paleontology and archaeology. Between 1996 and 2000 Figueiredo worked in the Geological Museum of Lisbon, making an inventory of paleontological and archaeological collections, and between 2000 and 2002 he worked at the National Museum of Archaeology, participating in the inventory of collections of prehistoric archaeology.

Figueiredo has directed research projects in archaeology and paleontology in the region of Espichel, south of Lisbon, since 1998. Between 2000 and 2005, he coordinated research for the development of the "Archaeological Chart of Montijo." He is connected to Instituto Politécnico de Tomar (Tomar), Centro Português de Geo-História e Pré-História (Lisboa and Golegã), Laboratório de Arqueozoologia e Paleontologia (Tomar), Instituto Terra e Memória (Mação), and Centro de Geociências da Universidade de Coimbra (Coimbra).

Cross-References

- ▶ European Middle Paleolithic: Geography and Culture
- ▶ Zooarchaeology

Further Reading

Figueiredo, S., coord. 2011. *Catálogo da Exposição Um Olhar sobre a Pré-História do Espichel*. Lisboa: Centro Português de Geo-História e Pré-História.

Figueiredo, S. 2012. The Pleistocene elephants of Portugal. In *Actas do Congresso Marfil y elefantes en la Península Ibérica y en el Mediterráneo occidental*, 37–44. Alicante: University of Alicante.

Figueiredo, S., and H. Cardosdo. 2011. *Aurora dos Tempos Modernos, da extinção dos dinossauros ao aparecimento do homem*. Chamusca: Ed. Cosmos.

Figueiredo, S., and J. Carvalho. 2007. *A Pré-História do Espichel: Subsídeos para uma Arqueológica do Cabo Espichel*. Chamusca: Centro Português de Geo-História e Pré-História, Ed. Cosmos.

Figueiredo, S., J. Carvalho, and L. Nobre. 2005a. *A Estação Arqueológica do Campo de Futebol de Santo Antão do Tojal – Loures*. Actas do IV Congresso de Arqueologia Peninsular 2, 349–364. Faro: Univeridade Faro arqueoligica.

Figueiredo, S., M.F. Sousa, L. Nobre, and J. Costa. 2005b. *Carta Arqueológica do Concelho do Montijo: do Paleolítico ao Romano*. Lisboa: Edições Colibri.

Figueiredo, S., M.N. Antas, P. Callapez, J. Carvalho, C. Ferreira, and P.P. Cunha. 2012. Novos Dados Sobre a Pré-História do Cabo Espichel. *Almadan* 17: 117–127.

Pimenta, C., S. Figueiredo, and M. Moreno-Garcia. 2010. *Novo registo de Pinguim (Pinguinus impennis) no Plistocénico de Portugal*. Revista Portuguesa de Arqueologia, 361–370. Lisboa: IGESPAR.

Film, Archaeology in

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Cinematic depictions of archaeology and archaeologists in film are diverse. Genre classifications are crude expressions of thematic difference in movies, with multiple genres often being hybridized in a single film, but they are one way to characterize the variety of films containing archaeology. The most common genres in recent years have been action/adventure, horror, and science fiction. But it was in westerns that archaeologists were first commonly screened. During the 1930s, archaeologists featured in westerns such *Hidden Valley* (1932), *Riders of the Whistling Skull* (1937), *Death rides the Range* (1939), and *The Fighting Renegade* (1939). Such early films often portrayed archaeologists as pith-helmeted intellectuals who were elderly and neither streetwise nor athletic. To drive the narrative action forward, these archaeologists were paired with the lead action figure, archetypically male, young, and sporty. Plots usually had the archaeologist hiring a cowboy to guide them or rescue kidnapped members of the scientific team. As narrative sidekick the archaeologists were often wounded or killed, but sometimes the aged archaeologist also fought the bad-guys and sometimes archaeologists were the bad-guys. Virtually the same plots were found in popular science fiction serials of the 1930s, such as *The Lost City* (1935) *The Phantom Empire* (1935), *Ace Drummond* (1936), and *Undersea Kingdom* (1936), and this is not surprisingly because those early science fiction narratives were effectively westerns set in exotic contexts with high technology. As cinematic science fiction developed archaeologists and archaeological themes continue to be occasionally represented (e.g., *Forbidden planet* 1956; *Planet of the Apes* 1968; *Alien* 1979; Stargate 1994; Prometheus 2012).

Depictions of archaeologists in modern cinema grew out of the action of early westerns, and the influence is still potent and obvious. The costume of Indiana Jones, his hat, jacket, and gun all hark back to these Western images, and his code of behavior is largely that of Tucson Smith (note the name) in *Riders of the Whistling Skull* (1937) or Bob Harding in *Hidden Valley* (1932). A key change in representations since early cinema is that the characters of action hero and knowledgeable archaeologist have morphed into the modern filmic persona of adventurous archaeologist exemplified by Indiana Jones.

Archaeological work and the nature of the ancient human past were variously sketched in the early decades of cinema. Depictions of life in

the Stone Age began in silent films, with *The Cave Man* (1912), Chaplin's *His Prehistoric Past* (1914), *The Stone Age* (1917), and Keaton's *The Three Ages* (1923). These movies employed comic situations to provide commentary on human nature and modern life. "Caveman" films have persisted ever since, often with the same comic role, as in *Caveman* (1981) or *Year One* (2009). Dramas of Palaeolithic people have also been attempted: set in the past such as *One Million Years B.C.* (1966), *La guerre du feu* (*Quest for Fire* 1981) and *10,000 BC* (2008) or in the present such as *Iceman* (1984).

Historical dramas dealing with classical civilizations have also been persistent over the past century, as in Griffith's *Intolerance: Love's Struggle Throughout the Ages* (1916), *Ben-Hur* (1959), *Spartacus* (1960), *Cleopatra* (1963), *Gladiator* (2000), or *Troy* (2004). Such films typically explored the epic narratives of history and in many ways were not attempting to be historically accurate.

In films depicting the past, however, it is the image of archaeology as the pursuit of lost civilizations and their treasures which was often repeated. Hollywood focused on this theme from the 1930s onwards, commencing with films such as *The Live Wire* (1935) and *King Solomon's Mines* (1937, remade 1950, 1985), a trend encouraged by parallel themes in *Lost Horizon* (1937, remade 1973). The tradition of combining adventure with archaeologists searching for lost civilizations and treasures has continued in a stream of B-movies until today, such as *The White Orchid* (1954), *The Mole People* (1956), *The Lone Ranger and the Lost City of Gold* (1958), *Invaders of the Lost Gold* (1982), *The Lost Treasure of the Grand Canyon* (2008), and *Lost Treasure of the Maya* (2008). Additionally archaeology is now commonly used as a backstory for action/science fiction movies dealing with ancient civilizations, as exemplified by *Doom* (2005) or *Timeline* (2003).

A number of films also explored human relationships in the physically extreme and dangerous situations archaeological adventurers are thought to inhabit. Films such as *Bitter Victory* (1957), *Legend of the Lost* (1957), *March or Die* (1977), or *The English Patient* (1996) are classic examples, but movies have also explored the dangers and difficulties of relationships with family or friends as in *The Purple Rose of Cairo* (1985), *Old Explorers* (1990), and *Around the Bend* (2004), or even of sexual encounters in the soft-core erotica of *Laura's Toys* (1975).

Cinematic archaeologists have typically been white and male, but even in Hollywood these stereotypes have sometimes been broken. In the 1930s and 1940s, a series of movies depicted Asian archaeologists acting as detectives, or detectives acting as archaeologists, such as *Charlie Chan in Egypt* (1935), *Mr. Moto Takes a Vacation* (1939), or *Phantom of Chinatown* (1940). Female leads have been rare, but notable examples include *Lara Croft: Tomb Raider* (2001) and its sequel *Lara Croft Tomb Raider: The Cradle of Life* (2003), as well as the telemovie *The Last Templar* (2009). More frequently female archaeologists are presented as only minor characters, often with the implication that it is a quirky social role for a woman, as in *Tea with Mussolini* (1999). Even more rarely has Hollywood selected African American actors in films with archaeological themes, but it has occurred in movies such as *Blood Tide* (1982). When indigenous people have been included in films, they are often represented as being betrayed and exploited by archaeologists. In films such as *Raiders of the Lost Ark* (1981) or *A Thief of Time* (2004), archaeologists are presented as obsessively searching for treasure or knowledge with little concern for the consequences for native peoples.

Fundamental elements of filmic representations of archaeologists, archaeological practice, and the ancient human past were shaped in the early 1930s, particularly through the powerful work of Boris Karloff in *The Mummy* (1932) and *The Ghoul* (1933). Building on Egyptian/mummy themes in earlier silent films (Lant 1992), these movies presented narratives in which popular concepts of reanimation and resurrection were evoked, and their dramatic impact and popular appeal linked plots about archaeology with supernatural processes. This articulation has been repeated and reworked until it became the central theme in archaeological films. Movies reworking *The Mummy*, in which archaeologists accidently reanimate mummies and/or battle the monstrous beings, have persistently been released: from Universal Studios (e.g., *The Mummy's Curse* 1944; *The*

Mummy's Ghost 1944; *The Mummy* 1999; *The Mummy Returns* 2001, *The Mummy* 2017), from Hammer Productions (e.g., *The Mummy* 1959; *The Mummy's Shroud* 1967) and by numerous small studios and independent film makers. These plots were parodied in films such as *Abbott and Costello Meet the Mummy* (1955), *Where's My Mummy?* (2005), and *Bubba Ho-Tep* (2002). Non-Anglophone cinemas have played with the notion, as in *La momia azteca* (*The Aztec Mummy* 1957) and its sequels from Mexico, *Belphégor - Le fantôme du Louvre* (2001) from France or *La malédiction de Belphégor* (1967) from Italy. Variations on the theme were also presented in films exploring spiritual possession by ancient entities in films such as *The Awakening* (1980) and *The Exorcist* (1973).

Ever since *The Mummy* the connection of archaeology and the supernatural has been the strongest narrative theme in films dealing with the discipline. This connection was transferred to movies without a reanimation element but with supernatural, or trans-natural, events and evil forces threatening us, and opposed/fought by archaeologists. This was the basis for horror films such as *The Exorcist* (1973) and its prequels, *The Lair of the White Worm* (1988) and others. Supernatural themes are also seen in plots in which extra-terrestrial events threaten humanity or in which the use of objects left by aliens or gods are about to be used to destroy humanity. Examples of these films include *Lara Croft: tomb raider* (2001) and *Lara Croft Tomb Raider: The Cradle of Life* (2003), *Stargate* (1994), *Stonehenge Apocalypse* (2010), *A genesis found* (2010), and of course the iconic archaeology movie *Raiders of the Lost Ark* (1981). In those narratives, archaeological sites and archaeological knowledge are central to saving the situation. Increasingly such Hollywood plots have become entwined with the pseudo-scientific narratives of alien astronauts shaping the human past, as directors such as Roland Emmerich (*Stargate* 1994), Steven Spielberg (*Indiana Jones and the Kingdom of the Crystal Skull*, 2008), Ridley Scott (*Prometheus*, 2012) have all explored the ideas of Erich von Däniken.

Emphasis on supernatural and extra-terrestrial events in archaeological movies reflects the reality that cinema explores the interests of the public rather than the nature of archaeological practices or discoveries (Hall 2004; Noble 2007; Hiscock 2012). Often the narratives presented in films are founded on popular religious and nonscientific beliefs, and cinema has commonly presented archaeologists either as meddling academic elites who release danger into the world through their ignorant actions or as advocates for pseudo-archaeological views (Hall 2004; Hiscock 2009, 2012). Representations of archaeology in cinema can be viewed as a public dialogue about the nature of the past, the nature of contemporary culture, and the value of science. Movies have not so much romanticized or fetishized archaeology as they have employed nonspecialist fictions of what it is to be an archaeologist to pursue mythic imperatives.

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References

Hall, M.A. 2004. Romancing the stones: Archaeology in popular cinema European. *Journal of Archaeology* 7: 159–176.

Hiscock, P. 2009. Archaeology threatens the world! Representations of archaeologists in cinema. In *How do the media represent archaeology, what is at stake*, ed. Serge Lemaitre and Céline Schall, 71–79. Bruxelles: Kineon.

Hiscock, P. 2012. Cinema, supernatural archaeology and the hidden human past. *Numen* 59: 156–177.

Lant, A. 1992. The curse of the pharaoh, or how cinema contracted Egyptomania. *October* 59: 86–112.

Noble, V.E. 2007. When the legend becomes fact. Reconciling Hollywood realism and archaeological realities. In *Box office archaeology. Refining Hollywood's portrayals of the past*, ed. J. Schablitsky, 223–244. Walnut Creek: Left Coast Press.

Finch, Jonathan

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Basic Biographical Information

Jonathan Finch, an expert in designed and agrarian historic landscapes of the postmedieval period, began his academic career at the University of East Anglia, completing his M.A. in Local and Regional History (1989) and his Ph.D. (1997) at the latter

institution. He was briefly a part-time lecturer at UAE (1997–1998) before taking up a 1-year post in the Department of History and Archaeology at the University of Wales, Bangor (1998–1999). He was then appointed lecturer in the Department of Archaeology at the University of York in 1999; he is currently a reader in the same department and is also Director of Studies for York's MA in Historical Archaeology program. He was elected a fellow of the Society of Antiquaries of London in 2006.

Major Accomplishments

Though Finch's recent focus has been on post-medieval landscapes, his initial research interests were more oriented toward commemoration in both the medieval and postmedieval periods. Changes in the iconography of commemoration before 1400, the impact of the Reformation on commemoration, and the role of commemoration in constructions of social identity have all been strong themes in this work (Finch 2000, 2003, 2007a). This continues to be a research interest for Finch, who is currently working on a thematic summary of death, memory, and identity in Britain between AD 1000 and 1850.

Finch's research turned more directly toward postmedieval estate landscapes in the first decade of the twenty-first century. His work has a range of subjects related to the character, context, and development of landed estates (e.g., Finch 2004; Finch and Giles 2007). Yorkshire has been a particular geographical focus (Finch 2007b, 2008), and Finch has worked closely with the Yorkshire Country House Partnership – a joint venture between the University of York and seven country seats in the county – to develop new archaeological approaches to the archaeology of the eighteenth- and nineteenth-century estate landscapes. Some of this work was presented in the "Work and Play" exhibit hosted by Burton Constable, Brodsworth, Harewood, and Temple Newsam houses.

Finch built on the international connections of these estates to engage in international comparative research focused on the Lascelles family holdings in Yorkshire and Barbados. Finch's ongoing program of research at Harewood House (near Leeds) and its predecessor Gawthorpe Hall focuses on the seat of the Earls of Harewood, a title originally created for George Lascelles in 1812. The Lascelles family wealth had been made in the Caribbean – primarily Barbados – via sugar plantations, the slave trade, and the collection of local customs duties; as a result, in addition to Harewood House, they maintained extensive landed estates in the Caribbean, where Finch has also been directing fieldwork. His current research therefore uses the international Lascelles holdings to explore the global connections of rural landscapes by examining the relationships between both colonial and domestic environments while also studying the impact of West Indies land holdings on the English rural landscape (Finch 2017, 2019).

Recently, Finch has also turned his attention to the twentieth-century marginalized communities in rural landscapes, with a particular focus on a Heritage Lottery-funded project at the First World War site of Breary Banks, Yorkshire, which was home to both navvies (volunteer recruits) and German prisoners of war during its brief occupation.

Cross-References

- ▶ British Isles: Medieval Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Landscape Archaeology
- ▶ Post-Medieval Archaeology (Europe)

References

Finch, J. 2000. *Church monuments in Norfolk before 1850: an archaeology of commemoration* (British archaeological reports British series 317). Oxford: Archaeopress.

Finch, J. 2003. A reformation of meaning: commemoration and the parish church c.1450–c.1550. In *The archaeology of reformation c.1480–1580*, ed. D. Gaimster and R. Gilchrist, 437–449. Oxford: Oxbow.

Finch, J. 2004. Grass, grass, grass: hunting and the creation of the modern landscape. *Landscape* 5: 41–51.

Finch, J. 2007a. Sacred and secular spheres: commemoration and the practice of privacy in Reformation England. In *Archäologie der Reformation. Studien zu den Auswirkungen des Konfessionswechsels auf die materielle Kultur*, ed. J. Staecker and C. Jaggi, 195–210. Berlin: Studien zur Kirchengeschichte.
Finch, J. 2007b. Pallas, Flora and Ceres: landscape priorities and improvement on the Castle Howard estate, 1699–1880. In *Estate landscapes*, ed. J. Finch and K. Giles, 1–18. Woodbridge: Boydell.
Finch, J. 2008. The Yorkshire estate: people, place and the modern landscape. In *Great estates of Yorkshire*, ed. V. Wallace, 3–8. York: PLACE.
Finch, J. 2017. Harewood house and the destruction of Gawthorpe Hall. *Herregarshistorie* 12: 85–96.
Finch, J. 2019. Making modern England: the 'New Domesday' and estate landscapes during the late-nineteenth century. In *Estate landscapes in Northern Europe*, ed. J.C. Finch, K. Dyrmann, and M. Frausing, 59–95. Aarhus: University of Aarhus Press.
Finch, J., and K. Giles, eds. 2007. *Estate landscapes: design, improvement and power in the post-medieval landscape*. Woodbridge: Boydell & Brewer.

Finger Millet: Origins and Development

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Basic Species Information

Finger millet is the common English name of the crop *Eleusine coracana* (L.) Gaertn., a domesticated cereal of African origin which spreads in prehistory to Asia, also sometimes referred to as korakan or ragi (a widespread local name in India) or dagusa (in Ethiopia). Its English common name comes from the growth form of its seed heads (panicles) which take the form of several fingers (Fig. 1). This cereal is widely cultivated in eastern and central Africa, India, and Sri Lanka and extends eastwards through the Himalayas to southern China, the hills of Southeast Asia and into the hills of Taiwan, and parts of Indonesia and Guam. In Asia it is frequently a cereal in shifting cultivation systems, although it is also produced in permanent field systems on the plains of India.

Finger Millet: Origins and Development, Fig. 1 Photograph of finger millet panicle, in cultivation in the Western Ghats, Maharashtra, and India

It is also cultivated to a limited extent in modern Yemen and Oman. Although the wild progenitor species (*Eleusine africana* Kennedy-O'Byrne) is well established, where and how many times within the African native range of this species it was cultivated initially remains unclear (Hilu and De Wet 1976). Ecologically it is regarded as coming from an upland environment, and as a crop it is most commonly grown in hill zones, above 900 m. Nevertheless, it can be grown in the lowlands, to a limited extent in Africa and to a larger extent in India. In Asia upland races, which are especially widespread in the Himalayas from India to Nepal and southern China, appear to be a secondary adaptation. One limited genetic study suggested that the hills of western Tanzania might be the region of origin (Hilu 1995), while many botanists have pointed to the Ethiopia highlands as a point of origin (e.g., De Wet 2000). There remains no clear evidence from botany or archaeology on where within the range of the wild progenitor it was first brought into cultivation or whether this occurred more than once (Fig. 2).

Major Domestication Traits

Finger millet is somewhat less hardy than other millets, preferring richer and wetter soils, but it has exceptional storage advantages. Finger millet grains are rarely attacked by pests or spoil in storage, and

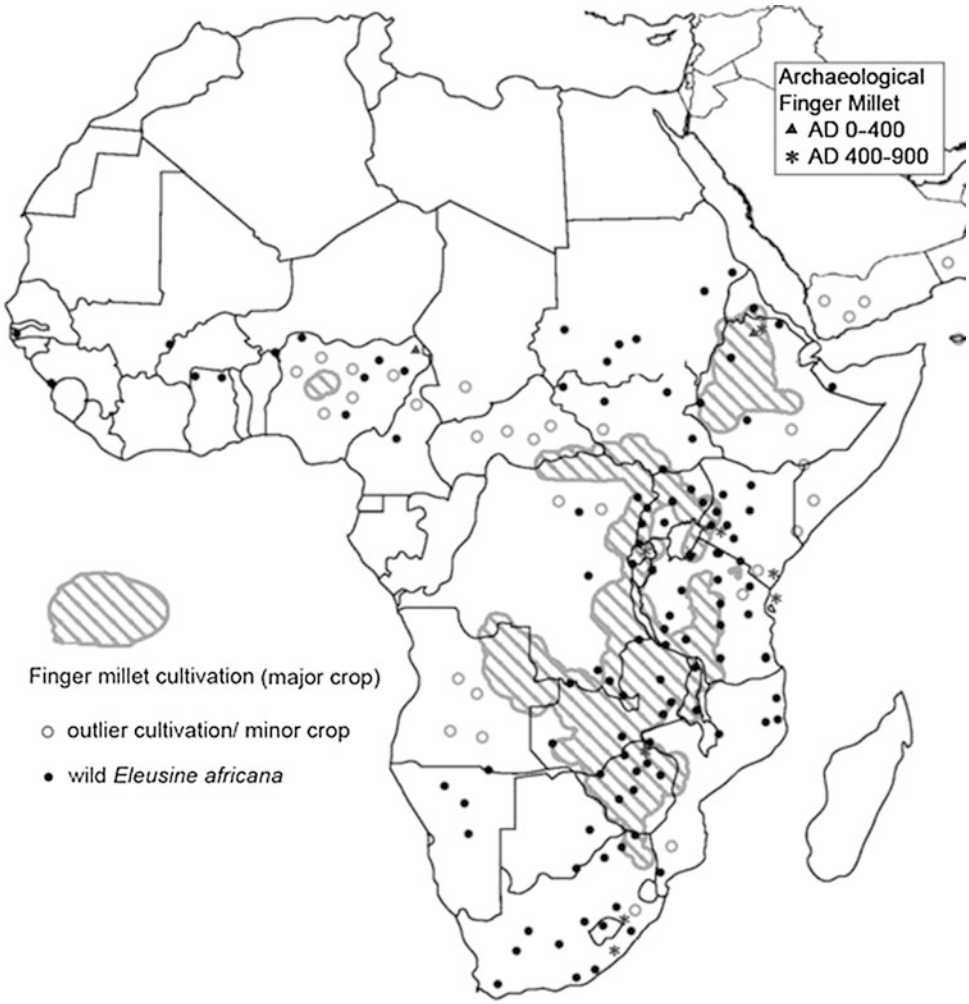

Finger Millet: Origins and Development, Fig. 2 Map of wild progenitor (after Hilu and De Wet 1976) and approximate limits of cultivation in Africa (after Murdock 1960) together with distribution of archaeological reports in Africa. (Based on the database of Giblin and Fuller 2011)

shelf life of up to a decade is commonly reported. Although it may survive with 500 mm of rainfall, it is generally grown on 800–1,000 mm. It is often the first crop in rotations of shifting cultivation or the second crop after rice, as it does not do as well on impoverished soils as other millets. While it can be made into porridges and flat breads, finger millet beers are traditional both in parts of Africa and Asia.

Studies of the crop processing of finger millet have been carried out in both Africa and India and indicate that it is a free-threshing grain, with most grains freely separated from chaff after one stage of threshing and winnowing. This may bias against preservation of this species by comparison to cereals, such as rice and most small millets, that require intensive dehusking (Reddy 1997; Young 1999).

Recognition of grains of finger millet should be straightforward if preservation is good (Fig. 3). It has a distinctive globose but angular shape, a short embryo, and a hilum placed at the edge of the embryo on a separate edge rather than on the ventral grain surface. The surface of the grain is distinctly sculptured with small warts. Nevertheless, there have been recurrent misattributions of other small millets to "finger millet" in older archaeological

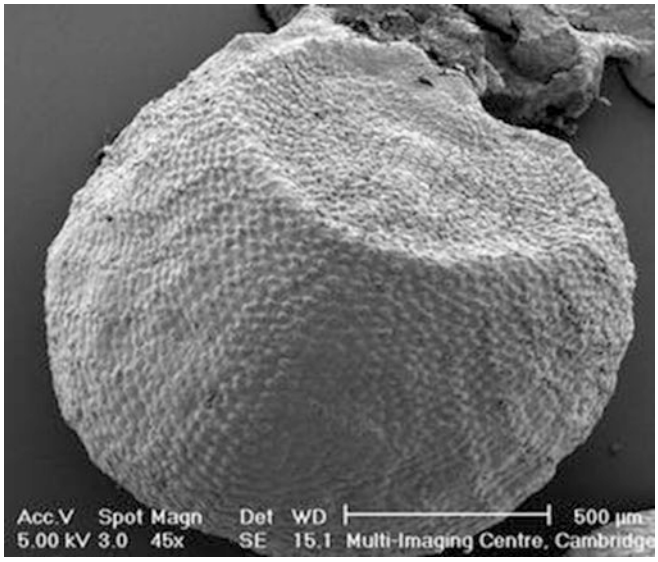

Finger Millet: Origins and Development, Fig. 3 Scanning electron micrograph of finger millet grain, dorsal view

studies in India due to confusion of the husk of *Setaria/Brachiaria* with grain surface of *Eleusine* and an anachronistic assumption that finger millet is the most widespread small-grained millet in India (see Fuller 2003). Therefore, within South Asian archaeobotany, the antiquity and distribution of this cereal remains controversial.

Timing and Tracking Domestication

Archaeobotanical evidence does not yet shed much light on where or when finger millet was brought into cultivation (Giblin and Fuller 2011). The earliest finds in Africa are only just over 2,000 BP from Nigeria and northern Ethiopia. Most evidence in Ethiopia is post-Axumite, while further south in Eastern Africa, it is widespread from Middle Iron Age times after c. CE 600 (Giblin and Fuller 2011). As a result of concerns over identification, the date at which finger millet arrived in India from Africa remains contentious, but it is certainly present by the end of the second millennium BCE (Fuller 2011). Some claims would put it in India as early as c. 2,500 BCE (Weber 1991). On most Indian sites where it has so far been found, both prehistoric and early historic levels occur, raising the possibility of later intrusive grains. It also appears to be a fairly minor component by comparisons to other millets on most sites, suggesting that its rise to importance only took place in the past 1,500 years or so. There is no archaeological evidence yet that sheds light on its spread through the Himalayas or eastwards to south China and Southeast Asia.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Brown Top Millet: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Millets: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

De Wet, J.M.J. 2000. Millets. In *The Cambridge world history of food*, ed. K.F. Kiple and K.C. Ornelas, 112–121. Cambridge: Cambridge University Press.

Fuller, D.Q. 2003. African crops in prehistoric South Asia: A critical review. In *Food, fuel and fields: Progress in*

African archaeobotany, ed. K. Neumann, A. Butler, and S. Kahlheber, 239–271. Köln: Heinrich-Barth Institut.
Fuller, D.Q. 2011. Finding plant domestication on the Indian subcontinent. *Current Anthropology* 52 (S4): S347–S362.
Giblin, J.D., and D.Q. Fuller. 2011. First and second millennium A.D. agriculture in Rwanda: Archaeobotanical finds and radiocarbon dates from seven sites. *Vegetation History and Archaeobotany* 20: 253–265.
Hilu, K.W. 1995. Evolution of finder millet: Evidence from random amplified polymorphic DNA. *Genome* 38: 232–238.
Hilu, K.W., and J.M.J. De Wet. 1976. Domestication of *Eleusine coracana*. *Economic Botany* 30: 199–208.
Murdock, G.P. 1960. Staple subsistence crops of Africa. *Geographical Review* 50: 523–540.
Reddy, S.N. 1997. If the threshing floor could talk: Integration of agriculture and pastoralism during the late Harappan in Gujarat, India. *Journal of Anthropological Archaeology* 16: 162–187.
Young, R. 1999. Finger millet processing in East Africa. *Vegetation History and Archaeobotany* 8: 31–34.
Weber, S.A. 1991. *Plants and Harappan subsistence: An example of stability and change from Rojdi*. New Delhi: Oxford & IBH.

Fiorelli, Giuseppe

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Basic Biographical Information

The Italian archaeologist Giuseppe Fiorelli was born in Naples on 8th June, 1823. Educated in Naples, Fiorelli achieved a degree in legal studies by the time he was 18, but chose a career in archaeology instead because of his passion for ancient cultures (Dwyer 2010: 25). In addition to this, Fiorelli had a background in the study of epigraphy, numismatics and pre-Romantic Italic languages (Dwyer 2010: 25). He was also an excellent antiquarian and had solid scientific knowledge (Cooley and Cooley 2004: 192).

By the age of 20 Fiorelli had published an article on numismatics in an archaeological journal. In 1847, at the age of 24, he secured the position of Inspector of the Pompeii excavations (Dwyer 2010: 25). His post was terminated in 1848 due to his activities during the political uprising in Italy (Cooley and Cooley 2004: 192). In 1849 Giuseppe Fiorelli was detained as a political prisoner under Bourbon rule. It was during this sentence that Fiorelli assembled manuscript notes from previous excavators of the site, and transformed them into a three-volume work entitled *History of Pompeian Antiquities* (Cooley and Cooley 2004: 192). Fiorelli's professional life suffered as a result of regulations set in place by organisations and political parties during the 1840s and 1850s. During this time, publications that concerned sites in the Kingdome of Naples needed the official approval of the Royal Herculaneum Academy. In 1850 when Fiorelli published the first volume of an intended series of eight books, his work was confiscated and burned by the authorities (Cooley and Cooley 2004: 192).

While these events limited Fiorelli's professional life to a degree, he found employment through Count Leopold of Syracuse, who hired him to work as a private secretary between 1853 and 1860. During this period Fiorelli excavated and published works relating to Cumae (Cooley and Cooley 2004: 192). In 1863, following the fall of the Bourbon dynasty, Fiorelli became superintendent of excavations at Pompeii, where he developed a unique approach to conserving the material remains of this ancient city (Amery and Curran 2002: 43). Fiorelli was appointed as director of the National Archaeological Museum in Naples, a position that had been previously filled by the French author Alexandre Dumas. In 1875, after extensive and groundbreaking work at Pompeii, Fiorelli successfully published his findings known as '*Descrizione di Pompei*', or 'Description of Pompeii'. In the same year he was appointed as General Director of Antiquities and Fine Arts in Rome (Amery and Curran 2002: 43). After a successful and groundbreaking career as an archaeologist, Giuseppe Fiorelli died at the age of seventy-six in Naples on 28th January, 1896.

Major Accomplishments

Giuseppe Fiorelli's wealth of knowledge influenced his approach to archaeology and gave

rise to new methods in archaeological practice, particularly in regards to excavation. One of his major achievements concerned development of innovative techniques for the excavation of ancient structures at Pompeii. The archaeological approach to excavating houses at that time was destructive and recorded little information. The earth and debris would be shoveled out of the structure at ground level, and any material remains of interest were set aside with no documentation or context (Amery and Curran 2002: 44). Due to a lack of reinforcement, these buildings would often collapse, causing further damage and inducing a vast loss of information (Amery and Curran 2002: 44). In response to this, Guiseppe Fiorelli developed a new system of excavation in which every structure was uncovered by removing the individual strata from the highest point of the site to the original ground level. Fiorelli's innovation allowed buildings that were being uncovered at Pompeii to maintain their structural integrity, thus salvaging and yielding more information for archaeologists (Amery and Curran 2002: 44).

Guiseppe Fiorelli's second major accomplishment in archaeology involved the development of a method for preserving cavities in the layers of ash and soil of Pompeii. Fiorelli recognized that these air pockets were impressions of humans, animals and other organic material that had been encased in ash and eventually decomposed over time, leaving distinct impressions (Amery and Curran 2002: 45). When such cavities were located Fiorelli organized for plaster to be poured into them. Once it hardened and the debris was cleared away casts of human bodies and animals were exposed. This technique, known as Fiorelli's process, revealed the true nature of the terror that engulfed the inhabitants of Pompeii when Mount Vesuvius erupted. To this day, it is one of the most poignant features of the excavations (Amery and Curran 2002: 45; Luongoa et al. 2003).

Giuseppe Fiorelli also brought order to the way in which excavations were managed, in terms of the topography of Pompeii. He divided the city into *regions* and *insulae*, or regions and blocks, so that every region and block was numbered and could be easily identified (Amery and Curran 2002: 45). This enabled the specific descriptions of building locations and their proximity to other structures to be accurately recorded, which further aided any map making and drawing plans. Archaeologists who continued Fiorelli's work maintained the use of this grid-like system which it is still in use today in archaeological work (Amery and Curran 2002: 44).

Cross-References

▶ Excavation Methods in Archaeology
▶ Pompeii

References

Amery, C., and B. Curran. 2002. *The lost world of Pompeii*. London: Frances Lincoln Ltd.

Cooley, A.E., and M.G. Cooley. 2004. *Pompeii: A source book*. London: Routledge.

Dwyer, E. 2010. *Pompeii's living statues: Ancient Roman lives stolen from death*. Michigan: University of Michigan Press.

Luongoa, G., A. Perrottaa, C. Scarpati, E. Carolis, G. Patricelli, and A. Ciarallob. 2003. Impact of the AD 79 explosive eruption on Pompeii, II. Causes of death of the inhabitants inferred by stratigraphic analysis and areal distribution of the human casualties. *Journal of Volcanology and Geothermal Research* 126 (3–4): 169–200.

Further Reading

Connolly, P. 1990. *Pompeii*. Oxford: Oxford University Press.

First Australians: Origins

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Introduction

Many Aboriginal people view that their ancestry is closely linked with the creation of the Australian landscape during the period they refer

to as "the Dreaming." From a scientific perspective, this is in some ways complementary to the picture from archaeology. The Australian landscape, with its diverse and changing environments during the dramatic fluctuations over the last 50,000 years, has been assumed to play a significant role in influencing and forming the diverse morphology of the modern Aboriginal people. Understanding the biological basis that underpins these diverse and changing morphologies is one of the key challenges confronting Australian palaeoanthropology.

In general terms, the picture from the archaeological record identifies that Aboriginal origins are external to Australasia and what would appear to be emerging from the global picture is that within the last 100,000 years of human evolution, several species of hominins once coexisted across the globe at the time of the great *Homo sapiens* expansion. The known species include: *Homo floresiensis*, *Homo neanderthalensis* (which may or may not include the Denisovans), and possibly also *Homo erectus*. What remains unclear is how these species interacted, although the evidence from ancient DNA (aDNA) now indicates that some degree of assimilation of Neanderthals and/or the Denisovans did occur, albeit on a small scale. The First Australians play a key role in the understanding of modern human origins globally and within their aDNA would appear to be preserved the signature of both Neanderthals (Yotova et al. 2011) and Denisovans.

Historical Background

Huxley (1863) published the first study comparing Aboriginal skeletal biology to the fossil record in an attempt to explain modern human origins. At the time, he compared an Aboriginal calotte to that of the recently found Neanderthal fossils where he observed a number of similar characteristics. The general opinion at the time suggested that as Aboriginal people still lived in a hunter-gatherer state, then it was likely that they more closely represented the original state of humankind. They were in the words of numerous scientists of the late nineteenth century "living fossils." This was a position also largely supported by the social anthropology of the time, as reflected in the works of such scholars as Tylor (1873).

Of course, there were exceptions to this position, and indeed, some physical anthropologists considered the Aboriginal peoples position in the human evolutionary story in a different light. Klaatsch, the German physical anthropologist known for his pre-World War I work on the Neanderthals, and inspired by Huxley's (1863) comparisons with the Neanderthal calotte, argued for ancient human origins in Southeast Asia. He suggested that the first modern humans evolved in Southeast Asia and were: (a) the ancestors of the Aurignacians (an archaeological culture of the Upper Paleolithic); (b) the population responsible for the extinction of the Neanderthals; and (c) the colonists of Australia. Klaatsch made a detailed study of a range of Australian crania indicating that the first modern humans were still represented in Aboriginal populations. The Great War saw a dramatic decline in interest in German science and British models came to dominate debates. Sir Arthur Keith was the preeminent physical anthropologist of the time and greatly influenced the course of American physical anthropology through his training of Earnest Hooton, a preeminent United States physical anthropologist in the first half of the twentieth century, Earnest Hooton (Brace 2005). It was a student of Hootons, Joseph Birdsell, who was to establish a theory of human evolution known as the "Trihybrid" model of Aboriginal origins that was to dominate debate and influence scientific and popular opinion for almost 40 years. Birdsell (1967, 1977) argued that three successive waves of migrants arrived in Australia, the first represented by the Barrineans (a 'Negrito' - based population), the next the Murrayineans (Aboriginal people that inhabited the Murray River corridor), and the latest the Carpenterians (people of tall stature from Lake Carpentaria). Opposing Birdsell's view was that of Abbie, who argued that the variation that was present represents homogeneity in a population adapted over a long period of time to differing environments (Abbie 1951, 1963, 1966) (Fig. 1).

The other main interpretation was initiated by Sir Arthur Keith (1936), building on the idea and

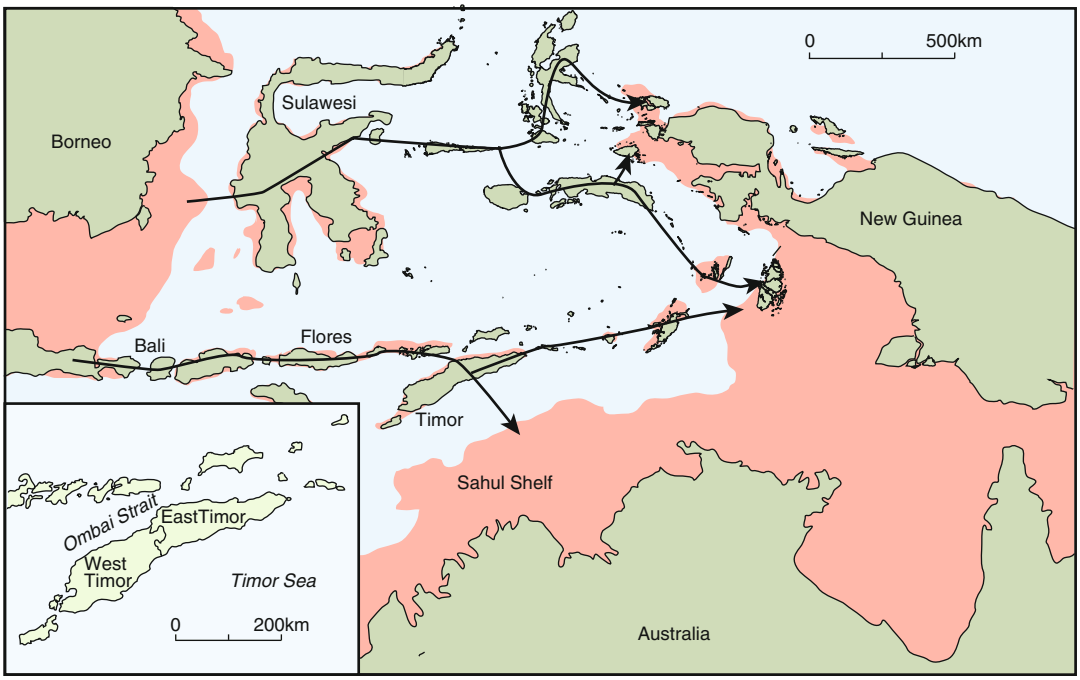

First Australians: Origins, Fig. 1 Birdsell's map illustrating the northern and southern migrational routes through Sunda into Sahul

discoveries of Eugene Dubois. Dubois (1922) suggested that there was an evolutionary sequence of regional continuity represented in Sunda and Sahul by the Trinil, Sangiran, and Ngandong *Homo erectus* sequence through to the Wajak *Homo sapiens* to Aboriginal Australians. This idea was further developed by Weidenreich (1943) who is often credited with the theory of regional continuity. He added to the model the Keilor fossil to extend the regional evolutionary sequence into Pleistocene Sahul. The concept of a close evolutionary connection with Java was further developed by the work of Macintosh (1965) who referred to the "mark of Ancient Java" being present in Australian populations. However, it was Macintosh's student Alan Thorne who was to become the most prominent supporter of this theory through the development of his own brand of multiregional continuity known as the Di-Hybrid view of Aboriginal origins. Others such as Howells (1973) considered that two differing morphologies representing two different populations were most likely represented in the Australian fossil record. This idea was developed in far greater depth, in both time and space by Thorne who through his survey and excavations at the Willandra Lakes and Kow Swamp developed an extensive fossil series that brought Australian palaeoanthropology into the global scene. It also played an important role in inspiring a generation of new Australian biological anthropologists working out of schools of archaeology as opposed to schools of anatomy.

Key Issues/Current Debates

Interpreting the Fossil Trail to Sahul

While local evolution from more ancient predecessors has been claimed for Sunda and Sahul in the past, it is only in Africa that we see transitional premodern and modern human fossil forms. The consensus is that it is only in Africa that we can trace the origins of the First Australians. The first appearance of *Homo sapiens* in the fossil record occurs in Eastern Africa in Ethiopia around 190 ka with the Omo and Herto fossils. The first appearance of *Homo sapiens* outside of Africa is in the

Levant with the Jebel Skhūl and Jebel Qafzeh fossil series generally thought to date between 110 and 90 ka. The general assessment is that this population seems to have been replaced sometime after 90 ka by Neanderthals who returned to South West Asia (Tchernov 1998). Curiously, there seems to have been little consideration of the possibility that this initial range extension of *Homo sapiens* (some 100 ka) may have extended further east than the Levant. This possibility has received little attention perhaps because of the uncertainly regarding the dates of the Liujiang fossil and isolated teeth from Punung in Java (120 ka), together with the fact that there is no other fossil evidence of *Homo sapiens* in Asia before 50 ka. The available record for *Homo sapiens* prior to the Marine Isotope Stage (MIS) 2 between Africa and Australia is currently very sparse and provides little evidence of the evolution of modern humans in the Asian region.

As a result of the scarcity of the modern human fossil record, much of the interpretation of the human fossil record from Sahul in the past has depended upon the record of more archaic hominins from neighboring Sunda, the land mass incorporating the islands of Southeast Asia. As noted in the preceding section, the record from Java played a primary role in influencing our understanding of Aboriginal origins for much of the twentieth century. For many years, a number of variations of multiregional continuity proposed that Aboriginal origins were closely associated with the evolution of *Homo erectus*, as known from the extensive record from Java at sites such as Trinil, Sangiran, and Ngandong. Despite earlier claims of a late Pleistocene age for *Homo erectus* (Swisher et al. 1996), there would currently appear to be no evidence to suggest that *Homo erectus* survived beyond the middle Pleistocene (Westaway and Groves 2009; Indriati et al. 2011). We do not presently know from the available evidence if *H. erectus* and *H. sapiens* overlapped in time.

However, there is evidence from the Lesser Sunda Islands that suggests that at least two hominin species perhaps coexisted within Sunda. Several specimens of *Homo floresiensis* recovered from Liang Bua, Flores, have revealed that a small bodied hominin continued in this island refuge perhaps as late as 18 ka (Morwood et al. 2004). The most parsimonious explanation for this hominin is that it is a species predating *Homo erectus*. Descriptions of the available post crania (e.g., Jungers et al. 2009) also support the view that *Homo floresiensis* derived from a pre-ergaster/erectus hominin.

In terms of other archaic hominins from the Asian region on the fossil trail to Australia, there is very little. The Namarda fossil is the only representative of a post ergaster/erectus hominin from the Asian region on the trail to Australia and has been interpreted as an Indian representative of *Homo heidelbergensis* (Groves 1989). More recently, the discovery of a new hominin from aDNA recovered from a phalange has revolutionized our idea of hominin interaction during the last 100,000 years. Nothing is known of the morphology of this new hominin identified from the Denisovan Cave in Siberia, and neither do we know anything much regarding its geographical distribution.

Our understanding of the distribution of *Homo sapiens* is limited as there are very few modern human fossils dating to the crucial period of Marine Isotope Stage 3 when Southeast Asia is alleged to have been colonized by *Homo sapiens*. Fossils include the Niah skull dated to 40 ka. The record for *Homo sapiens* in Sunda dating to the Pleistocene is minimal to say the least. The Wajak fossils have been dated as terminal Pleistocene (although this age determination is by no means definitive) and as noted above their morphology is often compared to the Keilor fossil discovered on the outskirts of Melbourne, Victoria. Another intriguing specimen suggested to be representative of *H. sapiens* is known from Punung, dated to 120 ka and it is known only from teeth.

The First Seafarers

Of all the continents colonized by modern humans, Australia is the only one that was not connected at some stage during the Pleistocene by a land bridge. Its colonization has always required the use of water craft capable of a number of significant sea crossings. Birdsell (1977) was the first to summarize these sea routes. The shortest

leg of the journey taking the northern route would have involved a sea journey of around 70 km. Much planning and preparation was required for the colonization and it is likely that a familiarity with the sea and an understanding of the type of signs to look for (such as smoke well over the horizon and the movement of migratory birds) were part of the intellectual tool kit required to undertake long-distance sea journeys. This process has been identified as the earliest example of modern human cognition (Noble and Davidson 1996; Davidson 2010). Watercrafts were most likely rafts constructed from bamboo. The absence of bamboo on mainland Australia perhaps made return journeys quite difficult although there is evidence in the archaeological record, such as the early appearance of edge ground axes and the presence of CusCus in East Timor, which indicates that return journeys may have been made. The survival of the archaic hominin *Homo floresiensis* along the southern route on Flores perhaps indicates that the northern route through the Birds Head of Papua was taken in the initial colonization of Sahul (Balme et al. 2009) (Fig. 2).

The Australian Fossil Human Record

The extent of the Pleistocene *Homo sapiens* fossil record from Sahul is quite considerable when compared to the regions to the north within the tropical belt. This is in large part an outcome of taphonomy, the large extinct lake systems that covered much of Southeast Australia provided excellent conditions for the fossilization of carefully interred human burials, of which there must have been many thousands. Australia has a rich record of human fossils dating to the Pleistocene, although the record was built over a century. The initial record was patchy, with the discovery of Talgai in 1886 and the recognition of its importance being identified at the British Academy of Science meeting in 1914. It was followed by the discovery of the Cohuna fossil in 1925 and Keilor in 1940 (both from Victoria). Numerous other key specimens were collected by George Murray Black during the 1930s including probable Pleistocene fossils from Coobool Creek and Lake Benanee along the Murray River. Several other key specimens including those from Lake Nitchie and Mosgiel reported in the 1960s. It was not until the concerted effort of Alan Thorne that Australia

First Australians: Origins, Fig. 2 A Lardil man paddling a "walba." The vessel was built in 2 days from rope stripped from hibiscus, white mangrove logs, and the paddle constructed from a splayed mangrove root. Lardil men would traditionally tie rope around their waist so that they could make repairs to the craft at sea. Rafts provided a far more stable platform in choppy seas than canoes. It is likely that similar (but larger) rafts made from bamboo lashed together with rope made by plant fibers represented the first vessels to bring people to Australia

First Australians: Origins, Fig. 3 The Cohuna fossil found in 1925. The frontal flattening, initially thought to be a trait shared with *Homo erectus*, is now recognized as a result of deliberate cranial deformation. (Photo Colin Groves ANU)

started to accumulate a larger fossil sequence from more controlled stratigraphic contexts. Between 1968 and 1988, Thorne and colleagues amassed a fossils series representing over 160 individuals first from Kow Swamp and then the Willandra Lakes (Fig. 3).

One of the most intriguing elements of the Australian fossil record is its considerable diversity. Arguments have been based around the two "morph" types, defined by many as robust and gracile, that were the foundation of Thorne's Dihybrid model. Others have argued that the differences are a result of sexual dimorphism while others still have indicated that the variation in morphology may in fact be the result of microevolutionary change and genetic isolation during the period of climatic stress at the Last Glacial Maximum. What is of particular interest is the general chronological pattern that emerges from the assessment of the burial age range with cranial robusticity appearing no earlier than 25 ka. This age range correlates with the onset of glacial aridity, and suggests that robusticity may in fact be influenced by the harsh environmental stress associated with the LGM. The proposal that cranial robusticity may be associated with the LGM is supported by recent age ranges from Kow Swamp (Stone and Cupper 2003). Certainly sexual dimorphism plays a role in morphological expression (Pardoe 1991), but the harsh climatic conditions of the LGM may have applied evolutionary pressure on the series also. Gilligan and Bulbeck (2007) have suggested that, based on the large Birdsell's (1993) late Holocene Aboriginal data set, a considerable amount of morphological variation within the Australian Aboriginal population can be explained in terms of adaptations to the physical environment. Correlations (particularly with temperature) are found for measures relating to body shape, head size and shape, limb lengths, and limb proportions. These observations are in accordance with correlations predictable from biological principles of long-term human adjustment to environmental conditions. A larger cranial shape is often correlated with colder climates (Guglielmino-Matess et al. 1979). They note that exposure to cooler conditions during the late Pleistocene, particularly in the southern part of Sahul, might have amplified regional variation in evolutionary or phenotypic change in response to thermal conditions at the time (Fig. 4).

The earliest fossils from Sahul which can be considered representative of the First Australians are those of Mungo Woman (WLH 1) and Man (WLH 3) dating to soon after first human arrival approximately 42 ka ago. These individuals have very lightly built crania with vault thickness not exceeding 7 mm. Mungo Man does have very robust postcrania, the general dimensions supporting the assessment that the remains are those of a male. An intriguing component of WLH3's morphology is his high frontal curvature index and minimal development of the superciliary ridges. This is a pattern quite different to that in later Australian male fossils and it is primarily these characters that have resulted in Brown's (2000) assertion that these represent the remains of a female. This is not supported by the dimensions of WLH 3's postcrania (Durband et al. 2009) (Fig. 5).

There are 23 other fossils that preserve enough of their cranial anatomy to provide an insight into the range of cranial variation in the Willandra Lakes. This represents an important series as it provides us with an insight into population variation at least around the time of the LGM, rather than just simply depending on one or two key

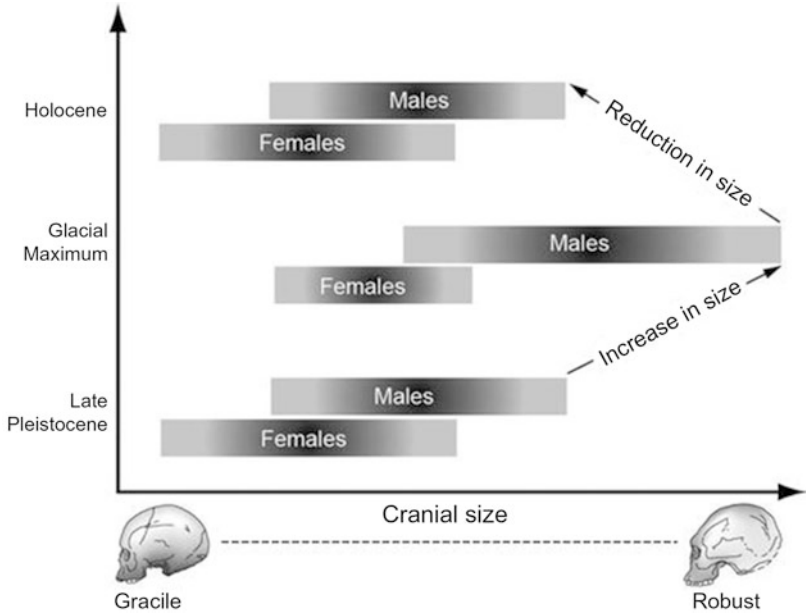

First Australians: Origins, Fig. 4 Theorized representation of the emergence of cranial robusticity associated with the onset of the Last Glacial Maximum

specimens for our understanding of cranial variation. Some of these individuals are very robust, including WLH 19 and the most heavily studied specimen WLH 50. Robust characters do not appear to be restricted to males, with WLH 45 (established from female characters in the pelvis) also preserving characters that could be assessed as robust. From the available dates, cranial robusticity correlates with the Last Glacial Maximum and, as suggested by Bulbeck (2001), may reflect evolutionary or at least phenotypic processes in response to significant climatic change (Fig. 6).

The suggestion that cranial robusticity may be associated with the environmental stress of the LGM is further supported by the evidence from Kow Swamp, located south of the Murray River some 400 km Southeast from the Willandra Lakes. This site was redated to between 19 and 21 ka through a more recent assessment of the site (Stone and Cupper 2003). Criticisms have been raised that this series of OSL ages date the surrounding units and not the burials. However, as all burials (with the exception of KS 15) are sealed in the Cohuna silts (Stone and Cupper 2003), this indicates that the above age range is reliable. Another very significant element of the series is that it preserves the earliest evidence of the practice of artificial cranial deformation in the world. Cranial deformation has exaggerated some of the characters, such as the angle of the receding frontal, which has resulted in the more archaic appearance of these fossil human remains (Fig. 7).

First Australians: Origins, Fig. 5 Lateral view of WLH 3. There is very minimal development of the lateral trigone and superciliary ridge. Interestingly, the frontal curvature index is quite high when compared to later Australian fossils. (Photo: Dragi Markovic, NMA)

Further to the west downstream along the Murray are a series of other significant burial sites that have quite often been described as very early

First Australians: Origins, Fig. 6 Lateral view of WLH 50. This specimen represents the most robust fossil cranium yet known from the fossil record. Thickening in the diploë suggests that there has been some hematopoietic reinforcement in the cortical bone as a result of pathology. (Photo: Dragi Markovic, NMA)

First Australians: Origins, Fig. 7 Kow Swamp 1. Like the Cohuna fossil, the heavily receding frontal is the result of artificial cranial deformation and not admixture with more archaic hominins from Sunda (Cast, photo Arthur Durband)

cemeteries. Little detail exists to support the suggestion that cemeteries were in existence in the Late Pleistocene-Early Holocene, and these are likely to represent individual and small group burials scattered over many centuries, rather than evidence of Pleistocene cemeteries per se. Coobool Creek is one of the more significant of these sites (although its precise location is now lost) and like Kow Swamp, it preserves crania, demonstrating artificial cranial deformation.

First Australians: Origins, Fig. 8 Nacurrie 2. This heavily mineralized calotte preserves a well-defined superciliary ridge and mental trigone. (Photo NMA)

Existing absolute dates suggest that these individuals are terminal Pleistocene. The Nacurrie calottes, 1 and 2, are often considered as part of the Coobool Creek series. These heavily mineralized crania also preserve evidence of cranial deformation. The Roonka fossil series (Pretty 1977) provides important insights into prehistoric cemeteries as it represents one of the only such site types to be archaeologically excavated (the other is the late Holocene cemetery site at Broadbeach). The site complex is defined into three stages, Roonka I (20–8 ka), Roonka II (8–4 ka), and Roonka III (4–2 ka). Over 216 burials have been excavated and there are over 250 age determinations. Only one burial EB2 F8 has been excavated that has been established as Pleistocene in age, bracketed between two OSL ages at 20–16 ka (Fig. 8).

Another key fossil that has featured prominently in debates was discovered on the northern outskirts of Melbourne, Victoria, in the Pleistocene terraces of the Maribyrnong River. This is the site of the discovery of the Keilor skull in a quarry in 1940 (Wunderly 1943). Keilor Man is intriguing in that he represents a large individual; however, he does not preserve robust cranial characters. Historically, Keilor was often compared to the Wajak crania from Java, and it is true that they share a very similar general morphology.

Numerous other fossils have been recovered that preserve robust cranial morphology that

extend into the early Holocene. These include two specimens from Western New South Wales, Mossgiel, and Lake Nitchie. Lake Nitchie is an extraordinary burial in that it also preserves a necklace representing the teeth of 47 different Tasmanian Devils (*Sarcophilus harrisii*). One further robust Australian fossil that requires further discussion is the individual from Cossack. It represents the only known fossil representative of Western Australia. The male cranium was discovered in 1972 and bears robust characters that have been identified as similar to the robust individuals from the Kow Swamp series. Cranial vault thickness and the low frontal curvature index sits closely to the robust individuals from the Kow Swamp series (Freedman and Lofgren 1979), and yet, this individual's age range is from the mid to (more likely) late Holocene. If the cranium dates to the last few thousand years and the reconstruction is accurate, it suggests that some robust characters continued to be present much later in prehistory and may be representative of adaptation to harsh environmental conditions, rather than a late Pleistocene or early Holocene cranial morphology. There are however numerous issues in the published image of the Cossack reconstruction, including the positioning of the malar which impacts on the reconstruction of the shape of the orbit, which has resulted in placing the fossil in the incorrect orientation of the Frankfurt Horizontal Plain. In addition, the reconstruction of the position of the maxilla would seem to exaggerate prognathism in the fossil, and this is supported by the angle of the occlusal plain in the teeth, which angles unnaturally upward. The superciliary region is also not as well developed as the more robust specimens such as WLH 50, Kow Swamp 1 and 5, and Nacurrie 2. It lacks any sign of a sulcus behind the superciliary ridges. A reconstruction of Cossack is overdue and if undertaken will in all likelihood reduce exaggerated robust characters such as midfacial prognathism and indeed the orientation that the frontal is often illustrated (Fig. 9).

In the last several years, a number of important fossil discoveries from Papua New Guinea have helped build a picture of Australian morphology in northern most Sahul. A semicomplete burial excavated from Liang Lemdubu dating to 18,000 years provides an important insight into the morphology of people living in this region during the peak of the Last Glacial Maximum. Unlike the Willandra which at this time was under severe environmental stress, Lemdubu woman was living well within the tropical belt, the Aru Archipelago of West Papua being at the time adjacent to the coast (Hope and Aplin 2005) (Fig. 10).

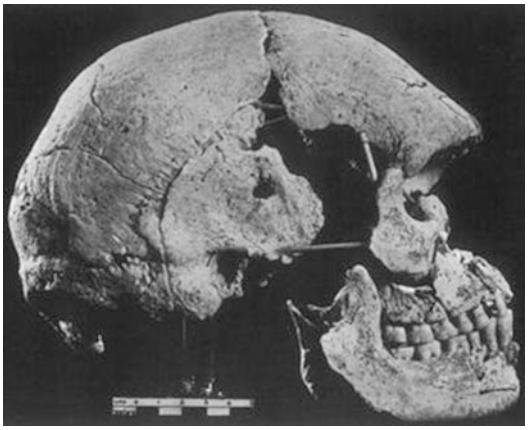

First Australians: Origins, Fig. 9 Cossack Man. It is probable that the prognathism is exaggerated in this reconstruction giving the fossil a more archaic appearance. In all likelihood the face was probably positioned more posteriorly beneath the cranial vault. This is supported by the angle of the occlusal plain in the above reconstruction. (From Freedman and Lofgren 1979)

The Emerging Picture from Studies of Aboriginal DNA

The evidence from DNA studies is providing new insights into our understanding of the origins of the First Australians that were not possible previously from studies of the fossil and osteological record. While in the past there has been a number of studies that have examined variation in Aboriginal blood genetic markers (blood groups, leukocyte, serum protein groups, and red blood cell enzymes), more recent Aboriginal genomic studies have altered our understanding of the early population history of Australia. Two lines of investigation have been undertaken that have revealed the genetic composition of the First Australians. Studies on living populations have

First Australians: Origins, Fig. 10 Lemdubu woman (Bulbeck 2005)

distinguished unique Y chromosome and mtDNA haplotypes in Aboriginal Australia which indicate that migrations into Australia through Asia predate 50 ka (Keinan et al. 2007; Gutenkunst et al. 2009; van Holst Pellekaan 2011). However, like all other non-African populations, all Aboriginal Australian mtDNA studies demonstrate that their ancestry can be traced to a single L3 haplotype. One important component of mtDNA studies from Melanesia, as highlighted by Davidson (2010), is that the genetic evidence indicates two possible migration events, with a separation between the mtDNA of the colonists of north and east Papua New Guinea, with those from southern Sahul. Indeed it would appear that the haplotypes from Melanesia represent earlier haplotypes from those present in southern Sahul (Merriwether et al. 2005). The Australian mt haplogroups S, O, and M42a are not shared with New Guinea on current evidence and this, together with shared haplogroups P and Q, has been interpreted as indicating separate origins of Australian and New Guinea people, while at the same time different migration histories of these separate groups of colonizers. Van Holst Pellekaan (2008) has raised the question: Do the differences in haplogroups indicate that there were different entry points into Australia. This proposition has been explored by Davidson in reference to archaeological, ethnographic, and linguistic evidence (2010 and in press). In particular, Davidson (2013) suggests that separate studies of mtDNA (van Holst Pellekaan et al. 2006) and of mtDNA and Y chromosome (Hudjashov et al. 2007) show consistently that variations within the region of Sahul have deep roots going back to the first colonization of the continent at 40 to 50 kya. We agree that, taken together, these data are consistent with the possibility of separate colonizations along Birdsell's northern and southern colonization routes to Sahul (Fig. 1).

The recent sequencing of genomes of *Homo neanderthalensis* and of Denisovans and their subsequent comparison with modern human genomes has been suggested to indicate hybridization with modern human populations, subsequent to their movement out of Africa (Reich et al. 2010). Specifically, it has been proposed that 1–4% of the Eurasian genome derives from Neanderthal and 5–8% of the Melanesian genome is derived from Denisovan and Neanderthal sequences (Reich et al. 2010; Abi-Rached et al. 2011; Mendez et al. 2012).

This latest evidence for hybridization from genomic studies has been based on the number of derived shared SNPs from either the Neanderthal or Denisovan samples, compared with those of selected modern individuals representing the major population groups. These studies have shown that both the Denisovan and Neanderthal samples share more derived SNPs with Eurasian and Melanesian populations than they do with African. It has been argued that this indicates hybridization with these populations subsequent to their migration out of Africa (Reich et al. 2010; Lalueza-Fox and Gilbert 2011; Stoneking and Krause 2011). In support of this view, recent simulations conducted by Hammer et al. (2011) allowed the authors to reject the null model of no admixture between *H. sapiens* and archaic forms. Instead they suggest that contemporary African populations have retained a small proportion of genetic material (~2%) that introgressed ~35 ka from an archaic population that split from the ancestors of anatomically modern humans ~700 ka. One particular locus ~31 kb in length on chromosome 4 appears to have introgressed into modern Africans from an unknown and now extinct taxon that may have lived in central Africa.

This issue had been debated extensively in the past with partial mitochondrial DNA sequences suggesting that there was no evidence of hybridization (Serre et al. 2004), in contrast to some morphological studies (Bilsborough 1972). Wall and coworkers have, for some time, argued that, based on haplotype length data, there is strong evidence for ancient admixture in both European and West African populations, with contributions to the modern *H. sapiens* gene pool of at least 5%. This issue was important because the integrity of the Out of Africa (OOA) theory, in its formal sense, was at stake. That is the proposal that anatomically modern humans evolved in Africa 200,000–150,000 years ago and that they subsequently migrated out of Africa 100,000–60,000 years ago, displacing other archaic hominins (with no hybridization), giving rise to all current human populations. Hence, any evidence for hybridization between modern humans and any archaic group(s) is contrary to that view.

The now recognized relatively large contribution of archaic DNA to modern human is in stark contrast to the absence of any evidence for hybridization from uniparental Neanderthal of Denisovan markers in modern or even early modern populations (Ghirotto et al. 2011). However, Currat and Excoffier (2011) suggested that nuclear DNA introgression is compatible with the observed absence of Neanderthal mitochondrial lineages among contemporary humans. These authors concluded that an interbreeding success smaller than 2% for Neanderthal human hybrids is fully compatible with limited Neanderthal nuclear introgression and with no introgression of mtDNA. The authors note that they obtained comparable estimates of maximum interbreeding success rates (<3%) in an earlier simulation study that focused on the absence of Neanderthal mtDNA introgression into modern humans (Currat and Excoffier 2004).

In addition, the robustness of the data themselves has been questioned including the possibility of human contamination, and the confounding effects of ascertainment bias and/or genetic drift (Reich et al. 2010; Skoglund and Jakobsson 2011). The latter authors (Skoglund and Jakobsson 2011) showed that genetic similarity to Neanderthal increases with increasing distance from Africa. However, and conversely to expectation, a significant gene flow was detected between the Denisovan and Southeast Asians. The former authors (Reich et al. 2010) suggested that similarities between modern human and the Denisovan and Neanderthal genomes may simply be the result of parallel substitution, or convergent evolution and that this might be enough to influence archaic hominin/modern human associations by a few percent, perhaps ample to infer hybridization events.

Specifically with respect to Australian Aboriginals, investigations into aDNA of subfossil remains from the Willandra Lakes and Kow Swamp, these have revealed some intriguing insights into the population history of Australia. The evidence from aDNA has indicated that two of the sampled individuals, WLH 3 and KS 8, lie outside of the range of modern Aboriginal genomic variation, it being argued that they have non-L3 ancestry (Adcock et al. 2001). This position has been the subject of considerable criticism, (Groves 2001; Relethford 2001; Cameron and Groves 2004) and it is by nuclear mitochondrial sequences (numts) may have resulted in the observed mtDNA sequence or that it may in fact represent modern contamination (Colgan 2001; Trueman 2001; Cameron and Groves 2004). A current study being undertaken by the authors is expanding on the original aDNA study undertaken on the Willandra fossil series to assess if the results can be replicated and if so an ultimate goal is to determine if a signature for Neanderthals or Denisovans can be detected in any recovered sequences.

Future Directions

It would seem that aDNA research is opening up new avenues of understanding on the origins of the First Australians. If the original study of the aDNA of Mungo Man is correct, and does not represent modern contamination, Mungo Man (WLH 3) and KS 8 represent a distinct lineage. If accurate, this has enormous bearing on our

understanding of the population history of Sahul and indeed the evolutionary history of modern humans. The very gracile cranial features, including a reduced superciliary region and high frontal, may not simply represent variation within a homogenous population but could in fact represent a more gracile morphology, represented also by the Niah fossil from Borneo which supports the hypothesis that the first significant population movement into Australasia was represented by a lightly built population (Bulbeck and O'Connor 2011). Perhaps the more robust characters that we see in the once rich fossil record of Sahul represent a later movement into Asia. Could this include a phenotype that incorporated the assimilation of Denisovan and Neanderthal genes that reintroduced a robust cranial morphological component? As discussed above, the available evidence from the genome indicates that genetic exchange between modern and archaic people was on such a small scale that it is unlikely to have had any influence on the expression of cranial morphology. The differences in haplogroups between Aboriginal and Melanesian populations indicate that there may have been different entry points into Sahul during the Late Pleistocene, but it is not clear how this could relate to diversity in Pleistocene cranial form.

An alternative hypothesis is that the robust cranial morphology is a character somehow selected for in environments of climatic stress, or that it represents the results of a process of genetic drift in some populations. It is interesting that this morphology is present from 25 to 10 ka supports the proposal that it is associated with the climatic changes of the LGM. Higher chronological resolution is required in order to support this hypothesis. A major obstacle to our understanding, as pointed out by Pardoe (1991), is that until we have larger samples that provide us with an understanding of variation within a certain point in time, as opposed to simply a picture from one or two key fossils from a known time period, our understanding of evolutionary processes and possible migratory events will remain limited. This is a problem that has been exacerbated by the repatriation and reburial of numerous key fossil specimens that are no longer available for future analysis. The concept of a "keeping place" for such important collections (such as the 100+ individuals from the Willandra fossil series) would represent a key achievement as it provides a positive compromise to both science and Aboriginal cultural responsibilities for the deceased.

The archaeological and linguistic record for later migrations in the Holocene provides yet another complex picture to be investigated. It is clear that there was a linguistic expansion which is argued to have occurred in the mid-Holocene, but what is unclear from the available evidence is whether this had any impact on the Aboriginal phenotype through a pulse of new genes into Sahul. These questions and more will hopefully be the focus of future collaborative efforts between archaeologist, geneticists, biological anthropologists, and traditional owners as we continue to expand on our understanding of one of the more intriguing chapters on the global dispersal of our species.

Cross-References

- ▶ *Homo erectus*
- ▶ *Homo sapiens*
- ▶ Java Man
- ▶ Kow Swamp
- ▶ Lake Mungo, Archaeology of
- ▶ Stringer, Chris
- ▶ Wolpoff, Milford H.

References

Abi-Rached, L., et al. 2011. The shaping of modern human immune systems by multiregional admixture with archaic humans. *Science* 334: 89–94.

Abbie, A.A. 1951. The Australian Aboriginal. *Oceania* 22: 91–100.

Abbie, A.A. 1963. Physical characteristics of Australian Aborigines. In *Australian Aboriginal studies*, ed. H. Shiels, 89–107. Oxford: Oxford University Press.

Abbie, A.A. 1966. Physical characteristics. In *Aboriginal man in south and central Australia*, Part 1, ed. B.C. Cotton, 9–45. Adelaide: Government Printers.

Adcock, G.J., E.S. Dennis, S. Easteal, G.A. Huttley, L.S. Jermiin, W.J. Peacock, and A. Thorne. 2001. Mitochondrial DNA sequences in ancient Australians: Implications for modern human origins. *Proceedings of the National Academy of Sciences of the United States* 98: 537–542.

Balme, J., I. Davidson, J. McDonald, N. Stern, and P. Veth. 2009. Symbolic behaviour and the peopling of the southern arc route to Australia. *Quaternary International* 202: 59–68.

Bilsborough, A. 1972. Cranial morphology of Neanderthal man. *Nature* 237: 351–352.

Birdsell, J.B. 1967. Preliminary data on the trihybrid origin of the Australian Aborigines. *Archaeology and Physical Anthropology in Oceania* 2: 100–155.

Birdsell, J.B. 1977. The recalibration of a paradigm for the first peopling of greater Australia. In *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia, and Australia*, ed. J. Allen, J. Golson, and R. Jones, 113–167. New York: Academic Press.

Birdsell, J.B. 1993. *Microevolutionary patterns in Aboriginal Australia: A gradient analysis of clines*. Oxford: Oxford University Press.

Brace, C.L. 2005. *"Race" is a four-letter word: The genesis of the concept*. New York: Oxford University Press.

Brown, P. 2000. Australian Pleistocene variation and the sex of Lake Mungo 3. *Journal of Human Evolution* 38: 743–749.

Bulbeck, F.D. 2001. Robust and gracile Australian crania: The tale of the Willandra Lakes. In *Sangiran: Man, culture and environment in Pleistocene times*, ed. T. Simanjuntak, B. Prasetyo, and R. Handini, 60–106. Jakarta: Yayasan Obor Indonesia/The National Research Centre of Archaeology/École Française d'Extrême-Orient.

Bulbeck, F.D. 2005. The Last Glacial Maximum human burial from Liang Lemdubu in northern Sahuland. In *The archaeology of the Aru Islands, eastern Indonesia* (Terra Australis 22), ed. S. O'Connor, M. Spriggs, and P. Veth. Canberra: Australian National University.

Bulbeck, D., and S. O'Connor. 2011. The Watinglo mandible: A second terminal Pleistocene Homo sapiens fossil from tropical Sahul with a test on existing models for the human settlement of the region. *HOMO Journal of Comparative Human Biology* 62 (12): 1–29.

Cameron, D.W., and C.P. Groves. 2004. *Bones, stones and molecules. 'Out of Africa' and human origins*. Sydney: Academic Press.

Colgan, D.J. 2001. Commentary on G.J. Adcock et al. 2001 "Mitochondrial DNA sequences in ancient Australians: Implications for modern human origins". *Archaeology in Oceania* 36 (3): 168–169.

Currat, M., and L. Excoffier. 2004. Modern humans did not admix with Neanderthals during their range expansion into Europe. *PLoS Biology* 2 (12): e421.

Currat, M., and L. Excoffier. 2011. Strong reproductive isolation between humans and Neanderthals inferred from observed patterns of introgression. *PNAS* 108: 15129–15134.

Davidson, I. 2010. A lecture by the returning Chair of Australian studies, Harvard University 2008e09: Australian archaeology as a historical science. *Journal of Australian Studies* 34 (3): 377e398.

Davidson, I. 2013. Peopling the last new worlds: The first colonisation of Sahul and the Americas. *Quaternary International* 288: 1–29.

Dubois, E. 1922. The Proto-Australian fossil man of Wadjak, Java. *Krominklijke Akademie van Wetenschappen, Amsterdam* 23 (7): 1013–1051.

Durband, A.C., D.R.T. Rayner, and M.C. Westaway. 2009. The sex of the Lake Mungo 3 skeleton. *Archaeology in Oceania* 44: 77–83.

Freedman, L., and M. Lofgren. 1979. Human skeletal remains from Cossack, Western Australia. *Journal of Human Evolution* 8: 283–300.

Freedman, L., and M. Lofgren. 1983. Human skeletal remains from Lake Tandou, New South Wales. *Archaeology in Oceania* 18: 98–105.

Gilligan, I., and F.D. Bulbeck. 2007. Environment and morphology in Australian Aborigines: A reanalysis of the Birdsell database. *American Journal of Physical Anthropology* 134: 75–91.

Ghirotto, S., et al. 2011. No evidence of Neandertal admixture in the mitochondrial genomes of early European modern humans and contemporary Europeans. *American Journal of Physical Anthropology* 146: 242–252.

Groves, C.P. 1989. A regional approach to the problem of the origin of modern humans in Australia. In *The human revolution: Behavioural and biological perspectives on the origins of modern humans*, ed. P.A. Mellars and C.B. Stringer, 274–285. Edinburgh: Edinburgh University Press.

Groves, C.P. 2001. Lake Mungo 3 and his DNA. *Archaeology in Oceania* 36 (3): 166–167.

Guglielmino-Matess, C.R., P. Gluckman, and L.L. Cavalli-Sforza. 1979. Climate and the evolution of skull metrics in man. *American Journal of Physical Anthropology* 50: 549–564.

Gutenkunst, R.N., R.D. Hernandez, S.H. Williamson, and C.D. Bustamante. 2009. Inferring the joint demographic history of multiple populations from multidimensional SNP frequency data. *PLoS Genetics* 5 (10): e1000695.

Hope, G., and K. Aplin. 2005. Environmental change in the Aru Islands. In *The archaeology of the Aru Islands, eastern Indonesia (Terra Australis 22)*, ed. S. O'Connor, M. Spriggs, and P.M. Veth. Canberra: Australian National University.

Howells, W.W. 1973. *The Pacific Islanders*. New York: Charles Scribner's Sons.

Hudjashov, G., T. Kivisild, P.A. Underhill, P. Endicott, J.J. Sanchez, A.A. Lin, P. Shen, P. Oefner, C. Renfrew, R. Villems, and P. Forster. 2007. Revealing the prehistoric settlement of Australia by Y chromosome and mtDNA analysis. *PNAS* 104 (21): 8726–8730.

Huxley, T.H. 1863. *Evidence as to man's place in nature*. London: Williams & Norgate.

Indriati, E., C.C. Swisher III, C. Lepre, R.L. Quinn, R.A. Suriyanto, A.T. Hascaryo, R. Grun, C.S. Feibel, B.L. Pobiner, M. Aubert, W. Lees, and S.C. Antón. 2011. The age of the 20 meter Solo river terrace, Java, Indonesia and the survival of *Homo erectus* in Asia. *PLoS One* 6 (6): e21562.

Jungers, W.L., S.G. Larson, W. Harcourt-Smith, M.J. Morwood, T. Sutikna, A. Rokhus Duw, and T. Djubiantono. 2009. *Journal of Human Evolution* 57 (5): 538–554.

Keinan, A., J.C. Mullikin, N. Patterson, and D. Reich. 2007. Measurement of the human allele frequency spectrum demonstrates greater genetic drift in East Asians than in Europeans. *Nature Genetics* 39: 1251–1255.

Keith, A. 1936. *History from caves: A new theory of the origin of modern races of mankind*. London: British Speleological Association (First Speleological Conference).

Lalueza-Fox, C., and M.T. Gilbert. 2011. Paleogenomics of archaic hominins. *Current Biology* 21: R1002–R1009.

Macintosh, N.W.G. 1965. The physical aspects of man in Australia. In *Aboriginal man in Australia. Essays in honour of Emeritus Professor A.P. Elkin*, ed. R.M. Berndt and C.H. Berndt. Sydney: Angus and Robertson.

Mendez, F.L., et al. 2012. Global genetic variation at OAS1 provides evidence of archaicadmixture in Melanesian populations. *Molecular Biology and Evolution* 29: 1513–1520.

Merriwether, D.A., J.A. Hodgson, F.R. Friedlaender, R. Allaby, S. Cerchio, G. Koki, and J.S. Friedlaender. 2005. Ancient mitochondrial M haplogroups identified in the Southwest Pacific. *PNAS* 102 (37): 13034–13039.

Morwood, M.J., R.P. Soejono, R.G. Roberts, T. Sutikna, C.S. Turney, K.E. Westaway, W.J. Rink, J.X. Zhao, G.D. van den Bergh, R.A. Due, D.R. Hobbs, M.W. Moore, M.I. Bird, and L.K. Fifield. 2004. Archaeology and age of a new hominin from Flores in eastern Indonesia. *Nature* 31 (7012): 1087–1091.

Noble, W., and I. Davidson. 1996. *Human evolution, language and mind: A psychological and archaeological inquiry*. Cambridge: Cambridge University Press.

Pardoe, C. 1991. Competing paradigms and ancient human remains: The state of the discipline. *Archaeology in Oceania* 26: 79–85.

Pretty, G.L. 1977. The cultural chronology of the Roonka Flat: A preliminary consideration. In *Stone tools as cultural markers: Change, evolution and complexity*, ed. R.V.S. Wright, 288–331. Canberra: Australian Institute of Aboriginal Studies.

Reich, D., R.E. Green, M. Kircher, J. Krause, N. Patterson, E.Y. Durand, B. Viola, A.W. Briggs, U. Stenzel, P.L. Johnson, et al. 2010. Genetic history of an archaic human group from Denisova Cave in Siberia. *Nature* 468: 1053–1060.

Relethford, J.H. 2001. Ancient DNA and the origin of modern humans. *PNAS* 98 (2): 390–391.

Serre, D., et al. 2004. No evidence of Neandertal mtDNA contribution to early modern humans. *PLoS Biology* 2: e57.

Skoglund, P., and M. Jakobsson. 2011. Archaic human ancestry in East Asia. *Proceedings of the National Academy of Sciences USA.* 108: 18301–18306.

Stone, T., and M.L. Cupper. 2003. Last glacial maximum ages for robust humans at Kow Swamp, southern Australia. *Journal of Human Evolution* 45: 99–111.

Stoneking, M., and J. Krause. 2011. Learning about human population history from ancient and modern genomes. *Nature Reviews Genetics* 12: 603–614.

Swisher, C.C., III, W.J. Rink, S.C. Antón, H.P. Schwarcz, G.H. Curtis, A. Suprijo, and A. Widiasmoro. 1996. Latest *Homo erectus* of Java: Potential contemporaneity with *Homo sapiens* in Southeast Asia. *Science* 274: 1870–1874.

Tchernov, E. 1998. The faunal sequence of the southwest Asian Middle Paleolithic in relation to hominid dispersal events. In *Neandertals and modern humans in western Asia*, ed. T. Akazawa, K. Aoki, and O. Bar-Yosef, 77–90. New York: Plenum.

Trueman, J.W.H. 2001. Does the Lake Mungo 3 mtDNA evidence stand up to analysis? *Archaeology in Oceania* 36 (3): 163–165.

Tylor, E.B. 1873. *Primitive culture: Researches into the development of mythology, philosophy, religion, language, art and custom*. London: J. Murray.

van Holst Pellekaan, S.M. 2008. Origins of the Australian and New Guinea Aborigines. In *Encyclopedia of life sciences*. Chichester: John Wiley Sons Ltd. https://doi.org/10.1002/9780470015902.a0020815.

van Holst Pellekaan, S. 2011. Genetic evidence for the colonization of Australia. *Quaternary International*. https://doi.org/10.1016/j.quaint.2011.04.014.

van Holst Pellekaan, S., M. Ingman, J. Roberts-Thomson, and R.M. Harding. 2006. Mitochondrial genomics identifies major haplogroups in Aboriginal Australians. *American Journal of Physical Anthropology* 131 (2): 282–294.

Weidenreich, F. 1943. The skull of *Sinanthropus pekinensis*: A comparative study on a primitive hominid skull. *Palaeontologia Sinica, New Series D* 10.

Westaway, M.C., and C.P. Groves. 2009. The mark of ancient Java is on none of them. *Archaeology in Oceania* 44: 84–95.

Wunderly, J. 1943. The Keilor fossil skull: Anatomical description. *Memoirs. National Museum of Victoria* 13: 57–69.

Yotova, V., et al. 2011. An X-linked haplotype of Neandertal origin is present among all non-African populations. *Molecular Biology and Evolution* 28 (7): 1957–1962.

Further Reading

Krause, J., Q. Fu, J.M. Good, B. Viola, M.V. Shunkov, A.P. Derevianko, and S. Pääbo. 2010. The complete mitochondrial DNA genome of an unknown hominin from southern Siberia. *Nature* 464: 894–897.

Rasmussen, M., X. Guo, et al. 2011. An Aboriginal Australian genome reveals separate human dispersals into Asia. *Science* 334 (6052): 94–98.

Thorne, A.G., and P.G. Macumber. 1972. Discoveries of late Pleistocene man at Kow Swamp, Australia. *Nature* 238: 316–319.

Thorne, A.G., and M.H. Wolpoff. 1981. Regional continuity in Australasian Pleistocene hominid evolution. *American Journal of Physical Anthropology* 55: 337–349.

Flannery, Kent Vaughn

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Basic Biographical Information

Kent Vaughn Flannery was born in 1934 and grew up in the Chesapeake Bay region of Maryland. One of his high school teachers instilled in him a strong interest in zoology, ecology, and evolution. Flannery took advantage of the University of Chicago's "early entrant" program to enroll after his sophomore year of high school, receiving his B.A. in 1954. He then began studying for an M.A. in zoology. In 1957–1958, Flannery spent a year in Mexico collecting data for his thesis. He took archaeology courses at the Universidad de las Américas and participated in excavations in the Valley of Oaxaca. On his return to Chicago, he switched to anthropology. In 1960, Robert Braidwood took him to Iran as a field assistant to his staff zoologist, Charles A. Reed along with fellow student Frank Hole. Flannery wrote a Master's thesis (1961) in which he distinguished wild and domestic pigs from Near Eastern Neolithic sites. In 1961 Hole and Flannery returned to Iran to conduct excavations at Paleolithic and Prepottery Neolithic sites. They were joined in 1963 by James Neeley (Hole et al. 1969).

Flannery maintained his interest in Mesoamerica by working in Chiapas, Mexico, with Robert McC. Adams and at Ocós, Guatemala, with Michael D. Coe (Coe and Flannery 1967). Enroute to Guatemala, Coe and Flannery visited Richard S. MacNeish's project in Mexico's Tehuacán Valley. Once MacNeish learned that Flannery was an archaeozoologist and had worked with Braidwood on the origins of agriculture and animal domestication, he invited Flannery to join the Tehuacán project. Flannery worked with MacNeish during 1962–1963 and his archaeozoological research was included in Volume One of *The Prehistory of the Tehuacán Valley* (1967). MacNeish also encouraged Flannery to use data from the Tehuacán Formative for his Ph.D. thesis (1964) at the University of Chicago.

Flannery was hired as Associate Curator of Mesoamerican Archaeology by the Smithsonian Institution in 1964. One of his first responsibilities was to begin a new research project. Remembering the many unexplored caves and Formative sites he had seen in the Valley of Oaxaca, Flannery obtained funds for a pilot season in Oaxaca. In 1966 Flannery (1986) excavated Guilá Naquitz Cave, which yielded what were then the New World's oldest preserved gourds and squash (8000 cal. BCE), runner beans (6400 cal. BCE), and maize (4250 cal. BCE). By 1967 Flannery began excavations at the large Oaxacan Formative site, San José Mogote, a task that would occupy him for 15 years. By 1972 he had been joined there by Joyce Marcus. Flannery and Marcus discovered that San José Mogote had been occupied continuously from the beginnings of village life in Oaxaca (c. 1600 cal. BCE) until its transformation into the largest civic-ceremonial center in the valley (600–500 cal. BCE) (Flannery and Marcus 1983; Marcus and Flannery 1996).

Flannery also collaborated with colleagues in the Andean region of South America. In the early 1970s he joined MacNeish in Ayacucho, Peru, analyzing faunal remains from sites like Jaywamachay Cave and Tukumachay Cave. During the 1980s he served as the faunal analyst on Joyce Marcus' project at Cerro Azul in Peru's Cañete Valley.

Major Accomplishments

Kent Flannery is a leader in applying an ecosystem approach to reconstructing the past, using archaeological and other relevant data to construct models that identify the adaptive changes in the relationships between human societies and their environments. This perspective has provided the basic theoretical foundation of Flannery's precedent-setting research in both the Middle East and Mesoamerica. Flannery (1968, 1972) united this approach with broader systems theory as it is applied across many scientific disciplines. He also adopted a broad multidimensional

perspective on ecosystems, which encompass all relationships maintained by a given society with its natural and cultural environment. In Flannery's view, information is one of the most crucial aspects of these relationships and identifying the what, how, and who involved in the flow of information is key to understanding how systems change.

Application of an ecosystem approach allowed Flannery to reconstruct the gradual transition from hunting and gathering subsistence to agriculture in the Valley of Oaxaca. Based on both archaeological and ethnographic data, Flannery (1968) proposed that the subsistence activities of early Oaxacan societies were regulated by seasonality and scheduling in a deviation-counteracting system that maintained the equilibrium of the subsistence system. Such a system has the potential to shift to a deviation-amplifying system when one or more components change causing the entire system to diverge from its former state – in this case, the trigger was genetic changes in several food plants that encouraged their increased exploitation, which ultimately led to a new subsistence system based on agriculture.

Throughout his career, Flannery has maintained a multidimensional perspective of change within human society. While acknowledging there are universal factors and processes at work, these are expressed in each case in unique ways, so that archaeology must seek and reconstruct the specific conditions and factors that were the crucial agents of change. To do this Flannery takes an inclusionary perspective to problem solving, considering all relevant archaeological, ecological, and anthropological data. In reconstructing the rise of complexity and urbanism in Oaxaca, Flannery led his colleagues and students to apply data from multiple disciplines to investigate each level within society – household, community, village, region, and area – to trace the unique developmental course toward increasing complexity. His inclusive perspective is also apparent in his application of ethnographic case studies to illuminate specific archaeological situations and provide insights into in the past based on similar ecological conditions and sociocultural factors. Flannery also applies ethnographic data from descendent native Zapotec communities in Oaxaca. A case in point is Flannery and Marcus's (1976, 1993), Marcus and Flannery (1994) studies of the crucial role of ideology to both the continuities and changes in pre-Columbian Oaxacan society which presaged developments in cognitive archaeology.

Flannery's career as an archaeologist is strongly shaped by his early background in science and his love of zoology, paleontology, and ecology. He continues to believe in a unique past that is knowable through the collection of empirical data, and the testing of universal models of social evolution. In his favorite theoretical model, agriculture began in an early Holocene period of "broad-spectrum" plant collecting and resulted from attempts to increase the density of certain plants while reducing travel time. A key turning point for early farmers was the privatization of storage; this allowed certain families to work harder and outstrip their neighbors, leading to social inequality. Flannery sees hereditary inequality as based not simply on economic advantage but also on ideological changes that justify inequality by giving it supernatural authority. He sees the origins of the world's first states as taking place in the context of competing hierarchical societies, when one of those societies gained an advantage that allowed it to subjugate the others. He is also a trenchant critic of fads in archaeological theory, especially those that pay limited attention to empirical data (Flannery 1982, 2006).

Perhaps the most important impact of Flannery's inclusive ecosystem approach can be seen in the recent shift in our concepts concerning the long-term evolution of human societies. While there certainly has never been a single unified "school of thought" within archaeology on cultural evolution (nor on any other perspective on the past, for that matter), the once popular assumption that human societies evolved along a course set by "prime movers" and "technological determinism" has given way to a more particularistic view of change that operates in an infinite number of ways under an infinite number of conditions – and can be reconstructed and understood by archaeology from an almost infinite number of approaches and theoretical perspectives. Seen in this light, Flannery's contribution to a

multidimensional ecosystems approach clearly has been one of the most essential "prime movers" in the evolution of American archaeology over the past half century.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Braidwood, Robert John
- ▶ Cognitive Archaeology
- ▶ Marcus, Joyce
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture

References

Coe, M.D., and K.V. Flannery. 1967. *Early cultures and human ecology in South Coastal Guatemala*. Smithsonian Contributions to Anthropology 3. Washington, DC: Smithsonian.

Flannery, K.V. 1968. Archaeological systems theory and early Mesoamerica. In *Anthropological archaeology in the Americas*, ed. B.J. Meggers, 67–87. Washington, DC: Anthropological Society of Washington.

Flannery, K.V. 1972. The cultural evolution of civilizations. *Annual Review of Ecology and Systematics* 3: 399–426.

Flannery, K.V. 1982. The golden Marshalltown: A parable for the archeology of the 1980s. *American Anthropologist* 84 (2): 65–278.

Flannery, K.V., ed. 1986. *Guilá Naquitz: Archaic foraging and early agriculture in Oaxaca, Mexico*. New York: Academic.

Flannery, K.V. 2006. On the resilience of anthropological archaeology. *Annual Review of Anthropology* 35: 1–13.

Flannery, K.V., and J. Marcus. 1976. Formative Oaxaca and the Zapotec cosmos. *American Scientist* 64: 374–383.

Flannery, K.V., and J. Marcus. 1983. *The cloud people: Divergent evolution of the Zapotec and Mixtec civilizations*. New York: Academic.

Flannery, K.V., and J. Marcus. 1993. Cognitive archaeology. *Cambridge Archaeological Journal* 3: 260–270.

Hole, F., K.V. Flannery, and J.A. Neely. 1969. *Prehistory and human ecology of the Deh Luran Plain*. Memoirs of the Museum of Anthropology 1. Ann Arbor: University of Michigan.

Marcus, J., and K.V. Flannery. 1994. Ancient Zapotec ritual and religion: An application of the direct historical approach. In *The ancient mind: Elements of cognitive archaeology*, ed. C. Renfrew and E.B.W. Zubrow, 55–74. Cambridge: Cambridge University Press.

Marcus, J., and K.V. Flannery. 1996. *Zapotec civilization: How urban society evolved in Mexico's Oaxaca Valley*. London: Thames and Hudson.

Further Reading

Feinman, G.M. 2000. A concluding perspective on the theoretical contributions of Kent V. Flannery. In *Cultural evolution: Contemporary viewpoints*, ed. G.-M. Feinman and L. Manzanilla. New York: Kluwer Academic/Plenum.

Flannery, K.V., ed. 1976. *The early Mesoamerican village*. New York: Academic.

Flannery, K.V., ed. 1982. *Maya subsistence: Studies in memory of Dennis E. Puleston*. New York: Academic.

Flannery, K.V., and J. Marcus. 2005. *Excavations at San José Mogote 1: The household archaeology.* Museum of Anthropology Memoir 40. Ann Arbor: University of Michigan.

Flannery, K.V., J. Marcus, and R.G. Reynolds. 1989. *The flocks of the Wamani: A study of llama herders on the punas of Ayacucho, Peru*. New York: Academic.

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Floors and Occupation Surface Analysis in Archaeology

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Introduction

In the same way modern carpets reflect the activities of their owners, occupation surfaces can tell many things about their users. Looking at the characteristics of the carpet once it has been removed from the floor of the whole house, one can realize that there are worn areas, consequence of intense transit and intact zones normally placed under heavy furniture. It is also possible to differentiate between clean areas and dirty parts of the carpet containing many residues spelt on the surface. Then, after a careful study of this carpet, it is possible to reconstruct most of the everyday activities of its users.

The same happens with the study of archaeological structures. In the case of occupation surfaces, it is now possible to use this approach to try to understand how people lived in the past. Traditionally, archaeological artifact distribution and architecture have suggested the way spaces were used. In recent times, chemical residues detected in the porous of floors have complemented this information and in many cases have confirmed preliminary inferences, but in some others, especially when there is no archaeological material on surface floors, they have been the unique indicator of the human activities carried out on the occupation surfaces.

In general terms, productive activities are easily recognized because the energy, the amount of materials involved, and the intensity of the activities produce a dramatic change in the archaeological context. However, occasional activities with limited material and energy involved are difficult to detect.

As a consequence of the use of chemical indicators, floors, which not so many years ago were disposable, became a new important archaeological material that has to be preserved, documented, and studied in order to recover valuable information concerning human activities carried out in the past.

Definition

Following well-established definitions, *soils* can be considered as the top of weathering profiles (vertical sequences) developed by the in-place physical and chemical alterations of preexisting sediments. If a sediment mass is stable, weathering at the surface creates horizons with distinctive physical and chemical properties that become superimposed on the previously deposited sediments. Soils are not sedimentary deposits, and normally support the vegetation allowing agriculture.

Sediments are produced by the weathering of rocks that are transported as solid particles or dissolved chemicals and are accumulated or precipitated in sedimentary environments. They are usually horizontal and nevertheless might be modified by tectonic movements.

In archaeological context, *fill dirt* describes the earthy material that is used to *fill in* a depression, but especially to level surfaces or to build mounds and archaeological structures in general.

Occupation surface is any surface that was used in the past. An example of these surfaces is the irregular level occupied by the inhabitants of a cave. One special case of this kind of surfaces is the *floor* that can be defined as a man-made nearly horizontal surface consisting of several layers of preparation and finishing. An outstanding example of floor is the lime-plastered floor (usually called stucco floor) that represents an important technological and architectonic development in Mesoamerica. Any occupation surface is able to preserve organic residues, but the reliability of the interpretation is maximized in lime-plastered floors.

As a result of the accumulation of thousands of analyses of floor samples, the importance of looking at floors as a new archaeological material became evident. During the first stage of chemical prospection, the object of study was the soil, but for the study of intrasite human activities, the focus changed to occupation surfaces and floors, man-made surfaces that behave in very different ways than soil. During an archaeological excavation, it is very important to establish the difference between fill earth, sediments, soil, and specially floors because the same chemical results can be interpreted in different ways depending on the kind of material under study.

In recent years, it has been demonstrated that chemical residues are well preserved in the porous texture of the floors, allowing their study after hundreds, even thousands, of years, and revealed the floor as an outstanding archaeological material that preserves information that has not been traditionally taken into account.

Historical Background

Hirth (1975) published a paper that put together the results of fieldwork carried out during 1972 in Manzanilla, Puebla and Chalcatzingo, Morelos, Mexico. In this entry, he mentions that in Puebla he used sampling grids to search for intensive

habitation areas. The high phosphate values were interpreted as the place for fire spot, trash pits, and burials. After excavating the detected areas, he found habitational remains.

In Chalcatzingo, Morelos, the main goal of the project was to detect the most intensive occupation areas of the site, the relationship with the surroundings, and the function of different parts of the site. In that case, the fieldwork used pits within transects to define the site extension and intensive occupation areas.

Most of these results had bad diffusion and were almost unknown. The only paper, published by *Vínculos* in 1975, had a resume of the first two experiences of phosphate studies in Mexico, but no figures were included. It was a shame because these two field experiences were the first successful applications of phosphate analysis in Mesoamerican archaeology.

Some years later, other applications of this new technique were made in the Laboratorio de Prospección Arqueológica, using phosphates as an archaeological prospection tool to look for settlement limits and garbage dispersion. Despite of some success in the delimitation of archaeological sites in Terremote, Tlaltenco, DF, in 1978, I considered that the time investment was not in accord with the information obtained (Barba 1980).

It was during fieldwork carried out in Xochipala, Guerrero, in 1978 that something changed. In prospection, we used to work with large regular grids, taking soil samples at intersections. After analyzing the samples from one small grid, it was clear that one part of the grid presented high values of phosphate, while the other showed lower values. The most interesting thing was that after a shallow archaeological excavation in the same grid, a wall foundation was exposed exactly between the high and low phosphate values (Barba 1990).

Up to then, I was used to deal with large-scale sampling of entire sites and their interpretation, but in this case, for the first time, I was looking at differences on both sides of a wall. The excavation also showed that the exterior of the structure had higher values than the interior, suggesting the important idea that human activities produced different chemical enrichment of the same surface, inside and outside of a structure.

Previously, some authors had shown how some chemical indicators such as organic matter and nitrogen were related to human activities. In order to test these ideas and the relationship with phosphates, I proposed a project to sample the earthen floor of the house of a family who was living in a small town in Tlaxcala, Mexico. The idea was to also observe their daily activities in order to correlate this information with the results from the samples. We spent some days making a floor plan of the house and taking almost 40 floor samples, as well as pictures and notes of their everyday activities.

The hypothesis to test was that the activities we observed would produce differential chemical enrichment of the floor in both sides of the walls. After some days of lab work, spot test results were mapped on the house plan. The distribution of phosphates was explained according to different activities. Also interesting, during the phosphate analytical procedure, we applied Eidt's acid solution, which produced an effervescent reaction in many samples. That reaction was the first approach to the establishment of carbonate determination; it was also plotted and by the first time showed a very interesting correlation with human activities.

That was the beginning of an important change in the use of phosphate analysis and chemical indicators. In those days, it was generally thought that these chemical techniques could detect human settlements, even going to the extreme of supposing they could detect structures. With the arrival of geophysical techniques to archaeology during the 1970s, it was soon realized that these techniques were the best approach for the detection of architectural remains, and chemical techniques were more or less put aside. Our lab, nevertheless, proposed that the chemical techniques could be even more useful for archaeology in detecting areas of human activity in floors within architectural structures. With this new approach, a major change occurred in both the scale and goals of the study of chemical residues not in soils but in floors.

During the first stages of the study of chemical residues in the floors of living spaces, it was very difficult to accept that human activities could leave such a permanent track and that residues found in the present could be related to materials used in the past. It was difficult to support because we were dealing with intangible and invisible substances that were impossible to see after excavation, and it was unbelievable that after hundreds of years, organic residues were in floors against our personal experience that these substances are lost just after some weeks.

Nevertheless, the ethnoarchaeological studies carried out showed that chemical enrichment patterns found in floors of traditional households remained some months and years and had direct relationship with activities and substances spilled on floors. Then, the main problem was to go back on time and demonstrate that organic residues could survive hundreds and even thousands of years.

Fortunately, during this time, the first results of organic residues found in Mediterranean ceramic pots came out. In some cases, those pots had inscriptions or marks describing the ancient content, and that information was useful to contrast the chemical analysis results that showed the presence of organic residues. This fact allowed to build the bridge that connected the activities carried out hundreds of years ago and the organic residues found in the pores of ceramic pots in the present. This important coincidence provided the support to accept that organic residues could survive and also be present in the pores of the floors.

In this way, the crazy idea of recognizing activity areas through the chemical study of floors was transformed in a reasonable idea that perhaps could be improved including another kind of analytical techniques. In the 1980s, the ICP was included to study chemical residues in floors (Middleton and Price 1996).

In the same way that centuries ago the Galileo's telescope and the observation of the Moon surface produced the optical theory to support it, in our field of study, the presence of chemical residues in floor is no longer questioned thanks to the discovery of the residues in pottery pores. Now the discussion could be on the appropriate analytical technique, the smallest portion of sample to be analyzed, the original substances that can be identified after the time transformation of residues, etc., but the existence of organic residues is presently a commonly accepted knowledge.

Some of the most comprehensive reviews of papers published in this field are the articles published by Holliday and Gartner (2007) and Wells and Moreno (2010), the first emphasizing phosphorous chemistry and analytical techniques while the second more concerning on the applications to archaeology in Mesoamerica.

Key Issues

Theoretical Background

The detailed analyses of archaeological materials, as well as their spatial associations, are very powerful tools for studying activity areas. An activity area has been usually defined as the association of raw materials, products, artifacts, and chemical residues accumulated in specific places as a consequence of human activities. As a part of complementary information for the study of activity areas, there are chemical indicators that can be analyzed to determine the kind of activity that was carried out on the floors (Pepe et al. 1989).

The use of chemical indicators for the study of activity areas is based on the following assumptions:

1. When an activity takes place, some liquid residues could be spilled on the floor, and, sometimes, depending on the characteristics (porosity) of this surface, the residues could be absorbed. For that reason, a differential enrichment of the floor could be observed depending on the distribution and diversity of the activities made in a room or household.
2. Once the chemical compounds, which were the by-products of human activities, have been incorporated into the floor's pores mainly as solutions, they remain protected and preserved by this matrix.
3. Through the chemical analyses of floor samples, it is possible to identify and evaluate the

presence and the spatial distribution of several indicators. Some of the floors were used for specific activities, so through their characterization, it could be possible to identify the function of the studied area.

4. The comparative study of materials and substances in any particular case, as well as previous studies in modern households, offers the possibility of improving interpretation in archaeological terms.

The differential chemical enrichment of floors is related to the type of activity (production, use-consume, storage, or waste); the periodicity, the intensity, and the duration of the activity; the changes in the spatial distribution of the activity; and the different uses of the area (in the same and later times).

For these studies, the assumption that the original floor had a homogeneous composition at the moment of its construction is required; this means that the floor composition is the same in every point of its surface; thus, the human activities modify such homogeneity by adding specific chemical residues.

Several types of floor can be recognized in Mesoamerica. From this variety, the lime-plastered floors are the most suitable for the study of activity areas because their production process with fire discards the chemical residues possibly incorporated before the use of this material as a floor (Barba 2007).

Ethnoarchaeological Approach

The ethnoarchaeological approach has been one of the ways to achieve the interpretation of results regarding the distribution of chemical residues in archaeological terms. To correlate the origin of a chemical concentration of any compound found in a floor with any kind of activity that has taken place, we can draw upon the study of the activities carried out in an inhabited domestic structure. In this respect, several interesting essays have been carried out as part of the research project on activity areas at the Archaeological Prospection Lab, with the main goal of establishing the general enrichment patterns for various activities, whether they are domestic, productive, or ritual.

As the first part of this general project in 1978, we used the phosphate analysis in a house at San Vicente Xiloxochitla, Tlaxcala, Mexico. We related direct observations, the information provided by the inhabitants with a traditional way of life, and the concentration of chemical residues in the floors of the residential unit. Among the outstanding conclusions, we found that there was a strong evidence of distribution patterns directly associated with observed activities, where the resting areas (around and under the beds) were found to be poor in phosphates, while food consumption areas and open yards were very rich in this compound. Moreover, intensive transit areas suffered considerable erosion, being, therefore, poor in phosphate content. Finally, the area where meals were prepared and cooked (where the hearth was located) was low in phosphate content but high in pH values. Some years later, the same floor samples of this house were studied again, this time including a new set of inorganic and organic tests (Barba and Ortiz 1992).

As a second stage of the same project, we made a research in the recently abandoned village of Osumacinta Viejo, Chiapas. We studied two houses, one located downtown and the other in the outskirts of the village. Both had been abandoned for 3 years. We arrived to the following conclusions: the area close to the hearth where meals were eaten presented high phosphate concentrations, while the corners and the spaces close to walls showed a considerable depletion of this compound. The places where hearths and fireplaces had been located showed high pH values. Two large concentrations of chemical elements were visualized in the areas outside the rooms. In order to explain them, the authors resorted to ethnoarchaeological explanations. For instance, the calcium distribution pattern is explained as a result of the use of lime to soften kernels for nixtamal, and, on the other hand, iron concentration was due to the treatment of agave leaves.

A more recent study of a household at Muxucuxcab, Yucatan, provided information concerning the distribution of chemical compounds in a modern house that reflects the activities of the inhabitants. Additional information was obtained interviewing the people living there

and including the results of the detailed archaeological excavation. The joint interpretation of these three levels of information clearly delimited four activity areas at the household. The same samples were studied years later to compare results from different analytical techniques (Middleton et al. 2010).

After the study of ethnoarchaeological cases, it has been proved that chemical residues existed in floors, that their distribution was not random, and that it depended on activities performed by the inhabitants. Some differences in the use of the spaces can be observed, and many of the activities produced recognizable patterns.

It was important to accumulate information from ethnoarchaeological cases in order to understand patterns in the use of domestic spaces. The study of modern and recently abandoned houses has made possible to apply the recognized patterns to the study of archaeological house floors.

The importance of the lime-plastered floors is enhanced by the fact that limestone is not readily available in the Basin of Mexico, so the lime used, firstly at Teotihuacan and later at Tenochtitlan, had to be transported from limestone outcrops close to present Tula city, among others places (Barba et al. 2009). Pre-Hispanic lime plaster was a very important technological development. Floors were very homogeneous and had a very low content of residues, since, in order to prepare the lime, limestone was fired at temperatures of up to 800 °C, thereby removing all organic materials. During the slaking and preparation with water, masons produced homogeneous mixtures that were evenly applied to floor surfaces. Once the floor was dry, it was used and began to accumulate residues in the pores as a consequence of the inhabitants' activities. After Teotihuacan, many other settlements used this kind of floors providing the opportunity to investigate the past everyday living to the present archaeologists.

Analytical Techniques

In the case of our laboratory, most of the tests selected are characterized by the ease of application; all of them are simple, reliable, semiquantitative tests, and they allow the immediate processing of numerous samples at a minimum cost and time (Barba 2007). The first set of tests carried out included phosphate, carbonate, and Munsell color determination, along with pH measurement. In addition, calcium and iron were sometimes analyzed to determine their distribution in residential areas. In all cases, the experiments have shown that variations in concentration reflect human activities. Tests for organic compounds have been incorporated in later times. It has been shown that organic compounds remain in the pores of floors as well as in the pores of ceramics. Spot tests for fatty acids, carbohydrates, and protein residues have been successfully used to study floors. Since most human activities are related to organic solutions, the study of both kinds of chemical compounds (organic and inorganic) has enriched the interpretation substantially.

Samples are usually obtained by drilling at grid intersections and collecting in plastic bags the produced powder. Sampling density is an important factor of the study. The most common density is one sample per square meter. In some cases, such as in the interior of small roofed rooms, the density can be increased to four samples per square meter, but in large open areas, it might decrease to one sample per 4 or 16 m^2. As a result, it is quite common to have hundreds and even thousands of samples for the study of a single household or residential unit. This kind of studies requires the use of low-cost and easy spot tests. For the interpretation of human activities through chemical analysis of residues in floors, it is important to look for enrichment patterns that are only revealed by large numbers of analyzed samples.

In all cases, a map of isoconcentration lines is produced showing the distribution of chemical residues in the floor under study. Whenever available, this distribution should be related to the archaeological materials found on top of the floors during excavation. In the course of fieldwork, the immediately processed analytical results sometimes have enabled researchers to modify their sampling strategy.

Gas Chromatography–Mass Spectrometry Analysis (GC-MS)

As discussed above, spot tests inform about the distribution of residues but cannot provide information on the origin of the organic residues, often constituted by complex mixtures. Frequently, it is advisable to identify each component of these mixtures, and, for this purpose, gas chromatography

coupled with mass spectrometry (GC-MS) is one of the most suitable techniques. This analytical technique allows the separation and identification of many substances, lipids in particular. This permits the interpretation of the residues absorbed in the pores of archaeological floors and ceramics, through the identification of specific markers that are characteristics of the different substances (Evershed et al. 2005).

For example, it is possible now to distinguish between animal and vegetal fats. In many cases, it has been possible to identify olive oil. Furthermore, GC-MS has allowed the identification of markers characteristic of other vegetal substances common in the European ancient diet such as wine (Guash-Jané et al. 2004) and *Brassicaceae*, a common vegetable (Charters et al. 1997). The presence of animal stables and latrines can also be detected by monitoring the presence of *coprostanol* (Bull et al. 2003; Evershed et al. 2005).

The advantages of GC-MS are therefore evident, and they are particularly related to the possibilities of knowing the specific substances involved in ancient activities. On the other side, the main disadvantage of this kind of chemical analysis consists mainly in the complex and expensive instrumentation required. Considering procedures often carried out to extract different compounds (Mottram et al. 1999), in many cases it can be an extremely time-consuming technique.

As mentioned before, the study of the distribution of organic residues in archaeological floors requires the analyses of hundreds of samples, and, probably for this reason, no case studies exist of this kind of study performed only by GC-MS analysis.

At the National University of Mexico and the University of Siena, integrated analysis of spot tests and GC-MS has been applied in order to understand the horizontal residue distribution and function of different areas or structures by spot test and then verified by the identification of some specific substances by GC-MS (Pecci 2009; Middleton et al. 2010).

Induced Coupled Plasma–Optical Emission Spectrometry Analysis (ICP-OES)

Another approach to study archaeological floors and the function of archaeological structures is the use of ICP-OES analysis of an acid extract of floor samples. This technique has been particularly useful in the identification of anthropogenic chemical elements present in archaeological surfaces (Middleton et al. 2005). It entails the characterization of a suite of elements that includes both anthropogenic and geochemical indicators, therefore making it possible to distinguish between anthropogenic and natural processes in the composition of the archaeological surfaces. A variety of extraction techniques can be used, ranging from a buffered neutral extraction to a total digestion. The particular technique employed in a given case depends on the purpose and goals of the study.

The advantage of this technique is that it is highly sensitive to subtle differences in the chemical composition of floor samples, making it possible to distinguish between a wide range of by-products involved in human activities and to distinguish between human activities and geochemical processes. The copious quantitative data produced by this technique readily lend themselves to powerful inferential statistical analysis. Factor analysis of principal components and numerical classification recognize patterns of covariance in the enrichment and depletion of elemental concentrations in the data that help to identify the patterns of activity that took place upon the surface. Both the raw data and the derivative statistics, such as factor scores, can be surface plotted to provide a visual aid for the interpretation of enrichment patterns. Both the distribution of the factor scores and the raw elemental data often mirror the areas of most intense activity and reflect activities such as food preparation, washing, or the contribution of human metabolic by-products in the soil. Because data can range over several orders of magnitude, data are usually converted to a logarithmic scale for analysis and plotting (Middleton and Price 1996).

Although a powerful technique, there are limitations to this approach, particularly in comparison to spot tests in the field. Foremost, the length of time involved in sample preparation and extraction would bar this approach for use in the field in most cases, whereas spot tests can provide immediate results in the field, which can be used to guide excavation and interpretation. A second and significant drawback is the cost of the instrument. However, beyond the instrument cost, ICP-

OES analysis of samples is fairly economical. Finally, although sensitive to some constituents of organic matter such as phosphorus, ICP-OES analysis cannot identify organic compounds.

Current Debates

One of the latest technologies developed for fieldwork that shows a broad field of applications, including archaeology, is the portable X-ray fluorescence. Recent electronic developments have provided compact instruments, with high sensitivity and at a reasonable cost. Besides many other applications in industry, environment, and conservation, in the particular case of archaeology, this kind of instruments might contribute to the advancement of chemistry applications to archaeology mainly because this analytic technique does not require sample preparation, which is a problem with previously mentioned techniques.

As many of the analytical techniques XRF determines elements. But since most of the human activities in the past are related with organic residues composed by C, N, H, and O, the challenge is to build a bridge between elementary distribution and the chemical residues produced by human activities.

Nowadays, a lot of sophisticated analytical techniques are available; depending on research goals and economic resources, all of them can be successfully applied to the study of chemical residues in floors. However, no matter which analytical tool is used, whether the most technologically sophisticated or the simplest one, it is important to bear in mind the necessity of building a bridge between the concentration of chemical residues in floors and the human activities that produced them, through the study of living households by means of observation or with controlled laboratory experiments. By not doing so, we could end up with a long list of chemical elements, even in parts per billion, with no archaeological meaning.

International Perspectives

After 30 years promoting the use of spot test in archaeology, interesting attempts have been done to establish these analytical procedures in different places. The successful ones have been done by universities. The first successful experiences were carried out in Cuba, at Universidad de la Habana and in Costa Rica. In more recent times, these ideas have been spread out in some other countries. One of these cases is the recent study of the residential units in the Aburrá region in Colombia, to figure out the domestic and productive activities of the ancient inhabitants. A special case is Italy, where Pecci at the University of Siena has been intensively working in the application of spot test to archaeological contexts of different temporalities in the Mediterranean area in addition to the use of GC-MS for the identification of residues in ceramic vessels and floors (Pecci 2009). United States has various groups that have developed different analytical approaches for the study of human activities in the past. The group in Madison, University of Wisconsin, has a long-term successful application of ICP for the study of residues in floors that began with Middleton's Ph.D. dissertation. The group in BYU has been using spot test, phosphate quantitative determinations, and ICP for the study of Mayan archaeological sites and associated market places (Terry et al. 2004). The group in the University of South Florida has been performing different experiments to understand residue behavior in the archaeological context and studying different sites (Wells et al. 2000). Very recent is the establishment of the Chemistry Laboratory in the Universidad Autónoma de Yucatán that began the study of historic and archaeological floors in the Maya region using spot tests.

Future Directions

Besides the ongoing development of the pXRF equipment for the study of elements associated to human activities, either in soil samples as a chemical prospecting tool or in floors as a tool to detect residues produced by human activities, there is a new analytical tool with promising perspectives in the detection of organic residues: the new portable infrared spectroscopy equipment. For many years, this technology has provided reliable information analyzing organic residues in laboratories, but

now it is possible to use portable equipment for the detection of organic residues in floor samples, even during the fieldwork.

A little behind is the development of new portable RAMAN spectroscopy that, theoretically, is able to detect organic residues, but this technology needs some time to reach the reliability of the infrared technology. Nevertheless, these technologies represent an open field of research to discover and need a lot of work to become useful for archaeology.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Chemistry: Definition
- ▶ Archaeological Prospection Laboratory (National Autonomous University of Mexico)
- ▶ Archaeological Soil Micromorphology Working Group
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology
- ▶ Laboratory for Archaeological Chemistry (University of Wisconsin)
- ▶ Organic Residue Analysis in Archaeology

References

Barba, L. 1980. *El análisis de fosfatos como herramienta de prospección y delimitación*, 267–274. II: Proceedings XVI Mesa Redonda de la Sociedad Mexicana de Antropología.

Barba, L. 1990. El uso del análisis de fosfato en sitios arqueológicos de Xochipala, Guerrero. In *Arqueología de Xochipala*, ed. P. Schmidt, 257–272. México: IIA, UNAM.

Barba, L. 2007. Chemical residues in lime plastered archaeological floors. *Geoarchaeology* 22 (3): 439–453.

Barba, L., and A. Ortiz. 1992. Análisis químico de pisos de ocupación: un caso etonográfico en Tlaxcala, México. *Latin American Antiquity* 3: 63–82.

Barba, L., D. Barca, J. Blancas, G.M. Crisci, L. Manzanilla, D. Miriello, A. Ortiz, and A. Pecci. 2009. Provenance of the limestone used in Teotihuacan (Mexico). A methodological approach. *Archaeometry* 51: 525–545.

Bull, I.D., M.M. Elhmmali, D.J. Roberts, and R.P. Evershed. 2003. The application of steroid biomarkers to track the abandonment of a roman water course at the Agora (Athens, Greece). *Archaeometry* 45: 149–161.

Charters, S., R.P. Evershed, A. Quye, P.W. Blinkhorn, and V. Reeves. 1997. Simulation experiments for determining the use of ancient pottery vessels: The behavior of epicuticular leaf wax during boiling of a leafy vegetable. *Journal of Archaeological Science* 27: 1–27.

Evershed, R., S.N. Dudd, and M.J. Lockehart. 2005. Lipids in archaeology. In *Archaeological science*, ed. D.R. Brothwell and A.M. Pollard, 331–350. Chichester: Wiley.

Guash-Jané, M.R., M. Iberno Gómez, C. Andrés-Lacueva, O. Jáuregui, and R.M. Lamuela-raventós. 2004. Liquid chromatography with mass spectrometry in Tandem mode applied for the identification of wine markers in residues from ancient Egyptian vessels. *Analytical Chemistry* 76: 1672–1677.

Hirth, K.G. 1975. Estudios de fosfatos en el contexto de arqueología. *Vínculos* 2: 99–102.

Holliday, V.T., and W.G. Gartner. 2007. Methods of soil P analysis in archaeology. *Journal of Archaeological Science* 34: 301–333.

Middleton, W.D., and T.D. Price. 1996. Chemical analysis of modern and archaeological house floors by means of inductively coupled plasma- atomic emission spectroscopy. *Journal of Archaeological Science* 23: 673–687.

Middleton, W.D., T.D. Price, and D.C. Mieggs. 2005. Chemical analysis of floor sediments for the identification of anthropogenic activity residues. In *Inhabiting Çatalhöyük: Reports from the 1995–99 seasons*, ed. I. Hodder, 399–412. Cambridge: McDonald Institute Monographs/British Institute of Archaeology at Ankara.

Middleton, W.D., L. Barba, A. Pecci, J. Burton, A. Ortiz, L. Salvini, and R. Rodriguez. 2010. The study of archaeological floors. Methodological proposal for the analysis of anthropogenic residues by spot test, ICP-OES and GC-MS. *Journal of Archaeological Method and Theory* 17: 183–208.

Mottram, H.R., S.N. Dudd, G.J. Lawrence, A.W. Stott, and R.P. Everhed. 1999. New chromatographic, mass spectrometric and stable isotope approaches to the classification of degraded animal fats preserved in archaeological pottery. *Journal of Chromatography A* 833: 209–221.

Pecci, A. 2009. Analisi chimiche delle superfici pavimentali: un contributo all'interpretazione funzionale degli spazi archeologici. In *V Congresso Nazionale di Archeologia Medievale*, ed. G. Volpe and P. Favia, 105–110. Borgo S. Lorenzo: All'Insegna del Giglio.

Pepe, C., P. Dizabo, P. Scribe, J. Dagaut, J. Fillaux, and A. Saliot. 1989. Les marqueurs biogeochimiques: application a l'archeologie. *Revue d'Archeometrie* 13: 1–11.

Terry, R.E., F.G. Fernández, J.J. Parnell, and T. Inomata. 2004. The story in the floors: Chemical signatures of ancient and modern Maya activities at Aguateca,

F

Guatemala. *Journal of Archaeological Science* 31: 1237–1250.
Wells, E.C., and J.E. Moreno Cortés. 2010. Chimie du sol et activités humaines anciennes. Les exemples archéologiques du Mexique et d'Amérique centrale. *Étude et Gestion des Sols* 17 (1): 59–70.
Wells, E.C., R.E. Terry, P.J. Hardin, J.J. Parnell, S.D. Houston, and M.W. Jackson. 2000. Chemical analyses of ancient anthrosols in residential areas at Piedras Negras, Guatemala. *Journal of Archaeological Science* 27: 449–462.

Florence Charter on Historic Gardens (1982)

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Introduction

The 1982 ICOMOS Florence Charter on Historic Gardens (Florence Charter) was developed at a meeting of the members of the ICOMOS IFLA International Committee for Historic Gardens (now known as the ICOMOS IFLA International Scientific Committee on Cultural Landscapes) in Florence on 21 May 1981. The Florence Charter, a document addressing a specific field of garden preservation within preservation of historic resources, was registered by the International Council on Monuments and Sites (ICOMOS) as an addendum to the Venice Charter on 15 December 1982. The drafting and acceptance of this charter as an addition to guiding documents in the preservation of cultural heritage signaled an enlargement of the realm of preservation from consideration of significant architecture and monuments to include historic gardens and parks in a range of sizes, which may be associated with a building or a property important for a significant landscape. The Florence Charter ushered in the landscape as a realm for research, planning, and action in cultural heritage preservation that has progressed and enlarged in 40 years since its registration.

Definition

The Florence Charter is a document approved by ICOMOS in 1982 that defines historic gardens as "an architectural and horticultural composition of interest to the public from the historical and artistic point of view" (ICOMOS Florence Charter: Article 1). This charter specifically addresses the conservation of gardens, parks, and commemorative landscapes purposely designed and constructed of organic and inorganic materials. Historic garden maintenance, conservation, restoration, reconstruction, use, legal protection, and administrative stewardship are specifically outlined in this charter. The charter provides a clear capture of the realm of historic gardens identifying the composition of the historic garden as (1982, Article 4, The Florence Charter):

- Its plan and its topography
- Its vegetation, including species, proportions, color schemes, spacing, and respective heights
- Its structural and decorative features
- Its water, running or still, reflecting the sky

Further, the charter refers to the setting for the historic garden, beyond the garden boundaries, indicating that "The historic garden must be preserved in appropriate surroundings. Any alteration of the physical environment which will endanger the ecological equilibrium must be prohibited" (1982, Article 4, The Florence Charter). This inclusion of setting heralded the contemporary definition of buffer zones for protection of heritage resources. The Florence Charter is a touchstone to which professional practice in the realm of historic gardens and cultural landscapes constantly refers to as a foundational document framing international guidance.

Key Issues/Current Debates/Future Directions/Examples

Leadership by René Pechère, Landscape Architect

The Committee on Historic Gardens and Sites, the precursor to today's ICOMOS IFLA Cultural

Landscape International Scientific Committee, brought together a group of professionals interested in historic gardens. The committee first convened at Fontainebleau in 1971 under the leadership of René Pechère, a prominent professional with many notable private and public commissions. Pechère served as the president of the International Federation of Landscape Architects (IFLA) from 1956 to 1958 and became active again a decade later, taking charge of forming and fostering a section on historic gardens. Landscapes of historical significance were not popular topics at the time. Pechère spoke to his colleagues to convince them to support formation of this committee, saying: "Nothing starts from nothing, and it is on your past, on what you are now, that everything that you will be depends" (Pechère 2011). He defended the formation of an IFLA Committee on Historic Gardens and Sites n this way, and his leadership led to the formation of the committee in 1968 at Sardinia. In the years following, Pechère worked first with Gerda Gollwitzer, editor of "Garden and Landscape," and then brought together a garden history research team extending beyond the landscape architecture profession to include "art historians, architects, botanists, and archaeologists" (Pechère 2011). He engaged ICOMOS president Piero Gazzolo in the garden history effort, which yielded the first meeting of the committee in 1971 in Fontainebleau. Pechère assembled a talented and experienced team to work on this committee, founded on a decade of effort. At Florence in 1981, he led the drafting of the Florence Charter, which ICOMOS approved in 1982.

From Historic Gardens to Cultural Landscapes and Issues for the Future

The ICOMOS (International Charter for the Conservation and Restoration of Monuments and Sites) of 1964 (Venice Charter) is the forbearer of the Florence Charter and addresses monuments of civilization, citing architectural works within their urban or rural setting that bear witness to a civilization, cultural development, or historical event. The Venice Charter focused on the conservation of monuments as works of art and historical evidence, but failed to explicitly direct such attention to gardens or landscapes. In fact, the words "landscape" and "garden" do not appear in the Venice Charter. The Florence Charter, framed 18 years later, sought to enlarge the consideration of shared global heritage from monument and site to designed landscape. This step opened a preservation direction toward the landscape as cultural heritage worthy of conservation, an expanding understanding that continues to enlarge through the present day.

The Florence Charter of 1982 was a signal call to include garden and landscape works created with purposeful designs as heritage worthy of conservation and preservation alongside historically important monuments and sites. The concept of cultural landscapes as expressions of outstanding universal value was intensely debated through the 1980s. The entire Lake District of Great Britain was proposed for World Heritage listing during these years and denied. Cultural landscapes were added to the World Heritage Operational Guidelines in 1992 and defined as defined landscape, designed and created intentionally; organically evolved landscape, either relict or fossil where the evolutionary process is ended, or continuing evolved landscape where contemporary society is present and evolution continues; and associative cultural landscape, which have inspired art and literature, which are places of religious or spiritual beliefs or embody traditions and intangible aspects of cultural heritage (UNESCO 2012).

The 20 years from 1992 to 2012 have seen an increasing interest in and evolution of the recognition and protection of cultural landscape resources. Based on recent research, the World Heritage inscriptions of cultural landscapes in the past two decades number 98 inscribed properties, representing, in only 20 years, 10% (10%) of total inscriptions (O'Donnell et al. 2012). The following distribution of types shows:

- 7 clearly defined
- 32 organically evolved – relict
- 73 organically evolved – continuing
- 25 associative

This distribution shows the prevalence of organically evolved continuing landscapes,

which represent some 75% of the 98 inscribed cultural landscape properties. This predominance also underscores the pivotal issues in retaining authenticity of the cultural landscape heritage: managing change while evolution continues. The threats to the integrity of cultural landscapes are varied and broadly include population growth pressures, socioeconomic transformation, climate change, and human conflict with examples of urban sprawl, migration, poverty, extractive industries, modern infrastructure, civil war, and natural disasters affecting valued cultural landscapes inscribed on the World Heritage list. This range of pressures also threatens cultural landscapes of national, regional, and local significance.

Inscribed cultural landscapes represent a global range throughout the UNESCO world regions. The dispersion of properties is listed with increasing counts top to bottom as:

- 3 in the Arab States
- 10 in Africa
- 15 in Latin America and the Caribbean
- 21 in Asia and the Pacific
- 43 in Europe and North America

Thirty (30) of these inscribed properties are historic urban landscapes, where global urban populations coalesce in greater numbers. In November 2011, UNESCO approved the UNESCO Historic Urban Landscape Recommendation (HUL), which positions urban cultural heritage broadly for the first time within considerations of quality of life, economic vitality, development, industry, tourism, and evolution of urban centers. This holistic view sees heritage as a co-contributor to urban vitality in the twenty-first century. Sparked by out-of-scale development proposed adjacent to the core of historic Vienna, HUL is directed toward all urban places, each unique and each a place of heritage, enlarging the notions of the historic center or urban ensemble to include the broad urban context and larger setting (Fig. 1).

Cultural landscapes of urban areas, defined as the combined work of humanity and nature, generally comprise about half of the settlement space and contribute significantly to the character of the place. Buildings represent the other half and contribute, as a whole, to the scale, density, and character of the townscape. The public and private historic urban landscape expresses traditions and values, both tangible and intangible, forming an accreted record of interactions between people and place and rooting culture in landscape. The historic urban landscape and the urban cultural landscape offer parallel terminology for the same resources. HUL and urban cultural landscape both address the entire townscape ensemble of structures and landscapes, views, hills, slopes, vegetation, shorelines, rivers, parks, streets, bridges, walls, residences, commercial buildings, transit stops and tracks, and so forth. These urban features are composed, by humanity and nature over time, to establish the urban character. The contemporary threats to the protection of urban heritage and to fostering its vitality into the future are myriad. HUL is a vehicle both for capturing and directing a reinforcement of traditional values of monument heritage and for framing and applying a wider framework for sustaining contemporary

Florence Charter on Historic Gardens (1982), Fig. 1 Vienna panorama (O'Donnell & May 2005)

and future urban heritage values. It encourages stewardship by diverse urban actors in a collaborative, iterative process. HUL signals a scale shift that embraces historic urban cores and the territory around them, urban and rural. This evolution of foundational concepts imbedded in the Florence Charter demonstrates over 30 years a transition from precious garden and parks to cityscape and townscape, where gardens and parks are elements within a continuous urban context, all of which has heritage value and intangible and tangible heritage resources.

Another cultural landscape relevant evolution within cultural heritage preservation activity is the emergence of cultural routes and regional itineraries of large areas or multiple sites. Recognizing linear corridors of heritage value, such as the Silk Routes of ancient trade of transboundary resources and the 150 km Quebrada de Humahuaca that follows the line of the Inca Route, Argentina, among others, captures the heritage of corridor landscapes marked by human transportation and settlement uses. While the Agave Landscape and Ancient Industrial Facilities of Tequila, Mexico, a site of nearly 35,000 ha, the five regional sites of the Ifugao province Rice Terraces of the Philippine Cordilleras, the tentative listed Cape Winelands Cultural Landscape of South Africa, and many other agricultural landscapes bring forward regions that embrace long traditions of farming, crop production, and related settlements as integrated land-based cultural resources (Fig. 2).

The recognition of large-scale heritage corridors and regional itineraries embraces landscapes of place and humanity, living and evolving or relict, where archeological resources abound.

There are 91 cultural landscapes inscribed as World Heritage cultural property and 7 as mixed properties. This small group of mixed properties, which are recognized for both outstanding cultural and natural resources, opens another avenue for consideration. In cultural landscapes, we find the intersection of humanity and nature. At a 2004 US ICOMOS Symposium, a declaration on heritage landscapes, which embody cultural and natural resources, was prepared that captures a pressing issue in the realm of cultural landscapes and the future of human society: "There is a convergence of natural and cultural values in the landscape, and a growing recognition that the traditional separation of nature and culture is a hindrance to protection, and is no longer sustainable. Further, heritage landscape protection is required at the local, national and global levels in order to transmit these universally valuable heritage resources to future generations. . . With this declaration, we call for increased commitment to the gamut of preservation and conservation planning and management efforts to preserve the universally significant heritage landscapes of our

Florence Charter on Historic Gardens (1982), Fig. 2 Ifugao Rice Terraces, Philippines (O'Donnell, Nov 2012)

planet" (2004, US ICOMOS, Natchitoches Declaration on Heritage Landscapes). One of the core challenges of the current day is for humanity to embrace a positive relationship with landscape in all its forms. As stated in the World Heritage Operational Guidelines, "Cultural landscapes often reflect specific techniques of sustainable land use, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature. Protection of cultural landscapes can contribute to modern techniques of sustainable land use and can maintain or enhance natural values in the landscape. The continued existence of traditional forms of land use supports biological diversity in many regions of the world" (UNESCO 2012: 98, item 9). Cultural landscapes we live in, enjoy, and learn from each day are significant cultural resources expressing historic human endeavor and the qualities of place with import for tomorrow. By addressing the cultural value of gardens as the combined works of humanity and nature, the Florence Charter began the steps on the path we tread today. Cultural landscapes are heritage resources at the junction of our global future.

Cross-References

- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage Landscapes
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Urban Heritage
- ▶ Urban Landscapes: Environmental Archaeology
- ▶ Zoning: Boundary Areas and Buffer Zones

References

O'Donnell, P. M., G. W. De Vries, and S. LeVaun Graulty. 2012. Twenty years of world heritage cultural landscapes 1992 to 2012. Poster presentation, IFLA 49th World Congress, Cape Town, South Africa, Sept 2012.

Pechère, R. 2011. Memorandum on the origins of IFLA, and the International Committee of Gardens and Historic Sites ICOMOS-IFLA. Typescript, in Comité Scientifique International de Paysages Culturels – International Scientific Committee on Cultural Landscapes ICOMOS-, Chateau Royal de Fontainebleau, 1971–2011: 7.

UNESCO Culture Sector. 2011. UNESCO recommendation on the historic urban landscape (approved November 2011). Available at: http://whc.unesco.org/en/activities/638

UNESCO World Heritage. 2012. World heritage operational guidelines; Cultural landscape definitions. Available at: http://whc.unesco.org/en/guidelines/

US ICOMOS, and P. O'Donnell. 2004. Natchitoches Declaration on Heritage Landscapes. 27 March 2004, Natchitoches, LA, US ICOMOS 7th International Symposium: Learning from world heritage: Lessons from international preservation & stewardship of cultural & ecological landscapes of global significance. Available at: http://www.usicomos.org/natchitoches-declaration

Further Reading

Bandarin, F., and R. van Oers. 2012. *The historic urban landscape: Managing heritage in an urban century*. Oxford: Blackwell Scientific.

O'Donnell, P. 2004. Learning from world heritage: Lessons from international preservation & stewardship of cultural & ecological landscapes of global significance. *George Wright Society FORUM* 21 (2): 41–61.

Folklore Archaeology

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Introduction

It is not hyperbolic to state that folklore, in its myriad forms, is a feature of all societies, regardless of time and place. As such it has been the subject of countless studies from various disciplines, of which Archaeology may seem one of the least obvious; such phenomena as "traditional" beliefs, customs, and legends may not seem obviously archaeological because they do not appear, at first glance, enmeshed in material culture. That first glance, however, is misleading.

To take a subcategory of folklore as an example, beliefs in preternatural forces – from the benevolent to the malevolent – lead to a desire to

control those forces. This desire to control engenders customs: habitual practices enacted by believers with the design to harness the good (heal the sick, attract luck, fulfill a wish, etc.) or to divert the bad (counter a witch's curse, placate spirits, deter demons, etc.). These customs tend to involve some form of physical activity and engagement with the material world – e.g., the deposition of an object – and are thus bound up in place, action, and thing. Folklore Archaeology is concerned with said place, action, and thing; it is the study of how folkloric beliefs, customs, and legends exist within the material record.

Folklore Archaeology, while still not formally recognized as a discipline, is a field of research which many folklorists – and some archaeologists – have been engaging with throughout much of the twentieth century. Some researchers have engaged this area in more depth than others, and some more successfully, but generally speaking their approaches can be divided into two primary, although not mutually exclusive, strands (Gazin-Schwartz 2011):

1. The Folklore of Archaeology: The study of folklore concerning archaeological sites and artifacts, which were not initially created or employed in connection with the customs, beliefs, and legends later applied to them. This approach can prove problematic where the researcher seeks to identify folklore as the "survivals" of prehistoric beliefs and rituals but can be highly enlightening where folklore is viewed as one of many layers of meaning attached to a site or artifact.
2. The Archaeology of Folklore: The archaeological analysis of artifacts, monuments, and landscapes created and/or employed in connection with customs, beliefs, and legends. This approach is primarily concerned with how folklore manifests itself in the material record and utilizes both archaeological techniques in the contextualization of obscure practices (e.g., what can this artifact tell us about how and why it was used?) and folkloric methodologies in the analysis of obscure material remains (e.g., what can oral sources tell us about the function of such an object?)

Definition

Folklore Archaeology is a subdiscipline of both Folklore and Archaeology, referring to the areas of intersection between the two. Given the context of this entry, a definition of the latter is not required; the former, however, requires significant unpicking. Capitalized "Folklore" designates the discipline, which is concerned with the study of (noncapitalized) "folklore" as a subject matter. This is a problematic term as there has been, and continues to be, debate surrounding its meaning (see Further Reading). Its earliest definition comes from 1846 when British writer William Thoms penned a letter to *The Athenaeum*, a literary magazine published in London, suggesting an alternative to "what we in England designate as Popular Antiquities, or Popular Literature"; he recommended, instead, "a good Saxon compound, Folklore, – *the Lore of the People*."

Since the term was coined, it has been subjected to criticism, contestation, and re-definition, in large part due to the ambiguity of its two primary components: "lore" and "people." Taking the latter component first, what constitutes "the People"? Early definitions clearly identify the "folk" as the rural, uneducated, lower classes of society. However, few folklorists today adhere to these rather narrow-minded – and condescending – specifications. Rurality is no longer seen as a prerequisite of the "folk" and it is generally agreed that any group of people, regardless of class or education, can constitute "folk," so long as they have a sense of collective identity, normally borne from a shared common factor. This can be geographic location, language, religion, occupation, or hobby, to name only some.

"Folklife" (Swedish *folkliv*), therefore, is the anthropological study of the culture of a group of people sharing a sense of collective identity; it is, simply put, the folks' way of life: their practices, architecture, clothing, art, etc. What, then, is folk*lore*? It can be viewed as a subcategory of folklife, but there is some debate over where (or, indeed, if) the line is drawn between the two terms. Many folklorists define "lore" as a list of genres (beliefs, legends, customs, etc.) while simultaneously acknowledging the reductive nature of this

approach. It is generally recognized today that no single definition of "lore" will suffice and that what is encapsulated by this term varies depending upon context and the folklorist her/himself. However, broadly speaking, the "lore" of "folklore" is information known by, and disseminated amongst, a group of people, as it refers to customs, beliefs, and legends.

Folklore is not usually considered to be in accordance with widely accepted or authoritatively established theological doctrines, although it is not necessarily exclusive of/to them. What largely distinguishes "folklore" from orthodox rituals and religions is its mode of transmission. It is information passed from person to person, usually without any formal indoctrination and most certainly without any authoritative text (e.g., the Bible, the Qur'an); instead, it is information transmitted orally. Orality is therefore considered central to folklore. However, changes in modes of communication – most notably the Internet – have led to alterations in definitions (see below).

Folklore as a discipline is the study of the above and utilizes largely ethnographic methodologies, but also some textual sources where relevant, in the collection and analysis of a group's folklore. The British *Folklore Society* (considered in more detail below) states on their website that they are concerned with "all aspects of folklore and tradition," including the compilation and interpretation of the following:

> ballads, folktales, fairy tales, myths, legends, traditional song and dance, folk plays, games, seasonal events, calendar customs, childlore and children's folklore, folk arts and crafts, popular belief, folk religion, material culture, vernacular language, sayings, proverbs and nursery rhymes, folk medicine, plantlore and weather lore. (The Folklore Society 2013–2018)

Folklore Archaeology is the archaeological study of all of the above. It is the employment of methodologies from any subdiscipline of Archaeology – e.g., material culture studies, phenomenology, contemporary archaeology – in the analysis of the material manifestations of folklore: artifacts, monuments, and landscapes connected with customs, beliefs, and legends.

Historical Background

A history of Folklore on a global scale is beyond the scope of this entry; geographic focus will, by necessity, be narrowed down and will rest largely, although not exclusively, on Britain (but see International Perspectives). However, attention must first be given to Europe more broadly, which witnessed a heightened interest in folklore studies during the nineteenth century. German scholars Jacob and Wilhelm Grimm are well known for having vigorously collected and published folklore, to be greatly popularized in later media, and other nineteenth-century folklore collectors included Kaarle Krohn of Finland, Paul Sébillot of France, and Giuseppe Pitrè of Italy, to name only some. Forging links with these early pioneers of Folklore, England's *Folk-Lore Society* was founded in 1878, and it was throughout the Victorian period when the famous names of Folklore – Andrew Lang, Joseph Jacobs, George Laurence Gomme, Alfred Nutt, Edwin Sidney Hartland, Edward Clodd, and William Alexander Clouston – were at their most active, publishing numerous books and papers on the subject.

However, even during the Victorian period, Folklore was not considered an academic discipline. The above folklorists were, without exception, private scholars: lawyers, publishers, civil servants, and businessmen, with no university affiliations (Dorson 1976). And during the early twentieth century, as scholarship became more of an academic profession than the pastimes of Victorian amateurs, the "golden age" of Folklore reached its end. Unlike Anthropology and Archaeology, Folklore had not gained academic acceptance as a discipline in itself with the rise of universities in Britain, and it was either subsumed by other disciplines – History, Literature, Anthropology – or discarded entirely.

Prior to this, Folklore and Archaeology had been practically inseparable. The pre-Victorian British antiquarians rarely distinguished between the collecting of material relics and the recording of ancient practices and beliefs. However, by the mid-nineteenth century, both Folklore and Archaeology had made their move away from antiquarianism – and from each other, with

Archaeology and Folklore beginning to view themselves as separate and distinct professional fields. This academic divorce appears to have been initiated by those identifying themselves as archaeologists, who – with Britain's first serious excavations beginning in the late eighteenth and early nineteenth centuries – had begun embracing scientific techniques and empirical practices. The nineteenth century, therefore, saw the emergence of the newly styled archaeologists, who sought to dissociate themselves from Folklore most likely because (unlike Archaeology, and as outlined above) it had not received academic acceptance (Gazin-Schwartz and Holtorf 1999: 9).

It is posited that archaeologists rejected folklore, viewing its value with skepticism, because of its questionable authenticity and accuracy; often finding that folk tradition and material remains did not correlate, they opted to dismiss the former as inauthentic (Gazin-Schwartz and Holtorf 1999: 5). Folklore was slightly less dismissive of Archaeology, but from the outset of its development as a separate field in the nineteenth century, it was clear that material culture was not considered central to the study of folklore. Tellingly, in its first publication in 1878, the *Folk-Lore Society* defined its objectives as "the preservation and publication of Popular Traditions, Legendary Ballads, Local Proverbial Sayings, Superstitions, and Old Customs" (Folklore Society 1878, cited in Gazin-Schwartz and Holtorf 1999: 22), with no reference at all to material culture. And by the mid-twentieth century, most folklorists (although not all, see below) had become more concerned with the collection and preservation of oral traditions than with the study of artifacts.

This model is far from global (see International Perspectives) and far from absolute. For example, the broader study of folklife is heavily associated with material culture and has been for some time (see Glassie 1999; George 2010). Explicit association between Archaeology and the more specific Folklore, however, is rarer – but not absent. There has been some engagement with both disciplines, as is evident by the inclusion of "material culture" in the long inventory of subjects listed on the *Folklore Society* website (see above). And this engagement has resulted in two primary strands of research: the Folklore of Archaeology and the Archaeology of Folklore.

The Folklore of Archaeology

For much of the twentieth century, studies of the relationship between Archaeology and Folklore in Britain have taken one main form: the collection of folklore concerning archaeological sites, usually compiled by folklorists with an interest in archaeology. The general consensus among these scholars was that folklore constituted the remnants – the "survivals" – of prehistoric beliefs and rituals; thus, folklore was utilized as a resource to contextualize the material evidence, most often a prehistoric monument.

Walter Johnson was one of Britain's first folklorists to apply this theory to the archaeological record in 1908. In his book, *Folk-Memory; or the Continuity of British Archaeology* (1908), he traced folkloric associations and uses of megaliths back chronologically in order to contextualize them, considering, for example, the healing powers attributed to prehistoric holed stones. Johnson was not, however, under any illusion of direct continuity; while he wrote of the endurance of veneration at certain megaliths, from prehistory to the nineteenth century, he warned his readers that most traditions will have been "grossly perverted" (1908: 132), stating that any "folk-memory" must be "scrupulously tested" (1908: 319).

Similar methodologies are employed by later scholars, who draw on folklore as a contextualizing resource for the understanding of prehistoric monuments, from Stonehenge (Fleure 1948) to the many "countless" megalithic stones (Menefee 1975). Likewise, Bord and Bord, writing in the 1970s, refer to "race-memory" as the "only real illumination" onto the significance of the prehistoric sites of the British Isles: standing stones, henges, hill-forts, and burial mounds (1976).

In most cases, a degree of skepticism is maintained concerning the continuity of these folk traditions; they are not presented as unaltered survivals from prehistory but as distorted remnants which, if very carefully interpreted, may

yield some truth over the monuments' original purposes. The details of a tradition will undoubtedly have changed over the centuries, but traditions reflect attitudes, and attitudes are more likely to have been consistently inherited: a site is considered sacred today because it was considered sacred 3000 years ago (Bord and Bord 1976: 1–2). Not all scholars, however, accepted these theories of long-term unbroken continuity; Grinsell (1976), for example, was a little more skeptical.

Grinsell is probably the most widely known scholar of the folklore of British prehistoric sites and, unlike the majority of scholars considered in this entry, Grinsell classifies himself as an archaeologist rather than as a folklorist (1976: 9). It is probably his archaeological background that made him more wary of drawing on the oral traditions associated with prehistoric sites in order to contextualize them. Although he offers little in the way of interpretation – the majority of *Folklore of Prehistoric Sites in Britain* (1976), for example, is a simple county-by-county catalogue of prehistoric sites with folkloric associations – he does acknowledge that many associated traditions are far more recent in origin than they seem, and he is discerning in his distinction between the older remnants (folklore) and the more recent traditions ("fakelore").

The Archaeology of Folklore

The other strand of Folklore Archaeology is the analysis of material manifestations of folklore. This can be subdivided into two further strands: (1) the use of known customs, beliefs, and legends in order to contextualize otherwise obscure material evidence and (2) the use of material evidence in order to contextualize otherwise obscure customs, beliefs, and legends. The former is evident in studies from the mid-twentieth century to the present day, with examples of obscure material evidence including foundation sacrifices, ritual markings on domestic timber, witch-bottles, "thunderstones" and "thunder-axes," and concealed garments (Swann 1996; Eastop 2006), to name only some.

It was Ralph Merrifield, however, whose book, *The Archaeology of Ritual and Magic* (1987), was the first full-length volume devoted to the materiality of British folkloric customs and beliefs. Attesting that, as ritual and magic were, in many cases, aspects of everyday life, they should leave as many traces in the archaeological record as any basic human activity, Merrifield seeks to identify and catalogue them (1987: 1). Covering a wide chronological period from the pre-Roman Iron Age to the twentieth century, with a geographic focus on Europe – most prominently south-eastern England – he reconstructs ritual activity, such as the deposition of witch-bottles and mummified cats, from the archaeological evidence, supplementing it wherever possible with written sources.

In other scholarship on the subject, folklore is not employed to elucidate the archaeological evidence, but vice versa. For many British folkloric customs, there are few – if any – relevant contemporaneous literary sources; oral testimonies and the material remains are thus the only surviving testaments to the custom and subsequently the only contextualizing resources available. Concealed objects are particularly pertinent to this. These are objects, ranging from shoes to mummified cats, which are discovered in unusual locations within buildings (e.g., in the roof space, within the walls, up the chimneybreast). No literary evidence has come to light explaining why such objects were concealed. However, by analyzing the archaeological evidence – considering both the physical attributes and symbolic associations of such objects – researchers have reconstructed the beliefs and ritual activities which may have led to the deposition of concealed objects (Davies and Houlbrook Forthcoming; Eastop 2006; Hoggard 2004; Houlbrook 2013; Hukantaival 2016; Massey 2014; Swann 1996).

Other seemingly enigmatic material finds have been subject to similar analyses: burn marks, for example. Lloyd et al. (2001) have only a few vague literary references to the apotropaic powers of candles to contextualize the flame-shaped burn marks found on late-medieval/early-modern domestic timber. They thus employ the material evidence of the burn marks themselves in order to

"decode" the custom. Employing experimental archaeology to determine how the burn marks were produced, they ascertain what materials and conditions would have been required to produce such marks and conclude that they were probably intended as apotropaic devices. Their study demonstrates the successful application of experimental archaeology to the interpretation of enigmatic – and often ignored – material evidence.

Key Issues

The current key issue in Folklore Archaeology is the legitimacy of the term itself. This entry is being penned in England, where Folklore is currently considered largely marginal. Despite being at the forefront of folklore collection in the nineteenth century, today England boasts no professional body of folklorists, bar the *Folklore Society*. This society, founded in 1878 and still in existence today, has an estimated 375 members and three journal issues of *Folklore* published annually. However, it is not a government- or university-funded organization; registered as a charity and run by volunteers, it demonstrates the passion and commitment of its members rather than a countrywide and well-established academic interest in the subject. Indeed, only a handful of universities in Britain provide courses in Folklore, with most of these in Scotland (the University of Aberdeen and the University of Glasgow). At the time of writing, the only English university with an established specialism in Folklore is the University of Chichester, which accommodates the "Sussex Centre for Folklore, Fairy Tales and Fantasy" (although see below).

Scholars and organizations alike have chosen to avoid the term "folklore" or discard it altogether; the "Survey of Language and Folklore" founded at Sheffield in 1964 became the "Centre for English Cultural Tradition and Language" in 1974, while the "Welsh Folk Museum" in Cardiff, founded in 1948, was changed to "St Fagan's National History Museum." Academic avoidance of the term "Folklore" may stem from its pejorative connotations, whereby the "folk" were identified as the less-educated, lower classes of society. It may also stem from the perceived "quaintness" of the term, with scholars preferring to employ alternatives, such as "ritual" or "popular beliefs."

The twenty-first century, however, has witnessed a perceptible shift in attitudes towards both the term "Folklore" and its suitability as a focus of research. The seminal work of Gazin-Schwartz and Holtorf (1999) and Gazin-Schwartz (2011) has undoubtedly contributed to this, drawing scholars' attention to the advantageous pairing of Archaeology and Folklore, a pairing which was re-ignited in 2011 with the introduction of University College London's Institute of Archaeology's "Popular Antiquities: Folklore and Archaeology" conference, co-organized by the *Folklore Society*. This, and its subsequent conference in 2012, attracted scholars from across the globe, demonstrating the widely-felt benefits of utilizing both resources in scholarly research and in fostering a dialogue between the two disciplines. The 2010s also witnessed the introduction of the *Folklore Society*'s "Newer Researchers" conference, held in collaboration with the Elphinstone Institute, Aberdeen (2014, 2015, 2017), providing a platform for folklorists to not only share their research, but to legitimize their self-identifications as folklorists.

Other promising changes are afoot, with a Folklore Studies MA currently being set up at the University of Hertfordshire, led by Owen Davies and due to open in 2019. Additionally in 2018 the Centre for Contemporary Legend was launched by a special interest research group based in the Cultural Communication and Computing Research Institute at Sheffield Hallam University, including David Clarke, Diane Rodgers, and Andrew Robinson. The long term aim of the Centre is to create an institutional base with an archive and teaching program that could act as a focal point for those working in the field of folklore and legend studies in the UK. There have also been recent calls to implement a national survey of contemporary folklore in England, with John Widdowson (2016) penning an article in *Folklore* which considers the benefits and challenges of such an endeavor. This proposal has

been met with enthusiasm and further suggestions (cf. Young 2018).

Two other key issues go further in legitimizing "Folklore Archaeology." Firstly, the recognition that the folklore of archaeology (e.g., prehistoric sites) should not be harnessed in an attempt to elucidate origins. Instead, it can be used to ascertain how a monument or landscape has been perceived and utilized throughout history into the present day. Stonehenge is the most obvious example: the contemporary and early modern folklore surrounding this structure undoubtedly sheds little – or no – light on its original purpose but reveals much about how prehistoric structures can serve as focal points within communities. Archaeology and folklore are two distinct, opposing forces; folklore surrounds a prehistoric site despite – and often in contradiction to – the archaeological evidence, and while archaeology can provide factual history, folklore offers largely metaphorical history (Voss 1987: 81). While the archaeologist may seek facts, the folklorist seeks explanation.

Another key issue is the acknowledgment of the redundancy of the term "authenticity." "Folklore," synonymous with the term "tradition," is often perceived as fixed and immutable; however, many customs, beliefs, and legends are in fact the result of recent adaptation or invention (Hobsbawm and Ranger 1983). This is sometimes a conscious and deliberate process, producing "fakelore" (Dorson 1976), i.e., inauthentic folklore. Recent scholarship, however, recognizes that there is no such thing as "inauthentic folklore." Folklore is transient and changeable. Its orality causes malleability – in fact, it necessitates it. Like any other entity, folklore must adapt in order to survive; therefore, while there is a theoretical original for any custom, belief, or legend, there is no "authentic" or "inauthentic" version, just as there is no "accurate" or "inaccurate" account. This is not to say that the adaptations, recontextualizations, and inventions of folklore should be taken as given, but that they are worthy of careful study in and of themselves.

An interdisciplinary dialogue between Archaeology and Folklore is thus a dialogue between two different systems of meaning; archaeology (which seeks facts) and folklore (which seeks explanations) are not partial fragments of the same whole, correlated, and combined to reveal a full picture. They are two different modes of representing the past, often providing contradictory accounts of events, landscapes, and artifacts (Gazin-Schwartz and Holtorf 1999). It is, therefore, generally recognized that an archaeologist's employment of folklore should not be to seek factual answers which supplement the material evidence, but to aid in an understanding of the malleability of artifacts, monuments, and landscapes, and the multiplicity of meanings attributed to them. Folklore is not (usually) meant to be taken literally; it is primarily symbolic and therefore should not be resorted to in the search for facts, but in the search for meaning.

International Perspectives

No university worldwide officially recognizes Folklore Archaeology as a discipline or subdiscipline. Some global regions, however, have a notably deeper academic acceptance of Folklore itself. In the Scandinavian countries, for example, folklore studies have a particularly long history; Sweden can trace academic interest in folklore back to the seventeenth century, and in Finland, the early eighteenth century. However, it was the nineteenth century that saw a rise in scholarship on the subject, with the founding of such establishments as the Nordiska Museum in Stockholm and the outdoor museum in Skansen. In 1898, Kaarle Krohn of Helsinki University became Professor of Finnish and Comparative Folklore, and subsequently the first person in the world to hold such a chair.

Ireland likewise has a rich history of folklore collecting, with the establishment of the Irish Folklore Commission in 1935, leading to the National Folklore Collection at University College Dublin, now listed on the UNESCO Memory of the World Register. Key figures in this highly successful commission included Seán Ó Súilleabháin and Åke Campbell, both of whom were heavily influenced by Sweden's model of folklore collecting. Today, two of Ireland's

universities (University College Dublin and University College Cork) offer specialisms in Folklore.

In North America, on the other hand, Folklore has emerged as an academic subject relatively recently, having originally been taught in universities as an aspect of Literary Studies. Francis James Child, Professor of English, began his work on British folk ballads at Harvard in the 1850s, and although there were no formal courses in Folklore at this time, the subject was incorporated into Literature and Philology courses. In the late-nineteenth and early-twentieth centuries, Child's successor, George Lyman Kittredge, widened Harvard's English department's folkloric focus to include tales, beliefs, and proverbs, while anthropologist Franz Boas was beginning his collection of North American folklore at Clark University, Massachusetts.

Because of the influence of these early folklorists, most Folklore courses in America are taught in departments of Anthropology and English. However, it was specifically the growth of American Studies in the 1930s and 1940s which maintained academic interest in American folklore. It was in 1940 when the first MA degree and doctoral minor in Folklore was offered, at the University of North Carolina, followed by its introduction as a doctoral program at Indiana University in 1949, which was later elevated to departmental status by Richard Dorson. By the 1980s, at least 509 American and 19 Canadian universities offered courses in folklore.

Additionally, many Folklore departments and centers have been founded relatively recently, demonstrating that these programs are not simply survivals from the subject's earlier popularity. For example, official Folklore degrees first began to be offered at the University of Oregon in 1989, and the Center for Folklore Studies at the Ohio State University was established in 1995. However, in the majority of cases, Folklore is paired with another subject: Mythology, Ethnomusicology, Oral Traditions, Cultural Studies, Folklife, Popular Culture, Anthropology, Ethnology, Literature, and Art. Significantly it is not paired with Archaeology, demonstrating that even in environments where Folklore has retained (or is receiving recent) relative popularity, Folklore Archaeology is still not formally acknowledged as a distinct field of research.

Future Directions

As folklore is recognized as a malleable, dynamic phenomenon, frequently adapting to time and place, techniques in its study require equal malleability and dynamism. As such, Folklore Archaeology must adapt its approaches and methodologies in response to contemporary issues. For example, one future direction for the discipline involves a continuation of the question: who constitutes the "folk" and what therefore constitutes "folklore"?

This is a question that has occupied folklorists since the advent of the discipline but is particularly pertinent today given the rapid changes of contemporary society. Previously, folklore has been defined as customs, beliefs, and legends communicated orally amongst a group of people. However, the Internet, and the consequent advent of rapid, geographically unbound communication, has altered how – and amongst whom – customs, beliefs, and legends are transmitted (Blank 2009). The Internet enables a global discourse; cultural identity is no longer necessarily equated with geography and therefore a "folk group" has no need for a geographical base. A person can be sitting at their computer transmitting folklore to/from/about a different county, country, or continent – a county, country, or continent they may never have been to. This has deep implications for Folklore Archaeology in that it alters how people – the "folk" – engage with artifacts, monuments, and landscapes, which in turn influences the customs, beliefs, and legends they subsequently apply to them.

Folklore Archaeology must also engage further with – and has much to offer – the subject of migration. Valuable work is currently being undertaken, for example, on what light the archaeological record can shed on the migration of folk ritual practices. Research has uncovered significant material evidence of British and European "domestic magic" (e.g., concealed objects,

charms, graffiti) in the USA and Australia (Evans 2010; Manning 2012; Augé 2013; Burke et al. 2016), with 2017–2018 seeing the first intensive folklore archaeological survey in Australia (Evans 2018). More work needs to be undertaken to compile the data from the various continents into one large-scale accessible resource, which would allow for comparisons and contrasts of the material evidence to be made. The Concealed and Revealed Project, based at the University of Hertfordshire, is currently managing a crowd-sourced website, with the aim of producing such an international resource (https://www.historypin.org/en/person/66740).

Current Folklore research is also concerned with assessing the historical evidence along with the archaeology, testing the limitations for understanding the material against the historical and folkloric archival evidence. Davies and Houlbrook's (Forthcoming) work contextualizing such phenomena as concealed mummified cats, horse skulls buried beneath floors, and witch balls, for instance, demonstrates the necessity of drawing on historical literary material as well as on the physical evidence. Such research reveals that we can be led astray by adopting the methodologies of Archaeology at the expense of History, and future work will hopefully combine both disciplines with that of Folklore.

Much work still needs to be done on promoting acceptance of Folklore Archaeology as a field of research. However, a widespread interest in the materiality of customs, beliefs, and legends has recently surfaced, with three edited volumes so concerned published within a year of each other (Boschung and Bremmer 2015; Houlbrook and Armitage 2015; Hutton 2015). The volumes' contributors, hailing from a wide variety of disciplines, focus on the material evidence of folkloric practices, demonstrating not only growing acceptance of, and interest in, a dialogue between Folklore and Archaeology, but also the widely felt benefits of it. Folklorists and archaeologists alike can contemplate the approaches taken in these volumes and perhaps consider alternative angles to their research, thus promoting further successful interdisciplinary dialogues.

References

Augé, C.R. 2013. *Silent sentinels: Archaeology, magic, and the gendered control of domestic boundaries in New England, 1620–1725*. Unpublished PhD thesis, Department of Anthropology and Cultural Heritage Studies, University of Montana, Missoula.

Blank, T.J., ed. 2009. *Folklore and the internet: Vernacular expression in a digital world*. Logan: Utah State University Press.

Bord, J., and C. Bord. 1976. *The secret country: More mysterious Britain*. St Albans: Granada Publishing Ltd.

Boschung, D., and J.N. Bremmer, eds. 2015. *The materiality of magic*. Paderborn: Wilhelm Fink.

Burke, H.D., S.A. Arthure, and C. De Leiuen. 2016. A context for concealment: The historical archaeology of folk ritual and superstition in Australia. *International Journal of Historical Archaeology* 20 (1): 45–72.

Davies, O., and C. Houlbrook. Forthcoming. *Magic under our roofs: Ritual, reinvention and re-enchantment*.

Dorson, R.M. 1976. *Folklore and fakelore: Essays toward a discipline of folk studies*. Cambridge, MA/London: Harvard University Press.

Eastop, D. 2006. Outside in: Making sense of the deliberate concealment of garments within buildings. *Text* 4 (3): 238–255.

Evans, I. 2010. *Touching magic. Deliberately concealed objects in old Australian houses and buildings*. Unpublished PhD thesis, Department of History, University of Newcastle, Newcastle.

Evans, I. 2018. *Tasmanian magic research project: Report of the second field season*. Unpublished field report.

Fleure, H.J. 1948. Archaeology and folklore. *Folklore* 59 (2): 69–74.

Gazin-Schwartz, A. 2011. Myth and folklore. In *The Oxford handbook of the archaeology of ritual and religion*, ed. T. Insoll, 63–75. Oxford: Oxford University Press.

Gazin-Schwartz, A., and C. Holtorf, eds. 1999. *Archaeology and folklore*. London/New York: Routledge.

George, R.S. 2010. Material culture in folklife studies. In *The Oxford handbook of material culture studies*, ed. D. Hicks and M.C. Beaudry, 123–149. Oxford: Oxford University Press.

Glassie, H. 1999. *Material culture*. Bloomington: Indiana University Press.

Grinsell, L.V. 1976. *Folklore of prehistoric sites in Britain*. Newton Abbot/London: David & Charles Ltd.

Hobsbawm, E., and T. Ranger, eds. 1983. *The invention of tradition*. Cambridge: Cambridge University Press.

Hoggard, B. 2004. The archaeology of counter-witchcraft and popular magic. In *Beyond the witch trials: Witchcraft and magic in enlightenment Europe*, ed. O. Davies and W. de Blécourt, 167–186. Manchester/New York: Manchester University Press.

Houlbrook, C. 2013. Ritual, recycling, and recontextualisation: Putting the concealed shoe into context. *Cambridge Archaeological Journal* 23 (1): 99–112.

Houlbrook, C., and N. Armitage, eds. 2015. *The materiality of magic: An artefactual investigation into ritual practices and popular beliefs*. Oxford: Oxbow.
Hukantaival, S. 2016. *"For a Witch Cannot Cross Such a Threshold!" Building concealment traditions in Finland c.1200–1950*, Archaeologia Medii Aevie Finlandiae, vol. XXIII. Turku: University of Turku.
Hutton, R., ed. 2015. *Physical evidence for ritual acts, sorcery and witchcraft in Christian Britain*. Basingstoke: Palgrave Macmillan.
Johnson, W. 1908. *Folk-memory; or the continuity of British archaeology*. Oxford: Clarendon Press.
Lloyd, V., J. Dean, and J. Westwood. 2001. Burn marks as evidence of apotropaic practices in houses, farm buildings and churches in post-medieval East Anglia. In *A permeability of boundaries? New approaches to the archaeology of art, religion and folklore*, BAR international series, ed. R.J. Wallis and K. Lymer, vol. 936, 57–70. Oxford: J. and E. Hedges.
Manning, M.C. 2012. *Homemade magic: Concealed deposits in architectural contexts in the Eastern United States*. Unpublished master of arts thesis, Department of Anthropology, Ball State University, Indiana.
Massey, F.R. 2014. *Ritualisation and reappropriation: Special deposits and ritual activity in domestic structures in Early Modern England*. Unpublished PhD thesis, Department of Archaeology, University of Sheffield.
Menefee, S.P. 1975. The 'countless stones': A final reckoning. *Folklore* 86 (3/4): 146–166.
Merrifield, R. 1987. *The archaeology of ritual and magic*. London: B. T. Batsford Ltd.
Swann, J. 1996. Shoes concealed in buildings. *Costume* 30: 56–69.
The Folklore Society. 2013–2015. Available at: http://folklore-society.com/. Accessed 21 Dec 2015.
Thoms, W. 1846. Folk-Lore. *The Athenaeum* 22 Aug 862-863.
Voss, J.A. 1987. Antiquity imagined: Cultural values in archaeological folklore. *Folklore* 98 (1): 80–90.
Widdowson, J. 2016. New beginnings in folklore: Towards a national folklore survey. *Folklore* 127 (3): 257–269.
Young, S. 2018. And a historical folklore survey? A reply to John Widdowson's 'new beginnings'. *Folklore* 129 (2): 181–191.

Further Reading

American Folklore Society. http://www.afsnet.org/?page=WhatIsFolklore. Accessed 4 Jan 2016.
Benedict, R. 1932. Folklore. In *Encyclopaedia of the social sciences*, ed. E.R.A. Seligman and A. Johnson, vol. 6, 288–293. London: MacMillan and Co.
Dorson, R.M. 1968. *The British folklorists: A history*. London: Routledge and Kegan Paul.
Dundes, A., ed. 1965. *The study of folklore*. Englewood Cliffs: Prentice-Hall.
Gazin-Schwartz, A. 2001. Archaeology and folklore of material culture, ritual, and everyday life. *International Journal of Historical Archaeology* 5 (4): 263–280.

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Basic Biographical Information

Seasoned university Administrator and Academic, Caleb Adebayo Folorunso (Fig. 1) was born on 13 April 1956. He attended Oyan Grammar School for his secondary education and the famous Igbobi College for his Higher School Certificate. He graduated from the then Department of Archaeology, in 1979, with a Bachelor of Arts honors degree with Second Class Upper Division Certificate. He completed his masters in the same department in 1981 before proceeding to the Universite Paris I Pantheon-Sorbonne in France for his doctorate degree program which was successfully defended in 1989. Caleb Folorunso also has a certificate in African archaeology from the Universite Libre de Bruxelles, Belgium, under the Erasmus program in 1989.

Major Accomplishments

Professor Folorunso's contributions to African archaeology centered on four main themes, ethno-archaeology, historical archaeology, cultural resources management, and archaeology and tourism. He has written over 30 journal articles and has contributed more than 20 chapters in books. His contribution has not been limited to teaching and research as he has supervised over 15 master's degree dissertations and 6 Ph.D. theses. Three of his doctoral students are now professors in universities in Nigeria, while the rest are also occupying research positions in the universities. He is a mentor to a crop of young brilliant Nigerian archaeologists and budding archaeologists spread over universities across the world. He had been involved in international collaborative research works with scholars from

Fig. 1

University of Cambridge (UK), University of the Witswaterand (South Africa), and Kenyan National Museum in the African Farming Network Project.

Professor Folorunso served as Head of Department of Archaeology and Anthropology for 10 years, 1995–1997, 2002, and 2005–2010. His tenure witnessed tremendous infrastructural growth coupled with a strong support for the department by the university authority in terms of equipment and facilities. The scholar is the immediate chairman of University of Ibadan Senior Staff Housing Committee, a member of the Senate, and a member of Appointments and Promotions Panel in the University of Ibadan since 1993.

Adebayo Folorunso is one of the most visible African archaeologists based on the continent. He was elected the Vice President of the World Archaeological Congress in 2008 at WAC 6 in Dublin Ireland and retired in 2013 at WAC 7 in Jordan. Before then he was for a decade the Senior Representative of WAC for the West African Region. For his invaluable contributions to the organization, Folorunso was given a life membership award of WAC since 2004. His selfless service and exemplary contributions to the World Archaeological Congress at several levels was duly recognized with the WAC President's Award at the 8th World Archaeological Congress Meeting in Japan in August 2016. Other distinctions include General Secretary, West African Archaeological Association, 1994–1996; Business Manager, West African Journal of Archaeology, 1989–1999; and a member of the advisory board Nigeria Heritage, a journal of the National Commission for Museums and Monuments. He is a member of several editorial boards including *Archaeologies*, a journal of the World Archaeological Congress; Journal of the Environment and Culture; and *Journal of African Diaspora Archaeology and Heritage*. He became a Fellow of the Archaeological Association of Nigeria in August 2016.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Ethnoarchaeology
- ▶ Historical Archaeology
- ▶ World Archaeological Congress (WAC)

References

Andah, B.W., K.N. Momin, D.A. Aremu, and C.A. Folorunso. 1992. Archaeological investigation on the campus of the University of Ibadan (an unusual salvage experiment). *West Africa Journal of Archaeology* 22: 98–108.

Folorunso, C.A. 1997. The stone figurine from Igbominaland: Some comments. *West Africa Journal of Archaeology* 27 (2): 63–67.

Folorunso, C.A., B.J. Tubosun, and J.O. Aleru. 2008. The challenges to archaeological fieldwork training at the University of Ibadan, Nigeria. In *From concept of the past to practical strategies*, ed. P. Ucko, Q. Ling, and J. Hubert, 129–142. London: Saffron Books, Eastern Art Publishing.

Foodways in Historical Archaeology

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Introduction

Foodways represents a conceptual approach adopted by researchers to study the social, cultural, and ideological meanings associated with food. Adoption of this concept allows archaeologists to broaden their research questions, progressing away from simple dietary reconstructions to explore the human behaviors associated with food and the role(s) food played in shaping individual and group identities. The concept was widely adopted in historical archaeology (understood here as the archaeology of the post-CE-1500 period). Historical foodways was an especially prominent research theme in the United States from the 1970s onward. It has since been used to address a variety of archaeological research questions in North America and beyond. The following discusses the definition and adoption of the concept in historical archaeology while summarizing key research developments.

Definition

Concepts akin to that of foodways and how it is used today were introduced in anthropology by Audrey Richards in the 1930s (Richards 1932) and further popularized through the works of Margaret Mead and the National Research Council of the United States between 1942 and 1945 (e.g., Mead 1943; NRC 1945). While addressing the challenges involved in studying food-related behaviors, these early works were influential in emphasizing the links between food habits (e.g., the procurement, preparation, and consumption of food) and expressions of culture. The first archaeological publication referencing the term was James Deetz's highly influential book *In Small Things Forgotten*, which presented research linking food habits to material culture (Deetz 1977). The book included a definition of foodways taken from folklorist Jay Anderson (1971) which now likely represents the most cited definition in American historical archaeology. It describes foodways as "the whole interrelated system of food conceptualization, procurement, distribution, preservation, preparation, and consumption shared by all members of a particular group" (Anderson 1971: 2). Later archaeologists add to this definition the behaviors relating to the disposal of food waste.

A variety of data sources are used by archaeologists to investigate past foodways. Analyses of plant and animal remains, cooking wares, food processing tools and equipment, architecture, landscapes, and skeletal remains and historical documents, among other sources of evidence, can be revealing of the foods that were (and were not) eaten, the modes of production and preparation, differential consumption practices, discard habits, nutrition, divisions of labor, and many other food-related habits. Each type of data also carries their own limitations and inherent biases (e.g., differential preservation or deposition patterns). Representing such a complex cultural system, no single type of data can be used to entirely reconstruct past foodways, and the most comprehensive studies manage to incorporate data from diverse types of evidence.

Specific use of the term "foodways" is most often employed by historical archaeologists working in the United States, a reflection of the strong influence of Deetz's work on subsequent research. However, the conceptual links between food and culture, whether or not the term "foodways" is used, were adopted globally by archaeologists working on historical or other time periods. Over the past two decades, the concept is increasingly being employed as a theoretical paradigm guiding archaeological research in Canada, Europe, and Oceania. These studies do not always identify Deetz or Richards as etiological influences and may cite later anthropological, sociological, or archaeological sources; however, all share in the idea that food and food-related habits are cultural constructs imbued with meaning.

In Britain and Ireland, archaeological research making use of a foodways paradigm tended to focus on earlier periods of history (e.g., prehistoric, Roman, medieval), while later postmedieval assemblages were often deemed unimportant, uninformative, and, therefore, unworthy of collection by excavators working in the commercial archaeology industry (Murphy 2007: 371). Thomas (2009) called attention to the lack of postmedieval research making use of animal bones specifically, and more archaeologists are now working to address this issue. Unfavorable views of the historical period are changing as more people are engaging with postmedieval archaeology through organizations like the Society for Post-Medieval Archaeology and an increasing number of excavation reports are describing postmedieval assemblages, leading to more data available for foodways-related research.

Key Developments

Upon adoption of the concept, many historical archaeologists focused on describing the foodways of early colonial groups settling in the United States and the Caribbean. Their research was highly influenced by the New Archaeology movement and its emphasis on identifying links between subsistence strategies and environmental adaptations. Reitz and Cumbaa's (1983) study compared pre- and post-contact diets between Spanish and Native American groups in Florida. Their approach and conclusions emphasized adaptive and acculturative interpretations of early Spanish colonists' foodways. Deetz's (1977) study of eighteenth-century ceramics in the northeast United States led to his identification of a shift in the foodways and broader world views of Euro-Americans at the time. He noticed ceramics became more common, specialized, and individualized and noted that meat was prepared for individual portions as opposed to being served as larger portions for groups of people. His structuralist interpretations of these data in combination with other observations led him to describe a change in mind-set within the culture: from an earlier disorganized, organic, and corporate world view toward a mechanic, ordered, and individual one. Over the following decade, landmark studies concerning the foodways of earlier Americans continued to emphasize the adapted foodways of colonists to their New World setting. The influence of interactions with non-Europeans in the development of colonist foodways was rarely acknowledged, and the ever-changing nature of food habits over the long-term process of colonialism was generally underexplored.

The 1980s saw historical archaeologists becoming increasingly interested in research themes exploring socioeconomic relationships. Foodways archaeology was no exception, and many studies were concerned with identifying socioeconomic status through the analysis of differential consumption patterns of food-related material culture or plant and animal remains. Schulz and Gust (1983) represent one landmark study whereby the authors compared nineteenth-century cattle bone assemblages originating from deposits of contrasting socioeconomic standing. The purpose was to later associate economic values to specific cuts of beef and use animal bones to identify socioeconomic differences within archaeological materials. Many others followed similar approaches, often interpreting foodways through the lens of capitalism and consumer choice theory (e.g., various papers in Spencer-Wood (1987) and Schmitt and Zeier (1993)).

Scholars increasingly broadened the interpretive scope of foodways throughout the late 1980s and early 1990s. Research emphasized the flexible nature of foodways and the roles these played in the formation of individual and group identities. Similar approaches continue today, recognizing that food habits and cultural identities are inextricably linked and under constant renegotiation as a response to changing internal and external pressures (Twiss 2012). Status, gender, ethnicity, religion, and other social phenomena are increasingly explored vis-à-vis their role in shaping foodways. Researchers continued to consider the effects of environment, market availability, consumer choice, and socioeconomic status but discussed these alongside social phenomena while considering the effects of intercultural interaction.

Archaeologists became especially interested in studying the foodways of subaltern, silenced, or disenfranchised groups (e.g., slaves, indigenous populations, ethnic minorities, women, and children), and interpretations of their foodways were no longer being framed as consequential to the actions of colonists or oppressors but as active and reciprocal relationships between cultural groups. In the case of African American and indigenous populations, researchers have used foodways as evidence for the maintenance of a distinct cultural identity where groups and individuals were actively engaged in sociopolitical interactions while also using foodways as a form of cultural resistance and social cohesion (e.g., Franklin 2001; Cipolla et al. 2007). Studies of gendered foodways highlight the fluid dynamics of concept by demonstrating changing meanings ascribed to material culture over time and the shifting status of women (e.g., Yentsch 1991).

As we approach the present, themes that were previously discussed on broader scales of analyses are increasingly being explored at a local or regional level, highlighting variations in the practice of foodways among people of similar culture/ethnicity/social status that are occupying comparable but distinct regions. While cities, surrounding regions, and rural areas did not exist in isolation, their populations each experienced their own unique sets of challenges, circumstances, and histories leading to different identities and ways of interacting with the world around them. Archaeological research examining the foodways of individual regions is generally focused on exploring the local conditions that lead to unique cuisines and food habits while describing the role of food in expressing and maintaining local or regional identities. Such focus allows archaeologists to explore the subtle nuances of regional foodways and the effects of multiple social phenomena without being limited to investigating one single theme or cultural group.

Future Directions

Food plays such an integral role in the daily lives of all people, and its centrality as a research theme is unlikely to waver as foodways research is becoming increasingly global. A rising number of archaeological excavations and improved field methods are continuously producing valuable data. Sophisticated laboratory technologies (e.g., stable isotope and residue analyses) are allowing archaeologists to extract new types of previously unimagined data and address exciting new research questions. When combined with advances in data sharing and management, researchers increasingly have access to large, complex datasets allowing them to further delve into the complexities of foodways and explore sections of society that have traditionally been more elusive in the archaeological record. As more projects are conducted at the regional/local level, the eventual combination of their data has the potential to address broader anthropological themes such as colonialism and expressions of identity (Peres 2017). The challenge will be to reconcile large and varied datasets while also better integrating and promoting our work outside of the discipline. Foodways research is truly multidisciplinary with studies conducted in fields as diverse as English studies to public health and epidemiology. Unfortunately, archaeologists are mostly working and publishing within their own discipline, while the opportunity exists to embark on truly interdisciplinary research with wide-ranging impact.

Cross-References

- ▶ Archaeobotany
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Consumption, Archaeology of
- ▶ Deetz, James (Historical Archaeology)
- ▶ Deetz, James (Theory)
- ▶ Engendering Historical Archaeology
- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Historical Archaeology
- ▶ Post-medieval Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Social Zooarchaeology
- ▶ Zooarchaeology

References

Anderson, J. 1971. *A solid sufficiency: An ethnography of yeoman foodways in Stuart England*. Unpublished PhD dissertation, University of Pennsylvania.

Cipolla, C.N., S.W. Silliman, and D.B. Landon. 2007. "Making do": Nineteenth-century subsistence practices on the Eastern Pequot Reservation. *Northeast Anthropology* 74: 41–64.

Deetz, J. 1977. *Small things forgotten: An archaeology of early American life*. New York: Anchor Books.

Franklin, M. 2001. The archaeological dimensions of soul food: Interpreting race, culture and Afro-Virginian identity. In *Race and the archaeology of identity*, ed. C. Orser, 88–107. Salt Lake City: University of Utah Press.

Mead, M. 1943. The factor of food habits. *Annals of the American Academy of Political and Social Science* 225 (1): 136–141.

Murphy, E. 2007. An overview of livestock husbandry and economic practices in the urban environments of post-medieval Ireland. In *The post-medieval archaeology of Ireland*, ed. A. Horning, R.Ó. Baoill, C. Donnelly, and P. Logue, 371–391. Dublin: Wordwell.

NRC (National Research Council). 1945. *Manual for the study of food habits: Report of the Committee on Food Habits*. Washington, DC: National Academy of Science.

Peres, T.M. 2017. Foodways archaeology: A decade of research from the southeastern United States. *Journal of Archaeological Research*. https://doi.org/10.1007/s10814-017-9104-4.

Reitz, E.J., and S.J. Cumbaa. 1983. Diet and foodways of eighteenth-century Spanish St. Augustine. In *Spanish St. Augustine: The archaeology of a colonial Creole community*, ed. K. Deagan, 151–186. New York: Academic.

Richards, A.I. 1932. *Hunger and work in a savage tribe: A functional study of nutrition among the southern Bantu*. London: George Routledge & Sons.

Schmitt, D.N., and C.D. Zeier. 1993. Not by bones alone: Exploring household composition and socioeconomic status in an isolated historic mining community. *Historical Archaeology* 27 (4): 20–38.

Schulz, P.D., and S.M. Gust. 1983. Faunal remains and social status in 19th-century Sacramento. *Historical Archaeology* 17 (1): 44–53.

Spencer-Wood, S.M. 1987. *Consumer Choice in Historical Archaeology*. New York: Plenum Press.

Thomas, R. 2009. Bones of contention: Why later post-medieval faunal assemblages in Britain matter. In *Crossing paths or sharing tracks? Future directions in the archaeological study of post-1550 Britain and Ireland*, ed. A. Horning and M. Palmer, 19–34. Woodbridge: The Boydell Press.

Twiss, K. 2012. The archaeology of food and social diversity. *Journal of Archaeological Research* 20: 357–395.

Yentsch, A.E. 1991. Engendering visible and invisible ceramic artifacts, especially dairy vessels. *Historical Archaeology* 25 (4): 132–155.

Foraging to Farming Transition: Global Health Impacts, Trends, and Variation

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Introduction

Among the most important developments in the history of our species was the transition from a dietary focus based exclusively on hunting, gathering, and collecting wild plants and animals to a diet based in whole or in part on domesticated plants and animals (Gremillion 2011). This development is especially profound because it laid the foundation for the world we live in today, including the rise of complex societies, urbanization, dramatic population increase, and establishing conditions for the appearance and spread of various infectious diseases (sometimes as epidemics), decline in nutritional quality, increase in interpopulation conflict, and the appearance of a plethora of other health and well-being issues now present and anticipated for the foreseeable future.

The transition to farming and domestication generally is all the more remarkable when one considers that the shift took place in just the last 10,000 or so years of the 6–7 million years that humans and humanlike ancestors have been inhabiting the planet. The shift to farming began some 10–12 thousand years ago by a few human groups in the Middle East. By 5,000 years ago or so, dependence on domesticated plants had developed in at least 10 primary centers in both the Old World and the New World and had begun to spread from these centers around the globe. Today, all of humanity is dependent to some degree on domesticated plants and animals for food. In this discussion, the human impacts of the foraging to farming transition – especially with regard to consequences for health and lifestyle – are highlighted using the study of human remains recovered from archaeological contexts.

Key Issues/Current Debates/Future Directions/Examples

There has long been a scientific interest in health outcomes in past human populations, especially with regard to the origin and history of specific diseases, such as leprosy, syphilis, and tuberculosis (Buikstra et al. 2012). For much of the history of paleopathology – the study of ancient diseases – the interest in this topic has been largely in diagnosis in either individual skeletons or limited collections of skeletons from archaeological localities. Today, the prevailing focus has been in documenting and interpreting health outcomes based on the study of collections of remains from localities and regions in order to understand population variation in health. It is this population orientation coupled with broad-based temporal and spatial comparative analysis of series of human remains that has helped to open up new perspectives about the history of health and well-being (Ortner 2003). These kinds of investigations have been crucial in developing a more informed understanding of etiology of disease and health conditions. In part, bioarchaeologists strive to understand health for addressing issues relating to major adaptive transitions, such as those associated with dietary change, settlement pattern shifts, and alterations in living circumstances generally. The foraging to farming transition is probably the most comprehensively investigated issue addressed by bioarchaeologists, in part because it reveals some common patterns globally. On the other hand, it has also revealed considerable variation in health and well-being that is likely related to highly localized circumstances and conditions.

In the 1970s and 1980s, a small group of biological anthropologists recognized the fund of data that the study of human remains could provide for drawing a better understanding of the foraging to farming transition, especially with regard to assessment of health as a measure of adaptive success (or failure). For example, in a number of settings in North America, authorities reported increased prevalence of pathological conditions, reduced stature, and other indicators, reflecting poorer health and elevated stress in later farming populations compared to earlier foragers or incipient farmers (e.g., see Stout 1978; Goodman et al. 1980; Larsen 1982; Cook 1984; Rose et al. 1984). Similarly, other early studies revealed evidence of impacts of food and food preparation technology on masticatory function and craniofacial morphology (e.g., Carlson and Van Gerven 1979). These investigations provided the basis for the development of the general hypothesis that the shift from a lifeway based on foraging to farming occasioned a worldwide decline in health and quality of life.

The early studies stimulated the further investigation of the costs and consequence of the foraging to farming transition (and other forms of economic intensification) in settings around the world. These investigations of various indicators of health and lifestyle (Table 1) reveal some common trends in comparison of earlier foragers and later farmers in a range of settings worldwide (Cohen and Armelagos 1984; Larsen 1995, 2003; Cohen and Crane-Kramer 2007; Mummert et al. 2011). This record is dominated by the generally better context for and study of larger samples of skeletons in North America than in most other areas of the world. In view of the North American record, a number of key trends emerge that are repeated in some (but not all) settings in other continents where archaeological human remains have been studied. Indeed, the scientific literature for these continents is far more comprehensive now than it was just 10 years, especially in Asia (e.g., Domett 2001; Oxenham and Tayles 2006; Perry 2012; Pechenkina and Oxenham 2013; Temple and Larsen 2013). Nevertheless, skeletal samples are either nonexistent or poorly studied for large regions of South America, Europe, Asia, and Africa (and see discussions by various authors in Steckel and Rose 2002; Cohen and Crane-Kramer 2007). Viewed collectively, however, the record shows a picture of increasing morbidity, poorer health, and generally deteriorating conditions and quality of life as human populations became increasingly dedicated to farming.

What do we now know about human impacts in relation to the transition from foraging to farming and its biological impact? Health outcomes

Foraging to Farming Transition: Global Health Impacts, Trends, and Variation, Table 1 Skeletal variables used to characterize health and lifestyle in archaeological contexts[a]

Variable	Cause/condition
Health	
Dental caries	Carbohydrate consumption (sugars, starches)
Periodontal disease	Poor oral hygiene in carbohydrate-rich diet
Antemortem tooth loss	Periodontal disease, dental caries
Enamel hypoplasia	General physiological stress under poor living conditions
Enamel microdefects	General physiological stress under poor living conditions
Dental asymmetry	General physiological stress under poor living conditions
Tooth size	General physiological stress under poor living conditions
Growth rates	General physiological stress under poor living conditions
Adult height	General physiological stress under poor living conditions
Cribra orbitalia and porotic hyperostosis	Iron deficiency of various causes
Periosteal reaction/ inflammation	Infection or trauma
Scurvy	Vitamin C deficiency
Rickets/osteomalacia	Vitamin D deficiency
Leprosy	Specific bacterial infection
Tuberculosis	Specific bacterial infection
Treponematosis (venereal and nonvenereal)	Specific bacterial infection
Lifestyle/activity/workload indicators	
Osteoarthritis	Repetitive loading of articular joints
Cross-sectional geometric properties	Continuous loading of limb bones involving bending/ torsion

[a]This list is not exhaustive. See Cohen and Crane-Kramer (2007), Steckel and Rose (2002), and Ortner (2003) for detailed explanation and additional variables

reflect two circumstances. First, they reflect the properties and nutritional quality of kinds of foods consumed, especially of the domesticated plants. For example, the major plants – maize, wheat, and rice – are starches. Dietary focus on starches promotes dental caries (tooth decay), periodontal disease, and oral health problems generally (Larsen 1997; Hillson 2008). Second, farming societies tend to live in more permanent, densely crowded settlements. In contrast to foragers, who tend to move on a regular basis and have low population size and density, this kind of environment promotes the maintenance and spread of infectious disease (Larsen 1997; various in Cohen and Crane-Kramer 2007). Some of the best evidence for this process is in North America where there is an impressive body of evidence to show increase in various specific and nonspecific infectious diseases and other health conditions (e.g., treponematosis, dental caries, periosteal reactions), nonspecific stress indicators (e.g., enamel hypoplasias, cribra orbitalia, porotic hyperostosis, stature), and workload/activity impacts on articular joints (osteoarthritis) and skeletal adaptation involving work and activity (cross-sectional geometric analysis of long bone morphology). Generally speaking, for example, in North America and some settings in South America, the increased focus on maize and some other plant domestics resulted in significant declines in oral health, and the associated settlement changes involved decrease in mobility substantial evidence for disease and illness.

Bioarchaeological analysis inferring level of workload and activity reveals highly variable results (Larsen and Ruff 2011), as do analyses of indicators of health and lifestyle (e.g., various authors in Cohen and Crane-Kramer 2007; Pinhasi and Stock 2011). That is, in some regions, biomechanical properties known as cross-sectional geometric properties increase (e.g., Tennessee River valley) but decrease in others (e.g., coast of the southeastern US Atlantic). In the Georgia coast, dramatic increases in osteoarthritis and skeletal robusticity following European contact suggest the intensification of farming practices (Larsen et al. 2001; Larsen and Ruff 2011). Other regions of the world show similar trends as North America and South America, especially in regard to a general deterioration in health in nearly all places where plant domesticates were adopted and consumed with some degree of dominance in diet.

The growing record of bioarchaeological data is beginning to reveal some important trends that show variation in health, with some regions displaying evidence of less dramatic changes in

health than in other regions. Presumably, the pattern of variation reflects geographic differences in the types of plants that were produced and consumed (various in Cohen and Crane-Kramer 2007). For example, in East Asian rice farmers, there is significant presence of dental caries and periodontal disease (e.g., Douglas and Pietrusewsky 2007; Temple and Larsen 2007). On the other hand, a number of Asian rice farmers have relatively low caries prevalence, especially when compared to maize farmers in the Americas. Some authorities argue that rice is less cariogenic than maize (Sakashita et al. 1997; Tayles et al. 2000; Domett 2001; Oxenham 2006; Pietrusewsky and Ikehara-Quebral 2006; Domett and Tayles 2007). In at least one setting where rice production and consumption increased, there is a significant decline in prevalence of dental caries (Domett 2001). Similarly, although diachronic comparisons of foragers and farmers show clear reduction in adult stature (an indication in reduced health), there are some exceptions showing no change or increase in stature (see Mummert et al. 2011).

The record for links between population aggregation and health outcomes in early farming societies is also highly variable. There are numerous instances of increase in cribra orbitalia and porotic hyperostosis (indicators of iron deficiency anemia) and periosteal lesions (infection) in farmers relative to earlier foragers (Larsen 1995; Cunha et al. 2007; Pechenkina et al. 2007; Klaus and Tam 2009), but the frequency of these conditions is low in a number of settings in Southeast Asia (e.g., Domett and Tayles 2007; Douglas and Pietrusewsky 2007) and Western Asia (e.g., Hillson et al. n.d.). Community health in late prehistoric populations in eastern North America was highly variable (Milner 1991). The variable pattern of infection prevalence also points to a high degree of diversity between human groups occupying very different landscapes and physiographic zones, ranging from highly fertile river bottoms to marginal uplands or coastal regions (various in Steckel and Rose 2002; Cohen and Crane-Kramer 2007).

Analysis of patterns of osteoarthritis and skeletal robusticity (cross-sectional geometry of limb bones) reveals evidence relating to workload and activity patterns in the foraging to farming transition and in populations who intensified their farming practices. Osteoarthritis presents a highly variable record, with some regional analyses revealing declines, others showing no change, and still others showing increases to varying degrees (Cohen and Armelagos 1984; Bridges 1992; Larsen 1995; Lambert 2000; Steckel and Rose 2002; Cohen and Crane-Kramer 2007; Larsen and Ruff 2011). A complementary bioarchaeological record of workload and activity is available from long bone biomechanical analysis. This record reveals a pattern of decline in skeletal robusticity. This record, however, is highly region specific reflecting variation in degree of sedentism, terrain, climate, the kinds of plants grown, and degree of commitment to domestication (see Ruff 2008, 2010; Larsen and Ruff 2011; Lieverse et al. 2011; Stock et al. 2011).

There is a decline in skeletal robusticity in Neolithic and other early farming societies compared to foragers, with some exceptions (e.g., Bridges 1989). The record also reveals, however, that intensification of farming shows a reversal of a trend for decrease in skeletal robusticity in at least one locality (Larsen and Ruff 1994). There is considerable variation in the rate and timing of decline in skeletal robusticity in comparison of the skeletons of men and women. For example, in the Nile valley, activity in women appears to have decreased later or only minimally in comparison with men (Stock et al. 2011). This pattern reflects the degree of variability in temporal and spatial patterns of sexual dimorphism in comparison of a broad range of biomechanical analyses emerging around the globe. These male–female differences in timing and pattern of skeletal robusticity are no doubt related to local circumstances and strategies of plant and animal exploitation. Most settings analyzed by bioarchaeologists reveal that while males clearly had a role to play in plant production, they were nevertheless largely responsible for hunting, sometimes involving long-distance travel, whereas females were likely responsible for tending crops and preparation of food. It seems likely, then, that women were more closely associated with the village or habitus than males.

Much of the bioarchaeological record described above represents a cost assessment of health for populations that adopted agriculture. The record of health in many places where the farming transition took place, however, seems to contradict the record emerging from paleodemographic reconstructions for the period. That is, the record of health shows one of general decline, whereas the record of demography shows one of increasing fertility and population growth – often remarkably so – during and/or following the adoption of agriculture (Sattenspiel and Harpending 1983; Buikstra et al. 1986; and see applications by Bocquet-Appel and Naji 2006; Bocquet-Appel and Bar-Yosef 2008; Bocquet-Appel 2008; Lambert 2009). A central goal of bioarchaeology is to assess the relative success of a population to maintain homeostasis under different environmental circumstances, including the foods eaten and the degree of success in acquiring them (see Lambert 2009). The skeletal indicators discussed above track the ability of a population to maintain homeostasis. The biological costs seem to be at odds with the increase in enhanced reproductive outcomes, with the latter showing indication of success, at least as it relates to survival and increased birthrates (Armelagos et al. 1991; Lambert 2009). The implication is that health should not be regarded as a prime mover for the rise of agriculture. Rather, declining health was a consequence of the increase in population and change in the kinds of foods consumed. It would seem, therefore, that humans can live in deplorable conditions involving more disease and debility, but not so much as to have a negative impact on reproductive success.

In summary, the transition from foraging to farming had clear disadvantages and advantages for our species. The remarkable increase in population in the last 10,000 years speaks to the evolutionary success of humankind. The increase in disease and morbidity reveals the health and behavioral costs of our evolutionary success. The balance of cost and success is the story of our species, a story that will likely continue for the long term.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Demographic Transitions
- ▶ Dental Anthropology
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition

References

Armelagos, G.J., A.H. Goodman, and K.H. Jacobs. 1991. The origins of agriculture: Population growth during a period of declining health. *Population and Environment* 13: 9–22.

Bocquet-Appel, J.-P., ed. 2008. *Recent advances in paleodemography: Data, techniques, patterns*. Dordrecht: Springer.

Bocquet-Appel, J.-P., and O. Bar-Yosef, eds. 2008. *The Neolithic demographic transition and its consequences*. New York: Springer.

Bocquet-Appel, J.-P., and S. Naji. 2006. Testing the hypothesis of a worldwide Neolithic demographic transition: Corroboration from American cemeteries. *Current Anthropology* 47: 341–365.

Bridges, P.S. 1989. Changes in activities with the shift to agriculture in the southeastern United States. *Current Anthropology* 30: 385–394.

Bridges, P.S. 1992. Prehistoric arthritis in the Americas. *Annual Review of Anthropology* 21: 67–91.

Buikstra, J.E., L.W. Konigsberg, and J. Bullington. 1986. Fertility and the development of agriculture in the prehistoric Midwest. *American Antiquity* 51: 528–546.

Buikstra, J.E., C.A. Roberts, and S.M. Schreiner, eds. 2012. *Global history of paleopathology: Pioneers and prospects*. New York: Oxford University Press.

Carlson, D.S., and D.P. Van Gerven. 1979. Diffusion, biological determinism, and biocultural adaptation in the Nubian Corridor. *American Anthropologist* 81: 561–580.

Cohen, M.N. 1989. *Health and the rise of civilization*. New Haven: Yale University Press.

Cohen, M.N., and G.J. Armelagos, eds. 1984. *Paleopathology at the origins of agriculture*. Orlando: Academic Press.

Cohen, M.N., and G.M.M. Crane-Kramer, eds. 2007. *Ancient health: Skeletal indicators of agricultural and economic intensification*. Gainesville: University Press of Florida.

Cook, D.C. 1984. Subsistence and health in the lower Illinois Valley: Osteological evidence. In *Paleopathology at the origins of agriculture*, ed. M.N. Cohen and G.J. Armelagos, 235–269. Orlando: Academic Press.

Cunha, E., C. Umbelino, A.M. Silva, and F. Cardoso. 2007. What can pathology say about the Mesolithic and Late Neolithic/Chalcolithic communities? In *Ancient health: Skeletal indicators of agricultural and economic intensification*, ed. M.N. Cohen and G.M.M. Crane-Kramer, 164–175. Gainesville: University Press of Florida.

Domett, K.M. 2001. *Health in late prehistoric Thailand*. Oxford: Archaeopress.

Domett, K., and N. Tayles. 2007. Population health from the Bronze to the Iron Age in the Mun River valley, northeastern Thailand. In *Ancient health: Skeletal indicators of agricultural and economic intensification*, ed. M.-N. Cohen and G.M.M. Crane-Kramer, 286–299. Gainesville: University Press of Florida.

Douglas, M.T., and M. Pietrusewsky. 2007. Biological consequences of sedentism: Agricultural intensification in northeastern Thailand. In *Ancient health: Skeletal indicators of agricultural and economic intensification*, ed. M.N. Cohen and G.M.M. Crane-Kramer, 300–319. Gainesville: University Press of Florida.

Goodman, A., J.R. Rose, and G.J. Armelagos. 1980. Enamel hypoplasias as indicators of stress in three prehistoric populations from Illinois. *Human Biology* 52: 515–528.

Gremillion, K.J. 2011. *Ancestral appetites: Food in prehistory*. New York: Cambridge University Press.

Hillson, S.W. 2008. The current state of dental decay. In *Technique and application in dental anthropology*, ed. J.D. Irish and G.C. Nelson, 111–135. Cambridge: Cambridge University Press.

Hillson, S.W., C.S. Larsen, B. Boz, M.A. Pilloud, J.W. Sadvari, S.C. Agarwal, B. Glencross, P. Beauchesne, J. Pearson, C.B. Ruff, E.M. Garofalo, L. Hager, and S.D. Haddow. 2013. The human remains I: Interpreting community structure, health and diet in Neolithic Çatalhöyük. In *Humans and landscapes of Çatalhöyük*, ed. I. Hodder. Los Angeles: Cotsen Institute of Archaeology Press. in press.

Klaus, H.D., and M.E. Tam. 2009. Contact in the Andes: Bioarchaeology of systemic stress in colonial Morrope, Peru. *American Journal of Physical Anthropology* 138: 356–368.

Lambert, P.M., ed. 2000. *Bioarchaeological studies of life in the age of agriculture: A view from the Southeast*. Tuscaloosa: University of Alabama Press.

Lambert, P.M. 2009. Health versus fitness: Competing themes in the origins and spread of agriculture? *Current Anthropology* 50: 603–608.

Larsen, C.S. 1982. The anthropology of St. Catherines Island: Prehistoric human biological adaptation. *Anthropological Papers of the American Museum of Natural History* 57 (part 3).

Larsen, C.S. 1995. Biological changes in human populations with agriculture. *Annual Review of Anthropology* 24: 185–213.

Larsen, C.S. 1997. *Bioarchaeology: Interpreting behavior from the human skeleton*. Cambridge: Cambridge University Press.

Larsen, C.S. 2003. Animal source foods and human health during evolution. *Journal of Nutrition* 133: 1S–5S.

Larsen, C.S., and C.B. Ruff. 1994. The stresses of conquest in Spanish Florida: Structural adaptation and change before and after contact. In *In the wake of contact: Biological responses to conquest*, ed. C.S. Larsen and G.R. Milner, 21–34. New York: Wiley-Liss.

Larsen, C.S., and C.B. Ruff. 2011. 'An external agency of considerable importance': The stresses of agriculture in the foraging-to-farming transition in eastern North America. In *Human bioarchaeology of the transition to agriculture*, ed. R. Pinhasi and J.T. Stock, 293–315. Chichester: Wiley-Blackwell.

Larsen, C.S., M.C. Griffin, D.L. Hutchinson, V.E. Noble, L. Norr, R.F. Pastor, C.B. Ruff, K.F. Russell, M.J. Schoeninger, and M. Schultz. 2001. Frontiers of contact: Bioarchaeology of Spanish Florida. *Journal of World Prehistory* 15: 69–123.

Lieverse, A.R., J.T. Stock, M.A. Katzenberg, and C.M. Haverkort. 2011. The bioarchaeology of habitual activity and dietary change in the Siberian middle Holocene. In *Human bioarchaeology of the transition to agriculture*, ed. R. Pinhasi and J.T. Stock, 265–291. Chichester: Wiley-Blackwell.

Milner, G.R. 1991. Health and cultural change in the late prehistoric American Bottom, Illinois. In *What mean these bones? Studies in southeastern bioarchaeology*, ed. M.-L. Powell, P.S. Bridges, and A.M.W. Mires, 52–69. Tuscaloosa: University of Alabama Press.

Mummert, A., E. Esche, J. Robinson, and G.J. Armelagos. 2011. Stature and robusticity during the agricultural transition: Evidence from the bioarchaeological record. *Economics and Human Biology* 9: 284–301.

Ortner, D.J. 2003. *Identification of pathological conditions in human skeletal remains*. 2nd ed. San Diego: Academic Press.

Oxenham, M. 2006. Biological responses to change in prehistoric Viet Nam. *Asian Perspectives* 45: 212–239.

Oxenham, M., and N. Tayles, eds. 2006. *Bioarchaeology of Southeast Asia*. Cambridge: Cambridge University Press.

Pechenkina, E., and M. Oxenham, eds. 2013. *Bioarchaeology of ancient East Asia: Movement, contact, health*. Gainesville: University Press of Florida.

Pechenkina, E.A., J.A. Vrandenburg, R.A. Benfer Jr., and J.F. Farnum. 2007. Skeletal biology of the central Peruvian coast. In *Ancient health: Skeletal indicators of agricultural and economic intensification*, ed. M.-N. Cohen and G.M.M. Crane-Kramer, 92–112. Gainesville: University Press of Florida.

Perry, M.A., ed. 2012. *Bioarchaeology of the Near East and eastern Mediterranean*. Gainesville: University Press of Florida.

Pietrusewsky, M., and R. Ikehara-Quebral. 2006. The bioarchaeology of the Vat Komnou cemetery, Angkor Borei, Cambodia. *Bulletin of the Indo-Prehistory Association* 26: 86–97.

Pinhasi, R., and J.T. Stock, eds. 2011. *Human bioarchaeology of the transition to agriculture*. Chichester: Wiley-Blackwell.

Rose, J.C., B.A. Burnett, M.S. Nassaney, and M.W. Blaeuer. 1984. Paleopathology and the origins of maize agriculture in the lower Mississippi Valley and Caddoan culture areas. In *Paleopathology at the origins of agriculture*, ed. M.N. Cohen and G.J. Armelagos, 393–424. Orlando: Academic Press.

Ruff, C.B. 1999. Skeletal structure and behavioral patterns of prehistoric Great Basin populations. In *Prehistoric lifeways in the Great Basin wetlands: Bioarchaeological reconstruction and interpretation*, ed. B.E. Hemphill and C.S. Larsen, 290–320. Salt Lake City: University of Utah Press.

Ruff, C.B. 2008. Biomechanical analyses of archaeological human skeletons. In *Biological anthropology of the human skeleton*, ed. M.A. Katzenberg and S.R. Saunders, 2nd ed., 183–206. Hoboken: Wiley-Liss.

Ruff, C.B. 2010. Skeletal structure and behavioral patterns of prehistoric Great Basin populations. In *Understanding prehistoric lifeways in the Great Basin wetlands: Bioarchaeological reconstruction and interpretation*, ed. B.E. Hemphill and C.S. Larsen, 290–320. Salt Lake City: University of Utah Press.

Sakashita, R., M. Inoue, N. Inoue, Q. Pan, and H. Zhu. 1997. Dental disease in the Chinese Yin-Shang period with respect to relationships between citizens and slaves. *American Journal of Physical Anthropology* 103: 401–408.

Sattenspiel, L., and H. Harpending. 1983. Stable population and skeletal age. *American Antiquity* 48: 489–498.

Steckel, R.H., and J.C. Rose, eds. 2002. *The backbone of history: Long-term trends in health and nutrition in the Americas*. New York: Cambridge University Press.

Stock, J.T., M.C. O'Neill, C.B. Ruff, M. Zabecki, L. Shackelford, and J.C. Rose. 2011. Body size, skeletal biomechanics, mobility and habitual activity from the Late Palaeolithic to the mid-Dynastic Nile Valley. In *Human bioarchaeology of the transition to agriculture*, ed. R. Pinhasi and J.T. Stock, 347–367. Chichester: Wiley-Blackwell.

Stout, S.D. 1978. Histological structures and its preservation in ancient bone. *Current Anthropology* 19: 601–603.

Tayles, N., K. Domett, and K. Nelsen. 2000. Agriculture and dental caries? The case of rice in prehistoric Southeast Asia. *World Archaeology* 32: 68–83.

Temple, D.H., and C.S. Larsen. 2007. Dental caries prevalence as evidence for agriculture and subsistence variation among the prehistoric Yayoi of Japan: Biocultural interpretations of an economy in transition. *American Journal of Physical Anthropology* 134: 501–512.

Temple, D.H., and C.S. Larsen. 2013. Bioarchaeological perspectives on systemic stress during the agricultural transition in prehistoric Japan. In *Bioarchaeology of East Asia: Movement, contact, health*, ed. E. Pechenkina and M. Oxenham. Gainesville: University Press of Florida. in press.

Forensic and Archaeological Analyses: Similarities and Differences

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Introduction

Methodology in the analysis of human remains varies considerably in relation to context and problem orientation. Human remains are found in a myriad of contexts, with different levels of completeness and with varying degrees of preservation. All of these factors influence approach and the types of tests that can be utilized in analysis. The central problem to be examined also shapes methodology selection.

Definition

Forensic Analysis

In forensic applications, the particular issues presented by each case largely dictate what procedures should be employed. Forensic anthropologists bring awareness of the range of approaches possible to each issue. With this perspective, they then can select the appropriate techniques to solve the problems presented by each individual case.

Methodology selection in forensic work begins with recovery. Knowledge that remains are buried within a discrete location calls for archaeological techniques that remove the surrounding soil, leaving the remains and associated evidence in situ. Thorough documentation employing photography, mapping, and note-taking is required.

If remains are known to be buried, but the exact location is unknown, remote sensing techniques may be called for. These can include ground-penetrating radar, electromagnetic testing, soil resistivity, and even manual probes. The terrain and topography can be key factors in selecting approaches. Remote sensing methods excel in rural areas with homogeneous soils and topography.

Of course, human remains can be found in many different environments and each requires thoughtful consideration of appropriate recovery techniques. Skeletonized remains located on the ground surface do not require the archaeological approaches discussed above but still call for careful documentation and removal of debris so that evidence position can be clearly ascertained. Marine environments present special challenges and may dictate use of diving equipment. Recovery in all situations demands proper documentation, packaging, and general evidence control, ensuring the integrity of the chain of custody.

Key Issues

Human Versus Nonhuman

Recognition of human remains usually can be accomplished with visual examination by a skilled practitioner. Challenges surface with fragmentation and/or evidence of extensive postmortem (taphonomic) alteration. Scanning electron microscopy/energy dispersive spectroscopy (SEM/EDS) can be useful to distinguish fragments of bone or tooth from other materials. Histological techniques examining internal structure at the microscopic level sometimes can distinguish nonhuman fragments from those of humans. Protein radioimmunoassay (pRIA) offers a procedure that can determine species of bones and teeth. The nature of the evidence, financial resources, and the medicolegal problem dictate which of the above approaches are employed.

Age at Death

The choice of methods to use in the estimation of age at death depends upon the general life stage of the individual. For neonates and very young infants (0–2 years), bone size provides the best information. If the small bones are relatively complete, measurements can be taken and utilized in regression equations to estimate body length. Chronological age can then be estimated by using appropriate population-specific data on the age correlation with body length.

For older infants, children, and adolescents, bone size can provide useful information as well, but if present, teeth represent the most accurate age predictors. Although dental eruption proffers some information, the most accurate estimates are derived from dental formation. Selection of which published dental standards to utilize depends upon the likely ancestry of the remains and the particular teeth present.

Many means exist for adult age estimation depending upon the evidence present and the general age of the individual (young or old adult). Most seasoned practitioners utilize all of the approaches that are suitable for the evidence recovered and then develop a reasoned interpretation. These applications may involve teeth as well as bones. They can include morphological assessment, measurement, and/or microscopic and radiographic techniques. Key areas of the skeleton examined include the sternal rib ends, pubic symphysis, vertebral bodies, long bone joint surfaces, teeth, auricular area of the pelvis, long bone internal structure (both microscopic and macroscopic), and cranial sutures.

Sex Estimation

Approaches to sex estimation usually involve visual examination of comparative adult morphological features, especially those on the pelvis. Metric techniques also are available including custom discriminant function equations. These morphological methods are not applicable to juvenile remains because of the minimal expression of sexual dimorphism in them.

Recently, molecular processes for sex determination have been employed as well. These approaches can determine sex in both adult and

immature remains and also in fragments that allow sufficient DNA recovery. Molecular procedures are more time-consuming and costly but offer definitive determinations in cases where sex assessment is crucial. Thus, if the pelvis is present and well preserved, morphological techniques of pelvic assessment would likely be chosen. If the pelvis is not present, size of other bones should be considered with the realization that only those extremely robust (male) or gracile (female) offer definitive information. Molecular techniques comprise the methodology of choice with fragmentary or immature remains or any situation in which accurate determination of sex is extremely critical.

Stature Estimation

Estimates of living stature can be useful in building the biological profile of a recovered skeleton. Regression equations derived from various population samples are available to aid in this process. Determining the appropriate equation to use depends upon the bones recovered and their likely ancestry. When multiple equations are possible, selection should be driven by their relative accuracy.

Ancestry Estimation

Ancestry evaluation in a forensic context can include a variety of methods such as morphological assessment of bones and teeth as well as metric discriminant function analysis. Recovered evidence and its context must influence decisions on the approach and interpretation method. Analysis of ancestry calls for an understanding of the social/historical dimensions of locally employed racial categories as well as representation/sampling issues of the metric approaches.

Time Since Death

Evaluation of time since death can include methods of morphological assessment as well as more analytical approaches. Since the extent of tissue preservation is highly variable and context dependent, objective techniques such as radiocarbon analysis can prove useful. The use of radiocarbon analysis with special attention to the modern bomb curve can distinguish ancient from modern remains. This type of analysis can even clarify the birth and death dates for individuals in some age at death and chronological categories, granted that the appropriate tissues are preserved.

Other Issues

Multiple forensic techniques are available for personal identification, assessment of pathological alterations and treatment of disease, facial imaging, taphonomic (postmortem) factors, and evidence of foul play. Like other areas of forensic application, choice of methodology depends upon the particular evidence recovered and the specific question being addressed.

Cases in forensic anthropology vary extensively in the problems they present. An unknown skeleton recovered from any context usually requires a full analysis with the general goal being construction of the biological profile of a missing person that might lead to identification. In contrast, some cases that arrive in forensic anthropology laboratories may represent previously identified individuals, but trauma analysis may be required. Some requests for examination focus specifically on such techniques as facial approximation, photographic superimposition, or identification of particular evidence.

In studying human remains from archaeological contexts, skeletal biologists employ a similar logic in methodological choice. Selection is problem oriented and shaped by the nature of the recovered evidence.

In paleopathology, proper employment of differential diagnosis techniques is critical. Microscopic and radiographic procedures frequently are utilized to assist diagnosis and interpretation. Molecular attempts to identify the residual DNA of particular pathogens represent an exciting new development with great potential to sharpen understanding of the history of disease.

Paleodemography relies extensively on the methodology of age and sex estimation outlined above in regard to forensic applications. Consideration of appropriate statistical approaches and sampling issues are key factors.

Biological distance studies rely upon varied methodology of measurement, morphological assessment, population sampling, and statistical

procedures. Recent advances in instrumentation and computer software development have enabled three-dimensional morphometric assessment providing more penetrating interpretation. Ancient DNA analysis offers a genetic approach to issues of past population relationships. Methodology assessment in this area of skeletal biology is influenced by sample preservation and availability, as well as cost factors and accessibility to appropriate equipment and facilities.

The field of biomechanics presents the opportunity for understanding patterns of human physical activity as evidenced in skeletal remains. Studies of biomechanics rely extensively on methodology in radiographic imaging and computer modeling. Such technological advances can aid in providing appropriate methodological choices in this field.

Although analyses of human skeletal remains vary greatly in the different areas of application and research, several themes are apparent. The extent of tissue preservation and context of recovery represent key factors in methodology selection. The particular problem being investigated largely determines the selection of techniques used. While many techniques are routinely employed, there is no standard protocol for all applications. Investigators must be aware of the range of possible methods available and wisely select those that are most useful for each specific application. Technology continues to advance rapidly offering skeletal biologists a growing number of choices.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Bone, Trauma in
- ▶ Bone: Chemical Analysis
- ▶ Bone: Histological Analysis
- ▶ Children in Bioarchaeology and Forensic Anthropology
- ▶ Demographic Transitions
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Excavation Methods in Archaeology
- ▶ Facial Approximation and Craniofacial Superimposition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Radiocarbon Dating in Archaeology
- ▶ Sex Assessment
- ▶ Stature Estimation
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Time Since Death in Bioarchaeology and Human Osteology

Further Reading

Blau, S., and D.H. Ubelaker, eds. 2009. *Handbook of forensic anthropology and archaeology*. Walnut Creek: Left Coast Press.

Katzenberg, M.A., and S.R. Saunders, eds. 2008. *Biological anthropology of the human skeleton*. 2nd ed. Hoboken: Wiley.

Larsen, C.S., ed. 2010. *A companion to biological anthropology*. West Sussex: Wiley-Blackwell.

Ubelaker, D.H. 1999. *Human skeletal remains: Excavation, analysis, interpretation*. 3rd ed. Washington, DC: Taraxacum.

Forensic Anthropology and Archaeology in Disaster Response

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Introduction

Forensic anthropology has continued to demonstrate its usefulness to the field of disaster

response since the publication of T. Dale Stewart's *Personal Identification in Mass Disasters* (1970). Today, the increasing numbers of specialists in this area are applying their knowledge, skills, and research abilities to all aspects of disaster victim recovery and identification, personal effects management, and family assistance (Sledzik 2009).

Victims of mass disasters are often difficult to identify due to extensive trauma, fire, and other modifying forces associated with these types of incidents. Depending on the scale of the disaster, human remains may also be in advanced stages of decomposition by the time responders can extricate them from the scene, thus adding to the overall suite of identification challenges. In these circumstances, bereaved family members cannot be expected to provide reliable visual identifications of remains; instead, appropriate scientific practices must be employed.

Although the legal requirement for conducting identifications resides with the medicolegal authority in the jurisdiction where the disaster occurred, it is possible for a high-volume surge in fatalities, associated with a specific incident, to overwhelm the capabilities of these systems – particularly at smaller medical examiner or coroner's offices with limited resources. Such challenges require a multidisciplinary response that can include the assistance of forensic anthropologists experienced in disaster recovery operations, human remains and evidence processing, and the identification of individuals whose remains are severely fragmented, burned, decomposed, or otherwise unrecognizable (Kontanis and Sledzik 2008; Sledzik 2009).

Definition

Forensic anthropology plays a comprehensive role across the three critical areas of disaster response: the recovery scene, the temporary morgue, and interactions with families (Sledzik 2009). Trained in the principles and techniques of archaeology, with an extensive background in taphonomy, human osteology, and trauma analysis, anthropologists routinely work alongside medicolegal and forensic practitioners in the fields of pathology, dentistry, radiology, fingerprint analysis, and molecular biology (i.e., DNA). When requested to attend a scene, the work of an anthropologist is primarily to assist and support the medicolegal authority responsible for victim recovery, identification, death certification, and the final release of remains – all areas of critical importance to family members and to the settlement of insurance claims and estates.

Key Issues

Disaster scenes can be broadly categorized as having resulted from natural phenomena (e.g., earthquake, tsunami, tornado); an accident (e.g., vehicle collision, pipeline explosion, stadium collapse); or criminal activity (e.g., shooting, bombing). The recovery contexts that result from such events are complex, presenting commingled biological remains, personal effects, and other diagnostic evidence that can be distributed over areas ranging from meters to kilometers. These immediate challenges are only exacerbated by the compressed timeline that all medical examiners/coroners face as they attempt to balance the needs and concerns of family members and society with their overall medicolegal responsibility for victim recovery and identification, and in a "zero defect" operational environment (Dirkmaat et al. 2001; Sledzik 2009).

Victim identification begins with the recovery effort at the disaster scene. Regardless of the type of incident encountered (natural, accident, or criminal), preserving the overall integrity of the scene's spatial and temporal context is of paramount concern. Subsequently, the shared core objectives that drive investigators at any mass fatality incident are very similar: locate the scene, define its maximum dimensions, and if possible, clearly delineate and secure its boundary line; identify, number, document, and collect all physical and contextual evidence; and transfer all such evidence to the proper medicolegal authority, in a manner that does not harm its probative value or the chain-of-custody.

Appropriate strategies for search and recovery operations ensure that all areas throughout the disaster scene are surveyed and that human remains, associated personal effects, and other probative evidence are systematically detected, recorded, and collected using scientific methods and techniques. The quality of work at the recovery scene can influence the overall success of the victim identification process inside the morgue. Thoughtful practices on scene can mitigate additional disturbance of human remains and evidence by responders and the accidental loss or destruction of evidence. Subsequently, practitioners are developing and implementing more consistent operating procedures; reporting on the accuracy, repeatability, and level of estimated uncertainty; and defining the quality assurance and quality control processes employed.

Today, systematic approaches designed to maximize search coverage and effectiveness are being codified almost exclusively within the discipline of forensic anthropology. The development and validation of these standardized protocols – specifically in measures of survey completeness, precision mapping systems and technologies, and spatial data collection, visualization, and analysis – are firmly rooted in the study of geographic surfaces and field archaeology (O'Sullivan and Unwin 2003; Dirkmaat 2012). Applied science programs at institutions like Mercyhurst University, the University of Sydney, the Victorian Institute of Forensic Medicine, and Istanbul University represent just a fraction of the total number actively supporting worldwide advancements in survey methods, body documentation techniques, and recovery protocols for disaster scenes. In addition, the International Committee of the Red Cross (ICRC), the International Commission on Missing Persons (ICMP), and the international policing organization (INTERPOL) have all created guidelines for the recovery of victims from mass fatality contexts.

Among the first tasks confronting any disaster response is determining the scope of the incident and the context of the recovery scene. In order to effectively respond, the incident command structure needs to gather information (as soon as possible) about what happened, where the incident occurred, the pertinent environmental conditions, an estimated number of victims and fatalities, the potential health and safety hazards associated with the scene, and any immediate security issues. These data, in turn, help shape the planning effort and the mobilization of personnel and resources for human remains recovery and identification, personal effects management, and other evidence collection and investigation activities.

While there have been significant advances in a number of technological areas associated with disaster response, the implementation of new, higher-resolution remote sensing instruments in some contexts is one of the most useful innovations being applied during initial evaluation of recovery scenes. A reconnaissance survey, similar to the type used in archaeological fieldwork, provides a systematic and comprehensive approach for defining and securing the scene. The goal of this survey is to rapidly evaluate the scene's general size, orientation, and complexity at the earliest moment possible, in order to guide operational planning efforts and develop the most appropriate recovery strategy.

Integrating overhead imagery with data collected on the ground (during initial walkthroughs) can provide a more complete and accurate understanding of the incident area as a whole and the spatial distribution of the victim recovery scene across the landscape. In modern response work, the traditional walkthrough is being supplemented (if not preceded) by aerial reconnaissance of various kinds – e.g., vertical and oblique photography, overhead satellite imagery, and even active types of remote sensing, such as LiDAR. A key advantage shared among these techniques is the fact that they are nonintrusive, thus the potential for scene disturbance or contamination is nearly eliminated. Large-scale assessment and interpretation of damage areas, evidence and wreckage distributions, and scene accessibility is enhanced by the advent of spatial analysis and visualization software capable of layering and displaying massive amounts of remote sensing and other georeferenced data via Geographic Information Systems (GIS). These systems integrate data collected by various means, at different times, and across a range of scales (Greene 2002).

The context of a recovery scene is the basic interpretive framework used by forensic anthropologists in the field; the same concept is fundamental to medicolegal, and to some extent, accident investigations (Dirkmaat 2012). The position of and spatial relationship between human remains, personal effects, and other physical evidence is the key to understanding what happened and to reconstructing the different factors that contributed to the event.

The location of evidence and the spatial associations that exist between items of evidence contained within the scene, or between evidence and its surrounding matrix, help to create statistical models that assist with some of the more challenging disaster victim recovery tasks. Among these are models for identifying the full horizontal and vertical limits of scene boundaries, maximizing coverage of search areas, quantifying the effectiveness of various survey patterns and regimen, and interpreting scene context through spatial analysis of evidence distributions (Dirkmaat et al. 2008; Dirkmaat 2012).

As practitioners, Dirkmaat and Hochrein have, in particular, recognized that a significant number of the problems that arise in disaster scene recovery work are inherently spatial in nature; therefore, exacting methods in survey, mapping, and evidence collection, specifically adapted for use in either open or confined mass fatality scenes, can help mitigate post-incident commingling and damage of human remains and other evidence (Dirkmaat 2012). Although protecting the spatial integrity of these scenes can be difficult, it is indeed necessary. As an example, during the transition from life-safety to recovery operations, responders often have to move victims, property, and other potentially diagnostic evidence. Non-transportable, contextual data are subsequently lost, unless they can be documented.

Wind, water, and other geomorphic agents – completely apart from human activity – present some of the most dynamic forces affecting the spatial integrity of evidence at scenes. Aircraft accidents into steep, mountainous terrain have resulted in landslides capable of obscuring large portions of wreckage, as was the case with Avianca Flight 410, lost near Cucuta, Colombia, in 1988 (Levinson and Granot 2002: 80). By contrast, impact into water may involve a combination of high and low-energy transport mechanisms. These recovery scenes can become dispersed over a distance of seabed, or along the bottom of a river, into a secondary context by the movement of the water (e.g., waves, tidal currents, flow volume).

Although the interpretive value of three-dimensional spatial patterns and postdepositional formation processes has been widely understood by the geological and archaeological sciences, the same awareness is only recently gaining acceptance among medicolegal investigators, largely through their increased contact with forensic anthropologists working in medical examiner/coroner settings (Crowder et al. 2012).

Arguably one of the greatest challenges presented by mass fatality scenes is the mixing together, or "commingling," of highly fragmented human remains. Tuller et al. (2008) have begun examining ways in which spatial analysis can assist in sorting out commingled remains using statistical methods, such as the nearest neighbor criterion. Although this application of spatial analysis and statistics is relatively new, the concept has been widely employed as a presumptive starting point in forensic anthropology casework, especially for scenes with multiple individuals deposited into complex assemblages (Tuller et al. 2008).

Traditionally, the function of the forensic anthropologist in the disaster morgue centered on triage and sorting tasks, as well as the documentation of hard tissue remains (Kontanis and Sledzik 2008; Mundorff 2008). The anthropology station represents just one stop along the high-throughput morgue operation. Complete postmortem documentation follows a well-defined work progression from case admission processing and the assignment of a unique tracking number to photography, radiography, pathology, fingerprints, dental, and DNA sampling (Sledzik 2009).

A number of different evidence accountability and data management challenges must be addressed through sound quality control and assurance measures before the first set of remains

enters the morgue flow. As anthropologists have assumed greater management roles in disaster victim morgue operations over the past two decades, they have had to move beyond the limits of their forensic specialty and develop a better understanding of the effectiveness and efficiency of evidence tracking systems, the proper order of analytical stations, and what configurations best support the requirements of the broader medicolegal investigation. Redundant systems of data capture, with systematic verification checks, are also being modeled from professional survey and archaeological site work, and applied to help manage the overall quality and reliability of the documentation effort at the scene.

Effective management of the identification effort also demands a proactive role in family assistance on the part of the medicolegal authority. Anthropologists can assist with identifying the core needs of victims, family members, and their support networks; they help facilitate and coordinate the timely recovery and identification of victims and the return of personal effects; and they help explain the re-association and group remains processes to families and legal authorities. In some cases, the provision of family assistance is required by law; yet even when there is no formal requirement, local, state, and federal entities continue to provide information and guidance to the medicolegal community and to others affected by the incident.

Antemortem data collection – a critical factor in victim identification – hinges largely on contact with the families of those "unaccounted-for" individuals known to be associated with the incident. This process is complex and it requires a commitment of personnel and resources beyond the postmortem data collection effort being carried out in the morgue. Antemortem data can be influenced by several variables: the nature of the disaster (open, e.g., bomb blast in a shopping mall vs. closed, e.g., plane accident); the demographic profile of each respective decedent; and the availability, quality, and accuracy of the data (Kontanis and Sledzik 2008). Death investigators, mortuary personnel, and forensic anthropologists are among the specialists trained to conduct antemortem data collection interviews.

Positive identification of victims requires the comparison and reconciliation of antemortem and postmortem information. The threshold of certainty needed to move from a "circumstantial" to a "positive" identification, however, presents a complicated problem that medicolegal professionals confront daily. In a disaster victim context the potential for a misidentification can be magnified by the number of victims, the condition of their remains (fragmented, burned, etc.), the thoroughness of the recovery effort, the nature of the victim population (open vs. closed), the availability and quality of antemortem records, and access to DNA reference samples. Forensic anthropologists are examining likelihood ratios as a means of quantifying the strength of an identification (Steadman et al. 2006). Specifically, they are looking at the ratio between the likelihood that evidence of a unique biological characteristic (or set of characteristics) came from a particular individual, versus the likelihood that it came from a random, unrelated individual. In other words, what would be the probability of obtaining the evidence if the identification was correct versus the probability of obtaining the same evidence if the identification was incorrect? Figura (2011) has developed this concept further for its specific applications in disaster victim identification work. And recently, de Cosmo (2012) has devised a decision support tool designed to reduce subjectivity when using physical attributes to make identifications in these same types of contexts.

Future Directions

New emphasis is being placed on the use of validated scientific practices in disaster victim recovery and identification. This trend has been stimulated in part by the Supreme Court's rulings in *Daubert v. Merrell Dow Pharmaceuticals, Inc.* (1993), *Kumho Tire Company v. Carmichael* (1999), and the Rule 702 Amendment (2001). *Daubert*, in particular, has changed the rules on the admissibility of expert testimony in federal courts; expert witnesses are being required to provide an estimation of probability and to substantiate their assertions with methods that have been

scientifically tested and validated (Dirkmaat et al. 2008). The National Academy of Sciences (2009), in the USA, has further underscored the Supreme Court's concerns, specifically citing a need for standards, guidelines, and best practices in human identification techniques (National Academy of Sciences 2009).

Significant variation in medicolegal and law enforcement systems across the country has prompted the development of best practices in death investigation. Just a few years after the *Daubert* ruling, the National Institute of Justice and the National Association of Medical Examiners in the USA began pushing for standardized operating procedures and checklists in the field of death investigation and in the performance of autopsies (National Academy of Sciences 2009). Refining the focus more specifically on mass fatality management issues, forensic anthropologists and other practitioners from the medicolegal and forensic communities have voiced a similar need for guidelines and best practices specifically in the area of disaster victim identification. In 2009, the Federal Bureau of Investigation (FBI) in the USA received funding to assemble a Scientific Working Group on Disaster Victim Identification. Although this group has no enforcement function, its efforts are intended to generate consensus among practitioners in disaster planning, response, and victim identification through the recommendation of best practices and an emphasis on quality control and assurance. These documents are made available for public review and feedback as a way to encourage maximum contribution and acceptance.

The growing membership of physical anthropologists within the American Academy of Forensic Sciences and the American Board of Forensic Anthropology is also reflective of an expanding interest in the medicolegal aspects of disaster response and victim identification. Traditional employment opportunities for forensic anthropologists at universities and other research institutes have expanded to include agencies focused specifically on mass fatality issues, human rights and humanitarian organizations; federal, state, and city medical examiner's offices; crime laboratories; emergency management departments; public health and safety offices; and the armed forces. In fact, the largest numbers of staff dedicated to the practice of forensic anthropology in the world today is the Central Identification Laboratory, comprised of multiple facilities run by the US Department of Defense and accredited through the American Society of Crime Laboratory Directors/Laboratory Accreditation Board.

Forensic anthropologists with technical expertise in archaeology are treating disaster scenes as large-scale death investigations requiring the use of scientifically validated field methods and techniques. As a result, their research is expanding rapidly into the wider application of spatial data analysis and visualization, mapping systems and technologies, and the quality assurance and control measures that define effective survey and recovery operations.

The accurate identification and efficient return of disaster victims to their loved ones is an integral part of the grieving process that transcends all cultural boundaries. In its current state of development, forensic anthropology and its use of standardized archaeological field procedures, has begun to take a new role within the framework of disaster response, providing medicolegal authorities with more consistent and reliable ways of detecting, mapping, and recovering victims. Amid the chaos of a disaster, it is only through comprehensive scene processing and interpretation that the complexity of the incident can be understood and articulated in a way that strikes an effective balance between the concerns of the bereaved and the responsibilities of the medicolegal authority.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Bone, Trauma in
- ▶ Burned Remains in Forensic Contexts
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Forensic Anthropology: Definition

▶ Forensic Anthropology: Investigating Human Rights Violations
▶ Human Remains Recovery: Archaeological and Forensic Perspectives
▶ Taphonomy in Bioarchaeology and Human Osteology

Disclaimer The author is an employee of the National Transportation Safety Board. The views expressed are the personal views of the individual and do not necessarily represent the views of the National Transportation Safety Board or the United States Government.

References

Crowder, C., C. Rainwater, K. Hartnett, J. Fridie, B.J. Figura, J. Godbold, S. Warnasch, and B. Adams. 2012. Roles of the forensic anthropologist at the New York City Office of Chief Medical Examiner. *Proceedings of the American Academy of Forensic Sciences* 18: 393–394.

De Cosmo, S. 2012. *Decision support tool for mass fatality victim identification*. Unpublished Ph.D. dissertation, The George Washington University.

Dirkmaat, D.C. 2012. Forensic anthropology at the mass fatality incident (commercial airliner) crash scene. In *A companion to forensic anthropology*, ed. D.C. Dirkmaat, 136–156. West Sussex: Wiley.

Dirkmaat, D.C., J.T. Hefner, and M.J. Hochrein. 2001. Forensic processing of the terrestrial mass fatality scene: Testing new search, documentation and recovery methodologies. *Proceedings of the American Academy of Forensic Sciences* 7: 241–242.

Dirkmaat, D.C., L.L. Cabo, S.D. Ousley, and S.A. Symes. 2008. New perspectives in forensic anthropology. *Yearbook of Physical Anthropology* 51: 33–52.

Figura, B.J. 2011. *A Bayesian approach to disaster victim identification*. Unpublished Ph.D. dissertation, Binghamton University, State University of New York.

Greene, R.W. 2002. *Confronting catastrophe: A GIS handbook*. Redlands: ESRI Press.

Kontanis, E.J., and P.S. Sledzik. 2008. Resolving commingling issues during the medicolegal investigation of mass fatality incidents. In *Recovery, analysis, and identification of commingled human remains*, ed. B.J. Adams and J.E. Byrd, 317–336. Totowa: Humana Press.

Levinson, J., and H. Granot. 2002. *Transportation disaster response handbook*. London: Academic.

Mundorff, A.Z. 2008. Anthropologist-directed triage: Three distinct mass fatality events involving fragmentation of human remains. In *Recovery, analysis, and identification of commingled human remains*, ed. B.J. Adams and J.E. Byrd, 123–144. Totowa: Humana Press.

National Academy of Sciences. 2009. *Strengthening forensic science in the United States: A path forward*. Washington, DC: The National Academies Press.

O'Sullivan, D., and D. Unwin. 2003. *Geographic information analysis*. Hoboken: Wiley.

Sledzik, P.S. 2009. Forensic anthropology in disaster response. In *Handbook of forensic anthropology and archaeology*, ed. S. Blau and D.H. Ubelaker, 374–387. Walnut Creek: Left Coast Press.

Steadman, D.W., B.J. Adams, and L.W. Konigsberg. 2006. Statistical basis for positive identification in forensic anthropology. *American Journal of Physical Anthropology* 131: 15–26.

Tuller, H., U. Hofmeister, and S. Daley. 2008. Spatial analysis of mass grave mapping data to assist in the reassociation of disarticulated and commingled human remains. In *Recovery, analysis, and identification of commingled human remains*, ed. B.J. Adams and J.E. Byrd, 7–29. Totowa: Humana Press.

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Forensic Anthropology: Definition

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Brief Definition of the Topic

Since the development of the discipline, forensic anthropology has been defined in different ways depending on the context (Blau and Ubelaker 2009). Initially defined by Stewart (1979: ix), forensic anthropology was seen as "the branch of physical anthropology which, for forensic purposes deals with the identification of more or less skeletonized remains known to be, or suspected of being human." In 1977, an official definition was provided by the American Board of Forensic Anthropology that defines forensic anthropology as "the application of the science of physical or biological anthropology to the legal process. Physical or biological anthropologists who specialize in forensics primarily focus their studies on the human skeleton" (http://www.theabfa.org/).

More recently, the Scientific Working Group for Forensic Anthropology (SWGANTH) proposed a new definition: "forensic Anthropology is the application of anthropological methods and

theory – particularly those relating to the recovery and analysis of human remains – to resolve legal matters" (http://www.swganth.org/index.html).

These definitions illustrate the wide role that forensic anthropology practitioners have been developing over the last 30 years: from an initial specific role analyzing skeletal remains to a wider contribution that today incorporates the archaeological recovery of human remains, the analysis of taphonomic processes and the analysis of perimortem bone trauma.

The expansion of the application of forensic anthropology also highlights the undefined boundaries of the discipline. This broadness sometimes creates confusion for lawyers and police forces in terms of what is possible to expect from a forensic anthropologist.

More recently, forensic anthropology has been applied to the investigation of human rights violations. Such work is redefining the role of forensic anthropologists in the identification process and their role in the collection and analysis of antemortem data.

It is worth mentioning that perceptions about the role of a forensic anthropologist differ from country to country. In some contexts, forensic anthropologists almost exclusively analyze skeletal remains in order to produce a biological profile; in other contexts, practitioners are involved in physical work at the crime scene, involving fleshed remains and bones; in others, they also incorporate the analysis of different kinds of trauma in the skeleton, complementing the work of the forensic pathologist, and in others, their work involves also the analysis of living people, in terms of age estimation of migrants, for example.

In conclusion, the traditional concepts that are usual to mention when talking about forensic anthropology, as "skeletal remains," "physical anthropology," "identification," and "biological variability", are increasingly expanding. A forensic anthropologist may work at the crime scene (survey, recovery, taphonomy, interpretation), at the laboratory (trauma, disease), and in antemortem data collection.

Finally, it is important to remember that a forensic anthropologist is primarily an anthropologist, someone with a wider background than a forensic odontologist or a forensic pathologist. This may be an advantage in the understanding and comprehension of processes in forensic contexts, where cultural and religious elements could play an important role.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Bone, Trauma in
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Investigating Human Rights Violations
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Time Since Death in Bioarchaeology and Human Osteology

References

Blau, S., and D.H. Ubelaker, eds. 2009. *Handbook of forensic anthropology and archaeology.* Walnut Creek: Left Coast Press.

Stewart, T.D. 1979. *Essentials of forensic anthropology.* Springfield: Charles C. Thomas.

Forensic Anthropology: Investigating Human Rights Violations

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Introduction

The contribution of forensic anthropology and archaeology to human rights revolves around three

core concepts: historical record keeping or "getting the record straight," enforcing "the right to know" of surviving families, and the creation of new approaches in the "jurisprudence" pertaining to interpretation of evidence about violations against international humanitarian law and international human rights law.

Definition

Forensic anthropology and archaeology have significantly improved human rights work throughout the world, from the starting point of investigations carried out on the after effects of armed conflicts where state officials perpetrated massive human rights abuses. International instruments set forth by the UN to prevent crimes against humanity, such as the *Geneva Conventions*, *the Convention on the Prevention and Punishment of the Crime of Genocide*, and the *Convention for the Protection of All Persons from Enforced Disappearance*, have set the groundwork for forensic anthropology and archaeology to be included in the investigative strategies used for legal purposes, historical reconstruction of events, and humanitarian identification. These scientific fields use a variety of methods for data gathering and analysis. The physical records they gather help to establish human behavioral patterns that provide important clues to clarify the most probable sequence of the events that occurred at a given location at a specific time.

Key Issues

To understand the importance and nature of these contributions, it is important to observe the work involved with each of the three main purposes separately. The three key issues are identified and categorized as historical revisionism ("*getting the record straight*"), jurisprudence, and humanitarian identification ("*the right to know*").

Getting the Record Straight

Human rights advocacy entails, among other things, trying to establish the factual truth for the historical record of events. In this regard, a fundamental contribution is objective statistical analysis based on good data gathering and accurate physical records. Good statistical practices are crucial in order to dismantle false records and assure historical truth.

Jurisprudence

Legal forensic interpretations of data are very challenging in cases where there are large numbers of victims. New and more complete means of interpretation are increasingly requested from forensic anthropology and archaeology. The following are three concrete examples of different patterns observed:

Demography of Genocide (Krstic IT-98-33; Popovic et al. IT-05-88; Tolimir IT-05-88/2)

Analysis of the age and sex distribution of a large number of cases demonstrated that the victims were not random but rather were part of a selected population: "men of fighting age."

Torture (Limaj et al. IT-03-66)

Analysis of the remains of ten individuals alleged to have been kidnapped and imprisoned in a clandestine detention center by the Kosovo Liberation Army (KLA) demonstrated that their injuries matched the description provided by the only surviving victim of what was inflicted by their captors and fell within the time frame of the detention.

Injury Patterns in Combatants Versus Noncombatants (Dordevic IT-05-87/1, Nova Brasilia vs. Brazil)

It was determined that the distribution of injuries in combatants and noncombatants is different. While the latter sustained gunshot injuries with greater frequency in the extremities and then in the chest and with the least frequency in the head, victims of human rights violations do so in the opposite manner: most frequently in the head, then in the chest, and least frequently in the extremities.

The Right to Know

The right to know what happened to a relative is said by the ICRC to be a fundamental pillar of international humanitarian law, and all countries and conflicting parties should respect and follow this law of war. Forensic anthropology is fundamental to reaching the humanitarian

purpose of identifying victims. As a result it is a key tool for victims and associations of victims of forced disappearance, extrajudicial killings, and the like.

Current Debates and Future Directions

Traditionally, forensic sciences have been considered principally as a means to establish the truth with the ultimate goal of administering justice. This concept is expanding, however. The "humanitarian umbrella," for example, is an initiative which seeks to prioritize the right to know of surviving family members through the identification of victims before legal processes. There are also human development initiatives arising from the contact with the communities. Understanding who the victims are and what interactions with other actors are generated during forensic interventions has increasingly gained relevance. The victims are often the poor, the illiterate, and the minorities, individuals whose position in society made them susceptible to various violations of their economic, social, and cultural rights which were not respected, defended, or enforced. This leads to an important question: would the proper respect and guarantee of civil and political rights alone, as traditionally pursued in truth-seeking mechanisms and trials, allow those victims to undertake the long path to recover their condition as citizens, if they were not considered citizens to begin with? Individuals become survivors in a system that tolerates them as objects but not as subjects of rights: the natural transition from victimhood is to survivorship. Perhaps the full enforcement not only of civil and political rights but also of economic, social, and cultural rights is the key to enable a further transition: from victims to citizens.

Forensics, when applied to the "illustration" of human rights violations, has the power to produce social change since it establishes a link with communities that choose to remember. Investigating these types of crimes is a long-term process. Its success depends on systematic strategies for preliminary investigations including antemortem data collection and grave record collection of missing persons. Understanding memory becomes, in this case, a mechanism for empowerment, a means to establish transactions between incontrovertible facts and constituencies with contentious memories of facts. This is the "illustrative" power of forensics.

Forensics need to be used in a proactive way so as not only to illustrate victims' suffering but also to provide a chance for compensation and also to remedy the unfavorable conditions that converted people into victims in the first place. This means highlighting the causes and not just the consequences of marginalization and exclusion. By profiting from the spree of change sparked by forensic intervention in a community, survivors are empowered to start their path to citizenship. This, in turn, forces the State to fulfill its obligation to enforce economic, social, and cultural as well as civil and political rights, often overlooked in processes of transition, and to guarantee all rights of new "citizens" forged in this struggle. Reconciliation or perhaps "less contentious coexistence" is achieved when transactions of memory are carried out in order to contrast that memory with the incontrovertible evidence that forensics provides. A semblance of collective memory is then achieved.

References

Baraybar, J.P. 2015. Variation of gunshot injury patterns in mortality associated with human rights abuses and armed conflict: An exploratory study. *Science and Justice* 55 (5): 355–362.

Baraybar, J.P., and R. Blackwell. 2014. Where are they? Missing, forensics and memory. *Annals of Anthropological Practice* 38 (1): 22–42.

Baraybar, J.P., and M. Gasior. 2006. Forensic anthropology and the determination of the most probable cause of death: An example from Bosnia y Herzegovina. *Journal of Forensic Sciences* 51 (1): 103–108.

Baraybar, J.P., V. Brasey, and A. Zadel. 2007. The need for a centralised and humanitarian-based approach to missing persons in Iraq. *The International Journal of Human Rights* 11 (3): 265–274.

Case of Favela Nova Brasília v. Brazil. Preliminary objections, merits, reparations and costs. Judgment of February 16, 2017. Series C No. 333. http://www.corteidh.or.cr/docs/casos/articulos/seriec_333_esp.pdf. Accessed July 6 2017.

Dordevic IT-05-87/1. http://www.icty.org/x/cases/djordjevic/cis/en/cis_djordjevic_en.pdf. Accessed Oct 12 2011.

Doretti, M., and C.C. Snow. 2003. Forensic anthropology and human rights. In *Hard evidence: Case studies in forensic anthropology*, ed. D.W. Steadman, 290–310. Prentice Hall: Upper Saddle River.

Ferllini, R. 2007. *Forensic archaeology and human rights violations*. Charles C Thomas: Springfield.

Juhl, K. 2005. The contribution by (Forensic) archaeologists to human rights investigations of mass graves. *AmS-NETT 5*, 77 pp., Stavanger. ISSN 0809-618X, ISBN 82-7760-118-2, UDK 343.979, URN:NBN:no-a1640 http://am.uis.no/getfile.php/Arkeologisk%20museum/publikasjoner/ams-nett/Mass_Graves2.pdf. Accessed Oct 12 2011.
Kimmerle, E.H., and J.P. Baraybar. 2008. *Skeletal trauma: Identification of injuries resulting from human rights abuse and armed conflict*. Boca Raton: CRC Press.
Krstic IT-98-33; Popovic et al. IT-05-88; Tolimir IT-05-88/2. http://www.icty.org/x/cases/krstic/tjug/en/krs-tj010802e.pdf. Accessed Oct 12 2011.
Limaj et al. IT-03-66. http://www.icty.org/x/cases/limaj/tjug/en/lim-tj051130-e.pdf. Accessed Oct 12 2011.
Schmitt, S. 2001. Mass graves and the collection of forensic evidence: Genocide, war crimes and crimes against humanity. In *Forensic taphonomy: The postmortem fate of human remains*, ed. W.D. Haglund and M.H. Sorg, 277–292. Boca Raton: CRC Press.
Snow, C.C., and M.J. Bihurriet. 1992. An epidemiology of homicide: Ningun Nombre burials in the province of Buenos Aires from 1970 to 1984. In *Human rights and statistics: Getting the record straight*, ed. T.B. Jabine and R.P. Claude, 328–363. Philadelphia: University of Pennsylvania Press.
Snow, C.C., L. Levine, L. Lukash, L.G. Tedeschi, C. Orrego, and E. Stover. 1984. The investigation of human remains of the "Disappeared" in Argentina. *American Journal of Physical Anthropology* 5 (4): 297–299.
Steadman, D. Wolfe, and W.D. Haglund. 2005. The scope of anthropological contributions to human rights investigations. *Journal of Forensic Sciences* 50 (1): 23–30.
Tidball-Binz, M. 2006. Forensic investigations into the missing: Recommendations and operational best practices. In *Forensic anthropology and medicine*, ed. A. Schmitt, E. Cunha, and J. Pinheiro, 383–408. Totowa: Humana Press.

Form in the Archaeology of Art

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Introduction

The study of form or morphology is one of the fundamental bases of classification analysis in the archaeology of art. Unlike anthropology that denied the study of art almost entirely until the 1960s (Morphy 1994), archaeology of art was established at the beginning of the twentieth century. It began with the study of form as general configuration of the object, to establish the first typological or stylistic classifications of the "primitive," prehistoric, or exotic arts. Today, recent trends linked to material culture studies allow us to go beyond initial, essentially descriptive and functional, approximations of these visual artifacts to deal with form in its material dimension.

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Definition

Form, in archaeology of art, is defined as the fundamental physical property of an object, its own three dimension, from its material composition to its constructive composition and contrast with its environment. In the archaeology of art, the study of form corresponds with the analyses of the different properties of the objects or visual arts relating to their general configuration or outline (contour), their size, their shape, their texture, their color, and relationship with space. In methodological terms, the study of the form of visual artifacts implies their analysis as a visual system through the selection and definition of specific morphological attributes, emanating mostly from the history of art and semiotics. At an interpretive level, the study of form has been traditionally linked to the search for the significance and accuracy of its function, touching on established focuses from the analyses of perception and aesthetics.

Key Issues

Form currently possesses various meaning and applications in archaeology of art. This is due, among other reasons, to the fact that its study formed one of the first pillars of archaeology as a discipline and to the diversity of focuses that have been covered in the study since then. Since the beginning of the twentieth century, form, limited to the study of outline (as with iconography), contributed to the definition of countless

seriations, typologies (Adams and Adams 1991), and styles, by way of arranging a set of visual evidence of which the chronological attribution established itself relatively. Form as outline was initially analyzed as an external aspect or the general configuration of an object or image, in order to later tackle the constituent elements of the form. The first studies of form meant to distinguish images or visual objects in terms of natural or abstract or geometric forms; on the basis of its size (small, medium, large); in terms of its color, referring to the surface or exterior of the object or image; in terms of its texture (rough and smooth, among others); and on the basis of its distinction from its environment or base. At that time, the visual object was limited to the study of the content or configuration established in the outline or silhouette, taking into account different attributes that constitute its general morphology. In the analysis of animals in European art, this meant studying the number and placement of paws, of ears, and of the head to define a series of perspective forms, understanding that these visual configurations had a relative chronological value (Breuil 1952). Under the influence of the French structuralist school, the study of form as composition, defined as the spatial relationship and compositional logic established between the parietal images, would later be addressed for the definition of styles (Leroi-Gourhan 1968) and accuracy of meanings (Raphael 1986).

Current Debates

This structuralist vision is taken up again and amplified, from the 1980s through post-processual or New Archaeology whereby form is defined as a complex visual system requiring codes or grammatical specifics and Cultural Semiotics (Layton 2006), in relation with determined local contexts (Preucel and Hodder 1996). The study of form as composition is also extended, for example, to the study of the structure of iconography by way of language (Washburn and Crowe 1988). More recently and in this same logical framework, form has been understood also from the point of view of the spatial relationships between objects at a macroanalytical level, the conception of which constitutes one of the foundations of landscape archaeology. Regardless of these different meanings, the discussion of the relationship between form and function has undoubtedly occupied a special place in archaeology of art. Form as essence of style and form as a result of the selection between functioning alternatives have oriented the debate towards the functionality of the form and its meaning in the 1970s and 1980s. Consequently, form has been defined as an ethnic or territorial marker, a differentiator of role, status, or genre, among other things (Dunnell 1978; Sackett 1982, 1985; Wiessner 1983, 1985; Conkey and Hastorf 1993). In the last few decades, from the material culture (Tilley 2006) and technology (Sigaut 2004) perspectives, the analysis of form of visual artifacts incorporates, beyond its physical appearance, the study of its materiality. That is to say, it considers the materials, knowledge, abilities, techniques, and specific movements used in the different stages of its production (Sepúlveda 2009; Fiore 2011). As a visual system, the materiality of a form implies cultural decisions, particularly in relation to temporal space contexts. Because of the broadening of previous, essentially functionalist, views, form today could also be interpreted in terms of culture, in terms of material, economic, and social implications, and more.

Cross-References

► Style: Its Role in the Archaeology of Art

References

Adams, W.Y., and W.E. Adams. 1991. *Archaeological tipology and practical reality*. Cambridge: Cambridge University Press.

Breuil, H. 1952. Quatre cents siècles d'art pariétal. Les cavernes ornées de l'âge du renne. Montignac: Centre d'Études et de Documentation Préhistoriques.

Conkey, M., and C. Hastorf, eds. 1993. *The uses of style in archaeology*. Cambridge: Cambridge University Press.
Dunnell, R. 1978. Style and function: A fundamental dichotomy. *American Antiquity* 43 (2): 192–202.
Fiore, D. 2011. Materialidad visual y arqueología de la imagen. Perspectivas conceptuales y propuestas metodológicas desde el sur de Sudamérica. *Boletín del Museo Chileno de Arte Precolombino* 16 (2): 101–119.
Layton, R. 2006. Structuralism and semiotics. In *Handbook of material studies*, ed. C. Tilley, W. Keane, S. Kuechler, M. Rowlands, and P. Spyer, 29–42. London/California/New Delhi: Sage Publications.
Leroi-Gourhan, A. 1968. Prehistoria del arte occidental. Barcelona: Editorial Gustavo Gili.
Morphy, H. 1994. The anthropology of art. In *Companion encyclopedia of anthropology. Humanity, culture and social life*, ed. T. Ingold, 648–685. London and New York: Routledge.
Preucel, R.W., and I. Hodder. 1996. *Contemporary archaeology in theory: A reader*. London: Wiley.
Raphael, M. 1986. *Trois essais sur la signification de l'art pariétal paléolithique*. Paris: Le Couteaudans la Plaie, Kronos.
Sackett, J. 1982. Approaches to style in lithic archaeology. *Journal of Anthropological Archaeology* 1: 59–112.
Sackett, J. 1985. Style and ethnicity. *American Antiquity* 50 (1): 154–159.
Sepúlveda, M. 2009. Aspectos tecnológicos en la pintura. Reflexiones elaboradas a partir de análisis físico-químicos aplicados al estudio de las pinturas de la localidad del rı'o Salado (II región, norte de Chile). In *M. Sepúlveda, L. Briones y J. Chacama (ed.) Crónicas sobre la piedra. Arte rupestre de Las Américas*, 119–128. Arica: Ediciones Universidad de Tarapacá.
Sigaut, F. 2004. Technology. In *Companion encyclopedia of anthropology. Humanity, culture and social life*, ed. T. Ingold, 420–459. London/New York: Routledge.
Tilley, C. 2006. Introduction. In *Handbook of material studies*, ed. C. Tilley, W. Keane, S. Kuechler, M. Rowlands, and P. Spyer, 7–12. London, California and New Delhi: Sage Publications.
Washburn, D., and D. CROWE. 1988. *Symmetries of culture. Theory and practice of plain pattern analysis*. Washington, DC: University of Washington Press.
Wiessner, P. 1983. Style and ethnicity in Kalahari San points. *American Antiquity* 48 (2): 253–276.
Wiessner, P. 1985. Style or isochrestic variation? A reply to Sackett. *American Antiquity* 50 (1): 160–166.

Further Reading

Corbey, R., R. Layton, and J. Tanner. 2006. Archaeology and art. In *A companion to archaeology*, ed. J. Bintliff. Oxford: Blackwell Publishing Ltd.
Morphy, M., and M. Perkins, eds. 2006. *The anthropology of art*. Malden: Blackwell Publishing Ltd.

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Introduction

When we look at the place of archaeology in formal education in the United Kingdom, we see a paradox. Archaeology is extremely popular with the general public and with the media. Millions of people are members of organizations like the National Trust, up to 3 million viewers will regularly watch TV programs on archaeology, many thousands attend events such as the Festival of British Archaeology, and over 200,000 are members of local societies and clubs concerned with the historic environment, and yet archaeology has no explicit place in the school curriculum. The reason may be simple, that archaeology had not yet established itself as an academic subject in universities at the time when the school curriculum was being determined in the later nineteenth century. Subjects like history and geography were well established and could claim a presence in the curriculum. The nineteenth century curriculum has proven very hard to change and is still the basis for education up to the age of 18.

However, this is unlikely to be the only reason for archaeology's unpopularity with educators. Archaeology is widely seen as a technical and physical discipline concerned with excavation and recording of remains and, therefore, of less academic standing than a purely intellectual subject than history. This was for a long time an attitude among historians that archaeology was the handmaiden of history, providing physical backup for the written record of the past. This attitude is no longer part of academic discourse in archaeology or history, and yet it does still seem to be held by many outside the hallowed halls of academia. The great advances in archaeology

from the 1960s onwards which have shifted archaeology away from culture history towards more sociological, geographical, or psychological interpretations of the past and toward a more self-reflexive questioning of archaeology's role and purpose have yet to find their way into popular understandings of the subject.

Key Issues

The traditional method of educational delivery is of the didactic provision of information. Bodies of knowledge as structured facts about the world or as agreed narratives are the life blood of teaching. Over the last 20 years, there has been a move towards balancing imparting knowledge with the acquisition of skills. There has also been a longer-term move towards more child-centered approaches to education. In practice, the assessment of learning in formal examinations at 16, 17, and 18 still privileges knowledge. Universities continually complain that their new entrants are unable to work independently and expect to be spoon-fed ideas and facts. In such a situation, archaeology is at a disadvantage. Archaeological facts belong firmly within the discarded tradition of culture history. Newer forms of archaeology are based around contested interpretations, and single narratives are hard to find in modern archaeological publication. Archaeology is too contested and uncertain of its knowledge base to be easily delivered as a subject in schools.

This weakness of archaeology is, however, also its strength. Archaeology offers more than knowledge. It is a set of processes involved in learning about the past and in understanding the role that the past could play in people's lives today. It offers critical thinking of an advanced kind. It can give students of all ages intellectual challenge and fascination, as well as deep emotional engagement. The variety of work involved in archaeology can reach every kind of learner. It is especially well geared towards supportive constructivist education. To understand why, we must understand what archaeology is. It is not the simple accumulation of artifacts and sites from the past. It is the study of human life and behavior as reflected in those artifacts and sites. Archaeologists study people, not things. All aspects of human existence are reflected in archaeology. All kinds of analytical, recording, and descriptive processes are involved in archaeology. Archaeology can support every subject in the school curriculum.

Most archaeologists do not understand education. There is a long tradition of thinking about education. Education theory is complex and contested. A range of thinkers and educators have provided different models of how children learn. One early influential thinker was the developmental psychologist Jean Piaget, who came up with a chronological scheme for how a child's mind assimilates information, a kind of cognitive learning theory. The earliest stage is the sensorimotor, from birth to approximately 2 years old in which the child explores the world directly through action. The preoperational stage lasts from 2 to around 7 years old, where objects are associated with words and learn to classify things by their characteristics. Concrete operational thinking follows from around 7 to 11 years old in which the ordering of information becomes more sophisticated. Children at this age can manipulate more than one variable at a time and think in terms of hypotheses, asking "what if" and thinking about the consequences of this. From the age of about 11 onwards, the mind enters the formal operational stage, involving abstract reasoning, thinking about hypothetical futures and ideologies. Where followers of Piaget may have erred is in assuming his stages of development replace each other rather than build upon and extend each other. There is a common and fallacious assumption that as children develop, the intellect takes over from more physical ways of engaging with the world and that abstract thought is a higher form of thinking than concrete thought. If archaeology is seen as a technical exercise in finding, classifying, and recording artifacts, then it is hardly worthy to be taught alongside subjects like history. Indeed, we shall see that where archaeology is used in schools, it tends to be used with younger ages below the age of 11. By looking at the work of more recent educational theorists, we can see how wrong this is.

Another cognitive psychologist whose work has been important for education was Lev Vygotsky, who stressed the importance of the social context of learning. Vygotsky understood how children need to make sense of the world and internalize their external experiences. Most children do not learn in isolation. Learning is a social process where children exchange ideas and information with adult and with each other. The role of teacher is one of enabling and guiding rather than telling. The setting of puzzles or problems to be solved is a legacy of this way of seeing education, as is the creation of group activities where dialogue is part of the learning process. The necessity for teamwork in archaeology and the intellectually challenging nature of archaeological inquiry are clearly well suited to social learning.

Vygotsky's ideas are the basis of constructivism, in which children construct their own understanding of the world from the stimuli they receive from others. The theorist who did most to develop a constructivist theory of learning was Jerome Bruner, who stressed the importance of active learning by structuring knowledge into forms suitable for the child, building on existing skills, stimulating self-discovery, and learning by doing rather than listening. Good teaching should understand the child's motivations and willingness, or otherwise to learn, and should be designed to stretch the child to go beyond what it taught and to extrapolate or fill in gaps in knowledge and understanding. Again, archaeology has advantages for this kind of learning in that it is tactile, necessitates going beyond the immediate evidence, and has an innate fascination that makes children want to learn.

It is now appreciated that not all children learn in the same way. However, there is little agreement on the different ways in which children learn. One simple and easily applied scheme is the taxonomy of learning devised by Benjamin Bloom. Bloom identified three domains of learning: cognitive, affective, and psychomotor. Cognitive learning involves the assimilation of knowledge and development of thinking skills. Such skills would include pattern recognition, devising abstract concepts, evaluating data, solving problems, and justifying arguments. All of these are clearly involved in archaeology. Affective learning involves making use of our emotional responses to things. This involves understanding our attitudes, ethical standards, making judgments, and being artistically creative. Again, all of these can be found in archaeology. Psychomotor learning involves the development of physical skills. Archaeology of course uses a great many such skills. It is perhaps significant that there is an unspoken hierarchy of domains in that cognitive learning is rated above affective learning, which in turn is rated about psychomotor learning. The scientist ranks higher than the painter who in turns ranks higher than the plumber. This is wrong and highly unfortunate. All three domains are an equal part of learning, and archaeology is one of the rare subjects able to include them in the same activity.

Another popular way of looking at different ways of learning is the experiential learning theory of David Kolb. This envisages learning as the reaction to a four-stage cycle of understanding. Concrete experiences are used as a basis for making observations and reflections, which in turn lead to developing abstract concepts. These are then used to derive implications for active testing, which in turn produces concrete experiences, and so the whole cycle begins again. Some people are better than others at learning in different parts of the cycle, depending on their preferred learning style. There are four such styles: feeling and watching, watching and thinking, doing and thinking, doing and feeling. Archaeology involves both thinking and doing but also thinking and watching, being able to make sense of information gathered by others. There is a clear sense in which the divergence between processual and post-processual archaeology can be understood as the irreconcilable opposition of different learning styles, where those who feel were asking for equal space alongside those who think.

Perhaps the most widely known learning theory of recent years in the heritage sector is Howard Gardner's multiple intelligences theory. Gardner's idea is that the human mind is wired up to see the world in different ways and that we all have a combination of at least eight different kinds of understanding or intelligences. Linguistic

intelligence is the ability to understand and use the spoken and written word. Mathematical-logical intelligence involves analyzing problems and understanding logical relationships. Musical intelligence involves recognizing and using sounds rather than words, with the ability to distinguish pitch, tone, and rhythm. Kinesthetic-bodily intelligence involves being able to coordinate bodily movements and solve problems by doing rather than thinking. Spatial intelligence involves awareness of space and spatial patterns. Naturalist intelligence involves being able to observe, classify, and categorize the world around us, spotting its patterns and potential. Interpersonal intelligences involve empathizing with others and working well within teams. Intrapersonal intelligence is a capacity to know yourself and understand our own interactions with others. Most people have all eight but usually have two or three dominant intelligences. Apart from musical intelligence, these are all a natural part of doing archaeology. The lone researcher who likes to solve the problem of untangling the palimpsest of features in the landscape would score highly in intrapersonal, naturalist, and logical intelligences. The excavator who loves being on site and unraveling contexts would score highly in spatial, kinesthetic, and interpersonal intelligences. Gardner's ideas are ideal for use in heritage education where artifacts and sites can be understood through different learning approaches. Children can be asked to write a guidebook for a historic site, sort artifacts into types, investigate why sites are where they are on a map, work in groups to say whether a site was used for domestic or religious purposes, or be asked to write a personal description of poem based on their favorite artifact. All these activities will involve different mixes of intelligences. There are very few children who cannot engage with archaeological evidence as a way of learning.

Archaeology then is ideal for learning, no matter what the educational theory that underlies the curriculum or teaching in the classroom. It is concerned with the physical manipulation of evidence. This evidence comes from real people with whom we can make an imagined emotional connection. Making sense of the evidence involved solving puzzles and problems and using words to express and debate our ideas. We work in teams, yet can also have intensely personal responses to the past. We use science and technology in our work. We make use of artistic representation and delve into all aspects of past life from exploiting the environment to religious belief. Archaeology can not only reach every learner, it can also support every subject on the school curriculum.

The United Kingdom Perspective

School curricula in the United Kingdom are developed separately in England, Wales, Scotland, and Northern Ireland. A national curriculum was first introduced in England from 1988. All the curricula have been revised a various times and continue to be under revision. The curriculum orders have often made reference to the evidence of the past in various of the subjects. In spite of this, and the utility of archaeology for a range of subjects, archaeology has mostly been used in support of history or, occasionally, geography. It is also more used for teaching children aged below 11 or 12.

It has proved hard to get any explicit reference to archaeology in the various curriculum orders and guidelines. There has always been reference in the history orders in England to artifacts, buildings, and sites as sources of evidence and more recently of museums as places that should be visited. The work of archaeologists was only included as an example in the latest form of the orders, under the skill of interpretation. The key historical skills to be taught have included chronology, the facts about events and life at different times, how the past is interpreted, the types and uses of historical evidence, and communicating an organized historical narrative. Archaeology can play a role in all of these but was most used as a way of interrogating physical evidence for life in the past, often using the key question "how do we know what life like at that time?" Archaeology was clearly seen a methodology for studying the past. Conspicuously missing from the curriculum was any reference to prehistory. The periods of time to be taught in primary schools (up to the age of 11) were highly selective. These were mostly Roman Britain, the Anglo-Saxons, the Vikings, Tudor times, the Victorians, Britain in the 1930s

and 1940s, ancient Greece, and usually ancient Egypt. Archaeology of course came into several of these periods. The history taught in secondary schools after the age of 11 dealt with all of history after the Norman Conquest of 1066 along with some European history (often the Roman Empire) and one world history topic. Most of the secondary history could safely include traditional political and socioeconomic documentary history. The lack of prehistory involves pupils knowing nothing of the development of humans as a species or of the settlement of the British Isles and its continuous occupation from around 15,000 years ago until the Roman involvement in Britain 2,000 years ago. The shaping of the British landscape and the development of society and its rituals as reflected in iconic sites like Stonehenge were ignored.

A comparison between the history taught in different pasts of the United Kingdom is instructive. There are clear differences between the four nations, which reflect the different political and cultural relationships that each nation has with the past. In Wales, there was explicit reference to teaching about the earliest inhabitants and the Iron Age Celts. Some 1,500 years after the Anglo-Saxon migration and conquest of southeast Britain, there is still a sense of continuity between modern Wales and the prehistoric past that is missing in England. There was no mandatory study of ancient Greece in Wales and instead a much greater concern with local history. Likewise, in Northern Ireland there was a concern with prehistory from the Mesolithic onwards as part of Irish identity. The Irish have deep historical roots, partly rooted in literary myth, but nonetheless deeply felt, and prehistory provides a noncontentious way of providing an identity separate from that of Britain. The teaching of the medieval past immediately polarizes between the history of the native kings and the incoming English lordship. Likewise, the Vikings were active throughout the British Isles and so not uniquely an Irish experience. In Scotland, prehistory was never emphasized as it was the medieval period which provided Scotland with its roots and identity. What Scotland did have that the other nations did not was an explicit recognition in the rationale for teaching history as a subject of the importance of the historical heritage of Scotland for tourism and the economy. History had a purpose beyond mere curiosity about the past. This linked history with heritage and could allow teachers to touch on the historic environment and issues involved in its management and conservation.

Whatever the guidelines and orders of the curriculum, teaching of history is in the hands of teachers. History teaching is far from homogeneous. There are different visions of the kind of history that should be taught and deep divisions within history teaching. These divisions can be simplified into a polarity between teaching knowledge and teaching skills. The balance between knowledge and skills has often been one of the debated topics during curriculum reform or revision. Traditional history teaching until the 1970s focused on the acquisition of historical knowledge and dates of events and of kings and queens. History was equated in the popular mind with knowing what happened when. This is still the attitude of many. Repeated newspaper scare stories about the inadequacy of history teaching usually involve showing how little people know about dates, events, and famous people in the past. This kind of history is often closely tied to national history and notions of national identity. Good history is deemed to be the history of the nation. Archaeology suffers badly under such a regime of history teaching since it rarely provides a chronological narrative or association of site or events with names individuals.

A reaction against this kind of history began in the 1960s among teacher dissatisfied with didactic teaching. An article by Mary Price in 1968 called for the use of primary sources in the teaching of history in schools. This became a reality with the formation of the Schools Council History Project in 1972. This body still exists as an association of like-minded teachers as the Schools History Project (SHP). The SHP approach is based on the teaching of historical skills, using primary evidence. It moves history teaching away from a narrow focus on dates, events, and personalities towards understanding past ways of life, motivations, and contested interpretations. Many members of the SHP are sympathetic towards the use of

archaeology in teaching history precisely because it allows (even demands) the exploration of issues relating to historical methodology. The SHP produces resources and teaching ideas, many of which include archaeology. A key member of the SHP, Ian Dawson, has made resources for teachers at all levels of education available from his Thinking History website (http://www.thinkinghistory.co.uk). These often include archaeology.

The SHP principles have been followed in the creation of history qualifications at GCSE and A level. These balance learning about the development of a theme over a long time scale and the history of one particular time in depth. The development studies include warfare, medicine, and crime and punishment. Some of the qualifications also focus on using historical evidence. Archaeology can be a part of these qualifications, in a supporting role to history. Archaeology has more of a presence in the GCSE History Pilot that was developed to move history away from its traditional emphasis at GCSE on the nineteenth and twentieth centuries. The Pilot ensures that medieval history is covered and that there are options on archaeology and heritage management. Although useful, the Pilot is not a replacement for the GCSE Archaeology that was abolished in 2004. This had been an excellent introduction to the subject. Its abolition was unjustified and contested in vain by the Council for British Archaeology and others. There is still an A-level Archaeology (run by the AQA awarding body), which is a rigorous and challenging qualification which equips students well for further study. There is also some archaeology within GCSE and A-level Classical Civilization and A levels in Travel and Tourism. In Scotland, there is some archaeology in Standard Grade Classical Studies and as options in Highers.

One reason why the GCSE Archaeology was abolished was the low numbers of students taking the exam. This was partly a product of the difficulty that archaeology graduates have in becoming school teachers. Without teachers who have a knowledge of archaeology, there are few incentives or confidence to use it. Some teacher training institutions have taken a very strict attitude that only graduates in subjects that appear in the national curriculum can be accepted for training as teachers, especially for teaching at secondary level. This is unfortunate and not the intention of the teacher training regulations. It is far easier to be accepted for teacher training with a joint archaeology and history degree than with a single honors archaeology degree. There are some enlightened training colleges and universities who will take archaeologists, but there are still too few teachers with a knowledge of the subject and confidence to use it within their teaching.

Future Directions

Archaeology is a wonderful subject for use in teaching all ages of children. It can inspire and enthuse otherwise demotivated pupils. It can stretch and challenge to high attainers. The nature of archaeological evidence and methods is ideal for meeting the needs of different learning styles and intelligences. Yet, archaeology as practiced by archaeologists has weaknesses. The end product of research is seldom synthesized as narratives of the past, and many aspects of archaeological practice are only debated or explained in esoteric or hard-to-obtain academic forums. The full richness of archaeology is not as accessible to teachers as it should be.

The way to make archaeology more accessible and available is to make sure that archaeology finds its place within wider educational contexts. Recent initiatives in England have sought to improve the use of the built environment and out-of-classroom resources generally by teachers. Archaeology obviously has a place within these. The Engaging Places initiative has the aim of encouraging teachers to make more use of the built environment. This could easily be dominated by contemporary architecture, but from the beginning, the Council for British Archaeology was able to make sure that the historic environment was also included. All environments have a historic element, and archaeologists can enable people to see this and make use of it. The Council for Learning Outside the Classroom has a wider aim to encourage learning in real-world situations outside of the classroom. Heritage is one of the eight sectors within the council, and archaeology is clearly a

key arena for real-world learning. Again the Council for British Archaeology played a key role in the early formation of the Council.

We also need to make sure that heritage educators improve the quality of their work with schools and the public. No matter how good the offering is, there is always room for self-reflection, evaluation, and improving the learning outcomes for pupils and students. The Council for Learning Outside the Classroom has instituted a quality badge for providers of educational opportunities. Another organization, the Heritage Education Trust, issues the Sandford Heritage Education Awards for the provision of quality education by heritage sites. More and more archaeologists are working with schools and have the skills and knowledge to make use of opportunities such as these. Many field units and local authority archaeology services now provide resources for teachers to make use of archaeology within the curriculum.

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Constructivism in Archaeology Education
- ▶ Heritage Values and Education
- ▶ Material Culture and Education in Archaeology
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

Further Reading

Archaeology Scotland. n.d. Available at: http://www.archaeologyscotland.org.uk/?q=node/17.

British Museum. n.d. Availaible at: http://www.britishmuseum.org/learning.aspx.

Cadw. n.d. Available at: http://www.cadw.wales.gov.uk.

Curtis, E., and N. Curtis, eds. 1996. *Touching the past: Archaeology*. Dalkeith: Scottish Children's Press.

English Heritage. n.d. Available at: http://www.english-heritage.org.uk/education/resources/.

Green, M. 1998. *Discovering archaeology in national curriculum history key stages 1, 2 and 3*. Canterbury: Canterbury Archaeological Trust.

Henson, D., ed. 1997. *Archaeology in the English national curriculum*. York: Council for British Archaeology.

Historic Scotland. n.d. Available at: http://www.historic-scotland.gov.uk/index/learning.htm.

Howell, R., ed. 1994. *Archaeology and the national curriculum in Wales*. York: Council for British Archaeology.

Museums, Libraries & Archives. n.d. Available at: http://www.mylearning.org.

National Monuments Record. n.d. Available at: http://www.heritage-explorer.co.uk.

National Trust. n.d. Available at: http://www.nationaltrust.org.uk/main/w-chl/w-learning_discovery/w-schools.htm.

National Trust for Scotland. n.d. Available at: http://www.nts.org.uk/Learn/.

Pearson, V. 2001. *Teaching the past*. York: Council for British Archaeology.

Planel, P. 1996. Education and excavation. *The Field Archaeologist* 26: 22–23.

Portable Antiquities Scheme. n.d. Available at: http://www.pastexplorers.org.uk/.

Royal Commission on the Ancient and Historical Monuments of Wales. n.d. Available at: http://www.rcahmw.gov.uk/HI/ENG/Learning/.

Scran. n.d. Available at: http://www.scran.ac.uk/.

Thinking History. n.d. Available at: http://www.thinkinghistory.co.uk/.

Thomson, K., and T. Copeland. 1996. *At least 101 things to do in a museum*. Cheltenham: Cheltenham & Gloucester College of Higher Education.

Fort Odanak Archaeological Project

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Brief Definition of the Topic

Since 1979, the High Council of the Waban-Aki Nation, commissioned by two band councils of Odanak and Wôlinak, has had a mission to ensure the future of the Abenaki Nation by offering a series of studies related to the documentation of their past and the promotion of their culture. It thus seems only natural to integrate archaeology in this process. It was in 2010, with the collaboration and

financial support of the Department of Canadian Heritage, the Abenaki Museum, and the Odanak Band Council, that the Fort Odanak archaeological project began under the responsibility of two archaeologists: Geneviève Treyvaud and Michel Plourde. They set up a research project aimed at discovering the missions and the Abenaki fort and by extension, a better understanding of their way of life in the "Transition" and "Colonial" periods. This project lasted 3 years and ended with the publication of a report and the establishment of a semipermanent exhibition.

The Abenaki territories of Wôlinak and Odanak are the only two Abenaki communities recognized in Quebec. The village is situated in the MRC (regional county municipality) of Nicolet-Yamaska on the eastern shore of the St. François River, 32 km east of Sorel and near Lake St. Pierre. The community counts about 1800 residents, 400 of which reside in Odanak. The land area is 6.07 km^2. It is composed of upper and lower riparian terraces, some islands upstream and downstream of the village, as well as two woodlands located in the municipalities of Saint-François-du-Lac and Pierreville.

The excavations in 2010 found two archaeological sites: CaFe-4 dating to the Woodland period and CaFe-5 dating to the Archaic. In the fall of 2012, an inventory was undertaken on the historic quadrilateral of Odanak. An important archaeological site, CaFe-7, was excavated. This site presents many occupations dating from the Woodland period until today. The artifacts and the relics discovered, as well as stratigraphic levels, have enabled the identification of an occupation contemporary to the fortified village at the beginning of the eighteenth century.

Cross-References

- ▶ Canada: Cultural Heritage Management
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canada: World Heritage

Further Reading

Musée des Abénakis. n.d. Available at: http://museedesabenakis.ca/site/.

Fortea, Javier

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Basic Biographical Information

Javier Fortea (born in Arnedo (La Rioja, Spain) in 1946; died in Oviedo (Asturias, Spain) in 2009) studied Philosophy and Arts, with an expertise in History, at the University of Salamanca between 1963 and 1968. In this same university, Professor Francisco Jordá became his academic guide into Palaeolithic research, with a special focus on the Upper Paleolithic and Epipaleolithic periods. He received his Ph.D. in 1972 from the University of Salamanca with an in depth dissertation on the Epipaleolithic sequence of the Mediterranean area of Iberia (Fortea 1973), which is still a reference work for anyone studying this period.

Up until 1979, while being assistant lecturer at the University of Salamanca, his research was mainly focused on a specific geographical area, the eastern part of Iberia, and more specifically on the central area: Valencia. The excavations of Mallaetes and Cocina caves, together with the studies of other lithic industries and art evidences from other key sites, provided him a wide picture to suggest a robust synthesis of the Upper Palaeolithic in eastern Iberia, from Catalonia to Andalusia (Fortea et al. 1983). His approach to rock art research also began with a very important *status quaestionis* of Palaeolithic art in the Mediterranean area (Fortea 1978).

In 1979, his academic career took a turn, as he became Professor of Prehistory at the University of Oviedo, in Asturias, one of the richest European regions in Upper Paleolithic sites and rock art caves. The excavations conducted at two main sites, La Viña and Llonín, gave him the opportunity of introducing innovations in the archaeological methodology and finding important series of Upper Palaeolithic bone and lithic industries.

But his rock art discoveries and research mark the highlight of his scientific career. New sites as Covaciella and El Bosque were studied, dated, and published, becoming part of the list of ornamented caves of Western Europe. He had a special interest in the precise dating of the animals represented in Upper Palaeolithic caves, and he devoted most of his time and efforts to work closely with the laboratories to assure that the resulting dates were correct (Fortea 2002).

His international papers on rock art were very appreciated by foreign colleagues; each paper being the product of in depth research. It means that Professor Fortea did not publish hundreds of papers and thousands of pages, but each of them was so solid that they could easily resist the passing of time.

Some English-speaking colleagues, such as Ian Davidson and Lawrence Straus, were well aware of the scientific achievements of Professor Fortea, as they worked for many years in Spain and met him often to debate about their common research interests. He became a member of many international institutions, although he always preferred working in the field and in the laboratory, more than assisting to hard and nonproductive meetings. Perhaps, his most important international positions were being member of the Upper Palaeolithic Commission of the UISPP and of ICOMOS.

Major Accomplishments

Professor Fortea's most important accomplishments took place in France. He collaborated with Jean Clottes in the research teams that studied the new rock art discoveries at Cosquer, Coussac, and, the most important, Chauvet. And, in the last decade, he studied and published many papers with Georges Sauvet, Carole Fritz, and Gilles Tosello (Sauvet et al. 2008, among others) concerning key aspects of rock art, such as styles and chronology.

One of Professor Fortea's creations, which will last forever, was the archaeological park of prehistoric art of Teverga. In this little town of Asturias, in the mountains, he offered the public a walk along the birth of prehistoric art, with visits to real size reproductions of three significant sets of European Palaeolithic with paintings and engravings. In Teverga, Professor Fortea applied all his knowledge in the service of society to give to the public an understanding of prehistoric art.

The last years before his death in 2009, Professor Fortea was involved in a very high-level scientific research concerning Neanderthals and their DNA sequence. Together with his collaborator Marco de la Rasilla, also from the University of Oviedo, he began working at El Sidrón cave, where they discovered the best-preserved Neanderthal remains to obtain DNA. The collaboration with the most important international specialists in the field provides Professor Fortea his last projection with several impact papers (Torres et al. 2010; Green et al. 2010).

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Art, Paleolithic
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Davidson, Iain
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Europe: Paleolithic Art
- ▶ European Mesolithic: Geography and Culture
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ International Council of Museums (ICOM)
- ▶ Lithic Technology, Paleolithic

References

de Torres, T., J.E. Ortiz, R. Grün, S. Eggins, H. Valladas, N. Mercier, N. Tisnérat-Laborde, R. Juliá, V. Soler, E. Martínez, S. Sánchez-Moral, J.C. Cañaveras, J. Lario, E. Badal, C. Lalueza-Fox, A. Rosas, D. Santamaría, M. de la Rasilla, and J. Fortea. 2010. Dating of the hominid (*Homo neanderthalensis*) remains accumulation from El Sidrón cave (Piloña, Asturias, North Spain): An example of a multi-

methodological approach to the dating of Upper Pleistocene sites. *Archaeometry* 52 (4): 680–705.
Fortea, J. 1973. *Los complejos microlaminares y geométricos del Epipaleolítico mediterráneo español*. Salamanca: Univ. de Salamanca.
Fortea, J. 1978. Arte paleolítico del Mediterráneo español. *Trabajos de Prehistoria* 35: 99–149.
Fortea, J. 2002. Trente-neuf dates C14-SMA pour l'art parietal paléolithique des Asturies. *Préhistoire, Art et Sociétés* 57: 7–28.
Fortea, J., J.M. Fullola, V. Villaverde, I. Davidson, M. Dupré, and P. Fumanal. 1983. Schéma paléoclimatique, faunique et chrono-stratigraphique des industries à bord abattu de la région méditerranéenne espagnole. *Rivista di Scienze Preistoriche* 38 (1–2): 21–67.
Green, R.E., J. Krause, A.W. Briggs, T. Maricic, U. Stenzel, M. Kircher, N. Patterson, H. Li, W. Zhai, M. Hsi-Yang Fritz, N.F. Hansen, E.Y. Durand, A.-S. Malaspinas, J.D. Jensen, T. Marques-Bonet, C. Alkan, K. Prüfer, M. Meyer, H.A. Burbano, J.M. Good, R. Schultz, A. Aximu-Petri, A. Butthof, B. Höber, B. Höffner, M. Siegemund, A. Weihmann, C. Nusbaum, E.S. Lander, C. Russ, N. Novod, J. Affourtit, M. Egholm, C. Verna, P. Rudan, D. Brajkovic, Z. Kucan, I. Gusic, V.B. Doronichev, L.V. Golovanova, C. Lalueza-Fox, M. De La Rasilla, J. Fortea, A. Rosas, R.W. Schmitz, P.L.F. Johnson, E.E. Eichler, D. Falush, E. Birney, J.C. Mullikin, M. Slatkin, R. Nielsen, J. Kelso, M. Lachmann, D. Reich, and S. Pääbo. 2010. A draft sequence of the Neandertal genome. *Science* 328: 710. https://doi.org/10.1126/science.1188021.
Sauvet, G., J. Fortea, C. Fritz, and G. Tosello. 2008. Crónica de los intercambios entre los grupos humanos paleolíticos. La contribución del arte para el periodo 20000–12000 años BP. *Zephyrus* LXI: 33–59.

Fortifications, Archaeology of

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Introduction and Definition

Defensive structures come in a wide variety of forms and cover an exceptionally long time frame; indeed there are relatively few societies existing either today or in the past that have not utilized some form of fortification, even if it was just a thorn brush fence around a group of huts. What is not clear is when they first appeared, though Mesolithic (c. 10,000–4000 BCE) possibilities have been cited (Sippila and Lahelma 2006). In their most obvious guises, they range from European Iron Age hillforts to medieval castles, seventeenth-century Anglo-Scottish bastle houses, eighteenth-century fortresses, colonial stockades, and Maori Pãs to First and Second World War concrete defenses, but this list is just the tip of the iceberg. Although this wide portfolio of structures is an obvious response to interhuman conflict, or the threat of it, the nature of this conflict has almost as many variants as there are types of fortifications. This is not however the place to be considering the anthropology of conflict, beyond recognizing that this variation exists.

Limiting this entry to fortifications from the historic period makes the subject matter only slightly more manageable. However, to narrow the field even further, our period will commence with the end of the European medieval period, which conveniently removes most castles from the mix. The beginning of our period was heralded by not just the introduction of gunpowder weapons, which can be traced far back into medieval times, but the point at which they came to dominate warfare, at least in Europe. This watershed occurs at some point in the late fifteenth and the early sixteenth century and is marked by the appearance of new styles of fortification which, following their introduction in the Italian wars, spread throughout Europe in the form of the so-called trace italienne, a largely earthwork fortification designed to withstand the onslaught of heavy artillery. These structures were also known as star forts due to projecting triangular bastions which provided mutual support from the artillery pieces placed in them.

Historical Background

Developments in Europe c. CE 1300–1800

The arrival of cannon in the fourteenth century marked the beginning of the end of the stone-walled castle. Stone balls and then iron fired by cannon of various sizes were very effective at bringing down stone walls, having the ability to punch through even thick masonry. In response to this redundancy, battered earth walls were

introduced. These did not achieve the same height as the earlier stone walls, and the thick masses of earth effectively soaked up the impact of cannon shot while angled faces helped to deflect the blow. This is not to say that stone fortifications were abandoned entirely, and many earthwork forts were fronted with stone. Modifications to pre-existing castles and forts were also common and can be seen in the form of bastions replacing towers, the addition of gun loops, and the throwing up of earthworks around older, stone defenses. The effectiveness of these defenses can be judged by their rapid spread across Europe, which by the early sixteenth century had brought them to the western fringes of Scotland and Ireland. The recent upsurge in conflict archaeology has seen a flowering of interest in these and other fortifications. For example, the archaeological investigation of the battlefield of Flodden, fought in 1513 by the armies of James IV of Scotland and Henry VIII of England, in a hilly landscape not far south of the Scottish border, has brought to light Scottish defenses on Flodden Hill which appear to have been influenced by the Italian school, with triangular buttresses providing a platform for cannon with interlocking fields of fire (an important advantage which these purpose-built artillery forts had over the earlier castles was the absence of blind spots, into which defensive artillery or other firearms were unable to fire). Italian inspired modifications to Edinburgh Castle dating to roughly the same period have also come to light thanks to archaeological intervention within the castle's precincts. In the wake of English victory at Flodden, the town of Edinburgh gained a city wall and the castle also underwent some modification. It was not however until the mid-1500s that substantial new defenses, including a formidable earthen artillery fortification known as the spur, were thrown up. Subsumed beneath the parade ground or esplanade in 1753, the remains of this structure, actually a triangular ravelin, a defensive fieldwork placed in advance of the castle entrance, were exposed during an archaeological intervention related to the construction of stands for the Edinburgh Tattoo in 2010.

As fortifications for defense developed, so did those for offense. Siege warfare reached a peak of sophistication in the medieval period with the evolution of siege engines such as the mangonel, giving the attacker the ability of launching heavy missiles, usually stone, against the walls (Viollet-Le-Duc and Bucknell 2009). Underground, the digging of tunnels allowed attackers to undermine castle walls and towers. However, all of this changed with the widespread adoption of artillery. Artillery allowed attackers to stand off from the target at greater distances, but this did not negate the need to get close enough to deliver attacking infantry into breaches created by the cannon. The need to accommodate artillery and to deliver infantry assault led to the construction of siegeworks, which included artillery bastions, trenches, saps, and mines, which ideally would entirely surround the castle, fortress, or walled town under siege in what was called circumvallation. Siege tactics included the digging of parallels, which as the name suggests were trenches sighted parallel to the defensive walls. These trenches provided cover for the digging of saps, which ran perpendicular to the defenses, heading toward them. Once a suitable distance had been covered, another parallel system was dug to provide a new platform for operations closer to the defenses. During this process the walls were continually bombarded by heavy artillery located further back until a breach was created, by which time troops were theoretically positioned close enough to the walls to allow an attack on the breach from cover rather than a costly charge over open ground.

That fortification and siege warfare were regarded as key aspects of the arts of war is emphasized by the flowering of manuals and scale drawings published from the mid-sixteenth century onward. An impressive example of the latter is the Petworth map (so called because it resides in Petworth House, Sussex) which shows the citadel of Leith, to the north of Edinburgh, which in 1560 was a French enclave, and the surrounding siegeworks thrown up by a combined force of Scots and English. This map was to provide the key to an attempt to locate surviving remnants of the siegeworks within the modern urban environment of Leith, which is now essentially a suburb of Edinburgh (Pollard and Banks 2008a, 2008b). Although the wider landscape was portrayed in three dimensions, the town walls and

siegeworks were based on measured surveys. When these were scaled up and overlaid on a modern street map, it was apparent that elements of the siegeworks corresponded to areas which are free of development, surviving as open parkland (Fig. 1). The resulting project uncovered buried banks and ditches associated with an artillery fort in Pilrig Park, with a metal-working forge in the bottom of the ditch to the rear of the feature – presumably where it was far enough away from powder (Pollard 2008).

The Dutch War of Independence fought against Spain, between 1568 and 1648, was to see a flowering in fortification technologies, though the influence of the Trace Italienne was still dominant. Warfare at this time was characterized by siege warfare rather than open-field battles, and this tendency was only to begin to break down during the Thirty Years War (1618–1648), of which the Dutch war became a part. Gustav Adolf, King of Sweden, followed in the footsteps of Prince Maurice of Nassau and overhauled the way armies operated – largely based around the complex relationship between pike and shot. Many European cities retain at least some vestige of their late-sixteenth-century and early-seventeenth-century defenses, though they have yet to attract the archaeological attention they deserve. When archaeological intervention has taken place, it is usually prompted by urban development, as most of these impressive structures are now embedded within the framework of modern towns and cities. This was the case with the discovery in 2011 of two skeletons of soldiers killed during the siege of Stralsund, a heavily fortified German Hanseatic town on the shore of the Baltic which over several weeks in 1628 was besieged by Imperial troops under Wallenstein (Anonymous 2012). The two men, who were found face down in a ditch and seemed to have been buried where they fell, along with their muskets, swords, and various pole-arms, are thought to have been Imperial Landsknecht mercenaries killed by besieged Protestant troops during a sally outside of the defenses. One thing that this discovery does demonstrate is the rich contexts of burial which fortifications and siegeworks can provide – for at this time formal mass graves on battlefields seem to have consisted of bodies stripped bare of clothing and equipment, as demonstrated by the graves at Leipzig (1632) and Wittstock (1636) – the first of which was discovered thanks to a program of research, the second accidently in a sand quarry (Eickhoff et al. 2008).

Just as the various infantry tactics introduced by Maurice of Nassau, King Gustav Adolf of Sweden and others had an influence on the battlefields of the British Civil Wars in the mid-seventeenth century, so the military engineers of the Netherlands, France, and Italy also played a hand in defining the nature of fortifications during this conflict. Again, sieges rather than battles dominated, with major towns such as Bristol, Oxford, and York having old defenses, usually medieval walls, strengthened and new fieldworks constructed. Siegeworks were equally impressive, though the practice of slighting these and other features after the wars ended has left few surviving examples of upstanding earthworks. Perhaps the most dramatic of these in the British Isles is the Queen's sconce, outside the town of Newark. "Sconce" comes from the Dutch *schans* meaning "small protective earthwork or shelter" and is itself an indication of the importance of continental influence, with early treatises such as *The Practice of Fortification* by Paul Ive (1589) translating techniques into English. At Newark, there were originally two of these artillery positions, a square rather than triangular defense mounded from earth but making good use of a natural rise, outside the main defenses of the town, where they were positioned to provide protective fire from an advanced position. Connecting sconces to one another with ditches and banks was a popular way of providing defense for towns which had expanded drastically since the medieval period, when stone curtain walls were not unusual, and London, Bristol, and Plymouth were just some examples of this type of urban defense (Harrington 2005: 29).

One legacy of the British Civil Wars which has only recently attracted the attention of conflict

Fortifications, Archaeology of, Fig. 1 Details of siegeworks around citadel of Leith taken from Petworth map and overlain over modern map – showing relationship to open spaces

archaeologists is the impact craters created by musket balls and other types of ordnance when they struck stone-walled buildings. The gatehouses of Stirling Castle and Linlithgow Palace are just two examples from Scotland, and similar damage has also recently been identified around the ground floor windows of the tower at Cambuskenneth Abbey. Musket balls indicative of seventeenth-century conflict have also been recovered by metal detectorists in nearby fields, and the two forms of evidence in combination may indicate a previously unrecorded combat on the outskirts of Stirling, perhaps an unrecorded incident from the Battle of Stirling which was fought in September 1648.

The continued process of fortification design in the early modern period reached its climax with Sébastien Le Prestre de Vauban (1633–1707), a French military engineer renowned to this day for his flair for fortress design, though he actually made his reputation in taking forts by siege rather than designing them. Many of the elements of Vauban forts, such as angled bastions, glacis slopes to deflect cannon shot, covered ways, and caponniers, which allowed defenders to shoot along the defensive ditches from cover, can be seen in the earlier trace italienne, but Vauban refined them and combined the key elements to work in conjunction with the terrain. Although Vauban is usually associated with European forts, particularly those in France such as Bayonne, Cambrai, La Rochelle, and Verdun, his influence was to be much wider, with the colonies of various European powers, and most particularly the French and the British, constructing Vauban-style forts in the Americas, Africa, and India.

By the time of the Napoleonic wars, armies were much bigger than they had been for much of the eighteenth century and open-field engagements, of which the Battle of Waterloo in 1815 is the most famous, became more common. Sieges did however still occur, and the storming of French-held citadels such as Ciudad Rodrigo and Badajoz, both in 1812, demonstrated the delivery of infantry to the enemy walls via the trenches, saps, and parallels first developed by military engineers in the sixteenth and seventeenth centuries, while heavy artillery created breaches. The continued use of stone walls, despite angled bastions and other refinements, demonstrated their fallibility in the face of siege artillery, though at Ciudad Rodrigo the breaching was assisted by poor-quality mortar. Storming fortifications was however a costly exercise, and for obvious reasons, the lead units into a breach were known as the forlorn hope. After the death of 3000 British and Portuguese troops in the final assault on Badajoz, Wellington's army wreaked a terrible revenge on the occupants, military, and around 4000 civilians alike, in an act of barbarity which led him to famously describe his soldiers as "the scum of the earth."

Trends in North America c. 1750–1900

In North America, forts were usually constructed from timber rather than stone, though Quebec City is the last city north of Mexico to retain its original stone walls, dating from the mid-eighteenth century, largely intact (the British modified the French walls after Wolfe's victory on the Plains of Abraham, outside the walls, in 1759). It was, however, smaller forts rather than walled cities that were the norm in North America, including what was to become Canada, following the defeat of the French in the French and Indian War of 1754–1763 (known as part of the Seven Years War in Europe). These forts provided footholds on the European frontier as colonists expanded their territories further west and were to provide the focus of conflict first between the French and the British, and then the British and Americans during the American Revolution, which in part grew out of the previous conflict.

Given the longer history of historical archaeology in the USA and Canada, largely due to the colonial character of these late-forming nations and the more recent unwillingness to disturb potentially earlier indigenous sites, it is no surprise that these complex structures have provided a particular focus for archaeologists. Perhaps the most famous of these is among the very earliest. The first archaeological evidence for Jamestown, the site of the first European settlement and fort, in the form of weaponry and ironwork, was ironically uncovered by Confederate troops building fieldworks on the island during the American Civil War. Major excavations in the mid- to late

twentieth century have provided a rich body of evidence for life and death among the first settler communities and also their relationship with Native Americans, which at times was a conflicted one (Kelso 2008). Remains of postholes marking the palisades from which the first fort was constructed have shown a simple triangular plan, with circular bastions in each corner. Of note in the present context is a large assemblage of weaponry and armor, a lot of which was recovered from a well. Much of this equipment, including breastplates, helmets, musket rests, and pike heads, was already well out of date when it was issued from the royal armories for use by the expedition, which perhaps suggests that it was not regarded as a mission likely to succeed. The abandonment and recycling of some of this equipment, including heavy body armor, indicates that it was more of a hindrance than a help when fighting the local inhabitants, in periodic conflicts climaxing in 1622 when 200 colonists were killed. As such, the assemblage provides early evidence for the difficulties inherent in colonial warfare and perhaps even an attempt to adapt to what we would today call asymmetric warfare.

By the mid-eighteenth century, American forts were generally modeled on the Vauban model; though these were usually simpler in plan than their European antecedents and although timber was a popular building material, the larger forts, such as Fort Ticonderoga, included substantial stone elements. As European settlements spread further west and the influence of European powers subsided, most obviously after the American War of Independence, fort design also began to demonstrate variation from the Vauban form in part because protection against artillery became a lesser concern. Simpler, square forts were more common on the Western frontier, just one example being Fort Union, a bison fur trading post in North Dakota, occupied in 1828–1867 (Matzko 2001). As ever, it is difficult to make generalizations, with each fort demonstrating variation based on resource availability, location, architectural preference, garrison size, etc. Despite this, and largely thanks to Hollywood, the "wild west" stockade fort has become an icon of American history.

Although they had an obvious role in defense and conflict in general, colonial forts in the Americas and elsewhere were also an important focus for settlement and trade, and archaeological research based on these sites has made an important contribution to our understanding of social relations among colonists and between colonists and indigenous peoples, with houses (civilian as well as military barracks), sutling houses (stores), and trading posts, all commonly associated with the larger forts (Starbuck 2010). Studies of artifact distributions and food refuse have allowed archaeologists to examine the various ways in which different social and ethnic groups negotiated their place within what could at times have been hostile environments. A typical study is an analysis of military tablewares from 1760 to 1830 from sites in Canada, largely based on a rich assemblage of ceramics from Fort Beauséjour in New Brunswick (Sussman 1978). This suggested that British line regiments chose popular forms of design and pattern as they were more likely to be available in bulk and readily replaced, which in turn led to a number of regiments choosing to use the same ceramic types in the mess. Analysis of building materials from the Fort at Crown Point, New York, built in 1759 (Feister 1984), has demonstrated that even at a wilderness outpost the difference in social standing between officers and men was marked architecturally, here through the use of more expensive materials in the flooring and fireplaces in the officer's barracks than was the case for the accommodation built for other ranks.

The Mid- to Late Nineteenth Century

Military technology, which was always an important factor influencing the evolution of fortifications, saw to it that dramatic changes were again evident by the mid- to late nineteenth century, when further increases in the efficiency of artillery and firearms created the first indications of trench warfare during the American Civil War. The advance of Empire, particularly under the British, also saw an upsurge in the construction of forts across the globe, in places such as India and Africa, and again European patterns were to dominate. In some cases fortifications were makeshift, constructed in a hurry to defend against attack, usually from technologically weaker indigenous peoples. Such was the case at Eshowe, in

Zululand in South Africa, where after a British invasion in January 1879 a fort was constructed around a Norwegian mission station (Pollard and Banks 2005). Captain Wynne, a Royal Engineer officer, integrated well-tested features of European forts, such as the caponnier, within a structure which also demonstrated a good deal of initiative in the face of limited sources and harsh local conditions – including loopholing the church so that rifles could be fired from cover and using biscuit boxes covered in earth to create ramparts (Fig. 2). Today these ramparts with external ditch still stand, and geophysical survey and excavation has identified structures within, including the mission church, from which the iron window frames were removed by Zulus after the siege so that the metal could be recycled (Pollard and Banks 2005).

European military engineers were also in demand in foreign parts outside the Imperial sphere, including Paraguay in South America, where for instance in the 1860s the despotic leader of Paraguay, Francisco Solano Lopez, contracted a Colonel Thompson, along with British railway engineers, iron founders, and surgeons, to supervise the construction of forts and linear defense systems in advance of the catastrophic, but outside of South America little known, War of the Triple Alliance, which between 1864 and 1870 pitted Paraguay against the combined might of Argentina, Uruguay, and Brazil. The remains of these earthwork fortifications, which like those of the American Civil War were to presage the trenches of the First World War, can still be seen today in the south of the country, where urbanization has not had a chance to erase them. Limited archaeological assessment has suggested that these sites have the potential to tell us much about this conflict and the people who fought it (Pollard 2006).

More basic types of fortification are also known, including the *sangar*, a word originating from the nineteenth-century British experience in the North West Passage and in Afghanistan, and referring to stone breastworks and still used today by the British Army and others to describe small-scale defensive structures usually constructed from sandbags. Archaeological survey has identified one of these structures on the battlefield of Isandlwana, fought in Zululand on 22 January 1879. During the battle, which was a resounding victory for the Zulus, a British soldier created a barricade by piling rocks between two boulders; metal detector survey recovered five Martini Henry cartridge cases from the ground just behind the sangar, from where the soldier had fired on the advancing Zulus, probably just before retiring back to the camp area with the rest of the force, where it is likely he met his death. A rare example of fieldworks surviving on a British battlefield is rock-built *sangars* constructed by Spanish troops during the battle of Glenshiel, fought by Jacobite

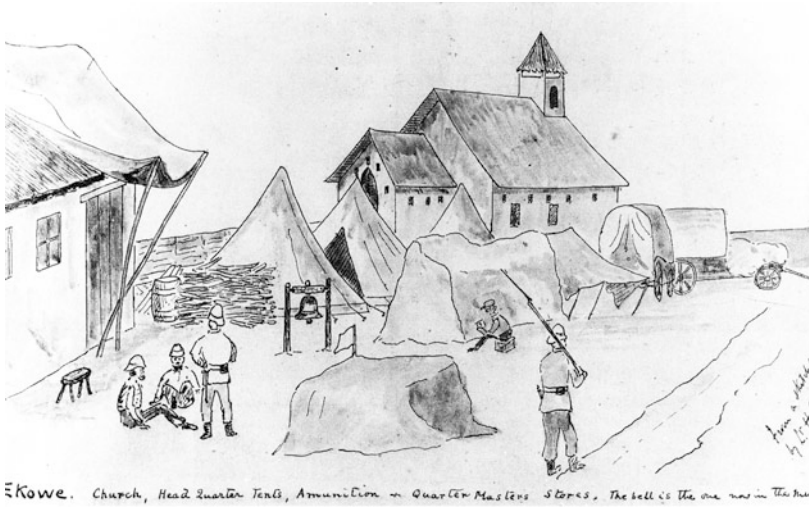

Fortifications, Archaeology of, Fig. 2 Contemporary drawing of interior of fort at Eshowe by Lt. Knight of Buffs. Note loopholes under eaves of church roof

forces, supported by the Spanish, against government troops in 1719. Several of these structures are still to be seen on a hilltop position in the glen in an area which because of their presence has been protected as a scheduled monument (Fig. 3).

Another category of makeshift fortifications relates to the defense of buildings, either during a siege or battle. The British fort at Eshowe could be taken as an example; however, this was more of a fort built around a mission station than an attempt to fortify the mission station itself. The defense of Rorke's Drift, which took place on the same day as the battle of Isandlwana, is a better known example of modification, with the mission buildings linked with defensive breastworks which themselves were ad hoc, with biscuit boxes, mealie bags, and wagons utilized. These temporary palisades leave little if any archaeological trace, as they are entirely removed after the fighting has ceased, but the remains of the buildings at Rorke's Drift, one of which was burned to the ground in the battle, have been subject to excavation (Pollard and Banks 2005). Other examples include the Alamo, where American irregular troops fighting for Texan independence from Mexico fortified a Spanish mission station. Archaeological excavations have provided some idea of how the defenses were constructed, with trenches not really fitting with the popular image of the defenders standing on walls and makeshift ramparts, though these were also utilized (Ivey and Fox 1997). Some buildings have been subject to the minimum of modification, no matter how rapidly executed, prior to them providing effective defense against attack. A good example of this is the farm complex of Hougoumont, which during the 1815 Battle of Waterloo was defended by British and Allied troops against repeated French attacks (Paget and Saunders 1992). This was only possible thanks to walls and gates which linked various buildings around a courtyard, thus providing a ready-made fort. Loopholes were created and parts of the roof removed to allow sharpshooters a high vantage point, but for the most part the building was left unmodified. Some archaeological excavation has been carried out on the site, but this was merely geared toward uncovering wall bases for display; as yet a full academic program of recording and investigation has to be instigated.

Finally, it was not just Europeans who constructed forts during many of the colonial wars that characterized the rise and fall of the age of Empire. In the 1840s the Maori of New Zealand went to war with the British Empire and used their traditional forts, multi-vallate

Fortifications, Archaeology of, Fig. 3 Stone sangar built by Spanish troops on hilltop at Glenshiel from 1719 Jacobite Rebellion

palisaded settlements often located on terraced hill tops and known as Pãs, to great effect, even using tunnels to evade the enemy and execute ambushes. Archaeologists have recently adopted these indigenous forts as ethnographic parallels to much earlier structures in Europe, namely, Iron Age hillforts, which although built 2000 years before the nineteenth century Pãs share some similarity in form and perhaps function (Armit 2007). Another example of non-European forts which were utilized in defense against the forces of Empire was the Taku forts in China, with some of them built specifically to defend against incursions by the Western powers. The forts saw action during the Opium wars of the 1850s and 1860s, when they were assaulted by British, American, and French troops, and although they put up stiff resistance, they ultimately fell due to superior firepower, the same being the case for forts stormed by a multinational force during the Boxer Rebellion of 1899–1901. Most of the forts were dismantled in the nineteenth century, but two of them, the Hai and Dagu forts on the banks of the river Haihe, have been renovated and serve as visitor attractions.

First and Second World Wars

It was the First World War (1914–1918), especially on the Western Front in Europe, which saw the evolution of trench warfare on an epic scale, as both sides fell into a stalemate following the halting of the German advance by French and British armies. Thousands of kilometers of trenches were dug by both sides, with the no man's land between them sometimes being just a few meters wide. The Germans, who generally managed to occupy more advantageous higher ground, even if it was a ridge line at a few meters altitude, prior to the stalemate, also integrated concrete pillboxes into their trench systems, which provided protection against shell fire and often served to threaten Allied assaults from the rear once they had successfully pushed through several lines of trenches. This defense in depth was a key feature of the development of German trench tactics. The ancient arts of mining beneath enemy fortifications in order to destroy them from below were reintroduced and updated thanks to new types of explosives, which could kill hundreds of men in a single detonation from deep underground. Ultimately, it was the Allied adoption of a combined arms approach, infantry supported by tanks, aircraft, and targeted artillery, late in the war which turned the tide and pushed the Germans back to secondary defensive systems such as the Siegfried line.

First World War archaeology has developed over the past decade and been given new impetus due the last veterans of the war passing away (Novotny 2009). Trenches have provided an obvious focus, and an increasing number of projects have demonstrated that archaeology can shed new light on a conflict which might be thought to be adequately covered by a wealth of photographs, maps, war diaries, and even moving pictures (Fraser and Brown 2007). Archaeology has allowed archaeologists to study this vast, industrial conflict on a micro- and personal scale, and some projects have demonstrated that archaeology can provide insights into aspects of large-scale battles, which have not been recorded in the historical record. An example is the previously undocumented construction of a new communication trench by German troops in advance of the Australian attack in late September 1918 at Mont St Quentin on the Somme. The previous trench was deeper but ran in a straight line rather than in zigzag (Fig. 4) and thus placed men moving along it at greater risk from incoming artillery fire.

In the years following the First World War, the devastated landscape of France and Belgium was repaired and the trenches backfilled. Thousands of laborers were employed on the task, including many Chinese "coolies," and farmers were paid cash for every meter of trench they filled in. Today, there are relatively few original sections to be seen, though bands of chalk running across plowed fields in the Somme are a giveaway of their location. Exceptions are areas of woodland, within which silted remnants of trenches escaped backfilling as they are not on agricultural land. This is the case at Mont St Quentin, where the trench lines can still be seen as linear depressions running through the floor of the wood, in which double-trunked trees are said to be the result of shell damage and then recovery.

Fortifications, Archaeology of, Fig. 4 Topographic survey of German communication trenches at Mont St Quentin, Somme, France. Shows original trench (*lower*) and later zigzag version (*upper*)

In addition to temporary field fortifications, permanent concrete built forts and defenses became a feature of the twentieth century, though the origins of what were sometimes subterranean complexes have their antecedents in the forts of the nineteenth century (including coastal artillery positions in the UK and USA). Advances in gunnery and shell penetration and the need to provide interlocking fire brought about the introduction of underground magazines, with elevators to bring up propellant and shells to the guns mounted in surface batteries. The pop-up gun, which could be loaded under cover and then raised to be fired, was a good example of how in the late nineteenth century artillery was being developed for incorporation into forts rather than fortifications being built around guns. The dominance of artillery on the battlefields of the Western Front eventually meant that there was no safe place on the surface, not even in trenches, and so deep dugouts were constructed to accommodate men in their off-duty hours 15 m or more underground (as previously mentioned, the Germans tended to prefer pillboxes to deep dugouts). Several of these structures have been excavated, and, in some, the water-logged conditions (Fig. 5) have demonstrated incredible levels of preservation not only in the wooden structure but also in the objects surviving (Barton et al. 2005).

Fixed fortifications could be found wanting, as was the case with the Maginot Line, a series of underground magazines, barracks, communication hubs, and tunnels, supported by an underground railway and linking guns enclosed in armored cupolas on the surface. This impressive structure was built after the First World War across the French-German border to prevent future incursions by the latter. In 1940 the Germans, utilizing Blitzkrieg tactics honed in Poland, simply sidestepped the defenses and went around them. The Germans were however to place much store on an impressive range of largely concrete built fortifications known as the Atlantic Wall, which stretched along the western seaboard of Europe.

Fortifications, Archaeology of, Fig. 5 Stairway in British deep dugout known as Vampir, near Ypres, Flanders, Belgium. Structure has just been drained, hence sludge on steps

These installations included massive bunker-type emplacements which housed 15- and 16-in. guns capable of hitting the English town of Dover nearly 50 kilometers away across the English Channel. Slave labor was utilized in the construction of these fortifications in a program supervised by Organisation Todt, the civil and military engineering wing of the Third Reich also responsible for the German system of freeways known as the autobahn.

In the lead up to D-day on 6 June 1944, the Allies in Britain developed various technologies for overwhelming these defenses, including a series of specialist armored tanks and other vehicles, known as Funnies, which were variously capable of swimming ashore, laying tracks over soft sand, clearing mines, and planting explosive charges on heavily fortified positions. These were tested against replicas of the German defenses, the most impressive of which can still be seen on an isolated moor not far to the north of Stirling in Scotland (Fig. 6). This striking reminder of the effort put into D-day is protected as a scheduled monument and is likely to be subject to full archaeological recording at some point in the future. Despite heavy losses on some of the invasion beaches, D-day was a success, and the major problems occurred once the Atlantic Wall had been negotiated, when the Allied advance was slowed due to the enclosed nature of the French landscape and the effective deployment of German forces, especially their tanks. In a move similar to the German treatment of the Maginot Line, the heavily fortified gun emplacements were simply bypassed and isolated, most of them finally surrendering to the Allies after some resistance in September of 1944.

Hindsight is a wonderful thing, and today we are comfortable in the knowledge that Hitler's Germany and the Axis powers lost the Second World War. Obviously, this was not the case in the early months and years of the war, when prior to the intervention of the USA, Britain alone continued to resist. For a time, German invasion of mainland Britain seemed inevitable, and so in order to defend against it, a wealth of defensive fortifications were constructed. These included stop lines around major cities such as London, where ditches were dug and concrete bunkers built in order to break the momentum of a German advance. The pillbox, small concrete boxes, mostly built to accommodate just a handful of men armed with rifles and machine guns, became a ubiquitous feature of the British landscape. Today, they can still be seen covering roads, railways, and bridges, sitting on high ground where they had good fields of fire or covering the approach to a crossroad. In addition, there were coastal gun installations, underground headquarter complexes, airfield defenses, subterranean hospitals, and all manner of inventive devices. The Tett turret for instance was a one-man pillbox, really nothing more than a pipe sunk vertically into the ground with a rotating concrete turret sitting on the ground surface. Not many were put into service, largely because they were a defense of last resort; for once in them there was little hope of escape once combat commenced. Several of these were located during an archaeological

Fortifications, Archaeology of, Fig. 6 Replica section of German Atlantic Wall used for D-day training, Sheriffmuir, Scotland

survey of Hornchurch airfield in Essex and have since been integrated into a heritage walk around the remains of the old airfield which saw heavy service during the Battle of Britain (Pollard and Oliver 2002).

Post–Second World War Examples

The post–Second World War nuclear age brought about another shift in the nature of fortifications with the destructive power of the atom bomb which encouraged the move to deep protective structures, for both the defense against nuclear strike and the accommodation of missiles in fortified silos. With nuclear limitation and the demise of the USSR, many of these sites have fallen into disuse and to a degree have been accepted as elements of our cultural heritage (Cocroft et al. 2005). Field fortifications of a more traditional nature did not however disappear, and entrenched firebases became a key element of the failed US insertion strategy in Vietnam where helicopters, aerial bombardment, and artillery provided support for these isolated strongpoints deep in enemy-held territory. Following the invasion of the Falkland Islands in 1982, Argentine troops built great numbers of small bunkers or sangars from rocks, turf, and timber, one reason being that the ground is so wet that the digging of trenches is all but impossible. In Iraq and Afghanistan, the modern equivalent of the firebase can be seen in the form of the many strongpoints, depots, and fortified camps which provide protection for US, British, and other forces engaged in these theaters. There can be little doubt that at some point in the future these conflicts, raw and alive as they are at present, will attract the attention of archaeologists. Some of these sites, such as the tunnels dug by the Viet Cong to provide protection from American aerial bombing and artillery fire and also as a means of springing ambushes, have already become a popular visitor attraction and perhaps serve as an indicator of the potential for other modern fortifications and installations as tourist-friendly heritage sites.

Future Directions

The foregoing has attempted to provide a basic overview of the many different types of fortification, both defensive and offensive, which have played a role in various conflicts across the globe in the postmedieval period (1500–present). Although it has not been possible to provide an exhaustive survey, it is hoped that the wide range of variation in form and function is apparent,

given a modest suggestion of the sorts of information which the archaeological analysis of these structures can provide.

Cross-References

- ▶ American Pioneers and Traditions
- ▶ Battlefield Archaeology
- ▶ Cold War
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ New Spain: Forts and Transport Archaeology
- ▶ West and Central Africa: Historical Archaeology

References

Anonymous. 2012. Archaeologists uncover skeletons and weapons from 1628 battle. Available at: http://news.monstersandcritics.com/europe/news/article_1570519.php/Archaeologists-uncover-skeletons-and-weapons-from-1628-battle. Accessed 3 Sept 2012.

Armit, I. 2007. Hillforts at war: from Maiden Castle to Taniwaha Pa. *Proceedings of the Prehistoric Society* 73: 25–37.

Barton, P., P. Doyle, and J. Vandewalle. 2005. *Beneath Flanders fields: The tunneller's war 1914–1918*. Quebec: McGill-Queens University Press.

Cocroft, W.D., R.J.C. Thomas, and P.S. Barnwell. 2005. *Cold War: Building for nuclear confrontation 1946–89*. London: English Heritage.

Eickhoff, S., A. Grothe, and B. Jungklaus. 2009. Memento Mori – Söldnerbestattungen der Schlacht bei Wittstock 1636. *Archäologie in Deutschland* 1: 26–29.

Feister, L.M. 1984. Building materials indicative of status differentiation at the Crown Point Barracks – 1759–1783. *Historical Archaeology* 18: 103–107.

Fraser, A.H., and M. Brown. 2007. Mud, blood and missing men: excavations at Serre, Somme, France. *Journal of Conflict Archaeology* 3: 147–173.

Harrington, P. 2005. Siege fields: An archaeological assessment of English civil war 'small' sieges. *Journal of Conflict Archaeology* 1: 93–113.

Ive, P. 1589 (ed. 2008). *'Servant to the king for his fortifications': Paul Ive and the practise of fortification*. Edited by C. Stephenson. Doncaster: DP&G Military Publishers.

Ivey, J.E., and A.A. Fox. 1997. *Archaeological and historical investigations at the Alamo North Wall San Antonio, Bexar County, Texas*, Archaeological Survey Report 224. San Antonio: The University of Texas, Center for Archaeological Research.

Kelso, W.W. 2008. *Jamestown, the buried truth*. Charlottesville: University of Virginia Press.

Matzko, J. 2001. *Reconstructing Fort Union*. Lincoln: University of Nebraska Press.

Novotny, J. 2009. Digging deeper: recent publications on First World War archaeology. *Journal of Conflict Archaeology* 5: 273–282.

Paget, J., and D. Saunders. 1992. *Hougoumont: the key to victory at Waterloo*. Barnsley: Pen and Sword.

Pollard, T. 2006. Seven eventful days in Paraguay: reconnoitering the archaeology of the War of the Triple Alliance. In *Fields of conflict: battlefield archaeology from the Roman Empire to the Korean War*, ed. D. Scott, L. Babits, and C. Haecker, 314–336. Portsmouth: Greenwood Publishing Group.

Pollard, T., and I. Banks. 2005. Survey and excavation of an Anglo-Zulu war fort at Eshowe, KwaZulu-Natal, South Africa. *Journal of Conflict Archaeology* 1: 133–180.

Pollard, T., and I. Banks. 2008a. The archaeology of the siege of Leith, 1560. *Journal of Conflict Archaeology* 4: 159–189.

Pollard, T., and I. Banks. 2008b. Archaeological investigation of military sites on Inchkeith Island. *Journal of Conflict Archaeology* 4: 109–136.

Pollard, T., and N. Oliver. 2002. *Two men in a trench: battlefield archaeology – The key to unlocking the past*. London: Penguin.

Sippila, J., and A. Lahelma. 2006. War as a paradigmatic phenomenon: Endemic violence and the Finnish Sub-Neolithic. *Journal of Conflict Archaeology* 2: 189–211.

Starbuck, D.R. 2010. *Excavating the Sutlers' house: Artifacts of the British armies in Fort Edward and Lake George*. Dartford: University Press of New England.

Sussman, L. 1978. British military tableware 1760–1830. *Historical Archaeology* 12: 93–104.

Viollet-Le-Duc, E.E., and B. Bucknell. 2009. *Annals of a fortress: Twenty-two centuries of Siege warfare*. Mineola: Dover Books.

Fortified Homesteads

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Introduction

The fortified house represents a subclass of vernacular architecture. These are civilian buildings, into which certain architectural features have been incorporated in order to make them more defendable. Fortified houses are typically a product of frontier

conditions and can be found in as widely separated contexts as seventeenth-century Ireland (Nunan 2006), nineteenth-century Australia (Grguric 2007), and twentieth-century South Africa (Bremner 1999) to name a few. On face value these structures were built to protect the occupants from attackers. However, because fortified houses directly reflect the needs of the builders in their own particular context, such structures also embody the builder's emotions at a particular time and place. In particular, they represent physical manifestations of fear on the part of the builder. This remains so, whether one considers the fear to be justified or not. Furthermore, these structures are often imbued with a powerful mythology connected to their defensive nature which plays into notions of settler identity construction. Because fortified houses manifest themselves in numerous contexts across the globe, there is ample potential for comparative analysis to be made between the occurrences of this phenomenon in different frontier environments.

Definition

A fortified house is a dwelling built by civilians which incorporates one or more architectural features, designed to render the building more defendable in the event of an attack. This definition excludes purely ornamental features such as decorative crenellations or towers and refers specifically to buildings whose defensive features were included in response to a perceived threat. As it is used here, this term also excludes structures built by the military and other government authorities. Fortification can be defined as "all dispositions made which allow a defending force to defend a position to its advantage" (Lafferty 1973, quoted in Kenzle 1997: 201). The most common method used to make houses more defendable was the inclusion of one or more small apertures in the walls through which the occupants could observe and fire weapons through while being relatively protected (Grguric 2007: 84). The correct term for such an aperture is "embrasure" (Johnson 1976: 268). Embrasures could take the form of elongated slits with outward-angled sides or simple square or rectangular perforations in a wall. Generally, fortified houses are associated with frontier environments and were built by colonists/settlers as a response to conflict with Indigenous peoples (Figs. 1, 2, and 3).

Historical Background

The architectural historian, J.M. Freeland, realized the significance of buildings as "original historical documents," noting that "[a] country's architecture is a near-perfect record of its history. Every building records, describes and explains the time and the place in which it was built" (1968: Preface). Fortified houses represent both real and perceived conflict between invaders and the invaded. They are significant and unique, in that they are standing testimonials to historical periods of fear and conflict. Research into these structures and their past and present social context, contributes to a greater understanding of frontier architecture as well as to frontiers in general.

The modification of material culture as a result of cross-cultural contact is an area which has been investigated by archaeologists to some extent (e.g., Rubertone 1994; Hoagland 1999; Bender and Winer 2001). At the 1999 World Archaeological Conference, a workshop was held on the topic of "The archaeology of culture contact in Australia and beyond" (Harrison and Paterson 1999). One of the sessions discussed "the use, modification and identification of material culture sites in the archaeology of culture contact." However, one factor influencing the material culture contact which was not considered was that of fear. Fear is an all-important factor in the construction of fortified houses because it was this emotion that caused their construction.

In his PhD dissertation, Nicolas Grguric identified fortified houses as a sub-category of Australian vernacular frontier architecture (2007). Grguric found the typical Australian fortified house took the form of a vernacular dwelling of British heritage, but with the addition of one or more embrasures in its walls. In addition to testing and evaluating the actual functionality of these structures, Grguric also investigated the role local

Fortified Homesteads, Fig. 1 Rear view of the "men's hut" at Central Outstation, Eyre Peninsula, South Australia, showing three evenly spaced embrasures positioned along the wall, built to provide defense against potential Indigenous raids. This fortified house was built in the mid-1850s for sheep station workers. (After Baillie 1978: 134)

histories attached to these sites played in the mythology of settler society identity construction (2010: 49–67). He found in the buildings attached to these stories a physical manifestation of what historian Rick Foster described as, "[t]he tension between the desire to reveal and the imperative to conceal – the pride in the hardship and danger of 'winning the land' set against the fear of revealing too much" (2009: 68.13). Some local histories pointed out that a certain building was fortified for defense against Aboriginal attack, whereas others omitted this aspect of the site history altogether (Grguric 2010: 62–65). Grguric noticed a trend in the stories attached to these buildings to portray the settlers as victimized by Aboriginal people while omitting any explanation as to why conflict was occurring or any wrongdoing on the part of the settlers. This selective remembering of the history attached to fortified houses has made them into monuments that serve to justify the colonizer's occupation of the land as won through suffering.

Joe Nunan's study of seventeenth-century fortified houses of County Cork in Ireland has provided a comprehensive analysis of defensive, architectural, and social aspects of these structures (2005). Irish fortified houses formed a transitional phase of architecture that bridges the gap between the medieval Irish tower house and the unfortified country manor house of the late seventeenth century (Nunan 2006: 1). Fortified houses were built to protect the Irish elite from banditry, cattle raids, or attack during rebellion. They took the form of a substantial dwelling with embrasures and other defensive architectural features taken from medieval castles. In later versions, a fortified walled enclosure called a "bawn" incorporating embrasures and corner towers became the primary fortification, with the house incorporated into the bawn (Nunan 2006: 2). As well as addressing the need to defend the property and lives in turbulent times, Nunan believes the construction of fortified houses by the Irish elite represented their desire to modernize and Anglicize (2006: 1).

Blair St. George investigated the transplanting of the Irish fortified house style into frontier New England in the United States (1990). He analyzed the architectural sources upon which the English

Fortified Homesteads, Fig. 2 Interior of the "men's hut" at Central Outstation, Eyre Peninsula, South Australia, showing the position of one of the embrasures, located at a suitable height through which to use a firearm. (After Grguric 2007: 149)

settlers of New England drew when they constructed this enclosed, courtyarded settlement form in a new environment. Two such houses are focused on one which still stands, known as the "Whitfield House," and another which is only known from a contemporary plan. The Whitfield House, which included an embrasure for a small cannon in its upper story, also provides an example of the use of archaeological excavation to investigate a civilian-built defensive structure on the US frontier. In this case, excavation suggested that the house may well have formed part of a larger enclosed complex, such as a bawn (Langley 1982).

Turning to the East Cape of South Africa, a region settled by Anglo-Europeans in the late eighteenth and nineteenth centuries, Margot Winer provides some examples of the influence of fear on civilian architecture. Winer studied changes in vernacular architecture in the small British settler village of Salem on the East Cape (2001: 257–271). Winer identified four phases of frontier-influenced modifications to the vernacular architecture which she termed "Architecture of Coping (1820–1823)," "Architecture of Identity (1823–1832)," "Architecture of Affluence (1832–1860)," and "Architecture of Fear (1835+ recurring)" (Winer 2001: Fig. 15.1). The changes in architecture that this final phase displayed were brought about by widespread and devastating attacks upon settler property and the lives by the Indigenous Xhosa people during what are known as the Cape Wars. This phase was characterized by the incorporation of defensive architectural features into older forms, the construction of new dwellings with embrasures, and other defensive techniques. For example, previously built structures, such as farmyard walls, which were usually seen only as symbolic perimeter markers and barriers to livestock, were modified by the digging of deep ditches on the outside to convert them into fortifications. Newly built farms were constructed so that all the buildings and livestock areas were protected by high walls with embrasures for defense. Also, hedges of brush and other thorny plants were used as protective barriers (Winer 2001: Fig. 15.1, 266).

Fear of the kind felt by the colonial settlers of the seventeenth to nineteenth centuries and its subsequent visibility in civilian architecture can even be seen in the modern era in the example of fortified houses in Johannesburg in South Africa. Here, European people's fear of crime has resulted in the construction of heavily fortified houses and communities, using razor wire, high walls, and sophisticated surveillance systems (Bremner 1999: B2).

Key Issues/Current Debates

Where oral and local histories associated with such sites refer to fortified houses as having been built for defense against Indigenous people, this goes to the heart of the controversy surrounding the history of frontier conflict in Australia. The

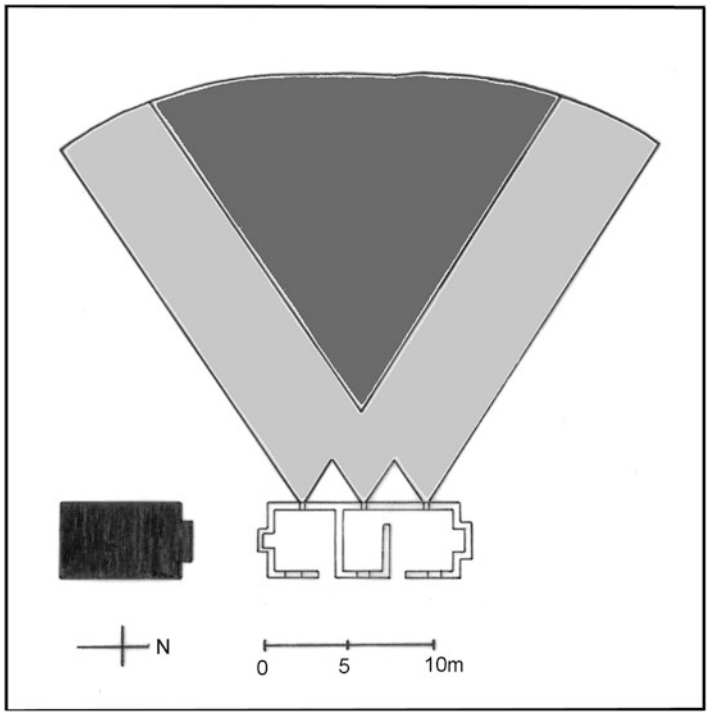

Fortified Homesteads, Fig. 3 Plan of the "men's hut" at Central Outstation, Eyre Peninsula, South Australia, showing extrapolated fields of fire provided by the embrasures. The dark gray-shaded portion denotes intersecting fields of fire. The black outline represents a subsequently demolished building. (After Grguric 2007a: 166)

source of the controversy is the fact that such stories highlight a history of violent race relations. This has been a contentious issue to many, as evidenced in the ongoing public debate in Australia which has become known as the "history wars" (see Macintyre and Clark 2004). The issue is sometimes all the more sensitive in rural areas where descendants of the pioneer settlers are still associated with the land their forbears wrested from its Aboriginal owners. In this case, Stanner's culture of silence (1974) may exist, manifesting itself in an attempt to deny or cover up stories of frontier conflict in order to prevent the memory of pioneering ancestors being sullied with charges of racial violence (Haggis 2001: 92).

Historian Robert Foster has shown that, although denial (or "forgetting") was a characteristic of the national identity construction narrative, when it comes to local history, "misrememberance" is a more common characterization (2009: 68.2). During the process of constructing social identity, elements of history can be forgotten, excluded, altered, or added. In terms of fortified houses, this translates into the creation of histories about a structure's defensive use. In his research into fortified houses in Australia, Grguric found that some believed that a particular structure was built for defense, while others did not (2007: 3). It is important to investigate why such opposing views of history exist, as they may tell us something about the ways in which communities remember their past, and why some memories are privileged, while others are forgotten, denied, or even hidden. In a sense, fortified houses can tell of a hidden history. This has considerable political relevance because of what it can tell us about race relations on the frontiers and modern relationships between Indigenous and non-Indigenous communities today that rest on these foundations. For example, structures which were built defensively out of fear of Indigenous attack could stand as physical monuments to the fact that Indigenous resistance was strong enough in that area to cause the invading colonists to take such precautions and that the settlers feared what they could not understand. Moreover, the fact that colonial settlers found it necessary to fortify their structures could illustrate the fact that the land was taken by force from its Indigenous owners. As Lydon and Ireland argue,

"heritage" is actually "an active process of identity formation and so has become the arena for contesting the form and content of national identity" (Lydon and Ireland 2005: 3).

The confusion that surrounds examples of fortified houses also stems from the peculiar nature of these buildings. They are not usually purely defensive structures such as a fort, but instead they served multiple roles. Therefore, what would usually be a diagnostic element of use as a fortification, such as a narrow slit in a wall, may not necessarily have functioned that way and may have served an entirely different purpose. This issue is not, however, limited to the Australian context; other studies of civilian defensive architecture in different contexts have had to grapple with the same problem. For example, Blair St. George, in his investigation of the seventeenth-century Whitfield House in Connecticut, USA, found that there was disagreement over the existence and function of what he argues was a cannon embrasure located in an upper wall of the house (1990: 265). Blair St. George convincingly argued that it was in fact a cannon embrasure. One of the ways he supported his interpretation was by comparing it to several contemporary fortified houses in Europe and Ireland which also have cannon and small arm embrasures (Blair St. George 1990: 265–6, 276–7).

Future Directions

There are internationally observable patterns in the relationship between settler societies, fear, race relations, and the resulting influences on architectural material culture. This provides opportunities for cross-contextual analysis. Using such an approach, fortified houses and the conditions that gave rise to their construction have the potential to provide transnational perspectives of the processes involved. This allows one to understand contact and colonialism using a global approach, not just focusing on particular times and places in isolation.

By way of example, the Australian frontier was characterized by often intimate cultural intermingling, both peaceful and violent (Denholm 1979: 40). Although this kind of intermingled frontier is characteristically Australian and was one of the main formative factors of the nature of Australian frontier conflict, a comparable situation has been pointed out by Winer in relation to the East Cape frontier in South Africa at a similar period (i.e., 1779–1870) (Winer 2001: 257–9). Winer's observation that "[t]he practical, logical *modus vivendi* bred of proximity, intimacy, familiarity and mutual convenience was co-operation and conflict simultaneously" (Winer 2001: 258–9) could equally be said for the Australian frontier (e.g., Critchett 1990: 23). Therefore, it is probable that given the similar character of the different frontiers, one can expect to see similarities between them in the kinds of material culture produced, its meaning and function, and also in the myths produced around these frontier sites. In this example, Winer identified very similar processes in the incorporation of defensive architectural techniques into civilian buildings in the East Cape of South Africa as Grguric observed in Australia (Winer 2001: Fig. 15.1; Grguric 2007: 287–291).

Cross-References

- ▶ Battlefield Archaeology
- ▶ Buildings Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Cultural Heritage and Communities
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Heritage: History and Context
- ▶ Social Identity in Historical Archaeology

References

Baillie, P. 1978. *Port Lincoln and district: A pictorial history*. Blackwood: Lynton Publications.

Bender, B., and M. Winer, eds. 2001. *Contested landscapes: Movement, exile and place*. Oxford: Berg.

Blair St. George, R. 1990. Bawns and beliefs: Architecture, commerce and conservation in early New England. *Winterthur Portfolio* 25 (4): 241–287.

Bremner, L. 1999. Crime and the emerging landscape of post-apartheid Johannesburg. In *Blank – architecture, apartheid and after*, ed. H. Judin and I. Vladislavic. Cape Town: David Philip.

Critchett, J. 1990. *A distant field of murder: Western district frontiers 1834–1848*. Carlton: Melbourne University Press.
Denholm, D. 1979. *The colonial Australians*. Ringwood: Penguin Books.
Foster, R. 2009. Don't mention the war: Frontier violence and the language of concealment. *History Australia* 6 (3): 68.1–68.15.
Freeland, J.M. 1968. *Architecture in Australia*. Melbourne: F.W. Cheshire Publishing.
Grguric, N. 2007. Fortified homesteads: The architecture of fear in frontier South Australia and the Northern Territory, ca 1847–1885. Unpublished PhD dissertation, Flinders University.
Grguric, N. 2010. Staking a claim: Fortified homesteads and their place in Australian settler identity construction. *Archaeological Review from Cambridge* 25 (1): 49–67.
Haggis, J. 2001. The social memory of a colonial frontier. *Australian Feminist Studies* 16 (34): 91–99.
Harrison, R., and A. Paterson. 1999. (hosts) The archaeology of culture contact in Australia and beyond. Workshop run at the 1999 World Archaeological Congress conference, Mandurah, Western Australia, 8 December 1999.
Hoagland, A. 1999. Village constructions: U.S. Army forts on the plains, 1848–1890. *Winturther Portfolio* 34 (4): 215–237.
Johnson, G. 1976. *The Australian pocket Oxford dictionary*. Melbourne: Oxford University Press.
Kenzle, S. 1997. Enclosing walls in the northern San Juan: Sociophysical boundaries and defensive fortifications in the American southwest. *Journal of Field Archaeology* 24 (2): 195–210.
Lafferty, R.H. 1973. *An analysis of prehistoric southeastern fortifications*. Unpublished Masters thesis Southern Illinois University, Carbondale.
Langley, S. 1982. Archaeological work on the grounds of the Henry Whitfield House Museum. *Connecticut History* 23: 56–60.
Lydon, J., and T. Ireland. 2005. *Object lessons: archaeology & heritage in Australia*. Melbourne: Melbourne Scholarly Publishing.
Macintyre, S., and A. Clark. 2004. *The history wars*. Carlton: Melbourne University Press.
Nunan, J. 2005. The fortified houses of county cork: Origin, form, fabric, function and social use of space. Unpublished Masters dissertation, University College Cork.
Nunan, J. 2006. The fortified houses of county cork: Origin, fabric, form, function and social space. The Proceedings of the 2006 Association of Young Irish Archaeologists conference 65–75.
Rubertone, P. 1994. Archaeology, colonialism and 17th century native America: Towards and alternative interpretation. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 33–45. London: Routledge.
Stanner, W.E.H. 1974. *After the dreaming*. Sydney: Australian Broadcasting Commission.
Winer, M. 2001. Landscapes, fear and land loss on the nineteenth-century south African colonial frontier. In *Contested landscapes: Movement, exile and place*, ed. B. Bender and M. Winer, 257–271. London: Berg.

Further Reading

Grguric, N. 2007. Fortified Homesteads: The Architecture of Fear in Frontier South Australia and the Northern Territory, ca 1847–1885. Unpublished PhD dissertation, Flinders University.

Forum

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Introduction and Definition

A *locus celeberrimus* composed of an often-rectangular space delimited by religious and administrative buildings, the forum constitutes the institutional, commercial, and monumental center of a Roman city (Gros 2001: 228–259, with bibliography). An inaugurated area, ritually delimited as a *templum augurale* to be able to host, as in the *Saepta*, popular meetings and electoral assemblies in particular, the forum is the site devoted to the essential social and public activities of colonies and municipalities alike: in fact, the chief ritual celebrations of the community are either observed in the forum or passed through it. Laws are promulgated in the forum, trials conducted, and justice administered. Just as in Greek *agorai*, commercial transactions are often conducted in the forum. Forum squares equipped with temporary wooden stands (public *fori*) would be the site of games (*ludi*) or gladiatorial contests in the presence of the populace (Liv. 41.28.11).

During the late Republican period, the need to satisfy the multipurpose uses of the forum seems to have inspired the emergence of a number of different building typologies and/or complexes, each with a specific functionality organically

linked to the forum space. These included the architecturalization of the curia-*comitium* system (Balty 1991), present in the Forum Romanum since the sixth century BCE as an area for meetings of the Senate and for the *comitia curiata* (Coarelli 1983; Coarelli 1985). Certain Latin colonies in Italy dating to the third century BCE reproduced this architectural form. The *atria publica* were venues of both public and religious activity provided with shops (*tabernae*) for commercial use. The *basilica forensis* was a monumental building with a complicated usage; the building could accommodate judicial, administrative, and financial activities. The *tabularium*, a building mainly used as an archive (*tabulae publicae*), faced the Forum Romanum from the slope of the Capitoline hill, in Rome's case. Lastly, the *macellum*, a structure with a peculiar plan, served as a market for the sale of meat and fish.

Surrounding many of these secular buildings, often placed in emphatic positions, one could find the monumentalized forms of preexisting sacred sites linked to the venerable traditions of the city's past (and often its origins). In the case of subjugated cities or territories, these cults were always adjusted according to the rules of *interpretatio romana* (e.g., Hercules of Alba Fucens; the Greek divinities of Paestum; the Iuppiter cult of Pompeii). Otherwise temples and shrines (*sacella*) for newly established cults, as demonstrated by the *Capitolia* and the numerous temples (*aedes*) dedicated to members of the Imperial house, constituted a clear manifestation of Roman politics and power, and consequently of the loyalty of the municipal élites towards the central government.

This cumulative function makes the forum and its buildings the privileged site for individual and collective, private and public, profane and religious meetings. Accordingly, in such a frequented place the most relevant commemorative and honorific monuments of the city were displayed and adorned with both images and inscriptions that promoted the military exploits and the munificence of generals, politicians, and notables. It has been correctly pointed out that the forum is:

> "an authentic *monumentum*, a site of memory", "in which all of the symbols of municipal dignity are concentrated and around which the next generations, aside from their juridical status, acquire or enforce the awareness of belonging to a community." (Gros 2001: 228)

Arches, trophies, columns, and honorific statues constitute the usual architectural and sculptural adornment of the open central area. From the second century BCE onwards there exists a tendency to use framing devices to both regularize and emphasize the longitudinal perspective of the forum and its buildings. This included the use of side streets and gates and, in particular, the *porticus*.

Key Issues/Current Debates/Future Directions/Examples

The city of Rome's so-called Imperial *fora*, a series of majestic squares bordered by arcades, began with the Forum of Julius Caesar and, with the exception of the Forum of Trajan, were dominated on their short sides by temples dedicated to the tutelary deities of the dynasty. These forum complexes doubtlessly represent the culmination of this arc of monumental and ideological development. These Imperial *fora* were configured as complexes with celebratory and commemorative purposes that prevailed over the institutional and commercial functions. The spatial progression and the monumental evolution of the Forum Romanum, but also of the different colonial and municipal *fora*, coincide also with the history of the conquest of public power over private property. It is a phenomenon that emerged as another sign of the gradual and unavoidable crisis of Republican society, already underway in the second century BCE with the Roman triumphs in Greece and in the eastern Mediterranean and the consequent diffusion of the multiform manifestations of *luxuria Asiatica* (Pollitt 1978). The residences of the local aristocrats normally occupied many central and/or contiguous blocks of a city's layout until the final two centuries of the Republic when these residences often were expropriated for the extension of the forum spaces and for the

creation of new civic and religious buildings. For example, the luxurious house (*domus*) that Publius Cornelius Scipio Africanus had built facing on to the Forum Romanum was razed by Ti. Sempronius Gracchus in order to make way for the construction of the Basilica Sempronia (Liv. 44.16.10). Similar is the case of the land on which the Forum of Julius Caesar was built after Cicero purchased it in 54 BCE, under the mandate of his then-friend Julius Caesar, for the sum of 60 million sesterces (Cic. *ad Att*. 4.16.8). The latter operation was accompanied by the complementary, firm will to unhinge "the old Republican symbology" (Coarelli 1985: 237) and which culminated, in fact, in the demolition of the Curia and some of the monuments of the ancient *Comitium*.

In the articulated process of monumental and architectural development of forum squares, it is possible to distinguish at least three crucial moments, documented not only by means of historiography but also by decades of archaeological investigation. The phase of middle Republican colonization that followed the dissolution of the Latin League in 338 BCE (Gros and Torelli 2007: 165–181) coincided with the final decades of the fourth century and the early decades of the third century BCE. This was a first, crucial moment in the conceptualization and realization of both the space and the architecture of forum squares, as demonstrated by the excavated colonial sites of Fregellae, Alba Fucens, Cosa, and Paestum. These middle Republican sites, at least, seem to adopt urban and architectural solutions in faithful conformity and in full synchronicity with the city of Rome (Torelli 1999). As documented by a series of pits discovered at the margins of the squares of these cities, the *fora* created by the new colonies were founded, as in Rome, not only according to augural doctrine so that they could serve as *saepta* (Torelli 1991), but also in keeping with the process of the *imitatio Urbis*. In Cosa, for example, the combination of the citadel (*arx*), the sacred road (*via Sacra*), and the forum may be seen to imitate the urban situation at Rome (Brown 1980; Brown et al. 1993).

The circular *comitium*, perhaps inspired by the *ekklesiasterion* of Magna Graecia and Sicily, preserves in its quadrangular enclosure its original nature as *templum* following the Italic tradition. It is significant to note that this situation is present in all four of the colonies mentioned above as a reproduction of the Roman *Comitium* that gained this particular configuration from a reconstruction of c. 263 BCE (Coarelli 1983: 145–153). On the other hand, the *atria publica* with *tabernae* investigated at the margins of Cosa's square (Brown et al. 1993: 57–106) are reproductions of the analogous buildings that bordered the mid-Republican Forum Romanum (Welin 1953: 178–219); these are mainly known via the literary sources (*atrium Regium*, *atrium Vestae, atrium Libertatis*, *atrium Sutorium*, *atria Licinia*, *atrium Maenium*, *atrium Titium*). And finally the discovery of a bronze statue of Marsyas in the area of Paestum's forum is perhaps a replica of the statue present in the *Comitium* of Rome since 294 BCE; this demonstrates the deep and faithful accuracy that guided the imitation of urban models, in that it even involved, for political purposes, the reproduction of single statues.

A second important moment in the evolution of the forum is certainly the second century BCE, coincident with Rome's eastern conquests and with the transformation of the institution of colonialism that had fallen into a crisis because of the increasing political and economic demands of the settlers (Gros and Torelli 2007: 181–198). This is the phase of rationalization and monumentalization of the Italic cities, which was made possible thanks to the wider availability of resources and was carried out under the decisive influence of Hellenistic urban planning and architecture. Also in the *fora* the monumental apparatus increased considerably, as they started to include building typologies not previously or substantially well known in the Roman world, such as the *porticus*, the basilica, the *macellum* (market), and sometimes public baths (*thermae*). In many cases, however, the planning and the transformation processes of the period are conditioned by preexisting circumstances and structures that, as demonstrated by the Forum Romanum itself, can significantly scale down the ambitious intentions of regular urban planning.

After the establishment (*deductio*) of a Sullan colony in 80 BCE at Pompeii, an increased degree of regularity in the forum area may be observed.

This took the form of a basilica, the *macellum*, and arcades that were aligned with the axis of Iuppiter temple that was transformed into the Capitolium of the town. These building activities contribute to an attempt to realign the public space on an axis that diverged from that of the preexisting ancient sanctuary of Apollo that stood adjacent to the forum square.

The addition of the basilica and a *forum Piscarium* constitutes the most relevant building integrations of the period in Cosa's forum; in the arcades positioned on the three sides of the forum and in the monumental arch erected at the northwest entrance of the square shortly after 180 BCE, an analogous desire for spatial and prospective regularization is revealed. In the forum of Alba Fucens, where there is also an attestation for the presence of a statue of Marsyas, a basilica and *macellum* were part of the same phase of construction. As in the previous century, the Forum Romanum remained the model for those realizations of the colonial *fora*. At Rome the comedic playwright Plautus described the Forum Romanum in the final years of the third century BCE and, based on the textual account, it seems that the elaboration of both basilica and *macellum* typologies had begun. These complexes were inspired by an increasing specialization of space and function that, as a matter of fact, replaced structures considered outdated by this time such as the *atria* or the alimentary *fora* (*Piscarium* and *Cuppedinis*). In Rome, in a few years and despite a strong opposition, three *basilicae* were built that not only conferred a certain symmetry at the long side of the forum square but radically changed the organization and the efficiency of the forum space. In 184 BCE the Basilica Porcia replaced the two public *atria* (*Maenium et Titium*). In 179 BCE the Basilica Fulvia-Aemilia was built during the famous censorship of M. Fulvius Nobilior (Liv. 40.51), and finally, in the area of the still visible Basilica Iulia, the Basilica Sempronia was built in 169 BCE (Liv. 39.44). The sumptuous Basilica Aemilia remained for centuries as a commemorative monument of the *gens Aemilia*, showing how, at its best, enduring propaganda was always combined with ordinary functionality (Plin. *HN* 36.102).

This evident inclination for celebration, already present for centuries in the buildings and monuments of the Forum Romanum, was transformed into dynastic glorification under the pressure of the imperialistic tendencies of the first century BCE, as the creation of the Forum of Caesar clearly demonstrates. The complex inaugurated by the dictator in 46 BCE therefore ratifies a new phase of the general evolution of the ideology of forum squares: from this time, not just the successive Imperial *fora* (La Rocca et al. 1995; Packer 1997; La Rocca 2001; Meneghini and Santangeli Valenzani 2007, 2010) but also all of the *fora* of the Italian and provincial centers (Gros and Torelli 2007: 243–392) will be tasked to satisfy the fundamental needs of propaganda and the cult of the emperors and of their families through every public and religious building, a phenomenon that coincides with a phase of gradual "restriction of municipal and colonial powers" (Gros 2001: 237). The structural solutions tested in the Italic territory since the second century BCE, though, will turn out to be perfectly up to date in the new constructions, and they will sometimes be applied in an even more radical way, as clearly shown by the Imperial *fora* (Fig. 1) and, outside of Italy, by the exceptional "provincial *fora*" (e.g., Tarragona) (Gros 2001: 252–255). The width of the squares with arcades, the size of religious buildings, and the tendency towards enclosure are characteristics that had already been proven in Rome in the *porticus* of the Campus Martius. On the other hand, each of the Imperial *fora* is provided with distinctive monumental features, a clear result of contingency, but also of centuries of architectonic progress and intentionally diverse ideological choices. Accordingly, in the Forum of Augustus (42–2 BCE) large hemicycles are added to the porticoes that flank the central temple dedicated to Mars Ultor, elements that were already present in the Forum of Caesar. In the Forum of Augustus the inclusion of an exceptional sculptural program summarized the mythic origins and the history of Rome. Vespasian built the *Templum Pacis* (71–75 CE) on the site of the Republican *macellum* in order to celebrate his victory of the Judean war; it featured the temple with its façade aligned with the lateral arcades that delimited a central area glorified by works of art and gardens. A long and quiet narrow

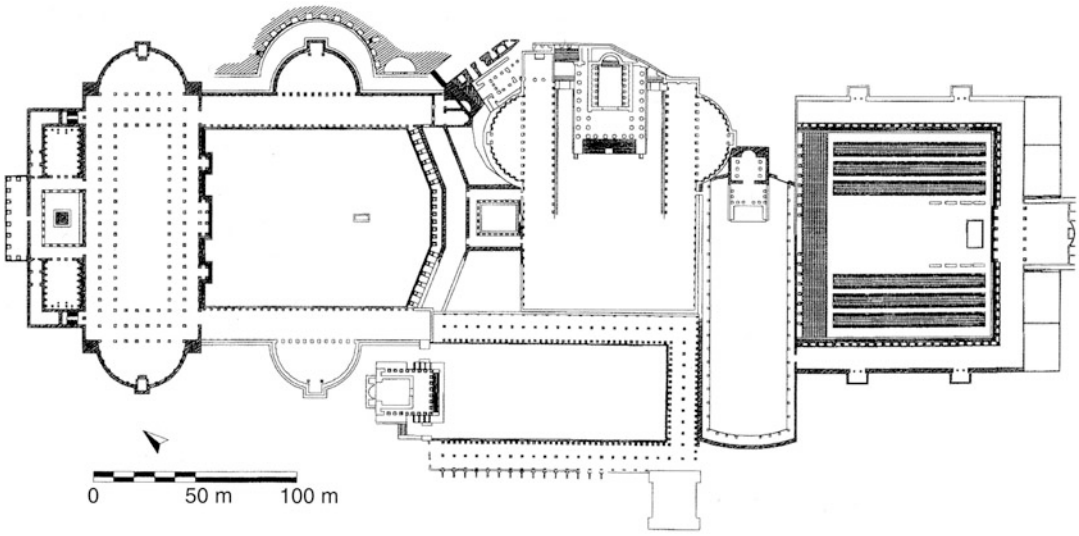

Forum, Fig. 1 The Imperial fora. (From Meneghini and Santangeli Valenzani 2010: 104, Fig. 2)

square characterized the Forum of Nerva or Transitorium, inaugurated in 97 CE and dominated by a temple dedicated to Minerva. Due to the constraints of the available space it showed very particular arcades, constituted by a colonnade raised close to the walls at the end of the complex. Finally the most revolutionary and extensive of the Imperial *fora*, that of Trajan (107–113 CE), *locus sepolturae* of the *optimus Princeps* and of his wife Plotina, was built between the Quirinal and Capitoline hills after an exceptional program of excavation. Financed with the proceeds of the Dacian campaigns, it was composed of a monumental sequence that included a large square with arcades, two lateral *exedrae*, and the equestrian statue of Trajan; the Basilica Ulpia closed the minor northwestern side of the square and, behind it, finally, stood the Column of Trajan with its two flanking libraries.

In line with the urban models, there are two traditional building types that, more than others, seem to qualify the municipal forum as belonging to the Imperial period. These two are the principal sanctuary of the city, most often axially aligned and dedicated to the Capitoline Triad or to the cult of Roma and *principes*, and the civil basilica, that often closes one of the short sides of the forum and that now, with the disappearance of *comitia*, includes the Curia inside it. Buildings that when located in the same position, one in front of the other on the same axis, divided in the middle only by the regular square with arcades, create the popular system of the forum called "tripartite," which became very common during the Imperial period in the provincial centers (Gros 2001: 242–247). Since the Augustan period, the need to celebrate scenic *ludi* in honor of the dynasties could determine the location of theatres close to the forum temples dedicated to the dynastic cult, as is demonstrated well by the cases of Minturnae, Brixia, and Augusta Bagiennorum.

The forum of Pompeii and the forum of Glanum – one Italic, the other provincial – constitute two optimum demonstrations of the development of public areas reflecting the new needs of Imperial religion and Roman administration. The eastern part of the forum of Pompeii (Fig. 2), already occupied by the temple of the Capitoline Triad and by Apollo's sanctuary in the northern and western sides, is entirely reshaped by the creation of a temple of the *Genius Augusti*, the temple of Public *Lares*, and the building of Eumachia, imitating the *porticus Liviae* of Rome in the Campanian center (Torelli 1998). At Glanum, located in Gallia Narbonensis, the Roman conquest resulted in the obliteration of the Hellenistic public area around 40 BCE; it

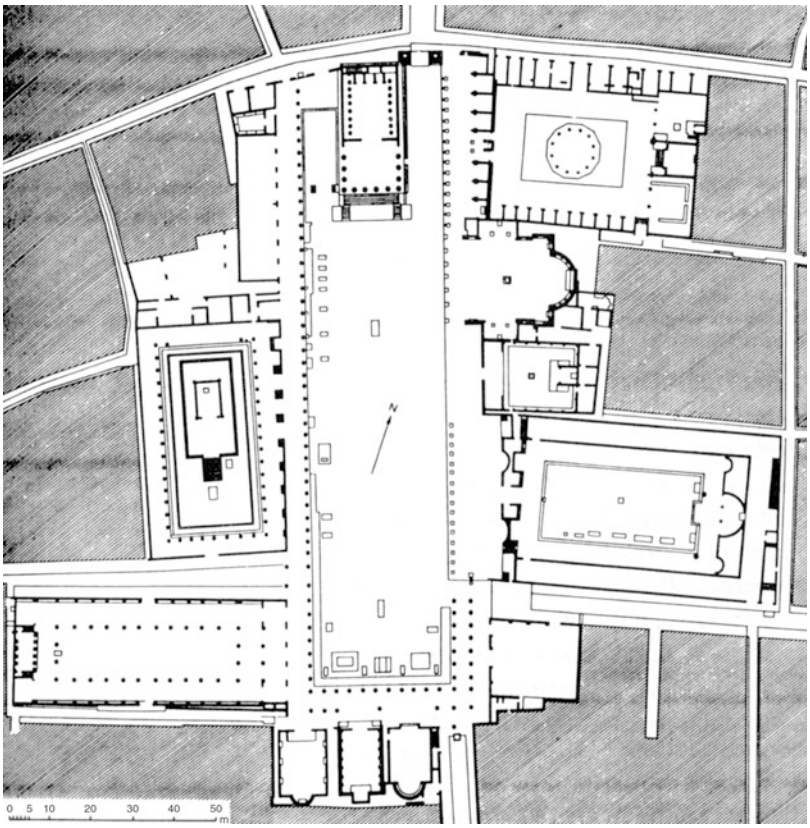

Forum, Fig. 2 Plan of the forum of Pompeii. (From Gros 2001: 232, Fig. 247)

was replaced by two temples (30–20 BCE) and by a forum provided with arcades, a basilica, Curia, *tabularium*, and public bath. The growing desire for self-representation on the part of the local élites, ever more greedy for political privileges and for the good will of the Imperial court, led some families to focus their euergetic activity and to invest their own funds in the construction and embellishment of the monumental centers, as happens, for example, in the cities of Dougga and Lepcis Magna in north Africa. The dynamism of three prominent *gentes* (ancient Roman families), together with some preexisting structures, renders quite peculiar the plan and spatial organization of the forum of Dougga in *Africa Proconsularis*. *Domi nobiles* (local nobles) belonging to wealthy indigenous families are responsible, from the late first century BCE, for the realization of the main public and religious buildings of Lepcis Magna, a city that concentrated in the so-called Old Forum the basilica, the Curia, and six cult places dedicated to traditional Punic divinities now side by side with the new Roman divinities (Roma, Augustus, and the Capitoline Triad).

Thanks to the generosity of the locally born emperor Septimius Severus (r. 193–211 CE), the city of Lepcis Magna was provided with a second, monumental forum in the third century CE. The monumentality of the dynastic temple and scope of the wide square bounded by arcades, the impressive basilica built on the minor side of the square, and provided with two mirror hemicycles just as the Basilica Ulpia in Rome, shows one more time the prestige exercised in the monumental center of the *Urbs Roma*.

The Forum Romanum itself would maintain both its charm and some of its ancient functions for centuries, until the construction of the final ancient monument in the square. This final monument was an honorific column crowned with a statue and dedicated to the Emperor Phocas in 608 CE; it remains visible in the Forum Romanum to this day.

Cross-References

- ▶ Agora in the Greek World
- ▶ Architecture, Roman
- ▶ Basilica in Classical Archaeology
- ▶ Baths and Bathing, Roman
- ▶ Domestic Architecture, Roman
- ▶ Imperial Cult, Roman
- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Romanization
- ▶ Topography of Rome
- ▶ Urban Planning, Roman

References

Balty, J.-C. 1991. *Curia Ordinis. Recherches d'architecture et d'urbanisme antiques sur les curies provinciales du monde romain*. Brussels: Académie Royale de Belgique.

Brown, F.E. 1980. *Cosa, the making of a Roman town*. Ann Arbor: University of Michigan Press.

Brown, F.E., E.H. Richardson, and L. Richardson, Jr. 1993. *Cosa III. The buildings of the forum*. Memoirs of the American Academy in Rome. Rome: The Pennsylvania State University Press.

Coarelli, F. 1983. *Il Foro Romano. Periodo arcaico*. Roma: Quasar.

Coarelli, F. 1985. *Il Foro Romano. Periodo repubblicano e augusteo*. Roma: Quasar.

Gros, P. 2001. *L'architettura romana. Dagli inizi del III secolo a.C. alla fine dell'alto Impero*. Translated by M.P. Guidobaldi. Milan: Longanesi.

Gros, P., and M. Torelli. 2007. *Storia dell'urbanistica. Il mondo romano*. Laterza: Rome-Bari.

La Rocca, E. 2001. La nuova immagine dei fori imperiali. Appunti in margine agli scavi. *Mitteilungen des Deutschen Archäologischen Instituts. Römische Abteilung* 108: 171–213.

La Rocca, E., L. Ungaro, and R. Meneghini, eds. 1995. *I luoghi del consenso imperiale. Il foro di Augusto. Il foro di Traiano. Introduzione storico-topografica*. Rome: Progetti Museali Editore.

Meneghini, R., and R. Santangeli Valenzani. 2007. *I fori imperiali. Gli scavi del comune di Roma (1991–2007)*. Rome: Viviani.

Meneghini, R., and R. Santangeli Valenzani. 2010. *Scavi dei Fori imperiali. Il foro di Augusto. L'area centrale*. Rome: "L'Erma" di Bretscheneider.

Packer, J.E. 1997. *The Forum of Trajan in Rome. A study of the monuments*. 2 v. Berkeley: University of California Press.

Pollitt, J.J. 1978. The impact of Greek art on Rome. *Transactions of the American Philological Association* 108: 155–174.

Torelli, M. 1991. Il '*diribitorium*' di Alba Fucens e il '*campus*' eroico di Herdonia. In *Comunità indigene e problemi della romanizzazione nell'Italia centro-meridionale (IV-III sec. av. C.)*, ed. J. Mertens and R. Lambrechts, 39–63. Brussels/Rome: Institut historique belge de Rome.

Torelli, M. 1998. Il culto imperiale a Pompei. In *I culti della Campania antica*, ed. S. Adamo Muscettola and G. Greco, 245–270. Rome: G. Bretschneider.

Torelli, M. 1999. Tota Italia. *Essays in the cultural formation of Roman Italy*. Oxford: Clarendon Press.

Welin, E. 1953. *Studien zur Topographie des Forum Romanum*. Lund: Gleerup.

Fossil Records of Early African *Homo*

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Introduction

Molecular and paleontological evidence suggests that modern humans first originated in Africa as early as 250,000 years ago. However, fossil remains in Eurasia dating to at least 1.8 mya (million years ago) suggest that some of our ancient relatives had already migrated out of Africa by the time modern humans emerged. Thus, the peopling of the world does not begin with modern humans. Rather, the fossil record suggests a long history of previous occupations in Africa and Eurasia.

In this review, we discuss the nearest fossil relatives of modern humans. The fossil species we review include the early members of the genus *Homo*, a group within the broader category of "hominins" (all primate species more closely related to modern humans than to any other living taxon). Early *Homo* likely shared its environment with non-*Homo* hominins such as *Paranthropus*, a taxon with a suite of morphological features distinct from the derived characteristics of the genus *Homo*. When we speak of derived traits in *Homo*, we mean traits shared with modern

humans. In contrast, primitive traits are morphological features shared by all hominins and therefore not unique to *Homo*. Both primitive and derived traits are combined to define the morphology of a fossil taxon. "Taxon" (pl. taxa) refers to a hierarchical category, and although taxon is often equated with species, this is not necessarily correct. "*Homo*" is a genus-level taxon, while our species, *Homo sapiens*, is a species-level taxon. Because it is difficult to establish speciation events for certain in the fossil record, we prefer to use the term taxon and begin by reviewing the definition of the taxon *Homo*.

Definition

What Is *Homo*?

In 1940, Franz Weidenreich proposed the inclusion of several hominin fossils in the genus *Homo* on the basis of their morphological similarities with two well-established taxa of *Homo* known at the time, *H. sapiens* and *Homo neanderthalensis* (Neanderthals). These additional specimens were classified as *Homo erectus*. The addition of a new taxon to the genus *Homo* necessitated an improved definition of the genus *Homo*. In 1950, Ernst Mayr proposed that *Homo* was a genus of modern human-like creatures whose members showed morphological evidence of increased brain size and bipedal locomotion. However, this definition was unsatisfactory, for it would have included specimens belonging to, *Australopithecus*, a different hominin genus established in 1925. Wilfrid Le Gros Clark expanded upon Mayr's definition and provided four criteria for inclusion into the genus *Homo*: a minimum endocranial volume of 750 cc (cubic centimeters), evidence of tool use, evidence of a precision grip, and evidence of spoken language. Additionally, he suggested that derived morphological traits of *Homo* included a cranium with less robust muscular markings, a flatter (more orthognathic) face, a rounded dental arcade with no evidence of a premolar-canine honing complex, smaller teeth, and adaptations for bipedalism.

This description of *Homo* has undergone many revisions and interpretations, especially in light of the discoveries of many more hominin fossils since the 1950s. Some of the modifications to this definition are discussed in the text that follows, but it is important to note that researchers today have the benefit of more fossils and more rigorous phylogenetic methods to assess the evolutionary relationships of modern humans and fossil hominins. One prominent cladistics-based definition describes the crania of members of *Homo* as possessing, relative to *Australopithecus*, a thicker cranial vault, greater cranial vault height, reduced postorbital constriction, increased contribution of the occipital bone to the cranial sagittal arc length, an anteriorly situated foramen magnum, reduced prognathism, narrow tooth crowns especially in the premolars, and reduction in the length of the molar row (Chamberlain and Wood 1987). Another phylogenetic study found only four derived features common to all members of the genus *Homo* – a larger brain, the absence of a nasal sill, reduced temporal lines, and fewer air cells in the temporal squama (Strait et al. 1997). Though there are discrepancies between analyses, definitions of *Homo* are becoming more specific and quantifiable.

In both historic and modern approaches to defining the genus *Homo*, there is a well-recognized distinction between the earliest forms of *Homo* that still share many traits with *Australopithecus* and intermediate forms of *Homo* that appear more like *H. sapiens* but have not yet reached complete anatomic modernity. We refer to these groups as transitional *Homo* and pre-modern *Homo*, respectively, and discuss the significance, morphology, and key fossils of the taxa within these groups below.

Historical Background

Transitional *Homo: Homo habilis*

Significance

From 1960 to 1963, a series of fragmentary fossils were found in Olduvai Gorge, Tanzania, that seemed to belong to a new *Homo* taxon. Despite some morphological similarity to younger *Homo* remains, these fragments (OH 4, a mandibular fragment, and OH 6, cranial fragments and an

upper molar) were considered too incomplete to determine a new species. Instead, the announcement was made after the discovery of OH 7, an associated find of fragmentary parietal bones, a badly damaged juvenile mandible but with the tooth crowns in good condition, an isolated upper molar, and hand bones. The discoverers of OH 7 noted derived traits shared between this specimen and members of the genus *Homo*, but the endocranial volume of OH 7 was unusually small for *Homo*. The discoverers of OH 7 combined its announcement with a revision to the criteria for membership in *Homo* that reduced the requisite endocranial volume to only 600 cc and thus within the upper range of *Australopithecus*. This decision was met with objection by other researchers.

Since OH 7 was found in the same stratigraphic level as primitive (i.e., Oldowan) stone tools, it was dubbed *Homo habilis*, the Handy Man. In addition to proposing a new species of *Homo*, the announcement of *H. habilis* changed our understanding of the depth of the evolutionary history of the genus *Homo*. The stratigraphic level of OH 7 dates to 1.8 mya, a million years earlier than the previously known emergence date of *Homo*.

Morphology

Some researchers argue that *H. habilis* marks the first evidence for derived features such as encephalization (Tobias 1966: 1971), a more modern human-like cranium and face (Bromage 1989), and reduction in the size of the tooth and jaw size (Vandebroek 1969).

H. habilis appears especially distinct from *Australopithecus* in the shape of its cranial base (Wood 1996).

Until the discovery of potential tools at Dikika dating to 3.39 mya, *H. habilis* was also considered the oldest tool-making hominin. *H. habilis* has some modern human-like features of its hand bones that suggest the ability to craft tools. The trapezium, the wrist bone that articulates with the thumb, has a broad articular surface that would have allowed for a wide range of medial rotation, and *H. habilis* has broad apical tufts on the distal phalanges that suggest robust finger tips (Napier 1962; Tocheri et al. 2008).

However, some researchers consider the morphology of *H. habilis* too primitive for inclusion in the genus *Homo*. With an average of 680 cc among specimens, the cranium of *H. habilis* is only slightly larger than *Australopithecus*, and the crown areas of the cheek teeth are not notably reduced. Even the bones of the hand appear less modern human-like than originally believed. The phalanges are curved and robust, with fibrotendinous marks suggesting frequent climbing. Some aspects of the wrist, including broad lunate and scaphoid articular surfaces, also appear primitive. Whether or not *H. habilis* possessed the precision grip that defines modern human hands cannot be reliably determined from the current evidence.

Whether or not emerging *Homo* possessed the striding gait of modern humans is also a matter of debate. Although the foot of *H. habilis* (OH 8) possesses some adaptations for supporting the body during bipedal walking, its morphology does not suggest a propulsive role for the big toe. The foot overall retains apelike morphology consistent with climbing, and the femur has a knee joint not well adapted for modern bipedalism. It is possible that *H. habilis* shared a form of bipedalism with *Australopithecus* that was unlike the gait of *H. erectus* and later *H. sapiens*. Recently, some researchers have reopened the proposal that the OH 8 ft. may not belong to early *Homo* but to *Paranthropus boisei* (Gebo and Schwartz 2006).

Notable Fossils

In addition to the type specimen OH 7, Olduvai has yielded many fragmentary remains of *H. habilis*. Notable specimens include OH 8, dating to 1.76 mya. The fossils comprising OH 8 are a well-preserved left foot (see above), some dental fragments, and the adult hand bones originally grouped with OH 7. The foot is likely adult and therefore not part of the juvenile OH 7. However, some researchers argue that the foot is juvenile, in which case it could belong to the same individual as OH 7, and the remains of a tibia and fibula (OH 35) may also belong to the same individual (Susman and Stern 1982). However, this unlikely as the discrepancies in joint surfaces and the respective stratigraphic and spatial locations of

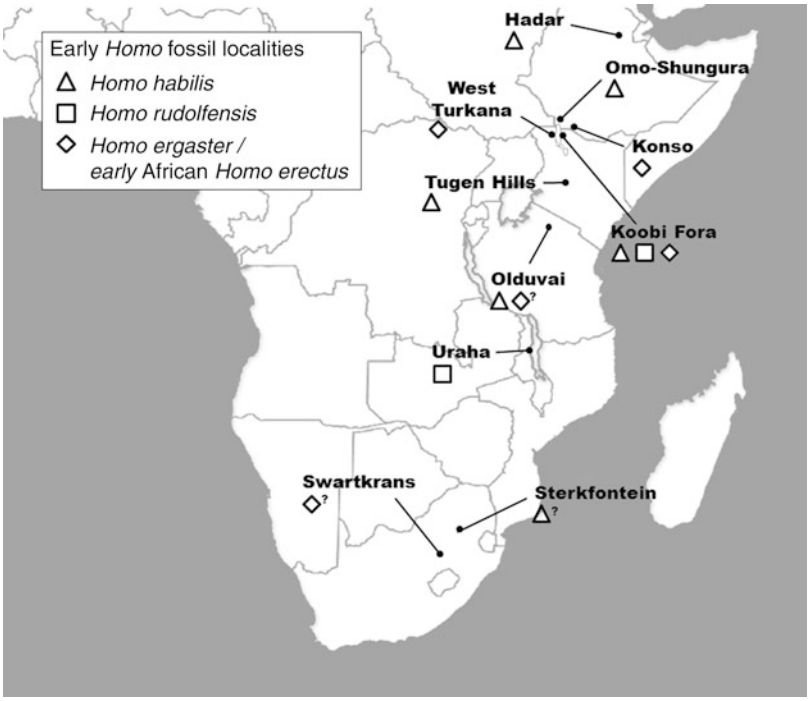

Fossil Records of Early African *Homo*,
Fig. 1 Fossil localities of transitional and premodern Homo in East and South Africa. Triangles denote discoveries of *Homo habilis* remains, *squares* denote discoveries of *Homo rudolfensis* remains, and *circles* denote discoveries of *Homo ergaster* remains. *Question marks* indicate that the affinities of specimens to specific taxa are uncertain. Note that most of the African continent remains unexplored

OH 7, OH 8, and OH 35 are not consistent with them belonging to the same individual.

Other discoveries of *H. habilis* at Olduvai include two fragmentary juvenile skulls (OH 13 and OH 16), a fragmented and distorted cranium (OH 24), and a partial skeleton (OH 62). The skulls of OH 13 and OH 16 date to 1.7 mya, and the OH 24 and OH 62 date to at least 100,000 years earlier. The OH 24 cranium includes derived cranial traits distinct from *Australopithecus* such as reduced postorbital constriction, an inverted V shape formed by the lambdoidal suture, and a more modern human-like mandible. The cranial capacity, however, is small even compared to the juvenile OH 7.

The OH 62 partial skeleton allows for a poor estimate of body proportions in *H. habilis*, and the forelimb to hindlimb proportions are suggested to be more apelike than those of *Australopithecus*. Although these differences in limb proportions may be the result of intraspecific variation, they may also be evidence that *H. habilis* did not share the locomotor style of later hominins.

Beginning in the 1970s, transitional *Homo* remains were also recovered from the site of Koobi Fora, Kenya (Fig. 1). KNM-ER 1813 is a nearly complete cranium with a cranial capacity of only 510 cc. It dates to 1.88–1.90 mya, although earlier dates have been proposed (Gathogo and Brown 2006). The incomplete skull KNM-ER 1805, which is possibly older than 1.87 mya, is similar to KNM-ER 1813, and both specimens are often designated as examples of *H. habilis*. However, some researchers argue that some unusual features of the cranium and teeth of KNM-ER 1805 preclude it from belonging to early *Homo*. A recent discovery at Koobi Fora, the KNM-ER 42703 maxilla, dates to 1.44 mya and expands the temporal range of *H. habilis* to much later than previously thought.

Also found at Koobi Fora is KNM-ER 3735, a partial skeleton with evidence of the cranium, the upper limb and its girdle, the sacrum, and the lower limb dating to 1.88–1.9 mya. The postcranial evidence of KNM-ER 3735 is more similar to *Australopithecus* than OH 62; the scapula and radius are especially apelike.

The geographic range of *H. habilis* expands beyond the boundaries of the principal sites of Olduvai and Koobi Fora. A fragmentary cranium,

L 894–1, dating to 1.8 mya, that comes from the Shungura Formation, Omo, Ethiopia, is comparable to OH 13 and OH 24. A maxilla from Hadar, Ethiopia (AL 666–1), extends the earliest known date of appearance for *H. habilis* to 2.3 mya. A temporal bone KNM-BC 1 from the Tugen Hills, Kenya, dates to 2.4 mya and has also been referred to transitional *Homo*.

One African specimen outside of eastern Africa has been likened to *H. habilis* though never formally included in its hypodigm. STW 53 is a well-preserved cranium from Sterkfontein, South Africa, that dates to at least 2.0–1.5 mya. Examination of the bony labyrinth of STW 53 suggests that it is not similar to later *Homo* and may have relied on less bipedal locomotion than *Australopithecus* (Spoor et al. 1994). Cladistics analyses that treat this specimen as its own taxonomic unit suggest it is a sister-taxon to a *H. habilis*/*H. erectus*/*H. sapiens* clade (Smith and Grine 2008).

Transitional *Homo* – *Homo rudolfensis*

Significance

Several of the transitional *Homo* fossils found at Koobi Fora, Kenya, in the 1970s were referred to transitional *Homo* and later subsumed within the *H. habilis* hypodigm (i.e., KNM-ER 1813). Others, however, exhibited more robust features than the Olduvai sample of transitional *Homo* (i.e., KNM-ER 1470). Aleexev (1986) argued that KNM-ER 1470, a cranium dating to 1.88–1.95 mya, was distinct enough to constitute a new species and recommended the name *Pithecanthropus rudolfensis*. Groves (1989) later transferred this taxon to *Homo* since the genus name *Pithecanthropus* was no longer used.

There remains considerable debate over the Koobi Fora sample of *H. rudolfensis* and whether it represents a taxon distinct from *H. habilis*. Some authors argue that the variation within a combined *H. habilis*/*H. rudolfensis* sample reflects a high degree of sexual dimorphism or anagenetic change rather than evidence of speciation. However, if the specimens belonging to *H. rudolfensis* are incorporated in the *H. habilis* hypodigm, the resulting interspecific variation is greater than seen in several extant ape species and the pattern of variation is different from that seen in any great ape or in modern humans. Additionally, KNM-ER 1813 shares with *H. habilis* buccolingually narrow premolars and molars, while KNM-ER 1470 does not. It is likely that two transitional *Homo* taxa are sampled at Koobi Fora.

Morphology

The suite of derived and primitive traits in the crania of *H. habilis* and *H. rudolfensis* are distinct. *H. rudolfensis* retains several primitive traits, including a thin-walled cranium with marked postorbital constriction and an inflated mastoid region, deep zygomatics, and larger postcanine teeth with more complex premolar and molar crowns and roots. The face of *H. rudolfensis* is also wider at the midface rather than the upper face as in *H. habilis* (Fig. 2). However, *H. rudolfensis* also has more some features more derived than *H. habilis*, including a more orthognathic face. At 800 cc, its endocranial volume is larger than *H. habilis* and larger than its contemporary KNM-ER 1813, which has a cranial capacity of only 510 cc. However, when the effects of body size are taken in account, the endocranial volume of KNM-ER 1470 and *H. habilis* is not significantly different.

Notable Fossils

There are several craniodental discoveries at Koobi Fora referred to *H. rudolfensis* but none as complete as the lectotype, KNM-ER 1470. There are no postcranial remains unequivocally referred to *H. rudolfensis*; the site at which potential *H. rudolfensis* postcrania have been found is also where cranial evidence of *P. boisei*, *H. habilis*, and *H. ergaster* has been found. Two femora, KNM-ER 1472 and KNM-ER 1481, *may* belong to *H. rudolfensis*.

A mandible found in 2.5–2.3 mya sediments of Uraha, Malawi (HCRP-UR 501), has also been referred to *H. rudolfensis*. If this designation holds true, it greatly expands the geographic and temporal range of this taxon.

Premodern *Homo*: *Homo ergaster*/*Homo erectus*

Significance

In the early 1890s, a hominin fossil found on the island of Java was classified as a new hominin

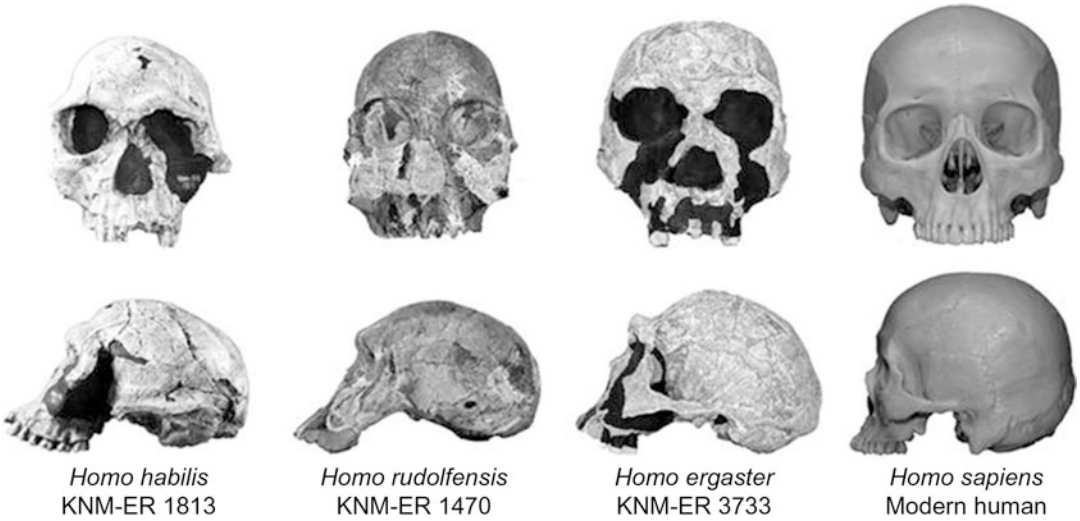

Fossil Records of Early African *Homo*, Fig. 2 Cranial comparisons of (*left to right*) *Homo habilis*, *Homo rudolfensis*, *Homo ergaster*, and *Homo sapiens* in portrait (*top row*) and profile (*bottom row*) views. Casts represent Koobi Fora specimens in the collection of the National Museums of Kenya and a modern human

called originally *Anthropopithecus erectus* and later *Pithecanthropus erectus*. This discovery, the Trinil calotte, demonstrated a smaller brain size and more primitive features than the two species of *Homo* (*H. sapiens* and *H. neanderthalensis*) known at the time of its discovery. The calotte was also much older than these taxa, dated originally to 500,000 years old and later closer to between 700,000 and 1 mya. Similar finds were subsequently discovered at the site of Sangiran, also on Java and at what is now called Zhoukoudian, in China. The overall similarity of the cranial morphology of these Asian specimens to modern *Homo* eventually led to their inclusion within the genus as *Homo erectus*.

Fossils of similar morphology were later found in Koobi Fora and dated to around 1.5 mya, 0.5 mya older than the Trinil calotte. Although the Koobi Fora specimens shared some of the derived features of *H. erectus*, they were less well defined. For example, *H. ergaster* generally had thinner cranial vaults, less sagittal keeling, and larger and more complex premolars. Groves and Mazak (1975) argued that these early African specimens do not share the morphology of Asian *H. erectus* and they provided a new species name, *Homo ergaster*, for the East African sample. However, some researchers argue that the East African sample is an early form of *H. erectus* that does not require a separate name and they refer to this taxon as "early African *Homo erectus*" (Kramer 1993).

Morphology

Homo ergaster is, in general, more modern-human like than transitional *Homo*. The mandible of *H. ergaster* is reduced in size compared to transitional *Homo* as is the dentition of *H. ergaster*. However, the endocranial volume of *H. ergaster* is still relatively small, and when body size is taken into account, the endocranial volume is not significantly larger than *Australopithecus*.

Homo ergaster is the earliest hominin to demonstrate a modern body form. *H. ergaster* is also larger than hominins of the past, with an especially significant increase in the height of females. The lower limbs of *H. ergaster* and its modern thoracic shape suggest bipedal locomotion, with no evidence of climbing adaptations. Cross-sectional measures of the femoral and humeral shafts demonstrate a modern human-like strength in the forelimbs and hindlimbs, and the pelvis is similar to modern humans. Additionally, the semicircular canal structure of the inner ear is similar to modern humans and suggests upright posture (Spoor et al. 1994). It is probable that *H. ergaster* was capable of long-distance walking and transport and possibly adapted to endurance

running. Archaeological evidence from *H. ergaster* localities suggests that raw materials for stone tools were being carried over long distances (Anton 2003).

Notable Fossils

The KNM-ER 992 mandible that dates to 1.5 mya is the type specimen of *H. ergaster*. The first well-preserved cranium of *H. ergaster* to be recovered is KNM-ER 3733, which dates to 1.78–1.65 mya; it has an endocranial volume of about 848 cc. This is similar to the endocranial volume estimates for KNM-ER 3883, an *H. ergaster* calvaria that dates to 100,000 years later. The 1.55 mya cranium without a face, KNM-ER 42700, is referred to *H. ergaster*, but it has an estimated adult body size more similar to transitional *Homo*. This relatively large range of body size suggests that *H. ergaster* may have retained a high degree of sexual dimorphism.

Among the postcranial remains known for *H. ergaster*, two notable discoveries are KNM-ER 803, a partial skeleton dating to 1.5 mya, and KNM-ER 3228, a 1.9-million-year-old pelvic bone. These fossils provide evidence that *H. ergaster* shared a similar walking pattern with modern humans.

Perhaps the most significant fossil remains of *H. ergaster* are those of KNM-WT 15000 (Turkana Boy), a well-preserved skeleton of an 8–12-year-old boy dating to 1.55 mya. Found in 1984, KNM-WT 15000 took four seasons to excavate and is one of the most complete skeletons in the early human fossil record. The discovery demonstrates conclusively that *H. ergaster* possessed modern limb proportions and a modern body shape. The teeth of KNM-WT 15000 provide for some life history reconstruction, and it has been determined that *H. ergaster* shares a similar dental development pattern with transitional *Homo* (Dean and Smith 2009). This suggests that modern life history patterns originated late in human evolution. Turkana Boy also has a cranial capacity of 909 cc, which is still small relative to later *Homo*.

All specimens formally referred to *H. ergaster* come from Kenya, but other *H. ergaster*-/*H. erectus*-like remains have been found in Ethiopia, Tanzania, and South Africa. At Konso, Ethiopia, the left side of mandibular corpus with preserved postcanines was found in association with Acheulean tools. This specimen, KGA 10–1, dates to 1.4 mya and has strong similarities to KNM-ER 992.

At Olduvai, several specimens have been formally referred to early African *H. erectus*. The OH 9 partial calvaria has a well-preserved supraorbital region and dates to 1.5–1.2 mya. The OH 12 skull, which comprises a fragmentary calvaria plus part of the mandible, is more recent (c. 0.78 mya) yet its endocranial volume of 727 cc is substantially smaller than that of OH 9.

Among the hominin remains at Swartkrans, SK 15, SK 45, and SK 847 have been referred to early *H. erectus*. SK 15 is a distorted mandibular corpus dating to 1.5–1.0 mya, and SK 45 is a fragment of the right mandible dating to 2.0–1.5 mya. SK 847 is known as the "Composite Cranium" and also dates to 2.0–1.5 mya. In 1969, 20 years after their discovery, Ron Clarke realized that the fossils SK 80, SK 846, and SK 847 belonged to the same individual. Today, SK 847 is composed of the left side of the face and cranial base. Some authors argue its affiliation is with *H. erectus*, but others refer all three of these specimens to transitional *Homo* (Strait et al. 1997).

Key Issues/Current Debates

Phylogenetic Relationships

Phylogenetic analyses demonstrate that *H. habilis* is not consistently grouped more frequently with *Homo* than with *Australopithecus*, and some argue for its removal from the hypodigm of *Homo*. Still other researchers maintain that there exists phylogenetic support for a clade of *Homo* that includes *H. habilis*, with *H. habilis* as the possible sister-taxon of *H. ergaster*. Regardless of whether or not *H. habilis* belongs in the genus *Homo*, it is unlikely to prove an ancestor of later hominins such as *H. ergaster* because some remains of *H. ergaster* are found in the same fossil localities and date to the same era as *H. habilis*.

Homo habilis and *H. rudolfensis* overlap significantly both temporally and geographically,

and their potential sister-taxa relationship is often debated. Like *H. habilis*, *H. rudolfensis* does not group consistently with *Homo*, and it is possible this taxon represents a member of *Australopithecus*. However, *Homo rudolfensis* may also represent a better candidate for the ancestor of *H. ergaster*/*H. erectus* than *H. habilis* based on its cranial shape (Gonzalez-Jose et al. 2008). This ancestral relationship, however, is unlikely since *H. rudolfensis* and *H. ergaster* also overlap considerably in time and place (Fig. 3).

H. ergaster's inclusion in the genus *Homo* is well established, but its relationships to other *Homo* taxa are debatable (Fig. 4). *Homo ergaster* overlapped significantly in time and place with members of transitional *Homo*, suggesting they do not have an ancestor-descendant relationship. Similarly, the earliest known emergence dates of *H. ergaster* in Africa and *H. erectus* in Asia are close, and it is hard to reconstruct an ancestor-descendant relationship between these two taxa if these earliest known dates of emergence are correct. Although traditionally described as "early African *Homo erectus*," *H. ergaster* may be a sister-taxon of *H. erectus* or both taxa may be descendants of an earlier taxon.

Dispersal from Africa

Paleoenvironment

Transitional *Homo* and *H. ergaster* are known from 1.9 mya and older geological sediments in East and Southern Africa. Around 2 mya, Africa experienced great climate change, especially increasing aridity. Olduvai fossil plants from the same stratigraphic level as OH 7 imply the emergence of more grasslands during this time, and high C_4 isotopic signals suggest the same (Cerling 1991). High C_4 signals have also been found in the lacustrine sediments around Koobi Fora (Cerling et al. 1988) and in Southern Africa (Hopley et al. 2007). Grazing bovids appear to become more prevalent in East Africa around 2.4 mya, also suggesting the emergence of more grassland. Current environmental reconstructions suggest that transitional *Homo* and *H. ergaster* evolved during a time of increasing complexity and heterogeneity in the landscape, which was likely composed of a mixture of closed forests and open grasslands. While the fossil and archaeological records of transitional *Homo* do not yet support long-distance travel, it is reasonably certain that *H. ergaster* made use of a wider range of landscapes than previous hominins. Certainly the presence of *H. erectus* in East Asia implies that hominins must have left Africa sometime before 1.3 mya ago.

Out-of-Africa and the Multiregional Hypothesis

Historically, there are two theories concerning the dispersal of hominins beyond Africa. The "Out-of-Africa" Hypothesis argues that the genetic changes giving rise to modern humans evolved only once in an African population and then dispersed to Asia and Europe and subsequently the rest of the world. This theory has since been divided into Out of Africa I (the dispersal of *H. ergaster*/*H. erectus*) and Out of Africa II (the dispersal of *H. sapiens*). Genetic evidence demonstrates that the most parsimonious origin for modern DNA variation is Africa, lending support for this theory. The alternative hypothesis, the "Multiregional Hypothesis," argues that gene flow between hominin populations gave rise to modern humans. Neanderthal DNA is more similar to non-African populations of modern *Homo*, suggesting some interbreeding between *Homo* populations. The debate between Out-of-Africa and the Multiregional Hypothesis is ongoing; new morphological and molecular data promise to provide some resolution in the coming years (Fig. 5).

Early Fossil Evidence of Homo *Outside of Africa*

While this review has focused on the fossil records of transitional *Homo* and *H. ergaster*/*H. erectus*, there are several sites outside of Africa that show evidence of these hominins or very similar taxa. Morphological analyses of these fossils provide an especially rich source of information for assessing the migration patterns of premodern hominins and the evolutionary origin of *H. sapiens*. These fossils deserve their own review, and we include here only a few highlights found in the Republic of Georgia and China.

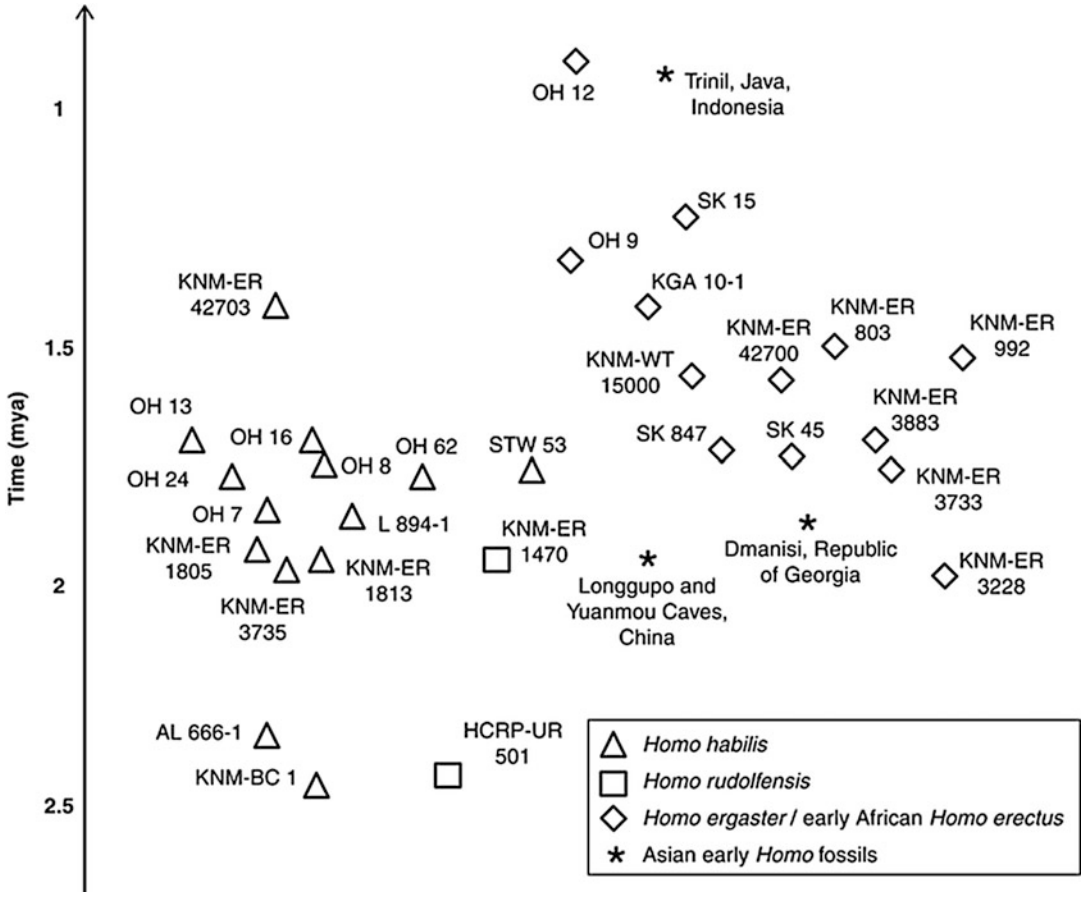

Fossil Records of Early African *Homo*, Fig. 3 Specimens mentioned in this review plotted against their age (averaged). *Triangles* denote discoveries of *Homo habilis* remains, *squares* denote discoveries of *Homo rudolfensis* remains, and *circles* denote discoveries of *Homo ergaster* remains. *Stars* denote comparative Asian specimens of both transitional and premodern *Homo*. Note the high degree of overlap between transitional and premodern *Homo* specimens, suggesting that *Homo ergaster* does not represent a descendant of the transitional *Homo* taxa known to date

At the site of Dmanisi in the Republic of Georgia, a *Homo* mandible dating from 1.85 to 1.78 mya has been referred to the *H. ergaster*/*H. erectus* hypodigm. This mandible shares with *Homo* its small size, relative gracility, and symphyseal shape, but the mandible is also smaller than the earliest *Homo* currently known and includes a diminutive P_4, M_2, and M_3. The premolars are especially narrow, similar to OH 13, a representative of *H. habilis*. The discovery of several skulls at Dmanisi sharing a unique combination of transitional *Homo* and premodern *Homo* traits has led some researchers to propose a new taxon, *Homo georgicus*, for this population, and at least one phylogenetic analysis suggests the cranial shape is similar to *H. ergaster* samples (Rosas and Bermudez De Castro 1998). The postcrania of the Dmanisi fossils are a mosaic of primitive and derived traits, combining a small estimated body size and an encephalization coefficient within the range of *H. habilis*. There is no evidence of the humeral torsion seen in later *Homo*, and the glenoid cavity is cranially oriented as in apes, suggesting the retention of adaptations for climbing. The clavicle, however, is modern like *H. ergaster*/*H. erectus*. The Dmanisi hominins also appear to have modern body proportions, including relatively long lower limbs.

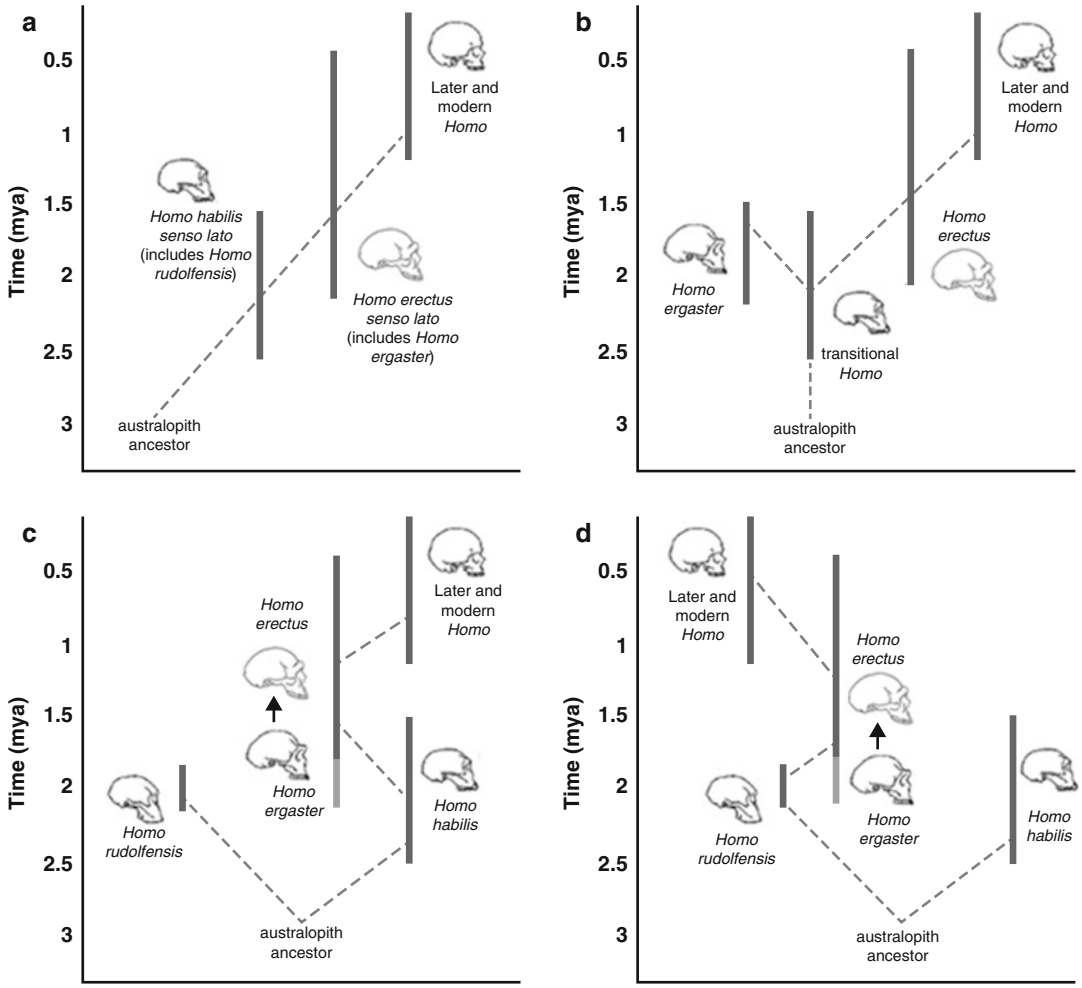

Fossil Records of Early African *Homo*, Fig. 4 Four hypotheses of the taxonomic and phylogenetic relationships of transitional and premodern *Homo* remains (there may be others). (**a**) A conservative hypothesis that places specimens referred to *Homo rudolfensis* within *Homo habilis* and specimens referred to *Homo ergaster* within *Homo erectus*. This phylogeny also indicates a direct descendant relationship between transitional *Homo*, premodern *Homo*, and modern humans. (**b**) A sister-taxa hypothesis that suggests an unspecified transitional *Homo* ancestor (possibly *Homo habilis* or *Homo rudolfensis*) gives rise to the sister-taxa *Homo ergaster* and *Homo erectus*. Modern humans are descendants of *Homo erectus*. (**c**) An anagenetic hypothesis suggesting that *Homo ergaster* is an early form of *Homo erectus*, descended from *Homo habilis*, and gives rise to modern humans. This phylogeny also shows *Homo habilis* and *Homo rudolfensis* as sister-taxa. (**d**) A second anagenetic hypothesis, in which *Homo ergaster* is instead descended from *Homo rudolfensis*

Longgupo Cave, a 1.96–1.78-million-year-old site in the Sichuan Province of China, is the site of another mosaic hominin referred to both *H. ergaster* and *H. habilis*. The Longgupo Cave remains include a fragmentary left mandible and right upper later incisor, originally referred to *H. erectus*. The same authors, however, note affinities with *H. habilis* and *H. ergaster*. The mandibular corpus of Longgupo Cave hominin is small for this taxon and the cusp morphology more primitive, leading some authors to identify it as an ancient ape (Etler et al. 2001). The P_4 is especially distinct from the hypodigm of Asian *H. erectus*, having different talonid and root morphologies. Like other transitional *Homo* remains, the Longgupo Cave hominin was found in

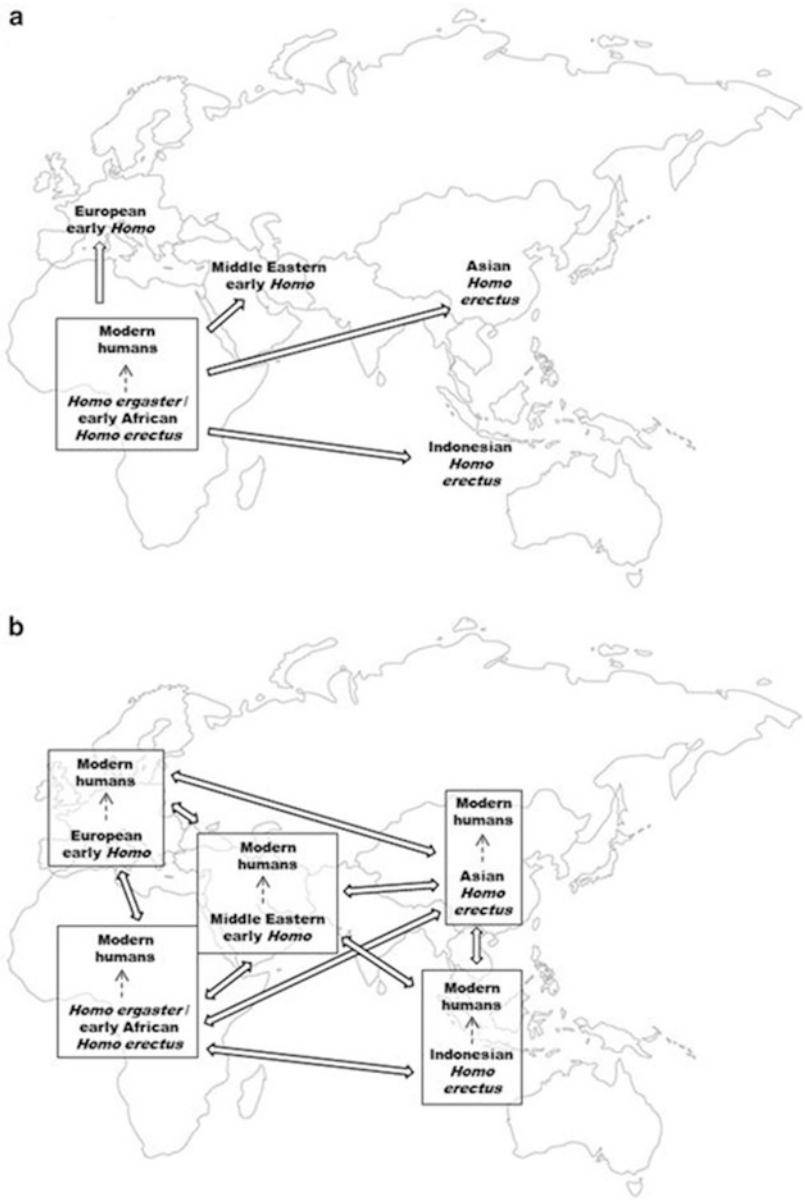

Fossil Records of Early African *Homo*,
Fig. 5 Possible scenarios of the origin of modern humans from early *Homo*. (**a**) The Out-of-Africa Hypothesis, in which modern humans evolve from an *Homo ergaster*/ *Homo erectus* population in Africa, disperse throughout the world, and replace existing archaic hominin populations. (**b**) The Multiregional Hypothesis, in which early *Homo* populations regularly encounter and interbreed with each other, eventually giving rise to regional but regularly interbreeding populations of modern humans

association with two items that may represent Oldowan tools.

A second fossil site from China dating to the same era as Longgupo Cave is Yuanmou Cave in southwest China. The incisors of a hominin found in this cave strongly resemble the incisors of *H. ergaster* and have similarities to *H. habilis*. The Yuanmou Cave hominin was also found in association with stone tools.

Future Directions

We are the last surviving species of a diverse hominin lineage. Previous members of our genus, *Homo*, were likely the earliest hominins to spread beyond Africa, having expanded beyond that continent by at least 1.8 mya. The diversity of transitional and premodern *Homo* forms is a testimony to the adaptive radiation of hominins to

occupy new landscapes and ecological niches in a changing world 2 million years ago. The evolutionary and cognitive abilities that have enabled modern humans to occupy many different environments have their origins millions of years prior to the emergence of *H. sapiens*. Ongoing analysis of our fossil relatives *H. habilis*, *H. rudolfensis*, and *H. ergaster* will improve our understanding of these abilities and help us reconstruct the phylogenetic history of our lineage. Like the many modern human populations we observe today, these fossils of early *Homo* provide us with a view of the great antiquity of human migration, adaptation, and diversity.

Cross-References

- ▶ Archaic *Homo sapiens*
- ▶ Australopithecines
- ▶ Dmanisi Hominins and Archaeology
- ▶ East Africa: Museums
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ Europe: Early *Homo* Fossil Records
- ▶ Hominids, Earliest African
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
- ▶ *Homo habilis*
- ▶ *Homo sapiens*
- ▶ Leakey Family
- ▶ Olduvai Gorge Archaeological Site
- ▶ Out-of-Africa Origins
- ▶ West and Central Asia: Early Homo Fossil Records

References

Anton, S. 2003. Natural history of *Homo erectus*. *Yearbook of Physical Anthropolgy* 46: 126–170.

Bromage, T. 1989. Ontogeny of the early hominid face. *Journal of Human Evolution* 18: 751–773.

Cerling, T.E. 1991. Carbon dioxide in the atmosphere: Evidence from Cenozoic and Mesozoic paleosols. *American Journal of Science* 291: 377–400.

Cerling, T.E., J. Bowman, and J. O'Neil. 1988. An isotopic study of a fluvial-lacustrine sequence: The Plio-Pleistocene Koobi Fora sequence, East Africa. *Palaeogeography Palaeoclimatology Palaeoecology* 63: 335–356.

Chamberlain, A.T., and B.A. Wood. 1987. Early hominid phylogeny. *Journal of Human Evolution* 16: 119–133.

Dean, C., and B.H. Smith. 2009. Growth and development of the Nariokotome youth, KNM-WT 15000. In *The first humans – Origin and early evolution of the genus Homo*, ed. F. Grine, J. Fleagle, and R. Leakey, 101–120. New York: Springer.

Etler, D.A., T.L. Crummett, and M.H. Wolpoff. 2001. Longgupo: Early *Homo* colonizer or late Pliocene *Lufengpithecus* survivor in South China? *Human Evolution* 16: 1–12.

Gathogo, P.N., and F.H. Brown. 2006. Revised stratigraphy of Area 123, Koobi Fora, Kenya, and new age estimates of its fossil mammals, including hominins. *Journal of Human Evolution* 51: 471–479.

Gebo, D.L., and G.T. Schwartz. 2006. Foot bones from Omo: Implications for hominid evolution. *American Journal of Physical Anthropology* 129: 499–511.

Gonzalez-Jose, R., I. Escapa, W.A. Neves, R. Cuneo, and H.M. Pucciarelli. 2008. Cladistic analysis of continuous modularized traits provides phylogenetic signals in *Homo* evolution. *Nature* 453: 775–779.

Groves, C.P. 1989. *A theory of human and primate evolution*. Oxford: Clarendon.

Groves, C.P., and V. Mazak. 1975. An approach to the taxonomy of the Hominidae: Gracile Villafranchian hominids of Africa. *Caspos Mineral Geology* 20: 225–247.

Hopley, P.J., J.D. Marshall, G.P. Weedon, A.G. Latham, A.I.R. Herries, and K.L. Kuykendall. 2007. Orbital forcing and the spread of C_4 grasses in the late Neogene: Stable isotope evidence from South African speleothems. *Journal of Human Evolution* 53: 620–634.

Kramer, A. 1993. Human taxonomic diversity in the Pleistocene: Does *H. erectus* represent multiple hominid species? *American Journal of Physical Anthropology* 91: 161–171.

Napier, J.R. 1962. Fossil hand bones from Olduvai Gorge. *Nature* 196: 409–411.

Smith, H.F., and F.E. Grine. 2008. Cladistic analysis of early *Homo* crania from Swartkrans and Sterkfontein, South Africa. *Journal of Human Evolution* 54: 684–704.

Spoor, F., B.A. Wood, and F. Zonneveld. 1994. Implications of early hominid labyrinthine morphology for the evolution of human bipedal locomotion. *Nature* 369: 645–648.

Strait, D.S., F.E. Grine, and M.A. Moniz. 1997. A reappraisal of early hominid phylogeny. *Journal of Human Evolution* 32: 17–82.

Susman, R., and J. Stern. 1982. Functional morphology of *Homo habilis*. *Science* 217: 931–934.

Tobias, P. 1966. The distinctiveness of *Homo habilis*. *Nature* 209: 953–957.

Tocheri, M.W., C.M. Orr, M.C. Jacofsky, and M.W. Marzke. 2008. The evolutionary history of the hominin hand since the last common ancestor of *Pan* and *Homo*. *Journal of Anatomy* 212: 544–562.

Vandebroek, G. 1969. *Evolution des vertebrates de leur origine a l'homme*. Paris: Masson and Cie.

Wood, B.A. 1996. Human evolution. In *Companion encyclopedia of geography*, ed. I. Douglas, R. Huggett, and M. Robinson, 86–106. London: Routledge.

Further Reading

Alexeev, V. 1986. *The origin of the human race*. Moscow: Progress.

Bobe, R. 2011. Fossil mammals and paleoenvironments in the Omo-Turkana basin. *Evolutionary Anthropology* 20: 254–263.

Bobe, R., and A.K. Behrensmeyer. 2004. The expansion of grassland ecosystems in Africa in relation to mammalian evolution and the origin of the genus *Homo*. *Palaeogeography, Palaeoclimatology, Palaeoecology* 207: 399–420.

Bramble, D., and D. Lieberman. 2004. Endurance running and the evolution of *Homo*. *Nature* 432: 345–352.

Howell, F.C. 1978. Hominidae. In *Evolution of African mammals: 145*, ed. J.V. Maglio and H.B.S. Cooke. Cambridge, MA: Harvard University Press.

Jorde, L.B., W.S. Watkins, M.J. Bamshad, M.E. Dixon, C.E. Ricker, M.T. Seielstad, and M.A. Batzer. 2000. The distribution of human genetic diversity: A comparison of mitochondrial, autosomal, and y-chromosome data. *American Journal of Human Genetics* 66: 979–988.

Kimbel, W., Y. Rak, and D.C. Johanson. 2004. *The skull of Australopithecus afarensis*. New York: Oxford University Press.

Leakey, L.S.B., P.V. Tobias, and J.R. Napier. 1964. A new species of the genus *Homo* from Olduvai Gorge. *Nature* 202: 7–9.

Le Gos Clark, W.E. 1955. *The fossil evidence for human evolution*. Chicago: University of Chicago Press.

Lieberman, D.E., D.R. Pilbeam, and B.A. Wood. 1988. A probabilistic approach to the problem of sexual dimorphism in *H. habilis*: A comparison of KNM-ER 1470 and KNM-ER 1813. *Journal of Human Evolution* 17: 503–511.

Lieberman, D.E., B.A. Wood, and D.R. Pilbeam. 1996. Homoplasy and early *Homo*: An analysis of the evolutionary relationships of *H. habilis sensu stricto* and *H. rudolfensis*. *Journal of Human Evolution* 30: 97–120.

Mayr, E. 1950. Taxonomic categories of fossil hominids. *Cold Spring Harbor Symposia on Quantitative Biology* 25: 109–118.

Rightmire, P. 1993. Variation among early *Homo* crania from Olduvai Gorge and the Koobi Fora Region. *American Journal of Physical Anthropology* 90: 1–33.

Robinson, J.T. 1965. *Homo 'habilis'* and the australopithecines. *Nature* 205: 121–124.

Rosas, A., and J.M. Bermudez De Castro. 1998. On the taxonomic affinities of the Dmanisi mandible (Georgia). *American Journal of Physical Anthropology* 107: 145–162.

Strait, D.S., and F.E. Grine. 2004. Inferring hominoid and early hominid phylogeny using craniodental characters: The role of fossil taxa. *Journal of Human Evolution* 47: 399–452.

Stringer, C. 1986. The credibility of *Homo habilis*. In *Major topics in primate and human evolution*, ed. B.A. Wood, L. Martin, and P. Andrews. Cambridge, MA: Cambridge University Press.

Stringer, C. 2002. Modern human origins: Progress and prospects. *Philosophical Transactions of the Royal Society* 357: 563–579.

Wolpoff, M.H., X.Z. Wu, and A. Thorne. 1984. Modern *Homo sapiens* origins: A general theory of hominid evolution involving the fossil evidence from East Asia. In *The origin of modern humans*, ed. F.H. Smith and F. Spencer, 411–483. New York: Alan R. Liss.

Wolpoff, M.H., J.D. Hawks, and R. Caspari. 2000. Multiregional, not multiple origins. *American Journal of Physical Anthropology* 112: 129–136.

Wood, B.A. 1991. *Koobi Fora research project. volume 4 hominid cranial remains*. Oxford: Clarendon.

Wood, B.A. 1992. Origin and evolution of the genus *Homo*. *Nature* 355 (6363): 783–790.

Wood, B.A. 1999. Plio-Pleistocene hominins from the Baringo region, Kenya. In *Late Cenezoic environments and human evolution: A tribute to Bill Bishop*, ed. P. Andrews and P. Banham, 113–122. London: Geological Society.

Wood, B.A., and J. Baker. 2011. Evolution in the genus *Homo*. *Annual Review of Ecology, Evolution, and Systematics* 42: 47–69.

Fossil Records of Early Modern Humans

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Introduction

Efforts to understand the origin of *Homo sapiens* were bedeviled for decades by the inclusion within our species of a host of late Middle or Late Pleistocene "archaic" fossils possessing cranial morphologies that deviated, sometimes enormously, from those we see among humans living today. In recent years, however, it has begun to dawn on some paleoanthropologists that modern *Homo sapiens* is actually very distinctive, and highly derived in its morphology, and that it

makes most biological sense to include within this species only fossils that bear significant osteodental hallmarks of the living form (Tattersall and Schwartz 2009; Schwartz and Tattersall 2010). This morphological requirement makes the search for the origins of *Homo sapiens* more straightforward, although not necessarily easier.

Definition

Without doubt, the single most significant cranial apomorphy of the living species *Homo sapiens* is the retraction of its small facial skeleton beneath the front of a more or less globular braincase (that averages some 1,330 ml in volume: Holloway et al. 2004). This complex and ramifying feature is most exhaustively documented and discussed by Lieberman et al. (2002; see also Lieberman 2011), who plausibly suggest that facial retraction is associated both with the extreme flexion of the *Homo sapiens* cranial base and with the typical rounding of the well-inflated human cranial vault in side view. It is this overall ensemble that gives the modern human skull its very characteristic Gestalt; but several more detailed features (some of them possibly also developmentally correlated) additionally appear to be *Homo sapiens* autapomorphies.

Such detail autapomorphies include extension of a deep and compressed vaginal process to the margin of the ectotympanic tube; approximation of the vaginal process to the mastoid process; extreme lateral placement of the styloid process, with the stylomastoid foramen lying very posteromedially at its base; narrow, high, occipital plane of the occipital bone; retention into the adult of a discernible arcuate eminence on the superior internal face of the petrosal; fully segmented cranial sutures, with some segments deeply interdigitated; bipartite brow area, in which a medial segment continuous with a more or less swollen glabella is undercut by a distinct lateral plate that originates around the supraorbital notch; mandibular symphysis that is thicker than the corpora behind it when seen from below; and a chin in the form of an "inverted T," with a vertical central keel bounded by depressions on either side, and a horizontal bar below running between more or less well-defined lateral tubercles (Schwartz and Tattersall 2005). Additional *Homo sapiens* characters that have also been noted include an unenclosed subarcuate fossa and an inferior orbital plane that tilts down and back from the inferior orbital margin (Arsuaga et al. 1997).

Together, these characteristics produce a cranium of highly individual aspect, and the postcranial skeleton is equally distinctive. A recent composite reconstruction of a Neanderthal skeleton by Sawyer and Maley (2005) appears to be reasonably representative of the structure of robust Middle Pleistocene *Homo* in general (Tattersall 2010), and comparing it with its counterpart in *Homo sapiens* emphasizes just how autapomorphic the latter species is in its postcranial morphology as well as its skull structure. This highly derived condition is dramatically visible in the overall gracility of the *Homo sapiens* postcranial skeleton, and it is most specifically observed in the barrel-shaped rib cage that tapers in at the top and the bottom and in the matching narrowness of the pelvis, with its laterally compressed iliac blades and short pubic rami. All in all, despite some variation in its defining cranial and postcranial features, today's *Homo sapiens* is a highly distinctive morphological entity. But when we broaden the scope to the fossil record, some grayer areas emerge.

Key Issues/Current Debates

The Fossil Record: Africa

Leaving aside the motley assortment of hominins in the 500–200 ka age range that have been called "archaic *Homo sapiens*" despite possessing morphologies very unlike those of modern humans, the earliest generally accepted *Homo sapiens* fossils are known exclusively from African sites younger than 200 ka. Best preserved among these is one of three crania from the Ethiopian Middle Awash site of Herto that are dated to between 160 and 154 ka (White et al. 2003). With a braincase volume of some 1,450 ml, the

BOU-VP-16/1 cranium (along with the other Herto specimens) was referred by its describers to a new subspecies of *Homo sapiens*, *H. s. idaltu*, because it is "morphologically just beyond the range of variation" seen in the living species (White et al. 2003). Its allocation to *Homo sapiens*, at least, seems provisionally reasonable based on rather scanty published information. Whether the recognition of a distinct subspecies is wise, or even useful, is a separate and perhaps trivial question.

Unfortunately, it is unclear whether the two most striking skull details of the living species, the bipartite brow and the chin, are present in the Herto skull: the brow region is damaged and its detail undescribed, while the mandible is unknown. But interestingly, these two features are indeed absent in the oldest credible candidate of all for "anatomically modern *Homo sapiens*." This is Omo Kibish 1, a fragmentary skull from southern Ethiopia that has been dated to as much as 195 ka (McDougall et al. 2005). As reconstructed by Day and Stringer (1982), Omo 1 has a tall, roomy cranium with a *Homo sapiens*-like high occipital plane. Atypically for our species, however, the occipital is undercut by a transverse sulcus; and while in the mandible there is a low swelling in the symphyseal midline, there is no classic "chin," with vertical keel and horizontal bar. What is more, the incomplete supraorbital margins are pinched inferosuperiorly, and it seems very unlikely that they were originally bipartite. A second and penecontemporaneous cranium from Omo Kibish has a more complete braincase of 1,435 ml volume, but its proportions are not those of the extant form, and despite their common provenance, it is hard to see the two fossils as members of the same population.

Interestingly, there is a suite of later fossil hominins from southern Africa that also show the Omo 1 pattern of basically *Homo sapiens* skull morphology in the absence of the modern chin and/or bipartite brow (Schwartz and Tattersall 2005). These include specimens (from Border Cave [BC5], Boskop, Fish Hoek, and most from Klasies River Mouth), that span a period of almost 100 kyr (some of the KRM fragments appear to be well over 100 kyr old, while the Fish Hoek cranium has been dated to around 12 ka: Singer and Wymer 1982; Deacon and Wilson 1992). Given that an admittedly rather spotty record in the region also includes individuals of more comprehensively modern morphology (e.g., Border Cave 1 and 2, KRM AP 6222, Hofmeyr) throughout much of this period, it seems legitimate to conclude that aspects of an Omo 1/Herto-like morphology may have been primitive for *Homo sapiens* or at least common as variants among its early populations. Subsequently, such conformations became lost in African populations, their last traces disappearing only quite recently.

At the very least, the Omo and Herto fossils are in the right places, at the right times, to have been very early members of our species: molecular comparisons among modern populations indicate strongly that *Homo sapiens* originated somewhere in sub-Saharan Africa, and coalescence calculations converge on a date of origin for our species in the period following about 200 ka (Harpending and Rogers 2000; Campbell and Tishkoff 2010; Scheinfeldt et al. 2010).

Perhaps a bit unusually for such an osteologically distinctive form, the larger phylogenetic context in which the species *Homo sapiens* appeared remains quite opaque. Unlike *Homo neanderthalensis*, for example, which has well-established antecedents in the fossil record (most notably at the Sima de los Huesos at Atapuerca), *Homo sapiens* lacks clear fossil precursors. Apart from the specimens just discussed, which may provisionally be subsumed into the living species, there are no almost-but-not-quite *Homo sapiens* fossils known in the African record: nothing, for example, that possesses the facial retraction of the modern form in the absence of other *Homo sapiens* autapomorphies (or vice versa). African representatives of *Homo heidelbergensis* such as Kabwe, Bodo, and Saldanha most emphatically do not fill this particular morphological role, even though *Homo heidelbergensis* is often considered a strong candidate for ancestor of *Homo sapiens*. Such more recent specimens as the apparently pathological >133 ka Singa cranium from Sudan (McDermott et al. 1996), the fragmentary

>180 ka Guomde skull from East Turkana in Kenya (Brauer et al. 1997), and the badly damaged >200 ka Eliye Springs specimen from the western side of the same basin (Brauer et al. 2003) remain problematic, while fossils such as those from Ngaloba, Ndutu, and even Florisbad that have at one time or another been described as "archaic *Homo sapiens*" do not obviously group monophyletically with our species (Schwartz and Tattersall 2005, 2010).

If the hominin fossil record as it stands has any reliability whatsoever as an indicator of actual phylogenetic history, it is thus looking increasingly probable that the anatomically distinctive species *Homo sapiens* was born in a single event of altered gene regulation or expression, presumably minor at the genomic level, that had cascading developmental effects throughout the body.

Perhaps the nearest thing we have to a "close but [probably] no cigar" situation is found among hominin fossils from northern Africa that have broadly Aterian or pre-Aterian associations. The ~160 ka crania from Jebel Irhoud in Morocco have often been loosely considered *Homo sapiens*, and a juvenile jaw from the site exhibits a dental developmental schedule comparable to our own (Smith et al. 2007). But the best-preserved Jebel Irhoud adult skull (JI 1) has a rather squat braincase of 1,305 ml volume, in addition to a substantially unretracted face that, while smallish, is distinctive in structure from its counterpart in *Homo sapiens* (Schwartz and Tattersall 2005). The Jebel Irhoud hominids resemble in some respects the marginally more *Homo sapiens*-like ~80 ka (Barton et al. 2009) cranium from Dar es-Soltan, also in Morocco, and perhaps additionally a very badly crushed and fractured ~108 ka adolescent cranium from a third Moroccan site, Contrebandiers Cave (Balter 2011). Together, all of these specimens may turn out to constitute a morphologically (and perhaps also culturally) distinctive regional morph, one that might have shared a fairly recent common ancestry with more fully recognizable *Homo sapiens*. And indeed, if anatomically distinctive *Homo sapiens* originated from a less derived ancestor in a single major reorganizational event, then we might not expect ever to find anything anatomically much closer to it.

The Fossil Record: The Near East

Perhaps not unexpectedly, the earliest fossil occurrence of clearly anatomically modern *Homo sapiens* outside Africa occurs in the Levant, a region often considered to be a biogeographic extension of the continent to its south, and situated athwart the major exit route from it. The fossils in question are from the cave site of Jebel Qafzeh, in Israel, and are dated to around 95 ka (Bar-Yosef 1998). Associated with Mousterian lithics, hominid remains from this site have all been allocated to *Homo sapiens* (Vandermeersch 1981). But while two of the individuals concerned (the subnasally prognathic adult Q9, of 1,531 ml cranial volume, and the immature Q11) are clearly of entirely modern *Homo sapiens* morphology (as are Q1 and 2 which are intrusive more recent burials), the majority of the Qafzeh fossils are anatomically non-modern. The best-preserved cranium among these latter is Q6, which has protruding supraorbital margins that are continuous across glabella, together with a smallish but poorly retracted face. It also lacks many of the detailed *Homo sapiens* apomorphies listed above (Schwartz and Tattersall 2005, 2010), although it has an impressive cranial volume of 1,568 ml (Holloway et al. 2004). Including all of the Qafzeh hominids in *Homo sapiens* certainly simplifies interpretation, but it clearly obscures the evident morphological complexity at this site.

What might explain the morphological heterogeneity at Qafzeh? There are only three potential scenarios possible, namely, that all the hominids are *Homo sapiens*; that two distinct kinds of hominid occur at the site, one of them represented by Q9 and the other by Q6; and that hybridization was occurring between two entities at Jebel Qafzeh, one of them evidently anatomically modern *Homo sapiens*. If the first possibility is the correct one, it would unsettlingly imply that our species is undefinable morphologically. In that case, all systematic bets would be off (by implication across the hominin board), and there would basically be no utility whatever in seeking the origin of our morphologically distinctive species in the fossil record. One rather hopes this is not the case.

If the second possibility in fact applies, we have recognizable *Homo sapiens* at Qafzeh, plus a second species that has not been named and may be unknown from elsewhere.

The third option is the most intriguing, especially in view of the curious morphology exhibited by the hominids from Skhūl, another site in Israel that are probably substantially older than 100 ka (Grün et al. 2005). The Skhūl fossils were originally described (together with the Tabūn Neanderthals) under the name of *Palaeanthropus palestiniensis* just before the outbreak of World War II (McCown and Keith 1939). This name actually appears to be a nomen nudum, since no holotype was specified for it, and it was applied equally to the Skhūl and Tabūn populations – which are now acknowledged to represent distinct hominin species. In any event, the new name never caught on, and for the last half-century or so, the Skhūl fossils have generally been crammed into *Homo sapiens*. It is not easy to understand why. With fairly nicely rounded braincases of 1,450–1,590 ml in volume (Holloway et al. 2004), the Skhūl hominins do have faces of modest size. But those faces are poorly retracted at best, and while there is some variation within the Skhūl sample in supraorbital conformation, all individuals agree in lacking the classic *Homo sapiens* morphology. What is more, in the best-preserved specimens (Skhūl II and Skhūl V), this region is very aggressively unlike *Homo sapiens* in being transversely bar-like and more or less continuous across glabella. Further, while there is some swelling at the lower anterior border of the symphysis in all of the adult Skhūl mandibles, none of them shows any hint of the complex human chin morphology. Interestingly, although the best-preserved specimens from Qafzeh and Skhūl (Q6 and Skhūl V) present distinctively different Gestalts, some resemblances between other individuals from the two sites have been recorded (Schwartz and Tattersall 2010).

Altogether, the fairly chaotic assortments of morphologies at Qafzeh and Skhūl invite the speculation that some hybridization among different hominid lineages may have occurred in the Levant. When such speculations have been made in the past, they have involved mingling between *Homo sapiens* and *Homo neanderthalensis*: a species that is well documented to have occurred in the region in the same general time frame. The morphological consequences of interspecies hybridization among hominids are at best poorly understood, but the radical morphological differences between Neanderthals and moderns, and the difficulty of detecting any specifically Neanderthal features in the Skhūl and Qafzeh hominids, do suggest that such intermingling was likely not the case. A more plausible scenario of intermixing might involve Levantine hybridization between emigrating North African Aterians (exiting the continent eastwards along the continent's northern coast, thence north through the Sinai peninsula), and *Homo sapiens* of ultimately Eastern African origin (migrating northwards along the Nile corridor). Intuitively, this seems to make better morphological sense; and in the time around 120–100 ka, the initial separation of the two populations would have been a relatively recent event. What is more, the levels of technological sophistication of these two groups (hence possibly their cultural compatibility) would have been comparable to each other—as, admittedly, they also evidently were to that of *Homo neanderthalensis*, a hominin species that was already resident in the Levant, at least episodically.

Whatever the exact case, and however the curious mixture of Levantine morphologies will eventually be explained, the early foray of anatomically (but not behaviorally) modern *Homo sapiens* out of Africa that is confirmed by the Qafzeh 9 and 11 fossils (and also by recent archaeological findings in Arabia: Armitage et al. 2011) appears to have been short-lived – as apparently were any putatively hybrid populations. Due either to climatic vicissitudes or to competition, or to a combination of both, *Homo sapiens* soon found itself confined once more to Africa. Molecular comparisons (of mtDNA, Y-chromosome DNA, and some nuclear autosomal markers) suggest that expanding populations (which were evidently both anatomically and behaviorally

modern) later reemerged from Africa at around 70–60 ka (see Maca-Meyer et al. 2001). This exodus likely followed a severe contraction of the already thinly spread *Homo sapiens* population during the climatic vicissitudes of MIS 4, and probably in the wake of (though most likely not as a direct result of) the super eruption of Mount Toba in Sumatra at about 74 ka.

The Fossil Record: Europe and Asia

Following the 70–60 ka exodus from Africa, *Homo sapiens* rapidly spread to the ends of the Eurasian continent. By ~40 ka, armed with an Aurignacian toolkit, it had begun flooding into western Europe (Mellars and French 2011), a region already occupied by Neanderthals. This early stage of colonization is documented by numerous archaeological sites but relatively few fossils, although the late Aurignacian (>31 ka) Mladeč crania from the Czech Republic are clearly anatomically modern (see Teschler-Nicola 2006). Following the end of the Aurignacian, the record rapidly picks up, with numerous standard-issue *Homo sapiens* fossils from classic Gravettian sites such as Cro-Magnon and the Abri Pataud.

At the very early end of the timescale, though, some paleoanthropologists (e.g., Rougier et al. 2007) have found it tempting to propose that such *Homo sapiens* fossils as the ~40 ka cranium and mandible from the Peştera cu Oase in Romania show various "archaic" features that are attributable to "complex population dynamics" (for which read: "hybridization with Neanderthals"). Similarly, a Gravettian child's skeleton from the Portuguese Abrigo do Lagar Velho has been reported to show Neanderthal-like features (Duarte et al. 1999), even though this individual lived at least 100 generations after the final disappearance of *Homo neanderthalensis* from Iberia.

In both of these cases the various morphologies concerned, while interesting, offer on closer examination no convincing indications of Neanderthal admixture (Schwartz and Tattersall 2010). Indeed, the fossil record makes it pretty clear that, although the recently announced draft Neanderthal genome (Green et al. 2010) is said to offer some evidence for a low level of (oddly one-way) genetic introgression (1–4%) from Neanderthal into modern populations at an early stage, any early introgression there may have been was evidently not biologically significant, i.e., it did not materially affect the subsequent morphological or evolutionary histories of either species.

In Australia, the earliest physical evidence for human occupation comes from two gracile early modern human burials at Lake Mungo in New South Wales. Dated to ~40 ka (Bowler et al. 2003), they occur some 10 kyr after the first evidence for human habitation both in the region and on the continent. Australia was then virgin territory for hominins, something that cannot be said for Java, where the *Homo erectus* lineage is documented as late as about ~40 ka (Swisher et al. 1996). By this time, we can fairly safely surmise that *Homo sapiens* had already arrived on the island, although the earliest recorded occurrence of modern humans in island southeast Asia, the cranium from Niah Cave in Borneo, is also dated to ~40 ka (Barker et al. 2007).

On the Asian mainland, *Homo erectus* may well have already been displaced by *Homo heidelbergensis* (known in China from Dali and Jinniushan), which was presumably the hominid in residence when *Homo sapiens* arrived. The earliest clear evidence for the advent of *Homo sapiens* in China is a partial skeleton, including a mandible with a distinct chin, from the cave site of Tianyuan, near Beijing (42–39 ka: Shang et al. 2007). It is just possible that a clearly *Homo sapiens* skull from Liujiang in southern China is considerably older than this, but the exact provenance of this specimen is greatly disputed (contrast Shen et al. 2002 with Wu 2004). A recently described "*Homo sapiens*" mandibular fragment from the Zhirendong Cave, also in southern China, seems more reliably dated to >100 ka (Wu et al. 2010), but despite the presence in this specimen of a low swelling at the anterior base of the symphysis, it is largely edentulous, lacks the hallmarks of the *Homo sapiens* chin, and is in general pretty undiagnostic. At present then, there is no really reliable evidence for the presence of modern *Homo sapiens* in China prior to about 40 kyr ago.

Future Directions

Modern *Homo sapiens* is a morphologically distinctive (and highly derived) species that originated in sub-Saharan Africa as indicated by both fossil and molecular evidence. The main elements of the characteristic modern morphology, notably the small face fully retracted below a tall, rounded cranium, are first seen in Ethiopian fossils dating to between about 195 and 160 kyr ago. However, two of the features of the modern form, namely, the bipartite brow area and the complex chin, were most likely absent in both of these individuals and apparently did not become universal among *Homo sapiens* in sub-Saharan Africa until the very end of the Pleistocene. The northern African Aterians (broadly defined) seem to represent a distinctive population that evolved independently in the Saharan region and its northern fringes at a time when the region was substantially better watered than at present. Aterian populations may have spread before 100 Ka to the Levant, where they intermingled with anatomically (but not behaviorally) modern humans who were following the Nile Corridor north at around the same time. This scenario would account for the odd combination of morphologies found at Levantine sites such as Qafzeh and Skhūl, and also for the contemporaneous occurrence of typical *Homo sapiens* individuals at the former.

In any event, the record strongly suggests that *Homo sapiens* first exited Africa at over 100 Ka but subsequently became reconfined to that continent, from which it emerged once more, equipped with a modern behavioral repertoire, at around 70–60 ka. By about 40 ka, fossil remains of fully modern *Homo sapiens* testify that the descendants of those second-wave émigrés had become established as far afield as in western Europe, Australia, and eastern China. In Australia (as, later, they did in the New World), they encountered virgin territory, but both in Europe and eastern Asia, modern humans would have encountered entrenched hominid populations. The exact nature of any putative interaction among the residents and the newcomers is barely documented, if at all, and must for the moment remain conjectural. However, the frustratingly slender relevant fossil record lacks any firm indication of significant genetic interchange among expanding *Homo sapiens* and the hominid residents whose territory they invaded – and whose disappearance followed close on their arrival.

Cross-References

► *Homo neanderthalensis*
► *Homo sapiens*
► Out-of-Africa Origins

References

Armitage, S.J., S.A. Jasim, A.E. Marks, A.G. Parker, V.I. Usik, and H.-P. Uerpmann. 2011. The southern route "out of Africa": Evidence for an early expansion of modern humans into Arabia. *Science* 331: 453–456.

Arsuaga, J.-L., J.M. Bermudez De Castro, and E. Carbonell, eds. 1997. Special issue: The Sima de los Huesos hominid site. *Journal of Human Evolution* 33: 105–421.

Balter, M. 2011. Was North Africa the launch pad for modern human migrations? *Science* 331: 20–23.

Barker, G., et al. 2007. The "human revolution" in lowland tropical Southeast Asia: The antiquity and behavior of anatomically modern humans at Niah Cave (Sarawak, Borneo). *Journal of Human Evolution* 52: 243–261.

Barton, R.N.E., A. Bouzouggar, S.N. Collcutt, J.-L. Schwenninger, and L. Clark-Balzan. 2009. OSL dating of the Aterian levels at Dar es-Soltan I (Rabat, Morocco) and implications for the dispersal of modern *Homo sapiens*. *Quaternary Science Reviews* 28: 1914–1931.

Bar-Yosef, O. 1998. The chronology of the Middle Paleolithic of the Levant. In *Neandertals and modern humans in western Asia*, ed. T. Akazawa, K. Aoki, and O. Bar-Yosef, 39–56. New York: Plenum Press.

Bowler, J.M., H. Johnston, J.M. Olley, J.R. Prescott, R.G. Roberts, W. Shawcross, and N.A. Spooner. 2003. New ages for human occupation and climatic change at Lake Mungo, Australia. *Nature* 421: 837–840.

Brauer, G., Y. Yokoyama, C. Falgueres, and E. Mbua. 1997. Modern human origins backdated. *Nature* 386: 337–338.

Brauer, G., C. Groden, G. Delling, K. Kupzic, E. Mbua, and M. Schultz. 2003. Pathological alterations in the archaic *Homo sapiens* cranium from Eliye Springs, Kenya. *American Journal of Physical Anthropology* 120: 200–204.

Campbell, M., and S.A. Tishkoff. 2010. The evolution of human genetic and phenotypic variation in Africa. *Current Biology* 20: R166–R173.

Day, M., and C. Stringer. 1982. A reconsideration of the Omo Kibish remains and the *erectus-sapiens* transition. *Prétirage*, 1er International Congrès de Humain Paléontologie, Nice, 814–846.

Deacon, H., and M. Wilson. 1992. Peers Cave: "the cave the world forgot". *The Digging Stick* 9: 2–5.

Duarte, C., J. Msuricio, P.B. Pettitt, P. Souto, E. Trinkaus, H. van der Plicht, and J. Zilháo. 1999. The early Upper Paleolithic human skeleton from the Abrigo do Lagar Velho (Portugal) and modern human emergence in Iberia. *Proceedings of the National Academy of Sciences (USA)* 96: 7604–7609.

Green, R., et al. 2010. A draft sequence of the Neandertal genome. *Science* 238: 710–722.

Grün, R., et al. 2005. U-series and ESR analyses of bones and teeth relating to the human burials from Skhūl. *Journal of Human Evolution* 49: 316–334.

Harpending, H., and A.R. Rogers. 2000. Genetic perspectives on human origins and differentiation. *Annual Reviews of Genomics and Human Genetics* 1: 361–385.

Holloway, R.L., D.C. Broadfield, and M.S. Yuan. 2004. *The human fossil record. volume 3: Brain endocasts: The Paleoneurological evidence*. Hoboken: Wiley-Liss.

Lieberman, D.E. 2011. *The evolution of the human head*. Cambridge, MA: Harvard University Press.

Lieberman, D.E., B.M. McBratney, and G. Krovitz. 2002. The evolution and development of cranial form in *Homo sapiens*. *Proceedings of the National Academy of Sciences (USA)* 99: 1134–1139.

Liu, W., Y.-Q. Zhang, Y.-J. Cai, S. Xin, X.-J. Wu, H. Cheng, R.L. Edwards, W.-S. Pan, D.-G. Qin, Z.-S. An, E. Trinkaus, and X.-Z. Wu. 2010. Human remains from Zhirendong, South China, and modern human emergence in East Asia. *Proceedings of the National Academy of Sciences (USA)* 107: 19201–19206.

Maca-Meyer, N., A.M. Gonzalez, J.M. Larruga, C. Flores, and V.M. Cabrera. 2001. Major genomic mitochondrial lineages delineate early human expansions. *BMC Genetics* 2: 13.

McCown, T.D., and A. Keith. 1939. *The Stone Age of Mount Carmel: The fossil remains from the Levalloiso-Mousterian*. Oxford: Clarendon Press.

McDougall, I., F.H. Brown, and J.G. Fleagle. 2005. Stratigraphic placement and age of modern humans from Kibish, Ethiopia. *Nature* 433: 733–736.

Mellars, P.A., and J. French. 2011. Tenfold population increase in western Europe at the Neandertal-to-modern-human transition. *Science* 333: 623–627.

Rougier, H., Ş. Milota, R. Rodrigo, M. Gherase, L. Sarcină, O. Moldavan, J. Zilhăo, S. Constantin, R.G. Franciscus, C.P.E. Zollikofer, M. Ponce de León, and E. Trinkaus. 2007. Peştera cu Oase 2 and the cranial morphology of early modern Europeans. *Proceedings of the National Academy of Sciences (USA)* 104: 1165–1170.

Sawyer, G.J., and B. Maley. 2005. Neanderthal reconstructed. *Anatomical Record (New Anatomist)* 283B: 23–31.

Scheinfeldt, L.B., S. Soi, and S.A. Tishkoff. 2010. Working toward a synthesis of archaeological, linguistic and genetic data for inferring African population history. *Proceedings of the National Academy of Sciences (USA)* 107 (Suppl 2): 8931–8938.

Schwartz, J.H., and I. Tattersall. 2005. *The human fossil record, volume 4: Craniodental morphology of early hominids (Genera Australopithecus, Paranthropus, Orrorin) and overview*. New York: Wiley-Liss.

Schwartz, J.H., and I. Tattersall. 2010. Fossil evidence for the origin of *Homo sapiens*. *Yearbook of Physical Anthropology* 53: 94–121.

Shang, H., H. Tong, S. Zhang, F. Chen, and E. Trinkaus. 2007. An early modern human from Tianyuan Cave, Zhoukoudian, China. *Proceedings of the National Academy of Sciences (USA)* 104: 6573–6578.

Shen, G., W. Wang, Q. Wang, J. Zhao, K. Collerson, C. Zhou, and P.V. Tobias. 2002. U-Series dating of Liujiang hominid site in Guanxi, southern China. *Journal of Human Evolution* 43: 817–829.

Singer, R., and J. Wymer. 1982. *The Middle Stone Age at Klasies River Mouth in South Africa*. Chicago: University of Chicago Press.

Smith, T.M., P. Tafforeau, D.J. Reid, R. Grun, S. Eggins, M. Boutakiout, and J.-J. Hublin. 2007. Earliest evidence of modern human life history in North African early *Homo sapiens*. *Proceedings of the National Academy of Sciences (USA)* 104: 6128–6133.

Swisher, C.C., W.J. Rink, S.C. Anton, H.P. Schwarcz, G.H. Curtis, A. Suprijo, and Widiasmoro. 1996. Latest *Homo erectus* of Java: Potential contemporaneity with *Homo sapiens* in Southeast Asia. *Science* 274: 1870–1874.

Tattersall, I. 2010. The Neanderthals and their place in human evolution. In *Where did we come from? Current views on human evolution*, ed. B. Bajd, 111–126. Ljubljana: University of Ljubljana.

Tattersall, I., and J.H. Schwartz. 2009. Evolution of the genus *Homo*. *Annual Reviews of Earth and Planetary Sciences* 37: 67–92.

Teschler-Nicola, M., ed. 2006. *Early modern humans at the Moravian gate: The Mladeč Caves and their remains*. Vienna: Springer Verlag.

Vandermeersch, B. 1981. *Les Hommes Fossiles de Qafzeh (Israel)*. Paris: CNRS.

White, T.D., B. Asfaw, D. DeGusta, H. Gilbert, G.D. Richards, G. Suwa, and F.C. Howell. 2003. Pleistocene *Homo sapiens* from Middle Awash, Ethiopia. *Nature* 423: 742–747.

Wu, X. 2004. On the origin of modern humans in China. *Quaternary International* 117: 131–140.

Further Reading

Bowler, J.M., et al. 2002. New ages for human occupation and climatic change at Lake Mungo, Australia. *Nature* 421: 837–840.

Rougier, H., et al. 2007. Pestera cu Oase 2 and the cranial morphology of early modern Europeans. *Proceedings of the National Academy of Sciences (USA)* 105: 1165–1170.

Tattersall, I. 2009. Human origins: Out of Africa. *Proceedings of the National Academy of Sciences (USA)* 106: 16018–16021.

Tillier, A.-M., B. Arensberg, H. Duday, and B. Vandermeersch. 2001. Brief communication: An early case of hydrocephalus: The Middle Paleolithic Qafzeh 12 child (Israel). *American Journal of Physical Anthropology* 114: 166–170.

Wu, L., et al. 2010. Human remains from Zhirendong, South China, and modern emergence in East Asia. *Proceedings of the National Academy of Sciences (USA)* 107: 19201–19206.

Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology

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Introduction

Few techniques for chemical analysis are as rapid and informative as Fourier transform infrared spectroscopy (FTIR). FTIR can be used to identify and compare sample compositions and in a quantitative fashion to determine the concentration of different components of a mixture (Smith 1999: 1). Its popularity in the field of conservation reflects attributes that make the technique appealing for many archaeological applications as well, including the small amount of sample required for analysis (milligrams or micrograms) and the fact that samples can be organic or inorganic and have a crystalline or amorphous structure. Its wide applicability makes FTIR a particular asset to nearly any professional archaeology laboratory as it can aid in determining the composition of such materials as fired clays, bone and tooth enamel, wood ash, fibers and dyes, plasters, and resins.

Infrared spectroscopy (IR) is used to identify the functional groups that are the building blocks of molecules. Examples include the amides found in silk proteins and the phosphate component of bone mineral. In brief, a sample is exposed to a beam of infrared radiation and responds by vibrating (bending and stretching) in patterns unique to each functional group. Older IR devices worked by separating out individual infrared frequencies and recording the interaction of the sample with each. FTIR trumps these by using a special optical device called an interferometer to measure the interaction of a sample with all infrared frequencies simultaneously. An automated mathematical procedure (the Fourier transform) translates the resulting interferogram into a spectrum whose peak locations along the x-axis are associated with the vibrational patterns distinct to a particular type of chemical bond. Peak (band) heights are measured in absorbance or % transmittance on the y-axis, and their position along the x-axis is a measure of radiation frequency, typically recorded in units of cm^{-1}. Once a spectrum is produced, identifying the composition of the sample then becomes a process of learning (or looking up) the functional groups that are associated with particular bands and determining how these functional groups together comprise a molecular structure.

Key Issues

Advantages of FTIR

FTIR is particularly well suited to investigating not only the composition of the types of materials that archaeologists are often interested in but also how these have transformed through time as a result of human or natural processes. Our understanding of site formation processes and artifact life histories has been enriched through research on the chemical signatures of bone and sediment diagenesis, degradation of organics such as silk proteins, and crystallinity shifts as clays and bone undergo thermal alteration, all through the application of FTIR techniques.

A general advantage of FTIR is the ease and rapidity with which samples can be prepared and spectra produced. FTIR may be applied to liquids and gases but most archaeological applications involve solid phase samples. The common sample preparation technique of creating a pressed pellet mixture of ground sample and a potassium bromide (KBr) matrix (see Weiner et al. 1993) is relatively easy to carry out. It takes only a few minutes to produce a spectrum whose band

positions, heights, and widths all relay information about the sample makeup. Moreover, only a few milligrams of sample are needed – or even micrograms if used in conjunction with an FTIR microscope – making the technique a good choice for use on trace compounds or rare objects (e.g., Doménech Carbó et al. 1996; Lluveras et al. 2010; Liu et al. 2011).

Finally, benchtop FTIR instruments are inexpensive relative to many types of high-tech analytical equipment. An "M series" instrument from MIDAC Corp. (CA, USA) currently (2011) runs about $20,000 (USD) – a good bargain for such a general utility analytical tool. Manufacturers have also made great strides in improving the ease of the instrument's physical transport for field applications. In the 1990s, pioneering efforts at on-site FTIR analysis for archaeology required daily hauling of a benchtop instrument (roughly the size of a trombone case but considerably heavier) into a remote cave site, where the machine was powered by a gasoline generator and draped in plastic sheeting for protection from dust (Weiner et al. 1993). The rugged miniaturized and even handheld portable instruments on the market today command roughly two to five times the price of a benchtop machine, placing them out of reach for many archaeologists. Many of these instruments are quite specialized, developed for niche markets like federal law enforcement. As consumer interest in portable FTIR instruments continues to grow, however, archaeologists may soon find it easy to conduct real-time analysis of archaeological materials as they are revealed through excavation.

Disadvantages of FTIR

FTIR has important limitations. Potential users should be aware that results can vary with sample preparation technique and the type of instrumentation employed (Coleman 1993). A particular nuisance that accompanies the use of KBr as a pelleting medium is its propensity to absorb liquid and atmospheric water. Unlike KBr, which is transparent in the mid-IR range, water produces bands that may overlap with those associated with the material of interest. Researchers must thus take care to keep the samples and instrument free of ambient moisture (e.g., Weiner et al. 1993). Partly for this reason, many scientists outside of archaeology have turned to other sampling techniques. Attenuated total reflectance (ATR) is one of the more popular but produces different spectra from those obtained with KBr. Data collected with an ATR accessory may be referenced to spectra produced using the standard KBr technique (Thompson et al. 2009; Smith 2011: 132–138), but archaeometrists have so far shown little enthusiasm in adopting alternative sampling methods (Thompson et al. 2009) as they work to build spectral reference libraries unique to the discipline.

A more specific problem regards the preparation of bone samples. Mineral crystallinity is one measure used to evaluate the extent of burning and other postmortem processes that bone has undergone (Stiner et al. 1995; Lebon et al. 2010). Surovell and Stiner (2001) have shown, however, that crystallinity is also affected by the intensity with which a bone sample is ground in preparation for KBr pelleting, but offer a protocol to standardize the procedure.

Applications

Below I offer examples of the array of archaeological problems to which FTIR can be profitably applied, drawing on representative publications that I hope will inspire the reader to consider how FTIR may be used in her own research. Many of these can be found in the *Journal of Archaeological Science*, a major publisher of archaeometry studies whose readership is international.

In a particularly noteworthy group of studies, researchers used FTIR to document the surprising extent to which archaeological deposits may become chemically transformed. Wood ash from prehistoric hearths and bone are two archaeological materials capable of delivering key information about past hominin behavior. FTIR analysis of Pleistocene sediments from Israel's Kebara and Hayonim Caves (Weiner et al. 1993, 2002) and Theopetra Cave in Greece (Karkanas et al. 1999) has revealed that both types of deposits are susceptible to severe diagenetic alterations in the complex chemical environments that caves

frequently support. In some areas of these sites, chemical alterations significantly reduced sediment volume by dissolving large deposits of fresh wood ash, leaving behind only relatively insoluble silica-rich bodies called silicious aggregates. In other areas, often in close proximity, diagenesis transformed bone and ash from their fresh, calcite-rich state into a sequence of intriguing minerals that can be identified using FTIR by their distinct phosphate structures (Schiegl et al. 1996; Stiner et al. 2001). The implications of diagenesis for taphonomy, site dating, and reconstructing site formation processes are significant and wide-reaching. FTIR has proven especially important in ongoing attempts to measure and improve our understanding of how bone diagenesis works. Research in this vein is likely to grow in the future, coordinated with studies aimed at reconstructing past diets and environmental conditions through the use of stable isotopes derived from well-preserved bone and tooth enamel (e.g., Wright and Schwarcz 1996; Lebon et al. 2010; Roche et al. 2010).

FTIR can also provide clues to artifact production sequences, such as the temperature ranges in which clay vessels were fired (Damjanović et al. 2011). These types of studies often require that researchers create their own reference spectra *de novo*. The investigators cited here, for instance, collected reference data by conducting experiments on the effects of thermal alteration on local materials using heating methods appropriate for the time period under investigation.

Finally, FTIR has important applications in provenance studies such as amber sourcing (Beck et al. 1965; Peñalver et al. 2007), materials identification (e.g., Lluveras et al. 2010), and conservation. To illustrate, Liu et al. (2011) were interested in identifying the types of fibers and dyes used in elaborately decorated textiles unearthed from tombs located along China's Silk Road. FTIR coupled with an FTIR microscope revealed amide bands particular to a particular form of silk protein, while complementary analyses including scanning electron microscopy and high-performance liquid chromatography (HPLC) allowed the researchers to examine the morphology of the fibers and identify the dyes used to tint them. Significantly, FTIR also revealed degradation of the textiles that had gone previously undetected. Excellent examples showing the range of materials and applications to which FTIR can be applied for conservation purposes can be found in Doménech Carbó et al. (1996).

A Note on Training

With a little practice, a user can learn to produce consistently high-quality spectra using ATR or KBr methods. Making meaning from these spectra, however, requires additional training and experience – as well as a good reference library of spectra. As suggested above, users may need to generate some of these comparative spectra on their own. Smith (1999) rightly describes the process of interpreting IR spectra as equal parts art and science, and his 1999 and 2011 texts are essential guides for users of all types. No book, however, can replace the experience of working alongside a skilled practitioner as one first learns to navigate the spectral landscape.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Provenance Studies in Archaeology
- ▶ Textiles and Fabrics: Conservation and Preservation

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References

Beck, C.W., E. Wilbur, S. Meret, D. Kossove, and K. Kermani. 1965. The infrared spectra of amber and the identification of Baltic amber. *Archaeometry* 8: 96–109.

Coleman, P.B. 1993. *Practical sampling techniques for infrared analysis*. Boca Raton: CRC Press.

Damjanović, L., I. Holclajtner-Antunović, U.B. Mioč, V. Bikić, D. Milovanović, and I. Radosavljević Evans. 2011. Archaeometric study of medieval pottery excavated at Stari (Old) Ras, Serbia. *Journal of Archaeological Science* 38: 818–828.

Doménech Carbó, M.T., F. Bosch Reif, J.V. Gimeno Adelantado, and V. Periz Marínez. 1996. Fourier transform infrared spectroscopy and the analytical study of works of art for purposes of diagnosis and conservation. *Analytica Chimica Acta* 330: 207–215.

Karkanas, P., N. Kyparissi-Apostolika, O. Bar-Yosef, and S. Weiner. 1999. Mineral assemblages in Theopetra, Greece: A framework for understanding diagenesis in a prehistoric cave. *Journal of Archaeological Science* 26: 1171–1180.

Lebon, M., I. Reiche, J.-J. Bahain, C. Chadefaux, A.-M. Moigne, F. Fröhlich, F. Sémah, H.P. Schwarcz, and C. Falguères. 2010. New parameters for the characterization of diagenetic alterations and heat-induced changes of fossil bone mineral using Fourier transform infrared spectrometry. *Journal of Archaeological Science* 37: 2265–2276.

Liu, J., D. Guo, Y. Zhou, Z. Wu, W. Li, F. Zhao, and X. Zheng. 2011. Identification of ancient textiles from Yingpan, Xinjiang, by multiple analytical techniques. *Journal of Archaeological Science* 38: 1763–1770.

Lluveras, A., A. Torrents, P. Giráldez, and M. Vendrell-Saz. 2010. Evidence for the use of Egyptian blue in an 11th century mural altarpiece by SEM-EDS, FTIR and SR XRD (Church of Sant Pere, Terrassa, Spain). *Archaeometry* 52: 308–319.

Peñalver, E., E. Álvarez-Fernández, P. Arias, X. Delclòs, and R. Ontañón. 2007. Local amber in a Palaeolithic context in Cantabrian Spain: The case of La Garma A. *Journal of Archaeological Science* 37: 2265–2276.

Roche, D., L. Ségalen, E. Balan, and S. Delattre. 2010. Preservation assessment of Miocene-Pliocene tooth enamel from Tugen Hills (Kenyan Rift Valley) through FTIR, chemical and stable-isotope analyses. *Journal of Archaeological Science* 37: 1690–1699.

Schiegl, S., P. Goldberg, O. Bar-Yosef, and S. Weiner. 1996. Ash deposits in Hayonim and Kebara Caves, Israel: Macroscopic, microscopic and mineralogical observations, and their archaeological implications. *Journal of Archaeological Science* 23: 763–781.

Smith, B. 1999. *Infrared spectral interpretation: A systematic approach*. Boca Raton: CRC Press.

Smith, B. 2011. *Fundamentals of Fourier transform infrared spectroscopy.* Boca Raton: CRC Press.

Stiner, M.C., S.L. Kuhn, S. Weiner, and O. Bar-Yosef. 1995. Differential burning, recrystallization, and fragmentation of archaeological bone. *Journal of Archaeological Science* 22: 223–237.

Stiner, M.C., S.L. Kuhn, T.A. Surovell, P. Goldberg, L. Meignen, S. Weiner, and O. Bar-Yosef. 2001. Bone preservation in Hayonim Cave (Israel): A macroscopic and mineralogical study. *Journal of Archaeological Science* 28: 643–659.

Surovell, T.A., and M.C. Stiner. 2001. Standardizing infrared measures of bone mineral crystallinity: An experimental approach. *Journal of Archaeological Science* 28: 633–642.

Thompson, T.J.U., M. Gauthier, and M. Islam. 2009. The application of a new method of Fourier transform infrared spectroscopy to the analysis of burned bone. *Journal of Archaeological Science* 36: 910–914.

Weiner, S., P. Goldberg, and O. Bar-Yosef. 1993. Bone preservation in Kebara Cave, Israel using on-site Fourier transform infrared spectroscopy. *Journal of Archaeological Science* 20: 613–627.

Weiner, S., P. Goldberg, and O. Bar-Yosef. 2002. Three-dimensional distribution of minerals in the sediments of Hayonim Cave, Israel: Diagenetic processes and archaeological implications. *Journal of Archaeological Science* 29: 1289–1308.

Wright, L.E., and H.P. Schwarcz. 1996. Infrared and isotopic evidence for diagenesis of bone apatite at Dos Pilas, Guatemala: Palaeodietary implications. *Journal of Archaeological Science* 23: 933–944.

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Fournier, Patricia

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Basic Biographical Information

Patricia Fournier is a Mexican archaeologist, professor, and researcher at Mexico City's National Institute of Anthropology and History. Born on April 28, 1955, she completed her undergraduate degree at the National School of Anthropology and History in Mexico City (1985) under the supervision of Thomas H. Charlton and obtained her M.A. degree in anthropology from the University of Arizona (1989), where she worked under the supervision of Michael B. Schiffer. In 1995, she obtained her doctorate in anthropology at the National Autonomous University of Mexico. Her postdoctoral research was at the

Fournier, Patricia, Fig. 1 Patricia Fournier in 2012

Smithsonian Institution's Center for Materials Research and Education in Washington, DC, in 2003 under the supervision of Ronald L. Bishop. Her academic career began in 1980 working for the National Institute of Anthropology and History. By 1989, she was one of the main protagonists in the foundation of the first graduate program in archaeology in Mexico at the National School of Anthropology and History (Fig. 1).

Fournier has a vast experience in both fieldwork and analysis of archaeological materials. Throughout her career, she has directed and participated in historical archaeology research projects in diverse Mexican rural and urban sites as well as in Texas and New Mexico.

Fournier has received several distinctions along her career such as the Fulbright-LASPAU scholarship to pursue her M.A. studies in anthropology at the University of Arizona and the award for best archaeological undergraduate thesis in archaeology in 1985, as well as the award for the best research in archaeology in 1995 on behalf of the National Institute of Anthropology and History of Mexico. She has been an active member of the Society for American Archaeology serving as coeditor of Latin American Antiquity (1999–2002) and in the Committee on the Americas. She has also been an active member of the Society for Historical Archaeology; since 1999, she has served in the Advisory Editorial Committee for the journal *Historical Archaeology*, and she is a member of the Mexican Academy of Sciences. Since 2006, she is a research associate at the Archaeometry Program (National Museum of Natural History-Smithsonian Institution, Washington, DC) and an associate collaborator with the Arizona State Museum (the University of Arizona).

Major Accomplishments

It is not an easy task for a female archaeologist interested in the early modern period to catch the eye of local and international scholars in a field dominated by men and pre-Hispanic archaeology. This is an inherent quality of Patricia Fournier, one of Mexico's best representatives of historical archaeology who has raised the field to its highest levels in terms of impeccable scholarship, practical development, and theoretical understanding. As a faculty member and senior archaeologist at the National School of Anthropology and History, in 1992, she founded the specialization in historical archaeology and later in ethnoarchaeology and modern material culture studies.

Early in her career, Patricia Fournier became aware of the need to develop archaeological research of the historical periods in Mexico. This pioneer interest took her into the adventure of studying local and imported ceramics found in Mexico City which resulted in the foundational study *Evidencias Arqueológicas de la Importación de Cerámica en México, con base en los Materiales del Ex-Convento de San Jerónimo* (1990). Her interests in conducting research of historic sites were further shaped by Thomas H. Charlton with whom she collaborated in research projects that have had substantial impacts in Mexican historical archaeology, namely, on the study of indigenous and Hispanic ceramic traditions and technologies (e.g., Charlton et al. 2007).

Her vast interests and fascination for historical archaeology have taken her into the pioneer archaeological research of mining sites, rural settlements, and historic ceramic correlates for the understanding of commercial networks along the colonial Royal Road and Afro-descendant groups

(e.g., Fournier 1999; Fournier and Charlton 2008; Fournier and Blackman 2010). Moreover, her research on ceramics has resulted in a range of works related to production and consumerism during the colonial and independent periods in Mexico, a topic that had been overlooked in Mexican archaeology. Those works now serve as a foundation for subsequent studies (Fournier 1997). Recently, she has been collaborating with scholars from the Smithsonian Institution utilizing archaeometric techniques in the study of majolica and glazed wares (e.g., Blackman et al. 2006; Fournier et al. 2009), identifying production centers and addressing commercialization, consumerism, identity, display of wealth, and the impact of colonizing processes in the lives of indigenous and European groups. The results derived from these research projects have changed significantly previous conceptions on the production origin of Mexican ceramics and have enabled the reframing of previous assumptions on exchange, technology, production, and consumerism.

The vast trajectory of Patricia Fournier has established an archaeological tradition that has paved the way for students and scholars alike. It pronounces the importance of studying historical remains through a scientific approach. Moreover, she stresses the relevance of incorporating concepts related to site formation processes, ethnoarchaeological techniques, experimental archaeology, material culture studies, the dynamics involved in social complexity, symbolic anthropology, and an emphasis on the use of primary and secondary documentary sources in archaeological studies. Her innate ability as a researcher and professor since 1984 has enabled her to prepare generations of students and continues to inspire many in Mexico and elsewhere to follow her steps into the fascinating adventure of unraveling the recent past.

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Charlton, Thomas H.
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Industrial Archaeology
- ▶ Mexico: Historical Archaeology
- ▶ Oral Sources and Oral History

References

Blackman, J.M., P. Fournier, and R.L. Bishop. 2006. Complejidad e interacción social en el México colonial. *Cuicuilco* 13: 203–224.

Charlton, T.H., P. Fournier, and C. Otis Charlton. 2007. La cerámica del periodo Colonial Temprano en la Cuenca de México: permanencia y cambio en la cultura material. In *La producción alfarera en el México antiguo V*, ed. B.M. Carrión and A.G. Cook, 429–496. México: Instituto Nacional de Antropología e Historia.

Fournier, P. 1990. *Evidencias arqueológicas de la importación de cerámica en Mexico, con base en los materiales del ex-convento de San Jerónimo*. México: Instituto Nacional de Antropología e Historia.

Fournier, P. 1997. Tendencias de consumo en México durante los períodos colonial e Independiente. In *Approaches to the historical archaeology of Mexico, Central and South America*, ed. J. Gasco, G.C. Smith, and P. Fournier, 40–58. Los Angeles: The Institute of Archaeology, University of California.

Fournier, P. 1999. Ceramic production and trade on the Camino Real. In *El Camino Real de Tierra Adentro, volume 2*, Bureau of Land Management, Cultural Resources series 13, ed. G.G. Palmer and S. Fosberg, 153–176. New Mexico: New Mexico State Office.

Fournier, P., and M.J. Blackman. 2010. Recorridos a lo largo del Camino de la Plata: El Real de Minas de Pánuco y la Hacienda del Buen Suceso, Zacatecas. In *En patrimonio, identidad y complejidad social*, ed. P. Fournier and F. López, 309–340. México: Instituto Nacional de Antropología e Historia.

Fournier, P., and T.H. Charlton. 2008. Negritos y Pardos: Hacia una arqueología histórica de la población de origen africano en la Nueva España. In *Perspectivas de la investigación arqueológica*, ed. F. López, W. Wiesheu, and P. Fournier, vol. III, 201–234. México: Instituto Nacional de Antropología e Historia.

Fournier, P., M.J. Blackman, and R.L. Bishop. 2009. Empleo de análisis instrumentales de activación neutrónica (INAA) en el estudio del origen de la mayólica en México. *Arqueología* 42: 151–165.

Further Readings

Brown, R.B., P. Fournier, J.A. Peterson, D.V. Hill, and M. Willis. 2004. Settlement and ceramics in northern New Spain: A case study of brownware pottery and historical change. In *Surveying the archaeology of Northwest Mexico*, ed. G. Newell and E. Gallaga, 265–288. Utah: University of Utah Press.

Charlton, T.H., and P. Fournier. 1993. Urban and rural dimensions of the contact period: Central Mexico,

F

1521–1620. In *Perspectives on change: Ethnohistorical and archaeological approaches*, ed. J.D. Rogers and S.M. Wilson, 201–220. New York: Plenum Publishing Corp.

Charlton, T.H., and P. Fournier. 2010. Pots and plots: The multiple roles of early colonial red wares in the Basin of Mexico. In *Enduring conquests. Rethinking the archaeology of resistance to Spanish colonialism in the Americas*, ed. M. Liebmann and M.S. Murphy, 127–148. New Mexico: School for Advanced Research.

Charlton, T.H., P. Fournier, and J. Cervantes. 1995. La cerámica del periodo colonial temprano en Tlatelolco: El caso de la loza roja bruñida. *Presencias y encuentros. Investigaciones arqueológicas de salvamento*, 135–155.

Charlton, T.H., C.L. Otis Charlton, and P. Fournier. 2005. The Basin of Mexico A.D. 1450–1620. In *The postclassic to Spanish-era transition in Mesoamerica: Archaeological perspectives*, ed. S. Kepecs and R.T. Alexander, 49–65. Albuquerque: University of New Mexico Press.

Fournier, P. 1985. Arqueología histórica en la Ciudad de México. *Boletín de Antropología Americana* 11: 27–31.

Fournier, P. 1987. Loza fina mexicana del siglo XIX en el exconvento de San Jerónimo. *Arqueología* 1: 181–194.

Fournier, P. 1997. Símbolos de la conquista hispana: Hacia una interpretación de significados de artefactos cerámicos del periodo Colonial Temprano en la cuenca de México. In *Simbológicas*, ed. M.O. Marion, 125–138. México: Plaza y Valdés-CONACyT-Instituto Nacional de Antropología e Historia.

Fournier, P. 2003. The Mayólica of Guanajuato. In *Cerámica y cultura. The story of Spanish and Mexican Mayólica*, ed. R.F. Gavin, D. Pierce, and A. Pleguezuelo, 296–313. Albuquerque: University of New Mexico Press.

Fournier, P., and T.H. Charlton. 1996. Correlatos materiales de diferencias socioétnicas en Nueva España. In *Historical archaeology in Latin America 15. Actas II. Segunda conferencia internacional de arqueología histórica Americana*, ed. S. South, 71–76. Columbia: The University of South Carolina.

Fournier, P., and T.H. Charlton. 1998. La Tradición de Mayólica en México (Siglos XVI al XIX). In *Memoria del Primer Congreso Nacional de Arqueología Histórica*, ed. E.F. Dávila and S.G. Serafín, 419–426. México: Consejo Nacional para la Cultura y las Artes-Instituto Nacional de Antropología e Historia.

Fournier, P., and T.H. Charlton. 2011a. Arqueología histórica de Cuauhnahuac-Cuernavaca. In *Perspectivas de la investigación arqueológica*, ed. P. Fournier and W. Wiesheu, vol. 5, 129–164. México: Escuela Nacional de Antropología e Historia-Instituto Nacional de Antropología e Historia.

Fournier, P., and T.H. Charlton. 2011b. El contexto del consumo de cerámica de tradición indígena entre las elites del virreinato de la Nueva España. El caso del Códice de los Alfareros de Cuauhtitlán. In *Mesoamérica. Debates y perspectivas*, ed. E. Williams, M. García Sánchez, P.C. Weigand, and M. Gándara, 329–357. Zamora: El Colegio de Michoacán, A.C.

Fournier, P., and M.L. Fournier. 1992. Catalogación y periodificación de materiales históricos de Sonora. In *La frontera protohistórica Pima-Opata en Sonora, México, Tomo III*, ed. C.B. Braniff, 923–962. México: Instituto Nacional de Antropología e Historia.

Fournier, P., and F. Miranda. 1992. Historic sites archaeology in Mexico. *Historical Archaeology* 26: 75–83.

Fournier, P., and L. Mondragón. 2003. Haciendas, ranches, and the Otomí way of life in the Mezquital Valley, Hidalgo, Mexico. *Ethnohistory* 50: 47–68.

Fournier, P., T.H. Charlton, and F. Miranda. 1994. Perspectivas recientes y avances metodológicos en la arqueología del período colonial en México. *Métodos arqueológicos e gerenciamiento de bens culturais*, 2: 139–162.

Fournier, P., M.J. Blackman, and R.L. Bishop. 2007. Los alfareros purépecha de la Cuenca de Pátzcuaro: Producción, intercambio y consumo de cerámica vidriada durante la época virreinal. In *Arqueología y complejidad social*, ed. P. Fournier, W. Wiesheu, and T.H. Charlton, 195–221. México: Instituto Nacional de Antropología e Historia.

Fournier, P., K. Castillo, R.L. Bishop, and M.J. Blackman. 2009. La loza blanca novohispana: Tecnohistoria de la mayólica en México. In *Arqueología Colonial Latinoamericana. Modelos de estudio*, British Archaeological Reports International series 1988, ed. J.G. Targa and P. Fournier, 99–114. Oxford: Archaeopress.

Junco, R., and P. Fournier. 2008. Del Celeste Imperio a la Nueva España: importación, distribución y consumo de la loza de la China del periodo Ming tardío en el México virreinal. In *La nueva Nao: de Formosa a América Latina. Intercambios culturales, económicos y políticos entre vecinos distantes*, ed. L. Chen (Hsiao-Chuan Chen), and A. Saladino García : 3–21. Taipei: Universidad de Tamkang.

Mondragón, L., P. Fournier, and N. Noguera. 1997. Arqueología histórica y etnoarqueología de la comunidad Alfarera Otomí de Santa María del Pino, México. In *Approaches to the historical archaeology of Mexico, Central and South America*, ed. J. Gasco, G.C. Smith, and P. Fournier, 17–28. Los Angeles: The Institute of Archaeology, University of California.

Pastrana, A., and P. Fournier. 1998. Explotación colonial de obsidiana en el yacimiento de Sierra de las Navajas. In *Memoria del Primer Congreso Nacional de Arqueología Histórica*, ed. E.F. Dávila and S.G. Serafín, 486–496. México: Consejo Nacional para la Cultura y las Artes-Instituto Nacional de Antropología e Historia.

France: Field Method Origins

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Brief Definition of the Topic

It was through the innovative application of sound field methods that Jacques Boucher de Perthes (1788–1868), a customs official in northern France, contributed decisively to the establishment of human antiquity. He argued that proof of an object's antiquity resided first and foremost in "its surrounding [*entourage*] and the place where it is encountered" (Boucher de Perthes 1847: 34, 178, 181). By insisting on such principles of stratigraphic position and integrity, Boucher de Perthes could argue that the artificially shaped flint *haches* he found beneath meters of undisturbed gravels in association with fossil bones of extinct species were therefore of infinitely ancient age, long before the Biblical Flood (thus *antediluvian*). While these claims had met with skepticism, a dramatic reversal of fortune occurred in 1859 with the visit to the region of two English scientists, the wine merchant and geologist Joseph Prestwich (1812–1896) and the paper manufacturer and numismatist John Evans (1823–1908). Besides conducting a thorough audit of the context of discovery, the visitors also took the unprecedented step of having a photograph taken, on the 27th April 1859, of an in situ hand axe embedded in a quarry section at Saint-Acheul (Fig. 1). This very first use of the photographic medium for stratigraphic demonstration not only confirmed human antiquity but also served to shift the onus of archaeological demonstration from rhetoric and personal reputation to methodically documented observation (Gamble and Kruszynski 2009).

Meanwhile in the South of France, cave sites were being explored by Édouard Lartet (1801–1871), a lawyer and paleontologist from Sarlat. The *Reliquiae Aquitanicae* he published together with banker Henry Christy in the mid-1860s highlighted the rich potential of these caves, with their well-preserved faunal remains as well as flint and bone tools, for establishing a sequence of periods when rhinoceros, mammoth, and reindeer roamed. This research was soon brought together at the newly created *Musée des antiquités nationales* by the engineer and curator Gabriel de Mortillet (1821–1898). By means of their association with geological strata and fauna, de Mortillet defined the artifacts themselves as fossil types, so establishing the succession of Acheulean, Mousterian, Solutrean, and Magdalenian periods, named after the French sites where they were defined. While undergoing many revisions and expansions over the years, this classificatory system still remains today as the cornerstone of Paleolithic archaeology.

France: Field Method Origins, Fig. 1 A quarry worker showing the location of an in situ hand axe, Saint-Acheul, 27th April 1859 (Photograph by C. Pinsard, albuminated paper. Courtesy of Bibliothèques d'Amiens Métropole, Ms 1370.f.33)

This development of vertical investigation in France was followed in the 1960s by the development of the horizontal (*décapage*) method of

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excavation pioneered by the ethnologist, technologist, and prehistorian André Leroi-Gourhan (1911–1986. See Audouze and Schlanger 2004). It was not of course without precedents. In the loess plains of Central and Eastern Europe, from Dolní Věstonice in Moravia to Kostenki in Russia, Upper Paleolithic habitations and mammoth-bone huts had long been identified and excavated through investigations in open area. Fluent in Russian, Leroi-Gourhan was well aware of these studies, though not necessarily of their historical materialist underpinnings. Drawing on his own paleontological and anatomical expertise, he himself had undertaken since the 1940s (e.g., at Les Furtins) the meticulous recording of human burials, in their sequence of inhumation and deposition, thus pioneering the subfield of funerary archaeology.

These initiatives converged in 1964, at the excavation of an extremely well-preserved hunter-gatherer occupation site in the sand quarries of Pincevent, south of Paris. This series of Magdalenian camps (c. 12,500 BP) represent the seasonal halts of reindeer hunters, next to a ford on the R. Seine (Bodu et al. 2006). The dedicated excavation methodology deployed there by Leroi-Gourhan and his team included the meticulous exposure and millimetric stripping (sometimes with dental tools) of vast surfaces of finds and features, left for as long as possible in situ to be drawn, recorded, photographed, and thoroughly documented, square meter by square meter (Fig. 2). This small-scale plotting of the distribution of the finds – flint and bone remains – made it possible to map the functional and spatial relations between such features as hearths, tents, butchery areas, knapping areas, and dumps and led to the identification of vanished structures. Moreover, the extensive refitting of flint débitage and tools at Pincevent (and subsequently at other sites in the region) not only served to retrace the spatial and functional biographies of tools and thus grasp "precise moments in the remote past" – they also made it possible to reconstruct the technical processes of Upper Paleolithic flint tool production and use, thus contributing decisively to the development and demonstration of the *chaîne opératoire* approach in prehistoric archaeology.

Leroi-Gourhan's concern with the minutiae of "prehistoric ethnology" led subsequently to ongoing comparative research in Arctic areas – where it was to converge with ethnoarchaeological studies by Lewis Binford and others on hunter-gatherer campsites in Alaska, as well as Australia and Southern Africa.

Cross-References

- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Europe: Early Upper Paleolithic
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Lithic Technology, Paleolithic
- ▶ Spatial Analysis in Field Archaeology

France: Field Method Origins, Fig. 2 On-site briefing in front of a décapage at Pincevent. From left: André Leroi-Gourhan, Michèle Julien, Claudine Karlin, and Michel Brézillon (©: Centre archéologique de Pincevent)

References

Audouze, F., and N. Schlanger, eds. 2004. *Autour de l'homme: contexte et actualité d'André Leroi-Gourhan*. Antibes: Editions APDCA.

Bodu, P., G. Debout, M. Julien, and B. Valentin, eds. 2006. Un dernier hiver à Pincevent: les Magdaléniens du niveau IV-0. *Gallia-Préhistoire* 48: 19–35.

Boucher de Perthes, J. 1847. *Antiquités celtiques et anté--dilluviennes. Mémoire sur l'industrie primitive et les arts à leur origine, volume 1*. Paris: Treuttel & Würtz.

Gamble, C., and R. Kruszynski. 2009. John Evans, Joseph Prestwich and the stone that shattered the time barrier. *Antiquity* 83: 461–475.

France: Medieval Archaeology

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Introduction

In 2006, when a congress of the *Société d'archéologie médiévale* (*SAM*) reviewed the history of the field, about 500 people in France were being paid to work "for the benefit of medieval archaeology," which accounted for 25–30% of all archaeological activity in the country. The research sector was vigorous: between 1991 and 2008, for example, 103 research projects recognized by the *Centre national de la recherche archéologique* (CNRA) were under way – with most activity conducted by professionals from the "preventive archaeology" sector. The lion's share of publication, however, was done by researchers based in the universities and/or the *Centre national de la recherche scientifique* (CNRS). Between 1999 and 2008 some 377 works treating of medieval archaeology (168 of them almost exclusively) appeared; 37 of the 69 authors who published at least twice from 2002 to 2005 were University or CNRS. The next largest group, 16, belonged to the *Institut national de recherches archéologiques préventives* (INRAP), the public archaeology operator which since its creation in 2002 has been responsible for most excavation in France. The phenomenal growth of highly professional, publically funded archaeology over the past 30 years has fostered methodological innovation and improvement (Chapelot 2010: 393–435). Two recent works aimed at a popular audience offer well-illustrated examples of preventive excavations (Burnouf 2008; Catteddu 2009). Aimed at students and scholars, the *Manuel d'archéologie médiévale et moderne* stresses how our perspectives on the Middle Ages as a whole are being reshaped by the results of expanded and improved fieldwork integrated with the analysis of written, iconographic, and other surviving sources (Burnouf et al. 2009).

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Definition

Traditional usage deriving from written sources defines the Middle Ages as the millenium between the Fall of the Western Roman Empire (CE 476) and the Renaissance (c. 1500). Recent research incorporating archaeological data blends the earliest phase with a new chronological period labeled Late Antique, already transforming the Roman world by CE 300, when the influence of barbarian groups and of Christianity had become significant (Catteddu 2009: 6–23). Archaeology strongly supports the view that by the twelfth century, notably in France, major social, political, and environmental changes were under way that were to define the basic structures of Europe in the early modern period, before the transformations wrought by industrialization. Joëlle Burnouf would thus blend the Renaissance into a long second Middle Ages that extends throughout the sixteenth century and even beyond (Burnouf 2008: 6–13).

Historical Background

Origins of Medieval Archaeology in France (c. 1830–c. 1960)

Before about 1970 medieval archaeology had no institutional standing and no generally recognized identity in theory or practice. There were predecessors going back into the first half of the

nineteenth century: Merovingian funerary archaeology and monumental religious (essentially Christian) archaeology (Young 2001). Both were tributary to paradigms derived from established academic disciplines. Merovingian graves, identified by artifacts frequently placed with the deceased (notably weapons, personal ornament, ceramics), were thought to reflect the settlement of ethnically distinct "barbarians" who took power, as the narrative derived from written sources had it, in the western provinces of the former Roman Empire. From the 1850s, marked by the excavations and publications of the Abbé Cochet in Normandy, through the 1950s when Edouard Salin closed his long career with four volumes synthesizing fieldwork and laboratory analysis, many thousands of graves were excavated, at times by amateurs with some sense of method, but many more were plundered or simply destroyed by development (Périn 1980). Following the creation of the *Monuments Historiques* in 1830 and the founding by Arcisse de Caumont of the *Société française d'archéologie* and the *Bulletin monumental* in 1834, the decision to preserve the churches (and a few castles) of medieval France led architects like Viollet-le-Duc and art historians to develop methods to study the historical development of these monuments where some excavation might be combined with stylistic analysis to guide restoration (Barral I Altet 1991). In the twentieth century this tradition was continued not only by *Monuments Historiques* architects like Jules Formigé but further developed with long-term projects by the American art historians Kenneth Conant at Cluny and Sumner Crosby at Saint-Denis concerned primarily with understanding the history and the influence of these major monuments (Young 2001).

Emergence of Medieval Archaeology (c. 1960–c. 1980)

As a discipline and practice "modern" medieval archaeology in France has developed over the past 40 years (Burnouf 2008: 12–24; Chapelot and Gentili 2010). Its godfather was Dean Michel de Boüard of the University of Caen, who created there the *Centre de Recherches Archéologiques Médiévales* (CRAM), linking it also to the CNRS, with the consequence that systematic, ongoing research excavation as well as salvage operations could enjoy permanent laboratory support. As he was also regional director of historical antiquities, the organism of the Ministry of Culture responsible (since 1942) for overseeing all excavation, de Boüard was able to develop a model of practical cooperation among archaeological actors and consumers which dynamized research and raised overall standards. Himself a pioneer of the archaeology of castles (Chateau de Caen, Doué-la-Fontaine, early *motte* sites), he also created in 1971 the scholarly journal of reference, *Archéologie Médiévale*, published the first textbook (de Boüard 1975), and founded the *Société d'Archéologie Médiévale* (1983). His students and associates conducted innovative and rigorous Merovingian cemetery excavations in the Caen region, notably, at Frénouville, the first totally excavated and published necropolis (Pilet 1981) complemented by a complete study of the physical anthropology (Buchet 1978). The second University/CNRS medieval research center working closely with the public authorities was created in 1967 by Gabrielle Démians d'Archimbaud at Aix-en-Provence (*Laboratoire d'Archéologie Médiévale Méditerranée*, or LAMM) with a particular focus on ceramics and, later, glassware. She also launched the first long-term research excavation of a medieval settlement at Rougiers, near Marseille (Démians d'Archimbaud 1981). The third research pole developed in Paris, where Jean-Marie Pesez, working with historians of the *Annales* school based at the future *École des Hautes Études en Sciences Sociales* (EHESS) launched in 1965 at Dracy (Côte d'Or), a long-term, multisite research program involving deserted villages (inspired by Wharram Percy in England), later expanded along with his pupils to other types of rural settlement of the later Middle Ages (Pesez 1998). He founded in 1969 the *Groupe d'archéologie médiévale* (GAM), today directed by Jean Chapelot. Beginning with the excavations from 1968 to 1972 of the pottery workshops at the Carolingian site of Saran (Loiret), Chapelot launched systematic research into the production, technology, and distribution of medieval ceramics.

Heightened awareness of the accelerating destruction of the archaeological heritage by development favored, in the 1970s, the growth of salvage archaeology conducted by better-trained teams accountable to public authorities (Chapelot and Gentili 2010). The creation in 1973 by the Ministry of Culture of the *Association française d'archéologie nationale* (AFAN) as a vehicle to publically fund excavation by paying shovel bums on limited contracts provided a flexible workforce. Medieval urban archaeology emerged as a major enterprise for the first time in Douai, the first town to salary a full-time archaeologist (Pierre Demolon, in 1971), and in Tours, where Henri Galinié returned from working under Martin Biddle at Winchester to win municipal support for an urban archaeology unit (*Laboratoire d'archéologie urbaine)* which would host the first national colloquium on urban archaeology in 1980 and provide the basis for the *Centre national d'archéologie urbaine* (CNAU) in 1984. The longest ongoing urban program began as a salvage operation by Olivier Meyer and Nicole Meyer-Rodrigues in 1973 in Saint-Denis, just north of Paris; it expanded in 1982 into a municipal archaeology unit as well as a field school for various branches of the University of Paris and a beacon for "civic archaeology", developing since 1998 a "*Parcours historique*" as a permanent feature of the renovated city center. By 2008 about 13% of the medieval town had been seen in the course of some 160 operations, with about 3%, including key areas adjacent to the famous abbey church at the core, systematically excavated with the open-area methodology originally borrowed from Britain, and in use here since the 1970s (Meyer-Rodrigues 2010).

Other long-term research projects which got under way in the 1970s concerned the transition from Roman towns to Christian episcopal cities, with very active excavation programs in Grenoble (M. & R. Colardelle) and Lyons (J-F. Reynaud) inspired by the pioneering work of Charles Bonnet in Geneva and the study of religious monuments and cemeteries in Burgundy (Sapin 2010). The excavation of an early castral site at Andone (Charente) by André Debord would provide a model archaeological case study of the historians' "feudal mutation" (Bourgeois 2009), while Michel Colardelle's exploration of a timber-built early eleventh century settlement, subsequently submerged under an Alpine lake at Charavines (Isère), was innovative for its underwater excavation methodology and its multidisciplinary environmental perspectives (Colardelle and Verdel 1993). Merovingian archaeology was renewed with the creation in 1979 of the *Association française d'archéologie mérovingienne* (AFAM) and Patrick Périn's development, with the help of René Legoux, of more precise and reliable artifact chronologies and of innovative tools of topochronological analysis (Périn 1980).

Nonetheless, a 1976 report to the French parliament on the state of national archaeology found it alarmingly undermanned and underfunded in the face of the challenges posed by accelerating development. Medieval archaeology was particularly badly served. Of the 198 archaeologists paid by the CNRS, only four were medievalists; indeed, only 74 worked primarily in France. There were rather more in the universities, 16 as compared to 28 specialized in earlier periods. For France as a whole, Jean Chapelot finds that there were then 27 specialists for the Middle Ages compared to 180 concerned with the Gallo-Roman and prehistoric eras. Professional infrastructure overall was weak. Of France's 44 archaeological circumscriptions, only 12 were then headed by salaried directors, who were aided by 23 salaried assistants. Not one of them was a medievalist (Chapelot and Gentili 2010: 11–14).

Maturity and Expansion in the Age of Preventive Archaeology (1980–2010)

The year 1980, decreed by the French president as Heritage Year (*l'Année du Patrimoine*), marked the beginning of a phase of phenomenal growth for archaeology in France, with the creation of the *Sous-Direction de l'archéologie* in the Ministry of Culture, a sign of government engagement. The passage of a law requiring an environmental impact study in 1976 came to normalize the principle that developers pay for preventive archaeological study; public funding for research was also increased massively (Chapelot and Gentili 2010:

13–14). Over the 20 years from 1989 to 2009, the number of archaeological operations increased by 60% (and they tended to encompass much larger areas), the number of people employed multiplied by 4, and funding multiplied by 7 (Chapelot 2010: 396–398). The last two decades of the twentieth century also saw much infrastructure development in France, with new high-speed lines (TGV-Nord), new autoroutes, and massive redevelopment in core urban centers (Paris Grand Louvre is the outstanding example), peri-urban areas (Marne-la-Vallée and Eurodisney east of Paris; Roissy airport to the north), and rural areas as well, providing opportunities for salvage – now called preventive – archaeology on a scale hitherto unimaginable. The challenges encouraged methodological innovation carried out by an increasingly professional workforce, their status strengthened when in 2002 AFAN was replaced by INRAP (*Institut nationale de recherches archéologiques préventives)* as the primary archaeological operator in France. The medieval component has been particularly dynamic (Chapelot and Gentili 2010: 14–19). In 2008 some 25–30% of all archaeological operations were medieval, with around 500 people salaried full time at work on some aspect of medieval research. Of these about 15% were based in the universities or the CNRS (they account for the lion's share of publication); more than a third of the total worked for INRAP. Between 1991 and 2008, 103 research projects concerning the Middle Ages received national funding, about half of them directed by University/CNRS scholars, with the other half directed by INRAP or other public archaeological authorities (Chapelot 2010: 393–404).

One field spectacularly transformed by the change in scale of operations and multidisciplinary character of the research teams is the study of the rural landscape. In 1979 only four rural settlements had been excavated in all France; in 1991 the total was 155, a quarter of these in the Ile-de-France alone. The scale of excavation jumped from a norm of a few hundred square meters at best before 1985 to over 4 ha at La Grande Paroisse by 1986 and in the 1990s to over 10 ha at Serris and Villiers-le-Sec (Chapelot and Gentili 2010: 17–19). Perspective shifted from an emphasis on the individual settlement – or even certain of its phases – to the dynamics of spatial organization over time, as at Montours in Brittany where the INRAP team studied how a landscape was structured in Carolingian times through the interaction of four poles of settlement (Catteddu 2001). The traditions of architectural history have given rise to a new methodology for studying the modification over time of standing buildings, *l'archéologie du bati*, which, conjoined with excavation, has enhanced our understanding of the medieval town as the direct ancestor of the modern city and the complexity of its role as a site of the material and ideological competition of local and regional elites (Burnouf 2008: 69–87; 102–111). Before preventive archaeology the recovery and post-excavation conservation of artifacts (to say nothing of ecofacts) was often haphazard; today the millions of tons of objects – ceramics, metal, glass, bone, and construction materials – preserved are testimony, as Joëlle Burnouf stresses, to a medieval industrial revolution that prepared the one better known to historians, resulting in an expansion and refinement of products available that prefigures consumer society (Burnouf 2008: 118–155).

With that founding at Caen in 1983 of the *Société d'Archéologie Médiévale (SAM)*, the new discipline entered a phase of maturity. Beginning with the theme of ceramics in 1985, the SAM has organized ten international congresses (the latest, at Arles in 2012, focused on the horse) and regularly published their proceedings. A review of these volumes, of *Archéologie Médiévale* with its valuable annual gazetteer of sites under excavation, of the major regional journals, the monographs published in the nationally supported series *Documents d' archéologie française (DAF)*, by the *Association française d'Archéologie mérovingienne* (AFAM), and by private publishers, confirms the vitality of the field today (Faure-Boucharlat and Flambard Héricher 2010).

Key Issues/Current Debates

1. Migration, ethnic identity, and Christianization. Authors from the Abbé Cochet through E. Salin accepted as self-evident the notion that

the funerary practices of Late Roman and Merovingian times reflected the ethnic identity and religious ideas of the Romans and barbarians. Since the 1970s this view, still tenacious in popular literature, has been challenged by interpretations which emphasize social, economic, and cultural factors and area more critical of the written sources from which the older view derives. Ethnographic, folklore, and cultural studies have helped show that "Christianization" was not a monolithic process, that funerary practice could vary considerably even within Christian contexts and similar or even identical symbols could have a variety of meanings, often inaccessible. Debate continues regarding the establishment of Christian infrastructure, such as rural parish churches, monasteries, in the earlier Middle Ages, or chapels of mendicant orders later on, and their role.

2. The urban phenomenon. The caricatural view, based on a few written sources and still commonly held in the 1960s, was that Roman towns in Gaul brutally declined and fell to barbarian invaders, leaving a largely primitive, Dark Age landscape. Excavation now suggests that almost all survived, transformed into Christian capitals, though debates continue on the nature and function of these towns in earlier medieval times, including how to interpret the strata of dark earth often encountered. The role of "Dark Age" emporia, long overlooked, is now posed by the Quentovic research program. Another older notion, forcefully argued by the historian Henri Pirenne before WWII, of a revival of towns and trade in NW temperate Europe around the year 1000, needs considerable nuancing in the light of recent research. Discussion today stresses the densification, apparent by the twelfth century, of a complex urban network, hierarchically organized, in the context of rapid demographic and economic growth and the self-affirmation of emerging elites confronted with growing royal and princely power.
3. The village and the rural landscape. The village has long been viewed as a key artifact of medieval civilization, its origins and development a matter of research and ongoing debate. Historians like R. Fossier argued in the 1970s that it was largely a post-Carolingian creation, an aspect of the "feudal mutation" associated with the imposition of lordly power, village churches, and serfdom. Earlier medieval settlements, he thought, were poor, fluctuating, and unstable. The large-scale preventive excavations since the 1980s have provided an enormous amount of new data still being analyzed, but it is already clear that Carolingian and Merovingian settlements were more complex and varied than had been appreciated and that Christian infrastructure sometimes appeared well before the year 1000. The case for the plausibility of continuity from Late Roman, Roman, or even Iron Age times for key settlements appears stronger. The debate will likely continue, since much of the archaeology of rural settlements concerns those which were subsequently abandoned and that excavation of permanently occupied villages on any significant scale has not been possible.
4. Fortification, castles, and feudal mutation. A key tenet of the "feudal mutation" hypothesis, based mostly on written sources, is that the extensive network of rural fortifications whose visible remnants are the stone castles surviving today was largely developed in the post-Carolingian times with the spread of lordship, whereas earlier villages and elite residences were usually unfortified. The twelfth century saw new fortifications around towns, rebuilt and expanded as these grew in the following centuries. Excavation since WWII has provided much new data about the fortification of the reduced core areas of Late Roman cities and their continuing use throughout the earlier Middle Ages. More surprising is the recent discovery in some regions, such as the Languedoc and the Massif Central, of Late Antique or early medieval fortified rural sites subsequently abandoned (Schneider 2010). Much new data has also emerged about the construction of earthen mottes topped with timber ramparts and towers in Normandy, Flanders, and similar regions in the tenth to twelfth centuries, but Annie Renoux warns that these need

to be understood in the context of a wide variety of elite residences, more or less fortified urban and rural (Renoux 2010). Two very different types of fortified sites from the time of the now contested "feudal mutation" at the turn of the millenium are now known through the publication of systematic modern excavations followed up by specialist studies of artifacts and ecofacts: the palisaded Alpine lakeside settlement of Charavines (Colardelle and Verdel 1993) and the stone *castrum* of the Counts of Angoulême at Andone (Bourgeois 2009).

5. Environment, climate, economy, infrastructure, and society. Forty years ago a strong contrast was drawn between, on the one hand, a primitive, even autarchic, earlier medieval landscape peopled (sparsely) by poor peasants living in villages surrounded by forests, marshes, and wastelands and surviving (barely) with crude technologies and, on the other, the dramatic expansion after c. 1000 of population and production driven by innovative technologies, with massive land clearances and vigorous exchange networks prefiguring the early modern world. Though the twelfth century now appears more than ever as an irreversible threshold, the picture needs much nuancing. The early medieval countryside now appears more the result of the successful adaptation of environmentally savvy local communities to changed conditions, with climate deterioration (not even on the radar 40 years ago) perhaps as much a factor as political changes. Fluvial archaeology, another new field, reveals a more complex and sophisticated infrastructure of exchange than hitherto suspected, and the excavation of emporium sites abroad, like Dorestad in Holland and Ribe in Denmark, is prompting research in France around sites like Quentovic. For Joëlle Burnouf the "second Middle Age" inherited many key features from the earlier centuries (transportation networks, rural landscapes already largely cleared and structured, metal-working techniques perfected since Iron Age times) and carried them to unprecedented levels of development under the favorable conditions of the climatic optimum. When in the fourteenth century the beginning of the Little Ice Age conjoined with the more abrupt brutality of the Black Plague so rooted were the technologies and productions, the elite-dominated but flexible social structure with their nuanced displays of power and prestige upholding religion-infused ideologies that the lifeways attested by archaeology reflect not catastrophe but continuity, a cultural resilience that carries right through the "Renaissance" of art historians right through the sixteenth century (Burnouf 2008: 102–110, 138–159).
6. Technologies and the medieval industrial revolution. Research into the production and distribution of ceramics was the first subfield of medieval industrial production to emerge; more recently new research has focused on glass manufacture, mines and quarries, iron working, energy production through wind and water, salt extraction and distribution, brick and tile and timber as construction components, products made from animal matter such as leather and bone, and other organic materials (the latter aided by methodologies favoring the recovery and conservation of artifacts from water-saturated zones). Altogether they confirm an unprecedented change in the scale of production during the later Middle Ages and, hence, an impact on lifeways and expectations which prepared the later, better-known Industrial Revolution (Burnouf 2008: 118–136).

International Perspectives

In the nineteenth and twentieth centuries, French Merovingian archaeologists were often in contact with colleagues also excavating barbarian graves in England, Belgium, Germany, Switzerland, and even Russia but were little influenced by the pioneering settlement excavations of such sites as Gladbach, in Germany, before WWII. The American art historians excavating religious monuments at Cluny and Saint-Denis shared the same essential training and methodologies and perspectives as their French peers (Barral I. Altet 1991). International influences

became notable and decisive in the postwar period. *Medieval Archaeology*, created in 1956, was the model for *Archéologie Médiévale*, and Michel de Boüard's engagement in castle research soon led to the regular international meetings and publications of the *Chateau Gaillard* group. Wharram Percy and the deserted villages project influenced both G. Demains d'Archimbaud and J.-M. Pesez to launch settlement excavation in the 1960s, and in that decade Paul Courbin encouraged the use of the Wheeler method in France. Pesez and the EHESS group developed strong and regular relations with the school of Polish archaeologists, adopting their methods for excavating timber-and-earth structures (Chapelot and Gentili 2010: 4–8). The innovative approaches to studying the internal dynamics, chronology, and socioeconomic and cultural implications of Merovingian cemeteries developed by German scholars like Kurt Böhner and Joachim Werner became familiar in France from the 1970s through the work of Patrick Périn (1980). At the yearly AFAM conferences since 1979, presentations of ongoing research by British, German, Dutch, Scandinavian, East European, Italian, Spanish, and even American scholars have been a regular feature. The American "New Archaeology," however, has had only limited influence on French archaeologists; medievalists, in particular, used to working collaboratively with colleagues in the historical disciplines, have been little tempted by calls for rigid separation.

Since the 1970s a growing number of close-knit international groups of scholars have collaborated on common projects. The pioneering excavations of Charles Bonnet, cantonal archaeologist of Geneva, on the development from Roman times of the Christian episcopal center in relationship to its countryside inspired similar programs led by Michel and Renée Colardelle in Grenoble and Jean-François Reynaud in Lyons (as well as by Rinaldo Perinetti in Aosta); these archaeologists met regularly to follow one another's work and together organized the 1985 international congress of Christian Archaeology which visited all these sites. Their work fit into the larger project on the *Topographie chrétienne des cités de la Gaule*, launched in 1974 by N. Duval, P-A. Février, and Ch. Pietri, which has since that time been publishing standardized notices, developed through regular and rigorous discussion by the participating scholars, of the Christian monuments and religious topography from all the Gallo-Germanic provinces. Christian Sapin cites the influence of Joseph Mertens (Belgium), William Rodwell (England), Hans Sennhauser, and Charles Bonnet (Switzerland) in the recent development of religious archaeology in France; since 1986 the *Centre d'Études médiévales* he founded in Auxerre has sponsored research on cathedrals, abbeys, funerary churches and cemeteries, and other religious monuments throughout Burgundy (Sapin 2010). The American archaeologist Harry Titus (Wake Forest University) collaborated on the study of the Auxerre cathedral using nondestructive, digital-based laser methodologies. Since 1982 Clark Maines (Wesleyan University) and Sheila Bonde (Brown University) have been excavating the abbey of Saint-Jean-des-Vignes in Soissons in the context of an interdisciplinary, international study of medieval monasticism (MonArch project). The strong influence of English examples on urban archaeology, most notably through the efforts of Henri Galinié at Tours, has been noted above. Fluvial and coastal archaeology developed in France after the International Waterfront Archaeology conference in London in 1981. English and Belgian archaeologists are associated with French colleagues in an ongoing study, coordinated by Laurent Verslype of the *Université catholique de Louvain*, of the Canche Valley where Quentovic, a major "Dark Age" emporium site, once flourished.

In the age of preventive archaeology and the World Wide Web, Medieval Europe has emerged as the focus of an international research community. French researchers were active in the first three congresses at York (1992), Bruges (1997), and Basel (2002); the fourth congress, organized by Joëlle Burnouf, was held at the Sorbonne in Paris in 2007.

Future Directions

Writing the conclusion to the 2006 SAM colloquium, Jean Chapelot stressed that the remarkable

growth of medieval archaeology since 1980, the new fields of inquiry and the robust infrastructure it has developed, should not arouse ambitions of disciplinary autonomy (Chapelot 2010: 431). As Michel de Boüard stressed 40 years ago (DeBoüard 1975) and Joëlle Burnouf and her coauthors reaffirm (Burnouf et al. 2009), the Middle Ages offers archaeologists the challenge of a field which, to a much greater extent than earlier periods in Europe, is richly furnished with a great variety of surviving written, iconographic, and architectural "documents." With their specific methodologies so much enhanced by the progress of the past generation, archaeologists must continue to work closely, collaboratively, and creatively with textual scholars, art historians, epigraphers, anthropologists, geographers, and of course scientists concerned, for example, with the history of plants and animals, human populations and disease, climate and environment, in order to broaden and enhance our understanding of the crucial millennium which gave birth to the modern world.

Cross-References

- ▶ Medieval Archaeology
- ▶ Medieval Urbanism
- ▶ Ruralia: The Jean-Marie Pesez Conferences on Medieval Rural Archaeology
- ▶ Urban Heritage
- ▶ Western Roman Provinces, Archaeology of the

References

Barral I. Altet, X. 1991. Les étapes de la recherche au XIXe siècle et les personnalités. In *Naissance des arts chrétiens. Atlas des monuments paléochrétiens de la France*, ed. N. Duval, 348–367. Paris: Imprimerie Nationale.

Bourgeois, L., ed. 2009. *Une résidence des comtes d'Angoulême autour de l'An Mil: le castrum d'Andone (Villejoubert, Charente). Publication des fouilles d'André Debord (1971–1995)*. Caen: CRAHM.

Buchet, L. 1978. La nécropole gallo-romaine et mérovingienne de Frénouville (Calvados. Etude anthropologique). *Archéologie médiévale* VIII: 5–53.

Burnouf, J. 2008. *Archéologie médiévale en France. Le second Moyen Age (XIIe-XVIe siècle)*. Paris: La Decouverte.

Burnouf, J., D. Arribert-Deroi, B. Desachy, F. Journot, and A. Nissen Jaubert. 2009. *Manuel d'archéologie médiévale et moderne*. Paris: Armand Colin.

Catteddu, I., ed. 2001. *Les habitats carolingiens de Montours et LaChapelle – Saint – Aubert (Ille – et -Vilaine)*, 327–329. Paris: EHESS.

Catteddu, I. 2009. *Archéologie médiévale en France. Le premier Moyen Age (Ve-XIe siècle)*. Paris: La Decouverte.

Chapelot, J. 2010. L'archéologie médiévale en France au début du XXIe siècle ou comment changer d'époque. In *Trente ans d'archéologie médiévale en France. Un bilan pour un avenir*, ed. J. Chapelot, 393–435. Caen: Publications du CRAHM.

Chapelot, J., and F. Gentili. 2010. Trente ans d'archéologie médiévale en France. In *Trente ans d'archéologie médiévale en France. Un bilan pour un avenir*, ed. J. Chapelot, 3–24. Caen: Publications du CRAHM.

Colardelle, M., and E. Verdel, (eds.) 1993. *Les habitats du lac de Paladru (Isère) dans leur environment. La formation d'un terroir au Xe siècle*. Documents d'Archéologie française 40. Paris: Maison des Sciences de l'Homme.

DeBoüard, M. 1975. *Manuel d'archéologie médiévale. De la fouille à l'histoire*. Paris: SEDES.

Démians d'Archimbaud, G. 1981. *Les fouilles de Rougiers: Contribution à l'archéologie de l'habitat rural médiéval en pays méditerranéen*. Éditions du C. N.R.S.1981 (1982); rééd. 2010.

Faure-Boucharlat, E., and A.-M. Flambard Hericher. 2010. L'édition scientifique dans le domaine de l'archéologie médiévale en France. In *Trente ans d'archéologie médiévale en France. Un bilan pour un avenir*, ed. J. Chapelot, 375–392. Caen: Publications du CRAHM.

Meyer-Rodrigues, N. 2010. Saint-Denis, archéologie, territoire et citoyenneté. In *Trente ans d'archéologie médiévale en France. Un bilan pour un avenir*, ed. J. Chapelot, 369–374. Caen: Publications du CRAHM.

Périn, P. 1980. *La datation des tombes mérovingiennes. Historique-Méthodes-Applications*. Geneva: Droz.

Pesez, J.-M. 1998. *Archéologie du village et de la maison rurale au Moyen Age: vingt ans d'études sur l'habitat paysan dans la France médiévale*. Lyon: Presses universitaires de Lyon.

Pilet, C. 1981. *La nécropole de Frénouville. Etude d'une population de la fin du IIIe à la fin du VIIe siècle*. British archaeological reports, Supp. series 83. Oxford: Archaeopress.

Renoux, A. 2010. Chateaux, palais et habitats aristocratiques fortifiés et semi-fortifiés. In *Trente ans d'archéologie médiévale en France. Un bilan pour un avenir*, ed. J. Chapelot, 239–256. Caen: Publications du CRAHM.

Sapin, C. 2010. L'église dans tous ses états, 30 ans d'archéologie des sites et édifices religieux. In *Trente ans d'archéologie médiévale en France. Un bilan pour*

un avenir, ed. J. Chapelot, 195–211. Caen: Publications du CRAHM.
Schneider, L. 2010. De la fouille des villages abandonés à l'archéologie des territoires locaux. L'étude des systèmes d'habitat du haut Moyen Age en France méridionale (Ve-Xe siècle): nouveaux matériaux, nouvelles interrogations. In *Trente ans d'archéologie médiévale en France. Un bilan pour un avenir*, ed. J. Chapelot, 133–161. Caen: Publications du CRAHM.
Young, B.K. 2001. Late antique and medieval archaeology in France. In *Medieval archaeology, an encyclopedia*, ed. P. Crabtree, 111–127. New York: Garland.

Further Reading

Archéologie de la France. 30 ans de découvertes. 1989. *Exhibition catalogue, Galeries nationales du Grand Palais*. Paris: Editions de la Réunion des musées nationaux.
Duval, N., et al. 1991. *Naissance des arts chrétiens. Atlas des monuments paléochrétiens de la France*. Paris: Imprimerie Nationale.
Effros, B. 2003. *Merovingian mortuary archaeology and the making of the early Middle Ages*. Berkeley: University of California.
Wyss, M. 1996. *Atlas historique de Saint-Denis. Des origines aux XVIIIe siècle*. Paris: Editions de la Maison des sciences de l'Homme.

France: Promotion of Archaeological Heritage

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Introduction

The conservation of archaeological remains in France is part of a process of heritage promotion and education. It is also directly involved in the Tourism sector of the territories and their reputation.

As they are often called upon by heritage preservation associations and the public at the time of discovery and relayed by the media, these presentations of archaeological remains have always been exceptional for various reasons: the exhumed remains are extremely fragile, their readability is complicated by the superposition of remnants over many periods, the costs of investment and maintenance are very high, and they are incompatible with development plans.

Definition

We can estimate that in France the number of surveys leading to a sustainable promotion, in one form or another, of substantial archaeological heritage is in the low hundred. In the sites corpus, we can distinguish between two main types: open-air sites and crypts.

Within these groups, there are sites where access is fee paying with the possibility of guided tours for some. A few of these heritage sites benefit from a protection as Historical Monument (registered or listed), and sometimes they can even benefit from international recognition, directly or indirectly (UNESCO).

Examples

"Open-air" sites: for the Prehistory, we will mention as an example the Neolithic megalithic site of Carnac (Morbihan). For historical periods, especially in urban areas, the "garden of remains" of the Centre Bourse in Marseille (Bouches-du-Rhône) is an archaeological conservation area of nearly 1 ha in direct relation with a large history museum of the city.

It should be noted that this achievement is recognized in the national history of archaeology as a major event since it is the result of a political compromise achieved during the 1970s between the decision to build modern constructions in the heart of the oldest town in France and the decision to conserve highly significant Greek, Roman, and Medieval remains (port and fortifications).

Some presentations are limited to a consolidation of ruins in the state they were in after excavations. In this regard, the site with the most extensive archaeological remains, listed as Historical Monuments in France, is that of Vaison-la-Romaine (Vaucluse) with an area of more than 8 ha.

In the south of France, many archaeological sites are open to visitors, of which several are oppida, in Ensérune (Hérault) and Entremont (Aix-en-Provence, Bouches-du-Rhône), for example, or ancient cities like Glanum (St. Rémy-de-Provence, Bouches-du-Rhône) and Vaison-la-Romaine already cited.

Other sites open to visitors are still undergoing more or less substantial research programs, with the example of the Bibracte site (Mont Beuvray) bordering the regional departments of Saône-et-Loire and Nièvre. This undeniably increases the public's interest and therefore attendance at the site.

The visit can be extended to the experimental archaeology structures like at the European Park Bliesbruck-Reinheim (Moselle) or at Saint-Romain-en-Gal (Vienna) with the reconstruction of a vineyard and elsewhere to museographic installations (Cimiez, Nice (Alpes-Maritimes); Bavay (North)).

In recent years, several sites have been given prominence right after the excavations on the site with the construction of a museum space, for example, in Languedoc-Roussillon Loupian (Hérault) and Sallèles-d'Aude (Aude). The presentation of the ruins can also be enhanced by markings in the soil and soil treatments (colored gravel, grass) to facilitate the easy reading of plans. Only the site of Glanum (Saint-Rémy-de-Provence, Bouches-du-Rhône) has been the object, about 20 years ago, of a life-size anastylosis for the angle of an Augustus temple erected on the side of the forum.

Archaeological crypts make up the second group. The most monumental example is that of the Grand Louvre (Paris) with pits from the fortress of Philippe Auguste and Charles V. They were brought to light between 1983 and 1985. These archaeological crypts primarily show the vestiges from the Gallo-Roman or Medieval period. For this latter period, these are essentially religious relics. Among the most important recent achievements worth mentioning are the crypts of churches of Saint-Laurent de Grenoble (Isère), Saint-Raphaël (Var), and Digne-les-Bains (Alpes-de-Haute-Provence) and most recently the one in Nice (Alpes-Maritimes) made during the construction of a tram line to showcase modern and medieval fortifications. This crypt is the largest built in France after the Louvre in Paris.

To these two main categories, we must also add, in recent years, facsimiles or virtual tours of major World Heritage sites that are prehistoric caves. These initiatives allow a large number to discover these remarkable sites, where visits are prohibited for conservation reasons. The most representative example is being that of Lascaux II (Dordogne).

Finally, on this theme of the promotion of archaeological heritage, we must not forget the 20 or so archaeological parks, or archaeosites, that offer the public the possibility to visit educational reconstructions, relating to one or several periods, like, for example, the site of Aspanio (Villeneuve d'Asq, Nord).

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Conservation in Archaeological Practice

Further Reading

Bibracte EPCC. 2013. Bibracte Mont: Beuvray – Morvan – Bourgogne. Available at: http://www.bibracte.fr/en/ (accessed March 2013).

Centre des Monuments Nationaux. 2013. The Centre des Monuments Nationaux. Available at: http://www.monuments-nationaux.fr/en (accessed March 2013).

Delestre, X., and F. Wible. 2012. La valorisation des sites archéologiques, in Actes du colloque de Martigny (Suisse). (Cahiers d'Archéologie Romande). *Archeologia Vallensia* 9: 127.

France, Direction du Patrimoine. 1991. Entretiens du patrimoine de la Direction du patrimoine: Faut-il restaurer les ruines? In *Actes des Colloques de la Direction du Patrimoine* 10. Paris: Éditions Picard.

Guides archéologiques de la France. 2012. *Collections des guides archéologiques de la France*. Paris: Éditions du Patrimoine – Centre des Monuments Nationaux.

Iksis & Altéarch. 2013. *Annuaire de l'archéologie francophone*. Available at: http://www.archeophile.com (accessed March 2013).

Ministère de la Culture et de la Communication. 2013. Great archaeological sites, collection edited by the Ministry of Culture and Communication. Available at: http://www.grands-sites-archeologiques.culture.fr/ (accessed March 2013).

Parc Archéologique Européen Bliesbruck-Reinheim. 2013. Revivre l'Antiquité. Available at: http://www.archeo57.com (accessed March 2013).

Franchthi (Greece), Agriculture and Domestication At

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Introduction

Franchthi (37° 25′ 20.90″ N, 23° 7′ 52.73″ E) is an archaeological site in Argolide, in the Southern part of Greece. It is one of a kind in Greece since it shows traces of human presence starting from the Upper Paleolithic (20,000 B.C. or even earlier) until the Final Neolithic (3,000 B.C.). The site is located in a cave in the South Western Argolide, in a small bay not far from the modern village of Kilada (see Douka et al. 2011).

The chronological sequence is determined on the basis of a homogeneous series of radiometric dating of the various levels of the stratigraphic deposit. The most ancient sample has been dated 20,000 B.C., another finding goes back to the Middle Paleolithic. The lowest layer, dug at present, has been dated around 35,000 and 30,000 years ago.

The site shows several stages of occupation: Medium Paleolithic, 35,000–30,000 years ago; Upper Paleolithic, 20,000–8,300 B.C.; Mesolithic, 8,300–6,000 B.C.; Lower Neolithic, 6,000–5,000 B.C..; Medium Neolithic, 5,000–4,500 B.C.; Upper Neolithic, 4,500–4,000 B.C.; and Final Neolithic, 4,000–3,000 B.C (see Farrand 2000).

Key Issues

The site was excavated between 1967 and 1979 by the American Mission of Indiana University, and the mission was led by Prof. T.W. Jacobsen, Professor of Classical Archaeology and Classical Studies at Indiana University. The excavation lasted almost 10 years and showed a continuous and long lasting human presence, the longest founded in the whole Greece. From 1979 until today, many scholars have continued to analyze the numerous findings discovered during the years of the excavation (see Douka et al. 2011; and for excavations see Farrand 2000).

From the studies, it has emerged that the cave of Franchthi must have been further away from the coast for most of its history. There was in fact a coastal plain that was slightly submerged during the occupation. This change was due to the progressive rise of the sea level.

In the Upper Paleolithic (20,000–8,300 B.C.), the people who were in the cave were probably hunters and gatherers, they occupied the site just seasonally. In this period in fact people would not stay in this site during the winter season. Before 11,000 B.C. there is no certain evidence of the cultivation of plants. It seems that the presence of seeds of plants from the family of Boraginaceae is due to the use of making pallets to sleep on or to the extraction of a colored pigment from their roots. Starting from 11,000 B.C., the first plants grown were lentils, vetch, pistachio, and almond trees. Wild barley and oats were rarely present, and they started to become more popular from 7,000 B.C. (Mesolithic). Thanks to the remains of animals' bones (also used to determine the three stages of this period), it has been possible to understand the kind of meat that the inhabitants of the cave used to eat. The majority of the remains were of wild horses and donkeys. There were also remains of deers, pigs, hares, turtles, and birds. The number of foxes, cattle, caprine animals, moles, and small fish was minor. The presence of small fish is proof of the fishing done close to the coast probably due to the lack of proper boats. In terms of tools, the archaeologists have found mainly flints and some instruments made of obsidian from the island of Melos. There is no sign of ceramic, burials, and architectonic structures in that period (Stiner and Munro 2011).

During the Mesolithic (8,300–6,000 B.C.), the cave of Franchthi continued to be accessed after a stage in which it was abandoned due to climatic changes. We can distinguish two settlement phases. In the first phase, the same plants of the Upper Paleolithic were cultivated with a few exceptions: oat and barley became common

while we do not have the Boraginaceae anymore, and peas and pears made their appearance. This data are probably the result of an environmental change. As for hunting, the equine and caprine species has been replaced mainly by deers. It seems that the inhabitants of the cave had developed better fishing skills since there are more remains of marine fauna and sea urchins. This shows a change in the habits and preferences of the inhabitants of the cave (Farrand 2003).

The second phase of the Mesolithic is characterized by a relevant increase in fish remains, fish of larger size in particular. This indicates that the inhabitants of the cave could fish in deeper waters. Besides that there is also an increase in the presence of obsidian from the island of Melos. Since the island was located 150 km from the shore, we can conclude that the navigation techniques were also more advanced at this stage. The quality of stone tools had also improved. In this period, there is no sign of ceramics or architectural structures but we have the first burials. The most ancient tomb dates back to the Lower Mesolithic. It is the burial of a 25-year-old male in a contracted position and with no furniture. He died because of a wound on the forehead, and it seems that the man was not in good health probably due to malaria. Further studies conducted on the human remains in 1989 have shown that this burial is located in the higher strata of this period and that there are other burials underneath. There are at least five inhumations and two cremations. Human remains belonging to other people (two to five people) does not seem to belong to those burials. On the basis of these elements, we can conclude that probably the inhabitants of the cave had become sedentary (see Perles 2003).

At the beginning of the Lower Neolithic (6,000–5,000 B.C.), we can record several changes. First of all, the domestication of sheep and goats and the cultivation of wheat, barley, and lentils. In the same way, the production of utensils and polished stone, agricultural tools in particular, improved.

Another important change is the presence of ceramic production and the remains of architectonical structures (temporary dry-stone walls) that were found out of the cave, on the coast.

The ceramics are mainly dark monochrome pottery cooked at quite low temperatures (less than 650 ° C).

These innovations as well the presence of several other burials confirm the sedentary characteristics of the people who were staying at Franchthi in this period.

In the Medium Neolithic (5,000–4,500 B.C.), ceramics and the kind of animals' bones differ from the previous period. Most of the bones found mainly belong to caprine-ovine species and fish while we have fewer remains of deers, pigs, and cows. The ceramics are now of better quality with a cooking temperature that has raised 800 ° C ca. Obsidian is the most utilized stone in the lithic industry. Among the burials, we can highlight those of two females aged around 33 and 40, both of them have a furniture with some obsidian lamellae.

The Upper Neolithic (4,500–4,000 B.C.) is a continuum of the previous stage. The making of ceramics continues to develop. The number of animal bones coming from caprine and ovine species increases until they become the only kind of meat eaten with a minimum presence of cows, deers, and fish. Obsidian is used to make arrow heads and its presence is more and more relevant.

The Final Neolithic (4,000–3,000 B.C.) represents the last settlement phase at Franchthi's cave. Many scholars consider the Final Neolithic at Franchthi as a continuation of the Upper Neolithic. In fact, the further improvement in the making of ceramics has been the main development; at this stage, the ceramics are decorated. Obsidian is almost the only kind of stone used. The burials continue and infant tombs start to appear (see Hansen 1991).

The site was abandoned around 3,000 B.C., probably due to a sudden sea level rise that must have partially flooded the spaces used by the community. Sporadic finds of archaic period are evidence of the use of the cave as a rural cult site. These deposits have not damaged the prehistorical ones (Figs. 1 and 2).

Franchthi (Greece), Agriculture and Domestication At, Fig. 1 External view of the cave of Franchthi

Franchthi (Greece), Agriculture and Domestication At, Fig. 2 Cave of Franchthi from the inside

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Andes: Origins and Development of Agriculture
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Barley: Origins and Development
- ▶ Buckwheat: Origins and Development
- ▶ Domestication: Definition and Overview
- ▶ Europe: Paleolithic Art
- ▶ Goat: Domestication
- ▶ Lentil: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Sheep: Domestication

References

Douka, K., C. Perles, H. Valladas, M. Vanhaeren, and R.E.M. Hedges. 2011. Franchthi cave revisited: The age of the Aurignacian in South-Eastern Europe. *Antiquity* 85: 1131–1150.

Farrand, W.R. 2000. *Depositional history of Franchthi cave: Stratigraphy, sedimentology, and chronology*, Excavations at Franchthi cave, Greece, fasc. 12. Bloomington: Indiana University Press.

Farrand, W.R. 2003. Depositional environments and site formation during the Mesolithic occupations of Franchthi cave, Peloponnesos, Greece. In *The Greek Mesolithic: Problems and perspectives*, 69–78. London: The British School at Athens.

Hansen, J.M. 1991. *The Palaeoethnobotany of Franchthi cave*, Excavations at Franchthi cave, Greece, fasc. 7. Bloomington: Indiana University Press.

Perles, C. 2003. The Mesolithic at Franchthi: An overview of the data and problems. In *The Greek Mesolithic: Problems and perspectives*, 79–87. London: The British School at Athens.

Stiner, M.C., and N.D. Munro. 2011. On the evolution of diet and landscape during the Upper Paleolithic through Mesolithic at Franchthi Cave (Peloponnese, Greece). *Journal of Human Evolution* 60: 618–636.

Frankel, David

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Basic Biographical Information

David Frankel is an Australian archaeologist with expertise in the prehistory of Australia, New Guinea, and Cyprus (Fig. 1). He was born in Johannesburg in 1946 and moved to Australia in 1963. He received his BA (1970) and MA (1973) in archaeology from Sydney University and his PhD from Gothenburg University, Sweden, in 1975. From 1975 to 1978, he worked in the Department of Western Asiatic Antiquities at the British Museum, before taking a lectureship at La Trobe University in Melbourne in 1978. He was appointed senior lecturer in the Department of Archaeology in 1982, reader in 1992, and professor in 2009. He retired in 2013 and was appointed emeritus professor.

As a student Professor Frankel worked at Burrill Lake, Irrawang, and Elizabeth Farm in New South Wales and at Kauri Point in New Zealand, Zagora in Greece, as well as in Israel and Cyprus, before embarking on his own career as a field director. His dissertation was a groundbreaking analytical survey of the White Painted ware pottery of Middle Bronze Age Cyprus. Published in 1974, it was one of the first studies to use multivariate statistical analysis of design motifs to assess social relationships.

Professor Frankel has served on numerous national bodies, including the Australian Archaeological Association, the Australian Quaternary Association, and the Australian Association of Consulting Archaeologists, and played a key advisory role in the development of indigenous cultural heritage and teaching programs. In 2012 he initiated an annual colloquium on Victorian archaeology and heritage management. He has also had an active engagement with the Jewish Museum of Australia, coordinating an exhibition on the Archaeology of Ancient Israel in 1986 and teaching adult education courses.

Frankel, David, Fig. 1 David Frankel with Early Bronze Age pottery from Cyprus, Larnaca Museum, Cyprus

Major Accomplishments

David Frankel has set new standards for teaching, research, and publication in Australia and beyond. His fieldwork has provided opportunities for training for generations of students while also serving as the basis for a teaching program strongly informed by the research process. His status within the discipline rests on an integration of the practical and theoretical aspects of archaeological research and a deep engagement with primary evidence.

In his early years at La Trobe University, Frankel developed innovative courses on the archaeology of Australia and Melanesia and began an active program of fieldwork in order to develop a research profile for the discipline and cater to the needs of students. Over the next decade, he carried out excavations at Sunbury, Moonlight Head, and Phillip Island in Victoria, Barham in New South Wales, and Karremarter and Koongine caves in South Australia, as well as in the Gulf Province, Papua New Guinea. He developed new models for assessing changes in land use, technology, and behavior during the last 10,000 years. *Remains to be Seen: Archaeological Insights into Australian Prehistory*, a textbook published in 1991, drew heavily on these studies and on his courses in Australian archaeology (Frankel 1991). It differs from other texts in its self-conscious evaluation of the research process and is used extensively at Australian universities.

In the 1990s Frankel turned his research focus to Cypriot prehistory. A decade of excavations at the prehistoric Bronze Age settlement of Marki uncovered deposits spanning 500 years in the largest exposure of any settlement of this period on the island (Frankel and Webb 2006). This was followed by the excavation of Bronze Age cemeteries at Deneia and a Chalcolithic hunting station at Politiko and the publication of Early and Middle Bronze Age cemeteries at Psematismenos and Karmi and a mining and pottery manufacturing site at Ambelikou (Frankel and Webb 2007, Georgiou et al. 2011, Webb and Frankel 2013). These projects have had a profound influence on the understanding of prehistoric society in Cyprus and led to new insights into issues of households, identity, ethnicity and migration, technology transfer, population growth, and social relationships. Importantly, Frankel's excavation reports offer a new approach to presenting the archaeological record and use innovative technologies to make large quantities of primary data available in digital form. In recent years Frankel has returned to Australian prehistory, with the publication in 2017 of a general book on the Aboriginal archaeology of southeastern Australia (Frankel 2017. See also Bird and Frankel 2005).

Professor Frankel has played an important role in shaping research policy in Australia as a member of the Australian Research Council's Research Evaluation Committee, Excellence of Research in Australia (2010, 2012), and Humanities Disciplinary Panel (1996–1998). His 1998 review of archaeology in Australia for the Academy of Humanities made a major impact nationally. He is a Fellow of the Australian Academy of the Humanities; a Fellow of the Society of Antiquaries, London; and the recipient of a Prime Minister's Centenary Award for services to Australian society and the humanities. In 2016 he was awarded the Rhys Jones Medal for Outstanding Contribution to Australian Archaeology by the Australian Archaeological Association. He is a member of the Australian Institute of Aboriginal and Torres Strait Islander Studies and joint editor-in-chief of the Swedish monograph series *Studies in Mediterranean Archaeology* and has served on the editorial boards of *Archaeology in Oceania*, *Journal of Australian Studies*, and *Mediterranean Archaeology*.

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Cyprus, Archaeology of
- ▶ Hunter-Gatherer Subsistence Variation and Intensification

References

Bird, C.F.M., and D. Frankel. 2005. *An archaeology of Gariwerd. From Pleistocene to Holocene in Western Victoria*. St Lucia: University of Queensland.

Frankel, D. 1991. *Remains to be seen: Archaeological insights into Australian prehistory*. Melbourne: Longman Cheshire.
Frankel, D. 2017. *Between the Murray and the sea: Aboriginal archaeology in South-Eastern Australia*. Sydney: Sydney University Press.
Frankel, D., and J.M. Webb. 2006. *Marki Alonia. An Early and Middle Bronze Age settlement in Cyprus. Excavations 1995–2000*, Studies in Mediterranean Archaeology 123:2. Sävedalen: Åströms förlag.
Frankel, D., and J.M. Webb. 2007. *The Bronze Age cemeteries at Deneia in Cyprus*, Studies in Mediterranean archaeology 135. Sävedalen: Åströms förlag.
Georgiou, G., J.M. Webb, and D. Frankel. 2011. *Psematismenos. An Early Bronze Age cemetery in Cyprus*. Nicosia: Department of Antiquities.
Webb, J.M., and D. Frankel. 2013. *Ambelikou Aletri. Metallurgy and pottery production in Middle Bronze Age Cyprus*, Studies in Mediterranean Archaeology 138. Uppsala: Åströms förlag.

French Guiana: Archaeology and Indigenous Peoples

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French Guiana, a country of 84,000 km^2, was inhabited by approximately 50,000–100,000 Amerindians before the European conquest; in the late seventeenth and early nineteenth century, the Amerindians were reduced to less than a thousand throughout the whole territory (as a result of bacteria shock, wars, escapes, etc.).

At the end of the nineteenth century, during several world's fairs, the Kali'nas were displayed in human zoos.

In 1930, the territory of Inini was created, to "protect Indians from civilization."

Between 1946 and 1969 (which marks the end of the status as a territory for the Inini), some geographers (Hurault, Frenay) and ethnologists (Grenand Pierre and Françoise) mingled with the people from "the Hinterland."

In 1970, a prefectorial decree limited access to the south of French Guiana, still in order to protect the "primitive and traditional populations who live of the forest. . .." Young Amerindians, however, were sent to religious homes, to be "educated."

French Guiana today counts six Amerindian nations and four different groups of Bushinengés (Some terms like "noir-marrons" have special historical/cultural significance in this context – don't know how to translate them. It refers to a cultural group of mixed racial heritage. I simply use the term "Maroons" like Richard Price does) (Maroons or descendents of runaway slaves) who are all regarded as indigenous, plus Metropolitans (people from the European French territory), various Creole communities (French Guianese, Saint Lucian, Martiniquan, Haitian, etc.) as well as more recent arrivals including Chinese, Lebanese, Hmong, Peruvian, Colombian, and other immigrants, making it an ethnically diverse and multicultural country.

Administratively speaking, French Guiana is 1 of the 100 departments of France, that old Jacobin country, which is made up of 1 single people, the French people. French Guiana is still, to this day, "an administrative department like any other," even though, in 2014, this overseas department is to become an overseas collectivity (perhaps similar to the New Caledonian model) within the legal framework of decentralization. French Guiana, however, is the only French department in which an "indigenous" group lives, according to the international definition.

France has not officially recognized Amerindian and Bushinengés peoples of French Guiana, neither through its national laws nor through many international treaties or conventions. For example, it has neither ratified the Convention 169 of the ILO (Article 13 de la Convention 169 de l'Organisation Internationale du Travail (O.I.T): "*[. . .] les gouvernements doivent respecter l'importance spéciale que revêt pour la culture et les valeurs spirituelles des peuples intéressés la relation qu'ils entretiennent avec les terres ou territoires, ou avec les deux selon le cas, qu'ils occupent ou utilisent d'une autre manière, et en particulier des aspects collectifs de cette relation.*") nor the UN Declaration on regional languages, nor the Declaration on the Rights of Indigenous Peoples, adopted on September 13, 2007, at the UN (**Article 11 (extraits) de la** Déclaration sur les droits des peuples autochtones: "*1. Les peuples autochtones ont le droit d'observer et de revivifier leurs traditions culturelles et leurs coutumes. Ils*

ont notamment le droit de conserver, de protéger et de développer les manifestations passées, présentes et futures de leur culture, telles que les sites archéologiques et historiques, l'artisanat, les dessins et modèles, les rites, les techniques, les arts visuels et du spectacle et la littérature.").

In this short presentation on the relationship between archaeology and indigenous peoples in French Guiana, the current legal situation will be presented first, followed by the relationship to the Earth and sites; objects and museums will be the concern of the third section, and finally, the multicultural approach gradually being set up in French Guiana will be presented as a tentative conclusion of our thinking on this subject.

Current Legal Situation and the Struggles of Amerindian Demands

Some decrees have superficially masked the monolithic French republican law. Since 1970, some French laws are applied "notwithstanding": limited access to the southern zone, non-conscription of indigenous boys, the collective use rights of state land (1987), etc.. It is clear that French Guiana is not quite the old Gallic country (metropolitan France).

A 1970 prefectural decree restricted access to certain parts of French Guiana to protect indigenous peoples from the evils of civilization. It was followed by the land decrees of 1987 and 1992 establishing articles R.170–56 and R.170–58 of the Code of State Domain. The Ministerial Decree of 14 April 1987 (art. 170.56) allows "The people who traditionally draw their livelihood from the forest" (Amerindians and Maroons or Bushinengés) to be granted "on federal lands in Guyana collective use rights for hunting, fishing and, in general, for any activity necessary for the subsistence of these communities."

This concerns only use rights; the ruling n·98-777 clearly reaffirms that the State private domain can only be granted to the benefit of people, not of communities.

Since 1981, with the creation of the Association des Amérindiens de Guyane française (which includes the six Indian nations), and after Félix Tiouka's address to the French State in 1984 and the advent of the Fédération des Organisations amérindiennes de Guyane (1992), the struggle of native Americans (conducted mainly by the Kali'nas) intensified: demands for access to their native language, their culture, their own political organization, some land, etc.

Membership to the COICA (Coordinadora de las Organizaciones Indígenas of the Amazon Basin) in 1992, as well as participation in the Charter of the Indigenous and Tribal Peoples of the Tropical Forests (Penang, Malaysia), also strengthened the internationalization of the struggle for Amerindian pride and recognition of the rights of indigenous peoples.

The creation of the Guiana Amazonian Park (le *Parc amazonien de Guyane*) in February 2007 may be an opportunity or a disaster for the Amerindians of the forest. It is too early to make a judgment!

In 2008, the "Conseil consultatif des peuples autochtones de Guyane" was created, but to this day they have not yet held a meeting.

The Relationship to the Earth and Archaeological Sites

The relationship to the Earth allows, in many societies, especially in pre-industrial societies, the construction of territorial identities as well as individual and collective local roots, based on the past, memory, and heritage. Archaeological sites, by their very nature, are part of the Earth, of Mother Earth, of the Earth as a food resource, for indigenous peoples.

Inselbergs, the shelters under rocks and caves, which are inlets into the Earth, and also rock art sites, are seen as sacred.

Like almost everywhere in the world, Guyanese archaeological sites, including Amerindian sites (*We only speak very rarely about Bushinengés archaeological sites because their authentication is not yet as developed; the age of these peoples in Guyana has not yet produced archaeological sites in the usual sense. We will return to it later.*), are under threat of being destroyed by the natural processes of erosion and on a larger scale by recent "economic and social development," characteristically the construction of roads, subdivisions, schools, hospitals, etc. and heavy extractive

activities, such as sand, granite, and laterite quarries, and both illegal and legal gold mines.

But the main problem remains that of the territories claimed by some Amerindians. The French government does not recognize collective land ownership by a community, nor does the administration of the Guiana Amazonian Park created in 2007. Only those areas used by populations who "*traditionally draw their livelihood from the forest*" are recognized.

In recent years the archaeology department of French Guiana has drawn inspiration from the principles held by Canadian archaeologists, in particular that of "recognition and respect for the spiritual bond that exists between Aboriginal peoples and special places and features of the landscape of high symbolic significance" (Canadian Archaeology Association, Statement of Principles for Ethical Conduct Pertaining to Aboriginal (www.canadianarchaeology.com/caa/fr/enonce-de-principes-dethique-touchant-les-autochtones)).

Thus, the altars of the ancestors, the altars of the dead, traditional and illegal cemeteries, and sacred Bushinengés groves of Apatou and of Papaïchton are protected, as are the sub-contemporary and nonofficial Amerindian cemeteries in Kali'nas villages on the west coast of French Guiana, by being integrated to the database Patriarche, as sites on the national archaeological map.

In addition, during each preventive or programmed study, Amerindian communities living on or near the archaeological sites concerned are not only informed of the arrival of archaeologists, but field work (prospecting, testing, excavating) does not begin until permission to do so is granted by traditional chiefs and shamans. This was the case in Kourou during excavations conducted prior to the construction of the *Soyuz Launch Complex*, which unearthed graves, and also at Awala-Yalimapo during the excavations of funeral urns, in 2009, 2010, and 2011.

And what about objects and their exhibition in museums?

Objects and Museums

According to the French Heritage Code published in 2004, it is neither legal nor obligatory to return bones belonging to indigenous peoples, nor objects found in their graves, nor any other objects deemed "sacred" to them.

The cultural significance of human remains and associated objects for indigenous communities is such that we duly reinstated, in practice and in law, a temporary storage space held by the State, in the municipality of Awala-Yalimapo in 2010. Similarly, following a study, the associated Amerindian human remains and funerary urn were entrusted to the care of the customary chief of Awala-Yalimapo. French law allows this type of stocking, if the archaeological remains are preserved and kept safe (normally under the responsibility of a qualified heritage agent). For now, the remains of the urn unearthed in 1997 are well kept in a communal room, but will a subsequent reburial by the community take place? When this happens, should we consider then that their conservation can no longer be ensured? Only time will tell, but the chances lay in the future and the confidence we have in the Kali'na community.

Furthermore, in November 2011, the archaeology department was approached to mount an exhibition, with the loan of funerary urns excavated since 2009, to be held in the town's library in 2012. Both points of view, Amerindian and Western, will be presented in Kali'na and in French, on the functions, symbolism, representation, etc. of the objects presented to the population.

The practices of museums have also evolved; the Museum of Guyanese Cultures regularly mounts exhibitions of the peoples of Guyana, using bilingual or trilingual signage, where the participation of indigenous peoples is sought, active and valued.

The Multicultural Approach

In 2010 in Awala-Yalimapo, a township of 1500 inhabitants founded in 1989 at the request of representatives of the Kali'na from the township of Mana, the Amerindian Mayor created a Council of Culture. The Council brings together representatives of the town associations, of the Town Hall, as well as two traditional chiefs; one of the goals is to establish the identity of the

municipality and the community, based on the past as it is revealed, to a large extent, by archaeology. Discussions and briefings are organized several times a year, thus allowing people to get better acquainted and speak a shared language.

The results of archaeological studies are made available in a timely manner to the communities and citizens of French Guiana, but admittedly not always in a manner that is accessible to all. In addition, conceptual approaches are different: archaeologists are used to sorting, classifying, and dividing remains, while the Amerindians consider minerals, animals, plants, and their spirits and humans as an inseparable whole.

Since 2010, however, the Awala-Yalimapo town council has been even better at reclaiming ownership of its past. Thanks to regional, national, and European funding, it has implemented training for four young Kali'nas in order to carry out a participatory inventory, relying on the help of heritage professionals, with a view to better understand Amerindian heritage in the township and contribute to its future prominence by the community.

This inventory is based on traditional field surveys (archaeological surveys, architectural surveys, etc.), but also oral based, that enhance the knowledge and expertise of the elders. The participation of Amerindian youth in the knowledge of archaeological heritage is growing; and the recruitment of one or more young Kali'nas as archaeologists or heritage officers in the coming years should enhance the sharing of oral and written knowledge. Archaeology can also become a means of social development for members of indigenous communities.

The Kali'na township of Awala-Yalimapo thus plays a pioneering role in the conservation of its heritage, shared by other Amerindians of French Guiana, whom are less active for various reasons.

Camopi, another Amerindian (Teko and Wayãpi) township on the Oyapock river, also seeks to foster their own heritage, through basketry workshops led by elders, photographic exhibitions taken by young people in their villages, or archaeological objects collected by their own families and presented to all during Heritage Day in 2008.

Other communities, such as those of the Tekos (Arawaks) of Balate in Saint-Laurent-du-Maroni, or that of the Kali'nas of Yaou (Bellevue) in Iracoubo, not to mention the Wayana, whose one rite of passage, the Maraké, is in the process of being registered as immaterial heritage for humanity, have expressed great interest for the archaeological heritage of their respective traditional territories.

As for the Bushinengés, somewhat lacking in this presentation, they have not been forgotten, but their awareness of the importance of material heritage, particularly archaeological, is only recent. One of the first archaeological research programs on Maroon groups of Guyana is expected to begin in 2012.

Conclusion

The address to the French people and government of, issued by Félix Tiouka on December 9, 1984, has thus borne fruit, even though maturation has been long and painful.

Since 1981, the year in which the Association des Amérindiens de Guyane Française (currently called the Fédération des Organisations Amérindiennes de Guyane) was created, archaeological heritage has become a preoccupation for Amerindian nations and particularly that of their political and spiritual leaders, their traditional chiefs, of their elected representatives, who see it as a way to provide historical legitimacy that is sometimes contested by other communities living in Guyana but also as a way to reinstate their culture in the long time of history.

French Guiana: Archaeology and Minority Communities

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French Guiana, one of the overseas departments of the French Republic, is composed of various ethnic minorities who are administered from a cultural, political, and economic perspective at State, Regional, and Departmental levels which

are dominated by Metropolitans (French people from Metropolitan France), Guyanese Creoles, and people of Chinese and Lebanese descent.

These minorities include six American Indian nations and four Bushinengé groups, all of whom are considered native, diverse Creole communities (from Saint Lucia, Martinique, Haiti, etc.) and more recent immigrants such as the Hmong, Peruvians, Colombians, etc. that make up this multiethnic and multicultural country.

This schematic and quick presentation of the sociocultural groups in Guiana may appear simplistic and caricatural. In the following paper, we will attempt to show that this is unfortunately the case, especially concerning the position of the archaeological heritage of minorities in the institutions responsible for preserving cultural heritage (the archaeology service of the Ministry of Culture and local museums), even though recent understanding and awareness of this fact have led to some progress over the past 15 years.

Archaeological Sites of Minorities

The national archaeological map (Patriarch) does not allow for the easy integration of a number of places of worship and cemeteries dating from the eighteenth century which are still in use, such as habitat or cemeteries which are known only through oral tradition and for which physical evidence is tenuous, even impossible to find.

And yet, in French Guiana, the Amerindian, Bushinengé and Creole populations practice many rites in places considered natural by the Metropolitans and other communities living in Guiana. It is worth mentioning, for example, the ancient Amerindian cemeteries of Mana, Awala-Yalimapo, and Iracoubo, the sacred forest of the Bushinengé in Apatou, the old houses of traditional Aluku chiefs in Boniville or of the grand Man Difou in Papaïchton, the Haitian voodoo cults at the foot of trees in a number of places like the rock carvings in Rémire-Montjoly, the Calvary of Bourda in Cayenne, etc.

How then can one recognize an Amerindian or Bushinengé cemetery when there is nothing to signal the location of the graves, if only by trusting the local people?

How does one know that a particular part of the forest is sacred and that only those who are initiated can enter it?

How can one guess that the remains of a few bottles, planks of wood, and a destroyed cassava oven are sacred because they are those of the last Grand Man of the Boni of Papaïchton?

Finally, when, during surveys, for example, we identify a voodoo place of worship often made up only by offerings of food and flowers and candles that leave little trace for future archaeologists, are we to save it on the national database or not?

Technically and theoretically speaking, it is much easier to record Amerindian sites, such as polishing stones, petroglyphs, etc. which leave tangible traces, than Bushinengé habitats of the eighteenth and nineteenth centuries which are virtually invisible.

Much of the problem lies in the immateriality of many of the human activities practiced by these ancient civilizations which did not necessarily build monuments with stone or brick. This is especially true in a context where tropical plants offer a wide range of building materials as well as effective and simple tools to make. To cut, you take a piece of bamboo, to scrape, a shard of quartz lying on the ground, to serve food, a palm frond, etc.

In French Guiana, we have decided to include ancient and contemporary Amerindian and Bushinengé cemeteries as well as the altars and sacred groves of the Bushinengé, Aluku (one of the four Bushinengé groups or Maroons of French Guiana), and Creole habitats in our list of archaeological sites in order to protect them. The Creole village of Guisanbourg near Regina, for example, founded while slavery was still legal, has been abandoned by its inhabitants for nearly 30 years but is still regularly visited by former families each year in a "pilgrimage."

For now, it is not intended to "restore" these Bushinengé or Creole habitats and much less their burial sites as Bushinengé cemeteries are forbidden to the uninitiated that we are and even to some of the Bushinengé population.

However, an innovative project is presently being put in place, in association with the Saül city council and the Guyanese Amazonian Park (PAG), around the Agasso House, the name of an old Saint Lucia gold prospector and grocer from Saül. The house has been recovered by the municipality, who want to convert it, after undertaking a study and restoration-consolidation, into an eco-museum displaying the tradition and history of gold mining in the region.

There is also the issue of conservation of cultural landscapes, as in the case of hundreds of hectares of former Amerindian farmland or Bushinengé Kottika burnt brush piles (the latter being classified as natural sites) that have shaped original cultural landscapes and are therefore considered by the Archaeology Service of French Guiana as archaeological sites, since they were modeled by man.

In the first case, some field areas have been set aside as natural areas of ecological interest, flora, and fauna (ZNIEFF) with the support of government department of ecology. One might object that it is an error to include what is natural as cultural, but we say that it is better to protect twice rather than once! On the contrary, I believe that this offers complementary protection since both natural and cultural heritage are inseparable.

The Archaeological Collections of Minorities

The three "museums of France" have collections coming from different histories.

The oldest, the Musée départemental Franconie, which dates back to the early twentieth century, is at once an historical museum and display cabinet of curious exhibits. Naturalist collections and some objects from different indigenous and traditional peoples of French Guiana (Amerindians, Bushinengés, Creoles), together with an amazing collection of paintings and engravings by convicts, are exhibited there in a permanent collection.

The Museum of Guyanese Cultures, administered by the Region, holds a more varied collection and, more importantly, has been established since the late 1980s by an inspired curator. Exhibitions, which are only on temporary display, are often thematic, multicultural, and cross-disciplinary and aim to show Guyanese cultural diversity, even if the collections are mostly made up of Amerindian, Bushinengé, and Creole ethnological objects. The difficulty in French Guiana lies in the demarcation between the archaeological and the ethnological. Is a Kali'na vase from the 1930s considered ethnological or archaeological? And what about a Saramaka bench? And Creole furniture? It all depends on the method used: Was the object collected in its context? In this case, it is archaeological; or was it collected elsewhere, such as, for example, in an auction? In fact, it is better to understand the objects in their extended cultural and functional context, in a continuum rather than trying to catalog, classify, or put the objects and concepts away in a drawer.

The third museum is in fact an eco-museum established in 2008, which presents, in a beautiful Creole house, once the trading post and home of a prosperous family, collections relating to life on the Approuague River in the early and middle twentieth century and its industrial heritage. Indeed, the owner of the trading post also had a sawmill, located next to where the wood was worked prior to being exported. An historical introduction is given in several windows displaying pre-Columbian objects and others dating from the colonial period in a broad sense, which considers the development of lowlands, particularly through the reclamation of flooded land and the contribution of the first steam engines of the Industrial Revolution.

All three museums are housed in Creole mansions, should this signify something particular? Everyone is free to find the symbol hidden behind these beautiful wooden facades. But it is clear that the dominant Creole minority sought primarily to preserve its past more than the past of other communities in French Guiana.

What happens elsewhere in French Guiana in the noninstitutional places?

In another article in this Encyclopedia *Archaeology and Natives in French Guiana*, we

highlighted the pioneering role of the Kali'na community from Awala-Yalimapo, which took control over its heritage, conducting a participatory inventory, exhibiting past and present objects, and educating young people in research techniques, conservation, and heritage management.

We also need to mention the initiative of the Kourou association Kalawachi, who over 3 years have set up and organized an exhibition on Amerindian tradition, in a traditional kalian hut near Kourou.

Exhibitions of their own culture by young Hmong in Cocoa, the most populous Hmong village in Guiana, have emerged in recent years.

In contrast, the Chinese and the Lebanese have not demonstrated, to date and to our knowledge, any desire for heritage recognition.

As for the other groups in French Guiana, who were the earliest to arrive (and who still continue to arrive today) such as Haitians, people from Martinique, Indians from India, or those who arrived more recently such as Peruvians, Colombians, Guyanese, Surinamese, or Brazilians, they are hardly visible in official exhibitions. Even if behind a Palikur or a Wayãpi, one may find a Brazilian. Similarly some Saramaka or Djuka who reside in French Guiana may have a Surinamese passport.

Conclusion

To conclude, we would like to examine the representation of individuals originating from minorities in archaeological and heritage institutions.

Amerindian political and cultural struggles carried out mainly by the Kali'nas have intensified since 1981, with on the one hand the creation of the Association des Amérindiens de Guyane Française, which includes the six Indian nations, and on the other hand, after the French State Address by Felix Tiouka in 1984, with the advent of the Fédération des Organisations amérindiennes de Guyane in 1992.

The demands for access to their native language, culture, land, own political organization, etc. have led the Kali'nas of Awala'Yalimapo to take control of their culture and, in particular, their archaeological heritage. At a regional level, only Sandra Kayamaré, who was initially employed with the regional archaeology service on a fixed term contract, was later permanently hired by the National Institute of Preventive Archaeological Research (INRAP), though unfortunately not for the Carte archéologique nationale.

Currently two young Amerindians, Eleluwa Tiouka, who studied archaeology in Paris, and Anne-Marie Chambrier, who works occasionally with the archaeology service of French Guiana, have indicated their intention to work in this field.

In museums and other heritage institutions, representatives of minorities are rare, as the majority of positions are occupied by Creoles or Metropolitans. The weight of history still weighs very heavily in Guiana!

French, Charles A. I.

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Basic Biographical Information

Pressed on the point, Charly French (Fig. 1), the Canadian-born UK-based Professor of Geoarchaeology at the University of Cambridge, recalls that he fell into his first excavation – a deep pit for plutonium rods at McMaster University – when he was four years of age. However, his steps into the field of geoarchaeology begin with his first archaeological foray: helping out with the excavations at Wharram Percy, Yorkshire, during a visit to the UK in 1971. This experience prompted him to return to Britain to study archaeology. During his bachelor's degree at the University of Wales, Cardiff, Charly was taken in by landscape analysis and wrote an undergraduate dissertation on the earlier prehistoric molluscs and paleo-vegetation of the dry valleys of South Wales (1975). Immediately after, Charly took up a job with Francis Pryor, digging and

French, Charles A. I., Fig. 1 Professor Charles French in the McBurney Geoarchaeology Laboratory. (Photo by Tonko Rajkovaca)

analyzing molluscs at Fengate. This he followed up with a cataloguing job at the Royal Ontario Museum, and, next, with excavations at East Karnak in Egypt. He then embarked on the study of a Masters in Environmental Archaeology under the direction of Professor Dimbleby at the Institute of Archaeology, London. Around the late 1970s and up to the mid-1980s, Charly was employed by Francis Pryor as part of the Welland Valley Project team and the Fenland Project, leading to the discovery of Flag Fen and the Etton causewayed enclosure. At the same time, he successfully obtained a Ph.D. at the Institute of Archaeology, London, in July 1983. His dissertation, which focused on fen-edge and river valley site/landscape data, was defended in June 1983, a month before receiving a deportation order for overstaying in the UK (successfully appealed with the support of Ian Longworth at the British Museum and Geoff Wainwright, then Chief Archaeologist of what would in time become English Heritage). At around this time, Charly got together with his partner Kasia Gdaniec, also an archaeologist, joined the UK Institute of Field Archaeologists and (with Francis Pryor and Maisie Taylor) formed the Fenland Archaeological Trust, which oversaw the opening of Flag Fen to the public a year later in 1986. Charly went on to work in contract and developer-funded archaeology in the later 1980s and early 1990s, until – unexpectedly, in April 1992 – he was made Lecturer in Archaeological Science at the Department of Archaeology, University of Cambridge. By this time, Charly was already one of the pioneers in the use of soil micromorphological analysis to tackle landscape and archaeological research questions. In 2000, Charly became head of the Department of Archaeology and Senior Lecturer in Archaeological Science. In 2005, Charly became Cambridge University's first Reader in Geoarchaeology. In 2009, he received the Pilkington Teaching Prize, and in 2012, he became the first Professor of Geoarchaeology at the University of Cambridge.

Major Accomplishments

As a researcher, Charly's main activities have centered on the application of geoarchaeological, especially micromorphological, analytical techniques to tackle archaeological questions. At Cambridge University, he oversaw the development of the McBurney Geoarchaeology Laboratory (Fig. 1), the world's largest archaeological soil micromorphology laboratory. The McBurney

Lab currently undertakes investigations and contract work funded by research bodies and developers (Charly acts as consultant and micromorphologist in many parts of Britain and beyond). The lab also serves as a hub for postgraduate research and undergraduate teaching and has its own in-house facility for the manufacture of archaeological thin sections.

Charly's approach to geoarchaeology is a unique blend between the study of specific features of anthropogenic deposits and the interpretation of signatures of geomorphic and paleopedological processes affecting the archaeological record. This perspective, which is firmly anchored in landscape evolution and landscape history, emphasizes the reconstruction of buried landscapes, the characterization of archaeological formation processes, and the study of landscape degradation and human impact. Recently, Charly has also turned his attention to the interpretation of domestic space within settlement sites. The multiple strands of his approach make up a vast bibliography (some case studies can be found in his book *Geoarchaeology in Action: Studies in Soil Micromorphology and Landscape Evolution* (French 2002)) and are also well represented by the research of his former students. The latter make up a cohort of world-class geoarchaeologists that use soil micromorphology in a wide range of landscapes across Europe, Africa, the Middle East, the Americas, Australia, and Asia. Many of them are now university lecturers and researchers in different institutions around the world.

Charly's regions and countries of special research interest have included the East Anglian fenlands and the river systems that drain into them, the chalk downlands of Wessex, the Channel Islands, northern Bosnia, northwestern India, southern Patagonia, and the Ica valley of southern Peru. He is currently involved with a number of research projects: multidisciplinary investigations of Neolithic/Bronze Age environmental change in the Avon River Basin around Durrington Walls and the Kennet valley around Avebury; geomorphological and micromorphological investigations of Holocene erosion and paleosol sequences in southern Sicily, the Sava River Basin of northern Bosnia, the island of Herm (Channel Islands), and coastal and steppe regions of southern Patagonia and Tierra del Fuego in Chile; and the geoarchaeology of the Ica valley in southern Peru, as well as more site-specific investigations of settlements of the Harappan period sites in Haryana and Rajasthan provinces of northern India. The McBurney Geoarchaeology Laboratory continues to attract research students from these regions and other parts of the world.

Cross-References

► Archaeological Soil Micromorphology
► Geoarchaeology

References

French, C.A.I. 2002. *Geoarchaeology in action: Studies in soil micromorphology and landscape evolution*. London: Routledge.

Freshwater Archaeology

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Introduction and Definition

Freshwater archaeology can be defined as archaeological research that takes place in or near streams, rivers, lakes, ponds, oxbow lakes, or inundated natural and man-made features such as springs, cenotes, or flooded mines and quarries. In this venue, freshwater archaeology will not include features located in oceanic sounds, bays, gulfs, and some seas that contain brackish (mixture of fresh and salt) water. For archaeological purposes, therefore, freshwater can be defined by water at which point the average salt content, or salinity, is or remains lower than .5 ppt (parts

per thousand). Typical oceanic salt content averages 35 ppt and importantly for archaeologists, 12 ppt is the point at which typical oceanic fouling assemblages such as corals, coralline algae, shellfish, and tubeworms as well as wood borers such as shipworms, piddocks, and gribbles can no longer live.

Freshwater systems typically demonstrate high levels of artifact preservation as well as a lack of concretion and biodegradation. The preservation qualities of freshwater are largely due to the absence of chloride ions, living corals, and fewer bio-organisms that break down artifacts. Preservation can also be enhanced by cold temperatures found in the deeper large bodies of freshwater exemplified by the North American Great Lakes. However, it should be noted that as sea levels rise, due to climate change, the defined geographical parameters of fresh- and saltwater systems, particularly riparian, will become more complex.

Historical Background and Key Issues

The chronological range of archaeological sites that may be located in freshwater systems theoretically stretch to the beginnings of mans' migration from Africa. Every stream, river, and lake crossed by early humans potentially contains invaluable artifacts or evidence of habitat sites and food-gathering activities. The Little Salt Spring site in Florida suggests that some prehistoric underwater archaeology is certainly possible and remarkable finds can be made. Archaic riparian fishing activity in the form of stone fish weirs has been noted in the American Midwest. And trading routes extending from the Caribbean to the Yellowstone region can be deduced by the presence of unique artifact materials of copper, mica, flint, and seashells found in excavations far from their origin, indicating that extensive freshwater-borne trade existed in North America as long ago as 2500 years before present.

Yet there are several major problems with exploring freshwater riparian systems for prehistoric archaeological evidence. The recent Pleistocene glacial period, which only ended some 10,000 years BP, has remade much of the geography of North America, Europe, and Asia, forming most of the northern river, lake, and gulf systems we see today. These recently formed river systems are extremely dynamic and tend to flood with some regularity, periodically scrambling or eliminating much of the evidence of human activity. In one recorded archaeological case study (albeit historical), a dozen archaeologically documented shipwrecks dating to the early nineteenth century were swept away in Eastern North Carolina during the flooding from hurricane Floyd in 1999. It follows that if this happens in historic times, then it must have happened in prehistoric times, creating similar problems for archaeological interpretation. Geologists relate that it is also not uncommon, given the proper circumstances of outlying severe climatic events, for rivers to dramatically change shape in very little time. Given a long enough time frame, river systems often form a braided system of older dried courses and oxbow lakes that can be located some distance from the present watercourse. It is easily demonstrated archaeologically that many nineteenth-century North American Western riverboats lie buried under cornfields or are entombed in the mud at the bottom of oxbow lakes. It must follow that in these instances, archaeological sites, be they prehistoric or historic, have not moved, the rivers have.

Yet freshwater historic archaeology has become a growing success story, in both rivers and lakes, with more scientific data accumulated annually. Most often these successful projects use research designs that tap into data presented by well-preserved sites that lie in more stable deep-water rivers and lakes in both Europe and North America. The more recent craft and vessels of the historic period lie in greater abundance on lake and river bottoms and can be used to piece together a patchwork quilt of archaeological information extending from Roman times to the twentieth century. As in all historic archaeological study, the goal is to gather information to better interpret the lives of the people who created these artifacts. Underwater archaeology is a new profession and not well represented in some major areas of the world. This entry will, therefore, concentrate solely and by necessity on the areas

of the world where most of the freshwater archaeology has taken place, Europe and North America.

International Perspectives

European Freshwater Archaeology

It would be impossible in this small venue to discuss all of the Continental freshwater archaeological finds. At best, some of the better examples can be described and placed in a sort of archaeological/historical context. As elsewhere, European lakes and rivers offer an archaeological glimpse into freshwater human activity. And as elsewhere, these studies are often enhanced by unsurpassed freshwater preservation of artifacts and strata. It should also be noted that the concept of freshwater archaeology adds an artificial barrier that does not concern most archaeologists, who most often follow overarching research designs regardless of what environment this information is located.

Likely the first freshwater archaeological research accomplished on the Continent of Europe centered on examination of Irish and Scottish Crannogs, small artificial islands that were built over and used as dwellings from the Neolithic period onward. Crannogs were placed deliberately in lakes, rivers, and estuaries as both a means of protection and to allow humans easy access to resource use and waterborne transportation. Proto-archaeological examinations of crannogs first took place toward the end of the nineteenth century but continue to present day, where modern scientific method and theory is used to glean a great deal of archaeological data concerning Neolithic and Bronze Age life.

Some of the earliest finds in the freshwater nautical archaeology venue are log boats discovered in Britain, Denmark, Spain, France, and Germany. The earliest of these seem to date from the Mesolithic period, examples being the Pesse, Netherlands, log boat (8300 BP) and a log boat site located in Locharbriggs, Dumfriesshire, in Britain (4000 BP). Log boat finds are common in the freshwater archaeological record, and their use spans virtually all recorded history until nearly present day. Log boats were produced in large numbers and despite river changes and flooding, many still exist in riverbanks and lake bottoms. Log boats were produced to carry out all activities associated with prehistoric and historic living practices including hunting, fishing, trading, exploration, and warfare. It can be surmised that log boats became more practical to human use after the glacial retreat and the growth of large Continental forests.

Woven or skin boats were likely used before this time. The Husan boat fragments (11,000 BP) seem to be the only archaeological evidence of these craft, but they are represented in the ethnographic use of woven coracles and hide kayaks. Sophisticated intermixing of log boat, skin boat, and woven boat technologies are also hinted at in the Evanshus, Berguter, and Karelia Petroglyphs. These early craft showed such utility that they are still being produced today in some areas of the world, but importantly in this case, and in the context of freshwater environments, these craft gave humans the ability to travel great distances, turning freshwater obstacles of lakes and rivers into freshwater roadways. Log boats, skin boats, and woven vessels allowed humans to migrate while taking better advantage of the environment for production of food.

European freshwater navigation technology changed during the late Neolithic and Bronze Age as humans found a greater need to take advantage of riparian, brackish, and estuarine environments to transport a new and growing wealth of agricultural commodities. Bronze and Iron Age flats were constructed combining log boat and skin boat technology as exemplified by the Brigg Raft in Yorkshire, England, and the Polish Galar flat (2800 BP). These early examples of flat boats designed for freshwater and estuarine trade began another vessel tradition that spans the entire historic range from that period nearly to present time. Flats, scows, ferries, barges, litter freshwater and estuarine environments, and rival log boats are the most plentiful example of freshwater vessel.

During this same period, vessels were produced in Europe to take advantage of both river and cross channel trade. These stitched plank boats were lighter and likely faster to paddle than log boats, and some were designed to not only navigate up rivers but to make short dashes

carrying tin between Britain and the Continent. Good archaeological examples of these types of vessels can be seen in the Dover Boat (3300 BP) found near the River Dour and the Ferriby Boats (3300 BP and 2400 BP) found on the Humber Estuary. From descriptions given by Sean McGrail and Basil Greenhill, these vessels can best be described as large canoe-type craft that could carry up to 7 t of material and driven by a fair-sized crew of paddlers.

The Continental freshwater archaeology trail continues in the rivers of Central Europe with Roman period riparian trade vessels of Celtic design referred to as the Laiback type, best exemplified by those archaeologically excavated and recovered at Pommeroeul. These river vessels were intended to be poled and later towed by animals on the peaceful Roman period rivers of Central Europe. They were plank built and could be quite large at up to 30 m in length. Their construction, with flat bottoms and slab sides, made them ideal for rolling cargo on and off from riverbanks, but unlike the other flats previously discussed, they were narrow enough to make headway towed against the river current. It can be seen in Roman funerary reliefs that another type of vessel shared the rivers of Central Europe with the Laiback type; the Blussus Boat is pictured as a large dugout-type vessel. It was designed to be towed upstream but oared downstream. As yet there are no archaeological examples.

It should be mentioned here that a fantastic discovery was made when the Italian Lake Nemi was drained in Northern Italy in 1929. Two vessels were discovered in the lake that dated to the reign of Emperor Caligula in the first century CE. The Lake Nemi vessels were flat bottomed and over 70 m in length, but otherwise built in the Romano-Greek oceanic vessel tradition. They were likely constructed as floating temples or palaces, and although they were destroyed by fire near the end of WWII, much of the stone and ceramic work for the deck buildings was saved.

The Scandinavian tradition in boat building and ship construction was only in its infancy during the Roman period. Many of these early vessels were intended to ply both fresh- and saltwater, but here, we will concentrate on those examples found in freshwater. Classic period Viking vessels were fully capable of transitioning from a marine environment to a riparian environment, but a full discussion of these seagoing vessels and their predecessors is not possible here. However, proto-Norse vessels such as the Als boat at Hjortspring in South Denmark is a good example of an early Norse-type freshwater technological tradition. It is dated to 2350 BP and described as a dugout-type boat with additional planks added, lapstrake style, to the sides. Adding to the proto-Norse style were a carved stem and stern. Als was found in a lake along with various weapons and likely placed there as a spoil of war. Als can be placed in context with other finds from Denmark; the Bjorke Boat (2100 BP) and the nineteenth-century finds of two vessels at Nydam (dated to 310–320 CE) together give a hint at how proto-Norse vessels evolved.

Finally it should be noted that many river and lake discoveries will not be mentioned here as they involve vessel types that were never intended for inland lake and river use. The Bremen Cog, located and excavated out of the River Weser, in Germany is a good example of an archaeological project that took place in freshwater, but whose implications mostly affect marine archaeology and seagoing technology. The Thames River alone contains many archaeological sites that may be termed freshwater but relate more to the sea. Blackfriars and County Hall sites represent a Gallo-Roman marine shipbuilding tradition that is beyond the scope of this submission. Other known historic vessel types such as medieval hulks and bardes will, no doubt, be discovered, perhaps well preserved in a freshwater environment. But these vessels are, as well, of a marine oceanic technical tradition and not intended to spend their working lives in freshwater.

North American Freshwater Archaeology

American freshwater archaeology is a recent phenomenon having been conducted to date with only one generation of trained archaeologists. But these archaeologists were trained to respond to the needs of their time. The period between the common use of scuba diving gear in the 1960s and the introduction of Federal and State cultural

resource management laws in the 1980s can best be described as a period of underwater cultural resource chaos. This time period leads to the destruction and near destruction of vast amounts of submerged archaeological evidence in often well-intentioned but ill-advised attempts to salvage and or recover freshwater shipwrecks of all types. This included the eventual complete destruction of the intact Great Lakes Schooner Alvin Clark (raised in 1969) and the near destruction of the Civil War ironclad gunboats USS Cairo (raised in 1964) on the Mississippi, along with Confederate ironclads CSS Neuse and CSS Jackson (CSS Muscogee), as well as a multitude of ship parts and machinery from other sites. It should be noted that although these Civil War ironclad gunboats were eventually saved, preserved, and curated, their complete destruction due to lack of preservation funding hung in the balance. Given this, a large amount of freshwater archaeological data has, since the 1980s, been retrieved in America's inland fresh waterways, and our understanding of maritime trade, ship construction, and history has been greatly enhanced.

In North America, freshwater archaeology can be divided between freshwater lakes and the great river systems that span the country. These freshwater systems were often commercially interconnected yet were serviced by unique freshwater technologies and ship classes that evolved to service an area's individual geographic needs. It is, therefore, most meaningful to organize this entry into a section concerning the Great Lakes and juxtapose that discussion with a section concerning American River Transportation.

The Great Lakes

The Great Lakes of North America consist of five large interconnected lakes that contain 94,500 m^2 (244,754 sq. km) of inland freshwater sea. The combined lake shores stretch for thousands of miles forming a partial boundary between Canada and the United States. The Great Lakes combined create the world's largest freshwater body exceeding 1300 ft. (396 m) in depth in Lake Superior. The upper lakes of Huron, Michigan, and Erie are on average 570 ft. (174 m) above sea level, while Superior is elevated an additional 20 ft. (6.1 m). Lake Superior became economically connected to the other lakes in 1856 by the busiest lock system in the world at Sault Ste. Marie. The lower easternmost lake of Ontario is 245 ft. (75 m) above mean sea level. Ontario receives the runoff of the Western lakes over the great cataract of the Niagara Falls located in Western New York State. Navigation, however, is made continuous with the other lakes by the Welland Canal system in Canada that bypasses the falls. Since 1825, the Atlantic port of New York has been connected to the Great Lakes via the Hudson River and the Erie Canal, while today, larger vessels can navigate from the Atlantic Ocean into the Great Lakes via the St. Lawrence Seaway.

Professional freshwater archaeological studies began on the Great Lakes in 1985 in Wisconsin waters near Bayfield with the publication of the first of several reports put out by the Submerged Cultural Resources Unit of the National Park Service – the *Submerged Cultural Resources Site Report: Noquebay*, by Toni Carrell. In all, three reports emerged from these efforts outlining the condition and relevant histories of several shipwreck sites in Lake Superior. It should be noted that unlike European studies that tend to concentrate on prehistoric occupation and freshwater vessels, American studies have remained within the historic archaeological realm. Dugout canoes and prehistoric artifacts no doubt exist in the lakes' area but as yet have received little archaeological attention.

At nearly the same time, a branch of the Wisconsin State Historical Society (WSHS) became charged with examining and managing the shipwrecks located on the State's bottomlands in both Lake Superior and Lake Michigan. The first of these management efforts took place in 1985 with a collaborative study conducted by the WSHS and East Carolina University (ECU) on the Schooner Fleetwing site. This single wreck study was published by David Cooper in 1988, as *ECU Research Report #6 The 1986–1987 Archaeological Survey of the Schooner Fleetwing Site, 47DR 168, Garrett Bay, Wisconsin*. This began an ongoing 28-year collaboration between East Carolina University and the State of Wisconsin that has

produced to date 4 books, 14 Master's theses, and an additional 12 collaborative and independent reports that can be accessed through the Wisconsin Historical Society and ECU websites.

Since that time, additional collaborations have been forged between the aforementioned entities and the Federal NOAA Marine Sanctuary at Thunder Bay; the Michigan State Department of History, Arts, and Libraries; the Rodger's Street Museum; and the Wisconsin Maritime Museum. Other organizations conducting freshwater archaeology and collaborations on the lakes include Texas A&M University (TAMU), Parks Canada, Wisconsin Sea Grant, as well as private nonprofit groups such as Save Ontario's Shipwrecks, and the Great Lakes Historical Society.

Freshwater archaeological research on the Great Lakes began with site-specific projects aimed at recording individual shipwrecks. This research was often driven by cultural resource management needs to identify the extent of the submerged resources on state bottomlands. Additional efforts soon branched to include systematic remote sensing surveys such as those conducted by the SHSW.

Site surveys of shipwrecks combined with and underlined by sound background historical studies have given, since then, a more focused view of the maritime history and archaeology of the Great Lakes. These studies demonstrate that during the nineteenth century, freshwater vessels transitioned or technologically evolved from generic sailing craft, that would have been at home in any oceanic environment, to vessels that were specifically designed to meet the needs and varying niches of the economic and geographic restraints placed on them. History and archaeology have demonstrated that nineteenth-century freshwater ships diversified in design and evolved via the increasing influence of large shipping and railroad companies.

The following descriptions of nineteenth-century vessel types are placed here in the historic order that they appeared. It should be noted that not all of the archaeological evidence for these vessel classes can be cited in this venue. The sustained and systematic exploration of the following identified vessel types follows the basic research design set into motion in 1985. It should also be noted that site-specific research has evolved to now include more salient overarching questions of culture, economics, and human systems interaction.

The Millecoquins vessel is named for the stream in Michigan's Upper Peninsula where it was found. Likely a brig or topsail schooner, the wreck is located several hundred meters from Lake Michigan where it was likely blown in a gale. This small vessel exemplifies the generic trading ships of the early nineteenth century and is largely intact and still contains its cargo of salt fish in barrels within the hold. Its dimensions of 65 ft. (19.8 m) by 24 ft. (7.3 m) with a five-foot (1.5 m) draft would have allowed it to navigate the unimproved harbors and river mouths of the Great Lakes. It had no centerboard, a sailing improvement adapted from the coast in the late 1830s and 1840s. It also contained an American penny in the mast step dated to 1833. This owner/operated vessel likely traded with various fishing camps located along the lake shores.

By the mid-nineteenth century, sailing vessels on the lakes increased in size and carrying capacity very dramatically and also diversified in form and function. This was made possible by an increased use of iron in construction, improved harbor infrastructure, and the use of centerboards. The addition of an internal centerboard (originally located beside the keel keelson structure and eventually moved to actually penetrate through the center of the ship) allowed better use of the fore-and-aft schooner rig that became predominant in lakes sailing vessels. These freshwater schooners evolved to become various classes known as Canal Schooners, Lumber Schooners, and, largest of all, the Grain Schooner and Schooner Barge. Smaller flats were also schooner rigged to service unimproved shallow water ports; these were known as Scow Schooners. All of these vessel types have now been archaeologically documented in site-specific archaeological projects, in many instances demonstrating the sophisticated nature of the designs. But sail was not the only type of power in use on the Great Lakes.

The use of steam had a great influence on nineteenth-century freshwater inland navigation.

Each of the following steamship classes has also been archaeologically documented in site-specific projects. Since there are few if any remaining plans for these early ships, the archaeological data is sometimes the only way to tell these ship classes from one another when a new site is located.

The geography and natural resources of the Great Lakes area allowed steamship companies to operate early inefficient steamships at great profit. Several factors allowed steam to compete and even dominate sail on the lakes much sooner than it could in an oceanic environment. First, distances between ports, though it could be hundreds of miles, were considerably less than that on the ocean. In addition, the boilers had all of the freshwater they could consume without the need to worry about salt buildup, while fuel was found in the abundant forest reserves that crowded the shoreline. A variety of classes of steamer have been archaeologically studied on the Great Lakes and include large passenger paddle wheelers known simply as Steamers. These vessels specialized in passenger transportation between the 1820s and the Civil War and were responsible for much of the migration westward in the nineteenth century.

Steam Barges or Lumber Hookers originated in the late 1840s and quickly found a niche towing heavily laden lumber schooners in what became known as the consort system. The consort system speeded transportation of lumber from the great pineries of the American Midwest to the east via the lakes. The Steam Barge towed as many as seven lumber schooners in line astern, alleviating the need for each schooner to carry a full crew. A Steam Barge, as is seen archaeologically, is simply a schooner hull, sometimes complete with centerboard, into which a single cylinder direct-acting steam engine, propeller, and boiler were added. Outwardly early Schooner Barges were given a deckhouse aft but later sported houses both fore and aft much like their technical progeny the Bulk Carrier. Internally, however, they remained for all intents and purposes, a schooner with a steam engine.

As mentioned, Bulk Carriers evolved on the Great Lakes from Steam Barges, the first being produced in 1869. Unlike Steam Barges, however, bulk carriers grew to enormous size to carry all of their cargo internally. Steam and propeller driven, these vessels pioneered large open cargo holds to accommodate fast and easy loading of unpackaged bulk commodities such as grain, stone, coal, and ore. It is not uncommon for these wooden vessels to exceed 200 ft. (61 m) in length with a 50-ft (15.2 m) beam and a 24-ft (7.3 m) depth of hold. Internally they evolved a very sophisticated support structure unlike anything produced for any other type of wooden vessel. Bulk Carriers are still in use today and when they transitioned to much stronger iron and steel hulls at the turn of the twentieth century, they became truly enormous; today some exceed 1000 ft. (305 m) in length.

One more lakes vessel class has been identified archaeologically and deserves short mention here, the Propeller or Passenger/Freight Propeller. These were fast, well-appointed medium-sized ships of less than 200 ft. (61 m) and a high length to beam ratio. Their purpose in the 2nd half of the nineteenth century was to extend passenger and manufactured freight rail service to the harbors and ports on the lakes that did not yet have rail.

North American River System

As happened in the Great Lakes, the period before adequate cultural resource management practice in the 1960s and 1970s opened a Pandora's box of sporadic riverboat recoveries in the American West. Riverboats Bertrand (1865) and Arabia (1856) were excavated on land (as the river had moved since their sinking), and partially recovered. The material remains of these vessels have made for spectacular historical museum exhibits by the organizations that recovered them, but unfortunately, much of the archaeological information concerning the construction and engineering of these vessels has been lost in their excavation. Many other sites were partially salvaged for their artifacts, engines, and boilers. But these sites do highlight the fact that rivers offer a unique opportunity for archaeological study. The preservation qualities of freshwater are well documented, and if the site can be placed in a holistic context, archaeologists are often offered

a greater potential to study the integrated maritime cultural landscape as it extends from the shoreline.

Sites included in this genre of research include abandoned and wrecked vessels, plantation landings, town waterfronts and submerged infrastructure, wharf and dock structures (some of which include abandoned vessels), bridge structures, and nearshore settlements and trading posts. Each of these types of study offers unique insight to human habitation. Yet it should be noted that although archaeological studies have taken place on all of these types of sites, they have not received the same professionally planned systematic research attention that the Great Lakes has received.

Riparian archaeological attention first centered on a wrecked steamboat with George Bass's 1980 survey of the Steamboat Black Cloud in the Trinity River in Texas. At nearly the same time, Gordon Watts conducted a visual and remote sensing survey of an area near historic Fort Fisher also in 1980 and followed this with an abandoned ferryboat survey in the N.E. Cape Fear River in North Carolina in 1986. These surveys contributed to the research design for the Yorktown Shipwreck Archaeological Study of an abandoned British seagoing collier of the Revolutionary period in the brackish water of the York River in Yorktown, Virginia. The project, under direction of John Broadwater, was conducted within a steel cofferdam between 1983 and 1994. Although the cofferdam made it possible to deal with the low visibility and currents of the river, it proved too expensive for routine river archaeology.

During this early period, scattered systematic remote sensing river surveys followed in the Delaware River near Philadelphia and White Oak River in Southeast North Carolina. Many abandoned and wrecked vessels were located in these surveys ranging from iron- and steel-hulled oceangoing ships of the late nineteenth centuries to canoes, johnboats, and flats from much earlier periods. In fact, the diversified nature of riparian submerged cultural resources and the difficulties involved in working black and brown water river sites tended to slow the development of a riparian archaeological tool kit. Archaeologists needed techniques to help them deal with lack of visibility, fast currents, and the location of sites that sometimes were not only submerged but also lay under several meters of flowing and viscous silt.

The study and excavation of the Maple Leaf site in the St. Johns River in N.E. Florida near Jacksonville between 1992 and 1994 became a test platform for riparian excavation techniques in the USA. The Maple Leaf project was a collaborative effort between the private nonprofit St. Johns Archaeological Expeditions and East Carolina University. During this project, Rodgers and Cantelas designed a portable prefabricated underwater cofferdam system that could be assembled in place on the wreck site. It was used in conjunction with surface-supplied air and underwater communications gear to excavate the vessel under 20 ft. (6.1 m) of black water (rich in tannins) and 8–10 ft. (2.4–3.0 m) of silt. The techniques, which included carrying clear plastic bags of water in order to see gauges, slate drawings, and tape measures, proved workable, successful, and inexpensive but required skilled technicians and many hours of labor.

Riparian archaeology continued with the examination of a ship's graveyard at Castle Island in the Tar/Pamlico River near Washington, North Carolina, between 1998 and 2002. Over a dozen southeastern river and estuarine working craft from sailing canoes to sharpies, oyster boats, and schooners dating from the early nineteenth century were recorded archaeologically. This collection included one unique style flat-bottomed, sloped-sided stern-wheeled river steamer later identified as an up riverboat. Another example of this class of craft was recorded in the Tar River near Old Sparta, North Carolina, between 2008 and 2010.

Although most of the freshwater river archaeology conducted in the United States has taken place in the Southeast, sporadic finds and work in Western Rivers are continuing, and finds continue to this day. Wreck sites on the Red River and the Missouri River have revealed an early low-pressure side-wheeler (TAMU) as well as the Montana (1879), the largest Mountain Steamer ever constructed and documented by ECU in 2003. Very recent finds have drawn the attention

of archaeologists to steamboat remains on the banks of the Yukon River. As can be seen, although conditions can be challenging, freshwater archaeology continues in the United States and other places around the world.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Deep-Water Archaeology
- ▶ Maritime Archaeological Organizations
- ▶ Maritime Contact Rock Art
- ▶ Maritime History
- ▶ Maritime Iconography
- ▶ Maritime Landscapes
- ▶ Plantation Archaeology
- ▶ Ship Archaeology
- ▶ Shipyard Archaeology
- ▶ Society of the Ship
- ▶ Underwater Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

Further Reading

Adams, R.M. 1980. *Survey of the steamboat Black Cloud*. Austin: Texas A&M University.

Avery, T. 1974. *The mystery ship from 19 fathoms: The discovery and resurrection of the Alvin Clark, part of a missing chapter in Great Lakes history*. Michigan: Avery Color Studios.

Barton, D.F. 1995. The Dyreson fish weir on the Yahara river. *Yahara Watershed Journal* 1: 14–16.

Bazzill, D.M. 2007. *The missing link between sail and steam: Steambarges and the Joys of Door county, Wisconsin*. Research Report 19. Columbus: PAST Foundation.

Brehm, V., ed. 2001. *A fully accredited ocean: Essays on the Great Lakes*. Ann Arbor: The University of Michigan Press.

Carrell, T. 1985. *Submerged cultural resources site report: Noquebay*. Sante Fe: National Park Service.

Cooper, D.J. 1988. *1986–1987 archaeological survey of the Schooner Fleetwing site, 47 DR168, Garrett Bay, Wisconsin*. ECU Research Report 6. Greenville: East Carolina University.

Cooper, D.J. 1989. *Survey of submerged cultural resources in northern Door County: 1988 field season report*. Madison: State Historical Society of Wisconsin.

Cooper, D.J. 1991. *By fire, storm, and ice: Underwater archaeological investigations in the Apostle Islands*. Wisconsin: State Historical Society of Wisconsin.

Cooper, D., and J. Jensen. 1995. *Davidson's Goliaths: Underwater investigations of the steamer Frank O'Connor and the Schooner- Barge Pretoria*. Madison: State Underwater Archaeology Program.

Cooper, D.J., and B. Rodgers. 1990. *Report on phase 1 marine magnetometer survey in Death's Door Passage, Door County, Wisconsin*. Wisconsin: Wisconsin Historical Society.

Corbin, A., and B. Rodgers. 2008. *The steamboat Montana and the opening of the West: History, excavation, and architecture*. Gainsville: University of Florida.

Dappert, C.P. 2006. *Oaken whale with a cast iron tail: The single-decked wooden bulk carrier Monohansett*. ECU Research Report 13. Greenville: East Carolina University.

Fleetwood, W.C. 1995. *Tidecraft: The boats of South Carolina, Georgia and northeastern Florida, 1550–1950*. Tybee Island: WBG Marine Press.

Friedman, A.D. 2008. *The legal choice in a cultural landscape: An explanatory model of the Roanoke River, North Carolina*. ECU Research Report 20. Greenville: East Carolina University Program in Maritime Studies.

Gardiner, R. 1996. *The earliest ships: The evolution of boats into ships*. London: Conway Maritime Press.

Greenhill, B., and J. Morrison. 1995. *The archaeology of boats and ships*. Annapolis: Naval Institute Press.

Kane, A.I. 2001. *The western steamboat: Structure and machinery, 1811 to 1860*. Austin: Graduate Studies of Texas A&M University.

Labadie, C.P. 1989. *Submerged cultural study: Pictured rocks national lakeshore*. Professional Papers 22. Sante Fe: Southwest Cultural Resources Center.

Meverden, K.N., and T.L. Thomsen. 2005. *Wisconsin's cross-planked mosquito fleet: Underwater archaeological investigations of the Scow schooners Iris, Ocean Wave, and Tennie and Laura*. Madison: Wisconsin Historical Society.

Meverden, K.N., and T.L. Thomsen. 2010. *Small boats on a big lake: Underwater investigations of Wisconsin's trading fleet 2007–2009*. Madison: Wisconsin Historical Society.

Pollack, J.C. 2008. A catalogue of historic sternwheeler wrecks and Hulks in the Yukon. Institute of Nautical Archaeology File Report INA-124-2008/1.

Rodgers, B.A. 1995. *The 1995 pre-disturbance wreck site investigation at Claflin Point, Little Sturgeon Bay, Wisconsin*. ECU Research Report 10. Greenville: East Carolina University.

Rodgers, B.A. 1996. *Guardian of the great lakes: The U.S. paddle frigate Michigan*. Ann Arbor: The University of Michigan Press.

Rodgers, B.A., and R.T. Green. 2003. *Of limestone and labor shipwrecks of the stone trade: The 1999 Bullhead Point stone barge investigations Sturgeon Bay,*

Wisconsin; phase II- pre-disturbance underwater archaeological site report. ECU Research Report 11. Greenville: East Carolina University.
Rodgers, B.A., and N. Richards. 2006. *The Castle Island ship's graveyard: The history and archaeology of eleven wrecked and abandoned watercraft; phase II-pre-disturbance underwater archaeological site report*. ECU Research Report 14. Greenville: East Carolina University.
Rodgers, B.A., J.D. Moore III, A. Corbin, J. D. Piero, and A. Pietruszka. 2006. *From quarry to quay: Shipwrecks of McCracken's Cove; the 2001–2002 Sturgeon Bay wreck and wharf investigation at the Birmingham site*. ECU Research Report 17. Greenville: East Carolina University.
Rodgers, B., T.R. Hicks, and E. Wyllie. n.d. *Enigma of the Old Sparta vessel: The phase II pre-disturbance archaeological survey of a tar river steamboat*. Greenville: East Carolina University Program in Maritime Studies.
Thompson, M.L. 2000. *Graveyard of the lakes*. Detroit: Wayne State University Press.
Watts, G.P., Jr., and W.K. Hall. 1986. *An investigation of Blossom's Ferry on the Northeast Cape Fear River*. ECU Research Report 1. Greenville: East Carolina University.

From Sautuola to Cartailhac

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Introduction

"Papá, bueyes!" – This exclamation of María Sanz de Sautuola (1870–1946) gave way to a discovery that changed the view of the Paleolithic as much as it rarely happens in the history of science (Fig. 1 (left)). Around 1868, Modesto Cubillas Pérez (1820–1881) discovered the cave of Altamira and later informed Don Marcelino Sanz de Sautuola (1831–1888) of his discovery. Sautuola was a graduate jurist and was academically educated (Fig. 1 (right)). He was particularly interested in regional history and natural sciences. He introduced the cultivated eucalyptus tree to Cantabria, and for many years he was Vice-Chairman of the Provincial Monuments Committee. He collected antiques, fossils, and minerals (Sanz de Sautuola et al. 2004). After having heard about the discovery, he was particularly interested in investigating the cave. The estate of Altamira, which means "High View" in Spanish, extends over slightly sloping high-altitude meadowland about 4 km from the northern Spanish coast, near Santillana del Mar in Cantabria, about 30 km west of Santander. Under the estate, an underground system of caverns and narrow corridors winds through the limestone rock.

Sautuola began the first investigations of the cave in 1875. He concentrated his work on the floor of the cave and found some bones and stone tools. In 1878 he visited the Paris World Fair and saw the Anthropological pavilion where prehistoric artifacts from various excavations in France were exhibited. During this occasion, he spoke to the French prehistorian Édouard Piette (1827–1906) who gave him advice on what he should pay attention to while investigating the cave. Inspired by this conversation, Sautuola reentered the cave and examined it more thoroughly. He discovered that the entrance led to several galleries with different lateral branches. Farther back, these galleries tapered to a long, narrow, winding corridor about 50 m long, so that the entire cave system reached a total length of about 300 m (Sanz de Sautuola et al. 2004).

One day in 1879, when he took his 9-year-old daughter María with him, she went to a low cave hall, which her father had examined before. The father had to crawl on all fours and concentrated his work on the floor, but the child could stand upright. When she looked up, on the ceiling she recognized colorful paintings that her father had not noticed before. The red-brown figures of nearly two dozen bison huddled in the flickering lamplight (Figs. 3 and 5).

Definition

The discovery of the cave of Altamira marks a crucial step in the exploration of the Paleolithic. It opened our eyes to an important genre of human cultural achievements in prehistory. Rock art is not only a vast field of exploration today, but it is

From Sautuola to Cartailhac, Fig. 1 Maria (left) and Don Marcelino Sanz de Sautuola (right)

also evidence of a cultural practice by many prehistoric and modern peoples of the earth. Rock art, or parietal art, is a generic term for a number of art expressions, which share the fact that they are attached to natural rock walls. These can be rock walls in open terrain, in rock shelters, or in deep caves. Different techniques can create the images: painting, airbrushing, drawing, engraving, carving, or "finger-fluting." In most cases, a mixture of different techniques is applied. In Paleolithic rock art, often the natural form of the rock is used to give volume to the depictions and create three-dimensional impression. Thematically, mostly animals and humans appear. A large part consists also of negative and positive hand imprints. Geometric signs are abundant and accompany the figurative depictions. Concerning the motivation for creating rock art, different theories exist. They range from magical/ritual practices, initiation rites, and shamanistic practices of individuals and during group gatherings, as means for the expression of group affiliation, manifestations of history and mythology, landmarks, to large symbolical communications systems.

Historical Background

Archaeology was still a young science in the nineteenth century. After archaeological and various other "exotic" remains were collected for curiosity cabinets of European courts, the authorities established the first museums. The curators of these institutions were facing the problem of bringing order into the hundreds and thousands of objects. The Danish archaeologist Christian Jürgensen Thomsen (1788–1865) sorted the collections in his care according to their material and developed the so-called three-age system of Stone Age, Bronze Age, and Iron Age, which is still valid today. In the early 1830s, the geologist Charles Lyell (1797–1875) developed the stratigraphical method for determining relative chronologies for geological deposits (Lyell 1830). In 1838, Jacques Boucher de Crèvecoeur de Perthes (1788–1868) carried out the first systematic excavations in the Somme Valley (France). From 1847 on, he applied the stratigraphical method for determining the relative chronology of his finds and stated that man-made artifacts in association with animal remains in old geological layers prove that human existence reaches far beyond the biblical timespan (Boucher de Perthes 1847–1864). Although his observations and results were strongly criticized, more and more scholars and clergymen became interested in the study of caves, rock shelters, and open-air sites. In 1860, after having excavated the cave of Aurignac, Édouard Armand Lartet (1801–1871) proposed a first chronological subdivision of the

Paleolithic based on different *Leitfossilien* he found in his excavations (Lartet 1861). In 1865, John Lubbock, 1st Baron of Avebury (1834–1913), divided the Stone Age into the period of the knapped stone, "the Paleolithic," and the period of the polished stone, "the Neolithic" (Lubbock 1865). Later, it was Gabriel de Mortillet (1821–1898) who established the subdivision and succession of different Paleolithic periods (de Mortillet 1883).

With Charles Darwin's (1809–1882) publication *On the Origin of Species by Means of Natural Selection, Or, The Preservation of Favored Races in the Struggle for Life* (Darwin 1859), the world was shaken. For the first time, the biblical view (according to which God created the earth and all living beings immutably and assigned their place in the world a few thousand years ago with (Western) Man at the top) was called into question. In *The Origin of Species*, Darwin hints to the possibility that humans are the result of evolution in the sentence: "Light will be thrown on the origin of man and his history" (Darwin 1859, 424). Evolution of animals was a revolutionary thought; the evolution of humans was blasphemy. The phylogenetic proximity of humans and primates was expressed in detail by Thomas Henry Huxley (1825–1895) in *Evidence as to Man's Place in Nature* (Huxley 1863) and later in Darwin's *The Descent of Man, and Selection in Relation to Sex* (Darwin 1871). Here, Darwin refers to the archaeological investigations of Boucher de Perthes (1847–1864), Charles Lyell (1863), and John Lubbock (1865), and compares "civilized races," thus Western societies, with "savages," and classifies the latter as lesser developed.

Fossil humans were discovered long before Darwin's publication, but remained unnoticed by science. One particular find, however, stimulated minds. As early as 1856, 3 years before the publication of *The Origin of Species*, workers in limestone quarries found bones in the so-called Kleine Feldhofer Grotte in the Neander Valley near Mettmann (North Rhine-Westphalia, Germany), which they first thought were the remains of a bear. The remains were given to a local teacher and naturalist Johann Carl Fuhlrott (1803–1877). Already after initial investigations, Fuhlrott stated that these must be the bones of an ancient human form. In 1857 the anatomist Hermann Schaaffhausen (1816–1893) from Bonn examined the bones and came to the same conclusion (Schaaffhausen 1858). The bones were presented to the scientific community, but there were strong doubts about the age of this skeleton. One of the most important opponents was the anatomist Rudolf Virchow (1821–1902) from Berlin, who in 1872 completely denied that the find was an ancient human and stated that the particularities of the bones and the cranium were caused by pathological conditions. Until his death, he did not accept that the bones from the Neander Valley and other finds belonged to a primitive human form. Virchow was a strong opponent of the theory of evolution, which was not compatible with his social-liberal convictions. In the coming years, Fuhlrott and Schaaffhausen had to deal with strong hostility from scholars. It was thanks to the investigations of Huxley (1863) and Lyell (1863) that this find further received scientific attention.

The question of the age of human bones and artifacts, and whether humans had lived with extinct – so-called antediluvial – animals such as mammoths occupied the mind of the scientific world in the 1860s. It was Édouard Lartet who discussed this question in detail in 1861 in his publication *Nouvelles recherches sur la coexistence de l'homme et des grands mammifères fossiles réputés caractéristiques de la dernière période géologique* (Lartet 1861). A spectacular find from 1864 confirmed this assumption with convincing force: in the French site La Madeleine, the fragment of a tusk with a detailed engraving of a mammoth was discovered. This object, together with other examples of mammoths represented in mobile art like from Laugerie-Basse or Bruniquel, undoubtedly proved that the artists must have seen these animals during their lifetime (Lartet 1865). Despite some scientific resistance, the exhibition of these pieces at the Paris World Fair in 1867 led to the general acceptance of the simultaneity of humans and extinct animals, and the recognition of works of art from the so-called *l'époche du renne* (Lartet 1861).

These and many other milestones in the early history of prehistoric research led to a

confrontation with the prevailing biblical view on the genesis of humans. The possibility of human evolution challenged self-understanding in the Western world. This caused many controversies and oscillations between modernism and evidence-based science but also conservatism and rejection or even ridicule of new insights. In addition, Western scholars had a feeling of superiority toward other allegedly less developed peoples. On one hand, colonialism stimulated confrontation with other cultures, raised curiosity, but always in the context of the inferiority of the "less" developed culture. On the other hand, archaeological research led to more and more knowledge about Europe's own "primitive" past, which confronted scholars with the need to explain and justify the "superior" status of Western culture. Both ultimately paved the way for unrestrained racism. Evolutionistic, naturalistic, humanistic, clerical, and creationist visions competed in the scientific world, sometimes even merging in the convictions of individual scholars.

Key Issues/Current Debates

Paleolithic Mobile Art

Already in the first excavations, particularly in southwestern France, archaeologists found objects that did not quite fit into the picture of "primitive savages." According to popular beliefs, cultural performance in early societies had to be underdeveloped, and since art was considered to be one of the highest forms of cultural expression in the nineteenth century, the presence of figurative representations in Prehistoric deposits was an intellectual challenge. Édouard Lartet undertook excavations in, among others, Massat (Dept. Ariège), Le Moustier, Laugerie-Basse and Laugerie-Haute, Pech-de-l'Azé, and La Madeleine (Dept. Dordogne) (Lartet und Christy 1864, 1865). Many of these sites delivered skillfully decorated objects. The abovementioned engraved mammoth from La Madeleine offered unquestionable proof of the coexistence of humans and extinct animals (Lartet 1865). Other researchers added objects of this kind, like sculpted spear throwers from the Abris de Bruniquel, or the first prehistoric female figurine found, called the "Venus impudique," which was excavated in 1864 by Marquis Paul de Vibraye (1809–1878) in Laugerie-Basse. These artifacts testified that Prehistoric people were capable of artistic expressions and produced them regularly and skillfully. Art historians and scholars denied any deeper meaning with the artifacts and explained it in the sense of the then common *Zeitgeist* as "l'art pour l'art" – as a self-sufficient, aesthetic pleasure. Paleolithic or "primitive" men – more animal than human – lacked the capacity for developing religious ideas and expressing them in symbolic representations. Lartet and Christy developed a theory about the origin of art (Lartet und Christy 1864). They stated that art emerged in an ecologically favorable situation in which humans increasingly became independent of nature and used the free time to develop their aesthetic talents in a playful way. Producing art was a personal, and not a social, matter, and particularly gifted individuals became "artists."

The Debate About Altamira

In 1878, Sautuola had visited the Paris World Fair. He was interested in prehistoric objects from French excavations. Among them were examples of mobile artworks that have been recognized by the scientific community recently. After his daughter discovered the paintings in Altamira in 1879, he remembered these objects. The stylistic similarities between the mobile art and polychrome paintings in Altamira made Sautuola suspect that those are of Prehistoric age. In the paintings, which are executed on bumps and depressions of the ceiling and give the pictures a three-dimensional expression, Sautuola saw an echo of the animals depicted on the mobile objects. He consulted the Madrid geologist Juan Vilanova y Piera (1821–1893), who interestingly was a creationist (Sanz de Sautuola et al. 2004) but nevertheless shared Sautuola's opinion on the paintings in Altamira. In 1880, Sautuola published his discovery under the title *Breves apuntes sobre algunos objetos prehistóricos de la provincia de Santander* (*Brief Notes on Some Prehistoric Objects of the Province of Santander*) (Sanz de Sautuola 1880).

In *Breves apuntes*, Sautuola first describes the discovery of a cave at Revilla, where he carried out his own excavations. Among others, he found stone artifacts, animal teeth and bones, shells (*Patella* sp.), as well as modern bricks, tiles, earthenware, and prehistoric ceramics. The report on the cave of Altamira begins with a description of its location and extent of the galleries. In the main gallery, Sautuola describes a large deposit consisting of *Patella* sp., sea snails, animal bones and teeth, antlers, boulders, and stone artifacts in a layer of black ash material of about 1m thickness. He draws a comparison to Danish Kjökkenmöddings but refers explicitly to the lack of ceramics in the findings from Altamira. He then turns to the description of the paintings, which are located on the ceiling (Fig. 3). He discusses the size, the pigments used, and the animal species presented. He identifies most of the animals as bison. He describes the paintings as "produced with considerable skill" and that the artist "had a steady hand and there are no signs of vacillation. On the contrary, each trace was produced with one clean stroke, in spite of the irregular surface of the cave ceiling and whatever the tools the artist may have used to depict the animals" (translation in Sanz de Sautuola et al. 2004, 82). Next, he explains the different postures the artist must have taken – either kneeling or stretching up to the ceiling – and the fact that artificial lighting was necessary. For the second gallery, he mentions four geometric paintings in black and red (Fig. 4). In the third gallery, he describes fallen rocks and a single painting and in the fourth two more pictures. The access to the fifth gallery is particularly difficult, as one can only get in on all fours. In the small hall are numerous scratch marks, which Sautuola characterizes as made with a sharp tool. Not recognizing any patterns, he is considering the possibility that these could also be made by bats. In addition, he speaks about polished areas on the walls, which could have been caused by the rubbing of humans or animals. Consequently, and because of the presence of fallen blocks, he assumes that the entrance to this gallery must have been larger in prehistoric times. The ceiling of this gallery is covered with a thin layer of clay, with grooves that presumably were applied with fingers. He also describes five more paintings. When passing through the galleries, with the exception of gallery 1, black outlines are seen to the left and right, which correspond to each other.

In his conclusion, he states that the cave must have been inhabited either over an extended period of time or by a large number of people, proven by the abundance of animal bones and artifacts. In the different states of erosion of organic artifacts, Sautuola sees an indication for repeated settlement over a long time span. Concerning the quality of the paintings, he states that they are much finer in the first gallery than in the others. Nevertheless, he assumes that they have been applied simultaneously. The more difficult question to him is if the paintings and the archaeological layers correspond in time. Although he mentiones the excellent state of preservation of the paintings as an argument for a much later age than the deposition of the artifacts, he emphasizes that ocher pieces were found in the layers that could have been used for the paintings. To him, the fact that prehistoric humans were able to represent themselves and animals in mobile art carved in osseous materials offered uncontestable evidence that these people were capable of painting the same on cave walls. Although the presence of the extinct bison in the region was not yet proven, he quotes Georges-Louis Leclerc de Buffon (1707–1788), who attests to the presence these animals in many parts of Europe. He does not rule out the possibility that the paintings are of modern origin, but he argues that the cave was completely unknown at the time of its exploration. He does not doubt that the pictures are very old. The fingerprints in gallery 5 are especially in favor of this, as well as the fact that in gallery 1 there are animals that do not appear in the region around Altamira today. He classifies both caves mentioned in *Breves apuntes* as Paleolithic.

Initially, Sautuola's discovery was acknowledged by the public. Even the Spanish King Alfonso XII (1857–1885) visited Altamira. But shortly after, the first critics raised their voice. The strongest and most direct hostility came

from the regional scholar Ángel de los Ríos (1823–1899) in the Cantabrian press. He represented a conservative, religious viewpoint; this controversy took on slanderous tones. He accused Sautuola of having charged the artist Paul Ratier (1832–1896) with the forgery, whom he had entrusted with producing copies of the paintings and who regularly visited the cave (Figs. 3 and 4). The head of the Spanish National Chalcography Institute, Eugenio Lemus y Olmo (1843–1911), said that the paintings of Altamira were "the work of a mediocre disciple of modern art who neither knows how to pretend nor anything about the prehistoric period: it seems they wanted to simulate this period and [. . .] recruited the least appropriate artist to do so" (citation and translation in Sanz de Sautuola et al. 2004, 57). The *Institución Libre de Enseñanza* concluded that the paintings of Altamira were the product of Roman soldiers who sought refuge in the cave during the Cantabrian wars (29–19 BC). Also the debates under the auspices of the Spanish Natural History Society ended by denying the prehistoric age of the paintings (Sanz de Sautuola et al. 2004). Outside of Spain, French specialists were determined to reject the hypothesis of Sautuola, and his presentation was loudly mocked at the Prehistoric Congress of 1880 in Lisbon. The paintings seemed too old, too magnificent, too well made, and too well preserved. Even the support of renowned scholars like Juan Vilanova and Édouard Piette did not help him (Sanz de Sautuola et al. 2004).

Émile Cartailhac (1845–1921) was one of the most important and influential prehistorians of his time (Fig. 2). He conducted excavations at the dolmens of Aveyron, in Portugal, Iceland, and the Balearic Islands. He was the curator of the Prehistoric Department of the Paris World Fair in 1867 and chief editor of the magazine *Matériaux pour l'histoire naturelle et primitive de l'homme*. From 1882 he taught at the University of Toulouse, and in 1897 he became curator of the *Académie des Jeux floraux*, the oldest scientific society in Europe. He co-founded the Saint-Raymond Museum in Toulouse and was one of the first editors of the journal *L'Anthropologie*. Cartailhac was one of the strongest opponents of

From Sautuola to Cartailhac, Fig. 2 Émile Cartailhac (Muséum de Toulouse)

Sautuola's discovery. He sent the paleontologists Édouard Harlé (1850–1922) to inspect the paintings of Altamira. Harlé reported that although the archaeological deposits in Altamira were indeed Paleolithic, the paintings were modern (Sanz de Sautuola et al. 2004). Cartailhac called the paintings a "vulgar prank of a dauber" – it would not even be worthwhile to look at the pictures. His rejection led to the cave of Altamira and its explorer Sautuola to be tacitly ignored at all congresses. The excellent preservation seemed to confirm their suspicions, and scholars did not believe that "primitive" humans were capable of such great works. Small carvings without symbolic content were acceptable; great paintings removed from the traces of everyday life in caves, executed with large effort and care, probably as parts of rituals, were inconceivable. And so the cave of Altamira fell into oblivion for more than 20 years. Pained and stunned by the rejection of the scholars, Sautuola had the cave closed. He died in 1888, embittered and without his discovery being recognized.

The Acceptance: *Mea culpa d'un sceptique*

Cartailhac remained unyielding. Even when Édouard Piette, who was convinced of the authenticity of the paintings in Altamira, asked him a year before Sautuola's death to review his assessment, he did not engage. It took about 20 years until it came to reconsideration. Similarly to the history of scientific acceptance of the Neanderthal skeleton, more and more Paleolithic painted caves were reported. In 1895, the cave of La Mouthe (Dept. Dordogne) was discovered, containing paintings and engravings of bison and a beautiful stone lamp whose dating to the Ice Age was beyond dispute. Further caves were discovered: in 1896 Pair-non-Pair (Dept. Gironde) and, subsequently, in 1901 Font-de-Gaume and Les Combarelles near Les Eyzies-de-Tayac-Sireuil in the Dordogne, and the doubts about Sautuola's discovery dwindled. In 1902, Cartailhac visited Altamira together with the young Abbé Henri Breuil (1877–1961) for the first time and met María Sanz de Sautuola (Cartailhac and Breuil 1903). He apologized to her and promised her to do everything to clear Don Marcelino's name. In a letter from 9 October 1902, he says: "We live in a new world."

He admitted his mistake in the article *Les cavernes ornées de dessins. La grotte d'Altamira, Espagne. Mea culpa d'un sceptique*, published in the *L'Anthropologie* (Cartailhac 1902) – 22 years after the publication of *Breves apuntes*. He accused himself of "an error, committed twenty years ago, an injustice that it is essential to public acknowledge and make amends for . . . It is necessary to face the reality and, as far as I am concerned, I must do justice to M. de Sautuola" (Cartailhac 1902; translation in Sanz de Sautuola et al. 2004, 62). He repented holding back the progress of science and harshly criticized himself for doing an injustice to an honest man and rejecting his discovery without any investigation. Today, the opinions about Cartailhac's *Mea culpa* differ. While most see it as a humble and honest gesture of a great man, who was not afraid to admit his error publicly (e.g., Lasheras and de las Heras in Sanz de Sautuola et al. 2004), there are also skeptics who consider this as a well-calculated move, as his own position was no longer tenable under the oppressive burden of proof (Lewis-Williams 2002; Figs. 3 and 4).

International Perspectives and Future Directions

Cartailhac himself examined the cave of Altamira together with the young Abbé Breuil. This resulted in the monograph *La Caverne d'Altamira à Santillane près Santander (Espagne)* (Cartailhac and Breuil 1906). In 1935, after careful excavations and first conservational actions, a second monograph by Breuil and Hugo Obermaier (1877–1946) in English followed (Breuil and Obermaier 1935). While the cave of Altamira achieved great fame, Sautuola's sophisticated and ingenious deduction was downplayed in numerous publications and not adequately appreciated. This is partly due to his cautious formulations in *Breves apuntes*, but also because of the low prevalence of this excellent study (sees Sanz de Sautuola et al. 2004, 64–65). In his short essay, Sautuola proves an exemplary grasp of lines of interpretation and argumentation necessary for the understanding of archaeological remains. In addition, he shows an openness for foreign and past cultures, which he describes as "not progressed very far along the road to civilization" (translation in Sanz de Sautuola et al. 2004, 55), without classifying them as "primitive" or "savage." In addition, he states about the artist of Altamira that "the author possessed a developed aesthetic sense" (translation in Sanz de Sautuola et al. 2004, 56) – in contrast to the then-common view of aesthetics, which was still dominated by the style of old masters and showed no sense for modern stylistic features as abstraction, the play of colors, or exaggeration (Fig. 5).

With the discovery of other painted caves, the view on Paleolithic art changed. Abbé Breuil dedicated much of his work to the exploration and documentation of Paleolithic cave art. He used ethnological comparisons to understand the works of art and interpreted them as part of hunting-magic rituals. His student André Leroi-Gourhan (1911–1986) already had such a large assemblage to investigate that he was able to establish a chronology of Paleolithic art on the basis of stylistic criteria, which has been partly confirmed by modern dating methods. Today, researchers can study countless painted and

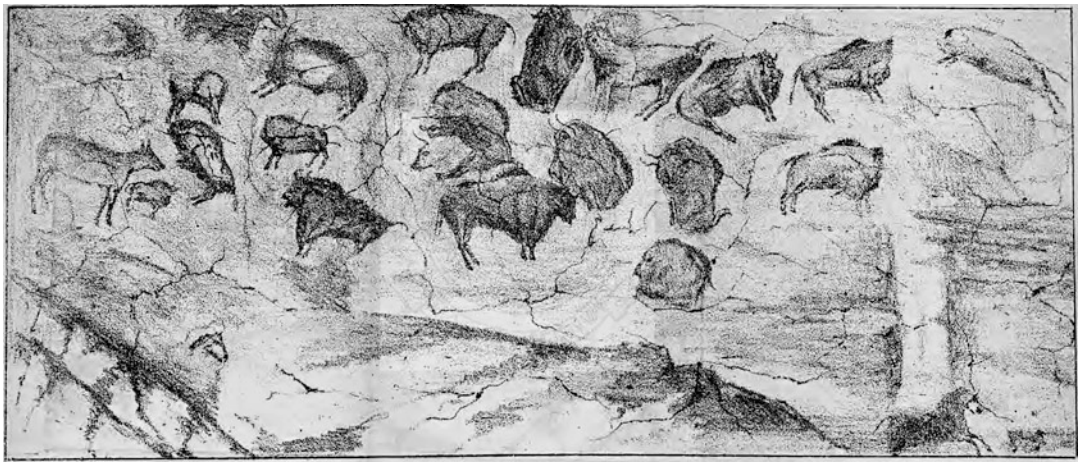

From Sautuola to Cartailhac, Fig. 3 Panel of gallery 1 of Altamira as published in *Breves apuntes.* (After Sanz de Sautuola 1880, modified)

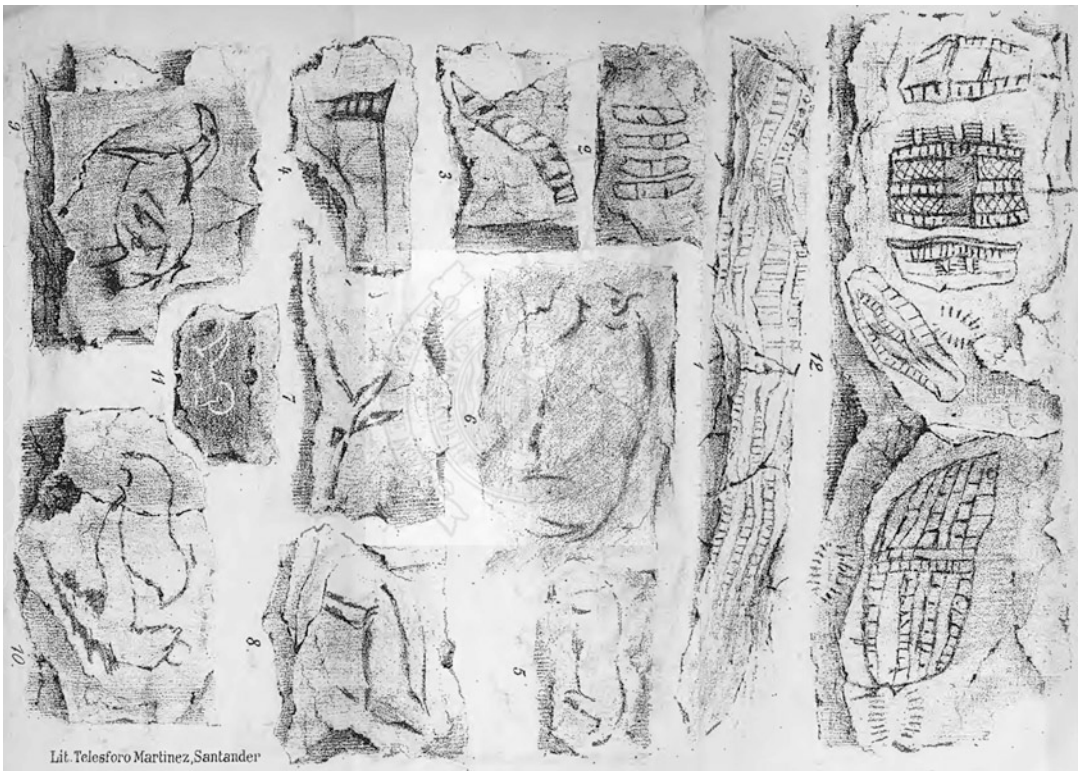

From Sautuola to Cartailhac, Fig. 4 Other paintings of Altamira as published in *Breves apuntes.* (After Sanz de Sautuola 1880, modified)

From Sautuola to Cartailhac, Fig. 5 Photography of the Panel in gallery 1. (Polychrome ceiling, © Museo de Altamira. Photo: Pedro Saura)

engraved caves, rock shelters, and open areas in many parts of Europe from Spain to the Ural Mountains. Nobody questions the high craftsmanship of Paleolithic artists anymore. The legacy of these early artists continues to exert a unique fascination. Painted caves had to be closed or severely restricted for the public traffic due to conservation problems. Many of the caves, including Altamira (Fig. 5), have been designated UNESCO World Heritage sites and their faithful replicas attract hundreds of thousands of visitors each year.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Darwin, Charles R.
- ▶ Europe: Prehistoric Rock Art
- ▶ Leroi-Gourhan, André
- ▶ Lubbock, John
- ▶ Mobiliary Art, Paleolithic
- ▶ Rock Art, Forms of
- ▶ Rock Art, Semiotics and Meaning of
- ▶ Rock Art Sites: Management and Conservation
- ▶ Techniques of Paleolithic Art
- ▶ Thomsen, Christian Jürgensen

References

Breuil, Abbé Henri, and Hugo Obermaier. 1935. *The cave of Altamira at Santillana del Mar, Spain*. Madrid: Tipgrafía de Archivos.

Cartailhac, Émile. 1902. Les cavernes ornées de dessins. La grotte d'Altamira, Espagne. 'Mea culpa d'un sceptique'. *L'Anthropologie* 13: 348–354.

Cartailhac, Émile, and Abbé Henri Breuil. 1903. Les peintures préhistoriques de la grotte d'Altamira à Santillana (Espagne). *Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres*, 256–64.

Cartailhac, Émile, and Abbé Henri Breuil. 1906. *La caverne d'Altamira à Santillane près Santander (Espagne)*. Monaco: Imprimerie de Monaco.

Darwin, Charles. 1859. *On the origin of species by means of natural selection, or, the preservation of favoured races in the struggle for life*. London: John Murray.

Darwin, Charles. 1871. *The descent of man, and selection in relation to sex*. London: John Murray.

de Mortillet, Gabriel. 1883. *Le préhistorique: origine et antiquité de l'homme*. Paris.

de Perthes, Jaques Boucher. 1847. *Antiquités celtiques et antédiluviennes: Mémoire sur l'industrie primitive et les arts à leur origine. 1847, 1857, 1864*, Bd. Tome 1–3. Paris: Treuttel et Wurtz.

de Sautuola, Marcelino Sanz. 1880. *Breves apuntes sobre algunos objetos prehistóricos de la provincia de Santander*. Santander: imp. y lit. de Telesforo Martínez.

de Sautuola, Sanz, Emilio Botín Marcelino, José A. Lasheras, and Carmen de la Heras. 2004. *Breves apuntes sobre algunos objetos prehistóricos de la Provincia de Santander (Traducciones al inglés, francés y portugues)*. Madrid: Turner.

Huxley, Thomas Henry. 1863. *Evidence as to man's place in nature*. London: Williams & Norgate.

Lartet, Édouard. 1861. Nouvelles recherches sur la coexistence de l'homme et des grands mammifères fossiles réputés caractéristiques de la dernière période géologique. *Annales Sciences Naturelles. Zoologie Série 4, Bd* 15: 177–253.

Lartet, Édouard. 1865. Une lame d'ivoire fossile trouvée dans un gisement ossifère du Périgord, et portant des incisions qui paraissent constituer la reproduction d'un Éléphant à longue crinière. *Comptes rendus des séances de l'Académie des Sciences* Tome LXI (8).

Lartet, Édouard, and Henry Christy. 1864. Sur des figures d'animaux gravées ou sculptées et autres produits d'art et d'industries rapportables aux temps primordiaux de la période humaine. *Revue Archéologique* 9: 233–267.

Lartet, Édouard, and Henry Christy. 1865. *Reliquiae Aquitanicæ. Being contributions to the archæology and palæontology of Périgord and the adjoining provinces of Southern France*. London: Williams & Norgate.

Lewis-Williams, J. David. 2002. *The mind in the cave*. London: Thames & Hudson Ltd.

Lubbock, John. 1865. *Prehistoric times, as illustrated by ancient remains and the manners and customs of modern savages*. London/Edinburgh: Williams and Norgate.
Lyell, Charles. 1830. *Principles of geology: Being an attempt to explain the former changes of the Earth's surface, by reference to causes now in operation*. London: John Murray.
Lyell, Charles. 1863. *Geological evidences of the antiquity of man*. London: John Murray.
Schaaffhausen, Hermann. 1858. Zur Kenntnis der ältesten Rasseschädel (‚Neanderthalschädel') Archiv für Anatomie, Physiologie und wissenschaftliche Medicin.

Further Reading

Beltrán, Antonio, Pedro A. Saura Ramos, and Gerhard Bosinski. 1998. *Altamira*, Thorbecke SPELÄO 6. Sigmaringen: Thorbecke.
Bon, François. 2009. *Préhistoire. La fabrique de l'homme. L'Univers Historique*. Paris: Éditions du Seuil.
Breuil, Abbé Henri. 1952. *Quatre cent siècles d'art pariétal. Les cavernes ornées de l'age du renne*. Montignac: Fernand Windels.
Capitan, Louis, Abbé Henri Breuil, and Denis Peyrony. 1910. *La caverne de Font de Gaume aux Eyzies*. Monaco: A. Chêne.
Capitan, Louis, Abbé Henri Breuil, and Denis Peyrony. 1924. *Les Combarelles aux Eyzies (Dordogne) (Peintures et gravures murales des cavernes paléolithiques)*. Paris: Masson.
Cheynier, André, and Abbé Henri Breuil. 1963. *La caverne de Pair-non-Pair (Gironde). Fouilles de François Daleau. Description des parois gravées par l'Abbé Henri Breuil*, Documents d'Aquitaine. Vol. III. Bordeaux: Societé Archéologique de Bordeaux.
Laming-Emperaire, Annette. 1962. *La signification de l'art rupestre paléolithique*. Paris: Picard.
Lasheras, José A., ed. 2003. *Redescubrir Altamira*. Madrid: Editorial Turner.
Lasheras, José A. 2009. *The cave of Altamira. 22.000 years of history Adoranten*, 5–33. Tanumshede: Scandinavian Society for Prehistoric Art.
Leroi-Gourhan, André. 1965. *Préhistoire de l'art occidental. L' Art et Les Grandes Civilisations*. Paris: Ed. d'Art Lucien Mazenod.
Paillet, Patrick. 2011. Le mammouth de la Madeleine (Tursac, Dordogne) – Dans son siècle et aujourd'hui the mammoth of La Madeleine (Tursac, Dordogne) in its century and today. *PALEO* 22: 223–270.
Paillet, Patrick. 2016. La collection du marquis Paul de Vibraye au Muséum national d'Histoire naturelle. In "*L'art au quotidien – Objets ornés du Paléolithique supérieur". Actes du colloque international. Les Eyzies-de-Tayac, 16–20 juin 2014*, ed. Jean-Jacques Cleyet-Merle, Jean-Michel Geneste, and Elena Man-Estier, numéro spécial:19–42. PALEO. Les Eyzies-de-Tayac.
Rivière, Émile. 1897. La grotte de la Mouthe (Dordogne). *Bulletins de la Société d'anthropologie de Paris IV Série* 8: 302–329. https://doi.org/10.3406/bmsap.1897.5702.
Thomsen. 1836. *Ledetraad til nordisk Oldkyndighed*. Kopenhagen: Det Kongelige Nordiske Oldskriftselskab.

Frost, Honor

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Basic Biographical Information

Honor Frost (1917–2010) was born and brought up in Cyprus surrounded by the sea. The lands of the Eastern Mediterranean retained her loyalty throughout her life. Of Byblos in the Lebanon, she wrote late in her career "this is where I belong." She learnt her diving at the Nice Divers Club when convalescing and where Cousteau's original team hung out. They introduced her to amphora wrecks from antiquity that stimulated her interest in submerged archaeology. She had already had a ballet staged by Ninette de Valois in London and attended art school which refined her drawing skills which she readily applied underwater. She joined the last season of Kay Kenyon's excavations of Jericho as draftsperson. This gave her a flying start in surveying stone structures underwater, the telltale remains of 11 ancient harbors along the shelterless Levantine coast. Stone anchors that marked ship graveyards also became an obsession.

Major Accomplishments

A chance encounter with a sponge-diver at Bodrum, South Turkey, brought about the discovery of a twelfth-century BCE Bronze Age wreck deposit which made her famous and put underwater archaeology on the map. It was the first deep-water site to be excavated to land archaeology standards and focused the Anglo-American world on the new discipline. The cargo of ingots and bronze scrap suggested a traveling tinker's workshop benefiting from the contemporary Trojan War. Honor's 1963 best-seller *Under the Mediterranean* describes this period, and she was soon to be invited by UNESCO to provide a guide for international consumption – *Underwater Archaeology, A Nascent Discipline* (1972) – which was highly influential and made her something of a world mentor for budding archaeological divers.

As 1970 opened, Honor led a project that resulted in the discovery and excavation of a third-century BCE Punic warship off Sicily. This time, it was a fisherman who reported bringing up very old timbers from the site of a sea battle with the Romans. It was the first time than an ancient warship had been discovered intact. Honor's Punic ship showed through matching marks on the timbers that the ancients used prefabrication to build an entire fighting fleet in months. It took rather longer to reconstruct and put on display but became in effect Italy's *Vasa*.

Honor Frost was now the world authority on stone anchors as well as the lost harbors of antiquity submerged by sea level and climate change. Among her other achievements were over a 100 scholarly publications, the initiation in 1972 of the unique *International Journal of Nautical Archaeology* (still the lead journal in this subject), and her promotion of best practice and innovative techniques. In one hundred years time, she will probably be best known for the fruit of her legacy of £30,000,000 for the encouragement of nautical archaeology research, particularly in the Eastern Mediterranean.

Cross-References

- ▶ Bass, George Fletcher
- ▶ Ship Archaeology
- ▶ Sicily and Magna Graecia, Archaeology of
- ▶ Throckmorton, Peter
- ▶ Trade and Transport in the Ancient Mediterranean

References

Frost, H. 1963. *Under the Mediterranean: Marine antiquities*. London: Routledge.

Frost, H. 1972. *Underwater archaeology, a nascent discipline* (Museums and Monuments series 13). Paris: UNESCO.

Further Reading

Honor Frost Foundation. n.d. Available at: http://www.honorfrostfoundation.org/frost.html.

International Journal of Nautical Archaeology, n.d. Available at http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291095-9270/homepage/ForAuthors.html.

Frozen Conditions: Preservation and Excavation

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Introduction

Frozen sites provide unique opportunities to understand the full range of a people's material culture. From frozen bodies to intact multi-component artifacts to wooden structures to faunal remains and macrobotanical remains, these sites can lead to unparalleled insights into cultures and paleoenvironments. The special challenges of excavation include the need for multiple specialties in the field, the typical need for a field laboratory, multiple seasons to allow the site to thaw, and extraordinary logistical costs. Global warming has greatly increased the challenges.

Definition

Various types of sites and contexts frequently demonstrate long-term frozen conditions. There are some differences among them that influence preservation conditions and determine choices for excavation techniques. These include permafrost, cold dry sites (polar or alpine), ice patches, and glaciers. About one-quarter of the earth's land area carries permafrost. Where continuous, it is typically hundreds of meters deep. Further south, discontinuous permafrost is tens of meters deep. In the first International Polar Year, the Point Barrow Expedition personnel spent 2 years (1881–1883) digging to find the bottom of the permafrost. They never found it but did pass through an archaeological deposit (Murdoch 1892). Upon the end of the expedition, they left behind what for many decades was the deepest ice cellar in the Native Iñupiat Eskimo community of Utqiaġvik.

Permafrost

The technical definition of permafrost (permanently frozen ground) is soil, sediment, or rock that remains at or below 0 °C for at least 2 years. When applied to archaeological sites, the term generally refers to sites in which cultural materials and the surrounding matrix have remained frozen essentially since they were deposited. Depending on the regional climate, if there is not enough overburden to insulate the cultural deposits, the upper levels of a site (the active layer) may go through freeze-thaw cycles. During the unfrozen period, underlying frozen ground can trap melting water at the surface, creating waterlogged conditions, which aid preservation. Excellent examples of permafrost sites include Utqiaġvik (Hall and Fullerton 1990; Sheehan 1997), the Zhokhov and Yana River RHS sites in Siberia (Pitulko 2001, 2008; Pitulko et al. 2004), and Qeqertassuk (Grønnow 1994; Meldgaard 2004).

The depth of the active layer varies with the type of matrix. Permafrost sites can be found in gravel, as at Nuvuk (Jensen 2009), in tundra soils as at Utqiaġvik (Hall and Fullerton 1990), and in sand as at Pingusugruk (Sheehan 1997). The looser the matrix, the deeper the active layer. The deeper the active layer, the more potential damage to more recent (higher) levels of an otherwise permafrost embedded site.

People in cold regions often found the most effective protection from the cold was to get out of the wind. Lacking trees and often lacking any natural windbreaks in prime locations, as in the Arctic Coastal Plain, this protection often was assisted by excavating structures into the permafrost and insulating them with grass sods. The inadvertent result was increased preservation. In a house whose floor lay in the permafrost, freezing started immediately once there was a lack of a heat source, whether a seal oil or whale oil lamp or a fireplace, and a lack of human body heat.

Cold Dry Sites

In cases where the surrounding environment is extremely dry (alpine or high arctic deserts), or the matrix has a low organic content and is well-drained, organic materials in a site essentially can be freeze-dried. While such sites may meet the technical definition of permafrost, the lack of moisture creates somewhat different preservation conditions and excavation issues. Good examples of dry sites are Mount Llullaillaco in Argentina (Reinhard and Ceruti 2010) and Qilakitsok in Greenland (Meldgaard et al. 1991).

Ice Patches

Ice patches are not massive enough to form glaciers. They are permanent ice or snowfields that do not melt away over the summer and that continue to accumulate and turn to ice. They attract animals such as caribou, serving as summer insect relief areas. The animals have attracted hunters over millennia. Animal dung and artifacts have been preserved frozen in the ice.

Warming climate is melting back the patches, so that previously hidden materials can be exposed annually. If not collected very quickly, they will decay or be destroyed by caribou trampling. Ice patch archaeology is now a vibrant field, beginning with finds in the Canadian Yukon in 1997. Examination of nearby ice patches as part of a project during the fourth International Polar Year led to finds at additional locations. Europeans have been finding archaeological materials in ice patches for much longer. Known concentrations of ice patch sites include Wrangell-St. Elias National Park and Lake Clark National Park in Alaska; Rocky Mountain National Park and the Greater Yellowstone in the US Rocky Mountains; Mackenzie and Selwyn Mountains between the Yukon and Northwest Territories in Canada; Oppdal, Oppland County, and Finnmark in Norway; and the Swiss Alps (Andrews and MacKay 2012; VanderHoek et al. 2012; Reckin 2013; Dixon et al. 2014).

Glaciers

Glaciers can contain what could be considered archaeological sites, although they are usually encased in a moving matrix of snow and/or ice. The majority developed when some form of material culture (e.g., crashed aircraft, scientific research stations) was deposited on the glacier's surface layers and then covered by snow.

As glaciers move they develop crevasses that change the relative position of items, so glacial sites generally lack integrity. Even large aircraft

can be torn apart in a few decades. For this reason, archaeologists rarely deal with such "sites."

Sometimes an advancing glacier covers an existing site that is protected by terrain from the moving ice. These sites can be revealed when the glacier retreats. The most famous find from such a site is Ötzi, the "Iceman" who was recovered with many of his belongings from a gully in the Italian Tyrol (Höpfel et al. 1992). He had died in the gully and was found shortly after glacial retreat exposed him.

Key Issues/Current Debates/Future Directions/Examples

Preservation in Frozen Sites

Frozen sites are generally protected from insects and digging creatures. Roots from vegetation cannot penetrate them. More recent human occupations typically do not excavate very far into previous occupations, since digging into permafrost requires almost the same effort as digging into concrete. This often results in superimposed stratigraphically intact cultural levels that can cover periods of thousands of years and multiple cultural designations.

Deterioration typically seen in organics at unfrozen sites is delayed. Frozen conditions allow for the preservation of a wide range of organic material in addition to the inorganic materials that are more commonly found at archaeological sites. Most chemical and biological processes slow in cold conditions, almost stopping at temperatures below freezing. Freezing of organic remains like a human body or an animal carcass does eventually result in dehydration, even if the freezing is accomplished in a pool of water that turns to ice (Zimmerman et al. 2000). This creates the possibility of very detailed cultural and paleoenvironmental studies if proper samples are collected and retained.

The active layer in permafrost is the soil or level that actively thaws each summer, starting at the ground surface and penetrating repeatedly to roughly the same depth in any given location. Materials below the active layer are permanently frozen. Those in the active layer are frozen for much of the year. In most cases, the long periods of freezing seem to have outweighed the brief annual thaws, despite the disruptions to preservation that thawing and freezing can induce or allow.

Excavation for Maximum Preservation

Significant portions of standing structures can be preserved when buried in permafrost. Organic artifacts can outnumber lithics in frozen sites 100 to 1, rewarding fieldwork with assemblages rarely seen in most of the world. Interpretation of past lifeways is likely to be more successful thanks to this much more representative sampling of material culture. However, excavation of frozen sites is technically demanding, the logistics are complex and expensive, and analyzing and conserving the resulting collections can be challenging. Successful excavation in frozen sites requires a good deal of planning. The use of geophysical techniques can facilitate excavation planning if the logistics can be accomplished (Urban et al. 2016).

The cost of stabilizing and then permanently storing wooden architectural components after documentation and sampling can be prohibitive. On-site burial deep in the permafrost below the active layer may be the best option. Erosion and increased depth of active layers due to global warming must be taken into account. Refreezing important organics may be the best way to maintain integrity after analysis in the laboratory. This requires a long-term institutional commitment to freezers and their maintenance. Even conventional museum storage for such large, organic-rich collections, including bulk samples for analyses like sedaDNA (Seersholm et al. 2016) can be problematic given the current curation crisis at museums. Costs for frozen sites fieldwork are already high due to remoteness, the need to work with the daily thaw rate, extremely short "warm" seasons, and the need for representation of multiple skilled disciplines on-site and during analysis.

The often-spectacular preservation of the spectrum of human material culture plus processed and unprocessed animal products and sometimes the presence of frozen human remains ideally requires a large multidisciplinary field crew, many of whom might be confined to a laboratory

during excavation of less well-preserved sites. Specialists may attend to architectural elements, to multicomponent artifacts that incorporate organic and inorganic materials, and to faunal remains. Wood specialists and clothing specialists, especially for fur and hide, are desirable. Also, aDNA specialists must be present to retrieve uncontaminated samples successfully.

Competent polar bear guards must be employed in some locations in order for staff to focus on fieldwork. Experienced field hands and camp and logistics managers, field laboratory supervisors, and staff are all required to take advantage of the pristine status of materials on the day they are removed from the ground, pristine status that cannot be maintained without prompt and constant attention during what can be a long period of partial exposure. It may be days before an item can successfully be removed, so this attention must start as artifacts are first revealed in the frozen levels. During this period, preservation must be maintained until the item can be extracted and moved to the field laboratory.

The slow rate of thaw after exposure typically means that sterile soil cannot be reached in a single season. Funds for multiple seasons are necessary to recover a site's archaeological history successfully. Sondages can be impossible thanks to permafrost. Part of a season's fieldwork is working to preserve the site's integrity for the following season. Many reviewers are shocked by the cost of proposals for frozen sites archaeology and unfortunately do not get past it to consider the value of data from sites where "everything ever left at the site" is still there and still in very good condition.

The Good and the Bad of Frozen Conditions On-site and in the Laboratory

Frozen soils can be subject to a process called solifluction, where soils move and flow downhill. This can considerably disturb site integrity, sometimes folding strata and causing stratigraphic reversals. Frozen sites can be more cohesive than the natural strata below them. When the sites are elevated and on the coast, as at Utqiaġvik (Mason 1991), entire stacks of superimposed semi-subterranean houses can be undermined by wave action and can fall en bloc onto the beach or into the water, rotating as they fall and resulting in tilting or reversed stratigraphy until thawing and erosion eliminate the evidence (Fig. 1). Similar effects can occur when sites in areas of ice-rich permafrost overlie large ice wedges, which can melt and drain away, leaving voids under sites.

In conditions where patterned ground forms, if sufficient water is present, new ice wedges can develop, and they also can affect the integrity of the site as a whole. This generally takes the form of separate chunks of the site moving relative to each other.

Frozen Conditions: Preservation and Excavation, Fig. 1 Slump block on the beach. Walakpa, view north

Frozen conditions can greatly slow, if not entirely stop, biological and chemical processes which cause the decay of organic materials. Thus, the period of time that organic materials can be preserved is extended well beyond that which could be expected for the same materials in unfrozen conditions. This makes possible both highly detailed cultural analyses and paleoenvironmental reconstruction.

Freezing is not an unmixed blessing for artifacts and organic remains. Freezing water expands, potentially damaging them. Ice crystals form in moisture-bearing materials as freezing occurs. The size of the crystals depends on the speed of freezing, with smaller crystals forming with faster freezing and larger crystals doing more structural damage. Ice crystals damage organic materials' cellular structure. Since past freezing and thawing of organic artifacts may have damaged cellular structures, artifacts can appear in excellent shape when first excavated and then deteriorate rapidly. Many artifacts from permafrost sites have high moisture content, requiring slow drying to avoid serious cracking. Lithics tend to split into plates in a process called frost spalling, particularly artifacts manufactured from softer sedimentary rock such as sandstone.

It is sometimes possible to stabilize certain classes of materials in the field or a field laboratory. Field options may be limited by equipment and compounded by airline safety regulations that limit transport of some important chemicals. In some cases, treatment by a conservator in a fully equipped laboratory is the only practical solution.

It can be difficult to find a conservator to assist in the field, since most frozen sites contain a very wide range of materials, and conservators are becoming more specialized. They are often employed by institutions that do not wish to be without their services for months at a time.

Again, funding is generally a limiting factor. It has been fairly standard practice for many decades not to apply any conservation treatments to faunal collections from frozen sites. In addition to reserving funds for the conservation of artifacts, this has the advantage of avoiding contamination to bones and keeping them suitable for use in aDNA, stable isotope, trace elements, and other analyses that were not anticipated when the practice was first adopted.

Long-Term Prospects for Frozen Sites

Long-term prospects for frozen sites are very concerning (Figs. 2 and 3). With a warming climate, ice patch sites are rapidly disappearing. Already some newly discovered ice patches, which held materials of more than a millennium in age, have disappeared. Most known sites are coastal or next to bodies of water and subject to erosion. Comparatively little inland exploration

Frozen Conditions: Preservation and Excavation, Fig. 2 Remains of the house and ice-filled tunnel exposed and undercut by erosion. Nuvuk, view south

Frozen Conditions: Preservation and Excavation, Fig. 3 House timbers slumping due to permafrost collapse and erosion. Utqiaġvik, view southwest

has been accomplished. Inland sites are therefore less well documented and threats to their integrity are less well understood.

As climate warms, so does permafrost. The depth of the active layer is increasing around the Arctic, which means that sites and artifacts previously in stasis are being exposed to repeated freeze-thaw cycles with longer annual opportunities for chemical and biological decay-producing processes to act (Hollesen et al. 2015). In Alaska, predictions are that the active layer may reach 2 m in depth even in the northernmost part of the state by 2100 AD (Murray et al. 2011).

For coastal sites, rising sea level and less marine ice cover increase erosion. As threats increase to these sites, and as their potential to contribute to our understanding of human culture and past environments is better understood by reviewers and the general public, we can expect more research. The best archaeological record of cultures adapting to rapid climate change is found in frozen sites dating to the last major warming period, roughly a thousand years ago. To better understand how we can adapt to current climate warming, we should more thoroughly understand how people did it a thousand years ago.

Cross-References

- ► DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ► Permafrost Digging
- ► Zooarchaeology

References

Andrews, T.D., and G. MacKay. 2012. The archaeology and paleoecology of alpine ice patches. *Arctic* 65 (Suppl 1): iii–ivi.

Dixon, J.E., M. Callanan, A. Hafner, and P.G. Hare. 2014. The emergence of glacial archaeology. *Journal of Glacial Archaeology* 1 (1): 1–9.

Grønnow, B. 1994. Qeqertassuk – The Archaeology of a Frozen Saqqaq Site in Disko Bugt, West Greenland. In *Threads of arctic prehistory: Papers in Honour of William E. Taylor, Jr.*, Archaeological Survey of Canada, Mercury Series Paper 149, ed. D. Morrison and J.-L. Pilon, 197–238. Ottawa: Canadian Museum of Civilization.

Hall, E.S., Jr., and L. Fullerton, eds. 1990. *The Utqiaġvik Excavations*. Barrow: The North Slope Borough Commission on Iñupiat History, Language and Culture.

Hollesen, J., H. Mathiassen, A.B. Møller, and B. Eberling. 2015. Climate change and the loss of organic archaeological deposits in the Arctic. *Scientific Reports* 6: 28690.

Höpfel, F., W. Platzer, and K. Spindler. 1992. *Der Mann im Eis. Bericht uber das Internationle Symposium 1992 in Innsbruck*. Innsbruck: Eigenverlag der Uni Innsbruck.

Jensen, A.M. 2009. Nuvuk: Point Barrow, Alaska: The Thule Cemetery and Ipiutak Occupation. PhD dissertation at Bryn Mawr College. On file at University Microfilms, Inc.

Mason, O.K. 1991. Coastal Geomorphology in the Barrow Area: Bluff Erosion, Ivu and the Stratigraphic Context of the Mound 44 Slump. In Mason,O.K., S.C. Gerlach, and S.L. Ludwig, eds., *Coastal Erosion and Salvage Archaeology at Utqiagvik, Alaska: The 1990 excavation of the Mound 44 Slump Block*. Chapter 3, pp. 10–27. Occasional papers of the Alaska Quaternary Center No.4. Fairbanks.

Meldgaard, M. 2004. *Ancient Harp Seal Hunters of Disko Bay. Subsistence and settlement at the Saqqaq Culture Site Qeqertasussuk (2400–1400 BC), West Greenland*. Meddelelser om Grønland, Man & Society 30.

Meldgaard, J., J. Nordqvist, and J.P.H. Hansen. 1991. *The Greenland Mummies*. London: British Museum Publications.

Murdoch, J. 1892. *Ethnological results of the point barrow expedition. Ninth annual report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution 1887–88*, by J.W. Powell, Director. Washington: Government Printing Office.

Murray, M., A. M. Jensen, and M. Friesen. 2011. Identifying climate change threats to the arctic archaeological record: Global climate change and the polar archaeological record; Tromsø, 15–16 Feb 2011. *EOS* 91(21):180.

Pitulko, V.V. 2001. Terminal pleistocene-early holocene occupations in northeast Asia and the Zhokhov assemblage. *Quaternary Science Reviews* 20: 267–275.

Pitulko, V.V. 2008. Principal excavation techniques under permafrost conditions (Based on Zhokhov and Yana Sites, Northern Yakutia). *Archaeology Ethnology & Anthropology of Eurasia* 34 (2): 26–33.

Pitulko, V.V., P.A. Nikolsky, E.Yu. Girya, A.E. Basilyan, V.E. Tumskoy, S.A. Koulakov, S.N. Astakhov, E.Yu. Pavlova, and M.A. Anisimov. 2004. The Yana RHS Site: Humans in the Arctic before the last glacial maximum. *Science* 303: 52–56.

Reckin, R. 2013. Ice patch archaeology in global perspective: Archaeological discoveries from alpine ice patches worldwide and their relationship with palaeoclimates. *Journal of World Prehistory* 26: 323–385.

Reinhard, J., and C. Ceruti. 2010. *Inca rituals and sacred mountains: A study of the world's highest archaeological sites*. Los Angeles: Cotsen Institute of Archaeology, University of California, Los Angeles.

Seersholm, F.V., M.W. Pedersen, M.J. Søe, H. Shokry, S.S.T. Mak, A. Ruter, M. Raghavan, W. Fitzhugh, K.H. Kjær, E. Willerslev, M. Meldgaard, C.M.O. Kapel, and A.J. Hansen. 2016. DNA evidence of bowhead whale exploitation by Greenlandic Paleo-Inuit 4,000 years ago. *Nature Communications* 7: 13389.

Sheehan, G.W. 1997. *In the belly of the whale: Trade and war in Eskimo Society. Aurora, Alaska Anthropological association monograph series – VI*. Alaska Anthropological Association, Anchorage, AK.

Urban, T.M., J.T. Rasic, C. Alix, D.D. Anderson, S.W. Manning, O.K. Mason, A.H. Tremayne, and C.B. Wolff. 2016. Frozen: The potential and pitfalls of ground-penetrating radar for archaeology in the Alaskan Arctic. *Remote Sensing* 8 (12): 1007.

VanderHoek, R., E.J. Dixon, N.L. Jarman, and R.M. Tedor. 2012. Ice patch archaeology in Alaska: 2000–2010. *Arctic* 65 (Suppl 1): 153–164.

Zimmerman, M., A.M. Jensen, and G.W. Sheehan. 2000. Aġnaiyaaq: The Autopsy of a Frozen Thule Mummy. *Arctic Anthropology* 37 (2): 52–59.

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Basic Biographical Information

Richard Fullagar is an Australian archaeologist and a Founding Director of Scarp Archaeology. He grew up in Melbourne, Victoria, and completed his Higher School Certificate in 1972. He completed a B.A. at the University of Melbourne in 1977, picking up archaeology as a fill-in subject, and worked for the Victoria Archaeological Survey (VAS) from 1978 until 1983. He went on to complete a Ph.D. in archaeology at La Trobe University in 1986.

While at the VAS, he undertook numerous surveys and excavations on the Victorian coast and along a transect running north from Warrnambool (through the Western District, the Mallee, and the Little Desert) to the Murray River. He also undertook field research in the Philippines, initially with Peter Coutts (Director, VAS) and later on his own. He has lived in Wollongong since 1987 and has held Australian Research Council (ARC) Fellowships at the Australian Museum (Sydney) and the University of Sydney.

Fullagar has undertaken collaborative projects with colleagues in the Netherlands, Belgium, and South Africa and developed broad interests in hunter-gatherer lithic technology, the history of plant food processing, and modern human dispersal into Australia.

He is one of Australia's most experienced field archaeologists, having undertaken research projects in all states of Australia and in Papua New Guinea. Fullagar received ARC support for projects in West New Britain, Papua New Guinea; the Keep River area in the East Kimberley; Cuddie Springs, Western NSW; and Riversleigh, Northwestern Queensland. He is a Chief Investigator on two current (2011–2015) ARC projects: one to re-excavate early archaeological sites in

Australia and Timor and the other to undertake collaborative research into wetlands with Aboriginal groups in New England and Tasmania.

Dr. Fullagar is a founding Director of Scarp Archaeology (established 2007), a company that focuses on cultural heritage management projects and related research in the Pilbara (WA) and the Hunter Valley (NSW).

Major Accomplishments

Building particularly on the work of Johan Kamminga and Tom Loy, Richard Fullagar pioneered the integration of lithic usewear and residues in Australia. He was the first Australian to systematically study usewear and residues of stone tool assemblages under vertical incident light microscopes. His initial work focused on use-polishes and plant residues, notably starch grains, to reconstruct food processing and ancient diets. He advocated the use of different microscope types and initiated the establishment of microscopic usewear/residue laboratories at La Trobe University, Australian Museum, University of Sydney, and University of Wollongong, where he is currently Honorary Principal Fellow in the Centre for Archaeological Science, School of Earth and Environmental Sciences. He has advised several other institutions on appropriate facilities for similar laboratories.

He has made important contributions to archaeology in Australia, New Guinea, and the Asia-Pacific. Much of his work has been in the form of specialist stone tool studies linked with diverse archaeological projects in Australia, Papua New Guinea, Asia-Pacific, and Africa. Research highlights over the last 35 years include identification of 28,000-year-old seed-grinding tools at Cuddie Springs, Western NSW; excavation and dating of Jinmium rockshelter, Northern Territory, Australia; and the discovery of 10,000-year-old taro-processing tools from Kuk Swamp, PNG.

Dr. Fullagar has authored or coauthored more than 65 technical and consultancy reports, three edited volumes, and 115 journal articles and book chapters. He has taken a special interest in public engagement with 65 contributions published regularly from 1999 to 2006 in *Nature Australia*, the Australian Museum's award-winning magazine (now discontinued).

Dr. Fullagar has served on the Executive of the Australian Archaeological Association (AAA) and is a past President of the Australian Association of Consulting Archaeologists Inc. (AACAI). He was awarded the inaugural AAA Bruce Veitch Award for Excellence in Indigenous Engagement in 2006.

Cross-References

► Stone Tool Usewear and Residue Analysis

Further Reading

Brumm, A., F. Aziz, G.D. Van Den Bergh, M. Moore, M. Morwood, D. Hobbs, I. Kurniawan, and R. Fullagar. 2006. Early Pleistocene artefacts from Mata Menge, Flores: Implications for *Homo floresiensis*. *Nature* 44 (4618): 624–626.

Denham, T., R. Fullagar, and L. Head. 2009. Plant exploitation on Sahul: From colonization to the emergence of regional specialization during the Holocene. *Quaternary International* 202 (1-2): 29–40.

Fullagar, R. 2006. Residues and usewear. In *Archaeology in practice: A student guide to archaeological analysis*, ed. J. Balme and A. Paterson, 207–234. Malden: Blackwell Publishing.

Fullagar, R. 2011. Burins, bones and base camps: A re-analysis of Aire Shelter 2, Glenaire, southern Victoria. *Technical Reports of the Australian Museum, Online* 23 (8): 103–131.

Fullagar, R., ed. 1998. *A closer look: Recent studies of Australian stone tools*, Sydney University archaeological methods series. Vol. 6. Sydney: Archaeological Computing Laboratory, School of Archaeology, University of Sydney.

Fullagar, R., and J. Field. 1997. Pleistocene seed grinding implements from the Australian arid zone. *Antiquity* 71 (272): 300–307.

Fullagar, R., J. Field, T. Denham, and C. Lentfer. 2006. Early and mid Holocene processing of taro (*Colocasia esculenta*), yam (*Dioscorea* sp.) and other plants at Kuk Swamp in the highlands of Papua New Guinea. *Journal of Archaeological Science* 33: 595–614.

Fullagar, R., J. McDonald, J. Field, and D. Donlon. 2009. Deadly weapons: Backed microliths from Narrabeen. In *Archaeological science under a microscope: Studies in residue and ancient DNA analysis in honour of Thomas H. Loy*, Terra Australis, ed. M. Haslam,

G. Robertson, A. Crowther, S. Nugent, and L. Kirkwood, vol. 30, 248–260. Canberra: The Australian National University.
Liu, L., J. Field, R. Fullagar, Z. Chaohong, C. Xingcan, and Y. Jincheng. 2010. A functional analysis of grinding stones from an early Holocene site at Donghulin, North China. *Journal of Archaeological Science* 37: 2630–2639.
Summerhayes, G.R., M. Leavesley, A. Fairnbairn, H. Mandui, J. Field, A. Ford, and R. Fullagar. 2010. Human adaptation and plant use in highland New Guinea 49,000 to 44,000 years ago. *Science* 330: 78–81.
Van Peer, P., R. Fullagar, S. Stokes, R. Bailey, J. Moeyersons, F. Steenhoudt, A. Geerts, T. Vanderbeken, M. De Dapper, and F. Geus. 2003. The early to middle Stone Age transition and the emergence of modern human behaviour at site 8-B-11, Sai Island, Sudan. *Journal of Human Evolution* 45: 187–193.

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Basic Biographical Information

Pedro Paulo Abreu Funari was born in Sao Paulo, Brazil, and earned his Bachelor's Degree in History at the Sao Paulo University (USP) during the early 1980s. He has specialized in Ancient History and Classical Archaeology, with special emphasis on the subject of olive oil circulation within the Roman Empire. He continued to develop this theme for his Masters in Social Anthropology and doctoral studies in Archaeology, under the supervision of Professor Haiganuch Sarian. During this process, Funari continued specializing in material culture studies, while attending internships at the USP Archaeology and Ethnology Museum. In the latter, he participated in several excavations and archaeological projects, such as the amphora's research, and the Pompeii graffiti and paintings' study (Funari 2002).

In 1992, Funari became part of UNICAMP History Department as a professor. Since then he has continuously taken a leading role in the promotion of archaeological investigations at the university, transforming it into a center of excellence in archaeological studies and formation. Currently, he is a professor at the History Department of Campinas State University (UNICAMP), and coordinator of the Advanced Studies Institute (UNICAMP).

Major Accomplishments

In the 1990s, Funari organized a project of Historical Archaeology in collaboration with American Archaeologist Charles E. Orser and British Archaeologist Michael Rowlands, studying the Barriga Ridge. This site was the former capital of the Palmares Quilombo in the seventeenth century. Sponsored by Brazilian, American, and British funding, the excavations were very important as they revealed the Archaeology of the Subaltern for the first time in Brazil (Orser and Funari 2001; Funari 2006).

Another field of interest to Funari has been the History of Brazilian Archaeology. Considering ideological and historical contexts through a critical perspective, he has focused on how they have influenced the process of succession among different schools and theoretical trends in the Brazilian context (e.g., Funari 1999; Funari and Menezes Ferreira 2006).

Most recently, Professor Funari has been introducing Brazil to important discussions regarding the archaeological practice, the political enrollment of archaeologists inside the local communities with whom they work, and the building of the past and its effects on the present, among other issues. Therefore, the creation of the Public Archaeology Center in UNICAMP is the result of all these debates envisioned through the public archaeology perspective (e.g., Funari 2004, 2009). Among Latin-American archaeologists, Professor Funari has one of the greatest scholarly productions and enjoys regional and worldwide recognition (Funari et al. 1999). He has published several books and more than 300 articles. A confirmation of his success is his vast work that has become a reference in several fields,

such as Classical Archaeology, Historical Archaeology, Archaeological Theory, the History of Brazilian Archaeology, and Public Archaeology.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Funari, Pedro Paulo A. (Indigenous Archaeology)
- ▶ Orser, Jr., Charles E.
- ▶ Race in Archaeology

References

Funari, P.P.A. 1999. Brazilian archaeology: A reappraisal. In *Archaeology in Latin America*, ed. G. Polits and A. Benjamin, 17–39. London: Routledge.

Funari, P.P.A. 2002. The consumption of olive oil in Roman Britain and the role of the army. In *The Roman army and the economy,* org. P. Erdkamp, 235–263. Amsterdam: J.C. Gieben Publisher.

Funari, P.P.A. 2004. Public archaeology in Brazil. In *Public archaeology*, ed. N. Merriman, 202–210. London/New York: Routledge.

Funari, P.P.A. 2006. Conquistadors, plantations, and quilombo: Latin America in historical archaeology context. In *Historical archaeology*, ed. M. Hall and S. Silliman, 209–229. Oxford: Blackwell.

Funari, P.P.A. 2009. The Archaeology of Conflict in Brazil. In *Memories from darkness: Archaeology of repression and resistance in Latin America*, ed. P.P.A. Funari, A. Zarankin, and M. Salerno, 25–32. New York: Springer.

Funari, P.P.A., and L. Menezes Ferreira. 2006. A social history of Brazilian archaeology: A case study. *Bulletin for the History of Archaeology* 16: 18–27. https://doi.org/10.5334/bha.16203.

Funari, P.P.A., M. Hall, and S. Jones, eds. 1999. *Historical archaeology: Back from the edge*. London: Routledge.

Orser, C.E., Jr., and P.P.A. Funari. 2001. Archaeology and slave resistance and rebellion. *World Archaeology* 33: 61–72.

Further Reading

Funari, P.P.A. 2002. Class interests in Brazilian archaeology. *International Journal of Historical Archaeology* 6: 209–216.

Funari, P.P.A., A. Zarankin, and M. Salerno, eds. 2009. *Memories from darkness: Archaeology of repression and resistance in Latin America*. New York: Springer.

Funari, P.P.A., A. Zarankin, and E. Stovel, eds. 2005. *Global archaeological theory: Contextual voices and contemporary thoughts*. New York: Springer.

Funari, Pedro Paulo A. (Indigenous Archaeology)

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Basic Biographical Information

Pedro Paulo A. Funari (1959–) was born in São Paulo, southeast of Brazil, to a family of humble origins but adept to reading and to culture in general (Fig. 1). Influenced by the family environment, he became, at a young age, interested in the humanities, specially philosophy, politics, and religion. Philosophy would have been his choice for ingressing in higher education, but the political context of Brazil in the 1970s – the military dictatorship – forced him to choose another path: history. The undergraduate major in history at the Universidade de São Paulo/USP, between 1977 and 1981, however, allowed his insertion in a forum of reflections on the social injustices, in particular, on the political panorama of Latin America (one of his constant concerns)

Funari, Pedro Paulo A. (Indigenous Archaeology), Fig. 1 Funari, Pedro P. de A. (Brazilian archaeologist)

and, at the same time, granted him the right to lecture history. For Funari, the teaching of history at the time fulfilled two roles: the chance to share with his students a more critical view of history and of society and his ingressing in a field of work that would permit the improvement of his studies. His proposal to study the military dictatorship right at the time of the military regime, however, did not find echo at the academic environment of freedom curtailed by the authoritarian government. Once more, the opting for another path was necessary. This was how ancient history became one of his major areas of interest. While developing research on olive oil in ancient Rome during his Masters in Social Studies (Anthropology) at the Universidade de São Paulo, between 1982 and 1986, Funari came across the field of study of material culture, which would come to define a significant part of his career. The research on ancient ceramics was further developed during the Doctorate in Archaeology at the Universidade de São Paulo, between 1986 and 1990, period in which he undertook various research trips and internships in renowned teaching and research institutions in Europe. His fluency in various languages enhanced these experiences, leading him to establish contacts and partnerships with distinguished foreign researchers. His international career consolidated itself between the years of 1992 and 2004, a period in which he conducted 6 postdoctorates in universities of Brazil, the United States, Spain, and England. In 1992 he became professor of the Universidade Estadual de Campinas/UNICAMP, one of the most prestigious universities in the country, where he works until today. At UNICAMP, Funari coordinates groups and research projects related to classical antiquity, to politics, and to archaeology and edits periodicals such as "Arqueologia Pública." Besides being editor of over 40 foreign and Brazilian scientific publications, he has published over 100 books, 190 book chapters, and 490 articles in Brazil, other countries of South America, Europe, Oceania, and the United States.

Major Accomplishments

His extraordinary academic production, summed to the political activism which characterized his career, has made him respected by colleagues in various countries, which resulted in his indication as Southern American Representative (1994 and 2002) and Secretary of World Archaeological Congress (2002 and 2003). In Brazil, Funari has occupied various positions in scientific societies in the history and archaeology areas. His political inquietudes, arisen while still in his youth, have always accompanied him. A tenacious critic of dominant ideologies – inside and outside of the academy – Funari has formed a generation of researchers concerned with establishing more humane and solidary academic relations. His vast bibliographical production includes such themes: dictatorships in Latin America, slavery, postcolonialism, education, teaching of indigenous history, critique of archaeology, public archaeology, and heritage, therefore of issues that involve reflection on power relations in the past and in the present. His formation in history, social sciences (anthropology), and archaeology allows his ideas to transit between distinct domains of knowledge and reach diverse audiences. One of the most cited authors in Brazilian archaeology at present time, Funari is author of the first book on introduction to archaeology in the country. The book "Arqueologia," released in 1988 and reedited in 2003, is widely used by students of archaeology and related areas as well as by teachers of diverse areas. Also of his authorship is the first book on Brazilian prehistory in an accessible language to a main audience (Funari and Noelli 2002). In 2001, he published a book that presents the precolonial history of Brazil to child and teenage audiences. Recently Funari released, in coauthorship with Spanish researcher Ana Piñon, a book that discusses the indigenous theme in school for teachers (Funari and Piñon 2011). Such category of literature demonstrates one of the most marked characteristics of this acting archaeologist and historian: his concern with the formation of students and teachers and the democratization of science in Brazil. Pedro Paulo A. Funari is a brilliant researcher who possesses the rare ability to stimulate vocations. In his teaching career, he has supervised 12 postdoctorates, 23 doctorates, and 31 masters in Brazil and abroad. Funari has a strong political commitment to archaeology and a solid dedication

to his students, with whom he has shared authorship in articles and books in Brazil and abroad. Currently (2012), Funari directs the Center for Advanced Studies, founded by him in 2009, at UNICAMP and is an associated faculty at the Universidade de Algarve (Portugal), Universidad del Centro de la Provincia de Buenos Aires (Argentina), Illinois State University (United States), Universidad de Barcelona (Spain), and various Brazilian universities. His passion for academic life, allied to his combative – but elegant – political positioning against hierarchies, has attracted many young and restless students that, such as young Funari, aspire to social relations that are less unequal, inside as well as outside of archaeology.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Brazil: Cultural Heritage Management Education
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Classical (Greek) Archaeology
- ▶ Critical Historical Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ "Public" and Archaeology

References

Funari, P.P.A. 1988. *Arqueologia*. São Paulo: Ática.

Funari, P.P.A., and F.S. Noelli. 2002. *Pré-história do Brasil*. São Paulo: Contexto.

Funari, P.P.A., and A. Piñon. 2011. *A temática indígena na escola: subsídios para os professores*. São Paulo: Contexto.

Further Reading

Funari, P.P.A., ed. 2002a. *Encyclopaedia of historical archaeology*. London/New York: Routledge.

Funari, P.P.A. 2002b. *Os antigos habitantes do Brasil*. São Paulo: Editora da UNESP: Imprensa Oficial do Estado de São Paulo.

Funari, P. P. A. 2007. Trajetória acadêmica: um depoimento. História e-história. Available at http://www.historiaehistoria.com.br/materia.cfm?tb=professores&ID=34. Accessed 15 Dec 2011.

Funari, P.P.A. 2010. *Contemporary issues in historical archaeology*. Vol. 1. Oxford: Archaeopress.

Funari, P.P.A., and M. Bezerra. 2012. Public archaeology in Latin America. In *The Oxford handbook of public archaeology*, ed. R. Skeates, C. McDavid, and J. Carman, 100–115. Oxford: Oxford University Press.

Funari, P.P.A., M. Hall, and S. Jones, eds. 1999. *Historical archaeology: Back from the edge*. London: Routledge.

Funari, P.P.A., A. Zarankin, and E. Stovel, eds. 2005. *Global archaeological theory: Contextual voices and contemporary thoughts*. New York: Springer.

Funari, P.P.A., A. Zarankin, and M. Salerno, eds. 2009. *Memories from darkness*, Archaeology of repression and resistance in Latin America. Vol. 1. New York: Springer.

Pearsall, D.M., and P.P.A. Funari, eds. 2007. *Encyclopaedia of archaeology*. Vol. 3. Oxford: Academic.

Funerary Customs and Religious Practices in the Ancient Near East

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The death of an individual represents a moment of tragic and unexplainable loss for the members of a community that reveals the need and consequent desire to create beliefs about the existence of an afterlife. For numerous scholars this aspect of human life represents the beginning of a long-term evolutionary process that generated the development of forms of religiosity, dating back to the earliest members of the human species.

In general, the evolutionary approach that was developed by nineteenth-century Victorian anthropologists connects the belief that when an individual dies, a nonphysical soul departs from the physical body to the beginning of religious phenomena (i.e., animism), which is the basis from which more complex forms of religious beliefs developed over time. According to Tylor's seminal perspective, among "primitive cultures" it is possible to distinguish between a more basic and general belief in the soul of the deceased that serves the purpose of a "continued existence after

the death or destruction of the body" and more complex forms of belief in spiritual beings "upward to the rank of powerful deities" (Tylor 2016, I: 426). For him, spiritual beings are those immaterial entities that "affect or control the events of the material world, and man's life here and hereafter" (ibid., I: 426).

In the Near East, elements of early forms of belief in the afterlife of human spirits are recognizable in the burial of Paleolithic corpses found deposited in the rock caves of Shanidar in northern Iraq. Here, the burial of individuals is found in association with a few artifacts and, especially, trace remains of flower pollen.

These early attempts to cope with death represent a first step toward the creation of beliefs in something outside of the physical realm, as well as the search for the immortality of the soul and the creation of spiritual entities, all of which play a fundamental role in shaping people's lives throughout the history of ancient Near Eastern communities.

Drawing upon these premises, the aim of this contribution is to investigate how funerary customs and religious practices transformed throughout the history of the ancient Near East. The rich and varied examples available from the region span thousands of years, allowing us to trace the emergence of important elements from the cult of the ancestors and the subsequent creation of enclosures in which ritual practices were performed more than 10,000 years ago in southeastern Anatolia and the Levant, to the beginning of complex forms of polytheism in Mesopotamia starting from the fourth millennium BC, to the emergence of the first example of monotheistic religiosity (i.e., Judaism) in the Levant during the first millennium BC.

The Cult of the Ancestors During the Neolithic Period

One of the first steps in defining a link between funerary customs and religious beliefs is clearly related to how, within a given community, the cult of the dead was transformed into a cult of selected deceased, otherwise known as the cult of the ancestors. The idea that the spirit continues to live beyond the death of a family member is a defining factor of ancestor worship in the Near East, and this belief explains the needs for humans to have an ongoing relationship with the dead through funerary feasts, prayers, and offerings. In this way, the physical death of the deceased does not imply a rupture of the relationship between the living and the deceased but rather becomes an opportunity to reinforce family ties through a series of reciprocal obligations.

Since prehistoric times, the manipulation of human skulls illustrates that ancestral cults were deeply embedded in the traditions of ancient Near Eastern societies, through actions ranging from the removal of skulls from corpses to their caching, deformation, and, in some cases, decoration (Verhoeven 2011). This tradition was part of the so-called skull cult, a ceremonial practice that started during the Natufian period (ca. 12,500–9500 BC) and was enacted until the Late Neolithic (ca. 6200 BC) from the Levant all the way to southeastern and central Anatolia.

Even though the manipulation of the human body is recognizable since the Late Natufian period, it is particularly during the Pre-Pottery Neolithic (PPN, ca. 9500–7000 BC) that the custom of decapitating selected deceased and using the skulls isolated or grouped in caches becomes an element of commonality among groups that were slowly moving from a nomadic to a more sedentary form of living. This is especially the case of the Levant during the Pre-Pottery Neolithic B, when plastered skulls were found in caches either buried in pits at the end of their life history, such as those found at Jericho, 'Ain Ghazal, Beisomoun, and Kfar HaHoresh in southern Levant, or displayed above ground, as in the case of the four plastered skulls discovered at Tell Aswad in western Syria (Kuijt 2008; Verhoeven 2011). The skulls are of both sexes and of all ages and were removed after burial of the dead body. According to Croucher (2012: 303), "plastered skulls were intended to be displayed rather than kept permanently hidden or stored," and they were used as part of religious cults (probably

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associated with the memory of the ancestors) in ceremonial practices that served to connect ties among early agricultural communities in a transforming (and probably stressful) social and cultural environment.

In this process, the body (or part of it) has been reused after its initial burial in graves both intramurally (the highest number of cases) and extramurally, constituting a form of construction of social memories of the ancestors through the circulation of body parts of the selected individuals. Thus, as mentioned by Kuijt (2008: 183), "Neolithic secondary mortuary practices are a form of bodily recirculation." In so doing, the selection of body parts was also used as a form of selecting the deceased and introducing their memory in the daily life of the other components of the community. Within this framework, the creation of religious dimensions by the Pre-Pottery Neolithic communities of southeastern Anatolia is entangled within a broader cosmological construct that includes the deposition of human remains in buildings, as seen with the skull building at Çayönü, and the construction of enclosures that had special ritual purposes, such as the case of Göbekli Tepe (see below).

In Anatolia, the importance of displaying decorated skulls in ritualized contexts is also recognizable in later Neolithic contexts (ca. 7000–6200 BC), as is the case of the recently discovered skull of an adult male, plastered and decorated with red ochre, which was found in an intramural tomb excavated at Çatalhöyük in central Anatolia and buried in the arms of a woman deposited in a pit that was part of the foundation of the house. The numerous layers of plaster and red paint that covered the skull have lead Hodder (2006: 149) to suggest that the plastered skull was circulated prior to its final burial. The skull has been interpreted as the head of a person of prestige status (e.g., a sort of shaman) that was displayed and buried in this particular manner, within the foundation of a new house, in the process of creating genealogies for the people inhabiting the house.

Such examples can help illustrate that the fragmentation of the body served the purpose of embodying the memory of the dead among the living and strengthen the relationship between ancestors and the community of the living. In this way, the body could be transformed into an object useful for materializing the memory of ancestors among the society of the living. This aspect of material religion in the Near East can be seen in other archaeological contexts in which the display and use of body relics are important elements for constructing community identities (as, e.g., with the Early Bronze Age II, ca. 2900–2350 BC, "body libraries" found in charnel houses at Bab edh-Dhra in Jordan, Chesson 2007).

In general the fragmentation and display of parts of the body in public might have occurred to emphasize commonality versus individual personhood when cooperation was needed or in instances of radical transformation of the social and economic organization that could have increased the level of stress among the community's members.

Animism and the First Ceremonial Buildings at Göbekli Tepe (Southeastern Turkey)

The importance of creating a sense of community through ritual and religious practices is clearly evident when confronting other Neolithic contexts in the Near East, such as with the extraordinary ceremonial architecture unearthed at sites like Göbekli Tepe and Nevali Çori in southeastern Turkey that dates to the Pre-pottery Neolithic (ca. 9500–7000 BC).

In particular, the numerous stone enclosures from both the PPNA level III and the PPNB level II at Göbekli Tepe have been interpreted as the first examples of religious architecture associated with forms of animism during a phase in which the urge to create a sense of community appears pivotal for a society that was transforming toward new subsistence strategies associated with farming (Dietrich and Notroff 2015). Such an interpretation is based on the actual presence of large, almost underground, circular buildings but most of all by the presence of a unique iconography based on centrally located, tall,

T-shaped stelae with clear evidence of stylized anthropomorphism and a series of bas-reliefs representing elements of wild animals in movement. This mixture of animal and stylized human representation has led to a discussion on the possibility that the enclosures represent locales of spiritual representation of the encounters between the human and natural domains, probably in connection with a belief in the supernatural world.

Within this unique ritualistic context, Busacca (2017: 2) adeptly argues that the Pre-Pottery Neolithic examples of religious/ritual architecture of Göbekli Tepe represent "precise techniques of visual representation aimed to create illusions of motion and the intentional arrangement of depictions within the ritual space that contributed to the performative 'animation' of the animal image and to a ritualized *encounter* between humans and animals."

Increasing Social Complexity: From Community-Oriented Ceremonial Buildings to the First Temples

At the end of the Neolithic, the transformed communities of the Near East were fully established in an agropastoral economic subsistence strategy; their increasing size brought about a constant need for a greater level of agropastoral production and the establishment of larger centers in which specialized activities (e.g., metal and pottery making, textile production, etc.) were controlled by emerging elites. It is within this socioeconomic landscape that a more organized sense of both the world of the dead and the relationship with the supernatural domains emerged among ancient Near Eastern communities of the Chalcolithic period (i.e., fifth and fourth millennium BC, Hole 1983).

Regarding funerary customs, this trend is clearly evident in the creation of areas dedicated to the deposition of the dead in large cemeteries. For example, at the end of the fifth millennium BC (i.e., the Ubaid period), large cemeteries were created outside of the most important centers of southern Iraq and southwestern Iran (e.g., at Eridu, Ur, and Susa) as well as in areas not directly interconnected with settlements and considered as possible cemeteries for nomadic groups (Pollock 1999: 104–204). The interments are mostly of single individuals positioned on their backs, with the skeleton in an intact articulated status, and accompanied by a few items of funerary goods (e.g., pottery vessels, beads, stone mace-heads, clay figurines, etc.). In southern Iraq little or no status differentiations are recognizable in the funerary goods, whereas in the cemetery of the southwestern settlement of Susa (ca. 4200–3800 BC), rich furnishing goods including copper objects (e.g., axes, disks, needles) and elaborately decorated vessels were discovered in the graves of specific individuals in which some fragmented skeletons were also found, to suggest either a secondary deposit or death at war (Hole 1983, 1989). In some circumstances the graves were empty as a consequence of their possible use as cenotaphs or ritualized tombs. According to the French archeologists Morgan and Mecquenem, who excavated the site at the beginning of the twentieth century, there was a link between the large cemetery (with more than 2000 graves) and the massive platforms (i.e., the low platform, *massif funéraire*, and the stepped platform, *haute terrasse*, Hole 1983: 316–317). Hole (1983: 315) has suggested that it is at this specific southwestern Iranian site that we can signal the first correlates of an "increasing institutionalization of religion" in which control over production starts to be centered in the hands of a small community of priests representing about 3% of the population, taking into account the differences in funerary goods within the extramural cemeteries. This interpretation is based on the increasing complexity in burial data, the complexity of the decorative motifs (human, animalistic, and geometric) depicted on the vessels, the creation of anthropomorphic figures, the presence of the monumental, 10-m high stepped platform of unbaked mud bricks with the possible presence of a temple on top (that was burnt at the end of its use) within the 15-ha village, as well as the iconography engraved on the seals (e.g., the so-called master of the animals or stepped platforms) at Susa during the late fifth millennium BC (Pollock 1999: 176). Interestingly seals are never

found in funerary contexts, whereas some objects depicted in the image engraved on the seal (e.g., the beakers) are represented as part of the funerary goods found in the graves, thus suggesting that the seals were not associated with individuals but rather "they symbolized or depicted rites and institutions" and served the purpose of marking "goods that were brought to the temple for use in the rites depicted or for the shrines of particular deities" (Hole 1983: 321). Within this perspective, Rothman (2004: 102) adds that the case of Susa "demonstrates how religious ideology, the mobilization of labor in the service of god and community, and the use of pottery style and mortuary behavior to signify new statuses and reward political allies combined to catalyze growth, functional segregation, and the development of leadership in Susiana."

Thus, the presence of larger buildings in a more complex urban fabric of newly founded centers in ancient Mesopotamia and Iran represents both a new sense of centralized authority, as well as the need for representing a link with the spiritual domain. This element will further emerge during the fourth millennium BC, when the presence of large buildings with a central courtyard (*mittelsat*) or tripartite plan most probably dedicated to religious practices and built on high terraces or large platforms becomes more common in large- and medium-sized urban centers. In particular, the construction of buildings with a tripartite plan appears to have been derived from plans of private houses typical of the Chalcolithic period. Within this perspective, it is interesting to notice that in Sumerian the word for "house" is *é*, for temple is *é-name of the divinity* or the cosmological locale associated with the divinity, and for palace is *é-gal* ("the great house") testifying to the central role played by the institution of the extended family in the construction of Mesopotamian society.

Housing the Gods in Mesopotamia: The Fourth Millennium BC Sacred Precincts of Anu and Eanna at Uruk

The evolution of the first temple built on a high terrace is clearly recognizable at the site of Eridu in southern Iraq, where a series of layers testify to the transformation from a one-cell building into a tripartite building between the end of the fifth and end of the fourth millennia BC. However, clearly the most famous examples of Mesopotamian religious architecture during this period are the Anu and Eanna precincts in the large mid-to-late fourth millennium city of Uruk in southern Mesopotamia (levels VI–IV). In particular, the Anu precinct was composed of a small stone temple at the bottom of a high terrace (ca. 16-m tall) in which a tripartite temple, most probably dedicated to the Sumerian god of heaven, Anu, was located and reachable by a long staircase, whereas the Eanna precinct, dedicated to the goddess of love and fertility, Inanna, was composed of a series of buildings located on a 10-m high terrace, which included large outdoor spaces, halls, and buildings with a tripartite plan (Heinz 2012: 179–185). The lack of large indoor spaces within these primeval religious buildings at Uruk has suggested to D'Altroy (2001: 463) that during the second half of the fourth millennium BC, Uruk's religious practices were "spatially and socially exclusionary … and performance-oriented rather than participatory." In fact, in part due to climate conditions, it appears that the use of outdoor spaces for the performance of rituals and the public display of power gained by the religious elites was a common religious practice in the Near Eastern tradition. Furthermore, as noticed starting with the large stepped platform at Susa, the visibility of monumental religious buildings from afar becomes a priority of Uruk's elites, which was further emphasized by their highly decorated facades that were adorned with either wall paintings or colorful stone and clay cones embedded in the outer walls to create a sort of proto-mosaic effect. In so doing, religious monuments were built in order to impress not only the entire urban community but also the people arriving at this large urban center (ca. 250 ha in extension at the beginning of the third millennium BC) through "a visual statement of power" (Pollock 1999: 178).

Within this context, the figure of a political/religious leader (i.e., the so-called king-priest) is part of an innovative iconography typical of the late Uruk period (i.e., late fourth millennium BC).

He is usually portrayed standing with a beard and clothed in a rounded hat and net skirt and sometimes bearing weapons while confronting enemies, hunting, or offering tributes. This figure was also probably represented in the missing part of the famous meter-high Uruk alabaster vase, in which the natural world (represented at the bottom with water, plants, and flocks of animal) is linked with the procession of naked humans bestowing offerings to a goddess (most probably Inanna) in the upper section of the vase (Pollock 1999: 189–190, Fig. 7.7). The scenes depicted on the vessel are part of the hierarchical Mesopotamian system in which gods and goddesses represent different aspects of nature and mankind and their earthly representative, i.e., the king-priest, is given their consent to control and dominate nature owing to his pious devotion to them.

Thus, at the end of the fourth millennium BC, religious beliefs and practices in Mesopotamia are clearly entangled with politics and economics. Starting from this historical moment, it becomes clear that these three dimensions cannot be easily separated from each other and that the possibility of distinguishing secular and religious perspectives in the life of Near Eastern pre-modern societies becomes a very complex exercise for interested scholars (Fowles 2013: 4–12).

Despite such a complex system of religious beliefs and practices, the archaeological data associated with funerary customs dating to the end of the fourth millennium BC in Mesopotamia does not exhibit a similar level of complexity. However, further north, in the Caucasus, northwestern Iran, and eastern Anatolia, as well as in the Levant, the archaeological data related to funerary customs allows us to reconstruct a more complex scenario. It is especially in the northern regions that a burial tradition emerges as unique and further marks the funerary customs of the people inhabiting such a broad region. An example is the custom of burying individuals in large funerary tumuli (i.e., the *kurgan*, a Russian word for burial mound or tumulus), a funerary custom that began in the Pontic region and then becomes a typical funerary architecture used in the southern Caucasus regions, eastern Anatolia, as well as northwestern Iran starting from the fourth millennium BC.

A New Picture of the Cosmic World

At the end of the fourth and beginning of the third millennia BCE, a dramatic transformation occurs in Mesopotamia and its peripheral regions due to the collapse of the broad commercial networks established by southern Mesopotamian elites in various Near Eastern regions. It is during this period that changes in funerary customs and religious practices occur. In general, the presence of large extramural cemeteries with a clear variability in grave architecture and funerary goods emerges as a distinctive trait within numerous Near Eastern regions.

Due to the increasing presence of written documents in ancient Mesopotamia, the third millennium BCE represents a distinctive period in which the description of funerary rituals as well as forms of religious beliefs and practices allow for clearer reconstructions.

In particular, the organization of the Sumerian pantheon mirrors the social organization of Mesopotamian societies with its numerous city-states and gods, some of which are patron deities to specific cities (See Pollock 1999 (Table 7.2) for a list of the most important Sumerian gods, their attributes, and their referring city). The pantheon is organized in an "extended" familial type of scheme in which the sovereign god of the heaven, Anu, is the father of the god of the storm (Enlil), of the fresh water (Enki), and of mother earth (Ninhursag), from which all the other Mesopotamian gods and goddesses have been generated (Bottéro 2001).

In the Sumerian tradition, the cosmology was initially envisioned with a strict horizontal division between the realm of the living and the netherworld originally located in the mountains to the east; slowly, this separation became vertical with a separation between the "Great Above" (where the celestial gods were located), the world of the fresh water (Abzu/Apsu) (where Enki is in charge), and the netherworld commanded by the queen of the netherworld (the goddess Ereshkigal) and her companion (Nergal). As accurately pointed out by Pongratz-Leisten (2013: 40), "the direct and unbreakable link between the heavens and the lower realms was guaranteed by the cosmic

mooring rope that bound the two hemispheres together" in which "cities and temples can be seen as the physical location where these two spheres were held together by the cosmic bonds, as is Nippur with the Enlil Temple and later Babylon with the Temple of Marduk."

While each city was represented by its temple and the patron god that was venerated in it, other temples were also present within the city, as seen with the city-state of Lagash and the reference to its 20 temples in third millennium BCE texts (Pollock 1999: 186). The temple slowly became the center of Mesopotamian city-states; this phenomenon is recognizable in the symbols associated with the different cities in the so-called city sealings of the Early Dynastic I period (2900–2750 BC), in which an altar was associated with the emblem of the city (e.g., "sun for Larsa," Postgate 1992: 109). Due to its importance, the temple was usually located at the center of the city and, in some circumstances, built on top of a terrace through the means of stepped towers (i.e., the *ziqqurat*), reminiscent of the stepped platforms built at Susa and Uruk between the end fifth and throughout the fourth millennia BC, and slowly became the quintessential marker of Mesopotamian religious architecture.

Moreover, in Mesopotamian cities Early Dynastic temples (2900–2350 BC) could be distinguished by those embedded in the urban fabric and those built on high terraces or else as those representing institutional religious buildings and those associated with more domestic religious practices. This is clearly evident in important centers such as Khafajah (levels VII–VIII) in the Diyala (Iraq), where there was a distinction between institutionalized religious buildings, as in the case of the Temple Oval that represented the tradition of the shrine built on top of a high terrace, along with the Sin Temple, a "low" temple with a monumental entrance, large open courtyard, a series of annexed rooms, and a long cella room with a bent-axis entrance, in contrast to other low and smaller temples (e.g., the Small Temple, Heinz 2012: 188) built in a different section of the city and embedded in a nonpublic urban fabric that might have served the purpose of "popular religion" (i.e., the religion of "common" people, Pollock 1999: 192).

More generally, Mesopotamian temples had an altar along the short wall that was visible after a 90° turn from the entrance to the room, and, presumably, the image of the venerated divine figure would have been located either on top of the altar or along the wall behind it. According to the texts, the statues were probably composed of different materials with a central part comprised of wood or stone, with gold and other semiprecious stones used to decorate the body. The statue representing the divine figure had a proper life. This religious practice of giving life to votive statues of gods and goddess through the "opening of the mouth" ritual is peculiar to the ancient Near East and Egypt. In fact, as summarized by Pollock (1999: 187), in ancient Mesopotamia, "the statue underwent mouth- and eye-opening rituals in order to animate it. After these rituals were performed, it was clothed in luxurious garments and jewelry, fed, and brought into the temple, where it was placed on a pedestal in the inner sanctaury." At the end of their "lives," the statues were dismantled, and the remaining parts are occasionally found in archaeological contexts (as seen, e.g., in Ebla and Mari during the third millennium BC). Within this perspective, even the architecture and ritual paraphernalia associated with the religious buildings went through a process of ritual termination and required a proper burial similar to the one granted to human beings. Including the famous Early Dynastic figurines of devotees represented with wide open eye, arms attached to the body, and hands either joined together or holding a cup.

As mentioned before, since its first appearance during the Late Chalcolithic period, the temple functioned not merely as a center for religious activities but rather as a complex administrative structure in which, beginning from the third millennium BC, the presence of archives with cuneiform written texts documents an established control over economic activities by the religious authorities, from the production and exchange of goods to the organization of labor (Postgate 1992: 109–136). While it was originally thought that the Mesopotamian cities primarily functioned as "city temples," the important role played by the palaces and rulers in controlling the administration of the cities has more recently been defined.

When moving outside of proper Mesopotamia, it is clear that the temple had a different political role; in fact, it usually consisted of a building with one single room and was smaller as compared to the large religious institutional complexes built in southern Mesopotamia city-states. In these contexts the presence of large funerary complexes unearthed in western Syria and southeastern Turkey is of great interest (such as those unearthed at Tell Banat, Gre Virike, and Umm el-Marra) as testimonials to the growing concern for offering tributes to elite ancestors, probably in order to connect the newly emerging royal genealogies with the cosmic dimension in a context where the process of urbanization arrived as a consequence of the urban revolution in southern Mesopotamia (Schwartz 2012).

The Search for Immortality by the Mesopotamian Rulers

According to the Sumerian King List, copies of which are available from early second millennium BC cuneiform texts, Mesopotamian kingship descended from heaven, and the ruler was thus the vicar of the gods on earth, thereby making it impossible for him to reach a god-like status as was the case with neighboring Egypt. Despite this information, additional textual evidence clearly testifies to the interest in achieving the immortality by the Mesopotamian leaders as described in tablets narrating the epic stories of Gilgamesh or other mythological stories associated with this subject, such as the descent of the goddess Inanna/Ishtar to the netherworld and the myth of Adapa. Life, death, the netherworld, and the search for immortality are elements linked not only to Mesopotamian mythological stories but also to other ancient Near Eastern societies.

Among these stories, the one narrating the relationship between Inanna, the goddess of fertility and love, and the shepherd, Dumuzi, perhaps most clearly illustrates this struggle for immortality as well as the connection between the netherworld, the celestial world, and the desire to wield control over nature for agropastoral economic subsistence strategies. According to the story, after their marriage Dumuzi substitutes the goddess Inanna in the netherworld, who had previously decided to descend to the netherworld and was kept there by her sister Ereshkigal; however, after 6 months below ground, Dumuzi was allowed to leave the netherworld and was substituted by his sister Geshtinanna, who is also the goddess of the grape and wine, thereby allowing Dumuzi to return to his job as a shepherd and oversee the grazing of the animals (Jacobsen 1976: 27–73). Another mythological story in which a mythological Mesopotamian king struggles with his desire to reach immortality is the one narrated in the 12th tablet of the Epic of Gilgamesh (i.e., Gilgamesh and the Netherworld) in which the king of Uruk, due to the death of his friend Enkidu, decided to travel into the netherworld in search of immortality but instead learns at the end of his journey that the fate of humans is in the hands of the gods. While the obvious intention of these mythological stories is to narrate and explain the way nature functions (e.g., the agricultural cycle, the end of human life), a secondary function is to also represent the struggle of the Mesopotamian rulers to become immortal through divinization (Pollock 1999: 187–188).

Regarding the actual divinization of kings, at the end of the Early Dynastic period, after a period marked by the regionalization of power divided among city-states, we encounter the advent of the first territorial empire (i.e., the Akkadian period) and starting with king Naram-Sin (2254–2218 BC) and the first attempt by a Mesopotamian king to reach divine status recognizable by the addition of the determinative for "god" before his name (Postgate 1992: 266–267).

The struggle of members of the elite to control the underworld and obtain a stronger connection with the cosmological order and divine world is evident in the increased complexity of funerary customs and the practice of lavish funerary rituals during the third millennium BC. In particular, during the third millennium BC, an increasing variability in the archaeological data associated with funerary practices is witnessed, as exemplified by the funerary remains discovered in Early Dynastic Mesopotamian contexts (2900–2350 BC). The importance of lavish

funerary rituals in ancient Mesopotamia is reinforced by written documents, such as the famous reform texts of Uru'inimgina, the last ruler of the First Dynasty of the city-state of Lagash (ca. 2400–2350 BC), in which details about the performance of the funerary rituals at this specific Mesopotamian city-state are described (Vogel 2012: 421).

The archaeological data from the Early Dynastic period greatly aid in reconstructing the funerary customs of ancient Mesopotamian communities, the quintessential example of which is the famous Royal Cemetery of Ur (2450–2350 BC, Woolley 1934; Zettler and Horne 1998). The cemetery was located at the bottom of the sacred area's temenos that was dedicated to the moon god, Nanna, and consisted of hundreds of graves with dates spanning the entire third millennium BC. Among them 16 royal graves were identified in which possible rulers of the First Dynasty of Ur were buried. These royal graves are comprised of larger than normal stone shaft graves with corbel or barrel vaults decorated with plaster and some traces of paint on the walls. The funerary chambers were located ca. 8–10 m in depth and reachable by a ramp; the associated bodies were usually wrapped in reed mats and placed inside a wood or clay coffin (Vogel 2012: 425). The funerary goods consisted of stone, metal and ceramic vessels, gold and semiprecious stone objects, highly decorated musical instruments, and, most notably, sacrificed individuals who accompanied the buried rulers (usually buried in dedicated "death pits") dressed with special clothing and jewels emulating those worn by the rulers. The ceremonies associated with the burial of the rulers must have been part of a theatrical performance that established the preeminence of the dynastic family over the netherworld as part of their cosmological connection with the world of the divine (Cohen 2005).

The importance of connecting royal genealogies with the divine is even more evident in the tradition of northern Mesopotamia and eastern Anatolia during the third millennium BC (Peltenburg 2013; Schwartz 2012). It is in fact in these contexts that archaeologists have found the earliest traces of human sacrifices associated with the disposal of individuals of elevated status (e.g., at Arslantepe and Bashur Höyük) during the beginning of the third millennium BC. As mentioned before, in this context the tribal form of social organization of the communities brought about the commemoration of ancestral figures through the construction of large funerary complexes (e.g., the White Monument at Tell Banat or the funerary complexes of Umm el-Marra and Gre Virike).

Moreover, it is at the western Syrian city-state of Ebla that both archaeological and textual evidences clearly document the important connection established by Syro-Mesopotamian communities of the third millennium BC between funerary customs and the creation of a cosmological world in which the royal ancestors were connected with the world of the divine. At this city-state a large mid-third millennium BC royal complex (i.e., the Royal Palace G) with an archive of thousands of cuneiform tablets written in a local version of Akkadian was brought to light by an Italian team of archaeologists (Matthiae 1995). In addition, underneath the palace a large shaft grave was discovered, and the royal funerary customs at Ebla are further enlightened by the tablets found in the archive that include the description of the ritual associated with the coronation of the new royal couple that was described as a pilgrimage of the couple from the temples dedicated to the local gods Kura and Barama in the city of Ebla to the mausoleum dedicated to the royal ancestors, i.e., the mausoleum in NE*nash*. In addition, within the Royal Palace G, the archaeologists discovered a standard representing two facing women, one seated and one standing, that can be interpreted as a material representation of a form of spiritual connection between the living queen and the ancestral seated queen who is dressed in special attire associated with the divine (Laneri 2016).

All of these elements are of extraordinary importance in providing a clear picture of the importance of the royal ancestors in continuing the royal genealogy, as well as the role of the ritual performance of the pilgrimage to the NE*nash* mausoleum as part of a religious practice that embedded the royal genealogy of Ebla within the cosmic world (Ristvet 2015: 87–89).

Meals for the Spirits of the Dead Ancestors

In reconstructing the evolution of ancestor worship in the Near East, some elements seem to be consistent throughout Mesopotamia, Anatolia, Syria, and Israel, such as the importance of caring for the dead through a proper burial and libations in the form of continual offerings of food and beverages postmortem, both of which are necessary for establishing and maintaining positive relationships between the living and the dead. In fact, in most ancient Near Eastern literature, the netherworld is described as a place with no lights where the "soul" of the dead (e.g., *gidim* in Sumerian) eats dust and mud and drinks wastewater; thus, the libations offered by the living are precious necessities that ensure the spirit of dead has a decent life in the netherworld (Vogel 2012: 429–431). Descriptions of how to properly care for the dead are outlined in numerous ancient written texts including the myth of Atrahasis, also known as the Babylonian flood story, or the death of Ur-Nammu (i.e., the first king of the Third Dynasty of Ur, end of the third millennium BC). Archaeologically, elements associated with offerings and libations can be identified by the presence of vessels that can be found among furnishing goods, as well as the remains of food within and outside the grave, and pipes and drains that connect the tomb dromos-entrance or the above floor with the grave room (Laneri 2016). In particular, the presence of residential graves planned and built within dwellings or palaces can indicate forms of caring for dead ancestors and a demonstration of the spiritual connection between the living and the spirits of the selected deceased (Laneri 2014).

More specifically, the tradition of burying select bodies representing dead ancestors in residential graves created inside of homes is a funerary custom that has characterized Mesopotamia since the beginning of the third millennium BC. Together with residential graves, the creation of areas specifically used for the sharing of meals with the ancestors on certain occasions is documented in third millennium BC texts, exemplified by cases such as the *ki.a.nag* (i.e., a funerary chapel) in the Sumerian cuneiform written tradition. The discovery of pipes and drains connecting the floor with the underlying funerary chamber, as exemplified by the case of the early second millennium BC residential graves excavated at the southern Mesopotamian city-state of Ur, confirms the custom of the ritual offering of libations to the buried dead by the living (Postgate 1992: 99).

Moreover, the offering of libations to the royal ancestors is mentioned in the previously mentioned texts from Ebla. Archaeologically speaking, the custom of venerating the memory of elite dead ancestors is recognizable at numerous sites including the royal mausoleum dedicated to the kings Shulgi and Amar-Sin of the Third Dynasty of Ur or the funerary complex of the Giparu dedicated to the *entu*-priestess of the moon god Nanna, both of which are built on the sacred *temenos* dedicated to Nanna in the city-state of Ur in the third millennium BC (Heinz 2012: 192–196, Fig. 9.5).

However, it is during the second and first millennia BC that tighter connections between funerary customs and religious practices associated with the care of dead ancestors become widespread in Near Eastern communities. In particular, the performance of a ritual associated with the caring for dead ancestors had a specific Akkadian term, i.e., *kispu*, and represented a feast in which a meal is consumed as a dedication to the memory of the ancestors (Tsukimoto 2010). Starting from the second millennium BC, the performance of the *kispu* ritual occurred at specific locales called the *bit kispi*, which is "the building of food and drink offerings to the dead" (Al-Khalesi 1977: 57).

Numerous attempts have been made to identify this type of locale in the archaeological record. Even though such an investigation is complex by nature, the discovery of a large shaft grave under the royal palace of Qatna in western Syria is a great opportunity to envision how the cult of the ancestors might have been performed and how the *kispu* ritual was performed. In fact, the excellent state of preservation of the grave excavated by a team of Syro-German archaeologists (Pfälzner 2012) illustrates the potential for archaeology to

be used as a tool in reconstructing the agency of ancient communities (Laneri 2016).

A royal palace and its related hypogeum were also brought to light at this western Syrian center. The palatial complex's long chronology dates from the eighteenth to fourteenth centuries BC, at which time the palace was destroyed by either the Hittites or their enemies during the reign of Suppiluliuma I. The funerary chambers of the hypogeum were located about 12-m below the palace's foundations and were connected to the palace through a long, stepped corridor. The corridor contained four wooden doors that led to the antechamber, reachable by disposable wooden ladders, and served as the entrance to the hypogeum (Pfälzner 2012).

The entrance to the rock-cut hypogeum consisted of a large gate flanked by the presence of two basalt statues of seated royal male figures with offering bowls in front of them. Examples of similar stone statues can be found in other Syro-Hittite contexts and have usually been interpreted as associated with the *kispu* ritual dedicated to memorialize the royal ancestors (Bonatz 2016). From the antechamber, a door led into the main large funerary chamber that was columned and gave access to three smaller rooms located on each side. The grave had multiple depositions representing at least the last 50 years of the palace's use. In fact, together with more than 2000 objects and funerary goods (i.e., numerous ceramic vessels, gold or semiprecious stone beads, decorative plaques, miniature vessels, a modeled hand of gold, an extraordinary example of an amber lion), the remains of a total of about 20–24 individuals were found. From among the skeletal remains, only in one case was the skeleton discovered in a fully articulated position. In the central chamber, a basalt sarcophagus and four wooden biers were used to contain the bodies of the deceased.

The presence of benches, vessels, and animal bones in this room supports the hypothesis that it was used as a sort of "banqueting room" for performing the *kispu* ritual in remembrance of the royal ancestors that, as noticed since the case of Ebla, were of fundamental importance for strengthening family ties as well as the political, economic, and religious leadership of the new royal individuals (Laneri 2016). The importance of the cult of the ancestors is especially evident among the Amorites, who have characterized the ethnic identity of western Syria and later of southern Mesopotamia and the Levant since the end of third millennium BC (Burke 2011). Their presence in this broad region has also marked dynastic lineages (as is the case of the first Babylonian dynasty of Hammurabi I) as well as religious traditions that also continue during the first millennium BC (e.g., the in antis temple).

The Materialization of Spirits

It is during this period that the performance of ritual practices established the materialization of profound religious beliefs that come to mark the religiosity of Near Eastern communities throughout the second and first millennia BC. This is the case of the *akitu* festival, which celebrates the beginning of the New Year. Even though the tradition of the *akitu* festival has origins that can be traced back to the third millennium BC, it is during the second and first millennia BC in Babylonia that the festival becomes "the most complete expression of Mesopotamian religiosity" (Frankfort 1978: 313). The feast was established through the enactment of a 12-day festival celebrating the victory of the primary Babylonian god Marduk over Tiamat that embodied primordial chaos. More specifically, the festivals celebrated the relationship between the god Marduk and the king through a ritualized journey of the statue of the god by the king and the high priest from the temple of Marduk in Babylon (i.e., the *E-sagila*) and the *bit akiti* located outside of the city and by the narration of a series of mythological stories, including the creation of the world, the *Enuma Elish*. Moreover, through the millennia, the *akitu* festival became the quintessential Mesopotamian religious feast to celebrate the spring season, but, most of all, it "was a political device employed by the monarchy and/or the central priesthood to ensure the supremacy of the king, the national god, and his capital city" (Bidmead 2014: 2).

Moreover, it is starting with the second half of the second millennium BC that exchanges of products and ideas crossed the traditional frontiers of the ancient Near East. This historical phase is in fact known as the "International" period. Extensive Egyptian and Hittite archives record in cuneiform writing the exchange of goods and forms of alliances between the rulers of the "great powers" (i.e., the Egyptians, Hittite, Babylonians, and Assyrians), providing a testimonial to the development of intense commercial exchanges, new forms of artistic production, and forms of syncretism in the religious beliefs of the involved communities. Of special interest during this period is the entanglement between spirits and stone reliefs in Anatolia. In this geographical context, the relationship between natural phenomena, the belief in spirits, and their representation on stone reliefs is recognizable since prehistoric times, but it is specifically during the Hittite kingdom that this form of material religiosity becomes pivotal for Anatolian communities. Of particular interest is the open-air sanctuary of Yazilikaya (ca. 1400–1300 BC) near the Hittite capital of Hattusa in central Anatolia. The sanctuary was connected to Temple I of the storm god Teshup in the capital through a long trail and was conceived as religious architecture incorporating natural rock caves in which a series of bas-reliefs were engraved in the natural bedrock (Matthiae 1997: 68–73). Depicted in the first room (Room A) of the open-air sanctuary is a parade of gods, on one side, and goddesses, on the other side, coming toward each other from opposite sides of the room. The divine figures are represented standing on top of animal and human figures. The parade terminates with the meeting of the two primary Hittite divine figures, the storm god, Teshup, who wields his mace, and the goddess of the sun, Arinna. In Room B, the representation depicted on a large bas-relief is dedicated to the memorialization of the spirit of the dead king Tudkhalia IV, who is shown wearing the clothing of a priest and being embraced by his protective god Sharruma, who introduces him to the netherworld. The name of the king is engraved in the Hittite hieroglyphs cartouche next to head of the god.

The end of this period (i.e., the Late Bronze Age) is a transformative moment in the history of the Near East marked by the collapse of numerous kingdoms located in western regions (e.g., the Hittite kingdom) due to the arrival of the "Sea People" from the Mediterranean region during the twelfth century BC. At the end of this historical phase, a transformed and fragmented political landscape emerges, and as a consequence the Syro-Hittite city-states of western Syrian and southeastern Anatolia region become the new cultural and political venues of local tribal domains. It is within this context that stone bas-reliefs located in outdoor spaces, depicting ritual and religious visual representations, became a fundamental part of the performance of religious practices by elite members of the community (Gilibert 2011).

The tradition of using stone bas-reliefs as a medium for symbolically containing the souls of the dead encounters in the royal Hittite funerary continues into the end of the second and the beginning of the first millennia BC, when depictions of the deceased on stelai as well as written texts associated with iconographic representations appear to substitute the physical presence of residential graves within private dwellings or palaces of the Syro-Hittite city-states. This is, for example, the case of the stone stele of Katumuwa, a non-elite citizen of the eighth century BC city-state of Sam'al/Zincirli in southeastern Turkey that was found in a room of a private dwelling not associated with a grave. In the stone bas-relief, the deceased is depicted in front of a banquet table, and it is possible to infer from the written inscription in Aramean that "the soul was expected to dwell on in the stele in order to enable the deceased's participation in the offering meal" to the gods (Bonatz 2016: 187).

In addition, the tradition of embedding the cult of the souls of the ancestors into decorated slabs (i.e., orthostates) becomes pivotal for the religious practices associated with the memory of the royal ancestors, also among the Assyrian kings during the first millennium BC, when Assyria rises from northern Mesopotamia (i.e., along the Tigris river) to become the first universal empire in human history. This is especially the case of the

orthostates representing the tree of life with two specular genies in one room. According to Richardson (1999/2001), the tree of life represents the spirits of dead kings who were to be buried in the Old Palace at Assur, the first palace of the Assyrian capital dating to the early second millennium BC. According to the Assyrian kings, the palace at Assur is the "palace of repose, the eternal abode," and in fact, it is in the southeastern section of the palace that a series of underground funerary chambers with stone sarcophagi bearing inscriptions of the Assyrian rulers were found. Of great interest is the fact that after the construction of the new palace complex of Ashurnasirpal II (883–859 BC) in the new capital of Nimrud/Kalhu, the queens started to be buried in an underground funerary complex located in the southeastern corner of the palace (Lundström 2012).

Thus, the northwestern palace of Nimrud might have had the function of becoming the locale for connecting with the ancestral spirits of past Assyrian rulers through their embodiment in the orthostates, while the spirit of the queens instead rested in the domestic section of the palace as a symbol of their connection with the future rulers of the Assyrian empire.

In addition, according to Harmanşah (2015: 126), the anthropomorphic representation of the god Ninurta (i.e., a leading god in the Assyrian pantheon and to whom Ashurnasirpal II dedicated a temple and a ziqqurat in the new capital of Nimrud) functioned "as a conceptual metaphor for the image of the king, whose duty was to restore order in the world." In order to achieve this duty, Near Eastern kings performed festivals and rituals both inside and outside of the city walls with the purpose of both connecting the royal genealogies to the divine world as well as displaying to the communities the pious and civilizing role of the ruler. Through the performance of festivals and the creation of commemorative and religious monuments, it was possible for Near Eastern rulers to intertwine ritual practices with political propaganda in (ibid. 135) "ceremonial events that brought together the king, the dynastic family, the army, state officials, citizens, gods of the city, and ancestors all at the same time" in Mesopotamian as well as Syro-Hittite cities.

The Origin of the Migdol Temple in the Levant

During the second half of the second millennium BC, activities of economic and cultural exchange are primarily concentrated in the western regions of the Near East. During this period elements of commonality in both religious and funerary customs practiced by the communities inhabiting these regions also emerge, such as with the use of specific types of religious architecture, i.e., the long in antis temple, which links western Syria and the Levant during the second and especially the first millennium BC. The typical architectural plan of the in antis temple is of a single-roomed temple with thick walls, suggesting the hypothesis of a multistoried structure protruding toward the entrance in order to form either an antechamber (in same cases with corner towers) or two flanking sides to the entrance; in the back, a large room (either long or large) with a niche embedded in the back wall represents the religious cella where the statue of the god was most probably located (Burke 2011: Fig. 55.1). In some circumstances the cella presents two rows of columns in the main room that act as supports for the roof and divide the cella (see, e.g., the double temple dedicated to Ba'al and Astarte at the Late Bronze Age site of Emar along the middle Euphrates river in Syria, Matthiae 1997: 116).

Examples of *antentemple* coming from third millennium BC Syria are reminiscent of this type of temple. From the site of Ebla, further examples dating to the third millennium BC are available from the archaeological record and especially moving into the beginning of the second millennium as seen with the in antis temple dedicated to Ishtar, the goddess of love and fertility (corresponding to the Sumerian Inanna). This temple can be considered as the standard for religious architecture and later evolves into an established tradition during the first millennium in Syro-Hittite and Aramean city-states, such as Ayn Dara, Aleppo, and Shechem, as well as other centers located in western Syria and also Canaanite contexts in the Levant (Matthiae 1997: 182–191).

Particularly in the Levant, the tradition of the single-room shrine, sometimes with towers flanking the entrance (the *Migdol* Temple of the

Bible), becomes popular. The development can be traced to contacts between different ethnic identities in the region (i.e., Canaanites, Phoenicians, Israelites, Philistines, etc.) and especially the popularity of western Syrian religious cults of gods like Ba'al, Dagon, and Astarte, whose presence in the region is also legitimized by iconographic representations. Obviously this type of temple brings to mind the description in the Old Testament of the first Israelite temple built in Jerusalem by Solomon during the tenth century BC (1 Kings 6:1). The detailed description of its construction in the Old Testament suggests that the workforce and building materials needed to construct the temple were brought to Jerusalem from numerous Canaanite and Phoenician city-states (e.g., from King Hiram I of Tyre), further strengthening the links between these different communities and suggesting syncretic forms of religiosity that are also confirmed in the stories narrated in the Hebrew Bible (Burke 2011: 898–901).

In the Name of One God: The Creation of the Bible and Funerary Customs in the Levant

The first millennium BC has been considered by Karl Jaspers as the Axial Age, signifying the simultaneous appearance of new forms of spirituality in multiple parts of the world based on spiritual interiorization as well as monotheistic religious beliefs. In the Near East, this period is marked by the formation of the first universal empires (i.e., Assyrian, Babylonian, and Achaemenid empires) and the emergence of new forms of religious behavior and experiences: the first form of monotheism by the Israelites in the Levant (i.e., Judaism) and a deepened interiorization of religious spirituality within other Near Eastern communities (e.g., Iran and Babylonia).

These new developments occurred as part of a lengthy process that did not end in a few years or even a few decades but rather lasted for centuries, allowing the different Near Eastern societies and their associated religions to be exposed to phenomena of cultural osmosis as well as antagonism against attempts of cultural colonization. This aspect is especially evident when forms of imperial power eradicated communities from their local contexts, as seen in the case of the Assyrian and Babylonian empires.

Within this complex sociopolitical landscape, the case of the Levant is emblematic with its fragmented political identity during the end of the Late Bronze Age and beginning of the Iron Age when the whole region was comprised of different communities (e.g., the Canaanites, the Israelites, the Philistines) and diverse forms of religious practices and funerary customs. Starting with the military conquest by first the Assyrians, and later the Babylonians, we witness the development of a stronger affinity toward the cult of one god, i.e., Yahweh, as evidenced by the one dedicated temple erected in Jerusalem by Solomon and as documented in the written rules of the Torah.

In terms of funerary customs, until the sixth century BC, the funerary tradition of Levantine communities is based on the use of cave, chamber, and bench tombs cut into the natural bedrock. In some instances these tombs could be elaborated with a decorated entrance as seen in the case of tombs of high officials of the kingdom of Judah in the famous Silwan cemetery (ninth to seventh centuries BC) located just across from the city of Jerusalem (Bloch-Smith 1992). In a way similar to the royal hypogeum of Qatna, tombs of this context generally represented an eternal residence for the extended family "featuring a central room off which smaller chambers opened to accommodate individual family members," some of which were laid on benches (Burke 2011: 903).

As part of this religious process, even the cult of the ancestors, which as we have seen throughout this contribution has been pivotal to Near Eastern ancient communities, received a heavy reform by the Israelites through the words of the prophets. In fact, it is clear that the link between polytheism and the cult of the ancestors was part of a cultural and religious liaison with the Canaanites that was difficult for the Israelites to disentangle.

In particular, the Israelites believed in a netherworld that was not dissimilar to the one known from Ugaritic texts and thus belonging to the Canaanite tradition. In that tradition the god of

the netherworld is Mot, who according to a mythological story eats the main god Ba'al and, in order to free himself from the netherworld, uses Mot's brother as his substitute in a way that is similar to the relationship between the goddess of the underworld, Ereshkigal, and her celestial sister, Ishtar/Inanna, in the Mesopotamian poem narrating her descent to the netherworld. It is interesting to notice that in Hebrew the past tense of the verb to die is "mot" and the goddess of death in the western Syrian city of Emar is Shawal, not dissimilar to the divine figure controlling the netherworld in the Biblical tradition (i.e., She'ol). It is against such a religious tradition that the prophet Isaiah spoke (28: 15) when he criticized that the Israelites "have a covenant with Death (Mavet/Mot) and with She'ol we have made an agreement" (Hallote 2001: 110–114). In fact, it is in his book (Isa. 8: 19–20), which was most probably written during the Babylonian captivity of the sixth century BC, that the desire to dismantle this tight relationship with the Canaanite religious tradition emerges, especially regarding funerary customs.

Moreover, the complex, intertwined relationship between the Canaanites and the Israelites is clearly evident in Old Testament narrations about the construction of the first temple of Jerusalem by Solomon. As previously mentioned, it is unclear when the first temple of Jerusalem was erected, but it is important to further highlight that it was constructed according to an architectural template from the Canaanite tradition (i.e., the in antis single-room shrine) and that included among the people mentioned in the Bible that were involved by Solomon in its construction is a Phoenician king of Tyre, Hiram I.

In fact, one of the most extraordinary examples of sarcophagi, that of Ahiram I of Byblos, comes from an Iron Age Phoenician context. The sarcophagus is embellished with carved decorative motifs and iconography considered to be a quintessential representation of the cult of the royal ancestors in the Near East. The ruler is represented seated on a throne, flanked by a pair of winged sphinx, in front of a table holding offerings, with a procession of dancing and singing women lead by a priestess offering a lotus flower to the king; on top, the lid presents two male figures most probably representing the king with his son; along the lid, an inscription in Phoenician with 38 words describes the devotion of the son Ithobaal I toward his father Ahiram, the respectful manner in which the coffin should be treated, and the subsequent punishments that would ensue should anyone cause it damage, including the cancelation of "his registration concerning the libation tube of the memorial sacrifice" (Matthiae 1997: 233).

This representation is not dissimilar to those available from the previously mentioned Syro-Hittite stone stelai and confirms the fundamental role played by the ancestors in framing familial religiosity and cohesion in the entire Near East (Bonatz 2016).

Thus, it was a tremendous undertaking for the Israelites to also erase this aspect in the process of dematerializing the relationship with the supernatural domain and, especially, focusing the attention of devotees onto the words of god and not its representative power. However, the continuous violence suffered during the Assyrian and Babylonian invasions (including the destruction of the first temple by the armies of the Babylonian king Nebuchadnezzar in 587 BC) forced the Israelites to move toward a phenomenon of interiorization that was necessary to survive the struggle subsequent to these external invasions. Obviously, this phenomenon of interiorization also characterized other first millennium BC communities, and even among Mesopotamian societies, we encounter a higher value given to symbolic representation of the gods through the use of their astral symbol.

Thus, the beginning of monotheism in the Levant is part of a broader form of interconnection among people inhabiting such a broad region as well as a form of rejection of the violence that occurred with the territorial conquests of the first universal empires.

Conclusions

Even though the spirits of dead have been considered as the primeval step in the construction of human beliefs in supernatural beings, their role appears, both from archaeological and textual

evidences, as a founding pillar of the religious beliefs of the people inhabiting the ancient Near East from prehistoric periods until the first millennium BC. In particular, the continual revising of the memory of the dead ancestors through forms of calendric ritual practices has the power of cementing familial lineages and, at a royal level, to connect these lineages to cosmological genealogies.

It is for these purposes that also, starting with the Sumerians during the third millennium BC, the cosmos is envisioned following the parameters of the social organization of the city-states emerging within a fragmented regional power. In order to facilitate the connection with the celestial world, a "high temple" (i.e., the *ziqqurat*) became the focal point for the cult of the most important Mesopotamian gods.

For the rulers, a pious and a devoted life that exhibited respect to the ancestors and the gods was fundamental for gaining the respect of the members of the community. In order to reach this target, religious festivals and performances had to be properly enacted in dedicated outdoor spaces (usually in front of religious complexes) and well-built and maintained religious monuments.

Within this perspective, religious materiality was intensified by cognitive beliefs in supernatural beings, and traces of this materialization of religious beliefs are clearly evident in both public and domestic archaeological contexts. However, in the Levant during the first millennium BC, the need emerged for an interiorization of spiritual life without the assistance of external anthropomorphic figures that in ancient Mesopotamia were brought to life through the ceremony of the "opening the mouth" of the divine statues, as well as altars and temples for a daily connection with the divine. This will be a major turning point in the history of humanity with the creation of the Bible and of the first monotheistic temple that will later rise as a pivotal element in constructing the modern world.

References

Al-Khalesi, Yasin. 1977. The bit Kispim in Mesopotamian architecture: Studies of form and function. *Mesopotamia* 12: 53–81.

Bidmead, Julye. 2014. *The Akītu festival: Religious continuity and Royal Legitimation in Mesopotamia*. Piscataway: Gorgia Press.

Bloch-Smith, Elizabeth. 1992. *Judahite burial practices and beliefs about the dead*, JSOT/ASOR monograph series. Vol. 7. Sheffield: Sheffield Academic Press.

Bonatz, Dominik. 2016. Syro-Hittite funerary monuments revisited. In *Dining and death: Interdisciplinary perspectives on the funerary banquet in ancient art, burial and belief*, Colloquia antiqua, ed. C.M. Draycott and M. Stamatopoulou, vol. 16, 173–194. Leuven: Peeters.

Bottéro, Jean. 2001. *Religion in ancient Mesopotamia*. Chicago: The University of Chicago Press.

Burke, Aaron. 2011. The archaeology of ritual and religion in ancient Israel and the Levant, and the origins of Judaism. In *The Oxford handbook of the archaeology of ritual and religion*, ed. T. Insoll, 895–907. Oxford: Oxford University Press.

Busacca, Gesualdo. 2017. Places of encounter: Relational ontologies, animal depiction and ritual performance at Göbekli Tepe. *Cambridge Archaeological Journal* 27 (2): 313–330.

Chesson, Meredith. 2007. Remembering and forgetting in early bronze age mortuary practices on the southeastern Dead Sea Plain, Jordan. In *Performing death: Social analyses of funerary traditions in the ancient Mediterranean*, ed. N. Laneri, 109–123. Chicago: Oriental Institute, University of Chicago.

Cohen, Andrew C. 2005. *Death rituals, ideology, and the development of early Mesopotamian kingship: Toward a new understanding of Iraq's royal cemetery of Ur*. Leiden: Brill Academic Publishers.

Croucher, Karina. 2012. *Death and dying in the Neolithic Near East*. Oxford: Oxford University Press.

D'Altroy, Terence N. 2001. A view of the plains from the mountains. In *Uruk Mesopotamia and its neighbours: Cross-cultural interactions in the era of state formation*, ed. M.S. Rothman, 445–475. Santa Fe: School for Advanced Research Press.

Dietrich, Oliver, and Jens Notroff. 2015. A sanctuary, or so fair a house? In defense of an archaeology of cult at prepottery Neolithic Göbekli Tepe. In *Defining the sacred: Approaches to the archaeology of religion in the Near East*, ed. N. Laneri, 73–89. Oxford: Oxbow.

Fowles, Severin M. 2013. *An archaeology of doings secularism and the study of Pueblo religion*. Santa Fe: School for Advanced Research Press.

Frankfort, Henri. 1978. *Kingship and the gods: A study of ancient near-eastern religion as the integration of society and nature*. Chicago: University of Chicago Press.

Gilibert, Alessandra. 2011. *Syro-Hittite monumental art and the archaeology of performance. The stone reliefs at Carchemish and Zincirli in the earlier first millennium BCE*. Berlin: De Gruyter.

Hallote, Rachel S. 2001. *Death, burial, and afterlife in the biblical world: How the Israelites and their neighbors treated the dead*. Chicago: Ivan R. Dee.

Harmanşah, Ömür. 2015. *Cities and the shaping of memory in the ancient Near East*. Cambridge: Cambridge University Press.

F

Heinz, Marlies. 2012. Public buildings, palaces and temples. In *The Sumerian world*, ed. H. Crawford, 179–200. London: Routledge.

Hodder, Ian. 2006. *The Leopard's tale: Revealing the mysteries of Çatalhöyük*. New York: Thames & Hudson.

Hole, Frank. 1983. Symbols of religion and social organization at Susa. In *The Hilly Flanks and beyond. Essays on the prehistory of Southwestern Asia presented to Robert J. Braidwood*, Studies in ancient oriental civilization, ed. T. Cuyler Young Jr., P.E.L. Smith, and P. Mortensen, vol. 36, 315–331. Chicago: The Oriental Institute of the University of Chicago.

Hole, Frank. 1989. Patterns of burial in the fifth millennium. In *Upon this foundation: The 'Ubaid reconsidered (proceedings from the 'Ubaid symposium, Elsinore, May 30th–June 1st, 1988)*, Carsten Niebuhr Institute of ancient Near Eastern studies publications, ed. E.-F. Henrickson and I. Thuesen, vol. 10, 149–180. Copenhagen: Museum Tusculanum Press.

Jacobsen, Thorkild. 1976. *The treasure of darkness: A history of Mesopotamian religion*. New Haven: Yale University Press.

Kuijt, Ian. 2008. The regeneration of life: Neolithic structures of symbolic remembering and forgetting. *Current Anthropology* 49 (2): 171–197.

Laneri, Nicola. 2014. Locating the social memory of the ancestors. Residential funerary chambers locales of social remembrance in Mesopotamia during the late third and early second millennia BC. In *Contextualizing grave inventories in the ancient Near East. Proceedings of the workshop at the London 7th ICAANE in April 2010 and an International Symposium in Tubingen in November 2010, both organized by the Tubingen Post-graduate school 'Symbols of the dead'*, Qatna Studien Supplementa, ed. P. Pfälzner, H. Niehr, E. Pernicka, S. Lange, and T. Koster, vol. 3, 3–11. Berlin: Harrassowitz.

Laneri, Nicola. 2016. In memory of the royal families: Relationship between hypogea and palaces in ancient western Syria. In *Envisioning the past through memories. How memory shaped ancient Near Eastern societies*, ed. D. Nadali, 53–67. London: Bloomsbury.

Lundström, Steven. 2012. Concerning the dead – How to bury an Assyrian King? Possibilities and limits of the archaeological and written evidence in the second and first millenium BC. In *Contextualizing grave inventories in the ancient Near East. Proceedings of the workshop at the London 7th ICAANE in April 2010 and an International Symposium in Tubingen in November 2010, both organized by the Tubingen Post-graduate school 'Symbols of the dead'*, ed. P. Pfälzner, H. Niehr, E. Pernicka, S. Lange, and T. Koster, 271–280. Wiesbaden: Harrassowitz.

Matthiae, Paolo. 1995. *Ebla: un impero ritrovato: dai primi scavi alle ultime scoperte*. Torino: Einaudi.

Matthiae, Paolo. 1997. *I primi imperi e i principati del ferro: 1600–700 a.C*. Milano: Electa.

Peltenburg, Edgar J. 2013. Conflict and exclusivity in early Bronze Age societies of the middle Euphrates Valley. *Journal of Near Eastern Studies* 72 (2): 233–252.

Pfälzner, Peter. 2012. How did they bury the kings of Qatna? In *(Re-)Constructing funerary rituals in the ancient Near East*, ed. P. Pfälzner, H. Niehr, E. Pernicka, and A. Wissing, 205–221. Wiesbaden: Harrassowitz.

Pollock, Susan. 1999. *Ancient Mesopotamia: The Eden that never was*. Cambridge: Cambridge University Press.

Pongratz-Leisten, Beate. 2013. Mesopotamia. In *The Cambridge companion to ancient Mediterranean religions*, ed. B. Spaeth, 33–54. Cambridge: Cambridge University Press.

Postgate, Nicholas J. 1992. *Early Mesopotamia: Society and economy at the dawn of history*. London: Routledge.

Richardson, Seth. 1999/2001. An Assyrian garden of ancestors: Room I, Northwest Palace, Kalhu. *State Archive of Assyria Bulletin* 13: 145–216.

Ristvet, Lauren. 2015. *Ritual, performance, and politics in the ancient Near East*. New York: Cambridge University Press.

Rothman, Mitchell. 2004. Studying the development of complex society: Mesopotamia in the late fifth and fourth millennia BC. *Journal of Archaeological Research* 12 (1): 75–119.

Schwartz, Glenn M. 2012. Era of the living dead: Funerary praxis and symbol in third millennium BC Syria. In *Contextualizing grave inventories in the ancient Near East. Proceedings of the workshop at the London 7th ICAANE in April 2010 and an International Symposium in Tubingen in November 2010, both organized by the Tubingen Post-graduate school 'Symbols of the dead'*, ed. P. Pfälzner, H. Niehr, E. Pernicka, S. Lange, and T. Koster, 59–78. Wiesbaden: Harrassowitz.

Tsukimoto, Akio. 2010. Peace for the dead, or kispu (m) again. *Orient* 45: 101–109.

Tylor, Edward B. [1871]2016. *Primitive culture. Researches into the development of mythology philosophy religion, language, art and custom*. Mineola: Dover Publications.

Verhoeven, Mark. 2011. Retrieving the supernatural. Ritual and religion in the prehistoric Levant. In *The Oxford handbook of the archaeology of ritual and religion*, ed. T. Insoll, 795–810. Oxford: Oxford University Press.

Vogel, Helga. 2012. Death and burial. In *The Sumerian world*, ed. H. Crawford, 419–434. London: Routledge.

Woolley, Leonard. 1934. *The Royal cemetery: A report on the Predynastic and Sargonid graves excavated between 1926 and 1931*. Philadelphia: Pennsylvania Museum.

Zettler, Richard, and Lee Horne, eds. 1998. *Treasures from the royal tombs of Ur*. Philadelphia: University of Pennsylvania, Museum of Archaeology and Anthropology.

Fung, Rosa

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Basic Biographical Information

Rosa Fung Pineda was born in 1935, the child of Chinese immigrants to Peru. Her childhood was spent in Casma, a rural town on the north-central Peruvian coast. She moved to Lima to attend secondary school and then went on to study at the Universidad Nacional Mayor de San Marcos (UNMSM), the largest and most prestigious public university in Peru and the center of the nation's archaeological and anthropological training and scholarship at that time. At the university, she specialized in Ethnology and Archaeology, receiving her bachelor degree in 1963 and her doctoral degree in 1967. The faculty at UNMSM featured major figures such as Luis Valcárcel, Jorge Muelle, Jose Matos Mar, and Raul Porras Barrenechea.

Fung remained at UNMSM throughout her career training generations of young archaeologists, and filling crucial administrative positions including director of the UNMSM Museum of Archaeology (1973–1978), coordinator of the Archaeology Program (1981–1984) and director of UNMSM's program of graduate studies in the Social Sciences (1985–1986). After retiring, Fung was appointed as emeritus professor in 1999.

Early in her career, Fung was married to US archaeologist, Edward P. Lanning, and the couple had two children, Eduardo, an engineer, and Zaida, a librarian and jeweler. Fung was a cosmopolitan scholar; she traveled to the United States and taught briefly at Arizona State University. Later in her career, she attended conferences and other academic activities in Chile, Brazil, and Japan.

Fieldwork

Despite limited research funds, Fung maintained an active career in the field, focusing most of her investigations on the Preceramic, Initial Period, and Early Horizon. Early in her career, she participated in the excavations directed by Seiichi Izumi in Chancay (1957) and Tumbes (1958). She eventually went on to direct her own investigations at Las Aldas, an Initial Period ceremonial complex on the Pacific shores of the Casma Valley (1963–1964); these served as the basis of her doctoral dissertation and first major monograph (Fung 1972). Over the following three decades that she worked at UNMSM, she organized and directed excavations at numerous archaeological sites along the coast and in the highlands. On the coast, her investigations at Chivateros (Fung 1968), Bermejo, Bandurria, Curayacu, and Chankillo were particularly important as were her excavations in the highlands at Pacopampa and Chavin de Huantar (Fung 1976, 1987).

Major Accomplishments

Rosa Fung was known for her rigorous and meticulous approach to archaeological science. She was a demanding professor and emphasized the importance of achieving a comprehensive knowledge of the literature in multiple languages and prioritizing the use of empirical data in the evaluation of competing hypotheses. At a time when Marxist theory dominated archaeology at UNMSM, Fung insisted on a theoretical approach that had its roots in Franz Boas, Alfred Kroeber, and John H. Rowe. She was scrupulous in her citations and avoided exaggerating the importance of her own findings. In the field, she lived austerely with a minimum of concern for her own personal comfort.

Fung was the first female to hold a position as a tenured archaeologist in the Division of Social Sciences in Peru and as such she was able to provide a refuge for female UNMSM archaeology students alienated by the misogynist attitudes that polluted the UNMSM academic environment in the 1970s.

Fung maintained a long-standing interest in fiber technology, including textiles and baskets,

an interest that was encouraged by her colleagues in the United States, such as Junius Bird. Given Peru's uniquely rich textile heritage and its remarkable preservation in the archaeological record, Fung's research and teaching in this area is particularly significant (Fung 1978). She thought that the textiles held the key to a better understanding of the development of complexity in the Andes.

While much of Fung's fieldwork produced results of lasting value, she is probably best known for her focus on Peru's north-central coast. In her synthetic overviews, she emphasized the crucial role of this region in the origin of civilization and the special place that Peru's rich marine resources played in this process (Fung 1972, 1987). Her salvage excavations at the Preceramic site of Bandurria, her pioneering description of the early Initial Period pottery from Tortugas (1972), her detailed analyses of the material culture of Las Aldas (Fung 1972), and her survey of the Casma Valley with her friend and collaborator architect Carlos Williams (Fung and Williams 1979) are all benchmarks in the literature on early Peruvian civilization.

Cross-References

► Bird, Junius

References

Fung, R. 1968. Los antiguos pobladores del Peru: nuevos hallzgos arqueológicos. *Amaru* 8: 71–77.

Fung, R. 1972a. *Las Aldas: su ubicación dentro del proceso histórico del antiguo Perú*, Dédalo 5. Sao Paulo: Museo de Arte y Antropología.

Fung, R. 1972b. El temprano surgimiento en el Perú de los sistemas socio-políticos complejos: planteamientos de una hipótesis de desarollo original. *Apuntes Arqueológicos* 2: 10–32.

Fung, R. 1972c. Nuevos datos para el period Inicial en el Valle de Casma. *Arqueología y Sociedad* 7–8: 1–12.

Fung, R. 1976. Excavaciones en Pacopampa. *Cajamarca. Revista del Museo Nacional* 41: 129–210.

Fung, R. 1988. Late Preceramic and initial period socioeconomic development and the rise of ceremonial centers. In *An overview of Peruvian prehistory*, ed. Richard Keating, 67–98. Cambridge: Cambridge University Press.

Fung, R. 2008. El arte textil en el Antiguo Perú: sus implicancias económicas, sociales, políticas y religiosas. *Proceso* 1: 20–23.

Fung, R., and C. Williams. 1979. Exploraciones y excavaciones en el Valle de Sechín, Casma. *Revista del Museo Nacional* 43: 11–155.

G

Gamio Martínez, Manuel

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Basic Biographical Information

Manuel Gamio Martinez was a Mexican archaeologist and anthropologist and a promoter of the welfare of indigenous Mexicans. He was born in Mexico City on March 2, 1883, and died on July 16, 1960, in the same city at age 77. Gamio completed his basic studies in the colleges Fournier and Colón and his high school studies in the National Preparatory School from which he graduated in 1903. Pressured by his father, he went to the School of Engineering but soon abandoned it due to lack of interest (Comas 1956; Gallegos 1996). In 1905, he obtained the post of Assistant in Evening Elementary School Supplemental Instruction No. 5, and in 1907, he joined as Editor of the Spanish section in the *Revista Moderna de México* (*Modern Mexico Magazine*) where he wrote about the Indians (Gallegos 1996: 25–65).

In 1906, he attended courses in archaeology at the National Museum taking classes on Nahuatl and ethnology given by Nicolas Leon and Andres Molina Enriquez. In 1907 he was appointed Assistant Professor of History class, and he presented, along with Leon, the project *Archaeological Guide to Mexico*, which was rejected. Being a student of the Museum, after an excursion to Zacatecas, his work "The archaeological monuments in the vicinity of Chalchihuites, Zacatecas" was published in *Anales del Museo Nacional* (Annals of the National Museum 3rd season, vol. II) (Gallegos 1996: 29–65). With the support of Zelia Nuttall, he studied at Columbia University with Franz Boas and Marshall Saville from 1909 to 1911. When he returned to Mexico, he was appointed Professor of Archaeology and Practice Professor of Archaeology in charge of the tours in the National Museum at the National Museum (August 1911–January 1912). In parallel, he became a Fellow at the International School of American Archaeology and Ethnology, and he was appointed Assistant Inspector of the Inspectorate of Monuments, which caused his dismissal from the Museum due to the neglect of his work (Gallegos 1996: 65–98). The constant duplication of work caused him problems with Franz Boas, who repeatedly complained about his informality with the International School. In June 1913, he quit the International School to take up the post of

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Inspector in the General Inspectorate of Monuments. The following year he was appointed Head of Inspection, and he removed this office from the Museum (Gallegos 1996; Rutsch 2007).

Gamio held a number of important administrative positions throughout his career. He was member of the Supreme Council of Welfare from 1929 to 1932. In 1933, he held various positions in Public Education, National Economy, and the Agricultural Department. In 1934, he was General Director of Rural Population and Settlement in the Ministry of Agriculture and from 1935 to 1937 was a member of the Technical Advisory Committee of the SEP and, from 1938 to 1942, Head of Vital Statistics of the Ministry of Interior (Comas 1956: 12–17). In 1942, he was appointed Director of the Inter-American Indigenist Institute, which allowed him to join the indigenismo. He was reelected twice in this post, which he held until his death. One of his main concerns in the Institute was the improvement of indigenous peoples by the introduction of American soybeans in their diet (Comas 1956; Gallegos 1996).

Major Accomplishments

Gamio is sometimes considered to be the father of modern anthropological studies in Mexico. He postulated that anthropology should be considered as an applied science that focused on solving problems of contemporary peoples and on the cultural identification of indigenous cultures based on social, paleontological, archaeological, anthropological, linguistic, and historical knowledge (Gallegos 1996; Rutsch 2007). Gamio is also considered one of the key practitioners of stratigraphic excavation (Adams 1960). From 1910 to 1912, he excavated a series of deep trenches in the refuse deposits at San Miguel Amantla (Azcapotzalco) in Mexico City under the direction of Boas, who proposed the sequence of De los Cerros-Teotihuacan-Azteca for Mexico Basin (Gamio 1913).

In his classic work *Forjando Patria* (1916), Gamio portrayed contemporary Indians as backward, uneducated, and poor. He advocated stronger education programs, with an emphasis on Spanish education and the sciences. He saw cultural fusion, linguistic unification, and economic equilibrium as a means of building a new nation. His approach was launched in the new Department of Ethnographic and Archaeological Studies founded in 1917 (called also Department of Anthropology from 1919) in the Ministry of Agriculture and Development. As Director of the institution, he proposed regional studies as tools to understand and improve the indigenous population in their physical and cultural aspects and to exercise good governance. He proposed the use of applied anthropology as a tool of government, taking into account Molina Enriquez and Boas' proposals. With these concerns in mind, Gamio attended the Second International Congress of Eugenics in New York, representing the Mexican government (Urías 2002; López 2003).

Since 1917, Gamio conducted a regional study of the Teotihuacan Valley integrating archaeological, historical, and anthropological investigations. He held workshops to teach people Spanish; science and craft manufacturing, to encourage economic activity complementary to agriculture, were established (Gallegos 1999). The results were published in *The Population of the Teotihuacan Valley* (Gamio 1922).

When Gamio was appointed Assistant Secretary of Public Education, he moved the Department of Archaeology to the Secretariat (with the name of Department of Anthropology). He denounced the inflated expenses in several purchases of the Secretariat and had to leave the post and the country since Plutarco Elias Calles rejected all these allegations and supported the Secretary Puig Casauranc. With his departure, the Department was converted into an office for archaeological research (Department of Archaeology), canceling the second regional project in Monte Alban, Oaxaca (Urías 2002; López 2003). Gamio sought refuge in America. There he joined the archaeological-ethnographic exploration of the American Archaeological Society of Washington in Guatemala and then, sponsored by the Social Science Research Council and the Rockefeller Foundation Spelman, took the migration to the USA as subject of research, studying its impact on economy and society and the reasons

why migrants had preserved their traditions and customs without full integration to the American lifestyle (Gamio 1930, 1931).

Gamio never lost hope of regaining the confidence of President Calles and maintained a constant correspondence in which he always showed his unconditional support, despite the disdain of Mexican politics. He returned to the Mexican public administration occupying minor positions; this fact was the end of his archaeological career and also an impasse in his interest in improving indigenous races (Urías 2002: 110–113).

Cross-References

► Mesoamerica: Complex Society Development
► Nationalism and Archaeology

References

Adams, R. 1960. Manuel Gamio and the stratigraphic excavation. *American Antiquity* 26 (1): 99.

Comas, J. 1956. *La vida y obra de Manuel Gamio, in Estudios antropológicos publicados en homenaje al doctor Manuel Gamio*, 1–26. México: Dirección General de Publicaciones-Universidad Nacional Autónoma de México/Sociedad Mexicana de Antropología.

Gallegos, J.R. 1996. *Manuel Gamio y la formación de la nacionalidad: el problema de los indios y de los derechos de los pueblos*. Unpublished Bachelor dissertation, Universidad Nacional Autónoma de México.

Gallegos, J.R. 1999. La artesanía, un modelo social y tecnológico para los indígenas. *Política y Cultura* 12: 223–241.

Gamio, M.M. 1913. Arqueologia de Atzcapotzalco, D. F. Mexico. In *Proceedings of the Eighteenth International Congress of Americanists*, 180–187.

Gamio, M.M. 1916. *Forjando patria: Pro nacionalismo*. Mexico City: Libreria de Porrúa Hermanos.

Gamio, M.M. 1922. *La población del valle de Teotihuacan*. Mexico City: Instituto Nacional Indigenista.

Gamio, M.M. 1930. *Mexican immigration into the United States: A study of human migration and adjustment*. Chicago: University of Chicago Press.

Gamio, M.M. 1931. *The life story of the Mexican immigrant*. Chicago: University of Chicago Press.

López, H. 2003. *La arqueología mexicana en un periodo de transición, 1917–1938*. Unpublished Bachelor dissertation, Escuela Nacional de Antropología e Historia.

Rutsch, M. 2007. *Entre el campo y el gabinete. Nacionales y extranjeros en la profesionalización de antropología mexicana (1877–1920)*. Mexico City: Instituto Nacional de Antropología e Historia-Universidad Nacional Autónoma de México.

Urías, B. 2002. Las ciencias sociales en la encrucijada del poder: Manuel Gamio (1920–1940). *Revista Mexicana de Sociología* 64 (3): 93–121.

Further Reading

Gamio, M. 1935. *Hacia un México nuevo: Problemas sociales*. Mexico City: Instituto Nacional Indigenista.

Gamio, M. 1948. *Consideraciones sobre el problema del indigenismo*. Mexico City: Instituto Indigenista Interamericano.

González-Gamio, A. 1987. *Manuel Gamio. Una lucha sin final*. Mexico City: Universidad Nacional Autónoma de México.

González-Mello, R. 2004. Manuel Gamio, Diego Rivera, and the politics of Mexican anthropology. *Res* 45: 161–185.

Hansen, L.D.T. 2003. Reseña de El inmigrante mexicano: la historia de su vida. Entrevistas completas, 1926–1927, de Manuel Gamio. *Migraciones Internacionales* 2 (1): 171–175.

Matos, E. 1998. *Las piedras negadas. De la Coatlicue al Templo Mayor*. Mexico City: Consejo Nacional para la Cultura y las Artes.

Rutsch, M. 2002. Ramón Mena y Manuel Gamio. *Una mirada oblicua sobre la antropología mexicana en los años veinte del siglo pasado. Relaciones* 88: 81–118.

G

Garden Hunting

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Introduction

Garden hunting was originally proposed as an indigenous subsistence strategy associated with pre-Hispanic tropical agroforestry in western Panama. At the time, it was offered as a potential means for farmers to supplement their carbohydrate-dominated diets in tropical environments that were traditionally viewed as "protein deserts" (Nigh and Nations 1980). As a subsistence option that exploited wild game animals that were either passively or intentionally attracted to indigenous agroecological landscapes, the possibilities of

garden hunting subsequently engaged the attention of archaeologists working in different areas of the world and biologists who were interested in its possible conservation implications within anthropogenic landscapes.

Definition

Garden hunting refers to subsistence exploitation of local animals that are attracted to the concentrated foraging opportunities provided in horticultural settings throughout the tropics. Although it refers to the opportunistic hunting of prey items whose availability in and around tropical gardens is increased simply as a by-product of farming, it is often used to connote the intentional game farming of anthropic (related to humans) faunas.

Historical Background

The term "garden hunting" was first introduced by Olga Linares (1976) to refer to a game procurement system less reminiscent of tropical forest hunting than of agricultural harvesting and maritime collecting. Previously, Conklin (1957: 102–103) had described a pattern of hunting in Philippine Hanunóo shifting gardens that was undertaken primarily for crop protection but also partly for food and sport. In particular, Linares (1976) inferred a pre-Columbian garden hunting pattern from preserved archaeofaunal specimens recovered at the site of Cerro Brujo which was occupied between CE 960 and CE 985 in northwestern Bocas del Toro province, Panama. The assemblage was overwhelmingly comprised of specimens identified as terrestrial mammals with strong predilections toward disturbed habitats and the increased foraging opportunities associated with swidden gardens. These included principally agouti (*Dasyprocta*), paca (*Cuniculus*), and armadillo (*Dasypus*), along with collared (*Tayassu*) and white-lipped (*Pecari*) peccaries, white-tailed (*Odocoileus*) and brocket (*Mazama*) deer, as well as rats (*Sigmodon, Oryzomys, Hoplomys*) and opossum (*Caluromys*, *Marmosa*). This "cultural faunal assemblage" differed markedly from fauna associated with "natural undisturbed habitats" as it was predominantly composed of disturbance taxa that readily invade anthropogenic clearing and excluded canopy-dwelling, shy, forest animals. The cultivation of root crops in tropical swidden gardens, which affects the locally available biomass of animals behaviorally preadapted to commensality, may have been a form of neotropical domestication in the manner of "animal tending." Garden hunting has become a popular strategy for understanding how indigenous agroecology can provide sufficient protein in tropical forest environments traditionally characterized as "protein deserts" (Nigh and Nations 1980) (Fig. 1).

Key Issues/Current Debates

The number of different kinds of species (richness) and their relative abundance (equitability) tend to be much higher in tropical forest ecosystems that have developed over longer periods of time under optimal growing conditions. Unlike temperate ecosystems which tend to be dominated by eurytopic taxa (generalists with broad niche requirements), tropical ecosystems contain more stenotopic taxa (specialists with narrow niche requirements). The latter have not had to adapt to extreme seasonal fluctuations, which enables them to increasingly partition their habitats and focus on environmental heterogeneity (Eldredge 1991). Tropical ecosystems composed of canopied forests are dominated by small-bodied animals which tend to be stenotopic as they perceive their environments in a relatively fine-grained manner. Many of their larger mammalian counterparts tend to be eurytopic as they exploit their temporally and spatially dispersed resources in a relatively coarse-grained manner and thus require greater foraging space (Mares and Willig 1994). Stable environments with low levels of resources tend to favor small populations with narrow niche tolerance and low reproduction rates. Small populations of K-selected (producing larger and/or fewer offspring less frequently) specialists can exploit heterogeneous environments that have reached maximum population levels

Garden Hunting, Fig. 1 Skinning a garden-hunted paca (*Cuniculus*) or hochi (San Calixto, Beni, Bolivia). (Photo by author)

more effectively. Stable environments with low resource levels tend to be characterized by many different kinds of species (high richness) with comparable population sizes (high equitability). This is in contrast to unstable environments with high and fluctuating resource levels which favor populations tolerant of broader niches and with high reproduction rates. Large populations of r-selected (producing smaller or more offspring more frequently) generalists are favored under conditions where the most food can be harvested and the largest families can be reared (MacArthur and Wilson 1967; Valentine 1971).

Environmental instability is important for understanding the historic evolution of biological diversity in the tropics. Although classical characterizations of tropical forest ecosystems have depicted a steady accumulation of species in benign settings over long periods of time, more recent models emphasize continuous but modest change as the engine behind high species richness. The ecological history of tropical forests is one of dynamic stability, which relies on temporally and spatially localized instability to prevent monopolization by a few species while presenting new opportunities for others (Connell 1978; Colinvaux 2001). Sporadic and localized instability in canopied forests may be caused by a variety of natural perturbations including tree fall, fire, disease, drought, flood, or animal activity. As a universal cultural footprint, anthropogenic clearance is an important feature in landscape modification that contributes to changing plant and animal diversity in the forested tropics. Ecologically, indigenous gardens can be considered as mechanisms that produce higher net productivity while maintaining or increasing high diversity through a pattern of "intermediate disturbance" (Nigh and Nations 1980).

Indigenous cultivation is characterized by a wide range of land-intensive as well as land-extensive practices but is today dominated by shifting cultivation, so named because the technique usually involves leaving older gardens to fallow for periods of variable length when farmers shift their focus to preparing, planting, and harvesting newer gardens. The practice normally involves the selective clearing of vegetation in small garden plots, after which the slash can be mulched or dried and burned for additional fertilization. Indigenous gardens are diverse and multi-storied plots characterized by multiple cropping and interaction with natural vegetation. Early succession gardens often feature plantings of higher nutrient-demanding annuals requiring greater ambient sunlight. Subsequently, with increased vegetational maturity and complexity, less nutrient-demanding shade-tolerant perennials, particularly root crops, dominate later succession gardens. Over time, farmers manage and utilize

Garden Hunting, Fig. 2 Neotropical chakra or swidden garden (Jasiaquiri, Beni, Bolivia). (Photo by author)

forest fallows in an active form of agroforestry. Old fallows are returned to for various reasons and can be considered both structurally and functionally as "orchard fallows." Fallow utilization is a way to convert a system of short-term cropping into a longer-term agroforestry system; however, eventual abandonment "is not a moment in time but a process over time" (Denevan et al. 1984: 347) (Fig. 2).

Garden hunting is generally considered as an integrated feature of indigenous tropical agroecology. It is undertaken throughout the entire cycle of garden life but can continue particularly during the management of later stage swidden fallows. For the same reason that farmers who manage the succession of their fallow orchards continue to harvest relic products, these sites also continue as favorite foraging locales for eurytopic and synanthropic (wild animals living near and benefitting from humans) species. In most cases, this latter propensity should be viewed as an actively managed outcome of fallow orchards in order to take advantage of the increased productivity found in unstable forest clearings. Mosaic landscapes created by indigenous agroecological systems can be productive habitats for human populations as they provide multiple, dispersed, and productive venues in tropical forest settings. Controlled field studies in neotropical forests are identifying the ecological effects of habitat fragmentation and edge creation on the abundance and distribution of animal life. These are linked to body size, mobility, and trophic status, along with the willingness and physical ability of organisms to cross non-forested gaps, the minimum area of forest necessary to maintain normal behavior, the degree of spatial/temporal patchiness of resource distribution, and the effects of edge environments on animals (Dale et al. 1994). Fragmentation and edge creation create conditions that can favor certain synanthropic faunas which have a propensity for dramatic population increase under anthropogenic conditions. Many of these animals are preferred prey items that thrive in fragmented mosaics and thus complement the agroecological strategy of tropical agroforestry.

The production and exploitation of agroecological landscape mosaics in the past can be potentially inferred from an analysis of recovered and preserved archaeofaunal and archaeobotanical specimens. However, the reliability of these inferences is subject to many of the problems usually inherent in archaeological data interpretation, particularly those associated with assemblage accumulation and preservation. For example, the original accumulation of many of the faunas recovered at the site of deposition in an archaeological site may have actually been incidental to garden hunting. However, in certain kinds of depositional contexts, it is possible to identify the mode of accumulation in the

archaeological record based upon patterned preservation. The natural histories of incidentally accumulated faunas, moreover, might also suggest local conditions that can be used to support an interpretation that suggests habitat fragmentation. Recognizing a pattern of garden hunting in the archaeological record involves identifying a suite of eurytopic taxa that proportionately dominates the recovered sample in a cultural assemblage. These can be compared and contrasted to faunal distributions associated with continuous primary forest habitats. The relative proportions of eurytopic taxa supporting the inference of garden hunting and expressed in the form of richness and evenness values can be assessed through ubiquity measures, rank correlations, and techniques that are sensitive to sample size differences like rarefaction, regression, sampling to redundancy, and computer simulation (Stahl 2000; Stahl and Pearsall 2012).

In its first appearance, garden hunting was presented as a potential indigenous subsistence strategy practiced by pre-Hispanic neotropical horticulturalists. It was originally an archaeological interpretation that was based upon patterning of animal bone specimens recovered from archaeological contexts in forested Panama and coupled with inferences derived from ethnographic analogy and ecological observations. Critical issues surrounding garden hunting as a prehistoric subsistence strategy have been raised in archaeological studies from areas outside the tropics. Field-based studies of garden hunting by tropical subsistence farmers have also been undertaken to understand its possible implications for conservation. It has been argued that the relationship between increasing agricultural effort, human sedentism, and hunting is a complex and interrelated issue. Citing diachronic data from archaeological assemblages in the Near East, North America, and particularly the American Southwest, Speth and Scott (1989) suggest that reliance on large game actually increased in association with increasing settlement stability. This appears to have arisen independently of environmental change, demographic increase, or technological innovation. Instead, they suggest that increased reliance on large game is causally linked to fundamental socioeconomic changes associated with larger community size, residential stability, and augmented horticultural commitment. Larger and more permanent communities tend to deplete local game, while increased horticultural effort also places constraints on time and labor which involves a rescheduling of hunting effort. Additionally, the increased stability afforded by a predictable agricultural diet enables hunters to engage in greater risk-taking. Hunters, therefore, increasingly tend to spend more time farther afield pursuing larger, high-quality game. This critique, however, does not clearly define what is meant by "large" and "small" game animals nor does it substantiate how increased reliance on larger animals is established in the archaeological record. It also relies on research undertaken among neotropical, primarily Amazonian, farmers and foragers to critique the application of an hypothesis which was originally proposed for pre-Hispanic neotropical horticulturalists to archaeological assemblages in ecologically unrelated geographical areas like the desert Southwest.

Recent field-based studies of tropical horticulturalists, mainly conducted among non-indigenous small-holding ribereños and subsistence farmers, have been undertaken specifically to examine the contemporary practice of garden hunting. An 18-month study of 60 non-indigenous farms in the Peruvian Amazon found that the most common game animals above 2 kg in live weight consisted of species that regularly consume agroforestry crops. In order of importance, these included the following: agouti (*Dasyprocta*), paca (*Cuniculus*), collared peccary (*Tayassu*), tayra (*Eira*), armadillo (*Dasypus*), brocket deer (*Mazama*), and rabbit (*Sylvilagus*). Large game animals like capybara (*Hydrochoerus*), tapir (*Tapirus*), and white-lipped peccary (*Pecari*) were seldom observed (Naughton-Treves 2002). A related study of non-indigenous colonist and lowland Quechua farms in the Peruvian Amazon determined that older forests contained significantly more wildlife per unit area; however, animals were more readily available to hunters in secondary vegetation both in terms of biomass and number of collection events (Gavin 2007). It has been suggested that non-indigenous hunters prefer to pursue wild game in primary forest and

tend to spend more time there. Although anthropogenic habitats may be more productive in terms of hunting effort, primary vegetation may be preferred because of less dense understory, increased prey predictability, and the opportunity to combine hunting with the pursuit of other forest products (Parry et al. 2009). Highly prized game like paca is usually hunted in gardens and fallow, where hunting takes on the dual role of guarding crops. The choice of technology is also a factor as some hunters will not waste a relatively expensive shotgun shell on a small game item like an agouti (Naughton-Treves 2002: 498). It has been suggested that non-indigenous ribereños do not manage gardens in order to intentionally attract game, a pattern also followed by the indigenous Buglé of western Panama. Buglé hunters encounter most of their wild game within agricultural areas and do not consider it necessary to garden intentionally in order to attract crop pests that would be normally attracted anyway. The primary reason that Buglé hunt in their gardens is due to the constant threat that animal pests pose to agricultural production. As in other tropical areas of the world, garden hunting is a complementary activity that is undertaken within a broader cultural ecological pattern (Smith 2005).

International Perspectives

Garden hunting as a potential subsistence strategy has been pursued by archaeologists in different world areas, but it remains best studied and recognized in tropical areas as a complement to indigenous agroforestry. Conservation biology is particularly interested in garden hunting as it relates to conservation efforts linked to expanded farming, global deforestation, and the loss of animal biodiversity. Throughout tropical regions of South America, Africa, and Asia, secondary forests are particularly important for the acquisition of wild meat (Parry et al. 2009). Open anthropogenic landscapes are particularly productive in this regard as the tropical wildlife most likely to survive in the fragmented conditions created through farming tend to be a suit of relatively small, highly adaptable, rapidly reproducing, and pervasive faunas that include rodents, deer, and peccary in South America; cane rat, porcupine, pig duiker, baboon, and vervet monkeys in Africa; and, pig, deer, and primates in Southeast Asia (Naughton-Treves 2002). Typically, high-canopy species are rare, minimally due to canopy removal, and farmers often "clean the forest of large predators" (Naughton-Treves 2002: 499). However, the removal of large predators may also be a preventative measure, particularly by farmers who maintain domestic stock. It is particularly because of their habits that small, pervasive, r-selected, and highly adaptable eurytopic species are in low risk of extinction and consequently of no interest for conservation (Naughton-Treves 2002: 500). The higher species richness that often accompanies anthropogenic habitats also does not take into account the rare endemic species that are of particular interest for conservation (Smith 2005: 527). Conservation biology has considered secondary forests as a possible source for replenishing game depleted through hunting in primary forests (Gavin 2007). Also, hunting in anthropogenic habitats is also considered as a potential source for relieving hunting pressure of primary forest prey. Nevertheless, the former primarily consist of terrestrial species of low interest for conservation, whereas the latter include many of the canopy dwellers like birds and primates that are targeted by conservation efforts (Parry et al. 2009: 1785). Studies undertaken throughout the tropics suggest that humans do indeed prefer large wild prey over their smaller counterparts; however, the former decrease in numbers and can become locally extinct in association with settlement age (Wilkie and Lee 2004). Hunting effort is often greater in fallow forests than in primary forests and continues to be a complementary activity within agroforestry throughout the tropics. Animals are hunted and meat protein is obtained while crops are cultivated and protected from predation (Wilkie and Lee 2004: 358). Field studies have however suggested that human hunting in agroforestry landscapes does not otherwise necessarily alleviate the pressure of species loss, nor is it a strategy that is more productive than the maintenance of animal domesticates, nor does it support game biomass similar to that found in

savanna habitats. Fallow hunting currently appears to supply sufficient protein for human populations when their density is kept under four people per square kilometer (Wilkie and Lee 2004: 366). The metaphor of gardens as enclosed spaces for attracting animals, as opposed to enclosed spaces for excluding animals, has been criticized as a false allegory that was originally coupled with an ancient dream of human harmony with nature (Naughton-Treves 2002).

Cross-References

- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Sustainability and Cultural Heritage
- ▶ Vertebrate Taphonomy in Archaeological Research

References

Colinvaux, P. 2001. Paradigm lost: Pleistocene environments of the Amazon basin (continued forest cover in perpetual flux, part 2). *Review of Archaeology* 22: 20–31.

Conklin, H.C. 1957. *Hanunóo agriculture. A report on an integral system of shifting cultivation in the Philippines*. Rome: Food and Agriculture Organization of the United Nations.

Connell, J.H. 1978. Diversity in tropical rain forests and coral reefs. *Science* 199: 1302–1310.

Dale, V.S.M., H.L. Offerman, and R.V. O'Neill. 1994. Relating patterns of land-use change to faunal biodiversity in the central Amazon. *Conservation Biology* 8: 1027–1036.

Denevan, W.M., J.M. Treacy, J.B. Alcorn, C. Padoch, J. Denslow, and S. Flores Paitan. 1984. Indigenous agroforestry in the Peruvian Amazon: Bora Indian management of swidden fallows. *Interciencia* 9: 347–357.

Eldredge, N. 1991. *The miner's canary: Unraveling the mysteries of extinction*. New York: Prentice Hall.

Gavin, M.C. 2007. Foraging in the fallows: Hunting patterns across a successional continuum in the Peruvian Amazon. *Biological Conservation* 134: 64–72.

Linares, O.F. 1976. "Garden hunting" in the American tropics. *Human Ecology* 4: 331–349.

MacArthur, R.H., and E.O. Wilson. 1967. *The theory of island biogeography*. Princeton: Princeton University Press.

Mares, M.A., and M.R. Willig. 1994. Inferring biome associations of recent mammals from samples of temperate and tropical faunas: Paleoecological considerations. *Historical Biology* 8: 31–48.

Naughton-Treves, L. 2002. Wild animals in the garden: Conserving wildlife in Amazonian agroecosystems. *Annals of the Association of American Geographers* 92: 488–506.

Nigh, R.B., and J.D. Nations. 1980. Tropical rainforests. *Bulletin of the Atomic Scientists* 36 (3): 12–19.

Parry, L., J. Barlow, and C.A. Peres. 2009. Allocation of hunting effort by Amazonian smallholders: Implications for conserving wildlife in mixed-use landscapes. *Biological Conservation* 142: 1777–1786.

Smith, D.A. 2005. Garden game: Shifting cultivation, indigenous hunting and wildlife ecology in western Panama. *Human Ecology* 33: 505–537.

Speth, J.D., and S.L. Scott. 1989. Horticulture and large-mammal hunting: The role of resource depletion and the constraints of time and labor. In *Farmers as hunters. The implications of sedentism*, ed. S. Kent, 71–79. Cambridge: Cambridge University Press.

Stahl, P.W. 2000. Archaeofaunal accumulation, fragmented forests, and anthropogenic landscape mosaics in the tropical lowlands of prehispanic Ecuador. *Latin American Antiquity* 11: 241–257.

Stahl, P.W., and D.M. Pearsall. 2012. Late Pre-Columbian agroforestry in the tropical lowlands of western Ecuador. *Quaternary International* 249: 43–52.

Valentine, J.W. 1971. Resource supply and species diversity patterns. *Lethaia* 4: 51–61.

Wilkie, D.S., and R.J. Lee. 2004. Hunting in agroforestry systems and landscapes: Conservation implications in west-central Africa and southeast Asia. In *Agroforestry and biodiversity conservation in tropical landscapes*, ed. G. Schroth, G.A.B.. da Fonseca, C.A. Harvey, C. Gascan, H.L. Vascancelos, and A.-M. N. Izac, 347–370. Washington (DC): Island Press.

Further Reading

Balée, W. 1994. *Footprints of the forest. Ka'apor ethnobotany – the historical ecology of plant utilization by and Amazonian people*. New York: Columbia University Press.

Denevan, W.A. 2001. *Cultivated landscapes of Native Amazonia and the Andes*. Oxford: Oxford University Press.

Posey, D.A. 2002. *Kayapó ethnoecology and culture*. London: Routledge.

Posey, D.A., and W. Balée, eds. 1989. *Resource management in Amazonia: Indigenous and folk strategies*. Bronx: New York Botanical Gardens.

Stahl, P.W. 2006. Microvertebrate synecology and anthropogenic footprints in the forested neotropics. In *Time and complexity in historical ecology*, ed. B. Balée and C.L. Erickson, 127–149. New York: Columbia University Press.

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Basic Biographical Information

Jean-Claude Gardin has not only left a lasting impression on archaeological theory but he was also an avid contributor to Middle Eastern Archaeology, as well as a pioneer for the utilization of computer and information sciences to the social sciences. Gardin, a native of France, served in the French Free Army during the Second World War, receiving the Croix du Guerre among several other honorable awards for exceptional service. After leaving the army, Gardin enrolled at the London School of Economics where he completed his B.Sc. in Economics in 1948. Gardin continued his studies at the Sorbonne in Paris where he studied Computer and Information science. His early research focused on the use of computers for organizing and cataloging the archaeological record. Later in his research, Gardin became interested in the role that cognitive sciences have in archaeology of interpretation, specifically semiotics.

Gardin's primary geographic focus was Western and Central Asia, where his publications reflect his growing interest in the semiotics of style. Gardin's use of semiotics in relation to archaeological fieldwork has influenced the recent work of several archaeologists, including that of Robert Preucel. In the United States, Gardin has been compared with Processualism, especially his research and incorporation of mathematics in archaeology. He is associated with the University of Indiana in the United States, as well as serving as director of research at the Centre National de la Recherche Scientifique (CNRS), director of studies at the Ecole des Hautes Etudes en Sciences Sociales in Paris. In 1958, he founded the Centre d'Analyse Documentaire pour l'Archéologie and in 1970 founded the Centre de Recherches Archéologiques of the CNRS. He also served as director of the UNESCO committee that produced the General Information Program (UNISIST) for the sharing of scientific knowledge and was a recipient of the Prix International de la Foundation Fyssen in cognitive studies in 1989. Gardin is also a founding member of the Arkeotek association and a member of the House of Archaeology and Ethnology at the University of Nanterre in Paris.

Major Accomplishments

The main focus of Jean-Claude Gardin's research was concentrated around semiotics in archaeological theory. He was particularly interested in how an archaeologist can look at an object and interpret its meaning. According to Gardin, one of the central issues in archaeology was the disconnection between an artifact and the interpretation given to that artifact by the archaeologist (Gardin 1997a, 2000). He strove to help create a universal system that allowed for precise classification of artifacts, ultimately leading to better communication of interpretation (Gardin 1958, 1980). In order to create this universal system for classification, Gardin introduced mathematics and scientific methodology to semiotics (Gardin 1958, 1980). The use of mathematics and scientific method in Jean-Claude Gardin's work appealed to the Processualist archaeology in the United States. Later research by Gardin involved the use of semantics in interpretation, specifically the use of declensions in descriptive analysis of artifacts (Gardin 1989a, 1997a, b). Much of his research involves the use of coding in descriptive analysis in order to achieve accurate physical descriptions of artifacts.

Jean-Claude Gardin conducted archaeological research in the Western and Central Asia, specifically in Afghanistan and the Indus Valley. His system for codes and semiotics was applied to his research on the pottery of the ancient culture of Bactria (Gardin 1985, 1998). Among the most recent of Gardin's research interests in the area include the study of artificial intelligence and the role of technology among the humanities (Gardin 1989a), as well as the role of local knowledge in archaeology (Gardin 1989b). Regarding the role

of local knowledge in archaeology, Gardin is particularly interested in the role of universal versus local semantics in providing interpretations of artifacts (Gardin 1989b: 110). Universal semantics is described as symbols that are generally accepted without argument and local semantics as more relative to a certain context and not common knowledge (Gardin 1989b: 110–111).

Jean-Claude Gardin was a pioneer for the role of mathematics and semiotics in the humanities, specifically in archaeology. His primary research included the use of semiotics in classification systems, artificial intelligence, and the importance of semantics within archaeology. His work has influenced many archaeologists regarding the use of coding to aid in descriptions of artifacts. Gardin's primary goal was to simplify classification systems and coding systems for the description and interpretation of artifacts to provide a universal system of classification to the discipline of archaeology.

Cross-References

- ▶ Interpretation in Archaeological Theory
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ Preucel, Robert W.
- ▶ Processualism in Archaeological Theory
- ▶ Semiotics in Archaeological Theory

References

Gardin, J.-C. 1958. Four codes for the description of artefacts: An essay in archeological technique and theory. *American Anthropologist* 60: 335–357.

Gardin, J.-C. 1980. *Archaeological constructs: An aspect of theoretical archaeology*. London: Cambridge University Press.

Gardin, J.-C. 1985. Les relations entre la Méditerranée et la bactriane dans l'antiquité d'après des données céramologiques inédites. In *De L'Indus aux Balkans*, ed. J. Deshayes, 447–460. Paris: Editions recherche sur les civilizations.

Gardin, J.-C. 1989a. Artificial intelligence and the future of semiotics: An archaeological perspective. *Semiotica* 77: 5–26.

Gardin, J.-C. 1989b. The role of "local knowledge" in archaeological interpretation. In *Archaeological approaches to cultural identity*, ed. S.J. Shennan, 110–122. London: Routledge.

Gardin, J.-C. 1997a. Le questionnement logiciste et les conflits d'interprétation. *Enquête* 5: 35–54.

Gardin, J.-C. 1997b. Quand on voit c'qu'on voit, quand on sait c'qu'on sait. *L'Homme* 143: 83–90.

Gardin, J.-C. 1998. *Prospections archéologiques en Bactriane orientale (1974–1978): Description des sites et notes de synthèse*. Paris: Editions Recherché sur les Civilisations.

Gardin, J.-C. 2000. Approches sémiotiques du raisonnement en archéologie: Un contribution au problème du pont. In *Semiotics as a bridge between the humanities and the sciences*, ed. P. Perron, L.G. Sbrocci, P. Colilli, and M. Danesi, 27–48. New York: Legas.

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Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology

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State of Knowledge and Current Debates

Gas Chromatography-Mass Spectrometry (GC-MS) is an analytical technique that allows the separation of mixtures of volatile organic compounds and the identification of each constituent compound. Due to its sensitivity, speed, versatility, inexpensiveness, and the ability to identify many different compounds in a mixture, it is a favorite instrumental technique for archaeological organic chemistry and can be applied to any substance containing volatile organic compounds. It is commonly used to analyze absorbed pottery residues, visible pottery residues, organic binders and pigments in paintings and artwork, resins, sealants, and many other substances.

Technique Background

GC-MS is the combination of two well-known analytical techniques: gas chromatography and mass spectrometry. Gas chromatography utilizes variable compound retention time on a carefully

Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology, Fig. 1 A Thermo 1310 gas chromatograph with an ISQ single quadropole mass spectrometer (GC/MS) with attached autosampler (Credit: Dr. Chad Lane, UNC Wilmington Isotope Ratio Mass Spectrometry facility)

selected column to separate complex mixtures. The separated compounds can then be analyzed with a variety of detectors attached to the end of the GC column. In the case of GC-MS, the detector is a mass spectrometer, which allows the identification of each compound type (see Fig. 1 for a photograph of a GC/MS instrument).

When applying this type of analysis, an organic archaeological sample is dissolved in a solvent and a very small amount (1–3 μl) is injected into the GC portion of the instrument. The result is a gas chromatogram showing the presence and abundance of volatile compounds in a sample, with the area underneath each "sample peak" corresponding with the abundance of a compound (Fig. 2). If a known amount of internal standard has been added to the initial sample, the amount of each separated compound in the sample can be calculated.

Once the volatile compounds are separated by the GC, the mass spectrometer (MS) ionizes each separated compound and measures the mass-to-charge ratio (m/z) of each positive ionic fragment that enters the analyzer. The result is a mass spectrum, a graph showing the molecular weights of the ionic fragments coming from a single compound (Fig. 3). Since the molecule fragments according to the unique structure of the parent compound, each compound's mass spectrum is unique and reflects its original structure. The compound can then be identified by comparison with a sample library or with a known control sample.

One of the strengths of GC/MS analysis is its flexibility. Variations and additions may be made to the instrument and its methodology to accommodate a wide range of sample types, compound mixtures, and research questions (Fig. 4). Many variables are present in the GC portion of the instrument alone, including solvent used, injection type and temperature, carrier gas type and velocity, column type and length, stationary phase type and thickness, and temperature programming. A change in any of the variables affects compound separation, and all of these variables must be tweaked to maximize the desired result when using the GC for a large variety of archaeological science applications. Fortunately, for most archaeological science applications of the GC, there are standard instrumental methodologies to aid the investigator and give consistency to results across different laboratories (Evershed et al. 1990; Barnard et al. 2007, and others).

The mass spectrometer in most archaeological science applications is set to scan a range of ionic fragment weights, for example, from 50 to 700. This allows complete mass spectra to be produced for almost every compound in a sample. Such a scan does take a small amount of time, however,

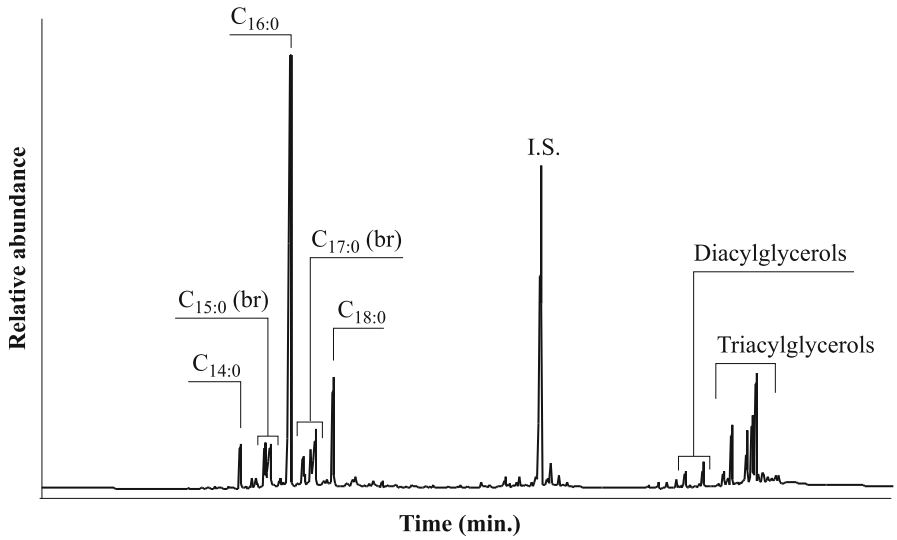

Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology, Fig. 2 Gas chromatograph of the total lipid extract of an archaeological pottery residue. The residue is made up of a complex mixture of lipids which have been separated by the gas chromatogram. The free fatty acids (written $C_{\text{chain length:\# of double bonds}}$) and diacylglycerols were formed during deposition by the breakdown of tri acylglycerols

and so there is a slight trade-off between sensitivity and completeness in mass spectrum detection. If a very sensitive analysis of a known compound is needed, the mass spectrometer may be run in Selected Ion Monitoring (SIM) mode, so that the mass spectrometer is detecting only a small range of selected fragment weights. This dramatically increases the sensitivity of the analysis, at the cost of not detecting any nonselected mass fragments. As a result, SIM is not appropriate for definite identifications of unknown compounds, or structural determinations of related compounds. Instruments run in SIM mode will not detect any unexpected compounds present in the sample.

In some cases, an isotope-ratio monitoring mass spectrometer is attached to the end of the GC column (GC-IRMS), with the result that the stable isotope ratios of each compound separated by the GC can be determined. The GC-IRMS is generally applied to a mixture that has already been analyzed by GC-MS, so that the identity of each compound undergoing compound-specific isotopic analysis is known.

GC-MS analysis works only on compounds that are volatile enough to vaporize in the GC column, and archaeological science applications of this technique often involve a mixture of compounds of varying (and sometimes unknown) volatility. To maximize compound volatility, a sample is often derivatized. In this procedure, a sample undergoes a chemical reaction to produce a "derivatized sample" in which most of the compounds are more volatile than the original compounds and have better GC separation than the un-derivatized parent compounds. There are many types of derivatization, but in archaeological science applications, trimethylsilyl ester derivatization (TMS esters) is often used in samples containing a mixture of compounds, including alcohols, fatty acids, terpenoids, and acyl glycerols. This type of derivatization is relatively easy, cheap, and safe to perform. Methyl ester derivatization is often used in samples consisting primarily or entirely of fatty acids. This type of derivatization adds only one additional carbon to derivatized compounds, making it especially useful in compound-specific isotope applications.

Samples of poor or uncertain volatility can also be analyzed on the GC/MS by attaching a pyrolyzer to the front of the GC column. There are several different types of pyrolyzer, but all heat a sample in a vacuum or inert atmosphere to

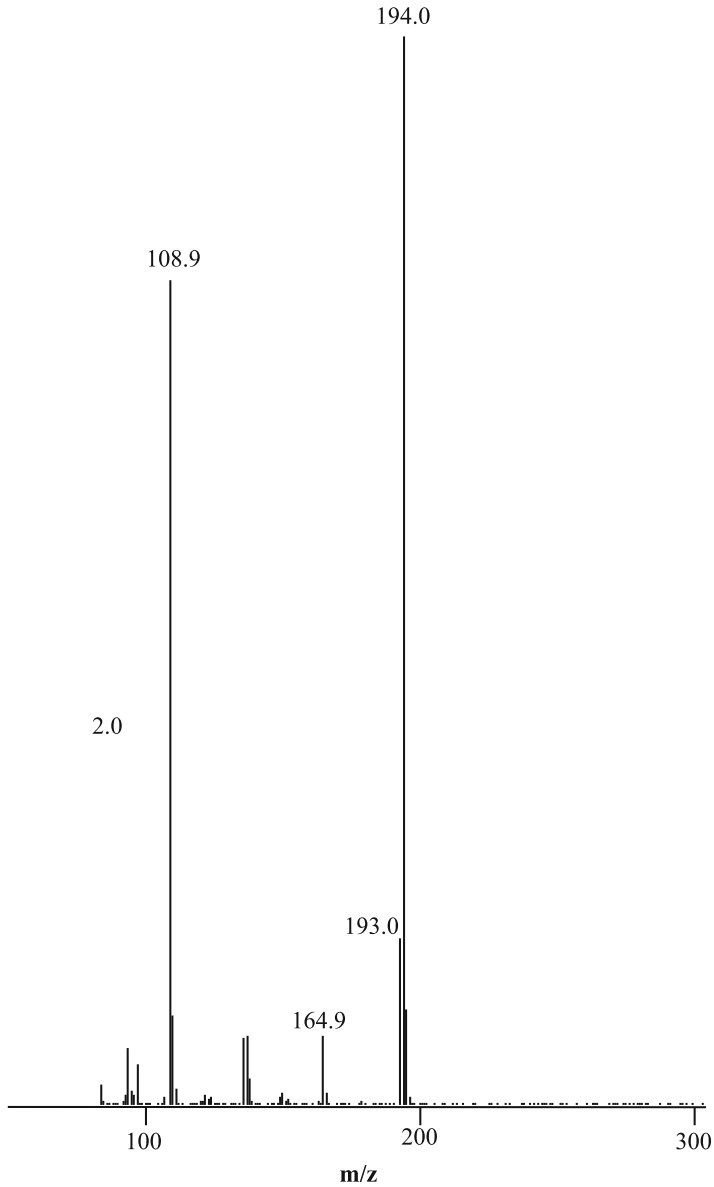

Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology, Fig. 3 Mass spectrum of caffeine from *Ilex vomitoria* tea. Each line in the graph represents the molecular weight of a particular fragment from a molecule. Molecules fragment into unique patterns, which can be matched to a known reference compound

thermally decompose nonvolatile sample constituents into volatile fragment compounds. The decomposed fragments are then introduced into the GC column, and are identified using the MS, as usual. The original constituents of the sample can then be identified through the decomposed fragments in the GC (Fig. 5). Since many constituents of the mixture are fragmented prior to analysis, however, the resulting gas chromatogram tends to be more complicated than those for a GC/MS without a pyrolyzer. This technique is often referred to as py-GC/MS in the literature.

Historical Background

The GC/MS was invented in 1955 by Roland Gohlke and Fred McLafferty while working for the Dow Chemical Company (Gohlke and McLafferty 1993). The first application of gas chromatography to archaeological science was published in 1976 by Condamin et al. when they

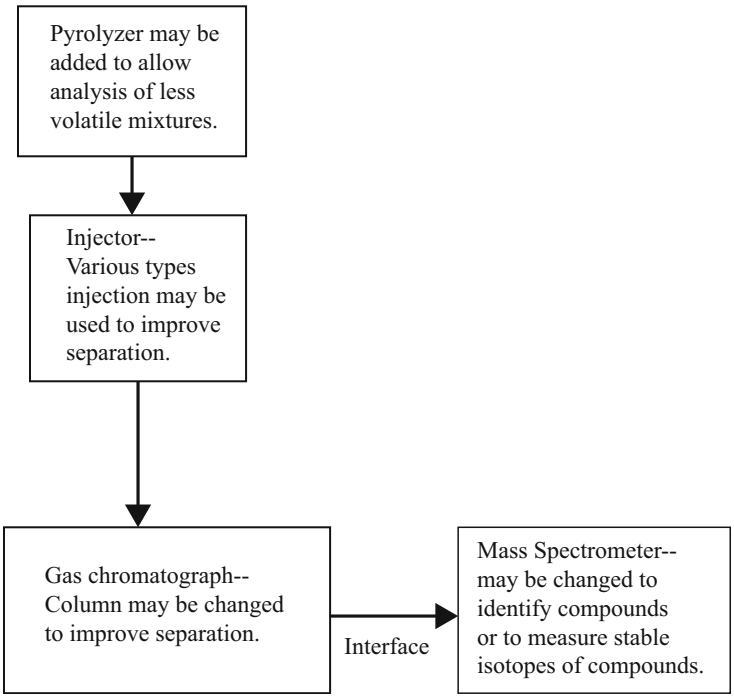

Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology, Fig. 4 Schematic of a GC/MS, showing the ways that various parts of it may be changed to optimize analysis for a variety of different applications to archaeological science

used the technique to confirm the survival of olive oil residues in Roman amphorae (Condamin et al. 1976). Gas chromatography alone was also used by a few analysts to analyze assorted organic materials during the 1980s (Rottlander and Schlichtherle 1979; Morgan et al. 1984, and others).

The first application of GC-MS to archaeological science was published in 1985 by Evershed et al. and identified the origin of pitch from the anaerobically preserved shipwreck the Mary Rose (Evershed et al. 1985). GC-MS was used occasionally through the late 1980s in archaeological science, generally to identify pure substances, such as sealants and adhesives (Beck et al. 1989; Heron et al. 1989a, and others).

In 1990, Evershed et al. published the first description of using high-temperature GC-MS to analyze complex mixtures of intact archaeological residues, such as pottery residues (Evershed et al. 1990). This paper began a new era of applying GC-MS in archaeological science and formed the basis for what became the standard methods of pottery residue extraction and analysis. It was soon followed by a raft of other papers utilizing the technique in a variety of situations, many produced by Richard Evershed and his students. From this beginning, GC-MS has become the standard instrumental application for the analysis of most complex organic mixtures found on an archaeological site or in anthropogenic soils, including but not limited to absorbed pottery residues, visible pottery residues, and organic binders in painting.

Compound Specific Isotope Analysis

In 1994, Evershed and colleagues first applied Gas Chromatography-Isotope Ratio Mass Spectrometry (GC-IRMS) to archaeological science (Evershed et al. 1994). In this instrumental method, the sample goes through the GC, as usual, but instead of a standard mass spectrometer, the GC column is attached to an isotope ratio mass spectrometer, which permits the analysis of the specific isotopic values for each compound in the sample. The isotopes measured depend upon the capacity of the instrument and the needs of the specific project. The most commonly analyzed isotopes in archaeological sciences are generally $\delta^{13}C$, $\delta^{18}O$, and $\delta^{15}N$, with $\delta^{13}C$ being the most

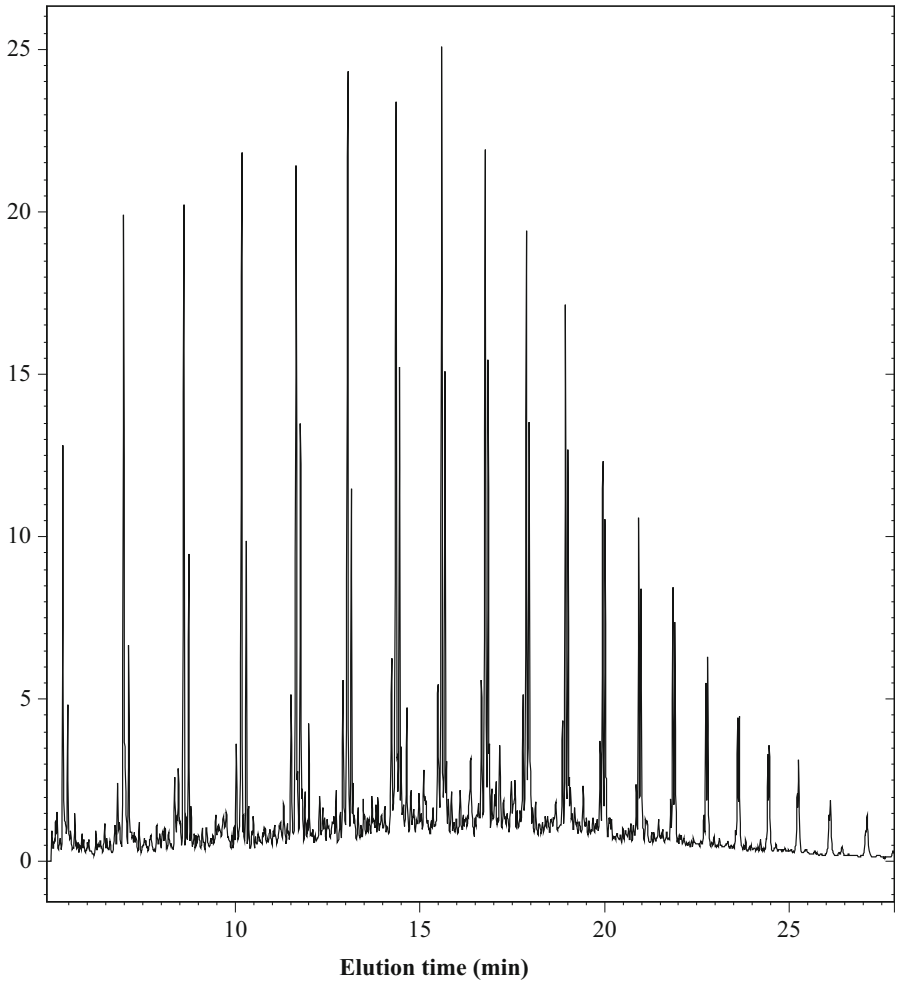

Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology, Fig. 5 GC showing pyrolysis of primarily high density polyethylene, which normally would be insufficiently volatile to be analyzed using GC/MS. Pyrolysis has broken the nonvolatile plastic into a distinctive series of volatile compounds made up of alkenes and a corresponding alkane (Credit: Dr. Pamela Seaton, UNC Wilmington, Department of Chemistry and Biochemistry)

popular in archaeological applications of the technique, due to its usefulness in separating components from C_4 and C_3 plants in a single residue or sedimentary deposit. This technique is increasing in popularity as the instrumentation becomes more widespread, and is extremely useful in the identification of isotopically unique resources in residues and soils, such as dairy products, maize, and aquatic products (Dudd and Evershed 1998; Reber et al. 2004; Craig et al. 2011). Since the IRMS analyzes only specific isotopes, and not molecular fragments, the identity of each compound in the analyzed mixture is determined by being analyzed in parallel on a standard GC/MS, either on a separate instrument or through the splitting of the sample as it exits the GC column.

When performing compound-specific analysis of $\delta^{13}C$ values, it is important to minimize the amount of modern carbon added to a specific compound for derivatization. A correction factor must be added in order to correct for modern carbon. However, such correction always adds increased uncertainty to the result, which

increases for the number of modern carbons added in derivatization. For that reason, compounds that do not require derivatization, such as alkanes, are often preferred as a focus for GC-IRMS applications. If that is not possible, derivatization methods that add the minimum possible number of carbon atoms for each molecule are preferred.

A logical refinement of compound specific isotope analysis is compound-specific radiocarbon dating, in which the mass spectrometer measures not just stable isotope values for each compound, but also radioactive isotopes. The result is an instrumental method that permits radiocarbon dating of specific compounds in an archaeological mixture. When the correct compounds are chosen, this technique has the ability to date samples such as pottery residues or soil lipids and remove known contaminants from these complex mixtures. In order to obtain these data, however, the mass spectrometer must be extremely sensitive, and the quantities of the target compound must be adequate to obtain a good date. This technique is presently in its infancy and has largely been used in environmental reconstructions (Mollenhauer and Rethemeyer 2009). As it is further developed, however, it has the potential to be applied extensively and usefully in archaeological science.

Important Issues in the Application of GC/MS Analysis to Archaeological Science

The key issue in the application of GC-MS to archaeological science is the successful interpretation of the data from archaeological samples. Since any volatile mixture of organics can be successfully analyzed by this technique, it is easy for anyone with a background in organic chemistry to obtain results from archaeological samples. Interpretation of these results is always challenging and often problematic, however, and requires familiarity with a wide range of biochemical and chemical knowledge. Difficulties in the interpretation of GC-MS data from archaeological samples include issues in compound degradation during deposition, issues of resource mixing in organic mixtures known or suspected to come from a variety of sources, and modern contamination. Many debates surrounding GC/MS applications to archaeological sciences focus around these areas.

A good example of these issues is shown in the interpretation of pottery residues, a common application of GC-MS in archaeological science. Residue degradation occurs in two major phases. First, compounds in a residue can undergo thermal degradation during cooking and processing. Then, after the pottery sherd is deposited in the archaeological site, some of the compounds will wash into the soil, while others undergo oxidation and hydrolysis. As a result, the GC-MS analysis of an archaeological extract of a known resource often looks remarkably different from a modern extract of the same resource (Figs. 6a and b). In general, compounds with longer carbon chains survive intact for longer than those with shorter chains, while compounds with fewer double bonds (saturated compounds) survive longer than those with more double bonds (unsaturated compounds) (Eglinton and Logan 1991). This problem varies according to environment, with dry and anaerobic environments providing the best preservation for organic compounds. The probable loss and degradation of compounds in an archaeological mixture must always be kept in mind during interpretation.

Many resources contain a similar suite of common fatty acids linked to glycerol backbones, producing acyl lipids. To identify a specific resource through GC/MS, biomarkers are required. Biomarkers are compounds that are unique to a particular resource or class of resources. For example, the presence of cholesterol in a pottery residue allows a confident interpretation of animal or fish products being processed in a vessel. Plant sterols, such as sitosterol, campesterol, and stigmasterol, indicate the presence of plant processing. Much of modern GC-MS analysis of archaeological resins, sealants, residues, and soils rests on the identification and detection of such biomarkers. Plant resins, chocolate, marine resources, tobacco, and other resources all produce biomarkers known to survive in the archaeological record (Mills and White 1977; Hurst et al. 1989; Hansel et al. 2004; Evershed 2008, and others). An important part of biomarker interpretation is a solid knowledge

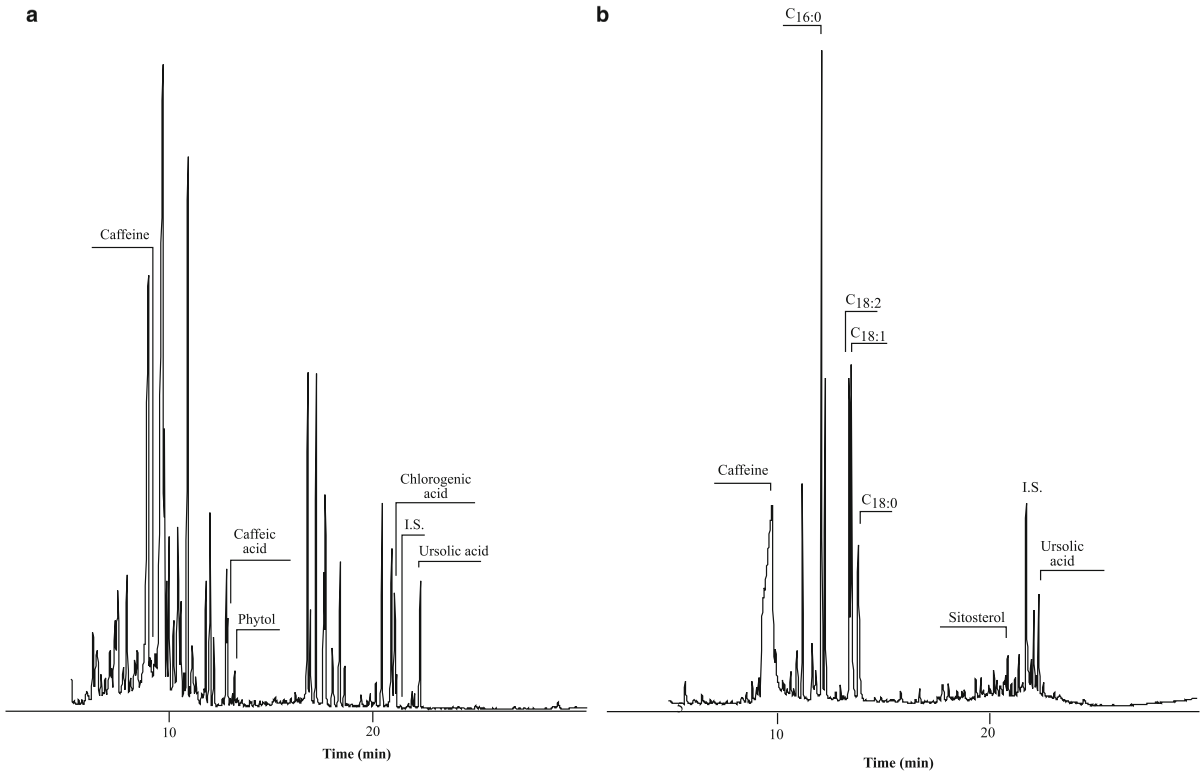

Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology, Fig. 6 (**a**) GC showing the total lipid extract of a Black Drink tea extracted from a pot immediately after the pot was used to produce the tea. Unlabeled compounds are largely sugars and glucopyranosides. Sitosterol is present in this residue, but is masked by other compounds and is not visible in the GC (**b**) GC showing the total lipid extract of the same Black Drink pot from a after it was buried for 1 month in a sandy loam acidic soil. Note the loss of many sugars and pyranosides, although some are still present. Caffeine is now much more visible in the residue, as are free fatty acids and sitosterol. This is partially due to the loss of the abundant sugars and pyranosides from 6a, but also due to diagenesis of more complex compounds, such as chlorogenic acid-caffeine complex and acyl lipids. These reactions become more complete after 1 month, and the archaeological residue continues to change

of the biome from which an organic sample derived. Many biomarkers may exist in several different resources around the planet, but be unique in a particular biome. For example, caffeine detected in a residue from Mesoamerica generally indicates chocolate, while the same compound identified in a Chinese residue would indicate tea, and in the Southeastern United States would probably indicate *Ilex vomitoria*, the main ingredient in Black Drink. If trade is suspected, secondary biomarkers and/or archaeological evidence must be used to distinguish the resources (Washburn et al. 2014).

Compound-specific isotope analysis using GC-IRMS may be used in some circumstances to help in the analysis of mixed residues, such as when an isotopically unique resource or resources is present in the mixture in large enough amounts to affect the stable isotope ratios of a given compound. As in any isotopic study, a good understanding of the archaeological biome is crucial when performing compound-specific analysis. For example, a compound-specific carbon isotope analysis of fatty acids may detect a primarily C_4 component in fatty acids or other compounds from a residue. If the residue is from eastern North America, the source of the C_4 component is probably maize (Reber et al. 2004). If the residue originates from another biome, the source of the C_4 component might be completely different. Further discussion of the application of GC/MS analysis to pottery residues is included below.

Modern contamination is also an issue in the interpretation of GC-MS analysis of archaeological samples. Due to the sensitivity of the technique and its ability to separate complex mixtures, a wide range of contaminants has been identified in archaeological samples. Modern fertilizers and pollution in the soil may contribute contaminants to a sample before excavation. During excavation, compounds from excavators' bug spray and sunscreen often contaminate an artifact and are detected in the GC/MS analysis. Since many sunscreens and bug sprays include acyl lipids, this form of contamination affects the interpretation of fatty acids in the sample. After excavation, contamination from modern plasticizers is ubiquitous and appears to be exceptionally difficult to eliminate, while archaeological labeling procedures are also a common source of contaminants. Samples stored in museum shelves in open storage are vulnerable to contamination from modern caffeine and possibly other substances (Washburn et al. 2014). For this reason, all samples taken for GC-MS analysis should ideally be handled minimally by excavators and placed in lipid-free aluminum foil in the field. Contact with plastic bags should be minimized if possible. That said, the ability of GC-MS to separate complex mixtures means that contaminants, if correctly identified, may be separated from the remainder of the sample with minimal problems to interpretation.

When to Use GC/MS

A secondary issue in GC-MS analysis is the correct selection of instrumental analysis. GC-MS is generally the best instrumental technique to use when a complex mixture of volatile organic compounds is known to be present. When a complex mixture of nonvolatile compounds is present, Liquid Chromatography-Mass Spectrometry (LC-MS) is preferred. High Pressure Liquid Chromatography/Mass Spectrometry (HPLC-MS) has recently been successful in detecting trace amounts of less volatile biomarkers in pottery residues, such as caffeine and capsaicin (Hall et al. 1990; Powis et al. 2013, and others). If a substance is known to come from a single source, then Fourier-Transform Infrared Spectroscopy (FTIR) analysis may be considered, although it does not allow for the separation of different compounds in a mixture. If a mixture contains a mixture of volatile and nonvolatile organic compounds, derivatization or py-GC/MS may allow the analysis of the entire mixture by GC-MS.

Application of GC/MS to Resins and Sealants

The analysis of resins and sealants was the earliest application of GC/MS to archaeological science (Evershed et al. 1985). GC/MS is especially well suited to resin and sealant analysis for several reasons. Many archaeological and historical incenses, sealants, and glues are organic in nature, deriving from plant sap or resin or bitumen,

meaning that these compounds are volatile when derivatized. They separate and identify very clearly on GC/MS. Further, many resins are relatively simple mixtures, deriving from a single natural source, which may have been additionally heated or processed. When the analyst is faced with such a resin, it is reasonably certain that GC/MS can analyze the entire sample. Constituent compounds in many resins and sealants are chemically stable and contain a variety of well-known biomarkers, both for the source of the resin and for heating or processing (Mills and White 1977; Stern et al. 2003, and others). As a result, GC/MS analysis of resins and sealants tends to give a clear indicator of the source of the resin or sealant and its processing.

Many resins or sealants derive from some sort of coniferous resin (Mills and White 1977; Colombini et al. 2003, and others). Coniferous resins are generally distinguished by their diterpenoid constituents, which vary, sometimes dramatically, between different families of conifers. Resins deriving from members of Pinaceae, for example, contain abundant abietane and/or pimarane diterpenoids, and their identification is fairly routine. Furthermore, these diterpenoids oxidize to stable compounds – abietane diterpenoids regularly oxidize to dehydroabietic or 7-oxodehydroabietic acid during deposition (Mills and White 1977) or retene in the presence of regular heating such as the production of pitch or turpentine from pine (Mills and White 1977; Evershed et al. 1985). For these reasons, the biomarker compounds are especially stable, and processed pine resin may be distinguished from unprocessed resin. Resins from Cupressaceae contain more pimarane diterpenoids and communic acid, a type of labdane diterpenoid, while those from Araucariaceae contain an unusual mixture of abietane, pimarane, labdane, and kaurane diterpenoids (Mills and White 1977). These compounds are also generally stable in the archaeological record.

Resins and sealants may also be derived from non-coniferous plants, as in frankincense, Protium copal, Bursera resin, resin from leguminous members of Fabaceae, resin from various species of *Agathis,* birch tar, and gum mastic (from members of genus *Pistacia*), among many others (Mills and White 1977; Langenheim 2003, and others). Leguminous resins appear to be comprised primarily of labdane diterpenoids, which therefore occur in both coniferous and non-coniferous resins (Mills and White 1977). In most other cases, nonconiferous plant resins are distinguished by a variety of triterpenoid compounds, some of which are biomarkers for a specific genus or family of plant (Mills and White 1977; Stern et al. 2003, and others). These compounds are also stable and can be separated and identified using GC/MS (Mills and White 1977; Heron et al. 1989a).

Bitumen, tar, or asphalt have also been used as sealants in the past in a variety of locations (Connan et al. 1992; Serpico and White 2000). These hydrocarbon-derived sealants may be identified by the standard biomarkers for crude oil, especially hopanoid terpanes, polyaromatic hydrocarbons, and a complex mixture of aromatic compounds including asphaltenes (Serpico and White 2000, and others).

Application of Gas Chromatography/Mass Spectrometry to Pottery Residues

GC/MS is commonly used to analyze organic pottery residues, either absorbed within the wall of a pot (an absorbed residue) or encased in carbon on the interior surface of a pot wall (a visible residue). Absorbed residues are often comprised primarily of a complex mixture of lipids, as discussed above. Visible residues often contain lipids in addition to other types of elements such as starch and proteins, (Heron et al. 1989b; Thompson and Staller 2000, and others). In both types of residue, however, the residues are comprised of a complex mixture of compounds, many of which are volatile. As a result, GC/MS is the preferred instrument type for most pottery residue analyses, unless the project is specifically focused on a resource with a biomarker that is better suited to HPLC/MS or another type of instrumental analysis. Pottery residues are archaeologically important because their analysis allows a direct understanding of pottery use in a culture. This often allows a much clearer understanding of the ways that ancient people processed food and other

substances, casting a light on cultural practices that would not otherwise be detectable by the archaeologist.

Interpretation of GC/MS analysis of pottery residues is complex, because pottery residues often derive from a variety of sources. An extracted organic pottery residue is comprised of a mixture of lipids, including acyl lipids, fatty acids, long-chain alcohols, alkanes, terpenoids, and many other compound types. Unless the pottery vessel was known to have processed only one resource, these compounds cannot be assumed to have come from the same source. Often, these compounds were derived from all the resources processed in a vessel over its lifetime. For example, the common fatty acid $C_{16:0}$ (palmitic acid) in a residue may derive from literally every resource ever processed in a pot, with no way of knowing how much of the compound derived from any one resource. For this reason, interpretations of vessel contents based only on common compounds such as fatty acids and acyl lipids tend to be problematic, aside from issues of oxidative and bacterial degradation mentioned above (Reber and Evershed 2004). Although single source resources often have distinctive fatty acid ratios (Malainey et al. 1999), in the case of mixed-use vessels a general interpretation of "primarily vegetable in origin" (more unsaturated fatty acids, and more abundant $C_{16:0}$ vs. $C_{18:0}$ fatty acids) or "primarily animal or meat in origin" (more saturated fatty acids, and more abundant $C_{18:0}$ vs. $C_{16:0}$ fatty acids) is usually the most precise interpretation that can be derived from fatty acid and acyl lipid abundances. This is generally disappointing to the excavator, who was hoping for a more precise characterization. An exception to this issue is present in the case of vessels that are known to have contained only one resource, such as transport amphorae and labeled chocolate pots.

Because of resource mixing in many pottery vessels, biomarkers are required for a more precise description of vessels contents. As described above, sterols are probably the most commonly used biomarkers in absorbed residues, with cholesterol and plant sterols allowing the presence of animal-based and plant-based foods to be definitively identified. Depending upon the contents of the vessel, a variety of other resources may be identified in pottery residues using biomarkers, including resins and sealants as described above, aquatic resources, nicotine, caffeine-containing resources (which vary by biome, as described above), a variety of psychoactive plants, and waxes (Evershed 2008). Probably unique to pottery residues are pyrolytically formed biomarkers – unique compounds that result from the heating of chemically unstable compounds within the pot walls. Polyunsaturated fatty acids, normally chemically unstable during deposition, undergo pyrolysis to ω-(o-alkylphenyl) alkanoic acids, which are stable in the archaeological record (Hansel et al. 2004). These compounds allow the detection of fish or marine resources that contained unstable polyunsaturated fatty acids otherwise unlikely to preserve in the archaeological record. A similar process occurs in the formation of ketones from fatty acids at temperatures above 300 ° C (Evershed et al. 1995).

In the absence of biomarkers, compound-specific isotopic analysis allows an analytical pathway to address resource mixing, if resources are present in the residue that can be distinguished isotopically. When used to identify dairy, aquatic resources, porcine fat, or another lipid-rich resource, isotopic mixing in fatty acids may relatively easily be detected (Dudd and Evershed 1998; Craig et al. 2013, and others). Among other things, this application of GC-IRMS has allowed a better understanding of the importance of dairy products and aquatic resources in archaeological foodways (Craig et al. 2013; Evershed 2008).

Identifying cereal grains in a pottery residue is complicated by the fact that these grains are often primarily comprised of starch and are lipid-poor. As a result, common lipids from fattier resources may overwhelm the signature from isotopically unique grains. In these cases, compound-specific isotope analysis is most effective if focused on compounds that are more abundant in plant than in meat resources, such as alkanols or alkanes (Reber et al. 2004). Maize is most effectively detected in absorbed residues by compound-specific isotopic analysis of the long-chain alkanol *n*-dotriacontanol, for example, although

it may also be identified using other compounds (Reber et al. 2004).

The literature on GC/MS application to pottery residues is voluminous and has produced a fairly standardized methodology in terms of extraction, derivatization, instrumental method, and interpretation, albeit one that is constantly being refined and improved (Barnard et al. 2007, and others). Lipid residues have been successfully extracted and interpreted from Incipient Jomon pottery (Craig et al. 2013) and from pottery existing at the foraging/farming transition in Europe and North America (Craig et al. 2011; Tache and Craig 2015). These applications demonstrate the potential of GC/MS analysis of pottery residues to address issues of archaeological importance across a longer-than expected time range.

Extraction of absorbed residues from pottery is destructive, requiring sample sizes of at least 1 g of sherd (and usually more), and relatively labor-intensive in the laboratory. Recent innovations in GC/MS applications to pottery residues have tended to focus on this process. Direct acidic or alkaline extraction of residues from potsherds appears to both increase the amount of lipid extracted from pottery and speed the extraction of lipids from powdered sherds. This allows larger numbers of samples to be analyzed in the same time period and with smaller sample sizes (Craig et al. 2013; Correa-Ascencio and Evershed 2014). To minimize destruction in the case of museum-quality or vessels of archaeological importance, powdered sherd is sometimes removed from the interior of a vessel through abrasion, rather than powdering an entire sherd (Washburn et al. 2014).

Application of GC/MS to Pigments and Binders

The application of GC/MS to pigments is relatively difficult, because of the nonvolatile nature of many pigments, especially those derived from mineral sources. Py-GC/MS has been used to identify organic pigments, as well as cinnabar and other mercury-based pigments (Wei et al. 2012; Gebremariam et al. 2016).

Binders used in archaeological and historical painting are often derived from organic sources, however, and GC/MS is generally considered the preferred instrumentation for their analysis. Owing to the difficulty of separating pigments and binders in many applications, GC/MS or py-GC/MS is often used in combination with another method or methods more applicable to the identification of nonvolatile compounds and pigments, such as FTIR, Energy Dispersion X-ray microanalysis, Raman spectroscopy, X-ray fluorescence (XRF), or X-ray diffraction (XRD) (Colombini et al. 2003; Duran et al. 2010; Gebremariam et al. 2016). This allows the identification of inorganic pigments, organic pigments, and a variety of binders, giving a complete reconstruction of the painting method used.

Commonly used binders include plant resin (pine sap, gum mastic, gum Arabic, etc.), beeswax, animal glue, milk, garlic, and egg (Colombini et al. 1999; Duran et al. 2010, and many others). Plant resins may be identified using many of the same methods and biomarkers as the plant-based sealants described above, and are often the same or similar plant resins to those used as sealants or glue. Beeswax is distinguishable by its unique pattern of wax esters, alkanes, and alkanols (Colombini et al. 2003; Regert et al. 2003).

Animal glue is generally made up of a collagen-based polymer produced by boiling animal products such as skin, bones, or hooves; it is very proteinaceous and is high in the amino acids glycine, proline, and hydroxyproline; hydroxyproline is often used as a biomarker for animal glue (Wei et al. 2012, and others). Egg, milk, and garlic binders are similarly proteinaceous. The amino acid constituents of these proteinaceous binders may be identified through py-GC/MS (Gebremariam et al. 2016; Wei et al. 2012) or on GC/MS after derivatization (Colombini et al. 1999). Proteinaceous binders such as eggs, milk, animal glue, and garlic may be distinguished by relative abundances of various amino acids (Schilling and Khanjian 1996; Gimeno-Adelantado et al. 2002, and others). Often, statistical analyses such as Principal Component Analysis (PCA) are used to compare amino acids detected in binders with aged standards produced in the laboratory (Colombini et al. 1999; Gimeno-Adelantado et al. 2002, and others). This method

is useful in most cases, but it is important to remember that both the historical literature and archaeological science suggest that ancient artists occasionally mixed substances together to produce a complex binder, which would be intermediate in values to the controls (Gimeno-Adelantado et al. 2002; Duran et al. 2010).

Compound binders from nonproteinaceous sources, or from a mixture of proteinaceous and resin-derived sources, would produce mixtures that would contain multiple biomarkers, and/or resin biomarkers with the addition of typical amino acids for proteinaceous binders. Further, in the case of frescoes, damp lime plaster or lime water was used as a binder, which is nonorganic. A nonorganic binder could not be identified using GC/MS or could be identified only through the absence of the indicators for organic binders.

Applications of GC/MS and GC-IRMS to Soils

Soil chemistry is largely comprised of a very complex mixture of lipids, lignins, and decayed leaf litter that may also be analyzed through GC/MS, py-GC/MS, and GC-IRMS for a variety of applications. Analysis of these chemicals in closed context is often most effective, as soil chemicals often leach into and out of soil layers in open contexts.

Manure and Fecal Biomarkers

Digestion of foodstuffs in the guts of most animals produces a distinctive set of biomarkers, 5-β-stanols and bile acids (Bethell et al. 1994; Evershed et al. 1997), which are known to persist in soils over long periods of time. The precise type of 5β-stanols produced through digestion depends on the original foodstuff – coprostanol is produced by the breakdown of cholesterol (Bethell et al. 1994), while 5β-stigmastanol is produced by the breakdown of vegetation (Evershed et al. 1997). In this way, fecal biomarkers from human or other omnivorous animals (for example, pigs and dogs) may be distinguished from biomarkers deriving primarily from herbivores, such as cows or horses. Other types of stanols indicate a variety of breakdown processes that take place in sterols and stanols. For example, epi-5β-stanols may form from 5β stanols through microbial breakdown, and this compound type is often used as an indicator of deliberate composting of dung (Bull et al. 2001).

Given the complexity of soil and microbial interactions present in areas with an abundant presence of feces or manure, a series of ratios of different sterol/stanol types has been proposed to distinguish a variety of specific applications of this technique – fecal or manure presence vs. natural soil stanols, feces from primarily omnivorous animals vs. herbivores, and fresh manure vs. compost (Evershed et al. 1997; Bull et al. 2001, and others). This specific application of GC/MS to soil chemistry is generally used in areas where the excavator suspects the presence of a latrine or heavy manuring for archaeological reasons. It has been used to confirm the presence and use of latrines in a variety of places (Shillito et al. 2011) and to determine manuring in fields (Bull et al. 2001, and others).

Environmental Reconstruction

Although soil lipids do migrate in a variety of ways depending upon the individual geomorphology and environment for an area, GC/MS may be applied to soil columns to produce a broad environmental reconstruction of a site or regional area. Py-GC/MS is often used in this application, as it can be used to break down cellulose, lignin, suberin, and other nonvolatile soil components deriving from plant polymers. This allows a reconstruction of type and amount of organic matter present in a soil layer (Almendros et al. 1998). Presence of abundant burning is indicated by biomarkers such as polyaromatic hydrocarbons (PAHs) (Kaal et al. 2008), which are present either during burning or in crude oil (Ocean Sciences Board 1985). In the absence of a known source of hydrocarbon oil contamination, therefore, PAHs may be used to indicate abundant or increasing fire episodes. This can be used as a proxy for human land clearing through fire or climate change leading to increased fire incidence (Tallón-Armada et al. 2014). In these ways, broad environmental changes around a site may be distinguished through application of GC/MS to soil columns. These applications are often best

used in tandem with a variety of other analysis types that can be used to confirm the changes in soil chemistry, notably charcoal and pollen analyses. In performing this type of analysis, it is crucial to remember the potential of soil lipids to migrate in a variety of ways.

More anthropocentric changes to the environment can also be detected using compound-specific isotope analyses of compounds in soil columns and lake-bed sediment cores. In an environment where the biome is predominantly C_3 (or C_4), the advent of abundant C_4 (or C_3) agriculture may be detected by compound-specific analyses of leaf wax components washed into lake beds or preserved in soil columns. As the native C_3 plant cover is removed and replaced by C_4 crop fields, the organic matter in fields and washed into lake-beds becomes measurably more enriched in $\delta^{13}C$ (Webb et al. 2007; Lane et al. 2008). Alkanes are often preferred for this type of analysis, as they do not require derivatization. The advent of intensive maize agriculture in Mesoamerica, Costa Rica and parts of the Caribbean (Lane et al. 2009, and others) as well as the decrease in maize agriculture in the Mayan Lowlands following the Terminal Classic period have been determined using this technique (Webb et al. 2007, and others).

Application of GC/MS to Amino Acids and Proteins

GC/MS is not normally the preferred choice for protein and amino acid analysis. Proteins are nonvolatile and are better suited for HPLC/MS analysis than GC/MS analysis (Barker et al. 2012).

In order to analyze proteins using a GC/MS, the analyst must assume that the protein is already breaking down into constituent amino acids due to natural diagenetic factors, or must initiate this breakdown as part of a laboratory or instrumental method (Schilling and Khanjian 1996). Py-GC/MS is often used to pyrolyze proteins into amino acids, which may then undergo separation and identification. For GC/MS analysis without pyrolysis, the amino acids must undergo some form of derivatization, as discussed above. Because of this analytical complexity, GC/MS analysis of proteins and amino acids are most useful when investigating complex mixtures of lipids and proteins, such as paint binders (discussed above), lacquerware, or visible pottery residues (Oudemans and Boon 1991; Wei et al. 2011, and others).

Future Directions

The power and flexibility of GC/MS analysis makes it almost indispensable for the analysis of any type of complex organic mixture believed to contain at least some volatile compounds. The increased availability of GC-IRMS instruments will allow compound-specific isotope analysis to be applied over a wider range of resources going forward, which will further allow more precise and culturally informative interpretations of archaeological resource use.

As more background research is performed, more biomarkers will be identified. As a result, the number of biomarker identifications of prehistoric resources in a residue will increase. That said biomarker identification is becoming an increasingly complex process. Because of diagenesis, oxidation, microbial breakdown, and hydrolysis of archaeological organic compounds during burial, biomarkers are often best detected by examining archaeological resources, rather than modern control samples. Many compounds proposed as biomarkers from modern resources undergo unexpected transformations during burial, and do not survive in the archaeological record in their original form. As many of the most distinctive organic substances have already been identified, future biomarker identification will probably become increasingly complex and dependent upon large numbers of archaeological samples undergoing analysis.

In terms of archaeological interpretation, the next step in GC/MS applications to archaeological science will also lie in increasingly large numbers of samples undergoing GC/MS analysis to answer-specific archaeological questions. Such sample sizes can be used to answer questions regarding trade, specific resource use, changes in

pot use over time, and varying uses of varying vessel types at a site. These questions are of archaeological importance and cannot readily be answered without a carefully chosen group of at least 100–200 samples (Evershed 2008; Craig et al. 2011; Tache and Craig 2015).

Increasing interaction and understanding between archaeologists and GC/MS analysts will be essential in future applications of the technique. Ideally, the GC/MS analyst should understand the archaeological issues at question. Misunderstandings between the excavator and analyst can result in a flawed project and considerable frustration (Mazow et al. 2014).

In general, therefore, the future direction of GC/MS applications to archaeological science will involve increasing application of the technique to a variety of specific archaeological questions. With increasing communication, and a better understanding of the technique, GC/MS analysis should enter the standard repertoire of archaeological techniques around the world.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Bone Chemistry and Ancient Diet
- ▶ Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology
- ▶ Isotope Geochemistry in Archaeology
- ▶ Organic Residue Analysis in Archaeology

References

Almendros, G., F.J. González-Vila, F. Martin, J. Sanz, and C. Álvarez-Ramis. 1998. Appraisal of pyrolytic techniques on different forms of organic matter from a cretaceous basement in Central Spain. *Organic Geochemistry* 28 (9–10): 613–623. https://doi.org/10.1016/S0146-6380(98)00029-1.

Barker, A., B. Venables, S.M. Stevens, K.W. Seeley, P. Wang, and S. Wolverton. 2012. An optimized approach for protein residue extraction and identification from ceramics after cooking. *Journal of Archaeological Method and Theory* 19(3): 407–439. https://doi.org/10.1007/s10816-011-9120-5.

Barnard, H., S.H. Ambrose, D.E. Beehr, M.D. Forster, R.E. Lanehart, M.E. Malainey, R.E. Parr, M. Rider, C. Solazzo, and R.M. Yohe Ii. 2007. Mixed results of seven methods for organic residue analysis applied to one vessel with the residue of a known foodstuff. *Journal of Archaeological Science* 34(1): 28–37. https://doi.org/10.1016/j.jas.2006.03.010.

Beck, C.W., C.J. Smart, and D.J. Ossenkop. 1989. Residues and linings in ancient Mediterranean transport amphoras. In *Archaeological chemistry*, Advance in Chemistry Series, 369–380. Washington, DC: American Chemical Society.

Bethell, P.H., L.J. Goad, R.P. Evershed, and J. Ottaway. 1994. The study of molecular markers of human activity: The use of Coprostanol in the soil as an indicator of human faecal material. *Journal of Archaeological Science* 21(5): 619–632. https://doi.org/10.1006/jasc.1994.1061.

Bull, I.D., R.P. Evershed, and P.P. Betancourt. 2001. An organic geochemical investigation of the practice of manuring at a Minoan site on Pseira Island, Crete. *Geoarchaeology* 16(2): 223–242. https://doi.org/10.1002/1520-6548(200102)16:2<223::AID-GEA1002>3.0.CO;2-7

Colombini, M.P., G. Giachi, F. Modugno, P. Pallecchi, and E. Ribechini. 2003. The characterization of paints and waterproofing materials from the shipwrecks found at the archaeological site of the Etruscan and roman harbour of Pisa (Italy). *Archaeometry* 45(4): 659–674.

Colombini, M.P., F. Modugno, M. Giacomelli, and S. Francesconi. 1999. Characterisation of proteinaceous binders and drying oils in wall painting samples by gas chromatography-mass spectrometry. *Journal of Chromatography A* 846(1–2): 113–124.

Condamin, J., F. Formenti, M.O. Metais, M. Michel, and P. Blond. 1976. The application of gas chromatography to the tracing of oil in ancient amphorae. *Archaeometry* 18(2): 195–201.

Connan, J., A. Nissenbaum, and D. Dessort. 1992. Molecular archaeology: Export of Dead Sea asphalt to Canaan and Egypt in the chalcolithic-early bronze age (4th–3rd millennium BC). *Geochimica et Cosmochimica Acta* 56(7): 2743–2759.

Correa-Ascencio, M., and R.P. Evershed. 2014. High throughput screening of organic residues in archaeological potsherds using direct acidified methanol extraction. *Analytical Methods* 6 (5): 1330–1340. https://doi.org/10.1039/c3ay41678j.

Craig, O.E., H. Saul, A. Lucquin, Y. Nishida, K. Tache, L. Clarke, A. Thompson, D.T. Altoft, J. Uchiyama, M. Ajimoto, K. Gibbs, S. Isaksson, C.P. Heron, and P. Jordan. 2013. Earliest evidence for the use of pottery. *Nature* 496(7445): 351–354. https://doi.org/10.1038/nature12109.

Craig, O.E., V.J. Steele, A. Fischer, S. Hartz, S.H. Andersen, P. Donohoe, A. Glykou, H. Saul, D.-M. Jones, E. Koch, and C.P. Heron. 2011. Ancient lipids reveal continuity in culinary practices across the transition to agriculture in northern Europe.

G

Proceedings of the National Academy of Sciences 108 (44): 17910–17915.

Dudd, S.N., and R.P. Evershed. 1998. Direct demonstration of milk as an element of archaeological economies. *Science* 282: 1478–1481.

Duran, A., M.C. Jimenez De Haro, J.L. Perez-Rodriguez, M.L. Franquelo, L.K. Herrera, and A. Justo. 2010. Determination of pigments and binders in Pompeian wall paintings using synchrotron radiation – High-resolution x-ray powder diffraction and conventional spectroscopy – Chromatography. *Archaeometry* 52(2): 286–307. https://doi.org/10.1111/j.1475-4754.2009.00478.x.

Eglinton, G., and G.A. Logan. 1991. Molecular preservation. *Philosophical Transactions of the Royal Society of London B* 333: 315–328.

Evershed, R.P. 2008. Organic residue analysis in archaeology: The archaeological biomarker revolution. *Archaeometry* 50(6): 895–924. https://doi.org/10.1111/j.1475-4754.2008.00446.x.

Evershed, R.P., K.I. Arnot, J. Collister, G. Eglinton, and S. Charters. 1994. Application of isotope ratio monitoring gas chromatography-mass spectrometry to the analysis of organic residues of archaeological origin. *Analyst* 119: 909–914.

Evershed, R.P., P.H. Bethell, P.J. Reynolds, and N.J. Walsh. 1997. 5β-Stigmastanol and related 5-β-Stanols as biomarkers of manuring: Analysis of modern experimental material and assessment of the archaeological potential. *Journal of Archaeological Science* 24(6): 485–495. https://doi.org/10.1006/jasc.1996.0132.

Evershed, R.P., C. Heron, and L.J. Goad. 1990. Analysis of organic residues of archaeological origin by high-temperature gas chromatography and gas chromatography-mass spectrometry. *Analyst* 115: 1339–1342.

Evershed, R.P., K. Jerman, and G. Eglinton. 1985. Pine wood origin for pitch from the Mary rose. *Nature* 314(6011): 528–530.

Evershed, R.P., A.W. Stott, A. Raven, S.N. Dudd, S. Charters, and A. Leyden. 1995. Formation of long-chain ketones in ancient pottery vessels by pyrolysis of acyl lipids. *Tetrahedron Letters* 36 (48): 8875–8878. https://doi.org/10.1016/0040-4039(95)01844-8.

Gebremariam, K.F., L. Kvittingen, and F.G. Banica. 2016. Physico-chemical characterization of pigments and binders of murals in a church in Ethiopia. *Archaeometry* 58(2): 271–283. https://doi.org/10.1111/arcm.12163.

Gimeno-Adelantado, J.V., R. Mateo-Castro, M.T. Doménech-Carbó, F. Bosch-Reig, A. Doménech-Carbó, J. De la Cruz-Cañizares, and M.J. Casas-Catalán. 2002. Analytical study of proteinaceous binding media in works of art by gas chromatography using alkyl chloroformates as derivatising agents. *Talanta* 56 (1): 71–77. https://doi.org/10.1016/S0039-9140(01)00538-0.

Gohlke, R.S., and F.W. McLafferty. 1993. Early gas chromatography/mass spectrometry. *Journal of the American Society for Mass Spectrometry* 4(5): 367–371. https://doi.org/10.1016/1044-0305(93)85001-E.

Hall, G.C., S. Tarka Jr., W.J. Hurst, D. Stuart, and R. Adams. 1990. Cacao residues in ancient maya vessels from Rio Azul, Guatemala. *American Antiquity* 55(1): 138–143.

Hansel, F.A., M.S. Copley, L.A.S. Madureira, and R.P. Evershed. 2004. Thermally produced ω-(o-alkylphenyl)alkanoic acids provide evidence for the processing of marine products in archaeological pottery vessels. *Tetrahedron Letters* 45(14): 2999–3002.

Heron, C., R.P. Evershed, B. Chapman, and M. Pollard. 1989a. Glue, disinfectant and "chewing gum" in prehistory. In *Archaeological sciences 1989: Proceedings of a conference on the application of scientific techniques to archaeology, Bradford, September 1989*, Oxford monograph, ed. P. Budd, B. Chapman, C. Jackson, R. Janaway, and B. Ottaway, vol. 9, 325–331. UK: Bradford.

Heron, C., R.P. Evershed, L.J. Goad, and V. Denham. 1989b. New approaches to the analysis of organic residues from archaeological remains. In *Archaeological sciences 1989: Proceedings of a conference on the application of scientific techniques to archaeology, Bradford, September 1989*, Oxbow monograph, ed. P. Budd, B. Chapman, C. Jackson, R. Janaway, and B. Ottaway, vol. 9, 332–339. Oxford: Oxbow.

Hurst, W.J., R. Martin Jr., S. Tarka Jr., and G.C. Hall. 1989. Authentication of cocoa in Maya vessels using high-performance liquid chromatographic techniques. *Journal of Chromatography* 466: 279–289.

Kaal, J., A. Martínez Cortizas, E. Eckmeier, M. Costa Casais, M. Santos Estévez, and F. Criado Boado. 2008. Holocene fire history of black colluvial soils revealed by pyrolysis-GC/MS: A case study from Campo Lameiro (NW Spain). *Journal of Archaeological Science* 35(8): 2133–2143. https://doi.org/10.1016/j.jas.2008.01.013.

Lane, C.S., S.P. Horn, Z.P. Taylor, and C.I. Mora. 2009. Assessing the scale of prehistoric human impact in the neotropics using stable carbon isotope analyses of lake sediments: A test case from Costa Rica. *Latin American Antiquity* 20(1): 120–133.

Lane, C.S., C.I. Mora, S.P. Horn, and K.H. Orvis. 2008. Sensitivity of bulk sedimentary stable carbon isotopes to prehistoric forest clearance and maize agriculture. *Journal of Archaeological Science* 35(8): 2119–2132.

Langenheim, J.H. 2003. *Plant resins: Chemistry, evolution, ecology, and ethnobotany.* Portland: Timber Press.

Malainey, M.E., K. Przybylski, and B.L. Sherriff. 1999. The fatty acid composition of native food plants and animals of western Canada. *Journal of Archaeological Science* 26: 83–94.

Mazow, L., S. Grieve, and A. Kennedy. 2014. Contamination in organic residue analysis: A cautionary tale. *Journal of Eastern Mediterranean Archaeology* 2(2): 90–109.

Mills, J.S., and R. White. 1977. Natural resins of art and archaeology their sources, chemistry, and identification. *Studies in Conservation* 22(1): 12–31.

Mollenhauer, G., and J. Rethemeyer. 2009. Compound-specific radiocarbon analysis – Analytical challenges and applications. Deep-sea to coastal zones: Methods and techniques for studying paleoenvironments. *IOP Conference Series: Earth and Environmental Sciences* 5(1): 012006.

Morgan, E.D., L. Titus, R.J. Small, and C. Edwards. 1984. Gas chromatographic analysis of fatty material from a Thule midden. *Archaeometry* 26: 43–48.

Ocean Sciences Board NRC. 1985. *Oil in the sea: Inputs, fates, and effects*. Washington DC: National Academy Press.

Oudemans, T.F.M., and J.J. Boon. 1991. Molecular archaeology: Analysis of charred (food) remains from prehistoric pottery by pyrolysis – Gas chromatography/mass spectrometry. *Journal of Analytical and Applied Pyrolysis* 20: 197–227.

Powis, T.G., E. Gallaga Murrieta, R. Lesure, R. Lopez Bravo, L. Grivetti, H. Kucera, and N.W. Gaikwad. 2013. Prehispanic use of chili peppers in Chiapas, Mexico. *PLoS One* 8(11): e79013. https://doi.org/10.1371/journal.pone.0079013.

Reber, E.A., S.N. Dudd, N.J. Van der Merwe, and R.P. Evershed. 2004. Direct detection of maize processing in archaeological pottery through compound-specific stable isotope analysis of n-dotriacontanol in absorbed organic residues. *Antiquity* 78(301): 682–691.

Reber, E.A., and R.P. Evershed. 2004. Identification of maize in absorbed organic residues: A cautionary tale. *Journal of Archaeological Science* 31(4): 399–410. https://doi.org/10.1016/j.jas.2003.09.008.

Regert, M., S. Vacher, C. Moulherat, and O. Decavallas. 2003. Adhesive production and pottery function during the iron age at the site of grand Aunay (Sarthe, France). *Archaeometry* 45(1): 101–120.

Rottlander, R.C.A., and H. Schlichtherle. 1979. Food identification of samples from archaeological sites. *Archaeo-Physika* 10: 260–268.

Schilling, M.R., and H.P. Khanjian. 1996. Gas chromatographic analysis of amino acids as ethyl chloroformate derivatives. Part 2, Effects of pigments and accelerated aging on the identification of proteinaceous binding media. *Journal of the American Institute for Conservation* 35(2): 123–144. https://doi.org/10.1179/019713696806124511.

Serpico, M., and R. White. 2000. Resins, amber and bitumen. In *Ancient Egyptian materials and technology*, ed. P.T. Nicholson and I. Shaw, 430–474. Cambridge: Cambridge University Press.

Shillito, L.-M., I.D. Bull, W. Matthews, M.J. Almond, J.M. Williams, and R.P. Evershed. 2011. Biomolecular and micromorphological analysis of suspected faecal deposits at Neolithic Çatalhöyük, Turkey. *Journal of Archaeological Science* 38(8): 1869–1877. https://doi.org/10.1016/j.jas.2011.03.031.

Thompson, R.G., and J.E. Staller. 2000. An analysis of opal phytoliths from food residues of selected sherds from excavations at the site of La Emerenciana, El Oro Province, Ecuador. *The Phytolitharien* 13(2&3): 8–16.

Stern, B., C. Heron, and L. Corr. 2003. Compositional variations in aged and heated pistacia resin found in late bronze age Canaanite amphorae and bowls from Amarna, Egypt. *Archaeometry* 45(3): 457–469.

Taché, K., and O.E. Craig. 2015. Cooperative harvesting of aquatic resources triggered the beginning of pottery production in north-eastern North America. *Antiquity* 343(89): 177–190.

Tallón-Armada, R., M. Costa-Casais, J. Schellekens, T. Taboada Rodríguez, J. Vives-Ferrándiz Sánchez, C. Ferrer García, D. Abel Schaad, J.A. López-Sáez, Y. Carrión Marco, and A. Martínez Cortizas. 2014. Holocene environmental change in eastern Spain reconstructed through the multiproxy study of a pedo-sedimentary sequence from Les Alcusses (Valencia, Spain). *Journal of Archaeological Science* 47: 22–38. https://doi.org/10.1016/j.jas.2014.03.023.

Washburn, D.K., W.N. Washburn, P.A. Shipkova, and M.A. Pelleymounter. 2014. Chemical analysis of cacao residues in archaeological ceramics from North America: Considerations of contamination, sample size and systematic controls. *Journal of Archaeological Science* 50: 191–207. https://doi.org/10.1016/j.jas.2014.07.011.

Webb, E.A., H.P. Schwarcz, C.T. Jensen, R.E. Terry, M.-D. Moriarty, and K.F. Emery. 2007. Stable carbon isotope signature of ancient maize agriculture in the soils of Motul de San José, Guatemala. *Geoarchaeology* 22(3): 291–312. https://doi.org/10.1002/gea.20154.

Wei, S., Q. Ma, and M. Schreiner. 2012. Scientific investigation of the paint and adhesive materials used in the western Han dynasty polychromy terracotta army, Qingzhou, China. *Journal of Archaeological Science* 39(5): 1628–1633. https://doi.org/10.1016/j.jas.2012.01.011.

Wei, S., V. Pintus, V. Pitthard, M. Schreiner, and G. Song. 2011. Analytical characterization of lacquer objects excavated from a Chu tomb in China. *Journal of Archaeological Science* 38(10): 2667–2674. https://doi.org/10.1016/j.jas.2011.05.026.

Gavà Mining Site: Fieldwork

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Brief Definition of the Topic

Gavà, a village by the sea at the mouth of the Llobregat river in the northeast Iberian Peninsula, is the site of the only known Neolithic mine in Europe extracting *variscite*. This green mineral, similar to turquoise, is found in Neolithic tombs; its color is probably linked symbolically with the regeneration of life. At Gavà it occurs as seams of slate within layers of limestone and dolomite or sealed under clay where it outcrops. The prehistoric miners followed the seams, digging shafts leading to tunnels between 5 and 10 m long and about 2.5 m wide. These later expanded into more complex galleries with chambers, reaching depths of 30 m and more. In general the prehistoric mining cavities had been backfilled with extraction debris, including broken mining tools (stone picks and bone wedges); this saved the labor of transporting it outside the mine. Some of the cavities were reused as graves in Neolithic times (Figs. 1 and 2).

The first task of archaeological investigation was to make the mining galleries safe. Shoring with metal frames and concrete, as in modern mining, was unsuitable, as it would mask the surface of the rock, where prehistoric tool marks are still visible. Instead, metal anchors are placed on the rock with a resin coating that protects and secures the surface. Cracks and fissures are also filled with resin. The rock surface is impregnated with a product that allows moisture to escape. Humidity and the flow of water inside the mines are controlled with high precision, and warning instruments monitor the stability of the rock.

Excavation to date has focused on the deposits inside the mine. A full stratigraphic record of the strata in the galleries, chambers, and minor cavities is being made, both to define any features such as the graves and to investigate the patterns of extraction and discard noted in the debris. The assemblage includes different kinds of lithics, ceramics, and animal bones. Systematic screening maximizes recovery and has allowed the find of a variscite necklace. The date of the mining, from radiocarbon, is between 4100 and 3400 cal. BCE.

Gavà Mining Site: Fieldwork, Fig. 1 The drawing process (Museu de Gavà, Josep Bosch)

Gavà Mining Site: Fieldwork,
Fig. 2 Restoration of one of the mines (Museu de Gavà, Benet Solina)

After nearly four decades since its discovery, a sizable, but unknown, proportion of the mine has been examined. The mine was declared a site of National Cultural Interest in 1996, and there is a plan to open it to the public once safe access and robust conservation measures are in place.

Cross-References

- ▶ Archaeological Record
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage and the Public
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ "Public" and Archaeology
- ▶ Spain: Archaeological Heritage Management
- ▶ Western Europe: Historical Archaeology

Further Reading

Parc Arqueològic Mines de Gavà. n.d. Available at: http://www.parcarqueologic.cat/cat/imgpcn/m.asp

Gender and Feminism in Brazilian Archaeology

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Forewords

From the history of formation of Brazilian archaeology and its great themes, we will discuss in which manner *gender* issue has been worked in research and practice, as we will treat the presence (and in many cases, the absence) of women in archaeological past. In Brazil, colonialism, racism, and sexism are the foundation and structure of society and dominant classes, which includes intellectuals and knowledge sources. Historically, European and North American concepts were imported to the interpretations regarding native and traditional populations (*quilombola*, riverine, among others). (*Quilombolas* are traditional groups that may or may not has historical

connections with the *quilombos*, communities created by Afro-Americans that escaped slavery in the colonial period, is today an important social and cultural identity of struggle and resistance to racism and social inequality that structure the Brazilian society.). This has resulted in the erasure of emic perspectives regarding gender, identity, and personhood. The classifications and periods developed to explain the history of Americas are based on foreign civilizational parameter that made inviable the ethnicity of indigenous and African people, be it in the archaeology made about periods before or after the European invasion. Typological concepts, such as "hunter-gatherers," "Neolithic," "ceramists," "Formative," among others, are being discussed again and substituted for not representing the *modus operandi* of American native societies.

A similar process has occurred in relation to gender discussions in the discipline. Brazilian archaeology has been constructed as an empirical scientific endeavor, the ultimate goal being the production of objective and verifiable facts, under the paradigm of neutrality, of unequivocal facts, and of scientific objectivity. In part, this supposedly neutral model of archaeology is necessitated by the need for primary investigations into archaeologically unknown contexts throughout the country where no previous research exists. Because of this model of archaeology, allied to the necessity of making new researches in unknown contexts and to a scientificism focused of the production of numeric data (sites, excavation, quantity and statistics of archaeological material, dating, etc.), Brazilian archaeology has long denied itself to incorporate gender theory and feminist and *queer* critics in its research agenda.

There is a fusion between narrative parameters from historic-culturalism and processual methodologies that difficult the visualization of a delimited distinction between classical archaeological schools, as is proposed by Trigger (1989) to European and North American context. In such places, the breakage of Eurocentric paradigm promoted by postprocessual (or postmodern) archaeology has brought to its agenda the political feminist movement and the critics of a parameter of heterosexual and white masculinity as a "neutral gender" of pre- and postcolonial past. The first Brazilian researches that evoked gender issue brought an evolutionary baggage based on sexual dimorphism and in the binary correlation between sex (masculine and feminine) and gender (man and woman). Only in the last decade, some stank conception about the roles played by different social segments have been coming out. As says Ribeiro (2017), it is still necessary to undergo a process of unlearning the modern conception of gender and of questioning diverse practices of relationship involving ethnicity/race, age, sexuality, activities, among others.

The "origins," a noble issue in Brazilian archaeology, specifically the origins of sexual division of labor, has been incorporated in interpretations about the past, considering the origins of gender inequality and the paradigm of universal masculine domination (seen, always, through a binary lens): hunters – men/ceramist gatherers – women, and so on. Thus, indigenous gender categories were invisibilized and diluted in the sexual dimorphism. Ethnography, for a long time, has demonstrated that indigenous genders and bodies are much more complex constructs, such as the classical work of Pierre Clastres (1972) among the Aché Gatu, in which he demonstrates that gender is not related only to labor division but also to the abilities that people can acquire or lose. If a man, for example, loses his abilities (or luck) in hunting he becomes *panema*. (*Panema* is a word present in several tupi-guarani languages, which means unlucky, unhappy, bad, unproductive, sterile (Tupi-Guarani – Portuguese Vocabulary, Silveira Bueno 2008).) If he does not assume the condition of *panema* and go to gather activities with women, he will become a displaced individual in the group.

This entry is organized into four parts. The first is dedicated to introduce the pioneering researches in precolonial archaeology from the 1980s and 1990s and some more recent ones that bring gender issues. Those works brought gender issue to Brazilian archaeology, especially through

bioarchaeology and archaeology of symbolism (e.g., rock art, Amazonian ceramic, among other). In the second, we are going to focus on researches about historic archaeology and the evidences about the roles played by women represented in material culture, architecture, and historic documentation. Then, we will bring some perspectives on gender discussed by anthropology regarding indigenous identities that can be used as guides to new perspectives on this theme in Brazil. Finally, we will present a very recent scenario, in which archaeologists have debated not only about gender and *queer* theories, but also with a theoretic and political feminism. This last entry is dedicated to relationships of labor (the present ones) and researches in the professional and academic environments.

We cannot deny the pioneering of women in the development of archaeology since the beginning of the twentieth century, both Brazilian and foreign, which are responsible for part of the scientification in the Brazilian field. However, beyond those "founder" women (Sombrio 2006), there is a mass of unknown women producing knowledge in the country. As pointed by Ribeiro et al. (2017), besides the majority of the intellectual production in last years having been done by women, only a small part of them reach research coordinator positions. Their production is rarely mentioned by their colleagues and only a few are included as reference in under-graduation programs. If we turn to Amazonian archaeology, where the protagonist of Betty Meggers (1971) and Anna Roosevelt (1991) influences the researches until today, we will see something very similar. Although most part of the research is developed by women, mainly young and writing most of the articles, they are less quoted than men, and their production has smaller impact away from this geographic and academic area (Caromano et al. 2017). For all those questions, we will champion female writers in this entry, not only because archaeology has a historical debt to them but also to make justice to reality of this theme in Brazilian research, which is conducted mainly by women.

Gender in Precolonial Brazilian Archaeology

In the 1980s, some Brazilian archaeologists began to highlight the role of gender in their research. This focus coincided with the increasing prominence of feminist scholarship in Brazilian academia during the decade, as part of an institutional agenda of Brazilian archaeology, mainly those conducted by women. In those initial moments, these archaeologists used a binary interpretation of gender to identify the sex in the archaeological record, primarily through skeletal data and symbolic representations of human bodies in artefacts and rock art paintings. This research built on Margaret Mead's (1969) anthropological work on the social construction of feminine and masculine roles in indigenous North American societies. Through this frame, archaeologists sought to identify evidence of gendered activities in the past as a means to evaluate the existence gendered inequalities and hierarchies. This same research paradigm can be identified in studies on shellmound societies of southern Brazil (States of Rio de Janeiro, São Paulo, Santa Catarina, Paraná, and Rio Grande do Sul) (Gaspar et al. 2011; Escórcio and Gaspar 2005; Escórcio 2008), indigenous peoples of the Xingó region (Bahia state) (Lima 2012), and Capivara Hills (State of Piauí) (Pessis 2005; Castro 2010) and in rockshelters from Minas Gerais state (Sene 2007) (See Fig. 1 for the location of archaeological areas).

Many of the first known archaeological sites in the south, southeast, and northeast of Brazil, such as rock shelters and shellmounds dated from the Initial and Middle Holocene (c. 12.000–3.000 A.P.), are cemeteries with large numbers of buried individuals. Archaeologists working in these contexts have primarily investigated sexual divisions of labor and status at time of death by examining sexually dimorphic skeletal markers, pathological indicators, and ceremonial grave goods. For instance, Gaspar and Escórcio (2005) synthesized the several elements of material culture present in feminine and masculine burials in shellmounds of the coast (Fig. 2) and concluded that distinct labor activities between men and women would have

Gender and Feminism in Brazilian Archaeology, Fig. 1 Map of the mentioned archaeological regions. Cities: 1. Pelotas (Rio Grande do Sul). 2. São Sebastião (São Paulo). 3. Rio de Janeiro (Rio de Janeiro). 4. Belo Horizonte (Minas Gerais). 5. Salvador (Bahia). 6. Santarém (Pará). Regionas: 7. Marajó Island (Pará). 8. Capivara National Park. 9. Xingó

Gender and Feminism in Brazilian Archaeology, Fig. 2 Cabeçuda Shellmound (Santa Catarina state). A young woman (18–20 years) buried in a shallow pit in a ventral decubitus dated from 2900 B.C. (GRUPEP/UNISUL's collection photo)

been based around nonhierarchical system of cooperation. Notably, this goes against long-held traditions in Western thought that view patriarchal domination as a universal aspect of human sociality. Artifacts that should be, according with stereotypes that were crystalized in *Man the Hunter* (Lee and Devore 1968), connected to activities of hunting (bone and lithic tips and axes) and to the hunter status (necklace made of animal teeth) were equally present in feminine and masculine burials. Those artifacts should represent the roles of the buried person.

Based on material culture and burials dated to the Middle and Late Holocene in northwest Brazil, Lima (2012) has concluded that it is not gender relationships that structure the culture of the groups she studied, but the hierarchic relationships of social sectors within those communities, according to kinship relations. Even so, paleopathologic markers in human teeth (i.e., enamel hypoplasia) indicate that, even though men and women were able to participate in the same activities of food preparation of foodstuffs and artifacts, they nonetheless had differential access to food consumption during childhood.

Such research carries the embryo of complexification of gender issues through an anthropological perspective – that is going to be developed further – with the linkage between biological characteristics of sex, age, identity, individual status, among other questions. Even so, "genders are studied based on an individual's sex" and in the distribution of activities and related artefacts (Lima 2012: 21), showing a correlation between biological sex and gender identity in the interpretation of data. The differences of diets among children with feminine and masculine bodies (always in a binary sense) are attributed to "feeding privileges" and indicate that we still have much to learn about the construction of identity during childhood in these societies, specially regarded to feeding restrictions in periods of *tabu* and seclusions (Morim de Lima 2015).

This kind of identification also came out of studies of symbolic forms of human representation, especially in rock art traditions of northwestern Brazil. There are two principal types of archaeological sites in the Capivara Hills, State of Piauí, that allude to sexual scenes utilized in studies regarding gender distinctions (Fig. 3). Paintings from the Várzea Grande tradition have several dynamic representations of human figures engaged in hunting, dancing, and other activities. Copulation scenes which clearly express sexual differences through exaggerated representations of the penis and vagina are very common. We highlight the pioneering of Gabriela Martins and Anne Marie Pessis (Pessis and Martin 2005) on this issue in Brazilian archaeology. After them, there is a tradition of research on sex and gender in rock art, which combines perspectives of gender identification based on the presence of sexual organs to what is supposed to be the sexuality patterns of the past.

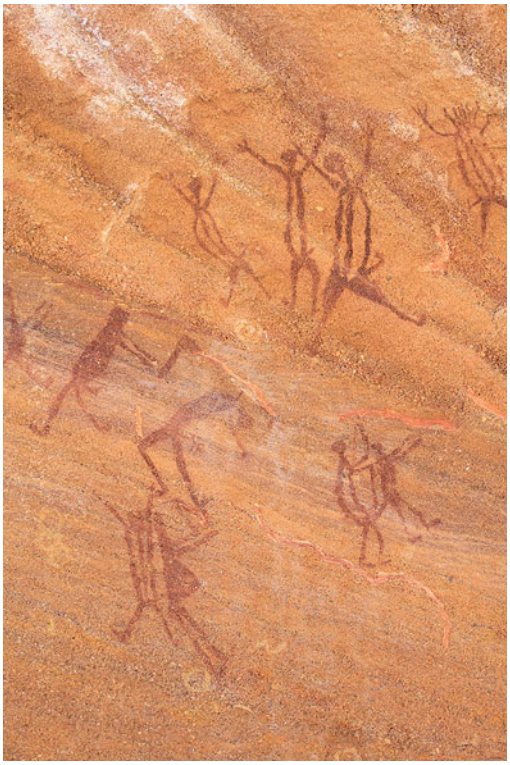

Gender and Feminism in Brazilian Archaeology, Fig. 3 Rockshelter Toca do Vento (Piauí state). Above three anthropomorphs with erect penis and erect arms, to the left center a combat scene, in which an anthropomorph hits another with instrument, below the sex scene, apparently heterosexual, and below and left, sex scene with a pregnant woman. (Photo: Andrei Isnardis)

Those works also care about the issue of sexual division of labor and are, in a way, used as source of information about prefarmer indigenous societies. As argued by Pessis (2005), the origins of agriculture would have been accomplished by a hierarchical division between men and women based on unequal access to technical knowledge and on male control over that knowledge. In contrast to this model, the early rock art depictions at Capivara Hills appear to imply a scenario of gendered social distinctions but not inequality between both, seen that there are phallic representations in panels that picture male initiation and

sex, and vagina representations in panels that picture sex and pregnancy. There is, however, a great amount of what has been named "neutral gender" – human figures without genitalia represented – that made the author works with the idea of a "primitive equality." Additionally, based on contemporary patterns and behaviors, Castro (2010) proposes the absence of rigid *tabus* regarding sexual relationships – using sexual positions and sexuality as synonymous. In sum, such research was responsible for helping to create an evolutionary line that begins with egalitarian societies of hunter-gatherers with a fluid sexuality and transforms itself with the advent of agriculture, when not only female activities are controlled but the female body itself is made object of possession.

The last context we discuss is the ceramics of Marajó Island, located in the mouth of the Amazon River. This elaborate ceramic complex is notable for its elaborate anthropomorphic vessels – especially funerary urns and figurines – and intricate decorations that often incorporate human and animal elements. The relation between ceramic and body construction is evident. For example, bodily representations can include human-like forms with scorpion eyes, serpent-like arms, and a myriad of other motifs. Many of these figures also include sexual features in the form of painted triangular appliqués that represent vaginas, appliques identified as nipples, and many other forms of sexual representation (Schaan 2001, 2003, 2006; Barreto 2005).

In this area, the organization of a complex system of artificial mounds with dams used for fishery, together with the management of cultivated plants such as maize, gave support to interpretations of Marajoara occupations as first evidence of complex pre-Columbian food-producing and matrilinear societies in the mouth of the Amazon from ca. 400 to 1400 AD. The identification of a distinctive pattern in funerary contexts – in which decorated urns containing ceramic "thongs" (known as *tangas* among Brazilian archaeologists) and small ceramic vessels are related to females and non-decorated urns with stone axes inside are associated with males – was used to define Marajoara society as a *Cacicado* where social hierarchies were matrilinearly-based, but only men could be leaders. (*Cacicado* is the concept adopted by several archaeologists to refer to complex and stratified indigenous societies in precolonial times.) Furthermore, Schaan (2003) concludes that social distinctions were primarily based on a hierarchical system of elites and common persons and not between men and women. For instance, Barreto (2005) associates ceramic thongs (Fig. 4) with female ornament (based on its triangular morphology), while figurines that represent feminine elements (i.e., nipple, vagina, womb) through a phallic format (the head and body composing the penis and the legs composing testicles) are interpreted as ritual objects linked to elite and shamanic activities (Schaan 2003; Barreto 2005). (Besides some articles mention the presence of thongs in female secondary burials (Schaan 2008, 2003), there are some contexts where they are associated to masculine burials (Barreto 2005; Schaan 2001). This can suggest that its use can be an allusion to specific maternal lineages.)

Gender and Feminism in Brazilian Archaeology, Fig. 4 Ceramic thongs (tangas) from the Marajoara context (Museum of the Pernambuco state). (Photo: Emerson Nobre)

Those ceramic feminine bodies with their "fertility" features exposed are used to infer the presence of a feminine fertility cult – an Amazonian "Venus" – associated with aspects of prestige and ritual activities (Schaan 2003; Roosevelt 1998). Other paradigms based on ethnographic accounts go beyond this dualistic perspective between men-women/patriarchy–matriarchy/human–non-human to think about the construction of these "bodies of clay." Cristiana Barreto (2005) conceptualizes ceramic vessels as constructed bodies to better approach a more critical perspective closer to the construction of human bodies in indigenous societies. In funerary contexts, the presence of urns with female representations used in both feminine and masculine burials can be seen as an allusion to the cycles of life and a connection between life, birth, and death. In moving beyond strictly functionalist and formal approaches, Barreto argues that decorative motifs on *tangas* could be better interpreted as markers of social associations relating to distinct identities like families and clans (families, lineages, or clans) for both men, women, and children.

In summary, even in these very distinct contexts regarding material culture, localization, and chronology, between archaeological sites from Amazon, Piauí, Bahia and the southern coast, there are strong commonalities in the way that researchers have interpreted gender in this field. Objects like urns, thongs, ceramic vessels, and pictorial representations are directly associated to a sex-gender. There is a tendency in Brazilian precolonial archaeology, where binary sexual dimorphism, sexual division of labor, and gender identity are linked to roles played by men and women through artifacts from funerary and ritual contexts. Gender is not interpreted as an identity, but as a number of activities and conceptions about feminine and masculine sex – even if treated as an extra somatic social construction. Sexuality, otherwise, is far from being a solid theme and for taking into account political and cultural organizations relating to the erotic and to sexual relationships, identities, and politics.

Historical Archaeologies and the Role of Women

Historical archaeology – concerning the expansion of the European world system, the colonial encounters and conflicts and the construction of the Brazilian nation state – has become one of the most prominent spaces for gender discussion in Brazil. Among its main issues, reclaiming the history of women – captives, Afro-descendants during colonial slavery, or free women – is an important political tool to deconstruct the idea that women remain only in domestic spaces. Archaeological studies of the African diaspora in the South of the country (Rodrigues 2015) are framed in a decolonial agenda. In the Imperial Period of Brazil, during the nineteenth and twentieth centuries, the societal position of women is debated in relation to their labour in the countryside, especially in gold-digging activities in the states of Minas Gerais (Ribeiro 2013) and Bahia (Sousa 2006), and in the material culture, acts, and practices of women from the urban elite in the states of Rio de Janeiro (Lima 1995, 1997, 2003) and Rio Grande do Sul (Fredel 2008, 2012).

Tânia Lima (1995, 1997) wrote one of the pioneering works on gender in historical archaeology. Her article about the ritual of tea shines a light on it as a practice imported from the English to the *carioca* elite as a particularly feminine practice, a space where they learned, perfected, and demonstrated their good behavior and elegance. The fine pottery used for tea consumption materialized this practice in nineteenth century archaeological sites in Rio de Janeiro. In such sites, miniature tea faience sets attest to the importance of inculcating bourgeois and middle-class values in children. Through analyses of different types of historical documents and literature, Lima realizes that, besides being a feminine practice, the tea ritual was performed in the living room, a predominantly male place. This ambiguity was part of a new capitalist order that contradicted the traditions of a slave-based, patriarchal, and colonial society. In regards to working class women, Camila Agostini (2010) sheds light on the domestic ceramic producers of São Sebastião, a small town on the coast of São Paulo state. These

pots were made in the nineteenth century primarily by poor white women, though some of the workers were also descendants of slaves brought from Africa. As Agostini notes, it is possible to recognize the activity of these captive women through their choice of decorative patterns that reference distinct male scarification drawings.

In the urban center of Belo Horizonte in Minas Gerais state, Luisa Roedel (2017) highlights a possible burial of a intersex individual at the Bonfim cemetery. Unlike other burials at the site, this particular grave did not a bear a name on its tombstone but instead displayed an inscribed epitaph referring to the famous nineteenth century French intersex, Herculine Barbin (cf. Foucault 1980). It is a plain and unadorned tomb that contrasts with the rest of the cemetery, even though it is located in the area of the cemetery apportioned to important and affluent local families. Roedel suggests that this burial may present a case where a conscious effort was made to erase the individual's identity. Since we know that intersexuality was considered to be a medical condition and gender anomaly during this time, Roedel suggests that this erasure directly links to the suffering this individual would have experienced in life, considering that "hermaphroditism" has been treated as a gender anomaly that needs medical treatment from the nineteenth century onwards. The necessity to choose a dominant sex was (and still is) a violence to intersex individuals, as underlined by the stories of Herculine Barbin and the unknown person at Bonfim cemetery, both of whom were marginalized in life and after death.

The recent period of military dictatorship in Brazil (1964–1984) is discussed by Jocyane Barreta (2017) through the lens of feminism and the decolonial archaeology. She studies the architecture of DOPS building and highlights its design strategy which aimed to degrade the humanity of the inmates. (Social and Political Order Department, which executed illegal arrestment against political militants that were contrary to the military government. In DOPS occurred practices of torture (physical, sexual, and psychologic violence) to take testimony of prisoners, many of whom were buried in illegal cemeteries or throw in clandestine trenches.) For male inmates, the process of dehumanization involved "feminization" through torture involving the sexual organs and the exposure of their bodies in ways to make them appear feminine. Such a distinction of gender in the process of dehumanization through torture of both men and women show that "gender differentiation is embedded in ideological and [the] epistemic logic of colonial modernity, emphasizing the dichotomy and hierarchy of gender" (Barreta 2017: 28).

This movement within historical archeology, as well as the studies of museum collections that highlight the lived experiences of women, serves to foreground the importance of feminine spaces of action in order to better understand the social construction of their bodies, gestures, clothing, and tools (Carvalho 2003, 2008, 2011). A strong criticism of this field is its invisibility of black and subalternal women in the Brazilian history, which is connected to a growing scenario of critical research about the foundations of racism, classicism, and colonialism, all contributing to unveil power structures that have women as agents of resistance. Even when closer to a politically engaged archaeology, researchers expose a historical segregation in the practical making of archaeology or field work: this research is mainly conducted by white men and women. Reflections about gender in historical archaeology have as principle, until now, to make women visible as they have been invisible for centuries, treated as secondary subjects or accessories in androcentric narratives.

Reflections on Archaeology from Indigenous Ethnography

In Brazilian archaeology, especially in Amazonian researches and with ceramist population from several regions (Tupiguarani, Aratu-Sapucaí, Taquara-Itararé, etc.), there is a recurrence in using ethnographic analogies to interpret past contexts. Regarding gender issues, this is basically restricted to assigning certain roles to men and women – ceramist women would be responsible for domestic and agricultural chores and men would focus on producing lithic tools,

hunting, fishing, and in politics. Those stereotypes have some exceptions or variations, but this is the general model (Landa 1999).

Anna Roosevelt has long debated on the origins of social complexity in ancient Amazonian society and its complex political systems (like the *cacicados*) has given weight to the possibility that the social positions and roles of women in these societies may have been more central than those that developed in postcolonial Amazonia (Roosevelt 1991). As noted above, Roosevelt contends that Marajoara society was matriarchal. In a similar vein, Denise Schaan explains the nature of social status in Marajó and Santarém cultures as a class-based system predicated on social divisions between elites and commoners, suggesting that women would have more status. Both scholars also highlight evidence of matriarchal indigenous social orders recorded historical documents written by Jesuit missionaries during the seventeenth and eighteenth centuries. These accounts illustrate the social significance of specific "noble" indigenous women among the Tapajós people of the Lower Amazon, known as "princesses" (Bettendorf 1990; Heriarte 1874).

Such an inversion of indigenous precolonial women role was important to put in evidence – even though through tortuous paths – how the understanding of gender among non-Western groups was constructed. In this sense, Brazilian archaeology is conversant with ethnoarchaeology and ethnographic analogy, but the discussion about gender in ethnology is not incorporated to the same extent, and this theme is not dominant in studies about indigenous people in Brazil. However, another transversal theme about gender that can bring archaeology and anthropology closer is the construction of the body.

Research on conceptions of the body (i.e., animal and human, men and women, children and adult) have played a central role in Brazilian ethnology. It is the *locus* where different personas and agencies are constructed. This construction is given only through specific practices such as food and sexual prescriptions, seclusion, learning techniques of labor and behavior (Seeger et al. 1979). This perspective has a very small impact in interpretations about archaeological remains, as the previously mentioned in the research by Lima (2012) and Roosevelt (1998), in which indication of diet differences are interpreted as *status* and leadership privilege or as hierarchies between male and female children are created in moments of food crisis. The production and (in)differentiation of bodies could very well be the connection point between precolonial archaeology working with indigenous people and anthropological gender theory.

Therefore, gender archaeology in Brazil could/should have a greater penchant to decolonizing debates, in the same way that other types of research do, as part of the production of knowledge is referred to non-Western groups that have very distinctive social forms if compared to the Eurocentric, Christian, and capitalist models. In conclusion, perspectives about gender diversity and identity that are applied in narrative construction about precolonial societies are culturally located and reflect a historically rooted Eurocentric, heteronormative, and masculine effort to colonize native bodies. In the words of Loredana Ribeiro:

> "(. . .) while witches were burned in the Metropolis hearts, in the colonies the Christian civilizatory project was concerned with the mission of transforming non-human males and females (since uncivilized, bestial and hypersexual) into men and women". (Ribeiro 2017: 215).

The Feminist Spring in Brazil

Since 2010, there is a growing academic and politically motivated movement in Brazilian archaeology to better engage with *queer* theory in their study of the past. This feminist-allied theoretical movement can be seen in a wide-array of academic products like scholarly articles, theses, dissertations, etc. There is, however, an eminently political scenario in which men and women – professionals and students – have guided and struggled against chauvinism, homophobia, transphobia, racism, and other normatives in several spaces of archaeology, from the university to environmental licensing, in field works, laboratory, museums, and other institutional spaces.

In political terms, feminist and *queer* activism have frequently occurred in scientific meetings – national and regional – like the Meetings of the Brazilian Society for Archaeology (SAB) in 2015 (18th meeting of the Brazilian Society for Archaeology: Archaeology to Whom? 2015, Goiânia, Brazil), its third northern meeting in 2016 (3rd meeting of the Regional North of SAB: Archaeology and Traditional Communities in Amazonia. 2016, Porto Velho, Brazil), its tenth southern meeting in 2016 (10th meeting of the Regional South of SAB: Deconstructing Asymmetries. 2016, Pelotas, Brazil), among others. In those meetings, men and women public manifestations against chauvinism, homophobia, and harassment suffered daily has exposed not only the actors of injury but also the academic structure itself, beyond the specific case of archaeology. Issues, such as wage inequality, hierarchy in scientific consulting activities, moral and sexual harassment in the field, a nonproportional incorporation of men and women in reference for the educational system (Ribeiro 2017; Passos 2017), among others, are being debated in order to recognize patriarchal influences not only in archaeological theory but also in its practices.

The Brazilian Society for Archaeology has incorporated matters regarding gender, sexuality, class, ethnic, and racial identity discrimination to its ethic code only in 2015, opening a channel for those practices to be exposed. Even so, there is an abyss between what is written on paper and the practice which can only be surpassed by a conscience creation process among professionals and students and a structural change in archaeological science. In the same year, besides the occurrence of a themed session regarding women's role in national scientific production, a political paper proposed to open wide chauvinist and homophobic practices that are crowded in professional archaeology:

> "Archaeology is a social Science, with a practice engaged in the contemporary world. Ours attitudes in the field and with the communities (*with who we work*) influence the construction of archaeological knowledge. The debates created in the academy should be reflected in empiric research, such as in our etic compromise". (Zine 2015).

In the same way, it happened with feminism and *queer* theory in other, mainly English speaking, countries. This critical movement goes from politics to academy and begins to make itself present in Brazilian archaeology. In 2017, the 13th Women's World was held in Brazil together with the 11th Making Gender, in which the session *Excavating Gender: Women in Indigenous History* (coordinated by Juliana Machado) was the first dedicated to this issue in Brazil. While the year 2000 represented a turning point in North America with the publication of *Why Queer Archaeology? An Introduction* (Dowson 2000) and *Archaeologies of Sexuality* (Schmidt and Voss 2000), Brazil had to wait another 17 years until the publication of *Archaeology and Feminist Critic in Brazil* (organized by Ribeiro 2017). The articles published in this dossier, many of them already mentioned in this entry, reflect a ripening of archaeological research and feminist criticism regarding women's knowledge diffusion in diverse themes – from precolonial archaeologies to the archaeologies of present times.

The themes are also more diverse when compared with the classical research described in the first chapter of this article: repression of women in Military Dictatorship (Jocyane Baretta), the construction of gender stereotypes in museums (Camila Wichers), the proposition of an archaeology of sexuality (Fabiano Gontijo and Denise Schaan), misogyny and homophobia in field activities (Frederic Poujet and Aline Carvalho), diffusion and reception of women's production in Amazonian archaeology (Caroline Caromano, Meliam Gaspar, Ester Pereira, Márjorie Lima, and Jaqueline Lima), and in undergrad and grad archaeology programs (Lara Passos) – only to mention those working on Brazilian issues.

In conclusion, there is an interpretative rush relating to forms of comprehending categories of "sex" and "gender," and to the possibilities of putting them in operation in different fields of archaeological research. Beyond a dichotomy between men and women, several forms of fluid and nonhomogenous sex, gender, and sexuality appear as interpretative possibilities and as criticism to the appliance of heteronormative occidental model to the precolonial past of Brazil.

Growing ethnographic production related to indigenous, black, feminist and LGBTQ political movements is added to this process, which complicates the issues of sexual division of labor and its parameter of universal male domination, as it does with issues regarding the construction of person and the correlations between sex and gender.

Queer theory is being pointed to as a powerful tool for producing a more "warned" archaeology, informed about the occidental constructs about gender, sex, and sexuality (Ribeiro 2017; Gontijo and Schaan 2017). From the North American reflection under *Queer* Archaeology and the incorporation of the criticism of using medical-juridical parameters involved in the creation of dimorphism and binary sex and of searching for sexual patterns seen by occidental societies as deviants, the authors propose a research agenda disposed to deconstruct Brazilian archaeology. Dimorphism and binarism, two of the main parameters in classical Brazilian researches, are taxonomies socially constructed to political ends. The intersections between sex, gender, sexuality, class, ethnic-racial identity, age, etc. are alternatives to such taxonomies and archaeology as emancipatory practise – more than a parameter to construct "alternative archaeologies."

Concluding Remarks

Within this patriarchal scenario, Brazilian archaeology carries a historic reproduction of Western categories in its theories, which contributed to erasing nondominant genders and sexualities in the contemporary world and in the precolonial past. In the professional medium, a chauvinist structure mainly occupied by men – professors, research project leaders – is also a place of feminist, LGBT, and *queer* production, which strives to deconstruct gender stereotypes and point to new conceptual and political directions that bound archaeology, whatever the historic period in question.

There is a mismatch between Brazilian and world reflections about gender, feminism, and *queer*. An example is the prominence of big historical-culturalist projects executed in Brazil between 1960 and 1970, a period during which North America and Europe were developing new archaeologies and several postprocessual archaeologies. Feminist and gender debates in the field of history and anthropology in Brazil gained strength after the fall of the last military president, in the so-called "democratic opening" in 1984. It is from this point the social movements in general, including women – black – deviant movements, emerged from clandestinity and begun to branch out to diverse fields occupying professional and educational environments.

What we see in Brazilian archaeology is a conservative and traditional scenario, where not even ethnic (even if indigenous people are main "actors" of "prehistoric" archaeology) nor gender minorities are taken into account. One frequent argument in debates and scientific articles is that "Brazilian archaeology is little developed, and we should invest our efforts in raising data, after all, we have a continental territory". (Today, there are 11 undergrad programs of archaeology and 5 universities with master and doctoral programs in Brazil. The expansion of education system in the last 15 years generated the entrance of profile of students: indigenous, *quilombolas*, black person, and people from urban cities from nonprivileged social and economic classes. In 2017, the first indigenous archaeologist, Jaime Xamen Waiwai, has graduated in Archaeology at the Federal University of Western Pará.) This apparently non-theoric arguments deliberately reiterates an occidental point of view, in which other archaeologies that propose forms of methodology and interpretations about the past – about gender, feminism, or positioned ethnic engagement, as indigenous, black, and subaltern archaeologies – have small relevance to science, bringing more interpretation than empirical data.

References

Agostini, C. 2010. Panelas e Paneleiras de São Sebastião: um núcleo produtor e a dinâmica social e simbólica de sua produção nos séculos XIX e XX. Revista Vestígios 4(2).

Barbosa, M. 2007. A ocupação pré-colonial da Região dos Lagos, RJ: sistema de assentamento e relações

G

intersocietais entre grupos sambaquianos e grupos ceramistas Tupinambá e da tradição Una. Tese (Programa de Pós-graduação em Arqueologia) – Museu de Arqueologia e Etnologia. São Paulo: Universidade de São Paulo.

Barreto, Cristiana. 2005. Simbolismo Sexual na Antiga Amazônia. Revisitando urnas, estatuetas e urnas marajoara. In *Antes: histórias da pré-história*. Rio de Janeiro: Centro Cultural Banco do Brasil Catálogo de exposição, 12 Oct 2004–09 Jan 2005.

Barreta, J. 2017. Por uma arqueologia feminist da Ditadura Militar no Brasil (1964–1985). *Revista de Arqueologia* 30(2). Arqueologia e Crítica Feminista.

Bettendorff, J.F. 1990. *Chronica da Missão dos Padres da Companhia de Jesus no Estado do Maranhão (Vol. Série Lendo o Pará 5)*. Fundação Cultural do Pará Tancredo Neves/Secretaria de Estado da Cultura: Belém.

Caromano, C., M. Gaspar, E. Pereira, M. Lima, and J. de Lima. 2017. Nem todas são Betty ou Anna: o lugar das arqueólogas no discurso da Arqueologia Amazônica. *Revista de Arqueologia* 30(2). Arqueologia e Crítica Feminista.

Carvalho, Vânia. 2003. Gênero e Cultura Material: uma introdução bibliográfica. *Anais do Museu Paulista* 8/9: 293–324.

Carvalho, Vânia. 2008. *Gênero e artefato. O sistema doméstico na perspectiva da cultura material – São Paulo, 1870–1920*. São Paulo: Edusp, FAPESP.

Castro, Luiza. 2010. Representações Sexuais na Pré-História, Parque Nacional da Serra da Capivara: padrões cenográficos. UNIVASF, Bacharelado em Arqueologia e Preservação Patrimonial, Trabalho de Conclusão de Curso.

Clastres, P. 1972. Crônica dos índios Guayaki: o que sabem os Aché, caçadores nômades do Paraguai. Rio de Janeiro: Ed. 34, 1995.

Carvalho, Vânia Carneiro de. 2011. Cultura material, espaço doméstico e musealização. *Varia História* (UFMG. Impresso) 27: 443–469.

Dowson, T. 2000. Why queer archaeology? An introduction. *World Archaeology*, 32(2): 161–165. Queer Archaeologies.

Gontijo, F., and D. Schaan. 2017. Sexualidade e Teoria Queer. Apontamentos para a Arqueologia e para a Antropologia Brasileiras. *Revista de Arqueologia*, 30(2). Arqueologia e Crítica Feminista.

Heriarte, M. de. Descripção do estado do Maranhaõ, Pará, Corupá e Rio das Amazonas. Vienna d' Austria, Carlos Gerold, [1662]1874.

de Roedel, L.A. 2017. O silêncio do corpo: a intersexualidade invizibilizada no cemitério do Bomfim. *Revista de Arqueologia: Especial Crítica Feminista e Arqueologia.* 30 (2): 71.

Escórcio, Eliana. 2008. Pescadores-coletores do litoral do Estado do Rio de Janeiro: um olhar sobre idade e gênero. UFRJ, Dissertação de Mestrado.

Escórcio, Eliana, and Gaspar, Maria Dulce. 2005. Indicadores de Diferenciação Social e de Gênero dos Pescadores-Coletores que ocuparam a Região dos Lagos – RJ. Cadernos do LEPAARQ, Textos de Antropologia, Arqueologia e Patrimônio, VII (3).

Foucault, Michel. 1980. *Herculine Barbin: Being the recently discovered memoirs of a nineteenth-century French hermaphrodite*. New York: Pantheon Books.

Fredel, Karla. 2008. Práticas de Gênero e a Cultura Material na Província de São Pedro – século XIX. Anais do XIX Encontro Regional de História: Poder, Violência e Exclusão. ANPUH/SP-USP.

Fredel, Karla. 2012. Arqueologia de Gênero nas Cidades de Pelotas – RS – Brasil e Habana Vieja – Habana – Cuba/século XIX. Unicamp, Tese de Doutorado.

Gaspar, Maria Dulce, Maria Heilborn, and Eliana Escorcio. 2011. A sociedade sambaquieira vista através de sexo e gênero. *Revista do Museu de Arqueologia e Etnologia* 21: 17–30.

Landa, Beatriz dos S. 1999. Arqueologia Guarani e Gênero. *Revista do CEPA* 23 (2): 240–244.

Lee, R., and I. Devore, eds. 1968. *Man the hunter*. New York: Aldine Publishing Company.

Lima, Tânia. 1995. Pratos e mais pratos: louças domésticas, divisões culturais e limites sociais no Rio de Janeiro, século XIX. *Anais do Museu Paulista: História e Cultura Material* 3 (1): 129–191.

Lima, Tânia. 1997. Chá e Simpatia: uma estratégia de gênero no Rio de Janeiro oitocentista. *Anais do Museu Paulista* 5: 93–127.

Lima, Tânia. 2003. Estudos de gênero na Arqueologia Brasileira. Por que não? *Habitus* 1 (1): 129–139.

Lima, Danúbia. 2012. Sobre morte e gênero: uma análise dos papéis de gênero no contexto funerário dos sítios Justino-SE e Furna do Estrago-PE. UFPE, Dissertação de Mestrado.

Mead, Margareth. 1969. *Sexo e temperamento em três sociedades primitivas*. São Paulo: Editorial Perspectiva.

Meggers, Betty. 1971. *Man and culture in a counterfeit paradise*. Washington, DC: Smithsonian Institution Scholarly Press.

Morim de Lima, A. 2015. Brotou Batata Pra Mim: cultivo, gênero e ritual entre os Krahô.

Passos, L. 2017. Gotas de um oceano. Uma abordagem feminista sobre a análise bibliométrica do curso de Antropologia da UFMG. *Revista de Arqueologia* 30(2). Arqueologia e Crítica Feminista.

Pessis, Anne-Marie. 2005. Arqueologia de Gênero: teoria e fato arqueológico. *Clio, Serie Arqueológica* 18: 13–25.

Pessis, Anne-Marie, and Martin, Gabriela. 2005 Das origens pré-históricas da desigualdade de gênero. In Marcadas a Ferro, Castillo-Martin, Marcia Oliveira, Suely de, (org.). Brasília, Secretaria Especial de Políticas para Mulheres.

Ribeiro, Loredana. 2013. Maria, párvola exposta, Domingos, padre maculado. Ensaio de arqueologia

micro histórica. Vestígios. *Revista Latino-Americana de Arqueologia Histórica* 6: 129–180.
Ribeiro, Loredana. 2017. Crítica Feminista, Arqueologia e Descolonialidade: sobre resistir na ciência. *Revista de Arqueologia* 30 (1): 210–234.
Ribeiro, Loredana, Bruno S.R. Silva, Sarah K.S. Schimidt, and Lara P. Passos. 2017. No prelo. A Saia Justa da Arqueologia Brasileira: mulheres e feminismos em apuro bibliográfico. *Estudos Feministas* 25: 1093.
Rodrigues, Marta. 2015. "A vida é um jogo para quem tem ancas": uma arqueologia documental sobre mulheres escravas domésticas em Pelotas/RS no século XIX. UFPel, Dissertação de Mestrado.
Roosevelt. 1991. *Moundbuilders of the Amazon: Geophysical archaeology on Marajo Island, Brazil*. San Diego: Academic.
Roosevelt, A.C. 1998. Paleoindian and archaic occupations in the lower Amazon, Brazil: A summary and comparison. In *Festschrift Honoring Wesley Hurt*, ed. Plew, M., 165–192. Lanham: University Press of America.
Schaan, D. 2001. Estatuetas antropomorfas marajoara: o simbolismo de identidades de gênero em uma sociedade complexa amazônica. *Boletim do Museu Paraense Emílio Goeldi, Série Antropologia* 17(2): 23–63.
Schaan, Denise Pahl. 2003. Investigando Gênero e Organização Social no Espaço Ritual e Funerário Marajoara. XII Congresso da Sociedade de Arqueologia Brasileira.
Schaan, Denise Pahl. 2006. Is there a need to (un)gender the past? In *Gender and the local/global nexus: Theory, research and action*, ed. Vasilikie Demos and Marcia Texler Segal, vol. 10, 1st ed., 47–64. Oxford: Elsevier.
Schaan, D. 2008. The nonagricultural chiefdoms of Marajó Island. In *Handbook of South American archaeology*, eds. Silverman and Isabel. New York, Springer.
Schmidt, R., and B. Voss. 2000. *Archaeologies of sexuality.* New York: Routledge.
Seeger, Anthony, Roberto da Matta, and Eduardo B.V. de Castro. 1979. A construção da pessoa nas sociedades indígenas brasileiras. *Boletim do Museu Nacional, Série Antropologia* 32: 2–19.
Sene, Glaucia. 2007. Indicadores de Gênero na Pré-História Brasileira: contexto funerário, simbolismo e diferenciação social. O sítio arqueológico Gruta do Gentio II, Unaí, Minas Gerais. USP, Tese de Doutorado.
Sombrio, Mariana Moraes de Oliveira. 2006. Em busca pelo campo – Mulheres em Expedições Científicas no Brasil em meados do século XX. Cadernos Pagu, Campinas 48, e16 4809.
Sousa, Ana Cristina. 2006. Mulheres do Jequitinhonha: um diálogo entre arqueologia, história e antropologia. *Revista de Arqueologia* 19: 9–28.
Trigger, B. 1989. *History of archaeological thought*. Cambridge: Cambridge University Press.

Gender, Feminist, and Queer Archaeologies: A Spanish Perspective

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Introduction

In the 1970s, in the aftermath of second-wave feminism, feminist scholars identified androcentric sexist biases behind scientific research, which included archaeology. They noticed that both the professional practice and the interpretation/presentation of the past were permeated by values enmeshed in the twentieth-century hegemonic gender system and argued for a culture of equality within the discipline.

In the following decade, Spanish archaeology began to incorporate this critique, led until then by archaeologists mainly working in Norway and the USA. Since then, the momentum gained by a growing number of researchers has turned feminist and gender studies into one of the most dynamic fields of the discipline in Spain, a field in its own right both in the general context of gender and feminist archaeology and in the particular context of theoretical and methodological discussion in the Iberian Peninsula. Also here, feminist researchers have promoted self-criticism and reflexivity within the discipline, provided alternative interpretations to problems previously examined, and developed new fields of inquiry. This has not included, at least until very recently, the queer archaeologies that developed from the end of the 1990s in English-speaking and Scandinavian countries. Because of this, the majority of this entry focuses only on the development of feminist and gender archaeologies, since queer archaeology is a promising but still incipient field in Spain.

Definition

Gender, feminist, and queer archaeologies refer to those archaeologies that explicitly problematize sex, gender, and/or sexuality in interpretations of the past and/or in the present practice of the discipline itself. Feminist and queer archaeologies are politically engaged with the end of patriarchy and, therefore, promote a cultural change in the discipline to remove its sexist and heterosexist biases. The archaeology of gender may have such a political dimension, but this is not always the case – there are both feminist and non-feminist archaeologies of gender. When the political dimension is not present, the archaeology of gender only broadens the content of other interpretive frameworks in considering the sociocultural interpretation of sexual difference as a structural principle in society, therefore adding gender to the study of the past.

Historical Background

In Spanish archaeology, the explicit interest in questioning androcentrism and problematizing questions linked to the experiences and practices of women began only a little later than in the pioneering countries, since the first related paper was published at the end of the 1980s (Sanahuja and Picazo 1989). Since then, the rejection of the double discrimination of women, in the profession and in the explanation/presentation of the past, has promoted a critical review of archaeological practices and narratives, new hypotheses for interpreting and reinterpreting the archaeological record, and new analytical categories for understanding historical dynamics. Currently, the volume of publications is such that there are already compilations that track events until present day (e.g., to mention just a few, Díaz-Andeu and Montón-Subías 2012; Zarzalejos 2008).

As in Norway and the USA, Spain also incorporated these concerns from feminist perspectives. However, both the theoretical-methodological context that received them and the interpretive model behind were different. While in the aforementioned countries processual archaeology already had a lengthy history and the post-processual move was beginning to emerge, in Spain culture history prevailed, being the description of archaeological materials the primary concern. This traditional way of understanding and practicing archaeology was primarily questioned from historical materialism – well-informed, nonetheless, by the processual methodology so popular in the English-speaking world. This early theoretical phase should be understood within the context of the unique political and historical situation of Spain at that time. The Spanish University had just experienced a transition due to the end of the Francoist dictatorship in 1975, and a number of archaeologists engaged in Marxism – and, in the case of some women, feminism too – were recruited into the team (on this process, see Vicent 1994).

For the previous reason, the first feminist archaeologists in Spain were also immersed in Marxist ideology. This union between Marxism and Feminism initially led to the distrust of gender archaeologists in the USA and England, which were seen as examples of historical idealism and low-intensity political practice. From this standpoint the category of *gender* was initially met with suspicion, perhaps even dismissal, and the concept of *sex* was preferred: "relations between the sexes" and "sexual roles," among others, were the expressions in use (Colomer et al. 1993: 5). This explicit wish to differ from gender archaeologies has continued through the years in proposals linked to the Marxist tradition (Vila Mitjà et al. 2017 being the latest), which has sometimes sought bonds with feminism connected to the French and Italian theories of sexual difference (Sanahuja 2002). That is why in Spain, apart from the fact that there are "feminist" and "non-feminist" archaeologies of gender, there are also "gender" and "non-gender" feminist archaeologies.

Despite the fact that in the 1980s interest in gender studies was very minor in Spanish archaeology, it had a significant weight within the group of professionals interested in promoting theoretical debate within the discipline. For instance, one of the sessions of the first and only "Reunión de Arqueología Teórica" (Meeting of Theoretical Archaeology, RAT), held in

Santiago de Compostela in 1992, was devoted to "Arqueología y Mujeres" (Archaeology and Women). This was the first time that the discussion of androcentrism in the discipline, including concerns on the professional practice, was transferred from individuals and specific groups to a wider national academic framework. The session provided much-needed reference for female archaeologists who had personal experience of sexism and spurred interest in the issue. At the end of the 1990s, the first book about archaeology and feminism was published (Colomer et al. 1999). It was a reader with 12 seminal works, mostly produced in England and the USA, but also in Norway, Sweden, and Mexico, aimed at facilitating access to the Spanish-speaking public to some of the most significant contributions in the development of feminist archaeology. It was also at the end of the 1990s when, faced with the ever-growing Anglophonic production and the influence of other disciplines like anthropology or history, the archaeology of gender (strictly speaking, that which incorporates gender as an analytical category) also entered into Spanish academia. The path for feminist archaeologies different to the earlier Marxist ones was then open.

Finally, it was during the first years of the twenty-first century that feminist and gender archaeologies were firmly established in Spain. In this period, the first monographs were published. In the year 2000, for instance, the *Seminario de Arqueología y Etnología Turolense* dedicated the 22nd volume of its journal, *Arqueología Espacial*, to gender and space in archaeology. Furthermore, new gatherings of women in archaeology were organized in different universities. The first was the course "Archaeology and Gender" that took place at Granada in 2003 (Sánchez-Romero 2005). Inspired by the Wedge conference procedure, and its influential *Engendering Archaeology*, this occasion also saw various archaeologists discuss their ways of understanding and practicing feminist and gender archaeology in front of the student body of the university. Soon after, thematic seminars on specific questions, such as "maintenance activities" (see below), held in Barcelona in 2005 and 2007 (Montón-Subías and Sánchez Romero 2008), began to be organized. In 2006, the Museum of Prehistory in Valencia organized the first museum exhibition of women in prehistory (Soler 2006). Originally designed with a provincial character, it soon aroused the interest of other Spanish museums and institutions, generating debates, courses, and circuits of academic dissemination where it was exhibited. In recent years the administrations in charge of some archaeological sites have expressed interest on gender and feminist debates by organizing courses and seminars such as *Women, genders and archaeology*, organized by World Heritage *Dólmenes de Antequera* in 2015, or *Gender and Maintenance Activities*, organized by the Roman site of Camp de les Lloses in 2017. Also in the past few years, queer stances have flourished within Iberian archaeology, thanks to events such as the *XVIII Meeting of Young Researchers in Archaeology* celebrated in 2017 in Vitoria (Basque Country) and devoted to queer and "transfeminist" studies or the exhibition *TRANS**, held in the same year in the Museum of America, Madrid, on the diversity of gender roles and identities within the American continent.

Key Issues/Current Debates

In over 30 years of research on gender and feminist archaeology in Spain, works on diverse themes have been published. Drawing on the critique of androcentrism, concerns similar to those demonstrated first in the pioneering countries have prospered. Thus, we have publications on the work and contributions of women in the past; on the labor situation of female archaeologists; on the sexist of archaeological discourse and language, verbal and nonverbal; on new ways of presenting the past and reflections on fundamental concepts, like those of space, time, and identity; and on new categories of historic analysis (a more detailed examination of those works can be seen in Díaz-Andreu and Montón-Subías 2012). Some of these concerns have been brought together around two specific lines of inquiry that Spanish archaeologists have and are contributing to the global scene:

maintenance activities and the sociohistorical construction of gendered personhood and self-identity (see also Montón Subías and Lozano 2012).

The maintenance activities approach was raised at the beginning of the 1990s by a group of researchers at *Universitat Autònoma de Barcelona* and within the emphasis given by a feminism of Marxist inspiration to the analysis of women's work and material conditions. The proposal was initially aimed at investigating a specific sphere of social production and reproduction, a sphere that had been forgotten in traditional master narratives (including those of Marxism). Soon other researchers joined their efforts. They shared with them concern and dissatisfaction of the sexist biases affecting the practice of archaeology and the motivation to join new categories of analysis to evaluate the practices and experiences of women. Inevitably, many of these contributions, although not all, exceeded the original theoretical framework, adding and/or combining concerns stemming from feminist theories different to the Marxist ones. Currently, this approach continues to be enriched by the contributions of different researchers within and outside of Spain (see, e.g., Montón-Subías and Sánchez-Romero 2008).

The concept of maintenance activities embraces under a single expression all basic activities necessary to create, regulate, stabilize, sustain, and reproduce (in the short, medium, and long term) society's lifeways. Related to the management of everyday life and the well-being of all of its members, they include, grosso modo, caregiving, cooking and food processing, basic textiles, hygiene and public health, the socialization of children, and the fitting out and organization of residential space. Specialized in maintaining the group's social connections and bonds, they are part and parcel of the relational framework in which they take part and which they create. Although chrono-geographically variable in its cultural forms, what remains stable is the structural function to which the term refers to (González Marcén et al. 2008: 4). With slight variations, the study of the previous tasks, in their possible conjugations, is what often appears in the analyses of maintenance activities (see Montón-Subías and Lozano 2012, and Sanahuja 2002: 172–189 for a review of the Marxist perspective).

The approach emphasizes, therefore, the structural character of these activities, whose ultimate function is to guarantee the reiteration and recurrence of the group's activities and/or to channel any changes in the latter into new reiteration and recurrence patterns or, in other words, into new ways of everyday life management (for a wider discussion, see González Marcén et al. 2008). Because of this, it has been unveiled as a tool with great potential to evaluate social dynamics over vast lapses of time and periods considered as transitions (see, for instance, section "Historical Background" in Montón-Subías and Sánchez-Romero 2008). Analyzing daily life in the long run, their forms of permanence and change, allows us to better understand the articulation of the different variables – also those considered macro – that integrate the social fabric, as well as their changes and modifications.

In this already established approach, one of the most recurrent debates has referred to the nature of the association between women and these practices. Do these perspectives homogenize the experience of women and confine them to this unique field of action (Picazo 1997: 60; González Marcén et al. 2008: 3; Lozano 2011: 31)? It is true that the proposal was initially partly aimed at interpreting the experiences and practices of women in an alternative way and that, therefore, there was an implicit link between maintenance activities and practices carried out by women. But already in the initial contributions, it was stressed that their dismissal by mainstream archaeology was due to their association with the female sphere in modern times. Subsequently, their relational character and their recurrent rhythm, in direct opposition to change, individuality, and power -the values highlighted by history, which is the discourse created to legitimate modernity (Hernando 2012)- were added as main reasons in their concealment. In any case, many different works have insisted that the association between women and maintenance activities has a historical genealogy, that women are also found in other realms, and that in

the origins of humankind the whole group would have been involved in their practice.

Indeed, subscribing the perspective of maintenance activities and suggesting that an important part of the times and roles of many women has been overlooked do not mean defending that maintenance activities represent the whole set of (potential) activities carried out by women (in fact some of the professionals that work on maintenance activities also investigate the presence of women in other spheres of action, traditionally assigned to men [Sánchez-Romero and Moreno Onorato 2005]). It does, of course, mean understanding this sphere of action in its singularity and articulating it with the rest of the social, economic, political, and ideological variables that orchestrate the course of life for human societies.

The feminist politics in this line of inquiry is underpinned by reflection on the values that should be integrated in the writing of history and how they might help in building a new form of public rationality. With the inspiration of authors grouped around the "ethics of care," like Nancy Chodorov or Carol Gilligan, unorthodox Marxist authors like Anna Jónasdóttir, and others linked to the feminism of difference connected to the Milan Women's Bookstore Collective such as Luisa Muraro and Adriana Cavarero, emphasis is placed on the value of relationality and interdependence. This endeavor is shared with another of the most original contributions of feminist archaeology in Spain: that which analyzes the historical reasons for gender inequality in the Western world starting from the study of the mechanisms through which we construct self-identity.

This line of investigation, which arose in Madrid in the late 1990s, started from a different point than the majority of feminist studies. It did not initially focus on women, but rather on the way that human beings construct their identity (Hernando et al. 2011; Hernando 2012). On the basis of her own previous ethnoarchaeological work in oral societies and drawing from studies in psychology, sociology, philosophy, and anthropology that had already examined the differences between relational and individualized identity, Hernando suggested that individuality and relationality constitute "packages" of characteristics that are combined in complex and dynamic ways within one single person, depending on their position of power or control in the social group. The author analyzed the genealogy of contemporary gender identities in the Western world, concluding that, initially, all men and women in human societies would have had relational identities (similar, in structural terms, to those that characterize contemporary hunter-gatherers).

This means, according to Hernando, that the so-called feminine identity would not be but the "relational identity" typical of both men and women in the beginnings of humankind, which allows her to escape from essentialisms linked to sex. In accordance with this perspective, men would have been slowly and gradually developing individuality, while women would have maintained the relational identity until modern times. Since then women would have also developed characteristics of individuality, but by virtue of their different historical trajectories, there would be a difference between the current individuality of men and women. Obviously, this line of work was aimed at analyzing the reasons of this differentiation or, in other words, the genesis of the patriarchal order. To this end, Hernando accepted that the extreme fragility of the *Homo* offspring played an important role in the differentiation of identity trajectories between males and females, although unlike other approaches, she did not argue that the central tenet of this differentiation was due to biological factors, but rather to cultural factors related to differential mobility between men and women. Caring for the highly dependent human offspring would have implied travelling shorter distances or less mobility for women than for men. This fact would have been critical in hunter-gatherer societies, considering the vital importance that oral societies place on the spatial dimension in the construction of the world (Hernando et al. 2011). These initial subtle differences in mobility did not establish power relationships between the sexes, but could have constituted the base for a progressive increase of masculine individuality and, with this, the subsequent appearance of the patriarchal order.

International Perspectives

Feminist archaeology in Spain has always shown great interest in knowing debates generated abroad. This openness has led researchers to integrate similar concerns from other countries and to develop strategies to internationalize their own reflections. Out of this, exchanges and collaborations have followed, which make this field one of the most dynamic and international in Spain. These external influences were first expressed through the weight that the "Women the gatherer" movement of US anthropology in the 1970s had in the interest in issues related to the origins of humankind (Querol 2001; Sanahuja 2002). Some years later, in the RAT of 1992, the title "¿Somos todas hombres?" (Are we all men?) was selected to present a paper about sexism in the practice of contemporary Spanish archaeology. It was the recognition paid by a group of Spanish female archaeologists to the first workshop on the subject, *Were they all men,* held in Norway in 1979. Equally decisive was the arrival of *Engendering Archaeology*, published by Meg Conkey and Joan Gero in 1991, that would inspire many later works on feminist and gender archaeology in Spain (see also Cruz Berrocal 2009: 124).

Spanish feminist and gender archaeologies have repaid this initial input bringing to the global scene more examples of how sexist and androcentric values have inappropriately influenced archaeological practice and archaeological knowledge and alternative or new interpretations of an archaeological record that, as a consequence, begins to be much more renowned internationally. The Iberian Iron Age is an outstanding example (Prados and Izquierdo 2006; García-Luque and Rísquez 2008). It has also contributed new analytical categories or perspectives, such as the ones reviewed in the previous section.

This spirit of internationalizing Spanish production has resulted in diverse forums. There have been international conferences in Spain, such as seminars on maintenance activities in Barcelona, which have brought together peninsular and abroad archaeologists to reflect on concrete aspects of the approach (Montón-Subías and Sánchez-Romero 2008). In the same vein, conferences abroad have been attended, including the organization of sessions in the annual editions of the EAA (European Association of Archaeologists) and the SAA (Society for American Archaeology). And publications on platforms of international scope have also appeared (e.g., Cruz Berrocal 2009; Montón-Subías 2010; Lozano 2011; Hernando et al. 2011; Moral 2016a), however mostly in English (in January 2018 only 8 of the 101 journals listed for archaeology in the Thomson Reuters Arts and Humanities citation index were in Spanish). It is important to value the extra effort that this fact implies and the situation of double (or triple, or quadruple) demand faced by many of these archaeologists: on the one hand, to find a way in a national and international academia dominated by androcentric power structures, and on the other hand, to do it in an international academia of Anglo-American hegemony, much more receptive to the empirical cases proposed by Spaniards than the theoretical approaches generated in our language. In fact, by the works cited in the English-speaking world, one could reach the misleading conclusion that there are very few theoretical contributions outside of its own linguistic area.

Furthermore, forums of debate to bring together Spanish-speaking feminist archaeologists from both sides of the Atlantic have also been created. For example, the interest in exploring the relationship between feminism and historical materialism has joined Spanish archaeologists with representatives of the Latin American Social Archaeology (see, e.g., Vargas 2004). A recent example of another Ibero-American (or Americo-Iberian) collaboration is the book *Museos Arqueológicos y Género. Educando en Igualdad* (Prados and López 2017), a compilation of essays written by scholars from Ecuador, Mexico, and Spain that aims to expose the way in which archaeological museums can and must transmit an inclusive history in order to contribute to an education in gender equality. The promotion of multilateral, international contacts is also behind the presence of several Spanish archaeologists in the creation and functioning of AGE, the Archaeology and Gender in Europe working party of the European Association of Archaeologists (http://www.archaeology-gender-europe.org/), a network designed to bring scholars of different

nationalities and academic traditions together in order to develop and exchange information on gender in archaeology in its many dimensions (Dommasnes and Montón-Subías 2012). This internationalist vocation has been in part supported by the Spanish research policy conducted after the Francoist dictatorship in relation to the concession of research fellowships for research residencies in foreign research centers (Díaz-Andreu and Montón Subías 2012). Thanks to these visits, for example, the first news of the influential *Were they all men* and *Engendering Archaeology* reached Spain.

Future Directions

The strength and importance that research on feminist and gender studies holds in Spanish archaeology is established. This said, it should be also clarified that there are obstacles and challenges, both internal and external, for this research. The explicit involvement or the affinity of many of these researchers with feminism and the resulting critique of academic androcentrism, often experienced in first person, cause doubt, reticence, hostility, and rejection in one part of the academic establishment. Without doubt, the progressive popularization of the issue has diminished public critiques, as they would be perceived as politically incorrect. However, from less visible platforms, such as, among others, anonymous decision-making panels, a veiled discrimination may act against research and candidacies related to the investigations of gender; a form of discrimination that is not only more difficult to identify but also more difficult to challenge.

Furthermore, the very dynamic nature and development of this research raises questions that demand greater attention and confront challenges of a different character depending on whether or not the research has a political involvement. A first necessary challenge would be to explicitly clarify the differences and affiliations among feminist archaeologies, archaeologies of gender, and women's archaeologies to avoid conceptual ambiguities. In fact, conceptual ambiguity has begun to happen already within archaeologies of gender. Since the popularization of the issue in the 1990s, some authors have just "targeted" gender, but ignored or rejected its original critical theoretical framework. In these works, gender is no longer a concept but instead a term with which to designate women and, to a lesser extent, also men. By incorporating gender as only a word, one can continue writing about men and women in a conceptual framework that perpetuates stereotypes and gender roles characteristic of the traditional imaginary and from the same androcentric positions confronted initially by feminist and gender archaeologies. Although the original desire of those who devote themselves to gender archaeology from a feminist position was and is to transform the *mainstream*, the opposite effect has oftentimes resulted from "less politicized" approaches. In these cases, the mainstream has transformed gender archaeology, blurring its feminist critique. Still, it should remain clear that in Spain, currently, the majority of the works on gender are elaborated from engagement with feminism.

As in other countries, also here feminist and gender research has mainly been identified with that of women. Indeed, women were the first who drew from their gender stereotypes and expressed the need to find themselves in another way in written history. This being acknowledged, it is however now important to associate feminist and gender archaeologies not only with women, especially when this fact particularizes their study and prevents the understanding of the social and power dynamics of which they are part. While it is important, for example, to continue writing historiographies about female archaeologists, it is even more vital to incorporate women in the general historiography of the discipline. Precisely, to move in this dual field, which is not incompatible, constitutes one of the most important challenges that feminist archaeologies face.

On the other hand, questioning the "hegemonic gender system" from which history has been written also means understanding that men of the past have been constructed following the dominant contemporary model of masculinity, a model which has assigned them a particular way of being and behaving, associated with success, individuality, change, power, heterosexuality, aggression, and violence. But, above all, it means

understanding that the very writing of history has been associated with these values, and oversized activities, such as war, related with them. Despite the fact that in 1998 Thomas Dowson published an article in the 14th edition of the Catalan journal *Cota Zero* calling for queer archaeology (see ▶ "Engendered Archaeologies," this volume) and that the construction of masculinity has become a growing concern in other fields of the social sciences in Spain, this issue has not yet had major impact in the archaeology of our country. For the last years, however, prevailing assumptions related to the hegemonic model of masculinity have begun to be questioned to critically reevaluate the supposedly structural character of warfare and warriors in the Argaric Bronze Age of Southeast Iberia (Aranda et al. 2009). Likewise, some archaeologists have recently adopted queer stances to contest gender and sexual categories in their research, deeply influenced by the Spanish "transfeminist" movement (see Higuero 2015; Moral 2016a, b).

As occurs in other countries, feminist archaeologists in Spain also should reflect more upon the implementation and the implications of their political involvement in archaeological practice. Building a new disciplinary culture should imply awareness and change of the different forms that patriarchal power structures adopt (in field work, in the teaching of the discipline, in PhD supervision, in academic management, or, among others, in the nature of the links with nonprofessional communities interested in archaeology (on this last aspect, see Gonzalez Marcén 2005). Otherwise, we run the risk of modifying archaeological discourse – the most visible front – but perpetuating an androcentric structure through the gears of its production.

Cross-References

- ▶ Engendered Archaeologies
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: European Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective

References

Aranda, G., S. Montón-Subías, and S. Jiménez-Brobeil. 2009. Conflicting evidence? Weapons and skeletons in the Bronze Age of south-east Iberia. *Antiquity* 83 (322): 1038–1051.

Colomer, L., S. Gili, P. González Marcén, S. Montón Subías, M. Picazo, C. Rihuete, M. Ruiz, M.E. Sanahuja, and M. Tenas. 1993. Género y Arqueología: las mujeres en la prehistoria. *Arqcrística* 6: 5–7.

Colomer, L., P. González Marcén, S. Montón Subías, and M. Picazo. 1999. Arqueología y teoría feminista. In *Estudios sobre mujeres y cultura material en arqueología*. Icaria: Barcelona.

Cruz Berrocal, M. 2009. Feminismo, teoría y práctica de una arqueología científica. *Trabajos de Prehistoria* 66 (2): 25–43.

Díaz-Andreu, M., and S. Montón-Subías. 2012. Gender and feminism in the prehistoric archaeology of Southwest Europe. In *A companion to gender prehistory*, ed. D. Bolger, 438–457. Malden: Wiley-Blackwell.

Dommasnes, L., and S. Montón-Subías. 2012. European gender archaeologies in historical perspective. *Journal of European Archaeology* 15 (3): 367–391.

García-Luque, A., and C. Rísquez. 2008. Maintenance activities in the funerary record. The case of Iberian cemeteries. In *Engendering social dynamics: The archaeology of maintenance activities*, BAR international series, ed. S. Montón-Subías and M. Sánchez-Romero, vol. 1862, 49–56. Oxford: Archaeopress.

González Marcén, P. 2005. Redes de complicidades y objetos vividos. In *Arqueología y Género*, ed. M. Sánchez Romero, 491–499. Granada: Universidad de Granada.

González Marcén, P., S. Montón-Subías, and M. Picazo. 2008. Towards an archaeology of maintenance activities. In *Engendering social dynamics: the archaeology of maintenance activities*, BAR international series, ed. S. Montón-Subías and M. Sánchez-Romero, vol. 1862, 3–8. Oxford: Archaeopress.

Hernando, A. 2012. *La fantasía de la individualidad. Sobre la construcción sociohistórica del sujeto moderno*. Madrid: Katz. (English translation (2017) *The Fantasy of Individuality. On the Sociohistorical Construction of the Modern Subject*. New York: Springer).

Hernando, A., G. Politis, A. González Ruibal, and E. Beserra Coelho. 2011. Gender, power and mobility among the Awá-Guajá (Maranhão, Brasil). *Journal of Anthropological Research* 67 (2): 189–211.

Higuero, A. 2015. Sesgos de género en la interpretación de los restos óseos humanos. *Journal of Feminist, Gender and Women Studies* 2: 49–55.

Lozano, S. 2011. Gender thinking in the making: Feminist epistemology and gender archaeology. *Norwegian Archaeological Review* 44 (1): 21–39.

Montón-Subías, S. 2010. Black swans and archaeological interpretation. *Norwegian Archaeological Review* 43 (1): 1–11.

Montón-Subías, S., and S. Lozano. 2012. La arqueología feminista en la normatividad académica. *Complutum* 23 (2): 163–176.
Montón-Subías, S., and M. Sánchez-Romero. 2008. Engendering social dynamics: The archaeology of maintenance activities. In *BAR international series 1862*. Oxford: Archaeopress.
Moral, E. 2016a. Qu(e)erying sex and gender in archaeology: A critique of the "third" and other sexual categories. *Journal of Archaeological Method and Theory* 23: 788–809.
Moral, E. 2016b. Heterotopías en conflicto. Sexualidad, colonialismo y cultura material en las Islas Marianas durante el siglo XVII. In *Entre ciência e cultura: Da interdisciplinaridade à transversalidade da arqueología (Actas das VIII Jornadas de Jovens em Investigação Arqueológica)*, ed. I. Pinto Coelho, J. Bento Torres, L. Serrão, and T. Ramos, 229–232. Lisboa: CHAM, IEM.
Picazo, M. 1997. Heart and home: The timing of maintenance activities. In *Invisible people and processes*, ed. J. Moore and E. Scott, 59–67. London/New York: Leicester University Press.
Prados, L., and I. Izquierdo. 2006. The image of women in Iberian culture (6th-1st century B.C.). In *Proceedings of the XVIth international congress of classical archaeology (Boston)/Associazione Internazionale di Archeologia Classicca*, ed. C. Mattusch, A. Donohue, and A. Brauer, 490–495. Oxford: Oxbow.
Prados, L., and C. López. 2017. Museos arqueológicos y género. In *Educando en igualdad*. Madrid: Universidad Autónoma de Madrid.
Querol, M.A. 2001. *Adán y Darwin*. Madrid: Síntesis.
Sanahuja, M.E. 2002. *Cuerpos sexuados, objetos y prehistoria*. Madrid: Cátedra.
Sanahuja, M.E., and M. Picazo. 1989. Los estudios de las mujeres a lo largo de la Prehistoria y en la Antigüedad griega: estado de la cuestión. *Arqueocrítica* 1: 32–37.
Sánchez Romero, M. 2005. *Arqueología y Género*. Granada: Universidad de Granada.
Sánchez Romero, M., and A. Moreno Onorato. 2005. Mujeres y metalurgia: el caso de Peñalosa (Baños de la Encina, Jaén). In *Arqueología y género. Monografías de Arte y Arqueología*, ed. M. Sánchez Romero, 261–281. Granada: Universidad de Granada.
Soler, B. 2006. *Les dones en la prehistòria*. Valencia: Museu de Prehistòria.
Vargas, I. 2004. Hacia una teoría feminista en arqueología. *Otras Miradas* 4 (002): 62–75.
Vicent, J. 1994. Perspectivas de la teoría arqueológica en España. In *Sexto Coloquio Hispano-ruso de Historia*, 215–222. Madrid: Fundación Cultural Banesto.
Vila Mitjà, A., J. Estévez, F. Lugli, and J. Grau. 2017. *La reproducción en la Prehistoria*. Madrid: CSIC & La Catarata.
Zarzalejos, M. 2008. Los estudios de arqueología del género en la Hispania Romana. In *Arqueología del Género. 1er Encuentro Internacional en la UAM*, ed. L. Prados and C. Ruiz, 297–326. Madrid: Universidad Autónoma de Madrid.

Gender, Feminist, and Queer Archaeologies: Australian Perspective

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Introduction

Gender, feminist, and queer archaeologies in Australia, as elsewhere around the world, are represented by a multiplicity of approaches and individual experiences. The progress of their development can, however, be traced to the emergence and influence of feminism and the women's movement. They are linked by a concern with examining the social construction of gender and its representations, ideologies, identities, and other such manifestations in the archaeological record. Uniquely Australian political and institutional settings have also impacted the evolution and outputs of gender, feminist, and queer archaeologies in this country, in combination with theoretical and research progress in these areas of archaeology globally.

Definition

Feminist, gender, and queer archaeologies are commonly associated together as they examine the social construction of gender and their materialization in the archaeological record, but are not mutually exclusive. They have also been grouped together under post-processualist archaeology. Feminist archaeology critiques androcentric interpretative biases and validates the place of women, either as subjects of study or as practitioners in archaeology. It also concerns the need to examine gender roles and inequalities within the archaeological profession and how this impacts on archaeological theory and method. Feminist archaeology also takes a political standpoint and often examines power relations.

Gender archaeology can be differentiated as an approach which foregrounds gender (which is the socially constructed conception of women and men, not biological sex), with other social categories, such as class, age, ethnicity, religion, and kin. It can also be practiced within a nonfeminist framework and may examine the relative positions of men and women in relation to each other and how these manifest archaeologically.

Queer archaeology challenges heteronormative interpretations by seeking to take the perspective of marginalized sexual, intellectual, or cultural groups. It is not concerned only with homosexuality; rather it presents alternatives to mainstream archaeological discourse.

Historical Background

A distinctively Australian archaeology developed in the 1960s and 1970s (see Colley 2002). Prior to this time it was possible to study anthropology and the archaeology of other continents, but it was during this period that Australian archaeology was first taught at Australian universities, and theory and method were modified for Australian conditions. Fieldwork was essential in providing archaeological evidence for environmental and cultural diversity and in growing an understanding of the antiquity of Indigenous occupation as well as increasing the number of recorded sites, including those resulting from post-European contact. Explanations of the human past were framed in terms of environment and technology, and cultural materialism was the dominant theoretical framework (Huchet 1991: 44). A strong processual platform still characterizes Australian archaeology. This backdrop of disciplinary culture is essential in understanding the development of feminist and gender archaeology in Australia as it has been characterized as distinctively male (see Smith and du Cros 1995; Smith and O'Donnell 2006; Moser 2007). Moser observed: "With its connections to colonialism and penetration of the frontier, fieldwork has been instrumental in attributing archaeology a masculine status" (Moser 2007: 251). Thus, a dominant theoretical setting which de-emphasized social archaeology and human agency, combined with a masculinist subculture of fieldwork, left little room for a feminist or gender archaeology to penetrate the mainstream research agenda. Indigenous archaeology had been further complicated by a Western and male bias towards perceived men's activities in complex Indigenous social and knowledge systems, such as hunting and stone artifact manufacture, often laden with assumptions about the meaning and universality of gendered task attribution. Despite this, research on women's and men's roles had been undertaken, but work had not come together under the umbrella of any theoretical or professional association. For example, as early as 1939 Phyllis Kaberry recorded women painting rock art and their roles in economic systems and information exchange in Northern Australia (Kaberry 1939). Women such as Judy Birmingham, Sandra Bowdler, Isabel McBryde, Betty Meehan, and Sharon Sullivan played a critical role in the formation of the discipline in Australia, but gender was not fostered as a legitimate research area until the 1990s.

In Australia the response to a gender and feminist archaeology is distinctive yet follows the path of similar academic traditions in Europe and North America. Although the first feminist and gender archaeology emerged from Scandinavia, Margaret Conkey and Janet Spector's 1984 paper *Archaeology and the Study of Gender* can be credited as the watershed article globally. Being in English it is still widely cited and can be seen as the first influential summary of the feminist critique of the discipline in Australia. Outside Australia feminist archaeology enjoyed an earlier emergence and greater support among the archaeological community. The 1989 Canadian Chacmool Conference, where overtly feminist papers were presented in conference symposia and published in the *The Archaeology of Gender* (1991) monograph, was undoubtedly an influence which led to the first meeting of the Women in Archaeology Conference in Australia in 1991. The attendance of international keynote speakers Margaret Conkey, Joan Gero, and Alison Wylie aided in the perception that gender was a legitimate research area, and their presence assisted in garnering support for an Australian

agenda. Thus, the 1991 Women in Archaeology Conference is highly significant with respect to research on gender in Australia. It was a turning point for gender as a field of study in Australian archaeology. It reflected both a broader change in Australian society about gender roles, national identity, and workplace rights and a change in the research directions for archaeology. This conference triggered formal discussions of gender and feminist archaeology and legitimized research interests and groups, generating five subsequent conferences and three published monographs (see du Cros and Smith 1993; Balme and Beck 1995; Casey et al. 1998). Much later in 1998, the first session on gender was held at an annual conference of the Australian Archaeological Association.

Key Issues

The key issues and influences to have emerged in Australia can be seen to pertain to two main areas of research. First there are issues of professional identity, equity, status, and the employment of women in Australian archaeology which are linked to personal and political motivations. Second there are issues relating to the establishment and recognition of gender in the archaeological record and, further to this (but to a lesser extent), the development of distinctive Australian feminist theory and interpretation. Queer archaeology has had the least impact of the three standpoints in Australia in terms of publication and influence.

Of the small number of published articles on gender or with a feminist perspective in Australia, the majority are thematically on women's status as archaeologists, not gender, queer, or feminist theory, or on women as subjects of archaeological enquiry (e.g., Bowdler and Clune 2000; Smith and Burke 2006; O'Connor 2008). As such, it is difficult to distinguish the influence of gender archaeology from that of the broader impacts of the women's movement. However, it can be surmised that women may have felt marginalized or a sense of inequity in the archaeological workforce or perhaps experienced personal discrimination. This is likely to have been the initial impetus for research and publication directed into this area, as has been the case internationally (see Nelson et al. 1994). It is also an indication of the nature of the archaeological workforce in Australia where there has been some degree of segregation; most women archaeologists have worked in consulting and cultural heritage management (CHM) and few in senior research or academic positions (with women clustering in lower paid and lower status positions). This is echoed in a study undertaken by du Cros and Smith (1995), who found that it was workplace issues, such as inequity or discrimination, rather than a theoretical standpoint or familiarity with feminist literature, that prompted most participants to attend the first Women in Archaeology Conference in 1991. As recently as 2007 Stephanie Moser has argued for the existence of a hegemonic (heterosexual) masculinity in the discipline in Australia, perpetuated through the subculture of fieldwork. In a 2006 study Smith and Burke found that there were systemic barriers to women's progress in academic archaeology. They found that there was what they term a "two-tiered glass ceiling" where women are less likely to gain entry level and tenured positions into academic archaeology. Of those who have obtained tenure at universities, they were underrepresented in senior positions. Bowman and Ulm (2009) have investigated the disparity between men and women's success in obtaining project funding. Their analysis of 2001–2008 Australian Research Council (ARC) grants found a link between the sex of the funding panel members and the sex of the successful applicants. They also found that more men receive fellowships than women, despite more women undertaking research. This means that women are disadvantaged as early career researchers in Australia; the majority of research is undertaken by women, but the majority of funding is going to the minority, who are men. Though overt discrimination has diminished in recent years and women have made up the majority of the paid archaeological workforce in Australia, they are still not breaking through the proverbial glass ceiling.

In terms of perspectives on homophobia, there is silence on the issue in Australian publications – not because the problem does not exist but, as

writers such as Dowson (2000) have pointed out, because there has perhaps been a need for professionals to downplay their sexuality to maintain authority and/or shield themselves from discrimination. Australia has a history of repression of homosexuality in society largely until the 1990s. Postmodern feminist theory since that time has influenced theories and gender research on sexuality, as well as masculinity in archaeology. A postmodern approach to researching historic masculinity/ies was advocated by Knapp (though not an Australian archaeologist) at the 1995 Australian Women in Archaeology Conference, and archaeologists such as Casella (2000) have demonstrated the validity of interpreting female homosexuality on Australian historic sites. A heterosexual hegemony, however, remains unchallenged in the archaeology of Australia's Indigenous past. This is because Australian archaeologists rely heavily on ethnographic information to complement interpretations of Indigenous archaeologies. Indigenous Australian social and kinship systems operate in terms of male–female relationships, and traditionally homosexuality is a "taboo" topic, presumed not to exist or remaining unquestionable in many communities, as well as the added dimension of men's business/women's business and sacred-secret knowledge (whereby particular customs, rituals, and practices are undertaken by men and women separately [see Smith and Jackson 2005]). Men and women have separate systems of meaning, and these can also be public or private. This is further complicated as Australian archaeology has largely not come to grips with the notion of sex and gender as spectrums rather than as binary male/female dichotomies. Queer archaeology can potentially fill a gap in analyses and be applied to a range of sites by potentially asking new questions (not only in terms of homosexuality), which may in fact be complementary to Indigenous perspectives, and encouraging archaeologists to think "outside the box" of Western and male perspectives.

Dominant models and narratives of Indigenous occupation have failed to move beyond male – female dichotomies. In 1990 Wendy Beck and Lesley Head pointed to the lack of Australian prehistorians moving beyond simplistic male and female assignment of gender to material culture, for example, continuing to identify stone artifacts with males and shell middens or seed grinding stones with women, rather than challenging the idea that a prehistoric division of labor existed. They state, "...there has been little systematic feminist influence on either theory or methodology in Australian prehistory" (Beck and Head 1990: 41). Given the minimal output of work in the area of gender prehistory to date in Australia, it is apparent that there is still a reluctance to move beyond evidence derived via natural sciences and "safe" interpretations of hunter – gatherer societies and male – female dichotomies based on ethnography. There has been some work directed towards reexamination in the areas of stone artifact use, manufacture, and hunting, whereby women making stone artifacts are often dismissed as exceptions. The groundbreaking article in this respect was by Bird (1993), who evidences women's manufacture and use of stone artifacts across Australia and New Guinea. For example, in the western desert of Australia, women used stone artifacts for woodworking and meat cutting, including the manufacture of bowls, digging sticks, fighting sticks, and flake scrapers. As well as differences in use, the raw materials selected also differed from those selected by men. Bird demonstrated that women could and did make stone artifacts; men's and women's technology is organized differently, but it should not be presumed that women were less skilled at manufacture than men. This area of research exemplifies much of the work on gender in Australian archaeology. It still focuses on making women "visible"; to date the majority of analyses have been concerned with establishing the mere presence and contribution of women. It is also important to note that publication in this area has decreased since the 1990s.

Rock art is an area where some contribution has been made to the consideration of gender as archaeologically significant. Rock art is found in all environmental zones of the continent, with examples of Pleistocene antiquity, although most sites are dated to the Holocene. Early ethnographic research had assumed that only men were responsible for its production. This was

disputed by Smith (1991), who collated a number of ethnographic and archival examples from regions of Northern Australia. She contended that gender was a variable that needed to be factored into rock art interpretation; that rock art may have been produced by men, women, and children; and that it may encode information on the age and gender of the artist. Likewise, McDonald (1992) systematically challenged the androcentric interpretation in several papers, while providing evidence that men, women, and children had a role in the stencilling of hands and implements in an analysis of rock art and excavated material. Such studies have permeated the study of rock art and led to a recognition of both genders in art production. Despite ethnographic records which indicate men are responsible for most rock art in recent generations, the contexts of production over thousands of years are most likely to have been much more diverse.

Several studies have sought to reassess the interpretation and assumptions made in terms of sex and gender of human remains held in museum collections. Donlon (1993) found that in the sexing of human remains held in the Australian Museum, there was systematic bias in the attribution towards males, particularly those from the Pleistocene and early mid-Holocene. This may be explained by differences in male and female burial practices or simply the bias of researchers. Hope (1998) also found bias in interpretations of Indigenous burials in Southern Australia. In a similar fashion, McCardle (2002) found that Indigenous bark burials of the Central Queensland Highlands included both sexes and all age groups, which contradicted prior researchers who had assumed these types of burial were only for young men and children.

Historical archaeology was first taught in Australia in 1974 at the University of Sydney, and Judy Birmingham is accredited with being instrumental in its development. With its links by way of British colonialism and European invasion of an Indigenous population, Australian historical archaeology is similar to that practiced in the United States. Although potentially able to provide more detailed social perspectives as aided by text, pictorial, and other evidence, gender is often left to a few sentences together with ethnicity and class and, like Indigenous archaeology, is practiced with a processual focus. As discussed by Lydon (1995), the influential Birmingham and Jeans (1983) model had less to say about social structures than economic and technological ones and was highly androcentric. Though historical archaeology has progressed since the Birmingham and Jeans model, the main focus in the areas of gender to date has been the construction of gentility (Russell 1994; Young 1998), the status of women (Hourani 1990), identifying women in male dominated spheres such as mining, whaling, and frontiers (Lawrence and Davies 2010), and more general issues of cultural identity (Lydon 1999; Ireland 2002). In maritime archaeology, which has undergone significant growth in Australia over the past two decades, there has also been a technological focus, but some work has been directed into the nuances of social relationships (Staniforth and Lawrence 1998). While the complex nature of the relationships between such phenomena as social organization and spatial organization has been recognized and addressed theoretically and despite papers which identify women in the archaeological record, there has been no substantial development of a particularly Australian feminist framework. The significant body of feminist theory developed from the United States has established a context for historical (and Indigenous) archaeology into which gender and feminist theories can be integrated. A reluctance to include such theoretical perspectives is perhaps a reflection of the passive opposition to gender and feminist archaeology in Australia. In a similar sense, a shunning of a feminist "heritage" and theory, in favor of a post-processual narrative, or a mere change to gender neutral language, can be interpreted either as taking a "safer" option or as an attempt at some degree of political correctness.

International Perspectives

One of the major research questions for archaeologists working in Australia is the timing and means by which Sahul (and hence the continent

of Australia) was first colonized by humans and the origins of those humans. Theories on colonization in this region are distinctive, following the argument put forth by Davidson and Noble (1992) that the maritime colonization of Australia must have been linked to people with language and therefore probably constitutes some of the earliest evidence of modern human behavior. Research of this nature thus continues to generate interest and contribute to debates of international significance. There is consensus that the first colonization was by anatomically modern humans and is central to understanding human evolution. Balme and Bowdler (2006) have put forth an argument for the role of gender in the colonization of Australia. While the binary assumptions and universalizing regarding gender that serve as the basis of their arguments are likely to be flawed, Balme and Bowdler nevertheless raise important considerations about the role of gender in such processes as colonizing new lands, an area where discussions on gender or women as active participants in this process is traditionally absent.

An internationally significant study also undertaken in Australia is that by Casella (2000) (although not an Australian archaeologist herself). Gender, sexuality, and power were strong emergent themes in her analysis of networks of black market exchange throughout the inmate population at the Ross Female Factory, a nineteenth-century Australian colonial prison for transported British female convicts in Tasmania. She concluded that both material objects and sexual encounters fuelled systems of illicit barter by relating the differential distribution patterns within the button assemblage to sexual dynamics of the convict black market. Asking and testing whether same-sex relationships can be archaeologically interpreted has highlighted the validity of asking such questions in these environments and demonstrated how a rigorous and gendered archaeology can be produced.

Future Directions

Despite efforts to construct and include gender theory in Australian archaeology, few methodological or theoretical breakthroughs have occurred in any mainstream sense. This lack of progress is due to several factors, including the issue that fundamental terms such as gender, sex, and queer have been used inconsistently and are often used interchangeably, which indicates a negligence in theoretical understanding or interest. This has also led to a misconception that all studies in these areas are concerned with the conflation of the status of women. The notion that gender is invisible archaeologically also persists – especially in relation to Indigenous women and the archaeology of deep time. Such archaeology is largely thought only to be accessible through perishable, organic ("gatherers") material remains or other invisible social processes. There is also, perhaps, a reluctance to consider gender in isolation from other social categories, such as ethnicity, particularly in historical and maritime archaeology. Despite some of the aforementioned work and given the distancing of much of gender archaeology from feminism, the discipline in Australia is *still* in the process of "adding women" (proving their existence) and thus has only achieved what Engelstad (2007) refers to as simply a "cosmetic change" to our interpretations of past societies. In this sense distancing gender from the political, and from theorizing, even within the gender archaeology "camp" may have contributed to the decline in inclusion and relevance in publications over the last decade in Australia.

To clearly delineate a future trajectory for such archaeologies, it is necessary to acknowledge that gender, queer, and feminist archaeologies do have a history and a "tradition" in Australia. Though this may be short and small, an agreed "version" of events, a recognition of an Australian discourse, may in fact prompt archaeologists into generating further discussion or regain the traction that was lost at the end of the 1990s. What is needed is an acknowledgement of those who worked so hard in these areas in the past and new ways to inspire the younger generations of conservative Australian archaeologists to recognize that there is still much more work to be done. These issues could be addressed in future by the creation of new communities as occurred through conferences in the past. The inclusion of the

theoretical aspects of gender, queer, and feminist archaeologies in teaching at undergraduate level at universities within mainstream archaeology, as was done in the 1990s, would also provide opportunities for greater understanding and debate. Following Bowman and Ulm (2009) it can also be asserted that individuals lack the capacity and/or funding to undertake directed research or publish on gender archaeology, as this is an area that has seen a decline in interest and attracts fewer funding opportunities. This is a problem not easily addressed, and not one confined to this discipline.

Australian archaeology has moved forward in developing some aspects of feminist archaeology, such as equity in employment opportunities, and removing overt discrimination. Despite its promising development, particularly in the 1990s, the future of an archaeology of gender (and especially of feminist archaeology) in Australia is uncertain. Given the recent focus on job and fieldwork training, the emphasis on "testable" data, combined with the general apathy towards feminism, and a major focus on CHM employment particularly in areas where mining is being undertaken, most archaeologists in Australia will never work in a university or pursue a higher degree. With a small pool of academics as compared to other countries, the percentage of the archaeological population who could focus on gender is small compared to the proportion who will earn a living from never having to do it. The question must be asked, does feminist, gender, and queer archaeology have a future in Australia at all?

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Post-Processualism, Development of
- ▶ Social Archaeology

References

Balme, J., and W. Beck, eds. 1995. *Gendered archaeology. The second Australian Women in Archaeology Conference*. Canberra: Archaeology and Natural History Publications, Australian National University Press.

Balme, J., and S. Bowdler. 2006. Spear and digging stick: The origin of gender and its implication for the colonization of new continents. *Journal of Social Archaeology* 6: 379–401.

Beck, W., and L. Head. 1990. Women in Australian prehistory. *Australian Feminist Studies* 11: 29–42.

Bird, C.F.M. 1993. Woman the toolmaker: Evidence for women's use and manufacture of flaked stone tools in Australia and New Guinea. In *Women in archaeology: A feminist critique*, Occasional Papers in Prehistory, ed. H. du Cros and L. Smith, vol. 23, 22–30. Canberra: Australian National University Press.

Birmingham, J., and D. Jeans. 1983. The Swiss family Robinson and the archaeology of colonisations. *Australian Journal of Historical Archaeology* 1: 13–14.

Bowdler, S., and G. Clune. 2000. That shadowy band: The role of women in the development of Australian archaeology. *Australian Archaeology* 50: 27–35.

Bowman, J., and S. Ulm. 2009. Grants, gender and glass ceilings? An analysis of ARC-funded archaeology projects. *Australian Archaeology* 68: 31–36.

Casella, E. 2000. Doing trade': A sexual economy of nineteenth-century Australian female convict prisons. *World Archaeology* 32 (2): 209–221.

Casey, M., D. Donlon, J. Hope, and S. Wellfare, eds. 1998. *Redefining archaeology: Feminist perspectives*. Canberra: Archaeology & Natural History Publications, RSPAS, Australian National University.

Colley, S. 2002. *Uncovering Australia. Archaeology, Indigenous people and the public*. Crows Nest: Allen and Unwin.

Davidson, I., and W. Noble. 1992. Why the first colonization of the Australian region is the earliest evidence for modern human behaviour. *Archaeology in Oceania* 27: 135–142.

Donlon, D. 1993. Imbalance in the sex ratio in collections of Australian Aboriginal remains. In *Women in archaeology: A feminist critique*, Occasional papers in prehistory, ed. H. du Cros and L. Smith, vol. 23, 98–103. Canberra: Australian National University Press.

Dowson, T.A. 2000. Why queer archaeology? An introduction. *World Archaeology* 32 (2): 161–165.

du Cros, H., and L. Smith, eds. 1993. *Women in archaeology: A feminist critique*, Occasional papers in prehistory. Vol. 23. Canberra: Australian National University.

Engelstad, E. 2007. Much more than gender. *Journal of Archaeological Method and Theory* 14 (3): 217–234.

Hope, J. 1998. Making up stories: Bias in interpretations of Aboriginal burial practices is southern Australia. In *Redefining archaeology: Feminist perspectives*, ed. M. Casey, D. Donlon, J. Hope, and S. Wellfare, 239–245. Canberra: Archaeology and Natural History Publications, Australian National University Press.

Hourani, P. 1990. Spatial organisation and the status of women in nineteenth century Australia. *Australian Journal of Historical Archaeology* 8: 70–77.

G

Huchet, B.M.J. 1991. Theories and Australian prehistory: The last three decades. *Australian Archaeology* 33: 44–51.

Ireland, T. 2002. Giving value to the Australian historic past: Historical archaeology, heritage and nationalism. *Australasian Historical Archaeology* 20: 15–25.

Kaberry, P. 1939. *Aboriginal women: Sacred and profane*. London: Routledge.

Lawrence, S., and P. Davies. 2010. *An archaeology of Australia since 1788*. New York: Springer.

Lydon, J. 1995. Gender in Australian historical archaeology. In *Gendered archaeology. The second Australian Women in Archaeology Conference*, ed. J. Balme and W. Beck, 72–79. Canberra: Archaeology and Natural History Publications, Australian National University Press.

Lydon, J. 1999. *Many inventions: The Chinese in the rocks, Sydney, 1890–1930*. Melbourne: Monash Publications in History.

McCardle, P. 2002. *The Aboriginal bark burial mortuary practice of the Central Queensland Highlands*. Undergraduate Honors dissertation, University of New England, Australia.

McDonald, J. 1992. The Great Mackerel rockshelter excavation: Women in the archaeological record? *Australian Archaeology* 35: 35–50.

Moser, S. 2007. On disciplinary culture: Archaeology as fieldwork and its gendered associations. *Journal of Archaeological Method and Theory* 14: 235–263.

Nelson, M.C., S.M. Nelson, and A. Wylie, eds. 1994. *Equity issues for women in archaeology*, Archaeological Papers of the American Anthropological Association. Vol. 5. Arlington: American Anthropological Association.

O'Connor, S. 2008. Engendering Australian and Southeast Asian prehistory…"beyond epistemological angst". More unconsidered trifles: Papers to celebrate the career of Sandra Bowdler. *Australian Archaeology* 67: 87–94.

Russell, P. 1994. In search of woman's place: an historical survey of gender and space in nineteenth-century Australia. *Australasian Historical Archaeology* 77: 28–32.

Smith, C.E. 1991. Female artists: the unrecognised factor in sacred rock art production. In *Rock art and prehistory: Proceedings of the 1st Australian Rock Art Research Association (AURA) Congress*, ed. P. Bahn and A. Rosenfeld, 45–52. Oxford: Oxbow.

Smith, C.E., and H. Burke. 2006. Glass ceilings, glass parasols and Australian academic archaeology. *Australian Archaeology* 62: 13–25.

Smith, L., and H. du Cros. 1995. Reflections of women in archaeology. In *Gendered archaeology. The second Australian Women in Archaeology Conference*, ed. J. Balme and W. Beck, 7–28. Canberra: Archaeology and Natural History Publications, Australian National University.

Smith, C.E., and G. Jackson. 2005. Living and learning on Aboriginal Lands: Decolonising archaeology in practice. In *Indigenous archaeologies decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 328–351. London/New York: Routledge.

Smith, C.E., and E. O'Donnell. 2006. Gender and the disciplinary culture of Australian archaeology. In *Handbook of gender in archaeology*, ed. S.M. Nelson, 691–732. Lanham: AltaMira.

Staniforth, M., and S. Lawrence, eds. 1998. *The archaeology of whaling in southern Australia and New Zealand*, Australian Institute for Maritime Archaeology, Special Publication 10. Canberra: Australasian Society for Historical Archaeology and the Australian Institute for Maritime Archaeology.

Young, L. 1998. The material construction of gentility: A context for understanding the role of women in early nineteenth-century sites. In *Redefining archaeology: Feminist perspectives*, ed. M. Casey, D. Donlon, J. Hope, and S. Wellfare, 134–137. Canberra: Archaeology & Natural History Publications, RSPAS, Australian National University.

Further Reading

Beck, W., and J. Balme. 1994. Gender in aboriginal archaeology: Recent research. *Australian Archaeology* 39: 39–46.

Conkey, M.W., and J.D. Spector. 1984. Archaeology and the study of gender. *Advances in Archaeological Method and Theory* 7: 1–38.

Davidson, I., and W. Noble. 1992. Why the first colonization of the Australian region is the earliest evidence for modern human behaviour. *Archaeology in Oceania* 27: 135–142.

Hourani, P. 1990. Spatial organisation and the status of women in nineteenth century Australia. *Australian Journal of Historical Archaeology* 8: 70–77.

Gender, Feminist, and Queer Archaeologies: European Perspective

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Introduction

In some European countries, gender archaeology started as early as the 1970s; in others the first gender-related research projects have yet to be created. Thus, there will be considerable differences within Europe regarding the interest in and development of the field, and it seems right to

speak of European gender archaeologies in the plural rather than one monolithic gender archaeology. On the other hand, the interaction between the different approaches, gender, feminist, and queer archaeologies has been so close that treating them separately becomes meaningless.

In this entry, the historical development of European gender archaeologies will be traced in terms of four distinct regions, each defined by common traits in language and academic culture: Scandinavia, the British Isles, the German-language area, and the Mediterranean region. Central and Eastern Europe would be a fifth region. Gender archaeology here is still in an early stage, however, and will only occasionally be referred to. Chronologically, the discussion will be restricted to prehistoric and early medieval archaeology, following regional definitions. A European perspective is understood as archaeology by scholars working in Europe and dealing with the European past. Nevertheless, there will be a bias toward Northern Europe, the region best known to this author. Within North Europe more attention will be paid to Scandinavia and the German-language area than to the United Kingdom and Ireland, simply because Anglophone European gender archaeology has been addressed extensively elsewhere (Gilchrist 1999; Sørensen 2000; Whitehouse 2006). Spanish gender archaeology is addressed in a separate entry in this encyclopedia (▶ Gender, Feminist, and Queer Archaeologies: A Spanish Perspective).

Overviews of European gender archaeology have been presented in two recent papers, by Whitehouse (2006) and by Dommasnes and Montón-Subías (2012). While the first study is organized by categories of evidence and discusses almost exclusively Anglophone research, the second presents a chronological/thematic discussion of four different European regions, referring to literature both in English and local languages.

Definition

"Gender archaeology" is often used as an umbrella term for several related but separate approaches:

Studies of women in the past (women are the subjects of study)
Archaeology that investigates past societies, including gender arrangements, based on feminist theory, critique, and epistemology (defined by its theoretical approach, feminist archaeology)
Analyses of gender and gender relations in past societies (gender as an analytical category)
Masculinist archaeology (still in a nascent stage)
Queer archaeology (investigates difference, sexualities, and the character of gender)

A common factor in these approaches is the inclusion of gender as a central element of social structures. All modern gender archaeology presupposes problematizing gender as a social construct, rather than taking it for granted, and analyzing the consequences of different gender arrangements. Studies focusing on women or gender without problematizing the concepts are sometimes termed gender-*relevant* research.

Historical Background

General Overview

Gender has been one of many aspects considered in interpretations of archaeological material from the early days of archaeology as an academic discipline, in the sense that artifacts have been ascribed to men and women, respectively.

Modern gender archaeology, going back to the 1970s, was from its inception firmly based in the second wave of feminism. European archaeologies were, at the time, overwhelmingly culture historical or processual (see the entry in this encyclopedia entitled ▶ "Processualism in Archaeological Theory"), and "science" was considered to be objective in the sense that it should be unbiased. In archaeology, feminism therefore became an early introduction to the idea that scholarship could, and should, be value-laden.

The invisibility of women in archaeology and in the past was considered to be a central problem and as a result early feminist archaeology was to a certain extent simply an archaeology about

women. But it was soon realized that feminist approaches must dig deeper. Challenging basic concepts, epistemologies, and practices became one of the hallmarks of feminist scholarship. Sex essentialism was rejected, while gender as a social structure was considered to be a pervasive element of any society. Asymmetrical power relations between men and women were seen to be part of most gender systems, and gender roles were conceptualized as social constructions which had to be investigated within their specific cultural contexts.

Post-processual archaeology, emerging in Europe from the early 1980s onward, brought new impulses from the social sciences and humanistic scholarship as well as an increasing emphasis on cultural diversity in the past. Diversity also became a key word in later developments of gender archaeology, largely inspired by third-wave feminists who were critiquing, often from black, lesbian, or third-world points of view, the monolithic constructions of femininity and masculinity prevalent in previous feminisms.

In spite of the fact that men and masculinities have sometimes been explicitly addressed in post-processual archaeology, the scholars involved do not necessarily think of themselves as gender researchers (Treherne 1998). Masculinity theory and masculinity studies as such have so far been very rare in European archaeology. In a paper advocating the development of a masculinist archaeology inspired by feminism, Knapp (1998: 94) distinguishes between *reactionary masculinities* and *motivated masculinities*. Motivated masculinities are influenced by feminist research and problematize masculinities in much the same way that femininities have been investigated. In a few cases, studies of masculinity are undertaken by women, from a feminist standpoint.

In the context of archaeological gender studies in Europe, postmodern deconstruction of the concepts of sex and gender has emerged as a dominant approach to gender studies, an approach that does not focus on women only. Postmodernism in archaeology has tended to favor the study of individuals, constructed identities, and personhood rather than groups, societies, and systems. In this process, focus in the sex/gender dichotomy has moved from gender to sexuality and embodiment, paving the way for queer archaeology, which can basically be described as an archaeology of difference and in this sense includes anybody and anything that does not fit into the society in question. In a narrower sense, queer archaeology is understood as investigation into genders and various sexual identities in the past. The impact of queer archaeology (in the narrower sense) in Europe has so far been limited mainly to the United Kingdom. A Scandinavian study of gender and the role of the main god Odin in Old Norse religion and ideology is based partly on queer approaches (Solli 2002).

The many approaches sketched above now exist side by side in gender archaeology, globally and in Europe. In sum, gender research is still developing and is characterized by critique on the one hand and theoretical eclecticism on the other.

Chronology: Where and When

Scandinavia, and particularly Norway, seems to have been the first place where a new feminist-inspired archaeology took hold, in the early 1970s. The inspiration was derived mainly from two sources, the critical theory of the German "Frankfurter school" and second-wave feminism from Simone de Beauvoir to American standpoint theorists.

The first Scandinavian gender archaeology initiatives took place among students in the early 1970s and were related to equity issues. A Norwegian conference organized by teachers and museum curators, "Var de alle menn?" (*Were they all men?*), followed in 1979. In 1985 the organization K.A.N. – *Kvinner i Arkeologi i Norge* (Women in Archaeology in Norway) – was founded. Its concomitant journal became the main publication venue of gender archaeology in Scandinavia until it was discontinued in 2005. Thus, critical theory and feminist/gender perspectives had already become part of Scandinavian archaeology when British post-processualism became a strong force in international archaeology during the late 1980s.

British gender archaeology, on the other hand, developed in parallel with post-processualist

approaches. Again, the gender initiative came from students who dedicated a whole issue of *Archaeological Review from Cambridge* (Arnold et al. 1988) to gender issues. In addition to presenting prehistoric women and discussing feminism as a basis for archaeological interpretations, gender as an analytical category was now introduced. In the following decades, this was going to become one of the most influential approaches of British gender archaeology.

Language is probably the reason why the vast amount of German-language gender archaeology, steadily increasing in volume from its inception in 1988 and addressing a wide variety of topics, is little known outside its own (large) linguistic area. Like in Britain, German gender archaeology developed from student initiatives (Mertens and Koch 2005). The German-language archaeological tradition in the 1980s was strictly culture historical and processual but also deeply influenced by neighboring humanistic disciplines. Early gender-relevant inspirations varied from popular engagement with the idea of matriarchies in the past to gender constructivism (Julia Koch 2011, personal communication). The *Netzwerk archäologisch arbeitender Frauen* (FemArc), which was to become the focal point of much German-language gender archaeology, was founded in 1991. FemArc now publishes a newsletter for its members and a book series, *Frauen- Forschung- Archäologie*, on the renowned Waxmann Verlag.

As a whole, southern Europe has so far shown relatively little interest in gender archaeology. Spain is a special case, with a strong tradition of women's and gender archaeologies going back to the 1980s and addressing many different issues (Sánchez Romero 2005; Prados Torreira and Ruis López 2008) (see also the entry in this encyclopedia entitled ▶ "Gender, Feminist, and Queer Archaeologies: A Spanish Perspective"). During the 1990s, a new and innovative strand of gender archaeology emerged from the basis of Marxist and feminist standpoint theories. This "maintenance archaeology" examines small events and the routines of daily life as part of social structures, often reevaluating their importance for the well-being of society and technological and political progress (Goncáles-Marcén et al. 2008).

As mentioned above, gender archaeology in Eastern Europe is still in its early stages, depending on a few active scholars. Until recently, gender archaeologists based in their East European homelands tended to work within processual paradigm exclusively. Changes are on the way, however, thanks to scholars working from within their local archaeological traditions and also contributing to theoretical developments (Berseneva 2008, 2010a, b; Palincas 2010, 2013, 2015a, b).

The chronological sequence presented here also indicates a process of diversification and specialization where different regions have been taking leading roles at different times. The golden years of Scandinavian gender archaeology were from 1985 onward, with a clear focus on feminist approaches. Later on, British (and American) gender archaeology took on leading roles internationally, developing gender as an analytical tool and anthropologically inspired approaches to past genders, respectively. At the same time, a German-language gender archaeology strengthened its position in its own cultural area, combining detailed analyses of archaeological finds with new theoretical impulses. At present, the Spanish development holds promises for a future archaeology where gender and daily-life activities are included in the study of social structures, history, and development, while the emerging East European participation in the gender project opens new horizons for all of us.

Key Issues/Current Debates

In a historical perspective, gender and feminist archaeologies are mainly associated with the study of women and the relationship between women and men. This is now slowly changing as queer and masculinist archaeologies are emerging.

It should also be mentioned that in a European setting, the archaeology of childhood has been closely associated with gender archaeology. Two early papers (Lillehammer 1986, revised and enlarged English version Lillehammer 1989;

Sofaer Derevenski 1994), published in the K.A.N. journal and the *Archaeological Review from Cambridge*, respectively, focused on how to identify children in the archaeological record. In tune with the development of gender archaeology proper, interest has since moved from visibility to the question of children's roles in prehistoric societies and relations between children and adults (e.g., Moore and Scott 1997; Röder 2002; Sánchez Romero 2004; Berseneva 2008). A recent contribution is a large anthology on Mädchen in Altertum/Girls in Antiquity (Moraw and Kieburg 2014). The archaeology of children is now recognized as a separate field represented all over Europe and is organized in the Society for the Study of Childhood in the Past (http://www.sscip.org.uk/).

In the following section, primary issues will be discussed against the background of goals and aims of early gender archaeology. Early publications and the agendas of the two gender archaeology organizations founded in 1985 and 1991, respectively, will provide keys to what was deemed important at the time.

The edited volume *Were they all men?* (Bertelsen et al. 1987), one of the very first volumes in English dedicated to gender archaeology, presented papers from the abovementioned Norwegian conference held in 1979. The editors stated that their aim was "identifying individuals in a prehistoric context" but also acknowledged their debt to the feminist movement which "may have provided a better basis for viewing not only the present but also the far past with a feminist perspective in mind," and the table of contents reveals that focus was almost exclusively on women (Bertelsen et al. 1987).

K.A.N. (*Kvinner i Arkeologi i Norge*, Women in Archaeology in Norway), the organization founded by Norwegian women archaeologists in 1985, presented its aims and goals in the first volume of its journal (published in Norwegian [English from 1996]) by the same name:

To promote well-established research on and by women in archaeology
To present traditional research areas as well as new aspects of research into prehistory
To be a medium for archaeologists seeking a qualitatively new research strategy through the development of new theories, reassessment of methodological principles, new ways of evaluating sources, and search for new source material
To be a medium of thoughts and opinions on the working conditions and the work of women in archaeology and in society

In the United Kingdom, the editors (Arnold et al. 1988: 2) of the 1988 "Women and archaeology" volume of *Archaeological Review from Cambridge* argued that the subject of women in archaeology demanded a critical evaluation of the following points:

The conditions under which women work in all areas of archaeological practice
How women are portrayed in the interpretation and presentation of the past
What gender is and what epistemological questions an archaeology of gender forces us to recognize in terms of social theory

The German FemArc organization (founded 1991) presents its aims and goals on its English-language website (http://www.femarc.de/) like this:

Create contact between women who are involved with archaeology and its related fields.
Prevent the isolation of female archaeologists.
Encourage the exchange of experiences between women.
Improve the employment situation of female archaeologists.
Promote the discussion between archaeologists and other academics involved in women's and gender studies.
Establish an interdisciplinary approach between female archaeologists, scientists of other fields, and interested amateurs.
Expand the theoretical foundations for feminist archaeology.
Open feminist archaeology to the public and to all women.

Establish feminist archaeology and gender studies as themes and methods in archaeology.

In slightly different terms, these declarations of intent all agree on three areas of concern: equity issues, the ways that women had been presented in archaeological narratives, and theoretical approaches. These three issues have been constant companions to gender and feminist archaeologies ever since.

Equity Issues

Equity issues were one of the main issues of second-wave feminism. Equity issues which have been addressed in archaeology include:

The number of women archaeologists and women working in archaeology
Positions held by women in archaeology
Research fields dominated by women and men, respectively
Archaeological arenas (research, teaching, museum, excavations) dominated by women and men, respectively
The prestige of women-dominated research fields

Research carried out in the 1980s and 1990s shows that in some countries, women made up a fair proportion of the archaeologists, but even so, few held permanent positions and even fewer held top positions. Power and prestige followed the subfields or arenas where men dominated. The number of women professionals in archaeology is now increasing all over Europe but gender inequality is still a serious problem in many European archaeological communities. As for gender archaeology, this is still dominated by women.

Learning about the history of women in archaeology became part of equity research. An edited volume *Excavating Women: A History of Women in European Archaeology* (Díaz-Andreu and Sørensen 1998) addressed women's contributions to archaeology in many European countries. Similarly, the FemArc publications *Eine Dame zwischen 500 Herren* (Koch and Mertens 2002) and *Ausgräberinnen, Forscherinnen, Pionierinnen. Ausgewählte Porträts früher Archäologinnen im Kontext ihrer Zeit* (Fries and Gutsmiedl-Schümann 2013) present portraits of female pioneers in the German-language area.

Representations of Women and Gender

It is only a short step from noting the asymmetrical relationship between female and male practitioners of archaeology to asking if this would also have affected the interpretations of the past.

Rock Art and Other Depictions

Past depictions of women, varying from statues to embroideries and rock carvings, were particularly important in early women's archaeology, as part of the project of making past women visible. Rock carvings, which are relatively common over many parts of Europe and cover a time span from the Early Stone Age to the Early Iron Age, were a special challenge, as they highlighted the problem of identifying sex as well as gender when confronted with foreign picture conventions. It has been claimed that all the humans depicted, for example, on Scandinavian rock carvings were male. Gender researchers have challenged such viewpoints and presented convincing arguments that women, women's activities, and in some cases even different (ethnic) gender ideologies are represented on European rock art panels (Figs. 1 and 2).

Gender, Feminist, and Queer Archaeologies: European Perspective, Fig. 1 Woman, man, and reindeer. Mesolithic rock carving, Vingen, West Norway (Photo: Svein Skare. © The University Museum of Bergen, Norway)

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Gender, Feminist, and Queer Archaeologies: European Perspective, Fig. 2 Mesolithic woman. Vingen, West Norway (Photo: Svein Skare. © The University Museum of Bergen, Norway)

Graves and Funerary Assemblies

Funerary assemblies will often be associated with individuals and have for that reason been central in gender studies, which have often focused on hierarchical statuses, power relations, and social roles.

Jewelry and weapons have been generally accepted as tentative gender markers. An example of a study based mainly on jewelry is Ursula Koch's (1997) study of two Merovingian cemeteries in Germany. Intimate knowledge of the archaeological material enabled her to divide the burials into families (households) and analyze the female burials in order to reveal geographical origins, ethnicity, and relative ranks of the women in each household. Skeletons were examined in order to determine age and other aspects such as whether the women had given birth. Koch's study does not aim to fundamentally challenge existing conceptions of early medieval women. But through meticulous analyses of finds and contexts, one of the hallmarks of German archaeology, new insights in women's gendered lives are generated and our understanding widened.

Studying roles and statuses from burial finds is most fruitful where burials are individual and gendered differences are indicated in terms of monuments, in body treatment, or in grave gifts. One should note, however, that dichotomous gender roles and other easily recognizable variations will be overrepresented in studies based on supposedly exclusive gender-related artifacts. Another source of error is that often a considerable percentage of burials in the cemeteries investigated cannot be gendered through the grave gifts. They therefore tend to be left out of the interpretations, thereby possibly creating sharper gender divisions than warranted. Finally, a question related to all representations of women (and men) in the past is whether the representations are idealized or realistic ones, gender ideologies or "gender in action."

Subsistence, Trade, and Technology

In spite of the great number of prehistoric settlements known in Europe, these have played a relatively small role in gender studies. One reason may be that tools found in settlement contexts can rarely be definitely attributed to any gender. Interpretations tend to rely on ethnographic and historic evidence, inviting the interpretation of subsistence activities like hunting or farming as men's work. But there also seems to be a general agreement that both women and men must have participated in economic activities in all kinds of societies. Grave gifts sometimes indicate what kind of work the people buried engaged in. As an example, agricultural implements in female graves may indicate that women have taken active parts in farm work during the Scandinavian Iron Age, and scale-weights found in graves indicate that Viking women in Russia may also have been traders, probably participants in family businesses (Stalsberg 1987). More generally, women seem to have been engaged in textile work all over Europe. Again, this is supported both by

grave gifts and iconography (spindle whorls, weaving equipment, and depictions of women weaving).

Technology is a masculine laden word, effectively often leaving women out of fields such as metalwork or boat building, although the question of women's participation has been raised (e.g., Sørensen 1996). A fruitful approach is to point to the fact that activities traditionally considered female, such as ceramic production, textile work, the preparation of food, and caring for people, require skill and knowledge and therefore represent sophisticated technologies. This is the strategy of the Spanish "maintenance archaeologists" (Goncáles-Marcén et al. 2008; ▶ "Gender, Feminist, and Queer Archaeologies: A Spanish Perspective" in this encyclopedia) who claim that these and related activities are basic for the structure and continuation of societies.

Theoretical Approaches/Current Debates

Insofar as the theories are applicable to archaeology, European gender archaeologies have followed the development of second (and third)-wave feminisms. Two issues, however, may be said to characterize the European archaeological scene. One is a sometimes explicit discussion of the relationship between feminist and gender research; second is the conflation of postmodern deconstruction and gender analyses as keys to understanding genders of the past.

Feminist studies are defined by their approach. A feminist study in archaeology may have as its subject any aspect of the archaeological past, men, women, the emergence of agriculture, technological innovations, or religious ideologies. The ensuing new interpretations would not only include women but be made from women's standpoints. Although feminist theories have been fundamental to the critiquing of androcentric science and vital to the early development of gender scholarship in Europe, feminism has not remained a preferred framework of interpretation for all gender archaeologists. Some scholars consider feminism to be political, or biased, while true scholarship should be objective and unbiased. Others claim that objectivity is impossible in humanistic scholarship and that the solution is to recognize your bias and take it into account in interpretations, as recommended by standpoint feminists.

The study of gender (or women), on the other hand, is defined by its subject and may take at least two different directions. One is the anthropologically inspired study of how gender works, that is, how people of the past have lived their lives as women, men, and possible other genders within different cultural contexts. Another approach, which will be discussed in the following paragraphs, is closely linked to the impact of postmodern skepticism and deconstruction in parts of European archaeology and concentrates on the character of gender and gender as an analytical concept.

British archaeologists signaled the analysis of gender as a central concern as early as 1988 (Arnold et al. 1988: 2). Discussion concerning the relationship between gender and material culture as archaeology's special contribution to gender research (cf. Sørensen 2000) is a further development of this theme, postmodern deconstruction and analysis another.

An early comment on the relationship between postmodernism and the study of gender in archaeology relates to the danger inherent in approaches that advocate pluralism and open-ended interpretations, namely, that with no fixed authority to appeal to, interpretation becomes a matter of power (Engelstad 1991). Power is still predominantly male in academic circles, and Engelstad's comment thus reflects the basic idea of feminist scholarship, namely, critique of androcentrism in any form. Another comment would be that by deconstructing the concept of gender, gender studies no longer have an object, and consequently the legitimacy of the field as such is undermined.

In a relatively recent paper, Whitehouse (2007) claims that European gender archaeology as a whole has developed in a post-processual and even postmodern direction, with the consequence that European gender archaeologists tend to neglect the fact that most people worldwide do in fact live and identify themselves as women and men. Central issues like male/female power relations and the role that reproduction and

motherhood must have played in women's lives are likewise excluded. In sum, claims Whitehouse (2007), European gender archaeology has removed itself from the lives of real women and men of the past.

This is a legitimate critique of strands of gender archaeology that seem to have problems accepting the category of "gender" at all. But it is a mistake to assume that this attitude characterizes European gender archaeology. Whitehouse's discussion is based almost exclusively on Anglophone gender archaeology. The trends she criticizes represent one particular European tradition which, because English is the academic lingua franca, tends to dominate the international field. European gender archaeologies are, however, situated within national archaeological communities of scholars. Spanish, German-language, British, Scandinavian, and the emerging East/Central European gender archaeologies all carry the hallmarks of their own local academic traditions, which may be culture historical, processual, post-processual, or postmodern, and favor different issues, approaches, and forms. In many European languages, it is also the case that biological sex and gender are intrinsically linked – even covered by the same term. Native speakers of such languages think differently about gender, thus contributing to the multivocality that is a precondition for new insights.

With these reservations, it is probably still the case that the analysis of gender in all its variations has become one of the most important – in terms of papers presented maybe *the* most important – strands of archaeological gender research in Europe today. Most British gender archaeology today falls into the category of gender analysis. The approach is represented in Scandinavian and Spanish archaeologies as well, although feminist archaeology is also relatively strong in these regions. In German-language archaeology, some scholars prefer working within a feminist framework, while others have emphasized the importance of finding a place for "nonideological" gender research (Mertens and Koch 2005), as, for example, gender analysis.

International Perspectives

Viewed from a Norwegian perspective, the first years of gender archaeology were characterized by a high degree of Scandinavian cooperation and enthusiasm. With the advent of the first English-language publications in the 1980s, a feeling of sharing a common frame of reference and working toward a common goal developed. On a European level, the British TAG conferences became an international meeting place for gender archaeological discussions.

From then on, gender archaeology was definitely an international phenomenon, with steadily increasing communication across borders. The number of publications increased dramatically, especially English-language books and papers. A positive effect was that scholars who wanted to participate on the international arena were often encouraged to publish in English, thus reaching a wider (academic) public. On the negative side is the fact that those who chose to write in their native languages, and thereby also to communicate with the general public in their countries, became more marginalized than ever internationally. The end result of the ongoing internationalization may be that in many European countries, gender archaeology is only occasionally disseminated to local publics.

International communication did not stop at the European borders. Conferences in Europe, North America, and Australia attracted participants from many continents, and the conference papers were read by everyone with an interest in gender and archaeology. Some sources of inspiration were shared by almost all gender researchers. Foremost among these are the writings by feminist theorists like Simone de Beauvoir from France and American standpoint feminists like Nancy Hartsock and Sandra Harding, who became household names to anyone working with women and gender. Donna Haraway and Judith Butler have also influenced European gender archaeology considerably, as have the philosopher/archaeologist Alison Wylie and gender archaeological pioneers like Margaret Conkey and Janet Spector.

International contacts tend to be unilateral between Britain (or the USA), where well-known international centers of education are to be found, and individuals of other nationalities. In the context of gender archaeology, however, multilateral contacts within Europe should not be underestimated. Naturally, these tend to go between regions with related traditions in culture and language, as reflected in the regions discussed above, but wider networks have also been established. From 2008 onward, European gender archaeologists have had a common meeting place in the working group "Archaeology and Gender in Europe" (http://www.upf.edu/materials/fhuma/age/), part of the European Association of Archaeologists (EAA). One of the goals of this network is to ensure that information and inspiration will cross borders and oceans in all directions.

Future Directions

In archaeology, gender research has been mainly an academic field or a discourse between archaeologists. But archaeology also has a role to play in society at large. Doing gender archaeology should, among other things, mean reaching out to the general public and presenting recent research through popular books and papers, museums, and other media.

Gender Studies and the Archaeological Record

The archaeological record, or the material remains recognized mainly through surveys and excavations, kept in the landscape or stored in museum collections, is the basis of all archaeological interpretations. Today, most of the additions to the archaeological record are results of rescue excavations taken on not for academic reasons but because the land in question is being developed for new purposes.

Increasingly, rescue archaeology is carried out by commercial firms, although guided by local heritage legislation and international agreements. In Europe, rescue archaeology works closer to the processual paradigm than does academic archaeology. The general opinion seems to be that (gender) theory is not relevant to rescue excavations or to the excavation phase at all: interpretation comes later. Large-scale excavations also tend to be headed by men, something that has not favored gender or feminist approaches. In the future, a closer relationship between rescue archaeology and academic research would be desirable in order to generate gender-relevant discoveries in creating the archaeological record and activating its potential in research and dissemination.

Gender in Teaching, in Museums, and in Books Directed at the General Public

Gender archaeology has a long history in teaching departments, and many universities offer courses in gender archaeology at different levels. Dissertations in gender archaeology have also been defended all over Europe from 1976 onward, in sum an imposing body of new knowledge.

The dissemination of all this newly generated knowledge to the general public, however, seems to be lagging behind. Museum archaeologists have been involved in gender archaeology from early on, but in spite of this, there have been far too few permanent museum exhibitions incorporating gender-relevant questions or women. Occasionally smaller, temporary exhibitions dedicated to women in the past are shown. A future task would be to include a gender aspect in all museum exhibitions, especially the permanent ones.

Another arena not yet conquered is that of general historical accounts, in textbooks and overviews aimed at nonspecialists. Like museum exhibitions, these tend to be conservative, and gender is seldom in focus. Incorporating the results of gender archaeology into the great narratives of humankind has been the main motivation of gender archaeology from the 1970s onward. It is now time to make this a priority in future work.

Cross-References

► Gender, Feminist, and Queer Archaeologies: A Spanish Perspective
► Post-Processual Archaeology

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▶ Post-Processualism, Development of
▶ Processualism in Archaeological Theory

References

Arnold, K., R. Gilchrist, P. Graves, and S. Taylor. 1988. Women and archaeology. *Archaeological Review from Cambridge* 7: 2–9.

Berseneva, N. 2008. Women and children in the Sargat culture. In *Are all warriors male? Gender roles on the ancient Eurasian steppe*, ed. K.M. Linuff and K.S. Rubinson, 131–152. Lanham: AltaMira Press.

Berseneva, N. 2010a. Sargat burial sites in the middle Irtysh area: A gender analysis. *Archaeology, Ethnology and Anthropology of Eurasia* 38 (3): 72–82.

Berseneva, N. 2010b. Child burial during the middle bronze age of the south Urals (Sintashta culture). In *Situating gender in European archaeologies*, Series minor, ed. L.H. Dommasnes, T. Hjørungdal, S. Montón-Subías, M. Sánchez-Romero, and N.L. Wicker, Vol. 29, 161–180. Budapest: Archaeolingua.

Bertelsen, R., A. Lillehammer, and J.-R. Næss, eds. 1987. *Were they all men? An examination of sex roles in prehistoric society.* Vol. 17. Stavanger: Arkeologisk museum i Stavanger.

Díaz-Andreu, M., and M.L. Sørensen, eds. 1998. *Excavating women. A history of women in European archaeology*. London and New York: Routledge.

Dommasnes, L.H., and S. Montón-Subías. 2012. European gender archaeologies in historical perspective. *European Journal of Archaeology* 15 (3): 367–391.

Engelstad, E. 1991. Images of power and contradiction: Feminist theory and post-processual archaeology. *Antiquity* 65: 502–514.

Fries, J.E., and D. Gutsmiedl-Schümann, eds. 2013. *Ausgräberinnen, Forscherinnen, Pionierinnen. Ausgewählte Porträts früher Archäologinnen im Kontext ihrer Zeit*, Frauen-Forschung-Archäologie 10. Münster: Waxmann Verlag.

Gilchrist, R. 1999. *Gender and archaeology contesting the past*. London and New York: Routledge.

Goncáles-Marcén, P., S. Montón-Subías, and M. Picazo. eds. 2008. Towards an archaeology of maintenance activities. In *Engendering social dynamics: The archaeology of maintenance activities* ed. S. Montón-Subías, M. Sánchez-Romero, *British archaeological reports international series 1862*, 3–8. Oxford: Archaeopress.

Knapp, A.B. 1998. Who's come a long way, baby? Masculinist approaches to a gendered archaeology. *Archaeological Dialogues* 5: 91–106.

Koch, U. 1997. Die Hierarchie der Frauen in merowingischer Zeit, beobachtet in Pleidelsheim (Kr. Ludwigsburg) und Klepsau (Hohenlohekreis). In *Königin, Klosterfrau, Bäuerin. Frauen im Frühmittelalter*, Frauen-Forschung-Archäologie 2, ed. H. Brandt and J.K. Koch, 29–54. Münster: Agenda Verlag.

Koch, J., and E.-M. Mertens, eds. 2002. *Eine Dame zwischen 500 Herren. Johanna Mestorf – Werk und Wirkung*, Frauen-Forschung-Archäologie 4. Münster: Waxmann.

Lillehammer, G. 1986. Barna i Nordens forhistorie Drøft metodegrunnlaget og kildenes bærekraft. *K.A.N. Kvinner i Arkeologi i Norge* 2: 3–21.

Lillehammer, G. 1989. A child is born. The child's world in an archaeological perspective. *Norwegian Archaeological Review* 22 (2): 89–105.

Mertens, E.M., and J.K. Koch. 2005. Jenseits von "weiblichen Kammern und Särgen". Entwicklung der archäologischen Geschlechterforschung in Deutschland. In *Ausgraben zwischen Materialclustern und Zeitscheiben. Perspektiven zur archäologischen Geschlechterforschung*, Frauen-Forschung-Archäologie 6, ed. J.E. Fries and J.K. Koch, 25–56. Münster: Waxmann.

Moore, J., and E. Scott, eds. 1997. *Invisible people and processes. Writing gender and childhood into European archaeology*. London and New York: Leicester University Press.

Moraw, S., and A. Kieburg, eds. 2014. *Mädchen im Altertum/Girls in Antiquity*, Frauen-Forschung-_ Archãeologie 11. Münster: Waxmann.

Palincas, N. 2010. Living for the others: Gender relations in prehistoric and contemporary archaeology of Romania. In *Situating gender in European archaeologies*, Series minor, ed. L.H. Dommasnes, T. Hjørungdal, S. Montón-Subías, M. Sánchez Romero, and N.L. Wicker, Vol. 29, 93–117. Budapest: Archaeolingua.

Palincas, Nona. 2013. Animals and the making of gender in the later period of the Monteoru culture (Subcarpathian arc between ca. 1700 and 1500 cal BC). *Mousaios* XVIII: 43–78 Bizau.

Palincas, Nona. 2015a. Artefact form and embodied knowledge. An archaeological perspective. In *On form and pattern. Humboldt symposium 29–31 May 2014*, ed. C. Vasilescu, M.-L. Flonta, and I. Cracium, 190–2017. Bucuresti.

Palincas, N. 2015b. A women-related ritual in early iron age Popesti (Southeast Romania, 9th century BCE). In *Representations, signs and symbols. Proceedings of the symposium on religion and magic*, ed. N.-C. Riscuta, T. Barbat, and I.V. Ferencz. Clui-Napoca: Mega.

Prados Torreira, L., and C. Ruis López, eds. 2008. *Arqueología del género. 1 er Encuentro Internacional en la UAM*. Madrid: UAM Ediciones.

Röder, B. 2002. Statisten in der Welt der Erwachsenen: Kinder auf archäologischen Lebensbildern. In *Kinderwelten. Anthropologie-Geschichte-Kulturvergleich*, ed. K.W. Alt and A. Kemkes-Grottenthaler, 96–106. Köln, Weimar, Wien: Böhlau Verlag.

Sánchez Romero, M. 2004. Children in south east of Iberian peninsula during bronze age. *Ethnographisch-Archäologische Zeitschrift* 45: 377–387.

Sánchez Romero, M., ed. 2005. *Arqueologia y género*. Granada: Universidad de Granada.

Sofaer Derevenski, J. 1994. Where are the children? Accessing children of the past. *Archaeological Review from Cambridge* 13: 7–30.

Solli, B. 2002. *Seid, myter, sjamanisme og kjønn i vikingenes tid*. Oslo: Pax Forlag.

Sørensen, M.L. 1996. Women as/and metalworkers. In *Women in industry and technology*, ed. A. Devonshire and B. Wood, 45–52. London: Museum of London.

Sørensen, M.L. 2000. *Gender archaeology*. Cambridge: Polity Press.

Stalsberg, A. 1987. The implications of the women's finds for the understanding of the activities of the Scandinavians in Rus' during the Viking Age. *K.A.N. Kvinner i Arkeologi i Norge* 5: 33–50.

Treherne, P. 1998. Who's come a long way, Dr. Knapp? *Archaeological Dialogues* 5: 115.

Whitehouse, R. 2006. Gender archaeology in Europe. In *Handbook of gender in archaeology*, ed. S.M. Nelson, 733–785. London: Altamira Press.

Whitehouse, R. 2007. Gender archaeology and archaeology of women. Do we need both? In *Archaeology and women. Ancient & modern issues*, ed. S. Hamilton, R.D. Whitehouse, and K.I. Wright, 41–54. Walnut Creek: Left Coast Press.

Further Reading

AGE Archaeology and Gender in Europe. n.d. Available at http://www.upf.edu/materials/fhuma/age/

Arwill-Nordbladh, E. 1998. *Genuskonstruktioner i nordisk vikingatid. Förr och nu*, Gothenburg archaeological theses series B 9. Gothenburg: GOTARC.

Barber, E.W. 1994. *Women's work. The first 20,000 years. Women, cloth and society in early times*. New York, London: W.W. Norton & Company.

Bergmann, S., S. Kästner, and E.M. Mertens, eds. 2004. *Göttinnen, Gräberinnen und gelehrte Frauen*, Frauen-Forschung-Archäologie 5. Münster: Waxmann.

Brandt, H., and J. Koch, eds. 1997. *Königin, Klosterfrau, Bäuerin. Frauen im Frühmittelalter*, Frauen-Forschung-Archäologie 2. Münster: Agenda Verlag.

Butler, J. 1990. *Gender trouble: Feminism and the subversion of identity*. New York: Routledge.

Conkey, M., and J. Spector. 1984. Archaeology and the study of gender. *Advances in Archaeological Method and Theory* 7: 1–38.

Díaz-Andreu, M., S. Lucy, S. Babic, and S.D. Edward, eds. 2005. *The archaeology of identity. Approaches to gender, age, status, ethnicity and religion*. London and New York: Routledge.

Dommasnes, L.H. 1982. Late iron age in Western Norway. Female roles and ranks as deduced from an analysis of burial customs. *Norwegian Archaeological Review* 15: 70–85.

Dommasnes, L.H. 1992. Two decades of women in prehistory and in archaeology in Norway. A review. *Norwegian Archaeological Review* 25 (1): 15.

Dommasnes, L.H., and M. Wrigglesworth, eds. 2008. *Children, identity and the past*. Newcastle: Cambridge Scholars Publishing.

Dommasnes, L.H., T. Hjørungdal, S. Montón-Subías, M. Sánchez-Romero, and N.L. Wicker, eds. 2010. *Situating gender in European archaeologies*, Series Minor 29, 93–117. Budapest: Archaeolingua.

du Cros, H., and L. Smith, eds. 1993. *Women in archaeology. A feminist critique*. Canberra: Department of Prehistory, Research School of Pacific Studies, The Australian National University.

Ehrenberg, M. 1989. *Women in prehistory*. London: British Museum Publications.

Engelstad, E. 2001. Desire and body maps: All the women are pregnant, all the men are virile, but. . .. In *Theoretical perspectives in rock art research*, ed. K. Helskog, 263–289. Oslo: Instituttet for sammenlignende kulturforskning, Novus forlag.

Escoriza Mateu, T. 2002. Representations of women in Spanish Levantine art: An intentional fragmentation. *Journal of Social Archaeology* 2: 81–108.

FemArc Netzwerk archäologisch arbeitender Frauen. n.d. Available at http://www.femarc.de/-

Fries, J.E., and J.K. Koch, eds. 2005. *Ausgegraben zwischen Materialclustern und Zeitscheiben. Perspektiven zur archäologischen Geschlechterforschung*, Frauen-Forschung-Archäologie 6. Münster: Waxmann.

Fries, J.E., U. Rambuscheck, and G. Schulte-Dornberg, eds. 2007. *Science oder Fiction? Geschlechterrollen in archäologischen Lebensbildern*, Frauen-Forschung-Archäologie 7. Münster: Waxmann.

Gilchrist, R. 1994. *Gender and material culture. The archaeology of religious women*. London and New York: Routledge.

Göransson, E.M.Y. 1999. Bilder av kvinnor och kvinnlighet. In *Genus och kroppsspråk under övergången till kristendomen*, Stockholm studies in archaeology 18. Stockholm: Stockholms Universitet.

Gutsmiedl-Schümann, D. 2011. Alters- und geschlechtsspezifische Zuweisung von The Hand- und Hauswerk im frühen Mittelalter nach Aussage von Werkzeug und Gerät aus Gräbern der Münchner Schotterebene. In *Von wirtschaftlicher Macht und militärischer Stärke. Beiträge zur archäologischen Geschlechterforschung. Bericht der 4. Sitzung der AG Geschlechterforschung der 79. Jahrestagung der Nordwestdeutschen Verbandes für Altertumsforschung e.V. in Detmund 2009*, Frauen-Forschung Archäologie 9, ed. J.E. Fries and U. Rambuscheck, 37–74. Münster: Waxmann.

Harding, S. 1998. *Is science multicultural? Postcolonialisms, feminisms, and epistemologies*. Bloomington and Indianapolis: Indiana University Press.

Hjørungdal, T. 1991. *Det skjulte kjønn. Patriarkal tradisjon og feministisk visjon i arkeologien belyst*

G

med fokus på en jernalderkontekst, Acta Archaeologica Lundensia series 8/19. Lund: Almqvist & Wiksell.
Insoll, T., ed. 2007. *The archaeology of identities. A reader*. London and New York: Routledge.
K.A.N. Kvinner i Arkeologi i Norge (Norwegian feminist archaeological journal published 1985 - 2005, edited by female archaeologists working at the university museums of Tromsø, Trondheim, Bergen and Stavanger)
Karlisch, S.M., S. Kästner, and H. Brandt. 2002. Women in the underground: Gender studies in German archaeology. In *Archaeology, ideology and society. The German experience*, Gesellschaften und Staaten im Epochenwandel 7, ed. H. Härke, 289–307. Frankfurt am Main: Peter Lang.
Karlisch, S.M., S. Kästner, and E.M. Mertens, eds. 1997. *Vom Knochenmann zur Menschenfrau. Feministische Theorie und archäologische Praxis*, Frauen-Forschung-Archäologie 3. Münster: Agenda Verlag.
Linduff, K.M., and K.S. Rubinson, eds. 2008. *Are all warriors male? Gender roles on the ancient Eurasian steppe*. Lanham: AltaMira Press.
Lozano, S. 2010. Gender thinking in the making: Feminist epistemology and gender archaeology. *Norwegian Archaeological Review* 44: 21–39.
Mandt, G. 1998. Vingen revisited. A gendered perspective on "hunters" rock art. In KVHAA Konferenser 40, 201–24. Stockholm.
Mertens, E.-M. 2002. Women's situation as archaeologists in West Germany. In *Archaeology, ideology and society. The German experience*, Gesellschaften und Staaten im Epochenwandel 7, ed. H. Härke, 275–288. Frankfurt am Main: Peter Lang.
Mina, M. 2009. Island histories, gender stories: A comparative view through Neolithic and early bronze age anthropomorphic figurines from Cyprus and Crete. *Medelhavsmuseet Focus on the Mediterranean* 5: 171–186.
Montón-Subías, S., and M. Sánchez-Romero, eds. 2008. *Engendering social dynamics: The archaeology of maintenance activities*, British archaeological reports international series 1862. Oxford: Archaeopress.
Nelson, S.M., ed. 2006. *Handbook of gender in archaeology*. Lanham: AltaMira Press.
Nelson, M.C., S.M. Nelson & A. Wylie. 1994. Equity issues for women in archaeology. In Archaeological Papers of the American Anthropological Association 5.
Rambuscheck, U., ed. 2007. *Zwischen Diskursanalyse und Isotopenforschung. Methoden der archäologischen Geschlechterforschung*, Frauen-Forschung-Archäologie 8. Münster: Waxmann.
Rebay-Salisbury, K., M.L. Stig Sørensen, and J. Hughes. eds. 2010. Body parts and bodies whole. In *Changing relations and meanings*. Oxford and Oakville: Oxbow Books.
Röder, B., J. Hummel, and B. Kunz, eds. 2001. *Göttinnendämmerung: Das Matriarchat aus archäologischer Sicht*. Königsförde: Königsfurt Verlag.
Shingiray, I. 2010. Gender, identity and display: Variations in materiality among different groups of the North-Western Caspian region during the early middle ages. In *Situating gender in European archaeologies*, ed. L.H. Dommasnes, T. Hjørungdal, S. Montón-Subías, M. Sánchez Romero, and N.L. Wicker, Vol. 29, 181–204. Budapest: Archaeolingua.
Skogstrand, L. 2010. Prehistoric hegemonic masculinities. In *Situating gender in European archaeologies*, Series minor, ed. L.H. Dommasnes, T. Hjørungdal, S. Montón-Subías, M. Sánchez Romero, and N.L. Wicker, Vol. 29, 35–50. Budapest: Archaeolingua.
Sofaer Derevenski, J., ed. 2000. *Children and material culture*. London and New York: Routledge.
The society for the study of childhood in the past. n.d. Available at http://www.sscip.org.uk/
Thomas, J. 1996. *Time, culture and identity. An interpretive archaeology*. London and New York: Routledge.
Treherne, P. 1995. The warrior's beauty: The masculine body and self-identity in bronze age Europe. *Journal of European Archaeology* 3: 105–145.
Walde, D., and N.D. Willows. ed. 1991. The archaeology of gender. In Proceedings of the twenty-second annual conference of the archaeological association of the university of Calgary. Calgary: University of Calgary Archaeological Association.
Wylie, A. 1997. The engendering of archaeology. Refiguring feminist science studies. *Osiris* 12 (2): 80–99.

Gender, Feminist, and Queer Archaeologies: USA Perspective

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Introduction

This entry presents a brief history of the emergence of feminism, gender, and queer in North American archaeology, which, along with the United Kingdom and Scandinavia to a lesser degree, represents the geographic origin and center of such work. The key concepts as used by archaeologists are defined; the relationship among them is explored and shown to be both problematic and productive. The place of feminism,

gender, and queer within North American archaeology today is characterized and, finally, likely avenues of future research are suggested. The greatest impact of feminist, gender, and queer archaeologies has been on the authority of positivist approaches, the objectivity of interpretation, equity issues within the profession, collaborative knowledge making, and the understanding of key archaeological interpretive concepts.

Definition

None of the terms "feminism," "gender," or "queer" have fixed meanings. Different academic disciplines have their own interpretations, histories, and methods embedded in each. In the following, the terms are defined in relation to how they have been used and employed within archaeology. Contrasts are drawn between North American and other usages, where relevant. Feminist archaeologies emerged in North America in the early 1980s; queer archaeologies were inaugurated in the early 2000s in both North America and Europe. Gender as an explicit object of study emerged with feminism. Stereotypically, feminist and queer archaeologies have been assigned their proper objects of study, mimicking that same division of labor in academia more broadly: feminism studies gender, while queer approaches are centrally concerned with sexuality. In actuality, neither feminism nor queer in archaeology need be limited to these objects of study.

Feminism

Feminism is recognized as an approach rooted in contemporary political goals. Feminist social science commitments are those that are relevant to women and others oppressed by gender structures (Wylie 2007: 211). Feminism in archaeology is concerned with the conditions of archaeological knowledge production in the present and the reconstruction of the past and past peoples' lives. Since this concerns power relations, focus is often – but certainly not exclusively – on women (Tomášková 2011). Feminism in archaeology is further about recognizing gender bias, rewriting histories of the discipline and the past that exclude or downplay the role of women, questioning the alleged neutrality of science, and addressing equity issues in the discipline and the theoretical development of key concepts, especially gender, but also power, bodies, and the State, among others (Conkey and Spector 1984; Wylie 2007). Ultimately, feminist archaeology involves a fundamental rethinking of the questions archaeologists address and the frameworks they use (Conkey 2005; Wylie 2007).

The feminist critique of science has come to dominate North American feminist archaeology and can be seen to constitute the orthodox approach. Work typically draws on feminist philosophers of science, such as Helen Longino and Sandra Harding (Wylie 1992, 2007). This orthodoxy co-exists with a lesser post-structuralist feminist production inspired largely by the work of feminist philosopher Judith Butler (e.g., Joyce 2008), which is concerned with questions of discourse and the performance of gender. Butler is a useful figure who crosses the divide between continental post-structuralist feminists and social science feminists by using a vocabulary of gender and performance. Work that draws on Butler in gender archaeology shares the concern of the feminist critique of science with empirical adequacy and evidential constraints (Joyce 2008). The more radical elements of Butler's and other continental feminist philosophers' work tend to be re-categorized as queer. Regardless of the type of feminism, all share a set of concerns around *reflexivity*, *accountability*, and *reframing* key debates.

Reflexivity

Reflexivity has its roots in feminism's grounding in the experience of oppression of women, where people are understood as constituted by their experiences rather than simply "having" them (Conkey 2005: 27). Reflexivity also refers to a commitment "to locating the researcher on the same critical plane as the researched" (Marshall et al. 2009: 226). The importance of reflecting on daily lives is double: research is founded on the experience of the everyday life of women and marginalized people in the present and aims to validate the lived experiences of past peoples, to

"people the past" (Spector 1993; Joyce 2008). A reflexive, situated archaeology is a response to the insight that all research reflects the position of the researcher within a given social structure and incorporates the pragmatic interests of that position. Counterintuitively, this is seen as the central virtue of reflexivity. A situated, feminist archaeology raises the bar epistemologically because it is a "critical, theoretically informed, *standpoint* on knowledge production" (Wylie 2007: 213).

Accountability

Accountability to research subjects is of central concern. The situatedness of knowledge production means that issues of power are recognized as inherent to all aspects of the research process. Archaeology is recognized to be inescapably political, as is the knowledge it engenders. A concern with ethical and pragmatic norms means that egalitarian and collaborative forms of knowledge production are sought, leading to community archaeology projects and alternative writing genres (Spector 1993; Joyce and Tringham 2007; Marshall et al. 2009). Accountability also refers to the recognition that feminist research is simultaneously about the past and how versions of the past are sustained or not (Conkey 2005: 33).

A widespread acknowledgment among feminist archaeologists is that while feminist research starts with the experience of women, it should ultimately lead to a general *reframing* of questions, practices, theories, and goals within the field as a whole (Conkey 2005: 26; Wylie 2007). In this regard, feminists question the central concepts of archaeology, such as technology, inequality, household, hunting/gathering, gender, and bodies, as well as archaeological practice and theory (Wylie 2007).

Gender

The original formulation of gender in archaeology was adopted from a social science understanding in which sex referred to biology (male and female), and gender referred to the meanings ascribed to that biological foundation by particular cultures. As such, gender is commonly understood as a social or cultural "construction." Conkey and Spector's (1984: 16) groundbreaking article "Archaeology and the Study of Gender" defined gender as "a system of social rather than biological classification that varies cross-culturally and changes over time" and stipulated a range of ways in which gender could be conceptualized and studied, including roles, identity, and ideology. Gender attribution was a central concern. Genders could be identified archaeologically through burials, representations, tool use, and skeletal remains by associating cultural items with biological sex or its representation. Ethnoarchaeology was also seen as key to illuminating the range of activities in which males and females were engaged.

Gender is now recognized as a historical process and a major structuring principle of societies of the past and present (Gero and Conkey 1991). Gender is also increasingly thought of as more a process than a static ascription of identity or one among a list of social variables. It can also be thought of as an ongoing embodied and performative process of identity formation which structures relations. Thus, gender is also relational (Joyce 2008).

Gender implies a definition of sex. The conceptual foundation of gender is the ascription of cultural meanings onto male and female bodies; even when gender is understood to be an important element of how societies, in general, are organized, this foundation remains. This means that when gender is explored as a social variable, even a structuring one, it is used to provide interpretations of historically and culturally specific ways of organizing people on the basis of difference grounded in binary sex. The concept itself is rarely open to theoretical reconsideration within the social construction formulation.

The concept of gender initially served the important purpose of liberating interpretation from the essentialism of sex role identity, where one's sex was assumed to determine one's capacities and roles in society (Conkey and Spector 1984). Quite quickly, sex was questioned as a static foundation for culture to ascribe gendered meanings – sex was also recognized as historical (see Joyce 2008). The

implications of the critique of sex have resulted in work on embodiment and performativity (Joyce 2008). Arguably, not even these approaches manage to dispense with the distinction between sex and gender which rests on that between nature and culture, although the nature of the relationship has been rethought.

Finally, some archaeologists, especially those influenced by queer theory, question the unconditional relevance of gender in all contexts (Joyce 2008), while others continue to argue that its central importance to feminist archaeology should be given (Wylie 2007).

Queer

Queer refers to a deliberate strategy by activists and academics to reclaim and redefine a word in terms of identities and bodies that avoid the essentialism of more conventional forms of identity labeling. In North American archaeology, queer theory has predominantly inspired work on sexualities (Schmidt and Voss 2000; Casella and Voss 2011). Nonetheless, queer also implies a critique of the ubiquity of heteronormativity, the notion that an assumption of heterosexuality underlies many political and social structures (Dowson 2006; Voss 2009).

Queer archaeology, in general, includes redemptive counter-histories that bring to light previously hidden histories of sexualities (Voss 2009), queer statements that challenge heteronormativity beyond a focus on sexuality (Dowson 2000), and work on embodiment predominantly influenced by Judith Butler's theory of gender performativity (Joyce 2008). Thus, the naturalization of heterosexual institutions such as the family and the division of labor is challenged (Dowson 2006; Voss 2009). Past identities are understood to be constructed in fluid ways (Joyce 2008). In common with feminism, queer critiques have appeared in response to equity issues within the discipline, such as the relationship between non-straight subjectivity and professional success and the "epistemological privilege" of straight archaeologists and their accounts of the past, although this trend is more visible outside North America (Dowson 2006; Voss 2009).

Historical Background

Gero and Conkey (1991) inaugurated a reflexive, self-conscious history of feminist archaeology in which the "three fold" development of feminism in the social sciences is cited: the critique of androcentrism and destabilizing assumptions about women's capacities, the "remedial" search for women in the past, and finally the theoretical development of gender as a concept. As such, feminism and gender co-emerged in archaeology.

Prior to the early 1980s feminist work had little visibility and much was outside the English-speaking world. Conkey and Spector's (1984) article is a milestone in feminist and gender archaeology; in it, the authors presented the case for the general applicability of gender and feminism. They presented a critique of androcentrism in the discipline, argued that in the absence of an explicit framework for theorizing gender archaeologists drew on common sense understandings, and provided a set of conceptual tools with which to address gender in a systematic way.

In the late 1980s, two quite different but equally agenda-setting events occurred: the small conference at the Wedge Plantation in 1988 and the far larger, student-organized 22nd Chacmool Calgary conference in 1989. Frustration with the slow development of gender archaeology led to the Wedge conference where the goals of the 1984 article were deliberately pursued in a series of detailed case studies (Gero and Conkey 1991). The Chacmool conference was notable for the number of papers presented as well as debate around the question of the relationship between gender and feminism.

Recently, the stance that gender archaeology in North America is feminist within the terms of the feminist critique of science was reaffirmed in a 2007 special issue of the *Journal of Archaeological Method and Theory* (although based on an earlier conference) (Wylie 2007). Particular emphasis was placed on feminist praxis. In her introductory paper, Wylie (2007) reorients the question away from "feminist archaeology" and toward what it means to do work as a feminist archaeologist. Epistemological issues remain at the forefront, including questions about the

gender of theory and the intersections that are possible among marginalized perspectives within archaeology (see also Conkey 2005). Since Janet Spector's (1993) groundbreaking book, *What This Awl Means: Feminist Archaeology at a Wahpeton Dakota Village*, feminist concerns have been increasingly seen as paralleling those of class, race, and indigeneity, resulting in collaborative projects and de-centered authorship. In addition, issues of representation have led to alternative writing genres, explorations of language, and research in hyper-media as a means of representation (Spector 1993; Joyce and Tringham 2007). North American leadership in the field of gender archaeology was demonstrated by the publication of the *Handbook of Gender in Archaeology* (Nelson 2006), which provided an exhaustive survey of the field from thematic, temporal, and geographic perspectives.

Feminist archaeology has rarely influenced feminist debate beyond archaeology except in the form of review pieces in general interdisciplinary surveys of feminism, of which there have been few. An exception is Marshall's (2008) contribution in the journal *Feminist Theory*, which prompts feminists to explore change, transition, and transformation using the archaeology of the Pacific Northwest as a case study.

Queer archaeology in North America has its roots both in feminism and the study of sexualities, first gaining visibility through two edited volumes published in 2000 (Dowson 2000; Schmidt and Voss 2000). Queer work in North American archaeology is generally influenced by Judith Butler and work on sexualities, resulting in specific case studies on bodies and performance or explorations of sexual identities, most often in historical contexts. It is recognized that many of queer archaeologies' concerns parallel those of feminism, where its roots lie (Voss 2009).

Queer is not overly visible in North American archaeology today. In an attempt to galvanize a focus on queer and gender archaeology, the 2004 Chacmool conference was organized around the theme "Que(e)rying archaeology"; even though it produced statements from leaders in the field surprisingly few queer papers were presented. Recent work on sexualities and colonialism may indicate a new avenue for queer research in archaeology (Casella and Voss 2011).

Key Issues/Current Debates

Some long-standing and some recent debates cross-cut feminist, gender, and queer interests, while others feature more strongly in one area. The key issues outlined here are (1) the relationship between feminism and gender; (2) epistemological concerns; (3) accountability; and (4) identities and embodiment. In the latter, the question of whether gender is necessarily relevant to all identities is raised.

The Relationship of Feminism to Gender

The question of whether gender archaeology need necessarily be feminist emerged in the late 1980s and has not entirely gone away. Gender is now present in many conventional archaeological interpretations alongside other social variables, but feminism is rarely mentioned. This is seen as a problem for some feminists who argue that gender without feminism loses the possibility of producing fundamental change (Conkey 2005; Wylie 2007). Moreover, feminist theoretical resources enable gender to remain as a dynamic concept in archaeology and allow us to account for the "epistemic and political commitments that inform practice" (Wylie 2007: 215).

The counterclaim is that feminism introduces an unnecessary political bias and risks further isolating gender from the mainstream. Though, it has been claimed that feminist epistemological concerns are central to gender work in archaeology at all levels irrespective of whether the label is used (Tomášková 2011).

Most feminist archaeologists retain the concept of gender in their work; gender as a category of analysis is still needed, even if expanded in scope (Conkey 2005: 19). Wylie (2007: 213) argues for the methodological axiom that gender should not be disappeared. Queer and some feminist archaeologists, however, see gender as a potential barrier to conceptualizing identities and bodies in non-binary ways (Joyce 2008). Many continental feminists, for example, do not work with the notion of

gender at all, but rather work through sexual difference. Judith Butler is a bridging figure who draws on sexual difference feminists but uses the social science conceptual language of gender, which may account both for her popularity and the misunderstanding or disavowal of some of the more radical implications of her work.

Epistemology

The charge leveled against feminists that objectivity cannot be maintained when an explicitly politically oriented approach is taken is rebuked by feminist archaeologists who claim that feminism can provide better, more objective accounts of the past while simultaneously valuing ambiguity (Conkey 2005). Thus, in common with post-processualism, feminist archaeologists tend to be concerned with the nature of political influence. Though, feminism is even more concerned with equity issues, leading to some adversarial exchanges on the grounds that post-processualism simply reproduces androcentric and heterosexist structures in the discipline (Tomášková 2011: 113–115).

Conkey and Spector (1984: 21) argued that the greatest limitations on our knowledge of the past are epistemological rather than lack of data (see also Wylie 1992). Epistemological concerns have to do with what we say about the past, how we go about saying it in a reasonable and justifiable way, and who has the authority to speak – all parts of the feminist method debate (Wylie 2007: 211). Questions that have concerned North American feminist archaeologists in relation to archaeological practice include ending inequality in the workplace, methodological issues, especially around objectivity, and who has the authority to speak. Workplace inequities are real and systematic, and the politics of gender affects data collection and interpretation in profound ways (see contributors to Gero and Conkey 1991).

The method debate is commonly phrased in terms of how to have gender while keeping archaeology objective, neutral, value-free, and scientific. Feminist archaeology has established itself as a legitimate field partly by addressing conventional archaeological concerns about empirical adequacy, hence its long-term protagonism with processual archaeology. One response has been the argument that gender archaeology can lead to "processual plus," a better but fundamentally unchanged processual archaeology (see Tomášková 2011: 115). The suggested has been criticized as an add-on to an unreflexive positivist approach (Tomášková 2011). In contrast, by locating feminist archaeology firmly within the tradition of post-positivist feminist critiques of the sciences, a philosophical space is opened for an engaged feminism without conceding the legitimating authority of science. Feminist archaeologists argue that it is the reflexive recognition of our standpoint as positioned subjects that provides the grounds for "strong objectivity" (Wylie 2007: 213). Wylie (1992: 30) has argued that "politically engaged science is often much more rigorous, self-critical, and responsive to the facts than allegedly neutral science, for which nothing much is at stake." Accordingly, social location rather than a polluting effect of our subjectivity is constitutive of the research process and simultaneously decenters a singular, authoritative science and hence opens the way to legitimizing other perspectives.

Ambiguity of data and interpretation is embraced by some feminist and queer archaeologists; data are irreducibly ambiguous, so interpretations must be uncertain and open (Conkey 2005: 25). To think otherwise is to falsely reduce complexity, to seek closure and causal simplicity (Wylie 2007: 213). Feminist archaeology adopts "strategic ambivalence" (Wylie 2007: 81) that refuses both unreflective objectivism and reductive constructivism. Empirical constraints exist but feminist archaeology has created an alternative epistemic position that also recognizes ambiguity and sociopolitical factors (Conkey 2005).

In queer theory, the impact of subjectivity on what pasts get written meets feminist critique in the recognition that masculine norms define the process of professional socialization, with institutions reproducing gendered and sexually normative conventions (Wylie 2007; Voss 2009).

Accountability

Feminist archaeology is concerned with ethical and political responsibility for knowledge

production. Recognizing the stakeholders in knowledge claims implies a different type of research practice involving the formulation of questions, the control and management of projects, and the forms of knowledge dissemination. Spector's (1993) work has achieved iconic status. Her project included Wahpeton Dakota people from the outset; she then wrote an account that melded conventional scientific analysis and presentation of the data with reflexive discussion of the research process and narrative reconstructions of the life of a young Dakota girl.

The question of accountability can also refer to the early and ongoing effort to recover women researchers whose contributions to the history of archaeology had been lost. Similarly, queer archaeologists, while signaling the danger of writing a history of deviants, stress the importance of uncovering a queer heritage to counter sometimes brutal contemporary politics (Voss 2009).

Joyce and Tringham (2007) stress the multiplicity of voices that need to be recovered from the past. Other authors have experimented with nonconventional narrative reconstructions of archaeological data (Spector 1993) in an attempt to get away from exclusionary scientific discourse. The BACH (Berkeley Archaeologists at Çatalhöyük) project's "Remixing Çatalhöyük" website (http://okapi.dreamhosters.com/remixing/mainpage.html), in which knowledge of the Neolithic site is created and mediated through an experiment in multi-vocal "open construction," clearly draws on Ruth Tringham's earlier, explicitly feminist work (Joyce and Tringham 2007). The inclusion of a broad range of publics in archaeological debate and interpretation of the past has resulted in the development of other web-based projects, such as the "Sister Stories" hypertext work, which presents fictional accounts based on Nahuatl-language texts about the Aztec capital, Tenochtitlan (Joyce and Tringham 2007).

Identities and Embodiment

Initially, the notion of gender identity was used in a straightforward way as the compliment to a socially constructed idea of gender (Conkey and Spector 1984). While it is still used commonly in this form, the introduction of post-structuralist feminist and queer theory that challenges the notion of a stable core to identity has led to work that conceptualizes identity in nonessentialist ways. Work on the archaeology of the Chumash of coastal southern California shows that identities may only be relationally relevant, based more on practice and profession than an enduring attachment to biologically based categories (see summary of Sandra Hollimon's work in Joyce 2008). The case demonstrates that we need not assume that identities are stable or co-terminus with bodies or that age and gender categories remain universally recognized and fixed.

The limited work on masculinities in archaeology provides an interesting case of the limits of identity archaeology (Alberti 2006). In archaeology, successful accounts of historically and culturally specific masculinities have demonstrated that identities associated with male bodies are highly variable and hierarchically organized (captured by the model of "hegemonic masculinities"). Most work in this genre has been carried out on documented cases. A notable recent example is the archaeology of the University of California's chapter of the Zeta Psi fraternity (Wilkie 2010). Wilkie (2010) uses a rich array of archaeological, architectural, and documentary evidence to reconstruct the changing and heterogeneous nature of modern masculinity from the late nineteenth to mid-twentieth centuries. However, the use of the term "masculinity" outside of historical contexts may have the paradoxical effect of reinstating an ahistorical essentialism to masculinity (Alberti 2006).

The concept "embodiment" was developed to explore ways in which identity and bodies can be thought of in nonbinary ways (see Joyce 2008). This perspective accompanies a critique of the sex/gender dualism as a timeless structure. Sex is understood to be equally historically contingent; a critique that has actually been present since early in the history of gender archaeology. One result has been the development of archaeologies of embodiment and the theory of gender performativity (Joyce 2008). Embodiment indicates that all people experience their worlds from specifically embodied perspectives and, moreover, that a gap can exist between an individual's

or group's embodied experience and the norms or expectations of the dominant society. Not all people or groups experience their bodies and society's norms the same way; such norms have a differential and sometimes exclusionary impact.

Judith Butler's theory of gender performativity has been a major influence on the archaeology of embodiment. The theory has been taken in archaeology to mean that gender is a kind of incessant action involving dress, gestures, and material culture, in fluid relationship to the materiality of the physical body (Joyce 2008). Such acts enforce or naturalize sex into historically contingent organizations, stereotypically binary in the modern West.

International Perspectives

Norway, along with Sweden, saw the establishment of a feminist archaeology in the late 1970s and 1980s; the United Kingdom was also an early influence. Today, however, North American archaeological publications devoted to issues concerning feminisms, gender, and queer dominate (Fig. 1). As such, they serve as a source of inspiration for feminist archaeology in Scandinavia, although the interest does not appear to be reciprocated.

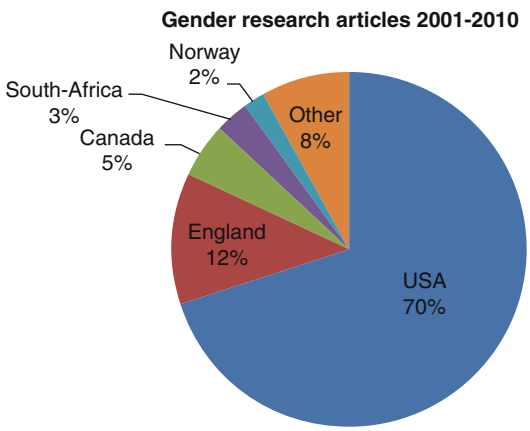

Gender, Feminist, and Queer Archaeologies: USA Perspective, Fig. 1 Number of gender research articles published in archaeology by country between 2001 and 2010 according to Thomson & Reuter's Web of Science (Arts & Humanities Citation Index, ISI). Gender research includes keywords, such as gender, feminism, masculinity, queer, embodiment, and intersectionality. There were 97 gender articles published out of a total of 3,525 archaeological articles

There are apparent differences in the scholarship on queer archaeology between North America and the United Kingdom. North American work tends more toward studies of sexuality, bodies, and performance (Schmidt and Voss 2000; Joyce 2008), whereas queer theorists in the United Kingdom and Scandinavia often take the dictum that queer is about opposition to the norm as their starting point (see contributors to Dowson 2000). Moreover, the genealogical relationship to feminism is stressed less in the United Kingdom. Exclusions in feminist scholarship have been noted, such as the assumption of normative family structures or the implication that sexuality is a secondary effect of gender (Dowson 2006); and epistemological concerns in relation to queer are more visible. Marginalization of studies of sexuality in archaeology and the recognition that the past is always already heterosexual has been linked to the question of epistemological privilege – whose account of the past is given greater credibility (Dowson 2006).

Future Directions

Work that takes gender as a social variable seems entrenched in North American archaeology. The most exciting theoretical developments, however, are in feminism and queer archaeology, including work on intersectionality, community or public archaeology, and new feminist and queer materialisms.

It has been argued that intersectionality and the postcolonial critique represent a turning point for archaeology in general (Conkey 2005: 10). Intersectionality is a means of describing and theorizing the many intersections among gender and other elements of identity, such as "race," class, age, and sexuality, within complex sociopolitical contexts. It is clear that an analysis of gender alone is inadequate – gender is constituted by its intersections. Earlier convergences between the interests of feminists and indigenous peoples in North American archaeology (e.g., Spector 1993)

have been reframed and explicitly theorized as intersectionality (Conkey 2005). Within this framework it is understood that multiple relations of domination result in privilege, differing positions and hierarchies among communities and individuals. In this light, Conkey (2005: 12) redefines gender as a contingent set of ideas and practices within multiple systems of oppression. The type of analysis entailed directs us toward the small scale, to daily lives, and the specific details of singular sets of relations. One point of intersection is the need to understand how inequality, in general, works in our present-day lives and in the lives of past peoples. However, just as intersections are needed precisely because of the partiality of perspectives, as feminist epistemology has outlined so clearly, Conkey (2005: 25) warns against scaling down or making hierarchical the relations that are intersecting, reducing, or subordinating one relation to another. Seeking clarity about gender, ironically, could produce just such a privilege.

Work in this genre includes contributions to Casella and Voss (2011), which demonstrate the constitutive intersections of sexualities, embodiments, and colonialism. Battle-Baptiste (2011) presents a non-formulaic Black feminist reflexive methodology to study the intersections of "race," gender, and class in the historical archaeology and history of Diasporic African Americans. There are also strong connections among intersectional approaches and recent Marxist archaeologies of praxis.

Although located in the United Kingdom, one model for the important convergence of feminist and queer approaches is the archaeology of the women's protest camps at Greenham Common (Marshall et al. 2009). The camps were occupied by women and children in the 1980s to protest the deployment of Cruise missiles. Spector's (1993) work, which emerged from a concern that archaeological practices and interpretation be meaningful on human terms, is a clear antecedent. In the Greenham Common case, the reflexive autoethnographic narratives of the three women researchers provide a possible model for feminist and queer archaeology, where issues of authority, vocality, and intersectionality are put into practice. Refusing to stay outside of Greenham's politics (Marshall et al. 2009: 233), their research method mirrors the queer nature of the site, with women and children living outdoors in communities and adopting practices that were threatening to heteronormative society.

On more speculative theoretical grounds, one direction that diverges from current work in North American archaeology but has its roots in queer and feminist approaches is a renewed interest in materiality. In the social sciences, in general, there is much recent interest in "post-human" approaches to materiality and identity. This is partly a response to what are thought to have been the excesses of the linguistic turn, represented in archaeology by symbolic and interpretive approaches under the umbrella of post-processualism. The theory of gender performativity, for example, would appear to give culture or discourse too much power over bodies and materiality. Archaeologists are consequently returning to the materiality of their subject matter as a source of agency in social life. In relation to sex and gender, this can take the form of a reassessment of the agency of the body conceived of as plastic and developmental rather than static. Or the body's natural variability and peoples' experiences of their embodied selves can be thought of as never fully erased by discourse and therefore free to challenge the binary gender/sex model (Joyce 2008). New queer and feminist approaches to osteoarchaeology in North America stress that knowledge of the sexed body is historically bound and thus open to future reformulations (Joyce 2008).

Tomášková (2011: 113) has recently asked whether gender archaeology is thriving. While gender in archaeology clearly has an enduring legacy and the impact of feminism on the discipline is undeniable, they arguably have not produced the sought after revolution in archaeological questions, frameworks, and practice. Has gender archaeology lost its cutting edge, its aura of creativity? One legacy of feminist archaeology is the space opened up for queer archaeology

(Dowson 2006; Voss 2009). In some ways, queer has come to occupy the position of the radical side to gender archaeology and has taken on elements of a feminist project not addressed by more orthodox feminist approaches in the discipline.

Cross-References

- ▶ Activism and Archaeology
- ▶ African Diaspora Archaeology
- ▶ Agency in Archaeological Theory
- ▶ Çatalhöyük Archaeological Site
- ▶ Colonial Encounters, Archaeology of
- ▶ Community Archaeology
- ▶ Conkey, Margaret Wright
- ▶ Engendered Archaeologies
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: European Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: A Spanish Perspective
- ▶ Gero, Joan
- ▶ Handsman, Russell G.
- ▶ Indigenous Archaeologies
- ▶ Joyce, Rosemary
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Materiality in Archaeological Theory
- ▶ Meskell, Lynn
- ▶ Post-Processualism, Development of
- ▶ Processualism in Archaeological Theory
- ▶ Sex Assessment
- ▶ Wylie, Alison

References

Alberti, B. 2006. Men, masculinities, and archaeology. In *Handbook of gender in archaeology*, ed. S. Nelson, 401–434. Walnut Creek: Altamira Press.

Battle-Baptiste, W. 2011. *Black feminist archaeology*. Walnut Creek: Left Coast Press.

Casella, E.C., and B.L. Voss, eds. 2011. *The archaeology of colonialism: Intimate encounters and sexual effects*. Cambridge: Cambridge University Press.

Conkey, M.W. 2005. Dwelling at the margins, action at the intersection? Feminist and indigenous archaeologies. *Archaeologies* 1: 9–59.

Conkey, M.W., and J. Spector. 1984. Archaeology and the study of gender. *Advances in Archaeological Method and Theory* 7: 1–38.

Dowson, T., ed. 2000. Queer archaeologies. *World Archaeology* 32: 161–165.

Dowson, T. 2006. Archaeologists, feminists and queers: Sexual politics in the construction of the past. In *Feminist anthropology: Past, present, and future*, ed. P. Geller and M. Stockett, 89–102. Philadelphia: University of Pennsylvania Press.

Gero, J.M., and M. Conkey, eds. 1991. *Engendering archaeology: Women and prehistory*. New York: Basil Blackwell.

Joyce, R.W. 2008. *Ancient bodies, ancient lives: Sex, gender, and archaeology*. New York: Thames & Hudson.

Joyce, R.W., and R. Tringham. 2007. Feminist adventures in hypertext. *Journal of Archaeological Method and Theory* 14: 328–358.

Marshall, Y. 2008. Archaeological possibilities for feminist theories of transition and transformation. *Feminist Theory* 9: 25–45.

Marshall, Y., S. Roseneil, and K. Armstrong. 2009. Situating the Greenham archaeology: An autoethnography of a feminist project. *Public Archaeology* 8: 225–245.

Nelson, S.M., ed. 2006. *Handbook of gender in archaeology*. Lanham: AltaMira Press.

Schmidt, R., and B.L. Voss, eds. 2000. *Archaeologies of sexuality*. London: Routledge.

Spector, J. 1993. *What this awl means: Feminist archaeology at a Wahpeton Dakota village*. St. Paul: Minnesota Historical Society Press.

Tomášková, S. 2011. Landscape for a good feminist. An archaeological review. *Archaeological Dialogues* 18: 109–136.

Voss, B.L. 2009. Looking for gender, finding sexuality: A queer politic of archaeology, fifteen years later. In *Que(e)rying archaeology: Proceedings of the 37th Annual Chacmool Conference*, ed. S. Terendy, N. Lyons, and M. Janse-Smekal, 29–39. Calgary: University of Calgary.

Wilkie, L.A. 2010. *The lost boys of Zeta Psi: A historical archaeology of masculinity at a university fraternity*. Berkeley: University of California Press.

Wylie, A. 1992. The interplay of evidential constraints and political interests: Recent archaeological work on gender. *American Antiquity* 57: 15–34.

Wylie, A. 2007. Doing archaeology as a feminist: Introduction. *Journal of Archaeological Method and Theory* 14: 209–216.

Genealogy on the Web: Benefits and Limitations

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Introduction

Probable conclusions about the ways people lived in the past can be made by archaeologists, genealogists, and family historians by using the same or similar resources for their research. Before the arrival of the Internet, researchers from these disciplines visited archives, libraries, and other repositories to view historical records, and their means of communication was by letter or telephone. Today's researchers can use the Internet which has provided a platform for resources to be shared in what is often called the world's largest library (Paton 2011: 1) – the World Wide Web (the Web). The Web has revolutionized the way people research, learn, and communicate both commercially and socially. It has benefits for archaeologists, genealogists, and family historians because of the opportunities to extend their research internationally and communicate with others easily. While the Web has many advantages for genealogical researchers, it also has some limitations.

A genealogical family tree whether digital or on paper is a database of personal information about individuals connected to one another by lines of family descent. It gives the names, dates, and events such as a birth, marriage, or death and the places that these occurred. As their research progresses, genealogists and family historians broaden their investigation to include the occupations, military service, and other social history that involve their ancestors and extended family. They can spend many decades researching, collating family trees and histories, and sharing their results with members of their family or the wider community. Archaeologists can find useful information for their research among the records produced for and by genealogists and family historians (▶ "Genealogy, Its Relevance to Archaeology").

Definition

A genealogist researches and traces "the descent of a person or family through an ancestral line" (Macquarie Dictionary 2018). Genealogists may have formal training, or through the experience of researching their own family, they advance to working as a professional genealogist. Family historians may work in a professional capacity but are usually researching their own family's genealogy and history.

The Internet, also known as the "Net," is defined as "the communications system created by the interconnecting networks of computers around the world" (Macquarie Dictionary 2018). The World Wide Web, also known as the "Web," is defined as "a large-scale, networked information system for documents in HTML released to users of the Internet" (Macquarie Dictionary 2018).

Historical Background

In the past, genealogical research was conducted in organizations such as archives, libraries, or church parishes for the records necessary to create a family tree, with additional information being provided by members of the family. Because letters were the main means of communication (Barratt 2010: 19), these, together with other documents, memorabilia, and oral histories were the ways genealogists and family historians learned about their family. However, this meant that a considerable amount of time was involved in correspondence, telephone calls or travel to visit these people and places, often limiting the access of genealogical resources to people who were financially better off or retired (Lynch 2008: 1).

In 1996, online family history research was launched by Ancestry Publishing (Ancestry Corporate 2018), and in 2003 Findmypast was licensed to publish birth, death, and marriage indexes online (Findmypast 2018). Since then, more and more records have been uploaded to the Web and are available to subscribers. The advent of the Internet has now changed the way genealogical and family history research is conducted; it is no longer necessary for people to

visit archival repositories because they can research from the comfort of home, and all that is needed is a computer and access to the Internet. This is beneficial for everyone but especially to the elderly or those with physical impairments who are restricted or confined. Records can be accessed from archives in other cities, counties, states, or countries. There are archival, subscription, organizational, and personal websites that provide genealogical resources, making family history research easier. More information can be gleaned in less time, and cross-checking and communication with archival repositories and other researchers can be more straightforward.

The amount of genealogical research material that is now available online is greater than ever before (Paton 2011: 1). However, this can mislead genealogists and family historians into assuming that finding ancestors on the Web is an easy exercise; it is not, and it may take many years to follow a trail with success (Barratt 2010: 9). Researchers may also believe that because it is in print or online, it is correct, and this is not always the case.

With the advent of the Internet and growth of resources on the Web since the early twenty-first century, genealogy is enjoying renewed interest and media attention. It is a growing industry and produces many useful resources for both genealogists and archaeologists.

Key Issues/Current Debates

Original documents are one of the primary sources of information used by genealogists and family historians; thus archives, other organizations, and private individuals are increasingly digitizing and uploading records onto their websites. While the Internet has made research easier, there are some experienced genealogists who believe that it should not be the primary source of information but used as a starting point and a means to extend their research (Barratt 2010: 9; Hicks 2011: 7).

Sharing over the Internet

Hand-drawn family trees are being replaced by computer-generated trees, and genealogists can share their research over the Internet. This can be done by creating a family tree on a computer database called a GEDCOM file (GEnealogical Data COMmunications) (Barratt 2010: 33–34). The GEDCOM file can be uploaded to a personal website or a subscription website such as Ancestry or Findmypast, and then viewed and downloaded by someone else. It is not necessary to purchase a genealogical computer program because GEDCOM files can also be created on subscription websites and can be viewed and added to during the life of the subscription. If the subscription is not renewed, alterations and additions cannot be made to the family tree, but it is usual for it to remain on the host site. This ease of access to pre-prepared family trees via GEDCOM files can be beneficial to other researchers, but indiscriminate downloading without checking the accuracy of another person's tree can also create problems for genealogists.

Internet Concerns

One concern that is currently debated by the genealogical community is the ease that the Internet provides information to a researcher and its potential for errors. While it has been argued that the Internet is a benefit to genealogical research, one of the questions concerns the attributes of the researcher, for example, does the person have genealogical research skills? Are they following correct genealogical procedures? Are they recording the source of their information? Do they have backup support of experienced genealogists through society or other membership of a genealogical authority? Because researchers can upload their research via a GEDCOM file and share it, if they have made mistakes and incorrect assumptions, these are perpetuated when the files are downloaded by others. The accuracy of another person's GEDCOM file should always be checked before importing it into a database.

Commercial Enterprises and Subscription Websites

Subscription websites such as Findmypast and Ancestry provide original documents to fee-paying subscribers who can search the records and create a family tree, attaching the documents, photographs, and stories to the people

on the tree (Barratt 2010: 90; Paton 2011: 10, 184). Subscription websites may be available for free at public libraries, and genealogy societies usually have a library subscription which is available to their members. These websites vary in their resource content but can include birth, marriage, and death certificates, census records, UK 1939 Register, and military, occupational, and school records (Ancestry 2018; Findmypast 2018). The subscriber can choose to keep their family tree private (Barratt 2010: 33) or make it visible to other subscribers (Paton 2011: 184) who are able to download the tree via a GEDCOM file if they see family connections. This provides an easy-to-use system of building a family database; but, it does come with a few disadvantages such as the limitations of the researchers as previously discussed. However, subscription websites do provide tutorials and newsletters to their subscribers to assist them in the correct procedures of genealogical research, using their sites to best advantage.

Not all genealogists are experienced researchers; thus, the accuracy of their data may be compromised. If documents are attached to the person, then they can be checked, but if they are not, then it is possible that the data may be poorly sourced and referenced. The researcher may have made assumptions about another person's research and attached their tree to their own. All family trees and other archival material attached to them may have transcription or research errors in the recording of information by another genealogist, family historian, or archive. All information should be verified with original documentation where possible or at least a question mark if it is unsure or unknown; otherwise it can result in the importation of a flawed GEDCOM file (Barratt 2010: 37).

In his discussion of resources, Dale Johns (2017), President of the South Australian Genealogy & Heraldry Society Inc., stated:

> The challenge for the researcher is to identify credible, authoritative and reliable sources of information to accurately portray the lives of their subject families and in turn provide valid sources (of) genealogical knowledge.

Genealogy Societies

Genealogy on the Web can create a state of ambivalence for some genealogy societies who have large library holdings and records. Digitization of records is slow, and meticulous care is needed when transcribing from original documents and creating indexes, and local knowledge is useful for this process to minimize errors. While societies are actively scanning their records, indexing, and making them available to their members, they are questioning just how much they should put online. One solution is to make the indexes available to nonmembers with access to the full records on joining the society. The more that societies put online, the easier it is for members to research from home and the less face-to-face contact they will have with the society and the support it provides. A greater online presence could result in fewer people needed for the operation of societies, and thus over time their knowledge and expertise are lost. Frustration does occur in researchers who do not check beforehand but travel to genealogy societies and historical archives to find that records are now only available online at subscription or pay-to-view websites.

Addressing Some Limitations

Unlike academic research there is a limited peer-review process that family historians undergo before publishing their family trees or stories online or in print. Genealogy societies and universities are seeking to address these issues by conducting courses; many of them are online (▶ "Genealogy, Its Relevance to Archaeology"). There are also legal issues regarding publishing information about living people because of identity theft and privacy concerns; therefore, publishing online becomes an issue of invasion of privacy if written permission to publish was not obtained beforehand. Uninformed family historians may be breaching copyright by using photographs or maps lifted from the Web without permission, or they may not be acknowledging their sources. Better support and education will address these issues, but it requires the genealogist or family historian to avail themselves of it by enrolling in

courses or joining a genealogical society; stay at home Web researchers may not do this.

Social Media and Genealogy

In the past, the means of mass communication was by newspaper, radio, or television. Families who wanted to announce a birth, marriage, or death usually did so with an advertisement in the personal pages of their local newspaper. These announcements can still be found by a search of the newspaper concerned. Libraries, other archives, and some genealogy societies keep digital and sometimes physical copies of the newspaper announcements so that it is still possible to search and view advertisements that may be decades old. However, today's society has embraced social media such as Facebook, Twitter, Myspace, and Flickr, and it has now become the place to announce special events: arrivals of new family members, departures of others, and marriages or relationships, together with the associated photographs. Although social media has not replaced newspaper announcements entirely, it has become a quick and easy alternative. The benefit of newspaper personal pages is that they can be scanned or transcribed and a searchable index created for future use. Social media does not have an index, and so it is impossible to look up an announcement without scrolling through the personal pages of the individuals concerned. Unless a researcher has been granted access to a personal page, this course of action is not available to them.

Social media has its benefits; it is a way of recording what is happening in a person's life today, but as Nick Barratt (2010: 268) has pointed out the information is limited in its historical value due to its sometimes unremarkable content. However, it is a form of personal archive that may be useful if an easy method of searching becomes possible in the future. Genealogists and family historians who are aware of and connected to family members on social media can keep up to date with their events, occupations, illnesses, hobbies, holidays, and personal opinions. It is not the preferred method of creating a family tree and archive, but it is a starting point to ask questions and request further information such as scanned copies of documentary evidence. This can then be recorded using traditional genealogical methods (Barratt 2010: 11–22; Adolph 2008: 21–23, 25).

The establishment of a place to put personal information for the benefit of family or society in the future is suggested by Nick Barratt (2010: 265–276) who favors a method of creating a personal archive using an online platform. This becomes a place for individuals to store their personal documents, photographs, memories, and family stories. It can be shared with family and the community, and this can be done by personal choice.

Privacy Concerns on the Web

Social media has changed society's views on privacy and what is acceptable to share with friends, family, and the public. It appears that people are more willing to share on social media, intimate details that would once have been kept private, but they are also concerned about an invasion of their privacy. In their research genealogists and family historians are not only creating records about themselves but are including others in their data collection and published results. Researchers who are using social media to add people and their personal information to a family tree must be aware that although it may be posted online, this is not deemed to have permission to share via a published tree or story. It is a usual genealogical practice not to publish data about people born less than 100 years ago or those still living (Paton 2011: 4), and to seek written permission before adding anyone to an intended publication. There are other privacy concerns such as family secrets and sensitive issues that need to be accommodated and should be considered by genealogists and family historians, as well as taking precautions against invasion of privacy and identity theft. Privacy settings on social media and subscription websites can be adjusted to suit the user and the needs of their individual family members (Barratt 2010: 275–276; Paton 2011: 4). These should also be respected in online and print publications.

Users of social media and subscription websites should also ensure they read and understand the terms and conditions of use before committing themselves (Barratt 2010: 275–276).

International Perspectives

Websites for Genealogists

The Web has a global reach, and it is possible to discover resources that archaeologists can find useful for their research on the same websites used by genealogists and family historians. This is because these researchers don't always confine their sources to just birth, death, and marriage certificates but use a variety of documents from archives and other documents such as land deeds, maps, military, and immigration records. The purpose of this is to broaden the details beyond the sometimes mundane, chronological data found on a family tree, thus enriching the family record with a social history (▶ "Genealogy, Its Relevance to Archaeology").

A simple Web search using the words "genealogy resources" will yield over 2 million results, and the word "genealogy" yields over 32 million. Not all will be useful for archaeologists, but it will reveal many that are worth investigation when the search is narrowed to specifics. Websites such as the National Archives ARCHON Directory (Barratt 2010: 98; Paton 2011: 8) provide links to archives within the United Kingdom and overseas and are a valuable resource for both genealogists and archaeologists. Libraries and genealogical societies can also provide a list of links to suitable family history websites, as will most recent genealogical "how to trace your family history" books and magazines. Archaeologists should consider taking advantage of these directories and links and to other sites known as "gateway sites" to access further resources.

A gateway site can provide links to other online sites (Paton 2011: 4). One of the largest genealogical gateway sites is Cyndi's List of Genealogy Sites on the Internet (Barratt 2010: 39; Hicks 2011: 9). This site is categorized alphabetically and cross-referenced and allows users to suggest new genealogical links for consideration. The site also includes thousands of links to genealogical and historical resources in various countries that are of interest to archaeologists, such as newspapers, canals, rivers and waterways, cemeteries, DNA, migration, land records, libraries, archives, museums, maps, and research methodology.

Genealogists also use the Web to access historical information and check dates, old place names, and conversions such as weights, measurements, temperatures, and currency and language translation to obtain the gist of foreign language letters and documents (Lynch 2008: 87–101). There are also discussion forums and blogs that genealogists use to share their research or ask questions (Paton 2011: 186–187).

Education for Genealogists

Online genealogical studies can be undertaken at universities and colleges allowing students to enroll at their educational institution of choice providing they meet the enrolment requirements. In some courses students are granted access to genealogy subscription websites and often engage in the study by researching their own family. There are many benefits of online courses because students may be able to study at a distance relatively inexpensively; the limitations are the lack of face-to-face contact with lecturers which for some students is a negative if they need support and are more productive with guidance (▶ "Genealogy, Its Relevance to Archaeology").

DNA Testing

DNA testing is now very popular with genealogists and family historians who are participating in autosomal, mitochondrial, and Y-DNA tests with various testing companies (Ancestry 2018; Family Tree DNA 2018). Results are compared with other people who have also tested, and they communicate with each other via online DNA forums within the company site. They also communicate using forums on social media. All these forums have a common connection such as country, family name, or genetic similarity.

Future Directions

No longer restricted to resources in their own country, the Web has made it easy for genealogists and family historians to research their ancestors and extended family. They are enjoying a proliferation of documents that have been provided by a worldwide network of archives, libraries, societies, businesses, subscription websites, and other individuals. Once located many of these records can be downloaded or their details taken in a relatively short period of time. Researchers now spend their time searching, cross-referencing, building their resources and family trees, and communicating over the Internet instead of travelling to repositories or writing letters, paying fees, and waiting for the results. Today's genealogists and family historians get better value for money because many resources are free and even a subscription or pay-to-view website is relatively inexpensive.

Gateway sites with their diverse links and international reach have shown researchers the potential for other kinds of resources that are available to them, and archives that have provided cross-links with other archives are doing the same. These sites have links to resources that are of use to genealogists and family historians, and there may be some that are of use to archaeologists.

Genealogy societies, universities, colleges, subscription websites, and individuals are continuing to educate genealogists and family historians on best practice, and this is available via online courses or discussion groups. This furthering of skills will enable the data created by these researchers to be more accurate so that GEDCOM files are more reliable.

Educational institutions and genealogy societies need to provide the support to genealogists and family historians regarding privacy, copyright, and due acknowledgment as more of them write their family histories and publish on the Web. They may also wish to consider a peer-review process before publishing articles in their journals both online and in print.

As more records become available on the Web, genealogy societies will continue to question the benefits of putting their records online. If they do so, they may lose membership, knowledgeable staff, and volunteers and become redundant.

Social media will continue to absorb the time and the minds of society who will persist in announcing special events on this platform. It will probably need the efforts of dedicated family historians to involve themselves in a more professional approach by contacting their family personally and asking for information, documents, and photographs. Online personal archives may become a popular pastime and provide an insight into the social history of the twenty-first century.

DNA studies will continue to fascinate society and may prove useful to archaeologists and anthropologists in the future as more people are tested and involve themselves in country, ethnic, and name studies among others.

Archaeologists may have no need for a genealogical family tree for their study, but some of the resources that genealogists and family historians use may be of value to them. There are many books written about genealogy and the availability of resources on the Web that are worth investigation, and if archaeologists examine them bearing in mind the limitations, they will find many that are of benefit.

Cross-References

► Genealogy, Its Relevance to Archaeology

References

Adolph, Anthony. 2008. In *Collins: Tracing your family history*, ed. Emma Callery. London: Harper Collins.

Ancestry. 2018. *Unlock the family story in your DNA*. Ancestry. https://www.ancestry.com.au/?geo_a=r&o_iid=41019&o_lid=41019&o_sch=Web+Property. Accessed 7 Mar 2018.

Ancestry Corporate. 2018. Ancestry. http://www.ancestry.com/corporate/. Accessed 7 Mar 2018.

Barratt, Nick. 2010. *Nick Barratt's beginner's guide to your ancestor's lives*. Barnsley: Pen & Sword Books.

Family Tree DNA. 2018. DNA testing for ancestry and genealogy. https://www.familytreedna.com/?idev_id=1625&utm_source=1625&utm_medium=affiliate. Accessed 24 Feb 2018.

Findmypast. 2018. https://www.findmypast.co.uk. Accessed 7 Mar 2018.

G

Hicks, S. 2011. *It's not all online: A guide to genealogy sources offline*. Modbury: Unlock the Past.
Johns, Dale. 2017. From the president. *The South Australian Genealogist* 44: 3–3.
Lynch, Daniel M. 2008. *Google your family tree: Unlock the hidden power of Google*. Provo: FamilyLink.
Macquarie Dictionary. 2018. Macmillan Publishers Australia. https://www.macquariedictionary.com.au. Accessed 7 Mar 2018.
Paton, Chris. 2011. *Tracing your family history on the internet: A guide for family historians*. Barnsley: Pen & Sword Books.

Further Readings

ARCHON Directory: Find an archive in the UK and beyond. (n.d.). The National Archives. http://discovery.nationalarchives.gov.uk/find-an-archive. Accessed 13 Mar 2018.
Cyndi's List of Genealogy Sites on the Internet. 2018. Cyndi Ingle. https://www.cyndislist.com. Accessed 7 Mar 2018.
Scott, Jonathan. 2015. *Family history web directory*. Barnsley: Pen & Sword Books.

Genealogy, Its Relevance to Archaeology

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Introduction

Genealogists and family historians can produce records that are a useful resource for archaeologists. These researchers trace ancestral lines of descent. To do this they use several different resources which may include but are not limited to archival records, their own or other family knowledge, oral histories, and memorabilia such as a family bible, medals, photographs, diaries, letters, and other written works. Their research may include data from several countries and take many years to complete. An inquiring mind and patience are needed to piece together the evidence necessary to create a genealogy or family history.

Most family genealogies and histories are not about the wealthy, well known, famous, or infamous. This means that the stories that are uncovered are not necessarily recorded in history books other than as a general reference to "the people," "the inhabitants of," or "ordinary folk." The contributions of these people to society by their work, civic duty, military service, or roles as family members often go unacknowledged except in the oral histories of their families. A consequence of genealogists and family historians compiling genealogical studies is the creation of a record of the lives of past populations as they attended to their daily activities, and as such they are providing a social history of the time.

Definition

The Macquarie Dictionary (2018) states that "genealogy (is) an account of the descent of a person or family through an ancestral line", and "the investigation of pedigrees as a department of knowledge." The word is Middle English which descends from the Late Latin word *genealogia*, which is derived from Greek meaning "tracing of descent."

A genealogist is a person who is either self-taught or tertiary trained, working in the field of genealogical research for others usually for a fee but not always. Some genealogists begin their career by researching their own family's genealogy, and because of their experience, they progress from there to working as a professional researcher. They are usually a member of a genealogical society and abide by a code of ethics. Occasionally genealogists give lectures about their specialty both locally and overseas, write books about genealogical research, or teach.

Family historians usually conduct genealogical research about their own family; they may also be self-taught, but increasingly like professional genealogists, they can further their knowledge and research skills by undertaking courses now offered at universities, private colleges, or genealogy societies. Family historians are often known as the "family genealogist." They undertake research on behalf of their family, collating the information, creating family trees, and sometimes publishing the results in the form of charts or books either in print or online. They may work

in collaboration with other members of their family both locally and overseas. Over time they acquire many skills and experience researching in archives and libraries, and become familiar with the history of the occupations, journeys, and places that involve their ancestors.

Historical Background

In the past, wealthy families kept genealogical records for reasons such as proof of lineage for marriage purposes, entitlement to birthright, or inheritance of property (Barratt 2010: 28). As people ventured to other parts of the world in greater waves of migration, their descendants have taken a growing interest in the origins of their ancestors resulting in an increasing number of family genealogists in the twentieth century. Before the emergence of the Internet, it was customary to either conduct the search yourself or engage the services of a professional genealogist. If an overseas search was necessary, then communication occurred by letter with time and cost making it prohibitive for some. Accordingly, most genealogical research was undertaken by literate people and those with considerable leisure time.

Genealogy societies developed due to the interest of genealogists and family historians who were willing to volunteer their time to create the resources needed to find out about their family history, and assist others to do the same. This initiative has resulted in the compilation of a vast amount of records suitable for genealogical and family history research. Society libraries and archives have grown and so have the collective knowledge and experience of those involved in maintaining them. In more recent times, much of this material has been digitized and put online for easy access via the Internet.

Genealogy society members come from all sectors of society; however, today's societies include among their membership a greater number of former academics and other professionals with tertiary qualifications such as historians, archivists, teachers, medical personnel, librarians, accountants, lawyers, engineers, and business owners. They will often apply their expertise to assist others or to create society resources suitable for family history research. They may be able to read Latin or old handwriting or have foreign language skills. Lawyers may interpret old wills, and architects assist with house and building plans. Teachers may take photos of schools and create an archive, and social workers or medical personnel may compile and maintain destitute asylum or old hospital record indexes. Others apply their skills to maintaining cemetery records, shipping records, or focusing on countries or localities. Their scholarly approach to research, referencing, and writing results in their work being a reliable contribution to the body of social historical knowledge (Triolo et al. 2017: 8).

Primarily a hobby for many and an occupation for relatively few, genealogy and family history have become a large-scale commercial activity and an alternative historical archive and human resource for other disciplines such as archaeology.

Key Issues/Current Debates

One of the key issues in genealogy is the accuracy of the research and recording process; if it is not done correctly or the research is not thorough, much time, money, and effort can be wasted tracing the wrong family over several generations. It is fortuitous when a mistake is found, but by then many years may have passed, and published charts and books will necessitate correction. There is a research and recording process that genealogists follow to lessen the chance of error.

Researching and Recording: The Process

Genealogists begin their research by working from the known to the unknown. For example, they may begin with themselves and work back through time recording their parents' details and then grandparents, great-grandparents, and other ancestors in turn (Adolph 2008: 14; Barratt 2010: 11). As the research proceeds, they record other members of the family, siblings, uncles, aunts, cousins, and partners. Vital records such as birth, death, and marriage certificates are the primary sources that give names, dates, and places of these events and

form the basis of the family tree. Depending on the requirements at the time, these records will often give names of the parents and occupation of the father and names of any witnesses. Archives, libraries, newspapers, letters, bibles, and wills are some of the other documents searched for evidence of family; this expands on the basic data and adds to the family story. Information should be confirmed by two or more sources, and these should be noted and referenced. Any inconsistencies should be question-marked for further research.

Best practice recommends keeping thorough and accurate records, and there are some conventional ways that genealogists do this. A record of searches and results both negative and positive including sources are logged in a logbook or a computer database, and should include names of the archive or document searched and the date. Speculation that is not backed up by documentary or other verification is discouraged, but inevitably some sources will be unverifiable or incorrect due to the way the document was created. For example, a name may be mispronounced by the informant and recorded incorrectly, or the exact date or place forgotten due to the veracity of the memory, or information may be falsified for various reasons. The genealogist's logbook becomes a useful tool for future research and equates with an archaeologist's field logbook.

There are recording conventions (Adolph 2008: 22; Barratt 2010: 23) that genealogists adhere to when creating charts; these simplify the data, clarify any ambiguities, and will make following a person or a family easier. It is wise for archaeologists who are creating genealogical charts for their historical reports to use these conventions, or alternatively engage the services of a genealogist to do the research and present the chart so that the work can be interpreted correctly by others in the future.

Computers and Genealogy

The once time-consuming job of creating paper records and charts has now been automated by genealogical computer programs. These programs are becoming more sophisticated in their ability to store genealogical data such as names, dates, and other information about people on the family tree. There is also the ability to indicate a source document and to attach a scanned or downloaded copy of the document or photograph to the individual concerned. Depending on the program, audio files and video files can also be attached, and some programs are able to link to a geographic locator or external website. Various family history charts and reports can be created and printed. These can be likened to a biographical index displaying details about names, dates, events, and places in a narrative; however, they do not replace a fully researched and written family history.

Genealogists can share their computer-generated family trees by using family history Genealogical Data Communications (GEDCOM) software, either by emailing the tree to another researcher or by uploading it to their own or an external website (Barratt 2010: 33). This allows others to view the tree and download it, adding it to their own if matches are found. There are advantages and limitations to using genealogical data created by others, and these are discussed in ▶ "Genealogy on the Web: Benefits and Limitations".

Writing Family History

The completed genealogical chart while useful and interesting provides the record of the family: the names, dates and places of birth, marriages, and death. However, it is the additional information about occupations, achievements, military service, travel, sports, hobbies, health, wealth, and possessions that adds flesh to the genealogical skeleton, and thus it becomes a more useful resource for archaeologists.

After compiling their genealogies, some family historians publish their research in print or online. This can take the form of a family history, family biographical index, biography, autobiography, genealogical chart, or a diary transcription. It may also include a substantial amount of detail about migration or the local history of a town, place, or building such as a school, hospital, or civic center. However, like some early local histories (Triolo et al. 2017: 7), family histories may be limited in their readability and consist of chronological historical data and names with an uninspiring storyline. Poor referencing and unstated sources prove to be another limitation

that reduces the value of the information. However, while early family histories may have their limitations, they can be a guide or starting point for further research.

Some genealogy societies are addressing these limitations by providing support to their members by way of a writing group; they may also convene genealogical research, recording, writing, and publishing seminars; publish "how to write your family history" books; or add them to their collections. They invite entries into their family history book awards (Wilson 2018) and encourage authors to donate a copy of their book to their library. Publishing and printing houses are more aware of the growing interest in writing among family historians, and they are accommodating their needs by hosting seminars and dedicating staff to service them. While family histories will have greatest readership among family members, the works are a valuable contribution to the body of knowledge of the social history of a time and place, and as such they are receiving more consideration from historians (Dymond 2016: 158–160). It is in this context that archaeologists can review these published works when they are researching social history.

The Importance of Meaning

Heirlooms and memorabilia, photographs, archives, and property are among the possessions that hold special meaning for family historians who may record their significance in photographs or stories. Sometimes the memorabilia become part of an inheritance remaining in the family for several generations, and the stories of its ownership and when and how it was used are passed on. This puts the memorabilia into an historical context and gives it a place within the family as a direct conduit to its original owner.

With a desire to imbue experiential response into archaeology, Michael Shanks (1991: 58) suggests that by exploring what an object meant to its owner, value can be attached to a trivial find. By communicating with family historians, archaeologists may derive better insights into social customs, traditions, and the meaning of their possessions or places, thereby coming to better conclusions about their archaeological investigations.

Researching Family Property

The types of records that family historians keep in their collections or access at the archives sometimes concern the homes, properties, or farms that their ancestors owned or lived in (Adolph 2008: 148–155; Barratt 2010: 114–120). Photographs, plans, and land titles are some of the records they may have in their possession. They may also have a more intimate knowledge of the property if they resided there such as: information such as the location of buildings, outhouses, rubbish tips, or other features. Some places may have been a part of the original settlement of an area. Family historians may also include the family home in their written historical account of their ancestors (Triolo et al. 2017: 8). This detailed knowledge may provide useful information to archaeologists researching a home, farm, or township, especially if there are plans and photographs included.

Cemetery Indexes and Photographs

Cemetery headstones provide genealogists with critical evidence about their family members and occasionally may also list multiple members of the same family. The deceased person's name, date of birth and death, and sometimes other useful information about their life such as occupation or military service are obtained from them. Because of the importance of headstones, some genealogy societies have a dedicated team of volunteers who have photographed and recorded the inscriptions over time, preserving the data in their archives. These photographic indexes are a valuable resource to archaeologists who are studying historical cemeteries especially where headstones have been lost or damaged due to time, vandalism, or the contemporary practice of gravesite reuse. Contact with the genealogical community may also reveal descendants who are willing to share information that will assist in archaeological studies, such as their ancestors' social status, occupation, or health.

DNA in Family History

The genealogy community is taking advantage of the availability of DNA tests. For some, it is to find genetic matches to further their research or confirm lineage where the paper trail is lacking, and for others it is the eagerness to find lost family

members due to adoption, abandonment, or, in the case of Indigenous Australians, forced separation due to Commonwealth government policy (MacDonald 1995: ix). Many people are simply curious about their genetic origins. Findings will sometimes provide unexpected results, for example, a Y-DNA test may disclose a paternity anomaly and disprove a well-researched and well-referenced paper trail. Some genealogy societies provide a DNA support group (Genealogy SA 2018) for their members who then become familiar with the terminology and tests, and may also share their results with DNA projects that focus on a surname, region, or country or with the National Geographic's Genographic Project (Family Tree DNA 2018).

The discovery that caught the attention of archaeologists, historians, scientists, genealogists, and the public in recent times was the collaborative efforts of the team involved in the archaeological excavation and scientific study of the remains of King Richard III. The merit of both genealogical research and DNA was effectively used to confirm the king's identity by establishing a genetic link via mitochondrial DNA inherited through female lines of descent. Working from the known to the unknown using historical genealogical charts, two descendants of Richard's sister, Anne of York were traced and genetically tested, and their mitochondrial DNA matched that of the skeleton. Further tests were done on fragmented Y-chromosome DNA to find a match with five patrilineal relatives without success; however, radiocarbon dating and other visible factors together with the DNA match provided evidence that the remains had a high probability of being those of King Richard III (King and Schurer 2015).

International Perspectives

It is evident from the worldwide spread of genealogical activities (Adolph 2008: 7) that people are curious about their ancestral origins. Through the efforts of the genealogical community, archives, subscription websites, and the Internet (▶ "Genealogy on the Web: Benefits and Limitations"), access to resources is easier and has enabled many more people to research their family's history. People are also travelling to places where their ancestors originated from and are combining research or education with tourism (Adolph 2008: 6).

Genealogy Societies and Regulatory Bodies

Each country or region may have one or several genealogy societies or regulatory bodies that service the needs of the genealogical community and the public. They are often not-for-profit organizations with a formal and legal constitution that dictates their purpose and conduct and that of their membership who may be bound by a code of ethics. A search on the Internet will provide a list of the organizations in each country. The following are some examples of the services provided. In the USA, the Board for Certification of Genealogists (BCG) (2018) has a code of ethics, promotes high standards, and provides certification to candidates who attain competency. In 2014, the BCG published a book of genealogy standards. The Society of Genealogists (n.d.) in London was established in 1911; among other support, it provides educational lectures and workshops and has a substantial library. In Australia and New Zealand, genealogy, family history, and other allied groups are supported by the Australasian Federation of Family History Organizations Inc. (AFFHO) (2018) which was established in 1978. Among its roles, the organization promotes family history research, provides a code of ethics, lobbies the government when necessary on issues relating to access of family history information, monitors international trends in genealogy and family history, and disseminates information to its members. The organization also initiated National Family History Month held annually in Australia, and supports the Australasian Congress on Genealogy and Heraldry held in a different city in Australia or New Zealand every 3 years. This congress provides worldwide perspectives through international speakers.

Genealogy societies network with each other as well as with other archives and history-related

groups. This association can be with both local and overseas organizations, such as the German-Australian Genealogy and History Alliance (2017). This member organization encourages the sharing of research and resources about the history and heritage of German-Australians. It is a partner of the International German Genealogy Partnership whose members are derived from genealogical organizations and societies in the USA, Germany, Canada, England, Australia, and Brazil. The research and resources generated by these organizations contribute to the social history of their region and are shared at conferences.

Qualifications and Professional Development

There are many courses that are developing professionalism in genealogy studies internationally. For example, in Australia, the University of Tasmania (2018) offers a fully online course of eight units with a focus on introducing students to family history research. The subjects cover researching convict ancestors, military records, and oral history; writing family history and photo essays; and interpreting family memorabilia and putting it into historical context. In the UK, the University of Strathclyde (n.d.) offers postgraduate studies that can lead to professional recognition and membership of the Association of Scottish Genealogists and Researchers in Archives (ASGRA) and the Association of Genealogists and Researchers in Archives (AGRA). Graduates may also be included on the Register of Qualified Genealogists (RQG). As students progress through the course, they not only study sources and genealogical methods and practice in the UK and Ireland but also in Europe, the USA and Canada, Australia, and New Zealand, Jewish genealogy and DNA. The National Genealogical Society (2018) in the USA gives several options for furthering professional studies in genealogy, for example, there is a certificate course at Boston University, and the Department of History at Brigham Young University in Utah offers a BA in Family History/Genealogy program where genealogy can be taken as a major or minor.

Future Directions

The future direction of the genealogical community will be driven by several determinants: genealogists and family historians, genealogy societies and their affiliated member organizations, archives, libraries, subscription websites, universities, and the public. There is an opportunity for other disciplines such as archaeology to add value to the development of genealogy and family history.

The Future for the Family Historian

The Internet has changed the way that genealogy and family history are researched and allowed more people to become involved in its study. Some challenges for family historians are the same as those for genealogy societies and organizations, for example, keeping up with technology and the future preservation of records.

If they are not already doing so, family historians should become familiar with genealogy best practice when researching, recording, and presenting results. If they are using the information and genealogies of others, these should be scrutinized and the sources checked for accuracy. The same applies to information found on the Internet because not everyone has scholarly research skills and some of their findings may be incorrect.

For archaeologists, the benefits of joining a genealogical society are found in the support provided to researchers. The genealogy community is active both locally and internationally, and by attending seminars and conferences, family historians will keep abreast of genealogical knowledge. Many family historians have already taken advantage of formal studies, and others are honing their literary skills to improve the quality of their research and writing. Both will make the future of their work more reliable as a contribution to social history.

There are some important aspects of genealogy that may be missed in the eagerness of creating a family tree or history and publishing it. For example, there are privacy laws, and so details about living people should not be published without consent. Family historians should also be aware

of the impact that the disclosure of sensitive information may have on some people. Copyright laws and due acknowledgment protect the work of others. Family historians will do well to abide by a genealogical code of ethics.

DNA is probably an unexpected and interesting way to do family history research, and is fast becoming a popular activity. However, once a match or close match is found, there still involves a considerable amount of archival research, following the paper trail to ascertain the connections.

Genealogy for the family historian is not going to slow down; what will change is the way it is conducted and the number of people undertaking it – the advent of the Internet has proven that. What must happen is what has been said before, a more discerning approach to research, recording, creating charts and writing, if the information is to be taken as an historical account of the past thereby becoming more useful as a social history for genealogists, archaeologists, and historians.

Challenges and Future Directions for Genealogy Societies and Organizations

Some societies have been operating since the beginning of the twentieth century, and over this time societies with an active membership have amassed a large collection of resources such as books, school, hospital and destitute asylum indexes and records, photographs, maps, newspaper cuttings, eulogies, and published family histories and genealogies. They have become an alternative repository for the social history of a place. Some of the challenges they face into the future are the undertaking of the preservation of their archives and resources by scanning and digitizing the records, then creating adequate and accurate indexes for ease of use, and finally using archival quality storage of the records.

Future challenges include keeping up to date with new software so that these records are available in a useable format for the future, and making decisions as to whom they make these records available, for example, allowing full access to members but nonmembers have access to indexes only. Societies need to find ways to remain relevant in the age of the Internet where resources are so easily accessed from home. They can do this by educating genealogists and family historians on best practice methods of research and recording so that their work is accurate, referenced, and as reliable as possible. They will also be supporting the genealogy community by continuing to keep an international perspective and ensure that the free-flow of information between countries is enabled via visiting speakers, congresses, and exhibitions.

Communicating with the public regarding the value of family history and its archives, and building closer relationships with other community groups including Indigenous people and new migrants will lead to better social inclusion, and thereby diversify the records and sources for genealogical research in the future. The value of genealogical records, research and expertise will be further understood if the genealogical community builds closer relationships with other archives and libraries. Also, by assisting others such as archaeologists and historians with their research, and at the same time, informing genealogists and family historian about archaeological practice and how both disciplines can benefit one another.

Genealogy and Archaeological Research

Genealogy is a community initiative, a desire on the part of family historians to reach into the past to find out about their origins and record and preserve it for future generations. Archaeologists may play a role in how genealogy progresses in the future by involving the community in the historical (Diaz-Andreu and Ruiz 2017) or practical aspects of archaeological studies. Larry Zimmerman (2014: 19) proposed that rather than merely studying the distant past, archaeologists should be more politically active in their practice by working with stakeholders and non-archaeologists. Together they may change societal attitudes or government policies. This adds a political dimension to archaeology in contemporary society. This adds a political dimension to archaeology in contemporary society. Whether the genealogical community wants to become involved in politically charged issues is a matter that they may need to consider, but they are able to provide archaeologists with some of the evidence necessary to give insights into community and social issues. This

evidence may be in the form of genealogies, compiled records, archives, DNA studies, knowledge and personal connections both local and overseas, and intimate insights into social history often unavailable in the usual historical studies and literature.

By communicating their research, archaeologists bring a tangible element of history to an audience that has considerable interest in the results. Archaeologists can publicize their research questions among the genealogical community and request information or support in their historical research. If forthcoming, this support may take the form of interviews, on-site discussion, and access to photographs, documents, and family memorabilia. Genealogy societies allow day visitors for a fee, and a visit to the genealogical or family history society or library in the city or town in the region of their study will give access to both archives and other resources including people with an intimate knowledge of those records. After the archaeological investigation is completed, the results can be presented at genealogy society meetings, seminars, and congresses thus bridging the gap between the community and archaeology and thereby promoting a better understanding of the value of archaeological research. Genealogy societies generally have a journal in which archaeological results can be published of historical, genetic, or social interest to genealogists. With better communication between the two parties, misconceptions can be corrected and questions answered. Genealogists and family historians may have the who, what, and when facts that are not recorded in history books because they were deemed unimportant by historians, and archaeologists can provide the evidence to establish a probable theory of a way of life or use of a place in the past.

Genealogists and archaeologists research people and places over time. Archaeologists are concerned with the material remains that people and societies produce or leave behind, and genealogists are concerned with finding out about their ancestors and family, who they were, what they did, and where and how they lived in the past. Like archaeologists they research in archives, obtain oral histories, question, travel, and examine possessions and documents for clues, writing up their results in the form of genealogical charts and family histories. Genealogical research is a valuable contribution to the social history of a place whether it is a village, town, city, or country, and archaeologists may obtain useful support from genealogical resources and the people that create them. Often genealogists can provide the missing piece of information that can indicate where an archaeologist should begin to search, not only in the records but also in the physical space or place. There is an opportunity for the future direction of both disciplines to assist one another in coming to conclusions about the past.

Cross-References

- ▶ Community and Archaeology
- ▶ Genealogy on the Web: Benefits and Limitations
- ▶ "Public" and Archaeology
- ▶ Social Archaeology
- ▶ Social Networks for Archaeological Research

References

Adolph, Anthony. 2008. In *Collins: Tracing your family history*, ed. Emma Callery. London: Harper Collins.

Barratt, Nick. 2010. *Nick Barratt's Beginner's guide to your ancestor's lives*. Barnsley: Pen & Sword Books.

Board for Certification of Genealogists. 2018. About BCG. https://bcgcertification.org/about/about-bcg/. Accessed 24 Feb 2018.

Diaz-Andreu, M., and A. Ruiz. 2017. Interacting with heritage: Social inclusion and archaeology in Barcelona. *Journal of Community Archaeology & Heritage* 4 (1): 53–68. https://doi.org/10.1080/20518196.2017.1230312.

Dymond, David. 2016. *Researching and writing history: A guide for local historians*. Lancaster: Carnegie Publishing in association with The British Association for Local History.

Family Tree DNA. 2018. The Genographic Project. https://www.familytreedna.com/genographic-project.aspx. Accessed 24 Feb 2018.

Genealogy SA. 2018. Genealogy SA: Services: Special interest groups. https://www.genealogysa.org.au/. Accessed 24 Feb 2018.

German-Australian Genealogy and History Alliance. 2017. http://www.germanheritage.org.au. Accessed 24 Feb 2018.

King, Turi, and Kevin Schurer. 2015. The cousins in the swabs. In *The bones of a king: Richard III rediscovered*, ed. The Grey Friars Research Team, Maev Kennedy, and Lin Foxhall, 109–126. Chichester: Wiley Blackwell.

MacDonald, Rowena, and Australian Archives. 1995. *Between two worlds: The Commonwealth government and the removal of Aboriginal children of part descent in the Northern Territory*. Alice Springs: IAD Press.

Macquarie Dictionary. 2018. Macmillan Publishers Australia. https://www.macquariedictionary.com.au/features/word/search/?word=genealogy&search_word_type=Dictionary. Accessed 7 Mar 2018.

National Genealogical Society. 2018. https://www.ngsgenealogy.org/cs/becoming_a_professional_genealogist. Accessed 24 Feb 2018.

Shanks, Michael. 1991. *Experiencing the past: On the character of archaeology*. Oxon: Routledge.

Society of Genealogists. (n.d.). http://www.sog.org.uk. Accessed 24 Feb 2018.

The Australasian Federation of Family History Organizations Inc. (AFFHO). 2018. Home: About: Congress. http://affho.org. Accessed 24 Feb 2018.

Triolo, Rosalie, Helen Doyle, and Katya Johanson. 2017. *Writing and publishing local history: A guide for first-time authors and historical societies*. Melbourne: Royal Historical Society of Victoria.

University of Strathclyde: Glasgow. (n.d.). Genealogical, palaeographic & heraldic studies. https://www.strath.ac.uk/courses/postgraduatetaught/genealogicalpalaeographicheraldicstudies/. Accessed 24 Feb 2018.

University of Tasmania. 2018. College of Arts, Law and Education: Diploma of family history. http://www.utas.edu.au/arts-law-education/study/diploma-of-family-history. Accessed 24 Feb 2018.

Wilson, Louise. 2018. Writing awards on offer. http://www.louisewilson.com.au/writing_awards.html. Accessed 24 Feb 2018.

Zimmerman, Larry J. 2014. Activism and archaeology. In *Encyclopedia of global archaeology*, ed. Claire Smith, 18–20. New York: Springer.

Further Reading

Board for Certification of Genealogists. 2014. *Genealogy standards: fiftieth-anniversary edition*. Nashville: Ancestry.

Herber, Mark D. 2000. *Ancestral trails: The complete guide to British genealogy and family history*. Gloucestershire: Sutton Publishing in association with the Society of Genealogists.

Moshenska, Gabriel, ed. 2017. *Key concepts in public archaeology*. London: UCL Press.

Petersson, Bodil, and Cornelius Holtorf, eds. 2017. *The archaeology of time travel: Experiencing the past in the 21st century*. Oxford: Archaeopress.

Redmonds, George, Turi King, and David Hey. 2011. *Surnames, DNA, and family history*. Oxford: Oxford University Press.

Genetics of Animal Domestication: Recent Advances

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Introduction

Although domestic species of plants and animals were key to the development of Darwin's theory of natural selection and featured prominently in his books, domesticates have not recently been central to the study of evolution and evolutionary genetics. However, recent developments in molecular genetics tools and techniques are changing this, renewing interest in the genetics of domestication and the use of domesticated species as model organisms for addressing general evolutionary questions (Wiener and Wilkinson 2011). This entry reviews how current genetic analyses are clarifying our views of animal domestication.

Key Issues and Examples

Detection of Selected Genes or Genomic Regions

Selection has clearly been a key force in shaping the histories and phenotypes of domesticated animal species, but the processes by which this has happened have only recently been addressed. Various approaches, many borrowed from human genetics, are being used to identify regions of the genome carrying signatures of selection, which thus may be associated with changes underlying domestication and breed development. One approach adopted in domestication genetics is to examine patterns of diversity around candidate genes, which based on their function are likely to have been targets of selection. However, most techniques have been developed or extended to exploit the current availability of dense genome-wide marker panels, allowing scans of the genome

that search for patterns consistent with selection. These include tests identifying breed differentiation, reduced genetic diversity, extended linkage disequilibrium (statistical associations between loci), or non-neutral allele frequency patterns in specific genomic regions as well as associations between genotype and domestication-related phenotypes.

The application of these various population genetic approaches has identified several classes of genes that appear to have been under selection. The strongest evidence for genetic changes associated with domestication and breed development has been found in genes related to animal color and pattern. Selection on a number of genes has resulted in a wide variety of colors and patterns across breeds, as evidenced by genetic differentiation and frequency spectrum patterns near these genes, including *MC1R* (melanocortin 1 receptor), which is associated with the switch between eumelanin (brown/black) and pheomelanin (red/yellow) pigment production. Although the closest wild relative to the domestic pig, wild boar, carry substantial neutral variation at this gene, nearly all individuals genotyped so far express the same *MC1R* protein, resulting in a coat in different shades of brown (Fang et al. 2009; Li et al. 2010). In contrast, there is reduced neutral variation in domesticated pigs but at least 10 different *MC1R* proteins, associated with a wide range of coat colors (Fang et al. 2009). Variation at *MC1R* is also responsible for independent evolution of the black coat in both European and Asian pigs, which carry different variants at this locus (Li et al. 2010). The selection in Chinese pigs appears to be due to the preference for the black coat in animal sacrifice rituals during the Neolithic period. There is also a suggestion of selection acting on several other color and pattern genes, including *KIT*, which affects melanocyte migration from the neural crest to the skin and is associated with spotting, belting, and other coat patterns in pigs, horses, and cattle. Evidence for selection near the *KIT* locus has been found from allele differentiation patterns between breeds of sheep (Kijas et al. 2012) and cattle (Stella et al. 2010).

Another group of genes that show signatures of selection are related to growth, size, and body conformation. The *GDF*-8 (myostatin) gene has been associated with a variety of muscle conformation phenotypes in cattle, sheep, and dogs. A dramatic reduction in genetic diversity, indicative of selection, has been identified near this gene in cattle breeds with exaggerated muscle development (double muscling) such as the Belgian Blue and Asturiana de los Valles (Wiener and Gutierrez-Gil 2009), and there is strong differentiation between Texel sheep, a highly muscled breed, and other sheep breeds (Kijas et al. 2012) near this gene. The region including the growth hormone receptor gene (*GHR*), associated with growth and cattle production traits, has also been highlighted by both breed differentiation and within-breed selection scans of the bovine genome (e.g., Hayes et al. 2009). The regions surrounding *IGF1* and *HMGA2*, two genes associated with body size, show signatures of selection in dogs (Sutter et al. 2007; Akey et al. 2010; Boyko et al. 2010).

There is limited evidence of selection signatures on genes related to fertility and reproduction. The clearest example is that of the thyroid-stimulating hormone receptor (*TSHR*) gene (Rubin et al. 2010), which is involved in metabolic regulation and reproduction. The region encompassing this gene was almost completely identical over a 40-kilobase segment across all domestic chicken lines. This gene also showed evidence of differentiation between sheep breeds (Kijas et al. 2012).

A final group of genes that show strong evidence of selection-imposed changes are those associated with skeleton- and skin-related phenotypes. One of the strongest signals of breed differentiation in a genomic scan of 10 dog breeds (Akey et al. 2010) was seen near the *HAS2* gene. This signal was seen only in the Shar-Pei breed, characterized by a distinctive skin folding phenotype not seen in other breeds. By comparing groups of dog breeds with distinct characteristics, genomic regions associated with ear shape and tail curl have also been located, although the underlying genes have not yet been identified (Boyko et al. 2010). Similarly, a region on sheep

chromosome 10 shows a strong signal of differentiation between horned and polled (hornless) breeds, and it has been suggested that mutations in the *RXFP2* (relaxin/insulin-like family peptide receptor 2) gene may be associated with loss of horns in this species (Kijas et al. 2012).

Detecting Demographic History

Genetic data is also helping to unravel the demographic history of domesticated breeds. Linkage disequilibrium (LD) declines with the genomic distance between markers; moreover, the shape of the relationship provides information on population history. LD patterns can be used to infer past effective population size (the number of individuals in an idealized population that would have the same rate of genetic drift as the actual population) and demographic events, as the LD between tightly linked markers reflects effective population size further in the past than the LD between loosely linked markers.

The relationship between LD and genomic distance has been exploited in a number of studies to estimate past effective population sizes of domesticated animal species. The cattle HapMap study (Gibbs et al. 2009) analyzed dense genome-wide SNP data from 19 breeds. They found that the decline of LD with distance between markers was generally rapid but varied between breeds. In contrast to the pattern seen in humans, effective population size appears to have declined recently for all breeds, presumably due to bottlenecks associated with domestication and breed formation. Comparing LD-distance relationships across breeds can be used to understand the different breed histories. The N'Dama (an African taurine breed, humpless cattle originating in the Middle East) had the highest LD values of all breeds at short distances, indicating a small ancestral population, whereas the three indicine breeds (humped cattle originating on the Indian subcontinent) had lower LD than the other breeds at short distances, indicating a relatively large ancestral population compared to the taurine breeds. This characterization of indicine cattle is consistent with findings of higher nucleotide diversity in indicine than taurine breeds (Gibbs et al. 2009).

An LD-based approach has also been used to reconstruct the demographic history of dogs. The publication of the first genome sequence for the dog and the initial set of dense SNP genotypes for dogs from various breeds allowed an assessment of LD patterns both within and across breeds (Lindblad-Toh et al. 2005). The decline in LD with respect to physical genomic distance for the overall dog population was rapid, falling quickly to low background levels. This relationship is consistent with a domestication-related bottleneck ~5,000–9,000 generations ago, based on comparisons with simulated data (Lindblad-Toh et al. 2005; Gray et al. 2009). In contrast, within most dog breeds, the presence of long-range homozygous haplotypes and high levels of LD over extended regions is consistent with a more severe contraction in population size 30–90 generations ago, at the time of breed-creation events. However, some dog breeds (e.g., Labrador Retrievers) do not have particularly high levels of LD (Lindblad-Toh et al. 2005; Gray et al. 2009), presumably because of their relatively large effective population size.

Introgression

Genetic data has also shed light on past introgression (hybridization) between breeds. Animal breeders often practice crossbreeding to introduce certain desirable traits for breed improvement. In the case of pig breeds, human-mediated crossing has influenced the genetic composition of European breeds (Wiener and Wilkinson 2011). In the eighteenth and nineteenth centuries, Asian alleles were introduced into certain British pig breeds to promote traits such as fattening and earlier maturation (White 2011). Molecular genetic studies have since provided evidence of this introgression. A study examining mitochondrial diversity in pigs revealed that a number of European commercial pig breeds carry Asian-like mtDNA haplotypes (Fang and Andersson 2006). Genetic introgression can also be non-human-mediated, such as gene flow between wild relatives and domestic populations. For example, Fang et al. (2009) found that a Chinese wild boar carried an *MC1R* allele common in European domestic pigs, presumably resulting from gene flow.

Future Directions

Although identification of the genes important in animal domestication and breed development is still in its early stages, some common themes have emerged. One is that there are clearly strong signatures of selection near a number of genes associated with coat color and pattern. There are also indicators that suggest selection on genes related to growth and body composition. For example, there is clear evidence in cattle and sheep for selection on the myostatin gene, associated with muscle composition, and several studies also suggest that there may have been selection in cattle on the growth hormone receptor gene, associated with growth rate and various production traits. In dogs, there is also evidence of strong selection on a number of genes associated with growth and skeletal traits, many of which are associated with breed-specific characteristics. Understanding the selection history of complex traits such as those related to behavior and milk production will require more extensive analysis. Genomic information has also provided substantial insight into the demographic and breeding history of domesticated animal species.

Cross-References

- ▶ Cattle: Domestication and Development
- ▶ Dog: Domestication
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Pig: Domestication
- ▶ Sheep: Domestication

References

Akey, J.M., A.L. Ruhe, D.T. Akey, A.K. Wong, C.F. Connelly, J. Madeoy, T.J. Nicholas, and M.W. Neff. 2010. Tracking footprints of artificial selection in the dog genome. *Proceedings of the National Academy of Sciences of the United States of America* 107: 1160–1165.

Boyko, A.R., P. Quignon, L. Li, J.J. Schoenebeck, J.-D. Degenhardt, K.E. Lohmueller, K.Y. Zhao, A. Brisbin, H.G. Parker, et al. 2010. A simple genetic architecture underlies morphological variation in dogs. *PLoS Biology* 8 (8): e1000451. https://doi.org/10.1371/journal.pbio.1000451.

Fang, M.Y., and L. Andersson. 2006. Mitochondrial diversity in European and Chinese pigs is consistent with population expansions that occurred prior to domestication. *Proceedings of the Royal Society B-Biological Sciences* 273: 1803–1810.

Fang, M.Y., G. Larson, H.S. Ribeiro, N. Li, and L. Andersson. 2009. Contrasting mode of evolution at a coat color locus in wild and domestic pigs. *PLoS Genetics* 5 (1): e1000341. https://doi.org/10.1371/journal.pgen.1000341.

Gibbs, R.A., J.F. Taylor, C.P. Van Tassell, W. Barendse, K.A. Eversoie, C.A. Gill, R.D. Green, D.L. Hamernik, S.M. Kappes, et al. 2009. Genome-wide survey of SNP variation uncovers the genetic structure of cattle breeds. *Science* 324: 528–532.

Gray, M.M., J.M. Granka, C.D. Bustamante, N.B. Sutter, A.R. Boyko, L. Zhu, E.A. Ostrander, and R. Wayne. 2009. Linkage disequilibrium and demographic history of wild and domestic canids. *Genetics* 181: 1493–1505.

Hayes, B.J., A.J. Chamberlain, S. Maceachern, K. Savin, H. McPartlan, I. MacLeod, L. Sethuraman, and M.E. Goddard. 2009. A genome map of divergent artificial selection between *Bos taurus* dairy cattle and *Bos taurus* beef cattle. *Animal Genetics* 40: 176–184.

Kijas, J.W., J.A. Lenstra, B. Hayes, S. Boitard, L.R.P. Neto, M. San Cristobal, B. Servin, R. McCulloch, V. Whan, et al. 2012. Genome-wide analysis of the world's sheep breeds reveals high levels of historic mixture and strong recent selection. *PLoS Biology* 10.

Li, J., H. Yang, J.R. Li, H.P. Li, T. Ning, X.R. Pan, P. Shi, and Y.P. Zhang. 2010. Artificial selection of the melanocortin receptor 1 gene in Chinese domestic pigs during domestication. *Heredity* 105: 274–281.

Lindblad-Toh, K., C.M. Wade, T.S. Mikkelsen, E.K. Karlsson, D.B. Jaffe, M. Kamal, M. Clamp, J.L. Chang, E.J. Kulbokas, et al. 2005. Genome sequence, comparative analysis and haplotype structure of the domestic dog. *Nature* 438: 803–819.

Rubin, C.J., M.C. Zody, J. Eriksson, J.R.S. Meadows, E. Sherwood, M.T. Webster, L. Jiang, M. Ingman, T. Sharpe, et al. 2010. Whole-genome resequencing reveals loci under selection during chicken domestication. *Nature* 464: 587–U145.

Stella, A., P. Ajmone-Marsan, B. Lazzari, and P. Boettcher. 2010. Identification of selection signatures in cattle breeds selected for dairy production. *Genetics* 185: 1451–1461.

Sutter, N.B., C.D. Bustamante, K. Chase, M.M. Gray, K.Y. Zhao, L. Zhu, B. Padhukasahasram, E. Karlins, S. Davis, et al. 2007. A single IGF1 allele is a major determinant of small size in dogs. *Science* 316: 112–115.

White, S. 2011. From globalized pig breeds to capitalist pigs: A study in animal cultures and evolutionary history. *Environmental History* 16: 94–120.

Wiener, P., and B. Gutierrez-Gil. 2009. Assessment of selection mapping near the myostatin gene (GDF-8) in cattle. *Animal Genetics* 40: 598–608.

Wiener, P., and S. Wilkinson. 2011. Deciphering the genetic basis of animal domestication. *Proceedings of the Royal Society B-Biological Sciences* 278: 3161–3170.

Further Reading

Cieslak, M., M. Reissmann, M. Hofreiter, and A. Ludwig. 2011. Colours of domestication. *Biological Reviews* 86: 885–899.

Darwin, C. 1859. *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life*. London: John Murray.

Darwin, C. 1868. *The variation of animals and plants under domestication, Volumes I and II*. London: John Murray.

Dobney, K., and G. Larson. 2006. Genetics and animal domestication: New windows on an elusive process. *Journal of Zoology* 269: 261–271.

Genetics of Early Plant Domestication: DNA and aDNA

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Introduction

The evolution of domesticated forms of crops was associated with the transition from hunting-gathering to agriculture at various centers around the world. Genetics has long been used to study domestication to answer questions about the mode and length of the process. Ancient DNA has been used to add a temporal dimension to interpreting genetic diversity by providing evidence of past expansions, some of which failed, and direct evidence of the selection of traits associated with domestication. A major challenge of the field is to reconcile genetic evidence with archaeological evidence and to redefine what exactly is meant by the term domestication.

Definition

In the case of plants, the evolution of domestication involves the selection of a characteristic group of traits that are collectively termed the domestication syndrome. Typically, half a dozen or so traits occur in any one domesticated plant. These traits include the loss of shattering (the ability for a plant to abscise and drop its seeds), changes in seed size, loss of photoperiod sensitivity, changes in plant physiology, and architecture. A combination of genome-wide information and direct evidence from the DNA obtained from the archaeological record is being used to assess the molecular mechanisms underlying domestication syndrome traits, the pace of the transition and the strength of the selection processes involved to understand this human-plant interaction.

Key Issues/Current Debates/Future Directions/Examples

Understanding the evolution of domestication of plants is a subject that is interlocked with understanding the rise of civilization. In broad terms, there have been two extreme viewpoints about the origins of domesticated plants, and the debate is ongoing. The first viewpoint is that the evolutionary process was rapid, artificial selection was strong, and domestication events were infrequent and often geographically restricted (Zohary and Hopf 2003). Associated with this viewpoint is that predomestication cultivation was limited and that domesticated plants appeared as a package originally described by Gordon Childe as a "revolution." The alternative viewpoint is that the evolutionary process was slow, and domesticated forms appeared in parallel in different locations (Weiss et al. 2006; Willcox et al. 2008).

Genetic evidence based on early techniques initially supported a simple origin for most crops (Brown et al. 2009). A problem was that these genetics-based findings contrasted with emerging evidence from the archaeological record that suggested that predomestication cultivation occurred for substantial periods before the emergence of domesticated forms and also that the assemblage of the traits of the domestication syndrome occurred in a staggered manner over a considerable time period (Fuller 2007). Further evidence directly from the archaeobotanical record suggests that the selection pressures

involved for at least some of the domestication syndrome traits, such as seed size and loss of shattering, were low within the range of normal natural selection for both wheat and rice (Purugganan and Fuller 2011). While these initial differences between the interpretation of genetic evidence and emergent archaeological evidence were reconciled through computational models that established that the genetic data could be interpreted within the archaeological framework (Allaby et al. 2008), the debate about the pace of transition continues and is dominated in particular by consideration of cereals of the East and Near East (Abbo et al. 2011).

A similar series of developments have occurred in the understanding of the evolution of domestication at tropical latitudes. The types of plants domesticated in the tropics differ in character to those of temperate latitudes including a large number of arboreal and herbaceous species with large fruits or tubers. It has long been known that tree species such as sweet almond were exploited well into the Pleistocene by peoples of the tropics. This can perhaps be compared to the well-known exploitation of hazel nuts by Mesolithic peoples of temperate Europe; however, the latter are not considered a domesticated species. In the case of arboreal species, the domestication syndrome is subtler than for cereals often only being evident in the thinning of nutshells or fruit skins in the case of screw pines and loss of seeds in the case of breadfruit, for instance, which raises the question at what point a plant species can be considered domesticated. A variety of features such as dwarf habit, self pollination, and a "*niu vai*" fruit morphology have been identified in the case of the coconut, which has now been shown to have complex origins from genetic evidence (Bunn et al. 2011). Despite the acceptance of a long history of tree exploitation, little credence had been given to the exploitation of herbaceous species in the early Holocene, until recently. Archaeological evidence shows the exploitation of bananas, for instance, in the Papua New Guinea Highlands in the early Holocene well before what is normally considered the onset of cultivation in that region. The genetic evidence in this case shows an extremely complex origin of bananas involving the differentiation of subspecies of the diploid progenitor in the islands of Southeast Asia and western Melanesia, followed by hybridizations repeatedly producing sterile triploids which have the seedless syndrome trait, such as the Cavendish banana (Perrier et al. 2011).

As analyses have moved to the genomic level increasingly, the specific genetic mechanisms underlying some domestication syndrome traits are being understood for several of the major cereal crops (Fuller and Allaby 2009). In the case of rice, it is apparent that different traits appear to have originated in different geographic origins (Shomura et al. 2008). The scale of the genetic underpinning of domestication is also becoming apparent, and although the number of syndrome traits is relatively low, the number of loci involved appears to be high. For example, in the wheat 30–70 genes have been estimated to be involved, over 30 genes in sunflower, and 50 genes in maize (Peng et al. 2003; Wright et al. 2005; Chapman et al. 2008; Peleg et al. 2011). Such a large number of genes involved suggest that the evolution that is associated with domestication has been ongoing and that a rethink is required about what is meant by domestication and the relevance of the term "domestication event." In the past domesticated plants in the archaeobotanical record have been identified as such on the basis of one or two traits, particularly the loss of shattering trait, and the implicit assumption has been that other less visible traits are probably also present. However, the staggered arrival of traits suggests this is a simplification and that a discrete "event" might be better replaced with the concept of a "domestication trajectory."

The evolution of plant domestication has also been directly studied through the use of ancient DNA. This approach has been used to establish the presence of particular species at specific locations in the past, the temporal stability of phylogeographic patterns of genes, and direct change of DNA through time. For example, the presence of one wheat species in Bronze Age Greece where it no longer occurs established the occurrence of a failed expansion (Brown et al. 1998). On the other hand, the geographical distribution of alleles from maize compared between ancient cobs and primitive land races showed that there had been little change in South America over

the past millennium and that such phylogeographic patterns can be stable to the point of being indicative of initial expansions of the plant (Lia et al. 2007). Furthermore, studies in maize remains over time have shown the process of selection of domestication syndrome traits was staggered with some traits such as architecture being selected early and traits affecting flour quality being selected millennia later (Jaenicke-Depres et al. 2003). More recently, ancient DNA studies in plants have moved to the genomic level where extensive genome level evolution has been observed in cotton in the past few thousand years (Palmer et al. 2012). Such studies are leading to a consensus common to that based on extant genetic data that the evolutionary process of domestication is an ongoing trajectory rather than discrete event and that crops have and continue to change in their local habitats and in some cases represent local adaptation over thousands of years. In the coming years a more complete picture of the evolution of domesticated crops is likely to develop as new technologies are increasingly applied directly to genome change viewed through the archaeological record.

A recurrent theme in the discourse about the evolution of domestication is the level of consciousness there was in the human agency of selection. In one extreme view, early cultivators were highly aware of all "sports" (visibly mutant plants) that occurred in plant populations and judiciously selected for desirable traits. At the other extreme all traits arose through the unconscious actions of the cultivators. The former appears to lend itself to scenarios of more rapid selection, while the latter appears less restrained to a rapid or protracted process. The truth of the matter is likely to differ for different traits and species. However, understanding the mode of human agency will ultimately require the integration of archaeological and genetic evidence in meaningful and deterministic ways, which is possibly one of the greatest challenges that lie ahead.

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Bananas: Origins and Development
- ▶ Barley: Origins and Development
- ▶ Breadfruit: Origins and Development
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Childe, Vere Gordon (Theory)
- ▶ Complex Hunter-Gatherers
- ▶ Darwin, Charles R.
- ▶ Grapes: Origins and Development
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Maize: Origins and Development
- ▶ Manioc: Origins and Development
- ▶ Millets: Origins and Development
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Pigeon Pea: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Potato: Origins and Development
- ▶ Rice: Origins and Development
- ▶ Sweet Potato: Origins and Development
- ▶ Wheats: Origins and Development
- ▶ Yams: Origins and Development

References

Abbo, S., S. Lev-Yasdun, and A. Gopher. 2011. Agricultural origins: Centers and noncenters; a Near Eastern appraisal. *Critical Reviews in Plant Sciences* 29: 317–328.

Allaby, R.G., D.Q. Fuller, and T.A. Brown. 2008. The genetic expectations of a protracted model for the origins of domesticated crops. *Proceedings of the National Academy of Sciences USA* 105: 13982–13986.

Brown, T.A., R.G. Aallaby, R. Sallares, and G. Jones. 1998. Ancient DNA in charred wheats: Taxonomic identification of mixed and single grains. *Ancient Biomolecules* 2: 185–193.

Brown, T.A., M.K. Jones, W. Powell, and R.G. Allaby. 2009. The complex origins of domesticated crops in the

Fertile Crescent. *Trends in Ecology and Evolution* 24: 103–109.
Bunn, B.F., L. Baudouin, and K.M. Olsen. 2011. Independent origins of cultivated coconut (*Cocos nucifera* L.) in the Old World tropics. *PLoS One* 6: e21143.
Chapman, M.A., C.H. Pashley, J. Wenzler, J. Hvala, S. Tang, S.J. Knapp, and J.M. Burke. 2008. A genomic scan for selection reveals candidates for genes involved in the evolution of cultivated sunflower (*Helianthus annuus*). *The Plant Cell* 20: 2931–2945.
Fuller, D.Q. 2007. Contrasting patterns in crop domestication and domestication rates: Recent archaeobotanical insights from the Old World. *Annals of Botany* 100: 903–909.
Fuller, D.Q., and R.G. Allaby. 2009. Seed dispersal and crop domestication: Shattering, germination and seasonality in evolution under cultivation. In *Fruit development and seed dispersal*, ed. L. Ostergaard, 238–295. Oxford: Wiley-Blackwell.
Jaenicke-Depres, V., E.S. Buckler, B.D. Smith, M.T.P. Gilbert, A. Cooper, J. Doebley, and S. Pääbo. 2003. Early allelic selection in maize as revealed by ancient DNA. *Science* 302: 1206–1208.
Lia, V.V., V.A. Confalonieri, N. Ratto, J.A.C. Hernandez, A.M.M. Alzogaray, L. Poggio, and T.A. Brown. 2007. Microsatellite typing of ancient maize: Insights into the history of agriculture in southern South America. *Proceedings of the Royal Society of London B Biological Sciences* 274: 545–554.
Palmer, S.A., A.J. Clapham, P. Rose, F. Freitas, B.D. Owen, D. Beresford-Jones, J.D. Moore, J.L. Kitchen, and R.G. Allaby. 2012. Archaeogenomic evidence of punctuated genome evolution in Gossypium. *Molecular Biology and Evolution*. https://doi.org/10.1093/molbev/mss070.
Peleg, Z., T. Fahima, A.B.. Korol, S. Abbo, and Y. Saranga. 2011. Genetic analysis of wheat domestication and evolution under domestication. *Journal of Experimental Botany* 62: 5051–5061.
Peng, J., Y. Ronin, T. Fahima, M.S. Röder, Y. Li, E. Nevo, and A. Korol. 2003. Domestication quantitative trait loci in *Triticum dicoccoides*, the progenitor of wheat. *Proceedings of the National Academy of Sciences USA* 100: 2489–2494.
Perrier, X., E. De Langhe, M. Donohue, C. Lentfer, L. Vrydaghs, F. Bakry, F. Carreel, I. Hippolyte, J.-P. Horry, C. Jenny, V. Lebot, A.-M. Risterucci, K. Tomekpe, H. Doutrelepont, T. Ball, J. Manwaring, P. De Maret, and T. Denham. 2011. Multidisciplinary perspectives on banana (Musa spp.) domestication. *Proceedings of the National Academy of Sciences USA* 108: 11311–11318.
Purugganan, M.D., and D.Q. Fuller. 2011. Archaeological data reveal slow rates of evolution during plant domestication. *Evolution* 65: 171–183.
Shomura, A., K. Izawa Ebana, T. Ebitani, H. Kanegae, S. Konishi, and M. Yano. 2008. Deletion in a gene associated with grain size increased yields during rice domestication. *Nature Genetics* 40: 1023–1028.
Weiss, E., M.E. Kislev, and A. Hartmann. 2006. Autonomous cultivation before domestication. *Science* 312: 1608–1610.
Willcox, G., S. Fornite, and L.H. Herveux. 2008. Early Holocene cultivation before domestication in northern Syria. *Vegetation History and Archaeobotany* 17: 313–325.
Wright, S.I., I. Vroh Bi, S.G. Schroeder, M. Yamasaki, J.F. Doebley, M.D. McMullen, and B.S. Gaut. 2005. The effects of artifical selection on the maize genome. *Science* 308: 1310–1314.
Zohary, D., and M. Hopf. 2003. *Domestication of plants in the Old World*. 3rd ed. Oxford: Oxford University Press.

Further Reading

Allaby, R.G. 2010. Integrating the processes in the evolutionary system of domestication. *Journal of Experimental Botany* 61: 935–944.
Fuller, D.Q., R.G. Allaby, and C. Stevens. 2010. Domestication as innovation: The entanglement of techniques, technology and chance in the domestication of cereal crops. *World Archaeology* 42: 13–28.
Fuller, D.Q., G. Willcox, and R.G. Allaby. 2012. Early agricultural pathways: Moving outside the 'core area' hypothesis in Southwest Asia. *Journal of Experimental Botany* 63: 617–633.
Palmer, S., O. Smith, and R.G. Allaby. 2012. The blossoming of plant archaeogenetics. *Annals of Anatomy* 194: 146–156.

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Geoarchaeology

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Introduction

Geoarchaeology unites the study of the record of past human activity with the natural sciences. The geoscience approach in archaeology is used in a variety of ways, including planning and performing fieldwork and collecting information from the field, deciding on the most appropriate and useful laboratory techniques, and evaluating the long-term connections between humans and the environment. A diverse array of archaeological questions can be addressed by using earth

science approaches, including studies of environmental contexts, examining patterns of human use of the land and natural resources, predicting the preservation potential and location of archaeological sites, documenting site and regional-scale sedimentology and stratigraphy, identifying and describing raw materials, evaluating taphonomic processes and the dynamics of site formation, dating, and ecological integration. Conceptually, geoarchaeology provides a means to examine long-term linkages between human populations and other components of the geosphere and biosphere.

Definition

Geoarchaeology includes the application of earth science methods to archaeology as well as the broader study of long-term patterns of interaction between people and natural systems. From the 1970s to the turn of the century, there were many discussions in the American literature concerning the definitions of geoarchaeology and archaeological geology.

Operationally, geoarchaeology is the application of any of the many subdisciplines in the geosciences (e.g., sedimentology, geomorphology, geophysics). It uses the methods, theories, and knowledge base of the geosciences to solve archaeological questions.

Based on this approach, geoarchaeology is affiliated with environmental archaeology and Quaternary geology as well as physical geography. Because of this, geoarchaeological projects employ nearly all the geoscience subdisciplines, except those that are focused exclusively on pre-Quaternary research. For instance, structural geology (folds and faults) has largely a pre-Quaternary focus, although tectonic geology, the study of earth forces resulting in folding and faulting, is important in understanding recent vertical earth movements that affect sites of human habitation, such as changes in relative sea level at coastal archaeological sites. Tectonic earth movements also generate earthquakes which have had devastating effects on humans in many parts of the world and have done so in the past as well.

There are many examples where subdisciplines of the geosciences play a critical role in archaeological studies. The study of sediments and soils is a crucial component of archaeological excavations. Artifacts can be found in unaltered sediments or in deposits transformed by soil-forming processes. Geoarchaeologists apply standard descriptive techniques to the matrix enclosing artifacts and features in archaeological sites. This approach is extended to the study of raw materials that compose artifacts. Besides the use of a standard nomenclature to document sediment and soil color, particle size, and mineralogy, the physical and chemical properties are used to infer environmental conditions before, during, and after human use of a site. Thus, one role of a geoarchaeologist as part of an archaeological research project is to make observations, take measurements, and collect samples that will help make it possible to evaluate changing physical environments at a particular site.

The principles of stratigraphy are crucial for interpreting the natural and human processes that produce an archaeological site. Stratigraphic studies provide a way to document the changes over time at a particular site and also a way to connect sites on a regional or even global basis. These types of studies are linked to the description of sediments and soils, but they expand the application of these techniques both horizontally and vertically within an archaeological site. Stratigraphic principles are crucial for interpretations of patterns within a site and also between sites. Thus, they play a crucial role in relative dating and in landscape studies. The application of the principles of stratigraphy in archaeology also connects geoarchaeology with other historical sciences such as geology and paleontology.

Geomorphology, the study of landforms and their development over time, is used by geoarchaeologists to evaluate the long-term dynamics of landscape and climate change as well as site preservation. For instance, Das and Panjo (1999) give a geoarchaeological perspective on the late Holocene archaeological record of a region in West Bengal, in eastern India. Their work is an attempt to examine the evidence available for a landscape with a dynamic and

constantly changing river environment. Their study was centered on habitation deposits and structures from the early Medieval Period (eighth to twelfth centuries). The study of Quaternary landforms should be an important part of any archaeological field project. It is important to understand the physical setting and the resources that would have made a particular location attractive for human use. Additionally, geomorphic features can contribute to an understanding of the long-term, ongoing processes that have affected an archaeological site.

Soil science, and especially the study of ancient soils, contributes in many ways to archaeology. Soil formation, or pedogenesis, occurs when a parent material like sediment or bedrock is altered over time by climate, plants, and animals. In the 1940s, Hans Jenning used the acronym CLORPT to designate the soil-forming factors of climate, organisms (plants and animals, including humans), relief, parent material, and time. Over time, a vertical sequence of soil horizons can develop within the parent material, based on additions, removals, transformations caused by processes like weathering, and movement of materials within a profile. Geoarchaeologists study the properties in the soil horizons to provide information on the conditions that led to the soil, including human activities. The basic soil horizons include (from top to bottom) the A horizon, primarily characterized by the accumulation of higher amounts of organics, weathering, and loss by leaching or translocation; the B horizon associated with weathering and enrichment by illuviation; and the C horizon, consisting of unconsolidated parent material. Soils that were formed in the past are designated as paleosols and can be on the surface or buried. Soils are very valuable in archaeology because they typically imply a period of landscape stability or period of nondeposition and can be used to infer ancient environments. In some regions, buried paleosols can be traced across landscapes. For instance, the Brady Soil and Leonard Paleosol are associated with a period of landscape stability associated with human presence during the terminal Pleistocene and early Holocene on the Great Plains of North America (Holliday and Mandel 2006). Holocene mound sites also contain paleosols. For example, four buried soils were documented at a Harappa site in the Indus Valley in Pakistan (Schuldenrein et al. 2004). Harappa period structures dating to about 4000 BP were constructed above a paleosol with A-B horizons. Below this paleosol, there were other Holocene soils and soils developed within Pleistocene river deposits. Anthrosols, or soils resulting from human activity, can provide information on how humans used the landscape. These are often studied using geochemistry.

Geochemistry has been of great value in understanding archaeological sites. This geoarchaeological technique can be used to help interpret the sediments and soils within sites. Often, changes in the acidity (pH) of the site matrix can be used to explain the preservation or absence of certain artifacts. For instance, bones are commonly preserved in sites with sediments that have high pH levels (such as calcareous or carbonate rich deposits). One of the most useful geochemical approaches has been phosphate analysis. Phosphates are deposited in sediments and soils as the result of the decay of organic materials. Phosphorus in soils undergoes both fractionation and bonding to soil minerals. Because it bonds to soil minerals, it is not easily removed by water within the soil profile. Analyses of phosphates in archaeological sites can provide both chronometric and land use information. One example comes from the study of a large Mayan ruin in Yucatan, Mexico (Huston et al. 2009). Phosphate analysis was used to explain different lengths of occupation, variations in land use, and reveal the byproducts of maize processing. Thus, the geochemical analysis of sediments and soils provide a means for understanding human activity within sites but also can be applied to the study of broader-scale landscape dynamics.

A completely different aspect of geochemistry in archaeology is provenance studies, which can be used to help determine the source of raw materials used to make artifacts. Small changes in the abundance or types of chemicals found within artifacts can be used to determine their place of origin. Trace-element signatures can indicate geological and geographical sources of unaltered raw

materials such as native copper and host of minerals and rocks including obsidian. Less well known are isotope methods. Lead isotope studies have been used for decades with modest success to determine the source of copper used to make artifacts. Recently, the vexing problem of sourcing tin has been aided by breakthroughs in tin isotope methods (Haustein et al. 2010). Although tin-bronze was used in Greece by about 2600 BCE and in central Europe 400 years later, the source of the tin has not been determined. Chemical sourcing methods were applied to tin from several regions. The measured variations in isotope values made it possible to distinguish between ores made in three different regions. These kinds of techniques contribute to an understanding of ancient networks used for the trade and exchange of raw materials used to make artifacts.

Petrography, the technique of using a polarizing microscope to analyze the content of 30-micron-thick sections of rock, was invented by geologists over 100 years ago. In recent decades, this technique has been adopted by geoarchaeologists to study a variety of archaeological materials, such as stone tools and ceramics. A good example of such studies can be seen in a paper by Fitzpatrick et al. (2003) which demonstrated the use of petrography in establishing cultural interaction in Palau, Micronesia. This study examined pottery from both volcanic and limestone islands in the Pacific. An analysis of the materials in the pottery suggested that the ceramics were locally made and then transported to other islands. This example shows how geoarchaeological studies of raw materials can be used to look at patterns of exchange and interaction.

Microstratigraphy and thin-section analysis of sediments using micromorphology are ways of examining the taphonomic (depositional and post-depositional) processes that have helped in the formation of archaeological sites and to assess their stratigraphic integrity. Micromorphology involves first collecting an intact block of sediment from an archaeological site. In the laboratory, the block is impregnated with polyester resin and then sliced to make thin sections that are examined using a microscope. For example, the micromorphological analysis of sediments collected along the contact between Middle and Upper Paleolithic deposits at a cave in Germany revealed a sharp erosional contact between the two groups of deposits, thus indicating that no mixing had occurred. Thin-section study of sediments from a Paleolithic cave in France provided evidence of burning, trampling, and hearth-cleaning activities (Goldberg and Berna 2010). A micromorphological study of cave deposits in China with pottery dating to about 19,000 years ago (the Last Glacial Maximum) demonstrated that mixing and redeposition was negligible, lending support to the stratigraphic integrity and dating of the site (Wu et al. 2012).

Geophysical techniques are used by geoarchaeologists in situations where they cannot excavate or to study places they may not be able to reach on the ground. The most common use of geophysics in archaeology is in geophysical prospecting, often referred to as remote sensing. These techniques have proved especially important in broader-scale landscape studies. Parkyn (2010) used high-resolution geophysical surveying as a precursor to field studies, as a way to guide excavation in addressing the 120-year development of a late Victorian municipal park. Remote-sensing techniques are used to distinguish anomalies in the ground which may indicate the presence of archaeological features.

In terms of dating, archaeologists usually are somewhat familiar with carbon 14 dating but geoscientists have played only a minor role in these methods. Chronometric dating methods such as the use of carbon 14 provide a numerical estimate for the age of an archaeological site. This is in contrast to stratigraphic dating which (in the absence of correlation with other dating methods) provides only an understanding of the relative age of an archaeological deposit. Several dating techniques have been developed that can be used to analyze materials associated with archaeological sites. Besides carbon 14, the major dating techniques used by geoarchaeologists are U-series and K-Ar dating. While carbon dating has been extensively used to date organic materials from archaeological sites that are younger than 40,000 years, U-series techniques have been commonly applied

to carbonates, including shells, bones, and limestones (such as travertines). K-Ar dating is used at archaeological sites that can be stratigraphically linked to lava flows and tephras. The age range for dating using U-series is on the order of several hundred thousand years, while igneous materials that are millions of years old can be dated using the K-Ar technique. In recent years, newer techniques such as luminescence dating have become more reliable and are now being applied more often to understand the chronologic context of archaeological sites.

The concepts of paleontology are especially important in biostratigraphic correlation and taphonomy. These concepts have been applied in paleoethnobotanical studies and in palynology, and zooarchaeology. Their usefulness for geoarchaeologists is in relative dating (by biostratigraphic correlation), site formation, and providing information on environmental change as reflected by biotic communities. Research on environmental change connected with the archaeological record usually studies either the general habitat associated with human presence at a particular locality or the specific resources used by people (for instance, plants or animals that are incorporated into an archaeological site because of human activities). Palynology, the study of fossil pollen, has played a crucial role in documenting changes in climate and in human land use. Changes in the types and abundances of pollen over time generally reflect changes in vegetation. The changes in vegetation may be the result of climate change, such as changes in temperature or precipitation. For example, a drought would be reflected in a change in vegetation and could be related to a contemporaneous change in the archaeological record. As an alternative, the inferred changes in vegetation may reflect human land use, such as deforestation connected with agriculture. Macrobotanical remains have proven very useful for ethnobotanical studies and also are valuable materials for carbon 14 dating. Animal remains, including vertebrates and invertebrates, also provide information on the ancient environments and resources available for human use. Usually, invertebrate remains and fossils of small mammals provide useful information on local environments, while the fossils of larger mammals provide regional-scale environmental information. Biotic remains are also important in correlations between sites; these types of comparisons have been used to examine broader-scale environmental patterns or to help place a site within a time framework.

Climate and long-term environmental change are important topics in global archaeology, and geoarchaeologists play an important role in evaluating the interplay between human societies and natural systems. These studies have focused on the ways environmental change has impacted human biological and behavioral evolution as well as the ways humans have affected the environment. The techniques applied by geoarchaeologists to study the archaeological record and its context are especially valuable in documenting patterns of climate variation at different scales of space and time. Thus, geoarchaeological techniques are useful for understanding the record of human response to climate change at the scale of a single layer within a stratigraphic sequence at a site as well as evaluating patterns of human-environment interaction at regional, continental, and global scales.

Historical Background

The term geoarchaeology or its variations were rarely used in the scientific literature until the 1970s. The term is used to describe research that applies geoscience techniques to examine and evaluate the archaeological record. While the first explicitly geoarchaeological text might be considered Sir Charles Lyell's *Geological Evidence for the Antiquity of Man* published in the mid-nineteenth century, the history of using the geosciences to examine archaeological questions begins in the 1700s. Lyell likely would have called his work "archaeological geology," and this term is still in use today, for example, in the Archaeological Geology Division of the Geological Society of America (GSA).

One of the first and most important uses of geological concepts in archaeology is in stratigraphy. The use of stratigraphic principles to study

the archaeological record is based on ideas proposed by Niels Stensen (also known as Nicolaus Steno) in the 1660s and James Hutton in the late 1700s. John Frere's 1797 report of the discovery of stone hand axes within a stratified sedimentary sequence in England is a good early example of the application of stratigraphic principles to archaeological discoveries.

While the principles of stratigraphy were crucial to understanding the archaeological record, the emergence of ecological perspectives connected with past human-environment interactions also has a long history of application to archaeological studies. From 1799 to 1803, Alexander von Humboldt conducted pioneering field research on archaeological sites in South America and Mesoamerica. Characterized by an empirical approach, Humboldt included descriptions of the raw materials used in the archaeological monuments and, in one instance, documented the internal structure of the pyramid. His studies in Venezuela linked human activities such as deforestation and cultivation to environmental change. The *Principles of Geology* published by Lyell from 1830 to 1832 included descriptions of the geology associated with archaeological sites like Vesuvius, Pompeii, and Herculaneum. Like the earlier work of von Humboldt, Lyell also recognized the contribution of human activity to environmental change. Lyell writes about how deforestation since the time of Caesar during the Iron Age had transformed the landscapes of Europe. At the same time as Lyell's *Principles* was first published, Boucher de Perthes used the principles of stratigraphy to evaluate the association of artifacts and extinct animals in the terrace river gravels of the Somme Valley, France.

Geoscience techniques were also being used to study archaeological sites in North America. Squier and Davis published *Ancient Monuments of the Mississippi Valley* in 1848 using stratigraphic methods to evaluate whether human or geological processes had created mounds found in the Mississippi Valley. In 1855, Lapham published *The Antiquities of Wisconsin* demonstrating the ways archaeological information could be incorporated into studies of landscape evolution and connected with human activities. Lapham's studies provided an example of long-term changes in the landscape associated with the transformation from prehistoric hunting and gathering to agriculture and the construction of mounds. He concluded that land covered by forest at the time of European settlement had been cultivated during prehistoric times. This is a good historical example of a study that connected the study of present-day landforms to past human land use.

Archaeologists and geologists in Europe during the middle of the nineteenth century began to develop an understanding of the ways the record of the human past reflected the long-term patterns of human use of natural resources. A prominent example of this was the realization that there were changes in the types of raw materials used by people to create tools over time. Geologist Forchammer and archaeologist Worsaae conducted studies of shell middens in Denmark and Sweden and in 1848 collaborated with paleontologist Steerup. This multidisciplinary research became the basis for verifying the Three-Age System (Stone, Bronze, Iron) used in archaeology. Thus, in the mid-1800s, geoarchaeological techniques were being applied to both the contexts of artifacts (using stratigraphic principles) as well as the composition of artifacts to document sequences through time.

Another important historic application of geoscience techniques to archaeology was connected with the then controversial question of human antiquity. Excavations of Brixham Cave in England by Pengelly in 1858 provided well-documented evidence for the presence of humans with extinct Ice Age animals using systematic excavation techniques. The geoarchaeological observations undertaken by Pengelly, as well as Falconer, Prestwich, and Lyell eventually led to a breakthrough in our understanding of human antiquity. There were other influential publications during the 1860s. Lubbock published *Pre-Historic Times* in 1865 arguing that archaeology formed the bridge connecting geology and history.

Geoscience techniques were also an important part of classical archaeology during the last half of the 1800s, especially the use of stratigraphy. In

1860, Fiorelli started stratigraphic excavations at Pompeii, and in 1873, Conze used stratigraphic techniques during his excavations at Samothrace. In 1882, Dorpfeld began careful stratigraphic excavations at Hissarlik (Troy), following the earlier studies of Schliemann.

In America, Powell had one foot in geology and the other in ethnology; he helped establish the United States Geological Survey and the Bureau of American Ethnology in the late 1800s. There were many connections between the geosciences and archaeology during this time. Putnam worked for the survey and was known for careful archaeological excavations that employed arbitrary levels and documentation of stratigraphy. Powell felt that the evidence for a Paleolithic stage in North America had to be based on geological evidence. Likewise, Holmes, an energetic critic of the American Paleolithic, wrote that the only reliable test for human antiquity in North America rested on geology. During the 1890s, researchers such as Haynes, Abbott, and Salisbury believed the reliability of the geological evidence was crucial to evaluating archaeological sites. Winchell used his 1902 presidential address to the Geological Society of America to summarize the geological evidence for ancient humans in the New World.

During the early part of the 1900s, techniques from the geosciences were used to examine archaeological sites in the context of landscape change. Von Post used pollen studies to document vegetational change since the melting of the glaciers. Relative dating techniques were also employed. Varve dating was used by deGeer in Sweden, Sauramo in Finland, and Antevs in North America. Remote sensing in the form of aerial photography was also used. Crawford mapped over 200 archaeological sites in southern Britain using aerial photography as part of a study of settlement patterns and ancient landscapes. The links between environmental and climatic change and human activities were also of interest after 1900. In 1905, Pumpelly, another president of the Geological Society of America, applied geological methods to study the archaeology of the Anau in Turkestan.

In 1911, Gamio used a stratigraphic approach in excavations at Azcapotzalco in Mexico City, Mexico, and similar methods were employed in 1914 by Nelson at Pueblo San Cristobal. Beginning in 1915, Alfred Kidder used more controlled stratigraphic excavation techniques at Pecos Pueblo. Andersson, a Swedish economic geologist, pioneered geoarchaeology in China. He defined the Chinese Neolithic and excavated at the famous Paleolithic cave site at Zhoukoudian from 1921 to 1926.

By the 1920s and 1930s, Carl Sauer was developing his ideas about the landscape as a product of space, time, and natural and human processes. Sauer uses the term *archaeogeography* to designate the study of archaeological sites in relation to their environmental setting (Sauer and Brand 1932). From about 1924 to 1950, Kirk Bryan was the preeminent figure combining geoscience techniques and archaeology.

Bryan's student, Herbert Wright, served as geologist for excavations at Ksar Akil, Lebanon, and also participated with Robert Braidwood's multidisciplinary project in Kurdistan, northern Iraq.

During the 1950s, geological studies were part of many archaeological studies in the Old World and in the New World. In Old World studies, Judson conducted a study of the geological and geographical setting of Abri Pataud. Sedimentological studies of Abri Pataud were started by John Miller in 1958 and additional studies were completed by Bill Farrand in 1964. Karl Butzer began his geoarchaeological research in the Nile Valley of Egypt during 1956 and 1958. Cornwall's 1958 *Soils for the Archaeologist* demonstrated the great potential sediments and soils offered in archaeological analysis and interpretation. In New World studies, geology played a prominent role in Paleoindian research in western North America. For example, Evans conducted stratigraphic studies at the Clovis type-site in New Mexico and at Lubbock Lake, Texas. Wendorf led a team which included Albritton in the study of the Midland site in west Texas. C. Vance Haynes began his important geological studies of archaeological sites in the 1950s.

Pyddoke's 1961 *Stratification for the Archaeologist* emphasized the importance of stratigraphic context. One of the most important

contributions to geoarchaeology was Butzer's landmark *Environment and Archaeology* first published in 1964. In East Africa in 1962, Hay initiated his geological studies of Olduvai Gorge (Hay 1976). In Greece during the 1960s, William McDonald included earth scientists in a survey of Messenia, bringing in Wright (who had previously collaborated in archaeological projects in Lebanon and Iraq) then Rapp in 1966. Field studies conducted by Kraft, Aschenbrenner, and Rapp from 1971 to 1975 focused on the paleogeography of the coastal plain of the southwestern Peloponnese. The studies initiated by Kraft and Rapp in the 1970s turned into a long-term investigation of the ways coastal change has affected major archaeological sites in Greece and Turkey such as Troy, Ephesus, Ancient Pylos, and the landscape of the famous battle at Thermopylae.

Historically, events and publications during the 1970s and 1980s served to firmly establish the discipline of geoarchaeology. The enhanced visibility of geological applications to archaeology led to a short note coauthored by Rapp, Albritton, and Bullard entitled "Geoarchaeology Anyone?" in a 1974 newsletter of the Geological Society of America (GSA). The Archaeological Geology Division of the GSA was founded in the 1977, providing a venue and structure for specialists in the field. Several publications provided an understanding of the wide scope of geoscience techniques that could be applied to archaeological contexts and artifacts. For instance, in the late 1970s, an edited volume was published by Davidson and Shackley entitled *Geoarchaeology* and Vita-Finzi published *Archaeological Sites in Their Setting* (Butzer 1982). These were soon followed in the 1980s by Butzer's *Archaeology as Human Ecology* which emphasized the application of a geoarchaeological approach and *Archaeological Geology* edited by Rapp and Gifford which demonstrated the strong diversity of techniques used to understand the human past. The first volume of *Geoarchaeology: An International Journal* was published in 1986.

From the nineteenth century to the mid-twentieth century, the application of geology in archaeology was a "specialty" practiced by a few geologists. Since the last third of the twentieth century, it has become an organized discipline with professional societies, journals, conferences, and university programs. For the first 100 years or so, geoarchaeology was the province of the geologists. But since the late twentieth century, most geoarchaeologists have been educated in archaeology or anthropology departments and/or previously trained in geology, geography, and/or soil science. At the same time, some research traditions, especially those rooted in continental Europe, continue to emphasize the collaboration between archaeologists and earth scientists over and above the training of students as geoarchaeologists.

Key Issues/Current Debates

Because of the wide scope of geoarchaeology, it addresses many key questions regarding the long-term connections between humans and the environment. Indeed, there is a debate about how geoarchaeology is related to other disciplines that also study people and nature. For example, some people see geoarchaeology and archaeological geology as having the same goals, while others see them as using the same concepts but having different objectives. Although there does not seem to be too much controversy over the concepts and techniques, there are different perspectives on how these should be applied. For example, archaeological geology can be viewed as the use of the archaeological record to study geological questions in contrast to geoarchaeology which would apply geoscience techniques to answer archaeological questions. There is also a debate regarding the relationships between geoarchaeology and archaeometry. One approach is to place studies of sediments, soils, stratigraphy, and landforms within the realm of geoarchaeology and to distinguish it from archaeometry which would have a focus on geochronology, geophysics, and raw material analysis. Geoarchaeology has also been considered as a subdiscipline (along with zooarchaeology and archaeobotany) of environmental archaeology. Overall, geoarchaeology is a discipline that has as a primary goal the understanding of humans

and past environmental systems. Three keys issues that can be addressed using geoarchaeology are (1) human response to climate change, (2) human use of resources and impact on the environment, and (3) natural hazards and people.

Geoarchaeology is a critical source of information for examining human biological and behavioral responses to climate change. This includes biological adaptations to changes in climate as well as the response of ancient societies to climate change. Many questions connected with the ways humans use natural resources and impact the environment can be examined using geoarchaeology. Examples would include petrographic or geochemical provenance studies designed to study the flow of raw materials or studies of how resource exploitation is linked to erosion and sediment deposition and landscape evolution. Geoarchaeology thus can provide important information on the use and management/mismanagement of resources. Another focus of geoarchaeology is the use of records of the past to understand and predict environmental hazards. These include studying the patterns and effects of earthquakes and other geological catastrophes such as floods, volcanic eruptions, and tsunamis. A broad look at the dramatic effects of seismic events around the globe is given by Nur (2008). This volume covers major earthquakes from ancient Israel to modern Japan. A volume on archaeoseismology that details other seismic impacts is focused on the eastern Mediterranean, especially Greece (Stiros and Jones 1996).

International Perspectives and Future Directions

One of the important aspects of geoarchaeology is that it is an empirical natural science approach that can be applied to any archaeological record, regardless of its location on the globe. An emphasis on process and product encourages an international perspective. This is reflected in the *Developing International Geoarchaeology* (DIG) conferences which bring together a diversity of international researchers to share research and promote international studies in geoarchaeology. The application of geosciences techniques can be applied to any environmental context. Any region of the world can be studied using the geoarchaeological approach. For example, since the last third of the twentieth century, coastal studies in the Aegean and elsewhere have aided historians and archaeologists in discovering and understanding coastal sites. Kraft et al. (2007) provide an excellent example of how core drilling and the geological analyses of the sediment cores offer critical information about ancient Ephesus otherwise unavailable to archaeologists, historical geographers, and historians. On the other side of the world, Jing et al. (1995) show how sediment coring can discover deeply buried sites that would otherwise remain unknown, even after intensive surface survey. The geoarchaeological community has benefited from international cooperation and collaboration for both conducting field work and laboratory studies. Because geoarchaeology examines the way natural systems interact with humans, there is great value in the exchange of ideas and techniques that can be used to understand how ecosystems work at various scales of time and space.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Chemistry: Definition
- ▶ Ash: Geoarchaeology
- ▶ Beach, Timothy
- ▶ Butzer, Karl W.
- ▶ Cornwall, Ian Wolfram
- ▶ Dating Techniques in Archaeological Science
- ▶ Deflation Archaeology
- ▶ Disaster Response Planning: Earthquakes
- ▶ Disaster Response Planning: Flood
- ▶ Disaster Response Planning: Tsunamis
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Gamio Martínez, Manuel
- ▶ Goldberg, Paul
- ▶ Haynes, Jr., C. Vance
- ▶ Historical Ecology and Environmental Archaeology

▶ Karstic Landscapes: Geoarchaeology
▶ Landscape Archaeology
▶ Lubbock, John
▶ Macphail, Richard I.
▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
▶ Prospection Methods in Archaeology
▶ Provenance Studies in Archaeology
▶ Radiocarbon Dating in Archaeology
▶ Rapp, George R.
▶ Rivers: Environmental Archaeology
▶ Site Formation Processes
▶ Taphonomy: Definition
▶ Wilkinson, Tony James
▶ Zeuner, Frederick Everard

References

Butzer, K. 1982. *Archaeology as human ecology*. New York: Cambridge University Press.

Das, A., and S. Panjo. 1999. Cultural history of Malda and South Dinajpur West Bengal: A geoarchaeological perspective. *Gondwana Geological Magazine Special Volume* 4: 347–359.

Fitzpatrick, S., W. Dickinson, and G. Clark. 2003. Ceramic petrography and cultural interaction in Palau, Micronesia. *Journal of Archaeological Science* 30: 1175–1184.

Goldberg, P., and F. Berna. 2010. Micromorphology and context. *Quaternary International* 214: 56–62.

Haustein, M., C. Gillis, and E. Pernicka. 2010. Tin isotopy – A new method for solving old questions. *Archaeometry* 52 (5): 816–832.

Hay, R. 1976. *Geology of the Olduvai Gorge*. Berkley: University of California Press.

Holliday, V., and R. Mandel. 2006. Geoarchaeology of the Plains, Southwest, and Great Lakes. In *Handbook of North American Indians, volume 3: Environment, origins, and population*, 23–46. Washington, DC: Smithsonian Institution.

Huston, S., A. Magnoni, R. Terry, T. Beach, B. Dahlin, and M. Schabel. 2009. Phosphate fractionation and spatial patterning in ancient ruins: A case study from Yucatan. *Catena* 78: 260–269.

Jing, Z., G. Rapp, and T. Gao. 1995. Holocene landscape evolution and its impact on the Neolithic and Bronze Age sites in the Shangqiu Area, northern China. *Geoarchaeology* 10: 481–513.

Kraft, J., H. Bruckner, I. Kayan, and H. Engelmann. 2007. The geographies of ancient Ephesus and the Artemision in Anatolia. *Geoarchaeology* 22: 121–149.

Nur, A. 2008. *Apocalypse: Earthquakes, archaeology, and the wrath of God*. Princeton: Princeton University Press.

Parkyn, A. 2010. A survey in the park: Methodological and practical problems associated with geophysical investigation in a late Victorian municipal park. *Archaeological Prospection* 17: 161–174.

Sauer, C., and D. Brand. 1932. *Aztatla'n: Prehistoric Mexican frontier on the Pacific coast*. Berkley: University of California Press.

Schuldenrein, J., R. Wright, M. Mughal, and M. Khan. 2004. Landscapes, soils, and mound histories of the Upper Indus Valley, Pakistan: New insights on the Holocene environments near ancient Harappa. *Journal of Archaeological Science* 31: 777–797.

Stiros, S., and R. Jones, eds. 1996. *Archaeoseismology*. Athens: Institute of Geology and Mineral Exploration and The British School at Athens.

Wu, X., C. Zhang, P. Goldberg, D. Cohen, Y. Pan, T. Arpin, and O. Bar-Yosef. 2012. Early pottery at 20,000 years ago in Xianrendong Cave, China. *Science* 336: 1696–1700.

Further Reading

French, C. 2003. *Geoarchaeology in action: studies in soil micromorphology and landscape evolution*. London: Routledge.

Goldberg, P., and R. Macphail. 2006. *Practical and theoretical geoarchaeology*. Malden: Wiley-Blackwell.

Holliday, V. 2004. *Soils in archaeological research*. New York: Oxford University Press.

Mandel, R. 2001. *Geoarchaeology of the Great Plains*. Norman: University of Oklahoma Press.

Rapp, G. 2009. *Archaeominerology*. Berlin: Springer.

Rapp, G., and J. Gifford, eds. 1985. *Archaeological geology*. New Haven: Yale University Press.

Rapp, G., and C. Hill. 2006. *Geoarchaeology: The earth-science approach to archaeological interpretation*. New Haven: Yale University Press.

Waters, M. 1997. *Principles of geoarchaeology: A North American perspective*. Tucson: The University of Arizona Press.

Geoglyphs

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Introduction

Geoglyphs are handmade features created on the surface of the earth. These have been made by removing or adding soil or stones. This creates

Geoglyphs, Fig. 1 The visibility of a linear geoglyph created using both additive and subtractive techniques is further enhanced by raking light that highlights differences in color and intensity between the geoglyph and the natural surface Nazca, Perú

contrast between the figure and the ground, enhancing visibility (Fig. 1). The most famous geoglyphs are in Nazca, Perú. Geoglyphs, nevertheless, also occur in a range of different forms worldwide. Despite the similarities that can be found between regions, it is clear that geoglyphs have independent origins and development in time and space.

Definition

What defines a geoglyph? This question is particularly relevant when we observe this phenomenon on a global scale; a wide variety of geoglyphs exist, although within limited parameters. Geoglyphs are intentional human made renderings of iconic/identifiable or non-iconic/unidentified forms placed over the surface of the earth, mainly by adding or removing material. Geoglyphs frequently include large-scale designs, i.e., either the individual figures are large or there are compositions of cluster of figures that extend over a sizable area. The term "geoglyph" may also apply to culturally significant patterns or locations resulting from ceremony, such as dance circles. A geoglyph's design – a llama, for example – fulfills a function which could be religious, aesthetic, economic, etc. Geoglyphs can last over time as a testament to activities or beliefs. Although we can identify its form, without additional information it is not possible to know its functions.

The term "geoglyph" was first used by the Venezuelan archaeologist Cruxent (1949), although it was Mostny (1964), head of the Anthropology section and subsequently the director of the Chilean Museo Nacional de Historia Natural, who explicitly defined this concept. Additional variants for the term include pintados, earth art, earthworks, terraforms, ground drawings, intaglios, mounds, stone arrangements, and ring ditches.

The creation of geoglyphs is accomplished through two techniques, additive and subtractive, either singly or in combination (Fig. 1). Making a geoglyph does not require a great deal of labor investment. Generally, the materials are not large or heavy, and the activity is not labor intensive, and thus, the task can be undertaken by the very young through to the very old. Some techniques require a greater degree of labor investment, such as the geoglyphs from Venezuela and Colombia, where the figures are engraved on rocky slopes, or the Amazonian mounds constructed within minimally cleared areas in forests, and the excavation of deep trenches to supply the sufficient quantities of heaped earth for platforms (Watling et al. 2017).

The specific location, size, style, and situation of geoglyphs on the ground have direct implications for their visibility. Geoglyphs on slopes are visible from a distance (Fig. 2). Geoglyphs situated on flat or horizontal surfaces are more difficult to see from a distance, although they can be discernible up close, or "seen" through the senses when people walk or move over the geoglyph (Fig. 3). Large geoglyphs (e.g., Nazca) and three-dimensional (e.g., Hopewell/Adena, Amazonia) geoglyphs may be difficult to discern in their totality. The

Geoglyphs, Fig. 2 Traditional llama caravan passes below additive/subtractive geoglyphs inscribed high on hillsides at Cerros Pintados, Chile, which are visible from both near and far

Geoglyphs, Fig. 3 Linear trapezoidal geoglyph Nazca, Perú

use or significance of some geoglyphs can be understood from oral traditions and indigenous knowledge. Thus, geoglyphs are comprehended visually (e.g., in Chile, England, Venezuela, and Colombia) or experienced (e.g., Nazca) or known (e.g., Californian rituals).

The relationship between the suitability of the earth's surface and the visibility of geoglyphs results in different kinds of techniques employed by the geoglyph makers. Suitable natural surfaces are common in arid regions of western Americas (e.g., Nazca in Perú, northern Chile, western US states, and Mexico), Argentina, Australia, Algeria, Libya, Egypt, Israel, and Kazakhstan. In such regions, images are added to or created on the natural surface. Forested or otherwise verdant landscapes required clearing prior to creating geoglyphs. These areas include the effigy mounds

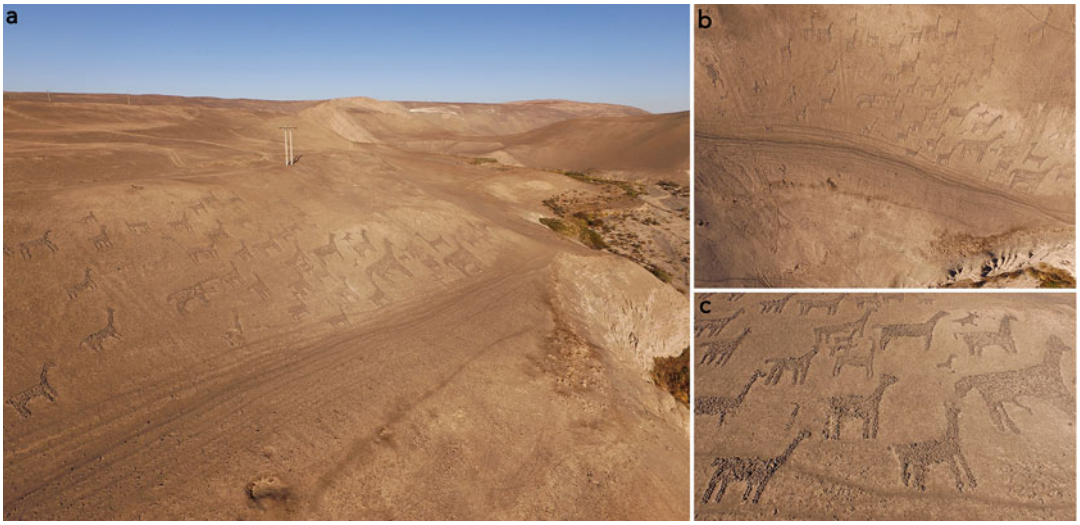

Geoglyphs, Fig. 4 Additive geoglyph composition of camelids situated on a gentle slope is comprised of large stones. Quebrada de Tiliviche, Chile: (**a**) view of the geoglyphs location on the slope of the river, (**b**) aerial view of geoglyphs associated to caravan trails, and (**c**) detail of the figures made by additive technique. (Photos permission of Marta Crespo, FONDECYT 1151046)

of the Mississippi Basin (Hopewell and Adena cultures) and the Amazon Basin.

The construction technique and placement can also affect durability as well as the visibility of geoglyphs. Images on slopes, such as the Uffington Horse in England, are visible from a long distance. The use of large stones to form a large panel of numerous figures on a moderately sloped surface at Quebrada Tiliviche in northern Chile has withstood the effects of gravity, wind, and rain (Fig. 4). Geoglyphs created with heaped soft soils or on steep slopes are less likely to withstand the effects of these natural processes. Visibility of geoglyphs is enhanced by raking light; this is particularly evident in older geoglyphs where the color or texture contrast between the original surface and disturbed subsurface may fade over time.

Key Issues

Purposes

Geoglyphs belong to a class of material culture commonly described as having religious, ritual, or ceremonial functions, when and if no utilitarian function is clearly evident (Clarkson 1998). In fact, in virtually every region where geoglyphs can be found, the main purpose in the construction of a geoglyph has been attributed to ceremonial and ritual activities. There are, obviously, other valid interpretations of ethnographic evidence of ritual or ceremonial use. References to shamanic activities associated with geoglyphs in pre-European contexts have been framed in cognitive archaeological explanations that employ scientific methodologies within social science and humanities investigations (Lewis-Williams 2010).

In the Bolivian Altiplano, it is thought that the so-called Sajama lines were originally associated with sacred places and mountain worship. This interpretation has been backed by ethnographic documentation (Morrison 1978; Reinhard 1996). The enigmatic geoglyphs of the Mojave Desert, in the southwestern United States, were interpreted as "rites of passage" in the nineteenth and twentieth centuries through ethnographic accounts and ceremonies (Johnson 1985). In Nazca, Perú, a variety of reasons have been suggested: geoglyphs had astronomical purposes limited evidence and served as pilgrimage sites, as well as place to worship ancestors, mountains, water, and fertility, among other functions. Cosmological and astronomical functions have been proposed for Mound 72 and other mounds at Cahokia

(Illinois, USA), a major site of the Mississippian culture, dated between 800 and 1350 CE. There are also rich ethnohistorical sources dating to the seventeenth century and later on Mississippian culture, including cosmological rituals and activities (Demel and Hall 1998). The geoglyphs of northern Chile are one of the few cases that seem also to have included a utilitarian purpose: they served as logistical markers to indicate routes for llama caravans on the western slope of the Andes. Similarly, the colored stone structures found in the province of La Rioja, Argentina, associated with water sources and natural steps, could have been related to trading routes of pre-Hispanic populations (Callegari and Raviña 2000).

Some geoglyphs executed on horizontal surfaces, particularly large images, are visually best observed from a distant or elevated location directly from above (Fig. 5). Aerial visual conceptualizations popularly invoke an intention for deities, supernaturals, or humans in altered states of consciousness. San Pedro cactus (*Trichocereus pachanoi*), portrayed on Nazca ceramics and native to the Nazca and Andean regions, contains hallucinogenic alkaloids which can produce a sensation of flying. Ethnographic evidence from southern California indicates that walking on and/or tracing the outline of geoglyphs was intended or practiced (Johnson 1985). Nazca figural geoglyphs were consistently made with a single line that scribes the entire figure, regardless of the complexity. The width of the line is consistent with that of a footpath, and thus, an individual can (de)scribe an entire figure, beginning and ending at the same location. The sensual and ritual effect is analogous to walking a prescribed route, such as the effect attributed to the thirteenth-century labyrinth in the floor of Chartres Cathedral, where the meandering line of the labyrinth is said to have been intended to be experienced as a ritual of devotion and contemplation or as a simulation of pilgrimage to the Holy Land. Similarly, the "wheel" and "pendant" forms reported in Arabia may have been used for the ritual circumambulation of sacred spaces, identified in both Islamic and early Arabic contexts (Kennedy 2011).

Distribution

Geoglyphs are known from every continent, except Antarctica (Fig. 6).

North America

In North America, the earliest geoglyphs described in the literature were the earthen mounds found throughout the Mississippi River and Ohio River basins and around the Great Lakes. The effigy mounds are naturalistic renderings of identifiable fauna, often in clusters. The complexity and precision of execution of both

Geoglyphs, Fig. 5 A large geoglyph of a spider inscribed on a horizontal surface is difficult to discern from a static location on the ground; the entire figure is visible from the air (approximate length 45 m/150 ft)

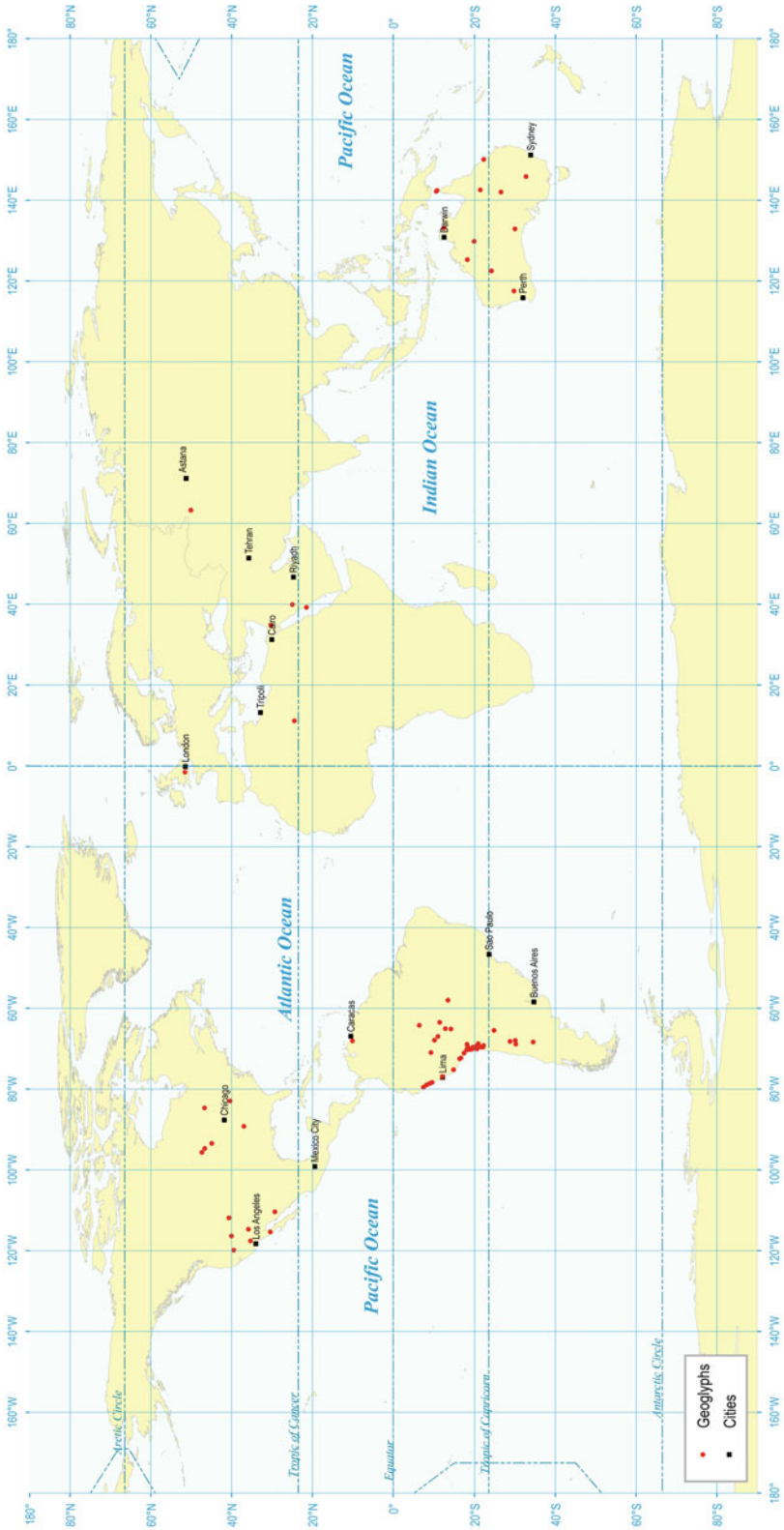

Geoglyphs, Fig. 6 Locations of geoglyphs discussed in the text

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effigy and geometric mounds belie large-scale effort and abstract visual comprehension of images that could only be viewed from above or by walking around and over them. The makers of these mounds are collectively referred to as "mound builders," and the mounds span broad cultural and temporal spheres, dating as early as approximately BCE 3500 (e.g., Watson Brake in Louisiana) and continuing up to European presence in the sixteenth century. The "mound builders" were alternately ascribed to Phoenicians, Egyptians, Romans, lost tribes of Israel, etc., in line with pre-twentieth-century "scholarly" thinking that ignored both the long-term presence of indigenous populations and their successful, unique, varied, and complex adaptations in the New World.

Subsequent explorations throughout the Americas have revealed additional examples of geoglyphs in the arid western regions of North and South America. These geoglyphs use the landscape as a natural "blackboard" on which soil and stone were scraped or heaped up to form low-profile naturalistic or abstract images, as well as alignments of stones or boulders. Cultural assignation of geoglyphs in the western regions of North America is difficult to ascertain due to a general lack of associated and dateable sites, material culture, or ethnographic reference. Some geoglyphs in the Great Basin and West may date to the Paleo-Indian (at least 13,000 years ago) or Archaic (BCE 8000-2000, up to the nineteenth century in some areas) periods. Research on geoglyphs in the American Southwest and the Northern Plains of the United States and Canada has revealed viable hypotheses regarding historic or protohistoric cultural affiliation of use, age, and purposes of the geoglyphs (Whitley 2000; Aveni 2008). The forms of these geoglyphs are varied and reflect a diverse cultural and chronological history. "Medicine wheels" on the Northern Plains have been correlated with astronomical or cosmological significance (Aveni 2008), while geoglyphs in the Southwest (California and Arizona, USA) and adjacent regions of Sonora (Mexico) have been ethnographically correlated with historic Akimel O'odham (Pima) and Tohono O'odham (Papago) peoples relating to their dance circles, community rituals, and social identifiers. The geoglyphs in these regions, known also in the literature as "alignments," "gravel effigies," and "pictographs," have proven difficult to date due to the general lack of chronological markers within or associated with the geoglyphs (Whitley 2000) (Fig. 7).

Geoglyphs, Fig. 7 Subtractive geoglyph of indeterminate age, cultural affiliation, or representation in the Colorado River region. (Photo permission of R. Dorn)

Researchers also extend the term "geoglyph" to refer to other culturally significant patterns or locations resulting from rituals associated with puberty rites, healing, harvest feasts, and origin myths, particularly in the American Southwest. The information is derived from natives living in and historically associated with the areas where such geoglyphs occur (Johnson 1985). The categories that distinguish these so-called patterns from geoglyphs are often indistinguishable to the Western researcher. The patterns convey information to the traditional people of the region, a unique form of art. Comparisons have also been drawn to the similarity of subject matter, motif, and execution technique between geoglyphs and petroglyphs (Davis and Winslow 1965) and sand paintings, although there is no evidence that people who created geoglyphs also created sand paintings (Harner 1953; Cohen 1987). Petroglyphs are also known as rock art, and sand paintings are elaborate images of mythological beings created during healing ceremonies and subsequently destroyed as part of the cure. Among the Navaho, the mastery of sand painting is deeply embedded with the intensive training for healers. Thus, ethnographically documented purposes for the artistic expressions of geoglyphs are usefully applied as hypothetical analogies elsewhere.

South America

The coastal deserts of western South America comprise excellent conditions for the creation of geoglyphs – minimal vegetation, minimally dissected terrain, and soils and stone suitable for creation. In Perú, the most famous geoglyphs are those in the region of Nazca, but geoglyphs have been found from the north coast to the southern tip of this country (see the entry on "Nasca and Pampa Jumana Lines and Geoglyphs" in this encyclopedia). Apart from the Nazca region, geoglyphs can also be found in the north coast valleys of Santa, Jequetepeque, and Moche, Rimac and Casma on the central coast, and in the valleys of Majes, Sihuas, Moquegua, and Tacna in the south coast (see Wilson 1988; Abanto 2009; Bikoulis et al. 2016). The geoglyphs in Perú have been made by using both extractive and additive techniques. In Nazca, most linear and biomorphic geoglyphs are made through an extractive technique, while the additive technique is limited to certain biomorphs from the Andean highlands (see the entry on "Nasca and Pampa Jumana Lines and Geoglyphs" in this encyclopedia). In the north, central, and south parts of the country, geoglyphs have been created using both additive and extractive techniques, and their forms vary from geometric to figurative.

In northern Chile, geoglyphs were first noted by European travelers and geographers during the eighteenth and nineteenth century. They are found mainly in lowland valleys and are scattered in the slopes and plains of the western side of the Andes and the coast. They can be also found in the Arica, Tarapacá, and Antofagasta regions. Here, geoglyphs show significant differences in terms of technique: additive, subtractive, and mixed, displaying an array of regional style, culture, and traditions (Briones 2006). The majority of the motifs are zoomorphic, mainly camelids, and there are also a variety of anthropomorphs (often with camelids) and geometric motifs. In general, geoglyphs in northern Chile are located on slopes, but they can also be found on horizontal surfaces, all of them normally associated with caravan trails (Figs. 4 and 8). This consistent association has led to geoglyphs being interpreted in terms of their functional and symbolic relationships to the caravan system and routes that connected the Andes and the Pacific coast during pre-European times (Núñez 1976; Pimentel 2011). Although most geoglyphs currently are dated from the late pre-Hispanic period (c. CE 900–1535), it is thought geoglyphs began to be used from the Late Formative period (c. BCE 500 - CE 600), as evidenced by funerary manifestations directly associated with them (Briones 2006).

Geoglyphs are also located in the highlands of South America. In Chile, geoglyphs can be found in the Zapahuira region in the Sierra de Arica (Briones 2006). The highland Bolivian Sajama region in the province of Oruro is home to several hundred-plus linear geoglyphs spread across a wide area of the Andean uplands. The "Sajama lines" were documented over a century ago by a variety of anthropologists and explorers (Morrison 1978). Their age and purpose remain

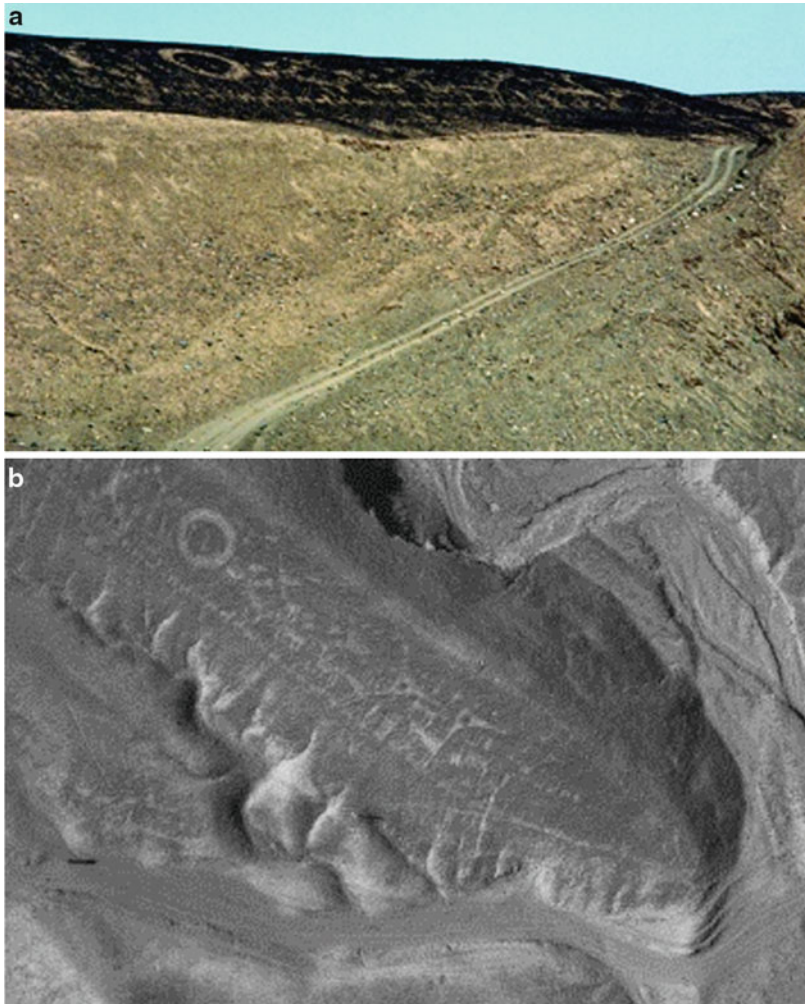

Geoglyphs, Fig. 8 A principal north to south caravan trail cuts across the Quebrada de los Pintados (Chile), flanked by geoglyphs on both sloped and horizontal surfaces. Geoglyphs on slopes are visible from the ground (**a**) and aerial views of both sloped (**b**) is an aerial view of (**a**) and horizontal surfaces easier to conceptualize. The different styles and themes of the geoglyphs may indicate different cultural and/or chronological factors

enigmatic, although parallels have been drawn to the appearance of Nazca line centers, ancient and modern Andean traditions related to ritual travel, and the Inca ceque system. Many of the Sajama lines coincide with community boundaries, and lines often extend between communities and major peaks (Tierra Sajama n.d.).

In Argentina, geoglyphs with particular technical and stylistic features have been discovered in recent archaeological explorations. They are located mainly in La Rioja province, although isolated examples can be found in Salta, San Juan, San Luis, and Mendoza. So far, all known geoglyphs in Argentina were made with an additive technique by heaping rocks and dirt on horizontal surfaces. Noteworthy are tall structures or structures of tamped earth covered with black, white, and red colored stones that were deliberately selected to form geometric shapes like circles and stars; the structures range in size from approximately 10–30 m (Callegari and Raviña 2000). Some of the geoglyphs are associated with sites of the Aguada culture (550–900 CE), although the chronology is still uncertain (Fig. 9).

There have been recent isolated reports of geoglyphs in areas where they were previously unknown, such as in the high valleys of the western state of Carabobo, north-central Venezuela (Urbani and Urbani 2001). The technique used in this region to create geoglyphs is unique: these occur as large circular and linear shapes

Geoglyphs, Fig. 9 Additive geoglyph of colored stones in Piedras de Afilar, Ischigualasto, San Juan, Argentina. (Photo permission of Mercedes Podestá and M. Pía Falchi)

(c. 35 × 42 m) and are located on rocky slopes. They are made by an engraving percussion technique (Urbani and Urbani 2001). Given their large size and location on the hillsides, these petroglyphs have been termed geoglyphs.

Geoglyphs were first identified in the Amazon region of Brazil and Bolivia in the late twentieth century, and only recently have they been conceptualized and recognized as geoglyphs. There are two main areas of distribution: the Baure region in the Bolivian Amazon and the Acre region in the Brazilian Amazon (Pärssinen et al. 2009; Erickson 2010; Bikoulis et al. 2016). These are large structures built by digging a deep trench and heaping the removed soil into desired forms. Their shapes are largely geometric circles and ellipses; octagonal, hexagonal, square, rectangular, "U", groups of circles, and concentric circles have also been observed. The perfect geometric forms suggest a symbolic significance (Pärssinen et al. 2009: 1093–1094). A variety of other functions, such as defense, settlements, residences of the elite, land and resource markers, animal traps, cemeteries, transportation routes water management features, and/or ceremonial public spaces, have also been proposed (Erickson 2010).

Australia

Numerous examples of geoglyphs referred to as "stone arrangements" have been documented in Australia. "Stone arrangement" is a broad category that includes features consistent with those shared with geoglyphs. These earth features characteristically appear in arid coastal regions of central, western, and northern Australia. Usually the geoglyphs take geometric, circular, and linear forms, as well as those of figurative effigies of animals. They are made by laying stones on horizontal surfaces on the ground or, in some cases, in intertidal zones along the coast. The meanings of some of these features have been discerned through rich ethnographic and ethnohistorical data, plus recent archaeological research. These geoglyphs were integral to traditional Aboriginal ceremonies, marking totemic centers or locations associated with myth, in addition to places where initiation ceremony and rites of passage occurred, among others (Mathews 1896; McNiven 2003; David et al. 2004).

Africa and Asia

In Algeria, Libya, and Egypt, geometric shapes, such as irregular and meandering lines, created by clearing dirt and rocks, are located on horizontal

desert surfaces (Gauthier 2007). In Israel, geoglyphs have been described in the Negev Desert, made by extractive and additive techniques (Anati 1999). The distribution, forms, meanings, functions, and timing of these geoglyphs are unknown.

An extensive remote sensing study in Arabia (including Syria, Jordan, Egypt, Israel, Saudi Arabia, and Yemen) has revealed hundreds of thousands of "structures" that are analogous to geoglyphs. Referred to as "works of the Old Men" by Bedouin from a number of regions in Arabia, these forms can extend up to several kilometers. The purposes ascribed to the variety of forms include hunting traps, funerary sites, ritual feasting, and possible astronomical or directional alignments. Chronological assessments via relative dating indicate these are up to 9000 years old (Kennedy 2011).

The discovery of up to several hundred geoglyphs in Kazakhstan has extended suggestion that a long-held anthropological theory that monumental art and constructions were coincident with settled life is too simplistic and that the lifeways of nomadic peoples were more complex than generally attributed (Blumenthal 2015). OSL dating and archaeological fieldwork in the region of the geoglyphs suggest a maximum age of 800 B.C. (Jarus 2015; Logvin et al. 2014).

Europe

The Uffington White Horse (Oxfordshire) is the best reliably confirmed geoglyph in England (Pollard 2017). The 2000-year-old Bronze Age figure was constructed by digging a trench and filling it with chunks of locally available white chalk. Other chalk figures are known in England, although their authenticity as ancient monuments is discredited in many cases.

Chronology

Two methods have been used to date geoglyphs: relative dating and absolute dating. Relative dating relies on associating artifacts of known age with the geoglyphs. It is usually difficult to determine what the association is between the stone features and artifacts found nearby. Furthermore, geoglyphs were likely reused, and therefore, the associated artifacts could relate to the construction event or subsequent use of the geoglyphs. For example, in northern Chile, geoglyphs associated with caravan trails and habitation sites between the oasis of Tamentica and the Quebrada de los Pintados were likely reused, reinterpreted, and redrawn over a considerable time period. The reuse of geoglyphs is indicated by superimposed drawings, although it is difficult to determine the chronological interval: it could be 1 hour or a millennium. When superimposed drawings have distinct stylistic/iconographic features, reuse over time can be suggested. Relative dates also can be established through stylistic and iconographic comparisons with dated iconography, such as that found on ceramics, textiles, baskets, or gourds, thus providing viable ages (Kennedy 2011). Lastly, patination may indicate relative ages within the same ecological zone (Dorn 2009). Absolute dates are provided by a variety of different chronometric analyses, such as cation ratio, 14 C, AMS 14 C, pedogenic-carbonate inversion (PCI), varnish microlamination stratigraphy (VML), 36 Cl, backscattered electron microscopy (BSE), and energy dispersive X-ray analysis (EDS), with the appropriate technique applied in different environments and contexts (Dalton 1999; Dorn 2009).

Future Directions

The fragile and ephemeral nature of geoglyphs has led to an increase in recent years in national and international efforts to conserve, preserve, protect, and document geoglyphs. Geoglyphs situated in undeveloped regions had been shielded from all except natural factors (e.g., erosion and taphonomy). In other regions, geoglyphs have disappeared in the wake of agricultural expansion, residential and urban construction, resource exploration and exploitation, through recreational activities, particularly those involving motorized vehicles, and armed conflict (Fig. 10).

Some circumstances make the protection and conservation of geoglyphs an arduous task: remote locations are difficult to police and protect, and funding is limited. In the north of Chile, a

Geoglyphs, Fig. 10 Geoglyphs inscribed on the slopes of Cerro Caramucho (Chile) were irreparably damaged by recreational vehicles sometime between 1998 and 2000. The area was signed as an archaeological site

process of documentation, restoration, and conservation of geoglyphs was carried out during the 1970s and 1980s, supported by the government and the University of Tarapacá. One example of effective management is the case of Cerros Pintados (northern Chile), where vehicle access is controlled, and there are designated footpaths, guards, and an entrance fee. Similarly, in Nazca (Perú), guards are stationed at key locations, and aerial flights over the geoglyphs are encouraged and popular. Nevertheless, illegal incidents of modern creation of geoglyphs within archaeologically protected zones in Perú and Chile have been documented, usually after irreparable damage has been done. Some of these modern creations have made their way into the literature as examples of the ancient corpus, in spite of documentation to the contrary.

The well-known "trident" geoglyph prominently inscribed on the slope facing the Paracas Bay in Perú has been documented as a creation of late Colonial times but continues to be featured in the corpus of "ancient" geoglyphs in the Nazca tradition. Unfortunately, dangerous remote locations cannot feasibly be studied or protected (e.g., northern Mexico is currently a domain of drug cartels, *coyotes* etc.; see Hayden 1998), and sites situated on either side of the US-Mexico border are difficult to coordinate under a single research program.

The advent of new technologies, beginning with aerial photography early in the twentieth century, has led to discovery in regions that are otherwise poor in natural resources or difficult to access: the enormous repertoire of geoglyphs in Arabia is an excellent case in point (Kennedy 2011). Subsequent refinements to remote sensing, such as satellite imagery, infrared and SLR ("side-looking radar") for vegetated areas, and easy access to Google Earth, have increased the inventory of geoglyphs. The ready access to information for scientific research on the geoglyphs is accompanied by increased likelihood of damage as a result of recreation and

economic exploration that needs to be addressed by local governments before it is too late.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Chile's World Archaeological Heritage and Its Management
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Landscape Archaeology
- ▶ Nasca and Pampa Jumana Lines and Geoglyphs
- ▶ Núñez, Lautaro
- ▶ Rock Art, Forms of
- ▶ South American Rock Art

References

Abanto, J. 2009. Evidencias arqueológicas del Período Formativo en la quebrada de Canto Grande, valle bajo del Rímac. *Boletín de Arqueología PUCP [Pontificia Universidad Católica del Perú]* 13: 159–185.

Anati, E. 1999. The rock art of the Negev Desert. *Near Eastern Archaeology* 62 (1): 22–34.

Aveni, A.F., ed. 2008. *Foundations of New World cultural astronomy*. Boulder: University Press of Colorado.

Bikoulis, P., F. Gonzalez-Macqueen, G. Spence-Morrow, W.Y. Alvarez, S. Bautista, and J. Jennings. 2016. A new methodology for geoglyph research: Preliminary survey results and practical workflow from the Quilcapampa Geoglyph Survey (Sihuas Valley, Peru). *Journal of Archaeological Science: Reports* 10: 119–129.

Blumenthal, R. 2015. NASA adds to evidence of mysterious ancient earthworks. *New York Times*. 30 October 2015. https://www.nytimes.com/2015/11/03/science/nasa-adds-to-evidence-of-mysterious-ancient-earthworks.html. Retrieved 1 June 2017.

Briones, L. 2006. The geoglyphs of the north Chilean desert: An archaeological and artistic perspective. *Antiquity* 80: 9–24.

Callegari, A. G. Raviña. 2000. Construcciones de piedras de colores. El empleo recurrente del negro, rojo y blanco, M. Podestá M. De Hoyos Arte en las rocas. Arte rupestre, menhires y piedras decolores en Argentina: 113–120. Buenos Aires: Sociedad Argentina de Antropología, Asociación Amigos del Instituto Nacional de Antropología y Pensamiento Latinoamericano.

Clarkson, P.B. 1998. Archaeological imaginings: Contextualization of images. In *Reader in archaeological theory: Post-processual and cognitive approaches*, ed. D.S. Whitley, 119–130. New York: Routledge.

Cohen, B. 1987. Indian sandpaintings of southern California. *Journal of California and Great Basin Anthropology* 9 (1): 4–34.

Cruxent, J.M. 1949. El Geoglifo de la Fila de Olivita. *Memorias de la Sociedad de Ciencias Naturales de la Salle, Caracas* IX (23): 27–49.

Dalton, R. 1999. "Faked" rock-dating charge dismissed. *Nature* 401 (6754): 629.

David, B., I.J. Mcniven, J. Crouch, and L. Brady. 2004. The Argan stone arrangement complex, Badu: Initial results from Torres Strait. *Australian Archaeology* 58: 1–6.

Davis, E.L., and S. Winslow. 1965. Giant ground figures of the prehistoric deserts. *Proceedings of the American Philosophical Society* 109 (1): 8–21.

Demel, S.J., and R.L. Hall. 1998. The Mississippian town plan and cultural landscape of Cahokia, Illinois. In *Mississippian towns and sacred spaces: Searching for an architectural grammar*, ed. R.B. Lewis and C.B. Stout, 200–224. Tuscaloosa: University of Alabama Press.

Dorn, R. 2009. The rock varnish revolution: New insights from microlaminations and the contributions of Tanzhou Liu. *Geography Compass* 3: 1804–1823.

Erickson, C.L. 2010. The transformation of environment into landscape: The historical ecology of monumental earthwork construction in the Bolivian Amazon. *Diversity* 2: 618–652.

Gauthier, Y. 2007. Sous Zone 4: Libye -Égypte – Nord du Soudan. In *Rock art of Sahara and North Africa*. *Thematic study*, 101–131. Paris: World Heritage Convention, ICOMOS.

Harner, M.J. 1953. Gravel pictographs of the lower Colorado. *University of California Archaeological Survey Report* 20: 1–32.

Hayden, J.D. 1998. *The Sierra Pinacate*. Tucson: University of Arizona Press.

Jarus, O. 2015. Mysterious symbols in Kazakhstan: How old are they, really? *Live Science*. 5 November 2015. https://www.livescience.com/52700-mysterious-geoglyphs-in-kazakhstan-revealed.html. Retrieved 1 June 2017.

Johnson, B. 1985. *Earth figures of the lower Colorado and Gila River Deserts: A functional analysis*. Yuma: Arizona Archaeological Society.

Kennedy, D. 2011. The "works of the old men" in Arabia: Remote sensing in interior Arabia. *Journal of Archaeological Science* 38: 3185–3203.

Lewis-Williams, D. 2010. *Conceiving god: The cognitive origin and evolution of religion*. London: Thames and Hudson.
Logvin, A., I. Shevnina, and G.M. Matuzevičiüté. 2014. Steppe geoglyphs mark the ancient routes of human migration across Central Asia: Introduction to the research. In *20th annual meeting of the European Association of Archaeologists, abstract of the oral and poster presentation: 492*, ed. Ö. Yilmaz. Istanbul: Archaeology & Art Publications.
Mathews, R.H. 1896. Australian ground and tree drawings. *American Anthropologist* 9 (2): 33–49.
Mcniven, I.J. 2003. Saltwater people: Spiritscapes, maritime rituals and the archaeology of Australian indigenous seascapes. *World Archaeology* 35 (3): 329–349.
Morrison, T. 1978. *Pathways to the gods. The mystery of the Andean lines*. Chicago: Academy Chicago Publishers.
Mostny, G. 1964. Pictografía rupestre. *Noticiario Mensual del Museo Nacional de Historia Natural* 8 (94): 1.
Núñez, L. 1976. Geoglifos y tráfico de caravanas en el desierto chileno. In *Homenaje al Dr. R.P. Gustavo Le Paige (Anales de la Universidad del Norte (Chile) 10)*, ed. L. Núñez, 147–201. Antofagasta: Universidad del Norte.
Pärssinen, M., D. Schaan, and A. Ranzi. 2009. Pre-Columbian geometric earthworks in the upper Purús: A complex society in western Amazonia. *Antiquity* 83 (322): 1084–1095.
Pimentel, G. 2011. Geoglifos e imaginarios sociales en el Desierto de Atacama (Región de Antofagasta, Chile). In *Temporalidad, interacción y dinamismo cultural. La búsqueda del hombre. Homenaje al profesor Dr. Lautaro Núñez Atencio*, ed. A. Hubert, J.A. González, and M. Pereira. Antofagasta: Universidad Católica del Norte Ediciones Universitarias.
Pollard, J. 2017. The Uffington White Horse geoglyph as sun-horse. *Antiquity* 91 (356): 406–420.
Reinhard, J. 1996. *The Nazca Lines. A new perspective on their origin and meaning*. Lima: Editorial Los Pinos.
Tierra Sajama. n.d. Available at: http://cml.upenn.edu/tierrasajama/sajama_english/context/sajama.htm. Accessed 12 Dec 2011.
Urbani, B., and F. Urbani. 2001. The geoglyph of La Rueda del Indio, Chirgua, Venezuela. *Rock Art Research* 18 (1): 33–39.
Watling, J., J. Iriarte, F.E. Mayle, D. Schaan, L.C.R. Pessenda, N.J. Loader, F.A. Street-Perrott, R.E. Dickau, A. Damasceno, and A. Ranzi. 2017. Impact of pre-Columbian "geoglyph" builders on Amazonian forests. *Proceedings of the National Academy of Sciences* 114: 1868–1873.
Whitley, D. 2000. *The art of the shaman: Rock art of California*. Salt Lake City: University of Utah Press.
Wilson, D.J. 1988. Desert ground drawings in the lower Santa Valley, north coast of Perú. *American Antiquity* 53 (4): 794–804.

Geometric Earthworks of Western Amazonia

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State of Knowledge and Current Debates

The geometric earthworks of Western Amazonia are huge ditched and walled enclosures built by pre-Columbian peoples from 1200 BCE to the seventeenth century. They are found over an enormous area that stretches over 490 miles in the west-east direction and about 400 miles in the south-north direction, in the Brazilian States of Acre (Eastern half), Rondônia, and Amazonas (South), as well as in Northern Bolivia (Fig. 1). The enclosures are in average the size of a city block but might measure up to four football fields. The regularity of the measurements and shapes has impressed scientists the most; many are perfect squares, circles, and hexagons but also composite figures (Fig. 2). The fact that they are better appreciated from airplanes makes people think they were made for a superior being to watch them. But who made them? With what purpose? What kinds of tools were used for building such gigantic structures in areas of dense forest? Over the past 10 years, teams of scientists from Brazil, Bolivia, Finland, the United States, England, and Germany have tried to answer these and other questions. This chapter brings the state of art and current debates regarding the geometric earthworks of the Amazon River basin.

The History of Discovery

In 1963, an article in *American Antiquity* featured aerial observations by the geologist George Plafker on what he called "remnants of cultivated fields, causeways, and canals" in Northeastern Bolivia, which he interpreted as "evidences of an extensive ancient civilization" (Plafker 1963: 372). In the

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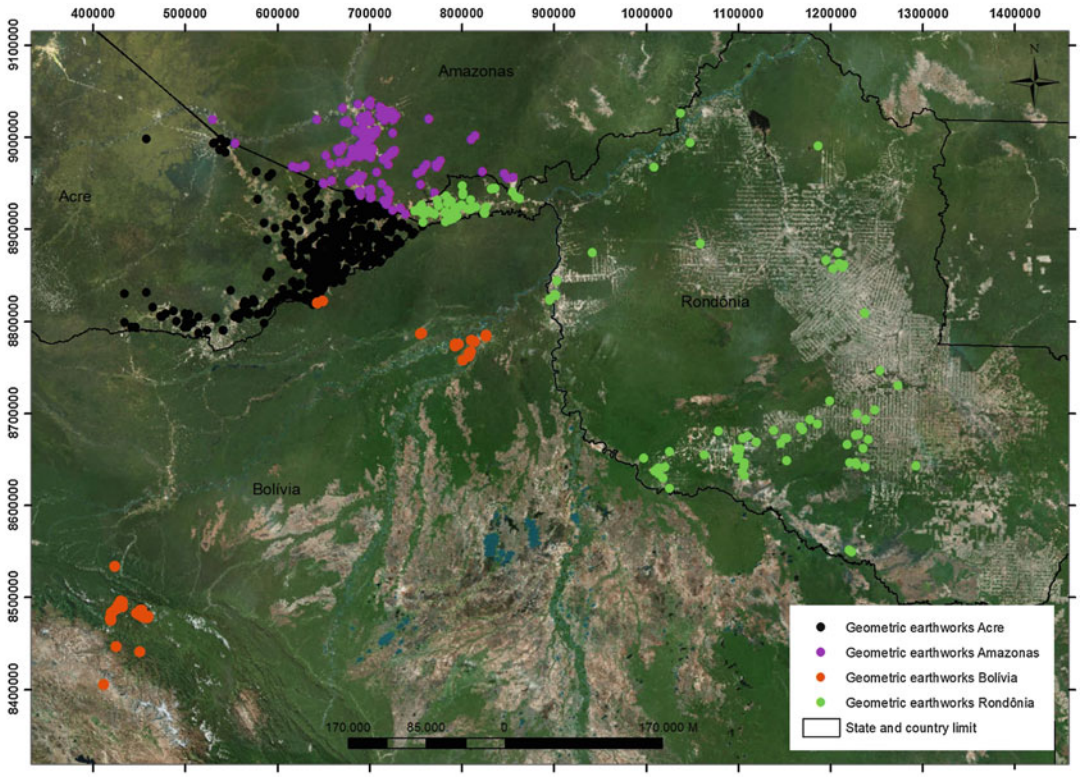

Geometric Earthworks of Western Amazonia, Fig. 1 Location of geometric earthworks in Western Amazonia. By Antonia D. Barbosa

same year, in the following number of the same journal, William Denevan, a cultural geographer, published a detailed account of the earthworks mentioned previously by Plafker. The numbers were impressive: in a 250 square mile area in the Llanos de Mojos, he counted 20,000 drained fields, 1000 miles of causeways, 42 over 10 feet high mounds, and "a large number of circular ditches (zanjas)." Denevan (1963: 542) concluded that the "ditches probably surrounded villages or shifting farms and had some sort of defensive purpose."

At that time, earthworks had already been recognized in other parts of the lowlands, but environmental determinism in archaeology was so strong that they were treated as exceptions. Meggers' 1954 article, "Environmental limitations to the development of culture," followed by her 1957 monograph on Marajo Island and her 1971 best seller *Men and Culture in a Counterfeit Paradise* had convinced archaeologists and the public opinion that the tropical environment placed serious limitations to food production and population growth. Reasons were the poor soils, cyclical climatic stresses (El Niño Southern Oscillation – ENSO), and shortage of protein (available mostly from hunting and seasonal fishing). Meggers and Steward (1950), her mentor, looked for evidence in the ethnography of living Amazonian natives, who they described as riverine peoples, living on manioc and game, at the edge of starvation, incapable of developing chiefdoms (as in Central America) or states (such as the Inca). They do not consider, however, that the so-called tropical forest peoples had their cultures and ways of life dramatically impacted by four centuries of colonization and decimation through diseases and war. So, whenever they saw evidence for complex societies, they characterized them as exterior to the basin. And although their views were strongly criticized from their inception, it

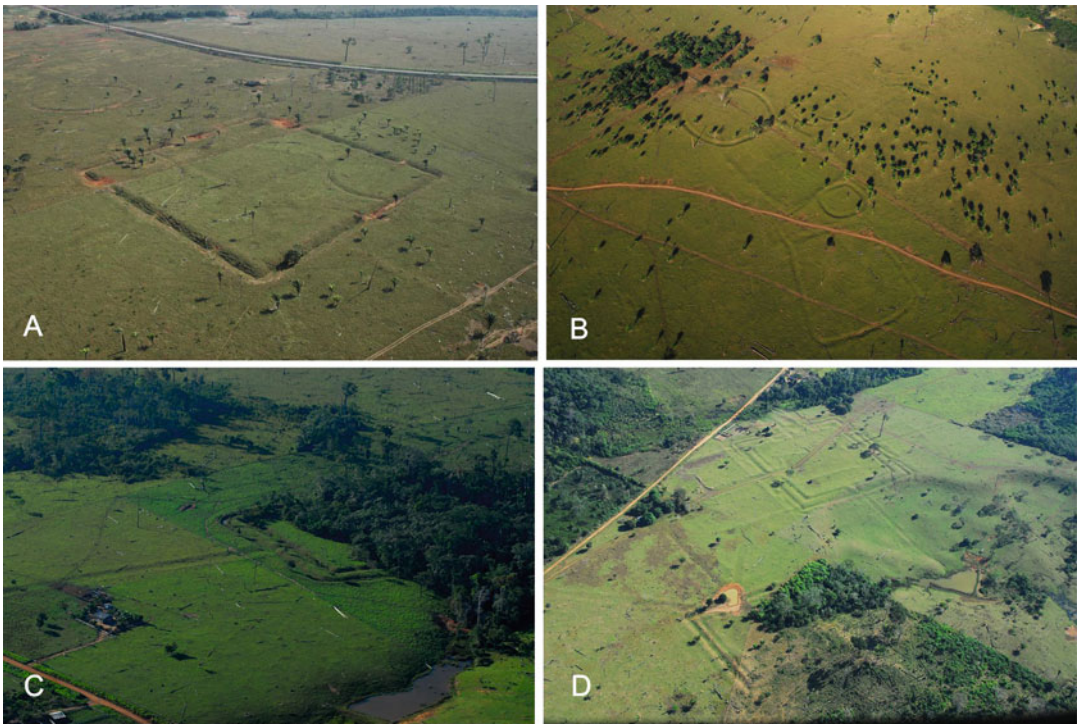

Geometric Earthworks of Western Amazonia, Fig. 2 Geometric earthworks in the state of Acre, Brazil. (**a**) – Site Fazenda Atlantica (Photo: Sergio Valle); (**b**) – site Gavião (Photo: Edison Caetano); (**c**) – site JK (Photo: Diego Gurgel); (**d**) – site Tequinho (Photo: Diego Gurgel)

took over 30 years to overcome them in Amazonian archaeology.

In Brazil, the geometric earthworks were first seen from the ground, in 1977, when a Brazilian archaeologist, Ondemar Dias, found circular ditches with exterior embankments in Acre, while surveying for a national archaeological program in Brazil partially sponsored by the Smithsonian Institution and directed by Betty Meggers (Dias 2008). At that time in Brazil large portions of the territory were unknown archaeologically, and Amazonia was considered a land where societies had lived for centuries without disturbing much of the ecosystems. Archaeologists were most interested in finding pottery sherds and classifying them into phases and traditions. So, although Ondemar Dias found eight sites with circular enclosures, he preferred to give more importance to the ceramics he collected for classification into archaeological phases. Eleven years later, the paleontologist and geographer Alceu Ranzi would become the first to see a geometric structure from the air in Brazil, aboard a flight from Porto Velho (Rondônia) to Rio Branco (Acre). Another decade will pass and Ranzi, again, spotted another structure from the air. The trained geographer knew these were not natural formations and started to record them, using small airplanes. In 2000 he had already counted 24 sites; relating them to the Nazca Lines, he named them "geoglyphs," a name that has since gained popularity in Brazil (Ranzi 2003).

While in Brazil, research on earthworks was limited until the inception of the twenty-first century; given the dominance of environmental determinism, in Bolivia, during the three or four decades that followed that initial survey, it was the raised fields that deserved most of the scholars' attention. So, although the existence of ditched enclosures was acknowledged over 40 years ago, it was not before the beginning of this century that they would be studied, both in

Bolivia and Brazil. This delay has several reasons besides the ones outlined above. First, there was a shortage of archaeologists working in the Amazon basin, given the difficulties with logistics and lack of adequate training. Second, the most important tool used to search earthworks remotely would be available much later: Google Earth free satellite imagery. Third, deforestation was not as critical as to uncover too many structures as it would be later.

The research started almost simultaneously in Brazil and Bolivia. In Brazil, a Brazilian-Finish team led by Denise Schaan and Martti Pärssinen began cooperation in 2005, being responsible, over the years, for several projects that included extensive surveys and excavations. In Bolivia, Clark Erickson, who, as Denevan student, had for most of his career focused on the raised fields research, in 2007 carries an extensive survey on the circular ditches (which they called zanjas circundantes), together with two Bolivian colleagues, Patrícia Álvarez and Sergio Calla (Erickson et al. 2008).

The amount of sites found in a couple of years of regional surveys amazed everyone. Soon it became clear that the Amazon forest had rapidly regenerated over hundreds of earthworks, and scholars began to think this was only the tip of the iceberg. Besides satellite imagery, aerial photography has been used to identify sites and the structures with more precision than pedestrian surveys. This is because given to erosion, many sites are poorly recognized from the ground level. So, while satellite image allows for the recognition of ditches, photos taken from small airplanes in the first morning hours delineates well "positive" structures, e.g., embankments, mounds, and walled roads, that make up the sites as a complex of earthwork features (Fig. 2).

At first, ditched enclosures in Acre were interpreted as remnants of ancient village sites, perhaps organized in regional level, following the same reasoning for other complex societies in the Amazon basin such as the ethnohistorical Tapajós or the mound builders of Marajo Island. In Acre, however, it appeared that complex societies had flourished also in *terra firme* (upland, areas not subjected to seasonal flooding) environments, adding to the Xingu data, where large societies had built "garden cities" beginning in 1000 AD (Heckenberger et al. 2013). As excavations progressed, however, a different picture began to emerge. First, the geometric enclosures lacked cultural remains of large sedentary populations, if compared to hundreds of archaeological sites, from the upper to the lower Amazon River. Sites would have only scattered ceramic sherds, soil chemistry showed no traces of large amounts of human waste, and the ubiquitous terra preta (Amazonian Dark Earths, ADE) was also absent. Besides, the earthmovers of Acre, radiocarbon dates showed, are much older than other complex societies in the basin. More than 20 calibrated radiocarbon dates place them in the first millennium ACE, although there are dates that show the beginning of earthmoving activities around 1200 BCE and the end by 1400 ACE. Now, scholars have proposed that the geometric enclosures in Brazil were built by highly mobile populations, as places for meetings, ceremonies, and rituals of peoples who would gather there over time, in certain periods of the year (Saunaluoma and Schaan 2012). These constructions would not be tied to particular ethnic groups but would be part of a shared technique and cosmology of societies in their formative state.

Other scholars, such as paleoecologist Francis Mayle, the palynologists Jose Iriarte and Jennifer Watling, and other students have joined the archaeologists working both in Bolivia and Brazil. They have helped to answer questions related to food production and the environmental scenario at the time of earthwork construction. Also, over the years, geologists, historians, anthropologists, soils scientists, and botanists have also looked for answers. In the remaining of this chapter the reader will find out what is known and what we still don't know about the geometric earthworks in Brazil and Bolivia. The data is organized by regions, taken in account similarities and differences between the landscapes and sites.

Earthwork Sites in Acre and Amazonas States in Brazil

Here the earthworks occur between the upper tributaries of the Purus River (Iaco and Acre

River) and the Madeira River (Abunã River). The earthworks were built on the plateau edges that top the valleys between129 and 285 masl. The placement of the earthworks in the highest spot in the landscape speaks of its ritual significance, as well as a defensive strategy, since from up there one could see whoever would approach coming from the rivers, several miles away. However, as one approaches the mouth of the Acre River at the Purus, in the state of Amazonas, there are earthworks in the lowland varzea (seasonally flooded areas) but not close to the main river.

There are 459 earthwork sites in Acre that sum up 600 ditched or walled enclosures. In the state of Amazonas there are 145 earthwork sites, with about 170 ditched enclosures (Fig. 3). An earthwork site might have only one enclosure, or up to six enclosures, linear embankments, mounds, associated roads, and other structures. The proximity of earthworks characterizes a site. About 80% of the sites are comprised by only one ditched enclosure, either a circle or a square. Circles are more common in the south, and squares are more common in the north (Fig. 4). Only 2% of the sites have shapes that differ from circles or squares, which occur in similar number in Acre. In Amazonas, squares are more common than circles.

There is still another type of site, associated with geoglyphs. These are clearly village sites formed by little mounds placed around a circular, open area. There are nine mound sites known to Acre only (Fig. 5). Excavations at these sites have yielded few cultural materials, mostly ceramics. The difference is that ceramics tend to be more elaborated; there are spindle whorls and polychrome wares. These sites were partially contemporaneous with the ditched enclosures, but in a later period.

About 30% of the sites are associated to roads of various lengths (up to 1 km), either connecting two enclosures or pointing to the main rivers. Roads are typically sunken paths with lineal embankments on both sides, since the earth was

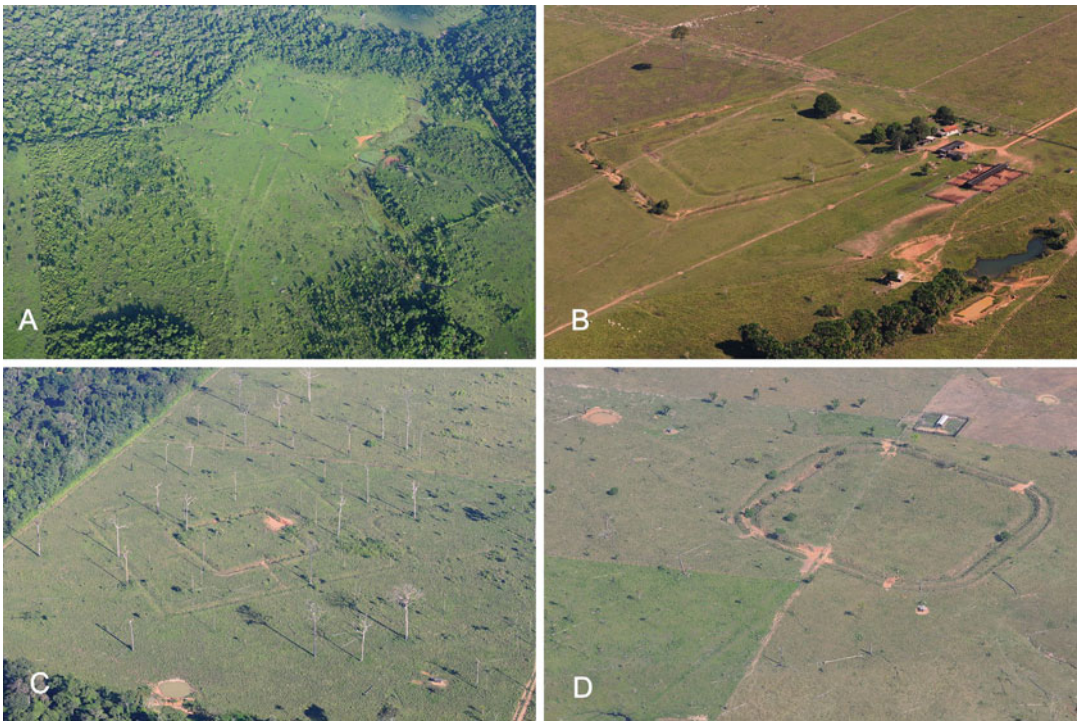

Geometric Earthworks of Western Amazonia, Fig. 3 Geometric earthworks in the state of Amazonas, Brazil. (**a**) – Site Boca do Acre; (**b**) – site Fazenda Vinha; (**c**) – site sobrevoo AM001; (**d**) – site AM 017 (Photos: Diego Gurgel)

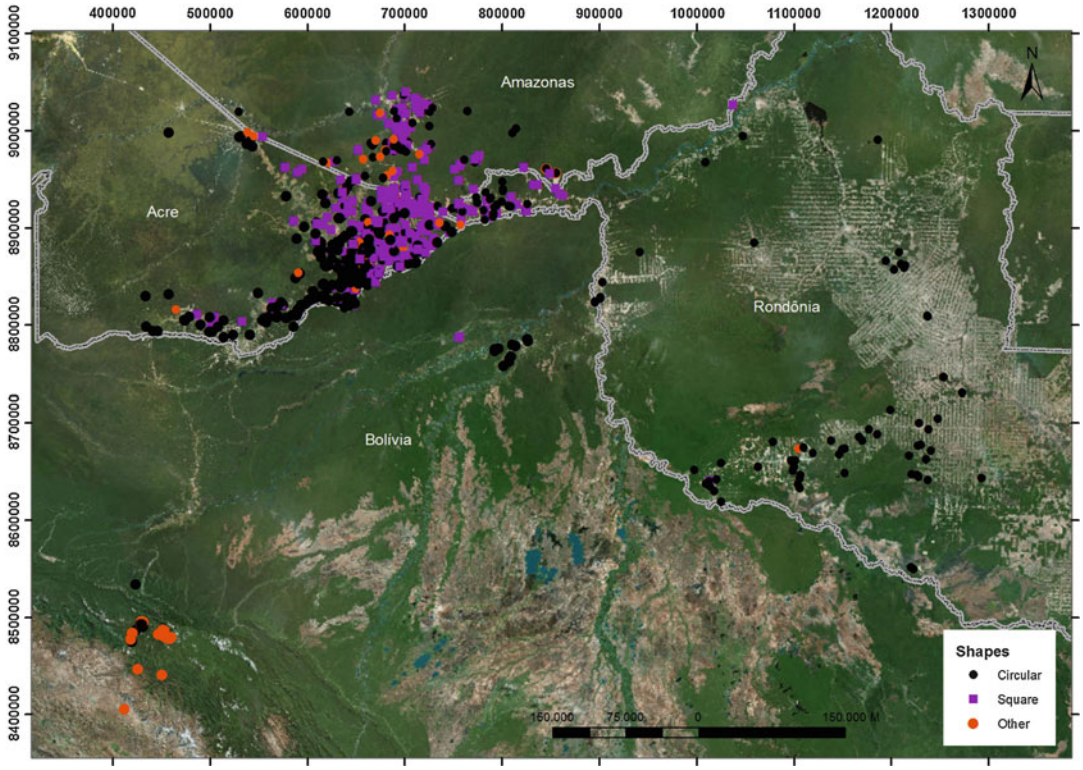

Geometric Earthworks of Western Amazonia, Fig. 4 Distribution of earthworks in relation to shape. By Antonia D. Barbosa

piled in the outside, and are about 18 m large. They have most likely been cleaned of vegetation periodically, and dug to the clay soil, which explains why they are so visible in the landscape so many centuries and even millennia after abandonment.

Excavations of 15 sites in Acre have helped scholars to build a comprehensive chronology and begin to understand site function. In some sites, it is possible to observe different episodes of construction, which indicates that, in different moments in time, the earthworks were rebuilt and that new structures were raised over the old ones. Different from other Amazonian sites that have abundant pottery sherds in black soil (ADE), here ceramics are scanty, their amounts vary a lot among sites, and anthropogenic soils are absent. In general ceramics are found in the embankments and inside the ditches, to where it was carried probably because of erosion. So, it seems that part of the ceramics was incorporated to the enclosures during its construction, while others were discarded as a result of breakage during its use. Although ceramics vary among sites, from poorly mixed and low-fired vessels to more elaborate, polychrome wares, there is one type of incised pottery that is recurrent and resembles styles of the Ucayali River, upper Amazon sites. Saunaluoma (2012) found a fragmented entire vessel belonging to this style (Fig. 6-I) as part of a votive offering in the Fazenda Atlântica site, together with animal bones, ashes, and calcium carbonate, a chemical compound known to be used in conjunction with coca leaves. In this and other sites, chunks of clay with stick impressions have been interpreted as remnants of adobe houses, or at least doorways or small huts built nearby the enclosures main entrance.

Excavations of the ditches have revealed interesting features, such as negatives of clapboard

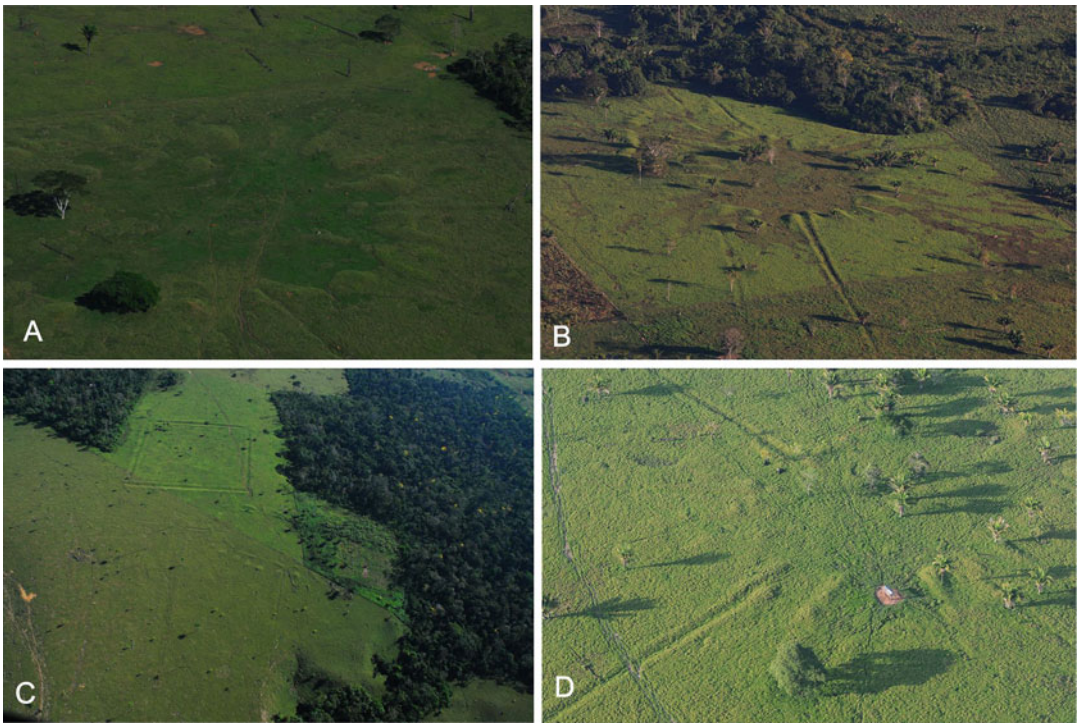

Geometric Earthworks of Western Amazonia, Fig. 5 Mound village sites in the state of Acre, Brazil. (**a**) – Site Fazenda Iquiri II (Photo: Diego Gurgel); (**b**) – Montículos Plácido (Photo: Diego Gurgel); (**c**) – Fonte Boa (Photo: Edison Caetano); (**d**) – Sol do Iquiri (Photo: Diego Gurgel)

placed at its bottom, with the purpose of preventing the straight walls to fall off. The ditches, as one might expect, were much more profound and also steeper in the past (Fig. 7). Erosion has carried at least 2 m of sediment to the ditches and has flattened external embankments that would be much higher at the time they were in use.

Paleoecological and palynological research conducted in Acre have given clues on what the ditch builders ate and what the landscape looked like at the time of the construction. Pollen samples were collected in nearby lakes, and phytolith samples were obtained in test pit dug along transects in and out sites and in controlled excavations in selected sites. Phytoliths of the cob of domesticated maize and squash were found in both archaeological contexts and in residues of artifacts in four sites in Acre (Watling et al. 2015). More abundant than these two domesticates, however, were phytoliths of non-domesticated palms, which we know are used by Amazonian peoples for a variety of reasons, from food to utensils and houses. The study of Watling and colleague concluded that squash and maize were grown in Acre at least from the beginning of the common era, where they planted and managed both domesticated and wild resources. The human management of the landscape during at least the last 6000 years has created an anthropogenic forest, dominated by palms and bamboos, which explains why it was not too hard to build the gigantic structures. They took advantage of this partially opened, easy to clear forest, which has remained with the same species dominance until nowadays (Watling et al. 2017).

Scholars today agree that the earthworks of Acre and Amazonas states were built by a population in the formative stage, which was not yet fully sedentary (Saunaluoma and Schaan 2012). The enclosures were gathering places, places for festivities and rituals. Their sizes and shapes would have made humans to feel small and

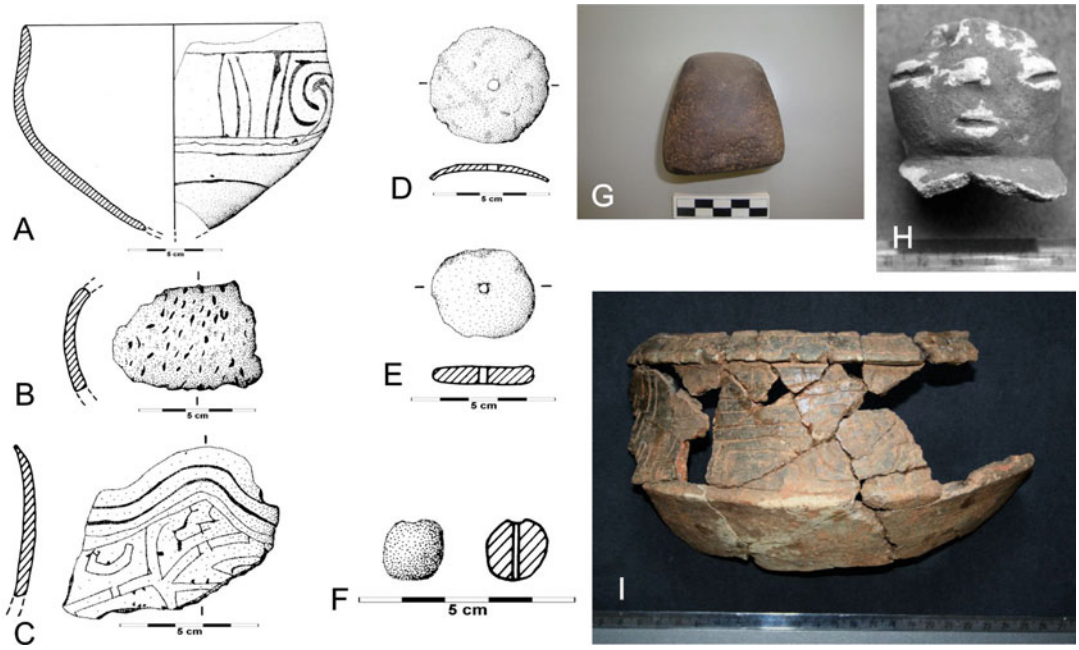

Geometric Earthworks of Western Amazonia, Fig. 6 Material culture associated with geometric earthworks. (**a**, **b** y **c**) – Vessel and sherds from site Tequinho, Acre; (**d**, **e** y **f**) – spindle whorls from site Tequinho, Acre (drawings by Joanna Troufflard); (**g**) – stone axe, site Ramal Batista, Acre; (**h**) – fragment of an anthropomorphic vessel, site Tumichucua, Bolivia (Photo: Sanna Saunaluoma); (**i**) – incised vessel, site Fazenda Atlantica, Acre (Photo: Sanna Saunaluoma)

speak of them as places where human beings would feel small and insignificant before a superior being. The fact that some enclosures display smaller enclosed areas might mean that special and secluded rituals were performed there (Saunaluoma and Kristiina Virtanen 2015). Some individuals must have enjoyed certain prerogatives, although there is no evidence for overt centralization.

Earthwork Sites in Rondônia

In Rondônia, earthwork sites occur in various parts of the state, but their location is biased by deforestation, since most of them have been identified by satellite imagery. Therefore, even if sites are likely to exist in the central and north of the state, the 120 recorded sites (with 136 enclosures) are mostly visible in the south, next to the Bolivian border. Thedata available for Rondônia sites comes from a study completed for the Institute of Patrimony in Brazil, which included remote sensing in deforested areas and limited ground survey in the west part of the state (Schaan 2014a).

Next to Acre and Amazonas, sites are mostly square, but as one moves toward south and east, for over 500 km, closest to Bolivia, sites began to look less geometric and are larger and mostly circular, similar to the ones found in Riberalta (Fig. 6). The most common shapes are squares and circles, but there are ditches shapes like U and D. More than 85% of the sites are comprised of a single enclosure, but there are sites with up to four ditched enclosures. All enclosures in the state are excavated ditches and adjacent embankments formed by the deposition of the excavated soil. There are no other earthwork features, such as lineal mounds, double ditches, moat enclosures, etc. Only seven enclosures, located next to the Acrean border, are connected to roads.

There is a lot of variability in terms of size: diameters range from 60 to 577 m, with a mean of 241 m. Here, the area of a single enclosure might

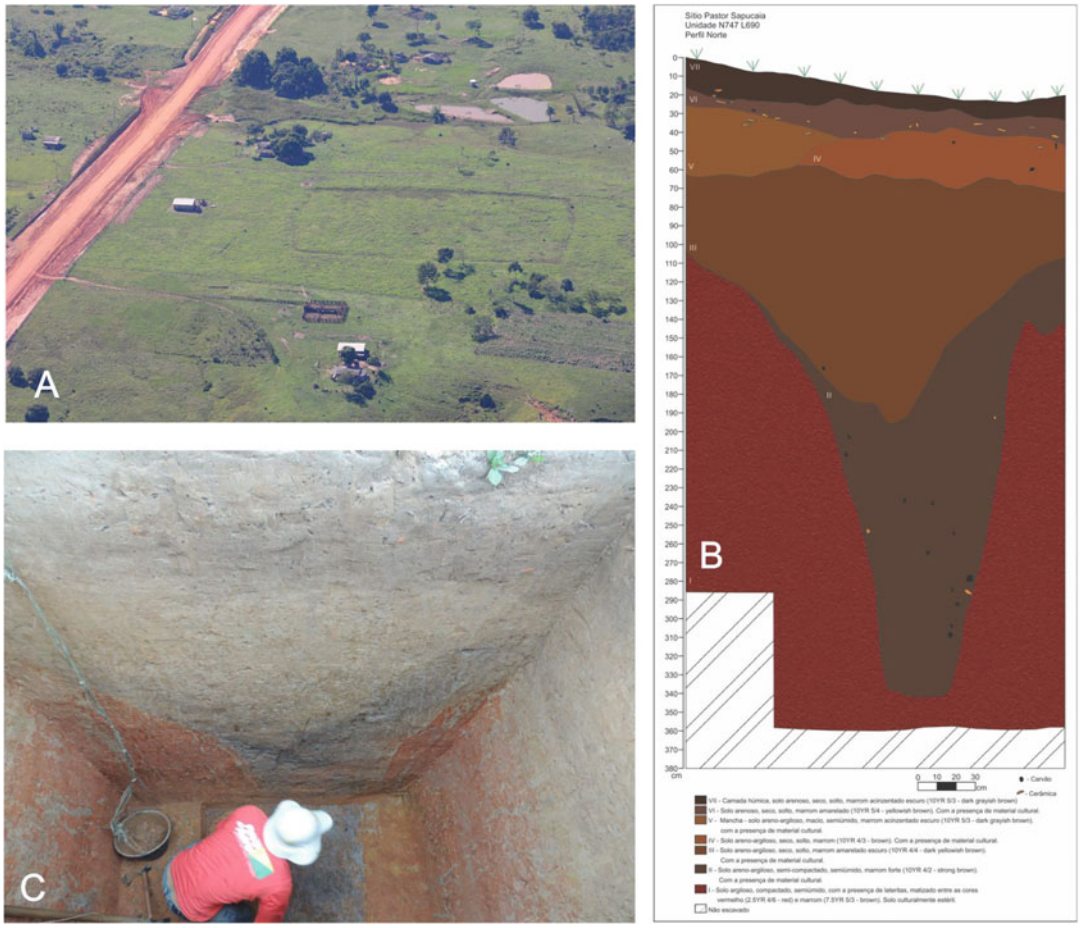

Geometric Earthworks of Western Amazonia, Fig. 7 Excavation profile of a ditch in the site Pastor Sapucaia, Acre. (**a**) – Site Pastor Sapucaia (Photo: Diego Gurgel); (**b**) – Perfil; (**c**) – excavation (Photo: Antonia Barbosa)

measure more than 20 football fields! The circular enclosures are the largest ones; their mean diameter is 100 m greater than the mean diameter for the square ones. There are other differences that definitely set apart the enclosures of the east from the west of Rondônia. For example, the ditch width, which is similar to Acre in the west (11,41 m), gets a lot smaller as one approaches the east, where it measures only 6,4 m in average.

The earthworks in Rondônia are more similar to the ones in Riberalta (below), because many of them are located very close to small streams, which suggest some form of water management or agricultural purposes. Unfortunately these sites in Rondônia have not been the focus of field studies and excavations, so there are no dates associated to their construction and use. There is no available ethnohistorical information about the people who build them.

Earthwork Sites in Bolivia

Different from Brazil, where earthwork sites have been constructed as primarily ceremonial, in Bolivia they are interpreted as permanent settlements (Saunaluoma 2013), although other functions have also been proposed. Indeed, since most of the sites have been used for long periods of time, most likely functions have changed through time (Erickson et al. 2008). Defensive purposes have been proposed by several researchers

(Arnold and Prettol 1988; Arellano 2002; Prümers 2014), a hypothesis that has been backed up by ethnohistorical sources that mentioned habitation sites with moats and palisades as defense against the expansionist and anthropophagous Guarani (Denevan 1963; Erickson et al. 2008).

More than a hundred earthwork sites are known in Bolivia, from the frontier with Acre to the northeastern part of the country (Fig. 7). Sites that have been the focus of studies are located in the seasonally flooded Baures region, where ditched enclosures and other earthworks cover an area of 12,000 km^2 (Erickson 2010) and in the Riberalta area at the confluence of the Madre de Dios River and the Beni River. In Baures, intensive surveys have identified 79 ditched earthworks (locally called "zanjas circundantes") including circular, oval, octagonal, hexagonal, quadrangular, or "D" and "U" forms (Erickson et al. 2008). In the Riberalta region of the Madre de Dios River, 26 earthwork sites are found inland or in the high river bluff. Five of them were studied and dated from 200 BCE and lasted until the European contact (Saunaluoma 2010). In the Llanos de Mojos, early indicators of earthmoving started by 900 BC, but the build environment related to agricultural activities and fish farming, indications of human settlements and the alteration of the savanna, and the active use of the massive earthworks related to agricultural activities took place between 400 BC and AD 1500 (Erickson 2010).

In the region of Riberalta, Saunaluoma studied 11 sites, of which 9 were the focus of systematic excavations. These sites have circular and linear ditches; one of them displays a circular embankment around an open area of 350 m of diameter. Sites are located next to the right bank of the Beni River, some of them near oxbow lakes, and others next to the Madre de Dios River. Some are located in the floodplain, others in high bluffs. In both cases, however, was clear the idea of locating next to a navigable river, different from Acrean sites, which were placed on the top of river valleys. Saunaluoma (2010) feels that the active movement of the Beni River might have played a role in the abandonment of some of the sites. This is because the region was occupied in two different periods: from 100 BC to 400 AD and, later, from AD 1200 to the conquest. Excavations yield mostly pottery sherds, which, according to Saunaluoma (2010), are part of the same cultural tradition. A human modeled head with coffee bean eyes recovered at the Tumichucua site is similar to the Barrancoid tradition (Fig. 6-H), which Lathrap (1970) equates with the Arawak expansion.

Erickson and colleagues have studied the ring ditches of the department of Beni, in the Baures region (Northeastern Bolivia). Some sites had up to four enclosures. Areas range from 1 to 5 hectares and ditch depth up to 4 m; ditch width measures in average 10 m (Erickson et al. 2008). There, ring ditches occupy areas of more than 1 km^2, sometimes with concentric multiple ditches. As in Acre, they were formed through the excavation of large, continuous ditches, up to 4.5 m deep and 10 m wide, "on forest islands or bluffs overlooking savannas, wetlands and rivers" (Erickson 2010). The function of such gigantic structures are multiple, such as "defense, settlements, elite residences, land and resource markers, animal traps, cemeteries, water management features, and/or pubic ceremonial spaces." Ethnohistorical accounts stated that many settlements in the Baures region were encircling by palisades, e.g., large trunks of trees aligned and placed closely to each other. This would require additional clearing; Erickson calls the region an engineering, cultural landscape, to stress the fact that not only humans build these large enclosures but also managed the space between them. This has caused an immense turnover of species which Balée (2013) calls secondary transformation of landscape.

The excavation of the site of Chipeno 1 ditch permitted to conclude that the north wall was more abrupt than the south wall and that the original depth was 2 m. The archaeologists believe that this ditch had a defensive function. The few potsherds found during the excavation included a fragment of an anthropomorphic figurine (Erickson et al. 2008). At the same time, they did not find evidence for domestic activities; thus both the figurine and the presence of fragments of large vessels, probably for the consumption of Chibcha, suggest a ceremonial usage for these sites.

Different from the Brazilian sites, here, in the Llanos de Mojos, the enclosures are associated with many other types of earthworks and some even with terra preta (Amazonian Dark Earths, ADE). The ditches in general enclose a so-called island of forest, a portion of elevated land that stands above the water level during the flood season. In the Baures complex, ditches are indirectly associated with walkways, canals, fish weirs, and fishponds, while in other places, they are associated with canals and raised fields and not with fish facilities (Erickson et al. 2008).

The only report on the use of an earthwork site as a cemetery comes from extensive excavations performed at the Bella Vista region (site BV-2) by Heiko Prumers. The archaeologist has recovered 16 funerary vessels containing poorly conserved human bones. It was possible to distinguish a funerary pattern: the individual was placed in a hole and covered with an upside-down globular vessel, which bottom was taking out. The was covered with the vessel bottom and other fragments. Funerary furniture is scarce and made of polished stone (in two cases) and vessel fragments. The burials were dated to AD 1300–1400 (Prümers 2014).

Paleoecological research in Northeastern Bolivia, as in Acre, has demonstrated that people did not have to clear large patches of forest in order to excavate the ditches, because they already lived in open savanna landscape. In fact, they were able to maintain the open savannas around their settlement even when rainforest began to expand some 2000 years ago (Carson et al. 2014). Erickson has suggested that the savannas were the result of centuries of manipulation of landscapes, with the use of fire. This has another important implication, since the fact that excavating ditches in the savannas implies less labor, than previously supposed, it would also imply lower population density (Carson et al. 2014).

Who Built the Geometric Earthworks?

In 1887, coming from Manaus, Coronel Labre ascended the Madeira River, hoping to find a land route between the rubber posts at the Madre de Dios River and a navigable point at the Acre River. They aim to build a railroad to connect Manaus and Bolivia through the Purus River. Departing from the Maravilha Port, at the Madre de Dios, Labre walked to the Acre River. In his way, he found many Araona villages (Tacana linguistic family). One of these, next to the border with Acre, had temples in the woods, where they reportedly kept effigies of their geometric gods. The father of all gods was shaped as an ellipse and called Epymará. This happened in a region full of geometric enclosures, but Labre does not describe them, probably because these were sacred places, kept away from intruders.

In Amazonian archaeology, it is difficult, if not impossible, to relate archaeological groups to present-day known ethnic or linguistic groups. The reasons are many, but all have to do with the history of migrations and alliances typical of Amazonian indigenous peoples after the conquest and maybe even before. As natives retreated away from the contact zones, escaping from the enslavement expeditions and running away from diseases and war, they would regroup with peoples with different ethnic backgrounds forming new supra-ethnic organizations. In the new land, centuries of cultural change later, they have lost the memories of the earthworks, and most of them do not fabricate ceramics. There has been a long tradition in Amazonian archaeology, beginning with Lathrap, to relate pottery traditions to particular ethnic groups, but, with the probable exception of the ethnohistorical Tupi-Guarani, whose pottery have been used as a cultural marker, such attempts have no sound evidence to support it.

Michael Heckenberger associates earthworks with Arawak speakers, explaining that the Arawak diaspora over a huge area of the Amazon periphery coincides with earthmoving activities. However, in the upper Xingu case were the Kuikuru (Carib language family) who is responsible for both building moat-fortified villages and carrying along the Arawak sense of regionality (Heckenberger et al. 2008).

It would, however, be impossible to think that only one ethnic group would be responsible for all the earthwork sites in Western Amazonia. Not only because of the huge area that they would

have dominated for centuries but also because the sites speak about variability of purposes and layouts. Ethnohistory places the Arawak, the Panoan, and the Tacana in the border between Bolivia and Brazil and the Baure in the Itenez Province, in Northeastern Bolivia. These were most likely the groups who built the multipurpose, gigantic enclosures over more than a millennium.

In Bolivia, the ring ditches are part of a vast complex of earthworks that include roads, raised agricultural fields, fish weirs, mounds, causeways, and canals, which impressed the first Spaniards who got there in the beginning of the eighteenth century (Denevan 1966; Erickson 2010). These people were described as highly civilized, with government, clothing, religion, etc., but they rapidly vanished though, with the spread of diseases, enslavement, and war. This situation stopped the maintenance of earthworks, and most knowledge pertained to that was lost before a good ethnography could register it.

Virtanen, a finish anthropologist, has worked with the Apuriña and Manchineri (Arawak speakers) in Acre, among other things, investigating their relation to the geometric enclosures. These two groups dominated the Upper Purus River Basin at the time of the first effective contacts, in the nineteenth century. Although they have no recollection of the earthworks, she argues that in their cosmology and mythology, they convey concepts closely related to the earthworks shapes, location, and landscape features (Figs. 8 and 9).

Future Research

After some 15 years of intensive studies of Western Amazonian earthworks, many questions are still waiting for answers. Although it has become clear that the rind ditches were a cultural phenomenon, a building technique used by many peoples to organize spaces of living, leisure, work, and

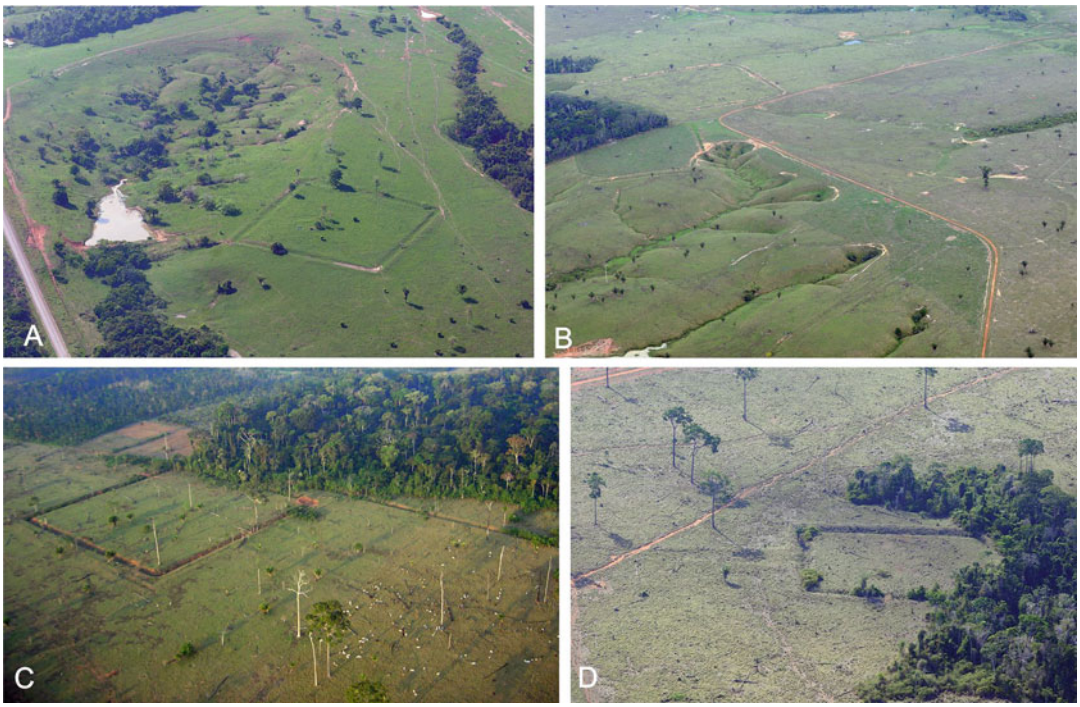

Geometric Earthworks of Western Amazonia, Fig. 8 Geometric earthworks in the state of Rondônia, Brazil. (**a**) – Site Diogo V (Photo: Diego Gurgel); (**b**) – site Fazenda Modelo (Photo: Diego Gurgel); (**c**) – site Santa Luzia I (Photo: Diego Selhorst); (**d**) – site Vila California I (Photo: Diego Gurgel)

Geometric Earthworks of Western Amazonia, Fig. 9 Geometric earthworks of Bolívia. (**a**) y (**b**) – Beni (Photo: Peter Stahl) (**c**) – Beni (Photo: Charles Mann); (**d**) – site Frontera (Photo: Diego Gurgel)

pray, the specificities of activities taken place in a given enclosure are not totally clear. Questions on demography, also extremely important, have not been adequately addressed. These questions are tied to the low densities of cultural debris found in the sites and fail to find other non-earthwork sites which might have housed the earthmovers elsewhere. Recent research on multiple-mound sites in Acre have showed that such occupations, although somehow related to geometric enclosures, are later than most of earthworks, thus not solving the problem.

In the next years, ceramic studies, focusing on loci of production, might help to verify or falsify the hypothesis that states that many people from different places gather in the enclosures for some time during the year, bringing their vessels with them. This would proof the use of the earthworks as meeting places for peoples who lived elsewhere.

A hot topic in Amazonian archaeology, in close relation to the geometric earthworks, is the extent to which humans have modified the landscapes. This question is not a simple one and must be addressed taking in consideration, of course, archaeological data. This is because it has become clear that the Amazon basin hosted different cultures and peoples over time and that the impact they caused on the landscapes was highly variable (Schaan 2014b). It is why research focus only on paleoecological data, detached to archaeological data, tends to be misleading. We know through archaeology, ethnography, ethnobiology, and ethnohistory that humans have greatly modified the Amazon forest and that much of its biodiversity is consequence of human management (Balée 2013; Levis et al. 2017).

A new technology in Amazonian archaeology is supposed to make a revolution in earthwork research in the next few years. It is the Lidar, a laser sensor capable of making a topographic map of the earth's surface in forested areas. Since most of the sites have been found using satellite imagery, which depends on areas free of vegetation, the

Lidar will solve the problem of survey bias, and we finally will be able to have an accurate account of the number and of the variability of geometric earthworks in Amazonia.

References

Arnold, Dean E., and Kenneth A. Prettol. 1988. Field reports: Aboriginal earthworks near the mouth of the Beni, Bolivia. *Journal of Field Archaeology* 15 (4): 457–465.

Balée, William. 2013. *Cultural forests of the Amazon. A historical ecology of people and their landscapes*. Tucaloosa: The University of Alabama Press.

Carson, John F., Bronwen Whitney, Francis E. Mayle, José Iriarte, J. Heiko Prümers, Daniel Soto, and Jennifer Watling. 2014. Environmental impact of geometric earthwork construction in pre-Columbian Amazonia. *PNAS* 111 (29): 10497–10502.

Denevan, William. 1963. Additional comments on the earthworks of Mojos in northeastern Bolivia. *American Antiquity* 28 (4): 540–545.

Dias, Ondemar e Eliana de Carvalho. 2008. As estruturas de terra na arqueologia do Acre. In *Arqueologia da Amazônia Ocidental: os Geoglifos do Acre,* Org. Denise Schaan, Alceu Ranzi, and Martti Pärssinen, 45–56.

Erickson, Clark. 2010. The transformation of environment into landscape: The historical ecology of monumental earthwork construction in the Bolivian Amazon. *Diversity* 2: 618–652.

Erickson, Clark, Patricia Alvarez, and Sergio Calla. 2008. Zanjas circundantes: Obras de tierra monumentales de Baures en la Amazonia Bolivia. *Report about the 2007 fieldwork of the Agro-Archaeological Project of the Beni*. La Paz: Department of Anthropology, University of Pennsylvania, Unidad Nacional de Arqueología.

Heckenberger, M.J., J.C. Christian Russell, C. Fausto, J.R. Toney, M.J. Schmidt, E. Pereira, B. Franchetto, and A. Kuikuro. 2008. Pre-Columbian urbanism, anthropogenic landscapes, and the future of the Amazon. *Science* 321: 1214–1217.

Levis, Carolina Flávia R.C. Costa, Frans Bongers, Marielos Peña-Claros, Charles R. Clement, André B. Junqueira, Eduardo G. Neves, et al. 2017. Persistent effects of pre-Columbian plant domestication on Amazonian forest compoSiten. *Science* 355 (6328): 925–931.

Meggers, Betty. 1954. Environmental limitations to the development of culture. *American Anthropologist* 56 (5): 801–824.

Meggers, Betty. 1971. *Men and culture in a counterfeit paradise*. Aldine: Atherton.

Plafker, George. 1963. Observations on Archeological remains in northeastern Bolivia. *American Antiquity* 28 (3): 372–378.

Prümers, Heiko. 2014. Sites prehispánicos con zanjas en Bella Vista, Provincia Iténez, Bolivia. In *Memorias de las Conferencias Magistrales del 3er Encuentro Internacional de Arqueología Amazónica Stéphen Rostain editor*, 73–90. Quito: Ministerio Coordinador de Conocimiento y Talento Humano e IKIAM.

Ranzi, Alceu. 2003. Geoglifos. Patrimônio Cultural do Acre. *Renvall Institute Publications, University of Helsinque* 14: 135–172.

Saunaluoma, Sanna. 2010. Pre-Columbian earthworks in the Riberata region of the Bolivian Amazon. *Amazônica* 2 (1): 104–138.

Saunaluoma, Sanna. 2012. Geometric earthworks in the State of Acre, Brazil: Excavations at the Fazenda Atlântica and Quinauá sites Latin. *American Antiquity* 23: 565–583.

Saunaluoma, Sanna, and Pirjo Kristiina Virtanen. 2015. Variable models for Organization of Earthworking Communities in upper Purus, southwestern Amazonia: Archaeological and ethnographic perspectives. *Tipití: Journal of the Society for the Anthropology of Lowland South America* 13 (1): 23–43.

Schaan, Denise. 2014a. Estudo dos sítios arqueológicos tipo geoglifo localizados nos estados do Acre, Amazonas e Rondônia com vistas a instruir processo de tombamento (Processo IPHAN n° 01410.000094/2007–32). Final Report, vol. I. Belém: NPEA/UFPA/IPHAN.

Schaan, Denise. 2014b. Chronology of landscape transformation in Amazonia. In *Memorias de las Conferencias Magistrales del 3er Encuentro Internacional de Arqueología Amazónica*, ed. Stéphen Rostain, 51–72. Quito: Ministerio Coordinador de Conocimiento y Talento Humano e IKIAM.

Schaan, Denise, Martti Parssinen, Sanna Saunaluoma, Alceu Ranzi, and Mirian Bueno e Antonia Barbosa. 2012. New radiometric dates for Precolumbian (2000–700 BP) earthworks in western Amazonia, Brazil. *Journal of Field Archaeology* 37: 132–142.

Watling, Jennifer, Sanna Saunaluoma, Martti Pärssinen, and Denise Schaan. 2015. Subsistence practices among earthwork builders: Phytolith evidence from archaeological sites in the southwest Amazonian interfluves. *Journal of Archaeological Science: Reports* 4: 541–551.

Watling, Jennifer, José Iriarte, Francis Mayle, Denise Schaan, Luiz Pessenda, Neil Loader, F. Alayne Street-Perrott, Ruth E. Dickau, Antonia Damasceno, and Alceu Ranzi. 2017. Impact of pre-Columbian "Geoglyph" builders on Amazonian forests. *PNAS* 114 (8): 1868–1873.

Further Reading

Balée, W., and C. Erickson, eds. 2006. *Time and complexity in historical ecology: Studies from the neotropical lowlands*. New York: Columbia University Press.

Schaan, D. 2011. New frontiers in historical ecology. In *Sacred geographies of ancient Amazonia: Historical ecology of social complexity*, 1st ed. Left Coast Press.

Geometric Morphometrics and Environmental Archaeology

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Introduction

History and Development of Geometric Morphometrics

The study of biological shape (morphometrics) involves the analysis of anatomical variation of an organism or its constituent parts. Geometric morphometrics (GMM) has taken advantage of contemporary developments in computing technology and statistical objectivity to establish a means of shape analysis that is mathematically derived, allowing comparisons of shape to be performed quantitatively. The main advantage that GMM has over traditional morphometrics (TMM) is that the latter inherently deals with size, not shape. While descriptions of size variation are useful, shape can inform on a greater range of biological processes, such as ontogeny, and adaptation to specific ecological niches (Zelditch et al. 2004).

Morphometric analysis is rooted in biological research with key advances made during the last decade. However, if one considers that both taxonomic classification and our understanding of biological diversity are based on morphological variation, it is evident that the analysis of *shape* has been an underlying tenet of biological research for centuries (Adams et al. 2004). D'Arcy Thompson is credited for his pioneering work on geometry and biology, which paved the way to modern morphometrics, demonstrating how simple changes in the body part proportions of an organism could "transform" it into another (Fig. 1, adapted from Thompson 1917). With the advent of computers, the early theory of shape analysis found practical applications that had previously been impossible to perform. The field effectively underwent a revolution in the early 1990s (Rohlf and Marcus 1993) with the development of robust statistical models for testing variations in shape and size between organisms, and of sophisticated computerized tools for the visualization of these differences.

Performing GMM Analysis: Landmark Configuration, Digitization, Superimposition, and Visualization

As a broad simplification, morphometric techniques can be two- or three-dimensional and use either landmarks on, or the outline/surface of, the organism (or its morphological part/s) being studied.

The landmark technique relies on the anatomy of the organism to provide distinct, nameable, loci that have clear one-to-one correspondence from one specimen to the next (e.g., the apex of a leaf, the meeting point of frontal and parietal bones in the skull, the intersections of homologous veins in a fly wing). The type of correspondence of landmarks, or "homology," varies depending on the specific context within a morphometric analysis. Biological homology can be loosely derived: for example, the hind limb of a lion can correspond to the hind limb of a gazelle in terms of its development and evolutionary origin. The wing of a bat and that of a bird, in contrast, originated independently and differ in development but could still be analyzed in terms of correspondence in a study on flight biomechanics. The choice of the landmarks and the type of correspondence are, therefore, functional to the specific hypothesis being tested. Numerically, Cartesian coordinates along two or three axes univocally define each landmark.

Although morphometric techniques have tended to favor the landmark approach with the majority of applications in 2D, this is not always applicable, as on occasion, landmarks are not available, practical, or replicable. The outline method was the first attempt to address this issue by using the delineation around the curvature of an organism or its parts (Bookstein 1997: 44–45) discretized by a series of ordered points along its contour. Recent advances in morphometric research have led to the development of 3D quantitative imaging techniques that extend the outline approach to surfaces. In general, 3D methods tend

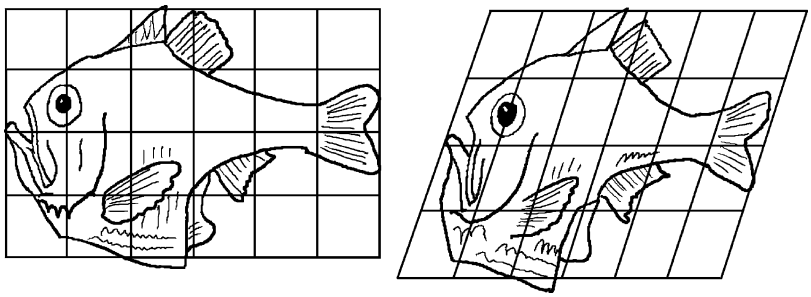

Geometric Morphometrics and Environmental Archaeology, Fig. 1 Adapted from D'arcy Thompson's (1917) original depiction, illustrating the transformation of *Argyropelecus olfersi* into *Sternoptyx diaphana* through a 20° shear

to be more accurate as most biological structures are not flat objects, i.e., a fly wing, but are highly complex organs, i.e., the skull.

Once landmark coordinates have been captured, termed digitization and employing data from a basic digital camera to sophisticated MicroScribe digitizers or CT scans, the first step in the process of analysis is to remove the information that does not alter shape, that is, translation, rotation, and scale (Fig. 2).

One method that has been particularly favored for this function is the Procrustes superimposition. This method scales the centroid (a mathematically derived midpoint, hence centroid, between all landmarks, Fig. 3) size of each specimen, makes the centroid the new common origin of the Cartesian space, and minimizes differences in rotation to produce shape data that can then be statistically analyzed (Fig. 4). Importantly, while the size data are removed, they are not lost and can be used for comparisons between groups.

Visualization follows and, in one of its most common forms, reverts to the basic tenet described by Thompson (1917), albeit with a greater degree of sophistication. Visualization of shape changes relies on a principle derived from engineering whereby a thin sheet of metal, on which a grid may be superimposed, is deformed in order to illustrate the variations that occur *between* the landmarks, when one shape is warped until it overlaps with the points of a different shape. This method of visualization, termed the thin plate spline (TPS), has been adopted by James Rohlf for his widely used and arguably one of the most important software packages for GMM, the TPS Suite (http://life.bio.sunysb.edu/morph/). Whether using the TPS software or other programs, the principle remains the same: to intuitively illustrate shape variation between specimens using a deformation grid (Fig. 5). Other more sophisticated diagrams and techniques include contour, surface, and volume rendering. In tandem with visualization methods is the obvious need to interpret and understand "shape space," distances, and directions of any observed variation (Klingenberg and Monteiro 2005). Principal components analysis (PCA) has proved to be a highly popular exploratory technique for this (Zelditch et al. 2004: 156), and more recently, the "R" language has increasingly been employed for the statistical analysis of GMM datasets (Claude 2008).

Applications of GMM

In terms of relevant applications, GMM has been widely employed within comparative zoology and biological/physical anthropology. Furthermore, it is by no means restricted to studies of vertebrate fauna and has been applied to arachnids (Crews and Hedin 2006), echinoderms (David and Laurin 1996), crustaceans (Aguirre et al. 2006), and hemiptera (Dujardin et al. 2007). Indeed, application of the technique is not limited to fauna and has been applied to plants (Viscosi and Cardini 2011). Given the ubiquity of plant, pollen, and insect remains on archaeological sites and their

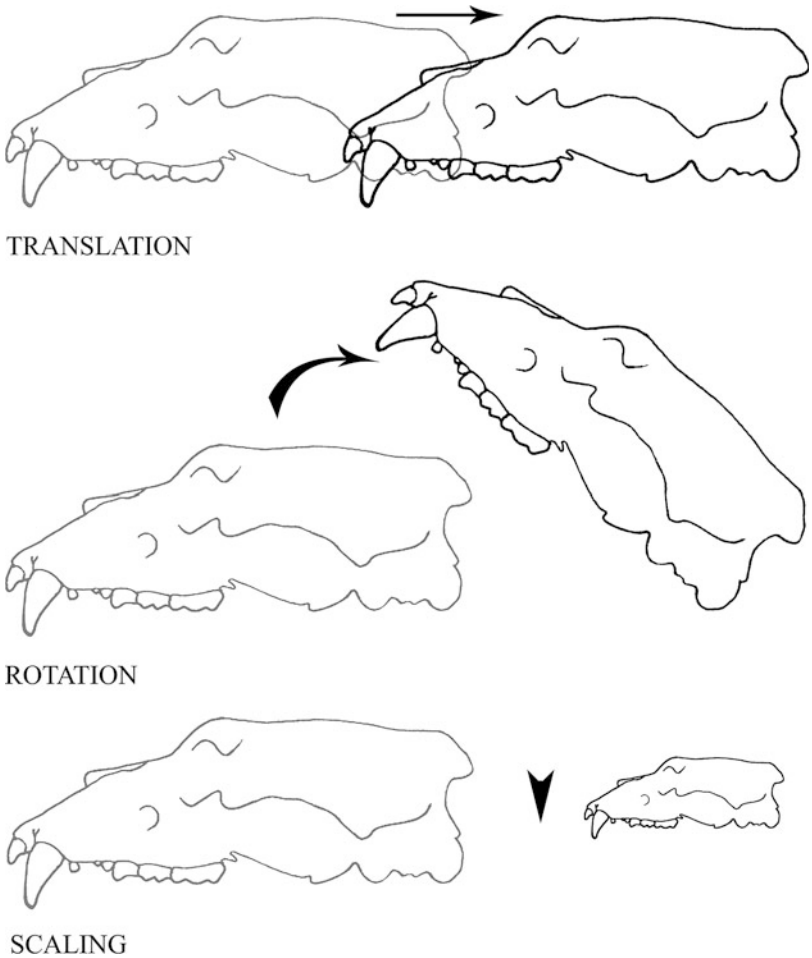

Geometric Morphometrics and Environmental Archaeology, Fig. 2 Shape independent variables: translation, rotation and scale (example using bear cranium)

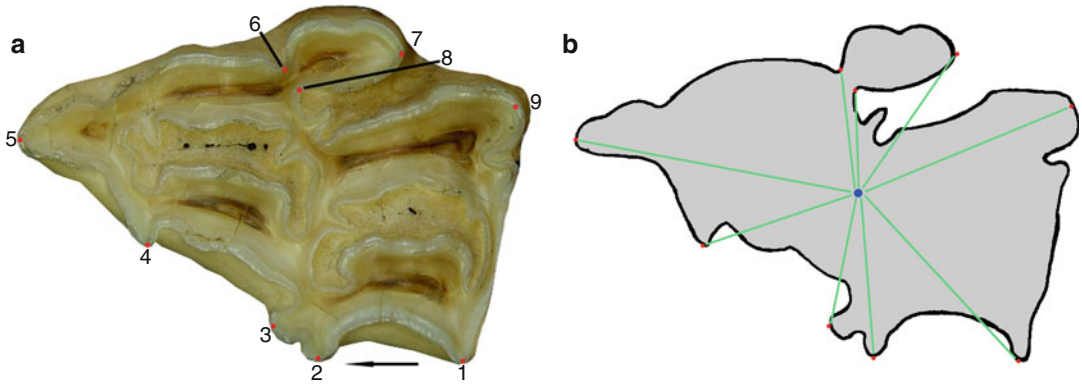

Geometric Morphometrics and Environmental Archaeology, Fig. 3 Centroid and the set of distances to the landmarks, used to computed size in GMM, as derived from the configuration used to capture data from horse upper permanent dentition (P2)

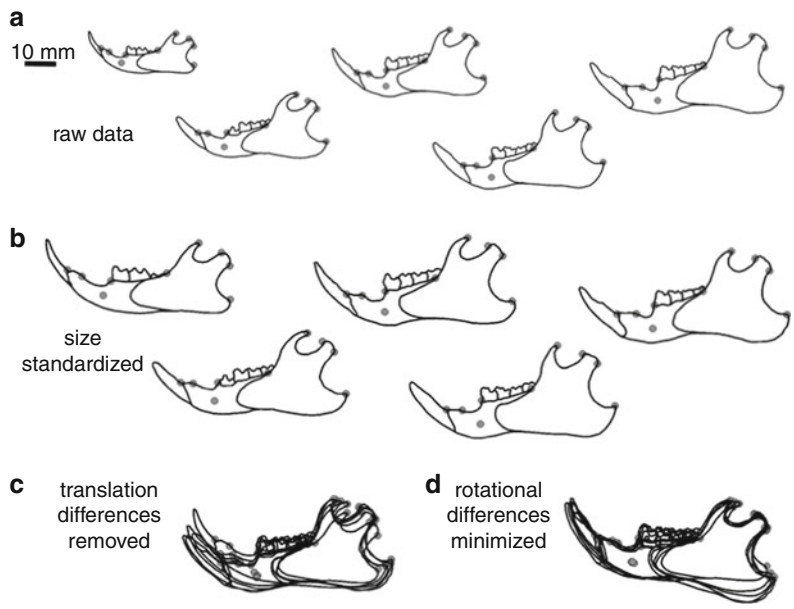

Geometric Morphometrics and Environmental Archaeology, Fig. 4 Generalized Procrustes analysis (GPA) showing how raw data are scaled to account for size variation, repositioned to remove translation differences and realigned to minimize rotation. (Image courtesy of A. Cardini)

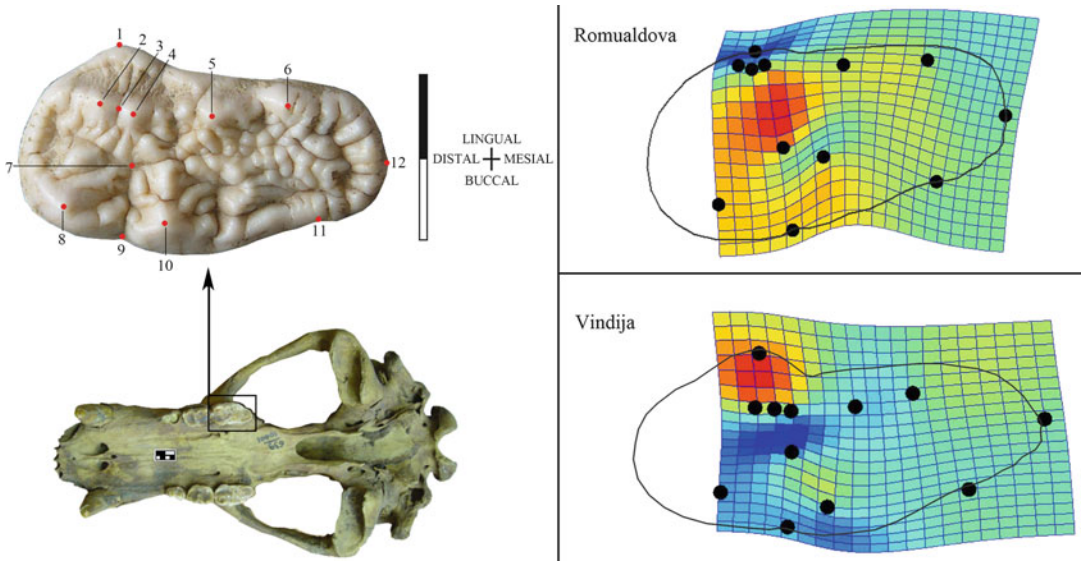

Geometric Morphometrics and Environmental Archaeology, Fig. 5 Deformation grid used to appraise variation between two groups of cave bears from Croatia. Selected tooth and landmark configuration (*left*) and grids for Romualdova and Vindja (*right*)

significance for studying paleoenvironments, for the paleobotanists, palynologists, and palaeoentomologists, these latter examples will no doubt serve as increasingly important for future research.

While the above exemplifies the diversity of application of GMM, and despite the variety of species and range of research themes that this method has been employed to study, to date, it has not been as widely applied in archaeology as

one might expect. This is especially surprising where zooarchaeology is concerned, particularly when one takes into account the long history of use in zoology. This should not be taken to suggest that GMM has not been employed to study the archaeological or fossil record. In the same way that the technique itself underwent dramatic developments over the last two decades, it is now undergoing a revolution with regard to application, which will ultimately have implications for its use in archaeology.

When the technique has been employed, it has proved to be highly effective. Cucchi et al. (2011) showed how trends in pig domestication could be interpreted using morphological variation and phenotypic divergence; research has also shown the potential of this method for identifying discrete populations of a species within a spatial-temporal framework (Seetah et al. 2012). Questions of wider significance have also been investigated: Larson et al. (2007) addressed issues of human dispersal in Island SouthEast Asia, using domestic animals as a proxy and employing GMM in combination with molecular techniques. The large-scale migration, and ultimately the importance of horse as a source of subsistence for humans in Western Europe, was studied from Magdalenian sites within the Paris Basin (Bignon et al. 2005) using GMM.

Definition

Geometric morphometrics is, in its most common implementation in evolutionary biology and related disciplines, the analysis of size and shape derived numerically from landmarks (topographically corresponding points) on biological/nonbiological organisms.

Key Issues/Future Directions/Examples

Arguably one of the main issues with regard to using GMM is that, despite the considerable potential for application to a variety of fields including archaeological research, developments made in the mathematical theory of shape were slow to be adopted into mainstream research due to jargon and statistical complexity. These issues have now been addressed with notable developments in both textbooks (Zelditch et al. 2004; Claude 2008) and software to facilitate statistical analysis (MorphoJ/Morphologika/Morpheus, IMP series, PAST, etc. – refer to http://life.bio.sunysb.edu/morph/soft-comprehensive.html).

Despite improvements, statistically analyzing the complex datasets that GMM produces requires some caution and may not be without pitfalls. The advent of advanced software with easy-to-use interfaces, while circumventing much of the complexity, has the negative outcome of detaching the analyst from a clearer understanding of the mechanics behind the analysis, an issue most detrimental for the novice. Additionally, the more complex statistical aspects of GMM data analysis and interpretation can occasionally lead to a misrepresentation of what is possible (at present) with the outcomes of GMM analysis (see Adams et al. 2011 for a discussion of the limitations of principle components (PC) for cladistics analysis).

Once these, often subtle, potential issues are clarified, and with step-by-step analytical examples available in the literature (Viscosi and Cardini 2011), there should be few barriers to the widespread application of GMM in environmental archaeology. Although there is little doubt that GMM can be applied to a very wide range of biological systems, in archaeology it is the study of bone, and in particular animal bone, that will invariably benefit the most from this method. GMM has two main applications in this regard: investigating phenotypic changes in populations and understanding ecomorphology (divergence in form as an adaptation to the environment). In the former case, as a first step, the landmark data may simply be compared between groups in order to identify significant morphological variation. This can then be used as a means of classifying unknown individuals using cross-validated models derived from well-known samples. In the latter, a more complex understanding of the animal's anatomy is achieved through cross-group comparisons (i.e., different species of bear) in relation to their ecology, often using modern populations to model variation in the past.

Ancient specimens are then projected into the shape space and similarities with modern counterparts used to infer past behavior (see Figueirido et al. 2009, using extant and extinct bears).

One of the main strengths of GMM is its inherent compatibility with complementary techniques to explore a greater range of questions that are pertinent to archaeological research. Though this is very much underexploited, there is much potential in combining GMM with both molecular methods, such as DNA, and morphological techniques, such as finite element modeling (FEM). DNA can provide evidence detailing evolutionary history, the role of drift and selective pressures, as well as other processes that may leave a genetic signature. FEM uses stress modeling to interpret load bearing and force capabilities of different parts of an organism's body, which can be used, for example to infer bite force and thus indirectly inform on diet, ecology, and behavior. GMM data not only provide quantitative phenotypic information that can be mapped onto the genetic landscape obtained from molecular analyses to explore the tempo and mode of evolutionary change but also allow the multivariate comparison of deformations from FEM-computerized experiments and the analysis of their covariation with predictors (environment, genetics, etc.) in an accurate statistical biomechanical framework. Taking this approach a step further, by combining the evidence from phenotypic and genetic studies with those that detail environmental conditions in deep time, it should be possible to position fauna into a more appropriate "archaic ecological niche."

Ultimately, GMM allows archaeologists to use modern biological approaches to investigate deep-time phenomena. The consensus remains that environmental samples from archaeological contexts, and bone in particular, are often too fragmented or scarce to carry out the type of rigorous experimentation that details past ecological systems. However, while the physical numbers may not compare with those available to contemporary biologists, for the environmental (and indeed "biological") archaeologist, by using species that occur in considerable abundance, such as the cave bear (Europe) or dire wolf (North America), it is possible to carry out the type of studies that are being performed on modern faunal populations (Cardini et al. 2007). Fragmentary material could still be fruitfully analyzed (Hublin et al. 2009) and incomplete fossils reconstructed (Gunz et al. 2009). The method could be instrumental in understanding the process of domestication and its outcomes (such as paedomorphism), as well as the mechanism promoting island dwarfism/gigantism and the role of allometry (the covariation of shape and size) in creating phenotypic variation, and other recurrent phenomena observed in species that underwent domestication.

GMM may well underpin a trend toward the type of interpretive studies that bridge a gap between contemporary biological and ecological studies and those concerned with adaptive changes through time as a consequence of environmental fluctuations and agency. Given its scientific rigor, the fact that it can be relatively inexpensive to perform and the range of questions it can potentially provide evidence to address, it would be a great surprise if this method does not enjoy the type of widespread application currently witnessed for DNA and isotope analysis.

Cross-References

- ▶ Archaeobotany
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Biometry in Zooarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

References

Adams, D.C., F.J. Rohlf, and D.E. Slice. 2004. Geometric morphometrics: Ten years of progress following the 'revolution'. *The Italian Journal of Zoology* 71: 5–16.

Adams, D.C., A. Cardini, L.R. Monteiro, P. O'Higgins, and F.J. Rohlf. 2011. Morphometrics and phylogenetics: Principal components of shape from cranial

modules are neither appropriate nor effective cladistic characters. *Journal of Human Evolution* 60: 240–243.
Aguirre, M.L., S.I. Perez, and Y.N. Sirch. 2006. Morphological variability of Brachidontes Swainson (Bivalvia, Mytilidae) in the marine Quaternary of Argentina (SW Atlantic). *Palaeogeography, Palaeoclimatology, Palaeoecology* 239: 100–125.
Bignon, O., M. Baylac, J.-D. Vigne, and V. Eisenmann. 2005. Geometric morphometrics and the population diversity of late glacial horses in western Europe (Equus caballus arcelini): Phylogeographic and anthropological implications. *Journal of Archaeological Science* 32: 375–391.
Bookstein, F.L. 1997. *Morphometric tools for landmark data. Geometry and biology.* New York: Cambridge University Press.
Cardini, A., A. Jansson, and S. Elton. 2007. A geometric morphometric approach to the study of ecogeographical and clinal variation in vervet monkeys. *Journal of Biogeography* 34: 1663–1678.
Claude, J. 2008. *Morphometrics with R*. New York: Springer.
Crews, S.C., and M. Hedin. 2006. Studies of morphological and molecular phylogenetic divergence in spiders (Araneae: Homalonychus) from the American southwest, including divergence along the Baja California Peninsula. *Molecular Phylogenetics and Evolution* 38: 470–487.
Cucchi, T., A. Hulme-Beaman, and K. Dobney. 2011. Early Neolithic pig domestication at Jiahu, Henan Province, China: Clues from molar shape analyses using geometric morphometric approaches. *Journal of Archaeological Science* 38: 11–22.
David, B., and B. Laurin. 1996. Morphometrics and cladistics: Measuring phylogeny in the sea urchin Echinocardium. *Evolution* 50: 348–359.
Dujardin, J.-P., C.B. Beard, and R. Ryckman. 2007. The relevance of wing geometry in entomological surveillance of Triatominae, vectors of Chagas disease. *Infection, Genetics and Evolution* 7: 161–167.
Figueirido, B.P., J.A. Palmqvist, and J.A. Pérez-Claros. 2009. Ecomorphological correlates of craniodental variation in bears and paleobiological implications for extinct taxa: An approach based on geometric morphometrics. *Journal of Zoology* 277: 70–80.
Gunz, P., P. Mitteroecker, S. Neubauer, G.W. Weber, and F.L. Bookstein. 2009. Principles for the virtual reconstruction of hominin crania. *Journal of Human Evolution* 57: 48–62.
Hublin, J.-J., D. Weston, P. Gunz, M. Richards, W. Roebroeks, J. Glimmerveen, and L. Anthonis. 2009. Out of the North Sea: The Zeeland Ridges Neandertal. *Journal of Human Evolution* 57: 777–785.
Klingenberg, C.P., and L.R. Monteiro. 2005. Distances and directions in multidimensional shape spaces: Implications for morphometric applications. *Systematic Biology* 54: 678–688.
Larson, G., T. Cucchi, M. Fujita, E. Matisoo-Smith, J. Robins, A. Anderson, B. Rolet, M. Spriggs, G. Dolman, T.H. Kim, E. Randi, D. Doherty, R. Awe Due, R. Bolt, T. Djiubiantono, B. Griffin, M. Intoh, E. Keane, P. Kirch, K.-T. Li, M. Morwood, L.M. Pedrina, P.J. Piper, R.J. Rabett, P. Shooter, G. van den Bergh, E. West, S. Wickler, J. Yuan, A. Cooper, and K. Dobney. 2007. Phylogeny and ancient DNA of Sus provides new insights into Neolithic expansion in Island Southeast Asia and Oceania. *Proceedings of the National Academy of Sciences* 104: 4834–4839.
Rohlf, F.J., and L.F. Marcus. 1993. A revolution in morphometrics. *TREE* 8: 129–132.
Seetah, T.K., A. Cardini, and P. Miracle. 2012. Can morphospace shed light on cave bear spatial-temporal variation? Population dynamics of Ursus spelaeus from Romualdova pecina and Vindija, (Croatia). *Journal of Archeaological Science* 39: 500–510.
Thompson, D. 1917. *On growth and form*. Cambridge: Cambridge University Press.
Viscosi, V., and A. Cardini. 2011. Leaf morphology, taxonomy and geometric morphometrics: A simplified protocol for beginners. *PLoS ONE* 6: e25630. https://doi.org/10.1371/journal.pone.0025630.
Zelditch, M., D. Swiderski, H.D. Sheets, and W.L. Fink. 2004. *Geometric morphometrics for biologists: A primer.* San Diego: Academic.

Further Reading

Bookstein, F.L. 1997. *Morphometric tools for landmark data. Geometry and biology.* New York: Cambridge University Press.
Claude, J. 2008. *Morphometrics with R*. New York: Springer.
Thompson, D. 1994. *On growth and form*. Cambridge: Cambridge University Press.
Zelditch, M.D., H. Swiderski, D. Sheets, and W.L. Fink. 2004. *Geometric morphometrics for biologists: A primer.* San Diego: Academic.

Gero, Joan

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Basic Biographical Information

Joan Margaret Gero was one of the leaders in the sociopolitics of archaeology, feminist archaeology, and Andean archaeology. She was born on 26 May 1944 in New York City and grew up in the city's suburbs. The countercultural movement served as historic backdrop for her undergraduate

years at the University of Pennsylvania. Social activism and the seeds of feminist thinking were planted at this time. Gero graduated in 1968 with a B.A. in English Literature. In 1970, she received a M.Ed. from Boston College and then worked for Teacher Corps, a domestic program that educated the socioeconomically disadvantaged. Enamored with the Corps's commitment to equality, the experience offered an important anthropological lesson about cultural differences in the classroom and community. After 2 years of teaching, Gero revisited the role of a student. During a summer exchange program at Oxford, she enrolled in an archaeology course that involved excavation of an Iron Age site in Wiltshire.

Gero returned to the USA in 1973. She attended classes in archaeology at Harvard and excavated at Chan Chan, Perú, under Michael Moseley's aegis. This fieldwork served as a springboard for her ongoing investigations of Andean prehistory. In 1974, Gero commenced graduate studies at the University of Massachusetts, Amherst. Several personal experiences during this time shaped her theoretical approach to archaeology. Sexism, as Gero soon discovered, was the status quo. Doctoral research in 1977 was initially hindered by a supervisor who questioned the appropriateness of a woman living in the project house, and many colleagues found research about ancient women implausible. Despite these obstacles, Gero completed her dissertation, which examined material culture's active social roles. In 1983, she was granted a Ph.D. in Anthropology.

Gero accepted a position in the University of South Carolina's Department of Anthropology where she taught from 1983 to 1997. She was hired as Assistant Professor at American University in 1998 and retired as Professor Emerita in December 2007. She held several visiting appointments – at England's University of Cambridge, Sweden's University of Umeå and Uppsala, and Argentina's Universidad Nacional de Catamarca and Universidad Nacional del Centro de la Provincia de Buenos Aires. From 1996 to 2016, Gero was a Research Associate at the Smithsonian Institution's Department of Anthropology. Throughout her career, she received grants from the National Endowment for the Humanities, National Science Foundation, Fulbright, Wenner-Gren Foundation, and Heinz Foundation. In 2007, Gero was awarded the Squeaky Wheel by the American Anthropological Association's Committee on the Status of Women in Anthropology.

Major Accomplishments

Gero was long committed to the radical transformation of archaeology. To this end, her investigations of the past incorporated feminist perspectives and addressed contemporary politics at global and local scales. Her earliest writings reveal the crystallization of perduring research interests. Notably, the publication of *The Socio-Politics of Archaeology* (Gero et al. 1983) called for sociological analysis of the field and its epistemological production. For her, critical consideration of North American archaeology ran parallel to, not in the wake of, paradigmatic shifts in British postprocessual archaeology. Gero's (1983) own chapter identified the gendered segregated nature of research; men predominated in the field, while women labored largely at museum studies and lab analysis. She continued to hone these arguments about inequities and expectations in the influential article "Socio-Politics and the Woman-at-Home Ideology" (1985). These writings were inspired by Gero's early experiences conducting fieldwork in Perú. In making the personal (and political) the professional, her feminist approach exposed and challenged the discipline's pervasive androcentrism, as well as questioned normative ways of thinking about the past.

One of Gero's major contributions was the fomentation of feminist archaeology. She is best known for *Engendering Archaeology* (1991), the volume she co-edited with Margaret Conkey. The now-canonical volume, which began as a 1988 conference titled "Women and Production in Prehistory," destabilized assumptions about men's societal contributions, legitimated gender as an issue for investigation, and effected more holistic understanding of ancient societies. In her chapter, Gero (1991) identified the implicit sexism in

Paleoindian archaeologists' studies of tool production. Building on her knowledge of lithics, she deconstructed "Man the Toolmaker" and the undue emphasis this notion places on supposedly "male-only" activities (i.e., hunting, butchering). She then argued for women as manufacturers of stone tools. Affirmation of women's roles and abilities, Gero concluded, laid important groundwork for more nuanced reconstructions of gender systems and social transformations. With gender's analytical validation, Gero's feminist concerns expanded. She examined the complex gendered arrangements of ancient households in Argentina, arguing that social relations often defy easy dichotomization as hierarchical or complementary (Gero and Scattolin 2002). Engagement with feminist perspectives also provided a basis for the querying of taken-for-granted evidence. In her study of Recuay pots from Perú, for instance, Gero (2004) deliberated about the sociopolitical significance of their graphic sexual couplings. Her final contribution to archaeological theory and Andean archaeology was *Yutopian: Archaeology, Ambiguity and the Production of Knowledge in Northwest Argentina*. In this 2015 book, Gero provided an account of excavations at an Early Formative village in the southern Andes (Gero 2015). Offering a new model for the site report, she explored the interplay between archaeologists' fieldwork experiences and their production of knowledge.

Gero's engendering of and subsequent contributions to feminist archaeology emphasized her concern not just for the theoretical and topical but also for disciplinary politics and remediation of asymmetrical power relations. Her archaeological praxis promoted social justice. Dedicated involvement in the World Archaeological Congress (WAC) signaled one means to an equitable end. The organization subverts traditional archaeology born of colonialism, and it gives practitioners who have been historically marginalized – due to nationality, ethnicity, and economic disadvantage – an opportunity to shape practice and theory. Gero wore many hats in WAC. She was elected the North American representative from 1999 to 2008 and served on the Standing Committee on Ethics from 2007 onward. In June 2003, Gero acted as Academic Secretary for WAC-5 in Washington, DC, a congress of particular importance given its attendance and international visibility. From 2003 to 2010, Gero was Head Series Editor for the *One World Archaeology* book series. Gero's own contribution to the series, coauthored with Dolores Root, argued that *National Geographic*'s portrayal of archaeology endorsed a nationalist ideology of American expansionism and capitalism (1990). In 2012, she and husband Stephen Loring received the Lifetime Achievement Award from the World Archaeological Congress.

In sum, Gero worked throughout the duration of her career to realize an archaeology that is fully self-aware, less exploitative, and more collaborative. She died on 14 July 2016, a beloved and inspirational figure in the field.

Cross-References

- ▶ Andes: Prehistoric Period
- ▶ Conkey, Margaret Wright
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Post-Processual Archaeology

References

Gero, J.M. 1983. Gender bias in archaeology: A cross-cultural perspective. In *The socio-politics of archaeology*, ed. J.M. Gero, D.M. Lacy, and M.L. Blakey, 51–57. Amherst: Department of Anthropology, University of Massachusetts.

Gero, J.M. 1985. Socio-politics and the woman-at-home ideology. *American Antiquity* 50 (2): 342–350.

Gero, J.M. 1991. Genderlithics: Women's roles in stone tool production. In *Engendering archaeology: Women and prehistory*, ed. J.M. Gero and M.W. Conkey, 163–193. Oxford: Blackwell.

Gero, J.M. 2004. Sex pots of ancient Peru. In *Combining the past and the present: Archaeological perspectives on society*, BAR International series 1210, ed. T. Oestigaard, N. Anfinset, and T. Saetersdal, 3–22. Oxford: Archaeopress.

Gero, J.M. 2015. *Yutopian: Archaeology, ambiguity, and the production of knowledge in northwest Argentina*. Austin: University of Texas Press.

Gero, J.M., and M.W. Conkey, eds. 1991. *Engendering archaeology: Women and prehistory*. Oxford: Blackwell.

Gero, J.M., and D. Root. 1990. Public presentations and private concerns: Archaeology in the pages of *National Geographic*. In *The politics of the past*, ed. P. Gathercole and D. Lowenthal, 19–37. New York: Routledge.

Gero, J.M., and M.C. Scattolin. 2002. Beyond complementarity and hierarchy: New definitions for archaeological gender relations. In *In pursuit of gender: Worldwide archaeological perspectives*, ed. S. Nelson and M. Rosen-Ayalon, 155–171. Walnut Creek: Altamira Press.

Gero, J.M., D.M. Lacey, and M.L. Blakey. 1983. *The socio-politics of archaeology*, Research Reports 23. Amherst: Department of Anthropology, University of Massachusetts.

Further Readings

Conkey, M.W., and J.M. Gero. 1997. Programme to practice: Gender and feminism in archaeology. *Annual Review of Anthropology* 26: 411–437.

Gero, J.M. 1993. The social world of prehistoric facts: Gender and power in Paleoindian research. In *Women in archaeology. A feminist critique*, Occasional Papers in Prehistory series 23, ed. H. du Cros and L. Smith, 31–40. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University.

Gero, J.M. 1996. Archaeological practice and gendered encounters with field data. In *Gender and archaeology*, ed. R. Wright, 251–280. Philadelphia: University of Pennsylvania Press.

Gero, J.M. 2007. Honoring ambiguity/problematizing certitude. *Journal of Archaeological Method and Theory* 14: 311–327.

Gerstenblith, Patty

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Basic Biographical Information

Dr. Gerstenblith earned her A.B. from Bryn Mawr College in Classical and Near Eastern Archaeology, Ph.D. from Harvard University in Art History and Anthropology, and J.D. from Northwestern University School of Law. Upon graduation from law school, she clerked for the Honorable Richard D. Cudahy of the US Court of Appeals for the Seventh Circuit. She is a Distinguished Research Professor at DePaul University College of Law, where she also acts as Director of the Center for Art, Museum and Cultural Heritage Law. She is a co-director of the Tulane-Siena Institute for International Law, Cultural Heritage and the Arts.

Major Accomplishments

Dr. Gerstenblith served as the Chair of the President's Cultural Property Advisory Committee, a federal advisory committee in the US Department of State, in the Obama administration from 2011 to 2017, and had served previously as a Public Representative in the Clinton administration from 2000 to 2003. She serves as the Secretary of the Board of Directors of the US Committee of the Blue Shield, is a Consulting Scholar at the University of Pennsylvania's Museum of Archaeology and Anthropology, is a member of the Editorial Board of the UK journal *Art Antiquity and Law*, and is a member of the Steering Committee of the American Bar Association's International Art and Cultural Heritage Law Committee. Prior to these appointments, she was Editor-in-Chief of the *International Journal of Cultural Property* (1995–2000) and the founding President of the Lawyers' Committee for Cultural Heritage Preservation (2006–2011). She has held several offices on the International Art and Cultural Heritage Law Committee of the American Bar Association's Section on International Law. She has served as a trustee of the Archaeological Institute of America, the American Schools of Oriental Research, and the Albright Institute of Archaeological Research and was a member of the American Alliance of Museums Task Force on Direct Care of Collections. She was an advisor to the Past for Sale project of the Neubauer Collegium for Culture and Society at the University of Chicago and an advisor to the Countering Looting of Antiquities from Syria and Iraq Project at George Mason University.

Her main areas of research and publication are the international trade in archaeological and cultural artifacts, museum acquisitions policies, and the protection of cultural heritage during armed

conflict. Among her publications is the casebook, *Art, Cultural Heritage and the Law* 4th ed. (Gerstenblith 2019). She is the author of more than 80 articles and has contributed to several amicus curiae briefs in cases involving cultural heritage issues. She has spoken at conferences, universities, and museums throughout the world and is interviewed in the 2016 documentary, *The Destruction of Memory*, produced by Tim Slade. In 2018, she received the Championing Cultural Heritage Award from the Archaeological Institute of America and the Antiquities Coalition.

Cross-References

- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions

References

Gerstenblith, P. 2019, forthcoming. *Art, cultural heritage and the law*. 4th ed. Durham: Carolina Academic.

Further Reading

Gerstenblith, P. 2009. *Schultz* and *Barakat*: Universal recognition of national ownership of antiquities. *Art, Antiquity, and Law* 14: 21–48.

Gerstenblith, P. 2012. Getting real: Cultural, aesthetic and legal perspectives on the meaning of authenticity of art works. *Columbia Journal of Art & Law* 35: 321–356.

Gerstenblith, P. 2013a. Enforcement by domestic courts: Criminal law and forfeiture in the recovery of cultural objects. In *Defending Aphrodite: Enforcing international cultural property law*, ed. F. Francioni and J. Gordley, 150–174. Oxford: Oxford Univ. Press.

Gerstenblith, P. 2013b. The meaning of 1970 for the acquisition of archaeological objects. *Journal of Field Archaeology* 38: 364–373.

Gerstenblith, P. 2016. The destruction of cultural heritage: A crime against property or a crime against people? *John Marshall Review of Intellectual Property Law* 15: 336–393.

Gerstenblith, P. 2017. Implementation of the 1970 UNESCO convention by the United States and other market nations. In *The Routledge companion to cultural property*, ed. Jane Anderson and Haidy Geismar, 70–88. London: Routledge.

Gerstenblith, P. 2018, forthcoming. Statutes of limitation and other legal challenges to the recovery of stolen art. In *Art, crime and criminals: Painting fresh pictures of art theft, fraud and plunder*, eds. Saskia Maria Hufnagel and Duncan Chappell. London: Palgrave Macmillan.

Gerstenblith, P. forthcoming. The disposition of movable cultural heritage. In *Intersections in international cultural heritage law*, ed. Anne-Marie Carstens. Oxford: Oxford Univ. Press.

Getty Foundation

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Basic Information

The Getty Foundation (http://www.getty.edu/foundation/index.html) functions as a philanthropic arm of the J. Paul Getty Trust. Originally based in Santa Monica, the foundation is now administered from the Getty Center in Los Angeles, USA. The Getty Grant Program was announced on the 11th of October 1984 and assumed its current title in 2005 reflecting the changing needs for funding support (About the J. Paul Getty Trust n.d.). The initial motivation was to provide a source of funding for the visual arts and in particular "...works of exceptional merit" (Administrative History n.d.). From 1985 the early grant categories comprised library and archival projects at independent centers for advanced research in the history of art, scholarly cataloging of art museum collections, publications, conservation, museum programs to interpret permanent collections, education in the arts, and national and international service organizations (Administrative History n.d.). The postdoctoral fellowship program which was previously administered externally commenced at the Getty Museum in 1986.

From 2005, key priorities were established to assist "...individuals and institutions committed to advancing the greater understanding and preservation of the visual arts in Los Angeles and throughout the world" (About the Getty

Foundation n.d.). These areas are supported by the Getty Foundation in conjunction with collaborative programs offered by the Getty Research Institute, the Getty Conservation Institute, and the J. Paul Getty Museum. The foundation currently focusses on four strategic areas based upon:

- Access to museums and archival collections
- Art history as a global discipline
- Advancing conservation practice
- Leadership and professional development

By the year 1990, 530 grants had been distributed to 18 countries, amounting to funding of US$20 million (Muchnic 1990). Between 2002 and 2011, nearly 100 grants, totaling US$11 million, were awarded to the *Pacific Standard Time* project alone, which began as an archiving project for postwar art in Los Angeles. In August 2012 US$1.95 million was granted to the Getty Leadership Institute, which relocated to Claremont Graduate University in 2010, as a 3-year commitment to ensuring the leading-edge development of museum professionals. The Getty Trust produces numerous publications with many works resulting from research funded through the Getty Foundation.

Applications for funding are competitive and must meet stringent selection criteria. Residential Grants and Fellowships for the Getty Research Institute and the Getty Conservation Institute, as well as Graduate and Undergraduate Internships are accepted online.

Major Impact

Since inception, the Getty Foundation has awarded significant grants to projects around the world. In 2012, 28 grants totaling more than US$1.3 million were given in the Access to Collections category. For the 2011–2012 period, seven grants ranging between US$48,000 and US$310,000 were allocated to five countries to enable international exchange among scholars in art history. A further seven grants, totaling approximately US$1.9 million, were also awarded in Conservation for the same period. To encourage professional development, undergraduates were included among 115 internships awarded in 2012. In the same year the foundation administered 83 residential grants (J. Paul Getty Trust 2012).

Examples of the range of projects the Getty Foundation has supported include:

- 2005 National Trust for Historic Preservation, Washington, DC. For an assessment of damage to historic structures in the Gulf Coast region affected by Hurricane Katrina. US$100,000
- 2008 New Orleans Jazz and Heritage Foundation, Inc., Louisiana. For a conservation survey of the foundation's archives. US$25,000
- 2008 West African Museums Program, Senegal. For training in the preservation of historical photographs. US$200,000
- 2008 International Council of African Museums, Kenya. Assist in the organization restructure to better serve the African museum community. US$175,000
- 2010 Conservation of the *Ghent Altarpiece* and Vasari's *The Last Supper*. €630,000
- 2011–2012 University of Sydney, Australia. For a series of planning meetings to assess the status of the history of modern and contemporary art in Southeast Asia. AU$94,000
- 2011–2012 The British School at Rome, Italy. For a workshop on protective shelters for archaeological sites. €78,000
- 2011–2012 Association Internationale des Critiques d'Art, Paris, France. For participants from developing countries to attend the 2012 Congress in Zurich, Switzerland. US$43,600

Cross-References

► Archaeology of Art: Theoretical Frameworks
► Art Studies: Normative Approaches
► Conservation in Museums

References

About the Getty Foundation. n.d. Available at: http://www.getty.edu/foundation/about/. Accessed 11 Feb 2013.
About the J. Paul Getty Trust. n.d. Available at: http://www.getty.edu/about/trust.html. Accessed 11 Feb 2013.

Administrative History. n.d. Available at: http://archives2.getty.edu:8082/xtf/view?docId=ead/IA20017/IA20017.xml;chunk.id=ref4;brand=default. Accessed 11 Feb 2013.
Muchnic, S. 1990. Director wants a wider reach for Getty grants. *Los Angeles Times*, 5 March 1990.
J. Paul Getty Trust. 2012. *2012 Annual report*. Los Angeles: J. Paul Getty Trust.

Further Reading

The Getty Foundation official website. n.d. Available at: http://www.getty.edu/foundation/.
The Getty Leadership official website. n.d. Available at: http://www.cgu.edu/gli.

Glacial Advances in Asia, Europe, and North America

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Introduction

Glacial-interglacial cycles (when glaciations advance to their maximum and retreat to their minimum) have occurred throughout much of the Earth's climatic history (EPICA 2004). Presently, in the Holocene epoch, the Earth is experiencing an interglacial period of a glacial-interglacial cycle that began approximately 100,000–124,000 years ago within the Pleistocene epoch (Berger 2002). Glacial advances have not only covered vast expanses of Asia, Europe, and North America but the globe as early as 2.4–2.0 billion years ago within the Proterozoic eon, when the first global glaciation is said to have occurred (Strand 2012: 70). The most extensive glacial advance to have dominated the global landscape occurred between 800,000 and 600,000 years ago, with glaciers advancing to mid-latitudes (Strand 2012: 70). Giving this period the term "snowball earth," researchers, through studies of oxygen isotopes gathered from deep-sea ocean sediments and ice cores, have determined further glaciations at roughly 100,000-, 41,000-, 23,000-, and 19,000-year intervals (Berger 1992: 572; Berger 2002; Strand 2012: 70). The most recent glacial advance occurred approximately 18,000–24,000 years ago and reached its peak 21,000 years ago (Mix et al. 2001). Termed the "Last Glacial Maximum" (LGM), this event saw, once again, the advent of large expanses of Asia, Europe, and North America covered in a number of ice sheets (Mix et al. 2001).

Definition

Glacial advances or glaciations occur when layers of snow accumulate in an area where the local climate is cold enough to sustain the newly deposited snow during the summer. Each winter, as younger snow is deposited, the layers of older snow compact further. The pressure of overlying layers eventually increases, and the hexagonal points of snowflakes partially melt and bond together. After some time, the layers of snow turn into an increasingly solid material (approximately 25% air) called firn (Marshak 2009: 472–3). With additional layers of snow causing more pressure, melting, and recrystallizing, the firn becomes a solid of interlocking ice crystals containing less than 20% air trapped in bubbles (Marshak 2009: 472–3). These solid masses of ice are called ice sheets on sea or glaciers on land, can last year round, and can take from 10 to 100 years to many thousands of years to develop (Marshak 2009: 473). The two main types of glaciers are mountain glaciers and continental glaciers.

Continental glaciers accumulate much the same way as mountainous glaciers, but rather than flow from higher latitudes to lower latitudes with the force of gravity, continental glaciers flow outward as the precipitation of snow increases. Glacial thickness can be several kilometers to a few hundred meters in depth and can span continents.

During the Last Glacial Maximum, a number of continental ice sheets (Fig. 1) covered large areas of the northern hemisphere (Clark and Mix 2002: 2). The Laurentide and Innuitian ice sheets accumulated in and covered all of Canada east of

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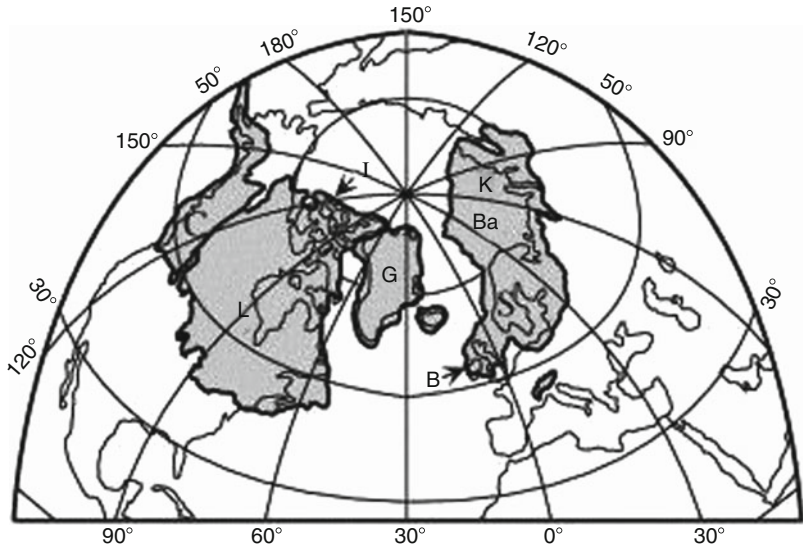

Glacial Advances in Asia, Europe, and North America, Fig. 1 The CLIMAP maximum model. Ice sheets are identified by letters: (*C*) Cordilleran, *L* Laurentide, *I* Innuitian, *G* Greenland, *B* British, *S* Scandinavian, *Ba* Barents Sea, and *K* Kara Sea (Clark and Mix 2002: 2)

the Rocky Mountains. These ice sheets advanced into North America with the greatest extent reaching southern Illinois (Marshak 2009: 491). The Cordilleran ice sheet covered the southern third of Alaska, including the Alaskan peninsula. In North America, mountain glaciers developed in the Rocky Mountains, Sierra Nevada, and the Cascade mountains (Marshak 2009: 491). The British ice sheet covered the majority of Ireland, Great Britain, and what is now the North Sea (CLIMAP 1981; Marshak 2009: 491). The Scandinavian ice sheet covered all of Scandinavia and northern Russia and reached the Swiss Alps. Northern Asia from northeastern Russia and Siberia to the higher latitudes of Tibet was covered by the Kara Sea and Barents Sea ice sheets (CLIMAP 1981; Clark and Mix 2002).

For the phenomenon of a global glaciation to occur, such as with the LGM, a drop in global climate had to occur. Factors that enable global cooling and glaciations have been attributed to the astronomical or Milankovitch theory (CLIMAP; EPILOG; Berger 1992). As the Earth travels on its elliptical orbit around the sun, it experiences certain variations in its eccentricity, axial tilt (also known as obliquity), and precession thought to arise by the orbital forcing of planetary bodies within the solar system. These in turn alter the amount of solar radiation that reaches the planet's surface thereby affecting seasonal and glacial-interglacial pacing (Rial 2004: 1, Schieber 2007). Although challenged in recent debates, the Milankovitch theory has maintained its validity through modern research techniques and a rigorous assessment of previous findings (Rial 2004; Huybers 2011; Strand 2012).

Key Issues/Current Debates/Future Directions/Examples

In the 1970s, the CLIMAP (Climate: Long range Investigation, Mapping, and Prediction) research project began a global collaboration to map the global extent of ice sheets and ascertain a definitive chronology for the LGM (CLIMAP 1981). In recent debates, their initial finding for the peak of the LGM at 18,000 BP has been in dispute. In 2001, the EPILOG (Environmental Processes of the ice age: Lands, Oceans, Glaciers) research project undertook a similar study and, with the aid of modern modeling techniques, found the peak of the LGM closer to 21,000 BP (Mix et al. 2001). A further debate involves the extent of the Kara Sea ice sheet in northwestern Russia (Clark and Mix 2002). The CLIMAP (1981) findings and geomorphic evidence indicate that a large ice sheet did cover this area (Grosswald and Hughes 2002). Clark and Mix (2002) and Mangerud et al. (2002), however, argue that a detailed look at the

chronological evidence suggests that the Kara ice sheet existed before the LGM at its onset and that the Kara ice sheets' extent was limited to the western region of the Novaya Zemlya.

Cross-References

- ▶ Geoarchaeology
- ▶ Glacial Landscapes: Environmental Archaeology

References

Berger, A. 1992. Astronomical theory of paleoclimates and the last glacial-interglacial cycle. *Quaternary Science Reviews* 11: 571–581.

Berger, W.H. 2002. Milankovitch theory supported. University of California San Diego. Available at: http://earthguide.ucsd.edu/virtualmuseum/climatechange2/03_1.shtml. Accessed 6 Dec 2012.

Clark, P.U., and A.C. Mix. 2002. Ice sheets and sea level of the last glacial maximum. *Quaternary Science Reviews* 21: 1–7.

CLIMAP. 1981. Seasonal reconstruction of the Earth's surface at the Last Glacial Maximum. In *Map series* (Technical report MC 36). Boulder: Geological Society of America.

Epica Community Members. 2004. Eight glacial cycles from an Antarctic ice core. *Nature* 429: 623–628.

Grosswald, M.G., and T.J. Hughes. 2002. The Russian component of an Arctic ice sheet during the late glacial maximum. *Quaternary Science Reviews* 21: 1–3.

Huybers, P. 2011. Combined obliquity and precession pacing of late Pleistocene deglaciations. *Nature* 480: 229–232.

Mangerud, J., V. Astakhov, and J.I. Svendsen. 2002. The extent of the Barents-Kara ice sheet during the last glacial maximum. *Quaternary Science Reviews* 21: 111–119.

Marshak, S. 2009. *Essentials of geology*. 3rd ed. London: W.W Norton & Company.

Mix, A.C., E. Bard, and R. Schneider. 2001. Environmental processes of the ice age: Land, ocean, glaciers (EPILOG). *Quaternary Science Reviews* 20: 627–657.

Rial, J.A. 2004. Earth's orbital eccentricity and the rhythm of the Pleistocene ice ages: The concealed pacemaker. *Global and Planetary Change* 41: 81–93.

Schieber, J. 2007. Milankovich Cycles and Glaciation. Indiana University. Available at: http://www.indiana.edu/~geol105/images/gaia_chapter_4/milankovitch.htm. Accessed 24 Nov 2017.

Strand, K. 2012. Global and continental – Scale glaciations on the Precambrian earth. *Marine and Petroleum Geology* 33: 69–79.

Further Reading

Barnola, J.M., D. Raynaud, Y.S. Karotkevich, and C. Lorius. 1987. Vostok ice core provides 160,000 year record of atmospheric CO2. *Nature* 39 (6138): 408–414.

Grossman, E.L. 1987. Stable isotopes in modern Benthic foraminifera: A study of vital effect. *Journal of Foraminiferal Research* 17: 148–161.

Glacial Landscapes: Environmental Archaeology

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Introduction

Glacial landscapes are distributed all over the planet, and they are present even in tropical regions. Hominins were necessarily involved with these landscapes, sometimes avoiding them, but many times developing means to adapt to them. The history of the advances and retreats of the ice during the Pleistocene shows that many of the areas where hominins lived after their initial radiation from Africa were characterized by glacial and periglacial conditions. Indeed, most of the process of hominin dispersal took place under very cold conditions. In most mountain areas, valley or cirque glaciers covered parts of regions that were eventually colonized by hominins. In many places, especially in the high latitudes of the northern hemisphere, periglacial environments were present even at sea level inhibiting or at least affecting the feasibility or continuity of human occupation in many places (Hoomard 2011).

Historical Background

The very first systematic accounts of the prehistory of humankind in Europe were organized by using a scheme of four Alpine glaciations, which now is known to be much more complicated, with a variable number of ice advances punctuating the

Pleistocene in different parts of the world (Bradley 1999). These ice advances affected the distribution of hominin populations mainly in Europe and Asia, restricting their distribution to the southern portions of those continental masses during millenia. By the end of the Pleistocene, *Homo sapiens* were present at most of the continents but were rare or absent in the extreme north (Straus 1996). During the Last Glacial Maximum (LGM) around 24–20 ka BP, many portions of the Northern Hemisphere were glaciated, a time during which many European human populations contracted to environmental refugia like the Iberian and Italian peninsulas. However, at a global scale the human response to cold glacial conditions was varied, ranging from dispersal to concentration (Gamble and Soffer 1988). The last significant ice advance of the Pleistocene was the Younger Dryas, a cold period characterized by its very fast inception that occurred in a matter of a few decades. It is dated around 11–10 ka BP – 12,900–11,600 cal BP – and it is known that it produced no important effects on populations living in central Europe (Jochim 2012) or North America (Meltzer 2009). However, this is a time during which the northern Netherlands, Scandinavia, and most of North America were not inhabited. In North America, human occupations were practically restricted to Alaska, Yukon, or the Southern Plains. On the other hand, it is not clear what was the importance of the Younger Dryas in southern South America or in Australia and New Zealand. However, late Pleistocene cold spells in synch with the Antarctic Cold Reversal were identified in the region of the Strait of Magellan, Southern Patagonia (McCulloch et al. 2005). As a result it must be inferred that the process of human colonization of southern South America took place under very cold conditions (Borrero 2012).

The colonization of Northern Europe or Northern Siberia required the availability of shelter, insulating clothing, and relatively sophisticated stone tool and bone technologies. It took hominins millions of years to be able to colonize these north cold periglacial habitats, and it was only with the advent of *Homo sapiens* that those regions were effectively reachable. In spite of claims for Neandertal's occupations at Byzovaya, near the Ural Mountains at 65 °N (Slimak et al. 2011), it must be kept in mind that this attribution was solely based on characteristics of the stone tools. This evidence is not strong enough to move 1000 km north the known limit in the distribution of Neandertals.

Specifically in Northeast Siberia, the hominin range apparently never reached above 55 °N during the early Upper Paleolithic, "and it was not until c. 25,000–20,000 BP that they inhabited the extreme continental north" (Goebel 2004: 195). This panorama, of course, implicates that the human entry to America took place under very cold conditions and relatively late in the Pleistocene. Even when most of the Beringian habitats were not glaciated, the conditions were difficult for humans. Palynological evaluations suggested that at that time Beringia was a barren landscape (Colinvaux 1986). However, the faunal vertebrate richness of Beringia – that characterizes the so-called Mammoth Steppe – surely facilitated the peopling process by providing an adequate subsistence base (Guthrie 1982). The subsequent history of human expansion toward the south through an ice-free corridor presents a classic example of interaction with periglacial environments. It is clear that if this corridor was the main access to the Americas, then hunter-gatherers have to wait until significant biotic resources were available to live and circulate in order to reach the North American plains (Meltzer 2009). Alternative coastal routes were proposed to explain the human expansion to the south, but the northern coastal habitats potentially used by the first colonizers were also in part glacial or periglacial. More recent theories suggest an Atlantic crossing with an origin in the European Solutrean (Stanford and Bradley 2011). This scenario also involves periglacial environments.

Key Issues/Current Debates

The evidence related with the human colonization of mountain environments is particularly relevant. The Tibetan plateau was covered by ice c. 50,000 years ago, after which retreat of the ice facilitated the expansion of animal resources into the plateau. It is postulated that c. 30,000 years

ago, humans entered the plateau, but the evidence is not abundant. At site Xiao Qaidam, 3100 masl, there are simple core and flake quartzite tools probably dating to c. 22,000–18,000 BP. At site Chusang, at 4200 masl, hand and footprints impressed on travertine are dated by OSL approximately 21,700–20,600 BP (Aldenderfer and Zhang 2004: 16). Several sites with core and flake tools are typologically assigned to Paleolithic times. Brantingham et al. (2003) proposed that the plateau was populated from the north, with people getting into eastern Qinghai lakes, at 3000–4000 masl, before the advent of the LGM. It is maintained that at that time, humans acquired the physiological adaptations required to live in the high country. Finally, displacement to the high plateau "may have occurred at the onset of LGM conditions, c. 23,000-22,000 B.P." (Aldenderfer and Zhang 2004: 21). Basically, the timing of the colonization necessarily was in synch with the retreat of the ice.

In the Central Andes, there is evidence of early human populations occupying mountain environments slightly before 10,000 BP (Aldenderfer 1997), while at Agua de la Cueva, Mendoza, Argentina, mountain environments begin to be used around 11,000 years ago (García 2003). In both cases, hunter-gatherer adaptations focused on the exploitation of wild camelids were defined. For these and other high altitude sites, the default interpretation is that human occupations are seasonal. However, interpretations of year-round occupations also exist, for example, at Pachamachay Cave, Perú, at c. 4300 masl (Rick 1980). This cave was occupied since the end of the Pleistocene by wild camelid hunters, and Rick suggested that the conditions were adequate for sedentary occupations. Alternative models can be offered for the evidence of Pachamachay, but it is clear that some of the high altitude environments of the Puna of the South Central Andes witnessed the early Holocene process of domestication of camelids (Yacobaccio 2007), a process that at some point was unequivocally related with year-round occupations.

Glacial and periglacial landscapes can be very prohibitive for humans, requiring complex sets of adaptations (Binford 1978). One example is the Paleo-Eskimos that were living in the relatively warm climate of the Arctic mid-Holocene, a region whose climate at some point began to change toward very cold conditions. One result was that entire sectors of that area were abandoned. The availability of both terrestrial and sea mammals was basic to select regions of human survival, which was possible even when it changed dramatically to the point of unpredictability, especially in Arctic Canada (Hoomard 2011). Hunter-gatherers living in the central Arctic were able to adapt to this conditions, probably constituting the best example of a human population living under glacial conditions. Of course, they were continuously exposed to starvation and other risks, especially during the Little Ice Age (McGhee 1997). Except for the mountain habitats, the importance for humans of periglacial environments in the Southern Hemisphere is less notable. Ultima Esperanza, Chile, is one of the few places where early colonizers were regularly living relatively close to the ice near a proglacial lake c. 10,500 years BP (Martin et al. 2011). Moreover, in other Southern Hemisphere places like Australia, there were very few areas affected by glaciers, and it is possible that the distribution of ice played no role in the process of exploration and colonization.

As already mentioned, mountains offered some of the more characteristic human-inhabited periglacial landscapes. For example, the lands around the Andes or the Himalayas present large high altitude periglacial habitats that were inhabited by humans with difficulty. Humans are not adapted to live in high altitude and required behavioral, cultural, and physiological adaptations to those habitats in order to survive (Aldenderfer 1997: 19–25). For that reason, the process of human colonization of these and other mountain environments started near the end of the Pleistocene and only after the effective colonization of lowlands nearby took place.

Future Directions

One problem in understanding the archaeology of periglacial landforms is that glacial erosion and other dynamic processes associated with deglaciation probably erased any indications of previous

human occupation. This is especially important since many proglacial lakes and other areas marginal to glaciers probably functioned as magnets for earlier colonizers, and the catastrophic draining of lakes completely destroyed any sites located nearby. For this reason, formational and taphonomic studies will be crucial in appreciating the magnitude of these problems and in trying to reconstruct the history of human use of those environments.

Finally, the literature discussing the tactics and strategies used by humans living under periglacial conditions emphasizes the availability of fire technologies and all kinds of shelter adaptations (Jochim 1981). Even more important is the existence of a full suite of secondary adaptations, like the intensive use of the different products offered by hunted animals, the use of stone boiling, or the use of bones for fuel. Examples of humans inhabiting periglacial habitats using these and many other tactics are well described in the literature (Jochim 1981; Soffer 1985; Meltzer 2009) and constitute the best proof of human adaptability. Bioanthropological studies should play a more important role in discussing these adaptations in the past, since it was only by conquering periglacial environments that *Homo sapiens* was able to successfully colonize the earth.

Cross-References

- ▶ Fossil Records of Early Modern Humans
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Glacial Advances in Asia, Europe, and North America

References

Aldenderfer, M. 1997. *Montane foragers: Asana and the south-central Andean archaic*. Iowa City: University of Iowa Press.

Aldenderfer, M., and Y. Zhang. 2004. The prehistory of the Tibetan Plateau to the seventh century A.D.: Perspectives and research from China and the West since 1950. *Journal of World Prehistory* 18 (1): 1–55.

Binford, L.R. 1978. *Nunamiut ethnoarchaeology*. New York: Academic Press.

Borrero, L.A. 2012. The human colonization of the High Andes and southern South America during the cold pulse of the late Pleistocene. In *Hunter-gatherer behavior. Human response during the Younger Dryas*, ed. M. Eren, 57–78. Walnut Creek: Left Coast Press.

Bradley, R. 1999. *Paleoclimatology: Reconstructing climate of the Quaternary*. San Diego: Harcourt/Academic Press.

Brantingham, P.J., H.Z. Ma, J.W. Olsen, X. Gao, D.B. Madsen, and D.E. Rhode. 2003. Speculation on the timing and nature of late Pleistocene hunter–gatherer colonization of the Tibetan Plateau. *China Science Bulletin* 48: 1510–1516.

Colinvaux, P. 1986. Plain thinking on Bering land bridge vegetation and mammoth population. *Quarterly Review of Archaeology* 7: 8–9.

Gamble, C., and O. Soffer. 1988. Introduction, Pleistocene polyphony: The diversity of human adaptations at the Last Glacial Maximum. In *The world at 18,000 B.P*, ed. O. Soffer and C. Gamble, vol. 1, 1–23. London: Unwin Hyman.

García, A. 2003. Exploitation territory at Agua de la Cueva (Southern Area) Site (11,000–9000 RCYBP). In *Where the south winds blow: Ancient evidence of Paleo South Americans*, ed. L. Miotti, M. Salemme, and N. Flegenheimer, 83–86. College Station: Center for the Study of the First Americans: A&M.

Goebel, T. 2004. The early upper Paleolithic of Siberia. In *The early Upper Paleolithic beyond Western Europe*, ed. J. Brantingham, S.L. Kuhn, and K.W. Kerry, 162–195. Berkeley: University of California Press.

Guthrie, D. 1982. Mammals of the Mammoth Steppe as paleoenvironmental indicators. In *Paleoecology of Beringia*, ed. D.M. Hopkins, J.V. Matthews, C.E. Schweger, and S.B. Young, 307–329. New York: Academic Press.

Hoomard, C. 2011. L'exploitation du morse au cours du Dorsétien dans l'Arctique canadien: Apports de l'étude du site de Tayara (KbFk-7, Nunavik, Canada). In *Peuplements et préhistoire en Amériques*, ed. D. Vialou, 166–179. Paris: Éditions du Comité des travaux historiques et scientifiques.

Jochim, M. 1981. *Strategies for survival: Cultural behavior in an ecological context*. New York: Academic Press.

Jochim, M. 2012. Coping with the Younger Dryas in the heart of Europe. In *Hunter-gatherer behavior. Human response during the Younger Dryas*, ed. M.I. Eren, 165–178. Walnut Creek: Left Coast Press.

Martin, F.M., M. San Román, and F. Morello. 2011. Reevaluación tafonómica de la interacción entre cazadores recolectores y fauna extinta a fines del Pleistoceno en Última Esperanza, Chile: Modelos de inserción y poblamiento. Bosques, montañas y cazadores. In *Investigaciones arqueológicas en Patagonia Meridional*, ed. L.A. Borrero and K.B. Borrazzo. Buenos Aires: CONICET-IMHICIHU.

McCulloch, R.D., C.J. Fogwill, D.E. Sugden, M.J. Bentley, and P.W. Kubik. 2005. Chronology of the last glaciation in central Strait of Magellan and Bahia Inútil, Southernmost South America. *Geografiska Annaler A* 87: 289–312.
McGhee, R. 1997. *Ancient people of the Arctic*. Vancouver: University of British Columbia Press.
Meltzer, D.J. 2009. *First peoples in a new world. Colonizing Ice Age America*. Berkeley: University of California Press.
Rick, J. 1980. *Prehistoric hunters of the highlands*. New York: Academic Press.
Slimak, L., J.I. Svendsen, J. Mangerud, H. Plisson, H.P. Heggen, A. Brugère, and P.Y. Pavlov. 2011. Late Mousterian persistence near the Arctic Circle. *Science* 332: 841–845.
Soffer, O. 1985. *The Upper Paleolithic of the Central Russian Plain*. New York: Academic Press.
Stanford, D.J., and B. Bradley. 2011. Across Atlantic ice. In *The origin of America's Clovis culture*. Berkeley: University of California Press.
Straus, L. 1996. The world at the end of the last Ice Age. In *Humans at the end of the Ice Age: The archaeology of the Pleistocene Holocene transition*, ed. L. Straus, B. Eriksen, J. Erlandson, and D. Yesner, 3–9. New York: Plenum Press.
Yacobaccio, H.D. 2007. Andean camelid herding in the South Andes: Ethnoarchaeological models for archaeozoological research. *Anthropozoologica* 42 (2): 143–154.

Glass Beads from Australian Indigenous Sites

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Introduction

The study of glass trade beads from various archaeological contexts, including contact and post-contact sites in North America, has been constructive in both advancing analytical methods and also in understanding past cultural entanglements (Hancock 2013); nonetheless, corresponding finds and reported studies from Australian Indigenous site contexts – such as rock-shelters and middens – are comparatively rare, occurring in reported quantities numbering less than 300 to date, and are largely constrained to western Arnhem Land in the Northern Territory (NT) (Allen et al. 2018; James et al. 2017; Litster et al. 2018; Wesley and Litster 2015a, b; Fig. 1).

This situation contrasts to the many historical references to the trade of glass beads in Australia from 1705 onward. An early source refers to the Dutch vessels the *Vossenboch*, *Nova Hollandia*, and *Wajer*, which explored the Tiwi Islands in the Arafura Sea in 1705, with the locals "... very greedy after linen, knives, beads and such knick-knacks" (Forrest 1995:16). Later references include the observations of the crew of the First Fleet in New South Wales (NSW), who were stocked with "articles of traffick," such as beads (McBryde 2000). Baudin described the appeal of beads in southern Tasmania in 1802 remarking "I had provided myself with a few presents, so I held up some necklaces of sparkling beads, which drew their attention. One of them signalled me to give them to him" (Baudin in Plomley and Piard-Bernier 1993:130). Baudin's botanist Leschenault also described early encounters "...one of the last of this group seemed to have some authority over the others ... he gave me a necklace he was wearing, which was made of small shells of glistening mother-of-pearl, threaded on a small cord made of bark and grass. He asked in exchange a necklace of glass beads" (Plomley and Piard-Bernier 1993:130). Allen et al. (2018) also discuss the significant signing of the "Batman Treaty" in 1835 where the east Kulin nation were given "blankets, scissors, knives, looking glasses, tomahawks, beads and flour in exchange for land around Port Philip Bay in Victoria." Taken together, these examples of the many accounts referring to glass beads suggest that the exchange of these objects was commonplace during the era of contact and thereafter.

Definition

Glass beads are small perforated ornaments manufactured from silica (e.g., quartz or sand), fluxes (e.g., potash, soda, or plant ash), and additional colorants and stabilizers. They are

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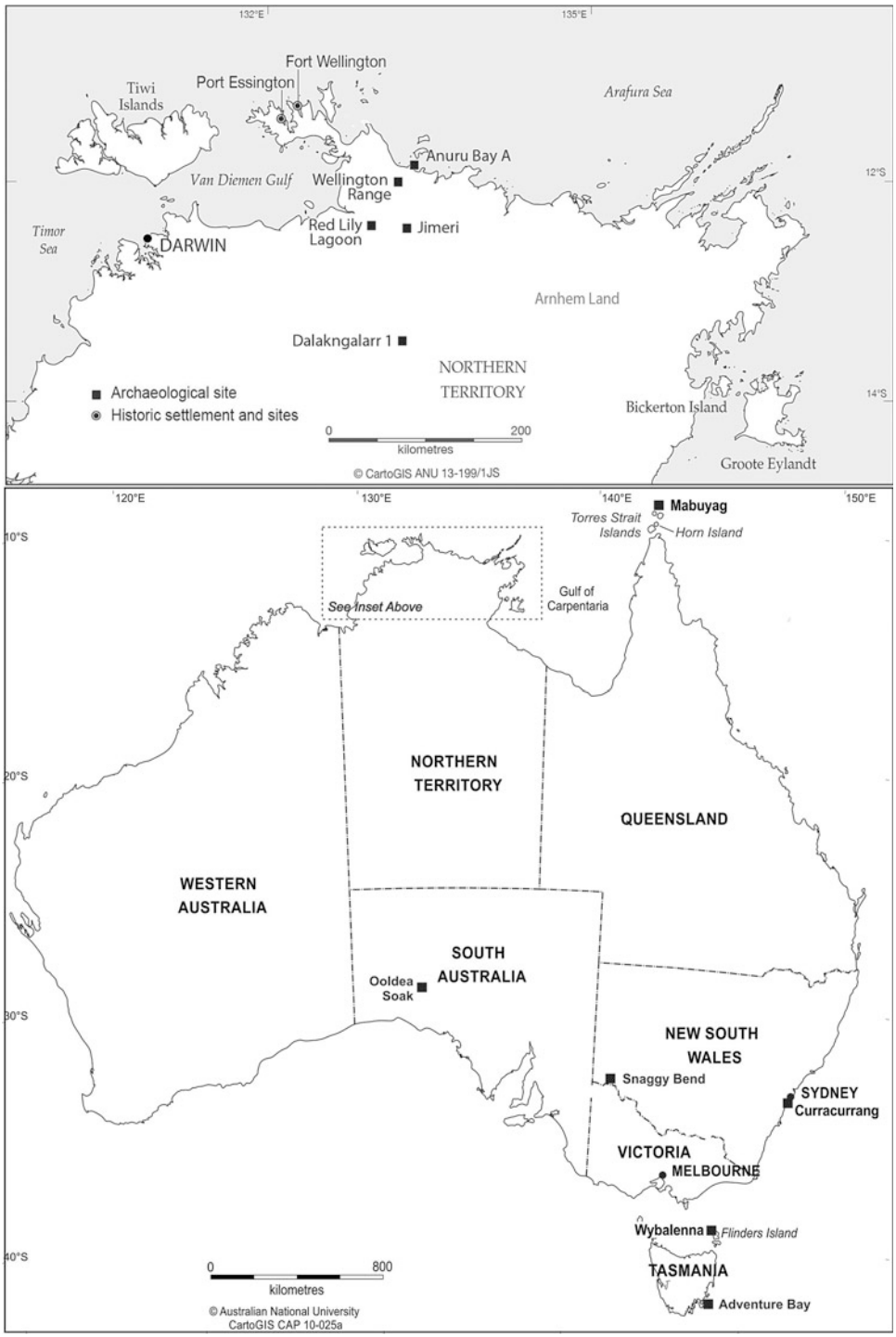

Glass Beads from Australian Indigenous Sites, Fig. 1 Locations mentioned in the text. (CartoGIS, College of Asia and the Pacific, ANU, and Daryl Wesley)

Glass Beads from Australian Indigenous Sites, Fig. 2 Examples of glass beads recovered from archaeological sites in the Northern Territory (*WR* Wellington Range, *RL* Red Lily Lagoon/Minjnymirnjdawabu). (With thanks to the Manganowal Traditional Owners, the Manilakarr Clan, and Daryl Wesley. Photo: Mirani Litster, with a Zeiss 2000-C stereomicroscope and an AxioCam MRc5)

manufactured through a variety of methods, which includes drawn, wound, wound on drawn, mold pressed, blown, or prosser molded (Karklins 2012:63). Glass beads can be used as suspended ornaments placed on the body or incorporated into other items of material culture, such as bags and clothing. Their durable and portable qualities enable their widespread distribution, which in the past has manifested through exchange, gifting, and, in some instances, use as a currency.

Early "trade" beads include those of the Indo-Pacific type (previously known as "trade wind beads"), which were first manufactured at the entrepôt of Arikamedu in India from approximately the third to second century BC and have been found in contexts ranging from Africa through to Japan (Katsuhiko and Gupta 2000). Later, European "trade beads" were manufactured in production centers in Bohemia (now Czechia), Venice, France, and the Netherlands. Trade beads were widely dispersed by the Spanish, Dutch, French, and English in exchange for services and commodities (including slaves) and were introduced into the Americas and Western Africa in the fifteenth century. In Australia "trade beads" have also been referred to as "contact beads" in order to avoid the assumption that they were only traded, as they may have been gifted or purchased (Allen et al. 2018; Wesley and Litster 2015a; see Fig. 2 for examples found in Australian archaeological contexts).

Historical Background

Australian archaeology has long emphasized questions concerning the early arrival of people to Australia (Clarkson et al. 2017), and consequently, "contact" and "post-contact" archaeologies, along with the associated study of artifacts such as glass beads, have received less attention (Harrison 2005). Early "contact" research was initiated in the late 1960s, with Allen's (1969) doctoral research on the nineteenth century Port Essington settlement (see Fig. 1 for location). Macknight (1969) also investigated Macassan (the mariners originating from Sulawesi who travelled to Australia to exploit the natural stocks of trepang) engagements in northern Australia. Birmingham (1976) later reported on several

early-to-mid-nineteenth century sites, including the "pottery enterprise" of settler James King in New South Wales, the Wybalenna mission on Flinders Island, and the Hill End gold rush town in New South Wales. During the 1990s scholars advanced a new phase of contact research, with theoretical progress made by Murray (1993), who presented the concept of "the historical archaeology of Aboriginal Australia." This diverted discussions away from unidirectional acculturation models that were prevalent in contact archaeology (Harrison 2005). In the 2000s, studies preferenced the terms "engagement" and "entanglement" over "contact," promoting the agency of "Indigenous participants in cross-cultural meetings" (Harrison 2005). It is against this backdrop that archaeological research into glass beads has been undertaken.

Glass beads have been reported from a range of contact and post-contact sites, including Wybalenna mission (Birmingham 1976) and Ooldea Soak and mission in South Australia (Brockwell et al. 1989). Blue glass beads were reported from a burial from Snaggy Bend on the central Murray River (Clark and Hope 1985). One blue glass bead was reported from Curracurrang Rockshelter, in northern New South Wales (Megaw 1969). In the Northern Territory, Macknight (1969) reported glass beads found at Anuru Bay, Schrire (1982) reported beads from Jimeri I and Jimeri II, and Mitchell (1994) reported on clay beads from the Cobourg Peninsula, with Clarke (1994) reporting on glass beads from Groote Eylandt and Bickerton Island. More recently, Wesley and Litster (2015a, b) have produced dedicated studies on the glass beads from the Wellington Range and at Minjnymirnjdawabu (Litster et al. 2018; Fig. 1), with James et al. (2017) also describing a single find from Dalakngalarr 1.

Key Issues/Current Debates

One main issue surrounding the study of glass beads in Australian sites – in particular northwestern Arnhem Land sites – relates to the source and the timing of exchange. Wesley and Litster (2015a) proposed a model for the introduction of glass beads in northwestern Arnhem Land, suggesting that they were initially introduced via Macassans in the eighteenth century (or beforehand), with subsequent introductions occurring via various vectors including Europeans and also possibly Japanese pearlers (Wesley and Litster 2015b). This model for a Macassan introduction is supported by other glass bead finds (Clarke 1994) and the presence of Makassarese words in local Arnhem Land languages, including the terms *manik-manik* (bead) and *ammanimani* (necklace) (Evans 1992:76).

Further hypotheses have been developed on the function of beads within customary systems. Wesley and Litster (2015a, b) suggest that they were incorporated into a hybrid economy functioning between Indigenous communities, Macassans and Europeans (Altman 2005), likely representing the "individual expression of customary rights in negotiating with Macassans and European economies" (Wesley and Litster 2015a). Importantly the archaeological sites of Maliwawa and Minjnymirnjdawabu (Red Lily Lagoon) in the NT (see Fig. 1) returned bead splatters/drips from excavations. Drips and splatters are refuse products of bead production and are contained in packages of beads (Fig. 3). These splatters indicate that beads were arriving at these sites unstrung, highlighting the potential for beadwork possibly occurring at these locations (Wesley and Litster 2015a).

Methodological concerns have also been raised by researchers (Litster et al. 2018). Firstly,

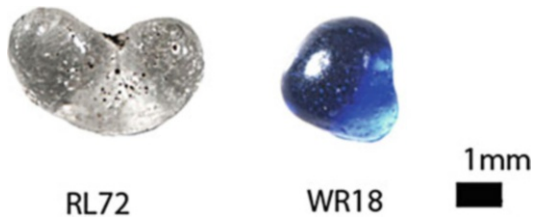

Glass Beads from Australian Indigenous Sites, Fig. 3 Examples of glass drips and splatters (RL 72 from Minjnymirnjdawabu and WR18 from Maliwawa). (With thanks to the Manganowal Traditional Owners, the Manilakarr Clan, and Daryl Wesley. Photo: Mirani Litster, with a Zeiss 2000-C stereomicroscope and an AxioCam MRc5)

most of the glass beads from archaeological sites derive from either undated contexts or are dated by association. This is problematic, as much like seeds, beads readily move in deposits (Wesley and Litster 2015a). Another major methodological issue is associated with current fieldwork methods often adhered to in Australia. As illustrated in Litster et al. (2018), the sieve sizes required to capture glass beads include those with screens ranging from 1 to 3 mm (preferably 1 mm); however larger sieve sizes are commonly used. This situation has probably contributed to the low numbers of glass beads recovered in Australian archaeological contexts. Similarly the "telephone box" excavations often seen in Australia, involving small quantities of 1 × 1 m square test pits, have resulted in a lack of information concerning intra-site spatial dynamics.

Finally, several attitudes toward the study of glass beads have also likely contributed to the marginalization of glass bead studies in Australian archaeological research. Sciama (2001:13) remarked that beads are often considered "trinkets," underlining European attitudes toward what is often associated with feminine work, thus trivializing the significance of these finds in archaeology. Byrne (1996) also identified a resistance to understanding the more recent past, with deep antiquity being correlated (wrongly) with "authentic Aboriginality." Consequently, glass beads have been on the periphery, with studies of objects perceived to be more "authentic," such as organic beads and stone artifacts, receiving more attention.

International Perspectives

Glass bead studies in other regions are well developed. Researchers have adopted both classification systems for recording the physical attributes of beads, in conjunction with studies into the chemical composition of glass bead finds. Early classification systems included the seminal *Classification and Nomenclature of Beads and Pendants*, which was established by Horace Beck in 1928. The most widely accepted was by Kenneth and Martha Kidd's *A Classification System for Glass Beads for the Use of Field Archaeologists* (1970). Most classification systems used today build on these previous systems, especially Kidd and Kidd (1970), with beads typically defined by manufacture method (Karklins 2012:63).

In the 1990s chemical characterization became more routine in bead studies. Importantly, chemical signatures can be associated with "geocultural traditions" (Pion and Gratuze 2016). A variety of techniques and methods have been adopted to better understand the composition of glass beads, including X-ray-based methods, neutron activation analysis, and laser ablation inductively coupled plasma mass spectrometry methods among others. Such approaches have been adopted across a wide range of regions, including in South Africa (e.g., Robertshaw et al. 2010), South Asia (e.g., Abraham 2016), Southeast Asia (e.g., Carter 2016; Lankton and Dussubieux 2013), North America (e.g., Hancock 2013), and Europe (e.g., Neri et al. 2018), which have resulted in more robust temporally sensitive bead sequences.

Future Directions

Because of the focus on "chasing the Pleistocene," contact archaeology and post-contact archaeology have been less emphasized in Australia. This has resulted in a lack of advancement in methodologies and theories about glass beads from Indigenous site contexts. While historical archaeologists have adopted bead classification systems, based on Kidd and Kidd (1970), the chemical characterization of glass beads found in Australia has only recently been applied, although not on archaeological assemblages but on chokers and necklaces housed at Museums Victoria (Allen et al. 2018). Further employment of these combined analytical approaches will result in a temporally and spatially sensitive bead sequence for Australia that has much benefitted international research. As outlined previously the refinement of field techniques will also result in a greater capture of glass beads in sieve residues, which will have significant implications in understanding their continent-wide distribution.

Furthermore, if sampling strategies are modified accordingly, an increased understanding of intra-site bead use might result.

Other identified issues – especially in understanding both the introduction and function of glass beads within customary contexts – will benefit mostly from engagement with other disciplines and Indigenous communities. For example, recent research developed by anthropologist and bead worker Gretchen Stolte has significantly explored the construction of beaded material culture found in collecting institutions (see Anthropology section of Litster et al. 2018 by Stolte), which when combined with oral histories, archaeological data, and community engagement will provide us with greater insight into the social context of these objects.

Cross-References

- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Postcolonial Archaeologies
- ▶ Trade Beads in Historical Archaeology

References

Abraham, S.A. 2016. Glass beads and glass production in early South India: Contextualizing indo-Pacific bead manufacture. *Archaeological Research in Asia* 6: 4–15.

Allen, F.J. 1969. *Archaeology and the history of Port Essington.* Ph.D. thesis. Department of Prehistory, Research School of Pacific Studies, Australian National University, Canberra.

Allen, L., S. Babister, E. Bonshek, and R. Goodall. 2018. Finding the signatures of glass beads: A preliminary investigation of indigenous artefacts from Australia and Papua New Guinea. *Journal of the Anthropological Society of South Australia* 42: 48–80.

Altman, J. 2005. Development options on aboriginal land: Sustainable indigenous hybrid economies in the twenty-first century. In *The power of knowledge, the resonance of tradition*, ed. L. Taylor, G.K. Ward, G. Henderson, R. Davis, and L.A. Wallis, 34–48. Canberra: Aboriginal Studies Press.

Beck, H.C. 1928. Classification and nomenclature of beads and pendants. *Archaeologia* 77: 1–76.

Birmingham, J. 1976. The archaeological contribution to nineteenth-century history: Some Australian case studies. *World Archaeology* 7 (3): 306–317.

Brockwell, S., T. Gara, S. Colley, and S. Cane. 1989. The history and archaeology of Ooldea soak and mission. *Australian Archaeology* 28: 55–77.

Byrne, D. 1996. Deep nation: Australia's acquisition of an indigenous past. *Aboriginal History* 20: 82–107.

Carter, A.K. 2016. The production and exchange of glass and stone beads in Southeast Asia from 500 BCE to the early second millennium CE: An assessment of the work of Peter Francis in light of recent research. *Archaeological Research in Asia* 6: 16–29.

Clarkson, C., Z. Jacobs, B. Marwick, R. Fullagar, L. Wallis, M. Smith, R.G. Roberts, E. Hayes, K. Lowe, X. Carah, S. Florin, J. McNeil, D. Cox, L. Arnold, Q. Hua, J. Huntley, H. Brand, T. Manne, A. Fairbairn, J. Schulmeister, L. Lyle, M. Salinas, M. Page, K. Connell, G. Park, K. Norman, T. Murphy, and C. Pardoe. 2017. Human occupation of northern Australia by 65,000 years ago. *Nature* 547: 306–310.

Clark, P., and J. Hope. 1985. Aboriginal burials and shell middens at Snaggy bend and other sites on the Central Murray River. *Australian Archaeology* 20: 68–89.

Clarke, A.F. 1994. *Winds of change: An archaeology of contact in the Groote Eylandt archipelago, Northern Australia*. Ph.D. thesis, Department of Archaeology and Natural History, the Australian National University, Canberra.

Evans, N. 1992. Macassan loanwords in top end languages. *Australian Journal of Linguistics* 12 (1): 45–91.

Forrest, P. 1995. *The Tiwi meet the Dutch: The first European contacts. An outline of the history of Tiwi contact with European navigators, with special reference to the Tiwi Encounter with Dutch seafarers in 1705.* Unpublished report prepared for the Tiwi Land Council.

Hancock, R.G.V. 2013. European glass trade beads in Northeastern North America. In *Modern methods for analysing archaeological and historical glass*, ed. K. Janssens, 1st ed., 459–471. Hoboken: Wiley.

Harrison, R. 2005. Contact archaeology and native title. *Australian Aboriginal Studies* 1: 16–29.

James, D., B. David, J.-J. Delannoy, R. Gunn, A. Hunt, I. Moffat, N. Iacono, S.P. Stephens, and M. Katherine. 2017. Archaeology of rock art at Dalakngalarr 1, Central-Western Arnhem Land. In *The archaeology of rock art in Western Arnhem Land (Terra Australis)*, ed. B. David, P. Tacon, J.-J. Delannoy, and J.-M. Geneste, 329–369. Canberra: ANU E-Press.

Karklins, K. 2012. Guide to the description and classification of glass beads found in the Americas. *Beads* 24: 62–90.

Katsuhiko, O., and S. Gupta. 2000. The Far East, Southeast and South Asia: Indo-Pacific beads from Yayoi Tombs as indicators of early maritime exchange. *South Asian Studies* 16: 73–88.

Kidd, K., and M. Kidd. 1970. A classification system for glass beads for the use of field archaeologists. *Canadian Historic Sites: Occasional Papers in Archaeology and History* 1: 45–89.

Lankton, J., and L. Dussubieux. 2013. Early glass in Southeast Asia. In *Modern methods for analyzing archaeological and historic glass*, ed. K. Janssens, 415–457. West Sussex: Wiley.

Litster, M., D. Wesley, and G. Stolte. 2018. Developing approaches for understanding indigenous Australia glass bead use during the contact period. In *The archaeology of portable art: Southeast Asian, Pacific and Australian perspectives*, ed. M. Langley, M. Litster, D. Wright, and S.K. May, 299–318. Oxon: Routledge.

Macknight, C. 1969. *The Macassans: A study of the early Trepang industry along the Northern Territory coast.* Unpublished Ph.D. Thesis, Department of Prehistory, the Australian National University, Canberra.

McBryde, I. 2000. Barter . . . immediately commenced to the satisfaction of both parties': Cross-cultural exchange at Port Jackson, 1788-1828. In *The archaeology of difference: Negotiating cross-cultural engagements in Oceania*, ed. R. Torrence and A. Clarke, 245–284. London: Routledge.

Megaw, V. 1969. Aboriginal archaeology of the Sutherland Shire. In *Geography and geology: Aboriginal archaeology*, ed. D.F. Branagan, 9–12. Cronulla: Southerland Shire Council.

Mitchell, S. 1994. *Culture contact and indigenous economies on the Coburg Peninsula, Northwestern Arnhem Land*. Unpublished Ph.D. thesis, Department of Anthropology, Northern Territory University, Darwin.

Murray, T. 1993. The childhood of William Lanne: Contact archaeology and aboriginality in Tasmania. *Antiquity* 67: 504–519.

Neri, E., B. Gratuze, and N. Schibille. 2018. The trade in glass beads in early medieval Illyricum: and Islamic monopoly. *Journal of Archaeological and Anthropological Sciences* 11 (3): 1107–1122.

Plomley, A., and J. Piard-Bernier. 1993. *The general: The visits of the expedition led by Bruny D'Entrecasteaux to Tasmanian waters in 1792–1793*. Launceston: Queen Victoria Museum.

Robertshaw, P., M. Wood, E. Melchiorre, R. Popelka-Filcoff, and M.D. Glascock. 2010. Southern African glass beads: Chemistry, glass sources and patterns of trade. *Journal of Archaeological Science* 37: 1898–1912.

Sciama, L. 2001. *Beads and bead makers: Gender, material culture and meaning*. Oxford: Berg.

Schrire, C. 1982. *The Alligator Rivers: Prehistory and ecology in Western Arnhem Land*. Canberra: Australian National University Press.

Wesley, D., and M. Litster. 2015a. 'Small, individually nondescript and easily overlooked': Contact beads from Northwest Arnhem Land in an indigenous-Macassan-European hybrid economy. *Australian Archaeology* 80 (1): 17.

Wesley, D., and M. Litster. 2015b. Unravelling the history of glass beads in Arnhem Land, Australia. In *Journal of the Borneo international beads conference*, ed. H. Munan, 191–233. Kuching: Crafthub.

Further Reading

Allen, L., S. Babister, E. Bonshek, and R. Goodall. 2018. Finding the signatures of glass beads: A preliminary investigation of indigenous artefacts from Australia and Papua New Guinea. *Journal of the Anthropological Society of South Australia* 42: 48–80.

Litster, M., D. Wesley, and G. Stolte. 2018. Developing approaches for understanding indigenous Australia glass bead use during the contact period. In *The archaeology of portable art: Southeast Asian, Pacific and Australian perspectives*, ed. M. Langley, M. Litster, D. Wright, and S.K. May, 299–318. Oxon: Routledge.

Wesley, D., and M. Litster. 2015a. 'Small, individually nondescript and easily overlooked': Contact beads from Northwest Arnhem Land in an indigenous-Macassan-European hybrid economy. *Australian Archaeology* 80 (1): 17.

Wesley, D., and M. Litster. 2015b. Unravelling the history of glass beads in Arnhem Land, Australia. In *Journal of the Borneo international beads conference*, ed. H. Munan, 191–233. Kuching: Crafthub.

G

Glass: Conservation and Preservation

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Introduction

Glass artifacts that are successfully recovered and preserved have the potential to contribute to the archaeological record in many ways. However, conservation and preservation of archaeological glass can be challenging. Some glasses are inherently less stable than others, and some burial environments more deleterious. Surface weathering on archaeological glass is common, and it is rare for glass to survive burial unbroken.

A successful preservation plan for glass incorporates both active and preventive conservation and begins before excavation. Because glass is fragile, careful handling, both at the time of excavation and subsequently, is important for its preservation. Once a glass artifact has been excavated, the level of deterioration, physical damage, and the stability of the glass itself must be evaluated, and steps to improve the artifact's condition should be taken if necessary. Wet or damp glass that may have absorbed soluble salts must be treated to remove the salts and slowly dried. Reconstruction and/or consolidation are sometimes necessary for the study, interpretation, publication, and preservation of archaeological glass, but conservation treatment should be as minimal as possible. Conservation treatment can have unintended long-term consequences, even when the most current recommendations are followed, and should only be undertaken by a conservator experienced in the treatment of archaeological glass. Finally, good storage conditions are required to ensure long-term preservation of glass and are best planned before excavation begins.

Definition

Conservation and preservation for archaeological glass may refer to both active and preventive conservation measures. The goal of active conservation treatment is to stop or slow the rate of deterioration in glass. Cleaning, reconstruction, and restoration, also considered active conservation, may also be involved if these steps are desired for interpretation or exhibition of glass objects. Preventive conservation refers to measures which do not intervene chemically or physically to alter the condition of an artifact, but which act to promote long-term preservation. Careful handling and climate-controlled storage at low relative humidity, for example, are two preventive conservation measures for glass. Preventive conservation is often the most cost-effective means of ensuring long-term preservation for archaeological objects.

Key Issues/Current Debates/Future Directions/Examples

Basic knowledge of the properties of glass is necessary to understand how it deteriorates in archaeological contexts and to plan adequately for its conservation. An in-depth explanation of the chemical composition and physical structure of glass is outside the scope of this entry, but these topics are covered in detail in monographs on glass conservation as well as in many other sources (Davison 2003; Koob 2006). In short, glass is composed of silica, an alkali like soda or potash, and a stabilizer like lime. In wet or damp burial environments, water leaches the alkali from the surface of the glass, leaving behind an unstable layer of silica. This layer will reflect and transmit light differently from the original glass. Depending on the level of deterioration, the glass surface may appear iridescent or opalescent but still relatively intact, or it may appear as if it has a thick, flaky weathering crust, a result of accumulated layers of thin, unstable silica.

Other factors which affect the preservation of archaeological glass are the pH and temperature of the burial environment. The preservation of archaeological glass is dependent not only on the burial conditions – dry environments promote preservation while damp environments accelerate deterioration – but also on the composition of the glass. Glasses made with an organic alkali like potash are inherently less stable. Preservation of archaeological glass not only varies widely from site to site but can also vary across a site, and even on the same vessel.

Deteriorated archaeological glass can be very fragile, and even well-preserved glass is easily subject to breakage. Careful handling is important at the time of excavation to ensure successful recovery. Like other fragile materials, deteriorated glass artifacts can be block-lifted and micro-excavated. Block lifting can assist not only with preserving fragile glass but also with the retention and orientation of the fragments and, therefore, the subsequent reconstruction of complex broken vessels. As with most archaeological materials, rapid changes in the ambient environment should be avoided. Wet glass should be dried slowly, for

example. For the same reason, damp glass should not be tightly sealed in plastic bags or condensation may accumulate on the surface.

The recovery and conservation of glass from very wet or underwater environments, whether marine or freshwater, can be especially challenging. Glass from such environments can be severely compromised structurally, with a consistency like gelatin, and may be permeated with soluble salts. In these cases, a conservator with experience in the treatment of glass from wet environments should be consulted. A few books and multiple articles provide information on conservation of glass from such environments and can be consulted for further information (Pearson 1987; Singley 1988; Hamilton 1996; Anastassiades and Ellis 2008; Mardikian and Girard 2010).

The condition of glass artifacts should be thoroughly documented after excavation, both in writing and with photography. Professional conservators should be familiar with this type of documentation, and archaeologists should expect the conservator to provide a written report summarizing the condition of the artifact(s) and any conservation treatment undertaken. Books on glass conservation can provide more information for those unfamiliar with documenting and describing the condition of archaeological glass (Davison 2003; Koob 2006).

Conservation treatment of deteriorated archaeological glass can be complex. In general, it is a good idea to remove soil and other surface accretions which might attract and hold moisture against the surface. Glass that is not weathered can be gently brushed or even rinsed with water. But if, as is the case with most archaeological glass, the surface is fragile, cleaning can be a dangerous operation and is best left to an experienced conservator. The outer, fragile, weathered layers of deteriorated glass should never be removed during cleaning; they represent the original surface of the glass. Surface details and decoration may be lost if these layers are removed, and the glass revealed beneath them is likely to be dull, pitted, and unattractive.

If the weathered surface of an archaeological glass object is flaky, consolidation of the outer layers of glass may be necessary. The decision to consolidate should not be undertaken lightly; consolidation of archaeological glass is rarely reversible, and the materials used can have long-term effects on the stability and appearance of the object. If the artifact can be stored safely and extensive handling is not required, consolidation of the surface should be avoided. Consolidation should only be carried out by an experienced conservator. Conservation science is a field which advances rapidly, and the most recent literature should be consulted before a consolidant and application method are chosen.

Often, reconstruction is required before fragmentary glass artifacts can be studied, photographed, or drawn for publication. Epoxy resins have been used extensively as adhesives for glass, but they are not recommended for archaeological glass; the epoxies commonly used in glass conservation are too strong for archaeological glass. Their use can create joins which are stronger than the surrounding glass, producing unintentional but problematic strains in joined artifacts (Koob 2006: 48). Softer solvent-based acrylic resins are a better choice, and the use of such resins has been documented and discussed extensively in conservation literature (Koob 1986, 2000, 2006; Horie 2000). The same considerations are important when creating infills for missing areas on archaeological glass vessels. Commonly cited drawbacks to using acrylic resins as adhesives and fill materials are that they must be prepared for use and that they create visible joins in glass objects. There is some truth to both observations, but most archaeological conservators find that acrylic resins are straightforward to prepare and apply, even in field conditions. Invisible joins, desirable in some museum settings, are rarely a concern for deteriorated archaeological glass. A desire to match the refractive index of the glass and a desire to produce joins without small bubbles from solvent evaporation are two reasons that museum conservators might choose an epoxy adhesive over an acrylic resin for joining or infilling non-archaeological glass. However, epoxies do not provide a good refractive index match for most archaeological glass. The small bubbles which result from solvent evaporation in acrylic resin

adhesives, if visible at all, are a small price to pay for an adhesive that will not cause further damage to the glass (Koob 2006: 48–50).

The previous paragraphs have discussed recovery and active conservation treatment for archaeological glass, but preventive conservation following excavation is the most important long-term preservation factor for glass artifacts. A good ambient storage environment is crucial because unstable glass that is exposed to high relative humidity can deteriorate quickly. In general, lower relative humidity is best for storage of glass. Storage at 45% relative humidity, +/− 5%, is recommended for stable glass, and 40% is suggested for unstable glass (Koob 2006: 141). Archaeological glass in storage should be checked regularly for signs of deterioration, which might appear as clouding of the surface, flaking or cracking, or moisture on the surface of the glass.

Glass, although durable, is also easily broken and chipped. It should always be handled and packed carefully. Glass that has adhesive joins and/or fills should be handled with special care, especially if the adhesive is old. Use common sense when packing glass for storage. Glass objects should be well supported, should not be stacked on top of one another, and should not move when drawers or cabinets are opened. Very fragile objects may require individual boxes or rigid containers, but air should be able to circulate around objects and they should not be tightly sealed inside containers, as this can create a microclimate which may accelerate deterioration of unstable glass. Acid-free storage materials are best (i.e., not wood or acidic papers like newsprint). A good, soft packing material is unbuffered acid-free tissue paper. Place the heaviest part of any object towards the bottom of the container and provide adequate padding. Inert foam, like Ethafoam, can be used when sturdier support is required.

When packing glass for transport, follow the same general principles. Air circulation is less important for temporary situations like transportation. For transport, glass can be completely wrapped in acid-free tissue and even surrounded by bubble wrap. The bottom and sides of the container should be well padded with several inches of foam, and all space between objects should be padded with a material that will not shift when the container is moved. Styrofoam pellets or other types of packing peanuts are not recommended because they may shift during transport and thus fail to provide adequate support (Koob 2006: 141–150).

In conclusion, the conservation and care of archaeological glass is not always straightforward. Glass is subject to damage and deterioration from many sources, and each artifact, collection, and site will present unique challenges. Collaborative planning that involves both archaeologists and conservators will yield the best results when designing conservation treatment and long-term preservation plans for archaeological glass.

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Ceramics: Conservation and Preservation
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Documentation of Treatment and Intervention in Archaeological Conservation and Preservation
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Field Stabilization of Movable Heritage
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Mosaics: Conservation and Preservation
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

Anastassiades, A., and L. Ellis. 2008. The conservation of glass ingots from the Bronze Age Uluburun shipwreck. *Studies in Conservation* 53: 225–237.

Davison, S. 2003. *Conservation and restoration of glass*. 2nd ed. Oxford/Boston: Butterworth-Heinemann.

Hamilton, D.L. 1996. *Basic methods of conserving underwater archaeological material culture*. Washington, DC: U.S. Department of Defense Legacy Resource Management Program.

Horie, C.V. 2000. *Materials for conservation: Organic consolidants, adhesives, and coatings*. London: Butterworth-Heinemann.

Koob, S.P. 1986. The use of Paraloid B-72 as an adhesive: Its application for archaeological ceramics and other materials. *Studies in Conservation* 31 (1): 7–14.
Koob, S.P. 2000. New techniques for the repair and restoration of ancient glass. In *Tradition and innovation: Advances in conservation*, ed. A. Roy and P. Smith, 92–95. London: The international Institute for Conservation of Historic and Artistic Works.
Koob, S.P. 2006. *Conservation and care of glass objects*. London: Archetype.
Mardikian, P., and P. Girard. 2010. 18 tons of Roman glass under the sea: A complex conservation puzzle. In *Glass & ceramics conservation 2010, proceedings of the Interim Meeting of the ICOM-CC Glass & Ceramics Working Group, October 3-6, 2010, Corning, NY, U.S.A*, ed. H. Roemich, 110–118. Corning: The Corning Museum of Glass.
Pearson, C. 1987. *Conservation of marine archaeological objects*. London: Butterworth-Heinemann.
Singley, K. 1988. *The conservation of archaeological artifacts from freshwater environments*. South Haven: Lake Michigan Maritime Museum.

Further Reading

Cronyn, J.M. 1990. *The elements of archaeological conservation*. London: Routledge.
Pye, E. 2001. *Caring for the past: Issues in conservation for archaeology and museums*. London: James and James.
Sease, C. 1987. *A conservation manual for the field archaeologist*. Los Angeles: Institute of Archaeology, University of California.
Watkinson, D., and V. Neal. 1998. *First aid for finds*. London: RESCUE – The British Archaeological Trust and the United Kingdom Institute for Conservation Archaeology Section.

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Basic Biographical Information

Internationally known folklore scholar Henry H. Glassie III, born March 24, 1941, received his B.A. in English and Anthropology from Tulane University (1964), an M.A. in Folk Culture from the Cooperstown Graduate Program of the State University of New York at Oneonta (1965), and a doctorate in Folklore from the University of Pennsylvania (1969). During the period of his doctoral work, he was the State Folklorist of Pennsylvania and Director of the Ethnic Culture Survey (1967–1969) for the Pennsylvania Historical and Museum Commission. He taught at Indiana University's Folklore Institute (1970–1976) before returning to Penn as Chairman of the Department of Folklore and Folklife (1976–1988) and coming back to Indiana as College Professor of Folklore (1988–2009). Glassie also served as Codirector of Turkish Studies and held adjunct appointments in Central Eurasian Studies, Near Eastern Languages and Cultures, and American Studies, and is now Emeritus Professor, Department of Folklore and Ethnomusicology and Emeritus Adjunct Professor, Department of Near Eastern Languages and Cultures. He also helped establish three museums in the United States and Ireland, including Conner Prairie, an outdoor living history museum in Fishers, Indiana. He is married to Pravina Shukla, a folklorist who specializes in clothing and adornment; they have four sons and four grandchildren.

Major Accomplishments

Glassie was a John Guggenheim Memorial Foundation Fellow (1972) and an Invited Fellow at the National Humanities Institute (1975–1976). In addition, he was a Fellow of the American Folklore Society (1976) and served as its president (1988–1990); he was also president of the Vernacular Architecture Forum (1983–1985) and Senior Research Associate at the Museum of International Folk Art (1986–1993 and 1993–2000). During the 1990s, Glassie was honored as a Folklore Fellow of the Finnish Academy and received an Award for Superior Service by the Turkish Ministry of Culture and the Award for Outstanding Achievement in the Arts by the Assembly of Turkish American Associations, as well as a Certificate of Honour from the Ministry of Cultural Affairs of Bangladesh. In 2003, the Vernacular Architecture Forum honored him by naming its outstanding achievement accolade the Henry

Charles C. Kolb has retired.

Glassie Award. With expertise in folk art, folklife, vernacular architecture, and material culture, Glassie has written 24 books and 102 articles on folklore and material culture from Ireland, Turkey, Bangladesh, and the United States (especially rural Virginia) (1999a, b, 2000a). Most books are illustrated with Glassie's own photographs and drawings; he also designed many of the Indiana University Press's volumes. His initial research resulted in major books on vernacular architecture (1969, 1975), followed by five books about Irish culture. In 1982 he began studies on the living arts of modern Turkey which resulted in a major traveling exhibition and book (1993), with additional research in South Asia (1997, 2000b), and a biography of a Nigerian artist (2010). Recognized as a master teacher at Indiana, he has received the Teaching Excellence Award from Indiana University. In 2000 he was named by President Clinton to serve on the National Council on the Humanities. Three books have been named by *The New York Times* as "Notable Books of the Year"; *Vernacular Architecture* (2000a) was the winner of the 2001 Cummings Award for the best book on North American architecture. Glassie is presently working on a monograph on Japanese figurative ceramics.

Cross-References

- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Ethnoarchaeology: Learning from Potters in Gilund
- ▶ Islamic Archaeology and Art History

References

Glassie, H.H. 1969. *Pattern in the material folk culture of the eastern United States*. Philadelphia: University of Pennsylvania Press.

Glassie, H.H. 1975. *Folk housing in middle Virginia: A structural analysis of historic artifacts*. Knoxville: University of Tennessee Press.

Glassie, H.H. 1993. *Turkish traditional art today*. Bloomington: Indiana University Press.

Glassie, H.H. 1997. *Art and life in Bangladesh*. Bloomington: Indiana University Press.

Glassie, H.H. 1999a. *Material culture*. Bloomington: Indiana University Press.

Glassie, H.H. 1999b. *The potters art*. Bloomington: Indiana University Press.

Glassie, H.H. 2000a. *Vernacular architecture*. Bloomington: Indiana University Press.

Glassie, H.H. 2000b. *Contemporary traditional art of Bangladesh*. Dhaka: Bangladesh National Museum.

Glassie, H.H. 2010. *Prince Twins Seven-Seven: His art, his life in Nigeria, his exile in America*. Bloomington: Indiana University Press.

Further Reading

Curriculum vitae: http://www.indiana.edu/~nelc/people/documents/cv_glassie.pdf.

Glassie, H.H. 1982a. *Passing the time in Ballymenone: Culture and history of an Ulster community*. Philadelphia: University of Pennsylvania Press.

Glassie, H.H. 1982b. *Irish folk history: Texts from the north*. Philadelphia: University of Pennsylvania Press; reprinted 1908.

Glassie, H.H. 1985. *Irish folktales*. New York: Pantheon.

Glassie, H.H. 1989. *The spirit of folk art: The Girard collection at the Museum of International Folk Art*. New York: Abrams.

Glassie, H.H. 2006. *The stars of Ballymenone*. Bloomington: Indiana University Press.

Glassie, H.H., and F. Mahmud, eds. 2007. *Living traditions*. Dhaka: Asiatic Society of Bangladesh.

Glassie, H.H., and T. Takahara. In press. *Lions of clay: The tradition of figurative ceramics in contemporary Japan*. Bloomington: Indiana University Press.

Life history: Henry Glassie 2007. Archives Online at Indiana University. http://webapp1.dlib.indiana.edu/findingaids/view?docId=ohrc116&chunk.id=d1e195.

Murphy, C.R., H. Glassie, D.D. Peach, and O.B. Reed. 2015. *Ola Belle Reed and southern mountain music on the Mason-Dixon Line*. Atlanta: Dust-to-Digital.

Global Archaeology

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Introduction

The history of science cannot be dissociated from its multiple contexts (Patterson 2001), whether they be in the physical or the spiritual domain. To

tackle the topic of the rise of global archaeology, we choose to reflect on three great ruptures in the experiential context of the history of western humanity and consequently of the human sciences.

The first of these is linked to the very concept of culture. If before the end of World War it were possible to imagine a homogenous culture, pure or superior, after the experiences of the totalitarian states (Arendt 2004: 3–15), the danger of thinking about culture in the singular became evident. The effect of the tragedies caused by Nazi-fascism, added to the later experiences of the different civil rights movements, was to introduce pluralist aspects into culture, including the humanistic and therefore the global. In this new context, the Declaration of Human Rights, among other things, gathered strength and was adopted by the United Nations Organization on December 10, 1948. Apart from the many criticisms that can be made, this Declaration did consolidate the idea of the universality of basic human rights.

The second rupture, closely related to the former, is centered on the human conception of the environment in which we live. The premise arose that all our actions have global consequences, based on experiences with nuclear weapons and the uncontrolled use of agro-toxins, both of which saw the rise of epidemics and disease. With the ecological movement was born the premise that it is imperative to think globally and act locally.

Finally, the third rupture was linked to the end of the Cold War and the fall of the Berlin Wall. By the mid-1980s, capitalism was accepted as the choice for life; it seemed to have been victorious, and in turn it became plausible to consider a history of mankind from the ideological bias of capitalism.

Clearly one could have chosen other ruptures to contextualize the birth of global archaeology, but we consider that these three lines will help us to understand the globalization process and the expansion of thinking about humanity. The influence of this thinking about human beings in a global context can be seen in various fields of knowledge, one of which is archaeology. It is quite common to find in the discussion agendas of this discipline, such as in the World Archaeological Congress (WAC), proposed topics related to the "re-humanization" of archaeology and global archaeology. Our aim is to understand some of the ideas that support these proposals.

Definition

Archaeology as a discipline started in the nineteenth century in the wake of the main thrusts of globalization, such as the spreading of capitalism worldwide and the imperial moves by colonial powers. The main intellectual ambitions of the discipline were also global, such as understanding the spread of material culture over large areas and later in the century the evolution of human ancestors (Boast 2009). In the twentieth century, this trend grew even larger, as witnesses the ambitious project of a global archaeological understanding of the whole human past as proposed by Vere Gordon Childe (1951). However, archaeology as a global interpretive move was very much centered on a core of western scholars and institutions, so that even the most daring global perspectives, such as Childe's, took a patronizing approach, leaving peoples and civilizations of the past as predecessors to the enlightened western world. So, culture history (Webster 2008: 34) and a global discipline did not escape the traps of being part of the array of western domination of the world.

The situation changed dramatically though in the later part of the twentieth century due to several reasons, not least the emergence of a plethora of social agents: women established themselves in the workplace and public sphere; former colonized peoples fought for their liberation; ethnic, religious, and other minorities struggled to have their rights recognized; and sexual liberation also led to new social mores in both western and non-western countries. Archaeology would not remain for a long time isolated from all those social changes, for, as David Clarke proposed as early as 1973, it lost the innocence (Clarke 1973). The Paradise Lost – echoing both Genesis, chapter 3, and Milton's opus magnum – was this land of joy but no awareness about the limits of knowledge itself. Processualism was a first response (Watson 2008: 2), soon to be criticized from several quarters (Johnson 2009). The emergence of social actors – women, blacks, and former colonized

peoples and beyond – led to a challenge to the old global approach and fostered a new, less imbalanced global archaeology. The World Archaeological Congress (Ucko 1987: 10), established in 1986, has proven a turning point in this new direction, for two different but related reasons (Funari 2006).

In epistemological terms, diversity, pluralism, and conflict in interpretation were increasingly recognized as key concepts to interpret the archaeological record, considering how important those same tenets are for contemporary life. This is directly related to a global approach to knowledge, considering that different people, in different historical and cultural contexts, offer a diverse array of understandings of the world and of material culture, as a consequence. The African origin of all human beings is seen probably from diverse perspectives in Africa and in other continents, and the role of chinaware is perceived also probably differently in China and in other parts of the world, to mention just two subjects clearly related to global issues. Archaeology shifted from a potentially limited, western narrative of the past to a chaotic, but pluralist, study of past material culture, from a variety of conflicting standpoints. This is indeed a huge epistemological shift from a normative, uniform, and totalizing narrative to a diversity of different interpretations. As Nick Shepherd (2005: 26–30) put it, this was a move from one world archaeology to one world and many archaeologies.

In social terms, all those concepts were related to the inclusion of a variety of social actors in the scholarly field of archaeology, in a global scale. Archaeologists from non-western countries were often sidelined or ignored and considered as part of the uncivilized scholarly world. This changed gradually and WAC was a major turning point. The new scholarly association for the first time ever was run by a worldwide body of scholars and included also native representatives, traditionally subjects, not actors in the scholarly world. Western scholars were for the first time in a minority and global gained a new meaning, really implying the participation of archaeologists from all over the world. Then, breaking with hierarchical tenets, WAC put together senior scholars and young students, and also natives and other social actors, so that a major hierarchical principle of western scholarship was put down (Smith 2005: 20). This is also a new global approach, taking global to mean comprehensive. So that epistemology and social aspects are interwoven in inextricable ways.

A global approach has also been related to capitalism, as pointed out by Michael Shanks (2008: 142): "Some have discerned a latest cultural phase, belonging with postmodernity and termed globalism. It refers to the expansion, especially after the fall of the eastern bloc in 1989 and after, and with the opening up of communist China to market forces, of the capitalist market across the globe." It is indeed impossible to set apart capitalism and globalization, so much so that historical archaeologist Charles E. Orser (1996) equated modernity, globalization, and capitalism and established the starting point as early as 1415. It is also clear that globalization did not end local specificities and, to the contrary, contributed to a plethora of global and local interactions, encouraging local identities and standpoints, as stressed by Wallace (2008: 12–18):

> The internet's ties to globalism are clear-cut. Yet the goals of the Internet highway's profiteers to "promote a world culture" (Bill Gates) conversely contribute to the desire by many people do find their own personal or group's identity within this global world. In fact, globalization is just a continuing process, which started much earlier and archaeology is particularly apt to deal with the subject (Kristiansen 2009: 36). Global archaeology in this sense is a catch word for archaeology in contemporary context, and it is no longer possible to think specificities without references to overall processes (and vice-versa).

Key Issues/Current Debates

Towards Global Thinking: Transformations of the Concept of Culture

Through the twentieth century, it is easy to find historical events that serve as models for understanding the conceptualization of past, present, and future (La Capra 2001). Undoubtedly, among these examples, we can highlight the

experiences of two world wars and their accompanying genocides, the civil rights movements, and feminism, which have all generated a new reflection on culture, memory and politics, and other topics related to constructing a present that is more democratic and diverse.

Specifically in the case of culture studies, which appear in the Humanitarian Sciences of Archaeology, Anthropology, and History, among others, the aforementioned events had a wide impact in the 1950s. According to the cultural theorist Stuart Hall (1980), three publications were fundamental to the interior revolution of this investigative field: firstly, *The Uses of Literacy: Aspects of Working Class Life*, published in 1957 by British author Richard Hoggart; secondly, *Culture and Society*, published in 1958 by the Welshman Raymond Williams; and finally, *The Making of the English Working Class*, published in 1963, by E. P. Thompson.

Despite marked epistemological differences between the works of Hoggart,Williams,and Thompson,which nonetheless came from each of them reading Karl Marx, the three intellectuals brought drastic changes to the way "culture" was treated. According to Hall, the change was linked to new ways of conceiving society, given that until this time "culture" had been viewed as the "anniversary calendar" of social display, that is to say, as demonstrations barely to be considered a product of economic status; after the publication of these three works, culture came to be viewed as the pillar of society. So culture became the primary concern of the humanities and was no longer seen as superfluous to economic and political topics.

According to Hall, these intellectuals tried to draw their readers' attention to the idea that the concept of culture includes matters directly related to the so-called great historical changes (Hall 2009: 127). However, it was Raymond Williams from among the cited authors who chose to open dialogue with archaeology, thus moving towards building a global perspective.

From among Williams' many definitions of culture, two caught the attention of Stuart Hall. The first related culture to the sum of possible descriptions by which societies bestow meaning on the world and reflect on their common experiences (Hall 2009: 126). Thus intellectual history was not only concerned with those few western traditions classified as "worthy of record," such as the great artists of the Renaissance, the great monuments and construction works of Antiquity, or the writers of holy illuminated texts. On the contrary, it dealt with the idea of a democratized "culture" that encompasses any human being's descriptions of the world.

While this first definition developed the concept of culture as an idea, the second definition would take in the anthropological universe. On this occasion, Williams emphasized culture as related to social practices and characterized culture as a global way of life (Hall 2009: 126). According to Hall, by integrating diverse lifestyles, this definition became one of the central axes of humanities.

From this viewpoint, the theory of culture became defined as the study of the relationships between typical elements of a global lifestyle. So culture would be neither a practice nor the descriptive sum of a society's popular customs. On the contrary, it would overflow the confines of social practices to become the sum of the interrelations that exist between them.

The writings of Raymond Williams were of added importance to the birth of new fields of action in the archaeological field. In the British case in particular, according to archaeologist Paul Courtney (2007: 38), landscape studies and the later foundations of industrial archaeology were profoundly influenced by Williams' text, *Culture and Society*. In understanding the relationships between human groups, having the starting point as an analysis of the cultural material was one contribution that would have made archaeology a new point of reference.

This new field, built from discussions of Hoggart, Williams, and Thompson, would be institutionalized in the 1970s as the "Linguistic Turn" Movement. The Linguistic Turn, whose roots lie, in part, within anthropology, immediately influenced the definition of culture as well as its supposed global character.

In 1973, the US anthropologist Clifford Geertz published *The Interpretation of Cultures: Selected*

Essays. Profoundly disturbed by the so-called conceptual bog around culture – which, according to the author, ended up creating an indefinition of the term – Geertz applied himself to building his own redefinition of culture and of all the areas involved in cultural studies. For Geertz, culture would always be something essentially semiotic. In his own words: "Believing, with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be not an experimental science in search of law but an interpretative one in search of meaning" (Geertz 1973: 5). From this point of view, all science dedicated to cultural analysis would be, therefore, interpretive science.

Supported by his interpretation of the "thick description" of English philosopher Gilbert Ryle, Geertz championed the practice of ethnography as a field that deciphers codes, and chooses and reads semantic structures, attributing to them specific meanings. This means that cultural interpretation would become an incomplete and subjective operation, since it is characterized by the understanding of human behavior as a symbolic action. For the readers – and followers – of Geertz's proposals, his description of the actions, possibilities, and limitations of ethnography act as a window through which human sciences can be understood as a whole, across the fields of anthropology and archaeology and including historiography.

Beyond this concept of culture, which is related to the beginning of contextual archaeology (Hodder 1982), we are also interested in understanding the limits Geertz imposes on the work of cultural reading. According to the anthropologist, there are three characteristics of ethnographic description: it would always be interpretative, it would interpret the flow of social discourse, and it would aim to save the "said" through speech in forms that are able to be investigated. Finally, he adds one more: the reading is microscopic. This is where we meet the problem of thinking on a global scale.

According to this theoretical model, culture is understood contextually; in this way, it can only be read on a singular and small scale: the local dimension. For Geertz, the only global element of the semiotic model for the interpretation of culture is that which allows us access to the conceptual world with which our subjects overlap, in such a way that, with this wider scope of meaning, we would be able to communicate (1973: 35). In this way, the global nature of thought would respond better to our desire to establish general rules of human behavior than would the possibility of understanding its local specificities. Not because the global should be left aside; on the other hand, for this author, whatever generalization we manage to establish should come from the finesse of its particularities and not from the scale of its abstractions. Thus, the local scale is shaped as a crucial piece of any attempt to think in global terms.

Geertz's proposals, which were explored and amplified through the studies of anthropologists from the School of Chicago in the 1970s, had a significant impact on anthropology and archaeology, upsetting the existing trend among behaviorists, linguistic formalists, and the like. The proposal of the symbolic interpretation of cultures on a local scale, cultures which nonetheless showed global interconnections, would gather strength within the humanities area.

In the particular case of archaeology, one cannot deny the contribution to the forms of analysis on a global scale of North American anthropologist James Deetz and his work *In Small Things Forgotten*: *The Archeology of Early American Life*, dated 1977. For this author, archaeology has a duty to approach anthropology with the aim of comprehending the diffusion of European culture around the world, commencing in the fifteenth century, and from this perspective understanding the impact and interactions between those cultures that were expanding and the native cultures they affected. Understanding of the so-called global transformations was modeled on an analysis of the small actions (and objects!) of daily life, many of which were related to food and housing in the North American colonies. In this way, the global scale was built up from the analysis of highly specific contexts.

For Deetz, who dialogued with anthropologists Edward Burnett Tylor, Franz Boas, Alfred L. Kroeber, Leslie White, and Claude Levi-Strauss,

the concept of culture should be the central paradigm for the conception of archaeology itself. Supported by the studies of Walter Taylor (1948: 50–64), culture was defined in this context as mental constructs that cannot be observed directly, but rather come to light in different ways, such as ritual practices, social structures, and even the physical world. Global scale thinking became part of archaeology, in the beginning from discussions of the term "culture" and consequently from debates about how each researcher perceives the world they are studying. Speculations in the theoretical area were closely tied to archaeological practice.

Global Thinking: The Ecological Movement on a Global Scale

Change to the concept of culture, as well as the consequent value given to the global scale, was intertwined with the gradual understanding of the "environmental crisis" in the second half of the 1950s (Palacio 2002: 13). Concomitant with an increased value given to a new model of life based on consumption, a practice stimulated by the world of the Cold War was the beginning of doubts about the same model. During the decade of the 1950s, pollution of European rivers, for example, the River Thames, reached alarming levels, while air contamination produced a proliferation of severe respiratory problems in the population. Even the seemingly unquestionable models of food production were put in check by the book *Silent Spring* (1962) by Rachel Carson.

In this book, the author denounces the chemical products used to improve agricultural production. From the 1950s, then, people were casting doubt on the belief that technology and science were the saviors of humanity. The perception that something had gone awry, something inherent in the development models being practiced in the West, would bring about the correction and redefinition of the concept of "environment" and in the same way expand its field of action to a global scale.

If the concept of the environment had previously been relegated to the darkest corners of scientific theory, by the 1960s, it became the banner of social movements, besides movements for the defense of civil rights and feminism. From then on, the definitions of what is "environment" have multiplied. In 1969, for example, the British researcher James E. Lovelock, with the North American biologist Lynn Margulis, launched the "Theory of Gaia," which imagines the planet Earth as an enormous living entity capable of self-regulation. The Theory of Gaia, which won sympathizers from members of mystic movements, environmentalists, and some researchers, facilitated the popularization of the concept of "environment" as composed of not only natural resources but also of human beings. Within this conception, man forms part of a planetary whole that is able to self-regulate and respond to the aggressions it suffers. The Earth, in this context, can be defined as the interaction between living and nonliving beings.

In his search for a holistic theory of environment, the geographer Yi-Fu Tuan defined "environment," in this same decade, as the set of conditions under which any person or thing lives or develops. The environment would be, therefore, the sum total of the influences that modify the development of life or character (Tuan 1974).

In a more pragmatic way, the environment could also be understood from the viewpoint of natural resources, a trend that materialized in the report *The Limits to Growth*, produced by the Club of Rome and published in 1972. In this report, the sustainability of the planet was analyzed, in terms of the demand for raw materials and natural resources, as well as eventual wastes. In this text, it was affirmed that the planet Earth could not support population growth, owing to the pressure that this would produce on the natural and energy resources and the increase in pollution, when taking into account technological advances.

From the 1960s, therefore, the definitions of "environment" have become different from the concepts of landscape. According to Brazilian researcher Tereza Emidio, the landscape became an integral part of a wider universe, denominated "environment": this landscape could be conceived then as a universe in miniature which, when articulated with other small universes, would constitute the environment (Emidio 2006: 13–4).

In this way, the global scale is converted into an imperative, above all for the biological sciences, which should come around to conceiving human actions as phenomena that cause an impact on the globe, this being conceived as a whole (Kingsland 1985).

Global Capitalism and a New Historical Archaeology

The archaeology of modernity and global capitalism has been particularly focused on a comprehensive approach, but it took a time for this universal stand to develop. Historical archaeology started in the United States as the narrow study of the Anglo-American material culture, excluding African-Americans, Natives, Latinos, Jewish, Irish, Italian, and other components of the American past. Critical understandings started in the 1970s and 1980s, mostly from a Marxist background, with groundbreaking studies by Orser, Leone, and MacGuire (Hicks and Beaudry 2006: 27–30). There has been since then a growing emphasis on global features of modernity, taking capitalism as a force organizing "a set of social relations," as put by Leone in 1999. Orser stressed that there is no global trend without local features, so that global and local are interwoven and enmeshed in profound ways.

From the late 1980s, from a global perspective, several archaeologists questioned the universal role of capitalism and proposed instead a variety of specificities in different continents, countries, and regions (Funari et al. 1999). Diversity and identities in the plural have also featured a plethora of studies, from Shanks and Tilley (1988: 5–10), and Voss (2008: 18–20), but also peripheral outlooks (Funari et al. 2005). Global archaeology did not lose its strength, but recognized the relevance of concrete situations in different historical and social contexts.

Future Directions

Archaeology has moved from a most conservative and even reactionary endeavor to become a force for change in the contemporary world. It is a no mean feat in itself. Within a few two or three generations, the discipline moved from defending the status quo, hierarchical relations, and social imbalances to contributing to challenging all those features and to promoting diversity, freedom, and the empowerment of people in general. There is future for archaeology out of a global perspective and the actual practice in concrete situations (Jones 2009: 109). Archaeologists are now largely from non-western countries, thousands of them from China, India, Japan, and other Asian countries, a large number from the Middle East, Africa, Latin America, Central Asia, and beyond. The USA, Canada, and Western Europe continue to be crucial do the discipline, but archaeologists working there are now in a minority and will increasingly be so. However, most archaeological intellectual scholarship is still from former colonial powers and this is to remain so for quite some time. A global archaeology is an archaeology accepting and including all those mixed features.

Cross-References

- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Culture in Archaeology
- ▶ Historical Archaeology

References

Arendt, H. 2004. *The origins of totalitarianism*. New York: Schocken.

Boast, R. 2009. The formative century, 1860–1960. In *The Oxford handbook of archaeology*, ed. B. Cunliffe, C. Gosden, and R. Joyce, 47–70. Oxford: Oxford University Press.

Childe, V.G. 1951. *Man makes himself*. New York: Mentor.

Clarke, D. 1973. Archaeology: The loss of innocence. *Antiquity* 47 (185): 6–18.

Courtney, P. 2007. Historians and archaeologists: An English perspective. *Historical Archaeology* 41 (2): 35–45.

Emídio, T. 2006. *Meio ambiente e paisagem*. São Paulo: Editora Senac.

Funari, P.P.A. 2006. The World Archaeological Congress from a critical and personal perspective. *Archaeologies* 2 (1): 73–79.

Funari, P.P.A., M. Hall, and S. Jones. 1999. *Historical archaeology, back from the edge*. London: Routledge.

Funari, P.P.A., A. Zarankin, and E. Stovel. 2005. *Global archaeological theory*. New York: Springer.
Geertz, C. 1973. *The interpretation of cultures*. New York: Basic.
Hall, S. 1980. Cultural studies: Two paradigms. *Media, Culture and Society* 2: 57–72.
Hall, S. 2009. *Da diáspora*. Belo Horizonte: Editora da UFMG.
Hicks, D., and M.C. Beaudry, eds. 2006. *The Cambridge companion to historical archaeology*. Cambridge: Cambridge University Press.
Hodder, I. 1982. *Symbols in action. Ethnoarchaeological studies of material culture*. Cambridge: Cambridge University Press.
Johnson, M. 2009. The theoretical scene, 1960–2000. In *The Oxford handbook of archaeology*, ed. B. Cunliffe, C. Gosden, and R.A. Joyce, 71–88. Oxford: Oxford University Press.
Jones, A. 2009. Into the future. In *The Oxford handbook of archaeology*, ed. B. Cunliffe, C. Gosden, and R.A. Joyce, 89–114. Oxford/New York: Oxford University Press.
Kingsland, S. 1985. *Modeling nature*. Chicago: The University of Chicago Press.
Kristiansen, K. 2009. The discipline of archaeology. In *The Oxford handbook of archaeology*, ed. B. Cunliffe, C. Gosden, and R.A. Joyce, 3–46. Oxford: Oxford University Press.
Orser, C.E. 1996. *A historical archaeology of the modern world*. New York: Plenum Press.
Palacio, G. 2002. Notas sobre lanoción ambiental: un nuevo matiz en el análisis histórico? In *Repensando la naturaleza*, ed. G. Palácio and A. Ulloa, 190–213. Colômbia: Universidad Nacional de Colômbia.
Shanks, M. 2008. Post-processual archaeology and after. In *Handbook of archaeological theories*, ed. R.A. Bentley, H.D.G. Maschner, and C. Chippindale, 133–144. Lanham: AltaMira.
Shanks, M., and C. Tilley. 1988. *Social theory and archaeology*. Albuquerque: University of New Mexico Press.
Sheperd, N. 2005. From "one world of archaeology" to "one world, many archaeologies". *Archaeologies* 1 (1): 1–6.
Smith, C. 2005. The World Archaeological Congress: Extending the vision. *Archaeologies* 1 (1): 126–138.
Taylor, W.W. 1948. A study of archeology. *American Anthropologist* 50 (69).
Ucko, P. 1987. *Academic freedom and apartheid: The story of the World Archaeological Congress*. London: Duckworth.
Voss, B. 2008. Between the household and the world-system: Social collectivity and community agency in Overseas Chinese archaeology. *Historical Archaeology* 42 (3): 37–52.
Wallace, G. 2008. Archaeology and society. In *Handbook of archaeological theories*, ed. R.A. Bentley, H.D.-G. Maschner, and C. Chippindale, 395–407. Lanham: AltaMira.
Watson, P.J. 2008. Processualism and after. In *Handbook of archaeological theories*, ed. R.A. Bentley, H. D.G. Maschner, and C. Chippindale, 29–37. Lanham: AltaMira.
Webster, G.S. 2008. Culture history: A culture-historical approach. In *Handbook of archaeological theories*, ed. R.A. Bentley, H.D.G. Maschner, and C. Chippindale, 11–28. Lanham: AltaMira.

Further Reading

Carson, R. 1962. *Silent spring*. Houghton Mifflin: Mariner Books.
Deetz, J. 1977. *In small things forgotten: The archaeology of early American life*. New York: Doubleday.
Hoggar, R. 1957. *The uses of literacy: Aspects of working class life*. London: Chatto and Windus.
LaCapra, D. 2001. *Writing history, writing trauma*. Baltimore: Johns Hopkins University Press.
Patterson, T. 2001. *A social history of anthropology in the United States*. Oxford: Berg.
Thompson, E.P. 1963. *The making of the English working class*. London: Penguin.
Tuan, Y.F. 1974. *Topophilia: A study of environmental perception, attitudes, and values*. Englewood Cliffs: Prentice-Hall.
Williams, R. 1958. *Culture and society*. London: Chatto and Windus.

Global Heritage Fund (GHF)

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Basic Information

Global Heritage Fund (GHF) is a private, nonprofit organization dedicated to the preservation of endangered archaeological and architectural heritage sites in developing countries and regions. It is distinguishable from other international heritage preservation nongovernmental organizations by its exclusive developing country focus and its signature methodology integrating conservation and economic development.

Headquartered in Palo Alto, California, GHF was founded in 2002 by entrepreneur Jeff Morgan. Morgan oversaw day-to-day operations as Executive Director, serving under a Board of Trustees responsible for determining overall strategy and direction until 2013, when Dr. Vince Michael took over the post. A Senior Advisory

Board comprised of a multidisciplinary team of noted archaeologists and architectural conservators provides guidance in matters of conservation.

Funding for GHF operations comes from corporate and private donations and project-specific matching allocations from governmental and nongovernmental organizations. According to GHF, they had invested $25 million and garnered $20 million in project co-funding as of 2011 (Jeff Morgan, *pers. comm*. 2011).

GHF seeks to advance the goals of site conservation, community development, and preservation advocacy through a program of field projects, fellowships, the Global Heritage Network (GHN) initiative, and various workshops, events, and publications.

Major Impact

Over its first decade of operations, GHF staged 19 major conservation projects in 12 countries. Project sites are selected on the basis of their estimated significance, threat level, regional economic need, and potential for long-term sustainability via community involvement. GHF has historically focused on World Heritage Tentative List and other major sites informally deemed to possess "Outstanding Universal Value." Of particular interest are those for which preexisting preservation leadership and grassroots support has been in evidence. The GHN threat-monitoring initiative, described below, informs the identification of potential GHF project locations through a program of expert site assessments.

A hallmark of GHF field projects is their overarching focus on long-term community development through heritage tourism, for which the conservation of physical fabric is intended to serve as catalyst. What GHF describes as an "integrated community-based conservation and development" framework is built around a trademarked "Preservation by Design" methodology comprised of four elements: planning and protection, conservation science, community development, and partnerships.

Planning and protection refers to preparatory research and investigation, the development of conservation and master management plans having defined goals, responsibilities, milestones, and provisions for monitoring. Conservation science refers to tailored research and direction by leading international architectural conservators in consultation with local experts. Community development includes local-level promotion, training, and capacity building for conservation, site management, heritage tourism, and craft production. Finally, GHF views partnerships with in-country governmental, academic, and special interest groups for conservation, funding, and executive management to be tactically and strategically critical.

Current and completed GHF projects include work at sites in East, South, and Southeast Asia; the Middle East; North Africa; South America; Central America; and Eastern Europe. These have entailed the conservation of historic structures, at places like Izborsk (Russia) and Pingyao (China); archaeological ruins, such as those of Hampi (India) and Banteay Chhmar (Cambodia); and in situ archaeological remains at locations including Chavin (Peru) and Çatalhöyük (Turkey). In ongoing efforts at the rapidly developing World Heritage Site of Pingyao, China, GHF is working with regional governmental and academic institutions to stem the deterioration and loss of traditional Qing Dynasty courtyard houses and promote locally based heritage tourism through a program of survey, planning, conservation, training, and the promotion of local craft production. At the heavily looted ancient Khmer complex of Banteay Chhmar, GHF has assembled an array of domestic and international partner organizations to develop a site Master Plan, stabilize and conserve key structures, facilitate the preparation of a World Heritage List nomination, and train local residents in conservation and tourism. At the Neolithic settlement of Çatalhöyük, GHF has acted in concert with a range of sponsors and collaborators to enact improvements including a shelter, walkways, and signage; conserve murals;

train locals in conservation and tourism; and assist the Turkish Ministry of Culture in the revision of a site management plan and establishment of a regional Heritage Park.

In 2011, GHF launched Global Heritage Network (GHN), an Internet-based preservation collaboration, advocacy, and threat-monitoring platform. Intended to facilitate international information exchange among working professionals and students, GHN consists of a threatened site database, a member community, and a documentation library. "GHN Sites" is a Google Earth-supported dynamic repository of satellite imagery, spatial data, photos, videos, news items, technical reports, GHF-sponsored site assessments, and other resources relating to the preservation of select developing country sites. The "GHN Community" is an online social network featuring preservation news and user-created discussion groups. The "GHN Library" consists of preservation literature such as management plans, studies, reports, articles, and bibliographies pertaining to heritage conservation, tourism, economics, and related themes. In addition to its active member community, GHN is supported through the voluntary efforts of qualified Site Coordinators and Site Monitors.

Other GHF activities include an annual Preservation Fellowship program supporting international students and scholars in the preservation of developing country sites, workshops and public fora on conservation-related topics, and the production of occasional research reports, white papers, a blog, and a biannual newsletter.

To its advocates, GHF's brand of "venture philanthropy" is a model of grassroots preservation engagement bridging developed and developing countries. The direct effects of GHF's work include the physical conservation, protection, and improvement of a significant number of sites and the enhancement of local-level knowledge and skills regarding conservation and tourism. By bringing together networks of partner organizations, they have promoted intra- and international cooperation and raised the visibility of best practices heritage management and planning. Global Heritage Network provides unprecedented public access to information on developing country heritage site management and hosts a sizable community of active participants.

Among the indirect impacts of GHF's efforts must be counted as yet unquantified economic effects of heritage tourism for households and communities, enriched future personal and professional opportunities for trainees and fellows, increased public awareness of the special vulnerability of developing country heritage, and strengthened appreciation among peer organizations of the importance of financial savvy for NGO efficacy and long-term site sustainability. By advertising their Preservation by Design™ methodology, GHF arguably helps to raise the bar of international heritage management practice, accentuating the need for holistic planning, community commitment, and clear accountability.

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation
- ▶ Global Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Local Populations and Global Heritage
- ▶ Morgan, Jeff
- ▶ Preservation Paradigm in Heritage Management
- ▶ Sustainability and Cultural Heritage
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

Further Reading

Global Heritage Fund. n.d. Available at: http://globalheritagefund.org/and http://ghn.globalheritagefund.org/. Accessed 3 Sept 2013.

Goat: Domestication

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Basic Species Information

The domestic goat *Capra hircus* (Linnaeus 1758) (Mammalia, Artiodactyla, Bovidae, Caprinae) is a small ruminant herbivore that browses on shrubs and weeds. Females reach puberty between 6 and 12 months and after a mean gestation time of 150 days give birth to a single or twins. On average, the wither's height is 60 cm and the weight 60 kg for a female, but these characteristics strongly vary according to the breed (e.g., for females from 27 kg for an African Pygmy to more than 100 kg for a Boer). Both sexes have a beard and horns in most breeds, and many breeds bear wattles. The 800 million goats distributed all over the world are mainly present in Asia and in the Near East (70% of the worldwide population) and are found in almost all kinds of environments. There are more than 640 breeds, including about 560 traditional breeds/populations adapted to local conditions (Fig. 1) and industrial breeds. The worldwide goat population show a high level of genetic diversity distributed independently of the breeds (Naderi et al. 2007).

Timing and Tracking Domestication

Archaeological (Harris 1961) and genetic (Manceau et al. 1999; Pidancier et al. 2006) data revealed that the goat's wild ancestor is the bezoar, *Capra aegagrus* (Fig. 2). Bezoars are distributed in mountains of the Middle East, from southwestern Turkey to central Afghanistan and southern Pakistan (Fig. 3), mainly in relatively arid habitats such as mixtures of rock outcrops and shrubby thickets or conifer forests (Fig. 2). Goats were among the first farm animals domesticated and rapidly had an important role in the economies of human societies. This is due to several characteristics inherited from its wild ancestor, including flexible feeding habits and the ability to live and breed under coarse conditions (Clutton-Brock 1999) and to be transported over long distances. Goats provide meat, milk, and dung (for fuel) but also hair and skin for clothing, or sinew (for glue or strings) and bones used for making tools and weapons. Since the beginning of domestication, the control of livestock by people released environmental pressures such as those exerted by sexual selection or predation on horn morphology or coat color.

Goat: Domestication, Fig. 1 Traditional goat population locally adapted to a semiarid mountainous environment (Atlas Mountains, Morocco). (Photo credit: F. Pompanon)

Goat: Domestication, Fig. 2 Male bezoars (*Capra aegagrus*) on a rocky slope in a protected area (Lashkar Dar Malayer, Iran). (Photo credit: H.R. Rezaei)

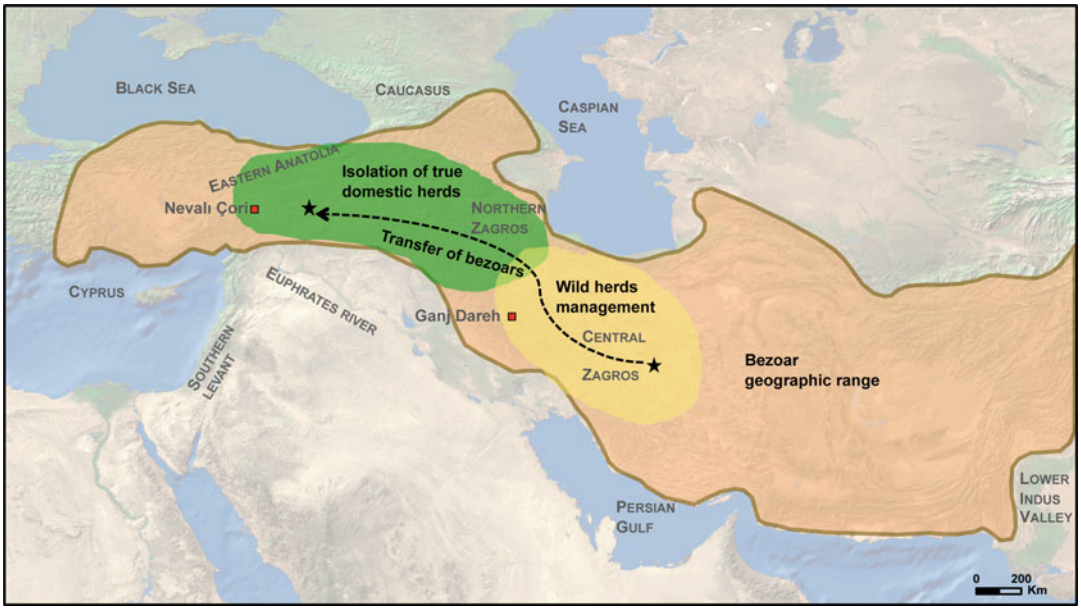

Goat: Domestication, Fig. 3 Simplified scenario of initial goat domestication from the bezoar in the Middle East. The *light brown* area represents the geographic range of the bezoar (*Capra aegagrus*) that may not have changed since the beginning of domestication. The *yellow* and *green* areas represent the approximate areas where herd management took place and where true domestic herds were isolated, respectively. The *stars* give an example of localities with bezoars sharing the same genotype (for a mitochondrial DNA gene) supporting past translocations by man (Naderi et al. 2008). In *red*: archaeological sites giving evidence for local pre-Neolithic goat domestication (see text)

Simultaneously, new selective pressures appeared since farmers instinctively or deliberately favored some characteristics. A general trend differentiating domestics from wilds is changes in skeletal conformation (i.e., mainly a reduction in body size), but traditional breeding led to a diversity of locally adapted phenotypes. The intensity of artificial selection strongly increased with the emergence of the breed concept 200 years ago, resulting in the standardization of morphology (e.g., size, coat color) and performance within well-defined industrial breeds.

The bezoar was among the wild ungulates hunted by hunter-gatherers from the Neolithic in Western Asia. Several tactics of animal use, more or less successful, may have been developed to ensure the transition from hunting to domestication. The control and protection of wild flocks kept in a favored place may have existed besides and/or before the taming and rearing of animals that led to the isolation of true domestic herds (Clutton-Brock 1999). Such archaeological prediction of herd management is coherent with the genetic signature of a past demographic expansion of the bezoars from Central Zagros (Fig. 3), which occurred before the isolation of domestic herds (i.e., time of expansion of Iranian goat populations, Naderi et al. 2008).

This is also consistent with young male-biased culling patterns without body size reduction found in this region (Ganj Dareh, Iran) about 10,000 Before Present (BP), although it has sometimes been interpreted as true domestication (Zeder and Hesse 2000). However, the first domestic herds may not have appeared from controlled populations from Central Zagros, but in a region ranging from Eastern Anatolia to Northern Zagros where the wild populations are genetically closer to the domestics and where there is archaeological evidence for local goat domestication c. 10,500 BP (Nevalı Çori, Turkey). However, the managed bezoars from Central Zagros would have contributed to a small part of the domestic gene pool captured in Northern Zagros/Eastern Anatolia through an early translocation of controlled animals (Fig. 3, Naderi et al. 2008).

Human-mediated long-distance transfers during the phase of herd management or at the early stages of true domestication are archaeologically attested by the presence of wild or feralized goats outside the geographical range of the species (e.g., in Cyprus during the eleventh millennium, Vigne et al. 2011). Such feralized populations are still living in several Mediterranean islands. Animal translocations are consistent with the weak phylogeographic structure of the bezoar over its whole range (Fig. 3), which is very unusual in wild ungulates. The high level of genomic diversity currently observed in goats, similar to that of bezoars, cannot be explained by the domestication of less than 1,300–1,900 ancestral lineages (Naderi et al. 2008).

Thus, the domestication of goats has been a long-term process which initial phase lasted at least several hundred years, over a large area (Western Anatolia/Northern Zagros), involving several hundred to several thousand individuals. Independently, an earlier phase of wild herd management in the Central Zagros did not contribute to the modern goat gene pool except by the transfer of wilds and/or early domestics by people to the area where domestication took place (Fig. 3). After isolation of the first domestic herds, goats diffused from the domestication area to reach Western Europe (c. 7,600 BP in southern France), Eastern Asia (not well documented, probably c. 3,000 BP in China), and Africa (c. 7,400 BP in the Maghreb and later than 4,000 BP in more southern parts). The current mix of genotypes in bezoar populations from the domestication area suggest that the weak genetic structure of modern goats at the worldwide level results more from the initial capture of genotypes from already mixed wild populations than from further transportations of domestics for commercial trade (Naderi et al. 2008). The introgression of wild genomes into the domestic gene pool through hybridization may have also taken place, but its importance and timing are still unknown.

Cross-References

► Animal Domestication and Pastoralism: Socio-Environmental Contexts
► Cyprus, Archaeology of

▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic

References

Clutton-Brock, J. 1999. *A natural history of domesticated mammals*. Cambridge: The Natural History Museum, Cambridge University Press.

Harris, D.R. 1961. The distribution and ancestry of the domestic goat. *Journal of the Linnean Society of London* 173: 79–91.

Manceau, V., L. Despres, J. Bouvet, and P. Taberlet. 1999. Systematics of the genus Capra inferred from mitochondrial DNA sequence data. *Molecular Phylogenetics and Evolution* 13: 504–510.

Naderi, S., H.R. Rezaei, P. Taberlet, S. Zundel, S.-A. Rafat, H.-R. Nagash, M.A.A. el-Barody, O. Ertugrul, F. Pompanon, and Econogene Consortium. 2007. Large-scale mitochondrial DNA analysis of the domestic goat reveals six haplogroups with high diversity. *PLoS One* 2: e1012. https://doi.org/10.1371/journal.pone.0001012.

Naderi, S., H.R. Rezaei, F. Pompanon, M.G. Blum, R. Negrini, H. Naghash, O. Balkız, M. Mashkour, O. Gaggiotti, P. Ajmone-Marsan, A. Kence, J.-D. Vigne, and P. Taberlet. 2008. The goat domestication process inferred from large-scale mitochondrial DNA analysis of wild and domestic individuals. *Proceedings of the National Academy of Sciences of the United States of America* 105: 17659–17664.

Pidancier, N., S. Jordan, G. Luikart, and P. Taberlet. 2006. Evolutionary history of the genus *Capra* (Mammalia, Artiodactyla): Discordance between mitochondrial DNA and Y-chromosome phylogenies. *Molecular Phylogenetics and Evolution* 40: 739–749.

Vigne, J.-D., I. Carrere, F. Briois, and J. Guilaine. 2011. The early process of mammal domestication in the Near East new evidence from the pre-Neolithic and pre-pottery Neolithic in Cyprus. *Current Anthropology* 52: S255–S271.

Zeder, M.A., and B. Hesse. 2000. The initial domestication of goats (*Capra hircus*) in the Zagros Mountains 10,000 years ago. *Science* 287: 2254–2257.

Further Reading

Food and Agriculture Organization of the United Nations (FAO). 2007. *The state of the world's animal genetic resources for food and agriculture*. Rome: Commission on Genetic Resources for Food and Agriculture.

Vigne, J.-D., J. Peters, and D. Helmer. 2005. *The first steps of animal domestication. New archaeological approaches*. Oxford: Oxbow Books.

Weinberg, P., T. Jdeidi, M. Masseti, I. Nader, K. de Smet, and F. Cuzin. 2008. *Capra aegagrus*. In *IUCN 2011. IUCN red list of threatened species* (Version 2011.2.). www.iucnredlist.org

Göbekli Tepe: Agriculture and Domestication

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State of Knowledge and Current Debates

The Site

Göbekli Tepe is situated on one of the highest points of the Germuş mountain range at ca. 770 m asl., offering a wide view over the Harran Plain to the south. The mound with a height of about 15 m has a diameter of around 300 m and is characterized by several knolls divided by hollows. It is surrounded by a limestone plateau, which mostly shows no soil cover today and only very scarce vegetation (Knitter et al. 2019). Neolithic traces were first reported

Klaus Schmidt: deceased.

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during a combined survey by the University of Istanbul and the Oriental Institute and Department of Anthropology at the University of Chicago in the 1960s (Benedict 1980), but the megalithic architecture covered by the mound remained unrecognized until its discovery in 1994 by Klaus Schmidt (2000).

Excavations at Göbekli Tepe commenced in 1995, and meanwhile, the site is best known for its monumental round-oval buildings. Measuring between 10 and 30 m in diameter, these structures are defined by monolithic T-shaped limestone pillars rich in symbolic depictions carved in low and high reliefs (Peters and Schmidt 2004; Schmidt 2000, 2012; Becker et al. 2012). These pillars stand up to 5.5 m in height, are interconnected by walls with benches along the inner wall faces, and are arranged around two even larger central pillars (Figs. 1 and 2). Arms and hands carved on some of the pillars confirm their anthropomorphic status. This interpretation is corroborated by depictions suggesting clothing, e.g., parallel bands decorating the front side of many of the pillars; additionally, the two central pillars in Building D carry low reliefs of pendants, belts, and fox-skin loincloths (Fig. 3). This latter structure is one of altogether eight "special buildings" partially excavated so far at the site (Buildings A–H), though results from ground-penetrating geophysical surveys could point to the presence of further extensive architectural structures (Dietrich et al. 2012). In the partially excavated Buildings C and D, the artificially smoothed bedrock constitutes the floor surface. The two "central" pillars were inserted into podia standing ca. 20–25 cm above the smoothed bedrock. Excavations at Building B came to a halt upon reaching a plaster floor. So far no floors have been reached in Buildings A and H. Building archaeological research suggests that the buildings were roofed (Kurapkat 2015). Based on radiocarbon dates, the earliest stone structures appear at Göbekli Tepe in the second half of the tenth millennium BC (Dietrich et al. 2013). The nature and origin of the sediment deposits excavated from the round-oval buildings is the focus of continued research and essential for clarifying whether the original working hypothesis, i.e., that the filling of the buildings was largely intentional, is correct (Clare et al. 2019).

Göbekli Tepe: Agriculture and Domestication, Fig. 1 Göbekli Tepe, the main excavation area with Buildings A–D. (© DAI, photo N. Becker)

In the first half of the ninth millennium BC, rectangular structures begin to appear at Göbekli Tepe (Fig. 4), though most of the "special buildings," which were functional throughout most of the site occupation, maintained their initial round-oval concept. Comparable architecture elsewhere in the Upper Euphrates Basin suggests that this building phase dates to the Early and Middle PPNB (Schmidt 2012; Kurapkat 2015). T-shaped pillars found in the rectangular structures are up to 2 m in height. Although clearly poorer in imagery, their symbolism is reminiscent of that already found in the round-oval "special buildings" (Schmidt 2012; Kinzel and Clare in press).

Architectural findings indicate that the built environment at Göbekli Tepe was long-lived and that "special buildings" were in use throughout the settlement sequence (Schmidt 2012; Piesker

Göbekli Tepe: Agriculture and Domestication, Fig. 2 Building D is the best preserved of the monumental circular buildings of Göbekli Tepe. (© DAI, photo N. Becker)

2014; Kurapkat 2015; Clare et al. 2019). The rectangular buildings have complex biographies as well, with phases of rebuilding and extensive use of spolia (Kurapkat 2015; Kinzel et al. in press). Ongoing analyses suggest that the archaeological deposits filling and covering these buildings represent settlement debris of mixed origin.

T-Shaped Pillars

The stratified limestone plateau with its vast horizontal banks varying in thickness between ~0.60 and 1.50 m was a determinant governing the locale of Göbekli Tepe: A distance of up to 700 m separates the quarry areas of the T-shaped workpieces from their final destinations. In a first step, the outlines of the monoliths were carved into the bedrock until the required depth was reached. The workpieces were then detached from the underlying strata, perhaps using wooden wedges and/or levers. The next and probably most labor-intensive step involved the transportation of the workpieces (some of which measured up to 6–7 m in length and weighed in excess of 10 t) across uneven and sloping terrain. Once at their final destinations, craftsmen would have prepared and decorated the surfaces of the pillars. Finishing touches as well as secondary iconography were likely carved once the monoliths were in the vertical. Throughout their use-lives, however, the "special buildings" including their T-pillars were constantly repaired and modified, with phases of construction, deconstruction, and reconstruction (Piesker 2014; Kurapkat 2015; Kinzel et al. in press).

Animal imagery at Göbekli Tepe is especially rich; it features at least 28 identified taxa. Notably, the pictorial composition differs between buildings, with a proportionately high number of snakes, foxes, wild boar, and vultures in Buildings A to D, respectively, and of felines in Building H (Peters and Schmidt 2004; Becker et al. 2012; Notroff et al. 2014). Where the sex of the animals is represented, they are invariably males. In addition to the diverse fauna and symbols depicted in flat relief, the buildings of Göbekli Tepe also yielded a series of anthropomorphic sculptures, usually heads, and a variety of zoomorphic figurines, reiterating the taxa shown in the flat reliefs, including, for instance, wild boars displaying their fangs or snarling predators (Schmidt 2008, 2010). Some of these sculptures have conical taps

which were used to insert them into the walls of the buildings. Figurines positioned in situ invariably evoke a feeling of danger since "charging" the observer. Sometimes animals were carved at mid-shaft height, such as the high relief of a leopard in Building C (Fig. 5).

Göbekli Tepe: Agriculture and Domestication, Fig. 3 Building D, Pillar 31. T-shaped pillar exhibiting the arms, hands, a belt, and a loincloth made of a fox skin. (© DAI, photo N. Becker)

Whereas the narrative nature evoked by the complex imagery and its "intimidating" aspect in particular has been reiterated at several occasions in literature, different opinions circulate about the function of animal symbolism at Göbekli Tepe and the ideological concept and imaginations underlying it (e.g., Peters and Schmidt 2004; Schmidt 2006; Becker et al. 2012; Benz and Bauer 2015). Clearly representing places of ritual significance to the communities involved in their construction and decoration, the very nature of past activities in the round-oval buildings is difficult to address with the material culture at hand. One possible exception are rituals involving dancing. Such performances might be indicated by depictions on the T-shaped pillars showing dancing cranes. Of interest is the fact that the lower legs of these birds exhibit an "inverse" anatomy which, together with their relative "thickness," lend a human-like appearance to the Göbekli Tepe cranes (Peters et al. 2005b). Apart from similar (but anatomically correct) depictions showing dancing cranes, the Neolithic site of Çatalhöyük also produced the articulated bones of a crane wing with specific cut marks, a find tentatively interpreted as a component of a costume used in ritual performances (Russell and McGowan 2003). That said, the main narrative of Göbekli Tepe seems to be related to the afterlife, which the PPNA community addressed

Göbekli Tepe: Agriculture and Domestication, Fig. 4 Area L9-56, Space 8. Example of a rectangular structure. (© DAI, photo L. Clare)

Göbekli Tepe: Agriculture and Domestication, Fig. 5 Building C, Pillar 27. Zoomorphic sculptures representing wild boar and carnivores and a high relief of a snarling predator, likely a leopard. (© DAI, photos K. Schmidt, D. Johannes)

within a communal memorial or other social context (Schmidt 2006; Notroff et al. 2016). However, whether the impression of fear evoked by the naturalistic depictions could have been intended to foster social cohesion and control (Benz and Bauer 2013) remains to be seen.

Subsistence

Located in the Southern Piedmont of the Southeastern Taurus overlooking the northern Harran Plain, the site possessed an ecologically highly diverse catchment area with permanent as well as seasonally available and storable bio-resources. Whereas the rectangular buildings (Schmidt 2012; Kurapkat 2015) and only recently discovered PPNA settlement areas (Clare et al. 2019) promise novel insights into foodways, storage practices, waste disposal, etc., the realization that the previously studied materials recovered from the excavated sediments of the "special buildings" in fact stem from relocated and chronologically mixed settlement debris seriously hampers deepening insights into diachronic human subsistence behaviors for this part of the site.

Notably, the supposed domestic function of the rectangular buildings (Kurapkat 2015) now appears to be confirmed by studies of significant concentrations of grinding stones (+10,000) and phytoliths illustrating extensive cereal processing at the site (Dietrich et al. 2019). Unfortunately, macrobotanical remains are poorly preserved in the contexts excavated so far; their analysis illustrates the exploitation of wild einkorn (*Triticum boeticum*), wild barley (*Hordeum spontaneum*), and possibly wild rye (*Secale cereale*) as well as non-cereals, like almonds (*Prunus*) and pistachios (*Pistacia*) (Neef 2003; Dietrich et al. 2019). Although limitations of sample size preclude conclusions about the relative contribution of each of these plant foods to the Göbekli Tepe diet, cereals appear of major nutritional importance, similar to other early Neolithic sites in the Upper Euphrates Basin and in marked contrast to contemporaneous sites in the Upper Tigris region, except for Çayönü (Cappers 2014). Use-wear analyses combined with experimental studies indicate that handstones and grinding bowls, or slabs, were the basic components of the tool kit used for processing cereals. The latter included dehusking in special grinding bowls with perforated bases and the preparation of coarse and fine flour, as can be deduced from the combined results of use-wear analyses and experimental work (Dietrich et al. 2019).

For the moment it cannot be decided whether wild cereals were also processed in the monumental round-oval buildings. Of interest, however, is

the fact that the grinding stones found there were used for grinding ochre. A prominent case are the grinding stones and ochre-rich sediments associated with the podia of the central pillars in Building D. Conversely, ample grinding equipment has been found in the rectangular buildings, predominantly in upper room fills and therefore not immediately above the floors. Arguably, relocation from the rooftop following the collapse of the ceiling could account for this observation, though for each context, the consideration of other potential explanations is essential. While the ongoing study of site formation processes will help to clarify those processes which could have led to the dislocation of grinding equipment, the overall high density of grinding stones and tools in the rectangular architecture and open spaces surrounding the monumental buildings does illustrate that there was extensive cereal processing on-site in PPNB times. As such, cereal processing on the roof of the rectangular buildings would undoubtedly have taken advantage of the wind carrying away the husks. Additionally, the processing of cereal could have had communal character, perhaps undertaken in the frame of work feasts connected to the monumental buildings (Dietrich et al. 2012, 2019). In the rectangular buildings, a spatial connection between the preparation and consumption of cereal foods is also suggested by the presence of large stone vessels that may have served several purposes including food preparation and storage of staples, thus protecting valuable foodstuffs against seed-eating rodents, birds, etc. Cereals may also have been fermented in these containers, thus producing a low alcoholic beverage (Dietrich et al. 2012).

Here we note that the archaeological record associated with the monumental round-oval buildings does not illustrate any of the aforementioned domestic activities. Therefore, given the temporally overlapping use of the round-oval and rectangular buildings, this dichotomy seems primarily functional, with a principally ritual instead of domestic use for the monumental architecture. In a way, this situation seems reminiscent of Jerf el Ahmar, where rectangular buildings with toolkits for cereal processing are arranged around communal circular buildings. However, the latter are smaller-sized compared to Göbekli Tepe and subdivided into cells (Willcox and Stordeur 2012). As these cells contained higher than average concentrations of cereals (mostly barley), the building was interpreted as a communal silo. Contrary to Jerf el Ahmar, however, the lack of relevant botanical finds in the floor sediments in the Buildings C and D at Göbekli Tepe does not support such an interpretation.

Archaeofaunal remains illustrate that meat procurement at Göbekli Tepe relied on hunting and fowling. At all times predominantly Persian gazelle (*Gazella subgutturosa*), wild cattle (*Bos primigenius*), and Asiatic wild ass (*Equus hemionus*) were hunted. Occasionally, wild boar (*Sus scrofa*), wild sheep (*Ovis orientalis*), red deer (*Cervus elaphus*), brown hare (*Lepus europaeus)*, and fox (*Vulpes vulpes, V. cana*) were added to the hunter's bag. A highly diverse avifauna complements the broad-spectrum subsistence practiced by the site inhabitants. It mainly includes ducks, geese, partridges, sandgrouse, cranes, bustards and several birds of prey, as well as more than 20 species of passerines, varying in size from bunting to raven. Occasionally, the presence of small-sized cyprinid fishes was noted, implying exploitation of the Balikh River catchment downhill. We also noted that in contrast to iconography, snake remains are extremely rare. Find context and skeletal completeness indicate that these reptiles died during hibernation. Finally, in contrast to most contemporaneous early Neolithic sites located deeper in the Southeastern Taurus, the absence of wild goat (*Capra aegagrus*) at Göbekli Tepe is noted. This we explain by the lack of suitable orographic habitat with rocky outcrops and steep slopes at higher altitude in the site catchment exploited by the site inhabitants.

Body part representation, skeletal size, sex, and age of key food mammals indicate that meat procurement was based on hunting. Transportation logistics explain why in large game, such as aurochs or red deer, bone elements of the meat-bearing body parts are statistically overrepresented at the detriment of those of the feet, the trunk, and the head. Conversely, medium-sized game like gazelle is represented by far more balanced skeletal inventories implying transportation

uphill of animals in toto. In contrast to the Göbekli Tepe iconographic repertoire in which aurochs and their bucrania figure prominently, the complete absence of skulls in the faunal assemblage studied so far (+120,000 specimens) is remarkable. Arguably, the fact that past archaeological excavations did not produce tangible evidence for this highly symbolic item could relate to the secondary nature of the contexts excavated so far. Alternatively, perhaps the bucrania carved on the pillars served as a substitute for it (Fig. 6).

Demographic profiles and stable isotope analysis of major game species suggest that hunting of gazelles and hemiones likely peaked in late summer and autumn, when these gregarious and migratory taxa visited the Göbekli Tepe catchment in numbers (Lang et al. 2013). Nemrik, Helwan, Byblos, and other projectile points indicate the use of bow and arrow and perhaps of spears for hunting, which is supported by the find of a right humerus of an aurochs cow with an embedded flint projectile point (Pöllath et al. 2018). The impact of the shot (or thrust) sufficed to pierce the soft tissues and impede the animal, which must have been dispatched shortly thereafter in view of the lack of reactive bone tissue near the impact point. The circumstances of this find imply collaborative rather than individual hunting of this formidable game, a situation tellingly illustrated at Çatalhöyük (Mellaart 1967; Russell 2012). Whereas communal hunting of aggregations of gazelle and hemione secured meat procurement and probably helped to build up supplies, aurochs were clearly more dangerous adversaries; furthermore, they were ritually charged animals which, considering their large meat and fat yields, likely prompted feasting due to surplus, thereby strengthening group cohesion. Beyond food, the aurochs' symbolic role is repeatedly attested in the archaeological record of the Neolithic Near East (e.g., Meier et al. 2017) and visualized at Göbekli Tepe by individuals carved in different poses (Peters and Schmidt 2004; Becker et al. 2012).

Göbekli Tepe: Agriculture and Domestication, Fig. 6 Building D, Pillar 31. Stylized bucranium of an aurochs. (© DAI, photo I. Wagner)

Human Remains

Osteological analyses of human bone from Göbekli Tepe began in 2009, and a total of 691 fragments have so far been recorded (Gresky et al. 2017). The preservation of human bone can be described as "moderate"; many pieces feature a thick cohesive layer of minerals (sinter) that is known to promote fragmentation. The bulk of human bone recovered during archaeological investigations stems from the mixed settlement debris excavated within the round-oval monumental buildings. For this reason, it is conceivable that many of these bones originate from displaced primary and secondary human burials and/or skull caches associated with disturbed domestic contexts, a conclusion that is further supported by signs of artificial modifications, including cut marks and burning.

Among the artificial modifications is a previously undocumented type of postmortem cranial modification that is thought to be a variation of early Neolithic skull cult so far distinct to Göbekli Tepe (Gresky et al. 2017). Cranial fragments from three individuals show evidence for a substantial cutting on the outer skull vault. Notably, in the absence of primary and secondary burials at Göbekli Tepe, these intentional deep incisions (which pass along the sagittal axes of the crania) have provided the very first osteological evidence

for the treatment of the dead at Göbekli Tepe. This evidence suggests that the skulls of certain individuals were removed from the post-cranium in the frame of secondary burial rites, as reported from other sites in Anatolia (cf. Hodder and Meskell 2011; Notroff et al. 2016). Although the selection criteria are unknown (and in spite of their poor preservation and high fragmentation), in two cases, the skulls could be attributed to adult individuals (25–45 years), one of whom was probably female.

The application of deep incisions to the skulls of selected individuals suggests that these people were either (positively) venerated or (negatively) "branded" by the living. Whatever the case, the grooves likely served the functional modification of the skull for display purposes, perhaps holding a cord which would have otherwise slipped from the smooth surface of the skull. This cord would have held the lower jaw in position and could also have been used to attach decorative elements to the cranium. Finally, the drilled perforation at the left parietal of one of the skulls could indicate that it was suspended for display purposes.

Early Neolithic Worldview and the Dawn of Husbandry

Animals figure prominently in the Near Eastern PPN sociocultural landscape. This is reflected by the increased evidence for long-lasting symbolism, cult practices, and representations with complex social and cosmological meaning. Feasting events and the social competition that is played out within them have, for instance, been suggested at Hallan Çemi (Rosenberg et al. 1998) in the Upper Tigris River Basin, where pig-centric feasting events were socially important, and in central Anatolia and the Levant, where bovine-centric feasting practices predominate (Buitenhuis 1997; Meier et al. 2017). In addition to feasting, the abundant and rich iconography including paintings, engravings, plastered relief figures, mounted bucrania, figurines, and sculptures indicates a prominent symbolic role for animals in early Neolithic cosmology and ritual practice. Current research therefore increasingly explores the social and religious uses of animals as motivating factors in the process of ungulate management and domestication (Peters et al. 2017).

Conceivably the most revelatory aspect of Göbekli Tepe is the tangible architectural and iconographic evidence of a complex belief system and a hierarchically structured universe at the Epipalaeolithic-Neolithic boundary. The fact that the anthropomorphic T-shaped pillars have been decorated with a variety of animal taxa, many of them dangerous to humans, e.g., aurochs, brown bear, wild boar, leopard, snakes, scorpions, etc., could perhaps signify that the supranatural beings evoked by the T-shaped pillars exerted power over these animals and thus – in the figurative sense – over the world of the living. If symbolism at Göbekli Tepe would indeed reflect "mental" control over the living world, "physical" and hence human control over animals may have been logical next steps, resulting over time in the emergence of novel ways of ungulate exploitation and management and ultimately domestication. Similar and other considerations led Cauvin (1997) to argue that the emergence of religious concepts played a catalytic role in the transition from hunting to farming.

Most researchers agree that a sedentary way of life and long-term acquaintance with the wild ancestors were required for a closer human-ungulate relationship. The latter however necessitated at some point spatial isolation of individuals from their free-ranging relatives (and thus interrupting gene flow) to consolidate the increasingly time-consuming efforts of selection and controlled breeding in the anthropogenic environment. Applying traditional archaeozoological methods to demonstrate human interference with the life cycle of an ungulate taxon during initial management when hunting activities continued providing the bulk of the meat (and hence of the osseous remains in the assemblage) is problematic, but a promising venue could be the study of intra-articular osteopathologies (Zimmermann et al. 2018). Unfortunately, the mixed origin and uncertain stratigraphic position of the fill materials in the round-oval and rectangular buildings studied until now preclude addressing the issue of possible emergence of ungulate management at Göbekli Tepe.

Building activities as well as carving, moving, decorating, and positioning T-pillars required manpower and effective logistics, e.g., in terms of food provisioning. Conceivably, the fact that several animal motifs, featuring leopards, cranes, vultures, scorpions, snakes, and aurochs, were widely shared across early Neolithic Upper Mesopotamia may well attest to the presence at Göbekli Tepe of groups of hunter-gatherers originating from different parts of the northern Fertile Crescent (Peters and Schmidt 2004; Notroff et al. 2014). If so, people from geographically distinct communities may have utilized occasional large-scale gatherings to exchange knowledge and experiences relative to the exploitation of key food taxa including gazelle, wild sheep, wild goat, wild boar, aurochs, and Asiatic wild ass. This way, more efficient hunting techniques and strategies or even novel methods for monitoring and controlling migratory wild ungulates crossing the site catchment could have spread in the community. The same is true for aspects concerning the practicability, workload, and economic benefits of penning and breeding hoofed animals inside residential areas, a practice discernible, for instance, by accumulations of dung and urine salts, e.g., at Çayönü (Brochier 1993) and Aşıklı Höyük (Özbaşaran 2012; Abell et al. 2019), and the aforementioned osteopathologies (Zimmermann et al. 2018). Not only would such dissemination scenario be consistent with the available bioarchaeological evidence indicating broadly contemporaneous appearance of husbandry practices across the (northern) Fertile Crescent, it would also highlight why the mid-late ninth millennium calBC management of ungulates was not restricted either to a single mammalian species or to taxa confined to a particular ecogeographic setting (Peters et al. 2014, 2017). In this respect, wild sheep and wild goat are seasonally migratory species inhabiting temperate to arid habitats, the first feeding on grasses in grasslands and open woodlands in hilly country at moderate altitude and the second subsisting on a mixed diet of grasses, herbs, and shrubs in landscapes characterized by steep slopes and rocky outcrops at higher altitude. Depending on water and tree cover for their survival, Southeastern Anatolian aurochs and wild boar certainly preferred the more temperate environments offered by alluvial plains, riverine habitats, gallery forests, and adjacent open woodlands, where the first essentially foraged on grass vegetation and the second on a wide variety of food items including tubers, roots, seeds, and fruits as well as the refuse resulting from human food preparation and consumption.

The fact that livestock management can be evidenced in the Upper Euphrates Basin in the later Early PPNB ~8,500–8,300 calBC (Peters et al. 2017) allows us to postulate the initial stages of these efforts to the first half of the ninth millennium calBC, if not earlier. Arguably, social obligations to participate in important communal events and the status gained through provisioning such events with animals may have been prominent motivational factors that drove the costly and failure-prone initial stages of ungulate management and husbandry. Although the precise relationships between animal symbolism, ritual practices, communal feasting, and the origins of animal husbandry are difficult to articulate, the early stages of livestock management were obviously situated within a cognitive world in which animals played a central and symbolic role. It is therefore likely that the symbolic associations of animals in the PPNA, richly expressed at Göbekli Tepe and related sites, and the ontologies that they represent provided a meaningful context which framed and stimulated the emergence of animal husbandry (Peters et al. 2017).

Toward the end of the ninth millennium calBC, Göbekli Tepe was abandoned. It is telling that this step coincided with major shifts in subsistence practices in the Upper Euphrates River Basin, more precisely the intensification of crop cultivation followed by the domestication of cereals and pulses (Tanno and Willcox 2006) and the replacement of gazelle hunting by sheep and goat husbandry (Peters et al. 2005a, 2014), signaling the end of the foraging way of life in this part of Anatolia. With the spread and intensification of agriculture increasingly tying workforce from Middle PPNB times onward, the sociocultural importance of supra-regional ritual places along with the motivation and manpower to maintain

"ancestral" monumental buildings inevitably declined in favor of local communal activities that included the construction of small-scaled cult buildings, as illustrated at Nevalı Çori (Hauptmann 2011). The rich PPNA legacy outstandingly displayed at Göbekli Tepe was nonetheless commemorated long after people had left behind their hunter-gatherer past, animal symbolism still surviving in the collective memory of Pottery Neolithic groups populating Anatolia and Syria in the eighth and seventh millennia calBC, e.g., at Çatalhöyük (Mellaart 1967) and Bouqras (Clason 1999).

Cross-References

- ▶ Agriculture: Definition and overview
- ▶ Plant Domestication and Cultivation in Archaeology

References

Abell, Jordan T., Jay Quade, Güneş Duru, Susan M. Mentzer, Mary C. Stiner, Melis Uzdurum, and Mihriban Özbaşaran. 2019. Urine salts elucidate Early Neolithic animal management at Aşıklı Höyük, Turkey. *Science Advances* 5 (4). https://doi.org/10.1126/sciadv.aaw0038.

Becker, Nico, Oliver Dietrich, Thomas Götzelt, Çiğdem Köksal-Schmidt, Jens Notroff, and Klaus Schmidt. 2012. Materialien zur Deutung der zentralen Pfeilerpaare des Göbekli Tepe und weiterer Orte des obermesopotamischen Frühneolithikums. *Zeitschrift für Orient-Archäologie* 5: 14–43.

Benedict, Peter. 1980. Survey work in Southeastern Anatolia. In *İstanbul ve Chicago Üniversiteleri karma projesi güneydoğu anadolu tarihöncesi araştırmaları – The Joint Istanbul – Chicago Universities Prehistoric Research in Southeastern Anatolia*, ed. Halet Çambel and Robert J. Braidwood, 150–191. Istanbul: University of Istanbul, Faculty of Letters Press.

Benz, Marion, and Joachim Bauer. 2013. Symbols of power – Symbols of crisis? A psycho-social approach to early Neolithic symbol systems. *Neo-Lithics* 2 (13): 11–24.

Benz, Marion, and Joachim Bauer. 2015. On scorpions, birds, and snakes – Evidence for Shamanism in Northern Mesopotamia during the Early Holocene. *Journal of Ritual Studies* 29 (2): 1–23.

Brochier, Jacques É. 1993. Cayönü Tepesi. Domestication, rythmes et environnement au PPNB. *Paléorient* 19 (2): 39–49.

Buitenhuis, Hijlke. 1997. Asikli Höyük: A protodomestication site. *Anthropozoologica* 25 (26): 655–662.

Cappers, René T.J. 2014. Archaeobotanical evidence of agriculture in Neolithic Turkey. In *The Neolithic in Turkey, 10,500–5200 BC: Environment, settlement, flora, fauna, dating, symbols of belief, with views from North, South, East and West*, ed. Mehmet Özdoğan, Nezih Başgelen, and Peter Kuniholm, vol. 6, 205–222. Istanbul: Arkeoloji ve Sanat Yayınları.

Cauvin, Jacques. 1997. *Naissance des divinités. Naissance de l'agriculture: la révolution des symboles au Néolithique*. 2nd ed. Paris: C.N.R.S.

Clare, Lee, Moritz Kinzel, Devrim Sönmez, and Celal Uludağ. 2019. (Göbekli Tepe, Şanlıurfa, UNESCO World Heritage Site: Changing perspectives). *Mimarlık* 405: 14–18. http://www.mimarlikdergisi.com/index.cfm?sayfa=mimarlik&DergiSayi=419&RecID=4613

Clason, Anneke T. 1999. The leopard (?) of Bouqras, south-east Syria. In *Historia animalium ex ossibus. Beiträge zur Paläoanatomie, Archäologie, Ägyptologie, Ethnologie und Geschichte der Tiermedizin. Festschrift für Angela von den Driesch*, ed. Cornelia Becker, Henriette Manhart, Joris Peters, and Jörg Schibler, 133–140. Rahden/Westf.: Leidorf.

Dietrich, Oliver, Manfred Heun, Jens Notroff, Klaus Schmidt, and Martin Zarnkow. 2012. The role of cult and feasting in the emergence of Neolithic communities. New evidence from Göbekli Tepe, south-eastern Turkey. *Antiquity* 86: 674–695.

Dietrich, Oliver, Çiğdem Köksal-Schmidt, Jens Notroff, and Klaus Schmidt. 2013. Establishing a radiocarbon sequence for Göbekli Tepe. State of research and new data. *Neo-Lithics* 1/13: 36–41.

Dietrich, Laura, Julia Meister, Oliver Dietrich, Jens Notroff, Janika Kiep, Julia Heeb, Andre Beuger, and Brigitta Schütt. 2019. Cereal processing at Early Neolithic Göbekli Tepe, southeastern Turkey. *PLoS One* 14 (5): e0215214.

Gresky, Julia, Juliane Haelm, and Lee Clare. 2017. Modified human crania from Göbekli Tepe provide evidence for a new form of Neolithic skull cult. *Science Advances* 3 (6): e1700564. https://doi.org/10.1126/sciadv.1700564.

Hauptmann, Harald. 2011. The Urfa region. In *The Neolithic in Turkey. Vol. 2. The Euphrates Basin*, ed. Mehmet Özdoğan, Nezih Başgelen, and Peter Kuniholm, 85–138. Istanbul: Arkeoloji ve Sanat Yayınları.

Hodder, Ian, and Lynn Meskell. 2011. A "Curious and sometimes a Trifle Macabre Artistry". *Current Anthropology* 52 (2): 235–263.

Kinzel, Moritz, and Lee Clare. in press. Monumental – Compared to what? A perspective from Göbekli Tepe.

In *Monumentalizing life in Neolithic Europe: Narratives of continuity and change*. Oxford: Oxbow Books.
Kinzel, Moritz, Güneş Duru, and Marek Barański. in press. Modify to last – A Neolithic perspective on rebuilding and continuation. In *Umgebaut: DiskAB13*, ed. Ulrike Wulf-Reidt, Katja Piesker, and Stephan Zink. Regensburg: Schnell & Steiner.
Knitter, Daniel, Ricarda Braun, Lee Clare, Moritz Nykamp, and Brigitta Schütt. 2019. Göbekli Tepe: A Brief Description of the Environmental Development in the Surroundings of the UNESCO World Heritage Site. *Land* 8 (4): 72.
Kurapkat, Dietmar. 2015. *Frühneolithische Sonderbauten auf dem Göbekli Tepe in Obermesopotamien und vergleichbare Bauten in Vorderasien*. PhD thesis, Technische Universität Berlin.
Lang, Carolin, Joris Peters, Nadja Pöllath, Klaus Schmidt, and Gisela Grupe. 2013. *Gazella* behaviour and human presence at early Neolithic Göbekli Tepe, south-east Anatolia. *World Archaeology* 45 (3): 410–429.
Meier, Jacqueline, A. Nigel Goring-Morris, and Natalie Munro. 2017. Aurochs bone deposits at Kfar HaHoresh and the southern Levant across the agricultural transition. *Antiquity* 91 (360): 1469–1483. https://doi.org/10.15184/aqy.2017.179.
Mellaart, James. 1967. *Çatal Hüyük: A Neolithic town in Anatolia*. London: Thames & Hudson.
Neef, Reinder. 2003. Overlooking the Steppe-Forest: A preliminary report on the botanical remains from Early Neolithic Göbekli Tepe. *Neo-Lithics* 2: 13–16.
Notroff, Jens, Oliver Dietrich, and Klaus Schmidt. 2014. Building monuments, creating communities. Early monumental architecture at Pre-Pottery Neolithic Göbekli Tepe. In *Approaching monumentality in archaeology*, ed. James Osborne, 83–105. Albany: SUNY Press.
Notroff, Jens, Oliver Dietrich, and Klaus Schmidt. 2016. Gathering of the dead? The Early Neolithic sanctuaries of Göbekli Tepe, Southeastern Turkey. In *Death rituals, social order and the archaeology of immortality in the ancient world. "Death shall have no dominion"*, ed. Colin Renfrew, Michael J. Boyd, and Iain Morley, 65–81. Cambridge: Cambridge University Press.
Özbasaran, Mihriban. 2012. Aşıklı. In *The Neolithic in Turkey. Vol. 3. Central Turkey and Mediterranean*, ed. Mehmet Özdoğan, Nezih Başgelen, and Peter Kuniholm, 135–158. Istanbul: Arkeoloji ve Sanat Yayınları.
Peters, Joris, and Klaus Schmidt. 2004. Animals in the symbolic world of Pre-Pottery Neolithic Göbekli Tepe, south-eastern Turkey: A preliminary assessment. *Anthropozoologica* 39 (1): 179–218.
Peters, Joris, Angela von den Driesch, and Daniel Helmer. 2005a. The upper Euphrates-Tigris basin: Cradle of agro-pastoralism? In *The first steps of animal domestication: New archaeozoological approaches*, ed. Jean-Denis Vigne, Joris Peters, and Daniel Helmer, 96–124. Oxford: Oxbow Books.
Peters, Joris, Angela von den Driesch, Nadja Pöllath, and Klaus Schmidt. 2005b. Birds in the megalithic art of Pre-Pottery Neolithic Göbekli Tepe, Southeast Turkey. In *Feathers, grit and symbolism. Birds and humans in the ancient Old and New worlds. Documenta Archaeobiologiae*, ed. Gisela Grupe and Joris Peters, vol. 4, 223–234. Leidorf Verlag: Rahden/Westf.
Peters, Joris, Benjamin S. Arbuckle, and Nadja Pöllath. 2014. Subsistence and beyond: Animals in Neolithic Anatolia. In *The Neolithic in Turkey, 10,500–5200 BC. Environment, settlement, flora, fauna, dating, symbols of belief, with views from North, South, East and West*, ed. Mehmet Özdoğan, Nezih Başgelen, and Peter Kuniholm, vol. 6, 135–203. Istanbul: Arkeoloji ve Sanat Yayınları.
Peters, Joris, Nadja Pöllath, and Benjamin S. Arbuckle. 2017. The emergence of livestock husbandry in Early Neolithic Anatolia. In *The Oxford handbook of zooarchaeology*, ed. Umberto Albarella, Mauro Rizzetto, Hannah Russ, Kim Vickers, and Sarah Viner-Daniels, 247–265. Oxford: Oxford University Press.
Piesker, Katja. 2014. Göbekli Tepe-Bauforschung in den Anlagen C und E in den Jahren 2010 und 2012. *Zeitschrift für Orient-Archäologie* 7: 14–54.
Pöllath, Nadja, Oliver Dietrich, Jens Notroff, Lee Clare, Laura Dietrich, Çiğdem Köksal-Schmidt, Klaus Schmidt, and Joris Peters. 2018. Almost a chest hit: An aurochs humerus with hunting lesion from Göbekli Tepe, south-eastern Tukey, and its implications. *Quaternary International* 495: 30–48.
Rosenberg, Michael, R. Marc Nesbitt, Richard W. Redding, and Brian L. Peasnall. 1998. Hallan Çemi, pig husbandry, and post-Pleistocene adaptations along the Taurus-Zagros arc (Turkey). *Paléorient* 24 (1): 25–41.
Russell, Nerissa. 2012. Hunting sacrifice at Neolithic Çatalhöyük. In *Sacred Killing. The archaeology of sacrifice in the ancient Near East*, ed. A.M. Porter and G.M. Schwartz, 79–95. Winona Lake: Eisenbrauns.
Russell, Nerissa, and Kevin J. McGowan. 2003. Dance of the cranes: Crane symbolism at Çatalhöyük and beyond. *Antiquity* 77 (297): 445–455.
Schmidt, Klaus. 2000. Göbekli Tepe, Southeastern Turkey. A preliminary report on the 1995–1999 excavations. *Paléorient* 26 (1): 45–54.
Schmidt, Klaus. 2006. *Sie bauten die ersten Tempel. Das rätselhafte Heiligtum der Steinzeitjäger*. München: Beck Verlag.
Schmidt, Klaus. 2008. Die zähnefletschenden Raubtiere des Göbekli Tepe. In *Fundstellen. Gesammelte Schriften zur Archäologie und Geschichte Altvorderasiens ad honorem Hartmut Kühne*, ed. D. Bonatz, R.M. Czichon, and F. Janoscha Kreppner, 61–69. Wiesbaden: Harrassowitz Verlag.

Schmidt, Klaus. 2010. Göbekli Tepe – The Stone Age Sanctuaries. New results of ongoing excavations with a special focus on sculptures and high reliefs. *Documenta Praehistorica* 37: 239–256.
Schmidt, Klaus. 2012. *Göbekli Tepe. A Stone Age Sanctuary in South-Eastern Anatolia*. Berlin: ex oriente.
Tanno, Ken-Ichi, and George Willcox. 2006. How fast was wild wheat domesticated? *Science* 311: 1886.
Willcox, George, and Danielle Stordeur. 2012. Large-scale cereal processing before domestication during the tenth millennium calBC in northern Syria. *Antiquity* 86: 99–114.
Zimmermann, Michaela I., Nadja Pöllath, Mihriban Özbaşaran, and Joris Peters. 2018. Joint health in free-ranging and confined small bovids – Implications for early stage caprine management. *Journal of Archaeological Science* 92: 13–27.

Gobustan Rock Art Cultural Landscape (Azerbaijan)

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Gobustan Rock Art Cultural Landscape (Azerbaijan), Fig. 1 Zenital photo of the area of the Park and map with localization of Gobustan. (After: http://www.gobustan-rockart.az/en/pages/5-Map and editing by D. Sigari)

Introduction

The Gobustan Rock Art Cultural Landscape, 40° 7′ 30“ N latitude and 49° 22′ 30” E longitude, is located within the Gobustan State Historical-Artistic Reserve, in the territories of two administrative districts, Garadağ included in the Baku city administrative territory, and Abşeron, 60 km south, the Azerbaijan capital city, Baku. The rock art area has more than 6,000 petroglyphs on more than 1,000 rocks with a long chronology, from the Upper Palaeolithic to historical times (Fig. 1).

The Gobustan National Park covers 4,535 hectares and includes five main rock art concentrations: Böyükdaş, Kiçikdaş, Jingirdağ, Şongardag, and Şikhgaya. The total area of the World Heritage Site is 537.22 hectares.

On September 9, 1966, the area enclosing Böyük Daş, Kiçik Daş, and Jingirdağ-Yazılitepe was declared a State Historical Artistic Reserve, referring it as a special protected historic-cultural site of world significance.

In 2007, at the XXXI Session of UNESCO, which was held in Christchurch, New Zealand, the Gobustan Rock Art Cultural Landscape Complex was included in the “World Cultural Heritage”

list. In the same year, Gobustan acquired the designated status as a National Reserve.

Definition

Gobustan, which means the "land of dry riverbed," is characterized by a rocky landscape, within a semiarid environment. The region is at the south-eastern appendix of the Great Caucasus range, on the west bank of the Caspian Sea, on the northern edge of the subdesert plane called Shirvan Steppe, and represents a landbridge between Europe and Asia.

The geology of Gobustan comprises a thick limestone sedimentary rock that has within its matrix numerous species of bivalve shells of *Didacna* sp.; a fossil record, testifying the submersion of the region during the Pleistocene era (Arslanov et al. 2015). The characteristic terraced profile of the three upland areas, Böyükdaş, Kiçikdaş, and Jingirdağ-Yazılitepe, is a clear evidence of ancient coastal lines onto which the first human groups landed and settled down. These terraces are the results of the Caspian Sea repeated regression and transgression activities (Sigari 2017), so it is possible to use the Caspian eustatic movements as a valid chronological indicator for the rock art chronology (as well as other archaeological factors). According to Arslanov et al. 2015, following the maximum stage of the Early Khvalynian transgression (+48 to +50 m asl), two more transgressions of +35 and +22 m also occurred during a period of deglaciation, approximately between 16 and 14 ka cal. BP (Arslanov et al. 2015). Finally, between 14 and 12 ka cal. BP, other two transgressions occurred, reaching altitudes asl of 0 and –12 m, probably corresponding to an Allerød warming phase the former, to the warming at the end of the Younger Dryas the latter (Arslanov et al. 2015; Sigari 2017). So it is plausible to state that the first inhabitants of the Gobustan region were also responsible for the production of the first rock art during what is referred to as the Early Khvalynian Transgression (Sigari 2017) (Fig. 2).

Early Studies and the Archaeological Context

The first Gobustan engravings were discovered in May 1939 by Ishag Jafarzade. However, due to events in World War II, the systematic researches did not start until 1947.

The first scientific study of Gobustan rock art is attributed to the prominent Azerbaijani archaeologist Ishag Mamedrza Jafarzade, who undertook fieldwork during the mid-1960s, recording more than 3,500 petroglyphs, that included anthropic hollows and holes, on more than 750 rocks (Jafarzade 1973).

Gobustan Rock Art Cultural Landscape (Azerbaijan), Fig. 2 (**a**) Panoramic view of Böyükdaş and its terraces; (**b**) Seashell fossils enclosed in the limestone rocks. (Photos by D. Sigari)

Following the work of Jafarzade, archaeologists C. Rustamov and F. Muradova continued archaeological research in Gobustan, unearthing a long chronological multilayered stratigraphy that revealed from Upper Paleolithic to Middle Age (Rustamov 1994; Rustamov and Muradova 2008). The archaeological excavations were undertaken in a number of rock shelters. Forty kurgans, a multiple burial (ten adults and one child) in Firuz, a possible sanctuary in Yazılıtepe, Bronze Age settlements, and thousands of archaeological artifacts were uncovered. Muradova and Rustamov recorded nearly 400 new engraved stones, increasing the number of rock art sites to more than 6,000 engravings on a 1,000 rocks (Rustamov and Muradova 2008). Comparing the stratigraphic sequences of each of the rock shelter sites, it was possible to correlate them and establish a more precise chronology.

According to Rustamov (2006), the first occupation phase was between 20 and 17 ka BP. Recently published datings may confirm this, even though their archaeological contexts have not yet been officially sanctioned or published (see Sigari 2017: 57). A study on eustatic rise of the Caspian Sea was proposed in (Sigari 2017). The study suggested that a variety of locates were utilized, from hilltops to the lower beaches.

Based on the archaeological evidence, a Pre-Pottery Neolithic burial unearthed in Kaniza and some artifacts, the Neolithic was underrepresented, probably due to a natural catastrophe occurred in Gobustan, which is recognized through a number of different rock displacements that occurred in the early years of the Mesolithic-Neolithic transition (Rustamov 2006).

Later during the Bronze Age, it is possible to recognize a strong influence by other Caucasian cultures, e.g., the "Kura-Arax," "Maykop," and "Khojaly-Gadabay" (Muradova 2011).

The continuous occupation of the region, dating the Upper Palaeolithic to the Middle Ages, involved the production of rock art as well (Rustamov 2006). In terms of rock art chronology, five main horizons were recognized: Horizon I (Upper Palaeolithic-Mesolithic), Horizon II (Neolithic), Horizon III (Bronze Age), Horizon IV (Iron Age-Antique), and Horizon V (Middle Age and later) (Farajova 2009).

In terms of engravings techniques, Gobustan rock art is usually scratched and/or abraded into the limestone rocks, with exception of only two red painted figures (Rustamov 2006). The main themes include the auroch, horse, boats, feminine silhouette, warrior-hunter, goat, camel, tamga, deer, and rider. Each chronological phase has its own distinct style and subject matter.

The Most Ancient Rock Art: The Upper Palaeolithic

The most ancient phases of Gobustan rock art can be attributed to the end of Pleistocene era and are concentrated in and around Böyükdaş, Kiçikdaş, and Şongardag areas.

Especially on the terraces of Kiçikdaş and Böyükdaş, the engravings can be found in open-air locates, rock shelter and caves. They are also found on erratic boulders, and on the south-eastern, eastern sides of the mountains that overlook the Caspian Sea.

The most ancient rock art can be grouped into four main categories: zoomorphs (bovid, equid, caprid), anthropomorphs (feminine silhouettes, the so-called hunters-warriors and dancers), boat-forms, and geometric signs, which are considered relatively infrequent (Fig. 3).

Zoomorphic figures were mainly portrayed adopting strategic contour line, used as a form of enhancement. In some cases, it is possible to notice how the rock features were used to represent parts of the animal body, to frame or to give a three-dimensional effect to the figures. The dominant subjects are aurochs and horses that can be coupled (e.g., Rocks No. 42-49-46b on Böyükdaş) (Fig. 4) and in hunting scenes (e.g., Rock No. 45 on Böyükdaş), or in what appear to be generic ritual scenes (e.g., Rock No. 30 on Böyükdaş).

Anthropomorphic figures are usually divided into three groups: hunters-warriors, feminine silhouettes, and dancers. Anthropomorphs usually change from the most stylized to the most naturalistic figures. These changes occur according to different chronological phases. Rustamov gave emphasis to the anthropomorphic figures which

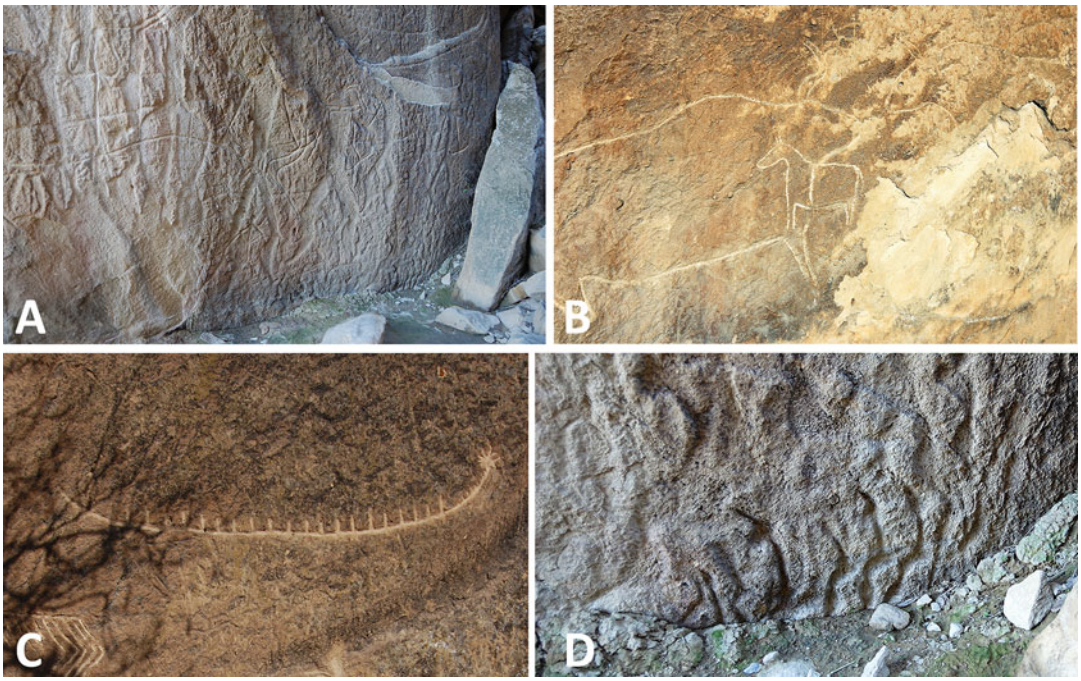

Gobustan Rock Art Cultural Landscape (Azerbaijan), Fig. 3 The most recurrent themes in the most ancient rock art of Gobustan: (**a**) a big bovid with several anthropomorphic under and overimposed on Rock No. 29 in Böyükdaş, (**b**) Two big bovids and a horse Rock No. 49 in Böyükdaş, the eye of one of the two auroch is a crack into the rock surface; (**c**) A boat figure on the southern side of Rock No. 29 in Böyükdaş; (**d**) Feminine silhouettes, partly covered by the soil, on the northern side of Rock No. 29 in Böyükdaş. (Photos by D. Sigari)

Gobustan Rock Art Cultural Landscape (Azerbaijan), Fig. 4 Tracing of two facing aurochs on Rock No. 46b in Böyükdaş. (Photo by D. Sigari)

seem to have been the first engraved. They reveal male figures to belong to a different sequence based on their size, from the smallest to the largest (Rustamov 2006). The same stylistic evolution appears in the varying shapes of boats. Sigari (2017) recently proposed a relative chronology for boat figures, whose different styles are diffused along the terraces of Böyükdaş and Kiçikdaş. These figures show some degree of uniformity, suggesting that the first boat images, which are present on the upper terraces of both Böyükdaş and Kiçikdaş, date to a period of deglaciation, which occurred between 16 and 14 ka or even earlier. A new style emerged with the adoption of the new symbols in the boat representation, such as the sun symbol one and the "X"- shaped

crew, was probably dated after 14 and 12 ka cal. BP, when the Later Khvalynian stages occurred, thus witnessing a rising sea level of between 0 and −12 masl (Sigari 2017). Zoomorphic figures, the most ancient figures of the Gobustan assemblage are usually the most naturalistic, except for, say, the smallest forms (Rustamov 2006; Sigari 2013).

The Neolithic Rock Art: Continuity with the Past Towards New Economies and Societies?

The presence of Neolithic rock art is based on the idea of the stylistic evolution of some figurative themes from the previous stage (Rustamov 2006; Farajova 2009). However, no systematic studies have been carried out yet, making hard any attempt of a substantial definition for this phase.

The Rock Art of an Ancient Complex Society: The Bronze Age

The majority of the Gobustan rock art assemblage is dated to the Bronze Age, between fourth and second millennium BCE, suggesting that the area was intensively lived in this period.

The engraved figures were portrayed adopting contour lines. They were carved on the southern and eastern sides of the boulders, occasionally they appear on the northern sides.

Engraved stones can be placed in association with other stones and/or structures suggesting a possible place of worship.

Bronze Age petroglyphs follow a stylistic tradition that is repeated elsewhere during this period, from naturalistic to schematic forms. Newly introduced figures include abstract forms, wheeled vehicles, and horseman.

The most recurrent themes of Gobustan Bronze Age rock art are: bezoar goat, cervids, and anthropomorphic imagery.

Goat images are the main subject matter and (Fig. 5) in Böyükdaş are ideal chronological markers, being not associated with the most ancient figures and, in some cases, overlapping previous carvings. This subject was found on 30 rocks out of 34 rocks, which were sealed by layers dated to the Bronze Age (Muradova 2003).

Anthropomorphic petroglyphs are mainly portrayed in two ways: the *so-called* praying figures (Fig. 6), with raised arms, and the dancers. The praying figures are extremely schematic in form, while the dancing figures have the body with a straight vertical line, open legs with wrapped knees, curved arms, a small edged head, and with clear sexual organs. Within some panel narratives, dancers are associated with goats, resembling an ethnographic folk play "Təkə oyunu," a ritual ceremonial dance occurring in this part of the world (Abdullayev 2015).

Cervid images have a proportionate body structure and are in a motion stance, sometimes turning the head backwards.

Gobustan Rock Art Cultural Landscape (Azerbaijan), Fig. 5 Goat figures on Rock No. 54 in Jingirdağ mountain. (Photo by K. Abbasov)

Gobustan Rock Art Cultural Landscape (Azerbaijan), Fig. 6 Praying anthropomorphs on Rock No. 24 in Böyükdaş. (Photo by D. Sigari)

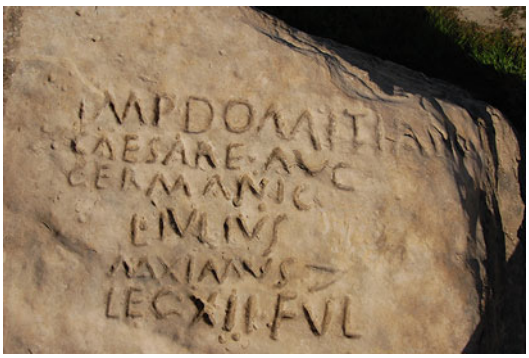

Gobustan Rock Art Cultural Landscape (Azerbaijan), Fig. 7 The Roman inscription in Böyükdaş. (Photo by D. Sigari)

Historical Rock Art: From the Antique to Medieval Periods

At the foot of the Böyükdaş Mountain, there is inscription engraved by a centurion of the Legio XII fulminata of the Roman Army. The inscription testifies the passage of the Romans in Gobustan during Domitian's empire (AD 81–96). Medieval rock carvings can be grouped into the following categories: riders, hunting scenes, zoomorphs, geometric signs, tamgas, and epigraphic inscriptions, representing an important historical reference, confirming a long use of the site (Fig. 7).

The historical rock art was scratched and pecked using both stone and metal tools.

Zoomorphic figures appear to have different meanings. They can be considered as being reflections of everyday life, or part of a cosmogony and beliefs, e.g., goat figures which, incidentally can even assist in establishing a chronology for medieval pottery. Goat images are depicted on twelfth to thirteenth century jars (Ahmadov 1959; Leviatov 1945). These figures with curved horns are similar to those present on Gobustan medieval petroglyphs. Since goat is interpreted as a symbol of abundance and fertility, its frequent representation may be due to the semi-nomadic lifestyle of the human groups living in Gobustan during the Middle Age.

Other frequent zoomorphic subjects include cervids, camelids, predators, and horse. Humped camels can be associated with caravan scenes too. They are usually portrayed in profile-view and the chronology of these images is between thirteenth and fifteenth centuries.

An important part of the Gobustan rock art assemblage of this period is the various types of tamgas and geometric forms. According to Jafarzade's chronological sequence, the oldest tamgas date to the tenth century, even though they become a very recurrent theme between the fifteenth and eighteenth centuries (Jafarzade 1973).

Tamgas and geometric forms are found on five Gobustan mountain rock art sites, as well as

Gobustan Rock Art Cultural Landscape (Azerbaijan), Fig. 8 Rock No. 123 in Jingirdağ Mountain. Twenty 20 tribal signs-tamgas were engraved on this rock. (Photo by K.Abbasov)

on medieval grave stones and on the walls of two caravanserais: Sangachal and Miecik in Gobustan. In the latter site, these forms are underneath an inscription that dates to the fifteenth or sixteenth century. They are similar to those associated with prehistoric rock art (Fig. 8).

Tamgas were probably used for different purposes: either to mark places of residence, pointers to "natural boundaries" for tribal communities, places where important issues were settled, or on grave stones, to indicate the family lineage.

The tradition of carving stones in Gobustan continued until the nineteenth century and the local population still attribute a sacred meaning to the mountains, readapting it in the light of the Islamic tradition through the medium of art.

Key Issues/Current Debates/Future Directions/Examples

The Gobustan rock art assemblage has common problems that are also found with other open air rock art sites, such as the Côa valley, Qurta, and Siega Verde. First and foremost of these is making sense of its comprehension and meaning and chronology. Part of the solution may come from making inferences to the landscape in which the rock art is located.

Though some attempts have been made in establishing a relative chronology of rock art production (Sigari 2013, 2017; Farajova 2009) and use, further research is needed. Recent research focused on this topic (Sigari 2013, 2017; Farajova 2009; Jafarzade 1973), culminating in the "Gobustan Rock Art Recording Project," undertaken by the Gobustan National Historical Artistic Reserve commenced in 2016, will take the issue of open air rock art to the next stage beyond primary documentation. The project aims to document systematically all known Gobustan rock art, creating a digital database and a new catalogue, the result of adopting modern methodologies. The investigation is now focusing on the area of Jingirdağ-Yazılitepe (Abdullayev et al. 2016) and has already permitted to recognize 14 new engraved rocks and 521 new figures.

Advances in rock art studies and the new systematic research in the area will allow the project team to be better informed on not just the rock art per se but the ancient remnant environment in which it stands and the relationships with other rock art sites of the Euro-Caucasian region.

The analysis of represented themes, such as boats, fauna, and human figures, their distribution and relationship within Gobustan region itself and other rock art contexts, combined with the other archaeological, palaeontological, and palaeoclimatic evidence will be the key issues in further research within this fascinating key region where Asia meets Europe.

Cross-References

▶ Côa Valley Rock Art Sites
▶ Europe: Prehistoric Rock Art
▶ Landscape Archaeology
▶ Siega Verde Rock Art Sites

References

Abdullayev, Rahman. 2015. Qobustanın Tunc Dövrü keçi təsvirləri. In *Proceedings of the International Conference on Actual problems of the history of the Caucasus, Ganja, 15–16 October 2015 Vol. 1*, edited by Yusif Yusifov, 25–28. Ganja: Ganja State University Publishing House.

Abdullayev, Rahman, Sevinc Shirinli, Kamran Abbasov, Səidə Musayeva, and Leyla Əliyeva. 2016. *Qobustan. Yeni Baxış. Cingirdağ – Yazılıtəpə 2016–Cı Il Çöl Tədqiqatı*. Baku: Setline production

Ahmadov, Qara Mehemmad. 1959. *Azərbaycanın Şirsiz Saxsı Məmulatı*. Baku: Az.SSR Elmlər Akademiyası.

Arslanov, Kh.A., Tamara A. Yanina, A.L. Chepalyga, A.A. Svitoch, R.R. Makshaev, F.E. Maksimov, S.B. Chernov, N.I. Tertychniy, and A.A. Starikova. 2015. On the age of the Khvalynian deposits of the Caspian Sea coasts according to 14C and 230Th/234U methods. *Quaternary International* 409: 1–7. https://doi.org/10.1016/j.quaint.2015.05.067.

Farajova, Malahat. 2009. *Rock art of Azerbaijan*. Baku: Aspoliqraf.

Jafarzade, Ishag Mamed. 1973. *Qobustan. Qayaüstü Rəsmləri*. Baku: Elm.

Leviatov, Vadim Nikolayevic. 1945. Ukrasheniya na karasakh Staroi Gandji. *AZ.SSR EA xəbərləri* 8:50–65. (in Russian)

Muradova, Firuze. 2003. Qobustanın Tunc Dövrü Abidələrindən Rəsmli Daşlar. *Azərbaycan Arxeologiyası və Etnoqrafiyası Jurnalı* 1: 47–54.

Muradova, Firuze. 2011. *Gobustan at the Bronze Age*. Baku: YEK production.

Rustamov, Djafargulu. 1994. *Gobustan Dünyasi*. Baku: Nurlar.

Rustamov, Djafargulu. 2006. In *Gobustan, the ancient centre of Azerbaijan culture: Devoted to the 80th anniversary of archeologist Jafargulu Rustamov*, ed. Firuza Muradova. Baku: Nurlar.

Rustamov, Djafargulu, and Firuze Muradova. 2008. *Kiçikdaş Abidələri*. Baku: E. L.

Sigari, Dario. 2013. Palaeolithic rock art in Gobustan, Azerbaijan, the rock 44 of Böyük Das, Gobustan. *Journal of Iranian Archaeology* 4: 15–22.

Sigari, Dario. 2017. Portrayal of a sea in a semiarid environment: Boat engravings in Böyük Daş, Gobustan. *Journal of Arid Environments* 143 (29): 57–63. https://doi.org/10.1016/j.jaridenv.2016.12.012.

Further Reading

Abdullayev, Rahman. 2015. Bronze Age rock art of Gobustan. Arkeos. Proceedings of the XIX International Rock Art Conference IFRAO 2015, vol. 37, Cáceres, 31 Aug – 4 Sept 2015, pp. 1693–1703.

Anati, Emmanuel. 2001. *Gobustan. Azerbaijan*. Capo di Ponte: Edizioni del Centro.

Shirinli, Sevinc. 2015. The characteristics of the some medieval period images of Gobustan. Arkeos. Proceedings of the XIX International Rock Art Conference IFRAO 2015, vol. 37, Cáceres, 31 Aug – 4 Sept 2015, pp. 1515–1525.

G

Goggin, John M.

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Basic Biographical Information

John Mann Goggin (1916–1963) was a great mind that led a life of expedition and discovery, had vast interests and eccentric hobbies, and was a devotee of natural history. Moreover, he was an anthropologist and archaeologist committed to the history of humanity (Sturtevant 1964: 386–9).

Goggin was born in Chicago and undertook his graduate degree at Yale University. His experiences growing up in Miami with the Seminole Indians and his excursions to New Mexico and to Chihuahua with the Tarahumara, along with his passion for the great outdoors and collecting natural specimens and artifacts, influenced the way in which he understood the relationship between humankind and the natural environment. This made him increasingly aware of the problems involved in sampling and the similarities and variations within artifacts. These ideas were translated into the methodological tool known as cultural traditions, following the work of Rouse in Connecticut

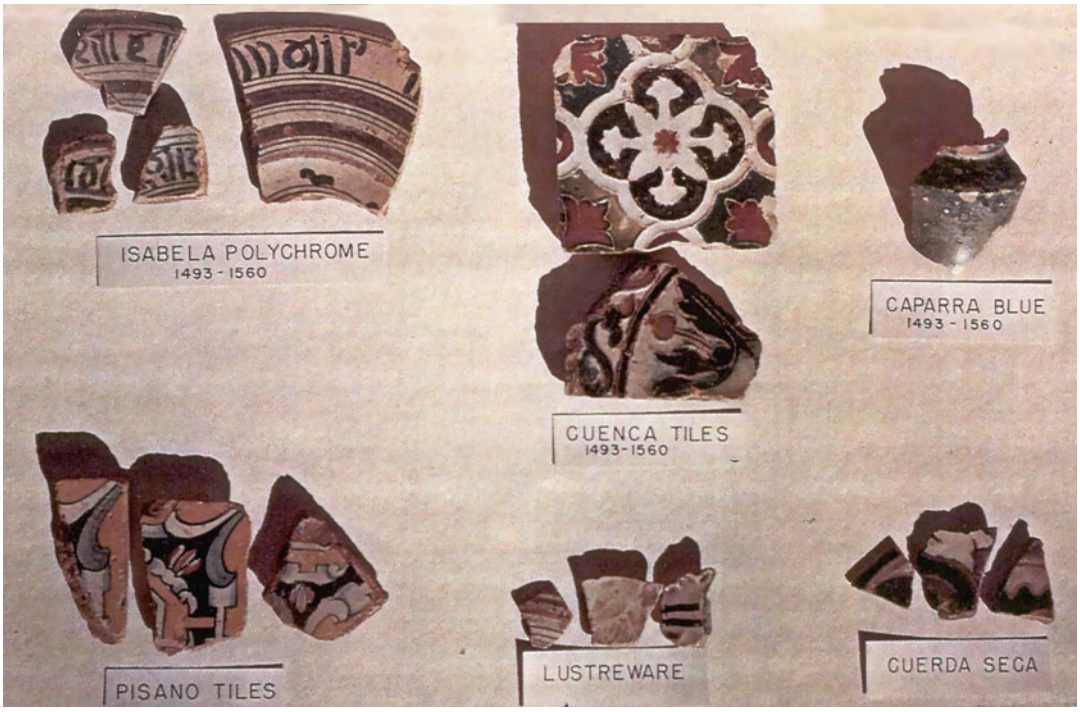

Goggin, John M., Fig. 1 Majolica samples originally classified by Goggin

and that by Willey in Peru (Goggin 1964: 110). Moreover, this was applied in the St. John's region, where he identified a Spanish-Indian tradition that resulted from the impact of Hispanic culture on Indian one (Goggin 1998: 71–2).

Major Accomplishments

Goggin's main interest was the interaction between colonists and indigenous groups in the New World. His fascination for the pottery of former Spanish colonies made him aware of the necessity to create a complete typology of majolica pottery from the sixteenth to the eighteenth centuries. This drew him into studying materials from Mexico, Colombia, and the Caribbean, which culminated in the posthumous publication of *Spanish Majolica in the New World* (1968). This is a foundational study that set the basis for typological analysis of majolica in the Spanish Empire and the Indies. Along this one, *The Spanish Olive Jar* (1960) is a comprehensive typological work that emphasizes the relevance of studying these artifacts from the former Spanish colonies. Unfortunately, his untimely death in 1963 left much of his research in note and manuscript form (Goggin n.d.) (Fig. 1).

His legacy of scholarship and theoretical developments continues inspiring students and scholars alike to follow his steps in the archaeology of the former Spanish Empire and shaped the interests of scholars and students allocated in the Department of Archaeology in the University of Florida.

His work on pottery from the Indies was translated into one of the most complete databases intended for pottery identification by the Florida Museum of Natural History (http://www.flmnh.ufl.edu/histarch/gallery_types/). His emphasis on the value of combining surface collection, stratigraphic tests, typology and the use

of historical sources, and examination of works of art and artifacts in museums to study historical periods is widely used today (Rouse 1964: 372). His seminal studies of majolica, glass beads, and Spanish olive jars are still relevant reference works, although subsequent researchers have refined our understanding of these artifacts (Weisman 2002).

His personality and bequest were unique and his written works reveal his passion and profound respect for archaeological and ethnographic cultures.

Cross-References

- ▶ Caribbean Historical Archaeology
- ▶ Deagan, Kathleen A.
- ▶ Hispanic South America: Historical Archaeology
- ▶ Mexico: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Willey, Gordon Randolph

References

Goggin, J.M. 1960. *The Spanish olive jar. An introductory study*. New Haven: Yale University.

Goggin, J.M. 1964. In *Indian and Spanish: Selected writings*, ed. C.H. Fairbanks, I. Rouse, and W.C. Sturtevant. Coral Gables: University of Miami Press.

Goggin, J.M. 1968. *Spanish majolica in the new world*. New Haven: Yale University.

Goggin, J.M. 1998. *Space and time perspective in northern St. Johns archaeology, Florida*. Gainesville: University Press of Florida.

Goggin, John Mann. (1916–1963). n.d.. *The Goggin notecard collection. Indexed boxes on file*. Gainesville: P.K. Yonge Library of Florida History.

Rouse, I. 1964. John Mann Goggin, 1916–1963. *American Antiquity* 29: 369–375.

Sturtevant, W.C. 1964. John Mann Goggin, 1916–1963. *American Anthropologist* 66: 385–394.

Further Reading

Goggin, J.M. 1960. Underwater archaeology: Its nature and limitations. *American Antiquity* 25: 348–354.

Weisman, B.R. 2002. *Pioneer in space and time: John Mann Goggin and the development of Florida archaeology*. Gainesville: University Press of Florida.

Gold Museum (Museo del Oro)

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Basic Information

Museo del Oro ("Gold Museum")
Parque Santander, Carrera 5, Calle 16
Bogotá, Colombia
http://www.banrepcultural.org/museo-del-oro

The Bogotá Gold Museum was created in 1939 and houses archaeological objects of gold, pottery, bone, shell, stone, and textiles. The extraordinary quality of its collection of pre-Hispanic goldwork, the largest in existence, makes it unique in the world. It was established by the Central Bank of Colombia, to which the museum belongs, to save metallurgical pieces from being destroyed or removed to museums and private collections in other parts of the world, especially Europe and North America. From its foundation, the museum has valued the unique and artistic nature of the objects and their importance to Colombians as representations of a common past. The Gold Museum is by nature a national museum, the most important Museum of Anthropology and Archaeology in the country, being, from its creation, the leading institution in museology, museography, and conservation. Research programs in archaeology, archaeometallurgy, and education, the latter focusing on public primary schools, have been of particular importance.

The majority of objects forming the Gold Museum's collection have not come from systematic archaeological excavations, but rather from treasure hunters, or "guaqueros," grave robbers, and so come from the looting of pre-Hispanic indigenous tombs and places of offerings. The lack of an archaeological context for the museum's objects makes study of the social significance of the cultural material difficult, especially of the goldwork. The information that is presented to the public, therefore, comes from

various other sources, such as ethnography, ethnology, and ethnohistory, which are used to explain the objects and suggest possible meanings for them and their uses. Other aspects can be studied from the objects themselves and have been widely investigated, such as the technology and iconographic styles of diverse groups of metal objects (e.g., Plazas and Falchetti 1986; Falchetti 1995; Lleras Pérez 1999; Uribe 2005, 2007; Saenz Samper 2010).

The museum has four exhibition galleries and one interactive gallery, the Exploratorium. The first gallery is dedicated to Metal Technology. The second gallery exhibits objects produced by the different pre-Hispanic societies that existed in the territory now known as Colombia. Here, archaeological information is used to contextualize the objects of metal and other materials, emphasizing their relationship with the political and religious organization of those societies. The third gallery deals with the cosmology and symbolism of the metal objects and exhibits objects that have been interpreted as genuine examples of shamanic art by various authors (e.g., Reichel Dolmatoff 1988). The gallery of Offerings is a closed precinct, which, through exhibiting hundreds of diverse types of objects with lights and sound, evokes the Tribute Ceremony, in which many pre-Hispanic societies would use metal objects. The Exploratorium is a gallery where visitors interact across distinct Anthropological and Archaeological themes, facilitating reflection on the importance of archaeological heritage and cultural diversity.

Major Impact

History

In 1939, the Colombian government requested that the Central Bank buy pre-Hispanic gold objects in order to preserve them. Subsequently the Central Bank acquired archaeological pieces from private collections. In 1968, a building specially designed for the museum was opened (Londoño Vélez 1989). During the 1970s and 1980s, the collections were expanded and objects of pottery, shell, bone, and textile acquired. The museum considered it essential to draw on anthropology and archaeology in order to enable its exhibitions to present a more full understanding of many aspects of pre-Hispanic societies.

Towards the 1980s, the theoretical basis of archaeology in Colombia changed from being a purely traditional one that emphasized the characterization of archaeological zones, chronological sequences, and artifact classification to a processual theoretical framework that emphasized, among others, studies of settlements and relations between humans and the environment. At the museum, this change was reflected in the content of the permanent exhibition; the guidebooks used information obtained from the museum's own archaeological research (e.g., Plazas and Falchetti 1986), and from other institutions, and at the same time adopted an approach that utilized the insights of anthropology to incorporate ethnographic information and suggest uses and functions for the objects (e.g., Pineda Camacho 1986; Reichel Dolmatoff 1988).

Today

The museum was completely renovated in 2008. The museum's new exhibition constitutes a modern museographic design and includes an interactive gallery (see above) and audio visual aids specially designed for different audiences. The current museum guides separate the technological information about metallurgy, derived from the more than 30 years of investigation by the museum, from that of a more archaeological nature, which draws on current information from other researchers. Three of the new museum galleries are dedicated to the interpretation of meanings and symbols of the metal objects. Making use of ethnographic analogy, and working from the fact that various indigenous societies currently living in Colombia have ancestral links with the pre-Hispanic period, anthropological information about the cosmology, symbolism, and religious beliefs of indigenous American societies, particularly from Colombia, is used to interpret and suggest the meanings of archaeological objects.

The importance that the museum has given the country's indigenous societies contributes to valuing and respecting the present-day indigenous

peoples as part of a multicultural nation. The museum constitutes a unique space that attracts a large and diverse audience and is moreover a highly regarded institution. The Gold Museum's excellent and invaluable work of informing and educating has made it a distinguished institution in Colombia and an obligatory reference for any statements about Colombian identity.

Cross-References

- ▶ Conservation in Museums
- ▶ Heritage Museums and the Public
- ▶ Modern Material Culture, Archaeology of
- ▶ Museums and Memory Experiences
- ▶ South American Rock Art

References

Falchetti, A.M. 1995. *El oro del Gran Zenú. Metalurgia prehispánica en las llanuras del Caribe colombiano*. Bogotá: Banco de la República.

Lleras Pérez, R. 1999. *Prehispanic metallurgy and votive offerings in the eastern Cordillera, Colombia*. British Archaeological Reports International series 778. Oxford: Archaeopress.

Londoño Vélez, S. 1989. *Museo del Oro 50 años*. Bogotá: Banco de la República.

Pineda Camacho, R. 1986. Etnografía del mambeadero: espacio de la coca. *Texto y Contexto* 9: 113–127.

Plazas, C., and A.M. Falchetti. 1986. Patrones culturales en la orfebrería prehispánica de Colombia. In *Metalurgia de América Precolombina, 45 International Congress of Americanistas*, ed. C. Plazas and A.M. Falchetti, 201–246. Bogotá: Colección Bibliográfica Banco de la República.

Reichel Dolmatoff, G. 1988. *Orfebrería y chamanismo. Un estudio iconográfico del Museo del Oro*. Bogotá: Banco de la República.

Saenz Samper, J. 2010. *Engraved in metal: goldworking technologies at the Sierra Nevada de Santa Marta, Colombia. From Nahuange to Tairona. AD 100-AD 1600*. Unpublished MSc dissertation, University College London, Institute of Archaeology.

Uribe, M.A. 2005. Mujeres, calabazos, brillo y tumbaga. Símbolos de vida y transformación en la orfebreria Quimbaya Temprana. *Boletín de Antropología* 19 (36): 61–93.

Uribe, M.A. 2007. *From chemical analyses to meaning: A study of materials and choices in Muisca metalwork from pre-hispanic Colombia*. Unpublished MA dissertation, University College London.

Further Reading

Archila, S. 1996. *La orfebrería de Malagana*. Bogotá: Museo del Oro, Banco de la República.

Botero, C.I. 2005. Los conceptos y las miradas a la metalurgia prehispánica de Colombia, las exhibiciones permanentes del Museo del Oro 1940–1968. *Journal de la Societé des Américanistes*.

Bray, W. 1978. *The gold of El Dorado*. Exhibition catalogue. London: The Royal Academic of Arts.

Lleras Pérez, R., ed. 2007. *Metalurgia en la América Antigua. Teoría, arqueología y simbología de los metales prehispánicos*. Bogotá: Fundación de Investigaciones Arqueológicas Nacionales and Centro de Estudios Mexicanos y Centeroamericanos.

Plazas, C. 2007. *Vuelo nocturno. El murciélago prehispánico y su comparación con el murciélago tairona*. Bogotá: Fundación de Investigaciones Arqueológicas Nacionales e Instituto francés de Estudios Andinos.

G

Goldberg, Paul

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Paul Goldberg is a geologist by training and obtained his B.A. in Geology from the University of Colorado (1965), Boulder. For his postgraduate studies, he moved to the University of Michigan, Ann Arbor, where he studied under William R. Farrand, one of the pioneers of Geoarchaeology; he earned M.S. (1968) and Ph.D. (1973) in Geology. His doctoral dissertation was a sedimentological study of the Palaeolithic cave deposits from Tabun, Mt. Carmel, Israel.

In 1973, he moved to the Institute of Archaeology, Hebrew University of Jerusalem, Israel, to undertake a Lady Davis Fellowship. He remained there until 1991, reaching the level of Associate Professor. During this time he continued his research on prehistoric cave sediments, such as at Kebara Cave (Goldberg et al. 2007), but also began to investigate the relationship between Quaternary landscapes and environments associated with archaeological sites in the Negev and Sinai Deserts (Goldberg 1984). Concomitantly, he began to develop the

technique of micromorphology and its application to geoarchaeological problems (Courty et al. 1989; Goldberg 1980).

From 1991 to 1995, he became a Research Scientist at the Texas Archeological Research Laboratory (TARL), The University of Texas at Austin, where he carried out geoarchaeological research, examining the micromorphology of burnt rock middens and the geoarchaeology of the Paleoindian-Prehistoric site of Wilson-Leonard. In 1995, he moved to the Department of Archaeology, Boston University, as Associate and then Full Professor and was involved in teaching courses in geoarchaeology, micromorphology, and site formation processes, emphasizing the importance of documenting artifacts and their microstratigraphic context (Goldberg and Berna 2010). Around 2000 he and colleagues from Israel, China, and the USA employed micromorphology and Fourier transform infrared spectrometry (FTIR) to demonstrate the lack of ashes and fireplaces at the *Homo erectus* site of Zhoukoudian in China (Goldberg et al. 2001).

His research continues to focus on the application and development of micromorphological techniques to understand site formation, and in the last several years, he has investigated the microstratigraphy deposits from Pleistocene caves in France (Goldberg et al. 2012), Israel, Germany, Siberia, Indonesia, and South Africa. Some of these sites are related to issues of Neanderthal pyrotechnology and Neanderthal burials. He is also currently involved in the study of Iron Age/Muslim Period sites in Menorca. In 2014–2019 he was a Professorial Research Fellow at the Centre for Archaeological Science (CAS) at the University of Wollongong and remains as a Visiting Research Professor. He is also a Senior Visiting Professor at the Institute for Archaeological Science, University of Tübingen. In addition to publications in journals, he has co-authored several books that illustrate geoarchaeological and micromorphological techniques, approaches, and theory. These include *Practical and Theoretical Geoarchaeology* (Goldberg and Macphail 2006), *Applied Soils and Micromorphology in Archaeology* (Macphail and Goldberg 2018a, b) 2018, *The Middle Paleolithic Site of Pech de l'Azé IV* (Dibble et al. 2017), and *Reconstructing Archaeological Sites* (Karkanas and Goldberg 2018).

He has received a number of rewards for his work in geoarchaeology and micromorphology, including the Rip Rapp Award (Archaeological Geology Division, Geological Society of America 2002), the Roald Fryxell Award (Society for American Archaeology 2008), the Pomerantz Award (Archaeological Institute of America 2010), and several research awards from the Alexander von Humboldt Foundation (2004, 2013, 2019).

References

Courty, M.-A., P. Goldberg, and R.I. Macphail. 1989. *Soils and micromorphology in archaeology*. Cambridge: Cambridge University Press.

Dibble, H., S.P. McPherron, P. Goldberg, and D. Sandgathe. 2017. *The Middle Paleolithic Site of Pech de l'Azé IVCave and Karst Systems of the World*. Basel: Springer International.

Goldberg, P. 1980. Micromorphology in archaeology and prehistory. *Paleorient* 6: 159–164.

Goldberg, P. 1984. Late Quaternary history of Qadesh Barnea Northeastern Sinai. *Zeitschrift für Geomorphologie* 28 (2): 193–217.

Goldberg, P., and F. Berna. 2010. Micromorphology and context. *Quaternary International* 214 (1–2): 56–62.

Goldberg, P., and R.I. Macphail. 2006. *Practical and theoretical Geoarchaeology*. Oxford: Blackwell Publishing.

Goldberg, P., S. Weiner, O. Bar-Yosef, Q. Xu, and J. Liu. 2001. Site formation processes at Zhoukoudian, China. *Journal of Human Evolution* 41: 483–530.

Goldberg, P., H. Laville, L. Meignen, and O. Bar-Yosef. 2007. Stratigraphy and Geoarchaeological history of Kebara Cave, Mount Carmel. In *Kebara Cave*, ed. O. Bar-Yosef and L. Meignen, vol. 2, 49–89. Cambridge, MA: Peabody Museum.

Goldberg, P., H. Dibble, F. Berna, D. Sandgathe, S.J.P. McPherron, and A. Turq. 2012. New evidence on Neandertal use of fire: Examples from Roc de Marsal and Pech de l'Azé IV. *Quaternary International* 247: 325–340.

Karkanas, P., and P. Goldberg. 2018. *Reconstructing archaeological sites: Understanding the Geoarchaeological matrix*. Oxford: Wiley-Blackwell.

Macphail, R.I., and P. Goldberg. 2018a. Archaeological materials. In *Interpretation of micromorphological features of soils and Regoliths*, ed. G. Stoops, V. Marcelino, and F. Mees, p. 779–819. Amsterdam: Elsevier.

Macphail, R.I., and P. Goldberg. 2018b. *Applied soils and micromorphology in archaeology*. Cambridge: Cambridge University Press.

Golmsten, Vera V.

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Basic Biographical Information

Vera Vladimirovna Golmsten (1880–1942) was an archaeologist and a doctor of historical sciences. She was born in St. Petersburg into the family of a military doctor, Vladimir V. Golmsten. She graduated from the Gymnasium for Females at the Ministry of Public Education at the Intercession Community of Nurses in St. Petersburg in 1898 and took an additional eighth pedagogical class in 1899. In 1910 she graduated from the Moscow Institute of Archaeology. She was a student of famous Russian archaeologist V.A. Gorodtsov.

After graduating from the Institute in 1910, Golmsten spent a few months living in Ufa province. In 1911 she carried out excavations of the "Chortovo (Devil)" fortified site near Ufa. After defending her dissertation in 1909–1912, she conducted archaeological excavations in Slavic and prehistoric sites in the Pskov region and the Urals. Her life was connected with the Historical Museum in Moscow from 1911 to 1919. In 1912 she became a corresponding member of the Imperial Moscow Archaeological Society.

From 1919 to 1929, Golmsten worked in Samara as a professor of Samara University. She was a teacher of higher ethnological and archaeological courses and scientific secretary of the Society of Archaeology, History, Ethnography, and Natural History. From 1922 to 1929, she was the director of the regional museum (Kuzminykh et al. 2007).

Since 1929, after her departure to Leningrad, Golmsten worked at the State Hermitage and the State Academy of the History of Material Culture (IHMC). In 1935 she received a doctorate in history. At the end of 1930, her field studies were conducted on the Lower Don.

Vera Golmsten died of hunger on March 8, 1942, during the Leningrad Blockade in the Second World War.

Major Accomplishments

Under Golmsten's leadership, continuous archaeological surveys were conducted in Samara province on 1200 archaeological sites. Excavations were conducted on monuments of all eras, including the Paleolithic in Postnikov ravine, Bronze Age burial mounds near the stations of Bezymyanka and Red Kryazhok, an early Iron Age burial ground in Berezovka, and the fortified site era Volga Bulgaria in s. Valy – "Muromsky town." (Golmsten 1925) There are more than 100 collections by Golmsten in the Samara Regional Museum named after Alabin.

Cross-References

► Gorodtsov, Vasily A.

References

Golmsten, V.V. 1925. Materials on archaeology of Samara region. Pottery of ancient settlement sites of the Samara Bend. *Bulletin of the Society of Archaeology, History, Ethnography and Natural History* 3. (in Russian).

Golmsten, V.V. 1940. *The emergence of pastoralism in Eastern Europe. Problems of the origin, evolution and the formation of breed animals*. Moscow-Leningrad (in Russian).

Kuzminykh, S.V., I.E. Safonov, and D.A. Stashenkov. 2007. *Vera Vladimirovna Golmsten: Materials for the biography*. Samara.

Golson, Jack

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Basic Biographical Information

Jack Golson was born in 1926 and raised in Rochdale in northern England (Fig. 1). As a child of the Great Depression, growing up during World War II, he was attracted to join the Young Communist

Golson, Jack, Fig. 1 Jack and Clare Golson receiving the World Archaeological Congress' Lifetime Achievement Award at the annual meeting of the Australian Archaeological Association, Adelaide, 2009

League in his late high school years and to join the student branch of the Communist Party at university. In 1943 he won a scholarship to study history at Cambridge University but was called up for national service at the end of his first year, 1943–1944. For his national service, he was conscripted to work in the coal mines as one of the "Bevin Boys" named after the Minister of Labour, Ernest Bevin (Stewart 1998). These experiences helped to form Jack Golson's strong sense of social justice.

He resumed his history studies at Cambridge in October 1948 and almost immediately discovered archaeology in the lectures on European medieval history, which brought the contribution of archaeology to an understanding of the non-literate invaders who had overthrown the Roman Empire and laid the foundations of the European Middle Ages. Golson switched his major from history to archaeology, becoming a student of Grahame Clark. He graduated with B.A. (Hons) in 1950 (M.A. in 1952) and began doctoral research in 1951, under the joint supervision of the archaeologist Clark and the historian Maurice Postan, combining history and archaeology in the study of medieval settlement in an English county.

The doctorate was never finished because in 1953 he was persuaded to apply for a Lectureship in Prehistory in the recently established Department of Anthropology at the then Auckland University College, New Zealand. The argument was that a few years' experience of this type would justify his appointment back in England in the minority field of medieval archaeology. In fact, he had decided before the end of 1954, the first year of his appointment, that he would prefer to stay where he was.

Nevertheless, in 1961, he left the University of Auckland to take up the first position in archaeology at the Australian National University, a Fellowship in Prehistory in the Department of Anthropology and Sociology in the Research School of Pacific Studies, being certain that the ANU offered greater opportunity for a professional career in the archaeology of the region. Indeed, by 1969, the archaeological component of the Department of Anthropology was strong enough to form an independent department, with Golson as the foundation Professor of Prehistory. He retired in 1991 and continues as Emeritus Professor at the Australian National University. The Jack Golson Lecture is held biennially at the Australian National University to honor his work as a founding figure in developing modern archaeology in several nations and as an important researcher in the evolution of horticultural economies in the Pacific.

Major Accomplishments

Jack Golson is an individual of remarkable talents. His research, teaching, and professional service have had a profound impact on archaeology globally. In his early career based in New Zealand, he led in some of the first productive collaborations between Indigenous peoples and archaeologists.

In New Zealand, he saw his role as introducing the archaeological practice of stratigraphic excavation and scientific collaboration that he had learned in his student years. In 1954 he was instrumental in the establishment of the New Zealand

Archaeological Association, which became the vehicle for these aims and for his own education in a proper relationship of his discipline with the Indigenous Polynesian population, whose history he, as an archaeologist in New Zealand, was addressing (Golson 2004).

In 1957 he was invited to undertake archaeological research in Tonga and Western Samoa for the Tri-Institutional Pacific Program – the Bishop Museum (in Honolulu), the University of Hawaii, and Yale University – which was part of the post-WWII story of the growth of serious archaeological involvement in the South Pacific field. This entailed his own entry not only into the Pacific field but also into the wider one of island and mainland Southeast Asia and the Pacific, which was looked after by the recently (1953) established Far Eastern Prehistory Association (FEPA), whose American branch had launched the first issue of the journal *Asian Perspectives* on its behalf in 1957. In 1971 FEPA held one of its 4-yearly congresses in Canberra, in what is seen as a landmark meeting, in the course of which it was decided to change its colonial era name to one more appropriate to current political reality – the Indo-Pacific Prehistory Association (IPPA) (Golson 1998), in which Australian archaeologists have and continue to play an important role. These developments came at a time when the archaeological profession that had expanded so rapidly in the 1960s worked together to form the Australian Archaeological Association. In this it was helped by the fact that, from its establishment by the Commonwealth government in the early 1960s, the Australian Institute of Aboriginal Studies gave archaeology recognition as a separate discipline.

The brief that Golson had been given for the post to which he had been appointed in 1961 was to develop a program for archaeological research in Australia and the nearer islands of the southwest Pacific, with particular reference to the then dependent territory of Papua and New Guinea. Golson was joined in this task by John Mulvaney, who was recruited in 1965 to take over the direction of Australian research, leaving the Pacific, including New Guinea, to Golson. Meanwhile, to help their planning, they organized seminars to which they recruited the talent of ANU and CSIRO staff active in field research in tropical Australia and Papua New Guinea on climates, landscapes and land systems, soils, geology, botany, ethnobotany, and wildlife. Out of these came, not only, an edited book on *Aboriginal Man and Environment in Australia* (Mulvaney and Golson 1971), which now ranks as a landmark publication, but also information to help planning archaeological survey in little known Papua New Guinea.

His work of site survey and excavation for the Tri-Institutional Pacific Program was done in 1957 on the Tongan island of Tongatapu and the Western Samoan one of Upolu. From the mid-1960s Golson was a pioneer and major player in the development of archaeological studies of Papua New Guinea (Denham and Ballard 2003). In March 1992 his contribution to academic research in the region was recognized when the University of Papua New Guinea awarded him an honorary doctorate.

In 1966, at an early stage of his work in PNG, Golson discovered the potential of the Wahgi Valley swamps of the central highlands to reveal agricultural history through collaboration of archaeologists with geomorphologists and palaeoecologists. Investigations of the 1970s at Kuk Swamp, followed up by Tim Denham in the 1990s, produced evidence for the antiquity (at least 7,000 years ago) and independence of the origins in the region of an agriculture based on yams, taros, and bananas that was characteristic of the South Pacific as a whole in later times. In 2008 Kuk was given World Heritage status by UNESCO.

This was the sort of contribution to national identity that Golson and colleagues inside and outside PNG were confident that archaeology could make to a country that was moving towards independence (Golson 1970) and achieved it in 1975.

Jack Golson was one of a small group of scholars who initiated study of the interrelationships between environment, ecology, and people in the Australasian region. Seminal publications in this area include *Sunda and Sahul*: *Prehistoric Studies in Southeast Asia*, *Melanesia and*

Australia (Allen et al. 1977) and *Aboriginal Man and Environment in Australia* (Mulvaney and Golson 1971). Today, the study of people and their environments is a thriving area of research in Australian and Pacific archaeology.

Along with John Mulvaney, Rhys Jones, Betty Meehan, and others, Golson played a key role in the professionalization of archaeology as a discipline in Australia, a process that started in the 1960s and included establishment of the Australian Archaeological Association. Golson was a prime mover in many other initiatives that were critical to the development of archaeology in Australia, including establishment of a radiocarbon-dating facility at the Australian National University in 1965.

Jack Golson was President of the World Archaeological Congress (WAC) from 1990 to 1994. He and his wife Clare were present at the 1986 conference in Southampton out of which it grew. He was elected to the Steering Committee that drafted the original WAC statutes and codes of ethics for approval at the second WAC conference in Venezuela in 1990. In 2009, Jack and Clare Golson's personal and professional contributions to the World Archaeological Congress were recognized in them being awarded its Inaugural Lifetime Achievement Award.

Jack Golson's contributions to Pacific archaeology were honored by his departmental colleagues following his retirement in 1991 in the edited volume *A Community of Culture*: *the People and Prehistory of the Pacific*, published in 1993.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Jones, Rhys Maengwyn
- ▶ Meehan, Betty
- ▶ Mulvaney, John
- ▶ World Archaeological Congress (WAC)

References

Allen, J., J. Golson, and R. Jones, eds. 1977. *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia and Australia*. London: Academic.

Denham, T., and C. Ballard. 2003. Jack Golson and the investigation of prehistoric agriculture in Highland New Guinea: Recent work and future prospects. *Archaeology in Oceania* 38 (3): 129–134.

Golson, J. 1970. Foundations for New Guinea nationhood. *Search: The Journal of the Australian and New Zealand Association for the Advancement of Science* 1 (5): 192–197.

Golson, J. 1998. From FEPA to IPPA: The remaking of an institution. In *Indo-Pacific prehistory: The Melaka Papers, volume 1 (Pre-Congress Issue): 3–12*, *Bulletin of the Indo-Pacific Prehistory Association*, ed. P. Bellwood, vol. 17, 1–12.

Golson, J. 2004. NZAA: The circumstances of its conception, birth and early upbringing. In *Digging into history: 50 years of the New Zealand Archaeological Association*, ed. M. Campbell, 27–37. Dunedin: New Zealand Archaeological Association.

Mulvaney, D.J., and J. Golson, eds. 1971. *Aboriginal man and environment in Australia*. Canberra: ANU Press.

Further Reading

Spriggs, M., D.E. Yen, W. Ambrose, R. Jones, A. Thorne, and A. Andrews, eds. 1993. *A community of culture: The peoples and prehistory of the Pacific*, Occasional papers in prehistory. Vol. 21. Canberra: Department of Prehistory, Research School of Pacific Studies, The Australian National University.

Stewart, P. 2008. Australian National University, Emeritus Faculty Oral History, Emeritus Professor Jack Golson. Interview conducted 17 Sept 2008, at Emeritus Faculty. Available at: www.anu.edu.au/emeritus/ohp/interviews/jack_golson.htm/.

Gomes, Mário Varela

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Basic Biographical Information

Mário Varela Gomes is a Portuguese archaeologist who was born in Lisbon in 1949. He developed an interest in archaeology while still a young boy searching for the evidence of "past

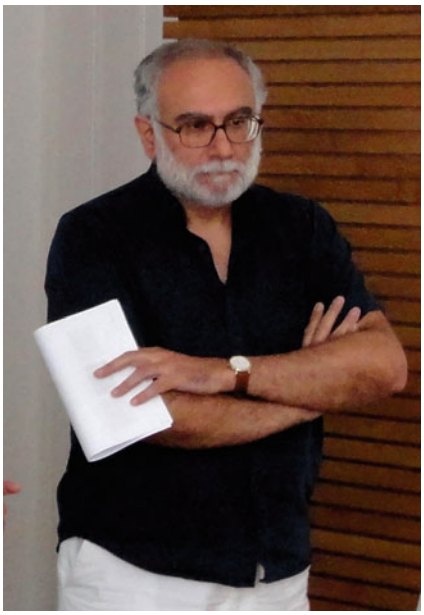

Gomes, Mário Varela, Fig. 1 Mario V. Gomes in 2012

civilizations" wherever he travelled, not only in Lisbon where he grew up but also in Ericeira where his family had a summer house where he passed many months each year. The adventurous interests of his youth developed into a professional occupation. He graduated in architecture from the Lisbon Fine Arts University and studied history and archaeology at the Faculdade de Letras in Lisbon and also at other institutions in Spain, Italy, England, and Sweden. He has a Ph.D. in archaeology based on his research into pre- and protohistoric rock art sites in Vale do Tejo, Portugal (Fig. 1).

Mário Varela Gomes was the director of the Silves' Archaeology Museum and of the Montemor-o-Novo's Museum. From 1992 to 1995 he was a teacher at the Masters in Urban Centres Architectural Rehabilitation in the Fine Arts University. In 1994–97 he was one of the responsible people for the first studies from Foz Côa leading to the site's classification as world heritage, a scientific advisor for the Chauvet cave (France), and an expert in the European Commission for the 2000 Cultural Program. Today, he is a professor in Prehistory and Cognitive Archaeology with the Faculty of Humanities and Social Sciences at the New University of Lisbon.

Major Accomplishments

Mário Varela Gomes' archaeological activities have been extensive. He is responsible for the study, classification, and publication of two major rock art groups in Portugal, Foz Côa, and Vale do Tejo, as well as major discoveries in other archaeological periods. He has undertaken tracings and studied rock art engravings in many regions, including Stonehenge, Züschen, Vale do Tejo, the Arronches shelters, Escoural cave, Vale do Côa and Monte de Góios in northern Portugal. In addition, he has studied other rock and megalithic art, southwest Portuguese Bronze Age stelae, and Iron Age epigraphic stelae.

Gomes has supervised dozens of archaeological excavations in sites from all prehistoric and historic periods, including the Xarez, Portela de Mogos, and Almendres stone circles; Perdigões, Algarve, Padrão, Amantes, and Caramujeira menhirs; the megalithic graves from Pedra Escorregadia, Bulhoa, and Anta Grande da Comenda da Igreja; the Bronze Age necropolis from Vilamoura, Alfarrobeira, and Vale da Telha; and also the protohistoric settlements of Escoural and Pontes de Marchil, the Rocha Branca Phoenician-Punic factory, and the Iron Age Garvão sanctuary. Islamic archaeology is another of his major research activities, undertaken through excavations in the Silves cistern-well, castle, and urban areas and also the rural castle (husun) from Castelo Belinho where a stupendous Neolithic village was found, and in the Arrifana *Ribat*. All of his students at the New University of Lisbon remember Gomes as an enthusiastic and accessible teacher who took them on field assignments or worked with them in the lab, teaching and publishing together.

Gomes has published more than 250 books and papers dedicated to archaeology, art history, ethnology, and architecture, in Portugal and in other countries. With A. Coelho F. da Silva, he is the coauthor of the students' handbook *Portuguese Protohistory* (1998) and the founder of the scientific journal *Xelb*, published by Silves.

In his 40-year career Gomes was a presence in the major archaeology and history associations of Portugal. As vice-president of the Portuguese Archaeologist Association, the oldest archaeological

institution in Portugal, founded in 1853, Gomes was responsible for many of the association's activities over the last decade and for quite some time he was the youngest member of the Portuguese History Academy.

Despite his lifelong dedication to archaeology, Gomes is also known as an architect responsible for the concept and construction of many Portuguese museums such as the Silves, Salir, Albufeira, and Loulé. In 2003 he received the Portuguese History Academy award for archaeology and the Portuguese Archaeologist Association's silver medal. Although a recognized expert outside Portugal with published works in Spain, France, Italy, and the United Kingdom, Gomes still finds time to be a major enthusiast and advocate of local history, supporting and writing to local journals and newsletters in the defense of archaeological heritage.

Cross-References

- ▶ Côa Valley Rock Art Sites
- ▶ Europe: Prehistoric Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Valcamonica Rock Art

Further Reading

Gomes, M.V. 1994. *A necrópole de Alfarrobeira (S. Bartolomeu de Messines) e a Idade do Bronze no concelho de Silves* (Xelb 2). Silves: Museu Municipal de Arqueologia.

Gomes, M.V. 2002. *De monsaraz e o seu termo ao cromeleque do Xarez*. Lisboa: Fundação Convento da Orada.

Gomes, M.V. 2007a. Nés à l'extrême Sud-Ouest de l'Europe: les menhirs de l'Algarve et l'avènement de l'idéologie mégalithique. In *Les expressions intellectuelles et spirituelles des peuples sans ecriture*, 147–157. Paris: UISPP/CISENP.

Gomes, M.V. 2007b. Os períodos iniciais da arte do Vale do Tejo (Paleolítico e Epipaleolítico). *Cuadernos de Arte Rupestre* 4: 81–116.

Gomes, M.V. 2008. Castelo Belinho (Algarve, Portugal) and the first Southwest Iberian villages, in Early Neolithic in the Iberian Peninsula. UISPP congress 18, British archaeological reports international series 1857, 71–78. Oxford: Archaeopress.

Gomes, M.V. 2010a. Time and signs: Southern Portuguese Megalithic art diachrony. In *Monumental questions: Prehistoric megaliths, mounds and enclosures*. U.I.S.-P.P. Congress 7, British Archaeological Reports International series 2122, 17–24. Oxford: Archeopress.

Gomes, M.V. 2010b. Castelo Belinho (Algarve): a ritualização funerária em meados do V milénio A.C. In *Os últimos caçadores-recolectores e as primeiras comunidades produtoras do sul da Península Ibérica e do norte de Marrocos.* Promontória Monográfica 15, 69–79. Faro: Universidade do Algarve.

Gomes, M.V. 2010c. Early Neolithic funerary practices in Castelo Belinho's village (western Algarve, Portugal). In *Funerary practices in the Iberian Peninsula from the Mesolithic to the Chalcolithic*. British archaeological reports international series 2417, 113–123. Oxford: Archaeopress.

Gomes, M.V. 2011. Representações de armas na arte rupestre do Vale do Tejo – Importância sócio-económica, cronológica e cognitiva. In From the origins: the prehistory of the Inner Tagus region. British archaeological reports international series 2219, 177–198. Oxford: Archeopress.

Gomes, M.V. 2012. *Silo Islâmico de Albufeira (Rua Henrique Calado)*. Lisboa: Instituto de Arqueologia e Paleociências, Universidade Nova de Lisboa.

Gomes, M.V., T.M. Casimiro, and J. Gonçalves. 2012. *Espólio do naufrágio da Ponta do Leme Velho (Ilha do Sal, Cabo Verde). Contributo para a arqueologia da expansão*. Lisboa: Instituto de Arqueologia e Paleociências da Universidade Nova de Lisboa.

Gomes, R.V., and M.V. Gomes. 2007. *Ribāt da Arrifana. Cultura material e espiritualidade*. Aljezur: Associação de Defesa do Património Histórico e Arqueológico de Aljezur, Município de Aljezur.

Gönnersdorf (Magdalenian): Geography and Culture

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Introduction

Gönnersdorf is one of two major Magdalenian settlements in the Central Rhineland of Germany (the other being Andernach-Martinsberg). The

site was largely saved from destruction by burial under ash deposits of the late-glacial Laacher See volcanic eruption. Analysis of a broad range of well-preserved finds and features provides detailed insights into many aspects of Magdalenian life, such as technology and subsistence economy, use of the on-site living space, medium- and long-range mobility patterns, the use of personal ornament, and forms of artistic expression.

Definition

The Magdalenian locality Gönnersdorf (Central Rhineland, Germany) is characterized by the preservation of complex settlement features exceptional for an open-air site of this age. Due to burial beneath volcanic deposits, the site offers a rare opportunity to investigate a broad range of settlement information preserved largely in situ over an area of several hundred square meters and, by comparison with other sites, integrate this within a synthetic model for Magdalenian settlement processes and land use.

Key Issues

Location and Research History

The Gönnersdorf Magdalenian site was discovered in 1968 at the western end of a step formed by the Rhine Middle Terrace, on higher land secure from flooding by the river which flows at the foot of the terrace to the north. Just west of the site the Rhine reenters the narrow channel of the narrow Rhine Gorge, leaving the open Neuwied Basin. The site is sheltered to the west and the north by higher land, and the long known Paleolithic site Andernach-Martinsberg lies in view only 2 km distant south of the Rhine.

Between 1968 and 1976, Gerhard Bosinski excavated a total of 687 m^2 at Gönnersdorf, uncovering five distinct find concentrations (Konzentration = K) K I–K IV and SW characterized by differing combinations of placements of large stone slabs, groups of pits, various lithic and faunal materials, and areas stained by ocher (Bosinski 1979).

Chronology and Environment

The chronological position of Gönnersdorf is now quite well understood (Stevens et al. 2009), with the main Magdalenian occupation falling toward the end of the cold and arid Greenland Stadial 2a (~13,800 BCE in calibrated years, with radiocarbon dates between 13,270 BP and 12,990 BP). This contradicts the initial interpretation of the site (Brunnacker 1978) as dating to the end of an interstadial (*Bølling*) phase but is consistent with the wider range of environmental/ecological information available today.

The species of the Gönnersdorf hunted mammal fauna are those typical of the open, continental to arctic *mammoth steppe*, and for Magdalenian subsistence activities (Poplin 1976; Brunnacker 1978). Small rodent remains associated with the archaeological horizons include numerous lemmings (*Dicrostonyx*) and voles (*Microtus gregalis*) typical of arctic/continental conditions. By contrast, four absolute dates for remains of woolly rhino and mammoth are older than those for the hunted ungulates by ~600/1,600 radiocarbon years and potentially represent collected subfossil material. Both species were however still part of the fauna and known to the Magdalenian hunters as demonstrated by their engraved depictions. The few specimens of post-cranial bone of two species more characteristic of wooded conditions, red deer and elk, showed a spatially limited distribution in area SW, away from the main site structures (Buschkämper 1993; Street and Turner 2012) and are certainly (in the case of a directly dated elk bone) or probably several hundred years younger than the main faunal assemblage.

Settlement Features

The artificially dug pits in the Gönnersdorf structures K I–K III have been variously interpreted as posthole settings, hearths, or cooking pits, and these three structures, also characterized by central zones of dense paving, are interpreted as stable and quasi permanent dwellings used for long-term residence (Jöris et al. 2012).

The largest, centrally located concentration (K II) can be subdivided into two subunits, a larger central area (K IIa) and a smaller area (K IIb) to the immediate northwest, each located

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around a distinct group of pits (Sensburg 2007). K IIb has now been interpreted as an open-air activity area possibly involving the use of cooking pits (Sensburg and Moseler 2008).

K IV (at the northern edge of the excavated area) and SW (adjacent to and west of K I) have no pits and were interpreted as the remains of possibly transportable dwelling structures used only for shorter stays (Buschkämper 1993; Terberger 1997). GIS-supported analyses of lithic find densities and systematic refitting studies provide details of the inner organization of K IV and its relationship to several external areas which probably had several different functions (Sensburg and Moseler 2008).

Taken together, the investment of time and effort represented by the great quantity and diversity of accumulated material suggests that at least some of the Gönnersdorf structures were in use over an extended period of time. Many of the rocks used as constructional material show complex patterns of modification, such as splitting and notching of the edges of blocks and slabs, and this possibly represents ad hoc modification of these elements to accommodate now perished objects such as wooden stakes or supports, perhaps during multiple episodes involving reuse of the same elements. The features and material as they were uncovered represent only the final, abandoned stage of a complex development, which probably took place during repeated occupations, conceivably extending over several years.

Gönnersdorf provides no evidence for a superstratification of living floors which might enable the recognition of distinct occupation horizons, but other methods have been used to try and establish some degree of temporal differentiation. Long-distance refits of slate slabs and quartzite blocks between K IV and other concentrations produced a complex model of the relationships between these structures (Terberger 1997). In K III certain lithic raw materials occur in some pits, whereas others are never found in pits, suggesting that the dwelling was occupied on at least two and perhaps three occasions during which the several pits were variously open or already closed by infilling.

In view of this complexity, Gönnersdorf has been interpreted as the remains of a group of dwelling structures occupied intermittently over an extended period of time; several of them possibly occupied contemporaneously, in effect forming a *temporary village*. Differential spatial patterning of lithic raw materials (Franken and Veil 1983) brought the suggestion that this *village* was occupied by distinct groups of Magdalenian people with various geographical origins who possibly visited Gönnersdorf with perhaps only partly overlapping phases of occupation, conforming to a model of an aggregation camp.

Gönnersdorf provided some evidence for the use of fire. Burnt lithic artifacts are present in very small numbers and almost no bones show traces of burning. Small quantities of charcoal were identified and plotted during excavation.

Well-defined evident structures recognizable as hearths are rare. The clearest evidence comes from K IV, where complexes of fire-cracked and reddened quartz and other rocks at the center of the dwelling structure and outside this are interlinked by refitting. The presence of an internal hearth at the center of the large K I structure is suggested by a pit containing charcoal and burnt quartz. The use of fire at Gönnersdorf is also shown by quantities of thermally reddened slate and quartzite slabs and cobbles and fire-cracked quartz pebbles interpreted as cooking stones (Brunnacker 1978). Their location provides an indication of areas in which fires may have burned, but the absence of clear hearth structures suggests that thermally altered rocks were moved after contact with fire, perhaps being used repeatedly in different parts of the occupation area. Such multiple use of hearth construction materials during different occupations or phases of activity would remove or blur traces of earlier activities.

The non-cryptocrystalline rocks brought to the site did not only serve as constructional material, and many of them were transformed into various forms of artifacts. Fragments of geodes and conglomerate with naturally concave surfaces and slate slabs with artificially hollowed depressions are believed to have served as lamps fueled with animal fat, and it can be discussed whether light and heat within the dwellings were provided by

these and not by open fires (see above). Some of these objects probably served as mortars for grinding red hematite, a material found at the site, sometimes in the form of clearly abraded or facetted pieces.

Different types of pebbles obtained from river gravels were used as hammer stones for stone working or for the secondary retouch of lithic artifacts in manufacturing tools. Larger cobbles probably served for processing other inorganic or organic materials, by crushing, pounding, or grinding. More than 400 small perforated slate disks and their fragments were found. Many of them are engraved with geometric patterns, although it is sometimes clear that disks were manufactured from fragments of slate that had been engraved previously. These finds are not necessarily or principally symbolic items but may have had a practical function, perhaps as aids in fastening together hides which are presumed to have covered the dwelling structures.

Lithic Artifacts and Group Mobility

The Gönnersdorf site produced a total of almost 82,000 lithic artifacts (Floss 1994). The majority comprises exogenous flint (>50,000 artifacts) with regional to local materials (forms of limnic quartzite (~15,000) and lydite (~12,000) making up the balance). Smaller groups of material include chalcedony (~3,000) and indurated oolite (~2,000), while a small number of artifacts are made of probably exotic semiprecious stones such as rock crystal, opal, or jasper.

The flint was derived from various sources. Good quality Cretaceous flint (*Western European Flint*) was obtained from primary chalk formations in the region of the Belgium-Dutch-German border, some 120–130 km to the northwest and in derived form from river terraces in the western part of the Lower Rhineland. This material characterizes K II in particular and is associated with a small quantity of probably Mesozoic quartzite, probably imported from the same region. A second variety of Cretaceous flint (*Baltic Flint*) was obtained from moraines left by the antepenultimate glaciation, the nearest of which are immediately north of the River Ruhr, some 100 km north of the Central Rhineland.

The chalcedony and indurated oolite (*Kieseloolith*), which are quite important in structures at the north of the Gönnersdorf site (K III, K IV), were very probably obtained from the Mainz Basin and lower Main valley some 80–100 km to the southeast.

The exogenous lithic raw materials are generally accepted as proxies for the mobility of Paleolithic groups or individuals, and the sources of the flint suggest possible contacts from the Central Rhineland to the Magdalenian of the Rhine-Meuse loess region (and possibly further west to the Netherlands or Belgium) on the one hand and to the eastern Lower Rhineland and perhaps further to the north and east on the other. The materials obtained from southern sources could indicate contact to southern German Magdalenian groups.

Fine-grained Tertiary limnic quartzite occurs in the region at numerous localities (outcrops, block fields) and was probably available within a range of some 30 km, perhaps being targeted by middle-range expeditions during the occupations of the Gönnersdorf site or collected during the initial journeys to the sites.

Intensive use of the local raw material lydite, obtainable in the Rhine gravels, might reflect a late phase of site occupation prior to leaving the region, when expeditions to obtain raw material were not an option. Alternatively, it might simply represent ad hoc collecting of a poor quality rock type during periods of low mobility. This material is predominantly found in structure K I.

The varied origin of the Gönnersdorf lithic raw materials has contributed to an interpretation of the site as a meeting point of distinct Magdalenian groups from different regions. It is possible that these groups met at Gönnersdorf, which would then have the character of an *aggregation camp* or *base camp*. Alternatively, a single larger group occupying the Central Rhineland may have dispersed into different regions at certain times of the year and brought back specific materials from these regions.

Subsistence

At Gönnersdorf the most important food species in all investigated structural concentrations is the

horse. In the largest assemblage, from K II, some 2,100 postcranial specimens and 850 cranial and tooth fragments must come from at least 28 animals. K I produced more than 1,500 horse remains, representing at least 12 individuals, while at least 7 individuals of horse are represented in K III by c. 300 specimens. At least five horses are represented by 150 specimens in the SW structure, whereas at the north of the site, 159 identified specimens in spatial association with the K IV structure demonstrate only two horses. The total number of horses represented at the site is thus 54, if the figures established for the different concentrations are added together.

Other large and small mammal species, together with some birds (raven, ptarmigan, swan, goose, snowy owl, and seagull) and very few fish remains (trout, burbot, and a cyprinid), play a far less significant role in the diet; indeed not all of the identified species represent a food resource. Specimens of a rhinoceros maxilla and mammoth bone and ivory are shown by radiocarbon dating to be subfossil remains collected possibly as a curio or for use as raw material (ivory) or a constructional element (mammoth femur). Much of the material identified as reindeer is in the form of antler tools or their waste, in some cases demonstrably collected shed antlers. Teeth and foot bones of wolf might represent pelts rather than animals hunted locally while bird remains, in particular wing and foot bones, may derive from ornamental feathers and claws. A large bovine, chamois, and saïga antelope are represented by at most one or two animals and cannot always definitively be demonstrated to represent animals hunted for food.

Many other faunal remains clearly do represent the animals hunted during human residence at Gönnersdorf. A number of cut-marked and fractured bones reveal standardized stages of butchering. Skinning, disarticulation, and filleting of meat can be identified, along with intensive bone fracturing for obtaining marrow and grease.

The composition of the faunal assemblages of the various structures shows clear differences. Arctic fox is the most common species in K I (c. 2,500 specimens from at least 30 animals), probably as a result of winter trapping for furs, followed by horse and varying hare. By contrast horse dominates the assemblage of K II and less than 200 remains of arctic fox were present. Hare overtakes arctic fox in importance with more than 400 specimens. Several other species present here (large bovine, rhinoceros, chamois) are not represented in K I. It was noted above that their role in the diet is sometimes unclear. Some 280 bones and teeth of reindeer from K I represent at least three hunted animals, whereas of the c. 170 pieces of antler, some were demonstrably brought to the site as shed specimens. Reindeer is represented in K II by some 350 specimens of bone, tooth, and antler, but no more than one individual can be demonstrated here.

The presence in K III of bones of the large bovine, rhinoceros tooth fragments, and chamois teeth suggest that it was somehow linked to the adjacent K II. Apart from horse, described above, K III also produced 71 finds identified as arctic fox (no more than one individual), c. 100 specimens of varying hare, and over 200 specimens of reindeer from at least two animals.

Faunal remains are comparatively poorly represented in the northern area of K IV and at the southwestern part of the site (SW). The smaller species fox and hare are absent or exceedingly rare, and reindeer is absent from K IV and represented by less than 20 finds in the SW area, where it might be argued that some or all of this is waste discarded from adjacent K I and K II.

Organic Artifacts and Objects of Adornment

The numerous artifacts of bone, antler, and ivory found at Gönnersdorf are typical for the later Magdalenian. They include eyed needles of bone and the cores from which they were manufactured, mainly horse metapodial bones. Spalls and projectile points, batons percés, and baguettes demi-rondes were made of reindeer antler, and waste debitage shows the manufacture of such items at the site. K I, K II, and K III produced a small number of mammoth ivory artifacts, such as projectile points or a perforated disk, and debitage mainly in the form of small fragments.

Various types of material modified to objects of personal adornment were found. Red deer is

mainly represented at the site by teeth or tooth fragments modified as personal adornments, among them a group of six perforated canine teeth in K I and fragments of incisor teeth modified by removal of the roots in K II. These probably have nothing to do with subsistence and may have been imported over a large distance. This is certainly the case for perforated marine mollusk shells (*Homalopoma sanguineum, Dentalium*), which are ultimately derived from southwestern Europe and provide evidence of contact between the Mediterranean or the southern French Atlantic coast and the Central Rhineland. Whether their transport over a distance of some 800–1,000 km reflects the mobility of individual persons or human groups is unknown.

Reindeer incisors were cut or sawn as articulated series from the mandible, and the presence of the removed roots shows that in some cases, these were certainly manufactured at the site. This also applies to the canine, incisor, and premolar teeth of arctic fox which were removed from the jaws and perforated for suspension. Some specimens of collected fossilized wood are equivalent to jet in their density and appearance and were used for the production of beads. That this took place on site is demonstrated by half-finished specimens. A small pit in K I contained several jet beads associated with perforated teeth.

Art

Among the most interesting finds from Gönnersdorf are numerous slabs of slate engraved with figurative art, including depictions of women (Bosinski and Fischer 1974; Bosinski et al. 2001) and many species of animals (Bosinski and Fischer 1980; Bosinski 2008), together with abstract symbols.

The highly schematic human female depictions are shown with pronounced buttocks and sometimes with breasts, but without head and feet, and are often arranged as pairs or in groups to form scenes interpreted as dancing. The abstract style is typical of the period and is also known from neighboring regions. Female figurines in the same style are normally carved of ivory, but specimens made of antler or stone are also present at Gönnersdorf.

The most commonly depicted animal species represented are horse and mammoth (Bosinski and Fischer 1974), with representations of woolly rhinoceros, large bovines (bison and aurochs), red deer, reindeer, saïga-antelope, wolf, bear, lion, and seal present in far lower numbers. There are few engravings of birds and rare examples of fish, reptiles, and amphibians. The realistic engravings clearly prove that these species were well known to the artists, but they may have encountered or observed some of them in other regions and not in the Central Rhineland. Very rarely the engraved figures appear to be grouped together to form a narrative or symbolic scene.

The Gönnersdorf art mirrors the wealth of artistic expression from Magdalenian caves in Western Europe and suggests the complex social activities which occurred at the site.

Season and Duration of Occupation

Seasonality information from the analysis of the faunal remains suggests that Gönnersdorf was occupied over an extended period of the year. The season of horse hunting was established by analysis of milk teeth to establish the age of the foals at death. For K I, K II, and K III, the season of death and hence human presence at Gönnersdorf extended from December/January until the beginning of the summer. An apparent cutoff here was perhaps when horses (and possibly reindeer) left the lowland Neuwied Basin for upland foaling and calving grounds, which may suggest a possible abandonment of the Gönnersdorf site during summer.

Other evidences such as tooth eruption patterns of reindeer and wolf, the presence of an otolith of a burbot (*Lota lota*), horse fetal bone at various stages of development, arguments for winter trapping of fox and possibly hare, and the probable seasonal presence of migratory birds provide support for a scenario of occupation over a longer period of time and through different seasons of the year. Altogether it suggests that coexistence by the inhabitants of K I, K II, and K III may have extended over a large part of the year.

The season of occupation for K IV and SW remains unknown due to both their generally

limited faunal evidence and absence of relevant information on the age at death of the horses.

Future Directions

Gönnersdorf must be seen as only one location in an extensively oriented land-use occupation strategy of highly mobile Magdalenian groups. That these mobile groups were also in a position to occupy specific localities intensively is shown by the vast amount of material accumulated at favored locations in the landscape such as Gönnersdorf. The observed intensity of settlement is probably a palimpsest of several occupations extending over several weeks to several months, representing repeated visits separated by periods of desertion.

The winter half of the year with the shortest hours of daylight and coldest temperatures is the time of year when the *temporary sedentism* reconstructed for Gönnersdorf would be the most appropriate survival strategy. It is possible that northern Magdalenian groups generally spent this time of the year in sheltered locations, such as the Rhine valley. While we have no certain information on the frequency of Magdalenian peoples' absence from the Central Rhineland, the available seasonal data strongly suggests that the season of their absence would have been the summer, while exogenous lithic materials and other materials give some indication of the distant regions visited at this time.

Finally, any analysis of complex Magdalenian sites must recognize their adaptability and variability. The sometimes very different structures at Gönnersdorf do not all represent the same range or intensity of activities, and it is quite probable that the function of a specific concentration changed dynamically through time according to several factors.

The apparently younger occupation of Gönnersdorf SW, with an associated fauna of elk and red deer, probably took place under quite different environmental factors than the main settlement phases of K I–K IV. The far more ephemeral evidence for human presence in SW possibly foreshadows the settlement patterns of the Federmessergruppen that will emerge during the younger wooded Allerød interstadial.

Cross-References

► Andernach-Martinsberg (Magdalenian): Geography and Culture

References

Bosinski, G. 1979. *Die Ausgrabungen in Gönnersdorf 1968–1976 und die Siedlungsbefunde der Grabung 1968*. Der Magdalénien-Fundplatz Gönnersdorf 3. Wiesbaden: Franz Steiner Verlag.

Bosinski, G. 2008. *Tierdarstellungen von Gönnersdorf. Nachträge zu Mammut und Pferd sowie die übrigen Tierdarstellungen*. Monographien des Römisch-Germanischen Zentralmuseums Band 72/Der Magdalénien-Fundplatz Gönnersdorf 9. Mainz: Verlag des Römisch-Germanischen Zentralmuseums.

Bosinski, G., and G. Fischer. 1974. *Die Menschendarstellungen von Gönnersdorf der Ausgrabung 1968*. Der Magdalénien-Fundplatz Gönnersdorf 1. Wiesbaden: Franz Steiner Verlag.

Bosinski, G., and G. Fischer 1980. *Mammut- und Pferdedarstellungen von Gönnersdorf*. Der Magdalénien-Fundplatz Gönnersdorf 5. Wiesbaden: Franz Steiner Verlag.

Bosinski, G., F. D'Errico, and P. Schiller. 2001. *Die gravierten Frauendarstellungen von Gönnersdorf*. Der Magdalénien-Fundplatz Gönnersdorf 8. Stuttgart: Franz Steiner Verlag.

Brunnacker, K. (ed.) 1978. *Geowissenschaftliche Untersuchungen in Gönnersdorf*. Der Magdalénien-Fundplatz Gönnersdorf 4. Wiesbaden: Franz Steiner Verlag.

Buschkämper, T. 1993. Die Befunde im Südwestteil der Gönnersdorfer Grabungsfläche. Unpublished MA dissertation, Cologne University.

Floss, H. 1994. *Rohmaterialversorgung im Paläolithikum des Mittelrheingebietes*. Monographien des Römisch-Germanischen Zentralmuseums Mainz 21. Mainz, Bonn: Dr. R. Habelt.

Franken, E. & S. Veil. 1983. *Die Steinartefakte von Gönnersdorf*. Der Magdalénien-Fundplatz Gönnersdorf 7. Wiesbaden: Franz Steiner Verlag.

Jöris, O., M. Street, and E. Turner. 2012. Spatial analysis at the Magdalenian site of Gönnersdorf (central Rhineland, Germany). An introduction. In *Site-internal organization of hunter-gatherer societies: case studies from the European Palaeolithic and Mesolithic*. RGZM Tagungen 12, ed. S. Gaudzinski-Windheuser, O. Jöris, M. Sensburg, M. Street, and E. Turner, 53–80. Mainz: Verlag des Römisch-Germanischen Zentralmuseums.

Poplin, F. 1976. *Les grands vertébrés de Gönnersdorf. Fouilles 1968*. Der Magdalénien-Fundplatz Gönnersdorf 2. Wiesbaden: Franz Steiner Verlag.

Sensburg, M. 2007. *Die räumliche Organisation der Konzentration IIa von Gönnersdorf*. Monographien des Römisch-Germanischen Zentralmuseums Mainz 69. Mainz: Verlag des Römisch-Germanischen Zentralmuseums.

Sensburg, M. & F. Moseler. 2008. *Die Konzentrationen IIb und IV des Magdalénien-Fundplatzes Gönnersdorf (Mittelrhein)*. Monographien des Römisch-Germanischen Zentralmuseums 73. Mainz: Verlag des Römisch-Germanischen Zentralmuseums.

Stevens, R.E., T.C. O'Connell, R.E.M. Hedges, and M. Street. 2009. Radiocarbon and stable isotope investigations at the central Rhineland sites of Gönnersdorf and Andernach-Martinsberg, Germany. *Journal of Human Evolution* 57: 131–148.

Street, M. & E. Turner. 2012. *The faunal remains from Gönnersdorf*. Monographien des Römisch-Germanischen Zentralmuseums. Mainz: Verlag des Römisch-Germanischen Zentralmuseums.

Terberger, T. 1997. *Die Siedlungsbefunde des Magdalénien-Fundplatzes Gönnersdorf. Konzentrationen III und IV*. Der Magdalénien-Fundplatz Gönnersdorf 6. Stuttgart: Franz Steiner Verlag.

González, Alberto Rex

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Basic Biographical Information

Alberto Rex González (1918–2012) was a charismatic figure with the most profound influence on Argentine archaeology through the twentieth century. Born in Pergamino (Buenos Aires province), his introduction to archaeology came through an early reading of the work of Argentine naturalist Florentino Ameghino. This drove him from a young age to carry out excavations at different sites around the country.

After gaining his medical degree at the University of Cordoba (Argentina), he took archaeology courses at Columbia University (USA). In 1948, he began to work at the La Plata Museum (Argentina), and in 1953, he started to lecture at the University of Rosario. Three years later, he settled in Cordoba, where he was the Director of the university's Institute of Anthropology. In 1962, he returned to La Plata, now an established figure of Argentine archaeology, as a researcher at CONICET (the Argentine National Council for Scientific and Technical Research). In spite of all this, in 1976, he was fired from his academic position at the university, in the context of the terrorist military dictatorship which razed the country. Once democracy returned in 1983, he took up the role of lecturer at the University of Buenos Aires, where he was the Director of the Ethnographic Museum. Through his long career, he carried out numerous excavations, formed a considerable group of disciples, and published around 150 scientific and dissemination works. After retirement, he spent his last years organizing his archives in the city of La Plata.

Major Accomplishments

From the University of La Plata, at the end of the 1940s, he started a tenacious campaign to revive the practice of fieldwork. He also promoted a deeper temporal conception of the native occupation of Argentine territory: after obtaining the country's first radiocarbon dating of the deepest deposits of Inti Huasi cave (San Luis Province), he could reliably determine a minimum antiquity of 8000 years BP for the occupation of present Argentine territory, which constituted a true milestone in the history of archaeological investigations in Argentina.

Due to his initiatives, the first Argentine radiocarbon dating laboratory was set up, installed in the University of La Plata (Latyr). He also fostered the creation of CONICET, which is the country's main research institution which gathers the largest proportion of Argentina's professional archaeologists as full-time researchers.

His reformulation of the prehistory of northwestern Argentina, in the 1950s and 1960s, was based on the analysis of the burial contexts of the Muniz Barreto Collection held at the Museum of La Plata, which boasts an itemized record of its

documents. Calling on his detailed stylistic knowledge of the materials, and carrying out further excavations and radiocarbon dating, he proposed a *master sequence* of cultural development of the "agricultural ceramicist stage" of Hualfín Valley, which he extrapolated to the whole region denominated "valliserrana" (mountain-valley), greatly stimulating archaeological investigation.

One of his key publications, in collaboration with J. Pérez Gollán – *Indigenous Argentina. Eve of Conquest* (1972) – became a fundamental reference work about the prehistory of the Argentine territory.

With his 1974 book *Art, Structure, Archaeology*, he ventured into the terrain of the symbolic interpretation of aboriginal art, a subject that monopolized his interest during the latter years of his research career. In this work, influenced by the structuralism of Levi-Strauss, he identified the diverse mechanisms of physical and visual expression of Andean dualism in the material culture of the agricultural ceramic societies of Northwestern Argentine, as follows:

1. Feline-human mixed features (Fig. 1)
2. Multiple hybrid features
3. Human-feline attitudes mixed
4. Dual realistic images in the same piece
5. Duality of binary opposition as expression of other concepts
6. Duality in the same image (anatropical figures)
7. Duality by split representation (Fig. 2)
8. Duality by opposition of antipodean figures

His masterpiece is *Pre-Columbian Art of Argentina* (1977) in which he described and analyzed the plastic expressions of all the Indigenous cultures of Argentina, developing in particular the agricultural ceramicist stage in the northwest of the country with the greatest degree of detail achieved so far.

In *1992*, he published *The Metallic Plates of the Southern Andes*, an exhaustive compilation about the different types of objects manufactured in the South Andes area in pre-Columbian times.

With profuse iconography, these metallic plates (Fig. 3) still constitute a giant archaeological question mark, since it is very rare to find examples in properly documented archaeological contexts. In this work, González provided a first chronology based on elements of stylistic criteria and unfolded an original hermeneutic approach supported by historical and ethnographic sources.

González, Alberto Rex, Fig. 1 Ceramic piece from Aguada culture, taken by González as an example of the mixture of feline and human features (Taken from González 1974: Fig. 4.1)

González, Alberto Rex, Fig. 2 Example of two-sided representation in a Santa María funerary urn number 4534, La Plata Museum (González 1974: Fig. 2.3)

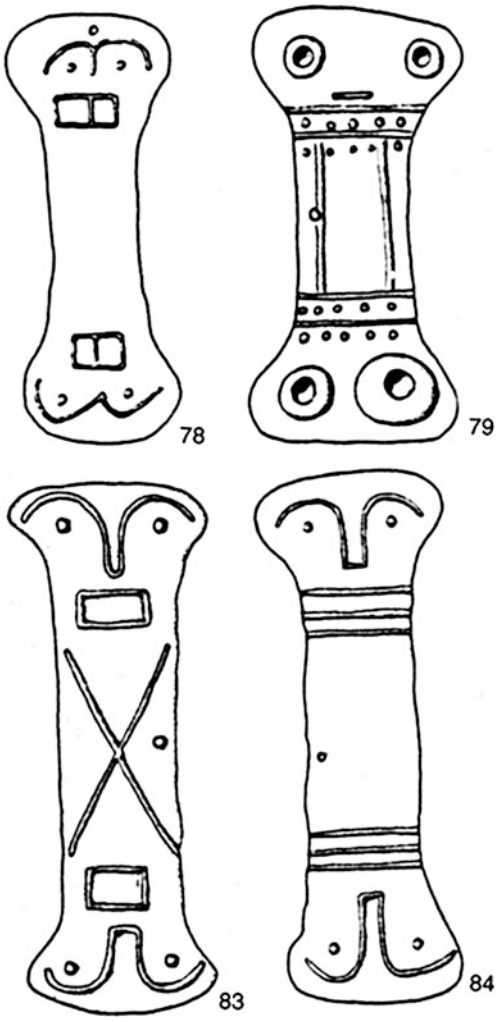

González, Alberto Rex, Fig. 3 Metallic plates from Río Lípez (Bolivia), from the corpus studied by González in his work *Las placas metálicas de los Andes del Sur* (Taken from Tomado de González 1992: plate 3)

At nearly 80 years old, by the end of the 1990s, he returned to fieldwork on the archaeological site *La Choya*, in the Province of Catamarca, revealing a new ceremonial center of the *La Aguada* culture. It is to the latter that he dedicated his last great work: *La Aguada Culture, Archaeology and Designs* (1998). Here, he provided the most complete image of the very cultural context that he himself had defined in the 1960s, and which constituted, after Max Uhle's synthesis in 1910, a fundamental watershed in the agro-ceramic cultural sequence of northwestern Argentina.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art Studies: Normative Approaches
- ▶ Structural Archaeology
- ▶ Style: Its Role in the Archaeology of Art

References

González, A.R. 1974. Arte, estructura y arqueología. Buenos Aires: Nueva Visión.

González, A.R. 1977. *Arte precolombino de la Argentina. Introducción a su historia cultural*. Buenos Aires: Filmediciones Valero.

González, A.R. 1992. *Las placas metálicas de los Andes del Sur. Contribución al estudio de las religiones precolombinas*. Mainz am Rhein: Philipp von Zabern.

González, A.R. 1998. *Cultura La Aguada. Arqueología y diseños*. Buenos Aires: Filmediciones Valero.

González, A.R., and A. Pérez. 1972. *Argentina indígena. Vísperas de la conquista*. Buenos Aires: Paidós.

Further Reading

Bonnin, M., and G. Soprano. 2011. Antropólogos y antropología entre las universidades nacionales de La Plata, Litoral y Córdoba. Circulación de personas, saberes y prácticas antropológicas en torno del liderazgo académico de Alberto Rex González (1949-1976). *Relaciones de la Sociedad Argentina de Antropología* 36: 37–60.

Bianciotti, A. 2005. Alberto Rex González: la imagen y el espejo. *Arqueología Suramericana* 1 (2): 155–184.

Perez Gollán, J.A. 1995. Cuando las piedras florecen. *Artinf* 91: 10–15.

Google Earth Afghan Surveys

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Introduction and Definition

The development of "virtual globes," such as Google Earth and NASA's World Wind, represents "the most important development in aerial archaeology" for 35 years (Irwin Scollar, cited in Scollar and Palmer 2008: 15). "Virtual globes"

provide a user-friendly means of accessing geo-referenced (i.e., accurately located) satellite images of the world – there are no Google Earth or World Wind images per se, merely satellite images and aerial photographs available through these digital portals. "Virtual globes" are much more dynamic and interactive than more traditional, static photographic and cartographic representations of Earth, enabling viewers to move around, and zoom in and out, to determine what they want to investigate (Parcak 2009a: 3, 48). The costs involved are also low compared to purchasing commercially available satellite images and acquiring the geographical information systems (GIS) software and skills necessary to utilize these images – standard versions of Google Earth and World Wind are freely available to anyone with a high-speed Internet connection, while Google Earth Pro, which has some useful additional features but does not offer higher resolution or different images, is now also free.

World Wind consists of the Blue Marble, a true-color image of the entire Earth. When you zoom in closer, the "virtual globe" transforms into a seamless mosaic of Landsat 7 images, collected from 1999 to 2003. These images have been draped over a digital terrain model (DTM) derived from Shuttle Radar Topography Mission (SRTM) data to generate a relatively accurate three-dimensional model of the Earth's surface. World Wind also includes images with other color bands such as the infrared spectrum, which can be useful in identifying archaeological features (Parcak 2009a: 61), although the 15 m per pixel resolution of the Landsat images limits the value of World Wind to archaeologists interested in small sites and features.

In 2016, Google Earth upgraded its imagery to a seamless cloud-free mosaic of images from the Landsat 8 satellite and announced new processing techniques for sharper images – gone is the patchwork of geo-referenced high- and mid-resolution satellite images and aerial photographs which was, until recently, visible in some regions such as the northern Indian subcontinent and much of China and Southeast Asia.

The disappearance of the albeit patchy high-resolution satellite coverage formerly available through Google Earth presents one of the major constraints to its use by archaeologists. While densely populated areas, particularly in Western countries, tend to have higher-resolution coverage, due to user demand and the commercial synergies inherent in such projects, the coverage of sparsely populated, less developed countries such as Afghanistan is poorer. Only 7% of Afghanistan was covered by the relatively narrow strips of high-resolution images prior to an upgrade to 2.5 m spatial resolution SPOT imagery in June 2009 (Fig. 1). These high-resolution images, however, still amounted to a total area of 47,000 km^2 and formed the basis for detailed studies of known archaeological sites and under-explored areas by the Archaeological Sites of Afghanistan in Google Earth (ASAGE) project (Thomas et al. 2008; Thomas 2015; Thomas and Kidd 2017; see below). Unfortunately, although the upgrade to SPOT imagery, which was not announced in advance, resulted in a general improvement in the coverage of the country, many of the highest-resolution image strips are no longer available. This lack of transparency in the policies and timetabling of imagery upgrades is a major deficiency in Google Earth's program of updating satellite image coverage.

Despite its variable image resolutions, Google Earth has largely superseded World Wind due to the higher resolution of many of the images it uses. It has become an integral part of news broadcasts, television dramas, academic presentations, and "virtual" travel – over one billion copies of Google Earth software had been downloaded in 2011 since its launch in 2005. Users can visit specific places by searching Google Earth's database or simply explore whichever part of the globe interests them, unrestricted by national boundaries, topography, and no-fly zones.

The coordinates of sites can be uploaded from a spreadsheet using Google Earth Pro to create "placemarks." "Placemarks" can in turn be enriched with images, video clips, links to other Internet resources, and additional information via .kmz files posted on online bulletin boards such as History Illustrated (Ur 2006: 37). The extra measuring tools available in Google Earth Pro enable archaeologists to calculate the area of sites and

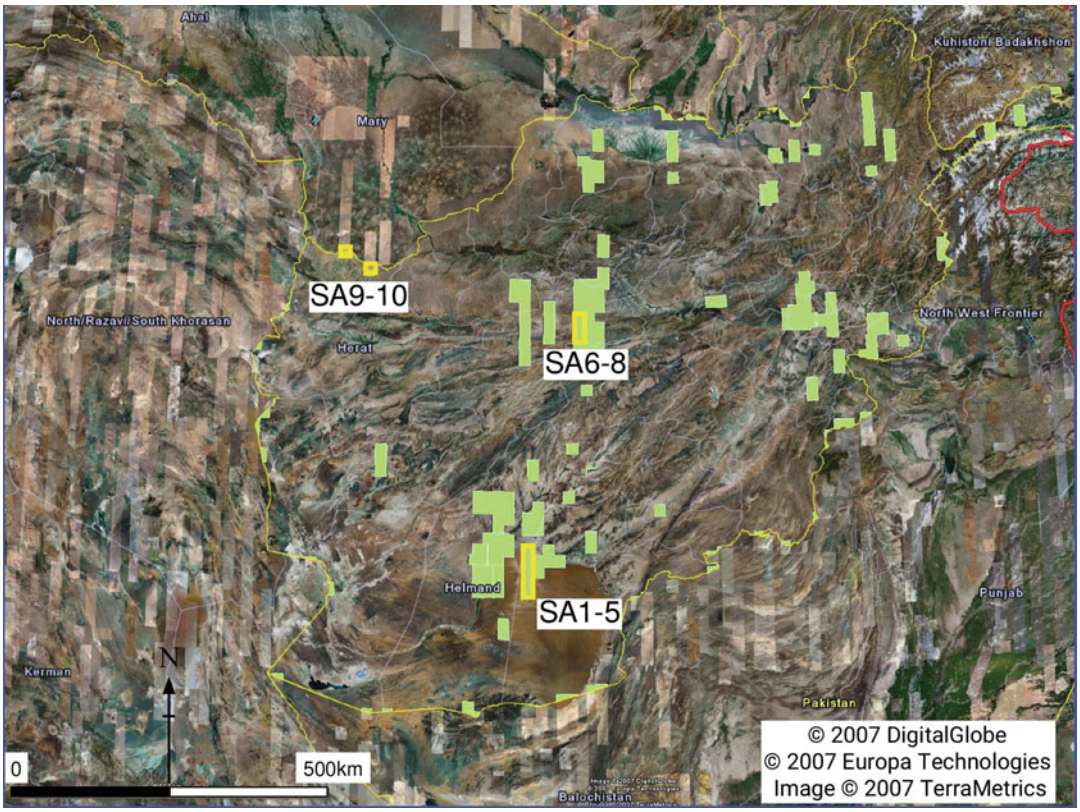

Google Earth Afghan Surveys, Fig. 1 Satellite images of Afghanistan, available through Google Earth prior to the 2009 upgrade to SPOT imagery; high-resolution strips are highlighted in *green* and ASAGE study areas outlined in *yellow*(Image GoogleEarth © 2007 DigitalGlobe © 2007 Europa Technologies Image © 2007 TerraMetrics)

their components, while existing maps and plans can be laid over the satellite images available through Google Earth to verify and improve site descriptions and integrate additional information such as geological data in the interpretative process (Fig. 2). Sketch plans of standing structures can also easily be generated over saved images using drawing software packages such as Adobe Illustrator.

The thousands of postings on the History Illustrated bulletin board highlight the popularity of the medium among "armchair archaeologists" and the plethora of unusual features which excite human curiosity (Fig. 3). The opportunities generated by this "democratization of satellite imagery," to use Stefan Geens' term, were soon recognized by several archaeologists, who saw the potential to increase the spatial area that can be studied and to engage with, and even enlist the help of, the general public (Beck 2006; Ur 2006; inter alia). Archaeologists, however, have largely failed to maximize the potential of Google Earth, primarily because most use Google Earth as a precursor to conducting fieldwork, rather than as a source of data for desk-based studies in its own right.

This oversight is starting to be addressed, as several recent innovative studies have demonstrated the value of Google Earth to archaeologists wishing to investigate regions which are difficult or impossible to reach for political, security, or logistical reasons. Archaeologists are in particular using Google Earth to revisit semiarid parts of North Africa, the Near East, and Central Asia, regions which were the foci of many of the pioneers of aerial archaeology such as Theodor Wiegand, Flt Lt Maitland, Father Poidebard, and Sir Aurel Stein (Kennedy and Bewley 2004:

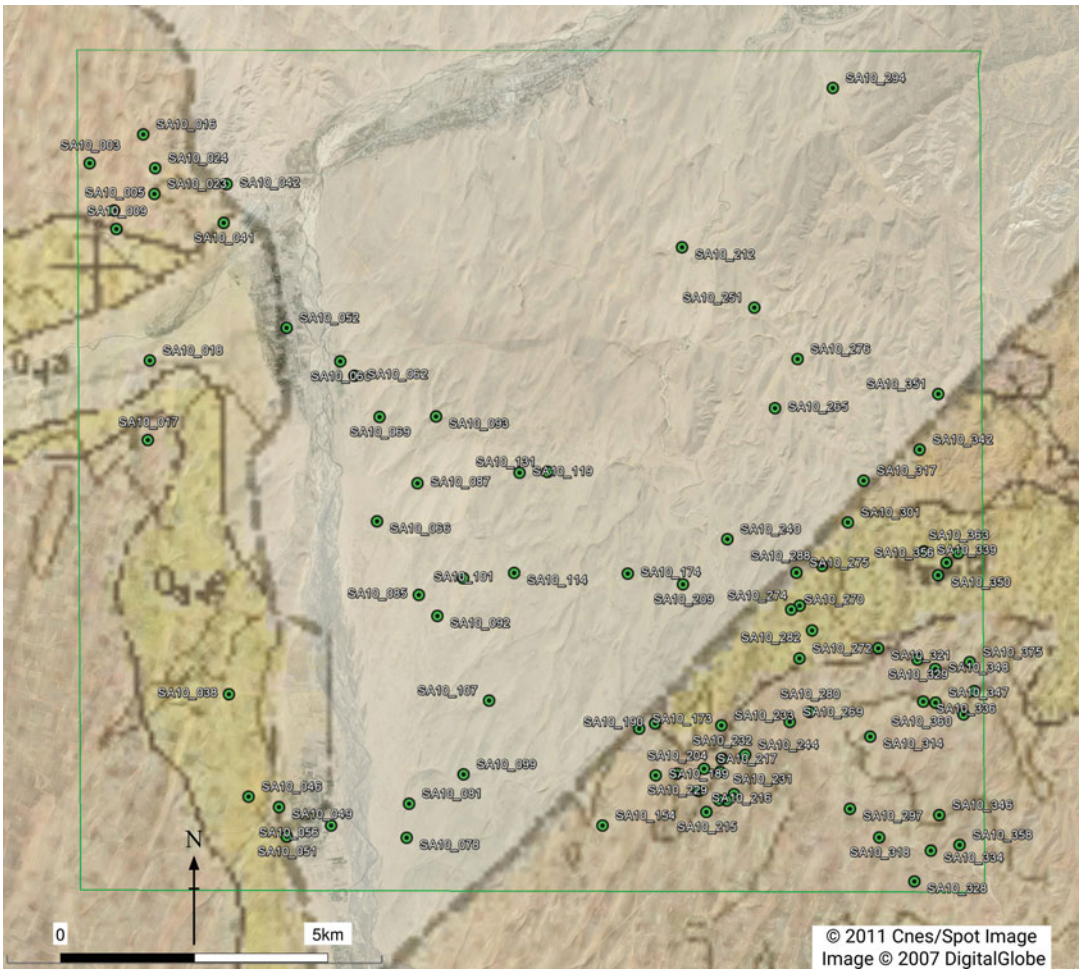

Google Earth Afghan Surveys, Fig. 2 US Geological Survey map of northern Afghanistan laid over ASAGE study area 10 in Google Earth (Image GoogleEarth © 2011 Cnes/Spot Image Image © 2007 DigitalGlobe)

Google Earth Afghan Surveys, Fig. 3 An enigmatic "saucer-shaped" site (SA2_569) in the Rīgistān desert, Afghanistan – possibly a burial in a banked enclosure (Image GoogleEarth © 2008 DigitalGlobe © 2008 Europa Technologies)

51–52). The environmental conditions which facilitated previous aerial archaeology studies of these regions remain essentially the same – relatively low levels of natural vegetation and cloud cover, and the inhospitable terrain, result in optimum site preservation and visibility. The primary reason that these new studies using Google Earth are proving so productive is that much more of the landscape can now be studied systematically (Contreras and Brodie 2010: 101).

Reconnaissance of southern Libya as part of the Desert Migrations Project, for example, has revealed numerous "lost cities" built by the Garamantian civilization c. CE 1–500 (Sterry and Mattingly 2011). Visible structures include the mud-brick remains of fortified farms and village complexes, along with traces of cairn cemeteries, associated field systems, wells, and sophisticated irrigation systems. Over the border in Egypt, Sarah Parcak has used images available through Google Earth to gain "virtual" access to industrial compounds in the Markha Plain. This has enabled Parcak to identify a string of circular fortresses to the south of Tell Ras Budran, which are out of view of the main fortress but within fire−/smoke-signaling distance. These sites would probably have remained undiscovered and thus prone to unwitting destruction without the images available through Google Earth, because fieldwork is impossible in these restricted areas (Parcak 2009b: 363).

Further east in the Levant and Arabian Peninsula, David Kennedy's team has revealed much older and more extensive archaeological remains (Kennedy and Bishop 2011). The surviving desert kites (hunting traps), funerary/religious sites, and seasonal camps, many of which are virtually impossible to recognize at ground level without the benefit of an aerial perspective, indicate a prehistoric cultural continuum stretching across thousands of kilometers. The identification of nearly 2,000 sites in the 1,240 km^2 pilot study area illustrates both the potential of the technique and the rich pre-Islamic archaeological heritage of the region which has largely been ignored in the past – previous survey work has recorded just c. 1,800 sites throughout the whole of Saudi Arabia (Kennedy and Bishop 2011: 1292). Where available, however, declassified aerial photographs, such as those taken by the U-2 spy planes between 1958 and 1960, continue to offer higher-resolution images which provide a historical record of thousands of archaeological features, many of which have since been destroyed (Hammer and Lauricella 2017).

Elsewhere, the contemporary relevance of this form of archaeological research and the value of Google Earth's Historical Imagery View tool are evident in the documentation of the looting of archaeological sites in Jordan (Contreras and Brodie 2010) and Adrian Myers' study of Camp Delta (Guantánamo Bay, Cuba). The Historical Imagery View tool enables users to study successive images of the same place. By overlaying these images in a geographical information system and mapping changes in the site over time, Myers has been able to demonstrate both the rapid expansion and increasingly permanent nature of the prison facilities. As a result, Myers has been able to juxtapose the expansion of the USA's top security goal with official policy announcements relating to the site (Myers 2010: 464).

Few countries illustrate the vital importance of Google Earth to archaeologists better than Afghanistan, where the volatile security situation and unexploded ordnance render fieldwork impractical in many areas. Although the country was systematically photographed from the air during the 1960s, as part of a photogrammetric mapping initiative, these valuable archival images have since been lost. Satellite images, therefore, represent the major, largely untapped source of data for archaeological sites in the country and form the basis of two research projects: Cameron Petrie (2007) has used Google Earth to explore the archaeological sites positioned along ancient trade routes between Afghanistan and Pakistan, while Étienne de la Vaissière and his colleagues (2015) have used satellite imagery to reveal a Kushan military camp near Bactra. At the landscape level, the ASAGE project has sought to document a spatially and diachronically broader range of sites across selected study areas, while the Oriental Institute in Chicago's Afghan Mapping Project is now applying this research goal across the whole country (Franklin and Hammer 2018; Hammer 2016),

as is the Délégation archéologique française en Afghanistan (DAFA).

Key Issues/Current Debates

Only 10% of the sites listed in the archaeological gazetteer of Afghanistan (Ball 1982) have even rudimentary plans, so at the most basic level, Google Earth is being used to generate detailed sketch plans of numerous unplanned sites (Fig. 4; Thomas et al. 2008). Google Earth also provides valuable data on the relatively few sites which have been planned, such as the early Islamic (twelfth- to thirteenth-century CE) capital of Bust/Lashkar-i Bāzār. A French team led by Daniel Schlumberger conducted pioneering excavations and surveys at this sprawling site from 1949 to 1952. Despite their best efforts under difficult working conditions and with few resources, the art historian Terry Allen estimates that nearly 100 Ghaznavid/Ghūrid buildings, some standing two storeys high, survive at Bust, most of which have never been documented. The external walls of many of these structures, which are not marked on the French expedition's plans of the site, are clearly identifiable in Google Earth, while additional details can be collated for several of the other structures which were merely outlined (Thomas and Zipfel 2008). The archived satellite images also create benchmarks against which the impact of threats to archaeological sites, such as the encroachment of agriculture and urbanism, can be monitored over time.

In addition to providing valuable data on known sites in Afghanistan, Google Earth also provides a means of investigating unsurveyed areas. Given the limited opportunities for "ground-truthing" (i.e., checking results by site visits), this form of "remote" archaeological exploration benefits from the process of "visiting" and verifying known sites mentioned above – by exploring the known sites, researchers' eyes can become attuned to how archaeological features appear in Google Earth. This "virtual experience," as well as years of fieldwork experience in the region and a detailed appreciation of both landforms and archaeological site formation processes, is essential if previously undocumented sites are to be identified (and natural or modern features are not to be mistaken for archaeological sites).

A systematic approach to the study of images available through Google Earth, which by its very

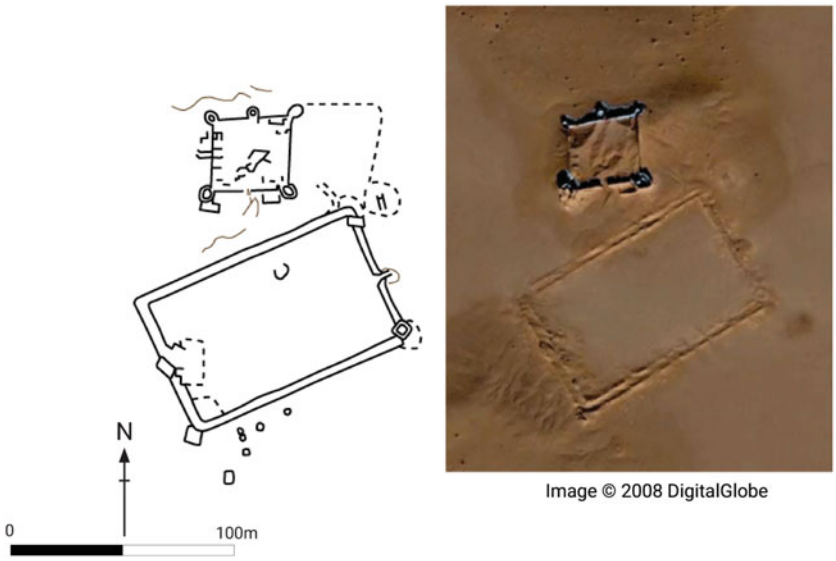

Google Earth Afghan Surveys, Fig. 4 Sketch plan of the hitherto unplanned Ghaznavid site of Qal'a-i Hauz, derived from the imagery available through Google Earth (Image GoogleEarth ©2008 DigitalGlobe)

nature is highly time-consuming, wearying, and often tedious, is essential when they are being used for reconnaissance purposes. ASAGE researchers "zoomed in" to the 100–200 m scale, beyond which even high-resolution satellite images start to pixelate, and spent dozens of hours methodically scrolling up and down selected high-resolution study areas, "placemarking" ambiguous features (Thomas et al. 2008; Thomas and Kidd 2017). The most experienced field archaeologist on the project was assigned the task of cataloguing all the placemarked sites, in an effort to standardize site recognition and descriptions. This review process resulted in three quarters of the placemarks being dismissed as natural or too uncertain to document. Once catalogued, the images and data for the remaining placemarked sites were cross-checked by another archaeologist with firsthand knowledge of the region, so as to minimize errors, reduce subjectivity, and maximize standardization.

A degree of subjectivity is inherent in the process of cataloguing a placemark as an archaeological site, particularly when it is not possible to ground-truth the site and when the site's date and contemporaneity with other sites are difficult to determine. Subjectivity can be reduced by defining site types explicitly at the start of the project. Chronological parameters can be set by adopting the rolling 50-year date used by numerous heritage agencies around the world as the arbitrary division between "archaeological" sites and "modern" sites and comparing the satellite images in Google Earth with declassified CORONA images from the 1960s and 1970s. These images provide an effective terminus ante quem (date before which the sites must have formed) for most of the larger sites visible in both images and thus increase confidence that many of the other smaller sites identified in Google Earth are also premodern.

This relatively recent cutoff point differs from that adopted by Warwick Ball, who argues that if post-Tīmūrid (c. CE 1526) remains were included in his gazetteer "virtually every modern town and even many villages would qualify as a 'site'" (Ball 1982 I: 14). While Ball's reasoning is understandable given the practicalities of producing a gazetteer which already has over 2,000 sites in it, the relatively recent cultural heritage of Afghanistan is just as worthy of recognition, preservation, and protection as its older sites, as is the case elsewhere in the world.

Ten ASAGE study areas were selected in different environmental zones close to major early Islamic urban centers to investigate the use of different "marginal" landscapes by nomads and to test whether the methodology ASAGE has devised is applicable across the Afghan landscape and beyond. Only one of the ten study areas yielded more than 0.5 sites per km^2 (Table 1). Despite this apparently low success rate, 679 definite or probable archaeological sites were identified over an area of 2,680 km^2. These include

Google Earth Afghan Surveys, Table 1 Details of the ten ASAGE study areas in Afghanistan

Study area	Area (km^2)	Placemarks	Sites	Site density	Location	Date of image
SA1	312.5	163	55	0.18	N5 – south central desert around Qal'a-i Hauz	6/12/2004
SA2	273.5	579	118	0.43	N1 – primarily N of Arghandab	6/12/2004
SA3	240.5	599	171	0.71	N2 – south of Arghandab	6/12/2004
SA4	267.5	382	91	0.34	N3 – north central desert	6/12/2004
SA5	273.0	107	16	0.06	N4 – central desert	6/12/2004
SA6	225.0	123	20	0.09	Ghur province, north of Hari Rud	25/07/2004
SA7	263.7	41	17	0.06	Ghur province, south of Hari Rud	25/07/2004
SA8	265.5	143	24	0.09	Ghur province, south of Hari Rud	25/07/2004
SA9	299.0	285	81	0.27	Afghan/Turkmen border	20/09/2006
SA10	260.0	257	86	0.33	Afghan/Turkmen border	30/08/2002
Total	2,680.2	2,679	679	0.25		

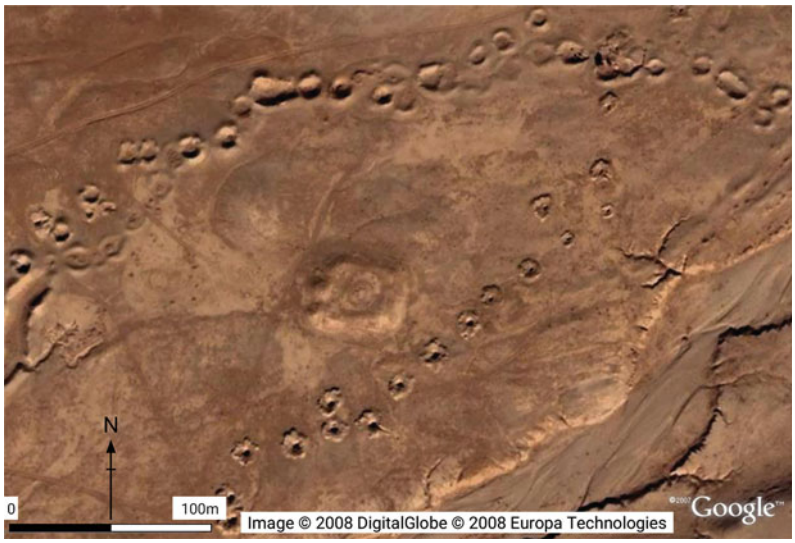

Google Earth Afghan Surveys, Fig. 5 SA2_101: *tepe* with towers guarding the entrance in the West; note the overlapping *kārīz* spoil heaps running to the north and south of the *tepe* (Image GoogleEarth © 2008 DigitalGlobe © 2008 Europa Technologies)

isolated nomad campsites and corrals, fortified dwellings and *tepe*s (occupation mounds, probably dating back several millennia), deserted villages, dams and reservoirs, and *kārīz* (underground water channels; Fig. 5). Prior to the study, only three archaeological sites were listed in the study areas.

The wealth of sites found in the Arghandāb river valley and Rīgistān desert (Thomas and Kidd 2017) contrasts with the much smaller numbers identified in the three study areas in the mountains of Ghūr province (SA6-8) and the two on the steppe in the north of Harāt province (SA9-10). The most obvious explanation is the differing intensities of use in the different environmental zones. Other factors, however, may have contributed to the reduced site numbers in these areas – summer campsites in the mountains are likely to be more dispersed and ephemeral than winter ones, while the harsh winters, which are accompanied by heavy snow falls and violent spring floods, may also have impacted on site preservation and visibility in the mountains of Ghūr.

The value of adopting a systematic approach to studying archaeological landscapes in Google Earth, therefore, extends beyond the numbers of sites identified. It permits an assessment of the significance of the distribution of sites in quantitative terms, relative to the types of sites found, different landforms covered, topographic features, and varying levels of preservation and visibility. The conclusions derived from such analyses have obvious implications for cultural heritage management and archaeological impact assessments.

Future Directions and Examples

The large number of sites in Afghanistan (and elsewhere) identified using Google Earth should not come as a surprise, despite the dearth of sites previously recorded in the study areas. Survey work in the 1960s and 1970s in the nearby deserts of Sīstān, the anecdotal reports from travelers in the region, and fieldwork in other semiarid regions of the Near East and Central Asia have demonstrated that deserts have been utilized by nomads for millennia and that their sites survive, despite often being ephemeral and difficult to date. The blanks on distribution maps are frequently due to a lack of investigation arising from Western preconceptions about "uninhabitable" semiarid regions rather than a lack of archaeological sites.

The primary value of the ASAGE research is as a basis for future fieldwork. The newly discovered sites need to be ground-truthed, both to establish the veracity of their identification and to collect datable ceramics from the surface. The detailed

sketch plans can be used by the relevant authorities and other archaeologists to develop site management plans, particularly where farmers are encroaching upon sites. The latest 4G mobile phone and iPad/tablet technology even raise the possibility of developing tourist itineraries and context-rich online resources at sites such as Ghazni, which was "Cultural City of the Islamic Civilization" for 2013 (Thomas 2015).

The archaeological potential of Google Earth is so vast that it cannot be exploited fully by a few academics alone. Much can be achieved by engaging with the sizable "armchair archaeologist" community and enlisting their assistance in exploring study areas and identifying sites, as Sarah Parcak is doing through her GlobalXplorer project. Engagement, however, is a two-way process and requires considerable commitment of time (in training, cross-checking, and providing feedback) and a willingness to communicate and share knowledge on the part of academics. Similarly, while much of Afghanistan remains a no-go zone for Westerners, it is imperative to share data with the National Afghan Institute of Archaeology and other relevant Afghan authorities, foreign archaeologists, NGOs and individuals, and sections of the military who are interested in discovering and protecting cultural heritage. The ease with which Google Earth data can be generated, exported, and exchanged provides a further example of how central this versatile medium will be to archaeological research for the foreseeable future.

Cross-References

► Aerial Archaeology

References

Ball, W. 1982. *Archaeological gazetteer of Afghanistan*. Paris: Editions Recherche sur les civilisations.

Beck, A. 2006. Google Earth and world wind: Remote sensing for the masses? *Antiquity* 80. Available at: http://antiquity.ac.uk/projgall/beck308/. Accessed 30 June 2017.

Contreras, D.A., and N. Brodie. 2010. Quantifying destruction: An evaluation of the utility of publicly-available satellite imagery for investigating looting of archaeological sites in Jordan. *Journal of Field Archaeology* 35 (1): 98–111.

de la Vaissière, É., P. Marquis, and J. Bendezu Sarmiento. 2015. A Kushan military camp near Bactra. In *Kushan histories. Literary sources and selected papers from a symposium at Berlin, December 5 to 7, 2013*, ed. H. Falk, 241–254. Bremen: Hempen Verlag.

Franklin, K., and E. Hammer. 2018. Untangling palimpsest landscapes in conflict zones: A "remote survey" in Spin Boldak, Southeast Afghanistan. *Journal of Field Archaeology* 43 (1): 58-73.

Hammer, E. 2016. New research directions in the CAMEL lab. *News and Notes (Oriental Institute, University of Chicago)* 228: 4–9.

Hammer, E., and A. Lauricella. 2017. Historical imagery of desert kites in eastern Jordan. *Near Eastern Archaeology* 80 (2): 74–83.

Kennedy, D., and R. Bewley. 2004. *Ancient Jordan from the air*. London: Council for British Research in the Levant.

Kennedy, D., and M.C. Bishop. 2011. Google Earth and the archaeology of Saudi Arabia. A case study from the Jeddah area. *Journal of Archaeological Science* 38 (6): 1284–1293.

Myers, A. 2010. Camp Delta, Google Earth and the ethics of remote sensing in archaeology. *World Archaeology* 42 (3): 455–467.

Parcak, S.H. 2009a. *Satellite remote sensing for archaeology*. London: Routledge.

Parcak, S.H. 2009b. The skeptical remote sensor: Google earth and Egyptian archaeology. In *Beyond the horizon: Studies in Egyptian art, archaeology and history in honour of Barry J. Kemp*, ed. S. Ikram and A. Dodson, 361–381. Cairo: The American Research Center in Egypt.

Petrie, C.A. 2007. Remote sensing in inaccessible lands: Plains and preservation along old routes between Pakistan and Afghanistan. *ArchAtlas* February 2010, Ed. 4. Available at http://www.archatlas.org/workshop/Petrie07.php. Accessed 30 June 2017.

Scollar, I., and R. Palmer. 2008. Using goggle earth imagery. *AARGnews* 37: 15–21.

Sterry, M., and D.J. Mattingly. 2011. DMPXIII: Reconnaissance survey of archaeological sites in the Murzuq area. *Libyan Studies* 42: 103–116.

Thomas, D. 2015. Google Earth™ @ Ghazni. In *Asian horizons: Giuseppe Tucci's Buddhist, Indian, Himalayan and Central Asian studies*, Serie Orientale Roma CVI, ed. A.A. Di Castro and D. Templeman, 495–528. Melbourne: Monash University Publishing.

Thomas, D.C., and F.J. Kidd. 2017. On the margins: Enduring pre-modern water management strategies in and around the Registan desert, Afghanistan. *Journal of Field Archaeology* 42 (1): 29–42.

Thomas, D.C., and C. Zipfel. 2008. A new look at Bust: Google Earth™ and archaeological sites in Afghanistan. Poster presented at the 6th World Archaeological Congress, Dublin.

Thomas, D.C., F.J. Kidd, S. Nikolovski, and C. Zipfel. 2008. The archaeological sites of Afghanistan in Google Earth. *AARGnews* 37: 22–30.

G

Ur, J. 2006. Google Earth and archaeology. *The SAA Archaeological Record* 6 (3): 35–38.

Further Reading

GlobalXplorer. n.d. Available at: https://www.globalxplorer.org/. Accessed 30 June 2017.
Google Earth. n.d. Available at: http://www.google.com/earth/index.html. Accessed 30 June 2017.
Google Earth Community Forums. n.d. Available at: http://googleearthcommunity.proboards.com/. Accessed 30 June 2017.
World Wind. n.d. Available at: http://worldwind.arc.nasa.gov/index.html. Accessed 30 June 2017.

Goose: Domestication

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Basic Species Information

Domestic geese descend from two wild species, the greylag, *Anser anser* (Linnaeus 1758), and the swan goose, *Anser cygnoides* (Linnaeus 1758) (Shi et al. 2006). The natural breeding range of the swan goose, the ancestor of the Chinese goose, is in Mongolia, North China, and southeastern Russia, and wintering areas are mainly in China. The breeding area of the greylag, the wild form of the domestic goose in Europe (European goose), covers Northern and Central Europe and Asia; wintering areas are in Southern Europe and Northern Africa. Two subspecies of the greylag are known, *A. a. anser* (western form) and *A. a. rubrirostris* (eastern form). Both *A. a. rubrirostris* and the European domestic goose have pink beaks, while *A. a. anser* has an orange beak. The pink beak indicates that the European domestic goose descends from the eastern form.

The two domesticated forms of geese, the European and the Chinese, are closely related. Both are widely spread in the world today, and they can have fertile offspring. Also wild forms, the greylag and the swan goose, can interbreed (Gray 1958). The Chinese goose grows larger than the European and has a longer neck; the male has a pronounced knob at the base of the beak. Both Chinese and European geese have white and gray breeds.

The Egyptian goose *Alopochen aegyptiaca* was kept by ancient Egyptians a long time before the greylags, but this species never became fully domesticated. One early use of domesticated geese has been for sacrifices (e.g., in Mesopotamia, Middle East, and classical Greece). Geese were probably sacred in Pre-Roman Britain (Zeuner 1963). Domestic geese were associated with religious symbolism in Roman times in Britain and Italy (Albarella 2005), and geese bones are regularly found in Iron Age burials in Northern and Central Europe. Over time, geese have provided meat, liver, and eggs. Wild or domestic goose was identified, for example, in Tutankhamun's tomb (c. 1330 BCE) among the remains of the funerary meal (Houlihan 1986). Romans and probably ancient Egyptians overfed geese in order to improve the flavor of the liver and meat. Perhaps, the most important material advantage of geese was the fine quality of feathers and down. Quill pens were used in medieval and historical times. Geese were respected house guards at least from Roman time onward.

It is currently not possible to date or locate when and where geese were kept for the first time, though in China, the goose was domesticated by ~1000 BCE and most likely earlier. The first introduction of the Chinese goose to Europe was in the eighteenth century.

Domestic geese are depicted on the walls of burial chambers in ancient Egypt c. 1400 BCE. Domestic geese appeared in ancient Greece by 700 BCE. Homer mentions white geese in the Odyssey c. 800–700 BCE, apparently meaning the domestic bird. Zeuner (1963) proposed that the domestication must have happened first in the breeding areas, where young birds were taken from nests and raised though the breeding distribution of the greylag does not cover Egypt.

The greylag may have been domesticated in many places at different times. Crossbreeding of domestic and wild forms has most likely happened often. For example, in Scotland and Fennoscandia, it had been common to take

young wild geese from the nests and raise these (Sirelius 1919). Geese probably belonging to the domestic form have been identified in samples dating from the Bronze Age (c. 1700–500 BCE) in Southern Sweden and Eastern Germany and Pre-Roman and Roman Iron Age (c. 400 BCE–CE 400) in Southern Sweden (Ericson and Tyrberg 2004), probably indicating a local domestication.

Based on size, domesticated geese were kept in Iron Age and Viking Age Denmark (c. CE 500–1000) and in Roman and Saxon Britain (c. CE 0–1000). However, according to archaeological materials, domestic geese became abundant only during medieval times in most of Europe (Reichstein and Pieper 1986; Yalden and Albarella 2009). In Western Russia the earliest morphologically identified domestic geese date to 500 BCE-300 CE, and genetically identified domestic geese to 10 CE (Middle Volga Region) (Honka et al. 2018). A sudden increase in the amount of goose bones and bones of young individuals in archaeological data can be interpreted as indirect evidence of the presence of the domesticated form.

Molecular studies of recent and archaeological specimens show a close genetic relationship between the different species of genus *Anser* (Barnes and Dobney 2000; Ruokonen et al. 2000; Shi et al. 2006). Separation between the domestic and wild *Anser* geese, or the eastern and western form of the greylag, by ancient DNA, has not yet been successful (e.g., Heikkinen 2017). Identification of plumage color by analysis of ancient DNA from the bone might in the future give good results in tracking the early domestication of geese.

All species in genus *Anser* are very similar in skeletal morphology, which makes species identification of archaeological bones difficult. Vague morphological differences occur in the cranium and sternum. In sternum, the keel is deeper in the domestic compared to the wild form (Yalden and Albarella 2009). However, these elements are rarely preserved in archaeological samples.

The earliest domestic geese were of similar size to their wild ancestors, making the bones of the earliest domestic geese indistinguishable from wild geese. Only few changes have occurred in the appearance of the European goose during domestication. As a consequence of selection, their size became larger and heavier, which led to a restricted ability to fly. Leg bones (probably not the tibiotarsus) of domesticated geese are stouter than those of wild forms because they carry the increased weight, and the wing bones are shorter and broader (Reichstein and Pieper 1986; Boessneck and Von den Driesch 1979).

The plumage color changed from gray to heterogeneous and finally to white in some domestic breeds. In about CE 27, Pliny the Elder writes about the value of down and meat from white geese, evidently pointing to the domestic form. The Romans knew several breeds of geese such as the small white German and the large white (Albarella 2005).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

References

Albarella, U. 2005. Alternate fortunes? The role of domestic ducks and geese from Roman to medieval times in Britain. In *Feathers, grit and symbolism. Proceedings of the 5th Meeting of the ICAZ Bird Working Group in Munich*, Documenta Archaeobiologiae 3, ed. G. Grupe and J. Peters, 249–258. Rahden: International Council for Archaeozoology.

Barnes, I., and K. Dobney. 2000. DNA-based identification of goose species from two archaeological sites in Lincolnshire. *Journal of Archaeological Science* 27: 91–100.

Boessneck, J., and A. Von den Driesch. 1979. *Eketorp. Befestigung und Siedlung auf Oland/Schweden. Die Fauna*. Stockholm: Almqvist & Wiksell.

Ericson, P.G.E., and T. Tyrberg. 2004. *The early history of Swedish avifauna. A review of the fossil record and early written sources*. Stockholm: Kungliga Vitterhets Historie och Antikvitets Akademien.

Gray, A.P. 1958. *Bird hybrids. A check-list with bibliography*. Farnham Royal: Commonwealth Agricultural Bureaux.

Heikkinen, M. 2017. *The domestication history of the European goose. A genomic perspective*. Acta Universitatis ouluensis A692. Oulu: University of Oulu.

Honka, J., Heino, M.T, Kvist, L, Askeyev, I.V., Shaymuratova, D.N., Askeyev, O.V., Askeyev, A.O., Heikkinen, M.E., Searle, J.B. and Aspi, J. 2018. Over a Thousand Years of Evolutionary History of Domestic Geese from Russian Archaeological Sites, Analysed Using Ancient DNA. Genes 9, 367.

Houlihan, P.F. 1986. *The birds of ancient Egypt*. Warminster: Aris & Phillips.

Reichstein, H., and H. Pieper. 1986. *Untersuchungen an Skelettresten von Vögeln aus Haithabu (Ausgrabungen 1966–1969)*. Neumünster: Karl Wachholtz.

Ruokonen, M., L. Kvist, and J. Lumme. 2000. Close relatedness between mitochondrial DNA from seven Anser goose species. *Journal of Evolutionary Biology* 13: 532–540.

Shi, X.-W., J.W. Wang, F.-T. Xeng, and X.-P. Qiu. 2006. Mitochondrial DNA cleavage patterns distinguish independent origin of Chinese domestic geese and Western domestic geese. *Biochemical Genetics* 44 (5–6): 237–245.

Sirelius, U.T. 1919. *Suomen kansanomaista kulttuuria: esineellisen kansatieteen tuloksia I*. Helsinki: Otava. (Translation in Swedish 1932 Stockholm: Finlands folkliga kultur I.).

Yalden, D.W., and U. Albarella. 2009. *The history of British birds*. Oxford: Oxford University Press.

Zeuner, F.E. 1963. *A history of domesticated animals*. London: Hutchinson & Co.

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Basic Biographical Information

Vasily Alekseevich Gorodtsov (1860–1945) (Fig. 1) was an outstanding Russian archaeologist. He began the scientific work in the archival committee of Ryazan and Yaroslavl (1889–1899). During this period, Gorodtsov explored Neolithic settlements on the Oka River downs (the right feeder of the Volga River). In 1901, he was given a mission from the Moscow archaeological committee to lead excavations in the South of Russia. Over a period of six months, he excavated 107 barrows in the river Donets Basin (Kharkov Region). During this time, scientific excavation and describing the methodology of burial complexities was invented for the first time.

Gorodtsov, Vasily A., Fig. 1 Vasily Alekseevich Gorodtsov

From 1903 to 1929, Gorodtsov worked in the Historical Museum of Moscow. In 1905, his excavation report on the barrows was published. Four groups of burials were identified according to their stratigraphic horizons, all of them belonging to the second Bronze Age. There were three consequent Bronze Age cultures: pit-house, catacomb, and log house. Gorodtsov's division into periods took its rightful place in the history of European science in line with such systems as Montelius', Reineke, and Furumark.

Gorodstov had an active teaching profession also. From 1907–1914, he taught archaeology at the Moscow Archeological Institute and from 1915 to 1918, he taught at Shanyavsky National University. After 1918, he became a professor at Moscow State University. Sometime later, he became a professor at the Chernyshevsky Literature Philosophy and History University. Gorodstov was also a member of the Material Culture Institute of the ASUSSR. Many talented students followed him, the most famous of which is N. Y. Merpirt.

Major Accomplishments

V.A. Gorodtsov was the first person in 20 years to explore pit-houses of paleontological humans in

the East European territory (Timonov settlement, 1928). He classified Fatianovskaya, Panfilovskaya forest-steppe archaeological cultures. He researched sites of Scythian-plowmen and also artifacts of the Gorodetskaya and Diakovskaya cultures. Gorodtsov was the first archaeologist to organize large excavations in the Old Ryazan. He is the author of more than two hundred scientific works.

Gorodtsov's scientific works determined the direction of Russian archaeology for many years. This was characterized by the holistic and systematic approach of archaeological material classification. Gorodtsov's scientific work "typological methods in archaeology" was republished in the USA. V.A. Gorodtsov developed the historical approach to archaeology, which was initiated by his predecessor, Count A.S. Uvarov, and which is now typical of the Russian science. He invented a model concerning the establishment and the expansion of industrial farms in the Middle East, Balkans, and Central and East Europe. His publications prefigured Gordon Childe's diffusion theory in many respects. Gorodtsov's research regarding Eurasian cultures still plays a significant role in contemporary archaeology.

Cross-References

- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Childe, Vere Gordon (Theory)
- ▶ Russia: Management of Archaeological Heritage

Further Reading

Gorodtsov, V.A. 1901. Archaeological researches result in Izumsky County Kharkov Region. Works of the XII archaeological conference. Moscow.

Gorodtsov, V.A. 1908. Primogenital archaeology. Moscow.

Gorodtsov, V.A. 1910. Common archaeology. Moscow.

Gorodtsov, V.A. 1914. *The Bronze Age cultures in the Middle Russia period*. The Russian historical museum report. Moscow, 1915. Moscow.

Gorodtsov, V.A. 1923. *Archaeology, volume 1: The Stone Age*. Moscow: Gosudarstvennoe Izdatel'stro.

Gorodtsov, V.A. 1925. Archaeological classification. Moscow.

Gorodtsov, V.A. 1927. The typological method in archaeology. Ryazan.

Gorodtsov, V.A. 1935. Timonov Paleolithic settlement. Moscow/Leningrad.

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Basic Biographical Information

Richard Allen Gould was born in 1939, in Newton, Massachusetts, as an only child. His father served in the Pacific during WWII on the aircraft carrier USS *Yorktown* (CV-10) and, after the war, spent a career in higher education as President of Antioch College, Chancellor of the University of California at Santa Barbara, and, ultimately, Chancellor of the State University of New York (SUNY). During the war, his first-generation Finnish mother worked at a shipyard in Massachusetts, and Gould grew up in a bilingual household (Fig. 1).

Gould graduated with a B.A. (cum laude) in anthropology from Harvard University in 1961 and followed with a Ph.D. in anthropology from the University of California at Berkeley in 1965.

Gould's initial interest in archaeology was sparked by a meeting with the former Chair of the University of Chicago Department of Anthropology, Fay Cooper-Cole, who had retired to California and was a family friend. Through Cooper-Cole, Gould was introduced to one of Cole's former graduate students, Jessie Jennings, who was leading the southern section of the Glen Canyon Project – a vast public archaeology undertaking that was to catalogue and excavate key sites along the Colorado River that would be submerged by the construction of Glen Canyon Dam. Gould worked under the exacting tutelage of Jennings during field

Gould, Richard A., Fig. 1 Richard Gould measuring the propeller of the Bird Key Shipwreck, Dry Tortugas National Park c. 1991. (Courtesy of US National Park Service)

seasons in 1961–1962 and came to appreciate the value of science and intellectual rigor as applied to archaeological work.

While at Berkeley, Gould wrote a Ph.D. thesis on Northern California Tolowa ethnoarchaeology. The work addressed questions of cultural continuity and change that were tested via excavations at the Point Saint George Site. Gould's thesis advisor, John Rowe, was a prominent Peruvian scholar, and though he did not become an Inca specialist, Gould was drawn to Rowe by his expertise in ceramic analysis and culture history which he has applied to other areas throughout his professional life.

Subsequent to his graduate work in California, Gould and his wife Elizabeth (Betsy) did groundbreaking work in ethnoarchaeology with the Aboriginal people of the Western Australian Desert. Drawing on past experiences, the Goulds proposed the concept of a Western Desert Culture – a discernible amalgamation of the ideas of cultural continuity drawn from John Rowe coupled to the culture area theories of Jessie Jennings.

After work in Western Australia, Gould looked to his mother's homeland of Finland where he studied the historical processes of farm abandonment and the material residues that were left behind as Finish families reacted to varying degrees of socioeconomic stress after the Russo-Finnish War and WWII.

In 1977 while on sabbatical to Cambridge University to work on his book *Living Archaeology*, Gould met maritime archaeologist Keith Muckelroy. Muckelroy sparked a long-term interest in the subject of underwater archaeology in Gould, and in 1981 he chaired a School of American Research Seminar dedicated to the subject. From this seminar came the highly regarded book *Shipwreck Anthropology*, one of the first volumes to advocate for an explicitly anthropological approach to underwater archaeology. The seminar began a long, productive professional relationship between Gould and National Park Service underwater archaeologists Daniel Lenihan, Larry Murphy, Matthew Russell, and David Conlin. Following the seminar, Gould expanded his research interests to include underwater work in Dry Tortugas, Florida, and Bermuda.

After the September 11, 2001 terrorist attacks, Gould realized that the techniques of archaeology could provide insights into mass-casualty events and bring closure to the families of those who died. Gould's World Trade Center work was followed, in 2003, by a much larger examination of a tragic fire at "The Station" nightclub in Warwick Rhode Island – this work tied in with his commitment to a "knowable past" and an empirical approach in line with the standards of modern crime-scene forensics.

Gould retired from his position in the Department of Anthropology at Brown University in 2009 and currently lives in Honolulu, Hawaii, with his sweetheart and wife of 50 years Betsy Gould (neé Barber).

Major Accomplishments

After completing his Ph.D. in Anthropology at Berkeley, Gould embarked on a diverse

examination of different subjects, all tied together by the common thread of human cultural and behavioral adaptations to stress, risk, conflict, and uncertainty (http://philosopedia.org/index.php/Richard_A._Gould). Gould's career blossomed during the transition in American archaeology from cultural-historical particularism to the scientific/ecological focus of the New Archaeology in the late 1960s and 1970s, and he remained heavily involved in the field during the period of paradigmatic confrontation between Post-Processual and Processual archaeology in the late 1980s and 1990s.

Gould's definition of "culture" shades closely to a "bio-cultural" mechanism of adaptation that combines elements of both biological and non-biological aspects of human experience as opposed to an ideational notion of culture defined as a negotiated system of symbols. As such this sometimes put him at odds with archaeologists of the Post-Processual movement as it moved into maturity in the 1990s.

Gould's writings are fundamentally scientific and carry a theme of a "real past" that is knowable in some of its facets via the careful application of science and the scientific method. Gould's approach has been to apply standards of evidence akin to courtroom testimony (i.e., empiricism, logical connection, minimal assumptions, and rigorously argued linkages between the observed material and inferred behavioral causes) to the results of his research. His mass-casualty work came as a result of his emphasis on science and the notion that in some instances there is a single answer that adheres most closely to the facts and is at least "provisionally true." Gould privileges statements about the past that carry with them minimal assumptions, yet he has also been able to ague from particular instances such as the shipwrecks of the Spanish Armada and the salvage of WWII aircraft during the Battle of Britain towards more generalized statements of human behavior as related to risk, stress, and conflict that have broad applicability over time and space.

Gould argues that the past is knowable with varying degrees of certainty and also notes that a large amount of human behavior, even in some surprising instances, can be linked to adaptive responses to the environment. In this he defines "environment" as encompassing both the physical environment and also the larger socioeconomic forces that shaped human decisions in the past. He is a strong proponent of a stepwise approach to the study of cultural adaptation that encompasses multiple feedback loops combining a systemic relationship of both the ideational and biological aspects of human experience. In this Gould advocates for the use of both "emic" (i.e., internal, socially constructed categories of thought and meaning such as local religion) and "etic" (i.e., external categories of thought and meaning such as the application of the Western scientific method).

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Ethnoarchaeology
- ▶ Underwater Archaeology

Further Reading

Gould, R.A. 1966. *Archaeology of the Point St. George Site and Tolowa prehistory* (Publications in Anthropology 4). University of California.

Gould, R.A. 1968. Living archaeology: The Ngatatjara of Western Australia. *Southwestern Journal of Anthropology* 24 (2): 101–122.

Gould, R.A. 1969. *Yiwara: Foragers of the Australian Desert*. New York/London and Sydney: Charles Scribner's Sons/William Collins, Ltd.

Gould, R.A., ed. 1973. *Man's many ways: A natural history reader in anthropology*. New York: Harper and Row. (Rev edn. published in 1977).

Gould, R.A. 1977. *Puntutjarpa Rockshelter and the Australian Desert culture, part 1* (Anthropological Papers of the American Museum of Natural History 54).

Gould, R.A. 1978a. Tolowa. In *Handbook of North American Indians, volume 8*, ed. R.F. Heizer, 128–136. Washington, DC: Smithsonian Institution.

Gould, R.A., ed. 1978b. *Explorations in ethnoarchaeology*. Albuquerque: University of New Mexico Press.

Gould, R.A. 1980. *Living archaeology*. New York: Cambridge University Press.

Gould, R.A., ed. 1983. *Shipwreck anthropology*. Albuquerque: University of New Mexico Press.
Gould, R.A., ed. 1984. *Toward an ethnoarchaeology of modern America (Research Papers in Anthropology 4)*. Providence: Brown University.
Gould, R.A. 1985. The empiricist strikes back: Reply to Binford. *American Antiquity* 50 (3): 638–644.
Gould, R.A. 1988. Life among the ruins: The ethnoarchaeology of abandonment in a Finnish farming community. In *The social implications of Agrarian change in northern and eastern Finland*, ed. T. Ingold, 99–120. Helsinki: Suomen Antropologinen.
Gould, R.A. 1990. *Recovering the past*. Albuquerque: University of New Mexico Press.
Gould, R.A. 2000. *Archaeology and the social history of ships*. New York: Cambridge University Press.
Gould, R.A. 2004. Disaster archaeology at the West Warwick, RI, nightclub fire scene. *The SAA Archaeological Record* 3: 1–7.
Gould, R.A. 2007. *Disaster archaeology*. Salt Lake City: University of Utah Press.
Gould, R.A., and M.B. Schiffer, eds. 1981. *Modern material culture: The archaeology of us*. New York: Academic Press.

Graffiti Archaeology

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Introduction

Graffiti is an important source of material evidence through which archaeologists can learn about cultural identities and ideas. The tradition of graffiti goes back to ancient Greece and Rome, if not earlier (Baird and Taylor 2010). One of the renowned characteristics of Pompeii and Herculaneum is the wealth of political slogans and bawdy statements that are inscribed on the walls of buildings, both inside and outside (Benefiel 2010; UNESCO 2013). In contemporary societies, graffiti is widely perceived as undesirable and labeled as "vandalism" and often connected with feelings of adrenaline (O'Doherty 2012).

Archaeologists investigate the nexus of technique, form, and content of this visual culture to extract uncensored, uninstitutionalized information about attitudes toward social, political, religious, and ideological issues. Graffiti is a continuation of the landscape-marking and mark-making communication practices that have been used by humans for at least 40,000 years. While rock art receives much academic interest owing to its ability to reveal a myriad of information about past societies, economies, material culture, and ideologies (McDonald 2012), the same can be said of classical, medieval, and historical colonial, military, and convict graffiti. Though this entry focuses on contemporary graffiti, the issues discussed are relevant to classical, medieval, and historical graffiti.

Definition

Graffiti, the plural of graffito, comes from the Italian word *graffiare*, meaning "to scratch" and is used to refer to human-made markings in the public domain. The term is widely used to describe markings that are unauthorized or illegal and can include expressions in both two- and three-dimensions. Certainly, graffiti is generally conceived as illegal behavior (e.g., Fig. 1); however, not all types of graffiti are illegal. Graffiti becomes illegal and/or vandalism when the author does not have a legal right to be making their mark on the surface they are marking.

Graffiti can be defined as a form of visual communication and intended human-made marking that occurs publicly on any fixed surface in natural and built landscapes. Put simply, graffiti is communication through landscape-marking, and is inclusive of a wide range of forms, such as regulated traffic signs, public murals, advertising, and street art. This definition maintains a degree of fluidity and flexibility and is consistent with archaeological approaches to rock art style as a means of communication (Wobst 1977; McDonald 2012). From this viewpoint, graffiti encompasses all public visual communication, regardless of authorship, form, material, technique, message, legality, and social and cultural acceptances.

Graffiti Archaeology, Fig. 1 Sign describing graffiti as vandalism, New York, USA, 2011

Key Issues and Current Debates

One key issue under current debate concerns what actually constitutes graffiti. Daniell (2011: 455) explains that graffiti comprised "essentially handwriting or hand-drawn designs" until the late 1960s and early 1970s, when "tagging" became popular and urban graffiti became "larger and more colourful and included designs, writing and pictures"; this change came about due to the availability of new techniques and implements, such as aerosol spray cans. Macdonald (2001: 2–3) argued that the contemporary practice of graffiti is "far from mindless or senseless and that there is always a purpose behind [its] production". Frederick (2009: 212) agreed, stating that graffiti is "a mode of expression and communication which comprises a vast array of media, technique, subject matter, form and meanings" and that a common feature of most graffiti is that comprises "text and/or images that [are] made in shared spaces where it is viewed publicly, be that a privately owned building, public transport, or an alleyway" (Frederick 2009: 212). David and Wilson (2002: 43) say that graffiti:

> . . . has a more pointed definition, referring to unsolicited inscriptions in public spaces. As a form of inscription usually practiced outside the censoring arm of the power elite, graffiti confronts and contradicts the ordered and ordering space of institutionalised life. Thus by definition, graffiti is imbued with a polluting and vandalistic quality irrespective of its decorative potential. It threatens the status quo not just because of the words or images written, but by the fact that its execution in public spaces lies outside the control of existing social forces.

Daniell (2011) argues that our understanding of contemporary graffiti should be informed by contemporary issues, such as legality, regulation, control, and resistance; however, using a similar approach toward non-contemporary graffiti is problematic because those markings were created under different legal, political, and social circumstances (Daniell 2011: 458, 462).

Several archaeological studies of graffiti have been undertaken across the globe and the following paragraphs are examples of some of the recent graffiti archaeology projects that have been undertaken around the world. In the United Kingdom, Graves-Brown and Schofield (2011) studied graffiti found on the interior walls of an apartment at 6, Denmark Street, London. This location was once occupied by members of the punk band, Sex Pistols, and the study mainly focused on caricatures of band members drawn by Sex Pistols lead singer, John Lydon. Graves-Brown and Schofield (2011: 1398) questioned whether heritage conservation of this location might betray the "spirit of punk and rock music more generally," and were

criticized in mainstream media for suggesting this site should attract the same level of significance and attention as a site from the distant past. One of the major messages to come out of Graves-Brown and Schofield's (2011) article, and one that was missed in the media, is the issue of cultural heritage management, preservation, and conservation in light of intersecting and even counteracting cultural needs:

> In case readers are wondering whether this paper is written tongue in cheek — or with tongue sticking out — it is worth recalling that modern archaeology includes recent periods in its remit, and uses recent materiality to help understand more ancient times as well as a critique on modernity itself.

Oliver and Neal (2010: 15) focused on tree carvings throughout their study of contemporary graffiti in the UK, and argue that "archaeologists and others have begun to turn their attention away from symbols of authority and towards the daubed, painted and scratched writings of the disadvantaged, the excluded or the subversive in society" because these are the stories that are not likely to be discovered in other media. Such an approach allows people to understand the ways in which visitors and inhabitants actively use the space and landscapes available to them, and helps people to acknowledge that these places are not "ageless, static or just plain dull" (Oliver and Neal 2010: 20).

In continental Europe, Merrill and Hack (2013) investigated Soviet graffiti at a former military base in Germany. Merrill and Hack (2013: 101) argued that it is archaeologically important for "graffiti and other forms of what is traditionally considered vandalism to contribute to the cultural significance and interpretation of heritage sites." This study includes an argument similar to that of Oliver and Neal (2010) that graffiti can highlight and reveal information about people, places, and events that would otherwise remain unknown or lost. It is suggested that the Soviet graffiti adds to, rather than reduces, the cultural significance of the heritage site, and can be used as a system of interpretation (Merrill and Hack 2013).

South African archaeologist Sven Ouzman (2010: 1) examined the implications of approaching historic and contemporary graffiti as a "multi-sensorial" artifact comprising blends of "crime, art, corporate co-option, and historic witness" to understand post-Apartheid South Africa. Our understanding of what constitutes "rock art" and what constitutes "graffiti" is questioned by Ouzman (2010: 17) upon his discussion about attitudes toward inscriptions made by soldiers from the Boer War, because, he argues, some people do not like these inscriptions being referred to as rock art, despite having striking similarities; Ouzman (2010: 18) asks: "is this because 'rock art' is perceived to reside unthreateningly in the past and 'graffiti' is an easy to ignore pollutant?"

In Australia, Frederick (2009) considered the link between ancient Aboriginal Australian rock art and contemporary urban graffiti in Perth. Frederick (2009: 210) used an archaeological approach to contemporary graffiti to identify the significance of contemporary graffiti as an artifact. This study (2009: 229) has implications that may lead to a more informed approach to rock art research, in particular, the suppositions that rock art researchers make about the images depicted in rock art. For example, images and slogans depicted in contemporary graffiti can be sanctioned by some from the community, while at the same time be unsanctioned by others. Interpretations of contemporary graffiti data are marred by our separation from insight into the graffiti writer's intention and motivation; this is equally so for rock art data. Frederick (2009: 231) argues that there is no single conclusion that can be drawn from contemporary graffiti data, and rock art researchers should not be aiming for a conclusive interpretation of rock art data.

Ralph (2012) conducted research into contemporary Indigenous graffiti in the Jawoyn Aboriginal communities in the Northern Territory, Australia. He developed a theoretical model to underpin a more nuanced understanding of contemporary landscape-markings, drawing upon actor-network theory, in which a "disparate family of material-semiotic tools, sensibilities and methods for analysis that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located" (Law 2007: 2). Accordingly,

communication through landscape-marking is interpreted as existing in a web of interdependent relationships which are embedded in empirical, materially grounded practices (Callon 2006). Actors in this web include governments, communities, and individuals who communicate their own experiences and agendas through the action of landscape-marking. As Couldry (2004: 1) points out, both human and nonhuman entities within these webs "acquire power through the number, extensiveness and stability of the connections routed through them." In Aboriginal communities in Northern Australia, Ralph (2012) found that graffiti serves the intra-group purpose of communication between community members, rather than the intergroup purpose of propagating political and social commentary (e.g., Fig. 2). He argued that the graffiti was more closely aligned to the ongoing cultural tradition of rock art production and landscape-marking, than to the contemporary graffiti expressions often found in urban settings (e.g., Fig. 3).

Each of the above studies has three common themes. Firstly, the authors acknowledge that graffiti in contemporary societies is often seen as vandalism, and they each attempt to redress that point of view, for example, Oliver and Neal (2010) and Merrill and Hack (2013) who claim that graffiti archaeology has the potential to uncover information about people whose stories may not be found elsewhere. The archaeology of graffiti, while by no means a new area of archaeological inquiry, is growing at a rapid rate. Prior to the early twenty-first century, very little archaeological research was conducted on contemporary, or even historical, graffiti. During the early twenty-first century, graffiti archaeology has become a considerably sized stream of the archaeological discipline, which involves a number of researchers from across the globe, particularly in the United Kingdom, continental Europe, Africa, and Australia. In saying this, and coupled with contemporary viewpoints toward graffiti, the second common theme of the above studies is that graffiti archaeologists tend to argue for the legitimacy of their work; for example, Graves-Brown and Schofield (2011) and Oliver and Neal (2010). Finally, many archaeologies of graffiti attempt to situate the contemporary practice of graffiti as part of an ancient, continuing visual culture that consists of vital social meaning and information, rather than a clandestine, unsavory, and meaningless act, for example (Frederick 2009; Ouzman 2010; Graves-Brown and Schofield 2011; Ralph 2012).

In 2013, the state of graffiti archaeology intimates that this stream of archaeology will continue to grow in both scholarship and interest. This is due, in part, to the capacity for up-and-coming archaeologists to explore "new ground" in

Graffiti Archaeology, Fig. 2 High-density minuscule graffiti on a road sign, community meeting area, Barunga region, Northern Territory, Australia, 2012. The location, size, and density of graffiti demonstrate that this is a form of intra-group communication

Graffiti Archaeology, Fig. 3 "Tag" graffiti, inscribed over public mural, Venice Beach, California, USA, 2011

these relatively under-examined contemporary, historical, medieval, and ancient material practices, but more so because the purpose of archaeology and archaeological research is to learn about past human behavior. As with other archaeological materials, graffiti allows archaeologists to understand the cultural identities and behaviors of humans in the past.

Cross-References

- ▶ Landscape Archaeology
- ▶ Pompeii
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Urban Heritage

References

Baird, J.A., and C. Taylor, eds. 2010. *Ancient graffiti in context*. London: Routledge.

Benefiel, R. 2010. Dialogues of graffiti in the House of the Four Styles at Pompeii (Casa Dei Quattro Stili, I. 8.17, 11). In *Ancient graffiti in context*, ed. J.A. Baird and C. Taylor, 20–48. London: Routledge.

Callon, M. 2006. What does it mean to say that economics is performative? In *Do economists make markets? On the performativity of economics*, ed. D. MacKenzie, F. Muniesa, and L. Siu, 1–58. Princeton: Princeton University Press.

Couldry, N. 2004. Actor network theory and media: Do they connect and on what terms? In *Connectivity, networks and flows*, ed. A. Hepp et al., 93–108. New York: Hampton Press.

Daniell, C. 2011. Graffiti, calliglyphs and markers in the UK. *Archaeologies* 7 (2): 454–476.

David, B., and M. Wilson. 2002. Spaces of resistance: Graffiti and indigenous place markings in the early European contact period of northern Australia. In *Inscribed landscapes: Marking and making place*, ed. B. David and M. Wilson, 42–60. Honolulu: University of Hawaii Press.

Frederick, U.K. 2009. Revolution is the new black: Graffiti/art and mark-making practices. *Archaeologies* 5 (2): 210–227.

Graves-Brown, P., and J. Schofield. 2011. The filth and the fury: 6 Denmark Street (London) and the Sex Pistols. *Antiquity* 85 (330): 1385–1401.

Law, J. 2007. *Actor network theory and material semiotics*. Available at: http://www.heterogeneities.net/publications/Law2007ANTandMaterialSemiotics.pdf (accessed 16 March 2012).

Macdonald, N. 2001. *The graffiti subculture: Youth, masculinity and identity in London and New York*. New York: Palgrave.

McDonald, J.J. 2012. Pictures of women: The social context of Australian rock art production. In *A companion to rock art*. Blackwell Companions to Anthropology series, ed. J.J. McDonald and P.M. Veth, 214–236. Oxford/Malden: Blackwell Publishing.

Merrill, S.O.C., and H. Hack. 2013. Exploring hidden narratives: Conscript graffiti at the former military

base 'Kummersdorf'. *Journal of Social Archaeology* 13 (1): 101–121.
O'Doherty, S. 2012. Under siege? Exploring the hidden world of Irish graffiti artists. Socheolas. *Limerick Student Journal of Sociology* 4 (2): 104–121.
Oliver, J., and T. Neal. 2010. Elbow grease and time to spare: The place of tree carving. In *Wild signs: Graffiti in archaeology and history*, ed. J. Oliver and T. Neal, 15–22. Oxford: Archaeopress.
Ouzman, S. 2010. *Graffiti as art(e)fact: A contemporary archaeology*. Paper presented at University of Johannesburg Sociology, Anthropology & Development Seminar, Johannesburg, 10 March, 2010.
Ralph, J. 2012. *Convenient canvasses: An archaeology of social identity and contemporary graffiti in Jawoyn country, Northern Territory, Australia*. Unpublished Honours dissertation, Department of Archaeology, Flinders University, Adelaide.
UNESCO. 2013. Archaeological areas of Pompei, Herculaneum and Torre Annunziata. Available at: http://whc.unesco.org/en/list/829 (accessed 2 June 2013).
Wobst, H.M. 1977. Stylistic behaviour and information exchange. In *Papers for the director: Research papers in honour of James B. Griffin*, ed. C.-E. Cleland, 317–342. Michigan: University of Michigan.

The Grand Canal Museum

Hongkai Ma
Grand Canal Museum, Liaocheng, China

State of Knowledge and Current Debates

Introduction

This essay takes a case study of the Grand Canal Museum in Liaocheng, China, as a way of highlighting the great value that China places on museums and on the cultural heritage of the country. The Grand Canal Museum is the first large-scale thematic museum with the canal culture as the theme; comrade Fei Xiaotong, the famous sociologist, anthropologist, ethnologist, social activist, and former vice-chairman of the NPC Standing Committee, bestowed the name on the museum (Fig. 1).

The museum, located on the east side of Water City square on the north shore of the Dongchang Lake, was built in November 2004 and subsequently opened to the public in May 1, 2009. It was built to collect, protect, and study all facets of canal culture while also displaying the natural features and ancient history of the Chinese Grand Canal.

The museum has an area of 12,000 m^2, with an exhibition area of 6000 m^2, covering five floors, one of which is located underground. It is divided into three functional areas: an exhibition area, a collection area, and a research and academic exchange area. The museum's message is that "Canal history can change our lives." In addition to the entrance hall, there are ten exhibition halls. Located on the first floor, there are three exhibition halls dedicated to Liaocheng City's government's tenth anniversary of the museum. On the second floor, three exhibition halls are dedicated to a canal culture exhibition. On the third floor, three halls are provided for historical and relics exhibition on Liaocheng, and the fourth floor hosts rotating temporary exhibitions (Fig. 2).

Situated in the lobby of the Grand Canal Museum is a large electronic sand table reflecting Liaocheng City's landscape. This provides a more intuitive understanding of Liaocheng City and its unique structure. The ancient city is like an ark, floating in clean water, leading to a common saying: "Water is in the city, water surrounds the city, water is the city."

The Exhibition of Canal Culture

The cutting of canals allows for rivers to connect to oceans, remote peninsulas, and isthmuses becoming frequent routes of travel for bodies of water. Canals are therefore a great fruit of human brightness and an important mark of the civilization of human society. Throughout civilization, canals have always had an important part in benefiting local people with economic prosperity and social progress in the region. The creation of the canal narrowed the distance between economic and cultural exchanges, driving the rise of the urban, economic, and cultural belt. In the canal museum, exhibition of canal culture

The Grand Canal Museum, Fig. 1 The Grand Canal Museum, Liaocheng, China

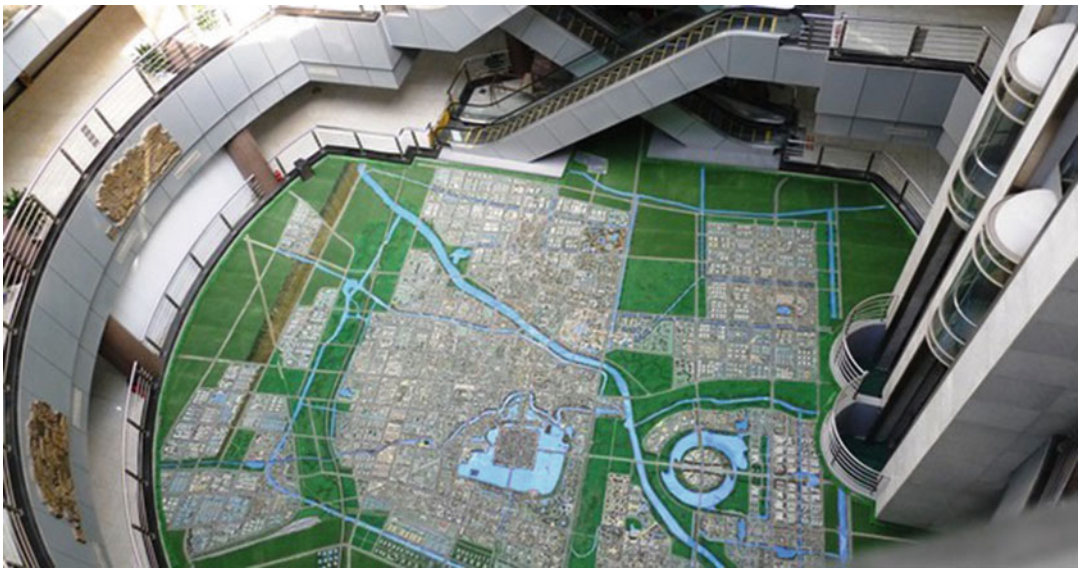

The Grand Canal Museum, Fig. 2 Electronic sand table reflecting Liaocheng City's landscape

includes three exhibition halls: "The World Canal Exhibition," "Chinese Canal Exhibition," and "Liaocheng section of Chinese Canal" (Fig. 3).

The World Canal Exhibition

Early in the nineteenth century BC, Egypt built a canal connecting the Nile and the Red Sea. Subsequently, with the development of shipping

The Grand Canal Museum, Fig. 3 Introduction to the most famous canals

technology and the increase in trade volume, some European countries accelerated the excavation of canals. The sixteenth century to eighteenth century was the high-speed period of European canal construction. The second half of the eighteenth century to 1870s saw an increase in capacity and volume, as the original canal was no longer able to meet the transportation needs. The most famous canals are the Suez, Kiel, and Panama Canal. Canals of different countries however serve different functions and therefore have different styles. The exhibit displays a map and list of canals worldwide. On this list, the Chinese Grand Canal is recorded as the earliest and longest canal ever created (Fig. 4).

Among the currently existing canals, the Grand Canal occupies the most prominent position in the human history of canals. The exhibition design makes extensive use of Chinese elements, such as the traditional painting scroll rendering. This shows that Chinese people are full of yearning and have great expectations for China's Grand Canal. Additionally, there is also a yacht simulation cockpit that travels from Alexandria, the United States, via the Suez Canal traveling to the Red Sea, Indian Ocean, the Malacca Strait, the South China Sea, East China Sea, and Beijing-Hangzhou Grand Canal, and then finally arrives in Beijing, the capital of China. In this magical journey of the canals, it allows you to fully understand the different customs and historical changes of the world canals and the cities along the canals.

Chinese Canal Exhibition

This exhibition hall includes five parts: canals in the early stages; the Sui and Tang Dynasties' canal; the Song, Jin, and Yuan Dynasties' canal; the Ming and Qing Dynasties' canal; and finally the modern day canal.

The Chinese Grand Canal was built in the Spring and Autumn period, formed in the Sui and Tang Dynasties and flourished in the Ming and Qing Dynasties. It was one of the greatest monuments in the history of Chinese water conservancy projects and played an important role in China's political unity, economic development, and cultural prosperity. During the excavation and utilization of the canal, China's working people created rich material and spiritual wealth, forming a unique canal culture. Additionally featured in this hall is an electronic sketch map of changes in the Grand Canal during the Sui, Tang, Yuan, Ming, and Qing Dynasties, so we can identify the progressive changes in China's Grand Canal.

Canals in the Early Years

During the Spring and Autumn period of the Warring States, princes fought for hegemony creating war over many years. In order to facilitate efficient military transportation, Wu, Chu, Wei, Qi, Qin, and other countries successively cut the canal. In 494 BC, Fu Chai, King of Wu, obtained victory in the war with Yue and enslaved Goujian, the King of Yue (Fig. 5). Yue begged for peace with Wu, and Wu promised Yue that Yue could be Wu's ally. Sometime after this event, Fu thought that Yue was no longer a concern and therefore

世界著名运河一览表

名　称	长度(千米)	建造时间	所属国家
中国大运河	1800(明清部分)	公元前五世纪	中国
威尼斯运河	4	452年	意大利
米迪运河	360	1667—1694年	法国
约塔运河	580	1800—1832年	瑞典
伊利运河	544	1817—1925年	美国
苏伊士运河	173	1859—1869年	埃及
巴拿马运河	81.3	1881—1920年	巴拿马
曼彻斯特运河	58	1887—1894年	英国
基尔运河	98.7	1887—1895年	德国
阿尔贝特运河	130	1930—1939年	比利时
莫斯科运河	128	1932—1937年	俄罗斯
伏尔加河—顿河运河	101	1948—1952年	俄罗斯
阿姆斯特丹运河	72	1952年	荷兰

Name	Length(km)	Cutting Date	Country
The Great Canal	1,800(Ming & Qing Dynasties)	5th Century B.C.	China
Venice Canal	4	452 A.D.	Italy
Canal du Midi	360	1667—1694 A.D.	France
Gota Canal	580	1800—1832 A.D.	Sweden
Erie Canal	544	1817—1925 A.D.	America
Suez Canal	173	1859—1869 A.D.	Egypt
Panama Canal	81.3	1881—1920 A.D.	Panama
Manchester Canal	58	1887—1894 A.D.	England
Kiel Canal	98.7	1887—1895 A.D.	Germany
Albert Canal	130	1930—1939 A.D.	Belgium
Moscow Canal	128	1932—1937 A.D.	Russia
Volga River-Don Canal	101	1948—1952 A.D.	Russia
Amsterdam Canal	72	1952 A.D.	Holand

The Grand Canal Museum, Fig. 4 "World Famous Canal" list

The Grand Canal Museum, Fig. 5 Fu Chai, king of Wu during the Spring and Autumn period

only wanted to fight for hegemony with Qi. However, the distance to Qi was vast, roads poorly maintained, and the transportation of food and weapons too labor intensive and costly to do so over land. Wu had advantage in its boat division, advanced river shipbuilding and shipping technology, but had no waterway between Jiang and the Huai rivers (Fig. 6).

The Grand Canal Museum, Fig. 6 Qin Shi Huang, first emperor of Qin Dynasty

In 486 BC, Wu decided to use the natural conditions of the rivers and lakes to measure and excavate locally and connect several lakes. From that point onward, the Yangtze River and the Huai River were linked. In the *Commentary of Zuo*, the ninth year of Duke Ai, he states "Wu built a city in Han, which connected Jiang and Huai rivers." Because Han City is the canal's starting point, it is called the "Hangou Canal." When Emperor Yang of Sui cut the Grand Canal in the North Jiangsu section, he adopted the name Hangou Canal. Three years later, Wu had dug He water, which connected Yishui and ancient Jishui. In the tenth year of Emperor Hui of Wei (361 BC), Wei opened the gap from the Yellow River to the Huai River, fundamentally forming the rudiments of early Chinese canals.

The exhibition showcases pottery as the earliest form of Chinese wine vessels with lateral bodies, cup-shaped mouths, and upper ends spiked with visual similarities to that of a small boat. On both sides of the abdomen is a fishnet pattern symbolizing a boat finished fishing and drying its nets. The upper two shoulders of the earthenware pot are transversely provided with two bridge-shaped small ears, which are convenient for carrying while also allowing it to be carried by a rope.

After the Qin Dynasty unified the whole country, it opened the Ling Canal which connected the Hunan and Li rivers and connected the Yangtze River and the Zhu River, becoming a crucial river in the south of China. The Western Han Dynasty, Martial Emperor, excavated Cao Canal which spans from Chang'an to Tongguan, while the Eastern Han Dynasty dredged and governed the Bian River.

The Eastern Han Dynasty, Cao Cao, excavated Baigou, Ping Lu, Li Cao, and Suiyang canals and others, forming a north-south waterway in the Hebei plain.

Cao Cao was not only an outstanding statesman, military strategist, writer, and poet but also an outstanding water expert. In particular he ordered digging in Shandong Province, which had a very important position in the history of the China's canals, allowing for an indelible contribution to the North-South Grand Canal. This exhibition showcases a statue of Cao Cao digging the river, fashioning pottery ink stone, tiles, and mirrors that reflect the culture from this time period.

When Wei was founded, it continued to maintain the territory of the canal. The Sun Wu regime, in addition to using the Yangtze River and Taihu water conservancy, also dug the Pogangdu Canal and renovated the Jiangnan Canal. The Eastern Jin Dynasty and the Northern and Southern Dynasties and the southern political capital Jiankang roughly followed the waterway development system of the Sun Wu era plan, while in the Northern Wei the canal roughly followed the Wei canal layout.

During this period, the primary focus of canals was military based, which is emphasized by a picture of three battles on display in this hall.

The Sui and Tang Dynasties' Canal

The formation, and the most important stage, of the Grand Canal was excavated by Emperor Yang of the Sui Dynasty, in order to consolidate national unity and better control the Jiangnan

area. The rich resources of the Yangtze River Delta region were controlled by the central government, and due to the dependence of the Sui Central government on the economy of Jianghuai, the Sui Central Committee and the Emperor ordered the cutting of the Grand Canal.

In 604 AD, Emperor Yang Guang left the capital Chang'an to travel to Luoyang to inspect the creation of the canal. In 605 AD, he proposed the two major projects regardless of official opinions: first, that the capital be moved from Chang'an to Luoyang and the second to recruit millions of migrant workers, to be overseen by the outstanding engineering expert Yuwen Kai, to cut the Grand Canal, and to open the Tongji and Yongji canals. Emperor Yang ordered workers to commence creation of the Grand Canal in 605 AD.

The Tongji ditch was dug in 605 AD, dividing Luoyang into two sections. The western part included the suburbs of Luoyang from the Luo River and Valley into the Yellow River. The eastern part included Sishui, Xingyang, the Yellow River, the river by the water (the original Huaihe tributary), and Shangqiu, Suxian County, and Si County into the Huaihe River.

The Yongji ditch was dug in 608 AD. Navigation to Tianjin was enabled subsequently, using the Qin River, Qi water, and Wei River water and following the Yongding River to Zhuo County (now Beijing).

In 610, the Jiangnan canal was opened, spanning from Zhenjiang to Hangzhou, stretching over 400 km. This allowed more readily available travel via boat to any city connected to the canal.

Luoyang as the center, at this point in time, connected through the Han ditch and the Jiangnan River and connected the Haihe, Yellow, Huai, Yangtze, and the Qiantang rivers. North of Zhu County (now Beijing), Yuhang (now Hangzhou), the main waterway is 2700 km long, and communication between the north and the south and the east and the middle of the water transport arteries had been formed.

The Luohe River, located in the Luoyang basin, is of special significance as it is the most important transportation hub and is the royal river and the millennium ancient capital of Luoyang.

In the first year of the reign of Emperor Wu Zetian (701 AD), she set up a new pool in the south of Luoyang. "All the boats of the world are collected, and there are more than ten thousand vessels in the world."

As a result of the Grand Canal navigation, it facilitated the communication and exchange of northern and southern Chinese economy. The prosperity and economy in the coastal cities along the canal gradually formed Suzhou and Hangzhou, Zhenjiang shipbuilding industrial bases, and Wuxi, Yangzhou, Jiangdu, and other important foreign trade port cities.

The Song, Jin, and Yuan Dynasties' Canal

After the opening of the Jizhou River, boats could sail from the Yangtze River to the Yellow, Si, and Jizhou rivers and then go straight to the bottom of An mountain. Two water trade routes existed from north of the Ji River to Tianjin: the first route, traveled through the Gulf of Bohai to Tianjin and then into the sea, and the second from Dong'e dry station (North Dongping, and from north through Linqing) to the Jinwei River. The transportation of the latter route is more difficult during the summer seasons. Therefore, in 1289, goods traveled along the Jizhou River north through Shouzhang, Liaocheng to Linqing, and the Huitong River, a distance of 250 km, finally connecting to the Wei River. The Huitong River being located along a dividing ridge between the Huai River and Wei River resulted in the building of 26 lock plug plates on the Huitong River and a water tank in Ji'ning, to control the water level. As a result, the Huitong River is also referred to as the "river's gate." After completion of the Huitong River controls, transportation was then possible through the Jizhou, Huitong, and Wei rivers through to Tongzhou. During the years 1291–1293, the Yuan Dynasty dug the Huitong River from Tongzhou to Dadu, and since then, ship transport by Tongzhou to the Tonghui River would then terminate at Beijing City. During this period of time, today's route of the Grand Canal was formed.

The Ming and Qing Dynasties' Canal

The Ming Dynasty moved the capital to Beijing, based on the layout of its canals in the Yuan

Dynasty. While renovating the Huitong, Zhongyun, and Liyun rivers, additions were made in connecting the Nanyang and Jia rivers to the network. During the 24th year of Hongwu (1391 AD), the Yellow River burst its banks, resulting in Huitong River silt waste. During the 9th–13th year reign of Yongle (1411–1415 AD), the Court adopted Bai Ying's proposal to build the Daicun Dam above the Wen River, to allow the water to flow to Nanwang Lake. Nanwang Lake, located in the middle part of Si and Wei rivers, was propagated on high terrain, known as water ridge. Once water was led to the Nanwang Lake, it was controlled by two gates, to separate the water to the north and south. The amount of water flowing northbound is roughly seventy percent, with southern stream accounting for the remaining thirty percent, resulting in the phrase "seven points toward the emperor, three points to Jiangnan." During this period, they also built 38 gates, to resolve water flow issues on the Huitong River (Fig. 7).

The Qing Dynasty maintained the Ming Dynasty's canal, and river at great expense, so that the Grand Canal and water transport would enable prosperity. From the electronic map of the canal in the Qing Dynasty, we can see that 12,000 km of the north and south Qing Dynasty Grand Canal is not smooth sailing. This is due to the terrain, creating a different flow to the water. Water flows from Beijing to Tianjin, from Nanwang to Tianjin; Nanwang to the Zhenjiang section, from Tianjin to Zhenjiang; and from Hangzhou to Yangzhou. In order to solve the problem of different water flows and water levels, some high-tech water conservancy projects were applied to canal governance. There is a group of canals with a complimenting sand table, seen across the Haihe, Yellow, Huai, Yangtze, and Qiantang rivers. The relationship between the water and sand table is complex and unique, particularly between the canal and Yellow River in different places.

The Nanwang Water Sand Table on the river's wall is a high-tech water conservancy project created by Song Li of the Ming Dynasty and Bai Ying the water expert. It played an essential role in the historical science and technology of water conservancy in China and the rest of the world. After the Grand Canal north from Beijing and

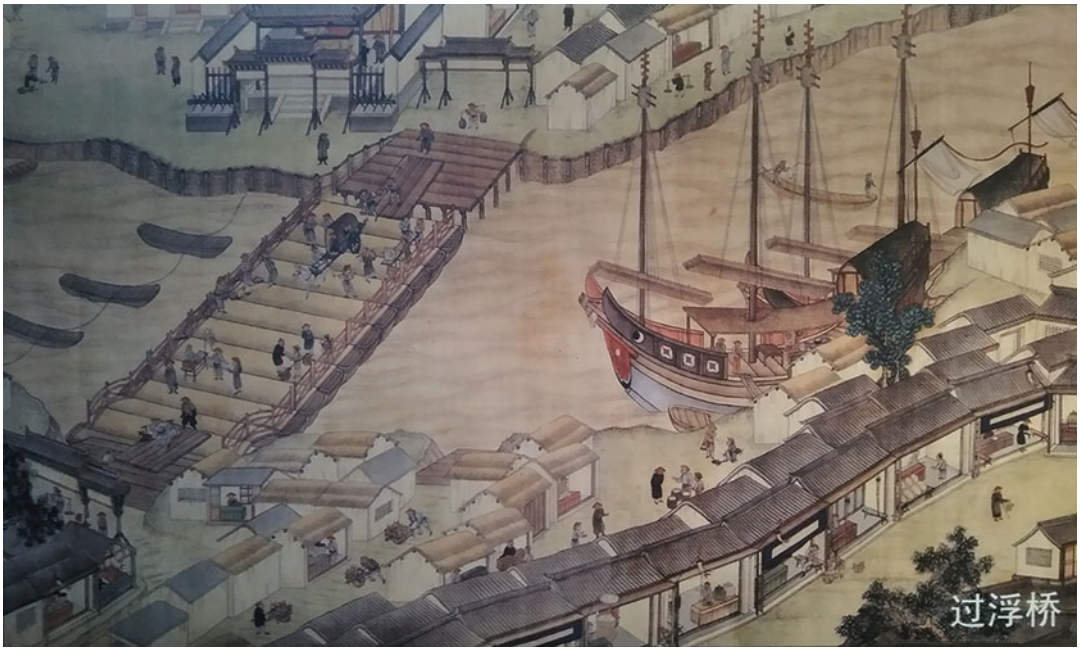

The Grand Canal Museum, Fig. 7 The floating bridge

south to Ningbo opened, the narrow coast along the canal had created China's most affluent economy, concentrated supplies, and formed the largest populations and developed areas of transport. In the absence of the modern transportation era, the rise and fall of coastal cities on the Grand Canal was linked to the accessibility of the water system of the canal. The Ming and Qing Dynasties in particular benefited, with the enhancement of the canal economic functions and prosperity of commodities, resulting in commercial cities appearing on both banks of rivers. There were more than 30 emerging commercial cities in China during this period, most of them distributed along the Grand Canal.

Important Individuals to the Grand Canal Displayed above is a group of Ming Dynasty flood management character statues; in addition to Bai Ying, they are all the officials who managed water in the Ming Dynasty. They all made great contributions to the Ming Dynasty's canal and conquered many difficulties during the process, creating historic miracle of the canal that we see today (Fig. 8).

The leftmost statue is Song Li (1359–1422), who is known for the opening of the Huitong River, rebuilding the Bay of Wenshui, Nanwang water diversion, Wei County, Qingping City (now is Linqing City) flood engineering, and many other projects.

The statue besides Song Li is Pan Jixun (1521–1595), born in Wucheng, Zhejiang (now Huzhou City), the famous water conservancy expert of the Ming Dynasty and department minister. During the 44th year of Jiajing to the 20th year of Wanli (1592), he managed the river on four occasions over 10 years. In treating of the relationship between the Yellow, Huai, and Yun rivers, he proposed the principle of "Through the river, the river is governed by the canal, and the canal is cured by the river. The Hui and Huai rivers flowed into the sea and that is the governance of the sea by the rivers." In dealing with water and sediment, Pan Jixun put forward the "river to river, water attacks sand" policy. Additionally, during his career, he wrote "Two Rivers," "Defense at a Glance," and many other books, which elaborated his strategy and experience in the river, stipulating that the rivers and canals have had a profound impact on many facets of life.

Bai Ying (1363–1419) is a famous peasant expert in water conservancy in early Ming Dynasty. Bai Ying is known as the "old man" who lived by the canal. The reference to "old man" doesn't mean an elderly person but the

The Grand Canal Museum, Fig. 8 Ming Dynasty flood management character statues (Song Li, Pan Jixun, Bai Ying, Xu Youzhen, Liu Dongxing)

senior leader of a group of more than ten canal works. This is also in part due to his vast water management and sailing experience and experience with the territory of the Grand Canal in Shandong Province. After Song Li failed in the governance of the Huitong River, he went to the North of Wenshang City to seek a positive strategy where he then met Bai Ying.

Bai Ying, accounting for the terrain and hydrological Huitong River, proposed six methods of training. As Wenshui was the water source, an embankment diversion caused the water in the canal to flow to the highest elevation of the South Wang and then diverted to the north and south, to resolve the problems of water shortage. Song Li adopted the proposal of Bai Ying and organized construction in accordance with drawings designed by Bai Ying. After 9 years of hard work, they completed the water conservancy project in the Ji'ning canal. Rivers were interlinked, multiple canals connected, and lakes dependent on one another merged into a combined water system. Due to the success of Bai Ying's governance of water, commerce was established in the Ming and Qing Dynasties, for 600 years, allowing for the highest annual grain transportation of 25 billion kg. This effectively promoted the economic and cultural development and social stability in the Ming and Qing Dynasties, earning the respect of the people.

Xu Youzhen (1407–1472 AD) lived in Wu County (present Suzhou City) known as the successful candidate during the highest imperial examinations at the eighth year of Xuande. Despite his smaller stature, he was wise and knowledgeable in astronomy, geography, art, and water works, with a desire for betterment. In the third year of Jingtai (1452 AD), Xu was promoted to a higher position, at the time the Yellow River had been in a sand bay for 7 years and poorly governed. The group officials unanimously recommended Xu to govern the river. Subsequently, he was promoted to the left of the imperial, who were responsible for the management of the river. After detailed investigation on his domain, he put forward three measures of water sluice: expenditure flow, dredging the canal, and actively organizing a large number of migrant workers. He personally oversaw the project construction, finally eliminating the long-standing water problems.

The Function of the Grand Canal In this area, the museum created a model of the Grand Canal on its floor space. It twists and turns, symbolizing the peaceful flow of the Grand Canal. It displays 35 major cities along the Grand Canal for their historic sites and featured on an electronic sand table.

In addition to political and military functions, the digging of the canal to a great extent affected the economy and transportation heavily. The transportation by waterway also transports the land tax of levy grain to the capital or designated locations. In Qing Dynasty, tax collection provinces include Shandong, Henan, Hunan, Hubei, Jiangsu, Jiangxi, Anhui, and Zhejiang. In the Qing Dynasty, salt, water transport, and river were known as the "three policy," which are three of the most important affairs of the nation.

Transport ships traveled to the north, flowed through the Yangtze River, and across the Yellow River, where there are several large lakes to the south of Huai'an. These ships would face the danger of overturning when they met storms, or fast flowing rivers. To prevent accidents due to overloading, the government limited the water capacity of the ship, established a building of wear observations, and directed the ship's transportation behavior. In addition, facilities such as lifeboats were added.

The departures of large transport ships were the cause of busy canal activity and food transport difficulties. In ancient times, there were hundreds of ships on the canal, and the transportation of grain, coal, timber, agricultural products, and commodities were by ships. As such, trackers played a key role in this process, bending forward with a stiff rope and a limping gait. Many trackers wore no clothes, despite seasonal weather changes.

But why?

That is due to many trackers being from poor families, clothing having very low durability, and the need to frequently dive into water with little or no notice. If they wore clothes and proceeded to get

The Grand Canal Museum, Fig. 9 Boat trackers

in and out the water, it was not only inconvenient and heavy but also made it easier to get rheumatoid arthritis, etc., so they chose to be naked.

In the cold winter, once the boat had been laid low, you could look at the shore and see a neat little line of trackers with some stiff ropes, communicating loudly to one another. While the river wind was wrapped in snow and ice, and the situation was difficult for most people, the tracker however took this for granted with his seasoned experience (Fig. 9).

Transport ships arrived at Tongzhou warehouses, and the public lottery decided where the grain was transported to from there. This was in accordance with the grain, as they had to lay down the grain in the earth dam. After the transport ship arrived at the dam, inspection began to check whether the grain was clean or not. At the time of unloading, it would then be sent to the warehouse, to allow for the central government to perform additional checks. The entire year's work for the warehouses would be completed when grain had been successfully transported to Beijing's warehouses by canal.

The books in the display room showcases are all related to cultural relics of grain transportation relating to the canal. Most of them are the Ming and Qing Dynasty's imperial palace hidden files, decorations of the first historical archives of China, and state administration of cultural heritage. Included are the regulations of the Qing Dynasty, which are the discipline of the inner secrets of the Cao group and similar to the constitution of our present association.

There is also a photo depicting Qing Dynasty's "Commissary agency operator fan." From the beginning of the Ming Dynasty, it was widely used in water transport on the canal. This is a close kept secret, created by a military agent, and as such outsiders are not allowed to read it. Records of fan were maintained on each grain shipment and etched on a label in the grain stipulating the military grain broker that inspected the grain so that in the future if something goes wrong with the shipment, they would know who is responsible.

In front of the following photo, there is an infographic of a Dou, an important instrument for the collection of cao grain at that time. This was the official standard weighing apparatus, equivalent to five fights, which is about 75 jin (Fig. 10).

The ship was the pride of the canal, and the canal's contribution to humanity was reflected by the ships that sailed north and south. Busy shipping was not only a sign of economic and traffic

The Grand Canal Museum, Fig. 10 Dou, a measure tool for grain

development but also a symbol of canal culture. The display case in the museum shows the ship model of Song, Ming, and Qing Dynasties.

The canal not only promoted the development of the urban economy but also brought about cultural prosperity. Many would say that the Grand Canal is like an encyclopedia of Chinese culture. Its cultural connotations are rich, profound, and vivid. During the Ming and Qing Dynasties, the civil economy and the accomplishment of the canal zone's commodity economy presented unprecedented prosperity, a significant increase in the size of the market along the Yuncheng trade, and bolstered rural town market activity (Fig. 11).

The prosperity of the commercial economy had enabled the urban handicraft industry to also develop rapidly. This was particularly the case for cotton silk textiles, printing, dyeing and printing, embroidery, gold and silver foil, iron wood lacquer, bamboo weaving, food processing, and brick kilns. The scale of production and trade were ranked among the top nationwide. During

The Grand Canal Museum, Fig. 11 Papercut

the late Ming Dynasty, some of the handicraft industries also had the emergence of capitalist production relations.

Arts and Crafts Above are some arts and crafts from the cities along the Grand Canal. In commodity-economy-developed cities along the canal, craftsmen produced various kinds of exquisite handicrafts and many distinctive works of art, such as papercut of Liaocheng, Yangzhou lacquerware, Huai'an's bronze, Wuxi clay figurines, Suzhou fans, pictures about Tianjin, tapestries of Hangzhou, Changzhou comb gas, Shaoxing's blue prints, and many more (Fig. 12).

With the prosperity of the commodity economy along the canal, and the rise of the civil class, novels and plays were adapted to the public interest and vigorously developed. The four famous Chinese classics and the famous three words of the Ming Dynasty were born on the side of the canal.

The prosperity of the canal also allowed Chinese religions to spread, from south to north. This included Buddhism, Taoism, Islam, Judaism, Catholicism, and Christianity, resulting in many religious buildings to be constructed alongside the canal.

Today's Canal

The opening of the canal gave the southeast coastal area a more direct connection to the

The Grand Canal Museum, Fig. 12 Dongchang clay sculpture

whole country. In particular, the development of the canal made it a frontier region of sino-foreign economic and cultural exchanges. China's neighboring countries, Asia, Europe, and East Africa, established commerce to China, conducting frequent economic and cultural exchanges. North Korea, Japan's policymakers, monks, Italy's Marco Polo, and the French's Brooke in particular left meaningful footprints along the canal in China (Fig. 13).

The ancient Chinese Grand Canal still plays a huge role in the local economy to this day, benefiting flood control, irrigation, water supply, and tourism, despite the northern part of the canal having been broken. The implementation of the eastern route of the south-to-north water diversion project, and the application of the Grand Canal in China, will enable the Grand Canal to undertake the task of revitalizing the north portion of the Grand Canal.

In May 2006, the state council officially unveiled the Grand Canal as a national cultural relic and tasked a unit with its protection. In 2006, 58 members of the national committee of the Chinese People's Political Consultative Conference (CPPCC) requested restoration of the Grand Canal. At the end of 2006, the state administration of cultural heritage created a new list of China' s world cultural heritage, stipulating the Grand Canal as the first project. The state administration of cultural heritage decided that the Grand Canal cultural heritage project would be submitted to UNESCO in 2013 to officially declare it as world cultural heritage (Fig. 14).

Currently, there is a plan for a south-to-north water diversion project. The planned canal through the Yellow River will be in Liaocheng. When this happens, the water of the Yangtze River, flowing under the Yellow River, will become another spectacle on the Grand Canal.

Liaocheng Section of the Chinese Grand Canal

The Liaocheng section of the Chinese Grand Canal exhibition details the excavation, governance, economy, and culture in the Liaocheng area.

The canal and the Huitong River flowed through the hinterland of Liaocheng during the Yuan Dynasty, bringing with them historic development opportunities to Liaocheng. During the Ming and Qing Dynasties, Liaocheng, Linqing, and Zhangqiu became important commercial ports along the canal. "The boat was like a cloud, and the sails can cover the sun." In

The Grand Canal Museum, Fig. 13 The Chinese Grand Canal introduction

The Grand Canal Museum, Fig. 14 Kublai Khan, the fifth emperor of the Yuan Dynasty

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particular, Liaocheng was known as "the throat of the Cao river, the elbow of the capital" and "a metropolis of the north of the Yangtze river."

Excavation

The excavation of the Liaocheng section of the canal began in the Yuan Dynasty. The Yuan Dynasty government, under advisement of Minister Han Zhonghui and official Bian Yuan, dug up the Huitong River from Mount Anshan to Linqing. This would then be named by Kublai Khan. This pass-through river is the ancient canal that runs through the Liaocheng district. From this point onward, boats would come from the south by water to Beijing (Fig. 15).

In the example above, the pair of animals resembling tigers or lions is a variety of dragon. They were situated on the wild goose wing in the canal, then moved to the Liaocheng Park for protection, and then finally situated in this exhibition of the museum. The function of this pair of animals was to overcome the arrogant "water monster" under the bridges, preventing the halt of water flow and avoiding water damage. During the construction of ancient bridges and dams, they would often be placed on the column's head or goose wings.

Most of the old photos beside these statues on display were taken in the 1930s and 1940s, showing the edges of the canal wharf, city, sails, and buildings by the canal. Most of the images reflected in the photos are now nonexistent.

During the ninth year of Yongzheng (1731 BC), the repair of the city's census records was undertaken by Deng Zhongyue, the Scholar of Liaocheng, including a detailed population account of 4.5 million during the Ming and Qing Dynasties. "There are more than 100,000 families in the city, it can be seen from the smoke from the chimney."

Featured on the exhibit's wall is a scene of Kublai Khan naming the Huitong River, displaying Kublai Khan's control of the canal and the reconstitution of the country. Due to a lack of water and the land disparity in the canal's section of Liaocheng, it was often affected by flooding from the Yellow River resulting in a much more difficult task. The Zhangqiu section in particular was a targeted area of restoration by the government. Both Xu Youzhen and Liu Daxia were sent there to control the river and achieved great success.

Governance

In front of Kublai Khan's scene is a sculpture featuring Liu Daxia's management of the canal.

The Grand Canal Museum, Fig. 15 Beasts for flood suppression

Liu Daxia (1436 BC–1516 BC) was born in Huarong, Hunan. During February in the sixth year of Hongzhi (1493 BC), Liu was endorsed by his peers to manage the river. When Liu Daxia exclaimed that: "the ancient river management was to protect the people, but today, the river management policy is to ensure the smooth transportation of grain." After taking office, Liu formulated a strategy for means of transportation through the river. This entailed diverting water to the south, opening the Zhangqiu canal and the dam of the north bank of the Yellow River. In order to solve the difficulties of Liaocheng's lack of water, Liu created a large number of water conservancy facilities, including dams and embankments. Overall this played a decisive role in the success of the river's control and guaranteed the transport of the canal for more than 400 years.

Liaocheng's Tongji sluice's function was to adjust water level differences, allowing smooth sailing by boat. Entrance and exit points of the docks on the moon river (also known as Yue River) were excavated due to the canal being too narrow. The end result was a more convenient transportation and loading of goods, resolving traffic jams and allowing other ships to carry on to the new canal. The moon river's canal functionality is seen by some as a precursor to today's emergency parking area on highways.

The weir dam was another innovation in the canal water project acting as a buffer that could be built for the balancing of water levels. There are two types of dams along the canal, "hard" dams and "soft" dams. The construction and use of hard weirs and soft weirs were for the various terrain types along the canal.

The Huitong and Wei rivers in Linqing south gate mixed when the water in Wei River was torrential, pouring down the canal when the water was slow, resulting in the level of the canal being higher than the Wei River. During the year of Wanli, Wan Gong proposed building an earth dam on the canal's interchange of Hui and Wei, creating a board shaped like a gate that could move up and down, to be closed at any time. When the gate was lowered, the dam can be used to hold water so that when the canal was opened, the water wouldn't flood into the boat. It was also used to prevent the water from flooding the canals and damaging the embankments. Sometime after the dam's creation, the dam was upgraded to stone, and later in the Qing Dynasty, ships would be dragged through the dam's crest and into the canal or the river as a point of initial entry. The Linqing River's entry is through the dam's engineering sand table, which is based on historical materials and photos.

The group of iron anchors was collected during the survey of cultural relics along the canal, having been used on the Liaocheng canal during the Qing Dynasty. The location of Liaocheng's canal section is special, due to its easier navigation; the transport ships in Liaocheng canal were relatively small, resulting in the ship's anchors being smaller.

The breakthrough of the Huitong River made Liaocheng a bustling port city, stimulating its commerce. "Liaocheng is taken for grain transportation accessible, the ships from south had an endless stream." The transportation in and out of the city was busy along both sides of the canal, with many companies and shops lining the canal. In the commercial street of Liaocheng, Dongguan, the scene along the canal consists of wharf monuments, duty-free shops, a public hall, and streams of many people busily coming and going. The scene focuses on such scenes as Hengchang drugstore, Yongsheng carbon store, Jin Kuidan shop, public trust cloth shop and other famous trade and exhibition halls and public places.

The duty-free tablet in front of the wharf is 4 meters high, it was originally built on the south bank of the west canal of the southern power plant of Zhakou, Liaocheng south power plant. There is also a well-known legend in Liaocheng.

There was also a well-known legend in Liaocheng. It was said that during the year of Kangxi during the Qing Dynasty, the Ministry of Law Assistant Minister Ren Kepu returned to his hometown and lived in the "Qi Yuan garden" in the north of Dongchang City. When he was an official in Beijing, he was actively involved in government affairs and was highly valued by the Emperor. Eventually he returned to his hometown, as he wanted to live in peace. However,

his hometown of Dongchang was flooded. Starvation and drought clasped itself over the town, resulting in the abandonment of babies, selling of women, and even the slaughter and consumption of other people. The officials of Dongchang didn't report the city's circumstances and continued to collect all kinds of exorbitant taxes, causing much complaint among the public.

To save the people, Ren reported the heavy disaster to the Emperor three times, asking for tax cuts and relief for the victims, but he did not get the reply. Ren became very anxious and nervous.

One day, Ren asked his family, "Is there a letter from the court?" The family replied: "I just received a letter from Beijing and now it is in your son's hands." "Go get it," he said. "I want to read it." When the family received the letter, he looked it over; however it was just a memo from a colleague. He felt a great disappointment and sighed, but a line behind the letter caught his attention. It read: "Emperor Kangxi will visit the south of the canal soon, and he will pass by Dongchang." When he saw this, he immediately turned his head and said, "Well, God helps those who help themselves!"

Ren had figured that if the first few times he had attempted contact had failed, this upcoming visit from the Emperor would be ideal. He also thought that if the Emperor believed in destiny, it would be a good idea for him to permit a tax reduction of his hometown, relieving his people's suffering.

On the day of the Emperor's visit, the long-expected dragon boat of Kangxi finally came to Dongchang. The officials of Dongchang lined up and knelt to meet the dragon boat with Ren among them. As the dragon boat sailed to the east gate of Dongchang hall, the dragon boat was suddenly stranded and unable to sail having to stop the boat for a moment they cast anchor. The accompanying officials immediately told Kangxi, requesting him to order a water worker to clean up the river.

The governor of Dongchang received information that the river had blocked the dragon boat; frightened and terrified, he didn't know what to do. "You don't need to be panic," Ren said. "You can send someone to clean up the water and find out why."

Workers cleaned out the obstacles and soon found a stone tablet, its writing somewhat blurry; Kangxi asked: "What's on it?"

Kangxi walked out of the dragon boat, and the handwriting on the stone became more clear, so he said, "There is no tax since today." Ren knelt on his knees. "Thank you, My Lord," he said. Kangxi puzzled and asked, "What does this mean?" Ren said: "Dongchang is suffering from the flood, people's livelihood is difficult." Kangxi finally listened to Ren, suddenly remembering that Ren had reported this situation three times, but because he was busy, there was no reply.

The stone tablet wasn't due to providence. Ren had asked his family to check the exact time of the dragon boat's arrival in Dongchang, so as to make the stone tablets ready for the first night to secretly put the stone tablet into the river. It was known that those who intentionally block the dragon boat are guilty of attempted murder. Ren however thought it would be worthwhile to save the people of Dongchang (Fig. 16).

After Kangxi's departure, the leader of Dongchang erected the "no tax since today" tablet, on the south bank of canal and built a monument to signify this moment. From then on, all cargo handling goods at this pier were not taxed.

In the exhibitions the gate of the Suzhou Guild Hall follows the tax exemption tablet. The Suzhou Guild Hall is located in the north side of Shan-Shaan Guild Hall, Liaocheng, and the west bank of the canal, which is a testament to the flourishing of the Liaocheng canal. When passing through the city, the canal transport prosperous, commercial prosperity, foreign and local rich commercial capital concentrated in Taiping street, and Shuang street river area, the foreign merchants guild also concentrated here, Shan Shaan hall, Jiangxi hall, martial arts hall, a total of more than 20, among the larger 8, known as the "eight guild halls". Shan Shaan guild hall is located in Longwan park where stopped the most ships in Liaocheng, Shanxi, Shaanxi businessmen have more than 1000 people, capital is the most abundant, so the spirit is also the largest Shan Shaan guild hall (Fig. 17).

The Grand Canal Museum, Fig. 16 Kangxi, Emperor of the Qing Dynasty history, the longest reigning emperor

The Grand Canal Museum, Fig. 17 Suzhou Guild Hall

Economy and Culture Development

The prosperity of commerce had greatly increased the population of Liaocheng. In addition to Liaocheng's local population were personnel brought in by the canal's official ship, greatly promoting the development of Liaocheng handicraft industry. These industries include printing, ship repair, gold silver processing, garment cutting, food processing, bamboo weaving, brick, and tile creation but the most influential being Linqing's Gong brick.

Emperors and literati had come to Liaocheng many times along the canal; among them, Emperor Kangxi of the Qing Dynasty had stayed three times and personally inscribed the "shen guang zhong ying" plaque in the Guangyue building. Emperor Qianlong visited nine times, writing 13 poems during his stays. A picture

The Grand Canal Museum, Fig. 18 Image of Emperor Qianlong of the Qing Dynasty's journey to the south. [Qianlong] title of the fourth emperor's reign in Qing Dynasty

commemorates Emperor Kangxi's stay and his exemption of taxation, now located on the wall of great relief.

The exhibition of the "Emperor Kangxi's southern tour ceremony" was transcribed onto a long scroll, with the original located in the Palace Museum. The long scroll depicts the grand scene of Kangxi's southern tour with a simple brushstroke, providing insight into the makings of this flourishing area.

The Liaocheng canal zone is also part of the "sluice river," and since the opening of the Huitong River, successive governments have set up different management agencies in Liaocheng. The Yuan Dynasty was located in the city of Zhangqiu, and the Ming Dynasty was set up on the bank of the city. In addition, the Dongchang canal services department, the canal standard camp, the canal garrison, the Dongchang department, the Pingshan health department, and the other canal military institutions such as the department of public health also provided a guarantee for the smooth operation of the canal (Fig. 18).

The year of Xuande in Ming Dynasty (1429) had a history of more than 570 years on the west bank of the Grand Canal, 300 m south of the city. There are more than 80 ancient buildings, which occupied an extremely important position in the history of grain transportation by the canal. The cultural relics exhibited in these display cabinets were all collected for the preparation of the China canal cultural museum. Among these relics are ship tickets, shipping orders, queries, and some musical instruments.

The smooth opening of the canal promoted the prosperity of the culture and promoted the development of engraving, printing, and writing, making Liaocheng one of the centers of national engraving and printing. Liaocheng's book industry, goods hall, boxing hall, and four great

booksellers were a canal coastal exclusive. The printed books were exported to Beijing, Tianjin, Suzhou, and Hangzhou during the Qin and Jin Dynasties. Most of the ancient books on display in this exhibition are from these printing houses. Combined, they were the largest and oldest book industry of Liaocheng. The Kangxi book production founded in Liaocheng in the east gate road included bookbinding and paper collating, and authors could be very fastidious. These books are very popular. The bookstores are also located in Taiyuan, Xin County, Shanxi Province, Pingyao, Jinan, and other places. In addition to marketing in Shandong Province, the printed books were exported to Beijing, Datong, Zhangjiakou, Luoyang, Xuzhou, Tianjin, Nanjing, and Shanghai. There were over 1000 books and books of engravings in the books.

The Grand Canal Museum, Fig. 19 Cangjie, the inventor of Chinese characters in legend

Liaocheng Historical and Cultural Relics Exhibition

The ancient, beautiful, vast, and magical land of Liaocheng once gave birth to a generation of hardworking, intelligent, loyal, and courageous people of the west Shandong Province. The people here used their hands to create the magnificent cradle of Chinese civilization we see today.

Fortunately, predecessors left us with valuable cultural relics, historical sites, poems, and the beautiful legends of the heart. Even more precious, generations of Liaocheng people forged the spirit of "self-improvement, pragmatic innovation, openness, honesty and trustworthiness."

Liaocheng City is located in the lower reaches of the Yellow River, Luxi Plains, and is located at the junction point of three provinces: Hebei, Shandong, and Henan. It is 114 km wide and 159 km long, totaling an area of 8715 km^2. This area now has jurisdiction over eight counties (Dongchang District, Linqing City, Guanxian County, Shenxian County, Yanggu County, Dong'e County, Chiping County, and Gaotang County) and an economic development zone, with a total population of 5.73 million (Fig. 19).

The Liaocheng historical and culture relics exhibition is divided into six parts: the Prehistory period; Shang, Zhou, Qin, and Han Dynasties; Wei, Jin, Sui, and Tang Dynasties; Song, Liao, Jin, and Yuan Dynasties; Ming and Qing Dynasties; and modern time.

The first part of this exhibition is prehistoric times. Ancient Liaocheng ancestors on the west bank of Jishui, equivalent to the area of Chiping, Dong'e, and Dongchang prefecture, were primarily involved in primitive agriculture, fishing, and hunting. By the Late Neolithic age, they had created a splendid prehistoric culture. Liaocheng's ancestors, like others in the Shandong Province, were known for making bows and arrows and consequently known as "Dongyi people," belonging to the tribe of Dongyi and later integrated into the Huaxia tribe. At present, there are 17 cultural relics of Dawenkou, more than 40 sites with Longshan cultural relics, and 15 Yueshi cultural sites in Liaocheng. The discovery of Chiping teaching field and two groups of Longshan culture sites in Jingyang mountain, Yanggu, informs us that the Liaocheng area had formed three levels of social organization structure. These findings provide an important reference for the study of the

The Grand Canal Museum, Fig. 20 Dawenkou Cultural Red Pottery with three pouch feet

origin of Chinese civilization. The legendary Chinese ancestors like Chiyou, Cangjie, Chaofu, Shun, and Yu had left their footprints in Liaocheng (Fig. 20).

The second part of the exhibition is on the Shang, Zhou, Qin, and Han Dynasties. During the Shang and western Zhou dynasties, there were many important countries in Liaocheng. During the Spring and Autumn period of the Warring States Period, social unrest and wars were frequent, and Liaocheng became an important strategic point for the warring states. During the Qin and Han dynasties, Liaocheng's economy developed rapidly, establishing many industries and numerous cultural relics, providing important rich materials for the study of the economic and social development of the two Han dynasties. By the end of the Eastern Han dynasty, Liaocheng had become an important political and military base for Cao to unify the north (Fig. 21).

On display here, there are more than 30 Shang Dynasty cultural relics and more than 40 west Zhou Dynasty cultural relics. Additionally, there is also a picture named "The war in Maling," depicting a notoriously famous war in ancient Chinese military history (Fig. 22).

The Wulou tomb of Han Dynasty in Yanggu is located in the Yanggu County. The Liaocheng cultural relics administration committee dug it in August 1997 and found many relics. The tomb was created with bricks, and the layout resembles a Chinese character "凸," with the brick building being comprised of an aisle, two rooms, and corridors. The burial chamber is surrounded by corridors, the corridors being connected. During the process of cleaning this site, discoveries on the front and back porch consisted of bronze mirrors, tripods, wells, and other pottery. The east corridor had iron swords, bronze chariots, and horses. The west corridor had figures and animals, such as dogs, geese, pigs, and sheep. According to textual research, the owner of this tomb was a prince in Yangping of the late west Han Dynasty. The display case for these items has a piece of the picture on the stone of the tomb of the Han Dynasty in Dengmiao village, Jianglou, Dong'e, and a collection of painted ceramic horses (Figs. 23 and 24).

The third part of the exhibition is Wei, Jin, Sui, and Tang Dynasties. These were a time of great integration for our nation, in which Liaocheng's regional economic and social status resulted in sustainable development. Confucianism, Buddhism, Taoism, and other cultural trends flourished, and numerous outstanding historical figures and talented people created a claim to fame. Here there are many pictures of ancient

The Grand Canal Museum, Fig. 21 Porcelain pillow, Song Dynasty, 960 AD–1279 AD

The Grand Canal Museum, Fig. 22 Knife made in Shang Dynasty

famous people, like Cao Zhi (son of Cao Cao), Huaqin (Minister of Han Dynasty), Ma Zhou (Head of the secretariat of Tang Dynasty), and lv Cai (a scholar in the Tang Dynasty).

On display here there are also a lot of precious unearthed cultural relics, such as a stone statue of the Tang Dynasty 52 cm high and 32.9 cm wide and the image of Maitreya-taught Buddhist scriptures, which is a Tang Dynasty stone carving art, but also historical religious data for the study of Buddhist art. The Tang Dynasty sea beast grape mirror is a larger size and has fine intricate sea grape patterning, with a few sea lions on its back, surrounded by symmetrical grape branches made from pure copper. The sea beast mirror style was primarily manufactured during the Wu Zetian period, Tang Dynasty. There is also a collection of Tang sancai ceramics from the Tang Dynasty, known for their wonderful works of ancient Chinese art and regarded by many famous museums in the world as priceless treasures.

The fourth part of the exhibition is the Song, Liao, Jin, and Yuan Dynasties. These Dynasties were a period of great national integration, with the economy, society, and culture continuing to develop diverse characteristics. The Huitong River excavated in Yuan Dynasty, Liaocheng, quickly became an important place of political, military, and economic matters due to its location (Fig. 25).

Longxing Temple Tower, located in Dongguan, Dongchangfu District, according to textual research, was built in the Northern Song Dynasty and is the oldest existing building in Liaocheng. The tower has an octagonal pavilion-style pagoda, standing 15.8 m tall with 12 floors. The tower was originally 13 floors; however due to storms and earthquakes, only 5 floors remain in the base. In 1973, the government organized personnel to perform maintenance on the tower.

The Grand Canal Museum, Fig. 23 White porcelain jar

The Grand Canal Museum, Fig. 24 White porcelain jar

While doing so, personnel found an underground palace, where they found many copper statues, net bottles, period currency, Buddhist artifacts, and a silver coffin in which there were ashes and many Sariras. In 1973, the damage the century tower had taken had been reversed and is now standing proud by the ancient canal again. Liaocheng Tower is one of China's few stone constructions, with its architectural style and stone carving art having a high research value, and as such the tower is now part of a national key cultural relics protection unit (Fig. 26).

The fifth part of the exhibition is the Ming and Qing Dynasties. During these dynasties, Liaocheng became the main trade center of the canal, with the political, military, and cultural center in Luxi. In the late Qing Dynasty, the ethnic and class contradictions became increasingly acute, causing the anti-imperialist patriotic peasant revolution movement to break out in Liaocheng (Figs. 27 and 28).

There is a group of Ming and Qing Dynasties of jade carvings. The ancients pay attention to "lines must have meanings, and that means auspicious", which has become a feature of ancient Chinese artifacts, especially the jade system, with its precious material, it is carefully designed, this piece of jade, cleverly avoided and to cover up the jade material in the qin color and gap pattern.

The sixth part is modern times. Liaocheng has a glorious revolutionary tradition. During the Agrarian Revolution, the Anti-Japanese War, and

The Grand Canal Museum, Fig. 25 Longxing Temple Tower (built in the Northern Song Dynasty)

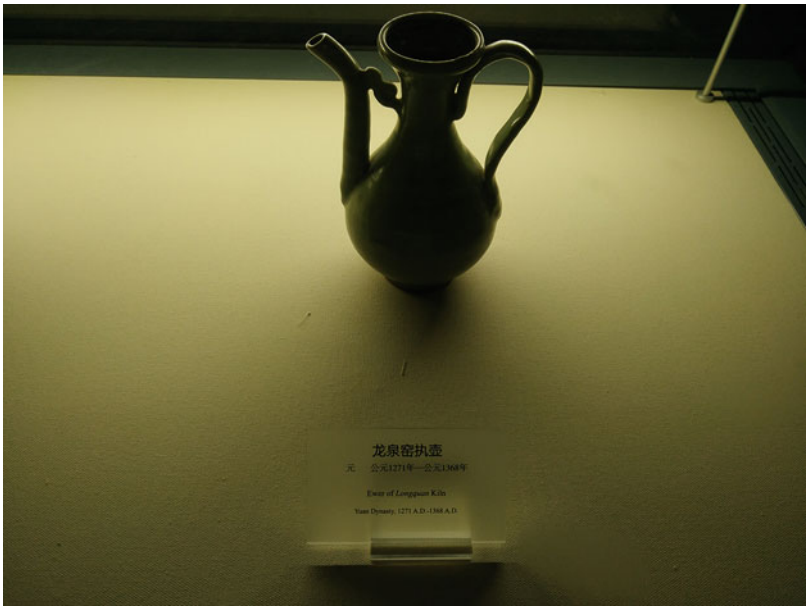

The Grand Canal Museum, Fig. 26 Ewer of Longquan Kiln (Yuan Dynasty, 1271 AD–1368 AD)

the War of Liberation, the people of Liaocheng, in pursuit of democracy and expelling foreign aggression, produced many praise events through the lands, where there are many people capable of evoking praises and tears, creating a positive contribution for the liberation of the Chinese nation and the China revolution.

She is like a mirror, reflecting the Dongchang Lake, reflecting the harmony of civilization and light.

The Grand Canal Museum, Fig. 27 Copper

The Grand Canal Museum, Fig. 28 Black-glazed jar with four loop handles (Song Dynasty, 960 AD–1279 AD)

She is like a melody, lingering in the light of the floor, echoed with unwavering singing.

She is like a train, carrying five thousand years of dreams, Chi to the future more clear direction.

Today, standing at the intersection of our history and future, we admire and enjoy together our country's insightful and profound history. We witness together and explore her wonderful and eternal land.

Conclusion

In this essay I have used the case study of the Grand Canal Museum to highlight the importance of cultural heritage and the complexity of this heritage in China. Liaocheng, an ancient canal, absorbed the essence of ancient Chinese, modern Chinese, and foreign cultures, with amorous feelings from all of China's northern and southern folk, forming the unique canal feeling and culture, to be the scene of many historical stories and backgrounds. Numerous literati and famous

The Grand Canal Museum, Fig. 29 The Grand Canal Museum, Liaocheng, China

scholars had visited here and left many poems, which enriched the infinite charm of Liaocheng. Classics such as *The Travels of Marco Polo*, *Heroes of the Marshes*, *The Golden Lotus*, *Strange Stories from a Chinese Studio*, and *The Travels of Lao Ts'an* have all left the shadow of Liaocheng in their content (Fig. 29).

The birth of Liaocheng City is due to the canal, along with the people of the canal, and the canal's many generations. In recent years, vigorous implementation of the ancient canal renovation and protection of Liaocheng City has taken place, removing "sewage, silt and greening, active water distribution, landscape protection and management," strengthening China's Grand Canal of Liaocheng section's ecology, culture, tourism, leisure, commercial, and residential activities, adding new vigor to the city. There are some images showing the new landscape in Liaocheng district. During the renovation of the canal, a large number of precious canal relics were unearthed, including exquisite porcelain and inscriptions, being extremely valuable objects for studying the canal's history.

China's Grand Canal has given Liaocheng more than 400 years of prosperity and has left a rich cultural heritage for Liaocheng. Liaocheng's people will never forget the merits of the Grand Canal and will continue to inherit its excellent culture, cultivating and carrying forward the "self-reliance, inclusive, open, honest and trustworthy, pragmatic innovation" spirit of Liaocheng in the new period, surely accelerating the development of the city. Meanwhile, in line with the scientific plan and the requirement of building a ecological civilization city, we shall take the

opportunity of the declaration of world culture heritage by the grand canal and South-North Water Transfer Project to create the new splendid glory of Liaocheng, the ancient city.

It was once said that the Grand Canal and the Great Wall were written by our forefathers on the land of China. They are long, large, enduring, powerful, and influential and are unmatched by any other civilization in the world. The Grand Canal and the Great Wall are the cultural treasures of our Chinese nation. If the Great Wall guards the safety of agricultural civilization with its barrier function, then the canal has injected vitality into the civilization with its transportation functionality. Our people believe that with the increased protection of the Grand Canal, China's Grand Canal will surely become a World Heritage Site. The profound cultural connotation of the Chinese nation will always inspire us to become the source of our spiritual life.

Cross-References

- ▶ China: Cultural Heritage Management Education
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: Museums

Grapes: Origins and Development

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Basic Species Information

It is difficult to discern the true wild ancestor of cultivated grape (*Vitis vinifera* L.) because the Mediterranean Basin has a wide variety of wild forms. These include escapees and seed-propagated weedy types growing in natural habitat, occurring mainly in disturbed surroundings and cultivated clones of the grapevine (Zohary and Hopf 2001: 152). Recent genetic studies have proven that cultivated grapevines growing in different regions have genetic diversity and heterozygosity which can only have been established through an influx of genes from nearby wild *V. sylvestris* populations (Imazio et al. 2006: 1009). *Vitis sylvestris* C. C. Gmelin is now considered to be the wild race of the cultivated grape and is indigenous to southern Europe, the Near East, and the southern Caspian belt (Zohary and Hopf 2001: 152).

Vitis vinifera (L.) (grape) is the sole Mediterranean representative of the genus *Vitis* (Zohary and Hopf 2001: 155). The plants are monosexual with the female flowers only ripening into grapes. *Vitis vinifera* is hermaphroditic and occasionally, with the escape of cultivated vines into the wild, reverts back to *Vitis sylvestris* (wild variety) in all characteristics except for being a hermaphrodite, and the seeds of these escapees remain much closer to those of the cultivated form. In terms of elevation, the plant can establish itself at a height of 400 m above sea level and is rarely found as high as 800 m. The cultivated *Vitis vinifera* has a more restricted distribution than its wild variety (Renfrew 1973: 125; Olmo 1995).

Timing and Tracking Domestication

Using genetic studies, Imazio et al. (2006: 1003) have claimed to have found a unique domestication center for all the European cultivars of *Vitis vinifera* located in the Caucasian and Middle East regions, which was present around 6000–7000 years ago and is supported by historical sources. Molecular genetics has shown the existence of varietal exchange and propagation throughout Europe (Imazio et al. 2006: 1010). However, the process of domestication of the grapevine is still largely unknown.

Within the palynological record, *Vitis* is noted in several locations in northern Greece with an increasing presence, albeit patchy, both spatially and temporally, since the beginning of the Holocene. Around 3500 BP (1550 BCE) onwards, there is a rise in the pollen record that is believed

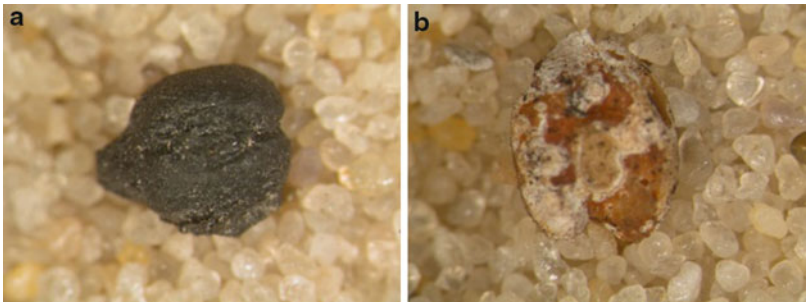

Grapes: Origins and Development, Fig. 1 (**a**) Carbonized Vitis vinifera (grape) pip and (**b**) mineralized Vitis vinifera (grape) pip (both dorsal view) from Insula VI.I, Pompeii, Italy. (Photo by author)

Grapes: Origins and Development, Fig. 2 (**a**) and (**b**) Carbonized Vitis vinifera (grape) pips and (**c**) mineralized Vitis vinifera (grape) pip (all ventral views) from Insula VI.I, Pompeii, Italy. (Photo by author)

to reflect human manipulation and cultivation of the grapevine (Bottema 1982 cited in Valamoti et al. 2007: 56). Recent archaeobotanical analysis has confirmed this complex interaction and spread of the grapevine through Europe and the Mediterranean region by humans with carbonized seeds of both *Vitis sylvestris* (*Vitis vinifera* ssp. *sylvestris*) and *V. vinifera* recovered from prehistoric sites throughout Europe (Renfrew 1973: 125; Zohary and Hopf 2001: 156; Terral et al. 2010: 443). The earliest archaeological evidence of the domesticated grape comes from Egypt and Syria during the fourth millennium BCE. In Palestine seeds of grapes date from 3000 BCE to Bronze Age sites in Jericho (Jashemski 2002: 174). Based upon archaeobotanical and historical information, it is known that domesticated grapevines appeared during the first half of the third millennium BCE in Minor Asia, Southern Greece, Crete, and Cyprus. At the start of the second millennium BCE, they have been recovered from the Southern Balkans, and during the second half of the second millennium BCE, they first appeared in southern Italy. Subsequently, during the second part of the first millennium BCE, the distribution extended to

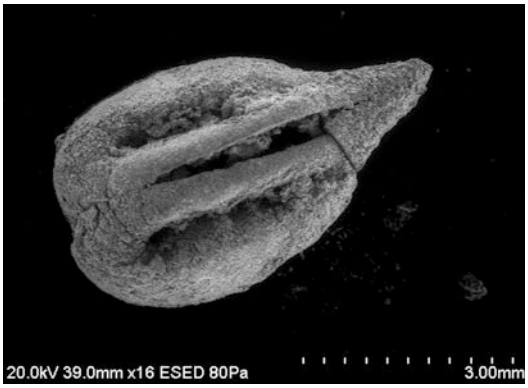

Grapes: Origins and Development, Fig. 3 SEM of carbonized Vitis vinifera (grape) pip from Insula VI.I, Pompeii, Italy. (SEM by author)

Northern Italy, Southern France, Spain, and Portugal (Riviera-Nunez and Walker 1989 in Imazio et al. 2006: 1004).

The fresh fruits of grapes are rich in sugar, containing 15–25% sugar content. Practically, grapes can be easily stored as dried raisins in winter storerooms, and the juice can be fermented and made into wine. Viticulture is

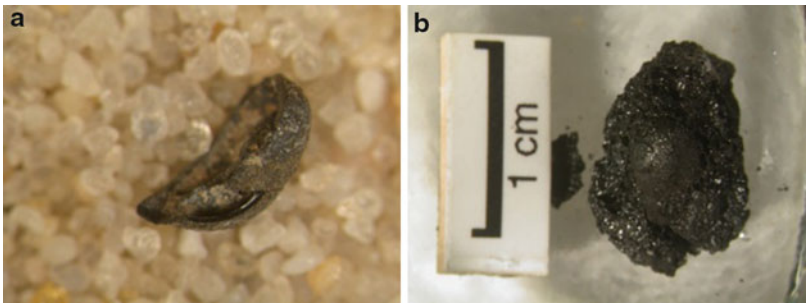

Grapes: Origins and Development, Fig. 4 (**a**) Carbonized half fragment of Vitis vinifera (grape) pip and (**b**) carbonized grape pip embedded in mesocarp from Insula VI.I, Pompeii, Italy (scale in centimeters). (Photos by author)

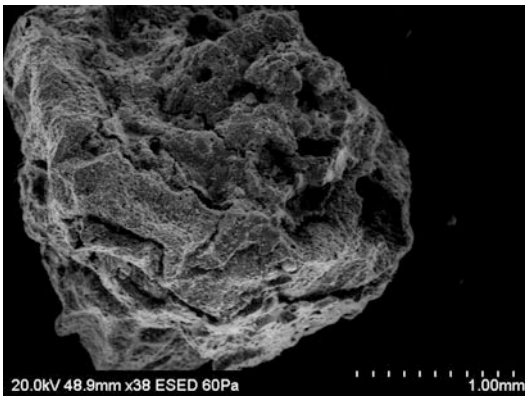

Grapes: Origins and Development, Fig. 5 SEM of carbonized Vitis vinifera (grape) petiole from Insula VI.I, Pompeii, Italy. (SEM by author)

considered a risky agricultural enterprise compared with other non-staple crops that are suited to the Mediterranean climate. Fermented grapes were the commonest source of alcohol in the ancient world and probably the cheapest intoxicant available, as well as an extremely important trade item around the Mediterranean Basin (Brothwell and Brothwell 1998: 147; Zohary and Hopf 2001: 151).

The secure identification of cultivated versus wild grapes has proven problematic and has been a topic of heated debate among archaeobotanists for the last half century. Stummer (1911) initially pointed out that pips from *Vitis sylvestris* were small, short, and broad, whereas pips of cultivated grapes had longer stalks and were narrower in relation to their length (Renfrew 1973: 127–129; Runnels and Hansen 1986; Smith and Jones 1990: 317). Traditionally, the established distinction between archaeological specimens of wild (*Vitis vinifera* ssp. *sylvestris*) and domesticated (*Vitis vinifera* ssp. *vinifera*) grapes has been based on the overall dimensions and other morphological characteristics of the grape pips. Due to the fact that there is considerable overlap between the cultivated and wild types, "pip shape cannot be regarded as a safe diagnostic trait for distinguishing between wild and cultivated Vitis remains in archaeological excavations" (Zohary and Hops 2001: 153). A number of studies on both cultivated and wild charred grape remains have demonstrated that the moisture content in the plant and fruit and the oxygen level present during the time of charring could potentially influence the final dimensions and morphology of the charred grape seeds and ultimately affect their preservation and survival in the archaeobotanical record (Margaritis and Jones 2006: 791–792) (Figs. 1, 2, 3, 4, and 5).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Date Palm: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Figs: Origins and Development
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Olives: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Brothwell, D., and P. Brothwell. 1998. *Food in antiquity: A survey of the diet of early peoples*. Baltimore/London: Johns Hopkins University Press.

Imazio, S., M. Labra, A.S. Grassi, and O. Failla. 2006. Chloroplast microsatellites to investigate the origin of grapevine. *Genetic Resources and Crop Evolution* 53: 1003–1011.

Jashemski, W.F. 2002. The Vesuvian sites before A.D 79: The archaeological, literary, and epigraphical evidence. In *The natural history of Pompeii*, ed. W.F. Jashemski and F.G. Meyer, 6–28. Cambridge: Cambridge University Press. Chap. 2.

Jashemski, W.F., F.G. Meyer, and M. Ricciardi. 2002. Plants: Evidence from wall paintings, mosaics, sculpture, plant remains, graffiti, inscriptions, and ancient authors, catalogue of plants. In *The natural history of Pompeii*, 80–180. Cambridge: Cambridge University Press.

Margaritis, E., and M. Jones. 2006. Beyond cereals: crop processing and *Vitis vinifera* L. ethnography, experiment and charred grape remains from Hellenistic Greece. *Journal of Archaeological Science* 33 (6): 784–805.

Olmo, H.P. 1995. The origin and domestication of the *Vinifera* grape. In *The origins and ancient history of wine*, ed. P.E. Mc Govern, S.J. Fleming, and S.H. Katz, 31–43. New York: Gordon and Bread.

Renfrew, J.M. 1973. *Palaeoethnobotany: The prehistory food plants of the Near East and Europe*. London: Methuen.

Runnels, C.N., and J. Hansen. 1986. The olive in the prehistoric Aegean: The evidence for domestication in the early Bronze Age. *Oxford Journal of Archaeological Science* 5: 299–308.

Smith, H., and G. Jones. 1990. Experiments on the effects of charring on cultivated grape seeds. *Journal of Archaeological Science* 17 (3): 317–327.

Stummer, A. 1911. Zur Urgeschichte der Rebe und des Weinbaues. *Mitteilungen der Anthropologischen Gesellschaft in Wien* 41: 283–296.

Terral, J.-F., E. Tabard, L. Bouby, S. Ivorra, T. Pastor, I. Figueiral, S. Picq, J.-B. Chevance, C. Jung, L. Fabre, C. Tardy, M. Compan, R. Bacilieri, T. Lacombe, and P. This. 2010. Evolution and history of grapevine (*Vitis vinifera*) under domestication: New morphometric perspectives to understand seed domestication syndrome and reveal origins of ancient European cultivars. *Annals of Botany* 105 (3): 443–455.

Valamoti, S.M., M. Mangafa, C. Koukouli-Chrysanthaki, and D. Malamidou. 2007. Grape-pressing from northern Greece: The earliest wine in the Aegean? *Antiquity* 81: 54–61.

Zohary, D., and M. Hopf. 2001. *Domestication of plants in the Old World: The origin and spread of cultivated plants in West Asia, Europe and the Nile Valley.* 3rd ed. Oxford: Oxford University Press.

Further Reading

Borgongino, M. 1999. Suburban agriculture. In *Pompeii: Life in a Roman town*, ed. A. Ciarallo and E. De Carolis, 89–91. Milan: Electa.

Ciarallo, A. 2000. *Gardens of Pompeii*. Rome: L'Erma di Bretschneider.

Graziosi, Paolo

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G

Basic Biographical Information

Paolo Graziosi (1906–1988) was one of the most relevant Italian scholars in prehistoric archaeology. Born in Florence in 1906, his father was the sculptor and painter Giuseppe Graziosi (1979–1942), and his mother was Bianca Coduri, an artist. In 1930 he graduated from the University of Florence with a degree in natural science under the supervision of Aldobrandino Mochi, an anthropologist, and Renato Biasutti, a geographer. During this period, he had his first experiences as researcher, spending multiple research periods in Paris where he studied with Henri Breuil (Vigliardi 1992).

In 1933 he began his fieldwork experiences in Africa, first in Libya (1933), then in Egypt (1935), and in Somalia (1935), focusing on reconstructing the archaeological stratigraphy of important prehistoric sites (i.e., Bur Eibi in Somalia).

Graziosi taught prehistoric archaeology in the School of Humanities, at the University of Florence (1936–1977), which was the second Italian university to create this course after the University of Rome.

He became a lecturer in anthropology (1939–1953) and then paleoanthropology (1942–1953) in the School of Natural Science, at the University of Pisa. In 1954, he became full professor of anthropology at the University of Florence, position he held until 1977 (Vigliardi 1992).

Graziosi was the co-founder of the "Istituto di Paletnologia" (1940), the "Museo e Istituto

Fiorentino di Preistoria" (1946), and the Italian Institute of Prehistory and Protohistory (1954). He was also an active member of numerous societies and the organizer of multiple workshops, exhibition, conferences, and congresses (e.g., International Congress of Prehistory and Protohistory).

His interest in the rock art and prehistory is visible from the numerous campaigns conducted in Italy and abroad. In Italy his most famous excavations were conducted at the Balzi Rossi caves, Romanelli caves, and Porto Badisco cave in Italy. Since 1950 he studied the Levanzo island (Italy) where he discovered both Neolithic pictures and Paleolithic rock art (Vigliardi 1998).

Graziosi also conducted multiple fieldworks and study periods abroad such as in Libya (1933, 1938, 1939, 1940, 1952–1954, 1962, 1965, 1967–1968), Egypt (1935), Somalia (1935, 1952–1954, 1958, 1963), Spain (1950), France (1959), Chile (1959), Peru (1959), Argentina (1959), India (1954–1960), Pakistan (1954–1960), Afghanistan (1954–1960), Eritrea (1961), Ethiopia (1965), Scandinavia (1957), Mexico (1957), and Kenya (1958), focusing on prehistoric rock art, lithic industries, and paleoanthropology. Additionally, he served as scientific member to the Italian expedition to the Karakorum K2, directed by Ardito Desio where he was in charge of the archaeological research in Pakistan and India. There, Graziosi surveyed numerous Paleolithic and Neolithic sites, analyzing extensively the lithic material of the north-western Punjab (Graziosi 1964).

Major Accomplishments

Graziosi published more than 260 articles that highlight his extraordinary academic breadth on the subjects of prehistory, ethnography, rock art, and anthropology. His first published work was on the Venus of Savignano (Graziosi 1926), which he completed before enrolling to university, probably guiding his future interests to prehistoric arts. Graziosi's research interests included Euro-Asian and African prehistoric cultures, and his investigations made him a pioneer in the study of African rock art and lithic industries.

In Italy Graziosi directed numerous excavations at the Romito cave, S. Teodoro (Messina), Levanzo (Egadi), and Porto Badisco cave. His research of Romanelli cave first highlighted the need for rock art to be investigated in conjunction with precise stratigraphic information (Graziosi 1932; Graziosi 1933). He was a precursor in the reconstruction of prehistoric sites by the combined used of stratigraphy, material culture, and stylistic analysis of prehistoric paintings, expanding this analysis to compare motives across different geographical areas (Graziosi 1973). His last published research was on the Porto Badisco cave (Italy) where he focused on the Neolithic paintings, the stratigraphy, and the methodological process applied to the study of cave paintings (Graziosi 1987).

His fieldwork in Libya (1933–1940 and 1952–1968) helped him to develop a rigorous methodology promoting analysis of the lithic industries as well as a new classification for local rock art (Fig. 1). His studies were published in numerous articles and in the monograph *L'arte rupestre della Libia*, which mainly focused on the classification and stylistic analysis of Libyan rock art (Graziosi 1942). Likewise, his studies in Somalia were collected in the ample monograph *L'arte della Pietra in Somalia* that it is still considered one of the most comprehensive works on Somalia prehistoric archaeology. The volume presents a comprehensive catalogue of archaeological sites, lithic finds, and rock art finds in the region (Graziosi 1940).

Graziosi's major contribution to lithic studies was constituted by his research of Mousterian lithic industries, which focusing on both qualitative and quantitative data helped reconsider the role of the microburin as a fossil guide in the passage between Paleolithic and Mesolithic in Italy (Graziosi 1951). Graziosi's extensive investigations also have the merit to address the problem of chronology in rock art sites as he dedicated multiple publications to highlight that stylistic and contextual analysis should be combined with stratigraphic information and the analysis of material culture. His investigation of technological, contextual, and stylistic characteristics of cave paintings and engravings was

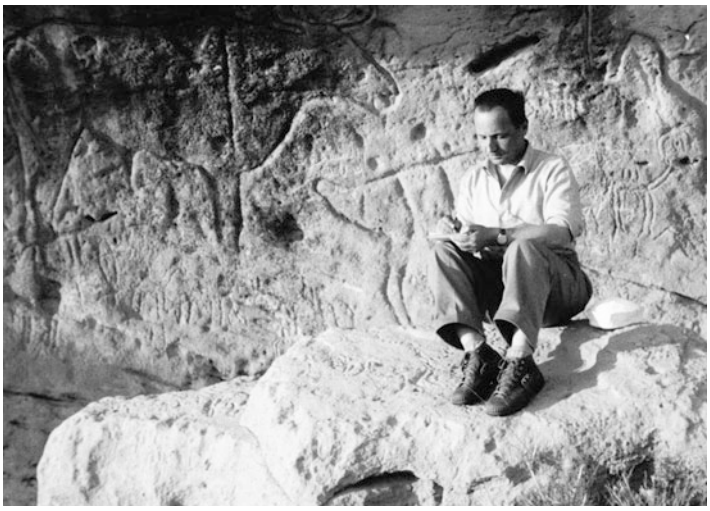

Graziosi, Paolo,
Fig. 1 Photo of Paolo Graziosi. Udei el Chel–Libya, 1954. (Courtesy of Museo Fiorentino di Preistoria "P. Graziosi". © Museo Fiorentino di Preistoria "P. Graziosi")

a cutting edge and helped him coin the term "Mediterranean artistic province" for Italian, French, and Spanish rock art sites (Graziosi 1960).

He was the founder of the scientific journal *Rivista di Scienze Preistoriche* (1946) and a member of the Accademia dei Lincei, and he received numerous national and international honors and awards. The Museum of Prehistory in Florence was named in his honor and posthumously hosts Graziosi's archive donated to the Museum in his will. In 1992 the Italian Institute of Prehistory and Protohistory organized and published a memorial in his honor (Vigliardi 1992).

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Rock Art, Forms of

References

Graziosi, P. 1926. Su una statuette steatopigica preistorica rinvenuta a Savignano sul Panaro in Provincia di Modena. *Archivio per l'Antropologia e l'Etnologia* 54 (1924): 165–167.

Graziosi, P. 1932. Nuovi elementi per lo studio dei graffiti di Grotta Romanelli. Le incisioni della Cova de Parpallò (Valenza). *Archivio per l'Antropologia e l'Etnologia* 62: 142–146.

Graziosi, P. 1933. Les gravures de la Grotte Romanelli (Puglia, Italie). Essai comparative. In *IPEK*, Band. 8 1932–33, 26–36.

Graziosi, P. 1940. *L'età della pietra in Somalia*. Firenze: Sansoni.

Graziosi, P. 1942. *L'arte rupestre in Libia*. Napoli: Ed. Triennal d'Oltremare.

Graziosi, P. 1951. Les industries paléolithiques à dos rabattu et le passage du Paléolithique au Mésolithique en Italia. *Bulletin de la Société Préhistorique Française* 48: 55–61.

Graziosi, P. 1960. *Palaeolithic art*. London: Faber.

Graziosi, P. 1964. Prehistoric research in North-Western Punjab. In *Italian Expedition to Karakoroum K2 and Hindu Kush, Scientific Reports*, Vol. V, 1–52. Leiden: Ed. Brill.

Graziosi, P. 1973. *L'arte preistorica in Italia*. Firenze: Sansoni.

Graziosi, P. 1987. L'arte preistorica della Grotta di Porto Badisco. In *L'Umana Avventura*, pp. 65–75. Milan: Ed. Jaca Book.

Vigliardi, A. 1992. Ricordo di Paolo Graziosi. In *Estratto da Atti della XXVIII Riunione scientifica dell' Istituto di Preistoria e Protostoria, Firenze*, pp. 13–25.

Vigliardi, A. 1998. Bibliografia di Paolo Graziosi. In *Rivista di Scienze Preistoriche* 49: 5–41.

Further Reading

Graziosi, P. 1962. *Levanzo, pitture e incisioni*. Firenze: Sansoni.

Graziosi, P. 1964. *Prehistoric research in North-Western Punjab. Antropological Research in Chitral.* Part of the series Italian Expedition to Karakorum K2 and Hindu Kush. Scientific Reports. Leiden: Ed. Brill.

Graziosi, P. 1973. *L'arte preistorica in Italia*. Firenze: Sansoni.

Great Zimbabwe, 1100–1600 AD, Rise, Development, and Demise of

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State of Knowledge and Current Debates

Introduction

Since the monumental architecture of Great Zimbabwe and sites related to it became known to Westerners in the sixteenth century, the scope and grandeur of the site has never ceased to amaze observers. From the days of the earliest Portuguese travelers' narratives, speculation about the site has been continuous and inventive. Since serious scholarly interest started in the late nineteenth century, debate on the origins, development, and decline of the culture once based there and later elsewhere has never stopped. With increased archaeological research throughout the twentieth century, and at the beginning of the twenty-first century, it has become even more complex. From the viewpoint of heritage, Great Zimbabwe is testimony to a major civilization that existed in Southern Africa between the eleventh and seventeenth centuries. The settlement, whose remains cover some 700 hectares, was an important trading center, connected to the worlds of the northern Indian Ocean and the Far East.

Great Zimbabwe (Fig. 1) fits into a conventional category of settlements that only exists on the Zimbabwe plateau and adjacent regions of eastern Botswana, the middle Limpopo Valley, and the Mozambican plains and nowhere else in

Great Zimbabwe, 1100–1600 AD, Rise, Development, and Demise of, Fig. 1 View of the Great Enclosure and the valley complexes at Great Zimbabwe. (Photo by the author)

the world. The critical question then is how should we characterize these monumental, stone-built structures which are unique to this part of southern Africa? They were certainly major settlements, far exceeding the sizes of farming villages, which dominated the region in the preceding century, showing considerable internal functional differentiation, greater regional cooperation, and integration. Their appearance further brought southern African societies into the global commercial network of eastern Africa and Asia.

The Portuguese referred to Great Zimbabwe and hundreds other stone-built structures over the Zimbabwe escarpment as "great stone edifices," which they thought served as palaces for the biblical King Solomon, the Queen of Sheba, and the legendary Prester John. The inhabitants of Mukaranga, whom the Portuguese encountered from the early sixteenth century onwards, called these "Simbaoe" (*Zimbabwe*, houses of stone), meaning centers of authority and power (Diogo de Couto, *Decade IX,* Chapter 25, In Theal 1898–1903, p. 390). Antiquarian investigators reinforced these Portuguese views from the late nineteenth century onwards, labeling the Hill Complex at Great Zimbabwe a copy of the biblical Solomon's temple, while the Great Enclosure was seen as a replica of the palace the Queen of Sheba stayed in when she visited Jerusalem. The auriferous southern African region, which attracted European explorers and concession seekers, reinforced the idea of Ophir, as the source of King Solomon's gold. Theodore Bent (1896) referred to Great Zimbabwe and other monumental structures in the region as "cities." During much of the twentieth century, professional archaeologists have realized the monumentality associated with Great Zimbabwe and other places, but accompanied by minimal discussion on what these represented (see, e.g., Huffman 1977). These sites are currently interpreted as pre-European urban centers (see Sinclair 2012; Sinclair et al. 1993; Manyanga et al. 2010), which exemplify a transformation of the region from agrarian modes of production to complex sociopolitical forms.

Evidently these structures were local in origin (Caton-Thompson 1931; Garlake 1973) and, in terms of size, were more than just large villages. Roland Fletcher has suggested that they, like their counterparts in Asia, Europe, and the Americas, might be usefully considered as a class of settlement with "no name." As undefined phenomena, they transform the global understanding of settlement growth, gain new significance in regional culture histories, and have implications for our urban future.

Focusing on Great Zimbabwe, this entry presents the nature and form of early anomalous settlements in southern Africa, pointing out that these centers defined futuristic settlements. Their size and density had a bearing on sustainability, which is also connected to their continued existence or eventual demise. Sustainability is important when considering the fate of Great Zimbabwe, as the natural resources around it indicate a fragile ecosystem. These have a bearing on the settlement "process" at Great Zimbabwe and determined the type of settlements found especially on the periphery, which may have required less aggregation, less density, and far less monuments. This discussion places Great Zimbabwe in the context of new global approaches to giant, anomalous places in its category, in other parts of the world. The objective is to further dialogue on Great Zimbabwe, to understand what it was.

Physiography

Great Zimbabwe is situated in the southern sections of the Zimbabwe escarpment (GPS ref.: 20 deg. 16′ 22.64"S, 30 deg. 56′2″E, 1150–1250 m above sea level) (Fig. 2). The physical landscape comprises whaleback granodiorite hills. The hills define a watershed with several micro-catchments, drained by streams and small rivers towards the Mutirikwe and Tugwi rivers. These rivers flow southeastwards draining into the Runde River, which in turn joins the Indian Ocean-bound Save River. The vegetation is mixed savannah woodland. The bare granite hilltops have *Brachystegia* and varieties of acacia vegetation on their slopes and adjoining valleys. Some 10 km west of Great Zimbabwe are greenstone schists trending southwest/northeast, where evidence of pre-European gold workings has

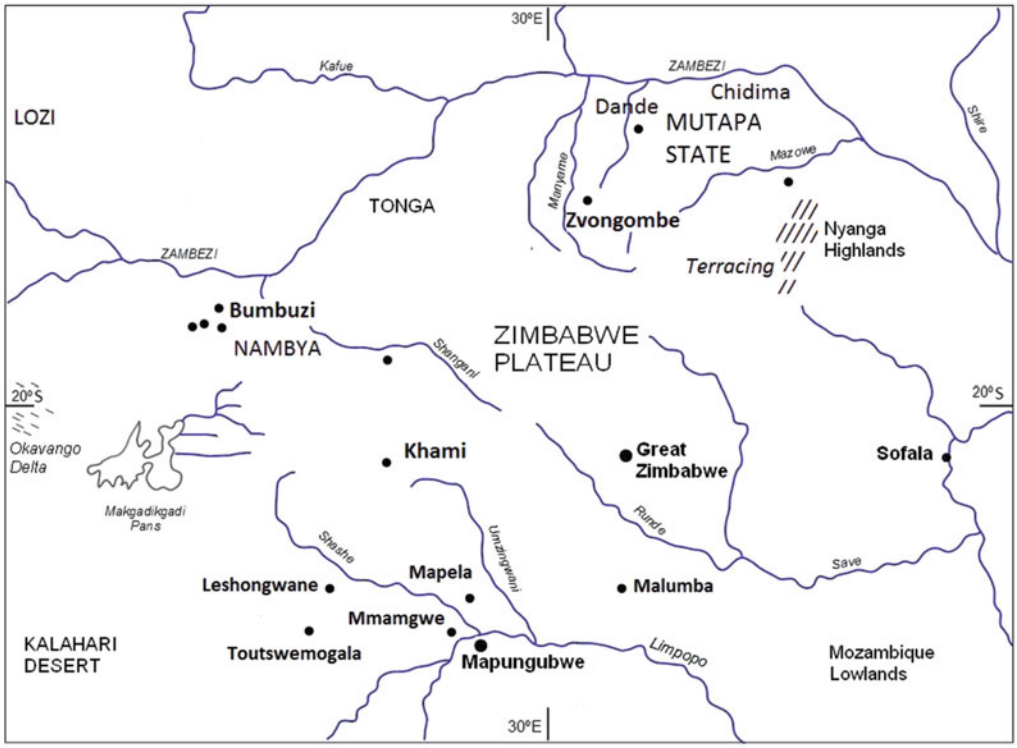

Great Zimbabwe, 1100–1600 AD, Rise, Development, and Demise of, Fig. 2 Map of the Zimbabwe plateau and adjacent regions showing the location of Great Zimbabwe. (Photo by the author)

been recorded (Phimister 1974, 1976). The weathering of granodiorite rock has been exploited since the early second millennium AD, as stone could easily be shaped into building materials and used in the construction of residences (*dzimba dzemabwe* or *Zimbabwe*) (houses of stone) (Pikirayi 1993, 2001a).

Compared to other regions of the escarpment, Great Zimbabwe is located in a favorable environment, with sufficient, though variable, summer rainfall (800–1300 mm) and periodic winter rains (*guti*) to allow the cultivation of cereals such as maize, sorghum, and millet. Surveys suggest the granite geology was exploited very intensely to capture underground water sources for use at the site. This practice is still carried out today around Great Zimbabwe today, with farmers using the water to irrigate maize and vegetables. Apart from the variable annual rainfall, and the extremely high summer temperatures are a constraining factor to subsistence activity. Droughts and arid conditions occur frequently (see Scoones et al. 1996). Significant periods of aridity during the last 1000 years (Huffman 2008, 2010a; Tyson and Lindesay 1992) may have triggered large-scale abandonment of such regions. Chiefdoms and states may have arisen as collective responses to these constraints, through the control of strategic resources such as water, cattle, and grain (Kim and Kusimba 2008, Huffman 2009a, b, 2010b).

Origins

Prior to the rise of Great Zimbabwe in the early to mid-thirteenth century (see Chirikure et al. 2013), the region was inhabited by farmers, as attested at Chivowa, Gumanye, and Great Zimbabwe hills (Sinclair 1985, 1987). Their material culture shared similar cultural traits with those found in the middle Limpopo Valley and adjacent areas. In effect, southern Zimbabwe was on the margins of mainstream developments in the middle

Limpopo Valley for much of the tenth, eleventh, and twelfth centuries AD, where emerging chiefdom and possibly state level societies competed for the gold and other trade with the Indian Ocean coast (Huffman 2007). However, it is the manner in which farmers in southern Zimbabwe responded to the Indian Ocean trade that shifted the momentum in their favor. Those around Great Zimbabwe seized upon this opportunity during the twelfth centuries and increasingly wrestled for political and economic dominance of the southern Zimbabwe escarpment from the thirteenth century onwards. At Chivowa and Great Zimbabwe, the first substantial houses appeared, the design of locally made ceramics changed, and access was gained to a greater number of imports (Sinclair 1984, 1985). During the thirteenth century, this process rapidly advanced. Dry masonry stone walls were raised using blocks of granite that screened the compounds of prominent people. By c.1250, the foundations of an elaborate urban center had been set. While the importance of agriculture and cattle (Garlake 1978) must not be overlooked in the rise of Great Zimbabwe, long-distance trade played a huge part, acting as a powerful catalyst transforming localized tribal organizations into regional ones. Both land and cattle were essential in developing a vital social network of associates, clients and kinship ties, and to enfranchise management of goods and services distributed as benefits within traditional political and social institutions.

The southern Zimbabwe escarpment seems to have offered a more favorable environment and climate for the support of a large urban complex and territorial state (Pikirayi 2001a). By 1250 AD, Great Zimbabwe was clearly the more preferred destination for Indian Ocean traders; with the consequence that Mapungubwe and other polities in the middle Limpopo Valley were undercut, losing their wealth in the process (Pikirayi 2003). The fate of floodplain agriculture in the middle Limpopo Valley is not clear during this time, but a large-scale abandonment of the region towards more favorable environments may have triggered further the region's demise. Other scholars link the rise of Great Zimbabwe to the ideology of rainmaking or control (Huffman 2009b). However, this is not practical (Pikirayi 2001a) and clearly not supported by Karanga/Kalanga histories and ethnographies. These histories and ethnographies point to rainmaking centers or cults located away from centers of political power, with responsibilities for rain ceremonies entrusted to members autochthonous to particular regions, and not linked to the ruling elite or even rival dynasties.

Great Zimbabwe's location points to the possibility of a viable agriculture even under drier climatic conditions (Holmgren and Öberg 2006). Added to this must be local water management strategies used to capture and use water from the surrounding granite landscape. The rise of Great Zimbabwe, ultimately, was a combination of economic opportunities driven by gold resources as well as the need to manage a variety of environmental assets and hazards, in a region where droughts and prolonged periods of aridity, high rainfall, and flooding were common.

Settlement Layout

Great Zimbabwe is located within and around a granite hilly terrain (Fig. 3). The layout of its structures indicates a core, characterized by massive and imposing monumental architecture, and a peripheral zone, with far less visible settlements. The first stone structures were built on a whaleback hill during the twelfth and thirteenth centuries (Chirikure et al. 2013). They are collectively referred to as the Hill Complex. Here two very large enclosures (the Western Enclosure and the Eastern Enclosure) and several smaller intervening ones, all constructed from, and in between natural granite boulders, define living spaces, presumably for royalty. Ritual spearheads, iron gongs, and soapstone bird effigies attest to the existence of royalty (Huffman 1996). Commoner settlements are found at the base of the hill, enclosed within a perimeter wall, but soon the population became too large to be retained inside it. With the expansion of the settlement, royalty shifted to the more elaborately built elliptical complex, named the Great Enclosure. Constructed during the thirteenth and fourteenth centuries, it is the largest single stone-built structure in southern Africa. It has a girdle wall

Great Zimbabwe, 1100–1600 AD, Rise, Development, and Demise of, Fig. 3 Granite country around Great Zimbabwe. (Photo by the author)

244 m long, 6 m wide, and 11 m high. The Great Enclosure, which is accessed via three entrances to the north and northwest, encloses a passage leading to a conical tower and a number of enclosures. The destructive activities of antiquarian investigators during the late nineteenth and early twentieth century make it difficult to determine how this massive structure was utilized (Garlake 1973), but it appears the enclosures partitioned domestic and public spaces, some perhaps serving ritual functions (Huffman 1985). Overall, the Great Enclosure represents the peak development of Great Zimbabwe both as a major settlement and as a state (Chirikure and Pikirayi 2008; Pikirayi and Chirikure 2011).

Five enclosure complexes were constructed adjacent to the Great Enclosure and extending to a nearby valley to the northeast and east. Commonly referred to as the Valley Complex, they date from the fifteenth century onwards and probably represent the royal palaces used in the terminal periods of the settlement.

A second perimeter wall, which is well defined to the west of the settlement, attests to the continuous growth of Great Zimbabwe. Beyond these are "peripheral settlements," being stone enclosures located on a number of hills around Great Zimbabwe (Huffman 1996). Their function has not been established archaeologically. It has been suggested they housed members of the ruling family (Huffman 1996) or catered for the increased administrative functions of the metropolis (Pikirayi 2001b). The area between the core and the peripheral structures revealed dense mud-built structures, interpreted as commoner housing (Huffman 2007). Overall, all this reflects an expansion of the settlement.

Early Portuguese descriptions seem to focus on the largest and most impressive part of Great Zimbabwe, called the Great Enclosure. This may have been the focus of the settlement just prior to their arrival in northern Zimbabwe. The identity of Great Zimbabwe is strengthened by references

to the conical tower and the location of stone walled settlements in surrounding hills:

> "This edifice is almost surrounded by hills, upon which are others resembling it in the fashioning of the stone and the absence of mortar, and one of them is a tower more than twelve fathoms high." (De Barros, in *Decades*, 1.10.1, In Theal 1898–1903).

Modern mapping to determine the extent of Great Zimbabwe started with Karl Mauch (Burke 1969) in the early 1870s. Karl Mauch attempted to clear the overgrown Great Enclosure to enhance access to the site. His rudimentary sketch plans and three-dimensional representation of both the Hill Complex and the Great Enclosure is a first attempt in presenting the site to a European audience (Petermann 1874). R. M. Swan, who worked together with Theodore Bent produced the first accurate plans of the site, which Swan interpreted using absurd astronomical theories (Bent 1896), and for which he was criticized by Sir John Willoughby (1893) and Frederick Mennell (1902). Sir John Willoughby himself destroyed the stratigraphy of two stone structures and contributed towards the disappearance of one large enclosure, a record of which only exists on Mauch's sketch plan. Franklin White (1903–1904, 1905), a mining engineer, published an accurate, scientific plan of the Great Enclosure (which referred to as "Temple or Elliptical Building") in the *Journal of the Royal Anthropological Institute*. This plan was used by subsequent researchers until 1958, although compromised somewhat by the pillaging which took place, particularly as reflected in the work of Bent (1893a, b, 1896), Hall (1905, 1909; Hall and Neal 1902), and the Public Works Department (PWD), who administered the site from 1891 to 1936.

Size and Function

David Randall-MacIver (1906) observed that the stone structures of Great Zimbabwe were "very imposing," with "a massive grandeur all their own" (p. 61) when compared to others, but not as extensive as those of Nyanga, as lavishly decorated as those found in the Insiza district, in reference to Naletale, Danangombe, and other structures in west-central Zimbabwe. In terms of the extent of the site, he identified "…three distinct, though connected, groups of buildings, viz. the 'Elliptical Temple' (Great Enclosure), the 'Valley Ruins' (Valley Complex) and the 'Acropolis' (Hill Complex)". The 'Valley Ruins' are described as extending for about three-quarters of a mile in a line from east to west and occupying the southern side of the valley that separates the 'Elliptical Temple' from the 'Acropolis' (p. 75).

The first aerial photographs of the site were taken by Caton-Thompson in 1929, and these further enhanced the accuracy in the mapping of the core settlement. Using published plans, Fletcher (1993) provided a broad comparative view of settlement sizes of indigenous African towns and cities and discussed them in relation to information management and the role of external economic influences. This was useful pioneering work, which crucially pointed to the need for detailed archaeological surveys to provide more accurate detail. Noting the challenges represented by the edges of settlements, some of which are clearly not recognizable, or consistent, Fletcher (1993) provided a useful indicator of the sizes of African towns. Great Zimbabwe is presented as a dispersed, low-density residential town (see Fletcher 1993, pp. 738, 740). This interpretation is informed by Huffman (1977) and Sinclair et al. (1993) who conducted systematic archaeological surveys and detailed excavations around Great Zimbabwe, altering previous estimates about its size.

Great Zimbabwe was of comparable size to pre-industrial London (early thirteenth–mid-sixteenth century) (see Fletcher 1993, Fig. 44 (a)), the only difference being settlement density, with London more compact. A size of between 6 and 8 km^2 in extent would be a realistic estimation, based on current archaeological evidence. In relation to later African cities such as Zaria and Addis Ababa which spread over a far larger area, the overall tendency was for such settlements to have relatively low average residential densities and comparatively small population sizes. This would make it easier to manage. A very large settlement would imply marked communication difficulties (Fletcher 1981).

According to Fletcher (1986), an assessment of the overall behavioral factors affecting settlement size has to refer to the total built area and occupation area within which the aggregate activity of the community occurred and should be identified archaeologically from the general scatter of debris that marks a site. An open settlement is presumed to include a periphery of open spaces, service function localities, and dumps. The peripheral zone of a settlement may be recognized as a low-density scatter of occupation debris.

Using a combination of archaeological, ethnographic, and historical evidence with ecological and statistical modeling, Chirikure et al. (2017) have revised the population estimates of Great Zimbabwe from the 20,000 (Garlake 1973) towards a Fig. 10,000 people. This is supported by the absence of large middens at the site, the chronological differences between several key areas of the settlement traditionally assumed to be coeval, and the historically documented low populations recorded for the subcontinent between the early seventeenth and the twentieth centuries.

From the limited scientific archaeological excavations, we are unable to estimate Great Zimbabwe's urban density. A differentiation is imperative given the marked spatial differences between houses enclosed within the stone enclosures and those outside these. The latter suggested dense settlement associated with commoner housing (Huffman 2007). Use of such space remains debatable (see, e.g., Pikirayi and Chirikure 2011), largely based on the merits and demerits of using the ethnography. Alternative approaches are needed, which provide appropriate tools to describe and measure spatial layout, especially integration and connectivity (see, e.g., Long et al. 2007). It is spatial configuration that affects people's spatial cognition, and human cognitive maps are developed through movement and interaction rather than through a set of predetermined rules. Great Zimbabwe grew into a large settlement, and this was achieved not only through accessibility and connectivity to certain spaces but also through facilitating and limiting access and connection to the same spaces. This also involved reorganization of certain spaces and revisiting some of the spatial principles followed in using space previously (Pikirayi 2013c).

Few studies have discussed the use and meaning of space at Great Zimbabwe and other Zimbabwe Culture sites (see, e.g., Huffman 1984, 1985, 1996, 2007; Beach et al. 1997, 1998). These studies however did not address basic questions about the minds of the inhabitants who lived inside the stone structures and the towns they defined. The connections between royalty and commoners, for example, have not been viewed in the context of how settlement design reconnected urban neighborhoods, how space was used for food production and industrial output, and how the overall layout expressed organizational structure of the residents. It makes sense to view the various parts of these urban centers as operating and functioning both independently and as extensions to each other.

An alternative approach to the use of space at Great Zimbabwe may be arrived at through the study of the built environment, especially the development of stone architecture (Pikirayi 2013c). At Great Zimbabwe authority and power defines space, and thus there is a connection between space and authority. The importance of residential spaces extends to non-built areas, e.g., middens. Understanding the development of monumental and non-monumental architecture towards a composite, integrated settlement is necessary.

Development

To understand how Great Zimbabwe grew to become a giant settlement as well as center of a territorial state, an evaluation of the evolution of the settlement based on available radiocarbon and other dating evidence, and monumental architecture, is imperative. The activities of antiquarian investigators as well as the Ancient Rhodesian Mining Company would result in the pillaging of Great Zimbabwe and similar structures in Southern Africa between the 1890s and 1920s. This compromised the work of professional archaeologists, who struggled to establish a credible stratigraphy and chronology for the site. The activities arising from the antiquarian and scientific archaeological investigation of Great

Zimbabwe would result in the Zimbabwe controversy, which dominated the historiography of the site for the entire twentieth century (Pikirayi 2001a; Chirikure et al. 2013). The dating and chronology of Great Zimbabwe was key to the controversy. Most forgotten in understanding how Great Zimbabwe grew into a large settlement is its monumental architecture. I discuss the dating and chronology first.

The scientific archaeological excavations from the various parts of Great Zimbabwe conducted since the early twentieth century provide a limited stratigraphic information as well as dateable imported glass beads and Asian ceramics. The advent of radiocarbon dating in the 1950s would result in the generation of absolute ages on archaeological events at Great Zimbabwe. Available radiocarbon dates have been extensively discussed by Huffman and Vogel (1991), Chirikure and Pikirayi (2008), Pikirayi and Chirikure (2011), and Chirikure et al. (2013). Huffman and Vogel (1991) argue for a limited settlement at Great Zimbabwe, from the late thirteenth to mid-fifteenth century, while a recalibration of the same radiocarbon dates, as well as the use of Bayesian modeling by Chirikure and Pikirayi (2008) and Chirikure et al. (2013), points towards a much longer settlement of the site. Great Zimbabwe may have been settled from the eleventh century, with the first stone walls being constructed end of the twelfth century/beginning of the thirteenth. The site was continuously occupied up to the late sixteenth/early seventeenth centuries. The Bayesian modeling indicates that the Hill Complex flourished between approximately 1100 and 1280, while the Great Enclosure flourished between 1225 and 1380. The settlement expanded from there to other parts, including the Valley complexes, which were settled up to the early seventeenth century. This chronology matches that of the imports, especially glass beads, which date the site from the early tenth to the sixteenth, possibly seventeenth century.

In spatial terms, the dating suggests that the earliest palace complex existed on the Hill, and later on moved to the Great Enclosure and the valley prior to abandonment (Chipunza 1993, Collett et al. 1992, Chirikure and Pikirayi (2008), Pikirayi and Chirikure (2011)).

The thirteenth century witnessed increased gold production and trade on the Zimbabwe plateau, matched by corresponding prosperity in east African coastal cities. Great Zimbabwe itself has yielded a range of imported ceramics, including Persian tin-glazed earthenware bowls, Chinese celadon, and Chinese stoneware vessels as well as Near Eastern glass, some coral pieces, a variety of copper objects, bronze hawk bells, yellow and green glass beads, brass wire, and cowrie shells (Garlake 1973; Chirikure et al. 2013). Great Zimbabwe had extensive regional and long-distance trading networks with central Africa, the Indian Ocean coast, the Persian Gulf, India, and the Far East (Garlake 1973).

Many studies of Great Zimbabwe and related stone-walled sites have treated architecture as a backdrop to typology and dating of the structures (e.g., Garlake 1970; Whitty 1957, 1961). They have used wall types P, Q, and R as a basis for relative dating and chronology, as well as for tracing the development of building sequences. This observation has remained the cornerstone for understanding the development of the culture once based at Great Zimbabwe and its spread to the northern and western regions of the Zimbabwe plateau (see Walker 1993). The emergence and development of monumental architecture brings Great Zimbabwe into the realm of regional and intercontinental trade, becoming the Great Enclosure the largest, most influential and wealthy city in southern Africa, especially during the second half of the fourteenth century.

Demise

The decline of Great Zimbabwe as a center of a powerful prehistoric state remains unresolved. A major factor is the unsystematic investigations of late nineteenth/early twentieth century European antiquarians and prospectors that destroyed its stratigraphy and looted it in search of Near Eastern artifacts and gold. While systematic research from the 1950s onwards has resolved the chronology of the site and identity of the builders, circumstances leading to the decline or even collapse of the site remain obscure.

Explanations range from the effects of long-distance trade (Huffman 1972; Pikirayi 2006), environmental degradation (Garlake 1978), climate change (Holmgren and Öberg 2006), to the emergence of competing polities to the north and west (Pikirayi 1993, 2013b).

It remains unclear what role climate change played in the demise of Great Zimbabwe. Although the cool-dry conditions experienced in the fifteenth century (see Holmgren et al. 2003; Tyson and Lindesay 1992; Tyson et al. 2000, 2002) could have undermined its agriculture and its increasing population (Holmgren and Öberg 2006), the location of Great Zimbabwe in a favorable rainfall zone would have offset this (Huffman 2007). Given the generally warmer and wetter conditions, the abandonment of Great Zimbabwe may not have been conditioned by climate. However, Hannaford et al. (2014) attempt a synthesis and critique of the extant hypotheses and dominant approaches regarding possible regional climate-society linkages in Southern Africa for the period covering the origins and demise of Mapungubwe and Great Zimbabwe. They pay particular attention to climate causation and determinism, relating the southern African context to global issues on the same. This approach is in response to recent discussion in global climate history literature on environmental collapse which has raised critical questions over the basis of climate as a chief causal factor is societal change. Given that Mapungubwe and Great Zimbabwe witnessed considerable sociopolitical complexity which may have ended due to environmental change, social disintegration, population depletion, and migration, they discuss the potential of societal vulnerability and resilience and attempt to incorporate diverse sources of data to help understand the role of climate in southern African history.

Beyond climate change, it is important to realize that Great Zimbabwe had to prosper as a territorial state and had to extend its influence to maintain regional dominance. Its inhabitants needed more land for farming, while traders wanted more gold for export to the Indian Ocean coast. The demise of Great Zimbabwe after 1400 AD may be linked to general global economic depression experienced at the time (Pikirayi 2006). Europe saw a falling demand in gold. Great Zimbabwe, located close to the gold mining areas and production centers, must have felt the effects of this economic downturn. International trade began to decline from the early fifteenth century, as indicated by the paucity of Chinese porcelain at Great Zimbabwe. In response to this, the elite at Great Zimbabwe expanded regional networks of trade, leading to the rise of monumental structures in distant regions like the Makgadikgadi Pans in eastern Botswana and northern Zimbabwe (Pikirayi 2006). By the late fifteenth century, the consequences of this decision were obvious in terms of demographic and regional shifts of some of the population from southern to northern Zimbabwe which saw the rise of the Mutapa State (Pikirayi 1993). To the west, Great Zimbabwe was facing competition from Khami, the capital of the Torwa State, which developed an architectural canon different from the former, but which translated into far more superior and grandeur monumental entity. By the sixteenth century, political and economic power had shifted to the northern and western regions of the Zimbabwe escarpment. From this explanation, Great Zimbabwe may have expanded too fast and rapidly. Written sources indicate Great Zimbabwe continued to be inhabited in the sixteenth century (Pikirayi 2006, 2013a, b), while a Bayesian modeling of available radiocarbon dates suggests settlement until the early seventeenth century (Chirikure et al. 2013).

Great Zimbabwe in the Present

In considering collapse or demise, it is important to detect and document societal stresses which develop over the long and short term. Questions to be asked, for example, are whether Great Zimbabwe experienced overpopulation growth, a declining subsistence base, a deteriorating physical environment around it, and competition from neighboring polities which undermined its regional influence and economy. These developments have a bearing on settlement growth or shrinkage. Thus the role of environmental degradation in the demise of Great Zimbabwe

requires reconsideration from the perspective of sustainability.

Current surveys around Great Zimbabwe documenting its water resources indicate that the inhabitants relied mainly on subsurface water, which was tapped or harvested from springs that occurred with the granite landscape (Pikirayi et al. 2016). The water was carefully channeled to the core of the settlement where it was stored in reservoirs for consumption (Fig. 4). It is evident these springs provided the bulk of the settlement's water requirements as some of the streams and rivers flowing to the east and south of Great Zimbabwe are fed from these sources and have running water for throughout the year. This points to sustainability and resilience, which can help interrogate the demise of the settlement and collapse, and even regeneration of the settlement (see Tainter 2006).

The current population living around Great Zimbabwe, which is between 5000 and 10,000 inhabitants, relies entirely on water from the springs all situated within a 5 kilometer radius of the site. It is dispersed all over the granite landscape, the only clustering existing at two places, one a tertiary institution to the south and the other a "growth point" – a term synonymous with emerging urban or rural centers in Zimbabwe. This dispersal is critical since settlement growth and expansion do impair the natural functions performed by watersheds. The growth of Great Zimbabwe must have factored this into account, since not all parts of the granite landscape are suitable for settlement. Some parts of the landscape such as streams and valleys to be managed differently in response to increases in human-induced environmental pressure. This decoupling was necessary to ensure conservation of vital resources in the landscape and allowed for managed population growth. It remains to be demonstrated how other human activity may have offset this.

Recent research has focused on local narratives around water resources within the

Great Zimbabwe, 1100–1600 AD, Rise, Development, and Demise of, Fig. 4 Some of the reservoirs used by the inhabitants of Great Zimbabwe to store water. (Photo by the author)

Great Zimbabwe and broader landscape (Pikirayi 2019). It came out of the realization that archaeologists struggle understanding the demise of Great Zimbabwe because of poor appreciation of local and regional histories of the southern Zimbabwe plateau, post-fifteenth century. Listening to some of these extant histories and living narratives is key to understanding developments around Great Zimbabwe from the sixteenth century onwards. Focus on Boroma, a toponym east of Great Zimbabwe, the study invokes sixteenth-century Portuguese accounts which mention "Burrom" (Boroma), who is presented as a prince in charge of a "fortress" whose location coincides with Great Zimbabwe. Local narratives and histories as well as documented written sources collected from villagers living around Chizhou Hill some 100 km north of Great Zimbabwe connect the settlements there to the resettlement of the area by migrants from the Mutapa State in northern Zimbabwe. The Mutapa State (1450–1900 AD) is regarded as the successor of Great Zimbabwe (Pikirayi 1993). These landscape dynamics attest to a complex process on the demise of Great Zimbabwe and its culture from the sixteenth to the nineteenth centuries

Sustainability is about living within the means of our natural systems and ensuring that human lifestyles do not harm society and culture. At Great Zimbabwe, it must be viewed in human terms, encompassing the potential for long-term maintenance of well-being, with a bearing on the environment, the economy, politics, and culture. The question is whether there was anything around the site which could have caused negative impact on the resident population. Sustainability is located at the confluence of society, the physical environment and economy. For sustainability to occur, society and economy must be equitable; the relationship between society and environment must be bearable, while economy and environment must be viable (Adams 2006). It must be measured to determine risk, societal resilience, and vulnerability.

There is a link between settlements of this magnitude with a presumably large residential population and aspects of sustainability, with the general assertion that higher-density settlements are more sustainable than low-density cities. However, this remains a contested area of planning theory, and there is need to consider the correlation between energy consumption and overall urban density of a given settlement, i.e., the lower the density, the more energy consumed (Newman and Kenworthy 1999). Thus, can one use sustainable urbanism – the application of sustainability and resilient principles – to the design planning, and functioning of ancient places such as Great Zimbabwe? We need to consider a number of options: (a) the total floor area of buildings divided by land area they are built on; (b) residential density, which is the number of dwelling units in any given area; or (c) population density (the number of people in any given area).

Despite many years of archaeological fieldwork (as is the case with Great Zimbabwe), settlements with a dispersed occupation are hard to recognize. Fletcher pointed out that assessing how the community dealt with scarce resources such as salt and water becomes very difficult when a 4–5 km ^{2}, low-density occupation is being considered rather than a compact 50–70 hectare settlement. According to Fletcher (1993) resource supply cannot in general be proposed as a factor directly affecting settlement area, as it is regionally specific. It is the absolute number of very large settlements in a region which is a function of resource supply. Resource constraint apparently delimits the number of large community aggregates which a region can support and therefore the probability of a very large case arising. Thus regardless of what resources communities command, the growth of their settlements is constrained by the limits to manage the flow of information and services within the settlement. This is universal.

How could the management of Great Zimbabwe's environment have impacted on its growth as a settlement? The micro-catchments within the Great Zimbabwe landscape, and in many cases the variable slope, also had a bearing on the low-density settlement experienced even to this day. A rise in population within this may have generated impervious cover due to vegetation

clearance, which in turn, impacted on water quality. Great Zimbabwe's hilly location and surroundings point a constricted catchment and highly impaired micro-watersheds due to intense construction activity, especially towards and within the core of the settlement (on vegetation clearance and increased imperviousness, see Butler and Davies 2000).

Current studies on water suggest that dispersed, low-density developments can exacerbate nonpoint source pollutant loadings by consuming absorbent open space and increasing impervious surface area relative to compact development (Richards et al. 2003). Thus there is a relationship between water quality and growth patterns. In the face of drought and aridity, communities are increasingly concerned about managing their watersheds to maintain hydrologic integrity and water quality. It is the most valuable asset of any settlement. Water pollution can be ascribed either point source (e.g. industrial discharge) or non-point source (which can result, say in increased sedimentation). Great Zimbabwe's water quality was largely point source, as some of this was generated from urban runoff. Water quality may have been compromised by increased nutrients, metals, hydrocarbons, bacteria, and other constituents.

How did the authorities at Great Zimbabwe manage the impacts of development on water availability and quality? Was a low-density footprint bad for Great Zimbabwe's water availability? What was the impact of commoner housing on water quality? There are no indications that low-density development is better for watershed quality because it limits impervious cover at the site level. High-density development is better for watershed water quality because overall it disturbs less land to accommodate the similar number of people and leaves more land available to serve critical ecological functions (Richards et al. 2003, pp. 345–346).

Another important point to consider for Great Zimbabwe is water withdrawal by its increasing population. How much did this alter the water quality, and the amount contained in the aquifers, and how sustainable was this, modelled on a population of more than 2000 people? By the peak of Great Zimbabwe, what could have been the city's water demand, and how was this demand managed?

Cross-References

- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective
- ▶ Zimbabwe's World Heritage Sites
- ▶ Zimbabwe's World Heritage Sites

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References

Adams, W.M. 2006. The future of sustainability: rethinking environment and development of the twenty-first century. *Report of the IUCN Renowned Thinkers Meeting*, 29–31 January 2006.

Beach, D.N., M.F.C. Bourdillon, J. Denbow, M. Hall, P. Lane, I. Pikirayi, G. Pwiti, and T.N. Huffman. 1997. Review feature on *Snakes and Crocodiles: Power and symbolism in ancient Zimbabwe* by T. N. Huffman. *The South African Archaeological Bulletin* 52 (166): 125–143.

Beach, D.N., M.F.C. Bourdillon, J. Denbow, G. Liesegang, J.N. Loubser, I. Pikirayi, D. Schoenbrun, R. Soper, and A.B. Stahl. 1998. Cognitive archaeology and imaginary history at great Zimbabwe – Comments and reply. *Current Anthropology* 1: 47–72.

Bent, J.T. 1893a. The ruins in Mashonaland. *Geographical Journal* 2: 438–441.

Bent, J.T. 1893b. On the finds at the great Zimbabwe ruins (with a view to elucidating the origin of the race that built them). *Journal of the Royal Anthropological Institute* 22: 124–136.

Bent, J.T. 1896. *The ruined cities of Mashonaland*. London: Spottiswoode.

Burke, E.D., ed. 1969. *The journals of Carl Mauch*. Salisbury: National Archives of Rhodesia.

Butler, D., and J.W. Davies. 2000. *Urban drainage*. London: Spies.

Caton-Thompson, G. 1931. *The Zimbabwe culture: Ruins and reactions*. Oxford: Clarendon Press.

Chipunza, K.T. 1993. *A diachronic analysis of the standing structures of the Hill Complex at Great Zimbabwe. Studies in African archaeology 8*. Uppsala: Societa Archaeologica Uppsaliensis.

Chirikure, S., and I. Pikirayi. 2008. Inside and outside the dry stone walls: Revisiting the material culture of great Zimbabwe. *Antiquity* 82: 1–18.

Chirikure, S., M. Manyanga, M. Pollard, and I. Pikirayi. 2013. New pathways of sociopolitical complexity in southern Africa. *African Archaeological Review* 30: 339–366.

Chirikure, S., T. Moultrie, F. Bandama, C. Dandara, and M. Manyanga. 2017. What was the population of great Zimbabwe (CE1000 – 1800)? *PLoS One* 12 (6): e0178335. https://doi.org/10.1371/journal.pone.0178335.

Collett, D.P., A.D. Vines, and E.G. Hughes. 1992. The chronology of the valley enclosures: Implications for the interpretation of great Zimbabwe. *African Archaeological Review* 10: 139–161.

Fletcher, R.J. 1981. People and space. In *Pattern of the past*, ed. I. Hodder, G.L. Isaac, and N. Hammond, 97–128. Cambridge: Cambridge University Press.

Fletcher, R.J. 1986. Settlement archaeology: Worldwide comparisons. *World Archaeology* 18: 59–83.

Fletcher, R.J. 1993. Settlement area and communication in African towns and cities. In *The Archaeology of Africa: Food, metals and towns. One world archaeology 20*, ed. T. Shaw, P.J.J. Sinclair, B. Andah, and A. Okpoko, 732–749. London/New York: Routledge. (+ references).

Garlake, P.S. 1970. Rhodesian ruins–a preliminary assessment of their styles and chronology. *Journal of African History* 11 (4): 495–513.

Garlake, P.S. 1973. *Great Zimbabwe*. London: Thames and Hudson.

Garlake, P.S. 1978. Pastoralism and Zimbabwe. *Journal of African History* 19 (4): 479–493.

Hall, R.N. 1905. *Great Zimbabwe*. London: Methuen.

Hall, R.N. 1909. *Prehistoric Rhodesia*. London: Fisher T. Unwin.

Hall, R.N., and W.G. Neal. 1902 (2nd edition, 1904). *The ancient ruins of Rhodesia*. London: Methuen.

Hannaford, M., G.R. Bigg, J.M. Jones, M. Staub, and I. Phimister. 2014. Climate variability and societal dynamics in pre-colonial southern African history (AD 900–1840): A synthesis and critique. *Environment and History* 20 (3): 411–445.

Holmgren, K., and H. Öberg. 2006. Climate change in southern and eastern Africa during the past millennium and its implications for societal development. *Environment, Development and Sustainability* 8: 185–195.

Holmgren, K., J.A. Lee-Thorp, G.R. Cooper, K. Lundblad, T.C. Partridge, L. Scott, R. Sithaldeen, A.S. Talma, and P.D. Tyson. 2003. Persistent millennial-scale climatic variability over the past 25,000 years in southern Africa. *Quaternary Science Reviews* 22: 2311–2326.

Huffman, T.N. 1972. Rise and fall of Zimbabwe. *Journal of African History* 13 (3): 353–366.

Huffman, T.N. 1977. Zimbabwe: Southern Africa's first town. *Rhodesian Prehistory* 7: 9–14.

Huffman, T.N. 1984. Expressive space in the Zimbabwe culture. *Man* 19: 593–612.

Huffman, T.N. 1985. The great enclosure and Domba. *Man* 20: 543–545.

Huffman, T.N. 1996. *Snakes and crocodiles: Power and symbolism in ancient Zimbabwe*. Johannesburg: Witwatersrand University Press.

Huffman, T.N. 2007. *Handbook to the Iron Age: The archaeology of pre-colonial farming societies in southern Africa*. Scottsville: University of KwaZulu-Natal Press.

Huffman, T.N. 2008. Climate change during the Iron Age in the Shashe-Limpopo Basin, southern Africa. *Journal of Archaeological Science* 35: 2032–2047.

Huffman, T.N. 2009a. A cultural proxy for drought: Ritual burning in the Iron Age of southern Africa. *Journal of Archaeological Science* 36: 991–1005.

Huffman, T.N. 2009b. Mapungubwe and great Zimbabwe: The origin and spread of social complexity in southern Africa. *Journal of Anthropological Archaeology* 28: 37–54.

Huffman, T.N. 2010a. Intensive El Niño and the Iron Age of South-Eastern Africa. *Journal of Archaeological Science* 27: 2572–2586.

Huffman, T.N. 2010b. State formation in southern Africa: A reply to Kim and Kusimba. *African Archaeological Review* 27: 1–11.

Huffman, T.N., and J.C. Vogel. 1991. The chronology of great Zimbabwe. *South African Archaeological Bulletin* 46: 61–70.

Kim, N.C., and C.M. Kusimba. 2008. Pathways to social complexity and state formation in the southern Zambezian region. *African Archaeological Review* 21: 131–152.

Long, Y., P.K. Baran, and R. Moore. 2007. The role of space syntax in spatial cognition: evidence from urban China. In *Proceedings of the 6th International Space Syntax Symposium*, Istanbul, paper 129: 1–6.

Manyanga, M., I. Pikirayi, and S. Chirikure. 2010. Conceptualising the urban mind in Pre-European Southern Africa: Rethinking Mapungubwe and Great Zimbabwe. In *The Urban Mind: Cultural and Environmental Dynamics*. Studies in Global Archaeology 15, ed. P.J.J Sinclair, G. Nordquist, F. Herschend & C. Isendahl, 573–590. Uppsala University/African and Comparative Archaeology, Department of Archaeology and Ancient History.

Mennell, F.P. 1902. The Zimbabwe ruins, near Victoria, southern Rhodesia. *Proceedings of the Rhodesia Scientific Association* 3: 69–70.

Newman, P., and J. Kenworthy. 1999. *Cities and sustainability: Overcoming automobile dependence*. Washington, D. C: Island Press.

Petermann, A., ed. 1874. Karl Mauch's reisen im inneren von Sud-Africa. *Petermann's Mitteilungen, Erganzung* 8 (37): 1873–1874.

Phimister, I.R. 1974. Ancient mining near great Zimbabwe. *Journal of the South African Institute of Mining and Metallurgy* 74: 233–237.

Phimister, I.R. 1976. Precolonial gold mining in southern Zambesia: A reassessment. *African Social Research* 21: 1–30.

Pikirayi, I. 1993. *The archaeological identity of the Mutapa state: Towards an historical archaeology of northern Zimbabwe*. Uppsala: Societas Archaeologica Upsaliensis.

Pikirayi, I. 2001a. The physical environment and the landscapes of great Zimbabwe culture states. In *People, contacts and the environments in the African Past. Studies in the African Past 1*, ed. F. Chami, G. Pwiti, and C. Radimilahy, 129–150. Dar es Salaam: Dar es Salaam University Press.

Pikirayi, I. 2001b. *The Zimbabwe culture: Origins and decline of southern Zambezian states*. Walnut Creek: Altamira Press.

Pikirayi, I. 2003. Shifting patterns of trade in the western Indian Ocean zone: Northern Zimbabwe, 1500–1750 AD. In *Climate change, trade and modes of production in Sub-Saharan Africa. Studies in the African past 3*, ed. F. Chami, G. Pwiti, and C. Radimilahy, 129–154. Dar es Salaam: Dar es Salaam University Press Ltd.

Pikirayi, I. 2006. The demise of great Zimbabwe, AD 1420–1550: An environmental re-appraisal. In *Cities in the World, 1500–2000. The society for post-medieval archaeology monograph 3*, ed. A. Green and R. Leech, 31–47. Leeds: Maney Publishing.

Pikirayi, I. 2013a. Great Zimbabwe in historical archaeology: Reconceptualising decline, abandonment, and reoccupation of an ancient polity, A.D. 1450–1900. *Historical Archaeology* 47 (1): 26–37.

Pikirayi, I. 2013b. The Zimbabwe culture and its neighbours: Origins, development, and consequences of social complexity in southern Africa. In *The Oxford handbook of African archaeology*, ed. P. Mitchell and P. Lane, 915–927. Oxford: Oxford University Press.

Pikirayi, I. 2013c. Stone architecture and the development of power in the Zimbabwe tradition AD 1270–1830. *Azania* 48 (2): 282–300.

Pikirayi, I. 2019. Local narratives, regional histories and the demise of great Zimbabwe. In *Archaeologies of listening*, ed. P. Schmidt and A.B. Kehoe, 131–153. Gainesville: University Press of Florida.

Pikirayi, I., and S. Chirikure. 2011. Debating great Zimbabwe. *Azania* 46 (2): 221–230.

Pikirayi, I., F. Sulas, T.T. Musindo, A. Chimwada, J. Chikumbirike, E. Mtetwa, B. Nxumalo, and E. Sagiya. 2016. Great Zimbabwe's water. *WIREs Water* 3: 195–210.

Randall-Maciver, D. 1906. *Medieval Rhodesia*. London: Macmillan and Co. Ltd.

Richards, L., G. Anderson, and M.K. Santore. 2003. *Protecting water resources with higher density developments*, 340–368. US Environmental Protection Agency.

Scoones, I.L., C. Chibudu, S. Chikura, P. Jeranyama, D. Machakaire, W. Machanja, B. Mavedzenge, B. Mombeshora, M. Mudhara, C. Mudziwo, F. Murimbarimba, and B. Zirereza. 1996. *Hazards and opportunities: Farming livelihoods in dryland Africa-lessons from Zimbabwe*. London/New Jersey: ZED Books.

Sinclair, P.J.J. 1984. Some aspects of the economic level of the Zimbabwe state. *Zimbabwea* 1: 48–53.

Sinclair, P.J.J. 1985. Excavations at Chivowa Hill, South Central Zimbabwe. *Working Papers in African Studies* 9. Uppsala University/Department of Cultural Anthropology.

Sinclair, P.J.J. 1987. *Space, time and social formation: A territorial approach to the archaeology and anthropology of Zimbabwe and Mozambique, c. 0–1700 AD*. Uppsala: Societas Archaeologica Upsaliensis.

Sinclair, P.J.J. 2012. Towards an archaeology of the future: The urban mind, energy regimes and long-term settlement system dynamics on the Zimbabwe plateau. In *The Urban mind: Cultural and environmental dynamics*. Studies in global archaeology 15, ed. P.J.J Sinclair, G. Nordquist, F. Herschend & C. Isendahl, 591–616. Uppsala University/African and Comparative Archaeology, Department of Archaeology and Ancient History.

Sinclair, P.J.J., I. Pikirayi, G. Pwiti, and R. Soper. 1993. Urban trajectories on the Zimbabwe plateau. In *The Archaeology of Africa: Food, metals and towns. One world archaeology 20*, ed. T. Shaw, P. Sinclair, B. Andah, and A. Okpoko, 705–731. London/New York: Routledge. (+ references).

Tainter, J.A. 2006. Social complexity and sustainability. *Ecological Complexity* 3: 91–103.

Theal, G.M. 1898–1903. *Records of South Eastern Africa (9 vols)*. Cape Town: Government of the Cape Colony.

Tyson, P.D., and J.A. Lindesay. 1992. The climate of the last 2000 years in southern Africa. *The Holocene* 2: 271–278.

Tyson, P.D., W. Karlén, K. Holmgren, and G.A. Heiss. 2000. The little ice age and medieval warming in South Africa. *South African Journal of Science* 96: 121–126.

Tyson, P.D., J. Lee-Thorp, K. Holmgren, and J.F. Thackeray. 2002. Changing gradients of climate change in southern Africa during the past millennium: Implications for population movements. *Climatic Change* 52: 129–135.

Walker, P.J. 1993. The architectural development of great Zimbabwe. *Azania* 28: 87–102.

White, F. 1903–4. Observations on recent discoveries at ancient ruins. *Proceedings of the Rhodesia Scientific Association* 4: 14–20.

White, F. 1905. The large elliptical ruin at great Zimbabwe. *Proceedings of the Rhodesia Scientific Association* 5: 11–20.

Whitty, A. 1957. The origins of the stone architecture of Zimbabwe. In *Third pan-African congress on prehistory*, ed. J.D. Clark and S. Cole, 366–377. London: Chatto and Windus.

Whitty, A. 1961. Architectural style at Zimbabwe. *Occasional Papers of the National Museums of Southern Rhodesia, Series A. Human Sciences* 3 (23A): 289–305.

Willoughby, W.C. 1893. *A narrative of further excavations at Zimbabwe*. London: George Philip & Son.

Greater Syria: Islamic Archaeology

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Introduction

Greater Syria (also Bilad al-Sham, meaning literally the "country of Syria") is one of the most extensively excavated regions of the Middle East. The wealth of excavations is complemented by numerous field surveys as well as published studies of the material culture, architecture, and environmental data gathered during these projects. Most phases of Islamic history are well represented from the seventh to the early twentieth century, as are the centuries preceding the Islamic conquest (the period known as Late Antiquity). Archaeological projects have targeted every type of settlement from cities and towns to villages and transient forms of occupation. There have also been excavations of built structures as diverse as industrial installations, water catchment systems, religious monuments, domestic architecture, palaces, and fortifications. While the geographical coverage of this archaeological work is somewhat uneven, the volume of published studies allows for the formation of sophisticated research questions concerning the political, socioeconomic, and cultural life of Greater Syria in the Islamic period.

Definition

The term Greater Syria refers to a large area encompassing the modern states of Syria, Lebanon, Jordan, Israel, and the Palestine Authority. In addition, the historical boundaries of Greater Syria take in the southeastern part of Anatolia (Turkey). Damascus, also sometimes known in Arabic as al-Sham, was the principal city from the seventh century onward and usually functioned as the administrative capital of Greater Syria. Other major urban centers of Greater Syria during the Islamic period are Aleppo, Jerusalem, Homs, Hama, and Beirut. Places such as Ramla, 'Akko (Acre), Karak, and Raqqa rose to political and economic prominence for more limited phases before the modern period.

The backbone of the premodern economy was the agricultural sector, and many parts of Greater Syria were densely occupied with villages (as they still are today). The heavily populated areas are mainly located in the fertile lands of the western side of Greater Syria and along the Euphrates river. Estimates of the population of rural areas also need to take into account the pastoralist groups (bedouin) who have coexisted with sedentary farmers for millennia. Bedouin and their flocks move in an annual cycle between semiarid steppe lands and areas of permanent agricultural cultivation. Prior to the widespread employment of modern irrigation techniques and chemical fertilizers, agriculture was largely determined by the climatic and geological factors. Most other parts of the region possess semiarid or arid climates, with an annual precipitation of about 300 mm being the minimum required to sustain dry farming techniques (principally for growing wheat and barley). The Dead Sea and Jordan valley and parts of the Syrian littoral experience a subtropical climate that allows for the cultivation of a wide variety of fruits as well as valuable crops such as sugar cane, dates, rice, and indigo. There is debate concerning the occurrence of periodic fluctuations in annual temperature and rainfall in the Late Antique and Islamic periods (Rubin 1989). Allowing for the possibility of cooler and wetter phases, it remains the case that adequate rainfall in the winter period (typically October to March) dictated whether crops would succeed. Periods of severe drought are recorded in written sources, though the archaeological evidence suggests that rural communities were usually able to recover from these and other types of short-term catastrophe (Johns 1995). Cisterns and other simple forms of water catchment are commonly employed in rural areas, often for sustaining flocks or sheep. Sophisticated systems of dams and canalization are relatively rare in Greater Syria, and some of those utilized during the Islamic period were actually constructed in earlier centuries.

The economy of Islamic Greater Syria was also reliant upon manufacturing and trade. The region was famed in Medieval Europe as a source for the finest crafts. The most lucrative crafts – particularly high-quality textiles, glass, decorated glazed ceramics, inlaid woodwork, and inlaid metalwork – tended to be located within or on the peripheries of urban centers. Less expensive objects were produced in towns and villages all over Greater Syria. Pastoralists also made items for sale including woolen rugs, leather, and food items such as dried yoghurt. The region contains some of the necessary resources for these activities, including plant and animal products, deposits of high-quality clay and sand, and limited reserves of copper and iron ore. Other raw materials had to be imported from neighboring areas. For instance, Greater Syria contains few forests, and wood needed for building, manufacturing, and as fuel for industrial activities might sometimes be brought from more densely wooded areas such as the Taurus mountains in southern Anatolia. Throughout the Islamic period Greater Syria benefited from a vibrant mercantile sector. The location of the region must in part account for this: Greater Syria connects to both the Mediterranean and Red Seas (the latter principally through the port of Ayla in southern Jordan), and land routes lead north to Anatolia, east to Iraq, south to the Arabian Peninsula, and southwest via the Sinai to Egypt.

Historical Background

Greater Syria was one of the first regions to be incorporated into the nascent Islamic state in the years following the death of the Prophet Muhammad in 632. Muhammad sent troops north in 629, but they were defeated near Mu'ta by a force led by a Ghassanid phylarch of the Byzantine empire. The decisive engagements in the conquest of Greater Syria were at Ajnadayn in 634 and at Yarmouk in 636; as a result of these victories, the Arabs were able to occupy the administrative capital of Damascus (634) and the symbolically significant city of Jerusalem (probably 637). In 638 the region of Jazira (i.e., between the Euphrates and Tigris rivers) was conquered. The Arab armies continued to fight against the Byzantines in northern Syria during the caliphate of 'Uthman (r. 644–656). In the early Islamic period, Greater Syria was subdivided into administrative regions (*jund*, pl. *ajnad*) comprising Dimashq (Damascus), Hims, Urdunn (Jordan), Filastin (Palestine), and Qinnasrin.

Mu'awiya ibn Abi Sufyan, the founder of the Umayyad dynasty (661–750), served as governor of Syria under 'Uthman and used the resources of the region in his struggle with caliph 'Ali (r. 656–661). When Mu'awiya assumed the caliphate (661–680), it was a natural move for him to transfer the capital of the empire to Damascus. Papyri excavated at Nessana in the Negev provides evidence for the operation of a bilingual (Greek and Arabic) bureaucracy during the reign of Mu'awiya (Hoyland 2006). With the exception of Marwan II (r. 744–750) who favored Harran in southern Anatolia, the Umayyad caliphs all employed Damascus as their seat of government. Due to the patronage of al-Walid I (r. 705–715), the city was equipped with a magnificent Congregational Mosque occupying the ancient *temenos*. The caliphal palace was located immediately south of the mosque. Damascus is also important as the mint for gold (*dinar*s) and silver (*dirham*s) coins, other provincial mints in Greater Syria only being permitted to strike copper (*fals*, pl. *fulus*) (Walmsley 2007: 59–64). Jerusalem too was the subject of extensive Umayyad patronage, particularly under 'Abd al-Malik (r. 685–705) and al-Walid I. The remodelling of the Temple Mount (Haram al-Sharif) included the rebuilding of the Aqsa Mosque and the construction of the Dome of the Rock, the Dome of the Chain, and a complex of palatial/administrative structures to the south and southwest of the enclosure walls (Creswell 1989: 18–42, 73–82, 94–6; Prag 2008: 101–241).

The Umayyads were toppled in 749–750 and the caliphate passed to a new dynasty, the Abbasids (749–1258). The eastward focus of the Abbasids led them, under the caliphate of al-Mansur (r. 754–775), to establish a new capital, Baghdad, on the banks of the Tigris in Iraq (constructed between 762 and 766). This crucial

shift in the center of power into the heartlands of the former Sassanian Empire (c. 224–651) was to have far-reaching consequences for the development of Islamic culture; for Greater Syria the effect was rather negative with the removal of the caliph and his court diminishing the political importance of Damascus and reducing economic activity throughout the region. The south of Greater Syria was also hit by a massive earthquake in 749, and evidence for the destruction of urban architecture is abundant in the archaeological record. It is important not to overemphasize the extent of the decline after c. 750, however; Abbasid caliphs continued to build new structures – most notably the cistern at Ramla (dated 789) – and renovate others, such as the Aqsa Mosque and Dome of the Rock. The Umayyad buildings south of the Temple Mount evidently remained in use through the early Abbasid period (Prag 2008: 157–8, 195–207). Even more important is the foundation of a new city, al-Rafiqa ("the companion"), about 600 m to the west of the town of Raqqa (known as Kallinikos prior to the Islamic conquest). This urban development also comprised a series of palaces and related structures to the north, and between 796 and 808 it served as the capital of the caliph Harun al-Rashid (r. 786–809) (Daiber and Becker 2004).

The authority of the Abbasid caliphs eroded in the latter part of the ninth century. This process led to the establishment of semiautonomous or fully independent dynasties in various parts of the Islamic world. The political map of Greater Syria in the tenth and eleventh centuries is complex with a combination of major empires – most importantly the Fatimids (909–1171) and the "Great Saljuqs" (1034–1057) – and local dynasties controlling the region. The First Crusade (1096–1099) created an entirely new dynamic with the establishment of a series of Frankish states in Greater Syria and southern Anatolia. These comprised the Kingdom of Jerusalem, the County of Tripoli, the Principality of Antioch, and the County of Edessa. The Franks brought with them a militant Christianity and a fierce determination to capture and hold territory in the "Holy Land." Analysis of surveys and excavations in Israel has also brought forward intriguing information about the Frankish (European) occupation of the countryside of the Kingdom of Jerusalem (Ellenblum 1998: 213–87).

The capture of Edessa in 1144 by Zangi, the *atabak* of Mosul (r. 1127–1146), marks a turning point in the political life of Islamic Greater Syria. This is the beginning of the Muslim "counter-Crusade" or Holy War (*jihad*) which was prosecuted with varying degrees of commitment by his son, Nur al-Din (r. 1146–1174), and the sultans of the Ayyubid (1171–1250 in Egypt and 1174–1260 in Syria) and Mamluk dynasties (1250–1517). Features of this period are a greater centralization of power, increased military expenditure, and a closer relationship between Egypt and Syria (with Cairo usually as the most important center of power). Nur al-Din unified most of Syria, while Salah al-Din (Saladin, r. 1171–1193) brought together Egypt and Greater Syria into one empire. This unity was broken during the Ayyubid confederacy that followed his death, but the Mamluk sultans, particularly Baybars (r. 1260–1277) and al-Nasir Muhammad (r. 1294–1295, 1299–1309, 1310–1341), sought to create an empire that would dominate the Levant. Salah al-Din scored a decisive victory over the forces of the Crusader states at Hattin in 1187 and went on to liberate Jerusalem from the Franks. The Mamluks ended the Crusader occupation of mainland Syria with the capture of ʻAkko in 1291. Even more important was the Mamluk defeat over the Mongol army at ʻAyn Jalut in Palestine in 1260. This battle halted the westward expansion of the Mongols through the Islamic world and established the Mamluks as defenders of Sunni Islam. While Mongol military activity doubtlessly brought short-term suffering for the inhabitants of Greater Syria, it is only among the urban communities along the Euphrates that the damage was more lasting; for instance, the pottery and glass industries of Raqqa and Balis cease around this time, and the towns themselves are abandoned.

In contrast to the instability of the later Ayyubid period, the Mamluk period from Baybars to the death of al-Nasir Muhammad in 1341 was one of considerable prosperity for Greater Syria. There was extensive investment in military architecture and in the transport and communications

infrastructure of the region. The relative security offered by the Mamluk sultanate facilitated trade, industrial activity, and investment in agriculture, especially valuable crops such as sugar cane (see below). Surveys conducted in Jordan and Israel provide plausible evidence that settlement numbers reached a peak in the thirteenth and fourteenth centuries. While locally produced handmade pottery predominates (Johns 1998), this phase is also characterized by the presence of glass and high-quality ceramics in many villages. A similar picture can be drawn from excavations in urban sites and ports in Greater Syria; in addition to Syrian luxury items, one sometimes also encounters exotic imports from Italy, Spain, or China.

The arrival of the Black Death in Syria in 1348 certainly had a huge impact upon the urban and rural communities of the region. Depopulation combined with a failure to invest in new technology affected the economic health of Greater Syria. Damascus also suffered during the occupation by Timur Lenk (Tamerlane, r. 1370–1405), probably losing many of its skilled artisans at this time. Evidence of destruction by Timur is also apparent in the excavations of the citadel in Hama, though the ceramic record indicates that the site was partially reoccupied in the late Mamluk and early Ottoman periods (Milwright 2000: 192). Judging from anecdotal evidence in contemporary written sources, the Mamluk authorities of fifteenth- and early sixteenth-century Greater Syria struggled to maintain security.

The Ottomans controlled Greater Syria between 1516 and 1918. Greater Syria was not one of the most profitable areas of the Ottoman Empire, and there is evidence for gradual decline in many aspects of the economy, particularly between the later seventeenth and the early nineteenth century. Ottoman authority in southern Greater Syria was also challenged in the first half of the nineteenth century by the expansionist policies of Muhammad ʻAli (d. 1849), ruler of Egypt. One area of significant Ottoman state investment from the sixteenth to the eighteenth century was in the route of the annual *hajj* through Greater Syria and northwestern Arabia. The major investment by the state was in the erection of a line of forts – each garrisoned with troops – and the construction of related features such as cisterns and bridges (Petersen in MacDonald et al. 2001: 685–91).

The Ottoman authorities demonstrated their continued commitment to the patronage of the *hajj* with the construction of the Hijaz railway from Istanbul to Medina (1900–1908). The military value of the Hijaz railway was recognized by all sides during World War I, and the southern section of this vital route was the subject of repeated attacks during the Arab Revolt (1916–1918). Following the expulsion of the Ottoman army in 1918, Greater Syria was placed under mandate by the League of Nations, with Britain controlling the southern part (Palestine and Transjordan) and France the northern part (Syria and Lebanon). The modern nation states of Syria, Jordan, Israel, and Lebanon emerged after the end of World War II.

Key Issues/Current Debates

A particularly fertile area of study is the period of transition from Byzantine rule to Islam. Broadly, the issues revolve around the degree to which the material record of the first phase of Islamic rule (from the conquests of the 630s to the mid-eighth century) manifests continuity with earlier centuries. If there were radical changes during this period, what were they and how did they affect the future development of Islamic culture in Greater Syria and elsewhere in the Middle East? These questions call for a comparative evaluation of Late Antique and early Islamic Greater Syria that takes into account the material culture of both urban and rural areas. Starting with the towns and cities, there has been considerable debate concerning the timing and nature of the evolution from the "Classical" city (Greek: *polis*) to the archetypal "Islamic" city (Arabic: *madina*). Consistent features of this evolution are the encroachment upon public spaces such as the forum and the wide colonnaded street as well as the disappearance of key institutions such as theaters, temples, and nymphaea (Kennedy 1985). In addition, most Late Antique/early Islamic towns occupy a smaller area than their Classical predecessors

(indicating a reduction in the population), and previously extramural activities, most importantly industries such as ceramic manufacture, start to be located within urban areas. In some cases pottery workshops were set up within abandoned theaters in the Late Antique and early Islamic periods.

It is now well understood that these processes predate the arrival of Islam and that in the early seventh century only remnants of Classical urban planning remained within most towns and cities of Greater Syria. The Christianization of the region from the fourth century eradicated the pagan temples and theaters (this was mirrored by a massive expansion in church building with single towns such as Jarash/Gerasa in Jordan boasting over 20 places of worship). Private building can also be detected in the colonnaded streets and other public areas, particularly from the sixth century onward. It has been persuasively argued that these adaptations reflect both a reduction in the power of local officials to control the public spaces and the expansion of mercantile activity within urban areas. The replacement of wheeled transport with pack animals (particularly camels) also made the wide, straight urban streets rather irrelevant.

Recent archaeological research has provided a nuanced picture of these changes in the urban fabric of Greater Syria during the transition from Byzantine to early Islamic rule (Magness 2003: 193–214; Walmsley 2007: 71–112; Avni 2011). Change was far from uniform across the region; for instance, there is evidence for the maintenance of colonnaded streets and other aspects of Classical urban planning in some towns in Palestine and Jordan through the sixth and early seventh centuries. Furthermore, the arrival of Islam did not result in a wholesale abandonment of these principles. The early eighth-century settlement of ʻAnjar is striking for its orthogonally arranged streets and orderly arrangement of space, and it seems likely that Ramla and other new Muslim cities (*misr* pl. *amsar*) of this time adopted similar principles. Within existing towns one encounters numerous examples of interventions by caliphs and other members of the Umayyad elite, ranging from new markets to mosques and administrative structures. Good examples of Umayyad architectural patronage have been identified at Beth Shean/Baysan (Scythopolis), Arsuf, Palmyra, and Jarash. The mosque at Jarash is notable for the way in which it is integrated into the street plan, despite its orientation being different from that of the main street (Walmsley 2007: 84–7). Archaeology is increasingly demonstrating that trade and industry continued to thrive in Greater Syria after the fall of the Umayyad caliphate; even in towns affected by the 749 earthquake, one encounters evidence for relatively ambitious phases of rebuilding.

While scholars in the early twentieth century had posited a reduction in the rural population in Greater Syria during the sixth and seventh centuries and virtual abandonment of some regions (most famously the "Dead Cities" of northern Syria), this picture is now subject to considerable revision. Reevaluation of occupation phases evidences continuous settlement into the eighth or ninth centuries. In the case of the Negev, this picture of rural prosperity under early Islamic rule is confirmed both by settlement patterns and the archive of papyri recovered from the town of Nessana (Magness 2003: 130–94). Umayyad patrons also invested in the countryside through the creation of country estates (*qasr*, pl. *qusur*), particularly in the more marginal lands of Jordan and Syria. While the *qusur* (sometimes known rather misleadingly as "desert castles") clearly had a role as sites of private entertainment for the Umayyad elite, more recent investigations have focused upon their placement along the major arteries of trade and communication and the promotion of agriculture in the surrounding areas. Links to the architectural patronage of the Ghassanid dynasty in the fifth and sixth centuries are suggested in the locations chosen for many of the Umayyad *qusur*. Dams, canalization, and extensive retaining walls have been found around several of the *qusur*; existing hydraulic structures were obviously brought into use, but some of what remains can probably be attributed to Umayyad patrons (Genequand 2006).

The most significant phase of activity in the Euphrates region dates from the last quarter of the eighth into the ninth century. The largest urban project was the walled city of Rafiqa (from 771). The construction techniques (principally mud

brick and baked brick), the use of carved stucco decoration, and the plans of the fortifications, palatial complexes, and mosques all suggest comparisons with the Iraqi cities of Baghdad (from 762) and Samarra (from 836) (Daiber and Becker 2004: 59–134). The presence of underground canals (*qanat*) in the vicinity of Raqqa-Rafiqa is a further indication of the eastward orientation of this Abbasid enterprise in Syria. Surveys of the irrigation systems of the Middle Euphrates and the Balikh and Khabur Rivers have demonstrated an upsurge in canal construction in this phase; presumably the expansion of irrigated agriculture was a response to the demands created by the huge urban populations of Raqqa-Rafiqa and Baghdad (Berthier 2001).

Considerable attention has been paid to the industrial sectors of the region, particularly the establishment of pottery- and glass-making facilities to the north and northeast of the existing settlement of Raqqa (Heidemann 2006). Analysis of the broken glass and glass waste indicates that artisans adapted their techniques (particularly the replacement of Egyptian natron with ashes made from locally abundant plants as the major fluxing agent), probably in response to difficulties in obtaining imported materials (Henderson 1999). Pottery production in the late eighth and early ninth century was more conservative, with potters concentrating upon the manufacture of utilitarian unglazed vessels and other items such as drainage pipes and roof tiles. Glazed ceramics were produced in very limited numbers in the early Abbasid phase, with luxury pottery (such as blue and white and luster-painted wares) being imported from Basra and other production centers in Iraq (Miglus 1999; Mason 2004: 92–4).

Raqqa was just one of the production centers for luster-painted and underglaze-painted stonepaste (fritware) wares in Greater Syria between the late eleventh and the fifteenth century. Excavations have identified evidence of production at sites including Damascus, Aleppo, Balis, Qal‘at Ja‘bar, and Raqqa, while others such as the “Tell Minis” (located near Ma‘arrat al-Nu‘man) group have less secure provenance. The understanding of the evolution of these centers of production has been further refined through petrographic analysis of thin sections of ceramic bodies and other forms of scientific analysis of glazes. It is now possible to establish a reasonably secure chronology with “Tell Minis” forming the transition between the techniques and styles of Fatimid period Cairo and the products of Syrian centers such as Raqqa (Mason 2004: 91–120).

Jordan and Israel have been the subject of extensive survey work, and these data allow researchers to plot the spatial variations and temporal fluctuations in rural settlement patterns. In many areas the ceramic record indicates an upsurge in sedentary occupation in the twelfth to fourteenth centuries (i.e., associated with the Crusader, Ayyubid, and early Mamluk periods). According to this evidence, settlement levels reduce during the latter part of the fourteenth century, and a process of decline continues unabated in areas such as Jordan until the end of the nineteenth century. One aspect of this process is perhaps a move from sedentary to pastoralist modes of occupation. While the relative prosperity of the twelfth- to fourteenth-century phase remains secure, the extent and nature of the later “decline” has been questioned. Much of the ceramic evidence in regions such as Jordan comprises handmade pottery, which has proven very difficult to date with accuracy. Furthermore, Ottoman cadastral records (*daftar*s) of the sixteenth century suggest continued productivity and sedentary occupation in rural areas (Johns 1995; Walker 2004).

The production of sugar and molasses was one of the most economically significant activities in Greater Syria between the twelfth and the fifteenth century, and numerous processing sites have been identified in the Jordan valley, around the banks of the Dead Sea, and in the region of ‘Akko. The processing of sugar was expensive requiring the construction and maintenance of the installations themselves, the manufacture of copper boiling vats and ceramic vessels (molasses jars and conical sugar pots), and the provision of labor, fuel, and water. Most of the sugar mills of Greater Syria probably ceased to operate during the fifteenth century largely because they were unable to compete with cheaper sugar imported from Cyprus. Wadi Faynan, located south of the Dead Sea on

the eastern side of the Wadi ‘Araba, has provided evidence for the revival of copper smelting in the thirteenth century (Kind et al. 2005).

The Ottoman period in Greater Syria has often been characterized as one of economic and cultural decline. This picture can now be revised in many respects; while it is true that the traditional crafts found it difficult to compete against industrially manufactured products from Europe (particularly after the late eighteenth century), the archaeological record suggests considerable economic activity with the inhabitants of Greater Syria consuming a wide range of locally made and imported goods. Notably successful in the confrontation with foreign imports were the ceramic producers of Gaza and Rashaya al-Fukhkhar. Examples of the gray-bodied (reduction-fired) “Gaza wares” are encountered on numerous sites in the south of Greater Syria. Pottery can also be used to track the emergence and spread of popular pastimes of the Ottoman period, tobacco smoking and drinking of coffee (and, from the nineteenth century onward, tea). The former is evident principally in the ceramic pipe bowls of the traditional *chibouk* pipe; the ubiquity of these artifacts is allowing for the formation of increasingly accurate typologies. A vital component of coffee drinking was the small glazed ceramic cup. Syrian manufacturers satisfied some of the demand for these decorative items, but it is also clear that they were also imported from Turkey, Europe, and Southeast Asia (Milwright 2000; Walker 2009). The issues of diet and disease in the Ottoman period have been investigated in paleopathological studies (e.g., Smith and Horwitz 2009).

International Perspectives

The study of the material culture of Greater Syria requires a constant awareness of the integration of the region into international networks of mercantile exchange and cultural interaction. Excavations of major ports such as Ayla on the Red Sea and Beirut and ‘Akko on the Mediterranean provide excellent evidence of changing patterns of long-distance trade. Chinese ceramics first make their appearance on sites of the early Abbasid period, such as Raqqa-Rafiqa, and by the thirteenth century enjoy a relatively widespread distribution across Greater Syria. The Ayyubid and Mamluk periods are particularly notable for the diversity of the imported ceramics, particularly on urban sites. These imports include slip-incised (sgraffito) wares from Italy, Cyprus, and the Aegean region, tin-glazed maiolica from Italy, luster wares from Spain, blue and white porcelain and celadon (“green ware”) from Southeast Asia, and glazed stonepaste from Iran. During the Ottoman period one also encounters imported glazed pottery from Turkey (particularly from Iznik, Kütahya, and Çanakkale) and a range of decorated porcelains from China, Japan, Korea, Germany, France, and Britain.

There is evidence of international contact in many other aspects of the material culture of Greater Syria between the seventh and the twentieth century. In architecture there are numerous examples of building plans, decorative styles, or modes of construction entering from other regions. For instance, minarets in locations such as Raqqa, Balis, and Qal‘at Ja‘bar draw upon Persian prototypes. Greater Syria formed part of larger polities during the Ayyubid, Mamluk, and Ottoman periods, and this facilitated further cross-pollination of architectural forms and decorative features. The presence of these forms of artistic exchange in architecture also opens the possibility of identifying similar phenomena in many aspects of the archaeological record from portable arts to urban planning and agricultural practices.

Future Directions

It seems likely that the archaeological study of Greater Syria in the Islamic period will continue to build upon many of the themes outlined in the previous sections. The ability of archaeology to appreciate long-term processes also means that continued excavation will refine our knowledge of such questions as the evolution of urban spaces through the Islamic period and the fluctuations in rural settlement and modes of cultivation in different regions of Greater Syria. The Ottoman period is particularly rich in primary textual sources, and this can facilitate future collaborative projects between historians and archaeologists.

The potential of integrating textual sources – chronicles, geographical and topographical writing, charitable bequests (*waqfiyyas*), travellers' accounts, mercantile or consular archives, cadastral records, and so on – with archaeological data has been demonstrated in numerous case studies. Archaeological projects now tend to emphasize collaboration between a wide range of specialists, and the recent contributions by archaeobotanists, zooarchaeologists, physical anthropologists, and environmental archaeologists illustrate the ways in which we can ask new questions of the physical remains of past cultures in Greater Syria. Lastly, there is much scope for comparative perspectives in future study. Periods of transition in Greater Syria could fruitfully be compared with equivalent phases in other regions of the Mediterranean (cf. Hodges and Whitehouse 1983) and elsewhere. The impact of the Crusades upon the Middle East invites comparison with Crusades in other regions as well as with later phases of colonial occupation. The Ottoman period offers rich potential for comparative research, with recent research in areas such as Greece and the Balkans providing an opportunity to evaluate the divergent experiences of being a province within a larger Muslim empire.

Cross-References

- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Clay Pipes in Historical Archaeology
- ▶ Decapolis, Archaeology of
- ▶ Dura-Europos, Archaeology of
- ▶ Historical Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic and Crusader Archaeologies
- ▶ Islamic and Maritime Archaeologies
- ▶ Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of
- ▶ Military Activity in Islamic Archaeology
- ▶ Palmyra, Archaeology of
- ▶ Petra, Archaeology of
- ▶ Polis
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology
- ▶ Syrian Archaeological Heritage Management: "Dead Cities" and Living Communities

References

Avni, G. 2011. "From polis to madina" revisited – Urban change in Byzantine and early Islamic Syria. *Journal of the Royal Asiatic Society* 21 (3): 301–329.

Berthier, S., ed. 2001. *Peuplement rural et aménagements hydroagricole dans la moyenne vallée de l'Euphrat, fin VIIIe-XIX siècle: Région de Deir ez Zor-Abu Kemal, Syrie: Mission Mésopotamie syrienne, archéologie islamique, 1986–1989*. Damascus: Institut Français d'études arabes de Damas.

Creswell, K. 1989. *A short account of early Muslim architecture*. Aldershot: Scolar Press.

Daiber, V., and A. Becker. 2004. Raqqa III: Baudenkmäler und Paläste I. *Mainz am Rhein: Philipp von Zabern.*

Ellenblum, R. 1998. *Frankish rural settlement in the Latin Kingdom of Jerusalem*. Cambridge/New York: Cambridge University Press.

Genequand, D. 2006. Some thoughts on Qasr al-Hayr al-Gharbi, its dams, its monastery, and the Ghassanids. *Levant* 38: 63–83.

Heidemann, S. 2006. The history of the industrial and commercial area of 'Abbasid Al-Raqqa, called Al-Raqqa al-Muhtariqa. *Bulletin of the School of Oriental and African Studies* 69 (1): 33–52.

Henderson, J. 1999. Archaeological investigations of an Islamic industrial complex at Raqqa, Syria. *Damaszener Mitteilungen* 11: 243–265.

Hodges, R., and D. Whitehouse. 1983. *Mohammed, Charlemagne and the origins of Europe: Archaeology and the Pirenne thesis*. London: Duckworth.

Hoyland, R. 2006. New documentary texts and the early Islamic state. *Bulletin of the School of Oriental and African Studies* 69 (3): 395–416.

Johns, J. 1995. The Longue Durée: State and settlement strategies in southern Transjordan across the Islamic centuries. In *Village, steppe and state. The social origins of modern Jordan*, ed. E. Rogan and T. Tell, 1–31. London/ New York: British Academic Press.

Johns, J. 1998. The rise of Middle Islamic hand-made geometrically-painted ware in Greater Syria (11th–13th centuries A.D.). In *Colloque international d'archéologie islamique, IFAO, Le Caire, 3-7 février 1993*, Textes arabes et études islamiques 36, ed. R.-P. Gayraud, 65–93. Institut Français d'Archéologie Orientale du Caire: Cairo.

Kennedy, H. 1985. From polis to madina: urban change in late antique and early Islamic Syria. *Past and Present* 106: 3–27.

Kind, H.-D., K. Gilles, A. Hauptmann, and G. Weisgerber. 2005. Coins from Wadi Faynan, Jordan. *Levant* 37: 169–195.

MacDonald, B., R. Adams, and P. Bienkowski, eds. 2001. *The archaeology of Jordan*. Sheffield: Sheffield University Press.

Magness, J. 2003. *The archaeology of early Islamic settlement in Palestine*. Winona Lake: Eisenbrauns.

Mason, R.B. 2004. *Shine like the sun: Lustre-painted and associated pottery from the medieval Middle East*. Costa Mesa: Mazda.

G

Miglus, P., ed. 1999. *Die frühislamische Keramik von Tall Aswad (Ar-Raqqa I)*. Mainz: Philipp von Zabern.
Milwright, M. 2000. Pottery of Greater Syria in the Ottoman period: a review of the published archaeological evidence. *Levant* 32: 189–208.
Prag, K. 2008. *Excavations by K. M. Kenyon in Jerusalem, 1961–1967, volume 5: Discoveries in Hellenistic to Ottoman Jerusalem* (Levant Supplementary series 7). Oxford: Oxbow Books.
Rubin, R. 1989. The debate over climatic changes in the Negev, fourth-seventh centuries CE. *Palestine Exploration Quarterly* 121: 71–78.
Smith, P., and L. Horwitz. 2009. A synthetic approach to the study of diet, health and disease in an Ottoman period population from Palestine. *Al-Rafidan* 30: 78–106.
Walker, B. 2004. Mamluk investment in Transjordan: A "boom and bust" economy. *Mamluk Studies Review* 8 (2): 119–147.
Walker, B. (ed.) 2009. *Reflections of Empire: Archaeological and ethnographic studies of pottery in the Ottoman Levant* (Annual of the American Schools of Oriental Research). Winona Lake: Eisenbrauns.
Walmsley, A. 2007. *Early Islamic Syria, an archaeological assessment*. London: Duckworth.

Further Reading

Burns, R. 1999. *Monuments of Syria: A historical guide*. rev edn. London: I.B. Tauris.
Kennedy, H. (ed.) 2006. *Muslim military architecture in Greater Syria. From the coming of Islam to the Ottoman period* (History of Warfare 35). Leiden and Boston: E.J. Brill.
Milwright, M. 2010. *An introduction to Islamic archaeology* (Edinburgh New Islamic Surveys). Edinburgh: Edinburgh University Press.

Greece: Cultural Heritage Management

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Introduction

Greece is a country with very rich cultural heritage. From the prehistoric ages down to the present, Greek civilization has created monuments and artworks, which are outstanding landmarks and exceptional points of reference in human history. Greek art and architecture have inspired and highly influenced the Western world throughout the ages. The protection and preservation of this heritage has always been a priority for the Greek state since its independence in 1830. The legal framework for cultural issues offers guidelines for the protection and management of antiquities and cultural heritage in general.

Definition

The most recent legal framework is established in 2002 with Law 3028 (http://www.culture.gr/DocLib/g_1950.pdf), which protects monuments or cultural goods dating from prehistoric times until 1830. Certain categories, however, from more recent periods are also included, if they are important or have a specific cultural or historical significance. The management of Greek tangible and intangible heritage is administered and controlled by the state.

Efforts to protect remains of the past actually began before 1830 (Pantos 2000: 15–16), during the War of Independence, by the revolutionary Greek government. The first legal measures for the protection of antiquities in the modern Greek state were taken as early as 1833, and a year later, the first official law was published. The sensitivity and importance given to antiquities is apparent.

Since then, the legal framework has broadened its scope, and it is considered as one of the strictest and most extensive in the world. The Greek Constitution established in 1975 gives more power to the state, while it weakens private property for the benefit of the protection of antiquities and their environment. According to the Law, all movable finds and monuments are owned by the state, and all activities relating to them are controlled by the state Archaeological Service.

Inside the state boundaries protection covers antiquities on land or sea including marine zones, in which Greece has the right of jurisdiction according to international law. Greece seeks the protection of its antiquities outside its borders as well, in correspondence to the regulations of

international cultural law, irrespective of the time when they were removed.

Examples

For the better control of customs and the import of antiquities, Greece has signed bilateral agreements, protocols, and memoranda with countries such as Cyprus, France, Switzerland, China, Turkey, Peru, and the USA.

Greece gives also great importance to the repatriation of its cultural property and has internationally been very active in this field (Μπουτοπούλου et al. 2008). Repatriation of many cultural goods has been achieved in the last years. In several cases, a compromise solution was found, and in others, goods were returned on voluntary basis.

Greece and Italy have launched major campaigns for the restitution of cultural property and have even organized common exhibitions of returned antiquities under the title "Nostoi" with impressive objects repatriated from the J. Paul Getty Museum, the Shelby White collection, and others.

Since 1982, the Greek Ministry of Culture has officially requested the return of the Parthenon Marbles from the British Museum in London (Korka 2003, 2006). The request has been discussed at various international fora and organizations (Meyer 1977; Shaw 1979; Prunty 1984; Greenfield 1989; Walden 1996: 49–66; Renfrew 2000). This issue has world significance, because the Parthenon is considered the symbol of Western civilization and forms the logo of UNESCO. Greece undertook the construction of the New Acropolis Museum, which was inaugurated in 2009 next to the Acropolis in order to house all the Parthenon Marbles. Three museums (Heidelberg University Collections, Palermo Salinas Museum, and the Vatican) have supported this campaign by returning either permanently or on loan fragments of the Parthenon, which existed in their collections.

By 2005 there were twelve (12) national associations from around the world that supported the reunification of the Parthenon sculptures, whereas this number has increased to eighteen (18). Today, there are also 22 International Committees all over the world which support the reunification of the Parthenon Marbles in Athens.

In 2013 a process of mediation, facilitated by UNESCO, was undertaken for the Reunification of the Parthenon Sculptures. However the British Government and the British Museum have issued a formal response declining to participate in this process. The issue is pending on the agenda and is discussed by UNESCO at every meeting of the Intergovernmental Committee for promoting the return of cultural property to its countries of origin or its restitution in case of illicit appropriation (Hitchens 2008).

Key Issues

Propriety of antiquities belongs only to the state. The individual can only hold possession of them. The objects are inventoried and photographed, their provenance is checked, and a permit of legal possession is issued. This way a very important data base is accumulated with important antiquities, which benefit scholarship considerably. On the other hand, the individual is sensitized concerning the protection of cultural heritage. There is also strict control of the use of metal detectors.

The Archaeological Service of the Hellenic Ministry of Culture and Sports includes two General Directorates concerning the cultural heritage, one for antiquities and cultural heritage in general, including conservation, state museums, and folklore, and a second for restoration of monuments of all periods, photogrammetry, conservation of museums, and technical works and infrastructure in general. There are individual directorates and departments, as well, which coordinate regional services. These are the Ephorates of Antiquities on the one hand side and the Services of Modern Monuments and Technical Works on the other. The Archaeological Service also includes special regional services: for caves, underwater antiquities, and individual museums.

In addition, there are councils either regional or central, which examine issues of importance,

before which the citizens can present their requests and support their cases. Furthermore, there are special committees for the monitoring of the restoration of specific monuments or task forces, which are appointed for a specific project.

The Archaeological Receipts Fund for Sites and Expropriations, which is supervised by the Ministry of Culture and Sports, is in charge of publishing archaeological guide books, special editions, and annual periodicals, as well as for producing exact replicas of antiquities. The revenues from this fund support the work of the regional archaeological services.

The central services form the executive body, which plans, directs, approves, and monitors the work of the Ephorates and other services and secures their funding. A large part of the work of the Ephorates includes the supervision and control of modern technical or infrastructure works carried out in the environs (built or natural) of monuments. Monitoring takes place in every type of activity that could directly or even indirectly affect the archaeological sites, monuments, and places of historical interest. Most often, there is a demarcation of a broader area of protection, buffer zones, and specific land use. Excavations, conservation, restoration, rehabilitation of monuments, and their protection through shelters and other means, educational programs, and cultural events are controlled by the Archaeological Service, which examines the feasibility and extent of the intervention, quality of the work, scientific documentation and reversibility of the interventions, and guaranty of proper publication. The sensitization of the broader public is also important, and there is a lot of effort put in combining the needs of modern society with the benefits of a monument or site. There is always communication between the Archaeological Service and the competent authorities and social actors, especially concerning expropriations or compensation of the individual for the deprivation of use of immovable property for archaeological reasons. Expropriation takes place in recent years only when a group of monuments needs to be promoted and there is no other alternative for their preservation and enhancement or in case an extraordinary site is revealed. In the case of major public works, there is allocation of important funds for salvage excavations, conservation, preservation, storage, landscape design and promotion, and finally publication of the finds.

Among the activities undertaken abroad are archaeological missions and excavations in countries, where antiquities of Greek interest have been found. Control of the import, export, and transfer of cultural goods is strict in Greece and falls under the responsibility of the Directorate of the Management of the National Archive of Monuments, Documentation and Protection of Cultural Goods.

Because the Ministry of Culture places great emphasis on the fight against illegal excavations and the illicit traffic of antiquities, it has established the Department of Documentation, Illicit Trafficking, and Protection of Cultural Goods, which operates under the Directorate of the Management of the National Archive of Monuments, Documentation and Protection of Cultural Goods (http://www.culture.gr/el/ministry/SitePages/viewyphresia.aspx?iID=172). The general tasks of this Department is to deal with cases of theft and illegal commerce of artifact and antiquities, to keep the central departments informed about the current market prices of antiquities, to track the antiquities markets in Greece and abroad, and to inspect Auction' Houses abroad in order to localize stolen antiquities.

Issues concerning the private collectors and antique shops fall under the jurisdiction of the same Directorate and particular of the Department of Antique Shops and Private Archaeological Collections. In previous years, permits to form private collections were granted to possessors of antiquities of considerable number and scientific significance. Basic preconditions for acquiring a collector's permit were knowledge of the subject and the economic means to purchase important antiquities. A central idea, around which the creation of the collection evolved, was necessitated, as well as the unity of the collection. Collectors are obliged by law to declare their new acquisitions. Many of the earlier collectors have donated all or part of their collection to the state, and major public or semipublic museums were created.

Today provisions for the creation of a collection are very strict, as well as for its transfer or commercial disposition. The state always has first priority in acquiring objects from a collector or simple possessor of antiquities. Furthermore, the legislation stipulates that antiquities in the possession of any citizen, acquired through inheritance, purchase, or gift, must be declared to the abovementioned Department.

During the last years, Greece has been very active on the protection and promotion of intangible heritage. The competent Service in the Greek Ministry of Culture and Sports for all related issues is the Directorate of Modern Cultural Assets and Intangible Cultural Heritage. The UNESCO 2003 Convention for the Safeguarding of Intangible Heritage has offered a vitally important management tool for Greek authorities for the safeguarding and promotion of this particular aspect of our culture. Since 2013, Greece has made a significant progress in managing and promoting its intangible heritage according to the principles set by the abovementioned UNESCO Convention and has inscribed four elements on the Representative List of the Intangible Heritage of Humanity (Mediterranean diet, know-how of cultivating mastic on the island of Chios, Tinian marble craftsmanship, Momoeria-New Year's celebration in eight villages of Kozani, West Macedonia).

There are 18 foreign archaeological schools functioning in Greece, which carry out excavations and survey projects, either in collaboration with the Greek Service or on their own. They receive their permits under specific preconditions. They offer know-how; advanced technology; funds for expropriation of the land, on which they excavate; periodicals with annual publications and specialized libraries; as well as other benefits (Korka 2007). The foreign archaeological institutions in Greece function by decision of the Minister of Culture, after prior prescript of the Central Archaeological Council.

Greek university professors and other researchers also conduct excavations under the supervision of the service, which must control that all Greek and foreign excavators abide by the law and keep proper inventories in their storerooms along with digital photographs. Surveys and other nondestructive methods are encouraged, while excavation is conducted only when proven necessary.

This recent and innovative framework offers more flexible means and better possibilities for more immediate results. The targeted individual is also given motives to surrender antiquities and collaborate.

Greece has ratified almost all international cultural conventions and is signatory to most relevant instruments. Specifically, Greece has ratified the following conventions (Βουδούρη and Στρατή 1999: 1–92, 209–246, 391–422, 503–526):

- Hague Convention on the Protection of Cultural Goods in the Event of Armed Conflict (1954) and its two protocols 1954 and 1999 (Clément 1995: 133–150).
- UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (Paris 1970) (Askerud and Clément 1997).
- UNESCO Convention on the Protection of World Cultural and Natural Heritage (Paris 1972).
- European Convention on the Protection of Archaeological Heritage Revised (Valetta 1992).
- Convention on the Protection of Architectural Heritage (Granada 1985).
- UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (Rome 1995) (Siehr 1998: 617–689).
- Convention for the Safeguarding of Intangible Cultural Heritage (Paris 2003).

These conventions along with the application of international charters and recommendations are implemented by the Greek public administration and have enriched the existing legal framework giving it an international perspective and dimension.

Greece has inscribed 18 monuments and sites on the World Heritage list of UNESCO and 4 sites on the European Label catalogue. The law provides for the examination of every issue

concerning World Heritage monuments by the highest council in the Ministry (Korka 2004).

Furthermore, Greece has entered the European Union and has therefore incorporated EU directives in its legislation. The EEC Regulation 3911/92 concerning the export of cultural property is implemented in regard to customs issues, as it harmonizes export controls over cultural property outside the borders of the EU by establishing the procedure of granting an export certificate for these goods. Most important is the application of Directive 93/7/EEC of the Council on March 15, 1993, concerning the return of cultural goods unlawfully removed from the territory of a member state, the annex of which was modified by Directive 96/100/EC of the European Parliament and the Council on February 17, 1997 (Γραμματικάκη- Αλεξίου 2002: 274–299).

Greece participates in many international initiatives within the frame of Memoranda that has signed with many countries around the world. Among the joint projects undertaken in collaboration with the state parties is the organization of exhibitions in which Greek representative antiquities are included according to the thematic of each exhibition. The exhibitions "Greeks: from Agamemnon to Alexander the Great," hosted in USA and Canada, and "World of Emotions: Ancient Greece, 700BC-200AD," hosted in USA, are some of the most successful recent ones.

An exhibition on Egyptian culture and its influences on Greek and Roman civilization will also take place in 2018 at the Getty Center in Los Angeles, USA. The largest museums in the world will lend about 200 works for the exhibition "Egypt – Greece – Rome: Cultures in Contact," which deals with the relations that have developed between these three cultures, from the Late Bronze Age (1600–1100 BC) to the late Roman years, with a center of gravity in Egypt.

Based on intergovernmental memoranda, cross-cultural years have been established between Greece and other countries. 2016 was declared "Cross-cultural Year between Greece and Russia" and 2017 with China. Within this frame hundreds of events were organized each year in the fields of art, culture, sports, tourism, education, economy, agriculture, science, technology, etc. in order to further advance ties of friendship and cooperation between the two countries and to promote the cultural heritage of both.

Current Debates

In recent years, the ministry has focused on reorganizing and upgrading its museums. Most museums were site museums or in any case were continuously supplied with new material from the ongoing systematic or rescue excavations. A new tendency prevailed, however, and some museums became independent from the local Ephorate. The most advanced framework today is that of the New Acropolis Museum, which has an independent governing board appointed by the Minister of Culture (www.newacropolismuseum.gr). Management of museums has become more user-friendly to the public, and info-kiosks; educational programs; visitor facilities, especially for handicapped people; audio systems; and electronic entry machines are now available. Furthermore, many periodic exhibitions take place along with cultural events and educational programs, which bring the public closer to antiquities. Funding, in general, comes from the state and is boosted a lot with European development programs. There is a new law also encouraging sponsors.

An ongoing public consultation is in process in order to establish a specific accreditation procedure for museums according to the provisions set out by the Greek Archaeological Law (3028/2002). The whole idea is to obtain an effective system of control and evaluation of a museum carried out by a competent governmental body or a valid professional association of museums. Among the prerequisites that must be met in order for a museum to acquire the accreditation are the existence of an analytical collections inventory, the documentation of suitability and space adequacy and info on staffing, planning of actions, and the internal regulation.

The Archaeological Services are also updating the means of documenting and communicating knowledge by using modern technology. Within

this frame, the Ministry of Culture established the first organized, ongoing, and systematic digital registry of the country's immovable cultural property, called the "Hellenic Archaeological Cadastre." This project is an administrative tool that will be of great help to the services, saving human resources, but also an important scientific tool that will allow researchers to have clear and precise data about the cultural heritage of Greece.

Regarding the online information provided on issues of cultural heritage, there is an official website for the Ministry (www.yppo.gr) and for the Greek cultural heritage (http://followodysseus.culture.gr/en-us/home.aspx) which are continuously updated in order to provide to all viewers, experts or not, in an innovative and effective manner information about archaeological sites, museums and the collections, educational programs, art and festivals, and many other aspects of Greek cultural heritage.

In terms of managing cultural heritage, Greece has undertaken many initiatives in order to cope with the current economic conditions (Korka 2014) and to secure funds for the overall protection of its cultural heritage. Under this perspective, an effort is being made to improve the function of the authorities which are competent for economic affairs, the Archaeological Receipts Fund being the most important among them. The Fund is responsible for managing and distributing the resources stemming from ticket revenues and for the manufacture and promotion of cultural products. Despite the impact of the economic crisis which inevitable affects the function of the Fund, a coordinated plan is being implemented in order to reorganize its administrative and organizational structure thus securing the Fund's function and contribution to the protection of promotion of cultural heritage in the light of the new fiscal policy.

Future Directions

Greece participates in the UN, UNESCO, the Council of Europe, the UN Economic and Social Council, the EU instruments, and other international governmental and nongovernmental organizations with the goal to promote the protection of cultural heritage. Many exhibitions of Greek antiquities are circulated abroad in collaboration with major museums and cultural institutions all over the world. Through various initiatives and programs, the Greek Ministry of Culture and Sports wishes to enhance its heritage, strengthen its collaboration with cultural actors, and promote cultural and educational activities.

Greece acknowledges the role of culture for economic growth and sustainable development in accordance with the 2030 SDG Agenda. Large infrastructure technical projects have been or are implemented with the mobilization and cooperation of all stakeholders, public and private, domestic and international, as well as the strategic combination of all financial instruments and means. During the last decade, the Archaeological Service has undertaken extensive rescue excavations within the frame of major public works (road networks, metro works, etc.) as well as works to enhance and promote the important antiquities that have come to light. Throughout this experience, the Services of the Ministry of Culture have acquired the expertise and know-how for the implementation and management of such demanding projects.

Greece is playing an active role in programs and initiatives supported by the European Union and have participated successfully in nominations related to the European cultural heritage. Greek sites have been selected for their role in European History in both the European Heritage Label and the European Capitals of Culture.

On the occasion of celebrating 2018 as the European Cultural Heritage Year, Greece will host and organize a series of events and programs aiming in encouraging approaches to cultural heritage that are people-centered, inclusive, forward-looking, more integrated, sustainable, and cross-sectoral.

The scientific personnel of the ministry is open to exchanging expertise and collaborating with foreign colleagues. There is great concern about modern management problems such as cultural tourism, climate change, natural and human-provoked hazards, and sustainable development. At the time of writing, however, an economic crisis risks diminishing personnel, services,

projects, and cultural benefits, which had occurred due to great effort and years of dedication.

Cross-References

- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)
- ▶ International Council of Museums (ICOM)
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Parthenon (Elgin) Marbles: Case Study
- ▶ Repatriation: Overview
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions
- ▶ UNESCO's World Heritage List Process
- ▶ Uses of Heritage
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme
- ▶ World Monuments Fund (WMF)

References

Askerud, P., and E. Clément. 1997. *Preventing the illicit traffic in cultural property: A resource handbook for the implementation of the 1970 UNESCO convention*. Paris: UNESCO.

Βουδούρη, Δ., and Α. Στρατή. 1999. Η *Προστασία της Πολιτιστική ς Κληρονομιάς σε Διεθνές και Ευρωπαϊκό Επίπεδο* (Ινστιτούτο Συνταγματικών Ερευνών 3). Αθήνα, Κομοτηνή: Εκδόσεις Σάκκουλα.

Clément, E. 1995. Le réexamen de la convention de la Haye de 1954 pour la protection des biens culturels en cas de conflit armé. In *International legal issues arising under the United Nations Decade of International Law*, 133–150. The Hague: Martinus Nijhoff.

Γραμματικάκη-Αλεξίου, Α. 2002. *Διεθνή ς Διακίνηση Πολιτιστικών Αγαθών και Ιδιωτικό Δίκαιο*. Αθήνα, Θεσσαλονίκη: Εκδόσεις Σάκκουλα.

Greenfield, J. 1989. *The return of cultural treasures*. Cambridge: Cambridge University Press.

Hitchens, Ch. 2008. *The Parthenon Marbles: The case for reunification*. London/New York: Verso.

Korka, E., ed. 2003. *The reunification of the Parthenon sculptures*. Athens: Hellenic Ministry of Culture-Melina Merkouri Foundation.

Korka, E., ed. 2004. *Ε λλάδα - Προϊ στορικά και Κλασικά Μνημεί α Παγκό σμιας Πολιτιστική ς Κληρονομι άς*, δίγλωσση έκδοση σε ελληνικά και αγγλικά. Αθήνα: Υπουργείο Πολιτισμού- Εκδόσεις Καπόν.

Korka, E., ed. 2006. *The reunification of the Parthenon sculptures – a cultural imperative*. Athens: Hellenic Ministry of Culture.

Korka, E., ed. 2007. *Foreign archaeological schools in Greece, from the 19th to the 21st century*. Athens: Hellenic Ministry of Culture, Melissa Publishing House.

Korka, E., ed. 2014. *The protection of archaeological heritage in times of economic crisis from the proceedings of the regional conference "From Past Experience to New Approaches and Synergies: The Future of Protection Management for Archaeological Heritage in Times of Economic Crisis". New Acropolis Museum. 23–25 May 2012*. Organized by ICOMOS Hellenic and ICAHM. Cambridge Scholars Publishing, Newcastle upon Tyne, UK.

Meyer, K.E. 1977. *The plundered past*. London: Hamish Hamilton.

Μπουτοπούλου, Σ., Μ. Μούλιου, Σ. Καλλιώδη, and Β. Σακελλιάδης. 2008. Η Προστασία των Πολιτιστικών Αγαθών από την Παράνομη Διακίνηση και η Διεκδίκησή τους, Πρακτικά Διημερίδας: 24–25. Αθήνα: Σεπτεμβρίου Νέο Μουσείο Ακρόπολης, Μάρθα Συμεωνίδου (επιμ.).

Pantos, A.P. 2000. Greece and Greek legislation about antiquities. In *Cultural property: Return and illicit trade. Proceedings of the meeting,* ed. S. Samartzidou. Athens: Ministry of Culture, Directorate of Prehistoric and Classical Antiquities, Foreign Schools Division, I. Decopoulos.

Prunty, A.P. 1984. Toward establishing an international tribunal for the settlement of cultural property disputes: How to keep Greece from losing its marble. *The Georgetown Law Journal* 72: 1155–1182.

Renfrew, C. 2000. *Loot, legitimacy, and ownership: The ethical crisis in archaeology*. London: Duckworth.

Shaw, R. 1979. The retention and retrieval of art and antiquities through international and national means: The tug of war over sculptural property. *Brooklyn Journal of International Law* 1: 103–128.

Siehr, K. 1998. The protection of cultural property: The 1995 UNIDROIT convention and the EEC instruments

of 1992/1993 compared. *Uniform Law Review* 4 (2/3): 671–683.

Walden, D.A. 1996. UNESCO and the Parthenon Marbles. In *The Parthenon sculptures: Their history and destiny*, ed. A. Lea. Washington, DC: The Society for the Preservation of Greek Heritage.

Further Readings

Averof, Y., and V. Lambrinoudakis, eds. 2007. *History lost*. Athens: Hellenic Foundation for Culture, Anemon Productions.

Βασιλοπούλου, Β. (επιμ.) 2008. Επαναπατρισθέντα Αριστουργήματα, NOSTOI. Αθήνα: Κατάλογος Έκθεσης, Νέο Μουσείο Ακρόπολης, 24/9-31/12/2008.

Browning, R. 1998. The case for the return of the Parthenon Marbles. *Museum* 36 (1): 38–41.

Chamberlain, R. 1983. *Loot: The heritage of plunder*. London: Thames and Hudson.

Convention for the Protection of the Archaeological Heritage of Europe (Revised), Valletta, 16.1. 1992. Council of Europe Treaties ETS No. 143.

Γραμματικάκη-Αλεξίου, Α., Α. Στρατή, Ε. Μουαμελετζή, and Δ. Αναγνωστοπούλου. 2001. *Νόμμη και παράνομη διακίνηση πολιτιστικών αγαθών υπό το πρίσμα του διεθνούς, κοινοτικού και ελληνικού δικαίου*. Αθήνα: Εκδόσεις Σάκκουλα.

Δωρής, Ε.Φ. 1985. *Το Δίκαιον των Αρχαιοτήτων*. Αθήνα; Κομοτηνή: Εκδόσεις Σάκκουλα.

Κόκκου, Α. 1975. Η μέριμνα για τις αρχαιότητες στην Ελλάδα και τα πρώτα μουσεία, διατριβή επί διδακτορία. Αθήνα.

Korka, E. 2005. The Greek request for the return of the Parthenon Marbles. *Medelhausmuseet Periodical* 2: 147–150.

Korka, E. 2009. *The reunification of the Parthenon sculptures within the framework of the new international practice of returning cultural goods*. Unpublished PhD dissertation, National & Kapodistrian University of Athens.

Palmer, N. 2004. Legislation, litigation and loss. The legal and ethical obligation of state museums confronted by restitution claims. In *The Parthenon. The repatriation of the sculptures. Historical, cultural and legal aspects*, ed. M.M. Zilemenou, 233–241. Athens: Center of European Studies and Humanities, Ioannis Kapodistrias, Cultural Horizons Organization, I. Sideris.

Πάντος, Π.Α. 2005. *Κωδικοποίηση νομοθεσίας για την πολιτιστική κληρονομιά, κατά θέματα. Β΄ Διεθνές και Κοινοτικό Δίκαιο*. Αθήνα: ΥΠΠΟ ΔΕΑΜ.

Παπαπετρόπουλος, Δ.Α. 2006. *Νόμος 3028/ 2002 Για την προστασία των Αρχαιοτήτων και εν γένει της πολιτιστικής κληρονομιάς*. Αθήνα; Θεσσαλονίκη: Κείμενο-Σχόλια-Ερμηνεία, Εκδόσεις Σάκκουλα.

Prott, V.L., ed. 2009. *Witnesses to history. Documents and writings on the return of cultural objects*. Paris: UNESCO Publishing.

Prott, L.V., and P.J. O'Keefe. 1983. *National legal control of illicit traffic in cultural property*. Paris: UNESCO.

Sljivic, A. 1997. Why do you think it's yours? An exposition of the jurisprudence underlying the debate between cultural nationalism and cultural internationalism. *George Washington Journal of International Law and Economics* 31: 393–438.

Πρωτόπαπας, Δ. 2004. Οι ποινικές διατάξεις για την παράνομη διακίνηση, στο Ε. Τροβά (επιμ) Η *πολιτιστική κληρονομιά και το δίκαιο*: 191–210. Αθήνα; Θεσσαλονίκη: Πρακτικά Συνεδρίου, Αθήνα 3–4 Ιουνίου 2003, Εκδόσεις Σάκκουλα.

Stamatoudi, I. 2004. Legal issues associated with the return of the Parthenon Marbles. In *The Parthenon. The repatriation of the sculptures. Historical, cultural and legal aspects*, ed. M.M. Zilemenou, 214–227. Athens: Center of European Studies and Humanities, Ioannis Kapodistrias, Cultural Horizons Organization, I. Sideris.

Σκουρής, Π, and Ε. Τροβα. 2003. *Προστασία Αρχαιοτήτων και Πολιτιστικής Κληρονομιάς*, ΟΝ. 3028 / 2002. Αθήνα, Θεσσαλονίκη: Εκδόσεις Σάκκουλα.

Stamatoudi, A.I. 2011. *Cultural property law and restitution*. Cheltenham/Northampton: Edward Elgar.

Vrelis, S. 2003. La Convention d´Unidroit sur les biens culturels voles ou illicitement exportes: Un acquis culturel. In *La protection internationale des biens culturels – Regard dans l´ avenir*. Athenes/Komotini: Ant.N. Sakkoulas.

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Greek Colonialism, Archaeology of

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Introduction

From the mid-eighth century BCE onwards, Greeks began to migrate in significant numbers from Greece and the Aegean to many areas of the Mediterranean. By the sixth century, Greek communities had been established as far afield as Spain, Italy, France, North Africa, Asia Minor, and the Black Sea coast. This colonialism raises important questions about the processes of migration and the reasons for it. Other issues include the nature of interactions between Greeks and non-Greeks, the influence of colonialism on the

development of the Greek city, and whether settlement overseas impacted on expressions of Greek ethnicity. There is a high degree of local variation in the way these communities developed, but they highlight some central aspects of Greek archaeology. Greek cities continued to be founded outside Greece during the fifth to third centuries BCE, but these were rather different in character and this article will focus primarily on colonialism in the eighth to sixth centuries.

Definition

The definition of Greek colonialism is contentious. The Greeks had no word for "colony," referring to overseas settlements as *apoikiai* (literally homes away from home), or *emporia* (trading settlements). This distinguishes between independent Greek city-states (*apoikiai*) and trading communities – sometimes of mixed ethnicity (*emporia*). Until the 1990s archaeologists and historians largely accepted the terminology of colonies and colonization to describe the Greek diaspora of the eighth to sixth centuries BCE (Graham 1982; Dunbabin 1999). Recent scholarship has problematized these terms. They imply acceptance of ancient sources which present settlement as an organized state-sponsored act of colonization to an extent which is now no longer tenable. They are also shaped by analogy with eighteenth- and nineteenth-century imperialism and colonialism, which are not appropriate models to apply to Greek colonialism (Osborne 1998; Shepherd 2005). The terms "colony" and "colonization" have now been largely replaced by more neutral terms such as "settlement" or "migration." Where the terms "colony" or "colonization" are used in this entry, it should be understood that they are being used as a synonym for Greek settlements outside Greece and do not carry any implication that these settlements were the result of the structured state foundation of the type critiqued below. However, this is still a contentious issue, and as Malkin (2016) has argued, networks of contacts between so-called "colonies" and metropoleis, and rights of return from one to the other, suggest that the Greeks themselves saw the colonial relationship as meaningful.

Historical Background

Greek mobility in the Mediterranean has a long history. Mycenaean finds indicate contact between Greeks and other areas of the Mediterranean from at least the twelfth century BCE, and Greeks were a significant presence in ports such as Al Mina during the ninth century (Boardman 1999). By the mid-eighth century BCE, the size and importance of Greek settlement increased markedly. Between c. 750 and 650 BCE, Greek settlements were established at many locations on the coasts of Sicily, southern Italy, and Campania. During the seventh and sixth centuries, numerous settlements developed in the northern Aegean and the Black Sea area, north Africa, the Dalmatian coast, and coastal Asia Minor. There was also further sixth-century settlement in Italy, Spain, southern France, and on some of the islands of the western Mediterranean. Finally, a number of settlements were founded in Italy, Sicily, and the Black Sea area in the fifth and early fourth centuries (Figs. 1 and 2; Osborne 1996: 119–129). The settlers were drawn from many different areas of the Greek world. Ancient sources attribute notional founding cities or regions to each colony, and relationships, but they are based largely on fictive rather than real kinship. Many settlements have yielded finds from many areas of the Greek world in their early phases, suggesting mixed groups of settlers from several areas of Greece.

In addition to self-identified Greek colonies, there were many Greeks living in indigenous communities (Lomas 2006). In Spain, only two Greek cities – Emporion and Rhode – were established, but seventh- and sixth-century Greek pottery and amphorae found around Tartessos suggests large-scale trade between Greeks and Iberians. Inscribed Greek personal names from Iberian contexts demonstrate the presence of Greek people as well as Greek goods, and a fifth century inscribed lead tablet from Pech-Maho records a complex commercial contract involving both Greeks and Iberians. The Greek presence in

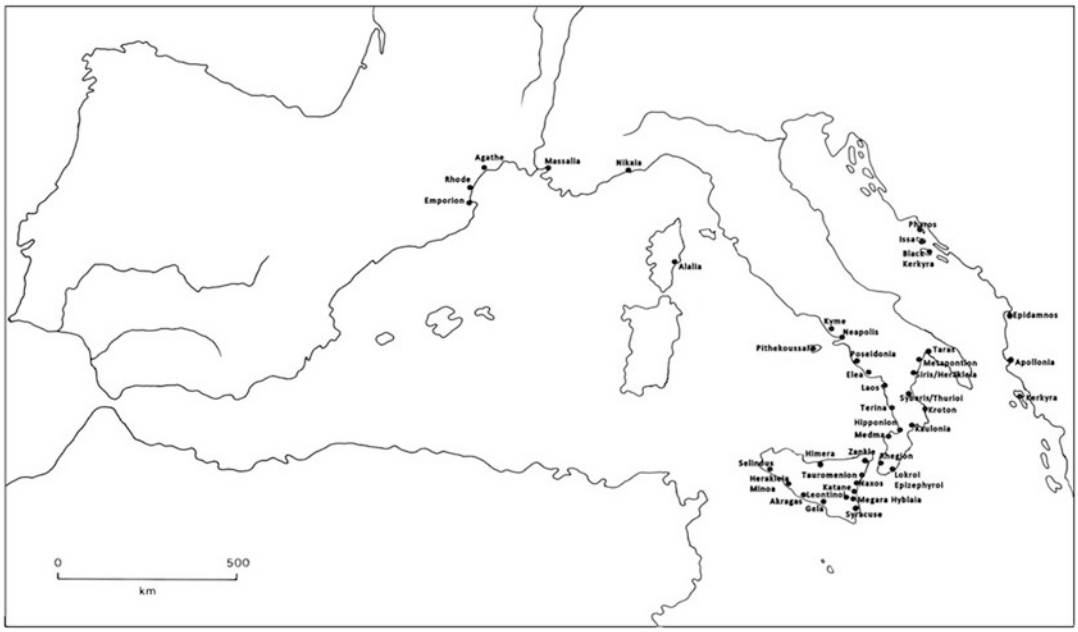

Greek Colonialism, Archaeology of, Fig. 1 Greek colonial settlement in the Western Mediterranean

Spain was extensive but did not take the form of city-foundation and has been termed colonialism without colonization (Dominguez Monedero 2002, 2004).

The motives for Greek migration are unclear. The large quantities of Greek goods circulating throughout the Mediterranean area suggest a connection with trade, and the nature of the earliest settlements supports this. Pithekoussai (modern Ischia), established c. 750 BCE, was located on an off-shore island, in close proximity to a major trade route linking Italy and Sardinia with Cyprus and Greece. Grave goods from the settlement include pottery from many parts of the Greek world, along with Italic fibulae, Egyptian scarabs, and Phoenician artifacts. Remains of smelting furnaces and waste metal indicate that the smelting of iron ore from Etruria was an important activity (Ridgway 1992). Trade, particularly in metals, was a key activity as well.

Colonialism is often presented as the result of a desire for land, prompted by demographic pressure (Graham 1982: 83–94, 157–159; Dunbabin 1999: 1–47), but this is questionable. Although some settlements had abundant supplies of fertile land, others did not. Settlements on the "instep" of Italy controlled large amounts of land, as did those of south-east Sicily, but other colonies seem to have had different priorities. Rhegion, Taras, and Massalia had good harbors and strategic positions on trade routes. Others, such as those on the Calabrian coast, were in areas that were not attractive to those mainly seeking land. Evidence for demographic pressure in Greece which might have forced Greeks to migrate is also ambiguous. Increases in the size of cemeteries in the eighth century demonstrate that the population was growing (although it also reflects changes in funerary customs) but not at a rate to force mass migration. A survey of Megara Hyblaia and its colony Selinous, designed to test the hypothesis that migration, was driven by demographic expansion and need for land, conclusively demonstrated that in this case, it was not (De Angelis 1994). When Selinous was founded, c. 650 BCE, Megara had a plentiful supply of land and no sign of demographic pressure. Ancient sources attribute colonialism to specific factors such as drought, famine, and political strife, rather than a specific desire for land.

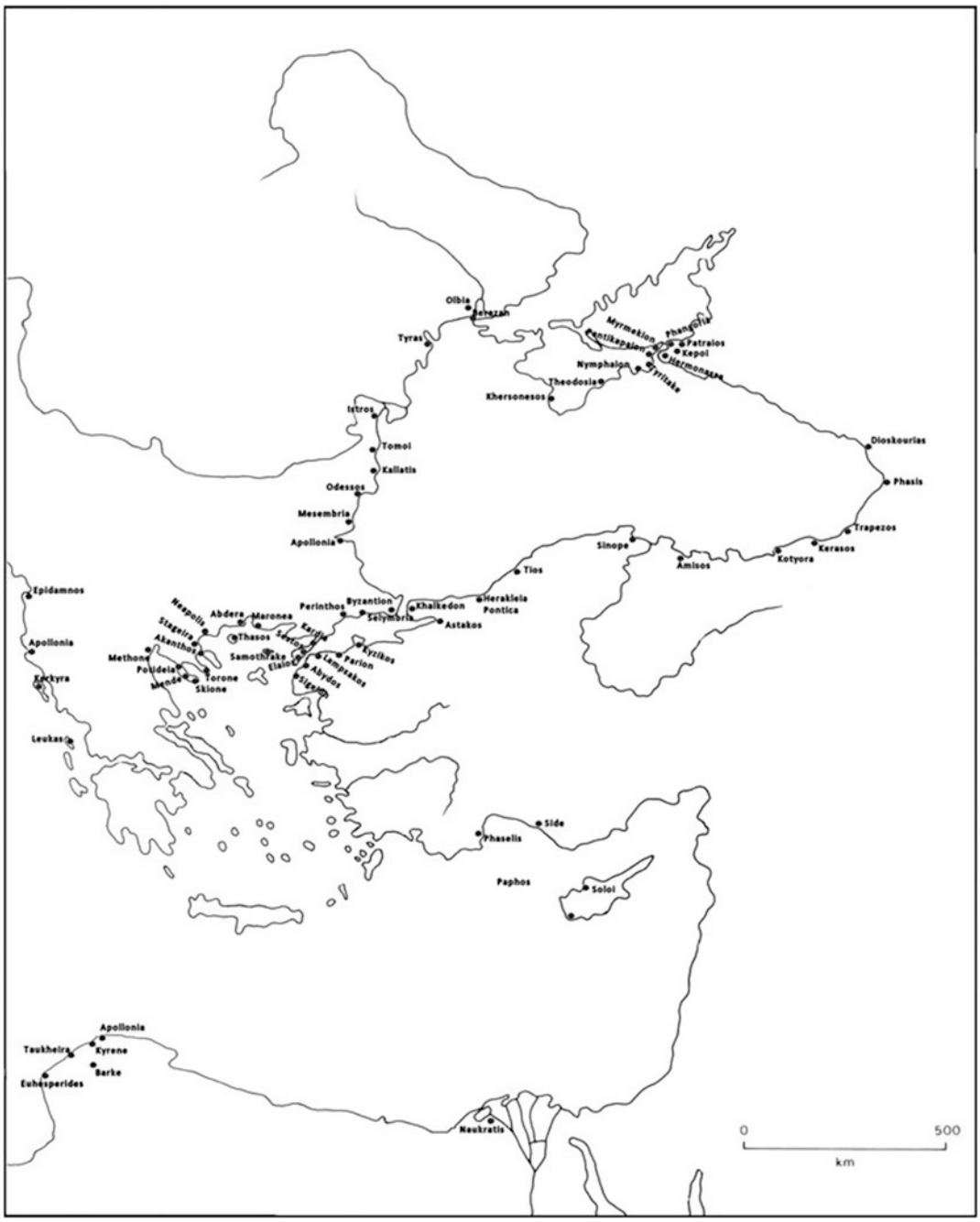

Greek Colonialism, Archaeology of, Fig. 2 Greek colonial settlement in North Africa, Asia Minor, and the Black Sea area

The answer may lie in the fact that the eighth to seventh centuries BCE were periods of great personal mobility, driven by a variety of factors. It has been described as an era of exploration, in which Greeks moved to exploit a range of new social and economic opportunities (Purcell 2005).

The colonialism of the period may have been driven by a mixture of commercial motives, opportunism, and curiosity about the wider Mediterranean world, rather than by demographic pressure and lack of land.

Between c. 720 and 600 BCE colonial settlements show a high degree of local variation in their development. Some were ethnically mixed communities and many others may not have been fully urban in their early stages. By the end of the seventh century, most had established themselves as fully urban and fully Greek settlements. Many developed organized urban plans to a much greater extent that cities in Greece and did so from an early date. This so-called Hippodamian town plan was based around two main thoroughfares crossing at the center of town and a grid of streets dividing the area into long rectangular blocks, which were subdivided into regular plots for housing. The agora was usually placed near the center of the urban area. Temples and sanctuaries could be grouped together on an acropolis (as at Akragas), placed at the edges of the urban area (as at Poseidonia), or a mixture of both. However, there were many local variations in the ways sites developed. At Megara Hyblaia, the regular layout seems to have been in place from the earliest date of settlement, with designated areas for cemeteries and sanctuaries and for public business. The uniformity of the early houses in size and form suggests a high degree of central organization in allocating space. At Thasos, in contrast, pottery deposits demonstrate that sanctuaries were established early, but the seventh-century city was haphazard and the first signs of communal planning and organization date to the early sixth century (Osborne 1996: 233–242).

Greeks overseas were early adopters of many aspects of Greek urban life. Colonies built monumental stone buildings earlier and more prolifically than the cities of Greece; in particular many monumental temples were constructed. Coinage was adopted early, as were writing and codified laws. Territories were also carefully organized. During the sixth century, the territory of Metapontion was systematically reorganized and a regular grid of land divisions imposed (Di Siena 2001: 24–29). The fact that these were new communities may have prompted this investment in civic infrastructure. Unlike cities in Greece, which had grown up piecemeal, developments on new sites could develop more systematically and also a need to create strong civic organization and a strong civic identity to integrate the inhabitants into a functioning citizen body.

Ancient sources describe ethnic conflict between Greeks and their non-Greek neighbors, but archaeological evidence presents a more nuanced picture. Some settlements started out as mixed communities before adopting a fully Greek identity during the seventh century. Graves at Pithekoussai have yielded Italic and Phoenician grave goods, suggesting an ethnically mixed rather than purely Greek community (Ridgway 1992: 109–119). At Metapontion and Siris, Greek and Italic burial customs co-existed in earliest phases of the cemeteries, and both Greek and non-Greek pottery have been found, although buildings are mainly of Greek type (Carter 1998; Di Siena 2001: 17–26). This persists until the late seventh century, after which these sites become more clearly Greek in character. This is accompanied by changes in the territories of these communities, which may suggest a phase of more aggressive expansion (Di Siena 2001: 24–31). One hypothesis is that many Greeks arrived in all-male groups rather than as families and intermarried with the local populations, although studies of this in the western Mediterranean have shown mixed results (Shepherd 1999). At Pithekoussai, Metapontion, and a number of other sites, some female burials contained Italic fibula brooches rather than the straight dress-pins used by Greeks, suggesting that these may have been local women. As there was no spatial distinction between these and graves with Greek grave goods, they have been taken as evidence for women intermarrying with Greek colonists. At other Greek sites, however, there is little evidence of ethnic intermingling, and patterns of interaction with local populations varied from colony to colony.

Whatever the specific nature of social relations, there were significant levels of economic and cultural contact and exchange of goods and ideas between Greeks and non-Greeks, even during

periods of conflict. Religious sanctuaries seem to have acted as important points of contact for such exchanges. Greek inscriptions are found in non-Greek contexts; the Greek alphabet was adopted for writing non-Greek languages and coinage based on Greek designs and weights was minted by some non-Greeks. Greek pottery styles were also widely adopted, and adapted by non-Greeks, often from an early date. In Italy, for example, Apulia, Lucania, and Campania all developed local red-figure pottery, closely based on Greek techniques and designs but with their own distinctive shapes and decorative styles. In extreme cases, it can be difficult to distinguish between Greek and non-Greek settlements. The Sicilian city of Segesta constructed a fine Doric temple, despite being an indigenous community. At Morgantina in southeast Sicily, a settlement of the indigenous Sikels, the center of the city had Greek-style buildings and looked very similar to the agora of a Greek city, despite its non-Greek population (Antonaccio 2005: 98–101). The social and cultural interactions between Greeks and their non-Greek neighbors were both highly complex and central to the development of areas of Greek settlement.

The Greeks of the colonial world were not a cohesive group and are evidence of tension, sometimes on ethnic lines between those of Dorian and Ionian origin. Despite this, they maintained a strong Greek identity. Greeks overseas participated in events symbolizing shared ethnicity, such as the Olympic games and other Panhellenic festivals. The victory lists at Olympia and other sanctuaries include victors from the colonial world. Colonies built treasuries at Delphi and made victory dedications at Delphi and Olympia. Although founding "mother-cities" are likely to have been largely fictive, social and political links between a colony and its putative founder were important. Cults associated with the foundation formed a vital part of civic religion in the colonial world, whether they were cults of deities associated with colonialism, cults of a heroized founder, or cults associated with the nominal mother city. It was also common for colonies to adopt the linguistic dialect and form of script used by their assumed mother city and to use the same weight standard for their coinage. Although these relationships were largely based on fictive rather than real kinship, they became more prominent, and more politicized, from the sixth century onwards. The colonies founded by Phokaian refugees after the Persian sack of Phokaia – Alalia, Elea, Massilia and Emporion – shared a strong sense of common Ionian identity, maintaining their Ionic scripts and dialect, and many aspects of architecture and material culture derived from Phokaia (Dominguez Monedero 2002, 2004), while Korinth maintained active links with states which claimed Korinthian origin during the fifth century. Greeks outside Greece were embedded in a complex web of connections to both their non-Greek neighbors and the wider Greek world.

Key Issues/Current Debates

There are currently several key issues in the archaeology of Greek colonialism. These include the nature of the process by which new communities were created, the reasons for the migrations of the eighth and seventh centuries, the interpretation of relations between Greeks and local populations, and the impact of colonialism on Greek conceptions of their own ethnicity. They touch on important problems such as how (or if) archaeological evidence can be integrated with ancient sources, whether we can identify ethnic origins from material evidence, and what sort of analytical frameworks can be used to clarify cultural interactions between Greeks and their neighbors.

Trade and Colonialism

Discussions of mass migration in the eighth and seventh centuries BCE historically assumed that trade was of relatively little importance and the main motivation was desire for land (Boardman 1999; Dunbabin 1999). This was, in part, based on a tendency to privilege the ancient sources over material evidence. Accounts which mentioned desire for land as a motive (Strabo, *Geography*, 5.4.9) or drew distinctions between mercantile Phoenicians who founded trading posts and Greeks who founded cities (Thucydides 6.2) were largely accepted. It also relies on a

primitivist view of ancient Greek economies in which trade is assumed to be of little importance. Recent critiques demonstrate that this approach was shaped by eighteenth- and nineteenth-century colonialisms, in which trading relationships were rapidly followed by territorial expansion. New research on the economy of the archaic Mediterranean suggests that economic behavior was much more sophisticated and diverse than this model suggests and that nineteenth-century concepts of "trade before the flag" distorts both the nature of ancient trade and that of the settlement process (Shepherd 2005: 24–30). The excavations at Pithekoussai show that it was a community with a vibrant economy based on trade in mineral resources as well as agriculture. The archaic Mediterranean was a region of high mobility, in which long-distance travel motivated by commercial opportunities and curiosity about an expanding world, was not unusual (Purcell 2005). Network theory is proving to be a valuable tool for examining Mediterranean-wide commercial and cultural contacts and has underlined the high degree of mobility and interconnectedness in this period of Greek history (Malkin 2011).

The Nature of Settlement

The process by which settlements were established has generated much debate. Until the 1990s, ancient accounts of how to found a new settlement were largely accepted (Graham 1982). These present colonization as a well-defined and organized process, whether carried out by a state or an individual. An oracle was consulted to gain divine approval for the mission, leaders were appointed, and the colonists set off to find the place indicated by the oracle. Once located, the leaders laid out the boundary of the new city, instituted the main cults, and divided the land within the new city and its territory to ensure that settlers received a fair share. The foundation process was presented as setting up a community to a recognized pattern, replicating the organization of a Greek *polis*.

There are many problems with this model. The texts on which it relies were written long after the foundation of the early colonies, reflecting later practices and attitudes, and cannot be accepted as an accurate account of how colonies were established. In addition, ancient sources and archaeological evidence address fundamentally different questions (Owen 2005: 6–8). Archaeology reveals long-term trends and patterns, but dating is too imprecise to pinpoint short-term factors. Ancient sources, in contrast, focus on immediate events and motivations. Both yield valuable information, but from radically different perspectives. Recently, the debate about the nature of Greek settlement overseas has swung strongly against the model of colonization as an organized political project. Many scholars now regard it as a fluid process, in which Greek settlements formed by piecemeal migration by individuals and small groups, some of whom initially lived in mixed communities alongside indigenous populations. Many did not develop a fully Greek identity and city-state organization, either by assimilating or ejecting these local populations, until the late seventh century.

This view is strongest in Anglo-American scholarship, where the use of the term "colonization" to described Greek settlement overseas has become problematized, but it is not universally accepted. One of the key arguments against the organized foundation of colonies is that the city-state was at an early stage of development in Greece in the eighth century and that the *polis* was not yet established as the main form of political and social organization, so the creation of new settlements which replicated this emergent form of organization seems unlikely (Osborne 1998). However, counter-arguments have been made, that the development of the *polis* was assisted precisely by colonization and the need to create new forms of community from scratch and that there is nothing implausible about a new society inventing new forms of community and new ways of setting them out (Malkin 1994, 2002). Although the balance has tipped in favor of Greek settlement overseas as a process of migration rather than organized colonization, there are still ambiguities to resolve.

Modeling Cultural Interactions

The concept of Hellenization – the adoption, either voluntary or enforced, of Greek customs,

language and material culture by non-Greeks – has long been the dominant model for understanding Greek relations with local populations. It is an analytical framework shaped by eighteenth- and nineteenth-century colonialisms, in which a mission to civilize non-European cultures was an important part of colonial ideology (Shepherd 2005). However, it is no longer tenable to view the archaeology of areas of Greek settlement as shaped by a one-way transmission of advanced Greek customs and culture to more backward locals. Instead, various analytical models have been put forward to interpret relations between ethnic groups.

A core-periphery model, in which the Greek core obtained natural resources such as mineral ores from the non-Greek periphery in exchange for Greek manufactured goods, is one possible approach. This argues that Greek goods were circulated to non-Greek elites, by either trade or gift-exchange, in return for resources such as mineral ores. These goods were regarded as prestige items, the ownership of which enhanced the status of the non-Greek owner and also his/her social and political power (Dietler 1995). This opens up alternative ways to look at trade and exchange of goods and also gives the local population a more dynamic role in the relationship, but it also implies the same basic level of inequality between non-Greeks and Greeks which characterized the Hellenization model.

Postcolonial theories of hybridization and Middle Ground theory offer a possible alternative. These argue that interaction between Greeks and non-Greeks resulted in the emergence of hybrid (or creole) culture which contained elements of both cultures and which facilitated the development of local and regional identities which were not Greek or non-Greek but Sicilian, or Italiote, or Graeco-African, etc. (Antonaccio 2005). A site such as Morgantina, where there is evidence of the adoption of at least some Greek customs (e.g., Greek civic architecture) but not others (Greek religious architecture, Greek sculpture), is not an example of Hellenization but of an expression of local Sicilian identity in which Greek and Sikeliote elements mix to produce new cultural forms. One strength of this model is that it allows for changes in the ways in which artifacts are used. For example, Greek drinking vessels are frequently found in elite burials in many areas of Italy, but they do not prove the adoption of the Greek *symposion*. Most Italian societies had their own traditions of elite banqueting, which were very different from that of the all-male *symposion*, and it is far more likely that Greek drinking sets were used for these local celebrations. Although Middle Ground theory and hybridization escape from the overtly top-down and colonialist aspects of Hellenization and core-periphery analysis, they are still problematic as a framework for studying Greek-local interactions. Recent critiques note that they potentially underplay aspects of conflict or imbalances of power between the parties involved. They can also make it difficult to differentiate between the various cultural elements under discussion and can obscure important factors such as gender or social class, which have an important role in determining which cultural features are transmitted and how they are used.

Another influential approach has been examination of Greek and non-Greek cultures in terms of localism versus globalization (Hodos 2009). The spread of Greek culture over such a wide area of the Mediterranean meant that Greek customs and artifacts could be used as a form of cultural lingua franca, just as the Greek language could be used as a common language to communicate across ethnic and cultural boundaries. Greek red-figure pottery, for example, could be customized with local scenes and therefore used to present local identities in a visual idiom which was familiar throughout the Greek world. South Italian red-figure vases frequently depicted scenes of warriors in local costume and with Italic armor and weapons, using it to present local elite culture. Greek culture could be seen as a form of globalized cultural language which could be customized to reflect local cultures but also used as a form of communication across cultural boundaries.

Ethnicity and Colonization

The role of colonialism in the development of Greek ethnicity, and how reliably we can identify ethnicity in the archaeological record, is an important issue. Distance from one's own culture or

proximity to other cultures is frequently a factor in the emergence of a stronger and more assertive sense of ethnic identity. Ethnicity is often more in evidence in frontier areas where cultures are in contact, and for this reason, it has been suggested that Greeks living in colonies may have had a stronger sense of Greek identity. This oppositional Greek identity, and the polarity between Greeks and barbarians, is, however, more developed in the sixth century, when networks of Panhellenic sanctuaries and festivals had become securely established, and in the fifth century, when Greek identity was tested by the Persian invasion, than it was in the archaic period. It has been argued that Greeks of the eighth and seventh centuries may have been more aware of the differences between settlers from different parts of Greece as between themselves and neighboring non-Greeks (Hall 2002).

There is evidence for both points of view. Greeks outside Greece were not a cohesive group. Evidence of regionalization is apparent in their use of different alphabets and dialects, and they seem to have maintained subgroup identities as either Dorians or Ionians. The mixed communities found in some early settlements, and evidence for commercial, social, and even familial contacts with non-Greeks, suggest that ethnic boundaries were flexible. However, there are methodological problems. The hypothesis that Greeks and non-Greeks intermarried is based on presence of certain artifact types in funerary assemblages, but possession of local objects may be a matter of taste, patterns of trade or gift-exchange, or simply what was available, rather than an indication of ethnicity (Shepherd 1999). The presence of other evidence such as the use of non-Greek burial customs in a Greek city strengthens the case for mixed communities but inferring a mixed population on the basis of grave goods alone is unwise. As with most aspects of Greek colonialism, patterns were geographically and chronologically varied. Relations with locals differed from colony to colony, and Greek identity became more sharply defined from the fifth century, but it was never a simple matter of Greeks versus barbarians.

International Perspectives

Greek colonialism is hugely varied, with many local variations in the development of Greek settlements outside Greece. Some regional patterns can be discerned: settlement in Spain and the islands of the western Mediterranean seems to be less *polis*-based and more integrated with local populations than elsewhere, and the emergence of regional styles in material culture can be identified, but there is also intense variability of development even between settlements in the same areas of the Mediterranean. This has been exacerbated by some trends in modern scholarship. There has been a tendency for researchers to focus on specific regions and sites, and dialogue between these has sometimes been limited. One of the key challenges in the archaeology of Greek colonialism is to identify overarching themes and patterns in colonial settlements without losing sight of these local factors.

Future Directions

There are many important issues which remain to be explored in relation to Greek colonialism.

1. Better methodologies for integrating archaeological and textual evidence are badly needed. Historians frequently privilege texts over material evidence, while some archaeologists adopt the extreme position that textual evidence should be rejected entirely. Dialogue between archaeologists and historians is essential for the resolution of this problem.
2. Further research on cultural identities and the interactions between Greeks and other ethnic groups is needed. This is a complex area, and none of the models review above are without their problems. A single interpretative framework which will address cultural interaction without any bias or distortion may be difficult to achieve. In particular, more investigation is needed on how factors such as gender or social class may shape cultural interactions. There is much scope for the development of new models of cultural interaction which

place Greeks and non-Greeks on a more equal footing.

3. Better integration between researchers working on different areas of the Greek colonial world is required. As noted above, Greek experiences of colonialism were often locally specific, but more dialogue between researchers working on different areas of the Greek world may help to illuminate aspects of colonialism. Recent research applying network analysis to the ancient Mediterranean has opened up valuable new approaches to aspects of colonialism and connectivity between different areas of the Greek world. A recent conference (Donnellan et al. 2016) has highlighted the need for greater dialogue between researchers from different fields of study and different national traditions.

Cross-References

- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Ethnicity and Identity in the Ancient Mediterranean World

References

Antonaccio, C. 2005. Excavating colonization. In *Ancient colonizations: Analogy, similarity and difference*, ed. S. Owen and H. Hurst, 97–114. London: Duckworth.

Boardman, J. 1999. *The Greeks overseas: Their early colonies and trade*. 4th ed. London: Thames and Hudson.

Carter, J.C. 1998. *The chora of Metaponto: The necropoleis*. Austin: University of Texas Press.

De Angelis, F. 1994. The foundation of Selinous: Overpopulation or opportunities? In *The archaeology of Greek colonisation*, ed. F. De Angelis and G. Tsetskhladze, 87–110. Oxford: Oxford University Committee for Archaeology.

Di Siena, A., ed. 2001. *Metaponto. Archeologia di una colonia greca*. Taranto: Scorpione Editrice.

Dietler, M. 1995. The cup of Gyptis: Rethinking the colonial encounter in early Iron Age western Europe and the relevance of world systems models. *Journal of European Archeology* 3: 89–111.

Dominguez Monedero, A. 2002. The Greeks in Iberia: Colonialism without colonisation. In *The archaeology of colonialism*, ed. C.L. Lyons and J.K. Papadopoulos, 65–95. Los Angeles: Getty Research Institute.

Dominguez Monedero, A. 2004. Greek identity in the Phocaean colonies. In K. Lomas (eds.), Greek identity in the western Mediterranean: 429–56. Leiden: Brill.

Donnellan, L., V. Nizzo, and G.-J. Burgers, eds. 2016. *Conceptualising early colonisation*. Brussels/Rome: Istituto Storico Belgo di Roma.

Dunbabin, T.J. 1999. *The western Greeks: The history of Sicily and south Italy from the foundation of the Greek colonies to 480 B.C.* Oxford: Clarendon Press.

Graham, A.J. 1982. The colonial expansion of Greece. In *Cambridge ancient history*, vol. III, 2nd ed., 83–162. Cambridge: Cambridge University Press.

Hall, J.H. 2002. *Hellenicity: Between ethnicity and culture*. Chicago: Chicago University Press.

Hodos, T. 2009. Colonial engagements in the global Mediterranean Iron Age. *Cambridge Archaeological Journal* 19: 221–241.

Lomas, K. 2006. Beyond Magna Graecia: Greeks and non-Greeks in France, Spain and northern Italy, 500–300 BCE. In *The Blackwell companion to the classical Greek world, 478–323 BCE*, ed. K.H. Kinzl, 174–196. Oxford: Blackwell.

Malkin, I. 1994. Inside and outside: Colonization and the formation of the mother city. In *Apoikia: i più antichi insediamenti greci in occidente: funzioni e modi dell'organizzazione politica e sociale*, ed. B. D'Agostino and D. Ridgway, 1–10. Naples: Istituto Universitario Orientale.

Malkin, I. 2002. Exploring the validity of the concept of 'foundation': A visit to Megara Hyblaia. In *Oikistes: Studies in constitutions, colonies, and military power in the ancient world, offered in honor of A. J. Graham*, ed. V. Gorman and E.W. Robinson, 195–225. Leiden: Brill.

Malkin, I. 2011. *A small Greek world: Networks in the ancient Mediterranean*. New York: Oxford University Press.

Malkin, I. 2016. Greek colonisation: The right to return. In *Conceptualising early colonisation*, ed. L. Donnellan, V. Nizzo, and G.-J. Burgers, 27–51. Brussels/Rome: Istituto Storico Belgo di Roma.

Osborne, R. 1996. *Greece in the making, 1200–479 BCE*. London: Routledge.

Osborne, R. 1998. Early Greek colonization? The nature of Greek settlement in the west. In *Archaic Greece. New approaches and new evidence*, ed. N. Fisher and H. Van Wees, 251–270. London: Duckworth.

Owen, S. 2005. Analogy, archaeology and archaic Greek colonization. In *Ancient colonizations: Analogy, similarity and difference*, ed. H. Hurst and S. Owen, 5–22. London: Duckworth.

Purcell, N. 2005. Colonization and Mediterranean history. In *Ancient colonizations: Analogy, similarity and difference*, ed. H. Hurst and S. Owen, 115–139. London: Duckworth.

Ridgway, D. 1992. *The first western Greeks*. Cambridge, MA: Cambridge University Press.
Shepherd, G. 1999. Fibulae and females: Intermarriage in the western Greek colonies and the evidence from cemeteries. In *Ancient Greeks: West and east*, ed. G. Tsetskhladze, 267–300. Leiden: Brill.
Shepherd, G. 2005. The advance of the Greek: Greece, Great Britain and archaeological empires. In *Ancient colonizations: Analogy, similarity and difference*, ed. H. Hurst and S. Owen, 23–44. London: Duckworth.

Greek Houses, Archaeology of

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Introduction

Most visitors to Greek archaeological sites can be excused if they never visit the residential districts or even realize that houses have been excavated there. Greek domestic architecture is often poorly preserved and consequently neglected by countries that have more cultural property to protect than their budgets will cover. This situation is regrettable, as houses and their contents can reveal much about the cultural and social life of the Greeks, providing an insight on the economy, religion, relationships between men and women, and the interactions between freemen and slaves. Careful examination of the archaeological remains, informed by a judicious reading of ancient literary and epigraphical testimonia, and cautious use of ancient visual depictions of domestic scenes can help bring Greek houses to life.

Definition

What are the determinants for identifying a house and for labeling that house as Greek? The first question can be difficult to answer, as many excavated buildings were both residences and the locations for industrial or commercial activity. It is probably most accurate to say that a house was a building where the primary function was residence but where there could be attendant workshop production and/or commercial sales. A number of Greek houses accommodating such multiple uses have been recognized in rural settings and almost by definition include agricultural or pastoral production. The identifying characteristics for a domestic use of space are as much the artifactual assemblages as the architectural structure. The collections of household impedimenta reveal the human use of space within, including food storage, preparation and consumption, as well as sleeping, household production such as textile work, and the entertainment of guests. The answer to the question of Greek identity is dependent in part on chronology. From the Early Iron Age until the late fourth century BCE, it is fair to say that a Greek house is a residence constructed in territories established and occupied by Greeks, who identified themselves as such by virtue of their common language and the gods they worshiped. This definition follows Greek ideas of self-identification which were based on language and religion (see, e.g., Herodotus 8.1.44).

Historical Background

The houses considered in this entry date over the course of a single millennium, from c. 1,000 BCE until the first century BCE. While Greek speakers were resident in the Balkan Peninsula, the homeland of Greece, from before 1,500 BCE, the governing political and economic structure of the Greek Bronze Age was such that the house types of that period were shaped by factors very different from those in the succeeding Iron Age when social changes fundamentally altered the forms of domestic architecture. The study of the Greek house is inextricably bound to the study of urbanism in the Greek world, as domestic architecture responds to the organization of the city in its adherence to the street system; the interior arrangements of the house also recognize the interplay between the interior, with any attendant

notions of privacy or segregation, and public life in the city.

Throughout the Greek world, Early Iron Age houses were limited in both size and elaboration. Houses of one, two, or at most three rooms were the norm whether the houses were built on the Greek mainland or in the colonies that multiplied, especially in the western Mediterranean, from the late eighth century BCE. The techniques of construction that prevailed throughout history seem to have originated at an early date – mud brick walls were built on a low stone socle in order that the easily fashioned mud brick could provide insulation and so that the stone underpinnings could prevent moisture from destroying the mud brick. Early Iron Age houses usually had fixed hearths to serve as a heating element and probably also as a source of light, a space for cooking, and a focus of family life and ritual (Tsakirgis 2007).

Another characteristic feature of Greek houses also emerges early, that is, their southern orientation. Doors and windows were often placed to open to the south so that the rays of the winter sun shining low would penetrate the rooms and warm them and so that the summer sun, high overhead, would beat on the roof, thus providing much needed shade in the hot season. This environmentally conscious architectural arrangement is seen equally in the early colonial houses at Megara Hyblaea in Sicily, in Classical houses in Athens (Fig. 1), in the Late Classical houses at Olynthos (Fig. 2), and in the Late Hellenistic House on the Hill on Delos (Hoepfner and Schwandner 1994: 4; Trümper 1998: 211–212; Cahill 2002: 75). The archaeological evidence for the practice of southern orientation predates by several centuries the testimony of the fourth century authors Xenophon (*Mem*. 3.8.8–9) and Pseudo-Aristotle (*Oec*. 1345a), both of whom prescribe that houses should be built facing south.

In front of, generally south of the earliest Greek houses, there is evidence of an open yard. Given the usually limited size of these houses, the unroofed area greatly increased the household's living area. At sites such as Zagora, the yard was shared, suggesting familial or social relationships among the families who resided in the surrounding homes (Hoepfner 1999: 163–169). No architectural embellishment of the early yards exists, although the overhanging eaves or shaded porches in front may have anticipated or given rise to the roofed porticoes of later houses.

Greek houses increased in both size and architectural complexity in the sixth and early fifth centuries BCE, as cities expanded in economic and political complexity. The open yard, formerly in front of the house, was in many cities at this time enclosed within the architectural structure, creating an unroofed courtyard surrounded by rooms. The plans of Late Archaic houses at Athens reflect this change. Entrance to the living space was no longer through the yard but rather through a door in the façade and often into a vestibule, creating what has been called the single-entrance courtyard house. Unlike the foyer of a modern home, the vestibule of the Late Archaic and Classical houses was a buffer, separating the public world of the street from the domestic world, and there was neither easy physical nor direct visual access to the innermost parts of the house because the interior doorway of the vestibule was not placed directly in line with the street entrance (Fig. 1). These architectural changes have been recognized as reflecting changing social practice in Greek cities and houses, a subject that will be discussed in more detail below (Nevett 1999: 103).

In many houses of the fifth and fourth centuries BCE, the unroofed courtyard was located fairly centrally (Figs. 1, 2, 3, and 4). Judging from the materials found in Greek domestic courtyards, many and varied activities took place there over the course of a family's life, including food preparation, ritual events, and probably activities that leave no archaeological record, including children's play. Since the courtyard was unroofed, light and air would penetrate into the surrounding rooms through both doorways and windows, as can be seen in better preserved Hellenistic houses at Iaitas and Delos (Dalcher 1994: 29–32; Trümper 1998). The courtyard was the major node of access to all of the surrounding rooms. Suites exist in Greek domestic architecture, but passage through several rooms was not common, and almost all parts of the house opened directly onto the courtyard. Because of this arrangement, it

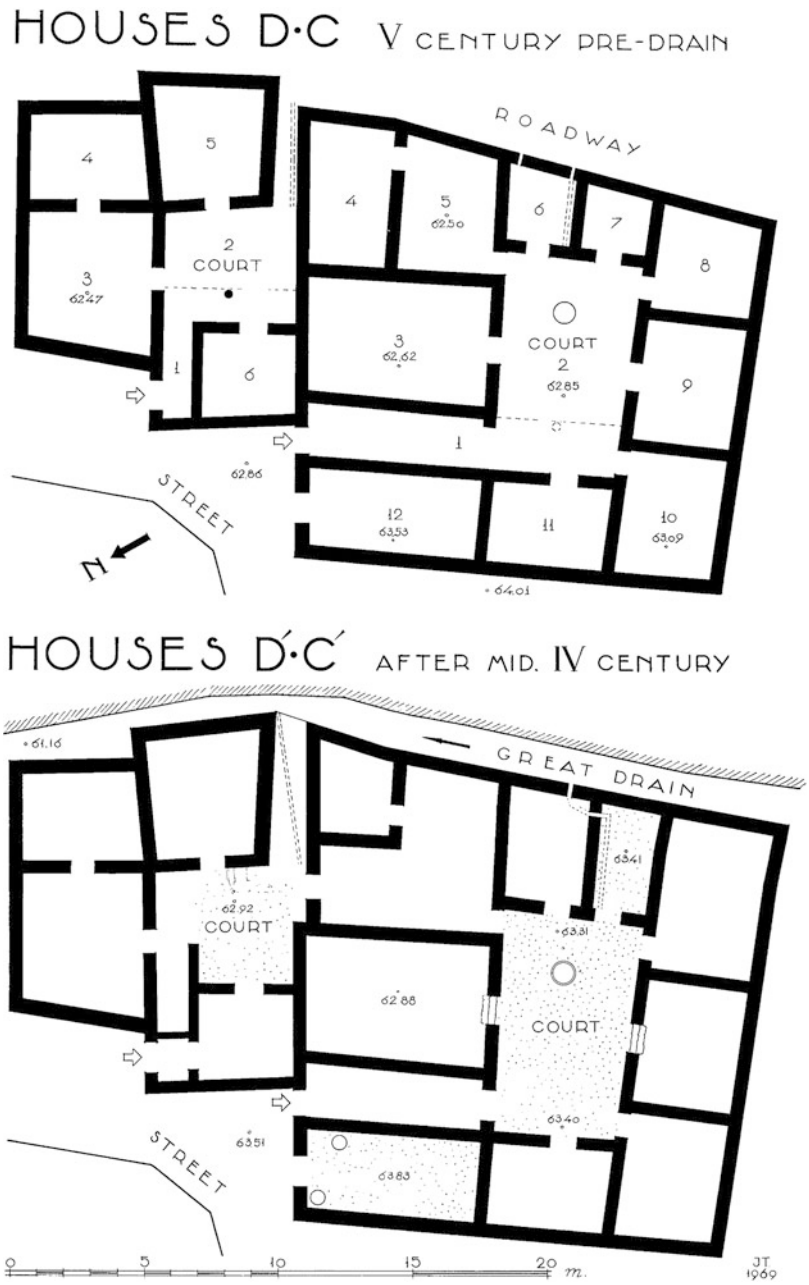

Greek Houses, Archaeology of, Fig. 1 Athens, industrial district, houses C and D, plans. (Permission: Athenian Agora excavations)

has been argued that the courtyard also enforced social control, as any inhabitant would have to pass through the courtyard on the way to any other room or to the street door of the house (Nevett 2010: 49).

The courtyard served the crucial purpose of housing the domestic water source. While running water from springs was preferred for drinking and was collected from fountains close to residential districts, wells were dug in or near Greek houses from a very early date. In the Late Classical period, the Greeks came to prefer cisterns to wells as domestic water sources, and one or more of these storage tanks were dug under the courtyard. The cisterns were usually bottle shaped but larger scale tanks were excavated under the

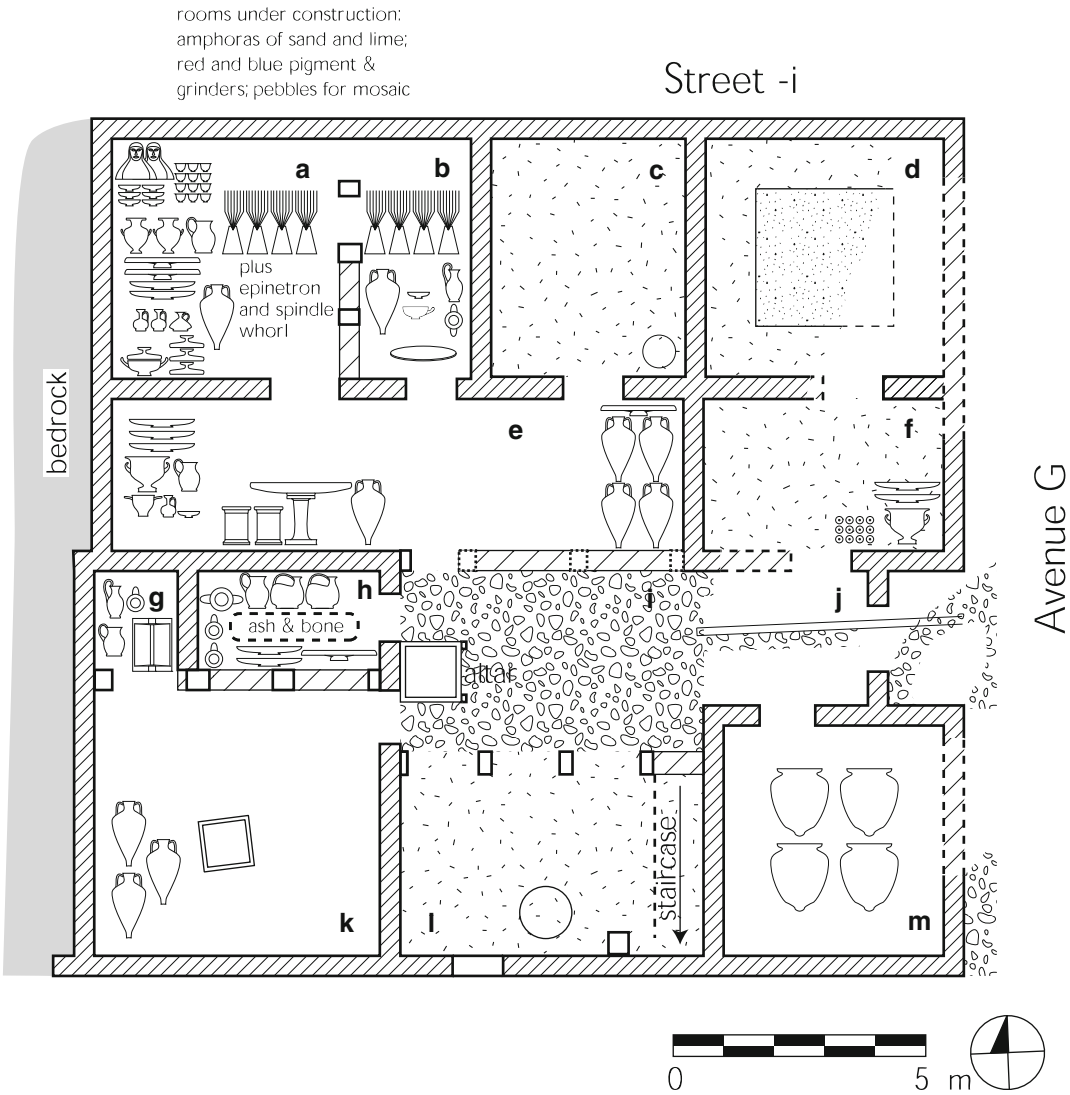

Greek Houses, Archaeology of, Fig. 2 Olynthos, House of Many Colors, plan with distribution of finds. (Permission: Nicholas D. Cahill)

houses on the dry Cycladic island of Delos and at Soluntum in Sicily (Wolf 2003: 93). The terracotta roofs of the houses were sloped to shed the rainwater into the courtyard, where the runoff would fill the cisterns (Fig. 4). The paving of Greek domestic courtyards further facilitated and maximized the water collection, and gardens were not planted in courtyards until the Hellenistic period and then only rarely (see, e.g., the House of the Arched Cistern, Tsakirgis Forthcoming).

Beginning in the Classical period, there is increasing evidence for a shed roof built on one or more sides of the domestic courtyard. The roofs were supported on a row of pilasters or columns, but peristyles running around all four sides of the court were not common until the fourth century BCE. The covered porticoes provided shelter for the inhabitants to sit or work out of the elements while still enjoying the light and air. Depending on the time of day and the season of the year, the

Greek Houses, Archaeology of, Fig. 3 Athens, block of classical houses on the north slope of Areopagus, plan. (Permission: Athenian Agora excavations)

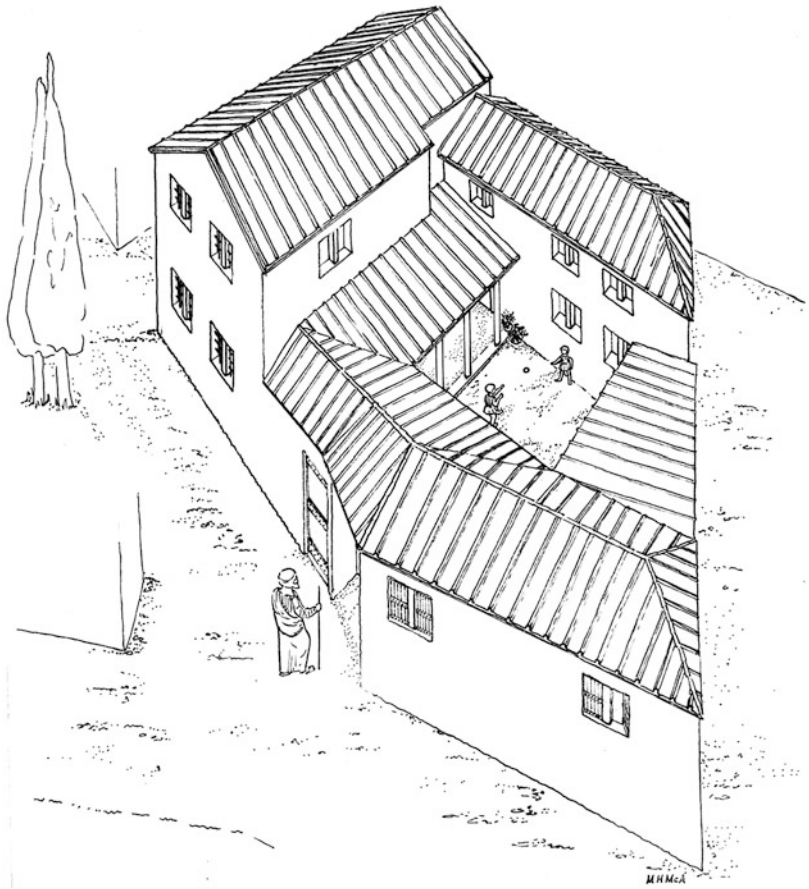

Greek Houses, Archaeology of, Fig. 4 Athens, House of the Greek Mosaic, reconstruction drawing. (Permission: Athenian Agora excavations)

porticoes also provided shade to the surrounding rooms. The shade could keep the inhabitants cool in the summer and the contrast between the bright exterior and the darker interior could increase the privacy of those within.

What we learn from the domestic assemblages recorded at Olynthos, Halieis, Halos, and elsewhere is that the Greek house was characterized by a considerable flexibility in the use of space (Cahill 2002; Ault 2005; Reinders and Prummel 2003: 284–294). The rigid identifications and specific functions of rooms in modern houses were not a feature of ancient domestic space. This flexibility was enhanced both by the furnishings in Greek houses, which were fewer than those we are accustomed to today, and also by the portability of many of the household objects, including the charcoal brazier and beds.

In the later fourth century BCE, houses increased significantly in size and in interior decoration. It has been theorized that the breakdown of the traditional Greek polis turned the Greeks to the home as a location for the types of social interaction that had previously taken place in public settings (Walter-Karydi 1994). From this date, many houses throughout the Greek world were built with two courtyards, one of which served as the hub of a nexus of rooms devoted to private domestic activities, while the other was the centerpiece of large and well-decorated rooms intended to be seen and used by guests. As will be discussed below, not all could afford such expansive living space, but those who could would decorate their homes with mosaic floors and painted wall plaster (Fig. 5). Hellenistic houses in both this extensive plan and highly

Greek Houses, Archaeology of, Fig. 5 Morgantina, House of Ganymede, mosaic of Ganymede. (Permission: Princeton University, Department of Art and Archaeology)

embellished interiors may have been influenced indirectly by the palaces built by the Macedonian kings and their successors and the importation of ideas of private luxury from the newly Hellenized east.

Key Issues/Current Debates

There are many aspects of Greek houses that have led to scholarly studies; the following section highlights several that have garnered the most attention and others which have attracted recent attention: typology, gender, economy, and regional variation.

Typology

Early studies of Greek houses focused on establishing typologies, emphasizing one feature over another as important in the layout of the house. Many of these early works are barren, as they focus solely on establishing typologies of house form. Of particular note in these typological studies was the distinction made between the *pastas* and the *prostas* house. Both terms derive from the same passage of the Roman architectural historian Vitruvius (VI.7.1), who wrote in the first century BCE that the porch-like area mediating the transition between the courtyard of the house and its main rooms was called by some Greeks the *pastas* and by others the *prostas*. The excavators of the 102 houses at Olynthos adopted the first term for the wider northern portico of the central courtyard (Fig. 2), while the excavators of the nearly contemporaneous houses at Priene adopted the second term for the columned porch serving a similar but limited function in front of the main room of the house. The arrangement of porch and rooms at Priene was limited to some houses in the eastern Mediterranean and possibly derived from the *megaron* form common in Bronze Age architecture. The typical *megaron* includes a main living room with a front porch, often facing south, and an overall axial approach, that is, direct line of access from the porch to the main room. In many Late Classical and Hellenistic houses the portico on the northern side of the courtyard was wider than any of the other three and can be seen as a survival of the earlier *pastas* form.

These earlier studies in terminology and typology have recently been supplanted by more nuanced considerations which have attempted to understand the use of space in the Greek house. These later studies stem ultimately from an attention to research on domestic architecture conducted by anthropologists and prehistorians who have not relied solely on literary sources for their interpretation of the use of space in the dwellings. Ultimately the more recent analyses have been of greater value in explicating life in

the Greek house as scholars have based their ideas more on the humble objects of the domestic assemblages than on the textual sources (e.g., Xenophon. *Oec*. or Lysias 1), some of which are highly idealized accounts of Greek private life.

Gender

A critical area to be understood is how Greek houses were used by women and men in the course of their daily lives. In the past it was held to be true that women were secluded in quarters separate from those of the men, and because physical proof of this separation is difficult if not impossible to recognize in the remains of houses, the women's quarters were conveniently assumed to have occupied the upper, now destroyed, story. The living arrangement in the Greek house was doubtlessly far more nuanced than was earlier believed. The vestibule, as described above, allowed for a separation of the private from the public and ensured that the family, in particular its female members, were kept apart from men to whom they were not related.

The parts of the house where women lived and worked cannot be recognized as separate from that of the men's quarters because women probably used all or almost all of the house throughout the day. What remains to give testimony of their daily lives is the household equipment used by them as they tended to domestic affairs. For Classical Athens these activities can be recognized in the highly idealized *Oeconomicus* by Xenophon. The unnamed bride in this account oversees the domestic activities, including cooking, textile work, management of the slaves, and the safekeeping of the family storerooms. It is not clear how much the wife in question actually participates actively in the housework.

Food was cooked for the family or for the male guests dining in the *andron* in any one of several locations. Terracotta braziers which burned charcoal were commonly used for heating and cooking and were small enough to be moved from one part of a house to another, thus reinforcing the flexible use of space (Fig. 6). Much cooking was likely done in the courtyard, where smoke could be easily evacuated through the unroofed space. Some houses may have allowed for food preparation in the anteroom of the *andron* (Fig. 2, rm. f), in order to facilitate the presentation of the hot dishes to the guests. In many later houses, a fixed hearth was never built, and its role as heat source, cook stove, and locus of ritual was accomplished by the humble brazier. Some houses, especially in northern Greece, continued to have fixed hearths: for example, less than a quarter of the houses at Olynthos (Fig. 2, rm. k), as well as at Orraon, and in one house at Kassope (Hoepfner and Schwandner 1994: 146–149). Many of these domestic hearths preserve no traces of bones or other food stuffs, and they probably served instead as gathering points for the family and as sources of heat, light, and ritual activity rather than as cook stoves. In the later Classical and Hellenistic periods, purpose-built kitchens became more common and at Olynthos, flues were constructed in part to evacuate the smoke from cooking (Cahill 2002: 139).

Greek Houses, Archaeology of, Fig. 6 Eschara-type brazier (Agora P 21956). (Permission: Athenian Agora excavations)

Weaving is presented in the literary sources as quintessentially women's work, but the *histeion* (loom room) as referred to by Menander (*Sam*. 19) appears to mean not a dedicated room but rather wherever the warp-weighted vertical loom was erected. As the loom was fashioned of wooden beams, none survives, but the terracotta weights do, and they are found everywhere in Greek houses, showing that looms could be erected wherever the weaver chose (Fig. 7). Store rooms (*pitheon*, *tameion*) can be identified by a concentration of storage jars (*pithoi*) or amphorae, but many houses lack traces of these terracotta vessels

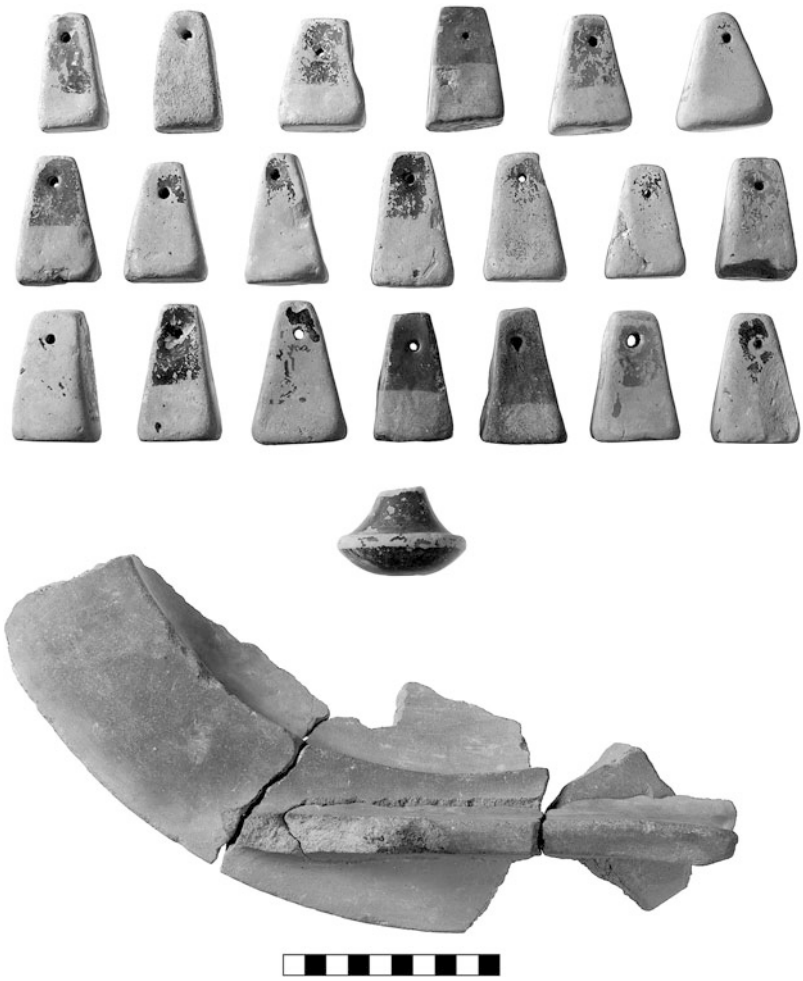

Greek Houses, Archaeology of, Fig. 7 Athens, house C, collection of loom weights, spindle whorl, rim of brazier. (Permission: Athenian Agora excavations)

and may have had provisions stored in now disintegrated cloth or leather sacks and baskets.

The upper stories of classical Greek houses are better known from literature than they are from material evidence and in his first forensic speech, Lysias (1.9) locates the women's quarters of an Athenian house on the upper story. The layout of the rooms mentioned by Lysias and whether they were dedicated only to the housing of women are much disputed by scholars of Greek private life. The northern rooms of classical houses at Olynthos are restored with upper stories that were approached by staircases rising from the domestic courtyard. The upper story was a feature in many Hellenistic houses such as Peristyle House I at Iaitas and most of the houses on the Aegean island of Delos (Dalcher 1994; Trümper 1998: 90–106). In contrast to the assumptions about the use of the upper rooms as women's quarters, domestic assemblages show that they could serve a variety of functions, including the men's office, as in the House of the Seals in Delos (Siebert 2001: 91). Many rooms on the upper floors of Hellenistic houses were no less well decorated than those on the lower story indicating that they were to be seen by guests. One upper room in Peristyle House I at Iaitas was a dining room, paved with mosaic rosettes and an inscription set in *opus signinum* (Brem 2000: 98–100, 116).

A characteristic room in many Classical Greek houses is the *andron*, used primarily as a setting for entertaining male guests. Purpose-built *andrones* appear in Classical houses at Priene,

Athens, and Olynthos (Fig. 2, rm. d), but many houses do not contain a room intended solely for hosting the symposium. Men could lie on couches or mattresses around any room and eat or drink wine, so a house without an *andron* is not necessarily a house where the symposium did not take place. Rooms built to function primarily as *androne*s were usually square, with an off-center doorway, so that the maximum number of dining couches could be placed against the walls; a raised platform for the couches was common in the Classical house. *Androne*s accommodating three, seven, or even eleven couches were common in domestic buildings (Fig. 4; Fig. 2, room d).

The *andron* was the room displaying the highest quality decoration; mosaic floors were first placed here and only later were used to pave other rooms of houses and public buildings (Westgate 1997–1998). The mosaics were primarily decorative with the designs aligned to be seen best by diners entering the *andron* (Fig. 5). The pavements were conceived of as carpets in stone and some rooms also had a small panel laid in the doorway to mimic a doormat. The stone floors had a practical aspect. Many dinner and drinking parties ended with spilled food and drink mixed with the remains of vessels that had slipped from the grasp of drunken guests and the stomach contents of those who had over-imbibed. Slaves charged with cleaning the *andron* could simply sluice out the mess without damaging a floor laid in stone. Some *androne*s were preceded by an anteroom, a buffer between the noise of the all-male party, and the privacy of the household residents, and many anterooms were furnished as nicely as the dining room itself, with mosaic pavements and painted walls. The quality of much of the décor was intended to declare the wealth and taste of the householder to his guests.

Economy

Status Display

Throughout Greek history, the householder had many ways to demonstrate his wealth. Some status displays were on the house façade and were intended for both the passerby and the invited guest. Storage jars were often prominently placed in early Greek houses on Crete and the Cycladic islands, declaring that the owner had the necessary resources to supply his dependents in times of need. Doorways and some windows were inserted into the exterior walls of Classical and Hellenistic houses and were further means for demonstrating wealth (Tsakirgis 2010). Because the regions that border the Mediterranean are extremely dry, wood was rare and extremely costly, so much so that evidence from inscriptions (e.g., sales contracts and leases for houses as well as auctions of property) often stipulated that the doors and shutters were movable property, rather than part of the real estate (e.g., IG I^3 422, ll. 13-6; IG I^3 l. 3, l. 6). The metal nails and bronze bosses attached to the doors made the wooden doors impregnable and even more impressive to a visitor. The street entrance to the Classical Greek house was rarely distinguished by any architectural embellishments, although some were favored in the Hellenistic period when pilasters were fashioned on either side of the main door, as in the House of the Official at Morgantina (Tsakirgis Forthcoming). The upper rooms in several Delian houses, such as the House of the Pediments, were provided with large windows, framed with impressive pilasters.

In the Late Classical and Hellenistic period when larger houses were built, the rooms were more commodious than their predecessors, but more specialized rooms were also constructed. As noted above, purpose-built kitchens first appear in fourth century houses. Personal cleansing, which was earlier accomplished with water poured into *lekanai* (basins) or *louters* (shallow basins on stands), took place instead in the bathrooms of elite houses. The bathrooms were often constructed next to rooms with hearths, either the kitchen, as at Eretria, or the hearth room, as at Olynthos (Reber 1998: 56–57; Cahill 2002: 250). The proximity of the two rooms allowed water to be heated before it was used by the bather. Bathing culture developed considerably in the Hellenistic period when heated domestic baths were built in Hellenistic houses, for example, the House of the Arched Cistern at Morgantina (Tsakirgis Forthcoming; Trümper 2010).

Early Greek houses lacked any permanent decoration; textiles used as curtains or rugs may have provided some interior embellishment. The second half of the fifth century BCE was a watershed for domestic décor as it was for house size. At this time mosaic pavements and painted wall plaster first appeared in domestic settings and both were intended to impress guests, as is evident from their placement first in the *andron* where men were entertained. As did the doors and fittings of the street entrance, the formal flooring and the painted plaster declared the wealth and taste of the householder to those outside of the family. The earliest domestic mosaics were created with black and white pebbles laid in designs including the geometric and floral forms known from vase painting, architecture, and probably also no longer extant textiles. Central scenes were largely mythological and Dionysos was favored in the *andron* where drinking was the preferred activity. In the third century BCE, the stones were cut into cubic *tesserae* so that they could be set more closely together and the palette was broadened to include as full a spectrum of colors as the available materials allowed (Dunbabin 1999: 18–37) (Fig. 5).

The painted wall plaster was quite simple in its arrangement in Classical houses, with one color used for the dado and another for the wall above. On the walls of Hellenistic houses, fictive architecture was produced in painted and sometimes molded stucco; rows of blocks with drafted edges were rendered in a variety of hues, often reflecting the wider array of colors used in the floor mosaics. Some blocks were painted with imitation veining to resemble expensive marble, the ultimate inspiration for all of the colorful display. Doorframes and cornices were created in stucco in imitation of the forms used in public architecture. Figural painting was very rare in the domestic setting until the late Hellenistic period, when it is found in some Delian houses. As houses became larger in the Hellenistic period, rooms that would be seen by guests were favored with expensive decoration, but increasingly more of the house was decorated in some way (Westgate 1997–1998).

The evidence for other forms of decoration in domestic contexts is scant, largely due to the vagaries of archaeological preservation. Greek houses possessed some sculpture, although most if not all must have been dedicated to household ritual; however, a secondary function of the images would have been their aesthetic effect. Sculptures in the houses at Eretria and Delos were displayed so that they could be seen from many parts of the home and especially by those entering the front door. Terracotta figurines are abundant in domestic assemblages and also functioned as both ritual equipment and decoration of the interior space. Written sources (IG I^3 423, ll. 59, 60–61, 62; Pritchett 1956: 250–253) attest that painted panels (*pinakes*) were displayed in some Classical houses, but none is preserved to give any information as to common subjects or settings for the pictures.

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Socioeconomic Considerations

Distinguishing between elite and non-elite housing can be difficult in the absence of both prosopographic information and complete artifactual assemblages. A further complication results from anachronistic assumptions about elite residences. While it might be assumed that the wealthy or politically powerful lived in large and elaborately furnished homes, testimony from Demosthenes (*Olynthiac* 3.25) suggests that at least in the fifth century BCE men of power lived in houses indistinguishable from those of other Athenians. In cities such as Athens, with a large population of metics (resident aliens) in the Classical period, it is also difficult to distinguish between houses occupied by citizens and those lived in by the metics who could not own a property before the fourth century BCE and thus rented living space from a citizen landlord (Thür 1989).

The homes of the poor are especially challenging to identify. Literacy among this group was virtually nonexistent, so there are no firsthand accounts of their houses. Some two- or three-room residences, identified as such from the domestic wares recovered there, have been recognized in a block of Classical houses on the slope of the Areopagus in Athens (Fig. 3). A few of the original housing lots at Olynthos were later divided into smaller units, perhaps for families of lesser means. Some Delian houses of the Hellenistic period, for example, the House of the Masks, had

staircases located in the street, suggesting that the upper story was independent of the house below and may have been a rented or separately owned apartment (Trümper 2005: 136).

Commercial Activity and Houses

In many Greek cities the divide between residential areas and those dedicated to industry and commerce was not as pronounced as it is in modern urban areas. In some Athenian houses living and workspace was little distinguished, and both tools and worked materials suggest that industrial activity was conducted in the same building where whole families resided (Tsakirgis 2005). Spacious houses allowed for the segregation of industrial activity from the domestic, the assemblages indicating that household activities were relegated to one part of the building and the manufacturing and sales to another. Several such houses stand on the periphery of the Athenian Agora (Fig. 1) and because of their location take advantage of the commercial activities that were one focus of the civic center.

Some Greek houses have single rooms or two-room suites which open directly onto the street and do not communicate with the living quarters within (Fig. 1, rm. 12). While these rooms were likely shops, many do not contain evidence of what was manufactured or sold within. Such shops lined major thoroughfares or clustered at the intersections. The shopkeepers of antiquity were well aware of the advantage of location for attracting passersby to purchase their wares.

Regional Variation

There is evidence of regional variation in Greek houses. Some differences can be ascribed to the availability of materials, such as wood or expensive stone, for example, although wood was scarce in mainland Greece, it was more abundant in Sicily, and so wooden doors were more commonly built in the island houses and woven curtains probably used to close off rooms in mainland houses. In mainland and eastern Greece where marble was abundant, household sculpture or *tesserae* in the mosaic floors could be crafted from the more expensive stone.

Other differences were due to climatic variation in the areas where Greeks lived. Most of the islands, for example, were especially dry, and the flat roofs of Cycladic houses can be seen as responses to this climatic condition. The rainfall there was so negligible that the pitched roofs with costly terracotta tiles common on the mainland were not constructed on island houses. Some northern sites (e.g., Olynthos and Stageira) were subject to cold and windy weather in winter, so fixed hearths continued to be built there throughout the Classical period, even though elsewhere the portable brazier served for heating and cooking.

Significant regional differences in the plans of houses result from variations in social practice. While the Greeks can be recognized in general terms as a cultural group, their social organization, whether familial or political, was based on varied practices throughout the Mediterranean. As the layout of houses has been deemed to be a direct response to the organization of social life, we can observe the social variations in the plan of the city in macrocosm and the house in microcosm. Thus, while the single-entrance courtyard house prevailed in democratic cities, communities with different social practice built their houses to a different model. Houses on Crete, for example, continued to have direct access from the exterior and a linear layout of rooms in later periods, indicating that the social norms and practices there differed from those in cities such as Athens (Westgate 2007).

Cross-References

- ▶ Andron
- ▶ Baths and Bathing, Greek
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Crete, Archaeology of
- ▶ Domestic Architecture, Roman
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Nuragic Culture and Architecture (Bronze Age to Iron Age)
- ▶ Polis

▶ Sicily and Magna Graecia, Archaeology of
▶ Symposion
▶ Urban Planning in the Greek World

References

Ault, B. A. 2005. *The excavations at Halieis*. vol. 2. The houses: the organization and use of domestic space. Bloomington: University of Indiana Press.

Brem, H. 2000. *Studia Ietina 7: Das Peristylhaus 1 von Iaitas: Wand- und Bodendekorationen*. Zurich: Archaeological Institute, University of Zurich.

Cahill, N.D. 2002. *Household and city organization at Olynthus*. New Haven: Yale University Press.

Dalcher, K. 1994. *Studia Ietina 6: Das Peristylhaus 1 von Iaitas: Architektur und Baugeschichte*. Zurich: Archaeological Institute, University of Zurich.

Dunbabin, K.M.D. 1999. *Mosaics of the Greek and Roman world*. Cambridge: Cambridge University Press.

Hoepfner, W., ed. 1999. *Geschichte des Wohnens, Band 1. 5000 v. Chr.-500n. Chr. Vorgeschichte, Frühgeschichte, Antike*. Stuttgart: Deutsche Verlags Anstalt.

Hoepfner, W., and E. L. Schwandner. 1994. *Haus und Stadt im klassischen Griechenland*. 2nd edn. Wohnen in der klassischen Polis I. Munich: Deutscher Kunstverlag.

Nevett, L.C. 1999. *House and society in the ancient Greek world*. Cambridge: Cambridge University Press.

Nevett, L.C. 2010. *Domestic space in classical antiquity*. Cambridge: Cambridge University Press.

Pritchett, W.K. 1956. The Attic Stelai: part II. *Hesperia* 25: 178–328.

Reber, K. 1998. *Eretria. Ausgrabungen und Forschungen X. Die klassischen und hellenistischen Wohnhäuser im Westquartier*. Lausanne: Editions Payot.

Reinders, H.R., and W. Prummel. 2003. *Housing in New Halos*. Lisse: Balkema.

Siebert, G. 2001. *Exploration archéologique de Délos, XXXVIII: L'Îlot des Bijoux, L'Îlot des Bronzes, la maison des Sceaux, 1: topographie et architecture*. Paris: de Boccard.

Thür, G. 1989. "Wo wohnen die Metöken?". In *Demokratie und Architektur. Der hippodamische Städtebau und die Entstehung der Demokratie*. Wohnen in der klassischen Polis II, ed. W. Schuller, W. Hoepfner, and E.-L. Schwandner, 117–112. Munich: Deutscher Kunstverlag.

Trümper, M. 1998. *Wohnen in Delos: eine baugeschichtliche Untersuchung zum Wandel der Wohnkultur in hellenistischer Zeit*. Rahden/Westfahlen: Verlag Marie Leidorf.

Trümper, M. 2005. Modest housing in late Hellenistic Delos. In *Ancient Greek houses and households. Chronological, regional, and social diversity*, ed. B.A. Ault and L.C. Nevett, 119–139. Philadelphia: University of Pennsylvania Press.

Trümper, M. 2010. Bathing culture in Hellenistic domestic culture. In *Urban living in the Eastern Mediterranean*, ed. S. Ladstätter and V. Scheibelreiter, 529–567. Vienna: Austrian Academy of Sciences Press.

Tsakirgis, B. 2005. Living and working around the Athenian Agora: a preliminary case study of three houses. In *Ancient Greek houses and households: chronological, regional, and social diversity*, ed. B.A. Ault and L.C. Nevett, 67–83. Philadelphia: University of Pennsylvania Press.

Tsakirgis, B. 2007. Fire and smoke: hearths, braziers and chimneys in the Greek house. In *Building communities: house, settlement and society in the Aegean and beyond*. BSA Studies 15, ed. R. Westgate, N. Fisher, and J. Whitley, 225–231. London.

Tsakirgis, B. 2010. Illuminating the life within. Windows on behavioral patterns in Greek houses. In *Urban living in the Eastern Mediterranean, fourth century B.C. to first century A.D*, ed. S. Ladstätter and V. Scheibelreiter, 569–582. Vienna: Austrian Academy of Sciences Press.

Tsakirgis, B. forthcoming. *The domestic architecture of Morgantina in the Hellenistic and Roman periods*. Morgantina studies 7. Princeton: Princeton University Press.

Walter-Karydi, E. 1994. *Die Nobilitierung des Wohnhauses. Lebensform und Architektur im spätklassischen Griechenland*. Konstanzer althistorische Vorträge und Forschungen 35. Xenia: Wolfgang Schuller.

Westgate, R. 1997–1998. Greek mosaics in their architectural and social context. *BICS* 42: 93–115.

Westgate, R. 2007. House and society in classical and Hellenistic Crete: a case study in regional variation. *American Journal of Archaeology* 111: 423–457.

Wolf, M. 2003. *Die Häuser von Solunt und die hellenistische Wohnarchitektur*. Mainz am Rhein: von Zabern.

G

Greek Islands (Excluding Crete), Archaeology of

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Introduction

The Aegean Sea is full of islands ranging in size from a few large ones to numerous islets and uninhabited rocks. It is easy to discern a series of distinct clusters: the Northern and Eastern Aegean islands, the Northern Sporades, the Argo-Saronic Gulf islands, the Cyclades, and the Dodecanese.

Another cluster is formed by the islands in the Ionian Sea. Although the Greek islands differ in size, landscapes, or resource wealth, they share many common features, which have consequently shaped their more or less common history. In addition to the numerical dominance of smaller islands over large ones, just a handful of islands can be characterized as rather isolated (e.g., Lemnos, Skyros, and Astypalaia) since interisland distances are modest and the majority of the islands are a short distance from mainland shores. This feature entails, in optimal weather conditions, the high degree of intervisibility in the island-studded seas of Greece. Thus, the islands became enmeshed in interaction networks and, thanks to their key role in communication routes, occupied diachronically a particularly favorable position in these networks. The dialectical relationship with non-insular communities significantly influenced the Greek islands from their early history. The insularity, however, enabled islands to assimilate selectively continental elements and develop their own cultural diversity. Nevertheless, the escalating incorporation by the great powers of each historical period led to the gradual loss of the islands' cultural identity. Explicitly, the flourishing islands of the Early Iron Age (EIA) and the Archaic period gradually lost their autonomy and were controlled by the emergent *poleis* (city-states) of mainland Greece and the Hellenistic kingdoms, until they were reduced to a minor part of the Roman provinces.

Definition

Archaeology of the Greek islands may be defined as the study of every element of their material culture, in order to provide an expanded understanding of island history. The available archaeological information results from the numerous systematic or rescue excavations and field surveys that have been undertaken in the Greek islands since the end of nineteenth century by many organizations: the Greek Archaeological Service, the Archaeological Society of Athens, and other Greek institutions (such as universities and institutes), as well as several foreign archaeological schools (e.g., the British, the French, and the Italian) and institutes (including the German, the Austrian, the Swedish, the Danish, the Norwegian, the Irish, the Netherland, the Australian, and the Canadian).

Historical Background

The time span from the end of the Bronze Age to Byzantine times is conventionally divided into five periods: the Early Iron Age (c. 1050–700 BCE), the Archaic (c. 700–479 BCE), the Classical (c. 479–323 BCE), the Hellenistic (c. 323–31 BCE), and the Roman period (c. 31–324 CE).

The collapse of Mycenaean palatial centers in the late thirteenth century BCE and the consequent gradual disintegration of the Mycenaean civilization during the twelfth and early eleventh centuries BCE marked the beginning of a long period of social upheaval and political ferment that significantly affected the Greek islands (Dickinson 2006). In the early 1970s, the term "Dark Ages" was adopted for the period c. 1050–900 BCE in order to denote its culture, which seemed to be in a state of decline and isolation, as well as the low level of our knowledge of this period (Lemos 2002: 1). Recent archaeological research, however, is gradually changing this picture, particularly regarding the alleged poverty and isolation. An alternative term for the period c. 1050–900 BCE is "Protogeometric," after its characteristic pottery style (Lemos 2002: 27–100).

The ensuing Geometric period (c. 900–700 BCE), named after its main style of pottery, was a time of dramatic transformation that led to the establishment of primary Greek institutions (Coldstream 2003). The small Protogeometric settlements developed into well-organized towns, population increased, overseas contacts were intensified, trade was expanded, and iron metallurgy developed significantly. Moreover, the Greeks adopted the Phoenician alphabet during the first half of the eighth century BCE. It is not possible to determine the birthplace of the Greek alphabet, but there is no doubt that Euboea and the Aegean islands played a pivotal role (Mazarakis

Ainian and Leventi 2009: 214–215). All these advances were interdependent and resulted in the general improvement of living conditions. The major rise in population, however, created a land hunger, which eventually led to the foundation of colonies overseas, and wars in the homeland (Coldstream 2003: 368). Moreover, maritime trade rivalries aroused the hostility between certain islands, and archaeological research may reveal some events related to these conflicts (e.g., the two massed graves at Paroikia on Paros; Coldstream 2003: 398–399; Mazarakis Ainian and Leventi 2009: 215).

The Archaic period (c. 700–479 BCE) was the heyday of the islands. They enjoyed great prosperity, thanks to the exploitation of raw materials (e.g., marble quarries of Naxos and Paros, gold and silver mines of Siphnos), their strategic position for control of sea routes, and their political autonomy. Many flourishing islands, such as Naxos, Paros, Andros, Thera, Samos, Chios, Thasos, and Rhodes, took a leading role in the colonization of Sicily, Southern Italy, Thrace, the Black Sea, the west coast of Asia Minor, and the north coast of Africa, while several offshore islands (e.g., Thasos, Lesbos, and Rhodes) controlled extensive lands on the mainland opposite (Constantakopoulou 2007: 231–253). On the other hand, trade rivalries led to clashes between island and mainland cities (e.g., Mytilene-Athens and Samos-Megara) or between islands (e.g., Naxos-Paros and Samos-Aegina). Meanwhile, political ferments and social upheavals took place in the island *poleis*, as a result of the economic success of more middling citizens (e.g., seafarers and merchants) or the disaffection of excluded aristocrats. This allowed the emergence of tyrannical regimes in a few islands, such as Naxos (Lygdamis) and Samos (Polycrates). In order to maintain and stabilize their own positions of power, the tyrants embarked on major building projects, whose distinguishing feature is monumentality. Herodotus (3.60) considers the Samian buildings as the greatest of all Greece and admires particularly the temple of Hera, the aqueduct, and the great harbor mole, ordered by Polycrates (Rolley 1994: 157).

From the Persian wars onward (the Classical period, c. 479–323 BCE), the islands lost their political independence and stayed in the shadow of the great powers of each historical period. At the beginning of the fifth century BCE, most of the islands were under Persian rule. After the Greek success against the Persian Empire, the islands fell under the direct control of Athens, first in the "Delian (or "First Athenian") League" and then in the "Second Athenian League," interrupted only by an interval under Spartan domination (c. 404–378 BCE). After the victory of Phillip II over the combined Greek forces at Chaeronea (338 BCE), the islands became subject states of the Macedonian kingdom. Nevertheless, thanks to their strategic position and the exploitation of their natural resources (e.g., marble from Paros and Thasos; wine from Thasos, Chios, and Kos; ruddle from Kea; mastic from Chios), several islands achieved economic prosperity which is clearly manifested in their material culture (see below).

During the early Hellenistic period (late fourth–early third centuries BCE), the rivalries between the rulers of the successor kingdoms involved the Greek islands, as the Antigonids and the Ptolemies were trying hard to assume the leadership of the "League of Islanders." Rhodes was the only island able to maintain her political independence and developed into a naval power until Delos was declared a free port (167/6 BCE), delivering a severe blow to the Rhodian economy and promoting the explosive growth of Delos during the second half of the second century BCE (Bruneau and Ducat 2005: 41). Meanwhile, trade and, to a lesser extent, religious festivals (for instance, in honor of Hera on Samos, Asklepios on Kos, and the Kabeiroi on Samothrace) gave island communities a cosmopolitan character, reflected in the temples which served non-Greek deities on Delos, as well as in the Jewish synagogues on the islands of Samos, Delos, Kos, and Rhodes. Throughout the Hellenistic period, piracy was a constant threat to the islanders but at the same time yielded substantial profits for several islands, such as Delos, Rhodes, and Aegina, where there were thriving slave markets (de Souza 1999: 43–96). Moreover, the islands

suffered many hardships as a result of the Mithridatic wars and Rome's civil strife during the first century BCE, as, for example, Delos, which was sacked twice (88 and 69 BCE) and never fully recovered (Bruneau and Ducat 2005: 42–43).

Rome first established trade contacts with the Greek world in the sixth century BCE, while her political and military involvement started with the 1st Illyrian war (229–228 BCE) and grew steadily, resulting in the complete submission of Greece (Alcock 1993: 8–24). It was not until the battle of Actium (31 BC), however, that Greece was finally reconciled to Roman rule in a unified empire. The islands were included in the Roman provinces of Achaea, Macedonia, Epirus, and Asia, until the end of the third century CE when a separate island province (*Insulae*) was formed including most of the Aegean islands. Trade routes were extended throughout the Mediterranean due to the vast size of the Roman Empire. As a result, the islands lost the key role they had played over the preceding centuries. A clear indication of their marginal importance is illustrated by the fact that many islands (e.g., Amorgos, Donousa, and Gyaros) served as places of exile. Nevertheless, *negotiators* or *pragmateuomenoi* (businessmen; Alcock 1993: 75–77, 101) settled in many islands (e.g., Kerkyra, Zakynthos, Tenos, Delos, Naxos, Melos, and Thera), and, as archaeological evidence indicates, several island communities or certain islanders enjoyed economic prosperity.

Key Issues/Current Debates

Archaeological research of the Greek islands is very important, as it can inform us about the history of islands themselves, as well as about the history of the Greek world and, more generally, of the Mediterranean. There are notable idiosyncrasies related to island culture as islanders can be temporarily linked in or cut off from the Aegean/Mediterranean as networks shift. Thus, one of the greatest challenges for scholars is to explore the indigenous island elements and how they factored into the formation of island culture. Another challenge is to understand which aspects of island culture resulted from the influence of other regions, as well as in what way the islands affected the non-island world. Thanks to fieldwork and study conducted by several generations of Greek and non-Greek archaeologists, our knowledge about the archaeology of the Greek islands has increased significantly. There is certainly a lot that remains unknown or which requires further examination, but the current state of archaeological knowledge about the Greek islands provides enough material for a satisfactory understanding of what living on islands might have been like.

Settlement and Settlements

The limited data available about the Protogeometric settlements do not permit safe conclusions about their layout. However, it can be stated that in most islands, habitation was scattered in villages, hamlets, and isolated farmsteads (Dickinson 2006: 84–93). Dramatic changes during the Geometric period resulted in the gradual development of well-organized towns toward the end of the eighth century BCE. Most of these towns (e.g., Zagora and Hypsele on Andros, Emborio on Chios) were founded on rather inaccessible and naturally defensible positions, indicating a feeling of insecurity (perhaps because of piratical raids), and were usually densely built but with no precise plan (Coldstream 2003: 305–311, 399). The houses were rectangular and stone built, while flat roofs must have been the general rule (Mazarakis Ainian and Leventi 2009: 216–218).

During the Archaic period, some of the EIA settlements grew into *poleis* (e.g., Naxos, Xobourgo on Tenos, and Minoa on Amorgos), while others did not (e.g., Ayios Andreas on Siphnos, Hypsele on Andros). Island *poleis* also were created by the unification of communities which peacefully abandoned their previous settlements to found a new city. For example, Palaiopolis on Andros probably received an influx of population from Zagora and Hypsele, and on Paros, the inhabitants of Koukounaries apparently moved to Paroikia (Mazarakis Ainian and Leventi 2009: 219). It is noteworthy that several large islands, such as Andros, Tenos, Naxos, and Paros, had only one single *polis*, while smaller

and less prosperous islands (e.g., Kea, Mykonos, and Amorgos) had more than one *polis* from the Archaic period onward. There is no universal explanation for this phenomenon, as it seems that each case was affected by local factors. For instance, the division of Kea into four territories reflects either different periods of settling or intervention by neighboring and powerful Athens (Cherry et al. 1991: 5, 8).

During the Classical, Hellenistic, and Roman periods, the *poleis* of Archaic times continued to be inhabited, but the available information is rather restricted since most of these cities lie under the modern towns. Regarding settlement patterns of the islands, archaeological research indicates a three-tier hierarchy: towns, villages and/or hamlets, and farmsteads. The Archaic and Classical houses were simple structures and served the needs of a family. However, from late Classical times and during the Hellenistic period, houses became a medium for the rich and powerful to demonstrate their wealth and social status. As a result, luxurious edifices of two or even three stories, with peristyle courts, elaborate banquet halls (*androne*s), sumptuously decorated rooms, and a large number of service rooms, were constructed (Winter 2006: 157–182).

During the Roman period, the island cities gradually acquired a pronounced Roman flavor, but they retained their Greek character (see below). Both in the cities and in the countryside of islands like Lesbos, Samos, Kos, Naxos, Melos, Kerkyra, and Kephallenia, luxurious buildings (usually referred to as "villas," Alcock 1993: 64–68) decorated with mosaic pavements, wall paintings, and statuary were constructed. These buildings, the most distinguished of which are the so-called Menandros's House on Lesbos and the Casa Romana on Kos, usually served as residences of wealthy families or were intended for certain public services, such as the "Hall of the Mystae" in the city of Melos, a religious meeting place for worshipping Dionysos (Karvonis and Mikedaki 2012: 38, 92–93, 174, respectively).

Public and Religious Architecture

Strong fortification walls reinforced the natural defensibility of many EIA settlements, including Zagora and Hypsele on Andros, Xobourgo on Tenos, Vathy Limenari on Donousa, Minoa on Amorgos, and Emborio on Chios. The construction of fortifications was a corporate enterprise, indicating a remarkable degree of political cohesion among the people who dwelt inside them, as well as of political organization of island communities. Moreover, in some of the better-preserved island settlements (Emborio on Chios and Zagora on Andros), an open space between the sanctuary and the chief residence has been interpreted as a space for assembly, where the elite group was entitled to take the decisions on the public life (Coldstream 2003: 314–315).

Due to the lack of architectural evidence with undisputed religious purposes, it is assumed that almost all worship took place in the open air during the Protogeometric period. The focal point of the cultic activity was usually an altar or a large rectangular hearth (*eschara*). During the Geometric period, these open-air sanctuaries gradually evolved into temples, and worship habits were standardized. In addition to the urban temples (e.g., at Emborio on Chios, Zagora on Andros, and Koukounaries on Paros), there were sanctuaries and temples located outside the settlements. These are divided into "rural" and "peri-urban," such as at Ayia Irini on Kea and Iria on Naxos. The Heraion of Samos is a characteristic case of an open-air sanctuary which subsequently evolved into a major "peri-urban" temple.

During the Archaic period, the prosperity of the islands and intense competition between citizens, tyrants, and *poleis* for wealth, power, and prestige is evidenced by the public and religious architecture. Until the end of sixth century BCE, many island *poleis* had constructed impressive fortifications (e.g., Thasos, Samos, Aegina, Karthaia on Kea; Xobourgo on Tenos; Vryokastro on Kythnos; Kastro on Siphnos; Paroikia on Paros; Minoa on Amorgos; Melos) and aqueducts, such as the famous aqueduct by the architect Eupalinos for the city of Samos and the aqueduct of Naxos. Moreover, public buildings with different functions appeared mainly in major sanctuaries, such as Delos (e.g., "Oikos of the Naxians," "Treasury 5," "Bouleuterion" or

"Building D," "Stoa of the Naxians," "Oikos of Andros"; Bruneau and Ducat 2005: 171–176, 188, 189, 199–200, 205, respectively) and the Samian Heraion ("South Stoa"; Gruben 1966: 319–320). Display of wealth is also observed in impressive architectural offerings, such as the treasury of the Siphnians dedicated at Delphi and the Naxian dedications at Delos (Gruben 1966: 81–82, 144; Bruneau and Ducat 2005: 199–200).

Several of the most prosperous islands contributed significantly to the process that led to the canonical form of the monumental Greek temple (Gruben 1966: 32–42, 309–315). At Samos, three successive temples dedicated to Hera were built during the Archaic period: the "Hekatompedon II" (c. 675–625 BCE), the "Rhoikos temple" (the first monumental Ionic temple, c. 570–560 BCE), and the "Great Temple" (erected by Polycrates before the end of sixth century BCE; Gruben 1966: 318–319, 321–325, 325–329, respectively). Naxos undoubtedly played a leading role in the shaping and development of the Ionic order, as evidenced by the temple of Yria, the unfinished temple of Apollo Delios in the city of Naxos, the temple of Gyroulas (Mazarakis Ainian and Leventi 2009: 220–222), and the Oikos of the Naxians on Delos (Gruben 1966: 144; Bruneau and Ducat 2005: 199–200). Paros rivalled Naxos with the temple of Athena at Koukounaries, the temple of Artemis on the Delion, and the Apollo sanctuary on the islet of Despotiko near Antiparos (Mazarakis Ainian and Leventi 2009: 219, 222–223). Lesbos contributed to the formation of the so-called "Aeolic" (or "Proto-Ionic") order, whose main feature was the Aeolic column capital (Betancourt 1977: 87). The Doric order was formed in mainland Greece, yet important Doric temples are found on several Greek islands, as, for instance, the two successive temples of Athena Aphaia on Aegina (Gruben 1966: 110–115) and the temple of Artemis on Kerkyra (Gruben 1966: 103–107).

During the Classical period, the majority of cities had massive fortifications, which were both a military advantage and a vivid symbol of the sovereignty of the *polis*. Some of them (e.g., Thasos in 463 BCE, Aegina in 457 BCE, Samos in 439 BCE, and Mytilene in 427 BCE; Hansen and Nielsen 2004: 779, 622, 1095–1097, and 1027, respectively) were compelled to demolish their walls for political reasons. Numerous temples, political structures (e.g., *prytaneion* and *bouleuterion* on Delos and Paros), and other public buildings (e.g., stoas on Delos, Andros, Thera, Kos, and Thasos) are attested archaeologically. Moreover, theaters (e.g., Delos, Methymna on Lesbos, Ialysos and Lindos on Rhodes) and stadia (e.g., Aegina, Rhodes) started to be constructed in the islands probably before the end of the Classical period (Hansen and Nielsen 2004: 1379–1381).

Freestanding towers, round or square in shape, are one of the most common features of the islands in the late Classical and Hellenistic periods (Morris and Papadopoulos 2005). Particularly numerous on some islands (33 on Thasos, over 70 on Kea, 76 on Siphnos), they have been detected on the Cyclades (Andros, Tenos, Naxos, Kythnos, Seriphos, Ios, Amorgos), the Northern Sporades (Skopelos, Alonnesos), the northeastern Aegean (Lesbos), and the Ionian islands (Leukada), as well as on tiny islands (e.g., Seriphopoula, Herakleia, Arkioi, and Pharmakonisi). Various interpretations have been proposed, such as that they served as agricultural storehouses, slave quarters, lookout, and signaling posts and that they protected mines and quarries and/or were used as places of temporary refuge in cases of emergency; their precise function, however, remains disputed.

The most characteristic feature of the Hellenistic architecture is the theatrical mentality, which is expressed mainly in planning and organization of sanctuaries (Pollitt 1986: 230–242). Stoas, stairways, ramps, colonnades, and gates were used in a calculated, coordinated way in order to slowly lead potential visitors to a dramatic climax before the temple was revealed. Perhaps the most impressive of such arrangements are the temple of Athena at Lindos on Rhodes and the sanctuary of Asklepios on Kos (Winter 2006: 216–218). It is worth mentioning that the initiative in the architectural formation of the great sanctuaries (e.g., on Samothrace, Kos, and Rhodes) was being seized by rulers (such as Ptolemy II Philadelphus,

Arsinoe II, and Eumenes II), who flaunted their power, wealth, and hegemonic ambitions.

In Roman times, the temples, public buildings, and urban infrastructure resulted from the beneficence of local patrons and, sometimes, the emperor himself, who donated the construction costs and materials or underwrote repairs. The traditional forms of urban architecture could easily absorb Roman structures. As a result, certain typical building structures, such as fora and basilicas, did not exist in most island cities. Arenas, the main feature of Roman public leisure, are also not found on the islands, since preexisting theaters and stadia could be adapted, as is the case of the theater on Thasos. Odea (music halls) were built on several islands (e.g., Ikaria, Kos, Rhodes; Karvonis and Mikedaki 2012: 58, 94, 124) in order to host music competitions, oratorical speeches, and philosophical lectures. Despite their strong Greek character, however, the islands adopted numerous typical Roman features, such as temples constructed on podiums, paved streets (e.g., Samos, Kos; Karvonis and Mikedaki 2012: 68–69, 94), drains (e.g., Samos; Karvonis and Mikedaki 2012: 69–70), aqueducts (e.g., Lesbos, Samos, Melos; Karvonis and Mikedaki 2012: 32–33, 65–66, 174), and cisterns (e.g., Karpathos, Amorgos; Karvonis and Mikedaki 2012: 81, 143). Moreover, bathhouses have been found on many islands, such as Lesbos, Ikaria, Kalymnos, Kos, Nisyros, Telendos, Amorgos, and Skiathos (Karvonis and Mikedaki 2012: 27, 59, 79–80. 95–97, 105–106, 136, 141, 242), proving that the islanders had adopted the habit of public bathing, a salient characteristic of Roman daily life. The scale and the quality of the baths varied enormously, from small, less sumptuous structures to large, luxurious facilities.

Burial Customs

Graves and grave goods provide the greater part of the available archaeological data for the Protogeometric period in the islands. The presence of numerous small, separate, and close clusters of graves (e.g., at Naxos or Skyros) indicates a dispersed settlement pattern on most of the islands, on the assumption that each cemetery was attached to a settled area. Although the universal rite was inhumation in cist tombs and in vessels, some cremated burials have been dated to the same period (Dickinson 2006: 183–195). Offerings from the graves consisted of pottery, dress ornaments, jewelry, and weapons.

During the Geometric period, the dominant practice was inhumation in cist or pit graves (e.g., at Tenos and Kos) and urn cremation (e.g., at Lemnos, Naxos, Paros, Kimolos, Thera, and Rhodes). Grave goods (mainly pottery, jewelry, and weapons) reflect the growth of prosperity in the period. Also worth mentioning are the cemeteries at Tsikalario in central Naxos and at Kylindra on Astypalaia, as they are unique in the islands. At Tsikalario, a cemetery of tumuli that contained varying numbers of cremation *pyres* was used during the Middle Geometric period (c. 850–750 BCE). In the recently excavated Kylindra's cemetery on Astypalaia, over 2000 children younger than 3 years old were buried in pots from the second half of the eighth century BCE through Roman times. Finally, during this period, a new form of cult developed in the Greek world; the veneration of heroic forebears first appeared during the ninth century BCE and became firmly established at the end of the eighth century BCE. Excavations at the Metropolis square site on Naxos revealed that rituals in honor of the dead gradually took the form of an abstract ancestor cult (ninth and eighth centuries BCE) and finally evolved into hero worship (second half of the eighth century BCE). Other examples of this new form of cult come from several islands, such as Amorgos and Paros (Dickinson 2006: 191, 234; Mazarakis Ainian and Leventi 2009: 219, 237 n. 29).

In the seventh century BCE, diversity of burial customs continued, since the dominant practice in some islands was inhumation, while in others was cremation. During the sixth century BCE, however, inhumation became the more popular method of burial, although still not exclusively, and only Thera retained a preference for cremation burials (Kurtz and Boardman 1971: 177–179). In Aegina, an important series of chamber tombs began to appear in the early sixth century BCE. A remarkable innovation of the Archaic burial customs was the use of the plain

or decorated stone *sarcophagus*, which was used from the seventh century BCE in many islands, including Rhodes, Samos, Chios, and Aegina. The decorated clay sarcophagi, which were used in Kameiros on Rhodes, Samos, Chios, and Lesbos, date mainly to the sixth and early fifth century BCE. Moreover, many island cemeteries have yielded a fair number of grave markers and monuments, such as *stelai*, relief and decorated gravestones, and statuary (mainly *kouroi* and *korai*). Finally, worth mentioning is the grave of Menekrates on Kerkyra, an impressive circular cenotaph of c. 600 BCE (Kurtz and Boardman 1971: 245, 375).

During the Classical period, there was a marked decrease in funerary monumentality and offerings. In general, chamber tombs went out of fashion, and graves had the form of shafts or pits cut into the ground, slab-lined pits, and *sarcophagi*. In several islands, however, there are groups of elaborately constructed chamber tombs (e.g., Rhodes, Aegina). For adults, inhumation was the usual method of burial, and cremation was still practiced to any marked extent only in Thera, although it did not completely disappear from the islands. Children were buried in pots, clay tubs, and small *sarcophagi* (Kurtz and Boardman 1971: 193, 195–196).

In the Hellenistic period, burial customs did not change considerably from the preceding centuries, but in many cases, there is a marked tendency toward monumentality and theatricality, adopting the characteristic cultural attitudes of the period. In Rhodes, for example, there are impressive rock-cut tombs, several vaulted chambers, and a small stone tumulus. In Kos, Charmylos was honored by a two-story building constructed over a vaulted crypt (c. 300 BCE), and on the second-century BCE Paros, there were *sarcophagi* raised on rectangular bases (Kurtz and Boardman 1971: 281, 286, 300, 373–374).

Finally, in Roman times, there was a great range of grave types, including rock-cut tombs and carved stone (usually marble) *sarcophagi*. The grave goods included pottery, terracotta figurines, lamps, jewelry, and coins. Worth mentioning also is the rock-cut necropolis of the city of Melos (the so-called catacombs) with the several thousand burials of third and fourth centuries CE (although a few were earlier), virtually unique in Greece (Karvonis and Mikedaki 2012: 175).

Pottery

Protogeometric pottery offers valuable evidence for island communities, as well as for their external contacts (Lemos 2002). Besides imports, local productions afford evidence for close contacts with the mainland world, and especially with Attica and Euboea. During the Geometric period, many non-insular regions (mainly Euboea, Attica, Corinth, and Anatolia) continued to exercise considerable influence on islands' pottery production (Boardman 1998: 23–55). Nevertheless, several islands (e.g., Naxos, Paros, Melos, Thera, and Rhodes) established their own workshops, which contributed greatly to the development of the Greek Geometric pottery.

From the end of the eighth century BCE, there were several local workshops which incorporated models and ideas from the east into their Geometric tradition (sc. "Orientalizing phase" in Boardman 1998: 83–85, 110–112, 141–147). Gradually, however, these workshops developed their own Archaic styles, which were under the greater influence of Athenian and Corinthian black figure pottery (Boardman 1998: 177–178, 216).

Throughout the Classical period, island pottery production was under the artistic domination of Athens. Besides Atticizing imitations, ceramic production of the island workshops was almost limited to the production of transport *amphorae*. The Thasian, Chian, Lesbian, Samothracian, Samian, Rhodian, and Koan wine was famous, and their *amphorae* are found in large quantities throughout the Mediterranean world, as their wine was famous (Whitbread 1995: 41–44).

Production of painted vases in the islands declined in the Hellenistic period, due to the general replacement of fine pottery by metal vessels. Particularly popular, however, was the relief ware, which imitated luxurious metal tableware. The relief bowls (the so-called Megarian, as it was formerly believed that the sole center of production was Megara) are black- or red-glazed

hemispherical cups with decoration covering the entire exterior of the vase (except for the rim) and ranging from abstract and floral ornaments to animal and human figures (Henig 1983: 182; Pollitt 1986: 256). Rhodes has yielded a fair amount of distinct black-figured pottery reserved for funeral use, which has been named "Hadra" style after the homonymous cemetery near Alexandria, where the first examples were discovered (Politt 1986: 256–257). Again, several islands produced transport *amphorae* for liquid products, like wine and olive oil. The shape of a typical transport *amphora* with a pointed or rounded toe was unsuitable for storage but ideal for transportation in the hull of a ship, where the vessel could be tightly packed (Whitbread 1995: 19–24, 34–37). Finally, in Roman times, the local pottery production was restricted to domestic and commercial needs, while imports from Rome and other major centers were increased (Henig 1983: 186–187).

The Plastic Arts

Throughout the EIA, the range of plastic works was restricted to figurines in terracotta, bronze, wood, and, extremely rare, ivory. The figurines, usually male and female, were used almost exclusively as sanctuary dedications (especially at major sanctuaries, such as Delos and the Samian Heraion), but their number increased gradually during the course of the eighth century BCE.

In the early Archaic period, elaborately decorated female statuettes in terracotta were dedicated at sanctuaries (e.g., Samos, Despotiko, and Kastro on Siphnos). Plastic works in terracotta, bronze, wood, and ivory continued to be produced, but, from this time on, stone became the basic material; one of the earliest works of monumental sculpture was the female statue dedicated by the Naxian Nikandre at Delos (Rolley 1994: 145–146; Bruneau and Ducat 2005: 86).

From the later seventh century BCE onward, monumental sculpture underwent a considerable improvement, and the islands played an important role in the development of the two basic sculptural types: the *kouros* and the *kore* (Rolley 1994: 165–174, 176–187). The *kouroi*, young men appearing as "heroic nudes," were votives at sanctuaries or used as funeral monuments. Initially, the *kouroi* had supernatural size, such as the "Colossus of the Naxians" on Delos, a few *kouroi* from Samos and from the Archaic cemetery of Thera, and the so-called kriophoros ("man carrying a ram") from Thasos (Rolley 1994: 146; Bruneau and Ducat 2005: 177–181). Gradually, however, they became more realistic: for instance, the so-called Strangford Apollo (Anaphe is the reputed provenance, now in the British Museum) and the *kouros* from Kea (Rolley 1994: 272). Several early *korai*, seated or standing clothed women, were also represented as larger than life size (e.g., the fragment of a 2.5 m. tall *kore* from Samos), while later artistic focus shifted to a concern for a detailed rendering of their elaborate dresses. The *korai* were widely set up as dedications to female deities (e.g., to Artemis on Delos, to Hera and Nymphs on Samos), though funerary *korai* may have been extant on Samos, Chios, and Thera. Dedicatory inscriptions and signatures of their sculptors are quite often found on both types. Several island workshops, with their own stylistic characteristics, have been identified; most famous were the Naxian and Parian workshops which received commissions from other islands and mainland Greece. Finally, the architectural sculpture was restricted to sacred buildings, such as the temple of Artemis on Kerkyra, the treasury of the Siphnians at Delphi, and the Samian Heraion (Rolley 1994: 183, 190, 221, 269–270).

The Archaic tradition continued into the first half of the fifth century BCE, when several schools (e.g., Naxian, Thasian, Samian, and East Ionian) functioned in the islands. Paros, especially with the reliefs in the so-called Severe style (c. 480–450 BCE), was the leading center for early Classical sculpture (Rolley 1994: 359–362). Parian works, in addition to those found on the island itself, have been found on the Aegean islands (mainly Thasos) and mainland Greece. In the second half of the fifth century BCE, the sculptural style of Classical Athens proved to be so influential that the local workshops gradually lost their unique styles. A fine example of this process is seen on the *stele* of Krito and Timarista from Rhodes (c. 410 BCE, Archaeological Museum of Rhodes), which combines the Parian tradition with the achievements of Attic

sculpture (Rolley 1999: 185). During the fourth century BCE, works of Attic origin or inspiration appear on most islands (mainly grave *stelae* in relief or with *anthemion*; Rolley 1999: 220).

The Hellenistic sculpture covered a wide range of types, such as freestanding statues of eminent men and distinguished women, equestrian statues of rulers, narrative groups, and athlete or hero figures. The typical feature of these works is a theatrical manner of representation, which emphasizes emotional intensity and a dramatic crisis. This theatrical temperament is obvious in the famous "Winged Nike of Samothrace," one of the masterpieces of Hellenistic sculpture (Ridgway 2000: 150–157). The goddess is shown in the form of a winged woman standing on the prow of a ship, braced against the strong wind blowing through her garments. This colossal work was placed in a pool filled with water in which the ship appeared to float. It has been suggested that this monument was dedicated to the sanctuary of the great gods by the Rhodians in commemoration of a specific naval victory in the early second century BCE. Naturally, sculpture flourished on prosperous islands, such as Rhodes, Kos, and Delos. During the Hellenistic period, Rhodes became a great center of sculpture in the Aegean, and some of the most important Hellenistic sculptures, for instance, the Aphrodite and the Poseidon of Melos, have been attributed to Rhodian sculptors (Ridgway 2000: 167–171). Kos has also yielded a rich collection of statues in a distinct style (Ridgway 2000: 164). The most renowned sculptors of the period worked on Delos, and a few workshops were established on the island, even though they cannot be considered as a "school" in the sense of a unified style (Bruneau and Ducat 2005: 101–111).

Finally, during the Roman period, all the public places of the cities were adorned with honorific statuary of prominent citizens, local benefactors, governors, and emperors. Although sculpture did not flourish as formerly, a large number of plastic works have come to light: copies of great Classical or Hellenistic originals (such as the well-known "Hermes of Andros"), portraits, funeral or votive steles, sarcophagi, and altars (Henig 1983: 66–96).

Mosaics

The first mosaics, made of natural pebbles, appeared in the Greek world c. 400 BCE, but it was only during the Hellenistic period that the technique of mosaic making underwent a striking development and remarkable innovations as a result of the prosperity of individuals and the desire to demonstrate their wealth (Pollitt 1986: 210–229). The house was a tangible symbol of the owner's status and helped to establish and enhance his position in the social order. Decorated pebble mosaics were produced in Greece probably from the late fifth century BCE and continued into the Hellenistic period. However, from the late third century BCE onward, regular cubes (*tesserae*) of stone, glass, and terracotta replaced pebbles as the principal material for mosaics. Mosaics of very high quality were made in a technique known as *opus vermiculatum*, in which extremely tiny *tesserae* were used (Pollitt 1986: 212). Some of the finest Hellenistic mosaics are found on Delos, where the great majority was produced between 166 and 100 BCE (Pollitt 1986: 215–218; Bruneau and Decat 2005: 125–130). Geometric designs are the most common, including bands of guilloche, complex meanders, groups of lozenges, or bead and reel; also popular are pictorial themes derived from the world of the sea (e.g., dolphins, tritons, and anchors) or the theater (e.g., masks). During the Roman period, mosaic art continued to flourish using geometric or abstract patterns and depicting mythological scenes. Masterpieces of Roman mosaics are found at "Menandros's House" on Lesbos and at "Casa Romana" on Kos (Karvonis and Mikedaki 2012: 38, 92–93).

Numismatics

The first Greek coins seem to be struck on Aegina around the middle of the sixth century BCE, and until the end of that century, many island *poleis* (e.g., Kerkyra, Siphnos, Naxos, Paros, Thasos, Lesbos, Chios, Samos, and Rhodes) minted their own coinage –evidence of their prosperity in Archaic times. During the Classical period, the majority of the islands issued their own coins, although Athens suppressed the civic coinage of

several islands for a substantial part of the fifth century BCE (Hansen and Nielsen 2004: 144–149, 1382–1389). The coins were normally minted in silver or bronze, although some gold (Thasos) or electrum (Lesbos) issues were also produced. In most cases, they carry legends referring to *polis*-ethnics, regional ethnics, or place-names, as well as pictorial and other devices (e.g., the principal deity of each island, subsidiary or local divinities, heroes, animal, and plants). Coinage was an essential feature of Greek economies, and the different standards and issues did not prevent commerce. Nevertheless, the domestic coinage of many islands, including Lemnos, Tenos, Syros, Amorgos, and the Northern Sporades, enjoyed circulation only at a local level. Finally, numismatics reveals the loss of the islands' autonomy during the Hellenistic and Roman periods. In the Hellenistic period, there were few civic issues of independent types, as civic coin types were replaced by the mass-produced coinage of the successor kingdoms (Hoover 2010: esp. lix-lxiv). During the Roman period, several islands (e.g., Chios, Samos, Lesbos, Cos, Rhodes, and Ios) enjoyed the right to mint their own coins in order to be used locally, but it was the Roman currency that dominated exchange (Heuchert 2005: 29–40, Maps 3.1, 3.2.1, 3.2.2).

Future Directions

The Greek islands are an ideal theater for exploring the ideas, agendas and methods employed in island archaeology. The first major steps in this direction have been made by several recent publications (e.g., Broodbank 2000; Berg 2007), but these studies focused so far mainly on prehistoric periods. More efforts should be made to analyze the Early Iron Age and later periods, as island archaeology is vital in order to enhance our understanding of past communities in the Greek islands. Moreover, interdisciplinary research projects should be intensified. The systematic involvement of palynologists, archaeobotanists, zooarchaeologists, osteoarchaeologists, geologists, mineralogists, etc. in fieldwork and material analysis will contribute to the fuller exploration of the islands.

Some islands have been investigated for many decades, and as a result, much information about their archaeology and history is available. However, there are still several islands that are less well explored, while others have had little or no exploration. Therefore, in some cases, scholars have based their work on incomplete data, and as the flow of information increases, their interpretations are proved to be not valid. For example, until quite recently, Zagora was considered as the only major settlement on Geometric Andros. In the last decades, however, another important settlement was excavated at Hypsele, completely changing the picture of the settlement pattern of Andros during the Geometric period. Excavation is a very time-consuming and expensive process, but intensive surveys may provide a fuller picture of the archaeology of the Greek islands and assess the risks and impact that development projects will have on archaeological heritage.

Finally, it is important to note that archaeology is not just for scholars but for all society. Unfortunately, there are several sites where the excavation was completed many years ago, but the final publication has not yet been produced; thus our information comes mainly from preliminary reports. Excavators should publish the results of their studies as soon as possible and inform both the scientific community and the general public (especially the local communities) about their work. Also, the enhancement of the archaeological sites is very important in order to make them accessible and readable to everyone.

Cross-References

- ▶ Agora in the Greek World
- ▶ Andron
- ▶ Baths and Bathing, Greek
- ▶ Baths and Bathing, Roman
- ▶ British School at Athens
- ▶ Ceramics, Ancient Greek
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)

- ▶ Crete, Archaeology of
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cyprus, Archaeology of
- ▶ Domestic Architecture, Roman
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Greek Colonialism, Archaeology of
- ▶ Numismatics, Ancient Greek
- ▶ Numismatics, Roman Imperial
- ▶ Numismatics, Roman Republican
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Panhellenism
- ▶ Polis
- ▶ Religion, Greek, Archaeology of
- ▶ Romanization
- ▶ Sicily and Magna Graecia, Archaeology of
- ▶ Stoa
- ▶ Survey Archaeology in the Greek Aegean World
- ▶ Tombs, Greek (Iron Age)
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ Urban Planning in the Greek World
- ▶ Urban Planning, Roman
- ▶ Villas and Farms in the Mediterranean World

References

Alcock, S.E. 1993. *Graecia capta: The landscapes of roman Greece*. Cambridge, UK: Cambridge University Press.

Berg, I. 2007. *Negotiating island identities: The active use of pottery in the middle and late bronze age cyclades*. New York: Gorgias Press.

Betancourt, P. 1977. *The Aeolic style in architecture. A survey of its development in Palestine, the Halikarnassos Peninsula, and Greece, 1000–500 B.C.* Princeton: Princeton University Press.

Boardman, J. 1998. *Early Greek vase painting: 11th–6th centuries BC*. London: Thames & Hudson.

Broodbank, C. 2000. *An island archaeology of the early Cyclades*. Cambridge, UK: Cambridge University Press.

Bruneau, P., and J. Ducat. 2005. *Guide de Délos (Sites et monuments 1)*. Athènes: École française d'Athènes.

Cherry, J.F., J.L. Davis, and E. Mantzourani. 1991. *Landscape archaeology as long-term history: Northern Keos in the Cycladic islands from earliest settlement until modern times (Monumenta Archaeologica 16)*. Los Angeles: Institute of Archaeology, University of California.

Coldstream, J.N. 2003. *Geometric Greece*. London: Routledge.

Constantakopoulou, C. 2007. *The dance of the islands: Insularity, networks, the Athenian empire, and the Aegean world*. Oxford: Oxford University Press.

Dickinson, O. 2006. *The Aegean from Bronze Age to Iron Age: Continuity and change between twelfth and eighth centuries BC*. London/New York: Routledge.

Gruben, G. 1966. *Die Tempel der Griechen*. München: Hirmer.

Hansen, M.H., and T.H. Nielsen, eds. 2004. *An inventory of archaic and classical poleis: An investigation conducted by the Copenhagen Polis Centre for the Danish National Research Foundation*. Oxford: Oxford University Press.

Henig, M. 1983. *A handbook of roman art. A survey of the visual arts of the roman world*. Oxford: Phaedon.

Heuchert, V. 2005. The chronological development of Roman provincial coin iconography. In *Coinage and identity in the roman provinces*, ed. C. Howgego, V. Heuchert, and A. Burnett, 29–56. Oxford: Oxford University Press.

Hoover, O.D. 2010. *Handbook of coins of the islands: Adriatic, Ionian, Thracian, Aegean, and Carpathian Seas (excluding Crete and Cyprus), sixth to first centuries BC*, The handbook of Greek Coinage series 6. Lancaster/London: Classical Numismatic Group.

Karvonis, P., and M. Mikedaki. 2012. *Tabvla Imperii Romani: J35 – Smyrna, volume I: Aegean Islands*. Athens: Academy of Athens.

Kurtz, D.C., and J. Boardman. 1971. *Greek burial customs*. London: Thames and Hudson.

Lemos, I.S. 2002. *The Protogeometric Aegean: The archaeology of the late eleventh and tenth centuries BC*. Oxford: Oxford University Press.

Mazarakis Ainian, A., and I. Leventi. 2009. The Aegean. In *A companion to Archaic Greece*, ed. K.A. Raaflaub and H. van Wees, 212–238. Chichester: Wiley-Blackwell.

Morris, S.P., and J.K. Papadopoulos. 2005. Greek towers and slaves: An archaeology of exploitation. *American Journal of Archaeology* 109: 155–255.

Politt, J.J. 1986. *Art in the Hellenistic Age*. Cambridge, UK: Cambridge University Press.

Ridgway, B.S. 2000. *Hellenistic sculpture, volume II: The styles of ca. 200–100 B.C.* London: University of Wisconsin Press.

Rolley, C. 1994. *La sculpture grecque, volume 1: des origines au milieu du Ve siècle*. Paris: Picard.

Rolley, C. 1999. *La sculpture grecque, volume 2: la période classique*. Paris: Picard.

de Souza, P. 1999. *Piracy in the Graeco-Roman world*. Cambridge, UK: Cambridge University Press.

Whitbread, I.K. 1995. *Greek transport amphorae: A petrological and archaeological study*, Fitch Laboratory Occasional Paper 4. Athens: British School at Athens.

Winter, F. 2006. *Studies in Hellenistic architecture*. Toronto: University of the Toronto Press.

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Basic Biographical Information

Jeremy Green (Fig. 1) is Head of the Department of Maritime Archaeology at the Western Australian Museum, a position he has held since 1971. After receiving a B.Sc. (Hons) in Physics from the University of Hull (1963), and a B.A. (Hons) in Physiology at Oxford (1966), Jeremy worked at the Research Laboratory for Archaeology, Oxford University (1967–1971). Here, under the direction of Professor E.T. Hall (1924–2001), a leading expert in archaeometry and the development of scientific techniques to examine archaeological discoveries, Jeremy developed an underwater metal detector, a proton magnetometer, and four systems of underwater photogrammetry. These techniques and instruments were investigated in field conditions in England, Ireland, and in the Mediterranean. Jeremy deployed them on shipwrecks such as the Byzantine wreck at Yassi Ada, the late fourth-century BCE Greek merchant shipwreck at Kyrenia, the Spanish Armada ships *Santa Maria de la Rosa* and *Trinidad Valencera*, the Dutch East Indies ship *Amsterdam*, and various sites around Cyprus dating from the Classical to the Byzantine period.

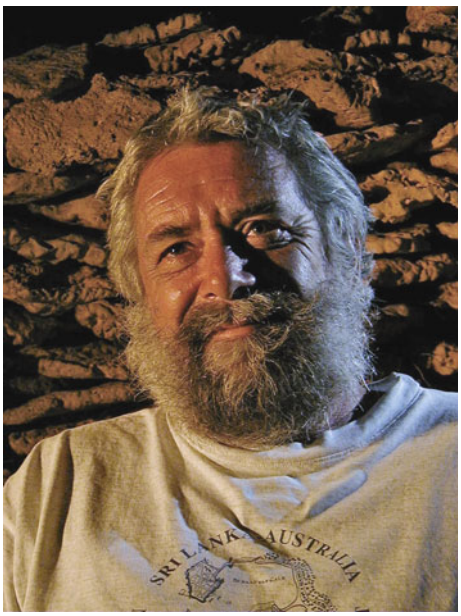

Green, Jeremy N., Fig. 1 Jeremy N. Green, Head, Department of Maritime Archaeology, Western Australian Museum. (Photo: Glen Martin)

Major Accomplishments

Jeremy Green's appointment to the Western Australian Museum arose out of a need for expertise to manage a number of significant shipwreck sites that had been legally protected under the jurisdiction of the museum. He set up the Department of Maritime Archaeology and established a program involving presettlement, post-settlement, and wreck inspection work. Jeremy Green's expertise was initially applied to the survey and excavation of the English East India ship *Trial* (1622), and the Dutch East India ships *Vergulde Draeck* (1656) and *Batavia* (1629), and later the preliminary work on the *Zeewijk* (1727) and *Zuytdorp* (1712). The excavation of the *Batavia* was the first archaeological excavation of a post-medieval shipwreck in the world and certainly Australia's most significant maritime archaeological excavation. Assisted by an Australian Research Council grant, and an Honorary Research Fellowship at the Institute of Archaeology, University of Oxford, Jeremy Green pursued a research program investigating early seventeenth-century shipbuilding techniques and Asian ships. He collaborated with international colleagues over the reconstruction of the *Batavia* timbers and the *Batavia* Reconstruction Project in Lelystad, the Netherlands, and expanded his work to sites in the Indian Ocean, Southeast Asia, and East Asia.

Aimed at developing a sustainable network between maritime archaeological practitioners and avocational groups throughout Australia, Jeremy Green co-founded the Maritime Archaeological Association of Western Australia

(MAAWA) (1973), shortly followed by the Australasian Institute for Maritime Archaeology (AIMA), of which he was foundation President and Editor of its Bulletin and Special Publications from 1977. In 1980, Jeremy Green initiated the first of a series of postgraduate diploma in maritime archaeology courses through Curtin University of Technology (WA); his book *Maritime Archaeology: A Technical Handbook* (1990, 2004) was designed as a primary reader for subsequent postgraduate courses, practicums, teaching, and supervision of students from Flinders and James Cook Universities, the University of Western Australia, and overseas interns. He also provides technical advice and services to professional practitioners in the use of remote sensing equipment – magnetometers and side scan sonar – and the computer software packages that have radically changed the efficiency and application of this type of equipment for locating, surveying, and mapping shipwreck sites.

Scientifically motivated, Jeremy Green was the first to install computer technology into a curatorial department at the Western Australian Museum, progressively developing shipwreck and artifact databases that provided the initiative for a national online system – the Australian National Shipwreck Database (http://www.environment.gov.au/heritage/shipwrecks/index.html). Always eager to experiment with new technology to improve underwater surveying techniques, Jeremy has trialed different computer programs – PhotoModeler, VirtualMapper, and Rhino – on Australian and international shipwreck sites to test their accuracy and usefulness in different situations.

Jeremy Green's career includes a long span of field and academic experience around the world. He has provided expert advice to governments embarking on maritime archaeological programs; assisted with the training of overseas personnel through UNESCO Regional Workshops and local training programs in places such as Thailand, China, and Sri Lanka, to advance underwater cultural heritage in these countries; and participated in numerous international conferences. In addition to leading the first archaeological project in China after the Cultural Revolution, Jeremy Green's work has taken him to Mombasa, Thailand, Japan, Korea, Malaysia, People's Republic of China, the Maldives, Philippines, Sri Lanka, Sicily, and Turkey. Reports on the various projects may be found in his extensive list of publications (http://www.museum.wa.gov.au/maritime-archaeology-db/maritime-reports).

In recognition of his expertise, Jeremy Green has been the recipient of numerous grants, fellowships, and awards, among them a Churchill Fellowship to conduct research work on the Dutch East India Company in Indonesia, an Australia-China Council grant to visit the Quanzhou ship in the People's Republic of China, and an Australia-Japan Foundation grant to work on the Kublai Khan Fleet in Japan.

Jeremy Green holds an M.A. from Oxford University and is an Honorary Research Fellow of the Institute of Archaeology, Oxford. He has held respected positions in Australian Universities including Honorary Fellow of the Centre for Archaeology, University of Western Australia, and Adjunct Associate Professor at Curtin University of Technology, Flinders and James Cook Universities. In 1994, he was appointed Head of the Australian National Centre of Excellence for Maritime Archaeology and is Editor of its Special Publication Series. He is a Fellow of the Australian Academy of the Humanities, Research Associate of the Institute of Nautical Archaeology, and Advisory Editor of the *International Journal of Nautical Archaeology*.

Jeremy Green's contributions to maritime archaeology have been acknowledged both in Australia and the United Kingdom. In 1986, he was awarded the Keith Muckelroy Prize for Achievement in the Field of Maritime Archaeology (UK). The following year, he was a finalist in the Bicentennial BHP Awards for the Pursuit of Excellence in Science and Technology. In 2003, he received an Australian Centennial Award and, in 2007, the prestigious Rhys Jones Medal in recognition of his pioneering work in the development of maritime archaeology in Australia. At the 2011 Inaugural Asia-Pacific Regional Conference on Underwater Cultural Heritage in Manila, Philippines, Jeremy Green was presented with the Asia-Pacific Maritime Archaeology medal in

recognition of his contribution to maritime archaeology, and in 2012 his long and dedicated service to the Australasian Institute for Maritime Archaeology (AIMA) was acknowledged with a special Appreciation Certificate.

Cross-References

- ▶ Australia: Maritime Archaeology
- ▶ Deep-Water Archaeology
- ▶ Hall, Edward T.
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Maritime Archaeological Organizations
- ▶ Underwater Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime

Further Reading

Catsambis, A., B. Ford, and D. Hamilton. 2011. *The Oxford handbook of maritime archaeology*. Oxford: Oxford University Press.

Green, J.N. 2002. The application of side-scan sonar and magnetometer to the location of archaeological sites. *Bulletin of the Australasian Institute for Maritime Archaeology* 26: 119–131.

Green, J.N. 2004. *Maritime archaeology: A technical handbook*. 2nd ed. San Diego: Elsevier Academic Press.

Green, J.N. 2005. Pursuing Southeast Asian wrecks: Ko Si Chang, Thailand. In *Beneath the seven seas: Adventures with the Institute of Nautical Archaeology*, ed. G.F. Bass. London: Thames and Hudson.

Green, J.N. 2006a. Collaboration within the region: Exchanges of information and training in the convention. In *Finishing the interrupted voyage: Papers of the UNESCO Asia-Pacific Workshop on the 2001 Convention on the Protection of the Underwater Cultural Heritage*, ed. L. Prott, 126–134. London: UNESCO Bangkok and Institute of Art and Law.

Green, J.N. 2006b. Nautical archaeology in Australia, the Indian Ocean and Asia. In *Maritime archaeology Australian approaches* (Plenum series in Underwater Archaeology), ed. M. Staniforth, and M. Nash, 97–110. New York: Springer.

Green, J.N. 2007. *Batavia* 1629: Mutiny and murder. In *Shipwreck archaeology in Australia*, ed. M. Nash, 12–24. Perth: University of Western Australia Press.

Green, J., and C. Souter. 2002. Technical communication: Archaeological applications of the HPASS (High precision acoustic surveying system) to surveys of the HMS Pandora wreck site and the Roman Bridge at Maastricht. *International Journal of Nautical Archaeology* 31 (2): 273–282.

Green, J., S. Matthews, and T. Turanli. 2002. Technical communication: Underwater archaeological surveying using PhotoModeler, VirtualMapper: Different applications for different problems. *International Journal of Nautical Archaeology* 31 (2): 283–292.

McCarthy, M., ed. 2012. *Shipwrecks of Australia's West Coast*. Welshpool: Western Australian Museum.

Greenland, Archaeology of

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[2]Greenland National Museum and Archives, Nuuk, Greenland

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Introduction

Located between 59° and 83° N and 11° and 74° W, Greenland (Kalaallit Nunaat) is an island in the North Atlantic spanning an area of 2,166,000 km^2, with approximately 80% of the land mass covered by the Greenland Ice Sheet. Greenland's ice-free margins exhibit notable topographic, environmental, and climatic variability (Fig. 1) with a coastline comprised of thousands of kilometers of low-lying island archipelagos, fjord systems, and rocky alpine hinterlands (Born and Böcher 2001). The ice-free areas of the island's High Arctic zones above 79° N consists of sparsely vegetated tundra and deserts. Moving south, the landscape changes between 79 and 72° N and can be generally characterized by a more oceanic climate dominated by low-lying heath and scrub vegetation. Below 72° N, the environment transitions dramatically into a Low Arctic zone with some areas of the interior so climatically mild that they can sustain pastoral farming.

Archaeological evidence has shown that the peopling of Greenland is the result of several distinct in-migrations (Fig. 2) broadly influenced by oscillating warming and cooling trends in the

Greenland, Archaeology of, Fig. 1 Climate zones of Greenland and important sites mentioned in the text. (© C.K. Madsen, Greenland National Museum and Archives 2019)

Arctic over past several thousand years (Arneborg 2004). At the same time, population densities have always remained low in Greenland, with human settlements primarily located along seaways and within the inner fjords. These maritime elements, although different in their individual expressions, are patterned across time in Greenland, with subsistence tied predominantly to exploitation of the island's vast abundance of coastal and marine resources.

The unifying characteristics of Greenland's different cultural historical groupings are remarkable considering that they represented very different geographic origins and technological traditions. The first in-migration occurred from the West via Ellesmere Island, Canada, along Greenland's northwest coast by peoples broadly labeled as Paleo-Inuit (in earlier literature as Paleo-Eskimo). Archaeologically, these groups all belonged to the Arctic Small Tool tradition (ASTt) and are represented in Greenland by the Saqqaq (2400–800/500 BC) and Independence I (ca. 2400–1300 BC) and Greenlandic Dorset (ca. 800 BC-AD 1) (Grønnow and Sørensen 2006). Following the Greenland Dorset, the island remained devoid of people for approximately 700 years until the arrival of the Late Dorset (ca. AD 700–1300), the last Paleo-Inuit group to settle in Greenland.

Between AD 1100 and 1300, Northwest Greenland was a geographical nexus for cultural contact between three distinct groups of people. Norse farmer-hunters from Iceland established two settlements in Southwest Greenland just prior to AD 1000 (Arneborg 2004). Historical texts and archaeological evidence support the theory that the Norse conducted long-distance hunting and exploration in the Eastern Arctic, eventually bringing them into direct contact with the Late Dorset in Northwest Greenland and native people of Labrador/Newfoundland (Appelt et al. 2016). Approximately AD 1250,

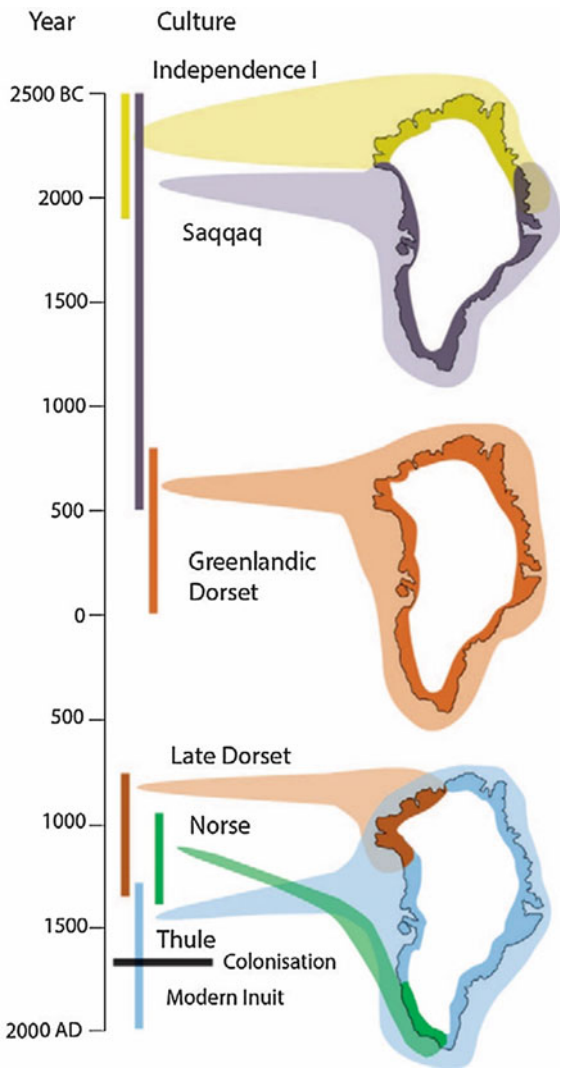

Greenland, Archaeology of, Fig. 2 Principal cultural sequences in Greenland's prehistory. (© GEUS, Ilulissat and Nipisat UNESCO nomination document)

Thule Inuit peoples originating from the Bering Sea region in the west arrived in Greenland, making cultural contact with both Late Dorset and Norse populations. The Thule culture brought a new and sophisticated hunting and transport technology, a high level of social organization, as well as a vast trading network spanning across the North American Arctic (Mathiassen 1927).

Whatever the nature of these cultural encounters, they were short-lived: the Late Dorset disappeared from Greenland ca. AD 1300, followed by the Norse by ca. AD 1450, leaving all of Greenland to be rapidly populated by the Thule Inuit. By AD 1500, the Thule had completely circumnavigated the whole of Greenland, gradually developing regionally distinct technologies, clothing, and dialects, with many of these elements still expressed by present-day Greenlandic Inuit descendants. Beginning in the late sixteenth century, European colonial explorers and later North Atlantic whalers made more frequent contact with Thule Inuit populations in Greenland (Gulløv 2016b). Increasing opportunities for lucrative trade between Europeans and Inuit residing on the West coast eventually led to the founding of the first official colony under the Kingdom of Denmark-Norway at Haabets Øe in 1721 by

missionary Hans Egede. The colony was later relocated to Nuuk, Greenland's present-day capital. The growing European presence in Greenland after 1721 and the onset of the colonial period initiated the gradual dilution of the traditional Thule way of life over the eighteenth and nineteenth centuries, with the colonial period lasting until Greenland was officially incorporated into the Kingdom of Denmark as a county in 1953.

Archaeological Cultures of Greenland: Key Characteristics

Arctic Small Tool Tradition (ASTt)

In Greenland, early Paleo-Inuit cultural traditions are archaeologically identified as regional variants within the larger Siberian and North American Arctic Small Tool tradition (ASTt). Technologically, this tradition comprises a highly idiosyncratic microblade tool kit originating in the Bering Strait region approximately 5500 years ago (Slaughter 2005). Recent aDNA research also supports a common genetic origin (and relative genetic isolation) of the ASTt archaeological cultures (Raghaven et al. 2014). While there are probably several causes for the eastward migration of these peoples into Greenland beginning approximately 4500–4200 years ago, pioneer groups were most likely drawn by the stable abundance of marine resources offered by the Smith Sound-North Water Polynya in the Baffin Bay. The overlapping concentration of Paleo-Inuit settlements at these resource-rich polynyas emphasizes the central role of marine mammal hunting (predominantly seal and whale) in Paleo-Inuit diets, although more subtle cultural differences in the exploitation of Arctic marine and wildlife species are now becoming more discernable with the availability of high-resolution paleofaunal genetic analysis (see Seersholm et al. 2016).

ASTt habitation sites are generally characterized as seasonal or temporary camps comprised of a few small tents or dwellings made of skin-covered, wood- or bone-framed tent structures, only visible to archaeologists today by the remains of small areas with stone flagging, tent rings, and shallow depressions. The most conspicuous architectural aspect of the ASTt dwellings is the presence of mid-passage structures with a rectangular and compartmentalized central hearth, interpreted by some to represent male and female spheres of activity (Andreasen 2004; Grønnow 2017). These hearths are also thought to be an advanced pyro-technological adaptation to the woodless Arctic (Odgaard 2003). In general, the ephemeral character of the archaeological record left behind by the ASTt cultures is suggestive of a high level of seasonal and regional mobility typical of small-scale Arctic hunter-gatherer societies.

Saqqaq and Independence I

Early Paleo-Inuit populations in Greenland are differentiated between the Saqqaq and Independence I cultures; the two groups identified as culturally related but distinct by virtue of their geographical separation and divergent lithic technologies. Bounded to the remote parts of North and Northeast Greenland, the Independence I lithic tool kit is characterized by large bifacial knives, adzes, tanged projectile points, broad microblades, and unground burins (Fig. 3), whereas the Saqqaq are noted for their preference for a local metamorphosized slate known as *killiaq* and a chaîne opératoire centered upon the production of bifacial knives, projectile points, adzes, scrapers, and ground burins (Fig. 4). Archaeological artifacts recovered from two permanently frozen sites in Disko Bay, West Greenland, have also demonstrated that Saqqaq technology was remarkably advanced and comprised a wide range of tools derived from organic materials (e.g., bows and arrows, lightweight harpoons and lances, wooden spoons and storage containers) (Grønnow 2017). The Saqqaq people were the longest inhabitants of Greenland with a duration spanning almost two millennia (2400–800/500 cal. BC) (Grønnow 2017).

Greenlandic Dorset

Approximately 800 BC, a distinctly different Paleo-Inuit group emerges in Greenland's archaeological record. Previously known as

Greenland, Archaeology of, Fig. 3 Examples of Independence I stone tools. Top: three knife blades. Below, left: two scrapers. Below right: two side scrapers. (© The National Museum of Denmark)

Independence II and Dorset I, the Greenlandic Dorset are identified throughout Greenland, with occupations frequently located on the same sites formerly occupied by Saqqaq and Independence I peoples (Jensen 2016). In terms of typology, Greenlandic Dorset lithic assemblages possess a higher proportion of microblades compared to earlier Saqqaq and Independence assemblages, as well as burin-like tools (BLTs), side-notched endblades, and scrapers with flared edges. Greenlandic Dorset peoples also showed a distinct preference for microcrystalline quartz that included colorful agate and quartz crystal (Fig. 5) (Grønnow and Sørensen 2004). At some point during the first millennium BC, the Greenlandic Dorset disappear, leaving Greenland absent of humans for approximately seven centuries, until the arrival of Late Dorset populations in Northwest Greenland sometime after ca. AD 700.

Late Dorset

Late Dorset culture represents the final expression of the ASTt in Greenland. These peoples settled over an enormous territory in the North American Arctic, spanning from Victoria Island in the west to Greenland in the East and as far south as Labrador (Appelt et al. 2016). However, in spite of their geographical reach and when contrasted against the previous phasing of earlier Paleo-Inuit groups, the Late Dorset in Greenland are observed to be relatively short-lived and restricted to the northwest part of the island (around the North Water Polynya). Late Dorset technology in Greenland conforms generally to earlier Dorset typologies but curiously lacked certain composite tools such as the bow drill, inflated drag float technology, and the bow and arrow, as well as the absence of dogs, dog sledges, and large watercraft (Appelt and Gulløv 2009). Late Dorset

Greenland, Archaeology of, Fig. 4 Saqqaq bifacial knife blade with preserved haft from Qeqertasussuk site, Disko Bay, West Greenland (approx. 16 cm in length). (© The National Museum of Denmark)

peoples are noted for their highly variegated microblades, as well as endblades and knives, adzes, scrapers, and BLTs used for working bone, antler, and ivory into tools and a variety of figurines (Fig. 6). Polished soapstone was also commonly employed in the furnishing of small lamps and cooking vessels.

The Late Dorset stand apart from other earlier ASTt cultural groups by their construction of megalithic common houses (or ceremonial structures) with connected hearth rows and an intricate ivory carving tradition that is believed to have reflected a very distinct set of religious practices (Betts et al. 2015). The Late Dorset were also the only ASTt cultural group in Greenland to exploit native metals – both copper imported from Western Canadian Arctic and meteoric iron scavenged from meteor fragments in the southern Avanersuaq (Thule) region. Shifting ranges of important marine resources such as walrus due to climate oscillations and the encroachment of the Thule into traditional hunting grounds are suggested as key factors in the redistribution and

Greenland, Archaeology of, Fig. 5 Selection of Greenlandic Dorset microblades and cores of various microcrystalline types, from Disco Bay, West Greenland. (© The National Museum of Denmark)

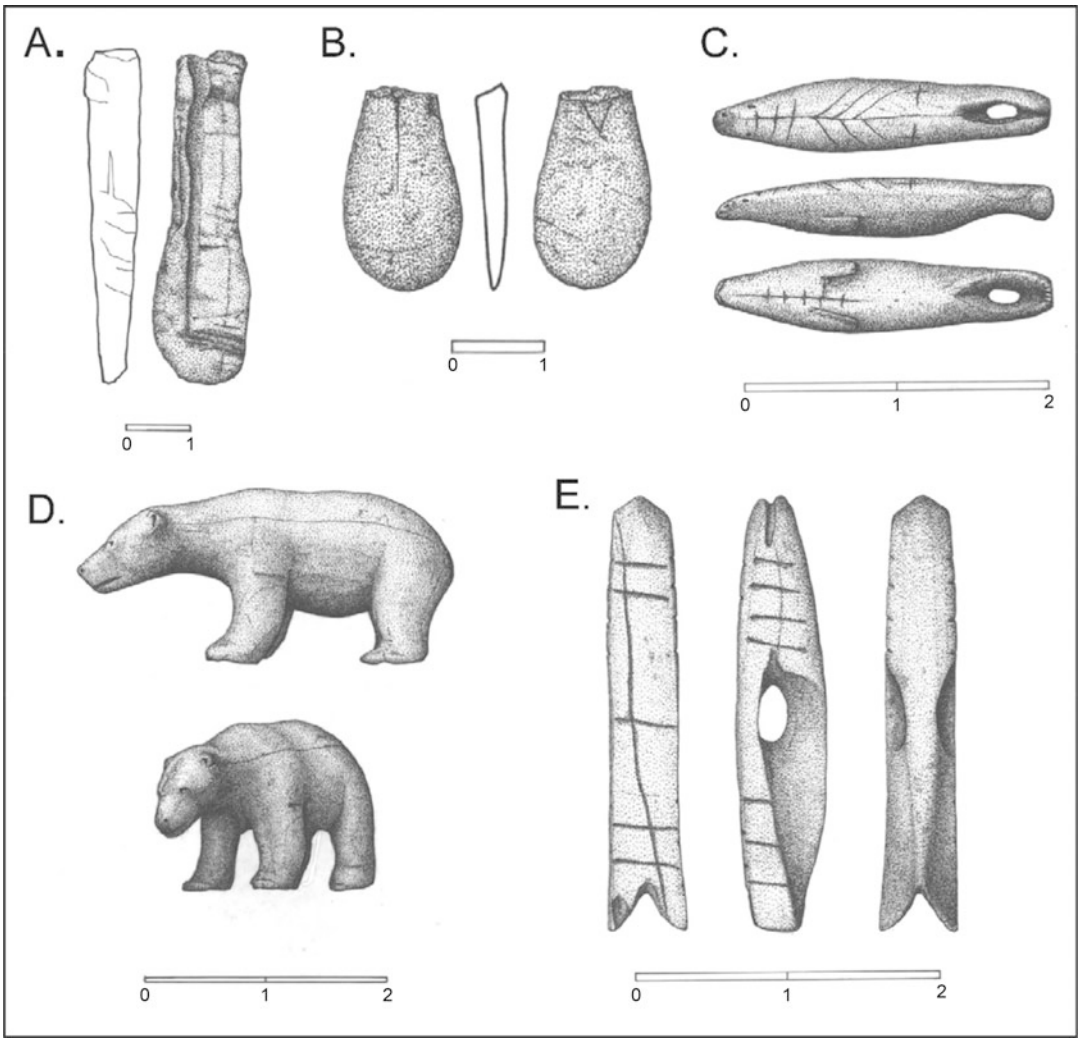

Greenland, Archaeology of, Fig. 6 A selection of the miniature carvings from the eleventh-to-twelfth-century AD (cal) Late Dorset winter house ruin 1 at Qeqertaaraq (Inglefield Land, Avanersuaq, Greenland). (**A**) Reworked preform of a spatula-like object (caribou-antler); (**B**) distal end of a spatula-like object (caribou-antler); (**C**) seal effigy with skeletal ornament and so-called soul-marks at the lower joints (walrus-tusk); (**D**) polar bear carving with – not visible – suspension hole (walrus-tusk); and (**E**): non-functional miniature of a type (**E**) harpoon head with skeletal ornaments (walrus-tusk). (© Niels Levinsen & The National Museum of Denmark)

eventual disappearance of the Late Dorset in Greenland (Appelt et al. 2016).

The Greenland Norse

The settlement of Greenland was the last westward migration of Scandinavian peoples across the North Atlantic during the late Viking Age. According to medieval texts, this migration occurred after the Norwegian-born Eric the Red led a small fleet of colonists from Iceland to Greenland ca. AD 985/986 (Arneborg 2004). The Norse established two main settlement areas, the *Eystribyggð* (Eastern Settlement) in South Greenland and the *Vestribyggð* (Western Settlement) in the Nuuk Fjord in West Greenland. Christianity was introduced quite rapidly into Norse Greenland beginning in the late tenth century and brought with it a character of society similar to developments occurring in neighboring Iceland and Scandinavia during the Middle Ages.

Norse economic and religious life in Greenland centered around larger estate farms, which became centers of law, trade, and commerce. These larger estate farms would often oversee several smaller tenant farms in the surrounding fjords.

Estate farms organized the labor and ships necessary for the seasonal hunting forays into North and East Greenland, a fact supported by both historical accounts and archaeological finds of Norse artifacts in contemporaneous Late Dorset or Thule culture contexts (Gulløv 2016b). Exploratory journeys from Greenland to the North American coast may have taken place as early as ca. AD 1000, continuing up through the middle fourteenth century (Grønlands Historiske Mindesmærker 1838). The Norse site at L'Anse Aux Meadows, Newfoundland (Ingstad 1977), most likely represents a specialized base camp relating to early Norse exploration of the North American mainland (Wallace 2003).

The geographical extent of Norse settlement in Greenland conforms to the subarctic environmental limits of farming in the North Atlantic, reflecting a society based on sedentary pastoralism with cattle, pig, sheep, and goat husbandry and horses for transport (Arneborg et al. 2012). Some 570 Norse sites are currently registered in the *Eystribyggð* and approximately 100 in the *Vestribyggð*. However, less than half of these sites were actual farmsteads, the remainder being seasonal satellites that provided the Norse with access to Greenland's vastly scattered terrestrial and marine resources (Jackson et al. 2018). Recent zooarchaeological and isotopic research has demonstrated that the importance of farming decreased over time, likely in response to deteriorating climatic conditions (Smiarowski et al. 2017). This included an overall decline in livestock populations during the thirteenth and fourteenth centuries AD and a phasing out of pig husbandry and a greater reliance on sheep and goat herding.

By the fourteenth century AD, some farmers appear to have subsisted on a diet comprised of up to 80% marine mammal (i.e., seal) at a level comparable to some later Inuit hunters (Arneborg et al. 2012). The shift to marine mammal hunting may have come quite naturally as the Norse were already engaged in the seasonal hunting of Arctic game such as walrus, narwhal, and polar bear in the North. Recent research suggests that harvesting of such resources may have been a primary pull factor that motivated the initial settlement of Greenland (Frei et al. 2015). Arctic walrus and whale ivory, narwhal tooth, and animal skins provided the Norse with a diverse set of valuable commodities that could attract foreign merchants to Greenland. These socioeconomic links to Scandinavia remained important to the Greenland Norse for several reasons, the most important being the import of raw iron used to produce tools and weapons. Historic sources suggest that the Greenland Norse actively attempted to maintain cultural and trade networks by securing the establishment of a local bishopric in AD 1126 and voluntarily submitting to the dominion of the Norwegian Crown in AD 1261 (Arneborg 2003).

The Norse settlement of Greenland lasted until sometime in the fifteenth century, with abandonment of the *Vestribyggð* ca. AD 1350 and the last written source from the *Eystribyggð* with reference to Hvalsey Church dating to AD 1408 (Fig. 7). Archaeological dates have largely corroborated this overall chronological framework, although some parts of the *Vestribyggð* may have survived until ca. AD 1400 and the *Eystribyggð* until ca. AD 1450 (Arneborg et al. 2012). The unexplained fate of the Norse in Greenland remains a dominating research theme, and today, most scholars believe the decline of the Norse settlements in Greenland was caused by a number of coinciding factors that included a deteriorating and unpredictable climate, growing geographic and cultural isolation, political and economic shifts in Northern Europe, and perhaps competition and/or violent encounters with the expanding Thule population.

Thule Culture-Historic Inuit

Around 1000 AD, Thule culture peoples from Northern Alaska migrated eastward across the Canadian High Arctic, arriving in Northwest

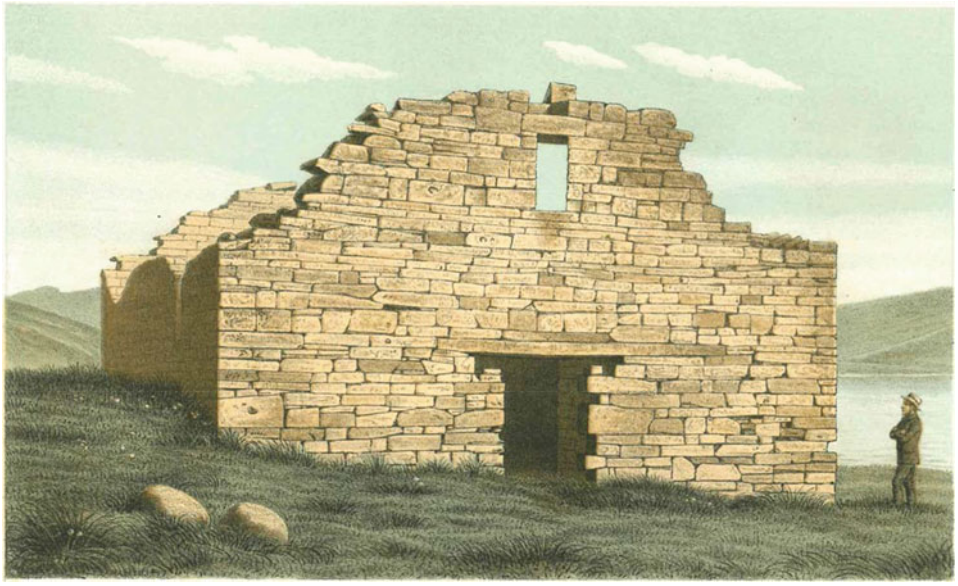

Greenland, Archaeology of, Fig. 7 Hvalsey Church in the Eastern Settlement. The Norse occupation of Greenland lasted until sometime in the fifteenth century, with abandonment of the Western Settlement occurring ca. AD 1350 and the last written source from the Eastern Settlement dating to AD 1408. Illustration by Th. Groth (1878) in Holm (1883, Fig. XX)

Greenland ca. 1250 AD (Friesen and Arnold 2008). By AD 1300, the Thule appear to have completely displaced the Late Dorset population in Northwest Greenland, spreading quickly along both the south and northeast coasts (Appelt and Gulløv 2009). By AD 1400, the Thule had reached as far south as the mouth of the Nuuk Fjord (ca. 64 ° N); their southerly advance halted only temporarily until the abandonment of the Norse Western settlement. With the abandonment of the Eastern Settlement ca. mid-fifteenth century AD, the Thule culture settled the last fjords in South Greenland, with some groups continuing eastward around Cape Farewell and up the east coast (Gulløv 2016b). At the same time, smaller groups of Thule settlers had migrated north along the coasts of Peary Land and northeastern Greenland, reaching as far as Ittoqqortoormiit (Scoresby Sound) at ca. 70 ° N. By the beginning of the sixteenth century AD, the Thule had completely circumnavigated the entirety of Greenland (Gulløv 2004).

Early Thule pioneers are characterized by their hunting of large whales, such as bowhead (Holtved 1954), an activity that required a high level of technological specialization and group organization. From an archaeological perspective, this was reflected in the development of new technological advances that include the heavy toggling harpoon, bladder floats, and long, wood-framed skin boats (*umiat*) (Fig. 8). This phase also saw the emergence of multiple house settlements and special men's houses (*qassit*) that reflected elements of the Old Bering Sea whaling tradition (Gulløv and McGhee 2006).

Seasonal mobility was a prerequisite for survival for the Thule and was reflected in a variety of sea and ice transportation systems such as the kayak, *umiaq*, and dog sledges that were used for both hunting and long-distance travel. Winter settlements were located in the outer fjords and coasts with single and/or multifamily houses clustered on shorelines with immediate access to the sea. These stone-and-sod-built dwellings possessed subterranean cold trap passages, designed to prevent heat loss from the main living area during the cold winter months (Fig. 9) (Gulløv 2004). In the woodless High Arctic, whale bones were frequently used for support beams for roofing for these structures, whereas driftwood was

Greenland, Archaeology of, Fig. 8 In 1949, during an expedition led by the archaeologist and polar explorer Eigil Knuth in Peary Land discovered the remains of an extremely well-preserved Thule umiaq (women's boat), dated to ca. fifteenth century. (Photo: E. Knuth (1952), © The National Museum of Denmark)

more frequently used in the southerly regions when available.

In the summer, families moved inland to strategically located camps where Arctic char, caribou, and gathered edibles were known to be plentiful. While whaling was an economically important activity for the Thule in many parts of Greenland, the seal and its by-products constituted one of the most important resources for the individual hunter and his family. Seal meat provided one of the main forms of sustenance, afforded lamp oil for heat and light, as well as warm skins for waterproof clothing, boots, and mittens. Several characteristic elements of the Thule Inuit material culture reflect the importance of the seal hunt, such as the kayak, toggling iron-tipped harpoons, bladder floats, traditional flensing knife (*ulu* or women's knife), and steatite blubber lamps. In general, the Thule possessed a highly diverse and sophisticated hunting arsenal that reflected an adept utilization of both locally available and exotic components (stone, wood, antler, bone, tooth, sinew, baleen, metal, etc.). Watercraft, tools, domestic utensils, and clothing also comprised a highly diverse combination of composite materials, some of which could only be acquired through long-distance trade.

Long-distance trading networks were vital to the Thule culture in Greenland for several reasons. While it is hypothesized that access to meteoric iron in Northwest Greenland and trade with the Norse could have been an important pull-factor in the early Thule culture migrations ca. thirteenth and fourteenth centuries (McGhee 2009), the seventeenth to eighteenth centuries saw the formalization of an elaborate regional exchange network that ensured the continual flow of valuable resources up and down the Greenlandic coasts: fox skins and driftwood from South Greenland moved north to be traded for caribou skins and steatite from central West Greenland and baleen and ivory tusks from North Greenland (Gulløv 1997). With the arrival of European whalers in the seventeenth century, new exotic items such as metal, beads, textiles, and other trinkets entered this network with large groups of families gathering together to exchange goods at certain times of the year at designated trading sites (*aasiviit*).

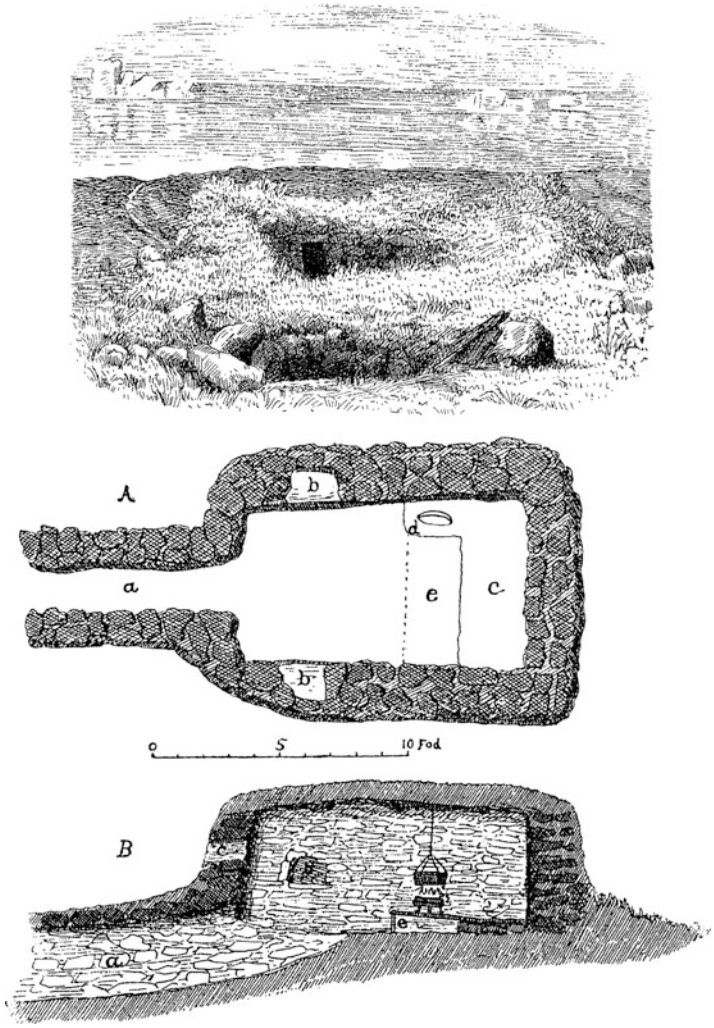

Greenland, Archaeology of, Fig. 9 Reconstruction of a Thule winterhouse from Hekla Havn in the Scoresby Sound, East Greenland, ca. 1891–1892. A long and narrow subterranean cold trap entrance (**a**) helped to minimize heat loss from the main dwelling area. (After Ryder 1895:297, Figs. 1–2)

Along the coast, the seasonal aggregation of large groups of people during the winter months is also observed archaeologically by the presence of large, sod-and-stone-built common houses, where upward of 40 people could reside in a single living space (Gulløv 2016b).

Increasing population and competition for subsistence and trade resources could also in part explain the appearance of new burial customs that emerge during this apex of the Thule culture in Greenland. While graves and human remain of the Early Thule Culture are difficult to identify – just as in the Paleo-Inuit cultures – the period after ca. 1450 AD saw the creation of highly visible funerary landscape across all of Greenland. Individuals were buried in stone-built chambers or hollow cairns that ranged in appearance from very small and rudimentary to large and almost monumental in character, frequently integrating elements of the local topography. The dead were commonly interred with objects and clothing needed for the afterlife, either placed directly within the grave itself or in an adjacent chambers. The few systematic archaeological investigations of Thule culture graves suggest frequent reuse of grave chambers and the removal and re-internment of individual skeletal materials and grave goods. One of the most famous and earliest Thule culture graves was found at Qilakitsoq in the Upernavik District in the early 1970s,

containing the remains of eight, naturally mummified individuals: six women and two children dating to ca. AD 1475 (Hansen and Gulløv 1989). Among the accompanying grave goods was some of the earliest and well-preserved examples of Thule skin clothing found in the Arctic. Traditional Thule Inuit culture burial customs appear to gradually disappear, replaced by more formal Christian burial practices over the course of the eighteenth and nineteenth centuries.

The establishment of permanent colonies and mission stations by the Kingdom of Denmark-Norway beginning in AD 1721 – in combination with epidemic diseases and the disruption of the aforementioned trade networks – marks the terminal phase of the Thule culture in Greenland. The transition from Thule to historic Inuit was a gradual process following the wake of a growing colonial presence that continued little by little until final contact was made with the last isolated communities in East Greenland in the 1880s.

Key Issues/Current Debates

The methodological maturing of archaeology as an academic discipline in Greenland developed parallel to antiquarian and cultural historical paradigms developing in Europe and North America in the late nineteenth and early twentieth centuries (Gulløv 2016a). This was later superseded by more pure archaeological research agendas focused on identification, classification, and sequencing of Greenland's prehistoric cultures (Grønnow 2005). This trend continued through the postwar decades and also saw the implementation of more modern, systematic approaches to excavation and survey (Gulløv 2004).

In the 1970s, the introduction of the New Archaeology's hypothesis-driven and process-oriented approach initiated a surge in archaeological research activity in Greenland, manifested through a series of important international and interdisciplinary research projects spanning the 1980s and 1990s. While archaeologists in Greenland have long abandoned the implications of environmental determinism and embraced more balanced views on human-environment relationships and ecodynamics, the research perspectives of postprocessual currents of archaeological practice never gained a strong foothold. The continued research impetus on environmental and ecological aspects of human livelihood in Greenland may be a consequence of the region's perceived marginality, combined with the predominance of climate and paleoenvironmental research taking place in Greenland over the last 50 years.

What archaeological and ethnographic evidence has broadly demonstrated is that past peoples in Greenland possessed incredible creativity and resilience in overcoming the environmental constraints of the island's geography. Yet questions about the origins of the Saqqaq and Independence I cultures – and ultimately their disappearance – are still on the archaeological agenda. Results of excavations during the last decades in conjunction with aDNA studies and a new series of radiocarbon dates have reinforced the empirical background concerning the temporal and spatial ranges of the pioneer societies and their roots in Canadian and Alaskan prehistory (Grønnow 2017).

Along these same lines, several other important questions remain unresolved in Greenland: for example, what kind of demographic, social, and economic forces drove the Eastern expansion of the Paleo-Inuit pioneer societies after a "standstill" in the Western Canadian Arctic? According to earlier radiocarbon dates, the entire island of Greenland was settled within two to three generations – and it is difficult to understand such a comprehensive migration episode with reference to current ethnographic and demographic knowledge. Could the Saqqaq have influenced Pre-Dorset peoples in Canada via "backward" migration through the High Arctic gateway (North Water Polynya) between Avanersuaq and Ellesmere Island? This could potentially be indicated by the spread of the blubber lamp technology (Grønnow et al. 2014). Additionally, when and how did the Saqqaq become isolated from concurrent social developments taking place in neighboring Arctic Canada? Analyses of the archaeological material suggest that Saqqaq material culture remained practically unchanged for

almost two millennia, a fact that could suggest the cultural/demographic isolation of Greenland (possibly during the last centuries of the Saqqaq period).

Furthermore, the complex and discontinuous cultural history of the High Arctic gateway between Canada and Greenland remains a jigsaw puzzle. Questions still linger as to when and how the Early Greenlandic Dorset replaced the Saqqaq in West Greenland. Due to a plateau on the calibration curve, ca. 800–400 BC, radiocarbon dates remain a weak source for resolving this problem, and future research must rely on "classic" archaeological analyses of stratigraphy and material culture.

The Norse – frequently credited as failing to overcome the challenge of Greenland's environmental limitations due to an intransigent dependence on farming – are now known to have been quite adept at modifying their landscapes by increasingly incorporating sea mammals into their diets to accommodate environmental uncertainty beginning in the thirteenth to fourteenth centuries (Arneborg et al. 2012; Jackson et al. 2018). Extensive use of widely scattered task sites is identified as a key to this success (however, at the time of this publication, very few of these sites have been excavated to ascertain their precise function and chronology). Oversimplified narratives of "collapse" due to resource depletion and the onset of the Little Ice Age have been replaced with new explanations that now emphasize the role of local environmental histories, sustainable resource management, and complex social hierarchies, combined with larger historical interactions of Greenland in the medieval European economic sphere of the North Atlantic, ca. early to middle fifteenth century AD (Hartman et al. 2017; Jackson et al. 2018).

Lastly, Thule peoples were able to find ways of exploiting almost every environmental niche within Greenland, a feat accomplished through a combination of highly specialized hunting and transportation technology and intergenerational knowledge of the land and sea that has survived to the present day. With a new, more nuanced chronological framework for the expansion of the Thule culture and an increasing inventory of Norse artifacts found in Thule culture contexts, the nature of Norse-Inuit interactions is again re-emerging as an important research theme. Early dates of a few Thule culture sites in the Norse settlement areas suggest a possible pioneer contact phase (Golding et al. 2011), but more dates are required from comparative contexts. At the same time, Thule culture sites along Greenland's southwest coast to date remain virtually unexplored.

International Perspectives

Over the past 40 years, Greenland has emerged as one of the world's foremost climate libraries, providing researchers with more accurate and high-resolution models of historic climatic and environmental variability at both the regional and global scale. A cold and dry Arctic climate has generally encouraged the survival of ancient organic remains and even human soft tissue – a factor that has made Greenland's archaeology unique within the global context. The Greenland ice sheet has also been a boon for understanding long-term changes occurring to earth systems and historically variable human responses to such change over the past several millennia (see Behringer 2010).

However, localized climate effects due to a warming Arctic in the twenty-first century are also having deleterious impacts on the archaeological record in Greenland as is observed in other parts of the Arctic (Matthiesen et al. 2014; Hollesen et al. 2016). This has seriously implications for the country as the loss of once outstandingly preserved organic deposits due to warming soil conditions appears to be rapidly increasing and may unfortunately but ultimately provide a valuable case study for similar processes taking place in other subarctic and alpine regions around the world. Great efforts are currently being made to examine the processes dictating the loss of organic material in Greenland, and these insights could potentially have important implications for the global loss of archaeological resources as environments continue to transform due to effects of climate change in the twenty-first century and beyond.

Future Directions

Greenland offers several potentials for innovative archaeological research. In the short term, what we expect to see in Greenland in the coming decades is a greater emphasis on new remote-based technologies and drone surveillance (Fenger-Nielsen et al. 2019) that can provide a level of geospatial data previously unavailable. Additionally, improvements in high-resolution aDNA studies are already revealing new information about the movement and migration of peoples across the North American Arctic and Greenland (e.g., Raghavan et al. 2014; Rasmussen et al. 2010; Lopopolo et al. 2016). At the same time, the appointment of Greenland's two new UNESCO World Heritage properties, Kujataa and Aasivissuit-Nipisat, offers the possibility for renewed international focus on the country's outstanding archaeological legacy and the recognized universal value of Greenland's cultural landscapes. Paralleling these developments are new legal frameworks will help to ensure the survival of Greenland's tangible and intangible heritage for future generations.

While the Greenland National Museum and its international partners are currently exploring new opportunities to ensure the survival of Greenland's cultural patrimony, future challenges may extend beyond the capacity of the country's museum network to fully mitigate all the changes anticipated over the coming century. This situation may be compounded by the coupling of human impacts combined with climate change as Greenland becomes increasingly accessible and a prime destination for international visitors seeking to experience Greenland's unique history, wildlife, and other natural phenomena. These new situations call for highly targeted and collaborative research efforts that build upon new interdisciplinary scientific investigations while engaging local communities to actively participate in the creation of new types of knowledge systems that extend beyond the traditional empirical focus of evidence-based archaeological inquiry.

Greenland's marginal and variegated environmental diversity have proven an important factor in shaping human life and livelihood in the Eastern Arctic over the last 4000 years, and these case studies could offer important analogs for modern human responses to climate change effects currently taking place throughout the Circumpolar North. Simultaneously, these same effects pose the greatest risk to the survival of the once outstandingly preserved archaeological record in Greenland. Future archaeologists working in Greenland must contend with this dichotomy while maximizing efforts to salvage as much data as possible before it is lost.

Cross-References

- ▶ Arctic Ocean and Bering Sea: Maritime Archaeology
- ▶ Barrow Area Sites: Nuvuk, Utqiaġvik, and Birnirk
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Greenland: Approaches to Historical Norse Archaeology
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law

References

Andreasen, Claus. 2004. Mennesket og samfundet. In *Grønlands forhistorie*, ed. H.C. Gulløv, 57–62. København: Gyldendal A/S.

Appelt, Martin, and Hans Christian Gulløv. 2009. Tunit, Norsemen and Inuit in thirteenth-century Northwest Greenland: Dorset between the devil and the Deep Sea. In *The Northern World, AD 900–1400*, ed. Herbert Maschner, Owen Mason, and Robert McGhee, 300–320. Salt Lake City: Utah University Press.

Appelt, Martin, Eric Damkjar, and Max Friesen. 2016. Late Dorset. In *The Oxford handbook of the prehistoric Arctic*, ed. T. Max Friesen and Owen K. Mason. New York: Oxford University Press.

Arneborg, Jette. 2003. Norse Greenland: Reflections on settlement and depopulation. In *Contact, continuity, and collapse: The norse colonization of the North*

Atlantic, ed. James H. Barrett, 163–181. Turnhout: Brepols.

Arneborg, Jette. 2004. Det Europæiske Landnam – Nordboerne i Grønland, 985–1450 e.v.t. In *Grønlands forhistorie*, ed. Hans Christian Gulløv, 434. København: Gyldendal A/S.

Arneborg, Jette, Niels Lynnerup, and Jan Heinemeier. 2012. Human diet and subsistence patterns in Norse Greenland AD C. 980 – AD c. 1450: Archaeological interpretations. *Journal of the North Atlantic* 3: 119–133.

Behringer, Wolfgang. 2010. *A cultural history of climate*. Cambridge: Polity.

Betts, M.W., M. Hardenberg, and I. Stirling. 2015. How animals create human history: Relational ecology and the Dorset-polar bear connection. *American Antiquity* 80 (1): 89–112.

Born, E.W., and J. Böcher, eds. 2001. *The ecology of Greenland*. Nuuk: Atuakkiorfik Illinniusiorfik.

Fenger-Nielsen, Rasmus, Jørgen Hollesen, Henning Matthiesen, Emil Alexander Sherman Andersen, Andreas Westergaard-Nielsen, Hans Harmsen, Anders Michelsen, and Bo Elberling. 2019. Footprints from the past: The influence of past human activities on vegetation and soil across five archaeological sites in Greenland. *Science of the Total Environment* 654: 895–905.

Frei, Karin M., Ashley N. Coutu, Konrad Smiarowski, Ramona Harrison, Christian K. Madsen, Jette Arneborg, Robert Frei, Gardar Guðmundsson, Søren M. Sindbæk, and James Woollett. 2015. Was it for walrus? Viking age settlement and medieval walrus ivory trade in Iceland and Greenland. *World Archaeology* 47 (3): 439–466.

Friesen, T. Max, and Charles D. Arnold. 2008. The timing of the Thule migration: New dates from the western Canadian Arctic. *American Antiquity* 73 (3): 527–538.

Golding, Kirsty A., Ian A. Simpson, J. Edward Schofield, and Kevin J. Edwards. 2011. Norse–Inuit interaction and landscape change in southern Greenland? A geochronological, pedological, and palynological investigation. *Geoarchaeology* 26 (3): 315–345.

Grønlands Historiske Mindesmærker. 1838. Kgl. nordiske Oldskrift-Selskab. Vol. I – III. Copenhagen 45.

Grønnow, Bjarne. 2005. Brudstykker af Baade og forarbeidede Steensager – Arktisk arkæologi. In *Grønlandsforskning. Historie Og Perspektiver*, ed. Kirsten Thisted, 175–193. København: Det Grønlandske Selskab.

Grønnow, Bjarne. 2017. *The frozen Saqqaq sites of Disko Bay, West Greenland-Qeqertasussuk and Qajaa (2400–900 BC): Studies of Saqqaq material culture in an eastern Arctic perspective*. Vol. 356. Copenhagen: Museum Tusculanum Press.

Grønnow, Bjarne, and Mikkel Sørensen. 2004. Palaeoeskimo migrations into Greenland: The Canadian connection. In *Dynamics of northern societies*, ed. J. Arneborg and B. Gronnow, 59–74. Aarhus University Press.

Grønnow, Bjarne, Martin Applet, and Ulla Odgaard. 2014. In the light of blubber: The earliest stone lamps in Greenland and beyond. In *Northern worlds–landscapes, interactions and dynamics*, ed. Hans Christian Gulløv, 403–422. Odense: University Press of Southern Denmark.

Gulløv, Hans Christian. 1997. *From middle ages to colonial times: Archaeological and ethnohistorical studies of the Thule culture in South West Greenland 1300–1800 AD, man & society*. Copenhagen: Kommissionen for Videnskabelige Undersøgelser i Grønland.

Gulløv, Hans Christian. 2004. *Grønlands forhistorie*. København: Gyldendal A/S.

Gulløv, Hans Christian. 2016a. The concepts of paleo- and neo-Eskimo cultures: The tradition from H. P Steensby and his students, G. Hatt, K. Birket-smith, and Therkel Mathiassen, to their successors, H. Larsen and J. Meldgaard. In *Early Inuit studies: Themes and transitions, 1850s–1980s*, ed. Igor Krupnik, 139–164. Washington: Smithsonian Institution.

Gulløv, Hans Christian. 2016b. Inuit-European interactions in Greenland. In *The Oxford handbook of the prehistoric Arctic*, ed. M. Friesen and O. Mason. Oxford: Oxford University Press.

Gulløv, Hans Christian, and Robert McGhee. 2006. Did Bering Strait people initiate the Thule migration. *Alaska Journal of Anthropology* 4 (1–2): 54–63.

Hansen, J.P. Hart, and H.C. Gulløv, eds. 1989. *The mummies from Qilaqitsoq – Eskimos in the 15th century, Meddelelser om Grønland, bioscience (geoscience, man & society)*. Odense: Man & Society.

Hartman, Steven, Astrid Ogilvie, Jon Haukur Ingimundarsson, Andrew Dugmore, George Hambrecht, and Thomas McGovern. 2017. Integrated environmental humanities: Medieval Iceland, Greenland, and the new human condition. *Global and Planetary Change* 156: 123–139.

Hollesen, Jørgen, Henning Matthiesen, Anders Bjørn Møller, Andreas Westergaard-Nielsen, and Bo Elberling. 2016. Climate change and the loss of organic archaeological deposits in the Arctic. *Scientific Reports* 6: 28690.

Holm, G.F. 1883. Ruiner i Julianehaabs Distrikt. *Meddelelser om Grønland* 6: 57–145.

Holtved, Erik. 1954. *Archaeological investigations in the Thule district: with figures and plates. 3. Nugdlit and Comers midden*. Vol. 146. *Meddeleser om Grønland*: Reitzel.

Ingstad, Anne Stine. 1977. *The discovery of a Norse settlement in America: Excavations at L'Anse aux meadows, Newfoundland, 1961–1968*. Vol. 1. Oslo: Universitetsforlaget.

Jackson, Rowan, Jette Arneborg, Andrew Dugmore, Christian Madsen, Tom McGovern, Konrad Smiarowski, and Richard Streeter. 2018. Disequilibrium, adaptation, and the Norse settlement of Greenland. *Human Ecology* 46 (5): 665–684.

Jensen, Jens Fog. 2016. Greenlandic Dorset. In *The Oxford handbook of the prehistoric Arctic*, ed. Max Friesen and Owen Mason. New York: Oxford University Press.

Lopopolo, Maria, Claus Børsting, Vania Pereira, and Niels Morling. 2016. A study of the peopling of Greenland using next generation sequencing of complete mitochondrial genomes. *American Journal of Physical Anthropology* 161 (4): 698–704.

Mathiassen, Therkel. 1927. *The Thule culture and its position within the Eskimo culture: Archæology of the central Eskimos II*. Vol. 2. Copenhagen: Gyldendalske Boghandel, Nordisk Forlag.

Matthiesen, Henning, Jan Bruun Jensen, D. Gregory, Jørgen Hollesen, and Elberling Bo. 2014. Degradation of archaeological wood under freezing and thawing conditions – Effects of permafrost and climate change. *Archaeometry* 56 (3): 479–495.

McGhee, Robert. 2009. When and why did the Inuit move to the Eastern Arctic. In *The Northern World, AD 900–1400*, ed. Herbert Maschner, Owen Mason, and Robert McGhee, 155–163. Salt Lake City: University of Utah Press.

Odgaard, Ulla. 2003. Hearth and home of the Palaeo-Eskimos. *Études/Inuit/Studies* 27 (1–2): 349–374.

Raghavan, Maanasa, Michael DeGiorgio, Anders Albrechtsen, Ida Moltke, Pontus Skoglund, Thorfinn S. Korneliussen, Bjarne Grønnow, Martin Appelt, Hans Christian Gulløv, and T. Max Friesen. 2014. The genetic prehistory of the New World Arctic. *Science* 345 (6200): 1255832.

Rasmussen, Morten, Yingrui Li, Stinus Lindgreen, Jakob Skou Pedersen, Anders Albrechtsen, Ida Moltke, Mait Metspalu, Ene Metspalu, Toomas Kivisild, and Ramneek Gupta. 2010. Ancient human genome sequence of an extinct Palaeo-Eskimo. *Nature* 463 (7282): 757–762.

Ryder, C. 1895. Beretning om den østgrønlandske Expedition 1891–1892. *Meddelelser om Grønland* 22: 1–159.

Seersholm, Frederik Valeur, Mikkel Winther Pedersen, Martin Jensen Søe, Hussein Shokry, Sarah Siu Tze Mak, Anthony Ruter, Maanasa Raghavan, William Fitzhugh, Kurt H. Kjær, Eske Willerslev, Morten Meldgaard, Christian M.O. Kapel, and Anders Johannes Hansen. 2016. DNA evidence of bowhead whale exploitation by Greenlandic Paleo-Inuit 4,000 years ago. *Nature Communications* 7: 1–9.

Slaughter, Dale C. 2005. Radiocarbon dating the Arctic small tool tradition in Alaska. *Alaska Journal of Anthropology* 3 (2): 117–134.

Smiarowski, Konrad, Ramona Harrison, S. Brewington, Megan Hicks, Frank J. Feeley, Céline Dupont-Hébert, Brenda Prehal, George Hambrecht, James Howatt Woollett, and Thomas McGovern. 2017. Zooarchaeology of the Scandinavian settlements in Iceland and Greenland: Diverging pathways. In *The Oxford handbook of Zooarchaeology*, ed. Umberto Albarella, Mauro Rizzetto, Hannah Russ, Kim Vickers, and Sarah Viner-Daniels. New York: Oxford University Press.

Wallace, Birgitta. 2003. The Norse in Newfoundland: L'Anse aux Meadows and Vinland. *Newfoundland and Labrador Studies* 19 (1): 5–43.

Further Reading

Cranz, David. 1765. *Historie von Grönland: enthaltend die Beschreibung des Landes und der Einwohner, &c., insbesondere die Geschichte der dortigen Mission der Evangelischen Brüder zu Neu Herrnhut und Lichtenfels. Mit acht Kupferkafeln und einem Register.* Vol. 1. Barbey: Ebers.

Egede, Hans. 1818. *A Description of Greenland, by Hans Egede,... A New Edition, with an Historical Introduction and a Life of the Author*. London: T. and J. Allman.

Graah, Wilhelm August. 1837. *Narrative of an expedition to the East Coast of Greenland, sent by order of the king of Denmark, in search of the lost colonies, Under the command of W.A.* Graah: John W. Parker.

Larsen, Helge, and Thorvald Sørensen. 1934. *Dødemandsbugten: An Eskimo settlement on Clavering Island; treaarsexpeditionen til Christian den X's Land 1931–34*. København: Reitzel.

Roussell, Aage. 1941. *Farms and churches in the medieval Norse settlements of Greenland*. Copenhagen: I kommission hos CA Reitzel.

Greenland: Approaches to Historical Norse Archaeology

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State of Knowledge and Current Debates

Introduction

The prehistory of Greenland is the story of successive migrations of Arctic hunters entering Greenland from what is now Canada. According to the archaeological record, the first humans to set foot on Greenland were the Independence I culture who spread from High Arctic Canada to North Greenland about 4500 years ago. During the next 3000 years, people of the Saqqaq, Independence II, and Dorset cultures followed (Gulløv 2004a). The first people to introduce a "writing" culture, however, were Norse colonists, who emigrated from Iceland to the southern subarctic parts of the Greenland west coast around AD 980. Unfortunately, we do not have written accounts from the Norse Greenlanders themselves; most information concerning events in Greenland was

written down in either Iceland or Norway. About 200 years after the Norse had become established in South Greenland, a new group of Arctic hunters, the Thule Inuit, arrived in North Greenland from Canada. Calling them Skrælings these were the first Inuit to be described in texts by the Norse, commencing just before 1200 AD.

Historical Background

According to early historical sources from Iceland and Norway, Icelanders under the leadership of Erik the Red migrated to Greenland around 985, where they settled in what they called the Eastern Settlement in what is today Kujalleq municipality and in the Western Settlement close to Nuuk. Dependence on the European markets for Arctic exotics primarily walrus tusks however extended their resource area northward, to the Disko Bay where the sought-after mammals were caught (Fig. 1).

In the broader perspective, the settlement in Greenland was the last step in the colonization of the North Atlantic Islands which began with the settlement of the Faroe Islands and Iceland in the latter part of the ninth century. Most of the immigrants, if not all, were Christians when they arrived in Greenland (Fig. 2), and around 1124, the first Greenlandic bishop was appointed from Norway, and in 1261 Greenlanders became subjects of the Norwegian king. The last bishop residing in Greenland died in 1378, and in the same period, the Western Settlement is reported as being abandoned.

Thirty years later, in 1408, an Icelandic couple married in the Hvalsey Fjord Church in the Eastern Settlement, and the attestation of their marriage is the last written testimony of life in the Norse settlements in Greenland (GHM III) (Fig. 3). Archaeology indicates that life in the Eastern Settlement continued to around the middle of the fifteenth century.

Scandinavia lost contact with the Norse settlements in the 1420s, and permanent contacts were only re-established in 1721 when the Danish-Norwegian priest Hans Egede established a small European colony called Godthåb (the Good Hope), in present-day Nuuk and what was formerly the Norse Western Settlement.

The history of the early years of Norse settlement in Greenland is based on Icelandic and Norwegian historical accounts and Icelandic sagas written down in the thirteenth century from much older oral tradition. Later periods are based on contemporary Icelandic annals, contemporary ecclesiastical correspondences, and topographical accounts, the latter often only known from much later copies.

Archaeology and the study of material culture (i.e., ancient monuments and primarily runic inscriptions) was introduced in Norse Greenlandic research early in the nineteenth century, peaking in the beginning of the twentieth century, and often with closely defined problems originating from a reading of the written sources, and, as was the common attitude to medieval archaeology at the time, the archaeological record was interpreted from the perspective of the written sources. Discussions of the chronology of the settlements depended entirely on written accounts, for instance, and archaeology only served to illustrate and verify what was already understood from the written sources. The medieval topographical accounts were used to identify and name the ruins of farms and churches in the landscape, several of which were subsequently excavated. Among others, key sites investigated during this phase included Erik the Red's farm Brattahlid (now the present-day settlement of Qassiarsuk); Gardar, where the bishops lived (present-day Igaliku); and Herjolfsnes (present-day Ikigaat), the southernmost of Norse farms mentioned in the accounts (Arneborg 2006).

In the late twentieth century, processual archaeology began to have more influence on approaches to the archaeology of Norse Greenland, encouraging a focus on the kind of social and economic questions that only archaeology can answer. For a period, archaeologists ignored churches, dwellings, and the stables and barns of the manor farms and turned instead to excavation of middens so as to recover data that could provide insights into the economy of the farms. This produced fresh insights. In particular, while the written sources and the settlement pattern gave the impression of an economy based on pastures and animal husbandry, the animal bone record

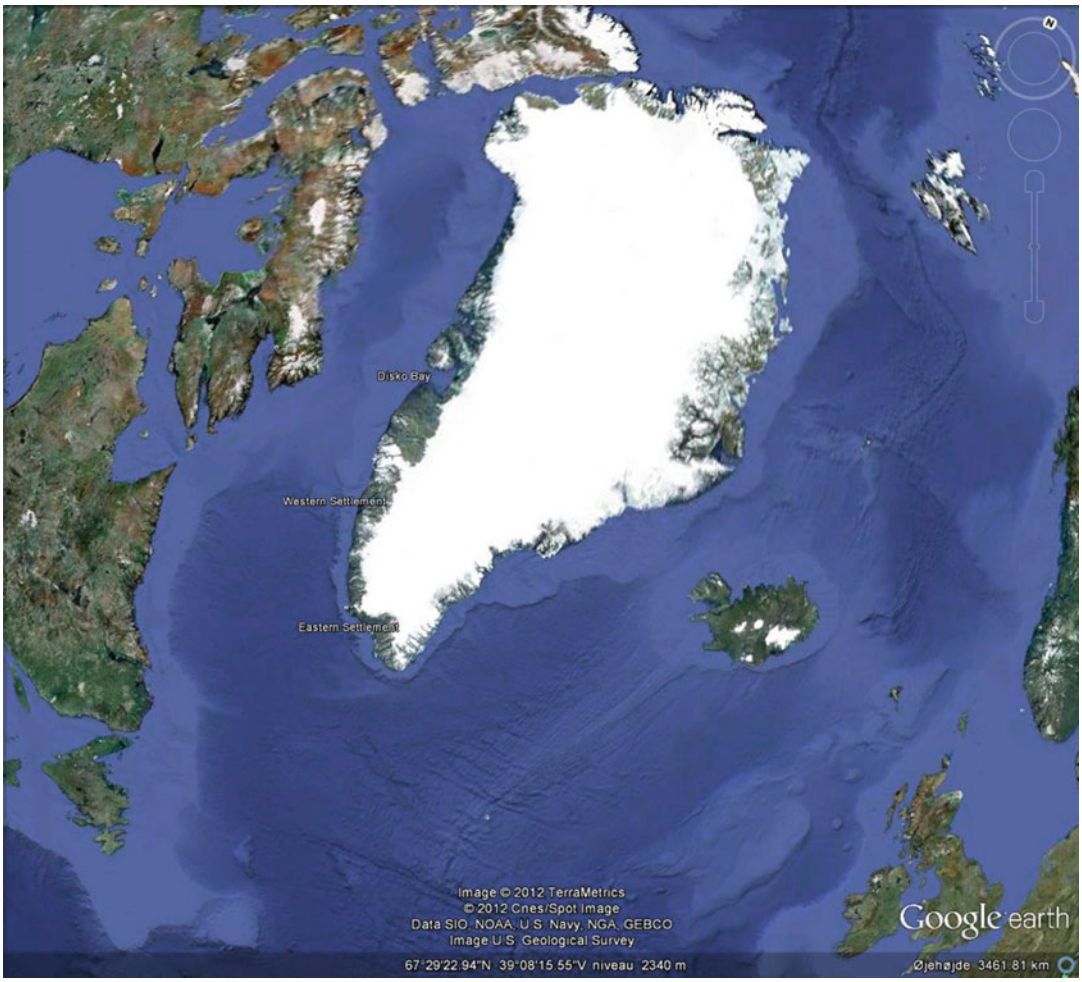

Greenland: Approaches to Historical Norse Archaeology, Fig. 1 The Norse settlements are both located on the west coast of Greenland. The Eastern Settlement around 60° N in present-day Kujalleq municipality and the Western Settlement around 64° N near Nuuk in Sermersooq municipality. The northern hunting grounds concentrated around the Disko Bay in West Greenland. (Google Earth)

indicated that marine resources played a much larger role than formerly recognized. In addition, careful, stratigraphically controlled excavations and the introduction of radiocarbon dating provided new insights into changes over time. These showed that the dependence on the marine resources increased over time. The animal bone record also revealed social differences between the cattle-based manor farms, often with connected churches, compared to the smaller farms, where sheep and goats dominated (McGovern 1985).

Today, midden excavations and the application of the methods and approaches of historical ecology, social history and archaeology, environmental archaeology, and the natural sciences still play a fundamental role in Norse Greenland archaeology. However, research has been expanded so as to get a broader perspective on questions such as the nature of social organization, systems of governance, variations in economy and subsistence, religious practices, and evidence for human well-being/suffering. This has prompted new surveys and excavations of farm buildings and churches

Greenland: Approaches to Historical Norse Archaeology, Fig. 2 Reconstruction of the so-called Tjodhildes Church in Qassiarsuk, the Norse farm Brattahlid. The remains of the small church were excavated in the beginning of the 1960s, and radiocarbon dates on skeletons from the surrounding cemetery indicate that the church was built in the late tenth century. (Photo: J. Arneborg 2000)

and a revival of interest in artifact studies. Instead of single site studies, whole regions and the interaction of the many cultural elements of the landscape are now standard, and the results are interpreted from a broader perspective that include theoretical frameworks derived from social anthropology and "Annales"-oriented research, with special emphasis on human-human and human-environment interaction. Most research is also interdisciplinary including both natural sciences and humanistic social-science approaches, i.e., history, human bioarchaeology, zooarchaeology, archaeobotany, geoarchaeology, stable isotopic analysis, historical ecology, environmental modeling, and artifact studies.

Key Issues

Although there are many other topics of research, the following broad themes capture many of the current concerns in the historical archaeology of Norse Greenland. These are the enigma of Norse settlement, Norse Greenland ecodynamics, security and vulnerability, and the causes of depopulation.

The Enigma of the Norse Settlements

One of the key concepts to the New Archaeology was to seek explanations rather than just providing descriptions of events, and this has been a recurrent feature of Norse Greenlandic archaeology, also before the appearance of New Archaeology. Above all, the human story about Norse Greenland has been a story about colonization of virgin land, survival for half a millennium, and then disappearance. The enigma of the depopulation of the settlements has always attracted archaeological attention, and many explanations have been put forward.

Written accounts indicate hostile encounters between the Norse and the Thule Inuit who moved very rapidly from North Greenland southward toward the Norse settlements, and the explanation that the Thule Inuit wiped out the Norse

Greenland: Approaches to Historical Norse Archaeology, Fig. 3 The very well-preserved ruin of the church at the elite farm in the *Hvalsey* fjord in the Eastern Settlement where the wedding on 1408 took place. The church was built in the last part of the thirteenth century. The photo is taken from the festal hall and in between is the remains of the dwelling of the farm. (Photo J. Arneborg 2004)

population has for a long time been one of the most persistent explanations of Norse disappearance. The theory however was based on a mixture of preconceived ideas of the eighteenth-century colonists of what might have happened with the old Norse and the influence of the colonists on the local Inuit population (Arneborg 1993).

With the growing recognition of the damaging consequences of modern utilization of Earth's limited natural resources, the Thule Inuit theory was overshadowed by ecological explanations, and from the 1980s the prevailing explanation of the depopulation of the Norse Greenland settlements was one of maladaptation and ruthless exploitation of the very fragile natural resources. The impacts of climate changes have added yet another facet to the discussion.

In his famous book *Collapse – How Societies Choose to Fail or Succeed*, Jared Diamond (2005) summarized the state of play and argued that the Norse Greenland society collapsed for three related reasons. First, they depleted the environmental resources on which they depended by cutting down trees, stripping turf, and overgrazing their pastures, all of which resulted in heavy soil erosion. Second, they did not utilize additional and available food sources such as fish, ringed seal, and stranded whales, and third is because they had established a rigid social system that could not adapt to the changing world. All these arguments can be challenged on archaeological grounds.

Norse Greenland Ecodynamics

From 2007 intensive archaeological research has taken place in the Vatnahverfi region from the inland to the outer coast between the two fjords Igalikup Kangerlua and Alluitsup Kangerlua. Vatnahverfi is a ca. 500 km^2 large peninsula situated in the Eastern Settlement south of the elite farm Gardar, where the Greenlandic bishops lived. In the Middle Ages, Vatnahverfi was relatively densely populated, and the aim of the research is to study a larger region, for the first

time ever, with the focus on the interaction between the individual farms and between settlement and environment, and results from the Vatnahverfi project, and other linked projects indicate that the theories of maladaptation and unsustainable farming practices are contradicted by the material evidence. The Norse introduced a dynamic subsistence strategy based on animal husbandry making use of all available resources. The farm was the center of all life, being a flexible organism that dispersed to all usable resources, for all-year round or seasonal use (Madsen 2014) and including the participating in the local seal hunt and the long-distance walrus hunt.

Norse *landnám* did impact the environment. The introduction of animal husbandry and stripping off large areas of turf for house construction caused increased erosion, but in the long run, Norse interaction with the environment seems to have been sustainable, perhaps because of changes in subsistence strategies (i.e., from a predominantly terrestrial-based economy to a more marine economy) (Massa et al. 2011; Schofield and Edwards 2011; Arneborg et al. 2012; Bichet et al. 2014). Vatnahverfi, for instance, does not show erosion disasters of consequence – many farms established artificial irrigation systems, and they fertilized their grass fields perhaps in the hope to increase yields or at least to preserve status quo (Buckland et al. 2009). In the Norwegian text, *The King's Mirror* written around AD 1250 (Jónsson trans. 1920), it is stated that the Greenlanders had good pastures and large and good farms and that they held many heads of cattle and sheep for butter, cheese, and meat. Yet, the author also mentions that the Greenlanders in addition subsisted on meat from reindeer, whale, seal, and bear and both the animal bone record (McGovern 1985) and the δC13 and δN15 values measured on Norse human bones show that the marine component of the diet increased over time (Arneborg et al. 2012). From the middle of the thirteenth century, the subsistence economy shifted from a predominantly terrestrial diet to a more marine diet with seal as the prime meat producer.

The climate deteriorated in the settlement period (Masson-Delmotte et al. 2012), and climate changes could be part of the explanation of the increased dependence on marine resources – either because of easier access to seals or because of a decline in the pasture economy.

In the first period, settlement was concentrated in the inner and mid-fjord regions where pasture farming was possible (Fig. 4).

The large and most wealthy farms were situated in the inner fjords where conditions were by far the best. Large living houses, festal halls, byres for cattle, warehouses, and connected churches were clear marks of status (Fig. 5).

There are indications in the written sources that a smaller number of manors owned all the land and the farms sitting there (Jónsson 1930) and the reduction in the number of farms with a connected church at the same time as a limited number of much larger stone churches were constructed in a few core manors suggests a consolidation of power around a few great families from the thirteenth century onward. In the same period, marginal farms on less favorable locations were abandoned. In the late settlement period, farms were concentrated in the core areas around the fjords Tunulliarfik and Igalikup Kangerlua and Vatnahverfi (Madsen 2014).

During the period of climatic deterioration, the elite consolidated their farms in the inner fjords, pasture farming declined, the scale of animal husbandry decreased, and the subsistence economy became more and more dependent on the marine resources that were only available on the outer coast (Smiarowski et al. 2017). Moving inland to the more "rural" region at the same time as subsistence became more dependent on outer coast resources appears to be inconsistent and could be interpreted as cultural rigidity – but may in fact only have been partly so and then only pressed by the elite. Compared to the animal husbandry, seal kept people alive, and as long as the elite was able to control the resources and maintain the perception of Norse Greenland as a society based on farming and landownership, sealing would only support the prevailing social order, though also challenging cultural identity (Fig. 6).

Greenland: Approaches to Historical Norse Archaeology, Fig. 4 Heading for the Norse farm no. E162 in the southern part of the Eastern Settlement. (Photo: J. Arneborg 2015)

Depopulation

Although most focus has been on the subsistence economy, one should however not ignore the fact that the survival of the Norse in Greenland depended on both local subsistence *and* trade with Europe. Necessities such as iron had to be imported, and the Greenlanders' most important trade item was tusk ivory from walruses caught in the Disko Bay and northward (Fig. 1).

The walrus hunt was elite driven and it was the elite who controlled the foreign trade linking Greenland with North Atlantic/Scandinavian trading networks that provided the North European markets with Arctic exotics – first and foremost the walrus tusk. At home redistribution of imported items formed part of the elites' power base. In fact, recent research suggests that rather than the prospects of getting more land, it might have been the walruses and the access to the valuable walrus ivory that in the first place attracted the Icelandic settlers to Greenland (Frei et al. 2015). However, over time trade patterns changed, and the highly valued and very valuable walrus tusk lost prestige during the Middle Ages, especially as other ivory sources became more accessible, and it was no longer worth risk losing both ships and men to acquire it (Roesdahl 1995). As a result, in Greenland, the elite lost prestige and power pari passu as the calls by foreign merchants' ships become fewer and fewer.

International Perspectives and Future Directions

The Norse settlements in Greenland were populated for about 500 years. New research indicates that the Norse Greenlanders were well adapted – at least with respect to local subsistence economy, and economic strategies seem to have been sustainable. Still, Norse Greenland society faced several difficulties caused by climate changes, changed international trade relations, and, perhaps, the arrival of the Thule Inuit, circumstances that were out of their power to change. Altogether life in Greenland became difficult resulting in a decrease of population to end with the total depopulation (Lynnerup 1998).

One stress factor on Norse society of which we know very little was the appearance of the Thule Inuit in Greenland and in the settlements in particular. In a late twelfth-century Norwegian history book *Historia Norwegiae* (trans. 2008), we learn for the first time about Norse encounters

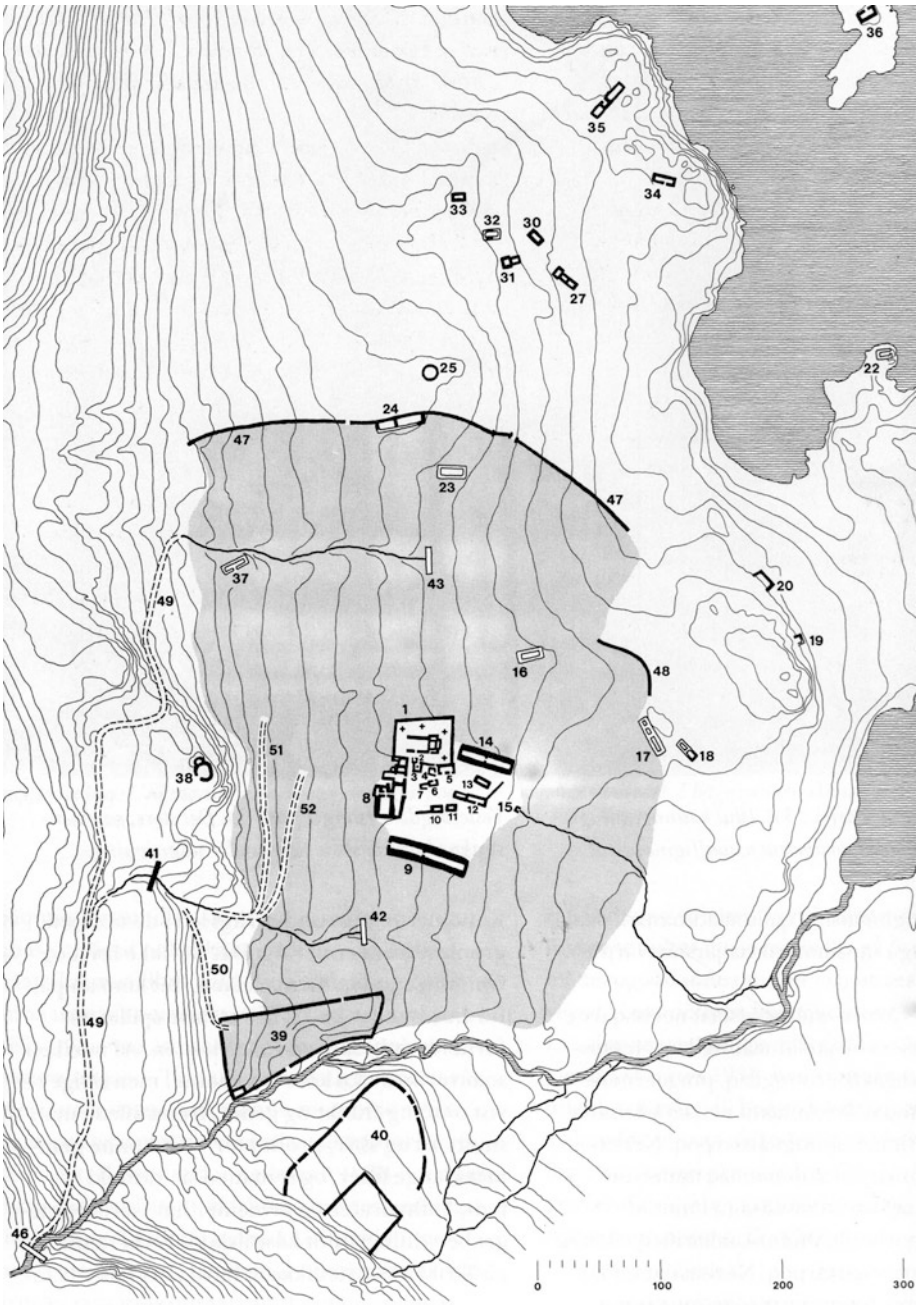

Greenland: Approaches to Historical Norse Archaeology, Fig. 5 The ruins of the Norse farm *Gardar* in present-day Igaliku. *Gardar* was one of the largest farms in the Eastern Settlement. The Greenlandic bishops lived here and ruin no. 1 is the cathedral. Ruin no. 8 is of the dwelling, and ruins nos. 9 and 14 are large byres with connected barns. The main buildings were placed centrally in the infield. The infield was used for growing grass for winter fodder for the animal husbandry that was kept in the byes and stables during winter. A fence surrounding the infield kept the grazing animals out of the infield. Water from dams in the mountains were led to the infield through the channels 49, 50, 51, and 52. (After Krogh 1982, National Museum of Denmark)

Greenland: Approaches to Historical Norse Archaeology, Fig. 6 Woolen dress found 1921 in the *Herjolfsnes* church yard in the Eastern Settlement C14 dated to the beginning of the 1400s. The dress is of contemporary European fashion and clearly shows the importance the Norse Greenlanders attached to their European identity. (Photo: National Museum of Denmark)

with the *Skrælings*. However, we do not know where these encounters took place and with whom. Rather than with the Thule Inuit, it might have been with their predecessors of the late Dorset culture (Appelt 2004). The presence of Thule Inuit in the Disko Bay region is documented archaeologically from the beginning of the thirteenth century onward (Gulløv 2004b), and encounters, friendly or hostile, between the two people must have been unavoidable. The archaeological record is still uncertain when it comes to the arrival of the Inuit to the Norse settlements. Nevertheless, if the Thule Inuit actually settled on the coast in the Norse settlements while the Norse were still living on their farms, the Thule – perhaps – would have been positioned to cut off Norse access to migratory seals. Future research may resolve this.

Another stress factor to the Norse society would be the standards of living in the Norse settlements and the human costs to climate change and elite decisions, especially when it came to the well-being and health of the population (Hegmon et al. 2014; Nelson et al. 2015, 2017). That too is for future research.

Finally, as research on these issues has progressed, from having been of local interest only, the fate of the Norse Greenlanders has now turned into a matter of global interest. Today ecologically orientated archaeology forms part of interdisciplinary studies on issues of sustainability, resilience, and the future of humans on earth, and Norse Greenland has turned into one of the classic examples of societies that did not make it. Against this background, future research in Norse Greenland is likely to seek to improve our understanding of the complex interactions of human governance, human well-being and health, climate change, human environmental impact, and world system effects.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Extreme Environments Archaeology: Climate
- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Geoarchaeology
- ▶ Greenland, Archaeology of
- ▶ Historical Ecology in Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ Hunting and Hunting Landscapes
- ▶ Interdisciplinarity and Archaeology
- ▶ Landscape Archaeology
- ▶ Medieval Archaeology
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ People as Agents of Environmental Change
- ▶ Radiocarbon Dating in Archaeology
- ▶ Scandinavia/Northern Europe: Historical Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Zooarchaeology

References

Appelt, M. 2004. De sidste Dorset Folk. In *Grønlands Forhistorie*, ed. H.C. Gulløv. Copenhagen: Gyldendal.

Arneborg, J. 1993. Contacts between Eskimos and Norsemen in Greenland. In *Beretning fra tolvte tværfaglige vikingesymposium*, eds. E. Roesdahl and P. Meulengracht Sørensen, 23–36. Forlaget Hikuin og Afdeling for Middelalder-arkæologi, Aarhus Universitet, Aarhus.

Arneborg, J. 2006. *Saga trails*. National Museum of Denmark, Nanortalik Museum, Narsaq Museum, Qaqortoq Museum, Aarhus 94 pp.

Arneborg, J., J. Heinemeier, and N. Lynnerup, eds. 2012. Greenland isotope project: Diet in Norse Greenland AD 1000–AD1450. *Journal of the North Atlantic* sp. Vol. 3: 135 pp.

Bichet, V., E. Gauthier, C. Massa, and B.B. Perren. 2014. Lake sediments as an archive of land use and environmental change in the eastern settlement, southwestern Greenland. *Journal of the North Atlantic* 6: 47–63.

Buckland, P.C., K.J. Edwards, E. Panagiotakopolu, and J.E. Schofield. 2009. Palaeoecological and historical evidence for manuring and irrigation at *Garðar* (Igaliku), Norse Eastern Settlement, Greenland. *The Holocene* 19 (1): 105–116.

Diamond, J. 2005. *Collapse – How societies choose to fail or succeed*. New York: Penguin Books.

Frei, K., , A.N. Coutu, K. Smiarowski, R. Harrison, C.K. Madsen, J. Arneborg, R. Frei, G. Guðmundsson, S.M. Sindbæk, J. Woollett, S. Hartman, M. Hicks, T.H. McGovern 2015. Was it for walrus? Viking Age settlement and medieval walrus ivory trade in Iceland and Greenland. World Archaeology, 47(3) 1–28. ISSN 0043-8243. https://doi.org/10.1080/00438243.2015.1025912.

GHM III. 1845. *Grönlands historiske Mindesmærker*. Kjøbenhavn: Det kongelige nordiske Oldskrift-selskab.

Gulløv, H.C. 2004a. *Grønlands Forhistorie*. Copenhagen: Gyldendal.

Gulløv, H.C. 2004b. Nunarput, vort land Thulekulturen. In *Grønlands Forhistorie*, ed. H.C. Gulløv. Copenhagen: Gyldendal.

Hegmon, M., J. Arneborg, L. Comeau, A. J. Dugmore, G. Hambrecth, S. Ingram, K. Kintigh, T.H. McGovern, M. Nelson, M.A. Peeples, I. Simpson, K. Spielmann, R. Streeter, O. Vésteinsson. 2014. The human experience of social change and continuity: The Southwest and North Atlantic in "interesting times" ca. 1300. In *Climates of change. The shifting environment of archaeology: Proceedings of the 44th Annual Chacmool Conference, Chacmool Archaeological Association, University of Calgary,* eds. Kulyk, S., C.G. Tremain and M. Sawyer, 53–68. Calgary: University of Calgary, Chacmool Archaeological Association.

Historia Norwegiae. (2008). A history of Norway and the passion and miracles of the blessed Óláfr. Transl. by D. Kunin, introduction and notes by C. Phelpstead. *Viking Society for Northern Research* XIII. University College London 2001. http://www.vsnrweb-publications.org.uk/Text%20Series/Historia%26Passio.pdf. Accessed 30 Nov 2011.

Jónsson, F., ed. 1920. *Konungs Skuggsjá: Speculum Regale*. Copenhagen: Det Kongelige Nordiske Oldskriftselskab.

Jónsson. 1930. Ívar Bárðarson, Det gamle Grønlands Beskrivelse af Ívar Bárðarson. Levin and Munksgaards Forlag Copenhagen, Copenhagen.

Lynnerup, N. 1998. The Greenland Norse. A biological-anthropological study. Meddelelser om Grønland. Man and Society 24.

Madsen, C.K. 2014 Pastoral settlement, farming, and hierarchy in Norse Vatnahverfi, South Greenland. PhD Dissertation Faculty of Humanities. University of Copenhagen 442 pp.

Massa, C., V. Bichet, É. Gauthier, B.B. Perren, O. Mathieu, C. Petit, F. Monna, J. Giraudeau, R. Losno, and H. Richard. 2011. A 2500-year record of natural and anthropogenic soil erosion in South Greenland. *Quaternary Science Reviews*. https://doi.org/10.1016/j.quascirev.2011.11.014.

Masson-Delmotte, V., D. Swingedouw, D. Landais, M.-S. Seidenkrantz, E. Gauthier, V. Bichet, C. Massa, B. Perren, V. Jomelli, G. Adalgeirsdottir, Hesselbjerg Christensen, J. Arneborg, U. Bhatt, D.A. Walker, B. Elberling, F. Gillet-Chaulet, C. Ritz, H. Gallée, M. Van Den Broeke, X. Fettweis, A. De Vernal, and B. Vinther. 2012. Greenland climate change: From the past to the future. *Wiley Interdisciplinary Reviews*. WIREs Clim Change 2012. https://doi.org/10.1002/wcc.186.

McGovern, T.H. 1985. Contribution to Paleoeconomy of Norse Greenland. *Acta Archaeologica* 54: 73–122.

Nelson, M., S. Ingram, A.J. Dugmore, R. Streeter, M.A. Peeples, T.H. McGovern, M. Hegmon, J. Arneborg, K. Kintigh, S. Brewington, K. Spielmann, I. Simpson, C. Strawhacker, L. Comeau, A. Torvinen, C.K. Madsen, G. Hambrecth, K. Smiarowski. 2015. Climate challenges, vulnerabilities, and food security. *Proceedings of the National Academy of Sciences PNAS.* (Proceedings of the National Academy of Sciences), Washington DC.

Nelson, M.C., A.P. Kiinzig, J. Arneborg, R. Streeter, S.E. Ingram. 2017. Vulnerability to Food Security. In *The give and take of sustainability,* ed. M. Hegmon. New York: Cambridge University Press.

Roesdahl, E. 1995. *Hvalrostand elfenben og nordboerne I Grønland*. Denmark: Odense Universitetsforlag.

Schofield, J.E., and K.J. Edwards. 2011. Grazing impacts and woodland management in Eriksfjord: Betula, coprophilous fungi and the Norse settlement of Greenland. *Vegetation History and Archaeobotany* 20: 181–197.

Smiarowski, K., R. Harrison, S. Brewington, M. Hicks, F.J. Feeley, C. Dupont-Hébert, B. Prehal, G. Hambrecht,

J. Woollett, T.H. McGovern. 2017. Zooarchaeology of the Scandinavian settlements in Iceland and Greenland: Diverging pathways. In *The Oxford handbook of zooarchaeology,* eds. Albarella, U. M. Rizzetto, H. Russ, K. Vickers and S. Viner-Daniels, Oxford https://doi.org/10.1093/oxfordhb/9780199686476.013.9

Further Readings

Arneborg, J. 2003a. Norse Greenland archaeology: The dialogue between the written and the archaeological record. In *Vinland revisited: The Norse world at the turn of the first millennium*, Selected papers from the Viking Millennium International Symposium 15–24 September, ed. S.M. Lewis, 111–123. Newfoundland and Labrador: Newfoundland Historic Sites Association.

Arneborg, J. 2003b. Norse Greenland – reflections on the discussion of depopulation. In *Contact, continuity and collapse: The Norse colonisation of the North Atlantic*, ed. H.J. Barrett, 163–181. Turnhout: Brepols, York Studies in the Early Middle Ages.

Arneborg, J. 2012. Churches, Christianity and magnate farmers in the Norse Eastern Settlement. In *Northern worlds – challenges and solutions,* eds. H.C. Gulløv, P.A. Toft and C.P. Hansgaard, 167–170. Report from workshop 2 at the National Museum, 1 November 2011.

Arneborg, J., G. Nyegaard, O. Vésteinsson. 2009. Norse Greenland: Selected papers from the Hvalsey conference 2008. *Journal of the North Atlantic* 2.

Arneborg, J., J. Heinemeier, N. Lynnerup, H.L. Nielsen, N. Rud, and A.E. Sveinbjörnsdóttir. 1999. Change of diet of the Greenland Vikings determined from stable carbon isotope and ^{14}C dating of their bones. *Radiocarbon* 41 (2): 157–168.

Dugmore, A.J., C. Keller, and T.H. McGovern. 2007. Norse Greenland settlement: Reflection on climate change, trade, and the contrasting fates of human settlements in the North Atlantic Islands. *Arctic Anthropology* 44 (1): 12–36.

Dugmore, A.J., T.H. McGovern, O. Vésteinsson, J. Arneborg, R. Streeter, and C. Keller. 2012. Cultural adaptation, compounding vulnerabilities and conjunctures in Norse Greenland. *PNAS* 109 (10): 3658–3663. https://doi.org/10.1073/pnas.1115292109.

Dugmore, A.J., T.H. McGovern, R. Streeter, C.K. Madsen, K. Smiarowski, and C. Keller. 2013. "Clumsy solutions" and "elegant failures": Lessons on climate change adaption from the settlement of the North Atlantic Islands. In *A changing environment for human security: Transformative approaches to research, policy and action*, ed. I. Synga, K. O'Brien, and J. Wolf, 435–451. Abingdon: Routledge.

Eiríks saga rauða. n.d.. http://sagadb.org/eiriks_saga_rauda.en. Accessed 30 Nov 2011.

Grænlendinga saga. n.d.. http://sagadb.org/graenlendinga_saga.on. Accessed 30 Nov 2011.

Hartman, S., A.E.J. Ogilvie, J.H. Ingimundarson, A.J. Dugmore, G. Hambrecht, and T.H. McGovern. 2017. Medieval Iceland, Greenland, and the new human condition: A case study in integrated environmental humanities. *Global and Planetary Change*. https://doi.org/10.1016/j.gloplacha.2017.04.007.

Imer, L.M. 2017. *Peasants and prayers – the inscriptions of Norse Greenland*. Publications from the National Museum. Studies in Archaeology and History, Copenhagen Vol. 25.

Krogh, K.J. 1982. *Erik den Rødes Grønland*. Copenhagen: National Museum of Denmark.

Mikkelsen, N., A. Kuijpers, and J. Arneborg. 2008. The Norse in Greenland and late Holocene sea-level change. *Polar Record* 44 (228): 45–50.

Ogilvie, A.E.J., J.M. Woollett, K. Smiarowski, J. Arneborg, S. Troelstra, A. Kuijpers, A. Pálsdóttir, and T. Mcgovern. 2009. Seals and Sea Ice in Medieval Greenland. *Journal of the North Atlantic* 2: 60–81.

Østergård, E. 2014. *Woven into the earth – textiles from Norse Greenland*. Aarhus: Aarhus University Press. Narayana Press, Gylling 298 pp.

Vesteinsson, O. 2010. Parishes and communities in Norse Greenland. *Journal of the North Atlantic* 2: 138–150.

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Basic Biographical Information

Stefano Grimaldi is an Italian archeologist who specializes in hunter-gatherer groups (Grimaldi 2009; Grimaldi and Flor 2009). He grew up in Rome and completed his graduate studies in Prehistoric Archaeology at the "La Sapienza" University of Rome (1992). He received a Ph. D. (1996) in anthropology in the same university under the guidance of Professor Amilcare Bietti.

Early in his career, Stefano Grimaldi worked as a field technician in several excavations in Europe. At the same time, he was co-founder member of a private company that specialized in cultural heritage management. Grimaldi has received research grants from the European Community to work in Portugal (1996–1999). In 1999 he was an assistant professor at the Instituto Politecnico de Tomar, Portugal, as a colleague of Luiz Oosterbeek. At this institution he taught prehistory, human evolution, and lithic technology. Since 2005 he has been an assistant professor at the University of Trento, Italy, teaching human evolution and European prehistory.

Since 2006 Stefano Grimaldi has been president of the "Human Occupations in Mountains Environments" Commission of the International Union of Prehistoric and Protohistoric Sciences. He is a researcher in the "Quaternary and Prehistory Group," Geosciences Center, at University of Coimbra, Portugal, and with the Instituto Terra e Memoria of Maçao, Portugal.

Major Accomplishments

Stefano Grimaldi's major accomplishments involve the development of a techno-functional approach to the study of lithic assemblages and new evidence from archaeological excavations in Italy and Portugal. Since 2007 Stefano Grimaldi has been a scientific director of excavations at the Middle-Upper Palaeolithic Riparo Mochi rockshelter, Balzi Rossi, Italy (Douka et al. 2012). Since 1999 he has been one of the scientists responsible for excavations at the Lower-Middle-Upper Palaeolithic Ribeira Ponte da Pedra open-air site in Portugal (Grimaldi and Cura 2009).

Cross-References

- ▶ Europe: Early Upper Paleolithic
- ▶ European Middle Paleolithic: Geography and Culture

References

Douka, K., S. Grimaldi, G. Boschian, A. Del Lucchese, and T. Higham. 2012. A new chronostratigraphic framework for the Upper Palaeolithic of Riparo Mochi (Italy). *Journal of Human Evolution* 62: 286–299.

Grimaldi, S. 2009. Early Mesolithic hunting strategies in northeastern Italian Alps: An experimental analyses. In *Mesolithic horizons, volume 2*, ed. S.B. McCartan, R. Shulting, G. Warren, and P. Woodman, 760–765. Oxford: Oxbow Books.

Grimaldi, S., and S. Cura, ed. 2009. *Technological analysis on quartzite exploitation. Proceedings of the XV World Congress UISPP (Lisbon, 4–9 September 2006),* British Archaeological Reports International series. Oxford: Archaeopress.

Grimaldi, S., and E. Flor. 2009. From the mountain to the sea: An ethnographic perspective for the early Mesolithic settlement dynamics in north-eastern Italy. In *Mesolithic horizons, volume 2*, ed. S.B. McCartan, R. Shulting, G. Warren, and P. Woodman, 754–759. Oxford: Oxbow Books.

Further Reading

Bietti, A., E. Cancellieri, C. Corinaldesi, S. Grimaldi, and E. Spinapolice. 2009–10. La percussion sur enclume en Italie centrale Tyrrhénienne. *Paléo*, numero special: 143–80.

Cavulli, F., and S. Grimaldi. 2009. Raw material and settlement strategies at the Pleistocene/Holocene boundary in Trentino (northeastern Italian Alps): A GIS approach. In *Mesolithic horizons, volume 1*, ed. S.B. McCartan, R. Shulting, G. Warren, and P. Woodman, 96–101. Oxford: Oxbow Books.

Coia, V., I. Boschi, F. Trombetta, F. Cavulli, F. Montinaro, G. Destro-Bisol, S. Grimaldi, and A. Pedrotti. 2012. Evidence of high genetic variation among linguistically diverse populations on a micro-geographic scale: A case study of the Italian Alps. *Journal of Human Genetics* 57 (4): 254–260.

Grimaldi, S., B. Aranguren, A. Revedin, G. Gottardi, and F. Cavulli. 2011. Remontages, burins de Noailles et meules: Analyse de la distribution spatiale sur le site de plein air gravettien de Bilancino. *Mémoire LII de la Société Préhistorique Française*: 85–98.

Martins, A.A., P.P. Cunha, P. Rosina, L. Oosterbeek, S. Cura, S. Grimaldi, J. Gomes, J.-P. Buylaert, A.S. Murray, and J. Matos. 2010. Geoarcheology of Pleistocene open-air sites in the Vila Nova da Barquinha-Santa Cita area (lower Tejo river basin, central Portugal). *Proceedings of the Geologists' Association* 121 (2): 128–140.

Oosterbeek, L., S. Grimaldi, P. Rosina, S. Cura, P.P. Cunha, and A. Martins. 2010. The earliest Pleistocene archaeological sites in western Iberia: present evidence and research prospects. *Quaternary International* 223–224: 399–407.

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Basic Biographical Information

Bernard Philippe Groslier (1926–86) was the most significant archaeologist of Cambodia in the twentieth century. He was born in Cambodia and lived there half his life. His career was affected by international politics and war, first World War II (1939–1944), then the French Indochina War (1946–1954), and the US Vietnam War (1954–1975) which led into Cambodia's Civil War (1970–1975) and the creation of Democratic Kampuchea (the "Khmer Rouge," 1975–1979).

Bernard Philippe, third and youngest child of a leading French art historian, also born in Cambodia, lived in Phnom Penh till 1939 when he moved with his mother and brother to central France to complete his studies. The University of Strasbourg excavations at the Gaulish site of Gergovie were a recruiting ground for the French Resistance, which Groslier joined in 1942. He enrolled in the (Free) French army in 1944, serving until 1948. He reached Cambodia with the army of General Leclerc in September 1945, to find that his father George had died under torture and that his sister had been interned under the Japanese occupation.

Back in Paris, Groslier studied history, anthropology and Khmer (Cambodian) language and literature. In 1950 he was appointed to the newly created Centre National de la Recherche Scientifique (CNRS) and returned to Indochina. There he was seconded to the French school of Asian Studies, the École Française d'Extrême Orient (EFEO), at a time when it was being split into four to work with the postcolonial states of Cambodia, Laos, North and South Vietnam. Until 1954 Groslier ran the Saigon Museum and a research journal and also carried out important aerial surveys over the Mekong Delta, confirming the existence of an early polity ("Funan," c. first to fifth centuries CE).

Between 1954 and 1958 Groslier travelled widely and worked on excavations, mostly around the Mediterranean, where he learnt more about stratigraphy, materials conservation and ceramics analysis. In 1958 he published an analysis of Angkor city in the fifteenth and sixteenth centuries, based on Portuguese historical records and his own knowledge of monsoonal environments (Groslier 2006). In 1959 he was appointed EFEO Director of Archaeological Research and Conservator (curator) of the Angkor Archaeological Park, which includes remains of at least 250 monuments (ninth to sixteenth centuries CE).

Despite his great knowledge of Cambodia, Groslier failed to read the political mood. Cambodian intellectuals he might have met in Paris as a student were rejecting not only colonialism but also traditional values. In 1966, at the very time when Groslier was lauding the stability of Buddhist Cambodia under King Sihanouk (1922–2012) (Groslier 1998: 83–4), their near-contemporary "Pol Pot" (c.1925–98) was in North Vietnam creating the Cambodian Communist Party, the "Khmer Rouge" whom Sihanouk was eventually forced to support.

During the Civil War, from 1970, Groslier would cycle across army lines to Angkor Wat, where many villagers had taken refuge, as that site is so sacred that neither of the opposing forces would dare to attack it. When he was eventually forbidden to go there, he started work on two Angkorian temples within the government-controlled town of Siem Reap but was forced to leave in 1972, returning to France in 1974. There he oversaw the creation of the Centre for Archaeological Research (CRA) and was starting work on a major book when he died of a heart attack at age 60.

Late in life he publicly reflected on the legacy of colonialism and his own part in it: "*We* started the research. *We* published it. . . . In so doing, we deprived the Khmer of their past, not intentionally, but in practice. It was no longer theirs. And if they wanted to know about it they had to learn

French. How infuriating was that!" (Groslier 1985–86: 26).

Major Accomplishments

Groslier ran the world's largest excavation site, at Angkor, from 1960 to 1970, and made significant statements about that city's land use. As an expert in the conservation of complex monuments he also carried out consultancies for UNESCO and for the governments of Burma (Bagan), Indonesia (Borobudur), Malaysia (Melaka and Bronze Age sites), South Korea (Seogkuram and Haeinsa), and Thailand (Phnom Rung and Bronze/Iron Age sites). For the general public, he published numerous works on southeast Asian archaeology and art (Moore 1989; Condominas 1992).

In his role as Conservator of Angkor Groslier displayed great energy and administrative ability. He had to rebuild the research facilities and create new ones; inventory over 5000 items gathered since 1908, establish a ceramics reference collection and equip laboratories for materials analysis. In the Archaeological Park, the major challenge was to rebuild or consolidate the monuments which had collapsed or were in danger because of shallow foundations. His method was to take the buildings apart, stone by stone and rebuild them over a core of concrete. Brick structures were similarly dismantled and re-applied onto new concrete walls (Groslier 1998: 69–75). The workforce, drawn from local villages, was expanded from 150 to over 900 men and the support staff eventually included 38 French-trained architectural draughtsmen.

Each consolidation was accompanied by excavations, but Groslier also carried out research excavations on nonmonumental sites, such as Angkor's only known cemetery (Sras Srang, eleventh to fourteenth centuries) and on sites outside Angkor proper. These projects enabled him to develop site-specific chronologies. Records and artifact collections were destroyed by the Khmer Rouge, but the information has been partly recovered by new work since the 1990s.

Groslier's main contribution to archaeology in general has been his environmental approach to the life and death of Angkor. From his aerial and ground surveys, he was able to state as early as 1966 that "archaeologically speaking, Angkor is primarily an immense system of hydraulic works: main supply channels, dikes, reservoirs, field runnels all designed to store up fresh water, collect rainwater and redistribute it all to the meticulously planned network of rice-fields below" (Groslier 1966, chapter 2). Over time he would elaborate on this interpretation extending it to include aspects of flood-mitigation, a major concern in Angkor's low-lying plain.

In his final statement on the topic, he argued that the city of Angkor and its suburbs – covering about 1000 km^2 – were overly dependent upon the hydraulic system. When that system collapsed, so did the city: "as long as it functioned the Angkorian system was probably ideal. With the first 'failures', even if they were due to modification in the social order and were thus not 'natural', it became a poisoned gift" (Groslier 2007 [1979]: 176). His dense arguments, based on years of on-site research, created controversy and various criticisms, some more cogent that others, the difficulty being that there was in the 1980s no way to test Groslier's hypothesis. Recent work, using more sophisticated methods, has found that the moat of Angkor Thom city ceased to be maintained after the mid-fourteenth century because 'multiple factors coalesced to encourage the Cambodian elite to relocate closer to the Mekong and Tonle Sap River'. The city was abandoned for reasons which were political and economic rather than environmental (Penny et al. 2019).

Cross-References

► Environmental Archaeology and Conservation
► History of Archaeology in Japan

References

Condominas, G. 1992. Bernard Philippe Groslier (10 mai 1926–29 mai 1986). l'homme et l'oeuvre. In *Disciplines croisées: Hommage à Bernard Philippe Groslier*, ed. G. Condominas, 17–50. Paris: EFEO.
Groslier, B.P. 1966. *Indochina*. London: Muller.

G

Groslier, B.P. 1985–86. L'image d'Angkor dans la conscience khmère. Transcription by Yinh Phong Tan of a public lecture given on 26 May 1984 at the Sorbonne, Paris. *Seksa Khmer* 8–9: 5–30.

Groslier B.P. 1998. *Mélanges sur l'archéologie du Cambodge (1949–1986): Textes réunis et présentés par Jacques Dumarçay* [Selected papers, some in English]. Paris: EFEO.

Groslier B.P. 2006 [1958]. *Angkor and Cambodia in the sixteenth century according to Portuguese and Spanish sources*. Trans. M. Smithies of *Angkor et le Cambodge au XVIe siècle d'après les sources portugaises et espagnoles*. Paris/Bangkok: PUF/Orchid.

Groslier B.P. 2007 [1979]. *The Angkorian hydraulic city: Exploitation or over-exploitation of the soil?* Trans. T. Lustig and C. Pottier of La cité hydraulique angkorienne: Exploitation ou surexploitation du sol? (BEFEO 66: 161–202), *Aséanie* 20 (December): 141–185. Available at: www.academia.edu. Accessed 30 Oct 2018.

Moore, E. 1989. Bernard Philippe Groslier 1926–1986. *Asian Perspectives* 27(2): 173–181. Available at: https://scholarspace.manoa.hawaii.edu/bitstream/10125/16949/1/AP-v27n2-obit2.pdf. Accessed 30 Oct 2018.

Penny, D., T. Hall, D. Evans and M. Polkinghorne. 2019. Geoarchaeological evidence from Angkor, Cambodia, reveals a gradual decline rather than a catastrophic 15th-century collapse. Available at: www.pnas.org/org/cgi/doi/10.1073/pnas.1821460116. Accessed 11 Mar 2019.

Further Reading

Clémentin-Ojha, C., and P.-Y. Manguin. 2007. *A century in Asia: The history of the École Française d'Extrême Orient 1898–2006*. Singapore: Didier Millet.

Fletcher, R., D. Penny, D. Evans, C. Pottier, et al. 2008. The water management network of Angkor, Cambodia. *Antiquity* 82: 658–670. Available at: https://doi.org/10.1017/S0003598X00097295. Accessed 30 Oct 2018.

Fletcher, R., C. Pottier, D. Evans, and M. Kummu. 2008. The development of the water management system of Angkor: A provisional model. *IPPA Bulletin* 28: 57–66. Available at: https://journals.lib.washington.edu/index.php/BIPPA/article/viewFile/12016/10641. Accessed 30 Oct 2018.

Gryaznov, Mikhail P.

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Basic Biographical Information

Mikhail Petrovitch Gryaznov (1902–1984) was an outstanding Russian scientist, Doctor of Historical Sciences, Professor, Laureate for the USSR National Award, and corresponding member of the German Archaeological Institute. M.P. Gryaznov entered into the archaeological chronicles of Euroasia as an outstanding specialist in archaeology, anthropology, and the ethnography of Siberia, Kazakhstan, and Middle Asia.

Mikhail Gryaznov made his pathway to archaeology through a untraditional route. While being a first year student in the physics branch of the Physics and Mathematics Department at the University of Tomsk, he participated in the Achinsk geographical expedition. On the banks of the Yenisei River, 17-year-old Gryaznov met an archaeology squad. He stayed there as he was excited by the excavations. From that time onward, Gryaznov's scientific interests were in archaeology, anthropology, and ethnography. Those interests were strongly connected to the discovery of the first four stages of currently well-known cultures by ancient Siberian archaeology: Afanasiev's, Andronov's, Karauk' memorials of Bronze Age, and Scythian Time mounds. In 1922, Mikhail Gryaznov transferred to Leningrad University, and in 1925, upon finishing a 3-year study period in the anthropology branch of the Physics and Mathematics Department, he left the university and started to work as a scientist in the ethnographic department of Russian National Museum.

At the end of 1920, under the guidance of his teacher S.A. Teplouhov, Mikhail Petrovitch Gryaznov's area of interests had become even clearer. During this period, he concentrated his attention on researching the monuments of the Bronze Age in a wide region, including Southern Siberia, Kyrgyzstan, and Kazakhstan.

M.P. Gryaznov's fieldwork on the Scythian period in Altai Mountains holds a very important place in the ancient history of Siberia. During the excavations of large mounds Shibe (1927) and Pazyryk (1929), cultural and art monuments of the "early nomads" were obtained, as they had been preserved in permafrost. In 1939, Gryaznov formulated the definition of the *early nomads period* as a distinctive period in Eurasian history. The definition "early nomads period" entered into specialized literature thanks to him.

In 1937, M.P. Gryaznov started his work at the National Hermitage, and from 1939 to June 1941, he held the position of senior researcher with the Institute of History of Material Culture at the Russian Academy of Sciences in Leningrad. During these years, he finished his study of early nomads and monuments of the Bronze Age. His first book about Pazyryk mound was published in 1937 and was completed as a great handwritten work, later published in shortened form (Great Pazyryk Mound, 1950). In January 1945, M.P. Gryaznov completed his master's thesis on *Bronze Age Burials in West Kazakhstan* and in June of the same year, he was awarded his full doctoral degree in history for his monograph *Pazyryk – Burial of a Tribe Chief in Altai*.

Major Accomplishments

At the same time, Gryaznov studied the shaping and development of Bronze Age and Scythian period cultures in Kazakhstan and Southern Siberia very closely. He devoted a line of his publishing to this topic, which entered the list of specialists' desk books not only in Russia, but also abroad. The top of his scientific heritage is *Southern Siberia* (Gryaznov 1969 and 1970; in *Sudsibiren Archaeologia Mundi* in English, French and German in Stuttgart, Munich, Geneva and Paris) and *Arzhan – Royal Mound of Early Scythian Period* (Gryaznov 1980). Gryaznov received the Laureate of the State Prize of the USSR.

His scientific legacy contains more than 140 published studies. They all have an extraordinary subtlety and accuracy of observation and are of great interest on the subjects of technology and the usage of ancient objects. Scrupulous analysis and deep erudition gave him the opportunity to recreate the lifestyle of ancient tribes in completely innovative ways and with details seemingly unavailable to archaeologists. Those studies were based on the results of first-rate excavations undertaken by Gryaznov himself. Many currently well-known in Commonwealth of Independent States (CIS/Former USSR) archaeologists passed through his field schools. From 1946, Gryaznov supervised archaeological expeditions to Siberia, and from 1955 to 1970, he headed one of the biggest expeditions in Krasnoyarsk (USSR). It can be said without exaggeration that it was due to Gryaznov's study of the archaeological data of southern Siberia that we have the most perfect method of complex study of burial memorials. He often used the correlation method for researching archaeological materials. M.P. Gryaznov was a pioneer in involving new methods to study artifacts, from statistical and multidisciplinary to trasological (*science of traces*, from Franch *la trace* and Greek *λόγος*).

M.P. Gryaznov was an excellent teacher. From 1946, he was giving lectures on Siberian archaeology and trasology in the history faculty at Leningrad University, producing highly qualified archaeologists. The broadness of his scientific mind and his gift for educating united many students and followers from different scientific schools.

Gryaznov always combined his research work with teaching, lecturing, and administration. From 1949, he was the head of office work laboratory, and from 1957, he was in charge of the laboratory of archaeological technology at the Institute of Archaeology at USSR's Academy of Sciences. He was the head of the Middle Asia and Caucasus Sector at Leningrad Department of Institute of Archaeology (at present time Institute of Material Culture in Saint-Petersburg) for 15 years from 1953 to 1968. For the last 10 of these years, he led the Leningrad Section of field research at the Presidium of USSR's Academy of Sciences.

In the archaeological chronicles of Eurasia, M.P. Gryaznov is recognized as an outstanding archaeologist, one of the main specialists of ancient Siberian history and Eurasian steppe cultures.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art Studies: Normative Approaches
- ▶ Askarov, Akhmadali A.
- ▶ Burial Archaeology and the Soviet Era
- ▶ Excavation Methods in Archaeology

References

Gryaznov, M.P. 1969. *Southern Sibiria*. Geneva: Archaeologia Mundi.
Gryaznov, M.P. 1980. *Arzhan – Tsarskiy kurgan ranneskifskogo vremeni [Arzhan – Royal Mound of Early Scythian Period]*. Leningrad: Nauka.

Further Reading

Gryaznov, M.P. 1928. Fürstengräber im Altaigebiet. *Wiener Prähistorische Zeitschrift* XV.
Gryaznov, M.P. 1929. Ein bronzener Dolch mit Widderkopf aus Ostsibirien. *Artibus Asiae* 4.
Gryaznov, M.P. 1930. Drevnie kultury Altaya. Materialy po izucheniyu Sibiri. *Novosibirsk* 2.
Gryaznov, M.P. 1933. The Pazirik burial of Altai. *American Journal of Archaeology* XXXVII.
Gryaznov, M.P. 1958. Drevnee iskusstvo Altaya. Leningrad.
Gryaznov, M.P. 1970. Pastusheskie plemena Sredney Azii v epokhu razvitoy i pozdney Bronzy. *KSIA* 122.

The Guianas: Pre-Columbian Heritage

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Introduction

Up to recently, pre-Columbian coastal Guianas were almost always forgotten in any study on the prehistory of Amazonia. In most publications, only the archaeology of the valley of the Amazon was presented, leaving away all the lands north of the Guianas watershed that were completely ignored.

Coastal Guianas are located north of the Guianas watershed line where rivers do not go from north to south toward the Amazon River but flow to the north toward the Atlantic Ocean. This concerns three entire countries that are Guyana, Suriname, and French Guiana and three states that are Delta Amacuro y Bolivar (partially) in Venezuela and Amapá in Brazil (Fig. 1). Remarkable progress and discoveries made these last years in the archaeology of the Guianas have changed the vision on the cultural developments and the role of this territory during pre-Columbian times. Archaeologists are now aware of the importance of the northern part of the lower Amazon, especially the Amapá State, as a crucial cultural cradle, but also of the extraordinary pre-Columbian human developments in the Guianas and particularly along the coast.

Comparing to the Andean societies or even to the cultures of the Pacific coast, many persons believe that there is no prehistoric monument in the Guianas or in Amazonia. It is common to ear that archaeological sites of this region are only constituted of some pottery sherds, few lithic artifacts, and many postholes. However, if it is true that pre-Columbian did not built architecture of stone, they did produce all kind of monumental structures. The most famous are obviously made on rocks or with stone as the petroglyphs, the rock paintings, and the geoglyphs but also the grinder stones that are so frequent on the Guianas. Because the scarcity of stone in the region, pre-Columbian Indigenous also made many earthworks that can be more discrete at a first glance and difficult to see on the ground, so they were unrecognized for a long time. They are raised fields, residential mounds, causeways, canals, and ditched hills.

Finally, it is impossible to ignore one of the main heritages left by pre-Columbian people that is an important part of the vegetational composition. During more than 10,000 years, hunter-gatherers, horticulturalists, and agriculturalist had modified plant species by inbreeding of species, favored plant associations, and created vegetation composition in specific landscapes. An important part of the actual rainforest results from millennia of vegetation manipulation and transformation by the Indigenous.

Key Issues

Pre-Columbian Stone Monuments Heritage

Stone monuments are the most famous pre-Columbian remains known in the Guianas

The Guianas: Pre-Columbian Heritage, Fig. 1 Map of the Guianas indicating the coastal Guianas that extend on five countries. (Drawing Rostain)

The Guianas: Pre-Columbian Heritage, Fig. 2 Drawing of a petroglyph by Morissot in 1886, Middle Orinoco, Venezuela (Morisot 2002)

because of their "artistic" value. Four different types of rock sites can be distinguished: petroglyphs (Fig. 2), rock paintings, geoglyphs, and grinder stones.

Petroglyphs are common through all the Guianas but, because the scarcity of investigations, only some of them are known and studied (Dubelaar 1986; Williams 2003). They are found either inland or on the coast, with a preference in the proximity of water but not systematically and almost always close to a hill (Mazière 2008). Anthropomorphic and zoomorphic figures are very frequent. First ones are often with raised arms and spread legs or just represented by a head with eyes and mouth (Fig. 3). Recognizable animals are snakes, fishes, birds, monkeys, caimans, felines, etc. (Fig. 4). There also are many geometric figures. Techniques of manufacture are varied including incision, grooving, staking, and grinding.

As in other parts of Amazonia, rock paintings are more rare in the Guianas than petroglyphs. They are very common in Venezuela but only few sites are known in the Guianas: one in

The Guianas: Pre-Columbian Heritage, Fig. 3 Petroglyph of the Carapa, near Kourou, central French Guiana. (Photo Rostain)

The Guianas: Pre-Columbian Heritage, Fig. 4 Petroglyph of Pascaud, Cayenne Island, French Guiana. (Photo Rostain)

Suriname and another one in French Guiana. The reason can be the destruction of the paintings by the weather and the acidity.

Various monuments made of stones are recognized in the Guianas (Boomert 1981). They can be erected or lay on the ground according to a certain distribution. The most impressive megalithic groups are the stone alignments found in the savannas of Rupununi in Guyana, Sipaliwini in Suriname, and in Parú and Amapá in Brazil. They are very large stand up slabs, eventually slightly modified by percussion, disposed in line, circle, or in triangle. Megalithic sites on the central coast of Amapá are generally found on hills, which are characterized by large panoramas (Meggers and Evans 1957; Rostain 2011). They can be far, up to 10 km, from the closest rock deposit so it had been a substantial work to bring enormous stone slabs to the site. They consist of vertical granite slabs that are arranged in lines, circles, or triangles (Fig. 5). Recent excavations made in the megalithic site of Rego Grande demonstrated a funerary use but also an astronomic function (Cabral and Saldanha 2009). Alignments of slabs laid on their face are found on the rocky top of granitic inselbergs that are free of vegetation and with open panoramas. The most diverse assemblages are located on the Mitaraka sugarloaves, at the southern boundary between Brazil and French Guiana (Hurault et al. 1963). They can be arranged in line or in such a way to form zoomorphic figures, similar to those of the petroglyphs, that have been interpreted as lizards, turtles, or human beings.

Hundreds of grinder stones have been found in the Guianas. A grinder stone is the remain of the result of the grinding and the polishing of stone tools preforms to make axes, chisels, points, etc. (Fig. 6). They are located along the rivers and small creeks and on the coastal outcrops in French Guiana. These marks can be classified in five types (Rostain 1994). The "cupule" is a small circular cavity. The "cupule with bump" is similar to the first one but it presents a central protuberance. The "almond" is an irregular basin, vaguely oval or rectangular, and not deep. The "ship's hull" is a wide and deep spindle-shaped basin. The "groove" is a deep and straight spindle-shaped cavity, with triangular or rounded profile. Different types of grinder can occur on the same rock outcrop. Sometimes, two types are combined that is mostly one, two, or three grooves inside a ship's hull. This last one was made first and reused after to make the grooves. The four first types result from the shaping and grinding of the sides of the tool and the sharpening of the cutting-edge. The groove is made shaping of the edges (and not by the sharpening as it is often said). Ship's hulls are much more common inland than cupules but they are absent on the

The Guianas: Pre-Columbian Heritage, Fig. 5 Megalithic site of Rego Grande, Northern Amapá, Brazil. (Photo Rostain)

The Guianas: Pre-Columbian Heritage, Fig. 6 Grinder stone with some stone axes on a beach of Cayenne Island, French Guiana. (Photo Rostain)

coast that could indicate technical differences. Ship's hulls result from a short up-and-down grinding while cupules and almonds are made by a circular movement.

Pre-Columbian Earthworks Heritage

Pre-Columbian groups were also landscape makers because they built a variety of earthworks, particularly along the Guianas coast (Rostain 2010). They are raised fields, residential and funerary mounds, causeways, canals, and ditched hills.

Raised fields are agricultural small earth mounds with two main functions: to secure a dry location for cultivation in flooding areas and to concentrate fertile material (Fig. 7). Thousands of pre-Columbian raised fields surrounded by ditches are located in the coastal zone of the Guianas. They are mainly attributed to Arauquinoid populations, which occupied a territory of 600 km long between Guyana and French Guyana from CE 650 to 1650. Raised fields are classified on the basis of their size, shape, and topographical location. This last criterion is indicative of differences of adaptation to the hydrographical conditions and to the nature

The Guianas: Pre-Columbian Heritage, Fig. 7 Raised field in a flooded area, Galibi area, eastern Suriname. (Photo Rostain)

of the soil. Four types of raised field are distinguished:

- Ridged fields are found in the three Guianas. They are elongated and narrow, measuring between 1 and 3 m in width, 5–30 m in length, and 30–80 cm in height. They take the shape of the slope between the sandy ridges and the swamp. Their distribution can be related to the altitude and the water level. At the foot of the Quaternary sand ridges, elongated raised fields are positioned in the direction of the slope to allow for easy drainage. Near the top of the sand ridges, the ridged fields are arranged perpendicular to the slope for optimal water retention.
- Large raised fields range in size from 2 to 5 m diameter and from 30 to 100 cm height. These raised fields are rounded-off rectangular to square (Fig. 8). Their size ranges from 3 to 4 m wide, 4–30 m long, and 50–100 cm high. These large raised fields are located in the most flooded areas and their sizes are smaller in the deepest swamps.
- Medium-sized raised fields are round, square, or rectangular. Their size ranges from 1.5 to 3 m diameter and 20–30 cm high. They occur in large clusters.
- Small, rounded raised fields range in size from 50 to 100 cm diameter and in height from 20 to 50 cm. They cover the entire surface of the seasonally flooded savannas, which become completely dry in August.

Along the French Guiana coast, raised fields generally are arranged in rough squares and, often, the largest are located in the deepest and wettest areas. Raised fields were built and disposed according to the differences of water level during the two annual seasons. In fact, water is the main physical constraint. The location of raised fields between the high and low areas suggests a precise selection by the Indigenous. However, this was not always enough to prevent drowning of the raised fields. For that reason, it was necessary to surround some groups of raised fields by a belt ditch. In some cases, the checkerboard distribution of the ridged fields also reflects the need to control the water level.

In some areas, the whole surface of the lower area is covered by raised fields, and in other areas, only the edge of the sandy ridges has raised fields. Six main categories of organization and types of raised fields can be distinguished from west to east in the Guianas coast. In eastern Guyana, elongated raised fields are distributed perpendicularly to a

The Guianas: Pre-Columbian Heritage, Fig. 8 Raised fields along slope of sand bars, Karouabo area, central French Guiana. (Photo Rostain)

river. In western Suriname, complexes are made of small groups of elongated raised fields. In eastern Suriname, up to the Mana River in French Guiana, parallel and ridged fields are in flooded depressions. Between the Iracoubo and Sinnamary rivers, savannas are covered by a large number of rounded medium-sized raised fields. Between the Sinnamary and Kourou rivers, rounded or square raised fields associated with ridged fields are located in the savannas and along the edge of the sandy ridges. Between the Kourou River and Cayenne Island, rounded or square raised fields cover the savannas like the area between the Iracoubo and Sinnamary rivers. These variations can represent cultural, chronological, or technical differences.

Artificial residential/funerary mounds are associated with raised-field complexes in various countries of South America like in the Llanos of Apure, in Venezuela, where several Arauquinoid mounds and raised fields have been found. Between the Berbice River in Guyana and the Coppename River in Suriname, sandy ridges are absent, so local people had to build rounded clay mounds above the water level to erect their villages. At least, nine mounds were erected on a landscape where fresh, brackish, and salt waters met, but other possible artificial mounds have been reported in this area. c. CE 300, a Barrancoid group raised two mounds. From CE 650, Arauquinoid communities built progressively layer-by-layer new mounds that they occupied up to CE 1250. Their territory extended to cover a region some 210 km long and 25 km wide.

Hertenrits is the largest of the mounds, with a raised area estimated at 4 ha (Fig. 9). It measures 200–320 m in diameter and 2.5 m high. The area around the mounds was inundated with freshwater at the end of the wet season. Humans modified some water lines to connect them or to improve natural drainage. A ditch of 20–100 m wide surrounds the Hertenrits mound. Five wharves of 20 m long and at least 1 m deep are disposed on the periphery to receive canoes. Two smaller satellite mounds were built diametrically opposite, equidistant from Hertenrits: Wageningen-1 is 4 km to the east and Wageningen-3 is 3 km to the west. Shallow seasonally inundated canals run radially, connecting the Hertenrits mound to raised fields and to the two other mounds. These canals were used as pathways during the dry season and as waterways during the rainy season, strongly suggesting that the three mounds were occupied at the same time. The inhabitants of Hertenrits organized and managed their territory in a precise and specific manner.

It is important to note here that long before, other pre-Columbian people have developed other solutions to inhabit flooded zones. Between 6800

The Guianas: Pre-Columbian Heritage, Fig. 9 Hertenrits artificial clay mound, Arauquinoid culture (CE 650–1250), western Suriname. (Photo Geisjkes c. 1950)

and 3550 BP (Williams 1992), the fisher-gatherers of the Alaska culture, in western Guyana, raised the floors of their settlements to live close to the shore (Fig. 10). They set aside the shells of marine resources they consumed, gradually forming enormous mounds above the flood level. These *sambaquís* are evidence of the importance of marine shellfish for these populations, who appear to have been attracted by richness of the fauna and flora.

Causeways are frequent near Arauquinoid sites of the Llanos de Apure in Venezuela, but not so common in the Guianas. Some raised pathways have been found in Suriname and French Guiana. They are oriented in a north–south direction and they generally cut through the swamps, connecting two west–east sand ridges or one sand ridge to the shore. They can reach up to 600 m long and 8 m wide.

Ditches made by pre-Columbian groups are difficult to recognize because, after several centuries, alluvium and vegetation tend to obliterate them. Moreover, Creole farmers had also made small canals during the twentieth century, which might be confused with pre-Columbian ones. Stereoscopic interpretation of aerial photographs also shows that there are numerous water lines, which do not follow the natural flow and must have been made by people. Ditches were made to improve water control. Small and curved waterlines perpendicular to the direction of the natural water flow enclose groups of raised fields. They are relatively narrow at their extremities and

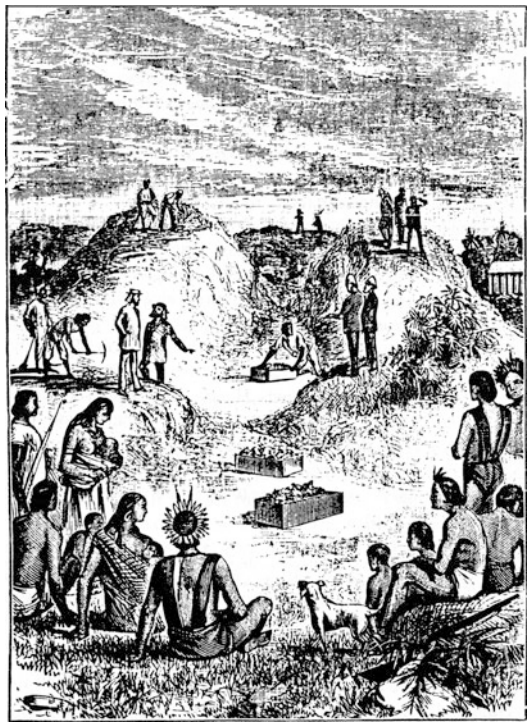

The Guianas: Pre-Columbian Heritage, Fig. 10 Waramuri shell mound during the excavation in the nineteenth century, western Guyana (Brett 1868: 430)

generally form a pond at the center. These ditches prevented too much water near the raised fields during the rainy season. They also most likely served as water reserves during the dry season. Straight and regular canals were used for the drainage of excessive water and, perhaps, as water tanks or fishponds. They often connect archaeological settlements on sand ridge and raised-field complexes. Some of them are exceptionally long and could serve for canoe travel through the flooded savannas. Ponds were sometimes dug near a sand ridge or in the middle of a swamp. They are generally rounded or irregular. It is probable that they were used as water tanks and fishponds.

During the first millennium CE, specific sites locally named "montagnes couronnées" (literally "crowned hills") appeared in French Guiana, northern Amapá in Brazil, and eastern Suriname. They can be made by trenches surrounding the top of a hill or ditches closing a spur on a riverbank. They are linear, oval, or round with a diameter between 100 and 300 m. Ditches measure 5–15 m wide and 1–3 m deep. Some entrances can be made by embankment through the ditch. Few pottery sherds, very eroded and not decorated, are generally found in these sites. Most of the sites are dated between the first centuries of our era and the thirteenth century (Mazière 1997; Versteeg 2003). Fortification purposes or ceremonial function have been ascribed to these sites.

Future Directions

Guianas are not the favorite spot for tourism so little attention has been given to pre-Columbian remains. Although archaeology still is relatively incipient in the Guianas because scientific programs have been conducted only for 30 years, it is already possible to draw up a panorama of the pre-Columbian occupation of this huge region (Rostain 2008). For the last decade, Guianas has known a remarkable increase in archaeological investigation, especially by the realization of large projects. On the contrary, very few actions have been carried out to preserve archaeological heritage. Governmental institutions are missing or have neither power, nor fund, to protect this patrimony. Even a simple inventory of stone monuments and earthworks as it is presented in this entry has never been done at the scale of the five Guianas because of patrimony politics and investigations were very nationalistic without consultation with neighbors. There is also no real desire to promote Indigenous past in these countries that prefer to put a slant on historical remains. The result is that pre-Columbian heritage is gradually destroyed by neglecting and vandalism.

To finish, there is a curious phenomenon acting on the preservation of certain archaeological remains. Leaf-cutter ants (*Atta* species) are generally considered as one of the main plagues for rainforest agriculture. These voracious insects are a nuisance for humans because they defoliate crops and destroy plantations. However, the same ant also permits the preservation of raised fields. Ants act as "central place foragers" and as "mound builders" (McKey et al. 2010). They construct deep nests, bringing subsoil to raised-field surfaces. Ants move materials to the raised fields where they set their nest. *Acromyrmex* workers carry large quantities of plants to the nest to feed their fungal symbiont. Moreover, transport of material to surface of abandoned raised fields thus at least partially compensates losses due to erosion and maintains the mound height. By reducing the erodibility of raised fields and by transporting materials to them, thereby compensating erosional losses, communities of ecosystem engineers on raised fields maintain the concentration of resources (and organisms) on raised fields and their depletion in the surrounding matrix. In conclusion, ecosystem engineers are responsible for the preservation of pre-Columbian raised fields up to nowadays. They are ants, earthworms, termites, and even plants. Each of them played a function more or less important.

It is noteworthy to outline that after their abandonment by human social mammals, raised fields were managed and preserved by natural social insects. In the Guianas, Nature tends to preserve Culture.

Cross-References

- ▶ Aerial Archaeology
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ French Guiana: Archaeology and Minority Communities
- ▶ Geoglyphs
- ▶ Landscape Domestication and Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Rostain, Stéphen
- ▶ South American Rock Art
- ▶ The Guianas: Pre-Columbian Heritage

References

Boomert, A. 1981. The Taruma phase of southern Suriname. *Journal of the Walter Roth Museum of Archaeology and Anthropology* 4: 104–157.

Cabral, M.P., and J.D.M. Saldanha. 2009. Note sur des structures mégalithiques en Guyane brésilienne. *Journal de la Société des Américanistes* 95: 97–110.

Dubelaar, C.N. 1986. *The petroglyphs in the Guianas and adjacent areas of Brazil and Venezuela: an inventory, with a comprehensive bibliography of South American and Antillean Petroglyphs.* Monumenta Archaeologica 12. Los Angeles: Institute of Archaeology, University of California.

Hurault, J., P. Frenay, and Y. Raoux. 1963. Pétroglyphes et assemblages de pierres dans le sud-est de la Guyane française. *Journal de la Société des Américanistes* LII: 157–166.

Mazière, M., ed. 1997. *L'archéologie en Guyane*. Cayenne: Edition APPAAG (Association pour la Protection du Patrimoine Archéologique et Architectural de la Guyane).

Mazière, M. 2008. *Art rupestre amérindien de Guyane française*. Matoury: Ibis Rouge Éditions.

McKey, D., S. Rostain, J. Iriarte, B. Glaser, J. Birk, I. Holst, and D. Renard. 2010. Pre-Columbian agricultural landscapes, ecosystem engineers and self-organized patchiness in Amazonia. *Proceedings of the National Academy of Sciences of the United States of America* 107: 7823–7828.

Meggers, B.J., and C. Evans. 1957. *Archaeological investigations at the mouth of the Amazon*. Bureau of American Ethnology Bulletin 167. Washington: Smithsonian Institution.

Rostain, S. 1994. *L'occupation amérindienne ancienne du littoral de Guyane.* TDM 129. Paris: ORSTOM Editions.

Rostain, S. 2008. The archaeology of the Guianas: An overview. In *Handbook of South American archaeology*, ed. H. Silverman and W. Isbell, 279–302. New York: Springer.

Rostain, S. 2010. Pre-Columbian earthworks in coastal Amazonia. *Diversity* 2: 353–369.

Rostain, S. 2011. Que hay de nuevo al Norte: apuntes sobre el Aristé. *Revista de arqueologia* 24: 10–31.

Versteeg, A.H. 2003. *Suriname voor Columbus/Suriname before Columbus.* Libri Musei Surinamensis 1. Paramaribo: Stichting Surinaams Museum.

Williams, D. 1992. El arcaico en el noroeste de Guyana y los cominezos de la horticultura. In *Prehistoria Sudamericana. Nuevas Perspectivas*, ed. B.J. Meggers, 233–251. Washington: Taraxacum.

Williams, D. 2003. *Prehistoric Guiana*. Miami: Ian Randle Publishers.

Further Reading

Boomert, A. 1980. The Sipaliwini archaeological complex of Surinam: A summary. *Nieuve West-Indische Gids* 2: 94–107.

Brett, W.H. 1868. *The Indian tribes of Guiana: Their condition and habits*. London: Bell & Daldy.

Morisot, A. 2002. *Auguste Morisot. Un pintor en el Orinoco, 1886–1887*. Caracas: Planeta, Fundación Cisneros.

Saldanha, J.D.M., and M.P. Cabral. 2010. A Arqueologia do Amapá: reavaliação e novas perspectivas. In *Arqueologia Amazônica*, ed. E.S. Pereira and V. Guapindaia, vol. 1, 95–112.

Guinea Pig: Domestication

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Guinea pigs (*Cavia porcellus*, Linneaus 1758; Rodentia, Caviidae) were the only small mammals domesticated in the Americas. The other New Word animal domesticates were turkeys (*Meleagris gallopavo*), llamas (*Lama glama*), alpacas (*Lama pacos*), and Muscovy ducks (*Cairina moschata*).

Guinea pigs are small Andean rodents that still function as a delicacy food (Fig. 1), as an

instrument to diagnose disease, and as key component in sacrificial offerings in traditional communities. In indigenous Quechua they are referred as *jaca* or *saca*, and in Ayamara the word is *wanku*. However, most people in the central Andes call them *cuis domestico*. Other known terms in South America are cuis domestico, *cobayo* and *conejillo de Indias.*

As part of the family Caviidae, guinea pigs present a particular dental formula: teeth cheeks are ever growing and have two enamel prisms with sharp folds and angular projections. They have four toes on the front feet and three on the hind feet, and the tail is extremely reduced. The adult guinea pig weights approximately 750 g and is on average 30 cm long. The most common colors are white, brown, and gray. Their life span is 5–7 years. Puberty occurs at roughly 70 days of age. The gestation period is generally 10–12 weeks, and litters are usually composed of two to four pups. A few days after birth, young *cuys* are able to care for themselves. Fertilization takes places again shortly after a female produces a litter. Pups or pregnant *cuys* do not need a special human care. In Andean communities, they are generally kept inside the kitchen (Fig. 2), and they are fed with alfalfa and table waste such as potato peelings, grass, fresh corncobs, and grains (Bolton 1979).

Guinea Pig: Domestication, Fig. 1 Fried guinea pig dish as served in a restaurant in Ayacucho, Peru

Wild *cuys* were surely attracted to human refuse in caves or other early settlements. People realized they were a good source of meat and probably encouraged wild *cuys* to stay around the house by giving them food scrapes. They were eventually brought into the kitchen areas where they received warmth, food, and protection until when, finally accustomed, they started reproducing in captivity (Gade 1967).

Given their small size in comparison to the Andean camelids, the domestication of guinea pigs does not seem to be primarily related to increases in their meat productivity. They do not provide secondary products such as milk, leather, or wool. Yet

Guinea Pig: Domestication, Fig. 2 Guinea pigs kept in a kitchen, Ayacucho, Peru

cuy manure is a rich fertilizer. It is collected to nourish orchards and cornfields in the Andes. Manure may have also been used as fuel, although it would have been needed in large quantities.

A cultural ecological analysis has been used to explain the successful introduction of guinea pigs in the Andean diet as environmentally determined. Data recorded in Cuzco (Peru) shows that *cuys* are primarily eaten during Christmas, Carnival, Easter, and Corpus Christi (Bolton 1979). It has been claimed that major communal *fiestas* in rural Andean Peru serve guinea pigs to distribute proteins during the wet season, November through April, the time of greatest protein need in Southern Peru (Bolton 1979). However, this explanation does not take into account other sources of protein common in rural Peru today, namely, the introduced chicken and pigs and the native camelids. Furthermore, this explanation does not consider the need for fat and carbohydrates in the Andean human diet.

Another explanation for the domestication and incorporation of guinea pigs in the pre-Columbian Andean diet is the fact that they represent an additional source of fat, especially during the wet season when carbohydrates and grain proteins were short in supply (Rosenfeld 2008). Guinea pig meat is 7.8% fat, as a weight-based proportion of the edible meat. This is not a high-fat value, but it could have been crucial as an additional source to that of camelids, particularly during certain times of the year and especially to the most needy segment of the human population (infants, pregnant, and nursing women). When carbohydrates are not abundant, humans must switch to animal fat as an energy source and/or synthesize energy from protein. Therefore, when carbohydrates were in short supply during the wet season of the Andes, guinea pigs could have provided the fat needed to help metabolize animal protein in order to have a balanced diet (Rosenfeld 2008).

Two wild ancestors of the domestic guinea pig have been suggested: *Cavia tschudii* and *Cavia aperea*. The distribution of both wild species extends from Colombia to Argentina, though while *C. tschudii* inhabits high-altitude environments, *C. aperea* inhabits the eastern lowlands. Both *Cavia* species would have been a good candidate for domestication as they have high birth rates, eat household refuse, and can easily be raised in captivity: important elements of preadaptation to domestication. Both species produce fertile hybrids when crossed with *C. porcellus* (Gade 1967). However, skull morphology (Wing 1977) and molecular analyses of the complete cytochrome b gene sequences (Spotorno et al. 2004) and 12S sequence (Sportorno et al. 2007) suggest that the wild species *C. tschudii* from western South America, and not *C. aperea*, is the ancestor of the domesticated species, *C. porcellus*. The available data points to the western central Andes as the probable place of original domestication of the guinea pigs.

At sites like Ayamachay and Puente in the Peruvian Andes, the association between man and wild *Cavia* dates back as far as 10,000 years before present (Wing 1977). Changes from selection for large size were noted by measuring the height of the jaw in the middle of the diastema. Archaeological samples from Ayacucho and Cuzco show that the most recent samples are the most variable; the mean of the diastema measurement shows a large and significant increase in size over older samples. These changes are seen by 3000 B.P. at the Pikimachay cave in the Ayacucho Valley (Wing 1977). While domestic guinea pigs preceded Inca occupation in Southern Peru, Northern Chile, and Ecuador (Sportorno et al. 2007; Stahl 2003), their presence in northwest Argentina appeared to be due to the Inca occupation in the fifteenth century (Rodriguez Loredo 1997–1998). Finally, recent analysis suggests that domestic guinea pigs were introduced in the Caribbean region as early as AD 600 (Kimura et al. 2016; LeFebvre and deFrance 2014).

References

Bolton, Ralph. 1979. Guinea pigs, protein, and ritual. *Ethnology* XVIII: 229–252.

Gade, Daniel W. 1967. The Guinea pig in Andean folk culture. *The Geographical Review* 57: 213–224.

Kimura, Birgitta K., Michelle J. LeFebvre, Hilary I. Knodel, Michelle S. Turner, Natalie S. Fitzsimmons, Scott M. Fitzpatrick, and Connie J. Mulligan. 2016. Origin of pre-Columbian Guinea pigs from Caribbean archeological sites revealed through genetic analysis. *Journal of Archaeological Science: Reports* 5: 442–452.

LeFebvre, Michelle J., and Susan deFrance. 2014. Guinea pigs in the pre-Columbian West Indies. *The Journal of Island and Coastal Archaeology* 9 (1): 16–44.
Rodriguez-Loredo, Cecilia. 1997–1998. Estudio arqueozoologico del sitio Inca Potrero de Chaquiago, Barrios La Solana y Retambay, Andalgala, Pcia de Catamarca (Argentina). *Relaciones de la Sociedad Argentina de Antropologia* XXII-XXIII: 203–245. Buenos Aires.
Rosenfeld, Silvana A. 2008. Delicious Guinea pigs: Seasonality studies and the use of fat in the pre-Columbian Andean diet. *Quaternary International* 180: 127–134.
Sportorno, Angel, German Manriquez, Andrea Fernandez, Juan Carlos Marin, Fermin Gonzales, and Jane Wheleer. 2007. Domestication of Guinea pigs from a Southern Peru- northern Chile wild species and their Middle Pre-Columbian mummies. In *The quintessential naturalist: Honoring the life and legacy of Oliver Pearson*, ed. Douglas Kelt, Enrique Lessa, Jorge Salazar-Bravo, and James Patton. Berkeley: UC Publications in Zoology, University of California Press.
Spotorno, Angel E., John P. Valladares, Juan C. Marin, and Horacio Zeballos. 2004. Molecular diversity among domestic Guinea pigs (*Cavia porcellus*) and their close phylogenetic relationship with the Andean wild species *Cavia tschudii*. *Revista Chilena de Historia Natural* 77: 243–250.
Stahl, Peter. 2003. Pre-Columbian Andean animal domesticates at the edge of empire. *World Archaeology* 34: 470–483.
Wing, Elizabeth S. 1977. Animal domestication in the Andes. In *Origins of agriculture*, ed. C.A. Reed, 827–859. The Hague: Mouton Publishers.

Further Reading

Archetti, Eduardo. 1997. Guinea pigs. In *Food, symbol and conflict on the knowledge in Ecuador*. Oxford: Berg.
Morales, Edmundo. 1995. *The Guinea pig. Healing, food, and ritual in the Andes*. Tucson: The University of Arizona Press.

Gwion Gwion

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Introduction and Definition

Gwion as Ancestors and Images

The term "Gwion" refers to a type of figurative pictogram found in northwestern Australia, especially the sandstone of the Kimberley Plateau. Typically, but not exclusively, the form of the paintings appears to be elegant "humans"; they are depicted in various poses, and appear to be wearing "wigs" and carrying items in their "hands" or attached to their "bodies" (Fig. 1). Often the figures are grouped in apparent scenes; both as single figures and in groups, the stance and orientation of many is suggestive of dance or ceremonial activity. Typically, the depiction is of small, slender figures, outlined and in-filled profiles, whose finely executed painting was achieved by delicate brush-work. Gwion figures are usually a wine red, a hue that has been described as "cherry" or "mulberry-colored." Their subject matter and method of execution may be contrasted with those of the much larger, more boldly wrought Wanjina figures; the distributions of the two overlap. Not dissimilar figures are found to the northeast in the Keep River and Fitzmaurice River regions, and it has been suggested that they are related to the Mimi figures of Arnhem Land, and that in the ancient past, there was a shared cultural area joined by the extensive coastal plain of northwestern and northern Australia that is now a shallow sea.

The region includes the traditional lands of the Ngarinyin; adjacent languages groups are the Wunambul and the Worora. The Ngarinyin term for the figures is "Gwion Gwion," sometimes written "Guyon" or "Kwion"; the Wunambul and Worora use linguistically similar descriptors (Ngarinyin are the largest language group). Some commentators have seen the Gwion as "mysterious" and even as having been produced by non-Aboriginal cultures or even "alien beings." Such a "mystery" if it ever existed has been "solved" by research conducted in collaboration with four senior Ngarinyin traditional owners, *munnumburra* (initiated men, "lawmen"). The verbal testimony of the Pathway Project was recorded on-site in painted shelters and published in an illustrated book entitled *Gwion Gwion: Dulwan Mamaa. Secret and Sacred Pathways of the Ngarinyin Aboriginal People of Australia* (Ngarjno et al. 2000: 14).

Essentially, Gwion are (depictions of) ancestral beings and are treated with great respect; they are not spoken of lightly. It needs to be recalled that people were frightened of ancestors, who were

G

Gwion Gwion, Fig. 1 "Inventors": Yandama site. The named Gwion personage, "Yandama," the inventor of the spear-thrower, is depicted at *left*; his body is delineated with stripes and his feet end in three digits – a reference to his avian clan. He is depicted wearing a feathered head-dress, and in his right hand (as seen from the viewer's perspective) he holds the hooked throwing-stick (*nyarndu*) of which he is the historic inventor. About his waist height, his spear is depicted horizontally to the *right*; it is shown having pieced the upper body of the kangaroo depicted on the *right* of the panel; the spear is shown with multiple, sharpened wooden barbs – used before hide-penetrating *gimbu* points were manufactured. Scale: central figure c. 150 mm. (Photograph: Pathway Project 1994 PP1309∗08 [130908])

powerful enough to hurt or to kill them (e.g., Ngarjno et al. 2000: 27, 83); they exercised great caution in approaching the painted images (e.g., Ngarjno et al. 2000: 38). They were secretive about them, to the extent that some commentators thought and regrettably still publish that the local people knew nothing of them. It is evident, however, that the Gwion are an integral part of the cosmology and social history of the Ngarinyin and others, and that they are part of their continuing cultural heritage has been recognized formally by granting of native title rights.

"Gwion" is both the term for the original humans born from the "Great Mother Jillinya" and who inhabited a land without boundaries (Ngarjno et al. 2000: 36), and, secondly, the corpus of painted images created by the ancestors. The subject of the Gwion paintings is "law." Gwion were inventors of hunting technology – of stone tools, spears, and woomera (Ngarjno et al. 2000: 85, 93, 209, 232); *Munga.nunga* is a term for the same artists as visionaries – law-makers and story-tellers (Ngarjno et al. 2000: 128); and *Jenagi Jenagi* for them as messengers (Ngarjno et al. 2000: 176), who are depicted carrying messages relating to the laws of the *Wunan* council across the extensive *dambun* regions and further afield, to the Dampier Archipelago and

Gwion Gwion, Fig. 2 "Visionaries": Galeru.ngarri North site. The Gwion figure on the *left* is depicted passing a sacred object to the first of a series of other figures; the image depicts the distribution of the Wunan Law through cultural exchange. Note dense silica skin covering part of imagery at *lower left*. Scale: central figure c. 110 mm. (Photograph: Pathway Project 1999 PP0059∗02 [005902])

Arnhem Land (Ngarjno et al. 2000: 174) (Fig. 2). While Gwion are the first skilled painters of the human form, it is important not to consider Gwion images as an art form, as entertainment, but as legal documents. Depictions of Gwion express the complex *Wunan* system of law and exchange that the Gwion invented and that originated with the actions of two Gwion heroes named Wodoi and Jungun, seekers of wisdom and knowledge (Ngarjno et al. 2000: 192–204). They inform the senior members of the community, especially the *munnumburra*, and might serve for instruction of younger generations (Ngarjno et al. 2000: 310–6) (Fig. 3).

Gwion images are painted with skill and often with some anatomical realism but also with bird characteristics including pairs of wings (Ngarjno et al. 2000: 126–7). Frequently, images appear to depict persons wearing or holding unfamiliar objects; but these items are extensions of the persons depicted, as if they are growths from the knee, elbow, hand, or shoulder – they are extensions of the personage, making emblematic connections with the landscape of the clan ancestors (Fig. 4). In these conceptualizations, every painted place has its own specific body and *mudurra* (headdress) extensions (Figs. 5 and 6), and refers to the various totems, to plants, animals, and especially to birds.

The term "Gwion" invokes the story of the cave-dwelling Gwion Gwion bird, which used his beak to wipe blood across the surface of stone and thus was responsible for the first paintings copied by humans (Ngarjno et al. 2000: 118–20). The color of the Gwion paintings derives from the wine-red sap of the *mamandu*, a mulberry-like bush that is commonly found near painted shelters. The liquid sap was extracted into shallow cup-shaped depressions in the stone – "cupules" (*norgun* in Ngarinyin) (Fig. 7) – that usually are found on the floor near shelter entrances, like painters' palettes (Ngarjno et al. 2000: 99–100, 123). (The Ngarinyin say that the original Gwion artists were clever because this sap gave them a fixative as well as red color!) Some images, despite being exposed to sun and rain, are vivid, contrasting with the surrounding rock face. Unlike the Wanjina, they were not regularly over-painted, although if damaged, might be repaired, restored to maintain the integrity of the image (for example, in the case of exfoliation of a painted surface: the ring dance imagery: Ngarjno et al. 2000: 209, 232), and many painted areas show a great complexity of superimposition. Researchers have observed that there is no residual pigment in Gwion paintings, but the images remain visible. Pettigrew et al. (2010) have written that the original paint ". . . has been replaced by a biofilm of living, pigmented microorganisms whose natural replenishment may account for [their] longevity and vividness . . .". The cherry to dark purple colors of the image was determined by the proportions of black pigmented fungus and red Cyanobacteria. It is

G

Gwion Gwion, Fig. 3 "Visionaries": Guringe site, a women's place within the Anaut.ngarri territorial division of the Wunan. This scene depicts a public meeting-dance (*birrina*); here a distinction is made between male and female Gwion figures. The central (*dark*) Gwion figure depicts a female dancing as a praying mantis among women who are depicted to each side; the scene signifies acceptance of the male figure depicted at *left*. Females wear *mambi* (a triangular skirt not in daily use; turned to back for dancing; cf. *jalgun*). Guringe is an important women's site of the Great Mother, a sanctuary established prior to the Wunan laws that were developed by males. The panel is many-layered and of considerable complexity. Scale: central figure c. 180 mm; note that the figures are small, and necessarily very finely painted, perhaps with feather "brushes" and probably by women. (Photograph: Pathway Project 1997 PP1711∗23 [171123])

likely that the organic character of the original paint provided the basis for the development of the biofilm.

Key Issues/Current Debates/Future Directions/Examples

Origins and Ownerships

A colonial settler, Joseph Bradshaw, exploring the Prince Regents River region of the Kimberley in 1891 provided the first known European recordings of the distinctive Gwion imagery; while he recognized them as "native paintings," he wrote that standing in front of them was like viewing ancient Egyptian temple walls. Later, in ignorance of the significance of these images to indigenous peoples, his name was used for these figures, and his casual comparison of the rockshelter to a southwest Asian locus appears to have supported ideas of "alien origins" for the motifs.

Since then, there has been some debate about the source of the Gwion images. Ignorance of their cultural significance encouraged speculation contextualized by the history of nineteenth and twentieth century colonial settlement of the continent and concomitant racism in which the autochthonous occupation was seen in terms of hyper-diffusionism, "primitive peoples," and "advanced civilizations." The "non-Aboriginal origin" argument sat within a pervading colonial discourse; if the elegant and sophisticated Gwion figures were "aesthetically superior" to other Aboriginal paintings, how could they have been made by uninventive "savages," by a "primitive culture"? They must have been painted by another race.

Gwion Gwion, Fig. 4 "Messengers": King Edward River site. This scene depicts a ceremonial dance with *walbud* (marsupial hide aprons) removed and holding *mandi* (crescent-shaped ceremonial boomerangs). "In the early days, there were three nations. When they came together to dance, one brother stole another brother's wife; so he hit him with a *mandi*. After that they all turned into different types of birds". – *Munnumburra* Paddy Neowarra 28 August 2012. Scale 100 mm; these figures are small and finely depicted. (Photograph: GK Ward 1999 (AW09-24) [AW09-24 24Jun99 KEdwardR site2 7 val Gwion Bcc])

Gwion Gwion, Fig. 5 "Messengers": King Edward River site. This scene depicts a group of women wearing conspicuous *mudurra* (sculptured headdresses). "This is a painting of a special women's dance. The women would go to a sacred place where they would teach the young women how to dance. It was a sacred women's place and men could not go there". – *Munnumburra* Paddy Neowarra 28 August 2012. Scale 100 mm; these figures are among the largest depictions of Gwion figures. (Photograph: GK Ward 1999 (AW09-18) [AW09-18 24Jun99 KEdwardR site2 Gwion x4 Bcc])

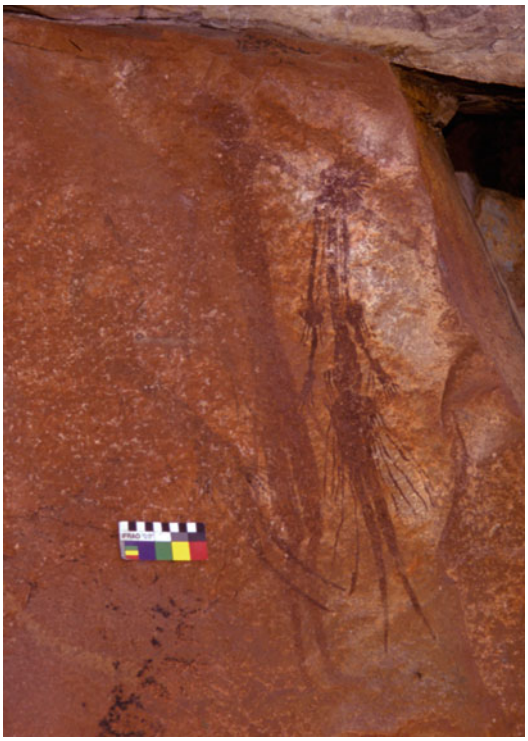

Gwion Gwion, Fig. 6 "Messengers": Donkey Creek site. Here a couple is depicted; a female (on *right*) is shown with long skirt, elbow, and other ornaments. Scale 100 mm; these figures are also large but finely delineated. (Photograph: GK Ward 1999 (AW08-30) [AW08-30 24Jun99 Donkey Creek Gwion Bcc])

Gwion Gwion, Fig. 7 *norgun* (concave palette) with typical staining from *mamandu* bark – (recent) red around lip and (transformed) black within *norgun*. Scale: width of opening c. 140 mm. (Photograph: Pathway Project 1995 PP1318∗13 [PP-Wulungarri-53norgun])

There had been nineteenth century speculations about earlier, non-Aboriginal, occupants of Australia – some prompted by apparent denials by traditional owners of knowledge of the origin and meaning of rock art images; indeed, some similar suggestions were made by twentieth century anthropologists – so it was perhaps not surprising that an "exotic" origin became a convenient if naïve explanation of the Gwion images. Few commentators apparently had read in Bradshaw's account – in the paragraphs immediately preceding his descriptions of the paintings – of a large group of men encountered by his party in the same area; many were painted and some wore large headdresses – which description sounds not too dissimilar to the painted images that he had recorded.

The debate regarding the "origins" of the Gwion images became one of "ownership" contextualized again by the concerns of the late twentieth century. The claims of a "mystery race" had implications for indigenous land rights, and attempts to deny indigenous peoples, authenticity and legitimacy were pursued by various elements of the popular media. Despite informed comments from and rebuttals by researchers, the popular misconceptions about the Gwion continue; a researcher who has been following the debate considers that informed responses have been ineffective, and suggests that it is necessary for archaeologists and indigenous people to combine efforts to provide more proactive mass-media engagement (McNiven 2011).

In 1992, Banggal (David Mowaljarlai), one of the Ngarinyin *munnumburra*, initiated a recording project in conjunction with ethnographer and film-maker, Jeff Doring. Their intention was to regain ownership of the Gwion by revealing previously secret aspects of their culture. Their collaboration resulted in a book (Ngarjno et al. 2000), symposia, and exhibitions of film in France and Australia, and explicit public statements: At the 1998 meeting of the Australian Rock Art Research Association, they spoke of their knowledge of the Gwion imagery and called for the Gwion figures to be known by their correct name.

In August 2004, the Wanjina-Wunggurr Community gained Native Title rights over their

traditional lands (Neowarra v State of Western Australia [2004] FCA 1092), including the painted imagery. The Ngarinyin research and recording including the published accounts were significant in achieving the native title determination.

Dating

Dating of the Gwion figures has been the subject of much research and considerably more debate. The Ngarinyin and other traditional owners in the region consider Gwion to be part of their cultural landscape, both long-standing and contemporary. The claims by some of an early age based on identification of a non-Aboriginal origin (above), rejected by traditional owners and the Federal Court, nevertheless have inspired the popular imagination and much ill-informed commentary. Part of this was based on the mistaken identification of the Gwion as "rubbish" pictures, a term that may be used to refer to old matter (Redmond 2002: 58) or that is sometimes used when one wishes to avoid discussion of a matter – particularly given the possible severe sanctions (above).

Subsequent research into the dating of the Gwion figures has produced questionable results. Claims of Pleistocene age are reinforced by identification of depicted megafauna known to have been extinct millennia ago, by excavation of ochre-stained rock panels, and by the results of optically stimulated luminescence (OSL) applied to quartz grains from mud-wasp nests seen to overlie rock paintings. An admirable review of the various methods of archaeological and chronometric methods and results from the Kimberley recently has been made by Aubert (2012). Aubert suggested that the possible identification of examples of extinct fauna (mostly extinct during the Pleistocene) should be treated as stimuli for further investigation rather than as conclusive. The identification (using elemental analysis) of ochre on a limestone slab excavated from the Carpenters Gap (Napier Range) site and dated to about 40,000 years ago could not be regarded as conclusive because of the possibility of a natural source of staining, and lack of clear figurative intent: "... a robust interpretation of Pleistocene rock art would require a recognisable motif as ochre was not exclusively used to produce rock art" (2012: 574).

Accelerator mass spectrometry (AMS) radiocarbon analysis has been used to date various materials enveloping rock art pigments in Kimberley sites (Aubert 2012: 574–5). Determinations made on debris contained within beeswax deposited over paintings typically range from modern to less than 4,000 years BP; those made using charcoal suggest that Wanjina motifs were painted – or repainted – relatively recently (dates range from modern to about 1,200 years BP). AMS dating of oxalate salts layered with paint pigments at the Carpenters Gap site produced results dating two examples of Gwion figures to between three and four thousand years BP, and results using silica skins indicated that another two Gwion figure types had minimum ages of about 1,500 years.

The most often quoted age determination for a possible Gwion figure is that of about 17,000 BP obtained from application of the OSL technique to dating quartz grains from mud-wasp nests. Aubert's review (2012: 575–6) of the results questioned whether the dated nest was actually overlying the painting, and whether application of the technique should be restricted to large nests where quartz grains could be extracted from the nest core where gains are protected from modern sunlight: whether "... the Kimberley has Pleistocene aged rock art remains debatable and requires additional dated motifs".

Aubert (2012: 576) considers that high-resolution uranium-series dating methods could be applied to the natural calcite and silica laminations that have been identified as enveloping rock paintings in the Kimberley and could be used to provide estimates of maximum and minimum ages; there are further such techniques applicable to age analysis of other natural surfaces that so far have not been applied to rock art.

Considering the range of non-figurative and figurative pictogram motifs recorded in the Kimberley region, the complexity of the superimposition sequences at many sites, the putative depiction of some fauna known to have become extinct during the Pleistocene, and the presence of

various biogeological factors enhancing the preservation of painted surfaces, it would perhaps be surprising that a rock art of Pleistocene age was not present in the Kimberley. This likelihood should not, however, mean that the painting tradition that includes the Gwion figures be considered to be exclusively ancient; not only are there AMS determinations establishing that Gwion figure painting was done in the last 4,000 years, but also the strong and formally recognized claims of the Ngarinyin that the Gwion are part of their continuing cultural tradition of *Wunan* Law. The last aspect is emphasized by the cinematographic record made by Jeff Doring in 1999 of Nyawarra (Paddy Neowarra) spontaneously painting a sentinel Gwion at the Garimbu Creek shelter, at the junction of three *dambun* districts, using charcoal mixed with water and a sap fixative (Ngarjno et al. 2000: 120–1) (Fig. 8); the sequence was included in the ACMI series of films shown throughout 2002 and discussed at an international congress in 2004 (Neowarra et al. 2004). The Ngarinyin recognize periodicity in the imagery and relate this to their cultural history. The earlier motifs, as well as being less expertly painted, tend to depict figures with three digits (e.g., Ngarjno et al. 2000: 292–3), a reference to the legacy of birds in the time of unrestricted wandering; this is followed by the time of the inventors in which the importance of the *gimbu* and woomera is emphasized; later, following the agreement at the stone table at Dududu.ngarri (Ngarjno et al. 2000: 141–7, 164) to divide the country and to control access to one another's *dambun*, to institute moiety kinship relationships, and to follow the *Wunan* law, the images of the messengers carrying the *maya.ngarri* and various Wunan ceremonies prevail. In this context, the chronometric results are not so important, but perhaps they will serve to confirm the longevity of the Wunan and the distinctive Gwion images.

Gwion Gwion, Fig. 8 "Messengers": Garimbu Creek site. Paddy Neowarra painting sentinel figure in 1999. The figure marks the location of the Wunan cultural exchange route connecting three territorial boundaries in Wunan Law. Scale: sentinel figure c. 600 mm high. (Photograph: Pathway Project 1999 [JDC297brush03])

Glossary

(After Ngarjno et al. 2000: 322–5)

birrina	"Coming together" dance linking men and women in public event
dambun	Clan regions allocated by the first Kamali council when originating law . . .; pattern of land titles inherited by Ngarinyin that defines the network of exchange with their neighbors
Dududu.ngarri	Place near the location of the stone table
gimbu	Reddish-brown stone; raw material for the sharpest spear-points invented by the Gwion; circumcision and cicatrise scalpel
jalgun	A small skirt of hide or string fiber worn by women
Jenagi *Jenagi*	Another title for the Gwion artists; literally the "wanderers" or nomads who became messengers of law; "messengers" who began the exchange of sacred *maya.ngarri*
mamandu	Sticky red sap of rough-barked mulberry-like tree; provides fixative and dye used to paint and stain many indelible Gwion figures onto rock surfaces

mambi	Triangular girdle skirt worn by women in Gwion paintings; mother's ceremonial skirt inherited by daughter
mandi	Crescent-shaped boomerang; pairs are clapped together for keeping the rhythm of songs
Munga. nunga	Gwion title for ancestors acknowledged as visionaries and originators of Wunan law . . .
maya. ngarri	Messages through sacred objects; secret or private forms of incised and painted boards preserving primary cultural concepts; abstracted law symbols circulated as messages of law . . .
mudurra	Sculptured wig or headdress of various shapes and sizes recorded in Gwion painting . . .
norgun	Concave palette worn into stone, used for extraction of red liquid from *mamandu* bark
nyarndu	Hooked sick used as a spear-thrower . . .
walbud	Tri-pointed belt-girdle of marsupial hide worn by Gwion males
Wunan	The sharing Law; ancient agreements that ended nomadism by fixing family *dumbun* estates and by establishing moiety divisions of society into two cross-marriage groups. . .

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Australian Rock Art
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Techniques in Archaeological Science
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Pigment Analysis in Archaeology
- ▶ Rock Art Sites: Management and Conservation

References

Aubert, M. 2012. A review of rock art dating in the Kimberley, Western Australia. *Journal of Archaeological Science* 39: 573–577. Available at: http://uow.academia.edu/MaximeAubert/Papers/1364692/A_review_of_rock_art_dating_in_the_Kimberley_Western_Australia. Accessed 22 June 2012.

McNiven, I.J. 2011. The Bradshaw debate: Lessons learned from critiquing colonialist interpretations of Gwion Gwion rock paintings of the Kimberley, Western Australia. *Australian Archaeology* 72: 35–44.

Neowarra, P., J. Doring, and G.K. Ward. 2004. Kimberley (Australia) rock-markings: Contemporary significance in the context of tourism. In *Rock art research: Changing paradigms. The RASI 2004 International Rock Art Congress*, Occasional RASI Publication, ed. G. Kumar, 46–47. Agra: The Rock Art Society of India.

Ngarjno, Ungudman, Nyawarra Banngal, and J. Doring, eds. 2000. *Gwion: Dulwan Mamaa. Secret and sacred pathways of the Ngarinyin Aboriginal people of Australia*. Köln: Könemann.

Pettigrew, J., C. Callistemon, A. Weiler, A. Gorbushina, W. Krumbein, and R. Weiler. 2010. Living pigments in Australian Bradshaw rock art. *Antiquity* 84: 326. Available at: http://antiquity.ac.uk/projgall/pettigrew326/. Accessed 13 Jan 2011.

Redmond, A. 2002. "Alien abductions", Kimberley Aboriginal cave paintings, and the speculation about human origins: On some investments in cultural tourism in the northern Kimberley, Western Australia. *Australian Aboriginal Studies* 2: 54–64.

Further Reading

McNiven, I.J., and L. Russell. 2005. *Appropriated pasts: Indigenous peoples and the colonial culture of archaeology*. Lanham: Altamira Press.

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H

Haakanson, Jr., Sven David

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Biographical Information

Sven Haakanson, Jr., is an Alaska Native archaeologist, museum professional, and artist. He was born in Kodiak and grew up in the native village of Old Harbor, which is a rural fishing community on Alaska's Kodiak Island. After earning his high school diploma from Anchorage's Bartlett High School (1985), he attended the University of Alaska Fairbanks (1985–1992). Here he studied English and education and discovered anthropology in classes with his mentor Dr. Lydia Black. A year teaching English in Magadan helped him develop fluency in Russian. Volunteering on archaeological projects in the Kodiak Archipelago fed his interests in history, technology, and native arts.

In 1988, Haakanson attended the sixth Inuit Studies Conference in Copenhagen, an opportunity that shaped his career. Listening to Dr. Black speak about his ancestral culture on the opposite side of the globe motivated Haakanson to continue his studies. In the fall of 1992, he entered Harvard University's graduate program in anthropology. During graduate school, he taught at Vermont's Center for Northern Studies (1995) and joined archaeological surveys in Siberia led by Smithsonian archaeologist Dr. William Fitzhugh (1994–1997). Working with Fitzhugh led to 2 years of his own fieldwork with the Nenets reindeer herders in the Yamal Peninsula, Russia (1996–1997), and a doctoral dissertation on the ethnoarchaeology of Nenets settlement patterns (Haakanson 2000, 2001). It was the first study of its kind in Siberia.

After completing his PhD, Haakanson returned to Kodiak to lead the newly established Alutiiq Museum and Archaeological Repository, a tribal heritage center dedicated to preserving and sharing the culture of the Alutiiq people. At the museum, he worked to reawaken Alutiiq traditions through research and educational programs that connected people to collections. In 2007, he received a MacArthur Foundation fellowship. In 2013, Haakanson accepted a joint appointment to the University of Washington's Burke Museum and Department of Anthropology. He earned tenure in 2015.

Haakanson's service to cultural and scientific organizations has included appointments to the Alaska State Council for the Arts, Alaska Humanities Forum, Alaska Native Science Commission, First Alaskans Institute, Museums Alaska, Alaska Native Heritage Center, Polar Research Board, and Western Museums Association.

Major Accomplishments

Haakanson's professional life developed in the decade following the passage of NAGPRA, at a

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time when the Alutiiq heritage movement was gaining momentum. As the director of a fledgling tribal museum, he set reestablishing cultural knowledge as a goal. Through archaeological inquiry, collections research, linguistic studies, and hands-on experimentation, his projects captured cultural information not found in the written record and reinvigorated traditions in the Alutiiq community. He calls this process "knowledge repatriation" (Haakanson 2004, 2007). He argues that helping native peoples learn from the archaeological record and collections is a powerful way to extend the value of cultural resources and promote partnerships that empower indigenous communities.

Haakanson is known best for his studies of ethnographic collections. From 2001 to 2008, he worked with the Château-Musée of Boulogne-sur-Mer, France (now call the Musée of Boulogne-sur-Mer) to develop an international exhibit of ancestral Alutiiq masks (Haakanson and Steffian 2009), connect Kodiak carvers directly to the works of their ancestors, and return carving knowledge to Alutiiq people by teaching skills preserved in the mask collection. From 2008 to 2012, he worked with museums in St. Petersburg, Russia, to develop a catalog of Alutiiq objects collected by early Russian traders in Alaska (Haakanson 2012), connect basket weavers with ancestral works, and teach weaving skills to youth. At present, he is leading studies of indigenous watercraft at the Burke Museum, building and launching traditional boats in partnership with culture bearers.

Haakanson's archaeological research includes a long-term study of the Cape Alitak petroglyphs (Figs. 1 and 2). This set of rock art sites at the southern tip of Kodiak Island holds the largest known assemblage of petroglyphs in Alaska. Since 2001, his research has expanded the number of known rock art localities from 5 to 13, documented over 1300 individual glyphs, recorded the settlement history of Cape Alitak, and created an accessible archive of rock art data at the Alutiiq Museum.

Throughout his work, Haakanson promotes scientific inquiry, museology, and Alutiiq values. Under his leadership, the Alutiiq Museum gained accreditation from the American Association of Museum (2011). The organization is only the seventh museum in Alaska and the second tribal museum in the United States to earn this rigorous national certification.

Haakanson is an accomplished artist. Museums and private collectors hold examples

Haakanson, Jr., Sven David, Fig. 1 Sven Haakanson on survey at Cape Alitak, 2010. (Photograph by Patrick Saltonstall, Cape Alitak Archaeological Survey Collection, Alutiiq Museum (AM688))

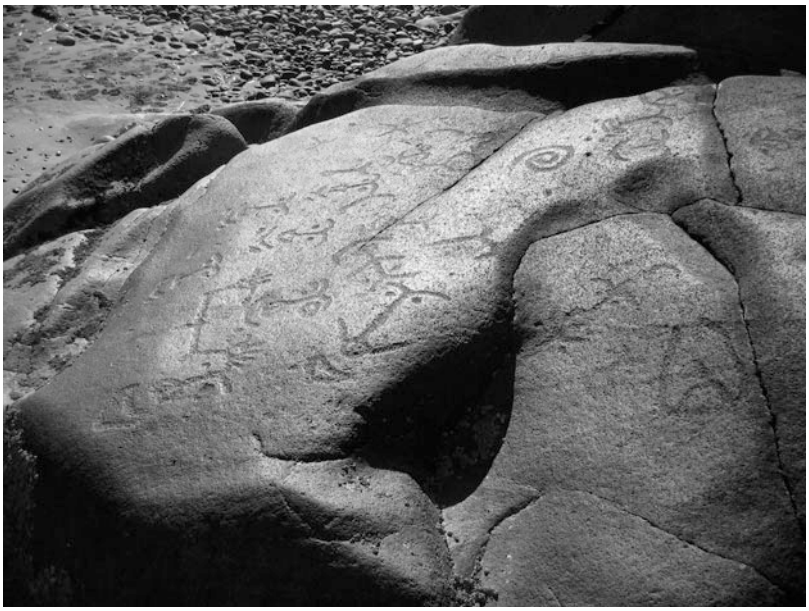

Haakanson, Jr., Sven David, Fig. 2 Petroglyphs from site 49-KOD-00129, Cape Alitak, Kodiak Island, Alaska. (Photograph by Sven Haakanson, Jr., Cape Alitak Archaeological Survey Collection, Alutiiq Museum (AM688))

of his wooden masks, and his photographs are widely published. *National Geographic* magazine printed a selection of his images of the Nenets people in 1997 and photographs of the last Eyak Speaker Maria Smith in 2007. In 2015, Alaska's Rasmuson Foundation engaged Haakanson to develop *Living Alaska* (Haakanson and Steffian 2015), a traveling exhibit of contemporary Alaska artwork, and *Creative Alaska* (Haakanson and Steffian 2016), a book chronicling 277 Alaska artists supported by foundation funding. The book features Haakanson's photographs and interviews. In 2017, Haakanson carved a mask for Reconciliation Pole, a memorial to Alaska Native people sent to boarding schools. The work was sponsored by the University of British Columbia in collaboration with James Hart.

Cross-References

- ▶ Archaeology and Art
- ▶ Heritage Museums and the Public
- ▶ Rock Art, Forms of

References

Haakanson, S. D. 2000. Ethnoarchaeology of the Yamal Nenets: Utilizing emic and etic evidence in the interpretation of archaeological residues. Unpublished PhD Dissertation, Harvard University.

Haakanson, S.D. 2001. Can there be such a thing as an Alutiiq anthropologist? In *Looking both ways: Heritage and identity of the Alutiiq people*, ed. A.L. Crowell, A.F. Steffian, and G.L. Pullar, vol. 79. Fairbanks: University of Alaska Press.

Haakanson, S.D. 2004. Understanding sacredness: Facing the challenges of cultural change. In *Stewards of the sacred*, ed. L.E. Sullivan and A. Edwards, 123–128. Washington, DC: American Association of Museums.

Haakanson, S.D. 2007. Understanding the value and importance of traditional heritage through hands on programs: What the Alutiiq Museum mission is doing for the local native community. In *The culture of the North Pacific region: Museums and indigenous culture*, ed. Reiko Saito, 13–18. Hokkaido: Hokkaido Museum of Northern Peoples.

Haakanson, S.D. 2012. Sugpiaq collections of the Kunstkamera: A Sugpiaq perspective. In *The Alutiit/Sugpiaq a catalog of the collections of the Kunstkamera*, ed. I.U.E. Berezkin, 391–396. Fairbanks: University of Alaska Press.

Haakanson, S.D., and A.F. Steffian. 2009. *Giinaquq: Like a face – Sugpiaq masks of the Kodiak archipelago*. Fairbanks: University of Alaska Press.

Haakanson, S.D., and A.F. Steffian. 2015. *Living Alaska: A decade of collecting contemporary art for Alaska*

museums. Anchorage: Anchorage Museum at Rasmuson Center.
Haakanson, S.D., and A.F. Steffian. 2016. *Creative Alaska*. Fairbanks: University of Alaska Press.

Further Readings

Crowell, A.L., A.F. Steffian, and G.L. Pullar, eds. 2001. *Looking both ways culture and identity of the Alutiiq people*. Fairbanks: University of Alaska Press.
Haakanson, S.D., and P. Jordan. 2010. 'Marking the land': Sacrifices, cemeteries and sacred places among the Yamal Nenets. In *Landscape and culture in northern Eurasia*, ed. P. Jordan, 161–178. London: University College London Institute of Archaeology Publications.
Knecht, R.A., S. Haakanson, and S. Dickson. 2002. Awa'uq: Discovery and excavation of an eighteenth century Alutiiq refuge rock in the Kodiak Archipelago. In *To the Aleutians and beyond: The anthropology of William S. Laughlin*, Publications of the National Museum Ethnographical Series 20, ed. Bruno Frohlich, Albert S. Harper, and Rolf Gilberg, 177–191. Copenhagen: Department of Ethnography, The National Museum of Denmark Copenhagen.

Haber, Alejandro Fabio

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Basic Biographical Information

Alejandro Fabio Haber was born in Buenos Aires, Argentina, on September 16, 1964. In 1982 he began studying Anthropology at the Faculty of Philosophy and Arts at the University of Buenos Aires (UBA), graduating in Anthropological Sciences in 1988. His academic interests from early on were sparked by the Puna of Atacama in the Argentine Province of Catamarca. However, the allures of the place would be more than academic. In Catamarca he met Silvina Del Carmen Ahumada, then an archaeology student, married her, and stayed to share her life over 20 years ago. Together they had four children: Santiago, Ignacio, Francisco, and Valentina.

A constant challenge for Alejandro is the critical analysis of the supposed theorems about nature and culture that underlie archaeological narratives. This has led him to have an interest in a number of fields, among them "domestication," "the social appropriation of natural resources," "the ethno-archaeology of shepherds," "the zoo-archaeology of llamas and vicunas," "systems of settlement: oases and enclaves," "domesticity," the "uywaña" (the Andean concept of nurture), "environmental politics in indigenous territories," and "territorial wangling."

Alejandro Fabio Haber received his doctorate in Anthropological Sciences from the UBA in 1999, under the guidance of Dr. José Antonio Pérez Gollán. His thesis was titled *An Archaeology of the Oases of Puna: Domesticity, Interaction, and Identity in Antofalla in the First and Second Millennia BP*. In it, he deconstructs the geographical image of the Puna of Atacama as a marginal landscape and incorporates it into the archaeological discourse. This signals the bond between Puna of Atacama landscape's narrative and the successive practices of appropriation of Puna territory by outsiders. This indicates the solidarity between the different scientific disciplines, in this case archaeology, and the colonial progress plan.

Apart from this thesis, Alejandro conducted several research projects in the Comunidad Indígena Colla Atacameña de Antofalla (the Atacama Colla Indigenous community of Antofalla). These projects have been embraced by the members of the community to the extent that some of them have been actively involved in research projects by Alejandro and his team. Significantly, they have even been involved as coauthors. The affection and wisdom of the locals from Antofalla has strongly guided Alejandro's academic interpretations. Undoubtedly, the Puna ancestral teachers have left their imprint on his work and his life. Perhaps it is this mutual friendship that warrants the classification of this biography under "Indigenous Archaeologies."

With the Colombian anthropologist Cristóbal Gnecco, Alejandro has initiated several archaeological projects that move towards the decolonization of his own discipline and his own work. An example of this is founding the publication *Arqueología Suramericana/Arqueología Sul-Americana* ("South American Archaeology,"

in Spanish and Portuguese). The first issue was published in 2005 with the support of the Anthropology Department from the University of Cauca, Colombia, and the World Archaeological Congress (WAC). The beginning of the first editorial encapsulated the spirit of this endeavor, positing that the search for historic meaning is a form of resistance to the postmodern devaluation of the past (Haber and Gnecco 2005: 2).

Currently, Alejandro is an independent researcher with CONICET (the National Scientific and Technical Research Council of the Argentine government), a member of the Academic Committee and coordinator of Indigenous Studies in the Doctorate of Human Sciences, Faculty of Humanities, of the National University of Catamarca (UNCa), and the incumbent lecturer of "Archaeology of the Old World II" and "Research Design" at the UNCa School of Archaeology.

As demonstrated by his most recent works, Alejandro is thinking of an "undisciplined archaeology" and a "non-methodology" which lets us find ourselves again in the "colonial wound," in the immense community of life, still charmed by the land to which all creation eventually returns.

Major Accomplishments

Alejandro Fabio Haber has presented a dozen national and international academic lectures. He has been invited to teach numerous graduate and postgraduate courses at the University of Buenos Aires (Argentina), the Universidad of Cauca (Colombia), Columbia University (USA), Sociedade de Arqueologia Brasileira (Brazilian Archaeological Society, Brazil), University of Melbourne (Australia), Universidad de la República (Republican University, Uruguay), and University of Cambridge (UK), among others. He is a member of the World Archaeological Congress (WAC) Ethics Committee and a member of the Editorial Committees of several publications in archaeology. Alejandro has received an external postdoctoral scholarship from CONICET and been a Visiting Research Fellow at Flinders University (South Australia). He has been awarded national and international grants for his research from such entities as UNCa (National University of Catamarca), CONICET, Agencia Nacional de Promoción de la Ciencia la Técnica (National Agency for the Promotion of Science and Technology), the National Geographic Society, and Wenner-Gren Foundation for Anthropological Research.

Furthermore, Alejandro has supervised dozens of theses and scholarship holders for CONICET and FONCyT (the National Science and Technology Fund, Argentina). He has published numerous articles and a total of six books, among them the highly recommended *An Archaeology of the Oasis: Domesticity, Interaction, and Identity in Antofalla, Puna de Atacama, Argentina, First and Second Millennia B. P.* (Haber 2007).

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Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Decolonization in Archaeological Theory
- ▶ Households and Domesticity: Historical Archaeology
- ▶ Postcolonial Archaeologies

References

Haber, A.F. 2007. *An archaeology of the oasis: domesticity, interaction, and identity in Antofalla, Puna de Atacama, Argentina, first and second millennia B. P.* Oxford: Archaeopress.

Haber, A.F., and C. Gnecco. 2005. Editorial. *Arqueología Sudamericana Arqueologia Sul Americana* 1 (1): 1–4.

Further Reading

Haber, A.F. 1988. *El recurso forrajero y la potencialidad del pastoreo*. Santiago: Libro de resúmenes del XI Congreso Nacional de Arqueología Chilena.

Haber, A.F. 1995. Supuestos teórico-metodológicos de la etapa formativa de la arqueología de Catamarca (1875–1900). *Publicaciones Del Ciffyh Arqueología* 47: 31–54.

Haber, A.F. 1996. Definición arqueológica del pastoreo de llamas: aportes etnoarqueológicos. *Shincal* 5: 57–65.

Haber, A.F. 1999. Caspinchango, la ruptura metafísica y la cuestión colonial en la arqueología sudamericana: el caso del noroeste argentino. *Revista do Museu de Arqueologia e Etnologia da USP* 3: 129–141.

Haber, A.F., org. 2004. *Hacia una arqueología de la arqueologías sudamericanas*. Santa Fé de Bogotá: Universidad de los Andes.

Haber, A.F. 2007. This is not an answer to the question "Who is indigenous?". *Archaeologies* 3 (3): 213–239.

Haber, A.F. 2009. Animism, relatedness, life: A post-Western perspective. *Cambridge Archaeological Journal* 19 (3): 423–435.

Haber, A.F. 2011. Nometodología payanesa: notas de metodología indisciplinada. *Revista Chilena de Antropología* 23 (1): 9–49.

Haber, A.F., C. Lema, and M. Quesada. 2006. Silenciamiento de la persistencia indígena en la Puna de Atacama. *Aportes científicos desde Humanidades* 6: 190–198.

Writing on the Wall: A Personal Perspective on Living near Hadrian's Frontier

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I lived for a decade in Durham City, to the south and nearly in the shadow of Hadrian's Wall. I arrived one dark January by train after flying from my home in sun-filled Southern California to Heathrow airport in London, bringing with me huge suitcases packed with entirely the wrong sort of clothing for the frigid north of England. I dragged my bags across the capital to King's Cross station and boarded a train. Three hours later Ishoved theluggage onto the station platform in Durham, fearful that the train doors would close with me still inside. Durham, for all its stunning beauty, is a brief, inconsequential stop on the northeastern line running up the right side of England. For an entire month, I shivered indoors and out in my inadequate apparel before discovering the superior protection offered by wool and leather over the array of cotton, waterproof nylon, and shiny black plastic boots I had brought. I learned my way around Durham on foot and schemed about accessing a car to explore further. Hadrian's Wall had fascinated me for years. I knew that by a miracle of luck and timing and connections, I now had an address not far from this near-mythic structure. When the days grew longer and the rain stopped, I would get there.

Spring arrived, late and doubtful, heralded by herds of daffodils around the walls of Durham Castle, and then summer, which brought me friends from the Netherlands, Jolien and Okke and their two children, their clothing and camping gear all packed into a red Renault 5. A car Transport. After a day in Durham, they said, "Let's go see Hadrian's Wall," and squeezed me in between the children, and we rumbled northward.

"Hadrian's Wall is an epic World Heritage Site, marching 73 miles from sea to sea across some of the wildest and most dramatic country in England," says English Heritage, guardians of Hadrian's Wall today. Anticipation mounted. We stopped first at Chesters, a fort not quite on the wall. I stifled my impatience: so near, yet not there. We admired the intricate plumbing and heating that allowed the Romans to be warm in a place and among people for whom the importance of warmth fell lower in the hierarchy of needs. And then, at last, we reached the fort of Housesteads, the northern boundary of which is Hadrian's Wall. The long uphill approach to the fort is quietly dramatic, like the curtain at a theater. At the top, the stage. I had arrived at Hadrian's Wall. I never felt more like an American bumpkin than I did right then, looking north across the erstwhile land of the Picts, my back to the south, the faraway home of the Romans.

They had left their mark, those Imperial forces. The inner walls and rooms and the communal toilets looked as if they might be the start of a construction project just beginning rather than one that had toppled from nearly two millennia ago. The top of the world and the ends of the world, the soldiers must have felt. We walked the portion of the wall which was far wider than I had anticipated, a soily, loamy path bordered by stones. The route back to the car park involved, inevitably, passage through the English Heritage gift shop. I bought some Roman figurines for my friends' children.

From Housesteads, on advice from fellow tourists, we drove a short distance westward and turned off the B6318 at the signpost for Once

Brewed, to see Steel Rigg. "The wall looks most wall-like there," we had heard, and found it true. The view is stunning. There is a wall, and there are the rolling green hills and heathered soil supporting – fertilizing – the wall. Nothing more, bar the stretching sky, blue and gray, over the narrow length of stone unspooling east and west.

That was my first time. Hadrian's Wall became one of my favorite places during the decade I lived in Durham. I escorted, or perhaps dragged, as many of my visitors as I could manage. Mostly guests stayed for three days. Day One we explored the magic of Durham. Day Two, up the Northumbrian coast to exclaim over the coastline and the castles, timing our journey with the tide so we could drive the causeway to Lindisfarne, the Holy Island. En route home, dinner in Newcastle, on the Quayside, at Leyla's in Dean Street while it lasted (across the street from the secret stairs to the Vampire Rabbit). Day three, saving the best for last, we headed to Hadrian's Wall, always the same stops: Chesters, Housesteads, and then Steel Rigg. Once, I experimented with adding the museuam at Vindolanda, more densely packed full of things and information than Chesters but somehow lacking its ghosts. We always bought mementos at the gift shop. An English Heritage scarf one very cold day, or little metal figures of centurions and legionnaires for my father, or plastic toys that various children (including, eventually, my own) loved for at least ten minutes. I once took an American friend and her young sons along with my own toddler to the wall. "Oh my! This is Hadrian's Wall! From a long time ago!" my friend exclaimed, reminding me of myself many years earlier. I bought her a tea towel printed with images of Roman soldiers. On the advice of an archaeologist I knew, we headed to Aydon Castle. "It's my favorite castle," the archaeologist confided. It is pretty perfect as an ancient castle. We liked it very much and bought ice creams from a truck in the car park. Mine made me violently ill on the way home though, so I learned to stick to my regulars. Chesters, Housesteads, and Steel Rigg. My wall.

Hadrian wanted his wall to keep the Picts out of Roman Britain. What is it with walls? They support, separate, delineate, and fascinate. They enclose; they are exposed. There's the ancient Great Wall of China, the cataclysmic, now-collapsed Berlin Wall. The Wailing Wall in Jerusalem. Walls around cities. A contested, as-yet-unbuilt wall between the United States and Mexico. Perhaps all walls are contested.

What must the Romans have been thinking, standing in the freezing gray of a Northumberland June, compacting earth, and topping it with stone and mortar? They could not have been happy. And then off they would go, these unfortunate soldiers and slaves, to sit in a communal toilet and to take refuge in the heated bathhouses.

Hadrian's Wall extended from the Irish Sea to the North Sea across England's narrow neck (clever Romans). When I started working at the University of Newcastle, my route from Durham required me to cross its eastern reaches daily. I could walk over it, stopping for coffee at the Wall Café if I had time. Newcastle has made efforts at preservation, even knocking down some houses to ensure that the traces of Hadrian's Wall make their presence felt in the heart of the city; when I walked that route, I saw the wall. Other days I might ride the Metro and pass underneath, but there it was, in my way. Eventually I lost the sense of amazement that my weekday commute encompassed such a wonder of the world. Hadrian's Wall is both a landmark and unremarked in the north.

At the eastern reach of Hadrian's Wall is the fort called Segedunum – probably meaning "strong place" – now a tourist attraction in the town of Wallsend. One of my children went to Segedunum on a school trip. The fort butts against the River Tyne at the point where the river itself makes a sharp right turn to the North Sea and takes over the defensive role of Hadrian's Wall. Wallsend, now a part of the city of Newcastle, became a center for shipbuilding until it slipped and slid and declined with the regions' coal mines. "The Last Ship," an extravagant musical show by Sting, a native son, dramatizes the effect of the industry's demise. A line in the play mentions Hadrian's Wall "running from Wallsend to Penrith." I saw the show in Toronto, where I live now, and had an eerie sense of the wall running

through Cumbria and right across the Atlantic Ocean into North America, following me. In a way, in the hold it has on world's imagination, Hadrian's Wall circles the globe. The narrative of men from Rome and from its conquered lands, ranging from the eastern Mediterranean to northwest Africa, walking north and further north and building a wall for their emperor and homes and bathhouses and lives for themselves, is a small story about the bigger story of human migration. Those men left their graffiti and their genes behind. A rare African Y chromosome has been traced to a family lineage in Leicester and may well have come from a soldier guarding Hadrian's Wall.

I moved from California to live by Hadrian's Wall and then moved again to Englands southern coast and then again to Canada. I am a migrant. I live now in a city, Toronto, where over 50% of the population was born outside of Canada. Immigrants and refugees have walked, flown, sailed, and driven here. The native inhabitants of the Americas, the First Nations, and indigenous peoples built no walls; perhaps they should have. Would that have helped them?

Apparently John F. Kennedy said of the Berlin Wall when it was erected: "A wall is better than a war." I woke up one morning to hear someone on the Canadian national radio station, the CBC, saying, "Border walls often increase the insecurity they're intended to stop." Borders cannot be impenetrable, commented the academic. (I look around at my own office: four walls, three of them punctured by doors or windows. Not impenetrable.) "For a while it may look like it is working, but actually it will just reroute and redefine the flows [of people and goods crossing the border]," said Elisabeth Vallet, an adjunct professor and scientific director in geopolitics and the Raoul Dandurand Chair at the University of Quebec. Another professor talked about border walls as architecture and as sites for creativity. A growing "wall culture" exists in the US/Mexico borderlands; Professor Ronald Réal of University of California, Berkeley, described wall volleyball, wall art, and wall horse races. He called that wall "the largest art gallery" as artists render their imaginations on its surface. Ana Fernandes, for instance, paints the wall blue. The graffiti on the Berlin Wall and its remains have become tourist attractions. A few rare examples remain of Roman era graffiti chiseled into Hadrian's Wall; with the same woad possibly used by Picts to paint themselves blue, Roman soldiers sketched images of the blue Mediterranean of their home.

Their legacy lives on in the wayward chromosomes but more so in those of us who visit the forts, who walk the Wall, and who buy the tea towels.

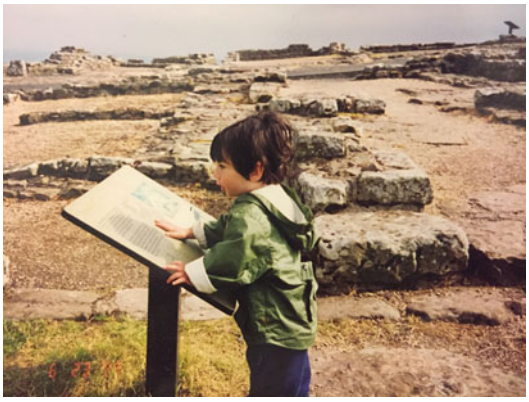

My son Eli, June 1999, lecturing at Housesteads

(Reference for the radio programme: 24 Jan 2019 https://www.cbc.ca/radio/thecurrent/the-current-for-january-24-2019-1.4989844/always-a-way-to-go-around-border-walls-create-insecurity-not-remove-it-says-expert-1.4989854)

Hall Dohan, Edith Hayward

Shay K. Hannah
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Basic Biographical Information

Edith Hayward Hall was born on December 31, 1877 in New Haven, Connecticut, to Ely Ransom and Mary Jane Hall. Throughout Hall's childhood, her father, a Yale graduate, instilled the importance of a fine education which would be

reflected in her later life (Thompson 1971; Morrow 2007). From 1888, Hall attended Woodstock Academy where Hall's love for the Greek culture and language would become apparent (Morrow 2007). After graduating from Woodstock Academy, Hall would attend Smith College in Northampton, Massachusetts, selecting the "Classical Course" as her major (Morrow 2007). Graduating from Smith College with a Bachelor of Arts, Hall would continue her academic career by attending Bryn Mawr College in Pennsylvania where she studied Greek archaeology (Morrow 2007). A constant struggle with poverty would plague Hall throughout her years of study at Bryn Mawr College, but thanks to her being awarded Mary E. Garrett European Fellowship, Hall was able to study at the American School of Classical Studies in Athens. In October 1903, Hall went on her first archaeological expedition to Athens, Greece, and would stay on till 1905, thanks to a stipend received from a fellowship founded by the Hoppin family which hoped "lift the restrictions on women in the study of archaeology" (Thompson 1971). While in Greece, Hall was invited to join an excavation to Gournia and Crete under the direction of Harriet Boyd Hawes. In Crete, Hall found material for her doctoral dissertation of 1907, *The Decorative Art of Crete in the Bronze Age* (Thompson 1971). Graduating with her dissertation in 1908, Hall accepted the position of instructor in classical archaeology at Mount Holyoke College where she would stay on till 1912. During these 4 years, Hall would revisit Crete doing work for the University of Pennsylvania at Sphoungaras in 1910 and at Vrokastro where she would be in full charge between 1910 and 1912 (Thompson 1971). Hall would leave Mount Holyoke College to become assistant curator at the University of Pennsylvania Museum, where she supervised the rearranging and cataloguing of the large collection of classical antiquities as well as publishing articles on a varied range of archaeological material. On May 12, 1915, Hall married Joseph M. Dohan, a lawyer and gentleman farmer, and the following years would see the arrival of their two children David Hayward Warrington and Katharine Elizabeth (Morrow 2007; Thompson 1971). In 1920, the now Mrs. Dohan returned to the University of Pennsylvania Museum where she became associate curator and would become curator of the Mediterranean Section. Dohan would undertake review editorship of the *American Journal of Archaeology* in 1932 and held the position until her death. It was in her middle age that Dohan changed her professional direction to focus on Italic archaeology. From her work cataloguing the previously uncatalogued Etruscan material in the University Museum, Dohan could reconstruct the original tomb groups and set up her Italic tomb groups in the University Museum in 1942, which was acclaimed by experts. Considered Dohan's most important work, it was hailed as "the first attempt ever to establish a synchronology of seventh-century Etruscan graves" (Thompson 1994). Dohan's next project, the study of Etruscan bucchero ware, was cut short by her death in 1943, aged 65. She was buried in a cemetery in Woodstock, Connecticut (Thompson 1994).

Hall Dohan, Edith Hayward, Fig. 1 Edith Hayward Hall Dohan, taken at the University of Pennsylvania Museum, ca. 1940. (courtesy of the University of Pennsylvania) Bryn Mawr College and Thompson (1971)

Major Accomplishments

Edith Hayward Hall Dohan was one of the first American female field archaeologists and was instrumental in the cataloguing and collecting of materials for the Mediterranean Section in the University of Pennsylvania Museum, helping build the collections that are today known throughout the world. Dohan would publish 4 books and over 50 articles (Morrow 2007) (Fig. 1).

Cross-References

- ▶ American Pioneers and Traditions
- ▶ American School of Classical Studies at Athens (ASCSA)

References

Bryn Mawr College. Breaking ground, breaking tradition: Bryn Mawr and the first generation of women archaeologists. http://www.brynmawr.edu/library/exhibits/BreakingGround/dohan.html.

Morrow, Katherine Dohan. 2007. Edith Hayward Hall Dohan, 1879–1943. In *Breaking ground: Pioneering women archaeologists*, ed. Getzel Cohen and Martha Joukowsky. Michigan: University of Michigan Press.

Thompson, Dorothy Burr. 1971. Dohan, Edith Hayward Hall. In *Notable American Women 1607–1950: A biographical dictionary*, ed. Janet Wilson James and Paul Boyer Edward James. Cambridge, Massachusetts: Belknap Press.

Hall, Edward T.

A. Mark Pollard
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Basic Biographical Information

Edward Thomas (Teddy) Hall (1924–2001) was born in London in 1924, the son of Lt. Col. Walter D'Arcy Hall, and grew up at Shipton Court in Oxfordshire. His grandfather, Thomas Hall, had left England in straitened circumstances in 1854 for Australia and returned at the end of that century a multimillionaire from his interests in the Mount Morgan goldmine. Following Eton, Teddy joined the Royal Naval Volunteer Reserve in 1943 and served during the Second World War in charge of a group of landing craft. In January 1946, he came to New College, Oxford, to read chemistry. On graduating, he decided to turn his hand to physics and offered his services to the head of the Clarendon Laboratory, Prof. Lindemann, later Viscount Cherwell, who, on learning that he required no payment, promptly set him to work! He worked in a team which designed and built a mass spectrometer for measuring ^{3}He in order to date rocks. He then turned his attention to X-rays and designed and built the first X-ray fluorescence spectrometer for the non-destructive analysis of museum objects.

Major Accomplishments

His first significant application was the analysis of the Piltdown skull, which had been found by Charles Dawson between 1912 and 1914 in a gravel pit near Lewes in Sussex. Teddy persuaded Kenneth Oakley of the Natural History Museum in London (by means of a lobster lunch!) to bring the skull to Oxford in 1949, and his XRF analysis showed high concentrations of chromium, which he attributed to artificial staining. He submitted his D.Phil. thesis (*Quantitative Analysis by Secondary X-Rays for Use Particularly in Archaeology*) in 1953. With the support of Lord Cherwell, Teddy was introduced to Christopher Hawkes, Professor of European Archaeology, at a dinner in Christ Church in 1949, and the resulting great friendship between the two led to the establishment, in 1953, of the Research Laboratory for Archaeology and the History of Art (RLAHA), in a Victorian terraced house in Keble Road. Typically, he made a deal with the University that he would forfeit his own salary in return for another position, and so Stuart Young, another physicist, was appointed as Deputy Director of the Lab in 1955, to be replaced, in 1957, by Martin Aitken.

Teddy's interests rapidly spread from XRF to other aspects of archaeometry, including optical emission spectrometry, electron microprobe analysis, and magnetometry (including proton magnetometers for marine survey work). He also developed equipment for monitoring ultraviolet levels within museums. He started a business manufacturing such equipment from a workshop at his house (Beenhams) in Littlemore, the Littlemore Scientific Engineering Company (LSEC). In addition to manufacturing equipment for archaeologists and museums, LSEC also made the "Cavendish Chair," in response to the plight of his friend Robin Cavendish, who contracted polio in Kenya and was flown back to England on a ventilator. To reduce the restrictions imposed by the cumbersome nature of the ventilator, Teddy developed a lightweight ventilator which ran on batteries, fitted to a modified aircraft seat on wheels, which gave him a certain degree of mobility.

During the late 1970s, along with Robert Hedges, he became increasingly interested in making radiocarbon dates by direct measurement of the ^{14}C atoms present using accelerator mass spectrometry, and in 1981 RLAHA took delivery of one of the first dedicated radiocarbon accelerators. In the early days, Teddy would often be found crawling inside the accelerator tank, or discussing design modifications, or even sweeping the floor. The first dates were published in 1984 in the journal *Archaeometry*, which had been founded by Teddy and Martin in 1958 as the Bulletin of the Research Lab. The Oxford Radiocarbon Dating Unit has now produced more than 22,000 archaeological radiocarbon dates.

One date in particular has created considerable public interest – that of the Shroud of Turin, which in 1988 was independently dated by three laboratories (Oxford, Zurich, and Arizona) to between CE 1260 and 1390. The Archbishop of Turin had written to Teddy in 1978 (when the Shroud was publicly displayed for the first time in 30 years) asking if it was possible to date it by radiocarbon. He replied to say that dating by AMS, when the technique was perfected, would enable a date to be obtained on a few milligrams of cloth. Consequently, in September 1986, a meeting took place in Turin where representatives of seven AMS laboratories proposed a protocol for the analysis. A year later, it was announced by the Cardinal of Turin that the Shroud would be dated by three laboratories, with the project to be coordinated by Dr. Michael Tite of the British Museum. Samples were taken in April 1988, and the results were announced in October of that year. The result that the Shroud is of medieval manufacture has not been accepted in all quarters, and the debate continues. Criticisms of the date range from the outlandish to the vaguely plausible, but Teddy's view was predictably robust: "Some people may continue to fight for the authenticity of the shroud, but this settles it once and for all as far as we are concerned."

He married Jeffie de la Harpe in 1957 and had two sons, Martin and William. He was made a Professor in 1975 and in 1989 Emeritus Professor of Archaeological Sciences, on his retirement from the University. In 1973 he was appointed a Trustee of the British Museum and also of the National Gallery. He also sat on the Advisory Council of the Science Museum. He was made an Honorary Fellow of the British Academy in 1984 and was appointed CBE in 1988. When he retired, the University realized that it was likely to have to pay a salary to his replacement and, like all universities, immediately claimed poverty, thus threatening the future of RLAHA. In response, Teddy launched an appeal and raised a million pounds to endow a Chair, which is now known as the Edward Hall Professorship in Archaeological Science.

Over and above his considerable scientific achievements, Teddy has always been a larger-than-life character. From being a collector of cigarette cards as a child, he became fascinated by Chinese porcelain in the 1950s and assembled a world-class collection of monochromes. He also collected clocks and scientific instruments, but, unlike many museums, was not averse to taking them apart and analyzing the brass from which they were made! In order to keep himself sane in retirement, he decided to make a pendulum clock with the accuracy of a quartz watch. The Littlemore Clock was housed in a wooden shed

in the garden of Beenhams, sitting on a 12-t block of concrete. Teddy was gratified to find that after 3 years of running, his clock had kept better time than the US Naval Observatory clock and was probably the most accurate pendulum clock ever built!

His summer Laboratory parties at Beenhams became the stuff of legend – strawberries and champagne around the swimming pool, followed by a trip in his hot air balloon for the chosen few! Not only was he gifted and generous, he was a world-class scientist, and the world of archaeology owes him a huge debt of gratitude.

Cross-References

- ▶ Aitken, Martin
- ▶ Radiocarbon Dating in Archaeology
- ▶ Research Laboratory for Archaeology and the History of Art (University of Oxford)
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

Further Reading

Archaeometry. Available at: http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291475-4754

Research Laboratory for Archaeology and the History of Art. n.d. Available at: http://www.arch.ox.ac.uk/rlaha.html

Hall, Martin (Historical Archaeology)

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Basic Biographical Information

Professor Martin Hall was born in Guildford and spent his youth in the south of England. He studied Archaeology (both undergraduate and postgraduate degrees) at Cambridge University where he was influenced by David Clarke and Eric Higgs. Although he had initially wanted to study Sociology, he took Anthropology and Archaeology in his 1st year and, after a fieldtrip to Bulgaria, switched his interest to Archaeology. After working as a contract archaeologist in London and assisting on Stone Age excavations in Lesotho, he embarked on Ph.D. fieldwork on the South African Iron Age under the supervision of David Clarke. He was employed as an ethnoarchaeologist at the Natal Museum (today the KwaZulu-Natal Museum) in Pietermaritzburg from 1975, taking up the appointment of Chief Archaeologist at the South African Museum in Cape Town upon the completion of his doctorate in 1980. He joined the Department of Archaeology at the University of Cape Town in 1983, becoming a full professor in 1991 (Lucas 2006).

After a number of years as the Chair of Historical Archaeology and Head of the Archaeology Department at the University of Cape Town (UCT), he moved into the administrative sector of the university. He acted as the inaugural Dean of Higher Education Development for 3 years and as the Deputy Vice-Chancellor of UCT for 6 years while continuing to publish in archaeology. He served as the Vice-Chancellor of the University of Salford (United Kingdom) from 2009 to 2014 (Martin Hall n.d.). He returned to Cape Town in 2015, where he is now associated with the UCT Graduate School of Business as Emeritus Professor. He continues to publish and provide commentary on a wide range of issues including heritage, media, virtual technologies, and higher education. Examples of these can be obtained at martinhallfacilitation.org.

Major Accomplishments

In a career that has included a diversity of research interests – the South African Iron Age, the making of the modern world, the social and political context of archaeology, the representation of the past, technology in pedagogy, and the role of tertiary education and the university in society – Hall's most prominent accomplishments in the field of archaeology are his contribution of a critical, materialist perspective to the study of the Iron

Age and his role in the establishment and development of the subdiscipline of Historical Archaeology in South Africa. Hall's doctorate focused on Iron Age settlement patterns in KwaZulu-Natal where he adopted an ecological perspective shaped by the New Archaeology's processualist approach, but, as he became more engaged with the politics of archaeology, he disengaged from the idea of a purely "scientific archaeology" (Lucas 2006), a move clearly evident in his 1987 book *The Changing Past: Farmers, Kings and Traders in Southern Africa* (Hall 1987), which took a materialist approach to the study of the Iron Age, in addition to situating Iron Age studies within the larger social and political contexts of their time (also see Hall 1984a, b).

The move away from a purely "scientific" approach to the past, within the increasingly fraught political context of apartheid South Africa, also spurred Hall's interest in the archaeology of colonial settlement and the potential that archaeology had to add to a different interpretation of that past. This development was solidified by the presence of Mark Leone and James Deetz who spent time as guest lecturers at the University of Cape Town in the mid-1980s (Lucas 2006). In collaboration with colleagues and students, Hall was involved in numerous historical projects in and around Cape Town producing a series of seminal articles reporting on work at sites such as Paradise, Onrust, the Barrack Street Well, the Castle, and the urban landscape of Cape Town, resulting finally in the publication of his book *Archaeology and the Modern World: Colonial Transcripts in South Africa and the Chesapeake* (Hall 2000). This period also saw ongoing collaboration with the University of California, Berkeley, and the establishment of the Historical Archaeology Research Group and the Archaeology Contracts Office at the University of Cape Town Archaeology Department (Lucas 2006). Hall's students at this time undertook studies of architecture, probate records, and various sites in and around Cape Town.

Hall organized the first World Archaeological Congress held in Africa at Cape Town in January 1999 (highly symbolic of South Africa's return to the international fold) and served as President of the organization from 1999 to 2003. In addition to all of his other accomplishments, Hall (1996) also produced a textbook, *Archaeology Africa*, which was the first introductory archaeology text to present the history, method, and theory of archaeology from an African perspective. Although no longer actively involved in primary archaeological research, Hall (2016) continues to engage with issues of materiality and multivalent sources in his analyses of issues pertaining to the modern world.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Leone, Mark P.
- ▶ Malan, Antonia
- ▶ Society for Historical Archaeology (SHA) (Modern World Archaeology)
- ▶ Southern Africa: Historical Archaeology
- ▶ World Archaeological Congress (WAC)

H

References

Hall, M. 1984a. Pots and politics: Ceramic interpretation in southern Africa. *World Archaeology* 15: 262–273.

Hall, M. 1984b. The burden of tribalism: The social context of southern African Iron Age studies. *American Antiquity* 49: 455–467.

Hall, M. 1987. *The changing past: Farmers, kings and traders in southern Africa, 200–1860*. Cape Town: David Philip.

Hall, M. 1996. *Archaeology Africa*. Cape Town: David Philip.

Hall, M. 2000. *Archaeology and the modern world: Colonial transcripts in South Africa and the Chesapeake*. London: Routledge.

Hall, M. 2016. Objects, images and texts, archaeology and violence. *Journal of Social Archaeology* 16 (1): 79–83.

Lucas, G. 2006. Archaeology at the edge. An archaeological dialogue with Martin Hall. *Archaeological Dialogues* 13: 56–67.

Martin Hall CV. n.d. Available at: http://www.gsb.uct.ac.za/martin-hall-cv. Accessed 15 Nov 2017.

Further Readings

Hall, M. 1981. *Settlement patterns in the Iron Age of Zululand: An ecological interpretation*, British Archaeological Reports International series 9. Oxford: Archaeopress.

Hall, M. 1991. High and low in the townscapes of Dutch South America and South Africa: The dialectics of material culture. *Social Dynamics* 17: 41–75.
Hall, M. 1992. Small things and the mobile, conflictual fusion of power, fear and desire. In *The art and mystery of historical archaeology. Essays in honor of James Deetz*, ed. A. Yentsch and M.C. Beaudry, 373–400. Boca Raton: CRC.
Hall, M. 1993. The archaeology of colonial settlement in southern Africa. *Annual Review of Anthropology* 22: 177–200.
Hall, M., and P. Bombardella. 2005. Las Vegas in Africa. *Journal of Social Archaeology* 5: 5–24.

Hall, Martin (Modern World)

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Basic Biographical Information

I began research in 1975, when I was appointed Ethnoarchaeologist at the Natal Museum in Pietermaritzburg, South Africa. My interest was in early farming settlement from the first millennium through until the rise of the Zulu Kingdom in the early nineteenth century. At this time, few radiocarbon dates had been obtained, and it was widely argued that the first Black farmers had arrived in southern Africa at much the same time as white colonists had moved northwards and eastwards from the Cape. This work culminated in my books *Settlement Patterns in the Iron Age of Zululand: An Ecological Interpretation* and *The Changing Past: Farmers, Kings, and Traders in Southern Africa, 200–1860* (Hall 1987).

Doing archaeology of this kind in apartheid South Africa was inherently political, as I realized when I published my radiocarbon dates for a first millennium farming settlement. I developed this connection between politics and practice in a series of papers published in the *South African Archaeological Bulletin*, *World Archaeology*, *American Antiquity*, and *Archaeology*. This trend in my research culminated in my book *Archaeology Africa* (Hall 1996) and in my invited contribution on Africa for the British Academy's millennial view of global archaeology (Hall 2002).

On joining the Department of Archaeology at the University of Cape Town in 1983, I became interested in the archaeology of colonial settlement, at that time almost unexplored. With a group of master's and doctoral students and in partnership with the University of California Berkeley (then a leading center for Historical Archaeology), we began fieldwork at a number of seventeenth- and eighteenth-century sites, looking particularly for evidence of slavery, the underclass and the ways in which colonial domination was marked through material culture.

Research in Historical Archaeology – as in other parts of the world – is closely related to cultural resource management. In order to gain access to sites of importance, promote site conservation, and fund archaeological research in partnership with the public and private sector, I founded the Archaeological Contracts Office in partnership with colleagues in the Archaeology Department. Between 1987 and 1993, I was responsible for a range of cultural resource management projects, including field surveys, urban excavations, and a major project at the Castle in Cape Town.

Our initial research in Historical Archaeology was brought together in two collections of papers, the first in *Social Dynamics* and the second, edited jointly with Anne Markell, in the *South African Archaeological Society Goodwin Series*. My own interest has been in the way that multiple sources of evidence could be used to expand the range and depth of archaeological interpretations. This is well represented by my study of the work of nineteenth-century Cape artists, published in the *South African Journal of Art and Architectural History*, by my chapter in *The Art and Mystery of Historical Archaeology: Essays in Honor of James Deetz* (Hall 1992) and by my paper on the ambivalences of gender in the archaeology of colonialism (Hall 1997). A prospectus for this approach to archaeological interpretation was developed in full in my book *Archaeology and the Modern World* (Hall 2000) and in the collection of essays co-edited with Stephen Silliman.

Major Accomplishments

My interests in multiple sources of evidence and in the connections between material culture, identity, and political practice have resulted in a theme of interpretation that reaches beyond the traditional disciplinary boundaries of archaeology. I started exploring this in my contributions to Malcolm Payne's artwork, *Face Value: Old Heads in Modern Masks*; Terry Kurgan's portfolio of prints, *Bodyparts*; and photographer Mark Lewis's piece on the Lost City and in fictional writing for young adults. This direction led to an awareness of the ways in which material culture, identity, and memory can be interwoven "beyond words," ideas that I have explored in a series of publications. "Blackbirds and Black Butterflies" and "The Reappearance of the Authentic" (Hall 2006) extend the interpretation to other parts of the world. My essays "Industrial Archaeology of Entertainment" (Hall 2005) and "Las Vegas in Africa" extend this line of thinking to show how the past is appropriated in the late capitalist imaginary.

Cross-References

- ▶ Hall, Martin (Historical Archaeology)
- ▶ Historical Archaeology
- ▶ Modern Material Culture, Archaeology of

References

Hall, M. 1987. *The changing past: Farmers, kings and traders in southern Africa, 200–1860*. Cape Town: David Philip.

Hall, M. 1992. Small things and the mobile, conflictual fusion of power, fear and desire. In *The art and mystery of historical archaeology: Essays in honor of James Deetz*, ed. A. Yentsch and M. Beaudry, 373–399. Boca Raton: CRC Press.

Hall, M. 1996. *Archaeology Africa*. Cape Town/London: David Philip/James Currey.

Hall, M. 1997. Patriarchal facades: The ambivalences of gender in the archaeology of colonialism. In *Our gendered past: Archaeological studies of gender in southern Africa*, ed. L. Wadley, 221–236. Johannesburg: Witwatersrand University Press.

Hall, M. 2000. *Archaeology and the modern world: Colonial transcripts in South Africa and the Chesapeake*. London/New York: Routledge.

Hall, M. 2002. Timeless time – Africa in the world. In *Archaeology: The widening debate*, ed. B. Cunliffe, W. Davies, and C. Renfrew, 439–464. London: British Academy and Oxford University Press.

Hall, M. 2005. The industrial archaeology of entertainment. In *Industrial archaeology: Future directions*, ed. E. Casella and J. Symonds, 261–278. New York: Springer.

Hall, M. 2006. The reappearance of the authentic. In *Museum frictions: Public cultures/global transformations*, ed. I. Karp, C.A. Kratz, L. Szwajaand, and T. Ybarra-Frausto, 70–101. Durham: Duke University Press.

Further Reading

Hall, M. 1980. Enkwazini, an Iron Age site on the Zululand coast. *Annals of the Natal Museum* 24 (1): 97–110.

Hall, M. 1981. *Settlement patterns in the Iron Age of Zululand: An ecological interpretation*. Oxford: British Archaeological Reports.

Hall, M. 1983. Tribes, traditions and numbers: The American model in southern African Iron Age ceramic studies. *South African Archaeological Bulletin* 38: 51–57.

Hall, M. 1984a. Pots and politics: Ceramic interpretations in southern Africa. *World Archaeology* 15 (3): 262–273.

Hall, M. 1984b. The burden of tribalism: The social context of southern African Iron Age studies. *American Antiquity* 49 (3): 455–467.

Hall, M. 1988. Archaeology under apartheid. *Archaeology* 41 (6): 62–64.

Hall, M. (ed.) 1990. Meaning and material culture in the colonial Cape. *Social Dynamics* 16(1).

Hall, M. 1991. Fish and the fisherman, archaeology and art: Cape Town seen by Bowler, D'Oyly and De Meillon. *South African Journal of Art and Architectural History* 2 (3 & 4): 78–88.

Hall, M. 1993. Tales and heads: Bodies and landscapes. In *Face value: Old heads in modern masks*, ed. M. Payne. Cape Town: Axeage.

Hall, M. 1994. Bodyparts. An interpretation. In *Bodyparts. Portfolio of multi-stoned lithographs*, ed. T. Kurgan. Cape Town: Terry Kurgan.

Hall, M. 1995. *Slaves, rings and rubbish*. Johannesburg: Heinemann.

Hall, M. 1998. Earth and stone: Archaeology as memory. In *Negotiating the past. The making of memory in South Africa*, ed. S. Nuttall and C. Coetzee, 180–200. Cape Town: Oxford University Press.

Hall, M. 2001a. Cape Town's District Six and the archaeology of memory. In *The destruction and conservation of cultural property*, ed. R. Layton, P. Stone, and J. Thomas, 298–311. London: Routledge.

Hall, M. 2001b. Social archaeology and the theatres of memory. *Journal of Social Archaeology* 1 (1): 50–61.

Hall, M. 2002. Blackbirds and black butterflies. In *Refiguring the archive*, ed. C. Hamilton, V. Harris, J. Taylor, M. Pickover, G. Reid, and R. Saleh, 333–361. Cape Town: David Philip.
Hall, M., and P. Bombardella. 2005. Las Vegas in Africa. *Journal of Social Archaeology* 5 (1): 5–24.
Hall, M., and A. Markell. 1993. Introduction: Historical archaeology in the Western Cape. *South African Archaeological Society Goodwin Series* 7: 3–7.
Hall, M., and S. Silliman. 2006. *Historical archaeology.* Oxford: Blackwell.

Hall, Robert Leonard

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Basic Biographical Information

Robert Leonard Hall (Fig. 1), of Stockbridge Mahican and Menominee descent through his mother, was born on February 8, 1927, in Green Bay, Wisconsin, where his father William Taylor Hall was a partner in a family grocery store. Robert Hall died on March 16, 2012, of cancer. Hall earned his B.A., M.A., and Ph.D. degrees, 1950, 1951, and 1960, from the University of Wisconsin-Madison. In 1958 he married Barbara Lee Mohr, with whom he had four daughters and four grandchildren. Robert Hall was 6 ft tall, with dark hair and blue eyes and a warm, gentle manner.

Hall, Robert Leonard, Fig. 1 Robert L. Hall

Robert Hall's modesty and sense of humor belied a remarkable intelligence able to grasp recondite Mayan calendar astronomy as well as technical details of Midwest archaeological materials. His power of visual synthesizing enabled him to discern symbols in Mesoamerican and North American artifacts and mythology and think through them into profound meanings, often shared over wide areas and millennia of time. Familiarity with his own Mahican and Menominee heritage and the cultures of the Oneida and Ho-Chunk (Winnebago) neighboring the Stockbridge and Menominee Reservations sensitized Hall to indigenous understandings of the cosmos and its inhabitants. His book *An Archaeology of the Soul: North American Indian Belief and Ritual* (1997), reprinted several times, brought together a wide range of archaeological and ethnological researches, proposing deep-time traditions through which, for example, the atlatl, outmoded as a weapon, became the potent stem of calumet pipes. Hall himself illustrated and laid out the book design for this notable work.

Hall's interest in archaeology led him to work at his hometown's Neville Public Museum while in high school, 1943–1945. His scientific ability won him national second place (out of 40 finalists) prize in the 1945 Westinghouse (now Regeneron) Science Talent Search for high school seniors. Military service as Seaman 1/c with the Navy 1945–1946 interrupted this, to be resumed when he worked as a student at Wisconsin State Historical Society Museum, 1946–1949, and then as a curator (level 1) in anthropology, 1949–1953. Summers 1947 and 1948, Hall worked on a crew of the Smithsonian Institution River Basin Surveys Missouri Valley Project. His first career-related employment after receiving his Ph.D. was at the University of South Dakota, Vermillion, where he was Director of the Institute of Indian Studies, 1959–1961. Then he moved to the Illinois State Museum, Springfield, serving as Curator of Anthropology 1962–1967 and after a year at Marquette University in Milwaukee, Wisconsin, as Associate Professor of Anthropology, settling into his principal academic home at the University of Illinois at Chicago as Associate

and then Full Professor of Anthropology, from 1968 until retiring with emeritus status in 1998.

Robert Hall presented his first scientific paper, coauthored with Warren Wittry and Robert Linck, in 1944 at the annual meeting of the Wisconsin Academy of Sciences, Arts and Letters. More than 60 years later, he coauthored the position paper "Cosmology and Society in the Ancient Amerindian World" and presented his own paper "The Role of Metaphor in Perceived Cosmologies: Variation and Redundancy in Metaphors of Sky-Earth Dualism" at a workshop of the prestigious Santa Fe Institute. He presented over 60 papers at professional conferences and published more than 30 chapters in edited volumes and articles in journals ranging from *American Antiquity* to *Archaeoastronomy*.

Major Accomplishments

Robert L. Hall was one of the soundest empirical archaeologists working in North America, painstaking and thorough in his research and keen to perceive significant data, combining this care for observations with an often breathtaking insight into links with deep time, other societies, and other sciences such as astronomy. Hall was one of the first to point out that radiocarbon dates from maize and certain other grasses will differ by as much as several centuries in radiocarbon age from dates on wood of the same calendar age. He noted, years before other archaeologists realized it, that the constructions of certain burial mounds of the Midwest USA were ritual reenactments of earth creation as described in the widespread earth-diver myth. Hall studied historical documents and ethnographies to obtain ethnohistorical information to meld with archaeological interpretation. In 2006 the Ho-Chunk Nation wrapped him in an honoring blanket in gratitude for his contributions to their history. Midwest archaeologists presented him with a Distinguished Career Award in 2008 and a festschrift in 2003 (Richards and Fowler 2003). His work in progress, *Touching History: Four Centuries of Indian-White Relations Told as a Family Story*, relates his family lines, Stockbridge Mahican, Menominee, and Euroamerican, to significant events in American history to which they were witness.

Although Robert Hall has always been respected as an excellent field archaeologist, and his published dissertation analysis of Oneota ceramics is a classic in continuing demand, many Midwestern archaeologists have been uncomfortable with his use of indigenous cosmologies to deepen interpretation of archaeological and ethnographic data and with his presentations of Mesoamerican links with Anglo-American First Nations. Long before the term "indigenous archaeologies" was introduced, and long before most archaeologists learned of his Native American ancestry, Robert Hall was quietly working from an indigenous standpoint. During the 1970s–1980s heyday of the narrowly scientific "New Archaeology," Hall's interpretations grounded in ethnohistorical and indigenous approaches were not always taken seriously. Never discouraged, Hall continued pursuing breadth and depth, gradually winning wider respect for what have often been brilliant insights illuminating the great traditions of Mesoamerica and Eastern North America. His work is likely to remain foundational to archaeologies east of the Rockies, while fads and personalities fade.

Cross-References

- ► Cahokia
- ► Holographic Epistemology: Native Common Sense
- ► North American Mound Builders: Hopewell, Natchez, Cahokia

References

Hall, R.L. 1997. *An archaeology of the soul: North American Indian belief and ritual*. Urbana/Chicago: University of Illinois Press.

Richards, J.D., and M.L. Fowler, eds. 2003. A deep-time perspective: Studies in symbols, meaning, and the archaeological record. Papers in honor of Robert L. Hall. *The Wisconsin Archeologist* 84 (1–2): 139–154.

Further Readings

Hall, R.L. 1991. Cahokia identity and interaction models of Cahokia Mississippian. In *Cahokia and the hinterlands: Middle Mississippian cultures of the Midwest*, ed. T.E. Emerson and R.B. Lewis, 3–34. Urbana/Chicago: University of Illinois Press.

Hall, R.L. 2004. The Cahokia site and its people. In *Hero, hawk, and open hand: Ancient Indian art of the woodlands*, ed. R.F. Townsend and R.V. Sharp, 92–103. New Haven: Yale University Press.

Hall, R.L. 2006. A plains experience and beyond. *Plains Anthropologist* 51 (200): 633–648 (dated 2006, appeared in 2007; special retrospective issue on the Smithsonian Institution River Basin surveys).

Hall, R.L. 2010. Archaeology in my soul. In *Being and becoming indigenous archaeologists*, ed. G. Nicholas, 121–130. Walnut Creek: Left Coast Press.

Hall, R.L. 2012. Some commonalities linking North America and Mesoamerica. In *Oxford handbook of North American archaeology*, ed. T.R. Pauketat, 52–63. New York: Oxford University Press.

Hamada, Kosaku

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Hamada, Kosaku, Fig. 1 Kosaku Hamada. (© Department of Archaeology, Kyoto University)

Basic Biographical Information

Kosaku (Seiryo, as a pseudonym) Hamada (1881–1938) was the father of archaeology in Japan (Fig. 1). He was born in Osaka. During his elementary school days, he became interested in ancient finds such as arrowheads. His first work on archaeological materials was published in 1898 during his junior high school days (in the old system of education; almost equal to the high school in the present educational system). After he graduated from Waseda Junior High School in Tokyo in 1899, Kosaku Hamada went to Third High School located in Kyoto. In 1902, he joined the Department of Occidental History at the University of Tokyo. In 1905, he finished an undergraduate course, having been supervised by Professor Tsuboi Shogoro. In his postgraduate studies, he focused on the relationship between European and Japanese art in ancient times, with the aim of elucidating the origin of Japanese ethnicity. Before becoming a lecturer of Kyoto University on 1909, he taught history and Japanese language at his alma mater (Waseda Junior High School) for several years.

From 1910 onward, Dr. Hamada acquired considerable experience in archaeological research, not only in Japan but also in East Asia. Immediately after being promoted to associate professor in 1913, he started a three year overseas inspection in Europe (1913–1916). One outcome of this was his subsequent establishment of the first department of archaeology in Japan. In hindsight, it appears that this European inspection was the preparatory work that formed Kosaku Hamada's framework for archaeology. This framework was based primarily on Flinders Petrie's archaeological methods and values. Soon after returning to Kyoto in 1916, Kosaku Hamada founded what is now the oldest department of archaeology in Japan, and became a professor of archaelogy in the next year. In 1922, he published the first textbook of archaeology in Japan, based upon

Flinders Petrie's *Methods and Aims in Archaeology* (1904).

Professor Hamada was awarded a doctorate by the President of Kyoto University in 1918. In 1927, he directed excavations of the Chinese prehistoric site, Hishika, as the first expedition of the Far Eastern Archaeological Society. In 1931 he was recommended for membership of the Japan Academy. He became the President of Kyoto University, but one year later, in 1938, he died of renal failure while in office as the President.

Major Accomplishments

In spite of his early death, Dr. Hamada's career in archaeology spanned 40 years. His interest in the origin of the ethnic culture of Japan does not seem to have borne much influential fruit in Japanese prehistory in itself. However, this interest must have served as a tool through which he understood the contemporary state of archaeological aims and methods. The outstanding accomplishment of his archaeological career was *Tsuron Koko-gaku* (*An Introduction to Archaeology*) which was published in 1922 and used as the textbook of archaeological methodology for several decades.

As a practical archaeologist, Dr. Hamada fully understood the importance of introducing the principle of stratification to archaeological excavations in Japan. It is likely that one of the reasons he excavated several shell middens was to prove to himself the importance of recognizing stratigraphy. He also took part in the first systematic archaeological research project by an academic organization in Japan: the series of excavations in Saitobaru tombs in Kyushu Island, undertaken from 1912 onward. After coming back from his European inspection, Dr. Hamada organized excavations of the tombs himself. This project is likely to have been guided by his interest in the origin of Japanese ethnicity, and probably, the same kind of motivation led him to excavate some of the above-mentioned shell middens; prehistoric human bones surrounded by shell can often survive in contrast to the ordinary soil condition in Japan. This interest was shown too in the excavations of Ko site in Osaka, undertaken from 1917, where he tried to identify the first evidence of Paleolithic settlement in Japan, inspired by the find of an ancient stone implement like a hand-axe.

As a missionary of sophisticated archaeology, Dr. Hamada formalized the style of editing an excavation report, which definitely improved Japanese scholars' recognition of archaeological findings as not only past remains but also historical resources. Moreover, Dr. Hamada paid great attention to publishing a report precisely and in a proper time after excavation, possibly because he concurred with Petrie's view on ethics in archaeology (1904).

As the founder of the first department of archaeology in Japan, Dr. Hamada not only collected past remains even from overseas but also rigorously recorded archaeological materials with clear information on context and location. He used these materials to develop archaeological education in the department and also produced a condensed English version of some archaeological reports. Considering his various accomplishments together, it appears that Kosaku Hamada consciously worked on a number of fronts in order to ensure that archaeology in Japan caught up with the high standard of archaeology in European countries such as England and France as quickly as possible.

Cross-References

- ▶ Kanaseki, Hiroshi
- ▶ Periodization in Japanese Prehistoric Archaeology
- ▶ Saito, Tadashi
- ▶ Tsuboi, Shogoro

References

Hamada, K. 1922. *Tsuron Koko-gaku. [An introduction to archaeology.]*. Tokyo: Taikaikaku. (in Japanese).

Petrie, W.M.F. 1904. *Methods and aims in archaeology.* New York: Macmillan.

Further Reading

Arimitsu, K. 1974. *Nihon Koko-gaku Senshu. [A series of selected papers of distinguished Japanese*

archaeologists.] Hamada Kosaku, volume 1. Tokyo: Tsukiji shokan. (in Japanese).
Arimitsu, K. 1975. *Nihon Koko-gaku Senshu. [A series of selected papers of distinguished Japanese archaeologists.] Hamada Kosaku, volume 2*. Tokyo: Tsukiji shokan. (in Japanese).
Hamada, K. 1929a. *Kudara Kan'non. [The Baekjean Avalokiteśvara.]*. Tokyo: Idea Syoin. (in Japanese).
Hamada, K. 1929b. *Koko Yuki. [The voyages as an archaeologist.]*. Tokyo: Toko Syoin. (in Japanese).
Hamada, K. 1941. *Koko-gaku Nyumon. [A guide to archaeology.]*. Osaka: Sogen-sha. (in Japanese).
Publication Committee for a Collection of Professor Kosaku Hamada's Works. 1987–1993. Hamada Kosaku Chosakushu. [A collection Kosaku Hamada's works.], Volumes 1–7. Kyoto: Doho-sha. (in Japanese).
Umehara, S., ed. 1939. *Hamada Sensei Tsuitoroku. [A collection of eulogies to Professor Hamada.]*. Kyoto: Kuwana Bunsei-do. (in Japanese).

Hamster: Domestication

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Basic Species Information

The golden hamster *Mesocricetus auratus* (Waterhouse, 1839) belongs to the class of mammals and to the subfamily hamster (Cricetinae): Order: Rodentia, Suborder: Myomorpha, Superfamily: Muroidea, Family: Cricetidae. This subfamily consists of approximately 20 species. The natural distribution of all hamsters belongs to the northern hemisphere in the palearctic region (Europe and Asia). The most well-known hamsters are species from the three genera *Cricetus*, *Mesocricetus*, and *Phodopus*.

The genus *Cricetus* consists only of one species, the common or European hamster *Cricetus cricetus* (Linneaeus, 1758). This is also the largest species of hamsters, with up to 30-cm body length and up to 1 kg body mass. The common hamster is widely distributed from the eastern part of Russia to the Netherlands and France in the west. There are three species in the genus *Phodopus*: the Dsungarian dwarf hamster *P. sungorus* (Pallas, 1773), Campbell's dwarf hamster *P. campbelli* (Thomas, 1905), and the Desert hamster *P. roborovskii* (Satunin, 1903). These three species of dwarf hamsters are relatively small (up to 10 cm and up to 50 g). They were brought to Europe in the 1970s and are used in scientific research in laboratories and kept as pets. Four to five species are described in the genus *Mesocricetus*, the so-called middle hamsters. One is the golden hamster and the other three are the Turkish hamster, *M. brandti* (Nehring, 1898), distributed in Anatolia (Turkey), Armenia to Iran; the Ciscaucasian hamster, *M. raddei* Nehring, 1894, living in Aserbaijan and Dagestan, and the Romanian hamster, *M. newtoni* (Nehring, 1898) which can be found in Romania and Bulgaria. The existence and relationship of a probable fifth species, *M. nigriculus*, is uncertain (Panteleyev 1998; Yigit et al. 2006) (Fig. 1).

The most prominent hamster is the golden hamster. In countries outside Europe, the word "hamster" refers to the *golden* hamster. The natural distribution of this species is very small. It occupies the northern part of Syria in the so-called Aleppinian Plateau (around and north of the city of Aleppo) and a southern portion of Turkey. The distribution of the golden hamster is limited by natural borders: the Mediterranean Sea in the west, the Taurus Mountains in the north, the Euphrates River in the east, and the Syrian Desert in the west (Gattermann et al. 2000). Burrows are mainly found in agricultural fields. As a result of the increasing urbanization in Syria, this species is increasingly endangered (Fig. 2).

Golden hamsters are mainly solitary animals with a promiscuous mating system. In captivity, they behave aggressively against conspecifics and grouping of unrelated animals is impossible. In the wild they live solitary in burrows approx. 65–100 cm deep dug by themselves. The individuals reach a length of about 18 cm and weigh up to 180 g. With their expendable cheek pouches, golden hamsters can carry about 20 g of grain into their burrow. In their natural habitat in spring and summer, and in captivity during the whole year, females are sexually receptive every 4 days. Only 16 days after successful copulation, they give birth to ~8 pups. Though golden hamsters

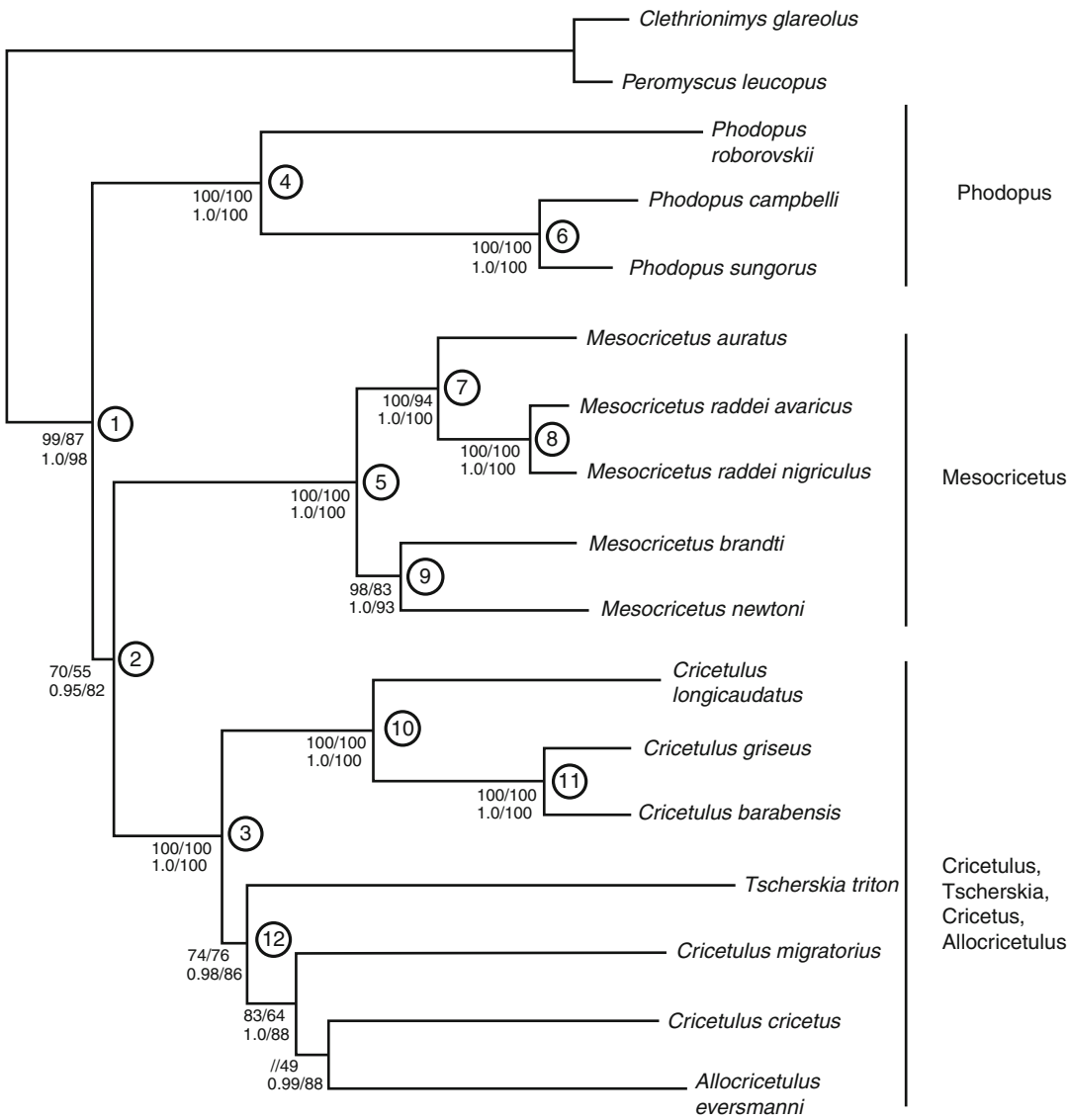

Hamster: Domestication, Fig. 1 Tree of the molecular phylogeny of hamsters (Neumann et al. 2006)

in the wild only live up to 2 years, in captivity, they can reach an age of 3 years.

The golden hamster is a popular pet and a widely used laboratory animal. Its unique domestication history started nearly 100 years after its scientific description in 1930 when an Israeli scientist discovered a female with 11 pups in an agricultural field near the city of Aleppo. Though the mother and several pups died, one female and three males survived. After successful mating, these animals established a captive hamster population that was the foundation for the entire modern domestic population that numbers several million individuals. No other mammal has achieved a similar breeding success from such a narrow gene pool.

In 1971, an additional 12 wild animals were brought to the USA (Murphy 1971). Since then, only a few golden hamsters have been caught in Syria and Turkey and they have not influenced the

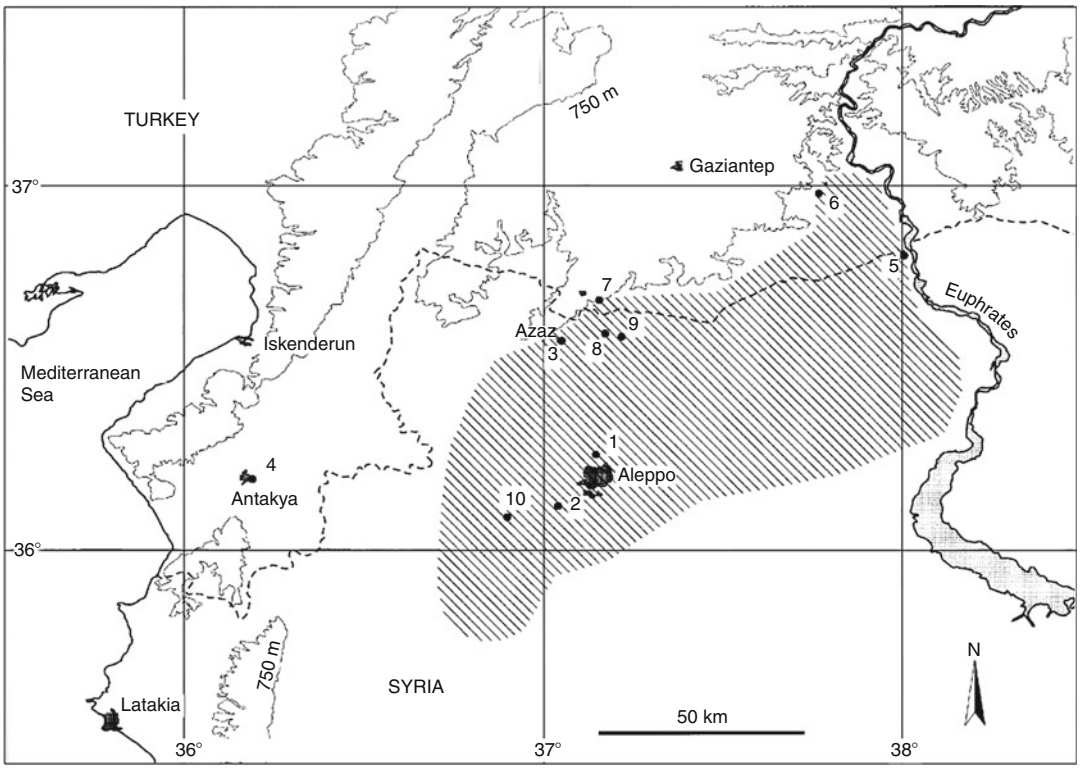

Hamster: Domestication, Fig. 2 Distribution map of the golden hamster. Numbers indicate historic and recent records (Gattermann et al. 2000)

modern gene pool of domestic hamsters. In 1999, after an expedition to Syria, 19 wild hamsters were brought to the University of Halle (Germany). The wild hamsters have been compared to the inbred lab hamsters regarding genetic variability, morphology, and behavior. An expected reduction in genetic variability was found. The domestic (lab) hamster sample shows an evidently reduced genetic variability (Neumann et al. 2005). Surprisingly, a remarkable feature of the species is that the domestic (lab) strain shows nearly no signs of inbreeding changes or depression. Differences between the strains in morphology and behavior are very small (Gattermann et al. 2002; Schneider and Fritzsche 2011). Given the opportunity to choose between lab and wild males, females of the lab strain prefer males of the wild strain for mating. If wild males and lab males have the same time to mate with females of both strains, the reproductive success of wild males dramatically exceeded that of lab males. A kind of sperm competition seems to occur (Fritzsche et al. 2006).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

References

Fritzsche, P., K. Neumann, K. Nasdal, and R. Gattermann. 2006. Differences in reproductive success between laboratory and wild-derived golden hamsters (*Mesocricetus auratus*) as a consequence of

inbreeding. *Behavioural Ecology and Sociobiology* 60: 220–226.
Gattermann, R., P. Fritzsche, K. Neumann, I. Al-Hussein, A. Kayser, M. Abiad, and R. Yakti. 2000. Notes on the current distribution and the ecology of wild golden hamsters (*Mesocricetus auratus*). *Journal of Zoology London* 254: 359–365.
Gattermann, R., P. Fritzsche, R. Weinandy, and K. Neumann. 2002. Comparative studies of body mass, body measurements and organ weights of wild-derived and laboratory golden hamsters (*Mesocricetus auratus*). *Lab Animal* 36: 445–454.
Murphy, M.R. 1971. Natural history of the Syrian golden hamster – A reconnaissance expedition. *American Zoology* 11: 632.
Neumann, K., S. Maak, P. Fritzsche, and R. Gattermann. 2005. Microsatellites for diversity studies in the golden hamster (*Mesocricetus auratus*). *Molecular Ecology Notes* 5: 876–878.
Neumann, K., J. Michaux, V. Lebedev, N. Yigit, E. Colak, N. Ivanova, A. Poltoraus, A. Surov, G. Markov, and S. Maak. 2006. Molecular phylogeny of the Cricetinae subfamily based on the mitochondrial cytochrome b and 12S rRNA genes and the nuclear vWF gene. *Molecular Phylogenetics and Evolution* 39: 135–148.
Panteleyev, P.A. 1998. *The rodents of the palearctic*. Moscow: Russian Academy of Science.
Schneider, N., and P. Fritzsche. 2011. Isolation calls and retrieving behavior in laboratory and wild-derived golden hamsters – No sign for inbreeding depression. *Mammalian Biology* 76: 549–554.
Yigit, N., E. Çolak, R. Gattermann, K. Neumann, Ş. Özkurt, M.M. Gharkheloo, P. Fritzsche, and R. Çolak. 2006. Morphological and biometrical comparisons of Mesocricetus Nehring, 1898 (Mammalia: Rodentia) species distributed in the palaearctic region. *Turkish Journal of Zoology* 30: 291–299.

Handaxes and Biface Technology

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Introduction

Few objects in the history of prehistoric archaeology have attracted such sustained scholarly interest – and proved so resilient to scientific explanation – as the handaxe.

Handaxe is an early term that is still widely used to describe an enigmatic type of stone tool found at archaeological sites across at least two-thirds of the Paleolithic Old World (Lycett and Gowlett 2008). These are stones that were flaked on two opposing surfaces in such a manner that a generally ovate- or teardrop-shaped plan form, and symmetry or near-symmetry about two planes, was produced (Figs. 1 and 2).

Handaxes are of particular interest to Paleolithic archaeologists, as they appear to be the first artifacts in the human cultural record to display characteristic hallmarks of intentional design. That is, to many – but not all – observers, they seem to have been deliberately shaped by hominins into particular tool forms (Wynn 1995).

The term handaxe was first used in a teleological sense to describe flint bifaces found in deeply stratified gravel quarries and clay pits in mid-nineteenth-century France and Britain (Prestwich 1860; Evans 1872). These curiously shaped stones, first described in the published literature a half century earlier (Frere 1800), occurred alongside extinct fossil fauna. Early French scholars named them *haches* (axes) or *coups de poings*, the latter meaning "blows of the fist," from which originated the English term handaxe (Debénath and Dibble 1994). The eventual acceptance of handaxes as humanly made artifacts (Prestwich 1860) provided the earliest scientific proof of the great antiquity of humankind. The first handaxe assemblages brought to the attention of nineteenth-century science were recovered from the St Acheul gravel pits of northern France. Thus, the entire time period of handaxe manufacture is often referred to as the "Acheulean" (alternative spelling: Acheulian) and the objects themselves as Acheulean handaxes.

Present evidence suggests that handaxe technology first arose in Africa ~1.76 Ma ago and had spread into western Asia and Europe by ~1 Ma ago. In the preceding Oldowan period, it is argued, stone toolmaking was less advanced from a technological, and also a cognitive, perspective. Dating to at least 2.6 Ma ago, African Oldowan assemblages constitute the earliest known evidence of stone technology. They

Handaxes and Biface Technology, Fig. 1 Acheulean handaxes from Middle Pleistocene Britain. Scale bars are in 10 mm increments. (Photos: A. Brumm; the artifacts are in the collections of the British Museum; used with permission)

typically contain few if any standardized artifact forms and are dominated by unretouched flakes and a limited range of relatively amorphous core types (i.e., choppers, discoids, core scrapers, and polyhedrons). Oldowan artifacts were made from almost any locally available raw materials, regardless of quality, and making them required little advanced planning and minimal investments of time and energy.

In light of this, it is often contended that the appearance of handaxes in the archaeological record reflects a major leap forward in hominin cognitive abilities, in particular, the emergence of the human capacity to impose preconceived forms on the environment – a possible precursor to language (Wynn and McGrew 1989; Wynn 1995). The intuitive impression that handaxes are over-engineered for functional purposes has led some to conclude that they reflect an incipient understanding of geometry and mathematics, perhaps even a sense of the aesthetic.

Recent findings from Ethiopia indicate the persistence of handaxe technology, in essentially unchanged form, until as recently as ~100 thousand years ago (Lycett and Gowlett 2008). This extraordinarily long time span implies that handaxes were associated with multiple hominin species, including *Homo erectus/ergaster*, *Homo heidelbergensis*, and early *Homo sapiens*.

The vast time-space distribution of the Acheulean has led some scholars to call it the most widespread culture in human history. However, others have questioned the extent to which handaxe technology represents a real tradition. As Clark and Riel-Salvatore (2006: 37) point out, for instance:

> . . .there is simply no behavioral or cultural mechanism by which a hypothetical tool-making tradition could be transmitted over hundreds of thousands of years and millions of square miles. So, whatever the Acheulean is, it is manifestly not a "culture" or "tradition."

Some archaeologists have also challenged the long-held theory that handaxes were products of an intended design ("finished artifacts"), a point returned to below.

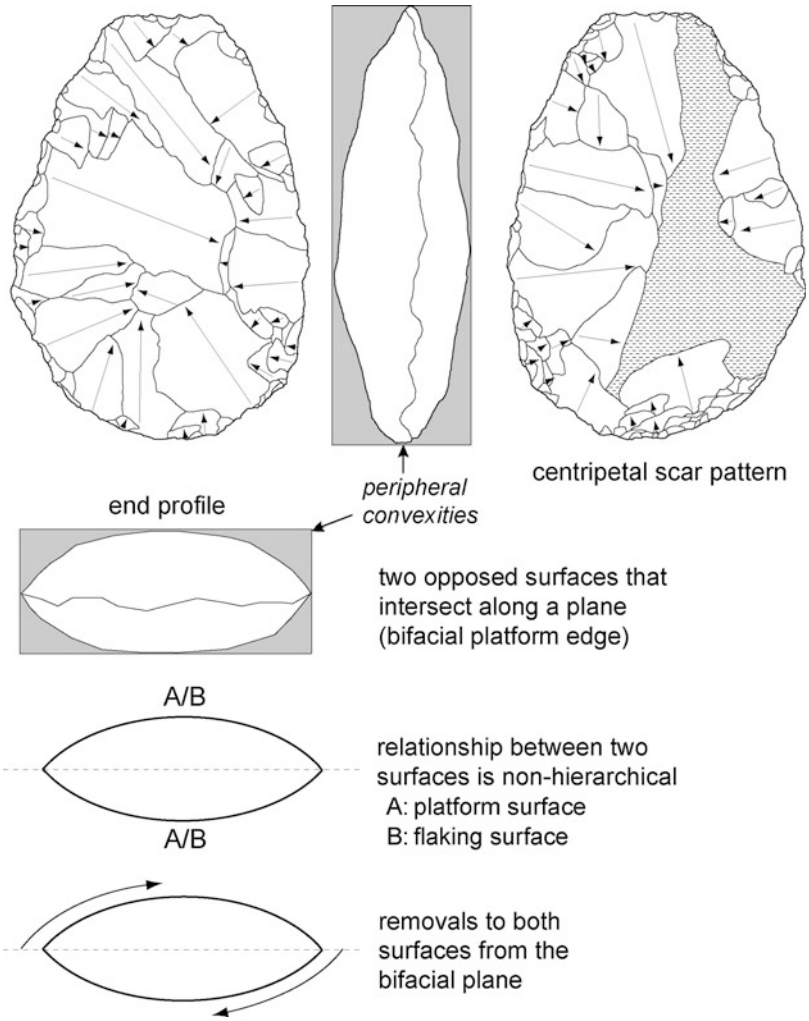

Handaxes and Biface Technology, Fig. 2 Schematic model showing the technological features of a handaxe. Flakes were typically removed from around the bifacial platform edges and towards the center of each face, creating a generally radial or sub-radial (i.e., centripetal) scar pattern (modeled after concepts in Boëda 1995)

Definition

Handaxes are technically bifaces. A biface is any piece of stone that has been worked by a toolmaker on two opposing surfaces (i.e., *bifacially*) (Fig. 2), while a bifacial technology is the culturally embedded suite of technical practices and know-how employed by the toolmaker to do so. Bifaces and bifacial technology are ubiquitous in the prehistoric and recent archaeological records. They are present in the world's oldest known stone tool assemblages, from the African Oldowan. There are also many ethnographic accounts of bifacial tool making by modern human groups.

Most Acheulean assemblages contain varying proportions of bifacially flaked stones. Paleolithic archaeologists classify these bifaces into two distinct categories: bifacial handaxes and bifacial cores. The conventional view of Acheulean bifacial cores is that hominins set out to remove sharp-edged flakes from them, which were used as tools. With Acheulean handaxes, on the other hand, bifacial knapping was done with the conscious aim of shaping the biface itself into a tool.

Accordingly, with Acheulean core reduction, it is assumed that only the flakes removed from a core were important to hominins – the resultant core was discarded as waste. With handaxe reduction, however, it was the *final form* of the biface

that was of greatest interest to hominins – the flakes produced in the process of handaxe manufacture were merely unwanted rubbish. The fundamental difference between core and handaxe reduction in Acheulean technology, therefore, according to received wisdom, is that cores were the incidental *by*-products of bifacial reduction, whereas handaxes were the desired *end* products of this process.

Most present-day archaeologists define Acheulean handaxes using a fairly polythetic set of characteristics. "Typical" handaxes comprise large (>10 cm in length) bifaces with a generally pointed or ovate plan form, acute and often finely retouched cutting edges extending around part or all of the outer perimeter, slender tips opposite thick, globular butts, and, most characteristically, approximate bilateral symmetry around the long axis. While not all handaxes are symmetrical, and indeed, asymmetrical specimens are the norm in most assemblages, some display high degrees of bilateral symmetry in plan outline, cross section, and profile (but see below).

Allometric scaling is also seen as a defining characteristic of handaxes. Several studies have shown that Acheulean bifaces occur in similar size ranges across time and space, indicating standardization. Gowlett (2009), for example, uses the analogy of modern screwdrivers, which show similar uniformity in dimensions. He suggests that some handaxes, like screwdrivers, were intentionally worked into specific sizes and shapes for use for particular purposes.

Handaxes were manufactured on cobbles, nodules, or large flake blanks, the latter in some cases being struck from specially prepared cores. The earliest handaxe assemblages were made using hard-hammer percussors, resulting in deep flake scars, sinuous bifacial platform edges, and a generally "crude" appearance. Some Middle Pleistocene handaxes, however, appear to have been made using soft-hammer percussors of antler, bone, or wood. The use of soft-hammer percussion is thought to imply a concern with controlling the reduction of three-dimensional volumes by removing thin, expanding flakes, resulting in shallower scars across the surfaces of the tools, permitting more careful shaping and refinement of the overall form.

It has often been argued that handaxe reduction – from initial raw material procurement through to the various sequential phases of manufacture – was complex and multistaged, implying careful planning ahead in the production of the tools. Gowlett (2009), for example, argues for flexible planning in handaxe production routines. He maintains that the fact that the same product (a handaxe) could be made from three distinct blank types (nodules, flakes, and cobbles) provides strong evidence that the artifacts were deliberately designed.

Cleavers and picks are other kinds of large Acheulean bifacial tools that are morphologically distinct from handaxes but often tacitly subsumed within this category. Cleavers are bifaces, usually made on large flakes, with an unretouched distal edge oriented in a perpendicular or slightly oblique direction to the long axis of the blank. Picks comprise large, thick, retouched tools with high-backed plano-convex or triangular cross sections and robust pointed tips.

It is generally assumed that handaxes were used for a wide range of purposes – indeed, they have been called the "Swiss Army knife of the Stone Age." Although experimental studies emphasize their role as butchery tools, many different functions have been inferred, ranging from missiles lobbed at animals to objects of sexual display (Kohn and Mithen 1999). Few residue or microwear analyses of archaeological specimens have produced unambiguous evidence of handaxe function, however.

Whatever Acheulean handaxes were used for, it is unlikely that they functioned as axe-like implements. The term is so deeply embedded in Paleolithic studies, however, that its continued use is largely a matter of convenience, although many prefer alternative appellations like large cutting tool (LCT) or biface.

By definition, "true" bifacial handaxes only occur in the Lower and Middle Paleolithic periods. It is important to emphasize, however, that there are no attributes of Acheulean bifaces that are chronologically unique. Virtually any

technology in which tools or cores were produced by bifacial flaking could result in the discard of objects resembling handaxes (Brumm and Moore 2012). Indeed, there is a long history of scholars mistakenly attributing bifaces produced by modern humans, such as "Neolithic" bifacial axe blanks, to the Acheulean (see, e.g., Johansen and Stapert 1995). Despite frequent assumptions to the contrary, therefore, bifaces found in undated surface contexts cannot be used as a reliable source of dating evidence, for example, to designate a surface site with handaxe-like bifaces as Acheulean.

Key Issues

As noted above, the standard interpretation of Acheulean handaxes holds that, prior to the appearance of these objects, hominins did not shape stones into preconceived forms. One of the most pressing issues in our understanding of handaxe technology, therefore, is a simple but fundamental question: were handaxes really intentionally shaped tools? That is, were handaxes made according to fixed designs that guided the planned actions of toolmakers, or is the appearance of complexity in these artifacts merely fortuitous? The standard story relies on the accuracy of the assumption that the forms of handaxes were, indeed, deliberately imposed, so this is clearly an important problem.

Iain Davidson argues that it is impossible to know what was going on in the minds of hominins when they made stone artifacts, so it is a fallacy for us to presume to know which artifacts were intended for use as *tools* and which were not. Indeed, Davidson (2002) suggests that handaxe shapes could well have resulted from the same underlying processes that produced bifacial cores. Contrary to popular belief, the target of hominin reduction may have been the *flakes* removed from handaxes, which were useful as tools, rather than the handaxes themselves. In other words, handaxes might have been leftover by-products of flake manufacture (i.e., *cores*), and handaxe symmetry may be merely an "accidental" outcome of the flake removal process.

Clark and Riel-Salvatore have offered a similar interpretation of handaxes as cores: "If such is the case, the formal convergence that is so much a part of lithic reduction everywhere would have produced [handaxes] simply as an accidental consequence of centripetal flaking of large, relatively flat, oval cobbles and flakes" (Clark and Riel-Salvatore 2006: 38). Shea further supports this viewpoint, stressing the extent to which preconceptions about handaxes bias our understanding of them:

> The "handaxes as cores" hypothesis may seem implausible if one's impression of these artifacts is shaped largely from illustrations in the archaeological literature. These illustrations are biased in favor of large, thin, symmetrical and carefully flaked artifacts. However, such "trophy specimens" are almost always a minority of the bifacial core tools in any substantial Acheulean assemblage. Most such tools are short, thick, asymmetrical and with exactly the kinds of deep and invasive flake scars that result from flake production (Shea 2006: 221).

Iain Davidson takes this argument a good deal further:

> Hand-axes look alike because archaeologists select for analysis objects that look like hand-axes. There are objects in Acheulean assemblages that have some of the characteristics of hand-axes, but not all. These are excluded from comparison, reinforcing some of the appearance of standardization (Davidson 2002: 193).

Shannon McPherron has put forward an alternative, and somewhat less extreme, hypothesis. He believes that, even if handaxes were tools, rather than cores, morphological patterning in the artifacts need not imply cognitive intent. Handaxes, McPherron (2000) points out, were often "resharpened" by successive generations of bifacial removals from around the periphery. This was done in order to get maximum use out of the tools. The process of rejuvenating tool edges in this way reduced the mass of a handaxe and modified its overall form.

If such was the case, it is possible to imagine how an individual handaxe could have varied in shape at different points in its "life history," as a result of resharpening. Indeed, McPherron has argued that certain recurring handaxe shapes

routinely interpreted by archaeologists as purposefully designed tool forms – namely, ovate and pointed handaxes – might be arbitrary points along a morphological continuum. In fact, his analyses imply that ovate handaxes might simply have been pointed handaxes that were intensively resharpened.

This leaves open the possibility that the unresharpened forms of handaxes reflected elements of conscious design. The chief implication is that morphological complexity in handaxes, including handaxe symmetry, may be largely due to chance, rather than the deliberate intent of hominins to impose these forms on stones.

The idea that Acheulean handaxes were simply worn-out cores is difficult – if not impossible – to verify empirically, but no less so than the more orthodox view that handaxes were deliberately shaped tools. Proof of either notion requires observations of hominin behavior that the archaeological record, so far, cannot provide.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
- ▶ *Homo heidelbergensis*
- ▶ Human Evolution: Theory and Progress
- ▶ Lithic Technology, Paleolithic
- ▶ Movius Line
- ▶ Oldowan Industrial Complex

References

Boëda, E. 1995. Levallois: A volumetric construction, methods, a technique. In *The definition and interpretation of Levallois technology*, ed. H.L. Dibble and O. Bar-Yosef, 41–68. Madison: Prehistory Press.

Brumm, A., and M.W. Moore. 2012. Biface distributions and the Movius Line: A Southeast Asian perspective. *Australian Archaeology* 74: 32–46.

Clark, G.A., and J. Riel-Salvatore. 2006. Observations on systematics in Paleolithic archaeology. In *Transitions before the transition: Evolution and stability in the Middle Paleolithic and Middle Stone Age*, ed. E. Hovers and S.L. Kuhn, 29–56. New York: Springer.

Davidson, I. 2002. The finished artefact fallacy: Acheulean hand-axes and language origins. In *The transition to language*, ed. A. Wray, 180–203. Oxford: Oxford University Press.

Debénath, A., and H.L. Dibble. 1994. *Handbook of Paleolithic typology, volume 1: Lower and Middle Paleolithic of Europe*. Philadelphia: University Museum, University of Pennsylvania.

Evans, J. 1872. *The ancient stone implements, weapons and ornaments of Great Britain*. London: Longmans, Green, Reader and Dyer.

Frere, J. 1800. Account of flint weapons discovered at Hoxne in Suffolk. *Archaeologia* 13: 204–205.

Gowlett, J.A.J. 2009. Artefacts of apes, humans, and others: Towards comparative assessment and analysis. *Journal of Human Evolution* 57: 401–410.

Johansen, L., and D. Stapert. 1995. Handaxes from Denmark: Neandertal tools or 'vicious flints'? *Palaeohistoria* 37: 1–22.

Kohn, M., and S. Mithen. 1999. Handaxes: Products of sexual selection? *Antiquity* 73: 518–526.

Lycett, S.J., and J.A. Gowlett. 2008. On questions surrounding the Acheulean "tradition". *World Archaeology* 40 (3): 295–315.

McPherron, S.P. 2000. Handaxes as a measure of the mental capabilities of early hominids. *Journal of Archaeological Science* 27: 655–663.

Prestwich, J. 1860. On the occurrence of flint implements, associated with the remains of animals of extinct species in beds of a late geological period, in France at Amiens and Abbeville, and in England at Hoxne. *Philosophical Transactions of the Royal Society of London* 150: 277–317.

Shea, J.J. 2006. Lithic archaeology, or, what stone tools can (and can't) tell us about early hominin diets. In *Evolution of the human diet: The known, the unknown, and the unknowable*, ed. P.S. Ungar, 212–229. Cary: Oxford University Press.

Wynn, T. 1995. Handaxe enigmas. *World Archaeology* 27 (1): 10–24.

Wynn, T., and W.C. McGrew. 1989. An ape's view of the Oldowan. *Man* 24: 383–398.

Handsman, Russell G.

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Russell G. Handsman is an archaeologist working in the northeastern United States. After receiving his PhD from American University in 1977, he worked for a series of organizations, including the

American Indian Archaeological Institute, the University of Rhode Island Program in Public Archaeology, the EcoTarium Center for Environmental Exploration, and the Mashantucket Pequot Museum and Research Center (MPMRC). His research interests range from the origins of capitalism in New England (Handsman 1981) to the archaeological study of ancestral homelands and their long-term histories (Handsman 2008a). While most of his research has focused on New England, he has also contributed to archaeological thought in other areas (e.g., Handsman 1991a, 2015a). Handsman often takes a Marxist approach, applied to topics such as critical archaeology, gender studies, and the tensions between document-based knowledge of the past and archaeology. This can be seen in his work on issues such as race (2015b, 2008b). He has called for an archaeology of "Our Times", the years between 1900 and 1935, in order to challenge conventional history (1995), and has used documentary sources to develop an archaeological approach to the study of Wampanoag Indian whaling and maritime communities (2011). Most recently, he has focused on the issue of Native American "survivance," a concept developed in the social sciences to emphasize the creative participation of indigenous peoples in the survival of their cultures in colonial situations (e.g., 2013). Overall, what has united Handsman's research is an interest in challenging uncritical assumptions about the past and in documenting the resistance and survival of groups whose histories are often ignored.

Major Accomplishments

In addition to his research interests, Handsman has always maintained a commitment to considering the place of archaeology in everyday society. This includes support of reburial, the rights of indigenous people, and the involvement of descendant communities in archaeological research. While at the University of Rhode Island, native people were included in designing research projects and employed in field work. At the MPMRC, Handsman carried out a cooperative project between the center and the Zuni Tribal Nation and also explored the use of technology in encouraging museum visitors to go beyond the first exhibits encountered in museum spaces. He also conducted a hands-on archaeological field project incorporating local 6th grade students in New London, CT. This combination of innovative archaeological ideas, meticulous and hypothesis-based research, and a commitment to the larger community makes Handsman one of the most interesting archaeologists currently working in historical archaeology.

References

Handsman, R.G. 1981. Early capitalism and the center village of Canaan, Connecticut: A study of transformations and separations. *Artifacts* 9: 1–20.

Handsman, R.G. 1991a. Whose art was found at Lepenski Vir? Gender relations and power in archaeology. In *Engendering archaeology. Women and prehistory*, ed. J.-M. Gero and M.W. Conkey, 329–365. Oxford: Basil Blackwell.

Handsman, R.G. 1995. The still-hidden histories of color and class. Public archaeology and the depot village of West Kingston, Rhode Island. In *Paper presented at the Conference on New England Archaeology*, April 1995.

Handsman, R.G. 2008a. Landscapes of memory in Wampanoag country. In *Archaeologies of placemaking*, ed. P.-E. Rubertone, 161–193. Walnut Creek: Left Coast Press.

Handsman, R.G. 2008b. *Race matters in Indian New England*. Mashantucket: Mashantucket Pequot Museum and Research Center.

Handsman, R.G. 2011. Some middle-range theory for archaeological studies of Wampanoag Indian whaling. In *Paper presented at the Conference on New England Archaeology*, 28 May 2011.

Handsman, R.G. 2013. Landscape ecology, social exchange, and an archaeology of Mashantucket Pequot lives, A.D. 1715–1760. In *The Inescapable Significance of Cultural Ecology and Environmental Sciences in Archaeology: Papers in Honor of William M. Gardner*, ed. C. Nash and H. Wholey, *Journal of Middle Atlantic Archaeology* 29: 159–170.

Handsman, R.G. 2015a. Representation: Museums and publications. In *The international encyclopedia of human sexuality*, ed. P. Whelehan and A. Bolin, 1078–1081. Wiley.

Handsman, R.G. 2015b. Race-based differences and historical archaeologies in Indian New England. In *The archaeology of race in the Northeast*, ed. C.N. Matthews and A. Manfra McGovern, 232–251. Gainesville: University Press of Florida and the Society for Historical Archaeology.

Further Reading

Handsman, R.G. 1983. Historical archaeology and capitalism, subscriptions and separations: The production of individualism. *North American Archaeologist* 4: 63–79.

Handsman, R.G. 1987. Material things and social relations: Toward an archaeology of "anti- structures". *Conference on New England Archaeology Newsletter* 16: 9–19.

Handsman, R.G. 1991b. Illuminating history's silences in the 'Pioneer Valley'. *Artifacts* 19: 14–15.

Handsman, R.G., and F. Harrington. 1994. A place for archaeology, an archaeology of place. *Conference on New England Archaeology Newsletter* 13: 1–8.

Handsman, R.G., and M.P. Leone. 1989. Living history and critical archaeology in the reconstruction of the past. In *Critical traditions in contemporary archaeology*, ed. V. Pinsky and A. Wylie, 117–135. Cambridge, MA: Cambridge University Press.

Handsman, R.G., and T.L. Richmond. 2011. Confronting colonialism: The Mahican and Schaghticoke peoples and us. In *Contemporary archaeology in theory. The new pragmatism*, ed. R.W. Preucel and S.A. Mrozowiski, 470–490. Malden: Wiley Blackwell.

Kasper, K., and R.G. Handsman. 2015. Survivance stories, co-creation, and a participatory model at the Mashantucket Pequot Museum and Research Center. *Advances in Archaeological Practice* 3 (3): 198–207. (/content/saa/aap).

Hanse Archaeology

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Introduction

The Hanseatic League was a medieval organization of mainly North German merchants aiming to represent their common interests and to secure their trading operations abroad. To this end, traders got together to trade via networks from the mid-twelfth to the seventeenth centuries. However, they were not a uniform group of German merchants but rather an association of traders from several different areas, representing trading towns in various countries and arranged in several different quarters. Over the course of the Late Middle Ages, the Hanseatic League became the largest economic power in northern Europe. It was also highly significant from a political, social, and cultural point of view, both in its core area and its peripheral regions.

The Hanse is no longer a mere domain of (economic) history. For more than 60 years, it has also been subject to archaeological research. The scope of the so-called Hanse Archaeology (or Hanseatic Archaeology) is now as international as the Hanseatic League itself was in its days.

Definition

To put it simply, Hanse Archaeology investigates the history of the Hanseatic League with archaeological methods. With regard to its content, Hanse Archaeology has both a narrow focus, concerned mainly with analysis of the intercultural exchange between the Hanseatic merchants and their agents (e.g., seamen, craftsmen) and their customers abroad, and a wider focus, which studies the social, economic, and cultural impact these contacts had. Hanse Archaeology thus has a different emphasis from Hanseatic history, which has traditionally been concerned mainly with questions of economic and political history. The reasons for this dichotomy lie largely with the different sources. The written records that have survived deal mainly with various aspects of the movement of goods, thus providing more detailed insight into this area, while the archaeological sources shed more light on facets of everyday life, which are only rarely, if at all, mentioned in the written records.

Thanks to the equal treatment and inclusion of written and pictorial sources, Hanse Archaeology can be considered a case study in the field of Historical Archaeology (Gaimster 2005: 408). It studies artifacts; biofacts; architectural remains in towns and rural areas, coastlines, and their hinterlands; port facilities; ships; and commercial routes, thus also forming an area of Maritime Archaeology.

Geographically, Hanse Archaeology operates over a very wide region, both in the core areas of the Hanse, i.e., the major Hanseatic towns in present-day northern Germany (Lübeck, Wismar, Stralsund, Bremen, Hamburg, etc.), and in the many subsidiaries (e.g., Bergen in Norway, Turku in Finland, Gdansk in Poland) and their surrounding areas.

The concept of Hanse Archaeology originated with David Gaimster (1999) and his research on the Hanseatic League throughout the Baltic. However, archaeologists were studying the Hanse much earlier, without identifying it explicitly as a distinct field of research. All the medieval or early modern excavations which have been regularly carried out, at least since the 1960s, in the core towns of the Hanse such as Lübeck, Bremen, or Hamburg, can also be associated with Hanse Archaeology in its wider scope. Moreover, archaeological methods have long been used to study the history of the Hanse in northern European towns like Bergen, which held great importance for the Hanse.

It is important to point out a linguistic detail: the German language differentiates between the adjectives "hansisch" and "hanseatisch." While "hansisch" denotes everything associated with the medieval and early modern Hanse, "hanseatisch" is a more recently coined term referring solely to the three towns of Lübeck, Bremen, and Hamburg, still called Hanse towns to this day, and their inhabitants. The English language does not make this distinction, and the adjective "Hanseatic" can also be used to denote the medieval and early modern Hanse.

Hanse Archaeology, Fig. 1 A sixteenth-century stove tile showing apostle Paulus, found at the episcopal residence at Kirkjubøur, Faroe Islands. The tile was produced at Lübeck. (Photograph Natascha Mehler)

Methods

Today, Hanse Archaeology operates in a very interdisciplinary manner. The methods used vary greatly, however, from project to project and depend ultimately on the funding available. Besides the archaeological sources, written records are another important source category, tying Hanse Archaeology closely in to the fields of history and economic history. Written records are an ambiguous data source, however. Customs records or toll registers tell of goods exported and imported, but they do not mention all the items shipped. Pottery, for example, is hardly ever listed as ship's cargo, though it was widely exported from the German coastal cities to the north and into the Baltic and is found in many excavations (Fig. 1). Many written documents are concerned with political issues or disputes between traders and the authorities. Everyday or personal matters, on the other hand, are very rarely mentioned. The archaeological record is difficult too. Often, sites are only partially excavated and the interpretation of the artifacts discovered is difficult. Also very important are pictorial sources, such as portraits of merchants or images of ships or ports identified by name, or simply material culture depicted in contemporary still lives (Fig. 2). Sixteenth and seventeenth century maps help identify small Hanseatic trading bases, as do place names and even oral history, e.g., farmers talking about ruins on land which have been in their family for generations. Best results are achieved when written, archaeological and pictorial sources are discussed and interpreted together. In cases where an archaeological excavation takes place, all the usual archaeological and scientific methods are applied.

Hanse Archaeology, Fig. 2 The Hanse merchant Georg Gisze (1497–1562), painted in 1532 by Hans Holbein the Younger. Georg Gisze was a merchant from Gdansk, Poland, and is shown here in his office at the Steelyard in London. Gisze imported fish, probably from Iceland, using Hamburg vessels; having sold the fish in London, he brought cloth back to Hamburg. On the table sits his official stamp, consisting of a bone handle and a metal seal matrix. (From Mehler 2009, Fig. 7)

The latter include, in particular, archaeobotany, archaeozoology, and paleoentomology, as well as dating methods such as radiocarbon dating or dendrochronology. The latter is particularly important in determining the age and even the origins of timbers recovered from shipwrecks. Hanseatic wrecks and their cargoes are investigated and recorded applying the usual methods of underwater archaeology, and some are actually salvaged.

Historical Background

The term "Hanse" has been known since the twelfth century. It originated from the Old High German word "hansa," meaning roughly "band" or "community," and denotes both a group of traveling merchants and the charge which was due for membership of such a community. In a third meaning, the term "Hanse" additionally denotes the legal right to carry out communal commercial enterprise (Hammel-Kiesow 2004: 27).

The Hanse came into being in the mid-twelfth century. There is no exact date or event linked with its formation. However, the rise of Lübeck in the mid-twelfth century, giving access to the Baltic Sea, is considered to have been one of the decisive elements in the formation process, since it meant that Western Europe could now trade with Russia, by navigating the Baltic and the rivers Dnjepr and Volga, and reach as far as the Caspian Sea (Dollinger 1970: 19; Fehring 1989: 61; Hammel-Kiesow 2004: 21–22).

This early organization of merchants, which can be traced back to 1160, is called the Merchants' Hanse (*Kaufmannshanse*). An important role in its inception was played by the Gotland Community (*Gotländische Genossenschaft*), a society of merchants which had formed in Lübeck. At that time the island of Gotland acted as the most important commercial hub. While trade with the Baltic region and Russia had previously been dominated by the Scandinavians, the Hanse merchants now took over the leadership (Dollinger 1970: 24–26; Hammel-Kiesow 2004: 30; Wubs-Mrozewicz 2013: 4–14).

Several pan-European political and social changes in the mid-thirteenth century resulted in the Merchants' Hanse evolving into the Hanse of the Towns (*Städtehanse*). During the Interregnum (1245–1273) in the Holy Roman Empire, the imperial protection which had previously been enjoyed by the merchants was lost. They found new protection in the towns, which now ensured the safety of trading routes and the maintenance of trading privileges. The towns formed alliances and organized so-called *Tagfahrten* or *Hansetage*, Hanseatic Diets, where envoys from the towns assembled in order to regulate their trading interests. All the resolutions were recorded in the so-called *Hanserezesse* (Hanse legislative records). The first Hanseatic Diet at which representatives of all the Hanse towns met took place in 1356. The Hanse of the Towns lasted from around 1250 to the early fifteenth century, and this period is considered to have been the heyday of the Hanse (Dollinger 1970: 45–85, 92–97;

Hammel-Kiesow 2004: 71–73; Wubs-Mrozewicz 2013: 4–14).

With the discovery of the New World, the Hanse increasingly lost its importance. Trade had shifted, and in addition powerful competitors began to enter the market. Moreover, the towns were now increasingly forced to subordinate their interests to the ruling princes. Sixteenth century attempts at reorganizing the Hanse failed. By the early seventeenth century, the Hanse was a union only in name. The final demise eventually came with the Thirty Years' War (1618–1648). In 1669, Lübeck held the last Hanseatic Diet, with the participation, however, of only a small number of towns (Dollinger 1970: 281–370; Hammel-Kiesow 2004: 97–115).

Geographically, the Hanse's main area of activity was enormous. The core area comprised the towns of the so-called Wendish Quarter, including Lübeck, Wismar, Rostock, Stralsund and Hamburg (all in Germany), and Visby (in present-day Sweden). Trade was pursued principally in the Baltic region and took in important towns of the so-called Baltic Quarter, such as Gdansk (Poland), Riga (Latvia), or Tallinn (Estonia). In the west, towns of the Westphalian Quarter such as Deventer and Groningen (both in the Netherlands) were of great importance (Dollinger 1970: map 3).

A major aspect of the Hanseatic League was its role as the predominant agent for the transport of goods from east to west, south to north, and north to west in northern Europe during the late medieval and early post-medieval periods. The weights and measures used throughout the Hanseatic trade region, while not identical, were at least sufficiently compatible to allow business to run smoothly. However, direct trade between the points of supply and the final destinations of goods was rare. Instead, goods were usually transported in several stages within the Hanseatic network (Dollinger 1970: 210–250), a factor which makes interpreting the distribution of archaeological artifacts somewhat problematic.

Long-distance trade was largely conducted via four so-called *Hanseatic kontors*, trading enclaves abroad, within which the merchants had formed associations with the aim of advancing their interests. Moreover, kontors were also legal communities endowed with privileges. The merchants and their retinues usually lived in these kontors all year round. The easternmost and oldest Hanseatic kontor was the so-called *Peterhof* in Novgorod, Russia, a fenced area within the city which had come into being in the mid-thirteenth century. St. Peter's Church stood at its center and was surrounded by residential buildings, shops and storage sheds, a bakery, a brewery, an infirmary, and a jail. The kontor in Bruges, Belgium, was the most important Hanseatic kontor in economic terms. It had been founded around the mid-fourteenth century. A short while later, the so-called *Tyske Bryggen*, the kontor in Bergen, Norway, was founded. In its heyday, it comprised around 30 farmsteads on the northern side of the Vågen Bay. It is estimated that some 2000–3000 Germans lived in Bergen during the summer months in the fifteenth and sixteenth centuries. However, Bryggen was not an isolated German ghetto but operated in vibrant interaction with its surroundings. The so-called *Steelyard* in London, the final kontor, was a fenced-in area on the northern bank of the river Thames which existed from 1475 onward (Dollinger 1970: 85–116; Hammel-Kiesow 2004: 61–64).

History of Research

Hanse Archaeology as a discipline is considerably older than its name. Two basic fields of research can be distinguished: the inward focus, which deals with the core region of the Hanse, and the outward focus, which looks at the contact areas abroad that were heavily influenced by the Hanse. Urban archaeology has long been pursued in many towns throughout the Hanseatic core region, essentially making a contribution to Hanse research, without, however, actually stating this or asking specific questions about the history of the Hanse. Strictly speaking, almost every inner-city excavation carried out since the Second World War in, for instance, Lübeck or Gdansk, which has uncovered late medieval or early modern remains, has provided information on the Hanse. After all, at that period many inhabitants of these towns were involved in the operation of

the Hanse in some capacity or other. Besides the merchants, this included, first and foremost, the numerous craftsmen, who made the trade in goods possible in the first place. At the end of the fourteenth century, it is estimated that approximately half of the population of Lübeck, to give just one example, were pursuing occupations connected to the harbor and shipping (Fritze 1998: 113). During the high and late medieval periods, Lübeck had grown considerably, and this development went hand in hand with the emergence of a merchant class in the town. Economic and demographic growth in Lübeck is reflected by the repeated subdivision of large plots and the change in architectural style from wooden constructions to brick-built houses with several stories (Fehring 1989). In the case of Lübeck, the results of these archaeological investigations have been published in the series *Lübecker Schriften zur Archäologie und Kulturgeschichte* since 1978. Moreover, the town hosts regular conferences on urban archaeology in European Hanseatic towns, whose proceedings have been published in the series *Lübecker Kolloquium zur Stadtarchäologie im Hanseraum* since 1997.

Archaeological research into the Hanseatic kontors abroad also has a long-standing tradition. Since 1932, excavations have regularly been taking place in Novgorod, uncovering an impressive number of excellently preserved timber finds. The results have been presented to European readers in the series *The Archaeology of Medieval Novgorod* (Brisbane and Gaimster 2001). Comprehensive excavations have also been carried out in the area of the German Brygge in Bergen. After a large conflagration in 1955, the remains of several timber buildings which had made up the Hanseatic kontor were excavated over the course of 15 years. The buildings were both post and log constructions and had storage areas on the ground floors, while the living quarters were located on the upper stories. The excavations were also an important milestone in the evolution of a European Archaeology of the Middle Ages. Besides the architectural remains, the emphasis of the published post-excavation reports has to date focused on find categories such as pottery, shoes, textile remains, and fishing equipment. The results of these, and of new excavations carried out more recently, have been published in *The Bryggen Papers, Main Series* and *The Bryggen Papers, Supplementary Series* since 1985.

In contrast, significantly fewer studies of Hanse Archaeology have so far been produced in Bruges or London. An example from London was the excavation carried out in the grounds of the Steelyard complex (1988–1989). It revealed stone walls which had been preserved up to a height of 1.4 m and had belonged to the Guildhall of the Cologne merchants (Keene 1989) (see Fig. 2).

In the 1990s, archaeological research into the Hanse began to be carried out in the Baltic coastal states. Here, too, the main emphasis has been on the study of material culture, primarily pottery. A good example is the research into the Hanseatic pottery trade in the Baltic. Western European ceramic products, especially tableware and interior fittings for buildings, were imported, adapted, and even imitated in order to emulate the Hanseatic urban lifestyle (Gaimster 1999, 2005). Later, in the early 2000s, archaeological research into the Hanse also started to include the North Atlantic islands such as Iceland, Faroe and Shetland and thus moved into the margins of the Hanseatic trade area (Mehler 2009; Mehler and Gardiner 2013).

Key Issues/Current Debates

Archaeological Hanseatic research, including both fields of research mentioned above, concentrated for a long time on the core region of the Hanse and on the Baltic trade. In this it followed the lead of Hanseatic historical research, which has traditionally concentrated on this area. While until the 1990s the main focus of archaeological research was analysis of material culture, more recent research has increasingly studied sociocultural questions. This line of approach was initiated by David Gaimster's work, which for the first time discussed the impact of the imported goods and the ongoing presence of foreign merchants on local societies, how the Hanseatic and the local cultures approached each other, and whether

assimilation occurred on the part of the local population, among the Hanseatic merchants, or perhaps from both sides (e.g., Gaimster 1999, 2005). He concluded that there was a distinct Hanseatic culture, which manifested itself mainly in the lifestyle of the urban bourgeoisie. Tangible evidence for this culture is gleaned from archaeological analysis of artifacts like stove tiles or tableware such as serving and eating vessels, which were often made in the Rhineland or northern Germany and widely exported throughout the Hanseatic trading area. When a purchaser at a Finnish market bought, for example, an item of Siegburg stoneware, he was expressing a wish to share the lifestyle that his purchase represented (Gaimster 1999, 2005). This line of approach follows the general trend of no longer viewing artifacts as mere indicators of trade but as carriers of cultural and ideological content.

Gaimster's concept of an explicitly Hanseatic culture and the methods he uses to identify such a culture have since been discussed, as has his perspective, which views the evidence largely from a Hanseatic point of view, thus assigning too passive a role to the local societies within the process of cultural exchange. In recent years, various researchers have questioned whether such a Hanseatic culture really existed, asking how it would be defined if in fact it did exist (e.g., Suhonen 2001; Immonen 2007; Müller 2013), and which archaeological methods would allow us to make such cultural interpretations (Mehler 2009). Müller (2014: 445) has reminded us that – while focusing on researching the Hanseatic cultural impact on certain areas – we should not neglect to take into account processes such as urban transitions of that specific area that existed parallel to those economic and cultural processes stimulated through Hanseatic connections.

Recent studies in the North Atlantic, such as Iceland, Shetland, and the Faroe Islands, investigate the interactions of Hansards with insular societies, thus including the peripheral regions of the Hanseatic area of influence, which were characterized by rural societies rather than urban centers (Mehler 2009). This stands in stark contrast to the investigations of Hanseatic influence on the urban bourgeoisie in the Baltic region, where large numbers of people from what is today Germany had settled in many of the late medieval towns. In Turku in Finland, these made up more than half of the population around 1400 (Immonen 2007) (Fig. 3). Many German

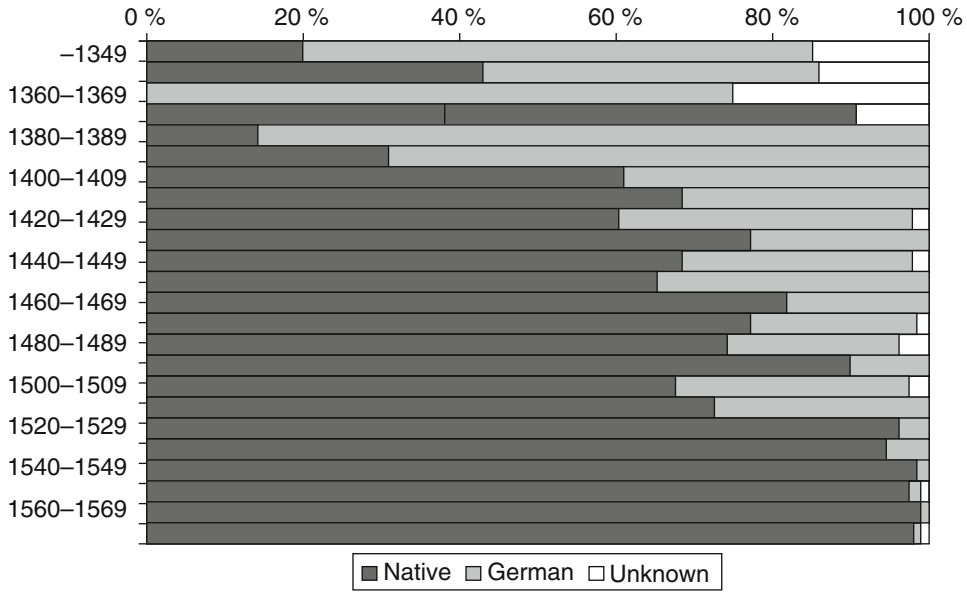

Hanse Archaeology, Fig. 3 Proportion of German burghers in medieval Turku, Finland. (After Immonen 2007, Fig. 1)

Hanse Archaeology, Fig. 4 The so-called Bremen cog, built after 1380, on display at the German Maritime Museum at Bremerhaven. (Photograph Wolfhard Scheer)

merchants and seamen also lived on the islands in the North Atlantic during the summers. However, they did not stay in towns but in small remote trading posts, which often consisted of just one to three buildings and served clients within a radius of up to 50 km (Mehler and Gardiner 2013).

The research in the North Atlantic is connected to that of the European westward expansion, which began in the fifteenth century and subsequently extended to the New World. The enterprises run in these islands, mainly by merchants from Bremen and Hamburg, were under great pressure from competition by Dutch and English merchants, of whom the latter eventually moved their business to the New World and founded colonies. In consequence, archaeological research in this area, as well as the Baltic, has been influenced by postcolonial theory. In both areas the Hanse has been discussed as a proto-colonial force (Immonen 2007: 729; Mehler and Gardiner 2013). With Germany celebrating the 500th reformation anniversary in 2017, the role of the Hanseatic trade and towns for processes of religious identity formation abroad has been investigated. Lutheranism spread to Scandinavia and the Baltic through Northern German towns such as Lübeck and Hamburg. Archaeologists studied the role of ceramic objects such as drinking vessels or stove tiles with protestant imagery, their distribution through Hanseatic networks, and what their use can tell us about their former owners (e.g., Ring 2013). Such aspects of the study of confessionalization keep the debate about the Hanse as a proto-colonial, or even colonial force alive. New approaches have also been pursued in Hanseatic underwater archaeology. Since the 1960s, several examples of ships thought to be cogs, a type of ship which came to be symbolic of the Hanse, have been found. Famous examples include the so-called Bremen cog (Fig. 4), which was built in 1380 and found on the bottom of the river Weser near Bremen, and the Mollö cog, built in c. 1365 and found off the west coast of Sweden. It has since become clear, however, that reconciling the features uncovered with the ship types mentioned in the written records is fraught with difficulties. The written records only provide information about loading capacities and goods rather than details about the construction of the ships (Weski 1999). Many ship finds are now being critically reevaluated. The Mollö cog, for instance, exhibited technical details characteristic of Scandinavian shipbuilding. As more old finds are critically reevaluated, the boundaries between Hanseatic and Scandinavian shipbuilding techniques appear to be progressively dissolving. This is a reflection of a significant exchange of shipbuilding skills throughout northern Europe, which went hand in hand with a considerably

increased international trade in the Late Middle Ages (Crumlin-Pedersen 2000; Zwick 2017).

International Perspectives

The earlier studies within Hanse Archaeology, in particular, were heavily focused on local interpretations. In addition, some countries tended to use Hanse Archaeology as a reflection of nationalistic views of history. In Norway, for instance, Hanseatic archaeological research is only carried out in Bergen, although so-called factories or trading posts also existed in Oslo and Tønsberg, which were also important for the Hanseatic trade.

Inner-city excavation teams in northern Germany and Poland have so far put very little effort into searching for wares imported from the countries of trading partners (e.g., fish) or analyzing the products created by their craftsmen for influences from other countries. It is therefore difficult to gain insight into the potential interaction between the Hanseatic traders and their partners abroad.

Icelandic researchers have to date viewed Hanseatic trade merely as a prelude to the Danish trade monopoly (1602–1786), while the Shetland Islands see their Hanseatic past in a rather positive light, since the takeover of trade by Scotland in the wake of the Act of Union in 1707 plunged Shetland into an economic depression, whereas the Islands had prospered during the Hanseatic period.

For the past 10 years approximately, Hanse Archaeology has attempted to free itself from such nation-centric thinking. Hanseatic trade is now being viewed and interpreted against the background of broader historical movements, and international perspectives are being developed. Moreover, a paradigm shift is becoming noticeable. While in many parts of northern Europe Hanseatic traders and their agents used to be viewed as colonialists, who exploited the native populations, such interpretations are now being criticized for their all-too-simplistic definition of colonialism. At first sight, Hanseatic trade appears to exhibit all the traits of simple colonial relationships between the economic powers of northern Europe. However, the asymmetry of economic power that this seems to suggest is not borne out by the actual relationships between the Germans and their clients abroad. The type of interaction between the Hanseatic merchants and their overseas customers is viewed as proto-colonial (Immonen 2007; Mehler 2009: 89; Mehler and Gardiner 2013). It was this economic interaction in the peripheral regions of Europe that eventually formed the basis of the northern European expansion into the New World. In this sense, Hanse Archaeology may be seen as a northern European contribution toward archaeological colonial research, a core subject of Historical Archaeology.

Future Directions

Hanse Archaeology has clearly evolved in its focus, particularly over the past decades. International and interdisciplinary research cooperation, mainly between archaeologists and historians both from the core region of the Hanse and from the countries with which it traded, has proved indispensable. Although Hanse Archaeology is headed in the right direction in this respect, more attention must nevertheless be paid to the written records. The archaeological results are still too often presented without their historical context. On the other hand, it is essential that Hanse historians also take into account the results of archaeological work, to be included in their discussions and interpretations. Frequently, analyses of archaeological and written sources come to different conclusions, and it is necessary to evaluate all available data (Hammel-Kiesow 2014). Furthermore, art historians have since long investigated fine arts produced in workshops of Hanseatic towns and the cultural and social implications of their trade within Northern Europe (e.g., Petermann et al. 2017). Hanse Archaeology has been slow to engage with such studies but it will do so in the future.

Cross-References

► Colonial Encounters, Archaeology of
► Historical Archaeology

▶ Medieval Archaeology
▶ Ship Archaeology
▶ Underwater Archaeology
▶ Urban Archaeology

References

Brisbane, M., and D. Gaimster, eds. 2001. *Novgorod: The archaeology of a Russian medieval city and its hinterland*, The British Museum Occasional Paper 141. London: British Museum Press.

Crumlin-Pedersen, O. 2000. To be or not to be a cog: The Bremen Cog in perspective. *International Journal of Nautical Archaeology* 29 (2): 230–246.

Dollinger, P. 1970. *The German Hansa*. Stanford: University Press.

Fehring, G.P. 1989. Archaeological evidence from Lübeck for changing material culture and socio-economic conditions from the 13th to the 16th century. *Medieval Archaeology* 33: 60–81.

Fritze, K. 1998. Der Hafen zur Hansezeit als ökonomisch-technisches und soziales Ensemble. *Hansische Studien* 10: 101–114.

Gaimster, D. 1999. The Baltic ceramic market c. 1200–1600: An archaeology of the Hanse. *Fennoscandia Archaeologica* 16: 59–69.

Gaimster, D. 2005. A parallel history: The archaeology of Hanseatic urban culture in the Baltic c. 1200–1600. *World Archaeology* 37 (3): 408–423.

Hammel-Kiesow, R. 2004. *Die Hanse*. 3rd ed. München: C.H. Beck.

Hammel-Kiesow, R. 2014. Der Beitrag der Archäologie zur hansischen Geschichte. In *Lübeck und der Hanseraum. Festschrift für Manfred Gläser*, ed. A. Falk, U. Müller, and M. Schneider, 107–114. Lübeck: Schmidt-Römhild.

Immonen, V. 2007. Defining a culture: The meaning of Hanseatic in medieval Turku. *Antiquity* 81: 720–732.

Keene, D. 1989. New discoveries at the Hanseatic steelyard in London. *Hansische Geschichtsblätter* 107: 15–25.

Mehler, N. 2009. The perception and interpretation of Hanseatic material culture in the North Atlantic: Problems and suggestions. *Journal of the North Atlantic* (1): 89–108.

Mehler, N., and M. Gardiner. 2013. On the verge of colonialism: English and Hanseatic trade in the North Atlantic islands. In *Exploring Atlantic transitions: archaeologies of permanence and transience in new found lands*, Society of Post-Medieval Archaeology Monograph series, ed. P. Pope and S. Lewis-Simpson, 1–14. Woodbridge: Boydell and Brewer.

Müller, U. 2013. Hanse und Archäologie. Vom Konstrukt zur Vielfalt kultureller Praxen. In *Hansegeschichte als Regionalgeschichte*, ed. O. Auge, 133–176. Frankfurt: Peter Lang.

Müller, U. 2014. "Archäologie" + "Kultur" = "Hansekultur"? Überlegungen zu einem Begriff. In *Lübeck und der Hanseraum. Festschrift für Manfred Gläser*, ed. A. Falk, U. Müller, and M. Schneider, 439–452. Lübeck: Schmidt-Römhild.

Petermann, K., A. Rasche, and G. Weilandt, eds. 2017. *Hansische Identitäten*. Petersberg: Michael Imhof Verlag.

Ring, E. 2013. Confessionalization in the domestic sphere during the 16th century: Archaeology and reformation. In *Historical archaeology in Central Europe*, Society of Historical Archaeology, Special Publication No. 10, ed. N. Mehler, 167–183. Rockville: Lulu.

Suhonen, M. 2001. Historiallisen ajan arkeologia – materiaalisia todisteita historiatieteen totuuskille. *SKAS* 1: 3–11.

Weski, T. 1999. Fiktion oder Realität? Anmerkungen zum archäologischen Nachweis spätmittelalterlicher Schiffsbezeichnungen. *Skyllis* 2: 96–106.

Wubs-Mrozewicz, J. 2013. The Hanse in medieval and early modern Europe. An introduction. In *The Hanse in medieval and early modern Europe*, The Northern World Vol. 60, ed. J. Wubs-Mrozewicz and Stuart Jenks, 1–16. Leiden: Brill.

Zwick, D. 2017. A 15th century shipwreck with Scandinavian features from Bremen (Germany). In *Ships and maritime landscapes*, Proceedings of the Thirteenth International Symposium on Boat and Ship Archaeology, Amsterdam 2012, ed. J. Gawronski, A. van Holk, and J. Schokkenbroek, 315–322. Amsterdam: Barkhuis Publishing.

Harappan Burials of Kalibangan

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Introduction

As archetypal as it would seem, burials emerged as a peculiar behavior among living beings and may be traced from the times of the hominids. We are, in today's world, so well accustomed to the idea of burials that we tend to forget the peculiarity and the circumstances which led humans to start burying the dead. With the progress from the phase of prehistory to protohistory and emergence

of the prodigious Harappan Civilization, we perceive burials as a customary practice. Though, existence of other methods of disposal of the dead, alongside burying the deceased, is quite a possibility. As a highly complex society develops, we see innovation and its application in all phases of human activity, the influence of which demonstrates in the tradition of burial of the dead also, which is our prime focus here. The Harappan Civilization, also called the First Urbanization in the cultural history, imbibed in itself a well-structured and disciplined society under the benefaction of central administration, with well-planned cities and houses, flanked with methodically built bathrooms, drainage systems, etc., market places, platforms of social interactions, separately marked townships for the ruling and ruled classes, mercantile activities, trade and craft, textile and other flourishing industries, etc. The cities that were protected with fortification walls and bastions had their burial mounds usually outside the city limits, at a distance, which was of course to avoid contamination of the drinking water supply systems and storage houses. Such was the well-planned administrative and social control of this civilization.

Key Factors/Analysis

In congruence of the above details, it is already known that the complex society at Harappa had understood the importance of hygiene, alongside their respect and reverence for the dead. However, an understanding of the ways and methods applied for burying the dead is to be developed in order to deduce the complexity of cognitive aspects of the society. We come across in almost all the sites of the Harappan Civilization, or the Indus Valley Civilization, as was called earlier, that the mode of disposal of the dead varied in variance of age and gender, and in most cases we sometimes come across elaborate burials dedicated to an individual of the same gender while a simplistic one for the other. An understanding of child burials may also help answering some questions related to the cognitive aspects of the society.

This brings us to explore the basics of the Harappan Civilization, the extent and the causes of its flourishing traits, before we finally understand the site of Kalibangan, through its burials, and how it may enlighten us on the fundamentals of understanding a burial tradition and culture of a typical Harappan site. The identification of the Harappan Civilization in the early twentieth century pushed the beginning of settled life in the Indian subcontinent by 2000 years. Documentation of the three phases of Harappan culture – Early Harappan (3300–2600 BC), Mature Harappan (2600–2000 BC), and Late Harappan (2000–1700 BC) – suggests a gradual cultural process of origin, development, and disintegration. A recent research done by the Woods Hole Oceanographic Institution explains the reasons for the disintegration of this cultural process to be climatic fluctuations, among other possible factors. The Civilization extends from Baluchistan in the northwest to Alamgirpur in the east and Jammu and Kashmir in the north to Daimabad in the south. Mehrgarh was a pre-Harappan neolithic site that saw the dawn of food producing era. The Mature Harappan Civilization was a culmination of Bagor, Hakra, and Kot Diji traditions or "ethnic groups" in the Ghaggar-Hakra valley on the borders of India and Pakistan, and these composed the Early Harappan phase or the formative period of the Harappan Civilization.

Fire altars, Kalibangan, Rajasthan

Kalibangan has provided the six fabrics of Early Harappan pottery that serve as a marker

for identification of ceramics of the regionalization phase of the civilization. The southern half of the citadel had ceremonial platforms and fire altars. Fire altars were also built in public dwellings where a room was apparently earmarked for them. This typical example leads archaeologists to suggest a prime position of the site of Kalibangan in an early chronology of the civilization in the Indian subcontinent. Burials, though, do not seem evident from the early age, from excavations till date, from the site of Kalibangan, specifically, according to the excavator. It is pertinent, therefore, to analyze the traditions, whatever can be drawn from the excavated burials, in order to elucidate the social life of the habitants of Kalibangan, literally meaning *black bangles*, something that we find on the surface of the mound, strewn in large numbers.

The archaeological site of Kalibangan is situated on the left bank of Ghaggar, in the district Sri Ganganagar of Rajasthan. The site revealed around 12 phases of Harappan habitational deposit. This is validated to 4040 ± 105 and 3165 ± 110 by 14c dating, hence marking the Mature Harappan deposits to a timespan from c. 2600 to c. 1900 B.C. Excavations conducted in this site from 1960 to 1969 revealed the Harappan phase cemetery. The burial ground, which is located 300 m west-southwest of the western mound, is a flat hard ground area flooded by the Ghaggar River in the rainy season every year. No evidence of practice of burial has been found in the Early Harappan phase context from this site. It has time and again been confirmed by archaeologists that the burials of Putti Seman, Bedwa, Sanauli, etc. belong to the Late Harappan period, while those of Kalibangan, Rakhigarhi, Tarkhanwala Dera, and Farmana belong to the Mature Harappan period. An overview of the burials of Harappan culture would denote to an area, away from the habitation site; facing any of the definite cardinal directions; besides following specific orientation of the body and body parts, again, in certain fundamental directions, that were different for different regions; well-off female burials, quite similar to most burial sites of the Harappan culture; coffin and brick-masonry burials in certain cases; use of ample number of potteries to emphasize a belief in life after death; etc. Though the mode of disposal of dead in usual Harappan burials forms a precise pattern, Kalibangan provides two other types of burials inclusive of the usual extended burials. They may be categorized as pot burials in circular pits and rectangular or oval pits with pottery deposits. Areas have been demarcated for the different types. The pot burial area is to the north of the extended burial area, whereas the rectangular or oblong pits (which are devoid of skeletal remains) are in the extended burial area. The extended human burials and pot burials were first located and documented by Prof. A.K. Sharma in 1963–1964. The rectangular pot burials were excavated and documented by Shri K.S. Ramachandran.

Location of Kalibangan, Rajasthan, India

Out of the 88 extended burials, 16 groups were plotted by the excavator, which have been then assigned by him to a certain group of people or family. Each of such group contained eight to ten burials. It is a well-established fact that the Harappans planned their burials quite scrupulously. The burials would undeniably be located away from the residential complexes, and in this case (the site of Kalibangan), it is even away from the sacred/religious area that is marked by several fireplaces or altars (KLB-3).

The mortuary practices adopted in the burials of the site follow certain sociological and ritual norms. Pits were dug in proper and uniform

proportions and laid with hard speckled brownish clay. The skeletons were kept in supine position, head toward north, provided with usual grave goods of potteries and antiquities. Apart from the usual pattern followed in Harappan-type burials, deviation from it can also be noticed in some of the burials with deceased people of either unnatural death or rich burials. In a particular case, the body was placed on platters so that it did not touch the ground. A grave contained three skulls and disarticulated bones, which may have belonged to people involved in an accident which had resulted in mutilation of body parts, making it difficult to detect definite individuals.

Now, if we investigate the general distribution of the skeletal remains in the extended burial type area, it can be noticed that the average height of the inhabitants ranges from 1.75 m to 1.55 m in males and from 1.55 m to 1.45 m in females. Most of the skeletons provide an upper age limit of 60 years, generally coming under the middle age category. Though child burial has also been found, the molar of a child in a relic casket in one of the burials was an interesting find. Mostly, the skeletons are laid in a supine position in a north-south orientation, with certain amount of deviation sometimes. Sometimes, the position of hands and legs may have been altered due to certain pathological conditions. These pathological deformities, which can be observed in some of the skeletons, include paralytic conditions, crippling, exostosis, hydrocephalic conditions, etc. Other than that, example of death caused by accident is also confronted with.

A general study of the skeletons, looking into the female, male, and child burials as separated subjects, may bring up new issues, which we shall take up herein. We shall look into the sociocultural aspect for detailing these burials, in order to build a societal framework of these departed Harappans of Kalibangan, as has been termed by the excavator.

Three female burials have been encountered with, numbering Skeleton Nos. 1, 4, and 8. Apart from the former, the other two are in a north-south orientation. Skeleton No. 8 shows deviation from the normal laying pattern of skeleton. Its head is toward south, in a crouched position. It indicates a paralytic case. The deviation from the usual ritual of placing the body north-south with head toward north, that is seen in this case, may be due to the clinical deformity (since it is a paralytic case). The placement of pots is also not definite. Some are placed to the south, near the skull, while the others are toward the feet of the skeleton to the north. Skeleton No. 4 seems to be a much sophisticatedly demonstrated burial. It contains a woman of absolute significance probably, as can be suggested by the substantially rich grave offerings. 20 pots and a copper mirror may point out to the elegance of the female, supposedly, to take care of herself even in the afterlife. Bowls and jars, along with cup-on-stand and beakers, form the majority of the pottery offerings, suggesting the disposal of eatable cutleries along with the burial, good enough to store food and beverage for the afterlife. Skeleton No. 4 was however not so well served as compared to the richly offered Skeleton No. 8, with only regular pots and bowls and a dish-on-stand. Another difference that can be noticed is that the richly adorned burial is that of the adult female, while the scarcely disposed burial is that of the teenager. Skeleton No. 1 too belongs to an adult female. It has variant offerings, ranging from potteries which serve as the ones to offer food and water to antiquities like beads, bangles, and gamesman. Such a custom as to a minimal disposal of burial offerings for an adolescent and lush offerings for adult females, as in this case, might have been practiced. Though, evidences from other sites also need to be investigated to prove this point. If we look at the burials of Rakhigarhi or Farmana, for that matter, the two Harappan sites in proximity that have yielded burials, we can find similar treatment to female burials. Burial No. 1 of RGR 7 of the burial mound in Rakhigarhi, for example, is that of a female, who possessed shell bangles, gold and stone beads, miniature gold armlet reminiscent of a fillet, varying arrangement of pots, etc. Another female burial bears evidence of shell bangles and a necklace of 408 micro steatite beads embedded around her skull and neck, a very first example. All these burials comprise of brick-masonry burial structures, while the adolescent burial encompasses mostly pots and a hopscotch,

but no antiquarian remains or stonework structures. The very recent DNA study of Rakhigarhi burials also points to the fact of an ancestry gradient that was widespread in farmers to the northwest of Peninsular India at the height of the IVC that had very less genetic contribution from Steppe pastoralists or western Iranian farmers or herders and that had a primary impact on the ancestry of later South Asians. Kalibangan Burial No.29 shared many features (grave structure, votive pots, and prone-positioned posture) with Rakhigarhi grave A2/BR33, according to the excavator. The similar finding was also reported at Harappa, the type site of the Harappan Civilization in Pakistan. A report from a seventh century Anglo-Saxon cemetery indicates that a real bed had been put in the grave, not a platform made of soil and pots, and that the individual had been a high-ranking female. Although the discovery of similar burials has been very rare to date, the possibility that such a funeral custom might have been followed over a much wider area cannot not be ruled out. Farmana, another necropolis, similar to the Harappan culture in the Indian subcontinent, has revealed three different types of burials from the mature Harappan levels, namely, primary, secondary, and tertiary burials. This site has also, equally, revealed certain burials, belonging to prominent social strata, as seen in the case of Kalibangan and Rakhigarhi, having given ceremonious burial, in accordance with his status, being observed from the number and variety of pots and other antiquarian remains in the form of grave goods. Even the child burial, one belonging to an affluent high strata of the society, bore evidences of plentiful classical Harappan potteries.

Coming back to the site of Kalibangan, let us now observe as to how child burials play an effective role in providing inputs in the mortality rate and the social beliefs of the people. The child burial, Skeleton No.3, had a condition of hydrocephaly and had to undergo trephination or surgical incisions in the skull to drain out accumulated fluid to release enlarged brain. The child was buried with utmost care, along with small pots, bowls, and beaker to carry food and water for afterlife. Placement of the pots in close proximity to the mouth of the skull suggests the affection of the persons burying the child, so that the child would not be deprived of necessities on the way to its heavenly abode. Another burial containing the molar of a child in a relic casket also contains an adolescent and an adult, all of whom may have died in an accident and hence buried together. This grave is also substantially laid with offerings of pots and other antiquities. Though in this case too, as seen in the previous child burial, small vase and medium-sized pots are seen, probably meant especially for children. The terracotta ball, found among the offerings, must have been a toy item that belonged to the child. The affection of the kins can be judged herewith.

The male burials are probably the richest of the deposits, after the extravagant female burial with Skeleton No. 4. All the male burials consist of an array of a large number and variety of potteries. Noteworthy are the abundance of shell ornaments, namely, shell bangles and earrings along with the skeletons. Etched and banded beads are also found. The male population seems to be very particular about their get up in those times. All types of pots ranging from serving dishes to beverage containers are found in abundant numbers. The most profligately furnished burial is the one with Skeleton Nos. 11 and 7. The former has not less than 70 plain and painted potteries, which depict human and animal motifs. The body is also laid on the potteries, another typical custom seen to be followed in this site. The latter is the richer one, with a number of varieties of beads along with gold beads too. Potteries include the usual variety, though a globular vase with thin red slip and "early Harappan Fabric A" has been found. An evidence of the continuation of usage of the early period pottery is hence seen here. Or it may be suggested that this person may have been the resident of the site for a long duration of time and hence been honored with a sherd of bygone days that may have been kept as a prized possession. No other "early Harappan fabric" sherds have been encountered within any other burial group in this site.

Discussion

The mode of disposal of the dead brings out the typical Harappan traits. Uniformly dugout pits in the same hard speckled soil with the same filling characterize the burial pits. An interesting feature can be derived from Skeleton Nos. 1 and 2. The former has its skull on a higher level than the pelvic region, while the latter is its reverse. A very simple explanation that can be derived from this is that the floor may have been dug unevenly. If this possibility is ruled out, another explanation that might seem to fulfil the cause may be that Skeleton No. 2 had an exostosis in its right ulna. The bend formed due to the pathological deformity might have been the reason for the lowering of the body above the pelvic region, as opposed to Skeleton No. 1 which has its upper body on a higher level than the lower. All the other skeletons that have been buried directly over the scooped out burial pit or floor covered with a layer of the filling material, the one burial of a male aged 55–60 years approximately, has been placed on an array of pots and the skull and the upper body parts on plates. This might have been an attempt to signify the importance of the person buried in the aforesaid manner, with a layer of plates beneath his upper body and an extravagant arrangement of 70 pots in two groups, both to the north and to the center of the pit. Not only do the preparation of floor for certain bodies denote importance of the individual, but the absence of a prepared floor with either potteries or the filling material may also indicate the fact that sometimes the mortuary ritual may have been a hurried endeavor. As we see in the Vedic times as well as in recent burial rituals, a definite period is discernible to bury or cremate the dead, which is regarded as an auspicious time period. Certain *mantras* are chanted to lead the soul of the dead on its way to heaven with pleasant memories of their life and a well-being for their "afterlife," as has been found from verses of Rigveda (no. 10.16, 10.18, etc.). This would become sometimes an extensive affair. Hence, to keep track of time, much attention might not have been given to the preparation of the burial. This might have been the case with Burial Nos. 35 and 36, to the south and northeast corner, respectively, of Burial No. 7, which had been disturbed by the latter. According to the excavator, *possibility of getting tibia, fibula, and foot bones cannot be ruled out* after the clearance of the filling. The same filling comprises Burial No. 36 too, though a similar explanation for the rich man's burial, i.e., Skeleton No. 11, was definitely not a capricious one. A lot of resources and time had been invested probably to pay homage to the dead, since a bed of plates were arranged for the laying down of the upper part of the body along with painted pots of human and animal motifs. Also, the usage of Harappan bricks of dimension 1 × 2 × 4 with plaster of *chunam* may also be involved in a significant person's burial imbibing certain ritualistic purpose. An attempt to provide a warm place for the deceased to feel comfortable in the afterlife was looked into while preparing the burial chamber by the kins. Such a compact environment may also have been instrumental in the longer storage of food offerings and protection of the dead body from scavengers.

Potteries, as can be seen from the previous example of a richly decorated burial, are a vital factor to categorize the wealth and prosperity of a certain individual or a group of inhabitants. Beginning with the number of pots, the types of pots placed along with the painted motifs and fabrics indicate the cognitive aspect of the kins in the process of mortuary practice. A chieftain obviously deserves a well-equipped and lavish farewell than a layman or his subjects, hence accounting for his pottery-laid deathbed, consisting of painted ones as well, and a casket to differentiate the status of the departed.

The usual practice of placing pots, mostly toward the northern end of the pit and in the vicinity of the skull, was mostly followed. However, pots were also found either all over the burial chamber or pit and sometimes in the middle of the pit or toward the feet of the dead. Such practices may relate to multifarious rituals being performed for each group of potteries

placed in different locations of the burial pit. Different types of pots may signify different purposes in relation to the mortuary practice performed. A plate or a bowl or a dish-on-stand or dish might have contained food offerings, whereas a *lota*, jars, cup-on-stand, and goblets might have contained water or some other liquid substance for usage by the deceased in afterlife.

Apart from the extended burials, the pot burials and the rectangular or oblong burials were extravagantly furnished with pots but devoid of skeletal remains. They may have provided a symbolic burial for the deceased who might have lost his/her life in a certain accident or in a voyage from which they never could return probably. Hence a burial, in memorial of the lost relatives, was constructed to pay homage to them. Sometimes disarticulated bones in the extended burial pits can signify persons mutilated in warfare or attack. Though, the possibility of war seems to be a far-fetched possibility in the site of Kalibangan. According to the excavators, no weaponry has been unearthed from the site which could indicate the maintenance of a garrison by the central administration who exercised control over the entire habitational area.

Availability of antiquities like shell bangles, shell earring, carnelian beads, jasper and agate beads, gold beads, etc. in the ear, wrists, and neck region signifies the ornamental taste of the females of the Kalibangan population. A copper mirror may indicate a stage of affluence in the livelihood of the people and advancement in science and technology in the early periods of human habitation along the Ghaggar. Gamesman, terracotta ball, etc. provide an insight of the recreation methods, whereas bone points may indicate the existence of techniques followed in prehistoric times for certain works of piercings and hunting. The minimal number may indicate a reduction in the usage of prehistoric tools in this phase of human history.

After the analysis of data from the burial report of Kalibangan, it may be confirmed that only the listed skeletal evidences do not account for the entire population of the site. Hence other modes of disposal of the dead were definitely in practice during those times. A definite mode of mortuary practice was laid down as norm to be followed by the population which was practiced meticulously by the inhabitants.

References

Agarwal, D.P., and Sheela Kusumgar. 1968. Radiocarbon dates of Kalibangan samples. *Current Science 37* (4): 96–99. Bangalore.

Ghosh, A. 1989. Disposal of the dead. In *An encyclopaedia of Indian Archaeology (Vol. I–Subjects)*. Munshiram Manoharlal Publisher Pvt. Ltd. New Delhi, India.

Kennedy, K.A.R. 2000. God-Apes and Fossil Men. In *Palaeoanthropology of South Asia*. University of Michigan Press. Ann Arbor.

Schug, G.R., and S.R. Walimbe, eds. 2016. New insights on the Indus civilization and Harappan Burial traditions. In *A companion to South Asia in the past*. Sussex: Wiley-Blackwell.

Sharma, A.K. 1999. *The Departed Harappans of Kalibangan*. New Delhi: Sundeep Parakashan.

Shinde, V.S. 2016. Current perspectives on the Harappan civilization. In *A companion to South Asia in the past*, ed. G.R. Schug and S.R. Walimbe. Sussex: Wiley-Blackwell.

Shinde, V.S., T. Osada, and A. Uesugi. eds. 2009. Harappan Necropolis at Farmana in the Ghaggar Basin. In *Special report no. 4*: The Indian Archaeological society publication, New Delhi, India.

Singh, U.A. 2009. *History of ancient and early medieval India: From the stone age to the twelfth century*. Pearson. UP, India.

Stacul, Giorgio. Sept – Dec 1975. The fractional burial custom in the Swat Valley and some connected problem. In *East and West*, New series, Vol. 25, Nos. 3&4. *India Archaeology – 1969–70 – A Review.* New Delhi.

Harris, David Russell

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Basic Biographical Information

David Harris is a leading authority in research into human ecology and agricultural origins. He was born in 1930 in London, England, and in 1950 commenced study of geography at Oxford University and in 1955 leading to a master's thesis entitled Water Resources and Land Use in

Tunisia. His growing interest in environmental diversity and the varied history of human land use took him to the University of California at Berkeley, where he engaged with the work and ideas of Carl Ortwin Sauer. His Ph.D. (1963) thesis entitled Plants, Animals, and Man in the Outer Leeward Islands, West Indies: An Ecological Study of Antigua, Barbuda, and Anguilla was the first of the many projects conducted during his career which took an ecological-historical approach to human land use.

After periods of lecturing at both Berkeley and London, in 1964 he took up a readership in geography at University College London. In 1980 he was appointed Professor and Head of the Department of the Human Environment, at the Institute of Archaeology in London. He served as Director of the Institute from 1989 to 1996 and retired in 1998. He served as President of the Prehistoric Society from 1990 to 1994 and of the UK Chapter of the Society for Economic Botany from 1995 to 1997. Among several honors and awards, he was elected Fellow of the Society of Antiquaries and Fellow of the British Academy and presented by the Royal Geographical Society in 1972 the Back Award for contributions to biogeography.

Major Accomplishments

Harris has been a significant authority in the fields of agricultural origins and the historical ecology of human land use and has also published on the history of archaeology. Two seminal publications (Harris and Hillman 1989; Harris 1996) served to extend the discourse of agricultural origins and spread beyond the conventional centers of origin, thus promulgating a truly global approach to human ecological history that researchers around the world have followed. Many earlier studies of the genesis of farming had placed a strong emphasis on a core set of classic centers of agricultural origin. The two publications above both extended the conceptual range of engagement with economic species and the geographical and ecological range of where its history could be explored.

The first of these publications also marked an early episode in the long-standing collaboration between Harris and the renowned archaeobotanist Gordon Hillman (also at the London Institute of Archaeology). That collaboration led to groundbreaking work at such sites as Tell Abu Hureyra in Syria (Harris and Hillman 1989) and Jeitun in Turkmenistan (Harris 2010). Their research with Victor Masson at Jeitun and sites in the surrounding region constitutes a key Central Asian study in human ecological history, providing some of the earliest indications of agricultural practices in Central Asia (Harris 2010). Over the course of his career, Harris's explicitly global approach has taken him to each of the world's continents to conduct field research. In addition to the Eurasian projects mentioned above, he has undertaken research projects in New Guinea, the Torres Strait, Africa, and Central America. His works have drawn attention to the diversity of ecosystems in the human past from which economic plant tissues of some sort have been harvested and have stimulated the diversification of archaeological method to trace these ecologies accordingly.

Throughout his career, Harris articulated and developed an explicit ecosystem-based approach to the human past (cf. Harris 1969; Harris and Thomas 1991), which has been particularly influential in the novel foci of research into agricultural origins, such as the tropical regions (Harris 1971) and arid/savannah regions (Harris 1980, 1984).

Cross-References

- ► Abu Hureyra: Agriculture and Domestication
- ► Agricultural Practice: Transformation Through Time
- ► Domestication: Definition and Overview

References

Harris, D.R. 1969. Agricultural systems, ecosystems and the origins of agriculture. In *The domestication and exploitation of plants and animals*, ed. P.J. Ucko and G.W. Dimbleby, 3–15. London: Duckworth.

Harris, D.R. 1971. The ecology of swidden cultivation in the upper Orinoco rain forest, Venezuela. *The Geographical Review* 61: 475–495.
Harris, D.R., ed. 1980. *Human ecology in savanna environments*. London: Academic.
Harris, D.R. 1984. Ethnohistorical evidence for the exploitation of wild grasses and forbs: Its scope and archaeological implications. In *Plants and ancient man*, ed. W. van Zeist and W.A. Casparie, 63–69. Rotterdam: Balkema.
Harris, D.R. 1996. *The origins and spread of agriculture and pastoralism in Eurasia*. London/Washington, DC: UCL Press/Smithsonian Institution Press.
Harris, D.R. 2010. *Origins of agriculture in western Central Asia: Archaeological–environmental research in Turkmenistan*. Philadelphia: University of Pennsylvania Museum Press.
Harris, D.R., and G.C. Hillman, eds. 1989. *Foraging and farming: The evolution of plant exploitation*. London: Unwin Hyman.
Harris, D.R., and K.D. Thomas, eds. 1991. *Modelling ecological change: Perspectives from neoecology, palaeoecology and environmental archaeology.* London: Institute of Archaeology.

Hastorf, Christine

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Basic Biographical Information

Christine Ann Hastorf (born December 7, 1950) is a North American archaeologist specializing in paleoethnobotany, agriculture, prehistoric lifeways, and pre-Hispanic and contemporary Andean communities. She was born in Hanover, New Hampshire, USA, and attended Stanford University where she received her B.A. in Human Biology (1972) and the University of California, Los Angeles, where she obtained both her M.A. (1977) and Ph.D. (1983) in Anthropology under the supervision of Timothy K. Earle. Following graduation, she took an appointment at the University of Minnesota, where she worked for the next 10 years, and from where in 1994, she was recruited as a tenured professor by the University of California, Berkeley. She is currently full Professor in the Department of Anthropology, Director of the McCown Archaeobotanical Laboratory, Director of the Archaeological Research Facility, and Curator of South American Archaeology of the Phoebe A. Hearst Museum of Anthropology at the University of California, Berkeley. Christine Hastorf has directed and participated various field and lab research projects and mentored and trained numerous cohorts of undergraduate, graduate, and postdoctoral scholars from various backgrounds and nationalities.

Major Accomplishments

Christine A. Hastorf is part of a generation of archaeologists who have successfully extended the impact of archaeology and expanded its breadth beyond disciplinary boundaries by broadly collaborating with social anthropologists, architects, biochemists, geologists, paleoecologists, and plant scientists, among many others. Arguably, her most significant contributions have been in the field of paleoethnobotany, a subdiscipline, which she has helped to reach its present maturity (see Hastorf and Popper 1988). Hastorf has been a prolific scholar and often pioneered addressing a wide range of questions using a diverse array of theoretical and methodological approaches, from the fundamental questions surrounding the evolution of agriculture to the technological and interpretative challenges of using different recovery, identification, and analytical procedures, from the changing use of fuel preferences in relation to resource depletion to the impact of climate change on agricultural practices, and from the sociopolitical impacts of dietary changes to the long-term development of culinary traditions. As an example, her work on the social impact that the increased consumption of maize (mainly as *chicha* or fermented corn beer) brought about by the Inca conquest of the Xauxa highland

communities is an often-cited example of how archaeology can ask and address complex research questions (see Hastorf 1991).

Hastorf's contributions have also been significant for explaining the spread of key significant New World cultigens including maize (*Zea mays*), quinoa (*Chenopodium quinoa*), potatoes (*Solanum tuberosum*), chile peppers (*Capsicum* spp.), and coca (*Erythroxylum coca*), among many others. Yet, she has not limited the scope of her research to plant-human interactions as she has also contributed significant work to the discussion of a broad range of topics not limited to ancient and contemporary sociopolitical integration, the constitution of meaning in everyday life, social memory, style, gender, and improving the preservation conditions of archaeological sites and collections by working with local communities (e.g., Arnold and Hastorf 2008; Conkey and Hastorf 1993; Hastorf 2006).

Most of her research has been centered in the archaeology of Andes, particularly the upper Mantaro River valley in the highlands of central Peru (Hastorf 1993) and the Taraco Peninsula in the Lake Titicaca basin of Bolivia (Hastorf 1999), where she has directed extensive research projects. Nevertheless, she has also collaborated with archaeologists from and working in most Latin American countries. Furthermore, she has designed and implemented the plant recovery paleoethnobotanical protocol of the excavations at Çatalhöyük in Turkey (Atalay and Hastorf 2006).

Christine Hastorf has been indicated in various prestigious societies and organizations including the California Academy of Sciences and the Society of Antiquaries. She has also received multiple awards and recognitions for her contributions to advancing anthropological and scientific knowledge including the 2012 Fryxell Award for Excellence in the Botanical Sciences in Archaeology granted by the Society for American Archaeology.

Finally, Christine Hastorf has an innate curiosity and discerning interest in solving often unconventional research questions using novel approaches. She is always earnestly interested in learning about other people's work, and her insights are helpful and provocative. She has helped archaeology extend its influence and significance by genuinely pushing its epistemological boundaries in terms of theory but also methods and practice.

Cross-References

- ▶ Chiripa and the Emergence of Social Complexity in the Lake Titicaca Basin
- ▶ Inca State and Empire Formation
- ▶ Paleoethnobotany

References

Arnold, D.Y., and C.A. Hastorf. 2008. *Heads of state: Icons, power and politics in the ancient and modern Andes*. Walnut Creek: Left Coast Press.

Atalay, S., and C.A. Hastorf. 2006. Food, meals and daily activities: The *habitus* of food practices at Neolithic Çatalhöyük. *American Antiquity* 71: 283–319.

Conkey, M.W., and C.A. Hastorf, eds. 1993. *The uses of style in archaeology*. 2nd ed. Cambridge, UK: Cambridge University Press.

Hastorf, C.A. 1991. Gender, space and food in prehistory. In *Engendering archaeology: Women and prehistory*, ed. J. Gero and M.W. Conkey, 132–159. Oxford: Blackwell Press.

Hastorf, C.A. 1993. *Agriculture and the onset of political inequality before the Inka*. Cambridge, UK: Cambridge University Press.

Hastorf, C.A., ed. 1999. *Early settlement in Chiripa, Bolivia: research of the Taraco Archaeological Project*, Contributions of the Archaeological Research Facility No. 57. Berkeley: University of California.

Hastorf, C.A. 2006. Building the community museum at Chiripa, Bolivia, down the road from Tiwanaku in the Titicaca Basin. In *Archaeological site museums in Latin America*, ed. H. Silverman, 85–98. Gainesville: University Press of Florida.

Hastorf, C.A., and V. Popper, eds. 1988. *Current paleoethnobotany: Analytical methods and cultural interpretations of archaeological plant remains*. Chicago: University of Chicago Press.

Further Reading

Chiou, K.L., C.A. Hastorf, D. Bonavia, and T.D. Dillehay. 2014. Documenting cultural selection pressure changes on chile pepper (*Capsicum baccatum* L.) seed size through time in coastal Peru (7600 B.P.-present). *Economic Botany* 68: 190–202.

Hastorf, C.A. 1998. The cultural life of early domestic plant use. *Antiquity* 72: 773–782.

Hastorf, C.A., and S. Johannessen. 1993. Pre-Hispanic political change and the role of maize in the central Andes of Peru. *American Anthropologist* 95: 115–138.
Logan, A., C.A. Hastorf, and D. Pearsall. 2012. "Let's drink together": Early ceremonial use of maize in the Titicaca Basin. *Latin American Antiquity* 23: 235–258.

Haua Fteah Cave

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Introduction

The Haua Fteah (22°3′5″E/32°53′70″N) is a large limestone karstic cave situated about a kilometer from the present-day coast of Cyrenaica, northeast Libya, at the foot of the northern escarpment of the Gebel Akhdar ("Green Mountain") massif (Fig. 1). In the course of three seasons of fieldwork (1951, 1952, 1955), Charles McBurney (University of Cambridge) excavated a trench ~14 m deep in the center of the cave's interior (Fig. 2). The excavations revealed a succession of sediments associated with evidence of human activity (stone tools, animal butchery waste, etc.) believed to represent a more or less continuous sequence of human occupation from the present day back to at least 80,000 years ago (McBurney 1967). This sequence has remained unparalleled in the region, and most subsequent research on North African prehistory has referred to McBurney's discoveries and interpretations. Renewed excavations directed by Graeme Barker (University of Cambridge) began in 2007 and are continuing.

Definition

During McBurney's excavations, sediments were removed in horizontal spits, and stratigraphic layers were then defined from the trench walls as the excavations proceeded downwards. These layers were divided into seven cultural phases, principally on the basis of changes in the stone tool assemblages. Eighteen radiocarbon (^{14}C) dates on charcoal gave indications of date for the upper layers, from the present day to the then-limits of the method c. 40 ka BP; lower down, ages were estimated from assumptions about rates of sediment deposition (Table 1).

Phase A was a flake and blade industry categorized as a "Pre-Aurignacian" Middle Paleolithic similar to Pre-Aurignacian and Amudian assemblages in Southwest Asia. This was succeeded (Phase B) by "Levalloiso-Mousterian" industries broadly comparable with Middle Paleolithic industries in the Levant and Europe. Two human mandibles in Layer XXXIII were categorized as "Neanderthaloid." Phase C consisted of an

Haua Fteah Cave, Fig. 1 The Haua Fteah cave: (*left*) looking up to the cave from the coastal plain and (*right*) looking across the doline floor into the cave. (Photographs: G. Barker)

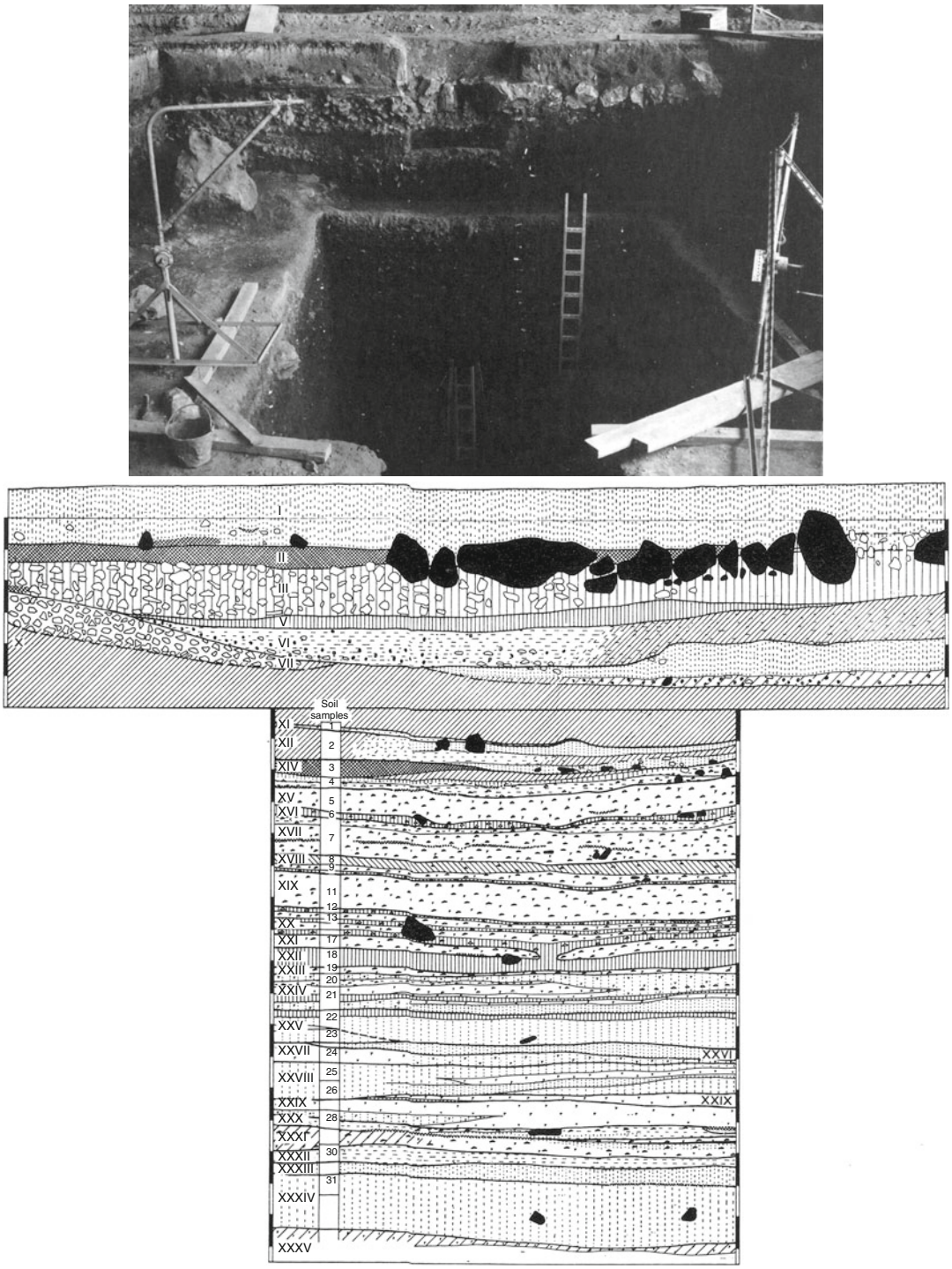

Haua Fteah Cave, Fig. 2 The McBurney trench in 1955: (*top*) "general view on completion of the operation" looking west to the east-facing sections of the Upper and Middle Trenches (Photograph: R. Inskeep), and (*bottom*) the same faces as recorded by R. Inskeep (McBurney 1967: Fig. 1.4)

Haua Fteah Cave, Table 1 Major phases of occupation defined at the Haua Fteah by McBurney (1967); the Middle Paleolithic was further subdivided

Phase	Layers	Cultural designation	Estimated age ka BP McBurney (1967)
A	From base of deep sounding to XXXV	Libyan Pre-Aurignacian	80–65
B	XXXIV–XXV	Middle Paleolithic	65–40
C	XXV–XVI	Dabban (Upper Paleolithic)	40–15
D	XV–XI	Eastern Oranian (Final Paleolithic)	15–10
E	X, IX	Libyco-Capsian (Mesolithic)	10–7
F	VII–IV	Neolithic of Libyco-Capsian tradition	7–4.7
G	III–I	Historic	4.5 to present

industry characterized by the preferential selection of blanks for the production of blades and with an artifact range similar to that of the European Upper Paleolithic Gravettian, termed the "Dabban" by McBurney after the Cyrenaican cave of Hagfet ed-Dabba where he had found similar material (McBurney 1960). The Dabban was succeeded by a microlithic late or final Upper Paleolithic industry (Phase D) termed the Eastern Oranian or Iberomaurusian from its similarities with assemblages in the Maghreb (northwest Africa), and this was succeeded (Phase E) by a microlithic Mesolithic-type industry with parallels to Capsian assemblages in the Maghreb and, hence, classified as the "Libyco-Capsian." The final prehistoric occupation (Phase F), with Neolithic pottery and domestic sheep and goats, was termed "Neolithic of Libyco-Capsian tradition" because of similarities in stone tools (e.g., the frequency of backed pieces) with the preceding Libyco-Capsian. This was capped (Phase G) by a substantial boulder-supported structure dating to the Graeco-Roman period (Layers III, II), covered by burnt animal dung and other evidence of animal stalling dating to recent centuries (Layer I). The cave is still used for stalling sheep and goats, and similar deposits continue to accumulate.

Key Issues

The McBurney excavations were remarkable in their scale, and the subsequent analyses of the material were pioneering for their time (McBurney 1967), but subsequent research on North African prehistory raised questions about the sequence, its age, the character of the various phases, and the explanations proposed for changes between them – McBurney generally favored population replacement to account for lithic changes. For example, sedimentary and faunal signatures of wetter climates in the basal sediments were interpreted by Moyer (2003) who suggest that they might in fact be far older than McBurney realized, dating between marine oxygen-isotope stage (MIS) 5 and MIS 7, c. 195 ka. McBurney regarded the blade-based Dabban industry as the evidence for the arrival of modern humans (Upper Paleolithic, in the European sequence), but the Pre-Aurignacian also contained a significant number of blades and burins, and evidence of shellfish collection which McBrearty and Brooks (2000) identified as a potential signature of modern human behavior in Africa, whilst bioanthropological analysis indicated that the two human mandibles in the Levalloiso-Mousterian layers were fully modern human (Hublin 2000), so the sequence raised major questions about when modern humans first arrived and what the technological changes represented by the Dabban and the subsequent three microlithic industries (phases D–F) signified in terms of behavioral changes and/or population changes. Questions like these were the context for the renewal of archaeological fieldwork at the site by the Cyrenaican Prehistory Project in 2007.

In the course of five seasons of fieldwork, the CPP has removed the backfill deposited in the

Haua Fteah Cave, Fig. 3 The CPP excavations in the Haua Fteah: (*left*) part of the north-facing section of the Middle Trench; the visible holes are the locations of OSL tubes; scale in.5 m divisions: (*right*) looking across the McBurney trench to a new excavation (Trench M); the second plywood sheet to the *left* of the standing figure covers the part of the trench wall shown in the *left* image; the north-facing and east-facing walls of the Holocene sediments in the Upper Trench are visible in front and to the *right* (compare the latter with the same face in 1955: Fig. 2, *left*). (Photographs: G. Barker)

McBurney trench at the end of the 1955 season; cleaned and recorded the original sections (which are well preserved, with many of the original aluminum labels still in place) using the single-context system; removed two 30 × 30 cm column samples of sediment from the cleaned faces for sedimentological and palynological analysis; and is in the process of excavating a new 2 × 1 m trench down the profile to provide new data about the sedimentary and cultural sequences, and the climatic and environmental contexts, in which they developed (Barker et al. 2007, 2008, 2009, 2010, 2012; Fig. 3). A suite of dating methods (^{14}C, OSL, ESR, tephra) has provided a new chronology that has greatly refined the McBurney chronology for phases B–F, indicates that initial occupation began c. 130 ka (the start of OIS 5), dates the layer with the human mandibles to 74.6–69.3 ka, and dates (including with a clear stratigraphic relationship to Campanian Ignimbrite tephra) the start of the Upper Paleolithic Dabban industries to 46–41 ka, approximately contemporary with the appearance of Early Upper Paleolithic industries in the Levant and southern Europe (Douka et al. in review). The Oranian began c. 17.5–16.6 ka BP, the Capsian c. 13–12.3 ka BP, and the Neolithic c. 7.4–6.9 ka BP.

The dating program has been integrated with palaeoclimatic investigations using sediment micromorphology, palynology, vertebrate faunal and molluscan assemblages, and isotope studies of mammal teeth, marine molluscs, and land snails. Despite sediment transport and reworking, sedimentary facies have been defined which correlate well with OIS climate stages 5–1. Archaeological investigations of materials from the new excavations include studies of lithic technologies, microwear, and residues; vertebrate fauna and molluscs; and carbonized plant remains; and these are being integrated with new studies of materials from the 1950s excavations archived in the Museum of Archaeology and Anthropology, University of Cambridge. This work is being combined with geoarchaeological survey and palaeoclimatic studies across the Gebel Akhdar.

The first human activity at the site cannot definitely be linked to modern humans, in that the only fossils are in a Levalloiso-Mousterian layer, but the fundamental similarities between the Pre-Aurignacian and Levalloiso-Mousterian industries

suggest that this is highly likely. Interesting, the modern humans at the Haua Fteah are not associated with Aterian industries as in the Maghreb (e.g., Barton et al. 2009; Scerri 2012). It is argued that modern humans first spread into North Africa across the Sahara in MIS 5, when wetter climates created major lakes across what is now desert (Drake et al. 2011), but in the case of the Gebel Akhdar, movement westwards from Egypt and/or the Levant may be as likely. Given the evidence of contemporaneity in the appearance of blade industries at Haua Fteah, the Levant, and southern Europe, it is unwise to assume that the Dabban is necessarily evidence of population movement from the Levant into North Africa. There is evidence for increasing aridity through the later Dabban and Oranian phases of occupation, but although the use of the Haua Fteah was highly variable in its intensity and seasonality, the indications are that the Gebel Akhdar was an important refugium at this time for animals, plants, and people. In the Early Holocene, Capsian people practiced broad spectrum subsistence, and this continued alongside animal herding in the Neolithic – there is no definite evidence for plant cultivation in the Neolithic. The cave was used for stabling livestock in the Graeco-Roman period, and there is evidence of significant impacts on the landscape around the cave from ploughing and cultivation (Hunt et al. 2010). The new work at the Haua Fteah suggests that the remarkable succession of human occupation in the cave first revealed by Charles McBurney's excavations will continue to remain seminal for the study of North African prehistory.

Cross-References

- ► African Stone Age
- ► Isotopic Studies of Husbandry Practices
- ► Lithic Technology, Paleolithic

References

Barker, G., C. Hunt, and T. Reynolds. 2007. The Haua Fteah, Cyrenaica (northeast Libya): Renewed investigations of the cave and its landscape. *Libyan Studies* 38: 93–114.

Barker, G., L. Basell, I. Brooks, L. Burn, C. Cartwright, F. Cole, J. Davison, L. Farr, R. Hamilton, C. Hunt, R. Inglis, Z. Jacobs, V. Leitch, J. Morales, I. Morley, M. Morley, S. Pawley, A. Pryor, R. Rabett, T. Reynolds, R. Roberts, D. Simpson, C. Stimpson, M. Touati, and M. Van Der Veen. 2008. The Cyrenaican prehistory project 2008: The second season of investigations of the Haua Fteah cave and its landscape, and further results from the initial 2007 fieldwork. *Libyan Studies* 39: 175–222.

Barker, G., A. Antoniadou, S. Armitage, I. Brooks, I. Candy, K. Connell, K. Dourka, N. Drake, L. Farr, E. Hill, C. Hunt, A. Ibrahim, R. Inglis, S. Jones, J. Morales, I. Morley, G. Mutri, R. Rabett, T. Reynolds, D. Simpson, M. Twati, and K. White. 2009. The Cyrenaican prehistory project 2009: The third season of investigations of the Haua Fteah cave and its landscape, and further results from the 2007–2008 fieldwork. *Libyan Studies* 40: 1–41.

Barker, G., A. Antoniadou, S. Armitage, I. Brooks, I. Candy, K. Connell, K. Douka, N. Drake, L. Farr, E. Hill, C. Hunt, R. Inglis, S. Jones, C. Lane, G. Lucarini, J. Meneely, J. Morales, G. Mutri, A. Prendergast, R. Rabett, H. Reade, T. Reynolds, N. Russell, D. Simpson, B. Smith, C. Stimpson, M. Twati, and K. White. 2010. The Cyrenaican prehistory project 2010: The fourth season of investigations of the Haua Fteah cave and its landscape, and further results from the 2007–2000 fieldwork. *Libyan Studies* 41: 63–88.

Barker, G., P. Bennett, L. Farr, E. Hill, C. Hunt, G. Lucarini, J. Morales, G. Mutri, A. Prendergast, A. Pryor, R. Rabett, T. Reynolds, and M. Twati. 2012. The Cyrenaican prehistory project 2012: The fifth season of investigations of the Haua Fteah cave. *Libyan Studies* 43: 115–136.

Barton, R.N.E., A. Bouzouggar, S. Collcutt, J.-L. Schwenninger, and L. Clark-Balzan. 2009. OSL dating of the Aterian levels at Grotte de Dar es-Soltan I (Rabat, Morocco) and possible implications for the origins of modern *Homo sapiens*. *Quaternary Science Reviews* 28: 1914–1931.

Douka, K., R. Grün, Z. Jacobs, C. Lane, L. Farr, C. Hunt, R. Inglis, T. Reynolds, P. Albert, M. Aubert, V. Cullen, E. Hill, L. Kinsley, R. Roberts, E. Tomlinson, S. Wulf, and G. Barker. in review. Redating the Haua Fteah cave (Cyrenaica, northeast Libya) and its implications for North African prehistory. *Journal of Human Evolution*.

Drake, N., R.M. Blench, S.J. Armitage, C.S. Bristow, and K. White. 2011. Ancient watercourses and biogeography of the Sahara explain the peopling of the desert. *Proceedings of the National Academy of Sciences* 108: 458–462.

Hublin, J.-J. 2000. Modern-non-modern hominid interactions: A Mediterranean perspective. In *The geography of Neandertals and modern humans in Europe and the Greater Mediterranean*. Peabody Museum Bulletin 8, ed. O. Bar-Yosef and D. Pilbeam, 157–182. Harvard: Peabody Museum of Archaeology and Ethnology.

Hunt, C., J. Davison, R. Inglis, L. Farr, D. Simpson, H. El-Rishi, and G. Barker. 2010. Site formation processes in caves: The Holocene sediments of the Haua Fteah, Cyrenaica, Libya. *Journal of Archaeological Science* 37: 1600–1611.
McBrearty, S., and A.S. Brooks. 2000. The revolution that wasn't: A new interpretation of the origins of modern human behaviour. *Journal of Human Evolution* 39: 453–563.
McBurney, C.B.M. 1960. *The Stone Age of northern Africa*. London: Penguin Books.
McBurney, C.B.M. 1967. *The Haua Fteah in Cyrenaica and the Stone Age of the South-East Mediterranean*. Cambridge: Cambridge University Press.
Moyer. C. 2003. *The organisation of lithic technology in the Middle and Early Upper Palaeolithic industries at the Haua Fteah, Libya*. Unpublished PhD dissertation, University of Cambridge.
Scerri, E. 2012. The Aterian and its place in the North African Middle Stone Age. Quaternary International. Available at: http://dx.doi.org/10/1016/j.quaint.2012.09.008

Haverfield, John Francis

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Basic Biographical Information

John Francis Haverfield (1860–1919), distinguished British classical scholar and archaeologist, was born in Shipston-on-Stour, Worcestershire, and educated at New College, Oxford, where he took a degree in Literae Humaniores (Classics) in 1883.

After graduation, he became a schoolmaster at Lancing College in Sussex, where he pursued research on various aspects of classical antiquity, publishing articles on classical authors and also on Roman epigraphy. His work on the latter led to contacts with Theodor Mommsen (1817–1903), who invited him to complete and refine Emil Hübner's volume 7 of the *Corpus Inscriptionum Latinarum*, containing the inscriptions found in Britain. In 1892 Haverfield was invited back to Oxford and appointed initially to a fellowship at Christ Church and later (1907) to the Camden Professorship of Ancient History. He then entered upon the most fruitful and productive phase of his career, with a focus on the history and archaeology of Roman Britain. He was constantly called upon to make progress reports on ongoing fieldwork and was closely associated with a number of important excavations, although he was never the formal director of any of them. Notable among his publications were his contributions to the *Victoria County History* series, where he wrote the chapters on the Roman period of a number of counties. His work was curtailed by a stroke in 1915. He died 4 years later.

Major Accomplishments

Haverfield gained recognition as the foremost authority on Romano-British history and in a very real sense was responsible for the discipline of Romano-British studies becoming a component of the university curriculum. He saw Britain as a province within a greater empire, and his great achievement was to redefine the study of that province on scientific lines. He was particularly noted for his meticulous and disciplined classification and cataloguing of small finds. Before him, Roman Britain was largely the preserve of the amateur and the dilettante, for whom Haverfield had much contempt. Inspired by Mommsen, he applied rigorous scholarly standards and was particularly insistent on archaeology, professionally conducted, as an important element of history. His record of publication was prodigious, but sadly he did not live to complete a comprehensive history of Britain in the Roman period. His Ford Lectures, given in Oxford in 1906, were published posthumously by Oxford University Press in 1924 as *The Roman Occupation of Britain*.

Cross-References

► British Pioneers and Fieldwork Traditions
► Epigraphy, Imperial Latin
► Western Roman Provinces, Archaeology of the

H

Further Reading

Freeman, P.W.M. 2004. Haverfield, Francis John (1860–1919). In *The dictionary of British classicists*, vol. II, 432–434. Bristol: Thoemmes.

Freeman, P.W.M. 2007. *The best training ground for archaeologists: Francis Haverfield and the invention of Romano-British archaeology*. Oxford: Oxbow.

MacDonald, G. 1919–20. F. Haverfield, 1860–1919. *Proceedings of the British Academy* 9: 475–491.

MacDonald, G., and P.W.M. Freeman. 2004. Haverfield, John Francis. *Dictionary of National Biography* 25: 856–857.

Hawkes, Christopher

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Flinders University, Adelaide, Australia

Basic Biographical Information

Charles Francis Christopher Hawkes was born in London in 1905. His family moved frequently during WW1, but in 1924 he began to read Classics at New College, Oxford, beginning a lifelong association with the university city. His potential was spotted, and he dug with Mortimer Wheeler and Nowell Myers, and on graduation in 1928, he joined the British Museum as an assistant keeper.

His first major book was a collaboration with his BM colleague, Tom Kendrick, *Archaeology in England and Wales*, 1941–1931, which "nourished generations of Cambridge archaeologists" according to the prehistorian Grahame Clark. He was briefly engaged, but in 1931 he met the promising young Cambridge archaeologist, Jacquetta Hawkes, when her tutor sent her to dig for him at the Roman site of Colchester. In 1933 they were married at Trinity College, Cambridge, where her father was a don. They had one child, Nicolas, born in 1937. Together they excavated sites in Southern England, and both were elected as Fellows of the Society of Antiquaries, Christopher in 1932. He wrote three papers on which the prehistorian Barry Cunliffe commented (Cunliffe 1991), who "totally altered the direction of thought on the Iron Age and paved the way for the next three decades of constructive study."

The pair continued their archaeology even as war was on the horizon; Christopher supervised the storage of artifacts from British Museum in the safety of the nearby Aldwych underground station. One of his most important works, *The Prehistoric Foundations of Europe*, was by then underway and, despite the difficult circumstances, was published in 1940. With Jacquetta, he wrote another well-received publication, *Prehistoric Britain*, published in 1943, which was his last book, although the academic papers continued. That year he was transferred to the Ministry of Aircraft Production where he remained there for the duration of the war, while Jacquetta served at the Ministry for Education, taking on the role of broadening the audience for archaeology. In 1946, Christopher returned to the British Museum. His academic specialization of Iron Age Britain was now within the context of rebuilding archaeology postwar. Within the year he was appointed the first professor of European archaeology at Oxford, and in 1948, a Fellow of the British Academy, on the recommendation of Gordon Childe. By the time Christopher moved his rooms at Keble College, Oxford, to take up his post, his marriage to Jacquetta was in trouble. Her affairs, with the critic Walter Turner and JB Priestley, who she married in 1953, were indicative of their very different characters, despite a shared passion for archaeology. Christopher's friends defended him, and many never forgave Jacquetta for breaking up the family. In 1959, Christopher, who craved a settled home life, was happily remarried to his research assistant, the Anglo-Saxon scholar, Sonia Chadwick.

Beyond his contribution to European archaeology, Christopher's influence on the discipline at Oxford was substantial. In 1961 he convinced the university to expand their teaching of the subject and to create an Institute of Archaeology, which still remains close to the Ashmolean Museum on its original site close to. His academic recognition continued into later life, and Diaz-Andreu, Price,

and Gosden (2009) suggested he was the originator of an Oxford school of protohistoric archaeology, comparable to Grahame Clark at Cambridge. The authors contend that in the early 1930s, Hawkes produced "three papers that were fundamental for the development of Iron Age studies," according to an analysis of Hawkes's extensive networks drawing on correspondence with professional and amateur archaeologists, in his papers at the Bodleian Library.

Christopher Hawkes held the chair of European archaeology until retirement in 1972. Christopher Hawkes died in March 1992; later that year Oxford began to admit the first undergraduates in the new joint honours degree of archaeology and anthropology.

Major Accomplishments

Professor of European Archaeology, University of Oxford
Fellow of the British Academy
Gold Medal, Society of Antiquaries of London

Cross-References

► Hawkes, Jacquetta

References

Cunliffe, B. 1991. *Iron Age communities in Britain. An account of England, Scotland and Wales from the 7th century BC until the Roman conquest*, 7. London: Routledge.

Díaz-Andreu, Margarita, Megan Price, and Chris Gosden. 2009. Christopher Hawkes, his archive and networks in British and European archaeology. *The Antiquaries Journal* 89: 1–22.

Further Reading

Collectanea antiqua: Essays in memory of Sonia Chadwick Hawkes. 2007. BAR, 2007.

Finn, Christine: A Life Online: Jacquetta Hawkes (softbooks, Stanford Humanities Lab, 2005).

Webster, Diana Bonakis. 1991. *Hawkeseye: The early life of Christopher Hawkes*. Stroud: Alan Sutton.

Hawkes, Jacquetta

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Basic Biographical Information

Jessie Jacquetta Hawkes (nee Hopkins) also known as Jacquetta Priestley was born on August 5, 1910, in Cambridge, UK. Her father was the Nobel prize-winning biochemist and Trinity don, Frederick Gowland Hopkins, and her mother, Jessie Ann, introduced her to museums. After an early declaration that she wanted to be an archaeologist, in 1929 she was one of the first to read for the new Cambridge degree of archaeology and anthropology. She left Newnham College with a first-class degree and an invitation to dig with Dorothy Garrod at Mount Carmel in Palestine. Her experience there, exposing a Neanderthal skeleton, had a marked effect on her, and she returned to this discovery in her prose and poetry. By then she had met another promising archaeologist, Christopher Hawkes, both working on a Roman site near Colchester. In 1933 they married and began what appeared to be a union of mutual interests, with a home in North London. Their only child, Nicolas, was born in 1937, and their first book together, *Prehistoric Britain*, was published in 1943. By then Jacquetta had taken over the second volume of *The Archaeology of the Channel Islands* from her husband's British Museum colleague, Tom Kendrick. This 1938 monograph helped her academic recognition, and she was elected a Fellow of the Society of Antiquaries. *Prehistoric Britain* already evidenced the different ways Jacquetta approached the past. Her contribution is the more lyrical, a style which would define her as a poet as much as an archaeologist, most notably in the 1951 book, *A Land*. By the time of its publication, to excellent reviews from literary critics, Jacquetta and Christopher's troubled marriage was ending.

It was significant that Jacquetta Hawkes remained in London during WW2; Christopher was awarded the Chair of Prehistory at Oxford, but his wife did not move there with him. She remained in London and worked for the civil service, notably the Ministry for Education, where her role was broad and public and enabled her to share her love of archaeology widely. She scripted a film, "The Beginning of History" (1946), and began to be published as a poet, encouraged by the Australian poet and critic, Walter Turner, with whom she had an affair. Central to Britain's post-war culture, she widened her circle beyond traditional archaeology to include artists, philosophers, photographers, and poets. In 1943 she was made principal and secretary of the UK commission for a new cultural body, UNESCO. At a conference in Mexico City in 1947, she began an affair with the celebrated writer, JB or Jack Priestley. After two much publicized divorces, the couple were married in July 1953. During their life together – Priestley died in 1984 – Jacquetta Hawkes continued to introduce her beloved archaeology to as wide an audience as possible, including children, lectured widely, and was a regular contributor to BBC radio and television.

She coedited UNESCO's prehistory volume against a background of new scientific data and, in 1968, in a widely debated *Antiquity* paper, warned that archaeology risked being narrowed by scientific development. She was encouraged to write the biography of Sir Mortimer Wheeler but ultimately felt she was out of favor with traditional archaeology. In 1980, her most controversial book, *A Quest of Love*, in which she imagined herself as a woman over time, left her sidelined by many academics who had never forgiven her for leaving Christopher. Her last publication, with Paul Bahn, was a popular guide to British archaeology. By 1992, when Oxford University launched its own degree in archaeology and anthropology, her best-known books were out of print, and her substantial contribution to archaeology overlooked as it would continue for 20 years. Most recently, *A Land*, her most acclaimed work, has found a new audience among enthusiasts of nature writing. It was republished in the UK in 2012.

Meanwhile Jacquetta Hawkes's approach to archaeology is becoming known to a generation of contemporary archaeologists who actively seek an engagement with the personal past. I believe she personifies what I have come to term "creative archaeology" in which the processes of excavation, and investigation, are transformed into other artistic practices and forms. She died in Cheltenham on March 18, 1996. Her ashes were interred with JB Priestley's, and her archive is with his in Special Collections at the University of Bradford.

Major Accomplishments

Elected a Fellow of the Society of Antiquaries of London, 1940
Archaeology advisor to the Festival of Britain, 1951
Governor of the British Film Institute (BFI)
Coeditor, UNESCO *History of Mankind*
Cofounder, Campaign for Nuclear Disarmament (CND)
Vice-president, Council for British Archaeology
OBE, Order of the British Empire medal

Cross-References

▶ Hawkes, Christopher
▶ Wheeler, Mortimer

References

Hawkes, Jacquetta. 1951. A Land. London: Cresset Press.
Finn, Christine. 2004. Jacquetta Hawkes. Oxford: New Oxford Dictionary of National Biography, OUP.
Hawkes, Jacquetta. 1968. The proper study of mankind. *Antiquity* XLII, pp 255–262.
Prehistoric Britain: Christopher and Jacquetta Hawkes. 1943. Pelican Books.

Further Readings

Collins, Diana. 1994. *Time and the Priestleys: the story of a friendship*, Stroud: Alan Sutton.
Finn, Christine. 2000. Ways of telling: Jacquetta Hawkes as film-maker. *Antiquity* 74, pp 127–130.
Finn, Christine. forthcoming 2021. Ice without, fire within: A life of Jacquetta Hawkes, Oxford: Archaeopress.
Macfarlane, Robert. 2012. Introduction to new edition of a land. Collins Perennial.

Haynes, Jr., C. Vance

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Basic Biographical Information

Vance Haynes' (1928–) initial training was in rocketry, engineering, and economic geology. He first attended Johns Hopkins University (1947–1949) but earned a B.S. in Engineering Geology at the Colorado School of Mines (1956). An early interest in human prehistory led to work with North American archaeologists studying the earliest occupations on the continent (Paleo-Indian archaeology). He joined the geochronology program at the University of Arizona and earned a Ph.D. in Geology (1965). With the exception of 5 years at Southern Methodist University (1968–1974), his career has been in Geosciences and Anthropology at the University of Arizona. He technically retired in 1999 but has maintained his research, producing several of his more substantive publications in the 2000s, including a magnum opus on Murray Springs (University of Arizona Press, 2007).

Major Accomplishments

Few North American researchers have made so many contributions to the archaeological sciences in so many different fields for so many years. His research includes site stratigraphy, environmental reconstructions, artifact typology and technology, and geochronology in both North America and North Africa. Very early in his career, he had the opportunity to combine a strong avocational interest in archaeology with his professional interest in geology. Through the 1960s and 1970s, he was one of the very few practicing geoarchaeologists in North America. Moreover, he remains one of the few geoarchaeologists in this country with both training and experience in the fundamentals and the subtleties of geology and archaeology. This background combined with careful, meticulous fieldwork allowed him to portray the physical environment in an archaeological context at both site-specific and regional scales. This work included investigations throughout the southwest, Great Plains, and midcontinental USA and in Egypt and Sudan.

Archaeologically, Vance has a long record of substantive contributions to the study of the peopling of the New World. His initial professional involvement in archaeology focused on the stratigraphy and geochronology of Paleo-Indian sites on the Great Plains. This work eventually included the southwestern USA. His fieldwork included a series of key sites: Clovis, Folsom, Lindenmeier, Hell Gap, Mill Iron, Lehner, and Murray Springs. Beyond site specifics, Vance has also produced a number of classic syntheses including a landmark 1964 paper in *Science* that first laid out a Paleo-Indian chronology based on careful application (mostly by him) of the then still relatively new radiocarbon method. He has since published a series of summary papers on the origins, paleoenvironments, and chronology of the Clovis and Folsom occupation of North America. Vance is also remarkably generous in sharing his experience and time with other Paleo-Indian specialists, traveling all over the continent (and down to South America) to view sites and collections and offer his advice.

Haynes' site-specific Paleo-Indian research, combined with his broad interdisciplinary interests, resulted in his classic publication on an "alluvial chronology" for the Great Plains and southwest (in the edited volume *Means of Correlation of Quaternary Successions*, 1968, University of Utah Press). He pursued this research throughout his career and is a leading authority on alluvial geoarchaeology. In working on alluvial chronologies, he sought to discover the driver of these apparently synchronic records (e.g., his paper on "Clovis Drought" in *Quaternary Research*, 1991). The result was a synthesis of his work on "black mats" (*Proceedings of the National Academy of Sciences*, 2008) which demonstrates the value of making such correlations. At the same time, Vance has always been careful

at detailing the stratigraphy at each of the sites on which he has worked. Further, repeated visits over the years to view new sections or apply new dating methods (e.g., the Clovis and Lindenmeier sites: *Denver Museum of Natural History Proceedings*, 1960; *American Antiquity*, 1966; *Ice Age Hunters of the Rockies*, University Press of Colorado, 1992; *Geoarchaeology*, 1995) helped refine Paleo-Indian stratigraphy and chronology. Though best known for his geoarchaeological work at Paleo-Indian sites in North America, his investigations span the late Pleistocene and Holocene and include stratigraphic studies at historic sites such as the Little Bighorn Battlefield.

Another major contribution by Vance Haynes is in the development and application of geochronological methods in both the geosciences and archaeology. Beyond simply applying the radiocarbon method, Vance has helped to develop many techniques. He built a lab at Southern Methodist University that always maintained a reputation for innovation and precision. Throughout his career, Haynes conducted pioneering research into the problematic issue of dating bone. In a 1971 paper (*Arctic Anthropology*), he was one of the first to realize that the calibration of the radiocarbon timescale for the late Pleistocene and early Holocene could have serious implications for understanding the Paleo-Indian chronology (over 20 years before the tree-ring and U-series/coral curve could be extended back that far). And he was one of the first and strongest proponents of careful application of the AMS radiocarbon method in archaeology (in the edited volume *Proceedings of the First Conference on Radiocarbon Dating with Accelerators*, 1978; *Archaeology of Eastern North America*, 1984).

Vance's career in North Africa began when he joined the Combined Prehistoric Expedition, directed by Fred Wendorf and Romuald Schild, drawing him into the Western Desert of Egypt where he became interested in the geoarchaeology of middle and late Paleolithic sites. In more than 40 papers on the Western Desert (or Darb el Arba'in Desert, as he named it), Vance delved into such diverse topics as the geochronology of playas, dune migration, and remote sensing of sand movement, Quaternary climate change, and the geomorphic evolution of the eastern Sahara (e.g., two papers in *Science* in 1982; *Quaternary Research* 1989). In his travels across the desert, he documented previously unknown Paleolithic sites and the historic camps of early desert travelers. And like his work on Paleo-Indian projectile points, Vance's research in the Western Desert touched the core of his many avocational interests, including military history and planetary geology.

In recognition of his many contributions to archaeology, geoarchaeology, geomorphology, and geochronology, Vance was presented with the Roald Fryxell Award of the Society for American Archaeology (1978), the Archaeological Geology Distinguished Career Award from the Geological Society of America (1984), election to membership in the National Academy of Sciences (1990), the Medal of Merit of the Egyptian Geological Survey (1996), and the Distinguished Career Award of the American Quaternary Association (2002).

Cross-References

- ▶ African Stone Age
- ▶ Dating Techniques in Archaeological Science
- ▶ Geoarchaeology
- ▶ Paleoindians
- ▶ Peopling of the Americas
- ▶ Radiocarbon Dating in Archaeology

Further Reading

Haynes, C.V., Jr. 1967. Carbon-14 dates and Early Man in the New World. In *Pleistocene extinctions: The search for a cause*, ed. P.S. Martin and H.E. Wright Jr., 267–286. New Haven: Yale University Press.

Haynes, C.V., Jr. 1970. Geochronology of man-mammoth sites and their bearing upon the origin of Llano Complex. In *Pleistocene and recent environments of the Central Plains*, ed. W. Dort Jr. and A.E. Johnson, 77–92. Lawrence: University of Kansas Press.

Haynes, C.V., Jr. 1975. Pleistocene and recent stratigraphy. In *Late Pleistocene environments of the southern High Plains*. Publication of the Fort Burgwin Research Center 9, ed. F. Wendorf and J.J. Hester, 57–96. Taos: Fort Burgwin Research Center.

Haynes, C.V., Jr. 1982. The Darb El-Arba'in Desert: A product of Quaternary climatic change. In *Desert*

landforms of southwest Egypt: A basis for comparison with Mars. NASA CR-3611, ed. F. El-Baz and T.A. Maxwell, 91–117. Washington, DC: NASA.
Haynes, C.V., Jr. 1985. Mastodon-bearing springs and late Quaternary geochronology of the Lower Pomme de Terre Valley, Missouri. Special Paper 204. Boulder: Geological Society of America.
Haynes, C.V., Jr. 1990. The Antevs-Bryan years and the legacy for Paleoindian geochronology. In *Establishment of a geologic framework for paleoanthropology.* Special Paper 242, ed. L.F. Laporte, 55–68. Boulder: Geological Society of America.
Haynes, C.V., Jr. 1992. Contributions of radiocarbon dating to the geochronology of the peopling of the New World. In *Radiocarbon after four decades: An interdisciplinary perspective*, ed. R.E. Taylor, A. Long, and R.S. Kra, 355–374. New York: Springer.
Haynes, C.V., Jr. 1993. Clovis-Folsom geochronology and climatic change. In *From Kostenki to Clovis: Upper Paleolithic – Paleo-Indian adaptations*, ed. O. Soffer and N.D. Praslov, 219–236. New York: Plenum Press.
Haynes, C.V., Jr. 1995. Geochronology of paleoenvironmental change, Clovis type site, Blackwater Draw, New Mexico. *Geoarchaeology* 10: 317–388.
Haynes, C.V., Jr. 2001. Geochronology and climate change of the Pleistocene-Holocene transition in the Darb el Arba'in Desert, eastern Sahara. *Geoarchaeology: An International Journal* 16: 119–141.
Haynes, C.V., Jr., T.A. Maxwell, D.L. Johnson, and A. Kilani. 2001. Acheulian sites near Bir Kiseiba in the Darb el Arba'in Desert, Egypt: New data. *Geoarchaeology: An International Journal* 16: 143–150.

Head, Lesley M.

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Basic Biographical Information

Professor Lesley Head is an Australian geographer who grew up in Melbourne, Victoria, and completed her Higher School Certificate in 1974. She completed a B.A. (Hons) at Monash University in 1979 and her Ph.D. in 1984. She worked briefly for the Australian Bureau of Statistics, and as a tutor in geography at Monash University, before taking up a lectureship at the University of Wollongong in 1987. She was Coordinator of the GeoQuEST Research Center from 2000 to 2005 and Head of the School of Earth and Environmental Sciences from 2007 to 2009.

Professor Head's research – focused on long-term changes in the Australian landscape and the interactions of both prehistoric and contemporary peoples with these environments – has positioned her as an international leader in geographic debates about the relationship between humans and nature. Her work is multidisciplinary and draws on concepts and analytical methods from physical geography, archaeology, and cultural geography. Her Ph.D. and early postdoctoral work focused on terrestrial pollen records to reconstruct Aboriginal landscapes, with significant contributions to archaeological research in southwestern Victoria and Australian prehistory.

Professor Head was the first Australian to be appointed the King Carl Gustaf XVI Visiting Professor of Environmental Science, taken up at Kristianstad University, Sweden, in 2005–2006. The international eminence of her work was also recognized when she was among the first group of Australian Research Council (ARC) and Australian Laureate Fellows announced in 2009.

Major Accomplishments

Central to Head's intellectual contributions is the concept – and challenge – of coming to terms with landscapes that have been peopled for many thousands of years. Although it is now widely understood that human influences pervade all Earth surface processes, ideals of pristine past landscapes without people continue to dominate environmental management. Head's scholarship has focused on articulating, then finding ways to overcome, these contradictions. Her theoretical contributions are grounded in the empirical findings of fieldwork projects across tropical, temperate, arid, and urban Australia. Her early work made significant contributions to knowledge through study of the social and ecological dimensions of Aboriginal fire and implications for vegetation change; prehistoric and contemporary Aboriginal

interactions with East Kimberley landscapes; and the pioneering study of stick-nest rat nests as evidence for vegetation and climate change in arid Australia.

Professor Head's recent work has been mostly in cultural geography, where she has continued her work on nature/culture interactions, and human-plant relations, in more contemporary time frames. Projects have included research on backyard gardens, wheat, and invasive plants. Head is Founding Director of the Australian Center for Cultural Environmental Research (AUSCCER), established in 2009 and funded by her ARC Laureate Fellowship and the University of Wollongong. AUSCCER aims to make significant conceptual, methodological, and practical contributions in conceptualizing the cultural environment and advancing cultural research for environmental sustainability.

Professor Head's professional service includes President of the Australian Quaternary Association (1989–1991); President Australia, NZ, and SW Pacific Subcommission, INQUA Holocene Commission (1995–1999); Chair Australian Academy of Science National Committee for Geography (2006–2008); and President and Vice-President Institute of Australian Geographers (2006–2011). Professor Head is a Fellow of both the Australian Academy of Humanities and the Australian Academy of Social Sciences.

Cross-References

- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Landscape Archaeology

Further Reading

Head, L. 1987. The Holocene prehistory of a coastal wetland system: Discovery Bay, south-eastern Australia. *Human Ecology* 15: 435–463.

Head, L. 1989. Prehistoric Aboriginal impacts on Australian vegetation: An assessment of the evidence. *Australian Geographer* 20: 36–45.

Head, L. 1996. Rethinking the prehistory of hunter-gatherers, fire and vegetation change in northern Australia. *The Holocene* 6: 501–507.

Head, L. 2000a. *Cultural landscapes and environmental change*. London: Arnold.

Head, L. 2000b. *Second nature. The history and implications of Australia as Aboriginal landscape*. Syracuse: Syracuse University Press.

Head, L. 2008. Is the concept of human impacts past its use by date? *The Holocene* 18: 373–377.

Head, L. 2009. Cultural landscapes. In *Oxford handbook of material culture studies: Chapter 17*, ed. D. Hicks and M. Beaudry. Oxford: Oxford University Press.

Head, L.M., and R.L.K. Fullagar. 1997. Hunter-gatherer archaeology and pastoral contact: Perspectives from the northwest Northern Territory, Australia. *World Archaeology* 28 (3): 418–428.

Head, L., and P. Muir. 2007. *Backyard. Nature and culture in suburban Australia*. Wollongong: University of Wollongong Press with Halstead Press.

Head, L., J. Atchison, and R. Fullagar. 2002. Country and garden: Ethnobotany, archaeobotany and Aboriginal landscapes near the Keep River, northwestern Australia. *Journal of Social Archaeology* 2: 173–196.

Head, L., J. Atchison, and A. Gates. 2012. Ingrained. *A human bio-geography of wheat*. Aldershot: Ashgate.

McCarthy, L., and L. Head. 2001. Holocene variability in semi-arid vegetation: New evidence from *Leporillus* middens from the Flinders Ranges. *The Holocene* 11: 681–689.

Head-Smashed-In Buffalo Jump

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Introduction

Over four million years of evolution as hunters, nothing in human history compares to the amount of food obtained at one "buffalo jump" on the Great Plains of North America. Elsewhere, animals much larger than the bison have been hunted for food – mammoth, rhinos, giraffes, elephants, and whales – but usually just one at a time. But in the great communal hunts, many groups of Plains hunters would cooperate to bring down as many as a hundred bison. At the conclusion of a typical successful

jump, something in the range of about 60,000 kg of meat, fat, hide, and bone lay at the bottom of a cliff.

Hundreds of mass bison kill sites have been found in the western United States and Canada; some are yet to be discovered, still more have been swept from the land by erosion, cultivation, and settlement. Of all that are known, perhaps the most imposing, perfectly designed, consistently executed, and lethal buffalo jump is Head-Smashed-In. It has been recognized as a Provincial Historical Resource in Alberta, a National Historic Site in Canada, and a UNESCO World Heritage Site as the premier example of a buffalo jump in North America.

Definition

Head-Smashed-In Buffalo Jump is located in southwestern Alberta, Canada, about 160 km south of the city of Calgary and 20 km west of the town of Fort Macleod (Fig. 1). It lies directly east of the Rocky Mountains, at the very southern terminus of a linear set of rolling uplands known as the Porcupine Hills, with the immense edge of the northern Plains to the east. Tracking herds of bison on the open prairie would have been a daunting exercise, but the rolling, broken country surrounding Head-Smashed-In is ideal for rounding up and moving herds of grazing animals. The hills also attract large numbers of herbivores, thanks to the great amount of dependable water, the shelter of valleys and occasional groves of trees, and the rich, nutritious rough fescue and blue grama grasses. The combination of these features leading to sheer sandstone cliffs almost always guaranteed a successful hunt.

The total area of land figuring into the Head-Smashed-In Buffalo Jump complex is vast, covering some 40 km^2. This includes the massive natural basin of the Porcupine Hills that lies to the west side of the jump, dozens of individual lines of small stone cairns (rock piles) that formed the drive lanes along which the bison were herded, the cliff itself, the kill site below the cliff, plus an extensive prairie whereon the spoils were butchered and processed.

Head-Smashed-In Buffalo Jump, Fig. 1 Location of Head-Smashed-In Buffalo Jump in southwestern Alberta, Canada

Key Issues

The Basin

Directly west of the jump extending toward the mountains is a huge collecting basin where the bison were rounded up (Reeves 1978). It is a natural bowl-shaped landform with a number of tributary basins that feed into the main basin, mostly from the north side, adding additional territory from which bison could be harvested to bring to the jump. The complex topography of the basin produced a landscape ideally suited for hunters to use in hiding, running, maneuvering, and orchestrating the events of the kill. A small stream draining the main basin provides water for hunters and bison alike. The almost perfectly formed gathering basin at Head-Smashed-In was the single most important factor in making this site perhaps the most productive of all known buffalo jumps, because it directed herds located in the region to the kill.

The Drive Lanes

Long lines of rock piles used at many bison kills to funnel the animals in the desired direction are called "drive lanes." Although farming has disturbed some of the rock lines at Head-Smashed-In, many remain intact. More than two dozen lanes have been identified and mapped, some extending as much as 8 km from the kill site (Reeves 1978; Rollans 1987). Today the lanes consist of small clusters of rocks that are rarely a foot high. It is unlikely that the rock piles were ever higher; rather, their role in directing herds of bison was derived from the addition of other materials to the rock piles: stacks of buffalo chips (dung), clumps of overturned sod, and especially branches of trees and brush that were likely wedged between the rocks (Brink and Rollans 1990). The purpose of the rock piles may have been twofold: to serve as a permanent marker for the proper direction of the drive to the cliff and as a place to anchor brush and branches that made the structures more imposing, more visible, and perhaps more like human beings.

The Cliff

The cliff that formed the jump-off faces east, as do many other bison kills in the area. Winds prevail from the west, so having the kill located downwind from the direction of the drive helped to hide the scent of hunters waiting at the site. The cliff at Head-Smashed-In is currently about 10 m high (Fig. 2). But windblown soil, bedrock topple, decayed vegetation, and bones of bison have gradually accumulated on the narrow bench below the cliff. The deepest excavations at the kill site recovered artifacts and bison bones nearly 10 m below the current surface (Reeves 1978). Thus, when the site was first used some 5700 years ago,

Head-Smashed-In Buffalo Jump, Fig. 2 The cliff at Head-Smashed-In and the bench below where the killing and initial butchering was conducted. (Courtesy Royal Alberta Museum)

bison were falling a considerably greater distance, so the fall was probably lethal. As debris accumulated at the base of the cliff over millennia, the drop became shorter, meaning that more animals had to be dispatched at the bottom of the cliff.

The Kill Site

Slump and bedrock topple has formed a narrow bench that parallels the north–south trend of the cliff (Fig. 2). This bench was the kill site, where the bison slammed into the hard earth, wounded animals were finished off, and initial butchering of their carcasses took place. An average buffalo jump may have involved some 50–100 animals (Frison 1991). This represented an enormous butchering task. The carcasses would spoil quickly if steps were not taken to process the meat and fat. The mound of carcasses was pulled apart, the thick hides of the bison removed and their stomachs opened to remove the heat-generating gastric fluids. With this accomplished, carcasses would cool down much more quickly. Individual bison were then cut into manageable pieces and loaded on the hides. These carcass portions were then dragged down slope to the prairie for the next step in the rendering procedure.

The Butchering/Processing Site

To the east of the Head-Smashed-In kill site, the ground slopes down sharply for about 100 m, then levels off into a broad prairie. This region served as an immense butchering area (Brink and Dawe 1989). Most likely, the piles of disarticulated pieces of bison carcasses were rendered into a variety of food products here. It was critical to treat the animal remains in ways that ensured long-term preservation, or the great effort of the communal drive would have been in vain. Drying was the most common preservation method. Meat and fat were cut into thin sheets and hung from wooden racks to be dried by the incessant winds of the Plains. Meat was also smoked over damp fires to reduce moisture further and to impart chemicals from smoke that aid preservation. Meat dried thus would last for weeks and months and was also much lighter to carry away from the site.

A great deal of cooking was also conducted at the Head-Smashed-In butchering site. A favorite cooking technique was to dig pits into the prairie soil and line them with a fresh bison hide (fur side out) filled with water. Rocks heated in a nearby fire were placed in the pits to bring the water to a boil. Many types of soups and stews were made in this manner. Roasting was also popular. Deep pits were lined with slabs of rock, meat wrapped in vegetation placed inside, and a fire made on the surface above. Left for many hours, the meat cooked in its own juices and was said to be a rare treat.

Archaeological studies of the butchering area have uncovered countless fireplaces, literally tons of stones used for boiling and dozens of roasting and boiling pits. Thousands more are estimated to remain at the site (Brink and Dawe 1989, 2003).

Future Directions

The future of Head-smashed-In Buffalo Jump lies more with public interpretation than with continuing archaeological research. In 1987 a 10,000 square foot interpretive center opened, funded, and operated by the Alberta government. The Head-smashed-In Buffalo Jump Interpretive Centre (Fig. 3) has since welcomed nearly three million visitors. It is built into the sandstone bedrock cliff and contains five levels of interpretive displays as well as a theater, gift shop, cafeteria, and administration areas. With 90% of the building underground, Head-Smashed-In preserves the vistas and the sense of the jump at the time it was being used.

From its inception, Head-Smashed-In was intended to be inclusive of contemporary Aboriginal people. Members of the local Blackfoot Nation played important roles in the planning and development of the site as well as on the archaeological digs. Blackfoot people continue to advise on the operation of the site and still make up most of the staff (Brink 1992; Slater 2006).

Annual visitation in 2016 was about 60,000 people. However, this number has been declining for more than a decade, so directions for the future

Head-Smashed-In Buffalo Jump, Fig. 3 The seven-story interpretive center built into the cliff at Head-Smashed-In. (Courtesy Head-Smashed-In Buffalo Jump Interpretive Centre)

at the site are aimed at reclaiming visitation. A major renovation to the building is planned, a number of new exhibits are now in place, and a process of renewing and replacing old exhibits continues.

While no archaeological research has been conducted at the site since the mid-1990s, there are continuing discussions with a local university to operate a field school program at the site. If this happens, it will mirror previous digs in that it will intentionally be placed in an area of the site accessible to the public, thus serving as an interpretive display as well as a research project.

Head-Smashed-In celebrates the astonishing skill, ingenuity, knowledge, sophistication, and spiritual power that went into a successful buffalo jump. The interpretive center is open year round. For information visit: http://www.head-smashed-in.com/

Cross-References

Canada: World Heritage
Heritage Museums and the Public
Heritage Tourism and the Marketplace
Hunter-Gatherers, Archaeology of
North American Plains: Geography and Culture

References

Brink, J. 1992. Blackfoot and buffalo jumps: Native people and the head-smashed-in project. In *Buffalo*, ed. J. Foster, D. Harrison, and I.S. MacLaren, 19–43. Edmonton: University of Alberta Press.

Brink, J., and B. Dawe. 1989. *Final report of the 1985 and 1986 field season at head-smashed-in buffalo jump, Alberta*, Archaeological survey of Alberta manuscript series. Vol. 16. Edmonton: Archaeological Survey of Alberta.

Brink, J., and B. Dawe. 2003. Hot rocks as scarce resources: The use, re-use and abandonment of heating stones at head-smashed-in buffalo jump. *Plains Anthropologist* 48: 85–104.

Brink, J., and M. Rollans. 1990. Thoughts on the structure and function of drive lane systems at communal buffalo jumps. In *Hunters of the recent past*, ed. L.B. Davis and B.O.K. Reeves, 152–167. London: Unwin Hyman.

Frison, G.C. 1991. *Prehistoric hunters of the high plains*. 2nd ed. San Diego: Academic Press.

Reeves, B.O.K. 1978. Head-smashed-in: 5500 years of bison jumping in the Alberta Plains. *Plains Anthropologist Memoir* 14: 151–174.

Rollans, M. 1987. *Interpreting the function of bison drive lanes at head-smashed-in Buffalo Jump, Alberta*. Unpublished MS dissertation, University of Alberta.

Slater, B. 2006. *Blackfoot consultation and head-smashed-in Buffalo Jump Interpretive Centre*. Unpublished MA dissertation, University of Newcastle.

Further Reading

Brink, J. 2008a. *Imagining head-smashed-in: Aboriginal buffalo hunting on the Northern Plains*. Edmonton: Athabasca University Press.

Brink, J. 2008b. Head-smashed-in buffalo jump and interpretive site. In *Archaeology in America, an encyclopedia*, Midwest and Great Plains/Rocky Mountains, ed. F.P. McManamon, vol. 2, 238–241. Westport: Greenwood Press.
Darragh, I. 1987. The killing cliffs. *Canadian Geographic* 107: 55–61.
Fagan, B. 1994. Bison hunters of the Northern Plains. *Archaeology Magazine* 47: 37–41.
Pringle, H. 1988. Boneyard enigma. *Equinoxe*: 87–103.
Pringle, H. 1996. Killing fields: Head-smashed-in buffalo jump, Alberta. In *In search of ancient North America*, ed. H. Pringle, 149–167. New York: John Wiley and Sons.
Reeves, B.O.K. 1983. Six millenniums of buffalo kills. *Scientific American* 249: 120–135.
Thomas, D.H. 2000. Head-smashed-in buffalo jump. In *Exploring native North America*, ed. D.H. Thomas, 52–61. Oxford: Oxford University Press.

Hedges in Historical Archaeology

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Brief Definition of the Topic

Hedges are field boundaries composed of lines of managed shrubs, often growing on a bank and accompanied by a ditch. They are found throughout Britain, and in many parts of lowland Europe including central and western France, the southern Low Countries, and parts of Germany. To serve their primary function, as stock-proof barriers, hedges need to be maintained or else they will develop into a line of disconnected trees and shrubs. In some areas they were, in English parlance, *layed* or *plashed*: the hedge was cut back rigorously but some of the principal stems were allowed to remain, cut roughly three quarters of the way through and bent downward at an angle of 60° or more so that each "pleacher" (as they were usually termed) overlapped its neighbor. In the spring, when growth resumed, a thick, impenetrable wall of vegetation was created. Elsewhere hedges were simply *coppiced*, like the understorey in traditionally managed woods: that is, their constituent shrubs were cut down to a point at or near ground level at intervals of between 10 and 20 years. Some local traditions combined elements of both practices.

In England, where most research has been undertaken, hedges of the eighteenth and nineteenth centuries tend to be composed mainly of hawthorn or blackthorn, while older examples contain a range of shrubs, including ash, maple, hazel, dogwood, holly, oak, elm, and hornbeam, depending on soil and climate. In the 1960s, Max Hooper suggested that the difference reflected the fact that these older hedges had originally been planted with a single species but had gradually been colonized by new ones. He further argued, on the basis of a large amount of field survey and documentary research, that this occurred at a relatively steady rate and that a hedge could therefore be approximately dated by counting the number of species it contained in a standard 30-m length, hedges acquiring, on average, one new species per century. Recent research has suggested that the "Hooper Hypothesis" is unreliable for a number of reasons, and especially because in the period before the eighteenth century hedges were usually *planted* with a range of species, in part because of the difficulty of obtaining hedging thorn but mainly because, as well as serving as boundaries, hedges were also regarded as an important source of fuel and fodder.

During the twentieth century, vast numbers of European hedges were neglected or removed. They were no longer needed as a source of fuel; agricultural mechanization and the development of specialized arable farming rendered them redundant and inconvenient in many areas; while even in livestock districts the development of barbed wire in the mid-nineteenth century provided a less labor-intensive method of constraining livestock. In many areas, hedges are now largely retained because of their importance as wildlife habitats and as elements of cultural landscapes.

Cross-References

▶ Agrarian Landscapes of the Historic Period
▶ Estate Landscapes in Historical Archaeology

Further Reading

Barnes, G., and T. Williamson. 2006. *Hedgerow history: Ecology, history and landscape character*. Macclesfield: Windgather Press.
Paillet, A. 2005. *Archaeologie de l'agriculture moderne*. Paris: Errance.
Pollard, E., M.D. Hooper, and N.W. Moore. 1974. *Hedges*. London: Collins.

Hellenistic and Roman Anatolia, Archaeology of

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Introduction

Anatolia, literally "the land of the sunrise" and constituting the Asiatic part of modern Turkey, is a very important peninsula for the birth and transmission of various cultures and peoples (Fig. 1). During the Hellenistic and Roman periods (roughly 300 BCE to 300 CE for present purposes), many cultures such as the Persians, Macedonians, Greeks, and Romans passed through Anatolia and had constant contact with indigenous peoples like the Lydians, Lycians, Phrygians, Pisidians, Cappadocians, and Paphlagonians. The encounter of the new cultures with indigenous peoples paved the way for new transformations and developments in Anatolia's cultural history, which can be defined as "acculturation." The archaeologists of the Hellenistic and Roman periods of Anatolia have been investigating, in the first 12 years of the twenty-first century, this phenomenon of encounter among different cultures and have been posing new scientific questions.

Definition

In the last 150 years, it seems that Anatolian archaeology has been marked by the study and documentation of ancient Greek and Roman cultures, as Western scholars specializing in natural and physical sciences recognized these as incontinuity with the cultures in Greece and Italy. The material elements of Greek culture arrived in Anatolia in abundance after the conquests of Alexander the Great, which introduced the Hellenistic period (after 330 BCE), and after increased Roman intervention, which began in the late second century BCE. Yet, Anatolian archaeology has reached a new stage due to the decipherment of indigenous Anatolian cultures and their written records through comparative linguistic and philological studies employed since the early twentieth century. Cultures like prehistory, antiquity, and medieval and modern periods that encompass the Seljuqs, Emirates, and Ottomans come under archaeological and scientific study, documentation of Anatolian archaeology seems daily to exceed the chronological limits of antiquity and illuminate a wide time span, as attested by numerous new finds.

Historical Background

Research on the Hellenistic and Roman periods of Anatolian antiquity started with the observations of various travellers such as Ibn Battuta in 1333 and Ciriaco di Pizzicolli, a merchant of Ancona between 1430 and 1452. The monuments in the Anatolian land were discovered by monks and pilgrims on their way to the Holy Land, and in 1555 Ogier Ghiselin de Busbecq, the Austro-Hungarian ambassador to Istanbul, deciphered the bilingual Greek and Latin text of *Monumentum Ancyranum* inscribed on the walls of the temple of Mên (Fig. 2). The text, often known today as the *Res Gestae* of the Roman emperor Augustus, contains the personal account of the deeds and wars of Augustus Octavian through the transition from Republic to Empire. Two noteworthy names in the epigraphic studies

Hellenistic and Roman Anatolia, Archaeology of, Fig. 1 Map of Asia Minor. (Modified from van Kampen 1956)

Hellenistic and Roman Anatolia, Archaeology of, Fig. 2 The temple of Mên with Latin and Greek texts of *Res Gestae Divi Augusti* in Ankara (*Monumentum Ancyranum*, first c. CE). (Photo by author)

for ancient Greek and Latin inscriptions are Philippe le Bas and William Henry Waddington.

European and American researchers started to excavate archaeologically promising spots in Turkey in the second half of the nineteenth century; however, it is not possible to claim that all these excavations targeting a variety of purposes were the fruits of an academic spirit. The British Museum was in fierce rivalry with the Louvre for the procurement of antiquities at that time.

This rivalry spread to encompass the museums of Berlin and Vienna.

It was in this context that Troy and Heinrich Schliemann became inextricably linked. Schliemann's admiration of Homer led him to search for Ilium where the events of the *Iliad* putatively took place. It was in 1868 when he first went to Troas (Biga Peninsula) from Greece where he had recently settled. Inspired by a long discussed theory, he began searching for Troy at Hisarlık Höyüğü and carried out his first excavations in 1870–1873 and then in 1879. In the first expedition he uncovered what he called "Priam's Treasure." This has been the most exciting archaeological find in history, together with Tutankhamun's tomb discovered at the Valley of Kings by Howard Carter in 1922. The discussions regarding whether the discovery of Schliemann was the actual Troy of Homer continued after his death. The claim was fiercely refuted at that time and paved the way for various discussions today. The scientific value of excavations carried out by Wilhelm Dörpfeld in 1893–1894 was to be appreciated much later. This excavation constituted the basis of modern archaeology, which is based on stratigraphy and chronology established from pottery studies.

Pergamum's excavations received no less interest than those at Troy. Their undertaking was shaped by diverse factors characteristic of this period, including diplomacy and politics between Berlin and the Ottoman administration, railway and road constructions in Turkey, Wilhelm II's passion for archaeology, the establishment of the German Archaeological Institute, and many other contemporary trends. These started with the railway constructions carried out by German companies and the removal of the reliefs of Pergamum's Altar of Zeus to Berlin. The excitement that this grand monument aroused paved the way for an accelerating interest in Anatolia. Carl Humann (1839–1896), the so-called pasha of Pergamum, is considered one of the pioneers of archaeology.

When the Prussian professor of archaeology Otto Benndorf was appointed in charge of surveys in Lycia by the Austrian Academy of Sciences, the Austro-Hungarian Empire grasped the chance to enrich its museum in Vienna. Felix von Luschan and Count Lanckoroński joined in these surveys and excavations culminated in the shipment to Vienna of reliefs of the monumental tomb/heroon at Trysa, dated to the fourth century BCE. Benndorf also founded the Austrian Institute of Archaeology in order to conduct excavations at Ephesus.

The career of Osman Hamdi Bey, son of the grand vizier Edhem Pasha, reached its zenith when he was appointed the director of the Imperial Museum in 1881. In addition to founding the Istanbul Archaeological Museum in 1891, he initiated the first Turkish excavations at Nemrut Dağı, at the Hecate temple in Lagina, and at Sidon. The royal *necropolis* that he excavated at Sidon contained the renowned "Alexander's Sarcophagus," the Whining Women Sarcophagus, the Satrap Sarcophagus, the Lycian Sarcophagus, and the Sarcophagus of the Phoenician King Tabnit, which were all brought to Istanbul, together with other sarcophagi and stelae.

Following the foundation of the Republic of Turkey after World War I by Mustafa Kemal Atatürk, H. T. Bossert and H. G. Güterbock contributed to the discipline of archaeology and research by establishing themselves in the young state and by training Turkish scholars. Bossert became a professor at Istanbul University in 1934. Together with his German student Franz Xavier and multilingual Turkish students Bahadır Alkım, Selim Dirvana, Halet Çambel, and Muhibbe Darga, he dedicated himself to the Hittite hieroglyphs, and between 1947 and 1957 he excavated Karatepe in Cilicia, which was to call for great attention in the future.

After World War II, scholars leaving Nazi Germany were invited to Turkey by Atatürk. Before the Nazis came to power in Germany, the German Archaeological Institute had opened its Istanbul branch in 1929, whose first director was Martin Schede until 1938, and the Turkish Historical Society (Türk Tarih Kurumu) was founded in Ankara in 1931. Promising youths were sent to Europe for university education at the demand of Atatürk. Among these students were Sedat Alp and Ekrem Akurgal, both of whom went to Leipzig to learn languages at the Schulpforta

Gymnasium, renowned because Friedrich Nietzsche and Ulrich von Wilamowitz-Moellendorff studied there. After language training, they went to Berlin where Alp became the student of Johannes Friedrich and Akurgal of Gerhart Rodenwaldt. They returned to Turkey in 1940 and 1941.

Key Issues/Current Debates

During the twentieth century, Ekrem Akurgal was among the most experienced representatives of modern Turkish archaeology. His second and third generations of students now direct many important excavations. Within his research covering all Anatolia, he particularly concentrated on the Greek culture in western Anatolia. The disputed and unknown location of Dascyleum, the Persian satrapy center as of the sixth century BCE, was clearly identified by him.

Carl Blegen of Cincinnati University directed the excavations at Troy between 1932 and 1938 and brought it back to the focus of international interest. The excavations were halted by World War II and could only be resumed in 1988 by the prehistorian Manfred Korfmann of Tübingen University. The continuous expedition undertaken until his death in 2005 attained an impressive dimension. A chemical engineer and archaeometrist of Vienna, Ernst Pernicka of Tübingen University succeeded him. As of 2013 the excavations will be led by American scholars and will concentrate on the Hellenistic and Roman phases of the city-state of Ilium, a continuation of ancient Troy.

The German tradition at Pergamum continued with the directors of the German Archaeological Institute in Istanbul after World War II. Longitudinal research at Miletus was conducted by Wolfgang Müller-Wiener, an architectural historian and the director of the German Archaeological Institute at Cairo, and Volkmar von Graeve. When the work was resumed, the most unusual temple under Miletus' hegemony, the temple of Apollo at Didyma, which had been excavated by Theodor Wiegand, came under restudy and restoration by archaeologist Klaus Tuchelt. Architectural researcher Lothar Haselberger noticed the payment lists and plans on the inner walls of the adyton, all incised on marble. Similar drawings identified at Sardis and Priene have shown that ancient architects used the walls and floors as sketchbooks. Following a long hiatus, the excavations at Priene were resumed by Wolf Koenigs, an architectural historian of Munich and director of the German Archaeological Institute in Istanbul, and then continued by the archaeologist Wulf Raeck (Frankfurt). The work in this city by the Maeander River has yielded great information, particularly on ancient urban planning and the development of Greek-Roman house architecture. Another important project of the German Archaeological Institute is Aizanoi in Phrygia (Fig. 3). One of the best preserved temples of Zeus in Roman period Anatolia is found there. The archaeologist Ralf von den Hoff of Freiburg University, who took on the direction of the expedition after Rheidt, is particularly interested in the city's development in the Hellenistic period. As of 2011, the excavations were taken over by Elif Özer of Pamukkale University, and the work in 2012 covered the stage building and the *necropolis* behind the theater.

The grandest focus of the twentieth-century archaeology, which concentrated on the architecture of ancient city-state centers, has naturally been Ephesus. The Austrian Institute of Archaeology conducted excavations between 1895 and 1913 as well as 1926 and 1935 under the direction of Otto Benndorf, Rudolf Heberdey, and Joseph Keil. However, during the hiatus created by World War I and the Greek occupation of western Turkey thereafter, Greek scholars carried out some restoration work at St. John's Church and Virgin Mary's House. After World War II, under the direction of Hermann Vetters until 1987, the Roman period architecture of Ephesus was widely uncovered and reconstructed. The best examples are the houses on terraces and the library. The most important data regarding domestic life in Roman Imperial period provinces comes from Ephesus; the only other sites yielding such information are Pompeii and Herculaneum in Italy. On the other hand, the south gate of the commercial agora and the

Hellenistic and Roman Anatolia, Archaeology of, Fig. 3 Maximum price edict of Roman Emperor Diocletian, CE 301 (Aezani, Phrygia). (Photo by author)

library reconstructed by Friedmund Hueber and Volker Michael Strocka in 1978 provide us with striking evidence regarding the grandeur of life in the capital of province of Asia in the Roman Empire. However, there is a cost to the success of the engineers and architects; intervention in the ruins has led to the damage of some structures of late antiquity. As in many other sites, here too the excavation site has been transformed into something of a construction site, and developments in mass tourism have brought both gains and damages. The largest archaeological park of Turkey, Ephesus continues to grow and develop attracting millions of tourists every year.

Apart from Smyrna there are many other ancient city-states along the Aegean littoral. Though smaller in size, they are of great importance: Nysa and Magnesia by the Maeander River, Claros in Ionia, Teos, Clazomenae (Urla), Phocaea (Foça), Erythrai (Ildırı), and Aigai are some examples. Some stone constructions at Aphrodisias and Sardis, which have been excavated by American teams, have been rebuilt in a similar way to those at Ephesus and Pergamum. The sculpture finds at Aphrodisias are so rich that clearly a school of sculpture was active in Aphrodisias in the Roman Imperial period.

Southwest Anatolia extending between the Maeander and Pamphylia houses numerous ancient cities, monuments, and temples. These include Hierapolis in Phrygia; Iasos in Caria; Patara; Tlos in the upper Xanthus valley; Limyra; Cnidus, located at the westernmost tip of Datça Peninsula; Stratonicea and Lagina; the temple of Carian Zeus Lepsynos in Euromos; the temple of Zeus Labrandeus in the mountainous parts of Caria; the Halicarnassian Mausoleum; Caunus; Arycanda; Xanthus, the capital of Lycia; and the nearby sanctuary of Letoon. A trilingual inscription in Lycian, Greek, and Aramaic has been found at Xanthus, the center of a region with a mixture of Lycian and Greek cultures. This philologically invaluable find can only be compared with a bilingual one in Carian and Greek of a later period found in Caunus.

Eastward along the south coast, the number of sizable excavations is more limited to Perge and Side. Numerous works of sculpture from Perge are accompanied by sculpted marble sarcophagi. Other systematic excavations in Cilicia include Anemurium excavated by Elisabeth Alföldi-Rosenbaum and James Russell (from 1960s to 1980s) and Elaiussa Sebaste excavated by Eugenia Equini Schneider of Roma La Sapienza University since 1995.

Northward and northwestward from Pergamum, there are not many current excavations, except for that at Troy. Recent work has focused on the Athena temple at Assos; Alexandria Troas, founded in the Hellenistic period and turned into a

Roman colony; the temple of Apollo Smintheus; a temple of the Roman Imperial period in Cyzicus; the marble quarry at Marmara Island; Dascyleum; the Persian satrapy center; and the Roman theater in Nicaea (İznik).

As Europeans have traditionally focused on ancient Greek culture and its influence on the architecture and art in the Hellenistic and Roman periods, the central parts of Anatolia have been neglected, with the exception of Hattusha, the Hittite capital. National customs have generally led most scholarly attention toward temples, large roofed structures, theaters, baths, and palaces; thus, most budgets were allocated for such excavations. Hence, systematic study of previous cultures in the country was rendered difficult. However, the British Institute of Archaeology at Ankara (BIAA) founded with the encouragement of Seton Lloyd in 1948 has followed a different course. Although the work that occurred between 1971 and 1978 at certain points in Turkey indicates that the archaeological mentality of the nineteenth-century museums still prevailed, Stephen Mitchell and Anthony W. McNicoll proposed the New Archaeology approach of the British in order to challenge such perspectives. The most successful project of this approach is the one at Aşvan Kale on the south bank of Murat River, which was settled from the Bronze Age through the Middle Ages. David French, the director of BIAA, decided to study the *höyük* and the modern village on its foot, and his efforts culminated in a study exploring the relations between humans and their environment from prehistory to the present. In 1970–1973 he employed the most sensitive sieving techniques and obtained paleobotanic data from this settlement, which contained very infrequent architecture and man-made tools. The purpose was to obtain evidence regarding the living conditions of the concerned period through, for instance, the study of animal bones and carbon samples and then to compare this evidence with the modern village life. The interests of many scholars, however, remained restricted only to the pottery, tools, and architecture, and it took about 30 years for many excavations and surveys in Turkey to adopt the teachings of New Archaeology.

Away from the above-mentioned coastal settlements and in the Central Anatolian Plateau, many excavations of medium and large size are worth noting: Sagalassos in Pisidia, Pessinus in Galatia, and Gordion, the capital of the Phrygians. Amorium, an important Byzantine settlement, has been found in the central part of western Turkey. Similar methods are also employed by joint German-American-Turkish research at Eski Kahta and Nemrut Dağı in Commagene. Elmar Schwertheim, Sencer Şahin, and Jörg Wagner, all students of Friedrich Dörner, attempted to find a path to reach the burial chamber of Antiochus I of Commagene at Nemrut Dağı by using geophysical techniques in 1987–1988 but did not succeed. Dörner, who conducted surveys in Bithynia, founded the Asia Minor Research Center at Münster University in 1968. Under Schwertheim, who succeeded Dörner, this center transformed to a Research Center on Anatolia, focusing on Commagene. The temple of Jupiter Dolichenus at Duluk, which had a worldwide importance in the Roman Imperial period, has been under study and excavation by Engelbert Winter since 2001. Some settlements of Commagene have been flooded under dam lakes – Samosata entirely and Zeugma partially. Rescue excavations were conducted before the dams started to collect water. Rescue excavations at Zeugma have been going on since 1996 as a Turkish-Swiss joint project. Excavation and restoration of Roman villas with gorgeous mosaics are being undertaken by Kutalmış Gökay of Ankara University.

The pioneer of historical geographical surveys in Biga Peninsula was John M. Cook. Philologist Joseph Stauber conducted a study concentrating on Homer's topography in the 1990s. Some surveys in Mysia, Aiolis, and Lydia were aimed mainly at epigraphic research. Already in 1890 the Austrian Academy of Sciences had started compiling inscriptions in Anatolia into an inscription corpus project titled *Tituli Asiae Minoris* (*TAM*). The series, foreseen as a continuation of *Inscriptiones Graecae* published in Berlin, started in 1901 and 1920 when Ernst Kalinka compiled Greek and Lycian inscriptions in Lycia. In Mysia, the environs of Pergamum have come under more detailed study recently. Exploration of Polis Elaia,

the main port of Pergamum, by Felix Pirson has already provided important information on Pergamene history and the historical topography of its environs. The historian Walter Voigtländer and the archaeologist Hans Lohmann conducted surveys in the environs of Miletus in the 1980s and 1990s. In addition Lohmann also surveyed Mt. Mycale facing Samos and discovered many new settlements.

Caria gained in popularity for surveys after World War II: Louis Robert was one of the researchers interested in this region. Besides Amyzon and Tabai, Robert explored Milas as well. George E. Bean explored southwest of Anatolia between 1946 and 1952 and published books on philology and guidebooks. Swedish Paavo Roos prepared a fundamental work on the typology of rock tombs in Caria in the 1960s. About the same time Wolfgang Radt, who would later become the director of Pergamene excavations, was exploring remains of Lelegian settlements in the Halicarnassian Peninsula. A Turkish-French team of Pierre Debord (Bordeaux) and Ender Varinlioğlu (Ankara) as well as Wolfgang Blümel of Köln University collected much data regarding the written works and historical topography of west and south Caria. The Heraclea region in Beşparmak (ancient Latmos) Mountains has been surveyed by Anneliese Peschlow-Bindokat for many years as part of a multidisciplinary project. The Carian-Lycian border region in the Gulf of Fethiye is now under investigation by Hans Lohmann and Werner Tietz, who are conducting new research on the topography and archaeological finds.

In recent years Lycia has been more extensively studied by international research projects. Research work on Byzantine Lycia and Pamphylia by Hansgerd Hellenkemper and Friedrich Hill was published as the eighth volume of *Tabula Imperii Byzantini* (*TIB*). The region was formerly surveyed by Martin Harrison and George Bean as well. Oinoanda, a small city in north Lycia, has a sizable reputation in academia thanks to a long inscription of importance in the history of philosophy. Discovered in the late nineteenth century, the text narrates the teachings of a local Epicurean from the Roman Imperial period about what he had learned from his teacher. Thomas Corsten of Vienna University currently conducts surveys in Cibyratis, another northern neighbor. Bülent İplikçioğlu conducted epigraphical surveys over the last twenty years in some parts of Lycia.

Surveys in south Lycia by the architectural historian Wolfgang Wurster and epigrapher Michael Wörrle are a pioneer of their kind. Wurster studied and compared a series of cities of various sizes, while Wörrle studied and published the incredibly rich epigraphic materials found shedding light onto the history and geography of entire Lycia. The Kyaneai project conducted by Frank Kolb of Tübingen in the 1990s has cast much light onto the quantitatively and qualitatively important finds of this city in central Lycia. The project compiled data for relations between the mother city and its agricultural settlements. Kolb's students have initiated lesser projects of the same framework. These are, for instance, Andreas Thomsen's architectural studies at Avşar Tepesi, Christina Kokkinia's re-transliteration of the Opramoas inscription in Rhodiapolis, and Martin Zimmermann's and Christoph Schuler's research at Teimiussa, Phellos, and Tyberissos. Thomas Marksteiner of Austria has conducted surveys in the area facing Limyra where he had conducted excavations. Sencer Şahin and Mustafa Adak currently survey the border region between east Lycia and Pamphylia while studying the topography and epigraphic evidence through the place names in the *Stadiasmus Patarensis* inscription.

British researchers have been heavily engaged in the region extending from north of Lycia into central Anatolia. The then newly founded American Society for Archaeological Research in Asia Minor encouraged research trips and surveys in the area extending from Rough Cilician coasts to Phrygia and environs in the latter half of the 1920s and 1930s. As per its newly introduced research method, each surface find was photographed and descriptions written, which were published in *Monumenta Asiae Minoris Antiqua* (*MAMA*). More than 1,200 texts copied were finally published in MAMA IX and X by Barbara Levick, Stephen Mitchell, et al. The *Classical Atlas of Asia Minor* published by Bean and Calder

Hellenistic and Roman Anatolia, Archaeology of, Fig. 4 Temple of Zeus Olbios in Diocaesarea in Cilicia Trachea (3rd c. BCE). (Photo by author)

via BIAA is the product of these surveys as well. BIAA supported field research has covered the cities of Antioch in Pisidia, Cremna, Sagalassos, and Ariassos and some agricultural settlements under the direction of Stephen Mitchell between 1982 and 1996. Taking into consideration the research carried out by Bean, Hall, Balance, Mitford, and French, it can be said that Pisidia is a "BIAA region."

Emilie Haspels, continuing in the footsteps of Ramsay, published the first comprehensive study on the rock monuments in Midas City, *The Highlands of Phrygia: Sites and Monuments* in 1971. Louis Robert and Georges Radet are among epigraphers who concentrated on this extensive region. Marc Waelkens has studied in detail the grave stelae called "door-stones," particularly those from Phrygia. Results of epigraphic studies on Dorylaeum (modern Eskişehir) by Peter Frei during the 1980s and 1990s will be published as a volume of *Tituli Asiae Minoris*.

Michael Gough followed W. M. Ramsay and H. Swoboda, who did research in Lycaonia, and studied the Alahan Monastery and the churches in Rough Cilicia between 1952 and 1972. In addition Gough undertook the surveys in Anazarbos (Anavarza). Serra Durugönül, who founded the Research Center for Cilician Archaeology at Mersin University, explored the towers and settlements. In Rough Cilicia Levent Zoroğlu from the University of Konya carried out the excavations in Kelenderis over thirty years. Yusuf Boysal from the University of Ankara/Konya began in the middle of the twentieth century with research into the Zeus Olbios temple in Uzuncaburç (Fig. 4). Detlev Wannagat from the University Rostock continued this research until 2006 (Fig. 5). Recently Emel Erten from Gazi University conducted an archaeological survey and newly carried out new excavations in the ancient city of Olba concerning the Hellenistic architecture. In Rough Cilicia Ümit Aydınoğlu from the University Mersin conducted surveys in Kanytellis (=Kanlıdivane) on the *necropolis*. The first city of Cilicia Plain on the west is Soloi/Pompeiopolis, which has been excavated by Remzi Yağcı over the past 15 years. The results on the columned street from the Roman Imperial time are remarkable. Finally, Friedrich Hild and Hansgerd Hellenkemper conducted a longitudinal survey covering the entire region which was rich in the Late Antique and Early Byzantine remains and published their finds in the fifth volume of *TIB* (1990). All the epigraphic work from the 1930s to 1980s was compiled in two volumes of *MAMA*, several reports, and a monograph. New surveys by historian Mustafa Hamdi Sayar of Istanbul University have found numerous inscriptions. Sayar has also identified the Karasis Fortress which was unknown until recently (Fig. 6). Built

in the Seleucid period, the fortress has been studied by an interdisciplinary team under the direction of Sayar and Adolf Hoffman from the German Archaeological Institute, the Department of Istanbul and prepared for publication. Since 1990, Sayar has also documented monuments of the Roman Imperial period and Late Antiquity in Anazarbos (Fig. 7), the largest city in the Cilician Plains, with an interdisciplinary team under Richard Posamentir from the German Archaeological Institute. The first volume on the ancient inscriptions from this city has been published, and the second volume is under preparation. In addition, Sayar studied and published on the sites of Hierapolis-Castabala and Uzunoğlan Tepesi with Ralph Christian Rosenbauer while he was researching the area of hegemony of the former pirate Tarcondimotus who was active in the late Hellenistic period (Fig. 8). He also investigated the cities of Mallus and Magarsus in the Karataş region with Ralph Christian Rosenbauer from the University of Bern. Mopsuhestia on the Ceyhan River, which was known as Epiphania and located to the north of the Gulf of İskenderun, was among the Hellenistic and Roman cities of Cilicia explored by Sayar. The Cilician capital Tarsus (Fig. 9) and settlements in its environs constitute an important part of Sayar's surveys. The road network concerning these cities and milestones on them have also been explored (Fig. 10).

Hellenistic and Roman Anatolia, Archaeology of, Fig. 5 The monumental tomb in the south of Olba in Cilicia Trachea, probably the monumental tomb of the last Seleucid King (1st c. BCE). (Photo by author)

Cappadocia seems to be poorer in finds. The border region between the Black Sea and Cappadocia, literally between Trabzon and Commagene, as separated by the Euphrates, has

Hellenistic and Roman Anatolia, Archaeology of, Fig. 6 Karasis Lower Fortress, Seleucid fortress in the Taurus Mountains in east Cilicia (2nd c. BCE). (Photo by author)

Hellenistic and Roman Anatolia, Archaeology of, Fig. 7 Anazarbos, metropolis of Cilicia Plain, monument with three arches from the Roman Imperial period (2nd c. CE). (Photo by author)

Hellenistic and Roman Anatolia, Archaeology of, Fig. 8 Uzunoğlan: Temple of Thunderbolt God on Uzunoğlan Hill in east Cilicia from the Roman Imperial period (1st or 2nd c. CE). (Photo by author)

been under the monopoly of British scholars since Biliotti (1874) and Hogarth (1894). David French, a prehistorian from the family and long-time director of BIAA, studied the Roman road network and milestones in entire Anatolia while publishing numerous inscriptions. His last publication was a compilation of inscriptions from Sinope. The most important surveys in the interior of north Anatolia were carried out at Sebastopolis and the Central Black Sea region. Sebastopolis was studied by Bernard Rémy, director of École française d'Istanbul, while the historian Eckart Olshausen of Stuttgart surveyed the Central Black Sea region. The most noteworthy finds in this area and neighboring Paphlagonia are the rock tombs, which the archaeologist Robert Fleischer has recently studied. Work by Hubertus von Gall has been insufficient to document uncountable monuments in Paphlagonia, and the gap in this area has been filled by the doctoral dissertation in Turkish of F. Eray Dökü, which lists all the rock monuments of Paphlagonia. Christian Marek conducted 19 epigraphic surveys in north Anatolia from 1983 to 2009. He has been studying the epigraphy of Pompeiopolis together with his team as of 2006.

Hellenistic and Roman Anatolia, Archaeology of, Fig. 9 The fundament of the Roman Temple Donuktaş in Tarsus; built probably under Roman emperor Hadrian; the largest Temple of Asia Minor

Hellenistic and Roman Anatolia, Archaeology of, Fig. 10 Roman road between Tarsus, metropolis of Cilicia, and Pylai Kilikiai near Sağlıklı. (3rd–4th c. CE)

Bithynia on the western tip of north Anatolia is quite behind the Aegean and Mediterranean regions with respect to surveys and finds. There are several local projects on the topography and epigraphy of the region, but the most comprehensive one is that by Karl Dörner and Sencer Şahin. Dörner compiled and studied all the epigraphic material of Bithynia except for Chalcedon (Kadıköy) and published it in the fourth volume of *TAM* (1978). Şahin's surveys cover Nicaea, the largest city of the region. In addition to compiling the texts from this city, he has also encouraged and supported the work on Prusias ad Hypium, Cius, Apamea, and Bithynion/Claudiopolis.

International Perspectives

Recently a new phase in Anatolian archaeology has been marked by the increasing numbers of excavations at ancient Greek and Roman sites as well as settlements and fortifications of the Middle Ages in addition to the East Roman (otherwise known as Byzantine) sites. Not only the indigenous Anatolian cultures, which include the Hittites, Urartians, Phrygians, Lydians, Lycians, and

Galatians, but also incoming cultures that settled in Anatolia, such as Assyrians, Persians, and Sassanids, have been studied in detail in recent years.

Future Directions

Following World War II, fieldwork other than excavations underwent transformation. There were no more travellers riding on horseback. Now suitable motor vehicles are used, thus covering larger areas. "Voyage" is replaced by "survey." This new term is used in the sense of studying large areas focusing on certain material groups. In time new and complex methods have been developed. In comprehensive surveys a single researcher may examine intensively a small area, or a group of researchers may share the site according to a plan and thus cover wider areas. Thus, it becomes easier to study larger areas and to reach architectural remains and all types of scattered surface finds.

Regarding the Greek-Roman civilization on the southern shores of the Black Sea, it is striking that the region has been greatly neglected in terms of academic studies. After the excavations at Sinope by Akurgal and Budde, the first projects worth noting are those at Pompeiopolis by Latife Summerer of Kastamonu University and at Hadrianopolis in Eskipazar by Vedat Keleş of Atatürk University in Erzurum.

Developments attained in Anatolian archaeology with the participation of scholars from a number of countries in the last 100 years have made this peninsula of utmost importance for the study of humankind's history. In the twenty-first century, new ways to examine, document, interpret, and share new finds with wider society and academics will surely emerge.

Cross-References

- ▶ Akurgal, Ekrem
- ▶ Aphrodisias, Archaeology of
- ▶ Late Antique Anatolia, Archaeology of
- ▶ Lydia, Archaeology of
- ▶ Nemrud Dağ, Archaeology of
- ▶ Sagalassos, Archaeology of
- ▶ Schliemann, Heinrich
- ▶ Turkey: Archaeological Museums

Further Reading

Astin, A.E., et al. 2008. *The Cambridge ancient history VIII: Rome and the Mediterranean*. 2nd ed. Cambridge: Cambridge University Press.

Bowman, A.K., et al. 2008. *The Cambridge ancient history X: Augustan Empire*. 2nd ed. Cambridge: Cambridge University Press.

Crook, J.A., et al. 2008. *The Cambridge ancient history IX: Last age of the Roman Republic, 146–43 BC*. 2nd ed. Cambridge: Cambridge University Press.

Hornblower, S., and A. Spawforth. 2012. *The Oxford classical dictionary*. 4th ed. Oxford: Oxford University Press.

Van Kampen, A. 1956. *Die Welt der Antike (Atlas Antiquus)*. Gotha: VEB Hermann Haack Geographisch Karthographische Anstalt.

Wallbank, F.W., et al. 2008a. *The Cambridge ancient history VII, Part 1: Hellenistic world*. 2nd ed. Cambridge: Cambridge University Press.

Wallbank, F.W., et al. 2008b. *The Cambridge ancient history VII, Part 2: The rise of Rome*. 2nd ed. Cambridge: Cambridge University Press.

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Hellenistic and Roman Egypt, Archaeology of

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Introduction

Until recently, the archaeology of Hellenistic and Roman Egypt has received little attention from scholars. The reasons for this scarce interest are various and mainly due to the fact that the scholars who are greatly involved in archaeological study and research in Egypt mostly focus on the millenary dynastic or Pharaonic period. Moreover, the best-preserved areas and monuments in the country belong to the periods prior to Macedonian domination. On the other hand, Egypt is the region that has the greatest amount of written

evidence for the Hellenistic and Roman periods, documentary and literary papyrus in particular. These documents have amply contributed to scholarly knowledge of Egypt's economy and culture in the period between Alexander the Great's conquest (332 BCE) and the Arab conquest (639 CE).

For a long time classicists and papyrologists have been the only scholars to work on Hellenistic and Roman Egypt. Only scarce attention has been dedicated to aspects related to material culture and to archaeology, which has often been merely considered a means to acquire new texts. Besides, the poor state and scarce conservation of monuments of this period have apparently encouraged classical archaeologists to shift their interests toward other provinces, and Egypt has often been considered a unique case for the survival of ancient Egyptian language and culture until the late Roman period.

A favorable concomitance of historical, climatic, and geographic conditions contributed to the good conservation of Egyptian cultural heritage at least until the end of the eighteenth century. The modernization of the region and its demographic growth, which started at the beginning of the nineteenth century and are still in progress, have contributed to the loss of several archaeological areas and monuments, sacrificed in the name of progress and economic development (Davoli 2008). Many ancient settlements have been destroyed to extract natural fertilizer (*sebbakh*) and to obtain building materials to be reused. Most of the more recent archaeological strata, namely, from the Byzantine, Roman, and Hellenistic periods, were the first to be dismantled. Another cause of demolition of later inhabited levels can be found in the prevailing interests of the first archaeological excavations, mainly focused on the Pharaonic levels. Much archaeological, urban, and architectural information was lost during the hurried excavations, as is evident, for example, in the great temples and *necropoleis* in the area of Thebes (Luxor).

It is certain that the substantial lack of classical monumental architecture in Egyptian territory is not due to its absence but to a systematic reutilization of stone materials that began in Late Antiquity and to a widespread use of mud brick, which is far less durable than the stone. In recent years an increasing number of scholars and archaeologists have conducted excavations and studies on Greco-Roman and Byzantine Egypt (Bagnall and Davoli 2011). Archaeological excavations and surveys all over the country have demonstrated the widespread presence of classical architectural elements and buildings that do not belong to local traditions, such as public baths (Boussac et al. 2009), theaters, and hippodromes. Urban studies, settlement excavations, investigations of quarries, and caravan trails, not to mention the difficult recovery of Alexandria and its harbors, are filling a gap in our knowledge of the territory and of its exploitation in the post-Pharaonic and pre-Islamic periods (Bagnall and Rathbone 2004).

Definition

Material culture, architecture, and city planning from Alexander the Great's conquest in 332 BCE to the beginning of the reign of Constantine I as the sole emperor in 324 CE constitute the core of the study of the archaeology of Hellenistic and Roman Egypt. There is, however, a cultural continuity between the late Roman and the Byzantine periods, and it is consequently difficult to determine precisely the chronological limits of a discipline.

The field of investigation for the archaeology of Hellenistic and Roman Egypt covers all Egyptian territory, including the Delta, the Nile Valley, and the eastern and western deserts, together with the Red Sea and Mediterranean coasts. In this period a homogeneous culture in fact existed throughout this vast territory, which was controlled and administered by a central authority based in Alexandria. Nevertheless, regional traditions persisted and are evident in the production of ceramic pottery, architecture, and town planning.

Key Issues

Alexandria assumed the role of capital of the country as early as 320 BCE and brought about a loss of importance for Memphis, the previous

historical capital and administrative center. The location of the new capital on the Mediterranean coast shifted the central administration's center of gravity to the sea and even beyond Egypt itself. This position certainly suited better the new political and commercial situation of the period and opened Egypt to the Mediterranean world. The Ptolemaic kingdom extended its boundaries outside Egypt, and its Greek maritime fleet enormously improved trade and movement in the Mediterranean, in which the Egyptians of the Pharaonic period did not excel.

Alexandria was built according to classical schemes and styles, following the prompting of Alexander himself, but in the meantime using stone monuments from previous periods located in the cities of the Delta. The city is today lost; part of it is buried by the new Alexandria and part of it has been demolished to recycle building materials (McKenzie 2007: 8–18). Recent archaeological investigations at Kom el-Dikka, in various places in the city center, and at the harbor are considerably improving the knowledge of its urban layout and stratigraphy. The use of water in the city and as a means of communication and trade has been the recent object of important archaeological, geographical, and historical investigations that have extended also due to Alexandria's surroundings. Water continued to have a central function in post-Pharaonic Egyptian religion and politics. Numerous local and regional hydrological projects were implemented in the Hellenistic and Roman periods, including the reclamation of large territories for irrigation. The best-known example of this is in the Fayyum, thanks to the conservation of a series of settlements and documents written on papyrus (Davoli 1998).

The Nile Delta, which was less investigated until the last few decades, is now the focus of surveys, archaeological excavations, and hydrographic studies that have finally filled a noteworthy gap in our historical knowledge of Egypt. 700 sites have become recent objects of investigation (Bagnall and Davoli 2011: 108–14), but much needs to be done to reach a detailed picture of the settlements from the Greco-Roman period. These seem to be characterized by the lack of perimeter walls and by the presence of a large main temple surrounded by high walls and situated in a prominent position, often with a *dromos*, or a processional way, that constituted one of the road axes (Leclère 2008). In the *metropoleis* (main cities) of the *nomoi* (administrative regions), there could be more than one temple with a *dromos*, as in the case of Tanis. The history of the landscape, including changes in the course of the Nile's branches in particular, is providing new elements for the evaluation and comprehension of the local dynamics of human habitation. The development and decline of settlements depended on their relatively strategic locations close to waterways. Furthermore, subsidence has caused the sinking of settlements such as Herakleion/Thonis, recently discovered through underwater explorations. Herakleion/Thonis and Canopus were two of the most important harbors on the Mediterranean Sea, as they were strategically located on the Canopic branch and consequently directly linked to the Nile, which was an artery that helped connect the Mediterranean Sea, Africa, and Indian Ocean at the time.

Other important commercial settlements were founded on the coast west of Alexandria (Davoli 2010: 351–2), in a zone no longer within Egypt's boundaries but connected with it. The westernmost of these was Paraetonium (Mersa Matruh). Among them was Plinthine, well known for its *necropolis* that counts about a hundred Hellenistic well-preserved hypogea (second century BCE). The town seems to have had a role in commercial traffic on Lake Mareotis, as did Taposiris Magna (Abusir), one of the places associated with the cult of Osiris and the location of an imposing temple dedicated to the god. Its *temenos*, built of limestone blocks, is preserved. Taposiris Magna probably had the role of a customs station. Additionally, Marina el-Alamein (Leukaspis or Antiphrae) was involved in trade as well as the agricultural exploitation of the area since it was located on the terrestrial and maritime communication routes between Alexandria and Cyrenaica. The *necropolis* has been restored: there were different types of tombs, built with local stone, that were sometimes adorned by monumental structures in the form of pyramids, sarcophagi, pillars, or columns.

The area of Lake Mareotis was important for both commercial and agricultural reasons. Many installations for wine production attached to rural villas with vineyards have been identified: they started to develop during the Hellenistic period and expanded considerably in the Roman period. About 30 workshops for the production of amphorae for transport, used for the trade of locally produced wine, have been recently discovered.

The western and eastern deserts have also attracted renewed attention for the Hellenistic and Roman periods in regard to agricultural exploitation in the oases and in regard to the opening of new communication routes to the Red Sea and its ports. These ports, which were oriented toward eastern trade, include Myos Hormos, and Nechesia (Marsa Nakari) (Sidebotham et al. 2008; Bagnall and Davoli 2011: 134–7). The eastern desert was also exploited for the extraction of precious stones, such as black granite (Mons Claudianus), porphyry (Mons Porphyrites), and emeralds (Mons Smaragdus), mainly in the Roman period.

Edfu and Koptos, in the Hellenistic and Roman periods, respectively, became key cities for trade because of their location on the Nile and at the confluence of caravan trails leading toward the Red Sea's ports (Davoli 2010: 256). Koptos in particular was an important emporium through which passed the goods imported from Arabia and India and then shipped toward the Mediterranean Sea along the Nile. The caravan routes of the eastern desert were equipped with rest areas constituted by small forts (*praesidia*) at whose center was a well for water (Cuvigny 2003). The excavations conducted at Berenike, on the Egyptian coast of the Red Sea, have revealed the importance assumed by this port in trade between the Hellenistic world, and then the Roman Empire, and India. The materials found there also indicate the existence of commercial routes from and to Arabia and the east African coast, from which elephants and ivory were imported. The port and the city reached their maximum expansion during the first three centuries of the imperial Roman period; they were inhabited by soldiers and by a multiethnic population of traders (Sidebotham 2011).

In the oases of the western desert, which were already very active during the Third Intermediate and the Late Periods, a demographic expansion and consequently an increased number of settlements occurred during the Roman period. Recent excavations at the various sites of Bahriya, Dakhla, and Kharga oases attest to the presence of intense agricultural activity and commerce from and to the Nile Valley, and even Africa and the Mediterranean, and a noteworthy prosperity exhibited by large richly decorated houses, stone temples, monumental tombs, and thermal structures (Bagnall and Davoli 2011: 138–41). At Kellis (Ismant el-Kharab) and Trimithis, both located in Dakhla Oasis, the practice of decorating houses, temples, churches, and tombs with wall paintings on plaster in classical and Egyptian styles and with plastic refinements molded from stucco plaster, such as capitals and cornices, was particularly widespread in the Roman and Late Roman periods (Bagnall and Davoli 2011: 140–1). The discovery of stone temples decorated in high relief (first and second centuries CE) shows the interest of Roman emperors for this marginal area of the Empire, which received particular attention also during the tetrarchy, when a series of small forts were erected probably for the defense of the caravan routes. The desert, its arid climate, and its remoteness from large populated areas have favored an optimal conservation of many archaeological areas and buildings built mainly of mud brick. For some of these sites, continuous habitation is attested from the Old Kingdom to the Mamluk period, as in the case of Mut el-Kharab, the main city in the oasis of Dakhla, for example (Hope et al. 2009).

The Fayyum is a region of the western desert not classifiable as an oasis, but better as a pseudo-oasis. It is a natural depression located approximately 100 km southwest of Cairo and supplies by water from the Nile through the Bahr Yussuf, a branch of the Nile. A very fertile area, it became a widely exploited agricultural region when Ptolemy II completed a land reclamation project that consisted of the digging of numerous artificial channels and the building of dams and sluices that facilitated the optimal usage of water for agriculture. Various new settlements of colonists

were founded and expanded, with assignments of land to "Greek" immigrants. Only a small part of those settlements (Davoli 1998), for which the regional capital was Crocodilopolis (Medinet el-Fayyum), has been preserved because of their location along the perimeter of the region, at the edges of the desert. The sand has preserved not only houses of mud brick but also temples and abandoned furnishings, among which there was a large amount of papyri. Some of these sites have been preserved until today and are still under excavation and survey, such as Soknopaiou Nesos (Dime), Karanis (Kom Aushim), Bakchias (Kom el-Atl), Tebtynis (Kom Umm el-Boreigat), Narmouthis (Medinet Madi), and Dionysias (Qasr Qarun). By contrast, other sites were excavated from the end of the nineteenth century to the first 30 years of the twentieth century only to disappear subsequently because of the activity connected to modern land reclamation projects. Among these are Philadelphia (Kom el-Kharaba el-Kebir) and Theadelphia (Bathn Ihrit), where, besides a great number of papyri, Roman funerary portraits (the so-called portraits of the Fayyum) and an intact temple dedicated to the crocodile god Pnepheros (partly preserved today at the Greco-Roman Museum of Alexandria) were found.

Karanis is so far the most investigated and best-known site, thanks to the excavations conducted by the University of Michigan from 1924 to 1935 (Davoli 1998: 73–116). Beyond the evolution of the site, whose five inhabited levels have been explored, and its urban layout and architecture, studies of categories of materials, such as ceramics, lamps, coins, and statuary, have become possible. Such cataloguing has constituted a useful starting point for comparing categories of objects, whose typological evolution, production, and circulation are now better known, and for the publication of recent works on them.

The Greco-Roman settlements in the Fayyum are often multi-stratified because of the accumulation of sand and phases of abandonment that alternated with phases of reoccupation and expansion. Some of those settlements can be defined as small urban units (towns) in terms of social complexity, population density, and urban structure. They reached maximum extension and flourished during the first centuries of the Empire, and, like the sites in the Delta, they are characterized by the lack of perimeter walls and the presence of at least a main temple surrounded by a *temenos*. The *dromos*, provided with one or two kiosks, constitutes the continuation of the temple into the settlement, and on it processions, or religious celebrations that involved the inhabitants many times a year, took place. The papyrus documentation and the monuments found along these processional areas permit a dating of the foundation of temples and their *dromos* to the Hellenistic period, with expansion and rebuilding during the Roman period. The *dromos* was considered the main public area in these settlements, in which no *agora* was generally present (Davoli 2011: 80–81). The most exceptional *dromos* in terms of its monumental features is that of Soknopaiou Nesos, originally 400 m in length and built so that it was elevated 3 m higher than the roads parallel to it. In such a way it constituted a barrier that divided the settlement into two parts, and it was also a scenographic footbridge for processions. Two tunnels built within the road's foundations and various lateral stairs allowed people to go from one quarter to the other and to go over the *dromos* (Minaya 2012).

The Hellenistic and Roman settlements in Egypt seldom imitate the capital Alexandria in their urban organization. The solutions adopted in small provincial towns are not standardized and often reflect regional particularity. By contrast, the *metropoleis* of the *nomoi*, insofar as they are poorly and little preserved, exhibit more monumentality only in part inherited from pre-Hellenistic periods. New types of buildings, whose existence is known above all through written sources and a few architectonical remains, were built by the local elite according to Classical style or Alexandrian style. In particular, an intense monumental building phase is documented by papyri from the second to the fourth century CE (Davoli 2011: 70).

The study of stone architectural material from Alexandria and other places in Egypt (Pensabene 1993; McKenzie 2007), together with the study of archaeological remains scattered throughout the region, reveals a certain diffusion of monumental

buildings in Classical style beyond what has been expected, at least in the main cities. It is accordingly thought that the urban landscape was not very different from that of other provinces of the Empire (Bailey 1990). Nevertheless, a strong local influence endured in urban life in this period due to traditions of building with regional peculiarity for thousands of years and to the presence of cultic buildings and structures in Egyptian style. The style in which certain buildings were built was often a new architectonical style, called Greco-Alexandrian. It was created in Alexandria and was circulating as early as the second century BCE. In this style some elements of Egyptian tradition are found along with Classical ones, which in their turn were employed according to new schemes and combinations. The Classical and Alexandrian styles were mainly used in buildings that did not exist in the dynastic period in Egypt, such as public squares, streets with colonnaded porticoes, public baths, fountains, theaters, hippodromes, perhaps gymnasia, and temples dedicated to divinities not Egyptian and to the imperial cult. The temples dedicated to Egyptian gods continued to be constructed in Egyptian style, but with various innovations (Arnold 1999).

Among the settlements founded in the Roman period, one was willed by the Emperor himself during a visit to Egypt in 130 CE: Antinoopolis, today Sheikh Ibada. The emperor Hadrian founded this city (*polis*) in the place where the Via Adriana started toward the Red Sea. The new city was mainly inhabited by "Greeks" coming from other areas of Egypt, and in particular from the Fayyum, to whom particular privileges were granted. The urban organization follows classical architectural schemes and models, with a perimeter wall on three sides, a *cardo*, and a *decumanus* whose length was adorned with statues and Doric columns. The city plan (Pensabene 1993: 274, Fig. 178) seems to follow a grid plan with two main street intersections on which were four, granite, monumental columns (*tetrastylon*), in Corinthian style, and surmounted by statues. There were also a triumphal arch with three fornices, a theater, a large public bath, and a hippodrome outside the city. It was probably after the foundation of Antinoopolis that other cities adopted monumental architecture of a Classical style, such as Hermopolis Magna (Bailey 1991), located nearby. Also this city adopted a *tetrastylon* and public buildings in Classical style situated along the main roads. The preexisting temples dedicated to the Egyptian divinities Amon and Thoth were integrated in the new city plan, in which various cults and styles coexisted.

During the tetrarchy, military forts were built in Egypt to host regional garrisons, just as in other provinces. Besides the well-known fort built by Diocletian around Luxor's temple, the fortresses of Dionysias and Narmouthis in the Fayyum, those of Trimithis and el-Deir, respectively, in the oases of Dakhla and Kharga, and those situated along the Nile Valley (at Atripe in Sohag, at Wadi Kubbaniya, and at Nag el-Hagar to the north of Aswan) are to be mentioned (Bagnall and Davoli 2011: 121, 131, 141). Other fortresses were built on the borders, like Tell el-Herr, to the south of Pelusium, which has seen continuous use from the fifth century BCE to Late Antiquity (Bagnall and Davoli 2011: 113). This fortress, together with those at Sile and Pelusium, constituted part of a chain of forts located along the eastern border and mainly possessing the duty of regulating trade. Also the fortress of Babylon (Old Cairo) has recently become the object of excavation and restoration. It is now certain that it was located on Trajan's canal, that it silted up at the beginning of the Islamic period, and that various harbor installations were located nearby (Shehan 2010).

The multiethnic culture of Egypt during the Greco-Roman period is also expressed in funerary beliefs. Next to the purely Egyptian *necropoleis*, in which the tradition of mummification persisted, there were *necropoleis* for incineration and inhumation, the last being especially widespread in Alexandria, in which large underground complexes with multiple tombs and various *loculi* are present. Alexandria's *necropoleis* certainly constitute the best preserved part of the ancient capital and testify to the presence of various cults and social groups, Christians and Jews included. The more monumental *necropoleis* are those of Kom el-Shuqafa, which developed on three storeys and were decorated with bas-reliefs in the

Egyptian style of the Roman period (first and second centuries CE). But no less important for the history of the city are the Gabbari's collective *hypogea*, dated to the beginning of the third century BCE.

Mummification continued to be practiced until Late Antiquity according to techniques that gradually became more imprecise and hasty. Since the end of the nineteenth century, great interest has been revived in the so-called portraits of the Fayyum, which were painted on wooden tables or on textile during the Roman period, and set in the bandages of mummies, and have been found in great number in the Fayyum as well as in other places in the Nile Valley. These portraits follow in function the tradition of the funerary masks of the Pharaonic and Hellenistic periods, as is also the case with painted shrouds and sarcophagi (Riggs 2005). The funerary documentation that has been preserved, as well as the varied testimony for regional traditions, is very rich. Monumental tombs of the Roman period have been found in the oasis of Dakhla; they were made out of mud brick and decorated with stuccos and wall paintings. Among the more singular monuments are a number of "pyramids," which are often only partially preserved, truncated at the top, and with plinth bases in which sometimes funeral rooms painted with traditional Egyptian motifs were built. On the contrary, the decoration is in Classical style on the outside, like on the tombs at Bir el-Shagala, Dakhla. Of noteworthy monumentality is also Tuna el-Gebel, the *necropolis* of Hermopolis Magna (El-Ashmunein), in which are stone temple tombs from the Hellenistic period. That of Petosiris is a sort of prototype. The so-called house tombs of the Roman or Late Roman periods are sometimes built with mud brick; they often are articulated into several floors and are richly decorated with stuccos and paintings (Lembke 2010: 234–40). Small pyramids are also present there.

Workshops for the production of ceramic pottery have been found in several sites and testify to the introduction of new cooking techniques for the production of copies, such as in the case of kilns of the first century CE at Buto in the Delta (Ballet 2007). The careful study of ceramic vessels is now widespread in archaeological excavations in Egypt, but with a great delay compared to other countries, with the consequence that complete repertoires for the Hellenistic and Roman periods are still lacking. The general picture that emerges is that of a local Hellenistic and then Roman production that imitates the shapes widespread in the Mediterranean, but with different clays and fabrics, and peculiar morphologies according to the region. This enables the identification of the inland commerce both of vessels and of products contained in amphorae and jars. The fabrics used are made from Nilotic silt, marl clays, and kaolinitic clay from Aswan (since the end of the Hellenistic period) and the so-called iron-rich clay of the oases. The compositions and the techniques of manufacture and baking became increasingly refined due to the influence of the so-called "sigillata" vessels imported from Italy and from the Eastern Mediterranean and of African "sigillata" imported during the later Empire. There is no discontinuity in production from the end of the Hellenistic period to the beginning of the Roman period. The study of amphorae has led to the identification of vast areas of production, if not individual workshops, associated with the production of wine, such as in the area of Maryut Lake (typologies AE 3 and 4) and the Fayyum in the Roman period (Marchand and Marangou 2007).

Besides the production of earthenware pottery, that of molded statuettes (*coroplastica*) was widespread in Egypt during the Hellenistic and Roman periods; these represent divinities, men and women, and animals too. The usage of such figurines ranges from temple precincts, probably as ex-voto offerings, to domestic and funerary contexts. It appears that such usage had been introduced to Egypt by Macedonian soldiers at the moment of the conquest of Alexander the Great; the iconography and the subjects, initially inspired by Greek culture, became increasingly derived from local Egyptian culture in later times. A workshop dated at the beginning of the Hellenistic period has been identified at Athribis in the Delta (Szymańska 2005).

Faïence and glass are two kinds of materials widely used for the production of vessels, small

statues, and decorative elements. Already in use in the pre-Hellenistic period for the production of similar manufactured items, the techniques and shapes used during the Greco-Roman period transformed and were enriched (Nenna and Seif el-Din 2000). During the Roman period particularly the techniques for the production of blown glass vessels, which reproduced forms common to the Empire, were imported. The glass raw material was produced in Egypt in workshops of the "primary" type, thanks to the presence of natron in natural deposits situated in the western desert to the south of Alexandria. Workshops of this type have been found at Beni Salama, in Wadi Natrun.

International Perspectives

In recent years research in the region has highlighted the strategic importance of Egypt, which can be understood as a commercial crossroads during the Hellenistic and Roman imperial periods. Water ways and caravan trails in the desert are quite well known, but much remains to be done to enable full understanding of the importance and modalities of international trade. Poorly known is the dispersion of ceramic vessels and other objects of Egyptian production in the countries linked to this trade, in the Arabian peninsula and India in particular. The systematic study of Egyptian ceramic is very recent if compared to the study of ceramics of other ancient civilizations. This is the main reason for the misidentification and thus of lack of data concerning the types and quantities of Egyptian pottery vessels found in other countries.

Future Directions

There is no doubt that the archaeology of the Greco-Roman Egypt is at its beginning. Many settlements and *necropoleis* still need to be excavated with rigorous scientific methods, and materials from previous excavations and stored in museums need to be studied and published. The archaeological methods applied in Egypt are still often obsolete and inadequate to answer the questions of a scientific world by now accustomed to studying ancient civilizations with multidisciplinary approaches. The so-called "archeometric" analyses and landscape archaeology are still not very common, even if in part because of the heavy restrictions imposed by Egyptian law.

Numerous artifacts and documents housed in collections and museums all over the world are completely out of their archaeological context because of the conditions of their discovery and their dispersal through the antiquities market. The study and virtual relocation of these artifacts within geographical and cultural contexts would enable their better evaluation and comprehension, not just in regard to their specific characteristics but also in terms of their material functions in the daily and religious life of the population.

The archaeological research conducted in the last 10 years has substantially contributed to a better understanding of the multicultural society of Egypt during the Hellenistic and Roman periods, which until now has been mainly studied through the rich textual documentation available in Greek, Latin, and Egyptian.

Cross-References

▶ Amheida, Archaeology of
▶ Berenike, Archaeology of

References

Arnold, D. 1999. *Temples of the last Pharaohs*. New York/Oxford: Oxford University Press.

Bagnall, R.S., and P. Davoli. 2011. Newsletter. Archaeological work on Hellenistic and Roman Egypt, 2000–2009. *American Journal of Archaeology* 115 (1): 103–157.

Bagnall, R.S., and D. Rathbone. 2004. *Egypt from Alexander to the Copts. An archaeological and historical guide*. London: The British Museum Press.

Bailey, D.M. 1990. Classical architecture in Roman Egypt. In *Architecture and architectural sculpture in the Roman Empire*, ed. M. Henig, 121–137. Oxford: Oxford University Committee for Archaeology.

Bailey, D.M. 1991. *Excavations at El-Ashmunein, volume 4: Hermopolis Magna: Buildings of the Roman period*. London: British Museum Press.

Ballet, P. 2007. Recherches sur les ateliers hellénistiques et romains de Buto (Delta). In *Proceedings of the Ninth International Congress of Egyptologists: Grenoble, 6–12 September 2004*, ed. J.-C. Goyon and C. Cardin, vol. 1, 133–143. Leuven: Peeters.

Boussac, M.-F., T. Fournet, and B. Redon, eds. 2009. *Le bain collectif en Egypte*. Cairo: Institut Français d'Archéologie Orientale.

Cuvigny, H., ed. 2003. *La route de Myos Hormos: L'armée romaine dans le désert oriental d'Egypte*. Cairo: Institut Français d'Archéologie Orientale.

Davoli, P. 1998. *L'archeologia urbana nel Fayyum di età ellenistica e romana*. Naples: Procaccini editore.

Davoli, P. 2008. Papiri, archeologia e storia moderna. *Atene e Roma NS Seconda* 1–2: 100–124.

Davoli, P. 2010. Settlements – Distribution, structure, architecture: Graeco-Roman. In *A companion to ancient Egypt*, ed. A.B.. Lloyd, vol. 1, 350–369. Oxford: Wiley-Blackwell.

Davoli, P. 2011. Reflections on urbanism in Graeco-Roman Egypt: a historical and regional perspective. In *The space of the city in Graeco-Roman Egypt: image and reality. Proceedings of the International Conference, Tarragona 30.9-1.10. 2010*, ed. E. Subias et al., 69–92. Tarragona: Insitut Català d'Arqueologia Clàssica.

Hope, C.A., et al. 2009. Report on the 2009 season of excavations at Mut el-Kharab, Dakhleh Oasis. *The Bulletin of the Australian Centre for Egyptology* 20: 47–86.

Leclère, F. 2008. *Les villes de Basse Egypte au Ier millénaire av. J.-C.: Analyse archéologique et historique de la topographie urbaine*. 2 vols. Cairo: Institut Français d'Archéologie Orientale.

Lembke, K. 2010. The Petosiris-Necropolis of Tuna el-Gebel. In *Tradition and transformation: Egypt under Roman rule. Proceedings of the International Conference, Hildesheim, Roemer- and Pelizaeus-Museum*, ed. K. Lembke, M. Minas-Nerpel, and S. Pfeifer, 231–254. Leiden/Boston: Brill.

Marchand, S., and A. Marangou, eds. 2007. *Cahiers de la céramique égyptienne 8*. 2 vols. Cairo: Institut Français d'Archéologie Orientale.

McKenzie, J. 2007. *The architecture of Alexandria and Egypt 300 BC-AD 700*. New Haven: Yale University Press.

Minaya, G.A. 2012. Il dromos. In *Soknopaiou Nesos Project I: 2003–2009*, ed. M. Capasso and P. Davoli, 83–109. Rome/Pisa: Accademia Editoriale.

Nenna, M.-D., and M. Seif el-Din. 2000. *La vaisselle en faïence d'époque gréco-romaine: Catalogue du Musée gréco-romain d'Alexandrie*. Études alexandrines, Vol. 4. Cairo: Institut Français d'Archéologie Orientale.

Pensabene, P. 1993. *Repertorio d'arte dell'Egitto greco-romano. Elementi architettonici di Alessandria e di altri siti egiziani*. Rome: L'Erma.

Riggs, C. 2005. *The beautiful burial in Roman Egypt*. Oxford: Oxford University Press.

Shehan, P. 2010. *Babylon of Egypt. The archaeology of old Cairo and the origin of the city*. Cairo: The American University in Cairo Press.

Sidebotham, S.E. 2011. *Berenike and the ancient maritime spice route*. Berkeley/Los Angeles/London: University of California Press.

Sidebotham, S.E., M. Hense, and H.M. Nouwens. 2008. *The red land. The illustrated archaeology of Egypt's eastern desert*. Cairo: The American University in Cairo Press.

Szymańska, H. 2005. *Terres cuites d'Athribis*. Turnhout: Brepols.

Further Reading

Ballet, P. 2001. Céramiques hellénistiques et romaines d'Egypte. In *Céramiques hellénistiques et romaines*, ed. P. Lévêque and J.-P. Morel, vol. 3, 105–144. Paris: Press Universitaires Franc-Comptoise.

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Basic Biographical Information

Piphal Heng received his degree in Archaeology in 2002 from the Faculty of Archaeology at the Royal University of Fine Arts (RUFA), Cambodia. He joined the University of Hawai'i-Mānoa (UHM) Anthropology graduate program in 2007 and is currently a Ph.D. candidate working on his dissertation, which explores the political economy of the pre-Angkorian period using a comparative analysis of early state formation, temple economy, and settlement patterns in Southeast Asia, South Asia, and other regions.

Major Accomplishments

His work focuses on settlement pattern analysis, archaeology, history, epigraphy, and art history of Cambodia. Since 2003, he has participated in many national and international archaeological projects related to Iron Age, pre-Angkorian, and Angkorian archaeology, as well as work on

ceramic analysis, settlement patterns, inscriptions, history, art history, and political economy. He has presented at several major international conferences, and published the results of his research in conference proceedings. In addition to research and fieldwork, Piphal Heng instructed archaeology students at RUFA in 2005–2006 and on various archaeological field projects from 2004 to the present. He has also helped train staff from the Ministry of Culture and Fine Arts, APSARA Authority, and Preah Vihear Authority in GIS and cultural resource management, and has participated and designed multiple education campaigns to raise awareness on heritage protection and conservation to reduce looting and smuggling of archaeological materials in Cambodia.

Cross-References

► Cambodia: Cultural Heritage Management
► Post-Khmer Rouge Cambodia, Archaeology in

Further Reading

Coe, M.D. 2003. *Angkor and the Khmer civilization*. New York: Thames and Hudson.
Higham, C. 2001. *The civilization of Angkor*. Berkeley: University of California Press.

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Sophady Heng completed his degree in the Faculty of Archaeology at the Royal University of Fine Arts in Phnom Penh in 1999. In 2005, he received a scholarship from the Erasmus Mundus Program to study in Paris for a M.A. degree in Quaternary and Prehistory, which was completed in July 2007.

Major Accomplishments

He has worked for the Memot Centre for Archaeology almost for 8 years. The Memot Centre was founded as a research institute for prehistoric archaeology in Cambodia and also as a training center for young Cambodian researchers to conduct archaeological research independently. During this period, he has participated in several excavations in and outside the country and organized many excavation projects, such as training programs for the students of the Faculty of Archaeology in the red soil region of Krek and Memot, Kampong Cham province. In 2002, he spearheaded the establishment of the Memot museum, which opened to the public in October 2002. Between 2007 and 2009, he served as the Deputy Director for the Department of Archaeology and Prehistory, Ministry of Culture and Fine Arts. In 2009 he was promoted to the position of Deputy Director General for Cultural Heritage, Ministry of Culture and Fine Arts and is responsible for collaboration with national and international institutions for archaeological research in Cambodia. Since 2007 he also has served as a lecturer at the Faculty of Archaeology, Royal University of Fine Arts in the field of Prehistory. Heng has participated in many national and international conferences, meetings, and workshops on archaeology, museum management, museum collections management, and conservation inside and outside Cambodia. He has written several articles about archaeological research in Cambodia and published in both Khmer and foreign journals. Recently, he worked on a salvage archaeology project at Kampong Preah temple, Kampong Chhnang province after a mobile phone company damaged a temple foundation during construction. In June 2012, he conducted preventive archaeology in the Sambor Prei Kuk area in the future site of a community market and tourism facility. This was a joint project between the Ministry of Culture and Fine Arts and the Ministry of Tourism with support from the Asian Development Bank. Between December 2012 and January 2013, he conducted a rescue excavation at the 12th century Banteay Chhmar temple complex in Thmor Pouk district, Banteay Meanchey province. The project was a collaboration between the

Ministry of Culture and Fine Arts, the Ministry of Transportation and Public Works, Kumho Industrial and Engineering (Republic of Korea) and the Embassy of the United States of America to Cambodia. In the course of the project, six complete burials were discovered in different locations associated with offering goods such as pottery vessels, iron tools, bronze objects and beads. Currently, he is a co-project organizer for the Mission Prehistorique Franco-Cambodgienne. This project was created in 2009, in collaboration with the Ministry of Culture and Fine Arts and the Muséum National d'Histoire Naturelle, Paris, France. This project focuses on prehistoric research in Cambodia and is currently investigating the site of Laang Spean. Excavation at Laang Spean, which began in 2009, will extend until 2016. An exhibit of work from the project is expected to be on display in the National Museum at Phnom Penh at the end of 2013.

Cross-References

► Cambodia: Cultural Heritage Management
► Post-Khmer Rouge Cambodia, Archaeology in

Further Reading

Coe, M.D. 2003. *Angkor and the Khmer civilization*. New York: Thames and Hudson.
Higham, C. 2001. *The civilization of Angkor*. Berkeley: University of California Press.

Herculaneum

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Introduction

The archaeological site of Roman Herculaneum is in and partly under the modern Italian town of Ercolano in Campania, Southern Italy, 7 km west of Mount Vesuvius on the coast of the Bay of Naples. Herculaneum was destroyed and buried along with the nearby towns of Pompeii, Stabiae, and Oplontis in 79 CE when Mount Vesuvius erupted. Pompeii, Herculaneum, and Torre Annunziata were added to the UNESCO World Heritage list in 1997 because they "provide a complete and vivid picture of society and daily life at a specific moment in the past that is without parallel anywhere in the world" (UNESCO 2019).

Historical Background

According to legend, Herculaneum was founded by the Greek hero Hercules from whom it took its name. It may have been first settled by Greek traders during the sixth century BCE who also created the towns of Cumae, Pompeii, Poseidonia (Paestum), and Neapolis (Naples). Eventually it came under the control of the Samnites, an Oscan-speaking people from central Italy, who built the first temples and the "Samnite House," dated to the end of the second century BCE, which show strong Hellenistic Greek architectural influences. The Samnites were defeated by the Romans in the "Social War" of 90–89 BCE when all of Campania came under Roman control. Herculaneum became a *municipium* in 89 BCE and most of the town seems to have been built around that time on top of the existing town (Formola 2013). Remote-sensing techniques have shown that two large Roman houses – the House of the Mosaic Atrium and the House of the Deer – were built directly above the rainwater-cistern of some Samnite houses (Carrara et al. 2001). Other second-century remains have been found during drainage works (Camardo et al. 2012).

Pliny the Younger, writing about the eruption some 25 years after the event, describes what happened in Pompeii but does not mention its impact on Herculaneum. Volcanologists, however, have been able to determine that whereas Pompeii was first affected by a relatively slow "air-fall" or rain of ash and pumice, which enabled many to escape, Herculaneum, more exposed and closer to the volcano, was buried under a hot pyroclastic surge of ash, rock, and volcanic gas flowing at ground level. Studies of charred

wood show the temperatures was at least 400 °C (Sigurdsson et al. 1982). The surge was so powerful that it toppled buildings and moved large stone blocks 2–4 m. Most walls were left in place, but some buildings were stripped of their roof tiles. The hot surge kept moving swiftly towards the waterfront and, as it entered the sea, it caused the water to boil and give off steam explosions. People who sought escape via the beach or those sheltering in large waterfront chambers were overwhelmed by the heat and will have died instantly (Petrone et al. 2018).

Herculaneum was buried under 20 m of volcanic debris which set like concrete. The town of Resina (now Ercolano) was built on this layer sometime before 1000 CE. Local people, seeking to reach groundwater, dug shafts and tunnels through the volcanic layers deposited by successive eruptions – the most recent one being in 1631 CE (Maiuri 1932: 24). They soon discovered that they could extract good-quality marble for building or decoration and started "quarrying" below ground. Evidence of their activity was revealed in 2006, when excavations by the Herculaneum Conservation Project found an ancient shaft with footholds containing thirteenth-century pottery while another shaft contained quantities of sixteenth- and seventeenth-century ceramics (Camardo 2013: 330–335).

By the eighteenth century, Resina had become part of the Kingdom of Naples and courtiers were building large coastal villas in the areas. The owners of these villas noticed and quickly started to collect the beautiful marble and bronze objects brought to the surface during construction and well-digging operations. This gave a new impetus to the study of classical art and ushered in the age of Neoclassicism, which was as important as the earlier rediscovery of antiquity during the Renaissance. Among other things, it led to the tradition of the Grand Tour, which greatly encouraged the collection of antiquities and in turn led to the creation of some of the world's greatest museums (Dyson 2006, Chap. 5).

The finds were of such exquisite quality that in 1736, the 18-year-old Charles III, the first Bourbon King of Naples, sent his royal antiquary Count Marcello Venuti down into some tunnels that had been known to locals for about 20 years. They led to what had come to be known as the Temple of Hercules. Venuti found an inscription and realized it did not refer to a temple but to a theater that had been presented to the lost town of Herculaneum. He advised the king to immediately begin the process of uncovering the ancient remains. This work is accepted as being the beginning of modern archaeology "as the systematic and organised research of an ancient city" (Camardo 2013: 337).

In 1755, Charles III created the *Accademia Ercolanese* (Herculaneum Academy), to study and publish the finds. The results were nine superb volumes printed between 1757 and 1792 and given as royal gifts. By then, however, excavations had ceased as people living in the modern town feared their houses would collapse, and interest had shifted to Pompeii where the remains were more complete and more accessible (De Caro 2015). In the early nineteenth century, Napoleon Bonaparte conquered Italy and installed his youngest sister Caroline and her husband General Murat as rulers of Naples (1806–1815). As a patron of the arts and champion of Neoclassicism, Queen Caroline took an interest in the local archaeology, especially at Pompeii. When Napoleon was defeated, the Bourbons returned and one of the first acts of King Ferdinand IV was to create the Archaeological Museum at Naples, completing the work started by his father Charles III.

In 1828, small-scale excavations resumed at Herculaneum. Some work was done between 1869 and 1875 by Giuseppe Fiorelli, who was the director of excavations at Pompeii, but he too was forced to cease work due to the difficult nature of the deposit. The site was not reopened until 1927 when Amedeo Maiuri obtained funding from the Italian state under its dictator, Benito Mussolini (Camardo 2007). The aims of the new programs were to uncover a large part of the residential area of the town, then excavate the houses of the wealthy. Maiuri is estimated to have uncovered about one-fifth of the Roman town and was unusually diligent in publishing as he went. Herculaneum eventually became the archaeological showpiece of southern Italy for

the Fascist regime. Maiuri has been criticized for over-enthusiastic reconstructions but there is no doubt his work does convey some of the charm and beauty of the ancient port-city. The total excavated area today is 45,000 m^2, about one-tenth of Pompeii's (Biggi et al. 2014: 43).

Key Issues/Current Debates

One of the most important places in Herculaneum is the Villa of the Papyri, a magnificent seaside residence located to the west of the town. It was accidentally discovered in 1738 by well-diggers and painstakingly excavated by the engineer Karl Weber between 1750 and 1765. Weber drew up a plan which he consistently annotated over the years, creating what was for the time an unusually detailed archaeological archive. The first excavation was astonishingly lucky in that it uncovered a large rectangular garden edged by a "peristyle," a covered walkway opening through columned arches onto the garden and its central pool. This garden is enormous, 100 m long by 7 m wide, with 25 arches on the long sides and 10 on the short. Between the arches was a set of bronze statues of extraordinary quality – some of the finest Roman bronzes ever discovered, now a highlight of the Naples Museum. The excavated portions of the villa, extending over 250 m, are mostly public spaces – gardens, courtyards, and reception rooms (Maiuri 1932, Chap. 4). Owners and guests could admire the whole of the Bay of Naples from the Belvedere, a circular viewing pavilion built on a raised terrace at the western end of the gardens.

The name of the Villa derives from an even more significant find, a collection of 1840 fragments of papyrus scrolls, the only "library" ever recovered from the Classical world (Sider 2005). The texts are manuscripts written on sheets of papyrus pasted together to make scrolls which may be up to 15 m long. They were discovered tightly bound and packed into wooden boxes. All scrolls and boxes were carbonized by the eruption, so badly that at first some scrolls were discarded because they looked just like charred sticks. Although unrolling the scrolls is extremely destructive, dozens have been partly opened since 1754. Work is continuing on the texts from the Villa of the Papyri infrared lighting and multispectral imaging have been tried on already unrolled papyri with some success (Banerji 2013). A promising new technique is X-ray phase-contrast tomography (XPCT) which "can reveal various letters hidden inside the precious papyri without unrolling them" (Mocella et al. 2015).

Current thinking is that the fragments represent 650–700 "volumes," of which only about one-tenth are in Latin, the rest being in Greek, the literary language of the time (Cavallo 2014). Many of the works relate to Epicureanism, a Greek philosophical system which was popular in Naples, and of those thirty-six are by Philodemus of Gadara (c.110–c.30 BCE), an Epicurean who is known to have moved to Rome around 80 BCE. He was for a while the house-guest of Lucius Calpurnius Piso Caesoninus (c.100–c.43 BCE), father-in-law of Julius Caesar. In an irony of history, L.C. Piso is today remembered largely through the attacks of Cicero – a great orator and vindictive enemy – who excoriated him for having given up public duties for the pursuit of "the good life" and for pressuring Philodemus into writing poetry rather than philosophy (*In Pisonem,* 66-72; Delacy 1941).

From that connection, early scholars deduced that Piso, wealthy senator and patron of the arts, was the man most likely to have built the Villa. However, as Maiuri pointed out, the Villa was extended and decorated well beyond one man's lifetime, as the wall-paintings are in the Fourth Pompeiian Style and therefore date to the mid-first century CE. Furthermore, one recently deciphered scroll is a previously unknown work by Seneca the Elder, about the reigns of Augustus and Tiberius (27 BCE–37 CE). The implication is that the owners were sufficiently wealthy to continue collecting books and beautifying their mansion throughout the first century CE, but we still do not know for certain that the owners were the Calpurnius Piso family, as several other families have been suggested (Capasso 2010).

The Villa's private and domestic rooms still lie beneath the modern city. There are no plans to excavate it any further, for conservation reasons, and because there are serious problems with

flooding: the site which once overlooked the coast is today well below the water table. However, it has been reconstructed (with modifications) and can today be visited in Malibu, California, where it forms one-half of the Getty Museum, created by the oil tycoon Jean-Paul Getty to house his collection. The other half of the Museum is in Los Angeles in the Getty Centre (Lapatin 2018).

Written and archaeological evidence indicates that Herculaneum was a desirable town in which to live. Many high-status Romans either had permanent or seasonal residences there. Nonius Balbus, one-time governor of Crete and Libya, owned a luxurious house in Herculaneum and was so generous that the citizens erected an equestrian statue of him on the Terrace named after him (Map of Herculaneum). Portraits of his whole family were found in the *basilica*. Emperor Tiberius may have owned a large villa near Herculaneum and Emperor Titus may have visited Herculaneum shortly before the eruption. It is likely that his physician Apollinaris had recently been in the so-called House of the Gem because a scribbled message on the wall of the toilet reads: *Apollinaris medicus Titi imperatoris hic cacavit bene* [Apollinaris, physician of the emperor Titus, here shitted well] (Map of Herculaneum).

By the first century CE, Herculaneum had become a resort for rich Roman traders from nearby Neapolis. Located on a hill with waves lapping at its base, the broad coastline of Herculaneum overlooked the Sinus Cumanus (Bay of Naples) to the west and gave easy access to the sea. Mount Vesuvius stood about 7 km to the east. Via Antiniana, the main road connecting the major cities around the bay, ran nearby. Houses were built on terraces that extended to the edge of the cliff and vaulted passages led from the city streets to the waterfront. The views from these houses, such as must have been spectacular. Unlike Pompeii, which was enclosed by walls to protect the population from external threats, Herculaneum was a seaport that was open to the sea. The city was divided into rectangular blocks or *insulae*, "islands," now numbered I to VII, by a street system of north-south *cardines* and east-west *decumani* (Map of Herculaneum).

The catastrophic earthquake of 62 CE almost totally destroyed the town and some of its estimated 5000 residents had likely moved out by the time Vesuvius erupted in 79 CE. However, restoration work was being undertaken, for instance at the Temple of Venus, a Samnite foundation of the second century BCE with an inscription in Oscan. It had been remodeled during the reign of Augustus (r. 27 BCE to 14 CE) and in 70 CE two local donors, Vibidia Saturnina and Furius Saturninus, did further work, erecting portrait-busts of Titus and Domitian, the sons of the newly proclaimed Emperor Vespasian (Guidobaldi et al. 2009). There is also an inscription of Vespasian himself, dated 76 CE, which Maiuri took to be the dedication for a temple to Cybele, the Great Mother (Maiuri 1932, p. 42). The House of the Wooden Partition shows evidence of extensive restorations that took place before the eruption, possibly to repair the house after the earthquake (Map of Herculaneum), and the Villa of Papyri library may have been packed up into its wooden boxes for storage during renovations.

Although a great deal of excavation had taken place at Herculaneum, very few human remains were found until 1982 when workmen accidently discovered hundreds of bodies of victims while digging a trench across the ancient waterfront. Some skeletons were found on the beach, others had huddled together for shelter in the waterfront chambers. A 9-m boat and miniature horse were also found (Gore 1984). A total of 250 skeletons were removed at this time during careful excavation. They were in a superior state of preservation because they had been perfectly sealed within volcanic material that had set as hard as cement and had not been exposed to varying changes in temperature or humidity since the eruption. These skeletons were removed for laboratory analysis, and the bodies that tourists today stop to examine are actually fiberglass reproductions.

Separate studies of the human remains have been undertaken over the years. Dr Sara Bisel's 1980s analysis of the skeletons revealed there were not as many children present as would be expected in a normal population sample and offered three possible interpretations: first, that many of the young and old occupants of

Herculaneum "had escaped to Neapolis the night before"; second, that "another unexcavated chamber holds the 'missing' people" (to a certain extent this is correct); third, that the seemingly low number of infants and youth reflect a "radically decreasing" fertility rate in the population (Bisel and Bisel, p. 453). A second analysis, using newer scientific methods, was done in the 1990s by anthropologist Professor Luigi Capasso who found evidence of respiratory infections, potentially caused by indoor cooking.

Bisel's analysis also found the Herculaneans had a low incidence of tooth decay and tooth loss before death. Bisel explained this could be because they did not eat sugar and consumed a wide variety of seafood, an excellent source of fluoride, which helps prevent tooth decay. On the other hand, many others had worn down teeth and gum disease, probably as a result of eating bread made from very gritty flour. A more recent study of dental enamel found that people aged 14–20 and 25–35 showed nutritional deficiencies, which the authors attribute to these groups having lived through the 62 CE earthquake, in the case of the younger ones, who would been around 6 years old at the time (D'Anastasio et al. 2013). They hypothesize that there must have been another catastrophe around 53 CE, which affected the older group. This finding fits well with Luigi and Lorenzo Capasso's interpretation (1999) "that the earthquake of 62 AD resulted in high mortality."

Nearly half the people examined had some amount of osteoarthritis, and it is thought that about 80% would have done some hard, physical work. One may conjecture that the population at the time of the eruption may have been largely the lower classes or slaves, the wealthy having by then abandoned the earthquake-damaged city. In 2001, Petrone and colleagues suggested that the body postures of the Herculaneum victims suggest death by thermal shock rather than suffocation by noxious gases or ash, long thought to be the proximate cause of death for many at Pompeii. Their very short article mentioned flexion of body parts – such as curled toes – as well as charred bones as evidence of instantaneous death from fulminant shock, in which vital activity ceases within a time-span shorter than conscious reaction time. "Their soft tissues were vaporized . . . and the temperature then fell over a few tens of minutes, inhibiting the progress of the pugilistic stance and the disappearance of residual soft tissue."

Petrone and his colleagues have now confirmed their findings (Petrone et al. 2018). Numerous skeletons recovered from the waterfront chambers at Herculaneum were covered in mysterious red and black mineral residues. Based on mass spectrometry and microspectroscopy, the team hypothesizes that the residues represent iron from human blood that was exposed to extreme heat. The victims' blood literally boiled, causing the skulls to explode and brain matter to be replaced by ash. Flesh evaporated from the bones.

Future Directions

Today, Herculaneum is a huge open-air museum made up of hundreds of smaller micro-sites – houses, shops, fountains, streets, temples, theatres, *thermae* (public baths), and public spaces – each requiring constant maintenance and protection from the agents of destruction, both natural and human. For Herculaneum, as with Pompeii, the economic blessings of tourism are also a curse on its future existence. Constant maintenance and repair are required to hold off decay, disintegration, and destruction: collapsed roofing, water seepage, fading frescoes and plasterwork, sinking mosaic floors, crumbling carbonized wood, and the acidic droppings of pigeons nesting in roofs. In the last years of the twentieth century, two-thirds of Herculaneum had to be closed to the public because the site was collapsing (Povoledo 2012).

For this reason, the Herculaneum Conservation Project, an international collaboration funded by the Packard Institute, was set up in 2001 with the principal objective of providing support to the authorities to address the critical state of decline at the site (Herculaneum Conservation Project). The team was made up of public officers with a wider team of specialists who worked on

site all year round, creating a GIS system, mapping the areas of decay (over 15,000 square meters in 1 year) cataloguing architectural elements, archival photographs, etc. (Biggi et al. 2014). It is a public-private partnership that brings together the Packard Humanities Institute, a philanthropic foundation that works in Italy through the Packard Institute for Cultural Heritage, with the local heritage authority, the *Soprintendenza Speciale per i Beni Archeologici di Napoli e Pompei* (SNAP) and an international partner, the British School at Rome (Wallace-Hadrill 2009). The Project achieved remarkable results, opening up the town to visitors, but also making important new archaeological discoveries during maintenance, such as the drainage work which uncovered a second-century BCE floor, part of a structure which had been demolished in the early Imperial period (Camardo et al. 2012). In 2007, the Herculaneum Centre was created as a "sister initiative" by the Associazione Herculaneum. It has three partners: the Comune di Ercolano, SNAP and the British School at Rome. It is a community-based cultural association, aimed at better engaging the residents of Ercolano with the archaeological area, through oral histories, school programs, and workshops (Biggi et al. 2014).

An analysis of the building materials on the site by the Herculaneum Conservation Project revealed that around 50% of the wall structures at Herculaneum today are reconstructions dating to the 1930s Maiuri period. With the best of intentions, Maiuri's workers used cement – the state-of the-art restoration material at the time – to restore and reconstruct the fragile remains of walls and wall paintings. Over the years, the cement has deteriorated, resulting in further damage to the already fragile ancient wall paintings. Ironically, many of the conservation problems of today are the result of these well-meaning conservation works which aimed to create Herculaneum as an open museum and tourist attraction. The vision of Amedeo Maiuri, director of Pompeii and Herculaneum from 1927 to 1962, was to turn Herculaneum into a "living museum" where the visitor could experience the feeling of stepping back in time (Wallace-Hadrill 2011: 317). Much of the current restoration focuses on using new technologies and materials to undo damage caused by these previous attempts at conservation. Debates and dilemmas continue about how Herculaneum should be managed: should excavation be resumed or should the site be left for future generations to examine with more sophisticated and less destructive scientific and technological methods? The exceptional work of the Herculaneum Conservation Project exemplifies the effectiveness of the current policy of conserving and restoring rather than extending excavation, so the site can be safely visited in the present as well as the future.

Cross-References

- ▶ Disaster Response Planning: Earthquakes
- ▶ Fiorelli, Giuseppe
- ▶ Herculaneum
- ▶ Maiuri, Amedeo
- ▶ Pompeii
- ▶ UNESCO World Heritage Convention (1972)
- ▶ Volcanic Activity

References

Banerji, R. 2013. Unlocking the scrolls of Herculaneum. *BBC News Magazine*, 20 December. https://www.bbc.com/news/magazine-25106956. Accessed 25 Sept 2019.

Biggi, C., A. D'Andrea, and P. Pesaresi. 2014. Herculaneum: Joining forces to secure heritage benefits for the ancient and the modern towns. In *Heritage in context: Conservation and site management within natural, urban and social frameworks. MIRAS 2*, 39–53. Istanbul: Deutsches Archäologisches Institut.

Bisel, S.C., and J.F. Bisel. 2002. Health and nutrition at Herculaneum: An examination of human skeletal remains. In *The natural history of Pompeii*, ed. W.F. Jashemski and F.G. Meyer, 451–475. New York: Cambridge University Press.

Camardo, D. 2007. Archaeology and conservation at Herculaneum: From the Maiuri campaign to the Herculaneum Conservation Project. *Conservation and Management of Archaeological Sites* 8 (4): 205–214.

Camardo, D. 2013. Herculaneum from the AD 79 eruption to the medieval period: Analysis of the documentary, iconographic and archaeological sources, with new data on the beginning of exploration at the ancient town. *Papers of the British School at Rome* 81: 303–340, 414.

Camardo, D., S. Court, and J. Thompson. 2012. Archaeological fieldwork reports: Ten years of the

Herculaneum Conservation Project. *Papers of the British School at Rome* 80: 360–362.
Capasso, M. 2010. Who lived in the Villa of the Papyri at Herculaneum – A settled question? In *The Villa of the Papyri at Herculaneum: Archaeology, reception, and digital reconstruction*, ed. M. Zarmakoupi, 89–113. Berlin/New York: Walter de Gruyter.
Capasso, L., and L. Capasso. 1999. Mortality in Herculaneum before volcanic eruption in 79 AD. *The Lancet* 354 (9192): 1826.
Carrara, E., M. Carrozzo, M. Fedi, G. Florio, S. Negri, V. Paoletti, G. Paolillo, T. Quarta, A. Rapolla, and N. Roberti. 2001. Resistivity and radar surveys at the archaeological site of Ercolano. *Journal of Environmental and Engineering Geophysics* 6 (3): 123–132.
Cavallo, G. 2014. *I papiri di Ercolano come documenti per la storia delle biblioteche e dei libri antichi.* http://villafarnesina.it/files/documenti/LectioBrevis_Cavallo.pdf. Accessed 25 Sept 2019.
Cicero, M. Tullius. *Against Piso* [transation of *In Pisonem*]. http://www.perseus.tufts.edu/hopper/text?doc=Cic.+Pis.+77. Accessed 25 Sept 2019.
D'Anastasio, R., D.T. Cesana, J. Viciano, M. Sciubba, P. Nibaruta, and L. Capasso. 2013. The possible correlation between dental enamel hypoplasia and a historic natural disaster in the Roman population of Herculaneum (79 AD – Central Italy). *Anthropologischer Anzeiger* 70 (4): 369–383.
De Caro, S. 2015. Excavation and conservation at Pompeii: A conflicted history. *The Journal of Fasti Online: Archaeological Conservation Series.* https://fastionline.academia.edu/FOLDER Accessed 25 Sept 2019.
DeLacy, P. 1941. Cicero's invective against Piso. *Transactions and Proceedings of the American Philological Association* 72: 49–58.
Diamond Light Source (DLS). 2019. Team studies 2000-year-old Herculaneum Scrolls. https://phys.org/news/2019-10-team-year-old-herculaneum-scrolls.html. Accessed 9 Oct 2019.
Dyson, S.L. 2006. *In pursuit of ancient pasts: A history of classical archaeology in the nineteenth and twentieth centuries*. New Haven: Yale University Press.
Formola, S. 2013. Ercolano prima della municipalizzazione: Geomorfologia, urbanistica e scavi stratigrafici. In *Vesuviana: Archaeologia a confronte*, ed. A. Coralini, 29–90. Bologna: Atti del Convegno Internazionale.
Gore, R. 1984. The dead do tell tales at Vesuvius. *National Geographic* 165 (5): 557–613.
Guidobaldi, M., G. Camodesca, and A. Balasco. 2009. Il Tempio di Venere a Ercolano. *Atti dell Pontificia Accademia Romana di Archeologia (serie III) Rendiconti* vol. LXXXI.
Herculaneum Conservation Project – Packard Humanities Institute, British School at Rome and Archaeological Park of Herculaneum. http://www.herculaneum.org/. Accessed 2 Oct 2019.
Lapatin, K. 2018. The Villa J. Paul Getty built but never saw. https://blogs.getty.edu/iris/the-villa-j-paul-getty-built-but-never-saw/. Accessed 25 Sept 2019.
Maiuri, A. 1932. *Ercolano*. Novara: Istituto Geografico De Agostini.
Map of Herculaneum. https://sites.google.com/site/ad79eruption/herculaneum-1/map-of-herculaneum. Accessed 25 Sept 2019.
Mocella, V., E. Brun, C. Ferrero, and D. Delattre. 2015. Revealing letters in rolled Herculaneum papyri by X-ray phase-contrast imaging. *Nature Communications* 6: 5895.
Petrone, P., P. Pucci, A. Vergara, A. Amoresano, L. Birolo, F. Pane, et al. 2018. A hypothesis of sudden body fluid vaporization in the 79 AD victims of Vesuvius. *PLoS One* 13 (9): e0203210. https://doi.org/10.1371/journal.pone.0203210. Accessed 25 Sept 2019.
Povoledo, E. 2012. Escaping the shadow of Pompeii. *New York Times*, November 14. https://www.nytimes.com/2012/11/15/arts/design/herculaneums-ruins-are-revived-by-philanthropy.html. Accessed 1 Oct 2019.
Sider, D. 2005. *The library of the Villa Dei Papiri at Herculaneum*. Los Angeles: Getty Publications.
Sigurdsson, H., S. Cashdollar, and R.S.J. Sparks. 1982. The eruption of Vesuvius in AD 79: Reconstruction from historical and volcanological evidence. *American Journal of Archaeology* 86 (1): 39–51.
Tournié, A., K. Fleischer, I. Bukreeva, F. Palermo, et al. 2019. Ancient Greek text concealed on the back of unrolled papyrus revealed through shortwave-infrared hyperspectral imaging. *Science Advances* 5: 10. https://doi.org/10.1126/sciadv.aav8936. Accessed 9 Oct 2019.
UNESCO. 2019. Archaeological areas of Pompeii, Herculaneum and Torre Annunziata. http://whc.unesco.org/en/list/829. Accessed 1 Sept 2019.
Wallace-Hadrill, A. 2009. The Herculaneum Conservation Project: An introduction. In *Vesuviana: Comparing archeologies. Proceedings of the international conference, Bologna, 14–16 January 2008*, ed. A. Coralini, 203–207. Bologna: Edizioni Antequem.
Wallace-Hadrill, A. 2011. *Herculaneum: Past and future*. London: Frances Lincoln Ltd.

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Heritage and Archaeology

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Introduction

Heritage is, literally, that which has been, or may be, inherited. Although the concept of *inheritance* has considerable antiquity, the word *heritage* is of western and medieval origin, and applied originally to property and land. Insofar as there is a

shared understanding of what constitutes heritage in modern western society, it is ostensibly a broader and more democratic understanding than it once was, encompassing both tangible inheritances, "natural" (not man-made, though not unnecessarily unaffected by human agency) and cultural, and intangible inheritances (such as language, dance forms, craftsmanship, and ritual practices, passed down behaviorally from generation to generation). But heritage is far from an uncontested realm, and it is arguable that an uncontested consensus with respect to definition and constitution cannot be conceived of. This is because heritage is entirely a cultural construct, originating in "the West." Consciousness of heritage as a "thing" is itself a heritage. Though not negated, the concept of *global cultural heritage*, of an inheritance of which some value is shared by mankind, is rendered somewhat problematic by that fact. So too, for that matter, is the concept of a *natural* heritage, since nature is itself a cultural construct. To debate what constitutes heritage in the first place, and to debate the range of possible engagements with heritage (as signified by such terms as "protection," "destruction," and "preservation"), is to engage, then, in a conversation about humankind itself. The relative ease with which the idea of a universal and cross-cultural heritage might be deconstructed and some of its inherent ideological dangers exposed do not mean that heritage does not matter profoundly. On the contrary, forms of identity are defined almost everywhere by reference to some conception of heritage, while tourism, one of the key drivers of economic wealth nationally and internationally, rotates around it.

The actual constitution of heritage might be contested, but as a construct it has long been "black-boxed." The question "what is heritage?" – the question at the heart of virtually every heritage-related initiative in the past half century and usually explicitly so – might suggest that the opposite is the case, that its very essence is under constant scrutiny. But close examination of the contexts in which that question is asked usually reveals the expectation of an actual answer: in other words, the question is asked not to find out if heritage *is*, in an ontological sense, but to find out *what* it is. Indeed, one could argue that heritage, perhaps like all cultural constructs that have been "black-boxed," is central to two conversations in two different languages: one is a conversation about philosophy and epistemology and is predicated on the knowledge that heritage has no ontological reality, while the other is a conversation that may well acknowledge the value of philosophical reflection but has as its more urgent agenda the need to find out what is in the heritage box so that it can be saved from damage, theft, or decay.

Archaeology is historically the key discipline with investigative and curatorial authority in the realm of tangible, cultural heritage of protohistoric and prehistoric antiquity. It goes without saying that it occupies this position historically in western society and western thinking and that it is western heritage to which it claims specific ownership of access; like heritage itself, archaeology is after all a product of "western culture" as vaguely defined. But it has historically claimed jurisdiction over the retrieval and interpretation of heritage data outside "the West" as well, some of that data being of relatively recent vintage in terms of absolute chronology (but still "prehistoric"). Anywhere in the world with tangible cultural relics belonging to historically undocumented pasts – another western concept – will find that archaeology is not only interested in it but will find a way to know about it. If the discipline's grasp has always been truly global on the horizontal axis of geographic scale, it is increasingly, thanks to its new interests in the heritages of modernity and contemporaneity, just as extensive on the vertical axis of temporality.

It is debateable whether the relatively new "heritage professions," most of them linked to accredited academic courses (in Cultural Heritage Management, Museum Studies, and so on) and possessed of strong managerial dimensions, challenge archaeology's historic hegemony over tangible heritages from the distant past or indeed its more recent claims to some authority over more recent tangible heritages. To a degree, that hegemony is, like heritage itself, "black-boxed." If tangible heritage is conceptualized as possessing an inherent archaeology, regardless of its actual

date, the discipline of archaeology can claim in theory to give at least associate membership to the entire cadre of heritage professionals, whatever their training (and whether they like it or not). One might argue that archaeology has actively claimed its hegemonic position by redefining itself: just as the constitution of tangible cultural heritage expanded to include "things" as diverse as the tourist landscape of Las Vegas or the Apollo Mission detritus on the Moon (Gorman and O'Leary 2007; Weaver 2011), archaeology itself expanded to meet it. There is no longer anything that the archaeologist regards as out of bounds, even (and increasingly) the intangible.

However it is defined, archaeology's relationship with its heritage subject matter has changed in one very radical way in recent decades, although one hesitates to claim that the change has been effected universally. Readers of this encyclopedia, who constitute a "knowledge community" in themselves and who are likely to be as "western" as the discipline of archaeology, will know that it no longer claims innocently to be a disinterested scientific praxis, simply retrieving and making sense of tangible heritages. It now self-identifies as a social praxis and highlights its own social responsibilities. Few would contest this as a positive development. Practitioners from western countries are rightfully mindful that archaeological investigations of heritages in non-western places and contexts can be construed as colonial, and many would identify archaeology (with anthropology) as *historically* complicit in the "othering" of the non-western people (Trouillot 2003). Practitioners in western countries are also rightfully mindful that archaeological investigations more locally of the heritages of minority or politically disenfranchised communities can be construed as elitist and, in the cases of communities originating in historic colonial expansions, neocolonial. There is a conviction within the global profession, though, that archaeology itself is fundamentally benign as both a practice and an intellectual pursuit and that potential allegations of neocolonialism or elitism are circumvented if all communities and societies are encouraged to engage positively with their own heritages on their own terms. Archaeology is, in this view, an agency which sensitively and reflexively empowers communities by providing strategies by which they can access their own pasts – their own heritages – in manners and for purposes which are culturally appropriate to them.

Definition

Dictionary definitions of heritage as "that which has been or may be inherited; any property, and esp. land, which devolves by right of inheritance" and/or as "that which comes from the circumstances of birth; an inherited lot or portion; the condition or state transmitted from ancestors" (OED Online 2012) disguise the struggles which national and international agencies, charged with oversight and management of heritage, have experienced over decades to arrive at an adequately broad definition. The modern (post-Venice Charter, 1964; see below) history of international heritage organizations and movements is in part a history of definition searching. The general tendency in every new initiative has been towards broadening the definition. One can see this by comparing definitions between two benchmark documents 40 years apart. In 1965 the Constitutive Assembly of ICOMOS (the International Council on Monuments and Sites), a non-governmental international organization, defined heritage solely in terms of monuments and sites and excluded conventionally defined archaeological collections precisely because ICOM (the International Council of Museums) was regarded as the authoritative body. By contrast, in 2005 the *Council of Europe Framework Convention on the Value of Cultural Heritage for Society* (the so-called Faro Convention) dealt with the broader category of "cultural heritage" which it defined as "a group of resources inherited from the past which people identify, independently of ownership, as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions, [and which] includes all aspects of the environment resulting from the interaction between people and places through time." It defined "a heritage community" as one

"consisting of people who value specific aspects of cultural heritage which they wish, within the framework of public action, to sustain and transmit to future generations."

These two definitions reflect a desire among international heritage agencies to achieve politically neutral definitions. They, and other definitions like them, have been generated in contexts of international debate about heritage and are subscribed to in broad principle in many countries, but there is little standardization of definition between countries, a fact which has long hampered the effective implementation of many heritage charters. Thus, for example, the Australian view of heritage privileges "place, cultural significance and fabric," the Canadian view privileges "material culture, geographic environments and human environments," while the Chinese view privileges "immovable physical remains" (Ahmad 2006: 299). National definitions of heritage reflect national intellectual traditions and political needs. National agendas always trump international aspirations.

Not all agencies have been as sensitive as UNESCO (the United Nations Educational, Scientific and Cultural Organization), ICOMOS, or the Council of Europe in defining heritage. For example, in 2001 the World Monuments Watch, a nonprofit heritage organization based in New York, added the recently created Ground Zero (the former World Trade Center site) to its global list of 100 sites which it regarded as needing protection. It was, as that organization proclaimed, included as one of "our landmarks," alongside Mostar Bridge and the Bamiyan Buddhas, which "have become prized targets for terrorists because they are what defines the cultures, ideals, and achievements of the people who created them, who use them, who live with them." The description of these places and sites as "*our* landmarks" and the use of the term "terrorists" capture with an economy of words precisely what international heritage agencies attempt to avoid. In any case, the World Trade Center prior to its destruction was a place of international finance and business and has little to do with the "culture and ideals" of Americans (O'Keeffe 2010).

Historical Background

Although the origins of the modern concept of heritage are to be found in the context of nineteenth-century modernity in western Europe (Smith 2006: 16–22; Fig. 1), the period of greatest expansion internationally of heritage consciousness was after World War II, particularly from the 1960s. A key event was the decision by the Egyptian government to build the Aswan High Dam, thus flooding the valley containing the Abu Simbel and Philae temples. UNESCO launched a successful international campaign to raise money for safeguarding this heritage. The temples were dismantled and reassembled elsewhere. Subsequent UNESCO projects, similarly conceived, ensured the preservation of Mohenjo-daro in Pakistan and the Borobudur temple compounds in Indonesia.

Briefly, UNESCO remains the leading force in the development of practices for the protection of cultural heritage. Member states (of which there are 196) are required, though only at the cost of

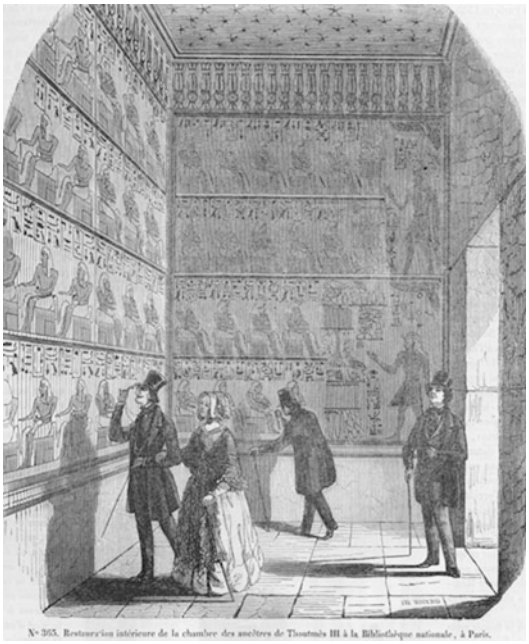

Heritage and Archaeology, Fig. 1 Visitors to a reconstructed Egyptian tomb in the Bibliothèque nationale de France in the mid-nineteenth century. (From Joanne 1850: 223)

censure, to honor the contents and recommendations of its various conventions, declarations, and guidelines. UNESCO maintains a list of what it designates World Heritage Sites, places both "natural" and "cultural" which it regards as having special significance to the global community. This list, which has 962 "sites," 77% of them "cultural," spread across 157 states, is overseen by its World Heritage Committee, the elected membership of which is drawn from the 190 countries which have signed and ratified the 1972 *World Heritage Convention (or Convention Concerning the Protection of the World Cultural and Natural Heritage)*. Whereas member states are represented on UNESCO's World Heritage Committee, membership of ICOMOS is comprised of individuals and institutions specializing in conservation in the broadest sense. ICOMOS advises UNESCO on World Heritage Sites.

Between them, UNESCO and ICOMOS are responsible for most of the thirty-odd charters and other documents created for international reference since World War II (or, more specifically, since the *Hague Convention* of 1954). Key documents created in these 60 years include (after Ahmad 2006, with additions):

- *International Charter for the Conservation and Restoration of Monuments and Sites*, CATHM, 1964 (http://www.icomos.org/charters/venice_e.pdf)
- *Recommendation Concerning the Preservation of Cultural Property Endangered by Public or Private Works*, UNESCO, 1968 (http://unesdoc.unesco.org/images/0016/001601/160145eb.pdf)
- *Resolution of the Symposium on the Introduction of Contemporary Architecture into Ancient Groups of Buildings*, ICOMOS, 1972 (http://www.international.icomos.org/publications/93towns7e.pdf)
- *Convention Concerning the Protection of the World Cultural and Natural Heritage*, UNESCO, 1972 (http://whc.unesco.org/archive/convention-en.pdf)
- *Recommendation Concerning the Safeguarding and Contemporary Role of Historic Areas*, UNESCO, 1976 (http://unesdoc.unesco.org/images/0011/001140/114038e.pdf#page=136)
- *Charter for the Conservation of Places of Cultural Significance*, Australia ICOMOS, 1979, revised 1999 (http://australia.icomos.org/wp-content/uploads/BURRA_CHARTER.pdf)
- *Charter for the Conservation of Historic Towns and Urban Areas*, ICOMOS, 1987 (http://www.international.icomos.org/charters/towns_e.pdf)
- *Charter on the Preservation of Historic Gardens*, ICOMOS, 1982 (http://www.international.icomos.org/charters/gardens_e.pdf)
- *Guidelines for Education and Training in the Conservation of Monuments, Ensembles and Sites*, ICOMOS, 1993 (http://www.getty.edu/conservation/publications_resources/research_resources/charters/charter52.html)
- *Nara Document on Authenticity*, Japan and UNESCO, 1994 (http://whc.unesco.org/uploads/events/documents/event-833-3.pdf)
- *Charter on the Protection and Management of Underwater Cultural Heritage*, ICOMOS, 1996 (http://www.international.icomos.org/charters/underwater_e.pdf)
- *Principles for the Recording of Monuments, Groups of Buildings and Sites*, ICOMOS, 1996 (http://www.icomos.org/charters/archives-e.pdf)
- *Principles for the Preservation of Historic Timber Buildings*, ICOMOS, 1999 (http://www.international.icomos.org/charters/wood_e.pdf)
- *Charter on the Built Vernacular Heritage*, ICOMOS, 2000 (http://www.international.icomos.org/charters/vernacular_e.pdf)
- *Convention on the Protection of the Underwater Cultural Heritage*, UNESCO, 2001 (http://unesdoc.unesco.org/images/0012/001260/126065e.pdf)
- *Charter for the Interpretation of Cultural Heritage Sites*, ICOMOS 2002 (http://icip.icomos.org/downloads/ICOMOS_Interpretation_Charter_ENG_04_10_08.pdf)
- *Framework Convention on the Value of Cultural Heritage for Society, The Council of Europe*, 2005 (http://conventions.coe.int/Treaty/EN/Treaties/Html/199.htm)

Archaeology features in most of them, but, surprisingly, perhaps, one cannot map particularly

well its own historical development as a heritage praxis, or its historical relationship with the concept of heritage, through an interrogation of their texts. In the 1964 *Venice Charter*, at the head of the list above, the disciplines of archaeology and history are given equal rank; the Charter does refer to the need for archaeological excavation to accord with agreed international scientific standards, but does not otherwise privilege the subject. The 1968 Recommendation which followed also mentioned archaeology but placed it among rather than in a privileged position within other disciplines and practices. It advocated, for example, "the conservation and the protection of monuments and historic, artistic, *archaeological* and scientific sites" and asserted that "the services responsible for the safeguarding of cultural property should be adequately staffed with the specialists required for the preservation or salvage of cultural property endangered by public or private works, such as architects, urbanists, *archaeologists*, historians, inspectors and other specialists and technicians." By the time of the *Faro Convention* of 2005, the last item on the list above, archaeology is not mentioned by name at all.

Key Issues

The key issues in heritage, certainly from an archaeological perspective but probably from every perspective, can be grouped under three headings: ethical, practical, and theoretical. Separating them like this suggests three different bundles of issues to be addressed, but all three are interconnected, with ethical concerns probably overarching all others. The application of theories and practices of heritage preservation and conservation, and of presentation, all require an advance rapprochement with the ethics of engaging in anybody's heritage or any group's heritage other than one's own.

In part, the ethical concerns are with respect to ownership of heritage. The role of western archaeological agencies, or indeed of archaeology as a western agency, in investigating heritages overseas, and the potential ethical conflicts, has already been alluded to above, but the issues extend also to the investigation of certain heritages within those western places themselves. The rights of communities to their own heritages, regardless of geographic location, are now recognized. In the United States, for example, initiatives addressing the specific concerns of indigenous peoples relating to cultural resource management have been in place since the mid-1970s, while a 1992 amendment to the *National Historic Preservation Act* allowed tribes to establish their own Tribal Historic Preservation Offices, enabling direct involvement in heritage preservation on tribal lands (Nicholas 2008). The treatment of burials is no longer the point of conflagration that it once was. The sort of controversy generated by the American burial ground (Epperson 1997) is unlikely to be repeated. Sometimes, though, the identification of rightful claimants to a heritage is a problem. In some cases, as with Stonehenge in the mid-1980s, there is no descendent community for an ancient heritage, but claims are still made for ownership (Chippendale 1986). In other cases, there is a descendent community, but claims from outside that community are made, as at Chaco Canyon (Finn 1997); identifying some heritage as global in significance opens a door for arguments to be made that everybody should have rights of access and intervention. In other cases again, communities with specific heritages have not sought heritage protection, and no offer of protection is made to them, thus creating the possibility that a heritage to be valued in the future will be destroyed in the present (Fig. 2). Ownership is one part, albeit a significant one, of a larger ethical-practical matrix. Imbricated with it is the problem of attaching a notional global heritage value or significance value if the communities whose heritages are being evaluated (such as "ethnic groups," as loosely defined) do not subscribe culturally to such metrics. This challenge trickles down to micro-level where tension can exist between a collective with a heritage that it desires not to retain and those within the heritage profession who might regard that same heritage as worthy of protective intervention (Fig. 3).

Once issues of the ownership and significance value of heritages are dealt with, there is a further

Heritage and Archaeology, Fig. 2 Moore Lane, Dublin (2009). One of the first sites of worship of Dublin's Nigerian community, it is typically in a back-street location. Will future generations of African-descended Irish people lament the loss of the site of the Tower of Power Pentecostal church? (Photo: T. O'Keeffe)

Heritage and Archaeology, Fig. 3 The remains of the Magdalene laundry attached to the Gloucester Street convent, Dublin (2009). The abuses (psychological, physical, sometimes sexual) suffered by women in such laundries are now public knowledge. According to local informants, there is no desire among survivors for their experiences to be memorialized in the preservation of this ruin, yet it represents an important, if very dark, passage in modern Irish history. (Photo: T. O'Keeffe)

area of on-going concern: presentation and interpretation. Establishing professional and ethical standards in tandem in these areas was central to the ICOMOS *Charter for the Interpretation of Cultural Heritage Sites*, drafted in 2002 by the Ename (Belgium) Center for Public Archaeology and Heritage Presentation. Cultural heritage site is defined in this context as broadly as possible: "a locality, natural landscape, settlement area, architectural complex, archaeological site, or standing structure that is recognized and often legally protected as a place of historical and cultural significance." In meeting its goal of establishing "international standards and guidelines for authenticity, intellectual integrity and sustainable development in the public preservation of archaeological and historical sites and landscapes," it distinguished between *interpretation* ("the full range of potential activities [including "professional and popular publications, on-site

installations, community activities, and so on"] intended to heighten public awareness and enhance understanding of cultural heritage site"), *presentation* ("the carefully planned communication of interpretive content through the arrangement of interpretive information, physical access, and interpretive infrastructure at a cultural heritage site"), and *interpretive infrastructure* ("physical installations, facilities, and areas at a cultural heritage site that may be specifically utilised for the purposes of interpretation and presentation"). Most interestingly, though, the same Charter defined *site interpreters* as "staff or volunteers at a cultural heritage site who are permanently or temporarily engaged in the public communication of information relating to the values and significance of the site." The information they communicate to "the public," in other words, is not information about the heritage but about its evaluation. The follow-up to the Charter, the *Charleston Declaration on Heritage Interpretation* (2005), suggested an "operational difference between *Presentation* and *Interpretation*" describing the former as a "one-way mode of communication" in which "scholars, design firms, and heritage professionals" (note the order of listing and the distinction made between the first and third) are involved and describing the latter as "the totality of activity, reflection, research, and creativity stimulated by a cultural heritage site" (www.enamecharter.org/downloads/charleston_declaration.doc). But it elided, arguably, the problem raised by the concept of the *site interpreter* who mediates a site's significance.

Among many key issues of a practical nature for scholars and heritage professionals, three can be picked briefly as representative. One is dealing with the impacts of so-called heritage tourism (see, e.g., Poria et al. 2003). The commodification of the past requires some accommodation between those involved in commerce and those concerned with conservation. Heritage tourism that is not carefully regulated damages more than just the physical: it can limit the sense of stakeholding among those whose heritage is commodified. A second issue is the tension between heritage sites in urban areas and the simple modern economic functioning of those urban areas. There is a difficulty of "translating traditional conservation concepts. . . to the diverse and dynamic urban contexts urban WHS [World Heritage Sites] represent" (Pendlebury et al. 2009: 349). A third issue is the problem of heritage theft. This has been addressed many times in the past 60 years, going back to the *Hague Convention* (http://unesdoc.unesco.org/images/0008/000824/082464mb.pdf). Yet, in more recent times, ICOM has had to issue what it described as *Red Lists* in which are classified the endangered categories of archaeological objects or works of art in the most vulnerable areas of the world, in order to prevent them being sold or illegally exported (http://icom.museum/programmes/fighting-illicit-traffic/red-list/). There are lists for *African Archaeological Objects* (2000), *Latin American Cultural Objects* (2003), an *Emergency Red List of Iraqi Antiquities at Risk* (2003), *Afghanistan Antiquities* (2006), *Peruvian Antiquities* (2007), *Cambodian Antiquities* (2009), *Endangered Cultural Objects of Central America and Mexico* (2009), an *Emergency Red List of Haitian Cultural Objects at Risk* (2010), *Chinese Cultural Objects* (2010), *Colombian Cultural Objects* (2010), and an *Emergency Red List of Egyptian Cultural Objects at Risk* (2011).

International Perspectives

UNESCO, the institutional epicenter of heritage history, and other international agencies have had considerable success in getting nation states to conceive of their national heritages as part of a greater, global heritage matrix and in encouraging most of those nation states to sign up to what are essentially covenants to protect the future(s) of heritage. But proposals from the international community to internationalize protection strategies for heritage have not always been compatible with national cultural traditions or chimed with national interests. The response to UNESCO's 1970 *Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Cultural Property*, mentioned above, illustrates this point very well. Declarations and

reservations came from 18 countries, most expressing reservation. Three examples from different corners of the world can be picked out as representative. They are of historic interest now, but they underline a point that is far from historic: the tension that exists, almost inevitably, between the aspirations of internationalization and national self-interest. For Australia came the declaration that it is not at present in a position to oblige antique dealers, subject to penal or administrative sanctions, to maintain a register recording the origin of each item of cultural property, names and addresses of the supplier, description and price of each item sold and to inform the purchaser of the cultural property of the export prohibition to which such property may be subject. Australia therefore accepts the Convention subject to a reservation as to Article 10, to the extent that it is unable to comply with the obligations imposed by that Article.

The Union of Soviet Socialist Republics declared that the provisions of Articles 12, 22 and 23 of the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property, providing for the possibility for the contracting parties to extend its application to the territories for the international relations of which they are responsible, are outdated and contrary to the Declaration of the United Nations General Assembly on the Granting of Independence to Colonial Countries and Peoples (resolution 1514/XV of 14 December 1960).

A third example is the declaration by the Republic of Guatemala that in conformity with the Fundamental Statute of Government, monuments and archaeological vestiges are the property of the nation and that, furthermore, national law prohibits the unauthorized export of property constituting its cultural wealth, makes an express reservation concerning paragraph (b) (ii) of Article 7 of the Convention to the effect that it does not consider itself obliged to pay any compensation to any person or persons holding cultural property that has been looted or stolen in Guatemala or exported illicitly to another State Party and that, at the request of the Government of Guatemala, has been the subject of appropriate steps for its confiscation and/or restitution by that other State Party. In any case, the Republic of Guatemala does not consider that the purchase of property forming part of its cultural wealth is in good faith solely through having been made in ignorance of the law. Concerning Article 3 of the Convention, the Republic of Guatemala shall also consider to be illicit the import and transfer of ownership of cultural property effected contrary to the national provisions in force that are not in conflict with the provisions of the Convention.

These very tensions are especially in evidence where underwater cultural heritage is concerned. The UNESCO *Convention on the Protection of the Underwater Cultural Heritage* aimed to provide an international legal framework for the protection of shipwrecks and other cultural remains located in international waters. It was adopted in 2001, but some major maritime states opted not to adopt it. Their principal legal concern was that their rights, under the UN *Convention on the Law of the Sea* 1982 (LOSC), would be compromised by signing up to the UNESCO Convention. A principal ethical concern was the protection offered by the Convention to sunken warships (Fig. 4). When afloat, such ships have a special legal status; they are afforded immunity from the jurisdiction of any state other than the flag state. Some maritime states insist that such protection survives their sinking. This issue has a particular currency: the Convention protects heritages which have been underwater for at least a century. The *Titanic* has recently fallen within its embrace; in 2014 the first of the World War underwater wrecks will be covered by the Convention (Dromgoole 2012).

Future Directions

The observation was made above that heritage is a topic in two conversations in two different languages, one philosophical and epistemological and the other concerned with practicalities. The two conversations converge on the issue of ethics, in that those engaged in the first recognize the ethical problems inherent in legislating for concepts inherently unstable, and those in the second

Heritage and Archaeology, Fig. 4 Tourists visit the *USS Lexington*, Corpus Christi, Texas (2008). (Photo: T. O'Keeffe)

understand how negotiation with ethics is necessary for practical action to be taken on heritage. Neither of these conversations will stop; the challenge into the future is to make their languages more compatible with each other.

Cross-References

- ▶ Archaeological Resource Management: The Changing Role of the State
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ International Council of Museums (ICOM)
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Preserving Heritage: The Role of the Media
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ UNESCO World Heritage Convention (1972)

References

Ahmad, Y. 2006. The scope and definitions of heritage: From tangible to intangible. *International Journal of Heritage Studies* 12 (3): 292–300.

Chippendale, C. 1986. Stoned henge: Events and issues at the Summer solstice, 1985. *World Archaeology* 18 (1): 38–58.

Dromgoole, S. 2012. Reflections on the position of the major maritime powers with respect to the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001, Mar. Policy (2012). https://doi.org/10.1016/j.marpol.2012.05.027.

Epperson, T.W. 1997. The politics of "race" and cultural identity at the African Burial Ground excavations, New York City. *World Archaeological Bulletin* 7: 108–117.

Finn, C. 1997. "Leaving more than footprints": modern votive offerings at Chaco Canyon prehistoric site. *Antiquity* 71: 177–178.

Gorman, A., and B. O'Leary. 2007. An ideological vacuum: The Cold War in outer space. In *A fearsome*

heritage. Diverse legacies of the Cold War, ed. J. Schofield and W. Cocroft, 73–92. Walnut Creek: Left Coast Press.
Joanne, A.L. 1850. *Voyage illustré dans les cinq parties du monde en 1846, 1847, 1848, 1849*. Paris: L'Illustration.
Nicholas, G.P. 2008. Native peoples and archaeology. In *The encyclopedia of archaeology, volume 3*, ed. D. Pearsall, 1660–1669. Oxford: Elsevier.
O'Keeffe, T. 2010. Time-space compression, ruination, and the 'profound otherness' of Ground Zero. In *Crossing borders: Space beyond disciplines*, ed. K. Chakraborty-James and S. Stumper-Kroebb, 177–188. Berlin: Peter Berg.
OED Online. 2012. *Heritage*. Oxford University Press. http://www.oed.com/ Accessed 20 Feb 2013.
Pendlebury, J., M. Short, and A. While. 2009. Urban world heritage sites and the problem of authenticity. *Cities* 26: 349–358.
Poria, Y., R. Butler, and D. Airey. 2003. The core of heritage tourism. *Annals of Tourism Research* 30 (1): 238–254.
Smith, L. 2006. *Uses of heritage*. London: Routledge.
Trouillot, M.-R. 2003. *Global transformations: Anthropology and the modern world*. Basingstoke: Palgrave Macmillan.
Weaver, D. 2011. Contemporary tourism heritage as heritage tourism. Evidence from Las Vegas and Gold Coast. *Annals of Tourism Research* 38 (1): 249–267.

Further Reading

Agbe-Davies, A. 2010. Concepts of community in the pursuit of an inclusive archaeology. *International Journal of Heritage Studies* 16 (6): 373–389.
Brattili, T. 2009. Managing the archaeological world cultural heritage: Consensus or rhetoric? *Norwegian Archaeological Review* 42 (1): 24–39.
Carman, J. 2005. *Against cultural property: Archaeology, heritage and ownership*. London: Duckworth.
Cleere, H. 2012. *Archaeological heritage management in the modern world*. London: Routledge.
Graham, B., and P. Howard, eds. 2008. *The Ashgate research companion to heritage and identity.* Aldershot: Ashgate.
Harrison, R. 2011. Intangible heritage embodied and intangible heritage. *International Journal of Heritage Studies* 17 (3): 280–282.
Logan, W. 2012. Cultural diversity, cultural heritage and human rights: Towards heritage management as human rights-based cultural practice. *International Journal of Heritage Studies* 18 (3): 231–244.
Rowan, Y.M., and U. Baram. 2004. *Marketing heritage: Archaeology and the consumption of the past*. Walnut Creek: Altamira.
Skeates, R. 2000. *Debating the archaeological heritage*. London: Duckworth.

Heritage and Higher Education

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Introduction

In the UK, Archaeological Higher Education courses have, in recent years, incorporated a growing component of heritage studies, and in addition, heritage is now often separated from archaeology as its own distinct discipline of study. The question of how closely linked the disciplines should be is rarely addressed, although many recognize the interdisciplinary nature of their research in these fields. This section will discuss the traditional "education versus training" debate, which sees a dichotomy of practice between academics and education, and professional archaeology, with a segregation between education and practice. Epistemologies of practice are also discussed, where the demographics of education contrast with those of the profession, especially at higher levels, a pattern also seen in other arts areas of study and practice. Finally, the importance of sociopolitics and the role of "alternative narratives" in heritage education and management will be considered.

Key Issues

Education Versus Training

In a current climate of financial downturn, the disciplines of archaeology and heritage face challenging times. The role of education is ever-more vital, securing the future knowledge base of the next generation of professionals, while also fundamental for nurturing an understanding of the value of the past and its role in life today. However, the heritage sector, including professional archaeologists, and academia debate the responsibilities for vocational training: the "education

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versus training" debate (Collis 2000; Aitchison 2004; Hamilakis and Rainbird 2004: 52). Archaeological employers argue that graduates are becoming increasingly ill-equipped for a career in field archaeology (Aitchison 2004), and at the heart of the discussion is the issue of whether universities are responsible for producing professional archaeologists, equipped with the field knowledge to work effectively on archaeological sites, or whether vocational aspects of training should fall under the remit of employers. A factor in the debate is the role of universities in ensuring the employability of all of their graduates, whether they decide to pursue archaeology or some other career, requiring a broader focus on employability skills, rather than simply archaeological techniques. With new jobs in archaeology predominantly awarded to those with degrees, there are responsibilities for both the education and professional sectors. Two major research projects which have investigated fieldwork training in the UK (Croucher et al. 2008; Everill and Nicholls 2011) have called for a closer relationship between the profession and universities, with the most productive training projects frequently resulting from collaboration between field units and universities (Croucher et al. 2008). It is also clear that archaeological training equips graduates with a range of transferable skills (e.g., analytical skills, interpretative abilities, communication skills, and team working) which are valuable to employers outside of archaeological careers.

Recent research by Everill (2009) has investigated the working conditions of archaeologists, observing a profession which is repeatedly subject to low-pay and poor conditions, further emphasizing a gap between the profession and academia. As the professional sector faces increasingly diminished funds in a competitive environment, the exploitation of excavators is frequently inherent in contracts of work. Schlanger and Aitchison (2010) describe a crisis in archaeology in the UK; a change in policy, brought in by a new coalition government, has resulted in cuts to publically funded projects, rather than the previous strategy of investment in order to drive growth. The government strategy, placed in its context of global economic downturn, has contributed to a diminishing construction industry, directly impacting on the archaeological sector (Aitchison 2010), alongside dramatic cuts in funding to education and heritage (Everill and Nicholls 2011). Schlanger and Aitchison describe the current situation as affecting four areas within archaeological and heritage research and practice: research funding and its priorities; professional employment; conservation and public outreach policies; and heritage management, policies, and legislation (2010: 10), themes which are interdependent and together their plight spells an overarching crisis for the profession and education. Aitchison estimates that in the UK, an equivalent of one in every six jobs in archaeological fieldwork was lost between 2007 and 2009, a decline of around 10% in the archaeological sector as a whole (2010: 26). Not only is the situation leading to an employment crisis, but is also resulting in the burgeoning of skills, knowledge, and experience from archaeological practice (Aitchison 2010; Schlanger and Aitchison 2010). With diminishing archaeological jobs, it is clear that only the most proficient of graduates will secure their place in an archaeological career, yet a career that is dominated by low salaries and poor conditions (Everill 2009). As the training of future generations of archaeologists and heritage sector professionals is fundamental to the continuity of the heritage sector, the way forward lies with a closer allegiance and understanding between the sectors of education and the profession. The effects of the financial crisis are echoed across the globe (see Schlanger and Aitchison 2010 and chapters within).

Demographics of the Profession

Alongside the decline in career opportunities, the demographics of those working in the sector remains a concern. Aitchison and Edwards' (2008) *Profiling the Profession* research describes how the profession is still dominated by a male workforce. It is apparent that within Higher Education, there is greater equality between the sexes at undergraduate level, yet the traditional picture

highlighted by Gero in 1994, of gender inequalities within archaeology, remains the same, with a narrowing of the career pyramid for female opportunities throughout the various levels of education and employment, with ultimately few female archaeology professors in the UK (see also Cant 2009). This worrying trend is not only evident with gender divides but permeates into fields of ethnicity, disability, and class, with the profession still remaining predominantly white, male, able-bodied, and middle class; 99% of the UK sector are white, and 98.4% able-bodied (Aitchison and Edwards 2008). The situation, writes Pope (2011), is in part attributable to a change in demographics and expectations during the 1950s in Britain, leading to the professional fast-tracking of many (male) Cambridge graduates into professorships, a legacy which still impacts on the discipline today. Highlighting the current indiscrepancies in our professional and academic workforce is essential if the situation is to be rectified and the heritage sector is to become more representative of our modern population. This is a situation which has been of concern for a number of years, with McGuire and Walker observing class inequities in archaeology in 1999, with inequalities relating to class as well as gender. While the current situation in terms of class is more difficult to define, research is demonstrating that the gender imbalance in the heritage sector remains a challenge. An investigation by the Cultural Leadership Programme (2008) into the arts and heritage sector in the UK confirmed the continuing situation. While in 2006 52% of the Cultural Heritage workforce were female (Dodd et al. 2008: Table 4), the percentages for executives were 62% male and 38% female (Dodd et al. 2008: Table 6). This figure does not seem so problematic until the sizes of companies with female executives are compared; companies with an all-female executive body make up 82% of those businesses employing 0–4 members of staff, with companies employing larger workforces dominated by male executives (Dodd et al. 2008: Table 8). Thus, female executives, where they are present, are predominantly situated in the smallest organizations.

Future Directions

It is clear that the heritage sector faces great challenges ahead. It must become more commercially viable if it is to exist in today's climate of cuts and financial downturn. Education is key, not just of tomorrow's professionals but of the whole population in securing its understanding of the value of the past. In order to increase participation in heritage projects, it can be argued that the sector's demography needs to be more diverse to represent a multicultural Britain. This also includes the acceptance of alternative narratives of the past, which enable different voices to be heard and accept different claims on heritage, rather than offering a single, unified interpretation of monuments, archaeological sites, and places. The acceptance of difference pasts offers a forum for greater engagement in archaeology and heritage (Joyce 2002; Mapunda and Lane 2004). Indeed, a multiplicity of meaning no doubt existed in the past as it does in the present. Finally, these challenges are not unique to Britain; they place Britain in a global context and in an international community, which is striving to communicate the past and the relevance of heritage to lives and communities today and in the future.

Cross-References

- ▶ Council for British Archaeology (CBA)
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Gender
- ▶ Cultural Heritage Outreach
- ▶ United Kingdom: Cultural Heritage Management Education

References

Aitchison, K. 2004. Supply, demand and a failure of understanding: Addressing the culture clash between archaeologists' expectations for training and employment in 'academia' versus 'practice'. *World Archaeology* 36: 203–219.

Aitchison, K. 2010. United Kingdom archaeology in economic crisis. In *Archaeology and the global economic crisis*, ed. N. Schlanger and K. Aitchison, 25–30. Tervuren: Culture Lab Editions.

Aitchison, K., and R. Edwards. 2008. *Archaeology labour market intelligence: Profiling the profession 2007–08*. Reading: Institute of Field Archaeologists.

Cant, A.M. 2009. Women's work? Challenges faced by women in archaeology. In *Que(e)rying archaeology: The proceedings of the 30th Annual chacmool conference, Calgary*, ed. S. Tereny, N. Lyons, and J. Kelly, 77–82. Calgary: Archaeological Association of the University of Calgary.

Collis, J. 2000. Towards a national training scheme. *Antiquity* 74: 208–214.

Croucher, K., H. Cobb, and A. Brennan. 2008. *Investigating the role of fieldwork in teaching and learning archaeology*. Lancaster: Carnegie Publishers.

Dodd, F., L. Hawkes, F. Sullivan, and TBR and Right Angle Management. 2008. Women in leadership in the creative and cultural sector. Cultural leadership programme. Available at: http://www.culturalleadership.org.uk/uploads/tx_rtgfiles/Women_in_Leadership.pdf

Everill, P. 2009. *The invisible diggers: A study of commercial archaeology in the UK*. Oxford: Oxbow Books.

Everill, P., and R. Nicholls. 2011. *Archaeological fieldwork training: Provision and assessment in higher education*. Winchester: University of Winchester/Higher Education Academy.

Gero, J.M. 1994. Excavation bias and the woman-at-home ideology. In *Equity issues for women in archaeology*, ed. M.C. Nelson, S.M. Nelson, and A. Wylie, 37–42. Washington: American Anthropological Association.

Hamilakis, Y., and P. Rainbird. 2004. Archaeology in higher education. In *Education and the historic environment*, ed. D. Henson, P. Stone, and M. Corbishley, 47–54. London: Routledge.

Joyce, R. 2002. *The languages of archaeology*. Oxford: Blackwell Publishers.

Mapunda, B., and P. Lane. 2004. Archaeology for whose interest – archaeologists or the locals? In *Public archaeology*, ed. N. Merriman, 211–222. London: Routledge.

McGuire, R.H., and M. Walker. 1999. Class confrontations in archaeology. *Historical Archaeology* 33: 159–183.

Pope, R. 2011. Processual archaeology and gender politics. The loss of innocence. *Archaeological Dialogues* 18: 59–86.

Schlanger, N., and K. Aitchison. 2010. Introduction: Archaeology and the global economic crisis. In *Archaeology and the global economic crisis*, ed. N. Schlanger and K. Aitchison, 9–12. Tervuren: Culture Lab Editions.

Heritage and Public Policy

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Introduction

The policy environment is a crucial factor affecting cultural heritage and its preservation in local, national, and international settings. It is policy that sets goals, determines courses of action, and establishes common principles for use in cultural heritage management.

Definition

Definitions of public policy vary considerably and it could be argued that there is no universally accepted definition. However, most generally acknowledge that policy, although usually made or initiated by government, is interpreted or implemented by both public and private sector actors. In the context of cultural heritage, policy can be defined as courses of action – identified or undertaken by governments (national, subnational, or local), organizations (public or private, multinational, national or local) and private sector entities or civic groups – to preserve, protect, maintain, or manage tangible or intangible aspects of cultural heritage.

Historical Background

Cultural heritage policies in use today can be categorized into at least two general categories: (1) conceptual or definitional policies; and, (2) policies guiding program action or implementation. Policies in either category typically address approaches for preserving or protecting heritage and/or ways for responsibly combining cultural heritage and economic interests (such as cultural resource management and tourism).

Conceptual or Definitional Policies

Some policies or statements of heritage preservation objectives are long-standing and often emerged from a process of national dialogue. One that has become a model is the United States (U.S.) *National Historic Preservation Act* of 1966 (Public Law 89-665) which amounts to a national declaration of policy for preservation that applies to several government agencies and organizations. The *National Historic Preservation Act* also authorized the National Register of Historic Places in the USA as part of the effort to identify and protect the country's historic and archeological resources. As of 2010, the Register had over 86,000 properties listed. Although a model that may be emulated by others, the venerable public policy, that is, the *National Historic Preservation Act*, was amended 18 times between 1966 and 2006 – illustrating that public policies for cultural heritage are evolving and changing to meet the needs of times or circumstances.

Within the international arena, a major force for cultural heritage issues in public policy has been the United Nations Educational, Scientific and Cultural Organization (UNESCO). The *World Heritage Convention* of 1972 linked the concepts of nature conservation and the preservation of cultural properties (United Nations Educational, Scientific and Cultural Organization (UNESCO) 1972). This convention has guided the foundations of policy dialogue on cultural heritage issues internationally for about four decades. By October 2011, 188 countries had signed the convention and are listed as participating states in the accord. Interestingly, the concept of nature conservancy and cultural heritage preservation remained linked in this policy forum.

In 1992, UNESCO established the World Heritage Centre, which serves as an action arm within UNESCO for the coordination of the *World Heritage Convention*. By organizing annual sessions of the World Heritage Committee, the Centre plays a lead role in setting significant policy issues related to heritage preservation across the globe. The Centre also maintains the World Heritage List, a compendium of cultural and natural properties that are considered the most outstanding heritage sites from an international perspective in need of preservation and protection. From a policy perspective, the World Heritage List performs a similar set of functions to that of the U.S. National Register of Historic Places. In 2011, there were 936 properties on the World Heritage List: 725 cultural properties, 183 natural properties, and 258 mixed natural properties in a total of 153 countries.

Subnationally, policies regarding cultural heritage are often products of state and local governments or nongovernment organizations concerned with heritage issues. For example, the *Heritage of Western Australia Act* 1990 (Government of Western Australia as amended 2009) establishes heritage conservation principles for the State of Western Australia. This Act served as the foundation for the creation of the Heritage Council of Western Australia that functions to establish and maintain the State Register of Heritage Places, ensure that any development of heritage places is in harmony with cultural values, and promote awareness and knowledge of cultural heritage. The 2011 *State Cultural Heritage Policy of Western Australia* builds upon the *Heritage Act* of 1990 and sets specific heritage policy objectives (Government of Western Australia, Heritage Council of Western Australia and the National Trust of Australia 2011).

Policies Guiding Program Action or Implementation

Once heritage policies are basically defined or established, additional policies often emerge that are designed to guide heritage program activities or the efforts to achieve more broadly defined heritage goals. For example, the U.S. National Park Service Management Policies describe procedures and protocols for the management of cultural resources on Park Service properties. These management practices relate to both preserving and fostering the appreciation of cultural resources.

On the international level, UNESCO and the World Heritage Centre issued its Operational

Guidelines for the Implementation of the *World Heritage Convention* (United Nations Educational, Scientific and Cultural Organization (UNESCO) 2008) which defines key processes of the Convention functions and documents implementation formats for signatory countries. Another international example is the *Charter for the Interpretation and Presentation of Cultural Heritage Sites* that was ratified in 2008 by the General Assembly of the International Council of Monuments and Sites (International Council on Monuments and Sites (ICOMOS) 2008). The Charter's stated purpose is "to define the basic principles of Interpretation and Presentation as essential components of heritage conservation efforts and as a means of enhancing public appreciation and understanding of cultural heritage sites" (International Council on Monuments and Sites (ICOMOS) 2008: 2).

Some policies relating to cultural heritage guide program operations of organizations not necessarily established to serve a specific cultural heritage purpose. The World Bank, for example, adopted policies (BP 4.11 and OP 4.11) in 2006 concerning the conservancy of "Physical Cultural Resources." These policies relate to the funding processes within the World Bank and are designed to "avoid or mitigate adverse impacts on physical cultural resources from development projects" that the World Bank finances (World Bank 2006a, b). As the policy title suggests, the definition of cultural resources is oriented to heritage that has physical form and the policy specifies that the assessment of risk to cultural resources is to be undertaken within a broader environmental assessment process for a proposed development project.

Key Issues/Current Debates

Public policies at the local, national, and international levels have made substantial progress in raising awareness about cultural heritage and promoting the principles of heritage preservation. A very common theme within the heritage policy arena is the linkage between issues of preservation or protection and those related to the economic potential of heritage sites. These potentially competing interests and how they are addressed or balanced are often the topic of the current dialogue on heritage policy.

Increasingly, cultural heritage policies are being woven within economic strategies and interests. Economic interests typically are driven or defined locally and within a country-specific context. Consequently, the policy issues associated with economic development and cultural heritage are increasingly being defined in terms consistent with the perspectives of national, district, or even city governments. As Western Australia's Minister for Heritage, G. M. Castrilli, states in his government's State Cultural Heritage Policy, "The protection and management of our heritage is also important to our social, environmental and economic prosperity" (Government of Western Australia, Heritage Council of Western Australia and the National Trust of Australia 2011).

Some have acknowledged the inseparability of heritage preservation and economic development. Yang and Phares, for example, outline protocols for including heritage management within poverty-reduction efforts, sustainable tourism, and job-creation interests at even the city level. Bono has emphasized the important role that countries and communities can play in identifying sites of heritage significance to indigenous cultures, while also recognizing the importance of linking cultural heritage interests with common interests in tourism, private enterprise, and job creation. Sullivan (2004: 54) identifies some of the advantages of empowering local communities to become involved in the cultural heritage management process and advocates addressing the economic and social interests of local communities to strengthen the policy environment for heritage preservation.

Managing heritage preservation objectives with economic growth interests also needs guidance. Acknowledging the importance of responsible site stewardship within an economic context, UNESCO's World Heritage Centre produced a manual for managing tourism at world heritage sites (Pederson 2002). In 2010, the U.S. State of Georgia's Historic Preservation Division of the

Department of Natural Resources and the Tourism Division of the Department of Economic Development produced a *Heritage Tourism Handbook* to "to assist communities in leveraging their historic assets to realize economic and cultural goals . . ." (Georgia Departments of Natural Resources and Economic Development 2010: 2). The Handbook provides the context for blending both heritage preservation and economic growth interests at the subnational level.

The effort to address various interests in the use of heritage sites can produce concerns over potential adverse impacts to heritage sites. ICOMOS (2011) recently issued guidance on how to assess the impact of development or other changes on World Heritage properties that both acknowledges that development can have negative effects on sites and offers concepts for mitigating impact. As such, the guidance provides an example of the effort to better manage potentially competing factors affecting heritage resources.

Another common theme within the public policy arena for heritage is resource allocation for cultural heritage work and the implementation of existing policies. While public awareness and willingness to do more in cultural heritage conservation and heritage management has grown, the financial resources available to fully implement existing heritage policies often limit what is possible. By 2002, for example, requests from countries to the World Heritage Centre for assistance with new World Heritage sites exceeded the resources available (Phares and Guttman 2002: 8–9). The interest among participating countries to receive financial assistance from UNESCO and the World Heritage Centre is regularly higher than annual funding levels. Similar situations of funding scarcity exist at national or subnational levels for cultural heritage work.

Recognizing the resource availability limitations, recent policy issues addressed in the international arena have included how to best expand the resources available to organizations active in cultural heritage. The World Heritage Centre held a conference in 2002 to help identify opportunities to develop new partnerships with civil society and corporations for cultural heritage efforts. Among the suggestions made were the development of public-private partnerships, and the "mainstreaming" of world heritage into the development processes of the World Bank and the United Nations (World Heritage Centre 2003: 144). Public-private partnerships often are relevant topics for local-level heritage preservation efforts or even in conservation efforts for a specific site.

International Perspectives

Internationally, initiatives are constantly evolving to build or maintain new systems of international cooperation for cultural heritage. Some (Barbosa 2003: 21) recommend new partnerships for heritage conservation that will involve "South-South" (developing country to developing country) cooperation and wider "North-south" (developed country to developing country) relationships that extend beyond traditional donor-recipient agreements as well as the involvement of corporations, research institutions, trust funds, foundations, and individuals in heritage conservation efforts. The fact that, in 2011, the World Bank hosted the 13th Annual International Symposium on the Economic Benefits and Challenges of Supporting Cultural Heritage for Sustainable Development illustrates that there are continuing ongoing gatherings in which new resources may be identified to help realize heritage policy goals.

One common issue within the policy arena affecting cultural heritage is that definitions of heritage change and evolve with time and location. Early cultural heritage policies focused largely upon tangible heritage and physical sites or items. Over time, definitions of cultural heritage have become more varied and more encompassing – incorporating oral or visual art forms, for example, and a variety of types of intangible heritage. Public policies, consequently, also must evolve with new policy expressions or be applied with flexibility to accommodate new concepts of heritage. As a result, public heritage policies are constantly being updated.

Once heritage policies are in place or adopted, organizations charged with implementing such policies often have insufficient internal capacities

to fully implement them. Heritage policies, therefore, frequently require capacity-building efforts (training, awareness-raising, adding staff, etc.) in order for policy principles to be realistically applied or undertaken. How best to build capacity for implementing heritage policies or realizing policy goals can be an important issue affecting the ultimate success of public policy.

Another issue that affects heritage policies is the complexity of stakeholder involvement in policy formulation as well as policy interpretation or implementation. The community of stakeholders for cultural heritage can be quite large and diverse. Stakeholders may be representatives of a particular cultural group, the residents of a specific location, local government officials, corporate executives, or senior national decision makers. The variety and wide range of disparate stakeholders can make effective involvement within the policy dialogue process challenging. Although new techniques for stakeholder involvement in heritage policy keep emerging, constant efforts for greater effectiveness in stakeholder participation are needed.

Future Directions

Within the public policy arena, new opportunities for cultural heritage dialogue appear destined to include more linkages between cultural preservation, job creation, and the economic benefits of cultural resource management. Policy advocacy, however, will need to be at international, national, subnational, and local levels in ways that also involve economic development interests and organizations.

At the country level, policies will be needed that clearly articulate a place for cultural heritage preservation within the economic growth strategies of national governments. These policies may require refining tourism policies and the role of cultural resource management in long-term plans for tourism over time. Significant opportunities exist at the national and subnational levels to rethink national policies related to cultural heritage management and longer-term national economic growth interests.

Within organizations or departments oriented to economic development or economic growth, new policies will be needed to ensure that initiatives succeed in conserving and protecting heritage and incorporate principles of prudent heritage management beyond just doing no harm to known cultural heritage sites. Development organizations will need help from cultural heritage experts to develop policies on financing heritage preservation efforts and also for creating an appropriate cultural resource management policy niche within economic growth or poverty-reduction priorities.

There are also opportunities for more active technical exchanges in cultural resource management where agencies with a historically domestic focus (such as the U.S. National Park Service or the Australian National Trust) can share proven cultural resource and asset management expertise within the wider global community. Countries which have a strong tradition of melding national cultural heritage management programs with a vibrant and important tourism industry (Italy, Egypt, or Tunisia, for example) also can provide valuable models for combined cultural heritage and economic growth strategies on a national scale that can be more effectively shared within the global community.

Another opportunity for public policy lies in the realm of measurement indicators for successful management of cultural heritage resources that can help governments and donor organizations know if growing investments in cultural heritage preservation are having the desired impact – both on heritage conservation and with respect to economic growth interests. New measurement indicators for heritage management will probably need to be developed and additional measurement techniques identified. Economists, archaeologists, other cultural heritage specialists, and a variety of other professionals will need to work together to formulate new multidisciplinary models for defining policy outcomes that link cultural heritage and economic growth goals.

Cultural Heritage and Future Public Policy

One of the most exciting aspects about cultural heritage in the future is that the policy environment will continue to change as new cultural

heritage conservation interests are expressed and heritage needs evolve at all levels. An ongoing challenge will be the broader involvement of stakeholders in the heritage policy process and the quest to link policy implementation with a broader array of available financial resources for the important work of cultural heritage preservation.

To realize the full potential of current and future heritage policy, there will need to be a vibrant and effective advocacy on the stage of public opinion for the importance of cultural heritage and the vital processes for responsible management of cultural resources. Advocacy for cultural heritage preservation within the economic development arena, where the financial resources at stake are substantial, remains incomplete. The development of new and evolved heritage policies will be required to take cultural heritage management to new levels and to attract the level of political and economic support that it deserves.

Advocacy champions for cultural heritage will still be needed within the policy context at all levels of government and civil society. These policy champions will have to be able to communicate convincingly with policymakers, using arguments that can link heritage conservation with economic goals and other programmatic imperatives of broad global concern. Policy champions may not be limited to cultural resource management professionals or to those who hold positions within the policy-formation arena of organizations already active in cultural heritage work.

There is also an important role for committed and informed laypersons with a cultural resource management perspective to play in future heritage policy development. They too can champion cultural heritage issues knowledgeably within the policy-formation process as communities become more involved in heritage management. Future advancements in public policy for cultural heritage issues will need to be based on an active and vibrant collaboration between cultural heritage professionals, managers of economic growth, communities, heritage organizations, and others. Therefore, the formulation of public policy for cultural heritage will continue to be a dynamic, multifaceted process.

Cross-References

- ▶ African World Heritage Fund (AWHF)
- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Charter for the Conservation of Historic Towns and Urban Areas (Washington 1987)
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ Collaborative for Cultural Heritage Management and Policy (CHAMP)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO (1972) and Malta (1992) Conventions
- ▶ UNESCO World Heritage Convention (1972)
- ▶ United States: Cultural Heritage Management

References

Barbosa, M. 2003. Keynote presentation. In *World heritage 2002: Shared legacy, common responsibility*. Paris: UNESCO World Heritage Centre.

Georgia Department of Natural Resources, Historic Preservation Division. 2010. *Heritage tourism handbook: A how-to-guide for Georgia*. Atlanta: Georgia Department of Natural Resources.

Government of Western Australia, Heritage Council of Western Australia & the National Trust. 2011. *State cultural heritage policy*. Perth: Heritage Council of Western Australia and National Trust of Australia.

International Council on Monuments and Sites (ICOMOS). 2008. *ICOMOS charter for the interpretation and presentation of cultural heritage sites*. Paris: ICOMOS.

International Council on Monuments and Sites (ICOMOS). 2011. *Guidance on heritage impact assessments for the cultural world*. Paris: ICOMOS.

Pederson, A. 2002. *Managing tourism at cultural heritage sites: A practical guide for world heritage site managers*. Paris: UNESCO World Heritage Centre.

Phares, J., and C. Guttman. 2002. *Investing in world heritage: Past achievements, future ambitions, a guide to international assistance*, World heritage papers 2. Paris: UNESCO World Heritage Centre.

Sullivan, S. 2004. Local involvement and traditional practices in the world heritage system. In *Linking universal and local values: Managing a sustainable future for world heritage*, World heritage papers 13, ed. E. de Merode, R. Smeets, and C. Westrik, 49–55. Paris: UNESCO World Heritage Centre.

United Nations Educational, Scientific and Cultural Organization (UNESCO). 1972. *Convention concerning the protection of the world cultural and natural heritage*. Paris: UNESCO.

United Nations Educational, Scientific and Cultural Organization (UNESCO). 2008. *Operational guidelines for the implementation of the World Heritage Convention*. Paris: UNESCO World Heritage Centre.

World Bank. 2006a. BP 4.11 – Physical cultural properties. In *Operational manual*. Washington, DC: The World Bank.

World Bank. 2006b. OP 4.11 – Physical cultural properties. In *Operational manual*. Washington, DC: The World Bank.

World Heritage Centre. 2003. *World heritage 2002: Shared legacy, common responsibility*. Paris: UNESCO World Heritage Centre.

Further Reading

Castrilli, G.M. 2011. Minister's message. In *State cultural heritage policy*. Perth: Heritage Council of Western Australia and National Trust of Australia.

United States Congress. 2006. *National Historic Preservation Act of 1966 (as amended through 2006)*, Public Law 89-665; 16 U.S.C. 470. Washington, DC: United States Congress.

Heritage and Society

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Brief Definition of the Topic

Heritage has been traditionally defined as a thing, or more precisely as a collection of things, inherited from the past and given value by us, in the present. We value these "things" both for our own sake (e.g., to protect them and keep them around us as buildings, monuments, or artifacts) and for that of future generations. Heritage has also been defined as a set of processes (administrative and political, notably in the form of conventions and laws) by which we manage these things. And often, those processes go unchallenged or untested, at least by heritage practitioners. But heritage has recently come under critical review, leading some to identify it as exclusive and specialized under both of these interpretations, either because it is only "special things" which are given value (the rest being merely ordinary and everyday) or because "heritage management" is entirely in the hands of specialists and experts, who make decisions on behalf of society. Under this critical review (e.g., Smith 2006 and Council of Europe 2009), heritage now has a broader definition, one that recognizes the values attributed to things, not only by "the system" or "the establishment" and its facilitators but also by the many and diverse interest groups within society.

The 2005 *Council of Europe (Faro) Framework Convention on the Value of Cultural Heritage for Society* usefully defines heritage within the related contexts of democracy, multi-vocality, localism, and participation:

> Cultural heritage is a group of resources inherited from the past which people identify, independently of ownership, as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions. It includes all aspects of the environment resulting from the interaction between people and places through time.

Faro also recognizes the concept of a "heritage community," being:

> People who value specific aspects of cultural heritage which they wish, within the framework of public action, to sustain and transmit to future generations.

And of course "transmitting to future generations" does not necessarily mean preservation, and certainly not keeping things unchanged. In its current guise, at least in the developed world, "transmitting" and "sustaining" means passing things on in such a way that a link can be maintained to past human actions or events. Under this more socially aligned approach to heritage, the focus of attention would be less on a building that is preserved unchanged and more on retaining the character of a neighborhood or ensuring that a distinctive style or density of architecture is reflected in new development.

Heritage should not only be about decisions made by a group of specialists and the processes by which those decisions become recommendations, for statutory protection, for example. While these specialists and their processes remain significant, the "constantly evolving" values of the heritage community are paramount. Faro notes in its preamble how "*every person* has a right to engage with the cultural heritage of their choice," while being "convinced of the need to involve *everyone* in society in the ongoing process of defining and managing cultural heritage" (my emphases). Similarly, English Heritage's *Conservation Principles* (2008) include recognition of social value, defined as being:

> Associated with places that people perceive as a source of identity, distinctiveness, social interaction and coherence. Some may be comparatively modest, acquiring communal significance through the passage of time as a result of a collective memory of stories linked to them. . . . (Further) Social values tend to be less dependent on the survival of historic fabric. They may survive the replacement of the original physical structure, so long as its key social and cultural characteristics are maintained.

All of this represents progress and a move away from heritage as things to heritage as process and from heritage being divided between that which is tangible and intangible to an entirely intangible heritage. But it also takes us back to the fundamental questions that we ask of heritage: why does having a heritage benefit us, and can we recognize value in ordinary places, the everyday heritage around us? For heritage to be critically engaged, to have social value, and to retain currency requires it to have such a foundation. The authorized heritage discourse is one example of how this can work. As Smith has stated, heritage is not a thing or a site; heritage is what goes on at these sites, and the sites are ordinary, everyday places just as much as they are special and iconic. Heritage in other words is a broad church and, above all, a cultural process that "engages with acts of remembering that work to create ways to understand and engage with the present, and the sites themselves are cultural tools that can facilitate . . . this process" (Smith 2006: 44). Here we can summarize the argument to a point of simplicity: for those who recognize a heritage made up entirely of things, it can indeed be seen as a largely pragmatic atheoretical pursuit, more concerned with following procedures and protocols. But once all heritage becomes intangible, and concerned with the everyday, and with a diverse suite of cultural processes that change both locally and with time, things become far more complex, and for this a firm foundation (such as that outlined here) is required if heritage is to be central to creating a sustainable future.

Cross-References

- ▶ Heritage and Society
- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Landscapes
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions

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References

Council of Europe. 2009. *Heritage and beyond*. Strasbourg: Council of Europe.

English Heritage. 2008. *Conservation principles: Policies and practice for the sustainable management of the historic environment*. Swindon: English Heritage.

Smith, L. 2006. *Uses of heritage*. London: Routledge.

Heritage Areas

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Heritage areas in the United States are large-scale living landscapes where residents and community leaders unite behind a common vision of shared heritage. Heritage areas strive to conserve natural and cultural resources while enhancing the vitality of communities within a region and managing change so that the region's sense of place is

retained. As such, a heritage area is not only a place, but it is also a management strategy by which local citizens work cooperatively to protect and enhance natural and cultural resources and living traditions resulting in economic, educational, and quality-of-life benefits for residents and visitors.

This United States' conceptualization of heritage areas aligns with specific categories for populated landscapes recognized by the International Council on Monuments and Sites (ICOMOS) and the World Conservation Union (IUCN). Both of these international organizations have established formal documentation schemes to describe and classify heritage. Both contribute to the definition of the World Heritage List through the United Nations Educational, Scientific, and Cultural Organization (UNESCO), with ICOMOS focusing on historic places and IUCN emphasizing natural heritage listings. Heritage areas fall under ICOMOS' Category 2 cultural landscapes, organically evolved landscapes that can be both relict (fossil) and continuing to evolve (UNESCO-ICOMOS 2011). Category 2 landscapes are living places reflecting the combined interaction of humans and nature and are mostly rural, primarily agricultural landscapes. Similarly, IUCN's Category V, protected landscapes and seascapes, recognizes the importance of places "where the interaction of people and nature over time has produced an area of distinct character" (IUCN 1994).

Under the conceptualization shaped by cultural resource management policy in the United States, a theme common to a specific region serves as the central element around which a heritage area is organized. The theme reflects the intangible heritage of a region, the shared history and cultural identity of the people who live there. The tangible heritage of the region – resources including archaeology, the extant built environment, living traditions, and the natural environment used by humans through time – is related to the primary theme of a region. In turn, this theme connects the individual resources to other resources, helping to define a cohesive cultural landscape with a shared history.

National Heritage Areas and National Heritage Corridors are designated by the United States Congress. They have evolved in conjunction with the National Park Service and share similarities with some national parks established in the latter half of the twentieth century, notably those whose boundaries include living populations. However, heritage areas are distinctive for the way in which they are managed from a local base of support. They expand on established resource stewardship models through their realization of large-scale, community-centered initiatives in which residents of the region, in partnership with the National Park Service, guide preservation and planning. As a partner and advisor, the National Park Service provides technical, planning, and limited financial assistance to National Heritage Areas, while decision-making authority remains in the hands of local people and organizations.

Each National Heritage Area has a coordinating entity that facilitates a broad network of partners who work collaboratively to preserve and interpret important resources and build a sustainable economy based on the heritage assets within a region. The coordinating entity oversees the development and implementation of a management plan to accomplish this. The coordinating entity also serves in an administrative capacity, including oversight of federal funding authorized by Congress through the National Park Service. The governance structures of coordinating entities vary widely, including nonprofit organizations, local and state governmental agencies, federal commissions, and universities. Although nonprofit organizations manage the majority of existing National Heritage Areas, the wide range of governance structures reflects the continued importance of identifying a coordinating entity that fits the individual circumstances of a region.

The first National Heritage Area, the Illinois and Michigan Canal National Heritage Corridor, was established in 1984. Since that time, the concept has experienced tremendous growth in popularity in the United States. In 2017, there are 49 congressionally designated National Heritage Areas, as well as numerous state and local programs. While resources, landscapes, themes, and management structures vary widely, the common element among all heritage areas is the strategy to

utilize a broad partnership network grounded at the local level for the protection and enhancement of cultural and natural resources related to a region's heritage.

References

UNESCO-ICOMOS Documentation Centre. 2011. World heritage cultural landscapes. Available at www.international.icomos.org/centre_documentation/bib/index.html. Accessed 22 Aug 2017.

World Conservation Union (IUCN). 1994. *Guidelines for protected area management categories*. Cambridge: IUCN.

Further Reading

Barrett, B., N.I.M. Morgan, and L.S. Gates. 2006. National heritage areas: Developing a new conservation strategy. In *Art and cultural heritage: Law, policy*, ed. B. Hoffman, 220–233. Cambridge: Cambridge University Press.

National Heritage Areas. n.d. Available at www.nps.gov/heritageareas. Accessed 22 Aug 2017.

The Alliance of National Heritage Areas. n.d. Available at www.nationalheritageareas.us. Accessed 22 Aug 2017.

Heritage as Resilience

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Introduction

Resilience broadly deals with the diverse ways social or ecological systems change or adapt to challenging environments. Within the wider context of resilience, themes of cultural resilience in particular, illustrate the centrality of culture and heritage in the ways through which individuals or communities respond to diverse forms of adversity. Although resilience has been widely discussed and developed in disciplines such as the physical and environmental sciences, psychology, and international development, it has received little attention in the field of heritage and archaeology to date. Core issues such as the politicization of heritage and archaeology, for example, continue to give significant analytical remit to concepts of conflict, contestation and dissonance of heritage monuments, sites, landscapes, and cultural expressions (See for example: Kohl and Fawcett 1995; Tunbridge and Ashworth 1996; Logan and Reeves 2008). This situation calls for the conceptualization of a different metrics of heritage analysis, one which can help tease out those elements of the cultural heritage matrix which have garnered relatively little attention thus far. A framework of resilience can shed new light here and provide useful ways through which we may explore the dynamics of heritage in rapidly shifting local or global contexts, calling focus to the ways communities and their heritage-making practices change or adapt to political, economic, or environmental upheaval resulting from diverse forms of social and environmental change.

Definition

The term resilience comes from the Latin term *resiliere* [*re* (back) + *salire* (to leap)], meaning to leap back (Stevenson and Waite 2011). Resilience is defined by the American Psychological Association (2018) as "the process of adapting well in the face of adversity, trauma, tragedy, threats or even significant sources of stress." This process of adapting is complex and contingent upon a constellation of biological, psychological, social and cultural factors which shapes the way individuals or groups respond to challenging situations (Southwick et al. 2014). Other scholars such as Katrina Brown (2015) argue that resilience is not only the ability to positively respond to adversity but is also a means of capacity building in anticipation of change. Despite the diverse theoretical applications of resilience theory, its basic premise, which pivots on the ability to adapt in the face of adversity, has seen it acquire wide ranging applicability, including the increased understandings of the ways social systems respond to change. The underlying commonality for enabling resilience in

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many of these definitions is the onset of significant risk or adversity, compelling change or adaptation amongst individuals or communities (Masten and Powell 2003, p. 4; Ungar 2008, p. 220).

Within wider theoretical framings of resilience, the concept of cultural resilience is crucial to the conceptualization of heritage resilience as it illustrates the centrality of culture and heritage to individuals and communities in response to diverse forms of adversity (Clauss-Ehlers 2010; Lalonde 2006; Hadler 2008). Caroline Clauss-Ehlers (2010, p. 324) argues that cultural resilience is enabled through the amalgamation of cultural background, cultural values, support systems, and other facilitating factors in the sociocultural environment which provides a dynamic and interactive process through which to negotiate adversity. How then does heritage resilience differ from cultural resilience? Although there are many underlying commonalities between cultural resilience and heritage resilience at both empirical and conceptual levels, I argue that heritage resilience needs to be viewed as distinct from cultural resilience. While cultural resilience focuses on the softer aspects of heritage such as cultural values, language, customs, and norms (Clauss-Ehlers 2010, p. 324), heritage resilience is more extensive as it also explores the impacts of harder forms of heritage, such as archaeological heritage, policy, and practice. Heritage resilience calls for a focus to the ways heritage is politicized, institutionalized, and operationalized [or even weaponized] within the context of local-global processes. Heritage resilience therefore can be defined as a constellation of heritage consciousness (embedded in either material forms of heritage or cultural expressions), shared sense of identity and community, contingent on a network or support system of individuals, groups, institutions, or social movements, which enable groups and communities to navigate and negotiate adversities by enabling identity affirmation, empowerment, and cultural survival. A framework of heritage resilience therefore can create useful pathways for understanding issues pertaining to identity and cultural diversity in nations dealing with complex or violent pasts, by compelling us to reconsider how communities negotiate and position themselves and their heritage within the complex local-global interplay of cultural politics.

Given the paucity of resilience as a framework of analysis in the field of heritage and archaeology, this entry on heritage resilience is informed by resilience perspectives from the spheres of social ecological systems and human development, notably the work of Michael Ungar (2008, 2012a) and Katrina Brown (2015). It particularly focuses on how heritage is mobilized in the face of challenges to the identity, belonging, and legitimacy of groups or communities resulting from diverse forms of social change. Ungar's definition of resilience is crucial here, as he notes that:

> Resilience is both the capacity of individuals [and communities] to *navigate* their way to the psychological, social, cultural and physical resources that build and sustain their wellbeing, and their individual and collective capacity to *negotiate* for these resources to be provided and experienced in culturally meaningful ways. (Ungar 2012b, p. 17)

How do communities mobilize heritage to navigate and negotiate adversity? This process of navigation and negotiation is underpinned by conceptualizing resilience as a "contextually and culturally embedded construct" (Ungar 2012a, p. 3). Thus, while there are universally common elements of resilience observable across communities navigating and negotiating change, it is also important to be cognizant of culturally and contextually embedded elements which may enable resilience in some communities but not necessarily in others. Other scholars such as Katrina Brown (2015, p. 203) argue that there are three key elements which enable resilience in the context of adversity. These are:

1. Resistance
2. Rootedness
3. Resourcefulness

How then can we conceptualize cultural heritage as a means of enabling resistance, rootedness, and resourcefulness of groups and communities in the face of adversity? Firstly, recognizing resistance as a key element of resilience helps focus on notions of agency (Brown 2015, p. 214). In the sphere of heritage, for example, resistance is key

to the establishment of alternative heritage narratives, which can be seen as a strategy for navigating and negotiating the constraints of the dominant or authorized heritage discourse. Elements of resistance/resilience can also be seen in the actions of heritage activists who reorient state or other hegemonic heritage discourses to further their own personal or communal symbolic capital. Notions of capital as a correlate of resilience are important here as it provides a means through which to evaluate resilience in communities dealing with change. Moreover, a capital approach also helps to chart resilience trajectories, a key element of predicting and managing future change (Mayunga 2007). Secondly, Brown's notion of the "rootedness" of resilience allows for greater emphasis on the lived realties of communities, calling focus to the ways they construct place, identity, and belonging and their role in facilitating resilience as a means of adapting to adverse situations (Brown 2015, p. 203). This approach also allows for better understandings of the deeper histories of resilience, departing from binary notions of resilience to conceptualizing it as existing on a continuum, observable in varying degrees across diverse groups and communities (Southwick et al. 2014, p. 2). Understanding the spatial and temporal aspects of resilience are crucial to situating resilience as a long-term process, constantly negotiated and renegotiated within the complex realm of local-global dynamics. Thirdly, Brown's identification of resilience as a form of resourcefulness deals with the adaptive capacity of communities including their aptitude for innovation, social learning and tenacity for accruing social and political capital (Brown 2015, p. 216). These understandings are crucial not only for developing resilience among affected groups and communities but also for ensuring its sustainability in the event of future challenges.

Historical Background

Resilience as a theoretical concept has its beginnings in the nineteenth century in the field of materials science and was used to assess the ability of materials to withstand extreme conditions (McAslan 2010, pp. 1–2). It also features prominently in the sphere of environment and ecology, focusing on the ways through which ecological systems return to a state of equilibrium following a disturbance or disaster (McAslan 2010, p. 3). Resilience theory gained traction in psychological sciences in the 1980s, with pioneering studies on resilience building among children and youth by scholars such as Norman Garmezy (1985). By the mid-2000s, the concept of resilience emerged as a popular frame of analysis in the field of international development, particularly following the events of the global financial crisis of 2007–2008 (Brown 2015).

Resilience theory presents significant potential as a framework of analysis for the field of heritage and archaeology. This is especially significant given the deficit discourse framing much of the contemporary debates on heritage and archaeology, which erases or obscures other equally important narratives on resilience emerging despite adversities such as urbanization, environmental catastrophe, or armed conflict. Minority, indigenous, and other historically, socially, or economically disadvantaged communities and their heritage are particularly susceptible to this erasure. As a consequence, these communities are portrayed as homogenous and often passive players within state or other hegemonic processes, further embedding notions of their exclusion, marginality, and victimhood (Kuutma 2012, p. 45).

Linda Tuhiwai Smith's (1999) seminal work on *Decolonising Methodologies* for example demonstrates how notions of victimhood and trauma are replicated in the literature on indigenous communities, even those produced by subaltern scholars who claim to write against established Western modes of knowledge. She argues that the uncritical use of colonial accounts of indigenous people, together with the embedded colonial/Eurocentric ways of reading, writing, and learning about them have resulted in the self-imposed *othering* and the perpetuation of colonial myths about native cultures. She notes, "we begin to write about ourselves as indigenous peoples as if we really were 'out there', the 'Other', with all the baggage this entails" (Smith 1999, p. 36).

Similarly, Dominick LaCapra's (2001, pp. x–xi) *Writing history, Writing trauma,* dealing with the depiction of the Holocaust, argues that trauma has become a scholarly preoccupation and is particularly evident in the literature dealing with major historical events. This has resulted in the needless conflation of culture or history with trauma, leading to notions that contemporary culture and history are fundamentally traumatic, even in spite of the existence of processes which counter or mitigate trauma (LaCapra 2001, p. x).

The victim discourse in heritage literature, in particular, have been critiqued by many scholars, particularly those working in the indigenous heritage space. Scholars such as Sonya Atalay, Audra Simpson, Kristin Kuutma, and others argue that much of the dominant heritage discourse establishes and constrains indigenous and minority communities into themes of marginality and victimhood, often overlooking their potential agency (Simpson 2007; Atalay 2006; Kuutma 2012). They are among a growing number of scholars who advocate for the recognition of resilience, empowerment, and resistance in the debates on indigenous and other communities, who are typically labelled as vulnerable or marginal within the dominant discourse. Audra Simpson's (2007) account of the Mohawks of Kahnawake, for instance, exemplifies the dramatic inconsistencies which exist between the community's anthropological representations and their lived realities. Simpson's work elaborates the myriad ways through which the Mohawk community transcends dominant discourses of marginalization imposed upon them to effectively garner sociopolitical and cultural recognition within wider American society (Simpson 2007, p. 68). Similarly Kristin Kuutma's (2012) work on Estonia's indigenous Seto community and the inscription of their *Leelo* choral tradition to the UNESCO Intangible Cultural Heritage (ICH) List demonstrate their achievement of agency despite frequent academic representations of them as powerless within state processes. Kuutma argues that rather than being "passive recipients" of authoritarian processes, the Seto community redeployed discourses of heritage and nationalism to further their sociopolitical recognition and also acquire personal as well as communal symbolic capital within the backdrop of the UNESCO ICH inscription process (Kuutma 2012, p. 45).

In their thought-provoking edited work, *Theory and practice in heritage and sustainability: between past and future,* Elizabeth Auclaire and Graham Fairclough (2015, p. 3) argue that "heritage is the central thread of sustainability, not only as an issue of preservation but of creation, adaptation and resilience to change." For example, heritage enables community resilience through its contribution to everyday life, identity formation, and relationship building (Auclair and Fairclough 2015, p. 3). The role of heritage in resilience building is particularly amplified in the event of political instability or armed conflict, especially those which challenge the identities, belonging, and legitimacies of minority groups or communities. Cultural heritage also plays a crucial role in post-disaster or post-conflict resilience building and is crucial to the formulation of disaster risk reduction strategies (Hosagrahar 2017; Jigyasu et al. 2013). Traditional knowledge, for example, especially that embedded in traditional lifestyles, customs, and livelihoods can provide strategies for communities to better equip themselves against natural disasters, especially those inhabiting areas prone to such phenomena (Jigyasu et al. 2013, p. 21; Hosagrahar 2017). More importantly, heritage provides a much-needed source of psychosocial support, by reinforcing a sense of identity, belonging, and self-esteem for communities in the aftermath of disaster or conflict, ensuring a more rapid and sustainable recovery (Jigyasu et al. 2013, p. 22). Despite these welcome shifts in academic thought, much still remains to be done in foregrounding themes of resilience in heritage and archaeology scholarship.

Key Issues/Current Debates

There are a number of contentions with the adoption of resilience as a theoretical concept. Firstly, its lacks of a concrete definition has led to

questions on the robustness of its application in particular contexts (McAslan 2010, p. 1). Secondly, some scholars suggest that the identification of resilience in communities may have more sinister implications, wherein the achievement of wellbeing may be seen as the "personal responsibility" of communities, thus absolving institutions, governments, and global systems of authority who are responsible for safeguarding the world's most vulnerable groups (Thrupkaew et al. 2010). Despite such contentions, scholars such as C.S. 'Buzz' Holling (2006), widely considered to be the father of resilience theory, has a more positive outlook on the concept of resilience. He contends that a framework of resilience provides a useful and innovative lens through which we may understand the ways individuals, communities, organizations, and ecosystems cope with our rapidly changing world. Notions of resilience can help us to better comprehend how communities could or should respond to diverse forms of upheaval and also help formulate contingencies in anticipation of future adversities (Holling 2006).

The third critique is that the concept of resilience under-theorizes issues of power and social relations (Hornborg 2009; Fabinyi et al. 2014). However, approaching resilience as a "contextually and culturally embedded construct" (Ungar 2012a, p. 3) and focusing on the way resilience is "lived and experienced" (Brown 2015, p. 115) through its myriad forms of resistance well as resourcefulness is perhaps crucial in overcoming this theoretical obstacle. Despite these issues, the consensus among scholars appears to be that a framework of resilience can help steer debates based on a purely deficit discourse to those which pivot on themes of wellbeing, empowerment, and capacity building of communities affected by adversity (Southwick et al. 2014; Ungar 2008; Brown 2015). In the sphere of cultural heritage, a focus on resilience is useful to recast "vulnerable" or "marginal" communities and heritage by recognizing potential agency, thus reorienting perceptions of such communities as passive players within state or other hegemonic systems. Thus, resilience provides a useful framework to analyze power relations between the various stakeholders of heritage, which have been conventionally conceptualized as a top-down process. The key challenge in utilizing resilience as a conceptual framework, however, lies in clearly defining its perimeters of analysis, including the elements and composition of what constitutes resilience in the communities or other contexts in question.

International Perspectives and Future Directions

Framed within the context of heritage, what meanings does resilience take on in nations which have been in a constant state of upheaval owing to processes such as colonization, decolonization, civil war, or natural disasters? What are the deeper social, political, or economic histories of communities which demonstrate resilience? How does resilience speak to themes of empowerment, cultural survival, and identity affirmation in disadvantaged communities or in the mediation of social relations in culturally diverse societies? Moreover, what are the different social, cultural, and structural forces which afford opportunities or resources to communities in times of adversity and how are these utilized?

In post-war Sri Lanka, for example, adversity also stems from the implications of post-war cultural politics on minority communities, notably when archaeological knowledge and practice are also used to challenge their identity, belonging, and legitimacy. The civil war which spanned nearly three decades was mainly a result of the struggle for a separatist Tamil homeland – *Eelam* – and was waged between the Liberation Tigers of Tamil Eelam (LTTE) and the Sri Lankan Government forces. As with ethnic conflicts elsewhere, in Sri Lanka, history and heritage played an important role in the questioning of belonging and legitimacy of non-Sinhalese minorities, wherein rhetorical wars over archaeological sites and place names paralleled the civil war (Spencer 1990). With the end of the armed struggle in 2009, conflict in Sri Lanka has taken on a new form,

with increasing incidents of post-war violence targeting another ethnoreligious minority, the Muslims. Historical and material continuity (or the lack thereof) have come into play once more and are co-opted in the rhetoric which questions Muslim identity, legitimacy, and belonging to the Sri Lankan state. The "lack" of visible, particularly monumental forms of Muslim heritage, in comparison to the majority Sinhalese community, as well as other minorities such as the Tamils, has often been used as leverage by those contesting their identity and belonging within the Sri Lankan state.

As a consequence of these sociopolitical developments, much of the dominant discourse on post-war Sri Lanka is replete with themes of conflict and contestation. This also includes a growing scholarly and popular discourse around threats to the wellbeing of the Muslim community, particularly in relation to the contestation and conflict of heritage sites and landscapes between Sinhalese and Muslim communities (See for example: Secretariat for Muslims 2015a, b). The rise in anti-Muslim rhetoric as well as the strategic politics of victimhood adopted by sections of the Muslim community has increasingly posited Muslims as "victims" of the civil war and the continued ethnic tensions in its aftermath. However, less obvious are the diverse ways through which the Muslim community mobilize heritage as a means of resilience to engender belonging, identity affirmation, or ensure cultural survival. Equally obscure are the ways they garner personal or communal forms of social, political, or economic capital in the face of adversity.

The rise of Islamic fundamentalism in the West and regional developments such as the ethnic cleansing of Myanmar's Rohingya Muslims, simmering Hindu-Muslim tensions in neighboring India, as well as the increasing spectre of ISIS (Islamic State in Iraq and Syria) in Asia has increasingly posited Muslims as nonintegrative or politically dissident minorities. These shifts have increasingly paved the way for questioning of Muslim identity, belonging, and legitimacy in Sri Lanka, often with violent consequences. Challenges to the identity, belonging, and legitimacy of Muslims in Sri Lanka have garnered diverse responses; clear among them, however, is the turn to history and heritage. This is evident not only in the construction of Sri Lanka's first Muslim heritage museum in 2015 but also in the increasing trend of other heritage- and culture-related activities promoted by Muslim grassroots and civil society movements. Everyday forms of heritage, particularly those pivoting on religious belief and cultural practice are important aspects of resilience building. These not only help to engender feelings of belonging and identity affirmation among the Muslim community but also plays a crucial role in enhancing dialog and understanding with other communities. Muslim civil society initiatives such as the Welcome to Our Mosque program and the Islamic Poster Exhibition series initiated by the Centre for Islamic Studies (Colombo) are an example of how civil society and grass roots movements can help the Muslim community positively respond to post-war cultural politics. The Welcome to Our Mosque program encourages those of different cultural or religious backgrounds to gain an immersive experience of Sri Lankan Muslim heritage by opening up the mosque – a core location of Muslim religious and community activity. This development is critical given that mosques in Sri Lanka have been particularly reticent to the idea of opening up that space for non-Muslims and to a certain extent also to women [Muslim or otherwise]. Although a deceptively simple approach, I would argue that this initiative has the potential to positively impact majority-minority relations as it provides a window into spaces and practices which hitherto had been confined to the Muslim community.

The ability to engender or cultivate resilience in the face of challenges to belonging and identity largely stem from the deep social, cultural, and structural forces developed by the community. Indeed, as anthropologist Dennis McGilvray notes, Muslims are seen as "shrewd, hardworking and successful" by other communities and have ensured their physical and cultural survival through the construction of distinct cultural styles, ethnic identities, and political tactics over the past

four centuries (McGilvray 1998, pp. 468, 473). This is further reflected in the Muslim community's position of a "good minority" within the context of the civil war. A rationale largely stemming from their support of the Sri Lankan government through intelligence gathering on behalf of the Sri Lankan armed forces, accommodative politics of Muslim political parties, as well as their proxying for support of Muslim nations on behalf of the State (DeVotta 2016, 2017). The crucial challenge for Muslims minorities in Sri Lanka (and elsewhere) in the present volatile and uncertain context therefore would be the formulation of strategies which ensures long-term resilience, empowerment, and wellbeing. For Muslims in Sri Lanka and increasingly other parts of the world, where they are part of national or migrant minorities, this would largely rest on their ability to build dialog with other groups and successfully position themselves as part of the whole. Indeed, as McGilvray (2016, p. 21) argues this would also require greater emphasis on their cultural rootedness to the land, rather than an emphasis on foreign forefathers or a connection to "[radical] global Islam." Culture and heritage are key to this process and present powerful means through which to cultivate this sense of rootedness and engender resilience among minority groups, encouraging identity affirmation, legitimacy, and belonging to their respective states.

Cross-References

- ▶ Activism and Archaeology
- ▶ Archaeology and Politics
- ▶ Armed Conflict and Archaeology: Ethical Issues
- ▶ Community Archaeology
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cultural Heritage Outreach
- ▶ Ethics in Archaeology
- ▶ Heritage and Archaeology
- ▶ Power and Knowledge in Archaeology
- ▶ Social Movements and Archaeology
- ▶ Sustainability and Cultural Heritage

References

American Psychological Association. 2018. The road to resilience. *American Psychological Association Help Centre*. http://www.apa.org/helpcenter/road-resilience.aspx. Accessed 21 June 2018.

Atalay, S. 2006. Decolonizing archaeology. *American Indian Quarterly* 30 (3/4): 269–279. http://offcampus.lib.washington.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=f5h&AN=23587190&site=ehost-live.

Auclair, E., and G.J. Fairclough. 2015. Living between past and future: An introduction to heritage and cultural sustainability. In *Theory and practice in heritage and sustainability: Between past and future*, Routledge studies in culture and sustainable development, ed. E. Auclair and G.J. Fairclough. London: Routledge. http://ezproxy.deakin.edu.au/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=cat00097a&AN=deakin.b3281006&site=eds-live&scope=site.

Brown, K. 2015. *Resilience, development and global change*. London/New York: Routledge.

Clauss-Ehlers, C.S. 2010. Cultural resilience. In *Encyclopedia of cross-cultural school psychology*, ed. C.S. Clauss-Ehlers, 324–326. Boston: Springer US.

DeVotta, N. 2016. Engaging Sinhalese Buddhist Majoritarianism and countering religious animus in Sri Lanka: Recommendations for the incoming U.S. Administration. *Review of Faith and International Affairs* 14 (2): 76–85.

DeVotta, N. 2017. Anti-Muslim extremism and violence in Sri Lanka. *IAPS dialogue: The online magazine of the Institute of Asia & Pacific Studies*.

Fabinyi, M., L. Evans, and S. Foale. 2014. Social-ecological systems, social diversity, and power: Insights from anthropology and political ecology. *Ecology and Society* 19 (4): 28.

Garmezy, N. 1985. Competence and adaptation in adult schizophrenic patients and children at risk. In *Research in the Schizophrenic Disorders: The Stanely R Dean Award Lectures Vol. II*, ed. R. Cancro, and S.R. Dean, 69 112. Dordrecht: Springer.

Hadler, J. 2008. *Muslims and matriarchs: Cultural resilience in Indonesia through jihad and colonialism*. Ithaca: Cornell University Press.

Holling, C.S. 2006. The Holling Memoir: A journey of discovery. *Resilience Alliance*. https://www.resalliance.org/files/Buzz_Holling_Memoir_2006_a_journey_of_discovery_buzz_holling.pdf. Accessed 26 June 2018.

Hornborg, A. 2009. Zero-sum world: Challenges in conceptualizing environmental load displacement and ecologically unequal exchange in the world-system. *International Journal of Comparative Sociology* 50 (3–4): 237–262.

Hosagrahar, J. 2017. Culture at the heart of SDGs. *The UNESCO Courier*. https://en.unesco.org/courier/2017-april-june/culture-heart-sdgs. Accessed 26 June 2018.

Jigyasu, R., et al. 2013. *Heritage and resilience: Issues and opportunities for reducing disaster risks*. Geneva: United Nations International Strategy for Disaster Reduction.

Kohl, P.L., and C. Fawcett. 1995. *Nationalism, politics and the practice of archaeology.* Cambridge: Cambridge University Press.

Kuutma, K. 2012. Communities and the contested politics of representation. In *The First ICH Researchers Forum – The implementation of UNESCO's 2003 Convention*. International Reseacrh Centre for Intangible Cultural Heritage in the Asia-Pacific Region (IRCI), 40–49.

LaCapra, D. 2001. *Writing history, writing trauma*. Baltimore/London: The Johns Hopkins University Press.

Lalonde, C.E. 2006. Identity formation and cultural resilience in aboriginal communities. In *Promoting resilience in child welfare*, 52–71. Ottawa: University of Ottawa Press.

Logan, W., and K. Reeves. 2008. *Places of pain and shame: Dealing with 'difficult heritage'*. London/New York: Routledge.

Masten, A.S., and J.L. Powell. 2003. A resilience framework for research, policy, and practice. In *Resilience and vulnerability: Adaptation in the context of childhood adversities*, ed. S.S. Luthar, 25. Cambridge: Cambridge University Press.

Mayunga, J. S. 2007. Understanding and applying the concept of community disaster resilience: a capital-based approach, Summer academy for social vulnerability and resilience building. Munich.

McAslan, A. 2010. The concept of resilience: Understanding its origins, meaning and utility, Adelaide.

McGilvray, D.B. 1998. Arabs, moors and Muslims: Sri Lankan Muslim ethnicity in regional perspective. *Contributions to Indian Sociology* 32 (2): 433–483. https://doi.org/10.1177/006996679803200213.

McGilvray, D.B. 2016. Rethinking Muslim identity in Sri Lanka. In *Buddhist extremists and Muslim minorities: Religious conflict in contemporary Sri Lanka*, ed. J.C. Holt. New York: Oxford University Press.

Secretariat for Muslims. 2015a. Of sacred sites and profane politics: tensions over religious sites and ethnic relations Vol 1, Secretariat for Muslims. Colombo. https://doi.org/10.1017/CBO9781107415324.004.

Secretariat for Muslims. 2015b. Of sacred sites and profane politics: tensions over religious sites and ethnic relations Vol 2, Secretariat for Muslims. Colombo. https://doi.org/10.1017/CBO9781107415324.004.

Simpson, A. 2007. On ethnographic refusal: Indigeneity, 'voice' and colonial citizenship. *Junctures* 9: 67–80.

Smith, L.T. 1999. *Decolonizing methodologies: Research and indigenous peoples*. London/New York: Zed books.

Southwick, S.M., et al. 2014. Resilience definitions, theory, and challenges: Interdisciplinary perspectives. *European Journal of Psychotraumatology.* 5: 25338.

Spencer, J. 1990. Introduction: The power of the past. In *Sri Lanka: History and the roots of conflict*. London: Routledge.

Stevenson, A., and M. Waite. 2011. *Concise Oxford English dictionary.* 12th ed. Oxford: Oxford University Press.

Thrupkaew, N., K. Li, and P. Jerido. 2010. Beyond victimhood: Recognizing resilience in social justice work. http://podbay.fm/show/281052077/e/1286546400

Tunbridge, J.E., and G.J. Ashworth. 1996. *Dissonant heritage: The management of the past as a resource in conflict*. Chichester: Wiley.

Ungar, M. 2008. Resilience across cultures. *British Journal of Social Work* 38 (2): 218–235.

Ungar, M. 2012a. Introduction to the volume. In *The social ecology of resilience*, ed. M. Ungar, 1–9. New York: Springer.

Ungar, M. 2012b. Social ecologies and their contribution to resilience. In *The social ecology of resilience*, ed. M. Ungar, 13–31. New York: Springer.

Heritage Conservation Training

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Introduction and Definitions

All archaeological materials come from materials present in nature, which are shaped and transformed through complex processes into what we call cultural heritage. After we uncover them and disrupt the steady condition which they had reached with its surroundings, every new environment or product that we introduce into the ancient material will cause a new reaction (Fig. 1).

Heritage is a very broad concept and the training involved will depend on the desired field of work.

In brief, heritage is firstly divided into natural heritage and cultural heritage. The latter is subdivided by intangible cultural heritage (e.g., music, rituals) and tangible cultural heritage (material things), which is divided into movable (e.g., paintings, ceramics) and immovable (e.g., monuments, archaeological sites).

Heritage Conservation Training, Fig. 1 Archaeological conservator-restorer meticulously stabilizing and restoring a mural painting to its original aesthetics and applying protection for its future conservation. Hence the difference between the decayed left area with later added layers of paint and the treated area on the right

This section deals solely with the conservation training for tangible cultural heritage, movable and immovable, with special attention to archaeological heritage, and with what is sometimes regarded as a third subdivision, which is underwater cultural heritage.

Education and Training Specializations

Heritage conservation training can be done by firstly studying all materials (cultural heritage conservation courses) and then later seeking further training to become a specialist in one or by choosing a specialization from the start. From one country to another, these specializations are separated in different ways. Even in the same country, specializations may be separated differently from one institution to another. It is usually separated either by material specialization, paper, stone, wood, glass, ceramics, textiles, etc., or by subjects, all kinds of painting (e.g., on canvas, wood, metal), graphic work (e.g., papyri, parchment, paper), sculpture (e.g., wood, metal, stone), etc. (Fig. 2).

One of the specializations by subject is archaeological conservation. It deals with all materials that can be found at archaeological sites (e.g., rock art, mural painting, mosaics, stone, glass, wood, papyri, parchment, bone, leather, metal, textiles, ceramics). Whether in the desert, forest, or underwater, an archaeological conservator must be ready and able to assure the protection and conservation of archaeological heritage at all its chemical, physical, and biological levels.

Heritage Conservation Training, Fig. 2 Conservator-restorers specialized in painting are trained to treat all painted surfaces, such as wood, leather, fabrics, stone, metal, etc., and with all sorts of materials applied to them, such as all different pigments, mediums, preparation materials, and gold

Archaeological conservation in excavations must start with planning, and it continues during the uncovering of materials with specific conservation methods for extractions and cleaning (which is when materials are most fragile) and other treatments in situ until packaging and final transport (Fig. 3).

Archaeological conservation then continues in future lab treatments and restorations, in storage

Heritage Conservation Training, Fig. 3 Training includes a lot of planning, organization, and documentation skills. Conservator-restorers with archaeological heritage specialization have their own independent procedures but will work side by side in interdisciplinary teams, especially during excavations

and exhibition parameters and monitoring work, and with archaeological site's conservation plans. In brief, from the moment an archaeological material is exposed, inevitable reactions already start during contact with the open-air atmosphere, and so, from this moment on, conservation is a responsibility and the highest priority. This is essential to secure these materials for professional research of future generations, not just for archaeologists and not just for those who discovered them.

Although there are courses that do include heritage conservation as part of the curricula, they are very different from the courses which are specific for those who want to pursue the conservator-restorer profession. For example, higher education in archaeology, museology, and cultural heritage management will address the conservation issue because the objects and sites are also the focus of their study and practice, but objects and site conservation are not their main issue.

While these courses sometimes include knowledge in conservation, it is very basic and mainly focused on promoting an overall preservation of objects and sites. These professionals will then work together with a conservator-restorer to take decisions on anything that regards to maintaining the objects and sites in a chemically, physically, and biologically stable condition for future generations, applying methods for arresting deterioration as much as possible, and rescuing the aesthetics and specific ancient technological information from objects and materials in situ (Figs. 4 and 5).

Different continents differ in requirements for training, but there is a global tendency to adopt the requirements specified by the European Confederation of Conservator-Restorers' Organisations – ECCO. Therefore, to be accredited as a conservator-restorer, one must achieve master's level (ENCoRE 2001). To start, one can have a degree either from a recognized heritage conservation school (usually under the auspices of the country's ministry of culture) or a university BA in conservation and restoration in accordance to ECCO's Professional Guidelines (ECCO 2004).

Heritage conservation schools are different depending on the country, with studies lasting 3–5 years. Access depends on entry examinations to compete for limited placements. These schools will sometimes dedicate all years to conservation of all materials, but some will start with a common training to all and then divide students into their desired specializations from the 2nd or 3rd year onward (see table below for an example of a heritage school curricula for specialization in Conservation and Restoration of Archaeological Heritage).

Heritage Conservation Training, Fig. 4 Experts in archaeological conservation-restoration train recent graduates for complex procedures, such as treatments in situ and the extraction of mosaics when necessary

Heritage Conservation Training, Fig. 5 Mosaic being prepared for extraction and transport to a museum

In universities, BAs usually mix contemporary fine arts studies with conservation of materials in general, and the degree obtained is in conservation and restoration of cultural heritage. There are also many master's degrees in universities that will focus on certain aspects of conservation, like new technologies for museum environments or only for scientific lab analysis work in conservation. Students who seek these masters may come from different backgrounds, like museology and chemistry, but those who already have a degree in heritage schools or a university BA in conservation also seek these masters to enhance their training (Fig. 6).

Although some of the BA level courses have existed for many decades, master's degrees are a recent requirement for work in this field, and many conservators now also pursue a PhD. Although these are today's requirements, many great conservator-restorers used to acquire their knowledge and skills as they were passed down through direct high-level apprenticeships in museums. Apprenticeship is still the strong part of training in heritage schools and universities; knowledge of theory and practice on original materials are passed onto students with the guidance of other conservator-restorers, the teachers.

Heritage Conservation Training, Fig. 6 Conservator-restorers will often transport to the lab objects that are extremely fragile as a whole block, surrounded by the materials as they were found at the excavation. The excavation will then proceed meticulously first with its stabilization and consolidation to, only then, remove earth and sand. In underwater environments, objects are kept in the original water from the site and are brought to atmosphere conditions through very long and complex procedures

Training in conservation and restoration of cultural heritage doesn't stop after attaining a degree, and internships and fellowships are important. These are later essential to those who come from another field of study and have only done a 2-year masters in conservation.

Recently graduated conservator-restorers will earn experience as interns or fellows in museums and, if doing an archaeological conservation specialization, also at archaeological sites assisting senior conservator-restorers. There are also many short courses offered by private schools and by heritage institutions, such as ICCROM, which are very useful for conservation and restoration professionals to expand and update their knowledge. These short courses are also sought by professionals from different areas who have a specific work demand, like architects who deal with ancient building materials or archaeologists who want to take part in packaging and transportation responsibly.

Many archaeological conservator-restorers specialize even further, becoming a specialist in metal or ceramic, for instance. Others may specialize on materials from one culture, like Greek and Roman, or from a specific environment, like underwater heritage. Material or culture specializations mainly occur in museums, where work areas are separated. This happens less with those who choose to work only with excavations since finds are a surprise and one must be ready to treat different materials.

Conservator-restorers are expected to always continue scientific research, attend international conferences and seminars, be updated with the latest technologies, and contribute to the conservation-restoration field of knowledge by publishing and giving lectures about their research and experiences (Fig. 7).

Observations About Archaeological Conservation

Archaeological conservation is separated from other specializations because all archaeological materials have been in environments with many elements other than those present in the air and they have been that way for very long periods of time. An archaeological wood, for instance, may have been underwater for centuries.

Thus, in this case, an archaeological conservator must understand the properties of both the wood and of the underwater environment in which it is in to better understand the interactions and alterations that happened on this and on other materials found at the site. Each of these environments interacts differently on materials and leaves

HERITAGE SCHOOL SPECIALISATION CURRICULA:
ARCHAEOLOGICAL CONSERVATION AND RESTORATION

Practical training in conservation-restoration laboratories:
- Technical and Methodological Conservation and Restoration 1st and 2nd Year
- Artistic Techniques and Procedures Applied to Conservation and Restoration 2nd Year
- Conservation and Restoration of Archaeological Heritage: Stone, Ceramics and Glass 3rd Year
- Conservation and Restoration of Archaeological Heritage: Metals 4th Year
- Conservation and Restoration of Ancient Pavements and Mural Coatings 3rd Year
- Conservation and Restoration of Organic and Paleontological Heritage 4th Year

Classroom:
- Archaeological and Paleontological Excavation Techniques 3rd Year
- Archaeology: Methods and Techniques of Heritage Production: Prehistory and First Civilisations 3rd Year
- Archaeology: Methods and Techniques of Heritage Production: Classical Period Onwards 4th Year
- Archaeological Heritage Techniques Applied to Conservation and Restoration 3rd Year
- Scientific Research Methodologies 4th Year

Drawing studio:
- Drawing: Artistic and Technical 1st Year
- Archaeological Drawing 3rd Year

Laboratories:
- Chemistry and Physics Applied to Conservation and Restoration 1st Year and 2nd Year
- Biology Applied to Conservation and Restoration 2nd Year
- Chemical and Physical Methods: Examination, Analysis and Dating 3rd Year
- Biological deterioration: Analysis and Control 3rd Year

Classroom:
- Material Properties and Technologies 1st Year
- Preventive Conservation: Display, Storage and Transport 2nd Year
- Iconography and Iconology 2nd Year
- Museology 3rd Year

Special Studios:
- Color Theory Applied to Conservation and Restoration 1st Year
- Photography 1st Year
- Photography Applied to Conservation and Restoration 2nd Year
- Casts and Reproductions 2nd Year
- Casts and Reproductions Applied to Conservation and Restoration 3rd Year
- Computer Science Applied to Conservation and Restoration 1st Year

Classroom:
- Documentation Techniques 2nd Year
- Cataloguing, Expertise and Assessment 4th Year
- Cultural Heritage Legislation 4th Year
- Management and Professional organisation 4th Year
- Graduation Project 4th Year

Heritage Conservation Training, Fig. 7 Free translation of 4-year archaeological heritage specialization from the school curricula of The Upper School for Conservation and Restoration of Heritage in Madrid, Spain. To see other accredited institutions with specialization in archaeological conservation and other specializations, refer to the European Network for Conservation-Restoration Education

Heritage Conservation Training, Fig. 8 Conservation uses the latest technologies, like in this example of cleaning with laser a fragment of Pompeian mural painting

a permanent mark on their chemical, physical, and biological properties, thus needing very specific treatments and ongoing conservation measures.

So besides the specific properties of each archaeological material, archaeological conservation also studies the properties of the environments, such as chemical properties of water (in marine environment, lakes, bogs, atmospheric humidity) and different sediments; physical properties, such as the effects of currents and pressure on archaeological materials; and biological activity, from underwater to desert environment.

These environments are important to understand because they give more information about the possible damage and alterations of the materials at microscopic level, which is crucial to determining future conservation methods and treatments to secure material integrity from the excavation moment when it is uncovered, to the subsequent phases of treatments, transportation, storage, and exhibition (Fig. 8).

Key Issues and Examples

Basic Concepts of Conservation and Restoration

Training in conservation and restoration reflects the different needs and demands in museums, archaeological sites, and working with heritage in general. Thus, the training choices must meet the desired work practice. One may have a BA in chemistry and do a masters in preventive conservation, which would lead to working in a museum as a consultant for object display, storage, and transport, for example. In contrast, with a BA in chemistry and a masters that focuses in applied technologies, one may work at museum laboratories to assist conservators on the analysis of materials.

In this case, although being at conservation masters level, it will not be possible to work as a restorer. Restoration requires high manual dexterity, expertise in material properties, and perfect use of color pigment materials, besides a lot of practice on original objects during the training period (Fig. 9).

To understand better the terminology while searching for conservation-restoration training, it is useful to know a few basic examples:

Preventive Conservation: indirect actions to preserve heritage, it deals specially with its environment. Examples of these are in management policies and management plans, such as limiting tourist access to certain areas, risk assessment and emergency plans at heritage sites, as well as heritage registration and documentation. Other examples are adapting lighting, temperature, and humidity to the objects' surroundings to prevent deterioration and guarantying specially adapted materials and conditions for display, storage, and transport.

Heritage Conservation Training, Fig. 9 Conservation and restoration are done at microscopic level, like on this ancient coin during mechanical cleaning with the tip of a scalpel

Conservation: direct actions to maintain the integrity and authenticity of objects and sites. They are actions taken only by conservator-restorers because they are direct interventions on the original materials. The interventions usually involve applying and removing substances and adding new materials to the original.

Conservation principles require, among other things, that all new materials applied be used only when strictly necessary, in minimal quantities and with properties that make it reversible and don't jeopardize the conservation of the original's properties. For that to be possible, a huge amount of research is done in conservation science.

Examples of conservation work are cleaning and applying protective coatings and deeper structural consolidations, such as filling in cracks between loosen parts or stabilizing mural paintings. The goal is solely to guarantee the object's "health" by stabilizing its structure and material properties to arrest deterioration. Work also involves rescuing heritage from places where they will be destroyed, such as removing and transporting mosaics from construction sites or because of natural disasters.

Restoration: direct actions on already damaged materials. The aim is to make it possible for the original to be understood in the way it was originally meant to be and recover part of its aesthetics as so not to disturb the overall appreciation of the object or site.

Restoration is done only up to the point of reaching these goals. They are kept to absolute minimal interventions that secure the object's integrity and with respect for the original's authenticity by differentiating it from the new intervention, a distinction that should be able to be seen from up close.

An example of restoration is when ceramic fragments, already conserved, are put together to regain its original shape. Another example is broken fingers of sculptures. As long as there is sufficient evidence of how the missing part was originally, another can be made accordingly so that the missing part will not disturb the aesthetic appreciation of the sculpture. Restoration is not necessary for the "health" of materials, but when it is done, interventions are always carried out under conservation principles.

One important difference between conservation and restoration is that conservation is not an option; it must always be done and it is done by constant ongoing procedures, even for materials that are in storage; and restoration is an option, also a decision that can be made later in time, depending usually if the heritage in question will be displayed to the public (Fig. 10).

Heritage Conservation Training, Fig. 10 As it can be seen on this image, stabilization and consolidation of mural paintings is a delicate process, usually done with syringes and always with tested chemicals that are compatible with the original

After Training

An archaeological conservator will live in interdisciplinary atmospheres, but mainly in the scientific fields of conservation and archaeology. Like during the 2 years of archaeology studies during conservation training, one must continue studying ancient cultures' technologies and materials and art history, as well as being up-to-date with new technologies being applied in archaeology to be able to work in interdisciplinary cooperation with professionals in situ and in museums.

In the conservation and restoration field, one must be completely up-to-date with what are the conservator-restorer's practices: latest researches about new conservation and restoration technologies; ongoing studies about new chemicals, materials, and methods being applied; conservation and management issues in archaeological sites and museums; conservation awareness projects; and what is being written by its scientific community. The main resource for this is *Studies in Conservation*, published by IIC (International Institute for Conservation of Historic and Artistic Works) with a range of heritage conservation topics and their latest developments in the international community.

As conservation procedures by professionals are necessary on-site, the relationship between archaeologists and conservator-restorers is very close in many countries, not only during excavations and for site conservation planning but also later. This relationship continues because they study archaeological materials from different perspectives, which is something that enriches research for both fields.

It is very common for conservators to discover further information on archaeological materials during conservation and restoration in museums and sites long after the excavation has ended, sometimes decades later. Examples of these are discovering parts of objects that were added to them in later years while still in usage. Not being part of the objects' first conception, these informations shed light on how the objects were used and thought of.

Other common examples during conservation work are revealing hidden ancient layers of painting, graffiti in mural decorations, discovering internal characteristics of materials that lead to ancient manufacturing techniques, and retrieving, many years later, color pigments in the materials' pores that hadn't been noticed before, thus revealing the true colors of something to know how it once was originally (Fig. 11).

Conclusion

As mentioned before, training in conservation is different from one country to another and so is the minimum training required to earn professional recognition as a conservator-restorer. Improper interventions without expertise are disastrous, even if microscopic reactions take years to reveal

Heritage Conservation Training, Fig. 11 After training, it is common for archaeological conservator-restorers to also work with medieval and baroque heritage that are not archaeological materials. This is because work involves conservation and restoration of materials that were studied during archaeological conservation training, like stone, wood, metal, mural paintings, stained glass, etc.

its consequences. Therefore, a masters level education with a lot of practical work is required in most countries, and paths to the desired work in the archaeological conservation field will depend on the training choices that are made.

Furthermore, conservator-restorers in archaeology can later specialize even more within archaeological conservation, as there are a multitude of environments and materials to work with. International institutions are a great source of information about conservation specializations and training opportunities. To know more about professional guidelines and conservation training, it is advised to search for the country's conservator-restorer association, as well as heritage conservation institutions and universities.

Cross-References

- ▶ American Institute for Conservation of Historic and Artistic Works (AIC)
- ▶ Authentication and Conservation in Archaeological Science
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Archaeological Practice
- ▶ Conservation in Museums
- ▶ Documentation of Treatment and Intervention in Archaeological Conservation and Preservation
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)

References

Association of Critical Heritage Studies. "Post Graduate Courses and Heritage Centres". n.d. http://www.criticalheritagestudies.org/post-graduate-courses/. Accessed 25 Aug 2017.

Associazione Giovanni Secco Suardo. n.d. Preservation of Cultural Heritage: Towards a European profile of the Conservator-Restorer. European Summit. Pavia, 18–22 October, 1997. http://www.associazionegiovanniseccosuardo.it/?q=en/node/171

Conseil International des Monuments et des Sites. n.d. ICOMOS. International Charter for the Conservation and Restoration of Monuments and Sites (The Venice Charter). https://www.icomos.org/charters/venice_e.pdf

Conservation DistList. COOL. n.d. Educational Opportunities in Museum, Library, Archives Conservation/Preservation. http://cool.conservation-us.org/bytopic/education/

Conservators-Restorers of Cultural Heritage in Europe: Education Centers and Institutes. 2000. A Comparative Research. CON.BE.FOR. Associazione Giovanni Secco Suardo, Lurano (BG), Italy. ISBN 88-8420-001-6.

Escuela Superior de Conservación y Restauración de Bienes Culturales de Madrid. n.d. Especialidad de Bienes Arqueológicos. http://www.escrbc.com/en/la-escuela-2/who-we-are/specialties/archaeological-heritage.html. Accessed 20 Aug 2017.

European Network for Conservation-Restoration Education. 2001. Clarification of conservation/restoration education at university level or recognised equivalent.

ENCoRE 3rd general assembly 19–22 June 2001, Munich. http://www.encore-edu.org/ENCoRE-documents/cp.pdf
European Network for Conservation-Restoration Education. n.d. E.C.C.O. Professional guidelines (III). http://www.ecco-eu.org/fileadmin/user_upload/ECCO_professional_guidelines_III.pdf
European Network for Conservation-Restoration Education. n.d. Which Institutions Offer Which Specializations. http://www.encore-edu.org/specialisations.htm. Accessed 23 Aug 2017.
European Network for Conservation-Restoration Education. n.d. On practice in conservation-restoration education. http://www.encore-edu.org/PracticePaper2014.html#_ftn11. Accessed 23 Aug 2017.
Heritage Portal. n.d. http://www.heritageportal.eu
ICCROM. International Centre for the Study of the Preservation and Restoration of Cultural Property. https://www.iccrom.org/
International Council of Museums – Committee for Conservation. 1984. ICOM-CC, "The Code of Ethics. "The Conservator-Restorer: a Definition of the Profession", Copenhagen. http://icom.museum/fileadmin/user_upload/pdf/professions/Theconservator-restorer.pdf. Accessed 20 Aug 2017.
IIC. International Institute for Conservation of historic and artistic works – studies in conservation. https://www.iiconservation.org/archive/www.iiconservation.org/publications/sic/sic.html
Metropolitan Museum of Art. "Conservation and Scientific Research". n.d. http://www.metmuseum.org/about-the-met/conservation-and-scientific-research
United Nations Educational, Scientific and Cultural Organization. n.d. UNESCO. What is meant by Cultural Heritage. http://www.unesco.org/new/en/culture/themes/illicit-trafficking-of-cultural-property/unesco-database-of-national-cultural-heritage-laws/frequently-asked-questions/definition-of-the-cultural-heritage/

Heritage Ethics, Cultural Base of

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Introduction

Most would agree that every profession has its own culture: a set of shared beliefs, values, customs, and appropriate behaviors that are passed on from one generation to the next. We recognize this culture in the friendly stereotypes derived from them: the archaeologist in safari gear, trowel in one hand, beer in the other; the art historian with CDs full of adjectives and a glass of chablis; politicians kissing babies and shaking hands; and so on. Aside from stereotypes, a professional culture includes a shared sense of the responsibilities and standards that guide members in the practice of their profession, that is, their professional ethics. These professional ethics are often implicit, passed on from mentor to student by example in the course of general training.

In the early years of most heritage-related disciplines, when the world felt simpler, fewer views were actively voiced and considered and most members of a profession knew each other (McGimsey 2002), this process worked reasonably well. Today, when the professions are themselves fragmented into subgroups and specialties, all interacting more frequently with the world outside the profession, implicitly conveyed ethics and standards seem insufficient. Thus, professional standards are increasingly being made explicit (O'Keefe 1998: 33), codified by professional organizations, and tailored to the specific goals and values of each organization; in a sense, their code of ethics grows out of their professional culture.

Key Issues/Current Debates/Future Directions/Examples

Professional organizations generally undertake the hard work of producing or revising a statement on ethics when the profession feels poorly represented by the actions of some or when serious issues with an ethical dimension shake the organization (McGimsey 2002; Davis 2003). Those drafting a new code basically begin with lists and discussions of perceived problems. These may include issues shared across professions but most are specific to one profession, even to one organization within that profession.

For example, in the early years of their discipline, archaeologists often worked closely with, or were themselves, collectors of antiquities (e.g., Butcher & Gill 1993). The archaeology of the day saw benefit, or at least no harm, in the practice.

Major developments in archaeological practice and goals, as well as the UNESCO *Convention on Cultural Property* (1970), encouraged rethinking and reevaluation of that practice. Archaeologists in a number of countries began suggesting that the commercial market in antiquities led to the permanent loss of information and to increased site destruction by essentially encouraging looting to meet the demands of the market. That is, they argued that the practice of collecting brought about results that had become antithetical to the contemporary goals of archaeology (see the *Journal of Field Archaeology's* regular feature on the Antiquities Market, renamed Archaeological Heritage and Ethics in 2008, for discussions that show changing attitudes and concerns about this and other archaeological heritage issues over the decades since the journal's inception in 1974).

Soon, participation in the antiquities market was seen as a serious problem by most professional archaeologists. By 1990 the membership of the Archaeological Institute of America (AIA), the primary professional organization for classical archaeologists in North America, had reached sufficient consensus on the problem to adopt a brief code of ethics (Professional Codes of Ethics and/or Standards of Professional Conduct can be found on the web sites of most professional organizations) for both its professional and numerous nonprofessional members. Each of the code's three statements addresses an aspect of the commercial market – calling for all excavation to be carried out to the highest standards by qualified personnel and for AIA members to refuse to participate in the illicit market in antiquities and to report illegal excavation and trade in antiquities to appropriate authorities. The professional culture had changed sufficiently to change ethical practice.

Four years later the AIA adopted a Code of Professional Standards to guide its professional members toward ethical choices. Members, most of whom are academics, generally do their fieldwork in the Mediterranean area, under permits, laws, and limitations imposed by the countries in which they work. They are often members of large, interdisciplinary, and international teams that work on extensive sites over many years. Directors assign publication responsibilities to individual scholars, who claim exclusive access to the relevant data until it is published. Reading the AIA Code of Professional Standards, one can discern the kinds of problems that came from that particular archaeological practice. Of 20 itemized points in the code, six (I.5, III.1, III.5, III.6, III.7, III.8) address aspects of behavior related to team projects and publication, that is, they reflect concerns arising from the specifics of AIA culture.

In the 1990s the Society for American Archaeology (SAA) also developed its Principles of Archaeological Ethics. The SAA is the primary professional organization for archaeologists practicing in the Americas, including many academics, although a majority of members work in government and business settings. While also concerned about the antiquities market and looting – in 1960 the SAA had already adopted Four Statements for Archaeology that included a prohibition on the buying and selling of artifacts (McGimsey 2002: 16; Lynott 2003: 20) – in the 1980s and 1990s the membership of the SAA was especially focused on issues related to reburial and other concerns of native peoples (Levy 2002: 96), issues that had less resonance in the classical world. The SAA Principles address many of the concerns also addressed by the AIA, but the emphasis on consulting and cooperating with "affected groups" is more prominent than in the AIA's document, while concerns about timely publishing are less extensively noted. The SAA document reflects the culture of the SAA in the 1980s and 1990s.

The codes of archaeologists in other parts of the world address most of the issues included in the AIA and SAA codes, reflecting the commonality of archaeological culture, but each code has different emphases and some items that are specific to the time, place, and organization. The Swedish Archaeological Society, for example, for its Principles for Good Archaeological Practice, adapted the Code of Practice of the European Association of Archaeologists, making adjustments to reflect specific situations encountered by, and the concerns of, Swedish archaeologists (Broadbent 2004: 88).

Other professions concerned with aspects of heritage have broadly similar histories and variations in their codes of ethics and practice depending on the nationality and particular focus, or culture, of the organization. Archaeological conservators, for example, once looked rather narrowly at *the object* and were primarily concerned with the reversibility of treatments, with concerns about conservation as opposed to restoration, and with maintaining full and accurate records of treatment (Tubb 1995: 256). As public discussion about the destructive nature of the antiquities market became more frequent in the 1980s and 1990s, more and more conservators recognized the role their profession unintentionally played in aggravating those problems (Elia 1995; Tubb 1995; Sease 1998). One result was that the American Institute for Conservation of Historic and Artistic Works (AIC) Code of Ethics and Guidelines for Practice now call on conservators in the USA to, for example, be aware of laws and regulations relevant to their practice, including those concerning excavated objects, human remains, and stolen property. The European Confederation of Conservator-Restorers' Organizations Professional Guidelines (II): Code of Ethics (Article 2) also draws attention to the need to practice in accordance with national and European laws, specifically mentioning those that deal with stolen property.

An official comment that accompanies the AIC statement goes on to say that:

> "Conservation professionals should be aware of and adhere to non-governmental charters and other recognized documents that have a bearing on professional activities (e.g. Venice Charter, New Orleans Charter, Secretary of the Interior's Guidelines for the Preservation of Historic Buildings, ICCROM's Site Management Guidelines for World Heritage Sites) and Codes of Ethics of allied professional organizations (e.g. American Association of Museums, American Association for State and Local History, Society of American Archivists, Society for American Archaeology, Association of Art Museum Directors)." (Commentary under item 3, Laws and Regulations, Guidelines for Practice, AIC, www.conservation-us.org7/13/11).

The more frequently the various professions interact on heritage issues, the more each learns about the concerns of the others and the more likely all the professions are to recognize common ground and to address similar issues in their codes. Nevertheless, opportunities for disagreements among (indeed, within) professions about the best way to proceed on any heritage issue remain abundant. Codes of ethics and best practice were never intended to cover every possible situation nor to provide easy or absolute answers on how to proceed in every situation. Ethical conflicts rarely involve clear rights and wrongs. Explicit codes of professional ethics provide useful guidelines, ways to think ethically about problems, but all require careful interpretation in each particular circumstance. Everyone involved needs to understand that others' arguments are not evil or wrongheaded, but stem from the cultural differences among the various professions and non-professional stakeholders. Everyone needs to listen to each other carefully and consider the arguments in the context of the source culture. Each professional may find it helpful to consult with her or his professional organization's committee or group in charge of the ethical code and standards. Individuals on these committees have a great deal of experience in ethical disputes and may well have been through or know of situations similar to the current one and be able to offer advice and suggestions for resolving the disputes. Those committees also need to know where the codes are creating or not helping to resolve problems. Each specific situation has the potential to be the catalyst for changing a professional culture and for revising its code.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Cultural Heritage Management and Native Americans
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage: History and Context
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Society for American Archaeology (SAA)

▶ Society for Historical Archaeology (SHA) (Cultural Heritage Management)
▶ World Archaeological Congress (WAC) and Cultural Heritage Management

References

Broadbent, N.D. 2004. The ethics of collaborative research in Sweden. Finding common ground with local and indigenous people. In *Swedish archaeologists on ethics*, ed. H. Karlsson, 87–94. Lindome: Bricoleur Press.

Butcher, K., and D. Gill. 1993. The director, the dealer, the goddess, and her champions: The acquisition of the Fitzwilliam goddess. *American Journal of Archaeology* 97: 383–401.

Davis, H. 2003. Creating and implementing a code and standards. In *Ethical issues in archaeology*, ed. L. Zimmerman, K.D. Vitelli, and J. Hollowell-Zimmer, 251–260. Walnut Creek: AltaMira Press in cooperation with The Society for American Archaeology.

Elia, R.J. 1995. Conservators and unprovenanced objects: preserving the cultural heritage or servicing the antiquities trade? In *Antiquities trade or betrayed. Legal, ethical and conservation issues*, ed. K.W. Tubb, 244–255. London: Archetype Publications in conjunction with UKIC Archaeology Section.

Levy, J. 2002. Ethics code of the American anthropological association and its relevance for SAA. In *Ethics in American archaeology*, ed. M.J. Lynott and A. Wylie, 2nd rev ed., 93–99. Washington, DC: Society for American Archaeology.

Lynott, M. 2003. The development of ethics in archaeology. In *Ethical issues in archaeology*, ed. L. Zimmerman, K.D. Vitelli, and J. Hollowell-Zimmer, 17–27. Walnut Creek: AltaMira Press in cooperation with The Society for American Archaeology.

McGimsey, C.R., III. 2002. Standards, ethics, and archaeology: A brief history. In *Ethics in American archaeology*, ed. M.J. Lynott and A. Wylie, 2nd rev ed., 16–18. Washington, DC: Society for American Archaeology.

O'Keefe, P.J. 1998. Codes of ethics: form and function in cultural heritage management. *International Journal of Cultural Property* 7: 32–51.

Sease, C. 1998. Codes of ethics for conservation. *International Journal of Cultural Property* 7: 98–117.

Tubb, K.W. 1995. The antiquities trade: An archaeological conservator's perspective. In *Antiquities trade or betrayed. Legal, ethical and conservation issues*, ed. K.W. Tubb, 256–263. London: Archetype Publications in conjunction with UKIC Archaeology Section.

Heritage Landscapes

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Introduction

Heritage landscapes, also referred to as cultural landscapes, represent some of the most well-known landmarks on earth and some of the most contentious. Their complexity, scale, and significance often mean that these landscapes are valued for different reasons and used for conflicting purposes, creating challenges for those who seek to manage and preserve them. An increasing awareness of the importance, multivalence, and political import of heritage landscapes has brought them to the fore of debates within the heritage community over issues of control, access, purpose, and preservation.

Definition

The term "heritage landscape" brings together two concepts, each of which is a cultural construction. As W. J. T. Mitchell (2002: 1) has suggested, landscape is "a process by which social and subjective identities are formed" and should be thought of as a verb rather than a noun. Similarly, heritage is a product of the shared values and beliefs predicated on the relationship of past and present (Lowenthal 1998) and is therefore inherently political (Smith 2006; Harrison 2012). The definition of heritage landscapes is, therefore, dependent on their political, economic, and social contexts, and they may be valued for multiple reasons, including aesthetic, historic, scientific, social, and spiritual (Burra Charter 2013). They include officially recognized sites such as those designated by UNESCO as World Heritage Sites and those listed on the US National Register of Historic Places, but they also include landscapes without formal sanction but

meaningful to descendant communities or other groups.

Key to most definitions is the recognition that heritage landscapes contain both natural and cultural resources, and the complexity of documenting, managing, protecting, and interpreting the landscapes often stems from the interplay of the two. The UNESCO 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage linked notions of cultural and natural heritage, and its operational guidelines divide cultural landscapes into three main categories depending on the "manifestations of the interaction between humankind and its natural environment" (UNESCO 2008: 86).

Heritage landscapes include all manner of forms, scales, and time periods. An inventory of heritage landscapes in Massachusetts, for example, identified forms as varied as scenic roads, formal gardens, cemeteries, shipyards, and cranberry bogs (Massachusetts Department of Conservation and Recreation 2008). Various criteria for assessing and classifying heritage sites have been developed since the 1964 Venice Charter (Birnbaum, ed. 1996). As of 2017, there are more than 1073 World Heritage Sites recognized as having "outstanding universal value" in 167 states parties (UNESCO 2017), and there are at least 40 documents at the international and national level establishing definitions and policies for the documentation and conservation of heritage sites and little consensus in definitions of heritage among nation-states (Ahmad 2006: 299).

Historical Background

While cultural landscapes are as old as humanity, their study has been framed over time by different disciplinary approaches. For example, art and architectural historians look to the genre of landscape painting as the genesis of the concept of landscape. While the study of geography dates to classical times, geographers point to the work of Otto Schluter and Carl O. Sauer for the development of cultural geography with its increasing attention to the variety of vernacular traditions (Jackson 1984) and the diversity of expressions along societal divisions such as race, class, and ethnicity (Noble 1992; Hayden 1995; Schein 2006; Tolia-Kelly 2010).

In archaeology, interest in environmental factors creating conditions for social complexity, domestication, and urbanization led to a focus on landscape. For example, Karl Wittfogel (1956) identified water control in the landscape as a central factor in the development of complex societies. Gordon Willey's (1953) survey of the Virú Valley demonstrated the utility of the systematic investigation of settlement patterns. Statistical models of site prediction and sampling strategies for regional surveys became essential methodologies for the study of archaeological landscapes. Increasing sophistication of environmental modeling, the advent of GIS with its integration of data layers, improvements in remote sensing, and the development of three-dimensional computer-generated reconstructions of space have advanced the study of past heritage landscapes. It has become possible, for example, to create virtual reality experiences with "fly-throughs" of ancient villages, reconstruct ceremonial processual routes, recreate acoustic environments, and trace the succession of environmental changes as ancient harbors silted in and became farmland. The use of technology has also helped to connect astronomical and terrestrial landscapes with reconstructions of lunar and solar alignments in landscapes such as Stonehenge, Cahokia, and Chaco Canyon.

The multidisciplinary study of heritage landscapes has been accompanied by the development of policy and legislation for the management of these cultural resources. In the USA, federal legislation dates to 1906 with the passage of the Antiquities Act that included the designation and protection of national monuments on federal land. The 1966 National Historic Preservation Act established the National Register of Historic Places. Australia's Burra Charter (1979, rev. 2013) has become a model for the management of cultural landscapes (Silberman 2016: 29). The increasingly sophisticated standards for heritage landscape management and protection have been accompanied by an intensification of the economic and political stakes of heritage sites. Even

as governments have used heritage sites for political purposes and entrepreneurs have developed them for economic gain, some countries have created policies to support more equitable and inclusive principles of heritage management. For example, the Burra Charter (Australia ICOMOS rev. 2013) includes a Code of Ethics of Coexistence as well as practice notes on Indigenous heritage, intangible heritage, and cultural routes. In the USA, the National Register of Historic Places criteria was expanded in 1990 to include traditional cultural properties in which the "significance is derived from the role the property plays in a community's rooted beliefs, customs, and practices" (National Park Service 1998).

Key Issues

Current debates in heritage landscapes often stem from their contested use and values. Sites such as Devils Tower National Monument in the Black Hills of Wyoming and Uluru (Ayres Rock) in Australia have pitted the interests of rock climbers against Indigenous peoples for whom the sites are sacred. These tensions challenge the authority vested in civic entities with the rights of descendant communities and test principles such as the separation of church and state and issues of sovereignty. Other contested heritage involves privileged narratives and the political implications of highlighting certain time periods or peoples, while others are marginalized, as at the California missions (Kryder-Reid 2016) and Luang Prabang (Dearborn and Stallmeyer 2010). Memorial landscapes have been charged loci of politicized debate about how societies commemorate the past, particularly the dark heritage of totalitarian and racist regimes and historical figures (Macdonald 2008; Upton 2015).

Recognizing the multivalence of heritage sites and acknowledging the role of heritage sites in the politics of identity have implications for practice. The range of values of heritage landscapes is being incorporated into official designations of significance, such as the inclusion of "traditional cultural properties" on the US National Register (King 2003). Similarly, a more inclusive perspective on landscape values is changing methodologies that some archaeologists are deploying to understand the meaning and significance of cultural resources and to "decolonize" long-standing heritage practices (Lonetree 2012). For example, archaeologists consulted with tribal elders as part of investigations of the ancestral homelands of the Zuni and Hopi in the San Pedro Valley of Arizona (Colwell-Chanthaphonh and Ferguson 2006).

Another response to the concerns about a lack of inclusive decision-making about heritage landscapes is the increasing use of collaboration and consultation in site management. For example, Hadrian's Wall in northern England exemplifies the potential for collaborative management plans to negotiate the interests of diverse stakeholders. Begun in 122 CE as a military fortification along the Roman frontier, today it is a World Heritage Site running 118 km through multiple legal and civil jurisdictions and incorporating public lands and more than 700 private property owners. The contemporary land use is complicated and includes urban centers, pastures, hiking trails, and archaeological research sites. This complex site is managed by a collaboration of numerous national departments and agencies, as well as a multitude of local county and district councils, which have developed a 5-year rolling management plan that accommodates the wide-ranging interests of those who manage, use, and enjoy the site (de la Torre 2005; Norman 2007).

Heritage landscapes are being used as catalysts or arenas for public dialogue about important social issues (Bender and Winer 2001; Shackel 2001; McAtackney and Ryzewski 2017), and they are being mobilized in social justice and political activism, as in the work of members of the International Coalition of Sites of Conscience (Ševčenko 2011). For example, scholars are examining the heritage of landscapes associated with marginalized people such as the immigrants (Morgan et al. 2005), migrants (Byrne 2016), and the homeless (Zimmerman et al. 2010; Kiddey 2017; Singleton 2017). Sites such as Russia's Gulag Museum at Perm-36 and the District Six Museum and Robben Island in South Africa advocate reconciliation and social justice, and they

demonstrate both the promise and challenges of realizing political change through heritage landscapes (Garuba 2007; Rassool 2007).

Future Directions

Heritage landscapes are threatened by risks from increasing development, particularly economic pressures for immediate profit over longer-term stewardship. Climate change also raises the specter of inundation for heritage landscapes in low-lying coastal and island communities, as well as other threats from increasing drought, erosion, and flooding caused by changing precipitation patterns and intensifying weather events. In other areas, political instability and extremist regimes pose threats to heritage landscapes and monuments, such as the Taliban's destruction of the Bamiyan Buddha statues in 2001 and the struggle between Russia and Ukraine over the interpretation of Tauric Chersonese, a UNESCO World Heritage Site in Crimea. Other challenges for the future of heritage landscapes include concerns about the "Heritagization" trend and critiques of the unwieldy and impractical implications of global heritage policy (Zan et al. 2015). Others have criticized the institutionalization of the heritage industry as part of broader neoliberal trends and challenged the use of heritage places as instruments of state power (Silberman 2016).

In times of conflict, critique, and contracting resources, it is tempting to be pessimistic about the future of heritage landscape, but projects continue to demonstrate innovative ways to engage new audiences and to advance participatory heritage through interpretation and preservation practices. For example, technological innovations have the potential to increase our capacity to understand and reconstruct past landscapes. The same sophisticated visualization and analytical tools offer the possibility of sharing the stories of past landscapes in innovative and engaging ways with ever-broadening audiences. Social media and the ubiquity of personal digital devices have created capacities for crowdsourcing and citizen-curated interpretations of cultural resources in ways that are transforming traditional cultural authority relationships. Scholars are expanding the scope of heritage landscapes to include seascapes (Pungetti 2012) and interplanetary space (Gorman 2005). While countries continue to use heritage to support their national interests, at the same time, advocates of democratized heritage and equity of access are promoting the principle of heritage as a human right that knows no geopolitical borders (Von Droste et al. 1995; Silverman and Ruggles 2007; Hsiao et al. 2017; Silverman et al. 2017).

Cross-References

- ▶ Annapolis: Historical Archaeology
- ▶ Bamiyan Buddhas
- ▶ Battlefield Archaeology
- ▶ Berlin Wall
- ▶ Cahokia
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Chaco Canyon, Archaeology of
- ▶ China: Managing Cultural Heritage and the World Heritage List
- ▶ Collaborative for Cultural Heritage Management and Policy (CHAMP)
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Environmental Archaeology and Conservation
- ▶ Florence Charter on Historic Gardens (1982)
- ▶ Global Heritage Fund (GHF)
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ Historic St. Mary's City
- ▶ Homelessness, Archaeology of
- ▶ Industrial Heritage in Archaeology
- ▶ Landscape Archaeology
- ▶ Machu Picchu: Geography and Culture
- ▶ Maritime Landscapes
- ▶ Mesa Verde
- ▶ Nationalism and Archaeology
- ▶ Plantation Archaeology

▶ Shackel, Paul
▶ Social Memory in Archaeological Theory
▶ Stakeholders and Community Participation
▶ Sustainability and Cultural Heritage
▶ UNESCO's World Heritage List Process
▶ World Heritage List: Criteria, Inscription, and Representation

References

Ahmad, Y. 2006. The scope and definitions of heritage: From tangible to intangible. *International Journal of Heritage Studies* 12: 292–300.

Australia ICOMOS. 2013. Burra charter and practice notes. 2013 http://australia.icomos.org/publications/burra-charter-practice-notes/.

Bender, B., and M. Winer, eds. 2001. *Contested landscapes: Movement exile and place*. Oxford: Berg.

Birnbaum, C.A. ed. 1996. *The secretary of the interior's standards for the treatment of historic properties with guidelines for the treatment of cultural landscapes. Historic landscape initiative, heritage preservation services, cultural resource stewardship and partnerships*. Washington, DC: National Park Service, United States Department of the Interior.

Byrne, B. 2016. Heritage corridors: Transnational flows and the built environment of migration. *Journal of Ethnic and Migration Studies* 42 (14): 2360–2378.

Colwell-Chanthaphonh, C., and T.J. Ferguson. 2006. Memory pieces and footprints: Multivocality and the meanings of ancient times and ancestral places among the Zuni and Hopi. *American Anthropologist* 108: 148–162.

Dearborn, L.M., and J.C. Stallmeyer. 2010. *Inconvenient heritage: Erasure and global tourism in Luang Prabang*. Walnut Creek: Left Coast Press.

de la Torre, M. 2005. *Heritage values in site management*. Los Angeles: Getty Publications.

Garuba, H. 2007. A second life: Museums, mimesis, and the narratives of tour guides of Robben Island. In *Desire lines: Space, memory and identity in the post-apartheid city*, ed. N. Murray, N. Shepherd, and M. Hall, 129–144. New York: Routledge.

Gorman, A. 2005. The cultural landscape of interplanetary space. *Journal of Social Archaeology* 5(1): 85–107.

Harrison, R. 2012. *Heritage: Critical approaches*. New York: Routledge.

Hayden, D. 1995. *The power of place: Urban landscapes as public history*. Cambridge, MA: The MIT Press.

Hsiao, H.M., H. Yew-Foong, and P. Peycam, eds. 2017. *Civil society and heritage-making in Asia*. Singapore: ISEAS Publishing.

Jackson, J.B. 1984. *Discovering the vernacular landscape*. New Haven: Yale University Press.

Kiddey, R. 2017. *Homeless heritage: Collaborative social archaeology as therapeutic practice*. Oxford: Oxford University Press.

King, T.F. 2003. *Places that count: Traditional cultural properties in cultural resource management*. Walnut Creek: AltaMira Press.

Kryder-Reid, E. 2016. *California mission landscapes: Race, memory, and the politics of heritage*. Minnesota: University of Minnesota Press.

Lonetree, A. 2012. *Decolonizing museums: Representing native America in national and tribal museums*. Chapel Hill: University of North Carolina Press.

Lowenthal, D. 1998. Fabricating heritage. *History and Memory* 10: 5–24.

Macdonald, S.J. 2008. *Difficult heritage: Negotiating the Nazi past in Nuremberg and beyond*. London: Routledge.

Massachusetts Department of Conservation and Recreation. 2008. *Translations: The first chapter of the heritage landscape inventory program*, 2001–2008. Boston: Commonwealth of Massachusetts.

McAtackney, L., and K. Ryzewski, eds. 2017. *Contemporary archaeology and the city: Creativity, ruination, and political action*. Oxford: Oxford University Press.

Mitchell, W.J.T. 2002. *Landscape and power*. Chicago: University of Chicago Press.

Morgan, G., C. Rocha, and S. Poynting. 2005. Grafting cultures: Longing and belonging in immigrants' gardens and backyards in Fairfield. *Journal of Intercultural Studies* 26 (1–2): 93–105.

National Park Service. 1998. Guidelines for evaluating and documenting traditional cultural properties. National Register Bulletin 38. https://nps.gov/nr/publications/bulletins/pdfs/nrb38.pdf.

Noble, A.G. 1992. *To build in a new land: Ethnic landscapes in North America*. Baltimore: The Johns Hopkins University Press.

Norman, K. 2007. The Hadrian's wall major study: A test for participatory planning in the management of a world heritage site. *Conservation and Management of Archaeological Sites* 9: 140–173.

Pungetti, G. 2012. Island, Culture, Landscape, and Seascape. *Journal of Marine and Island Cultures* (1): 51–54.

Rassool, C. 2007. Memory and the politics of history in the District Six Museum. In *Desire lines: Space, memory and identity in the post-apartheid city*, ed. N. Murray, N. Shepherd, and M. Hall, 113–128. New York: Routledge.

Schein, R.H., ed. 2006. *Landscape and race in the United States*. New York: Routledge.

Ševčenko, L. 2011. Sites of conscience: Heritage of and for human rights. In *Cultures and globalization: Heritage, memory and identity*, ed. H.K. Anheier and Y.R. Isar, 114–123. Thousand Oaks: Sage Publications.

Shackel, P.A., ed. 2001. *Myth, memory, and the making of the American landscape*. Gainesville: University of Florida Press.

Silberman, N. 2016. Heritage places: Evolving conceptions and changing forms. In *A companion to heritage studies*, ed. W. Logan, M.N. Craith, and E. Kockel, 29–40. London: Wiley.

Silverman, H., and D.F. Ruggles, eds. 2007. *Cultural heritage and human rights*. New York: Springer.

Silverman, H., E. Waterton, and S. Watson, eds. 2017. *Heritage in action: Making the past in the present. Cham*. Springer.
Singleton, C. 2017. Encountering home: A contemporary archaeology of homelessness. In *Contemporary archaeology and the City creativity, ruination, and political action*, ed. L. McAtackney and K. Ryzewski, 229–243. Oxford: Oxford University Press.
Smith, L. 2006. *The uses of heritage*. London: Routledge.
Tolia-Kelly, D.P. 2010. *Landscape, race, and memory*. Farnham: Ashgate.
UNESCO. 2008. Operational guidelines for the implementation of the World Heritage Convention. Available at: http://whc.unesco.org/archive/opguide08-en.pdf#annex 3.
UNESCO. 2017. World heritage list statistics. http://whc.unesco.org/en/list/stat.
Upton, D. 2015. *What can and can't be said: Race, uplift, and monument building in the contemporary south*. New Haven: Yale University Press.
Von Droste, B., H. Plachter, and M. Rössler, eds. 1995. *Cultural landscapes of universal value. Components of a global strategy*. Jena: Fischer Verlag.
Willey, G.R. 1953. *Prehistoric settlement patterns in the Virú Valley, Peru (Bureau of American Ethnology Bulletin 155)*. Washington, DC: Smithsonian Institution.
Wittfogel, K. 1956. The hydraulic civilizations. In *Man's role in changing the face of the earth*, ed. W. Thomas, 152–163. Chicago: Wenner-Gren Foundation.
Zan, L., S. Baraldi, M. Lusiani, D. Shoup, P. Ferri, and F. Onofri. 2015. *Managing cultural heritage: An international research perspective*. Burlington: Ashgate.
Zimmerman, L., S. Courtney, and W. Jessica. 2010. Singleton and Jessica Welch. Activism and creating a translational archaeology of homelessness. *World Archaeology* 42 (3): 443–454.

Heritage Legislation, The Introduction of: Disciplining Through Law

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State of Knowledge and Current Debates

Introduction

Legislation protecting cultural heritage emerged first in classical antiquity in the Mediterranean Basin as royal edicts by Alexander the Great and later by Rome were proclaimed to protect archaeological remains deemed to represent the heritage of the state (Fig. 1). This was driven by the recognition in the Mediterranean Basin that physical materials from the past represented a record of cultural heritage for subsequent generations. Similar proclamations and expectations developed later in the eighth-century Islamic caliphates of the Middle East and in imperial China in the eleventh century and then at the national level in Sweden in 1666 and Russia in 1704. All of this set a cultural precedent such that the emergence in Europe of Humanistic Antiquarianism along with Enlightenment values drove interest in the archaeological past, precipitating sequentially ethnological and archaeological societies, and then acceptance in the 1820s of national heritage legislation meant to protect the cultural patrimony of Greece and the newly independent states of Latin America. By the end of the nineteenth century, heritage legislation of some form was common across Europe and the Mediterranean Basin but was just starting to emerge within the Western Hemisphere. This legislation was often aimed at the access to and movement of archaeological materials and frequently was restricted to properties held at the national level. Laws giving the state the right of first refusal on cultural properties, regardless if owned privately or publically, developed early in Greece and Mexico, followed by the Ottoman Empire in the last quarter of the nineteenth century (and later becoming rather common for many Latin American nations).

National heritage legislation across South and East Asia, Oceania, and sub-Saharan Africa was introduced through some affiliation with European colonial powers such as the British Commonwealth/Commonwealth of Nations; in imitation of laws of such states; or in response to regional or international agreements, such as those promulgated by UNESCO (United Nations Education, Scientific, and Cultural Organization). In China and Japan, for example, such laws started emerging in the late nineteenth century, in former British colonies, usually close to the time of independence from Great Britain, particularly in sub-Saharan Africa.

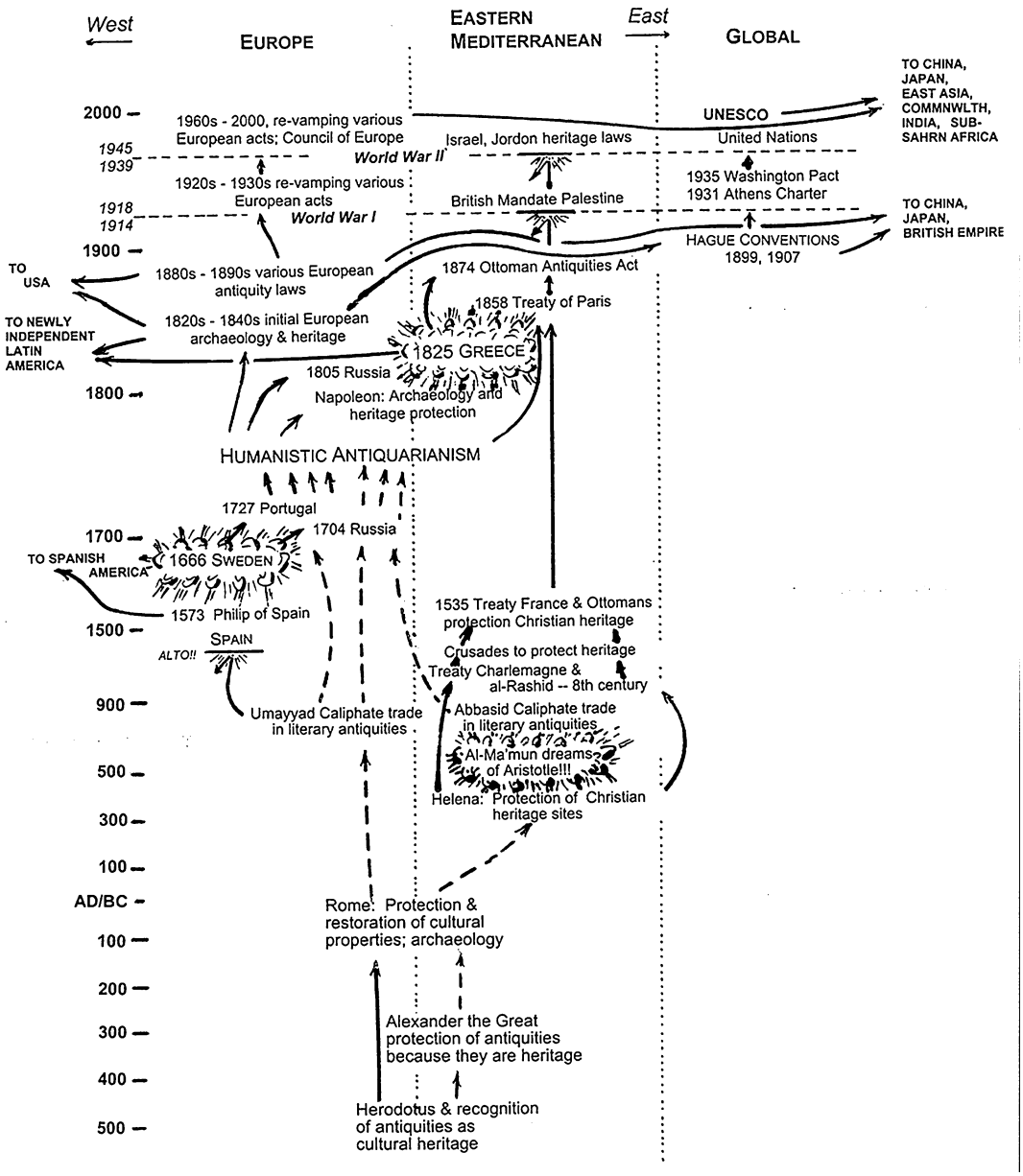

Heritage Legislation, The Introduction of: Disciplining Through Law, Fig. 1 Emergence of heritage legislation in Europe and the Mediterranean Basin, with reference to global impact

International (as distinct from imperial or intra-state) heritage legislation first appeared with the treaties between France – under Charlemagne in the eighth century and Francis I in the sixteenth – and Islamic caliphates for protection of religious heritage sites in the Levant (Fig. 1; Table 1). Various bi- and trilateral agreements developed between the Ottoman Empire and Britain and France in the nineteenth century, also protecting heritage properties across the greater Middle East.

In 1899, the first Hague Convention, a multi-national instrument protecting heritage properties in times of war, was passed (Fig. 1; Table 1). It was amended in 1907 and again in 1935 as part of

Heritage Legislation, The Introduction of: Disciplining Through Law, Table 1 Regional and global heritage conventions, resolutions, recommendations, and declarations

Regional	
1933	Treaty on Protection of Artistic and Scientific Institutions and Historic Monuments (approved at the seventh International Conference of American States)
1969	[London Convention] The European Convention on the Protection of Archaeological Heritage [see also 1992 below]
1969	[Cultural Manifesto of Algiers] Cultural Charter for Africa (Organization of African Unity) (touches on but is not mainly concerned with heritage protection)
1976	[Convention of San Salvador] Organization of American States: Convention on the Protection of Archaeological, Historical, and Artistic Heritage of the American Nations
1980	Organization of African Unity Lagos Plan of Action for the Economic Development of Africa and the Final Act of Lagos (touches on but is not mainly concerned with heritage protection)
1985	[The Granada Convention]: The European Convention for the Protection of Architectural Heritage, Granada
1985	[The Delphi Convention] The European Convention on Offences to Cultural Property, Delphi
1992	[The Valletta Convention] The European Convention on the Protection of Archaeological Heritage (Revised), Valletta
1999	Commonwealth of Nation's Environmental Protection and Biodiversity Conservation Act of 1999 (EPBC Act)
2000	Southern African Development Community (SADC) Blantyre Protocol on Cultural, Information, and Sport (touches on but is not mainly concerned with heritage protection)
2001	The Protection of Traditional Knowledge and Expressions of Culture Act 2001 (Pacific Basin instrument)
2002	[The Model Law] *Model Law for the Protection of Traditional Knowledge and Expressions of Culture* (Pacific Basin Instrument endorsed at the First Conference of Ministers of Culture of the Pacific Region)
2004	[The Florence Convention]: The European Landscape Convention, Florence
Global: Non-UNESCO	
1899	Convention of The Hague for protection of cultural property during war
1907	Convention of The Hague for protection of cultural property during war
1935	Washington Pact, again for protection of cultural property during war
Global: UNESCO	
1954	UNESCO. *Convention for the protection of cultural property in the event of armed conflict with regulations for the execution of the convention 1954*, The Hague
1956	UNESCO. *Recommendation on international principles applicable to archaeological excavations*, New Delhi
1968	UNESCO. *Recommendation concerning the preservation of cultural property endangered by public or private works*
1970	UNESCO. C*onvention on the means of prohibiting and preventing the illicit import, export and transfer of ownership of cultural property 1970*, Paris
1972	UNESCO. *Convention concerning the protection of the world cultural and natural heritage*, Paris
1972	UNESCO. *Recommendation concerning the protection, at national level, of the cultural and natural heritage*, Paris [World Heritage Convention]
1976	UNESCO. *Recommendation concerning the safeguarding and contemporary role of historic areas*, Nairobi
1976	UNESCO. *Recommendation concerning the international exchange of cultural property*, Nairobi
1978	UNESCO. *Recommendation for the protection of movable cultural property*, Paris
2001	UNESCO. *Convention on the protection of the underwater cultural heritage 2001*, Paris
2003	UNESCO. *UNESCO declaration concerning the intentional destruction of cultural heritage*, Paris
2003	UNESCO. *Convention for the safeguarding of the intangible cultural heritage 2003*, Paris
2005	UNESCO. *Convention on the protection and promotion of the diversity of cultural expressions 2005*, Paris
2011	UNESCO. *Recommendation on the historic urban landscape, including a glossary of definitions*, Paris
2015	UNESCO. *Recommendation concerning the protection and promotion of museums and collections, their diversity and their role in society*, Paris
2015	UNESCO. *Recommendation concerning the preservation of, and access to, documentary heritage including in digital form*, Paris

the Washington Pact. However, it was not until after World War II and the establishment of the United Nations that international agreements – in the form of conventions, recommendations, and declarations – were promulgated globally for the protection of cultural properties. Under the aegis of UNESCO, these instruments set out definitions of cultural properties along with expectations for their protection – both from damage either from domestic activities or from war and from looting and illicit trafficking. The UNESCO instruments, though, found acceptance for two reasons. The first reason was because issues of heritage legislation had been considered earlier across Europe, the Mediterranean Basin, and the Western Hemisphere – thus except for China essentially the founding nations of the United Nations. The second reason was because many of the eventual signatories to the UNESCO instruments either were or had been possessions/cultural descendants of those founding nations.

Definitions

"Heritage" here refers to "cultural heritage" in a material remains, archaeological sense, which in turn is used interchangeably – despite the definitions given below – with "cultural property" as used and/or understood by UNESCO in nine recommendations, six conventions, and a declaration all promulgated from 1954 to 2015. UNESCO (1972: I.1.) defined "cultural heritage" as:

> . . .monuments: architectural works, works of monumental sculpture and painting, including cave dwellings and inscriptions, and elements, groups of elements or structures of special value from the point of view of archaeology, history, art or science; groups of buildings: groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of special value from the point of view of history, art or science; sites: topographical areas, the combined works of man and of nature, which are of special value by reason of their beauty or their interest from the archaeological, historical, ethnological or anthropological points of view.

UNESCO (1970: Article 1) stated that "the term 'cultural property' means property which, on religious or secular grounds, is specifically designated by each State as being of importance for archaeology, prehistory, history, literature, art or science," going on to specify that this includes both non-portable items like architectural features, archaeological sites, and the settings of such and portable items ranging from artifacts through portions of those architectural features and archaeological sites. The term "cultural resources" commonly is substituted for "cultural property" among professionals in some nation-states, the USA and South Africa being examples. In the USA, the term is found not in heritage legislation but rather in advisory documents and in its National Environmental Policy Act.

"Heritage legislation" refers to the legislation meant to govern the recovery, use, protection, and possession of elements of the physical or conceptual world produced by a particular human culture. There are basically four levels of legislated governance within nation-states: (1) "legislation," which here is coincident with "laws" and "acts" (seen to include statutes passed through some kind of parliamentary/legislative body; "common law" developed through a judicial system such as in classical Rome, Great Britain, and their scions; constitutional provisions and articles; and "royal proclamation," "royal edict," "imperial fiat," or equivalent); (2) "ordinances," which are enacted by a governmental entity and provide the authority as well as intent; (3) "regulation," which specifies how that legislation is to be accomplished in the everyday world; and (4) "guidance," which aims to clarify specific applications of those regulations by the particular regulatory branch of government. Establishment of governmental agencies, offices, or ministries, along with designated administrative/enforcement responsibilities that may not be clearly set out in statutory law, also can be included under a general rubric of heritage legislation in that such entities are implementing or exercising some sort of governmental authority. This has been very common across Middle and South America.

"Treaties" might also be viewed as a form of legislated governance. In essence, these are international agreements – approved by the participants – that can ask, cajole, or require a signatory to abide by a series of rules both within the nation-state and in its interactions with other

nation-states. For example, the UNESCO conventions, recommendations, and declarations can be placed here, as can the various Hague Conventions and League of Nations mandates along with the A.D. 1535 treaty of Francis I of France with the Ottomans for the protection of religious heritage sites in the Levant.

Finally, it should be noted that heritage legislation in the sense considered here – material cultural property associated with archaeology – overlaps with the kind of heritage legislation covered by copyright law and similar laws protecting intellectual property, traditional knowledge, and traditional cultural expression. This touches on the separation of tangible and intangible heritage, which is beyond the scope of this entry. The 2002 Pacific Model Law, with its guidelines for protection of traditional knowledge and expressions of culture, is an example of where that form of heritage legislation treating intellectual property and other intangible heritage issues conceptually adjoins the kind of heritage legislation under consideration in this article.

Historical Background

Heritage legislation is a product of the Western Intellectual Tradition but found traction worldwide because many nation-states early on held that the materials of the past were of value to their own nation-state identity in some way and as such should be protected, both within national borders and from removal from the country. Globally, heritage legislation grew from efforts confined to limited territorial governance – fiefdoms, pre-industrial countries, and empires – to both nation-state mandates and international agreements and currently exists at both levels. While emergence varied in particular across the world, in all cases, it grew first from a concern to protect a culture's/nation's ownership over materials associated with its past and in all cases depended upon recognition that there was a "past" represented by material remains from which the "present" had emerged.

Ignoring common cultural proscriptions on the disturbance of burials and the somewhat less common but not unusual proscriptions on the disturbance of former living sites, both of which are social sanctions against disturbance of cultural property and archaeological sites, formal governmental or religious decrees effectively protecting cultural heritage existed in many pre-industrial states. And since all pre-industrial states have or had a state religion, secular or religious origin of prohibitions and regulations comes out to the same thing.

Antiquity

Heritage legislation in the form of pre-industrial state policies, edicts, and similar governmental actions are known in pre-modern times for two regions: the general Mediterranean Basin area and China. The actions that emerged in the Mediterranean Basin form the basis of modern heritage legislation and as such will be considered here. Those of China provided a cultural predilection for emplacing the sort of heritage legislation that would be promulgated globally from the European-Mediterranean Basin; the antiquity of their heritage legislation will be considered when "Asia" is discussed below.

Recognition of a past that is accessible through some sort of excavation is one requirement for archaeological heritage legislation to make any sense. However, recognition by one culture of the evidence for a past does not mean that another culture will interpret that evidence in the same way: classical Greece and Rome long excavated, recovered, reassembled, displayed, and interpreted past remains, both what would now be identified as human and paleontological. However, those remains were interpreted in keeping with the given culture's cosmologies, such that mammoth and mastodon bones became the bones of giants or the war elephants of Alexander the Great: *Protoceratops* skulls, those of griffins (Mayer 2000: 48–49, 55). People in the Mediterranean Basin antiquity were aware that people lived in the past and that physical remains of them were present; thus, the finding of things was used to make known things better understood and interpreted in terms of their understanding of the past (Mayer 2000: 157–163).

Herodotus in his *Histories* in the fifth century B.C. talked of Cimmerian remains left behind in lands since occupied by Scythians, as well as of

the fortifications left by Darius in his futile pursuit of those Scythians (Fig. 1). He spoke, too, of remains left by Ionians and Carians testifying to their early presence in Egypt. He identified ruins with events from the Trojan War, effectively recognizing that actions in the past left material remains from a world that was politically much different than his own time.

Arrian recounted in the *Anabasis Alexandrou* Alexander's (356–323 B.C.) defense of Macedonian and Persian antiquities as matters of state policy, since those items – tombs, especially that of Cyrus the Great in 324 B.C., and temples from centuries past – provided justification of Alexander's political and territorial attainments (Fig. 1). This is an early example of heritage legislation through imperial fiat: the penalty was that the perpetrators were sent to discuss their desecration face-to-face with the long-deceased Cyrus.

By the first century B.C., the wealth and power of imperial Rome was such that archaeology, along with jurisprudence, history, religion, and philosophy, became a favorite area of study by educated – upper class – Romans (Rostovtzeff 1960: 160). The Roman Empire limited what would now be called archaeological research. Under Augustus, there was a campaign to restore ancient shrines as part of an overall effort to reaffirm the character of ancient, pre-imperial Rome (Rostovtzeff 1960: 188–189): "the relics of Rome under the ancient kings. . .were carefully preserved" (Fig. 1).

The mother of Constantine, Empress Helena, undertook in A.D. 326 what amounted to a sustained and coordinated archaeological exploration of what is now Israel, driven by a desire to locate and then protect Christian religious heritage sites (Fig. 1). This exercise, along with Christianity becoming the state religion of the Eastern Roman Empire, resulted in a period of pilgrimage that continued well into the time of Islamic control of the region, prompting Caliph Harun al-Rashid in the eighth century to conclude a treaty with Charlemagne for Christian protection of those religiously significant sites (Silberman 1982: 7). For all practical purposes, that treaty ended first with the onset of the Crusades (the Crusades out of Europe in the twelfth century were exercises driven by a desire to defend or secure cultural property – and thus protection of cultural-religious heritage) and then later with the collapse of the last Crusader Kingdom in A.D. 1291. Protection of what would be deemed explicitly archaeological sites – in this case again, Christian religious sites – was re-established in A.D. 1535 by Francis I of France in a treaty with the now-governing Ottomans.

It was during the Abbasid Caliphate (A.D. 750–1519) that Baghdad was founded (A.D. 762) and later became a center of learning, drawing to it the scholarly community that had flourished for centuries at nearby Gundeshapur in what was then southwest Persia. That community, combined with the nighttime dream by Caliph al-Ma'mun in which Aristotle appeared, had precipitated an expansive era of scholarly research, including sustained, state-sanctioned efforts to identify and then bring to Baghdad earlier writings in Greek, which were then translated into Arabic. This then was state-sponsored acquisition of cultural properties – early books and documents – because of their heritage value, a form of acquisitive proactive heritage legislation by state policy (Fig. 1). However, by the late eleventh century, there was a reaction against al-Ma'mun's legacy and "foreign sciences" across the Abbasid Caliphate, which resulted – when the Ottomans inherited power in the sixteenth century – in a continuation of a lack of recognition of the importance of material cultural heritage that enabled the expansion of archaeological work, and removal of antiquities, from the Levant into the late nineteenth century.

Something similar transpired in what is now Spain, to where the Umayyads, deposed by the Abbasids, moved in A.D. 756. Cordova, Toledo, and Granada became, like Baghdad, cosmopolitan centers of learning. As with Baghdad, efforts were made to translate earlier works in Greek and Latin, identifying a link between a classical past that would be recognized. Indeed, it was the Islamic civilizations of the eighth through fifteenth centuries that preserved much of the earlier Mediterranean Basin intellectual and cultural heritage. And it did so intentionally by obtaining

then moving earlier works – the Elgin Marbles of their day – in those classical languages to a new place.

Societal Basis for Introduction of Heritage Legislation

Heritage legislation, particularly as it bears upon archaeology, is the legislation normally forwarded, promoted, and then enacted by the upper social strata of state-level societies, but which preserves information about – potentially – everyone's past stored in the physical remains found archaeologically, architecturally, or otherwise materially. Two things are required: recognition that there is a physical past, in the form of archaeological materials, present to be protected, and recognition that those archaeological remains are worth protecting.

Archaeological remains exist in a "destroyed-as-read" medium, which is how initial computer memories were configured (Silberman 1982: 178; The La Valetta Convention 1992 Article 1.1; Neumann and Sanford 2010: 12). This is why regulations exist for the protection of those long-term physical records of the past: Extracting information about the past from a destroyed-as-read matrix requires personnel trained in meticulous recordation skills along with research protocols aimed at doing that recordation. All current heritage legislation has that embedded as understood and in this respect is subsumed under what is known in the USA (United States of America) as "public trust doctrine." "Public trust doctrine" holds that public lands, along with their contents, be they wildlife or cultural resources, are held in trust for the citizenry writ large (Brushkotter et al. 2011). Although not as explicitly stated, much of the heritage legislation currently in existence along with the UNESCO conventions assumes that this is understood (see Table 1).

The societal process leading to modern heritage legislation has been similar worldwide: It begins with the recognition of cultural heritage in archaeological materials and sites; shifts to a realization that those materials and sites are in some way imperiled, be it from looting, privateering, or inadvertent destruction; and then becomes a cause célèbre for the upper social classes, in the form of the ruling social class (e.g., Roman Emperor, Chinese Emperor, Ottoman Emperor), an upper social class social group (e.g., the Mount Vernon Ladies' Association of the Union in the USA), or scientific societies underwritten by the upper social classes (e.g., the Royal Society of Canada; nineteenth-century excavations in Jerusalem). In the Western Hemisphere as well as Europe, the scientific societies that emerged starting in the mid-eighteenth century as an outgrowth of Humanistic Antiquarianism, normally dominated by the upper social classes with access to those who legislate (who often were themselves members of the given scientific society and even now, as with the Smithsonian Institution in the USA, are ex officio members), eventually succeed in having legislation either enacted (e.g., the USA, Canada, Great Britain) or set forth for a larger community of nations (e.g., the Council of Europe or the United Nations), from whence it then is embraced by the given state of concern as a starting point for its own heritage legislation. The British Empire was particularly instrumental in distributing heritage legislation, or the desire to have such, throughout the world. States adjacent to those Empire – later Commonwealth – states often adopted or were inclined, when the various UNESCO protocols emerged, to adopt similar laws. The British Empire served as a geographic-conceptual conduit for heritage legislation.

Introduction by Region of Modern National Heritage Legislation

Heritage legislation as a global initiative on a global scale started as a response to European actions within the Mediterranean Basin and was refined in the European/Mediterranean part of the world, to be later taken up by the cultural descendants of those nation-states. Thus, the first legislative exercises were spread among lands as disparate as Spanish America and the Ottoman Empire and were then coalesced among those when they became the newly independent

nation-states of Latin America and the Mediterranean Basin. Those exercises were further consolidated within the British Empire and subsequent Commonwealth of Nations and then through global organizations that were developed from that overall European/Mediterranean Basin/Western Hemisphere impetus. This global-level consolidation began first with the League of Nations, which facilitated wider acceptance of the Hague Conventions, and continues with the United Nations and the UNESCO conventions and resolutions that drive global heritage legislation today.

Europe and the Near East/Mediterranean Basin

Heritage legislation has at least a 2,400-year history in Europe and the Mediterranean Basin, dating first from Alexander the Great's protection of state-significant heritage sites and then from the first-century B.C. Imperial Roman requirement that, during construction within Rome, relics and architecture associated with the founding and early days of the City were to be preserved (Fig. 1).

Although Phillip II declared in 1573 that all indigenous heritage materials in Spanish America were the property of the Crown, thus reflecting the view that the state had jurisdiction of cultural property when it so chose, that restriction did not apply to Spain proper. It did, though, reflect an emerging regional view of a national material patrimony contained within cultural property. Sweden's Royal Proclamation of 1666 (also known as the Ordinance of 1666), protecting graves, monuments (including stones with runic inscriptions), sites, and antiquities in general (particularly those related to ancestral "greatness," especially those related to the royal household) from "interference," were the earliest legislative statements protecting cultural heritage. Under Peter the Great, the first Russian antiquity law was set forth in 1704. Similarly, Portugal in 1727 established the Royal Academy of History to protect architectural elements, although this was not really acted on. Napoleon, during the occupation of what would become Italy, in 1798 undertook systematic restoration and heritage protection of elements identified during archaeological excavations.

Through to the late eighteenth and early nineteenth centuries, heritage legislation in Europe and the Mediterranean Basin was forwarded by royal or imperial directive, if perhaps for no other reason than it represented the structure of most national governments. The intellectual climate of Europe at the time included the founding of national scientific and ethnologic societies (e.g., Royal Society [England] in 1662; ethnographic societies were established in Paris in 1839, London in 1841, and New York in 1842; ethnology as a field dates from around 1828; ethnography, 1834; and archaeology qua archaeology, 1837, with the Imperial Russian Archaeological Society established in 1846), all of which were products, first, of Humanistic Antiquarianism (which recognized that there was a "past" from which the "present" emerged) and then of the Enlightenment along with the expansion of European powers to overseas possessions.

The sudden emergence of heritage legislation during this time is not surprising (Fig. 1). For example, Russia's Alexander I prepared a register to protect archaeological (especially Greek) sites on the Black Sea in 1805, a list expanded for all of Russia by Nicholas I in 1829. Sweden revised the 1666 Ordinance in 1828 and appointed the first national antiquary. During the Greek War of Independence (1821–1829) establishing modern Greece, the Minister of Internal Affairs issued decrees ordering collection and then safekeeping of antiquities on school premises (1825) and the protection of the Athenian monuments (1826). In 1828, Article 18 of the Greek Constitution of the Third National Assembly in Troezen directed the head of state to make sure Greek antiquities were not sold or otherwise removed from Greece. In 1834, Greece issued the first archaeological laws, developed by G.L. von Maurer, declaring in part that "all the antiquities in Greece, being works of the ancestors of the Greek people, are considered as national property of all the Greeks in general." The law regulated, among other things, reporting of discoveries, ownership of antiquities, and excavation procedures. In many ways, the Greek law from 1834 became the inspiration for

national-patrimony-oriented legislation across the Western world (e.g., Mexico's 1934 *Law for the Protection and Conservation of Archaeological and Historical Monuments*, *Typical Towns, and Natural Beauty Sites*).

Similarly for the period, the Spanish Academia de San Fernando, in response to the establishment of the publication *El Artista*, began in 1836 protecting convents and monasteries. This led to a series of government orders and rulings for protection, such as the 1844 government commission to establish inventories and evaluate national heritage. France established the Commission Nationale des Monuments Historiques in 1837 in response to the damage done during the Revolution and Napoleonic era; the Commission would eventually become the Ministry of Culture.

In 1830, efforts by American merchants to develop an exclusive trade route into the Ottoman Empire resulted in the American-Ottoman Friendship Treaty. This enabled US Navy Lt William Lynch to obtain a permit (firman) to pursue what we would now call an archaeological exploration through what is now Israel and Jordan. Indeed, it can be argued that, beginning around this time, it was the competition among European powers for access to antiquities in the eastern Mediterranean that precipitated the second wave of heritage legislation, shifting it from a concern with internal protection of national heritage to that of protection of a shared cultural heritage – the religious and classical civilization basis of European civilization – along with concerns about the removal of that heritage from the nation/territory in which it originated.

From the mid-nineteenth century to the early twentieth century saw the beginnings of regional heritage legislation in the form of various internal laws along with treaties and international mandates. It was also a politically unsettled time, seeing, for example, the unified Kingdom of Italy proclaimed in 1861. The 1858 Treaty of Paris shifted protection of "the integrity" of the Ottoman Empire to Britain and France, which here included retaining exclusive access to the archaeological/cultural resources of the region (Silberman [1982: 68] argued convincingly that the Crimean War grew sequentially from the conflict between Russia and France over control of cultural materials in Palestine). Even allowing that, the first formal legislation to regulate cultural property in Turkey was put forth by the Ottomans in 1869 (Roosevelt and Luke 2006: 181). After the mid-1500s, the Ottoman Empire was seriously dysfunctional; Egypt, for example, had long been conceded to be under its own control, which Egypt had succeeded in doing by simply ignoring Istanbul. This was a period of considerable political instability. In the 1800s, for instance, Egypt, while like Tripoli [somewhat coterminous with the current nation of Libya] at the time nominally under the control of the Ottoman Empire, in reality, was governed by several European powers, principally Great Britain.

However, even allowing for British and French jurisdiction over doing the archaeological research, the Ottomans nevertheless retained control over the distribution of the recovered cultural properties. At least on paper. In 1874, the Empire promulgated the *Ottoman Antiquities Law* for regulation and protection of antiquities trafficking by foreigners. This was the antecedent to the *Ottoman Law of 1884*, which "established national patrimony (ownership) over all artefacts in the Ottoman Empire" (Kersel 2006: 24), declaring further that Turkey was the sole owner of its own cultural heritage. That 1884 law also regulated archaeological investigations: although very late to realize the financial value of controlling its cultural heritage, in 1888, the Ottomans detached Jerusalem administratively from the Pashalic of Sidon and transferred control directly to the Sublime Porte to better control – and tax – excavations and recovered artifacts from the plethora of religious-archaeological expeditions (Silberman 1982: 154–155).

It was also during this period that in 1899 Greece replaced its *Law of 1834* with *Law BXMS – 2646*, establishing that all Greek antiquities, without exception, were the property of the state, as well as the state's right to acquire all antiquities after paying compensation. This held regardless of where on the planet those antiquities were. The 1899 Law was modified in 1914, 1921, and 1932, redefining what antiquities were under

what kinds of state jurisdiction. Understanding the controversy over repatriation of the Elgin Marbles to Greece – which is not necessarily seen to be a repatriative act by everyone – requires awareness of this legislation.

Similar actions were happening elsewhere in Europe. Britain, for instance, after considerable effort by Sir John Lubbock enacted its *Ancient Monuments Protection Act* in 1882 (because of the extent and influence of the British Empire, arguably one of the most important heritage acts in history). Italy passed its *Monument Act* in 1902, providing an impetus for the restructuring of its heritage management. This seems to have grown out of private societies, such as the Society for the Defense of Old Florence (founded in 1898), established by the people from Great Britain enamored with Italian cultural heritage. During this time France passed the *Act of 1913*, which focused mainly on architecture and preservation of the setting of that architecture.

After the upheaval and political realignments from World War I, heritage legislation began expanding from the protection of national heritage to the protection of the cultural heritage in territories under the jurisdiction of external European powers (Fig. 1). Again, the idea for protecting the cultural heritage of countries other than one's own had been in the air certainly since the *Hague Convention of 1899*, which set out general rules of war. Under the Hague II Annex to that Convention, four articles (46, 47, 55, and 56) addressed the protection of private property and property deemed part of education, arts, and sciences. Those articles were clarified in the *Hague Convention of 1907*, where under the Hague IV Annex to that Convention articles 46, 47, 55, and 56 singled out the protection of cultural properties. Consonant with this broader, international view was the establishment of the League of Nations in 1920.

At the end of World War I, the Ottoman Empire was subdivided among the Allied powers and with it came a distribution over the control of antiquities. This redistribution brought to something of a conclusion an ongoing competition among European powers for access to the cultural heritage of the western Mediterranean since the late 1700s (see Silberman 1982) but in doing so presaged the kind of international heritage legislation/conventions – which form the basis for the heritage legislation in many nations that did not have anything like that earlier – that would emerge under the United Nations after World War II. The first step was the Antiquities Proclamation (British Mandate in Israel and Palestine) in 1918, which noted the region's cultural heritage and shifted it from a religious focus to a legal, secular status (since Helena in the fourth century, heritage regulations and attendant issues surrounding cultural property had been almost entirely religious in nature). This was soon followed by the Antiquities Ordinance in 1920, the primary goal of which was protecting archaeological materials by "vesting the ownership of moveable and immoveable cultural heritage in the Civil Government of Palestine" (Kersel 2006: 26). The League of Nations mandate for Palestine in 1923 explicitly outlined guidelines for excavation and preservation of archaeological remains while ensuring access to excavations and archaeological research for any member of the League, as well as giving authority to punish looters and unauthorized archaeological excavators. Out of this, in 1929, came Antiquities Ordinance No. 51, which "now forms the basis for all current domestic legislation concerning protection of cultural property in Israel and Palestine" (Kersel 2006: 26).

It was also during the interwar years that many nations updated or otherwise revamped their heritage legislation (Fig. 1): for example, Greece in 1921 and again in 1932, Italy in 1922 and again in 1931, and Spain in 1933.

After World War II – and with the devastation visited by the Nazis particularly on the architectural heritage of Europe – there were three emerging themes. For nation-states with a history of heritage legislation, the legislation was updated and the associated regulations refined to not just protect cultural property but to record that property in such a way that its physical destruction would not result in the complete loss of the heritage – the behavioral data content. This rendered the reactive nature of the earlier *Hague Conventions of 1899* and *1907* proactive for the protection of cultural property.

The second theme that emerged was an effort to establish international rules protecting cultural heritage, rules that ranged from prohibitions on international trade and the looting it spawns, through agreements on the protection of cultural heritage during times of war, to active recommendations on national cultural heritage protection. Such rules were an extension of national patrimony laws to the world, in effect recognizing that cultural property embodies the record of all human heritage, not just the heritage of a particular nation as that nation's boundaries are currently drawn. The Roerich Pact (see below), for example, drafted by a Russian artist and a Paris professor in 1930 and intended to declare all cultural properties neutral zones in times of war, was a product of the time.

The third theme after World War II was the emergence in nation-states lacking a history of heritage legislation. For members of the British Commonwealth, in addition to being signatories of *Environmental Protection and Biodiversity Conservation Act* of 1999 (EPBC Act), additional/subsequent national legislation often was patterned closely on that found in Great Britain. For non-Commonwealth nations, such legislation was based on UNESCO conventions or some combination of that and the legislation enacted in adjacent Commonwealth nation-states.

Not long after World War II, there was a restructuring of the global political landscape. Israel as a state was established in the western Mediterranean Basin and, with it, a re-emphasis on heritage legislation. In 1948, Israel replaced the 1929 *Antiquities No. 51 Ordinance* with the *Law and Administration Ordinance of Israel* (No. 1 of 5708) protecting cultural properties. Jordan, also part of that British Mandate, in 1966 replaced the same ordinance with *Jordanian Temporary Law No. 51 on Antiquities*, which in turn forms the basis of the 2012 Palestinian *National Charter for Cultural Heritage Preservation*.

Although outside of Europe, thematically consistent with the European lead in much of global heritage legislation, India as part of its independence from Great Britain in 1947 embodied in its Constitution Article 49, which states that "It shall be the obligation of the State to protect every monument or place or object of artistic or historic interest, declared by or under the law made by Parliament to be of national importance, from spoliation, disfigurement, destruction, removal, disposal or export, as the case may be," while Article 59A makes preservation of India's "composite culture" the duty of every citizen (Pachauri 2006: 236). From this came the 1947 *India Antiquities (Export Control) Act*, which in 1972 was augmented by the *Antiquity and Art Treasures Act*.

North America

North America resolves into two political entities that, for the purposes here, have different histories for heritage legislation. The first is Canada, which as a member of the Commonwealth has been strongly influenced by the heritage legacy of Great Britain and, to a lesser extent, France. It also has found inspiration in the heritage legislation of its neighbor to the south. The second entity is the USA, where the introduction of heritage legislation followed a pattern similar to that in Europe from the early nineteenth century onward. Both represent nation-states with two distinct cultural heritages: one left from the pre-European populations and the other from the colonizing European population.

The Dominion of Canada was established by the British Parliament as a confederated union in 1867. One consequence of this establishment is that "legislative control of heritage properties. . .is exerted mainly at the provincial and municipal levels, not at the federal level" (Stubbs and Makaš 2011: 485). In recent times, this has been achieved through a sequence beginning with some sort of commission, ministry founding/assessment, or report at the federal level that recommends legislative action at the provincial level. As became true in the USA, the impetus for Canadian heritage legislation grew from local historical societies and similar organizations, after which it became institutionalized as part of government agency mission. Thus, Manitoba established a historical society in 1870, and the Imperial Order of the Daughters of the Empire was established in 1895 to record

the history of European settlement along the St. Lawrence River. The Royal Society established a Committee for the Preservation of Scenic and Historic Places in Canada in 1901, and the Historic Landmarks Association was formed in 1907 (renamed the Canadian Historical Society in 1922). In 1922, Quebec passed Canada's first conservation act protecting cultural properties.

In 1951, the Royal Commission on National Development in the Arts, Letters, and Sciences called for legislation enhancing the protection of heritage properties and doing so in a way similar to that established in Great Britain and France (Great Britain, e.g., reworked its 1882 legislation in 1949 with the *National Parks and Access to the Countryside Act*). This resulted at the federal level in the *Historic Sites and Monuments Act* of 1953, which was aimed at federally owned properties. The action followed the 1951 report at the provincial level as well: Quebec rewrote its 1922 legislation in 1952, while New Brunswick passed its *Historic Sites Protection Act* in 1954. Other provinces followed suit until legislation was in place in all by the early 1970s (Stubbs and Makaš 2011: 489, 493).

The introduction of heritage legislation in the USA was different. Unlike in Canada, where the pre-European remains encountered by Europeans starting in the fifteenth century were seen to be the products of the native peoples – referred to as "First Nation Peoples" – in the USA, it was long felt that much of the prehistoric remains and certainly the extensive array of earthworks and mounds across the eastern half of the country were left from the Ten Lost Tribes of Israel, the Jewish population mentioned in Christian and Jewish scriptures that disappeared with the Babylonian conquest in 587 B.C. There were two inferences from this: (1) the archaeological remains associated with those earthworks and mounds were part of Judaic-Christian heritage and thus the arriving European's cultural patrimony and (2) the current native population – referred to almost always in current US federal regulations as "American Indians" – were late interlopers who displaced the descendants of the ten lost tribes. Not all agreed with that interpretation, and as a consequence, archaeology in the USA emerged in the early 1850s as a field bent on solving – one way or another – the "Mound Builder question." The Congress of the USA specifically set aside $5,000 per year for the Smithsonian Institution to resolve that question. As long as the possibility remained of the prehistoric Mound Builders having been descendants of the Ten Lost Tribes, the funding stipulation remained intact. When it was demonstrated in 1894 that those earthworks and mounds had been built by ancestors of American Indians, the funding requirement was withdrawn.

As in Europe, the early nineteenth century was a time in the USA of emerging scientific and anthropological societies, with an ethnological society established in 1842 and the Smithsonian Institution established by Congress in 1846. In 1853, the Mount Vernon Ladies' Association of the Union, a society made up of the upper social stratum, purchased the property and buildings of George Washington's estate as part of an effort to preserve it. This action is viewed as critical in establishing the heritage preservation movement in the USA (Hosmer 1981: 184–185, 525–527; Neumann and Sanford 2010: 7; Stubbs and Makaš 2011: 430–431).

The Mount Vernon Ladies' Association established upper-class societal approval and reflected emerging values that would lead to common-law legislation for protection of heritage properties. In 1876, the courts ruled to protect from demolition the Independence Hall, the structure in Philadelphia, USA, where the American Declaration of Independence had been signed. In 1896, the US Supreme Court ruled constitutional the use of federal funds to purchase private property to protect public interest, in this case part of the Gettysburg Battlefield in South Central Pennsylvania.

Reflecting the emerging feeling that there was heritage of sorts worth protecting, the US Congress passed legislation in the 1880s protecting some Revolutionary War (the War of Independence from Great Britain) battlefields. In 1889, specific legislation was enacted aimed at protecting Casa Grande, a prehistoric Classic Hohokam ruin in Southern Arizona.

It was not until 1906 that the comprehensive *Antiquities Act* was passed, which provided for the protection of historic or prehistoric remains, "or any object of antiquity," on federal lands. Further, it established regulations and sanctions regarding disturbance or damage of those remains. The next major package of legislation was the *Historic Sites Act* of 1935. This, in essence, was the first attempt to join together, under one statute, a federal policy that would encompass the decisions regarding historic structures, battlefields, and antiquities. It went beyond the *Antiquities Act* of 1906, although it was restricted to historic resources of national importance.

After World War II, there were a few governmental and legislative actions dealing with specific situations of heritage protection: the establishment of the National Science Foundation in 1950 (the first two awards for anthropology were for archaeological research in the Yucatán Peninsula of Mexico and the Zagros Mountains of Iran, not the USA); the Interagency Archaeological Survey, established in 1946 that would do salvage (rescue) archaeology along the Missouri River; the *Federal Aid Highway Act* of 1956; and the *Reservoir Salvage Act* of 1960. The last two acts prescribed archaeological salvage on a national level as a mitigative effort in the face of the loss of cultural properties from pending construction enabled by the federal government.

All of US heritage legislation was consolidated and focused in 1966 in the *National Historic Preservation Act* (NHPA), the single most important legislative act in the nation's historic preservation history and one that serves as a model worldwide. NHPA, particularly in what was originally its Section 106 (still commonly referred to as such, although US code now lists it as 54 USC 306108), in effect requires that, before any federally enabled – meaning federal funding, permit, or property somehow involved in whole or part – land alteration activity takes place, cultural properties that would be deemed eligible for listing on the nation's National Register of Historic Places must be identified. As that land alteration activity unfolds, such identified properties can be salvaged and recorded so that their continued existence is somewhat redundant from a recordation view, or those properties can be avoided through project redesign. This entire procedure is termed the "Section 106 Process." It is important to recognize that the nation's National Register of Historic Places is meant to serve only as a listing/inventory device to facilitate project planning; it does not confer protection on the heritage property. NHPA also became the single most important employer of archaeologists in the USA: Four out of every five archaeologists who work in positions in the USA that can only be held by an archaeologist do so as a result of NHPA (Neumann and Sanford 2010: 1–4, 25–26). Indeed, private-sector archaeology addressing the requirements of NHPA in the USA employs one out of every two anthropologists, working in positions that can only be held by an anthropologist, in the USA.

Six other acts were passed by the US Congress between the passage of the NHPA in 1966 and 1979, of which the *National Environmental Protection Act* (NEPA) of 1969 is the most important. It, too, requires cultural properties to be considered during federally enabled land alteration projects. NHPA, however, has regulatory precedence.

The NHPA applies only for federally enabled actions; many states have passed counterpart NHPA legislation, as have local governments, to address non-federally enabled situations. However, for completely private ventures involving private property, there is no heritage protection. Unlike in Middle and South America, Europe, the Mediterranean Basin, and China, the USA is not driven by a view of material remains representing a cultural patrimony that needs protection. Indeed, there is a thriving industry among the rural poor in locating and selling prehistoric and historic antiquities. While denounced by the professorate, professionals, and Indigenous communities, it is all perfectly legal provided public properties are not involved.

Middle and South America (Latin America)

The introduction of heritage legislation across Spanish America – which with the exception of Belize, Brazil, and some small European

territories is coterminous with Latin America/Middle and South America – begins with the tension that came from Spanish suppression and manipulation of the cultural heritage of the Indigenous peoples. Such legislation blossomed after independence from Spain, as the newly formed governments identified then sought to reaffirm their pre-colonial heritage. It should be noted that Latin American heritage legislation itself normally consists of a mixture of statutes and ministerial policies, depending upon the nation-state and the extent to which it contained extensive pre-Columbian populations and monumental architecture. It is also very important to note that those ministries often have, as part of their title, the Spanish or Portuguese cognate for "patrimony." As is the case with Greece, cultural property often is classified linguistically as synonymous with national identity and ownership. And since people think in and classify reality through their language, this is essential to understanding how important such heritage protection is viewed in those nations.

The conquest of Middle and South America began with Cortez's conquest of the Aztec Empire in 1513 and by Pizarro's of the vast Inca Empire in 1534. As mentioned earlier, by 1573, Phillip II had declared that all cultural properties under Spain's colonial dominion belonged to the Crown.

How the introduction of heritage legislation plays out among the various Spanish territories seems to follow how those territories were organized during the period of the Spanish Imperium, along with the heritage resources those territories contained (Fig. 2). For administrative reasons, Spain eventually divided its possessions into four sets: the Viceroyalty of New Spain, which ran from what is now the Southwestern USA through Mexico into Central America (set out in 1528); the Viceroyalty of New Granada (set out in 1739), which included some southern sections of Central America into what is now Panama, Colombia, Venezuela, and Ecuador; the Viceroyalty of Peru (declared in 1542), including mainly Peru; and the Viceroyalty of the Rio de la Plata (set out in 1776), which included Bolivia, Paraguay, Uruguay, Chile, and Argentina. While all of these areas were freed from Spain within 15 years of each other in the early 1800s, their subsequent emplacements of heritage legislation vary, in the main because of the differences in the ruling philosophies of the viceroys combined with major differences in their pre-Columbian heritages (Fig. 2).

The first major changes in Spanish control came with the independence from the Spanish rule of Argentina in 1816; of Chile and Paraguay in 1818; of Mexico and the Central America republics (except Panama, which was part of Colombia until 1903, and Belize, which became independent of Great Britain in 1981) in 1821; of Peru, in a sequence running from 1821 to 1824; of Bolivia in 1825; of Uruguay in 1828; and Ecuador, Colombia, and Venezuela, first together as Gran Colombia in 1821 and then each separately by 1830 (Brazil was a Portuguese possession, with independence coming in 1822). Mexico, Guatemala, El Salvador, Belize, and Honduras in Middle and Central America and Colombia, Ecuador, Peru, Bolivia, and Chile in South America are particularly rich in pre-Columbian antiquities that have long been sought internationally, be it as part of research efforts or simply as plunder. The emplacement of heritage legislation historically has had protection of those materials in mind.

Mexico serves as an extreme example of how the territories of New Spain sorted out protection of their heritage after independence. Mexico acted quickly banning the export of antiquities while establishing a national museum in 1826, an action reflecting the international feelings of the time and closely matching what was taking place in Greece during its independence movement. In 1864, during a brief time when Mexico was a monarchy, Maximilian I banned all excavations in the Yucatán. Legislation passed in 1868 declared that all Mexican archaeological sites and associated antiquities were the property of the state, further requiring that the state was to protect and preserve those properties. A governmental archaeological institution – Inspección de Monumentos Arqueológicos (IMA) – was established in 1885 and was charged with documenting archaeological sites, making heritage preservation an institutionalized government

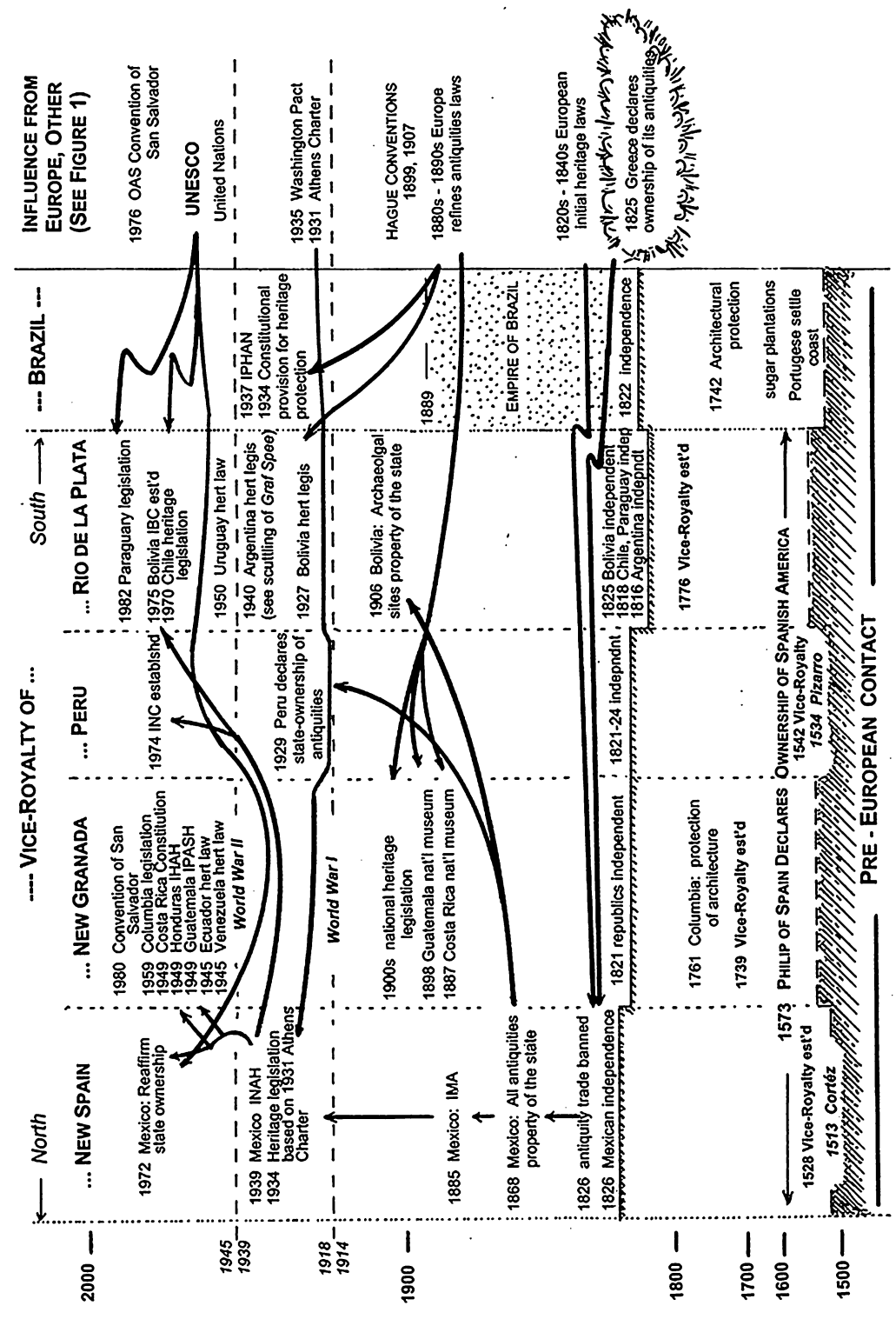

Heritage Legislation, The Introduction of: Disciplining Through Law, Fig. 2 Emergence of Heritage Legislation in Latin America

policy. That policy along with earlier laws establishing state control was enhanced in 1897 by legislation criminalizing the destruction of archaeological sites, restricting the export of cultural materials without federal permit and requiring that all recovered archaeological objects be housed in the National Museum. Heretofore, the laws enacted were aimed mainly at protecting the pre-Columbian heritage. However, legislation was passed in 1914 protecting the colonial heritage. By 1916, the IMA had been incorporated into the National Museum.

In 1934, Mexico enacted the *Law for Protection and Conservation of Archaeological and Historical Monuments, Typical Towns, and Natural Beauty Sites*, a law based upon the 1931 Athens Charter for the Restoration of Historic Monuments (adopted by the International Congress of Architects and Technicians of Historic Monuments). In 1939, INAH (Instituto Nacional de Anthropología e Historia) was established, becoming the government agency tasked with, among other things, explicating and preserving Mexico's cultural heritage. In 1972, a new federal law, the *Law of Monuments, Archaeological, Artistic, and Historic Zones* was passed, again reinforcing state ownership of cultural properties while also expanding restrictions on the marketing and export of antiquities and other items of cultural heritage value. One aspect of this law of interest was the inclusion of the following statement: "all documents of local and federal offices and all books and printed materials in Mexico from the same period [from the 16th through the 19th centuries]. . .are worthy of inclusion [as protected cultural properties] due to their importance or rarity" (Stubbs and Makaš 2011: 514). This law identified and also protected the kinds of classical documents that the Abbasid Caliphate in Baghdad and Umayyads in Spain had obtained in the eighth century, along with the various sacred texts removed from South Asia to Europe in the seventeenth to nineteenth centuries.

Introduction of heritage legislation in the remaining nation-states of what had been New Spain followed a similar pattern, although not always as quickly, comprehensively, or patrimonially. For example, Guatemala, which became independent at the same time as Mexico, has also sought the same kind of state-level control over its cultural heritage, Costa Rica, less so. Costa Rica did not establish its Museo Nacional until 1887, Guatemala, not until 1898. Generally, though, all of the nation-states viewed the pre-Columbian remains especially as part of their patrimony and historically have endeavored, at least on paper, to prevent those remains from being taken out of the country.

Honduras began government actions for protecting heritage properties even before becoming a separate, independent nation-state with the dissolution of the United Provinces of Central America in 1838. Action was taken in 1836 to protect the prehistoric Mayan site of Copán after archaeologist John Lloyd Stephens purchased it, a purchase Honduras later revoked. Heritage action at the legislative level did not resume until the turn of the last century, in a sense following from the activities going on in Europe in the late 1800s (Fig. 2). By 1900, Honduras had enacted a national heritage law, although this was mainly aimed at pre-Columbian antiquities. El Salvador did this in 1903, enacting laws to restrict the export of antiquities. And that is how things remained until after World War I.

During the inter-War years, as in Europe, efforts were made to consolidate and strengthen heritage legislation. In 1935, for example, Honduras enacted laws protecting historic sites, and that legislation was extended in 1940 to protect portable historic items. El Salvador passed a similar law in 1935, extending protection to portable objects in 1938. Costa Rica enacted its first laws to protect cultural properties – a law aimed mainly at archaeological excavations and limited removal from Costa Rica of artifacts recovered from sites – in 1938. However, for Guatemala, the various laws regarding its archaeological heritage would not be enacted until the 1940s.

After World War II, Guatemala's counterpart agency to Mexico's INAH – IDAEH (Instituto de Antroplogía e Historia) – was established in 1946; Honduras set up a similar agency – IHAH (Instituto Hondureño de Antroplogía e Historia) –

in 1952. Both were given authority over the respective nation's archaeological and historical heritage. The Costa Rican Constitution in 1949 declared that the government was to protect its cultural heritage. In 1955, Guatemala passed legislation declaring state ownership over its archaeological and historical patrimony while also prohibiting the export of antiquities and similar sorts of cultural property.

Six UNESCO conventions and recommendations were set forth between 1970 and 1978 (Table 1), the first being the C*onvention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970).* As happened in many parts of the world, the nation-states formerly of New Spain acted accordingly, with all eventually ratifying the 1970 Convention by 1996. This was further encouraged by the OAS (Organization of American States) 1976 *Convention on the Protection of Archaeological, Historical, and Artistic Heritage of the American Nations.* Known much more conveniently as the *Convention of San Salvador*, it was aimed primarily at illegal trade in antiquities, although it urged each signatory to pass heritage legislation.

Thus, between 1976 and 1984, most Guatemalan government heritage legislation came from ministry and agency procedures, where such government agencies were charged with protecting cultural property, be it archaeological or architectural. Some of this was done with the assistance of the OAS. Guatemala was the first Central American nation to sign the *Convention of El Salvador* in 1979, but it would not be until 1997 that it passed its *Law for the Protection of the Cultural Heritage of the Nation*. In 1983, Honduras also signed the *Convention of San Salvador* and in 1984 enacted its *Law for the Protection of the Nation's Cultural Heritage* (revised in 1997). The Law protected not only buildings, archaeological sites, and artifacts, but it also protected manuscripts while vesting authority over all of this in IHAH (Instituto Hondureño de Anthropología e Historia), which itself had been established in 1952.

Costa Rica signed the *Convention of San Salvador* in 1980; it enacted its *Law for the Conservation of the National Archaeological Heritage* in 1982. This was augmented in 1995 by the *Law for the Historic and Architectural Heritage* of Costa Rica which not only protected sites, pre-Columbian and historic, but also prescribed fines for damage to such properties. The 1995 Law also shifted protection of privately held cultural properties from the state to the owners, offering tax incentives and other enticements for preservation.

Across the former Viceroyalties of New Granada, Peru, and Rio de la Plata, the introduction of heritage legislation was not as detailed or organized as it has been to the north, generally because many of the nation-states have a history of government instability. This has resulted in periods of government interest in promoting heritage legislation or the equivalent ministerial policies and periods when such were not promoted. Stubbs and Makaš's (2011: 620) remark that Ecuador's "cultural resource policy and its enforcement has been. . .somewhat erratic during the past century" can been seen as an apt description for all of the nation-states formed out of those earlier Viceroyalties.

Ecuador itself is a case in point, where the first cultural heritage legislation was not passed until 1945, but it was not until 1978 that the INPC (Instituto Nacional de Patrimonio) was established to protect and promote the country's cultural heritage. The same holds for Venezuela, where heritage preservation measures were initiated in the town of Coro (founded in 1593, it was listed as a World Heritage site in 1993 because of its architecture) as early as the eighteenth century, and has been intermittently preserved through the subsequent centuries, but only to have UNESCO place it on its List of World Heritage in Danger in 2005. Like Ecuador, Venezuela's first legislation – the *Protection and Conservation of Antiquities and Artistic Works Act* – also was enacted in 1945 to protect the nation's cultural heritage. That Law was updated in 1993 with the *Law for the Protection and Defense of the Cultural Heritage*.

Concern in Columbia over pre-Columbian heritage was exhibited in 1761 when construction of a church over a pre-Columbian structure was

prohibited. However, excepting for establishment of a national museum in 1827 and formation of a Commission of Cartography – tasked with, among other things, documenting archaeological sites and similar heritage properties – in 1850, it was not until 1920 that comprehensive legal measures were taken to protect cultural properties from theft and export. In 1934, Columbia adopted the Roerich Pact (see below) as part of its constitution, which would render all heritage properties neutral during times of war. The Pact also was seen to provide clearer definitions of cultural properties than had Columbia's 1920 Law.

After World War II, Columbia refined and updated legislation in 1959 to specifically include archaeological sites and architecture and also to allow the state to expropriate archaeological sites if needed for their protection. The new law also established the Consejo Nacional de Monumentos, which was charged both with registering private property deemed of national importance and stopping the illegal export of cultural property. The responsibilities of the Consejo were shifted to the Instituto Colombiano de Cultura between 1968 and 1997. Colombia enacted a new constitution in 1991, which in part indicated that the state was responsible for protecting the nation's cultural heritage. As a result, the *General Law on Culture* was passed in 1997, replacing the Instituto Colombiano de Cultura with the Dirección de Patrimonio, which deals with heritage protection, conservation, and promotion of Colombia's heritage.

Peru set forth in its 1852 Civil Code that archaeological finds belong to the discoverers as well as to the owners of private property. This statute, so different from the patrimony laws found elsewhere in Latin America, was changed in 1929 by the *Law for the Protection of Archaeological Monuments* which declared state ownership of portable and immobile cultural property, restricted export of such properties, and required registration of "objects of value" be they in public or private ownership. The law was not retroactive; it only applied from 1929 forward (or backward, as Quechua phrases it, since one walks backward through time). While the 1929 law protected historic artifacts, it did not do so for historic structures; those were added in 1939, with registration of historic artifacts further added in 1958. In 1971, following the 1970 UNESCO convention, Peru established its INC (Instituto Nacional de Cultura), a government agency charged with protecting the country's cultural heritage. In 2004, Peru again updated its heritage legislation, reaffirming state ownership of all cultural heritage sites and objects, unless the INC declared the item of little value.

Bolivia followed a pattern more in line with Peru than with other nation-states of the old Viceroyalty of Rio de la Plata, in part because it contained extensive pre-Columbian remains. Heritage legislation in Bolivia has been, like Peru, both statutory and ministerial. Following independence in 1825, Bolivia issued a Supreme Decree calling for the preservation of historic – post-Columbian – buildings for educational purposes. In 1906, a number of the more significant archaeological sites were declared property of the state, and in 1927 the new *National Monuments Act* set in place more comprehensive heritage policies while also initiating a historical sites registration program. Beginning in 1961, a series of Supreme Decrees and Ministerial Resolutions refined the 1927 Law by clarifying what cultural properties were protected and the legal procedures to be used.

Bolivia established its IBC (Instituto Boliviano de Cultura) in 1975 which was concerned mainly with documenting and conserving the architectural and artistic heritage of the nation. It was replaced in 1993 with the National Secretary of Culture that, itself, was in 1997 restructured into the current VDC (Viceministerio de Desarrollo de las Culturas). The VDC is responsible for policies regarding cultural properties, compliance with international agreements, and dealing with illicit trafficking in antiquities and similar cultural properties.

Chile, like Bolivia, also has extensive pre-Columbian remains, although not as spectacular as Peru or Bolivia. Thus, Chile was late in developing heritage protection. In 1925, it established its Council of National Monuments (Consejo de Monumentos Nacionales), but due to internal Chilean politics, it was irregular in protective

actions. It was not until 1970 with the *Law 17.288 of National Monuments* that heritage properties to be protected were defined and categorized. The Consejo was reorganized first in the later 1970s and again in 1994. One element that had contributed to heritage protection in Chile was the requirement starting in the 1990s of environmental impact reviews prior to construction, serving in part to identify and salvage archaeological materials.

The remaining nation-states of the old Viceroyalty of Rio de La Plata had far less in the way of pre-Columbian populations and prehistoric wealth. Heritage legislation in the region has been more in the direction of historic remains and, excepting action by Argentina in 1913 protecting archaeological sites, did not emerge until well into the twentieth century (Fig. 2). As elsewhere in Latin America, much of the heritage protection has come from establishing government agencies that were then charged with developing some level of heritage protection. Argentina, for example, established its Comisión Nacional de Museos y Monumentos y Lugares Históricos in 1940, which was responsible for everything from designating to regulating the export of heritage properties. Uruguay established a similar government commission treating historic sites in 1950 but did not pass heritage legislation until the early 1970s which, in turn, reorganized the earlier Commission into the current Comisión del Patrimonio Histórico, Artistico y Cultural de la Nación. That Commission was reorganized in 1997 with the authority over archaeological excavations, rehabilitation, and the export of heritage properties.

Paraguay did not establish heritage legislation until 1982 with the creation of the General Directorate for Cultural Heritage (Dirección General de Patrimonio Histórico Cultural), which was mainly concerned with identifying heritage properties and overseeing restoration. A new constitution was set out in 1992, which specified the government's responsibility for protecting the nation's cultural heritage. This would be done not only by protecting what was present within Paraguay but also by locating and, if possible, buying back items that had left the country.

The introduction of heritage legislation in Brazil was different than that which had occurred in Spanish America, reflecting both the Portuguese roots of Brazilian colonization and the absence of Indigenous civilizations with monumental architecture, large populations, and great wealth (Fig. 2). European settlement began along the coast in the early 1500s, and the economy developed by 1700 into one of large sugar plantations enabled by native and African slaves. In 1808, the Portuguese royal family took refuge in Brazil from Napoleon; in 1822 and with the return of the royal family to Portugal, a son engineered an independence movement such that the Empire of Brazil was established, which lasted until 1889. Throughout that royal/imperial time from 1808 to 1889, there not only was extensive construction in a European style, but there was a concern by that royal class for the built environment (Fig. 2). The humid tropical climate necessitated continual conservation measures, and that need resulted in early and ongoing efforts at heritage preservation, mainly focused on architecture and related elements. Thus, the earliest protection program was in 1742 with the Palacio das duas Torres in what is now Recife, representing a pattern into the nineteenth century of a concern by the governing royal classes for the protection of key buildings, sites, and even inscriptions.

The period from 1889 forward was politically unsettled, and so too was any effort to protect the nation's cultural property and associated heritage. For example, in 1920, the Sociedade Brasileira de Belas Artes introduced legislation to protect cultural properties in Brazil, but the legislation did not pass. Efforts to pass such acts continued into the 1930s, and the concern for heritage protection worked its way into the 1934 constitution. A constitutional decree – Protection of Cultural Heritage – and the establishment of IPHAN (Instituto do Patrimônio Histórico e Artístico Nacional) occurred in 1937. The decree called for the registering of heritage sites and, for the built environment, the obtaining of government permission before anything was altered. The decree also classified the types of cultural properties, which included historical and prehistoric sites along with portable objects. IPHAN was

empowered in 1940 to acquire properties if needed to protect them. IPHAN remains the core agency attending to Brazil's heritage, such that its policies are effectively the country's heritage legislation. In recent times, it has followed UNESCO conventions in how to address heritage protection.

Asia

The introduction of heritage legislation across Asia varied according to the cultural values of the given area. In India, the idea of heritage was readily acceptable in part because of a long-standing acceptance of the past, which included a cosmology that had the world 4 billion years old. Thus, when India found unification under the British, the incorporation of a British sense of antiquity and antiquity laws was comparatively uneventful. That incorporation was also found in other British territories, such as present-day Pakistan, Burma, Malaysia, and the nation-states along the north coast of Borneo (the remainder of Borneo along with most of the rest of the Indonesian archipelago constitutes modern Indonesia – formerly the Dutch East Indies, Indonesia gained independence from the Netherlands in 1945). In China, heritage legislation came from a vision of a culturally unified people present in one geographic area for a very long time. This to some extent is true for Japan as well, although the impetus for heritage legislation postdates European penetration in the Japanese market, with most of the legislation itself emplaced after World War II. The cultural properties within those areas represented the peoples who, given the cosmology and structure of rule, represented the mandates of the imperial households themselves.

Other nation-states across Asia – Burma, Thailand, and Cambodia, the three kingdoms that currently are coalesced as Vietnam, among others – all had a sense of a cultural past, but it would not be until the various UNESCO conventions that each would start attending to their own cultural properties and the heritages represented by them. Each has done so in a way concordant with its own cultural values.

For South Asia: India has always had an awareness of its own antiquity, but the extent of that antiquity and how it related to the broader world – especially that of Europe – were not fully apparent until the eighteenth century. As in Latin America, it was the heritage content of South Asia, combined with the desire of other parts of the world to possess pieces of that heritage, which precipitated India's current heritage legislation.

Just as Spain controlled so much of Middle and South America, so too did Great Britain of India. British rule was incrementally established beginning in 1757, continued with the acquiescence of the Mughal Emperor to the British in 1803, and was completed with the placement of the princely states under British tutelage in 1858. During those 200 years, Great Britain enacted the *Regulating Act* of 1773 and the *India Act* of 1784, which together placed the Indian possessions firmly under British parliamentary control and, thus, physical control. Coincident with that control was the realization in the late 1700s not only of the antiquity of Sanskrit and its relationship to Latin and Greek – and thus its value for understanding European culture history – but the realization that that philological history was contained within India's sacred texts. By 1822, religious texts were being acquired and then sent back to England as part of those philological studies.

There had been an awareness of the value of historic Indian – mainly Vedic – texts and similar literary items since the seventeenth century, mainly as a consequence of Jesuit research. However, with the growing interest in Western Europe in philology, stimulated by the discovery of the Rosetta Stone in Egypt; the finding of the relationship of cuneiform writing to Sanskrit; and the general investigation not just of languages but of how languages as geographically disparate as Latin, Greek, and Sanskrit could all share a common ancestor (and eventually casting doubt on the idea that Hebrew was the original human language, a premise in the Judeo-Christian Europe/Mediterranean Basin), India's cultural property in the form of manuscripts and similar documents was suddenly of great value to Northern European scholars. Indeed, it was seen in the early nineteenth century and mid-nineteenth century that it was from India particularly that the origins of language and religion emerged, an enormous paradigm shift. Remember, the central

intellectual issue in Europe by the second half of the nineteenth century was how modern humans had come to be as they are; that issue drove nearly all archaeological heritage-related research and underlay much of the desire to acquire evidence documenting the origins of such things as language.

This removal of ancient texts (and other items) from the subcontinent is a history of which modern India is very aware, and it influenced how the country approached its cultural heritage and heritage legislation when it became independent in 1947. India as part of its independence from Great Britain in 1947 embodied in its Constitution Article 49, which states that "[i]t shall be the obligation of the State to protect every monument or place or object of artistic or historic interest, declared by or under the law made by Parliament to be of national importance, from spoliation, disfigurement, destruction, removal, disposal or export, as the case may be," while Article 59A makes preservation of Indian's "composite culture" the duty of every citizen (Pachauri 2006: 236). From this came the 1947 *India Antiquities (Export Control) Act*, which in 1972 was augmented by the *Antiquity and Art Treasures Act* (coincidentally when the UNESCO 1972 World Heritage Convention came out). India's heritage is protected mainly through the Archaeological Survey of India.

Government-level policies regarding cultural properties across eastern Asia are known mainly from China and Japan. The People's Republic of China (PRC) has a long and established cultural tradition of collecting relics, a practice common before the Revolution among intellectuals and the elite and a practice that continues today among many (Anonymous 2000). In imperial China, cultural properties – the cultural heritage that heritage legislation is now meant to protect – were seen to be a product of the people's cultural past.

Formal archaeological work began during the reign of Huizong [b. A.D.1082, reigned A.D. 1101–1125, d. A.D. 1135]. Huizong was a collector, and his fascination with the past "fostered a fashion in antiquities" (Watson 2005: 315). This appears to have been part of the zeitgeist for the time, with the Chinese Southern Song Dynasty (A.D. 1127–1279) conducting archaeological research as an exercise in state identity (Paludan 1998: 138). All of this was built on a legacy of formal historical research and classification of known antiquities/relics, such as Lu Dalin's *Archaeological Plates* published in A.D. 1092 and Sima Guang's vast *Complete Mirror of the Illustration of Government*, published between A.D. 1072 and 1084 (Watson 2005: 314). Those who could afford to do so collected what would now be termed "cultural property": Relics, be they items from under the ground, books, antiques, or architectural elements.

China does not have a cultural history of legislative rule of law, certainly not in the sense of the Roman legal system that gave rise to Western constitutional law. True, from the late 1800s to 1949, China was influenced by Western legal systems, but from the end of the Revolution until the Open Door Policy of 1978, that approach was abandoned by the PRC in favor of a patchwork of rules and regulations meant to protect cultural heritage. Guidelines on the export as well as the preservation of relics were issued in 1960, 1961, and 1967. After 1978, there was a conscious effort to establish a national legal system, which came to include consolidation and coordination of heritage legislation. The National People's Congress adopted the *Law of the People's Republic of China for the Protection of Cultural Relics* in 1982 (revised 1991, 2002, 2007), while the State Council approved regulations protecting underwater cultural property in 1989, administration of archaeological excavations done by foreigners in 1990, and an overall *Rules for the Implementation of the Law of Protection* in 1992 (revised 2005). The PRC is proactive in the protection of those cultural relics: Article 45 sets out substantial fines, including those due to damage during construction (up to 1% of the project costs). The PRC is a signatory on the UNESCO 1970 and 1972 Conventions; heritage protection proceeds from those.

Heritage legislation in Japan can be seen to start with the 1871 *Edict for the Preservation of Antiquities*, set out by the Council of State, soon augmented by the 1879 Ministry of the Interior's

Proposition to Preserve Shrines, Temples, and Their Treasures Forever. This was followed by enacting of the Koshaji-hozon-ho (*Law for the Preservation of Ancient Shrines and Temples*) in 1897 (Liebs 1998: 680). This was supplemented by Siseki-Meisho-Ten'nenkinenmutsu-hozon-ho [*Law for the Preservation of Historic Sites, Places of Scenic Beauty and Natural Monuments*] (1919), Kokuho-hozon-ho [*Law for the Preservation of National Treasures*] (1929 amendment to the 1897 law), and Juyo-bijutsuhin-to-no-hozon-ni-kansum-horitsu [*Law for the Preservation of Important Art Objects*] (1933).

Post-World War II Japanese heritage legislation starts with the 1950 Bunkazai-hogo-ho [*Law on the Protection of Cultural Properties (Act No. 214)*], which has been amended as recently as 2007 (*Act No. 7*). The *Law on the Protection of Cultural Properties*, both the original and subsequent modifications, has resulted in separate provisions "for protection of structures, designed and natural landscapes, archaeological sites, traditional crafts and skills, and even living people who could be designated as living national treasures" (Liebs 1998: 680).

Oceania

Heritage legislation across Oceania comes as much from legislation derived from or inspired by earlier colonial or protecting powers as it does from autochthonous development or using UNESCO conventions as a model. The USA and Great Britain have had the greatest influence across the region, with the latter's impact coming as much through the Commonwealth of Nations as through current or past territorial administration.

There are also regional agreements. The *Model Law for the Protection of Traditional Knowledge and Expressions of Culture Act* of 2002 is one such Pacific Basin regional instrument, although it is geared more to traditional cultural knowledge as it pertains to the given people's ecological setting. The *Model La*w was developed at a joint conference of the South Pacific Commission ("SPC"), the Pacific Island Forum Secretariat, and UNESCO and then endorsed at the First Conference of Ministers of Culture of the Pacific Region in 2002. The *Model Law* includes among its aims the protection of traditional knowledge and expressions of culture.

The Commonwealth of Nations (former British Commonwealth) in Oceania includes Australia, Papua New Guinea, New Zealand, Samoa, the Solomon Islands, Tonga, Vanuatu, Nauru, and Kiribati. All members of the Commonwealth of Nations are signatories to the *Commonwealth of Nation's Environmental Protection and Biodiversity Conservation Act* of 1999 (EPBC Act); national heritage is one of eight matters of national environmental significance protected by the EPBC Act. The predisposition for all of this, though, would have come out of Great Britain's 1882 *Ancient Monuments Protection Act.*

In addition, and a bit confusing, Australia's national law is also entitled *Environmental Protection and Biodiversity Conservation Act* of 1999 (EPBC Act). The EPBC Act lists eight categories of concern, of which two – world heritage properties and national heritage places – would include cultural properties of the kind under consideration here. The EPBC declares that any action that could affect such properties must first receive government approval, a decision made by the Minister for the Environment, Heritage, and Arts.

Nationally, Australia also has its *Historic Shipwrecks Act* of 1976, which protects shipwrecks over 75 years of age in Commonwealth waters. It also has the *Protection of Moveable Cultural Heritage Act* of 1986, which protects portable cultural properties from export. The list of "moveable cultural heritage of Australia," detailed in Part II, Division 1.7, consists of "objects that are of importance to Australia, or to a particular part of Australia, for ethnological, archaeological, historical, literary, artistic, scientific or technological reasons." However, like Canada, a lot of legislative initiative has been vested in sub-national administrative jurisdictions, which in Australia are called either "states" or "territories." Each of the states along with the Northern Territory and the ACT (Australian Capital Territory) has counterpart legislation, administered by heritage councils and branches, along with the Departments of Aboriginal Affairs or equivalents. Australia, in particular, has established extensive heritage legislative protocols, to the point where it, like the

USA and South Africa, has an extensive private-sector archaeological industry that helps clients stay in compliance with the heritage legislation.

The introduction of heritage legislation to New Zealand – in addition to that prescribed by Great Britain's by the *Ancient Monuments Protection Act* of 1882 – can be seen to start with the *Kapiti Island Public Reserve Act* of 1897, which broadly protected cultural properties. The 1928 *Canterbury Provincial Buildings Act* too was a heritage protection act. And thus after 1928 came a series of acts addressing heritage matters in New Zealand, somewhat focused in intent before World War II when there still was provincial sway, but more encompassing on a national level after New Zealand became a Commonwealth realm in 1947. A signatory to the UNESCO 1972 *Convention Concerning the Protection of the World Cultural and Natural Heritage* (World Heritage Convention), New Zealand followed soon after with a series of acts aimed in whole or part at protecting its cultural heritage.

For New Zealand, the 1975 Treaty of Waitangi (or *Treaty of Waitangi Act*) grew out of the Maori protest movement against non-Maori cultural dominance, establishing cultural rights to lands and subsistence practices. The Treaty's wording with respect to heritage properties is at best vague but was interpreted in keeping with the intent of protecting heritage properties and thus in the spirit of early 1970s to mid-1970s UNESCO cultural heritage protection. Soon after the Treaty of Waitangi came the *Reserves Act* of 1977. In addition to the protection of habitat along with flora and fauna, the *Reserves Act* provided for the preservation and management of "historic, cultural, [and] archaeological" features. This was complemented by the *Local Government Act* of 1977, which enables local authorities to protect archaeological sites, historic buildings, and similar cultural properties (as well as wildlife habitats and similar).

All of this set the stage for the *Conservation Act* of 1987. While the *Conservation Act* of 1987 was aimed mainly at noncultural properties, it did include in Section 2 "protection of. . .historic resources for the purpose of maintaining their intrinsic values. . .." However, the core legislation consists of the *Resource Management Act* (RMA) of 1991, which identified the preservation and protection of cultural properties as a matter of national importance and provided funding for such (protection funded through a national Heritage Lottery), and the *Historic Places Act* of 1993. The RMA of 1991 replaced the *Town and Country Planning Act* of 1977.

Sub-Saharan Africa

African nation-states contained within the Mediterranean Basin were considered above. Introduction of heritage legislation across the remainder of the continent found inspiration in at least one of three sources: (1) legislation developed by former colonial powers, which overlaps with (2) participation in the Commonwealth of Nations (formerly the British Commonwealth) or (3) UNESCO conventions implemented on a national level. Most heritage legislation in sub-Saharan Africa dates from after 1960. However, some nation-states do not have formal heritage legislation.

There is a disconnect between the cultural proscriptions on disturbing heritage sites – archaeological sites, graves, and cultural landscapes by whatever definition – on the one hand and the kind of legislation structured within UNESCO or its coincidents in Western legislative tradition on the other. Ndoro et al. (2009: 5), who see much of cultural heritage legislation as being distorted through the non-sub-Saharan African linguistic lens of temporal structure and material heritage, explained:

> In most areas of Africa, traditional regulatory mechanisms and practices have existed down through the ages of the protection of heritage places such as sacred groves, streams, rivers, shrines, temples, tombs, palaces, and mausoleums. These comprise prescriptive taboos, avoidances, and practices put in place by local communities and constitute customary laws and traditions which can be regarded as unwritten constitutions and laws passed on from one generation to the next.
>
> This prejudice, particularly for objects defined somehow as 'ancient,' is shown by the predilection of heritage laws being titled 'Historical Monuments, Relics, and Antiquities Act' or similar. (Ndoro et al. 2009: 25)

Roughly half of the sub-Saharan nation-states are members of the Commonwealth of Nations. Some were originally British colonies/territories by 1900: Sierra Leone, the Gambia, Ghana, Nigeria, South Africa, Botswana, Zimbabwe, Uganda, Kenya, Zambia, and Somalia. Some were essentially protectorates or applied for and were granted admission in the Commonwealth: what is now Tanzania (formerly German), Mozambique (formerly Portuguese), Rwanda (formerly Belgian), and Cameroon (formerly French). Each became independent between 1957 and 1965. Excepting Zimbabwe, which was suspended in 2002 and then withdrew in 2003, and the Gambia, which withdrew in 2013 but applied for readmission in 2017, all remain active members of the Commonwealth. All are signatories of *Environment Protection and Biodiversity Conservation Act* of 1999 (EPBC Act). The EPBC Act established the Commonwealth Heritage List, which comprises natural, indigenous, and historic heritage places within a Commonwealth area.

For example, in South Africa: the Republic of South Africa (RSA) became independent of Great Britain in 1961. The *National Monuments Act* of 1969, which in addition to clearly archaeological properties protected paleontological (which would include hominin-related) as well as mineralogical properties. The *Environment Conservation Act* of 1989 and the *Minerals Act* of 1991 enhanced heritage protection, although they were not aimed directly at that area; the *Environmental Conservation Act* was updated with the *Environmental Management Act* of 1998. Major heritage legislation came about with the *National Heritage Resources Act* (NHRA) of 1999. The NHRA established the South African Heritage Resources Agency, which is responsible for the protection of national heritage resources, controlling export and illegal import of cultural properties, and assisting provinces in managing their heritage resources. The NHRA protects archaeological and paleontological sites, burial grounds, and grave sites; these may not be disturbed, in any way at all, without a permit from the relevant heritage resources authority.

The legislation means that developers and people managing land that contains cultural heritage must employ qualified professionals to identify and mitigate harm to such sites. This requirement has resulted, as in the USA and Australia, in a professional archaeological sector, represented by the ASAPA (Association of Southern African Archaeologists), dominated by private-sector archaeologists. As in the USA, the heritage archaeological work in response to statutory mandates is known as "cultural resources management."

The only sub-Saharan nation-state that does not quite follow all of this is Sudan, now divided between north and south. Sudan was part of the Anglo-Egyptian Sudan, a dominion under joint French and British governance within the Ottoman Empire. However, it is from that heritage that Sudan – before its split between North and South in 2011 – had in place its *Antiquities Act* of 1952, protecting all human-associated objects from 1821 and before and all non-human fauna objects from before A.D. 1340.

For the other former British territories, the sequence has not been as detailed nor as immediate. Initial post-independence heritage legislation included Uganda's 1967 *Historic Monuments Act* (protecting not just landscape and culturally valued properties but also archaeological sites in a wide variety of possibilities), incorporated in general into its Constitution in 1995, Malawi's 1965 *Monuments Act*, which is similar in nature to Uganda's Act. Ghana enacted its National Museums Regulation in 1973 but protected materials only from the period before the "gold rush" of 1900. Tanzania emplaced its *Antiquities Act* in 1964, protecting "relics, monuments, and protected objects."

The other 14 Southern African Development Community (SADC) countries – Angola, Botswana, the Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, Swaziland, Tanzania, Zambia, and Zimbabwe – have legislation equivalent to the NHRA that makes similar demands to protect their national heritage. Zimbabwe's *National Museums and Monuments Act* of 1972 is one such example. All

15 SADC nations are also signatories on the 2000 Blantyre Protocol on Cultural, Information, and Sport, which includes a broadly worded provision for the preservation of vaguely defined cultural heritage. That Protocol was guided by the OAU (Organization of African Unity) 1969 Cultural Charter for Africa (Cultural Manifesto of Algiers) as well as the 1980 OAU Lagos Plan of Action for the Economic Development of Africa and the Final Act of Lagos. None of these, though, are mainly for or restricted to heritage protection.

In addition, many of those nations passed heritage legislation soon after establishing independence. For example, Tanzania – which was a merger of Tanganyika and Zanzibar in 1964 – had in place *Tanganyika's National Museum Act* of 1963, Tanganyika becoming independent in 1961. Zimbabwe, which as Rhodesia separated from Great Britain in 1966, emplaced its *National Museum and Monument Act* in 1972, the wording of which is very similar to Kenya's 1983 *Antiquities and Monuments Act* and *National Museum Act* (Kenya's 1983 law was updated with the 2006 *National Museums and Heritage Act*). That similarity may be due to a shared heritage as British territories.

Zambia, too, after World War II had several heritage-related government notices protecting specific heritage properties, ranging from prehistoric rock art and quarries in 1950 and 1952 to protection of the Kabwe Big Tree in 1955 (the tree from which the World War I East African Campaign departed in 1914). Zambia's *National Heritage Conservation Commission Act* of 1989 consolidated the earlier specific protective actions. Zambia passed its *National Heritage Conservation Commission Act* in 1994, which established a Commission for the Preservation of Natural and Historical Monuments and Relics. The Act relegates to the Commission the responsibility for heritage protection such that permits are required from the Commission for archaeological excavations at any heritage site or for the collecting of relics. Further, the Act gives the Commission the right to purchase any privately held relic.

Introduction of Global Heritage Legislation

Global and Regional Actions

All regional and global initiatives for heritage legislation began either in Europe/Mediterranean Basin or were developed and then promulgated from their cultural heirs, such as the USA and nation-states in Spanish America (Figs. 1 and 2; Table 1). The Hague Conventions were European in origin; the League of Nations and then the United Nations, of which UNESCO is a part, were – excepting China as a founding member – US and European in origin.

The immediate precursors for global heritage legislation were the *Hague Convention* of 1899 and of 1907, both of which were concerned primarily with the conduct of war and were aimed at nation-states regardless of where they were located on the planet. Articles 46, 47, 55, and 56 of the *Annex to the Convention of Hague II*, 1899, specifically protected private property, equated art and scientific property as private property, prohibited pillage, and required that all public property and lands to only be administered – not used – by occupying powers. The same articles were repeated with essentially the same content in the *Annex to the Convention of Hague IV*, 1907, but with the expansion of Article 56 to explicitly protect cultural properties, both fixed and portable.

The spirit of the heritage protection element of the Hague Conventions was embodied in the so-called Roerich Pact, a document drafted in 1929 by artist Nicholas Roerich along with George Chklaver. The basic idea of the Pact was that the protection of cultural properties during times of war was more important than military needs. The Pact eventually became the Treaty on Protection of Artistic and Scientific Institutions and Historic Monuments, which was approved in 1933 at the seventh International Conference of American States and signed by those nation-states in 1935.

In 1931, the First International Congress of Architects and Technicians of Historic Monuments passed "The Athens Charter for the Restoration of Historic Monuments." It embodied much of the heritage preservation

concerns of the inter-War period and is significant here for three reasons: (1) Resolution 4 calling for the reburial of excavated sites that cannot be adequately protected; (2) Resolution 6 calling for custodial protection of historical sites (which would include archaeological sites); and (3) Conclusion II recognizing the right of private ownership. This last point is of interest since some nation-states – for example, Mexico and Greece – view antiquities as being part of the nation's patrimony and thus rightly property of the state.

In 1976 the Organization of American States (OAS) issued its "Convention on the Protection of Archaeological, Historical, and Artistic Heritage of the American Nations." Known as the "Convention of San Salvador," it is concerned primarily with the illegal export and trafficking in antiquities, although also stressing that each country ensure modern excavation and conservation practices, maintain an inventory of cultural properties, and pass legislation protecting sites from destruction. Primarily the Central American republics – Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama – follow and are actively engaged in the Convention of San Salvador.

Three European regional agreements between 1985 and 1992 – *the European Convention for the Protection of Architectural Heritage* (the so-called *Granada Convention*), issued from Granada in 1985; *the European Convention on Offences to Cultural Property* (the so-called *Delphi Convention*), issued from Delphi in 1985; and *the Convention for the Protection of the Archaeological Heritage of Europe* (the so-called *La Valetta Convention*) issued from Malta in 1992 – form the basis of a European Union agreement on heritage protection. The *La Valetta Convention*, which replaced the *European Convention for the Protection of Archaeological Heritage* signed in London in 1969 and recognizing that Europe's archaeological heritage is increasingly threatened by development, aims to "protect the archaeological heritage as a source of European collective memory" (1992, Article 1.1). It further seeks to protect that heritage – that three-dimensional information storage matrix, as mentioned earlier – through prohibitions on illicit antiquities trading, pursuit of noninvasive archaeological investigations, and basic protection of archaeological resources.

UNESCO

Since its founding in 1946, the United Nations through UNESCO has issued six conventions (1954/1999, 1970, 1972, 2001, 2003, 2005), one declaration (2003), and nine recommendations (1956, 1968, 1972, 1976, 1976, 1978, 2015, 2015, 2015) in some way providing for the protection of cultural properties, ranging from protection of architectural and archaeological sites, through execution of proper scientific research on those cultural properties, to prohibitions on illicit excavations and trade in antiquities (Table 1). The vast majority of nation-states are signatories to each of those conventions.

Three conventions are seen as key: the *Convention for the Protection of Cultural Property in the Event of Armed Conflict*, often referred to as the *Hague Convention*, with the first protocol set forth in 1954 treating the return of cultural property after conflict and the second protocol in 1999 refining issues while extending penalties for violations; the 1970 *Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property*, which treated national ownership of moveable or portable cultural property; and the 1972 *Convention Concerning the Protection of the World's Cultural and Natural Heritage*, which addressed the deterioration and destruction of the world's cultural and natural heritage. This 1972 Convention, known as the *World Heritage Convention*, is what established the World Heritage List, which includes what are termed World Heritage Sites, "properties forming part of [the given signatory nation's cultural heritage and natural heritage. . .which it considers as having outstanding universal value" as set forth by the Convention's criteria. Together, these three UNESCO conventions have served variously as models or impetuses for the establishment of heritage legislation in nation-states either lacking a history of such legislation or nation-states newly emerged from outside administrative governance.

Key Issues/Current Debates

There are three key issues underlying the introduction of heritage legislation: (1) removal of cultural property from one nation-state to another (often viewed as loss of patrimony); (2) repatriation of cultural properties; and (3) damage, intended or not, to cultural properties as a consequence of modern activities.

The overriding issue underlying all heritage legislation has been the taking of cultural materials from the territory/jurisdiction of a nation-state. The taking could be in the form of items, recovered from archaeological research, transferred to another nation's university or museum. This underlies much of modern heritage legislation based out of the Mediterranean Basin, the original laws from Mexico (1826), Greece (1834), or the Ottomans (1874) being good examples. Or the taking could be the acquisition by private individuals of materials for personal use, be it for personal display or for commercial sale, which actually has a greater antiquity. Alexander's classification of the looting of Cyrus's tomb as an attack on the legitimacy of the state or the concerns during the Song Dynasty would fall in here.

The term used for the unauthorized removal of cultural materials is "looting." The issue, though, is complicated by the need to distinguish between legitimate transfer of ownership during one period that no longer is recognized as legitimate in another, subsequent period and the acquisition of materials in a manner deemed illegal regardless of the period.

Major related issues to the ongoing looting of cultural materials all derive from the social structure that results in the heritage legislation. Heritage legislation is a product of stratified societies and is initiated when the upper social classes are sufficiently concerned about national patrimony to move the forces of the state to deal with the threat to that patrimony. It is the degree to which the upper social classes desire heritage legislation to be *enforced* that the resultant laws or regulations *are* enforced. Modern Greek antiquity law was framed in part to accommodate government employees who were also antiquity collectors; museums and auction houses in the USA have long lobbied that nation-state to not become a party to international rules.

None of this is right or wrong; rather, it is how stratified societies work. Since that is how stratified societies work, it means that until and only when a situation is in the best interests of society's upper social stratum will legislation against looting and its equivalent be enacted and then enforced (and being enacted does not automatically mean that it will be enforced). Further, that will hold for only as long as it *is* in that upper social stratum's interest. Thus, several sub-Saharan nation-states are UNESCO signatories, but the rules are ignored while private gains in looting are made by those in power.

Stratified societies have by definition "haves" – people with power, privilege, and prestige, as Gerhard Lenski, following from Max Weber, noted – and "have-nots" those lacking such. Lenski, as Weber before him, noted that power, privilege, and prestige were social resources, enabling those who have such (again, the "haves") to exercise their will in matters regardless of how those lacking such social resources (the "have-nots") may feel about how matters should be addressed. What is defined as "looting" is also, in the end, defined by the given society's upper social classes. However, looting is often for the lower social classes a fiscally lucrative endeavor, where the income derived from it can form a significant portion of a lower social class family's annual income. The looting of graves and archaeological sites for material gain – often by local farmers – has been going on around the world for several millennia. Indeed, the lower social classes often view heritage legislation as a product of the upper social classes and as an instrument that prevents those lower classes from accessing wealth that from their perspective is no longer of any immediate value.

Another issue is repatriation, which may seem odd for a topic dealing with the introduction of heritage legislation. However, it appears to be the grounds under which a given nation-state introduces heritage legislation that can make repatriation an issue. Laws in several Spanish-American nation-states make provisions for reacquiring

cultural property that has left the current geographic boundaries of the country. The Elgin Marbles – again – can serve as an example. They are seen by Greece to belong in Greece, and Greece has a law now that says that those Marbles – like other Greek antiquities – are to be brought back to Greece. That law is derived from an earlier sequence of laws, beginning in 1834. Those laws in effect: (1) declare that anything made within the current geographic confines of what is now the Greek state (2) belong to Greece and (3) that Greece has every right to buy back or otherwise acquire said wandering antiquity, with a tacit understanding that the current possessor must sell. Yet the Elgin Marbles were removed, amid controversy yet under permit (Lord Elgin claimed to have a firman, a claim that in modern times has been challenged) between 1801 and 1812 from the Ottoman Empire, and then purchased from him by the British government in 1816. That purchase was well before the modern Greek state existed and 18 years before the first of Greece's laws – laws set out before Greek independence from the Ottomans – came into being. A second issue, then, is who owns the past and how retroactive is that ownership? And that is an enormous pan-cultural/state debate.

Repatriation has become a retroactive restoration of materials. In the USA, the *Native American Graves and Repatriation Act* (NAGPRA) requires that items associated with American Indian burials recovered as part of a federally enabled process to be returned to the descendants of the peoples who interred those remains. However, the issue that emerges with such actions is identifying suitable cultural antecedents to whom those cultural materials are to be repatriated. There are instances in the USA where the federal interpretation of NAGPRA requires that burial remains be handed over to the descendants of the people who killed those who were buried, that is, handed over to the decease's sworn cultural enemies. Such things were unanticipated when the laws were first set up and are extremely complicated and touchy in their resolutions.

The third issue underlying the introduction of cultural heritage legislation has been a potential damage to cultural properties, be it collateral or intentional as may occur during war or unintentional as may happen during construction. In the USA, any federally enabled land alteration project must first have the affected area checked to see if there are any cultural properties present that could be listed on the National Register of Historic Places. If such are present, then there is a regulatory system in place to evaluate those materials relative to what is already known and then to either protect or record so that the loss of those materials through construction is not a major issue. Counterpart regulations also often exist in the USA at the state and, much less often, local governance levels. Similar procedures exist in many nations, Mexico, the British Commonwealth, and general European Union being good examples.

International Perspectives

There are three international-scale perspectives on heritage legislation and its presence: (1) the very existence of a tolerated international market enabling illicit trade in antiquities; (2) differences in how languages classify reality and thus what is or is not heritage needing protection; and (3) intentional destruction of the heritage of one culture by another, conquering or ruling culture.

The first major issue on the international scale involves illicit trafficking in cultural property. Despite UNESCO as well as regional and even national laws, such trade continues. Where laws prohibit, enforcement is inconsistent. Some of this erratic enforcement can be seen to arise from conflicts of interest within the particular nation-state; some of it, though, can be seen as a fundamental difference in how one culture understands the world to work relative to another. In any event, illicit trafficking in antiquities cannot be substantively reduced until there is complete international commitment to stopping it.

The second issue involves how reality is classified. The main impetus for the introduction of heritage legislation has come out of the Western Intellectual Tradition and as a result out of a linguistic heritage that places a great deal of value on how old things are, as well as on how

"material," for lack of a better term, things are. Other parts of the world, with other linguistic classificatory schemes, do not see things quite this way, melding what in an Indo-European language would be past and present into a continuum. This is an issue among sub-Saharan African nation-states; it is also an issue in New Zealand and the USA. In the latter, American Indian languages and kinship systems do not distinguish "past" from "future" in the same way as English. For American Indians, the skeleton of a centuries- or millennia-old individual often will be seen as the remains of a person closely and immediately related to the particular American Indian group. The phrasing that that American Indian people will use will express in English that closeness of relationship as "recently departed next of kin." This is extremely hard for English speakers to internalize but, for the American Indian group involved in such removal and handling of burial remains – prehistoric *only* in English-speaking US eyes – is extremely upsetting. Again, this goes back to what was said above about how people think in and classify their reality through their language.

A third issue is that not everyone's heritage is seen as heritage by others. Historically, conquering nations have either attempted to merge the heritage of the conquered with their own or to erase that heritage, the Spanish razing of Mesoamerican temples and then the capping of said with their own churches being such a case, a practice common across post-Roman Europe as Christianity spread, but also found across South Asia for both Hindu and Islamic places of worship.

The destruction by ISIS of millennia-old Christian libraries and churches, to say nothing of the World Heritage site of Palmyra, or of the medieval Islamic libraries in Timbuktu by Islamic extremists reflect an ongoing problem of religious intolerance. Proselytizing religions hold that everyone else except the practitioner is in error. A logical extrapolation from this – frequently exercised throughout history – is that the conquered people must have the material heritage associated with their beliefs destroyed (it should be noted, as part of this, that commonly in the classical world the conquering peoples defaced and otherwise destroyed the images of their foes – the destruction of the cultural materials of subject peoples has a long and bitter history). And while Islam – among other proselytizing religions – has done this for centuries, the destruction of the Library at Alexandria and the stripping of the façade from the Pyramids to construct mosques being two better known examples (the core blocks of the Pyramids proved too large to be taken away), it is not alone; the Franciscan obliteration of the Mayan libraries in the 1500s ranks, along with the First Emperor's burning of the books in 220 B.C. in China, as similar – and successful – efforts to erase a people's cultural heritage. The Mediterranean Basin has a long history of destroying heritage properties after conquest; so, too, do most other nation-states. This even includes modern regime changes: Mao Ze-dong had the walls around Beijing pulled down and during the Cultural Revolution encouraged destruction of Confucian monuments and tombs.

Future Directions

The future directions for the introduction of heritage legislation go into two directions: international and intranational. International directions include further refining of existing legislation to cover heritage issues left vague or unaddressed by earlier acts while also getting hesitant nation-states to endorse or otherwise approve the various UNESCO conventions and recommendations. Nation-states must always act in their own interests first; this means that the aims of heritage legislation have to be shown to be of paramount importance for each particular signatory and must be done so in ways that can be enthusiastically embraced by that signatory. Until that is done, the various regional and international agreements will work more as ideals than actualities.

There are two future intranational directions, one which works for the other. The first is the emplacing of heritage legislation that is detailed

in what is covered and what triggers protection. For example, in the USA, any federally enabled action that results in land alteration or property transfer requires the area impacted to be examined first to see if anything present *could* be listed on the National Register of Historic Places. Such listing is specific in the general categories but quite flexible in what within those categories is eligible. But again, as mentioned under "International Perspectives," the USA works in an Indo-European language along with a cultural heritage driven by an empirical, Aristotelian, Enlightenment perspective of fixed rules and protocols, something derived from Roman law by way of English common law.

In the USA, Australia, and to some extent South Africa, retrieval of imperiled heritage properties has become a business concern, where private-sector archaeologists, reviewed and regulated by government archaeologists, recover endangered archaeological materials in response to heritage regulations. However, in the USA particularly, such work outside of a university setting in what has been until the mid-1960s traditionally an academic field is viewed as anathema, such that those participating are normally refused candidacy for faculty posts. Yet, such work melds the need to save a long-term three-dimensional information storage matrix with ongoing research questions, generates basic analyses while saving that information, and offers a chance for new archaeologists not just to do research but to underwrite future research. Indeed, in the USA particularly, major referents for ongoing scholarly questions in prehistory are scientists in either the archaeology divisions of engineering firms or stand-alone archaeology/cultural resources firms.

The collapse of public archaeological research funding along with the enormous surplus of PhD archaeologists as well as the needs both of the German research university model for publications and of the emplaced regulations together will drive an emerging private-sector/university research alliance enabled by heritage legislation. In the USA, where the demographics are well known (e.g., Neumann and Sanford 2010), there are around 1,300 university archaeologists, but federal research funding goes to fewer than 20. The private sector now does the vast majority of empirical research, and that research is funded through private contracts that bring clients into compliance with heritage regulations. There is at the same time a shortage of people to work within private-sector firms doing archaeology, which employs six out of every ten archaeologists in the USA with another two in ten serving as government regulators. A similar ratio of private-sector to academic-sector archaeologists appears to exist in the Republic of South Africa and Australia, at least to judge by institutional affiliations listed among the association of Southern African Professional Archaeologists and the Australian Association of Consulting Archaeologists. Both of those countries also have an active private-sector archaeological community addressing compliance requirements from heritage legislation.

Certainly in the USA, the capacity to protect archaeological heritage properties has in large measure been due to the availability of full-time archaeology firms (either stand-alone firms or divisions/departments within engineering firms) to execute the demands of the nation's heritage legislation. A future direction, then, not just in the USA but globally, will be archaeologists helping entities to comply with the requirements of heritage legislation. The second intranational direction grows out of that first, that presence of legislation that automatically triggers protection: development of professional heritage archaeologists who make those regulations work.

Related to this, a second collateral direction will be the mandatory training of future archaeologists in heritage legislation. Most university curricula internationally prepare the nascent archaeologist for life within a university setting. However, the field technique, research, and management skills needed to do heritage-driven archaeology, especially as a full-time non-university exercise, are often quite different and rarely are presented in university settings. Future archaeological training will need to address not just how the heritage legislation and associated regulations work in the particular nation-state but

also how the data recovery mechanics work in the extra-academic world.

References

Anonymous Lawyer, Cultural Heritage. 2000. The mainland's environment and the protection of China's cultural heritage: A Chinese cultural heritage lawyer's perspective. *Art, Antiquity and Law* 5(1). Available at http://www.museum-security.org/social-environment-of-protection.htm. Accessed 10 May 2011.

Brushkotter, J., S. Enzler, and A. Treves. 2011. Rescuing wolves from politics: Wildlife a public trust resource. *Science* 333: 828–1829.

Hosmer, C., Jr. 1981. *Preservation comes of age: From Williamsburg to the National Trust, 1926–1949*. Two volumes. Charlottesville: National Trust for Historic Preservation in the United States/University Press of Virginia.

Kersel, M.M. 2006. The trade in Palestinian antiquities. *Jerusalem Quarterly* 33: 21–38.

Liebs, C. 1998. Listing of tangible cultural properties: Expanded recognition for historic buildings in Japan. *Pacific Rim Law and Policy Journal* 7: 679–697.

Mayer, A. 2000. *The first fossil hunters: Paleontology in Greek and Roman times*. Princeton: Princeton University Press.

Ndoro, W., A. Mumma, and G. Abungu. 2009. *Cultural heritage and the law: Protecting immovable heritage in English-speaking countries of sub-Saharan Africa*, ICCROM conservation studies 8. Rome: ICCROM International Centre for the Study of the Preservation and Restoration of Cultural Property.

Neumann, T., and R. Sanford. 2010. *Practicing archaeology: An introduction to cultural resources archaeology*. 2nd ed. Lanham: AltaMira.

Pachauri, S. 2006. Illicit trafficking and trade in Indian antiquities. In *Archaeology, cultural heritage, and the antiquities trade*, ed. N. Brodie, M. Kersel, C. Luke, and K. Tubb, 236–244. Gainesville: University Press of Florida.

Paludan, A. 1998. *Chronicle of the Chinese emperors: The reign-by-reign record of the rulers of imperial China*. London: Thames and Hudson.

Roosevelt, C., and C. Luke. 2006. Looting Lydia: The destruction of an archaeological landscape in western Turkey. In *Archaeology, cultural heritage, and the antiquities trade*, ed. N. Brodie, M. Kersel, C. Luke, and K. Tubb, 173–187. Gainesville: University Press of Florida.

Rostovtzeff, M. 1960. *Rome*. London: Oxford University Press.

Silberman, N. 1982. *Digging for God and country: Exploration, archeology, and the secret struggle for the Holy Land, 1799–1917*. New York: Knopf.

Stubbs, J., and E. Makaš. 2011. *Architectural conservation in Europe and the Americas*. Hoboken: Wiley.

Watson, P. 2005. *Ideas: A history of thought and invention, from fire to Freud*. New York: Harper Perennial.

Further Reading

Brodie, N., M.M. Kersel, C. Luke, and K.W. Tubb, eds. 2006. *Archaeology, cultural heritage, and the antiquities trade*. Gainesville: University Press of Florida.

Cleere, H., ed. 1989. *Archaeological heritage management in the modern world*, One world archaeology no. 9. London: Unwin Hyman.

Cultural Heritage – Law. n.d. Available at http://www.anthropology-resources.net/Texts/law.html. Accessed 17 Nov 2011.

Hoffman, B., ed. 2006. *Art and cultural heritage: Law, policy and practice*. Cambridge: Cambridge University Press.

Luke, C. 2006. The antiquities trade, museums, legislation, and borders: Central America as a case study. *Athena Review* 4(3). Available at http://www.athenapub.com/central-america2.htm. Accessed 9 May 2011.

Stapp, D. 2009. Appendix D. A global guide to heritage management. In *Avoiding archaeological disasters: Risk management for heritage professionals*, ed. D. Stapp and J. Longenecker, 137–152. Walnut Creek: Left Coast Press.

Stubbs, J., ed. 2009. *Time honored: A global view of architectural conservation*. Hoboken: Wiley.

UNESCO. n.d. Available at http://portal.unesco.org/en/ev.php-URL_ID=13649&URL_DO=DO_TOPIC&URL_SECTION=471.html. Accessed 8 Aug 2011.

Heritage Museums and the Public

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Introduction

Museums are public institutions. The American Alliance of Museums Code of Ethics states that "for museums, public service is paramount." But there is continuing and useful debate about how public service – indeed how the public – should be defined; what the public might require, demand, or need; and what the museum might offer. How might museums balance the needs of general and specific publics? How should museums balance their responsibility to the immediate needs of the public today and those of future publics?

Museums have long been public institutions, but the nature of their interaction with the public

has changed. Victorian museums often aimed at "edifying" the masses. In the early twentieth century, many museums saw their role as providing training for citizenship. Exposure to the best that civilization had to offer, the thought went, would improve museum visitors, making them better people and better citizens. Toward the end of the twentieth century, many museums aimed to educate and inspire the public and to work toward democracy and social justice. In the words of museum theorist Stephen Weil (1999), museums moved "from being about something to being for somebody."

Current Debates

Over the past few decades, the role of the public in heritage museums has changed dramatically. Members of the public or the publics – many museums now prefer to use the plural to acknowledge the diversity of participants in their communities – have gone from being *visitors*, passive recipients of the wisdom of the curators to *participants* in museum processes and have become increasingly central to the ongoing work of the museum. Many museums – though by no means all – have begun to share authority with the public.

This has happened in three ways. Many heritage museums have invited source communities to participate in the curation of collections and exhibitions, giving them a measure of control over the aspects of the museum related to them. Funders looking for results from their support have insisted museums measure the outcome of their work, to show how they have changed the visiting public. And, in what has been called Museum 2.0, museums are increasingly allowing visitors to co-curate collections and exhibitions, part of a more general rise in participatory culture.

The reasons for these changes are social, cultural, and technological. Aboriginal peoples have gained new political and cultural authority. New public funding sources have demanded that museums consider public outcomes of their work. The rise of a postmodern museology that encourages multiple points of view and decenters authority, part of a larger cultural change that has shifted authority from experts to participants, is key. So too is the rising importance of education as the goal of museums and the concomitant rise of evaluation, making reception of the message as important as transmission. Finally, new technologies, especially Web 2.0, have made it much easier for the public to participate in museum exhibits and have raised the expectation of participation as a norm of cultural experience.

Heritage museums with indigenous collections have seen the most dramatic changes in their public role. Stating in the 1970s, as part of a postcolonial rise in communities demanding control of their history and future, many source communities for museum collections protested the way their objects were displayed and the way their stories were told. Heritage museums, they noted, were agents of colonialism and deculturation and needed to be redefined for a postcolonial era–to be "decolonized." Repatriation, the creation of culturally specific museums, and a new role for these publics in heritage museums reshaped museum culture.

Indigenous peoples around the world, and especially in the United States, Canada, Australia, and New Zealand, gained increased control of the stories museums told about them. In the United States, Native Americans wrested some collections away from museums, a policy written into law by the Native American Graves and Repatriation Act of 1990. The National Museum of the American Indian (1989) put Native concerns central to its mission; it "works in collaboration with the Native peoples of the Western Hemisphere to protect and foster their cultures by reaffirming traditions and beliefs, encouraging contemporary artistic expression, and empowering the Indian voice." In New Zealand, a policy of biculturalism gave Maori a formally recognized stake in the display of not only cultural materials but also historical paintings that showed their ancestors (Kirshenblatt-Gimblett 2012). The rise of ethnically specific museums in the 1980s, for example, the Wing Luke Museum of the Asian Pacific American Experience, in Seattle, and the Japanese American National Museum, in Los Angeles, shows the increased role that specific publics

play in heritage museums. These museums preserve and tell a community's story by and for that community.

The general audience for museums has also come to play a larger role in the work of museums. Part of a widespread rise in participatory culture, many heritage museums now consider their public audiences as the central factor in collecting, research, and display, where they might once have put collections, or research, in that place. A focus on the importance of the audience's needs and interests was rare, but not unknown, in the early twentieth century. For example, John Cotton Dana, director of the Newark Museum, emphasized the importance of allowing local communities to help shape the collections of museums and the stories told about them. "Learn what aid the community needs: fit the museum to those needs," he wrote (Dana 1917).

This focus on the importance of the public as audience became common in museums in the 1980s and 1990s. Increased dependence on federal and foundation funding and an increased demand by funders for evaluation of the results of their funding played a key part. Museums moved from considering *intent* of their programs (what did they claim to do?) to *output* (what did they produce?) and to *outcomes* (what change did they produce in their audiences?). This change, following similar changes in social services and then education, meant that audiences were central to funding and thus to mission.

Related to this is the rise to prominence in many museums of museum educators. "Audience advocates," as some educators called themselves, were responsible for seeing that exhibitions worked for an increasingly diverse audience. Evaluation became central to exhibitions, with questionnaires, focus groups, and other survey instruments becoming a part of the process of exhibitions in many museums. Front-end evaluation helps shape ideas for exhibits, based on public interests and knowledge; formative evaluation helps to shape exhibition concepts and techniques; and remedial and summative evaluation helps to suggest improvements or to show funders that exhibitions had the desired outcome. Together, these kinds of evaluations bring the public's voice into the processes of museum work in significant ways.

The third trend in the increasing role of the public in the heritage museum is the rise of audience participation in museum work. This trend, part of a more general participatory culture, is sometimes called Museum 2.0 (the term, coined by museum consultant Nina Simon, is derived from Web 2.0, the increased participation, collaboration, and interoperability that became common on the World Wide Web starting in about 2004). It is a part of more general trends in public engagement noted above but includes a more profound sharing of authority with the public.

Like Web 2.0, Museum 2.0 embraces the idea of a two-way interchange and the blurring of lines between authors and readers or curators and exhibit audiences (Simon 2010). While visitors have always been cocreators of meaning, interpreting exhibitions based not only on the intent of curators but also based on their own interests and knowledge, museums have increasingly recognized this, allowing visitors to suggest collections for acquisition, choose objects for display, display their own collections in museums, "tag" collections both online and in the museum, and add their own labels to exhibitions, among other experiments.

Future Directions

The notion that the museum is fundamentally for the publics that use it and should be shaped to their needs and desires – rather than about museum staff expertise, collections, or research – remains a contested one. The contest of ideas about the role of the public in museums and the compromises and synergies that it promotes provides for some of the most exciting opportunities in museum work today.

Cross-References

► Cultural Heritage and the Public
► Museums and Memory Experiences
► Public Humanities and Cultural Heritage

References

Dana, J.C. 1917. *The new museum*. Woodstock: The Elm Tree Press.
Kirshenblatt-Gimblett, B. 2012. From ethnology to heritage: The role of the museum. In *Museum studies: An anthology of contexts*, ed. B. Messias Carbonell, 2nd ed. London: Blackwell.
Simon, N. 2010. *The participatory museum*. Santa Cruz: Museum 2.0.
Weil, Stephen E. 1999. From being about something to being for somebody: The ongoing transformation of the American museum. *Daedalus* 128 (3): 229–258.

Heritage Research and Visitor Planning

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Introduction

Visitor planning and management are crucial to achieving the sustainability of resources presented and the effectiveness of the educational messages imparted in the visitor experience. Increasingly, the world is developing an experience economy. In terms of visitor planning, designing meaningful and engaging visitor experiences is also becoming as important as managing physical impacts. Archaeological heritage assets are also meaningful in more than one context, and planning should take into account pluralism in their presentation by using the most comprehensive heritage research available, as well as paying attention to physical planning issues, such as visitor flow. Accordingly, this entry will discuss planning principles and models for managing physical impacts of visitation, as well as a few examples of the measures essential for ensuring a memorable and educational visitor experience.

Definition

Visitor management has been defined as "the management of visitors in a manner which maximizes the quality of the visitor experience while assisting the achievement of an area's overall management objectives" (Hall and McArthur 1998: 107). This definition would fit with that for most archaeological heritage sites but perhaps not purpose-built facilities, such as museums, which tend to act as if visitor management is not a distinct activity. Accordingly, museums tend to submerge visitor management for archaeological assets among a number of planning and management concerns.

Underlying Principles

The three key books that have influenced the development of visitor management for archaeological assets in most cases deal with both heritage sites and museums (Hall and McArthur 1998; Leask and Yeoman 1999; Swarbrooke 2002). Hall and McArthur (1998) outline a range of possible visitor management models for heritage sites, from those developed directly for mainstream tourism attractions (e.g., Recreation Opportunity Spectrum) to those that have been applied more commonly to archaeological and other heritage sites (Carrying Capacity and Limits of Acceptable Change approaches). Leask and Yeoman (1999) principally advocate an Operation Management System based on Schmenner's Service Process Matrix (1995). Overall, both Hall and McArthur (1998) and Leask and Yeoman (1999) advise the use of specific models in order to assist heritage managers achieve a balance between visitor experience requirements and conservation needs.

In terms of the underlying principles of visitor management in relation to archaeological assets, Table 1 will act as a basis for the discussion that follows.

Heritage Research and Visitor Planning, Table 1 Underlying principles of visitor management for archaeological assets (based on du Cros and McKercher 2015 and own later research)

Themes	Principles	Explanatory notes
Nature of archaeological assets	Not all archaeological assets are suitable for visitation or should be visited	Some assets may be unsuitable for a number of environmental, social, or political reasons
	Purpose-built facilities, such as museums and visitor centers, are easier to manage well for visitation than archaeological sites	Although this seems obvious, resources are not always allocated in a way that reflects this principle or protects the asset
Factors influencing visitation levels	Access and proximity to large population centers and easy transport dictate the potential number of visitors	Consequently, remote assets will have to be very appealing or well known to attract visitors. Also, popular assets may need congestion management to prevent impacts
	Time availability influences the quality and depth of experience sought	Some visitors may not allow themselves or be allowed by others to spend much time during the visit
Visitor behavior	The visitor experience must be controlled, which in turn controls the actions of the visitor	Careful design of the activities the visitors' undertake is essential to the first stages of planning. It will also govern expectations of the visit later on
	Visitors want controlled experiences	Most visitors are risk adverse
	If visitors encounter engaging interpretation or activities, there is likely to be less damage to assets	Research has shown that bored or unhappy visitors are less likely to absorb conservation messages
Visitor experiences	Visitors differ in depth of experience sought	Marketing research is therefore essential as part of visitor management and planning
	Visitors want memorable and enjoyable experiences	Who would not? However, this aspect does not always get directly addressed in planning
	Updating and improving interpretation needs to be an ongoing process	Repeat visitation, particularly from a local area, is more likely if resources can be found to provide new ways to engage visitors over time
Tourism issues	Not all tourists are alike	Increasingly, popular assets are being visited by tourists from all over the world, so language and other needs have to be taken into account
	Not all archaeological assets are tourist attractions	Tourist market appeal does not equal archaeological significance – They are two different things
	Cultural tourism products may be presented in a challenging and confronting manner, but cannot be presented in an intimidating or accusatory manner	Conservation and other messages cannot be absorbed, if the visitor feels unwelcome or uncomfortable for some reason

Key Issues and Current Debates

Key issues for visitor management generally revolve around the initial planning, operations management, and ongoing monitoring and revision of actions. This cycle is often inseparable from other kinds of management for a well-managed heritage asset. Even so, some issues may arise for monitoring efforts that require faster or more frequent revisions. If an archaeological asset is managed with consideration of service quality, this aspect will often be one that requires frequent attention and revisions.

An example of a current debate regarding visitor management is that regarding whether World Heritage Sites are always managed as exemplars

of international best practice and in a way that clearly conveys their outstanding universal values to visitors (Su and Walle 2011). The sad truth is that, despite receiving such a designation, many sites have been inscribed without visitor management plans and a number still lack these instruments to guide the institution of best practices, despite availability of information on the topic (e.g., Pedersen 2002). Taking a step back, the evaluation process for nomination should actually call for more information on possible visitor and tourism development impacts to make this planning easier.

Another delicate issue is that of how to manage visitation of archaeological sites that are close to, or of significance to, particular groups. Asia has a number of significant archaeological sites that either include settlements (Angkor World Heritage Site) or are located close by settlements (Wun Yiu Archaeological Site, Hong Kong) (Miura 2005; du Cros and Lee 2007). Multiple issues that need some consideration in planning and management include shared use, visitor flows, profit from visitation, possible impacts on privacy, use of local volunteers, and employees in education/interpretation programs. Archaeological sites that have been more recently found to have significance for particular groups, such as for Stonehenge and Avebury in the UK, where these groups want to conduct rituals or festivals at these sites, need visitor management planning strategies to prevent inconvenience to other users and possible damage to the asset (Morris 2011).

Recent research on visitor behavior and visitor experiences (McKercher et al. 2008) indicates that inappropriate behavior (such as souveniring) can involve a complex set of rationalizations. The visitor may well know that what they are doing is against conservation needs or other interests but deals with this knowledge in a number of different ways cognitively to assuage their guilt. Strategies to engage visitors before they decide to undertake some activity likely to result in a negative impact are more successful than leaving them on their own to decide. Such strategies generally include greeting and orientation at the start of the visit (Shackley 1999), clear signage, and engaging staff who provide more than just a security function in order to manage the visitors' experience. Accordingly, bored visitors have been found to be more likely than others to engage in inappropriate behavior (du Cros 2007; McKercher et al. 2008).

Finally, a key issue for popular archaeological assets is that of overuse, which is a part of the overtourism phenomenon (Goodwin 2017; Seraphin et al. 2018). This is an issue for cases where there are many user groups competing to visit or where the asset is particularly well known, such as some archaeological sites in Europe. Some popular assets are already seeing impacts from overuse (such as congestion) as tourism grows to include visitors from developing countries to others' and their own countries' attractions. The United Nations World Tourism Organization (UNWTO) has issued a series of reports about tourism management and sustainability issues that sometimes include archaeological assets. The Tourism Congestion Management at Natural and Cultural Sites' (UNWTO 2004) set of guidelines is particularly useful in this respect.

Future Directions

Future directions for visitor management of archaeological assets may include more attention to and discussion on international best practices. While funding and resources will always remain a problem for many sites, there still should be more discussion on how new strategies can be used. Even those strategies that utilize community involvement and information communication technology (ICT) can be inexpensive and employed to prepare visitors' expectations prior to arrival and promote better visitor activities that engage the public. Also, visitor management needs to be more clearly recognized as important prior to any kind major promotion or designation of assets.

Archaeological heritage management of assets for tourism means more partnerships with tourism stakeholders. For instance, archaeological authorities interested in responsible tourism are finding that there are a number of initiatives in place from intergovernmental sponsored projects to self-regulation of tour operators (UNWTO 2019). Marketing still has an important role to play in visitor decision-making and behavior, and so heritage managers should try to employ more and increasingly sophisticated marketing research techniques to aid them in understanding how to reach their publics.

Overall, tension remains between resourcing services for the visitor experience as against the asset's long-term well-being. Visitor management could be seen in this context as a means to "generate a benefit between the heritage manager and visitor" (Hall and McArthur 1998: 138). While it tries to provide as high a quality visitor experience as possible from within its resources, it must also provide this service without allowing a reduction in the values of the asset. Some issues for future heritage managers and others to research may include increasing/decreasing visitation levels; visits involving shorter time frames; increasing public expectations; increasing mobility, such that nowhere is truly remote; changing markets; increasing politicization of heritage (in some countries); unpredictable weather conditions; and finally, unpredictable and often decreasing resourcing.

Cross-References

- ▶ Advertising and the Appropriation of Culture
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Experiencing Cultural Heritage
- ▶ Heritage Museums and the Public
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Heritage Tourism and the Marketplace
- ▶ Marketing Heritage

References

du Cros, H. 2007. Too much of a good thing? Visitor congestion management issues for popular world heritage tourist attractions. *Journal of Heritage Tourism* 2: 225–238.

du Cros, H., and Y.S.F. Lee. 2007. *Cultural heritage management in China: Preserving the Pearl River Delta cities*. London: Routledge.

du Cros, H., and B. McKercher. 2015. *Cultural tourism*. Abingdon: Routledge.

Goodwin, H. 2017. *The challenge of overtourism.* Responsible Tourism Partnership Working Paper 4. Available at: https://haroldgoodwin.info/pubs/RTP%27WP4Overtourism01%272017.pdf. Accessed 15 Sep 2019.

Hall, C.M., and S. McArthur. 1998. *Integrated heritage management. Principles and practice*. London: The Stationary Office.

Leask, A., and I. Yeoman, eds. 1999. *Heritage visitor attractions. An operations management perspective*. London: Cassell.

McKercher, B., K. Weber, and H. du Cros. 2008. Rationalizing inappropriate tourist behaviour at contested sites. *Journal of Sustainable Tourism* 16: 369–385.

Miura, K. 2005. Conservation of a 'living heritage site'. A contradiction in terms? A case study of Angkor world heritage site. *Conservation and Management of Archaeological Sites* 7 (1): 3–18.

Morris, S. 2011. Summer solstice revelers flock to Stonehenge. *The Guardian*, 21 June 2011. Available at: http://www.guardian.co.uk/culture/2011/jun/21/summer-solstice-celebrated-stonehenge. Accessed 30 Aug 2019.

Pedersen, A. 2002. *Managing tourism at world heritage sites: A practical manual for world heritage site managers*. Paris: UNESCO World Heritage Centre. Available at http://whc.unesco.org/uploads/activities/documents/activity-113-2.pdf. 30 Aug 2019.

Schmenner, R.W. 1995. *Service operations management*. Englewood Cliffs: Prentice Hall.

Seraphin, H., P. Sheeran, and M. Pilato. 2018. Over-tourism and the fall of Venice as a destination. *Journal of Destination Marketing & Management* 9: 374–376.

Shackley, M. 1999. Visitor management. In *Heritage visitor attractions. An operation management perspective*, ed. A. Leask and I. Yeoman, 69–82. London: Cassell.

Su, M.M., and G. Walle. 2011. Chinese research on world heritage tourism. *Asia Pacific Journal of Tourism Research* 16: 75–88.

Swarbrooke, J. 2002. *Development and management of visitor attractions*. 2nd ed. London: Butterworth and Heineman.

UNWTO. 2004. *Congestion management at cultural and national sites*. Madrid: UNWTO.

UNWTO. 2019. Global code of ethics for tourism. Available at: http://ethics.unwto.org/en/content/global-code-ethics-tourism. Accessed 30 Aug 2019.

Heritage Sites: Economic Incentives, Impacts, and Commercialization

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Introduction

Particularly as tourism has grown into the world's largest service industry, heritage sites increasingly have been recognized as potential sources of revenue for government agencies, of economic development for communities, and of profit for private enterprises. The organization and exploitation of these opportunities, known as *commercialization*, takes myriad forms. The motivations for commercialization range from providing funding for preservation of heritage to the creation of jobs and profit from investments in commercial heritage. However, there is considerable debate about the consequences of commercialization for heritage sites themselves and for the people who live and work around them. Whether commercialization has constructive or destructive consequences for any particular heritage site depends on the distribution of the economic and noneconomic benefits and costs of commercialization, its *impact*, and on how stakeholders respond to the *incentives* created by these benefits and costs. The debate over commercialization thus raises ethical, practical, and technical questions that are of importance to archaeologists. Each of these three concepts – commercialization, impact, and incentives – is central to the economic analysis of heritage sites.

Definitions

Incentives

Incentives are the inducements that drive personal behavior. They may be pecuniary – working for wages or seeking to profit from an investment – or they may be nonfinancial. Economists argue that individuals whose behavior is incentivized by personal gain are likely to be more productive and efficient; however, if incentives are misaligned with social needs, they can generate undesirable behavior. Heritage sites produce a complex web of incentives. Some are *economic incentives*, such as the potential to generate government revenue to pay for preservation or the opportunity to profit privately from tourist investments. Others are *social/political incentives*, such as the opportunity for governments to inculcate an "authorized" vision of history or the potential to reframe the story of people and places in a manner that appeals to tourists. Such incentives may produce socially positive outcomes – monetary rewards from income or jobs benefitting community members or outside businesses – or the hope that the benefits of commercialization may motivate local people to protect heritage sites. But incentives also may induce undesirable behavior. Heritage sites typically are managed and staffed by archaeologists and heritage professionals whose behavior may be driven by noneconomic incentives, such as acquiring bureaucratic authority or professional standing. Similarly, communities may be incentivized to pursue economic gain at the expense of the authenticity and cultural values of their heritage sites or to compete for tourist revenues in ways that disrupt the harmony of local communities. The opportunity for economic gains may incentivize corruption among the stewards of heritage sites, with damaging consequences to sites, communities, and national patrimony. Such negative incentives work against the interests of other stakeholders. A thoughtful analysis of the incentives that face individual stakeholders is essential to understanding why people behave as they do with regard to heritage sites, which in turn is essential to shaping ethical and effective public policies toward heritage.

Commercialization

Commercialization involves the introduction of market-based practices to the management of a place, a product, or a social practice in order to make it available for public consumption. The

process may be instigated by government action or by private entrepreneurs, including community members, seeking to exploit market opportunities to create income and jobs. Tourism is a primary driver behind the commercialization of cultural heritage sites and related practices because both international and domestic visitors have great interest in cultural, historical, and archaeological displays. Heritage commercialization takes many forms. Heritage sites may be managed and curated for tourist visitation. Traditional crafts may be adapted to produce marketable products. Even traditional activities, such as rituals or art, may be reconstrued for sale or public demonstration. Tourism enables a variety of commercial activities at heritage sites including guiding; collection of fees for admission or entertainment; retail sale of books, souvenirs, or food; and economic activity associated with operating and maintaining the site. Archaeological sites may be exploited through the sale of images used in advertising promotions, books, or movie and television productions; and sites may be rented for private events. Museums may license the copies of objects in their collections. Outside of heritage sites and museums, one encounters local micro-economies of shops, transportation concerns, restaurants, hotels, and other retail and service businesses created to satisfy the heritage tourist. Such tourism "supply chains" (Gould 2018) exist at every tourist venue, from Machu Picchu in Peru to the British Museum in London. Finally, excavation research and conservation activities at archaeological sites may provide significant occasional revenues for local communities and host countries, processes that may be directly commercialized by scholars, nonprofit, and for-profit organizations who market participation in research and conservation to students and other paying members of the public.

Economic Impact

Economists measure the economic impact generated by commercialization on two levels, the direct impacts of commercialization associated with the site and the follow-on "multiplier" effects on the broader economy. These impacts are included in the gross domestic product (GDP) of the country. Direct impacts include the revenues received by heritage sites, the salaries paid to workers there, payments to vendors and others to supply and operate the site, and the investments in conservation, signage, and site preparation required for it to receive visitors. These direct impacts stimulate further economic activity, defined by economists as "multiplier effects." To illustrate: An investment in a retail shop at a heritage site generates demand for products sold there. Some portion of the money spent at the store will be kept by the owners, and the rest will be used to buy replacement goods from producers, who in turn must pay to restock their raw materials and pay workers or themselves. Some portion of workers' pay will be saved, but most will be spent on housing, food, clothing, and other necessities. The economic impact of spending at a heritage site is multiplied through this process of spending and re-spending. Governments also benefit directly from commercialization. Governments are responsible for many important heritage sites and often earn revenues from ticket sales and on-site services or from taxes on the private tourism sector. Spending by foreign tourists is counted in national income accounts as an "export" and is a key source of foreign exchange for many governments. Revenue from sites may be spent by governments to benefit the sites themselves, be redirected to subsidize other sites or national heritage in general, or may simply be used to support the general activities of government.

The overall economic impact of tourism is substantial. Worldwide in 2018, tourism is estimated to have directly generated almost 154 million jobs and $3 trillion in global GDP. Taking multiplier effects into account, tourism is estimated to have contributed 10.4% of global GDP and 10% of global employment in 2018 (WTTC 2019). Visiting heritage sites is a primary driver of this vast industry, although there are few detailed studies of the actual magnitude and impact of heritage tourism. One agency that does attempt to do so is the National Lottery Heritage Fund (NLHF) of the UK. The NLHF's study concluded that heritage tourism drove four out of ten overseas visits to the UK in 2009 and, even when visits

to natural heritage sites are excluded, generated 270,000 total jobs in the UK and accounted for £11.9 billion of GDP. Foreign heritage tourists are highly valued economically, but the majority of tourists in the UK are domestic travelers (HLF 2010). However, estimating the economic impact of a cultural activity is complex and a subject of considerable technical debate (Snowball 2008; Crompton 2006). The magnitude depends on whether the money triggering the effect originates outside or from within the economy under study, the source of investment capital, and the rate of spending or saving of the various members of the value chain. Heritage managers also need to understand how much of the multiplier re-spending occurs within their targeted economy (e.g., a local village) and how much is lost or "leaked away" from the local area and the local stakeholders in the heritage site. For example, if souvenirs sold at a site are made in another region or country, much of the value goes to those foreign producers. Similarly, if workers live in other regions or hotel accommodation are owned by national or international chains, the income earned by nonresidents is leaked outside the immediate region of the heritage site.

Key Issues and Current Debates

Site Protection

Those who enjoy an economic benefit from a heritage site may have an incentive to conserve and protect that site and even to invest in it to continue to receive that economic benefit. However, increased tourist visitation also risks degradation of the physical site from foot traffic or pollution. Furthermore, the commoditization of heritage may detach traditional artifacts, practices, and places from their original context, presenting them in a distorted form for consumption by visitors who may not value their cultural significance (Kehoe 2007; Silberman 2007). Over the long term, reliance on tourism may reduce local economic diversity, with adverse consequences in later years on sites and communities because tourist interests are highly unstable (Timothy and Nyaupane 2009: 56–69). Economic incentives for communities to protect places have been widely pursued in environmental conservation (McNeely 2006) and, to a more limited degree, in archaeology (Coben 2014). The concept of ecotourism relies on using tourist revenues to make natural resources economically valuable for the groups that otherwise may cause them harm or who are in a position to protect them. However, ecotourism programs have had mixed success, encountering problems that include challenges in getting economic benefits to intended groups (e.g., the local population), achieving a linkage in people's minds between the economic impacts and the natural resource, and producing the desired behavioral changes in response to the proffered economic incentives (de Vasconcellos Pêgas and Stronza 2008). Parallel issues have been seen with commercialization projects that have heritage preservation as a central objective. Archaeologist-led programs to create community businesses based on heritage are nascent and still developing strategies, models, and best practices.

Benefit Distribution

The distribution of the benefits from commercialization is a critical political and ethical issue, one that can lead to contention among local, national, and international stakeholders, each of whom may assert rights to the site and its benefits. The power held by stakeholder groups is far from equal, corruption is hardly unknown, and residents living adjacent to a heritage site may be disadvantaged in commercial competition. The preparation of a site to appeal to the tourism market may displace long-standing residents from newly demarcated parks, looters may become aware of the value of artifacts to be unearthed at the site, or the aesthetic or sacred values of the site may be disrupted. Local community members often lack access to the banking system, to investment capital, or to the political connections needed to obtain permits or approvals, and they may lack the market knowledge and experience essential to compete with more sophisticated outside parties, especially national or multinational corporations. As a result, the economic impact of tourism can be compromised by high levels of leakages away from local stakeholders. The jobs created by

heritage commercialization can be low wage, informal, and seasonal and are exposed to fluctuations in tourist demand. Similarly, the jobs created through archaeological research can also be low paid and seasonal, with higher-skilled, better-paid jobs inaccessible to unskilled local populations. The distribution of benefits depends on the capability of stakeholders to take advantage of economic opportunities, as well as the multiplier benefits and leakages discussed above. Whether any particular distribution pattern is acceptable will depend on the political, social, and economic context of each site and the aims of any commercialization project. Studies into the distribution of economic benefits have demonstrated the severe challenges facing efforts to direct the benefits of heritage commercialization to local stakeholder groups (Adams 2010; Kausar and Nishikawa 2010; Hampton 2005).

Privatization

Heritage sites are often referred to by economists as public goods, tangible or intangible resources that benefit people in common in ways that cannot be managed purely through private ownership. Private goods, by contrast, are those that can be owned and controlled for the benefit of individuals for the purpose of making profits. Neoliberal economists, whose impact on public policy has been strong in countries such as the UK and the USA, argue that an entrepreneur incentivized by the opportunity to earn a profit on investment introduces to heritage management competitive pressures, financial capital, operational skills, knowledge of customer desires, and the willingness to take financial risks. In the case of heritage sites, neoliberal policies have promoted the emergence of privately owned businesses to deliver tourist services and, in limited cases, enabled entrepreneurs or nonprofits to manage the activities of museums and archaeological sites. In a period when most national governments are under stress, privatization can appear to be a particularly attractive policy. However, markets do not work optimally when faced with the extended time horizon of heritage sites and their important noneconomic values (Mason 1999). Such "market failures" have occurred sufficiently often that skepticism is rising, including in the management of heritage, that privatized services can deliver efficient and effective solutions.

Measuring the Benefits

A key issue is how one determines which heritage sites should be given priority for commercialization. Economists often take a "benefit/cost" approach to such questions (Brent 2017). In principle, this is a straightforward matter of comparing the benefits of a project, in monetary or other quantifiable terms, to the investment and operating costs of the project. If the value of the benefits exceeds the costs, the project may be seen as having a positive overall return. If not, it is either a poor investment or requires a government subsidy to continue providing benefits to the public. However, the measurement of the benefits flowing from cultural heritage is confounded because many of those benefits are intangible and difficult to reduce to monetary terms or otherwise quantify for the purposes of benefit/cost comparisons. The noneconomic values of heritage can include the local or national identity attached to a site, the value to Indigenous people of sustaining aspects of their culture that are not shared with fellow citizens, the scientific or historical value of preserving artifacts from the past, the aesthetic value of a site, or the general social value derived from uplifting the public through education that results from visiting heritage sites. Commercial heritage management is unlikely to prioritize those values. Furthermore, as pointed out above, there may be intangible costs to commoditizing heritage sites, such as site degradation or the desecration of places sacred to Indigenous people. Economists have developed tools that attempt to measure the value of cultural heritage through a variety of techniques (see Snowball 2008). They are subject to numerous qualifications and technical limitations that render the evaluation of the benefits of heritage sites a problematic enterprise. Furthermore, stakeholders' incentives may be widely divergent, leading to very different views on the value of any particular heritage site.

Sustainability

The economic principles governing the commercialization of heritage are applications of neoclassical theories developed to explain the behavior of firms and consumers in short-term market situations. While the theory may be applied sensibly to some long-term problems, there remains the problem that the time horizon associated with heritage sites – measured in decades if not centuries – is difficult for market-based institutions to address appropriately. Decisions whether to preserve, conserve, or open a heritage site to the public have implications that extend well beyond one individual's lifetime, which introduces the matter of "sustainability" to heritage site commercialization. Three decades ago, the Brundtland Commission defined sustainable development as a process that "seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future" (WCED 1987, Ch.1 Par. 49). Applied to heritage sites, that definition raises questions such as: What is to be sustained, for whose benefit, and for how long? And, who will make those decisions? Governments historically have performed this role. However, as noted above, some policymakers argue that market-based management solutions are a better choice. Alternatively, archaeologists increasingly see ethical and practical reasons to lodge decision-making responsibility in community-based structures. This divergence of views gives rise to a debate whether "top-down" or "bottom-up" control over heritage commercialization is most likely to meet the standards of sustainability. That debate, which also pervades the broader economic development literature, has practical, theoretical, and political implications that yield no single resolution (Binswanger-Mkhize et al. 2010).

The Role of International Organizations

International organizations have come to play an important role in the commercialization of heritage resources. UNESCO certifies as World Heritage Sites those deemed to exemplify "outstanding universal value" and requires management plans and detailed schemes both to conserve and preserve the site and to exploit it for economic purposes through tourism (Robinson and Picard 2006). World Heritage Site status is widely sought-after for its value as a tourism-inducing brand. International financial institutions, including the World Bank and regional development banks, provide capital for infrastructure investments, such as roads, electrification, and water systems, that often are required for successful heritage tourism (Cernea 2001). International nongovernmental organizations, such as the World Monuments Fund, the Sustainable Preservation Initiative, and the Global Heritage Fund, have experimented with community-based projects intended to create economic benefits for localities adjacent to important archaeological sites. Government entities such as USAID in the USA and the European Commission also are significant underwriters of projects that engage heritage resources to promote economic development. Usually, these international programs are undertaken with the approval and involvement of national governments, although increasingly NGOs are looking at alternative community-based models in order to address the operational failures of past top-down-driven programs or to redress the unequal distribution of benefits from past projects. Regardless, the intrusion of international organizations into heritage commercialization has introduced an array of new stakeholders to the processes of heritage conservation and commercialization. Often these institutions and individuals have priorities, values, and incentives that are very different from the national and local stakeholders in heritage sites. Furthermore, as critics of international organizations engaged in the heritage process point out, these international organizations lack the financial resources and enforcement powers needed to protect heritage and have been shown to respond to institutional and international political incentives in ways that are contrary to the long-term interests of cultural heritage sites (Meskell 2018).

Future Directions

Commercialization of heritage sites has proceeded rapidly since the 1950s as countries have

competed for the burgeoning income from tourists. However, the adverse consequences of the often-perverse incentives created by large-scale heritage bureaucracies, privatization, and the drive for tourist revenues also have become increasingly evident. The quest is for heritage management approaches that incentivize behaviors that will promote conservation of heritage sites and honor their cultural value even while delivering the beneficial impact of commercialization to communities and to national economies. In some countries, such as the UK in recent years, this project has resulted in greater levels of privatization and market dependence. In others, such as Italy, decentralization experiments are underway to improve efficiency and responsiveness to tourist needs while diminishing the influence of conservative cultural bureaucracies. In China, many aspects of heritage management have been devolved to regional and local authorities. With government budgets facing competing demands from urgent social problems, the tourism market will continue to be an alluring source of local and national economic impact, and cultural heritage will remain at the center of both national discourses and commercial opportunities. Thus, while experimentation in the management of heritage commercialization is in its infancy, the search for better ways to manage commercialization, limit the consequences of undesirable incentives, and promote desirable impacts will continue unabated.

Cross-References

- ▶ Community Economic Development and Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Economic Valuation of Heritage
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values and Education
- ▶ Privatization, Public-Private Partnerships, and Innovative Financing for Archaeology and Heritage
- ▶ Sustainability and Cultural Heritage

References

Adams, J.L. 2010. Interrogating the equity principle: The rhetoric and reality of management planning for sustainable archaeological tourism. *Journal of Heritage Tourism* 5: 103–123.

Binswanger-Mkhize, H.P., J.P.A. DeRegt, and S. Spector, eds. 2010. *Local and community driven development*. Washington DC: The World Bank.

Brent, R.J. 2017. *An advanced introduction to cost-benefit analysis*. Cheltenham/Northampton: Edward Elgar.

Cernea, M.M. 2001. *Cultural heritage and development: A framework for action in the Middle East and North Africa*. Washington DC: The World Bank.

Coben, Lawrence S. 2014. Sustainable preservation: Creating entrepreneurs, opportunities and measurable results. *Public Archaeology* 13 (1–3): 278–287.

Crompton, J.L. 2006. Economic impact studies: Instruments for political shenanigans. *Journal of Travel Research* 45 (1): 67–82.

De Vasconcellos Pêgas, F., and A. Stronza. 2008. Ecotourism equations: Do economic benefits equal conservation? In *Conservation and ecotourism in the Americas*, ed. A. Stronza and W.H. Durham, 163–176. Wallingford: CABI.

Gould, P.G. 2018. Community-centred supply chains and sustainable archaeological tourism. *Archeostorie Journal of Public Archaeology* 2: 61–74.

Hampton, M.P. 2005. Heritage, local communities and economic development. *Annals of Tourism Research* 12: 735–759.

HLF. 2010. *Investing in success: Heritage and the UK tourism economy*. London: National Lottery Heritage Fund.

Kausar, D.R., and Y. Nishikawa. 2010. Heritage tourism in rural areas: Challenges for improving socio-economic impacts. *Asia Pacific Journal of Tourism Research* 15: 195–213.

Kehoe, A.B.. 2007. Archaeology within marketing capitalism. In *Archaeology and capitalism*, ed. Y. Hamilakis and P. Duke, 169–178. Walnut Creek: Left Coast Press.

Mason, R. 1999. Economics and heritage conservation: Concepts, values and agendas for research. In *Economics and heritage conservation*, ed. M. De la Torre and R. Mason, 2–18. Los Angeles: Getty Conservation Institute.

McNeely, J.A. 2006. Using economic instruments to overcome obstacles to *in situ* conservation of biodiversity. *Integrative Zoology* 1: 25–31.

Meskell, L. 2018. *A future in ruins*. Oxford: Oxford University Press.

Robinson, M., and D. Picard. 2006. *Tourism, culture and sustainable development*. Paris: UNESCO.
Silberman, N.A. 2007. 'Sustainable' heritage? Public archaeological interpretation and the marketed past. In *Archaeology and capitalism*, ed. Y. Hamilakis and P. Duke, 179–194. Walnut Creek: Left Coast Press.
Snowball, J.D. 2008. *Measuring the economic value of culture*. Heidelberg/Berlin: Springer.
Timothy, D.J., and G.P. Nyaupane, eds. 2009. *Cultural heritage and tourism in the developing world: A regional perspective*. London/New York: Routledge.
WCED. 1987. *Our common future*. Available at: http://www.un-documents.net/ocf-01.htm#II. Accessed 30 Apr 2019.
WTTC. 2019. *Travel & tourism: Economic impact 2019 world*. London: World Travel and Tourism Council.

Heritage Theory

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Introduction

The field of heritage studies burst onto the academic scene in the late 1980s in tandem with the birth of critical museum studies, rise of the new social history, growth of postcolonial theory, the cultural turn in anthropology, and so forth throughout the humanities. Over the past three decades, heritage studies have ranged from descriptive to theoretical, local to worldwide in scale, focused on developing and developed societies, and directed at deep prehistory through to the present day. A multitude of issues in countless places have been addressed, sometimes repeatedly with different disciplinary nuances.

Definition

The retheorization of heritage studies as "critical heritage studies" (henceforth, CHS) focuses on many topics of interest in the humanities and social sciences overall: bodies of knowledge, class, colonialism/postcolonialism, dominant rhetoric/authoritative discourse, gender, globalization, identity, ideology, institutions, memory work, nationalism, negotiation, political economy, power structures, and the reproduction of hierarchy, race, representation, resistance, spatialities, technologies, and voice. CHS privileges some of these interests more than others and adds other concerns particular to it, such as cultural rights and human rights. Fundamentally, CHS examines "how power, identity and knowledge intersect with the practice, interpretation, display and management of cultural heritage" (Baird 2010). Harrison and Linkman pithily define the scope of CHS as "understanding how heritage functions in societies and the relationship between heritage and power" (2010: 77). Basically, CHS investigates top-down/official and bottom-up/unofficial processes and the relationship between them (Harrison 2010a: 8–9). A CHS approach reveals competitive intersections of power (political, economic, other), knowledge (monopolized/shared, authoritative/avocational), discourse (official/outsider), and interest groups (professional, international, national, popular, other).

CHS is sensitive to those who typically receive inadequate attention from the wielders of power. CHS recognizes the different and often contradictory understandings of the nature, ownership, value, meaning, and significance of heritage that are held by official interlocutors and unofficial sectors of the population. It attends to the varied ideologies and economies that underlie the uses of heritage. For instance, CHS responds to the commodification of heritage by the tourism industry and its nation-state partners. CHS valorizes non-Western as well as Western approaches to heritage conceptualization and practice. CHS considers the range and vast differences in scale of intangible heritage while retaining interest in the tangible manifestations of heritage that are well represented in heritage research. CHS advances the discipline of archaeology – so prominent in the heritage field – from its traditional interest in sites and monuments (the ultimate tangibility) to the inextricably associated intangibilities of the past and present.

Key Issues

Knowledge Brokers

CHS is very interested in institutional and vernacular decision-making as this reveals and enacts relations of power and domains of knowledge. CHS interrogates unofficial expressions of heritage and different (including non-Western) practices of heritage preservation (e.g., Karlstrom 2005), management, and promotion, including how these, at the local level, challenge official prescriptions and representations. Thus, CHS eschews authoritative positionality (e.g., Smith 2006).

Governance

Governance is the capacity of non-state organizations to accomplish something without the legal competence that states have to command their fulfillment (Czempiel 1992: 250). Instead, global governance may draw on moral power to advance its agenda. Global governance is of particular interest for CHS because it characterizes entities like UNESCO. Kirshenblatt-Gimblett observes that UNESCO's "World Heritage is one of several ways of envisioning and constituting a global polity. The goal is an active cosmopolitan citizenry" (2006: 189). But that global citizenry actually has little say in global cultural governance because of the monopoly of decision-making and lack of transparency in UNESCO's World Heritage Committees.

The authority of UNESCO itself and of national heritage institutions is being challenged intellectually by CHS scholars and also on the ground by a new form of heritage organization: the independent global-reaching heritage NGO that is unencumbered by the bureaucratic and diplomatic baggage of the United Nations/UNESCO and has its own private sources of financial capital. NGOs occupy an interesting intermediary terrain as knowledge brokers for they operate outside the self-policing of academic peer review and professional societies. The World Monuments Fund and Global Heritage Fund are exemplary as heritage NGOs. They have created a community of heritage-sympathetic individuals and sponsoring foundations. They are able to contract talented practitioners from the necessary disciplines to go into a country and, commando-like, tackle a perceived problem.

Following a recent discussion by Kate Clark (2008: 92), the following principles of heritage governance fall fully within the CHS agenda:

- Enable multi-sector participation.
- Formulate a strategic vision that encompasses human development and take into account historical, social, and cultural complexities.
- Insist on responsive performance by institutions.
- Maintain transparent accountability to the public and all stakeholders.
- Practice fairness involving equity and the rule of law.

The Contribution of Legal Scholars to CHS

A number of talented legal scholars are working within and advancing the CHS framework. Rosemary Coombe (2010), for instance, explores the global legal geography of cultural rights and cultural property as framed by international legal documents of a compulsory nature as well as various forms of "soft law" that recommend or proscribe certain actions. She explicitly unwraps neoliberalism as the context in which heritage operates and correctly argues for the inseparability of tangible and intangible heritage. Coombe recognizes new forms of social organization and their expression in social movements. Here we see CHS attending to the grassroots but with keen awareness of the significantly larger processes and agents in whose context they act. Other lawyers include Yvonne Donders (2008, 2009, 2010), Ana Filipa Vrdojlak (2009), and Jane Anderson (2009).

Heritage as Performance and Process

Whereas much previous heritage scholarship approached its object of study as fixed, something that can be apprehended because it is "there" (whether tangible or, more recently, intangible), CHS emphasizes the dynamic process of heritage production and the vernacular performativity of heritage. CHS denies the separability of tangible and intangible heritage. As David Crouch

observes, "heritage is continually emergent in living" (2010: 57), what he calls "perpetual performance," which is intrinsically related to cultural practice or the practice of culture in a Bourdieuian sense.

Festivals are an obvious example of heritage as performance and process (Kirshenblatt-Gimblett 1998; Harrison 2010b). Some formally staged performances in the tourist circuit are also very interesting to CHS scholars, especially when the nation-state or other official entity expresses interest in them or exerts control (see Bruner 2001). This is because "choices in repertoire and style are ideologically charged" (Kirshenblatt-Gimblett 1998: 65).

Memory and Landscape

Memory and landscape are at the heart of many diasporic heritages. Landscape – physically, socially, and cosmologically constructed – grounds heritage. Moreover, some landscapes are imbued with tragedy: a "heritage that hurts" (e.g., Sather-Wagstaff 2011) and places of pain and shame (Logan and Reeves 2009). Keller gives the example of geographies of memory and identity under conditions of migration and diaspora in the Melanesian archipelago, whereby "the heritage principles derived from emplaced community life are clearly still relevant… as generative principles embodied in memories subject to transformation and relevant to forming new dispositions and principles of habitus" (2009: 143). Fennell observes of memory that a "particular social group's construction of their cultural heritage often entails a selective emphasis on specific subjects within their history. The selective process of heritage construction includes instances of elision and omission as well as those of remembrance and commemoration" (2009: 149).

Heritagescapes

Across a range of disciplines, we are now awash in *scapes*, beginning with the social constructivist reengagement with *landscape* (e.g., Cosgrove 1984) and especially since Appadurai's (1996 [1990]) proposal of five dimensions of global cultural flows – all *scapes*: *ethnoscape*, *mediascape*, *technoscape*, *financescape*, and *ideoscape*.

It was inevitable that *heritagescape* would be coined (see Garden 2006). Among the many uses of the term today, Mitchell and De Waal (2009) define heritagescape as a landscape of historical buildings cum amenities, a place of commodified heritage. Here we have awareness of the economic forces driving heritage construction (literally and figuratively). Their work resonates with earlier studies of the manufacture and consumption of heritage (see, e.g., AlSayyad 2001).

Michael Di Giovine (2009) analyzes the *heritage-scape* that UNESCO has created, deploying the term in hyphenated form with the full weight of Appadurai's disentanglement of globalization. He asserts, correctly, that UNESCO is engaged in an "ambitious placemaking strategy designed to rearrange the geopolitical landscape into a reconceptualization of the world… the heritage-scape is a real social structure which creates real material effects on a globally distributed population in accordance with UNESCO's long-term goals" (2009: 6). This apprehension becomes a new point of departure in CHS.

Activism

CHS challenges the material-based notion of heritage in favor of recognition of public or community-based assertions of heritage and history (Waterton and Smith 2009). Heritage is not simply past looking, building upon dead remains excavated by archaeologists, be they grand or small. The issue is what living people *do* with those remains in the present, working toward the future. Indeed, criticizing the old model of heritage as material, Denis Byrne argues for "a new model: heritage as social action" (2008: 162; see also Harrison 2010b).

Not content to remain in the theoretical sphere of "studies," CHS has an activist dimension that builds, for instance, on applied anthropology's laser focus on real-world problems of race, gender, class, knowledge, political power, and the naturalization of discursive and embodied privilege. Examples include the work of Australian colleagues with Aboriginal communities (Davidson et al. 1995 inter alia), "teaching archaeology as a revolutionary act" (Pyburn and Sheperd

2005), and African American community mobilization (McDavid 2004; Mullins 2004).

The archaeology of the contemporary past is the study of the present as the present in terms of its materialized pathologies of class, race bias, economic disparities, conflict, labor, and human rights – issues of great importance to any engaged person today. The papers collected by Rodney Harrison and John Schofield (2009) and Larry Zimmerman's (Zimmerman and Welch 2011) work on the archaeology of the homeless are remarkable for their incisive and unflinching treatment of these issues, so different from the usual past focus of archaeologists.

Future Directions

Although the theoretical pendulum swings cyclically in the humanities and social sciences, in the case of CHS it is difficult to believe that this perspective will recede, since lack of attention on the ground to its concerns has resulted in too many multiparty heritage confrontations or deficient heritage management decisions, whether tangible or intangible in focus.

CHS has demonstrated that heritage is not a monolithic project. Rather, heritage should be conceived as an arena where "various issues are debated, negotiated, fought out, forced and manipulated by representatives" (Strauss 1991 [1978]: 124). Although not all participants have an equal voice, the opening of CHS is a dramatic advance in heritage studies and, to an increasing degree, heritage practice.

In decades past – as is well documented in early heritage instruments (conventions, charters, declarations, etc.) – heritage was an extremely limited arena with few participating social worlds. Indeed, it was the realm of architects and conservators, particularly. As living culture came to be regarded as part of the built heritage, the social worlds expanded, but it has taken a long time for primary cultural stakeholders – the communities – to be meaningfully involved. CHS will be more focused on the intersections of macro, midrange, and micro levels of social worlds.

CHS will increasingly involve institutional ethnography, particularly of NGOs and their relationship to the national entities charged with the care of cultural heritage (tangible and intangible) and to the local stakeholders whose heritage it is. This focus also speaks to the increasing scrutiny of UNESCO and heritage policy overall by CHS scholars.

CHS scholars will not just write about their discomfort with the purveyors of "authorized heritage discourse" (Smith 2006), they will increasingly demand to be heard in practical terms.

Attention to cultural rights, human rights, and cultural property/intellectual property rights will grow in importance. Issues of environmental heritage and the biological environment in which heritage operates will also become significant in CHS. Bioprospecting is an example (see Pan 2006).

CHS will increasingly focus on the economic and social dimensions of sustainability in the face of tourism's linkage with economic development and its propensity to consume vernacular life and its meaning-laden built environment.

CHS will become particularly concerned with historical discourses of citizenship and their evolution into new discourses, as well as with reconfigurations of citizenship in the current global world order. An important aspect of this issue is networked technologies of citizenship and their relationship to democratic movements and the generation of individual and collective subjectivities (see especially Stevenson 2003). We need to attend more to new social, cultural, and political forms of participatory heritage.

Western and especially Anglophone scholars dominate international academic forums on cultural heritage. If CHS is to be true to its own stance, it will need to more actively engage with non-Western scholars and heritage practitioners who may hold very different notions of what heritage, heritage studies, and heritage management are. Since its creation in 1986, WAC (World Archaeological Congress) has striven for equitable incorporation of colleagues and viewpoints from outside the dominant countries.

As the context of heritage studies changes, so, too, does its empirical focus and theorization. Today's transnationalism, multiscalar politics, and multidimensional and diasporic societies call for a different kind of research and fieldwork than that of the traditional community ethnography, richly nuanced though it has been. The situation of heritage today is so complex that its investigation and professional practice must be multisited, transdisciplinary, and longitudinal – involving the historic, present, and future study of culturally diverse local communities, regional governments, national offices, public policy, foreign players, and their networks and discourses. Archaeologists are increasingly subscribing to the CHS agenda.

Ultimately, CHS should produce not just academic scholars but also public practitioner-interlocutors who can advocate before an audience beyond university walls and directly engage policy makers.

Cross-References

- ▶ Heritage and Archaeology
- ▶ Marketing Heritage
- ▶ Social Memory in Archaeological Theory
- ▶ Uses of Heritage

References

Alsayyad, N., ed. 2001. *Consuming tradition, manufacturing heritage*. London: Routledge.

Anderson, J. 2009. *Law, knowledge, culture: The production of indigenous knowledge in intellectual property law*. Cheltenhem: Edward Elgar Press.

Appadurai, A. 1996. Disjuncture and difference in the global cultural economy. In *Modernity at large*, 27–47. Minneapolis: University of Minnesota Press.

Baird, M. 2010. *Critical heritage studies: Knowledge identity and power. Introductory remarks to the eponymous session*. 109th Annual Meeting of the American Anthropological Association, New Orleans.

Bruner, E. 2001. The Maasai and the Lion King: Authenticity, nationalism, and globalization in African tourism. *American Ethnologist* 28: 881–908.

Byrne, D. 2008. Heritage as social action. In *The heritage reader*, ed. G. Fairclough, R. Harrison, J.H. Jameson, and J. Schofield, 149–173. Oxon: Routledge.

Clark, K. 2008. Only connect – Sustainable development and cultural heritage. In *The heritage reader*, ed. G. Fairclough, R. Harrison, J.H. Jameson, and J. Schofield, 82–98. Oxon: Routledge.

Coombe, R. 2010. *Property forms and heritage politics*. Paper presented in the symposium "Critical heritage studies: Knowledge identity and power." 109th Annual Meeting of the American Anthropological Association, New Orleans.

Cosgrove, D.E. 1984. *Social formation and symbolic landscape*. Madison: University of Wisconsin Press.

Crouch, D. 2010. The perpetual performance and emergence of heritage. In *Culture, heritage and representation*, ed. E. Waterton and S. Watson, 57–71. Farnham: Ashgate.

Czempiel, E.-O. 1992. Governance and democratization. In *Governance without government: Order and change in world politics*, ed. J.N. Rosenau and E.-O. Czempiel, 250–271. Cambridge: Cambridge University Press.

Davidson, I., C. Lovell-Jones, and R. Bancroft, eds. 1995. *Archaeologists and Aborigines working together*. Armidale: University of New England Press.

Di Giovine, M. 2009. *The heritage-scape. UNESCO, world heritage and tourism*. Lanham: Lexington Books.

Donders, Y. 2008. The UN Declaration on the Rights of Indigenous Peoples: A victory for cultural autonomy? In *Changing perceptions of sovereignty and human rights: Essays in honour of Cees Flinterman*, ed. I. Boerefijn and J. Goldschmidt, 99–122. Antwerp: Intersentia.

Donders, Y. 2009. Culture and human rights. In *Encyclopedia of human rights*, ed. D. Forsythe, 441–450. Oxford: Oxford University Press.

Donders, Y. 2010. Do cultural diversity and human rights make a good match? *International Social Science Journal* 199: 15–35.

Fennell, C. 2009. Combating attempts at Elision: African American accomplishments at New Philadelphia, Illinois. In *Intangible heritage embodied*, ed. D.F. Ruggles and H. Silverman, 147–168. New York: Springer.

Garden, M.-C. 2006. The heritagescape: Looking at landscapes of the past. *International Journal of Heritage Studies* 12: 394–411.

Harrison, R. 2010a. What is heritage? In *Understanding the politics of heritage*, ed. R. Harrison, 5–42. Manchester: Manchester University Press.

Harrison, R. 2010b. Heritage as social action. In *Understanding the politics of heritage*, ed. R. Harrison, 240–276. Manchester: Manchester University Press.

Harrison, R., and A. Linkman. 2010. Critical approaches to heritage. In *Understanding the politics of heritage*, ed. R. Harrison, 43–80. Manchester: Manchester University Press.

Harrison, R., and J. Schofield. 2009. Special issue: Archaeo-ethnography, auto-archaeology: Introducing archaeologies of the contemporary past. *Archaeologies* 5: 185–209.

Karlstrom, A. 2005. Spiritual materiality. Heritage preservation in a Buddhist world? *Journal of Social Archaeology* 5: 338–355.
Keller, J.D. 2009. Geographies of memory and identity in Oceania. In *Intangible heritage embodied*, ed. D.F. Ruggles and H. Silverman, 127–146. New York: Springer.
Kirshenblatt-Gimblett, B. 1998. *Destination culture. Tourism, museums and heritage*. Berkeley: University of California Press.
Kirshenblatt-Gimblett, B. 2006. World heritage and cultural economics. In *Museum friction. Public cultures/global transformations*, ed. I. Karp, C.A. Kratz, L. Szwaja, and T. Ybarra-Frausto, 161–202. Durham: Duke University Press.
Logan, W.S., and K. Reeves, eds. 2009. *Places of pain and shame: Dealing with difficult heritage*. London: Routledge.
McDavid, C. 2004. From "traditional" archaeology to public archaeology to community action. In *Places in mind. Public archaeology as applied anthropology*, ed. P.-A. Shackel and E.J. Chambers, 35–56. New York: Routledge.
Mitchell, C., and S.B. De Waal. 2009. Revisiting the model of creative destruction: St Jacobs, Ontario a decade later. *Journal of Rural Studies* 25: 156–167.
Mullins, P.R. 2004. African-American heritage in a multicultural community. An archaeology of race, culture and consumption. In *Places in mind. Public archaeology as applied anthropology*, ed. P.A. Shackel and E.J. Chambers, 57–69. New York: Routledge.
Pan, P.G. 2006. *Bioprospecting: Issues and policy considerations*. Honolulu: Report 1. Honolulu: Legislative Reference Bureau, State Capitol.
Pyburn, K.A., and N. Sheperd. eds. 2005. *Archaeologies 1*. Themed issue Teaching archaeology as a revolutionary act.
Sather-Wagstaff, J. 2011. *Heritage that hurts. Tourists in the memoryscapes of September 11*. Walnut Creek: Left Coast Press.
Smith, L. 2006. *Uses of heritage*. London: Routledge.
Stevenson, N. 2003. *Cultural citizenship. Cosmopolitan questions*. Maidenhead: Open University Press.
Strauss, A. 1991. A social world perspective. In *Creating sociological awareness: Collective images and symbolic representations*. New Brunswick: Transaction Publishers.
Vrdojlak, A.F. 2009. Cultural heritage in human rights and humanitarian law. In *Human rights and international humanitarian law*, ed. O. Ben-Naftali, 250–302. Oxford: Oxford University Press.
Waterton, E., and L. Smith. 2009. There is no such thing as heritage. In *Taking archaeology out of heritage*, ed. E. Waterton and L. Smith, 10–27. Newcastle Upon Tyne: Cambridge Scholars Publishing.
Zimmerman, L.J., and J. Welch. 2011. Displaced and barely visible: Archaeology and the material culture of homelessness. *Historical Archaeology* (Special issue Archaeologies of engagement, representation, and identity) 45: 67–85.

Heritage Tourism and the Marketplace

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Introduction

Tourism destinations attract visitors for many reasons, and heritage is high on the list of things many travelers want to experience. Visitor expectations about the nature of the place and the experiences they will have there will be set in advance of their visit, based on what they have read, seen, or heard.

Successful tourism at heritage places must incorporate regard for heritage values and integrity. Through marketing, it must create accurate expectations of the nature of the place and the experiences available to selected groups of potential visitors (target markets). These experiences should be designed to engage visitors with the place, and help them understand its meaning. Host communities should be able to collaborate actively in both heritage management and tourism activities (ICOMOS 1999, 2008).

The heritage tourism marketplace is global but product and consumer bases differ at local level, depending on the nature and location of the heritage place and the potential market segments it might attract. Understanding of both domestic and international expectations and markets is increasingly important as use of electronic and social media expands along with globalized tourism (European Commission 2009; Govers and Go 2009).

Balancing these potentially conflicting elements to achieve outcomes that meet heritage, community, industry, and customer needs poses continuing challenges.

Definition

Heritage tourism includes both production and consumption of "experiences" based on places

or collections with heritage or historic value. This value need not always be formally recognized in official heritage lists, but is realized at community level. It often includes intangible cultural elements as well as material culture. The "marketplace" in this entry refers to the global tourism marketplace.

Key Issues

1. Destinations and attractions are the product component of the tourism marketing mix (Ritchie and Crouch 2003; Pike 2008). Heritage attractions are part of the product mix of destinations, and include interpretation centers, shops, thematic reproduction, trails, and staged events, as well as the original site, place, or collection.

   In some cases, sites can be such strong attractions that they create destinations (Timothy 2011: 276–7). Sites like these usually have World Heritage status, like Machu Pichu (Peru), Angkor Wat (Cambodia), Pompeii (Italy) and Uluru (Australia). Most cultural heritage sites, however, act as attractions for destinations that people visit for a variety of reasons. In this case, they compete with all other attractions in that destination, as their destination competes with all other destinations

   Images of destinations and attractions are projected into marketplaces through a wide range of media. They are the vehicle through which destinations compete in the marketplace (Pike 2008: 201) and are central to branding and positioning. Visitor expectations of what a site will offer are frequently set well in advance of the actual visit, and their behavior on site reflects those expectations.
2. For any product to succeed in a marketplace, it must set itself apart from its competitors (Pedersen 2002: 53) and convince potential customers to prefer it over others. Where the attributes of an attraction or destination are very strong, these can create the necessary points of difference. Heritage classification is often used as a point of difference, and World Heritage listing is particularly valuable as a visitor attractor.

   In heritage tourism, the heritage values of the place should form the basis of its distinctive difference. Once heritage values are identified and accepted by stakeholders, they can become a springboard for planning appropriate tourism experiences and activities. Such experiences of the visitors are often used as market differentiators.

   Frequently, this does not happen. For instance, Uluru is a sacred place for the indigenous people of central Australia, who strongly prefer that visitors do not climb the rock. Yet many tour companies develop itineraries featuring "the climb" as the essential experience at Ayers Rock (the preferred tourism marketing term for Uluru) rather than taking a tour with an Anangu guide who can give unique insight into some of the meanings of the Dreaming site Uluru.
3. "Authenticity" is often used as a selling point, but tourists are often seeking a sense of "otherness" rather than authenticity per se (Timothy and Boyd 2003: 239–55; Timothy 2011: 103). The concept of authenticity itself is constructed differently in the tourism and heritage sectors, (Wang 1999; Smith et al. 2010) and in different parts of the world. Tourism, for instance, is likely to focus on the "authenticity" of the visitor experience, which may mean a tour is led by local guides and local food is served at meals. For heritage managers influenced by western paradigms of heritage, their main concern is likely to center on integrity of physical fabric, but in Asian cultures like Japan, there is no such concept as authenticity (Winter 2009).

   It is never possible to recreate the past accurately, nor to offer a single version of heritage as the only one that is true or authentic. Using an informed understanding of heritage values offers a path toward honesty in presentation, if not authenticity.

   The need for visitors to enjoy themselves, to have a positive experience, is likely to be paramount for a tourism operator, and that is what they will promote. If cultural and heritage

values are not to be compromised through tourism, heritage managers need to be able to convince tourism operators that it is in their interest to offer and promote an experience that relates to the heritage values of the site.

4. Selection of elements of heritage for tourism promotion is political, in the sense that it favors some histories over others (Timothy 2011: 118–39) and can be contentious (Graham and Howard 2008). Representations of the past are always selective and subjective. The reductive processes of branding and positioning for marketing aim to arrive at a simple, clear statement. "Honest" representation of heritage and culture through marketing is bound to be problematic because complexity and multiple voices are difficult to convey accurately in a way that will entice visitors.

   As Graham and Howard (2008: 13) note, "[when] heritage place meanings are contested, communication, and control over it, are potentially powerful weapons." For many countries, heritage which is closely linked to cultural and national identity is their main tourism selling point. Often, heritage tourism operators need to consider whether they will reinforce a national position or interpretation of the past. The following questions are raised:

   Which strands of heritage are chosen for representation and promotion? Are representations accurate? Do they create or reinforce stereotypes of past events and groups of people, for instance, of different races, classes, or religious faiths? Will minority views or unpleasant events and memories (such as war, slavery, massacre) be represented? Whose viewpoint will prevail? Which aspects will attract money for development? Which elements will attract paying visitors? How will these factors influence decision making? Baram and Rowan (2008) and Hitchcock et al. (2010) put forward case studies examining these and related questions in Asia, Europe, the Middle East, and North and South America.

5. Potential markets for heritage tourism vary with nature of the product and the experiences it offers at a location and with the demographic and psychographic profiles (values and interests) of potential visitors. Visitors have different interests, motivations, behaviors, and desired experiences – for instance, somebody traveling to visit cultural monuments will have quite a different motivation, set of expectations, and likely behaviors than someone who visits the same monument but is only incidentally there (Pedersen 2002: 24).

   To enhance their competitive position in the cultural and heritage tourism marketplace, many governments and industry associations carry out research that identifies their target markets and potential matches of different types of product with different market segments. For instance, the Canadian Tourism Commission (2002: n.p.) "identified culture in its broadest sense as a key component of the tourist industry" and began to work on a business strategy to "position culture and heritage as a key product line for Canada's tourist industry." The New Zealand Government commissioned a report on the demand for cultural tourism in that country (Angus and Associates 2008). Both these reports analyzed their potential cultural and heritage tourism product, and the market segments to which these products might successfully be promoted. The European Commission (2009) has also published research that identifies potential markets for cultural and heritage tourism product.

Heritage values and the tourism marketplace have the potential to conflict at many levels. Heritage specialists, marketers, communities, and product developers need to work together to meet the needs of the site, its visitors, and host community.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Experiencing Cultural Heritage
- ▶ Heritage Museums and the Public
- ▶ Heritage Research and Visitor Planning
- ▶ Heritage Tourism and the Marketplace
- ▶ Marketing Heritage

References

Angus and Associates. 2008. Demand for cultural tourism update: June 2008. Report prepared for Ministry for Culture and Heritage, Wellington. http://www.mch.govt.nz/files/ResearchPt1CulturalTourismUpdate.pdf. Accessed Mar 2011.

Baram, U., and Y. Rowan. 2004. Archaeology after nationalism: Globalization and the consumption of the past. In *Marketing heritage: Archaeology and the consumption of the past*, ed. Y. Rowan and U. Baram, 3–23. Walnut Creek: Rowman and Littlefield.

Canadian Tourism Commission. 2001. Packaging the potential discovering heritage tourism, practical ideas for the tourism industry. http://destinet.eu/tools/command_control_instruments/c. Accessed Oct 2011.

European Commission. 2009. Flash Eurobarometer survey on the attitudes of Europeans towards tourism Analytical report. http://ec.europa.eu/public_opinion/flash/fl_258_en.pdf. Accessed 7 Mar 2011.

Govers, R., and F. Go. 2009. Tourism destination image formation. In *Handbook of tourist behavior*, ed. M. Kozak and A. Decrop, 35–49. New York: Routledge.

Graham, B., and P. Howard, eds. 2008. *The Ashgate research companion to heritage and identity.* Aldershot/Burlington: Ashgate.

Hitchcock, M., V.T. King, and M. Parnwell, eds. 2010. *Heritage tourism in southeast Asia*. Copenhagen: Nordic Institute of Asian Studies.

ICOMOS. 1999. International cultural tourism charter. http://www.international.icomos.org/charters/tourism_e.htm. Accessed Oct 2011.

ICOMOS. 2008. The ICOMOS charter for the interpretation and presentation of cultural heritage sites. http://www.international.icomos.org/charters/interpretation_e.pdf. Accessed Oct 2011.

Pedersen, A. 2002. *Managing tourism at world heritage sites: A practical manual for world heritage site managers*, World heritage manuals 1. Paris: World Heritage Centre.

Pike, S. 2008. *Destination marketing: An integrated marketing communication approach*. Oxford: Elsevier.

Ritchie, J.R.B., and G.I. Crouch. 2003. *The competitive destination: A sustainable tourism perspective*. Wallingford: CABI Publishing.

Smith, G., P.S. Messenger, and H. Soderland, eds. 2010. *Heritage values in contemporary society.* Walnut Creek: Left Coast Press.

Timothy, D.J. 2011. Cultural heritage and tourism: An introduction. Bristol/New York: Channel View Publications.

Timothy, D.J. & S. Boyd. 2003. Heritage tourism. Harlow/Essex: Pearson Education.

Wang, N. 1999. Rethinking authenticity in tourism experience. *Annals of Tourism Research* 26: 349–370.

Winter, T. 2009. The modernities of heritage and tourism: Interpretation in an Asian future. *Journal of Heritage Tourism* 4: 105–115.

Further Reading

Kozak, M., and A. Decrop, eds. 2009. *Handbook of tourist behavior*. New York: Routledge.

Rowan, Y., and U. Baram, eds. 2004. *Marketing heritage: Archaeology and the consumption of the past*. Walnut Creek: Rowman and Littlefield.

Heritage Valuation: Paradigm Shifts

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H

Introduction

The heritage preservation movement in the United States has traditionally focused on tangible, physical resources – real property – as its anchor to a concept of national heritage, with language about intangible heritage values finding footing in more recent years in National Park Service Preservation Brief 36 and National Register Bulletins 18, 30, and 38. The historical development of this unique preservation movement and how heritage resources have come to be valued and managed are well documented (e.g., Murtagh 1997; King 1998; Tyler 2000). In short, there were several major paradigm shifts in the early years of the preservation movement. What began as a wealthy women's grassroots movement intended to enshrine colonial patrons shifted over decades into the domain of sociopolitically elite philanthropists. It then evolved into a federalized bureaucratic system in response to the Great Depression and, later, in reaction to destructive federal transportation and housing programs launched in the mid-twentieth century. This entry is an overview of an additional transformation that has occurred in the decades since the 1960s. Specifically, this entry asserts that the civil rights movement coincided with a rise in a multi-vocal interpretation of the past, which largely overwhelmed the notion of a monolithic national patrimony, and the response in the last three decades was to emphasize stakeholder

power and community-level heritage valuation. The result was a pendulum swing from the definition of heritage value by affluent, sociopolitical gatekeepers to a much more democratized practice of historic preservation.

Definition

Heritage valuation is simply the process by which stewards – ranging inclusively in scale from governments to local community members – attempt to assess, identify, and specify what it is about a particular place on the landscape that gives it cultural significance and meaning. It reflects an understanding that values are mutable, multifaceted, and open to divergent interpretation, and that heritage resources have both historical depth and contemporary meaning.

Historical Background

More than a century since its inception, heritage valuation in the United States is now codified in more than a dozen laws, regulations, and presidential executive orders, and is measured in the coin of national patrimony. Arguably one of the most influential laws in terms of fiscal and preservation impact is the *National Historic Preservation Act* of 1966 (NHPA; PL 89-665). The NHPA, among other things, established the National Register of Historic Places and placed it under the administration of the National Park Service (16USC470[a]). The law was passed to ensure that resources significant to national heritage and exhibiting a certain "quality of significance" and "integrity" would be preserved (36CFR60). Such resources were defined strictly as "any prehistoric or historic district, site, building, structure or object included in, or eligible for inclusion on the National Register" (16USC470[w][5]). In advance of destructive federal projects, it is only properties listed on or eligible for listing on the National Register that are afforded consideration to determine whether their preservation or destruction is in the public's best interest. An entire private sector enterprise – "cultural resource management" – has arisen in response to the NHPA and other relevant preservation law, with parallel responses in the government sector and with theoretical grounding in the academic world.

Key Issues/Current Debates

The National Register and its associated guidelines have at times had difficulty reconciling the interwoven areas of stakeholder consultation, community-level resource valuation, intangible resources recognition, and national documentation. Major preservation interests in the United States have in recent years begun to grapple with these issues, responding to calls to reconcile the national recognition system with more democratic, grass roots understandings of what it is that gives heritage resources and places their value. A shift seems to have occurred in the late 1980s and 1990s, in which community-level valuation of these resources by ordinary people began to penetrate the traditional preservation practice of commemorating patrimonial icons.

International Perspectives

Several historical trends in different arenas – academic, economic, and social – have converged to make such a paradigm shift possible. One trend is for the deconstruction of the notion that there is "a" national heritage, largely as a consequence of the activism of descendant communities during and after the 1960s civil rights movement. Accepted national stories, such as how the west was "won" or how enslaved people were treated on plantations, were questioned, contested, and sometimes recast. Even the primacy of Western epistemology, including notions of "property" and "ownership," has been challenged by indigenous belief systems that view cultural objects and society as inextricably entwined (Ziff and Rao 1997; Warren 1999). Native Americans in the 1960s and 1970s were especially vocal, and their perceived connection with the natural environment made them key players in the evolution of cultural resource management (King 1998: 16).

This position enabled them to advocate strongly in the 1980s for federal recognition of "intangible" heritage values. Ultimately, they influenced the NHPA by means of an amendment in 1992 that specifically identifies properties of "traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization" as eligible for the National Register (16USC470 Section 101 [d][6]).

The National Park Service issued National Register Bulletin 38 in an effort to illustrate how traditional cultural properties were to be identified, assessed for significance and integrity, and considered for inclusion on the National Register (Parker and King 1990). Significantly, the authors of Bulletin 38 identified community stakeholders as the only people with the ability to recognize and evaluate the value of these types of resources, but reversed themselves to make stakeholders' opinions subject to validation by cultural anthropologists, i.e., "outside experts." One of the unintended consequences of the guidance thus was to highlight issues of authenticity, authority, and cultural legitimacy and their gatekeeping roles in the national heritage documentation system. Gatekeeper controversies and how to surmount the sociopolitical realities embedded historically already were a part of the traditional preservation conversation, and the new bulletin expanded that dialogue significantly, even if unintentionally. Consider, for instance, the highly visible and controversial "Chumash Debate" that transpired in the 1990s in cultural resource management and academic circles (e.g., Haley and Wilcoxon 1997). A series of critiques emerged and centered around the notion that at some level, arguments about the authenticity of indigenously identified traditions are a subtext for continued arguments over imperialism, sovereignty, and power. These discussions held that federal preservation law fosters the notion of a static past that is incompatible with the anthropological notion that change, fluidity, and situational boundaries are the sine qua non of culture.

Similar debates also arose that were centered on resources of value to other communities (e.g., places of African-American enslavement, Japanese American prisoner internment camps, and other "sites of conscience"), and the challenge to resource valuation grew. The recognition of subaltern histories and contradictory, competing interpretations of "patrimonial" icons became a primary concern in the traditional preservation community. Consider, for instance, the promulgation in 2004 of the *Ename Charter for the Interpretation of Cultural Heritage Sites* by the International Council on Monuments and Sites (ICOMOS), which was ratified in 2008 and called for interpretation of contested viewpoints. Gustavo Araoz (2006), then executive director of U.S. ICOMOS, explained that although "the international heritage community has managed to get by without detailed guidance on how to articulate a site's significance to the general public," there was a need for a new set of ethical principles based on the recognition that there are no unchallenged, uniformly accepted stories within a pluralistic democratic society. In summary, the empowerment of indigenous communities as part of the civil rights movement gave them the means by which to challenge the notion of a homogenous national patrimony, which indirectly challenged the idea of a homogenous national recognition system.

In addition to multivocality, another trend that has converged to promote a paradigm shift in heritage valuation is the growing recognition that, with few exceptions, the developmental trajectory of historic preservation in the United States has resulted in the exclusion of places that give specific communities their particular identity – sense of place. Sense of place is the connection between people and the places they repetitively use, in which they dwell, in which their memories are made, and to which they ascribe a unique feeling (Morgan et al. 2006: 706). Historic preservation in the national context has excluded the commonplace and the seemingly inconsequential markers on the landscape that anchor people to what they call home, and to what they identify as their heritage. This became poignantly clear in the aftermath of Hurricane Katrina in 2005, when local communities on the central Gulf Coast questioned the value of a federal commemorative system when it was not individual icons but an entire "sense of place" that was

endangered (Morgan et al. 2006). Preservationists were obliged to reconsider exactly what it is that our federal system documents and how effective it is at helping communities preserve the places important to them. Seemingly ordinary places underrepresented in the federal system can be as important to the people who live among them as the properties that preservation "experts" deem worthy of the National Register. That the gap between community sense of place and National Register placement did not come into sharp relief sooner suggests there is an institutional misunderstanding about what makes heritage resources valued in local and community contexts.

Additionally, the globalization of national communications, economics, and politics in recent years has strained notions of community identity. Randall Mason (2006) places the impetus for a paradigm shift in resource valuation in what Andreas Huyssen (2003) termed "memory culture." The last decade, Huyssen asserts, represents a time of innovation in how society deals with memories of its past, a crisis response catalyzed by "deep, fundamental dislocations in society caused by mega-trends like globalization, regional economic transformations, post-colonial policy shifts, migration, and the influence and reach of the media" (Mason 2006: 26). Memory culture, says Mason (2006: 28), "demands a different sort of preservation practice, in which preservationists' traditional focus on materiality is augmented by means for dealing with different cultural interpretations, competing political demands, and economic influences," which he dubs values-centered preservation.

Future Directions

Internationally the shift in heritage resource management toward decentralization and toward the placement of management and valuation into the hands of stakeholders is well under way (e.g., Mitchell 2003; Phillips 2003). In the United States, the practice of resource management suggests that what the American people value about the past is changing. Evidence may be seen in the explosive growth of National Heritage Areas: a grassroots, decentralized management strategy anchored on the concept of community sense of place, with valuation and management both at the local level (e.g., Barrett and Carlino 2003; Barrett et al. 2006; Morgan et al. 2006, 2010; Morgan 2010). It is also evident in the rising interest in historic highway corridors and historic trails, and in professional discourse about heritage values. The latter includes recent Preserve America Summit proceedings held by the Advisory Council on Historic Preservation (2007a, b), and a round table discussion at the National Trust for Historic Preservation annual meeting in 2007. Discussions at the Preserve America Summit, for instance, were oriented formally around stakeholder and intangible heritage value issues, and panels of distinguished preservation practitioners urged the Council to attempt to merge "places presently protected informally by cultural groups in the greater protection of the NHPA," with resource evaluation beginning with the stakeholder (Hutt et al. 2007: 1).

From these, we glean a sense that what ordinary citizens value about the places they hold dear is much more expansive than what is currently encompassed by traditional historic preservation. That which is valued tends to include modified and unmodified aspects of the landscape; encompasses living and diverse communities, along with their cultural traditions; is centered on people and sense of place rather than historic "fabric" alone; and connects people through their heritage via the act of narration. In short, preservation has belatedly embraced its overlap with cultural anthropology as it shifts the locus of its efforts to contemporary communities of local people. Stakeholder participation must rest at the heart of any documentation and preservation system that tries to capture sense of place at a local level.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Cultural Heritage and Communities

▶ Cultural Heritage and the Public
▶ Cultural Heritage Management and Gender
▶ Cultural Heritage Management and Native Americans
▶ Cultural Heritage Management and the Colonial Culture
▶ Cultural Heritage Management: Building Bridges
▶ Cultural Heritage Management: Cost and Benefit of Change
▶ Heritage and Public Policy
▶ Heritage Areas
▶ Heritage Landscapes
▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
▶ Heritage Theory
▶ Heritage, Changing Views of: A Legal Perspective
▶ Heritage: History and Context
▶ Heritage: Public Perceptions
▶ Intangible Cultural Heritage
▶ Local Populations and Global Heritage
▶ Urban Heritage

References

Advisory Council on Historic Preservation. 2007a. The Preserve America summit executive summary: Charting a future course for the national historic preservation program. Available at: http://www.preserveamerica.gov/docs/Executive_Summary_lr.pdf. Accessed 2 Oct 2007.

Advisory Council on Historic Preservation. 2007b. *The Preserve America summit: Findings and recommendations of the Advisory Council on Historic Preservation*. Published August 2007. Available at: http://www.preserveamerica.gov/docs/Summit_Report_full_LR.pdf. Accessed 4 Oct 2007.

Araoz, G. 2006. Some background musings on the need for an ICOMOS-ENAME charter for the interpretation of cultural heritage sites. *George Wright Forum* 23: 40–43.

Barrett, B., and A. Carlino. 2003. What is in the future for the heritage area movement? *Forum Journal* 17: 51–56.

Barrett, B., N.I.M. Morgan, and L.S. Gates. 2006. National heritage areas: Developing a new conservation strategy. In *Art and cultural heritage: Law, policy and practice*, ed. B. Hoffman, 220–233. Cambridge: Cambridge University Press.

Haley, B.D., and L.R. Wilcoxon. 1997. Anthropology and the making of Chumash tradition. *Current Anthropology* 38: 761–777.

Hutt, S., R. Pierpont, and D.B. Kraus., eds. 2007. Preserve America summit issue areas panel report: Involving all cultures. Available on the Advisory Council on Historic Preservation Website "Preserve America Summit Event and Information." Available at: http://www.preserveamericasummit.org/pa/. Accessed 2 Oct 2007.

Huyssen, A. 2003. *Present pasts: Urban palimpsests and the politics of memory*. Stanford: Stanford University Press.

King, T.F. 1998. *Cultural resource laws and practice: An introductory guide*. Walnut Creek: AltaMira Press.

Mason, R. 2006. Theoretical and practical arguments for values-centered preservation. *CRM: The Journal of Heritage Stewardship* 3: 21–48.

Mitchell, B. 2003. International models of protected landscapes. *The George Wright Forum* 20: 33–40.

Morgan, D.W. 2010. Descendant communities, heritage resource law, and heritage areas: Strategies for managing and interpreting Native American traditional and cultural places. In *Cultural heritage management: A global perspective*, ed. G.S. Smith and P.P. Messenger, 199–211. Gainesville: University Press of Florida.

Morgan, D.W., N.I.M. Morgan, and B. Barrett. 2006. Finding a place for the commonplace: Hurricane Katrina, communities, and preservation law. *American Anthropologist* 108: 706–718.

Morgan, D.W., N.I.M. Morgan, B. Barrett, and S. Copping. 2010. From national to local: Intangible values and the decentralization of heritage management in the United States. In *Heritage values: The past in contemporary society*, ed. G.S. Smith, P.M. Messenger, and H. Soderland, 113–128. Walnut Creek: Left Coast Press.

Murtagh, W.J. 1997. *Keeping time*. Revised edition. New York: Wiley.

Parker, P.L., and T.F. King. 1990. *Guidelines for evaluating and documenting traditional cultural properties*, National Register Bulletin. Vol. 38. Washington, DC: U.S. Department of the Interior, National Park Service, Interagency Resources Division.

Phillips, A. 2003. Turning ideas on their head: the new paradigm of protected areas. *The George Wright Forum* 20: 8–32.

Tyler, N. 2000. *Historic preservation: An introduction to its history, principles, and practice*. New York: W.W. Norton & Company.

Warren, K.J. 1999. A philosophical perspective on the ethics and resolution of cultural property issues. In *The ethics of collecting cultural property: Whose culture? Whose property?* ed. P.M. Messenger, 2nd ed., 1–25. Albuquerque: University of New Mexico Press.

Ziff, B.H., and P.V. Rao, eds. 1997. *Borrowed power: Essays on cultural appropriation*. New Brunswick: Rutgers University Press.

Further Reading

Barrett, B. 2003. Roots for the national heritage area family tree. *The George Wright Forum* 20: 41–49.

Brown, M.F. 1997. Comments: Anthropology and the making of Chumash tradition. *Current Anthropology* 38: 777–778.
Daly, J. 2003. Heritage areas: Connecting people to their place and history. *Forum Journal* 17: 5–12.
Haley, B.D. 2004. Review of places that count: Traditional cultural properties in cultural resource management. *Southeastern Archaeology* 23: 226–228.
Kelley, K.B. 1997. Comments: Anthropology and the making of Chumash tradition. *Current Anthropology* 38: 782–783.
Smith, G.S., and P.M. Messenger, eds. 2010. *Heritage resource management, policies, and issues in global perspective*. Gainesville: University Press of Florida.

Heritage Values and Education

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Introduction

Heritage is a complex topic that has critical relevance to social, cultural, and national issues around the world. In general, heritage professionals seek to document, preserve, interpret, and promote heritage stories on local and global levels. There are many complex issues involved in this work. For example, how does one interpret the heritage of the past, the present, their own heritage, or the heritage of others? More importantly, how do heritage professionals responsibly distribute this information to the public once it has been created and interpreted? This section examines how researchers in a wide variety of academic fields have studied heritage and how these researchers struggle to negotiate heritage in an increasingly globalized world.

Definition

The nature of its existence necessarily means that heritage is a difficult concept to identify in concrete terms. Heritage has a wide range of meanings and interpretations throughout the world and can hardly be defined in a way that would be appropriate for all of its applications. However, it is possible to consider some of the key issues that surround the idea of heritage. Identity, memory, and sociocultural values all contribute to how heritage is understood and interpreted (Smith 2007). While it may seem that heritage is necessarily synonymous with culture, the two concepts have very different aims in what they seek to describe. Heritage is the conglomeration of cultural or ethnic practices, beliefs, and expression throughout time. Although culture is absolutely necessary to understand heritage and it is very often the case that heritage helps in the understanding and formation of culture, both heritage and culture must be taken in their own contexts and then considered in relation to one another rather than as a single entity. Heritage and culture are not so much two sides of the same coin as they are different variations of social currency that influence one another heavily.

Beyond looking at manifestations of culture that include music, dance, art, architecture, language, religion, mythology, and/or folklore, heritage as a concept also represents the impressions, reactions, and the formation of ideas that come from interactions with each of these forms of cultural expression. Also at issue is whether heritage is purely a construction of those who recognize some notion of the concept for themselves or if heritage is constructed from the outside. Some could argue that the answer to this question is a combination of these two ideas. Heritage is not only the connections to the past that are recognized by a particular cultural group but also the characteristics assigned to the interpretation of these connections from those on the outside. It is from this point of view that key studies into the misinterpretation or "silencing" of cultural heritage come into play, an issue that will be discussed further in this entry (see Trouillot 1995).

Although heritage cannot be easily defined, the ways in which researchers have considered heritage in their work can lend to an understanding of the concept's scope. Valene L. Smith's highly influential book, *Hosts and Guests* (1977), catalyzed the analysis of cultural tourism within the

context of anthropology and ultimately influenced the study of heritage for the next three decades. In subsequent editions, Smith's view of heritage places the identification of the concept firmly in the hands of the cultural group. What this means is that the members of the group are the ones that claim association with a particular cultural tradition and are the ones who determine how this tradition is made available to an audience outside themselves (Smith 2001a). Furthermore, Smith carefully asserts that heritage is not history. Rather, heritage is the result of cultural groups adding value to the interpretations built from historical fact (Smith 2001b). It is clear from the evolution of the discussion of tourism and culture in her work that heritage grew as a focal point for tourism studies from the 1970s through to present-day studies of the concept.

The consideration of heritage in relation to tourism typically necessitates a commoditized view of heritage. Barbara Kirshenblatt-Gimblett (1998) views heritage as a new concept that works to connect the past to the present with the result of a new cultural interpretation of the past. Where some authors acknowledge a relatively narrow view of what heritage means, others explore the meaning of the concept in broader terms. In his book, *The Tourist Gaze*, John Urry (2002) grapples with the idea of what heritage is – or how it evolved – and examines how it has been folded into the tourism industry. He considers the many embodiments of the concept: heritage as a commodity constructed by the state, as fantasies about history, as artificial stories meant to entice the imagination into connecting with the history of a region, or as a result of public nostalgia and the need to tie together preservation efforts and public interest. In Urry's (2002) treatment of heritage, it seems that heritage displays as representations of history fail to properly encompass the social processes necessary for understanding the past on display. Thus, while heritage exists outside of historical fact and functions as a story about what took place during a particular time, the perception of what has taken place relies on the interpretation of facts rather than on the facts themselves. This interpretation is ultimately what is meant when heritage is discussed in present-day contexts. Erve Chambers (2000) also examines heritage through the lens of the tourism industry. Rather than focusing on heritage as the product of past cultural or historical expression, Chambers characterizes heritage as the history and cultural connections to the past that groups – in this case, indigenous groups acting as hosts for tourist engagement – recognize and embrace as part of their cultural story. The performances and simplistic representations of these stories are commoditized manifestations tied to the intersection of heritage and the tourism industry and not manifestations of heritage in and of themselves.

Looking beyond heritage in the context of tourism, authors such as Laurajane Smith and David Lowenthal characterize heritage as tangible and intangible links to the past, whether these links are manifest in the form of place, material culture, or other culturally significant connections to a shared past. Smith (2004, 2007) considers heritage in association with identity formation and how indigenous communities and professionals who view manifestations of heritage as data interact with one another. Lowenthal (1998) succinctly characterizes heritage as anything that has been handed down from the past, yet carefully ensures that heritage is understood as distinct from history. As both authors show, heritage and environment are inextricably linked, as are heritage and history, and these links are the foundations for the cultural stories that develop into the heritage product. Though these considerations of heritage are not particularly unified, they do point to an effort to broadly characterize heritage and heritage studies rather than constrain the concept to a single definition.

Historical Background

In the last several decades, the study of heritage has blossomed as both an anthropological and archaeological topic. The discussion of cultural heritage in an anthropological context has been building in importance and frequency since the late nineteenth century with a marked rise in relevance in the final decades of the twentieth century (Smith 2007). The past 75 years have been

particularly formative for the theoretical, methodological, ethical, and professional underpinnings of cultural and archaeological heritage issues. Until recently, heritage studies were focused largely on the technical matters of conservation, preservation, and management. It has taken this long period of development for heritage studies to be considered in a more sociocultural context (Harvey 2001). As has been discussed, heritage is not an easy concept to define but can generally be taken as a way cultural groups link the past, present, and the identities and connections formed from this link.

For centuries what we now refer to as heritage was a deeply meaningful but un-termed connection to the past that was inherent in cultural and personal identities. Serious academic consideration of heritage as an anthropological and archaeological topic took hold in the 1980s and 1990s. Since its inception, the concept of heritage has been viewed from a number of theoretical and academic perspectives. Cultural heritage as presented in the museum was the earliest manifestation of heritage for the public and was thus the aspect of heritage that was first considered by researchers. Discussions of display eventually gave way to the global showcasing of heritage and how it fits in to the globalization and the spread of culture that can be connected to the dawn of the mass tourism industry in the 1970s. With the increased engagement with physical manifestations of heritage – architecture, artifacts, and monumental remnants of the past – it has become necessary to consider how these objects and spaces can be protected while functioning to educate the public on their origins and uses. While exhibition and public access to sites and monuments are some of the key ways in which the public is educated on both the heritage of their own cultures and the cultures of other groups, these exhibitions are inherently taxing on the integrity of the object, if not destructive. Thus, the intersection of technology and heritage has gained relevance for researchers as it is becoming necessary to present tangible and intangible heritage digitally in order to preserve and protect this important resource (Pozzi and Ott 2011). This recent and innovative avenue of research coupled with issues of globalization, identity formation, agency, and community involvement makes up the contemporary format of heritage studies as it functions across disciplines today.

Key Issues/Current Debates

The distribution of heritage to the public is a complex process fraught with challenges and opportunities. Michel-Rolph Trouillot's work on "silences" is a key example of how heritage presentation can have both positive and negative outcomes (1995). In this work, Trouillot considers that heritage presentations do not always encompass the whole story. Rather, the truth in matters of history and heritage is bypassed by the narrative's presentation as a result of the power and authority that the narrative carries. The silencing of cultural history has to do with the power that competing stories have. This can mean that the most powerful faction, the group with the ability to make their voice heard, tells the story and effectively silences other interpretations of heritage and the past or it could mean that a particular story is more interesting or economically exploitable than another that is equally valid, as is frequently seen in heritage tourism. One must always consider what the representation of one set of facts or ideas rather than another does to the viability of the alternative views regarding the story being presented.

The display of cultural and archaeological heritage in venues such as museums or heritage centers is the primary way in which the public encounters the materiality of heritage. Whether these institutions are utilized at home or abroad, their influence is no less profound. Museums give legitimacy and authority to the items on display within them, they carry a certain level of power that allows objects to be seen as outside the world as it is typically presented. In some cases, this has the result of items on display in this context being viewed as artistic expressions, rather than as a cultural item with tangible connections to people alive today (Alpers 1991). This view of "object as art" disconnects the material cultural heritage from the community that claims it, and audiences come to see these items as having little to no

relevance in the present. However, display can be used effectively to unite heritage stories with their objects, particularly as new technological methods for enabling interaction and engagement between museums, heritage centers, and their audiences continue to emerge (Pozzi and Ott 2011).

The issues of ownership and agency have recently gained primacy in the discussion of heritage. Community involvement in the interpretation of heritage and the production of heritage display has risen to a level of ethical necessity. Just as display influences how those who engage with heritage presentations understand the heritage on display, the process of interpreting heritage for display influences how it is understood. Those professionals who decide what the story is and how it should be told filter the information through their own perspectives and experiences before they arrive at the final representation of the heritage they are considering (Karp and Lavine 1991; Copeland 2006). Thus, it is necessary to involve communities in the interpretation of their own heritage. Agency and ownership are vital in the authenticity of the story. The telling of one's heritage gives individuals power not only over the story of their past but the identity that grew out of it. They are able to influence how other people see them and engage meaningfully with their past, and in many cases this can have a powerful effect on the community on both a local and global scale (Jackson 2009; Figueroa et al. 2012). When heritage professionals attempt to interpret cultural stories without the help of the communities who embrace them as heritage, they effectively change how the story is perceived. Rather than originating from those who hold the heritage story as part of their cultural history, it is filtered through an outside perspective and becomes distanced from those who hold that heritage as their own (Karp and Lavine 1991).

Though the problems involved with the presentation of heritage are many, they are not insurmountable. The distribution of cultural heritage in both local and global contexts can serve to help cultural groups tell their stories and promote a more culturally relative world. When community relationships are built between the heritage professional and those whose heritage is being presented, the community can directly benefit. Participating in the display of their heritage, and deciding what will and will not be made available to the public, gives communities control over how their stories are used in a present context. Heritage and the cultural past have been used for centuries to affirm rights over lands, inheritances, and identities, and this is no less at issue today. This discussion has been focused on heritage as an embodiment of the past and the connections that people make to their own perceived history. However, it is also necessary to consider the production of heritage as it takes place today. How does society protect what they feel will be important for future manifestations of the cultural patterns that are identified and adhered to as heritage? What is the legacy that is left for future researchers, archaeologists, and enthusiasts? How does our own interpretation of what is important about us now and in the past influence the way we think about our past, present, and future? The establishment of heritage for the future is one realm of exploration that has yet to be considered and is one that will undoubtedly make for intellectually stimulating dialogue as the conversation about heritage develops.

International Perspectives

Heritage concerns vary across national borders. While in some countries it may be important to ensure preservation of intangible forms of heritage or work closely with cultural groups who identify as living ancestors of past peoples, other countries place greater emphasis on preserving the built environment. The United States and Australia are two examples of countries where a close relationship with local groups is vital to understanding and responsibly interpreting and displaying archaeological and cultural heritage. In both cases, there are descendent communities whose concern for the integrity of their ancestors' property and remains outweighs the interest of the general public. In the Mesoamerican region, the relationship between the built heritage and the descendent community is tied so closely to the

tourism industry that much of the power involved in heritage presentation is in the hands of the government or foreign interests.

Heritage has been developed at an international scale to appease both local and global publics. As tourism ventures have become more accessible to people living around the world, so have the cultures in the areas to which tourists are drawn. Outside of the media, tourism is the largest heritage educator for the global audience today. Despite the fact that travel may not be a possibility for every individual who learns a cultural lesson as a result of tourism, the stories that travel with those who are able to leave their home cities and countries influence how heritage is learned and understood throughout the world. As the world becomes more globalized, so does the understanding of culture and heritage. Depending on the context in which this information is presented and the methods taken to ensure responsible public education, people will come away with different perceptions of the places they visit (Salazar 2012). This globalization essentially builds heritage identities that may not necessarily be those that are embraced by the cultures to which these identities are inscribed.

With the recognition of heritage as a valuable asset for knowledge and commerce, the international community has developed a concern for the protection of these resources to be appreciated on a global scale. Indeed, it has become the trend to protect and view natural, anthropogenic, and intangible heritage resources as the legacy of all people, not just those that live in the areas where the resources reside. In order to facilitate the protection of these resources, the United Nations and other world organizations developed programs to oversee the preservation and care of the world's heritage. The United Nations Educational, Scientific, and Cultural Organization (UNESCO), the International Council on Monuments and Sites (ICOMOS), and the International Committee on Archaeological Heritage Management (ICAHM) are three examples of organizations who strive to protect the world's heritage legacy. Where UNESCO focuses on a variety of global issues and works to protect and educate the public on both tangible and intangible forms of heritage, ICOMOS, which operates in association with UNESCO, focuses mainly on bringing together professionals that work towards the research and protection of architectural and archaeological heritage. The ICAHM advises ICOMOS on issues concerning the protection of both archaeological sites and landscapes with a focus on professional method and practice.

Although these organizations certainly do a lot for heritage resources throughout the world, it is important for heritage professionals and academic researchers to recognize that, though these organizations have an international focus, they are largely based in Western views of heritage and heritage management. This results in an organizational bias towards Western heritage management strategies and practices that are not necessarily applicable globally. While Western cultures have largely embraced the roles of organizations such as UNESCO, ICOMOS, and the ICAHM, non-Western cultures are beginning to lament the assertion of Western heritage values on their cultural properties and perceived heritage (Smith 2007). A reflexive self-analysis of the role that heritage professionals and interpreters play in the final representation of heritage has become a vital part of heritage studies. This same reflexivity needs to be applied to the discipline and to look more closely at non-Western considerations of heritage, what it means, and how it should be presented to the global public, if at all.

Future Directions

This entry considers heritage education as a complex process of interpretation and presentation. How archaeologists and anthropologists interpret heritage is always changing and is consistently influenced by the local stakeholders and public interests that are at play. Although individuals may construct and interpret a personal view of their own heritage, the heritage of the other is mediated by professionals who strive – typically from an outside perspective – to understand past cultural knowledge for the benefit of a global audience. Although a definition is elusive, it is possible to understand heritage as connecting the past and the present of cultural groups in a way that is meaningful for the formation of identity

and the mutual understanding of cultural differences and similarities in the world. Heritage is essentially an umbrella term for a variety of cultural expressions that link people to their past and present. Heritage can, and does, represent everything from material culture to intangible forms of culture, such as dances or musical expression. In order to ensure that the host culture is properly served, heritage professionals must be responsible in the ways in which they showcase heritage. One must always be acutely aware of audience, display, context, and, inevitably, their own biases, as well as their knowledge of the material they are attempting to disseminate to a wider public. Without this care and attention to detail, the public may come to know a heritage story that is either inaccurate or does not do justice to the wishes of the community.

Cross-References

- ▶ Activism and Archaeology
- ▶ Advertising and the Appropriation of Culture
- ▶ Archaeology and Anthropology
- ▶ Archaeology as Anthropology
- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Global Heritage Fund (GHF)
- ▶ Heritage and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage Theory
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values, Communication of
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Intangible Cultural Heritage
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ Local Populations and Global Heritage
- ▶ Marketing Heritage
- ▶ Preservation Paradigm in Heritage Management
- ▶ Space Heritage Protection
- ▶ Sustainability and Cultural Heritage
- ▶ Tangible Heritage in Archaeology
- ▶ Uses of Heritage

H

References

Alpers, S. 1991. The museum as a way of seeing. In *Exhibiting cultures: The poetics and politics of museum display*, ed. I. Karp and S.D. Lavine, 25–32. Washington: Smithsonian Institution Press.

Chambers, E. 2000. *Native tours: The anthropology of travel and tourism*. Long Grove: Waveland Press, Inc.

Copeland, T. 2006. Constructing pasts: Interpreting the historic environment. In *Heritage interpretation*, ed. A. Hems and M. Blockley, 83–95. New York: Routledge.

Figueroa, A.J., W.A. Goodwin, and E.C. Wells. 2012. Mayanizing tourism on Roatán Island, Honduras: Archaeological perspectives on heritage, development, and indigeneity. In *Global tourism: Cultural heritage and economic encounters*, ed. S. Lyon and E.C. Wells, 43–60. Lanham: AltaMira.

Harvey, D.C. 2001. Heritage pasts and heritage presents. *International Journal of Heritage Studies* 7 (4): 319–338.

Jackson, A. 2009. Conducting heritage research and practicing heritage resource management on a community level – Negotiating contested historicity. *Practicing Anthropology* 31 (3): 5–10.

Karp, I., and S.D. Lavine, eds. 1991. *Exhibiting cultures: The poetics and politics of museum display.* Washington, DC: Smithsonian Institution Press.

Kirshenblatt-Gimblett, B. 1998. *Destination culture: Tourism, museums, and heritage*. Berkeley: University of California Press.

Lowenthal, D. 1998. Fabricating heritage. *History and Memory* 10 (1): 5–24.

Pozzi, M., and F. Ott. 2011. Towards a new era for cultural heritage education: Discussing the role of ICT. *Computers in Human Behavior* 27: 1365–1371.
Salazar, N.B. 2012. Shifting values and meanings of heritage: From cultural appropriation to tourism interpretation and back. In *Global tourism: Cultural heritage and economic encounters*, ed. S. Lyons and E.C. Wells, 21–41. Lanham: AltaMira Press.
Smith, V.L., ed. 1977. *Hosts and guests: The anthropology of tourism*. Philadelphia: University of Pennsylvania Press.
Smith, V.L. 2001a. Tourism change and impacts. In *Hosts and guests revisited: Tourism issues of the 21st century*, ed. V.L. Smith and S.M. Brent, 107–121. Elmsford: Cognizant Communication Corporation.
Smith, V.L. 2001b. Sustainability. In *Hosts and guests revisited: Tourism issues of the 21st century*, ed. V.-L. Smith and S.M. Brent, 187–200. Elmsford: Cognizant Communication Corporation.
Smith, L. 2004. *Archaeological theory and the politics of cultural heritage*. New York: Routledge.
Smith, L., ed. 2007. *Cultural heritage*. New York: Routledge.
Trouillot, M. 1995. *Silencing the past: Power and the production of history*. Boston: Beacon Press.
Urry, J. 2002. *The tourist gaze*. London: Sage Publications Ltd.

Further Reading

Brent, M., and V.L. Smith, eds. 2001. *Hosts and guests revisited: Tourism issues of the 21st century*. Elmsford: Cognizant Communication Corporation.
Brent, M., and V.L. Smith, eds. 2006. Natural and cultural heritage. *International Journal of Heritage Studies* 11 (1): 81–92.
Smith, V.L., ed. 1989. *Hosts and guests: The anthropology of tourism*. Philadelphia: University of Pennsylvania Press.

Heritage Values, Communication of

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Introduction

Safeguarding natural and cultural heritage is complex for many reasons, not least, determining what is important, to whom, and why. Inherent in the challenge is the engagement of a broad public. Fostering attachment and custodial responsibility for our patrimony, while ensuring heritage values embody the aspirations of sustainable futures in an inclusive and constituency-building manner, is not simple. Layered on this are the increasingly borderless and entangled realities of the "glocal" (Bauman 1998). Moreover, "heritage" and "identity" are contested, continually reconstructed, renegotiated, and subject to reinterpretation and to shifts in collective worldviews (Kirshenblatt-Gimblett 2004). ICOMOS acknowledges this slipperiness in Article 3 of the *Quebec Declaration for the Preservation of Spirit of Place*:

> A continuously reconstructed process, which responds to the needs for change and continuity of communities, we uphold that it can vary in time and from one culture to another according to their practices of memory, and that a place can have several spirits and be shared by different groups. (ICOMOS 2008)

This constancy of change and plurality of view are at the heart of numerous debates around heritage. Cultural migrations and blurrings are nothing new; however the speed of change is much greater, as is our awareness and sensitivity to what Bauman (2000) describes as "liquid modernity" where change is hyperconstant. Ongoing debates map tensions between conservation and development, between the developed and the developing world, between western and non-western views, between different cultural constructions of our connections to place and time, between global and local, and between Indigenous and non-Indigenous understandings among other deliberations on what is important and what "our" heritage means. These deliberations set in motion contestation around who should arbitrate on what is important, what should be protected, who should be entitled or empowered to make such decisions, and through what processes. To sensitively communicate heritage values, it is necessary to consider what agendas should be privileged; who is "authorized" to speak on behalf of particular places, histories, and understandings; who has agency and voice; and whose values are being communicated in these processes (Staiff and

Bushell 2003). These are significant ethical, philosophical, and pragmatic questions.

Defining the Topic

As noted heritage values do not lend themselves to simplistic definition. Heritage sites and places have both official and unofficial interpretation and visitor information, through visitor centers, Internet sites, guides, audio tours, guidebooks, and so on. With the democratization of mass communication and the exponential rise of electronic experience and idea sharing, various forms of social media are employed for the distribution of information and the experiences of place. Communicating heritage values entails processes of engaging and sharing with others, with place. Material should encourage an appreciation for both tangible and intangible heritages. The process of communication must be mindful of the complexity, and embrace the fluidity, and hybridity of both heritages and communities. Both are located at the interface of economy, place, stakeholders, history, and ongoing cultural productions. And so communications need to be sophisticated to be effective and to do justice to the values.

Key Issues

Many processes and relationships, social, political, and cultural, are in play, shaping views of heritage values. Contestations surrounding integrity and authenticity continue unabated and influence what should be valued, to be protected, and communicated as the embodiment of heritage. The *Nara Document on Authenticity* responded to concerns about *very* particular cultural views of how authenticity should be managed, protected, and understood. It states that:

> In a world that is increasingly subject to the forces of globalization and homogenization, and in a world in which the search for cultural identity is sometimes pursued through aggressive nationalism and the suppression of the cultures of minorities, the essential contribution made by the consideration of authenticity in conservation practice is to clarify and illuminate the collective memory of humanity. [Article 4]

The document continues. . .

> All judgements about values attributed to cultural properties as well as the credibility of related information sources may differ from culture to culture, and even within the same culture. It is thus not possible to base judgements of values and authenticity within fixed criteria. On the contrary, the respect due to all cultures requires that heritage properties must be considered and judged within the cultural contexts to which they belong. [Article 11] (ICOMOS 1994)

A nuanced framing is requisite to communicate such ideals to preserve the very local essence of these heritage values. This suggests moving away from approaches that treat heritage as though it were a tangible object that can be readily presented, represented, explained, and communicated. Attempts to do so through particular heritage "messages" – the triggers that curators, interpreters, and heritage professionals and bureaucracies hope will invoke passion and commitment toward heritage – are too often simplistic. Rather than a "takeaway message," given the complexity, is for any communication to open ongoing dialogue, through an engaging and empowering process encouraging personal connections and embodied responses; allowing a diversity of experiences, meanings, understandings, attachments, and purposes. Such processes should be designed to encourage greater opportunity for involvement from those who reside in and visit these special places, not keep the safeguarding, the rights, and the responsibilities for heritage specialists only. This would seem more appropriate, resonating with the democratization of communication and information sharing, allowing for a more subtle and personal sense of connection. The lead should come from communities working together to identify and protect that which is important to them – their heritage – and building civic pride, knowledge, and stronger bonds for the future (Staiff 2014).

The technological revolution has enabled everyone to be connected in real time to everywhere and everything. In this highly mobile and technologically linked world, places are not fixed

entities; rather they are sites of movement and change. The idea of "the expert," "the local," "the visitor," "the guide," and "the tourist" and the relationship of each to a place, and hence the relationships, connections, cultural productions, rights, and responsibilities toward the heritages of a place, are blurred, converging, and transformed by contemporary movements and mobilities (Bushell and Staiff 2012). Urry (2006) reminds us that within a place:

> There is no simple and unmediated relationship of subject and object, presence and absence. There is a haughtingness of place, through voices, memories, gestures and narratives that can inhabit a place for locals and for visitors (Urry 2006: vii).

Problems may occur as places are packaged and presented to visitors. Discursively constructed and selective representations of heritage places and landscapes through which particular narratives and images are appropriated, (re) produced, and (re)circulated may resonate with visitors who arrive with certain expectations created through online environments, travel shows, tourist brochures, and so on, but these same representations may alienate the "local," causing residents to feel like the stranger within the intrusiveness of the touristic performance of a place. It is incumbent on heritage site managers to consider the ethics of how heritage places are portrayed. However, visitation should not be positioned as a problem. Issues of scale, volume, and distribution of tourism pressures and the effects of commodification of heritage values worry many who consider tourism a threat to the integrity of the tangible and intangible heritage of many sites. Of particular concern are the most iconic and heavily visited such as small World Heritage towns which are increasingly attracting large numbers of investors, tourism operators, and visitors. Visitation therefore deserves more careful and holistic consideration, planning, and management. It is an important mechanism, not only for the financial support of heritage enterprises and regional economies but also for the presentation and transmission of heritage values to both local people and visitors. Well-managed tourism not only communicates and reinforces conservation values to local people, for many living in places with significant heritage, these sites are symbolic of hope. They can be catalysts of community development and, through improved education, can engage local people to advocate for the protection of their natural and cultural heritage. Conversely, poorly planned and/or not managed responsibly tourism can contribute, along with many other forces in play within all communities, to degradation and loss. It can create many negative impacts on the integrity of the material, the ambient, the cultural, and the spiritual, destroying sense of place and quality of life for associated communities.

While heritage sites are complex with multiple stakeholders, values, and meanings (Edensor 1998) contested by competing stakeholder groups (Owens 2002) and nodes where global forces converge, they are also the intrinsic elements of nation-building projects. Hence, the communication of heritage values needs to be seen in a much wider context than just the local.

Winter (2004) argues the importance of places being sites of living heritage, in which the past is significant in the formulation of "collective identity" (Edensor 1998), but these pasts should not erase the present. "[A]ll heritage interventions . . . change the relationship of people to what they do. They change how people understand themselves" (Kirshenblatt-Gimblett 2004: 58). This locates ethical responsibility with historians, heritage professionals, national and international bodies, as well as tourism developers to respect the present and to find processes and opportunities that are inclusive and empowering in community development as well as the representations of place. Further to concern about selectivity, Byrne (2007) eloquently reminds us of the disjunction between that which is readily accessible and that which has been socially and politically silenced; that heritage is a "surface discourse" selectively presenting some aspects of heritage and history.

Tourism should be planned to integrate local culture into its heritage economy and invigorate the sense of place and enable more voices to be heard. But instead, tourism often acts as a valorizing and idealizing agent of the past (Kirshenblatt-Gimblett 2004), selectively sanitizing histories (Hewison 1989) and further

vanquishing inconvenient pasts (Byrne 2007), stereotyping and commodifying peoples, places, and traditions. In these heritage spaces, the flow is not only of different bodies, the "local" and the "visitor," but of different histories, cultures, purposes, and understanding of the values of a place. Edensor (2007) agrees tourism serves to generate a host of competing discourses and practices about a place, identity, and culture.

As everything is relational, messy, and in process, expressing the values of heritage must reflect contemporary practice. With increasing self-authored communication to worldwide audiences on blog sites, Facebook pages, and so on, these competing discourses are powerful and give a significant voice to those who may have an intimate knowledge or may indeed have quite limited connection, knowledge, or respect for a place, its heritage, or its people. Processes and ways to engage with these alternate modes of communication need to be part of any strategy if heritage values are to work in the service of conservation, people, and place. Winter (2004: 330) describes tourism as "the context within which . . . history [can be] articulated and made meaningful." If embraced as an opportunity, tourism can be a vehicle to communicate and share multiple heritages and understanding of one place with many pasts and presents.

Future Directions

Albert and Dyer (2009) conducted a thorough critique of current heritage interpretation praxis. Like Staiff (2014) who presents a blueprint for heritage interpretation, both call for a very different framework, moving away from the dominant thinking in communication models based in cognitive psychology and characterized by the presentation of information. They express deep epistemological concerns about the objectivist, western scientific paradigm on which the "tradition" of interpretation praxis is based. Both raise ontological issues with the asymmetry inherent in such approaches, which are based on many assumptions about "facts," "knowledge," and "experts."

Heritage practitioners should not feel they are the "keepers" of the understanding; they are not the "inheritors"; rather they are the facilitators who should encourage a multiplicity of explorations and a richness of engagements. These should be two-way and utilize processes respectful of the knowledge systems of others. The alternative – to be didactic and *expert* – serves to alienate and threaten that which is deemed to "belong" to all. Heritage professionals know the material history and archaeological bibliography of things, yet may hold quite limited understandings of the emotional and spiritual meanings. Byrne (2007: 20) speaks – evocatively – of his experiences as a heritage professional "travelling through a universe of traces with insufficient local knowledge to be able, for the most part, to quite see them or of being conscious of the murmur of traces without, for the most part, ever quite hearing the words." This opens us to the "world of local knowledge."

Different backgrounds, beliefs, attitudes, understanding, and purposes mean people can relate in meaningful ways to the same place for very different reasons. Seeking to acknowledge, respect, and communicate plurality, diversity, and constancy of change in a living heritage serves the protection of tangible and intangible values of heritage places while sustaining local values and encouraging more responsible and custodial practices.

Cross-References

- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage and the Public
- ▶ Heritage Values and Education
- ▶ Heritage Museums and the Public
- ▶ Heritage: Public Perceptions

References

Albert, P.G., and P.K. Dyer. 2009. Heritage hermeneutics: Towards a broader interpretation of interpretation. *Current Issues in Tourism* 12: 209–233.

Bauman, Z. 1998. *Globalization: The human consequences*. New York: Columbia University Press.

Bauman, Z. 2000. *Liquid modernity*. Cambridge: Polity Press.

H

Bushell, R., and R. Staiff. 2012. Rethinking the relationship between world heritage, visitation and the tourism industry. In *The Routledge handbook of heritage in Asia*, ed. P. Daly and T. Winter, 247–265. London: Routledge.
Byrne, D. 2007. *Surface collection: Archaeological travels in South East Asia*. Plymouth: Alta Mira Press.
Edensor, T. 1998. *Tourists at the Taj: Performance and meaning at a symbolic site*. London and New York: Routledge.
Edensor, T. 2007. Foreword. In *Raj rhapsodies: Tourism, heritage and the seduction of history*, ed. C. Henderson and M. Weisgrau. Hampshire: Ashgate.
Hewison, R. 1989. Heritage: An interpretation. In *Heritage interpretation*, ed. D. Uzzell, 15–23. London and New York: Belhaven.
ICOMOS. 1994. Nara declaration on authenticity. ICOMOS. Available at www.international.icomos.org/charters/nara_e.htm (Accessed 22 July 2010).
ICOMOS. 2008. Quebec declaration on the preservation of the spirit of place. ICOMOS. Available at www.international.icomos.org/quebec2008/quebec_declaration/pdf/GA16_Quebec_Declaration_Final_EN.pdf (Accessed 22 July 2010).
Kirshenblatt-Gimblett, B. 2004. Intangible heritage as metacultural production. *Museum International* 56: 52–65.
Owens, B.M. 2002. Monumentality, identity and the state: Local practice, world heritage, and heterotopia at Swayamblu, Nepal. *Anthropological Quarterly* 75 (2): 269–316.
Staiff, R. 2014. *Re-imagining heritage interpretation: Enchanting the past-future*. London: Routledge.
Staiff, R., and R. Bushell. 2003. Heritage interpretation and cross-cultural translation in an age of global travel: Some issues. *Journal of Park and Recreation Administration* 21 (4): 104–122 Special Places Issue.
Urry, J. 2006. Preface: Places and performances. In *Travels in paradox: Remapping tourism*, ed. C. Minca and T. Oakes. Maryland: Rowan & Littlefield.
Winter, T. 2004. Landscape, memory and heritage: New Year celebrations at Angkor, Cambodia. *Current Issues in Tourism* 7 (4 & 5): 330–345.

Heritage, Changing Views of: A Legal Perspective

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Introduction

The role of law in cultural heritage management is now commonplace. Most, if not all, nations have a legal framework to preserve, protect, and regulate the past. From local to global, law has become interwoven in current cultural debates and practice, as well as in the contemporary fabric of archaeological discourse. International norms and consensus – in some instances amounting to customary international law – have embraced jurisprudence as implicit, if not compelling or obligatory, to appropriate heritage management. Law has the capacity to order, and even to transcend, nation-states' sovereignty as well as conventional geographical, national, and methodological boundaries. Legal burdens of proof, evidentiary standards, and jurisdiction affect the disposition of heritage as well as who has access to the past. Conflicts over repatriation and reburial decided by court ruling are highly visible and typify well-known and easily identifiable points of intersection (*Bonnichsen v. United States*, 367 F.3d 864 (9th Cir. 2004); Burke et al. 2008). However, the compass of law orienting heritage reaches further (Prott and O'Keefe 1984; Carman 1996; Greenfield 1996; Pugh-Smith and Samuels 1996; Richman and Forsyth 2003; Hutt et al. 2005; Gerstenblith 2012). For archaeology, law stipulates excavation and curation protocols and provides enforcement measures to combat threats to preservation and protection, such as looting, illicit trade, and fraud. It defines what constitutes a protected archaeological artifact, establishes who has standing to claim such an object, and frequently is the tool utilized to determine ultimate ownership and disposition. Indeed, legality also structures contemporary policy formation, viability of partnerships, and sociopolitics of the past, present, and future.

Definition

Insofar as jurisprudence has become a customary managerial norm or apparatus for governance, divisions continue to separate the bailiwick of law from the trenches of archaeology (Bruning 2006, 2010). Legal and cultural heritage metrics are often at odds. Cultural heritage encompasses conventional conceptions of the archaeological record as well as intangible constructs of tradition, expression, knowledge, skills, and practice that

recognize nuance and diversity. The ascription of value to heritage can be highly individualized and acutely subjective, particularly when heritage is viewed as a non-fungible, singular commodity. Authenticity and identity vest in modalities of culture. In contrast, law typically adheres to fixed standards and bright line rules. Definitional specificity is essential and legal reasoning is predicated on precedent, procedure, and canons of statutory interpretation. Law has a limited capacity to deviate from such jurisdictional principles, evidentiary standards, burdens of proof, and the right to judicial relief (the requirement that a claimant demonstrate a showing of "standing").

Key Issues/Current Debates/Future Directions/Examples

As such a formal prescriptive mandate, law situates heritage within a rigid regulatory rubric. Archaeological excavation constraints (such as permit requirements), curatorial methods, museological practices, and ownership rights all fall within its regulatory reach. So does prosecutorial discretion for enforcing criminal penalties. Legal standards that operationalize archaeological practice and policy also affect a claimant's ability to assert rights under the law by dictating that expressions of cultural heritage align with or, indeed fit within, a legally articulable right (Bruning 2006). Within heritage contests, the judge's gavel, not the archaeologist's trowel, increasingly directs how the concept of cultural heritage is to be interpreted, and accordingly, whose ownership claim or status is validated. In the legal adversarial process, juridical standards and procedure, as well as legal definitions of heritage, are dispositive. Thus, the true practical nature of opposing cultural heritage claims is exemplified because the contested cultural heritage object(s) (such as ceramics, burial goods, or skeletal remains) effectively can be owned by one claimant only. Ownership determination grants possession, and simultaneously legitimizes and authenticates both the claim to the heritage (or cultural property) and the particular claimant as stakeholder (Crawford 2000). Contentious heritage litigation is not immune to the media fanfare that accompanies courtroom contest and involves a wider, sometimes global, audience.

Nevertheless, as law affects the expression of heritage, so too does heritage inflect the lawmaking process. Heritage and law increasingly acculturate. Both within and beyond national borders, law has become a foremost instrument of change within the domain of cultural heritage and in the field of archaeology. From preservation protocols and looting prohibitions to proprietary interests, change to archaeology has – and will continue – to emerge through legislation and policy. Yet, law, akin to heritage and archaeology, is not exempt from inequalities or power imbalances and so the entrenchment of (post)colonial and hegemonic paradigms exists. Law accords rights to some but not to others. For instance, in the United States, the 1990 *Native American Graves Protection and Repatriation Act* differentially situates indigenous peoples vis-à-vis their cultural heritage since only lineal descendants, "Indian tribes" recognized by the United States federal government, or "Native Hawaiian organizations" have standing under the statute (25 U.S.C. § 3001 *et seq*.). Legal standing also can remain elusive for groups or peoples in "occupied" or war-torn areas or in regions of disputed sovereignty or without formal recognition under international law.

Heritage's definition and demarcation in law for nations to implement protective and regulatory policies, to prioritize rights to certain stakeholders, and to adjudicate conflicting claims is steadily expanding. This phenomenon raises the question of how legal classification directs a contemporary understanding of heritage (Miller 2003; McHugh 2004). It also inquires whether increasingly narrow definitions within law hinder law's capacity to offer a framework that can effectively reach beyond – as well as within – national borders. For even though judicial mores of justice, equity, and impartiality impart useful precepts to competing cultural heritage claims, formal adjudication can fail to account for the multiplicity of values embodied in heritage (Johnson 2007). Traditional forms of legal redress are not always appropriate or realistic when heritage has suffered irrevocable harm – financial compensation

("money damages"), and even restitution/repatriation, may never truly right a "wrong," or make the heritage "whole" again.

Law is certainly not a flawless instrument of heritage management. It does not offer an automatic solution or panacea for conflicting ideologies and complex questions. Tension between cultural heritage/archaeology and law can be great, particularly when court ruling, legal doctrine, or *stare decisis* (precedent) can be viewed as upholding the letter, but not the spirit, of the law. Heritage as a complex dynamic construct with intangible and culturally sensitive attributes is more fluid than law and can be incompatible with law's strictures. Law is often inadequate, lacks sufficient enforcement capabilities, impedes viable local or indigenous partnerships, or is ill-suited or overwhelmed by the practical realities of management, local priorities, indigenous perspectives, and/or grassroots initiatives. However, in spite of its limitations, law is a modern instrument of management often chosen to resolve heritage conflicts. Successful joint management plans or memoranda of understanding can be crafted carefully under judicial auspices to offer innovative, equitable, and legally binding resolution. Differences in law and heritage are not necessarily irreconcilable. With the expanding role and place of law vis-à-vis heritage, law is becoming a fundamental international instrument not only in the domain of cultural heritage but also in the contemporary archaeologist's toolkit.

Cross-References

- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Blue Shield
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ Conservation and Management of Archaeological Sites
- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Heritage Legislation, the Introduction of: Disciplining Through Law
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Legislation in Archaeology: Overview and Introduction
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ South Africa: Maritime Legal Management
- ▶ Underwater Cultural Heritage: International Law Regime
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions
- ▶ UNESCO (1972) and Malta (1992) Conventions
- ▶ UNESCO World Heritage Convention (1972)
- ▶ United Nations Declaration on the Rights of Indigenous Peoples (2007)
- ▶ Vermillion Accord on Human Remains (1989) (Legislation)

References

Bonnichsen v. United States, 367 F.3d 864 (9th Cir. 2004).

Bruning, S.B. 2006. Complex legal legacies: The Native American Graves Protection and Repatriation Act, scientific study, and Kennewick Man. *American Antiquity* 71: 501–521.

Bruning, S.B. 2010. Articulating culture in the legal sphere: Heritage values, Native Americans, and the

law. In *Heritage values in contemporary society*, ed. G. Smith, P. Messenger, and H. Soderland, 209–224. Walnut Creek: Left Coast Press.
Burke, H., C. Smith, D. Lippert, J. Watkins, and L. Zimmerman, eds. 2008. *Kennewick Man: Perspectives on the ancient one*. Walnut Creek: Left Coast Press.
Carman, R.J. 1996. *Valuing ancient things: Archaeology and law*. London: Leicester University Press.
Crawford, S.J. 2000. (Re)Constructing bodies: Semiotic sovereignty and the debate over Kennewick Man. In *Repatriation reader: Who owns American Indian remains?* ed. D.A. Mihesuah, 211–236. Lincoln: University of Nebraska Press.
Gerstenblith, P. 2012. *Art, cultural heritage and the law: Cases and materials*. 3rd ed. Durham: Carolina Academic Press.
Greenfield, J. 1996. *The return of cultural treasures*. 2nd ed. Cambridge: Cambridge University Press.
Hutt, S., M.P. Forsyth, and D. Tarler. 2005. *Presenting archaeology in court: A guide to legal protection of sites*. Lantham: AltaMira Press.
Johnson, G. 2007. *Sacred claims: Repatriation and living tradition*. Charlottesville: University of Virginia Press.
McHugh, P.G. 2004. *Aboriginal societies and the common law: A history of sovereignty, status, and self-determination*. Oxford: Oxford University Press.
Miller, B.G. 2003. *Invisible indigenes: The politics of nonrecognition*. Lincoln: University of Nebraska Press.
Prott, L.V., and P.J. O'Keefe. 1984. *Law and the cultural heritage*. Abingdon: Professional Books.
Pugh-Smith, J., and J. Samuels. 1996. *Archaeology in law*. London: Sweet & Maxwell.
Richman, J.R., and M.P. Forsyth, eds. 2003. *Legal perspectives on cultural resources*. Walnut Creek: AltaMira Press.
The Native American Graves Protection and Repatriation Act of 1990, 25 U.S.C. § 3001 *et seq*.

Heritage: History and Context

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Introduction

Definitions of "heritage" are unstable. In particular, the categories of phenomena covered by regulatory definitions of heritage are subject to periodic alteration in scope and content. This is due largely to the fact that in contemporary multicultural and diverse societies, there is constant competition among cultural groups and communities of interest to have their heritage formally or officially recognized. More recent definitions recognize that definitions are rooted in subjective understandings of material culture, not objectively inherent in the material traces of prehistory and history.

Definition

In thinking about heritage, we need to distinguish between a primordial intergenerational practice and a particular, institutionalized mode of structuring identity and experience that the word has more recently come to embody.

It is part of our common humanity to inherit things, practices and ideas bequeathed us by our predecessors. This sense is largely captured in the term "inheritance." But in modern times "heritage" has become detached from the realms of personal, familial, and tribal transaction and emerged as an *episteme*, a way of structuring our understanding of the world (Hooper-Greenhill 1992: 12). By the 1980s, we had become so suffused in heritage-consciousness that it precipitated a strong, critical reaction. Lowenthal's spirited polemic *The Heritage Crusade and the Spoils of History* (1998) described a world cosmically supersaturated with heritage. "All at once," he cried out in exasperation, "heritage is everywhere – in the news, in the movies, in the marketplace – in everything from galaxies to genes" (1998: xiii).

Though it is possible to trace the modern roots of heritage from practices of collecting and keeping in Renaissance Italy, and onwards through the incipient stages of a travel and leisure industry in the nineteenth century, the elevation of heritage into an episteme that structures our understanding of the world, and saturates it in the way described by Lowenthal, postdates the Second World War. The long-run period of prosperity that stretched from the late 1940s through to the crisis of 2008 facilitated a massive expansion in the scale and scope of leisure activities, combined with the economic means to pursue interests in culture. More than 90% of the world's museums postdate the

Second World War, as does most national heritage legislation and almost all international charters and conventions designed to protect it.

Tourism became the primary medium through which cultural phenomena and experiences were converted into economic resources and objects of consumption. Travel, the key modality of tourism, shaped the modern idea of heritage through the sense of space and place (one traveled to see places – Machu Picchu – or to see things gathered together in certain locations, the British Museum and the Louvre). Heritage was both material and experiential in nature, what you went on your holidays to see and what you photographed to prove you had been there. However, the construction of heritage through tourism and cultural consumption provoked the emergence of a heritage critique in the 1980s. At the heart of this critique lay a challenge to the assumption that the prehistorical, historical, natural, and aesthetic dimensions of the world can be categorized and packaged as heritage according to expertly determined or putatively objective criteria.

Tunbridge and Ashworth offered the first systematic analysis of heritage as a deeply subjective phenomenon in *Dissonant Heritage: The Management of the Past as a Resource in Conflict* (1996). They noted how the meaning of the term had been dramatically expanded to include all physical traces of the past in the present, the natural world, and those "experiences" generated by the tourist industry (1996: 1–2). The effect of this category expansion was to render heritage increasingly unmanageable. If heritage was without apparent boundaries, how were scarce resources to be deployed in its care? They rejected the notion of heritage as a "fixed resource endowment." The idea that there was "a fixed quantity of a conservable past that is recognizable through objective, universal, and measurable sets of intrinsic criteria" was, they argued, an illusion given credibility by legislation designed to define, conserve, and protect it. Heritage arose in response to consumer demands and management skills in exploiting them (1996: 9). Heritage, in essence, was rooted in subjectivity; it was a matter of choice, most often of consumer choice.

French economist Francois Benhamou noted how the definition of heritage for legislative purposes was subject to refinement and expansion but rarely to contraction. "The concept of heritage is becoming more and more extended," she wrote and warned that "heritage policies promote their own destruction by widening the definition of heritage" (Benhamou 1998: 75). A growing body of national and international legislation authorized an iterative and expansionary approach to the definition of heritage. The *UN Convention on the Protection of the World Cultural and Natural Heritage* (1972), for example, divides heritage into "built" and "natural" components but then leaves it to each state to decide how these broad categories are to be extended to particular properties in its jurisdiction – a level of discretion that allows for boundless variation in how the convention is applied. The resource challenges posed by heritage led some to argue, the author among them, that the effective management of heritage required its containment through more restrictive approaches to its definition (Cooke 2003).

A more historically based approach to defining heritage was to focus on the process of its production. Stanziola (1998: 168–176) traced the growth of heritage in the American context. Up to the 1940s, the rationale for recognizing phenomena as heritage remained primarily patriotic (Washington's home at Mount Vernon was the first protected historic house) and aesthetic (landscapes protected under the National Parks Act of 1916 were chosen primarily for their sublime and picturesque qualities, while wealthy philanthropists funded the great art museums). Then, beginning in the 1950s, the process of definition expanded to include the heritage content of the historic environment and its role in maintaining the fabric of community at local and regional levels. Hitherto, heritage's reach had embraced a selection of iconic national sites and artifacts and things and places chosen with discriminating connoisseurship for their aesthetic appeal; now, it extended over a wide expanse of popular culture and subcultures.

Goodey traces this growth more precisely in the British context. In the 1960s, he identifies two

main vectors of growth: firstly, the "democratization of culture," a process by which the heritage of all was deemed to be as significant as that of the (mostly aristocratic) few and secondly what he calls "geographical equality," which is closely related to the democratization process but arises more precisely from the attempt to revitalize areas impoverished by the decline of heavy industries. Government, local, and national turned to the "designers of a new geography" that relied heavily on nostalgia and historic associations to bring new life to dilapidated towns and industrial areas (1998: 201).

Tunbridge and Ashworth's "dissonant heritage" model works both as an epistemological tool and as a vector of production. At its core is the question of representation. Where nation states used to project a synthetic "imagined community" by claiming authority over a coherent national culture and heritage, now the diluting influence of globalization compels them to recognize and validate complex layers of local, communitarian, and multicultural forms of identity. Heritage dissonance arises substantially from these competing perspectives. The more we disagree about heritage as an expression of disputed identities, the more of it we tend to produce to satisfy the various identity claims.

The growth of cultural economics as a discipline added further tools and refinements to the critique. A central concern of economics from a public policy perspective is the allocation of scarce resources among competing interests. Though most economists accept the legitimacy of public funding of heritage, Peacock (1998: 22) states as a basic principle of its economic analysis that "the preservation of the past is not some segregated element in the list of benefits to humankind, but consists of inputs of resources which must be shown to contribute to our welfare in a more effective way than in any alternative use." Keeping up the stock of heritage amenities requiring care and conservation creates opportunity costs, as the resources involved could be used for alternative purposes (Frey 1997: 31). By developing concepts such as option value (the postponed gratification of enjoying a cultural amenity in the future), bequest value (a thing whose intrinsic value lies in its anticipated value to future generations) and existence value (the sheer pleasure of knowing something exists, regardless of the personal opportunity to experience it), and methodologies such as contingent valuation (a survey used to elicit people's willingness-to-pay for objects or projects), economists have contributed to the containability and manageability of heritage at both the conceptual and managerial levels (Throsby 2010).

Cross-References

- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage and Society
- ▶ Heritage Theory
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: Public Perceptions

H

References

Benhamou, F. 1998. The evolution of heritage policies. In *Does the past have a future?* ed. A. Peacock. London: Institute of Economic Affairs.

Cooke, P. 2003. *The containment of heritage: Setting limits to the growth of heritage in Ireland*, Studies in Public Policy. Vol. 11. Dublin: Trinity College. Available at: http://hdl.handle.net/2262/60507. Accessed 6 Nov 2012.

Frey, B.S. 1997. The evaluation of cultural heritage: Some critical issues. In *Economic perspectives on cultural heritage*, ed. M. Hutter and I. Rizzo. London: Macmilan.

Goodey, B. 1998. New Britain, new heritage: The consumption of a heritage culture. *International Journal of Heritage Studies* 5: 197–205.

Hooper-Greenhill, E. 1992. *Museums and the shaping of knowledge*. London: Routledge.

Lowenthal, D. 1998. *The heritage crusade and the spoils of history*. Cambridge: Cambridge University Press.

Peacock, A. 1998. The economist and heritage policy: A review of the issues. In *Does the past have a future? The political economy of heritage*, ed. A. Peacock, 1–26. London: Institute of Economic Affairs.

Stanziola, J. 1998. Modelling the heritage world: Economic, legal and political considerations. *International Journal of Heritage Studies* 4: 168–176.

Throsby, D. 2010. *The economics of cultural policy*. Cambridge: Cambridge University Press.
Tunbridge, J.E., and G.J. Ashworth. 1996. *Dissonant heritage: The management of the past as a resource in conflict*. Chichester: Wiley.

Further Reading

Throsby, D. 1997. Seven questions in the economics of cultural heritage. In *Economic perspectives on cultural heritage*, ed. M. Hutter and I. Rizzo, 13–30. London: Macmillan.

Heritage: Public Perceptions

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Introduction

In the public domain, heritage is perceived and widely appreciated in relation to stories which people tell about themselves. This applies in particular to the perception of cultural heritage in public life within so-called Western societies. Intriguingly, heritage is here often not valued for its literal content, that is, what it reveals about a past reality, but for its metaphorical content, that is, the stories it evokes about present reality. Such stories may establish social distinction through the onlooker's display of knowledge that is considered desirable; they may manifest belonging through symbolic references of heritage to a common past suggesting a shared collective identity; or they may describe alternative ways of life which can stimulate audiences in the process of reconsidering their own lives. All such stories are sometimes used politically or for commercial purposes, for example, in the context of cultural tourism, advertising, and commodified experiences. The way heritage is publically perceived has profound implications for how to manage cultural resources.

The motivation to travel and visit heritage sites is in many cases not a genuine experience of foreign places and their past but the realization of dreams and desires firmly linked to and preconceived at the point of origin (Hennig 1999). David Horne cited the telling example of the Stoa of Attalus which the American School of Classical Studies at Athens, Greece, reconstructed during the 1950s in its original place on the Athenian Agora. Significantly, "they were faithful to every known detail except one – they couldn't bring themselves to paint it in red and blue as it had been in the original. To have been authentic would have made it seem untrue to the modern stereotype of the classical" (Horne 1984: 29). In other words, the authenticity of a place is judged by the tourists' own preconceptions of the place and needs to be carefully managed by the heritage and tourism industries. The main asset of cultural heritage is thus its capacity to tell or evoke stories that appeal in the present.

Key Issues

Heritage and Social Distinction

As tourists, people travel the world to visit heritage attractions, but they also visit local heritage sites. Visitors often wish to learn about a culture by learning about its heritage and history. This preference is often perceived as a question of personal choice and taste. Taste and preference are however acquired and governed by social parameters like class and lifestyle. This is the main point of the French sociologist Pierre Bourdieu's (1984) famous "social critique of the judgment of taste": tell me what you like and I tell you who you are!

The German sociologist Gerhard Schulze (1993) argued similarly that the Experience Society in which we are living is segmented and that customers demand experiences that correspond to one of several predefined schemes related to their social position and lifestyle. Some people, who see themselves as particularly cultivated, enjoy culture that is consumed with the brain and does not stimulate extensive bodily reactions. Others will prefer cultural experiences that are unpretentious, embodied, and best consumed collectively.

A final group prefers experiencing environments that involve the entire body and all the senses and quickly change focus in order to avoid boredom. All these different groups may enjoy heritage, yet in distinctive ways that conform to the particular scheme with which they associate themselves. Whereas some can never have enough written information, others may primarily demand short and entertaining guided tours, and others again mostly want to engage themselves in exciting activities. Often heritage destinations now offer something for each of these (and other) preferences. Significantly, in each case one of the main aims of consuming heritage is in fact a confirmation of the visitor's own social milieu and lifestyle.

The story people are perhaps most interested in when they choose to visit heritage sites is thus in part a story about themselves rather than one about the sites or objects they look at. It takes some education and class to actually choose to look at ancient ruins at all, rather than lie on the beach or watch a blockbuster movie (Schulze 1993: 145). Heritage is valued because it allows people to tell stories about – and thereby reaffirm – their own social affinities and lifestyles. These stories are best told at sites whose significance is widely recognized in people's own social context, which is why tourists always "must see" the same sites first. At the same time, heritage can be meaningless for visitors when it appears to be unrelated or contrasting to the scheme governing their own lifestyle. The story of heritage matters insofar as it is about the visitors themselves and not about the past. Visitors like to buy, and often treasure, tokens of their visits such as postcards, entrance tickets, and especially souvenir guidebooks. Although many such guides will remain unread, they remind people for many years of their trip and that (rather than what) they have learned. In *The Great Museum: The Re-Presentation of History*, Australian writer Donald Horne (1984: 10) argued accordingly that "what matters is what [tourists] are told they are seeing. The fame of the object becomes its meaning; what finally matters may be a souvenir postcard, perhaps even the admission ticket, kept for years afterwards. . .."

Heritage and Shared Collective Identities

Another public perception of heritage is related to stories it evokes about the visitors' shared collective identities as members of distinctive ethnic or cultural communities. At the most general level, World Heritage sites and any exhibits about human origins emphasize our human identity as members of the same species and the fact that all people on this planet belong into this same category. For example, the Hall of Human Origins at the Smithsonian Museum of Natural History opened in 2010 with the aim "to provide visitors and online guests with an exciting educational experience that will encourage them to explore for themselves the scientific discoveries about what it means to be human" (www.humanorigins.si.edu/exhibit). On a continental level, the European Commission and the Council of Europe have long been pursuing cultural policies that promote European integration, for example, with the European heritage label introduced in 2013.

At the same time, heritage sites and many museums have long been managed as part of the collective heritage of a given nation-state. They thus reify preconceived national identities (Kristiansen 1993). On a somewhat smaller scale, something equivalent might be said about regional and local heritage and the regional and local identities supported by them. In each case, the cultural heritage contributes to people's self-understanding as members of a given community, whether as neighbors locally, as inhabitants of a region, or as citizens of a nation-state. The heritage seemingly manifesting such collective identities is often proudly presented to visitors of these nations, regions, or local communities. By appreciating the shared heritage of other communities, the visitors may also become more aware of their own ethnic or cultural collective identities.

In some cases, heritage can also stimulate or strengthen cultural identities of people that are linked to their social positions, as discussed earlier. Examples are particular segments of the population pursuing an interest in the heritage of the working classes, the heritage of African Americans, or the heritage of specific families. Here too,

a shared heritage serves to link people with each other and contributes to their shared identities in the present. But at the same time, these identities reflect social realities and lifestyles as well.

Heritage is thus valued because it allows people to tell stories of the past which can reassure them as members of particular communities in the present. It is almost irrelevant precisely what kind of past is shared or how limited our knowledge about that past may be. The limited knowledge of our most distant ancestors during the Pliocene is as sufficient for collective human identity as the well-documented heritage of twentieth-century cities for collective urban identities. German collective identity is to the same extent manifested in the heritage of Nazi atrocities (or Beethoven) as is Russian collective identity in the heritage of Pushkin (or Stalinism). A community of people may be as strongly defined by genealogical links going back two or three generations as by racial oppression or discrimination that has been going on for centuries. What matters is not so much the richness or character or length of the story being told but that a story is being told at all! Heritage thus does not necessarily function as a source of information about the past but may also become a therapy for people uncertain about who they are.

Heritage and Alternative Ways of Life

Heritage is also valued in society because it tells stories about alternative ways of life which stimulate audiences in the process of reconsidering their own present-day realities. Time-travel experiences are becoming ever more popular, whether in the form of role-play or living history, docusoaps, historical novels, or computer-generated simulations in games and films (Petersson and Holtorf 2017). Time travel does not demand a particular intellectual attitude, but it is about imagining other worlds from the embodied perspective of somebody actually living in that world, often involving multiple senses. The lessons drawn from such experiences may be nostalgic in character, admiring conditions of the past; they may be reconfirming the status quo of human life in present society; or they may be progressive, hoping for continuing improvements in the future.

The popularity of time travel is indicative for the transformed society we have been living in for more than two decades. Gerhard Schulze (1993) argued that experience value is quickly replacing use and monetary values in significance. As people in affluent Western societies have become economically secure and possess all the tools they require, they are orientating their lives more and more toward other values. Sometimes you hear today that a full life worth living is one in which the person concerned has seen and experienced a lot of different things. The market for experiences has thus been expanding fast. The American economists Joseph Pine and James Gilmore argued in their book *The Experience Economy* (2011) that those businesses that relegate themselves to the diminishing world of goods and services will be rendered irrelevant. Instead, businesses now need to offer experiences to people. These experiences consist of more than simply fun and are first and foremost about engaging people sensually, cognitively, socially, culturally, and emotionally. Yet there is still also a risk that fictive commercial pasts serve nothing but monetary gain or particular political ideologies (Kristiansen 1993).

Another widely appreciated alternative way of life linked to heritage is expressed in stories about the experts working with heritage. The aura of the genuine and authentic site or artifact puts even professional archaeologists and conservators (among others) in a special light. David Horne (1984: 17) reasoned that precisely "the importance of the authentic can be so great that techniques of restoration may be more interesting to tourists than what has been restored." This was borne out, for example, in the extremely popular Vasa Museum in Stockholm, Sweden, where for many years the main display in a foggy hall was the partly covered remains of a seventeenth-century warship regularly sprayed with water during the process of conservation.

Heritage may also evoke stories about exciting exploration and discovery, about meticulous documentation and analysis, and about outreach and preservation. This is mostly the domain of the archaeologist investigating heritage, not the least through the method of excavation. In popular

culture, the archaeologist is often portrayed as a hero and role model, competent and resourceful, responsibly serving the interests of society and of humanity (Holtorf 2007). Many visitors are excited about the process of archaeological research and would like to get involved in archaeological excavations themselves. Many wish they could realize this childhood dream in their own lives. The Canadian archaeologist Karolyn Smardz (1997: 103) once speculated that it is precisely "the excitement and romance of archaeological discovery that makes people think archaeology is worth doing and learning about." Quite rightly, she concluded that "it is not archaeology's ability to help all of us gain a better understanding of how people lived in the past that makes archaeology marketable, it is also that mysterious, romantic, exotic sense of delving into the unknown – ergo, the very process of archaeological research." The process of doing archaeology seems in many cases more exciting than its results, and it may bring about benefits for the visitors' quality of life that reach far beyond those gained from insights about the past.

Conclusions: Public Perceptions of Heritage and Cultural Resource Management

This analysis of the public perceptions and appreciation of heritage may imply that it is almost beside the point to convey to visitors any specific information about what actually happened in the past. Whether or not this conclusion holds true in its totality, heritage managers are certainly well advised to acknowledge existing preconceptions of heritage and the stories it evokes about the present. An interesting medieval cathedral may be interesting because it reaffirms a social milieu in which "you know your art history," and a precious Stone Age burial may be precious because it marks the beginning of the story of your own local community. Heritage is often less valued for its literal than for its metaphorical content, that is, stories about remains of the past that are much more stories about the present. As a consequence, it matters little for the storytelling potential if a heritage site has been meticulously repaired, faithfully restored, or entirely reconstructed – as long as it provides visitors with a believable experience. This does not make heritage any less important. If anything, experiencing heritage in terms of the stories it tells about the present increases its currency in the Experience Society. As many have argued, stories and experiences have become essential to people's social identities and often give inspiration, meaning, and happiness to their lives. It is the stories we tell that distinguish us from each other and make life enjoyable, maybe even worth living (Schulze 1993; Pine and Gilmore 2011). This is the larger social context within which the contemporary significance of cultural heritage must be seen.

One immediate implication is that heritage managers should from the very start of their involvement be actively engaging with all the people involved (the multiple stakeholders) and take seriously the stories about the present that are told through the cultural heritage. By the same token, in a major review of the Swedish heritage sector entitled "Putting People First," it was concluded that "we must make the public's involvement and participation our top priorities" and that "the motivation for preserving an object or an environment comes from the need and desire to tell a story" (Operation Heritage 2004: 12–13). Not all such stories will, however, be equally acceptable in political and indeed ethical terms. Whereas some public perceptions may deserve to be supported for the benefits they bring to quality of life and social cohesion, others may need to be problematized and even undermined when they harm political or ethical core values of society. In order to do so competently, a great deal of new research will be needed in order to better understand precisely how the cultural heritage is experienced and what stories are being told or appreciated by whom, in which contexts, and with which consequences. As the Danish archaeologist Kristian Kristiansen pointed out already in 1993, it is high time that archaeologists lose their political innocence and critically assess the way in which heritage and the past are popular, useful, and marketable in present society. Although research into that direction has begun by now,

there still remains much to be done, especially as society is continuously evolving.

Archaeologists and historians will always run the risk of construing in their work a representation of the past that is mostly an extension of the present. But this is maybe less a risk as an opportunity, as heritage matters when the stories about heritage matter. Ironically, therefore, an extension of their present may be precisely what visitors value most in their perceptions of heritage.

Cross-References

- ▶ Advertising and the Appropriation of Culture
- ▶ Archaeology and Time Travel
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Experiencing Cultural Heritage
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Museums and the Public

References

Bourdieu, P. 1984. *Distinction. A social critique of the judgement of taste*. London: Routledge.

Hennig, C. 1999. *Reiselust. Touristen, Tourismus und Urlaubskultur*. Frankfurt/M.: Suhrkamp.

Holtorf, C. 2007. *Archaeology is a brand! The meaning of archaeology in contemporary popular culture*. Oxford/Walnut Creek: Archaeopress/Left Coast Press.

Horne, D. 1984. *The great museum. The re-presentation of history*. London: Pluto Press.

Kristiansen, K. 1993. 'The past and its great might'; an essay on the use of the past. *Journal of European Archaeology* 1: 3–32.

Operation Heritage. 2004. *Putting people first*. Stockholm: Agenda Kulturarv. Available at: http://agendakulturarv.raa.se/opencms/export/agendakulturarv/dokument/Putting_people_First.pdf. Accessed 30 Jan 2018.

Petersson, B., and C. Holtorf, eds. 2017. *The archaeology of time travel. Experiencing the past in the 21st century*. Oxford: Archaeopress.

Pine, J., and J. Gilmore. 2011. *The experience economy. Work is theatre & every business a stage*. 2nd ed. Boston: Harvard Business Review Press.

Schulze, G. 1993. *Die Erlebnis-Gesellschaft. Kultursoziologie der Gegenwart*. 3rd ed. Frankfurt/M./New York: Campus.

Smardz, K. 1997. The past through tomorrow: Interpreting Toronto's heritage to a multicultural public. In *Presenting archaeology to the public. Digging for truths*, ed. J. Jameson, 101–113. Walnut Creek: AltaMira Press.

Further Reading

Holtorf, C. 2005. *From Stonehenge to Las Vegas. Archaeology as popular culture*. Walnut Creek: AltaMira Press.

Holtorf, C. 2010. Meta-stories of archaeology. *World Archaeology* 42: 381–393.

Lowenthal, D. 1996. *The heritage crusade and the spoils of history*. London: Viking.

Lowenthal, D. 2015. The past is a foreign country – Revisited. Revised 2nd ed. Cambridge: Cambridge University Press.

Smith, G.S., P.M. Messenger, and H.A. Soderland, eds. 2009. *Heritage values in contemporary society*. Walnut Creek: Left Coast Press.

High Lodge Archaeology Site

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Introduction

The site of High Lodge is situated in a disused clay pit in the Brecklands of Suffolk, UK. Artifacts were first discovered in the 1860s and were described together with the stratigraphy of the site by Sir John Evans (1872). He noted that at the base of the site lay glacial chalky boulder clay, which was overlain by red clay containing finely retouched scrapers. These in turn were overlain by sands and gravels containing handaxes, and boulder clay was also noted higher up the slope. Skertchley was the first to argue that this was a separate, stratigraphically higher boulder clay (Whittaker et al. 1891), which was controversial in the late nineteenth century as the pre-glacial antiquity of people had yet to be accepted.

A second controversy arose because the finely retouched scrapers were likened to those from Le Moustier in France (later termed Mousterian), while the overlying handaxes were typical of the earlier "drift" period or Lower Paleolithic. This inversion of the typological sequences observed

elsewhere led to a series of papers describing a variety of stratigraphic schemes, none of which could be observed within single sections (Evans 1897; Sturge 1911; Marr 1921; Harrison 1938).

Key Issues/Current Debates/Future Directions/Examples

The first large-scale excavations took place from 1962 to 1968 by Gale Sieveking of the British Museum. In addition to recovering properly excavated lithic assemblages and environmental data, a primary aim was to unravel the geological sequence and dating of the site. A conflict between an early geological age for the site and the apparently late date for the "Mousterian-like" flint artifacts delayed publication. These problems were resolved through further fieldwork in 1988, and the excavations were finally published in 1992 (Ashton et al. 1992). This latter work established the current understanding of the geological and environmental succession.

The oldest sediments at the site consist of clayey silts laid down as floodplain sediments and attributed to an eastward flowing river, called the Bytham (Lewis 1992). The Bytham river flowed from the Midlands across East Anglia, depositing quartz- and quartzite-rich gravels from its source areas and incorporated into the floodplain sediments at High Lodge. The course of the Bytham river was destroyed by the Anglian glaciation (MIS 12: c. 470–420 ka), which was the most extensive glaciation across Britain, reaching as far south as London. At High Lodge the floodplain sediments were glacially transported as frozen blocks by the ice, resulting in their emplacement above Anglian Lowestoft Till (the "chalky boulder clay"). The transported clayey silts were then overlain by outwash gravels and a soliflucted till from the same ice sheet. The clayey silts therefore date to a temperate phase prior to the Anglian glaciation, probably MIS 13 (c. 500 ka) or possibly older. An MIS 13 age is also supported by the recovery within the clayey silts of part of a rhinoceros tooth attributed to the *Stephanorhinus hundsheimensis* group, which became extinct after MIS 12 (Stuart 1992).

The clayey silts preserve pollen, insects, and occasionally wood and vertebrate remains. The palynology appears to show little change through the sequence with vegetation dominated by pine and spruce together with juniper and heathland plants (Hunt 1992). Pools and marshland are indicated with seasonal flooding from the nearby river. The insect fauna reflects a similar array of wetland habitats and also provide Mutual Climatic Range temperature estimates of summers between 15 °C and 16 °C and winters between −4 °C and 1 °C (Coope 2006). The vertebrate fauna is sparse but in addition to *Stephanorhinus hundsheimensis* can be added straight-tusked elephant (*Palaeoloxodon antiquus*), horse (*Equus sp.*), a medium-sized cervid, and a large bovid (Stuart 1992). In combination, the environmental remains reflect the marshy floodplain of a large river, surrounded by pine and spruce forest in a climate several degrees cooler than East Anglia today (Ashton and Lewis 2012).

The archaeological assemblages have been divided into five stratigraphic units, three of which come from different horizons within the clayey silts (Beds B, C1, and C2). A fourth assemblage (Bed D) was recovered from small runnels cut into the top of the clayey silts and probably derived from that bed. The final assemblage (Bed E) was recovered from the base of the overlying outwash sands and gravels (Ashton 1992). All the assemblages are in fresh condition, with slightly more abrasion occurring on the artifacts from Bed E.

The assemblages from Beds B, C1, and C2 can be treated as a single unit. The artifacts are spread over a depth of 2 m, but it is difficult to recognize distinct horizons, although they occur in greater densities towards the top. Over 1200 artifacts were excavated including 984 flakes, 69 flake tools, and 52 cores. The exact source of raw material is unknown, although as chalk-containing flint underlies the site, large nodules of flint would have been available in the nearby river sediments. The core working is typical of that found in other British Lower Paleolithic assemblages, where nodules of flint were worked through single-platform and alternate-platform techniques, sometimes with the core being rotated to find the next

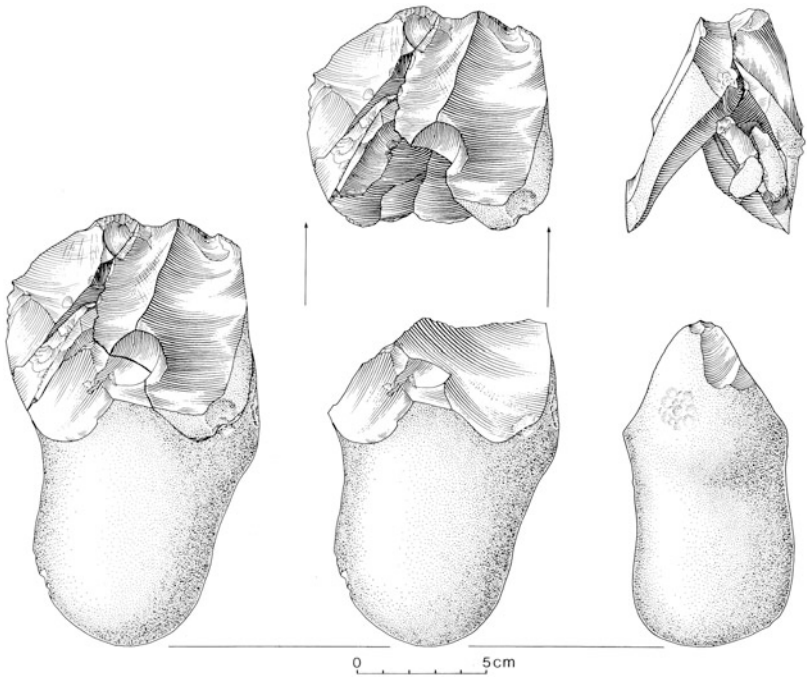

High Lodge Archaeology Site, Fig. 1 Flint core with refitting flakes from High Lodge Bed C2 showing alternate-platform technique. (Illustration by Phil Dean. Reproduced by permission of the Trustees of the British Museum)

best platform from which to detach further flakes (Fig. 1). In this way the evolving configuration of the core determined the next flake removals. This type of technology has often been described as Clactonian but in fact also occurs in Acheulian handaxe assemblages (McNabb 2007).

Flint knapping occurred on the site, as shown by the refitting flakes, flake tools, and cores, which were excavated as distinct knapping scatters in two locations. Elsewhere the scatter of artifacts seems more disturbed, perhaps caused by the transportation by ice.

The flake tools consist of notches, denticulates, and a range of scrapers. The notches and denticulates tend to be made on smaller flakes with single or multiple detachments from lateral, distal, or proximal edges and sometimes on the ventral side. By contrast the scrapers tend to be made on slightly larger flakes with semi-invasive retouch on a variety of lateral or distal edges. In two particular cases, large single scrapers have been created with finely executed, invasive retouch (Fig. 2) and are more typical of those recovered by collectors during the nineteenth and early twentieth centuries. The old collections are clearly biased towards the larger more elaborate tools, but they do provide an insight into the full range of scraper forms. These include convergent scrapers, sometimes with retouching or thinning of the butt and occasionally retouch on the ventral face.

The assemblage from Bed D was recovered from fine silts that infilled shallow channels and runnels across the surface of the floodplain clayey silts. The runnels were often less than 1 m wide and 50 cm deep and contained a small lag gravel containing artifacts at the base. The lag gravel was almost certainly derived from the underlying floodplain deposits. This interpretation is supported by the similarities in technology and typology of Bed D with Beds B, C1, and C2. The Bed D assemblage consists of 301 artifacts including 254 flakes, 16 flake tools, and 15 cores. The core technology is indistinguishable from that of Beds B, C1, and C2, and there is a similar range of notches and scrapers.

The assemblage from Bed E occurs in the lowermost part of the overlying glacial outwash gravels and consists of 462 artifacts, including 384 flakes, 15 flake tools, 14 handaxes, and 13 cores. The technology of the core working is again similar to that from Beds B to D with the use of single-platform and alternate-platform

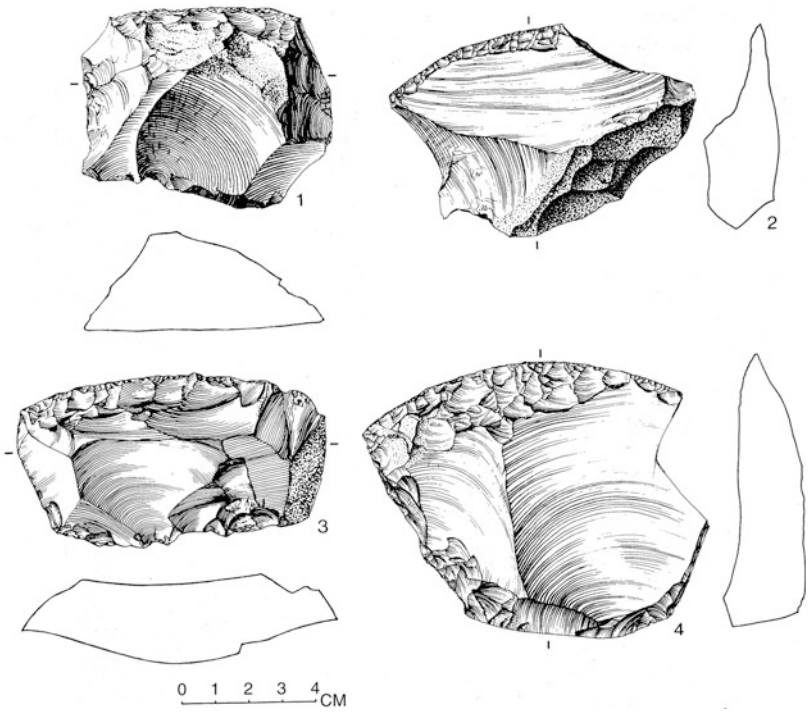

High Lodge Archaeology Site, Fig. 2 Flint scrapers High Lodge Bed C2 (*1*, *2*, and *4*) and Bed D (*3*). (Illustrations by Phil Dean. Reproduced by permission of the Trustees of the British Museum)

techniques deployed around the evolving cores. The flake tools are also similar with a range of notches, denticulates, and scrapers. At least one of the scrapers is invasively retouched and resembles the more elaborate scrapers from Bed C2. The only distinction of the assemblage from Bed E is the presence of 14 handaxes (Fig. 3). These consist of cordiform, ovate, and limande forms varying from 20 to 7 cm in length. They are finely made with soft-hammer percussion and occasionally have tranchet-sharpening removals. This range of forms is consistent with those recovered by collectors during the nineteenth and twentieth centuries.

The slight abrasion of the artifacts in Bed E suggests minimal transport within the glacial outwash gravel. Equally it seems unlikely that the assemblage is contemporary with the glacial conditions represented by the outwash gravel, when Britain would have been difficult to inhabit. The most likely explanation is that the assemblage was derived from a different location on the floodplain and transported a minimal distance prior to deposition. Whether the distinction in the assemblages reflects different activity areas on the floodplain or separate human groups with different tool types perhaps occupying the area at slightly different times is not clear.

The finely made scrapers from High Lodge are still unusual in the context of the Lower Paleolithic of Britain, where scrapers are rare and retouch is often sporadic with little attention paid to form. One exception is the site of Warren Hill, which lies only 800 m to the south of High Lodge (Bridgland et al. 1995). Here Bytham river gravels from the lowest terrace, also dating to MIS 13, contain a wealth of handaxes, many being similar to those from Bed E at High Lodge. In addition to the handaxes is a small series of elaborate scrapers, which have a remarkable similarity to the scrapers from Bed C2 at High Lodge. Indeed the assemblage from Warren Hill has been fluvially transported and could derive from the same floodplain sediments.

One aspect of the scrapers that should not be overlooked is their possible function. Although there is no direct evidence, there is little doubt that they would have functioned well in the processing of hides. If this is the case, High Lodge provides one of the earliest records at least in

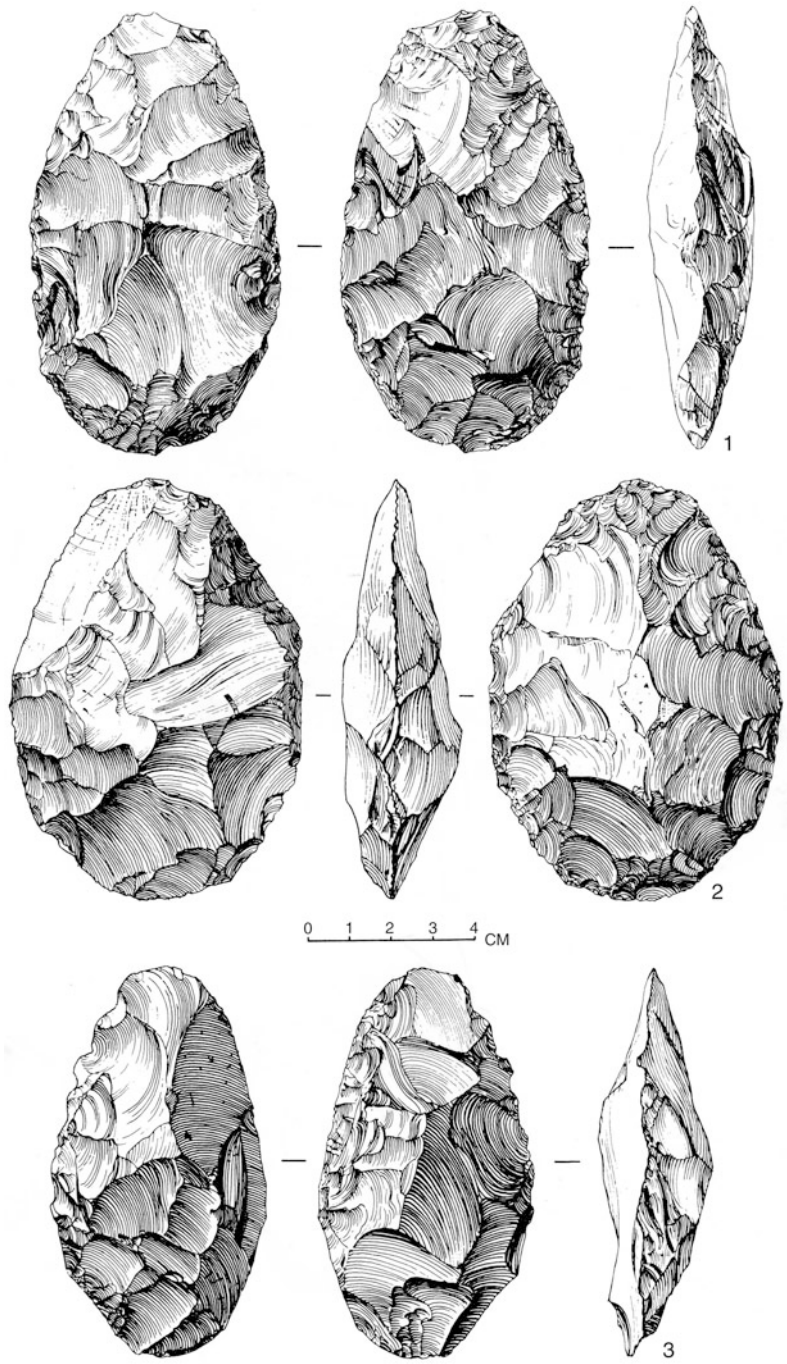

High Lodge Archaeology Site, Fig. 3 Flint handaxes from High Lodge Bed E. (Illustrations by Phil Dean. Reproduced by permission of the Trustees of the British Museum)

northern Europe for the abundant production of hide-working tools and by inference the use of hides for perhaps clothing or shelter (Ashton and Lewis 2012). It also implies that they were the top carnivore and had first access to the carcasses prior to the destructive scavenging by other predators such as hyena. At High Lodge it is pertinent that the possible early evidence for thermal buffering in the form of hide use coincides with a climate that is several degrees cooler than Britain today.

In summary, the site of High Lodge dates to c. 500 ka or possibly earlier. Humans occupied the open, marshy floodplain of the Bytham river surrounded by forest of pine and spruce in a climate several degrees cooler than Britain today. At least one of the activities taking place at the site was the manufacture of carefully crafted scrapers, perhaps used for the processing of hides for use as clothing or for shelter. Elsewhere on the floodplain, another or perhaps the same human group made handaxes, perhaps closer to the flint raw material sources exposed by the river. With the ensuing Anglian glaciation about 450 ka, the floodplain deposits were rafted as frozen blocks and emplaced above and within the glacial sediments, awaiting discovery in the middle of the nineteenth century.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Handaxes and Biface Technology
- ▶ Lithic Technology, Paleolithic

References

Ashton, N.M. 1992. The High Lodge flint industries. In *High Lodge: Excavations by G. de G. Sieveking 1962–68 and J. Cook 1988*, ed. N.M. Ashton, J. Cook, S.G. Lewis, and J. Rose, 124–163. London: British Museum Press.

Ashton, N.M., and S.G. Lewis. 2012. The environmental contexts of early human occupation of northwest Europe: The Lower Palaeolithic record. *Quaternary International* 271: 50–64.

Ashton, N.M., J. Cook, S.G. Lewis, and J. Rose, eds. 1992. *High Lodge: Excavations by G. de G. Sieveking 1962–68 and J . Cook 1988*. London: British Museum Press.

Bridgland, D.R., S.G. Lewis, and J.J. Wymer. 1995. Middle Pleistocene stratigraphy and archaeology around Mildenhall and Icklingham, Suffolk: Report on the Geologists' Association field meeting, 27th June 1992. *Proceedings of the Geologists' Association* 106: 57–69.

Coope, G.R. 2006. Insect faunas associated with Palaeolithic industries from five sites of pre-Anglian age in central England. *Quaternary Science Reviews* 25: 1738–1754.

Evans, J. 1872. *The ancient stone implements, weapons and ornaments of Great Britain*. London: Longmans Green.

Evans, J. 1897. *The ancient stone implements, weapons and ornaments of Great Britain*. 2nd ed. London: Longmans Green.

Harrison, K. 1938. A note on High Lodge, Mildenhall. *Proceedings of the Prehistoric Society* 4: 326–328.

Hunt, C.O. 1992. Pollen and algal microfossils from the High Lodge clayey-silts. In *High Lodge: Excavations by G. de G. Sieveking 1962–68 and J. Cook 1988*, ed. N.M. Ashton, J. Cook, S.G. Lewis, and J. Rose, 109–115. London: British Museum Press.

Lewis, S.G. 1992. High Lodge – stratigraphy and depositional environments. In *High Lodge: Excavations by G. de G. Sieveking 1962-68 and J. Cook 1988*, ed. N.-M. Ashton, J. Cook, S.G. Lewis, and J. Rose, 51–85. London: British Museum Press.

Marr, J.E. 1921. Excavations at High Lodge, Mildenhall in 1920 A.D. Report of the geology. *Proceedings of the Prehistoric Society of East Anglia* 3: 353–373.

McNabb, J. 2007. *The British Lower Palaeolithic: Stones in contention*. London: Routledge.

Stuart, A.J. 1992. The High Lodge mammalian fauna. In *High Lodge: Excavations by G. de G. Sieveking 1962-68 and J. Cook 1988*, ed. N.M. Ashton, J. Cook, S.G. Lewis, and J. Rose, 120–123. London: British Museum Press.

Sturge, W.A. 1911. The chronology of the Stone Age. *Proceedings of the Prehistoric Society of East Anglia* 1: 43–105.

Whitaker, W., S.B.J. Skertchly, and A.J. Jukes-Browne. 1891. *The geology of parts of Cambridgeshire and of Suffolk (Ely, Mildenhall, Thetford),* Memoir of the Geological Survey. London: Eyre and Spottiswoode.

High-Altitude Archaeology in Southeastern Europe

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Introduction

The scope of this entry is to describe and discuss some aspects of high-altitude archaeology. The paper focuses mainly on the data available from

High-Altitude Archaeology in Southeastern Europe, Fig. 1 Distribution of the sites and localities mentioned in the text. (1) Zurich Lake (CH), (2) Schnidejoch (CH), (3) Similaun (I), (4) Adige Valley, Romagnano (I), (5) Valcamonica, Crestoso (I), (6) Balm' Chanto (I), (7) Hallstatt (A), (8) Lessini Hills (I), (9) Monviso (I), (10) Finalese caves (I), (11) Iron Gates (SRB), (12) Cheile Turzi (RO), (13) Prut River (UA), (14) Ohrid (MK), (15) Dispiliò (GR), (16) Samarina (GR), (17) Epirus (GR), (18) Dmanisi (GE), (19) Trialeti (GE), (20) Chikiani (GE), (21) Aruchlo (GE), (22) Göytepe (AZ), (23) Muhkoi (RUS). (Drawing by E. Starnini)

four important mountain regions of Southeastern Europe, which show quite different geomorphological characteristics, climate, altitude, and latitude: the Alps, the Carpathians, the Pindus, and the Caucasus (Fig. 1). During the last 50 years, archaeological research in the highland zones has greatly improved. Moreover, it started to attract attention of many archaeologists throughout the world. These changes were due to the developing consciousness that mountains do not necessarily constitute impassable natural barriers for humans. This is demonstrated also by the fact that they are inhabited, at least since Medieval times, by peoples with very similar attitudes, behavior, and cultural background though often speaking different languages and dialects.

Slowly, the improving number and quality of archaeological data began to show how important mountains are in the study of human history and adaptation. Natural resources, such as precious ores, among which are gold and silver and everyday use stones and salt also employed as exchange goods, in many cases played a key role in the economy of very important prehistoric and protohistoric systems, while geographic locations and alpine pastures of easy access were approached moving from the surrounding plains following well-defined footpaths, gentle slopes, and watersheds. The same mountains started to be part of the subsistence strategy of prehistoric communities at least since the Late Neolithic.

During the last decades, we have seen an intensification of highland zone archaeological research in many countries of Europe, Asia, as well as the Americas (Stirn 2014). Many projects have been promoted, aimed to the interpretation of the reasons why, and the periods when, humans began to explore and settle at high altitudes, as well as to study the different types of traces they left during their movements across mountain environments. It has become clear that some Southeastern European mountain chains began to be approached already at the very beginning of the Palaeolithic, at least 2 Myr ago (Vasilyev and Amirkhanov 2018). These discoveries show that humans explored and exploited high-altitude resources during almost every period of prehistory, despite challenging environmental conditions.

State of Knowledge

Geography and Environment

Most of Europe south of the 49th parallel is mountainous, with its largest ranges running from west to east (Pyrenees, Alps) or forming a wide arc toward south (Carpathians) (Fig. 1). The forces responsible of the uplift of these enormous masses altogether covering ca 340,000 km^2 were active in different geological periods (the Pyrenees being older than the Alps and the Carpathians), though similar in their origin (collision between tectonic plates) (Siegesmund et al. 2008). The huge southern compression forces resulted in different size and shape: the Pyrenees stretch over a length of 430 km, with a maximum width of 120 km; the Alps over 1200 and 200 km; and the Carpathians over 1450 and, at their maximum, 400 km. Farther east, Caucasia is another very large ethnical and linguistic highland zone covering 440,000 km^2, with a length of 840 km and a width of 240 km, with peaks higher than 5600 m that find no comparison with those from other regions of Europe.

The main longitudinal striking of the chains has several important consequences. For instance, in the Alps:

(1) The separation between waters and runoff, with a higher stability of the regimes with glacial melting mostly on the north and relative instability of the regimes in the rain-fed rivers on the south. The contribution of the mountains to the periodic flow of the main rivers is always crucial, particularly in summer when river flow is low in the lowlands, though high in the Alpine Rivers due to snow and ice melt.
(2) A difference in the altitude of the permanent snow line of even 700 m between the northern and the southern side, with strong climatic implications.
(3) Local sharp changes in the topography and microclimate.
(4) Geological and soil chemistry peculiarities (crystalline rocks and acid soils prevailing in the western part of the chain, sedimentary calcareous rocks, and basic soils in the eastern section).
(5) Resulting local/regional ecological properties affecting prehistoric settlement distribution and economy.

Throughout the Pleistocene, glacial and interglacial conditions repeatedly affected entire Europe, drastically changing landscapes, faunas, and floras. During the last 800 ka, glacial cycles have succeeded with a periodicity of ca 100 ka. They are currently explained as consequent to changes in solar radiation coupled with critical levels of atmospheric CO_2. Evidences of glaciations can be observed in the geomorphologic characteristic roundness of the mountain slopes, ice cores, marine sediments, and sea-level variations. The structure of climatic change in the last 100 ka has been analyzed using different proxies, recently taking into account ice volume variations throughout several glacial cycles. During the last glacial maximum (LGM) roughly between 26 and 20 ka, most of the mountain range was capped with ice. Numeral models suggest a maximum ice volume of 163×10 km^3 just after 24 ka. However, we know that temperatures during the cold stages were not uniform. For instance, within the very cold Marine Isotope Stage MIS-4 and 2, spanning between 71 and 10 ka, a warmer interval occurred between 57 and 24 ka (MIS-3), with short cycles of 100–1000 year between warmer and nearly glacial conditions. During this period anatomically modern humans (AMH) replaced Neanderthals all over Europe. However, it would be misleading to consider the Alpine environment to be unable to offer favorable niches for hunting and collecting even during the harsh climatic conditions of the LGM. Middle- and high-altitude Middle Palaeolithic Mousterian sites have been discovered in the Alps, Pindus, Rhodopes, the Caucasus, and the Crimean Mountains. If one would suggest that during the coldest phases of the Late Glacial the Alps acted as an obstacle to hunters moving from the southern provinces of Europe, nevertheless we know very well that their unique ecosystems were locally exploited as soon as the slopes became free from ice toward the end of the LGM.

Human Settling

In the case of the Alps, a first exploration of the highland zones by the last hunter-gatherers began around 12,000 BP, during the Allerød interstadial. It was followed in the following periods, characterized by Early Holocene climatic ameliorations and later by the advent of Neolithic farming during the mid-Atlantic (Weninger et al. 2006). At present, the chronology of these events is well known both in the Alps and the Apennines, thanks to many pollen cores extracted from peat basins located close to high-altitude archaeological sites (Lowe 1992; Oeggl 1994).

The barren surfaces exposed by glacial withdraw were rapidly occupied by a pioneer vegetation, composed mainly by Poaceae (grasses) and *Artemisia*, with the presence of willows and pines. Pollen and macrofossil diagrams show similar evolutionary patterns both in the mountains and the plains. Broadly speaking, tundra-like vegetation is followed by a conifers tree cover. Starting from the plains, the slopes are gradually invaded by broad-leaved trees, and the typical Alpine vegetation zonation is settled during the mid-Holocene when the last hunter-gatherers are replaced by the first farmers. This is an important turning point in the ecology of the mountains, when the human impact on the landscape becomes an important element of transformation. Pastoralism, short (prehistoric)- and long (historic)-range transhumance, mining, and large use of fire to open wide pastures in the previous woodland are elements (Primas 1999) whose effects, protracted for centuries, result in soil erosion, slope instability, and stronger surface runoff. Growing intensity of mountain exploitation from the Late Neolithic onward is a general pattern observable in high-altitude sites all over Europe, as widely shown by the research currently underway in the Pyrenees (Catalan et al. 2017a) and the Carpathians (Pelisiak et al. 2018).

In the Swiss Alps, the present glacier retreat caused by global warming has brought to light the presence of organic archaeological artifacts among which are wooden bowls, a bow, shoes, a leather legging, and bark fibers in the melting ice at Schnidejoch and other high-altitude passes. They demonstrate that this region of the Alpine chain was frequently crossed between the Neolithic and the Iron Age (Hafner et al. 2017). A similar case is known also from the eastern Alps of South Tyrol, where the Similaun Man (otherwise known as Ötzi) was discovered in the autumn of 1991 at 3210 m of altitude within a natural depression later filled with ice. His very rich organic equipment, composed of everyday use artifacts, clothes, and shoes, was radiocarbon dated between ca 4700 and 4500 BP. This find shows us the way Chalcolithic people were equipped to survive extreme environmental conditions during their movements that involved the crossing of high-altitude passes (Kutschera et al. 2000). Curiously enough, the mtDNA analysis has shown that the Similaun Man belongs to a group that does not show any descendants in the extant population of the Alps (Coia et al. 2016).

Not all the mountains of Southern Europe share the aforementioned pattern. The Italian Apennines and the Pindus in Greece run north/south, and their climate is influenced by the sea. However, also the role played by lower altitude glaciers has been important during some periods of the Quaternary. Around the Smolikas, the highest peak of the Pindus range of Western Macedonia in Greece (2637 m), at least four glacial advances have been recognized and dated (Hughes et al. 2006), with frequent warmer cycles favoring, most probably after ca 70 ka, the repeated presence of Neanderthal hunters between 1500 and 2300 m of altitude (Biagi et al. 2016).

In the Caucasus, the presence of Mousterian artifacts in high-altitude sites located well above 1000 m shows that palaeoclimatic changes took place in a way similar to those known from other parts of Europe and produced comparable ecological changes since the beginning of the Pleistocene (Amirkhanov 2016). However, number and frequency of sites throughout the Late Pleistocene and the Holocene show that the same region was widely crossed by both ancient hominids and modern humans in search for raw materials, practicing hunting and probably gathering and, later, agricultural and farming activities. To sum up, also in the Caucasus, like elsewhere, mountains represent in most cases a link, and not a barrier between different regions as the richness of high-altitude discoveries demonstrate.

Current Debates

The Alps

The importance of high-altitude landscapes in prehistory started to become clear around the middle of the 1800s, thanks to the unexpected discovery of Neolithic and Bronze Age wooden pile dwellings at Obermehler, along the shores of Lake Zürich in Switzerland (Keller 1866). However, the study of Alpine archaeology greatly developed since the beginning of the 1970s, following the 1969 discovery of a few important rock shelter sequences at Romagnano III, Vatte di Zambana, and Pradestel in the Adige Valley near Trento, in northeastern Italy, that covers the entire Holocene from the Early Mesolithic to the Roman period. These finds showed for the first time the existence of valley bottom sites settled in prehistoric and also historic times, which were later buried by meters of alluvium transported by fluvial conoids. This fact was absolutely unknown to all archaeologists until those times. The new finds helped revise the general impression that most archaeologists had developed in Northern Italy during the last century, according to which the Mesolithic hunter-gatherers had never settled anywhere in the entire region with the exception of the Trieste Karst. It is important to repeat once more that before the end of the 1960s, the general assumption was that the Alps had never been settled before the metal ages and the Roman conquest. Moreover, following the aforementioned discoveries, most prehistorians started to compare the "newly available" knapped stone assemblages with those well known from the Mesolithic sequences of neighboring France and utilize the same terminology to describe and attribute them to the same cultural aspects. These discoveries were followed, in 1970, by those of high-altitude Mesolithic camps located along the shores of small glacial basins, close to alpine passes connecting important communication routes, in the inner alpine chain of the same Trentino region (Fig. 2).

High-Altitude Archaeology in Southeastern Europe, Fig. 2 Excavations underway at the high-altitude Mesolithic site of Laghetti del Crestoso in the Central Italian Alps. (Photograph by P. Biagi, 1988)

A few years later, international round tables and congresses on mountain archaeology started to be organized in Northern Italy and their proceedings to be published in different local and international journals. Their scope was to discuss and update the results already achieved and improve the quality of the research to organize in the years to follow (see Biagi and Nandris 1994).

This is why before those years, almost nothing was known of the prehistory of the alpine valleys and their surrounding highlands in the periods that followed the Late Pleistocene deglaciation. The same can be said of the reasons why, the modes how, and the times during which the Alps began to be settled in prehistory. In effect nobody had any idea of the great archaeological potential of the alpine chain, and the mountains in general, except for the role they had played during the Iron Age, the Roman, and Medieval periods (Pauli 1984) mainly for the exploitation of important mineral resources. Among them are salt (Kern et al. 2009) and copper, whose presence has been reported by classical and postclassical authors. At present we know that the Alps were undoubtedly (seasonally) settled by Mousterian hunters during the Middle Palaeolithic, though in many cases the traces they left are ephemeral, sometimes consisting of isolated tools, or have been destroyed by repeated ice movements.

During the milder Allerød interstadial, we assist at the first seasonal settling of the Alps by last hunter-gatherers. This fact took place toward the end of the Late Palaeolithic, around the beginning of the definitive retreat of the Late Pleistocene glaciers. Roughly during the same times, studies on the human impact on the alpine highland zone ecosystems started to develop. Their scope was the reconstruction of the alpine environment exploited by groups of mobile hunter-gatherers at high altitudes, their settlement pattern, and the interpretation of the relationships with their complementary low-altitude base camps.

In this respect the presence of rock-art engravings, in Valcamonica, for instance, played an important role in the interpretation of different aspects of human life in a wide alpine valley. According to the experts in this field, their earliest appearance is most probably to be referred to the end of the Late Palaeolithic, though they became far more important and numerous during the Copper, Bronze, and the Iron Ages (Fig. 3) (Pini et al. 2016). During these latter periods, human representations, scenes of daily life, house structure types, cultivated fields, weapons, and sacred images form complex engraved patterns on the rocks rounded and striated by glacial action.

Since the 1970s our knowledge has greatly improved not only in Northern Italy but all over

High-Altitude Archaeology in Southeastern Europe, Fig. 3 The Massi di Cemmo 3, Bronze Age rock engravings in the middle Valcamonica (Northern Italy). (Photograph by P. Biagi, 2005)

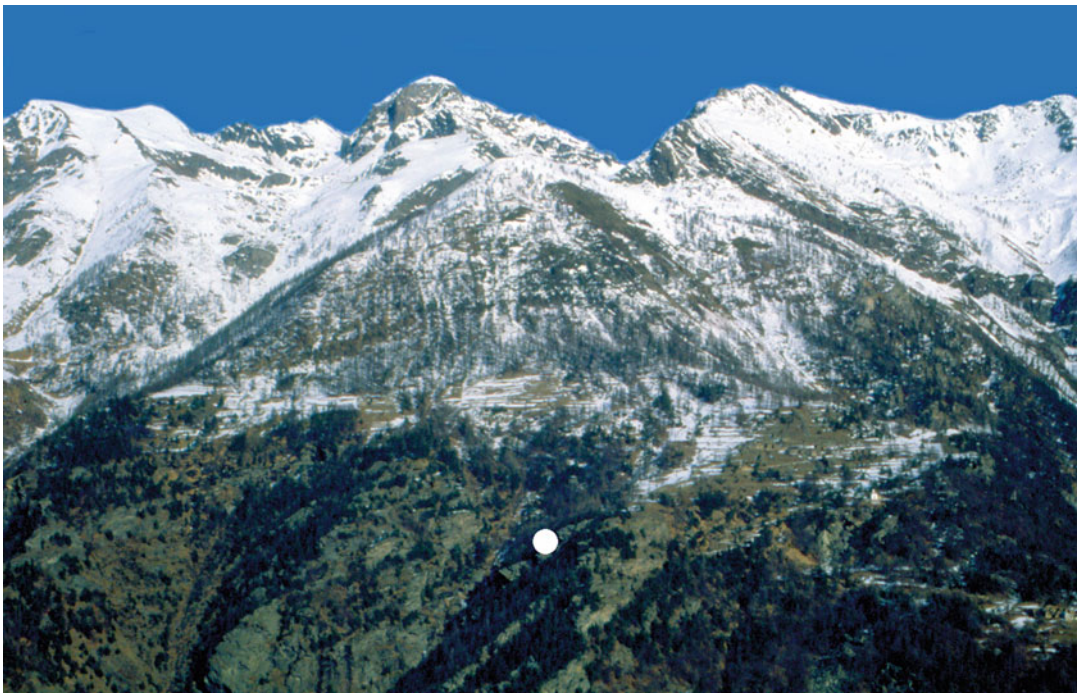

High-Altitude Archaeology in Southeastern Europe, Fig. 4 Location of the Chalcolithic rock shelter of Balm' Chanto (white dot) in the Cottian Alps (Northwestern Italy). (Photograph by R. Nisbet, 1983)

the Alpine arc, though highland zone research strategies and subsequent discoveries greatly varied country by country. The differences are mainly due to the characteristics of the natural resources, the great landscape variability of the mountain regions, the results achieved by excavations carried out in several countries (Fig. 4), the quality and quantity of published sites and materials, and the improving number of radiocarbon dates from both settlements and pollen cores extracted from neighboring peat-bog deposits. Thanks to the study of the lithic resources, trade models were developed regarding mostly chert and "greenstones," both of which are abundant in some well-defined zones of the Alps and the pre-Alps due to the richness of the raw material sources. Chert, hyaline quartz, and greenstones undoubtedly played a very important role in the prehistory of Northern Italy. They both were traded also across the Alps in different periods, according to different modalities.

Regarding chert, much effort has been paid to the study of the rich Lessini Hills sources and their mines located along the Alpine foothills of western Veneto near Verona. They were exploited already from the Palaeolithic, though mainly between the Early Neolithic and the Bronze Age. During these periods, many varieties of Lessini chert, mined or collected from well-defined outcrops, were traded throughout the Po Valley, even across the Ligurian Apennine/Alpine chain down to the Neolithic cave sites of the Finalese, close to the Ligurian Sea coastline (see Fig. 1, n. 10).

Moreover, also the western alpine high-pressure metaophiolithes rocks commonly named "greenstones" played a very important role in these periods. Greenstone artifacts were traded from the primary sources of Piedmont (Mt. Viso or Monviso) and Liguria (Voltri Group) and from secondary Oligocene deposits, according to models that are becoming more and more clear, thanks to the results obtained from highly refined scientific analyses and the typological study of polished stone tools from well-dated complexes, among which are axes, adzes, chisels, ring stones, and unique, ultra-polished ceremonial

implements (Pétrequin et al. 2012; Váczi et al. 2019). The distribution of polished stone artifacts are to be framed within a wider network system that regard also the trade of shell ornaments of Mediterranean origin, mainly *Spondylus* artifacts, among which are different types of beads and bracelets. These latter are known mainly from Neolithic and Copper Age settlements and graveyards excavated along the fringes of both sides of the Alps and from sites located well inside valleys of great trans-Alpine communication, among which is the Adige Valley of Trentino-South Tyrol (Séfériadès 1995).

The Carpathians

Located midway between Central and Southeastern Europe, the Carpathians are the second extensive mountain system in Europe. They form a large semicircle, over 1500 kms long that starts from Southern Poland, in the north, down to the lower Danube, in Romania. Though they are not dotted with impressive peaks, given that the highest mountains reach ca 2500 of altitude, their geographic location across the Balkan Peninsula always played a very important role in the prehistory of Europe since at least the Middle Palaeolithic period. The Danube, which separates them from the Alps, crosses the Carpathians throughout a narrow, winding gorge called the Iron Gates (Djerdap), between Romania and Serbia (Fig. 5). Politically this is a very important region that was always contended by the three great empires of the eighteenth century (Ottoman, Russian, and Austro-Hungarian), similarly to what happened ca 2000 years between the Romans and their facing enemy Dacian tribes, because of its strategic importance as a compulsory passage along a natural route linking Anatolia and its surrounding Aegean and Black Seas, in the south, with Central Europe, in the north. It is not a case that many prehistoric, classic, and more recent archaeological sites are located along the Iron Gates, among which Lepenski Vir is undoubtedly the most important and famous (Bonsall et al. 2015). The gorges

High-Altitude Archaeology in Southeastern Europe, Fig. 5 The Iron Gates (Djerdap) from the Serbian side of the gorge at Lepenski Vir. (Photograph by P. Biagi, 2006)

represent the easiest way to move across the Carpathians, although other minor passages do exist, for instance, along the course of the Olt River, to reach the Mureş Valley that flows inside the Carpathian Basin of lower Transylvania, down to the Danube River farther west.

It is well known that the Balkans, and the Carpathians in particular, have always represented a route along which transhumant shepherds moved until World War II to reach the Dinaric Alps, the Trieste, and Slovene Karst, though their roots are most probably to be searched in later prehistoric and classic times (Nandris 1985). Moreover, the Carpathians are rich in natural resources that were exploited in different periods of prehistory, whose outcrops are sometimes easy to identify: obsidian and salt in particular. At present, the locations of the three main north Carpathian obsidian sources are well known and characterized, though their scientific study started to attract the attention of archaeologists already in the 1970s. In contrast, the study of the salt sources developed mainly during the last 20 years. Their rich exploitation sites remark the important role played by this mineral in the economy of the south Balkan settlements at least since the beginning of the Early Neolithic Criş culture, mainly in Romania and Moldova (Brigand and Weller 2018).

These were not the only two important resources that were traded across the study region and beyond. Among the others we have to stress our attention toward at least three other important raw materials, namely, gold, copper, and Volhynian/Prut flint, whose sources are located in northwestern Ukraine along the course of the Prut River. The production, circulation, and trade of objects made from these materials within the Carpathian basin and outside it clearly show that these mountains did not act as a barrier; in contrast people systematically moved their goods across this chain, developing contacts that were activated at least since the end of the Neolithic onward. This fact is exemplified by the presence of different raw materials of both Carpathian and Transcarpathian origin involving, among others, sites where precious gold items were manufactured (Fig. 6). They show the importance of these materials at least since the beginning of the Copper Age. They were undoubtedly traded following a complex trade network that moves at least in two different directions, from north to south and west to east. In particular copper was mined to manufacture not only ornaments but also functional tools among which are different types of axes and other weapons that were recovered from hoards, burials, and settlements.

High-Altitude Archaeology in Southeastern Europe, Fig. 6 Excavations underway at the Cave Peştera Ungurească in the Cheile Turzii gorge near Turda in Transylvania (Romania) whose Chalcolithic deposits yielded evidence of gold smelting, Carpathian obsidian, and Volhynian/Prut chert artifacts. (Photograph by P. Biagi, 2004)

The Pindus

The Pindus range runs for ca. 200 km covering part of Albania, Northern Greece, and Macedonia, reaching the maximum altitude of 2637 m at Mt. Smolikas, in Western Macedonia. Due to its steep uneven slopes, its location between the short coastal Ionian Sea plain, and the wider lowlands of Thessaly and Western Macedonia, in the east, for long these mountains have been considered repulsive for prehistoric settlement of any age. Within the same mountain range, Lakes Ohrid and Prespa are the largest basins in the region, while along the south shore of Lake Kastorià, in Western Macedonia, is located the famous settlement of Dispiliò. Together with other villages discovered around Lake Maliq, in Albania, and Ohrid, in Macedonia, Dispiliò is one of the few prehistoric lake dwellings so far known in the Balkans.

Archaeological research has been seldom carried out in the remote Pindus range, with the exception of the archaeological program promoted by the University of Cambridge in Epirus during the 1960s, whose scope was the excavation of a few Palaeolithic rock shelters and the definition of the chronological sequence of the Middle Palaeolithic assemblages of this difficult mountain landscape (Higgs and Vita-Finzi 1966). However, there are many reasons that might have attracted hunters, gatherers, farmers, and shepherds along and around its slopes in different times. The high-altitude landscapes of the Pindus are scattered with small basins and ponds that provide not only insights of the human presence since the Middle Palaeolithic but also excellent potential sources for climatic and palaeoenvironmental reconstructions. Rich of springs and water, the eastern side of the chain is crossed by many steep valleys among which is that of the Aliakmon River, with red Pleistocene palaeosols along its terraces. Its course gives access to different mineral resources exploited in prehistory (greenstones, radiolarites, chert), as well as to the fertile high pastures, well known for many centuries to Arômani speaking Vlach transhumant shepherds (Wace and Thompson 1914).

Due to its southern location and its modest elevation, the range did not know the extreme climatic changes that affected the Alps during the Quaternary. However, glacial and periglacial morphologies have been identified and, in some ways, correlated to those of the Alps (Hughes et al. 2006). The oldest moraine in the Tymphi-Smolikas district dated by U-series isotopes predates 350 ka BP and includes at its top Levallois Mousterian industries around Smixi, at ca 1350 m of altitude (Fig. 7).

In this area the small town of Samarina is well known for earlier French and American ethnoarchaeological research on Vlach transhumant shepherds. Recent surveys have been successful in recovering, along the terraces that face the Samariniotikos River and the surrounding ridges up to 2300 m, many traces left by Middle Palaeolithic hunters, with their base camps and knapping sites (Fig. 8), hunting paths, and exploited good-quality chert outcrops over a radius of ca 30 km from the "residential" sites located along the river terraces (Biagi et al. 2016).

Though most of the prehistoric sites around the Samarina Mountains and watercourses consist of typical Middle Palaeolithic Levallois Mousterian assemblages, the same region yielded also many evidences of frequentation belonging to other prehistoric periods, among which are Late Neolithic scatters of lithic tools, as well as radiocarbon-dated Bronze Age sites and chert arrowheads attributable to the same period. Regarding the Bronze Age sites, they are often strategically located on top of high mountain peaks, because their scope was to control the lower-lying river valleys that move down to both the Aegean and Ionian Seas and pasture lands. The systematic recurrence of Bronze Age arrowheads, made from exogenous chert, shows that high-altitude footpaths were already in use during that period, and hunting was sometimes practiced also in the uplands around Samarina. During the Bronze Age, the first traces of deforestation have been radiocarbon-dated from tree pits discovered on the surface of the terrace that extends behind Samarina itself. The systematic radiocarbon dating of many such features has shown that deforestation continued to be practiced throughout historic and more recent periods, most probably to open pastures to move Vlach shepherds'

High-Altitude Archaeology in Southeastern Europe, Fig. 7 The lower Vasilitsa moraines, near Smixi, that yielded typical Levallois Mousterian artifacts at their top, in the Pindus range of Western Macedonia. (Photograph by R. Nisbet, 2016)

flocks, as also reported by A.J.B Wace and M.S. Thompson for subrecent, historic periods (Wace and Thompson 1914: 45).

The Caucasus

Recently, the unexpected discovery of a few high-altitude, open-air Early Palaeolithic sites has highlighted the importance of the Caucasus as a route followed by ancient hominids moving "out of Africa" toward Europe and Asia somewhat before 2 Myr ago throughout the so-called Caspian corridor (Amirkhanov 2016: Fig. 24). The sites yielded rich, typical Oldowan knapped stone assemblages made from local rocks, characterized by different types of cores, choppers, and flakes, associated with identifiable faunal remains that were often uncovered in a very good state of preservation at least at Dmanisi in Georgia (Fig. 9).

As elsewhere in the high mountains of Europe, Caucasus archaeology knew since long traditional survey techniques, i.e., field walking. Although this method has been questioned even by some archaeologists on the ground that uplands are prone to erosion and loss of documentation, nevertheless, it is still to be considered one of the fundamental ways to inspect the minute signs of humane presence also in the highland zones (Gassiot Ballbè et al. 2016). Since the times of large-scale surveys organized in the 1930s by B.A. Kuftin in the Tsalka/Trialeti region, this methodology has improved to a very high standard. This is shown by the impressive results recently obtained in the Samtskhe-Javakheti province of Georgia (Anderson et al. 2014). However, it is true that new techniques can greatly contribute to new discoveries. In recent years, the mountains of the Caucasus have acted as an excellent

High-Altitude Archaeology in Southeastern Europe, Fig. 8 A view of the Samariniòtikos River and the terraces on which Mousterian Levallois sites are located along its right bank, from La Greklu, in the Pindus range of Western Macedonia. (Photograph by P. Biagi, 2017)

laboratory to test new prospection methods of remote sensing such as aerial satellite and drone photography to detect, for instance, elusive features among which are prehistoric pastoral sites or semi-subterranean dwellings in such even topographies as the Northern Caucasus (Reinhold et al. 2016). For example, high-resolution satellite images confirmed previous terrain survey discoveries of hundreds of obsidian mining pits along the slopes of Mt. Chikiani volcano in the Lesser Caucasus Javakheti plateau of Georgia, otherwise invisible from the ground.

The Holocene prehistory of the Caucasus is strictly connected to northern steppe plains and the Near East at least since the Mesolithic. In this region, the presence of the last Early Holocene hunter-gatherers is known almost exclusively from caves and rock shelters excavated in Georgia, Abkhazia, Armenia, and Dagestan (Bader and Zereteli 1989). Hunting equids, bisons, and occasionally water birds (Bavra) represent the only documented subsistence economy, as no evidence of edible vegetables has ever been recorded from any archaeological site.

Farming makes its appearance around 7000 BP and quickly spread to the north. The sites of this period are often located along the course of the Kura River. The Early Neolithic settlements of the Shomutepe-Shulaveri culture show evidence of cereals (barley, wheat, legumes, and grapes) along with domesticated herbivores. The sedentary villages of this culture, among which are those of Aruchlo, in Georgia, and Göytepe in western Azerbaijan, are characterized by groups of walled, mud-brick circular buildings of different sizes (Chataigner et al. 2014). The first pastoral groups inhabited the plateaus of south Caucasia and the steppe zone north of the Caucasus as early as the late sixth millennium BP, though only from the middle of the fourth millennium BP onward, we assist at an intensive exploitation of the steppe and mountain pastures. The

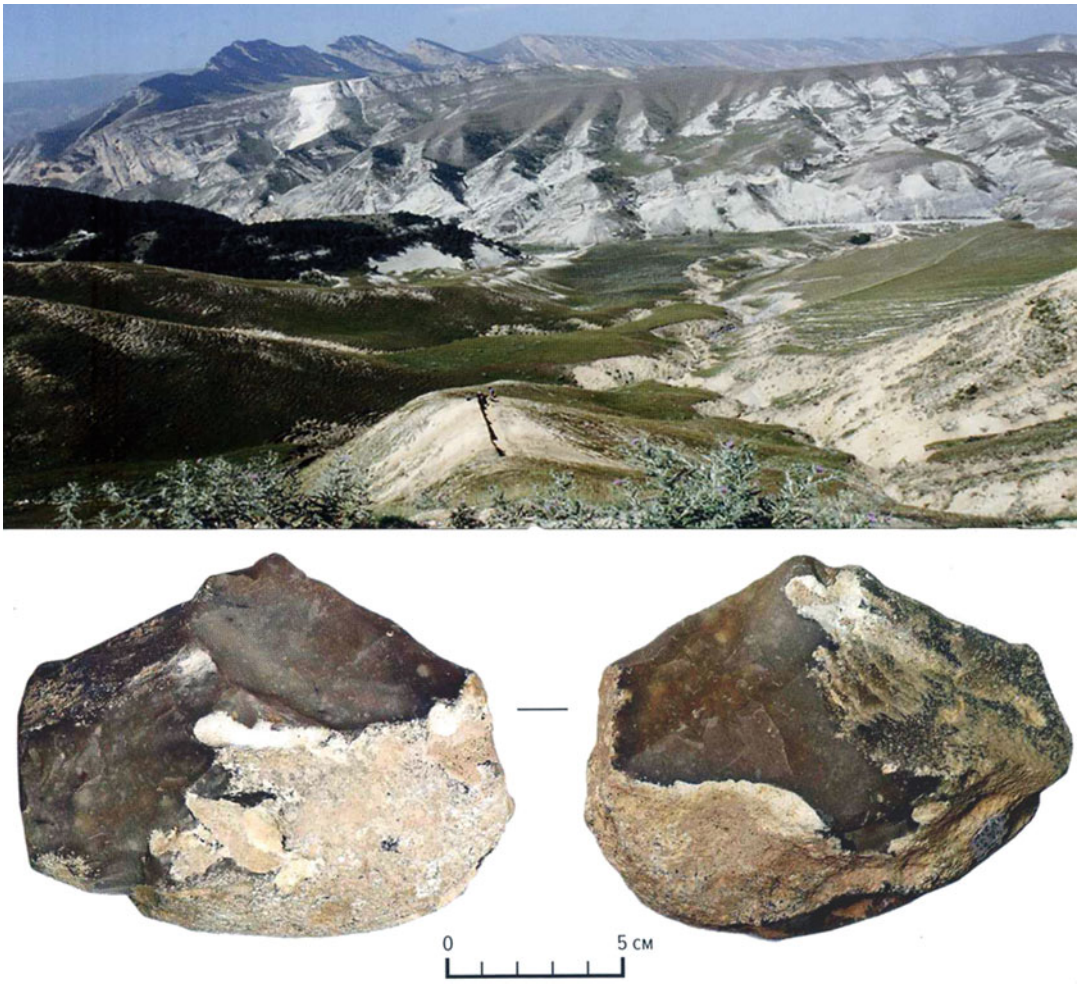

High-Altitude Archaeology in Southeastern Europe, Fig. 9 The Early Palaeolithic site of Muhkai 2 in Dagestan, in the foreground (above), and a chert chopper tool from the same site (below). (After Amirkhanov 2016: figs. 16 and 54)

opening up of the steppes has long been associated with the development of a mobile, pastoral way of life (Shishlina 2013). New technologies, in particular wheeled transport, and most likely horsemanship, fostered this process with its increasing demands for new large pastures. Moreover, the recent discovery of complex systems of different types of field terraces between 600 and 2600 m of altitude, along the slopes of the northern Caucasus in south Russia, opens new perspectives to the study of the prehistoric and historic agriculture practiced between the Copper Age and the Medieval period. This latter was practiced by Alani tribes that left impressive traces of their subsistence economy structures on the landscape (Korobov and Borisov 2013). In this respect we do not have to forget that, already in the Copper Age, the Caucasian mountains saw the first presence of complex agricultural implements among which are wooden threshing sledges with chert inserts that have sometimes recovered still intact inside grave-pits just below skeletal remains. This fact points out the importance that agriculture played in the region at least since the beginning of the Copper Age period, if not before (Skakun 2003).

The best-known Late Chalcolithic-Bronze Age culture in the Caucasus is the Kura-Araxes, whose

High-Altitude Archaeology in Southeastern Europe, Fig. 10 Monumental corridor *kurgan* in the Javakheti highland near Mt. Chikiani in the Lesser Caucasus of Georgia. (Drone photograph by R. Nisbet, 2017)

radiocarbon chronology falls roughly between 5200 and 4200 BP. Different types of monumental burials (*kurgans*) started to be built during the Chalcolithic as symbols of social differentiation (Fig. 10). The Kura-Araxes *kurgans* hold impressive wooden collective burial chambers inside which prestige goods are usually absent, though they have been interpreted as a sign of egalitarian funerary ideology (Kohl 2007: 57–124).

The search for ores in the mountains was intense in this period, though also knappable stone resources continued to be exploited during the development of a complex Bronze Age society that largely employed bronze to produce a great variety of everyday life objects, sophisticated weapons, and ornaments. Along the slopes of Mt. Chikiani volcano, northeast of Lake Paravani, well above 2000 m of altitude, this led to a large exploitation of obsidian (Fig. 11), with the opening of many hundred extraction pits inside different lava flows that formed well over 2 Myr ago, the presence of workshops, circular stone platforms on which knapping took place, villages with rows of semisubterranean houses, impressive long alignments of large stone boulders, *menhirs*, quarries, and many hundreds of tombs covered by obsidian and andesite blocks, scattered along the mountain slopes (Biagi and Nisbet 2018). Chikiani obsidian was traded all over Caucasus since the end of the Middle Palaeolithic period onward, down to the Neolithic settlements located along the eastern shores of the Black Sea, in order to supply sites located even more than 400 kms away.

Discussion

Though very different in their geography and geological and climatologic history, the mountain ranges discussed above share some important common elements regarding the role they played in prehistory, which hide the reasons why men discovered, approached, and later settled them. As far as we know from the study of the material culture remains brought to light during decades of high-altitude surveys and excavations and the geological richness of the natural mountain deposits, mountains were often frequented, though in different times and for different economic and cultural reasons, to exploit raw

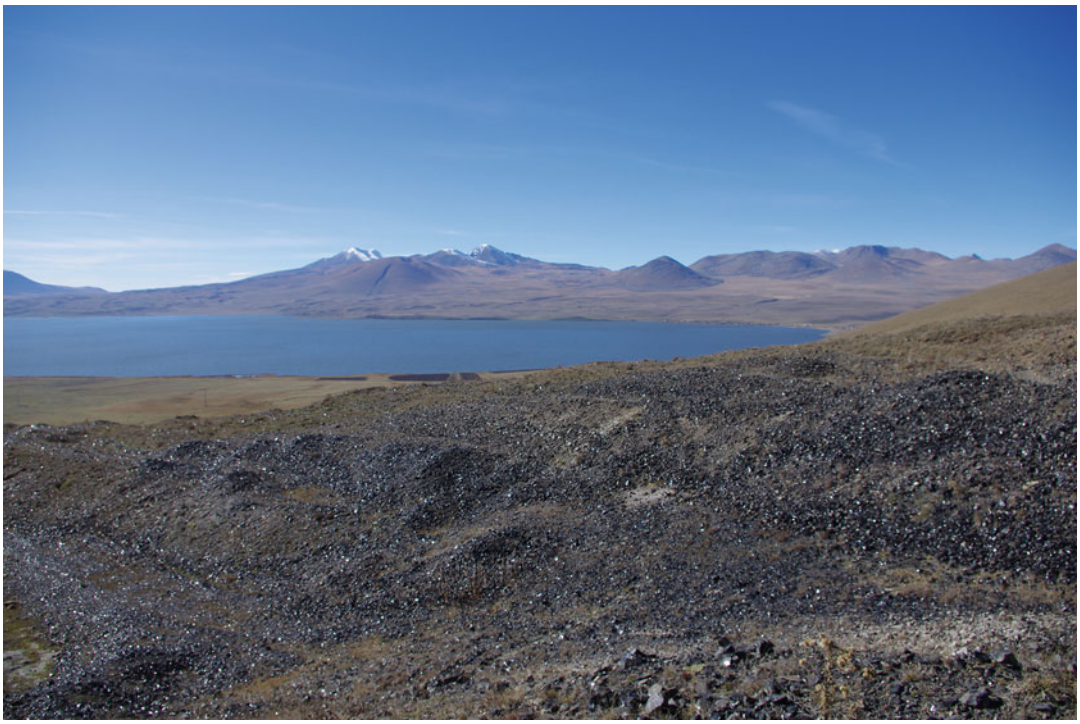

High-Altitude Archaeology in Southeastern Europe, Fig. 11 Obsidian deposit exposed along the slope of Mt. Chikiani in the Lesser Caucasus of Georgia north-east of Lake Paravani. (Photograph by P. Biagi, 2005)

material sources. They are represented mainly by obsidian, ores, and salt in the Caucasus; chert and radiolarite in the Pindus; salt, obsidian, and gold in the Carpathians; and chert, greenstones, salt, and also copper in the Alps, together with many more minerals and rocks, among which are chalk, soapstone, hyaline quartz, hornfels, basalts, etc. whose mining is suggested to have involved communication with supernatural powers as well as pecking images into the rock itself. In this respect, copper played a major role mainly during the Copper Age also in the Apennines and the Alps of Northern Italy, France, and Austria. During this period, lasting ca one millennium, a great variety of copper battle axes were manufactured smelting almost pure ore, sometimes containing arsenic or silver impurities that were circulated following still difficult-to-define trade routes. Their shape and dimension varied culture by culture, though they seem to reproduce original polished stone specimens (Sherratt 1976).

In addition, mountains are considered to be reservoirs of game animals since the Palaeolithic, and, in more recent periods, they offered the best pastures to pastoral economies, a role they still play nowadays. In comparison with the uniform, densely forested plains, the alleged difficulties of access to steep slopes are widely counterbalanced by the variety of diverse ecosystems, rapid changes in exposure and microclimate, good visibility over the landscape above the tree line, clearings providing excellent hunting spaces, as well as edible seeds and fruits. All over the world, mountains have been reached, explored, and settled in different times and for different reasons, not always necessarily only for functional or economic reasons. Prehistoric human presence in this challenging environment leaves recognizable signs that offer a ground for investigation to both archaeologists and palaeoecologists, to answer to the many questions arising in mountain archaeology: when, why, and how men began to settle in

highland zones; what type of pathways were chosen or created to reach them along slopes and ridges, though always following the easiest way; why they decided or were forced to move away; and how could they control and manage this environment so prone to erosion, loss of soil, and instability?

We know that mountains are not only places where to live but also where to die and sacrifice to gods and goddesses. In this respect, megalithism is a sort of communication with known or unknown forces, which is commonly found in the uplands, where monuments sometimes follow a precise orientation whose meaning is often difficult to suggest. In the mountains we have evidence of tombs made of simple heaps of pebbles, or monumental *kurgans* with one or several bodies buried according to well-planned rituals into spectacular wooden chambers together with chariots and horses (at least in the Caucasus), large richly-decorated stele-statues used as gravestone, *menhirs*, engraved surfaces on Alpine rocks, as for example, in the Valcamonica in the Central Alps and the Vallée des Merveilles (Mt. Bego) in the Western Alps of France (Lumley de and Échassoux 2011). The latter was settled from the end of the Palaeolithic period to the Bronze Age up to an altitude of more than 2500 m. Here an impressive number of many hundred thousand figures, symbols, cup marks, representations of specific tools and weapons, huts, animals, scenes of daily life, and probable divinities are only an example of the rich ideological relationships that undoubtedly existed between men, rocks, and mountains.

To sum up, the new evidence collected during the last decades of upland archaeology activities in different parts of the world substantially changed the old assumption according to which man had never inhabited high mountain ranges in prehistory and, more specifically, before historic periods, since the mountain ecosystem was considered a "marginal" one within the general pattern of traditional archaeology. In contrast, at present it is clear that the archaeological record of high-altitude human activity depends on many factors, among which are visibility and the state of preservation of the sites, the presence of particular resources, and the methods employed to conduct research.

Mountain archaeology is indeed challenged by difficult environmental conditions. Archaeologists have to move up- and downslopes and walk for hours to operate in areas often difficult to reach by car and transport their equipment by foot on steep pathways. Moreover, it is a time-consuming and a particularly harsh type of fieldwork, considering that weather conditions can change dramatically from 1 h to the next. However, there is little doubt that the study of human adaptation to highland environments is a promising avenue of future research that deserves particular care and systematic, accurate methods of investigation.

Cross-References

- ▶ Chinese Association for Quaternary Research (CHIQUA)
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Mousterian Industry Tradition
- ▶ Neanderthals and Their Contemporaries

References

Amirkhanov, H.A. 2016. *North Caucasus: The beginning of prehistory*. Moskow: Mavraev. (in Russian).

Anderson, W., J. Birkett-Rees, M. Negus Cleary, D. Krsmanovic, and N. Tskvitinidze. 2014. Archaeological survey in the South Caucasus (Samtskhe-Javakheti, Georgia): Approaches, methods and first results. *Anatolia Antiqua* 22: 11–33.

Bader, H.O., and L.D. Zereteli. 1989. The Mesolithic of the Caucasus. In *The Mesolithic of the USSR*, Archaeology of the USSR, ed. L.V. Kolzov, 93–105. Moskow: Nauka. (in Russian).

Biagi, P., and J. Nandris, eds. 1994. *Highland zone exploitation in Southern Europe*, Monografie di "Natura Bresciana". Vol. 20. Brescia: Museo Civico di Scienze Naturali.

Biagi, P., and R. Nisbet. 2018. The Georgian Caucasus and its resources: The exploitation of the Mount Chikiani uplands during the metal ages. *Antiquity* 92 (362): e7:1–e7:9. https://doi.org/10.15184/aqy.2018.53.

Biagi, P., R. Nisbet, E. Starnini, N. Efstratiou, and R. Michniak. 2016. Where mountains and Neanderthals meet: The middle Palaeolithic settlement of Samarina in the Northern Pindus (Western Macedonia, Greece). *Eurasian Prehistory* 13 (1–2): 3–76.

Bonsall, C., R. Vasić, A. Boroneanţ, M. Roksandic, A. Soicaru, K. McSweeney, A. Evatt, Ü. Aguraiuja, C. Pickard, V. Dimitrijević, T. Higham, D. Hamilton, and G. Cook. 2015. New AMS 14C dates for human remains from stone age sites in the Iron gates reach of the Danube, Southeast Europe. *Radiocarbon* 57 (1): 33–46. https://doi.org/10.2458/azu_rc.57.18188.

Brigand, R., and O. Weller. 2018. Neo-eneolithic settlement pattern and salt exploitation in Romanian Moldavia. *Journal of Archaeological Science: Reports* 17: 68–78. https://doi.org/10.1016/j.jasrep.2017.10.032.

Catalan, J., J.M. Ninot, and M.M. Aniz. 2017a. The high mountain conservation in a changing world. In *High mountain conservation in a changing world*, Advances in global change research, ed. J. Catalan, J.M. Ninot, and M.M. Aniz, vol. 62, 3–36. Springer Open, 9. https://doi.org/10.1007/978-3-319-55982-7_1.

Chataigner, C., R. Badalyan, and M. Arimura. 2014. The neolithic of the Caucasus. In *Oxford handbooks online*, 1–36. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199935413.013.1.

Coia, V., G. Cipollini, P. Anagnostou, F. Maixner, C. Battaggia, F. Brisighelli, A. Gómez-Carballa, G. Destro Bisol, A. Salas, and A. Zink. 2016. Whole mitochondrial DNA sequencing in alpine populations and the genetic history of the Neolithic Tyrolean iceman. *Scientific Reports* 6: 18932. https://doi.org/10.1038/srep18932.

de Lumley, H., and A. Échassoux. 2011. *La montagne sacrée du Bego*. Paris: CNRS.

Gassiot Ballbè, E., I.C. Conte, N. Mazzucco, D. Garcia Casas, L. Obea Gómez, and D. Rodríguez Antón. 2016. Surface surveying in high mountain areas, is it possible? Some methodological considerations. *Quaternary International* 402: 35–45. https://doi.org/10.1016/j.quaint.2015.09.103.

Hafner, A., M. Brunner, and J. Laabs. 2017. Archaeology of the alpine space. Research on the foothills, valley systems and high mountain landscapes of the Alps. *Human & Landscape. Prehistoric Archaeology of Eastern Europe. Vita Antiqua* 9: 16–37. https://doi.org/10.5281/zenodo.1240724.

Higgs, E.S., and C. Vita-Finzi. 1966. The climate, environment and industries of stone age Greece. *Proceedings of the Prehistoric Society* 32: 1–29. https://doi.org/10.1017/S0079497X00014328.

Hughes, P.D., J.C. Woodward, P.L. Gibbard, M.G. Macklin, M.A. Gilmour, and G.R. Smith. 2006. The glacial history of the Pindus mountains, Greece. *The Journal of Geology* 114 (3): 413–434. https://doi.org/10.1086/504177.

Keller, F. 1866. *The lake dwellings of Switzerland and other parts of Europe*. London: Longmans, Green, and Co.

Kern, A., K. Kowarik, A.W. Rausch, and H. Reschreiter. 2009. *Kingdom of Salt. 7000 years of Hallstatt*, Veröffentlichungen der Prähistorischen Abteilung (VPA). Vol. 3. Vienna: Natural History Museum.

Kohl, P.L. 2007. *The making of bronze age Eurasia*. Cambridge: Cambridge University Press.

Korobov, D.S., and A.D. Borisov. 2013. The origin of terraced field agriculture in the Caucasus: New discoveries in the Kislovodsk basin. *Antiquity* 87 (338): 1086–1103. https://doi.org/10.1017/S0003598X00049887.

Kutschera, W., R. Golser, A. Priller, W. Rom, P. Steier, E. Wild, M. Arnold, N. Tisnerat-Laborde, G. Possnert, S. Bortenschlager, and K. Oeggl. 2000. Radiocarbon dating of equipment from the iceman. In *The man in the ice. The iceman and its natural environment*, ed. S. Bortenschlager and K. Oeggl, vol. 4, 1–9. Springer. https://doi.org/10.1007/978-3-7091-6758-8_1.

Lowe, J.J. 1992. Late glacial and early Holocene lake sediments from the northern Apennines, Italy – Pollen stratigraphy and radiocarbon dating. *Boreas* 21: 193–208.

Nandris, J.G. 1985. The Stina and the Katun: Foundations of a research design in European Highland zone ethnoarchaeology. *World Archaeology* 17 (2): 256–268. https://doi.org/10.1080/00438243.1985.9979966.

Oeggl, K. 1994. The palynological record of human impact on highland zone ecosystems. In *Highland zone exploitation in Southern Europe*, Monografie di "Natura Bresciana", ed. P. Biagi and J. Nandris, vol. 20, 107–122. Brescia: Museo Civico di Scienze Naturali.

Pauli, L. 1984. *The Alps archaeology and early history*. London: Thames and Hudson.

Pelisiak, A., M. Nowak, and C. Astaloş. 2018. *People in the mountains. Current approaches to the archaeology of mountainous landscapes*. Oxford: Archaeopress Archaeology.

Pétrequin, P., S. Cassen, M. Errera, L. Klassen, and A. Sheridan, eds. 2012. *Jade. Grandes haches alpines du Néolithique européen. Ve et IVe millénaires av. J.-C.* Besançon: Presses Universitaires de Franche-Comté. Tome 1.

Pini, R., C. Ravazzi, A. Aceti, L. Castellano, R. Perego, T. Quirino, and F. Vallè. 2016. Ecological changes and human interaction in Valcamonica, the rock-art valley, since the last deglaciation. *Alpine and Mediterranean Quaternary* 29 (1): 19–34.

Primas, M. 1999. From fiction to facts. Current research on prehistoric human activity in the Alps. In *Prehistoric alpine environment, society, and economy*, ed. P. Della Casa, vol. 55, 1–10. Universitätsforschungen zur prähistorischen Archäologie.

Reinhold, S., A. Belinskiy, and D. Korobov. 2016. Caucasia top-down: Remote sensing data for survey in a high

altitude mountain landscape. *Quaternary International* 402: 46–60. https://doi.org/10.1016/j.quaint.2015.10.106.

Séfériadès, M. 1995. La route Néolithique des Spondyles de la Méditerranée à la Manche. In Otte, M. (ed.) Nature et Culture. Actes du colloque international de Liège. ERAUL, 68 (1): 291–358.

Sherratt, A. 1976. Resources, technology and trade: An essay on early European metallurgy. In *Problems in economic and social archaeology*, ed. G. de G. Sieveking, I.H. Longworth, and K.E. Wilson, 557–581. London: Duckworth.

Shishlina, N. 2013. The steppe and the Caucasus during the bronze age: Mutual relationships and mutual enrichments. In *Counterpoint: Essays in archaeology and heritage studies in honour of professor Kristian Kristiansen*, BAR international series, ed. S. Bergerbrant and S. Sabatini, vol. 2508, 53–60. Oxford: Hadrian Books.

Siegesmund, S., B. Fügenschuh, and N. Froitzheim. 2008. *Tectonic aspects of the alpine Dinaride-Carpathian system*. Vol. 298. London: Geological Society Special Publications.

Skakun, N. 2003. Threshing sledges in the Caucasus from prehistory to the present. In *Le traitement des récoltes. Un regard sur la diversité du Néolithique au present*, ed. P.C. Anderson, L.S. Cummings, T.K. Schippers, and B. Simonel, 389–399. Antibes: APDCA.

Stirn, M.A. 2014. Why all the way up there? Mountain and high-altitude archaeology. *The SAA Archaeological Record* 14 (2): 7–10.

Váczi, B., G. Szakmányi, E. Starnini, Z. Kasztovszky, Z. Bendő, F.A. Nebiacolombo, R. Giusetto, and R. Compagnoni. 2019. High-pressure meta-ophiolite boulders and cobbles from northern Italy as possible raw-material sources for "greenstone" prehistoric tools: Petrography and archaeological assessment. *European Journal of Mineralogy.* https://doi.org/10.1127/ejm/2019/0031-2859.

Vasilyev, S.V., and H.A. Amirkhanov. 2018. Palaeolithic Caucasus: Paleoanthropological panorama. *Quaternary International* 465: 105–116. https://doi.org/10.1016/j.quaint.2017.09.020.

Wace, A.J.B., and M.S. Thompson. 1914. *The nomads of the Balkans*. London: Methuen & Co. Ltd.

Weninger, B., E. Alram-Stern, E. Bauer, L. Clare, U. Danzeglocke, O. Jöris, C. Kubatzki, G.O. Rollefson, H. Todorova, and T. van Andel. 2006. Climate forcing due to the 8200 calBP event observed at early Neolithic sites in the eastern Mediterranean. *Quaternary Research* 66: 401–420. https://doi.org/10.1016/j.yqres.2006.06.009.

Further Readings

Badalyan, R.S. 2010. Obsidian of the South Caucasus: The use of raw materials in the Neolithic to early Iron age. In *Von Majkop bis Trialeti. Gewinnung und Verbreitung von Metallen und Obsidian in Kaukasien im 4.-2. Jt. v. Chr.*, Kolloquien zur Vor- und Frühgeschichte, ed. S. Hansen, A. Hauptmann, I. Motzenbäcker, and E. Pernicka, vol. 13, 27–38. Berlin/Bonn: Eurasien-Abteilung/Habelt.

Bagolini, B., P. Biagi, A. Broglio, J.K. Kozłowski, and S.K. Kozłowski, eds. 1992. Human adaptations to the mountain environment in the upper Palaeolithic and Mesolithic. *Preistoria Alpina* 28. (volumes 1 and 2).

Bailey, G., ed. 1997. *Klithi: Palaeolithic settlement and quaternary landscapes in Northwest Greece*, Klithi in its local and regional setting. Vol. 2. Cambridge: McDonald Institute for Archaeological Research.

Barfield, L.H. 2004. Lithics, culture and ethnic identity. *Lithics* 25: 65–77.

Biagi, P., R. Nisbet, and B. Gratuze. 2017. Obsidian mines and their characterization: New aspects of the exploitation of the obsidian sources of Mt. Chikiani (Koyun Dağ) in the lesser Caucasus of Georgia. *The Quarry* 12: 2–24.

Bonsall, C., V. Boroneanţ, and I. Radovanović, eds. 2008. *The Iron gates in prehistory*, BAR international series. Vol. 1893. Oxford: Archaeopress.

Catalan, J., J.M. Ninot, and M.M. Aniz. 2017b. High Mountain conservation in a changing world. *Advances in Global Change Research* 62: 3–36. Springer Open, 9.

Della Casa, Ph., ed. 1999. *Prehistoric alpine environment, society, and economy*, Universitätsforschungen zur Prähistorischen Archäologie. Vol. 55. Bonn: Habelt.

Endrizzi, L., and F. Marzatico. 1997. *Ori delle Alpi. Quaderni della Sezione Archeologica Castello del Buonconsiglio*, Monumenti e collezioni provinciali. Vol. 6. Trento: Provincia Autonoma di Trento, Servizio Beni Culturali.

Gasparyan, B. and Arimura, M., eds. 2014. Stone age of Armenia. A guide-book to the stone age archaeology in the Republic of Armenia. Monograph of the JSPS-bilateral joint research project. Center for Cultural Resource Studies, Kanazawa University, Kanazawa.

Grimaldi, S., S. Bang-Andersen, F. Carrer, P. Crotti, Ph. Della Casa, F. Fontana, W. Leitner, E. Mansur, and S. Reinhold, eds. 2016. Human occupations in mountain environments (HOME). *Quaternary International Special Issue* 402: 1–128.

Hafner, A. 2015. *Schnidejoch und Lötschenpass. Archäologische Forschungen in den Berner Alpen*, Erziehungsdirektion des Kantons Bern. Vol. 1 and 2. Amt für KulturArchäologischer Dienst des Kantons Bern.

Huet, T. 2017. *Les gravures piquetées du mont Bego (Alpes-Maritimes). Organisation spatiale et sériation (VIe-IIe millénaire av. J.-C.)*, Mémoires de la Société préhistorique française, 63.

Hughes, P.D., and P.L. Gibbard. 2018. Global glacier dynamics during 100 ka Pleistocene glacial cycles. *Quaternary Research* 90 (1): 222–243. https://doi.org/10.1017/qua.2018.37.

Jéquier, J.P. 1975. *Le Moustérien Alpin. Révision critique*, Eburodunum II. Cahiers d'Archéologie Romande. Vol. 2. Yverdon.

Kuftin, B.A. 1941. *Archaeological excavations in Trialeti I. An attempt to Periodize archaeological materials*. Tbilisi: Publishing House of the Academy of Sciences of the Georgian SSR. (in Russian).

Lazarovici, Gh., and A. Ardeţ, eds. 2015. *Tsara Gugulanilor: Studii de etnoarheologie, etnografie şi etnoistorie*. Mega, Cluj-Napoca: Acta Musei Caransebesiensis. (in Romenian).

Lordkipanidze, D., O. Bar-Yosef, and M. Otte. *Early humans at the gates of Europe*, 92. Liège: ERAUL.

Lyonnet, B., F. Guliyev, B. Helwing, A. Tevekkül, S. Hansen, and G. Mirtskhulava. 2012. Ancient Kura 2010–2011: The first two seasons of joint field work in the Southern Caucasus. *Archäologischen Mitteilungen aus Iran und Turan* 44: 1–190.

Makharadze, Z., N. Kalandadze, and B. Murvanidze. 2016. *Ananuri big kurgan 3*. Tbilisi: Georgian National Museum.

Marro, C., V. Bakhshaliyev, and S. Sauz. 2010. Archaeological investigations on the salt mine of Duzdaği (Nachchivan, Azerbaïdjan). *Tüba-AR* 13: 229–244.

Sagona, A. 2014. Rethinking the Kura-Araxes genesis. *Paléorient* 40 (2): 23–46. https://doi.org/10.3406/paleo.2014.5634.

Schnekenburger, G., ed. 2002. *Attraverso le Alpi uomini, vie e scambi nell'antichità*. Stuttgart: Archäologisches Landesmuseum Baden-Württemberg.

Tkachuk, T. 2018. Carpathians: Barrier or border? Tiszapolgár, Bodrogkeresztúr, Petreşti and Trypillia-Cucuteni cultures. In *People in the mountains: Current approaches to the archaeology of mountainous landscapes*, ed. A. Pelisiak, M. Nowak, and C. Astaloş, 79–86. Oxford: Archaeopress Archaeology.

van Andel, T.H., and W. Davies, eds. 2003. *Neanderthals and modern humans in the European landscape during the last glaciation*. Cambridge: McDonald Monographs. Institute for Archaeological Research.

Vasilyev, S.A., and A.V. Larionova. 2013. *The Most ancient Caucasus: A crossroad of Europe and Asia*. St. Petersburg: Russian Academy of Sciences, Institute for the Material Culture History. (in Russian).

Wierer, U., S. Arrighi, S. Bertola, G. Kaufmann, B. Baumgarten, A. Pedrotti, P. Pernter, and J. Pelegrin. 2018. The Iceman's lithic toolkit: Raw material, technology, typology and use. *PlosOne* 13 (6.): e0198292): 1–48. https://doi.org/10.1371/journal.pone.0198292.

Zierl, B., and H. Bugmann. 2005. Global change impacts on hydrological processes in alpine catchments. *Water Resources Research* 41: 1–13. W02028. https://doi.org/10.1029/2004WR003447.

Hillfort Investigations in the Czech Republic

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Brief Definition of the Topic

The *hillfort* is one of Europe's best known types of pre- and protohistoric monument. Those found in the Czech Republic range in date over the Neolithic, Eneolithic, Bronze Age, Iron Age, Roman, and early medieval periods. Many of these sites have long been familiar in the landscape, but more have been identified or studied during various archaeological survey projects (e.g., Gojda et al. 2004; Křivánek 2004). They vary in size from 0.1–0.5 ha to 100–200 ha. They offer important information on the key roles they performed in each period: military bases, settlement, industry, trade, communications, agriculture, burial, cult, or other activities.

The traditional method of investigating hillforts was the excavated trench, and in this country attention was focused on Slavic and Celtic fortified sites. The new approach places the emphasis on *remote mapping*, making particular use of *aerial survey*, *geophysical survey*, and *surface collection*. *Geochemical mapping* and *metal detector* surveys have also been used in particular situations. The purpose is to obtain the maximum amount of information about the structure and date range of the site using nondestructive methods, before applying targeted excavation for the solution of particular historical problems. Some examples follow.

The prehistoric hillfort near Zlončice (district Mělník) was first identified from surface collections by an amateur regional archaeologist. Enclosure systems of 12–13 ha on a promontory by the Vltava river confirmed later results of geophysical prospection (Fig. 1a). A *magnetometric survey*

Hillfort Investigations in the Czech Republic,
Fig. 1 Zlončice, district Mělník. Combination of (**a**) vertical aerial photography (public web source www.mapy.cz) and (**b**) the result of magnetometric survey of prehistoric hillfort (terrain: plowed field and meadow; surveyed area: approx. 9.5 ha; magnetometric survey: Křivánek 2008–2010)

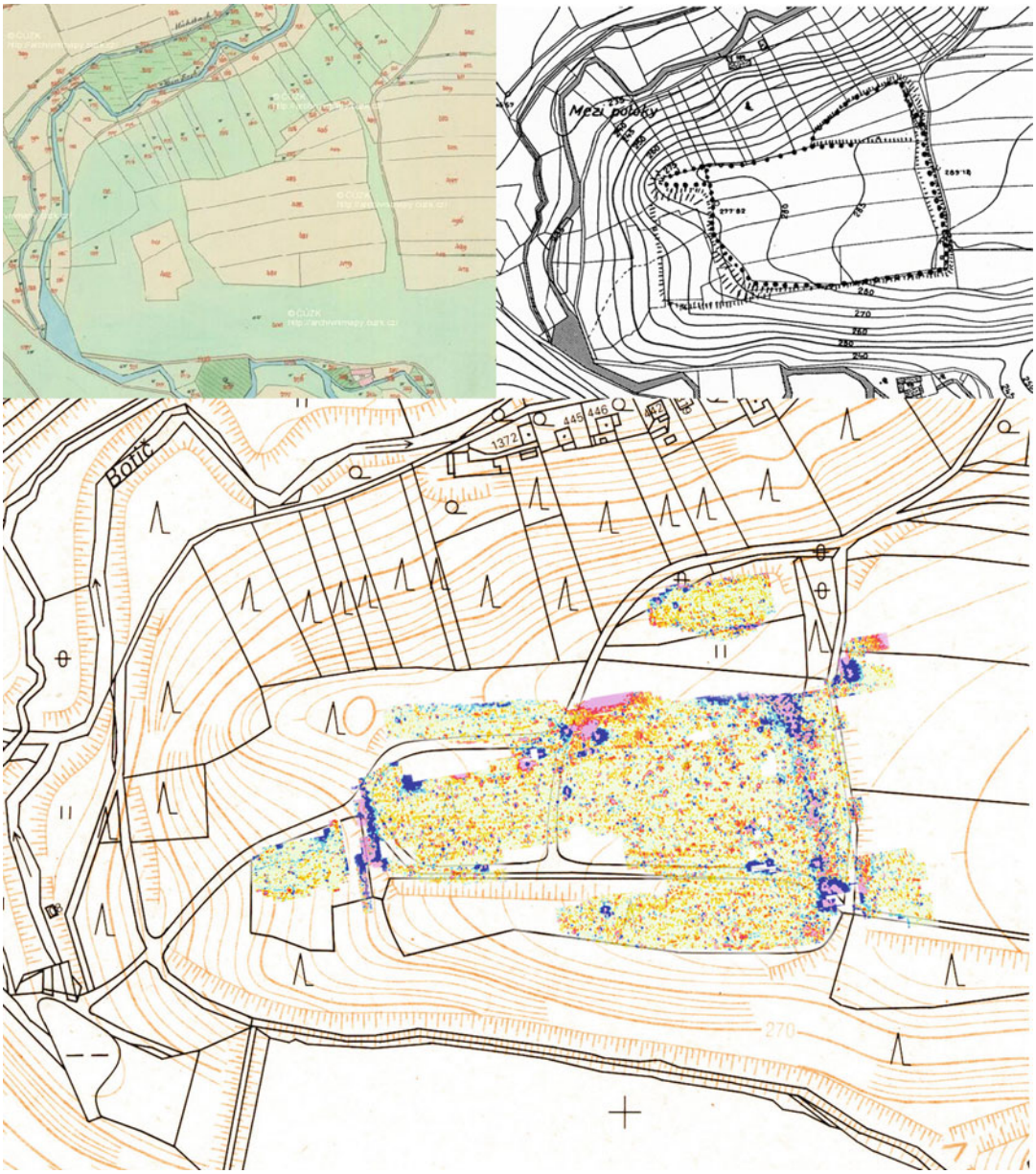

Hillfort Investigations in the Czech Republic, Fig. 2 Prague-Hostivař, district Prague 15. Comparison of old map (stable cadaster 1841), old site plan (Fillip 1949), and magnetometric survey of the Hallstatt hillfort (terrain: park; surveyed area: approx. 4.3 ha, magnetometric survey: Křivánek 2008)

subsequently revealed an intense level of occupation in the form of numerous pits and seven boundary ditches (Fig. 1b). Surface collection of artifacts suggested a Neolithic origin but with some later occupation (Křivánek 2011). Magnetometry also proved very effective at Libice (district Nymburk), an early medieval stronghold of 20 ha in a lowland area on a sand and gravel terrace on the flood plain of a meandering Jizera rives (Křivánek-Mařík 2009). The Hallstatt hillfort of Prague-Hostivař (district Prague 14) had more or less disappeared from view, but

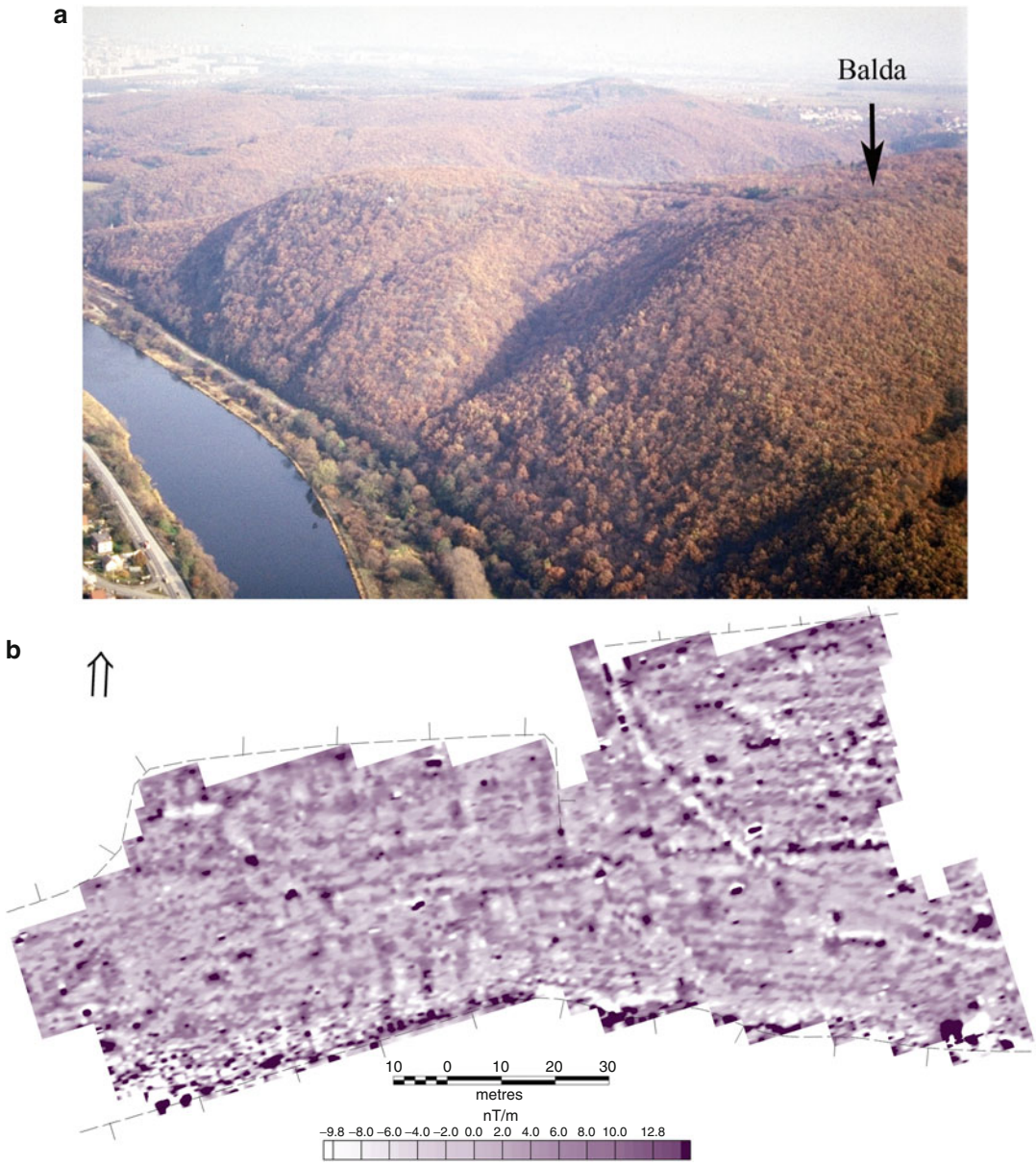

Hillfort Investigations in the Czech Republic, Fig. 3 Lhota, district Prague-west. Combination of (**a**) aerial documentation. (Photo by M. Gojda, Inst. of Archaeology, Prague) and (**b**) magnetometric survey of plateau Balda in central part of La Téne oppidum Závist (terrain: hilly forest; surveyed area: approx. 1.1 ha, magnetometric survey: Křivánek 2005)

investigators made use of an early map and the cadastral boundary plan to locate the probable location of the fortified enclosure. The extent of occupation and the burnt out defenses were then located by magnetometry (Fig. 2).

The La Téne oppidum at Závist in cadaster Lhota (district Prague-west) represents a different type of large hillfort in the Czech landscape, on hilly terrain and now thickly wooded (Fig. 3a). This kind of terrain presents a challenge to

conventional methods of aerial and geophysical survey. Even so magnetometry was able to map part of the site on the plateau of Balda (Fig. 3b), showing ordered settlement, a burnt rampart, and evidence for later plowing (see also *Lidar*, *radar* for other possible approaches).

The new research initiatives applied to the study of hillforts, both known and previously unknown, in every type of terrain, are providing a systematic basis for understanding their structure and use in different periods. This information leads to proposals for intensive investigation at particular sites for research purposes and at the same time provides an overall inventory to assist in the long-term protection of these cultural (or archaeological) monuments.

Cross-References

- ▶ Aerial Archaeology
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Fortifications, Archaeology of
- ▶ Heritage Landscapes
- ▶ Landscape Archaeology
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Prospection Methods in Archaeology
- ▶ Surface Survey: Method and Strategies

References

Gojda, M., et al. 2004. *Ancient landscape, settlement dynamics and non-destructive archaeology* – Czech research project 1997–2002. Praha: Academia.

Křivánek, R. 2004. Geophysical survey in the archaeologically uninvestigated parts of Czech oppida. *Antiquity – Project Gallery*. Available at: http://antiquity.ac.uk/ProjGall/krivanek/index.html.

Křivánek, R. 2011. Contribution of geophysical surveys to changes of archaeological interpretation on examples of various enclosed sites in Bohemia. In *Archaeological prospection*, ed. M. Drahor and M. Berge, 136–139. Izmir: Archaeology and Art Publications.

Křivánek, R., and J. Mařík. 2009. Early medieval stronghold Libice nad Cidlinou. An example of use of geophysical methods in systematic non-destructive archaeological project. *ArcheoSciences, revue d'archéométrie* 33: 93–95.

Hispanic South America: Historical Archaeology

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Introduction

Historical archaeology is a relatively new discipline in South America, systematically practiced only since the 1980s. The small number of archaeologists specializing in the field and lack of venues for the creation of professional networks, as well as the fact that scholars live and work in nations with distinct histories, have impeded the emergence of overarching theoretical orientations or research agendas. Over the last twenty years, however, the historical archaeology of Hispanic South America has experienced a period of rapid growth and professionalization, including the development of specialized academic programs and institutes that train students and conduct research, regional and national conferences focused on the subfield, and both print- and web-based publications that facilitate communication among scholars (Funari et al. 2009). Historical archaeology is now a well-established field in Argentina, Venezuela, Chile, Uruguay, and Colombia and is emerging as a recognized discipline in other South American countries. While historical archaeologists have practiced in Brazil for decades and have interacted regularly with scholars in neighboring Argentina and Uruguay, their work is not discussed in this entry as it is restricted to Spanish-speaking countries.

Definition

The emergence of historical archaeology as an academic discipline has generated a number of debates about its purpose, disciplinary affiliation, and the nature of its sources. One ongoing issue is how historical archaeology should be defined. In both South and North America, the field's initial development was tied to the creation of

Eurocentric national histories. Excavations centered on sites associated with historical figures who played a role in official discourses and were almost always men of European descent. In addition, historical archaeology was defined as the study of archaeological remains in conjunction with written records, but non-Western societies, such as the Maya and Aztecs, were excluded, thus reinforcing the colonialist distinction between supposedly civilized Europeans and the people who were conquered by them.

One way that contemporary archaeologists have responded to the Eurocentric nature of the early history of the field is by proposing changes to the definition of historical archaeology. Some scholars have called for the inclusion of all literate societies in the subdiscipline. A more popular approach has been to employ Charles Orser's (1996) definition of the field's purview as the development of the modern world, a process that encompasses colonialism and the emergence of capitalism and one that involved all sectors of the population. Regardless of theoretical orientation, the majority of scholars working in South America today understand historical archaeology to be the study of societies that date from the beginning of European expansion about 500 years ago to the present, using material culture as well as texts, maps, paintings, and oral histories when available. Such an approach includes not only elite men of European descent but all people who contributed to the creation of contemporary South American societies.

Historical Background

The field of historical archaeology has followed a similar intellectual trajectory in many countries. The earliest studies in Hispanic South America were often the result of fortuitous discoveries and thus tangential to other objectives. Historical materials were sometimes encountered during construction activities in urban areas and as a consequence of excavations at pre-Hispanic sites. The formal development of the discipline was linked to cultural heritage management, usually the restoration of colonial churches and buildings associated with people who played salient roles in national history. Initially, this work was conducted by non-archaeologists, and reports were highly descriptive, with the primary aim being to document the building's original form and subsequent development or to corroborate information provided in documents. Spanish colonists and institutions were emphasized, in part because of the use of archaeology to instantiate national histories but also because of the urban focus of many of these projects. One of the earliest endeavors began in the 1940s when Augustín Zapata Gollán started excavations in Santa Fe la Vieja, Argentina, in order to prove that it was the location of the original city founded by the conquistadors (Zapata Gollán 1991). For the following three decades, archaeologists throughout Hispanic South America occasionally excavated colonial forts, churches, indigenous settlements, harbors, and houses, but the research was sporadic and usually unconnected to broader intellectual discourses.

The field of historical archaeology only crystallized during the 1980s. The rapid development of the discipline in the Southern Cone countries was a consequence – at least in part – of the fall of long-standing dictatorships (Funari et al. 2009). The reestablishment of democratic regimes resulted in an upsurge of intellectual creativity and, particularly in Argentina and Chile, stronger intellectual connections with foreign scholars. Research also became more explicitly framed by theory; concepts drawn from processual archaeology, the theoretical perspective that dominated the United States at the time, were briefly explored by some archaeologists, while others adopted versions of historical materialism, including *arqueología social*, an approach originally promulgated by Luis Lumbreras (1974) in Perú and further developed by Sanoja Obediente and Vargas Arena (2011) in Venezuela, among others. It was during this decade that a number of robust programs of archaeological inquiry were developed, especially in urban centers where municipalities helped support salvage excavations.

The subsequent 20 years witnessed the emergence of historical archaeology as a recognizable discipline in the Southern Cone countries as well

as in Venezuela and Colombia; the scope and number of research projects increased, symposia and conferences were devoted to the subject, and specialized courses were developed for undergraduate and, in some cases, graduate programs. Research also continued to become more explicitly theoretical, with Marxist and postmodern approaches being the most common perspectives. The development of this academic infrastructure resulted in the first generation of historical archaeologists who were specifically trained in the discipline, a key hallmark of professionalism.

Key Issues

From a continental perspective, the size of the professional community is now large enough to sustain an intellectual discourse regarding issues of interest to historical archaeologists, but this has not happened to any great extent. There are, therefore, few debates or research foci in which archaeologists across the continent – or even within regions – are mutually engaged. However, some commonalities exist due to similarities in the historical development of the field in different countries as well as their shared history as Spanish colonies.

Cultural Heritage Management

Cultural heritage management is still a mainstay of historical archaeology in South America, in part because funding for archaeological research is sometimes included in the budget for civil works and restoration projects. In addition, all countries now have laws regarding the protection of culturally significant sites, although enforcement is inconsistent. In contrast to the past, however, heritage management is now usually conducted by multidisciplinary teams that include archaeologists. Projects range from salvage work to mitigate the effects of infrastructural development such as the expansion of the metro in Santiago, Chile, to less common programs focused on the preservation and study of significant cultural properties. An outstanding example of the latter is the extensive research, conservation, and interpretation of the *área fundacional*, or historic core, of Mendoza, Argentina (Chiavazza 2005). This project, along with many others, attempts to address issues of anthropological and historical significance in addition to furnishing architectural data. Some scholars have even redefined the concept of historic site management to include the restoration of largely forgotten social histories to the collective memory (Therrien 1998) and the preservation of contemporary traditions that have colonial roots (Grupo de Estudio de Arqueología y Antropología Colonial in the Quebrada Humahuaca, Argentina), while others have extended the notion by engaging in public archaeology. As in most countries, though, heritage management usually entails salvage operations that yield purely descriptive information.

Colonial Archaeology

The investigation of colonial remains was the goal of most early historical archaeology in South America and continues to be important today. Churches, convents, and monasteries – structures associated with a crucial colonial institution and usually the most elaborate buildings of that time – have probably been excavated more than any other type of site. These projects have provided information about architecture and other types of material culture but often remain unpublished. The human remains found in cemeteries beneath or adjacent to these structures represent an important source of information about health, demography, and colonial mortuary practices but have rarely been analyzed. Important exceptions include Douglas Ubelaker's work in Quito (Ubelaker and Ripley 1999; Ubelaker and Newson 2002) and the more recent research by Haagen Klaus (Klaus and Tam 2010) on the coast of Peru.

Colonial archaeology has, however, moved far beyond its role as an aid to architectural construction and has yielded information about many issues of broader anthropological significance. Chief among these is an examination of how indigenous populations as well as European colonists were affected by the colonial experience. The conceptualization of this issue has changed over time, with earlier research based on an implicit model of passive culture change and

more recent work explicitly investigating the active negotiation of identity. Additional research foci include early urbanism, frontier expansion, the organization of extractive industries, dietary change, the reconfiguration of rural landscapes, and the local implementation of Spanish colonial policy. An important example of the last is Senatore's (2007) examination of Spanish attempts to control Patagonia. Floridablanca was a fortified agrarian community that was established on the colonial frontier in 1781 in accordance with Enlightenment ideas regarding order and equality. By examining the everyday social practices of the settlers, Senatore has shown how a very different kind of order was generated by local residents, thus highlighting the negotiated and uncertain outcomes of colonial rule. This emphasis on agency, practice, and historical contingency is a hallmark of the most recent research on the colonial period by both South American and foreign scholars.

With the exception of Ross Jamieson's study of the relationship between domestic architecture and power in Cuenca (Jamieson 2000), most archaeological research conducted by foreigners on historical sites in Hispanic South America focuses on the hinterlands. All of these projects consider the ways in which indigenous and European peoples negotiated the colonial experience. One of the earliest was an investigation of the wine industry in the Moquegua Valley of Peru by Prudence Rice (2011) and her students in the late 1980s. They examined the interchange of technologies between Spaniards and Andeans and the effects of colonization on diet, exchange, and other aspects of the economy. More recent investigations have examined the organization of silver mining, the reconfiguration of rural landscapes in the wake of conquest, the impact of Western goods on indigenous practices and systems of value, and the interaction of Dominican friars with the population of an early *reducción*, or indigenous community resettled by the Spaniards. In addition, a new cohort of foreign and local scholars working in Peru is beginning the study of *haciendas*, or large agricultural estates, which has been a notable lacuna in colonial research.

Urban Archaeology

Urban phenomena have been the focus of much of the historical archaeology conducted in South America, in large part because of the discipline's involvement in the management of architecturally significant cultural properties, which tend to be located in cities. Most notable are the Buenos Aires Urban Archaeology Project (Schávelzon 2000), the San Francisco Ruins Project in Mendoza (Chiavazza 2005), the Urban Archaeology Project in Caracas, and the Colonia del Sacramento project in Uruguay (Fusco 1997). Smaller projects have also been carried out in Bogotá, Cartagena, Cuenca, Quito, and Lima. All of these initially focused on colonial remains.

By the 1990s, urban archaeology had become a distinct subdiscipline with its own techniques, opportunities, and limitations. Chief among the latter is the opportunistic nature of excavations that are usually carried out in advance of construction activities, making it difficult to excavate according to a preconceived research design. This constraint is overcome, to some extent, by the accumulation of data over time. The use of data sets from sites used during different periods has also allowed some investigators to produce long-term urban histories that extend from early colonial to republican times. Daniel Schávelzon directs one of the most productive and longest running projects of this type in Buenos Aires. He and his colleagues have produced fundamental descriptive information about the material culture of Buenos Aires, including a catalogue of ceramics from Buenos Aires that date from the sixteenth to the twentieth century (Schávelzon 2001). They have also investigated such diverse issues as the development of residential structures, the complex history of food and drink, and the archaeology of class, ethnicity, race, and gender (Schávelzon 2000). Of particular importance is Schávelzon's history of the African-American population in Buenos Aires, as the African diaspora has received little archaeological attention outside Brazil (Schávelzon 2003). In Venezuela, Sanoja and Vargas (2008) have taken advantage of the rich data sets there to compare urban development in three regions of the country. They point to differences in these trajectories, which they

attribute to unique historical conditions that shaped their incorporation into the globalizing capitalist economy. Exploring diversity as well as the commonalities among different cities and regions is one of the important next steps in the historical archaeology of the continent.

The Archaeology of Republican and Modern Sites

In the 1980s, historical archaeology in South America was practically synonymous with colonial archaeology, but over the last decade, scholars have investigated a variety of sites dating to the nineteenth and twentieth century. These projects are diverse, but three bodies of research stand out. One of the earliest to emerge was the investigation of nineteenth-century forts on the pampas of Argentina. These forts were constructed as the Argentine state expanded into indigenous territories and were meant to protect roads linking Buenos Aires with other Argentine cities. Research at these sites has included analysis of the strategies used by the state to conquer the region, the ways in which garrison personnel adapted to local conditions, and the relationships between personnel and indigenous groups (Zarankin and Salerno 2008).

The nineteenth century also witnessed the development of industrial capitalism, which manifested itself in South America in different ways. Monika Therrien (2007) directed a multidisciplinary investigation of a ceramic factory that was established in Bogotá by Colombian entrepreneurs shortly after Independence. This work included interviews with families who currently live on the property, an experience that has led her to both defend the importance of industrial patrimony and to challenge plans to remove the inhabitants in order to construct a museum on the site. Far to the south, nitrate production became an important industrial activity in Chile's Atacama Desert during the late nineteenth and early twentieth century. The first archaeological study of a nitrate plant was published in 1984, and after a lull of more than a decade, the industry is once again being investigated on the basis of survey, excavation, documentary records, and oral histories. This research centers on the experience of workers in a developing capitalist economy and links the past to the present through interviews with living people.

Finally, a number of researchers have turned their attention to the archaeology of the modern world. Some, drawing on Foucault, have analyzed the relationship between the architecture of institutions such as schools and the daily routines of discipline and surveillance that are practiced in them. Others have studied the detention centers used by twentieth-century military regimes to incarcerate political prisoners. By examining architecture, graffiti, and other kinds of material culture, these scholars can reveal both the means by which inmates were controlled and the ways in which these were resisted.

International Perspectives

Historical archaeology has followed the same general trajectory in Hispanic South America as it has in many other regions of the world, but the development of the field has been shaped by distinct aspects of regional history such as shared colonial and postcolonial experiences, as well as conditions at a national level, including differences in resources between wealthy and poor states. Thus, some countries, such as Argentina, have a well-trained cadre of historical archaeologists, many of whom have been educated in specialized doctoral programs and who enjoy a professional infrastructure that includes journals, conferences, research institutes, and funding opportunities. In Bolivia, on the other hand, only a handful of students have graduated with the equivalent of an undergraduate degree accompanied by a thesis that focused on historical archaeology, and no institutions specifically support training or research in the field. Most countries fall in the middle of this range, and thus the development of professional infrastructure as well as fundamental research tools such as artifact chronologies are still in progress.

A related challenge faced by archaeologists working in this region is the continuing destruction of the archaeological record. This is a problem in all countries but one that is exacerbated in

South America by the lack of resources and inconsistent application of heritage management laws. Rather than being normal practice, enforcement usually occurs only in exceptional cases, either at sites that have already been declared national monuments or in cases where communities have protested the destruction of local sites.

The current position of South American countries in the modern global political economy, however, also presents an opportunity that has not been adequately explored. The relative lack of wealth and political influence that characterize most countries on the continent makes the legacy of colonialism palpable and has promoted continuity in many traditional practices. These factors could facilitate the creation of theoretical perspectives framed by the distinctive experiences of the "global south" in the process of modernization in counterpoint to the conceptual schemes produced by scholars working in the United States. These conditions also generate similar interests among archaeologists, cultural anthropologists, sociologists, and historians, points of intersection that could serve as the basis for interdisciplinary research.

Future Directions

Over the last three decades, historical archaeology has developed into a fully professionalized field in some South American countries, while in others it has not yet emerged as a formal discipline. This unevenness is due primarily to differences in resources and will not be remedied unless the underlying economic conditions change. Nonetheless, the field continues to develop throughout the region and will attract increasing numbers of foreign and domestic scholars.

The archaeological study of nineteenth-century capitalism will undoubtedly grow as mining, rubber production, railways, and other industries are explored. This process will also link the subjects of archaeological research more closely to the concerns and memories of the contemporary population, enhancing opportunities for public outreach and collaboration with descendant communities.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Argentina: Maritime Archaeology
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Colonial Encounters, Archaeology of
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Funari, Pedro Paulo A. (Historical Archaeology)
- ▶ Historical Archaeology
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Industrial Archaeology
- ▶ Latin American Social Archaeology
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Mexico: Historical Archaeology
- ▶ Mission Archaeology in North America
- ▶ New Spain: Forts and Transport Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Post-Processual Archaeology
- ▶ Practice Theory in Archaeology
- ▶ "Public" and Archaeology
- ▶ Schávelzon, Daniel
- ▶ Social Identity in Historical Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

References

Chiavazza, H. 2005. *Los templos coloniales como estructuras funerarias: arqueología en la iglesia jesuita de Mendoza*, British archaeological reports S1388. Oxford: Archaeopress.

Funari, P., A. Zarankin, and M. Salerno. 2009. Historical archaeology in South America. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 399–407. New York: Springer.

Fusco, N. 1997. La arqueología histórica en el Uruguay: historia, análisis, y perspectivas. In *Approaches to the historical archaeology of Mexico, Central, and South America*, ed. J. Gasco, G. Smith, and P. Fournier, 139–145. Los Angeles: Institute of Archaeology, University of California.

Jamieson, R. 2000. *Domestic architecture and power: The historical archaeology of colonial Ecuador*. New York: Kluwer Academic Press.

Klaus, H., and M. Tam. 2010. Oral health and the post-contact adaptive transition: A contextual reconstruction of diet in Morrope, Peru. *American Journal of Physical Anthropology* 141: 594–609.

Lumbreras, L.G. 1974. *La Arqueología como ciencia social*. Lima: Ediciones Histar.

Orser, C.J. 1996. *A historical archaeology of the modern world*. New York: Plenum Press.

Rice, P. 2011. *Vintage Moquegua: History, wine, and archaeology on a colonial Peruvian periphery*. Austin: University of Texas Press.

Sanoja Obediente, M., and I. Vargas Arenas. 2008. El proceso urbano originario en las provincias de Caracas, Maracaibo y Guayana, siglos XVI-XIX: el modo de vida colonial venezolano. *International Journal of South American Archaeology* 2: 67–78.

Sanoja Obediente, M., and I. Vargas Arenas. 2011. The past and the revolutionary interpretation of the present: Our experience of social archaeology, 33 years late. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 555–568. New York: Springer.

Schávelzon, D. 2000. *The historical archaeology of Buenos Aires: A city at the end of the world*. New York: Kluwer Academic Press.

Schávelzon, D. 2001. *Catálogo de cerámicas históricas de Buenos Aires (siglo XVI-XX) con notas sobre la región del Río de la Plata*. Buenos Aires: Fundación de la Investigación del Arte Argentino.

Schávelzon, D. 2003. *Buenos Aires Negra*. Buenos Aires: Emecé.

Senatore, M.X. 2007. *Arqueología e historia en la colonia española de Floridablanca, Patagonia, siglo XVIII*. Buenos Aires: Teseo.

Therrien, M. 1998. Bases para una nueva historia del patrimonio cultural: un estudio de caso en Santa Fe de Bogotá. *Fronteras* 3: 75–117.

Therrien, M. 2007. *De fábrica a barrio: urbanización y urbanidad en la Fábrica de Loza Bogotana*. Bogotá: Editorial Pontificia Universidad Javeriana.

Ubelaker, D., and L. Newson. 2002. Patterns of health and nutrition in prehistoric and historic Ecuador. In *The backbone of history: Health and nutrition in the western hemisphere*, ed. R. Steckel and J. Rose, 343–375. Cambridge: Cambridge University Press.

Ubelaker, D., and C. Ripley. 1999. *The ossuary of San Francisco Church, Quito, Ecuador: Human skeletal biology*. Washington, DC: Smithsonian Institution Press.

Zapata Gollán, A. 1991. *Obras completas, Volumes 4 & 5*. Santa Fe: Universidad Nacional del Litoral.

Zarankin, A., and M. Salerno. 2008. "Looking South": Historical archaeology in South America. *Historical Archaeology* 42: 38–58.

Further Reading

Alzate Gallego, L.A. 2006. *Santa María de la Antigua del Darién. Cerámica española con texto y contexto en el Darién colombiano*. Barcelona: Grup d'Estudis Precolombins.

Bárcena, J.R. 2004. Arqueología e historia urbana: investigaciones en la ciudad y conurbano mendocino. *Chungará* 36: 187–196.

Brooks, A. 2012. A Venezuelan household clearance assemblage of 19th-century British ceramics in international perspective. *Post-Medieval Archaeology* 46: 70–88.

Centro de Arqueología Urbana. n.d. http://www.iaa.fadu.uba.ar/cau/. Accessed 16 Sept 2012.

deFrance, S. 1996. Iberian foodways in the Moquegua and Torata Valleys of southern Peru. *Historical Archaeology* 30: 20–48.

Funari, P., and A. Zarankin, eds. 2004. *Arqueología histórica en América del Sur: los desafíos del siglo XXI*. Bogotá: Ediciones Uniandes.

Gómez Romero, F. 2005. A brief overview of the evolution of historical archaeology in Argentina. *International Journal of Historical Archaeology* 9: 135–141.

Jamieson, R. 2001. Majolica in the early colonial Andes: The role of Panamanian wares. *Latin American Antiquity* 12: 45–58.

Jamieson, R. 2005. Colonialism, social archaeology, and lo andino: Historical archaeology in the Andes. *World Archaeology* 37: 352–372.

Mogrovejo Rosales, J.D. 1996. *Arqueología urbana de evidencias coloniales en la ciudad de Lima*. Lima, Perú: Instituto Riva-Agúero.

Murphy, M.S., E. Goycochea, and G. Cock. 2011. Resistance, persistence and accommodation at Puruchuco-Huaquerones, Peru. In *Enduring conquests. Rethinking the archaeology of resistance to Spanish colonialism in the Americas*, ed. M. Liebmann and M.S. Murphy, 57–76. Santa Fe: School for Advanced Research.

Quilter, J. 2011. Cultural encounters at Magdalena de Cao Viejo in the early colonial period. In *Enduring conquests. Rethinking the archaeology of resistance to Spanish colonialism in the Americas*, ed. M. Liebmann and M.S. Murphy, 103–125. Santa Fe: School for Advanced Research.

Quilter, J., M. Zender, K. Spalding, R. Franco Jordán, C. Gálvez Mora, and J. Castañeda Murga. 2010. Traces of a lost language and number system discovered on the North Coast of Peru. *American Anthropologist* 111: 357–369.

Sanoja, M. 1998. Arqueología del capitalismo. Estudio de casos: Santo Tomé de Guayana y Caracas, Venezuela. *Tierra Firme* 16: 637–660.

Sanoja Obediente, M., and I. Vargas Arenas. 1996. Tendencias del proceso urbano en las provincias de Caracas y Guayana, siglos XVI-XIX: el modo de vida colonial venezolano. *Revista de Arqueología Americana* 11: 57–77.

Sanoja Obediente, M., and I. Vargas Arenas. 2002. *El agua y el poder: Caracas y la formación del estado colonial caraqueño, 1567–1700*. Caracas: Banco Central de Venezuela.

Sanoja Obediente, M., I. Vargas Arenas, G. Alvarado, and M. Montilla. 1998. *Arqueología de Caracas, Tomo 1: Escuela de Música José Angel Lamas*. Caracas: Academia Nacional de la Historia.

Scaramelli, F., and K. Tarble de Scaramelli. 2005. The roles of material culture in the colonization of the Orinoco, Venezuela. *Journal of Social Archaeology*: 135–168.

Schávelzon, D. 2000b. *Historias del comer y del beber en Buenos Aires: arqueología histórica de la vajilla de mesa*. Buenos Aires: Aguilar.

Smith, G. 1997. Hispanic, Andean, and African influences in the Moquegua Valley of southern Peru. *Historical Archaeology* 31: 74–83.

Suaza Español, M.A. 2007. *Los esclavos en las haciendas de la Provincia de Neiva durante el siglo XVIII. Arqueología histórica de la Nueva Granada*. Neiva: Gobernación de Neiva, Secretaría de Cultura y Turismo, Fondo de Autores Huilenses.

Therrien, M. 1995. Terremotos, movimientos sociales y patrones de comportamiento cultural: arqueología en la cubierta de la catedral primada de Bogotá. *Revista Colombiana de Antropología* 32: 147–183.

Therrien, M. 1996. Sociedad y cultura material de la Nueva Granada ¿Preferencias o *referencias*? Aportes de la arqueología histórica en Colombia. *Revista Colombiana de Antropología* 33: 6–51.

Therrien, M., and L. Jaramillo Pacheco. 2004. *Mi casa no es tu casa: procesos de diferenciación en la construcción de Santa Fe, siglos XVI y XVII*. Colombia: Alcaldía Mayor de Bogotá.

Therrien, M., E. Uprimny, J. Lobo Guerrero, M.F. Salamanca, F. Gaitán, and M. Fandiño. 2002. *Catálogo de cerámica colonial y republicana de la Nueva Granada: producción local y materiales foráneos (Costa Caribe, Altiplano Cundiboyacense – Colombia)*. Bogotá: Banco de la República.

Van Buren, M. 1996. Rethinking the vertical archipelago: Ethnicity, exchange, and history in the south-central Andes. *American Anthropologist* 98: 338–351.

Van Buren, M. 1999. Tarapaya: An elite Spanish residence near colonial Potosí in comparative perspective. *Historical Archaeology* 33: 108–122.

Van Buren, M. 2010. The archaeological study of Spanish colonialism in the Americas. *Journal of Archaeological Research* 18: 151–201.

Van Buren, M., and B. Mills. 2005. *Huayrachinas* and *tocochimbos*: Traditional smelting technology of the southern Andes. *Latin American Antiquity* 16: 3–25.

Vargas Arenas, I., M. Sanoja Obediente, G. Alvarado, and M. Montilla. 1998. *Arqueología de Caracas, tomo 2: San Pablo, Teatro Municipal*. Caracas: Academia Nacional de la Historia.

Vilches, F., C. Rees, and C. Silva. 2008. Arqueología de asentamientos salitreros en la región de Antofagosta (1880–1930): síntesis y perspectivas. *Chungará* 40: 19–30.

Wernke, S. 2007a. Analogy or erasure? Dialectics of religious transformation in the early *doctrinas* of the Colca Valley, Peru. *International Journal of Historical Archaeology* 11: 152–182.

Wernke, S. 2007b. Negotiation, community and landscape in the Peruvian Andes: A transconquest view. *American Anthropologist* 109: 130–152.

Wernke, S. 2011. Convergences: The origins of colonial hybridity at an early *doctrina* in highland Peru. In *Enduring conquests. Rethinking the archaeology of resistance to Spanish colonialism in the Americas*, ed. M. Liebmann and M.S. Murphy, 77–101. Santa Fe: School for Advanced Research.

Historic Building Conservation: Current Approaches

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Brief Definition of the Topic

The twentieth century has seen changes in the way historic buildings are treated, from reconstruction to restoration and on to conservation. The development of specialized techniques and products makes it easier for professionals to maintain the material integrity of a construction, something that was not feasible 20 years ago. Current trends center around the training of specialists and research into new low-cost products that make it possible to act to prevent major interventions or replacements of the materials in historic buildings.

The conservation of historic buildings has changed over time and rapidly so in the late

twentieth century. The first generations were people with an art history or architectural history perspective concerned with maintaining buildings exactly as they supposed they had been originally. Without specialized technical knowledge, which was only just coming into being, their work was characterized by the replacement of the deteriorated or missing part by trying to make an exact but modern copy of what they supposed had existed. Materiality was not important itself but rather that it resembled what had been there before, whether or not this had actually existed. This trend still exists in many countries. But the advance of applied chemistry and physics to knowledge of materials, in addition to the professionalization of architects especially and now professional preservers and buildings archaeologists, led to the generation of theories that centered on preservation rather than restoration. It was cheaper and simpler to take precautionary measures than to allow a building to deteriorate and then fix it. In addition, theories demonstrated that architecture is not just walls and floors, it is also the historicity and significance that these possess; hence replacement, reconstruction, or building can only occur in extreme cases resulting from unintentional destruction, such as from wars.

Today there are nonintrusive methods that make it possible to observe the processes of deterioration of the stone or masonry, understand their problems, and resolve them with low-cost techniques. This sometimes means specialized knowledge and laboratory products, but these can be found in the market. This has changed conservation throughout most of the world since 1980. Likewise, the progress of international bodies such as UNESCO and the creation of national institutions formed by professionals, and not just art and history lovers, have gradually made preservation possible as a habitual action.

The central problems that have marked different policies are the differences in the level of economic development or levels of investment and interest in maintaining the past or certain material facts from the past. Hence there are cities that continue to prefer the building of highways and others that give priority to pedestrians, not out of ignorance but as conscious decisions about their priorities, as the result of different histories. Today it is understood that many variants of preservation forms were already established by the end of the Second World War when bombed-out European cities opted for paths that may seem opposed: Warsaw was rebuilt stone by stone, while Rotterdam was rebuilt as new; Hamburg preserved all that was not destroyed, and Berlin and Cologne rebuilt buildings of which only the shells or foundations remained. These variants are present today, with continuing controversy and marking different paths. Perhaps the example of ancient Japanese architecture, where for centuries every piece of wood that deteriorates has been replaced, cutting it in the same way, with the same tools; painting it with the same colors; and joining it all together without nails. Nothing remains of the original example, nor is it possible to know what it looked like, but the spirit, the form, and the builder's way of relating to the building have not been altered. That is to say, there are many varied ways, something which generates conflicts with ideas of globalization and the high consumption of industrial products that are encouraged at present.

Cross-References

- ▶ Buildings Archaeology
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Historic Jamestowne

Further Reading

International Journal of Architectural Heritage. n.d. Available at: http://www.tandfonline.com/loi/uarc20

Journal of the American Institute for Conservation. n.d. Available at: http://cool.conservation-us.org/jaic/

Journal of Architectural Conservation. n.d. Available at: http://www.donhead.com/journal_architectural_conservation/journal_of_architectural_conservation_past_issues.htm

Historic Jamestowne

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Basic Information

Historic Jamestowne is the official name given to the site of Jamestown, Virginia, England's first permanent New World colony. Jointly administered by the National Park Service and the Colonial Williamsburg Foundation on behalf of Preservation Virginia, Historic Jamestown is located approximately 45 km inland from the Chesapeake Bay on the James River and was settled by the English in 1607. Jamestown served as the capital of Virginia until 1699, when the seat of government moved to nearby Williamsburg. Jamestown has been the site of archaeological excavations since the 1890s and therefore holds a significant place in the development of historical archaeology. Presentation of the site is facilitated through a series of indoor and outdoor exhibits and ongoing archaeological excavations.

In 1994, archaeologists working on the 22.5 acre property owned by the Association for the Preservation of Virginia Antiquities (now Preservation Virginia) discovered traces of the fort constructed in 1607. Visitors to Historic Jamestowne can see the displays about the fort excavations in the Nathalie P. and Alan M. Voorhees Archaearium (Straube 2007). Special tours are available in the archaeological labs, and in the warmer months of the year, visitors can watch the excavations taking place. Adjacent to the excavation area is a reconstructed church and its original seventeenth-century brick church tower. Several structures relating to the early years of the fort have been partially reconstructed. Portions of an earthen Civil War fortification also survive on the Preservation Virginia land. Information about Jamestown Rediscovery can be found online at https://www.historicjamestowne.org/.

On the National Park Service property (1,500 acres), a visitor center highlights the history of the site and the results of over a century's worth of archaeological investigations and also incorporates displays about the history and current activities of Virginia's state-recognized Indian tribes. Outside, paths lead through the New Towne area (the portion of Jamestown settled after 1618) where archaeological features are interpreted through display panels and low brick outlines. A five-mile loop road takes visitors around the remainder of the island, where pull-in places feature displays on the natural and human history of the island over the past 10,000 years. Glassblowers demonstrate seventeenth-century techniques in a reconstructed glasshouse. Information about the Park Service property and displays at Jamestown can be found online at http://www.nps.gov/jame/index.htm.

Major Impact

Long celebrated as the birthplace of English-speaking America, Jamestown is also the birthplace of modern historical archaeology. The first excavations took place in the 1890s in advance of the reconstruction of the brick church and were followed in the 1930s by a major government-sponsored initiative that drew upon the labor of Civilian Conservation Corps volunteers. Directed by Jean C. "Pinky" Harrington, the 1930s investigations pinpointed the locations of 52 buildings in the townsite and pioneered the analysis of historic material culture. In the 1950s, another US government-sponsored project led by John Cotter employed extensive linear trenching across the townsite and exposed domestic, military, and manufacturing structures as well as a range of landscape features (Cotter 1958). Preparations for the 2007 four hundredth anniversary of the settlement of Jamestown led to two further projects in the 1990s. The Jamestown Archaeological Assessment (JAA), sponsored by the National

Park Service in cooperation with the Colonial Williamsburg Foundation, took an interdisciplinary approach to assessing all cultural resources on the island (Brown and Horning 2006). A full survey pinpointed 58 new sites, attesting to Native American activity from the Archaic through late Woodland periods as well as previously unknown historic activity (Blanton et al. 2000). Dendrochronological research identified a major period of drought corresponding to the English settlement of Jamestown (Stahle et al. 1998). A thorough reevaluation of all previously excavated materials was carried out, informing limited new excavations in New Towne (Carson et al. 2006) and a revision of understandings of urban development in the Chesapeake (Horning 1995, 2000; Carson et al. 2008).

Since 1994, Jamestown Rediscovery archaeologists have unearthed the original James Fort (1607–1624) and excavated more than a million artifacts. Over 480 ft. of palisade lines from the initial triangular fort have been exposed, as have the east and north cannon projections (bulwarks), a section of the western bulwark ditch, 11 filled-in cellars, three wells, dozens of burials, and ten structures (Kelso 2007; Kelso and Straube 2008). The range of material culture has significantly changed understandings of the character of Native and English relations in the early Chesapeake, with native wares comprising over 80% of the ceramic assemblages from the period 1607–1610. Extensive clearance deposits dumped into a series of early wells, which include personal items such as jewelry and still functional items including armor and weaponry, attest to the extreme stress experienced by inhabitants during the 1609–1610 Starving Time. The size and diversity of the archaeological assemblage from James Fort makes it one of the most significant early seventeenth-century collections of material culture relevant to European Atlantic expansion.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Historical Archaeology

References

Blanton, D.B., P. Kandle, and C. Downing. 2000. *Archaeological survey of Jamestown Island*. Williamsburg: Colonial Williamsburg Foundation.

Brown, M.R., III, and A. Horning. 2006. *Jamestown Island: A comprehensive analysis of the Jamestown archaeological assessment, 1992–1996*. Williamsburg: Colonial Williamsburg Foundation.

Carson, C., A. Horning, and B. Straube. 2006. *Evaluation of previous archaeology*. Williamsburg: Colonial Williamsburg Foundation.

Carson, C., J. Bowen, W. Graham, M. Mccartney, and L. Walsh. 2008. New world, real world: Improvising English culture in seventeenth-century Virginia. *Journal of Southern History* 74: 32–88.

Cotter, J.L. 1958. *Archaeological excavations at Jamestown, Virginia*, National Park Service archaeological research series. Vol. 4. Washington, DC: Government Printing Office.

Horning, A. 1995. 'A verie fit plae to erect a great cittie': Comparative contextual analysis of archaeological Jamestown. Unpublished Ph.D. dissertation, University of Pennsylvania.

Horning, A. 2000. Urbanism in the colonial south: The development of seventeenth-century Jamestown. In *Archaeology of southern urban landscapes*, ed. A. Young, 52–68. Tuscaloosa: University of Alabama Press.

Kelso, W. 2007. *Jamestown: The buried truth*. Charlottesville: University of Virginia Press.

Kelso, W., and B. Straube, ed. 2008. 2000–2006 Interim report on the excavations at Jamestown, Virginia. Unpublished report by the Association for the Preservation of Virginia Antiquities. Williamsburg.

Stahle, D.W., M.K. Cleaveland, D.B. Blanton, M.D. Therron, and D.A. Gray. 1998. The lost colony and Jamestown droughts. *Science* 280: 564–567.

Straube, B. 2007. *The Archaearium: Rediscovering Jamestown 1607–1699*. Richmond: Preservation Virginia.

Further Reading

Kelso, W., ed. 2010. *Archaeology of early Europeancolonial settlement in theemerging Atlantic world*, Society for historical archaeology special publication series. Vol. 8. Rockville: Society for Historical Archaeology.

Kupperman, K. 2007. *The Jamestown Project*. Cambridge, MA: Harvard University Press.

Mallios, S. 2006. *The deadly politics of giving: Exchange and violence at Ajacan, Roanoke, and Jamestown*. Tuscaloosa: University of Alabama Press.
Straube, B. 2006. 'Unfitt for any moderne service'? Arms and armour from James Fort. *Post-Medieval Archaeology* 40: 33–61.

Historic Site and Historic Building Preservation: Overview

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Introduction

The buildings and historic sites of Western culture are preserved according to this culture's own values or values added following arbitrary selection by each society. The theories, methods, and techniques for taking these decisions arose with the Enlightenment and have varied over time and regions. After a peak in autonomy and growth in the twentieth century, a process has now arisen to homogenize meanings and preservation methods as part of the process of globalization. In particular, toward the end of the twentieth century, criteria were unified under the *Venice Charter* of 1964 (ICOMOS 1964), based on previous agreements articulated in the *Athens Charter* of 1931 (CIAM 1931), bringing about the creation of international bodies and universal standards, albeit respecting regional variants (Page and Mason 2004). As a result, local concepts of historical value have been lost in favor of more general ones acceptable to Western tourists and heritage professionals (e.g., De Oliver 1996).

Definition

Since historic sites and buildings began to be judged to have values external to themselves or seen to have a significance that exceeded their own functionality and the society that produced them, it has been necessary to preserve them. The terms historic buildings and historic sites preservation, or more generally, "heritage conservation," refer therefore to the legal measures, practical conservation methods, and philosophies that underpin these goals and facilitate their implementation. The conceptual shift that attributed historical "value" or "significance" to elements of the built environment occurred in Western culture over the course of the seventeenth to nineteenth centuries, although other cultures began it earlier or approached it differently. These developments essentially arose in England and France and were gradually imposed with the expansion of the Industrial Revolution, the Bourgeoisie, and early Liberalism. The new ideas behind these changes were based on the Enlightenment concept regarding the past as different from the present and its potential for legitimizing the present (Lowenthal 1985), the growing body of knowledge of other cultures, and the growth of antiquarian interest in the past (Sweet 2004). Figures such as John Ruskin (1849) and Emanuel Viollet-le-Duc (1854) played a particularly important role in the construction of these new theories, which eventually spread around the world. In these early decades, the Romanticism of the nineteenth century was a fundamental factor for the aestheticizing appreciation of the legacy of the past, as William Ruskin preached.

The expansion of nationalism and the creation of the first modern nations in the USA, Latin America, and Europe gradually defined the need for special theories that permitted the construction of explanations of identity that these territories had or were supposed to have (Kohl 1998; Díaz-Andreu 2007). For this, it was necessary to have significant material elements and ensure these were accepted by all. There were two sides to this: buildings and sites had to be recognized for their historic value while at the same time the state imposed that same value on the nation as a homogenizing process (e.g., Dietler 1994). Thus arose the Cult of Heroes, the conservation of their houses or of battlefields, the erection of monuments, and preservation of important places in the foundation of the nation and the state as monuments of inestimable value that should not be

altered, maintaining them for the future. National heritage was a form of didactics, of teaching unarguable values. Constructing a nation implies defining an identity and deciding what stays and what is left out of history, what symbolizes it, and what can or must be destroyed.

Key Issues

In the twentieth century, standards were established with regard to how a historic building or place should be preserved and whether a damaged part may be replaced or not and in what way, especially after wars and other types of armed conflict. Schools, principles, and techniques of heritage conservation were created (Feilden 2003; Fisch 2008). Although the experience of Central Europe was that which had greatest impact in the world, other outstanding theories and methods were developed in the twentieth century, especially in Mexico and Japan.

By the end of the twentieth century, it became clear that every country gives different levels of importance to their heritage and to historic and archaeological sites because these historic locations are used to support and convey different identities unique to these individual countries and their political system (e.g., Trigger 1989; Kohl 1998). Cultural heritage was not seen as similarity but as difference. For some, it was used to consolidate ideologies in the light of the collapse of major political groupings; for others, it was a means to increase tourism; for still others, heritage became a way to siphon off illicit gains through the tendering of public works, or to represent elite groups, but rarely has heritage been used to represent the majority. All these issues are controversial and enmeshed within the globalizing processes of the late twentieth century. In recent years, with the development of norms established by UNESCO in the World Heritage system, preexisting theoretical concepts in each region have had to be homogenized, wiping out a large number of local differences in heritage theory and practice. This has led to a world increase in tourism to regions that are not prepared for it, causing major problems for the sites and local populations. These are cases where economic policy has prevailed over social or cultural development. It is from the creation of these policies that new theoretical positions will arise on the use and role of heritage.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ European Convention on the Protection of Archaeological Heritage (1992)
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Historic Building Conservation: Current Approaches
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNESCO's World Heritage List Process

References

Ciam. 1931. Athens Charter for the Restoration of Historic Monuments. First International Congress of Architects and Technicians of Historic Monuments, Athens. Available at: http://www.icomos.org/charters/venice_e.pdf

De Oliver, M. 1996. Historical preservation and identity: The Alamo and the production of a consumer landscape. *Antipode* 28: 1–23.

Díaz-Andreu, M. 2007. *A world history of nineteenth-century archaeology: Nationalism, colonialism and the past*. Oxford: Oxford University Press.

Dietler, M. 1994. "Our ancestors the Gauls": Archaeology, ethnic nationalism, and the manipulation of Celtic identity in modern Europe. *American Anthropologist* 96: 584–605.

Feilden, B.M., ed. 2003. *Conservation of historic buildings*. 3rd ed. Oxford: Architectural Press.

Fisch, S., ed. 2008. *National approaches to the governance of historical heritage over time: A comparative report*. Amsterdam/Brussels: IOS Press/International Institute of Administrative Sciences.

ICOMOS. 1964. The Venice Charter, International Charter for the Conservation and Restoration of Monuments and Sites. Venice. Available at: http://www.icomos.org/en/charters-and-texts/179-articles-en-francais/ressources/charters-and-standards/167-the-athens-charter-for-the-restoration-of-historic-monuments

Kohl, P. 1998. Nationalism and anthropology: On the constructions of nations and the reconstructions of the remote past. *Annual Review of Anthropology* 27: 223–246.

Lowenthal, D. 1985. *The past is a foreign country*. Cambridge: Cambridge University Press.

Page, M., and R. Mason, eds. 2004. *Giving preservation a history: Histories of historic preservation in the United States*. Oxford: Routledge.

Ruskin, J. 1849 [1989]. *The seven lamps of architecture*. New York: Dover Publications.

Sweet, R. 2004. *Antiquaries: The discovery of the past in eighteenth-century Britain*. London: Continuum International Publishing Group.

Trigger, B. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.

Viollet-le-Duc, E.E. 1854 [1990]. *The foundations of architecture: Selections from the Dictionnaire Raisonné*. New York: George Braziller.

Further Reading

Murtagh, W.J. 2005. *Keeping time: The history and theory of preservation in America*. 3rd ed. Hoboken: Wiley.

Stubbs, J.H., and E.G. Makaš, eds. 2011. *Architectural conservation in Europe and the Americas*. Hoboken: Wiley.

Tyler, N., T.J. Ligibel, and I.R. Tyler, eds. 2009. *Historic preservation: An introduction to its history, principles, and practice*. New York: W.W. Norton & Company.

Historic St. Mary's City

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State of Current Knowledge and Current Debates

St. Mary's City, Maryland's seventeenth-century founding site and first city, is a place of deep significance to anthropology, archaeology, and history. Although none of its original buildings survive aboveground, it is an exceptionally well-preserved 800 acre archaeology site that has been investigated for over 80 years. Today, Historic St. Mary's City Commission (HSMCC) is charged with the mission "to preserve and protect the archaeological and historical record of Maryland's first colonial capital and to appropriately develop and use this historic and scenic site for the education, enjoyment, and general benefit of the public." The Commission, a state agency, operates in Historic St. Mary's City museum to fulfill its mission of preservation, research, and education.

Religious Freedom

Maryland was established at St. Mary's City by George and Cecil Calvert, the first and second Lords Baltimore. As Catholics in seventeenth-century England, the Calverts had personal experience with religious persecution. George was forced to convert to Protestantism as a child and removed from his family's home to be educated by a Protestant tutor. Educated at Trinity College, Oxford University, he eventually rose to be Secretary of State for King James I and was knighted for good service. In 1625 George announced to King James that he had become a Catholic and would resign his position. James' son Charles I granted George's son Cecil the charter for Maryland.

As settlers departed for the new colony in 1633, Cecil, now the second Lord Baltimore, cautioned the Catholics to treat the Protestants fairly to "preserve unity and peace." In Maryland, the Calverts established the policy of "liberty of conscience" and separation of church and state. While many of the leaders in early Maryland were Catholic, its policy of religious freedom attracted a diverse mixture of ethnic and religious groups living in a pluralistic society.

The Calverts' policy of the separation of church and state would eventually be translated into the City's baroque plan, discovered by archaeologists. The plan dates to approximately 1665 and is based in geometry and symmetry. The main roads of the City radiated out from a central square leading to four brick structures: the State House, jail, Catholic Chapel, and likely the Jesuit "School of the Humanities." The Catholic Chapel

Historic St. Mary's City, Fig. 1 St. Mary's City, Maryland. (Courtesy of Historic St. Mary's City)

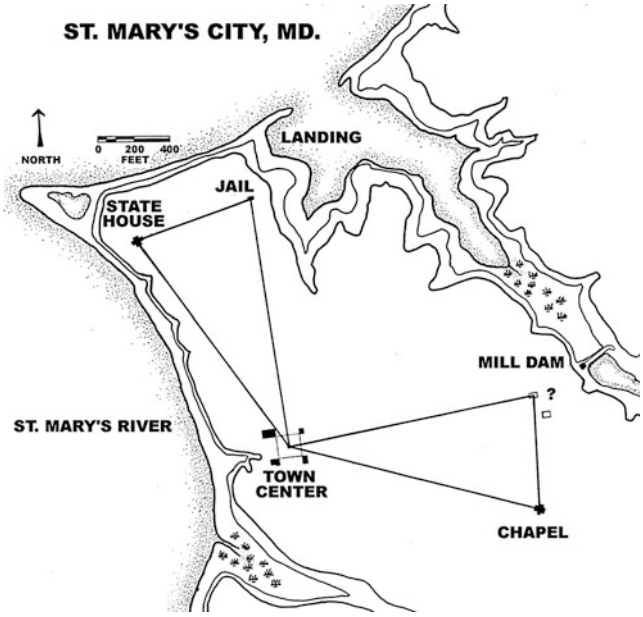

Historic St. Mary's City, Fig. 2 Baroque Design of St. Mary's City, Maryland (ca.1665). (Courtesy of Historic St. Mary's City)

and State house were located on opposite sides of the City, reflecting their political separation. This sophisticated plan was then being utilized in Rome. The designer of St. Mary's City was likely Jerome White, an English Catholic, who had been educated in Rome and served as Maryland's surveyor general from 1661 to 1671 (Fig. 2).

At a time, when Europe was riven with religious conflict, Maryland represented a novel experiment in world history where diverse people were able to live together and prosper. Despite multiple internal and external challenges to Lord Baltimore's authority, the experiment endured for some 60 years. In 1689 rebellion linked directly to the Glorious Revolution in England led to the overthrow of the Lords Baltimore, ending the policy of religious freedom in Maryland. The government was then moved to Annapolis and the first capital abandoned. It remained a farmland for nearly three centuries.

Intersection of Cultures

St. Mary's City was a location where Maryland Indian and British people met and interacted in an exceptional way in the early phase of the Atlantic World. After acquiring half the Yeocomico village at the site, the English moved into the native houses, while the Yeocomico continued residing in the other half of the village for about half a year, thereby facilitating significant cultural exchanges. This created friendly relations with Maryland's native peoples that endured until the end of the seventeenth century. The museum tells the story of this early interaction at its recreated Woodland Indian Hamlet Site (Fig. 3).

People from Africa and of African descent came to St. Mary's City in the seventeenth century before the development of the American system of chattel slavery. Matthias de Sousa, likely of Portuguese and African descent, arrived in Maryland in 1634 as an indentured servant. After serving his indenture, de Sousa became a mariner and fur trader. While living in St. Mary's City, he served in the 1642 legislative assembly of freemen at St. John's, home of John Lewger and meeting place of the Maryland assembly. At the time, Maryland allowed all freemen, regardless of color or religion, to participate and vote in the colonial assembly. By the early eighteenth century, Maryland's laws codified slavery as a lifelong status for African Americans (Fig. 4).

Historic St. Mary's City, Fig. 3 Inside a Witchott at the Woodland Indian Hamlet. (Courtesy of Historic St. Mary's City)

Historic St. Mary's City, Fig. 4 St. John's Site Museum at Historic St. Mary's City. (Courtesy of Historic St. Mary's City)

Research and Discovery

Since its founding, HSMC has been an active center for research. Little was known about the first capital when in the 1930s, Dr. Henry Chandlee Forman pioneered excavations that began the discovery of the buried city. It was not until the 1960s that renewed interest of the City and the values of freedom and equality it represented led to the establishment of the Historic St. Mary's City Commission in 1966. In 1971, the Commission began a program of intense archeological and historical research. Eminent Historic Lois Green Carr was the Commission's first employee. She and her colleagues (Lorena Walsh, Russell Menard, Paul Clemens, and Alan Kulikoff) who studied early Maryland in the 1960s and 1970s became known as the Chesapeake School. Their groundbreaking work in understanding the economy and social life of the region set it apart from the dominant New England perspective of the time.

For the past 45 years, generations of historians and archaeologists have discovered evidence of the indigenous people of the area, the City's baroque plan and development of Maryland's government, its ties to the Atlantic World, the tidewater tobacco economy, and the development of slavery. HSMC has been recognized as a pioneer in public archaeology, beginning in 1972 at the St. John's site dig where student and professional archaeologists offered tours of the excavation. In January 2012, HSMC was recognized with the Award of Merit by the Society of Historical Archaeology (SHA) for over four decades of effort to preserve, protect, and interpret Maryland's "ancient and chief seat of government" as an archaeological treasure for the public (Fig. 5).

The museum's staff continues to discover the City as it trains generations of students through its annual archaeological field school, the longest running field school in the United States. Only a small fraction of the original capital, shared by the museum, Trinity Episcopal Church, and St. Mary's College of Maryland, has been excavated. While much has been learned about Maryland's first capital, there are still years of exciting exploration and discovery ahead.

Interpreting History

When visitors come to HSMC today, they see meticulously recreated seventeenth-century buildings and meet costumed interpreters at four major sites, including the Woodland Indian Hamlet, Godiah Spray Plantation, Town Center, and the *Maryland Dove*, who discuss the people and experience of living in the Maryland colony (Figs. 6 and 7).

Collections

HSMC's collections of more than six million artifacts represent multiple periods of time-various eras of prehistory, seventeenth century, eighteenth

Historic St. Mary's City, Fig. 5 Archaeological field school at Historic St. Mary's City. (Courtesy of Historic St. Mary's City)

Historic St. Mary's City, Fig. 6 Smith's Ordinary at Town Center, Historic St. Mary's City. (Courtesy of Historic St. Mary's City)

Historic St. Mary's City, Fig. 7 *Maryland Dove*. (Courtesy of Historic St. Mary's City)

Historic St. Mary's City, Fig. 8 Lead coffins in situ 1992. (Courtesy of Historic St. Mary's City)

century, and up to the present. It includes such material culture as fragments of stoneware, Venetian glass, metalwork, colonial and American

Historic St. Mary's City, Fig. 9 Collections at Historic St. Mary's City. (Courtesy of Historic St. Mary's City)

Indian tobacco pipes and pottery, oyster shells, glass beads, nails, and lithics.

HSMC's most unique discovery, three lead clad coffins, may be seen in situ within the foundation of the Brick Chapel of 1667 in Town Center. Originally discovered in 1990, the lead coffins were fully excavated in 1992 by a team that included archaeologists, archaeological conservators, forensic anthropologists, geophysicists, nuclear physicists, engineers, pollen analysts, and atmospheric scientists. Careful analysis and research led to the identification of the three individuals: Philip Calvert, youngest son of George Calvert; Anne Wolseley Calvert, his first wife; and a baby boy, likely from Philip's second marriage (Fig. 8).

Project Lead Coffins, as the effort became known, produced a wealth of information concerning the cultural practices of the early citizens of Maryland's first capital. HSMC staff have delivered illustrated presentations and collaborated with others to produce articles, exhibits, and films about the lead coffin project. From 2009 to 2014, the coffins were featured in the exhibit, "Written in Bone," at the Smithsonian Institution's National Museum of Natural History that attracted approximately nine million visitors (Fig. 9).

HSMC recently moved its research staff and collections to a new state-of-the-art collections storage and study facilities that it shares with its partner St. Mary's College of Maryland, a liberal arts college. The new place provides space for artifact processing, analysis, and research in the museum's library. Scholars are encouraged to use the collection for research and assist HSMC in fulfilling its mission to tell the story of Maryland's first capital.

Cross-References

- ▶ Agrarian Landscapes of the Historic Period
- ▶ Annapolis: Historical Archaeology
- ▶ Archaeological Fieldwork
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Clay Pipes in Historical Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Field Schools, Archaeological
- ▶ Historic Site and Historic Building Preservation: Overview
- ▶ History and Archaeology: Relationship Over Time (US Perspective)
- ▶ Indigenous Archaeologies
- ▶ Journal of Material Culture
- ▶ Museum Education and Archaeology

- ▶ North America During the European Contact Period
- ▶ North America (USA and Canada): Museums
- ▶ North America (USA): Historical Archaeology
- ▶ Privatization, Public-Private Partnerships, and Innovative Financing for Archaeology and Heritage
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Rural Life in Islamic Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ Trade Beads in Historical Archaeology
- ▶ Woodland and Mississippian Cultures of the North American Heartland

General References

Carr, Lois Green, and David William Jordan. 1974. *Maryland's revolution of government, 1689–1692*. Ithaca: Cornell University Press.

Carr, Lois Green, Philip D. Morgan, and Jean B. Russo. 1989. *The Colonial Chesapeake society*. Chapel Hill: University of North Carolina Press.

Carr, Lois Green, Russell R. Menard, and Lorena S. Walsh. 1991. *Robert Cole's world: Agriculture and society in Colonial Maryland*. Chapel Hill: The University of North Carolina Press.

Faden, R. 2013. Historic St. Mary's City: Addressing the 21st century audience. In *We are what we remember: The American past through commemoration*, ed. Laura Mattoon D'Amore and Jeffrey Meriwether. Newcastle: Cambridge Scholars Publishing.

Horn, James. 2012. *Adapting to a new world: English society in the seventeenth-century Chesapeake*. Chapel Hill: University of North Carolina Press.

Hurry, S.D., and D. Bodeman. 2007. The whole site is the artifact: Interpreting the St. John's site, St. Mary's City, Maryland. In *Past meets present: Archaeologists partnering with museum curators, teachers, and community groups*, ed. John H. Jameson and Sherene Baugher. New York: Springer.

Maryland Historical Magazine. 2004. 99(3).

Miller, Henry M. 1986. Transforming a 'splendid and delightsome land': Colonists and ecological change in the Chesapeake 1607–1820. *Journal of the Washington Academy of Sciences* 76: 173–187.

Miller, Henry M. 2001. Living along the "Great Shellfish Bay": The relationship between prehistoric peoples and the Chesapeake. In *Discovering the Chesapeake: The history of an ecosystem*, ed. P.D. Curtin, G.S. Brush, and G.W. Fisher, 109–126. Baltimore: The Johns Hopkins University Press.

Miller, H.M. 2003. Lord Baltimore's colony of Maryland and its capital of St. Mary's City 1634–1695. In *Avalon chronicles*, vol. 8, 226–260. Ferryland: Colony of Avalon Foundation.

Miller, H.M. 2007. When the digging is over: Some observations on methods of interpreting archaeological sites for the public. In *Past meets present: Archaeologists partnering with museum curators, teachers, and community groups*, ed. John H. Jameson and Sherene Baugher. New York: Springer.

Riordan, Timothy B. 2004. *Maryland and the English civil war: 1645–1646*. Baltimore: Maryland Historical Society.

Stone, Gary Wheeler. 1987. Manorial Maryland. *Maryland Historical Magazine* 82: 3–36.

Walker, Sally. 2013. *Written in bone: Buried lives of Jamestown and Colonial Maryland*. Minneapolis: Carolrhoda Books.

Walker, Sally. 2014. *Ghost walls: The story of a 17th-century colonial homestead*. Minneapolis: Carolrhoda Books.

Historical Archaeology

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Brief Definition of the Topic

This quarterly journal is the flagship publication of the Society for Historical Archaeology (SHA) and the most widely distributed scholarly periodical pertaining to the discipline of historical archaeology. A subscription to *Historical Archaeology* is a benefit of membership in the SHA, though institutions and libraries may also subscribe. Its purpose is the dissemination of substantive and theoretical articles relevant to researchers in the field, scholars in allied disciplines, and the interested public. *Historical Archaeology* also includes published testimonials to certain SHA award recipients, transcribed interviews with prominent practitioners, and memorials that mark the passing of major figures in the field (past presidents and major award winners of the SHA as well as other major specialists

recommended to and approved by the SHA board of directors). Reviews (currently edited by Julie Schablitsky) were pulled from the printed journal in 2007 and moved to a special section of the SHA website as a space-saving measure (http://www.sha.org/publications/book_reviews.cfm). In a typical year, the journal publishes about 550 pages of content spread across four issues.

Created with the establishment of SHA in 1967, *Historical Archaeology* was then simply an annual publication. The founding editor, J. Glenn Little II, reluctantly resigned soon after his appointment, owing to illness, so the premier volume was compiled by an "emergency editor," the first SHA president, John L. Cotter. David A. Armour accepted a 3-year board appointment as editor starting with the 1968 volume, and after serving a second term, he was succeeded by John D. Combs in 1974.

Following a transitional year, Ronald J. Michael assumed full editorship of *Historical Archaeology* in 1978, a position he held through nine successive appointments until the start of 2005. Over that time, the journal expanded to a semiannual publication with two issues a year in 1981 and ultimately achieved its current status as a quarterly in 1990.

During his long and influential tenure, Michael introduced thematic journal issues (usually two each year) with guest editors and added occasional "forum" features promoting discourse among several noted authorities in response to a provocative position paper authored by one of them. A *Special Publications* series was launched, as well as topical guides to the literature, underwater archaeology proceedings from the conference, and readers compiled from reprinted journal articles (the latter now termed collectively as *Perspectives from Historical Archaeology*). Print and online indices to the journal, as well as searchable CD-ROM collections of journal volumes, also were produced. During the waning years of Michael's editorship, SHA unveiled its Internet website http://www.sha.org and began a joint publication program with the University Press of Florida. LouAnn Wurst was the first co-publications liaison in 2005, joined by Daniel G. Roberts later that year, and by Della A. Scott-Ireton in 2006. Analies Corbin became co-publications editor in 2007, a position she still holds, and under her leadership, joint publication programs were also initiated with the University of Nebraska Press and Springer Publishing.

Rebecca Allen became editor of *Historical Archaeology* in 2005 and served one term through the end of 2007. She built upon prior initiatives and supported expansion of the co-publications program. Allen also worked at defining the roles and functions of newer editorial positions, such as those responsible for joint publications and the SHA website.

J. W. (Joe) Joseph accepted appointment as journal editor in 2008, with Mary Beth Reed serving as coeditor. His editorial focus was on managing the orderly transition to electronic media, including SHA's Print-On-Demand (POD) Press. POD initiatives included the *Perspectives* series of topical readers with content selected from the journal back issues, each with an introduction to the subject matter written by the compiler.

Having been selected as SHA's president-elect, Joseph stepped down as journal editor in his third term, as did coeditor Reed, and was succeeded by Christopher N. Matthews in 2014. Matthews continues to serve as the editor of *Historical Archaeology* at this writing, maintaining the high quality established by his predecessors while working on development of new initiatives, such as the *Technical Briefs* series (currently edited by Ben Ford), which appears on the SHA website.

It should be noted that for most of SHA's history, the appointed journal editor was an officer of the society by virtue of his or her position, serving on the board of directors during his or her tenure (this was also the case with the appointed newsletter editor). A recent bylaws change, however, paired the journal editor and co-publications editor as the society's research editors, and the two incumbents run against each other at 3-year intervals for the privilege of serving as an officer of the society (similarly, the newsletter editor and website editor are paired as communications editors and stand for election to a seat on the board as an officer).

All journal back issues more than 5 years old are now available for downloading at SHA's website http://www.sha.org/publications/onlinepubs_html/, whereas more recent issues are

available to current SHA members who successfully log in to the website's members section. JSTOR archives digital back issues of *Historical Archaeology* for retrieval and downloading subject to the same "moving wall" (a fee is usually charged) http://www.jstor.org/action/showPublication?journalCode+histarch. Printed copies of many special publications and recent journal issues are also available through SHA.

Cross-References

► Society for Historical Archaeology (SHA) (Historical Archaeology)

References

Society for Historical Archaeology. n.d. Available at: http://www.sha.org/default.cfm.

Historical Archaeology in Latin America

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Basic Information

Historical Archaeology in LatinAmerica was the only specialized publication on historical archaeology that existed in the region until 2007, when some other journals, such as *Vestígios – Revista Latinoamericanade Arqueologia Histórica*, and *Revista de Arqueología HistóricaArgentina y Latinoamericana*, began to be published. It was coordinated by Stanley South, an American scholar mostly known for his pioneering work on pattern analysis in historical archaeology. These series of publications were funded through a grant from The Conference on Historic Site Archaeology, and enjoyed the support of the South Carolina Institute of Archaeology and Anthropology. Sixteen different volumes were published between January 1994 and April 1996, and after this year, *Historical Archaeology in LatinAmerica* ceased being published.

Major Impact

The volumes show the heterogeneous development of historical archaeology in the region. Articles were mostly written by Latin American archaeologists in Spanish, Portuguese, or English and 90% of the contributions were produced by Argentinean, Uruguayan, and Brazilian scholars, showing their strong presence in this field of study. The vast majority of the contributions focused on colonial archaeology (mainly the analysis of the European settlement in the region and its consequences) with Hispanic and Portuguese settlements as the major topic. However, some scholars also discussed the nature of other kind of sites during colonial times (such as those created by maroon slaves). The study of all of these contexts involved, among other things, discussions on the production and distribution of artifacts and the construction of social differences.

In the course of its short existence, *Historical Archeology in LatinAmerica* was fundamental in the consolidation of historical archaeology in the region. The works collected in this series stress two main arguments: On the one hand, different areas and countries had been traditionally connected by similar historical processes; on the other hand, archaeologists should stop working in isolation to improve the understanding of the past and present of their own societies.

Cross-References

► Brazil: Historical Archaeology
► Hispanic South America: Historical Archaeology
► Lima, Tania Andrade

▶ Schávelzon, Daniel
▶ South, Stanley A.
▶ Vestígios, Revista Latino-Americana de Arqueologia Histórica

Further Reading

Galvão, V. 1995. Religiosidade e morte: Instrumentos do projeto colonial portugués. In *Historical archaeology in LatinAmerica, volume 9*, ed. S. South. South Carolina Institute of Archaeology and Anthropology: Columbia.

Schávelzon, D. 1994. Arqueología e historia de la imprenta Coni, Buenos Aires. In *Historical archaeology in LatinAmerica, volume 1*, ed. S. South. South Carolina Institute of Archaeology and Anthropology: Columbia.

Schávelzon, D. 1995. Arqueología e historia del Cabildo de Buenos Aires: Informe de las excavaciones (1991–1992). In *Historical archaeology in LatinAmerica, volume 8*, ed. S. South. South Carolina Institute of Archaeology and Anthropology: Columbia.

Senatore, M.X. 1995. Tecnologías nativas y estrategias de ocupación española en la región del Río de la Plata. In *Historical archaeology in LatinAmerica, volume 11*, ed. S. South. South Carolina Institute of Archaeology and Anthropology: Columbia.

South, S. 1994. Arqueología en Santa Elena, entrada el pasado. In *Historical archaeology in LatinAmerica, volume 4*, ed. S. South. South Carolina Institute of Archaeology and Anthropology: Columbia.

South, S., ed. 1994a. A synthesis from Brazil. A fortlet from Argentina. Discovery at Santa Elena in La Florida, USA. Urban archaeology in Argentina. Method and theory. Is social science scientific? In *Historical archaeology in Latin America*, volume 2. Columbia: South Carolina Institute of Archaeology and Anthropology.

South, S., ed. 1994b. Cattle raising and rock painting in Brazil. Cerámica del Buenos Aires colonial. Arquitectura pública urbana de la Colonia del Sacramento, Uruguay. How Argentinean urban children learn to live in the city. In *Historical archaeology in LatinAmerica, volume 3*. Columbia: South Carolina Institute of Archaeology and Anthropology.

South, S., ed. 1994c. Restos humanos y arqueologia histórica: uma questão de ética. O Cemiterio da Prata de Manguinhos: notícia sobre um sítio histórico de Guaxindiba, RJ. Arqueología de superficie en Palermo, Buenos Aires. In *Historical archaeology in LatinAmerica, volume 5*. Columbia: South Carolina Institute of Archaeology and Anthropology.

South, S., ed. 1995a. Arqueologia histórica no Brasil: uma experiência de ensino. Cotidiano doméstico e cultura material no século XIX. In *Historical archaeology in LatinAmerica, volume 6*. Columbia: South Carolina Institute of Archaeology and Anthropology.

South, S., ed. 1995b. The archaeology of Palmares and its contribution to the understanding of the history of African-American culture. Análisis de restos faunísticos en sitios históricos de la Ciudad de Buenos Aires. El caballo en la Frontera del Sud (1855–1875). In *Historical archaeology in LatinAmerica, volume 7*. Columbia: South Carolina Institute of Archaeology and Anthropology.

South, S., ed. 1996a. Archaeological theory in Brazil: Ethnicity and politics at stake. Reciprocity vs. privilege. Rock paintings on the Chapada Diamanta uplands and the Bumba-Meu-Boi. In *Historical archaeology in LatinAmerica, volume 12*. Columbia: South Carolina Institute of Archaeology and Anthropology.

South, S., ed. 1996b. Historical archaeology in Brazil. In *Historical archaeology in LatinAmerica, volume 13*. Columbia: South Carolina Institute of Archaeology and Anthropology.

South, S., ed. 1996c. Segunda Conferencia Internacional de Arqueología Histórica Americana. Actas I. In *Historical archaeology in LatinAmerica, volume 14*. Columbia: South Carolina Institute of Archaeology and Anthropology.

South, S., ed. 1996d. Segunda Conferencia Internacional de Arqueología Histórica Americana. Actas II. In *Historical archaeology in LatinAmerica, volume 15*. Columbia: South Carolina Institute of Archaeology and Anthropology.

South, S., ed. 1996e. Segunda Conferencia Internacional de Arqueología Histórica Americana. Actas III. In *Historical archaeology in LatinAmerica, volume 16*. Columbia: South Carolina Institute of Archaeology and Anthropology.

Zarankin, A. 1995. Arqueología histórica urbana en Santa Fe La Vieja. In *Historical archaeology in LatinAmerica, volume 10*, ed. S. South. South Carolina Institute of Archaeology and Anthropology: Columbia.

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Historical Archaeology in Peru

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Introduction

During the last 30 years, there has been an increasing interest in historical archaeology in Peru, covering topics that range from the everyday life

of different groups to studies about changing landscapes through time. Until the 1980s, historical archaeology was not considered itself an independent field of study. Peruvian archaeologists focused mainly on prehispanic periods, leaving historical events (including the colonial, republican, and contemporaneous epochs) to anthropologists, ethnographers, and historians. Most efforts in what today would be defined as historical archaeology were oriented to support the interpretations made by historians and other specialists with data from material culture or even just treasure hunting (Hampe 1982; San Cristóbal and Guillén 1986). Globalization and postcolonial influences during the 1990s helped define historical archaeology in Peru as a field that could also help to better understand recent periods, as well as unveiling the history of groups that did not usually appear as clearly on historical records (due to biases related to race, class, and gender, among others).

Definition

Historical archaeology, as currently practiced in Peru, can be understood as "the study, using archaeological methods, of environments, moments, and processes that were also recorded contemporaneously in written documents" (Van Valkenburgh et al. 2016: 5). Thematically, this definition comes to equate the archaeological inquiry of everything that happened after the collapse of the Inca Empire due to the Spanish conquest, while expanding Deetz's (1977: 5) definition and its emphasis on the impact of European culture on indigenous peoples in the process. Methodologically, historical archaeology in Peru is essentially inter- and multidisciplinary, combining documentary and archaeological sources from a myriad of approaches.

Historical Background

The early years of historical archaeology in Peru were marked by a strong emphasis on the search for confirmation of historical accounts in the archaeological record. In particular, a lot of attention was devoted to the identification of relics and sites mentioned in Spanish chronicles, such as the search for the head of Spanish conqueror Francisco Pizarro (San Cristóbal and Guillén 1986) or the elite Inca mummies at the San Andrés Hospital in Lima (an endeavor first led by José de la Riva Agüero in 1937 as summarized by Hampe 1982 and later revisited by Bauer and Coello 2007).

Throughout the second half of the twentieth century, historical archaeology studies in Peru did not receive as much attention as in other South American countries (Van Valkenburgh et al. 2016: 8; Zarankin and Salerno 2008: 40). One of the main reasons behind this lag in interest can be traced to the professionalization of the discipline. During the 1930s and 1940s, renowned Peruvian archaeologists such as Julio C. Tello focused on proposing detailed chronologies for the development of Andean cultures, showing that it was possible to study ancient cultures without a written record. Moreover, the attempts to lead projects of construction of a national identity–particularly strong during the 1960s and 1970s–redirected the attention of the general public to a "search for precolonial splendor" (Funari 2002, cited in Zarankin and Salerno 2008: 40), deliberately leaving aside the struggles of indigenous populations across the country and the archaeological evidence of these more modern processes.

Diffusionism in historical archaeology was quite popular, particularly in the United States and parts of Europe up until the 1950s. Following this approach, archaeologists would be able to clearly define the affiliation of each object and site, using categories such as "native" and "foreign" (for a critique, see Silliman 2009). Zarankin and Salerno (2008: 40) suggest that one of the main characteristics of a diffusionist approach to archaeology was to present very detailed site reports and descriptions of artifacts, with the purpose of inserting archaeological sites within defined culture-history sequences. Historical archaeology – as practiced by Peruvian archaeologists – largely fitted into this trend at least until the mid-1970s (Arrieta et al. 1975;

Cárdenas 1970; Cogorno 1970). It is worth noticing that studies that favored cultural-historic interpretations became popular in Peru several years or even decades after they were in vogue in other regions. Furthermore, while a processual approach started to influence Peruvian archaeology during the 1950s and 1960s, this influence was not extended to historical archaeology in Peru until much later.

One of the main topics of these early research endeavors focused on the study of Spanish colonialism (Van Buren 2010) and particularly the investigation of historic sites and the founding of cities (Mogrovejo 1996). Unfortunately, most of the resulting data were presented only in "gray literature," reports submitted to the National Institute of Culture (former INC, now Ministry of Culture; Van Valkenburgh et al. 2016: 8; Mogrovejo 1996: 12). A point of departure occurred in the 1980s, as the field of historical archaeology in Peru focused on three main themes: (1) trade and economy during the colonial period; (2) technology, including metallurgy and pottery; and (3) religion, predominantly related to the syncretism between native and Catholic traditions.

In terms of the trade networks and the economy of the colonial period, one of the most important contributions to the field of historical archaeology during the late 1980s was the Moquegua-Bodegas Project, which focused on the Spanish wineries in the southern Moquegua valley. As part of this project, the research team excavated wine cellars, kilns, and other structures dating to the Spanish colonial period (Rice and Smith 1989; Rice 2012) to investigate the organization of wine and brandy production in hacienda sites. This production was predominantly structured to cover the demand for liquor at the mining center of Potosí in central Bolivia (Van Buren 2010: 174).

Research at Porco, a small mining center near Potosí, was key to expand the scope of historical archaeology in Peru to the topic of technology, in particular mining infrastructure (Van Buren 2010, 2016). In particular, this project offered the opportunity to examine the use of both native and colonial traditions related to mining and to compare repertoires across continents. Similarly, this period saw an increase in pottery studies, especially those centered on the reexamination of local and imported wares during the colonial period. However, although classifications of Spanish majolica and imported wares were conducted and made available in other South American countries (Therrien et al. 2002), only limited attempts to achieve such characterizations and comparisons were made in Peru until recently (Kelloway et al. 2018).

Finally, during the 1990s, there was a renewed interest in the study of syncretism between the Catholic and native religious traditions, in both burial rituals and their associated artifacts. In more recent years, this approach has been further explored (Murphy and Boza Cuadros 2016), especially with the excavation of churches associated with *reducciones* (Klaus and Tam 2009; Klaus 2016) and the consideration of a more substantial interpretative framework that includes evidence for violent and nonviolent native resistance, as well as other strategies (Murphy et al. 2010).

Key Issues/Current Debates

Over the last 20 years, historical archaeology in Peru has grown quite significantly as a discipline. What started as a series of isolated findings and an emphasis on description has now evolved into several long-term research programs, including the construction of museums (e.g., the Bodega and Cuadra Museum in downtown Lima; Fhon 2012, 2016). Researchers from Peru itself, the United States, and Japan are developing projects focused on historical archaeology, and several universities have become strongly associated with this field (e.g., Vanderbilt, Chicago, and Brown, among others). As it usually occurs due to multiple factors, including differences in availability of information among areas, certain regions have concentrated efforts (e.g., Arequipa, Cusco, Lima, and Lambayeque; Mogrovejo 1996: 13–22), while others remain practically unexplored (e.g., Cajamarca).

This new impetus behind the practice of historical archaeology has been favored not only

by changes in theoretical paradigms and the development of new technologies but also by political and social changes in Peru over the last couple of decades. In contrast with the univocal representation of the Peruvian "grandiose past" focused on the Inca empire and promoted by the military government during the 1970s (Rice 2012), now there is definitely more room for a multivocal interpretation of the events corresponding to the more recent past that includes the prehispanic, colonial, and republican periods (although there are sporadic instances of historical negationism, especially among political figures).

As a discipline, historical archaeology in Peru has also moved past the debate about the predominance of either the documentary sources or the archaeological sources, which is in itself an extension of the apparent tension between history and archaeology (Mogrovejo 1996). Its practitioners are less concerned with terminology (and the distinction between prehistory and history) and more focused on research questions and programs. There does not seem to be a unity of theoretical approaches or a uniquely Andean – much less Peruvian – brand of historical archaeology (Jamieson 2005), and there seems to be no apparent reason to do so. On the contrary, the field has benefitted from a diversity of academic traditions, topics, and methods.

Current Topics

Due to its particular sequence of development, historical archaeology in Peru has traditionally kept a close bond with ethnohistory (Murra 1975; Pease 1978; Rostworowski 1978), and this relationship translated into an emphasis on the study of the early colonial period. In particular, a topic that has received wide attention is the series of events related to the Spanish conquest of Peru, as part of the processes of European colonialism during the sixteenth century (Van Buren 2010). Interestingly enough, the place where such colonial encounter occurred – the city of Cajamarca and its surroundings – has not been subject of extensive archaeological and historical research for the period in question (with the exception of those sites intervened by the INC and published only through technical reports as well as a few interventions on urban landmarks; Sarmiento and Saldaña 2016), probably due to its fast urban growth, as well as other factors. On the contrary, what it is assumed to be the last bastion of the Incas – the Vilcabamba region – has been thoroughly studied in recent years (Bauer et al. 2015).

The use of more recent theoretical models to interpret culture contact and colonialism in the Andes allowed for a shift away from acculturation models toward an emphasis on dynamic power relations, the intersection of multiple cultural identities, and the transformations resulting from those interactions while acknowledging the asymmetrical relations of power in which these societies are immersed (Silliman 2009; Wernke 2013). Colonial institutions are being reexamined, and, among them, the *reducciones* (colonial settlements where the native population was relocated) have been receiving particular attention, given their position as links between communities, structures, and landscapes (Saito and Rosas Lauro 2017; Wernke 2013).

The Toledan *reducciones*, colonial doctrinas, and Jesuit missions all were part of a "civilizing" project imposed on the local indigenous population. These institutions implied the forced resettlement of communities to easily accessible areas not only for administrative and practical purposes but also to create *civitas*, an ideal of community based on order and decency (Cummins 2002). The archaeology of *reducciones* is particularly enlightening because while the documentary sources – mostly official guidelines to implement the accompanying sets of policies – outline the normative aspect of this institution, the archaeological study of these settlements has successfully shown how these guidelines translated into actual practices (Saito and Rosas Lauro 2017). Some of the better-documented *reducciones* include Chérrepe in the Zaña valley (Van Valkenburgh 2016), as well as Mawchu Llacta (the old reducción of Santa Cruz de Tuti) and the catholic doctrina at Malata, both in the Colca valley (Traslaviña 2016; Wernke 2016).

The evangelization and social engineering projects from the colonial era also brought along profound changes in the economic structures of the indigenous communities, including the reorganization of local economies toward imposed Spanish cultural practices like the production of wine and brandy. Continuing with her studies on the development of these industries during the sixteenth century and later in Moquegua, Prudence Rice (2012) has updated the results of her fieldwork between 1985 and 1990 and revisited them in her more recent synthesis with links to theoretical approaches that emerged in the last two decades, including the archaeology of capitalism, actor-network theory, world-system theory, and frontier theory.

Likewise, the Jesuit missions established mostly along the Peruvian coast also constituted dynamic actors in the economic landscape of the colonial era. Furthermore, considering that enslaved Africans comprised a significant part of their workforce, these settlements added layers of complexity to the social and cultural relationships of their time. Weaver (2016) offers a comprehensive archaeological and historical examination of the Jesuit wine haciendas of San Joseph and San Xavier in Nasca. His research sheds light on the coercive structures of *hacienda* labor, which pervaded both public and public spheres, as well as some of the ways enslaved Africans expressed their own agency, establishing a parallel economy and adding their own motifs to the *botijas* produced. The contextualization of hybrid material culture with historical documents allows us to document a diversity of experiences within the African diaspora in Peru (Maas 2018; Santa Cruz Alcalá 2019).

Finally, related to the study of diaspora and migration processes in Peru but in more recent times, several tombs corresponding to Chinese *coolíes* have been reported along the Peruvian coast (as the examples compiled by Chuhue et al. 2012 in the San Lorenzo Island and haciendas in Huaral, Lima and Cañete. A more recent case was found in Huaca Bellavista in Lima; Gomez 2015). Although mostly presented as isolated findings, and considering it is highly likely that these contexts continue to appear given that site reuse is quite typical in the Andes, one of the goals of future studies should be to incorporate this evidence into archaeological projects and long-term research programs. This type of projects would not only contribute to the still largely unexplored study of the Asian diaspora in Peru, but it would also give impulse to the archaeological study of the republican era, notoriously missing from research so far.

New Methods

In addition to renewed sets of topics, one of the most important contributions historical archaeology in Peru has brought to the table during the last 20 years is an emphasis on the design of interdisciplinary projects – combining archaeology, architecture, and history – and, with that, a wide range of methods. Beyond archives and trenches, whole new analytical toolkits – heavily favored by the development of new technologies – are now available for researchers across the country.

One of the most promising tools is the use of geographic information systems (GIS) to explore the spatial relationships between settlements and landscape and to outline the intricacies of, for example, major episodes of culture contact (Wernke 2013; Boza Cuadros 2018). Wernke (2013) and his team have used viewshed analysis, least-cost path models, and "reverse site-catchment" to study the entanglements and negotiations between the influential Collagua communities of the Colca valley and the Inca and Spanish groups trying to exert control over their territory (Wernke 2013: 252). Combining GIS with documentary and ethnographic sources, Wernke has moved past the dichotomy of "colonizer and colonized" frequently found in culture contact studies a few decades ago and has taken a step toward a much-needed multiscalar approach. The use of GIS has also helped to reconstruct landscapes and adaptation strategies on different periods, especially on the distribution of canals in valleys that are being used until now. A good example is the interdisciplinary work of Chacaltana and Cogorno (2018) about the Rimac valley in Lima, based on historical data of canal administration during colonial times to virtually

reconstruct the distribution of canals during prehispanic periods. This work has also been helpful to recognize canals that are used in modern times but were hidden by the urban expansion of Lima.

Also allowing a nuanced characterization of colonial encounters (Quilter 2010, 2016), bioarchaeological studies have contributed to expand our knowledge of the everyday life and struggles of indigenous populations during the colonial era (Klaus 2016; Klaus and Tam 2009). Klaus (2016) investigated the Muchik town of Mórrope, where a catholic church was built in 1536, and documented a wide set of variables associated with health and stress, including degenerative joint disease, ante-mortem tooth loss, enamel hypoplasia, and dental caries, combined with funerary data that showed hybrid – Spanish and Muchik – burial rituals (e.g., orientation along the Muchik traditional axis, use of cinnabar, and evidence of partial exhumation and manipulation of the human remains). These data show conditions of increased stress for the local communities, as well as processes of resistance and the construction of a new Muchik identity in response to the changing political and social conditions.

Bioarchaeological data also allows exploring the diversity of strategies local individuals and communities put in practice to deal with the sudden changes in their living conditions (the "archaeology of resistance"). To investigate this issue, Murphy and colleagues (Murphy et al. 2010; Murphy and Boza Cuadros 2016) focused on the burials at the Puruchuco-Huaquerones site in the Rimac valley, where they documented evidence of outright defiance and violence, as well as removal of the body and secondary interment as sign of resistance. In the first case, atypical individuals with injuries probably caused by Spanish or European weapons were interred without funerary graves and with a different orientation; within the context of the Spanish siege of Lima, some local communities allied with the Spaniards, but some others refused and suffered violent retribution. In the second case, the individual was removed from a church burial that disrupted the Late Horizon tradition of interring the dead in their ancestors land. Fine-grained bioarchaeology analysis can therefore provide valuable clues to reconstruct different types of interaction and diverse experiences in the context of a colonial encounter, including resistance (violent and nonviolent), accommodation, persistence, and complicity, put into practice by all the social actors involved.

International Perspectives

The development of historical archaeology in Peru did not occur in a vacuum. The field has received influences from the United States as well as other South American countries; however, its evolution shows both similarities and differences with these regions in terms of theoretical approaches and research subjects.

A relatively recent trend in Peruvian historical archaeology that had its antecedents in South America is the integrative approach between archaeology and heritage studies in urban contexts (Schavelzon 2003). While the archaeology of historical urban centers is not new (Mogrovejo 1996), there seems to be an increasing acknowledgment to consider the colonial, republican, and contemporary times as part of the "life-history" of many archaeological sites (Álvarez-Calderón 2016). In addition, this recognition of an extended cultural biography includes coming to terms with episodes of conflictive – or even negative – history.

In addition, as explained by Van Valkerburgh and colleagues (2016: 10–11), an important difference between South America (including Peru) and the rest of the world in the theorization of historical archaeology is a higher fluidity in the transition between the pre- and post-conquest periods. These stages are conceptualized as part of a continuum, which helps archaeologists to widen their interpretative frameworks along a diachronic axis; the concept of "transconquest" (Wernke 2007; Van Valkenburgh 2019) exemplifies how the archaeological analysis of larger social processes – including comparing colonial encounters – benefits from such an expansion. However, it is worth noticing that the comparison of colonial processes and strategies requires

the use of shared analytical categories (e.g., empires and colonies, among others) that make the contrast possible in the first place, leaving aside – at least partially – a more particularistic approach that emphasizes the unique qualities of "lo andino."

On the other hand, there has been a direct influence of US academic and intellectual traditions in the practice of historical archaeology in Peru since at least the 1950s, and this impact has been particularly noticeable during the last couple of decades, in terms of both theoretical approaches and research themes. An example of approach currently explored in US historical archaeology that is expected to gain traction in Peru is the need for a multiscalar approach and specifically of a "glocal" scale of analysis (Roudometof 2016), navigating between local, regional, and global levels. On a similar note, the study of haciendas (Weaver 2016) and the African diaspora in Peru has benefitted from the development of the archaeology of slavery and plantations in the United States, both theoretically and methodologically.

However, there are also significant differences between the practice of historical archaeology in Peru and the United States. For example, while many research projects use a glocal scale, the topic has not been adequately discussed in Peru in terms of theory and its utility. In addition, there still seems to be a reticence among historical archaeologists in Peru to investigate events of a more recent past; in general, there is a preference for studies focused on restoration of archaeological sites for tourism and not for systematic archaeological research. Other current topics and approaches in the United States, including the development of Industrial Archaeology, the Archaeology of the Asian Diaspora, and Subaquatic Archaeology, are still in the initial stages of growth in Peru.

Future Directions

There is a renewed interest in the practice of historical archaeology in Peru, as indicated by the publication of the proceedings of the International Symposium of Historical Archaeology (Traslaviña et al. 2016a, b), the recent special issue of the *International Journal of Historical Archaeology* (Kennedy and Norman 2019), and the now frequent symposia around this theme in the National Archaeology Congress (Santa Cruz Alcalá 2019; Vega Centeno 2018, among others). In particular, considering that the National Congress showcases the archaeological projects conducted each year, such increase in the number of historical archaeology papers correlates to a higher number of research projects dedicated to the discipline. Most of these projects are the result of international collaboration and have different degrees of success in community relations.

However, while historical archaeology has managed to make remarkable progress in its relatively short history in Peru, the list of prospective challenges – including continuing efforts as well as new initiatives – remains quite extensive. First, given the particular nature of historical archaeology, future projects must keep embracing interdisciplinarity from their inception. This approach has benefitted from the use of new technologies, like GIS (Boza Cuadros 2018; Wernke 2013), and it should encourage research teams to be creative and approach previously unexplored sets of material culture as well as to revisit old sets (e.g., *khipus*; Medrano and Urton 2018).

Additionally, several themes currently explored actively in other regions (i.e., North America and Europe) such as labor (Phillippi 2018) and migration have received only limited attention so far in Peru (but see Smith and Boza Cuadros 2019). This is particularly the case for the analysis of labor relations and migration processes among those communities historically underrepresented in the archaeological record (e.g., the African and Asian diasporas; Arrelucea 2018). In the United States, both Voss et al. (2018) and Ross (2013) have recently used multiscalar approaches to navigate between institutions, production processes, and people, while De León (2012) has carefully examined the materiality of modern migrant communities. These topics offer promising perspectives to expand the scope of historical archaeology in Peru in future years.

A related challenge arises from the potential that historical archaeology holds to reconstruct

a multivocal past – as opposed to the univocal "official history." In some cases, the historic-archaeological record allows to identify fine-grain differences (e.g., by class, gender, and race, among many others) and diverse experiences among the "indigenous" groups that might have been previously described as monolithic blocks (Zuloaga 2012 for the case of Conquest-era *curacas*; Chacaltana 2016 for the case of women in Colonial tambos). In others, it can shed light on the quotidian life of groups apparently well represented in the documentary record (e.g., Japanese immigrant workers in Coastal haciendas; Chirinos and Saucedo 2020). Material culture, in such occasions, can nuance and contextualize individual and social memories as well as their change over time.

Finally, the development of historical archaeology in Peru has the potential to connect people to their surrounding archaeological sites in new ways. By covering a wide range of contexts and materials – inherent to its *raison d'être* – historical archaeology has the potential to show that archaeological sites can appear in many shapes and forms, including (but not limited to) mines, harbors, and even old wineries (Mogrovejo 1996; Rice 2012). It can also provide a different perspective on a wide range of more recent events, including independence battles (i.e., an archaeology of battlefields), rural-to-urban migrations, and the development of urban centers.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Chile, Archaeology and Indigenous Communities of
- ▶ Colonial Encounters, Archaeology of
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historical Archaeology in Latin America
- ▶ Interdisciplinarity and Archaeology
- ▶ Labor Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

References

Álvarez-Calderón, R. 2016. Arqueología Histórica en las "Huacas" de la Ciudad de Lima: Ampliando la Narrativa. *Boletín de Arqueología PUCP* 20: 83–102.

Arrelucea, M. 2018. *Sobreviviendo a la esclavitud: negociación y honor en las prácticas cotidianas de los africanos y afrodescendientes: Lima, 1750–1820*. Lima: Instituto de Estudios Peruanos.

Arrieta, A., C. Arellano, A. Castañeda, and J. Polo. 1975. Primeros hallazgos en Huaca Casa Rosada (Loza, vidrio, cerámica vidriada), asociados al trabajo en el Archivo Histórico Nacional. *Boletín del Seminario de Arqueología PUC* 15–16: 159–166.

Bauer, B.S., and A. Coello. 2007. The hospital of San Andrés (Lima, Peru) and the search for the royal mummies of the Incas. *Fieldiana Anthropology* 39: 1–31.

Bauer, B.S., J. Fonseca Santa Cruz, and M. Aráoz Silva. 2015. *Vilcabamba and the archaeology of Inca resistance*, Cotsen Institute of Archaeology Press monographs. Vol. 81. Los Angeles: Cotsen Institute of Archaeology.

Boza Cuadros, M.F. 2018. *Places, ports, and their people: The rise of the Peruvian post-colonial state in the Arequipa coast*. Paper presented at the SAA 83rd annual meeting, Washington, DC.

Cárdenas, M. 1970. Ocupación Española de una Huaca del Valle de Lima: Casa en la Plataforma Superior de la Huaca Tres Palos. *Boletín del Seminario de Arqueología PUC* 5: 40–49.

Chacaltana, S. 2016. De los tambos incas a las tambarrías coloniales: economía colonial, legislación de tambos y actividades licenciosas de las mujeres indígenas. *Boletín de Arqueología PUCP* 21: 123–144.

Chacaltana, S., and G. Cogorno. 2018. *Arqueología hidráulica prehispánica del valle bajo del Rímac (Lima, Perú): estudio de un sistema de riego costeño*. Lima: Pontificia Universidad Católica del Perú.

Chirinos, P., and D. Saucedo-Segami. 2020. Towards an archaeology of the Japanese diaspora in Peru. In *International Journal of Historical Archaeology. Special issue: Charting the emerging field of Japanese diaspora archaeology*, ed. K. Lau-Ozawa and D.E. Ross. Springer: Cham.

Chuhue, R., L. Ning Na, and A. Coello. 2012. *La Inmigración China al Perú: Arqueología, Historia y Sociedad*. Lima: Universidad Ricardo Palma.

Cogorno, G. 1970. Documentos y Naipes hallados en las Excavaciones de la Huaca Tres Palos, Pando (Lima). *Boletín del Seminario de Arqueología PUC* 5: 1–39.

Cummins, T. 2002. Forms of Andean colonial towns, free will, and marriage. In *The archaeology of colonialism*, ed. C.L. Lyons and J.K. Papadopoulos, 199–240. Los Angeles: Getty Research Institute.

De León, J. 2012. "Better to be hot than caught": Excavating the conflicting roles of migrant material culture. *American Anthropologist* 114 (3): 477–495.

Deetz, J. 1977. *In small things forgotten: The archaeology of early American life*. 1st ed. Garden City: Anchor Press/Doubleday.

Fhon, M. 2012. El comercio con China a través del desentierro de menaje colonial (Casa Bodega y Cuadra, siglos XVI-XVIII). In *La Inmigración China al Perú. Arqueología, Historia y Sociedad*, ed. R. Chuhue, L.J. Na, and A. Coello, 23–37. Lima: Universidad Ricardo Palma.

Fhon, M. 2016. Excavaciones arqueológicas en la Casa Bodega y Quadra en el Centro Histórico de Lima. *Boletín de Arqueología PUCP* 21: 145–162.

Gomez, R. 2015. *Proyecto de Investigación Arqueológica: Recuperación de La Zona Arqueológica Bellavista, Distrito de Santa Anita*. Lima: Ministerio de Cultura.

Hampe, T. 1982. Las momias de los incas en Lima. *Revista del Museo Nacional* XLVI: 405–418.

Jamieson, R.W. 2005. Colonialism, social archaeology and lo andino: Historical archaeology in the Andes. *World Archaeology* 37 (3): 352–372.

Kelloway, S.J., P. Van Valkenburgh, J.G. Iñañez, L. Dussubieux, J. Quilter, and M.D. Glascock. 2018. Identifying new world majolica from 16th–18th century sites on Peru's north coast. *Journal of Archaeological Science: Reports* 17: 311–324.

Kennedy, S.A., and S.M. Norman. 2019. Introduction to status and identity in the imperial Andes: A collection of Transhistorical studies. *International Journal of Historical Archaeology* 23 (4): 807–815.

Klaus, H.D. 2016. Vida y Muerte en el Perú Colonial: Inicios de la Bioarqueología en Lambayeque Histórico (1536–1750 d.C.). *Boletín de Arqueología PUCP* 20: 103–128.

Klaus, H.D., and M. Tam. 2009. Surviving contact. Biological transformations, burial, and ethnogenesis in the colonial Lambayeque Valley, north coast of Peru. In *Bioarchaeology and identity in the Americas*, ed. K. Knudson and C.M. Stojanowski, 126–152. Gainesville: University Press of Florida.

Maas, C. 2018. Perspectivas arqueológicas hacia la historia de la esclavitud en el Perú colonial. In *Cultura Afroperuana: Encuentro de investigadores 2018*, 22–36. Lima: Ministerio de Cultura.

Medrano, M., and G. Urton. 2018. Toward the decipherment of a set of mid-colonial Khipus from the Santa Valley, coastal Peru. *Ethnohistory* 65 (1): 1–23.

Mogrovejo, J. 1996. *Arqueología urbana de evidencias coloniales en la ciudad de Lima (Cuadernos de Investigación)*. Lima: Pontificia Universidad Católica del Perú / Instituto Riva Agüero.

Murphy, M.S., and M.F. Boza Cuadros. 2016. Convirtiendo a los vivos, disputando a los muertos: evangelización, identidad y los ancestros. *Boletín de Arqueología PUCP* 21: 57–68.

Murphy, M.S., E. Goycochea, and G. Cock. 2010. Resistance, persistence, and accommodation at Puruchuco-Huaquerones, Peru. In *Enduring conquests. Rethinking the archaeology of resistance to Spanish colonialism in the Americas*, ed. M. Liebmann and M.S. Murphy, 57–76. Santa Fe: School for Advanced Research Press.

Murra, J.V. 1975. *Formaciones económicas y políticas del mundo andino*. Lima: Instituto de Estudios Peruanos.

Pease, F. 1978. *Del Tawantinsuyu a la historia del Perú*. Lima: Instituto de Estudios Peruanos.

Phillippi, B.D. 2018. Introduction: Labor and the challenge of plurality in historical archaeology. *Historical Archaeology* 52 (1): 6–11.

Quilter, J. 2010. Cultural encounters at Magdalena de Cao Viejo in the early colonial period. In *Enduring conquests. Rethinking the archaeology of resistance to Spanish colonialism in the Americas*, ed. M. Liebmann and M.S. Murphy, 103–125. Santa Fe: School for Advanced Research Press.

Quilter, J. 2016. Magdalena de Cao y la arqueología colonial en el Peru. *Boletín de Arqueología PUCP* 21: 69–84.

Rice, P.M. 2012. *Vintage Moquegua: History, wine, and archaeology on a colonial Peruvian periphery*. Austin: University of Texas Press.

Rice, P.M., and G. Smith. 1989. The Spanish colonial wineries of Moquegua, Peru. *Historical Archaeology* 23 (2): 41–49.

Ross, D.E. 2013. *An archaeology of Asian transnationalism*. Gainesville: University Press of Florida.

Rostworowski, M. 1978. *Señoríos indígenas de Lima y Canta*. Lima: Instituto de Estudios Peruanos.

Roudometof, V. 2016. *Glocalization: A critical introduction*. London/New York: Routledge is an imprint of the Taylor & Francis Group.

Saito, A., and C. Rosas Lauro, eds. 2017. *Reducciones. La concentración forzada de las poblaciones indígenas en el Virreinato del Perú*, Colección Estudios Andinos. Vol. 21. Lima: Pontificia Universidad Católica del Perú.

San Cristóbal, A., and E. Guillén. 1986. *La ficción del esqueleto de Pizarro*. Lima: Universidad Ricardo Palma.

Santa Cruz Alcalá, J.L. 2019. Fundación de la Villa de Cañete. Un espacio que evidencia cómo fue el inicio de la colonización española, hoy repositorio de cultura viva de la provincia de Cañete y una oportunidad para aplicar políticas culturales para el desarrollo local. In *Actas del IV Congreso Nacional de Arqueología*, vol. II, 107–122. Lima: Ministerio de Cultura.

Sarmiento, J., and D. Saldaña. 2016. *El Solar del Inca. Antología sobre el Cuarto del Rescate*. Cajamarca: Cuismanco Ediciones.

Schavelzon, D. 2003. *Buenos Aires Negra*. Buenos Aires: Emecé Editores.

Silliman, S.W. 2009. Change and continuity, practice and memory: Native American persistence in colonial New England. *American Antiquity* 74 (2): 211–230.

Smith, M., and M.F. Boza Cuadros. 2019. *Labor, workers, and capitalist Longue Durée in the Andes*. Paper presented at the XXXVII International Congress of the Latin American Studies Association, Boston.

Therrien, M., E. Uprimny, J. Lobo, M.F. Salamanca, F. Gaitán, and M. Fandiño. 2002. *Catálogo de Cerámica Colonial y Republicana de la Nueva Granada: Producción Local y Materiales Foráneos (Costa Caribe-Altiplano Cundiboyacense, Colombia)*. Bogotá: Fundación de Investigaciones Arqueológicas Nacionales/Banco de la República.

Traslaviña, A. 2016. La Transformación del Espacio Doméstico como Resultado de Cambios en el Espacio Público en Malata, una Doctrina Colonial Temprana en el Valle del Colca. *Boletín de Arqueología PUCP* 20: 187–211.

Traslaviña, A., Z. Chase, P. Van Valkenburgh, and B.J.M. Weaver, eds. 2016a. *Historical archaeology in Peru. Part I*, Boletín de Arqueología PUCP 20. Lima: Pontificia Universidad Católica del Perú.

Traslaviña, A., Z. Chase, P. Van Valkenburgh, and B.J.M. Weaver, eds. 2016b. *Historical Archaeology in Peru. Part II*, Boletín de Arqueología PUCP 21. Lima: Pontificia Universidad Católica del Perú.

Van Buren, M. 2010. The archaeological study of Spanish colonialism in the Americas. *Journal of Archaeological Research* 18 (2): 151–201.

Van Buren, M. 2016. Conectando el Pasado con el Presente: La Antropología Histórica de la Producción de Metal a Pequeña Escala en Porco, Bolivia. *Boletín de Arqueología PUCP* 20: 63–82.

Van Valkenburgh, P. 2016. Produciendo Chérrepe: Reducción, Etnia y Performance en los Valles de Zaña y Chamán, Siglos XVI y XVII. *Boletín de Arqueología PUCP* 20: 129–148.

Van Valkenburgh, P. 2019. The past, present, and future of transconquest archaeologies in the Andes. *International Journal of Historical Archaeology* 23 (4): 1063–1080.

Van Valkenburgh, P., Z. Chase, A. Traslaviña, and B.J.M. Weaver. 2016. Arqueología Histórica en el Perú: Posibilidades y Perspectivas. *Boletín de Arqueología PUCP* 20: 5–24.

Vega Centeno, M. 2018. Arqueología del campo de batalla del Alto de la Alianza, Tacna 1880. In *Actas del III Congreso Nacional de Arqueología*, vol. 1, 189–197. Lima: Ministerio de Cultura.

Voss, B.L., J.R. Kennedy, J.S. Tan, and L.W. Ng. 2018. The archaeology of home: Qiaoxiang and nonstate actors in the archaeology of the Chinese diaspora. *American Antiquity* 83 (3): 407–426.

Weaver, B.J.M. 2016. Perspectivas para el desarrollo de una arqueología de la diáspora africana en el Perú: Resultados preliminares del Proyecto Arqueológico Haciendas de Nasca. *Allpanchis* 80: 85–120.

Wernke, S.A. 2007. Negotiating community and landscape in the Peruvian Andes: A trans-conquest view. *American Anthropologist* 109 (1): 130–152.

Wernke, S.A. 2013. *Negotiated settlements: Andean communities and landscapes under Inka and Spanish colonialism*. Gainesville: University Press of Florida.

Wernke, S.A. 2016. La producción de poder en el entorno construido a través de la invasión española, valle del Colca (Perú). *Boletín de Arqueología PUCP* 20: 149–166.

Zarankin, A., and M.A. Salerno. 2008. "Looking south": Historical archaeology in South America. *Historical Archaeology* 42 (4): 38–58.

Zuloaga, M. 2012. *La conquista negociada: guarangas, autoridades locales e imperio en Huaylas, Perú (1532–1610)*. Lima: IFEA/IEP.

Further Reading

Funari, P.P.A. 2006. Conquistadors, plantations, and Quilombo: Latin America in historical archaeological context. In *Historical archaeology*, ed. M. Hall and S.W. Silliman, 209–229. Malden: Blackwell.

Orser, C.E. 2017. *Historical archaeology*. 3rd ed. London/New York: Routledge/Taylor & Francis Group.

Ramírez, S.E. 1996. *The world upside down: Cross-cultural contact and conflict in sixteenth-century Peru*. Stanford: Stanford University Press.

Historical Archaeology in the Iberian Peninsula

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Introduction

What is the intention behind talking about Portuguese and Spanish historical archaeology coextensively? Were these countries identical to such an extent that their archaeology should be jointly interpreted? Or are their respective ontological perspectives and disciplinary concerns so distinct that two different papers should be written? When taking into account the developments in historical archaeology over the last 30 years, both countries have faced similar challenges and disciplinary trajectories. Their geographical, political, and cultural proximity created comparable conditions and experiences during the Early Modern period, making a joint approach the most sensible. For example, their politics and economies during this period were intertwined in various ways: several marriages took place between their respective

Historical Archaeology in the Iberian Peninsula, Fig. 1 Map of the Iberian Peninsula with the places mentioned in the text

noble families; proximal ports traded constantly with each other; and even one king ruled both territories for 60 years (1580–1640). In addition, there is considerable evidence of people travelling between the two countries and settling in either during the Early Modern period (Fig. 1). This closeness (which may also be traced back to previous periods) should not be ignored in the context of historical archaeology, as both countries share the same thematic basis in the field (Azkarate and Escribano-Ruiz 2014: 88). If a combined perspective seems superfluous when talking about local contexts, it is integral when a more general or international approach is undertaken.

Defining Historical/Early Modern Archaeology

The general designation of "historical archaeology" in countries such as the United States, Australia, or Brazil, among others, is usually associated with archaeological material and deposits from the late fifteenth century (European arrival in the Americas) to the nineteenth or even the twentieth century, a timeframe generally accepted in publications and congresses of historical archaeology (Deetz 1977: 5; Montón Subias and Abejez 2015: 14; Mehler in press). In Portugal and Spain, the designation of historical archaeology is seldom used, the most widespread terms being *Arqueologia Moderna* or *Arqueologia Pós-Medieval*, since historical archaeology has a broader sense if understood as the archaeology of a time containing written records (Montón Subias and Anejez 2015: 13).

In Spain, historical archaeology begins in 1492, the iconic date marking the end of the Middle Ages in the conquest of the Muslim Emirate of Granada and Columbus' arrival in the Antilles. In Portugal, the defining date marking the division between medieval and Early Modern periods is more complicated, since it is assumed that the discoveries (beginning with the conquest of Ceuta in 1415) represent a major turning point. A recent exhibition about this event clearly presented Portugal as no longer a medieval country (Teixeira et al. 2015a). However, no visible changes are perceptible in the archaeological record prior to the late fifteenth century (Gomes 2012). In this sense, both countries assume

Arqueologia Moderna to have started around the same time.

If we take the late fifteenth/early sixteenth century to be the starting point for the Early Modern period, the end is more easily defined. In Portugal, the iconic date of 1 November 1755, when almost the entire country was affected by a major earthquake, conventionally marks the end of the Early Modern period. Although no one assumes that late eighteenth century is associated with the contemporary period, archaeological studies of the Early Modern period tend to stop around this time (Gomes 2012). In central and southern Portugal, the earthquake debris is frequently found in the archaeological record, and in archaeological practice, it seems that only things from below this layer are considered worth preserving or excavating properly. In Spain, though no specific date is noted by scholars, the end of the Early Modern period is more debatable. In some areas of the country, nineteenth- and twentieth-century contexts are constantly overlooked by archaeological investigation, with the French Revolution (1789) often used as the cutoff point. However, in other areas, contemporary archaeology is almost assumed to be a branch of historical archaeology (Escribano-Ruiz 2017: 517).

Recently, contemporary archaeology, which some scholars consider to be archaeology of the twentieth century, has developed into a research field in Spain through studies of the Civil War. In Portugal also, projects are currently being developed in relation to twentieth-century material culture (González-Ruibal 2010; Casimiro and Sequeira 2019). In Spain, twentieth-century archaeological contexts are excavated and recorded even in commercial archaeology, at least in urban centers (Escribano-Ruiz 2017: 516), while in Portugal, twentieth-century context and artifact recovery is still rare and, when done so, rarely studied. However, if some countries categorize contemporary archaeology as part of a broader historical archaeology – a subject currently being debated in Spain (Mehler in press) – in Portugal the theoretical framework in which nineteenth- and twentieth-century archaeology is developing differs completely from that of the Early Modern period (i.e., sixteenth to eighteenth centuries).

An exception to the general lack of interest in nineteenth-century archaeology in both countries has been industrial archaeology, which has assumed a leading role in archaeological studies of the period. This has led some authors in Portugal as well as Spain to suggest that all archaeology dating to nineteenth-century contexts is intrinsically industrial and that the labels of historical or contemporary archaeology cannot be assigned to these contexts and materials (Cerdà 2008: 72; Custódio 2015: 93).

Aside from this debate, it is generally agreed that historical archaeology in the Iberian Peninsula corresponds to the period from mid to late fifteenth/early sixteenth century till the late nineteenth century. Accordingly, this will be the chronological focus of this paper.

In both countries, historical archaeology findings are protected by archaeological and heritage laws, since protection is generalized to all archaeological finds regardless of their chronology (Portuguese Law 107/2001, 8 September, and Spanish Law 16/1985, 25 July). While in Portugal this law is applied to the entire country, in Spain, due to its administrative division, specific regional laws affect the treatment of archaeological material accordingly.

Underwater archaeology is intentionally omitted from this discussion, even though the global navigation undertaken by Portugal and Spain in the Early Modern period left unquestionable influence on their organization and economy, and resulted in the development of important port cities. However, this is in fact an important aspect of Iberian historical archaeology and where archaeologists from the two countries can work together, especially since Early Modern shipbuilding is assumed to be a shared Iberian tradition (Alves 2001) by underwater archaeologists. The number of joint projects and archaeological evidence in this area is too extensive to be mentioned here, although a few have shared links in both countries, such as the *Forest Resources for Iberian Empires: Ecology and Globalization in the Age of Discovery* project, and several

conferences in which researchers of both countries have presented joint work.

Key Issues, Current Debates, Future Directions, and Examples

A few attempts to draw a general overview of historical archaeology in Portugal and in Spain have been written, and they present important information about the discipline, especially in terms of site and artifact catalogues (Represa 1996; Amores 1997; Gomes 2012; Gomes and Casimiro 2013a; Montón- Subias and Abejez 2015; Escribano-Ruiz 2017). This paper is, nevertheless, the first to attempt a combined debate that will hopefully promote reflection not about the differences in Portuguese and Spanish Early Modern archaeology, which have been often enumerated, but the similarities. A list of every site where Early Modern archaeological finds have been found is not an objective of this paper, since this would entail describing hundreds if not thousands of sites in both countries. This also applies to the study and publication of the archaeological materials. This will only be referred to when contributing to an international overview of historical archaeology in both countries and how it can contribute to Iberian archaeology holistically.

Development in the interest of Early Modern archaeology in Portugal and Spain can be traced back to the 1980s, although it took a few decades for it to be recognized as a discipline (Amores 1997; Gomes 2012). This was generally brought about by the increase in excavation and recording of urban contexts. Cities such as Lisbon, Silves, Coimbra, and Porto (Portugal) and Seville, Madrid, Toledo, and Barcelona (Spain), among many others, were central to this development. From the 1980s onwards, the number of publications has also multiplied. While "Spanish research on the post-medieval period is more widely disseminated on a global scale than one a local one" (Escribano-Ruiz 2017: 517), the same cannot be said about Portuguese research, which is still oriented more towards a national audience. In spite of the frequent participation of Portuguese archaeologists in international conferences, the publication of papers in English-language journals seldom occurs. Indeed, both countries have come short in making their work widely available. Even if published in Portuguese or Spanish, most papers about sixteenth- to eighteenth-century archaeology are difficult to access (even when there are no publisher access limits), and only a small number of researchers make their papers available on online platforms.

At this point, it is necessary to talk about three different realities responsible for the development of historical archaeology in both countries. Firstly, the necessity of recording and keeping all archaeological material (due to the Valletta Convention) made archaeological companies the primary custodians of it, though most archaeologists are not trained as historical archaeology experts. This has resulted in an enormous number of records and archaeological stores filled with unstudied artifacts. Save for a few exceptions, the majority of these sites were never investigated or properly published. Secondly, there has been a turn in research at some universities where PhD students have started to dedicate their theses to material and theoretical debates focusing on Early Modern archaeology. The third reality is related to archaeologists working for municipalities or museums who have conducted excavations of this period. Except for a few isolated cases, universities, municipalities, and archaeological companies rarely work together in research projects. More frequently, archaeology students conduct some of their academic work using material excavated by archaeological companies or museums which is eventually published in journals or conference proceedings.

As for Early Modern research topics, they are quite similar in both Portugal and Spain. There is a strong interest in studying major buildings – primarily convents, fortresses, and castles (some being medieval in origin but still active in the following centuries); military archaeology; or material culture studies (i.e., ceramics; see discussion below) (Figs. 2 and 3). While ceramic studies were initially grounded culture-historical

Historical Archaeology in the Iberian Peninsula, Fig. 2 El Born Market – Barcelona

Historical Archaeology in the Iberian Peninsula, Fig. 3 Eighteenth-century house – Lisbon

approaches in the 1980s, following more recent contact with post-processualist archaeology, scholars have made use of new theoretical methods and subjects such as identity, inequality, and gender, among other themes, evolving from the initial empirical observations (Casimiro et al. 2019a; Escribano-Ruiz 2019). Consequently, Iberian archaeologists are currently more interested in "developing thematic archaeologies which are not fragmented by time restrictions analysing societies in their socio-economic-cultural changes overtime" (Azkarate and Escribano 2014: 220).

Material culture in general and ceramic studies in particular are among the most widespread areas of study in historical archaeology, owing to the abundance of material but also due to the fact that Iberian ceramics were exported in large quantities, not only to the former Iberian colonies from the Atlantic to the Pacific but to trade partners, especially in northern Europe, making them an important vector for understanding globalization (Barrachina and Escribano Ruiz 2012; Casimiro 2018). While international scholars have studied ceramics in former Spanish and Portuguese settlements in the New World for some time (Deagan 1987; Albuquerque 2008), it would take a few decades for Iberian archaeologists to recognize their importance and develop general studies which reflect their worldwide expansion (Gomes and Casimiro 2013b; Buxeda i Garrigós et al. 2015a; Casimiro and Newstead 2019). In this field, archaeometry has played an important role since a large portion of research projects undertook provenance studies to understand what was being made in the Iberian Peninsula and later exported around the world. Five key research projects have dealt with this material. In Spain, the *Tecnolonial*, *ArchSymb*, and *CERANOR* projects sought to understand the technological changes of Spanish and Indigenous ceramics and the transmission of technical knowledge from colonizer to colonized populations, especially for tin-glazed wares (Buxeda i Garrigós et al. 2015b). As for Portugal, the two main projects investigating the international distribution of ceramics have been *Portuguese Faience in the World (16th–18th centuries)* (Gomes and Casimiro 2013a) and *Portuguese Red Wares in the North Atlantic Trade* (Casimiro and Newstead 2019). While the projects developed in Spain had a major focus on production and impact in colonial territories, Portuguese projects focused on production distinction (also involving archaeometric studies) although with a more international perspective, examining distribution both in colonial territories and between trade partners.

In spite of the ceramic distribution research foci in both countries, Spanish ceramics were the first to be recognized internationally through study and publication in countries such as the United States – especially in Florida (Lister and Lister 1974) – the United Kingdom, and Ireland (Gerrard et al. 1995), while study of Portuguese ceramics outside the country has only recently begun to gain ground. In fact, most Portuguese ceramics, especially faience, have been mistaken for Spanish, Italian, or Dutch varieties when encountered archaeologically in other countries. The reason behind this is not only the lack of knowledge about Portuguese ceramics – for papers about ceramics were only published in Portuguese – but the fact that both Portugal and Spain were producing similar wares (Fig. 4) impossible to distinguish without archaeometric analysis. From white, plain, tin-glazed bowls and plates to *botijas* (olive jars) used to transport commodities in ships, both countries used and exported very similar vessels (Fig. 5).

Aside from ceramics, other disciplines have seen increased application in historical archaeology. In the last decade, bioarchaeological studies of cemeteries have traced a portrait of post-medieval populations in several parts of the Iberian Peninsula. The same can be said for zooarchaeological studies, which are attracting academic attention in both countries, though the theoretical framework continues to be a focus on the economic and alimentary importance of animals.

Although both countries were heavily involved in Atlantic and worldwide expansion, seen in the occupation of several territories, the discussion of colonial encounters is still very recent and not very proportional. In Spain, archaeology has engaged with this theme consistently, especially in the Canary Islands, where Spanish colonial

Historical Archaeology in the Iberian Peninsula, Fig. 4 Tin-glazed ware bowls. Spanish on the left and Portuguese on the right

Historical Archaeology in the Iberian Peninsula, Fig. 5 Olive jars. Portuguese product on the left and Spanish on the right (after Silva 2018)

occupation left quite a significant impact (Montón-Subias 2015; Montón-Subias et al. 2016). In Portugal, few publications have dealt with this subject (Coelho 2018; Casimiro et al. 2019b).

However, colonization is one of the main research areas where we see Spanish and Portuguese archaeologists working together. At the Society for Historical Archaeology conference in Leicester in 2013, a session was organized by André Teixeira and Javier Iñañez with the title *Territory, settlement and material culture in the Iberian colonial empires (16th–18th centuries)*. Just a year later, a group of young researchers – Joana Torres, Miguel Busto Zapico, Regis Barbosa, and Sergio Escribano Ruiz – organized

a session in the JIA Conference (Young Researchers in Archaeology) entitled *Towards Archaeology of Colonization: Living in Between Continents in the Early Modern Period*. In 2018, in the Barcelona European Archaeologists Association annual meeting, Javier Iñañez and André Teixeira once again organized a session named *Archaeology of Material Culture and Territory within the Iberian colonial empires (15th–18th centuries*). Despite the great interest and discussion generated in these respective sessions, there have been no published proceedings discussing similarities or differences in Iberian colonialist initiatives from an archaeological perspective. The colonial and postcolonial debates promoted by these conference sessions are still very much focused on material culture and less on the political, cultural, and social implications of colonialism (then and now) or even decolonization, a subject that is seeing debate in Spain (Montón-Subias et al. 2016).

In 2015, Paulo Funari and Maria Ximena Senatore edited a book entitled *Archaeology of Culture Contact and Colonialism in Spanish and Portuguese America*, which shows the disparate treatment of the topic by Spanish and Portuguese scholars. Of the book's 17 chapters (not counting the introduction and conclusion), only 4 are dedicated to Portuguese colonialism, and Portuguese archaeologists only participated with 1 paper, focusing on the trade and exchange of objects, plants, animals, and people (Teixeira et al. 2015b).

Several research projects and workshops are currently being undertaken investigating Early Modern trade and colonialism. In Spring 2020, a 1-day seminar organized by Teresa Canepa and the author will be held in London, entitled *Chinese porcelain in the Iberian Peninsula, 16th–18th centuries: an archaeological perspective on trade and consumption*, which intends to debate the similarities and differences between Spanish and Portuguese consumption of this global product. The European-funded project entitled *The construction of early modern global Cities and oceanic networks in the Atlantic: An approach* via *Ocean's Cultural Heritage (CONCHA)* is currently developing research agendas with multiple partners in Portugal, Spain, Ireland, France, Cape Verde, São Tomé and Principe, Colombia, Brazil, and the United States. One of its objectives is to understand "the rise of global capitalism in its early form ("colonial mercantilism"), by using coastal and underwater archaeological context analyses." Although a few workshops and conference sessions have been held, no publications have appeared yet, although this project will probably set a new benchmark for Iberian and Atlantic collaborations. No information on the project website mentions whether any attention will be given to the Atlantic cities in the Iberia Peninsula or solely in the colonized countries.

In terms of fieldwork, Spanish archaeologists have worked extensively in South America (e.g., Argentina and Chile) and even in the Basque fisheries of Newfoundland, while Portuguese archaeologists have conducted much research in Northern Africa (Ksar es-Seghir, Ceuta, El Jadida – Mazagan), where colonialism did not gain the ethical implications it has in southern African or Brazilian territories. Only recently have Portuguese archaeologists started to work in countries such as Cape Verde, which has not allowed time for publication of results. It must be noted that archaeology in Portugal itself, and in Spain as well, has largely ignored the study of slavery, which has recently started to emerge (Casimiro et al. 2019b). A combined Iberian perspective on Atlantic colonialism would be a fruitful research avenue, especially one that takes into account how similar cultural backgrounds may have influenced the type of occupation undertaken and how both countries reacted to the abolition of slavery and colonialism from an archaeological point of view. It would be interesting to extend this discussion beyond the eighteenth century and apply it to subjects such as the abolition of slavery in the Iberian empires, the loss of the African colonies in the twentieth century, and general processes of decolonization. Archaeology can provide fundamental contributions to these discussions.

As can be seen, although numerous studies have been conducted in Iberia, historical archaeology is still largely confined to site reports and the study/curation of specific collections. Broader

debates about major themes are still largely absent from archaeological publications and conferences in both countries. On the other hand, we should not ignore that both countries have in fact regional differences, and while in Portugal the focal point of research and fieldwork is Lisbon, in Spain, the Basque Country, Andalusia, and Catalonia are the primary research areas for historical archaeology (Bengoetxea Rementeria 2004; Barrachina and Escribano-Ruiz 2012). PhD researchers in both countries tend to pursue more holistic/general approaches and remove the major focus from these areas.

In terms of tertiary education, postmedieval archaeology, excluding industrial archaeology, is only taught in two universities in Portugal, and the number of academic university staff with the pertinent expertise is quite small. Although Sergio Escribano mentions that "it is not uncommon to find degree courses at Spanish universities which include post-medieval archaeology" (Escribano-Ruiz 2017: 516), a recent survey (Mehler in press) refers to only three such permanent positions in Spanish universities (Granada, Seville, and the Basque Country), suggesting that the teaching of courses may be in the hands of nonpermanent staff. In Portugal, the number is higher – six between Lisbon, Coimbra, and Porto. However, in both countries the number, especially in Spain, is low, also taking into account the number of universities that offer degrees in archaeology. Nevertheless, the number of PhD students and postdoctoral researchers working on post-medieval topics is increasing in both countries. While no formal survey has been made, research papers by postmedieval Iberian researchers have increased in the last two decades.

In terms of publication, there is no specific platform for publishing historical archaeology work in either country, and postmedieval papers appear frequently in general archaeology journals. In Portugal there are only about a dozen archaeological journals, and historical archaeology papers are published predominantly in *Almadan* and *O Arqueólogo Português*. In Spain, archaeological publication is much more widespread across some 70 journals (Armada 2017). Historical archaeology papers appear occasionally in journals such as *Complutum*, *Archeogazte*, *Acta Historica et archaeological mediaevalia*, or *Territorio y Arqueología*.

Conclusion

Due to its history, the Iberian Peninsula is very much a multicultural world. The Muslim domination until the late fifteenth century culturally connected a large portion of the population of this vast territory with people from northern Africa. By that time, the Atlantic expansion of both countries forced the entrance of populations from around the globe; although African slaves were the majority, they themselves came from diverse cultural backgrounds. There are numerous texts from the Early Modern period in which foreigners note surprise at the number of black Africans in Lisbon and Seville (Caldeira 2017). This mixed population made Spain and Portugal unique in the wider context of Europe.

Concerning material culture, the similarities between Portugal and Spain continued for an extended period, which may be seen, for example, in the similarity of sixteenth- and seventeenth-century tableware and transport jars. Whether there was a one-way influence or both countries were simply maintaining practices stemming from a common cultural background, which could go back to the Romans or the Islamic presence, is something worth investigating in the future.

Archaeological excavations, especially in urban areas, as well as research projects have greatly increased in the last two decades increasing the general knowledge about historical archaeology in both countries. Though most of these projects are geographically confined and relate to specific landscapes or cities, they have revealed the evolution of cities and buildings throughout the centuries, as well as how people lived in the past and their reactions to the globalization occurring at the time. The significance of these projects lies in their revealing a past that until the 1990s was not even considered as archaeology, and although the general law protects the sites and material coming from them, they remained poorly studied until 10 years ago.

In sum, there has been no lack of research in Portugal or Spain in historical archaeology in recent years, with numerous papers published every year. The problem remains that most of this research continues to be produced for an internal audience and written in the national languages. Although urban areas and city consumption are well represented in research topics, several lacunae remain. For example, rural areas have seen far less work, making non-urban populations in the sixteenth to eighteenth centuries poorly understood. The same can be said about religious communities such as convents and monasteries, in which only a few papers have been published.

Considering the global importance of both countries in the last 500 years in cultural, political, and economic spheres, there is a comparable lack of internationally oriented academic dissemination. Consequently, it is time for researchers in both countries to join forces and develop joint research projects that could contribute to understanding the reasons for mutual similarities in their respective material culture traditions and colonial contacts in the Early Modern period and engage with the international community.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Historical Archaeology

References

Albuquerque, P.T.S. 2008. A Faiança Portuguesa – demarcador cronológico na arqueologia brasileira. In *Actas das 4as Jornadas de Cerâmica Medieval e Pós-Medieval. Métodos e resultados para o seu estudo*: 221–270. Tondela: Câmara Municipal de Tondela.

Alves, F., ed. 2001. *Proceedings. International Symposium on Archaeology of Medieval and Modern Ships of Iberian-Atlantic Tradition. Hull remains, manuscripts and ethnographic sources: a comparative approach*. Lisbon: Centro Nacional de Arqueologia Náutica e Subaquática/Academia de Marinha.

Amores, F. 1997. La arqueología postmedieval en Espana. Panorama y perspectivas. *Archeologia Postmedievale* 1: 51–67.

Armada, X.L. 2017. Las revistas de arqueologia en España. In *El poder del pasado. 150 años de arqueología en España*, ed. C. Andrés, 90–91. Madrid: Ministerio de Educación, Cultura y Deporte de España.

Azkarate, A., and S. Escribano. 2014. De la arqueología histórica a la arqueología del colonialismo, Una reflexión desde la experiencia europea: "Arqueología de los primeros asentamientos urbanos españoles en la América Central y Meridional. *Actas del I seminario internacional RII_UC*: 87–109. Madrid: Universidad Politécnica de Madrid.

Barrachina, C.P., and S. Escribano-Ruiz. 2012. Las *producciones cerámicas vascas* de *época moderna*: Un *caso práctico* de *arqueología histórica*. In J. Cascalheira and C. Gonçalves (eds.) *Actas das IV Jornadas de Jovens em Investigação Arqueológica, JIA 2011* 1: 219–224. Faro: Universidade do Algarve.

Bengoetexea Rementeria, B. 2004. Arqueologia de la Edad Moderna: Valorixación y reflexiones en torno a una disciplina en construcción. *El ejemplo de la C.A.V. Kobie* 6 (2): 667–682.

Buxeda, I., J. Garrigós, M. Madrid, I. Fernandez, and J. Iñañez, eds. 2015a. *Global pottery proceedings – 1st international conference for historical archaeology e Archaeometry for societies in contact*. BAR International Series 2761. Oxford: Hadrian Books.

Buxeda, I., J. Garrigós, M. Madrid, I. Fernandez, J. Iñañez, and F. Marcos Garcia. 2015b. Archaeometry of the technological change in societies in contact. First examples for modern ceramics from the Crowns of Castille and Aragon. In *Global pottery proceedings – 1st international conference for historical archaeology e Archaeometry for societies in contact*. BAR International Series 2761, ed. I. Buxeda, J. Garrigós, I. Madrid, M. Fernandez, and J. Iñañez, 3–26. Oxford: Hadrian Books.

Caldeira, A. 2017. *Escravos em Portugal. Das origens ao século XIX*. Lisbon: Esfera dos Livros.

Casimiro, T.M. 2018. A distribuição e consumo de louça de Lisboa na Europa do Norte (1600–1700). In *Fragmentos de Arqueologia. Meios vias e trajectos*, ed. J.C. Senna-Martínez, A.C. Martins, A. Caessa, A. Marques, and I. Cameira, 160–168. Lisbon: Centro Arqueologia de Lisboa.

Casimiro, T.M., and S. Newstead. 2019. Portuguese coarsewares in North Atlantic trade (16th–18th centuries). *American Ceramic Circle Journal* 20: 59–81.

Casimiro, T.M., and J.L. Sequeira. 2019. Os deuses devem estar loucos. . . ou a emergência de uma Arqueologia Contemporânea em Portugal. *Almadan Online* 22 (3): 88–97.

Casimiro, T.M., J.P. Henriques, V. Filipe, and D. Neves. 2019a. Pottery use and social inequality in mid-18th

century Lisbon. An initial approach. In *Europa post-Medievalis*, ed. K. Matejkova and G. Blazkova, 1–18. Oxford: Archaeopress.

Casimiro, T.M., J.P. Henriques, V. Filipe, and S. Simões. 2019b. Mobility and identities. The case of the so-called African pots. *International Journal of Historical Archaeology*. https://doi.org/10.1007/s10761-019-00504-z.

Cerdà, M. 2008. *Arqueología industrial*. València: Universitat de València.

Coelho, R. 2018. Topographies of freedom. *Anthropology Now* 10 (1): 72–92.

Custódio, J. 2015. O Território e o Tempo da Arqueologia industrial. Intervenção e investigação: realidades de hoje, perspectivas de futuro. *Almadan* 18 (II série): 80–95.

Deagan, K. 1987. *Ceramics, glassware, and beads (artifacts of the Spanish colonies of Florida and the Caribbean, 1500–1800 – volume 1)*. Washington, DC: Smithsonian Institution Press.

Deetz, J. 1977. *In small things forgotten: The archaeology of early American life*. New York: Anchor Books.

Escribano-Ruiz, S. 2014. Cultura material y fuentes escritas en los estúdios arqueológicos de las pesquerías vascas de Canadá (siglos XVI al XVIII), una valoración crítica sobre su interacción. *Munibe Antropologia-Arkeologia* 65: 239–247.

Escribano-Ruiz, S. 2017. Recent past archaeology in Spain. *Post-Medieval Archaeology* 51 (3): 516–517.

Escribano-Ruiz, S. 2019. *Olor* a *sangre*. La *pesca vasca* del *Atlántico Norte* en *época moderna interpelada* desde una *posición colonial* y *sensorial*. *Arqueología Iberoamericana* 41: 52–61.

Funari, P., and M. Ximena Senatore, eds. 2015. *Archaeology of culture contact and colonialism in Spanish and Portuguese America*. New York: Springer.

Gerrard, C., A. Gutiérrez, and A. Vince, eds. 1995. *Spanish medieval ceramics in Spain and the British Isles*. BAR International Series 610. Oxford: Hadrian Books.

Gomes, R.V. 2012. A Arqueologia da Idade Moderna em Portugal – contributos e problemáticas. *O Arqueólogo Português Série* V (2): 13–75.

Gomes, M.V., and T.M. Casimiro, eds. 2013a. *On the world's routes. Portuguese faience (16th–18th centuries)*. Lisbon: Instituto de Arqueologia e Paleociências.

Gomes, R.V., and T.M. Casimiro. 2013b. Post-medieval archaeology in Portugal. *Post Medieval Archaeology* 47 (1): 17–34.

González-Ruibal, A. 2010. Contra la pospolítica: arqueología de la Guerra Civil Española. *Revista Chilena de Antropología* 22 (2): 9–32.

Leister, F., and R. Leister. 1974. Maiolica in colonial Spanish America. *Journal of Historical Archaeology* 8 (1): 17–52.

Mehler, N. in press. Historical archaeology in Europe. In *Handbook on historical archaeology*, ed. A. Zarankin, J. Symonds, and C. Orser. London: Routledge.

Montón-Subias, S. 2015. *Colonialismo*, *Monarquía Hispánica* y *cultura material*. *Algunas contribuciones* desde la *Arqueología*. *Índice Histórico Español* 128: 137–174.

Montón-Subias, S., and L. Abejez. 2015. Qué es esa cosa llamada Arqueología Histórica? *Complutum* 25 (1): 11–35.

Montón-Subias, S., M. Cruz Berrocal, and A. Ruiz Martínez. 2016. *Archaeologies of early modern Spanish colonialisms*. New York: Springer.

Represa, F. 1996. Post-medieval archaeology in Spain: An overview. *World Archaeology Bulletin* 7: 137–148.

Teixeira, A., F. Paredes, and R. Silva, eds. 2015a. *Lisboa 1415 Ceuta. História de Duas Cidades*. Lisbon: Câmara Municipal de Lisboa/Ciudad Autonoma de Ceuta.

Teixeira, A., J. Torres, and J. Bettencourt. 2015b. The Atlantic expansion and the Portuguese material culture in the early modern age: An archaeological approach. In *Archaeology of culture contact and colonialism in Spanish and Portuguese America*, ed. P. Funari and M. Senatore, 19–38. Berlin: Springer.

Historical Archaeology, Nationalism and National Identity in

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Introduction

The archaeology of nationalism, particularly the study of how archaeological evidence has been manipulated in the service of nationalist ideologies and how archaeological studies have been influenced by nationalist discourses, has been a vibrant field in recent decades. Most studies of the subject focus on prehistoric, classical, or early medieval subjects (see the separate entry on "Nationalism and Archaeology: Overview" for details and citations). But if modern nationalism is, as per Hobsbawm (1991), Gellner (1983), Anderson (1991), and others, largely a product of the post-medieval period, then historical archaeology – the archaeological study of the post-1500 period – potentially has a unique contribution to make as the study of the archaeological signature and impact of nationalism and national identity in the same period that the modern concepts developed.

Definition

For the purposes of the present discussion, "historical archaeology" is defined in the New World sense of postmedieval archaeology from c.1500 AD to the present. "National identity" is then defined as the development of a sense of shared identity and collective belonging within a particular geographical region (which need not be an independent state). Within this context, "national identity" and "ethnicity" are considered closely related but also distinct (see also Hobsbawm 1991:63–71). National identities rest on a complex interaction of factors such as (but not limited to) culture, language, history, religion, tradition, and internal and external perceptions of a group; they can include ethnicity and race, but are not dependent on the latter. These factors defy simple definition. Switzerland demonstrates that a nation with a strong sense of identity can be built out of multiple ethnic and cultural groups with distinct languages. The United States demonstrates that a common culture can be built out of immigrants and descendant groups that maintain some sense of, and often take quite explicit pride in, their ethnic identity of origin. Croatia, Serbia, and Bosnia meanwhile demonstrate that mutually intelligible languages and a recent shared national state need not necessarily generate a shared sense of identity where other factors, such as religion and historical political borders, differ; this despite deliberate attempts to build a common Yugoslav identity under both the monarchy and its communist successor state (on the latter, see Sekulic et al. 1994).

"Nationalism," in contrast, is the political use of national identity. In Gellner's formulation, it assumes that "the political and national unit should be congruent" (Gellner 1983:1), though defining the boundaries of both the political and the national unit is perhaps easier said than done. Indeed, many of the factors that contribute toward both national identity and the definition of a national unit are inherently subjective, whether these are ethnicity, race, language, or a sense of shared history. However, to recognize that something is subjective is not to argue that it lacks emotional resonance or should be dismissed on the basis of its artificiality. This is indeed a core theme in the historical archaeology of nationalism: "recognising and examining the artificial and subjective origins of a particular form of nationalism and national identity often goes hand in hand with studying and understanding why the latter continue to hold so much power in the modern world" (Brooks and Mehler 2017: 9).

Historical Background

The broader archaeology of nationalism and national identity has generated a significant body of work (see the relevant separate entry), but the historical archaeology of the topic has a period-specific role to play. Two key historical forces combined to the development of modern nationalism in the postmedieval world (Brooks and Mehler 2017: 9–11). The first of these was the formulation of the legal framework of European state sovereignty via the 1648 Peace of Westphalia. The second, and much more difficult to define, is the formulation of a concept of national identity based on ethnic identity in the wake of the French Revolution; "a self-conscious national identity formulated via some combination of ethnicity, language, culture, and/or religious identity only develops . . . as different political and social groups attempted, under the influence of the Enlightenment, to define the citizenry of the Westphalian state by their shared characteristics, whether real or imagined" (Brooks and Mehler 2017: 10). It is precisely because the modern nation state derives from the – not necessarily inevitable – interface between Westphalian sovereignty and post-Enlightenment nationalism, and modern concepts of national identity stem largely from the latter that historical archaeology has a unique role to play of the processes that built modern nationalism and national identity. Explicit recognition of this contribution has been outlined in an edited volume on the subject (Brooks and Mehler 2017), but this builds on an existing – and still growing – rich literature on postmedieval nationalism and national identity. This literature cannot be covered in detail in the present discussion, so case studies

and examples should be considered representative rather than comprehensive.

Key Issues/Current Debates

There are two themes in the historical archaeology of nationalism and national identity that can be used as focus points to outline the current state of research. The first of these – and a theme that will be wholly familiar to those studying the interface of nationalism and archaeology from earlier periods – is the use (or misuse) of archaeological evidence to support specific nationalist viewpoints past and present. Taking just one example, Belasus's study of the history of the archaeology of Hanseatic League ships shows the long influence of nineteenth-century nationalist discourses on the interpretation of these vessels. Under the 1871–1918 German Empire, the Hanseatic *Kogge* (cog) was held to be an emblematic symbol of the positive values of "courage, intrepidity, tenacity, and modesty" that were associated with the League and its perceived role as both a "glorious" maritime representative of the German people and a precursor of the nineteenth-century unified German state. It was particularly appropriated as a symbol of the need for, and importance of, German naval expansion in the years leading up to the First World War. Following the Second World War, archaeological research focused more on typological debates, with broad agreement eventually reached that the term "cog" is problematic and that alternative terminology should be based on more technical discussions, though these debates themselves stem from whether to embrace or reject a nineteenth-century terminology that both influenced and was influenced by nationalist discourses. Nonetheless, a term that grew out of the "pro-naval nationalistic zeitgeist of the pre-First World War period" is still in informal use, and the general public are still prone to seeing the "cog" as a positive symbol of a Hanseatic League that remains closely affiliated with German history. Thus an archaeological terminology born in, and designed to support, a very specific nineteenth-century nationalist context continues to influence modern archaeology debate and remains in use with a general public largely unaware of the original context (Belasus 2017).

The second primary theme is the study of the archaeological evidence of the development of modern nationalism and national identity. Here the key focus is on how this development impacted material culture at the time of its creation and use. Nationalist discourses of the post-medieval period often had a direct impact on material culture, and that material culture in turn influenced its users and consumers; but that influence could often change depending on the social or geographical context. Ceramics have been a particular (though by no means the only) focus of this type of study.

In the nineteenth century, many potters in Staffordshire produced transfer-printed designs that drew on concepts of British, Scottish, Welsh, and other identities that had only been formalized under, or were wholesale inventions of, Romantic period nationalism (Brooks 1997, 1999). For example, the close association between the eighteenth-century modern adaptation of the traditional Highland kilt and tartans assigned to specific "clans" (regardless of whether those families were Highland or Lowland) was largely a result of George IV's visit to Edinburgh in 1822 and Sir Walter Scott's decision to celebrate the monarch's visit (the first visit of a recognized reigning monarch to Scotland since 1633) with an elaborate "gathering of the Gael." The sight of the obese monarch in "traditional" dress was the cause of both ribaldry and satire (not least because of his pink tights), but the cultural consequences of the visit were long-lasting. The subsequent production of Scottish-themed transfer-printed ceramics in Staffordshire, England, for export to North America may seem layered in irony, but these objects played an important role in popularizing these newly created (or at least significantly transformed) material symbols of Scottish national identity to an international audience and in placing the previously marginalized Highlanders – hitherto treated with contempt by the majority of Lowland Scots – as the unexpected cultural guardians of "real" Scotland; a process itself both ironic

and paradoxical given the active repression of Highland culture and social structures following the failure of the of 1745 Jacobite Rebellion and the Highland Clearances that were taking place at the very moment George IV was wearing his pink pantaloons in Edinburgh.

Historical archaeologists have also played close attention to how nationalist interpretations of nineteenth-century British ceramics can be adapted or transformed in other social and geographical contexts. In some cases this transformation is relatively minor. In Australia, transfer-printed ceramics were a core part of a broader assemblage excavated at a late nineteenth and early twentieth-century homestead in Queensland, and used to examine how the site occupants negotiated their "Britishness" alongside the emerging Australian colonial identity, and could "accommodate both the competing and complementary ethnicities of simultaneously being British and colonial" (Terry and Prangnell 2009: 108). The latter example uses British ceramics and other material cultures to examine British identity in a British colonial setting; in other settings, the interpretive context can shift dramatically. The use of British transfer-printed ceramics to decorate nineteenth-century church towers in Uruguay, for example, has been studied from the perspective of the formation of a new Uruguayan national identity, with the British ceramics symbolizing ideologies of modernity and liberty that were being actively embraced by a small state sandwiched between its more powerful neighbors in Brazil and Argentina (Schávelzon and Girelli 2015). Here the specific patterns on the ceramics mattered less than what the objects represented; blue transfer prints, for example, were of particular significance in Uruguay and Argentina because of the strong symbolic connection between blue and liberty in the ideological fabric of the emerging states.

International Perspectives

There are significant differences in how the historical archaeology of nationalism and national identity are approached in Europe and the New World, particularly North America, and these reflect very real differences in the relevant geopolitical contexts. The historical archaeology of national identity in Europe has tended to focus on the concept of the ethnic nation as influenced by the combination of Romantic Enlightenment national identity and Westphalian sovereignty. Note that the ethnic nation is not necessarily congruent with the nation *state*, though where a self-identifying nation is not a state, there will often be a strong nationalist movement (as evidenced by – among others – Scotland and Catalonia). In contrast, a long history of political independence and of strong regional traditions can lead to a strong sense of regional identity, without necessarily being conceived of as a national identity or as the driver of a nationalist movement seeking independence as a nation state (see, e.g., Bavaria). Despite these necessary qualifiers, when a post-medievalist in Europe is looking at British (e.g., Brooks 1999), German (e.g., Belasus 2017), or Slovene (e.g., Predovnik 2017) identities, this is usually done within the context of a nation's geographic homeland – stressing that geographical boundaries are often both subjective and contested.

European historical archaeologists also often have to address a sense of cross-period continuity. Where in North America the arrival of Europeans and a written historical record (notwithstanding Mesoamerican writing systems) typically marks a major breach with the past, in Europe separation of the postmedieval from the medieval is often not just undesirable but actively impossible. For example, Belasus's work on Hanseatic League ships, as described above, necessarily addresses both late medieval and early postmedieval evidence. The League reached the peak of its power and prestige in the late fourteenth and early fifteenth centuries, before entering a long decline that continued well into the postmedieval period (Belasus 2017). While consideration of this continuity is not necessary for the archaeological study of postmedieval nationalism, it is often important.

In contrast, what are national identities in Europe are often transformed into narrowly ethnic identities in North America. Ideologically, European national identities in the United States (and much of Canada) were discarded within – or at least subordinated to – their new geographical context. Strong ethnic communities often existed within specific cities and regions, but not as part of an incipient nation state. Only in Quebec has a distinct ethno-cultural identity led to a prominent European-style nationalist movement arguing for a sovereign state on the basis of that identity. The transformation, romanticization, and appropriation of European identities in a New World context have often been the subject of archaeological research, but whether Irish-Americans (Brighton 2009), Dutch-Americans (Janowitz 1993), or African-Americans (Ferguson 2004), these studies typically examine the extent to which distinct identities remain visible in the material culture or are transformed (willingly or unwillingly; consciously or subconsciously) into hyphenated identities in their new environment. Archaeological study of European-style ethnogenesis in North American contexts, such as Fowler and Noel's work on how the development of an archaeology of Acadians mirrored the formation of a self-conscious Acadian identity (2017), remains unusual.

It remains entirely possible to study the formation of new national identities in New World settings, including for multiethnic nation states, whether via the Australian and South American studies mentioned earlier in this entry or Horning's work examining the role of the archaeological site of Jamestown in ideological discussions of national identity in the United States (Horning 2006); but, as demonstrated by the Acadian example, these rarely coincide with the formation of, or a call for, an ethnically based nation state. The latter observation may not prove to be a constant. As this entry was being written, the President of the United States held a campaign rally where his supporters openly called for the deportation of an elected Congresswoman ("send her back!") who happens to be a Muslim Somali who arrived in the United States as a child refugee. While this is not the first time in the history of the United States that race, ethnicity, and religion have informed American political debates on who can be considered a "true" citizen of the country, it helps to demonstrate the extent to which these discourses can prove to be fluid over time, even in a New World setting.

Future Directions

Given the key differences in how nationalism and national identity are approached between Europe and the New World, there is considerable scope for a growth in a comparative transcontinental historical archaeology of national identity, bringing together archaeological evidence from both Old and New World contexts. Important work has already been done in this regard, for example, via Brighton's *Historical Archaeology of the Irish Diaspora: A Transnational Approach*. Here archaeological data from four sites, two each in Ireland and the northeastern United States, were used to both "locate the reproduction of a traditional sense of being Irish" and "track the slow processes of the material manifestations of being indoctrinated into new American social values and behaviors" (Brighton 2009: 10). This transnational approach helped Brighton outline how specific groups within immigrant Irish communities maintained connections with their homeland while they were initially alienated from, but then slowly incorporated into, their new American sociocultural context. There is significant scope for expanding this type of analysis across different sociocultural, ethnic, and national identities across the post-1500 period. This need not be limited to immigrant groups in North America, or originating from Europe. Important communities of (inter alia) Italians in Argentina, Germans in Chile and Paraguay, and Japanese in Peru potentially invite this type of comparative

analysis. In Australia, important archaeological work has been done on the emergence of British and Australian identities (as per Terry and Prangnell's example discussed earlier), but – if the tyranny of distance can be overcome – opportunities certainly exist for expanding the comparative element by greater use of archaeological data from Great Britain. Expansion of a critical analysis of the extent to which immigrant groups adopt – whether consciously or unconsciously – material culture symbolic of specific national identities but representing traditions invented more or less wholesale in the Romantic period would also be welcome.

There is, however, an imbalance in the existing historical archaeology literature on the subject. Historical archaeology is the strongest and most developed in the North Atlantic (notwithstanding robust and internationally significant bodies of work elsewhere, particularly South America and Australasia). This is reflected in the available literature on the subject, where North Atlantic topics, particularly those relating to identity within the islands of Ireland and Great Britain on the one hand and conceptions of ethno-national identity in North America on the other, have been dominant within the literature. To a large extent this simply reflects that historical/postmedieval archaeology is still a developing discipline in much of Europe, as discussed in detail in Mehler's survey of historical archaeology in Central Europe (2013). Outside of Great Britain and Ireland (and often even within Great Britain and Ireland), comparative data that would inform this type of study can be hard to come by. The expansion of a global historical archaeology of nationalism and national identity therefore also requires a more robust Old World historical archaeology that, even if its primary goal need not be a focus on nationalist discourses, can provide data to inform this type of study.

The historical archaeology of nationalism and national identity almost always begins from the premise that a specific identity has formed and that its distinctive characteristics (or, in some cases, the lack or loss thereof) can and will be studied via the material culture record. Studies of why certain national identities failed to form, or critical analyses of how ideological agendas have hampered the development of historical archaeology in specific contexts, are much less common. One example is provided by Dikkaya's study of how Ataturk's new secular and (in conception) monoethnic republican government deliberately rejected the overtly Islamic yet multicultural Ottoman Empire as a national model has hampered the development of an Ottoman historical archaeology within Turkey (Dikkaya 2017). Approaching the issue from a somewhat different angle, Schávelzon and Igareta's study of the history of archaeology on Easter Island outlines how "an archaeological focus on Easter Island's mythic pre-contact past, at the expense of historical archaeology, has distorted both our understanding of Easter Island's history and the process of identity construction" (Schávelzon and Igareta 2017: 329). If in the Turkish case, the lack of historical archaeology is down to a deliberate state ideology of identity formation, in the Easter Island case the lack of historical archaeology has actively hampered identity formation. These two studies offer a welcome addition to the literature, but given the social and ideological complexities of identity formation in the postmedieval period, they perhaps offer building blocks through which this type of study can be expanded.

Finally, as a closing note, this entry has been highly Eurocentric, with nationalism and national identity largely studied through the lens of European identities and/or European colonialism and post-colonialism. Asia and Africa have barely featured. This merely reflects the current state of the historical archaeology literature. Clearly these issues can be studied in Asian and African contexts. Anderson's classic *Imagined Communities* (1991) is not an archaeological study but looks closely at Southeast Asia within its broader discussion. In a more overtly archaeological setting, Exell and Rico (2013) have examined how the construction of contemporary Qatari identity has

influenced approaches to, and interpretation of, heritage and archaeology in the Gulf state. While not a *historical* archaeology study, the latter helps outline the considerable potential of the topic. There is clearly room to grow a historical archaeology of nationalism and national identity in both Africa and Asia, taking into account both the impact of colonialism and the continuity and strength of local cultural traditions.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Historical Archaeology
- ▶ Nationalism and Archaeology: Overview
- ▶ North America (USA): Historical Archaeology
- ▶ Post-medieval Archaeology
- ▶ Post-medieval Archaeology (Europe)
- ▶ Race in Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Spain: Nationalism and Archaeology

References

Anderson, B. 1991. *Imagined communities*. London: Verso.

Belasus, M. 2017. Historical ship archaeology in the shadow of historism and nationalism: A German perspective. In *The country where my heart is; historical archaeologies of nationalism and national identity*, ed. A. Brooks and N. Mehler, 222–241. Gainesville: University Press of Florida.

Brighton, S.A. 2009. *Historical archaeology of the Irish Diaspora: A transnational approach*. Knoxville: University of Tennessee Press.

Brooks, A. 1997. Beyond the fringe: Transfer-printed ceramics and the internationalization of Celtic myth. *International Journal of Historical Archaeology* 1 (1): 39–55.

Brooks, A. 1999. Building Jerusalem: Transfer-printed finewares and the creation of British identity. In *The familiar past? Archaeologies of later historical Britain*, ed. S. Tarlow and S. West, 51–65. London: Routledge.

Brooks, A., and N. Mehler, eds. 2017. *The country where my heart is; historical archaeologies of nationalism and national identity*. Gainesville: University Press of Florida.

Dikkaya, F. 2017. Archaeology without an Ottoman past: National archaeology and historical paradigms in Turkey. In *The country where my heart is; historical archaeologies of nationalism and national identity*, ed. A. Brooks and N. Mehler, 295–311. Gainesville: University Press of Florida.

Exell, K., and T. Rico. 2013. 'There is no heritage in Qatar': Orientalism, colonialism and other problematic histories. *World Archaeology* 45 (4): 670–685.

Ferguson, L. 2004. *Uncommon ground: Archaeology and early African America, 1650–1800*. Washington, DC: Smithsonian Books.

Fowler, J., and S. Noël. 2017. "Poetry is always truer than history": The curious parentage of Acadian archaeology. In *The country where my heart is; historical archaeologies of nationalism and national identity*, ed. A. Brooks and N. Mehler, 37–68. Gainesville: University Press of Florida.

Gellner, E. 1983. *Nations and nationalism*. Oxford: Blackwell.

Hobsbawm, E. 1991. *Nations and nationalism since 1780*. Cambridge: Canto.

Horning, A. 2006. Archaeology and the construction of America's Jamestown. *Post-Medieval Archaeology* 40 (1): 1–27.

Janowitz, M.F. 1993. Indian corn and Dutch pots: Seventeenth century foodways in New Amsterdam/New York. *Historical Archaeology* 27 (2): 6–24.

Mehler, N. 2013. Breaking new ground: Historical archaeology in Central Europe. In *Historical archaeology in Central Europe*, ed. N. Mehler, 11–31. Rockville: Society for Historical Archaeology.

Predovnik, K. 2017. Defense against "the Turks": Identity construction between lived experience and political discourse in the early-modern Habsburg lands. In *The country where my heart is; historical archaeologies of nationalism and national identity*, ed. A. Brooks and N. Mehler, 69–94. Gainesville: University Press of Florida.

Schávelzon, D., and F. Girelli. 2015. 'China-ware in the skies': Overlapping identities in the ornamental use of plates in Uruguay. *Post-Medieval Archaeology* 49 (1): 57–71.

Schávelzon, D., and A. Igareta. 2017. Historical archaeology and Easter Island: Cultural destruction and the aborted formation of national identity. In *The country where my heart is; historical archaeologies of nationalism and national identity*, ed. A. Brooks and N. Mehler, 312–332. Gainesville: University Press of Florida.

Sekulic, D., G. Massey, and R. Hodson. 1994. Who were the Yugoslavs? Failed sources of a common identity in the former Yugoslavia. *American Sociological Review* 59 (1): 83–97.

Terry, L., and J. Prangnell. 2009. Caboonbah homestead 'Big Rock' or 'Little Britain': A study of Britishness in late 19th and early 20th century rural Queensland. *Australasian Historical Archaeology* 27: 99–110.

Historical Archaeology: Indigenous Perspectives and Approaches

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Introduction

In discussing the perspectives of Indigenous populations on historical archaeology, it first becomes necessary to discuss the varied perspectives on the general discipline of history. As James Wilson in his popular history of Native America writes "It is often very difficult to interpret the surviving oral tradition: the written English version of a story not only translates it into another language but also transposes it from the cultural context in which it was originally told"(1998: xxviii). Such interpretation may be necessary in order to "document" the events described by the speaker (such as the oral traditions by the Indian victors at the Battle of the Little Big Horn). It is important to also consider the fact that, even with these limitations, Wilson continues, "Indians are the central characters, rather than simply bit players; in which the importance of their history lies in its significance to *them* rather than for us; and in which the very concepts of history itself is [sic] radically at odds with Western assumptions and beliefs." Other groups, such as the Northern Cheyenne, are concerned that the tribe's "real history" is being lost. As McDonald et al. (1989: 266) note, "Many tribes, however, are now acknowledging the concept that 'history belongs to those who tell it,' and are striving to take action to eliminate inconsistencies between white and Indian accounts."

Definition

Historical archaeology, or, more precisely, archaeology of the historical period, is a branch of the discipline of archaeology that is devoted to using archaeological methodology to illustrate archaeological sites and events that have occurred within the period of time within a region that falls after contact between populations and those groups who have initiated and maintain a written historic record. In this manner, historical archaeology draws together written historic records, oral histories, and lesser known sources in conjunction with archaeological research to create fuller pictures of events that have transpired.

Key Issues

An issue in the relationship between historical archaeology and Native Americans is, as Rubertone notes, "hampered by the undefined role of archaeological findings in what has traditionally been the domain of the ethnohistorian" (2000: 426). Early historical archaeological work began by focusing on sites of historical situations and then working from those sites and chronologies backward in time, the "direct-historical approach" working extremely well in the Great Plains and American Southwest areas. This served "more as a means of gaining a backward glance at earlier cultural periods and less as a critical source of evidence for illuminating the realities of Native peoples' lives and struggles in colonial America" (Rubertone 2000: 427).

In general, the historical archaeology of Native Americans can be divided into four main categories: the archaeology of early contact, the archaeology of military events, the archaeology of frontier contact, and the archaeology of assimilation. Dixon's broader study of the American West (2014: 188) utilizes four themes – colonialism and post-colonialism, landscape transformation, migration and diaspora, and industrial capitalism – with the examination of the colonialism and post-colonialism topic (182–188) most relevant to this study.

Archaeologists looking at the archaeology of early contact in the United States have sought to gain insights into the actions and reactions of groups of people who are thrust into uneasy

contact. In the southeastern United States, early archaeological sites that document events between the Spanish and Native North America peoples can be used, argues Galloway, "as explanations for the origins of changes *following* contact" (1997: 292). Similar approaches might be suggested for the Native American-Russian contacts of California, the Spanish-Southwestern Native American contacts, and the contacts between the French and Native American groups, although each European group interacted differently with the native peoples with whom they came into contact.

The historical archaeology of military events has also been a point of contention among Native Americans and historical archaeology, often because the recorded history of the military event is often told by the victorious (or valorous) military historians. In 1988, Dull Knife Memorial College initiated an archaeological survey to determine the most likely escape route taken by Dull Knife's band of Northern Cheyenne during the "Cheyenne Outbreak" from Fort Robinson, Nebraska, on January 9, 1879. A literature search and results of field investigations suggested that the escape route suggested by the US Army and local historians was in error, and, instead, the most probable route was that described in the oral history of the tribe. "No single piece of evidence was sufficient to reach this conclusion, but the weight of the available evidence leans significantly towards this conclusion" (McDonald et al. 1989: 268). More frequently, however, the Native American version is given subservient positioning in relation to written documents. At the Sand Creek Massacre Site in Colorado, the National Park Service's determination of the most likely site of the massacre (based on archaeological materials) was at odds with the determination made by Cheyenne tribal members based on oral histories. In spite of the conflict with the scientific evidence, the Cheyenne consecrated the site of the massacre at the point established by *their* histories, thereby fixing the significance *of that particular location* (rather than the location determined by the archaeologists) as the location where "the village stood and the massacre began" (Greene and Scott 2004: 115). In this manner, the Cheyenne are content to consecrate their own location supported by their histories and yet allow the archaeological location to coexist with their own.

In looking at the archaeology of frontier contacts, it is important to realize that "Native Americans were never passive participants in the process; rather they were *active agents* … [in] everything that came their way" (Ware 2010: vii, emphasis added). In an analysis of the Townsend site in eastern Tennessee, Marcoux examined Indian occupations at the community level during a time when not only large events created enormous (and long-lasting impacts) but also the time when impacts hundreds of miles away rippled through the Indian habitations of the eastern part of the United States. Such impacts – the ripples across the shatter zone – influenced the lives of towns and community sites. Marcoux (2010) attempted to use the archaeological process and archaeological analyses to answer questions related to the period of initial English contact with the Indigenous populations along the east coast. For example, by examining the variety of pottery styles represented at the Townsend site, he hypothesized that the community was formed by people from different settlements in direct response to the violence and population loss associated with the time of English contact. This tumultuous period of contact, with its disease, warfare, the deer skin trade, and expansion of economic impact, had far-reaching and long-lasting effects on the groups of the area, and the archaeological information can provide insights into ways the local populations not only survived the clash of worlds but also reestablished themselves at the time.

The historic archaeology of assimilation can be viewed as the archaeology of historic sites created by Native Americans but which are nearly indistinguishable from those of surrounding non-Native inhabitants. Robert Brooks (1996: 265) notes: "(A)rchaeologists have been remiss in not examining the profound changes the tribes experienced, and there has been limited study of post-removal southeastern natives." It is not that such studies do not exist. Judy Bense recognizes some of this disconnect and presents some examples of

archaeological research on historic Indian towns and structures (Bense 1994: 297–9, 306–7, 308–9, 317–22). The tribal groups immediately accepted the durable and ornamental European trade goods both as evidence of social status and also as technological items; the tribal groups also shifted in their habitation and subsistence patterns from large towns to smaller farmsteads. Some tribal groups, however (most notably the Seminole and Creek Indians), apparently rejected European items, perhaps as an outright rejection of European influence and a reaffirmation of pre-European native ways. Ultimately, she notes that "Southeastern Indian groups tried both to assimilate into and reject European-American culture, and these strategies are well reflected in their archaeological remains" (1994: 322). Hartley and Watkins' excavations at the Whirlwind Mission site in western Oklahoma (1993: 43–56) noted the appearance of artifacts considered to be "traditional" to the American Indian culture within a so-called Western cultural context. The authors note: "Although the artifact assemblage is overwhelmingly of European-American manufacture, the early twentieth century survival of aboriginal technological traditions is indicated by a few chert flakes and one deliberately worked glass jar base dating to the second decade of the 1900s" (Hartley and Watkins 1993: 50). More recently, Watkins (2017) discusses various aspects of material cultural assemblages from homesteads inhabited by Indigenous and non-Indigenous populations in relation with the frontier and stages of assimilation to draw attention to the fact that the search for "ethnic markers" in artifacts of the historic past may not be profitable for archaeologists interested in the place of indigenous populations in the historical period.

International Perspectives

Indigenous groups in other parts of the world are also becoming involved in research concerning interactions between Indigenous and non-Indigenous people at contact and after through the archaeology of the historical period. However, in some areas, even defining the sites under consideration can be challenging. For example, the Department of Planning and Community Development of Victoria, Australia, limits historical archaeology to "the study of the past through non-Indigenous archaeological sites, artefacts (sic) and landscapes with the assistance of historical documentation" (2012 Victoria Department of Planning and Community Development). Still, other areas of Australia integrate the Indigenous population into the study of archaeology of the contact and early historic periods.

Greer et al. (2002) examine the range of archaeological research involving Indigenous populations in the York Peninsula, New South Wales, and North Western Australia involving communities relating to World War II events, the pastoral industry, and the convict periods of Australia's history. The authors conclude that stronger and more direct involvement of the Indigenous community in the research process creates a tendency to focus on the more recent, remembered history rather than the archaeology of a deep Paleolithic one, finally noting "the separation between indigenous and non-indigenous, so-called 'historic' archaeology, is nebulous" (2002: 283), a point that Kent Lightfoot, among others, has made with reference to North American archaeology. Wendy Beck and Margaret Somerville (2005) also look at the relationships between archaeology of the historic period and oral history as recognized as a result of work carried out from 1996 to 2002 by the University of New England (UNE) and the Yarrawarra Aboriginal Corporation. This work was oriented at utilizing conventional academic research as a means to record "place knowledge" so as "to establish credibility with government agencies" (2005: 469). In their work, they integrate oral history and archaeology without dominance of one discipline over the other, working toward the idea that the importance is not "whether the archaeology is richer or poorer in detail than the oral history, it is about presenting the diversity of place-stories" (2005: 480). Tim Murray, in reviewing the relationship between archaeologists and Indigenous people (2011: 368–370), examines the historical archaeologies of indigenous peoples, primarily post-contact with outside

cultures, offering a very broad and coherent discussion of these burgeoning relationships.

Susan Lawrence and Nick Shepherd (2006: 80–84) provide a glimpse into the relationships between Indigenous people of South Africa and the archaeology of the historic period as they discuss the situation that arose during the excavation of a historic cemetery on Prestwich Street, Cape Town. In their chapter, they note the need for "archaeology to come to terms with what might be characterised (sic) as the necessary entanglements of race, culture, and identity in the post-colony" (2006: 84). In Japan, Hirofumi Kato (2017) has undertaken research to help better place the historical Ainu populations firmly within the otherwise "homogenous" Japanese historical period archaeology.

Future Directions

The historical archaeology of Native American sites can move beyond the mere presentation of vanquished populations at the hands of a technologically advanced conqueror. The idea of cultural change and adaptation, rather than one of pure assimilation, can provide insights into the ways that Native American cultures adapted to external forces in the midst of cultural pressures brought about by land loss, changing land patterns, and pressures to give up traditional ways of life and to convert to European-American ideas or lifestyles – essentially, in a broader sense, the colonialism/post-colonialism divide as discussed by Dixon. The archaeology of Native American sites, Rubertone warns, should not be interpreted as indicative of culture loss and assimilation, but can also be interpreted "in ways that capture a diversity of experience and that challenge accounts in which the variations are finite and predictable" (2000: 439).

Cross-References

- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Cultural Heritage Management and Native Americans
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Peoples, Working with and for
- ▶ Missionization and Mission Archaeology in New Zealand and Australia
- ▶ Oral Sources and Oral History
- ▶ Watkins, Joe (Indigenous Archaeology)

References

Beck, W., and M. Somerville. 2005. Conversations between disciplines: Historical archaeology and oral history at Yarrawarra. *World Archaeology* 37: 468–483.

Bense, J. 1994. *Archaeology of the southeastern United States: Paleoindian to World War I*. San Diego: Academic.

Brooks, R.L. 1996. Reexamination of WPA excavations at Novotny site: Adaptations by early removal Chickasaws. *Chronicles of Oklahoma* 74: 264–283.

Dixon, K.J. 2014. Historical archaeologies of the American West. *Journal of Archaeological Research* 22: 177–228.

Galloway, P.C. 1997. Conjecture and longue durée: History, anthropology, and the Hernando de Soto expedition. In *The Hernando de Soto expedition: History, historiography, and "discovery" in the southeast*, ed. P.C. Galloway, 283–294. Lincoln: University of Nebraska Press.

Greene, J.A., and D.D. Scott. 2004. *Finding Sand Creek: History, archaeology, and the 1864 massacre site*. Norman: University of Oklahoma Press.

Greer, S., R. Harrison, and S. McIntyre-Tamwoy. 2002. Community-based archaeology in Australia. *World Archaeology* 34: 265–287.

Hartley, J., and J. Watkins. 1993. Test excavations at the Whirlwind Mission (Site 34Bl-47). In *Bulletin of the Oklahoma anthropological society XLI*, ed. G. Odell, 43–56. Norman: Bulletin of the Oklahoma Anthropological Society.

Kato, H. 2017. The Ainu and Japanese archaeology: A change of perspective. *Japanese Journal of Archaeology* 4: 185–190.

Lawrence, S., and N. Shepherd. 2006. Historical archaeology and colonialism. In *The Cambridge companion to historical archaeology*, ed. D. Hicks and

M.C. Beaudry, 69–86. New York: Cambridge University Press.
Marcoux, J.B. 2010. *Pox, empire, shackles, and hides: The Townsend site, 1670–1715*. Tuscaloosa: The University of Alabama Press.
McDonald, J.D., A.L. McDonald, B. Tallbull, and T. Risingsun. 1989. The 'Cheyenne Outbreak' revisited: The employment of archaeological methodology in the substantiation of oral history. *Plains Anthropologist* 34: 265–269.
Murray, T. 2011. Archaeologists and indigenous people: A maturing relationship? *Annual Review of Anthropology* 40: 63–78.
Rubertone, P.E. 2000. The historical archaeology of Native Americans. *Annual Review of Anthropology* 29: 425–446.
Victoria Department of Planning and Community Development. 2012. Historical archaeology and the heritage inventory. Available at: www.dpcd.vic.gov.au/heritage/archaeology/historical-archaeology-and-the-heritage-inventory
Ware, J. 2010. Introduction. In *Across a great divide: Continuity and change in native north American societies, 1400–1900*, ed. L.L. Scheiber and M.D. Mitchell, vii–vix. Tucson: University of Arizona Press.
Watkins, J. 2017. Can we separate the 'Indian' from the 'American' in the historic archaeology of the American Indian? In *Historical archaeology through a western lens*, ed. Mark Warner and Margie Purser, 113–137. Lincoln: University of Nebraska Press.
Wilson, J. 1998. *The earth shall weep: A history of native America*. London: MacMillian Publishers.

The Historical Cosmopolitics of the Mapoyo People

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Introduction

Mapoyo people have a complex history that is very much related to different political processes in Venezuela. Since colonial times up to now, their location has been situated at a "strategic territory" where human/nonhuman relationships are very salient. The colonization process transformed several aspects of indigenous existence in Orinoco region, but Mapoyo people managed to survive. While scholars in the middle of twentieth century proclaimed a cultural death of this group, they were developing "cultural reviving" strategies, which started with linguistic and archaeological research and have been continuing with heritage projects. This resulted in the construction of the first indigenous community museum in Venezuela (2012) and the first inscription of indigenous cultural heritage to the UNESCO List of Intangible Cultural Heritage in Need of Urgent Safeguarding (2014). Mapoyo's cosmopolitics interlinked with Venezuelan political context, enabling their integration of local concerns with the national society major processes. Recently, the development of mega-mining state enterprise in the Orinoco seriously infringes cultural and environmental dynamics.

Definition

The Mapoyo are an indigenous group from Bolivar State, Southern Venezuela (Fig. 1). Linguistically, they have been characterized as Carib speakers. The latest census (2011) declares an average population of around 423 individuals. Most of them are living in El Palomo town; however, some others migrated to closest bigger cities. Their community is constituted by single-family domestic units and a network of sowings, water courses, mountains, animals, plants, and spiritual entities. The Mapoyo presence in Middle Orinoco is testified by colonial chronicles since the eighteenth century, but archaeological remains in the region show a long pre-Hispanic settlement, although cannot be made undeniable cultural affiliations.

Historical Background

At the geographic area where Mapoyo people live, the Middle Orinoco, there have been archaeologically recovered several evidence of pre-Hispanic occupation, such as lithics used by hunter-gatherer populations, dated to 9000 B.P. Also there are significant rock art sites that testify diverse indigenous group interaction in this area. Followed by the entrance of ceramist and farmer

The Historical Cosmopolitics of the Mapoyo People, Fig. 1 El Palomo location. https://www.google.com.br/maps/place/Palomo,+Venezuela/. Accessed on 12 February 2017

groups (Tarble 1985), other dynamics developed. Nonetheless, a significant disruption occurred in the context of Spanish colonization of the Orinoco River. There are historical accounts mentioning Mapoyo people in the Colonial documents together with archaeological and oral history, which presents a long-term history of this group. One of the first narrations about Mapoyo people is when Father Joseph Gumilla [1741] writes: "the Mapoya nation calls the stone that tops and serves as capital to the Barraguan hill, Uruana, and they say that such a stone is the root of the people of their nation" (Gumilla 1965: 109). This cosmological relation perceptible at historical sources shows the importance of specific nonhumans in their social constructed landscapes.

Another example of past/present sociability can be found at summer time, when large quantities of Arrau turtles (*Podocnemis expansa*) go to the Middle Orinoco to put their eggs at riverine beaches. This was a major event existing since the precolonial times and attracted diverse indigenous groups, some of them from distant lands (as Western Llanos, Amazon Basin, the Andes, and the Antilles). Morey and Morey (1975) talk about a big yearly "feria" (exchange spot), where humans and animals were congregated and where along "quiripas" (shell beads coins), turtle eggs were the main attractions. Practically all chroniclers wrote accounts dedicating several pages to describe the huge amount of turtles and their importance to indigenous people and to themselves (e.g., excerpts of Father Gumilla, Father Gilij, Father Bueno, and in the nineteenth century, Humboldt, Chaffanjon in Meza 2013).

The Orinoco River conquest started with a period of sporadic settlement but soon turned a strategic space to dominate northern South American colonies and for the establishment of commercial routes. The eighteenth century onward, diverse military fortifications were constructed along the river. But as the civilizatory project also included the conversion of indigenous people to the Catholic faith, Spanish Crown promoted Jesuit Missionaries to fund "Reducciones" (Reductions). As some of them recognized, indigenous were mostly reluctant to settle at Reducciones, at first due to epidemics that killed a large number of natives (Morey and Morey 1975) but also because their proposal worked as a negation of native cosmological worlds and practices. Nonetheless, the offer of protection against slave raids led by Caribs and Dutchs, and access to European manufactured goods appreciated by indigenous, made possible the establishment of some Missions. The places chosen for these Missions reveal how much they had to insert themselves in already existing spatial and economic dynamics.

It is interesting to compare the location of the Missions (Nuestra Señora de los Ángeles de Carichana, Concepción de Nuestra Señora de

Uruana, San Luis Gonzaga de la Encaramada and Cabruta) and the location of the biggest nesting beaches, suggesting that they were purposely located to control the access to these spaces (Fig. 2). In fact, Father Ramón Bueno (1965: 126) indicates the putting of "guardians" to avoid people entering the beaches during the nesting time, because human presence scares turtles. In his chronicles he says that around "2000 souls from everywhere" bring their canoes (indigenous

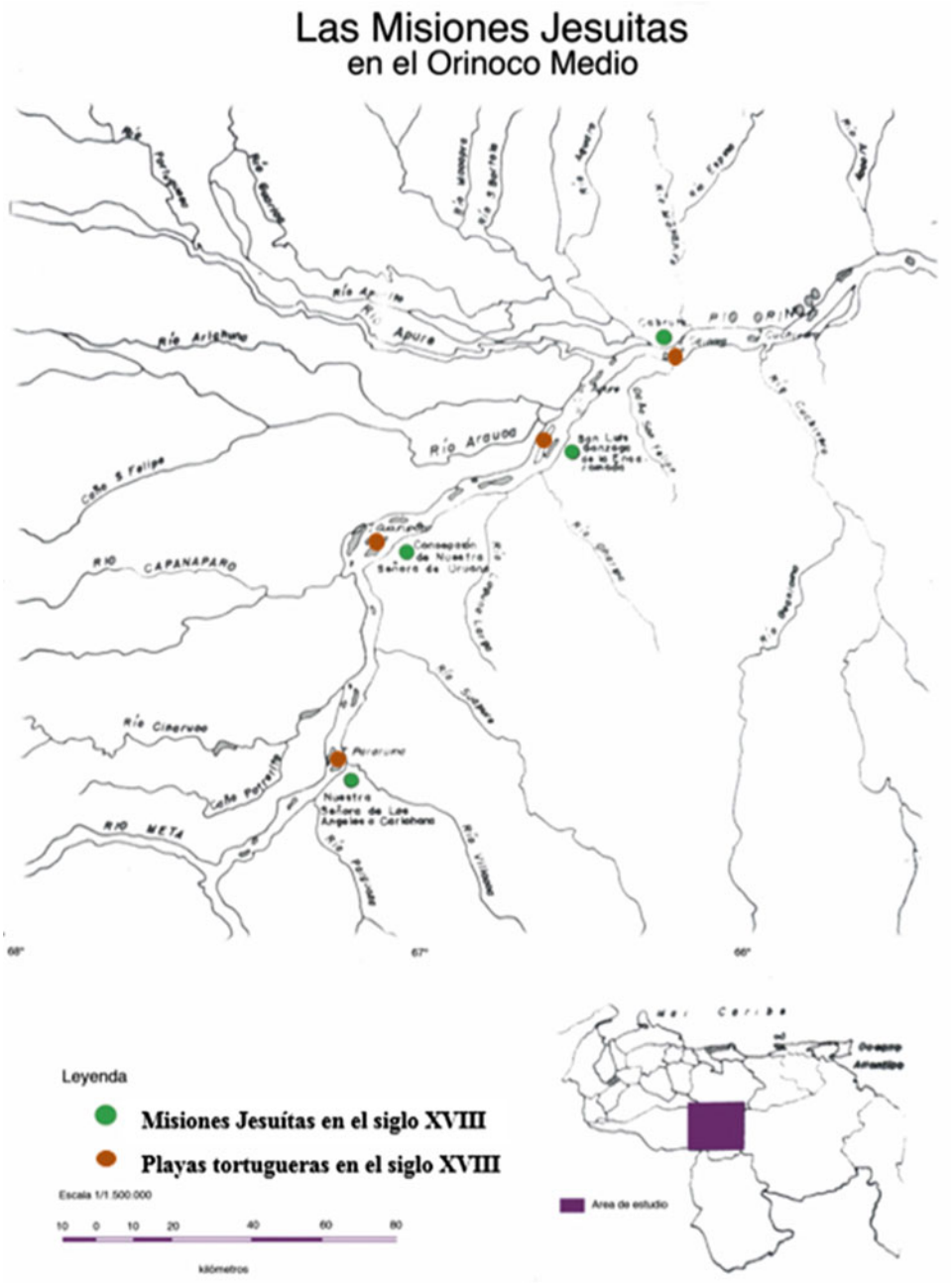

The Historical Cosmopolitics of the Mapoyo People, Fig. 2 Location of main turtle nesting beaches and Jesuit Missions in Middle Orinoco (Meza 2013: 105)

H

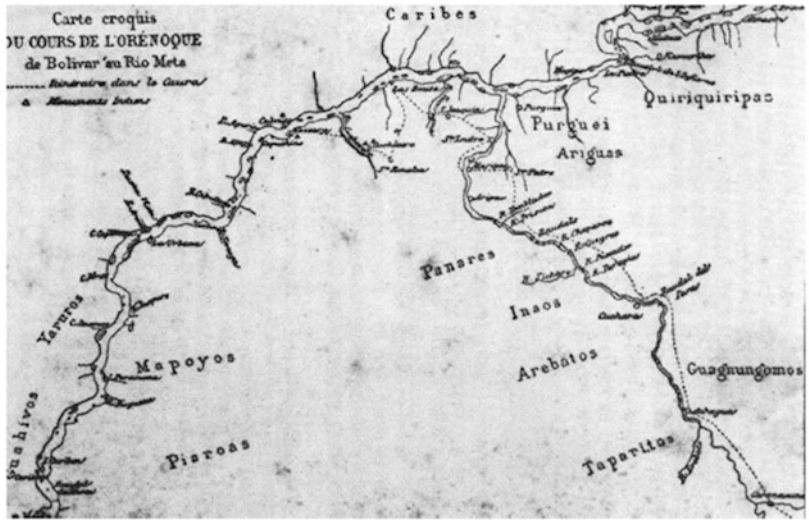

The Historical Cosmopolitics of the Mapoyo People, Fig. 3 Indigenous groups in the nineteenth-century Middle Orinoco (Chaffanjon 1986: 61)

boats) to carry turtle eggs and turtle oil. Missionaries offered outdoor masses at the turtle beaches and exhorted indigenous to stay at the Reducciones in order to be able to participate of the recollection, but some of them initially agreed to be granted access to the beaches and then, after charging their canoes, went away. This clearly exemplifies native negotiations following their ways of being. Among the groups mentioned in historical sources are Mapoyo, Atures, Otomacos, Achaguas, Guamos, and Sáliva. Just as the indigenous groups, missionaries depended on turtles to feed themselves. But eggs and oil were also exchange items between indigenous and missionaries and missionaries and other European traders. In any case, missionaries brought some transformations to the indigenous organization for interacting with turtles, but they could not totally disrupt local tradition, expressed at the social consumption of turtles and the technical knowledge of turtle oil production. Turtle oil was used for food preparing, lighting, and it was regularly applied at the body by some indigenous groups, as Otomacos, usually mixed with red colorific Onoto (*Bixa orellana*), and the technical knowledge of turtle oil production. Archaeological ethnography research shows a material continuity in Mapoyo's technical and social processes concerning turtle consumption (Meza 2013).

At Republican period (1830 onward), regional political transformations led to a substitution of the colonial regime to a creole domination. The Mapoyo did not run away to the forest as other groups did but stayed in settlements dependent to the newly created urban spaces (Fig. 3). This had an influence on the adoption of some creole costumes like Christian funerary rituals and developing a "conuco" economy, where manioc was a principal asset (Scaramelli and Tarble 2000). After Independence War (nineteenth century), some indigenous lands were taken by military leaders, who established extractive, agricultural, and livestock industries. Indigenous groups such as the Mapoyo were incorporated to these productive activities through a debt-peonage system (Torrealba 2011). In that scene, Mapoyo were involved in Tonka beans (*Dipteryx punctata*) recollection. Also, Mapoyo's territory was continuously invaded by a "creole" occupation: people attracted by work opportunities who settled at closest villages as "Los Pijigüaos." Later on, in the middle of the twentieth century, new wages of foreigners came over, interested in the mining industry (Bauxite extraction) located few minutes away from El Palomo.

In that scenario, Mapoyo got involved in what they called a "cultural revival" (Scaramelli and Tarble 2000) aimed at underscoring their ethnic position and their right to their land. This started with collaboration in research projects in the areas of linguistic and archaeology. Several undergraduate and master dissertations were developed with Mapoyo's help. These moves also served for them

to gain more contact with national society and achieve institutional and personal relationships that could possibly cooperate with Mapoyo's projects.

Key Issues/Current Debates

Away to an "extinction" image, Mapoyo people proudly manifested their interest to exhibit their history to local neighbor groups as well as national society, and so they built the Murükuní Community Museum (2012), first indigenous museum in Venezuela (Figs. 4 and 5). The museum had several years of negotiation between Mapoyo leaders and state functionaries of cultural institutions as well as conjunct work with archaeologists (Franz Scarameli and Kay Tarble), who approved the repatriation of archaeological artifacts found at Mapoyo territory sites, requested by local authorities at least from 2008 (Durán 2008).

In 2013 they were recognized by the Instituto de Patrimonio Cultural (Cultural Heritage Institute) as national heritage, at the same time that their land demarcation (13,000 ha) was accepted by national government. This is not a common situation as bureaucratic difficulties have produced very few indigenous land ownership titles

The Historical Cosmopolitics of the Mapoyo People, Fig. 4 Murukuní Community Museum. (Photo by Ernesto Yevara, in Meza 2017. Some members of Mapoyo community. http://www.unesco.org/culture/ich/index.php?lg=es&pg=00581&include=slideshow.inc.php&id=00983&width=620&call=slideshow&mode=scroll. Accessed on 12 January 2015)

The Historical Cosmopolitics of the Mapoyo People, Fig. 5 Children from Mapoyo Community at the Murukuní Community Museum. http://www.unesco.org/culture/ich/es/USL/la-tradicion-oral-mapoyo-y-sus-referentes-simbolicos-en-el-territorio-ancestral-00983. Accessed on 12 January 2015

from the large number of communities that requested their regularization. In 2014 "Mapoyo oral traditions and its symbolic reference points within their ancestral territory" was accepted in UNESCO List of Intangible Cultural Heritage in Need of Urgent Safeguarding (Fig. 6). That heritage process is crossed by human and nonhuman agency in a specific political context.

The humans are not the only ones who determine the avatars of "the social," but as a profuse anthropological and archaeological literature indicates, there is a co-constitution of people and things (Latour 1993). In that sense, things should also be seen as practitioners of an active role in the heritage condition. For example, in the Mapoyo case, a sword had especial relevance. During several generations, according to the Mapoyo oral tradition, they have guarded a sword offered to them by Simon Bolívar, the Republic founding father, due to their participation aiding the patriots at the Independence War in the nineteenth century (Fig. 7). With the sword, they could choose between money, becoming traders or the legal ownership their land. They took this last one, but

The Historical Cosmopolitics of the Mapoyo People, Fig. 6 Some members of Mapoyo community celebrating UNESCO's postulation. http://www.unesco.org/culture/ich/index.php?lg=es&pg=00581&include=slideshow.inc.php&id=00983&width=620&call=slideshow&mode=scroll. Accessed on 12 January 2015

The Historical Cosmopolitics of the Mapoyo People, Fig. 7 Captain Simón Bastidas with Bolivar's sword in front of National Pantheon. http://www.correodelorinoco.gob.ve/nacionales/pueblo-mapoyo-espada-bolivar-nos-ha-defendido-por-decadas/. Accessed on 14 April 2015 (Meza 2017: 104)

they had no documents to prove it; therefore, the possession of Bolivar's sword and its capacity to mobilize symbolic capital in the current political arena was decisive to achieve the activation of their heritage process.

As Olsen (2010) has been affirming, communities and things are entangled, but it should not be understood only on a local scale but also in its relationship with national and international scenarios. In 2014, with the UNESCO's approval, there was a media spotlight, not in the "oral traditions" in general, rather, as Mosonyi and Suárez Luque (2009) says, in the place of Mapoyo as a "forgotten patriot people." Bolivar's figure was of primordial importance for Hugo Chávez (1954–2013), leader of the "Bolivarian Revolution" and who actually renamed the country after the "liberator" (Venezuelan Bolivarian Republic). In that way, Mapoyo people made use of a scarce political resource to advance their interests in the context of the current government ideological project. Furthermore, human, nonhuman, and landscapes relationships articulate a politics where "cosmos refers to the unknown constituted by these multiple, divergent worlds and to the articulation of which they would eventually be capable" (Stengers 2005: 995). In that sense, Bolivar's sword, the heritage process, as well as the interaction with turtles take part of diverse conjunctures having in common Mapoyo's cosmopolitics.

International Perspectives

One of the main discussions in which Mapoyo participate is the movement toward a different perception of museums. Indigenous museums have constituted spaces of significant resemantization of a hegemonic western idea of museums, tied to a colonial trajectory. The large museums in imperial potencies not only built their collections on a cultural expropriation of foreign objects but also acted as ideological frameworks supporting colonialism. The position of Western superiority was projected through a representation of native impossibility to maintain their treasures with them. Rather, from human bodies to sacred artifacts were exposed to satisfy European curiosity about other people.

But the antiquarian model of the museum in the Enlightenment period, as well as their transformations to current "universal heritage" concept, was to be challenged by different localized, small museums, interested in their own history and their own representation. Scholars researching these non-hegemonic spaces such as James Clifford (1991) assert on the empowering of traditional communities through discussing what a local museum or exposition should contain. Native peoples, formerly excluded from a museum's staff, now take their positions as active actors in their public memory work.

This debate is conducted in North America by native Americans, with several productive experiences that include their participation as co-curators in "western museums" (Kreps 2009) or as curators in indigenous exhibitions, mainly underscoring the importance of their viewpoints on the way museum's practices are produced and the relevance of equitable power relations in cosmological (auto)representation, as much as the discussion of the adequate treatment of material and spiritual realms of "cultural heritage" (Smith 2005).

In Latin America there is a different context intertwined with indigenous museums. Their roots could be traced back to new museology and the claiming for museums to establish their "social function." Among the proposal of a democratization of culture, usually only accessible to economic elites, new museology defended the idea of museums that could discuss political contemporary and insert itself into diverse current realities. Community museums were conceived under these principles, attending the idea of community control and local resources management, as a way to create their museums and not museums about them.

Currently, a regional association for communication between community museums, the Latin American community museum network (Red de MuseosComunitarios de América Latina), with a web site (www.museoscomunitarios.org) and international encounters, contributes to exchange experiences. Also, there are smaller-scale

networks, as Brazilian Ceará Community Museum Network (Rede de MuseusComunitários de Ceará). Both networks aggregate indigenous and nonindigenous museums, such as rural initiatives and urban popular ones.

These museums share several elements, as their local identity reinforcement in front of threats to their territory. It is a search for national society recognition of their ontological constitution, in terms of what Marisol de la Cadena (2010) considers as "partial connections" between national hegemonic politics and indigenous cosmopolitics. That is also Mapoyo context. But one major difference is that most indigenous museums do not participate in the management of archaeological collections coming from their territories. Usually, legal impediments as much as scientific (dis)interest impede a closer relationship between archaeological objects and native communities. Murry (2011) states that while control of material artifacts is still an important debate, indigenous communities have expressed a special interest in the safekeeping of the landscapes containing their memory sites. Thus, indigenous political relationships are resting on processes of dialogue, collaboration, and negotiation (Colwell 2016).

Onuki (1999) reports a long-term experience of a peasant community in the Peruvian Andes, who strengthened their local identity through their communal management of archaeological site of terraces, Kuntur Wasi. As such, the museum served as repository to objects from the past (some of them in gold), but also, it was a space serving community needs, for example, Soccer Mundial games projection.

Therefore, these museums serve to open spaces for other rationalities and museological criteria, but also, they are highly linked with the archaeological repatriation debate in Latin America. Australia, New Zealand, and United States have already dealt even at a juridical state level with native rights to human remains to which they claim descendancy and so the establishment of stipulations such as NAGPRA (Smith and Wobst 2005). Latin America states have greatly ignored these issues, and cases as Argentinean repatriation of skeletal remains to native people (Tehuelche) are very rare. In that sense, the Mapoyo experienced a particular process of repatriation, that not included human remains but artifacts, held under their custody without implying a tense confrontation of state/science representatives and indigenous community.

Future Directions

A "redistributing" discourse was established in Bolivarian Venezuela since Hugo Chavez government, but it did not produce improvements in socioeconomic structure, especially maintaining resources inequality between the capital city and inland. The main industry supporting Venezuelan economy since the middle of the twentieth century has been oil extraction; therefore, its downturn in 2014, along with other political reasons into a very complex situation, led the country into an economic crisis. In that scene, has emerged a new extractive frontier at the Orinoco River.

CAMIMPEG, a military-led state company, was created to direct gold, iron ore, diamond, and, especially, coltan in what they have called a "strategic development zone" that includes 12% of national territory (110,000 km^2). This project called Arco Minero del Orinoco (Mining Arc of the Orinoco) accepted more than 135 international companies to invest and participate. Venezuelan National Assembly's report on this issue declared that this ecologically sensible area including fresh water deposits and protected forest areas would be seriously damaged. Also several indigenous communities are being affected, such as Mapoyo and Piaroa, Enepa, Hoti, Pume, Arawak, Kariña, Pemón, Yekuana, Sanema, Akawayo, and Warao. And along with environment and human and animal populations, memory landscapes would also suffer irreparable alterations.

That context is a major challenge for Mapoyo people in their struggle to maintain their ontological dynamics. Their current and future plans include linguistic recovery, in a conjunct work between the community museum, the local school, and linguistic anthropologist researchers. To contribute with museum self-management,

they are developing a "conuco" area along the museum, where traditional planting knowledge is transmitted, and it also generates a financial support and with the same purpose, a fishing area in the nearest lagoon. Transmission of ancestral knowledge is highly linked with the environment, so large-scale mining is causing serious disruptions. Cultural heritage agreements following UNESCO's declaration should promote respect to Mapoyo's territory, but the intersection of cultural policy and national development projects constitutes a difficult context that southern Venezuelan indigenous peoples will continue to confront.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Heritage and Archaeology
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ "Public" and Archaeology

References

Bueno, R. 1965. *Tratado histórico*. Caracas: Biblioteca de la Academia Nacional de la Historia.

Chaffanjon, J. 1986. El Orinoco y el Caura. Organización Orinoco. Caracas.

Clifford, J. 1991. Four Northwest Coast museums: Travel reflections. In *Exhibiting cultures: Poetics and politics of representation*, ed. I. Karp and S.D. Lavine. Washington, DC: Smithsonian Institution.

Colwell, C. 2016. Collaborative archaeologies and descendant communities. *Annual Review of Anthropology* 45: 113–127.

De la Cadena, M. 2010. Indigenous cosmopolitics in the Andes: Conceptual reflections beyond "politics". *Cultural Anthropology* 25 (2): 334–370.

Durán, R. 2008. *Wihi Mopue (Soy Mapoyo): El diseño de un Museo comunitario en la comunidad indígena Mapoyo de El Palomo, Edo. Bolivar y su utilización como instrumento de legitimación del pasado y reafirmación identitaria. Trabajo Final presentado para optar al título de Antropóloga*. Caracas: Universidad Central de Venezuela.

Gumilla, J. 1965. *El Orinoco ilustrado y defendido*. Caracas: Academia Nacional de la Historia. Fuentes Para la Historia Colonial de Venezuela.

Kreps, C. 2009. Indigenous curation, museums and intangible cultural heritage. In *Heritage, communities and archaeology*, ed. L. Smith and E. Waterton, 193–208. London: Duckworth.

Latour, B. 1993. *We have never been modern*. Cambridge, MA: Harvard University Press.

Meza, E. 2013. *Aceite de Tortuga: Colonialismo, Agencia y Producción en el Orinoco Medio durante los siglos XVIII al XX.* Tesis de Grado, Escuela de Antropología, Universidad Central de Venezuela, Caracas.

Morey, R., and N. Morey. 1975. Relaciones comerciales en el pasado en los llanos de Colombia y Venezuela. *Montalbán* 4: 533–564.

Mosonyi, E. E., and M. Suárez-Luque. 2009. Los Mapoyo: Un Pueblo Patriota Ignorado. Zona Tórrida n.4, p. 21–28.

Murry, T. 2011. Archaeologists and Indigenous people. A maturing relationship? *Annual Review of Anthropology* 40: 363–378.

Olsen, B. 2010. *In defense of things. Archaeology and the ontology of objects*. Lanham: AltaMira and Lanham.

Onuki, Y. 1999. Kuntur Wasi: templo, oro, museo. . ..y un experimento de desarrollo comunitario. *Museum Internacional* 204 (51): 4. París: UNESCO.

Scaramelli, F., and K. Tarble. 2000. Cultural change and identity in Mapoyo burial practice in the Middle Orinoco, Venezuela. *Ethnohistory* 47 (3–4): 705–729.

Smith, C. 2005. Decolonising the museum: The National Museum of the American Indian in Washington, DC. *Antiquity* 79: 424–439.

Smith, C., and H.M. Wobst, eds. 2005. *Indigenous archaeologies: Decolonising theory and practice*. London: Routledge.

Stengers, I. 2005. The cosmopolitical proposal. In *Making things public: Atmospheres of democracy*, ed. Bruno Latour and Peter Weibel, 994–1004. Cambridge, MA: MIT Press.

Tarble, K. 1985. Un Nuevo Modelo de la expansión Caribe para la época prehispánica. *Antropológica* 63–64: 45–81.

Torrealba, G. 2011. *La economía política de la sarrapia. Etnografía histórica de las actividades productivas entre los Mapoyo del Orinoco Medio, Venezuela.* Tesis de Maestría, Departamento de Antropología, Instituto Venezolano de Investigaciones Científicas, Altos de Pipe.

Further Reading

Abreu, R. 2012. Museus indígenas no Brasil: notas sobre as experiências Tikuna, Wajãpi, Karipuna, Palikur, Galibi-Marworno e GalibiKali'na. In *Ciências e Fronteiras*, ed. Bertol Faulhaber, 10–20. Rio de Janeiro: Museu de Astronomia.

Angosto Fernández, L. 2010. Pueblos indigenas, multiculturalismo y la nueva geometria del poder en Venezuela. *Cuadernos del CENDES* 27 (73): 97–132.

Meza, E. 2017. *Dinámicas locales y negociación de la modernidad: políticas de la patrimonialización entre los Mapoyo (Venezuela)*. Master's degree dissertation, Federal University of Pelotas, Pelotas.

Scaramelli, F., and K. Tarble de Scaramelli. 2015. O museu comunitário Murukuni. O passado e o presente nas políticas de cultura, identidade e representação Mapoyo. In *Museus e identidades na America Latina*, ed. Aline Carvalho, Camilo Vasconcello, and Pedro Paulo Funari. São Paulo: Annablume editora.

Silva, N. 2016. Sobre el Arco Minero y los pueblos indígenas. *Boletín Antropológico* 34 (91): 227–243.

Historical Ecology and Environmental Archaeology

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Introduction

Historical ecology is an interdisciplinary research program that studies the dynamic and dialectical interactions between humans and their environments. A relatively recent scientific approach with deep intellectual roots, historical ecology is related to, but differs from, other ecological perspectives by maintaining an anthropocentric focus on humanized landscapes. Stridently eclectic and multidisciplinary in its approach, historical ecology has borrowed from diverse sources including the "new" ecology, history, and geography. It is characterized by a set of core independent postulates which accentuate the impact of humans as keystone species; advocate recursive, nonlinear, and nondeterministic human environmental manipulation; underscore variability in humanized landscapes through time; and appreciate the inseparability of humans and landscapes. Archaeology and historical ecology are also inseparable. Environmental archaeology is essential for historical ecology, while archaeology, by definition, engages in historical ecology through its practice.

Definition

Historical ecology is an interdisciplinary and anthropocentrically oriented research program that is centered on studying the diachronic interactions between human societies and their environments. Historical ecology focuses on the landscape, both as the multidimensional material legacy of human activity and as an agent that actively shapes human actions in time and space through an embedded and dialectical relationship. Human activity, primarily through various forms of disturbance activities, is key to understanding the production of landscapes that are shaped by, and which simultaneously influence, human behavior in an historically contingent relationship. Past human behaviors can therefore be inferred from environmental settings as these are the material records of a culture which becomes physically embedded within humanized landscapes (Balée 2006; Balée and Erickson 2006).

Historical Background

Although a relatively recent scientific approach, historical ecology has deep intellectual roots. The term was earlier used by the late ecologist and paleolimnologist Edward S. Deevey (1964) who characterized a multidisciplinary and historical ecology that was capable of tracing the interactions of culture and environment in far more detail than written history. The idea of humans as historical agents active in the transformation of landscapes is of course traceable to classic antiquity and later Enlightenment philosophy (Balée 2006: 78), but one which was more recently anticipated in the work of historians (Marx and Engels 1970, original 1888) and geographers (Sauer 1925) who explicitly rejected the contemporary existence of forms of nature that preceded human history.

Historical ecology is related to, but differs from, a number of approaches that developed out of an earlier cultural ecology. The latter focused principally on how culture adapted to non-transformable and manifestly balanced equilibrial environments, thereby placing little to no emphasis on human agency. Human behavior was

largely considered as a disruptive force in the environment, and where anthropogenic disturbance was ephemeral or small in scale, homeostasis could be restored after removal of the disturbing agent. As such, cultural ecology was limited in its ability to explain anything but small-scale and technologically simple cultures that could be considered as adaptive when their ephemeral or sustainable activities enabled environments to retain or return to some preexisting "natural" condition (Balée 2006: 79). Through distancing itself from notions of steady-state ecosystems and functional adaptations, historical ecology is allied with the "new" or "dynamic" ecology which gained traction in the 1970s. Environmental balance, equilibrium, and homeostasis were replaced with instability, disequilibrium, and chaotic fluctuations, regardless of whether they occurred in the presence or absence of human action (Botkin 1990; Zimmerer 1994; Scoones 1999). Although the new ecology shared basic perspectives with historical ecology, its own historical divergence from systems ecology was facilitated through concepts developed in population and evolutionary biology. Historical ecology differs from the new ecology primarily through its strident anthropocentric focus and insistence on the holistic study of humans embedded within their landscapes through time and across space. This sets it apart from most materialist perspectives which variably emphasize the separation of humans from nature.

In accordance with its multidisciplinary perspective, historical ecology also utilizes concepts originally associated with the twentieth-century French *Annales* school of historiography. Dialectical processes between humans and humanized landscapes occur over differing temporal scales. These include short-term events (*événment*), much like the "punctuated equilibrium" of paleontological events; repetitive statistical patterns or cyclical episodes (*conjuncture*) that might occur within the time span encompassed by a human life; and the critically important long-term history (*longue durée*) which for most of the temporal span of human existence can only be made accessible through archaeology (Crumley 1998; Balée 2006: 80). It is the long-term perspective of historical ecology that is particularly powerful and one that corresponds well with the techniques, methods, and scope of environmental archaeology. The recognition of deep antecedent structure as the legacy of past human populations, one which also continues to carry important implications for contemporary human populations, certainly approaches the synthetic and multidisciplinary ecology that Deevey (1964: 34) saw as a bridge between the humanities and the behavioral, social, and earth sciences. This is made manifest particularly through highlighting its focal referent, the landscape (*paysage*), which records intentional and unintentional human action through time and across space. A focus on landscapes is highly integrative as it is a shared analytical unit in archaeology, geography, ecology, geomorphology, architecture, art, and regional planning (Crumley 1998).

Landscape is the paramount concept in historical ecology (Balée 1998a). The ancient western notion of the garden where humans habitually interact with various life-forms is the underlying premise of the landscape (Balée 2006). It provides the key analytical portal for studying the dialectical relationship between humans and their environments through time and across space. Eschewing adaptationist perspectives, historical ecology emphasizes the humanization of landscapes; instead of sociocultural and political systems adapting to environments, environments are adapted by human systems to facilitate their particular needs and desires. Landscapes are treated in their totality as multiscalar, diachronic, and holistic units that embed the patterned material manifestations of culture. As such, humanized landscapes are studied as artifacts from which human intentions and actions can be inferred through time and across space (Balée and Erickson 2006). Due to their central role in the modification and creation of humanized landscapes, humans are considered as keystone species, a term that ecologists have used since the 1960s to refer to any species whose impact on the ecological community is usually greater than that of any other member because their presence is considered to be particularly crucial for maintaining both organization and diversity

within the community (Mills et al. 1993). The principal mechanism by which humans assume the ecological role of a keystone species is through disturbance, which is a universal hallmark of modification by humans in the process of adapting landscapes to their particular requirements. The process is recursive, dynamic, and nonlinear, for as humans modify the landscape, they establish an historically contingent trajectory which directs all subsequent landscape history. Landscapes are both products of, and templates for, human actions (Scoones 1999: 493).

Key Issues/Current Debates

Anthropologist and ethnobiologist William Balée (Fig. 1), a key historical ecologist, considers historical ecology to be a partially accepted research program within the scientific community. It is characterized by a set of core independent postulates which (1) accentuate the deep temporal and globally spatial extent of human impact; (2) advocate the recursive, nonlinear, and non-deterministic trajectory of human environmental manipulation; (3) underscore the historically variable relationships between different societies and landscapes over time; and (4) appreciate the importance of understanding humanized landscapes in their totality (Balée 1998b, 2006).

Historical Ecology and Environmental Archaeology, Fig. 1 William Balée in the Central Amazon basin, 2010. (Photo taken by author)

Postulate 1: Human Activities Have Had a Significant Impact on the Non-Human Biosphere

The older adaptationist perspectives of ecosystems and cultural ecologies were predicated on the notion of stability in nature. They required belief in equilibrium, homeostasis, and orderly succession, which are ideas with ancient roots in western thought (Botkin 1990). They in turn necessitate the teleological assumption that a pristine nature must exist in an original and unspoiled (particularly by humans) condition and that a subsequently spoiled (particularly by humans) nature can return to its prior state in the absence of the disturbing agent. The idea that human activity was capable of transforming environments also has a deep history in western thought, beginning with Classical philosophy, continuing through the Enlightenment, and into the nineteenth and twentieth centuries, as historians and geographers questioned the existence of pristine conditions. In 1845, Karl Marx considered that a nature preceding human history "...is nature which today no longer exists anywhere (except perhaps on a few Australian coral-islands of recent origin)" (Marx and Engels 1970: 63). In his latter characterization of natural and cultural landscapes, geographer Carl Sauer believed that the former no longer existed in its entirety in many parts of the world (Sauer 1925). The concept of pristine environments is today considered to be a myth (Denevan 1992), one which is probably more like an old and cherished wish rather than an established fact. Wherever humans have been present, "natural" environments have been altered, and once altered they never revert back to a "natural" condition (Balée and Erickson

2006). An important question about an assailable nature concerns the temporal depth of human impact. Does it span the entire temporal range of genus *Homo*? Does it begin with the appearance of modern humans? Is it associated with the early Holocene advent of agriculture, or as some would prefer to call it, the Anthropocene? Agricultural humans are perhaps the pinnacle of disturbance agents, although all humans regularly modify landscapes regardless of their particular subsistence orientation. Indeed humans are unique only in terms of the scale to which they have modified landscapes and the degree to which they have intentionally planned their modification (Balée 1998b). Niche construction is a general and pervasive feature, and one which has likely influenced the ecology and evolution of many different species. Defined as the "activities, choices, and metabolic processes of organisms through which they define, choose, modify, and partly create their own niches" (Laland et al. 2000: 132–3), niche construction can proceed through the building of artifacts or benign habitat modification and can be undertaken by diverse life-forms. In all cases, descendant generations receive constructed niches as *ecological inheritance*; however, because it is dominated by learned knowledge and cultural inheritance, human niche construction is "unusually potent" (Laland et al. 2000: 141). It underscores the ecological role of humans as a keystone species. As the ecological impact that cultural humans assert on the landscape is both quantitatively and qualitatively greater, they assume a dominant and critical role in structuring the ecological community. Human activity affects all other organisms within the landscape and plays a key role in determining the kinds and numbers of different species within the community (Mills et al. 1993).

Postulate 2. The Effects of Human Activities Are Neither Inevitably Linear Nor Deterministic

The equilibrial perspectives of ecological systems that were premised on the assumption of stability and balance in nature, and which dominated scientific discourse on the relationship between humans and environments, have been supplanted by an increased appreciation of history, variability, complexity, and uncertainty (Scoones 1999). Despite the tenacious hold that metaphors of balance, regulation, and harmony have in anthropology, historical ecology can be a productive arena for coalescing contributions of the new ecology within the social sciences (Scoones 1999: 490). Historical ecology is particularly interested in the complex relationship between humans and their environments which is manifest in landscape change through time and across space. With this interest, historical ecology understands the dynamic interaction between cultural and ecological processes. Humanized landscapes are dynamic and recursively created in nonlinear, nondeterministic, and historically contingent ways. Their unique histories can be accessed by studying humanized landscapes as cultural artifacts. Furthermore, the holistic study of historical ecology appreciates the complexity, nonlinearity, and indeterminacy of humanized landscapes as historically contingent artifacts. The contingent perspectives of historical ecology and its rejection of equilibrial assumptions avoid essentializing an ecological role for humans in their interactions with landscapes. Humans are neither cast as obligate destructive agents (*Homo devastans*) whose activities necessarily degrade the environment through decreasing species richness, nor are they stereotyped as "ecologically noble savages" harmoniously adapted to, and existing ephemerally within, a balanced ecosystem (Balée 1998b). Humans, like any niche-constructing organism, are disturbance agents, except for the fact that humans are unique keystone species whose cultural equipment enables them to assert a quantitatively and qualitatively greater influence on the landscape. Nor should disturbance be automatically considered as ecologically destructive; rather its subsequent effect on the landscape must be understood in terms of degrees along a continuum. Empirical and mathematical modeling suggests that intermediate disturbance can lead to higher species richness (Fig. 2). At either extreme of the continuum, species richness diminishes as stable or undisturbed communities are characterized by a tendency toward monopolization by a few dominant species, whereas

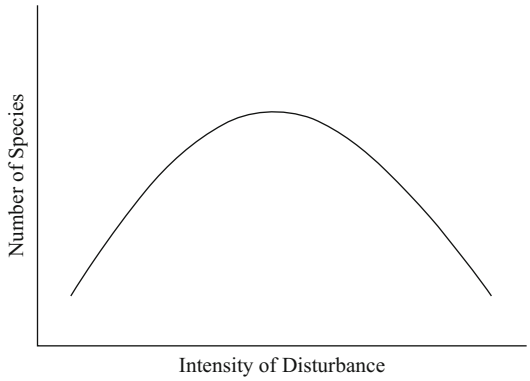

Historical Ecology and Environmental Archaeology, Fig. 2 Simplified model of the relationship between species abundance and disturbance intensity. (Reprinted, with permission, from the Annual Review of Anthropology, volume 35 © by Annual Reviews www.annualreviews.org)

catastrophic widespread and continuous disturbance radically decreases community complexity. Spatially and temporally localized instability prevents monopolization by a few while simultaneously presenting new opportunities for others (Connell 1978).

Postulate 3. Different Human Activities in Different Contexts Can Lead to Different Outcomes

Historical ecology emphasizes the dynamic nonlinearity and indeterminacy of environmental change advocated by the new ecology and stresses the historically contingent nature of humanized landscapes. Landscapes, once modified, never return to a "pristine" or "original" state but are produced through time and across space in dialectical fashion. Different social arrangements with different actors in different locations at different times can produce different outcomes (Scoones 1999: 494). For example, it has been conclusively demonstrated that Amazonian agroforestry can contribute to comparable if not greater species richness in old fallow fields when compared to species richness in surrounding high forest. However, fallow formations differ from high forest formations as they tend to be characterized by unique species. Also, disturbance indictors are the ecologically most important species in fallow, whereas their ecological counterparts in high forest are indicators of non-disturbance (Balée 1994). Many different kinds of biological enhancement are recorded in neotropical landscapes that are and were humanized through indigenous agroecological systems, including Kayapó apêtê forest islands in the Brazilian cerrado, raised field systems in savannas, anthropogenic forests, and dark earths (ADEs) throughout the Amazon basin and beyond (Balée 1998b; Balée and Erickson 2006; Erickson 2008). Conversely, biological degradation has been recorded in certain landscapes, especially island habitats which are particularly vulnerable to local extirpation of endemic species whether through intentional human exploitation or unintentional habitat destruction or introduction of exotic invasives. However, Balée (1998b: 23–4) has suggested that it is only within the context of ancient and modern state societies, in particular, that associated biodiversity reduction and decreased habitability have been solidly recorded. Whether state societies are intrinsically destructive or not remains an ethnographic and historical question, not a biological one. In any case, the results of human activity are not deterministically programmed.

Postulate 4. Humans and the Landscapes in Which They Interact Are Mutually Interdependent

Landscapes are both products of, and templates for, human actions (Scoones 1999: 493). Historical ecology emphasizes the humanized character of landscape and in doing so rejects the dualistic separation of humans and culture from landscapes and ecology. The anthropocentric focus of historical ecology emphasizes the ecologically important activities of humans within landscapes and simultaneously considers the effects of landscape modification through time on the human condition. In ecological terms, humans might be characterized as particularly dominant and somewhat unique keystone species; regardless, it is in the material manifestations of landscapes that humans and

environments can be considered as inseparable (Balée 1998b: 24).

Historical Ecology and Environmental Archaeology

It is specifically in the notion that landscapes can be studied as material artifacts of human behavior that culture and environment appear inseparable. It is also where environmental archaeology assumes particular importance not only for an understanding of the past but also for issues that transcend traditional subdisciplinary and disciplinary boundaries in archaeology and anthropology (Hayashida 2005; Stahl 2008). The historical ecological study of landscapes is strongly multidisciplinary. Balée and Erickson (2006: 7) emphasize that the primary data of historical ecology lie in the patterning of material residues, anomalies, and cultural imprints that human activity has inscribed in the landscape. These data are necessarily captured through an interdisciplinary application of techniques and methods as they minimally include genetics, plant and animal domestication, agroecology, soils, inventories of biological and agroecological diversity, hydraulic engineering, linguistic terms, environmental memory and oral histories, archaeology and material culture, and actualistic studies (Balée and Erickson 2006: 7). Archaeology and historical ecology are inseparable. Archaeology, through its techniques and methods, is essential for historical ecology, as its can access a "deep time" that is inscribed within the landscape yet far exceeds human memory and the advent of written records. Environmental archaeology is an entrée to data used for the establishment of reliable inferences about past ecologies. These are inscribed in the landscape in the form of preserved and retrievable information that is either directly relevant to or indirectly implicated as proxies for establishing past conditions. Simultaneously, whenever archaeologists retrieve data from landscapes or from the buried record of archaeological sites, they are exploring anthropogenic phenomena through time and across space and are by definition engaging in historical ecology. Furthermore, archaeologists practicing historical ecology are not simply learning about the past. Their interpretations can have serious consequences in contexts where indigenous rights are juxtaposed with issues of biodiversity management. They also have direct relevance to issues ranging from preservation and conservation to ecological restoration, rational development, and the elusive goal of sustainability (Stahl 2008).

International Perspectives

Historical ecology has rapidly become a major global research program. Specifically designed historical ecological research initiatives are retrieving important results and developing provocative interpretations in every continent and progressively more crucial insular contexts. Although it is an important perspective with temporally deep intellectual roots, the historical ecological approach in all its forms has been variably embraced at different times and in different places. Certainly, the minimal acceptance of the human capacity to transform landscapes has been better appreciated in Europe for decades, but it has been in the western hemisphere where the most dramatic recent developments have been undertaken. This is undoubtedly attributable to the intransigent and lingering belief that indigenous populations could only have affected a benign and ephemeral presence prior to the arrival of Europeans in the late fifteenth century (Delcourt 1987; Denevan 1992). A similar viewpoint was traditionally also projected onto many of the world's tropical areas. Historical ecology has become a dominant research program in the neotropics and particularly throughout the Amazon basin where its practitioners have countered long-held views that pre-Columbian populations were small, dispersed, and both technologically and socially simple. This viewpoint is being rapidly discarded, and in the process, some of the most dramatic and exciting empirical discoveries and theoretical formulations of historical ecology are emerging today from contemporary studies in the neotropical lowlands of the western hemisphere (Erickson 2008).

Cross-References

- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Cultural Ecology in Archaeology
- ▶ Garden Hunting
- ▶ Historical Ecology in Archaeology
- ▶ Human Evolution: Use of Fire
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology

References

Balée, W. 1994. *Footprints of the forest. Ka'apor ethnobotany – the historical ecology of plant utilization by and Amazonian people*. New York: Columbia University Press.

Balée, W. 1998a. Introduction. In *Advances in historical ecology*, ed. W. Balée, 1–10. New York: Columbia University Press.

Balée, W. 1998b. Historical ecology: Premises and postulates. In *Advances in historical ecology*, ed. W. Balée, 13–29. New York: Columbia University Press.

Balée, W. 2006. The research program of historical ecology. *Annual Review of Anthropology* 35: 75–98.

Balée, W., and C.L. Erickson. 2006. Time, complexity, and historical ecology. In *Time, complexity, and historical ecology. Studies in the neotropical lowlands*, ed. W. Balée and C.L. Erickson, 1–17. New York: Columbia University Press.

Botkin, D.B. 1990. *Discordant harmonies. A new ecology for the twenty-first century.* New York: Oxford University Press.

Connell, J.H. 1978. Diversity in tropical rain forests and coral reefs. *Science* 199: 1302–1310.

Crumley, C. 1998. Foreword. In *Advances in historical ecology*, ed. W. Balée, ix–xiv. New York: Columbia University Press.

Deevey, E.S., Jr. 1964. General and historical ecology. *Bioscience* 14 (7): 33–35.

Delcourt, H.R. 1987. The impact of prehistoric agriculture and land occupation on natural vegetation. *Trends in Ecology and Evolution* 2: 39–44.

Denevan, W.M. 1992. The pristine myth: The landscape of the Americas in 1492. *Annals of the Association of American Geographers* 82: 369–385.

Erickson, C.L. 2008. Amazonia: The historical ecology of a domesticated landscape. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 157–183. New York: Springer.

Hayashida, F.M. 2005. Archaeology, ecological history, and conservation. *Annual Review of Anthropology* 34: 43–65.

Laland, K.N., J. Odling-Smee, and M.W. Feldman. 2000. Niche construction, biological evolution, and cultural change. *Behavioral and Brain Sciences* 23: 131–175.

Marx, K., and F. Engels. 1970. In *The German ideology*, ed. C.J. Arthur. New York: International Publishers.

Mills, L.S., M.E. Soulée, and D.F. Doak. 1993. The keystone-species concept in ecology and conservation. *Bioscience* 43 (4): 219–224.

Sauer, C.O. 1925. The morphology of landscape. *University of California Publications in Geography* 2 (2): 19–54.

Scoones, I. 1999. New ecology and the social sciences: What prospects for a fruitful engagement? *Annual Review of Anthropology* 28: 479–507.

Stahl, P.W. 2008. The contributions of zooarchaeology to historical ecology in the neotropics. *Quaternary International* 180: 5–16.

Zimmerer, K.S. 1994. Human geography and the "new ecology": The prospect and premise of integration. *Annals of the Association of American Geographers* 84: 108–125.

Further Reading

Balée, W., ed. 1998. *Advances in historical ecology*. New York: Columbia University Press.

Balée, W., and C.L. Erickson, eds. 2006. *Time, complexity, and historical ecology. Studies in the neotropical lowlands*. New York: Columbia University Press.

Cronon, W. 1983. *Changes in the land: Indians, colonists, and the ecology of New England*. New York: Hill and Wang.

Crumley, C.L., ed. 1994. *Historical ecology. Cultural knowledge and changing landscapes*. Santa Fe: School of American Research Press.

Fairhead, J., and M. Leach. 1996. *Misreading the African landscape: Society and ecology in the forest-savanna mosaic*. Cambridge: Cambridge University Press.

Historical Ecology in Archaeology

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Introduction

Edward S. Deevey, who directed the Historical Ecology Project at the University of Florida in the early 1970s, introduced the term "historical

ecology" to archaeology. Working with archaeologists on Mesoamerican lake sediments, Deevey's integration of archaeology and paleoecology was visionary. Deevey's son Brian finds the first mention of historical ecology in his father's publications of 1964 (Brian Deevey *pers. comm*. 2009).

In the early 1980s, historian Lester J. Bilsky solicited the contributions of anthropologists, a human ecologist, an economist, and fellow historians for *Historical Ecology: Essays on Environment and Social Change* (1980). Anthropologist Alice Ingerson organized a session on historical ecology at the 1984 annual meeting of the American Anthropological Association. This session addressed the chasm between cultural (e.g., nature as metaphor) and environmental (e.g., energy cycle) studies within anthropology and explored political economy and social history approaches in the discipline.

By the late 1980s, Carole Crumley and William Marquardt – drawing on anthropology, archaeology, history, and the biophysical sciences – employed historical ecology in the study of long-term regional change in Burgundy, France (Crumley and Marquardt 1987). Later, they collaborated with colleagues in archaeology, evolutionary ecology, and anthropology to produce the edited volume *Historical Ecology: Cultural Knowledge and Changing Landscapes* (Crumley 1994). Independent of Crumley and her colleagues' work, William Balée and his colleagues, working in South America, enriched the traditional cultural ecology approach to include history. Balée organized a conference of anthropologists, historians, and geographers at Tulane University in 1994; the papers were published as *Advances in Historical Ecology* (Balée 1998). The same decades also witnessed the development of political ecology, which directly addresses the political economy of contemporary environmental processes and practices (Robbins 2012). There are obvious resonances with historical ecology. Because we act out our thoughts on landscapes, the history of landscapes can be seen as "congealed" politics: outcomes of the struggle over resources and ideas (Crumley in Sinclair et al. 2010: 10).

Working together since the mid-1990s, Balée and Crumley furthered the approach of historical ecology with the creation of two fruitful publishing venues for historical ecology. The first was a Columbia University Press series which produced seven volumes, including Balée and archaeologist Clark Erickson's exploration of deep-time biodiversity in the Amazon. Balée and Crumley's current series focuses on applications of historical ecology and is published by Routledge.

Historical ecology has another source, derived from forest history and restoration ecology (e.g., Swetnam et al. 1999; Egan and Howell 2001; Foster and Aber 2004; Jackson and Hobbs 2009; Burgi 2011; Szabo and Hedl 2011; Grossinger 2012; Jackson 2012). While drawing initially on geography and environmental history, the expanding framework for such research has come to resemble the strand of historical ecology found in anthropology and archaeology, in that it addresses community involvement, a longer time frame, and contested visions for modified landscapes. The involvement in landscape management of diverse stakeholders, along with the political issues they represent, requires an integrative approach both to understand current-day ecosystems and landscapes and to plan their future. In multiple-use landscapes, such as public lands and urban spaces, managers must understand the combined physical and social history of the ecosystems and landscapes in their charge. Archaeological evidence plays an important part both in developing landscape histories and in developing new strategies for more integrated and functionally robust landscape management.

Definition

For archaeologists and others who study the linked past of humans and the environment, historical ecology is a cluster of concepts in a practical framework for studying the past and future of that relationship (Crumley 1994, 2007a, 2012; Balée 1998, 2006; Meyer and Crumley 2011). While historical ecology may be applied to spatial and temporal frames at any resolution, it finds

particularly rich sources of data at the "landscape" scale – where human activity and cognition interact with biophysical systems and where archaeological, historical, ethnographic, environmental, and other records are plentiful.

The term *historical ecology* employs a definition of ecology that includes humans as a component of all ecosystems. Its definition of history is not limited to the written record but encompasses both the history of the Earth system and the social and physical past of our species. Historical ecology constructs an evidence-validated, open-ended narrative of landscape evolution and transformation. It follows the dialectical interaction between (spatially and temporally) diverse human activities and changing environmental conditions.

Historical ecology may not be familiar to every archaeologist, but its salient characteristics will be recognized as those which undergird most archaeological practice. Chief among these is a collaborative, transdisciplinary research environment. Historical ecology perforce draws on a broad spectrum of concepts, methods, theories, and evidence, taken from the biological and physical sciences, the social sciences, and the humanities.

Some examples of the power of this transdisciplinary approach are helpful. Traditional/local environmental knowledge can be equally valued and scrutinized along with scientific evidence: this requires a combination of field biology and other natural science disciplines, archaeology, written and oral history, and ethnography (e.g., Balée and Erickson 2006; Crumley et al. 2018). Because cultural landscapes are inherently political, the combined study of biogeophysical processes with historical and political ecology can expose social forces active in their formation and more completely analyze decision outcomes. Systems ecology offers a provocative heuristic approach, termed "resilience," to the study of complex adaptive socio-ecological systems over time (Folke et al. 2004). While the resilience concept has several drawbacks, it can focus archaeologists' interpretation of past system changes on issues that have immediate current applications (Costanza et al. 2012; Plieninger and Bieling 2012). More generally, complex adaptive systems theory contributes concepts such as initial conditions, emergence, and path dependence to the analysis of these ancient systems, broadening the archaeological study of change across time and space and into the future (Redman 2005).

Historical ecology enhances collaboration among differently trained researchers. It takes into account a project's stakeholders who could be impacted by providing an intellectual meeting place where diverse knowledge communities can exchange information about the past and present of a physical region and discuss various courses of action for its future. Of course, such exchanges require a strong commitment to dialogue, extensive translation, and significant efforts at coordination. Nonetheless, standard analytic procedures of these various disciplines are respected; the information thus derived provides critical "cross-checks" upon other data sets, revealing new patterns and encouraging researchers to ask further questions. From the beginning of the project, agreed-upon goals and frequent interaction underlie successful collaboration.

Key Issues

What term of theoretical reference should be used to describe historical ecology? It is not a discipline, recognizable in the equipment that practitioners employ; the material or phenomena that they examine; the research questions, methods, and hypotheses; and the results that they obtain. Because each archaeological "case" (e.g., site, research question, and availability and quality of the material record) is different, practitioners of historical ecology are far more concerned with a pragmatic approach to particular circumstances, using what is available to build a narrative of landscape history. Neither is historical ecology a method, meaning that particular procedures and techniques are employed.

Historical ecology is not a theory, in the sense of a proposed explanation of empirical phenomena. While there are certain postulates which are largely (but not universally) agreed upon (Balée 1998: 14, 2006: 2), historical ecology does not explain so much as it provides the tools to build a

body of data that can be inductively assessed. Balée is a strong advocate of the notion that historical ecology is a body of theory, identifying "a core of interdependent postulates" used to explain human/biosphere interactions. While his postulates do capture a number of the concerns that are central to historical ecology, "theory" implies that certain interpretive positions follow from them. However, the inductive approach of historical ecology admits many interpretive frameworks, as does archaeology in general. While archaeological fieldwork and analysis are tied to a broadly scientific approach to the data, the interpretation of those data reflects the archaeologist's attachment to particular theories of human agency and action, whence come the research questions that led to fieldwork. Thus historical ecology does not claim exclusive association with any theoretical approaches, other than embracing holism.

Having ruled out historical ecology as a discipline, method, or theory, what is left to describe it? Perhaps Winterhalder's characterization of the field as "an investigation within a framework provided by a certain set of concepts" (in Crumley 1994: 18) is most satisfying. Concepts are flexible, both in the breadth of their applicability and in the fact that they are subject to change. Historical ecology is a cluster or "toolbox" of concepts. This is an antidote to entrenched approaches in that the research design is necessarily broadly collaborative, thus ensuring many perspectives. It is also unabashedly particularistic, in that every site, landscape, or region has a unique history and particular resources that can tell its story.

Aside from its academic role, there is also an applied aspect to historical ecology. For example, the US National Park Service employs a historical ecology approach to manage and interpret the enormous national park system, which must respond to the often contradictory needs of many users (e.g., conflict between rock climbers and Native Americans who consider Devil's Tower, Wyoming, a sacred site). The Society for Ecological Restoration International (SER) frames its research and instructional programs around historical ecology. The San Francisco Estuary Institute (SFEI) is a pioneer in using historical ecology to track linked biophysical and anthropogenic changes in wetlands. The Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) hosted an international conference on Frontiers in Historical Ecology as recently as 2011, an event that underscored the rapidly entwining origins and histories of historical ecology.

Current Debates

Complexity science is the transdisciplinary study of *complex adaptive systems* (CAS) (for an introduction by archaeologists, see Beekman and Baden 2005). They are dynamic, nonlinear systems that are not in equilibrium and do not act predictably, which aptly describes systems that include humans. These key features also distinguish contemporary complex systems thinking from earlier systems theory, which assumed that "natural" systems could be modeled with a few key variables and would return to equilibrium after being disturbed. The CAS concept represents a highly practical "multi-tool" (Meyer and Crumley 2011: 112) in the historical ecologist's toolbox, introducing useful ideas such as system history, initial conditions, path dependence, and emergence. In concert with the more heuristic idea of resilience, referring to systems that do not degrade critical resources (Berkes et al. 2003; for an archaeological perspective, see Redman 2005), these conceptual tools allow archaeologists to think across time and space (thus following the evolution of specific societies and comparing them over the *longue durée*) and to ask questions whose answers have relevance today (Butzer 2005; Costanza et al. 2012).

More familiar concepts such as *diversity*, *region*, and *scale* also have an important place in the toolbox. As Evelyn Pielou demonstrated several decades ago, *scale* defines diversity. We must think of scale both in terms of how systems organize themselves and in terms of how we, in turn, study them. Scale – spatial, temporal, economic, social, and/or political – is of central importance to the archaeologist. It is in addressing this issue that archaeologists describe diversity in the past. If we choose the wrong analytic scale, we may

miss critical evidence of similarity or difference. The same is true if we fail to recognize that systems organize themselves at multiple scales which differ from one another and which evolve. To follow regional change over time, one must be able to work across changing analytic and systemic scales.

In order to understand change in the past, the traditional approach has been to establish a temporally ordered chain of events, termed *causation*, which allows generalization about the system. But because complex systems, like human societies, are comprised of properties that can change at various temporal and spatial scales and can interact in unanticipated ways, a simple temporal ordering of events cannot describe "causal" interactions among variables. While in complex systems a clear line of temporal causation is compromised, it is possible to analyze profound change in the nature of the system (termed a *regime shift*) by identifying the variables that concatenate to bring about the change. This requires a meta-theoretical approach that takes into account the properties of dynamical systems that frequently include human societies.

Variables that change quickly are only the most recent arrivals in a series of rapid, not-so-rapid, and slow variables within these systems. For example, a plant disease causes system collapse only after agricultural lands have been slowly depleted of nutrients *and* after local populations have decided to specialize in a limited number of plant crops. Archaeologists – with their close attention to scales of time and space – are perfectly poised to study not only rapid variables but also the slower, less easily identified variables which operate during periods of seeming system stability. Historical ecology enables archaeologists to study such periods of apparent inertia, encouraging us to seek evidence of slow variables in regional and local contexts.

Historical ecology draws from several strong historical traditions. Beginning in the 1920s, the French historical school *Annales* (Burke 1992) broke with traditional event-focused disciplinary history and instead emphasized context, incorporating geography, ethnography, and folklore as well as environmental science. The humanistic and dialectical *Annales* approach gave rise to a new collaborative framework for the study of regional history (e.g., the work of Braudel, Duby, and Le Roy Ladurie). Especially useful is the concept of processes operating among temporal scales of varying duration: these broad divisions are termed *événement* (event), *conjoncture* (cultural and historical context), and *longue durée* (long-term trends). Broad temporal frameworks, such as those that characterize an *Annales* approach, guide all historical sciences. Interpretation must rely on all three: events, whether they are a cleric's account of famine or stratigraphic evidence of flood, must be set in immediate and more distant contexts. The central *Annales* concept of landscape (*paysage*) allows researchers to address time and space simultaneously, follow intentional and unintentional acts, study human modification of the global ecosystem, and assess past events in shaping human choice and action. The study of changes in the temporal and spatial configurations of landscapes (a traditional pursuit of archaeology), along with work in cognition, offers practical means to integrate the natural and social sciences and the humanities.

Any discussion of causation in the systems of which humans are a part necessarily leads to *agency*. Agency has a long history in Western social theory (Dobres and Robb 2000). The last three decades have seen a revival of agency thinking throughout the social sciences, largely in response to the work of practice theorists Pierre Bourdieu and Anthony Giddens. Actor-network theory (ANT), most closely associated with Bruno Latour, describes human society as a complex, interactive, and iterative collective of human and nonhuman actors; no effective "science of the social" can exist without including both humans and nonhumans (Latour 2005). Studies that explore the agency of objects and living beings can provide models for exploring the complex ecological collectives/systems of which humans are a part (Ingold 2000).

It is important to note that complex adaptive systems have no overarching hierarchy of dominant/determining "stimulators" and subordinate "responders." Rather, they are complex *heterarchies* of interacting elements that may

sometimes stimulate and at other times respond and that may sometimes dominate the system and at other times may be dominated. A promising development in complex systems research is the concept of heterarchy, "which treats the diversity of relationships among system elements and offers a way to think about systemic change in spatial, temporal, and cognitive dimensions" (Crumley 2007b: 468). Originally developed in brain research, definitions of heterarchy are remarkably consistent across a vast array of disciplines, including artificial intelligence and computer design, mathematics, and sociology. Heterarchy refers to the relation among elements in a system in which they are unranked, or possess the potential for being ranked in a number of different ways, depending on systemic requirements (Crumley 1979: 144). Heterarchies stand in contrast to hierarchies but do not replace them; rather the two exist in dialectical relationship with one another. Heterarchy is a corrective to the naturalized characterization of power relations, which conflates hierarchy with order.

Future Directions

It is important to remember that historical ecology extends the concept of heterarchy not only to the material being studied but also to the conceptual framework of that study. As a transdisciplinary endeavor, historical ecology recognizes the contribution of many different kinds of researchers and types of data. Correlating the contributions of these researchers and integrating their data represent two of the biggest challenges of an historical ecological approach but also account for the richness of the understandings obtained. A set of operational principles guide research design (Meyer and Crumley 2011). Among the most important are collaboration from the beginning, ground rules that admit qualitative as well as quantitative data, "best practice" protocols, and other agreements that respect diverse knowledge communities.

The *Integrated History of the People of Earth* (IHOPE) is a global network of researchers (many of them archaeologists) and research projects that uses historical ecology's integrated approach to study combined human and Earth system history (Costanza et al. 2007; Sinclair et al. 2010; Costanza et al. 2012). IHOPE's long-term, human-scale perspective is intended as a corrective to Earth system science-based models that often exclude place-based ways of knowing the world. Such models, using relatively recent data and not taking into consideration long histories of human-environment interaction, cannot steer society toward long-term sustainability. IHOPE's vision affirms the need to critically evaluate these models and the relevance of archaeology in demonstrating that by searching the past, we can find clues to our future.

Particularly exciting is the possibility that organizations and communities that seek to avoid further degradation of the planet could work with those that would conserve human history or culture. For example, the Yucatan peninsula and the Amazon basin are regions of great biodiversity and also places that warrant cultural, linguistic, and heritage conservation (Maffi and Woodley 2010). Moreover, as several historical ecology studies have demonstrated, much of the biodiversity found in these landscapes has emerged as a direct result of human presence and the patterns of ecological mutualism that have evolved between humans and nonhuman species over the *longue durée* (e.g., Arroyo-Kalin 2010). Today many archaeologists have shifted their work from monumental architecture to ancient infrastructure in an effort to learn about place-based management solutions that are sturdy, inexpensive, and relatively easy to maintain. Archaeology, with its ties to groups that safeguard biological and cultural heritage, and with knowledge of the myriad experiments that are part of our human past, can play an important role in linking efforts to safeguard human history while envisioning an equitable and secure future.

Cross-References

▶ Agency in Archaeological Theory
▶ Cultural Landscapes: Conservation and Preservation

▶ Historical Ecology and Environmental Archaeology
▶ Indigenous Knowledge and Traditional Knowledge

References

Arroyo-Kalin, M. 2010. The Amazonian formative: Crop domestication and anthropogenic soils. *Diversity* 2: 473–504.

Balée, W., ed. 1998. *Advances in historical ecology*. New York: Columbia University Press.

Balée, W. 2006. The research program of historical ecology. *Annual Review of Anthropology* 35 (5): 15–24.

Balée, W.L., and C.L. Erickson. 2006. *Time and complexity in historical ecology: Studies in the neotropical lowlands*. New York: Columbia University Press.

Beekman, C.S., and W.S. Baden, eds. 2005. *Nonlinear models for archaeology and anthropology*. Aldershot: Ashgate Press.

Berkes, F., J. Colding, and C. Folke, eds. 2003. *Navigating social-ecological systems: Building resilience for complexity and change*. Cambridge, MA: Cambridge University Press.

Bilsky, L.J., ed. 1980. *Historical ecology: Essays on environment and social change*. Port Washington: Kennikat Press.

Burgi, M. 2011. Frontiers in historical ecology. *IUFRO News* 40: 3.

Burke, P. 1992. *The French historical revolution: The annales school, 1929–1989*. Stanford: Stanford University Press.

Butzer, K.W. 2005. Environmental history in the Mediterranean world: Cross-disciplinary investigation of cause-and-effect for degradation and soil erosion. *Journal of Archaeological Science* 32: 1773–1800.

Costanza, R., L.J. Graumlich, and W. Steffen, eds. 2007. *Sustainability or collapse? An integrated history and future of people on earth*. Boston: MIT Press.

Costanza, R., S. Van Der Leeuw, K. Hibbard, S. Aulenbach, S. Brewer, M. Burek, S. Cornell, C. Crumley, J. Dearing, C. Folke, L. Graumlich, M. Hegmon, S. Heckbert, S.T. Jackson, I. Kubiszewski, V. Scarborough, P. Sinclair, S. Sorlin, and W. Steffen. 2012. Developing an integrated history and future of people on earth (IHOPE). *Current Opinion in Environmental Sustainability* 4: 106–114.

Crumley, C.L. 1979. Three locational models: An epistemological assessment for anthropology and archaeology. *Advances in Archaeological Method and Theory* 2: 141–173.

Crumley, C.L., ed. 1994. *Historical ecology: Cultural knowledge and changing landscapes*. Santa Fe: School of American Research Press.

Crumley, C.L. 2007a. Historical ecology: Integrated thinking at multiple temporal and spatial scales. In *The world system and the earth system: Global socio-environmental change and sustainability since the Neolithic*, ed. A. Hornborg and C.L. Crumley, 15–28. Walnut Creek: Left Coast Press.

Crumley, C.L. 2007b. Heterarchy. In *International encyclopedia of the social sciences*, ed. W.A. Darity, 468–469. Detroit: Macmillian Reference USA.

Crumley, C.L. 2012. A heterarchy of knowledges: Tools for the study of landscape histories and futures. In *Resilience and the cultural landscape: Understanding and managing change in human-shaped environments*, ed. T. Plieninger and C. Bieling, 303–314. Cambridge, MA: Cambridge University Press.

Crumley, C.L., and W.H. Marquardt, eds. 1987. *Regional dynamics: Burgundian landscapes in historical perspective*. San Diego: Academic Press.

Crumley, C.L., T. Lennartsson, and A. Westin, eds. 2018. *Issues and concepts in historical ecology: The past and future of landscapes and regions*. Cambridge, UK: Cambridge University Press.

Dobres, M.-A., and J.E. Robb. 2000. Agency in archaeology: Paradigm or platitude? In *Agency in archaeology*, ed. M.-A. Dobres and J. Robb, 3–17. London: Routledge.

Egan, D., and E.A. Howell. 2001. *The historical ecology handbook: A restorationist's guide to reference ecosystems*. Washington, DC: Island Press.

Folke, C., S. Carpenter, B. Walker, M. Scheffer, T. Elmqvist, L. Gunderson, and C.S. Holling. 2004. Regime shifts, resilience and biodiversity in ecosystem management. *Annual Review in Ecology, Evolution and Systematics* 35: 557–581.

Foster, D., and J.D. Aber, eds. 2004. *Forests in time: The environmental consequences of 1,000 years of change in New England*. 2nd ed. New Haven: Yale University Press.

Grossinger, R. 2012. *Napa Valley historical ecology atlas: Exploring a hidden landscape of transformation and resilience*. Berkeley: University of California Press.

Ingold, T. 2000. *The perception of the environment: Essays in livelihood, dwelling and skill*. London: Routledge.

Jackson, S.T. 2012. Conservation and resource management in a changing world: Extending historical range-of-variability beyond the baseline. In *Historical environmental variation in conservation and natural resource management*, ed. J.A. Wiens, G.D. Hayward, H.D. Safford, and C. Giffen, 92–110. New York: Wiley-Blackwell.

Jackson, S.T., and R.J. Hobbs. 2009. Ecological restoration in the light of ecological history. *Science* 325: 567–569.

Latour, B. 2005. *Reassembling the social: An introduction to actor-network-theory*. Oxford: Oxford University Press.

Maffi, L., and E. Woodley. 2010. *Biocultural diversity conservation: A global sourcebook*. Oxford: Earthscan.
Meyer, W., and C. Crumley. 2011. Historical ecology: Using what works to cross the divide. In *Atlantic Europe in the first millennium BC: Crossing the divide*, ed. T. Moore and L. Armada, 109–134. Oxford: Oxford University Press.
Plieninger, T., and C. Bieling, eds. 2012. *Resilience and the cultural landscape: Understanding and managing change in human-shaped environments*. Cambridge, MA: Cambridge University Press.
Redman, C.L. 2005. Resilience theory in archaeology. *American Anthropologist* 107: 70–77.
Robbins, P. 2012. *Political ecology*. 2nd ed. London: Wiley-Blackwell.
Sinclair, P.J.J., G. Nordquist, F. Herschend, and C. Isendahl, eds. 2010. *The urban mind: Cultural and environmental dynamics*, Studies in global archaeology 15. Uppsala: Uppsala University.
Swetnam, T.W., C.D. Allen, and J.L. Betancourt. 1999. Applied historical ecology: Using the past to manage for the future. *Ecological Applications* 9: 1189–1206.
Szabo, P., and R. Hedl. 2011. Advancing the integration of history and ecology for conservation. *Conservation Biology* 25: 680–687.

Historical Metallurgy Society Ltd.

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Basic Information

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The Historical Metallurgy Society is the lead body for those interested in the past of metals and metal-working, from the earliest origins to the present day. Although UK based, its interests, membership, and publications cover the whole world. The Society is a registered UK Charity (No. 279314) and a Company limited by guarantee (England and Wales No. 1442508).

The Society celebrates its fiftieth anniversary in 2012–2013. It was originally set up by academic and industrial metallurgists interested in the past of their subject, as the Historical Group of the (UK) Iron and Steel Institute, but is now an independent society whose membership includes metallurgists, metal-industry workers, archaeometallurgists, archaeologists, historians, craft blacksmiths, members of related professions, and academic disciplines, and those whose interest in the subject is entirely amateur. Membership is increasingly international, with 36 countries represented in January 2012.

Major Impact

The Society aims to promote research, conservation, and experimental archaeology; disseminate knowledge and understanding; and promote discussion, throughout its subject-area and throughout the world. It does so mainly by the following.

Publications

The Society publishes a refereed academic journal, *Historical Metallurgy*, issued twice per year, and an informal *Newsletter* produced three times per year. It also produces monographs and Occasional Papers on an intermittent basis; most of these have been conference proceedings but other material can be considered. Digitization of back-issues of the Journal is in progress (http://www.hist-met.org/publications.html).

Meetings and Conferences

The Society holds at least three meetings per year: a residential Annual Conference (normally held over a weekend in September or October); a non-residential day meeting (normally held in May or June and combined with the administrative Annual General Meeting); and a Research in Progress meeting normally held on a weekday in November and aimed at research students and

others conducting active research within the subject. Other workshops and small meetings are arranged on an ad hoc basis, often on specialist topics. All of these meetings are normally held in the UK. The Society also welcomes opportunities for joint meetings, conferences, and study-trips with other like-minded organizations, both in the UK and overseas (http://www.histmet.org/meetings.html).

Grants

The Society offers grants toward costs of research, experimental work, and conference attendance within its subject-area. At the moment, these grants are for small sums, but the Society intends to increase its endowments in order to increase its grant-giving (http://www.hist-met.org/grants.html).

Conservation

The Society gives advice on, and lobbies for, the conservation of archaeological sites, historic monuments, artifacts, metallurgical collections and samples, and historical documents relevant to its subject, including company archives (http://www.hist-met.org/conservation.html). This activity has until recently centered on sites and monuments in the UK, but the focus is now moving toward artifact, sample, and documentary collections. *Metals and Metalworking*, the HMS Research Framework on Archaeometallurgy, is available as a free download from the Society's website (http://www.hist-met.org/specpubs.html), or by payment for the printed version; its detail is designed for the UK research and conservation situation, but much of the content is applicable more widely. A series of Datasheets, on specific topics, is available for free download on the website (http://www.hist-met.org/datasheets.html)

Resources

The Society holds a library of printed books, an archive of documents, etc. relating to its own activities plus the papers of Charles Blick and of Professor R.F. Tylecote, and reference collections of slags and metallurgical samples. It also manages the UK National Slag Collection held at Ironbridge Gorge Museum. It is intended to actively develop all of these collections, both for coverage and accessibility (http://www.hist-met.org/resources.html).

Cross-References

- ▶ Archaeometry: Definition
- ▶ Conservation and Management of Archaeological Sites
- ▶ Industrial Archaeology
- ▶ Industrial Heritage in Archaeology
- ▶ Ironbridge Gorge Museum Trust (IGMT)
- ▶ Ironbridge Institute
- ▶ Metals: Preservation and Conservation
- ▶ Museos de Real de Monte
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Research Laboratory for Archaeology and the History of Art (University of Oxford)
- ▶ Technological Studies in Archaeological Science
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Historical Metallurgy Society. n.d.. http://www.hist-met.org/ (For all the Society's publications, meetings, collections and other activities).

Further Reading

Barker, D., and D. Cranstone, eds. 2004. *The archaeology of industrialization*, The society for post-medieval archaeology monograph 2. Leeds: Maney.

Bayley, J., D. Crossley, and M. Ponting, eds. 2008. *Metals and metalworking: A research framework for archaeometallurgy*, HMS occasional publication 6. London: The Historical Metallurgy Society.

Ford, T.D. & L. Willies. (ed.) 1994. Mining before powder: Papers presented at the Georgius Agricola 500th anniversary conference held at Charlotte Mason College, Ambleside, Cumbria, on 25-27th March 1994. *Peak District Mines Historical Society Bulletin* 12.

Lang, J., ed. 1990. *Metals and the sea. Papers presented at the March 1990 conference of the Historical Metallurgy Society held at the National Maritime Museum, Greenwich*. London: Historical Metallurgy Society.

Historical Shipwrecks, Archaeometry of

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State of Knowledge and Current Debates

Introduction

Archaeometry can be broadly defined as the field where knowledge and analytical methods and techniques from natural and applied sciences enhance research carried out in archaeology and related disciplines, such as art history. In this context, an interdisciplinary approach is of crucial relevance for the entire research process. Close interaction between different specialists allows for systematic means of collecting, analyzing, and interpreting data to be applied and to shed light on archaeological questions about the life of past societies. Until the 1990s, most studies were focused on answering inquiries related to dating, exploration, artifact function and use, material sources, and manufacture methods. From then on, research topics, scale of analysis, and materials considered have expanded. Likewise, some analytical means became more complex, while new ones were incorporated. Thus, it was possible to achieve a more comprehensive and detailed understanding of social knowledge, behaviors, technologies, environments, and interactions between them, from ancient periods to recent times.

Today, the scope of archaeometry is pressing against ever-expanding frontiers. Investigations within the field of maritime archaeology have not been left out of this trend, as has been demonstrated by the increasing interest of scholars in adopting interdisciplinary approaches for the analysis of shipwrecks. Advances made on exploration and survey, identification of materials and manufacturing methods, dating, provenance, site formation processes, and treatments for the stabilization of remains are notable. A journal on archaeometric applications in maritime archaeology does not yet exist. But the growing quantity of studies that over the last years have incorporated analytical means to solve archaeological problems is currently reflected in many articles and book chapters, as well as meetings and courses, both of national and international scope. Furthermore, research news on these and other topics are published since 2014 in a special section of the *Newsletter of the Society for Archaeological Sciences* – known as the SAS Bulletin – titled "Maritime Archaeology."

This entry is not intended as a comprehensive review of archaeometric applications in maritime archaeology. Nor is it an exhaustive account on all the methods and analytical instrumentation available. Instead, it explores areas that have lately shown a notable advance regarding the means used for recording shipwrecks, characterizing wooden and metal remains, and preserving in situ and conserving sites and finds. The emphasis is placed on a selection of lines of research which deal with artifacts recovered from ca. fifteenth- to nineteenth-century wooden shipwrecks, especially those related with ship hulls, nautical equipment, and ordnance (Fig. 1).

Maritime and Nautical Archaeology

Maritime archaeology deals with the study of human activities associated with water scenarios (seas, rivers, and lakes), as well as with land operations related to them, through their surviving remains. The research in this field covers a broad spectrum of sites, including shipwrecks, harbors, dockyards, military batteries, and coastal settlements. Up to this point, noteworthy progress has been accomplished within the sphere of nautical archaeology. This particular situation is the outcome of both the predominance of shipwrecks around the world and the emphasis specialists have made on them in the specialty's history.

In this entry, attention is centered on sites from around AD 1450 onward, which are included in the research area known as historical maritime archaeology. This is the temporal framework widely accepted for historical archaeology and postmedieval archaeology, its closest relative in

Historical Shipwrecks, Archaeometry of, Fig. 1 View of the HMS *Victory* (1765 – in service) as an example of an eighteenth-century wooden warship. Note the cannons and the best bower and sheet anchor, located at the starboard side, artifacts commonly found in shipwrecks of the period. HM Naval Base, Portsmouth Historical Dockyard, Portsmouth. N. Ciarlo 2013

Europe. Nonetheless, challenging definitions based exclusively on temporal or methodological criteria, and in the light of recent discussions, it seems that these fields could be better characterized in terms of the diversity of new scenarios and social relationships (economical, political, and ideological) developed globally during the last centuries. In this regard, shipwrecks constitute an exceptional source of information for the study of the recent past, even when documentary sources (e.g., ships' logs, naval regulations, drawings, and paintings) and data from other archaeological remains are available.

Ships have been designed for specific tasks and environments, either the sea or other aquatic settings. As Maarleveld clearly posed: "ships contain in their construction one of the best clues to the mind of *homo faber* that the archaeologist can ever expect to find. The study of technical detail in shipbuilding (. . .) provides us with an exceptional opportunity to understand past thinking, concepts and decisions" (Maarleveld 1995: 4). Moreover, ships have an umbilical relationship with the mainland society: they are not isolated technological expressions nor navigate in a sociocultural vacuum. Watercraft is part of a sociocultural and environmental interweave, an expression of a complex array of factors, both material and nonmaterial, and therefore its study might improve our knowledge on nautical and other aspects related to the onboard and mainland societies. Authors such as Daniel J. Lenihan, Richard A. Gould, Jonathan Adams, and Colin Martin have addressed this theme. On the other hand, by articulating the wide range of documentary sources frequently available for the referred period, studies conducted on shipwrecks have contributed to a better understanding of modern society, in particular regarding military activities, commerce and exchange, extractive companies, and European colonialism (Flatman and Staniforth 2006).

Archaeometry on Historical Shipwrecks

Maritime archaeology is now acknowledged as a maturing field of global scope in which specialists are seeking to apply innovative approaches to explore scarcely developed areas. The need to integrate diverse scales of analysis, reflect on the theoretical foundations of the specialty, and foster the articulation of methods, techniques, and expertise from other disciplines has been stressed in the introduction of *The Oxford Handbook of Maritime Archaeology* (Catsambis et al. 2011: xiii). To broaden the scales of analysis, in particular, is a fruitful path for the development of investigations that go beyond approaches focused on single shipwrecks.

Within this trend, the case of archaeometry and its applications to historical shipwrecks can be highlighted. As was referred above, they have been useful for field-related activities, technological assessment of remains, interpretation of natural and cultural dynamics acting on site,

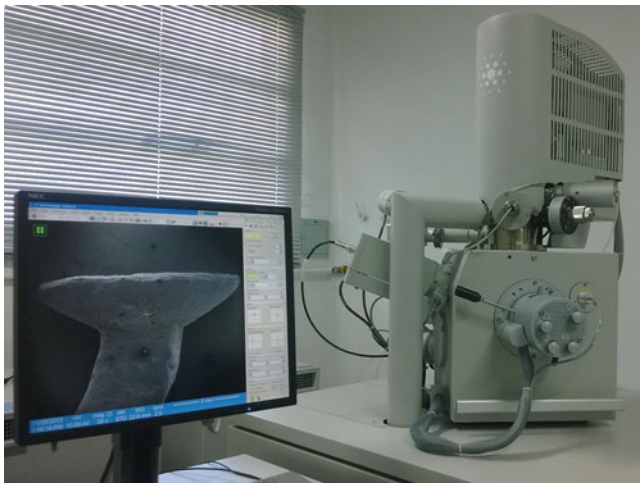

Historical Shipwrecks, Archaeometry of, Fig. 2 Scanning electron microscope QUANTA FEG 250 and image of the unaltered surface of a sheathing tack. (Courtesy of the National Institute of Industrial Technology (Argentina))

and stabilization and conservation of artifacts, among other aspects. The increasing quantity and diversity of archaeometric methods and techniques – some of which have improved and spread significantly in the new millennia – allowed researchers to achieve a better understanding of sites and specific research themes. Most analytical instrumentation was borrowed from the natural and applied sciences (for a summary of available means, please refer to the appendix on scientific analyses and dating techniques of the mentioned handbook) (Fig. 2). Several monographs on studies conducted at historical shipwrecks have incorporated special sections on archaeometric analyses since the 2000s (e.g., Grenier et al. 2007; Elkin et al. 2011; Satchell and Whitewright 2014; Nieto et al. 2016; see also specific works cited below).

Technological improvements have also opened new scenarios for archaeological research. At this point, a mention to geophysical techniques for acoustic and magnetometric underwater survey can be made. Together with unmanned underwater vehicles (UUVs), this area of research has shown outstanding development. An increasing number of maritime archaeologists use them, especially when wide areas need to be covered or deep-water sites accessed. James Delgado, from the US National Oceanic and Atmospheric Administration's (NOAA's) Office of Marine Sanctuaries, has directed interdisciplinary research on three nineteenth-century shipwrecks located 4,300 ft deep in the Gulf of Mexico (see papers presented at the *48th Annual Conference on Historical and Underwater Archaeology*, 6th to 11th January 2015, Seattle). Recent investigations carried out by archaeologists from the National Museum of Underwater Archaeology of Cartagena (ARQUA) on the 3,700 ft deep wreck *Nuestra Señora de las Mercedes* (1804), after the salvaging activities of commercial company Odyssey Marine Exploration, Inc., are also exemplar. They clearly show the importance of applying this kind of technologies with an adequate archaeological criterion, that is to say, aiming to answer archaeological questions (see fieldwork reports at: http://www.mecd.gob.es/mnarqua/).

A selection of significant accomplishments on the topics mentioned in the introduction is addressed in the next sections.

Site Survey and Recording with Multi-Image Photogrammetry

The new millennium saw profound transformations resulting from advances in digital technology. Within this context, the increasing number of tools available for the investigation of shipwrecks is remarkable. The constant improvements in data acquisition and processing systems have offered excellent results in terms of recording and analyzing the material remains of these sites. Photogrammetry deserves a special mention as an instrument for the study of ship hulls, the

morphological-functional analysis of finds, and the interpretation of site formation processes. Furthermore, visualizations and animations derived from this technique have an additional value, as a vehicle for the public dissemination and valorization of shipwrecks.

Undertaking a detailed documentation of the artifacts and structures from the sites under study is one of the fundamental aspects of the archaeological practice. Within maritime archaeology, the application of photogrammetric techniques to the study of shipwrecks dates back to the beginnings of the field, with George Bass's pioneering work. However, due to the operational costs and the technical knowledge required, its use remained relatively limited for several decades. The referred digital advances, especially in terms of software, brought about the introduction of multi-image photogrammetry (or Structure from Motion, SfM) at the beginning of this century. Currently, through software packages such as Agisoft PhotoScan®, it is possible to automatically process a set of numerous photographs to create dense point clouds, which can then be turned into meshes and texture models. Thanks to this new modality, photogrammetry is today a precise, fast, and economical method for surveying and recording shipwrecks (Yamafune et al. 2017).

The process of acquiring data by means of photographic coverage is essential. Precaution is needed before and during the registry, especially if a single conventional digital camera is used. McCarthy and Benjamin (2014) highlighted several aspects specifically related to the conditions of the underwater environment. To begin with, the camera must be calibrated to correct the geometrical distortions produced by the lens (radial distortion) and by the refraction of light in water. Also, to ensure the required vertical and horizontal overlap of images, one single point should be displayed in, at least, three different pictures. How the photographs are to be taken will also depend on the distance to the object, the surrounding visibility, the height of the remains above the sediment, and the presence of mobile elements such as plants and animals, among other factors. These variables must be considered for choosing an adequate camera and defining shooting settings (e.g., ISO, aperture, and shutter speed). The resulting images can be then processed to obtain orthophotos and 3D models. This and other works present some of the low-cost solutions currently available to obtain high-quality records of underwater sites.

Multi-image photogrammetry is especially suitable in both nonintrusive and excavation activities to quickly record complex artifacts and structures, which would demand a huge effort to draw manually. It holds additional value for deep water archaeological sites, where very little time is available to carry out the recording. In these cases, it is also possible to obtain images by means of remotely operated vehicles (ROVs). On the other hand, this technique is a reliable tool from which measures and planimetric drawings can be obtained. Green and Gainsford (2003) proved, through a series of comparative underwater tests, that the photogrammetric record (obtained with PhotoModeler) equals the accuracy of standard trilateration, although considerably faster and thus more efficiently. Given the advantages yielded by computer programs, it is even possible to build 3D reconstructions from raw images. In this regard, the work carried out by Bojakowski and his colleagues in the British shipwreck *Warwick* (1619) is notable. Using the photographic coverage taken during excavations at the site, originally collected to make a photomosaic, the authors assessed the accuracy of SfM against the results obtained by trilateration. Even though the latter is still indispensable, mainly in sites that possess numerous significant details, the former is an extremely useful complement (Bojakowski et al. 2015).

In practice, SfM has mostly been applied on Mediterranean shipwrecks, both to register structural remains and amphorae cargoes (see Drap et al. 2013, among others). However, its application within studies on modern and contemporary shipwrecks has gained ground in recent years. Recently, Yamafune and collaborators proposed a specific methodology for historical sites. Along with the presentation of a detailed procedure, they emphasized on the elaboration of 3D models and their importance both for the study of shipbuilding

design and construction and for the dissemination of archaeological sites to the public (Yamafune et al. 2017).

The high degree of detail provided by orthoimages and 3D models is helpful for the interpretation of sites. In the case of ship structural remains, these representations are a source of data permanently available to archaeologists – in this way they gain certain independence from the sites – when examining naval architecture. This is equally valid for isolated artifacts, such as anchors and cannons. Shipwrecks assessed in different parts of the world account for the relevance of this analytical tool (e.g., Mccarthy and Benjamin 2014; Bojakowski et al. 2015; Yamafune et al. 2017). Recent lines of work also include the generation of 3D models based on optical and acoustic sensors and underwater videos. Among current digital approaches to the study of shipwrecks, the recording, reconstruction, and analysis of recovered ship remains by 3D laser scanning, in particular the advances made within the Faro and Rhino Archaeological User Group (FRAUG) by Pat Tanner, Nigel Nayling, and colleagues, are worth mentioning (see also the 3D documentation of the hull of the Confederate submarine *H.L. Hunley*, 1864, made by Michael P. Scafuri).

A photogrammetry 3D model and an orthoimage of the Deltebre I site structure made using Agisoft PhotoScan® are displayed in Fig. 3. The remains studied by the Catalan Centre for Underwater Archaeology (Centre d'Arqueologia Subaquàtica de Catalunya – CASC), under the direction of Gustau Vivar, belong to a British naval transport which sailed during the Napoleonic wars and sunk at the Ebro river delta, off the Catalonia coast, in 1813. Since the beginning of the archaeological work in 2008 until its completion almost a decade later, a planimetric record of the excavated sectors was kept. This allowed verifying the structural deterioration suffered by several sectors of the hull, caused by the environment's erosion

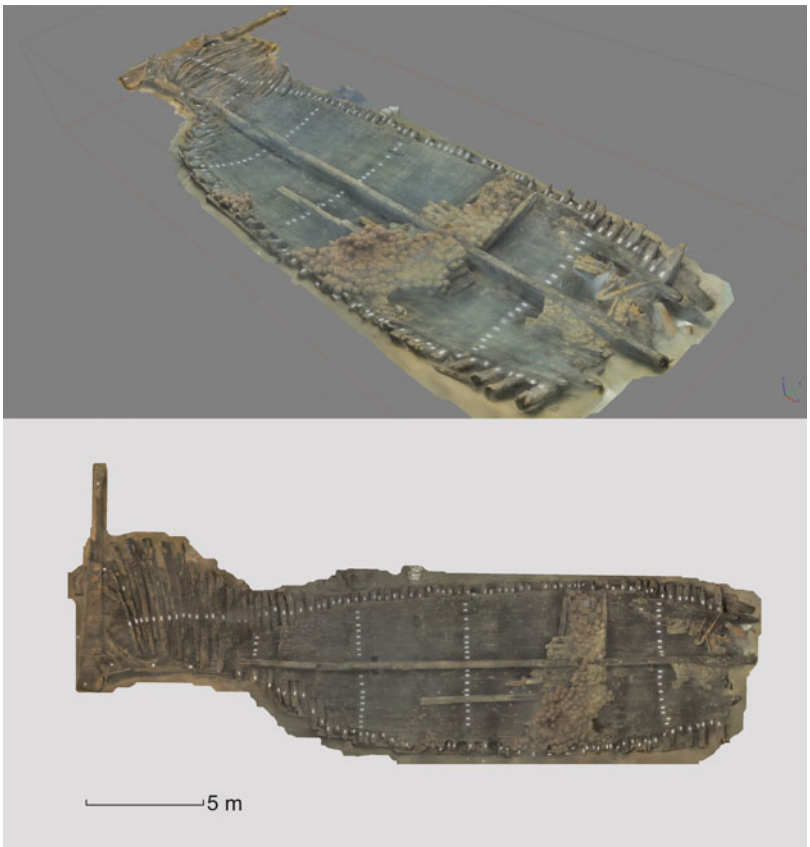

Historical Shipwrecks, Archaeometry of, Fig. 3 (above) Photogrammetry 3D model and (below) orthoimage of the Deltebre I site hull structure, after completing the excavation works of the cargo (by Juan Mayoral Peñalva 2018). Remains correspond to the lower part of the hull: note the frames and inner planking, the keelson, and the well-preserved rudder (height: 9.5 m) that lies horizontally on the seabed. A few canons and mortar bomb storage in bulk still continue in situ afore the midship area. (Courtesy of the CASC)

and consequent exposure of the timbers on the seabed. This record was recently complemented with a photogrammetric registry, which required over 6,000 photos. Thus, it was possible to appreciate the complete remaining hull structure, a significant aspect given the visibility at the site (a mean of 5 m). Because of the aforementioned, multi-image photogrammetry is a fundamental recording tool for the regular monitoring of the state of preservation and future study of the remains.

Research conducted until now offers a glimpse of this technique's future. Because of its utility and considering the trends of recent years, it is likely that SfM will soon become an indispensable tool for the research and management of the maritime cultural heritage that lies underwater and in the intertidal zone. From now on, as Drap and others have recently highlighted, the main issue revolves around the possibility of adding "semantic to this survey and offering a dynamic link between geometry and knowledge" (Drap et al. 2013: 389). Archaeological interpretations derived from the data collected will depend to a large extent on this.

Materials Characterization and Lines of Research

Wood Anatomical and Dendrochronological Studies

Wood has been the main material used for naval construction until the introduction of iron and steel in the nineteenth century. Even if from that moment on the industry radically changed, this did not imply the abandonment of wooden shipbuilding, which continued to be performed in diverse contexts. During the age of sail, certain species were selected for the different structural components of a ship's hull, its masts and yards, elements of the nautical equipment, etc. Within each shipbuilding tradition, the choice of species was based on their properties, availability, and abundance in the natural environment, among other aspects. On the other hand, multiple artifacts used onboard by the crew were also manufactured from this material. The study of the wooden remains of a shipwreck, thus, is fundamental for the knowledge of the aspects mentioned above. Two branches of botany that contemplate the examination of wood and provide information of interest to deal with archaeological problems are referred here: plant anatomy and dendrochronology. The cases of study considered are mainly focused on the characterization of woody plant species used in naval construction.

Plant anatomy is devoted to the study of the internal structure of specimens: cells, tissues, and organs. This structure provides information for taxonomical analyses, including the identification of the samples' family, genus, and, to a lesser extent, species. The study requires the identification of diagnostic anatomical features, typical of each plant species, by comparing the sample with a reference collection and/or specialized bibliography (Caruso Fermé 2013).

On the other hand, dendrochronology deals with the history of trees through the analysis of their annual growth rings. Through time, the thickness of trees increases because of the action of tissues located underneath the bark that produce successive layers of xylem (i.e., wood). The growth of concentric layers, which mainly depends on the local annual seasonality, can be appreciated as rings in a transversal section. The main aim of dendrochronology is establishing master chronologies. In addition to contributing with the research of the diverse environmental factors which affected the growth process (e.g., precipitations, temperature, physicochemical characteristics of the soil, and other natural and anthropic phenomena), it is also used in archaeology to estimate the felling date of trees and their ulterior employment in, for example, naval construction. The absolute dating of a sample is obtained by comparing (cross dating) the individual series with a reference tree-ring sequence, unique for each species and region. The master chronologies are elaborated by matching characteristic patterns of annual growth rings, that is to say, those that preserve the climatic signature of a certain moment, observed in long-lived trees in specific geographical areas. To these, in turn, can be added the series obtained from ancient and archaeological wood. Thanks to an extensive work, sequences covering hundreds of years uninterruptedly exist for several regions of Europe. Moreover, provenance estimations can be carried

out thanks to the marked differences that the growth patterns of some species present at a regional level, as is the case of the European oak (Gutiérrez Merino 2009).

Adequate sampling is essential for the anatomical and dendrochronological analyses. In the first case, if the material is not carbonized, three different cuts are made with specific tools, corresponding to the anatomical planes of the wood: cross (transverse), radial, and tangential longitudinal sections. Different anatomical features can be obtained from each section. After the preparation of samples, anatomical and structural observations are made by optical stereomicroscopy (OSM), light microscopy (LM), and scanning electron microscopy (SEM) (Castro and Aldazabal 2007). In the second case, samples are taken with an increment borer or cutting transversal sections, depending on the situation, after which they are slowly dried and have their surface polished for the observation and measuring of rings (Mundo 2012). In practice, diverse factors can condition this kind of studies: the amount of wood available and its state of deterioration are generally determinant. As regards of anatomical analyses, the intraspecific variation and the physical similarities between species can difficult the identification (Caruso Fermé 2003). In dendrochronological studies, the number of rings is crucial, as it must allow recognizing the characteristic pattern produced by climate. The more the rings are preserved – ideally more than 80, although there is no general agreement – the more reliable the dating is. Occasionally, despite the disappearance of certain structures because of the original anthropic modifications and/or the decay suffered afterward (e.g., lack of sapwood or heartwood rings), it is still possible to make useful estimations (see Carrell 2003).

The anatomical analysis of timbers from a shipwreck is of special interest for studying the qualities of materials employed in construction. On some occasions, given the spatial distribution of certain species, it is possible to evaluate the provenance of the archaeological remains and, by extension, the approximate location of the shipyard. On the other hand, the importance of dendrochronological studies lies in the possibility of dating and assessing the provenance of the remains of a site. Because of the complementarity of both analyses, they are frequently applied together. For historical shipwrecks, the data obtained from these studies are evaluated together with the abundant documentation usually available on naval architecture, forest resource policies, nature and uses of timbers, etc. In particular, the anatomical analyses have provided useful information about ships' technology and life history. Noteworthy contributions have been made to the knowledge of the technical qualities of ship structures and equipment, different construction traditions, refitting operations, navigational routes, and regional and local logging practices (e.g., Carrell 2003; Castro and Aldazabal 2007; Rich et al. 2017). The taxonomical studies have also been applied on cordage elements and other organic artifacts used onboard.

Dendrochronological analyses have been employed to circumscribe the time and place of construction of historical shipwrecks (e.g., Grenier et al. 2007; Mundo 2012; Auer and Nayling 2014; Satchell and Whitewright 2014). The articulation of diverse sources of information and analytical techniques has provided significant results. The studies carried out in the Akko 1 site can be mentioned as an example. This shipwreck corresponds to an armed brig, most likely of Egyptian flag, which sunk during the naval siege of the city of Akko, Israel, by the British-Austrian-Ottoman fleet in 1840. The implementation of radiocarbon wiggle-matching (a combination of tree-ring analysis and radiocarbon data) of the ship timbers and the ^{14}C dating of short- or shorter-lived samples found in the shipwreck (e.g., cordage elements and food remains), together with other archaeological data, allowed to asses not only the time of construction but also to estimate the date of its last voyage and loss (Lorentzen et al. 2014). In the case of positively identified shipwrecks for which abundant historical records are available, the results obtained can help understand the age of the trees employed, the relation between the felling date and the time when the wood was used, as well as the reuse of old timbers. In the French shipwreck *La Belle* (1684), the dating of several structural pieces

suggested that timbers from older ships were reused for the construction of the hull (Carrell 2003).

Nowadays, many regions of the world still lack reference databases for dendrochronological studies. This has limited the investigations, particularly in areas that have been important supply centers for naval construction. The case of forest resources of the Iberian Peninsula used during the early modern period (sixteenth to eighteenth centuries) is of special significance. As Crespo-Solana and Nayling (2016) have recently noted in their presentation of the ForSEAdiscovery project (http://forseadiscovery.eu/), it is currently fundamental to develop long tree-ring chronologies in specific regions. By carrying out interdisciplinary work that combines documentary information and data from diverse means of analysis, it will be possible to generate databases that enable archaeologists to extend the application of dendrochronological studies in historical maritime archaeology.

Metallurgical Examination

The research of archaeological remains related to the extraction, production, circulation, and use of metallic objects is covered by a well-developed specialty: archaeometallurgy. It was originally comprised within archaeometry but soon became a field of knowledge in its own right. The investigations draw on specific means of analysis, as well as on historical sources such as written and oral records. Metallurgical analyses are significant for archaeological research in general and for shipwreck studies in particular. Metallic objects are ubiquitous in historical sites around the world. Among the most frequent finds in wooden shipwrecks are parts of the hull, to which different metallic elements are often associated, nautical equipment, ordnance, and other elements that were either part of the ship or carried onboard. For more recent times, ships with mixed construction and iron or steel hulls should also be considered.

Nowadays, a multiplicity of analytical methods and instrumentation is available to characterize the structure and composition of metal artifacts. The structural features of metals are observable at different magnitudes and include dislocations, grains, inclusions, twins, shrinkage cavities, and pores. Metallurgical examination usually involves analyses at more than one level and helps recognize, for instance, the heterogeneity of constitutive elements and the thermomechanical and corrosive processes that transformed a given object. Among available observation techniques, metallography has played a leading role in the characterization of archaeological remains. It consists in the examination of the microstructure of samples by LM and SEM, to determine the type and morphology of the material's microconstituents. The proportions, shapes, colors, and configuration in which these occur are related with the composition and properties of the material, and they are the enduring evidence of some of the transformations that it suffered (see Wayman 2004, among others). On the other hand, several chemical composition analyses can detect and quantify major and trace elements of the materials, for instance, energy dispersive X-ray spectroscopy (EDS), X-ray fluorescence (XRF), optical emission spectroscopy (OES), atomic absorption spectrometry (AAS), and neutron activation analysis (NAA).

These and other techniques have often been combined for studying metals from shipwrecks. They help recognize events in the life history of archaeological artifacts, from the acquisition and processing of raw materials to the manufacture, use, and deterioration in the depositional context. The main aim is to bridge the technical data and the social aspects that were, in one way or another, involved in their shaping. To begin with, the temporal and spatial coordinates of the remains under study can be narrowed down by the observation of the analytical results together with documentary sources and archaeological parallels. But archaeometallurgical studies also enable transcending the knowledge of single finds or isolated shipwrecks. If a comparative approach is applied, they can help answer questions about nautical technology at a given time. Studies can even go beyond this particular scenario and deal with matters such as knowledge of the behavior of materials, craft production techniques, innovations in industrial methods, experimentation processes,

and dynamics of technological transference. As was stated for other analyses, the explanatory potential of the data obtained always depends on the nature of the questions asked and the studies developed to answer them.

Metallurgical examination of objects from historical shipwrecks began to be carried out on a regular basis at the beginning of the 1980s. The main foundations were laid in Australia; over time, this approach was extensively applied in other countries such as Argentina, England, Israel, and Spain. To date, studies on wooden-hulled historical shipwrecks from the eighteenth and nineteenth centuries are the highest in number.

Important contributions have been made on sites for which abundant documentary information is available. Works have mainly dealt with nautical (e.g., hull fastenings and sheathing; anchors, pumps, and rigging components) and military (e.g., cannons, personal weapons, and ammunition) technology. In general, they address the function of the pieces, materials and production methods, and available metallurgical knowledge (e.g., Samuels 1992; MacLeod 1994; Macleod and Pitrun 1996; Mentovich et al. 2010; Ciarlo 2015). Leading scholars such as Dana Ashkenazi (Tel Aviv University), Manuel Bethencourt (University of Cadiz), Horacio De Rosa (University of Buenos Aires), and Peter Northover (University of Oxford) have also conducted extensive analyses on iron, copper, and copper-based artifacts. Investigations also provided information on the wrecking process itself: the analysis of the steel plates and wrought iron rivets from the RMS *Titanic* (1912) conducted by scientists of the University of Missouri-Rolla can be mentioned as an example (Felkins et al. 1998). In unidentified shipwrecks, the typological and physicochemical characterization of structural elements such as bolts, nails, and sheathing plates has been useful to appraise their date and provenance and thus contributed to an initial approach to the sites themselves (e.g., De Rosa et al. 2015). Most of these studies are based on the application of one or more of the techniques mentioned above, primarily metallography (Fig. 4). More recently, analyses of lead stable isotopes by multiple-collector inductively coupled plasma mass spectrometry (MC-ICP-MS) were used to determine the provenance of the raw materials of artifacts from the cargoes and ships' structure (e.g., Birch et al. 2014), and statistical tools such as multivariate analysis were introduced for interpreting compositional quantitative data of large samples (e.g., Ciarlo et al. 2016).

Objects used onboard have not been analyzed to the same extent. Research on the HMS *Swift* (1770) can be quoted: not only were its nautical components studied but also personal firearms, furniture, food and kitchen utensils, uniform accessories, and personal belongings. Data recovered from these remains helped understand both life on board and technology of the society of that moment. The studies on alloys and manufacturing processes of small items such as buttons, buckles, spoons, kettles, knobs, candlesticks, and coins were important contributions, as few technical descriptions are available in documentary sources (Ciarlo 2014).

Generally, contributions have hitherto been focused on the remains of isolated shipwrecks from European origin located around the world. Therefore, comparative studies must be explored better if broader questions are to be addressed. The author's dissertation on technological innovations and conflict of naval powers, which focuses on the applications of metallurgy to shipwrecks, is based on this approach (Ciarlo 2016). The work presents the characterization of an array of metal artifacts from mid-eighteenth- to early nineteenth-century British, French, and Spanish shipwrecks. Ships of different rates (as well as unrated) were considered, and specific analyses were performed on structural fastenings, sheathing, nautical equipment, and ordnance. Both the manufacturing methods and the characteristics of the materials were identified with different instrumental techniques. Those results and the information recovered from documentary sources and other well-studied archaeological sites were used to analyze changes in metal elements used in wooden warships. The dynamic of some innovation processes developed during the period were discussed in the light of the technical changes at the beginnings of industrialization, the

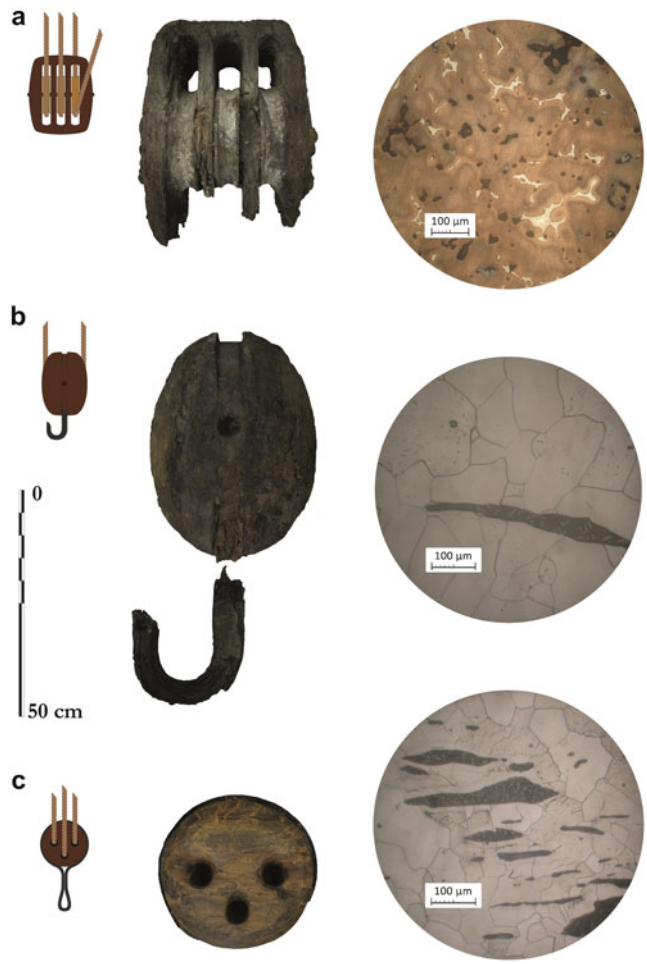

Historical Shipwrecks, Archaeometry of, Fig. 4 Rigging components recovered from the 74-cannon Spanish ship *Triunfante* (1795), Gulf of Roses: (**a**) triple sheave block; (**b**) single sheave block with an (now broken) iron hook; and (**c**) deadeye with an iron strap. A technological assessment of samples was carried out by means of metallography and other techniques. Photomicrographs indicate that one of the sheaves (**a**) was manufactured in a copper alloy by casting, while the hook and strap (**b** and **c**) were made in wrought iron by a hot-forging process (after Ciarlo 2016)

articulation of empirical and scientific knowledge, and the implications of states' conflicts on technology.

In regard to iron and steel ships, research conducted over 30 years on different sites in Australia should be mentioned, particularly the groundbreaking case of the *SS Xantho* (McCarthy 2009). Studies of these shipwrecks were mainly focused on the shipbuilding industry from the mid- to late nineteenth century and, within this context, the transition from sail to steam. Works carried out at local and regional scales helped understand the social and economic processes behind this change. Significant advances were made after Gould (2000) emphasized the need to explore this subject. Besides, archaeological surveys and recordings were performed on other underwater sites, such as steel-hulled ships, submarines, and other vehicles and machines from the Second World War. Archaeometallurgical analyses, however, are comparatively scarce. On the other hand, these wrecks have been of particular interest for corrosion specialists. They have studied the deterioration mechanisms of iron in maritime environments and, together with conservators, searched for the best treatments to preserve them (see below).

Archaeometallurgical research has contributed with nautical technology studies, including artifact production, shipbuilding, past technical and scientific knowledge, innovation processes, and performance of materials. The future of these studies seems to lie on the integration of information

from several shipwrecks. Works that follow this approach are recent but most promising.

Decaying Processes, In Situ Preservation and Conservation of Wooden and Metal Remains

Underwater archaeological remains can be preserved exceptionally under favorable conditions; this applies outstandingly to wood and other organic artifacts. This was acknowledged by archaeologists in the late nineteenth century. Nonetheless, a paradox in terms of conservation was also recognized early on: the integrity of these and other materials is severely altered when they are exposed and/or removed from their original context, especially if they are shifted from anaerobic to aerial conditions. Given the significance of cultural heritage and the need for long-term preservation, decisions and operations aiming to mitigate its deterioration must be applied from the very start. Within this scenario, several analytical means have been used to assess the state of preservation of the finds and thus decide the optimal way to protect them. Additionally, interdisciplinary researches have improved our understanding of the deterioration phenomena and their consequences and helped develop novel techniques for the in situ preservation and conservation of sites and finds. Due to their distinctive properties, wooden and metal artifacts are subject to different deterioration processes and therefore require special treatments.

The remains of wooden shipwrecks in seawater and other aquatic systems can lie either on the seabed (uncovered) or below the sediment (buried). In the former, remains can be affected by water erosion and wood-boring organisms. In the latter, although erosion bacteria degrade the cellulose and lignin of wood cells and decrease its strength, buried and waterlogged archaeological wood usually appears to be well-preserved to the naked eye. There are two main ways to handle wooden remains from underwater sites: (1) in situ preservation and (2) excavation, removal, and conservation in laboratory. Since the 1990s, a trend toward the first option has been observed: the works of David Gregory, Martijn Manders, Ian Oxley, and Vicki Richards, among other conservation scientists and archaeologists, are noteworthy. Concerning international standards, the 2001 UNESCO Convention for the Protection of the Underwater Cultural Heritage strongly promotes nonintrusive strategies for research and in situ preservation. It should be noted, however, that excavation continues to be an essential method for data recollection in archaeological research. As safeguarding this heritage for future generations is the main concern, archaeologists and conservators need to develop more effective and efficient methods for attaining this purpose (see Gregory et al. 2012).

If it is decided that a site must be protected in situ, which is desirable in most cases, the condition of the wood and the natural and cultural agents of deterioration should be noted in advance in order to correctly evaluate the decay potential. Besides, it is of great importance to periodically monitor the remains to ensure their long-term preservation. Macro- and microscopic examinations and chemical composition analyses of archaeological samples help understand the effects of degrading organisms (e.g., marine borers, soft rot fungi, and tunneling and erosion bacteria) in underwater sites. Studies on the decay rates of specimens placed in environments with specific oxygen levels, salinity, temperature, and other conditions constitute an important basis for the development of effective in situ preservation methods. For instance, while marine borers attack wooden remains exposed to salty water above the seabed, they are absent in near-anaerobic environments below the sediment, where erosion bacteria are the main cause of wood decay (Björdal 2012). As these agents can – and usually do – interact in a single site, their joint action and its consequences are an issue of special interest for future research.

In addition, the analysis of wood is a crucial step to determine its state of preservation and to decide the proper strategies for its raise, conservation, display, and storage. The evaluation of the degradation mechanisms and the consequences of exposing wood to aerobic conditions have received special attention. In the Baltic Sea and Scandinavian waters, timbers of several shipwrecks and their surrounding sediments were examined by means of different spectroscopic

methods and elemental analyses. Data recovered shed light on the decay process of wood deposited in a near-anaerobic substrate, where sulfate-reducing bacteria cause its degradation and chemical contamination. It was concluded that when timbers are raised and exposed to aerobic conditions, the sulfur and iron accumulated by these organisms can oxidize and acidify the wood and compromise their mechanical stability (Fors et al. 2012). Characterization techniques were also applied by Emma Hocker (The Vasa Museum) and other conservators to appraise the condition of timbers treated with polyethylene glycol (PEG) – a water-soluble agent that works by replacing water in the wood cells – that are contaminated with insoluble compounds of iron. Lessons learned from extensive conservation experiences on shipwrecks such as the Swedish warship *Vasa* (1628) can help to anticipate similar problems and face new challenges. Stabilization of recovered artifacts also created special challenges and depends on laboratory techniques that are highly environment-specific, for instance, the lyophilization process used with waterlogged organic remains.

Studies of the long-term corrosion behavior of metal artifacts are well developed. Extensive research was carried out on different remains from underwater sites, mainly iron and steel, by eminent specialists such as David Gregory, Ian MacLeod, Paul Mardikian, Jean-Bernard Memet, and David Watkinson. In Australia, the pioneering works of MacLeod with wooden and metal shipwrecks and associated iron finds such as cannons and anchors demonstrated the importance of on-site measurements of electrochemical parameters to understand corrosion mechanisms and the decay of materials in different environments (e.g., shallow vs. deeper waters). The effectiveness of treating the pieces in situ with sacrificial anodes was also assessed. Over the years, this author analyzed pre-disturbance pH values and corrosion potentials of cannons from the Cromwellian shipwreck at Duart Point (1653), the warship HMVS *Cerberus* (1926), and other sites of the period, before and during their in situ preservation. Measures taken since late 1980s have provided data on changes of the microenvironment underneath the concretion layer of each object. MacLeod then defined the arithmetic product of these parameters, named the Corrosion Indicator, as a valuable model that specialists can use to monitor the progress of a conservation treatment and determine the moment at which an object has been stabilized (MacLeod 2013). The microstructural examination of copper, bronze, and silver alloy artifacts recovered from seventeenth- to nineteenth-century sites has also expanded our knowledge on the long-term behavior of materials in seawater (e.g., MacLeod and Pitrun 1986). Archaeological remains that have been subjected to specific environmental conditions for centuries are also a useful source of information for other disciplines, such as materials science and engineering.

In the laboratory, some techniques such as X-ray radiography (XR) and computed tomography (CT) have been widely used to identify the morphology and appraise the integrity of ferrous and nonferrous artifacts before conservation, in particular for heavily concreted pieces. Data obtained is also helpful to evaluate marine iron remains extensively deteriorated, which thereupon can be replicated using cold-setting resins. Concretions associated to the remains of the Dutch vessel *Hoorn*, from the Jacob Le Maire and Willem Schouten' voyage, which sunk in the Deseado estuary, Santa Cruz, in 1615, were subjected to this replication process (Ciarlo 2006). As early as the 1960s, specialists from Australia, Britain, Scandinavia, and the USA began to experiment with different methods to remove encrustations and chloride ions from artifacts (see papers on the *International Journal of Nautical Archaeology* and *Studies in Conservation*, among others). Over the years, conservators and materials scientists developed novel techniques that improved the results obtained with conventional treatments, such as washing and electrolytic reduction systems, and are very useful for conserving and long-term managing of recovered archaeological materials (see ICOM-CC Metals Working Group online publications). For instance, Paul Mardikian, Nestor González-Pereyra, and colleagues from the Warren Lasch Conservation Center at the Clemson University Restoration Institute obtained significant results

from their experiments with subcritical and supercritical fluids for the stabilization of several artifacts from the *H.L. Hunley* (1864).

Understanding how a shipwreck was transformed due to natural and human impact over time is fundamental for the interpretation of archaeological evidence and the search for adequate solutions to mitigate threats and stabilize and monitor the remains. Investigations conducted at historical shipwrecks have mainly been focused on natural site formation processes, in particular on how natural agents affect the conservation and spatial distribution of materials in underwater and intertidal sites.

Systematic experimentation carried on underwater to test wood and metal samples is an interesting approach to assess the deterioration processes at a site. Archaeologists and biologists have centered in the identification and behavior of biofouling communities and wood-boring organisms. In Latin America, extensive work was carried out by Monica Grosso and Ricardo Bastida on the remains of the HMS *Swift*, 1770 (e.g., Bastida et al. 2004; see also Elkin et al. 2011). In Spain, a program to monitor the physicochemical and biological decay processes of materials commonly found in wooden shipwrecks was developed under the direction of Manuel Bethencourt. A series of test panels were located in shallow waters of the Gulf of Cadiz, both above and below the seabed (Fig. 5), and their response to different microenvironments followed closely (Bethencourt et al. 2017). On the other hand, stabilization trials with geotextile mats were conducted in the HMS *Colossus* (1798), Isles of Scilly, to evaluate the effectiveness of different existing methods for the in situ preservation of structural wooden remains. The characterization of timber test blocks by means of visual examination, XR, and SEM and the periodical monitoring of chemical and physical parameters (dissolved oxygen, Redox, temperature, and pressure) allowed specialists to determine how wood borers and microorganisms affected samples placed in dissimilar environmental conditions (Camidge 2009).

The analysis of the nature of sediments, current dynamics, wave conditions, and properties of water is also important. Here, interdisciplinary approaches based on the combination of data from geophysics, geomorphology, marine biology, and materials science, among other fields, have a special value in terms of theory and practice in shipwreck archaeology (e.g., for defining survey priority areas). In a recent work, field measurements and numerical modeling were developed to understand the articulation between scouring, geomorphologic changes, and hydrodynamic forcing at the shallow water wave-dominated *Fougueux* (1805) site, Gulf of Cadiz (Fernández-Montblanc et al. 2016).

In sum, archaeometric studies conducted at different sites have allowed archaeologists to obtain a better understanding of the conditions of wood and metal remains and their threats and

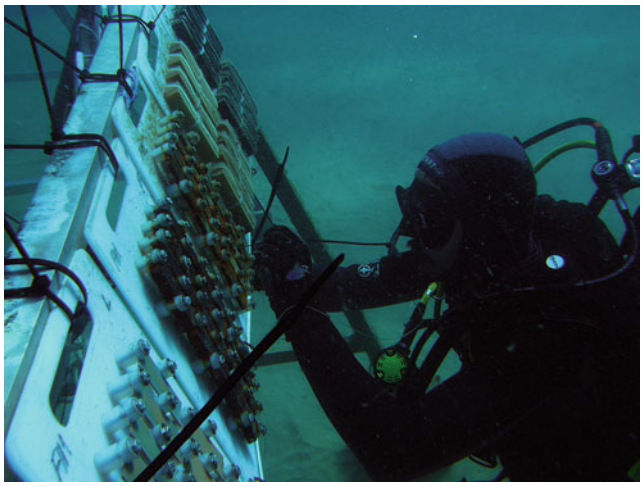

Historical Shipwrecks, Archaeometry of, Fig. 5 Test panels with different wood and metal samples, placed above the sediment in shallow waters at the Gulf of Cadiz. (Courtesy of M. Bethencourt)

decay rates. Results obtained so far are a solid foundation to improve the techniques applied to the in situ preservation and conservation of historical shipwrecks. Research advances achieved during the last years suggest that further improvements are likely to be developed before long.

Future Directions

Archaeometric studies stand as a valuable resource for the research of historical shipwrecks, one which should not be neglected. Studies conducted so far are a testimony of the increasing articulation of specific knowledge and theoretical-methodological approaches from different specialties belonging both to the natural and applied sciences. Concomitant efforts to overcome disciplinary trenches have allowed addressing subjects that could not be understood throughout from the optic of a unique field.

In this entry, just a fraction of the extensive contributions made up to this point was reviewed. However, I hope to have depicted the potential of bridging different yet complementary approaches within maritime and nautical archaeology. This have helped to locate and identify shipwrecks, examine their technology, establish the date and provenance of artifacts, elaborate 3D models of sites, and evaluate the integrity of the remains and the factors that affect them, among other aspects. In retrospective, investigations show that an increasing amount of analytical methods and instrumentation is being applied. Specifically, works that use digital techniques to record shipwrecks in situ and those that apply analytical means to investigate/inquire into wooden and metal remains experienced a remarkable growth since the beginning of the century. Less represented but with a promising future is the incorporation of statistical tools for processing compositional data of large samples, as well as numerical models for interpreting site formation processes. Other recent lines of archaeometric research in shipwrecks include DNA analysis and isotopic studies of human skeletal remains and chemical and petrographic characterization of ceramics shreds.

Comparative analyses provide an amazing opportunity for nautical studies. In the last years, researchers have explored the relationship between the material evidence at the sites under study – singular entities – and the large-scale context. They have thus considered both the distinctive aspects of social life and their articulation with extensive processes. Concerning shipwrecks, investigations have ranged from the study of the evidence from a single vessel to the analysis of several of a certain period or geographical area. Nowadays, diachronic archaeometric research accounts for multiple features that defined ships through time and contributes with the knowledge of dynamics in nautical technology and other social activities in local and regional maritime scenarios around the world. Available scientific devices stand as an important mean for conducting studies which, in the long run, could contribute to solving broad archaeological questions.

To accomplish it, it is crucial to keep an interdisciplinary approach throughout the entire research process, from the stages of planning and execution to the interpretation of results. It is widely acknowledged that obtaining data from available methods and techniques is not an end in itself. Even if they can be an exceptionally useful tool, the affirmations derived from their application are of little value without proper orientation. As I have sought to show in this essay, these resources are meaningful for maritime archaeology and archaeology in general, as long as specialists work jointly with the aim to achieve a comprehensive understanding of questions about the human past. In practice, the main challenge has been to bring together different spheres of knowledge, establish a fluid dialogue, and encourage mutual learning between specialists. Future advances will depend not solely on technical innovations but, primarily, on the improvement of interdisciplinary links.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Modern Vessel Archaeology (Iron and Steel Wrecks)
- ▶ Ship Archaeology

▶ Society of the Ship
▶ Underwater Archaeology
▶ Underwater Sites in Archaeological Conservation and Preservation
▶ Waterlogged Finds: Conservation
▶ Wreck Site Formation Processes

References

Auer, J., and N. Nayling. 2014. The ship. In *The Gresham ship project. A 16th-century merchantman wrecked in the Princes Channel, Thames estuary. volume 1: Excavation and Hull studies*, British archaeological reports, British series 602, ed. J. Auer and T.J. Maarleveld, 19–46. Oxford: Archeopress.

Bastida, R., D. Elkin, M. Grosso, M. Trassens, and J.P. Martin. 2004. The British sloop of war HMS *Swift* (1770): A case study of the effects of biodeterioration on the underwater cultural heritage of Patagonia. *Corrosion Reviews* 22 (5–6): 417–440.

Bethencourt, M., T. Fernández-Montblanc, A. Izquierdo, M. González-Duarte, and C. Muñoz-MAS. 2017. Study of the influence of physical, chemical and biological conditions that influence the deterioration and protection of underwater cultural heritage. *Science of the Total Environment* 613–614: 98–114.

Birch, T., M.F. Charlton, L. Biggs, Z.A. Stos-Gale, and M. Martinón-Torres. 2014. The cargo. In *The Gresham ship project: A 16th-century merchantman wrecked in the Princes Channel, Thames estuary. volume 2: Contents and context*, British archaeological reports, British series 606, ed. G. Milne and D. Sully, 53–69. Oxford: Archeopress.

Björdal, C.G. 2012. Microbial degradation of waterlogged archaeological wood. *Journal of Cultural Heritage* 13 (Supplement 3): S118–S122.

Bojakowski, P., K. Custer Bojakowski, and P. Naughton. 2015. A comparison between structure from motion and direct survey methodologies on the Warwick. *Journal of Maritime Archaeology* 10: 159–180.

Camidge, K. 2009. HMS *Colossus*, an experimental site stabilization. *Conservation and Management of Archaeological Sites* 11 (2): 161–188.

Carrell, T.L. 2003. From Forest to Fairway: Hull Analysis of *La Belle* a Late 17th Century French Ship. Unpublished PhD dissertation, University of St. Andrews.

Caruso Fermé, L. 2013. *Los recursos vegetales en Arqueología. Estrategias de muestreo y estudio del material leñoso*. Buenos Aires: Dunken.

Castro, M.A., and V.B. Aldazabal. 2007. *Maderas empleadas en la construcción naval. Embarcaciones halladas en la cuenca del Plata y Atlántico Sur*. Buenos Aires: Dunken.

Catsambis, A., B. Ford, and D.L. Hamilton, eds. 2011. *The Oxford handbook of maritime archaeology*. New York: Oxford University Press.

Ciarlo, N.C. 2006. Metodología de estudio de artefactos ferrosos corroídos en un medio subacuático. Un caso de estudio: Las concreciones del sitio *Hoorn*. *La Zaranda de Ideas* 2: 87–106.

Ciarlo, N.C. 2014. *Arqueometalurgia de un sitio de naufragio del siglo XVIII: la corbeta de guerra HMS Swift (1770), Puerto Deseado, provincia de Santa Cruz (Argentina)*, British Archaeological Reports, International series 2596. Oxford: Archeopress.

Ciarlo, N.C. 2015. Naval metals from mid 18th- to early 19th-century European shipwrecks: A first analytical approach. *Historical Metallurgy* 47 (2): 146–152.

Ciarlo, N.C. 2016. Innovación tecnológica y conflicto naval en Europa Occidental, 1751–1815: Aportes arqueológicos e históricos al conocimiento de la metalurgia y sus aplicaciones en los barcos de guerra. Unpublished Ph.D. dissertation, University of Buenos Aires.

Ciarlo, N.C., G. Maxia, M. Rañi, H. De Rosa, R. Geli Mauri, and G. Vivar Lombarte. 2016. Craft production of large quantities of metal artifacts at the beginnings of industrialization: Application of SEM-EDS and multivariate analysis on sheathing tacks from a British transport sunk in 1813. *Journal of Archaeological Sciences: Reports* 5: 263–275.

Crespo-Solana, A., and N. Nayling. 2016. ForSEAdiscovery. Forest resources for Iberian Empires: Ecology and globalization in the age of discovery (16th-18th centuries). In *A heritage for mankind: Proceedings of the 5th international congress on underwater archaeology*, ed. I. Negueruela Martínez, R. Castillo Belinchón and P. Recio Sánchez (coord.), 896–904. Cartagena: Ministry of Education, Culture and Sport.

De Rosa, H., N.C. Ciarlo, M. Pichipil, and A. Castelli. 2015. 19th century wooden ship sheathing. A case of study: The materials of Puerto Pirámides 1, Península Valdés. *Procedia Materials Science* 9: 177–186.

Drap, P., D. Merad, A. Mahiddine, J. Seinturier, D. Peloso, J.-M. Boï, B. Chemisky, and L. Long. 2013. Underwater photogrammetry for archaeology. What will be the next step? *International Journal of Heritage in the Digital Era* 2 (3): 375–394.

Elkin, D., C. Murray, R. Bastida, M. Grosso, A. Argüeso, D. Vainstub, C. Underwood, and N.C. Ciarlo. 2011. *El naufragio de la HMS Swift (1770): Arqueología marítima en la Patagonia*. Buenos Aires: Vázquez Mazzini Editores.

Felkins, K., H.P. Leighly Jr., and A. Jankovic. 1998. The royal mail ship Titanic: Did a metallurgical failure cause a night to remember? *JOM* 50 (1): 12–18.

Fernández-Montblanc, T., R. Quinn, A. Izquierdo, and M. Bethencourt. 2016. Evolution of a shallow water wave-dominated shipwreck site: Fougueux (1805), Gulf of Cadiz. *Geoarchaeology: An International Journal* 31: 487–505.

Flatman, J., and M. Staniforth. 2006. Historical maritime archaeology. In *The Cambridge companion to historical archaeology*, ed. D. Hicks and M. Beaudry, 168–188. Cambridge: Cambridge University Press.

Fors, Y., F. Jalilehvand, E.D. Risberg, C. Björdal, E. Phillips, and M. Sandström. 2012. Sulfur and iron

H

analyses of marine archaeological wood in shipwrecks from the Baltic Sea and Scandinavian waters. *Journal of Archaeological Science* 39: 2521–2532.

Green, J., and M. Gainsford. 2003. Evaluation of underwater surveying techniques. *The International Journal of Nautical Archaeology* 32 (2): 252–261.

Gregory, D., P. Jensen, and K. Strætkvern. 2012. Conservation and in situ preservation of wooden shipwrecks from marine environments. *Journal of Cultural Heritage* 13 (Supplement 3): S139–S148.

Grenier, R., M.-A. Bernier, and W. Stevens, eds. 2007. *The underwater archaeology of Red Bay: Basque shipbuilding and whaling in the 16th century. volume 5: Appendices, glossary and bibliography*. Ottawa: Parks Canada.

Gutiérrez Merino, E. 2009. La dendrocronología: métodos y aplicaciones. In *Arqueologia Nàutica Mediterrània*, Monografies del CASC 8, ed. X. Nieto and M.A. Cau, 309–321. Girona: Archaeological Museum of Catalonia.

Lorentzen, B., S.W. Manning, D. Cvikel, and Y. Kahanov. 2014. High-precision dating the Akko 1 shipwreck, Israel: Wiggle-matching the life and death of a ship into the historical record. *Journal of Archaeological Science* 41: 772–783.

Maarleveld, T.J. 1995. Type or technique. Some thoughts on boat and ship finds as indicative of cultural traditions. *The International Journal of Nautical Archaeology* 24 (1): 3–7.

Macleod, I.D. 1994. Conservation of corroded metals – A study of ships' fastenings from the wreck of HMS *Sirius*. In *Ancient and historic metals conservation and scientific research*, ed. D.A. Scott, J. Podany, and B.B. Considine, 265–278. Los Angeles: Getty Conservation Institute.

Macleod, I.D. 2013. The mechanism and kinetics of *in situ* conservation of iron cannon on shipwreck sites. *International Journal of Nautical Archaeology* 42 (2): 382–391.

Macleod, I.D., and M. Pitrun. 1986. The effects of microstructure on long-term corrosion. In *Proceedings of the Australasian corrosion association conference 26*, vol. 2, 1–14. Adelaide: Australasian Corrosion Association.

Macleod, I.D., and M. Pitrun. 1996. Metallography of copper and its alloys recovered from nineteenth century shipwrecks. In *Marine archaeology. The global perspectives*, ed. G. Kuppuram and K. Kumudamani, 347–356. New Delhi: New Gyan Offset Press.

Mccarthy, J., and J. Benjamin. 2014. Multi-image photogrammetry for underwater archaeological site recording: An accessible, diver-based approach. *Journal of Maritime Archaeology* 9: 95–114.

Mccarthy, M., ed. 2009. *Iron, steel & steamship archaeology: Proceedings of 2nd Australian seminar, held in Perth, Melbourne and Sydney, 2006*. Fremantle: Australian National Centre of Excellence for Maritime Archaeology.

Mentovich, E.D., D.S. Schreiber, Y. Goren, Y. Kahanov, H. Goren, D. Cvikel, and D. Ashkenazi. 2010. New insights regarding the Akko 1 shipwreck: A metallurgic and petrographic investigation of the cannonballs. *Journal of Archaeological Science* 37 (10): 2520–2528.

Mundo, I.A. 2012. Desde la interdisciplina: Análisis dendrocronológico del pecio de ZenCity. ¿Qué nos dicen los anillos de crecimiento de sus maderas? In *Un mercante español en el Puerto de Buenos Aires (publication in CD)*, ed. M. Valentini and J. García Cano, 80–85. Buenos Aires: General Direction of Heritage.

Nieto, J.F., M. Pujol, and G. Vivar, eds. 2016. *El vaixell Triunfante: Una fita de la ciència i de la tècnica del segle XVIII*, Monografies del CASC 12. Gerona: Centre d'Arqueologia Subaquàtica de Catalunya.

Rich, S.A., N. Nayling, G. Momber, and A. Crespo Solana. 2017. *Shipwrecks and Provenance: In-situ timber sampling protocols with a focus on wrecks of the Iberian shipbuilding tradition*, British archaeological reports, access archaeology 42. Oxford: Archeopress.

Samuels, L.E. 1992. Australia's contribution to archaeometallurgy. *Materials Characterization* 29: 69–109.

Satchell, J., and J. Whitewright, eds. 2014. *The Maritime Archaeology of Alum Bay: Two shipwrecks on the north-west coast of the Isle of Wight, England*, British archaeological reports, British series 608. Oxford: Archeopress.

Wayman, M.L. 2004. Metallography of archaeological alloys. In *ASM handbook, volume 9: Metallography and microstructures*, ed. G.F. Vander Voort, 468–477. USA: ASM International.

Yamafune, K., R. Torres, and F. Castro. 2017. Multi-image photogrammetry to record and reconstruct underwater shipwreck sites. *Journal of Archaeological Method and Theory* 24 (3): 703–725.

Further Readings

Adams, J. 2001. Ships and boats as archaeological source material. *World Archaeology* 32 (3): 292–310.

Bass, G.F. 2011. The development of maritime archaeology. In *The oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 3–22. New York: Oxford University Press.

Ciarlo, N.C., H. De Rosa, H. Lorusso, C. Vázquez, D. Elkin, and G. Custo. 2015. *Veritas Temporis Filia*: Non-destructive analysis of counterfeit and regal copper coins from the sloop-of-war HMS *Swift* (1770), by means of SEM-EDAX and WDXRF. *Numismatic Chronicle* 175: 227–242.

Cohen, M., D. Ashkenazi, Y. Kahanov, A. Stern, S. Klein, and D. Cvikel. 2015. The brass nails of the Akko Tower wreck (Israel): Archaeometallurgical analyses. *Metallography, Microstructure, and Analysis* 4: 188–206.

Dillmann, P., G. Béranger, P. Piccardo, and H. Matthiesen, eds. 2007. *Corrosion of metallic heritage artefacts. Investigation, conservation and prediction for long-term behaviour*, European Federation of Corrosion Publications 48. Cambridge: Woodhead Publishing Ltd./Maney Publishing Ltd.

Gould, R.A. 2011. *Archaeology and the social history of ships*. New York: Cambridge University Press.

Hocker, E., G. Almkvist, and M. Sahlstedt. 2012. The *Vasa* experience with polyethylene glycol: A conservator's perspective. *Journal of Cultural Heritage* 13 (Supplement 3): S175–S182.
Labbe, M. 2010. A Preliminary Reconstruction of the Yassiada Sixteenth-Century Ottoman Wreck. Unpublished Master dissertation, Texas A&M University. Available at: http://nautarch.tamu.edu/Theses/pdf-files/Labbe-MA2010.pdf. Accessed 5 Sept 2017. Accessed 5 May 2017.
Macleod, I. 1989. The application of corrosion science to the management of maritime archaeological sites. *The Bulletin of the Australian Institute for Maritime Archaeology* 13 (2): 7–16.
Mertes, J., T. Thomsen, and J. Gulley. 2014. Evaluation of structure from motion software to create 3d models of late nineteenth century great lakes shipwrecks using archived diver-acquired video surveys. *Journal of Maritime Archaeology* 9: 173–189.
Moore, J.D. 2015. Long-term corrosion processes of iron and steel shipwrecks in the marine environment: A review of current knowledge. *Journal of Maritime Archaeology* 10 (3): 191–204.
Näsänen, L.M.E., N.G. González-Pereyra, S.A. Cretté, and P. Deviviés. 2013. The applicability of subcritical fluids to the conservation of actively corroding iron artifacts of cultural significance. *The Journal of Supercritical Fluids* 79: 289–298.

Histories of the Archaeological Discipline: Issues to Consider

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Introduction

One could argue that archaeology is a discipline obsessed with its own history. It is as if the discipline, through studying the material remains of past human populations, feels that this is an obvious part of its mission. Indeed, textbooks, handbooks, regional syntheses, books on theory, and more will greet you with an archaeological history on the given topic within the first few pages.

Any general history of archaeology will tell you a version of how it was born, how it developed, and how it changed as new techniques or new theories or perspectives arose. In fact, archaeology and archaeologists cannot be disentangled from social and economic contexts or political orientations and institutions (see Harmansah and Shepherd 2012: 52). When one of these contexts changes so does the discipline by virtue of its reaction to these situations. As such, some archaeologists and theorists have become increasingly concerned with:

> . . .tracing the genealogies of the discipline in colonial modernity and reflecting on its powerfully political status in the postcolonial world (e.g. Hamilakis and Duke 2007; Liebman and Rizvi 2008) (Harmansah and Shepherd 2012: 52).

H

Key Issues

Political, Social, and Economic Considerations

The political, social, and economic interrelationships that link archaeologists and academic institutions with broader political contexts are particularly explored in this entry (as well as many other entries edited by Haber and Roberts in this encyclopedia – see Cross-References listed at the end of this entry). Indeed, it is argued that the ideological needs of political regimes have been shown to influence the development of certain archaeological interpretations in a number of cases.

Given the interrelationships outlined above, it can be argued that the narratives of the past produced by archaeologists can, therefore, be read as allegories of the narratives of power (of gender, race, class, etc.). In the majority of histories, archaeology is represented as changing over time according to either external influences or its own internal evolution (e.g., its techniques, theories, and institutions). However, the epistemic conditions of the discipline are often unexplored. Epistemic assumptions about the discipline are reinforced in the ways in which the discipline tells its own history. It is only by telling their own history that history-tellers reinforce their claims. Indeed, as Pocock (1998: 220) has remarked about historians:

> They may be unruly members, but still they are members, of the society and culture within which they write, and whose history they are as a rule in some sense writing. . . It follows that every political society tends to maintain and recount what may be termed an autocentric history, a history of itself so far as it has succeeded in maintaining itself. . ..

While Pocock frames this debate in relation to "political societies," we would argue that the sentiments are just as relevant to "disciplinary societies" such as the archaeological community. Likewise, just as Hamilakis (2012: 70) remarked in his recent paper, we should remember to heed Said's (1994) recommendations to continually reflect "on the dangers of professionalized scholarship, a scholarship that fails to interrogate the structures it is implicated in. . .."

Issues with Disciplinary Histories

Thus, in this entry, we attempt to consider a number of assumptions present in many narratives. For it can be stated that history produced by the history-tellers often reveals as much about the process of producing historical texts as it does about the discipline. For example, many narratives take for granted the idea of Western lineal time and thereby signify that certain philosophies and approaches are better suited than others for knowing the past. Although some accounts, such as Trigger's (1996: 40–41), point to alternative ideas:

> This assessment assumes that there is a past and, hence, that time, whether it is viewed as an attribute of the natural world or a form of perception embedded in the human brain, is invariably conceptualized as a linear, irreversible flow. This conclusion may be psychologically correct in the sense that, because of awareness of causality, everyone perceived time as they are experiencing it to be unidirectional. Yet it is known anthropologically that the imaging of time is culturally variable. . ..

We would argue that historical narratives about the discipline of archaeology should actually serve to highlight the often arbitrary relationships between the kind of knowledge we call archaeology and the ontological-epistemic assumptions on which it is based and which it sustains.

Thus, archaeologists and historians of the discipline should be the ones insisting that there are always exceptions to the primary stories told (after Pocock 1998: 229). By attempting to highlight such exceptions, researchers can at least try to avoid reinforcing typical assumptions (such as linearity), thereby revealing that histories are particular and contingent. Further, we would contend that the discipline now needs histories about the history-tellers so that the hegemonies inherent in past accounts may be illuminated. Areas where such hegemonic ideas have become general and pervasive should also be deconstructed and countered. Indeed, archaeology, like other Western traditions, cannot be separated from the habits of Western historiography. Thus, the history of history-tellers may also be a privileged and pervasive arena where ontological assumptions regarding history are reproduced.

The particular and contingent nature of disciplinary narratives becomes more apparent when regional meta-disciplinary accounts sit side by side – this can be more apparent in a compilation such as this encyclopedia which assembles histories written by scholars from around the globe and from different archaeological traditions and social, economic, and political persuasions. Such a collection is not, however, without complications as further explored below.

Grappling with Multiple Frameworks

It could be argued that a global encyclopedia, such as this volume, represents the attempt to grapple with the perhaps impossible task of presenting a comprehensive examination of multiple frameworks – primarily through the introduction of numerous international perspectives. However, there is the potential to over-estimate the results of this globalizing exercise and thereby introduce a systematic deformation.

In fact, it should be noted that many narratives profess a global standpoint, although in reality they may be quite insular in their own frameworks. In this sense, Trigger (1984) began the process of addressing these issues in his insightful and much-debated paper entitled "Alternative archaeologies: nationalist, colonialist, imperialist." He concluded that archaeology is "strongly influenced by the position that the countries and regions in which it is practiced occupy within the

modern world-system" (Trigger 1984: 355). He also rightly criticized Clarke's (1979: 154) belief that there should be a "single coherent empirical discipline of archaeology." Thus, taking into account the many corners of the world in which archaeology is now practiced and also given that many researchers who write archaeological histories are not necessarily reflective about the influences (social, political, economic etc.) on all aspects of their work a comprehensive examination of multiple frameworks will undoubtedly always be an impossibility.

It should also be acknowledged that there is disagreement about how much influence political (and other) forces have on the discipline. Indeed, since Trigger's influential paper, there has clearly been much debate on this topic with some researchers ultimately arguing that nationalism is at the very heart of some archaeologies (e.g., European and the so-called third world) with others taking a middle road – these discussions are apparent in the quote below:

> Yet it is going too far to claim that nationalism was embedded in the very concept of archaeology and was the only cause of its development (Díaz-Andreu and Champion 1996: 3) or that nationalism cannot do without archaeology (Slapšak and Novaković 1996: 290). . .. (Trigger 1996: 248–249)

Thus, the degree to which researchers should reflect on the external forces involved in the creation of archaeological histories is also a contested ground, further complicating the task of understanding multiple frameworks. We would also argue that there is still some way to go in relation to understanding how the debates about ideas such as nationalism have progressed. It has seemingly become popular to condemn nationalistic tendencies in "third world countries," for example, with little reflection on the purported universality from which the critique arises or the potential imperialistic underpinnings of such condemnations. As Trigger (1984: 363) noted nearly 30 years ago, we must not lose sight of the hegemonic ways in which some nations may exert their powerful cultural, political, and economic influences over neighboring countries.

It should also not be forgotten that archaeology is also a territorialized practice. As Hamilakis (2012: 71) has commented, "As in all colonial ideologies, the neo-colonialism or perhaps the crypto-colonialism of certain strands of archaeological and museographic thinking today enacts simultaneously strategies of territorialisation and temporalisation: sustained engagement with certain locales can be linked to primordialist ties and essentialist claims, nationalist or other, on the part of the scholar; but it may also be indicative of a long-term commitment to a place and all its people, past and present, things and objects, sentient and non-sentient beings that belong to that place."

Identifying Silences

When considering archaeological histories, we should not only be concerned with understanding multiple frameworks and contested understandings but also be cognizant of the fact that current interpretations will be bounded.

The history of archaeology, like any disciplinary history, is also an important mechanism for the demarcation of its boundaries. We can scrutinize such histories by considering the areas that they exclude. In this case, such exclusion may operate in the manner as outlined by Fabian (1983) in his discussion about anthropology which he described as a denegation of coevalness.

Ways of relating to objects and beings that are considered different in approach to an institutionalized archaeological discipline are often narrated as "pre-disciplinary" in archaeological histories. Indeed, archaeologies other-to-the-discipline are described as not only as nonscientific but also as prescientific, as if they were superseded by the arrival of the discipline. As Byrne (1995: 278) writes, "multiple and mature discourses on the material past already exist in the space archaeology depicts as a void." Thus, the archaeological discipline, being positioned on the same timeline as discarded versions, both excludes its other and confirms its own epistemic assumptions regarding time.

Conclusions: A Polyphony of Partial and Contingent Voices and an Infinity of Alternative Histories

We would argue that the edited entries relating to the history of archaeology (see Cross-References

below) do not represent a thorough global coverage. Instead, we would contend that this selection is rather a polyphony of voices, all of them partial and all of them contingent. It should also be noted that most of the voices in these entries originate from within the discipline.

Thus, we encourage readers to consider imagining an infinity of histories of archaeology that could be written or compiled as an alternative to this volume – and to think about all that remains to be written. For example, we pose the question: How would those outside of the disciplinary context view and write such histories?

Such a history of archaeology could detail encounters with archaeology, with its texts, its actions in the field, its works for the public, and its monuments. These encounters would not assume a position already inside the discipline and could include displacements and subjective transformations. In such a history of archaeology, events will not happen within a thing called "archaeology," but things would happen to archaeology-as-a-thing. As Haber (2012: 64) has remarked, the task of undisciplining archaeology "has to be done in conversation, not merely with other colleagues, already participants of the same disciplinary faith, but with non-academic actors and collectives" and that through these intercultural relationships with the hegemonic episteme a political and poetical job of critical theorizing might take place.

Cross-References

- ▶ Archaeology and Politics
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Archaeology as Anthropology
- ▶ Archaeology in the Enlightenment
- ▶ Archaeology: The World at 1800–1850
- ▶ Chronological Systems, Establishment of
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Early Excavations Around the Globe
- ▶ Gender, Feminist, and Queer Archaeologies: A Spanish Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: European Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Heritage Legislation, The Introduction of: Disciplining Through Law
- ▶ History and Archaeology: Relationship over Time (US Perspective)
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Nationalism and Archaeology: Overview
- ▶ New Archaeology, Development of
- ▶ Post-Processualism, Development of
- ▶ Professionalization: Archaeology as an "Expert" Knowledge
- ▶ Public Archaeology, The Move Towards
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Reflexive Approaches in Archaeology, Development of
- ▶ Second Modernity and the Second Phase of European Colonialism
- ▶ South American Archaeology: Postcolonial Perspectives
- ▶ Spain: Nationalism and Archaeology
- ▶ "Speculative Phase" of Archaeology
- ▶ Stratigraphy in Archaeology: A Brief History
- ▶ Unilinear Evolution and Lineal Time: A Critique

References

Byrne, D. 1995. Buddhist Stupa and Thai social practice. *World Archaeology* 27 (2): 266–281.

Clarke, D.L. 1979. *Analytical archaeologist*. London: Academic.

Díaz-Andreu, M., and T. Champion. 1996. Nationalism and archaeology in Europe: An introduction. In

Nationalism and archaeology in Europe, ed. M. Díaz-Andreu and T. Champion, 1–23. London: UCL Press.
Fabian, J. 1983. *Time and the other: How anthropology makes its object*. New York: Columbia University Press.
Haber, A. 2012. Un-disciplining archaeology. *Archaeologies* 8 (1): 55–66.
Hamilakis, Y. 2012. Are we postcolonial yet? Tales from the Battlefield. *Archaeologies* 8 (1): 67–76.
Hamilakis, Y., and P. Duke, eds. 2007. *Archaeology and capitalism: From ethics to politics*. Walnut Creek: Left Coast Press.
Harmansah, O., and N. Shepherd. 2012. The location of theory: A discussion with Homi Bhabha. *Archaeologies* 8 (1): 52–54.
Liebman, M., and U.Z. Rizvi, eds. 2008. *Archaeology and the postcolonial critique*. Lanham: Altamira Press.
Pocock, J.G.A. 1998. The politics of history: The subaltern and the subversive. *The Journal of Political Philosophy* 6 (3): 219–234.
Said, E. 1994. *Representations of the intellectual*. New York: Pantheon Books.
Slapšak, B., and P. Novaković. 1996. Is there national archaeology without nationalism? Archaeological tradition in Slovenia. In *Nationalism and archaeology in Europe*, ed. M. Díaz-Andreu and T. Champion, 256–293. London: UCL Press.
Trigger, B. 1984. Alternative archaeologies: Nationalist, colonialist, imperialist. *Man* 19 (3): 355–370.
Trigger, B. 1996. *A history of archaeological thought*. 2nd ed. New York: Cambridge University Press.

Historische Archäologie

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Brief Definition of the Topic

Today, the excavation of medieval and post-medieval sites is a major part of the work of archaeological heritage agencies. Medieval contexts and finds have been analyzed critically and comprehensively, after an initial period in which they were discussed uncritically and in isolation. In German-speaking Europe, however, there is no real methodological or theoretical forum for post-medieval themes. This gap should be filled by the online journal *Historische Archäologie*. The journal aims explicitly to present research and analysis from the late medieval period and the modern period up to contemporary history in all its aspects. Its time frame ranges from the fourteenth/fifteenth century CE until today.

"Historical archaeology" is a term used differently by the various different archaeological traditions found worldwide, but all definitions and uses have in common an emphasis on periods with so-called dense tradition. This generally means that the archaeological material sources are accompanied by written and visual records and perhaps by oral history. The availability of such a density and diversity of sources offers greater potential for an emic and internal view of the culture being studied than is possible for "prehistoric" societies; this is an aspect which this entry intends to emphasize.

With this entry, a bridge should be built to other parts of Europe and other regions in the world, regions that in the early modern and later periods were by no means border areas and peripheries but instead saw cultural developments and independent phenomena, which have been increasingly appreciated in archaeology since the 1990s. This entry aims to offer young scientists and "established" colleagues the opportunity to present their research, in the form of well-founded, methodologically or theoretically oriented papers, which are likely be discussed in professional circles, rather than data-heavy field reports. All types of sources (archaeological, documentary, visual, and oral) should be incorporated, analyzed, and evaluated in a complementary fashion to answer the questions asked. This is the only way comprehensive cultural scientific and historic conclusions can be reached. It is repeatedly said with regret in archaeology that there is hardly any professional interchange between English- and German-speaking colleagues due to the language barrier. To address this, *Historische Archäologie* hopes to publish many articles in English or at the very least with a detailed English summary. Only in this way will international attention be drawn to research from the German-language area and take part in international discussion.

The journal was founded in 2009 and publishes articles in no particular order. The submitted

manuscripts are reviewed by an editorial board. At the time of writing, the editors are Dr. Natascha Mehler; Deutsches Schiffahrtsmuseum Bremerhaven; Prof. Dr. Claudia Theune, University of Vienna; and Prof. Dr. Ulrich Müller, University of Kiel.

Cross-References

- ▶ Central–Eastern Europe: Historical Archaeology
- ▶ Deutsche Gesellschaft für Archäologie des Mittelalters und der Neuzeit e.V. (DGAMN)
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ International Journal of Historical Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Western Europe: Historical Archaeology

References

Historische Archäologie. n.d. Available at: http://www.histarch.uni-kiel.de/index.htm.

History and Archaeology: Relationship Over Time (US Perspective)

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Introduction

Anglo-American archaeology, like all archaeology, has always been about history (i.e., the past). Nonetheless, the relationship between archaeology and history, as disciplines, has not always been consistent. The views of archaeologists and historians toward one another's fields have changed over time as new ideas and approaches have come into prominence. As a result, any brief overview such as this must be limited in scope, touching on only a few of the more salient points.

Any exploration into the nature of the relationship between archaeology and history must begin with the explanation that "history" has two distinct meanings. In one sense, "history" represents what has actually happened in the past; it refers to the trillions of events that have occurred since the beginning of time. The renowned Italian historian Benedetto Croce (1921: 125) uses the phrase "the actuality of living history" (or past actuality) to refer to this meaning of history. All scholars acknowledge that human history is made by people going about their daily lives – building institutions, attending school, harvesting, sleeping, and performing millions of other activities throughout their lifetimes. In this sense, history is simply everything that has occurred before "now." This history – the real past – being gone forever, remains today as images in living memory or physical representations, such as standing structures and textual records.

Accepting that the past actually existed but appears in the present as images or reflections means that scholars disagree on precisely how history should be understood and interpreted. None of us today can observe the actions of past individuals. The second sense of "history" is thus much more contentious. Croce (1921: 19) terms the writing of history "chronicle" or history "recorded in abstract words." A chronicle is a written history reconstructed from images taken from the vast sweep of past actuality. Contention among scholars occurs because, as the American historian Carl Becker (1955) argues, any written history is necessarily selective; archaeologists and historians can only include a finite number of historical facts in their accounts. Recounting all of human history would take as long as human history itself. The result is that archaeologists, like historians, must select "historical facts" from past actuality to create images of history. This conclusion does not mean that archaeologists and historians are permitted to write fantasies because their professional responsibilities require them to be as honest and accurate as possible. Just how this is to be accomplished, however, has encouraged archaeologists and historians to ponder, discuss,

and debate the meaning of history and the relevance of the past to contemporary life. Shifting views about who writes history, the relevance of the intended audience, and an account's long-term impact mean that controversies over the relationship between archaeology and history will continue to occur as long as both disciplines exist. Contention is not necessarily detrimental because the overt engagement with difficult issues forces scholars to reflect on their professions' meanings and societal responsibilities.

Becker's understanding of historical fact selection is especially pertinent to the practice of archaeology because the act of excavation overtly involves sampling. No matter how careful an archaeologist may wish to be in the field, he or she can never perfectly collect all possible information. The minute spatial relationships between all other artifacts (even those not excavated), the precise angles of artifacts in the earth, and the number of grains of sand brushed from an artifact's surface constitute facts that may be lost forever. Thus, all archaeological research, even the most overtly scientific in design and implementation, involves some measure of selection.

Definition

A dividing line between archaeologists and historians is difficult to draw with clarity. During the 1960s, many scholars debated the differences between the two disciplines, but in the end decided that the actual differences were quite negligible (e.g., Hughes 1960). Both professions concern themselves with many of the same topics, and many often use the same sources of information. It would be too facile to state that archaeologists excavate sites and historians interpret documents because some historians excavate and most archaeologists examine written records. American archaeologists differ from most historians by virtue of the archaeologists' formal training in anthropology, but even this distinction is too simple because English archaeologists and social historians regularly rely on anthropological perspectives and concepts. It can be reasonably observed, however, that archaeologists and historians have different disciplinary traditions and histories even though their work with the past is similar. Self-identification as belonging to one discipline or another thus may be something of a personal matter based on one's disciplinary home or research approach.

The tension that sometimes exists between archaeology and history may occur because archaeological excavation can refute long-held historical understandings that have been based on written accounts alone. At the same time, excavation can cast light upon subjects little studied by historians and can change the ways we perceive the past. Many historians have recently begun to use more anthropological methods and materials in their research, and many archaeologists have learned to give more weight to the historians' methods. The willingness to bring the two disciplines closer together has had many positive outcomes, even though the practice of archaeology and history continues to exhibit a healthy tension that serves to improve both fields of inquiry. Perhaps the most obvious link between archaeology and history occurs in historical archaeology, a subfield of archaeology that explicitly combines archaeological research with historical materials and interpretation. Nonetheless, all archaeologists regardless of area of interest use history to create narratives about the past.

Historical Background

The history of the relationship between archaeology and history is difficult to characterize with ease because of the variety of opinions. The first archaeologists who excavated the ancient cities of Greece, Italy, and Egypt viewed themselves as engaged in historical research (e.g., Stiebing 1993; Dyson 2006). They adopted a crude evolutionary framework – sometimes only tacitly – that tended to envision broad-scale cultural change along a trajectory that extends from simple to complex. The acceptance of broad-scale cultural evolution was certainly prevalent after 1859 when Darwin published *The Origin of Species*, and this outlook on human history was partly responsible for creating professional archaeology (Willey and

Sabloff 1993: 86). The cultural evolution paradigm holds that human history has changed over time from incorporating relatively simple elements (such as hunting and collecting) to developing extremely complex institutions (such as industrialism). Of course, as archaeologists and historians began to investigate the realities of cultural evolution in actual settings, they began to question the precise ways in which it operated both locally and globally, and today's understanding of cultural evolution is much more nuanced than was possible in the late nineteenth century.

V. Gordon Childe, an Australian-born British archaeologist of international repute, was arguably the most well-read archaeologist to espouse an explicit cultural evolution and to work as an archaeologist-historian. He observes in his book *History* that "It should be the historian's business to disclose an order in the process of human history" (Childe 1947: 5). A committed proponent of Marx's historical materialism, Childe believed that human history had progressed through a series of distinct stages and that culture advanced when revolutions in the economic base caused broad-scale social changes in other institutions. For example, when people learned to feed themselves with sedentary horticulture rather than with nomadic hunting, they had time to develop writing, to devise different family structures, and to build cities (and thus create "civilization"). Childe's views on history were widely accepted for many years, partly because having a broad view, he was intimately familiar with little-known museum collections throughout Western and Central Europe and the Near East.

Not every Anglo-American archaeologist accepted Childe's views in their entirety, especially not in the United States where the Cold War era fostered a strong disinclination for all things that appeared Marxist in influence, even archaeological theory. Still, most archaeologists generally accepted the idea of broad cultural change over time, even though they may not have agreed with precisely how to model and interpret it. One problem with the approach is that it has been used outside archaeology to promote and reinforce social Darwinist claims about cultural superiority and inferiority.

One Anglo-American archaeologist who did not wholly ascribe to Childe's evolutionary view was the British scholar R.G. Collingwood. Collingwood, a professor of Metaphysical Philosophy at Oxford University, had performed archaeological research on Roman sites in Great Britain. His book *The Idea of History* (1946) appeared 1 year before Childe's book. Collingwood (1939: 133), who like Childe moved easily between the worlds of the archaeologist and the historian, defined archaeology as "history in which the sources used are "unwritten" sources, or, more accurately, are not pre-existing narratives of the events into which the historian is inquiring." In other words, archaeologists write history for those times that lack textual documentation, whereas historians write history with extant records.

Collingwood (1946: 213) focused one of his historical interests on "the outside and the inside" of events. By "outside," he meant past action or the movement of actual physical things in the past – Caesar's crossing of the Rubicon, the blood spilled at the assassination of Abraham Lincoln, and the course taken by Napoleon's army toward Waterloo. But the "inside" of an event could only be described in terms of thought: the ideas behind the events. For him, then, the ideas of history provide the key to understanding. His view offered an important refocusing of archaeological thought away from the strict materiality of artifacts as expressions of art or even as metaphors for technologically driven cultural evolution.

In the early 1940s, when British archaeologists Childe and Collingwood were pondering the relationship between archaeology and history, an American archaeologist named Walter Taylor was contemplating the same issues for his doctoral thesis. Taylor finished his thesis in 1943, reworked it after the Second World War, and published it for the first time in the *American Anthropologist* as a memoir in 1948. Since that time, his *A Study of Archaeology* has been republished and widely read.

Taylor wrote the study as a critique of the practice of Americanist archaeology in light of the historical perspective prominent in American

anthropology. Unlike English anthropology, American anthropology had been founded to investigate the precontact expressions of Native American life, in other words, all those elements of Indigenous life in North America that were beyond the reach of field ethnographers. The overall goal of early American anthropology – of which archaeology was perceived as an integral element – was based on the mistaken concept that Native American cultures were rapidly disappearing and so evidence of them needed to be saved for posterity. Given this mandate, the role of American archaeology during what has been termed the "Classificatory-Historical Period" (1914–1960) was to collect and describe ancient Native American artifacts and settlements (Willey and Sabloff 1993: 96–213).

Taylor's goal was to delve into the nature of archaeology, history, and anthropology and to determine how the three were interlinked. His controversial conclusion was that archaeology is "neither history nor anthropology" but is an "autonomous discipline" that is essentially a method of data collection (Taylor 1948: 44). He viewed carefully controlled, scientific excavation as merely a tool for gathering information. What divided archaeologists – as anthropologists or historians – was based on the way each individual used archaeological information. Taylor (1948: 32) explained how this worked using five steps. The first step concerns problem definition or what was to be studied and how; the second step involves collecting empirical information using a particular method, such as archaeological excavation; and the third step is characterized by developing the chronological sequence using the empirical information. For archaeology, this step could be characterized by dividing potsherds into time periods based on their physical characteristics. Taylor's analysis suggested that many archaeologists ceased their research at the third step without considering the fourth step, historical reconstruction. Many American archaeologists had joined their colleagues in the other "historical disciplines" (geology, astronomy, cultural anthropology, and history) and moved more toward historical reconstruction, but for Taylor, this step was not enough. Where the three disciplines actually separated, he thought, was at a fifth level focused on "the study of the nature of culture" (Taylor 1948: 38). This highest level of analysis, originally envisioned by Franz Boas, the founder of American anthropology, led to the development of processual archaeology in the 1960s because one of its goals was the discovery of general laws of cultural process.

Vestiges of the views of Childe, Collingwood, and Taylor remain in contemporary archaeology, but it would be unfair to suggest that any of their perspectives are followed without significant modification. For example, many of today's archaeologists who ascribe to a Marxian view of history have delved deeper into Marx's thought than was possible in Childe's time because of the greater availability today of more published sources. Radiocarbon dating also has undermined many of Childe's cultural chronologies. Today's archaeologists no longer perceive their research as limited to nonliterate societies as Collingwood believed, and archaeologists interested in recovering mind have been able to rely on today's sophisticated comprehension of the interactions between psychology, action, and material things. Taylor's understandings of the relationship between archaeology and history had a major impact on the development of late twentieth-century archaeology – and, like Collingwood, he was interested in recovering mind – but much of his work reflects the scholarship of the 1940s. One important offshoot of Taylor's perspective is that he legitimized historical archaeology by refusing to construct temporal boundaries around archaeological research.

Key Issues/Current Debates

The key issues and current debates that surround the relationship between archaeology and history often concern the scale at which archaeologists should attempt to write history, topics that Childe, Collingwood, and Taylor each tacitly considered. The key question is: Should the focus be purely on one or two archaeological sites, with the goal of attempting to understand all their facets before thinking in extra-site terms? Some archaeologists

argue that their profession's biggest contribution comes from working at the site level, where they can intensively examine one household, village, or settlement. Historians have termed these studies "microhistories."

Other archaeologists propose that detailed research conducted at a single site can be built upon in increasingly larger scales to inform our perspectives about world history. Issues of historical scale remain one of the most prominent controversies in contemporary archaeology.

Many Anglo-American archaeologists learned about the importance of historical scales from the work of French historian Fernand Braudel. Braudel studied history as a member of the French *Annales* school, a perspective on history named for the journal *Annales d'histoire économique et sociale* created in 1929. The general goal of the school is to provide analyses of social and economic history, while also including information about geography and human thought processes. Thus, Braudel's perspective, which reveals themes addressed by both Childe and Collingwood, demonstrates how scholarly research on the relationship between archaeology and history accrues over time.

The potential of the *Annales* school was most clearly presented by Braudel (1972) in his sweeping history of the Mediterranean, originally published in French in 1949 but only appearing in English in 1972. Archaeologists were intrigued by Braudel's use of three levels of historical time: the event (short-term history), *conjuncture* (processes being enacted from around 10 to 50 years), and structure (long-term history), more commonly termed the *longue dureé*. The archaeologists' interest stemmed from three elements of Braudel's approach: his interest in historical process (as Taylor-influenced processual archaeology was the major paradigm at the time), his investigation of specific events (which could be likened to an individual archaeological site), and his concern with long-term history. Braudel (1980: 29) explicitly understood that archaeology is especially well suited to study history over the long term. He sought to capture the rhythm of life in these different scales and to construct histories of large structures and huge processes over long periods of time. One of the criticisms of Braudel's approach, however, is that he tended to focus too strongly on the *longue dureé*, thus overlooking the local and the particular. Still, the concept of the *longue dureé* has entered the lexicon of most practicing archaeologists and is viewed as an especially rich area of investigation.

As noted above, some Anglo-American archaeologists are committed to microhistory. Microhistorians tend to focus on the minute and the local and seek to present images of past daily life in intimate detail through the close examination of a few especially enlightening documents. Often termed "cultural microhistory" to indicate its affinity to anthropological approaches, the authors of such studies seek to use the experiences and events in the lives of one or two people as a metaphor for the sociocultural environment of a single society at a particular point in history. In one of the most famous microhistories, Italian historian Carlo Ginzburg (1980) charts the life of an obscure sixteenth-century miller, Domenico Scandella – called Menocchio – who was burned at the stake for opposing official Church doctrine. Ginzburg's account provides rich detail on life in a small early modern European town and in the process illustrates how larger forces, such as religious intolerance, affected the lives of ordinary people. Ginzburg (1980: xvii) also argues that microhistories illustrate the "circular, reciprocal influence between the cultures of subordinate and ruling classes," a goal that is consistent with Braudel's perspective.

Significantly, Ginzburg (1980: xv) fully appreciates the value of archaeological information in microhistorical research: "Since historians are unable to converse with the peasants of the sixteenth century (and, in any case, there is no guarantee that they would understand them), they must depend almost entirely on written sources (and possibly archaeological evidence)." This statement perfectly agrees with much research in contemporary historical archaeology because of this field's inherent interest in men, women, and children who were not in the upper echelons of

society – Ginzburg's "subordinate classes" – and so were frequently ignored in the accounts of "official" history. Archaeology is especially well suited to investigating the everyday lives of ordinary people and in this regard is similar to "bottom-up history" (Ginzburg and Poni 1991), "grassroots history" (Hobsbawm 1985), and "the history of the common people" (Lüdtke 1995). Archaeology directed toward the world's largely undocumented, so-called "inarticulate" classes has significantly enhanced our appreciation of history's majority. Such research has been instrumental, for example, in providing unwritten information about numerous facets of everyday life extending from subsistence habits to spiritual practices of enslaved men, women, and children of African heritage in the Americas. Equally invaluable insights have come from the archaeological study of sites associated with Chinese and Irish laborers living and toiling outside their home countries.

Another trend in the writing of history is world-systems analysis, largely created by Immanuel Wallerstein (2004). World-systems analysis appeared in the 1970s as an overt way to examine the broad trends of the world's interconnections since about 1500 CE. Strongly influenced by Braudel, Wallerstein attempts to demonstrate how large-scale analysis can reveal the presence of interlinked "world-systems" or webs of interaction that existed within "a spatial/temporal zone which cuts across many political and cultural units" and which "represents an integrated zone of activity and institutions which obey certain systemic rules" (Wallerstein 2004: 17). One feature of world-systems analysis is the interconnections between a core and its peripheries or between a dominant, powerful administrative center and its distant dependencies.

Many archaeologists, particularly those engaged with the archaeology of the post-1500 CE world, immediately found merit in world-systems analysis because of its systemic perspective and its overt plan to link distant places together into a single network of interaction. Using world-systems analysis, archaeologists could forge clear connections between seventeenth-century Spain as core and post-colonial Central American native cultural settlements as peripheries. In addition, Wallerstein's interest in the movement of commodities – the archaeologists' artifacts – gave world-systems analysis immediate archaeological relevance. Some archaeologists, thinking that Wallerstein's ideas might be widely applicable to all history, sought to apply his concepts to pre-Columbian history. This usage remains controversial because Wallerstein presented his ideas for the investigation of the world after the rise of capitalism – which he termed "the capitalist world economy" – not for ancient times. As with other ideas, Wallerstein's views have been critiqued and refuted by some and expanded and refined by others.

An important current debate in archaeological practice concerns differences between Ginzburg's microhistorical approach and Wallerstein's world-systems analysis. What is the "proper" scale for archaeological research? Many archaeologists have expressed their interest in microhistory by specifically focusing on the household or even sub-household scales. Much of this research has the anthropological goal of building "thick processual understandings that transport the reader into the rich context of some previous place" (Paynter 2005: 404). This level of analysis is based on the idea that the small and seemingly insignificant things with which people surround themselves help to define, manipulate, and signal who they are. Archaeologists inherently find this scale interesting because it provides a contextual comprehension of history in intimate detail. Archaeological research focused on single sites at first may appear to run counter to modern-world analysis because the latter seeks to interpret extra-site interactions and connections in broad geographical space. To the contrary, however, even modern-world analysis begins with the household. The broader perspective, once termed the "international comparative approach" (Deetz 1991), has been reformulated more rigorously as modern-world archaeology (Orser 2004). Modern-world archaeology is focused specifically on the post-1500 CE world and explicitly employs

ideas and concepts from Braudel, Ginzburg, Wallerstein, and even Collingwood to some extent. Modern-world archaeology relies on the careful interpretation of individual archaeological sites and seeks to present analyses at several historically relevant scales that begin at the household and terminate in the world at large.

International Perspectives

The use of works by Braudel (French) and Ginzburg (Italian) by Anglo-American archaeologists shows that an international perspective has been integral to their conception of the relationship between archaeology and history. In a practical sense, some of the archaeologists' appreciation of such works has been hampered by the lag between initial publication in the original language and translation into English. The lag time can be considerable, as in the case of much of Braudel's work. Many Anglo-American archaeologists, of course, speak or at least read a language other than English and so are unaffected by the language barrier. Even so, an additional, practical factor that can add to Anglo-American provincialism is the often-limited distribution of non-English journals and books. A number of professional journals – both in print and online – have substantially improved every scholar's access to the works of non-English-speaking scholars. The general archaeological perspective is thus in the process becoming truly internationalized.

Future Directions

Archaeologists of all interests and areas of expertise will undoubtedly continue to ponder the relationship between archaeology and history. The intellectual exchange between archaeologists and historians is likely to continue, with practitioners of both disciplines borrowing perspectives and approaches as practicable. Archaeologists will likely continue to explore ways to investigate the various scales of analysis and will undoubtedly provide significant contributions along the way. One of the topics likely to be pursued in the future is a more intense examination of the different scales of analysis. The globalization of archaeology, increasingly conducted outside the Anglo-American world by Indigenous scholars, will provide new insights to old problems, such as the creation of archaeological linkages between the local site and the rest of the world. The spread of commoditized artifacts – as part of the globalization process – remains fertile research territory for archaeologists interested in local–global connections, and increasing numbers of archaeologists are likely to conduct this research in the future.

Increasing academic specialization is one obstacle that must be overcome, however. Unlike in the early-mid-twentieth century when Childe, Collingwood, and Taylor were writing, today's often-confining academic specialization has not always improved the frequency of collaboration between archaeologists and historians, even as the rise of the Internet has made communication easier and faster. The Internet has the power to defeat professional provincialism because of the sheer volume of information now available. At the same time, the explosion of research around the world may actually encourage increased specialization. The electronic availability of materials once difficult to obtain has meant that scholars now have a much more difficult time staying current with their own field of expertise. Reading widely in related disciplines is today more difficult than in the past, and the explosion of information tends to restrict the broad overviews that scholars like Childe once produced. Even with the Internet, archaeologists and historians who are investigating the same subjects may be unaware of one another's research or, if they are aware of their similar topics, may not readily perceive the benefits of disciplinary cross-pollination because of narrow specialization. Increased specialization thus may have had the unintended consequence of diminishing interaction between scholars in different albeit related fields like archaeology and history. With time, archaeologists and historians will hopefully find more common ground and create innovative ways to interact and collaborate.

Cross-References

- ▶ Archaeological Archives
- ▶ Historical Archaeology
- ▶ International Journal of Historical Archaeology
- ▶ Material Culture and Education in Archaeology
- ▶ Modern Material Culture, Archaeology of
- ▶ Oral Sources and Oral History
- ▶ Post-Medieval Archaeology
- ▶ Social Memory in Archaeological Theory

References

Becker, C. 1955. What are historical facts? *Western Political Quarterly* 8: 327–340.

Braudel, F. 1972. *The Mediterranean and the Mediterranean world in the age of Philip II*. Rev. edn. Trans. S. Reynolds. London: Collins.

Braudel, F. 1980. *On history*. Trans. S. Matthews. Chicago: University of Chicago Press.

Childe, V.G. 1947. *History*. London: Cobbett.

Collingwood, R.G. 1939. *An autobiography*. Oxford: Oxford University Press.

Collingwood, R.G. 1946. *The idea of history*. Oxford: Clarendon.

Croce, B. 1921. *History: Its theory and practice*. Trans. D. Ainslie. New York: Harcourt, Brace.

Deetz, J. 1991. Introduction: Archaeological evidence of sixteenth- and seventeenth-century encounters. In *Historical archaeology in global perspective*, ed. L. Falk, 1–9. Washington, DC: Smithsonian Institution Press.

Dyson, S.L. 2006. *In pursuit of ancient pasts: A history of classical archaeology in the nineteenth and twentieth centuries*. New Haven: Yale University Press.

Ginzburg, C. 1980. *The cheese and the worms: The cosmos of a sixteenth-century miller*. Trans. J. Tedeschi and A. Tedeschi. Baltimore: Johns Hopkins University Press.

Ginzburg, C., and C. Poni. 1991. The name of the game: Unequal exchange and the historiographic marketplace. In *Microhistory and the lost peoples of Europe*, ed. E. Muir and G. Ruggiero, 1–10. Baltimore: Johns Hopkins University Press.

Hobsbawm, E.J. 1985. History from below: Some reflections. In *History from below: Studies in popular protest and popular ideology in honour of George Rudé*, ed. F. Krantz, 63–73. Montreal: Concordia University Press.

Hughes, H.S. 1960. The historian and the social scientist. *American Historical Review* 66: 20–46.

Lüdtke, A., ed. 1995. *The history of everyday life: Reconstructing historical experiences and ways of life*. Trans. W. Templer. Princeton: Princeton University Press.

Orser, C.E., Jr. 2004. The archaeology of the recent past: Historical, post-medieval, and modern-world. In *A companion to archaeology*, ed. J. Bintliff, 272–290. Malden: Blackwell.

Paynter, R. 2005. Contesting culture histories in archaeology and their engagement with Marx. *Rethinking Marxism* 17: 399–412.

Stiebing, W.H., Jr. 1993. *Uncovering the past: A history of archaeology*. New York: Oxford University Press.

Taylor, W.W. 1948. *A study of archaeology*, Memoir 69. Washington, DC: American Anthropological Association.

Wallerstein, I. 2004. *World-systems analysis: An introduction*. Durham: Duke University Press.

Willey, G.R., and J.A. Sabloff. 1993. *A history of American archaeology*. 3rd ed. New York: W. H. Freeman.

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History and Current Debates of Archaeology in Island Southeast Asia

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Introduction

Island Southeast Asia (ISEA), situated between Mainland China, Mainland Southeast Asia (MSEA), and Oceania, has been among the world's most significant passageways of human migrations since more than one million years ago (1 Ma). Hominids such as *Homo erectus* lived in Java at least as early as 1.2 to 0.8 Ma. The high diversity of landscape, population, and culture in ISEA makes it an attractive place for archaeology, especially regarding issues such as the origins, dispersal, and interaction of ancient populations at different time depths and geographic routes. One challenge, though, has been the fragmented nature of the archaeological record here, well documented in some cases while under-studied in other areas.

As almost every region in ISEA has been colonialized by external countries, the discipline of archaeology has developed with influence

from those imposed political systems. Some distinctions can be noticed before and after World War II. At different times, the Philippines were claimed by Spain and the USA, Malaysia was under British authority, Indonesia was controlled by the Netherlands, East Timor was ruled by Portugal, and a broad and diverse expanse of the region was occupied by Japan.

This entry offers a large-scale view of archaeological practice in the region of ISEA. First, the history of the discipline is reviewed, from its inception through the present day. Next, key research issues and debates are identified, such as regarding the formation of the major populations of cultural groups living in ISEA during different periods of human evolution. Special focus here is given to the ongoing questions about the origins and dispersals of the Austronesian groups, involving input from archaeology, linguistics, genetics, and additional studies over the last few decades. This review provides a basis to consider international perspectives and future directions of archaeology in ISEA.

Definitions

In this entry, the region of Island Southeast Asia (ISEA) extends from Taiwan in the north and continues southward through the Philippines, Island Malaysia (including Sarawak and Sabah of Eastern Malaysia, plus Brunei), Indonesia, and East Timor.

History of Regional Research

The development of archaeology in ISEA traditionally has been divided into three major stages (see Tsang 2000; Chia 2017; Paz 2017; Simanjuntak 2017a). The early years of the discipline have been described as an *emergent period*, leading up to (and in some cases continuing into) World War II (WW II: 1939–1945). Next, a *transitional period* has been mentioned as operating after World War II (1945) and lasting until the 1970s. The current status of regional archaeology has been considered as a continuation of a *developmental period* since the 1970s.

Emergent Period, Before World War II

As was the case in many parts of the world, the earliest archaeology activities in ISEA were due to the adventures of foreign travelers in the habit of collecting antiquities. The initial pioneering forays were designed to learn the baseline scope of archaeological sites and artifacts in each area, for example, as potentially could be displayed in a museum. These explorations began as early as the 1800s, at a time when the discipline of archaeology was just beginning to take shape internationally.

Formally proclaimed as a British Colony in 1867, Malaysia witnessed archaeological inquiries earlier than most other countries of ISEA. Visiting researchers explored the rainforests and caves, and some of the region's first museums were established. Sarawak in particular attracted attention at the Niah and Bau Caves, studied in 1873–1878 by Alfred Hart Everett, Charles Darwin, Alfred R. Wallace, and Thomas H. Huxley (Harrisson 1954). Slightly later, projects were launched at caves along the east coast of Sabah, studied by C.V. Creagh in 1888–1895 (Rutter 1929: 217). Two of the oldest traditions of ISEA archaeology were stablished as the Sarawak Museum in 1886 and the *Sarawak Museum Journal* in 1911.

Indonesia has attracted natural scientists and curious collectors since Dutch control of the region as early as the 1600s, although archaeology specifically became more popular after major discoveries of the late 1800s. The key turning point for archaeology began with the historic finds of hominin fossils, *Pithecanthropus erectus* (later *H. erectus*), recovered by Eugène Dubois at Trinil, East Java in 1891 (Fig. 1) (Dubois 1896). Since then, several other *Homo erectus* discoveries have been reported, such as the fossils at Ngandong and the findings associated with stone tools of a "Sangiran flake industry" at Sangiran. Meanwhile, archaeology research offices were established, notably including *Oudheidkundige Dienst* (archaeological office) (Simanjuntak 2017a). Between 1931 and 1937, H. R. van Heekeren worked with W.J.A. Willems in East

History and Current Debates of Archaeology in Island Southeast Asia, Fig. 1 The Solo River at Trinil in East Java where Eugène Dubois discovered the first *Java Man* (*Homo erectus*) in 1891. (Image source: Hsiao-chun Hung)

History and Current Debates of Archaeology in Island Southeast Asia, Fig. 2 Pinglin jade workshop in Hualien of eastern Taiwan (at least 46,000 square meters with very dense worked-jade deposit), first discovered and excavated by Tadao Kano in 1929, is so far known the largest jade workshop in Southeast Asia. (Image source: Hsiao-chun Hung)

Java and South Sulawesi, and then 2 years later (in 1939) van Heekeren started the first excavation in Indonesia at Kedeng Lembu, Jember (Glover 1974). Farther south, in today's East Timor, Alfred Bühler conducted the first excavation there in 1935 (Sarasin 1936).

The first discovered archaeology site in Taiwan, Zhishanyan in Taipei Basin, was reported by Japanese school teacher Awano Dennojou in 1896. Before 1949 when the Chinese archaeologists moved from mainland China to Taiwan, Japanese scholars had discovered more than 100 prehistoric sites in Taiwan and surrounding islands. One of the most influential figures of that period was Tadao Kano, known for discovering numerous sites and for developing the first archaeological chronology of Taiwan (e.g., Kano 1946, 1952) (Fig. 2).

Philippines archaeology can be traced back to the early 1920s. H. Otley Beyer, an American anthropologist who later shifted to archaeology. Beyer conducted several excavations in Novaliches, and he collected large numbers of artifacts especially from Rizal, Bulacan, and Batangas of southern Luzon (Beyer 1926, 1947, 1948). Beyer was the first scholar to build a chronological narrative of material artifact categories in the Philippines. Until now, Beyer's chronology has influenced the thought and practice of Philippines archaeology.

Transitional Period, from World War II (1945) Through the 1970s

After World War II, archaeology as a discipline transformed worldwide, including major change not only in political influence but also in broad aspects of theory, method, and technique. Most countries in ISEA transferred into new political status and associations, with direct influence on how archaeology could be practiced and on how the research findings were perceived in national and international narratives. Meanwhile, profound impacts in archaeology developed in philosophical thought, as well as in the science of excavation procedures.

Overall during the decades of the 1940s through 1970s, archaeology became accepted as a way to learn concrete evidence directly from the past. Controlled excavations proceeded in carefully exposing individual geological and sedimentary layers, each associated with a measured time period and characterized by a set of tangible objects. Chronological sequences became even more robust after the availability of radiocarbon dating since the 1950s.

At the end of the Chinese Civil War (in 1948), a group of Mainland Chinese archaeologists moved into Taiwan with the Kuomintang (KMT) government of the Republic of China. Those scholars mostly had worked in northern China, and they brought their experience into Taiwan while forming the first archaeology division of the Institute of History and Philology (IHP) at Academia Sinica. LI Chi became the first head of this archaeology division at IHP, and furthermore he established the Department of Archaeology and Anthropology (now re-named Department of Anthropology) at National Taiwan University in Taipei.

In the Philippines during the 1950s through 1960s, American archaeologist Robert Fox conducted the first two systematic archaeological excavations, aiming to delineate the chronological sequence of artifacts in dated archaeological layers. One project was at Calatagan in Batangas of southwest Luzon (Fox 1959), and another was at the Tabon Cave Complex in Palawan (Fox 1970). The results supported a long-term chronological narrative that outlined thousands of years of cultural history, starting with ancient hunter-gatherer sites and continuing through later historical contexts.

In Sarawak and in Sabah of Malaysia, Tom Harrison organized excavations at several caves during the 1950s through 1960s, with special emphasis at the Niah Caves of Sarawak. The project at the Niah Caves expanded to accommodate input from paleontology, zoology, geology, botany, and radiocarbon dating (e.g., Harrisson 1957, 1958a, b, c, 1959a, b, 1967, 1968, 1970). Harrison explored caves along the east coast of Sabah (Harrisson 1973), yet the project at Niah Caves consistently attracted the most international attention for the numerous burial findings that extended through several thousands of years.

After World War II, H.R. van Heekeren returned to Indonesia in 1945, continuing his prior studies with new techniques and motivation. He completed his major works for outlining the chronological sequence of Indonesia and for describing the artifacts belonging to the individual time periods, especially concerning the Bronze–Iron Age of Indonesia (van Heekeren 1958) and the Stone Age of Indonesia (van Heekeren 1972). From 1950 until leaving Indonesia in 1956, van Heekeren trained new staff for the archaeological office, while he undertook several excavations with R.P. Soejono at Anjar in West Java, at sarcophagus burials in Bali, and at cave sites in Flores and Centeral Java (Glover 1974).

During the decades leading up to the 1970s, archaeology in ISEA for the most part was performed by foreign researchers, while those

projects created opportunities for the first generations of local scholars. Among those local scholars were Wen-Hsun Sung in Taiwan, Alfredo E. Evangelista in the Philippines, and R.P. Soejono, T. Jacob, and S. Sartono in Indonesia. Soon, they assumed the responsibilities for archaeological investigations and museum programs in their home countries.

Developmental Period, Since the 1970s and Continuing Now

Since the 1970s and continuing now, two aspects have characterized archaeology in ISEA, mirroring worldwide trends. One aspect has involved the development of new schools of thought in how to perceive of the archaeological record and how to formulate questions of relevance for broader social studies such as in the field of anthropology. Another aspect has involved the increasing role of indigenous scholars in shaping the practicalities of archaeology in each country.

In Taiwan, one of the major influential projects occurred during the 1970s, known as the *Interdisciplinary Cooperation Research Plan for the Natural and Cultural History of the Zhuoshui River and Daduxi River Basins in Taiwan Province*. The project was developed by Taiwanese archaeologist K.C. Chang, who had received formal Ph.D. training at Harvard University in the U.S., in collaboration with the local Taiwanese scholar Wen-Hsun Sung. During the years of 1972–1976, this project linked archaeology with ethnology, geology, landscape ecology, zoology, botany, and pedology. The results greatly strengthened the baseline of chronological studies in Taiwan, and furthermore archaeology was situated prominently within an interdisciplinary context. Meanwhile, archaeology in Taiwan grew in its international standing, owing to a number of unique characteristics of the local cultural traditions linking between Mainland East Asia and ISEA, with further implications of linking with Pacific Oceania, all potentially studied through the archaeological record.

In the Philippines since the 1970s, archaeology projects have continued at a number of key sites, viewed as representative or perhaps even iconic of the region's cultural history. Multi-disciplinary teams have incorporated archaeology as part of studying sites of Palawan, led by the National Museum of the Philippines (Peralta 1983), and this particular area attracts an ever growing number of archaeologists with different research interests. Archaeology has been the central or sole focus of studies in other regions of the Philippines, for example in northern Luzon, involving the discovery of ancient animal bones and stone tools in the Liwan Plain (Fox and Peralta 1974; Shutler and Mathisen 1979; Wasson and Cochrane 1979), the deep excavations for disclosing many thousands of years of human presence at the Peñablanca Caves (e.g., Ronquillo 1981; Thiel 1986a–1987, 1988–1989; Mijares 2005, 2006a, b; Mijares et al. 2010), and the excavations within and extending deep beneath the extensive shell middens along the Cagayan River (e.g., Cabanilla 1972; Thiel 1986b–1987; Aoyagi et al. 1993, 1997; Ogawa 2002a, b, 2005; Tanaka 2002, 2004; Hung 2005, 2008). So far, more than 30 sites in the Cagayan Province have revealed layers spanning through the last few thousands of years of changing pottery and other artifacts, thus providing substantial detail about the regional archaeological sequence (Fig. 3).

During the 1970s and 1980s, local Malaysian scholars began to receive overseas academic training in Australia and elsewhere, and they returned to Malaysia as the first generation of archaeologists shaping the discipline internally. Their primary interests were in outlining the local chronological sequence and then refining specific aspects of the sequence to address particular questions such as about the ancient lives of hunter-gatherers, the emergence of pottery traditions, the development of sedentary societies, and more (Chia 2017). Among the first local scholars, Zuraina Majid provided new understanding of the Malaysian archaeological sequence and food resource economy at Niah, based on her primary excavations in 1977 (Majid 1982). Adi Haji Taha's excavations at Gua Cha and other sites documented the long narrative of human presence since more than 10,000 years ago and continuing through the modern-day Orang Asli (e.g., Taha 1985, 1987, 1991). In 1995, the Center for

History and Current Debates of Archaeology in Island Southeast Asia, Fig. 3 One of the large shell midden sites, Magapit shell midden, located in Lal-lo, Cagayan, northern Philippines. (Image source: Hsiao-chun Hung)

History and Current Debates of Archaeology in Island Southeast Asia, Fig. 4 The field station at Lenggong for intensive field research in this region undertaken by the Center for Archaeological Research, University of Science Malaysia. (Image source: Hsiao-chun Hung)

Archaeological Research Malaysia at the University of Science Malaysia was established, and so far it has produced more than 15 Ph.D. and 30 M.A. graduates (Chia 2017), while serving as the leading archaeology institute and authority of the country (Fig. 4).

Since the 1970s in Indonesia, archaeology has been increasingly important in government policies, national identity, and international relations. In 1975, the Institution of Archaeology and National Heritage (Lembaga Penelitian Purbakala dan Peninggalan Nasional) was divided in two new entities, including the Directorate of History and Archaeology (Direktorat Sejarah dan Purbakala) for the duty of protection and conservation, and the National Research Center for Archaeology (Pusat Penelitian Arkeologi Nasional), for the purpose of research. Since then, the National Research Center for Archaeology has undertaken innumerable national archaeological projects, as well as collaborations with visiting international teams (see Simanjuntak

History and Current Debates of Archaeology in Island Southeast Asia, Fig. 5 The Harimau cave in South Sumatra, so far more than 80 human remains belong to two layers of ancient populations (the earlier Australo-Melanesian and the later East Asian-Austronesian) have been discovered. (Image source: Hsiao-chun Hung)

2017a). Among the many significant findings have been the definition of Acheulean stone tools in Sangiran, central Java (e.g., Simanjuntak and Forestier 2008; Simanjuntak 2011), of *Homo floresiensis* at Liang Bua, Flores (e.g., Brown et al. 2004, Morwood et al. 2004; see below), of rock art in Maros, Sulawesi (Aubert et al. 2014) and in Borneo (Aubert et al. 2018), of a large burial complex of Australo-Melanesian and East Asian populations of two layer formation at Harimau cave, South Sumatra (Simanjuntak 2016; Matsumura et al. 2018) (Fig. 5), and of early pottery-bearing sites in the Karama Valley in Sulawesi (e.g., Simanjuntak 2008; Anggraeni et al. 2014).

The above-mentioned research projects (among many others not detailed here, due to the space limit), have contributed to our baseline understanding of archaeology in ISEA, and they have provided the essential core data for guiding new investigations. Some of those projects have been ongoing and continually re-shaping with new generations of archaeologists. Inevitably, interpretations of the data have been variable, in some cases creating the grounds for academic debates.

Key Issues and Current Debates

In ISEA, several archaeology research issues of global significance have been controversial, leading to debates among scholars and shaping much of the published literature. Perhaps the most enduring debates have revolved around the dating and context of *Homo erectus* fossils, the appearance of the first anatomically modern human (AMH) or *Homo sapiens* in the region, and the development of cultural groups today known as the Austronesian people.

Homo erectus in ISEA: Dating, Craniometric Variation, and Relation with Fossils in Northern China

Fossils of *Homo erectus* in Indonesia have prompted questions about how long ago these ancient

hominids reached into ISEA, how they related with other groups of their species in other regions, and what happened later with the appearance of anatomically modern humans (AMH or *Homo sapiens*). The major fossil findings in ISEA have been in Java, at sites such as Trinil, Sangiran, Mojokerto, Sambungmacan, and Ngandong. Dating has been imprecise, relying on approximations of the ages of associated geological layers, but the age range overall has been congruent with *Homo erectus* in other regions, as old as 1.2–0.8 Ma and continuing at least through 0.75–0.4 Ma.

In a global view, *Homo erectus* as a species has been regarded as an ancient and now extinct hominid, including some members of the species who had migrated from Africa into Asia and evidently as far as Indonesia in ISEA, prior to the evolutionary appearance of *Homo sapiens*. Any findings of *Homo erectus* fossils can offer insights into our ancient evolutionary history. The findings in ISEA in particular deserve close attention about the possibility of localized variation within the species, given the geographic distance from other areas where *Homo erectus* had lived.

The fossils of *Homo erectus* in Java have exhibited some variation in their forms, and accordingly scholars have argued about what those morphological differences could imply or represent (e.g., Weidenreich 1943; Antón 2002; Baba et al. 2003; Kidder and Durband 2004; Zeitoun et al. 2010). Some scholars have proposed that *Homo erectus* had evolved with distinctive physical traits uniquely in Java, while other scholars have proposed a population replacement by other members of the *Homo* Genus. Currently, the evidence points to a long-term unbroken continuity of *Homo erectus* in Java (Kaifu 2017), yet this framing still could allow for debates about how much physical variation can be accepted within the overall definition of a biological species such as *Homo erectus*.

The *Homo erectus* fossils in Java definitely look different from the counterpart fossils of the same species as reported in China, specifically in Zhoukoudian at 0.75–0.4 Ma (see Shen et al. 2009; Antón 2002). Measurements of cranial morphology reveal that the faces looked different among those individuals in different regions. These variations are difficult to interpret, to some extent constrained by the small numbers of individuals that can be represented in the fossil records. The key point of debate has been about how to view the range of variation as occurring within the biological species or else suggesting distinctively separate variants or even perhaps subspecies.

Appearance of Anatomically Modern Humans (AMH or *Homo sapiens*) in ISEA: Timing, Migration Routes, and Number of Migrations

In ISEA, the appearance of anatomically modern humans (AMH or *Homo sapiens*) relates with several significant questions. First of all, when did the species enter into the region? Related with this first question, what was the migration route, and were multiple routes possible? Could more than one migratory event have occurred? Furthermore, how did the members of the *Homo sapiens* species interact with other members of the *Homo* Genus in different areas?

The dating issue can be framed within the parameters of when *Homo sapiens* first dispersed from the African continent and then when their descendants definitely had reached as far as Australia and New Guinea. The oldest evidence of *Homo sapiens* outside Africa could be interpreted as perhaps 100,000 years ago in the Israel, thus constituting an oldest bracket for the possible dating of the species entering into ISEA. Equally important, human remains have been confirmed in Australia about 50,000 years ago (noting older dating still under debate), supported by further evidence of stone tools in New Guinea within the range of 47,000–42,000 years ago, thus indicating that *Homo sapiens* must have passed through ISEA by that time and perhaps much earlier. Given those time brackets, *Homo sapiens* first may have migrated into ISEA at some time between 100,000 and 50,000 years ago.

Ancient remains of *Homo sapiens* have been reported at several sites in ISEA, but dating has been problematic with poor preservation and contextual association in many cases. From Fox's excavations in Palawan of the Philippines, human remains have produced dating of

History and Current Debates of Archaeology in Island Southeast Asia, Fig. 6 The Callao Cave in Peñablanca of northern Luzon of the Philippines has produced *Homo* sp. (?) dated as 66.7 ± 1 ka. (Image source: Mike T. Carson)

approximately 47,000 years ago by Uranium series (Detroit et al. 2004). Also in the Philippines, a metatarsal element from Callao Cave in Peñablanca of northern Luzon has been suggested as belonging to *Homo* sp., dated at 66,700 years ago by Uranium series (Mijares et al. 2010) (Fig. 6). The "Deep Skull" of the West Mouth of the Niah Caves in Sarawak, East Malaysia, has been dated to approximately 40,000 years ago (e.g., Harrisson 1959a, 1970; Brothwell 1960; Kennedy 1979; Barker et al. 2007). In Indonesia, bones of early *Homo* sp. have been reported at Punung (Storm et al. 2005) and Wajak in Java about 37,000–24,000 years ago) (Storm et al. 2013), as well as at Lida Ayer in Sumatra about 73,000–63,000 years ago) (Westaway et al. 2007).

These early findings of *Homo sapiens* in ISEA could be questioned on technical grounds. For instance, radiocarbon dating so far cannot extend beyond 50,000 years ago, and therefore any older dating must rely on other procedures with inherently wider error ranges of several thousands of years. Additionally, some of the taxonomic identifications have been challenged, such as the metatarsal fragment at Callao Cave in the Philippines, possibly attributed to a species other than *Homo sapiens* with similar metatarsal structure (O'Connell et al. 2018).

Ongoing research programs have been investigating issues of Archaic Hominin populations and early *Homo sapiens* in ISEA. Researchers have sought to clarify and refine the dating, biological affinities, geographic extent, and contexts of extinction of various species of the *Homo* Genus. Among the most notable examples have been the studies of fossils of *Homo floresiensis* in Flores Island of eastern Indonesia (e.g., Brown et al. 2004; Morwood et al. 2004, 2005; Jacob et al. 2006; Morwood and Jungers 2009; Brown and Maeda 2009; Kaifu et al. 2011, 2015a, b; Kubo et al. 2013; Henneberg et al. 2014; Sutikna et al. 2016; Brumm et al. 2016; van den Bergh et al. 2016), as well as the studies of ancient DNA suggesting admixture between modern and archaic (premodern) hominins such as Denisovans (e.g., Reich et al. 2011; Cooper and Stringer 2013; Kaifu 2017).

History and Current Debates of Archaeology in Island Southeast Asia, Fig. 7 Children of Ilocano-Austronesian in Alaguia, Lal-lo, Cagayan of northern Luzon, Philippines. (Image source: Hsiao-chun Hung)

Formation of Major Cultural Groups in ISEA: Cultural History of the Austronesian-Speaking Populations

Another enduring debate in ISEA archaeology has involved notions of how the region's different cultural groups and traditions came to exist, possibly through a series of migrations and interactions. Central to these debates, scholars have considered how the modern-day Austronesian-speaking groups came to be so broadly distributed all across the region and extending farther into Madagascar and into Pacific Oceania (Fig. 7). Much of the scholarly interest at first was pursued through studies of language history and living cultural traditions, and archaeology was added into the debates mostly since the 1970s. Many of the disagreements among archaeologists can be traced back to the 1970s or even earlier, prior to the availability of the most relevant archaeological data in the region. Currently, the archaeological records have developed with considerably more refinement than was possible in the 1970s, and meanwhile physical anthropology and other lines of evidence have provided additional supporting information.

Two quite different hypothetical models have been proposed about the origins of modern Southeast Asian populations, now known as the *Regional Continuity Model* and the *Two-Layer Hypothesis*. The *Regional Continuity Model* proposes that modern Southeast Asians developed in situ from local ancestors without significant incoming genetic admixture (e.g., Turner 1990). The *Two-Layer Hypothesis* argues that SEA was occupied initially by groups such as the Australo-Melanesian populations, and then later substantial genetic admixture occurred with East Asian immigrants who brought farming and other innovations into the local cultural inventories (e.g., Jacob 1967). Recently, the *Two-Layer Hypothesis* has gained solid support from bio-archaeology studies of cranio-morphometric comparison (e.g., Matsumura et al. 2018, in press) and ancient DNA studies (e.g., McColl et al. 2018). These studies concluded an earlier layer of Australo-Melanesian groups and a second layer of East Asian groups.

The research themes about the Austronesian origins and dispersals have been at the center of numerous projects all across ISEA for the last few decades. The related issues and debates can be complicated, and they are treated in more detail here in terms of the development of archaeology as a discipline in ISEA.

Academic Debates of Austronesian Origins

As the Austronesian-speaking populations comprise the majority of the modern ISEA communities, their origins and homelands have been subjected to ongoing debates among scholars of

different fields (e.g., Bellwood 1997, 2005; Oppenheimer 2004; Tsang 2005; Solheim 1988, 2006; Barker and Richards 2013). Numerous hypothetical models have been contradictory, and many have failed to refer to convincing evidence. The two most influential models provided by archaeologists have been the *Nusantao Maritime Trade and Communication Network (NMTCN) Model* and the *Farming-language Dispersal Hypothesis* (aligned with the *Out of Taiwan Model*).

The *Nusantao Maritime Trade and Communication Network Model*

A popular model has persisted as the *Nusantao Maritime Trade and Communication Network (NMTCN) Model*, despite no actual archaeological or linguistic evidence in support of it. The intellectual basis refers to the strong sea-faring traditions in ISEA, noting that people for several centuries have been highly skilled long-distance navigators. Solheim (e.g., 1988, 2006) described these people as the *Nusantao*. Some groups have been known as sea nomads, ranging over vast expanses of the region.

The *NMTCN model* involves more than just the movement of sea-crossing experts, and it explicitly calls for a locus of cultural origin activity within the central to southern provinces of ISEA, expanding radially from there into the farther edges of the region. In this view, Taiwan could not have been the origin of the population movements, and thus it disagrees with the *Out of Taiwan Model*. Moreover, the traditions of sea-crossing networks are described as originating long prior to a pottery-bearing horizon and pre-dating the Austronesian-speaking groups.

In one variant of *NMTCN Model*, Meacham (1988) proposed that Austronesian languages and other cultural traits evolved locally within a large triangular area with apex points at Taiwan, Sumatra, and Timor. The pottery-bearing horizon could be seen as emerging within this large region overall, termed *Austronesia* as a whole, rather than spreading from Taiwan into other areas in steps or stages (Fig. 8). This model now has been contradicted by the archaeological evidence and by independent linguistic studies.

Another iteration of the *NMTCN Model* was formulated by Solheim (2006: 90), most recently articulated as:

> The *Nusantao* began developing Pre-Austronesian as their trade language starting around 12,000 BP [years before present], forming over the vast territory from the east coast of Vietnam to the Bismarcks in northwestern Melanesia (Wallacea could be considered its homeland), and then Proto-Austronesian developed among the sailors and their families of the *NMTCN* in their communication and trading back again to the west through much of coastal eastern Indonesia and the Philippines, and along the coast of eastern Vietnam and South China.

Many of the concepts of the *NMTCN Model* had emerged prior to the availability of high-resolution archaeological data and other lines of evidence. For example, Solheim (e.g., 1964, 2006) stressed the links between Sa Huynh pottery in Vietnam and Kalanay pottery in the Philippines as evidence of a deeply ancient *Nusantao* sea-crossing network that would have excluded Taiwan from the origin story of Austronesians. Now these Sa Huynh-Kalanay pottery traditions are abundantly documented as post-dating 2500 years ago in Iron Age contexts (e.g., Reinecke et al. 2002; Hung et al. 2013), at least 1500 years more recent than the initial spread of a pottery-bearing horizon in ISEA (see below).

While the *NMTCN Model* lacks direct supporting evidence, its proponents have sought support in two ways. First has been to question the validity of the historical linguistics conclusions of a Taiwan origin of the Austronesian languages that spread into other parts of ISEA, although so far this conclusion has not been overturned. Second has been to question the dating of pottery-bearing horizons in different areas, although in fact the dating in Taiwan was much older than anywhere else in ISEA and then proceeded in discernable steps across the region.

The *Farming-language Dispersal Hypothesis* and *Out of Taiwan Model*

The *Farming-language Dispersal Hypothesis* and the *Out of Taiwan Model* have been linked together conceptually, but they should not be mistaken as a singular entity. Both are outlined here. According to the *Farming-language Dispersal Hypothesis*, many of the world's major migrations

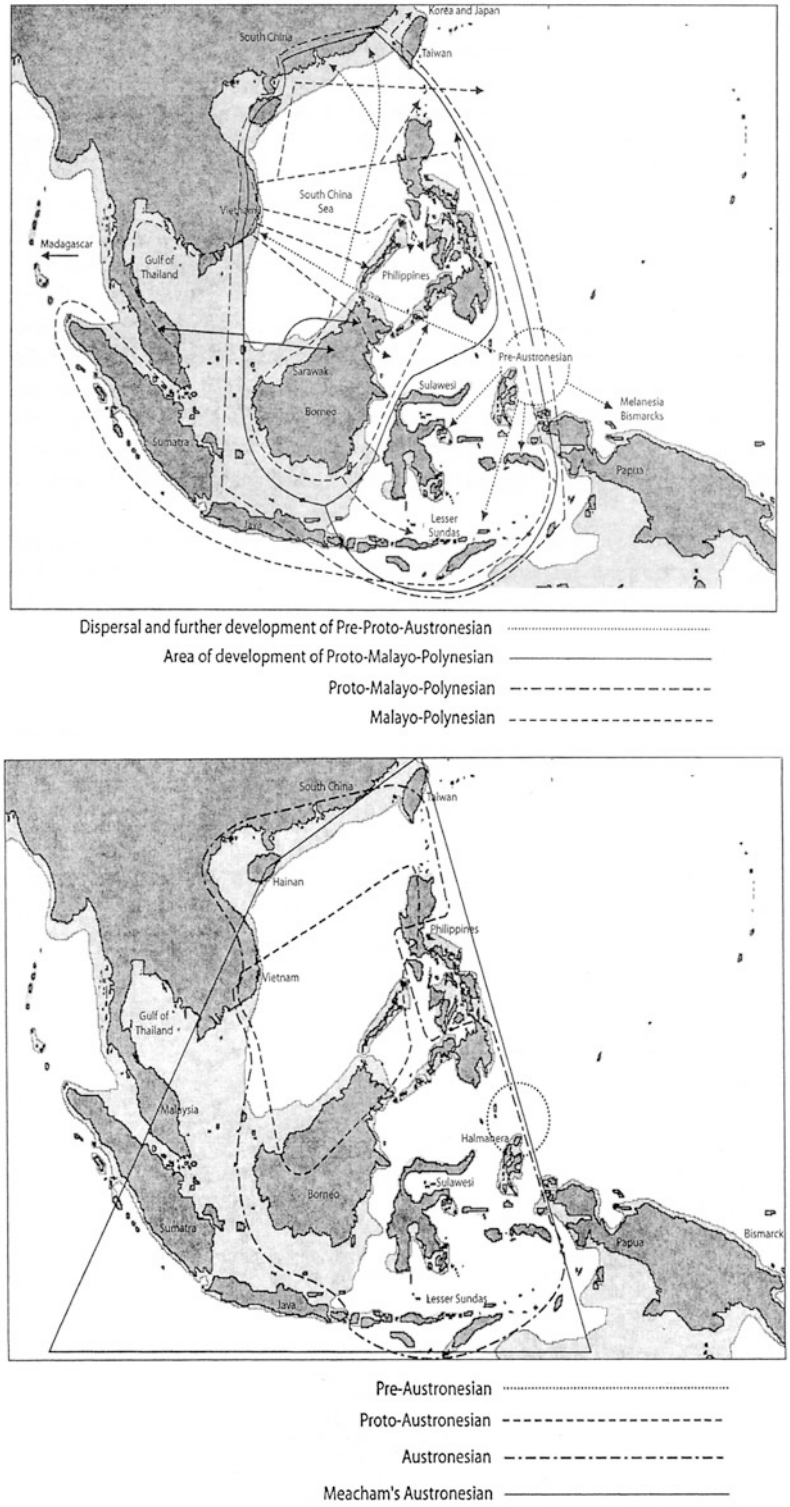

History and Current Debates of Archaeology in Island Southeast Asia, Fig. 8 Successive Austronesian language homelands and movements, suggested by Solheim and by Meacham. (Graphics source: Solheim 2006: 88, 91)

occurred by farmers seeking new lands for their crops and livelihood, and the farming populations in most cases spoke unified languages (Bellwood and Renfrew 2002). In this view, land-dependent farming eventually would force some portion of a population to move into new territory. When people migrated, they brought their languages and other cultural traits with them, and they tended to move in multiple instances within short periods of time, resulting in archaeological records of apparently rapid geographic spreading.

The *Farming-language Dispersal Hypothesis* in itself does not point to any specific migration route of the Austronesian-speaking groups who eventually spread through ISEA, but rather an independent line of evidence has come from linguistic studies that point to Austronesian language origins in Taiwan, hence building the framework for the *Out of Taiwan Model* (Fig. 9). According to the historical linguistic studies, the Austronesian languages are unified in a number of branches that reflect their order of separation and divergence form one another through time. When examining the inter-relationships of these branches in the Austronesian family, the oldest variants appear to be retained in Taiwan, and then a series of later branches can be mapped moving into various parts of ISEA and even later into the provinces of Pacific Oceania (Blust 2013).

Conceptually, this hypothesis would require testing through the material archaeological inventories of ISEA to identify what traits could reflect the arrival of Austronesian-speaking groups and their geographic expansion across the region. Depending on the patterns that are found, they may or may not validate the linguistic outline of the *Out of Taiwan Model*. Those material inventories could be examined for signs of past farming or other food production, toward testing the *Farming-language Dispersal Hypothesis*.

Bellwood (2005) recognized the pottery-bearing horizon as the most likely candidate to mirror past populations movements in ISEA. Looking at the cross-regional archaeological findings of ISEA, a sudden pottery-bearing horizon can be traced as moving generally from Taiwan well prior to 5000 years ago, then into different parts of ISEA after 4000 years ago and continuing for some centuries. This pottery trail reflected the geographic spread of cultural traits and ideas that logically involved the movement of people to certain degree. The geographic pattern accorded with the major steps in the linguistic history outline of the *Out of Taiwan Model* (Blust 2013). Bellwood further postulated that the Austronesian-speaking groups had migrated not only with pottery traditions but also with land-dependent farming systems or other forms of formal food-producing economies that forced people to seek new territories, in alignment with the *Farming-language Dispersal Hypothesis*.

Current Evidence and Research Questions

Now with more investigations throughout ISEA, as well as in neighboring areas of MSEA and East Asia, a more refined picture is emerging about the *Two-layer Hypothesis*. The older "first" layer of Australo-Melanesian hunter-gatherers now can be associated with flexed-burial traditions, and then the later "second" layer of East Asian sedentary groups now can be associated with extended-position burial traditions. Additionally, this "second layer" included the Austronesian-speaking groups who derived from East Asian biological affinities, and many of the sites in Mainland China and Taiwan showed clear evidence of rice farming economy (e.g., Hung et al. 2017; Matsumura et al. 2018, in press).

In terms of seeking how the apparent two population layers could match with a change in the archaeological record of ISEA, the association coincided mostly with the appearance of a pottery-bearing horizon at sites that furthermore have shown signs of sedentary lifestyle, beginning as early as 4000 years ago in some places of ISEA. Even later extensions of the pottery trail moved into Pacific Oceania after 3500 years ago (e.g., Hung 2005, 2008; Hung et al. 2011; Carson et al. 2013).

So far, the cross-regional evidence of a pottery trail indicates at least three major steps in the large-scale picture of ancient population movements across ISEA. First, people in Taiwan had developed traditions of farming rice and millets, living in formal villages, and making varied

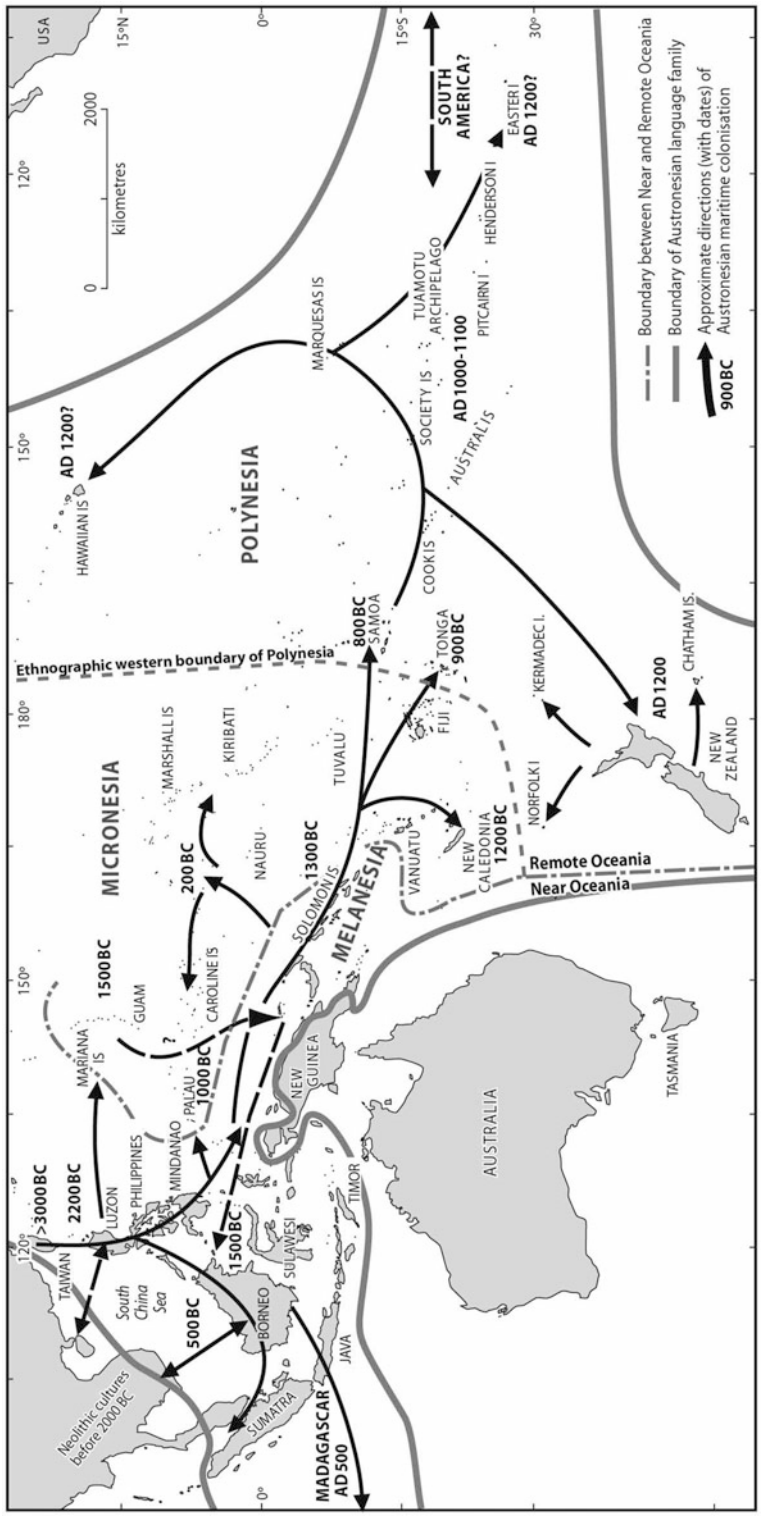

History and Current Debates of Archaeology in Island Southeast Asia, Fig. 9 The *Out of Taiwan Model* according to Bellwood. (Graphics source: Peter Bellwood, modified from Bellwood et al. 2011, Fig. 16.8)

History and Current Debates of Archaeology in Island Southeast Asia, Fig. 10 Examples of red slipped pottery, including a carinated jar with everted rim and an open footed bowl, from Nagsabaran Neolithic cultural layer, Cagayan, northern Luzon, Philippines. (Image source: Hsiao-chun Hung)

pottery by 4800 years ago or perhaps earlier. Second, by 4000 years ago, related groups moved into the northern Philippines, bringing a sudden and distinctive pottery-bearing horizon with links to Taiwan at that time (Fig. 10), yet the composition of food production has been unclear. Third, by 3500 years ago, the pottery-bearing horizon spread through more areas of ISEA. This pottery-bearing horizon often has been regarded as a *Neolithic* or N*ew Stone Age* association, overlaying and eventually replacing the older contexts of hunter-gatherer sites in the region. Those material traits appeared suddenly and then spread incrementally across the geographic expanse of ISEA, consistently replacing the older traditions of stone tool complexes. Furthermore, the new traditions of pottery, other artifacts, village layouts, and farming systems could be linked with the modern-day and historically known Austronesian-speaking groups of ISEA.

Overall, the pottery-bearing horizon represented the geographic spread of people, materials, and ideas throughout ISEA, generally during the centuries following 4000 years ago. The archaeological records prove that people already had been living in the region for many thousands of years prior to that time, so logically some degree of population admixture must have occurred. In some exceptional cases, local indigenous populations may have continued entirely intact in a biological sense, simply adopting some of the technologies and lifeways associated with the new pottery-bearing contexts. In other extreme cases, people bringing pottery and additional traits may have completely replaced the pre-existing groups. The reality probably was more complicated and variable, but eventually the Austronesian languages came to be spoken all across the region with definite implications about actual population dynamics. If the Austronesian languages were so successful in spreading throughout the region, then other cultural traditions and probably the physical populations were involved as well to a significant degree.

Given the strong congruence of the linguistic and archaeological findings (Bellwood et al. 2011), the *Out of Taiwan Model* appears to be robust and valid for describing the geographic spread of populations across ISEA. This descriptive evidence overall is consistent with the expectations of the *Farming-language Dispersal Hypothesis*, particularly for the starting point in eastern Taiwan where rice was cultivated in rather limited land, dated to 4200 years ago (Deng et al. 2018).

According to the *Farming-language Dispersal Hypothesis,* the population movements most likely were motivated by people seeking new lands for their food-producing land-use systems, but currently the direct evidence of farming has been inconsistent, and apparently the timing and composition differed across ISEA. Looking critically into these issues, the precise details of land-use systems must have been variable over the vast geography and time spans involved in the

Austronesian diaspora. Rice farming eventually gained prominence in most areas of ISEA, but each of those earliest movements may have involved somewhat different motivations for the migrant groups, as well as somewhat different subsistence land-use patterns. Research into this topic has been ongoing (Carson and Hung 2018), and the findings have been varied in different site-specific cases. This current understanding suggests a different scenario from a prior characterization of a rapid movement of people from Taiwan all the way eastward into Polynesia, as an *Express Train Model* (e.g., Diamond 1988).

Recently, Simanjuntak (2017b) proposed an Eastern Route Migration (ERM) of Austronesian people who brought red-slipped pottery traditions from Taiwan into the Philippines, northern Borneo, Sulawesi, and Pacific Oceania, separate from a Western Route Migration (WRM) of Austroasiatic people who brought cord-marked pottery traditions from MSEA through Peninsular Malaysia and into Sumatra and Borneo (Fig. 11). While the red-slipped pottery horizon has been well documented and dated at several sites of ISEA reflecting a large-scale ERM, the situation has been considerably more complicated for a WRM at the western edge of ISEA, as there are pre-existing early hunter-gatherer communities of Australo-Melanesian affiliation (Matsumura et al. in press) lived along the western side of the South China sea coast (in southern China, coastal Vietnam, Thailand, and the Malaysian Peninsula) with pottery production at least as early as 7000–4000 years ago (Hung in press). Thus, the role of WRM will need future investigation for clarifying its relation with ancestral Austronesian groups.

Looking just at the pottery-bearing horizon as a prime indicator, ancient population dispersals occurred over the course of some centuries, and conceivably the contexts of population movements had changed through time. Some of the internal details have been arguable and subjected to ongoing investigations that continue to

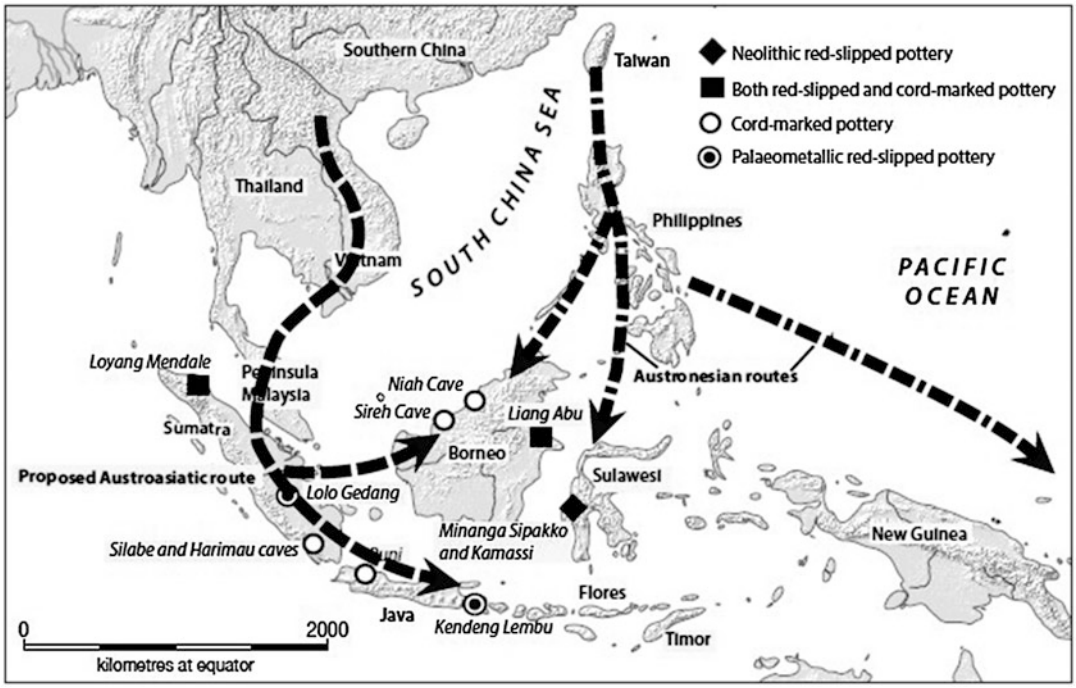

History and Current Debates of Archaeology in Island Southeast Asia, Fig. 11 The proposed two routes of Neolithic migrations, Austroasiatic and Austronesian, into Indonesia and the geographic distribution of sites with red-slipped and cord-marked pottery. (Graphics source: Simanjuntak 2017b)

generate new factual datasets. At least four major research programs have targeted: (1) the dating and definition of different early pottery assemblages in coastal Mainland SEA (e.g., Peninsular Malaysia) and Sumatra, noting their relation with ancient Austronesian societies in the region; (2) the roles of domesticated animals (e.g., dogs, pigs, and chicken), especially in cases of their sea-crossing translocation; (3) the emergence of farming or other formalized food-producing land-use systems in early ISEA; and (4) the ancient relationships between two or possibly more biological populations meeting in this region of ISEA.

In summary, the linguistic evidence is essential for outlining the *Out of Taiwan Model* of Austronesian dispersals through ISEA, and archaeology offers a way to test this model and furthermore to clarify the dating and associated context of the individual steps in ancient population movements. So far, the weight of archaeological evidence currently supports the *Out of Taiwan Model*, with strong suggestions in favor of the *Farming-language Dispersal Hypothesis* as well as the *Two-Layer Hypothesis*. As mentioned, studies of both modern and ancient DNA consistently have confirmed the expectations of the *Two-Layer Hypothesis* and of the *Out of Taiwan Model* (e.g., McColl et al. 2018). The findings suggest a pre-existing widespread Australo-Melanesian affinity throughout ISEA, later with increasing amounts of East Asian affinity in contexts of red-slipped pottery after 4000–3500 years ago. The East Asian affinities include definite links with Taiwan and coastal China as the deeper ancestral origin of the people who later spread throughout most of ISEA. No evidence at present can support the *NMTCN Model*.

While the *Out of Taiwan Model* may be regarded as portraying ancient population movements accurately, a number of core questions continue to drive regional research. The major focus for improving knowledge will be in developing and testing explanatory theories of the evident patterns and trends, such as proposed in the *Farming-language Dispersal Hypothesis* as a way to explain the evidence for the *Out of Taiwan Model*. In this regard, new lines of evidence will need to be brought into a comprehensive re-evaluation of the evidence, most likely looking at the new emerging findings in archaeo-botany and other specializations that still are in process of recovering primary datasets from relevant sites cross-regionally. Moreover, other hypothetical explanatory theories should be considered, although they would need to be logically consistent with the evidence in order to withstand testing with real data.

International Perspectives

Within the scope of what currently is known of ISEA archaeology, ample opportunities can be explored for solving questions and refining the available datasets. At present, the region-wide chronological narrative describes the early *Homo erectus* at 1.2–0.8 Ma, the first modern human more than 50,000 years ago, followed by the arrival and spread of rather large scale of human migrations, and then the Austronesian groups with a number of other changing conditions within the last 4000 years. The exact dating and the inventories of material findings have varied from one site to another, in total revealing cross-regional patterns and chronological trends that have been essential for outlining the large-scale narratives of ancient migrations in different time intervals.

The most enduring research themes in ISEA archaeology, such as the issues of the first arrival of *Homo sapiens* and the issues of Austronesian migrations, have been cross-regional and transcending political boundaries involving Taiwan, the Philippines, Malaysia, Indonesia, East Timor, and beyond. A cross-regional approach has characterized ISEA archaeology for several decades, and this perspective continues to guide most research. The most enduring themes still relate to cross-regional questions, for example:

1. How many species of the *Homo* Genus have lived in ISEA? What were the relations between these *Homo* Genus and others outside ISEA?

2. How did different groups of the *Homo* Genus come to populate this broad and diverse region?
3. How, when, and why did ancient groups transition evidently from hunting-gathering to variable food-producing economies such as horticulture and farming?
4. How did the Austronesian language traditions develop into the historically known contexts of the region?
5. How did ISEA contribute to the formation of early Lapita cultural group in the Pacific Oceanic region?
6. How did ISEA begin its Metal Age (bronze and iron), historical kingdoms, and complex state polities?

Within the established large-scale parameters of the archaeological record, these and other questions continue to be addressed with increasingly refined results. The work as a matter of practicality has proceeded one site at a time, and gradually the site-specific details have allowed re-assessment of the large-scale narratives.

Future Directions

Archaeology as a discipline in ISEA has undergone more than 100 years of development. A number of transformations occurred under foreign colonial and imperial influence, then again during and after World War II, and continuing more with professional advancements and training in each ISEA country. At present, numerous international collaboration projects are operating in ISEA for archaeology research. Through time, we can expect more projects by indigenous archaeologists, along with more research collaborations among countries within ISEA (or SEA more generally).

In order to solve many research questions and debates, the need of linking data from multiple lines of evidence has been increasingly obvious. For example, several debates have continued about the *Out of Taiwan Model*, based on conflicting views of the archaeological findings in the western part of ISEA, such as in Borneo, in principle resolvable through clarifying the actual material evidence. Adding to these debates are long-standing disagreements about the concepts of *Neolithic* societies, the role of farming or other modes of subsistence economies, and the ability to examine pottery assemblages as cultural markers. Another factor in debates has been a healthy skepticism of grand narratives, effectively resisting them even without alternative evidence. Overall, the situation is beginning to be clarified through continual integration of archaeology with more lines of evidence from the advancing research in ancient genetics, archaeobotany, palaeo-landscape reconstructions, and other perspectives.

Today, new discoveries from ISEA frequently attract the world's attention, such as the recently reported "*700,000-year-old stone tools point to mysterious human relative in Northern Luzon*" (Ingicco et al. 2018), and "*World's oldest figurative painting discovered in Borneo cave*" (Aubert et al. 2018). New discoveries continually change our knowledge about ISEA, and furthermore they revise our thoughts about the ancient world in general. As many parts of ISEA still are unexplored by modern-day archaeologists, ISEA will continue to support significant discoveries by new generations of investigators.

References

Anggraeni, M., T. Simanjuntak, P. Bellwood, and P. Piper. 2014. Neolithic foundations in the Karama valley, West Sulawesi, Indonesia. *Antiquity* 88 (2014): 740–756.

Antón, S.C. 2002. Evolutionary significance of cranial variation in Asian *Homo erectus*. *American Journal of Physical Anthropology* 118 (4): 301–323.

Aoyagi, Y., M. Aguilera Jr., H. Ogawa, and K. Tanaka. 1993. Excavation of hill top site, Magapit shell midden in Lal-lo shell middens, norhern Luzon, Philippines. *Man and Culture in Oceania* 9: 127–155.

Aoyagi, Y., H. Ogawa, and K. Tanaka. 1997. Excavation, and ornaments discovered at the Magapit shell-midden site, in northern Luzon. *The Journal of Sophia Asian Studies* 15: 167–180.

Aubert, M., A. Brumm, M. Ramli, T. Sutikna, E.W. Saptomo, B. Hakim, M.J. Morwood, G.D. van den Bergh, L. Kinsley, and A. Dosseto. 2014. Pleistocene cave art from Sulawesi, Indonesia. *Nature* 514: 223–227.

Aubert, M., P. Setiawan, A.A. Oktaviana, A. Brumm, P.H. Sulistyarto, E.W. Saptomo, B. Istiawan, T.A. Ma'rifat, V.N. Wahyuono, F.T. Atmoko, J.-X. Zhao, J. Huntley, P.S.C. Taçon, D.L. Howard, and H.E.A. Brand. 2018. Palaeolithic cave art in Borneo. *Nature*. (Published: 07 November 2018). https://doi.org/10.1038/s41586-018-0679-9.

Baba, H., F. Aziz, Y. Kaifu, G. Suwa, R.T. Kono, and T. Jacob. 2003. *Homo erectus* calvarium from the Pleistocene of Java. *Science* 299 (5611): 1384–1388. https://doi.org/10.1126/science.1081676.

Barker, G., and M.B. Richards. 2013. Foraging-farming transitions in Island Southeast Asia. *Journal of Archaeological Method and Theory* 20: 256–280. https://doi.org/10.1007/s10816-012-9150-7.

Barker, G., H. Barton, M. Bird, P. Daly, I. Datan, et al. 2007. The 'human revolution' in lowland tropical Southeast Asia: The antiquity and behavior of anatomically modern humans at Niah Cave (Sarawak, Borneo). *Journal of Human Evolution* 52: 243–261.

Bellwood, P. 1997. *Prehistory of the Indo-Malaysian Archipelago*. Revised ed. Honolulu: University of Hawaii Press.

Bellwood, P. 2005. Examining the farming/language dispersal hypothesis in the East Asian context. In *The peopling of East Asia*, ed. L. Sagart, R. Blench, and A. Sanchez-Mazas, 17–30. New York: Routledge Curzon Press.

Bellwood, P., and C. Renfrew (eds). 2002. *Examining the Farming/Language Dispersal Hypothesis*. Cambridge: McDonald Institute for Archaeological Research.

Bellwood, P., G. Chambers, M. Ross and H.C. Hung. 2011. Are "cultures" inherited? Multidisciplinary perspectives on the origins and migrations of Austronesian-speaking peoples prior to 1000 BC. In *Investigating Archaeological Cultures: Material Culture, Variability and Transmission*, eds. B. Roberts and M. Vander Linden, 321–54. Dordrecht: Springer.

Beyer, H.O. 1926. Recent discoveries in Philippine archeology. In *Proceedings third Pan-Pacific science conference*, vol. 3, 2469–2491. Tokyo.

Beyer, H.O. 1947. Outline review of Philippine archaeology by Island and Provinces. *The Philippine Journal of Science* 77 (3–4): 205–390.

Beyer, H.O. 1948. *Philippine and East Asian archaeology*, National Research Council of the Philippines bulletin 29. Quezon City: National Research Council of the Philippines.

Blust, R. 2013. *The Austronesian languages*. Revised ed. Canberra: Asia-Pacific Linguistics, Research School of Pacific and Asian Studies, the Australian National University.

Brothwell, D.R. 1960. Upper Pleistocene human skull from Niah Caves, Sarawak. *Sarawak Museum Journal* 9: 323–349.

Brown, P., and T. Maeda. 2009. Liang Bua *homo floresiensis* mandibles and mandibular teeth: A contribution to the comparative morphology of a new hominin species. *Journal of Human Evolution* 57 (5): 571–596.

Brown, P., T. Sutikna, M.J. Morwood, R.P. Soejono, et al. 2004. Anew small-bodied hominin from the Late Pleistocene of Flores, Indonesia. *Nature* 431: 1055–1091.

Brumm, A., G.D. van den Bergh, M. Storey, I. Kurniawan, B.V. Alloway, et al. 2016. Age and context of the oldest known hominin fossils from Flores. *Nature* 534: 249–253.

Cabanilla, I. 1972. *Neolithic shell mound of Cagayan: The Lal-Lo excavation*, Field report no. 1. Manila: National Museum of the Philippines.

Carson, M.T., and H.C. Hung. 2018. Learning from paleolandscapes: Defining the land-use systems of the ancient Malayo-Polynesian homeland. *Current Anthropology* 59 (online 12 Dec, 2018; https://doi.org/10.1086/700757).

Carson, M.T., H.C. Hung, G. Summerhayes, and P. Bellwood. 2013. The pottery trail from Southeast Asia to remote Oceania. *Journal of Island & Coastal Archaeology* 8 (1): 17–36.

Chia, S. 2017. A history of archaeology in Malaysia. In *Handbook of East and Southeast Asian archaeology*, ed. J. Habu, P.V. Lape, and J.W. Olsen, 125–141. New York: Springer.

Cooper, A., and C. Stringer. 2013. Did the Denisovans cross Wallace's line? *Science* 342: 321–323.

Deng, Z., H.C. Hung, M.T. Carson, P. Bellwood, S.L. Yang, and H. Lu. 2018. The first discovery of Neolithic rice remains in eastern Taiwan: Phytolith evidence from the Chaolaiqiao site. *Archaeological and Anthropological Sciences* 10: 1477–1484. https://doi.org/10.1007/s12520-017-0471-z.

Detroit, F., E. Dizon, C. Falguères, S. Hameau, W. Ronquillo, and F. Sémah. 2004. Upper Pleistocene *Homo sapiens* from the Tabon cave (Palawan, The Philippines): Description and dating of new discoveries. *Comptes Rendus Palevol* 3 (8): 705–712.

Diamond, J.M. 1988. Express train to Polynesia. *Nature* 336: 307–308.

Dubois, E. 1896. On Pithecanthropus erectus: A transitional form between man and the apes. *The Journal of the Anthropological Institute of Great Britain and Ireland* 25: 240–255.

Fox, R. 1959. *The Philippines in Pre-historic times: A handbook for the first national exhibition of Filipino pre-history and culture*. Manila: UNESCO National Commission of the Philippines.

Fox, R. 1970. *The Tabon caves*. Manila: National Museum of the Philippines.

Fox, R., and J. Peralta. 1974. Preliminary report on the Paleolithic archaeology of Cagayan valley, Philippines, and the Cabalwanian Industry. *First regional seminar on Southeast Asian prehistory and archaeology*, 100–147. Manila.

Glover, I.C. 1974. The death of Dr. H. R. van Heekeren. *Indonesia Circle. School of Oriental & African Studies. Newsletter* 2: 5–7. https://doi.org/10.1080/03062847708723575.

H

Harrisson, T. 1954. Bornean archaeology to 1955. *Sarawak Museum Journal* 6 (4): 188–192.

Harrisson, T. 1957. The Great Cave of Niah, a preliminary report on Bornean prehistory. *Man* 57: 161–166.

Harrisson, T. 1958a. The caves of Niah: A history of prehistory. *Sarawak Museum Journal* 8 (12): 549–595.

Harrisson, T. 1958b. Niah's Lobang Tulang: Cave of bones. *Sarawak Museum Journal* 8 (12): 596–619.

Harrisson, T. 1958c. The great Niah Caves, Sarawak: A-ship-of-the-dead cult and related rock paintings. *Archaeological Newsletter* 6 (9): 199–203.

Harrisson, T. 1959a. New archaeological and ethnological results from Niah Caves, Sarawak. *Man* 59: 1–8.

Harrisson, T. 1959b. Radiocarbon-C14 dating B.C. from Niah: A note. *Sarawak Museum Journal* 9 (13–14): 326–332.

Harrisson, T. 1967. A classification of stone age from Niah Great Cave, Sarawak. *Sarawak Museum Journal* 15 (30–31): 126–199.

Harrisson, T. 1968. A Niah Stone Age jar-burial, C-14 dated. *Sarawak Museum Journal* 16 (32–33): 64–66.

Harrisson, T. 1970. The prehistory of Borneo. *Asian Perspectives* 13: 17–46.

Harrisson, T. 1973. Newly discovered prehistoric rock carvings – Ulu Tomani, Sabah. *Journal of Malaysian Branch of The Royal Asiatic Society* XLVI (1): 123–139.

Henneberg, M., R.B. Eckhardt, S. Chavanaves, and K.J. Hsü. 2014. Evolved developmental homeostasis disturbed in LB1 from Flores, Indonesia, denotes Down syndrome and not diagnostic traits of the invalid species *Homo floresiensis*. *Proceedings of the National Academy of Sciences* 111: 11967–11972.

Hung, H.C. 2005. Neolithic interaction between Taiwan and Northern Luzon: The pottery and jade evidence form the Cagayan Valley. *Journal of Austronesian Studies* 1 (1): 109–134.

Hung, H.C. 2008. *Migration and cultural interaction in Southern Coastal China, Taiwan and the Northern Philippines, 3000 BC to AD 100: The early history of the Austronesian-speaking populations.* PhD thesis, Australian National University, Canberra.

Hung, H.C. in press. Prosperity and complexity without farming: The South China Coast at 5000–3000 BC. *Antiquity.*

Hung, H.C., M. Carson, P. Bellwood, et al. 2011. The first settlement of Remote Oceania: From the Philippines to the Marianas. *Antiquity* 85 (329): 909–926.

Hung, H.C., K.D. Nguyen, P. Bellwood, and M.T. Carson. 2013. Coastal connectivity: Long-term trading networks across the South China Sea. *Journal of Island & Coastal Archaeology* 8 (3): 384–404.

Hung, H.C., C. Zhang, H. Matsumura, and Z. Li. 2017. Neolithic transition in Guangxi: A long development of hunting-gathering society on Southern China. In *Bio-anthropological studies of early Holocene hunter-gatherer sites at Huiyaotian and Liyupo in Guangxi, China*, Monograph No. 47, ed. H. Matsumura, H.C. Hung, Z. Li, and K. Shinoda, 205–228. Tokyo: National Museum of Nature and Science.

Ingicco, T., G.D. van den Bergh, C. Jago-on, J.-J. Bahain, et al. 2018. Earliest known hominin activity in the Philippines by 709 thousand years ago. *Nature* 557: 233–237.

Jacob, T. 1967. *Some problems pertaining to the racial history of the Indonesian regions*. PhD dissertation, University of Utrecht.

Jacob, T., E. Indriati, R.P. Soejono, K.J. Hsü, et al. 2006. Pygmoid Australomelanesian *Homo sapiens* skeletal remains from Liang Bua, Flores: Population affinities and pathological abnormalities. *Proceedings of the National Academy of Sciences* 103 (36): 13421–13426.

Kaifu, Y. 2017. Archaic Hominin populations in Asia before the arrival of modern humans: Their phylogeny and implications for the "Southern Denisovans". *Current Anthropology* 58 (17): S418–S433.

Kaifu, Y., H. Baba, T. Sutikna, M.J. Morwood, D. Kubo, E.W. Saptomo, R.D. Awe Jatmiko, and T. Djubiantono. 2011. Craniofacial morphology of *Homo floresiensis*: Description, taxonomic affinities, and evolutionary implication. *Journal of Human Evolution* 61 (6): 644–682.

Kaifu, Y., R.T. Kono, T. Sutikna, E.W. Saptomo, Jatomiko, and Rokhus Due Awe. 2015a. Unique dental morphology of *Homo floresiensis* and its evolutionary implications. *PLoS One* 10 (11): e0141614.

Kaifu, Y., R.T. Kono, T. Sutikna, E.W. Saptomo, R.D. Awe Jatmiko, and H. Baba. 2015b. Descriptions of the dental remains of *Homo floresiensis*. *Anthropological Science* 123: 129–145.

Kano, T. 1946. *Studies in the ethnology and prehistory of Southeast Asia*. Vol. I. Tokyo: Yajima Shobo Press. (in Japanese).

Kano, T. 1952. *Studies in the ethnology and prehistory of Southeast Asia*. Vol. II. Tokyo: Yajima Shobo Press. (in Japanese).

Kennedy, K.A.R. 1979. The deep skull of Niah: An assessment of twenty years of speculation concerning its evolutionary significance. *Asian Perspectives* 20: 32–50.

Kidder, J.H., and A.C. Durband. 2004. A re-evaluation of the metric diversity within *Homo erectus. Journal of Human Evolution* 46 (3): 299–315.

Kubo, D., R.T. Kono, and Y. Kaifu. 2013. Brain size of *Homo floresiensis* and its evolutionary implications. *Proceedings of the Royal Society B* 280 (1760): 20130338.

Majid, Z. 1982. The West Mouth Niah in the prehistory of Southeast Asia. *Sarawak Museum Journal* 31 (52). Special monograph 3.

Matsumura, H., K. Shinoda, T. Shimanjuntak, A.A. Oktaviana, et al. 2018. Cranio-morphometric and aDNA corroboration of the Austronesian dispersal model in ancient Island Southeast Asia: Support from Gua Harimau, Indonesia. *PLoS One* 13 (6): e0198689. https://doi.org/10.1371/journal.pone.0198689.

Matsumura, H., H.C. Hung, C. Higham, C. Zhang, et al. in press. Craniometrics reveal "Two layers" of prehistoric human dispersal in Eastern Eurasia. *Scientific Reports*.

Meacham, W. 1988. On the probability of Austronesian origins in south China. *Asian Perspectives* 26 (1): 90–106.

Mijares, A.S.B. 2005. The archaeology of Peñablanca cave sites, northern Luzon, Philippines. *Journal of the Austronesian Studies* 1 (2): 65–93.

Mijares, A.S.B. 2006a. The early Austronesian migration to Luzon: Perspectives from the Peñablanca cave sites. *Bulletin of the Indo-Pacific Prehistory Association* 26: 72–78.

Mijares, A.S.B. 2006b. *Unearthing prehistory: The archaeology of Northeastern Luzon, Philippine Islands*, BAR international series. Vol. 1613. Oxford: Oxbow.

Mijares, A.S., F. Détroit, P. Piper, R. Grün, et al. 2010. New evidence for a 67,000 year-old human presence at Callao Cave, Luzon, Philippines. *Journal of Human Evolution* 59: 123–132.

McColl, Hugh, F. Racimo, L. Vinner, F. Demeter, et al. 2018. The prehistoric peopling of Southeast Asia. *Science* 361: 88–92.

Morwood, M.J., and W.L. Jungers. 2009. Conclusions: Implications of the Liang Bua excavations for hominin evolution and biogeography. *Journal of Human Evolution* 57: 640–648.

Morwood, M.J., R.P. Soejono, R.G. Roberts, T. Sutikna, et al. 2004. Archaeology and age of a new hominin from Flores in eastern Indonesia. *Nature* 431: 1087–1091.

Morwood, M.J., P. Brown, T. Sutikna, E.W. Saptomo, et al. 2005. Further evidence for small-bodied hominins from the Late Pleistocene of Flores, Indonesia. *Nature* 437: 1012–1017.

O'Connell, J.F., J. Allen, M.A.J. Williams, A.N. Williams, et al. 2018. When did *Homo sapiens* first reach Southeast Asia and Sahul? *Proceedings of the National Academy of Sciences* 115 (34): 8482–8490. https://doi.org/10.1073/pnas.1808385115.

Ogawa, H. 2002a. Chronological study on the red slipped pottery of Lal-lo shell middens: Special reference on the non-decorated red slipped pottery under the shell middens. *Journal of Southeast Asian Archaeology* 22: 59–80.

Ogawa, H., ed. 2002b. *Archaeological research on the Lower Cagayan River*. Tokyo: Tokyo University of Foreign Studies.

Ogawa, H. 2005. Typological chronology of pottery assemblages from the Lal-lo shell middens in northern Luzon, Philippines. *Journal of Southeast Asian Archaeology* 25: 1–30.

Oppenheimer, S. 2004. The 'express train from Taiwan to Polynesia': On the congruence of proxy lines of evidence. *World Archaeology* 36 (4): 591–600.

Paz, V. 2017. An outlined history of Philippine archaeology and its periodization. In *Handbook of East and Southeast Asian archaeology*, ed. J. Habu, P.V. Lape, and J.W. Olsen, 151–156. New York: Springer.

Peralta, J., ed. 1983. *Tau't Batu studies*. Manila: National Museum of the Philippines.

Reich, D., N. Patterson, M. Kircher, F. Delfin, et al. 2011. Denisova admixture and the first modern human dispersals into Southeast Asia and Oceania. *American Journal of Human Genetics* 89 (4): 516–528.

Reinecke, A., C. Nguyen, and T.M.D. Lam. 2002. *Neue Entdeckungen zur Sa-Huynh-Kultur*. Köln: Linden-Soft Press. (in German and Vietnamese).

Ronquillo, W. 1981. *The technological and functional analysis of lithic flake tools from Rabel Cave, Northern Luzon, Philippines*. Manila: Anthropological Paper.

Rutter, O. 1929. *British North Borneo: An account of history, resources and native tribes*. London: Constable & Company Limited.

Sarasin, F. 1936. Beiträge zur Prähistorie der Inseln Timor und Roti. *Verhandlungen der Naturforschenden Gesellschaft* 47: 1–59.

Shen, G., X. Gao, B. Gao, and D.E. Granger. 2009. Age of Zhoukoudian *Homo erectus* determined with 26Al/10Be burial dating. *Nature* 458 (7235): 198–200.

Shutler, R., and M.E. Mathisen. 1979. Pleistocene studies in the Cagayan valley of northern Luzon, Philippines. *Journal of the Hongkong Archaeological Society* 8: 105–114.

Simanjuntak, T., ed. 2008. *Austronesian in Sulawesi*. Jakarta: Center for Prehistoric and Austronesian Studies.

Simanjuntak, T. 2011. Acheulean tools in the Indonesian palaeolithic. In *Handaxes in the Imjin River. Diversity and variability in the East Asian Paleolithic*, ed. S. Yi, 179–192. Seoul: Seoul National University Press.

Simanjuntak, T., ed. 2016. *Gua Harimau cave and the long journey of Oku Civilization*. Yogyakarta: Gadjah Mada University Press.

Simanjuntak, T. 2017a. The archaeology of Indonesia. In *Handbook of East and Southeast Asian archaeology*, ed. J. Habu, P.V. Lape, and J.W. Olsen, 143–150. New York: Springer.

Simanjuntak, T. 2017b. The western route migration: A second probable Neolithic diffusion to Indonesia. In *New perspectives in Southeast Asian and Pacific prehistory*, ed. P. Piper, H. Matsumura, and D. Bulbeck, 201–211. Canberra: ANU EPress.

Simanjuntak, T., and H. Forestier. 2008. Handaxe in Indonesia: Question on the Movius Line. *Journal of Human Evolution* 23: 97–107.

Solheim, W.G.I.I. 1964. Further relationships of the Sa-Huynh-Kalanay pottery tradition. *Asian Perspectives* 8 (1): 196–211.

Solheim, W.G.I.I. 1988. The Nusanto hypothesis: The origin and spread of Austronesian speakers. *Asian Perspectives* 26 (1): 77–88.

Solheim, W.G.I.I. 2006. *Archaeology and culture in Southeast Asia: Unraveling the Nusantao*. Quzon: The University of the Philippines Press.

Storm, P., F. Aziz, J. de Vos, D. Kosasih, S. Baskoro, and L.W. van den Hoek Ostende. 2005. Late pleistocene *Homo sapiens* in a tropical rainforest fauna in East Java. *Journal of Human Evolution* 49: 536–545.

Storm, P., R. Wood, C. Stringer, A. Bartsiokas, J. de Vos, M. Aubert, et al. 2013. U-series and radiocarbon analyses of human and faunal remains from Wajak, Indonesia. *Journal of Human Evolution* 64: 356–365.

Sutikna, T., M.W. Tocheri, M.J. Morwood, E.W. Saptomo, D.A. Jatmiko, W. Rokus, et al. 2016. Revised stratigraphy and chronology for *Homo floresiensis* at Liang Bua in Indonesia. *Nature* 532: 366. https://doi.org/10.1038/nature17179.

Tanaka, K. 2002. *Ceramic chronology in Northern Luzon: Typological analysis of pottery from the Lal-lo Shell Midden*. PhD thesis, University of the Philippines, Quezon City.

Tanaka, K. 2004. The continuity and the gap of the occupation of shell midden sites in the lower reaches of the Cagayan River, northern Luzon. In *Southeast Asian archaeology*, ed. V. Paz, 158–183. Quezon City: University of the Philippines.

Taha, A.H. 1985. The re-excavation of the rock-shelter of Gua Cha, Ulu Kelantan, West Malaysia. *Monograph Federation Museums Journal* 30:1–134. Kuala Lumpur.

Taha, A.H. 1987. Archaeology in peninsular Malaysia: Past, present and future. *Journal of Southeast Asian Studies* 18 (2): 205–211.

Taha, A.H. 1991. Gua Cha and the archaeology of the Orang Asli. *Bulletin of the Indo-Pacific Prehistory Association* 2 (11): 363–372.

Thiel, B. 1986a. Excavations at Arku Cave, northeast Luzon, Philippines. *Asian Perspectives* 27 (2): 229–264.

Thiel, B. 1986b. Excavations at the Lal-lo shell middens, northeast Luzon, Philippines. *Asian Perspectives* 27 (1): 71–94.

Thiel, B. 1988–1989. Excavations at Musang cave, northeast Luzon, Philippines. *Asian Perspectives* 28: 61–81.

Tsang, C.H. 2000. *The archaeology of Taiwan*. Taipei: Council for Cultural Affairs, Executive Yuan.

Tsang, C.H. 2005. Recent discoveries at the Tapenkeng culture sites in Taiwan: Implications for the problem of Austronesian origins. In *The peopling of East Asia*, ed. L. Sagart, R. Blench, and A. Sanchez-Mazas, 63–73. London: Routledge Curzon.

Turner, C.G.I.I. 1990. Major features of Sundadonty and Sinodonty, including suggestions about East Asian microevolution, population history and late Pleistocene relationships with Australian aborigines. *American Journal of Physical Anthropology* 82: 295–317.

Van Den Bergh, G.D., Y. Kaifu, I. Kurniawan, R.T. Kono, A. Brumm, E. Setiyabudi, Fachroel Aziz, and M.J. Morwood. 2016. *Homo floresiensis*-like fossils from the early Middle Pleistocene of Flores. *Nature* 534: 245–248.

Van Heekeren, H.R. 1958. The bronze iron age of Indonesia. In *Verhandelingen van het Koninklijk Instituut voor Taal-,Land-, en Volkenkunde, Deel XXII*. S'Gravenhage: Martrinus Nijhoff.

Van Heekeren, H.R. 1972. The stone age of Indonesia. In *Verhandelingen het Kononklijk Instituut voor Taal-, Land-, enVolkenkunde, deel XXI*. The Hague: Martinus Nijhoff.

Wasson, R., and R. Cochrane. 1979. Geological and geomorphological perspectives on archaeological sites in the Cagayan valley, northern Luzon, Philippines. *Modern Quaternary Research in Southeast Asia* 5: 1–26.

Weidenreich, F. 1943. The skull of Sinanthropus pekinensis: A comparative study on a primitive hominin skull. *Paleontologia Sinica, New Series D* 10: 1–484.

Westaway, K.E., M.J. Morwood, R.G. Roberts, J.X. Awe Due Rokus, P.S. Zhao, Fachroel Aziz, Gert Van Den Bergh, et al. 2007. Age and biostratigraphic significance of the Punung rainforest fauna, East Java, Indonesia, and implications for Pongo and Homo. *Journal of Human Evolution* 53 (6): 709–717.

Zeitoun, V., F. Détroit, D. Grimaud-Hervé, and H. Widianto. 2010. Solo man in question: Convergent views to split Indonesian *Homo erectus* in two categories. *Quaternary International* 223–224: 281–292.

Future Reading

Barker, G., ed. 2013. *Rainforest foraging and farming in Island Southeast Asia*. Cambridge: McDonald Institute for Archaeological Research.

Barker, G., ed. 2016. *Archaeological investigations in the Niah Caves, Sarawak, 1954–2004*. Cambridge: McDonald Institute for Archaeological Research.

Bellwood, P. 2017. *First Islanders: Prehistory and human migration in Island Southeast Asia*. Hoboken: Wiley Blackwell.

Carson, M.T. 2018. *Archaeology of Pacific Oceania: Inhabiting a Sea of Islands*. London/New York: Routledge.

Chia, S. 2017. A history of archaeology in Malaysia. In *Handbook of East and Southeast Asian archaeology*, ed. J. Habu, P.V. Lape, and J.W. Olsen, 125–141. New York: Springer.

Kaifu, Y., M. Izuho, T. Goebel, H. Sato, and A. Ono, eds. 2015. *Emergence and diversity of modern human behavior in Paleolithic Asia*. College Station: Texas A&M University Press.

Paz, V. 2017. An outlined history of Philippine archaeology and its periodization. In *Handbook of East and Southeast Asian archaeology*, ed. J. Habu, P.V. Lape, and J.W. Olsen, 151–156. New York: Springer.

Simanjuntak, T. 2017. The archaeology of Indonesia. In *Handbook of East and Southeast Asian archaeology*, ed. J. Habu, P.V. Lape, and J.W. Olsen, 143–150. New York: Springer.

History and Current Debates of Archaeology in Mainland Southeast Asia

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Introduction

In this chapter, I discuss the history and current debates of archaeology in Mainland Southeast Asia to evaluate the past, present, and future of archaeological investigation within this region. I discuss the history of archaeological research during the pre- and post-World War II eras and major issues confronting archaeologists today, including evidence for early hominins, Hoabinhian hunter-gatherers, the forager-to-farmer transition, and the transition to metallurgy and complex societies.

Definition

Mainland Southeast Asia (MSEA) is defined as the modern geopolitical region encompassing Cambodia, Laos, Peninsular Malaysia, Myanmar, Thailand, and Vietnam (Fig. 1). For archaeologists studying prehistoric cultures in this region, the southernmost provinces of China (e.g., Yunnan) are also included in MSEA. This region is geographically, and geopolitically, distinct from South Asia, primarily encompassing Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka, East Asia, encompassing China, Japan, Mongolia, North Korea, South Korea and Taiwan, and Island Southeast Asia, including Brunei, Indonesia, Malaysia (non-Peninsular), the Philippines, Singapore and Timor Leste. The climate of MSEA varies, but it is a tropical and subtropical environment with warm temperatures and high humidity and rainfall patterns driven by the Southeast Asian monsoon system.

History and Current Debates of Archaeology in Mainland Southeast Asia, Fig. 1 Mainland Southeast Asia, and the sites discussed in text. (1) Spirit Cave and Long Long Rak, (2) Nong Ratchawat, (3) Ayutthaya, (4) Ban Non Wat, (5) Non Nok Tha, (6) Ban Chiang, and (7) Angkor Wat

In this chapter, I discuss important milestones in the history of archaeological research in MSEA and current debates facing archaeologists today. The archaeological record from MSEA spans the late-Pleistocene (~80–60,000 years ago) into the Neolithic, Bronze, and Iron Ages, the late prehistoric and protohistoric period, and modern times. In this entry, I base my discussion on the late-Pleistocene to Holocene record, from approximately 60,000–1500 years ago.

Historical Background

The history of archaeological research in MSEA is generally separated into two periods (see discussions by Chia 2017; Goh 2017; Heng and Phon 2017; Kim 2017; Marwick and Bouasisengpaseuth

2017; Shoocongdej 2017): the pre- and post-World War II (ca. 1939–1945) eras. These eras tend to coincide with the exploratory versus scientific periods in MSEA archaeological history.

Prior to the onset of World War II, archaeological research within MSEA was largely exploratory and tended to document sites of major cultural and religious significance, for example, the temples and monuments of Ayutthaya, Thailand, and Angkor Wat, Cambodia (Higham 1989). This period included the initial "discovery" of sites by nonlocal travelers and explorers, primarily Western Europeans, and the establishment of broad characteristics (i.e., the Three-Age System) in the cultural-chronological record. For example, in the early 1900s Madeleine Colani, working in northern Vietnam as part of the École Française d'Extrême Orient, excavated several prehistoric cave sites and identified the "Hoabinhian" lithic techno-complex (Colani 1927). Hoabinhian stone tools, which are often unifacially flaked river cobbles known as sumatraliths, occur throughout MSEA and are a major characteristic of prehistoric archaeological cultures (Fig. 2).

During the post-World War II period, archaeological research within MSEA shifted and became less exploratory and increasingly scientific and systematic. During this phase, especially during the 1960s–1980s, archaeologists investigating prehistoric human adaptations initiated more detailed analyses of organic remains at archaeological sites, directly dated the prehistoric record, and applied theoretical frameworks and expectations based on anthropological and archaeological theory. It was also in this post-World War II period that sites of major significance were excavated, including the hunter-gatherer site of Spirit Cave (Fig. 3; Gorman 1970) and Bronze Age sites of Ban Chiang (Gorman and Charoenwongsa 1976) and Non Nok Tha (Fig. 4; Bayard 1970). A major aspect of the archaeological history of the post-World War II period was the shift away from simply describing sites and assemblages toward question-driven research, methodological and theoretical debates, and a push for scientific advancement of the discipline.

Since several important archaeological sites in MSEA were excavated during the 1960s–1980s, many key issues and current debates surrounding these sites are directly impacted by this legacy record. In the following section, I discuss four major issues and debates surrounding MSEA archaeology.

Key Issues/Current Debates

There are four main much-debated issues and groups of material within MSEA archaeology: (1) the initial record of hominin dispersal and migration into this region, including by *Homo sapiens*, (2) the adaptations and cultural diversity of late

History and Current Debates of Archaeology in Mainland Southeast Asia, Fig. 2 A Hoabinhian sumatralith from Steep Cliff Cave (*Tham Phaa Can*). (Photograph by the author)

History and Current Debates of Archaeology in Mainland Southeast Asia, Fig. 3 Excavations at Spirit Cave (*Tham Phii Maen*) in Mae Hong Son Province, northwest Thailand. (Photograph by Chester Gorman ca. 1966. Courtesy of the Institute for Southeast Asian Archaeology, University of Pennsylvania, Penn Museum)

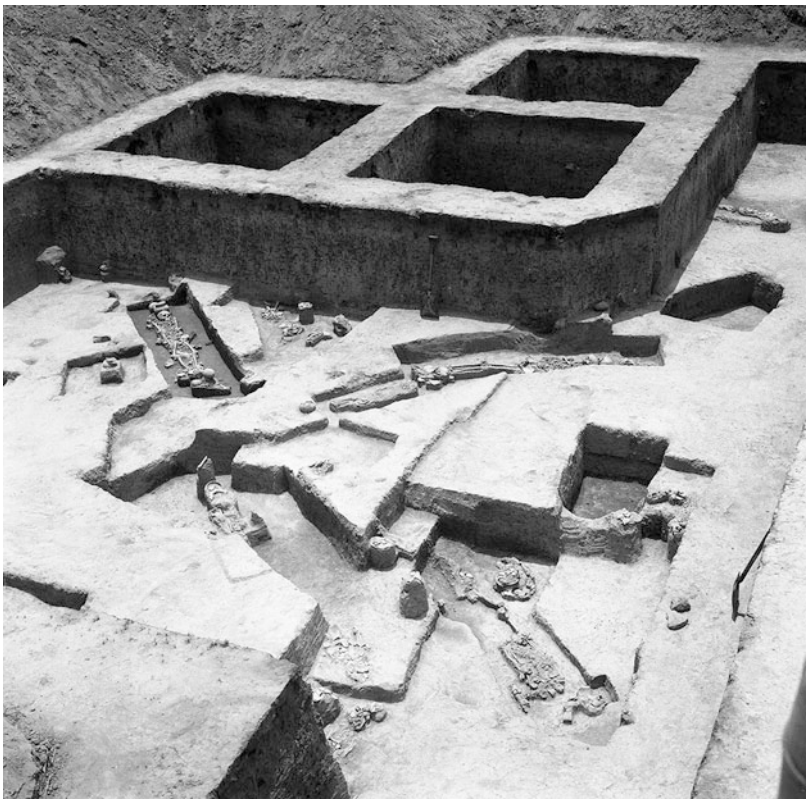

History and Current Debates of Archaeology in Mainland Southeast Asia, Fig. 4 Excavations at Non Nok Tha (Partridge Mound) in Khon Kaen Province, northeast Thailand. (Photographer unknown, possibly Donn Bayard ca. 1968. Courtesy of the Department of Anthropology at the University of Hawai'i at Mānoa and the American Heritage Center at the University of Wyoming)

Pleistocene and Holocene hunter-gatherer groups utilizing the Hoabinhian stone tool techno-complex, (3) the process and consequences of the forager-to-farmer transition, and (4) the emergence of metallurgy and complex societies. Below, I will discuss each of them in turn.

Hominin Emergence

A critical issue confronting MSEA archaeologists is determining the exact process(es), route, adaptations, and hominin speciation present during the various stages of hominin colonization in this region (Dennell and Petraglia 2012; Marwick 2009). Although recent discoveries in Southern China suggest that *Homo sapiens* colonized MSEA as early as 120,000–80,000 years ago, we still lack the evidence required to fully understand hominin socio-economic adaptations during this period, particularly by *Homo erectus*, and the potential for long-term interaction between hominin species within MSEA. These unresolved issues and questions are crucial for determining the process(es) of human evolution within the MSEA tropics and how *H. sapiens* eventually migrated into Island Southeast Asia, Australia, and beyond. Based on current evidence, hominins in MSEA expanded further, earlier, and practiced more complex hunting and gathering strategies than previously suspected. Recent recovery of hominin skeletal material throughout ongoing excavations in MSEA, and analyses of ancient genetics, also indicates a more morphologically diverse population of hominins inhabited this region during the Pleistocene.

Hoabinhian Hunter-Gatherers

When Madeleine Colani (1927) famously coined the term Hoabinhian to describe a set of common characteristics in stone tools while working in northern Vietnam, she set in motion the use of a descriptive which would impact Southeast Asian archaeologists throughout the twentieth and twenty-first centuries. Today, almost 100 years after Colani's excavations, archaeologists investigating MSEA hunter-gatherers continue to debate the exact definition and use of the term Hoabinhian. The primary issue surrounding the Hoabinhian relates to whether this term should still exist in MSEA since it carries a set of assumed characteristics in hunter-gatherer societies which do not necessarily exist (Shoocongdej 2000). These characteristics are often defined as small foraging group sizes, highly mobile populations, and broad diets (Gorman 1970).

However, within MSEA there are large differences in the regional record of hunter-gatherer foraging adaptations, for example, between coastal regions along the Thai-Malay Peninsula in comparison to the northern Thai uplands and northeast Thai Khorat Plateau. Although Hoabinhian tools appear throughout these regions (see examples in Reynolds 1990), suggesting a common set of human adaptations, archaeologists continue to lack a robust understanding of what this technological pattern really means and what it really masks. Many well-known Hoabinhian sites were excavated during the 1960s–1980s, which makes fine-grained analyses of their legacy assemblages difficult. For example, due largely to poor preservation, there is little direct evidence for organic tool adaptations used by these prehistoric hunter-gatherers, and how tools (Hoabinhian or otherwise) relate to foraging strategies.

Determining the origin and controlling the chronology for the Hoabinhian also remains elusive. Colani identified northern Vietnam as the origin of the Hoabinhian; however, this techno-complex is found throughout every modern geopolitical country in MSEA (and possibly in parts of Island Southeast Asia). Today, Hoabinhian stone tools are found in directly dated deposits spanning approximately 40,000–3,000 years ago, and the oldest Hoabinhian tools are currently from Southern China. Clearly, as archaeological research continues in MSEA, we must critically examine the Hoabinhian lithic techno-complex and determine what this term truly means for understanding prehistoric human adaptations within this region.

Forager-to-Farmer Transition

Understanding the exact dynamics of the transition from foraging to farming in MSEA continues to be a complicated endeavor. Although archaeologists have a relatively detailed understanding of the artifactual record of Neolithic population

movement into MSEA during the mid-Holocene from what is today China (Higham 2014; Rispoli 2007), they lack specific temporal control on localized pulses of Neolithic expansion, exactly how wild and domesticated resources were partitioned into diets, what type(s) of agriculture and horticulture were practiced, and how migrating Neolithic populations interacted with indigenous hunter-gatherer groups. Some regions throughout MSEA, particularly Vietnam, have a more well-established record of this Neolithization process, but portions of the interior, especially Laos, Cambodia, regions of Thailand, Myanmar and Peninsular Malaysia, have very little clear evidence.

Considering that the main domesticated plant and animal resources that eventually become staples of the MSEA diet – rice, millet, cattle, pigs, and chickens – are native to MSEA, it is critical to understand how the process of the forager-to-farmer transition occurred within this region. Establishing if there was a long-term relationship between hunter-gatherers and agricultural groups will help provide more detailed insight into the Neolithization process and this critical transition. Similar to the issues confronting the Hoabinhian, an important reason why archaeologists lack detailed information on the forager-to-farmer transition in many regions of MSEA (e.g., Thailand) is that sites with potential transitional records, for example, at Non Nok Tha (Bayard 1970), were excavated in the immediate post-World War II era without modern techniques and with different excavation goals (i.e., emphasis on metallurgy). Future research aimed at documenting the forager-to-farmer transition will undoubtedly help clarify and establish this record.

Metallurgy and Complex Societies

Although hominins, hunter-gatherers and the Neolithic transition are important issues in MSEA archaeology, one of the most significant debates today surrounds the emergence and timing of the advent of metallurgy, the emergence of complex societies, and broad-scale social changes during the Bronze Age and afterwards (Higham et al. 2011; White and Hamilton 2009). Related debates primarily focus on two sites in northeast Thailand, Ban Chiang and Ban Non Wat, and to a lesser degree, Non Nok Tha. The direct dates, context, and associated cultural artifacts for the earliest metal-bearing deposits at each of these sites differ markedly from each other. Since identifying the exact timing, process(es), and scale of metallurgical development has profound impacts on understanding long-term sociocultural processes within MSEA, it is no surprise that this issue continues to spur intense debate. What is clear from the evidence currently available is that the emergence of metal producing and metal using societies within MSEA differed between sites, both in its "arrival" (or appearance in the archaeological record) and functional use and purpose. Metals likely played multiple different roles within these agricultural communities, and this fluctuated through both time and space. Thus, as archaeologists continue to investigate important questions surrounding the emergence of metallurgy and increasing societal complexity (based on hierarchical, wealth, and status differences), it will remain necessary to contextualize these arguments within regional understandings of the diversity of mid- to late-Holocene agricultural communities throughout MSEA.

International Perspectives

Based on my own experience as an American citizen and archaeologist, there is increasing interest and consideration of the MSEA archaeological record in Western and global anthropological and archaeological discourse. The breadth of indigenous archaeological scholarship in MSEA is growing, and this provides a powerful new narrative on archaeological histories and perspectives from this region. During the pre- and immediate post-World War II eras, archaeology in MSEA was largely nonindigenous and dominated by Western researchers excavating and publishing archaeological findings based on their own ideas and interpretations. To their credit, many of these early archaeologists established strong relationships with their fellow collaborators and archaeologists within MSEA countries. Examples are easy to identify – both Chester Gorman

(an American archaeologist who excavated at Spirit Cave) and Donn Bayard (an American archaeologist who excavated at Non Nok Tha) have longstanding reputations highlighting their close relationships and collaboration with, in these cases, Thai scholars, archaeologists, and local communities. However, this has not always been the norm and because of this, and several other reasons (including language barriers), the archaeology of MSEA is still somewhat unknown to most American and Western scholars. Sites of major importance, Spirit Cave for example, are known worldwide but often by name only. The complete scope and scale of the archaeological record in this region has yet to be understood by most non-MSEA archaeologists. This situation will likely change as indigenous, American, and other archaeologists around the world continue to study MSEA archaeology. For example, ongoing Thai excavation and research projects directed by Dr. Rasmi Shoocongdej at Long Long Rak in northwest Thailand and by Ms. Supamas Duangsakul in western Thailand at the site of Nong Ratchawat hold excellent potential to redefine our understanding of the prehistoric hunter-gatherer and Neolithic records, respectively, within MSEA. This ongoing research is especially important given recent acknowledgement of the complexity and importance of MSEA as a pivotal center for human evolution and adaptation in the tropics.

Future Directions

I expect the future of archaeology in MSEA to include two major factors: (1) establishment of new international collaborations by indigenous archaeologists within MSEA and (2) detailed scientific analyses of legacy collections. As archaeological research continues within MSEA, it is likely that there will be a major transition in the type of research conducted. In the past, many research projects in MSEA were conducted by, mostly, Western archaeologists who included MSEA archaeological collaborators and co-directors. I expect that as future research occurs within MSEA, the opposite effect will become the norm – indigenous archaeologists will conduct research projects and will include nonindigenous archaeological collaborators and co-directors. The shift in the design and implementation of research projects will undoubtedly influence this, and the next generation of archaeologists, and will provide an entirely different narrative and perspective on the complex archaeology of this region (White 2017).

Alongside this change in the function of archaeological research within MSEA, I expect a renewed interest in previously excavated legacy archaeological assemblages. Although legacy collections are commonly burdened by missing contextual information (e.g., missing field notes, photographs, poor artifact curation), they also provide the opportunity to gain detailed information on prehistoric cultural activities using fine-grained scientific analyses. For example, innovations in radiocarbon dating, ancient DNA analysis, multiple stable isotope compound specific analyses, and 3D morphometrics now provide the opportunity for enormous information gain from, in some cases, individual artifacts. As scientific analyses of legacy collections continue, there will likely (and should) be a parallel effort in providing open-accessibility to data, results and interpretations, and reproducible results to allow archaeologists from all backgrounds and regions to reconstruct analyses and understand the minutia of site and artifact specific investigations.

With these future directions in the archaeology of MSEA, we are undeniably on track to identify new trends and patterns in the prehistoric cultural record, clarify and answer unresolved key issues and debates, and continue making significant discoveries that will influence our understanding of hominins on a global scale.

References

Bayard, Donn T. 1970. Excavation at Non Nok Tha, Northeastern Thailand, 1968: An interim report. *Asian Perspectives* 13: 110–143.

Chia, Stephen. 2017. A history of archaeology in Malaysia. In *Handbook of east and southeast Asian*

archaeology, ed. Junki Habu, Peter V. Lape, and John W. Olsen, 125–141. New York: Springer.

Colani, Madeleine. 1927. *L'Age de la Pierre dans la Province de Hoa-Binh (Tonkin)*. Hanoi: Mémoires du Service Géologique de l'Indochine, Imprimerie d'Extrême-Orient.

Dennell, Robin, and Michael D. Petraglia. 2012. The dispersal of *Homo sapiens* across southern Asia: How early, how often, how complex? *Quaternary Science Reviews* 47: 25–22.

Goh, Geok Yian. 2017. The history and practice of archaeology in Myanmar. In *Handbook of east and southeast Asian archaeology*, ed. Junki Habu, Peter V. Lape, and John W. Olsen, 111–117. New York: Springer.

Gorman, Chester F. 1970. Excavations at spirit cave, North Thailand: Some interim interpretations. *Asian Perspectives* 13: 79–107.

Gorman, Chester, and Pisit Charoenwongsa. 1976. Ban Chiang: A mosaic of impressions from the first two years. *Expedition* 18 (4): 14–26.

Heng, Piphal, and Kaseka Phon. 2017. The position of Cambodian archaeology in current sociopolitical context. In *Handbook of east and southeast Asian archaeology*, ed. Junki Habu, Peter V. Lape, and John W. Olsen, 83–87. New York: Springer.

Higham, Charles. 1989. *The archaeology of mainland southeast Asia: From 10,000 B.C. to the fall of Angkor*. Cambridge: Cambridge University Press.

Higham, Charles. 2014. *Early Mainland Southeast Asia: From first humans to Angkor*. Bangkok: River Books.

Higham, Charles, Thomas Higham, Roberto Ciarla, Katerina Douka, Amphan Kijngam, and Fiorella Rispoli. 2011. The origins of the bronze age of Southeast Asia. *Journal of World Prehistory* 24 (4): 227–274.

Kim, Nam C. 2017. The archaeology of Vietnam. In *Handbook of east and southeast Asian archaeology*, ed. Junki Habu, Peter V. Lape, and John W. Olsen, 79–82. New York: Springer.

Marwick, Ben. 2009. Biogeography of middle Pleistocene hominins in mainland Southeast Asia: A review of current evidence. *Quaternary International* 202: 51–58.

Marwick, Ben, and Bounheung Bouasisengpaseuth. 2017. The history and practice of archaeology in Laos. In *Handbook of east and southeast Asian archaeology*, ed. Junki Habu, Peter V. Lape, and John W. Olsen, 89–95. New York: Springer.

Reynolds, Timothy E.G. 1990. The Hoabinhian: A review. In *Hoabinhian, Jomon, Yayoi, early Korean states*, ed. G.L. Barnes, 1–30. Oxford: Oxbow Books.

Rispoli, Fiorella. 2007. The incised & impressed pottery style of mainland southeast Asia: Following the paths of neolithization. *East and West* 57 (1/4): 235–304.

Shoocongdej, Rasmi. 2000. Forager mobility organization in seasonal tropical environments of western Thailand. *World Archaeology* 32 (1): 14–40.

Shoocongdej, Rasmi. 2017. The history and practice of archaeology in Thailand. In *Handbook of east and southeast Asian archaeology*, ed. Junki Habu, Peter V. Lape, and John W. Olsen, 97–109. New York: Springer.

White, Joyce C. 2017. Changing paradigms in southeast Asian archaeology. *Journal of Indo-Pacific Archaeology* 41: 66–77.

White, Joyce C., and Elizabeth G. Hamilton. 2009. The transmission of early bronze technology to Thailand: New perspectives. *Journal of World Prehistory* 22: 357–397.

Further Reading

Bayard, Donn, and Wilhelm G. Solheim II. 2009a. *Archaeological excavations at Non Nok Tha Northeastern Thailand 1966–1968: Part I*. Mangilao: Richard F. Taitano Micronesian Area Research Center, University of Guam.

Bayard, Donn, and Wilhelm G. Solheim II. 2009b. *Archaeological Excavations at Non Nok Tha Northeastern Thailand 1966–1968: Part II*. Mangilao: Richard F. Taitano Micronesian Area Research Center, University of Guam.

Bellina, Bérénice, Elisabeth A. Bacus, Thomas Olivery Pryce, and Jan Wisseman Christie. 2010. *50 years of archaeology in Southeast Asia: Essays in honour of Ian Glover*. Bangkok: River Books.

Bellwood, Peter. 2007. *Prehistory of the Indo-Malaysian Archipelago*. Canberra: Australian National University.

Conrad, Cyler Norman. 2018. *Mainland Southeast Asia in the Longue Durée: A zooarchaeological test of the 'Broad Spectrum Revolution' in Northern Thailand*. Ph.D. dissertation, University of New Mexico.

Dennell, Robin, and Martin Porr. 2014. *Southern Asia, Australia and the search for human origins*. Cambridge: Cambridge University Press.

Douglas, D. 1990. *Anderson, Lang Rongrien Rockshelter: A Pleistocene, early Holocene archaeological site from Krabi, Southwestern Thailand*. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Higham, Charles. 2002. *Early cultures of Mainland Southeast Asia*. Chicago: Art Media Resources, Ltd.

Higham, Charles F.W. 2005. *The origins of the civilization of Angkor volume I: The excavation of Ban Lum Khao*. Bangkok: The Thai Fine Arts Department.

Higham, Charles F.W. 2007. *The origins of the civilization of Angkor volume II: The excavation of Noen U-Loke and Non Muang Kao*. Bangkok: The Thai Fine Arts Department.

Higham, Charles F.W., and Amphan Kijngam. 2009. *The origins of the civilization of Angkor volume III: The excavation of Ban Non Wat: Introduction*. Bangkok: The Thai Fine Arts Department.

Higham, Charles F.W., and Amphan Kijngam. 2012. *The origins of the civilization of Angkor volume V: The excavation of Ban Non Wat: The Bronze Age*. Bangkok: The Thai Fine Arts Department.

H

Higham, Charles F.W., and Amphan Kijngam. 2013. *The origins of the civilization of Angkor Volume VI: The excavation of Ban Non Wat: The Iron Age, summary and conclusions*. Bangkok: The Thai Fine Arts Department.

Kijngam, Amphan, and Charles F.W. Higham. 2011. *The origins of the civilization of Angkor volume IV: The excavation of Ban Non Wat: The neolithic occupation*. Bangkok: The Thai Fine Arts Department.

Marwick, Ben. 2008. *Stone Artefacts and Human Ecology at Two Rockshelters in Northwest Thailand*. PhD dissertation, Australian National University.

O'Reilly, Dougald J.W. 2007. *Early civilizations of Southeast Asia*. Lanham: AltaMira Press.

Oxenham, Marc, and Hallie R. Buckley. 2016. *The Routledge handbook of bioarchaeology in Southeast Asia and the Pacific Islands*. London: Routledge.

Pookajorn, Surin. 1988. *Archaeological research of the Hoabinhian culture or technocomplex and its comparison with ethnoarchaeology of the Phi Tong Luang, a Hunter-Gatherer Group of Thailand*. Tübingen: Institut für Urgeschichte der Universität Tübingen.

Rabett, Ryan J. 2012. *Human adaptation in the Asian Paleolithic: Hominin dispersal and behaviour during the late quaternary*. Cambridge: Cambridge University Press.

Shoocongdej, Rasmi. 1996. *Forager Mobility Organization in Seasonal Tropical Environments: A View from Lang Kamnan Cave, Western Thailand*. PhD dissertation, University of Michigan.

Stark, Miriam T. 2006. *Archaeology of Asia*. Malden: Blackwell.

Taha, Adi Haji. 2007. *Archaeology of Ulu Kelantan*. Kuala Lumpur: Department of Museums Malaysia, Ministry of Culture, Arts and Heritage Malaysia.

White, Joyce C., and Elizabeth G. Hamilton. 2018a. *Ban Chiang IIA: Background to the study of the Metal Remains*, Thai archaeology monograph series 2A. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

White, Joyce C., and Elizabeth G. Hamilton. 2018b. *Ban Chiang IIB: Metals and related evidence from Ban Chiang, Ban Tong, Ban Phak Top, and Don Klang*, Thai archaeology monograph series 2A. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

White, Joyce C., and Elizabeth G. Hamilton. 2018c. *Ban Chiang IIC: The metal remains in regional context*, Thai archaeology monograph series 2A. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

White, Joyce C., and Elizabeth G. Hamilton. 2018d. *Ban Chiang IID: Catalogs for metals and related remains from Ban Chiang, Ban Tong, Ban Phak Top, and Don Klang*, Thai archaeology monograph series 2A. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

History of Archaeology in Japan

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State of Knowledge and Current Debates

Edo and Meiji Period Antiquarianism and the Roots of Japanese Archaeology

Archaeological research has a very long tradition in Japan. The first pioneers of archaeology started studying objects from prehistoric and protohistoric periods in the seventeenth century. The Edo period (1603–1868) was a period of national isolation and very few contacts to other countries; however, it was also a period of cultural prosperity when art and scholarship flourished. During this time, Confucianism had a renaissance, and the study of history was regarded an essential part of this philosophy. Neo-Confucianism encouraged people to think rationally and to make objective observations. This led to the popular study of strange geological and archaeological objects by Neo-Confucian scholars and lay people. These early scholars also published and described their collections and research.

Tokugawa Mitsukuni (1628–1700) had two burial mounds excavated to investigate their links to a local chief, Kuni no Miyatsuko, who had been mentioned in written sources. Tokugawa Mitsukuni was thus the first scholar to use excavation as a scientific method to aid his research on historical periods (Bleed 1986; Sugiyama and Saitō 2008). Arai Hakuseki (1657–1725) was the first person in Japan to state that stone arrowheads did not fall from the sky, as was the common belief during that time (Ikawa-Smith 1982). He understood that these objects were man-made and had been manufactured by people of bygone ages. He even knew sites where those objects could be found. Hakuseki, and also Tō Teikan

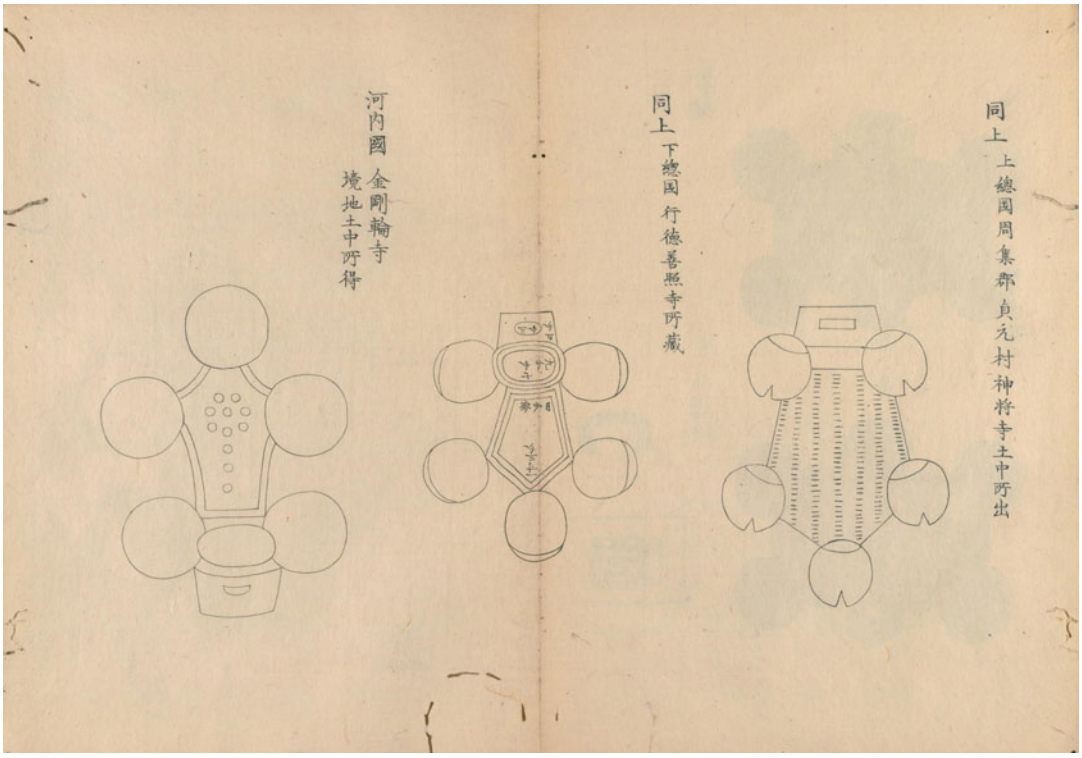

History of Archaeology in Japan, Fig. 1 Publication of Kofun period horse gear by Tō Teikan (Shūkozu 集古図 Vol. 4, from the collection of the National Diet Library)

(1732–1797), a Buddhist monk, denied the existence of an "Age of Gods" that was recorded in the ancient chronicles and developed theories of immigration routes through which people from the Eurasian mainland might have entered the Japanese islands (Fig. 1). Gamō Kumpei (1768–1813) provided the first overview of the structural evolution of burial mounds and was the first to use the term *zenpōkōenfun* (前方後円墳, tomb with a square front and circular back) as a term to describe keyhole-shaped tombs, a term still used in modern archaeology (Bleed 1986; Sugiyama and Saitō 2008). Kiuchi Sekitei (1724–1808) was a lay person interested in geological and archaeological objects. He founded the National Club for Stone Lovers (*roseki no sha* 弄石の社, lit. "Rock Fondlers") where people met and discussed objects from their collections (Sugiyama and Saitō 2008). The club was thus similar to modern academic societies and early forms of museums, such as the European cabinets of curiosity where unusual objects were collected and displayed.

Meiji Period

With the beginning of the Meiji Period (1868–1912), enormous changes occurred in Japan. After the end of the closed country policy (sakoku and Kanji: 鎖国) of the Edo period, Japan was being modernized with rapid speed; the same is true for Japanese archaeology. As early as 1871, the Japanese government passed a law to protect historical records, collections, and finds (*koki kyūbutsu hozon-hō* 古器旧物保存方). The following year, the Tōkyō Imperial Museum was founded. The museum immediately started acquiring newly excavated objects, such as the spectacular burial goods of the Eta Funayama tomb that had been excavated in 1873. To simplify and smoothen the process of adding objects to the collection, the Law of Regulations for the Handling of Lost Articles was passed in 1876

(*ishitsubutsu toriatsukai kisoku* 遺失物取扱規則). According to this law, the state could claim objects if it was impossible to determine their original ownership. Another law to protect the cultural heritage followed in 1897 when the Law for the Protection of Ancient Shrines and Temples (*koshaji hozon-hō* 古社寺保存法) was passed (Edwards 2008). In 1873 the government had begun to publish an encyclopedia about Western science, art, and culture (Nakai 2005). The word and the subject of archaeology were introduced to Japan for the first time in 1877 in a book named *The Study of Ancient Objects* (*kobutsugaku* 古物学) that was published as part of this encyclopedia that dealt with the research of ruins, excavation, and documentation. With this publication, archaeology was being acknowledged as an independent science for the first time (Nakai 2005; Saitō 1974). The political change brought some advantages for the development of the Japanese archaeology but also some disadvantages and restrictions for archaeologists. In 1874 the "reckless" excavations of Kofun period burial mounds had been prohibited, and this prohibition lasted until the end of the WW II. This governmental directive to refrain from excavations did not always deter the locals from opening tombs. In some cases, looting resulted in criminal prosecution; but in most cases, it did not have any consequences. Conversely, Tsuboi Shōgorō, an anthropologist and one of the most important figures of Meiji period archaeology, was reprimanded by the government for excavating the Uma-ga-take tomb (Fukuoka Prefecture) in 1888. He had excavated several tombs before without encountering problems; but after the caution, he ceased to investigate tombs altogether (Edwards 2008; Saitō 1974). The reason for the restriction of research on certain archaeological periods (mainly the Yayoi period and the Kofun period) was the state religion of Shintō which centered on the emperor. The highly mythological ancient Japanese chronicles became one of the main sources for this religion. Since Kofun period burial mounds were believed to be the graves of the ancestors of the emperor, their excavation was forbidden. Only research about the Jomon period was regarded as safe because it was thought that the Jomon people had been indigenous people with no ties to the current Japanese population and had been conquered by the imperial family after they had descended from heaven to the Japanese islands. On the plus side, Meiji legislation also ensured the preservation of more than 300 historical sites that were thought to be connected with the history of the imperial family (Edwards 2008; Fawcett 1996b), albeit for ideological rather than scientific reasons.

As in the preceding Edo period, archaeological research was done by individuals with no or little formal training in archaeology. Nevertheless, these scholars engaged in archaeological activities on a scientific level and laid the foundations for academic organization and infrastructure of Japanese archaeology.

In 1884, Tsuboi Shōgorō (1863–1913) founded the Anthropological Association of Tōkyō and was involved in the founding of the Archaeological Society in 1896. This was the first society in Japan where archaeological topics were discussed on a scientific level; Negishi Bunko (1831–1902) was another important pioneer of Japanese archaeology during the Meiji Period. In 1887, he became the first chairman of the just founded Society for the Collection of Old Things (*shuukokai* 集古会). The founding members of this society also belonged to the Anthropological Association of Tōkyō and the Archaeological Society. In this society, collectors, interested lay people, and scholars met to discuss objects of their private collections. Even though the society was oriented more toward popular science, its importance for the development of Japanese archaeology should not be underestimated (Bleed 1986; Nakai 2005).

The opening up of Japan during the Meiji Period provided Western scholars with a chance to enter the country. Some of them showed an interest in pre- and protohistoric Japan and engaged in archaeological research. German collector Heinrich von Siebold was probably the first to do so. He came to Japan in 1869 as an interpreter for the Austrian-Hungarian embassy. Just like his father, Philipp Franz von Siebold, he was interested in archaeological objects. In 1873, he first sent prehistoric stone objects from Japan to

the Danish National Museum. He published his archaeological research in 1879 in both English (*Notes on Japanese Archaeology with Especial Reference to the Stone Age*) and Japanese (*kōko setsuryaku* 考古説略, translated by Yoshida Masaharu). The English book contains a number of plates with photographs of stone tools, ritual stone objects, Jōmon pottery, beads, and Kofun period haniwa clay statues. The Japanese version contains an introduction to European archaeology. He is credited for first using the term *kōkogaku* (考古学 archaeology) which is still used today. Nevertheless, his various activities had very little impact on the development of Japanese archaeology itself (Hirata 2008; Kreiner 1980; Sahara 2004).

The American biologist Edward Sylvester Morse (1839–1917) came to Japan in 1877 to teach at Tōkyō University. Even though he had not studied archaeology, he was an avid amateur archaeologist and had gained some excavation experience in New England. He discovered the Ōmori shell mound on his way to Tōkyō and obtained the permission to conduct an excavation there. Today he is credited with conducting the first scientific excavation in Japan at the Ōmori shell mound, but he was not the only excavator (Bleed 1986). In 1880 Siebold had again sent stone objects to the Danish National Museum and stated in their description that they had been found in a shell mound between Tōkyō and Yokohama. It is therefore very likely that he investigated the Ōmori shell mound shortly before or after Morse conducted his excavation. In fact, a note on Morse's planned excavation by Tōkyō University explicitly states that other parties interested in the shell mound should not be permitted to excavate to avoid the scattering of the archaeological material (Sahara 2004). In 1879 Morse published a detailed excavation report in both English and Japanese, describing and illustrating the finds. He dated the excavated objects into the prehistoric period without making any references to ancient Japanese chronicles. This is remarkable because Morse thereby introduced the term and the concept of prehistory to Japanese scholars. He furthermore used the term cord-marked pottery to describe the pottery found in the Ōmori shell mound and therefore coined the term *jōmon* (縄文 cord-mark) that became the term for a whole archaeological period (Bleed 1986).

William Gowland came to Japan in 1872 as one of the many Western specialists who were tasked with aiding the modernization of Japan. Gowland was a chemist and metallurgist with a great interest in archaeology. He was employed at the Imperial Japan Mint in Ōsaka, first as a chemist and later as an assayer. He traveled all over Japan to visit archaeological sites, focussing on Kofun period burial mounds. His surveys of these tombs were extensive and surpassed everything that had been done by Japanese scholars. He measured the tombs, photographed them, recorded their shape and their orientation, and would even make scale drawings. In 1878 he excavated the Shibayama tomb (Kawachi, Ōsaka prefecture), a small keyhole-shaped mound, with the permission of the local governor. He made a detailed record of the finds, drew a layout map of the burial chamber, and meticulously collected even the smallest items. He used a grid system during his excavation to make sure he would be able to record the exact location of every object. His excavation is therefore one of the very few well-documented excavations of a burial mound during the Meiji period. He classified the tombs according to their shape and the burial chambers according to the shape and size of both the main burial chamber and the corridor leading to the chamber. In 1888 he returned to England with a large collection of Kofun period artifacts that is now exhibited in the British Museum. In 1899 and 1907, he published two papers on Japanese burials mounds in English (The Dolmens and Burial Mounds in Japan and The Dolmens of Japan and their Builders). The quality of the publications, his research, and interpretations of the archaeological material were exceptional for an amateur archaeologist (Harris 2003; Ōtsuka 2003). These publications which could have had an enormous impact on Kofun period archaeology in Japan were unknown to Japanese academic community until their translation in 1981, almost a hundred years after his time in Japan (Ueda 2003). But while his research gained only little recognition in Meiji period Japan, his huge collection and his records are a valuable resource today and are still

analyzed by archaeologists. His photographs are of great value still because he was able to enter the grounds of some imperial tombs before access was restricted (Harris 2003; Ōtsuka 2003).

Siebold, Morse, and Gowland have all been called founders or father of Japanese archaeology, but this is clearly an overestimation of their importance and the impact of their activities. Siebold was just a collector with an amateur interest in archaeology who lacked formal training. He also lacked Morse's connections to the academic world and had to finance all investigations by himself which put him at a considerable disadvantage. Gowland also had no contact to the academic world in Japan, and no Japanese scholars were involved in his investigations. He published detailed records of his research and the tombs he had visited. For the early development of Kofun period archaeology, his research played no role. Morse's activities had the greatest impact on the development of Japanese archaeology. His position as professor at Tōkyō University provided him with opportunities the others did not have. The introduction of introduced modern Western excavation methods and scientific terms for the finds and periods were his most important merits. These terms replaced the mythological names that had been used before by some pioneers of the Japanese archaeology. He also was in contact with Japanese scholars like Negishi Bunko and shared his knowledge with his students (Ōtsuka 2003; Sahara 2004). The real fathers of Japanese archaeology, however, are the Japanese scholars engaged in archaeological research during the Edo and Meiji period.

Taishō Period and Early Showa Period Archaeology

Despite the ongoing political restrictions for archaeologists, the Taishō period and the early Showa period are of great importance for the development of the Japanese archaeology. During this time span, the way for modern archaeology was paved. Archaeology became established as an independent subject at universities, and excavations became a common tool. Japanese archaeologists refined their methods, and their research resulted in a rapid sophistication of chronology and typology. The number of professional archaeologists increased steadily during this time. Archaeology had become acknowledged as a science rather than the hobby of a few.

In 1919 and 1929, two new laws for the protection of sites and cultural properties were passed that superseded the Meiji period legislation. First, the Law for the Protection of Cultural Monuments and Natural Landmarks (*shiseki meishō tenzen kinenbutsu hozon-hō* 史蹟名勝天然紀念物保存法) was introduced that protected archaeological sites as well. The Law for the Protection of National Treasures (*kokuhō hozon-hō* 国宝保存法) followed. This law broadened the scope of sites and objects that were to be protected (Edwards 2008).

The most important figure for the establishment of scientific archaeology was Hamada Kōsaku (1881–1938). He had studied at Tōkyō University, and from 1909, he began to teach the first archaeology courses in Japan at Kyōto University. From 1913 to 1916, he studied archaeology in Europe under the British archaeologist Flinders Petrie at University College London. Petrie was one of the first Western archaeologists to recognize the importance of stratigraphic excavations. He was aware that the sequence of archaeological layers could be used to date the objects found within these layers. He also realized the necessity for careful documentation of the excavation itself. Hamada learned all these methods from Petrie, and after his return to Japan, he published the first book about archaeological methods and theories with the title *Tsūron Kōkogaku* 通論考古学 (Introduction to Archaeology; Fig. 2) in 1922. In 1916, upon his return from Europe, he became the first professor for Japanese archaeology at Kyōto University. Until 1937, he conducted several excavations which were published in 14 volumes (Edwards 2008; Kanaseki 2004).

He brought Western methods and theories to Japan and made them available for a wide public via his Japanese translations. He also was the first professor of the first Department of Archaeology in Japan, at Kyoto University, and can therefore be called the first modern Japanese archaeologist.

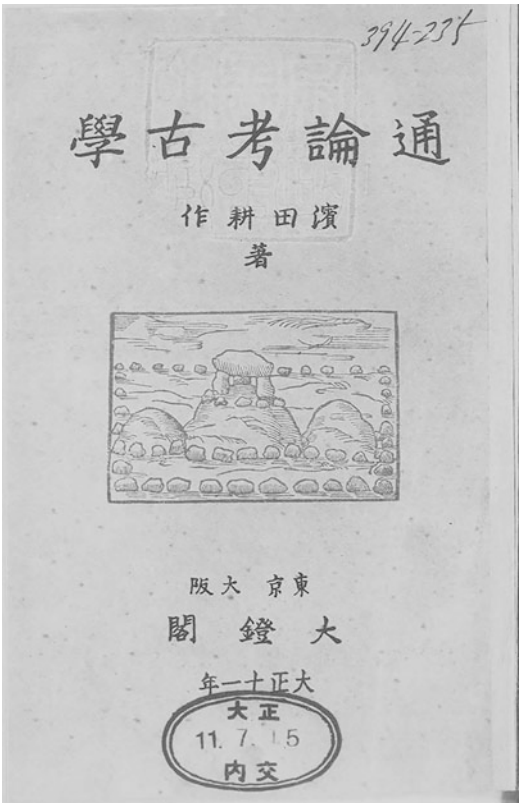

History of Archaeology in Japan, Fig. 2 Tsūron kōkogaku (from the collection of the National Diet Library)

Other notable scholars of this first period of scientific archaeology are, for example, Yamanouchi Sugao (1902–1970) whose intensive research about the Jōmon period resulted in a first chronological framework for this period, Morimoto Rokuji (1903–1936) who founded the founded the Kōkogaku Kenkyū-kai (Archaeological Society) which later became the Tōkyō Archaeology Society in 1927, and Matsumoto Hikoshichirō who stressed the importance of stratigraphic excavations and their importance for the dating of finds (Bleed 1983).

Colonial Archaeology

The end of the Meiji period marked an important turning point for Japanese archaeology. The government recognized the potential that archaeological research had for legitimating its aggressive expansionism on the Eurasian mainland. In 1904, with the start of the Russo-Japanese war, first articles about race and war were published in the Journal of the Tōkyō Anthropological Society. Tsuboi Shōgorō was among the researchers who wrote articles to justify the military activity. His article "Anthropological Contemplation of War" (*sensō no jinruigaku-teki kansatsu*, 戦争の人類学的観察) was published in April 1904, just 2 months after the war began (Tsuboi 1904; Saitō 1974). However, the involvement of Japanese archaeologists with the nationalist imperial propaganda was not limited to academic publications. Anthropologist Torii Ryūzō traveled to Taiwan and other regions to photograph the local indigenous population. He compared facial tattoos of Taiwanese women to patterns on Jōmon and Yayoi pottery and human-shaped haniwa, concluding that the people of Taiwan had descended from the Japanese (Pai 2009). With the occupation and annexation of the Korean Peninsula and the establishment of a colonial government (*Chōsen Sōtōku-fu* 朝鮮総督府), archaeological research and excavations began there as well. The colonial government even had a special branch for archaeology that conducted excavations in, for example, Kyŏngju and Pyŏng'yang. Several very influential early archaeologists were active on the Korean Peninsula and also China, among them, Hamada Kōsaku (Kyōto Imperial University), Harada Yoshito (Tōkyō Imperial University), and Umehara Sueji (Kyōto Imperial University). The aim of this archaeological research was intimately connected to the imperial ideology. In 1927, Hamada, Harada, and Ma Meng from the Archaeological Society of Peking University founded the East Asian Archaeological Society (*Tōa Kōko Gakkai* 東亜考古学会) that officially was aimed to promote joint research in East Asia but surely was also meant to aid the exploits of the colonial archaeologists (Miyamoto 2017; Sakazume 1994).

In Korea, Japanese archaeologists had the opportunity to excavate large-scale burial mounds that contained grave goods very similar to the ones known from tombs in Japan. While the excavation of such tombs was forbidden in Japan to avoid conflicts with the written sources and imperial ideology, the tombs on the Korean Peninsula

were excavated and interpreted according to these same written sources to prove that Korea had been a part of Japan in ancient times.

Archaeology After WWII

The end of WWII and the subsequent abolition of imperial ideology were a liberation for Japanese archaeology. The restrictions for researching certain periods and sites ended, and Japanese archaeology was faced with the enormous task to fill the void that the imperial ideology had left (Edwards 2008).

Even though Japanese archaeologists had been heavily involved in questionable research on the Eurasian mainland to legitimize the aggressive expansion of the Japanese empire, domestically, archaeology is generally thought to have survived these periods ideologically untainted. The heavy restrictions for archaeological research in Japan aided this positive perception of Japanese archaeology.

Archaeology was in the spotlight of public attention during the postwar period and was tasked to provide a picture of Japanese prehistory and protohistory based on scientific methods, scientific analysis of the excavated material, and unbiased by written sources. By 1948, only 3 years after the war, 109 excavations had already been conducted. Public funds and trained archaeologists were still scarce, so many of the excavations were privately funded and executed by lay people or archaeology clubs of public schools (Fawcett 1996b; Saitō 1974). The earliest large-scale excavation occurred immediately after the war, in 1946/1947, when five Japanese universities jointly excavated the Toro site in Shizuoka prefecture. During this excavation, rice fields associated with a prehistoric settlement were excavated for the first time. A picture of a peaceful farming society that had lived on the Japanese islands was created to provide a contrast to the militarism of the past decades. The discovery got large press coverage and brought the importance of site conservation to the attention of the Japanese public. Even though such huge excavation projects were the exception in the immediate postwar period, media coverage steadily rose and resulted in a high level of public interest for archaeology. Public attention and the postwar construction boom led to a substantial increase of public funds for archaeological projects (Fawcett 1996a, b).

In 1948, the Japanese Archaeological Association was founded to provide the people engaged in archaeological activities in Japan with the means to collaborate and to discuss their research on an academic level. This was a huge step toward a centralized infrastructure for Japanese archaeology and marked the end of the decentralized and individual research that was typical for early archaeological activities in the prewar era (Ishikawa 2017).

Archaeology in the 1950s and 1960s

In 1950, Japan became a pioneer for modern protection of archaeological heritage by passing the Law for the Protection of Cultural Properties (*bunkazai hogo-hō* 文化財保護法) that was administered by the Commission for the Protection of Cultural Heritage (since 1968 called Agency of Cultural Affairs, *Bunkachō* 文化庁). In 1954, this law was amended to ensure the protection of archaeological sites during the construction boom accompanying postwar development. But even with this amendment, several sites were destroyed by construction activities without prior scientific excavation. Therefore, a second amendment was passed in 1959 and the costs-by-cause principle became part of the law. This progressive amendment provided the authorities with the necessary funds to conduct rescue excavations because the costs were transferred to the companies responsible for the construction and subsequent rescue excavations. The amendment furthermore excluded important sites from construction development. These new laws and guidelines furthermore resulted in the first national database for archaeological sites that had already 35.000 entries in 1962 (Kobayashi 1986; Tsuboi 1992; Okamura 2004). A problem in the immediate postwar era was that many of the construction projects for housing and transportation were conducted by the state on state-owned land. One branch of the government thus destroyed archaeological sites that another branch was trying to protect. The construction of

infrastructure was a priority, and the Commission for the Protection of Cultural Heritage was unable to enforce the law against uncooperative bigger ministries (Barnes 1990).

Japanese archaeology in the 1950s and 1960s was characterized by a dominance of Marxist theories in archaeological thought, such as historical materialism, and an extensive participation of lay people in archaeological excavations and research (Fawcett 1996b). The first Marxist interpretations of archaeological material appeared in the 1920s, at a time when Marxism had a large following among Japanese intellectuals (Ikawa-Smith 1982). Marxists were among the few who had criticized the imperial government and its politics. In the postwar era, it was therefore considered to be untainted by the imperial ideology and experienced a renaissance (Gayle 2003). Public participation was strongly supported by the academic community – especially by the numerous Marxists among the Japanese academics and intellectuals. The public was encouraged to explore their own history and the history of their local communities by taking part in academic activities and discussions (Fawcett 1996b). A particular highlight of this movement was the excavation of the Tsukinowa tumulus in 1953 in the Okayama Prefecture. The excavation was supervised by archaeologist Kondō Yoshirō but funded by the local community. Furthermore, 10,000 local people volunteered to participate in the excavation. They were encouraged to critically analyze the finds in order to make them question the former imperial ideology and mythological history (Kondō 1998; Muraki 2011). This kind of archaeology has been dubbed "public archaeology" or "citizen excavations" and is practiced in Japan until today (Muraki 2011). Other large projects include the excavation of the Miharashidai site (Aichi prefecture) that has continued for almost 40 years. Each year, volunteers can participate in the excavation, and the project aims to interest the local population in their cultural heritage. In the early and middle 1990s the project had a record participation of 600–700 volunteers each year (Muraki 2011).

The various interactions of academics and the public resulted in a heightened awareness and interest for archaeology and cultural heritage. The establishment of archaeology clubs at schools, such as the club at the Tōhō University High School that was founded in 1963 (Yamagishi 2016), or the establishment of citizens' action committees to fight for the preservation of archaeological sites (Fawcett 1996b; Tsuboi 1992, 1998) are clearly a result of the movement – as are the student protests of the 1960s when students demonstrated, violently at times, against rescue excavations, and the destruction of archaeological sites for construction development (Fukuda 2007). This radical movement wanted to preserve all sites regardless of their importance (Kobayashi 1986). The protests against the destruction of important sites led to the establishment of a government project to preserve areas with large concentrations of sites in 1966. This project was called Fudoki no Oka (風土記の丘). The original intention was for each prefecture to select an important historical or archaeological site and build a museum close to the site. These museums are tasked with the maintenance of the site and the explanation and promotion of the importance of the site to visitors (Tsuboi 1992). Many of these Fudoki no Oka have been constructed close to tomb clusters, thus overly focussing on only one period. This and the unimaginative, generic design of the museums and the surrounding park areas have been criticized as damaging for the reputation of the project (Tsuboi 1986). The selection of important sites regardless of their location has resulted in the construction of museums in remote areas that are hard to access for potential visitors. But regardless of all criticism, Fudoki no Oka such as the Chikatsu-Asuka Museum and the Saitobaru Archaeological Museum are known for the appealing, modern design of their permanent exhibitions and their excellent temporary exhibitions. Until today only 16 prefectures have implemented the project.

It was not just student protests and public attention that provided challenges for Japanese archaeology though. The rapidly increasing number of rescue excavations revealed serious issues on the most basic structural level of archaeological organization. In the period immediately after the war, rescue excavations were conducted by the

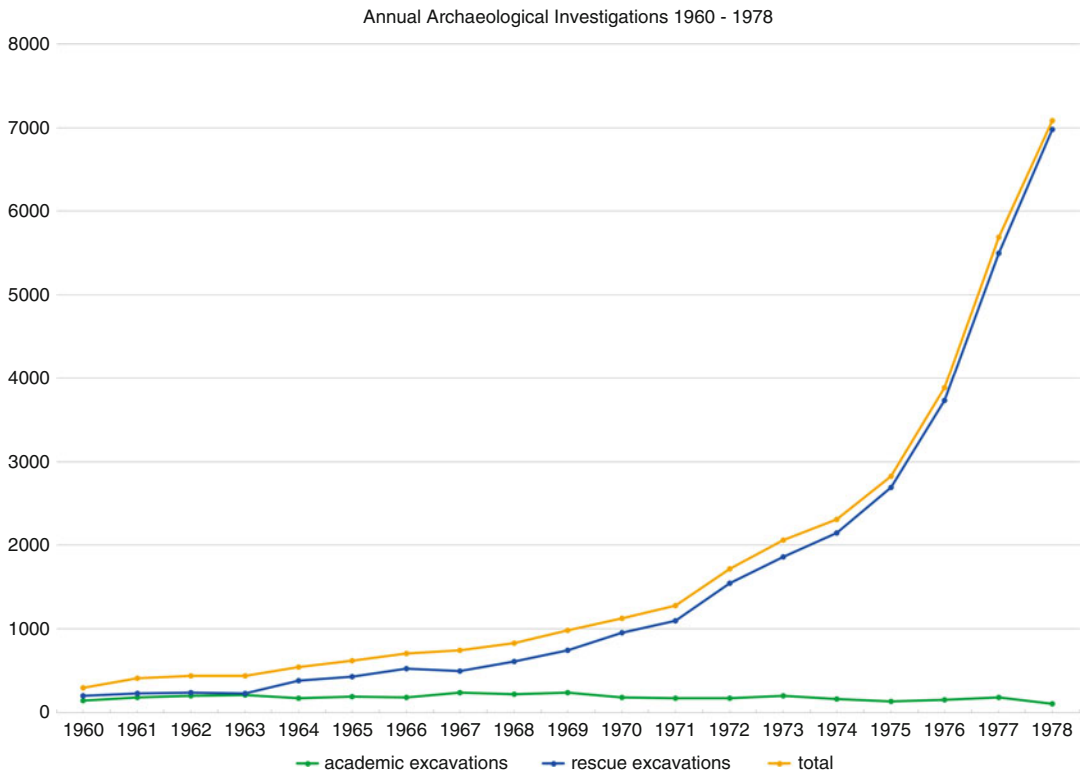

History of Archaeology in Japan, Fig. 3 Excavations in Japan 1960–1978. (After Tsuboi 1986)

universities, but by the 1960s, the number of necessary rescue excavations surpassed the number of academic excavations. In 1960, only 198 rescue excavations and 143 academic excavations were conducted in Japan. By 1969, the number of rescue excavations had almost quadrupled to 745, while the number of academic excavations had not even doubled (Fig. 3) (Tsuboi 1986). In fact, the number of necessary rescue excavations was so large, that the universities had to capitulate. They lacked the personnel to conduct all of these excavations. Moreover, the archaeologists at the universities themselves were critical of the destruction of the sites by rescue excavations and the dire conditions under which these excavations had to be conducted. Archaeologists such as Yoshirō Kondō began to refuse to conduct rescue excavations in order to force the Commission for the Protection of Cultural Properties to take a stance against these worrisome developments (Barnes 1990).

Due to the shortage of qualified staff and insufficient experience in rescue excavations, the costs exploded, while excavation reports remained unpublished, and thousands of finds were not properly analyzed (Tsuboi 1986). At the same time, universities were not able to meet the demand for new qualified archaeologists. In the early 1970s, archaeology could be studied at only 15 universities meaning that there was a lack of trained archaeologists (Okamura 2004).

Archaeology in the 1970s and 1980s

The Japanese government tried to counter the problems with rescue excavations by establishing centers for archaeological heritage management (Centres for Buried Cultural Properties, maizō bunkazai sentā 埋蔵文化財センター) that were tasked with the excavations and publication of reports. These centers were established on both prefectural and municipal level and hired their own archaeologists and specialists. In addition to

excavations, they are also responsible for the storage of the excavated material and usually have exhibition rooms where some of the finds are displayed. Some of the centers later became partly privatized nonprofit foundations funded by government grants. These foundations are responsible for rescue excavations on the prefectural level until today (Kobayashi 1986; Barnes 1990).

The influence of Marxism waned in this period because social conditions changed. The postwar economic growth resulted in higher wages, and more Japanese began to consider themselves being middle rather than working class. Historical Materialism had been used as a theoretical framework to study the development of prehistoric societies and thus affirm Marxist theories and politics of the Japanese communist party. This meant analyzing and interpreting finds in a wider, supra-regional context (Mizoguchi 1997). During the 1960s and 1970s, the first students of archaeology that had grown up in the postwar period graduated. They were raised in the time of the postwar construction boom and the ever-rising number of rescue excavations. Many of them probably felt as part of the newly developed middle class. Marxism and Historical Materialism were incompatible with the realities of their personal life and working life. Many started to work at the newly established foundations and were busy with rescue excavation on a local level. They did not have the time to fit these sites into a supra-regional context. With the demise of Marxism in Japan, Marxist archaeology became obsolete.

This framework was not replaced and left a theoretical vacuum, though. Archaeological research was largely reduced to revising and editing existing typological chronologies and the accumulation of finds and data. Comprehensive excavation reports were published, but the sites were rarely analyzed within a supra-regional context. The absent theoretical framework caused a lack of theorizing and discussions of the archaeological material. Japanese archaeologists were furthermore reluctant to participate in the discussion of theoretical and ideological issues that took place in Western archaeology (Habu 1989; Mizoguchi 1997).

The development of archaeology in the 1970s was shaped by spectacular finds such as the murals of the Takamatsu-zuka tomb and the inscribed sword from the Sakitama Inariyama tomb which resulted in a huge increase in media coverage. The tourism industry seized the opportunity to commercialize the large public interest. Asuka and Kashiwara (in Nara prefecture) were promoted as places where the traditional Japan could still be experienced. A law from 1966 to preserve the historical environment of former capitals (*koto hogo-hō* 古都保存法) was expanded and prompted the establishment of specially protected areas where the construction of new buildings and the alteration of the existing environment where heavily restricted. While highly unpopular with the local population who saw this law as a hindrance for the modernization of their communities and feared to be overrun by tourists, this law aided the endeavors of the tourism industry. Fears of the locals proved to be justified, and in 1970 the Ishibutai tomb site was visited by 3000 people on a single day. The rush of visitors increased with the establishment of two archaeological national parks (Iwaido and Ishibutai) and the Asuka Historical Museum (Fawcett 1996a).

The government used this atmosphere to utilize archaeology for its own purposes once again. It was the time of the emergence of a new line of research in Japan: the *Nihonjin-ron*. This theory was the result of governmental efforts to create a national identity based on the supposed cultural uniqueness and homogeneity of the Japanese people. The creation of a perceived uniqueness was an endeavor by the government to dissociate Japan from the West in a more and more globalized world. The public interest and huge media coverage were used to underline the fictional uniqueness of the Japanese people and to create the myth that the Yayoi and Kofun people were the direct ancestors of the Japanese. Influences from the Eurasian mainland and the role of immigrants during the pre- and protohistoric periods were downplayed. Some of the archaeologists themselves were complicit in spreading this distorted picture of prehistoric Japan (Fawcett 1996a; Kaner 1996).

Archaeology in the 1990s

The 1990s were the golden age of Japanese archaeology. While the Japanese economy struggled to recover from the collapse of the bubble economy of the late 1980s and early 1990s, the number of conducted archaeological surveys/excavations and available funds soared to previously unimaginable levels. In 1996 almost 12,000 rescue excavations were conducted. Academic excavations, rescue excavations, and preliminary surveys combined resulted in 41,880 archaeological investigations in that year. The budget peaked a year later, in 1997, when 132 billion yen (approx. 1.1 billion Dollar) were available for rescue excavations (Fig. 4). By the end of the 1990s, over 7000 archaeologists were employed in Japan. Of these archaeologists 90% were engaged in rescue excavations, and only a very small minority was employed at universities, research institutes, or museums and doing academic research (Bunkachō 2008; Yajima 1997).

The steady increase in rescue excavations and the ensuing increase in jobs for archaeologists were an opportunity for university graduates to get a lifetime position in one of the foundations responsible for buried cultural properties; however, work duties strongly differed from what many applicants expected. At the universities, research was stressed as the main task of an archaeologist. By contrast, working for the foundations meant much administrative work and less research. The basic structure of these foundations is similar to corporations. Archaeologists working for these foundations have the difficult task to be specialists and efficiently working managers at the same time. Their duties furthermore include negotiations with the construction companies concerning necessary rescue excavations, leaving

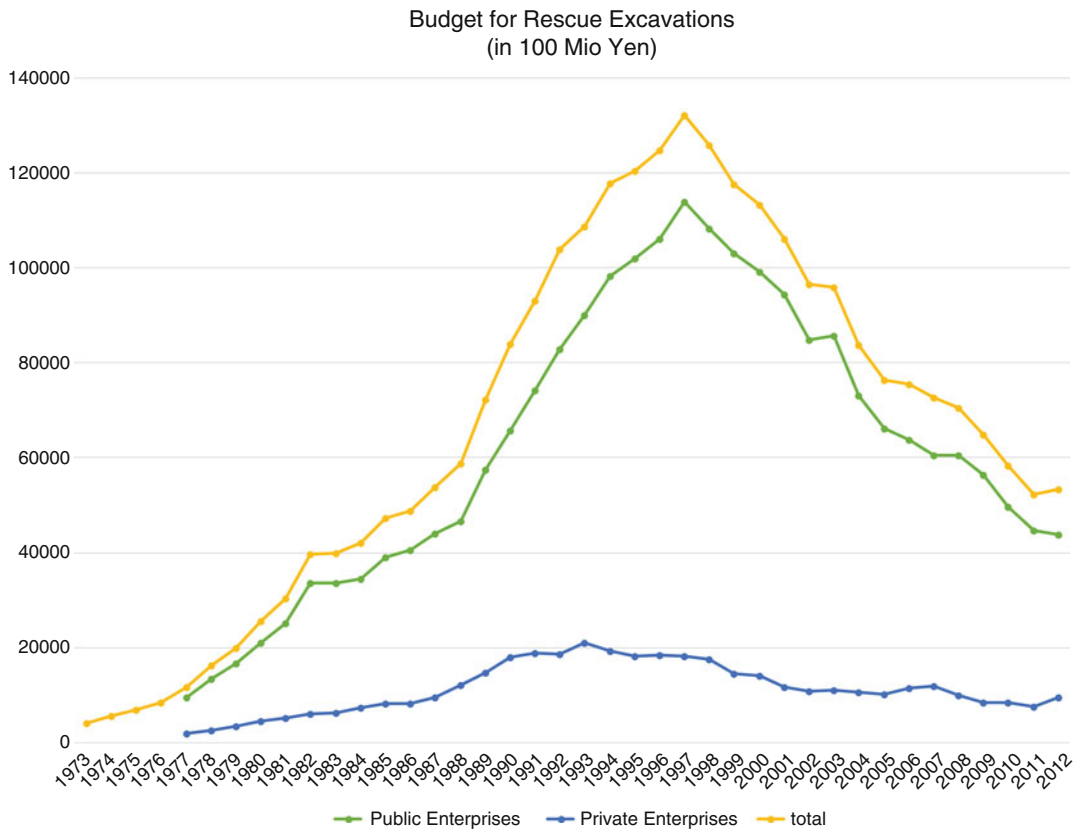

History of Archaeology in Japan, Fig. 4 Budget for rescue excavations 1973–2012. (After Bunkachō 2014)

archaeologists in a conflict of interest: they earned money with conducting recue excavations, which led to a destruction of the archaeological sites, while their main task should be preserving these sites (Mizoguchi 1997).

Since the 1970s, universities had tried to satisfy the increasing demand for archaeologists. While in 1970, only 13 universities offered archaeology as a field of study, the number had risen to 30 universities by the end of the 1970s and 68 in the mid-1990s. In 1979, 256 archaeology students graduated, and in 1994 the number had increased to 314. While this was certainly an increase, it was definitely not enough to satisfy the increasing demand for qualified personnel which had more than quadrupled in the same time (Okamura 2004). The massive increase in rescue excavations and preliminary surveys, therefore, did not result in an equally massive increase in student numbers.

Archaeology in the Twenty-First Century

The height of Japanese archaeology came to an abrupt end in 2000. A scandal surrounding amateur archaeologist Shin'ichi Fujimura and his team shattered public trust in archaeological research. Fujimura, a specialist for Paleolithic archaeology, was photographed by the newspaper Mainichi Shimbun while burying objects in the ground. These exact objects were later to be presented as spectacular finds. Fujimura became infamous for constantly making finds that pushed the date of first human settlement on the Japanese islands farther and farther until it reached 600,000 BC. Investigations by the Mainichi revealed an archaeological fraud of previously unimaginable proportions. Since the 1970s, Fujimura and his team had faked archaeological features in 108 cases and had buried much younger Jōmon period (12,000–500 BC) objects in Paleolithic layers. Decades of forgery were possible because the documentation of the excavations did not comply with professional standards. The objects were dated according to the stratigraphic layer they were found in, and no typological analyses were made to confirm their age. The academic community and the mass media also contributed to the fraud by unquestioningly agreeing with the results from Fujimura and his team (Inada 2004; Miyashiro and Yonehara 2010). There were attempts to draw the attention of the academic community to discrepancies between the presented objects and the proposed dating by some very few archaeologists. As early as 1986, Charles T. Keally and Oda Shizuo published an article criticizing the excavation methods, the dating, and the analysis of the objects. They pointed out that the assigned dates did not match the geological strata, the circumstances of the discoveries were suspicious, and that some of the objects might be just geofacts – but were ignored by the academic community (Oda and Keally 1986). The reason why a hoax this big went undiscovered for so long is rooted inside seniority-based academia. Younger scholars are expected to agree with the work of older and more experienced scholars. Criticism and discussion of research are not encouraged. This tradition, which is clearly unsuited for academia, prevented the discussion of these finds that would have been vital to put an early end to Fujimura's forgeries. After the scandal, Japanese Paleolithic research had to restart from scratch, and it took Japanese archaeologists years to rebuild public trust.

The budget for rescue excavations and the number of archaeologists employed in Japan steadily decreased since the turn of the century, while the number of archaeological investigations has continued to increase. In 2012, over 55,000 archaeological investigations were conducted; approx. 8000 of them were rescue excavations (Fig. 5). Academic excavations amounted for less than 1% (434) of these investigations. While in 1996 a budget of approx. 125 billion yen were available to deal with more than 41,000 archaeological investigations, in 2012 less than half of that (approx. 55.5 billion Yen) had to suffice to deal with a much larger number. The decrease of qualified personnel was less drastic. In 2012, 5,868 archaeologists were employed in Japan, and that number even increased in 2013 for the first time in 10 years (Fig. 6) (Bunkachō 2014).

Shintarō Shiina, specialist for the Japanese heritage preservation laws, has recently pointed out two problems arising from the decrease of

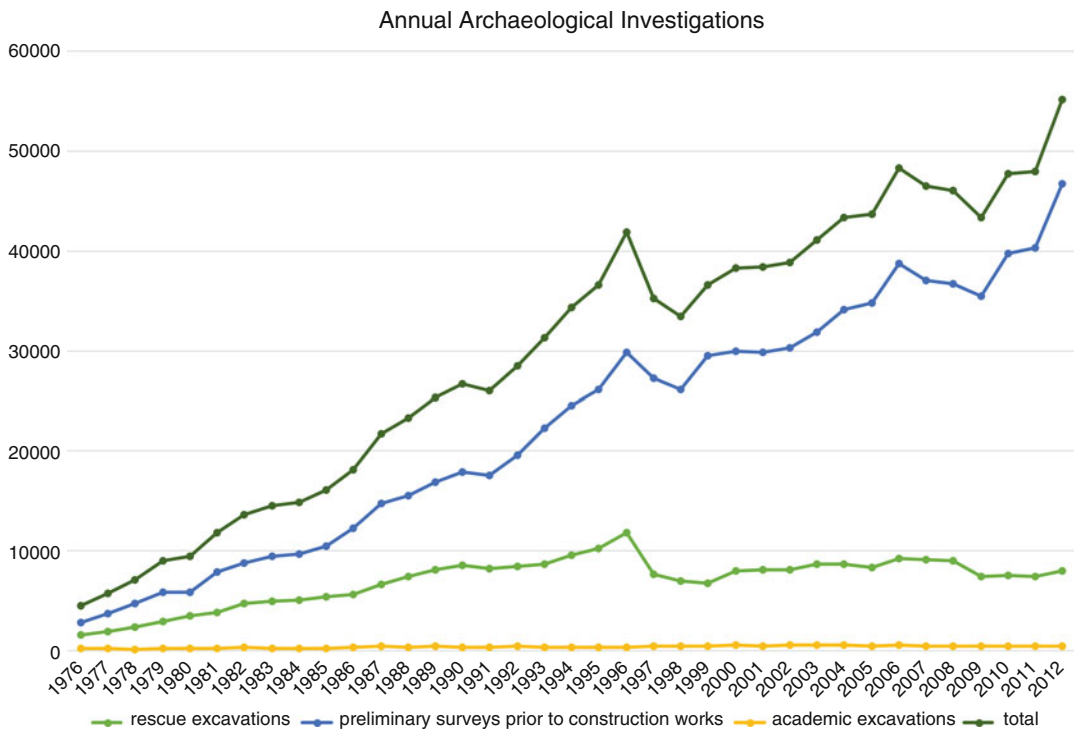

History of Archaeology in Japan, Fig. 5 Excavations in Japan 1976–2012. (After Bunkachō 2014)

archaeologists employed by the government. The specialists employed by the government in the 1960s and 1970s are nearing the age of retirement and need to be replaced. Young Japanese, however, are reluctant to accept the harsh working conditions that have characterized these jobs until now. Another problem is the outsourcing of not only specialist activities such as aerial photography and object preservation but the whole excavation process to private excavation companies. This trend began in the 1980s, and today 20% of all preliminary surveys are already carried out by private companies (Shiina 2016).

In 2008 the Agency for Cultural Affairs (Bunkachō) had identified a serious problem in regard to private excavation companies. Cost reduction was the main concern for local governments when choosing private excavation companies. In some cases, these companies were not able to finish the work they were contracted for because their tightly calculated budged was not sufficient and the local government had to take over. The result was not a cost reduction but a cost increase for the local governments (Bunkachō 2008; Shiina 2016).

Several other problems have arisen with the widespread outsourcing of excavations. Employees of private excavation companies were found to lack expertise and were unable to recognize regional characteristics of sites and finds. Local governments reduced their professional staff as part of their austerity measures and outsourced excavations. This left them without trained specialists to evaluate or oversee the work of the private companies. This causes a decline of expertise on handling excavations and cultural properties at the local governments (Bunkachō 2014; Shiina 2016).

Despite the severe cuts, Japanese archaeologists still think that the positive development of Japanese archaeology is continuing (Suda 2012).

In the recent years, natural disasters such as the Great East Japan Earthquake in 2011 and the earthquake in Kumamoto Prefecture in 2016

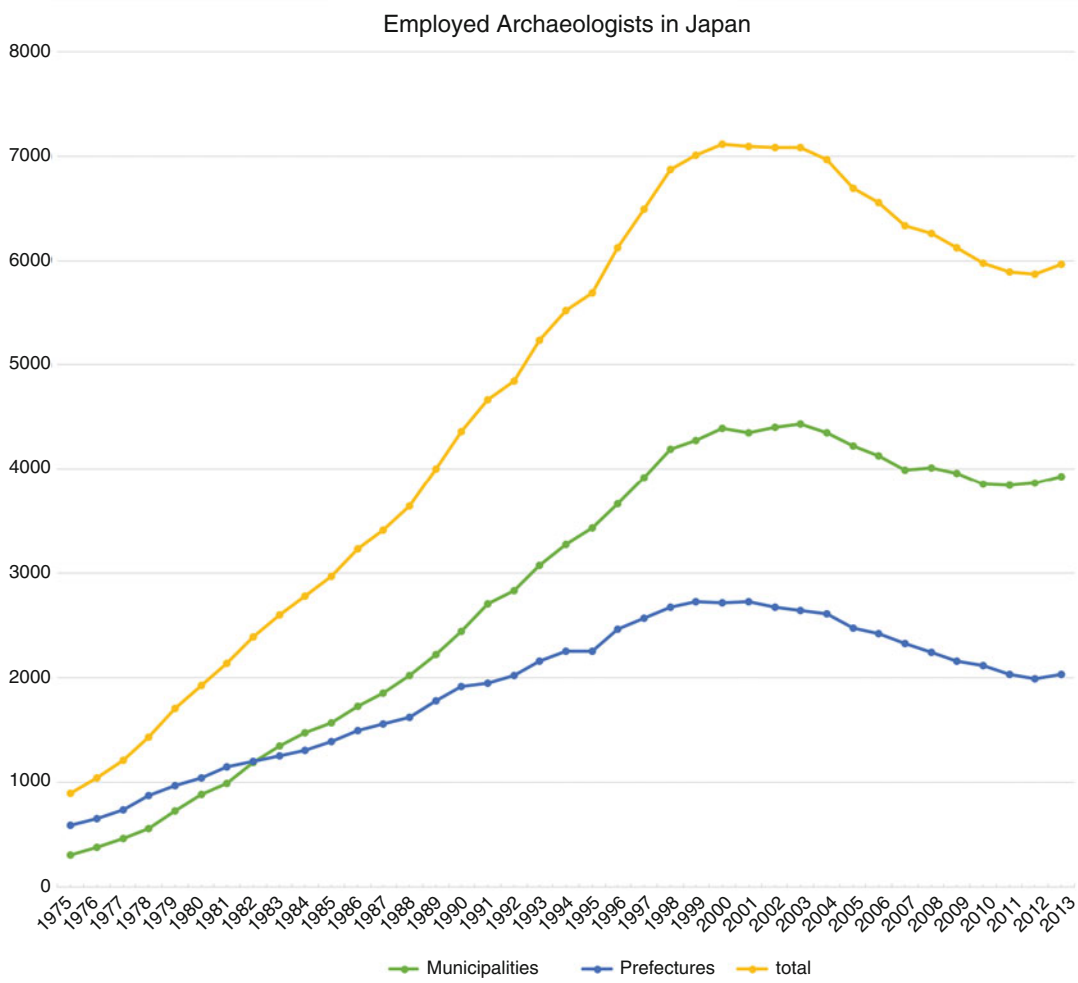

History of Archaeology in Japan, Fig. 6 Employed archaeologists in Japan 1971–2013. (After Bunkachō 2014)

have challenged Japanese heritage management and Japanese archaeology with the task to preserve damaged cultural properties and conduct a large number of rescue excavations while the communities are being rebuilt. This has also led to a surge in public participation. Efforts to rescue damaged cultural properties were aided by 6800 volunteers in the years after the Great East Japan Earthquake (Okamura 2017; Tate'ishi 2014). These natural disasters also resulted in increased activity in archaeological sub-disciplines such as earthquake archaeology and tsunami archaeology. These aim to investigate disasters in archaeological record and the human reactions to such disasters (Barnes 2017). Disaster archaeology is a developing field, and new discoveries in this area might even prove useful for future prevention of such disasters and the planning of disaster response measures (Okamura et al. 2013).

Conclusion

The history of Japanese archaeology is long and varied. Internal research as well as external influences has shaped its development. The extensive archaeological activities in Japan and the huge public interest in archaeological heritage are the

reason for the outstanding position of Japanese archaeology on a global scale today.

Nevertheless, there are some serious problems that need to be tackled. One of the issues in Japanese archaeology surely is the overwhelming domination of male archaeologists, while female archaeologists are disproportionately underrepresented; this is especially true for senior positions. This issue is not limited to archaeology or academia but the whole Japanese labor market. Young female scholars often spend much longer times in junior academic positions and are less likely to get promoted. There is also a huge gender gap for married women with children which are less likely to get promoted than men in comparable positions. A second problem is the scarcity of English publications that would make Japanese archaeology accessible for scholars outside Japan which has been criticized for decades, but until today only few improvements are visible. A handful of individual researchers have published articles and introductory literature, but the majority of works on archaeology in Japan is still published in Japanese only. English abstracts in Japanese journals remain the exception. Large and important journals such as *Gekkan Kōkogaku Jānaru* and *Kikkan Kōkogaku* still don't include English abstracts, while the Journal of the Japanese Archaeological Association is one of the few notable exceptions. The situation is similarly dire when searching for English abstracts in excavation reports. The accessibility of Japanese excavation reports is a general problem. These publications are often circulated only locally and cannot be purchased in normal bookstores or online stores. The situation has greatly improved since the Nara National Research Institute for Cultural Properties (Nabunken) has launched the *Comprehensive Database of Archaeological Site Reports* in Japan in 2015. Old and new site reports are provided as PDFs for any interested researcher for free, and almost 21.000 PDFs are online as of February 2018. The number of accessible site reports greatly varies from prefecture to prefecture; there are currently no excavation reports from prefectures such as Tōkyō and Fukushima and only five to ten reports from prefectures such as Kyōto and Tochigi. But even though there is an English version of the website, the site reports remain mostly Japanese only and are thus useful only for the handful of archaeologists that are able to read Japanese. The establishment of the English language *Japanese Journal of Archaeology* in 2013 is surely a step in the right direction, and it is to be hoped that these projects will lead to a greater internationalization of Japanese archaeology.

Cross-References

▶ Japan: Cultural Heritage Management
▶ Japan: Cultural Heritage Management Education
▶ Japan: Field Archaeology

References

Barnes, G.L. 1990. The origins of bureaucratic archaeology in Japan. *Journal of the Hong Kong Archaeological Society* 12: 183–196.

Barnes, G.L. 2017. The search for tsunami evidence in the geological and archaeological records, with a focus on Japan. *Asian Perspectives* 56 (2): 132–165.

Bleed, P. 1983. *Archaeology. Kodansha encyclopedia of Japan*, 75–80. Tōkyō: Kodansha.

Bleed, P. 1986. Almost archaeology: Early archaeological interest in Japan. In *Windows on the Japanese past*, ed. R.J. Pearson, 57–67. Ann Arbor: Center for Japanese Studies Michigan.

Bunkachō. 2008. *Kongo no maizō bunkazai hogo taisei no ari-kata ni tsuite (hōkoku)* 今後の埋蔵文化財保護体制のあり方(報告) [Future strategies for the protection of buried cultural properties (report)]. Tōkyō: Bunkachō.

Bunkachō. 2014. *Tekisei-na maizō bunkazai gyōsei wo ninau taisei no kōchiku ni tsuite (hōkoku)* 適正な埋蔵文化財行政を担う体制等の構築について [On the construction of a system for a suitable administration of buried cultural properties (report)]. Tōkyō: Bunkachō.

Edwards, W. 2008. Japanese archaeology and cultural properties management: Prewar ideology and postwar legacies. In *A companion to the anthropology of Japan*, ed. J. Robertson, 36–49. Malden: Wiley.

Fawcett, C. 1996a. Archaeology and Japanese identity. In *Multicultural Japan. Palaeolithic to postmodern*, ed. D. Denoon, 60–77. Cambridge: Cambridge University Press.

Fawcett, C. 1996b. Nationalism and postwar Japanese archaeology. In *Nationalism, politics and the practice of archaeology*, ed. C. Fawcett and P.L. Kohl, 232–246. Cambridge: Cambridge University Press.

Fukuda, T. 2007. Chijin-tachi no hōkō – 1969.10.25. Kyōto Heian-Hakubutsukan – 地人たちの彷徨-1969. 10. 25. 京都·平安博物館- [Roaming locals – 1969.10.25. Kyōto, Heian Museum]. In *Kōkogaku to iu gendai-shi: sengo kōkogaku no eppoku* 考古学という現代史: 戦後考古学のエポック (Archaeology in our times), ed. T. Fukuda, 102–192.

Gayle, C.A. 2003. *Marxist history and postwar Japanese nationalism*. London: Routledge.

Habu, J. 1989. Contemporary Japanese archaeology and society. *Archaeological Review from Cambridge* 8 (1): 37–45.

Harris, V. 2003. Works of Gowland in Japan. In *William Gowland: The father of Japanese archaeology*, ed. V. Harris and K. Gotō, 18–24. Tōkyō: Asahi Shimbun/British Museum Press.

Hirata T. 2008. H. v. Shiiborudo-cho 'kōko setsuryaku' to Meiji-ki no Nihon kōkogaku H.v.シーボルト著『考古説略』と明治期の日本考古学 [H. v. Siebold's 'Brief Outline of Archaeology' and Japanese archaeology of the Meiji era]. *Meiji Daigaku Toshokan Kiyō* 明治大学図書館紀要 [Bulletin of the Meiji University Museum] 12: 139–156.

Ikawa-Smith, F. 1982. Co-traditions in Japanese archaeology. *World Archaeology* 13 (3): 296–309.

Inada, T. 2004. Allgemeine Einführung: Das Paläolithikum. In *Zeit der Morgenröte: Japans Archäologie und Geschichte bis zu den ersten Kaisern*, ed. A. Wieczorek and W. Steinhaus, 31–40. Mannheim: Publikationen der Reiss-Engelhorn-Museen.

Ishikawa. 2017. Post-WWII Japanese archaeology and the founding of the Japanese Archaeological Association in 1948. *Japanese Journal of Archaeology* 4: 165–170.

Kanaseki, H. 2004. Zum Beginn der Yayoi-Zeit: Anmerkungen zur Forschungsgeschichte. In *Zeit der Morgenröte: Japans Archäologie und Geschichte bis zu den ersten Kaisern*, ed. A. Wieczorek and W. Steinhaus, 177–180. Mannheim: Publikationen der Reiss-Engelhorn-Museen.

Kaner, S. 1996. Beyond ethnicity and emergence in Japanese archaeology. In *Multicultural Japan. Palaeolithic to postmodern*, ed. D. Denoon, 46–59. Cambridge: Cambridge University Press.

Kobayashi, T. 1986. Trends in administrative salvage archaeology. In *Windows on the Japanese past*, ed. R.J. Pearson, 491–496. Ann Arbor: Center for Japanese Studies Michigan.

Kondō Y. 1998. *Tsukinowa kofun* 月の輪古墳 [Tsukinowa tomb]. Okayama: Kibito.

Kreiner, J. 1980. Heinrich Freiherr von Siebold: Ein Beitrag zur Geschichte der japanischen Völkerkunde und Urgeschichte. In *Beiträge zur japanischen Ethnogenese – 100 Jahre nach Heinrich von Siebold*, ed. J. Kreiner, 147–203. Bonn: Japanologisches Seminar der Universität Bonn.

Miyamoto, K. 2017. The beginnings of modern archaeology in Japan and Japanese archaeology before World War II. *Japanese Journal of Archaeology* 4: 157–164.

Miyashiro, E., and N. Yonehara. 2010. Shinchō ni shingi kenshō: kyūsekki hakkutsu netsuzō jiken kara 10 nen, eikyōha. In Asahi Shimbun 4.11.2010. http://www.asahi.com/culture/news_culture/TKY2010-11040220.html. Accessed 30 May 2013.

Mizoguchi, K. 1997. The reproduction of archaeological discourse: The case of Japan. *Journal of European Archaeology* 5 (2): 149–165.

Muraki, M. 2011. Sharing the pleasure of excavation. The public archaeology program at the Miharashidai site, Japan. In *New perspectives in global public archaeology*, ed. A. Matsuda and K. Okamura, 263–273. New York: Springer.

Nakai, A. 2005. Shūko no dentō, shōko no keifu – nihon rekishikōkogaku no kindai 集古の伝統 尚古系譜: 日本歴史考古学の近代 (The tradition of collecting old objects, the descent of treasuring old objects: The modernization of Japanese historical archaeology). *Japanese Language and Culture* 31: 1–26.

Oda, S. and C. T. Keally. 1986. A Critical Look at the Palaeolithic and Lower Palaeolithic Research in Miyagi Prefecture, Japan. Jinruigaku Zasshi 人類学雑誌 (Journal of the Anthropological Society of Nippon) 94 (3): 325–361.

Okamura, M. 2004. Die archäologische Denkmalpflege und die heutige Gesellschaft Japans. In *Zeit der Morgenröte: Japans Archäologie und Geschichte bis zu den ersten Kaisern*, ed. A. Wieczorek and W. Steinhaus, 494–499. Mannheim: Publikationen der Reiss-Engelhorn-Museen.

Okamura, K. 2017. After the quakes: The impact of disasters on Japanese archaeology and heritage management. *Japanese Journal of Archaeology* 4: 191–200.

Okamura, K., A. Fujisawa, Y. Kondo, Y. Fujimoto, T. Uozu, Y. Ogawa, S. Kaner, and K. Mizoguchi. 2013. The great East Japan earthquake and cultural heritage: Towards an archaeology of disaster. *Antiquity* 87 (335): 258–269.

Ōtsuka, H. 2003. Burial mound research and William Gowland. In *William Gowland: The father of Japanese archaeology*, ed. V. Harris and K. Gotō, 173–178. Tōkyō: Asahi Shimbun/British Museum Press.

Pai Hyung, Il. 2009. Capturing visions of Japan's prehistoric past: Torii Ryuzo's field photographs of "Primitive" races and lost civilizations (1896–1915). In *Looking modern: East Asian visual culture from treaty ports to world war II*, ed. J. Purtle and H.B. Thomsen, 265–293. Chicago: Center for the Art of East Asia.

Sahara, M. 2004. Die japanische Archäologie: Vergangenheit und Gegenwart. In *Zeit der Morgenröte: Japans Archäologie und Geschichte bis zu den ersten Kaisern*, ed. A. Wieczorek and W. Steinhaus, 491–493. Mannheim: Publikationen der Reiss-Engelhorn-Museen.

Saitō T. 1974. *Nihon kōkogaku-shi* 日本考古学史 [The history of Japanese Archaeology]. Tōkyō: Yoshikawa Kōbunkan.

Sakazume H. 1994. Nihon kōkogaku-shi shūi: tōa kōko gakkai, tōhō kōkogaku kyōkai to nihon kodai bunka

gakkai 日本考古学史拾遺: 東亜考古学会·東方考古学協会と日本古代文化学会 (Supplement in the history of Japanese archaeology). *Risshō Daigaku Bungaku-bu Ronsō* (The Journal of the Faculty of Letters, Risshô University) 99: 31–57.

Shiina S. 2016. Maizō bunkazai hogo to katsuyō no kore made to kore kara 埋蔵文化財保護と活用のこれまでとこれから (Protection and public use of archeological sites – Past, present and future). Nihon Fudōsan Gakkai-shi 日本不動産学会誌 (*The Japanese Journal of Real Estate Sciences*) 30(3): 4–9.

Suda T. 2012. Overview: Japanese archaeological research trends 2010. http://archaeology.jp/publication/trends/Overview-2010.pdf. Accessed 30 May 2013.

Sugiyama, S., and T. Saitō. 2008. Zandankai Saitō Tadashi sensei wo kakonde: edojidai no kōkoka-tachi – nihon kōkogaku no kiso wo kizuita hitobito 斎藤忠先生を囲んで: 江戸時代の好古家たち-日本考古学の基礎をきづいた人々 [Framed by (an interview with) Professor Saitō Tadashi: Edo period scholars of antiquities – The people who laid the foundations for Japanese archaeology]. In *Kinsei ni kōkokatachi – Mitsukuni, Kunpei, Teikan, Tanenobu* 近世の好古たち-光圀·君平·貞幹·種信- [Scholars of antiquities in the early modern period: Mitsukuni, Kunpei, Teikan, Tanenobu], ed. Kokogakuin Daigaku Nihon Bunka Kenkyūjo, 5–42.

Tate'ishi T. 2014. Overview of cultural properties affected by disaster in the Great East Japan Earthquake of March 2011, microbial biodeterioration of cultural property. In *Proceedings of the International Symposium on the Conservation and Restoration of Cultural Property 2012*, ed. National Research Institute for Cultural Properties, 29–33. http://www.tobunken.go.jp/~ccr/pub/symp2012/symp2012_03.pdf#search='Cultural+properties+rescue+program%5D'. Accessed 28 Nov 2017.

Tsuboi S. 1904. Sensō no jinruigaku-teki kansatsu 戦争の人類学的観察 [War from an anthropological perspective]. *Tōkyō Jinruigakkai Zasshi* 東京人類學會雜誌 [The Journal of the Tōkyō Anthropological Society] 217: 249–259.

Tsuboi, K. 1986. Problems concerning the preservation of archaeological sites in Japan. In *Windows on the Japanese past*, ed. R.J. Pearson, 481–490. Ann Arbor: Center for Japanese Studies Michigan.

Tsuboi, K. 1992. Issues in Japanese archaeology. *Acta Asiatica* 63: 1–20.

Ueda, H. 2003. William Gowland's footsteps in Japan: A photographic documentation. In *William Gowland: The father of Japanese archaeology*, ed. V. Harris and K. Gotō, 159–165. Tōkyō: Asahi Shimbun/British Museum Press.

Yamagishi R. 2016. Chūkō-kyō'iku genba to kōkogaku bukatsu 40 nen 中高教育現場と考古学部活40年 (Junior high school & high school fields of education and archaeology club activities for 40 years). *Gekkan Kōkogaku Jaanaru* 月刊考古学ジャーナル (*The Archaeological Journal*) 691: 28–29.

Further Readings

Barnes, G.L. 1990. The 'Idea of Prehistory' in Japan. *Antiquity* 64 (245): 929–940.

Barnes, G.L. 2010. Earthquake archaeology in Japan: An overview. In *Ancient earthquakes: Geological society of America special paper*, ed. M. Sintubin, I. S. Stewart, T. M. Niemi, and E. Altunel, 471, 81–96.

Barnes, G.L., and M. Okita. 1999. Japanese archaeology in the 1990s. *Journal of Archaeological Research* 7 (4): 349–395.

Gowland, W. 1899. *The dolmens of Japan and their builders*. London: William Clowes and Sons Ltd..

Habu, J., and K. Okamura. 2017. Japanese archaeology today: New developments, structural undermining, and prospects for disaster archaeology. In *Handbook of east and Southeast Asian archaeology*, ed. J. Habu et al., 11–25. New York: Springer.

Mizoguchi, K. 2006. *Archaeology, society and identity in modern Japan*. Cambridge: Cambridge University Press.

Person, R. 1992. The nature of Japanese archaeology. *Asian Perspectives* 31 (2): 115–127.

von Siebold, H. 1879. *Notes on Japanese archaeology with especial reference to the stone age*. Yokohama: Typography of C. Lévy.

The History of the Research of Amazonian Dark Earths in Brazil

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Introduction

Many of the archaeological sites in Amazonia contain Amazonian Dark Earth (ADE). Characterized by anthropogenic melanization because of the accumulation of organic materials, especially charcoal, coupled with a host of nutrients,

these soils also contain a high quantity of archaeological material, mainly ceramics and some lithics, moreover, all sorts of animal and human bones, feces, and house/garden waste (Woods and McCann 1999). Through their habitation activities, these past people unintentionally put nutrients into the soil, bringing micro- and macronutrients from food, fuel, and building material to the sites of their habitations, where their use and disposal contributed to change the soil's properties.

The ADEs are found in different types of soils, including Latosols, Podsols, Podzolic, and Plinthosols (Smith 1980; Kern et al. 2004), and generally found in the Pleistocene terraces. They are well-known for their high fertility and resilience, with almost neutral pH, high cation exchange capacity (CEC) and base saturation, and high levels of macro- and micronutrients for plants in both available and/or total measurements, including phosphorus (P), calcium (Ca), zinc (Zn), copper (Cu), magnesium (Mg), manganese (Mn), and carbon (C) (Sombroek 1966: 174–178). Sombroek (1966) also observed a variation in these anthropogenic soils. He called attention to lightly melanized (brown-hued) soils with few archaeological materials in the matrix, found dispersed concentrically in surrounding areas with *terra preta* (TP), and he denominated these lighter soils *terra mulata* (currently called *terra marrom* – TM, namely, brown hue color). TM is considered the result of intentional agricultural field improvements. The microbiological composition of ADE is responsible for their resilience, for the high activity level of their microorganisms makes them expand and grow (Woods 1995).

According to Denevan (1996: 669–670), *terra preta* and *terra marrom* are indirect evidence of intensive *terra firme* cultivation in permanent or semipermanent fields. According to the author, ancient villages in the Amazonia were surrounded by cultivation with fruit orchards, managed fallows, house gardens, and brief bush fallows with semipermanent settlements, some numbering thousands of people, surrounded by zones of modified forest manipulated by hunting and gathering activities (Denevan 1996). This viewpoint expresses a very different vision than that of Meggers, who argued for settlement discontinuities due to soil exhaustion and continual reoccupations of the same site through time (e.g., Meggers 1954). In support of Denevan's stance, research carried out in the lower Tapajós and Arapiuns drainages has identified very large ADE sites with different densities of archaeological materials whose distribution is suggestive of habitation middens associated with areas formed by long-term agricultural activities (Woods and McCann 1999), and similar results have been found in the Central Amazon (Heckenberger et al. 1999; Rebellato et al. 2009; Stenborg et al. 2018).

Although the white-water floodplains are composed of fertile soils, they also contain important risk factors for food production due to the annual flooding periodicity (Denevan 1996: 656). While the uplands are characterized by weathering and poor soils, they do have the advantage of not being flooded annually and consequently were considered a good place to build villages and house gardens according to archaeological records (Denevan 1996). Through their habitation activities, these past people unintentionally put nutrients into the soil, and through these activities they started to generate the Amazonian Dark Earths (Woods and McCann 1999).

Historical Background

The first records of ADE appeared in the Brazilian Amazon; the investigations of anthropogenic ADE have a historical relationship with Natural Science research during the first explorations by naturalists and geologists in the second half of the nineteenth century, such as James Orton, Orville Derby (1875), and Charles Hartt (1885). They reported the presence of black soils in

Taperinha (a farm built by North American immigrant who came to Brazil after the end of their civil war). The records also point out the presence of ADE in Diamantina, and Itaituba cities. In 1903 Friedrich Katzer not only recognized the fertility of those soils but also suggested that the previous inhabitants in the Amazon were responsible for the creation of the soils. He also was the pioneer in applying chemical analysis to soils in abandoned settlements for fertility tests, methods not applied again in Amazonia until Sombroek (Woods and Denevan 2009).

A more detailed survey of the *terra preta* from the anthropological point of view started during the first decades of the twentieth century, with the ethnoarchaeological research conducted by Curt Nimuendajú, who made maps with the dark soils' distribution and conducted excavations in the Tapajós region (1953). Nimuendajú, with the collaboration of Erlan H. Nordenskiöld, director of the Göteborg Museum in Sweden, amplified the collection of ethnoarchaeology artifacts for the museum from South America. During the 1940s and the 1950s, the fertility of the *terra preta* (TP) was assumed to be due to natural processes, although it attracted people to the specific places where they were found. Initially, TP fertility was hypothesized to be the result of nutrients from the floor of an extinct lake or an effect of volcanic ash deposition (Falesi 1974). Woods and Denevan (2009) have divided the second half of the twentieth century into the "pre-Sombroek" and "post-Sombroek" periods (1966), with Sombroek being the godfather of the *terra preta*.

Sombroek (1966) dismissed the idea of a natural formation process of the ADE through a three-pronged analysis that produced three significant findings: (1) the clay fraction is the same of the surrounding soils (predominantly kaolinite); (2) the texture is the same in and out of TP; and (3) the C horizon always presents the same characteristics as the other soils in the region (Sombroek 1966: 176). These findings sparked research about anthrosols in Amazon. He also proposed a model of occupational systems, where the TP (*terra preta*) is interpreted as a result of kitchen-midden deposition and TM (*terra marrom*) as the effect *of long-lasting cultivation from gardens around the past villages* (Sombroek 1966: 175). However, through the model of occupation that Meggers supported for Amazonia, the ADE was understood as a consequence of short reoccupations of a site through time, responsible for the genesis of thick and wide deposits of anthrosols due to the partial overlapping of occupations. The major contributions in archaeological research during the following decades were associated with the investigations developed by PRONAPABA (*Programa Nacional de Pesquisas Arqueológicas na Bacia Amazônica*), led by Meggers, which located numerous sites of ADE (1954).

Nigel Smith (1980) reopened the discussion of dark soils and pre-colonial populations with a current well-known paper describing the physical and chemical characteristics of these anthrosols that also propelled the heated debate concerning Amazon occupational systems. According to Smith, the ADE was related to large, dense, and permanent village occupational systems, instead of small groups with a re-occupational settlement strategy. Smith also stimulated a review of standard notions of the carrying capacity of the forest, calling for attention to the resilience, nutrient availability, microorganisms, and vegetation of the TP (*terra preta*) (Smith 1980: 562).

In Brazil, a group led by Marcondes Lima da Costa and Nestor Kämpf started to work with ADE in the 1980s, producing influential discussions about the associated settlement patterns, geochemistry, site formation processes, classification analysis, and mapping of these anthrosols (Costa and Kern 1999; Kämpf et al. 2009). During the middle 1990s, the University of São Paulo in association with the University of Vermont and University of Florida through Eduardo Neves, Michael Heckenberger, and James Petersen started to

look at the ADEs as the result of long and permanent settlement during pre-colonial times (Heckenberger et al. 1999).

In Colombia in the late 1970s and 1980s, Bray, Eden, Herrera, and McEvans identified many sites in the middle Caquetá Basin, archaeological sites related to ADE in the Colombian Amazon. Through a comparison of similarities between those anthrosols and the TP in Brazil, they recognized a regional pattern of anthrosol formation process in the Amazon as an effect of settlement intensification in the region (Eden et al. 1984). Following this line of investigation, Cavalier, Herrera, Mora, and Rodrigues observed that in an attempt to increase the food production in the region at the Araracuara archaeological site (Caquetá River), around 800 AD the population added alluvial silt in order to increase the soil fertility, thereby generating TP (Mora et al. 1991).

In Germany, the University of Bayreuth became a center of ADE studies thanks to Wolfgang Zech, who led the research about the fertility of TP and its holding capacity for nutrients (Zech et al. 1990). Pabst (1991) analyzed the content of OM (organic matter) and found a concentration six times higher than that of surrounding soils. Glaser et al. (2001) investigated the OM and black charcoal from incomplete combustion in the ADE, concluding that their effects were responsible for its fertility (Glaser et al. 2001). Lehmann added that inputs of charcoal in soils increase the nutrients available for plants while also decreasing the leaching of P, K, Ca, and Zn (Lehmann et al. 2003).

In North America, Bill Woods publish his first article about ADE and a short time after, at the University of Wisconsin a group formed that included professors and students led by William Denevan (1996), increasing the amount of knowledge and fieldwork focusing on ADE. Woods and McCann (1999) boosted the development of new research aimed at studying the formation process of anthropogenic soils, and its relation to pre-colonial settlements and their agricultural practices.

Distribution of ADE

The ADEs are found in several locations in Amazonia, and with the increase of research in the area, certainly more sites will be found in other locations and different contexts. Woods and McCann identified ADE sites along the rivers, in the uplands, and on bluffs; near water sources and not; and associated with both sandy and clayey soil matrices (Woods and McCann 1999: 8). Current baselines of research allow us to say that ADE area found at different types of soils, and these are usually less than 2 ha in size, but a few of them are more than 100 ha. ADE sites are found in every ecological zones and landscape in the Amazon Basin, and it covers around 0.1–0.3% or 6000–18,000 Km^2 of the total Amazon Basin (Kämpf et al. 2009; Woods and Denevan 2009). The majority of the ADE is found along the bluffs of the main rivers or abandoned river channels in the *terra firme* (non-floodable area) (Denevan 1996; Kern et al. 2004).

Current Debates

Due to the high fertility of ADE, they are currently used by the local populations for agricultural purposes and present a model for sustainable soil resource development in the tropics. Therefore, the study of the Amazonian Dark Earths is important to understand the past, and it also represents key knowledge for the present and future of the biggest tropical forest in the world. The Brazilian government's political agenda calls for development of portions of Amazonia, as well as expansion of its agricultural and development infrastructure ventures, increasing the population density and pressure on resources in this region. An effort is needed in order to protect the archaeological sites in the region, moreover increasing the studies about ADE and its geneses. Thus, the ADEs are an interesting research object and have been examined by a multidisciplinary group consisting of archaeologists, anthropologists, biologists,

chemists, geographers, and soil scientists. Certainly, they are a very important legacy from the past societies from the Amazon.

Cross-References

▶ Earthworks of the Amazon
▶ Geometric Earthworks of Western Amazonia

References

Costa, M., and D. Kern. 1999. Geochemical signatures of tropical soils with archaeological black earth in the Amazon. *Journal of Geochemical Exploration* 66: 369–385.

Denevan, W.M. 1996. A bluff model of riverine settlement in prehistoric Amazonia. *Annals of the Association of American Geographers* 86: 654–681.

Eden, M.J., W. Bray, L. Herrera, and C. McEwan. 1984. Terra preta soils and their archaeological context in the caquet basin of Southeast Colombia. *American Antiquity* 49: 125–140.

Falesi, I.C. 1974. Soils of the Brazilian Amazon. In *Man in the Amazon*, 201–229. Gainesville: University Presses of Florida.

Glaser, B., G. Guggenberger, L. Haumaier, and W. Zech. 2001. Persistence of soil organic matter in archaeological soils (Terra Preta) of the Brazilian Amazon region. In *Sustainable management of soil organic matter*, 190–194. Wallingford: CABI Publishing.

Hartt, C.F. 1885. Contribuições para a Ethologia do Valle do Amazonas. *Arquivos do Museu Nacional* 6: 1.

Heckenberger, M.J., J.B. Petersen, and E.G. Neves. 1999. Village size and permanence in Amazonia: Two archaeological examples from Brazil. *Latin American Antiquity* 10: 353–376.

Kämpf, N., W.I. Woods, D.C. Kern, and T.J. Cunha. 2009. Classificação das Terras Pretas de Índio e Outros Solos Antrópicos Antigos. In *As Terras Pretas de Índio da Amazônia: sua caracterização e uso deste conhecimento na criação de novas áreas*, ed. W.G. Teixeira, D.C. Kern, B.E. Madari, H.N. Lima, and W.I. Woods. Manaus: Embrapa Amazônia Ocidental.

Katzer, F. 1903. *Grundzuge der Geologie des untern Amazonasgebietes (des Staates Pará in Brasilien)*. Leipzig: Verlag von Max Weg.

Kern, D., G. D'aquino, T. Rodrigues, F. Frazao, W. Sombroek, T. Myers, and E. Neves. 2004. Distribution of Amazonian dark earths in the Brazilian Amazon. In *Amazonian dark earths*, ed. W.I. Woods, W. Teixeira, J. Lehmann, C. Steiner, A. Winklerprins, and L. Rebellato, 51–75.

Lehmann, J., J. Pereira da Silva, C. Steiner, T. Nehls, W. Zech, and B. Glaser. 2003. Nutrient availability and leaching in an archaeological Anthrosol and a Ferralsol of the Central Amazon basin: Fertilizer, manure and charcoal amendments. *Plant and Soil* 249: 343–357.

Meggers, B.J. 1954. Environmental limitation on the development of culture. *American Anthropologist* 56: 801–824.

Mora, S., L. Herrera, I. Cavalier, and C. Rodrigues. 1991. *Cultivars, anthropic soils and stability: A preliminary report of archaeological research in Araracuara colombian Amazonia*. Pittsburgh: Pittsburgh University.

Nimuendajú, C. 1953. Os Tapajó. *Revista de Antropologia* 1: 53–61.

Orton, J. 1875. *The Andes and the Amazon; or, across the continent of South America*. New York: Harper.

Pabst, E. 1991. Critérios de distinção entre terra preta e latossolo na região de Belterra e os seus significados para a discussão pedogenética. *Boletin do Museu Paraense Emílio Goeldi, Série Antropologia* 7: 5–19.

Rebellato, L., W.I. Woods, and E. Neves. 2009. Pre-Columbian settlement dynamics in the Central Amazon. In *Amazonian dark earths: Wim Sombroek's vision*, ed. W.I. Woods, W. Teixeira, J. Lehman, C. Steiner, A. Winklerprins, and L. Rebellato, 15–31. Dordrecht: Springer.

Smith, N.J.H. 1980. Anthrosols ad human carrying capacity in Amazonia. *Annals of the Association of American Geographers* 70: 553–566.

Sombroek, W.G. 1966. *Amazon soils: A reconaissance of the soils of the Brazilian Amazon region*. Wageningen: Center for Agricultural Publications and Documentation.

Stenborg, P., D.P. Schaan, and C.G. Figueiredo. 2018. Contours of the past: Lidar data expands the limits of late pre-columbian human settlement in the santarém region, lower amazon. *Journal of Field Archaeology* 43 (1): 44–57.

Woods, W.I. 1995. Comments on the Black Earth of Amazônia. *Applied Geography Conference* 18: 159–165.

Woods, W.I., and W.M. Denevan. 2009. Amazonian dark earths: The first century of reports. In *Amazonian dark earths: Wim Sombroek's vision*, ed. W.I. Woods, W. Teixeira, J. Lehman, C. Steiner, A. Winklerprins, and L. Rebellato, 1–14. Dordrecht: Springer.

Woods, W.I., and J.M. McCann. 1999. The anthropogenic origin and persistence of Amazonian dark earths. In *Conference of Latin Americanist geographers*, ed. C. Caviedes, 7–14. Austin: University of Texas Press.

Zech, W., L. Haumaier, R. Hempfling & P. MacCarthy. 1990. Ecological aspects of soil organic matter in tropical land use, 187–202. Madison: American Society of Agronomy, Inc., Soil Science Society of America, Inc.

Hodder, Ian (Modern World)

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Basic Biographical Information

Ian Hodder was trained at the Institute of Archaeology, University College London, and at Cambridge University where he obtained his Ph.D. in 1975. After a brief period teaching at Leeds, he returned to Cambridge where he taught until 1999. During that time, he became Professor of Archaeology and was elected a Fellow of the British Academy. In 1999, he moved to teach at Stanford University where he became Dunlevie Family Professor in the Department of Anthropology and where he was also for periods Director of the Stanford Archaeology Center. His first large-scale excavation project was at Haddenham in the east of England with Chris Evans; together they also set up the Cambridge Archaeological Unit. Since 1993, Hodder has reopened the excavations at Çatalhöyük in Turkey where he has led a large international team and has experimented with and developed reflexive methods.

Major Accomplishments

During the 1970s, Hodder developed techniques for spatial analysis in archaeology, drawing on quantitative and statistical techniques successfully developed in human geography (see Hodder and Orton 1976). His main application of these techniques was to the archaeology of Roman Britain. Unsatisfied with the ability of these techniques to discern the causes of cultural patterning, he then undertook several seasons of ethnoarchaeological fieldwork in Kenya, Zambia, and Sudan. The results of this work, published in 1982 (*Symbols in Action*; Hodder 1982a), demonstrated that material culture was actively used in social strategies and that it was meaningfully constituted. These ideas became part of a wider reaction against positivist processual archaeology that had initially taken hold in the United States in the 1960s and 1970s, strongly influenced by social evolutionary and adaptational accounts. A group of students at Cambridge in the late 1970s and early 1980s became more influenced by the social theoretical threads in anthropology and explored the critiques of positivism and the interpretive turn in anthropology. The first development of these ideas in archaeology was published in 1982 as the edited book *Symbolic and Structural Archaeology* (Hodder 1982b). Numerous other texts followed including Hodder's (1986) *Reading the Past* and books by Michael Shanks and Chris Tilley. The influences on this new approach were numerous, including critical theory, Marxism, structuralism, post-structuralism, and feminism, but also the agency and structuration theories of Bourdieu and Giddens. In 1985, Hodder termed this diversity of approaches postprocessual archaeology, and his main sustained attempt to apply the approach in prehistory was published in 1990 as *The Domestication of Europe* (Hodder 1990).

In the 1990s, the often-fierce debate between processual and postprocessual archaeology began slowly to settle down and the latter approaches often came to be termed interpretive. Hodder had by this time started excavating at Çatalhöyük, and he used this opportunity to develop a series of reflexive methods that made the field recording process more transparent and more open to diverging interpretation by multiple stakeholders. One idea was to bring forward interpretation to "the trowel's edge" instead of seeing excavation as descriptive followed by later interpretation in the laboratory or armchair. Another focus was to document the documentation process so that others could scrutinize the excavation and recording at a later date. But the main idea was to develop archaeology as a collaborative and participatory endeavor (Hodder 1999).

In the 2000s, Hodder became dissatisfied with the continuing tensions between positivist and rationalizing accounts and those informed by contemporary social theory. The rise in importance of material culture and materiality studies in archaeology had remained very much involved in social theory and insufficient attention had been paid to matter itself. Hodder developed a theory of entanglement that explored the dependencies between humans and things. Indebted to the theories of Bruno Latour, this approach was predominantly a response to the data from Çatalhöyük and to the necessity while working on that project of engaging with archaeologists with wide ranges of theoretical perspective. Entanglement theory was an attempt to bridge the divide between positivist and interpretive accounts of the past (Hodder 2012).

Throughout, Hodder's main concern has been to argue that archaeology is a social process. Its role in society is to create places and temporalities that others have to live by. Archaeology therefore has a duty to respond to the interests and needs of a diversity of communities and to take seriously the notion that it is as much about the present as about the past. In the 1990s and 2000s, he increasingly wrote about heritage and about the relationships between cultural heritage and human rights.

Cross-References

- ▶ Hodder, Ian (Theory)
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of
- ▶ Reflexive Approaches in Archaeology, Development of

References

Hodder, I. 1982a. *Symbols in action. Ethnoarchaeological studies of material culture*. Cambridge: Cambridge University Press.

Hodder, I., ed. 1982b. *Symbolic and structural archaeology*. Cambridge: Cambridge University Press.

Hodder, I. 1985. Post-processual archaeology. In *Advances in archaeological method and theory*, ed. M. Schiffer, vol. 8, 1–26. New York: Academic.

Hodder, I. 1986. *Reading the past. Current approaches to interpretation in archaeology*. Cambridge: Cambridge University Press.

Hodder, I. 1990. *The domestication of Europe: Structure and contingency in Neolithic societies*. Oxford: Blackwell.

Hodder, I. 1999. *The archaeological process. An introduction*. Oxford: Blackwell.

Hodder, I. 2012. *Entangled. An archaeology of the relationships between humans and things*. Oxford: Wiley Blackwell.

Hodder, I., and C. Orton. 1976. *Spatial analysis in archaeology*. Cambridge: Cambridge University Press.

Hodder, Ian (Theory)

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Basic Biographical Information

Ian Richard Hodder (Fig. 1) is one of the most important figures in contemporary archaeological theory. He was born in Bristol, England, on November 23, 1948, and spent his childhood between Singapore and Oxford, where he attended Magdalen College School. He took his undergraduate degree at London University and pursued graduate and postgraduate studies graduate at Cambridge University. Hodder completed his Ph.D. and graduated with honors from Cambridge University in 1976, under the supervision of David Clarke.

Upon graduation, Hodder took a position as a Lecturer at Leeds University (1974–1977). Three years later, he returned to Cambridge as a Lecturer (1977–1990), Reader (1990–1996), and then Professor (1996). He has held numerous other appointments including adjunct positions at State University of New York at Binghamton (1984–1989) and the University of Minnesota, Minneapolis (1986–1994), and Visiting Professorships at the Van Giffen Institute for Pre- and Protohistory in Amsterdam (1980) and the University of Paris I-Sorbonne (1985). In 1999, he joined newly created department of ultural and

Hodder, Ian (Theory), Fig. 1 Ian Hodder

Social Anthropology at Stanford University, California. There, he was appointed as Dunlevie Family Professor, Chair of the Department, and Director of the Archaeology Center.

Hodder has conducted innovative archaeological and ethnographic work in England, Italy, Kenya, Sudan, and Turkey. In England, he directed the excavations at Wendens Ambo (1973–1974), Ledston (1976–1978), and Haddenham (1981–1990). He was codirector of excavations at Maxey (1980). He was the director of prehistoric site survey in Calabria, Southern Italy (1979–1980). Interspersed among his archaeological projects, he conducted ethnographic fieldwork in Kenya (1974–1976, 1980–1981, 1982–1983) and the Sudan (1978–1979). Hodder is best known, however, for his ongoing research project at Çatalhöyük, Turkey (1993–present).

Hodder has received numerous awards and honors. These include the Gordon Childe Prize from Institute of Archaeology, London (1971), the Oscar Montelius Medal from the Swedish Society of Antiquaries (1995), the Lucy Wharton Drexel Medal from the University of Pennsylvania Museum (2009), and the Huxley Memorial Medal from the Royal Anthropological Institute (2009). He has held Residential Fellowships at the Center for Advanced Study in the Behavioral Sciences at Stanford (1987) and the Research Center for Anatolian Civilization at Koç University (2010). He has received honorary doctorates from the University of Bristol (2009) and the University of Leiden (2011) and a national prize from Turkish Minister of Culture for scientific contributions to Turkish archaeology. He is a Fellow of the British Academy, the Royal Anthropological Institute, and the Society of Antiquaries.

Major Accomplishments

Hodder and his graduate students at Cambridge University provided an important critique of processual archaeology and offered new approaches to the study of the social past. Highly influenced by human geography, his initial contributions were related to spatial analysis of prehistoric settlements in England. His work *Spatial Analysis in Archaeology*, coauthored with Clive Orton (Hodder and Orton 1976), earned him recognition during the apogee of the processual archaeology. However, Hodder became dissatisfied with the rather sterile and one-dimensional view offered by this perspective and set in motion a strong critique of functionalist archaeology and systems theory (Hodder 1986; Hodder and Hutson 2003).

At this same time, Hodder was conducting ethnoarchaeological work that was to generate one of his most influential theoretical contributions to archaeology. Based on the study of the peoples of the Baringo district of the sub-Saharan Africa, Hodder sought to understand the processes of social boundary formation in diverse ethnic communities. At this time, most archaeologists were using ethnoarchaeology to secure Middle Range Theory. In his seminal contribution *Symbols in Action: Ethnoarchaeological Studies of Material Culture* (Hodder 1982a), he argued that material culture was meaningfully constituted and that it needed to be studied contextually because meaning is made of specific and non-

fixed relationships and associations. Thus, far from being a passive by-product or mere reflection of human behavior, material culture plays an active role in shaping social relationships, which, in turn, speak of identity, individual, and group intentionality. In 1982, Hodder also published *The Present Past* (1982c) in which he reflected on the use of ethnoarchaeology, as a means to contribute to an interpretation of the past.

Convinced of the need for a new agenda, Hodder and his students organized a series of seminars inviting other colleagues to present alternative theoretical perspectives to the New Archaeology. Although *Symbolic and Structural Archaeology* (1982b) is now considered among the most groundbreaking and influential books in archaeological theory, it did not achieve a felicitous reception at that time. The book was an attempt to overcome – despite the title – the constraining notions posed by structuralism and materialist determinism (Hodder 2007: 200). As part of this new current that was being developed, Hodder stressed the need to conceive material culture as a text that could be read and interpreted within a specific historical context. By the mid-1980s, Hodder had firmly stepped into the theoretical debate and ignited by the emergence of what came to be known as "Post-processual archaeology." In *Reading the Past* (1986), Hodder presented the first synthesis of the main theoretical trends of the newly born post-processualism.

During the second half of the 1980s, Hodder (1987a, b) also produced a series of edited volumes and papers that consolidated the "Post-processual" approach and its emphasis in the symbolic and active role of material culture as well as historicity and narrative. In both the importance of context was emphasized and – contrary to his detractors' accusations of relativism – he argued optimistically for making a more rigorous theoretical move to approach the past. In 1986, Hodder participated in the formation of what would become the World Archaeological Congress, alongside the late Peter Ucko and other colleagues. From then on his writings evidenced a rather politically engaged tone in his critiques to the neutrality of science, mainly influenced by the work feminist thinkers and postcolonial critique, that would later take shape through the notion of multivocality (Hodder 1999).

By the mid-1990s, he embarked upon his most important and ambitious project: the excavation of Çatalhöyük, a 9,000-year-old Neolithic site located in the Konya region in Turkey, which had been excavated in the 1960s by James Mellaart. Determined to provide an empirically based argument for his theoretical claims along with a post-processual methodology, he began a long-term project that starting in 1993 was envisioned to last for 25 years. Hodder was convinced that the site, because of its rich symbolic expressions and well-preserved condition of its architecture and artifacts, as reported by Mellaart, would provide enough data to test his ideas about the symbolic nature of the Neolithic revolution (Hodder 1990).

Over the years, the Çatalhöyük Project has involved up to nine excavation teams from various Turkish, Greek, US, and European universities, each comprised by specialists and graduate students who work in collaboration with the other teams, conducting their own research questions through diverse methods. In the course of the project, (Hodder 1999) fleshed out his reflexive methods through what he called "theorizing at the 'trowel's edge'" pointing out the importance of reflexivity, relationality, interactivity, and multivocality and the need to engage in a closer and more dialogical relationship between data and theory. Hodder embraced the Internet as a tool to promote the project and facilitate dialogue (http://www.catalhoyuk.com/). As part of this process, he began a critical inquiry into the field of ethics and the roles of tourism and heritage in the production of the past in the present.

Even though the debates between processualism and post-processualism have diminished, Ian Hodder continues to advance theory and practice. He has reengaged with an old interest: the symbolic aspects involved in the process of sedentarization, during the Neolithic (Hodder 2006). He has revamped his ideas about the role of the house as part of the process and attempted to move on from a previous structuralist framework, by emphasizing the role of ritual, ancestry, memory, and practice in a more pervasive fashion, and advanced his theory of material entanglement

(Hodder 2010, 2011). His most ambitious publication entitled *Entangled: An Archaeology of the Relationships Between Humans and Things* (2012), combines aspects of actor network theory with behavioral archaeology and evolutionary archaeology as a way of examining the dialectic of dependence and dependency between humans and things. Hodder's contributions to a series of seminal ideas and debates have undoubtedly changed archaeology.

Cross-References

- ▶ Binford, Lewis R. (Theory)
- ▶ Ethnoarchaeology
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of
- ▶ Processualism in Archaeological Theory
- ▶ World Archaeological Congress (WAC)

References

Hodder, I. 1982a. *Symbols in action. Ethnoarchaeological studies of material culture*. Cambridge: Cambridge University Press.

Hodder, I., ed. 1982b. *Symbolic and structural archaeology*. Cambridge: Cambridge University Press.

Hodder, I. 1982c. *The present past. An introduction to anthropology for archaeologists*. London: Batsford.

Hodder, I. 1986. *Reading the past. Current approaches to interpretation in archaeology*. Cambridge: Cambridge University Press.

Hodder, I., ed. 1987a. *Archaeology as long-term history*. Cambridge: Cambridge University Press.

Hodder, I., ed. 1987b. *The archaeology of contextual meanings*. Cambridge: Cambridge University Press.

Hodder, I. 1990. *The domestication of Europe: Structure and contingency in Neolithic societies*. Oxford: Blackwell.

Hodder, I. 1999. *The archaeological process. An introduction*. Oxford: Blackwell.

Hodder, I. 2006. *The leopard's tale. Revealing the mysteries of Çatalhöyuk*. London: Thames & Hudson.

Hodder, I. 2007. Looking back at symbolic and structural archaeology. *Cambridge Archaeological Journal* 17 (2): 200–225.

Hodder, I., ed. 2010. *Religion in the emergence of civilization. Çatalhöyük as a case study*. Cambridge: Cambridge University Press.

Hodder, I. 2011. Human-thing entanglement: Towards an integrated archaeological perspective. *Journal of the Royal Anthropological Institute* 17: 154–177.

Hodder, I. 2012. *Entangled: An archaeology of the relationships between humans and things*. Oxford: Wiley-Blackwell.

Hodder, I., and C. Cressford. 2004. Daily practice and social memory at Çatalhöyuk. *American Antiquity* 69: 17–40.

Hodder, I., and S. Hutson. 2003. *Reading the past: Current approaches to interpretation in archaeology*. Cambridge: Cambridge University Press.

Hodder, I., and C. Orton. 1976. *Spatial analysis in archaeology*. Cambridge: Cambridge University Press.

Further Reading

Hodder, I. 1992. *Theory and practice in archaeology*. London: Routledge.

Hodder, I., ed. 1996. *On the surface: Çatalhöyük 1993–95*. Cambridge: McDonald Institute for Archaeological Research/British Institute of Archaeology at Ankara.

Hodder, I. 1997. Always momentary, fluid and flexible: Towards a reflexive excavation methodology. *Antiquity* 71: 691–700.

Hodder, I., ed. 2000. *Towards reflexive method in archaeology: The example at Çatalhöyük*. Cambridge: McDonald Institute for Archaeological Research/British Institute of Archaeology at Ankara.

Hodder, I. 2003. *Archaeology beyond dialogue*. Salt Lake City: University of Utah Press.

Hodder, I., and R.W. Preucel, eds. 1996. *Contemporary archaeology in theory*. Oxford: Blackwell.

Hodder, I., M. Shanks, A. Alexandri, V. Buchli, J. Carman, J. Last, and G. Lucas, eds. 1995. *Interpreting archaeology, finding meaning in the past*. London: Routledge.

Hodder, I., H. Karlsson, and B. Olsen. 2008. 40 years of theoretical engagement: A conversation with Ian Hodder. *Norwegian Archaeological Review* 41 (1): 26–42.

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Hokkaido Sequence and the Archaeology of the Ainu People

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Introduction

The archaeology in Hokkaido Island has long been recognized as a part of Japanese archaeology, or a northern variation of Japanese history

without attention to Hokkaido's particular history and the perspective of the Ainu. The primary focus of Japanese archaeology and history has been on state formation in the main island and narratives about the past have been constructed according to this framework. In other words, the archaeological narratives that have been produced present a model in which various local cultures are integrated under a homogenous cultural and political hegemony. The goal of those narratives was to support the unification of the nation state.

The greater part of history in Hokkaido Island was positioned outside of Japanese history. Long before Hokkaido and neighboring islands were annexed into Japanese territory, there were historical and cultural sequences of local societies, which gradually became related to the broader territory. Historical depictions of the Ainu, who did not have their own written history, have been created by the Japanese settlers, travelers, and bureaucrats, which consider the Ainu as peripheral undeveloped populations or resistant to the imperial state. However, accumulated archaeological information over the last decade suggests that the archaeological cultural sequence in Hokkaido Island and neighboring islands had an original complex historical dynamism. Now we must reconsider the normative framework and interpretations based on new perspectives, including the interpretation by the Ainu.

The recent shift in practice, evaluation, and interpretation around Northern Japan, especially in Hokkaido Island, addresses several exciting issues: the Ainu as the subject of the history, testing the validity of normative theoretical and methodological frameworks, repatriation of ancestral remains and grave goods, and ownership of historical cultural heritage. The challenge for contemporary archaeology in Hokkaido Island is developing relationships with all stakeholders in the local community, including the Ainu as indigenous peoples in Northern Japan (Fitzhugh and Dubreuil 1999; Tahara 2005, 2006, Walker 2006).

State of Knowledge

Hokkaido Island

Hokkaido Island (area: 83,453 km^2) is the second largest island of Japanese archipelago. The Tsugaru Strait separates Hokkaido Island from Honshu Island, and there is the Souya Strait between Hokkaido and Sakhalin (Karafuto) Islands. This island was formerly known as *Ezo*, *Yezo*, *Yeso*, and *Yesso* by written history, but the Ainu, who are indigenous peoples in Northern Japan, called this island as *Ainu-mosir* (the land where people live).

In 1869, when establishing the Development Commission after Meiji Restoration, the Meiji government decided to change the name of *Ezo-chi* (the land of Ezo). The Meiji government eventually decided to use the name *Hokkaido*. According to Takeshiro Matsuura, who is the nominator, this name of Hok-kai-do is including *Kai* element. The *Kai* element came from historical name of Ezo in the Sino-Japanese pronunciation. Even now, the element of Ainu culture is embedded in the cultural landscape as a place-name in Hokkaido such as rivers, mountains, and city name including Sapporo and has been continued to live as living culture.

Who Are the Ainu?

Ainu refers to indigenous peoples who originally inhabited the north part of the Japanese islands. Ethnographically and historically, the Ainu have been classified into three local populations: *Hokkaido*, *Sakhalin (Karahuto)*, and *Kuriles (Chishima) Ainu*. Besides that, the historical records support the Ainu lived in the northern part of Honshu island until the early twentieth century CE. They called as *Honshu Ainu*. Local populations include smaller local dialect groups.

In the early modern (Tokugawa shogunate) period, the Ainu has been positioned as an indigenous population in Northern Japan. After the modern state was established in Japan, the Meiji government forcibly incorporated the Ainu as a

part of the Japanese citizen and has carried out policies that are assimilated with the Japanese culture. To that end, Ainu's original culture tradition and the Ainu language have been threatened with extinction (Takakura 1960; Siddle 1996).

A living condition survey in 2013 estimated the Ainu population in 66 municipalities, Hokkaido to be just 16,786 people (23,782 people in 2006), but this number does not include Ainu populations around Tokyo and Osaka on the main island, Honshu.

Brief Colonial History in Hokkaido Island

The ancient Japanese state began to gradually encroach on the northern part of Honshu Island between the sixth and eighth centuries CE. Cultural contact between the ancestors of the Ainu and ancient Japanese started through active trading with each other.

In this trade between the ancient Ainu and the *Wajin* (the Honshu Japanese or the ethnic Japanese), bear and deer furs were mainly exported from the Ainu, and iron items, lacquerwares, and luxury goods such as rice, tea, and alcohol were brought in by the *Wajin*. Such economic exchanges have had a great influence for the Ainu's lifestyle (house structure, material culture, spiritual culture).

In the fourteenth century CE (the Muromachi period), the *Wajin* settlers constructed 12 political and trading posts (*Tate* in Japanese) in the southern part of Oshima peninsula, SW Hokkaido Island. As a result of the increase the *Wajin*'s population in Hokkaido Island, between the Ainu and the *Wajin* occurred armed conflicts. In 1457, the Ainu was led by chieftain *Koshamain* against the *Wajin* with an incident in which Ainu's youth was killed by blacksmith of the *Wajin* from the quarrel over the quality of an iron knife at Shinori village in SW Hokkaido. In this the Battle of Koshamain, 10 of 12 the *Wajin*'s posts had fallen by the Ainu. Eventually, the systematic resistance of the Ainu lasted nearly 100 years after the Battel of *Koshamain*.

In 1591, Yoshihiro Kakizaki attended Hideyoshi Toyotomi who was a chief advisor of the emperor and was granted the *Ezo-ga-shima* (which is now named Hokkaido Island). After that Yoshihiro Kakizaki became an independent load in this Island. In 1599, Yoshihiro Kakizaki became a vassal of Ieyasu Tokugawa and resented him the map of Ezo. In addition, Yoshihiro changed his surname from Kakizaki to Matsumae derived from the place-name which originally came from the Ainu's name *Matmae*.

Under the Tokugawa shogunate political system, the Matsumae clan had exclusive rights to trade with the Ainu and to guarantee. Relations between the Matsumae clan and the Ainu were sometimes hostile. Under the Matsumae clan control, there were numerous revolts by the Ainu. In 1669, the Battle of *Shakushain* took place. This systematic resistance by the Ainu spread throughout Hokkaido Island and continued until 1672. However, the systematic resistance by the Ainu finally ended the Battle of Menashi-Kunashiri in 1789. After the early nineteenth century CE, the whole of Hokkaido was controlled under the Tokugawa shogunate, and the Ainu gradually lost their original villages (*Kotan* in the Ainu) and traditional lifestyle.

In 1868, after the Meiji Restoration, Hokkaido was officially annexed by modern state of Japan. The beginning of the Meiji Restoration proved a turning point for the Ainu and their culture. The basis of the Ainu's policy by the Meiji government is assimilation; under this assimilation policy, the Ainu are prohibited for observing their daily customs. In 1871, The Hokkaido Development Commission (established in 1869) banned the tradition of burning house after death, male earing, and tattoos of women, also notified leaning Japanese. "The Land rules" and "the Land selling rules in Hokkaido" were established in 1872, and all of territory in Hokkaido Island was placed under the control of the Meiji government. In 1874, "Forest provisional rules" was established, and it was banned to cut trees for the traditional house and to correct bark of the tree for the material of the traditional clothes. "the Salmon and trout rules" in 1874 and "Hokkaido salmon and trout protection rules" in 1879 were notified, and

private salmon fishing was prohibited. Traditional deer hunting also was prohibited by "Hokkaido deer hunting rules" in 1876. In 1899, the Hokkaido Aborigine Protection Act was passed. The act primarily aimed to provide relief for the Ainu and help them become engaged in agriculture. However, this act designed the Ainu as "former aborigines" and clarified the distinction between the Honshu Japanese and the Ainu. This act was in force until 1997.

Chronological Sequence in Hokkaido Island

Compared with the main Island of Honshu, the archaeological cultural sequence in Hokkaido Island has many original aspects. Regarding the early stage of human occupation, the cultural traditions in Hokkaido and Honshu Islands have recognized commonalities. However, the later archaeological cultures in Hokkaido Island had strong uniqueness, which was different from cultural tradition in Honshu Island (Fig. 1).

The first inhabitants on Hokkaido Island date back to 35,000 years ago in the Upper Paleolithic period. Lithic complexes of Upper Paleolithic in Hokkaido had strong cultural influences from Siberian cultural traditions. The Upper Paleolithic complex is characterized by the technological diversity of microblade complexes. Siberian microblade traditions appeared first in Hokkaido, which were represented by wedge-shaped microcores and its reduction technologies (Izuho et al. 2012).

Under unstable climate conditions in the postglacial period, early Holocene complex hunter-gatherer society was sustainably continued on Hokkaido Island. These early Holocene hunter-gatherers are usually categorized as the northern Jomon culture. Still in this moment, the transition period between Upper Paleolithic and early Holocene culture cannot be seen as mass migration from Siberia to Hokkaido Island. Therefore, these Jomon culture's populations were the direct descendants of the Upper Paleolithic hunter-gatherer in Hokkaido Island.

Since Jomon culture, the prehistoric cultures in Hokkaido Island had remarkable originality of cultural tradition. Though a rice-cultivating culture (*Yayoi*) spread to Honshu Island in the sixth century BCE, their influence did not reach Hokkaido Island. Those living on Hokkaido Island maintained a hunter-gatherer society and formed various local cultures based on deer hunting, sea mammal hunting, and fishing. This post-Jomon culture stage is referred to as Epi-Jomon culture. The Epi-Jomon culture continued from the third century BCE to the seventh century CE. The Epi-Jomon culture had spread to the Tohoku region in northern part of Honshu Island and the southern part of Sakhalin Island from the fourth century to the sixth century CE. The diffusion of Epi-Jomon culture to Honshu Island and Sakhalin Island caused cultural integrations with neighboring archaeological cultural groups in the north and south and created new archaeological cultures. The Epi-Jomon culture that spread to Sakhalin Island had created northern marine hunter culture with an animal husbandry tradition called the Okhotsk culture under the influence of the ancient societies in the Lower Amur and Primorie region. On the other hand, the Epi-Jomon culture spread to the northern part of Honshu Island contacted with Kofun culture and subsequently created a complex hunter-gatherer culture that partly had a cultivation of millet.

After the fifth century CE, the Okhotsk culture dispersed to the Okhotsk seacoast from Sakhalin and Hokkaido Islands. After the tenth century CE, this archaeological culture had spread into Kuril Islands (Kikuchi 2004). This northern marine hunter culture had unique cultural characteristics that related to a bear cult and maintained trading networks with the lower Amur basin and Northern China. The middle stage (between the seventh and eighth century CE) of Okhotsk culture had strong influences from the *Mohe* culture from the lower Amur region. In addition, this culture had similar maritime adaptation technologies such as bone-antler tools with Tokarev culture (Lebedintsev 2004) and the Old Koryak culture (Vasil'evskij 1971) in the northern coast of Okhotsk sea. For the population of Okhotsk culture, previously scholars have been assumed them to be the *Mohe* populations in the Lower Amur basin. However, now it is better to recognize that the population of Okhotsk culture was cultural assemblage involving several regional populations in

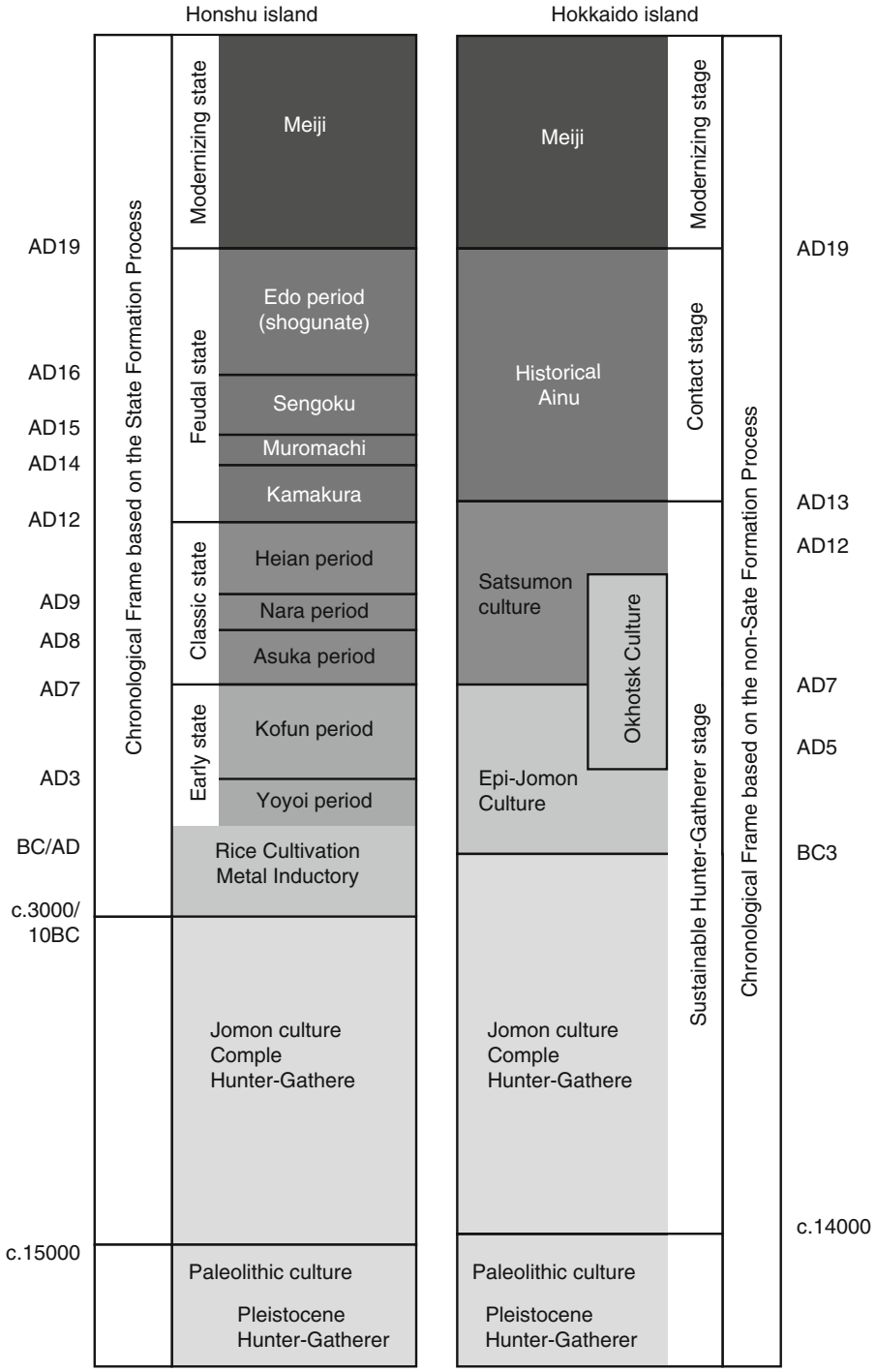

Hokkaido Sequence and the Archaeology of the Ainu People, Fig. 1 Comparison between sequences of Hokkaido Island and Main island Honshu

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the lower Amur region, Sakhalin Island, and the northern part of Hokkaido Island, not a single ethic group.

At the same period, in southwest Hokkaido, The Satsumon culture, which was closely related to ancient cultures on Honshu Island (i.e., strongly influenced by the Kofun and Nara culture), formed around seventh century CE (Yokoyama 1990). This culture was influenced from the south, especially in pottery-making traditions, mortuary systems, and the use of iron items as weapons and tools.

After tenth century, the Satsumon culture dispersed into northeast Hokkaido and integrated with the Okhotsk culture. Through this cultural integration, the historical Ainu culture was created in thirteenth century CE. Tradition of animal rituals in the Ainu culture such as whale worship and bear worship was passed on from the Okhotsk culture to the Ainu culture. On the other hand, cultural traditions such as iron items, woodcrafts, and millet farming were passed on from the Satsumon culture to the Ainu culture. In the thirteenth century, which was the transition period from the Satsumon culture to the Ainu culture, the pottery-making tradition disappeared, and the housing style also changed from pit-dwelling to flatland dwelling in Hokkaido Island.

As mentioned above, the historical sequence of Hokkaido Island is very different from Honshu and the southern Japanese islands. The history of Honshu Island has been presented as one evolving from hunter-gatherer societies, to agricultural societies, to early states. On the other hand, the historical sequence of Hokkaido has been continuous from sustainable hunter-gatherer societies to non-state ethnic formation. For this reason, we cannot sufficiently explain this historical dynamism in Hokkaido based on normative archaeological perspectives. Archaeological resources in Hokkaido are extremely unique and important for reconsideration of non-state societies. This long sequence of sustainable and open prehistoric hunter-gatherer culture suggests that we need new models and images to reconstruct the diversity of human history.

The Archaeology of the Ainu People

Archaeological culture between the thirteenth and the seventeenth century is called "Ainu culture period." This archaeological "Ainu culture" is characterized by iron pan, lacquerware, blue glass beads, accessories such as *tamasai* (a necklace) and *ninkari* (an earring), wooden pray stick, hunting equipment made by bone-antler, and *marek* (an iron salmon hook) (Udagawa 1980, 2001). During this period, iron swords, helmets, and armors can be seen, but these are imported from Honshu Island by trade. Also known as original ritual instruments for the Ainu culture are a wood-shaving stick, "inau," and a metallic hoe-shaped item, *bera-ushi-tomi-kamui* (Fig. 2). In Kuriyama town, there were found 12 hoe-shaped items together from a chache pit.

At the archaeological site, the *Kotan* as settlement, ritual ground, graves, shell-middens, and *chashi* have been excavated. The *Kotan* usually consists of two to five flatland-type dwelling called *chashi*. The *chashi* have regional variations, and building materials are different. In the southern Hokkaido Island, the *chise* called *ki-kitai-chise* was a thatched house. In central-internal area, the *chise* called *toprap-kitai-chise* is made by broad-leaf bamboo. But, in eastern Hokkaido Island the *chise* called *sarki-kitai-chise* is made by bark (Fig. 3).

Many of ritual grounds are related to the place of animal worship and shell-midden. In eastern Hokkaido Island, a ritual ground was found related with freshwater pearl mussel and ezo deer (Udagawa 1980), and in Rebun Island, northern Hokkaido Island, a ritual ground was found related with abalone shell and sea mammals (Fig. 4). The oldest bear worship remain *iomante* was found in Shiretoko-Shari in eastern Hokkaido Island and dates back to fifteen century CE (Kato et al. 2011).

The *chashi* is a special archaeological site that emerged after fifteenth century CE, and its origin has the place of ceremonies and the *chache* space of treasures and the lookout place. After sixteenth

Hokkaido Sequence and the Archaeology of the Ainu People, Fig. 2 "*Bera-ushi-tomi-kamui*" as a ritual metallic hoe-shaped item of the Ainu. (**a**) "Chosama" from *Ishuretsuzou*, Museum of Fine Art and Archaeology in Besancon; (**b**) *bera-ushi-tomi-kamui*, excavated from Kuriyama town; (**c**) *bera-ushi-tomi-kamui*, Tokyo National Museum

century CE, *chashi* was built as a fortress for defense. In Hokkaido Island are found 526 *chashies*. The chache are classified into the following four types: (a) type of an isolated island; (b) type of a hilltop; (c) type of a hill tip; (d) type of an edge of a cliff (Udagawa 2001).

Past Ainu Studies and Japanese Anthropology and Archaeology

One of the important issues in Japanese anthropology has been to understand the cultural identities and origins of the inhabitants of the Japanese archipelago. Around the end of the nineteenth and beginning of the twentieth century, when Western science was first introduced to Japanese anthropology, the Ainu people were repeatedly represented as the descendants of the Japanese Stone Age. Under this perspective, many of anthropologists and anatomists excavated Ainu human remains from Hokkaido, Sakhalin, and Kuril Islands between the 1880s and 1950s and discussed the formation process of inhabitants in Japanese archipelago.

In present studies, contact and hybrid models are becoming predominant for understanding the cultural formation processes of modern Japanese who integrated local populations with newcomers. The Ainu have been considered to derive from the Jomon. "The dual structure model" proposed by Hanihara Kazurou is the most popular model for the modern Japanese formation process (Hanihara 1991). Hanihara's model assumes that the local Jomon population migrated from Southeast Asia to the Japanese archipelago during the Upper Paleolithic period. There was then a second migration wave with rice cultivation and metal industries from Northeast Asia in the Yayoi period. Hanihara believed that modern Japanese

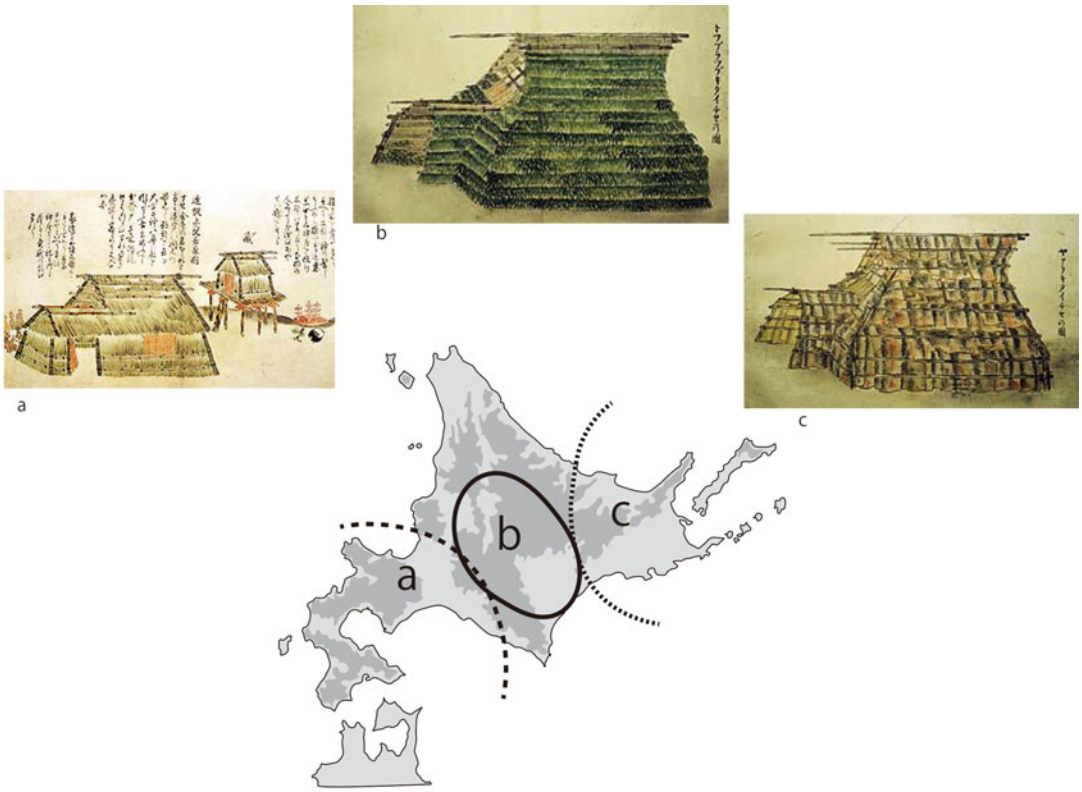

Hokkaido Sequence and the Archaeology of the Ainu People, Fig. 3 Regional differences of Ainu's house. (**a**): *ki-kitai-chise* was thatched house; (**b**) *toprap-kitai-chise* made by broad-leaf bamboo; (**c**) *sarki-kitai-chise* made by bark

Hokkaido Sequence and the Archaeology of the Ainu People, Fig. 4 Ritual ground related with abalone shell and sea mammals

populations gradually formed through this integration process, but this migration movement did not prevail on Hokkaido and Ryukyu islands. In these areas, which were less influenced by Yayoi culture migration, the Jomon population was ancestral to the Ainu.

Hanihara's model is based in outmoded ideas about cultural development and change. Recent aDNA studies also principally support this model (Kanzawa-Kiriyama et al. 2013; Adachi et al. 2017). In this context, newcomers who had more developed technologies and food production economies became the founders of early states, while hunter-gatherer populations who had a lower degree of contact with these innovations continued previous Stone Age traditions and food-gathering economies and eventually became the target of the ruler of the ancient and medieval state.

Until recently, anthropological and archaeological research interest in the Ainu has focused on their role in the formation of modern Japanese society. The term "Ainu archaeology" has appeared in the literature since 1945. This research largely considers the Ainu to be a culture that keeps some elements of Stone Age traditions (Komai 1952). Ainu people were considered the subject of the study, and researchers were interested in them as the descendants of the Stone Age in Japan or as living relics of the Jomon (Watanabe 1972). In this sense, past anthropological and archaeological Ainu studies never aimed to reveal the formation process and the cultural characteristics of the Ainu people.

Current Debates

Debates on the Meaning of "Ainu Culture"

There are, currently, two different meanings of the term "Ainu culture." One refers widely to the ethnic culture that has been historically developed by the living Ainu (Otsuka 1995; Irimoto 2014). The other is a narrowly fixed archaeological meaning dealing with explanations of the historical sequence of Hokkaido Island, indicating a period equivalent to medieval and modern ages for the thirteenth to eighteenth centuries in Honshu, the main island of Japan (Fujimoto 1984; Udagawa 2001).

In the broader sense, "Ainu culture" is found in northern areas of the Japanese archipelago, which includes Sakhalin Island and the northern Kuril Islands. Hitoshi Watanabe featured the bear-sending ceremony as an index of "Ainu culture" in social and religious practices and defined "Ainu culture" as "the cultural complex of bear sending ceremony" (Watanabe 1982; Fukazawa 1998; Amano 2003; Segawa 2005; Irimoto 2014). This "Ainu culture" is characterized by a worldview shaped by the idea of "Okuri" (sending of spirits), which is based on the reciprocity between the natural world (*Kamuy-moshiri:* the world of Gods) and the human world (*Ainu moshiri:* the world of Ainu). Their material culture, language, oral tradition, and dance are deeply related to this idea. By practicing and sharing this way of life, the identity of the Ainu has been maintained, and Ainu-pri (the way of life as an Ainu) has been reproduced.

"Ainu culture" was narrowly defined as an archaeological period and culture based on the emergence of new material culture, such as iron pots, lacquerwares, *ikupasuy* (stick for sending human words with alcohol), ceramic wares, and level ground houses and the disappearance of the ancient (Satsumon-type) pottery-making tradition. This usage of "Ainu culture" is problematic. Using the name of the living ethnic group as a label for a particular historical cultural stage is inappropriate. There is no evidence of displacement by the pre-stage "Satsumon culture" by the archaeological "Ainu culture."

Furthermore, recent genetic studies suggest that there was not much biological contact between local populations in Hokkaido and the Jomon on Honshu (Adachi et al. 2009, 2011). It has been pointed out that the unique ethnic formation processes in Hokkaido have hereditary influences of the groups in northeast Eurasia (Sato et al. 2009). In other words, the cultural shift from Satsumon culture to the archaeological "Ainu culture" occurred within the same ethnic group, and it is a tautology to discuss the "formation of Ainu culture" only by the appearance of

materials related to the "Ainu culture" after the eighteenth century (Watanabe 1972).

In addressing the question of what "Ainu culture" is, a central problem we face is that when we define the ethnic culture as stationary, we are blind to its variability. Ainu cultural history has been treated as a broadly conceived ethnic unit and narrowly defined archaeological culture and has been the object of comparative studies and the regional case studies in Japanese history and Japanese archaeology. Today, it is necessary to understand these dual usages.

The Impact of Ancient DNA Studies

Recent genetic studies have drawn considerable attention. The study of ancient DNA from Jomon sites has been used to reconsider population homogeneity of the early settlers of the Japanese archipelago. Traditionally, inhabitants of the Japanese archipelago during the Jomon period were considered to be a homogeneous human group: the "Jomon population." However, ancient DNA analysis based on Jomon skeletal remains from archaeological sites has shown local diversity in the structure of mtDNA haplogroups between Hokkaido and Honshu islands (the Tokyo Bay area) (Adachi et al. 2009, 2011). The Hokkaido Jomons were biologically isolated from other populations for a prolonged period. The frequency of mtDNA haplogroups from Hokkaido Jomons suggests genetic similarities with modern Ainu and indigenous peoples from the lower Amur region. The most distinctive feature of the haplogroup structure of the Hokkaido Jomons is the high frequency of haplogroup N9b, with a common ancestor calculated to be c. 22,000 years. It is likely that human migration to Hokkaido from Siberia occurred before the Jomon (Adachi et al. 2011).

In another study, the diffusion of other haplogroups from Siberia has occurred after the Jomon period in Hokkaido (Sato et al. 2009). The haplogroup Y was not present in the Hokkaido Jomon sample (Adachi et al. 2011) but was found to be the most dominant haplogroup in the lower Amur region. This haplogroup is the most prevalent in the Ainu today (Adachi et al. 2017). Genetic testing of ancient DNA from skeletal material from Okhotsk culture sites dating to the fifth to tenth century CE indicates that haplogroup Y was common in the Okhotsk people. In fact, the dispersal of Okhotsk culture from the lower Amur to Hokkaido might reflect an increase in the number of people with a haplogroup Y-dominated mtDNA profile in Siberia. Based on this data, the haplogroup Y may have been introduced to the Ainu by the Okhotsk people after fifth century CE.

These genetic studies force us to reconsider the historical formation processes of the Ainu (Adachi et al. 2017). While previous explanations posited that historical Ainu culture originated in a merger of the Okhotsk culture with the Satsumon culture, the genetic evidence indicates that the impact from the north may have been more significant. In further studies, it is necessary that we focus more on regional characteristics of the Hokkaido Jomon and reexamine a simple framework for Jomon culture. There is a need to study more deeply the population and cultural influences from Okhotsk culture in the formation process of Ainu culture and to review of the cultural and subsistent aspects of Ainu culture and its regional diversities.

Recent DNA study has remarkable progress. However, while such innovative research is processing, there is a criticism that sufficient explanation is lacking about how to sample the data for research, obtain informed consent during the sampling process, and share the research results to the Ainu communities. Researchers assert that research was conducted with permission from the relevant indigenous organization. However, there are diverse opinions on indigenous people's side, and it is difficult to prove heard opinions widely. DNA should involve extremely high personal information, and when considering the social impact of research results, it is necessary to reconsider whether the procedure by the previous researcher was sufficient or not enough.

The Nibutani Dam Controversy and Indigenous Heritage

Archaeological sites excavated by archaeological research include ancestral settlements and memories that were lost in present time. Through these investigations, local histories are reconfirmed, and cultural identity has often newly emerged inside the local community. In this context, archaeological site is part of an important indigenous cultural heritage and can be recognized as a living heritage for indigenous community members (Smith and Wobst 2005; Watkins 2000). It has been pointed out that indigenous heritage belong to indigenous peoples; however, it is not always clear that their attribution has not been legally stipulated.

In Japan, archaeological sites are protected by Act on Protection of Cultural Properties, but this legislation is not stated on the identity or ownership of the Ainu cultural property. When regarding the relationship between indigenous right of cultural heritage for the Ainu and archaeology, the judgment of the Sapporo District Court in 1997 can be highly appreciated as a landmark decision (Levin 1999, 2001). By this judgment, Ainu policy in Japan drastically changed from assimilation to cultural protection.

The Nibutani area in Biratori town is the area with the largest population of its residents being the Ainu in all of Hokkaido. The construction area for the Nibutani Dam included the place of ceremonies such as *Chipusanke* and the sacred site such as *Chinomishir*. It was an important place for the tradition of the Ainu culture. The *Chipsanke* was originally a ceremony handed down by the Ainu to set afloat newly built wooden canoe. This is practiced until around 1948 (Fig. 5).

The project plan started in 1973. Since it was confirmed that archaeological sites existed inside of construction area, the requested archaeological excavation was conducted from 1983 to 1985, and the remains of old *kotan* (village) with two graves before seventeenth century CE and two chashi was found in the project planned area (Fig. 6).

After this, the two Ainu elders who were part of landowners, Mr. Tadashi Kaizawa and Mr. Shigeru Kayano, refused to sell their land to the government. In 1987, the Ministry of Construction decided to take their land according to the Land Expropriation Law. Mr. Kaizawa and Mr. Kayano made a request for an examination of the Confiscatory Administrative Rulings to the Ministry of Construction. However, the Ministry of Construction rejected their request for the examination. As the result, Mr. Kaizawa and Mr. Kayano decided to raise an administrative lawsuit in the Sapporo District Court seeing an injunction against the Nibutani Dam Construction Project.

In 1997, the Sapporo District Court handed down a landmark decision. The ruling rejected the injunction on the dam construction. However, at the same time, the ruling pointed out that the government failed to give consideration to the uniqueness of the Ainu culture and did not consider the negative impacts of dam construction on the Ainu and their culture. The judgment also pointed out the detailed losing interest and cost for the Ainu by the dam construction: (1) the minority status of Nibutani area residents, (2) cultural characteristics of the Ainu people, and (3) Ainu culture in the Nibutani area. On losing interest Ainu culture in the Nibutani area involved the ceremonial place for the *Chipusanke*, the *Chashi* as archaeological site, and *Chinomishiri* as sacred site. The important part of this judgment, chief judge Mr. Kazuo Ichimita stated that "comprehensivery viewing the above recognized facts, we can see that for the most part of the Ainu people habe inhavited Hokkaido from before the extension of our country's rule. The formed thier own culture and had identity. . .Accordingly, the definition provided above of an "indigenous people" should certaily apply."(Levin 1999: 32). This ruling is the first judgment by Japanese court recognizing that the Ainu are indigenous people.

In response to this decision, the government did not appeal, and the ruling was finalized. In 1997, the Hokkaido Former Aborigines Protection Act was abolished, and Act on Promotion of the Ainu Culture was enacted.

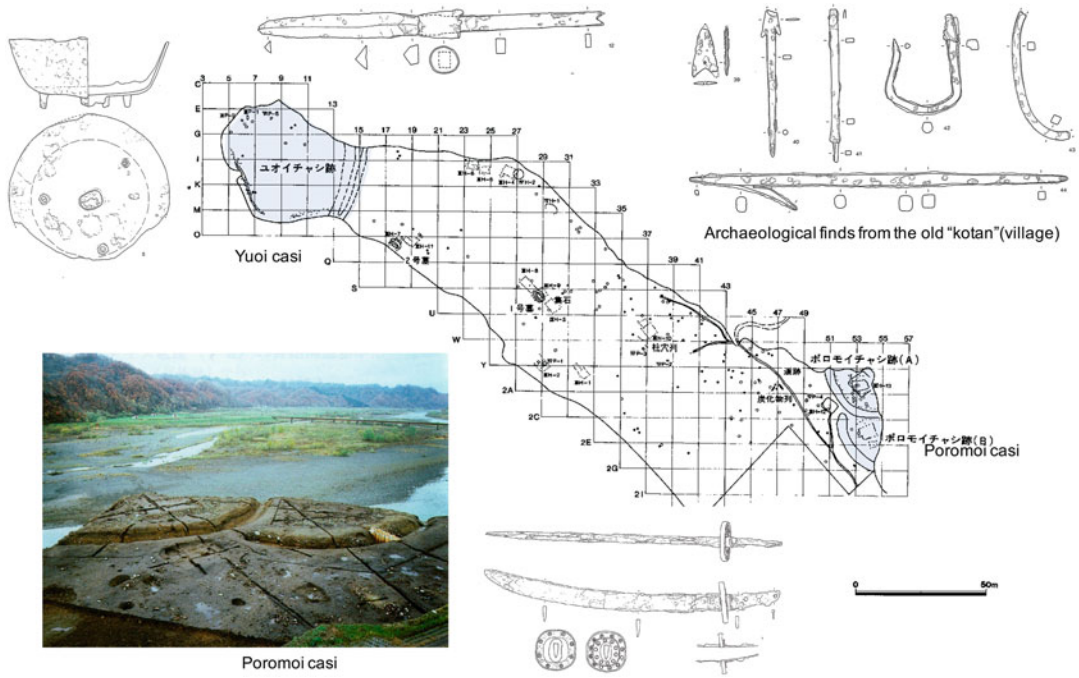

Hokkaido Sequence and the Archaeology of the Ainu People, Fig. 5 Nibutani site. From this archaeological site, excavated are historical village and two remains of *chashi*

Hokkaido Sequence and the Archaeology of the Ainu People, Fig. 6 Collaboration of archaeologists and Ainu people at the archaeological site

Repatriation of Ainu Ancestral Human Remains

According to survey in April 2017 conducted by the Ministry of Education, Culture, Sports, Science and Technology, Japan (MEXT), currently 1676 individuals of the Ainu ancestral human remains are stored in 12 universities in Japan. Also 76 individuals of Ainu human remains are stored in 12 museums in Japan. These remains were collected by anatomists and anthropologists for the purpose of racial anthropological research since the late nineteenth century CE. The excavation for the anthropological collections by anthropologists continued until the 1970s. The largest collection is stored at Hokkaido University. 1015 remains are stored in this moment. There are also 201 human remains at the University of Tokyo and 87 remains at Kyoto University. In Sapporo Medical College has also been stored 294 remains, but this collection includes archaeologically excavated Ainu ancestral human remains that were registered as cultural property.

The request of repatriation on ancestral human remains from Ainu communities started in the 1980s. At the beginning, Department of Medicine, Hokkaido University, recognized Ainu ancestral remains as academic collection for research and disagreed to repatriate to Ainu communities (Hokkaido University 2013). However, in response to the request from the Hokkaido Utari Association (present Hokkaido Ainu Association), they agreed part of collections to repatriate to communities from 1982. Between 1982 and 2001, Hokkaido University repatriated 35 human remains to local communities, in response from 5 local Ainu organizations.

In July 2009, the Advisory Council for Future Ainu Policy under the Chief Cabinet Secretary submitted a report for the future Ainu policy. In this report, it was proposed to establish the memorial facility for the Ainu ancestral remains that have been stored in universities and museums. However, in September 2012, some Ainu elders who opposed this decision have filed a suit for the repatriation with the Sapporo District Court. Meanwhile, in April 2015, Hokkaido University established the repatriation office for Ainu human remains. After July 2016, the Sapporo District Court presented a settlement proposal with plaintiffs and Hokkaido University, and Hokkaido University repatriated 14 ancestral human remains to the Association of Kotan including Mr. Ryukichi Ogawa who is a representative of Ainu descendant family in July 2016. Following this repatriation according to settlement proposals by the Sapporo District Court, Hokkaido University repatriated 82 human remains to Urahoro Ainu Association in August 2017 and 4 human remains to Monbetsu Ainu Association in September 2016.

In Japan, the correspondence of the government for this issue was extremely slow, and the government began to examine it after 2009. The MEXT had understood the number of Ainu ancestral remains in Japanese universities in 2013. In this moment, the Council for Ainu Policy Promotion is considering the guideline on the procedure for repatriation of human remains from universities to local communities. On the other hand, it was recognized that Ainu ancestral human remains are stored in overseas museum such as Germany and Australia in 2016. In June 2017, the Australian ambassador in Japan visited the Hokkaido Ainu Association and declared that three Ainu human remains in Australia National Museum and Museums Victoria in Australia can be repatriated to Japan. In July 2017, One Ainu ancestral human remain repatriated to the Hokkaido Ainu Association from Berlin Society of Anthropology, Ethnology, and Prehistory for the reason that it was collected illegally by a German traveler in 1879 from Sapporo, Hokkaido. However, the whole picture of Ainu human remains collection in the world is still unclear, and it is necessary to continue systematic survey with international collaboration.

There are unsolved issues on the repatriation of Ainu ancestral human remain. One of the key issues is the debate over the National Keeping Place. The government decided to build the National Keeping Place to gather and memorize the unknown remains to the repatriate destination.

In response to this decision, some community members have opposed the aggregation, and voices have been issued calling for the repatriation to the communities.

The second is a discussion on the handling of the Ainu ancestral human remains from archaeological excavation. Currently, in Japan, all of excavated archaeological finds are protected by Act on Protection of Cultural Properties. However, there is no provision in the act that refers to the handling of the ancestral remains and grave goods for the Ainu. According to the current legislation, excavated archaeological finds which dated before 1868 are classified as archaeological cultural property. Therefore, if there is no claim of ownership from descendant family, the Ainu ancestral human remains have ownership of the government as cultural property and have a right to be managed by the local government.

According to UNDRIP, the rights of indigenous ancestral human remains and sacred objects belong to indigenous peoples. In this context, Japanese legislation needs to add clauses that clearly recognize ownership of the Ainu. In Japan, the issues between indigenous rights and cultural heritage still remain unsolved (Kato 2017).

Future Directions for Indigenous Archaeology in Hokkaido

Japanese government officially recognized the Ainu as indigenous peoples in 2008. For this reason, it has not been studied the development of laws to ensure a right for the Ainu as indigenous peoples. The question of who owns the past is an important subject in the archaeology of Hokkaido Island (Fig. 6).

The concern is that Ainu are not sufficiently guaranteed the opportunity to participate actively in preservation and use of cultural heritage in Hokkaido. While internationally there is increasing engagement with indigenous peoples in the preservation and utilization of cultural history, there has been relatively little discussion and action on this front in Japanese archaeology. In order to promote discussion and action in the direction of increased engagement with Ainu, it is necessary to consider the contemporary context. In Hokkaido, a place with a polyethnic past and present, archaeologists should aim to develop heritage protection and management programs that involve indigenous and nonindigenous stakeholders as equal partners.

Although it is one step at a time, it is beginning to create a basis for the practice of archaeology involving the perspectives of the Ainu and fostering researchers from Ainu people in Hokkaido. In 2005, Hokkaido Ainu Association, the Anthropological Society of Nippon, and the Japanese Archaeological Association organized the round table for future research on Ainu human remains and grave goods and reported critical reviews for the past Ainu studies. This report was compiled in 2015 and reported at the Council for Ainu Policy Promotion in April 2017. In this report, it was recommended the necessity to establish a committee for the research ethics on the Ainu studies. A committee for preparation of research ethics will be organized by Hokkaido Ainu Association, the Anthropological Society of Nippon, the Japanese Archaeological Association, and the Japanese Society of Cultural Anthropology and begins to study in 2018. In April 2019, the first graduate school of Ainu study and indigenous studies in Japan will be established at Hokkaido University.

We well understand that "archaeology is a powerful tool in the creation of cultural identities in the past" (Smith and Wobst 2005: 14). Archaeologists should recognize that they cannot exist without a partnership with regional communities (Kato 2010, 2017).

Cross-References

► Decolonization in Archaeological Theory
► Indigenous Archaeologies

▶ Indigenous Archaeologies in Archaeological Theory
▶ Indigenous Intellectual Property Issues in Archaeology
▶ Indigenous Knowledge and Traditional Knowledge
▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies
▶ Postcolonial Archaeologies
▶ Repatriation: Overview
▶ Sacred Sites in Indigenous Archaeology

References

Adachi, N., K. Shinoda, K. Umetsu, and H. Matsumura. 2009. Mitochondrial DNA analysis of Jomon skeletons from the Funadomari site, Hokkaido, and its implication for the origin of Native Americans. *American Journal of Physical Anthropology* 138: 255–265.

Adachi, N., K. Shinoda, K. Umetsu, T. Kitano, H. Matsumura, R. Fujiyama, J. Shinoda, and M. Tanaka. 2011. Mitochondorial DNA analysis of Hokkaido Jomon skeletons: Remnants of archaic maternal lineages at the southwestern edge of former Beringia. *American Journal of Physical Anthropology* 146: 346–360.

Adachi, N., T. Kakuda, R. Takahashi, H. Kanzawa-Kiriyama, and K. Shinoda. 2017. Ethnic derivation of the Ainu inferred from ancient mitochondrial DNA data. *American Journal of Physical Anthropology.* https://doi.org/10.1002/ajpa.23338.

Amano, T. 2003. *Kuma Matsuri no Kigen (the origin of bear ceremony)*. Tokyo: Yuzankaku.

Fukazawa, Y. 1998. *Ainu archaeology as ethnohistory: iron technology among the Saru Ainu of Hokkaido. Japan,in the 17 th century.* BAR International Series 744.

Hanihara, K. 1991. Dual structure model for the population of Japanese. *Japan Review* 2: 1–33.

Hokkaido University. 2013. *Hokkaido Daigaku Igakubu Ainu Jinkotsu Syuzoukeii ni kansuru Chosa Houkokusyo (report for the investigation on collection history of Ainu human remains at Department of Medicine, Hokkaido University)*. Sapporo: Hokkaido University.

Irimoto, T. 2014. *The Ainu bear festival*. Sapporo: Hokkaido University Press.

Izuho, M., Akai, F., Nakazawa, Y., and A. Iwase 2012. The Upper Paleolithic of Hokkaido: Current evidence and its geochronological framework. In *Environmental changes and human occupation in* east Asia *during OIS3 and OIS2*, ed. A. Ono and M. Izuho, 109–128. BAR International Series 2352.

Kanzawa-Kiriyama, H., A. Saso, G. Suwa, and N. Saito. 2013. Ancient mitochondrial DNA sequences of Jomon teeth samples from Sanganji, Tohoku district, Japan. *Anthropological Science* 121 (2): 89–103.

Kato, H. 2010. Whose archaeology? Decolonizing archaeological perspective in Hokkaido Island. In *Reader on indigenous archaeologies*, ed. M. Bruchac, S. Hart, and H.M. Wobst, 314–321. Walnut Creek: Left Coast Press.

Kato, H. 2017. Archaeological heritage and Hokkaido Ainu: ethnicity and research ethics,. In *Archaeologies of 'us' and 'them' – debating the ethics and politics of ethnicity and indigeneity in archaeology and heritage discourse,* ed. C. Hillerdal, and A. Karlstrom Carl-Gosta Ojara, 218–232. Abington, Oxford, Routledge.

Kato, H., Matsuda, I., Suzuki, K., Iwanami, R., Uchiyama, S., Sato, Y., Katsuki, R., Onishi, R., Yamaguchi, S., Watanabe, T., and K. Nakamura. 2011. Shari cho Ikushina kaigan kita iseki Sokuryo Chosa Dai 4 ji Houkoku (The 4th Preliminary report of topographical mapping survey at Ikushina kaigan kita site in Shari town). *Shiretoko Hakubutsukan Kenkyu Houkoku (Bulletin of the Shiretoko Museum)* 32: 59–70, Shiretoko Museum.

Kikuchi, T. 2004. *Kan Okhotsk kai kodai bunka no kenkyu (The research of the ancient culture in the Circum Okhotsk Sea area)*. Sapporo: Hokkaido Dagaku Tosho Kankokai.

Komai, K. 1952. *Ainu no Kaizuka*. Tokyo: Fukumura Shoten.

Lebedintsev, A. I. 2004. *Neolit i Paleometal Severa Dal'nego Vostoka* (Neolithic and Paleometal of the Northern Far East). Magadan: Dal'nevostochnoe otdelenie. Russiskaya Akademiya Nauk.

Levin, M. 1999. Kayano et al. v. Hokkaido Exropriation committee: 'The Nibutani dam Decision'. International Legal Materials 38:394–429.

Levin, M. 2001. Essential commodities and racial justice: Using constitutional protection of Japan's indigenous Ainu people to inform understandings of the united state and Japan. *New York University of International Law and Politics* 33: 419–526.

Otsuka, K. 1995. *Ainu, Kaihin to Mizube no Tami (The Ainu, peoples at the seashore and waterside)*. Tokyo: Shinjyuku shobo.

Sato, T., T. Amano, H. Ono, H. Ishida, H. Kodera, H. Matsumura, M. Yoneda, and R. Masuda. 2009. Mitochondrial DNA haplogrouping of the Okhotsk people based on analysis of ancient DNA: An intermediate of gene flow from continental Sakhalin people to the Ainu. *Anthropological Science* 117: 171–180.

Segawa, T. 2005. *Ainu ekoshisutemu no Koukogaku (Archaeology of Ainu ecosystem)*. Sapporo: Hokkaido Shuppan Kikaku Center.

Smith, C., and H.M. Wobst. 2005. Decolonizing archaeological theory and practice. In *Indigenous archaeologies, decolonizing theory and practice*, ed. S. Cleare and H.M. Wobst. London: Routledge.

Udagawa, H. 1980. *Ainu Koukogaku (Ainu archaeology)*. Tokyo: Kyoiku sha.
Udagawa, H. 2001. *Ainu Koukogaku kenkyu Jyoron (Introduction to Research on Ainu archaeology)*. Sapporo: Hokkaido Syuppan Kikaku Senta.
Vasil'evskij, R.S. 1971. *Proiskhozhdenie i Drevnyaya Kul'tura Koryakov (The old Koryak culture and its origin)*. Novoshibirs: Sibirskoe otdelenie Izdatel'stovo Nauka.
Watanabe, H. 1972. *Ainu ecosystem: Environment and group structure. Tokyo*. Tokyo: University Press.
Watanabe, H. 1982. The emergence of Ainu culture: The juncture of ethnology, history and archaeology. *Journal of Archaeology* 58: 47–67.
Watkins, J. 2000. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: AltaMira Press.
Yokoyama, E. 1990. *Satsumon Bunka (The Satsumon culture)*. Tokyo: Nyu Saiensu Sha.

Further Readings

Fitzhugh, W., and C. Dubreuil. 1999. *The Ainu: Spirit of a northern people*. Washington, DC: Arctic Studies Center, National Museum of Natural History.
Siddle, R. 1996. *Race, resistance and the Ainu of Japan*. London: Routledge.
Tahara, K. 2005. The Ainu of Japan: An indigenous people or an ethnic group? *Public Archaeology* 4: 95–102.
Tahara, K. 2006. *Indigenous peoples Ainu*. Tokyo: Ningensha.
Takakura, S. 1960. *The Ainu of northern Japan: A study in conquest and acculturation*. Philadelphia: American Philosophical Society.
Walker, B. 2006. *The conquest of the Ainu lands: Ecology and culture on Japanese expansion, 1500–1800*. Berkley: University of California Press.

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Introduction

Augustin F. C. Holl is an African academic and archaeologist. A Cameroonian national naturalized French citizen, progressively established and well-known scholar in Africa, Europe, and the USA. This is not to omit his Chinese prominent implantation since 2017 as resident Distinguished University Professor at the Xiamen University (Fujian). His research centered around the emergence and development of food production and social complexity essentially in Africa but also elsewhere. This is done with a balanced complementary interest in the Chalcholithic as transitional technical phase (in Southwestern Asia and Europe) to the palaeo-metallurgic ages. With such techno-cultural sequenced professionalism, the risk might be taken to say that he is specialized in the "Neolithic" processes and periods, despite the increasingly questioning of the relevance of this concept in Africa and elsewhere. His fieldwork and intellectual accomplishments make him to be inclined towards trans- and multidisciplinary archaeological practice and theory.

Thus, Professor Holl stands a synergic team making and/or adherent researcher, first during his 1980s' nurturing professionalism at the long term well-known "Neolithic" Dhar Tichitt site in Mauritania, then in conducting the Houlouf Region Project (1982–1991) in Northern Cameroon, the Mouhoun Bend Archaeological Project (MOBAP 1997–2000) in Burkina Faso, and the Sine Ngayene Archaeological Project (SNAP 2002–2010), and the Xiamen University Saloum Delta Shell-Midden project (2017–present). In parallel, he was aptly involved in the Chalcholithic Negev Project in Northern Negev in Israel (1984–1996), conducted an Ethno-archaeological Project on Shuwa-Arab pastoralist settlements (1986–1988), and was as well member of the New York African Burial Ground Research Project (1993–2006).

His aptitude as archaeologist trained in palynology and faunal analysis, combined with multifaceted experience in excavation of a wide range of archaeological sites, allowed him to become a synergic "pilot" of multidisciplinary training and excavating teams. In addition, he is of a versatile intellectual competence that facilitates his teams' tasks of testing ideas formulated in field reports, co-authored articles and edited books. I had such positive experience personally as author of the

chapter on the "First technical and cultural complexes: characterization and classification," in the UNESCO's *General History of Africa. Volume IX*, completely edited by him since 2018.

Major Accomplishments

On His Research Programs and Topics. After the successful completion of his PhD (Sorbonne 1983), A. F. C. Holl became Assistant-professor, promoted to Associate-Professor in 1988 at the University Paris-X Nanterre. Thanks to his affiliation to a CNRS laboratory, he was able to launch his programs combining teaching in one semester and field research in the other. His research interests range broadly within the domain of anthropological archaeology and touch on material culture and technological change, the emergence of complex societies, mortuary archaeology, rock art, the emergence of food production; archaeology of African diaspora (New York African Burial Ground Research Project); West African archaeology, Prehistoric adaptation to marginal dry lands; Sahel, Sahara (West Africa) and the Negev desert (Israel), and Ethnoarchaeology of pastoral societies.

These topics were addressed systematically through regional archaeological research projects in Mauritania (Holl 1986) Cameroon (Holl 2002, 2003), Israel (Levy et al. 1991), Burkina Faso (Holl 2014), and Senegal (Holl and Bocoum 2017). Field-based research was complemented by forays into broader topics, the advent of metallurgy, Saharan rock art, West African early urbanization, and Bantu expansion (Holl 2004, 2006, 2009, 2017).

Holl's major accomplishments in individual and/or co-authored publications are mostly related to the results of the field investigations he conducted or was involved in. As to be seen with a selected list of detailed references below, all his projects were published in monographs: *Economie et Société Néolithique du Dhar Tichitt* (In English, viz., *Neolithic Economy and Society at Dhar Tichitt*) (Holl 1986), derived from his doctoral field research at the Dhar Tichitt; *Ethnoarcheology of Shuwa-Arab Settlements* (Holl 2003) and *The Land of Houlouf: Genesis of a Chadic Polity* (1900 B.C.–1800 A.D.) (Holl 2002) related to the Houlouf Archaeological and Ethnoarchaeological project (Sahelian Northern Cameroon); *Archaeology of West African Mounds Clusters* (Holl 2014) for Burkina Faso project, and *Megaliths, Cultural Landscape, and the Production of Ancestors* (Holl and Bocoum 2017), to mention a few examples.

An additional illustration is a co-authored article titled "Subterranean Negev Settlement" (Levy et al. 1991), which derived from ca. 4500 to 3700 BC data from the Chalcholithic Negev Project in Northern Negev in Israel. It is equally useful to mention two articles not hereby directly linked to specific field project results, one in what is scholarly called archaeometallugy (Holl 2009), and the other, belonging to the interrelated topics of migration and settlement in archaeology, entitled "L'Expansion Bantoue: Une Nouvelle Synthese" (In English, viz., "Focus. The Bantu expansion: old questions, new data") (Holl 2017). The intention and the chief interest in mentioning here and now this migration and settlement twofold topic is to making a topical connection with a recent and important "China-Global-Video Conference" that resident Distinguished Professor A. Holl delivered on 13 November 2018 (Fig. 1). Such connection is made chiefly in order to remind, in African Archaeology and History, the scholarly commitment to tirelessly updating the long lasting debate on the "Bantu origins and expansion." Hereby, A. Holl did not miss to play his part of the game in focusing the worldwide video conference on such challenging French stylistic terms as "Les langues bantoues ont conquis l'Afrique à travers des migrations" (In English, viz., "The Bantu languages have conquered Africa through migrations").

This latter project, the Xiamen University Saloum Delta Archaeological project (2017–present), related to his newly appointment as Distinguished University Professor at Xiamen University (Fujian, China), launched as field-school for Chinese and Senegalese students, is

Holl, Augustin F. C., Fig. 1 Professor A. F. C. Holl speaking at Xiamen University (Fujian, China). (©GlobalGeoPark)

the continuation of his life-long dedication to undergraduate training (Fig. 2). Such active, worldwide, and multisided field investigations associated sometimes with students' training exercises, are together inductive of a synergic impact on his multicontinental academic, administrative outstanding accomplishments.

About His Institutional Career. After the successful completion of his "Habilitation-Thesis" in 1994, Holl's academic career took a different, exciting, and unplanned turn. He was offered successive appointments in leading research institutions. As a result, from 1997 to 2019, the picture is that of interinstitutional and transcontinental promotions. In 1997 onwards, he moved from France to the USA where he was appointed, successively, Professor of Anthropology at the University of California, San Diego, then Curator of African Archaeology and Professor of Anthropology and Afro-American and African Studies at the University of Michigan, Ann Arbor. In 2011, he moved back to Paris (France) where he resumed his academic career as Professor of Prehistory at the University of Paris – Nanterre-La Defense. He was appointed vice-president in charge of International relations the following year, and Deputy-Director at the Institute of Social Science and Humanities, of the Centre National de la Recherche Scientifique (CNRS) in 2015. As a fortunate continuation of his institutional academic promotions, he was offered the exciting position of Distinguished University Professor at Xiamen University (Fujian, China), with the prestigious administrative job of founding Director of a multidisciplinary Africa Research Center. He resigned from the CNRS to settle in China in February 2017.

As the illustrative consecration of his ascending intercontinental academic career, he was selected as the Chairman of the International Scientific Committee of UNESCO General History of Africa (Vol. 9–11) at its first session in 2013 in Brazil, for the drafting and the publication of the book. This project started in 2013 under the auspices of the African Union's Heads of states and UNESCO's Council. It was initially focused on the writing of a *General History of African Diasporas* worldwide. The Republic of Brazil, then under President Lula Da Silva and Dilma Rousseff tenures, provided substantial funding to ensure both the drafting and the publication of the additional three volumes. The initial project was thus amended by the scientific committee to revisit and update the preceding eight volumes published from 1980 to 1999.

Basic Biographical Information

Augustin F. C. Holl was born on March 22, 1954, at Edea in Cameroon (Africa). From age 6, he started moving with his civil-servant parents to a different city almost every 2 years. In order to successively complete his middle and high school, he went to boarding school, and graduated in History and Anthropology at Yaounde

Holl, Augustin F. C., Fig. 2 (**a**) Overview of Megaliths' site (Senegal 2018). (**b**) View of team in excavation trench (Senegal 2018). (**c**) The research team at the World Heritage site of Sine-Ngayene (Senegal 2018)

University. In 1979, he went to graduate school at the University Paris-I Pantheon Sorbonne where he completed his PhD in 1983. He earned his HDR (Habilitation to Research Supervision) in 1994 at the University Paris-X Nanterre. As graduate student, in order to aptly handle his Prehistoric Economy research project on the "Neolithic" economy of Dhar Tichitt (Mauritania), he got trained in palynology and faunal analyses. As graduate student supervisor, he participated in field research projects in the Aisne Valley in France and Blicquy in Belgium. His doctoral field research at Dhar Tichitt was supervised by Professor Henry-Jean Hugot in February–April 1981. He completed his field research and defended his dissertation 2 years later in May 1983. He was married twice and has four children.

References

Holl, A.F.C. 1986. *Economie et Société Néolithiques du Dhar Tichitt (Mauritanie)*. Paris: Editions Recherches sur les civilisations.

Holl, A.F.C. 2002. *The land of Houlouf: Genesis of a Chadic polity (1900 B.C. – 1800 A.D.)*, Memoirs of the Museum of Anthropology series, no. 35. Ann Arbor: Museum of Anthropology, University of Michigan.

Holl, A.F.C. 2003. *Ethnoarcheology of Shuwa-Arab settlements*. Lanham: Lexington Books.
Holl, A.F.C. 2004. *Saharan rock art: Archeology of Tassilian pastoralist iconography*. Walnut Creek: AltaMira Press.
Holl, A.F.C. 2006. *West African early towns: Archeology of households in urban landscapes*. Ann Arbor: University of Michigan Museum of Anthropology.
Holl, A.F.C. 2009. West African metallurgies: New data and old orthodoxies. *Journal of World Prehistory* 22: 415–438.
Holl, A.F.C. 2014. *Archaeology of West African mounds clusters*, Monographs in African archaeology, British Archaeological reports international series. Oxford: Archaeopress.
Holl, A.F.C. 2017. L'Expansion Bantoue: Une Nouvelle Synthèse. In *Archeologie des migrations*, ed. D. Garcia and H. Le Bras, 225–236. Paris: INRAP – La Découverte.
Holl, A.F.C., and H. Bocoum. 2017. *Megaliths, cultural landscape, and the production of ancestors*. Sarrebruck: Editions Universitaires Européennes.
Levy, T.O., D. Alon, C. Grigson, A. Holl, et al. 1991. Subterranean Negev settlement. *National Geographic Research & Exploration* 7 (4): 394–431.

Holographic Epistemology: Native Common Sense

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> Research in a Maori sense seeks to expand knowledge outwards (tewhanuitanga); in depth (tehohonutanga); and toward light (temaramatanga) (Mead 2003). Knowledge is embedded in the culture of the people. Knowledge comes through in the lives of the people. (Una Nabobo-Baba, Fijian)

Introduction and Definition

In ancient systems around the world, there are inevitably three main ways in which to view and experience knowledge: (1) via the objective, physical, outside world, the world of science and measurement and density and force; (2) via the inside subjective world, the space of thought, mind, idea, and interiority that helps us understand meaning and our linkages with phenomenon; and finally (3) via the quantum world shaped by transpatial descriptors and intersections, a spiritual dimension unlinked to religious dogma, described in ethereal, mystic, and yet experiential terms, i.e., *All my relations* or in science the *Implicate Order* – simply put, *body, mind, and spirit* or in Maori, *tinana, hinengaro, and wairua*. Hawaiians refer to this epistemological trilogy as *manaoio, manaolana*, and *aloha;* Fijians see it as *vuku, kilaka* and *yalomatua*.

The challenge is to not see this trilogy as a linear sequence, rather as an event happening simultaneously and holographically. A hologram is a three-dimensional photograph made with the aid of a laser. To make a hologram, the object to be photographed is first bathed in the light of a laser beam. Then a second laser beam is bounced off the reflected light of the first, and the resulting interference pattern (the area where the two laser beams commingle) is captured on film. When the film is developed, it looks like a meaningless swirl of light and dark lines. But as soon as the developed film is illuminated by another laser beam, a three-dimensional image of the original object appears. The three-dimensionality of such images is not the only remarkable characteristic of holograms. If a hologram of a rose is cut in half and then illuminated by a laser, each half will still be found to contain the entire image of the rose. Indeed, even if the halves are divided again, each snippet of film will always be found to contain a smaller but intact version of the original image. Unlike normal photographs, every part of a hologram contains all the information possessed by the whole (see Talbot 2011).

In and of itself, each category exists potentially untangled and separate. Here is the state we are now in within classical physics and our current scientific epistemology. Objectivity is divorced from subjectivity and both are synonyms for the hard/soft sciences, while the topic of spirituality has become a pink crystal New Age embarrassment to all forms of science. The trilogy has become a dysfunctional family. Here is where we heal. *Right here*.

> Quantum Mechanics has established the primacy of the inseparable whole. For this reason, the basis of the new biophysics must be the insight into the fundamental inter-connectedness within the organism as well as between organisms, and that of the organism with the environment. (Marco Bischof)

If we are to alter and explore a more robust version of reality, then here is where our suspension of disbelief can be practiced. Here is where faith in wholeness and interconnection is rigorously definitive. Here is where indigenous realities, contexts, and understandings can benefit from cross-fertilization with Western classical sciences because a hologram is made with modern techniques but its implications are best understood with an ancient mind: *The whole is contained in all its parts* (Nadeau and Kafatos 1999). Body/Mind/Spirit is one idea. Or as quantum physicist David Peat explained, *The ground out of which matter emerges is also the source for consciousness*. Here is a (k)new idea we can all investigate together. Holographic epistemology thus helps us better understand the depth and rigor of an indigenous mind, but first we must understand our own (Mahalo to Dr. Shane Edwards of Te Wananga o Aotearoa of New Zealand for this idea of (k)new. It was found in his Ph.D. dissertation: *Titiro Whakamuri Kia Marama Ai Te Wao Nei: Whakapapa Epistemologies and Maniapoto Maori Cultural Identities*. It summarizes both the feeling and fact of the idea of ancient/new).

The following table gathers in one place this holographic image, using three "laser beams" to bring out facts, logic, *and* metaphor to help us get to this "inseparable whole" we have known all along exists. It is separated now for discussion only and only for a moment! (Table 1).

Is this idea of a hologram using three "beams" clear for you? Look at the list again. *See it with your own expansive awareness*. Lend your consciousness to its purpose and you will intersect with my own, across space/time, and we will be in sync with each other. Familiarize yourself with the three categories: Body, Mind, *and* Spirit. Do you hear their distinctive harmonics?

Do you see how the location of the idea describes the boundaries/freedom of that idea? No judgment here, just an observation of what the physical plane offers, what the mental plane offers, and what the spiritual plane offers. Here is a radical and profound simplification of a (k)new world epistemology Indigenous people and allied scholars are putting forth. Ken Wilber (2001) refers to this trilogy as The Big Three. Hale Makua (2004), Hawaiian elder-mystic, called it the Three Souls. It is found in the Tao Te Ching, chapter 42:

> The Tao gives birth to One.
> One gives birth to Two.
> Two gives birth to Three.
> Three gives birth to all things.

I had once referred to this process and thinking as the Triangulation of Meaning (Aluli-Meyer 2008). It was meant to bring coherence between the three operating principles, but it gave the impression of a linear sequence and unnatural hierarchy. I had initially thought that information came first in some kind of text or noun form, then it was experienced and *then* it was understood. Here is the dilemma of our schooling system. For years I've been trying to understand what happens simultaneously and yet it was described as a sequence, the lock-step approach found in modern expectations more interested in quantity, control, and time rather than *quality, consciousness* and *space*.

I now see these sets of three as holograms to collect, play with, and trade with others. There is a clear knowing that each beam in the hologram is necessary to bring forth the fullness of its essence, form, and purpose. See, there it is again: Mind/Body/Spirit. A holographic approach to knowledge has changed everything in my own life and scholarship. It is no longer simply about *technical rationality*, as Henry Giroux (1988) has detailed. It is about *hermeneutic rationality* and *emancipatory rationality*. It is about my own authentic interpretation and the freedom experienced when I render it clearly with an interest, reverence, and understanding of context/content. That has indeed changed *everything*.

Holographic Epistemology: Native Common Sense, Table 1 Holographic epistemology: native common sense

Body	Mind	Spirit	Source
Perception	Conceptualization	Remembering	*Yoga sutra*
Manaoio	Manaolana	Aloha	*Native Hawaiian*
Techne	Episteme	Phronesis	*Aristotle*
Objective	Subjective	Cultural	*Karl Popper*
External	Internal	Transpatial	*Ken Wilber*
Mohiotanga	Matauranga	Maramatanga	*Maori*
Instinct	Intelligence	Intuition	*Hale Makua*
Empiricism	Rationalism	Mysticism	*Ken Wilber*
Facts	Logic	Metaphor	*Mike McCloskey*
Gross	Subtle	Causal	*Ken Wilber*
Seeing	Hominization	Convergence	*Teilhard de Chardin*
Technical rationality	Hermeneutic rationality	Emancipatory rationality	*Henry Giroux*
Consumer intelligence	Recreative intelligence	Creative intelligence	*Molefi Asante*
Hearing	Thought	Meditation	*Buddhist*
Life	Mind	Joy	*Upanishads*
Tinana	Hinengaro	Wairua	*Maori*
Force	Power	Liberation	*David Hawkins*
Knowing	Knowledge	Understanding	*Manu Aluli Meyer*
Coarse	Subtle	Secret	*Buddha*
Vuku	Kilaka	Yalomatua	*Una Nabobo-Baba*
Sensing	Presencing	Realizing	*C.O. Scharmer*
Ways of knowing	Ways of being	Ways of doing	*Veronica Arbon*
Voice	Thought	Silence	*Rumi*
Classic	Relativistic	Unified	*Brian Greene*
Dense	Dynamic	Still	*Nityananda*
Tamas	Rajas	Sattva	*Upanishads*
Interpretation	Mythic maturation	Gnostic revival	*Taupouri Tangaro*
Measurement	Reflection	Witnessing	*Manu Aluli Meyer*
Ike (to see)	Ike (knowledge)	Ike (revelations)	*Native Hawaiian*
Duality	Non-duality	Wholeness	*Ken Wilber*
Emotion	Feeling	Awareness	*Spinoza*
Pleasure	Happiness	Bliss	*Osho*
Temporal	Noetic	Ineffable	*William James*

Key Issues

Three Whole Ideas: *Separately*

Body: External, Physical, and Objective Content

Context is the content (David Hawkins).

Context is within. Content is external (Roxanne Kala, Native Hawaiian).

Here is one laser beam in the hologram we know how to operate. It is the beam we are most familiar with and the projection we can recognize, even if it only makes the understanding two dimensional. The physical/body aspect of holographic epistemology is the foundation of Science, of classical Physics, and of positivism and all its empirical measurements and verifications. The physical world is an outside phenomenon we experience through our senses. It's our scraped and bloody knees from a hill we knew would thrill us. It's the flash of light you saw come before sound and boats listing at low tide. It's the weight of a premature baby in your one hand. It's the color blue in sky and water we knew quickened our pull for outdoor play.

Fundamental objectivity is also the basic ground for an Indigenous knowing because experience, over time/space, cannot occur without awareness of that which is physical, external, and the interacting agent grossly encountered outside oneself. The physical aspect of holographic epistemology is knowledge that comes from direct experience, a knowing because it has been encountered, registered, and remembered in bone and muscle. It is also knowledge gained by the full spa treatment of a scientific regime: time, weight, mass, velocity, etc. The physical world is a world that can be predicted, controlled, and shot into space. It extends the life of our hearts and kidneys and cloned itself by its own hand.

Indigenous scholarship is simply asking for an evolution of this idea with the heightened rigor of a just-as-real subjective and spiritual/quantum reality (aka *culture*) we know exists and indeed celebrate. It is a call for critical consciousness and respect for other way of knowing. It is what enduring practices in place have developed and processed: a knowledge ethic shaped by the needs of place and people. Here is *cultural empiricism* so to speak, altered by seasons, the sharing of ideas with others, and with its own referential knowing steeped in ancestral memory. It is also real, alive, and part of the external world – we just have different priorities and names for how we experience and express it.

Mind: Internal, Mental, and Subjective

> We must assume behind this force [in the atom] the existence of a consciousness and intelligent mind. This mind is the matrix of all matter. (Max Planck)

> The electron does not have objective properties independent of my mind. (Fritjof Capra)

> The great consciousness exists in my mind. (Oscar Kawagley, Yupiaq)

Here is the laser beam we squirrel away as intimacy unshared, a light we believe separate from quantifiable observability and our own bodies. Mind is the culprit in a qualitative quagmire and forever in some kind of conflict of interest. Subjectivity is the stain science and research has not yet been able to wash away. The mind category of our holographic/indigenous epistemology is the relative truth of what is not seen but yet available via thought, idea, and reflection. The mind beam in our hologram is about insideness, about the richness and infinity of difference found in our own humanity. Mind illuminates experience and brings forth meta-conscious awareness and purpose to detail meaning and interconnection. It is the maturing agency of collective and individual *thinking*. Without paper and pencil, without clock, and without competitive comparisons – a thinking that inspires what Maori have called aromatawai or self-reflection that instructs and transforms. Paulo Freire (1970) called this revolutionary process of waking up *conscientization*, while Teilhard de Chardin called it *hominization* vital to the larger transformations of society, this capacity to reflect, to think, and to *use* our minds.

Mind in this discussion is not the firing of neurons in our brain. It is the capacity to review an idea, to link what is known to new patterns, and to offer fresh understanding to reoccurring problems. Mind is the inside capacity that recognizes variations and brings forth their logic with symbols of shared meaning. It is the same as body, just from an inside vantage point. Hawaiians refer to this idea as naau or stomach region. It is the root word for wisdom, naauao, which means "enlightened intestines." I know, this idea may be hard to consume, but we must at least agree to its presence and legitimacy. *Mind matters*. It is the inside agency of body and the connecting essence of all that is material.

> Sensations originate in the body but it is the mind that experiences them. We say emotionscome from the heart but it is the mind that is aware of them. (Francesca Freemantle)

How one develops mind is the focus of this entry. Do you see it separate from body? Do you see mind as a hindrance to technical rationality? How one sees mind is perhaps the turning point of self-reflective subjective awakening. Remember, mind is one part of the trilogy necessary for our hologram to be fully operational. It is no less valuable, no more valuable than any of the other beams. It is what Indigenous scholarship brings forward as a segue to spirituality. We develop

awareness through the mind/body of our own selves, and here is where the simultaneous immersion into quantum realities changes everything. From the beginning of space it has been this way. Don't you think it's *time* to understand it?

Spirit: Transpatial, Nonphysical, Culture

> At this point, the rational, conceptual aspect of the mind must let go, allowing a breakthrough into direct, intuitive experience. (Fremantle 2001)

Ulua'ekewelina a ke aloha. Loving is the practice of an awake mind.

> Life, being an ascent of consciousness, could not continue to advance indefinitely along itsline without transforming itself in depth. It had, we said, like all growing realities in the world, to become different so as to remain itself. (Teilhard de Chardin 1959)

It is time/space to speak of the spiritual dimension of life. Do not curl away in antireligious dismay or leap into dogmatic exaltation. This discussion of spirituality is not a religious idea; *we just think it is*. Shake that belief off and clear your mind. Wairua/wailua is as real as the tangible and mindful realms. It has been proven, stitched, sung and experienced that *we are more than our bodies* (Near Death Experience (NDE) summary/lesson from L.M.S. of Pepeekeo, Hawaii, after drowning accident and immersion in coma at Hilo hospital, 2009) and more than our minds. *Matter is not separate from spirit* and so here is the culminating idea of this chapter and the animating third beam that Indigenous scholarship confirms. It is the laser that popped images into three-dimensional holograms surprising the world with its implicate wholeness, even as shards splintered on scientific floors across the planet and we discovered *the whole of life is found in all parts*. That is as much a physical and mental idea as it is a miracle of the quantum world. For many Native peoples, this is basic common sense. It is a *culture* shaped around an environment and the specific needs of people.

Many synonyms exist for this idea of dynamic interdependence; this field of mind enmeshed within body as the causal agent in an unseen reality we have direct access to and indeed are the shapers of the implicate order, self-organizing systems, auamo kuleana, coherence, non-seperability, fundamental character of reality, dependent co-arising, akashic field, paticca samuppada, interdependence, systems theory, mutual causality, holographic epistemology, complimentarity, the Divine Milieu, entanglement, makawalu, milestone of human thought, whakapapa, Indra's net, the blanket, undivided wholeness, and Indigenous epistemology.

Buddhists call this matrix the *expressible content of enlightenment* and their scientific collaboration is helping us understand our role in its creation or demise. The transpatial, contemplative, intuitive, loving, mystic, still, and joyful dimension is the on switch of our lives. It's the third laser beam that makes sense of the other two. In science it is an event horizon of knowledge that is causing a rethinking of classical epistemology and classical physics. Do you understand this idea? We are all three realms: Body, Mind, *and* Spirit – but we must be conscious of it to actualize them. Slow down, take a breath. Physical/mental/causal – three facets of one idea. *He 'ikekaihohonu* – here is deep ocean knowing.

The perceived contradiction is that spirituality has developed its own bureaucracy in the form of Religion and thus it has become an invalid source of scientific inquiry. Is it any wonder we ritualized our awe and gathered en masse at unseen mysteries? Science needed to pull away from dogma and what was labelled as superstition; it is part of our shared history. We are not talking about returning to this way of viewing the world. What Native intelligence as an enduring pattern of thinking is putting forth with the aid of quantum sciences is the notion that a realm of unseen connecting patterns exist and we are the causal linkages that alter its capacity. There is a new/old game in town. It must include what has forever been present but denied because of the beliefs of the day. As always, Indigenous peoples are near – watching, waiting, and ready to be of service.

Indigenous World Views

> *Makawalu* – A Hawaiian interpretation and practice of interdependence

> The depth of relatedness is so powerful that it guides our lives. It is our Law. (Karen Martin, Aboriginal)

> Wisdom is the recognition of the interdependence of things. (Sulak Sivaraksa)

An Indigenous world view thus begins with the idea that relationships are not nouns; they are *verbs*. This basic notion of relationality, dynamic coherence, interdependence, and mutual causality helps us see the *context* of an idea and people, tangible or not, and respond appropriately. The hard part of this notion is that you can't weigh verbs, well not really. Relationship as verbs infers the *intentional quality* of connection that is *experienced* and remembered. Here we begin our walk into Indigenous epistemology, into the simultaneity of the unseen and seen. We are entering a wide-open field of knowledge production and exchange with priorities in *practice, relevance, context, consciousness* and *shared common sense*. It is knowledge through *experience* individual or collective, and a way of being via site-specific familiarity through years, generations, and lifetimes. In this way, patterns emerge collapsing time into space and all unknowns into mystery and story. It is knowing shaped by purpose and knowledge prioritized by function. Finally, it is an understanding that has *endured* for a *reason*.

An Indigenous Weltanschauung (world view, product of culture, constructed in language) then is indeed a challenge to bring forward because of the myopia of our independently trained minds. The vast amount of difference the world offers us is currently withering in a hailstorm of uniformity, capitalistic assimilation, and literal renditions of reality asserting a predictable empiricism now waiting to evolve. It is at these very sites of tension, however, where the future of rigorous scholarship lies. For us to move forward in the exploration of indigenous ideas and to actually *see* other views of the world, there is first a call for the suspension of currently held thought patterns, particularly around knowledge, science, and reality.

> There is a critical need for a new old way now. (Veronica Arbon, Arabana – Aboriginal)

This entry is embedded within a global archaeology text. Archaeology as a system of science has brought specialized facts of humanity and cultural practices to the world and as a field worked to articulate the connection of people to place, history, and ideas. There are infinite ways one can portray a people, knowledge, values, or culture. Archaeology has historically privileged the technical form of rationality and strengthened the view that objectivity and measurement is the accurate and best way in which to engage and explore peoples. *That is a world view*. It is tutored by the expectations and values of a cultural system, a language, and the political/economic climate of the times. I believe Indigenous people share the same view, just *differently*.

Indigenous is simply a synonym for *that which has endured*. It is not a nostalgic or romantic cast over objective data, nor does it dismiss what modernity has thrust upon us. It is a way of behaving that offers us older ways to view the world. It is not meant to operate in lieu of but rather to synergize with classical views of science and now with a quantum world already dreamed of, debated, and woven into art forms of function, reliability, and beauty.

(K)new Science: An Indigenous Perspective

> The perspective of Native science goes beyond objective measurement honoring the primacy of direct experience, interconnectedness, relationship, holism, quality and values, and they are specific to tribe, context and cultural tradition. (Cajete 2000)

Science, the process to understand our natural world, is not a new idea; it is old. How it now unfolds within a mathematical, technical, capitalistic, and positivistic structure is relatively new. Engagement and meaning-making with our world is an evolutionary process, always present, that accelerates or expands with mature, conscious, and rigorous *reflection*. The opposite is also true: the understanding of our world remains static without reflection in a field of reference that mirrors itself with itself eventually pulling away from direct experience into a self-justifying loop. This is our current situation in my own field of philosophy, and I sense even in science. We then begin to name events in isolation from others, defying

contextual comprehension born through the ages, and understood by those who have witnessed them, remembered them, and sung their lessons in the life exchanged.

> The problem is not with the empirical data of science but with the contention that these data alone constitute the legitimate ground for developing a comprehensive worldview or an adequate means for responding to the world's problems. There is more to human existence and to reality itself than current science can ever give us access to. (Dalai Lama 2005)

Here it is, a call for a comprehensive world view in which to engage an idea, an object, and a collection of artifacts. How does one evolve in this manner without exposure to other ways of thinking? It is the key challenge to address in modern society.

> Hahai no kauaikaululaau. Plant a forest and the rain will follow (Native Hawaiian).

> To gain a sense of Native science one must participate with the natural world. To understand the foundations of Native science one must become open to the roles of sensation, perception, imagination, emotion, symbols and spirit as well as that of concept, logic, and rational empiricism. (Cajete 2000, Tewa Pueblo)

Native Science practitioners do not separate mind from body, nor do they separate that from the quantum world. We are neither wistful about their union. Sensual cues, coupled with imagination and emotional awareness, sharpen ones' sense of rational empiricism; they do not diminish it. Here is the perceived contradiction Native Science offers the world: wholeness and mature understanding of systems by seeing patterns, both tangible and in thought, of concrete, quantum, and causal worlds.

> In Blackfoot, objects that we see are simply descriptions; they are collective agreements only. (Leroy Little Bear)

> When you start seeing the world in patterns instead of laws, everything opens up. Vision itself changes. (Dolores LaChapelle)

How does one enter this kind of epistemological arena where the integration of an idea is the understanding of it? To see patterns develop themselves and then intersect, fractal, and converge with others in an infinite array of evolving life. How *do* you enter this kind of thinking/seeing? Here are the building blocks of *cultural empiricism*, the kind of empiricism that begins with a different sensory immersion, a heightened sense of context, and a whole different tool belt useful in shaping cultural priorities for different understandings. How will I describe this orange with an apple vocabulary?

> The world is mind. (Vine Deloria Jr.)

Here again is the segue from indigeneity into the quantum sciences, this reckoning with simultaneity and our own role in reality production and scientific findings. When the world becomes mind, as Standing Rock Sioux world scholar Vine Deloria (1999) suggests, he is inferring the radically empirical universe William James outlined almost 100 years ago. It is a connection with the physical and nonphysical states altered by our own seeing. Einstein held the same belief that our own viewing of phenomenon changed it. Is it any wonder the Hawaiian word for knowledge is "ike," to see/to know. Seeing then is an act beyond mere looking. Seeing is infused with the cultural shaping of its *purpose* and that by itself collapses waves into particles. Yes, why not work to understand this miracle? Why not see what intentionality and consciousness have to do with matter?

Here lies the path across dangerous waters where science and culture must meet and cross if we are to develop solutions necessary for our own evolution. Here is where indigenous sits down to discuss the latest ideas in nonlocality, coherence, and the universe as a self-organizing system some have long ago called Indra's net, the akashic field, the Divine Milieu, whakapapa, and the great ancestral plan.

Future Directions

Ha'inamaikapuana: Thus Ends My Story

> A modern "ecosophy" would be about the rediscovery of meaning as it relates to our universe. It would require not only a different way of

> thinking, but also a different way of knowing and living. Such an ecosophy would build a unitary view of the cosmos in which everything is interdependent and moved by creative energy, one that views the Earth and the universe with reverence and explores our essential relationships and responsibilities there in. It would be, essentially, the philosophy Indigenous people have lived for generations. (Greg Cajete, Tewa Pueblo)

It has always been about reverence, the act of care for others and for our earth. Aloha Aina is how we refer to it in Hawaii. It is also about the energy and life force found in *meaning as it relates to our universe*. Mahalo Greg, *I love that*. It does not matter if you view land as mother or sky as father. These are simply extensions of another's world view. What matters is that you have some kind of relationship with this place we live and breathe in, and if you only have an academic one, you must at least seek those who do not. *It is the quality of our relationships that will help us evolve*.

I believe the main purpose of these ideas is to get us to *think* together – to open our minds and explore the purpose of our lives, our work, and our particular way of viewing. Why are we this way? Why are you reading this article in a Global Archaeology text? There is a reason why you found this piece of my mind. Find out what it is and go into it with your passion for science, truth, culture, and the needs of our time. *Be of service to that*. Respond with your life to the questions of your heart. Don't make it only about cognitive accumulation of information. We do not have the luxury of time. Discover what interdependence *really* means by listening to others, by watching how those who have more experience do things, and by sharing ideas when asked. Then go out and watch the moon rise and swim in waters freshly seasoned with spring rains.

Finally, here is what mentor/friend Willis Harman had to say on the subject:

> I think the wisest thing is being humble and listening. We live in a very arrogant society. Listening has to do not only with listening to myself, but listening to nature and listening to very simple people. There are things that Native Americans have said to me in just a few words that just summarize so much. I was talking with one Native American and he got a little tired of my questions and he said, "you know you white people, you have so much trouble understanding the way we Indians look at the world, it is very simple to understand how Native Americans view things, you only have to remember two things, one is, everything in the universe is alive, the other is, we are all relatives"... and that is wisdom. (Willis Harman, Institute of Noetic Sciences; http://twm.co.nz/Harm_bio.html)

So here it is: *effulgent coherence*. This is why *three ways* of our knowing must now be detailed, debated, and understood: physical, mental, and spiritual *are* aspects of our holographic universe. They operate as beams of energy teaching us in separate ways about wholeness.

Our Wholeness

Indigenous world views will thus survive. Tides come in and they go out again. *Nouns have always been verbs*. It has been like this for a long time. The Big Three exist: *see* the science in it, *think* it through carefully, and then *inspire* the world with the quality of your participation. Please, most of all *ulukale'ale'a* – create *joy in the process*.

Amamauanoa.

Cross-References

► Indigenous Knowledge and Traditional Knowledge

References

Aluli-Meyer, M. 2003. *Ho'oulu: Our time of becoming; Hawaiian epistemology and early writings*. Honolulu: Ai Pohaku Press.

Aluli-Meyer, M. 2008. Indigenous and authentic: Native Hawaiian epistemology and the triangulation of meaning. In *Handbook of critical and indigenous methodologies*, ed. L. Smith, N. Denizon, and Y. Lincoln, 217–232. Thousand Oaks: SAGE.

Cajete, G. 2000. *Native science: Natural laws of interdependence*. New York: Clear Light Publishers.

Deloria, V. 1999. *Spirit and reason*. Colorado: Fulcrum Publishing.

Freire, P. 1970. *Pedagogy of the oppressed*. New York: Herder & Herder Publishing.

Fremantle, F. 2001. *Luminous emptiness*. Boston: Shambhala.

Giroux, H. 1988. *Teachers as intellectuals: Toward a critical pedagogy of learning*. New York: Bergin & Garvey Publishers.

Lama, Dalai. 2005. *The universe in a single atom: The convergence of science and spirituality*. New York: Broadway.
Makua, H. 2004. *Un-published writings*. Hawaii Island.
Mead, H.M. 2003. *Tikanga Maori: Living by Maori values*. Wellington: Huia.
Nadeau, R., and M. Kafatos. 1999. *The non-local universe: The new physics and matters of the mind*. New York: Oxford University Press.
Talbot, M. 2011. *The holographic universe: The revolutionary theory of reality*. Harper Perennial.
Teilhard De Chardin, P. 1959. *The phenomenon of man*. New York: Perennial.
Wilber, K. 2000. *Sex, ecology, spirituality: The spirit of evolution*. Boston: Shambhala.
Wilber, K. 2001. *Quantum questions: Mystical writings of the world's greatest physicists*. Boston: Shambhala.

Further Reading

Hartranft, C. 2003. *The Yoga Sutra of Patanjali*. Boston: Shambhala.
Laszlo, E. 2007. *Science and the Akashic field: An integral theory of everything*. Vermont: Inner Traditions.
Macy, J. 1991. *Mutual causality in Buddhism and general systems theory*. New York: SUNY Press.
Marsden, M. 2003. *The woven universe*. Te Wananga o Raukawa.
Mead, H.M., and N. Grove. 2001. *Nga Pepeha a nga Tipuna: The sayings of the ancestors*. Wellington: Victoria University Press.
Pukui, M.K. 1983. *'Olelo No'eau: Hawaiian proverbs and poetical sayings*. Honolulu: Bishop Museum Press.
Tagore, R. 2004. *Sadhana: The realization of life*. New York: Doubleday.
Tangaro, T. 2007. *Lele Kawa: Fire rituals of Pele*. Hawaii: HCC Press.

Homelessness, Archaeology of

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Introduction

The archaeological study of the material culture of people who, by circumstances beyond their control or for other reasons, are classified as homeless is a recent specialist scholarly field of enquiry in the Humanities. This enquiry uses traditional field methods and field techniques of archaeological and ethnographic investigation to examine the diversity of discarded, abandoned, or still in use materials and objects that represent distinct ways of life and behavior of people who do not reside in architecturally designed housing. In the examples of major studies given below, homeless people living without conventional shelter live in diverse geographical urban and rural environments and meet classifications of socially and politically marginalized peoples (Rossi 1989; Foscarinis 1996; Amster 2004; Valado 2006). Using the methods of archaeology and ethnography, researchers in the United States (USA), the United Kingdom (UK), and Australia reveal that homeless people are innovative and follow distinctive patterns of land use and settlement systems that leave unique traces in the form of archaeological evidence which attest to the personal experiences of homelessness in the past and in the present. Researchers in the USA, UK, and Australia conceived of theoretical frameworks that illuminate how social issues like homelessness impact societies. In the major studies below, archaeological conceptualizations of homelessness draw upon colonialism (Pollard 2019), Marxism and capitalism (Rooney 2016), social investment (Kiddy 2014), and political activism (Zimmerman et al. 2010). These knowledges highlight how archaeology can inform greater community awareness and empathy; better government policies to effectively address homelessness; and educational opportunities to challenge ignorance and racism. As a methodology of practice, archaeology of homelessness is in its infancy in international scholarship and applied study. In recent times archaeologists have identified as unique the archaeological signatures that are evidence of the human experience of homelessness and regard this to be an intrinsic part of human history and present life (Zimmerman et al. 2010).

Key Issues and Current Debates

To date, major archaeological studies of homelessness have primarily occurred in high-income

countries as demonstrated by the case studies in Australia, the UK, and the USA. The scholars involved in these studies are involved in large- and smaller-scale research projects that focus on different aspects of the archaeology of homelessness.

Darwin, Australia

In Darwin, Northern Territory, Australia, a doctoral study by Pollard (2019) examined the material culture and land use and settlement patterns of Aboriginal people from remote communities in the Northern Territory who travel to Darwin for a variety of reasons (Holmes and McRae-Williams 2008; Memmott et al. 2003). When in Darwin Aboriginal people make camps in the "long grass," a local term that encompasses publicly accessible beaches and rainforests, recreational and urban parks, and bush within the metropolitan area (Day 2001). Primarily, it is Aboriginal people who choose this way of living in Darwin (Memmott and Fantin 2001), and city authorities consider living this way of life illegal (https://legislation.nt.gov.ay/en/legislation/DARWIN-CITY-COUNCIL-BY-LAWS; Northern Territory Liquor Act 2015). The term "fringe camps" is a reference to their illegal status rather than their spatial arrangement within the metropolitan area. The study examined both the past and present use of areas around Darwin (1869–2018) by Aboriginal people, elucidating continuity of living in marginalized circumstances formerly and currently over a span of 130 years. Pollard's study contributes new and innovative theoretical understandings of Aboriginal behavior in fringe camps conceptualized in a model informed by philosophy and the concepts of accommodation, engagement, transgression, and survivance. The homelessness aspect of Pollard's doctoral study was part of a broader archaeological study of the post-European contact and adaptation of Aboriginal people after European colonization in Darwin in 1869.

Pollard demonstrated that material culture at fringe camps provide insights into the dietary habits, customs, and social organization of the people who reside in them. For example, homeless Aboriginal people eke out an existence on a diet of marine, freshwater, and terrestrial bush foods using traditional ecological knowledge to supplement a high-energy diet of shop-bought processed foods to prevent starvation; those people improvise modern Western manufactured objects into objects of use to make living homeless easier such as shopping trolleys for transport and storage of personal items, prams converted for transporting and storing personal items, cotton reels for fishing lines, or generators to supply electrical goods in makeshift camps. Many Aboriginal fringe camps contain the remains of bush foods caught, processed, and eaten, as well as shop-bought processed foods eaten using a plethora of Western manufactured kitchen and cooking utensils. Pollard found that although being homeless, Aboriginal people living in the long grass prefer to eat foods with plastic utensils rather than bare hands, people maintain personal health care, and people brush their teeth. All of which is suggestive of having values comparable to people who live in housing.

Finally, Pollard's study suggests that individual Aboriginal fringe camps are unique, differ in duration of occupation, differ in purpose of occupation and rationale for habitation, and reflect the continuity of cultural worldviews in the face of ongoing colonialism. This implies that rather than wandering aimlessly around the Darwin metropolitan region, Aboriginal people make camps in strategic locations for reasons that are important to Aboriginal people's ontological frames of reference.

Tampa, Florida

In the USA Rooney conceptualized the experiences of homelessness using a Marxist theoretical framework of analysis of capitalism's transforming industrialization changes on employment conditions that impact disproportionally, wage earners on a spectrum of technical capacity, expertise, and demand. As a result, some classes of people who formerly provided labor for wages abandoned their occupations due to the inability to adapt to replacement economic opportunities, thus underwriting burgeoning homelessness. Using ethnographic and archaeological techniques and elements of a participatory action

research (PAR) approach (site data mapping), Rooney studied the behavior and material culture of homeless individuals near Tampa, who Rooney argues exist as foragers in the urban metropolis. Aspects of the material culture analysis bear striking resemblance to Pollard's study of the same including tropical environmental conditions but also dietary choices, types of personal effects, and improvised creative use of Western manufactured raw materials for personal gain. Rooney's conceptualization of homeless people as urban forager's challenges negative connotations of homeless people as itinerant's (Pollard 2019), panhandler's (Zimmerman and Welch 2011), or worse (Day 1994). As a metaphor it infers the amount of focus, strategizing, and energy homeless people near Tampa expend in the pursuit of survival using an alternative means of production in an urban context. Rooney's analysis of material culture, combined with the location of homelessness sites, suggests somewhat a degree of universality of shared values between the housed and unhoused in that the types of materials homeless people collect, use, and discard are similar to those that people in housed conditions collect, use, and discard and also in the way homeless people use space and location for strategic reasons.

Bristol, England

The United Kingdom study by Kiddy and Schofield (2011) shows how archaeology can convey the experience of contemporary homeless people in Bristol. Kiddy and Schofield used a theoretical framework based on the notion of an archaeology that is socially inclusive arguing it provides social benefits to local communities in the broadest sense. Kiddy and Schofield collaborated with homeless people to convey their experiences of homelessness to the wider community through meetings and appearances in the mainstream media. This approach facilitated a mutual reevaluation of each group's perceptions of concepts such as legitimacy, humanity, and identity. The aims of the research were multiple: to empower homeless people in research, recognize the significance of homelessness oral history as an alternative narrative of contemporary land use and settlement patterning, describe the material culture of homelessness in archaeological terms, advocate an evolving definition of heritage to include homeless sites and places in the landscape as representations of "nonconformist" lives, and, finally, evaluate how to measure "benefit" to the homeless participants in the research.

After reviewing the notion of how archaeology is defined in traditional and populist terms, Kiddy and Schofield argued for a new conceptualization of archaeology as a "broad base" with a "range of intellectual possibilities." From this viewpoint, archaeology is not a pursuit confined to the study of the remote past but is a pursuit that has relevance and application to the understanding of contemporary societies. In this sense the concept of heritage is also a community-owned and ascribed living reality (Kiddy and Schofield 2011, p. 5). In this study, six sites inhabited by homeless people were identified, surveyed, and recorded for knowledge about contemporary land use and settlement patterns. The results shed light on the everyday lives and activities of homeless people, identifying occupational variability and changes in material culture through time and across space. To facilitate the contributions of long-term unemployed homeless people in the study, field methods were adapted to accommodate their work ethics and, where necessary, substance misuse addictions. This approach enabled homeless people to have a significant role in guiding surveys and in interpreting past and present occupation histories of sites which are innovative ethos toward capacity-building homeless people.

The broader local community benefited from the findings of this study through an enhanced understanding of the reality and complexity of the lives and experiences of homeless people. This research attracted widespread academic, professional, and lay interest and coalesced the community by forging new working relationships between homeless people and other people from diverse occupations and backgrounds.

St. Paul, Minnesota

The seminal publication in the archaeology of homelessness is that of Zimmerman et al. (2010) in their study of homelessness in St. Paul, Minnesota, in the USA. The theoretical framework for this study emerged from a view that archaeological knowledge can and should be of social benefit to society. Zimmerman et al. demonstrate the potential of material culture analyses to suggest solutions to problems in the lives of homeless people. For example, Zimmerman et al. observed that empty tin cans of food are a common type of artifact on homelessness sites, yet the cans display evidence of having been torn open, without the use of a can opener. The presence of empty hair conditioner containers is another type of artifact on homelessness sites. Of these two artifacts, Zimmerman et al. argue that homeless people would get more benefit from the issuing of can openers than they would from being given hair conditioner. While the archaeological evidence shows people consume a lot of canned food, the study of their land use patterns (and oral collaborations) also indicates that homeless people do not necessarily have access to water for washing. Further, the archaeological evidence suggests that it would be a better policy to distribute to homeless people something of use and that would have tangible benefit instead of something which is of little use, since it needs to be used in conjunction with a scarce resource, and results, in archaeological terms, becoming discard. Zimmerman et al. also show that archaeology does have the capacity to suggest changes in social policy through contributing knowledge about what homeless people actually need, as opposed to perceptions of what they need, perceptions not necessarily being based on evidence.

In their study Zimmerman et al. (2010) advance a philosophical conceptualization of the potential of archaeology to inform policy making by calling for a politically aware "activist" form of practice in which archaeologists discern the social benefit to be derived from archaeological interpretation of homelessness and use that knowledge to pursue new policy outcomes which improve the lives of homeless people. Underlying this argument is the notion of accountability as the core of ethical practice and awareness that a well-designed problem-oriented archaeological research can empower local communities.

Discussion

Major archaeological studies of homelessness demonstrate new, build on existing, use innovative and creative ethos, methodology, and theories to encapsulate the diverse material and ontological realities of what it is to be homeless. Each of the major studies offers insights that can inform policy debates and popular sentiment toward homeless people in local communities.

Cross-References

- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Modern Material Culture, Archaeology of
- ▶ Urban Archaeology
- ▶ Urban Archaeology in Twenty-First Century Perspective

References

Amster, R. 2004. *Street people and the contested realms of public space*. New York: LFB Scholarly Publishing.

Darwin City Council: https://legislation.nt.gov.ay/en/legislation/DARWIN-CITY-COUNCIL-BY-LAWS.

Day, W.B. 1994. *Bunji. A story of the Gwalwa Daraniki movement*. Aboriginal Studies Press: Canberra.

Day, W.B. 2001. *Aboriginal fringe dwellers in Darwin, Australia. Cultural persistence or a culture of resistance?* Unpublished PhD thesis, University of Western Australia, Western Australia.

Foscarinis, M. 1996. Downward spiral: Homelessness and its criminalization. *Yale Law and Policy Review* 14 (1): 1–63.

Holmes, C., and McRae-Williams, E. 2008. *An investigation into the influx of Indigenous 'visitors' to Darwin's Long Grass from remote NT communities – Phase 2. Being undesirable: law, health and life in Darwin's Long Grass*. An initiative of the National Drug Strategy: Monograph series, vol. 33. National Law and Drug Enforcement Research Fund. The Larrakia

Nation Aboriginal Corporation, Research Division, Dick Ward Drive, Coconut Grove, Darwin 0810.
Kiddy, R. 2014. *Homeless Heritage: collaborative social archaeology as therapeutic practice*. PhD thesis, University of York.
Kiddy, R., and J. Schofield. 2011. Embrace the margins: Adventures in archaeology and homelessness. *Public Archaeology* 10 (1): 4–22.
Memmott, P and S. Fantin. 2001. *'The long grassers'. A strategic report on aboriginal 'itinerants' in the Darwin and palmerston area*. Version 2, vol. 1. Paul Memmott and Associates, Queensland.
Memmott, P., S. Long and C. Chambers. 2003. *Between places: Indigenous mobility in remote and rural Australia*. Australian Housing and Urban Research Institute, University of Queensland, Australia.
Northern Territory Liquor Act 2015.
Pollard, K. 2019. *Archaeology in the long grass: A study of aboriginal fringe camps in Darwin, Australia*. Unpublished PhD thesis. Flinders University, Australia.
Rossi, P.H. 1989. *Down and out in America: The origins of homelessness*. Chicago: University of Chicago Press.
Valado, M. 2006. *Factors influencing homeless people's perception and use of urban space*. Unpublished PhD thesis, University of Arizona.
Zimmerman, L., and J. Welch. 2011. Displaced and barely visible: Archaeology and the material culture of homelessness. *Historical Archaeology* 45 (1): 67–85.
Zimmerman, L.J., et al. 2010. Activism and creating a translational archaeology of homelessness. *World Archaeology* 42 (3): 433–454.

Further Reading

Andersen, A., et al. 2012. *Living on the edge: An archaeological portrait of the unsheltered*. Lincoln: Department of Anthropology, University Nebraska-Lincoln.
Buchli, V., and G. Lucas, eds. 2001. *Archaeologies of the contemporary past*. London/New York: Routledge.
Harrison, R., and J. Schofield. 2010. *After modernity: Archaeological approaches to the contemporary past*. Oxford: Oxford University Press.
Hopper, K. 2003. *Reckoning with homelessness*. Ithaca: Cornell University Press.
Little, B.J., and L.J. Zimmerman. 2010. In the public interest: Creating a more activist, civically engaged archaeology. In *Voices in American archaeology*, ed. W. Ashmore, D. Lippert, and B.J. Mills, 131–159. Washington, DC: Society for American Archaeology Press.
Zimmerman, L.J. 2019. Homeless, home-making and archaeology: "To be at home wherever I find myself". In *Elements of architecture. Assembling archaeology, atmosphere and the performance of building spaces*, ed. M. Bille and T.F. Sorensen. New York and London: Routledge.

Hominids, Earliest African

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Introduction

The term "hominid" in the traditional sense, and the sense in which it was used for decades and is used here, derives from the family name Hominidae which applies to humans and their ancestors as far back as the divergence from the great apes traditionally known as Pongidae or pongids.

Definition

In recent years many, but not all, palaeoanthropologists have abandoned the traditional terminology because they have accepted genetic studies which claim that humans are more closely related to chimpanzees than to orangutans and they therefore argue that it is wrong to group chimps together with orangs in the family Pongidae and that, instead, all the great apes and humans and their ancestors should be classed as hominids. They then separate off the African apes (gorilla and chimp) together with humans and their ancestors in the subfamily Homininae (which has for decades been used only for *Homo* and *Pithecanthropus* to distinguish them from the subfamily Australopithecinae). Then they further separate off humans and their ancestors as a newly introduced tribe, the Hominini or "hominins" (Klein 2009: 75).

Such a scheme has not found favor with all researchers into human origins. Some, e.g., Schwartz (1987), consider that we are not more closely related to chimps than to other great apes. Schwartz has argued that we are closer to the orangutan. Furthermore, there is no consistency in classifications based on supposed genetic distance. Stringer and Andrews (2005) and many others separate the gibbons and siamangs

(*Hylobatidae*) from the Hominidae, but Goodman et al. (2001) include gibbons not only in the family Hominidae but also in the subfamily Homininae. Goodman et al. also classify the orang, gorilla, chimp, and *Homo* together in the tribe Hominini. This was taken even further by Watson et al. (2001) who classify gorilla, chimp, and humans together in the genus *Homo*. Stringer and Andrews (2005) classified chimpanzees into the tribe Panini and humans and their ancestral relatives into the tribe Hominini, but Andrews (2015) later united chimpanzees together with humans and their relatives into the tribe Hominini. This conflicts with the reason why the zoological tribe Hominini was initially created, i.e., to include humans but exclude apes (see Klein 2009). Furthermore, while Stringer and Andrews (2005) classified gorillas in a separate subfamily, Gorillinae, Andrews (2015) placed gorillas in the subfamily Homininae.

The purpose of classification is to provide clearly defined groupings so that people know what they are talking about. The variability and inconsistency in classification listed above do not do that but have instead created confusion. Here, the established classification is retained wherein Hominidae or hominids refers only to humans and their ancestral kin going back to their separation from Miocene apes.

Key Issues/Current Debates/Examples

The search for the earliest hominids has been a challenge, not only because of the rarity of such fossils but also because the closer they are to the ape ancestor, the more difficult it is to determine whether a fossil fragment is that of an ape or an early hominid. This was well illustrated by the case of *Ramapithecus punjabicus* represented by fragmentary jaw fossils from the Siwaliks of Pakistan. During the 1960s, these were generally accepted as early hominids from the Miocene of Asia (Simons and Pilbeam 1965; Simons 1968). Louis Leakey (1962) even championed his own version of this Miocene ancestor from Fort Ternan in Kenya. He called it *Kenyapithecus wickeri* and entered into arguments with Pilbeam and Simons who considered it to be *Ramapithecus*. The Siwalik fossils were about 12 Ma, and the Fort Ternan specimen was well dated to 14 Ma. Leakey was determined to find even earlier hominids and selected several jaw fossils from Lower Miocene sites in western Kenya dating to 18 Ma ago. He named a new species *Kenyapithecus africanus* as an early Miocene hominid (Leakey 1967). At that time, "hominid" meant member of the human family. Leakey's claim was not generally accepted, and even *Kenyapithecus wickeri* was later demonstrated to be an ape. Andrews (1978) found that an ape mandible from Fort Ternan actually belonged to the same individual as the supposed hominid maxilla. *Ramapithecus* also was eventually considered to be an ape, and all thoughts of the possibility of Lower and Middle Miocene hominids were abandoned with the general acceptance of the geneticists' contention that chimp and human ancestors shared a common ancestor around 5 Ma ago. That divergence date has been put back further with the discovery of older fossils claimed as hominids, i.e., *Orrorin tugenensis* at six million and *Sahelanthropus tchadensis* at seven million (discussed below).

Questions then arise as to, firstly, whether the geneticists could be wrong, and secondly, as to whether the dates for these fossils are accurate. A third, and very important, question is the matter of how one recognizes an early hominid, i.e., what are the distinguishing hallmarks of hominids that set them apart from the apes?

When *Australopithecus* was first discovered, the fossils were for several years referred to as apes with manlike features, even by their discoverers Dart and Broom. Now, with the wealth of fossils that we have of Australopithecines, their status as hominids or human ancestors is undeniable. They have three main characteristics that set them apart from the apes, living and fossil. These are (1) a dentition that is morphologically like that of humans albeit with cheek teeth sometimes of exceedingly large size and sometimes ape-like lower third premolars, but with canines that are relatively small compared to those of apes, (2) skeletal adaptations in the pelvis and lower limbs to facilitate bipedal walking, and (3) a hand with relatively short palm and fingers and

relatively long and opposable thumb when compared to the hands of apes.

It is all or any of these features that are looked for in fossils in order to determine whether they are ape or hominid. The problem is that in the fragmentary and sometimes poorly preserved fossils available, such features are sometimes not so clear-cut and thus subject to debate and disagreement.

The earliest fossils that have been claimed by their discoverers to be hominids are *Sahelanthropus*, *Orrorin*, and *Ardipithecus*. *Sahelanthropus tchadensis* was found in 2001 in the Djourab Desert of Chad, more than 2500 km west of the fossil hominid sites of the East African Rift Valley (Brunet et al. 2002). The crushed cranium (called Toumai) was located by Ahounta Djimdoumalbaye, a member of a team organized by Michel Brunet on a paleontological survey of the desert that was once the shore of mega Lake Chad, and was digitally reconstructed by Zollikofer et al. (2005). Some partial mandibles and isolated teeth have also been assigned to this species (Brunet et al. 2005; Beauvilain and Le Guellec 2004). Although the team had located many magnificent fossils of a variety of fauna, these were the first hominid fossils from those remote Miocene deposits.

The fossil cranium was found resting on the surface of the sands which were littered with fossil bones of other animals. As there was no way to obtain an absolute age for the fossil, it was dated by comparing the contemporary fauna with that of well-dated East African sites. An age of 6 or 7 Ma was considered probable for the cranium which has been given the name Toumai, meaning, in the Goran language of Chad, "hope of life." The name was given by the president of Chad, Idriss Déby. In order to better refine the dating, the associated sediments were dated using beryllium isotopes for cosmogenic nuclide dating (Lebatard et al. 2008). The result was 6.8–7.2 Ma. Hence, the usual date suggested for this cranium is 7 Ma.

It is a small cranium and has some small teeth preserved. The most noticeable feature is the massive brow ridge. It is humanlike in its lack of anterior facial projection, its small canine which is worn at the tip, thick tooth enamel, and the anteriorly positioned foramen magnum and short basicranium which suggests that such a skull was supported on an upright walking hominid (Brunet et al. 2002). There is no resemblance to a chimpanzee, and the brow ridge is not only more massive than that of a male gorilla, but it does not have a supratoral sulcus which is a characteristic of gorillas.

Another claimant for early hominid status is *Orrorin tugenensis* found in 2000 in the Lukeino Formation of the Baringo district in Kenya by Martin Pickford and Brigitte Senut (Senut et al. 2001); it is represented by some partial limb bones, jaw fragments, and teeth and dated to 6 Ma. The discoverers noted that the upper part of the femur with the head and neck had humanlike features indicating that *Orrorin* was adapted to terrestrial bipedalism.

A third candidate for early hominid ranking is *Ardipithecus ramidus* from Ethiopia, dating to 4.4 Ma ago (White et al. 2009). A fragmented partial skeleton found in 1995 took many years of careful extraction before it could be published in a series of 11 articles in a special section of the journal "Science." The skeleton was excavated at Aramis in the Middle Awash region of Ethiopia and represented a 120-cm tall female. There is much of the skull with teeth, revealing humanlike features of short cranial base, short face, small canines, and broad mandibular corpus. The brain is small (300–350 cc) and the foot has a divergent big toe. The pelvis has ilia that are broad and short in comparison to the apes. This and other features of the limbs and spinal column led the researchers to conclude that *Ardipithecus* was bipedal.

These suggestions of bipedality coupled with the dentition and skull structure were enough to convince White et al. (2009) that they had an early hominid. There have of course been skeptics just as there were with *Sahelanthropus* and *Orrorin*. This emphasizes the problems mentioned before of how to distinguish an early hominid from an ape when the fossils are fragmentary and poorly preserved and nevertheless display a mixture of ape-like and humanlike characters. The fact remains that somewhere in Africa, there was

undoubtedly an ancestor to the earliest generally accepted hominid which is *Australopithecus anamensis* at 4.2 Ma and *Sahelanthropus*, *Orrorin*, and *Ardipithecus* represent good candidates for such ancestral status.

An even earlier form of *Ardipithecus ramidus* dating to between 5.2 and 5.8 Ma ago also comes from the Middle Awash of Ethiopia. The fossils consisting of some teeth, a partial mandible, ulna and humerus portions, a foot phalanx, and a hand phalanx were named *Ardipithecus ramidus kadabba* (Haile-Selassie 2001).

A similarly aged fossil, part of the right side of a mandible with one heavily worn first molar, was recovered in 1967 at Lothagam, west of Lake Turkana, Kenya (Patterson et al. 1970), and dated to 5.5 Ma. The Lothagam site was discovered by Larry Robbins (then a University of California Berkeley student), who, together with a small team of assistants and another student, John Yellen, was exploring the remote western shore of what was then Lake Rudolf (now Lake Turkana), in the hope of finding Late Stone Age sites for his Ph.D. research. He showed it to Ron Clarke who, realizing the great age of the fossils, brought it to the attention of Brian Patterson of Harvard, who had been working at the nearby site of Kanapoi. Patterson's team subsequently surveyed Lothagam, and, together with a significant collection of Miocene fauna, they found the tantalizing fragment of a possible hominid mandible. However, the worn molar and the fragment of corpus were insufficient for palaeoanthropologists to be sure of its status, as it might instead have been an ape. Thus, for years, it remained largely undiscussed. However, Pilbeam (1972) was impressed with its similarity to *A. africanus* and published a photograph in which he compared it to a Makapansgat *A. africanus* mandible. Fourteen years later, it was discussed in more detail by Kramer (1986) and then by Hill et al. (1992). Now that the 4.2-Ma-old *Australopithecus anamensis* has been found at Kanapoi, and with the revelations of the 4.4–5.8-Ma-old *Ardipithecus*, it seems most probable that the Lothagam mandible is that of an early hominid, possibly belonging to *Ardipithecus* or to an early Australopithecine.

Cross-References

▶ Australopithecines
▶ *Homo habilis*
▶ *Paranthropus*

References

Andrews, P. 1978. A revision of Miocene Hominoidea of East Africa. *Bulletin of the British Museum (Natural History)* 30: 85–225.

Andrews, P. 2015. *An Ape's view of human evolution*. Cambridge: Cambridge University Press.

Beauvilain, A., and Y. Le Guellec. 2004. Further details concerning fossils attributed to *Sahelanthropus tchadensis* (Toumaï). *South African Journal of Science* 100 (3/4): 142–144.

Brunet, M., F. Guy, D. Pilbeam, H.T. Mackaye, A. Likius, D. Ahouta, A. Beauvilain, C. Blondel, H. Bocherens, J.-R. Boisserie, L. De Bonis, Y. Coppens, J. Dejax, P. Duringer, V. Eisenmann, G. Fanone, P. Fronty, D. Geraads, T. Lehmann, F. Lihoureau, A. Louchart, A. Mahamat, G. Merceron, G. Mouchelin, O. Otero, P. Pelaez Campomanes, M. Ponce De Leon, J.-C. Rage, M. Sapanet, M. Schuster, J. Sudre, P. Tassy, X. Valentin, P. Vignaud, L. Viriot, A. Zazzo, and C.P.E. Zollikofer. 2002. A new hominid from the upper Miocene of Chad, Central Africa. *Nature* 418: 145–151.

Brunet, M., F. Guy, D. Pilbeam, D.E. Liebermann, A. Likius, H.T. Mackaye, M. Ponce de Leon, C.P.E. Zollikofer, and P. Vignaud. 2005. New material of the earliest hominid from the upper Miocene of Chad. *Nature* 434: 752–755.

Goodman, M., J. Czelusniak, S. Page, and C.M. Meireles. 2001. Where DNA sequences place *Homo sapiens* in a phylogenetic classification of primates. In *Humanity from African naissance to coming millennia*, ed. P.V. Tobias, M.A. Raath, J. Moggi-Cecchi, and G.A. Doyle, 279–289. Florence/Johannesburg: Firenze University Press and Wits University Press.

Haile-Selassie, Y. 2001. Late Miocene hominids from the middle awash, Ethiopia. *Nature* 412: 178–181.

Hill, A., S. Ward, and B. Brown. 1992. Anatomy and age of the Lothagam mandible. *Journal of Human Evolution* 22: 439–451.

Klein, R.G. 2009. *The human career*. Chicago/London: University of Chicago Press.

Kramer, A. 1986. Hominid - pongid distinctiveness in the Miocene - Pliocene fossil record: The Lothagam mandible. *American Journal of Physical Anthropology* 70: 457–473.

Leakey, L.S.B. 1962. A new lower Pliocene fossil primate from Kenya. *Annals and Magazine of Natural History* 13 (4): 689–696.

Leakey, L.S.B. 1967. An early Miocene member of Hominidae. *Nature* 213: 155–163.

Lebatard, A.-E., D.L. Bourle, P. Duringer, M. Jolivet, R. Braucher, J. Carcaillet, M. Schuster, N. Arnaud, P. Monie, F. Lihoreau, A. Likius, H.T. Mackaye, P. Vignaud, and M. Brunet. 2008. Cosmogenic nuclide dating of *Sahelanthropus tchadensis* and *Australopithecus bahrelghazali*: Mio-Pliocene hominids from Chad. *Proceedings of the National Academy of Sciences* 105 (9): 3226–3231.

Patterson, B., A.K. Behrensmeyer, and W.D. Sill. 1970. Geology and fauna of a new Pliocene locality in North-Western Kenya. *Nature* 226: 918.

Pilbeam, D. 1972. *The ascent of man: An introduction to human evolution*. New York: Macmillan.

Schwartz, J.H. 1987. *The red ape: Orang- utans and human origins*. London: Elm Tree Books/Hamish Hamilton Ltd.

Senut, B., M. Pickford, D. Gommery, P. Mein, K. Cheboi, and Y. Coppens. 2001. First hominid from the Miocene (Lukeino Formation, Kenya). *Comptes Rendus de l' Académie des Sciences, Paris, Série Iia* 332: 137–144.

Simons, E.L. 1968. A source for dental comparison of *Ramapithecus* with *Australopithecus* and *Homo*. *South African Journal of Science* 64: 92–112.

Simons, E.L., and D. Pilbeam. 1965. Preliminary revision of the Dryopithecinae (Pongidae, Anthropoidea). *Folia Primatologia* 3: 81–152.

Stringer, C., and P. Andrews. 2005. *The complete world of human evolution*. London: Thames and Hudson.

Watson, E.E., S. Easteal, and D. Penny. 2001. Homo genus: a review of the classification of humans and the great apes. In *Humanity from African naissance to coming millennia*, ed. P.V. Tobias, M.A. Raath, J. Moggi-Cecchi, and G.A. Doyle, 307–318. Florence/Johannesburg: Firenze University Press & Wits University Press.

White, T.D., B. Asfaw, Y. Beyene, Y. Hailie-Selassie, C.O. Lovejoy, G. Suwa, and G. WoldeGabriel. 2009. *Ardipithecus ramidus* and the paleobiology of early hominids. *Science* 326: 75–86.

Zollikofer, C.P.E., M.S. Ponce de Leon, D.E. Lieberman, F. Guy, D. Pilbeam, A. Likius, H.T. Mackaye, P. Vignaud, and M. Brunet. 2005. Virtual cranial reconstruction of *Sahelanthropus tchadensis*. *Nature* 434: 755–759.

Further Reading

Gibbons, A. 2006. *The first human*. London/New York: Doubleday.

Reader, J. 2011. *Missing links*. Oxford: Oxford University Press.

Simons, E.L. 1972. *Primate evolution. An introduction to man' s place in nature*. London/New York: MacMillan.

Hominin Paleoecology and Environmental Archaeology

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Introduction

Reconstructing the lives of our closest fossil relatives is relevant to our understanding of the history of the human lineage, our biology, and our relationship with the environment. Further back in time, evidence of material culture dwindles until, at around 2.6 million years ago, there ceases to be any surviving record. Prior to this, researchers must work with the same record of fossils, sediments, and rocks as any paleontologist. For the period before 2.6 million years ago, an ecological perspective – as opposed to the archaeological one usually employed for *Homo sapiens* – is therefore necessary. But the value of the paleoecological approach is not limited to species which predate material culture. The insights to be gained from studies of trophic relationships, ecological structures, and hominin interactions with the physical environment ensure that this perspective remains important to the study of human evolution up to and including *Homo sapiens*.

Definition

Paleoecology is the study of ancient ecology. Environmental archaeology, in its broadest definition, is also concerned with the ecology of the past, specifically with an ecological approach to past human populations. The two fields are thus very similar, with the key difference lying in their scale and subjects. Hominin paleoecologists largely study fossil specimens of extinct species,

and their study spans the entirety of paleontological history. Environmental archaeology is more circumscribed, focusing on a single species typically represented by subfossil and archaeological evidence. There are exceptions to this, as in the case of the paleoecological study of subfossil specimens like *Homo floresiensis* (Flores, Indonesia) or specimens of our own species. Both fields draw upon methods from biology and geology, but paleoecology, by virtue of the nature of its source evidence, has a somewhat stronger relationship with the geological sciences, particularly the study of taphonomy (Hardt et al. 2007).

"Hominin" denotes all those species more closely related to modern humans than to their closest living relatives *Pan paniscus* and *Pan troglodytes* (Wood and Lonergan 2008). Panins and hominins shared a common ancestor some 5–6 million years ago. For much of their history, two or more hominin species have coexisted, resulting in a complex and unstable taxonomy. While different authors champion different demarcations between species and even genera, this article recognizes the genera *Sahelanthropus*, *Orrorin*, and *Ardipithecus* as stem hominins and *Australopithecus*, *Paranthropus*, and *Homo* as later, more certain forms.

Key Issues/Current Debates

Given the diversity of paleoecological research, which can include everything from isotope studies of ocean sediments through to microscopic studies of fossil teeth and computer modeling of paleoclimates, it is difficult to produce a general classification of the field. There is much ongoing debate and many questions remain unanswered, focusing at all scales from the individual site or specimen through to intercontinental studies of evolutionary ecology and dispersal of lineages and at every intermediate scale. There are four major topics in the literature, specifically:

1. Diet: what hominins ate, how they obtained their food, and the implications for anatomy, behavior, and energetics
2. Ecological interactions and intrinsic ecology: the relationships between hominin taxa and between hominins and other organisms, life history, and adaptations
3. Environment: the environmental tolerances and preferences of the hominins
4. System dynamics, agency, and cooperation

These topics are interlinked by the complex relationships between paleoecological evidence and its interpretation. A paleoecological dataset can typically be used for more than one purpose, and specific research questions can be approached in several ways through different analyses. For example, Bobe et al. (2002) used data on faunal samples from strata in the Omo Valley in Ethiopia between 4 and 1.9 million years old to reconstruct changes in the abundance of different taxa. Skeletal element counts were used to evaluate the role of taphonomic processes in producing these patterns. The resulting environmental reconstructions were then checked against evidence from marine dust records and found in part to reflect climatic changes at the time (Bobe et al. 2002). This sort of multi-proxy approach is becoming ever more common as it provides the opportunity to validate and enhance reconstructions based on a single line of evidence and to identify or reduce the impact of taphonomic bias. Research may also draw on computer modeling, studies of modern analogue environments and ecosystems, and comparative data on primates and other taxa. These comparisons may be with homologous taxa (those closely related to hominins) or analogous ones which perform similar ecological roles. The use of diverse methods has had a key impact on paleoecology. It raises second-order questions of data quality, the choice and accuracy of specific methods, and the role of theories and assumptions which are almost as important as first-order concerns about diet, environment, and ecology.

Hominin Diets

The earliest proposals of hominin diet were heavily influenced by contemporary anthropological emphases on the "humanness" of fossil specimens and the importance of hunting and meat eating in setting humans (and hence hominins)

apart from our closest relatives. Despite significant new methodological advances, such as the advent of tooth microwear studies, isotopic analyses of dental enamel and bones, and enamel microstructure analyses, scientists remain uncertain about hominin diets. Between 4.4 and 2.3 million years ago, the early hominins (*Australopithecus anamensis*, *Au. afarensis*, and *Au. africanus*, with initial signs also in *Ardipithecus ramidus*) developed a characteristic pattern of small incisors, large flat molars, thick tooth enamel, and robust mandibles which would have enabled them to eat both hard and soft, though not tough, foods (Teaford and Ungar 2000). This would have permitted a flexible diet consisting of a range of foods from savannah and forest. *Paranthropus robustus*, in contrast, may have been capable of processing more tough plant foods as well (Teaford and Ungar 2000). Later species likely made more use of higher-quality resources, perhaps including terrestrial and aquatic animal foods, honey, or tubers (Braun et al. 2010).

As more specimens of each species have been subjected to analysis, the significance attributed to intraspecies dietary variation has increased. The flexible adaptations of *Australopithecus*, and the mosaic patterns of dietary evolution in this taxon, suggest that they could have eaten a wide range of foods (Teaford and Ungar 2000), and indeed evidence for this is found in isotopic analyses of *Au. africanus* and *P. robustus* which are both more extreme generalists even than modern baboons (Codron et al. 2008). Emphasis has shifted from a focus on absolute dietary differences between taxa to one which recognizes the potential role of "fallback foods" – those which are important in times of scarcity, but which may not typically form a central part of the diet – in anatomy and ecological adaptation. Current debate centers on questions of dietary variability, niche breadth, niche overlap, and flexibility at the individual and species level. Concomitant considerations include "adequate" sample sizes, theoretical frameworks for adaptive evolution which might explain the complex relationship between food consumption and craniofacial anatomy, and analytical robusticity.

Ecological Interactions and Intrinsic Ecology

Questions of diet are closely linked to those of ecological interaction, including predation, competition, commensalism, and parasitism. Characterizing the communities at hominin sites is one priority and involves analyzing environmental context and taphonomy in an attempt to move from the paleocommunity (the species represented in a fossil assemblage) to an understanding of the living community. Studies of modern analogue communities and interpretations of an organisms' ecological niche based on that of their living relatives can be used to check or confirm these reconstructions (Potts 1998). In many cases, there is a focus on comparisons between sites or strata, as in the study by Bobe et al. (2002) of change in the dominance of suids, bovids, and cercopithecids through time in the Omo Valley. Another example is Lewis and Werdelin (2007)'s work on the ecological structure of the carnivore guild at various east African sites. These studies may help in placing hominins within a particular ecological group and in the identification of broader patterns in faunal evolution and ecology. Two examples are the "turnover pulses" characteristic of African mammal lineages which may correlate with hominin adaptive radiations or ecological shifts (Potts 1998) or changes in vegetation distributions and structures which might cause ecological divergence of hominins and panins (Hardt et al. 2007).

Closely linked to the question of the ecological position of hominins with respect to animals and plants are those of niche separation and coexistence among hominins themselves. Multiple hominin species have existed in parallel, often in the same regions and similar habitats, for all but the last few tens of thousands of years, with perhaps as many as six in certain periods (Wood and Lonergan 2008). Their classification into species and genera implies some sort of evolutionary and hence ecological separation from one another. Identifying precisely what this might imply, especially when all aspects of hominin ecology are showing increasing evidence of intra- and interspecies variability, is difficult and is an area which focuses on the synthesis of external factors (environment and community ecology) with

intrinsic ecological ones relating to life history and behavior (Senut 2007). Aspects of life history, such as lifespan, fertility, and reproductive rates may determine the long-term strategies available to hominins. They can be reconstructed for fossil species using "life history-related variables" like body mass, dental, and osteological development patterns and brain growth schedules (Robson and Wood 2008), through the application of general rules based on primate and mammal studies.

The first specimen to show a developmental pattern similar to that of extant *Homo sapiens* appears late in our history. Smith et al. (2007) identify a juvenile from Jebel Irhoud, North Africa, as this individual – but the relatively small sample size of immature hominins throws into context the issue of paleoecologists' reliance on individual specimens which may not always be representative of their populations. This humanlike pattern is not something which appears steadily from an apelike precursor. Robson and Wood (2008) note that early attempts to describe hominin life histories tend to focus on characterizing the shift from "apelike" (usually characterized by members of *Pan*) to "humanlike," but that in more recent research, it has become increasingly apparent, once again, that hominin life history variables not only change at different rates and periods but also show unique, distinctive configurations that differ from all living species. *Paranthropus*, in particular, has a pattern of dental development which sets it apart from both living African apes and humans (Robson and Wood 2008). Understanding these patterns, and how they fit with hominins' ecological strategies and niches, is thus less a question of characterizing evolution as it is of developing a more detailed understanding of each species' unique ecology. Questions of theoretical perspectives and their validity, and of how and why scientists approach hominin ecology (historically as intermediate between us and the nonhuman apes, or more recently as distinctive in their own right) are therefore central.

Hominin Environments

The interactions between hominins and the physical environment are also very important. The identity and role of specific environments which drove "hominization" or the acquisition of key human/hominin ecological and anatomical characters are of particular interest. There are two major groups of hypotheses as to the nature of the key environment. The first group focuses on simple shifts, either in the nature of the environment, for example, aridification and the expansion of grassland, or in the preferences and tolerances of hominins. The second group focuses on changes in environmental variability or evolutionary turnover, like the turnover pulse hypothesis or the variability selection model (Potts 1998). A new suggestion, focusing on spatial (as opposed to temporal) variability and the role of physical landscape rather than climate or vegetation in driving hominin evolution, has also recently been proposed (King and Bailey 2006), highlighting the role of spatial mosaics in environments and of rough topography in providing resource-rich refugia and tactical advantages over predators.

These environmental hypotheses are usually based on theories of the way(s) specific contexts might influence hominin precursors living in them, but they are closely tied to paleoenvironmental evidence from fauna, flora, geology, isotopes, and sediments for validation. Such studies are responsible for recent proposals which highlight the role of forests in generating hominin traits, as studies of the stem hominins *Ardipithecus*, *Orrorin*, and *Sahelanthropus* have suggested that forests and lakesides, rather than open plains, were typical of their localities (Senut 2007). Later species have been found in a variety of contexts, and questions today center not just on the nature of habitats but on the role of taphonomic bias and preservational factors in generating observed patterns in distributions and habitat associations (King and Bailey 2006). Fossils are often found in lake and river sediments, because these are the places where deposition is common and preservation most likely. A range of paleoenvironmental methods, modern analogue studies, and modeling techniques are therefore used to contextualize specific sites. This enables researchers to fill the gaps left in the fossil record by taphonomic bias, transport of remains, and

uncertain dating (Potts 1998). Later studies often focus on the role of coasts and other environments as dispersal routes for *H. erectus* and *H. sapiens* and the interactions of *Homo* spp. with the environments and ecosystems they encountered.

System Dynamics, Agency, and Cooperation

Much of the seminal literature on hominin paleoecology actually predates the word "ecology" and is closely linked to broader paradigms in biology and archaeology. Alfred Russel Wallace's paper on the origin of human races mounts a powerful challenge to the coevolutionary model presented in Darwin's *Origin* (Wallace 1864). Wallace argues that advanced cognitive skills effectively enabled humans to evade the universal effects of natural selection. In his later writings, notably *What is Life*, Wallace argues that this intellectual and technological liberation cannot be explained in purely scientific terms and infers the existence of a universal intelligence comparable to Henri Bergson's *élan vital*. Wallace's idea undermines all those chapters in Darwin's *Origin* that deal with cooperation and creative synergy. Wallace seems to have believed that only humans, with their superior intelligence and technology, could set natural selection in abeyance and influence the course of evolution.

Charles Darwin's *Descent of Man* presents a naturalistic model, which the older Wallace and Bergson rejected. Darwin believed higher cognitive function may actually have reduced the relative fitness of some individuals but would have persisted if it increased the fitness of the community in which the individual is embedded. Similar arguments are made in *Origin*, where Darwin discusses the coevolution of humans and their domesticated commensals and of plants and their pollinators. An insect that can only feed from rare, long-throated flowers, for example, may not enjoy the same reproductive success as a generalist but can persist as long as the community of plants and insects maintains the fitness of all. This difference of emphasis between Darwin and Wallace prefigures the twentieth-century tension between neo-Darwinists (who favor Wallace's model) and coevolutionary ecologists, who allow for the possibility that selection pressures can be mitigated by interspecies cooperation. This anticipation is all the more remarkable when one observes that Thomas Henry Huxley argued for a stick-slip model of evolution, which anticipated Hugo de Vries' later work on "mutationism" and later twentieth-century theories about "punctuated equilibria."

Although some of the key concepts of later twentieth-century systems ecology were well documented in the 1860s and 1870s and discussed almost continually since, the ideas did not become scientifically respectable until the 1960s and 1970s, when an innovation cascade fueled by postwar perestroika and the development of new computer methods led to a partial rehabilitation of Darwinian complexity. The first scholarly biological papers to explicitly use the word "coevolution" date from the 1960s; research on behavioral ecology and ethology that had been the preserve of natural historians and amateurs now came into the scientific mainstream, and models of stick-slip evolutionary dynamics and continental drift were rehabilitated. Although some textbook and popular literature presents this as a cascade of scientific discoveries, the primary sources are more consistent with an institutional veto that pushed complex dynamics beyond the pale, as it were.

In archaeology, this innovation cascade produced a number of confusing hybrids that tried to meld classic and complex approaches. It is helpful here to distinguish large-P from small-p processual archaeology. Large-P processualism had been a hybrid of classic and complex systems approaches that strove to link new developments in anthropological archaeology to classic science, particularly to Karl Hempel's concept of the scientific law. Small-p processualism or "new archaeology," on the other hand, was a more pragmatic attempt to integrate systems ecology, new scientific methods, and anthropological archaeology. Thus, by the time Lewis Binford (1981) published his research on taphonomy and hominin ecology, he had publicly repudiated his earlier processual polemics, rejecting the quest for universality in favor of what he called "middle-range theory." By studying animal modifications of bones, Binford learned to distinguish the shearing and crushing actions that can be effected using

jaws alone from modifications that could only have been effected by hominins. By analyzing faunal data in the light of this understanding, he felt able to reject the "man the hunter" hypothesis and suggested that early hominins were scavengers. The essential feature of Binford's later (small-p) processual research was a separate effort of research on process and transformation designed to provide an inferential platform. Middle-range theory identifies inferential links between the mundane and frankly uninteresting phenomena we can observe and unobservable phenomena that interest us.

As the processual vs. post-processual debates intensified in the later 1980s and 1990s, a number of new archaeologists became interested in more dynamic models of paleoecology. Where post-processual debates often degenerated into a paradigmatic argument about agency, scale, and the relative merits of environmental determinism and agency, the dynamic approach looked for some common ground. All socio-natural systems are "dynamic" in the sense that they change, but the studies referred to here involve co-dynamic situations, where cultural and natural systems create and recreate each other. This approach invites us to consider a stick-slip dynamic in which one set of causal structures can become unstable and a new, qualitatively different type of co-dynamic interaction can emerge.

The (co-)dynamic or coevolutionary approach is rare in archaeology as a whole, but two examples can be found in Pleistocene hominin paleoecology. Bailey's (1997) Epirus Project included a study of predator-prey interaction based on a hypothesis of constant disequilibrium. The result was an individual-based "toy-world" model of plant, herbivore, and predator interaction that suggested resilience could be lost if this open-ended game of hide and seek was constrained, for example, by obstacles to dispersal. By relating these middle-range insights to climate and sea-level changes, the project was able to predict the distribution of hunting sites through space and time, including some in regions that currently lie offshore.

A second example of co-dynamic paleoecology in Pleistocene ecology is provided by Mithen's (1993) work on mammoth populations. Mithen developed a simple model of mammoth reproductive behavior and used it to show that a relatively small human cull (less than 3%) could reduce the resilience of a healthy population, rendering it susceptible to relatively minor fluctuations in predation pressure and natural disasters. Again, the focus is on resilience and co-dynamic interaction between populations. Our final example uses a more ethnographic approach to systems analysis. Like Binford, Ezra Zubrow (2005) is concerned with developing methodological protocols for interpreting patterns in space and time. Where Binford's analyses were, at a first level of approximation, a-spatial, Zubrow is interested in GIS and exploring a form of auto-ethnography. Pleistocene hominins did not use the abstract, analytic skills we deploy, but those abstract methods are based on a similar cognitive foundation. By exploring the concepts of patchiness and crowding and the ways people perceive spatial pattern, Zubrow hopes to gain new insights into paleoanthropology and the dynamic ecologies of culture.

Conclusions

Our understanding of hominin paleoecology is variable and rapidly changing. Certain topics – for instance, diet in *Paranthropus* species, the interactions of species at major sites like the Omo and Olduvai, and the environments that may have driven hominization – have been intensively studied, while others are less well known. Both direct questions about ecology and more abstract problems of taphonomy, data quality and use, and methodological validation remain under active investigation. Progress is driven by a combination of methodological advances and refinements, new fossil discoveries, novel approaches to existing questions, and synthetic "meta-analyses" that integrate data from several sources and projects. Hominin paleoecology is a highly relevant and wide-reaching field with much to contribute to our understanding of the human past.

Cross-References

- ▶ Australopithecines
- ▶ Fossil Records of Early African *Homo*
- ▶ Hominids, Earliest African
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
- ▶ *Homo habilis*
- ▶ *Homo heidelbergensis*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Human Evolution: Theory and Progress
- ▶ Olduvai Gorge Archaeological Site
- ▶ *Paranthropus*
- ▶ Taphonomy in Human Evolution

References

Bailey, G.N. 1997. *Klithi: Palaeolithic settlement and Quaternary landscapes in northwest Greece*. Cambridge: McDonald Institute Monographs.

Binford, L.R. 1981. *Bones: Ancient men and modern myths*. London: Academic Press.

Bobe, R., A.K. Behrensmeyer, and R.E. Chapman. 2002. Faunal change, environmental variability and late Pliocene hominin evolution. *Journal of Human Evolution* 42: 475–497.

Braun, D.R., J.W.K. Harris, N.E. Levin, J.T. McCoy, A.I.R. Herries, M.K. Bamford, L.C. Bishop, B.G. Richmond, and M. Kibunjia. 2010. Early hominin diet included diverse terrestrial and aquatic animals 1.95 Ma in East Turkana, Kenya. *Proceedings of the National Academy of Sciences* 107: 10002–10007.

Codron, D., J.A. Lee-Thorp, M. Sponheimer, D. de Ruiter, and J. Codron. 2008. What insights can baboon feeding ecology provide for early hominin niche differentiation? *International Journal of Primatology* 29: 757–772.

Hardt, T., B. Hardt, and P. Menke. 2007. Paleoecology: An adequate window on the past? In *The handbook of paleoanthropology*, ed. W. Henke and I. Tattersall, 503–544. Heidelberg: Springer-Verlag.

King, G., and G. Bailey. 2006. Tectonics and human evolution. *Antiquity* 80: 1–22.

Lewis, M.E., and L. Werdelin. 2007. Patterns of change in the Plio-Pleistocene carnivorans of eastern Africa: Implications for hominin evolution. In *Hominin environments in the East African Pliocene*, ed. R. Bobe, Z. Alemseged, and A.K. Behrensmeyer, 77–105. Dordrecht: Springer.

Mithen, S. 1993. Simulating mammoth hunting and extinction: Implications for the late Pleistocene of the Central Russian Plain. *Archeological Papers of the American Anthropological Association* 4: 163–178.

Potts, R. 1998. Environmental hypotheses of hominin evolution. *Yearbook of Physical Anthropology* 41: 93–136.

Robson, S.L., and B. Wood. 2008. Hominin life history: Reconstruction and evolution. *Journal of Anatomy* 212: 394–425.

Senut, B. 2007. The earliest putative hominids. In *The handbook of paleoanthropology*, ed. W. Henke and I. Tattersall, 1519–1538. Heidelberg: Springer-Verlag.

Smith, T.M., P. Tafforeau, D.J. Reid, R. Grun, S. Eggins, M. Boutakiout, and J.-J. Hublin. 2007. Earliest evidence of modern human life history in North African early *Homo sapiens*. *Proceedings of the National Academy of Sciences* 104: 6128–6133.

Teaford, M.F., and P.S. Ungar. 2000. Diet and the evolution of the earliest human ancestors. *Proceedings of the National Academy of Sciences* 97: 13506–13511.

Wallace, A.R. 1864. The origin of human races and the antiquity of man deduced from the theory of "natural selection". *Journal of the Anthropological Society of London* 2: clviii–clxxxvii.

Wood, B., and N. Lonergan. 2008. The hominin fossil record: Taxa, grades and clades. *Journal of Anatomy* 212: 354–376.

Zubrow, E.B.W. 2005. Prehistoric space: An archaeological perspective. *Journal of World Anthropology* 2: 1–42.

Further Reading

Gell-Mann, M. 1994. *The Quark and the Jaguar: Adventures in the simple and the complex*. London: Little, Brown and Company.

Homo erectus

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Introduction

Homo erectus is a geographically widespread and temporally long-lasting fossil hominin species known from Africa and Asia between c. 1.9 Ma and 500 ka (but perhaps to <100 ka). The taxon

subsumes a large amount of skeletal variation, and one of the central debates concerns whether this variation should be partitioned into multiple species. *Homo erectus* was the first hominin to disperse out of Africa as well as the first to take important steps toward modern human form, development, and behavior. *Homo erectus* has traditionally held a canonical position in hominin evolution, chronologically succeeding *Homo habilis* and preceding *Homo sapiens*. However, this simple time-successive progression has been complicated by additional fossil discoveries in Africa that confirm the presence of multiple species of non-*erectus* early *Homo* (Leakey et al. 2012) as well as the temporal and geographic overlap of *Homo erectus* and *Homo habilis* (Spoor et al. 2007). Nonetheless, *H. erectus* remains the presumptive common ancestor for *H. sapiens*.

Definition

Species History and Distribution

The *Homo erectus* nomen dates to the 1940s, but fossils attributed to this species have been known since the nineteenth century. Spurred by the prevailing hypothesis that human ancestors would be found in Southeast Asia, Eugène Dubois sought and found fossils in Java in the 1890s that were recognizably nonhuman but possessed brain sizes well above those of modern apes. He assigned the material to a new species, *Pithecanthropus erectus* (upright ape-man; Dubois 1894). Subsequent discoveries at the site of Zhoukoudian in China were dubbed *Sinanthropus pekinensis* (Black 1927). Both genera, along with others named in Indonesia and South Africa, were eventually subsumed into *Homo* based on their similarities to each other and relationship to modern humans. The original species name was retained to create *Homo erectus* (Mayr 1944). Discoveries at Olduvai Gorge in the 1960s (e.g., OH 9) expanded the known range of *Homo erectus* into East Africa. The species is known from East, South, and possibly North Africa and West, East, and Southeast Asia.

Homo erectus is defined by its distinctive cranial morphology, including a long, low vault and the presence of cranial suprastructures such as sagittal keeling, an angular torus, a bar-like or arching supraorbital torus, and a projecting occipital torus (Antón 2003, 2012). The widest part of the cranial vault is low and in combination with sagittal keeling and parietal deflation gives the cranium a heptangular shape when viewed from behind. Crania display moderate to marked postorbital constriction and facial prognathism, and the bones of the cranium and mandible tend to be thick and robust, although some of these attributes scale with brain size. Brain sizes range from ~650 to 1200 cc's, with an average of ~900 cc's (Spoor et al. 2007). While there is a trend of increasing average brain size within *Homo erectus* throughout the Pleistocene, most of this range in variation is present throughout the entire temporal span of the species. The lower end of the range overlaps with other early *Homo*, although average brain size is ~25% greater in *Homo erectus* than in non-*erectus* early *Homo* (Antón and Snodgrass 2012).

Characterizing the postcranial skeleton of *Homo erectus* is a more difficult task given the paucity of skeletal remains that are definitively associated with diagnostic cranial remains and the temporal overlap with other *Homo* species. The most complete *Homo erectus* skeleton, KNM-WT 15000, demonstrates that some individuals were relatively large and probably possessed the long, linear body form associated with tropically adapted recent humans (Ruff and Walker 1993; Graves et al. 2010). As with cranial capacities, however, there is a wide range of body sizes for *Homo erectus*, with small individuals found in all regions (Antón and Snodgrass 2012), such as the small-sized individuals from Dmanisi, Georgia. South African and East African *H. erectus* are similar in size, with East African *H. erectus* ranging from 51 to 68 kg and 160 to 185 cm tall depending upon whether the Gona pelvis is included, but some of the South African remains may be as small as 30 kg (Antón 2012). The Georgian remains are 17–24% smaller (40–50 kg, 146–166 cm), although this difference may be the result of a categorization bias in Africa

that has tended to place smaller isolated postcrania into early *Homo* and larger into *H. erectus* (Antón 2012). Although previously argued to differ from earlier hominins in possessing a more modern-human-like body plan with longer legs and a less funnel-shaped rib cage, hind limb elongation appears instead to be a ubiquitous feature of hominins (Pontzer 2012). Nonetheless, overall the fossil record reveals larger average body sizes in *H. erectus* than in non-*erectus* early *Homo* (Pontzer 2012). Coupled with increased brain size, these body size differences suggest larger home range sizes and the beginning of an adaptive shift.

Homo erectus is notable for being the first hominin to disperse out of Africa, which is generally attributed to a combination of increased dietary quality, body size, and home range size (Antón et al. 2002, 2014). In particular, increased efficiency in the acquisition and processing of meat is arguably tied to increased body and brain sizes in *Homo erectus*. The discovery of the relatively small-brained and small-bodied *Homo erectus* individuals from Dmanisi, Georgia, however, suggests that increased body size may not have been a prerequisite for dispersal from Africa. In addition, microwear analyses of the Dmanisi teeth suggest they shared a similar dietary breadth as other *Homo erectus* specimens, which may imply a shift in foraging strategy independent of body size (Pontzer et al. 2011). The geographic range of *Homo erectus* within Africa exceeds that of any earlier hominin and, combined with the ability of *Homo erectus* to disperse out of Africa and colonize novel environments such as higher latitudes in Eastern Asia, points to a species able to adapt to a wide range of environments, foreshadowing the highly adaptable nature of modern humans.

The oldest *Homo erectus* fossils are found in Africa, including specimens from Koobi Fora, Kenya, dated from 1.89 to 1.7 Ma (e.g., KNM-ER 2598, 3733, and 3883; Fig. 1). Interestingly, *Homo erectus* is found outside of Africa almost from the beginning of its first appearance datum in Africa. Fossils from Dmanisi in the Republic of Georgia, for example, date to ~1.8 Ma (Gabunia et al. 2000). The ages of the Indonesian *Homo erectus* remains are less secure but nearly as old; the Mojokerto (Perning) child's cranium may date to ~1.8 Ma, a series of *H. erectus* bearing deposits at Sangiran range from 1.6 to 1.0 Ma, and the holotype, the Trinil skullcap recovered by Dubois, dates to about 1.0 Ma (Swisher et al. 1994; Antón and Swisher 2004). The oldest archaeological material in China dates to about 1.6 Ma (Zhu et al. 2004), and new dates for the Gongwangling cranium also approach this age (Zhu et al. 2015), with additional fossil remains present around 800–500 ka at Zhoukoudian (Shen et al. 2009). If the Ternifine mandibles are excluded, the youngest African *H. erectus* is about 900 ka at Olorgesailie and Daka, Ethiopia. The youngest mainland Asian remains are about 250 ka, and the last appearance datum for the entire species appears to be for Indonesian fossils from Ngandong and Sambungmacan that may date to 500–250 ka (Indriati et al. 2011) or perhaps even to 50–27,000 years (Swisher et al. 1996).

Homo erectus is associated with both the Oldowan and Acheulean stone tool industries. African *Homo erectus* fossils from the earliest Pleistocene (1.8–1.5 Ma) are often found with the core and chopping tools of the Oldowan, as are the earliest specimens outside of Africa (e.g., Dmanisi) and all of the Asian fossils (Ferring et al. 2011). The oldest Acheulean appears about 1.7 Ma in Africa (Lepre et al. 2011). The lack of the Acheulean tradition at *Homo erectus* sites in China and Indonesia has led researchers to hypothesize a different material culture perhaps involving bamboo tools in conjunction with Oldowan-type chopping tools. The fossil record shows much evidence for butchery and demonstrates that *Homo erectus* often had primary access to animal carcasses (Potts 2012).

Key Issues/Current Debates

The taxonomic debates surrounding *Homo erectus* center on how to partition the variation seen in a long-lived, globally dispersed fossil species. The paleoanthropological community remains divided on this core issue. Some researchers (e.g., Antón 2003; Baab 2008, 2016) argue that all of the Indonesian, Chinese, and

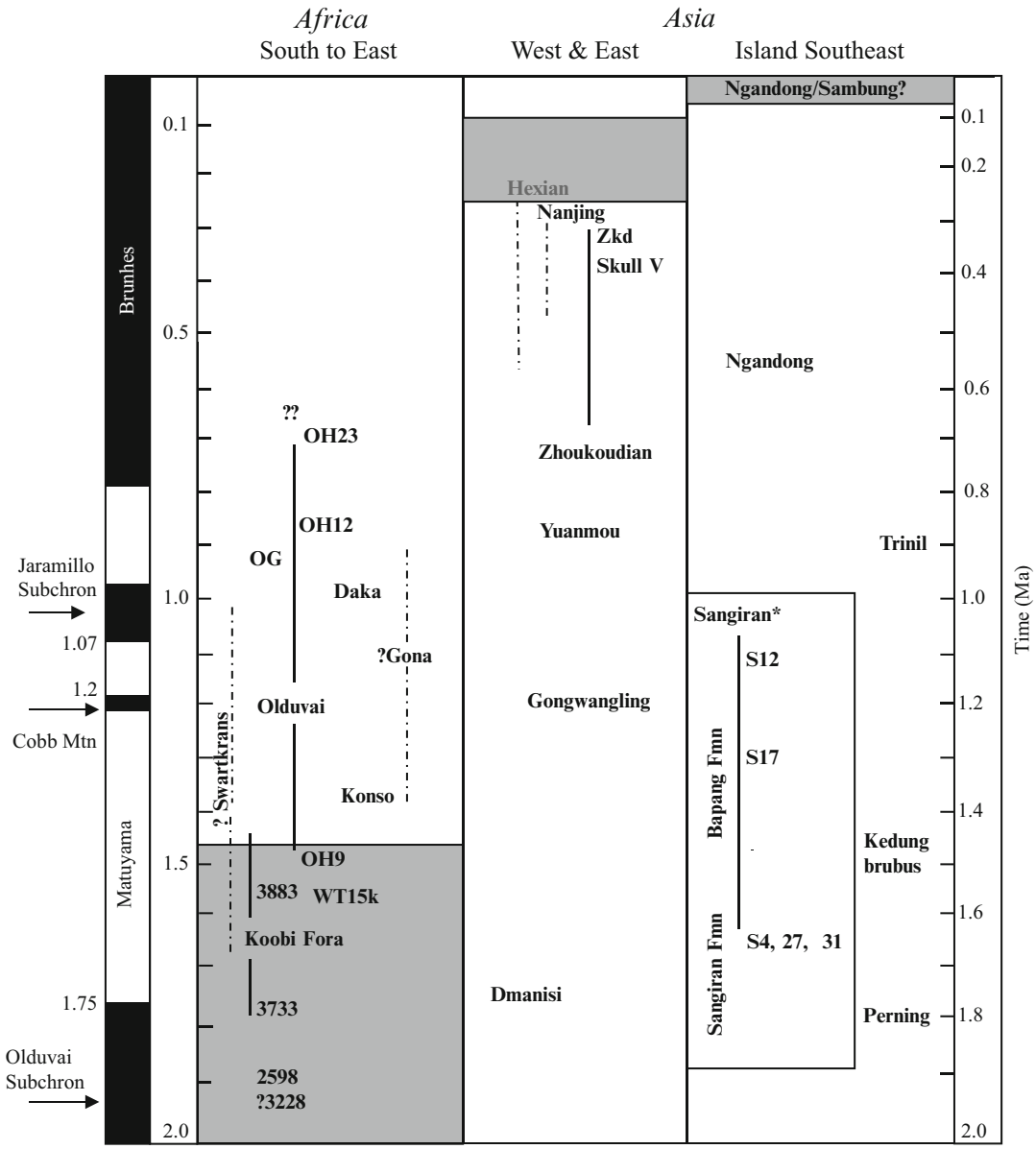

***Homo erectus*, Fig. 1** The temporal and geographic distribution of *H. erectus* localities and some important specimens. The geomagnetic polarity timescale, with normal periods in *black* and reversed in *white*, is on the far *left*. Radiometric time is indicated in millions of years on the far *right*. Within regional columns, *solid lines* on either side of site names indicate time spans suggested by multiple *H. erectus* individuals from a site; *dashed lines* indicate possible time range around a single/few specimens. Within Africa, sites are grouped from *left* to *right* as South Africa, Kenya, Tanzania, and Ethiopia; OG is Olorgesailie, OH is Olduvai Hominid, numbers on the Koobi Fora line are KNM-ER numbers, and WT15k refers to KNM-WT 15000. In Asia, the sites are grouped from Georgia to China; the earliest Chinese localities are archaeological assemblages presumed to be made by *H. erectus*. In Southeast Asia, the Sangiran box delineates the timing of the hominin-bearing Sangiran and Bapang formations; however, hominins are present only from about 1.6 Ma as indicated by S4, 27, 31 (which refer to Sangiran specimen numbers); younger overlying sediments are not (currently) hominin bearing and are not shown. In all columns, gray boxes indicate a period of temporal and geographic overlap with other species. The overlapping species are as follows: in Africa, *H. habilis* (LAD, 1.44 Ma Spoor et al. 2007); in China, archaic *H. sapiens* or *H. heidelbergensis*; and in Java, *H. sapiens*

African fossils represent the single, variable species *Homo erectus*, while others divide the fossils geographically, allocating the earliest African and Georgian specimens to *Homo ergaster*, with the Chinese, Indonesian, and some African fossils as the *H. ergaster*-derived species *Homo erectus* (Wood 1994; Wood and Collard 1999). The grounds for the latter view are both geographical and morphological, as several of the African specimens are more gracile than the Asian specimens, in particular possessing thinner cranial vault bones, although these have been shown to be allometrically scaled (Antón et al. 2007). Several conditions make *Homo ergaster* a problematic taxon. The differences between the African and Asian specimens tend to be in the degree of expression of traits, and there are African specimens (e.g., OH 9, Daka) that closely resemble the classical Asian *H. erectus* morphotype. In addition, even among researchers who advocate splitting the African and Asian material, debate exists over which fossils should be allocated to *Homo ergaster*. Others would split the material into even more species, including *Homo soloensis* for the younger Indonesian fossils from Ngandong or *Homo georgicus* for the Dmanisi material; these remain minority views.

A corollary of the taxonomic debate concerns whether or not *Homo erectus* is found in Europe. *Homo erectus* fossils may persist in Asia until the latest Pleistocene, but the hominin fossils found in Europe after 1 Ma (e.g., the Ceprano calvaria, the Sierra de Atapuerca specimens) lack the distinctive cranial morphology of *Homo erectus* and are generally agreed to represent a transitional or archaic form of *Homo sapiens* (e.g., *Homo antecessor*, *Homo heidelbergensis*). Although some researchers would allocate the earliest European fossils to *Homo erectus* (e.g., the Ceprano and Gran Dolina material at ~800 ka), most agree that these fossils represent a transitional form between *Homo erectus* and *Homo sapiens*.

Another important issue concerns the life history of *Homo erectus* and the extent to which the species had acquired the modern human behavioral package of altricial birth, a large energy-expensive brain, long juvenile dependency with relatively late reproduction, short interbirth intervals with high fertility, and a long post-reproductive life span (Antón and Snodgrass 2012). With this package humans appear to have been able to circumvent several of the key constraints that affect other primate species and are able to produce numerous high-quality offspring that experience relatively low mortality, grow slowly, and live long lives. Until recently, the juvenile Nariokotome specimen had been interpreted to suggest that much of the human package might have been in place by the time of *H. erectus*. However, recent studies of dental and skeletal development have suggested a faster rate of development and smaller adult size (Dean et al. 2001; Dean and Smith 2009; Graves et al. 2010; Jungers et al. 2016), suggesting that the life history shifts in *H. erectus* were more modest. Similarly, sexual dimorphism in body size has also been argued to be reduced in *Homo erectus* relative to earlier hominins but still greater than that observed in modern humans (McHenry and Coffing 2000), but recent evidence again suggests this is not the case (Antón 2012; Plavcan 2012). However, a certain level of cooperative breeding appears to be implied over the condition in non-*erectus* early *Homo*, and a level of secondary altriciality and developmental plasticity similar to recent humans may be implied as well (Antón and Snodgrass 2012; Cofran and DeSilva 2015). Recent work provides modest support for the idea that developmental plasticity – the ability to respond to environmental conditions by modifying development resulting in variation in adult morphology that is not genetically canalized – facilitated *H. erectus'* ability to disperse (Antón et al. 2016; Antón and Kuzawa 2017).

Cross-References

- ▶ Dmanisi Hominins and Archaeology
- ▶ Dubois, Eugène
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ Handaxes and Biface Technology

▶ *Homo ergaster*
▶ *Homo habilis*
▶ *Homo heidelbergensis*
▶ *Homo sapiens*
▶ Indonesia's World Heritage
▶ Movius Line
▶ Oldowan Industrial Complex
▶ Olduvai Gorge Archaeological Site
▶ Peking Man
▶ Weidenreich, Franz
▶ West and Central Asia: Early Homo Fossil Records
▶ Zhoukoudian, Archaeology of

References

Antón, S.C. 2003. Natural history of *Homo erectus*. *American Journal of Physical Anthropology* S37: 126–170.

Antón, S.C. 2012. Early *Homo:* Who, when and where. *Current Anthropology* 53: S278–S298.

Antón, S.C., and C.W. Kuzawa. 2017. Early *Homo*, plasticity, and the extended evolutionary synthesis. *Interface Focus* 7(5): 20170004.

Antón, S.C., and J.J. Snodgrass. 2012. Origin and evolution of *Homo* new perspectives. *Current Anthropology* 53: S479–S496.

Antón, S.C., and C.C. Swisher III. 2004. Early dispersals of *Homo* from Africa. *Annual Review of Anthropology* 33: 271–296.

Antón, S.C., W.R. Leonard, and M. Roberston. 2002. An ecomorphological model of the initial hominid dispersal from Africa. *Journal of Human Evolution* 43: 773–785.

Antón, S.C., F. Spoor, C.D. Fellmann, and C.C. Swisher III. 2007. Defining *Homo erectus*: Size considered. In *Handbook of paleoanthropology*, ed. W. Henke and I. Tattersall, vol. 3, 1655–1693. Berlin: Springer.

Antón, S.C., R. Potts, and L.C. Aiello. 2014. Evolution of early *Homo*: An integrated biological perspective. *Science* 345: 1236828.

Antón, S.C., H.G. Taboada, E.R. Middleton, C.W. Rainwater, A.B.. Taylor, T.R. Turner, J.E. Turnquist, K.J. Weinstein, and S.A. Williams. 2016. Morphological variation in *Homo erectus* and the origins of developmental plasticity. *Philosophical Transactions of the Royal Society B* 371: 20150236.

Baab, K.L. 2008. The taxonomic implications of cranial shape variation in *Homo erectus*. *Journal of Human Evolution* 54: 827–847.

Baab, K.L. 2016. The role of neurocranial shape in defining the boundaries of an expanded *Homo erectus* hypodigm. *Journal of Human Evolution* 92: 1–21.

Black, D. 1927. Further hominid remains of lower quaternary age from Chou Kou Tien deposit. *Nature* 120: 954.

Cofran, Z., and J.M. DeSilva. 2015. A neonatal perspective on *Homo erectus* brain growth. *Journal of Human Evolution* 81: 41–47.

Dean, C., and B.H. Smith. 2009. Growth and development of the Nariokotome youth, KNM-WT 15000. In *The first humans: Origin and early evolution of the genus* Homo, ed. F.E. Grine, J.G. Fleagle, and R.E. Leakey, 101–120. New York: Springer.

Dean, C., M.G. Leakey, D. Reid, F. Schrenk, G.T. Schwartz, C. Stringer, and A. Walker. 2001. Growth processes in teeth distinguish modern humans from *Homo erectus* and earlier hominins. *Nature* 414: 628–631.

Dubois, E. 1894. *Pithecanthropus erectus eine menschenaehnlich Uebergangsform aus Java*. Batavia: Landsdrukerei.

Ferring, R., O. Oms, J. Agustí, F. Berna, M. Nioradze, T. Shelia, M. Tappen, A. Vekua, D. Zhvania, and D. Lordkipanidze. 2011. Earliest human occupations at Dmanisi (Georgian Caucasus) dated to 1.85–1.78 Ma. *Proceedings of the National Academy of Sciences USA* 108: 10432–10436.

Gabunia, L., A. Vekua, D. Lordkipanidze, C.C. Swisher 3rd, R. Ferring, A. Justus, M. Nioradze, M. Tvalchrelidze, S.C. Antón, G. Bosinski, O. Jöris, M.A. Lumley, G. Majsuradze, and A. Mouskhelishvili. 2000. Earliest Pleistocene hominid cranial remains from Dmanisi, Republic of Georgia: Taxonomy, geological setting, and age. *Science* 288: 1019–1025.

Graves, R.R., A.C. Lupo, R.C. McCarthy, D.J. Wescott, and D.L. Cunningham. 2010. Just how strapping was KNM-WT 15000? *Journal of Human Evolution* 59: 542–554.

Indriati, E., C.C. Swisher III, C. Lepre, R.L. Quinn, R. Suriyanto, A.T. Hascaryo, R. Grun, B.L. Pobiner, M. Aubert, W. Lees, and S.C. Antón. 2011. The age of the 20 meter Solo River Terrace, Java, Indonesia and the survival of *Homo erectus* in Asia. *PLoS One* 6 (6): e21562. https://doi.org/10.1371/journal.pone.0021562.

Jungers, W.L., M. Grabowski, K.G. Hatala, and B.G. Richmond. 2016. The evolution of body size and shape in the human career. *Philosophical Transactions of the Royal Society B* 371: 20150247.

Leakey, M.G., F. Spoor, M.C. Dean, C.S. Feibel, S.-C. Antón, C. Kiarie, and L.N. Leakey. 2012. New early *Homo* fossils from Koobi Fora, northern Kenya, highlight facial diversity. *Nature* 488: 201–204.

Lepre, C.J., H. Roche, D.V. Kent, S. Harmand, R.L. Quinn, J.-P. Brugal, P.-J. Texier, A. Lenoble, and C.S. Feibel. 2011. An earlier origin for the Acheulian. *Nature* 477: 82–85.

Mayr, E. 1944. On the concepts and terminology of vertical subspecies and species. *Common Problems of Genetics, Paleontology and Systematics Bulletin* 2: 11–16.

McHenry, H.M., and K. Coffing. 2000. *Australopithecus* to *Homo* transformations in body and mind. *Annual Review of Anthropology* 29: 125–146.

Plavcan, J.M. 2012. Body size, size variation, and sexual size dimorphism in early *Homo*. *Current Anthropology* 53: S409–S423.

Pontzer, H. 2012. Ecological energetics in early *Homo*. *Current Anthropology* 53: S346–S358.

Pontzer, H., J.R. Scott, D. Lordkipanidze, and P.S. Ungar. 2011. Dental microwear texture analysis and diet in the Dmanisi hominins. *Journal of Human Evolution* 61: 683–687.

Potts, R. 2012. Environmental and behavioral evidence pertaining to the evolution of early *Homo*. *Current Anthropology* 53: S299–S317.

Ruff, C.B., and A. Walker. 1993. Body size and body shape. In *The Nariokotome Homo erectus skeleton,* ed. A. Walker and R. Leakey, 234–265. Cambridge: Harvard University Press.

Shen, G., X. Gao, B. Gao, and D.E. Granger. 2009. Age of Zhoukoudian *Homo erectus* determined with $^{26}Al/^{10}Be$ burial dating. *Nature* 458: 198–200.

Spoor, F., M.G. Leakey, P.N. Gathogo, F.H. Brown, S.C. Antón, I. McDougall, C. Kiarie, F.K. Manthi, and L.N. Leakey. 2007. Implications of new early *Homo* fossils from Ileret, east of Lake Turkana, Kenya. *Nature* 448: 688–691.

Swisher, C.C., III, G.H. Curtis, T. Jacob, A.G. Getty, G. Suprijo, and Widiasmoro. 1994. Age of the earliest known hominids in Java, Indonesia. *Science* 263: 1118–1121.

Swisher, C.C., III, W.J. Rink, S.C. Antón, H.P. Schwarcz, G.H. Curtis, A. Suprijo, and Widiasmoro. 1996. Latest *Homo erectus* of Java: Potential contemporaneity with *H. sapiens* in Southeast Asia. *Science* 274: 1870–1874.

Wood, B.A. 1994. Taxonomy and evolutionary relationships of *Homo erectus*. *Courier Forschungsinstitut Senckenberg* 171: 159–165.

Wood, B.A., and M.C. Collard. 1999. The human genus. *Science* 284: 65–71.

Zhu, Z.-Y., R. Potts, K.A. Hoffman, C.L. Deng, C.D. Shi, Y.X. Pan, H.Q. Wang, R.P. Shi, Y.C. Wang, G.H. Shi, and N.Q. Wu. 2004. New evidence on the earliest human presence at high northern latitudes in Northeast Asia. *Nature* 431: 559–562.

Zhu, Z.-Y., R. Dennell, W.-W. Huang, Y. Wu, Z.-G. Rao, S.-F. Qiu, J.-B. Xie, W. Liu, S.-Q. Fu, J.-W. Han, H.-Y. Zhou, T.-P.O. Yang, and H.-M. Li. 2015. New dating of the *Homo erectus* cranium from Lantian (Gongwangling), China. *Journal of Human Evolution* 78: 144–157.

Further Reading

Klein, R.G. 2009. *The human career*. 3rd ed. Chicago: University of Chicago Press.

Homo ergaster

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Introduction

Homo ergaster is a paleospecies often used to describe a subset of fossils within *Homo erectus*. Proponents generally allocate early African *Homo erectus* fossils dating from c. 1.8 to 1.4 Ma to *Homo ergaster*, mainly on the basis of smaller, more gracile crania and a lack of robust cranial suprastructures. In this schema, the geographic distribution of *Homo erectus* sensu stricto is restricted to Asian localities with a few examples (e.g., OH 9) of back migration into Africa. *Homo ergaster* includes the early African and Georgian specimens attributed by others to *H. erectus* and is therefore posited as the ancestor to *Homo erectus*, *Homo heidelbergensis*, and *Homo sapiens* (Wood 1994). However, considerable debate over the validity of the taxon exists, and there is growing support for the idea that the African and Asian specimens instead constitute a single, long-lived, polytypic species, *Homo erectus* (e.g., Rightmire 1990; Antón 2003, 2012).

Definition

Species History and Distribution

Current usage of the nomen *Homo ergaster* as a descriptor for the early African subset of *H. erectus* sensu lato differs from the original use of the name (Antón 2012). The type of the *Homo ergaster* nomen is the mandible, KNM-ER 992, from Koobi Fora, Kenya (Groves and Mazek

1975). The original paratypes included other remains often attributed to *H. erectus* (most notably KNM-ER 730 and 820). However, they did not include iconic African *H. erectus* crania KNM-ER 3733 or 3883 but did include the partial cranium KNM-ER 1805, which is universally otherwise allocated to non-*erectus Homo* (Wood 1991; Leakey et al. 2012). In contrast, in its current usage, most of the additional fossils attributed to *Homo ergaster* are allocated elsewhere to *Homo erectus* (or *Homo* aff. *H. erectus;* Wood 1991). These include the key crania and partial crania from Koobi Fora (e.g., KNM-ER 3733 and 3883), Swartkrans, South Africa (SK 847), and Dmanisi, as well as the mostly complete juvenile skeleton from West Turkana (i.e., Nariokotome boy, KNM-WT 15000), but exclude other African specimens, most notably Olduvai Hominid 9 and Daka.

When so designated, *H. ergaster* differs in several ways from non-*erectus* early *Homo* and *H. erectus* sensu stricto. *Homo ergaster* shows an increase in average brain size relative to the specimens attributed to non-*erectus* early *Homo* (i.e., *Homo habilis*/*Homo rudolfensis*), as well as overall reduction in the size of the face and postcanine teeth. On the other hand, *H. ergaster* has a somewhat smaller average cranial capacity (~800 cc's; range 650–909 cc's; Antón 2003) than does *H. erectus* sensu stricto, and overall the cranium is generally more gracile and the cranial bones are thinner. As discussed below, however, these perceived differences are arguably related to allometric scaling across *H. erectus*. Additionally, *H. ergaster* has been argued to lack pronounced cranial suprastructures such as a well-developed bregmatic eminence, sagittal keel, and angular or occipital torus seen in specimens from Indonesia and China, yet key African specimens such as KNM-ER 3733 and 3883 and the Dmanisi remains express several of these features (Rightmire 1990; Gabunia et al. 2000).

The relatively complete juvenile skeleton of KNM-WT 15000 demonstrates that some individuals were relatively large and may have possessed the long, linear body form associated with tropically adapted recent humans (Ruff and Walker 1993; Graves et al. 2010). However, there is a wide range of body sizes for *Homo ergaster*, including small-sized individuals from Dmanisi, Georgia. For a more complete discussion of postcranial morphology, body size, and range expansion, see the entry on *Homo erectus*.

Key Issues/Current Debates

The key issue for *H. ergaster* is whether the species exists or is a junior synonym of *H. erectus*. The taxonomic debate centers on how to partition the variation seen in a long-lived, globally dispersed fossil species. Several conditions make *Homo ergaster* a problematic taxon. The grounds for allocating the earliest African and Georgian specimens to *H. ergaster* and the Asian remains to *H. erectus* are arguably both geographical and morphological. Several of the African specimens are more gracile than the Asian specimens, in particular possessing thinner cranial vault bones. However, differences in cranial vault thickness and supraorbital toral development have been shown to be the result of allometric scaling of vault thickness with brain size (Antón et al. 2007; Spoor et al. 2007). The purported differences between the African and Asian specimens in the presence of cranial superstructures (i.e., keeling, tori, eminences) also fail to separate the regions as a number of included African specimens (i.e., KNM-ER 3733, 3883, Ileret) express such superstructures (Spoor et al. 2007).

Even among researchers who advocate splitting the African and Asian material, debate exists over which fossils should be allocated to *Homo ergaster*. As mentioned above, the original designation of the taxon included a mixed paratype of non-*erectus* and *H. erectus* specimens from Koobi Fora. More common today is a loose use of the term to refer to all African *H. erectus* specimens as *H. ergaster*. However, this view cannot be supported given that many African specimens (e.g., OH 9, Daka) closely resemble the classical Asian *H. erectus* morphotype (Wood 1994; Asfaw et al. 2002) yet cannot be separated from other African *H. erectus* on the basis of two- or three-dimensional metric analyses (Antón 2003; Spoor et al. 2007; Baab 2008, 2016)

or nonmetric analyses (Rightmire 1990; Antón 2003). Additionally, the inclusion in *H. ergaster* of historically earlier discoveries such as the OH 9 calvaria and the Tighennif (Ternifine) mandibles should give priority to the species for which these specimens serve as holotypes, *H. leakeyi* and *H. mauritanicus*, respectively (Arambourg 1954; Heberer 1963).

Cross-References

▶ Dmanisi Hominins and Archaeology
▶ *Homo erectus*

References

Antón, S.C. 2003. Natural history of *Homo erectus*. *American Journal of Physical Anthropology* S37: 126–170.
Antón, S.C. 2012. Early *Homo*: Who, when and where. *Current Anthropology* 53: S278–S298.
Antón, S.C., F. Spoor, C.D. Fellmann, and C.C. Swisher III. 2007. Defining *Homo erectus*: Size considered. In *Handbook of paleoanthropology*, ed. W. Henke and I. Tattersall, vol. 3, 1655–1693. Berlin: Springer.
Arambourg, C. 1954. L'hominien fossile de Ternifine (Algérie). *Comptes Rendus de l'Académie des Sciences* 239: 893–895.
Asfaw, B., W.H. Gilbert, Y. Beyene, W.K. Hart, P.R. Renne, G. WoldeGabriel, E.S. Vrba, and T.D. White. 2002. Remains of *Homo erectus* from Bouri, Middle Awash, Ethiopia. *Nature* 416: 317–320.
Baab, K.L. 2008. The taxonomic implications of cranial shape variation in *Homo erectus*. *Journal of Human Evolution* 54: 827–847.
Baab, K.L. 2016. The role of neurocranial shape in defining the boundaries of an expanded *Homo erectus* hypodigm. *Journal of Human Evolution* 92: 1–21.
Gabunia, L., A. Vekua, D. Lordkipanidze, C.C. Swisher 3rd, R. Ferring, A. Justus, M. Nioradze, M. Tvalchrelidze, S.C. Antón, G. Bosinski, O. Jöris, M.A. Lumley, G. Majsuradze, and A. Mouskhelishvili. 2000. Earliest Pleistocene hominid cranial remains from Dmanisi, Republic of Georgia: Taxonomy, geological setting, and age. *Science* 288: 1019–1025.
Graves, R.R., A.C. Lupo, R.C. McCarthy, D.J. Wescott, and D.L. Cunningham. 2010. Just how strapping was KNM-WT 15000? *Journal of Human Evolution* 59: 542–554.
Groves, C.P., and V. Mazek. 1975. An approach to the taxonomy of the Hominidae: Gracile Villafranchian hominids of Africa. *Caspos pro Mineralogii a Geologii* 20: 225–247.
Heberer, G. 1963. Ueber einen neuen archanthropin Typus aus der Oldoway-Schlucht. *Zeitschrift für Morphologie und Anthropologie* 53: 171–177.
Leakey, M.G., F. Spoor, M.C. Dean, C.S. Feibel, S.-C. Antón, C. Kiarie, and L.N. Leakey. 2012. New early *Homo* fossils from Koobi Fora, northern Kenya, highlight facial diversity. *Nature* 488: 201–204.
Rightmire, G.P. 1990. *The evolution of Homo erectus*. Cambridge, UK: Cambridge University Press.
Ruff, C.B., and A. Walker. 1993. Body size and body shape. In *The Nariokotome Homo erectus skeleton*, ed. A. Walker and R. Leakey, 234–265. Cambridge, MA: Harvard University Press.
Spoor, F., M.G. Leakey, P.N. Gathogo, F.H. Brown, S.-C. Antón, I. McDougall, C. Kiarie, F.K. Manthi, and L.N. Leakey. 2007. Implications of new early *Homo* fossils from Ileret, east of Lake Turkana, Kenya. *Nature* 448: 688–691.
Wood, B.A. 1991. *Hominid cranial remains, volume 4 of Koobi Fora research project*. Oxford: Clarendon.
Wood, B.A. 1994. Taxonomy and evolutionary relationships of *Homo erectus*. *Courier Forschungsinstitut Senckenberg* 171: 159–165.

Further Reading

Antón, S.C., R. Potts, and L.C. Aiello. 2014. Evolution of early *Homo*: An integrated biological perspective. *Science* 345: 1236828.
Antón, S.C., H.G. Taboada, E.R. Middleton, C.W. Rainwater, A.B.. Taylor, T.R. Turner, J.E. Turnquist, K.J. Weinstein, and S.A. Williams. 2016. Morphological variation in *Homo erectus* and the origins of developmental plasticity. *Philosophical Transactions of the Royal Society B* 371: 20150236.
Wood, B.A., and M.C. Collard. 1999. The human genus. *Science* 284: 65–71.

Homo habilis

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Introduction

The species name *Homo habilis* was given by Leakey et al. (1964) to the parietal bones, mandible with dentition (Fig. 1), and hand bones of a juvenile hominid (OH7) that was excavated at site FLK NN1, Olduvai Gorge, Tanzania by Jonathon Leakey on 2 November 1960. It came from a

***Homo habilis*, Fig. 1** OH 7 type mandible of *Homo habilis*, with the right second molar identified and added by R.J.C. (Clarke 2012)

horizon with many broken bones and stone tools of the Oldowan industry dating to 1.8 Ma ago.

From the size of the parietal bones, the child clearly had a brain considerably larger than that of either *Australopithecus* or *Paranthropus*. To Louis Leakey this was the confirmation of his long-held conviction that what he called "a true ancestor of *Homo sapiens*" would be found in the Lower Pleistocene. He had in 1932 proposed that the Kanam mandible fragment from Western Kenya represented such an ancestor. Then, in 1959 he convinced himself that the OH5 *Zinjanthropus* cranium (in reality a massive *Paranthropus*) represented the maker of the Oldowan industry and was in the direct line of our ancestry.

With the 1960 discovery of the large parietals and a mandible with smaller teeth than those of *Zinjanthropus*, Leakey relegated *Zinjanthropus* to a side branch of humanity and embraced the new fossil as the true ancestor of *Homo sapiens* and the maker of the associated Oldowan stone tools. Most of his colleagues were not so readily convinced. Even his collaborator Phillip Tobias, for 3 years after the discovery of the OH 7 fossil, considered that it could be a variant of *Australopithecus*. It was not until the finding of more Olduvai hominids (OH 13, 14, 15, and 16) coupled with his further analysis of the OH 7 fossil that Tobias agreed to join Leakey and hand expert John Napier in naming the new species as *Homo habilis*.

Definition

The name *Homo habilis* had been provided by Raymond Dart at the request of Tobias who was very familiar with Dart's facility with words. *Habilis* meant able, handy, and mentally skillful – an appropriate name for an early large-brained toolmaker. A formal definition of the species is provided in the conclusion.

Historical Background/Key Issues/ Current Debates

Ironically while the additional fossils helped to sway Tobias into recognizing the reality of *Homo habilis*, it was those extra fossils that were to cause confusion and disagreement over exactly what fossils belong to *Homo habilis* and what it represented. While Tobias accepted OH 13 and OH 16 as members of the species, Leakey considered OH 16 to be distinct and called it a protopithecanthropine. This was a reflection of their differing views on the path of human evolution. Tobias saw *Homo habilis* as a stage between *Australopithecus* and *Homo erectus*, but Leakey did not accept *Australopithecus* as ancestral to *Homo* and did not accept *Homo erectus* as a stage between *habilis* and *sapiens*. His view was that *Homo* had a long separate ancestry alongside *Australopithecus* and that *Homo habilis* evolved directly into *Homo sapiens*. He saw *Homo erectus* as a side branch. A detailed assessment of issues relating to the fossils attributed to *Homo habilis* is provided by Clarke (2017), who worked with Leakey and Tobias and has been responsible for the cleaning and reconstruction of many of the fossils that have been attributed to the species then and more recently.

Much later, in 1968, a badly crushed cranium was found by Peter Nzube compacted into a

concretion that had derived from lower Bed 1 at site DK, Olduvai Gorge. The almost unrecognizable hominid was cleaned out of the rock and reconstructed by Clarke. It was immediately accepted by Louis and Mary Leakey, by Phillip Tobias, and currently by most of the palaeoanthropological community as *Homo habilis*. This fossil, known generally as "Twiggy" and with the catalogue number OH 24, was in the words of Tobias (1991) "so fine a specimen of *H. habilis*" that it was given the distinction of being the first-described specimen in his *Homo habilis* volume. OH 24 is often depicted as a classic representative of *Homo habilis*. This is unfortunate because it is actually remarkably similar in cranial morphology to South African *Australopithecus africanus* in the form of Sts 5 and Sts 17. This has been discussed by Clarke (2012) who notes that Leakey et al. (1971) found OH 24 and OH 13 to have morphological differences from the OH 7 type specimen and from OH 16. They said the possibility of taxonomic variation could not be disregarded.

OH 13 is one of the fossils assigned by Leakey, Tobias, and Napier as a paratype of *Homo habilis*. It was found in 1963 by Ndibo Mbuika at site MNK, Olduvai Gorge, and was eroding out of Bed II deposits. It consisted of a fragmentary occipitoparietal region with some temporal fragments and the maxilla and mandible with much of the dentition in place. This had been one of the fossils that helped to convince Tobias that the creation of a new species of *Homo* was justified. The teeth were relatively small with narrowing of the cheek teeth when compared to *Australopithecus*, and the form of the parietals was thought to be humanlike and similar to, though smaller than, OH 7.

Later, Tobias (1971) calculated endocranial capacity for OH 13 on a partial endocast made by Clarke under his direction. Clarke also made comparable partial endocasts of OH 5 *Paranthropus* and Sts 5 *Australopithecus*, both of which had complete endocranial volumes that were known. By making six water displacement volumetric measurements on the partial OH 13, OH 5, and Sts 5 endocasts and comparing them proportionally with the complete endocast volumes, Tobias calculated the endocranial volume of OH 13 at 640 cc and then worked out a projected adult volume of 660 cc.

As this was much larger than the 480 cc he gave for Sts 5 and the 530 cc he gave for OH 5, Tobias thought this confirmed the status of OH 13 as a member of the genus *Homo*. Such a method of calculating brain size is of course prone to much error, and this was well demonstrated when a complete cranium KNM-ER 1813, virtually identical in dentition and cranial morphology to OH 13, produced a complete endocranial volume of only 510 cc (Holloway 2000). This is larger, but not much larger, than the 492 cc upper limit for *A. africanus* tabled by Tobias (1991: 708). As Sts 5 is the only complete, undistorted *A. africanus* braincase known and is a female (Clarke 2013), one should expect possible variation with other members of the species, particularly if such members are from geologically younger sites and separated by great distance geographically.

The KNM-ER 1813 cranium was found by Kimoya Kimeu at East Lake Turkana in 1973. It is dated at nearly 1.9 Ma. Richard Leakey (1974) considered it to belong to *A. africanus* as did Walker (1981), Falk (1986), and Clarke (2012). From this it follows that the virtually identical OH 13 would also belong to *A. africanus* or to a young variant of that species. KNM-ER 1813 was even named as a new species, *Homo microcranous* by Ferguson (1995).

The hand bones associated with the OH 7 mandible and parietals were found to show some features like those of humans which would have facilitated toolmaking. Subsequent finds of hand bones of *Australopithecus*, including the complete hand of StW 573 from Sterkfontein, have shown that such features indicating manual dexterity are not confined to *Homo* but were a general and primitive hominid character associated with probable tree climbing (Clarke 1999).

In 1972 on the east side of Lake Turkana, Bernard Ngeneo found a fossil that would bring new insights to the *Homo habilis* debate (Leakey 1973). Its catalogue number KNM-ER 1470 provided the commonly used name of "1470 Man." It dates to 1.9 Ma, and though reconstructed from

many fragments, it is reasonably complete but lacking tooth crowns. It has a large cranial capacity of 752 cc (Holloway 2000), a prominent upper nasal skeleton, and a broad, flat lower face with widely flaring roots of cheek teeth and indications of relatively large anterior teeth. While Richard Leakey (1973) assigned 1470 to the genus *Homo*, Alan Walker, who had been closely involved in the cleaning, reconstruction and description of the fossil, was inclined to view it as an *Australopithecus* in spite of its large cranial capacity (Walker 1981). Some researchers accepted 1470 as *Homo habilis*, while Bernard Wood (1992), who was very familiar with the Lake Turkana fossils, accepted it as representing a new species, *Homo rudolfensis*. Other specimens from East Lake Turkana that can be assigned to *Homo habilis* are a mandible, KNM-ER 1802, and a partial braincase and dentition, KNM-ER 1590.

Some clarification eventually came in 1995 in the form of a maxilla, OH 65, discovered by Rob Blumenschine and team in an excavation at Naisiusiu in lower Bed 1 of Olduvai Gorge. The maxilla was directly associated with butchered bones and Oldowan stone tools. It was exposed in blocks of tuffaceous and calcareous silty sandstone, which was cleaned from the specimen by R.J. Clarke who then reconstructed the maxilla (Clarke 2012). He could see that it had strong resemblances to KNM-ER 1470 (Blumenschine et al. 2003), but unlike that specimen, it preserved a complete dentition in excellent condition (Fig. 2). It had the same broad, flat lower face (Fig. 3) and the same wide, flaring roots of the cheek teeth. The crowns of these teeth, however, were not correspondingly enlarged but were clearly those of *Homo* and not *Australopithecus* or *Paranthropus*.

It was further pointed out in Blumenschine et al. (2003) and in the OH 65 description by Clarke (2012) that the parietals of 1470 matched in size and shape those of the OH 7 type specimen of *Homo habilis* and thus there is no justification for separating 1470 into a new taxon *Homo rudolfensis*. The fact that the OH 65 maxilla is so obviously that of *Homo* and that it closely matches 1470 reinforces the placement of 1470 as a cranium of *Homo habilis*. At the same time, it adds weight to the argument that the very different maxilla and dentitions of OH 13, OH 24, OH 62, and KNM-ER 1813, coupled with their much smaller brain sizes, suggest they be removed from *Homo habilis* and allied to *A. africanus*. The type mandible of OH 7 *Homo habilis* has the kind of

***Homo habilis*, Fig. 2** OH 65 maxilla of *Homo habilis*

***Homo habilis*, Fig. 3** KNM-ER 1470 cranium (above), compared to OH 65 maxilla (below)

dentition and robustly structured corpus that one might expel to match the dentition and robustly structured lower face of 1470.

OH 16, found in lower Bed II Olduvai by Maiko Matumbo in 1963 after it had been smashed by cattle hooves, would probably have been a complete or nearly complete skull. Several differing reconstructions based on the cranial vault fragments were made by M. Leakey, P. Tobias, and L. Distiller (Tobias 1971). One reconstruction included 107 fragments. However, none of these is conclusive, and there remains the possibility that it originally had a much larger cranial capacity than the 633 cc calculated by Tobias on partial endocasts made by Clarke. Certainly from the dentition, OH 16 could fit with *Homo habilis* as represented by OH 7 and OH 65.

Another badly broken-up Olduvai fossil, a partial skeleton with maxilla, upper dentition, and cranial fragments (OH 62), was found in 1986 (Johanson et al. 1987). The first fragment (part of an ulna) was spotted by Tim White on the eroded surface of Bed 1 deposits close to the FIK *Zinjanthropus* site. More fragments were then picked up by Berhane Asfaw, Don Johanson, and Gen Suwa, and the ensuing careful sieving of the area produced much more. OH 62 was assigned to *Homo habilis*, but it is clear that it aligns with the smaller-brained forms that had been placed in that species rather than with the bigger-brained OH 7 and KNM-ER1470.

Homo habilis of the 1470 kind also lived in South Africa. Clarke (1977) identified as early *Homo* a crushed child cranium, SK 27, from Swartkrans Cave that Broom and Robinson had classed as a large-brained *Paranthropus* with an aberrantly large canine (Fig. 4). Clarke (2017) showed that it was actually a cranium of early *Homo* with a normal sized large brain for that genus and a normal sized canine for early *Homo*, and he found similarities with 1470. He has now also compared the dentition with that of OH 65 and found them to be very similar in tooth sizes and morphology.

Also in South Africa, at Sterkfontein Caves there was excavated a cranium in 1976 that Alan Hughes and Phillip Tobias (1977) believed to be that of *Homo*, largely because of its supposed association with stone tools. However, Ferguson

***Homo habilis*, Fig. 4** SK 27 cranium of *Homo habilis* child from Swartkrans

(1989) demonstrated that it did not differ from *A. africanus*. Kuman and Clarke (2000) showed that it actually came from a separate deposit without stone tools and that morphologically it matched *Australopithecus africanus*. Clarke (2008) has demonstrated that it is in reality the cranium of a male *Australopithecus africanus* very similar to the TM 1511 first adult *Australopithecus* found at Sterkfontein by Robert Broom in 1936.

Conclusion

In terms of chronology, one of the oldest fossils which can be attributed to *Homo habilis* is the maxilla AL 666 (Kimbel et al. 1997) dated to 2.3 Ma from Hadar, Ethiopia, as it has similarity to the OH 65 maxilla. Possibly even older at 2.3–2.5 Ma is a mandible from Uraha in Malawi, originally assigned to *Homo rudolfensis* (Bromage et al. 1995). It is considered here to be *Homo habilis* based on its robusticity and dental

size and morphology, which are similar to the *H. habilis* type specimen OH 7. The species thus extends from about 2.5 to >1.7 Ma (the age of SK 27 at Swartkrans).

It seems possible that *Homo habilis* spread from Africa to the Far East. The *Meganthropus* Sangiran 6 mandible from Java was shown by Tobias and von Koenigswald (1964) to have strong resemblances to OH 7, and there are, from cave sites in China, isolated teeth that are large in comparison to those of *Homo erectus*. There are also intriguing resemblances between some crania from Dmanisi in Georgia and the cranium of 1470.

With the above discussion in mind, *Homo habilis* can be defined as having a large cranial capacity up to 750 cc, more vertical sides to braincase with parietal bosses, a broad frontal bone with widely separated temporal lines, a large face with relatively broad and flat mid and lower face, a prominent nasal skeleton, a broad and deep palate, and a mandible of moderate size but with a robust body.

Cross-References

- ▶ Australopithecines
- ▶ Hominids, Earliest African
- ▶ *Homo erectus*
- ▶ *Paranthropus*

References

Blumenschine, R.J., C.R. Peters, F.T. Masao, R.J. Clarke, A.L. Deino, R.L. Hay, C.C. Swisher, I.G. Stanistreet, G.M. Ashley, L.J. McHenry, N.E. Sikes, N.J. van der Merwe, J.C. Tactikos, A.E. Cushing, D.M. Deocampo, J.K. Njau, and J.I. Ebert. 2003. Late Pliocene *Homo* and hominid land use from western Olduvai Gorge, Tanzania. *Science* 299: 1217–1221.

Bromage, T.G., F. Schrenck, and F.W. Zonneveld. 1995. Paleoanthropology of the Malawi rift: An early hominid mandible from the Chiwondo beds, northern Malawi. *Journal of Human Evolution* 28: 71–108.

Clarke, R.J. 1977. A juvenile cranium and some adult teeth of early *Homo* from Swartkrans, Transvaal. *South African Journal of Science* 73: 46–49.

Clarke, R.J. 1999. Discovery of complete arm and hand of the 3.3 million-year-old *Australopithecus* skeleton from Sterkfontein. *South African Journal of Science* 95: 477–480.

Clarke, R.J. 2008. A new look at *Australopithecus* and latest information on Sterkfontein's *Australopithecus* skeleton. *South African Journal of Science* 104: 443–449.

Clarke, R.J. 2012. A *Homo habilis* maxilla and other newly-discovered hominid fossils from Olduvai Gorge, Tanzania. *Journal of Human Evolution* 63: 418–428.

Clarke, R.J. 2013. *Australopithecus* from Sterkfontein caves, South Africa. In *The Paleobiology of Australopithecus*, ed. K. Reed, J. Fleagle, and R. Leakey, 105–123. New York: Springer.

Clarke, R.J. 2017. *Homo habilis*: The inside story. In *Proceedings of the II meeting of African prehistory*, ed. M. Sahnouni, S. Semaw, and J.R. Garaizar, 25–51. Burgos: Centro Nacional de Investigación sobre la Evolución Humana.

Falk, D. 1986. Evolution of cranial blood drainage in hominids. Enlarged occipital/marginal sinuses and emissary foramina. *American Journal of Physical Anthropology* 70: 311–324.

Ferguson, W.W. 1989. Reappraisal of the taxonomic status of the cranium Stw 53 from the Plio/Pleistocene of Sterkfontein, in South Africa. *Primates* 30 (1): 103–109.

Ferguson, W.W. 1995. A new species of the genus *Homo* (Primates: *Hominidae*) from the Plio/Pleistocene of Koobi fora, in Kenya. *Primates* 36 (1): 69–89.

Holloway, R. 2000. Brain. In *Encyclopedia of human evolution and prehistory*, ed. E. Delson et al., 141–149. New York: Garland Publishing.

Hughes, A.R., and P.V. Tobias. 1977. A fossil skull probably of the genus Homo from Sterkfontein, Transvaal. *Nature* 265: 310–312.

Johanson, D.C., et al. 1987. New partial skeleton of *Homo habilis* from Olduvai Gorge, Tanzania. *Nature* 327: 205–209.

Kimbel, W.H., D.C. Johanson, and Y. Rak. 1997. Systematic assessment of a maxilla of *Homo* from Hadar, Ethiopia. *American Journal of Physical Anthropology* 103: 235–262.

Kuman, K., and R.J. Clarke. 2000. Stratigraphy, artefact industries and hominid associations for Sterkfontein, member 5. *Journal of Human Evolution* 38: 827–847.

Leakey, R.E.F. 1974. Further evidence of lower Pleistocene hominids from east Rudolf, North Kenya 1973. *Nature* 248: 653–656.

Leakey, L.S.B., P.V. Tobias, and J.R. Napier. 1964. A new species of the genus *Homo* from Olduvai Gorge. *Nature* 202 (4927): 3–9.

Leakey, M.D., R.J. Clarke, and L.S.B. Leakey. 1971. New hominid skull from bed I, Olduvai Gorge, Tanzania. *Nature* 232: 308–312.

Leakey, R.E.F. 1973. Evidence for an advanced Plio-Pleistocene hominid from east Rudolf, Kenya. *Nature* 242: 447–450.

Tobias, P.V. 1971. *The brain in hominid evolution*. New York/London: Columbia University Press.

Tobias, P.V. 1991. *The skulls, endocasts and teeth of Homo habilis. Olduvai gorge*. Vol. IV. Cambridge: Cambridge University Press.

Tobias, P.V., and G.H.R. von Koenigswald. 1964. A comparison between the Olduvai hominines and those of Java and some implications for hominid phylogeny. *Nature* 204: 515–518.
Walker, A. 1981. The Koobi Fora hominids and their bearing on the origins of the genus Homo. In *Homo erectus: papers in honor of Davidson Black*, ed. B.-A. Sigmon and J.S. Cybulski, 193–215. Toronto: Toronto University Press.
Wood, B. 1992. Origins and evolution of the genus *Homo*. *Nature* 355: 783–790.

Homo heidelbergensis

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Introduction

The species name *Homo heidelbergensis* was applied by Otto Schoetensack to a mandible recovered in 1907 at Mauer, near Heidelberg in Germany. Lying in fluvial sands deposited by the Neckar River, the human fossil was accompanied by animal bones indicating an early Middle Pleistocene age. In describing the well-preserved jaw (Fig. 1), Schoetensack (1908) commented on the lack of any bony chin but noted that the teeth are similar in form to those of recent humans. Many years later, F.C. Howell confirmed the presence of primitive features in the specimen while arguing that *H. heidelbergensis* could be distinguished from Asian and African representatives of *H. erectus*. Howell (1960) left open the relationship of the fossil to later Europeans, but *H. heidelbergensis* is now often regarded as ancestral to Neanderthals. It is generally accepted that the jaw from Mauer can be grouped with the mandibles and partial cranium from Arago Cave in France and the cranium from Petralona in Greece. If this grouping is expanded to include the Sima de los Huesos in Spain, then several additional skulls and numerous postcranial bones can be added to the species hypodigm. The Petralona and Arago specimens are also similar in many anatomical respects to crania from sites such as Broken Hill (Kabwe) in Zambia, Elandsfontein in South Africa, and Bodo from the Middle Awash of Ethiopia. Thus, it can be argued that *H. heidelbergensis* inhabited Africa as well as Europe. This species may be related not only to Neanderthals but also to modern humans.

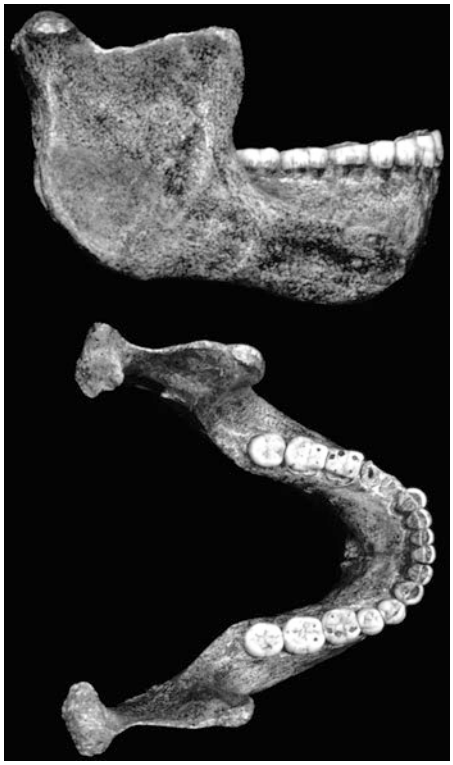

***Homo heidelbergensis*, Fig. 1** The Mauer mandible, considered by Schoetensack (1908) as the type specimen of *H. heidelbergensis*

Definition

Morphology and Evolutionary Significance of *H. heidelbergensis*

Homo heidelbergensis differs from *H. erectus* in brain size. Crania from Petralona, Arago, the Sima, Broken Hill, and Bodo have capacities of 1,100 cm^3 or greater (Holloway et al. 2004), and the average for this group is close to 1,230 cm^3. Height of the cranial vertex is increased in

comparison to *H. erectus*. The frontal region is broader, the outline of the squamous temporal is high and arched as in recent humans, and there is more rounding of the back of the vault. The occipital upper scale substantially exceeds the nuchal plane in length. Morphology of the temporomandibular joint generally resembles that in *H. sapiens*, as is also the case for the tympanic and petrous portions of the temporal bone. In Petralona and other individuals referred to *H. heidelbergensis*, the supraorbital torus is partitioned into medial and lateral segments. Nevertheless, the torus remains very massive. The frontal profile is flattened as in *H. erectus*, and the vault appears less globular relative to that of recent people. There is no reduction in overall face size in relation to *H. erectus*, and the facial skeleton seems to be "hafted" to the braincase in such a way as to accentuate facial projection. Reorientation of the nasal aperture and forward placement of the incisive canal within the palate suggest that the face of *H. heidelbergensis* may be more nearly vertical than is true for *H. erectus* (Rightmire 2008). But only in anatomically modern humans is the face significantly shortened supero-inferiorly and repositioned so as to lie underneath the anterior cranial fossa (Lieberman et al. 2002; Pearson 2008). The mandibular symphysis is receding as in *H. erectus*, and an internal alveolar planum is developed. European jaws referred to *H. heidelbergensis* also display resemblances to Neanderthals (Mounier et al. 2009). Limb bones and a pelvis excavated from the Sima de los Huesos demonstrate that at least some (male?) individuals were tall and robust (Arsuaga et al. 1999), while overall size differences assumed to reflect sexual dimorphism are comparable to those expressed in recent populations.

The place of *H. heidelbergensis* in the human family tree has been the subject of controversy. Dating of the Mauer sands and the mammal teeth contained in these deposits indicates an age of 609,000 years (Wagner et al. 2010). The Mauer mandible is thus one of the oldest fossils from Europe and comparable in age to material from Bodo in Africa. It is likely that populations differing from *H. erectus* evolved very early in the Middle Pleistocene. Just where this speciation event occurred cannot be determined from the evidence available. Whatever the locus, "new" populations must have dispersed quickly through Africa and western Eurasia, and perhaps also into southern Asia. Several evolutionary scenarios have been advanced, and each suggests a different taxonomic interpretation. Bräuer (2008) has grouped Middle and later Pleistocene populations into a series of more archaic and more modern grades within a broad *H. sapiens* category (Fig. 2a). Each grade is defined by advances in brain size and skull form. Although changes to the vault and face accumulate in a mosaic pattern, early and late groups follow one another seamlessly, as segments of a single evolving lineage. Bräuer's scheme recognizing only one species in the later Pleistocene has generally given way to hypotheses emphasizing cladogenesis within *Homo*. Tattersall and Schwartz (2008) and Schwartz and Tattersall (2010) regard living humans as a unique morphological entity, easily separable from most fossil hominins. In their view, *H. sapiens* possesses a package of derived cranial and mandibular features, and individuals that do not share this morphology can confidently be excluded from our species. Thus, multiple distinct taxa should be recognized, and speciation must have occurred repeatedly throughout the Pleistocene. In one such scenario, there are two lineages in addition to *H. erectus* and recent humans (Fig. 2b). A European branch comprising the Neanderthals can be traced back via Petralona, Arago, Sima de los Huesos, and Mauer deeply into the Middle Pleistocene. Proponents of this view (Arsuaga et al. 1997; Hublin 2009) claim that even the oldest European fossils share apomorphies with *H. neanderthalensis* and can reasonably be attributed to this species. A second lineage is rooted in Africa. Specimens including Broken Hill, Elandsfontein, and Bodo are referred to *H. rhodesiensis*, following the nomenclature proposed by Woodward (1921). Some (chronologically late) members of this group exhibit morphology that is archaic, coupled with characters suggestive of a link to anatomically modern humans. Another perspective (Fig. 2c) holds that morphological differences

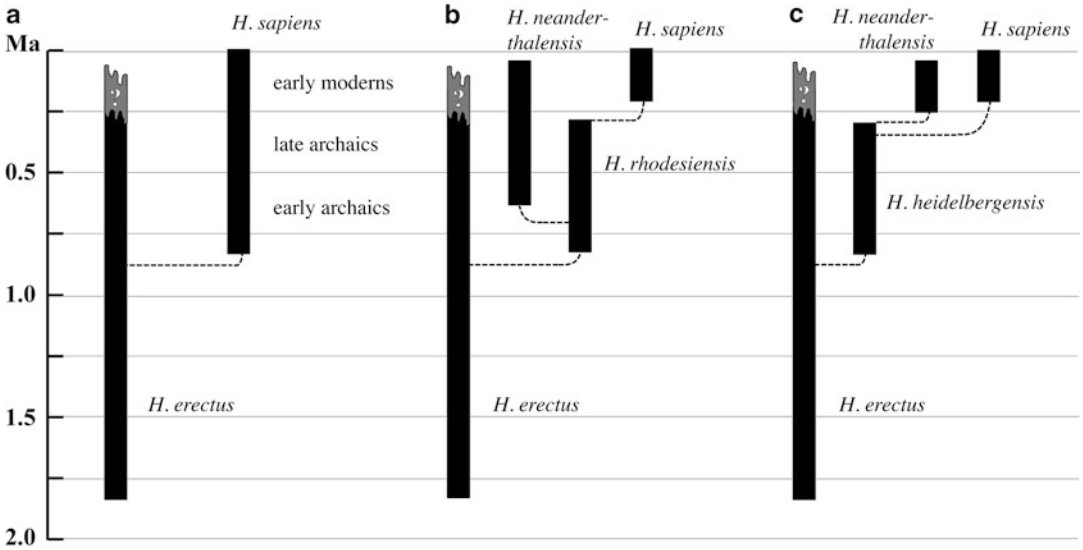

***Homo heidelbergensis*, Fig. 2** Alternative evolutionary trees showing the relationships of *H. erectus* to Middle Pleistocene hominins, Neanderthals, and recent humans. *Solid bars* depict the duration (first appearance date and last appearance date) estimated for each species. *Broken lines* indicate likely links of ancestors with descendants. In scenario (**a**), mid-Pleistocene and later populations are grouped into a series of grades within a broad *H. sapiens* category. In a second tree (**b**), there are two lineages in addition to *H. erectus* and recent humans. A European branch comprising the Neanderthals can be traced far back into the Middle Pleistocene. Proponents of this view claim that even the oldest European hominins share apomorphies with *H. neanderthalensis* and can be distinguished from a second lineage that is rooted in Africa. The latter is recognized as *H. rhodesiensis*. A third perspective (**c**) holds that morphological differences among the most ancient European and African specimens are minor and can be attributed to geography and intragroup variation. If the Mauer mandible is included within such a broadly construed hypodigm, then the appropriate name for this species is *H. heidelbergensis*

among the most ancient European and African fossils are minor and can be attributed to geography and intragroup variation (Rightmire 2008; Mounier et al. 2009; Stringer 2012). It is argued that all of the hominins should be placed together in one geographically dispersed taxon. The appropriate name for this species is *H. heidelbergensis*.

In summary, the Mauer mandible can be regarded as belonging either to a lineage restricted to Eurasia or to a larger population including representatives from Africa. If the latter, more comprehensive hypodigm is accepted for *H. heidelbergensis*, then this species may be the ancestor to both Neanderthals and anatomically modern *H. sapiens*. Which of these scenarios is to be preferred will be determined by the strength of morphometric similarities linking the European and African remains. The very complete Petralona cranium, for example, is demonstrably like Broken Hill in overall form of the braincase, proportions and massive construction of the upper face and cheek, orientation of the infraorbital region, and several measures of facial projection (Rightmire 2001; Harvati et al. 2010). Such findings support the hypothesis that *H. heidelbergensis* was a widespread (polytypic) species. Later in the Middle Pleistocene, some populations of *H. heidelbergensis* must have moved northward within Europe, where they were subjected repeatedly to episodes of extreme cold. During glacial advances and retreats occurring over several hundred thousand years, these hominins continued to adapt to harsh (cold/dry) conditions. In addition, random drift would have influenced the genetic make up of small or isolated groups. Eventually, such populations evolved the specialized craniofacial characters and (unique) body build of the Neanderthals. During this same time period, other representatives of *H. heidelbergensis* in Africa were becoming more like modern humans. Fossils from Irhoud in Morocco, the Omo KHS locality in southern

Ethiopia, Herto in the Middle Awash region, and Laetoli in Tanzania document this evolutionary progression toward *H. sapiens*.

Current Debates

A differing interpretation arises from ongoing analyses of the discoveries at the Sima de los Huesos. It has been established that the Sima skulls exhibit traits expected to occur (very) early in the evolution of the Neanderthal lineage. As described by Arsuaga et al. (1997), the midface of SH 5 seems to anticipate the distinctive morphology associated with Neanderthals. The infraorbital surface and the side wall of the nose meet at a shallow angle, so as to produce a slight concavity. The cheek region is thus not "inflated" in the extreme manner of Neanderthals, but it can be interpreted as intermediate in form. Also in the Sima sample, continuity of the supraorbital tori at glabella is said to be reminiscent of Neanderthals, and the broad nasal bones are set in a relatively horizontal orientation. At the rear of the cranium, the suprainiac area is large but not very depressed. This trait, and the shape of the occipital torus, may also foreshadow the Neanderthal condition.

Recently, it has been emphasized that the Sima de los Huesos teeth are remarkably like those of "typical" Neanderthals (Martinón-Torres et al. 2012). The upper incisors display conspicuous labial convexity and a distinctive shovel shape, while the upper premolars present a bulging of the buccal aspect of the crown. The M^1s possess an enlarged hypocone, giving the crown a rhomboidal outline characteristic of Neanderthals. The P_3s have a symmetrical contour. Here, the talonid is reduced or absent, so that the remaining cusps occupy a small area near the lingual border of the crown. This Neanderthal-like morphology is more pronounced in the Sima sample than in other Middle Pleistocene hominins. Indeed, Martinón-Torres et al. (2012) claim that the Sima specimens are "more Neanderthal" in form than the Mauer or the Arago dentitions. They suggest that the Sima may constitute a source population for Neanderthals, while Mauer and Arago document the presence of a morphologically distinct lineage. Such a conclusion is favored by Stringer (2012), who envisions two species coexisting in the European Middle Pleistocene. The second species (*H. heidelbergensis*) includes fossils presumed to predate the evolutionary emergence of *H. neanderthalensis*, as well as specimens such as Petralona from later time periods.

Future Directions

Our understanding of human evolution in the Middle Pleistocene remains incomplete. It is likely that additional clues will emerge, as new methods of analysis are applied to the fossils. Also, genomic data are continuing to accumulate, as more detailed DNA sequences are teased from ancient bones and teeth. Already, there are tantalizing indications that a group of archaic hominins related to but genetically distinct from Neanderthals was living in Siberia, several hundred thousand years ago. These "Denisovans" contributed genes to modern Australasian populations (Reich et al. 2010). Integrating the findings from DNA with inferences drawn from the fossil record presents a challenge. Nevertheless, the existence of Denisovans in the Far East can be accommodated by the view that *H. heidelbergensis* was dispersed across Eurasia and into Africa. This morphologically primitive species remains a good candidate for the last common ancestor to both the Neanderthal lineage and modern humans.

Cross-References

- ▶ Europe: Early *Homo* Fossil Records
- ▶ *Homo erectus*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ West and Central Asia: Early Homo Fossil Records

References

Arsuaga, J.L., I. Martinez, A. Gracia, and C. Lorenzo. 1997. The Sima de los Huesos crania (Sierra de Atapuerca, Spain). A comparative study. *Journal of Human Evolution* 33: 219–281.

H

Arsuaga, J.L., C. Lorenzo, J.M. Carretero, A. Gracia, I. Martinez, N. Gracia, J.M. Bermúdez de Castro, and E. Carbonell. 1999. A complete human pelvis from the Middle Pleistocene of Spain. *Nature* 399: 255–258.

Bräuer, G. 2008. The origin of modern anatomy: By speciation or intraspecific evolution? *Evolutionary Anthropology* 17: 22–37.

Harvati, K., J.J. Hublin, and P. Gunz. 2010. Evolution of middle-late Pleistocene human cranio-facial form: A 3-D approach. *Journal of Human Evolution* 59: 445–464.

Holloway, R.L., D. C. Broadfield, M. S. Yuan, J. H. Schwartz, and I. Tattersall. 2004.*Brain endocasts: The paleoneurological evidence.* The Human Fossil Record 3. Hoboken: Wiley-Liss.

Howell, F.C. 1960. European and northwest African Middle Pleistocene hominids. *Current Anthropology* 1: 195–232.

Hublin, J.J. 2009. The origin of Neandertals. *Proceedings of the National Academy of Sciences USA* 106: 16022–16027.

Lieberman, D.E., B.M. McBratney, and G. Krovitz. 2002. The evolution and development of cranial form in *Homo sapiens*. *Proceedings of the National Academy of Sciences USA* 99: 1134–1139.

Martinón-Torres, M., J.M. Bermúdez de Castro, A. Gómez-Robles, L. Prado-Simón, and J.L. Arsuaga. 2012. Morphological description and comparison of the dental remains from Atapuerca-Sima de los Huesos site (Spain). *Journal of Human Evolution* 62: 7–58.

Mounier, A., F. Marchal, and S. Condemi. 2009. Is *Homo heidelbergensis* a distinct species? New insight on the Mauer mandible. *Journal of Human Evolution* 56: 219–246.

Pearson, O.M. 2008. Statistical and biological definitions of "anatomically modern" humans: Suggestions for a unified approach to modern morphology. *Evolutionary Anthropology* 17: 38–48.

Reich, D., R.E. Green, M. Kircher, J. Krause, N. Patterson, et al. 2010. Genetic history of an archaic hominin group from Denisova Cave in Siberia. *Nature* 468: 1053–1060.

Rightmire, G.P. 2001. Comparison of Middle Pleistocene hominids from Africa and Asia. In *Human roots. Africa and Asia in the Middle Pleistocene*, ed. L. Barham and K. Robson-Brown, 123–133. Bristol: Western Academic and Specialist Press.

Rightmire, G.P. 2008. *Homo* in the Middle Pleistocene: Hypodigms, variation, and species recognition. *Evolutionary Anthropology* 17: 8–21.

Schoetensack, O. 1908. *Der Unterkiefer des Homo heidelbergensis aus den Sanden von Mauer bei Heidelberg. Ein Beitrag zur Paläontologie des Menschen*. Leipzig: Engelmann.

Schwartz, J.H., and I. Tattersall. 2010. Fossil evidence for the origin of *Homo sapiens*. *Yearbook of Physical Anthropology* 153: 94–121.

Stringer, C.B. 2012. The status of *Homo heidelbergensis* (Schoetensack, 1908). *Evolutionary Anthropology* 21: 101–107.

Tattersall, I., and J.H. Schwartz. 2008. The morphological distinctiveness of *Homo sapiens* and its recognition in the fossil record: Clarifying the problem. *Evolutionary Anthropology* 17: 49–54.

Wagner, G.A., M. Krbetschek, D. Dagering, J.J. Bahain, Q. Shao, C. Falguères, P. Voinchet, J.M. Dolo, T. García, and G.P. Rightmire. 2010. Radiometric dating of the type-site for *Homo heidelbergensis* at Mauer, Germany. *Proceedings of the National Academy of Sciences USA* 107: 19726–19730.

Woodward, A.S. 1921. A new cave man from Rhodesia, South Africa. *Nature* 108: 371–372.

Homo neanderthalensis

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Introduction

In August 1856, a group of quarry workers exploring the Feldhof caves in the Neanderthal (Neander Valley), Germany, discovered a collection of bones, buried in mud, which they initially assumed to be bear bones. Being quarry workers, and not archaeologists, and believing the bones to be simply animal remains, the men's excavation techniques were far from delicate, and even with encouragement from the quarry owners to recover more bones, only a small number were found – including parts of the arms and legs, ribs, pelvis, and skullcap, many of these fractured (Jordan 1999: 3). Despite the initial identification as non-human, the collection of bones was handed over to grammar school teacher, and Elberfield naturalist's society president, Johann Carl Fuhlrott for further study. Fuhlrott quickly established that the finds were not bear remains but those of an ancient human and in 1857 sent a cast of the cranium to anatomist Hermann Schaaffhausen of Bonn University (Jordan 1999: 11). After further study of all the recovered bones, Schaaffhausen meticulously described the first scientifically recognized Neanderthal, clearly stating his belief that the unusual skull morphology, particularly the pronounced brow ridges, was not due to injury

or disease, but an indication of the discovery of a new species of human. Despite some initial controversy, with several academics claiming the remains belonged to a disfigured and crippled man of various, much more recent, origins, the Neanderthal specimen was finally, and reluctantly, recognized as new, unique species in 1864 and named *Homo neanderthalensis* by William King, Professor of Geology at Queen's College, Galway (Reader 1988: 11). Much of the reluctance to accept the "Neanderthal Man" for what he was came from the lack of facial bones and teeth which would have more firmly identified him as a human ancestor, or as it now appears, a human "cousin" – the product of another branch of human development from our own. It was not long before the required evidence appeared however, with the reemergence of a female specimen found in Gibraltar sometime around 1948 (this "Gibraltar Woman," who's discovery predated "Neanderthal Man's" by approximately 8 years, was actually at least the second Neanderthal discovered and not recognized for what it was; a child's skullcap had been found at Engis in Belgium in 1830 (Jordan 1999: 8–10)) and the discovery of several more individuals in Belgium and France (Reader 1988: 13). Today, *Homo neanderthalensis* has been discovered across Europe and the Middle East, and it has been widely accepted that the "Neanderthal Man" and all the other specimens uncovered belong to their own, unique species. Current debate and research now focuses on whether Neanderthals are genetically related to modern humans, how intelligent they may have been (early descriptions painted them as primitive, brutish creatures, a view which is slowly shifting), how they communicated, whether they possessed any artistic traditions, how they lived, and also how they died.

Definition

Homo neanderthalensis is generally considered to be a separate species of human to *Homo sapiens*, although some scholars argue for a subspecies classification of *Homo sapiens neanderthalensis* (Tattersall and Schwartz 1999: 7117). Neanderthals (also spelled Neandertals without the "h" so as to more clearly represent the German pronunciation), as they are commonly known, likely separated from *Homo sapiens sapiens*, whether on a species or subspecies level, around half a million years ago, becoming geographically isolated, *H. neanderthalensis* developing in Eurasia while *H. sapiens* evolved in Africa (Finlayson 2009: viii). *Homo neanderthalensis* likely became extinct around 30,000 years ago. Recent revision of radiocarbon dates for the Vindija Neanderthals (found in Croatia), some of the youngest known, now place these specimens at approximately 32,000–33,000 ^{14}C years ago (Higham et al. 2006: 553). No Neanderthal fossils dating from later than 30,000 years before present have yet been found, although evidence of fire, butchered animals, and Neanderthal tools have been discovered at Gorham's Cave, in the Rock of Gibraltar dating to 24,000–28,000 years ago, possible evidence of the last of an entire species (Finlayson 2009: 144).

Key Issues/Current Debates/Future Directions/Examples

The Morphology of *Homo neanderthalensis*

The four hundred or so Neanderthal individuals found to date reveal a considerable diversity in morphology, with features varying over geography and time. However, most individuals do show traits relating to the classic Neanderthal type: robust and heavily built with slightly bowed, and proportionally short, limbs; barrel chested, with thick ribs; and broad feet and strong hands with thick, rounded fingers and long thumbs (Jordan 1999: 49–50). However, these postcranial traits can still be seen in some cultures today, especially in Eskimos and other groups who live in cold climates – robustness and shorter limbs are evolutionary adaptations designed to preserve heat – and none of the "typical Neanderthal features" on their own are beyond what could be found in modern humans. Therefore, it is the combination of a number of postcranial and cranial features that help define the species. It is the skulls of Neanderthals that show the distinctive features most

people now associate with *H. neanderthalensis* and those which most differ from our own. The "typical" Neanderthal had a large, thrust forward jaw with big teeth, small or almost nonexistent chin, broad nose, swept back cheek bones, and large pronounced brow ridges over the eyes. His or her skull would also have been longer and flatter than ours with a bun-shaped protuberance at the back (Jordan 1999: 52–54). The Neanderthal skull most likely housed a different shaped and larger brain than the average modern human's (Holloway 1985: 320), ranging from 1,200 to 1,740 ml (with a male average of 1,600 ml and a female average of 1,300 ml) (Jordan 1999: 52). Sexual dimorphism between Neanderthals is represented in both brain size and height (with males standing at around 164–168 cm and females at 152–156 cm (Helmuth 1998: 1)), but *H. neanderthalensis* men and women display a similar pelvis shape (unlike modern humans where male and female pelvises can appear quite different), although the Neanderthal female birth canal is no bigger than a modern woman's (Jordan 1999: 51). Dental growth patterns in Neanderthal children suggest that they developed much faster than *H. sapiens* children although they may have been no bigger at birth (Rozzi and de Castro 2004: 936).

Habitat, Range, and Diet

Although it is theorized that *Homo neanderthalensis* may have diverged from a modern human ancestor as much as half a million years ago, much of the fossil evidence for Neanderthals comes from much later. Most Neanderthal remains have been dated to the time of the last glacial period (around 110,000–10,000 years ago), possibly because shifting glaciers during this period may have destroyed many earlier sites, and it is these individuals that show the most typical Neanderthal features – as discussed above. This is not to say, however, that there is not a range of fossil evidence from prior to this period, but rather that those specimens, while still *H. neanderthalensis*, are of a more generalized type (Jordan 1999: 65). Nevertheless, a picture is painted, in most people's minds, of Neanderthals living in a cold, unforgiving climate in which much of their world was covered in towering glaciers. It is true that many would have lived in an icy Western Europe, but the Neanderthal range was not restricted to glacial areas. In fact evidence has been found of Neanderthals all across Europe and into Central Asia, as far south as the Levant (Jordan 1999: 65), and more recently as far east as Uzbekistan and the Altai region of southern Siberia (Krause et al. 2007: 1). Obviously not all of these places were under ice and snow, but they were impacted by the glacial period – their climates were different from today, some hotter, some colder, and some much drier; their coastlines were different – with much of the ocean bound up in ice sheets, the global sea level was lower, and their flora and fauna was also very different. How Neanderthals exploited this flora and fauna is widely debated. One view of Neanderthals, the one generally most accepted, is of carnivorous apex predators who effectively and selectively hunted a range of animals based on seasonality, the animal's availability, and the hunter's skill (Patou-Mathis 2000: 389). However, some researchers have argued that scavenging and the opportunistic killing of small prey was the Neanderthals most likely subsistence strategy (Henry 2003: 6). In reality, *H. neanderthalensis* probably employed a mix of both selective hunting and the scavenging of recently dead larger animals (Patou-Mathis 2000: 393) as well as the gathering and cooking of plant foods (Henry et al. 2010).

Tools, Art, and Language

Homo neanderthalensis is most commonly associated with the Mousterian culture, a style of stone tools named for the type site of Le Moustier, France (although there are other traditions also linked to Neanderthals such as the Chatelperronian). All Mousterian sites in Eurasia, dating from between 120,000 and 24,000 years ago, which also contain human fossils have been exclusively linked to Neanderthals (Finlayson 2009: 128), and it is the presence of Mousterian tools at Gorham's Cave, Gibraltar, which help define it as one of the, if not the last, sites ever occupied by Neanderthals. The Neanderthals employed a full stone toolkit including points,

scrapers, hand axes, grindstones, and backed knives which were used for butchery, food preparation, and other everyday uses. Some of these tools were hafted and show breakage that is linked with use as projectile points, and a large number show wear consistent with woodworking (Jordan 1999: 84). Wood, generally, does not survive well in archaeological sites, and so it is Neanderthal tools alongside their bones and the remains of their prey which have been used to define their culture. Neanderthal art is practically nonexistent. Unlike their archaic *H. sapiens* contemporaries and successors, Neanderthals did not appear to indulge in elaborate cave painting, nor did they construct statues or figurines. There is some evidence of possibly intentional bone engraving and a few pierced shells and animal teeth have been found associated with Chatelperronian sites (Jordan 1999: 110–111, 213) (which date from around 45,000 to 36,500 years ago (Finlayson 2009: 129), right at the end of the Neanderthal period), but that is about the extent of Neanderthal "art" represented in the archaeological record. It may be, however, that *H. neanderthalensis* expressed his or herself through body painting or the dying of clothes as fragments of iron oxide and manganese dioxide as well as possible ochre grinding stones have been discovered at Neanderthal sites (Jordan 1999: 110). A perceived lack of creative and artistic output by Neanderthals has led people to question how they communicated and whether they had language. Study of *H. neanderthalensis*' skull, jaw, neck, and hyoid suggests that they were capable of speech, if not able to pronounce the full range of sounds that modern humans can (Jordan 1999: 57). It is unknown, however, what form their language, if they had one, took; if they were able to speak in different tenses or with any form of grammar; and whether they possessed the ability to think and express abstract thoughts and feelings and communicate beyond the there and then.

Extinction

Somewhere around 30,000 years ago Neanderthals begin to disappear from the fossil record. Current evidence suggests that the last remaining group of true *Homo neanderthalensis* perished in Gibraltar 24,000–28,000 years ago, but it is, as yet, not definitively proven how or why. Various theories exist as to why Neanderthals suddenly vanished from the archaeological record. Some researchers suggest that *Homo sapiens*, who likely entered Europe around 40,000 years ago and coexisted with Neanderthals for some time, are to blame, either wiping out the Neanderthals through conflict or, less consciously, through the introduction of new parasites or diseases or via competitive exclusion (Banks et al. 2008) where slight advantages on the part of *H. sapiens* allowed them to out-compete Neanderthals for vital resources. The changing climate has also been blamed for Neanderthal extinction – the time they vanish from the archaeological record coincides with the approach of the last glacial maximum, which altered the climate, and ecology, of Europe. It has been suggested that *H. neanderthalensis* simply was not prepared for this change and could not adapt to it as the culturally and technologically superior *H. sapiens* could – Neanderthal hunting and subsistence strategies, living arrangements, and even clothing (Gilligan 2007) may just not have been suitable for the cooling climate. The last major argument for the extinction of the Neanderthals was that they did not go extinct at all but rather interbred with *Homo sapiens*, producing hybrids and passing on genes that remain with us today. Recent genetic evidence suggests that around 2–3% of the genome of modern non-Africans may be attributable to *H. sapiens/H. neanderthalensis* interbreeding (Currat and Excoffier 2011: 15129). This suggests either a low level of interbreeding with a high level of avoidance between the species and/or that the resulting hybrids were evolutionary unfit and mostly unable to successfully pass on their hybridized genes. Either way, it is possible that Neanderthals did not simply "die off" but rather integrated with *H. sapiens*, passed on their genes, albeit probably not very successfully, and still exist in some small way within the DNA of modern non-Africans. Without further archaeological and genetic research, it is impossible to know exactly what happened to *Homo neanderthalensis*. Each theory has its proponents and each has been argued extensively in the

literature; at this point a combination of factors may be the most likely cause for the extinction of the Neanderthals.

Cross-References

- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ Glacial Advances in Asia, Europe, and North America
- ▶ *Homo sapiens*
- ▶ Mousterian Industry Tradition
- ▶ Neanderthals and Their Contemporaries

References

Banks, W.E., F. d'Errico, A.T. Peterson, M. Kageyama, A. Sima, and M.F. Sánchez-Goñi. 2008. Neanderthal extinction by competitive exclusion. *PLoS One* 3 (12): e3972.

Currat, M., and L. Excoffier. 2011. Strong reproductive isolation between humans and Neanderthals inferred from observed patterns of introgression. *Proceedings of the National Academy of Sciences* 108 (37): 15129–15134.

Finlayson, C. 2009. *The humans who went extinct: Why Neanderthals died out and we survived*. New York: Oxford University Press.

Gilligan, I. 2007. Neanderthal extinction and modern human behaviour: The role of climate change and clothing. *World Archaeology* 39 (4): 449–514.

Helmuth, H. 1998. Body height, body mass and surface area of the Neandertals. *Zeitschrift für Morphologie Anthropologie* 82 (1): 1–12.

Henry, D.O. 2003. *Neanderthals in the Levant: Behavioral organization and the beginnings of human modernity*. London: Continuum.

Henry, A.G., A.S. Brooks, and D.R. Piperno. 2010. Microfossils in calculus demonstrate consumption of plants and cooked foods in Neanderthal diets (Shanidar III, Iraq; Spy I and II, Belgium). *Proceedings of the National Academy of Sciences* 108 (2): 486–491.

Higham, T., C.B. Ramsey, I. Karavanic, F.H. Smith, and E. Trinkaus. 2006. Revised direct radiocarbon dating of the Vindija G_1 Upper Paleolithic Neandertals. *Proceedings of the National Academy of Sciences* 103 (3): 553–557.

Holloway, R.L. 1985. The poor brain of Homo sapiens neanderthalensis: see what you please... Proceedings of the Symposium held at the American Museum of Natural History April 6-10, 1984 to mark the opening of the exhibition "Ancestors: four million years of humanity". In *Ancestors: The hard evidence*, ed. E. Delson, 319–324. New York: Alan R. Liss, Inc.

Jordan, P. 1999. *Neanderthal*. Stroud: Sutton Publishing Limited.

Krause, J., L. Orlando, D. Serre, B. Violoa, K. Prüfer, M.P. Richards, J.J. Hublin, C. Hänni, A.P. Derevianko, and S. Pääbo. 2007. Neanderthals in Central Asia and Siberia. *Nature* 449: 902–904.

Patou-Mathis, M. 2000. Neanderthal subsistence behaviours in Europe. *International Journal of Osteoarchaeology* 10: 379–395.

Reader, J. 1988. *Missing links: The hunt for earliest man*. London: Pelican Books.

Rozzi, F.V.R., and J.M.B. de Castro. 2004. Surprisingly rapid growth in Neanderthals. *Nature* 428: 936.

Tattersall, I., and J.H. Schwartz. 1999. Hominids and hybrids: The place of Neanderthals in human evolution. *Proceedings of the National Academy of Sciences* 96: 7117–7119.

Further Reading

Mellars, P. 1996. *The Neanderthal legacy: An archaeological perspective from western Europe*. Princeton: Princeton University Press.

Shreeve, J. 1997. *The Neanderthal enigma: solving the mystery of modern human origins*. London: Penguin Books.

Stringer, C., and C. Gamble. 1993. *In search of the Neanderthals: Solving the puzzle of human origins*. London: Thames & Hudson.

Trinkaus, E., and P. Shipman. 1993. *The Neanderthals: Changing the image of mankind*. London: Jonathan Cape.

Homo sapiens

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Introduction

Homo sapiens is the species commonly referred to as humans. The species evolved in Africa more than 300,000 years ago and is the only living representative of the genus *Homo*. Humans have a gracile body build compared to earlier members

of the genus *Homo*. All humans have a chin and a large brain that is highly developed. This brain allowed for the evolution of behavioral modernity and for continuous social and technological innovations to take place that allow *Homo sapiens* to survive in all habitats.

Definition

Homo sapiens (Linnæus 1758). Species to which all living modern humans belong. While fossils closely resembling living humans are often referred to as "anatomically modern *Homo sapiens*," earlier members of the lineage are sometimes termed "archaic *Homo sapiens*."

Key Issues/Current Debates/Future Directions/Examples

Morphology

Homo sapiens around the world share a number of derived characteristics (Lieberman 2008). These features were not present in previous hominins and include a rounded skull with a high forehead. Also, the browridges are reduced. The face is small, tucked under the forehead, and characterized by the presence of a mental protuberance or a forward projecting chin. The anterior teeth are small, indicating that they were less used as tools and that food was alternatively softened by processing such as grinding and cooking. The brain has a mean cranial capacity of about 1350 cc. This value is comparable with that of *Homo neanderthalensis* but is larger, relative to body size. The postcranial skeleton of *Homo sapiens* is more gracile than that of previous hominins. The earliest humans were more robustly built than people today because of their high level of daily activities, but in general, there was a tendency even in early *Homo sapiens* to have thinner walled long bones and more lightly built hands and feet. The scapula (shoulder blade) is less muscular and the pelvis is less robust, with a shorter pubic area. The skeletons of the earliest modern humans displayed long limbs and short trunks, reflecting the warm African climate in which they evolved (Holliday 1997). More recent humans show adaptation to the environment in which they live.

Key Fossils

The first widely accepted ancient *Homo sapiens* fossils were discovered in the Cro-Magnon rockshelter in Les Eyzies-de-Tayac, France (Fig. 1). The human remains at the site represented at least five people. The associated fauna and Upper Paleolithic archaeology confirmed that these fossils were very ancient. The site gave its name to European early modern humans in the Old Stone Age: the Cro-Magnon people. Not long after this discovery, more sites were uncovered across Europe, showing that humans had occupied Europe from at least 35,000 years ago, while recent re-dating of specimens from Italy and the UK indicates that they may have been present in Europe as early as 43,000 years ago (Benazzi et al. 2011; Higham et al. 2011).

The African continent has yielded the oldest *Homo sapiens* skeletons that include modern human-derived characteristics. The most securely dated of these are two partial skulls from Herto, in Ethiopia's Middle Awash River Valley. They date to between 160,000 and 154,000 years and show a humanlike cranial capacity, a tall forehead and rounded braincase of the skull, with a small, non-projecting face. There is earlier evidence from Omo Kibish (Fleagle et al. 2008) at 195,000 years, and this includes two partial skulls and some postcranial material. The first skull Omo 1 shows the most modern features, but Omo 2 is much more archaic, and additional newly excavated fossils have also displayed this mixed morphology (Fig. 2). In 2017, new thermoluminescence and ESR dates were announced for the site of Jebel Irhoud, Morocco. The Middle Stone Age cranial material shows clear *Homo sapiens* characteristics in its facial, mandibular, and dental morphology while retaining a more primitive neurocranial and endocranial morphology. The mosaic of modern and primitive features present around 315 ± 34 thousand years ago indicates an early phase of *Homo sapiens* evolution in Northwest Africa (Hublin et al. 2017).

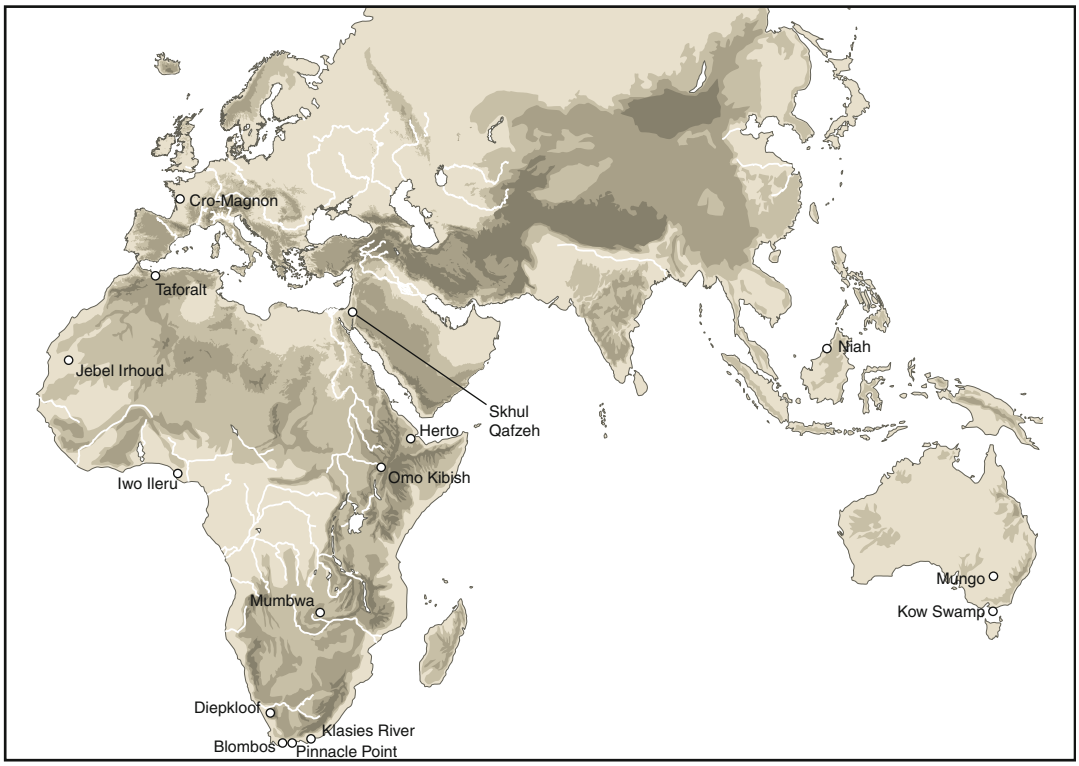

***Homo sapiens*, Fig. 1** Map showing some key *Homo sapiens* sites mentioned in the text. (Credits: Silvia Bello)

***Homo sapiens*, Fig. 2** Omo 1 (*right*) and Omo 2 (*left*) showing modern and more mixed features, respectively, indicating the mosaic nature of early *Homo sapiens.* (Credits: Michael Day. Digital editing: Charley Coleman)

Life History

Modern humans have distinctive growth and development patterns. These are different from those of our living primate relatives. Through the study of perikymata in teeth (incremental growth lines), it became clear that modern humans grow up slower than do our living primate and fossil hominin relatives. This slow growth is due to a long period of childhood growth and dependency. The extended childhood allows children to develop linguistic and other complex cultural skills that other primates do not have and,

arguably, skills that earlier fossil hominins did not possess (Smith et al. 2010). In addition to extended childhood, modern humans often live post-reproductively, indicating that the elderly in society still have a crucial role to play. This extended life span has been suggested to be linked to the importance of intergenerational transfer of cultural information. Even though older members of the population no longer play an active role in reproduction and hunting, they can collect resources more locally and provide knowledge and skill to the younger generations.

Genetics

Before the development of genetics, *Homo sapiens* was distinguished from earlier hominins primarily using morphology. Fossils and associated archaeology were the only sources of evidence to uncover the evolutionary past of humans. Advances in molecular genetics now not only allow scientists to look at how humans differ genetically from other living primates, but ancient DNA (aDNA) analysis of fossil material and genetic patterning in modern humans elucidate the origins and diversification of *Homo sapiens*.

Initially, analysis of modern human and chimpanzee DNA was compared (The Chimpanzee Sequencing and Analysis Consortium 2005) and found to differ in around 1.06% of the nucleotides. Insertions and deletions in parts of the DNA account for another 3% of the difference between the genomes. Nevertheless, phenotypically, there is a big difference between chimpanzees and humans, and this is because of the different ways in which similar genes express themselves in humans and in chimpanzees. This demonstrates clearly that the number of mutations in protein coding genes is not necessarily proportional to the phenotypic expression.

Recent developments in the successful extraction of DNA from fossil hominins have created a whole new area of research on ancient DNA. Several Neanderthal mitochondrial and nuclear DNA sequences, as well as Denisovan DNA, are currently being compared and are helping paleoanthropologists to determine what makes *Homo sapiens* genetically and, thus, physically. As geneticists further unravel the genome of humans and living primates and study the phenotypic expression of individual genes, it will be possible to reconstruct phenotypic differences between earlier hominins and *Homo sapiens* more accurately than is possible from the fossil and archaeological record alone.

Modern Human Behavior

For over a million years, *Homo erectus* and the subsequent species *Homo heidelbergensis* used Acheulean tools through most of western Eurasia and Africa. These tools proved advanced enough to allow the survival of the hominins using them over a wide range of habitats. With more complex technology and specialized tools, *Homo sapiens* has gradually been able to adapt to an even wider range of environments. In addition, *Homo sapiens* also show a range of other behaviors not seen in other living and fossil species: elaborate symbolic, artistic, and religious behaviors as well as advanced problem-solving. These are the result of our cognitive abilities and our cumulative and complex learning strategies.

Until fairly recently, many workers believed that modern human behavior had evolved rapidly in Europe some thousands of years after anatomically modern humans had originated in Africa. Anthropologists believed the presence of cave paintings in Europe, the use of symbolism, the diversification of hunting techniques and technology, the inclusion of aquatic resources in the diet, and a wider use of raw materials provided the essentials for behavioral modernity. Recent discoveries and a more comprehensive interpretation of what makes up modern behavior have now shown that human behavioral modernity did not evolve suddenly in Europe. Instead, it accumulated more episodically in Africa during the Middle Stone Age and reached the essentials of modernity before modern humans spread out of Africa around 60,000 years ago (McBrearty & Brooks 2000).

Some of the earliest potential evidence for modern behavior comes from sediments dated to about 164,000 years at the Pinnacle Point caves, South Africa, in the form of stone bladelets, ground red pigment, and the cooked remains of shells such as mussels and abalone (Gibbons

2007). Other evidence for the use of aquatic resources comes from Katanda (Congo) where bone harpoons were found and the remains of catfish dating back to about 90,000 years (McBrearty and Brooks 2000). Also at Blombos Cave in South Africa, bone points have been found, with evidence for pressure flaking in the Middle Stone Age Stillbay industry, well before these are widespread across Europe. Composite tools were also included in tool assemblages during the Middle Stone Age in Sudan, and there is clear evidence that raw materials were transported over extended distances. At Mumbwa Cave in Zambia, there is early evidence for the construction of shelters, and many sites have yielded remnants of hearths.

There is also evidence for decorative non-utilitarian objects in the form of *Nassarius* shell beads, with the oldest currently documented at Skhul and Qafzeh Caves in Israel and Taforalt Cave in Morocco, at about 100,000 years. The shells are perforated in the same way, and some show signs of ochre treatment. These are also known from sites such as Blombos Cave in South Africa at a somewhat later date. Ostrich egg shell beads are a little younger than shell beads but are evident before *Homo sapiens* left Africa about 60,000 years ago. Red ochre use seems widespread from at least 150,000 years ago, with ochre applied to artifacts and engraved pieces dating back to about 100,000 years. In 2011 (Henshilwood et al. 2011), what appear to be red ochre paint kits from Blombos Cave were published, also dating to about 100,000 years ago. Evidence of the first ritual burials is known from about 110,000 years ago at Skhul and Qafzeh Caves in Israel. However, so far, there is only disputed evidence for figurative art older than about 45,000 years ago, as modern humans spread from Africa into the rest of the world.

The slow accumulation of modern human behavior in Africa despite clear evidence for full anatomical modernity around 195,000 years ago can be explained by the gradual technical advances during the Middle Stone Age that slowly gave rise to larger and more networked populations. Increased group size would have facilitated the spread and growth of technological innovations, and extended social networks would have positively affected food acquisition efficiency, leading in turn to surpluses, role specialization, increased symbolic and linguistic expression, and ritual activity. Although some authors (Klein 2009) argue that these changes were associated with possible brain mutations, we see similar rapid accelerations in cultural and technological advances without these mutations throughout human history (e.g., the Neolithic and Industrial Revolutions).

Cross-References

- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Central and West African Middle Stone Age: Geography and Culture
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ Europe: Early *Homo* Fossil Records
- ▶ Fossil Records of Early Modern Humans
- ▶ *Homo heidelbergensis*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Human Evolution: Theory and Progress
- ▶ Journal of Human Evolution
- ▶ Out-of-Africa Origins
- ▶ Pinnacle Point: Excavation and Survey Methods
- ▶ Southern and East African Middle Stone Age: Geography and Culture
- ▶ West and Central Asia: Early Homo Fossil Records

References

Benazzi, S., K. Douka, C. Fornai, C.C. Bauer, O. Kullmer, J. Svoboda, I. Pap, F. Mallegni, P. Bayle, M. Coquerelle, S. Condemi, A. Ronchitelli, K. Harvati, and G.W. Weber. 2011. Early dispersal of modern humans in Europe and implications for Neanderthal behaviour. *Nature* 479 (7374): 525–528.

Fleagle, J.G., Z. Assefa, F.H. Brown, and J.J. Shea. 2008. Paleoanthropology of the Kibish Formation, southern Ethiopia: introduction. *Journal of Human Evolution* 55 (3): 360–365.

Gibbons, A. 2007. Coastal artifacts suggest early beginnings for modern behavior. *Science* 318 (5849): 377.

Henshilwood, C.S., F. d'Errico, K.L. van Niekerk, Y. Coquinot, Z. Jacobs, S.-E. Lauritzen, M. Menu, and R. García-Moreno. 2011. A 100,000-year-old ochre-processing workshop at Blombos Cave, South Africa. *Science* 334 (6053): 219–222.

Higham, T.F.G., T. Compton, C. Stringer, R. Jacobi, B. Shapiro, E. Trinkaus, B. Chandler, F. Gröning, C. Collins, S. Hillson, P. O'Higgins, C. Fitz Gerald, and M. Fagan. 2011. The earliest evidence for anatomically modern humans in northwestern Europe. *Nature* 479 (7374): 521–524.

Holliday, T.W. 1997. Body proportions in late Pleistocene Europe and modern human origins. *Journal of Human Evolution* 32 (5): 423–447.

Hublin, J.J., A. Ben-Ncer, S.E. Bailey, S.E. Freidline, S. Neubauer, M.M. Skinner, I. Bergmann, A. Le Cabec, S. Benazzi, K. Harvati, and P. Gunz. 2017. New fossils from Jebel Irhoud, Morocco and the pan-African origin of Homo sapiens. *Nature* 546 (7657): 289–292.

Klein, R.G. 2009. *The human career*. Chicago: University of Chicago Press.

Lieberman, D.E. 2008. Speculations about the selective basis for modern human craniofacial form. *Evolutionary Anthropology: Issues, News, and Reviews* 17 (1): 55–68.

Linnæus, C. 1758. *Systema naturæ per regna tria naturæ, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Tomus I. Editio decima, reformata [1–4]*, 1–824. Holmiæ: Salvius.

McBrearty, S., and A.S. Brooks. 2000. The revolution that wasn't: a new interpretation of the origin of modern human behavior. *Journal of Human Evolution* 39 (5): 453–563.

Smith, T.M., P. Tafforeau, D.J. Reid, J. Pouech, V. Lazzari, J.P. Zermeno, D. Guatelli-Steinberg, A.J. Olejniczak, A. Hoffman, J. Radovcic, M. Makaremi, M. Toussaint, C. Stringer, and J.-J. Hublin. 2010. Dental evidence for ontogenetic differences between modern humans and Neanderthals. *Proceedings of the National Academy of Sciences* 107 (49): 20923–20928.

Stringer, C., and J. Galway-Witham. 2017. Palaeoanthropology: on the origin of our species. *Nature* 546 (7657): 212–214.

The Chimpanzee Sequencing and Analysis Consortium. 2005. Initial sequence of the chimpanzee genome and comparison with the human genome. *Nature* 437 (7 055): 69–87.

Further Reading

Stringer, C. 2011. *The origin of our species*. London: Allen Lane.

Stringer, C. 2016. The origin and evolution of *Homo sapiens*. *Philosophical Transactions of the Royal Society B: Biological Sciences* 371 (1698): 20150237–20150237. https://doi.org/10.1098/rstb.2015.0237.

Honey Bee: Management

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The relationship between humans and honey bees (genus *Apis*) spans centuries (Crane 1983). Honey bees consist of between 10 and 12 extant species predominantly located in Asia (Ruttner 1988). Fossil evidence suggests that honey bees originated during the Oligocene, between 30 and 20 million years ago (Engel 1998; Kotthoff et al. 2013). *A. mellifera,* referred to as the European honey bee, is the most well-known and intensively managed bee. *A. mellifera* is native to Africa, Asia, and Europe, but because of human-mediated dispersal, is now found on all continents except Antarctica.

Humans have most likely been foraging for honey since the dawn of their evolution. The earliest evidence of honey hunting – the process of destructively acquiring honey from wild colonies – was depicted in cave paintings found in Northern Spain (likely between 30,000 and 9000 BC) (Crane 1983). Evidence of honey hunting was also documented in cave painting found in Eastern Spain, dated between 8000 and 2000 BC. There is extensive evidence of honey hunting in Africa from numerous depictions in rock paintings, but such paintings are difficult to date reliably (Crane 1983). As well, evidence of pottery shards containing honeybee products within Northern Africa, Anatolia, and Central Europe from at least 9000 years ago–associated with the earliest instances of farming in the area–suggest a long history of association of humans and honeybees and potentially of active beekeeping (Roffet-Salque et al. 2015).

The first archaeological evidence of beekeeping – the propagation of honey bee colonies by humans – is found in scenic depictions from Ancient Egypt around 2400 BC (Crane 1983;

Kritsky 2015). Depictions from the sun temple of Nyuserre Ini, Pharaoh of the Fifth Dynasty during the Old Kingdom, illustrate men pouring honey into pots, accompanied by hieroglyphs depicting a bee – *bit* (Kritsky 2015). The oldest discovered apiary was found in Tel Rehov, an archeological site in the Jordan Valley, dated to be 3000 years old. The honey bees preserved in the Tel Rehov apiary are different from contemporary honey bee subspecies inhabiting the Jordon Valley, which suggests that beekeepers were already importing bees and managing large apiaries during Biblical times (Bloch et al. 2010).

Older techniques of collecting and storing colonies in pots rendered inspecting a colony and extracting honey in a noninvasive manner very difficult (Crane 1983). With the advent of selectively removing honeycomb on pieces of wooden frames, beekeepers were able to nondestructively harvest honey and see the inner workings of the hive (Kritsky 2010). The first instance of moveable frames came from Greece in 1682, and these would be the predecessors of today's modern Langstroth hive, which was invented in 1852 (Crane 1983; Kritsky 2010). The Langstroth hive allowed beekeepers full access and control of honey bee colonies and spurred the development of commercial beekeeping around the globe (Crane 1983; Kritsky 2010).

Native *A. mellifera* subspecies – at least 26 subspecies – are organized into at least four evolutionary lineages or groups found in Africa, Western and Northern Europe, Eastern Europe, and the Middle East (Ruttner 1988; Garnery et al. 1992; Arias and Sheppard 1996; Franck et al. 2001; Whitfield et al. 2006; Wallberg et al. 2014; Cridland et al. 2017), with a potential fifth lineage recently identified in Northeast Africa and parts of the Middle East (Franck et al. 2001; Cridland et al. 2017; Harpur et al. 2014). The biogeographic and evolutionary history of the European honey bee is – like humans – both complex and intriguing. The history of *Apis mellifera* is best studied by examining differences in the genetic makeup of bees across the globe. Recent genetic studies have shown that the European honey bee originated in either Africa (Whitfield et al. 2006; Cridland et al. 2017) or Asia (Han et al. 2012; Chen et al. 2016; Wallberg et al. 2014) and then colonized Europe via at least two independent expansions. One of the colonization routes spans through Africa and into Europe through the Iberian Peninsula, while the second follows an Eastern route through Asia into Europe. The timing of these expansions is hypothesized to have begun 0.3–1.3 million years ago (Cornuet and Garnery 1991; Arias and Sheppard 1996; Wallberg et al. 2014; Chen et al. 2016).

The long history of human and honey bee interactions has had a profound influence on the bee's contemporary geographic distribution. European honey bees were introduced to the New World by means of European settlers as early as the seventeenth century (Ruttner 1988; Sheppard 1989). Subsequent introductions from Europe brought a mix of different European honey bee subspecies, including *A. m. mellifera*, *A. m. carnica* and *A. m. ligustica* (Sheppard 1989). European honey bees thereby spread through North and South America via beekeeping activities and natural dispersal. A more recent introduction of the African subspecie *A. m. scutellata* to Brazil in 1956 led to the invasion of Africanized – so-called killer – bees (Kerr 1967). Currently, Africanized bees are found in North America in the southern and southwestern United States, to as far south as Argentina in South America.

The movement of honey bees has led to commercial populations with a great deal of genetic admixture – or mixed ancestry – which results from intentional or natural hybridization events between subspecies from West Europe and East Europe (Harpur et al. 2012, 2015; Whitfield et al. 2006). This genetic admixture is readily explained considering beekeeping practices such as international importation of honey bee queens, as well as by the honey bee's mating biology: queens naturally mate with 15 to 20 different males from a relatively large geographic area, which promotes outbreeding and genetic mixing. As a result of mixing, managed honey bees actually have higher genetic diversity than their progenitors in East and West Europe (Harpur et al. 2012).

Today, honey bees are responsible for a large portion of crop pollination, accounting for at least 34% of pollination services in the United

Kingdom (Breeze et al. 2011) and likely more in North America. No single insect pollinates more plant species than the honey bee (Breeze et al. 2011). Honey bees are used to pollinate fruit crops (apples, apricots, avocados, blueberries), oilseeds (cotton, flax, soy), forage and legume crops (alfalfa, clover, buckwheat), and vegetables (broccoli, beans, cucumbers, carrots, peppers). Though the traditional honey harvesting and collecting methods still persist today, the contemporary relationship between humans and honey bees has expanded to a global multibillion-dollar industry.

References

Arias, M.C., and W.S. Sheppard. 1996. Molecular phylogenetics of honey bee subspecies (*Apis mellifera* L.) inferred from mitochondrial DNA sequence. *Molecular Phylogenetics and Evolution* 5 (3): 557–566.

Bloch, G., T.M. Francoy, I. Wachtel, N. Panitz-Cohen, S. Fuchs, and A. Mazar. 2010. Industrial apiculture in the Jordan valley during biblical times with Anatolian honeybees. *Proceedings of the National Academy of Sciences of the United States of America* 107 (25): 11240–11244. https://doi.org/10.1073/pnas.1003265107.

Breeze, T.D., A.P. Bailey, K.G. Balcombe, and S.G. Potts. 2011. Pollination services in the UK: How important are honeybees? *Agriculture Ecosystems & Environment* 142 (3–4): 137–143. https://doi.org/10.1016/j.agee.2011.03.020.

Chen, Chao, Zhiguang Liu, Qi Pan, Xiao Chen, Huihua Wang, Haikun Guo, Shidong Liu, Hongfeng Lu, Shilin Tian, and Ruiqiang Li. 2016. Genomic analyses reveal demographic history and temperate adaptation of the newly discovered honey bee subspecies *Apis mellifera* sinisxinyuan n. ssp. *Molecular Biology and Evolution* 33: 1337. msw017.

Cornuet, J.M., and L. Garnery. 1991. Mitochondrial DNA variability in honeybees and its phylogeographic implications. *Apidologie* 22 (6): 627–642.

Crane, E. 1983. *The archaeology of beekeeping*: Duckworth, London.

Cridland, Julie M., Neil D. Tsutsui, and Santiago R. Ramírez. 2017. The complex demographic history and evolutionary origin of the western honey bee, *Apis mellifera*. *Genome Biology and Evolution* 9: 457.

Engel, M.S. 1998. Fossil honey bees and evolution in the genus *Apis* (Hymenoptera: Apidae). *Apidologie* 29: 265–281.

Franck, P., L. Garnery, A. Loiseau, B.P. Oldroyd, H.R. Hepburn, M. Solignac, and J.-M. Cornuet. 2001. Genetic diversity of the honeybee in Africa: Microsatellite and mitochondrial data. *Heredity* 86 (4): 420–430.

Garnery, L., J.-M. Cornuet, and M. Solignac. 1992. Evolutionary history of the honey bee *Apis mellifera* inferred from mitochondrial DNA analysis. *Molecular Ecology* 1 (3): 145–154.

Han, Fan, Andreas Wallberg, and Matthew T. Webster. 2012. From where did the Western honeybee (*Apis mellifera*) originate? *Ecology and Evolution* 2 (8): 1949–1957.

Harpur, B.A., S. Minaei, C.F. Kent, and A. Zayed. 2012. Management increases genetic diversity of honey bees via admixture. *Molecular Ecology*. https://doi.org/10.1111/j.1365-294X.2012.05614.x.

Harpur, Brock A., Clement F. Kent, Daria Molodtsova, Jonathan M.D. Lebon, Abdulaziz S. Alqarni, Ayman A. Owayss, and Amro Zayed. 2014. Population genomics of the honey bee reveals strong signatures of positive selection on worker traits. *Proceedings of the National Academy of Sciences of the United States of America* 111: 2614–2619. https://doi.org/10.1073/pnas.1315506111.

Harpur, B.A., N.C. Chapman, Lior Krimus, Philip Maciukiewicz, Vijay Sandhu, Keshna Sood, Julianne Lim, T.E. Rinderer, M.H. Allsopp, and B.P. Oldroyd. 2015. Assessing patterns of admixture and ancestry in Canadian honey bees. *Insectes Sociaux* 62 (4): 479–489.

Kerr, W.E. 1967. The history of the introduction of African bees to Brazil. *South African Bee Journal* 39: 3.

Kotthoff, Ulrich, Torsten Wappler, and Michael S. Engel. 2013. Greater past disparity and diversity hints at ancient migrations of European honey bee lineages into Africa and Asia. *Journal of Biogeography* 40 (10): 1832–1838.

Kritsky, Gene. 2010. *The quest for the perfect hive: A history of innovation in bee culture*. New York: Oxford University Press.

Kritsky, Gene. 2015. *The tears of Re: Beekeeping in ancient Egypt*. New York: Oxford University Press.

Roffet-Salque, M., Regert, M., Evershed, R. P., Outram, A. K., Cramp, L. J., Decavallas, O., . . . and Pääkkönen, M. (2015). Widespread exploitation of the honeybee by early Neolithic farmers. Nature, 527(7577), 226.

Ruttner, F. 1988. *Biogeography and taxonomy of honeybees*. New York: Springer.

Sheppard, W.S. 1989. A history of the introduction of honey bee races into the United-States. *American Bee Journal* 129 (9): 617–619.

Wallberg, Andreas, Fan Han, Gustaf Wellhagen, Bjørn Dahle, Masakado Kawata, Nizar Haddad, Zilá Luz Paulino Simões, Mike H. Allsopp, Irfan Kandemir, Pilar De la Rúa, Christian W. Pirk, and Matthew T. Webster. 2014. A worldwide survey of genome sequence variation provides insight into the evolutionary history of the honeybee *Apis mellifera*. *Nature Genetics* 46: 1081–1088. https://doi.org/10.1038/ng.3077.

Whitfield, C.W., S.K. Behura, S.H. Berlocher, A.G. Clark, J.S. Johnston, W.S. Sheppard, D.R. Smith, A.V. Suarez, D. Weaver, and N.D. Tsutsui. 2006. Thrice out of Africa: Ancient and recent expansions of the honey bee, *Apis mellifera*. *Science* 314 (5799): 642–645. https://doi.org/10.1126/science.1132772.

Hopewell Culture, Archaeology of the

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Introduction

The Hopewell culture, named for the Hopewell Mound Group in the Paint Creek valley of southern Ohio, is best known for its monumental earthworks and the broad range of exotic raw materials its artisans acquired and crafted into magnificent works of art (Fig. 1). The Hopewell culture reached its fullest expression in the valleys of the major streams that flowed southward into the Ohio River in southern Ohio and neighboring Indiana during the Middle Woodland period (100 BCE–500 CE). Hopewell-related manifestations, however, are known throughout eastern North America, from the Mississippi River to the western flanks of the Appalachian Mountains and from the southern Great Lakes to the Gulf of Mexico.

Hopewell Culture, Archaeology of the, Fig. 1 Hopewell copper face effigy from the Hopewell Mound Group (A283/000140). 6.25 mm high. Ohio History Connection

The Hopewell culture was an outgrowth of the earlier Adena culture in the Ohio Valley. The Hopewell people built upon the foundation of mortuary ceremonialism centered on mound-building and the acquisition of exotic raw materials established during the Early Woodland period (800–100 BCE). The reasons for this florescence are unclear, but it appears to have been rapid and is not obviously due either to demographic or ecological causes (Carr and Case 2005: 290).

Definition

The Hopewell culture represents a brilliant florescence of art, architecture, ceremony, and interregional interaction that was unparalleled in North America up to that time (Fig. 2). It encompassed a number of societies in eastern North America linked by an intense focus on mortuary ceremonialism performed in monumental architectural settings and participation in an exchange network that likely involved a mixture of gift-giving, pilgrimage offerings, the direct acquisition of exotic materials through extraordinary journeys by individuals and small groups, and trade.

Typical artifacts that appear to have reflected a Hopewell identity included earspools and breastplates made from copper, elegant mica cutouts, marine shell vessels, animal effigy platform pipes, frequently oversized spear points and knives made from obsidian, and cores and bladelets made from both Flint Ridge flint and Wyandotte chert (Seeman 2004).

Hopewell farmers cultivated the plants of the Eastern Agricultural Complex, including goosefoot, knotweed, and maygrass, with their starchy seeds rich in carbohydrates, sunflower with its oily seeds, and sumpweed, as well as tobacco. In spite of this evidence for horticulture, Hopewell people appear to have relied principally on hunting, gathering, and fishing for their livelihoods. The cultivated plants provided both a storable

Hopewell Culture, Archaeology of the, Fig. 2 Artistic representation of life in the Middle Woodland period. Ancient Ohio Art Series, artist Susan A. Walton. Ohio History Connection

surplus of comestibles that would have alleviated seasonal food shortages and food to help support the periodic large gatherings at major earthwork centers.

The most important ceremonial earthwork centers include the Hopewell Mound Group, Mound City, Seip Earthworks, and the Portsmouth Earthworks in the Scioto River drainage; the Newark and Marietta earthworks in the Muskingum River drainage; Fort Ancient and the Turner Earthworks in the Little Miami Valley; and the Mann Site and Mount Vernon Mound in the Wabash Valley in Indiana.

The Newark Earthworks is the preeminent example of geometric earthworks consisting of two large circular enclosures, a square, and an octagonal enclosure all connected by avenues framed by parallel walls with the entire complex spreading across more than 1,000 ha (Lepper 2004). The Fort Ancient Earthworks is the largest hilltop enclosure in the Hopewell world. More than 5 km of earthen walls surround a mesa top overlooking the Little Miami Valley. In spite of its name, it does not appear ever to have functioned as a fortification. Instead, it appears to have been a ceremonial center very like the large geometric earthworks, but with less of an emphasis on mortuary activity.

The ceremonial nature of the Hopewell earthworks is indicated by a number of factors, including a focus on mortuary ceremonialism, the frequent incorporation of cryptic astronomical alignments into the architecture (Fig. 3), and the general absence of significant residential sites at the earthworks. Many earthworks do have

Hopewell Culture, Archaeology of the, Fig. 3 Moonrise over the Octagon Earthworks at Newark, Ohio. CERHAS, University of Cincinnati

domestic sites in association, but these plausibly have been interpreted as the temporary encampments of largely nonresident visitors, such as pilgrims coming to the site to participate in ceremonial activities.

Although earthworks dominate our view of the Hopewellian ceremonial landscape, it is increasingly clear that originally these sites included a significant number of wooden structures, including Big Houses (often characterized as charnel houses) and woodhenges. The woodhenge at the Stubbs Earthworks, for example, consisted of 172 wooden posts configured in a nearly perfect circle 73 m in diameter (Cowan 2005: 148). The Moorehead Circle at the Fort Ancient Earthworks was a series of three concentric rings of wooden posts surrounding an area of intense ritual activity, including limestone pavements, a centrally located large, shallow basin filled with bright reddish soil, and an activity area characterized by a succession of superimposed floors (Riordan 2015).

Key Issues

An important unresolved question is the nature of Hopewellian domestic sites, which occur in proximity to the earthworks as well as in widely dispersed locations in the surrounding valleys and uplands. There is disagreement among Hopewell researchers as to whether these settlements were sedentary homesteads of dedicated farmers or hamlets occupied seasonally by mobile foragers (Dancey and Pacheco 1997; Yerkes 2002). Excavations at the Patton site in southeastern Ohio revealed the remains of a substantial rectangular structure of wattle and daub suggesting to the investigators a commitment to some degree of permanence at least at this site (Weaver et al. 2011).

The most striking aspect of the Hopewell culture is the impressively large ceremonial earthen architecture (Fig. 4), including geometric enclosures, hilltop enclosures, and mounds in a variety of shapes and sizes. The scale of these ceremonial landscapes is far grander than would be needed to serve the needs of the local population who lived in the small, dispersed domestic sites. Therefore, the earthworks must have been locations of periodic large gatherings. Perhaps the most fascinating set of issues raised by the monumental architecture and its associated far flung interaction sphere (Fig. 5) is that they were created and operated by largely egalitarian societies that did not coalesce into a hierarchically organized polity.

The nature of Hopewell society and the purpose of the large ceremonial centers is the focus of ongoing debate. The most widely accepted model of Hopewell social organization is the Vacant Center/Dispersed Hamlet model (Dancey and Pacheco 1997). In this model, the earthworks are the ceremonial centers for a territorial proto-polity of related small hamlets in a sort of orbit around a centrally located earthwork. Alliances of these proto-polities are expressed in larger earthworks possibly located at territorial junctures at which joint funerary ceremonies helped to solidify the alliance (Carr and Case 2005). Byers (2011) presents an alternative model in which the networks of Hopewell hamlets were not territorial and the earthworks were built by sodalities, that is, groups bound by ties of companionship instead of kinship. For Byers, the mortuary foci at the earthworks were not kinship-based cemeteries, but the result of complex world renewal rituals in which human remains served as the principal sacrificial offerings.

There is no general agreement on the factors responsible for the dramatic rise and precipitous decline, sometimes characterized as a true collapse, of the Hopewell culture. Case and Carr (2008) convincingly argue that neither the florescence nor the dimming of Hopewell culture can be linked to demographic or ecological causes and that particular, historical events of a spiritual-religious nature likely initiated both.

Alternatively, the collapse of the Hopewell culture may be related to increasing competition between communities for scarce resources. Certainly, the achievements of the Hopewell culture were tied to a network of peaceful cooperation, sometimes referred to as the *Pax Hopewelliana*, and the subsequent Late Woodland period (CE 500–900) witnessed a shift toward population

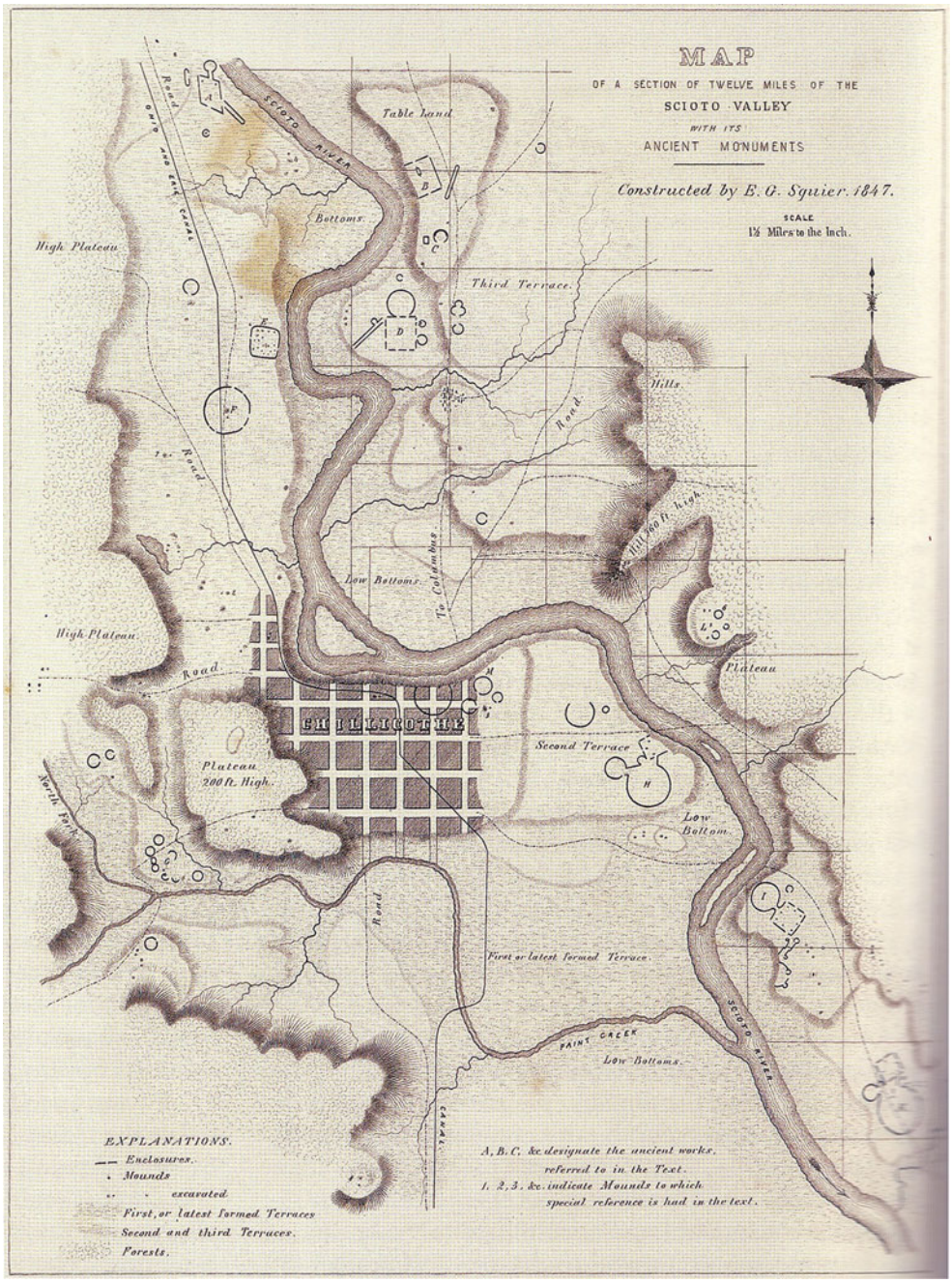

Hopewell Culture, Archaeology of the, Fig. 4 Map of a section of 12 miles of the Scioto Valley with its ancient monuments. Ephraim Squier and Edwin Davis from the first publication of the Smithsonian Institution

aggregation into larger villages frequently situated in defensible locations and with palisades, earthen walls, or ditches surrounding the settlements. In addition, Late Woodland and Late Prehistoric (CE 900–1650) human remains recovered from burials frequently exhibit traumatic injuries, including projectile points lodged in skeletons, whereas there is little or no evidence of

Hopewell Culture, Archaeology of the, Fig. 5 Map showing the extent of the Hopewell interaction sphere. Ohio History Connection

such interpersonal conflict in any Hopewell human remains (Case and Carr 2008: 650–1).

Cross-References

- ▶ North American Mound Builders: Hopewell, Natchez, Cahokia
- ▶ Woodland and Mississippian Cultures of the North American Heartland

References

Byers, A. 2011. *Sacred games, death, and renewal in the ancient eastern woodlands: The Ohio Hopewell system of cult sodality heterarchies*. Lanham: AltaMira.

Carr, C., and D.T. Case, eds. 2005. *Gathering Hopewell: Society, ritual and ritual interaction*. New York: Kluwer/Plenum.

Case, D.T., and C. Carr, eds. 2008. *The Scioto Hopewell and their neighbors: Bioarchaeological documentation and cultural understanding*. New York: Springer.

Cowan, Frank L. 2005. Stubbs earthworks: An Ohio Hopewell "woodhenge". In *Ohio archaeology: An illustrated chronicle of Ohio's ancient American Indian cultures*, ed. B.T. Lepper, 148–151. Wilmington: Orange Frazer Press.

Dancey, W.S., and P.J. Pacheco, eds. 1997. *Ohio Hopewell community organization*. Kent: Kent State University.

Lepper, B.T. 2004. The Newark earthworks: Monumental geometry and astronomy at a Hopewellian pilgrimage center. In *Hero, hawk and open hand: American Indian art of the ancient Midwest and south*, ed. R.F. Townsend and R.V. Sharp, 73–81. Chicago: Art Institute of Chicago.

Riordan, R.V. 2015. The end. In *Building the past: Prehistoric wooden post architecture in the Ohio Valley-Great Lakes*, ed. B.G. Redmond and R.A. Genheimer, 126–145. Gainesville: University Press of Florida.

Seeman, M.F. 2004. Hopewell art in Hopewell places. In *Hero, hawk and open hand: American Indian art of the ancient Midwest and south*, ed. R.F. Townsend and R.V. Sharp, 57–71. Chicago: Art Institute of Chicago.

Yerkes, R.W. 2002. Hopewell tribes: A study of middle woodland social organization in the Ohio Valley. In *The archaeology of tribal societies*, Archaeological series, ed. W.A. Parkinson, vol. 15, 227–245. Ann Arbor: International Monographs in Prehistory.

Further Reading

Abrams, E.M. 2009. Hopewell archaeology: A view from the northern woodlands. *Journal of Archaeological Research* 17: 169–204.

Byers, A.M., and D. Wymer, eds. 2010. *Hopewell settlement patterns, subsistence, and symbolic landscapes*. Gainesville: University Press of Florida.

Charles, D.K., and J.E. Buikstra, eds. 2006. *Recreating Hopewell*. Gainesville: University Press of Florida.

Greber, N.B. 2003. Chronological relationships among Ohio Hopewell site: Few dates and much complexity. In *Theory, method, and practice in modern archaeology*, ed. R.J. Jeske and D.K. Charles, 88–113. Westport: Praeger.

Lynott, M.J. 2014. *Hopewell ceremonial landscapes of Ohio: More than mounds and geometric earthworks*. Oxford: Oxbow Books.
Mainfort, R.C., Jr., and L.P. Sullivan, eds. 1998. *Ancient earthen enclosures of the eastern woodlands*. Gainesville: University Press of Florida.
Pacheco, P.J., ed. 1996. *A view from the core: A synthesis of Ohio Hopewell archaeology*. Columbus: Ohio Archaeological Council.
Weaver, S.A., E.M. Abrams, A. Freter, and D. Sack. 2011. Middle woodland domestic architecture and the issue of sedentism: Evidence from the Patton site (33AT990), Hocking Valley, Ohio. *Journal of Ohio Archaeology* 1: 22–37.

Horning, Audrey

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Basic Biographical Information

Audrey Horning earned her B.A. at the College of William and Mary in Williamsburg, Virginia, and completed her M.A. in 1991 and her Ph.D. in 1995, both at the University of Pennsylvania. Her doctoral thesis focused on comparative analysis of colonial Jamestown, the first English colony in Virginia. Horning previously lectured in historical archaeology and colonialism at the University of Leicester. Prior to this, she was Assistant Professor of Anthropology at the College of William and Mary. She also worked as an archaeologist for the Colonial Williamsburg Foundation and directed excavations at Jamestown.

In 2001 she received the John L. Cotter Award (Society for Historical Archaeology) for her outstanding contributions as a young historical archaeologist, as recognition for her doctoral dissertation on seventeenth-century Jamestown and a study of the "mountain folk" of Appalachia. Horning has recently been hosted as a visiting scholar at St. Mary's College, Maryland, in 2010, and at the University of Denver in 2011.

Horning's work is primarily concerned with colonialism, identity, and the North Atlantic world from the seventeenth century to the present day. She currently teaches and conducts research at Queen's University Belfast. She is a fellow of the Society of Antiquaries of London and Associate Editor of Historical Archaeology journal. Horning is an active member of the Irish Post-Medieval Archaeology Group, and edits the newsletter, and of the Society for Post-Medieval Archaeology, of which she is secretary.

Major Accomplishments

Reassessment and realignment of early colonial sites within a broader North Atlantic context has been a central focus of Horning's research, notably at Jamestown (2006). She has brought this approach to postmedieval archaeology in the British Isles. Horning's work in Ireland has centered on the study of rural sites, notably excavations at Achill Island on the west coast and at rural sites in Northern Ireland. Inferences drawn from these excavations have addressed the problematic nature of the presentation of identity through material culture (Horning 2000, 2001, 2007). Similarly, investigations at rural sites in the reforested region of Shenandoah National Park, Virginia (Horning 2000), formerly a working agricultural and small-scale industrial landscape, have focused on the displacement of people and the appropriation of identity. This forms part of Horning's broader research the role of historical archaeology in reassessing accepted historical identities.

In her work on historical identities, Horning has examined material culture of rural identity in Ireland in a museum context. Her research on museum collections has illustrated a stark contrast between the prominence of "authentic" Irish wares in museums and the substantial volume of imported goods such as tea cups evidenced by fragments uncovered during excavations (Horning 2007). This is comparable with her work on the people of Shenandoah. In the context of early twentieth-century land clearance at Shenandoah, the public image of the local people as cultural backwards was countered by the discovery of artifacts like a toy ray gun at one of the rural

sites, among other contemporaneous artifacts (Horning 2005). Central to Horning's thesis is that the creation of an "authentic" ideal has been used in the past as a motive for displacement; she also asserts that "authenticity" has been used as a vehicle for nationalism in postcolonial Ireland.

Horning's most recent publications have been concerned with the re-situation of Ireland within a broader North Atlantic context, both as a colonial enterprise and a market for the consumption of colonial goods (Horning et al. 2007; Horning and Palmer 2009; Horning and Brannon 2009). She has focused on the early plantation period in Ireland and earlier, drawing inferences from the remains of medieval village sites on the relationship between English settlers and native Irish in Anglo-Norman Ireland (2012). She has written extensively on the future of historical archaeology and has promoted the practice of postmedieval archaeology in Ireland (Horning et al. 2007; Horning and Brannon 2009).

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Historic Jamestowne
- ▶ Irish Post-Medieval Archaeology Group (IPMAG)
- ▶ Modern World: Historical Archaeology
- ▶ Plantation Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Urban Archaeology

References

Horning, A. 2000. Archaeological considerations of 'Appalachian' identity: Community-based archaeology in the Blue Ridge Mountains. In *The archaeology of communities: A new world perspective*, ed. M. Canuto and J. Yaeger, 210–230. London/ New York: Routledge.

Horning, A. 2001. 'Dwelling houses in the old Irish barbarous manner': Archaeological evidence for Gaelic architecture in an Ulster Plantation village. In *Gaelic Ireland 1300–1650: land, lordship, and settlement*, ed. P. Duffy, D. Edwards, and E. Fitzpatrick, 375–396. Dublin: Four Courts Press.

Horning, A. 2005. Does historical archaeology really matter in today's world? In *Unlocking the past: Celebrating historical archaeology in North America*, ed. L. De Cunzo and J. Jameson, 200–204. Gainesville: University of Florida Press.

Horning, A. 2006. Archaeology and the construction of America's Jamestown. *Post-Medieval Archaeology* 40: 1–27.

Horning, A. 2007. Materiality and mutable landscapes: Rethinking seasonality and marginality in rural Ireland. *International Journal of Historical Archaeology* 11: 358–378.

Horning, A. 2012. Ireland: Medieval identity, settlement and land use. In *Medieval rural settlement: Britain and Ireland, AD 800–1600*, ed. N. Christie and P. Stamper. Macclesfield: Windgather Press.

Horning, A., and N. Brannon, eds. 2009. *Ireland and Britain in the Atlantic world*. Dublin: Wordwell.

Horning, A., and M. Palmer, eds. 2009. *Crossing paths or sharing tracks? Future directions in the archaeological study of post-1550 Britain and Ireland*. Woodbridge: Boydell and Brewer.

Horning, A., R.Ó. Baoill, C. Donnelly, and P. Logue, eds. 2007. *The post-medieval archaeology of Ireland, 1550–1850*. Dublin: Wordwell.

Further Reading

Horning, A. 1996. Myth versus reality: Agricultural adaptation and innovation in the Nicholson Hollow District, Shenandoah National Park. *Upland archaeology in the east*, Special publication 38, Part 5, 107–115. Richmond: Archaeological Society of Virginia.

Horning, A. 1999. In search of a 'hollow ethnicity': Archaeological explorations of rural mountain settlement. In *Current perspectives on ethnicity in historical archaeology*, Colonial Williamsburg Foundation research publications series, ed. M. Franklin and G. Fesler, 121–138. Williamsburg: Colonial Williamsburg Foundation.

Horning, A. 2000. Urbanism in the colonial South: The development of seventeenth-century Jamestown. In *Archaeology of southern urban landscapes*, ed. A.L. Young, 52–68. Tuscaloosa/London: University of Alabama Press.

Horning, A. 2002a. Of saints and sinners: Landscapes of the old and new south. In *Contested memories and the making of the American landscape*, ed. P. Shackel, 21–46. Gainesville: University Press of Florida.

Horning, A. 2002b. Myth, migration, and material culture: Archaeology and the Ulster influence on Appalachia. *Historical Archaeology* 36: 129–149.

Horning, A. 2002c. Museums and material culture: An historical archaeologist's perspective. *Museum Ireland* 11: 58–60.

Horning, A. 2004. Archaeological explorations of cultural identity and rural economy in the north of Ireland: Goodland, Co. Antrim. *International Journal of Historical Archaeology* 8: 199–215.

Horning, A. 2006a. English towns on the periphery: Seventeenth-century town development in Ulster and the Chesapeake. In *Cities in the world*, Society for post medieval archaeology monograph series 3, ed. A. Green and R. Leech, 61–82. Leeds: Maney.
Horning, A. 2006b. Archaeology and the construction of America's Jamestown. *Post-Medieval Archaeology* 40: 1–27.
Horning, A. 2006c. Archaeology, conflict, and contemporary identity in the north of Ireland: Implications for theory and practice in Irish historical archaeology. *Archaeological Dialogues* 13: 183–199.
Horning, A. 2006d. Focus found. New directions for Irish historical archaeology. *Archaeological Dialogues* 13: 211–219.
Horning, A. 2007. On the banks of the Bann: The Riverine economy of an Ulster Plantation village. *Historical Archaeology* 41: 94–114.
Horning, A. 2007. Materiality and mutable landscapes: Re-thinking seasonality in the north and west of Ireland. *International Journal of Historical Archaeology* 11: 358–378.
Horning, A. 2009. 'The root of all vice and bestiality': Exploring the cultural role of the alehouse in the Ulster Plantation. In *Plantation Ireland*, ed. J. Lyttleton and C. Rynne, 113–131. Dublin: Four Courts Press.
Horning, A. 2010a. Small trenches: Archaeology and the postcolonial gaze. *Archaeological Dialogues* 17: 27–30.
Horning, A. 2010b. Ireland in the Virginian Sea: A comparative archaeology of British expansion. In *Archaeology of early colonial European settlement in the emerging Atlantic world*, Society for historical archaeology special publication 8, ed. W. Kelso, 13–30. Washington, DC: Society for Historical Archaeology.
Horning, A. 2011. Subduing tendencies? Colonialism, capitalism, and comparative Atlantic archaeologies. In *The archaeology of capitalism in colonial contexts*, ed. S.K. Croucher and L. Weiss, 65–84. New York: Springer.

Horse Gram: Origins and Development

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Basic Species Information

Horse gram (*Macrotyloma uniflorum* (Lam.) Verdc. (syn. *Dolichos uniflorus* Lam.)), also known as *kulthi, gahat, Madras gram, grain de cheval, kerdekorn*, and *favalinha*, is a domesticated bean grown today across tropical Africa, South Asia, Southeast Asia, China, and Australia. In much of the older literature on the botany and archaeology of India, it is referred to as *Dolichos biflorus*, although this is a misnomer, and accepted nomenclature today is *Macrotyloma uniflorum* (see Smartt 1990; Fuller 2002). The stems and leaves of the plant are often used as fodder, while the beans are harvested for human consumption. Horse gram is tolerant of both drought and low soil fertility, making it a particularly important crop in drier areas of south India (Kachroo and Arif 1970; Smartt 1990). It requires very little input and can be used as a green manure to improve depleted soils. As such, it is often an important component of crop rotation systems in which it is usually planted on fallow fields. It can be successfully intercropped with cereals, including pearl millet, sorghum, and the small millets. In addition, it does well as an understory crop in orchards and plantations.

Horse gram is a drought-resistant crop largely grown in areas with less than 900 mm annual rainfall, though it can be grown with as little as 380 mm. While it can tolerate higher temperatures, ideal temperatures for growth range between 25 °C and 35 °C. As such it is particularly suited to tropical environments. It takes around 120–180 days to reach maturity. Horse gram is easily harvested by uprooting. Because of this a relatively high number of weeds may be incorporated into the crop, increasing the prevalence of weed seeds in assemblages from each stage of processing and potentially increasing the visibility of horse gram crop processing in the archaeological record. It is processed in a similar way to glume-wheats, with two episodes of threshing and winnowing (Fuller and Harvey 2006). The second episode may occur daily, with the day's quota of the pulse removed from storage and prepared separately. This method increases the chance of archaeological preservation and may bias towards the prevalence of this crop in the archaeological record. The beans are usually dried for storage and longevity. These dry beans tend to be soaked overnight prior to cooking. Boiling is most common; however, they can also be fried or roasted. Boiling produces both cooked beans, which may be fed to humans or livestock,

and horse gram water, which can be condensed to produce a thick protein rich stock for soups and broths. In addition, the beans can be sprouted prior to cooking. There are several claimed health benefits and medicinal properties to horse gram, including its diuretic effect which may help kidney stones.

Major Domestication Traits

The identification of horse gram is relatively straightforward, although there is quite a lot of variability in both modern and archaeological populations. The beans of horse gram are generally around 5 mm in length when mature, are trapezoidal, and tend to be slightly reniform (Fig. 1). The hilum can be found within a depression at the center of the bean's edge. When the bean is split, the embryo can be seen to be around a third of the length of the bean and roughly parallel to the base of the seed.

The wild progenitor of horse gram is not well studied; however, archaeobotanical and ecological evidence indicates that it is a domesticate of India (Fig. 2). Wild populations are found across India within dry tropical evergreen and savannah vegetation zones (Jansen 1989; Asouti and Fuller 2008). From c. 2500 BCE there is evidence for horse gram stretching from southern to northwestern India (the state of Haryana), and this could imply that it was brought into cultivation more than once. The Haryana region, the Gujarat region, and the south Deccan are all plausible foci or early cultivation or domestication. Wild populations of horse gram are also found in Africa; however, there is no evidence to indicate that these were ever brought into cultivation there.

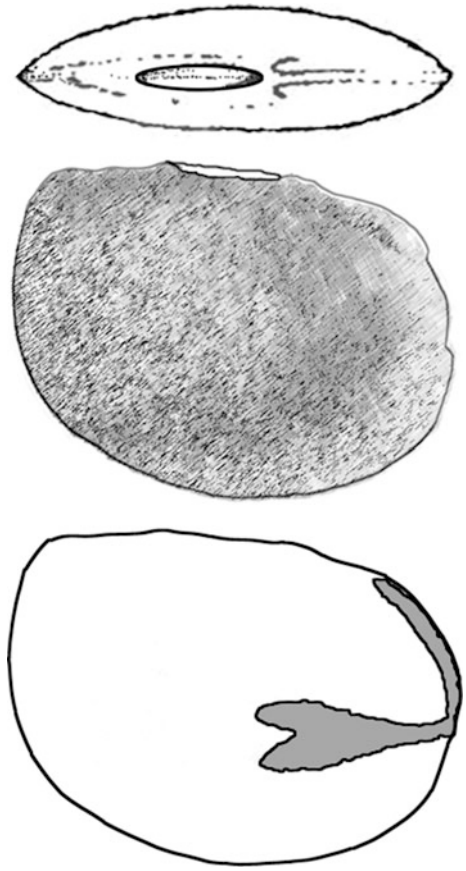

Horse Gram: Origins and Development, Fig. 1 Sketch of *Macrotyloma uniflorum* seed, from side view, hilum view, and interior of split cotyledon

Timing and Tracking Domestication

The high ubiquity of this crop at Neolithic southern Indian sites c. 2000 BCE suggests that it was a staple food. Furthermore, early finds indicate that it was part of an indigenous south Neolithic crop package along with two millets (*Brachiaria ramosa* and *Setaria verticillata*) and another pulse (*Vigna radiata*) (Fuller et al. 2004). This crop package appears to be synonymous with the semi-pastoral Ashmound culture, in which large areas of accumulated burnt cattle dung and hilltop settlements are prime features. It appears to be a later introduction to the agriculture in the Ganges plains and eastern India (Orissa) in the Chalcolithic after c. 1500 BCE. In the period 400–100 BCE, horse gram is found on the Malay peninsula in southern Thailand, for example, at Khao Sam Kaeo, where it might have been imported with other Indian pulses for Indian enclaves at important craft and trading cities (Castillo and Fuller 2010). Today it is not cultivated for human consumption in Southeast Asia, and this crop has remained restricted to South Asia, mainly as a low-status pulse.

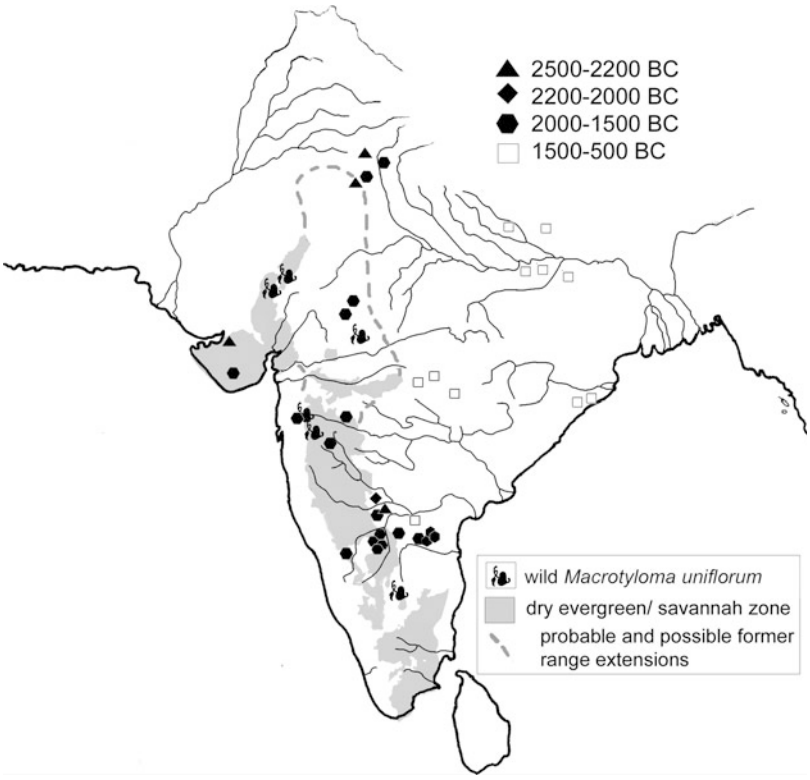

Horse Gram: Origins and Development,
Fig. 2 Map of wild South Asian horse gram and distribution of early archaeological finds. Modern documented wild populations are few, but it is inferred that they should have been wild spread in the dry savannah zone (shaded) and possibly more sporadically through areas enclosed in dashed lines. This map has been modified from Fuller and Harvey (2006) and updated

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Asouti, E., and D.Q. Fuller. 2008. *Trees and woodlands in South India: Archaeological perspectives*. Walnut Creek: Left Coast Press.

Castillo, C., and D.Q. Fuller. 2010. Still too fragmentary and dependent upon chance? Advances in the study of early Southeast Asian archaeobotany. In *50 years of archaeology in Southeast Asia: Essays in honour of Ian Glover*, ed. B. Bellina, E.A. Bacus, O. Pryce, and J. Weissman Christie, 91–111. Bangkok/London: River Books.

Fuller, D.Q. 2002. Fifty years of archaeobotanical studies in India: Laying a solid foundation. In *Indian archaeology in retrospect, Volume III: Archaeology and interactive disciplines*, Publications of the Indian Council for Historical Research, ed. S. Settar and R. Korisettar, 247–264. New Delhi: Manohar.

Fuller, D.Q., and E.L. Harvey. 2006. The archaeobotany of Indian pulses: Identification, processing and evidence for cultivation. *Environmental Archaeology* 11 (2): 219–246.

Fuller, D.Q., R. Korisettar, P.C. Vankatasubbaiah, and M.K. Jones. 2004. Early plant domestications in southern India: Some preliminary archaeobotanical results. *Vegetation History and Archaeobotany* 13: 115–129.

Jansen, P.C.M. 1989. *Macrotyloma uniflorum* (Lam.) Verdc. In *Plant resources of South-East Asia 1, pulses*, ed. L.J.G. Van der Maeson and S. Somaatmadji, 53–54. Wageningen: Pudoc.

Kachroo, P., and M. Arif, eds. 1970. *Pulse crops of India*. New Delhi: Indian Council for Agricultural Research.

Smartt, J. 1990. *Grain legumes: Evolution and genetic resources*. Cambridge: Cambridge University Press.

H

Horses: Domestication

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Pony: small variety of horse
Stallion: male adult horse
Gelding: castrated male adult horse
Mare: female adult horse
Foal: juvenile horse
Filly: female juvenile horse
Colt: male juvenile horse

Horses belong to the genus *Equus*, family Equidae in the order Perissodactyla (odd-toed hoofed mammals). Domestic horses are derived from the wild horse *Equus ferus* which was widespread across Eurasia and North America in the late Pleistocene but went extinct across nearly all of that range in the early to mid Holocene. The tarpan may have been a remnant population on the wild horse in Europe; the last individual died in captivity in the early twentieth century. The highly endangered Przewalski's horse, which historically went extinct in the wild but survived in zoological collections, may also be a remnant of this wild progenitor species. Although recent genomic analyses suggest that this horse has interbred with domestic horses (Der Sarkissian et al. 2015), it is even possible that it derives from animals that went feral very early in the domestication process (Gaunitz et al. 2018). However this horse has a different chromosome number and paternal and maternal lineages that are not present among modern horses, together with genome-wide differentiation, so it represents a separate lineage.

There are currently several free-ranging populations of horses in Eurasia, Africa, and the Americas. They are commonly referred to as wild horses, especially in North America (where they are also called mustangs). All these populations are actually feral, that is, descendants of domestic animals that are now free ranging.

Contrary to what seems to have occurred in many domesticates, no obvious osteological characteristics can be used to separate the first domestic horses from their wild counterparts. This has made it quite difficult to identify early domestic horses in the archaeological record. The earliest remains have most often been identified on the basis of tooth wear that could be indicative of wearing a bit or cribbing, changes in frequency of remains at individual sites, proportion of remains from the different age and sex groups, or remains of ritually sacrificed horses (Olsen 2006). The examination of abnormalities on the skulls of some ancient horses suggested that they wore a bit, and isotope analyses of food remnants on pottery shards revealed the presence of horse milk. These two pieces of evidence indicate that a population of central Asian horses was domesticated by 5500 years ago (Outram et al. 2009). This may be close to the time and place of domestication and shows that at this early point in their domestication, they were used both as a food resource and for transport.

The mode of domestication in horses was likely unique. Horses were the last of the common farm animals to be domesticated, thousands of years after dogs, cattle, pigs, goats, and sheep, and when these species were already spread across continents. Consequently, it would seem that there was no obvious need for the domestication and expansion throughout the world of another domesticate. Despite this, a very large number of wild horse lineages were introduced in the domestic population (Vilà et al. 2001; Jansen et al. 2002; Achilli et al. 2012). This could indicate a widespread deliberate incorporation of this new species into human groups, which may be associated with improved transport and warfare capabilities (Vilà et al. 2006). The introduction of horses would have had a dramatic impact on many human cultures. This is well illustrated by the historically documented changes in the Native American groups which rapidly adopted horses after their arrival to the Americas with Europeans in the sixteenth and seventeenth centuries. This gave groups with horses a competitive advantage over horseless neighbors. A similar process likely occurred across Eurasia starting around 5500 years ago.

Unlike other domesticates in which there was a focus or a few foci of domestication from which domesticated animals expanded, the appearance of horses may represent the expansion of an idea. Under this scenario, horses were domesticated in one or a few places in the Eurasian steppe and from there spread to neighboring cultures, where large numbers of local wild horses, possibly primarily mares, were captured and used to reinforce domestic stocks. This view is supported by the large amount of female-inherited (mitochondrial) genetic variation (Vilà et al. 2001; Jansen et al. 2002) and the small male-inherited (Y chromosome) genetic variation (Lindgren et al. 2004) as compared to wild horse populations in the Pleistocene (Vilà et al. 2001; Lippold et al. 2011) and by the linkage disequilibrium in the whole genome (Wade et al. 2009). However ancient domestic horses had much more Y chromosome variation than modern animals (Librado et al. 2017), suggesting a major bottleneck for males associated with more modern breeding practices. By fitting a spatially explicit model to genotype data from horses sampled across northern Eurasia, Warmuth et al. (2012) deduced that the domestication took place in the western part of the Eurasian steppe and that domestic herds were repeatedly restocked with local horses as they spread out of this area.

Despite the lack of obvious skeletal changes as a result of domestication, ancient DNA analyses have illustrated the early selection for alternative coat colors through the analysis of mutations for known coat colors (Ludwig et al. 2009), behavior, and physiology (Schubert et al. 2014). Wild horses were most likely dun, as is depicted in some cave paintings. Black may have become more common in wild populations in areas where the forest was expanding in the Holocene. Other colors are associated only with domestic horses and were identified from remains dating from 3500 years ago (Ludwig et al. 2009; Librado et al. 2017).

Horses today are divided into numerous breeds, many of which are maintained reproductively isolated from all others. Some of these breeds have very well documented recent origins, such as the Thoroughbred. Others have longer more obscure histories, such as the Arabian. Still others are the result of geographic isolation, such as the Icelandic. Although the breeds are easily distinguishable by nuclear markers, they do not have unique male- or female-inherited markers. This indicates that local breeds do not represent local domestications but originate from more recent isolation from a broadly mixed stock. In fact, the study of Viking-age horse remains showed that a great admixture of maternal lineages existed over a reduced geographic area more than a thousand years ago (Vilà et al. 2001, 2006). However, some maternal lineages show a somewhat restricted geographic distribution (Jansen et al. 2002; Achilli et al. 2012).

References

Achilli, A., A. Olivieri, P. Soares, H. Lancioni, B.H. Kashani, U.A. Perego, S.G. Nergadze, V. Carossa, M. Santagostino, S. Capomaccio, M. Felicetti, W. Al-Achkarf, M.C.T. Penedo, A. Verini-Supplizi, M. Houshmandh, S.R. Woodward, O. Semino, M. Silvestrelli, E. Giulotto, L. Pereira, H.-J. Bandelt, and A. Torroni. 2012. Mitochondrial genomes from modern horses reveal the major haplogroups that underwent domestication. *Proceedings of the National Academy of Science, USA* 109: 2449–2454.

Der Sarkissian, C., L. Ermini, M. Schubert, M.A. Yang, P. Librado, et al. 2015. Evolutionary genomics and conservation of the endangered Przewalski's horse. *Current Biology* 25: 2577–2583.

Gaunitz, C., A. Fages, K. Hanghoj, A. Albrechtsen, N. Khan, et al. 2018. Ancient genomes revisit the ancestry of domestic and Przewalski's horses. *Science* 360: 111–114.

Jansen, T., P. Forster, M.A. Levine, H. Oelke, M. Hurles, C. Renfrew, J. Weber, and K. Olek. 2002. Mitochondrial DNA and the origins of the domestic horse. *Proceedings of the National Academy of Science, USA* 99: 10905–10910.

Librado, O., C. Gamba, C. Gaunitz, C. Der Sarkissian, M. Pruvost, et al. 2017. Ancient genomic changes associated with domestication of the horse. *Science* 356: 442–225.

Lindgren, G., N. Backström, J. Swinburne, L. Hellborg, A. Einarsson, K. Sandberg, G. Cothran, C. Vilà, M. Bonns, and H. Ellegren. 2004. Limited number of patrilines in horse domestication. *Nature Genetics* 36: 335–336.

Lippold, S., M. Knapp, T. Kuznetsova, J.A. Leonard, N. Benecke, A. Ludwig, M. Rasmussen, J. Weinstock, E. Willerslev, B. Shapiro, and M. Hofreiter. 2011.

Discovery of lost diversity of paternal horse lineages using ancient DNA. *Nature Communications* 2: 450.
Ludwig, A., M. Pruvost, M. Reissmann, N. Benecke, G.A. Brockmann, P. Castaños, M. Cieslak, S. Lippold, L. Llorente, A.-S. Malaspinas, M. Slatkin, and M. Hofreiter. 2009. Coat color variation at the beginning of horse domestication. *Science* 324: 485–486.
Olsen, S.L. 2006. Early horse domestication on the Eurasian Steppe. In *Documenting domestication: New genetic and archaeological paradigms*, ed. M.A. Zeder, D.G. Bradley, E. Emshwiller, and B.D. Smith. Los Angeles: University of California Press.
Outram, A.K., N.A. Stear, R. Bedrey, S. Olsen, A. Kasparov, V. Zaibert, N. Thorpe, and R.P. Evershed. 2009. The earliest horse harnessing and milking. *Science* 323: 1332–1335.
Schubert, M., H. Jónsson, D. Chang, C. Der Sarkissian, L. Ermini, et al. 2014. Prehistoric genomes reveal the genetic foundation and cost of horse domestication. *Proceedings of the National Academy of Sciences, USA* 111: E5661–E5669.
Vilà, C., J.A. Leonard, A. Götherström, S. Marklund, K. Sandberg, K. Lindén, R.K. Wayne, and H. Ellegren. 2001. Widespread origins of domestic horse lineages. *Science* 291: 474–477.
Vilà, C., J.A. Leonard, and A. Beja-Pereira. 2006. Genetic documentation of horse and donkey domestication. In *Documenting domestication: New genetic and archaeological paradigms*, ed. M.A. Zeder, D.G. Bradley, E. Emshwiller, and B.D. Smith. Los Angeles: University of California Press.
Wade, C.M., et al. 2009. Genome sequence, comparative analysis, and population genetics of the domestic horse. *Science* 326: 865–867.
Warmuth, V., A. Eriksson, M.A. Bower, G. Barker, E. Barrett, B.K. Hanks, S. Li, D. Lomitashvili, M. Ochir-Goryaeva, G.V. Sizonov, V. Soyonovh, and A. Manica. 2012. Reconstructing the origin and spread of horse domestication in the Eurasian steppe. *Proceedings of the National Academy of Science, USA* 109: 8202–8206.

Further Readings

Lau, A.N., L. Peng, H. Goto, L. Chemnick, O.A. Ryder, and K.D. Makova. 2009. Horse domestication and conservation genetics of Przewalski's horse inferred from sex chromosomal and autosomal sequences. *Molecular Biology and Evolution* 26: 199–208.
MacFadden, B.J. 1992. *Fossil horses: Systematics, paleobiology, and the evolution of the family Equidae*. Cambridge, UK: University of Cambridge.
Simpson, G.G. 1961. *Horses: The story of the horse family in the modern world and through sixty million years of history.* New York: American Museum of Natural History.
Warmuth, V., A. Eriksson, M.A. Bower, J. Cañon, G. Cothran, O. Distl, M.-L. Glowatzki-Mullis, H. Hunt, C. Luís, M.M.M. Oom, I.T. Yupanqui, T. Ząbek, and Manica. 2011. European domestic horses originated in two Holocene refugia. *PLoS One* 6: e18194.
Warmuth, V., A. Manica, A. Eriksson, G. Barker, and M. Bower. 2013. Autosomal genetic diversity in non-breed horses from eastern Eurasia provides insights into historical population movements. *Animal Genetics* 44: 53–61.
Wiener, P., and S. Wilkinson. 2011. Deciphering the genetic basis of animal domestication. *Proceedings of the Royal Society B* 278: 3161–3170.

Households and Domesticity: Historical Archaeology

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Introduction

The archaeology of households and the related area of domesticity are fields most often explored in relation to the nineteenth century and are dominated by work on sites in North America and Australia. Household archaeology is one of the areas where the close synergies between the archaeological record and text may be best exploited. The wealth of data on household composition from a personnel and financial point of view which exists for the nineteenth century is indicative of official preoccupation with categorizing and analyzing socioeconomic units in the period, out of which the very notion of the household as a definable concept may be said to have arisen. Such documents mean that excavated sites can be tied to individuals. In some cases, based on date range or occupation data, specific artifacts can even be linked to individuals, making the field one in which analysis can take place on both a macro and a micro level.

Definition

Household archaeology is a relatively newly defined area, emerging as a properly theorized

field in its own right only in the 1980s (Barile and Brandon 2004: 5–6). Its roots lie in the very movements which form part of the modern theoretical background, in particular North American concerns to preserve and present the domestic sites of its founding fathers from the 1850s. The emphasis on domestic sites was in itself part of a "cult of domesticity" which is now recognized as part of the contested ground which household archaeology seeks to address. By the 1960s, prevailing processual trends within archaeology had redefined the household as an economic unit, a complete entity in its own right, and one which could be used as the basis of pattern analysis. Current scholarship emphasizes the tensions within that unit, and seeks to explore the household on a micro level, unpicking tensions based on class, race, gender, and age, to name but a few.

The definition of a household, and therefore of household archaeology, is itself an issue. It is often defined by what it is not, rather than what it is: thus, not merely an economic unit; not bounded by narrow spatial boundaries; not defined by architectural conventions. It is generally accepted that a household comprises one or more individuals with an emotional, economic, or spatial tie to one another. At its most basic, a household may comprise a nuclear family of wife, husband, and children, living in one spatially distinct dwelling and using any associated outdoor space. However, a household always encompasses more than a family, not least due to the difficulty of definitively attributing deposits to individuals. The household must, at the very least, include lodgers and servants, whether live-in or living outside. Guests, both occasional and longer term, may also be included. On a wider basis, any individuals having ties to the base unit may be considered as being part of the household. That unit may not be familial: work on temporary camps, boarding houses, and institutions such as workhouses have all considered the issues involved. The result of this complexity has been that those explicitly considering the household within their analysis have had to clearly state their own definition of that term and use it accordingly.

The aim of household archaeology is to explore tensions within each household, and not to study units as if they are a homogenous whole. Recognition and exploration of the various interests, which make up an individual household, and interpretation of artifacts and spaces in the light of intra-household tension as well as inter-household relations form the basis of household-based archaeology. Hence, it is crucial to understanding class and, while little work has yet been done on extant sites, has potential to shed light on differing racial experiences within communities.

Furthermore, it is impossible to study households, especially in the core period of the nineteenth century, without an understanding of notions of domesticity (and, with them, a familiarity with wider issues around feminism and gender). At the beginning of the nineteenth century, the position of women in Britain and its colonies, along with North America, was the subject of fierce debate. Women were frequently cast in a negative role, ranging from frivolous spendthrifts, to more seriously undermining a nation's virility and with it, ability to wage successful war, a preoccupation of many countries, especially until the fall of Napoleon in 1815. These views had long been combated by an alternative view of women as civilizers, able to tame man's natural propensities toward violence and lead society toward more genteel and cultured ways. By the 1840s, pressure on women to cease work and concentrate their energies in the domestic sphere was building. Class identity played a huge role in defining the accepted role of women. In many ways, little changed for the upper and lower ends of society: aristocratic ladies had never worked for a salary, while working class women struggled financially if they did not. Among the middle class, across borders, a pattern of movement can be seen in which the workplace was separated from the home, and women thereby encouraged to give up their former roles as – often unpaid but nevertheless key – administrators and assistants in their husbands' businesses (Wall 1994). Emphasis was put on the role of women as mothers and wives, a discourse which both strengthened their authority within the home and undermined their relationship with the workplace.

In the USA, a quasi-religious "cult of domesticity" grew up, which influenced architecture and furniture design (Clark 1988), as well as the choice of material culture in those households in which one or more people subscribed to it. Yet ideologies of domesticity were by no means fixed, nor were they universally accepted. Most definitions of acceptable domesticity were promoted by the middle classes, and most contemporary sources reflect that view. Generally, three tenets were held to constitute the aspirational idea: the absence of working women; the concept of the home as a sanctuary; and the idea of childhood as sacrosanct, a time for education and play, rather than work and early adulthood (Lampard 2009). However, not only was the middle class not a homogenous group, but attitudes varied by country, region and, of course, within each household.

Key Issues

A primary concern of household archaeology is to explore notions of domesticity, often sited within a class context. Most published work on excavated sites, to date, has been predominantly working class, urban, and either North American or Australian. Several essays in the special issue of *Historical Archaeology* on the Five Points area of New York analyzed domestic sites, with the issues raised by work on households running strongly through them (Yamin 2001). One driver, especially in this case, but also in exploration of The Rocks area of Sydney (Karskens 2003), has been to challenge popular views of particular urban areas as being slums. The definition of slum has been heavily influenced by middle class definitions of domesticity, and both the Five Points and The Rocks have been popularly seen as devoid of "homes," where home meant sanctuary and safety. Studies of these areas contradict such definitions, suggesting that middle class markers of domesticity, such as flowerpots and knick-knacks were embraced. Moreover, working class units, whether familial, individual, or communal, formulated their own ideas of the domestic.

A major interpretive theme is the question of how far the working class accepted middle class domestic ideals, and to what extent they adhered to them even when, for example, women and children had to work, either through financial exigency or personal choice. Evidence of flowerpots, figurines, vases, and toys for children is usually associated with the desire to adorn the home, while fancy hinges, picture hooks, and wallpaper are interpreted to show more dedicated structural change, often the case where occupiers are in residence for longer periods of time.

The integration of interpretation of the physical structure of each dwelling with smaller finds is ongoing. The emphasis away from architectural definitions of household and the drive to consider individual agency and action has led to a lessening of the exploration of space. More recent scholarship has considered space and gender through interpreting small finds (Yentsch 1991), but it is unclear how best to bring together spatial elements with an artifact-led approach.

Current Debates

Related to the definitional difficulties is discussion over what constitutes a household. While the general approach of multiple definitions has been accepted, it still poses problems for an integrated approach. The inclusion of nontraditional households such as cooperatives, boarding houses, and camps within the corpus of work in the field can pose difficulties (Beaudry 2004).

Emerging from economic definitions of the household in the 1960s–1970s, along with Marxist and post-Marxist emphasis on production, the role of the household as producer and reproducer is a key area for debate. Current scholarship looks both at the obvious aspects of production – homeworking such as taking in laundry or sewing – and the more nuanced role of the household in reproducing morals and belief systems grounded in a particular set of circumstances.

Archaeological data used in the exploration of households and domesticity tends to be small

finds. Beyond the dominant artifact groups of ceramics and glass, household-related items such as sewing ephemera, especially buttons; toys; fittings from furniture; parts of technical and musical instruments; and writing implements are all well represented in samples. Debate over the interpretation of these is evident across the field. For example, sewing equipment may be indicative of appropriate, domestically focused feminine activity, or it may show one or more women in the household were working from home. Pins may form part of a sewing kit, but they may also simply have fallen off garments in an age where pins were much used as fasteners. If a household contains no women, sewing-related ephemera may still be present, at which point its usefulness as a gendered item may also be questioned.

Examples

Key work on households and domesticity can be found in an edited volume by Barile and Brandon (2004). The essays within it cover a variety of approaches and differing definitions of household and show the breadth of approaches currently being taken in the field. The most frequently used definition, of a group of people living for a stated period at a specific, bounded, location, can be found in work on urban domestic sites. Lampard (2009) compares three working class sites in Port Adelaide, Australia, to demonstrate the interaction of financial circumstances and personal choice in the acceptance and exhibition of middle class domesticity. Significant work has also be done on brothels, considering domesticity as a middle class construct which was deliberately aped in public areas of brothels, but interpreted in a working class context behind the scenes (Seifert 1991, 1994).

Outside the strict confines of archaeology, work on recipe books and kitchens has demonstrated the potential of material culture to elucidate the changing notions of "home" and the way in which domestic space was conceptualized and used. Use of inventory and probate data, rather than results from excavations, has demonstrated the multiplicity of uses to which a room might be put, negating easy assumptions of gender and assignation of spaces to individuals or interest groups within the household (Pennell 1998). More recent archaeological work has started to incorporate a wider time period, as well as using more data from documentary sources and collections showing, for example, the negotiation of household responsibility through objects, such as tea things, heavily imbued with domestic significance (Spencer-Wood 2013).

Future Directions

Most work on households has concentrated on class and gender. However, work on cultural differences between immigrant groups in colonial contexts (e.g., Lampard 2009) has shown alternative readings are possible. More significantly, racial aspects are starting to be explored (Beaudry 2004; Praetzellis and Praetzellis 2004; Rotman 2006). Although the houses of both free and unfree African Americans have been excavated and interpreted in North America, consideration of them in the light of the issues around households and domesticity has often been lacking. Very little work has considered the post-Bellum differences in notions of domesticity and the relative influences of class and race in the formation of household identity. Moving beyond plantation sites and into exploration of houses where the servant divide was racially distinct but which were never associated with slavery would be a potentially rich area for exploration, as would the households of the rich in general.

Indeed, there has been a marked avoidance of the households of the rich, with the exception of certain well-known historical figures. In the UK, where little has been published to rival the interpretive output from America and Australia on domestic sites, country houses have been

increasingly recognized as sites through which class and gender tension may be usefully explored. Inevitably, many of them are still standing, but useful work has been done where structural work has necessitated the removal of floorboards (Newman 2004). It has not, as yet, been subject to systematic analysis within the theoretical tenets of household archaeology. It would be useful to see further archaeological exploration of the acceptance of or resistance to notions of domesticity among the upper classes.

The field of household archaeology is not restricted to the nineteenth century, but much work has to date been concentrated there. This is in part due to availability of sites to excavate – there are many more nineteenth century examples than earlier – and partly due to the explicit discourse on domesticity which occurs in the mid-late nineteenth century. This discourse can be directly related to archaeological data, affording the archaeologist a clear set of hypotheses. The wealth of documentary data to aid in the task is also important. Contemporary debate over the domestic sphere and the role of women ranges far beyond this period, however, and it would be valuable to investigate the formation of households and conflicts within them in the light of the rhetoric of the seventeenth and eighteenth century, especially in Britain.

Cross-References

- ▶ Archival Research and Historical Archaeology
- ▶ Beaudry, Mary C.
- ▶ Buildings Archaeology
- ▶ Critical Historical Archaeology
- ▶ Engendering Historical Archaeology
- ▶ Social Identity in Historical Archaeology

References

Barile, K., and J. Brandon. 2004. Household chores; Or, the chore of defining the household. In *Household chores and household choices: Theorizing the domestic sphere in historical archaeology*, ed. K. Barile and J. Brandon, 1–14. Tucson: University of Alabama Press.

Beaudry, M. 2004. Doing the housework: New approaches to the archaeology of households. In *Household chores and households choices: Theorizing the domestic sphere in historical archaeology*, ed. K. Barile and J. Brandon, 254–262. Tucson: University of Alabama Press.

Clark, C. 1988. Domestic architecture as an index to social history: The romantic revival and the cult of domesticity in America, 1840–1870. In *Material life in America, 1600–1860*, ed. R. Blair St George, 535–542. Boston: North-Eastern University Press.

DiZerega Wall, D. 1994. *The archaeology of gender: Separating the spheres inurban America*. New York: Plenum.

Karskens, G. 2003. Revisiting the world view: The archaeology of convict households in Sydney's Rocks neighbourhood. *Historical Archaeology* 37: 34–55.

Lampard, S. 2009. The ideology of domesticity and the working class women and children of Port Adelaide, 1840–1890. *Historical Archaeology* 43: 50–64.

Newman, M. 2004. Between the cracks: Hidden 'treasures' in National Trust houses. *National Trust Annual Archaeological Review*. Available at http://www.nationaltrust.org.uk/main/between_the_cracks.pdf. Accessed 6 Jan 2012.

Pennell, S. 1998. 'Pots and pans history': The material culture of the kitchen in early modern England. *Journal of Design History* 11: 201–216.

Praetzellis, A, and M Praetzellis. 2004. *Putting the 'there' there:historical archaeologies of West Oakland*. Available at www.sonama/edu/asc/cypress/finalreport/index/htm.

Rotman, D. 2006. Separate spheres? Beyond the dichotomies of domesticity. *Current Anthropology* 47: 666–674.

Seifert, D. 1991. Within site of the White House: The archaeology of working women. *Historical Archaeology* 25: 82–108.

Seifert, D. 1994. Mrs Starr's profession. In *Those of little note: Gender, race, and class in historical archaeology*, ed. E. Scott, 149–173. Tucson: University of Arizona Press.

Spencer-Wood, S., ed. 2013. *Historical and archaeological perspectiveson gender transformations: From private to public*. New York: Springer.

Yamin, R., ed. 2001. Becoming New York: The five points neighborhood. *Historical Archaeology* 35(3).

Yentsch, A. 1991. The symbolic divisions of pottery: Sex-related attributes of English and Anglo-American household pots. In *The archaeology of inequality*, ed. R. Mcguire and R. Paynter, 192–230. Oxford: Blackwell.

Further Reading

Rathje, W., and C. Murphy. 2001. *Rubbish! The archaeology ofgarbage*. Tucson: University of Arizona Press.

Young, L. 2003. *Middle class culture in the nineteenth century: America, Australia, Britain*. Basingstoke: Palgrave/Macmillan.

Households in the Ancient Near East, Archaeology of

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Introduction

The archaeological study of houses and households in the ancient Near East has traditionally focused on aspects of architecture and domestic artifact assemblages to elucidate ethnic groupings and kinship structures. More recent investigations have broadened their scope to examine such diverse topics as craft specialization, gender roles, and site formation processes that are manifest in, and interpreted from, the archaeological remains of houses. Households in the ancient Near East served as the basic unit of society and as an important focal point for the enculturation of its members. It is a place where social norms were learned, created, and disseminated and can thus be argued it formed the physical and psychological foundation for civilizations in this region.

Definition

The study of the practices, behaviors, and sociocultural structure of domestic groups or collectives related through kinship or shared activities. Households offer a window onto the everyday actions of people in the past. As a microcosm of society at large, households can also serve as linking agents between theories of social change and material culture.

Key Issues/Current Debates/Future Directions/Examples

Archaeologists do not excavate households directly. Instead, they must derive their impressions of households and the activities they performed in the past through the physical remains of those activities, including the construction, habitation, and destruction or abandonment of domestic dwellings or houses. A house is the physical structure in which households live, work, and play. Though households have many interests that are not always, or even usually, confined to the physical, architectural house, archaeologists have tended to rely on this focal point to offer clues about habitual household behaviors—cooking, eating, sleeping, creating, reproducing—and what these can tell about both "everyday life" (micro-narratives) and the effects of larger processes of social change (macro-narratives) on domestic groups.

Until recently, the archaeological study of houses and households remained underdeveloped in ancient Near Eastern scholarship. Excavations of large public buildings like temples and gateways, and private royal residences and palaces dominated the field. Thus, theoretical emphasis was traditionally placed on elucidating political history, large-scale economic and social systems, and royal and religious elite participants in these systems. True household investigations have become more of a focus in the last 25 years as the importance of domestic economy and social organization is increasingly recognized as crucial factors in the overall development of complex political, economic, and religious institutions that define the ancient Near East.

Today, archaeologists strive for a holistic approach to households by combining architecture with domestic assemblages, ecofacts, and site formation processes. These data are derived from field methods that take advantage of the full suite of scientific archaeological specialties including zooarchaeology, paleoethnobotany, lithic studies, and, increasingly, microarchaeological techniques. These involve the study of the microscopic archaeological record comprised of "residues" from human behaviors and natural formation processes that remain generally unseen to the naked eye in artifacts, features, or deposits. Examples of these techniques include geochemical analysis to detect ancient use of fire in domestic contexts (Alperson-Afil et al. 2007), microstratigraphy to chart the preparation and creation of living floors (Matthews 2001), and

microartifactual analysis to identify room use patterns or even deeply buried archaeological sites (Rainville 2005). Ethnoarchaeological studies in the modern Middle East have also provided interpretive frameworks by which to understand architecture, the use of space, and artifact assemblages (Watson 1979; Kramer 1982).

The most prolific application of household archaeology in the ancient Near East is reserved for prehistoric periods. Households of the Paleolithic/Natufian (c. 12,000–9,000 BCE.) and Neolithic periods (9,000–6,000 BCE.) in particular have garnered the greatest concentration by scholars who are interested in the social dynamics of hunter-gatherer groups, the adoption of sedentary agricultural practices, and how this latter change affected the social composition and framework of communities. It is here that remains of (now permanent) domestic structures—in the form of ovoid, cell, tripartite, or "megaron/pier" rectangular houses—play a key role. Architectural change has come to be seen as reflecting social change in, for example, newly developed strategic floor plans that impeded movement and developed social barriers at places like Basta (Kuijt 2000). Others argue that new building configurations were accompanied by psychological shifts, as households reconceptualized the physical house as symbolic "home" at Qermez Dere (Watkins 1990), Baida, Jericho, Jarmo, Hacilar, and other sites. Architectural changes over time for a single house can also be manifestations of changes in the coresidential group. These dynamic shifts can be brought about by multiple factors such as adjustments to room function, subdivision of private property through inheritance, ideological developments, physical deterioration of the building, or, as at 'Ain Ghazal, shifts in household composition over the course of a few generations (Byrd 2000; Banning 2003).

Perhaps the most progressive studies of prehistoric households in the ancient Near East are centered at the Neolithic site of Çatalhöyük in Anatolia. Exceptional preservation has allowed the multidisciplinary team to examine the entire use life of domestic structures, from construction and habitation to destruction and/or abandonment. The Berkeley Archaeologists at Çatalhöyük (BACH) team meticulously excavated a single house to reveal five major building phases characterized by a series of floors, fire installations, platforms, post-retrieval pits, bins, and niches (Fig. 1; Tringham and Stevanović 2012). Good preservation ensured the recovery of residues from woven baskets, a domed clay oven, and even the entire collapsed roof. These remains served as a template for a modern replica of the Neolithic house where the application of experimental archaeology provided information about the physical experience of living in these prehistoric dwellings, from working in smoky conditions to negotiating the narrow ladder to access the rooftop entrance. Others have focused on the social and psychological roles of houses (*domus*) specifically as the vehicle by which both wild animals *and* humans were domesticated. Though the factors behind human sedentarization remain contentious, Hodder (1992) has argued that Neolithic peoples accepted the constraints of sedentary lifestyles and agricultural production because the institutions of house and home were believed to ensure continuity as well as protection against the various perceived dangers of the outside natural world.

The development and characteristics of households within urban settings have also received increased attention in Near Eastern archaeology. At the dawn of urbanism in the ancient Near East, households appear to have retained productive control over such products like ceramics and chipped stone tools in the face of growing specialization and centrally administered facilities, a dynamic best exemplified at Tell Abu Salabikh (Pollock et al. 1996). This trend continues into the late third millennium BCE. when, at a time of increasing political centralization in the region, it appears that some households chose to acquire select specialist products with a high degree of social visibility, like serving vessels and textiles, instead of producing them domestically. Nonelite households were thus actively engaged in the creation of a social system demarking elite status through the demand for prestige-laden products (Wattenmaker 1998). These studies illustrate how households played important roles in complex systems of increased craft specialization and

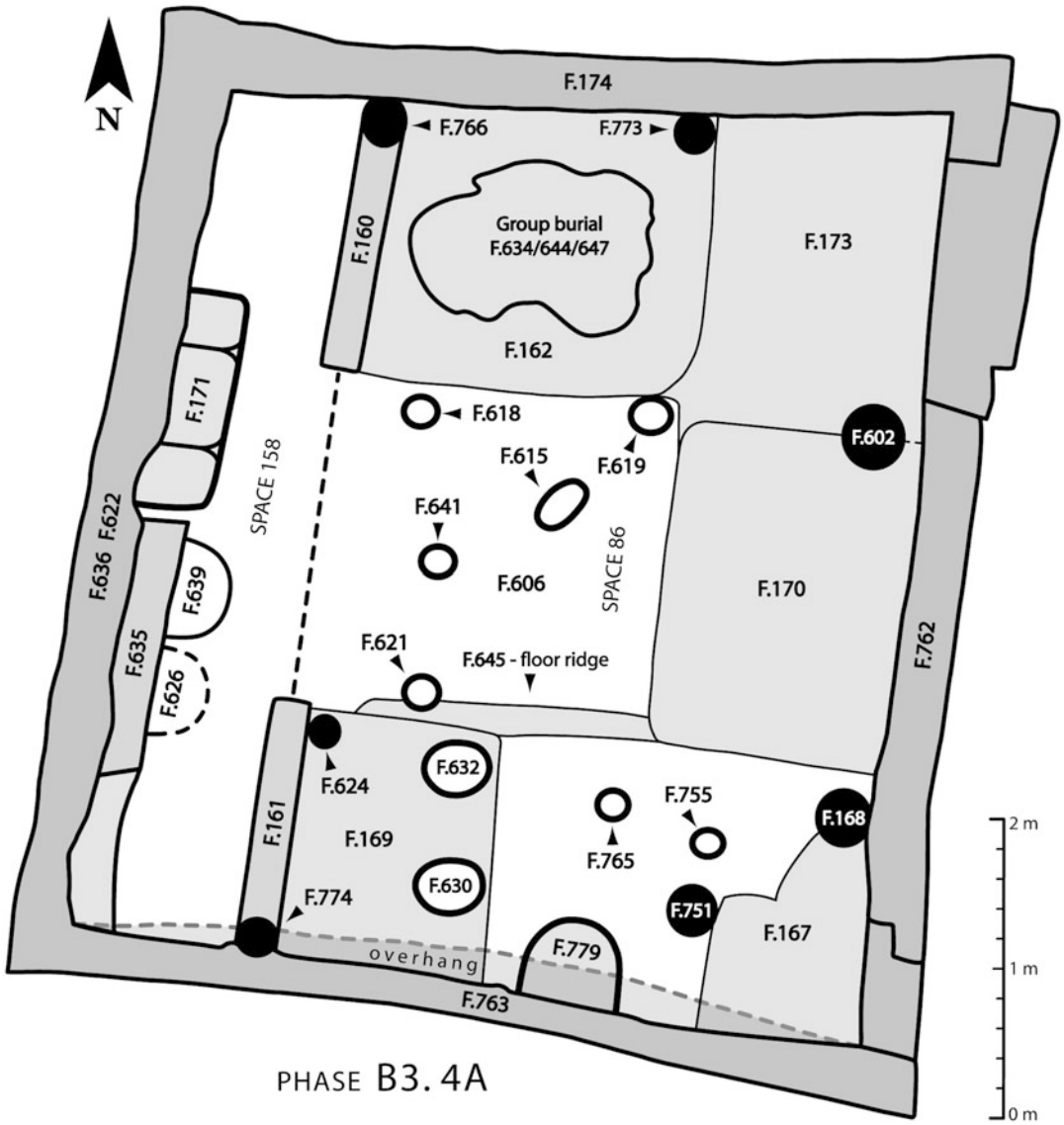

Households in the Ancient Near East, Archaeology of, Fig. 1 An example of a Neolithic dwelling from Catalhöyük (Building 3, phase B3.4A) with raised platforms, an oven in the south, and basins and bins along the west wall. (Çatalhöyük Research Project; Reused with permission by Cotsen Institute of Archaeology Press)

centralization, with the simultaneous retention of cottage industries.

In the southern Levant, urbanization—as viewed through a household lens—was a process whereby communities transformed their built environments to create new patterns of economic and political relationships and realign social identities while maintaining kinship bonds and alliances (Chesson 2003). This process was not a determined continuum, but instead a disjointed development that favored an outward ideology of uniformity in domestic architecture (i.e., "broadhouse" and "front-room" house) and city planning, best seen at sites like Tel Bet Yerah and Arad (Greenberg 2003). Later, household groupings and alliances were to become powerful forces

within ancient cities. The work by Stone (1987) at Nippur—which combined architecture, artifact assemblages, textual sources, and analogous patterns of urban residence in Islamic cities of the modern Middle East—shows the structure and life histories of urban households during the second millennium BCE. which determined the long-term social development of particular individual neighborhoods or quarters on a local scale, as well as the city as a whole.

For the Iron Age (c. 1200–612 BCE.), most scholarly attention has been paid to documenting and characterizing domestic buildings in the southern Levant. It is here that a standardized architectural form became dominant between the eleventh and sixth centuries BCE. after a period of development stretching back as far as the thirteenth century BCE. The so-called four-room house and its three-room subtype—composed of living and storage spaces encircling a central open courtyard—have been attested at multiple urban and rural sites including Tell el-Far'ah (N), Tell en-Nasbeh, Shechem, and Beersheva (King and Stager 2001; Schloen 2001). These buildings housed either nuclear or extended families or households, and they can be found in both urban and rural settings (Fig. 2). Until recently, these and other house forms (notably Aegean building traditions) and associated artifact assemblages were examined chiefly to characterize ethnicity ("Israelites," "Philistines," "Canaanites"), group identity, and/or family structure. The power of the text in biblical archaeology has led scholars to ignore aspects of gender, household production, and status in favor of house form and dietary indicators of ethnicity (Yasur-Landau et al. 2011). This is changing as more scholars begin to explore domestic economies, the physical use of space within domestic compounds, and aspects of gender relations that crosscut all household segments.

Still, several fundamental issues remain for the archaeological study of households in the ancient Near East. Beyond studies of prehistoric sites that, on the whole, grapple with the limits of preservation and sample size, other studies narrowly focus on a single house or household group at a site and do not consider its position within the larger contexts of the local community and the region. Households do not exist in a vacuum; they are affected by sociopolitical or economic conditions that exist beyond their front doors. Diachronic investigations are also essential for seeing the entire picture of domestic life; however, archaeologists often do not account for internal fluctuations or variation between household groups over time. Nor do they always consider aspects of natural and cultural formation processes of the archaeological record that not only affect household remains but all ancient contexts. Post-depositional processes are sometimes overlooked in household investigations in the Near East, where there is a frequent assumption that objects are excavated in their place of use. The application of microarchaeological techniques is beginning to address this problem, but their use remains limited.

Deeper theoretical considerations of ancient Near Eastern households are heavily weighted toward prehistoric contexts, where textual documentation is not available. Scholars of these early periods have managed to tease out the subtle nuances of ancient human behaviors, social structures, and cultural underpinnings based on archaeological materials and ethnographic parallels. On the opposite end of the scale, there remain fundamental gaps in our knowledge about later period households, most notably from Neo-Assyrian (c. 883–612 BCE) contexts. In this case, Assyriologists have provided the most information about households of the ancient Near East, particularly royal ones, through letters and inscriptions, but examinations of archaeological data remain woefully neglected. Thankfully, research projects at sites like Ziyaret Tepe and Ayanis in Turkey are beginning to address this lacuna for both provincial Assyrian and Urartian households alike.

Finally, the archaeological study of households has tended to favor the nonelite portions of society as scholars seek to understand the daily lives and interactions of the majority of the population. However, the palace was both a place of business and home to the royal family and their attendants and staff and would in theory also be amenable to household archaeological investigation. While legacy collections from excavations during the late nineteenth and early twentieth centuries do

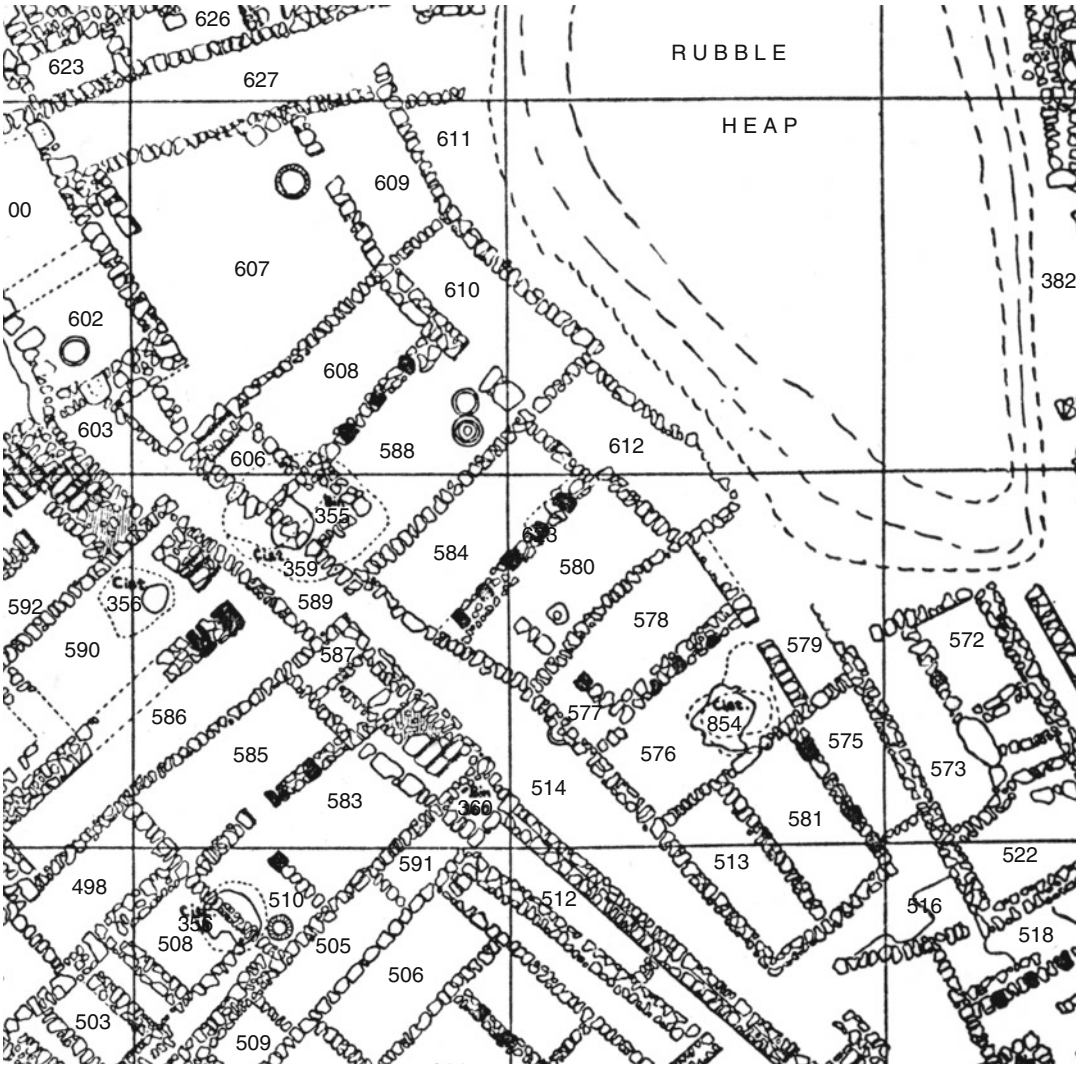

Households in the Ancient Near East, Archaeology of, Fig. 2 Tightly packed Iron Age house compounds with narrow street at Tell en-Nasbeh; scale: one grid square equals 10 m^2. (Reused with permission by Badè Museum, Pacific School of Religion)

not allow for particularly nuanced examinations of palaces beyond architecture and monumental artistic programs, contemporary excavation techniques and household archaeological theory allow scholars the opportunity to reexamine palace life as a lived experience with its own daily rhythms and many social actors.

Houses and households of the ancient Near East form a core dataset by which archaeologists can examine the everyday life of families and communities. They simultaneously offer a glimpse into the mundane and provide a lens by which to magnify the actions of people whose relationships weave together the fabric of society. Beyond providing basic shelter, houses are embodied spaces that both exhibit and reinforce cultural rules, practices, and beliefs. In short, they are a microcosm of society at large. Their inclusion in any truly holistic investigations of cultural, political, or economic developments within or between sociocultural groups of the ancient Near East is thus imperative (Parker and Foster 2012).

Cross-References

- ▶ Archaeology as Anthropology
- ▶ Behavioral Archaeology
- ▶ Buildings, Archaeological Study of
- ▶ Çatalhöyük Archaeological Site
- ▶ Engendered Archaeologies
- ▶ Ethnic Identity and Archaeology
- ▶ Ethnoarchaeology
- ▶ Hodder, Ian (Theory)
- ▶ Iraq: Archaeological Heritage
- ▶ Jericho Archaeological Site
- ▶ Material Culture and Education in Archaeology
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Site Formation Processes
- ▶ Spatial Analysis in Field Archaeology
- ▶ Urbanism in the Ancient Near East
- ▶ Watson, Patty Jo

References

Alperson-Afil, N., D. Richter, and N. Goren-Inbar. 2007. Phantom hearths and the use of fire at Gesher Benot Ya'aqov, Israel. *PaleoAnthropology* 2007: 1–15.

Banning, E.B. 2003. Housing Neolithic farmers. *Near Eastern Archaeology* 66 (1–2): 4–21.

Byrd, B.F. 2000. Households in transition: Neolithic social organization within Southwest Asia. In *Life in Neolithic farming communities: Social organization, identity, and differentiation*, ed. I. Kuijt, 63–98. New York: Kluwer Academic/Plenum.

Chesson, M. 2003. Households, houses, neighborhoods and corporate villages: Modeling the early Bronze Age as a house society. *Journal of Mediterranean Archaeology* 16 (1): 79–102.

Greenberg, R. 2003. Discontinuities in rural settlement in early Bronze Age-Middle Bronze Age I Palestine. In *The rural landscape of ancient Israel*, ed. A.M. Maeir, S. Dar, and Z. Safrai, 27–42. Oxford: Archaeopress.

Hodder, I. 1992. *Theory and practice in archaeology*. London: Routledge.

King, P.J., and L.E. Stager. 2001. *Life in biblical Israel*. Louisville: Westminster John Knox Press.

Kramer, C. 1982. *Village ethnoarchaeology: Rural Iran in archaeological perspective*. New York: Academic.

Kuijt, I. 2000. People and space in early agricultural villages: Exploring daily lives, community size, and architecture in the late pre-pottery Neolithic. *Journal of Anthropological Archaeology* 19: 75–102.

Matthews, W. 2001. Micromorphological analysis of occupational sequences. In Contextual analysis of the use of space at two Near Eastern Bronze Age sites, ed. R.-J. Matthews, and J.N. Postgate. Available at: http://archaeologydataservice.ac.uk/archives/view/TellBrak/. Accessed 27 Nov 2012.

Parker, B.J., and C.P. Foster, eds. 2012. *New perspectives on household archaeology*. Winona Lake: Eisenbrauns.

Pollock, S., M. Pope, and C. Coursey. 1996. Household production at the Uruk mound, Abu Salabikh, Iraq. *American Journal of Archaeology* 100 (4): 683–698.

Rainville, L. 2005. *Investigating upper Mesopotamian households using micro-archaeological techniques*. Oxford: Archaeopress.

Schloen, J.D. 2001. *The house of the father as fact and symbol: Patrimonialism in Ugarit and the ancient near east*. Winona Lake: Eisenbrauns.

Stone, E. 1987. *Nippur neighborhoods*. Chicago: Oriental Institute of the University of Chicago.

Tringham, R., and M. Stevanović, eds. 2012. *Last house on the hill: BACH area reports from Çatalhöyük, Turkey*. Los Angeles: Cotsen Institute of Archaeology.

Watkins, T. 1990. The origins of house and home? *World Archaeology* 21: 336–347.

Watson, P.J. 1979. *Archaeological ethnology in western Iran*. Tucson: University of Arizona Press.

Wattenmaker, P. 1998. *Household and state in upper Mesopotamia: Specialized economy and the social uses of goods in an early complex society*. Washington: Smithsonian Institution Press.

Yasur-Landau, A., J.R. Ebeling, and L.B. Mazow. 2011. *Household archaeology in ancient Israel and beyond*. Leiden: Brill.

Further Reading

Aja, A.J. 2009. Philistine domestic architecture in the Iron Age I. Unpublished Ph.D. dissertation, Harvard University.

Averbeck, R.E., M.W. Chavalas, and D.B. Weisberg. 2003. *Life and culture in the ancient Near East*. Potomac: CDL Press.

Brusasco, P. 1999. Family archives and the social use of space in Old Babylonian houses at Ur. *Mesopotamia* 34–35: 1–173.

Chesson, M., ed. 2011. *Daily life, materiality, and complexity in early urban communities of the southern Levant. Papers in honor of Walter E. Rast and R. Thomas Schaub*. Winona Lake: Eisenbrauns.

Daviau, P.M.M. 1993. *Houses and their furnishings in Bronze Age Palestine: Domestic activity areas and artifact distribution in the Middle and late Bronze Ages*. Sheffield: JSOT.

Düring, B.S., and A. Marciniak. 2005. Households and communities in the central Anatolian Neolithic. *Archaeological Dialogues* 12 (2): 165–187.

Einwag, B., and A. Otto. 1999. Tall Bazi: eine Metropole des 2. Jahrtausends v. Chr. im syrischen Euphrattal. In *Zehn Jahre Ausgrabungen und Forschungen in Syrien 1989–1998*, ed. Deutsches Archäologisches Institut,

Orient-Abteilung, Außenstelle Damaskus, 11–20. Damascus: Deutsches Archäologisches Institut.

Foster, C.P. 2009. Household archaeology and the Uruk phenomenon: A case study from Kenan Tepe, Turkey. Unpublished Ph.D. dissertation, University of California, Berkeley.

Foucault-Forest, C. 1996. *L'habitat prive en Palestine au Bronze Moyen et au Bronze Recent*, British archaeological reports international series. Vol. 625. Oxford: Archaeopress.

Gadot, Y., and A. Yasur-Landau. 2006. Beyond the finds: Reconstructing life in the courtyard building of level K-4. In *Megiddo IV: The 1998–2002 seasons*, ed. I. Finkelstein, D. Ussishkin, and B. Halpern, 583–600. Tel Aviv: Institute of Archaeology, Tel Aviv University.

Hardin, J.W. 2001. An archaeology of destruction: Households and the use of domestic space at Iron II Tel Halif. Unpublished Ph.D. dissertation, University of Arizona.

Herr, L.G., ed. 2003. House and home in the southern Levant. *Near Eastern Archaeology* 66(1–2).

Hodder, I., and C. Cessford. 2004. Daily practice and social memory at Çatalhöyük. *American Antiquity* 69 (1): 17–40.

Horne, L. 1994. *Village spaces: Settlement and society in northeastern Iran*. Washington, DC: Smithsonian Institution Press.

Ilan, O. 2001. Household archaeology at Arad and Ai in the Early Bronze Age II. In *Studies in the archaeology of Israel and neighboring lands in memory of Douglas L. Esse*, ed. S.R. Wolff, 317–354. Chicago/Boston: Oriental Institute of the University of Chicago and American Schools of Oriental Research.

Kamp, K.A. 2000. From village to tell: Household ethnoarchaeology in Syria. *Near Eastern Archaeology* 63 (2): 84–93.

Kramer, C. 1982b. Ethnographic households and archaeological interpretation: A case from Iranian Kurdistan. *American Behavioral Scientist* 25 (6): 663–675.

Kuijt, I., and N. Goodale. 2009. Daily practice and the organization of space at the dawn of agriculture: A case study from the Near East. *American Antiquity* 74 (3): 403–422.

Kuijt, I., E. Guerrero, M. Molist, and J. Anfruns. 2011. The changing Neolithic household: Household autonomy and social segmentation, Tell Halula, Syria. *Journal of Anthropological Archaeology* 30 (4): 502–522.

Lampl, P. 1968. *Cities and planning in the ancient Near East*. New York: Braziller.

MacEachern, S., D. Archer, and R. Garvin, eds. 1989. *Households and communities: Proceedings of the twenty-first annual conference of the Archaeological Association of the University of Calgary*. Calgary: University of Calgary.

Matthews, W., L.-M. Shillito, and M. Almond. 2004. Micromorphology: Investigation of Neolithic social and ecological strategies at seasonal, annual and life-cycle timescales. Çatalhöyük 2004 Archive Report. Available at: http://www.catalhoyuk.com/archive_reports/2004/ar04_22.html. Accessed 27 Nov 2012.

Meyers, C. 2003. Material remains and social relations: Women's culture in agrarian households of the Iron Age. In *Symbiosis, symbolism and the power of the past: Canaan, ancient Israel and their neighbors from the late Bronze Age through Roman Palestina*, ed. W.-G. Dever and S. Gitin, 425–444. Winona Lake: Eisenbrauns.

Meyers, C. 2005. *Households and holiness: The religious culture of Israelite women*. Minneapolis: Augsburg Fortress.

Nakhai, B.A. 2005. Daily life in the ancient Near East: New thoughts on an old topic. *Religious Studies Review* 31 (3/4): 147–153.

Nemet-Nejat, K.R. 1998. *Daily life in ancient Mesopotamia*. Westport: Greenwood Press.

Nishimura, Y. 2008. North Mesopotamian urban space: A reconstruction of household activities and city layout at Titris Höyük in the third millennium B.C. Unpublished Ph.D. dissertation, University of California.

Özbal, R. 2006. Households, daily practice, and cultural appropriation at sixth millennium Tell Kurdu. Unpublished Ph.D. dissertation, Northwestern University.

Paz, S. 2009. A home away from home? The settlement of Transcaucasian migrants at Tel Bet Yerah. *Tel Aviv* 36: 196–216.

Paz, S. 2010. Life in the city: The birth of an urban habitus in the early Bronze Age of Israel. Unpublished Ph.D. dissertation, University of Tel Aviv (in Hebrew).

Roaf, M. 1984. Tell Madhhur, a summary report on the excavation. *Sumer* 43: 108–167.

Roaf, M. 1989. Social organization and social activities at Tell Madhhur. In *Upon this foundation: the Ubaid reconsidered. Proceedings from the Ubaid symposium Elsinore May 30th – June 1st 1988*, ed. E.F. Henrickson and I. Thuesen, 91–146. Copenhagen: Museum Tusculanum Press.

Rosen, A.M. 1989. Ancient town and city sites: A view from the microscope. *American Antiquity* 54: 564–578.

Singer-Avitz, L. 1996. Household activities at Beersheba. *Eretz-Israel* 25: 166–174.

Stone, E. 1981. Texts, architecture and ethnographic analogy: Patterns of residence in Old Babylonian Nippur. *Iraq* 43: 19–33.

Tringham, R. 1991. Households with faces: The challenge of gender in prehistoric architectural remains. In *Engendering archaeology: Women and prehistory*, ed. J.M. Gero and M.H. Conkey, 93–131. Oxford: Blackwell.

Tringham, R. 1995. Archaeological houses, households, housework and the home. In *Home: Words, interpretations, meanings and environments*, ed. D.N. Benjamin, 79–107. Aldershot: Avebury.

Tringham, R. 2000. The continuous house: A view from the deep past. In *Beyond kinship: Social and material reproduction in house societies*, ed. S. Gillespie and

R. Joyce, 115–134. Philadelphia: University of Pennsylvania Press.
Ullah, I.I.T. 2009. Within-room spatial analysis of activity areas at late Neolithic Tabaqat al-Buma, Wadi Ziqlap, al-Kura, Jordan. *Studies in the History and Archaeology of Jordan* 10: 87–95.
Veenhof, K.R., ed. 1996. *Houses and households in ancient Mesopotamia: Papers read at the 40th Rencontre Assyriologique Internationale, Leiden, July 5–8, 1993*. Istanbul: Nederlands Historisch-Archaeologisch Instituut.
Verhoeven, M. 1999. *An archaeological ethnography of a Neolithic community: Space, place and social relations in the Burnt Village at Tell Sabi Abyad, Syria*. Istanbul: Nederlands Historisch-Archaeologisch Instituut te Instanbul.
Yon, M. 2006. *The city of Ugarit at Tell Ras Shamra*. Winona Lake: Eisenbrauns.

Hrdlička, Aleš

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Basic Biographical Information

Aleš Hrdlička, a pioneer of American biological anthropology, was born in 1869 in Humpolec in the Vysočina Region located between Prague and Brno in the present-day Czech Republic. Hrdlička was a founder of the Division of Physical Anthropology at the US National Museum of the Smithsonian Institution (now the National Museum of Natural History, under the same institution), and of the *American Journal of Physical Anthropology* – one of the 10 most influential biology and medicine journals of the century.

At the time of his youth, the area where he was born belonged to the Austro-Hungarian Empire. The Empire had an excellent system of education encouraging intellectual development of all children, irrespective of their socioeconomic status. From an early age, Aleš, the oldest of the seven children of an artisan cabinet maker, showed great aptitude for learning and interest in natural history. When he emigrated with his father to the United States of America at the age 13 years, he had to work in a cigar factory to help his father to earn a living for the family who followed them later to America. Hrdlička completed his education at evening courses.

At the age of 18, Aleš fell seriously ill with typhoid fever and tuberculosis. This period of illness led to his interest in studying medicine. He entered the Eclectic Medical College in New York, graduating as the first in his class in 1892 and continued his studies for the next two years in the New York Homeopathic Medical College. After graduation in 1894, he became a physician at the State Homeopathic Hospital for the Insane in Middletown, New York. Following his early education that compelled him to conduct objective observations, he became interested in reliable measuring of the human body and the brains and started his lifelong research in anthropometry and physical anthropology. Moving as a researcher to the newly established Pathological Institute of the New York State Hospital, he had an opportunity to travel to Paris to study biological anthropology in the Ecole d'Anthropologie with Leon Manouvrier, the successor to Paul Broca, the founder of the Ecole.

Upon return to New York, Hrdlička applied his skills in anthropometry to accumulate large samples of measurements of patients in various hospitals by involving about 20 collaborators. As a physical anthropologist, Hrdlička joined the Hyde Expeditions which were run by the American Museum of Natural History and nominally overseen by Frederick Ward Putnam of the Peabody Museum at Harvard. At the turn of the twentieth century, these expeditions were exploring all aspects of archaeology and anthropology of the American Southwest. During those regular trips to the Southwestern United States and Mexico, he accumulated observations on Native Americans that sparked his interest in their origin. When in 1903 the National Museum in Washington, DC created the new Division of Physical Anthropology, Hrdlička was given charge of this Division as an Assistant Curator. Promoted to full Curator seven years later, he remained in the Division for the rest of his career, finally retiring in 1941.

Major Accomplishments

During his studies that took him all over the world, he accumulated extensive osteological collections for the Museum, later renamed the Smithsonian Institution. These collections remain an important resource for anthropological studies, though many are now subject to repatriation. He was an indefatigable missionary for the discipline of physical anthropology establishing in 1928 the American Association of Physical Anthropologists which today is the largest, and to a certain extent international, association of biological anthropologists in the world. Although a leading figure in American anthropology, Hrdlička did not neglect his country of origin. He subsidized the foundation of a Chair of Anthropology at the Charles University in Prague that is still an important center of biological anthropology today. He also funded exploration of prehistoric sites by Czech Academy of Sciences and Arts. There is the Hrdlička Museum of Man in Prague and International Anthropological Congresses of Aleš Hrdlička are regularly organized by Czech anthropologists.

Aleš Hrdlička was principally an observer and a describer rather than a theoretician. He precisely measured large numbers of human skeletal remains of various peoples all over the world. Working in the era when physical anthropology was heavily involved in the studies of human races and their dangerously misinformed outgrowth of racism, he largely avoided drawing any conclusions about the superiority of one race over others. He maintained that all human races had a common origin in the Old World. His meticulous studies of Native Americans lead him to postulate that Americas were settled fairly recently (in the last 15,000 years) by people moving in from Asia through Bering straits.

There are more than 350 items in Aleš Hrdlička's bibliography. From the year of his graduation in 1894, he published an average of eight papers a year. Among his most important books are the following: *Catalogues of Human Crania in the U.S. National Museum* (1924, 1927, 1928, 1940, 1944); *Brain Weight in Vertebrates* (1905); *Physiological and Medical Observations among the Indians of Southwestern United States and Northern Mexico* (1908); *Early Man in South America* (1912); *Anthropometry* (1920) republished as expanded *Practical Anthropometry* in 1939; *The Skeletal Remains of Early Man* (1930); *Melanesians and Australians and the Peopling of America* (1935); *Diseases and Artifacts on Skulls and Bones from Kodiak Island* (1941), and *Alaska Diary* (1943).

Although married twice (1896 and 1920), Hrdlička had no children. He was considered by many as a man of authoritarian character delivering arbitrary judgments. In the words of M.F. Ashley Montagu (1944), an American anthropologist and humanist who popularized major themes of anthropology "Hrdlička was a kindly soul, and appeared much more formidable than he really was." This agrees well with the translation of his name into English – a turtledove. Aleš Hrdlička died on 5 September 1943.

Cross-References

- ▶ Ancestry Assessment
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Demographic Transitions
- ▶ Osteology Reference Collections
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition

References

Hrdlička, A. 1905. Brain weight in vertebrates. *Smithsonian Miscellaneous Collections* 48.

Hrdlička, A. 1908. Physiological and medical observations among the Indians of south-western United States and northern Mexico. *Bureau of American Ethnology Bulletin* 34.

Hrdlička, A. 1912. Early man in South America. *Bureau of American Ethnology Bulletin* 52.

Hrdlička, A. 1920. *Anthropometry*. Philadephia: The Wistar Institute of Anatomy and Biology.

Hrdlička, A. 1930. Skeletal remains of early man. *Smithsonian Miscellaneous Collections* 53.

Hrdlička, A. 1935. Melanesians and Australians and the peopling of America. *Smithsonian Miscellaneous Collection* 94 (11).
Hrdlička, A. 1939. *Practical anthropometry*. Philadelphia: The Wistar Institute of Anatomy and Biology.
Hrdlička, A. 1941. Diseases and artifacts on skulls and bones from Kodiak Island. *Smithsonian Miscellaneous Collections* 10 (4).

Further Reading

Hrdlička, A. 1943. *Alaska diary, 1926–1931*. Lancaster: The Jacques Cattell Press.
Montagu, M.F.A. 1944. Aleš Hrdlička, 1869–1943. *American Anthropologist* 46: 113–117.

Huashan Mountain Petroglyphs

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Introduction

The Huashan Mountain petroglyphs are located in Ningming County, Guangxi Province, in southern China. In addition to the rock art of Huashan Mountain itself, a total of 79 petroglyph sites, painted in a similar style and on steep cliffs, have been found along the Zuojiang River in this region. These petroglyphs usually are found at elevations higher than 20 m above the ground or water surface (i.e., for cliffs fronting the river) and can extend up to 80–120 m above the surface (Figs. 1, 2, 3, and 4).

Definition

All the images are painted in varying hues of reddish-brown color. While human figures are most commonly represented at all these sites, representations of dogs, birds, and implements such as knives, swords, and bells are also found. While some humans seem to be dancing or performing other ritual acts, some are seated in boats, and a few appear to be engaging in sexual intercourse. Huashan Mountain itself is the largest

Huashan Mountain Petroglyphs, Fig. 1 Details of the most well-known site

Huashan Mountain Petroglyphs, Fig. 2 Main panel

Huashan Mountain Petroglyphs, Fig. 3 Details of one of the panels

Huashan Mountain Petroglyphs, Fig. 4 Detail of one motif

of the known sites in this region. About 1819 figures can be seen on a cliff 210 m wide and extending 50 m above the Zuojiang River.

Key Issues/Current Debates/Future Directions/Examples

Based on implements interpreted from the images, associated archaeological materials, and C-14 dating, it is estimated that the Huashan petroglyphs were drawn in four stages sometime between the early Warring States Period and the Han Dynasty (c. 475 BCE–CE 220). The initial stage dates to the early and middle period of the Warring States. The main fluorescence of the paintings was in the second stage, between the later Warring States Period and the early period of the Western Dynasty. While still flourishing, rock painting began to decline during the middle and later period of the Western Han Dynasty. The fourth and final stage of painting took place during the Eastern Han Dynasty.

According to the historic records, the rock paintings were executed by the ancestors of the modern "Zhuang" people, the largest native ethnic group in the Guangxi region. According to Zhuang myths, legends, and traditional religious beliefs, the ancestor deities have many functions. The Huashan petroglyphs express the worship of ancestors to invoke their aid in preventing natural disasters of flood and drought, to ensure a flourishing population and to bless and protect Zhuang warriors.

The Huashan rock paintings were drawn mainly by outlining of figures in rough lines and in a style of primitive simplicity without details. The artists were rather good at composition, clearly portraying the main characteristics of human figures, animals, and implements. These petroglyphs use strong color and primitive lines, emanating an atmosphere of great zeal and mystery. The Huashan petroglyphs exhibit a style that is distinct from that of other regions.

All the Huashan petroglyphs show evidence of damage to varying degrees from a combination of

natural and man-made causes. Many images have become incomplete and blurred, and some of them cannot be recognized. Sometimes there are only some mottled spots left. So far, there has not been any effective scientific means to prevent further damage from the natural elements, even if protected from human-caused damage. It is necessary to organize concerned experts to carry out experiments and scientific research to identify ways to better conserve these petroglyphs. At the same time, these and other rock arts need to be protected from human-caused damage. This work would benefit from collaboration between rock-art specialists and concerned scientists in China and abroad.

The rock art of the Huashan Mountain region is the precious cultural heritage left by the ancestors of the Zhuang people. The grand scale of the rock painting and its stylistic characteristics are seldom seen in other places. It has great academic value for cultural and religious history, archaeology, and the history of fine arts. It is natural that interpretations of this rock art vary in different academic circles at present, but we are confident that the differences will be reduced with further scientific research.

Cross-References

- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ Rock Art, Forms of
- ▶ Rock Art Sites: Management and Conservation

References

Fu, C.Z. 1989. *China – prähistorische Felsbilder*. Zurich: Ü. Bär Verlag.

Guo, H., H. Rubin, H. Huaiwu, L. Riyong, and X. Riwan. 2010. Types of weathering of the Huashan rock paintings. In *Conservation of ancient sites on the silk road: Proceedings of the Second International Conference on Conservation of Grotto Sites, Mogao Grottoes, Sunhuang, People's Republic of China, June 28–July 3, 2004*, ed. N. Agnew. Los Angeles: The Getty Conservation Institute.

Human Evolution: Multiregional Origins

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Introduction

Understanding human phylogeny has always been contentious. For more than a century after Darwin, human phylogeny usually reflected current racial taxonomy. Through the end of the nineteenth century and into the twentieth, most paleoanthropologists and paleontologists were evolutionary polygenists who essentially described human races (=subspecies) as having independently evolved from different primate species, some ancient and others more recently (Wolpoff and Caspari 1997). In the twentieth century, evolutionary polygenism had come to focus on the independent evolution of human races (=subspecies) from a single prehuman hominid ancestor. The key element all variations of evolutionary polygenism had in common was the independent evolution of human races for so long that the races acquired their humanity separately (Wolpoff and Caspari 2000).

Even in its heyday evolutionary polygenism was not accepted by all paleoanthropologists, and after the end of the Second World War, as biological races lost any vestige of scientific validity (Caspari 2010), prominent evolutionary schemes could no longer be based on them (at least, not without repercussions). This polarized the developing interpretations of human variation and consequently theories of human evolution. For some, variation in the human fossil record was elevated to become species variation, a viewpoint prominent among scientists who accepted the punctuated-equilibrium theory. For others, the taxonomy of human variation was reduced to a lower level, and the null hypothesis became one of a single species lineage. A reduced number of species lineages were recognized in the human fossil record, and only one in genus *Homo*

(at the extreme, see Wildman et al. 2003). The predominant single lineage model for *Homo* (Wolpoff et al. 1994) is explained by the hypothesis of Multiregional Evolution (Wolpoff et al. 1984, 2000).

Definition

Multiregional Evolution describes the pattern of Pleistocene human evolution (Thorne and Wolpoff 1992). It describes a long-term evolution of central (African) and peripheral populations in the widespread polytypic human species that, in recent times with expanding populations, changed to no longer be polytypic (Wolpoff et al. 1984). This evolutionary pattern was structured by the initial and ongoing geographic dispersals of human populations (Hawks 2011) and their continued interconnections through gene flow and population movements allowing adaptive genes and behaviors, under selection, to spread throughout the human range. The key aspects of the multiregional pattern combine global evolutionary changes under selection, as adaptive genes disperse (Hawks and Wolpoff 2001), with continuity over time for regionally prominent features in various parts of the world, especially the peripheries – "regional continuity" (Wolpoff et al. 1984; Wolpoff 1989). This is an ethnogenetic pattern (Moore 1994) in which populations exist within a network, usually with both multiple ancestors and multiple descendents, and the trends in human evolution are universal as genes under selection evolution disperse throughout the network of interconnected populations.

Multiregional Evolution, in Templeton's words (2007: 1511), "is not just a single alternative of recent human evolution, but rather is a class of models. . . . Population genetic theory and observations indicate that there is a broad range of conditions that will result in this pattern." Examples of this class of models, besides those directly described as Multiregional Evolution, include the "assimilation model" (Smith et al. 2005), "hybridization with continuity" (Wu 1998), and "regional continuity" (sensu stricto) from Trinkaus (2007). Constructs such as the "Afro-European sapiens hypothesis" (Bräuer 1984) might also be considered this way, but the fit is not as clear.

The human species was quite small for most of the Pleistocene, totaling as little as one million or less (Eller et al. 2004). Multiregional Evolution is a consequence of its population structure and the fact that its populations were intermittently connected in a network of gene flow and population movements. It is likely that half or more of the human species lived in Africa, until the still ongoing population expansions beginning at the end of the Pleistocene, and this superimposes the multiregional pattern across the human range because the direction of gene flow across this interconnected network is very often from the center of the human range, where there were more people, to the various edges. In our first description of Multiregional Evolution (Wolpoff et al. 1984), we described a "center and edge" pattern in which most gene flow went from the African center with its large population to the more sparsely occupied peripheries. This has been a persistent pattern in the Pleistocene; the movement of genes from the center often brought new adaptive genes to the peripheries, but regional features were also maintained there, and at no time did the African features fully replace the regional ones. Two elements combine to strengthen this pattern: (1) the fact that with more people there were more adaptive mutations in Africa and (2) the several distinct dispersals out of Africa (Templeton 2007) that superimpose over lesser magnitudes of sporadic, continued gene flow.

The conditions are different at the peripheries where some differences between populations appeared (Fig. 1) – in human evolution, these are regions such as China, Europe, and Indonesia – where gene flow across the network of interconnected populations "can be a strong force that inhibits peripheral populations from evolving to their local ecological optima . . . as a result peripheral populations experience persistent directional selection" (Garcia-Ramos and Kirkpatrick 1997), the "center and edge" effect. This pattern of variation, relating the center and the various edges of humanity, is reflected in the

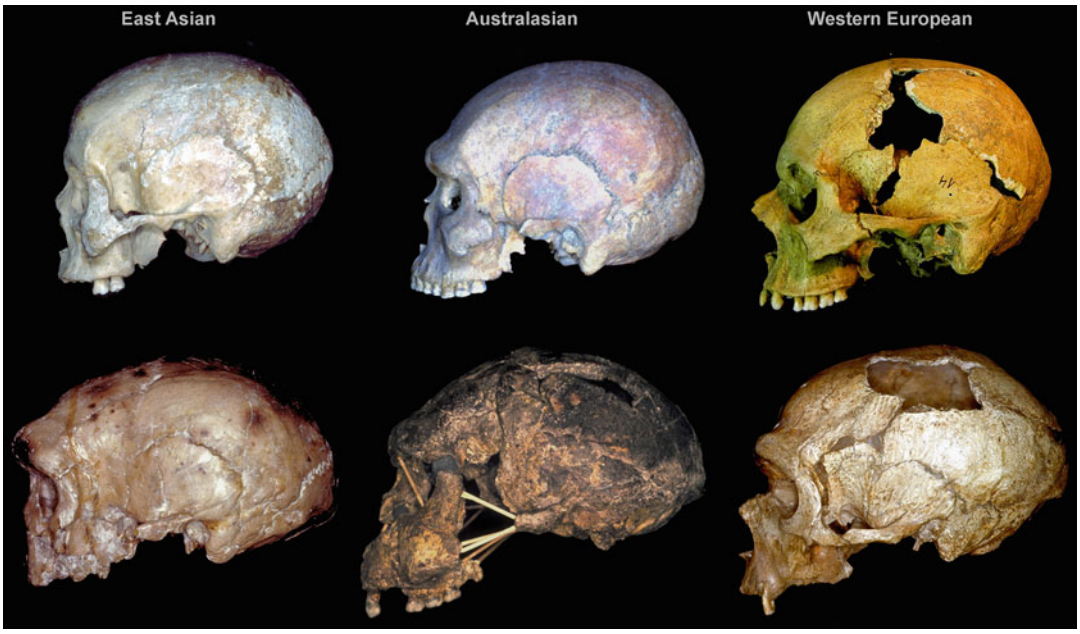

Human Evolution: Multiregional Origins, Fig. 1 The multiregional pattern at the human peripheries is shown in the comparison of archaic humans (*below*) from East Asia (Dali, *left*), Australasia (Sangiran 17, *center*), and Western Europe (La Chapelle Neandertal, *right*) with their recent counterparts. Regional features include, among other things, prognathism (little, alveolar, total facial), cheek orientation (forward or side facing), and nasal projection. In all cases, the recent crania (*above*) are higher, shorter, and rounder with smaller faces and less prominent buttresses, reflecting global changes in the human species

regional continuity of different anatomies in different places that extended beyond the time of initial colonizations (Wolpoff et al. 1984) and through continued Pleistocene dispersals (Templeton 2007). But finally, as the significant population expansions and movements of the late Pleistocene and more recent times began (Hawks et al. 2007), the ancient pattern of distinct regional differences (subspecies) was obscured. One consequence is that today variation within populations is greater than variation between populations, and subspecies (biological races) do not exist. Only some manifestations of the Pleistocene population structure can be found in recent populations (Fig. 1).

The key insight of Multiregional Evolution is that it describes evolutionary changes *within* an evolving species (lineage), not evolution as one species replaces another. Evolutionary history and local adaptive variations are related by selection throughout the Pleistocene, to account for how genetically interconnected populations in the widespread human species developed and maintained significant geographic differences, while the dispersal of adaptive genes under selection accounts for the global, adaptive evolutionary changes. Toward the end of the Pleistocene, this global pattern was increasingly obscured, as dramatic population size expansions from approximately one million humans, with concurrent dispersals and some population extinctions in the Neolithic, came to characterize the still expanding human species.

Key Issues/Current Debates/Future Directions/Examples

There have been ongoing debates about Multiregional Evolution since its first publication 30 years ago. If correct, the Eve replacement theory would be the disproof of Multiregional Evolution, and the question of whether this disproof is valid is the most important recent debate.

The Eve replacement theory posits that human evolution occurred by speciation and modern humans originated from a single, unique ancestral population living between 100 and 200,000 years ago in Africa that gave rise to and closely relate all of humanity. It would mean that modern humans are a new species that replaced all archaic populations without mixture. Like any theory, the Eve replacement theory can be tested, and new discoveries have made this alternative theory invalid to its supporters:

> The recent finding that significant interbreeding occurred between Neanderthals and modern populations refutes the long-standing model that proposes all living humans trace their ancestry exclusively back to a small African population that expanded and completely replaced archaic human species, without any interbreeding. (d'Errico and Stringer 2011: 1060)

Even before these findings, anatomical evidence from the human fossil record indicated that at the furthest peripheries of Europe and Australia, there is statistically significant evidence for dual ancestry of the earliest modern populations, one in African descendants and the other in local archaic populations (Wolpoff et al. 2001).

Subsequent studies of ancient genes and the human genome reveal more key details about past population movements and structure and directly address the multiregional issue. Neandertal genes dispersed under selection, in many cases long after the genes first appeared, into non-African populations where they led to significant adaptive changes (Hawks et al. 2008; Green et al. 2010). Neandertal genes persist in both Europe and Asia, but for the most part, the persisting genes in these two regions are different. This suggests two things: (1) a common region where the mixture took place – almost certainly the Levant, where anatomical evidence (Fig. 2) first suggested mixture of Europeans with Africans for more than a half-century, and (2) the likelihood that very small populations were involved in the incidences of mixture, wherein random loss of genetic variation from drift could play a significant role.

Nuclear DNA of a non-Neandertal specimen from Denisova Cave in Siberia (Reich et al. 2010) provided further evidence of intermixture, between a different lineage of archaic hominids and other ancestors of modern humans. The Denisovan and Neandertal lineages share a common ancestor that is more recent than the common ancestor with Africans. In further work, Skoglund and Jakobsson (2011: 18301) concluded:

> In addition to the previously reported gene flow between Neandertals and non-Africans as well as gene flow between an archaic human population from Siberia ("Denisovans") and Oceanians, we

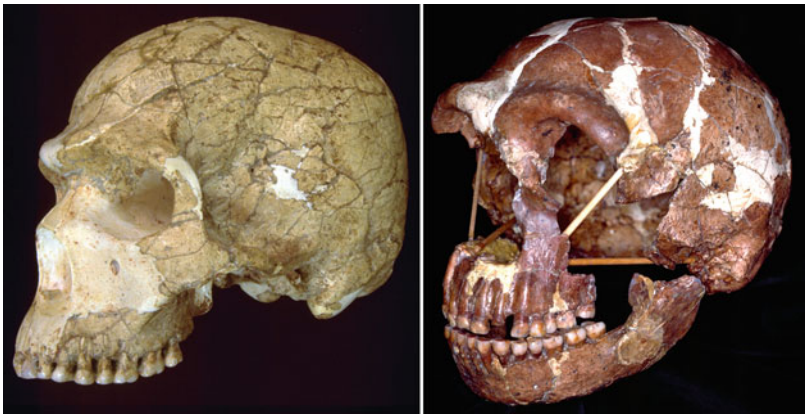

Human Evolution: Multiregional Origins, Fig. 2 Middle Paleolithic Levant specimens from Skhul (*left*) and Tabun (*right*) contrast anatomies that may reflect (respectively) primarily African and European descent. Some authors have regarded these two as "early modern" and "Neandertal" crania, but anatomy and archaeology reveal that these and other Levant specimens from the Middle Paleolithic reflect mixed descent

> found a significant affinity between East Asians, particularly Southeast Asians, and the Denisova genome. ...These results suggest admixture between Denisovans or a Denisova-related population and the ancestors of East Asians.

The extent of mixture between these two archaic lineages and Africans was significant and persistent; ancient populations, meaning Neandertals and the Denisovan Asians, account for some 8% of the ancestry of living non-Africans in one estimate from Reich et al. (2010). This is a substantial percentage, given the likelihood that these were small, peripheral populations at the northern margin of the Eurasian range. This growing body of new information fleshes out the details of Multiregional Evolution in ways that the fossil record could not address. The perseverance of Neandertal and Denisovan genes in significant numbers marked the end of the Eve replacement theory. But support for Eve replacement will not end so easily because science is a *human* activity.

Cross-References

- ▶ Fossil Records of Early Modern Humans
- ▶ Human Evolution: Theory and Progress
- ▶ Journal of Human Evolution
- ▶ Out-of-Africa Origins

References

Bräuer, G. 1984. The "Afro-European sapiens hypothesis" and hominid evolution in East Asia during the late middle and upper Pleistocene. In *The early evolution of man, with special emphasis on Southeast Asia and Africa*. Courier Forschungsinstitut Senckenberg, ed. P. Andrews and J.L. Franzen, Vol. 69, 145–165.

Caspari, R. 2010. Deconstructing race: Racial thinking, geographic variation, and implications for biological anthropology. In *A companion to biological anthropology*, ed. C.S. Larsen, 104–123. Chichester: Wiley-Blackwell.

d'Errico, F., and C.B. Stringer. 2011. Evolution, revolution or saltation scenario for the emergence of modern cultures. *Philosophical Transactions of the Royal Society B* 366: 1060–1069.

Eller, E., J. Hawks, and J.H. Relethford. 2004. Local extinction and recolonization, species effective population size, and modern human origins. *Human Biology* 76 (5): 689–709.

Garcia-Ramos, G., and M. Kirkpatrick. 1997. Genetic models of adaptation and gene flow in peripheral populations. *Evolution* 51: 21–28.

Green, R.E., J. Krause, A.W. Briggs, T. Maricic, U. Stenzel, M. Kircher, N. Patterson, Heng Li, Zhai Weiwei, M. Hsi-Yang Fritz, N.F. Hansen, E.Y. Durand, A.-S. Malaspinas, J.D. Jensen, T. Marques-Bonet, C. Alkan, K. Prüfer, M. Meyer, H.A. Burbano, J.M. Good, R. Schultz, A. Aximu-Petri, A. Butthof, B. Höber, B. Höffner, M. Siegemund, A. Weihmann, C. Nusbaum, E.S. Lander, C. Russ, N. Novod, Affourtit Jason, M. Egholm, C. Verna, P. Rudan, D. Brajkovic, Ž. Kucan, I. Gušic, V.B. Doronichev, L.V. Golovanova, C. Lalueza-Fox, M. de la Rasilla, J. Fortea, A. Rosas, R.W. Schmitz, P.L.F. Johnson, E.E. Eichler, D. Falush, E. Birney, J.C. Mullikin, M. Slatkin, R. Nielsen, J. Kelso, M. Lachmann, D. Reich, and S. Pääbo. 2010. A draft sequence of the Neandertal genome. *Science* 328: 710–722.

Hawks, J. 2011. Centre and edge: A foundational concept in human population dynamics. *Before Farming* 1.

Hawks, J., and M.H. Wolpoff. 2001. The accretion model of Neandertal evolution. *Evolution* 55: 1474–1485.

Hawks, J., E.T. Wang, G.M. Cochran, H.C. Harpending, and R.K. Moyzis. 2007. Recent acceleration of human adaptive evolution. *Proceedings of the National Academy of Sciences USA* 104 (52): 20753–20758.

Hawks, J., G. Cochran, H.C. Harpending, and B.T. Lahn. 2008. A genetic legacy from archaic *Homo*. *Trends in Genetics* 24 (1): 19–23.

Moore, J.H. 1994. Putting anthropology back together again: The ethnogenetic critique of cladistic theory. *American Anthropologist* 96 (4): 925–948.

Reich, D., R.E. Green, M. Kircher, J. Krause, N. Patterson, E.Y. Durand, B. Viola, A.W. Briggs, U. Stenzel, P.L.F. Johnson, T. Maricic, J.M. Good, T. Marques-Bonet, C. Alkan, Qiaomei Fu, S. Mallick, Heng Li, M. Meyer, E.E. Eichler, M. Stoneking, M. Richards, S. Talamo, M.V. Shunkov, A.P. Derevianko, J.-J. Hublin, J. Kelso, M. Slatkin, and S. Pääbo. 2010. Genetic history of an archaic hominin group from Denisova Cave in Siberia. *Nature* 468: 1053–1060.

Skoglund, P., and M. Jakobsson. 2011. Archaic human ancestry in East Asia. *Proceedings of the National Academy of Sciences USA* 108 (45): 18301–18306.

Smith, F.H., I. Jankovic, and I. Karavanic. 2005. The assimilation model, modern human origins in Europe, and the extinction of Neandertals. *Quaternary International* 137: 7–19.

Templeton, A.R. 2007. Genetics and recent human evolution. *Evolution* 61: 1507–1519.

Thorne, A.G., and M.H. Wolpoff. 1992. The multiregional evolution of humans. *Scientific American* 266 (4): 76–83.

Trinkaus, E. 2007. European early modern humans and the fate of the Neandertals. *Proceedings of the National Academy of Sciences USA* 104: 7367–7372.

Wolpoff, M.H. 1989. Multiregional evolution: The fossil alternative to Eden. In *The human revolution: Behavioural and biological perspectives on the origins of modern humans*, ed. P. Mellars and C.B. Stringer, 62–108. Edinburgh: Edinburgh University Press.

Wolpoff, M.H., and R. Caspari. 1997. *Race and human evolution*. New York: Simon and Schuster.

Wolpoff, M.H., and R. Caspari. 2000. The many species of humanity. *Przegląd Antropologiczny (Anthropological Review)* 63 (1): 3–17.

Wolpoff, M.H., X. Wu, and A.G. Thorne. 1984. Modern *Homo sapiens* origins: A general theory of hominid evolution involving the fossil evidence from East Asia. In *The origins of modern humans: A world survey of the fossil evidence*, ed. F.H. Smith and F. Spencer, 411–483. New York: Alan R. Liss.

Wolpoff, M.H., A.G. Thorne, J. Jelínek, and Y. Zhang. 1994. The case for sinking *Homo erectus*: 100 years of *Pithecanthropus* is enough! *Courier Forschungsinstitut Senckenberg* 171: 341–361.

Wolpoff, M.H., J. Hawks, and R. Caspari. 2000. Multiregional, not multiple origins. *American Journal of Physical Anthropology* 112 (1): 129–136.

Wolpoff, M.H., J.D. Hawks, D.W. Frayer, and K. Hunley. 2001. Modern human ancestry at the peripheries: A test of the replacement theory. *Science* 291: 293–297.

Wu, X. 1998. Origin of modern humans of China viewed from cranio-dental characteristics of late *Homo sapiens* in China. *Acta Anthropologica Sinica* 17 (4): 276–282.

Further Reading

Crummett, T.L. 1995. The three dimensions of shovel-shaping. In *Proceedings of the Ninth International Symposium on Dental Anthropology*, ed. J. Moggi-Cecchi, 305–313. Florence: International Institute for the Study of Man, Angelo Pontecorboli Editore.

Eswaran, V. 2002. A diffusion wave out of Africa. *Current Anthropology* 43 (5): 749–774.

Etler, D.A. 1996. The fossil evidence for human evolution in Asia. *Annual Review of Anthropology* 25: 275–301.

Frayer, D.W. 1997. Perspectives on Neanderthals as ancestors. In *Conceptual issues in modern human origins research*, ed. G.A. Clark and C.M. Willermet, 220–234, 437–492. New York: Aldine de Gruyter.

Kramer, A. 1991. Modern human origins in Australasia: Replacement or evolution? *American Journal of Physical Anthropology* 86 (4): 455–473.

Kramer, A., T.L. Crummett, and M.H. Wolpoff. 2001. Out of Africa and into the Levant: Replacement or admixture in Western Asia? *Quaternary International* 75 (1): 51–63.

Larnach, S.L., and N.W.G. Macintosh. 1974. A comparative study of Solo and Australian aboriginal crania. In *Grafton Elliot Smith: the man and his work*, ed. A.P. Elkin and N.W.G. Macintosh, 95–102. Sidney: Sidney University Press.

Pope, G.G. 1992. Replacement versus regional continuity models: The paleobehavioral and fossil evidence from East Asia. In *The evolution and dispersal of modern humans in Asia*, ed. T. Akazawa, K. Aoki, and T. Kimura, 3–14. Tokyo: Hokusen-sha.

Smith, F.H., I. Jankovic, and I. Karavanic. 2005. The assimilation model, modern human origins in Europe, and the extinction of Neandertals. *Quaternary International* 137: 7–19.

Templeton, A.R. 1998. Human races: A genetic and evolutionary perspective. *American Anthropologist* 100 (3): 632–650.

Wildman, D.E., M. Uddin, Liu Guozhen, L.I. Grossman, and M. Goodman. 2003. Implications of natural selection in shaping 99.4% nonsynonymous DNA identity between humans and chimpanzees: Enlarging genus *Homo*. *Proceedings of the National Academy of Sciences USA* 100 (12): 7181–7188.

Wu, X. 1998. Continuity or replacement: Viewed from the source of certain features of modern humans in China. In *Origins and past of modern humans: Towards reconciliation*, ed. K. Omoto and P.V. Tobias, 139–144. Singapore: World Scientific Press.

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Human Evolution: Theory and Progress

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Introduction

In one of the most remarkable understatements in the history of science, Charles Darwin wrote about his theory of evolution by natural selection that "light will be thrown on the origin of man and his history" (Darwin 1859: 488). That was practically all Darwin was prepared to share about the consequences for humankind of his theory in the *Origin of Species*, the seminal work on modern evolutionary ideas. But everybody around him immediately understood the implications, and as archaeological evidence and human fossil remains accumulated during the nineteenth and twentieth centuries in combination with genetic data, theories of human origins eventually became the science of human evolution.

Often overlooked, but central to Darwin's original method and the force of his argument, is the power of converging evidence from a number of different disciplines and bodies of knowledge. For the general theory of evolution, these originally included geology, paleontology, zoology, botany, physiology, anatomy, and, famously, selective breeding. Similarly, human evolutionary studies today are characterized by their multidisciplinarity. Whereas archaeology and paleoanthropology have been central to defining early human history, pushing the chronological boundaries of the first of everything further back in time, they no longer stand in unique positions to the understanding of the evolutionary history of humans.

Definition

Every extinct and extant species on earth have resulted from the same evolutionary processes determining the way they are through shaping their morphology, physiology, and behavior. The traits specific for the human species are the result of the same evolutionary processes responsible for any other living creature. From a general evolutionary perspective, humans are consequently no different than any other species on the planet. Human evolution refers to the natural process involved in the evolutionary history of all members of the human clade (consisting of *Homo* and other members of the human tribe, *Hominini*, after the split from chimpanzees and bonobos). Members of the human clade are referred to as hominins. Previously, the date, nature, and identity of the last common ancestor between modern humans and their closest living relatives were determined on the basis of comparative anatomy of living species and fragmentary fossil remains. Today, molecular genetic data play an increasing role in establishing phylogenetic relatedness between hominoids, the superfamily including all living and extinct ape and human species. Theories of human evolution refers to the complex defining methods, practices, hypotheses, models, explanations, and interpretations of data, answering the question what makes us human from an evolutionary perspective.

Historical Background

Nineteenth-century discovery of early human archaeological and fossil remains led to a systematic investigation of human origins using a scientific explanatory framework. The gradual acceptance of deep time that eventually included humans gave rise to the scholarly division of human history into history and prehistory. Deep history was connected to a deep evolutionary ancestry with the introduction of the scientific theory of descent with modification. A number of key events and publications were instrumental in shaping early theories of human evolution, including among others the publication of Darwin's *Origin of Species* (1859) and *Descent of Man* (1871), Charles Lyell's *Geological Evidences to the Antiquity of Man*, Thomas Henry Huxley's *Evidence as to Man's Place in Nature* (1863), and John Lubbock's *Pre-Historic Times* (1865), the discovery of Neanderthals in Gibraltar, Belgium, Germany, and France, along with archeological artifacts such as stone tools and kitchen midden remains from early settlements, and cultural expressions such as cave paintings found in Spain and France.

From the second half of the nineteenth century, theories of human evolution were largely driven by discoveries. Archeological evidence, which includes any objects that have been made by hominins, played an important part in generating evidence and establishing theories about the behavior of early modern humans. Comparative anatomy, which reasons that organisms that are closely related to each other share many anatomical similarities, was another source of knowledge establishing evolutionary kinship. But fossil evidence was generally seen as most important to prove evolutionary theory right, leading to a race to find the Missing Link connecting humans and apes (Reader 2011; Kjærgaard 2011).

With a limited fossil record, many questions in human evolution remained speculative. It was thus more a theoretical preference and indeed the

order in which fossils were discovered at different locations that determined the favored geographic local of human origins. Darwin had tentatively suggested Africa, but he was a minority. Asia was generally seen as the most likely place for the cradle of humankind, which was supported by Eugène Dubois' recognition of the first *Homo erectus* (1891–1892) found, at the time known as the Java Man echoing the location of the excavations. With a number of fossils turning up in Germany, France, Belgium, and Britain, including the first recognized Neanderthal (1856), *Homo heidelbergensis* (1907) and the notorious Piltdown Man (1912), Europe entered the race to find the first human. The discovery of *Australopithecus africanus* in South Africa 1924 was initially met by skepticism and the location of the true origin of humans remained undecided.

With the increasing number of early human fossils, in particular from Africa (Fig. 1), the resolution of the human family tree got better. But still with so few fossils to build ancestral phylogenies, there continued to be great difference in opinion among leading paleoanthropologists. Some argued for few species, others for a larger variety of early hominins. These groups are commonly referred to as lumpers and splitters. The scarcity of fossil data also made room for radically diverging interpretations of the human family tree. For decades, there were two coexisting theories. The "out of Africa hypothesis" stressed descent of modern humans from a single common ancestor with a growing support for an African origin. The other so-called multiregional theory argued for a multi-linear theory of descent postulating regional origins of modern humans from different ancestral species. With the tides turning in favor of the "out of Africa hypothesis" in the 1980s, the multi-linear model gradually went out of fashion. Following the

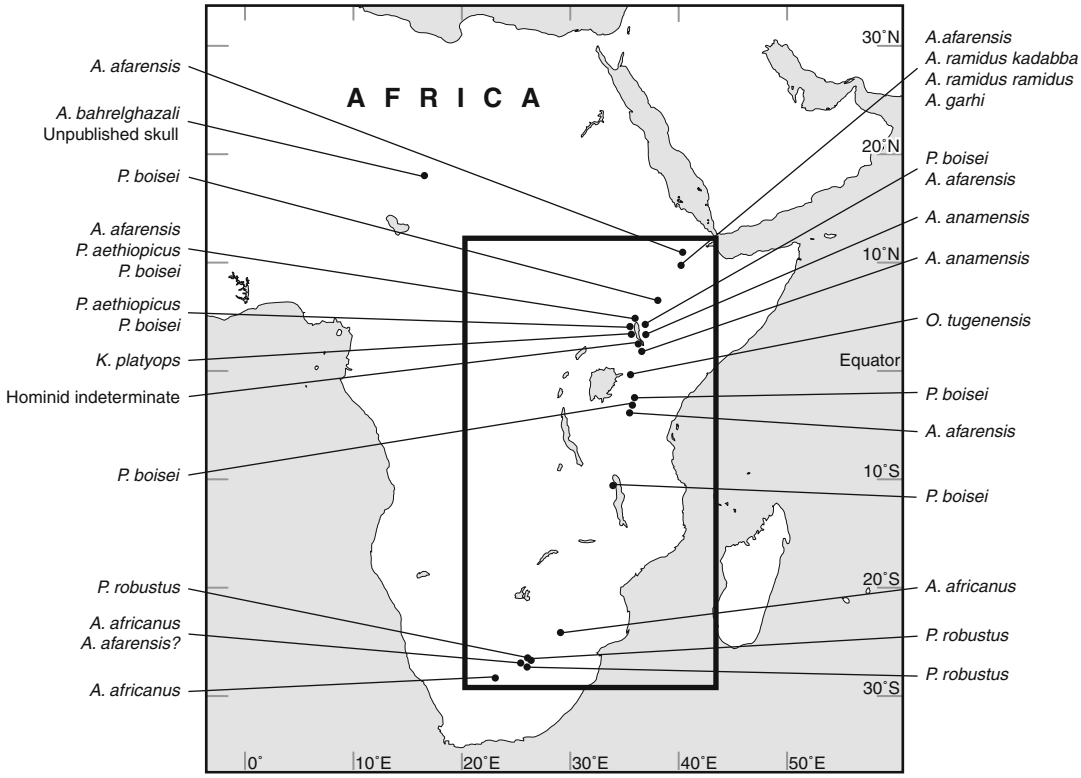

Human Evolution: Theory and Progress, Fig. 1 Map of Africa showing the locations where key hominin species have been found

"fossil explosion," which has seen 11 new species and four new genera named since 1987, understanding of the range of variation in the hominin phenotype was much improved. Two further developments have since revolutionized the empirical base supporting human evolution and emphasized the importance of transdisciplinary enquiry: dating technologies and genetics.

Dating Challenge

There are four primary dating technologies: radiogenic isotopes, paleomagnetism, thermoluminescence, and electron spin resonance. Henry Becquerel, French physicist, discovered the natural radioactive decay of uranium at the turn of the twentieth century. Further work by Ernest Rutherford and Bertram Borden Boltwood indicated that the predictable decay of radioactive elements could be used to keep track of time. Not only did it confirm the earth to be billions years old, it provided the earliest empirical time scale for the fossil record. Common chemical elements used in dating include Argon, Carbon-14 (radiocarbon), and Uranium (Fig. 2). Which elements researchers use depends on how quickly they decay. For example, Carbon-14 dating is extensively used to date organic finds 60 Ka and younger as it has a relatively short half-life (the time it takes for one half of the atoms in Carbon-14 to disintegrate) of about 5,730 years. It has allowed us to accurately document the origins of agriculture, around 12 Ka ago, by dating the remains of animals and plants (Zeder 2011). Argon in contrast has a longer half-life and is extremely useful in dating finds older than 10 Ka. Argon-Argon dating has been used to date many of the fossil sites in East Africa and was also used to date hominin remains at Dmanisi in Georgia to 1.8 Myr old (Garcia et al. 2010).

Paleomagnetism uses the direction of magnetic particles in layers of sediment and compares these to the known shifts in the Earth's magnetic field over time. These shifts can be full reversals when the north magnetic pole suddenly becomes the south magnetic pole, or smaller changes in direction due to the magnetic pole wandering and variations in magnetic field strength. Most fossils are found in sedimentary rock which can be difficult to do date using radiogenic isotopes, and this is where paleomagnetism is a powerful alternative. Paleomagnetism was used to date *Sivapithecus*, a genus of extinct primates and probable ancestor to orangutans, to 12.5 Ma (Kappelman 1993). In this case, the paleomagnetic resolution exceeded the typical 5% error rate associated with radiocarbon (potassium-argon) dating.

Thermoluminescence and electron spin resonance (ESR) measure the amount of electrons that get trapped inside a rock or fossil over time. First developed in the 1950s, thermoluminescence

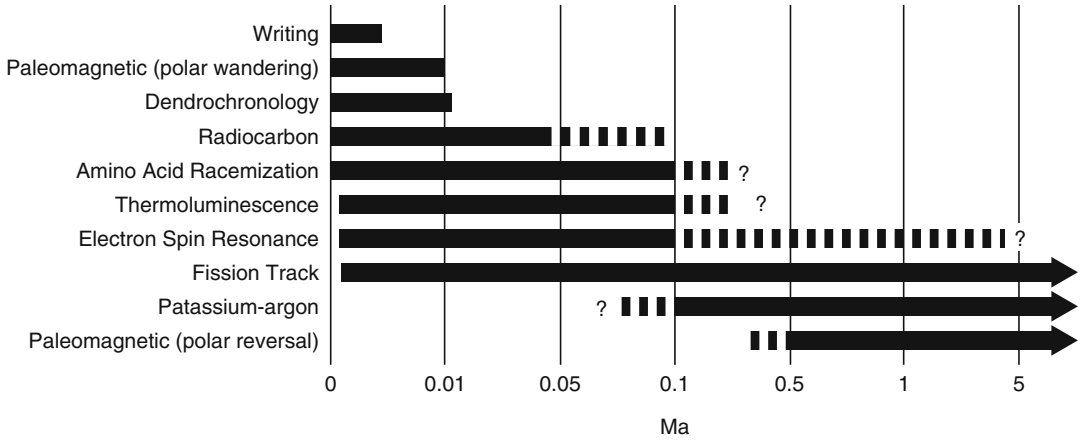

Human Evolution: Theory and Progress, Fig. 2 Effective ranges of major dating methods relevant to human evolution studies

works on the basis that crystals, such as quartz, trap electrical charges (electrons) at a known rate over time. If this crystal, for example, a flint blade, is heated, these electrons are liberated, emitting a measurable amount of light. This allows researchers to determine when an object was last heated. What is actually determined is the amount of elapsed time since the sample had previously been exposed to high temperatures. It is used to date volcanic materials and meteorite impact craters, but can also directly date past human activity such as when ceramics or flint materials were heated to improve strength and durability (Richter 2007). ESR also measures electrons trapped in the lattice, but unlike thermoluminescence, it does not destroy the sample being tested; this allows samples to be dated multiple times. ESR mostly tests calcium carbonate in limestone, coral, fossil teeth, molluscs, egg shells, quartz, and flint. Both methods are typically used to date samples from the last 300,000 years though theoretically they could be used on much older samples.

Genetic Revolution

Since the 1960s, the field of evolutionary genetics has arguably made the greatest impact upon human evolutionary studies. Advances in technology such as the development of the polymerase chain reaction (PCR) have been instrumental allowing, for example, the analysis of ancient DNA taken from Neanderthal fossils (Green et al. 2010). Allan Wilson, Emile Zuckerkandl, and Linus Pauling pioneered the use of molecular approaches, which examined evolution at the scale of DNA and proteins showing that relationships among living and extinct primates can be inferred from genetics as well as fossils. Genetics too can be used as a "clock," which compares the amount of genetic differences (mutations) between living organisms. Since mutations have predictable rates of change over time, they can be used to estimate how long ago a living species shared a common ancestor. The molecular clock cannot assign concrete dates and must be calibrated against independent evidence, such as the fossil record. Nevertheless, taking together the transdisciplinary evidence, we now have a robust understanding of the relationships between humans and apes. For example, we know that humans and chimpanzees split from their common ancestor approximately 4–8 Ma (Sarich and Wilson 1967; Gagneux and Varki 2001) and that the genetic difference between humans and chimpanzees is miniscule at about 1.2%.

Genetics has also confirmed that living humans have a limited genetic diversity indicating a series of population bottlenecks (temporary, drastic reductions in population size and therefore genetic variability, caused by earthquakes or disease, for example) and a limited ancestral gene pool (Foley 1994; Manica et al. 2007). Studies of genetic variation reveal that the greatest diversity can be found in African populations. This combined with evidence from female (mitochondrial DNA) and male (Y chromosome) specific histories confirms an African origin for our species and suggests our ancestors migrated out of Africa about 70–40 ka (Cann et al. 1987).

In addition to helping researchers identify phylogeny, demographic history, and dispersal patterns, we can also identify areas of the human genome influenced by natural selection. Functional genes, such as those involved in infectious disease resistance; life history patterns; diet; skin, hair, and eye coloration; human cognition; and even language, have revealed areas of the genome that have been influenced by natural selection in humans (Enard et al. 2002; Tishkoff and Williams 2002; Lao et al. 2007; Preuss 2012).

Key Issues/Current Debates

The contemporary science of human evolution is an interdisciplinary endeavor encompassing anatomy, anthropology, archaeology, botany, climate sciences, ecology, genetics including ancient DNA studies and geogenomics, geology, history, linguistics, paleoanthropology, paleontology with related subdisciplines, phylogeny, physiology, primatology, and a number of different disciplines specializing in dating. All these disciplines contribute with data and interpretations. They are also, however, contributing to making human evolutionary studies a theoretically heterodox

field. One of the main challenges, therefore, is to correlate data and results from different fields, while managing the differences in perspectives and theoretical traditions.

The increasing theoretical and practical complexity and the abundance of new data have overturned a number of simple scenarios of human evolution, leaving a far more multifaceted understanding of the past 6–7 million years of the human story. This aspect has had a great impact on the key questions in human evolution. Traditionally, in classic studies from the late nineteenth and early twentieth centuries, the main events could be summarized to terrestriality, bipedalism, encephalization, and civilization. Opinion was divided as to the order and importance of these key events, but the general consensus was that understanding what really happened in human evolution depended upon solving these four questions.

Following the increased theoretical complexity, the number of key questions has multiplied and now involves a thorough interdisciplinary understanding of the evolution and functions of adaptation, behavior, bipedalism, brain size, chronology, climate, common descent, evolutionary constraints, culture, dispersal and migration, diet, diversity, ecosystems, extinction, genetics, geography, language, lineage, morphology, ontogeny, phylogeny, species concept, technology, and variation. The answer to these questions includes a number of theoretical assumptions about time, selection pressures and mechanisms, inheritance, speciation, convergence, continuity, and discontinuity.

Take, for example, our changing perception of *Homo habilis* (dating between 2.1 and 1.5 Ma). First identified at Olduvai Gorge in Tanzania by Mary and Louis Leakey in the mid-1960s in the same general area as Oldowan stone tools, this was classified as the earliest member of the *Homo* lineage. Specifically, its name means, "man the handyman." In the 1960s, the existing evidence base and predominant view that tool making was unique to the *Homo* genus was a key factor in how these fossils were classified. In addition to tool use, *habilis* had more "modern" (derived) characteristics, including a relatively larger cranial capacity (680 cm^3), weaker brow ridges, smaller teeth, a higher forehead, and postcranial fossils, suggesting beyond doubt that it was fully bipedal. The reduction in so-called ancestral characteristics tipped the balance and led paleoanthropologists to classify it as *Homo*.

Since the 1960s however, more fossil and archaeological evidences have raised doubts about handyman's place in the hominin family tree. New evidence shows that *Australopithecus afarensis* was already using stone tools at 3.4 Ma more than a million years before *habilis* existed. It is also clear that tool making is ubiquitous across the primate order and not confined to *Homo* (Bentley-Condit and Smith 2010; McGrew 2010). Taken alone handyman's characteristics such as the larger brain and smaller teeth were deemed to be more derived traits. However, as more australopithecine species (especially *Au. garhi*) were discovered, the overall body size and shape, locomotion, the masticatory system, and dental wear analyses suggested that *habilis* had an adaptive strategy more similar to australopithecines than later *Homo* (Kuykendall 2003). For these reasons, some paleoanthropologists argue that *Homo habilis* should indeed be *Australopithecus habilis*. Whether or not this is valid depends not only on the fossil evidence, but how a genus is defined and whether phylogeny (evolutionary relationships) should be given precedence over adaptive strategies when defining a genus (Wood 2009; Arsuaga 2010).

As the transdisciplinary evidence base expands, it is not uncommon for (phylogenetic) models to change and whether we assign *habilis* to the genus *Homo* or *Australopithecus* has far-reaching effects in our interpretation of the fossil record as a whole. Indeed a similar debate surrounds the classification of chimpanzees, with some primatologists and geneticists arguing that *Pan* and *Homo* should be considered subgenera of *Homo* (e.g., *Homo homo sapiens* and *Homo pan troglodytes*) on the basis of how we interpret the fossil, archaeological, genetic, and behavioral evidence (Goodman et al. 1998; Aiello and Andrews 2000)

The specific nature of data, evidence produced within specific disciplinary frameworks, and the

consequences of using different methods and evolutionary models thus shape our interpretation of the evolutionary evidence.

Role of Theory

Theory has played a central role in the development of our understanding of hominin evolution. By creating theories based on the then current evidence, new sources of evidence can be found with which to test the existing theories. Environmental pressures have long been assumed to play a key role in hominin speciation and adaptation (Maslin and Christensen 2007). The *savannah hypothesis* implicates the long-term trend toward increased aridity and the expansion of the savannah as a major driver of hominin evolution. As opposed to long-term directional trends, the *variability selection hypothesis* advocates the role of environmental unpredictability in selecting for behavioral or ecological flexibility (Potts 1998). However, these hypotheses, which emphasize long-term trends toward either a drier or more variable climate, do not explain the pulsed nature of hominin speciation and migration events. Two alternative hypotheses, however, try to account for the discrete and episodic nature of hominin evolutionary events. The *turnover pulse hypothesis*, developed to explain discrete patterns in ungulate speciation, suggests that acute climate shifts drive adaptation and speciation (Vrba 1988). However, the evidence for this hypothesis is equivocal as the stacked benthic foraminifera $\delta^{18}O$ record, which is thought to represent global climate, does not contain the temporal signatures associated with key events in hominin evolution. A region specific hypothesis, the *pulsed climate variability hypothesis*, highlights the role of extreme wet-dry climate cycles specific to East Africa in driving hominin evolution (Maslin and Trauth 2009).

This last hypothesis is based on the distinct geologic and climate conditions of East Africa. The East African Rift System (EARS), one of the most extensive geological features on the Earth's surface, runs north–south for around 4,500 km from Syria through East Africa to Mozambique. The formation of the EARS had a profound effect on the long-term climate of East Africa. Evidence from carbon isotope records from both soil carbonates (Fig. 3) and biomarkers (*n*-alkanes) extracted from deep-sea sediments provide clear evidence of a progressive vegetation shift from C3 (~trees and shrubs) to C4 (~tropical grasses) plants during the Plio-Pleistocene. This shift has been ascribed to increased aridity due to the orographic barrier produced by the progressive rifting of East Africa during this period and supports the savannah hypothesis, which attempts to explain the appearance of bipedalism.

The progressive formation of the EARS also led to the production of isolated basins within which lakes could form (Fig. 3). Southward propagation of rifting and magmatic activity resulted in the formation of lake basins first in the northern parts of the EARS. For example, fluviolacustrine history of the Afar, Omo-Turkana, and Baringo-Bogoria Basins in the north began in the Middle and Late Miocene, whereas the oldest lacustrine sequences in the central and southern segments of the rift in Kenya and Tanzania are found in the Early Pliocene. Despite the southward progression of tectonic processes in East Africa, ephemeral deep-water lakes seem to occur in separate basins at approximately the same time, suggesting a climatic control (Maslin and Trauth 2009). There is growing evidence that during each of these major lake phases, the large fresh-water lakes appeared and disappeared on a precessional timescale, and is associated with repeated periods of extremely wet and arid conditions within the EARS (Fig. 4). Up to and including 2.6 Ma, these lakes track 400 ka eccentricity cycles. Subsequently, these lake phases still occur at the peak eccentricity forcing but only at 1.8 Ma and 1.0 Ma, with the most significant lake phase at 1.9–1.7 Ma, corresponding with the intensification of the Walker circulation (Trauth et al. 2005). At this time, the E-W sea surface temperature gradients in both the Pacific and Indian Oceans increased intensifying the E-W moisture transport in the tropics, which greatly increased rainfall variability both on a precession and an ENSO (El Niño Southern Oscillation) timescale. The best example of the *pulsed climate variability hypothesis* is the most profound period of

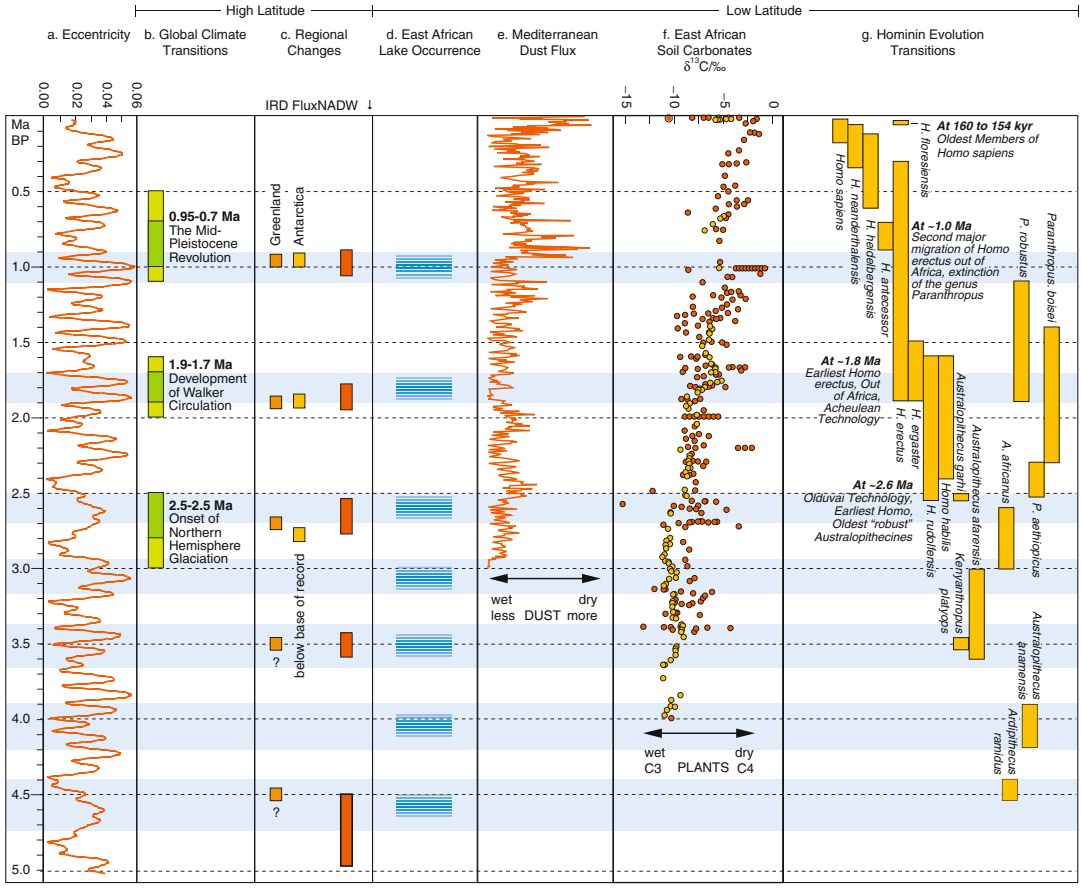

Human Evolution: Theory and Progress, Fig. 3 Environmental context of human evolution in Africa. Comparison of eccentricity variations (*a*) with global climate change (*b*), high latitude climate variations (*c*) with East African lake occurrence (*d*), Mediterranean dust flux (*e*), Soil carbonate carbon isotopes (*f*), with Hominin Evolution Transitions (*g*). (Adapted from Trauth et al. (2007))

hominin evolution at about 1.9 Ma; when there is the highest recorded diversity of hominin species, *Homo (sensu stricto)* appears with brain expansion of up to 80% and migration out of East Africa into Eurasia occurs for the first time. During this key period, ephemeral deep-fresh-water lakes appeared along the whole length of the EARS, fundamentally changing the local environment. However, it must be stressed that this theory is just one of many in a long history and the more paleoclimate and paleoanthropological data is collected, the theories will continue to evolve.

Environmental theories however can only go so far to explaining why some species thrived and managed to migrate across the globe. The application of environmental determinism should be done with great care especially with hominins for whom at some stage 'social' attributes and behaviours may have influenced morphological evolution. Insights into hominin behavior, mate choice, parental investment, foraging behaviors, and social cooperations which come from the behavioral sciences are thus essential to understand the full range of human evolution. Anthropology, behavioral ecology, economics, primatology, and neuroscience tell us that human life history has evolved gradually, humans are highly cooperative, and reproduction is communal (Tooby and DeVore 1987; Boyd and Richerson 2005).

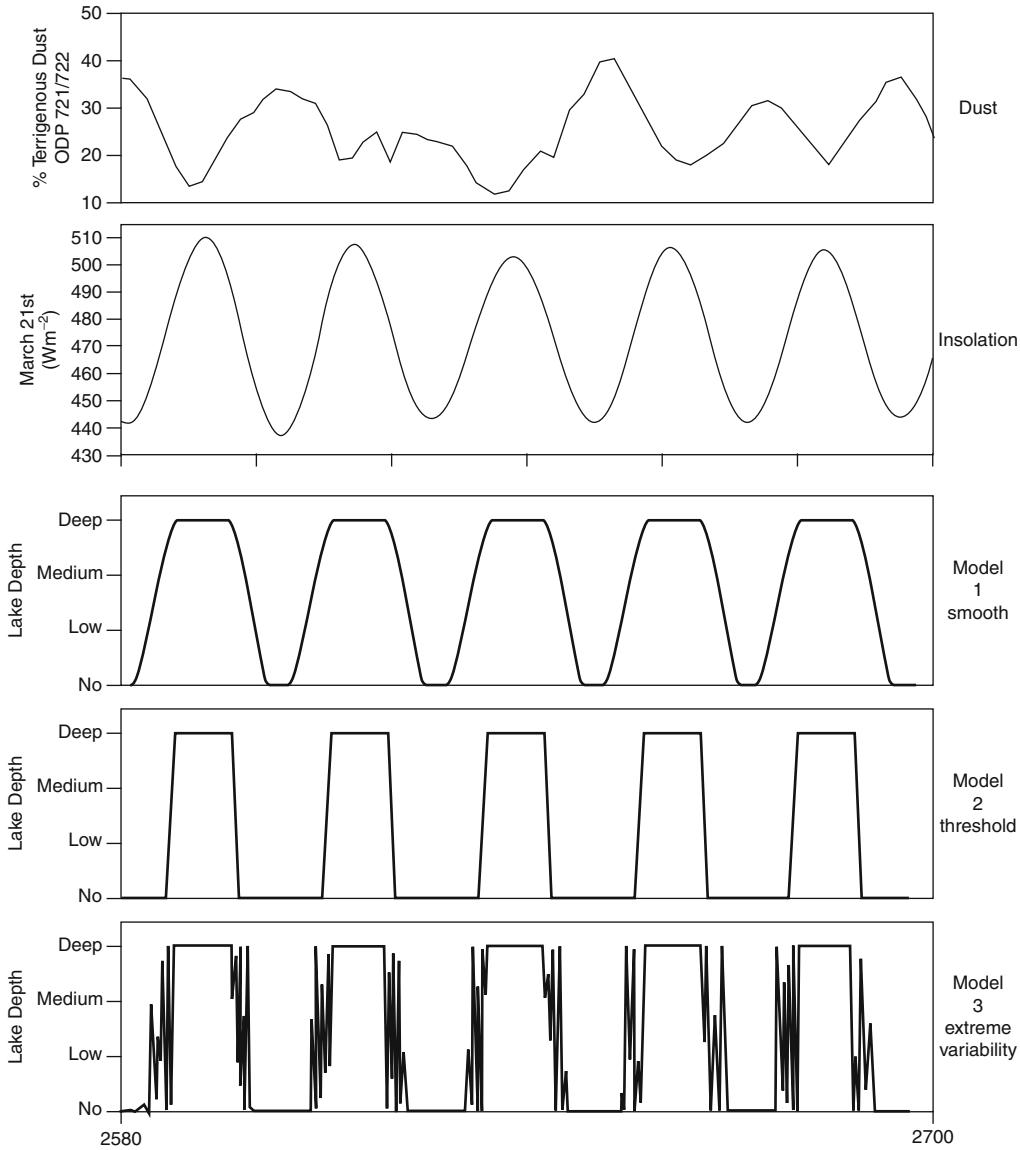

Human Evolution: Theory and Progress, Fig. 4 Three theoretical models of possible lake changes in East Africa during the Plio-Pleistocene and their implications for the causes of human evolution. 4e Model 1 suggests that there is a relatively smooth and gradual transition between periods with deep lakes and periods without lakes. If this "smooth" model is correct, there may have been prolonged periods of wet or arid conditions, which may invoke the Red Queen Hypothesis or the Turnover Pulse Hypothesis (*TPH*) as possible causes of evolution. Red Queen Hypothesis suggests that continued adaptation is needed in order for a species to maintain its relative fitness among co-evolving systems and that biotic interactions rather than climate are the driving evolutionary forces. While the extreme dry periods would support the TPH which suggests that during arid conditions, selective evolution toward larger, more juvenilized descendants in the bovid lineages and hominins would have occurred. Model 2 envisages a "threshold" scenario whereby ephemeral lakes expand and contract extremely rapidly, producing the very rapid onset of extremely dry conditions required by deMenocal's (1995) "aridity hypothesis." Model 3 is an elaboration of the threshold model in which there is "extreme climate variability" during the rapid transition between deep-lake and no-lake states. Such a model would invoke extreme short-term variability that could drive speciation and extinction events, especially if this climate change occurred over a large geographic region. This would produce the widespread environmental variability as required by the "Variability Selection Hypothesis" of human evolution

International Perspectives

Evidence for human evolution is scattered far and wide. The record is certainly not complete overall, but nor is it completely poor. In locations such as the Turkana Basin in east Africa (*Australopithecus, Paranthropus, Homo*), Atapuerca in Spain (*H. antecessor*), and the recent finds on the Indonesian island of Flores (*H. floresiensis*), researchers have collected abundant amounts of fossils and constructed a very in-depth local record. To see human evolution across deep timescales of millions of years however, it is essential to combine multi- and transdisciplinary evidence from all over the world. An excellent example of evidence coming together from all parts of the world is illustrated by evidence for an adaptive shift with *Homo* at around 2 Ma.

This major adaptive shift coincides with *Homo erectus* (1.8 Ma–300 Ka) and we now know that in addition to significant increases in brain size, changes in body shape (relatively elongated legs and shorter arms) which indicated a loss of tree climbing adaptations, innovations in tool technology (earliest handaxes), an ability to walk and possibly run long distances, *H. erectus* had a growth rate similar to that of a great ape with delayed juvenile development, indicating extended periods of learning as well as evidence for care of elderly and weak. They were also the first globetrotters, dispersing beyond Africa, across the Middle East and into Asia (Fig. 5).

However, when *H. erectus* was first unearthed in the form of a skull cap by Eugene Dubois in 1891 in Indonesia, it was the most primitive and smallest brained of all known early human species. This long skull, with a flat forehead, distinct browridges, and saggital keel, was initially placed in a separate genus. Not until the 1950s, by which time many more fossils were uncovered, was it placed into the *Homo* genus. Further discoveries of similar skull caps were made in Zhoukoudian in China and they were initially clearly confined to Asia. It explains the importance of taking the

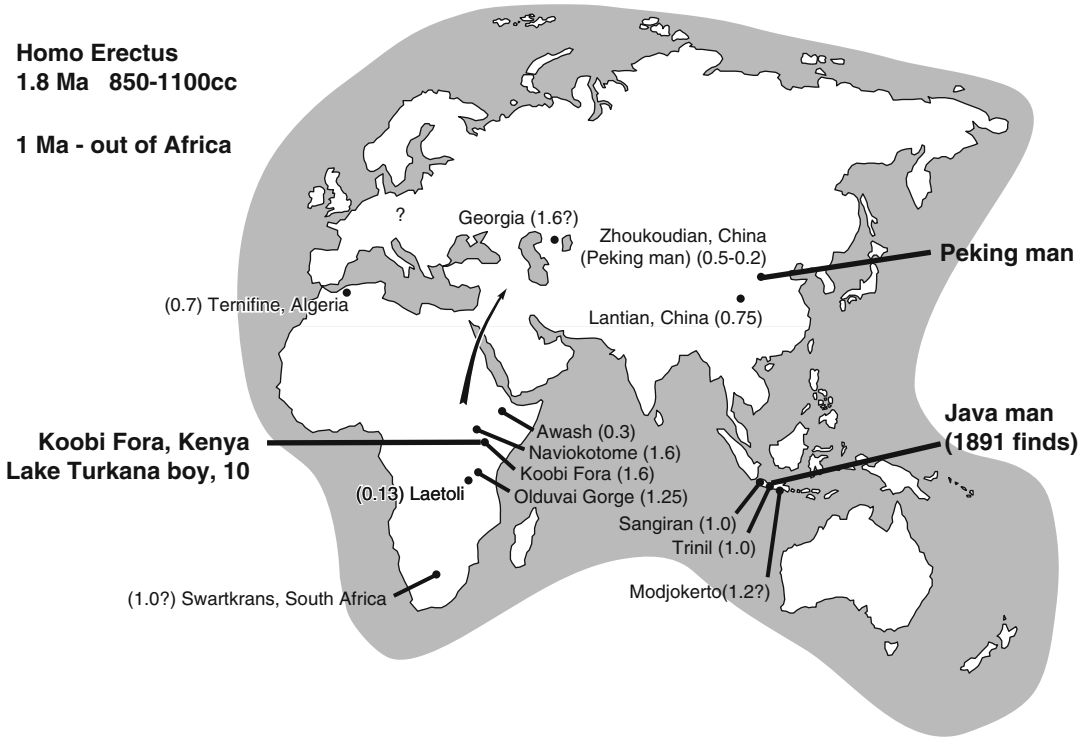

Human Evolution: Theory and Progress, Fig. 5 Dates and location of early *Homo erectus* finds

historical context of fossil finds into consideration. At the time, these early fossils were the most primitive known with only Neanderthal specimens in Europe for comparison until the 1920s and 1930s when *H. heidelbergensis*, *Australopithecus africanus*, and *Paranthropus* discoveries started to hint that the human family tree was more complex.

The fact that we now associate *erectus* with a major shift in the adaptive complex from earlier Australopithecines shown in cranial and dental morphology, behavior, and technology would perhaps startle earlier paleontologists (Wood and Collard 1999; Foley 2002). It demonstrates that human evolution is neither the result of a single revolutionary event nor a smooth accumulation of increasingly modern human features. Instead it is a cumulative process, with novel adaptations arising and disappearing in response to environmental pressures.

A lot more information about erectus body size, shape, and growth patterns came to light in 1984 with the discovery of the Turkana Boy from Kenya. Dated to 1.6 Ma, this near-complete skeleton (sometimes assigned to *Homo ergaster*, it is typically described as the "African erectus") of an 8-year-old male standing relatively tall at 1.60 m suggested that *H. erectus* was not nearly as primitive as previously thought (Fig. 6). A large cranial capacity (880 cm^3 compared to 1,300 cm^3 in modern humans) and tall stature illustrated a dependence on bipedalism, a growing rate (and probable adolescent growth spurt) similar to modern humans. The Turkana Boy made it clear that *H.erectus* originated and persisted in East Africa but left many questions on how, why, and when this species was able to disperse widely not only across Africa, but also in China and Java by 1.8 Ma, though it should be noted that this date is continually revised and it may have occurred slightly later. Evidence is now available from a plethora of fields and provides a solid empirical base to describe and explain the life course of this versatile, global traveler.

H. erectus thrived in a period of major climate change. Combining data from carbon isotope records from soil carbonates and biomarkers extracted from deep-sea sediments, paleo-geologists, -chemists, and physicists have put together a paleo-environmental model which

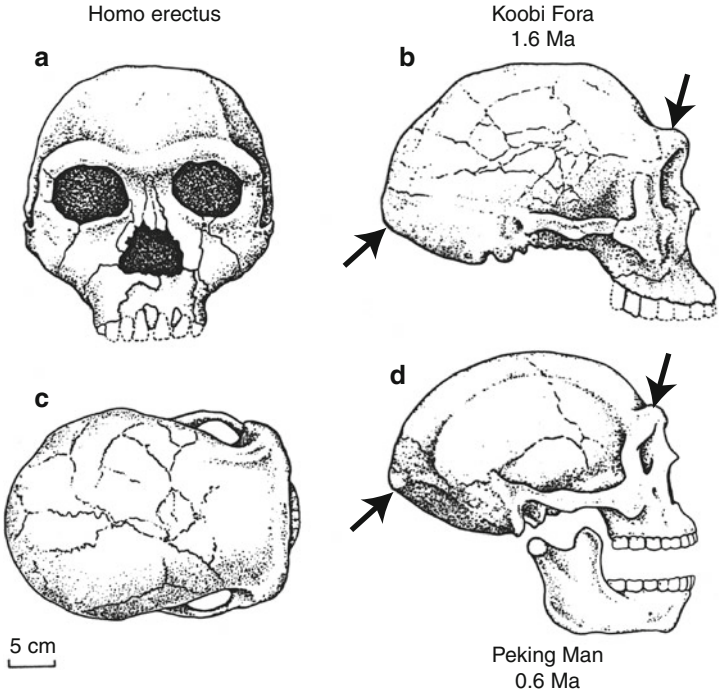

Human Evolution: Theory and Progress, Fig. 6 Comparison of *Homo erectus* skulls of Turkana boy (Kenya) and Peking man (China)

illustrates a progressive vegetation shift form C3 (trees and shrubs) to C4 (tropical grasses) plants during the Plio-Pleistocene. Previously semiarid areas became moister with denser vegetation and more lakes (King and Bailey 2006), making it easier for *H. erectus* to migrate from East Africa into Asia via the "Levant Corridor" through northeast Egypt, Israel, Lebanon, Syria, and Turkey.

In addition to teams from across the world comparing fossil evidence and compiling an environmental narrative in which *H. erectus* evolved, anatomists, primatologists, and ecologists were bringing in their own theoretical paradigms to build up a picture of how *H. erectus* would have survived. Since body size influences a range of physiological traits including energy requirements, choice of food, reproductive strategies, predation risk, range, and locomotor style, paleoanthropologists can learn a lot by comparing *H. erectus* specimens to those of living species. Estimates suggest that *H. erectus* specimens would have been 50% heavier than australopithecine females. The consequent energetic costs of reproduction, which can be extrapolated based on what we know of human and chimpanzee females, suggest that daily energetic requirements of gestation and lactation would have been significantly higher for erectus females (Aiello and Key 2012). Human biologists suggest that shortening the inter-birth interval would reduce these costs and increase reproductive output. These changes in life history will have necessitated changes in behavior, for example, increased cooperation and the division of labor. An ability to do so may have been facilitated by language, and evidence from the cervical vertebrae of *H. erectus* fossils from Dmanisi in Georgia shows that they are well within the normal human range, illustrating that erectus was probably able to regulate its breathing and produce complex sounds.

Another way to meet energetic requirements would be to eat energy-dense foods such as meat and technology advances such as the hand ax would have aided *H. erectus* in procuring such foods. The earliest evidence for fire is also associated with erectus fossils, this is significant because cooking food increases the energy availability in foods (Carmody and Wrangham 2009). Alternatively, you could offset the cost of metabolically expensive tissues, such as the brain, with a reduction in energetic cost somewhere else. The so-called expensive tissue hypothesis is based on comparing gut size across mammals. Anatomists have shown that gut size is highly correlated to diet and shown that the human gut is significantly smaller than expected for an animal of our body size. The expensive tissue hypothesis argues that we have managed to cut energetic costs by reducing gut size because species like *H. erectus* made the move toward hunting or scavenging high-energy and easily digestible meat products (in comparison to plant materials). This allowed an energetic cost saving by reducing the gut size which no longer needed to work so hard. Combining anthropological observations of the Hadza, traditional foragers in Tanzania, with evidence for the erectus' climate-driven adjustments in female foraging and food sharing practices, and longer lifespans, others argue that new social behaviors, such as grandmothers taking care of daughter's offspring, allowed *erectus* to thrive (O'Connell et al. 1999).

Using transdisciplinary evidence from paleoanthropology and primatology to anatomy and biology in combination with the fossil evidence from across the globe, we are now in a position to grasp anatomical, behavioral, and cognitive shifts that accompany the Plio-pleistocene hominins.

Future Directions

There are exciting developments in all fields that are contributing to the understanding of human evolution. We are increasing our understanding of the fossil record and must be prepared for additional surprises such as the discovery of *Homo floresiensis*. In the field of paleoclimate, we understand more and more about the landscape in which our ancestors evolved and how variable it may have been. In the last few years, of all the new fields, genetics has probably had the biggest impact on human evolutionary studies. However, if anything has been learnt from the past, it is that

our understanding of human evolution can only occur by combining evidence from multiple fields of study. This way, new theories can be developed and then tested with evidence.

Cross-References

- ▶ Australopithecines
- ▶ Darwin, Charles R.
- ▶ Dating Techniques in Archaeological Science
- ▶ Dubois, Eugène
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
- ▶ *Homo heidelbergensis*
- ▶ Human Evolution: Multiregional Origins
- ▶ Out-of-Africa Origins

References

Aiello, L.C., and P. Andrews. 2000. The Australopithecines in review. *Human Evolution* 15: 17–38. https://doi.org/10.1007/BF02436232.

Aiello, L.C., and C. Key. 2012. Energetic consequences of being an *erectus* female. *American Journal of Human Biology* 14 (5): 551–565. https://doi.org/10.1002/ajhb.10069.

Arsuaga, J.L. 2010. Terrestrial apes and phylogenetic trees. *Proceedings of the National Academy of Sciences* 107: 8910–8917.

Bentley-Condit, V., and E.O. Smith. 2010. Animal tool use: Current definitions and an updated comprehensive catalog. *Behaviour* 147: 185–221. https://doi.org/10.1163/000579509X12512865686555.

Boyd, R., and P.J. Richerson. 2005. Solving the puzzle of human cooperation. In *Evolution and culture*, ed. S. Levinson, 105–132. Cambridge, MA: MIT Press.

Cann, R.L., M. Stoneking, and A.C. Wilson. 1987. Mitochondrial DNA and human evolution. *Nature* 325: 31–36. https://doi.org/10.1038/325031a0.

Carmody, R.N., and R. Wrangham. 2009. The energetic significance of cooking. *Journal of Human Evolution* 57 (4): 379–391.

Darwin, C. 1859. *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life*. London: John Murray.

Enard, W., M. Przeworski, S.E. Fisher, C.S.L. Lai, V. Wiebe, T. Kitano, A.P. Monaco, and S. Pääbo. 2002. Molecular evolution of FOXP2, a gene involved in speech and language. *Nature* 418: 869–872. https://doi.org/10.1038/nature0102.

Foley, R.A. 1994. Speciation, extinction and climatic change in hominid evolution. *Journal of Human Evolution* 26 (4): 275–289. https://doi.org/10.1006/jhev.1994.1017.

Foley, R.A. 2002. Adaptive radiations and dispersals in hominin evolutionary ecology. *Evolutionary Anthropology* 51 (s1): 32–37.

Gagneux, P., and A. Varki. 2001. Genetic differences between humans and apes. *Molecular Phylogenetics and Evolution* 18 (1): 2–13.

Garcia, T., G. Féraud, C. Falguères, H. de Lumley, C. Perrenoud, and D. Lordkipanidze. 2010. Earliest remains in Eurasia: New $^{40}Ar/^{39}Ar$ dating of the Dmanisi hominid-bearing levels, Georgia. *Quaternary Geochronology* 5 (4): 443–451. https://doi.org/10.1016/j.quageo.2009.09.012.

Goodman, M., C.A. Porter, J. Czelusniak, S.L. Page, H. Schneider, J. Shoshani, G. Gunnell, and C.P. Groves. 1998. Toward a phylogenetic classification of primates based on DNA evidence complemented by fossil evidence. *Molecular Phylogenetics and Evolution* 9: 585–598.

Green, R.E., et al. 2010. A draft sequence of the Neanderthal genome. *Science* 328 (5979): 710–722. https://doi.org/10.1126/science.1188021.

Kappelman, J. 1993. The attraction of paleomagnetism. *Evolutionary Anthropology* 2 (3): 89–99.

Kjærgaard, P.C. 2011. 'Hurrah for the missing link!': A history of apes, ancestors and a crucial piece of evidence. *Notes and Records of the Royal Society* 65 (1): 83–98. https://doi.org/10.1098/rsnr.2010.0101.

Kuykendall, K.L. 2003. Reconstructing Australopithecine growth and development: What do we think we know. In *Patterns of growth and development in the genus Homo*, ed. J.L. Thompson, G.E. Krovitz, and A. Nelson, 191–217. Cambridge: Cambridge University Press.

Landau, M. 1991. *Narratives of human evolution*. New Haven: Yale University Press.

Lao, O., J.M. de Gruijter, K. van Duijn, A. Navarro, and M. Kayser. 2007. Signatures of positive selection in genes associated with human skin pigmentation as revealed from analyses of single nucleotide polymorphisms. *Annals of Humuman Genetics* 71: 354–369.

Manica, A., B. Amos, F. Balloux, and T. Hanihara. 2007. The effect of ancient population bottlenecks on human variation. *Nature* 448 (7151): 246–248. https://doi.org/10.1038/nature05951.

Maslin, M.A., and B. Christensen. 2007. Tectonics, orbital forcing, global climate change, and human evolution in Africa. *Journal of Human Evolution* 53: 443–464.

Maslin, M.A., and M.H. Trauth. 2009. Variability and its influence on early human evolution. In *The first humans – Origins of the genus Homo*, ed. F.E. Grine, R.E. Leakey, and J.G. Fleagle, 151–158.

Mcgrew, W. 2010. Chimpanzee technology. *Nature* 328: 579–580.

O'Connell, J.F., K. Hawkes, and N.G. Blurton Jones. 1999. Grandmothering and the evolution of *Homo erectus*. *Journal of Human Evolution* 36: 461–485.
Potts, R. 1998. Variability selection in hominid evolution. *Evolutionary Anthropology: Issues, News, and Reviews* 7: 81–96. https://doi.org/10.1002/(sici)1520-6505(1998)7:3<81::aid-evan3>3.0.co;2-a.
Preuss, T.M. 2012. Human brain evolution: From gene discovery to phenotype discovery. *Proceedings of the National Academy of Sciences* 109: s10709–s10716. https://doi.org/10.1073/pnas.1201894109.
Reader, J. 2011. *Missing links: In search of human origins*. 3rd ed. New York: Oxford University Press.
Richter, D. 2007. Advantages and limitations of thermoluminescence dating of heated flint from Paleolithic sites. *Geoarchaeology, An International Journal* 22 (6): 671–683.
Sarich, V.M., and A.C. Wilson. 1967. Immunological time scale for Hominid evolution. *Science* 158 (3805): 1200–1203.
Tishkoff, S.A., and S.M. Williams. 2002. Genetic analysis of African populations: Dissecting human evolutionary history and complex disease. *Nature Reviews Genetics* 3 (8): 611–621.
Tooby, J., and I. DeVore. 1987. The reconstruction of hominid behavioral evolution through strategic modelling. In *The evolution of human behavior: Primate models*, ed. G. Kinzey, 183–237. New York: State University of New York Press.
Trauth, M., M.A. Maslin, A. Deino, and M. Strecker. 2005. Late Cenozoic moisture history of East Africa. *Science* 309: 2051–2053.
Vrba, E.S. 1988. Late Pliocene climatic events and hominid evolution. In *Evolutionary history of the "robust" Australopithecines*, ed. F. Grine, 405–426. New York: De Gruyter.
Wood, B. 2009. Where does the genus *Homo* begin, and how would we know? In *The first humans – Origin and early evolution of the genus Homo*, ed. F.E. Griene, J.G. Fleagle, and R.E. Leakey, 17–28. New York: Springer.
Wood, B., and M. Collard. 1999. The changing face of the genus *Homo*. *Evolutinary Anthropology* 8 (6): 197–207.
Zeder, M.A. 2011. The origins of agriculture in the Near East. *Current Anthropology* 52: s221–s235.

Further Reading

McPherron, S.P., Z. Alemseged, C.W. Marean, J.G. Wynn, D. Reed, D. Geraads, R. Bobe, and H.A. Béarat. 2010. Evidence for stone-tool-assisted consumption of animal tissues before 3.39 million years ago at Dikika, Ethiopia. *Nature* 466: 857–860.
Wildman, D., M. Uddin, G. Liu, L.I. Grossman, and M. Goodman. 2003. Implications of natural selection in shaping 99.4% nonsynonymous DNA identity between humans and chimpanzees: Enlarging genus *Homo*. *Proceedings of the National Academy of Sciences* 100 (12): 7181–7188.

Human Evolution: Use of Fire

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Introduction

Fire is a resource of nature that has been harnessed by humans in their technology in such a wide-ranging and far-reaching way that it must be seen as a force in the evolutionary shaping of humanity. Fire use is difficult to investigate because in most cases it leads to no definite artifact, and most of its traces are easily lost to erosion and decay. Nevertheless, traces of burning are known from a surprisingly high number of early sites, and there is no doubt in some cases that they record fire use under human control.

Definition

Fire in Nature

Fire is a natural resource widespread in nature. Although it can be created by volcanoes, friction, or spontaneous combustion of matted vegetation, most of it is created by the many thousands of lightning strikes which occur each year. Thunder storms occur most intensively in the tropics and least commonly towards the Arctic Circle, but the highest "take-up" in bushfires and forest fires occurs in the subtropical semiarid zones and in temperate forests. Fires occur seasonally, often starting when the first lightning of an early season storm comes ahead of the main rainfall. "Fire weather" is well known in some regions and has generated its own literature in forestry research. Although some authors regard fire use as requiring advanced cognition, many animals, especially birds, make use of it in "fire following." Bush fires expose or drive prey in the form of insects, birds, nests of eggs, lizards, and small mammals, as well as revealing or cooking plant resources such as roots. Animals are often less disturbed by fire than

implied by classic stories such as Kipling's Jungle Book, and recently, savanna chimpanzees have been observed to show a situation awareness of fire's behavior.

Key Issues/Current Debates/Future Directions/Examples

Patterns of Human Fire Use

Human fire use can be set in three broad categories. First, opportunistic – a simple fire following geared to harnessing the most obvious resources; second, tethered, where fires are kept burning and perhaps moved to favored localities; and third, kindled or mastered fire, in which fire can be made and used at will. Of course these are arbitrary categories, not a necessary universal progression. Sometimes, they might be used side by side, and people (such as the San in southern Africa) who know how to kindle fire might prefer to operate via tethered fire, either because of religious prohibitions or for ease. The Hadza in East Africa sometimes keep the same fire burning for months at a time. Animal dung provides a convenient slow-burning material for tapers and is easily transportable. Australian aborigines have sometimes been known as "fire stick farmers" because they use selective burning to manage resources on the landscape. The ability to kindle fire greatly increases the flexibility of fire use, and the skills involved demonstrate advanced cognitive capacities, particularly the knowledge that something entirely new (fire) can be released from materials which are not burning at all. Before the invention of modern means, fire was generally made by striking selected stones together and catching the spark on prepared tinder or, by friction, using hard and soft wood. Greater rotational speed could be given to a fire drill by the use of a bow and string. The earliest shell beads with pierced holes suggest that cord was in use at least 100,000 years ago, but use in fire-making is not directly attested until the last few thousand years.

The Earliest Fire in Africa

The oldest archaeological evidence for fire comes from three sites in East Africa – Koobi Fora, Chesowanja, and Gadeb. All have burnt material in close conjunction with archaeological finds. At Chesowanja, burnt clay was found in a concentrated series of lumps among artifacts. At Koobi Fora, patches of burn sediment were found. The associations have been doubted on "taphonomic" grounds, but the doubt is not in the physical association but in the lack of necessary causal connection between the burnt material and the artifacts. The burnt patches could come from natural fires, and the artifacts are not specifically tied to fire use.

In southern Africa, the most valuable evidence comes from the cave sites of Swartkrans and Wonderwerk. At Swartkrans in Member 3, burnt bone has been found in numerous places and layers. At Wonderwerk, there is extensive evidence of charcoal fragments in one layer, and microanalysis tends to rule out bush fires. Claims of dates greater than one million years are not fully substantiated for these sites, but they certainly date to at least 800,000 and together demonstrate early human fire use with near-certainty.

Somewhat later is the Acheulean site of Kalambo Falls in Zambia. There, the late Desmond Clark excavated numbers of charred wooden artifacts, and a probable hearth was found. The site could be as old as 400,000 years.

The Earliest Fire in Eurasia

In Asia, charred bone was found at Bogatyri north of the Black Sea dating to 900,000, but the best known site with fire evidence is Gesher Benot Ya'aqov in Israel, dating to about 700,000. Here, charred plant material has been found from multiple levels and also "ghost hearths" marked out by tiny fragments of burnt flint. Part of the case for human control is the repeated nature of the burning in a lakeside context. Natural fire caused by lightning tends to occur spasmodically and usually on exposed slopes. Also well known is the cave of Zhoukoudian in China, where fire evidence has been recognized since the 1920s but remains controversial. Although some dark material has been shown not to be charred, but mineral stained, burnt bone is testified from the site at about 500,000 years.

Western Europe has provided some of the most convincing evidence for early fire use within the last half-million years. Beeches Pit in eastern

England dates to the Hoxnian interglacial at about 400,000. Here, there is a series of hearths. Beside one of them, an individual knapped a flint hand ax, and two of the series of 30 pieces which can be refitted fell forward into the hearth area and became burnt bright red. The knapping provides a direct connection with the fire, and the extreme selectivity of the burning disproves the idea of any wider natural fire. Again, as at Gesher Benot Ya'aqov, the site is by the side of water. Similarly, at Schoningen in Germany, of similar age and very well known for its preserved wooden spears, hearths are preserved, and in one a wooden stave found that is part-burnt. It may have been used as a hand-spit for roasting meat. Again, the direct association of burnt artifact and hearth provides incontrovertible evidence of the human context.

In the last 200,000–300,000 years, evidence of fire use becomes much more common. Many caves have sequences of hearths, for example, et Tabun in Israel or Bolomor in Spain. Bolomor is interesting, because it shows Neanderthals making small fires for cooking small animals such as rabbits. Elsewhere, such as Abric Romani in Spain or the earlier Beeches Pit, fires were large, more than a meter across. They may have been used for cooking larger animals such as pig or deer, and their fuelling implies some division of labor. Neanderthals certainly achieved a high degree of fire control. At Königsaue in Germany, they prepared pitch from resin, which can only be done by keeping high temperatures over a long period. In Israel, Middle Paleolithic people learned to fire gypsum plaster. In both cases, the material can be used to fix a stone tip to a wooden haft. It is notable that in several of our earliest cases of fire use, there is a link between the fire and fireside technology.

Hypotheses About Fire

Archaeology has the task of testing the balance between two different perspectives on fire use. The first of these is a general modelling view, taking into account biological, ecological, and psychological disciplines. It argues that human fire use began at an early stage, probably around the time of the first brain expansion in *Homo*, and that it played a major role in changing diet. The second view is much more cautious, depending on the fire evidence actually preserved on archaeological sites, and requiring definite traces of hearths or other burning of artifacts as its primary evidence. The philosophies of these approaches are different, although they can grade into one another. They leave us with views that fire use began as early as 1.7 million years ago or as late as 400,000 years ago. But considering that there can be different grades and types of fire use, the results could be less incompatible than they appear.

The cooking hypothesis has been championed by Richard Wrangham and colleagues.

Early hominin ancestors living in environments where fruit sources were limited would require access to other carbohydrates, as in roots. But starch is indigestible, and greater inputs of meat also require predigestion for a creature without an ancestral history of carnivory. Archaeological evidence does not prove that cooking provided the answers, but the general case and the regular association of burnt material with archaeological sites is strongly suggestive. The greatest puzzle is lack of fire evidence in the north, where fire would be most desirable – but also least available from nature. African cave sites have fire evidence, but so far, early European cave sites such as Arago do not, although humans were present and butchering animals. Possibly at this stage, fire was used only in particular places on landscapes.

It can remain hard to distinguish natural fire and human fire in the past record, because their patterns often overlap. Temperature of burning is not a good indicator – both natural and controlled fires will frequently burnt in the range 200–600 °C – but repeated burning in one place strongly indicates human use. Hearths provide good evidence but can sometimes be mimicked by natural features. Microscopic thin section studies can help to distinguish the type of burning. Selective burning of artifacts provides the strongest evidence for human control.

The Role of Fire

How important was fire in human evolution? Arguably, it was one of the most crucial technologies, raising the quality of diet and so helping

humans to acquire and maintain the large and expensive brains that had such great social implications. Once set in hearths, fire was also the focus of both social and technical activity. It allowed humans to gain a longer day and to alter their circadian rhythm so that they are awake more hours per day than other animals. Our peak alertness is in the early evening, when the apes are retiring to bed. The additional hours could be used for preparing food, making or repairing tools, or simply in conversation. Many technologies depend on fire, combined with time, patience, and skill. Apart from the pitch and gypsum already mentioned, one early use was the warming of stones so that they were more tractable for knapping, a practice observed at Pinnacle Point cave in South Africa about 120,000 years ago. Other uses of fire have multiplied greatly in recent times – in the late Paleolithic of France, water in small pits was heated by "pot boiler" stones for cooking; in the Upper Paleolithic of Moravia, small clay animal figures were baked; and in the Far East, true pottery goes back at least 20,000 years. Open fires have a temperature limit of about 800° centigrade. Within the last 5000 years controlled drafts were introduced, allowing temperatures to be greatly raised. Smelting of metals and production of glazes and glasses were among the results.

Cross-References

- ▶ Europe: Early Upper Paleolithic
- ▶ *Homo sapiens*
- ▶ West Asia: Paleolithic
- ▶ Zhoukoudian, Archaeology of

Further Reading

Alperson-Afil, N. 2008. Continual fire-making by hominins at Gesher Benot Ya'aqov, Israel. *Quaternary Science Reviews* 27: 1733–1739.

Alperson-Afil, N., and N. Goren-Inbar. 2010. *The Acheulian site of Gesher Beno Ya'aqov, Volume II: Ancient flames and controlled use of fire*. Vertebrate Paleobiology and Paleoanthropology series. Dordrecht: Springer.

Barbetti, M. 1986. Traces of fire in the archaeological record, before one million years ago? *Journal of Human Evolution* 15: 771–781.

Bellomo, R.V. 1993. A methodological approach for identifying archaeological evidence of fire resulting from human activities. *Journal of Archaeological Science* 20: 525–555.

Bellomo, R.V., and W.F. Kean. 1997. Evidence of hominid controlled fire at the FxJj20 site complex, Karari escarpment. Appendix 4A. In *Koobi Fora research project, volume 5: Plio-Pleistocene archaeology*, ed. G.-L. Isaac and B. Isaac, 224–233. Oxford: Clarendon Press.

Berna, F., P. Goldberg, L.K. Horwitz, J. Brink, D. Holt, M. Bamford, and M. Chazan. 2012. Microstratigraphic evidence of in situ fire in the Acheulean strata of Wonderwerk Cave, Northern Cape Province, South Africa. *PNAS*. https://doi.org/10.1073/pnas.1117620109.

Bosinski, G. 2006. Les premiers peuplements de l'Europe centrale et de l'Est. *Comptes Rendus Palevol* 5 (1–2): 311–317.

Brain, C.K. 2005. Essential attributes of any technologically competent animal. In *From tools to symbols: From early hominids to modern humans*, ed. F. d'Errico and L. Backwell, 38–51. Johannesburg: Witwatersrand University Press.

Brain, C.K., and A. Sillen. 1988. Evidence from the Swartkrans cave for the earliest use of fire. *Nature* 336: 464–466.

Carmody, R.N., and R.W. Wrangham. 2009. The energetic significance of cooking. *Journal of Human Evolution* 57: 379–391.

Clark, J.D., ed. 2001. *Kalambo Falls*. Vol. 3. Cambridge: Cambridge University Press.

Clark, J.D., and J.W.K. Harris. 1985. Fire and its roles in early hominid lifeways. *African Archaeological Review* 3: 3–27.

de Lumley, H. 2006. Il y a 400,000 ans: la domestication du feu, un formidable moteur d'hominisation. *Comptes Rendus Palevol* 5 (1-2): 149–154.

Goren-Inbar, N., N. Alperson, M.E. Kislev, O. Simchoni, Y. Melamed, A. Ben-Nun, and E. Werker. 2004. Evidence of hominin control of fire at Gesher Benot Ya'aqov, Israel. *Science* 304: 725–727.

Gowlett, J. 2010. Firing up the social brain. In *Social brain and distributed mind*, ed. R. Dunbar, C. Gamble, and J. Gowlett, 345–370. London: The British Academy.

Gowlett, J.A.J., and R.W. Wrangham. 2013. Earliest fire in Africa: Towards the convergence of archaeological evidence and the cooking hypothesis. *Azania* 48: 5–30.

Gowlett, J.A.J., J.W.K. Harris, D. Walton, and B.A. Wood. 1981. Early archaeological sites, hominid remains and traces of fire from Chesowanja, Kenya. *Nature* 294: 125–129.

Gowlett, J.A.J., J. Hallos, S. Hounsell, V. Brant, and N.C. Debenham. 2005. Beeches Pit – Archaeology, assemblage dynamics and early fire history of a Middle

Pleistocene site in East Anglia, UK. *Eurasian Prehistory* 3: 3–38.
Rolland, N. 2004. Was the emergence of home bases and domestic fire a punctuated event? A review of the Middle Pleistocene record in Eurasia. *Asian Perspectives* 43: 248–280.
Ronen, A. 1998. Domestic fire as evidence for language. In *Neanderthals and moderns in Asia*, ed. T. Akazawa, 439–445. New York: Plenum Press.
Thieme, H. 2005. The Lower Palaeolithic art of hunting: The case of Schöningen 13 II-4, Lower Saxony, Germany. In *The hominid individual in context: Archaeological investigations of Lower and Middle Palaeolithic landscapes, locales and artefacts*, ed. C.-S. Gamble and M. Porr, 115–132. London: Routledge.
Weiner, S., Q. Xu, P. Goldberg, J. Lui, and O. Bar-Yosef. 1998. Evidence for the use of fire at Zhoukoudian, China. *Science* 281: 251–253.
Wrangham, R. 2009. *Catching fire: How cooking made us human*. New York: Basic Books.
Wrangham, R.W. 2007. The cooking enigma. In *Evolution of the human diet: The known, the unknown and the unknowable*, ed. P.S. Ungar, 308–323. New York: Oxford University Press.

Human Impacts on Ancient Marine Ecosystems

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Brief Definition of the Topic

Understanding human impacts on ancient marine ecosystems is an area of archaeological research focused on the interactions between ancient peoples and marine environments and organisms. Closely allied with historical ecology (Crumley 1994), studies of human impacts on ancient marine ecosystems are interdisciplinary, drawing on history, biology, paleobiology, and other fields. This research is being performed by scholars around the world on a variety of different ecosystems (coral reefs, kelp forests, estuaries, etc.) and focused on different scales of human economic and social organization (e.g., hunter-gatherers, maritime agriculturalists, and states). The toolkit used to investigate this topic is equally diverse, relying on zooarchaeology, stable isotope analyses, ancient genetics, and geoarchaeology. Coastal archaeological and historical ecological studies are providing important deeper context for contemporary environmental problems and ecological restoration and conservation.

In studying human impacts on ancient marine ecosystems, researchers have focused on several key questions. When did people first settle along a particular coastline? What was the nature of ancient human subsistence economies in coastal areas, and how did these vary across space and through time? Did people have an impact on marine resources or ecosystems in the past, or is there evidence for long-term sustainability? What can ancient human interactions with and impacts on marine ecosystems tell us about contemporary environmental problems facing the ocean?

From North America's Pacific and Atlantic coasts to the North Sea, tropical Pacific and Caribbean islands, Mediterranean, Africa, and beyond, ancient peoples settled along the coast in the distant past. Humans have harvested coastal resources for more than 150,000 years in southern Africa, and ancient human dispersals to Australia, Pacific and Caribbean islands, and beyond crossed hundreds or even thousands of kilometers of open ocean. Along with natural climatic and other environmental changes, ancient peoples often had an impact or influence on local marine ecosystems – some extending back tens of thousands of years. These impacts vary considerably through time and across space. In some cases, archaeologists are just beginning to understand the patterns and processes of human over-exploitation of marine resources versus cases of long-term and potentially sustainable harvest of coastal ecosystems. Examples of ancient human impacts on marine organisms and ecosystems include the following: (1) resource depression or over-exploitation of key species, including seals, sea lions, and sea otters and shellfish, finfish, and seabirds, (2) predation pressure that results in a decline in the size and/or change in the age structure of marine shellfish and vertebrate populations,

and (3) human-induced trophic cascades, where exploitation of one or more keystone species can result in cascading changes to the structure and function of an ecosystem.

Archaeologists have gathered substantial evidence that many ancient peoples, including hunter-gatherers and agriculturalists, had a strong impact on marine ecosystems, but there is also growing evidence that some ancient peoples harvested resources sustainably over the long-term. Some marine ecosystems appear to be relatively resilient – able to withstand human exploitation while retaining the same basic structure – to certain thresholds of human harvest. In some cases, people also actively enhanced the productivity of specific marine ecosystems or organisms. These include cases of ancient aquaculture in Asia, Europe, North America, and the Pacific Islands, where engineering of streams and other waterways was used to create or enhance fish ponds, as well as the "clam gardens" of the Pacific Northwest (e.g., Lepofsky et al. 2015).

More recently, archaeologists have used data on ancient human impacts on marine ecosystems to help inform the management, restoration, and conservation of modern marine ecosystems, fisheries, and organisms. Today, the world's oceans are rapidly being degraded by human activities such as over-fishing, nutrient over-enrichment, pollution, wetland destruction, climate change, and invasive species introductions. Archaeological data provide important baselines and deep historical context on how marine ecosystems have changed over centuries or millennia, with and without human influence. When placed in the context of historical, paleobiological, and modern records of the long-term natural and anthropogenic influences on marine ecosystems, archaeology is a powerful tool for helping better understand contemporary environmental problems.

Coastal archaeology and research on human impacts on ancient marine ecosystems is also contributing to broad scientific discussions about the Anthropocene, or Age of Humans. There is considerable debate about when the Anthropocene began (~13,000 years ago or perhaps as recently as 50 years ago), with one proposal that Late Pleistocene/Holocene shell middens may be a stratigraphic marker for the onset of this new geological time period (Erlandson 2013).

Today, coastal archaeological sites around the world are increasingly threatened by accelerated sea level rise and erosion, development and construction projects, looting, and many other processes. As research into human impacts on ancient marine ecosystems continues to grow, we also need to work to conserve the fragile and disappearing global coastal archaeological record that is the foundation for this research.

References

Crumley, C.L., ed. 1994. *Historical ecology: Cultural knowledge and changing landscapes*. Santa Fe: School of American Research.

Erlandson, J.M. 2013. Shell middens and other anthropogenic soils as stratigraphic markers of the Anthropocene. *Anthropocene* 4: 24–32.

Lepofsky, D., N.F. Smith, N. Cardinal, and John Harper. 2015. Ancient shellfish mariculture on the northwest coast of North America. *American Antiquity* 80: 236–259.

Further Reading

Barrett, J.H., and D.C. Orton, eds. 2016. *Cod and herring: The archaeology and history of medieval sea fishing*. Oxford: Oxbow Books.

Braje, T.J., T.P. Leppard, S.M. Fitzpatrick, and J.M. Erlandson. 2017. Archaeology historical ecology, and anthropogenic island ecosystems. *Environmental Conservation* 44: 286–297.

Erlandson, J., and T. Rick. 2010. Archaeology meets marine ecology: The antiquity of maritime cultures and human impacts on marine fisheries and ecosystems. *Annual Review of Marine Science* 2: 231–251.

Fitzpatrick, S.M., T.C. Rick, and J.M. Erlandson. 2015. Recent progress, trends, and developments in island and coastal archaeology. *Journal of Island and Coastal Archaeology* 10: 3–27.

Jackson, J., K. Alexander, and E. Sala, eds. 2011. *Shifting baselines: The past and future of ocean fisheries*. New York: Island Press.

Kirch, P. 2005. Archaeology and global change: The Holocene record. *Annual Review of Environmental Resources* 30: 409–440.

Kirch, P.V., and T.L. Hunt, eds. 1997. *Historical ecology in the Pacific Islands: Prehistoric environmental and landscape change*. New Haven: Yale University Press.

McKechnie, I., D. Lepofsky, M.L. Moss, V.L. Butler, T.J. Orchard, G. Coupland, F. Foster, M. Caldwell, and K. Lertzman. 2014. Archaeological data provide alternative hypotheses on Pacific herring (*Clupea*

H

pallasii) distribution, abundance, and variability. *Proceedings of the National Academy of Sciences USA* 111 (9): E807–E816.
Reitz, E. 2004. "Fishing down the food web": A case study from St. Augustine, Florida, USA. *American Antiquity* 69: 63–83.
Rick, T., and J. Erlandson, eds. 2008. *Human impacts on ancient marine ecosystems: A global perspective*. Berkeley: University of California Press.
Rick, T., and J. Erlandson. 2009. Coastal exploitation. *Science* 325: 953–954.

Human Migration: Bioarchaeological Approaches

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Introduction

Migration is one of oldest and most widespread characteristics of humanity and identifying it in the past is one of the most critical questions that archaeologists address. Migration affects nearly every aspect of life, from the availability of sufficient land, food, or marriage partners, to the spread of deadly diseases. Archaeologists traditionally recognize ancient societies using material objects, which is problematic for research on migration. When does a change in material culture represent an influx of new people into a region, and when is it only trade or new ideas? The most critical changes in human history, like the transition from hunting and gathering to farming, hinge on this question. Significant advances in answering some of the most important questions in human history have come from a renewed interest in studying migration and development of new methods using bone chemistry and DNA (cf. Hakenbeck 2008).

Bioarchaeological methods are an important part of research on human mobility and provide a unique set of data that are otherwise not available. For example, analysis of seasonal and geographic movement of livestock at large urban centers can provide information on a society's perception of its environment, economy, and social organization. The precise "origin" of the animals matters less than how patterns might differ between house compounds, quarters of the city, and so-called market areas. The questions archaeologists ask about ancient mobility are diverse, and the number of scientific approaches they are using continues to grow (e.g., Cabana and Clark 2011; Cucina 2014; van Dommelen 2014; Kaiser et al. 2012). This entry focuses on the use of DNA, isotopic and elemental analyses, and osteological approaches to understanding ancient mobility.

Definitions

The term "bioarchaeology" is not limited to human skeletal remains, but can refer to all fauna recovered from an archaeological site. A bioarchaeological approach implies a suite of anthropological research questions and is not limited to a specific analytical technique. In North America, bioarchaeology is a multidisciplinary research strategy that focuses on human remains to reconstruct life histories and population structure (Buikstra and Beck 2006; Buikstra 1977; Larsen 2002). However, human skeletal remains do not represent the full range of materials archaeologists are using globally to investigate migration in past societies. Analyses may also include population genetics of modern peoples and archaeological fauna as proxies for human mobility.

What *is* migration and how do archaeologists attempt to identify it? Archaeologists have traditionally focused on one-way, long distance movements where one group colonizes a new area, whether uninhabited or by displacement of earlier inhabitants (e.g., Rouse 1986). Human mobility is far more complex, however, and this limited perspective excludes most types of population movement throughout history (Anthony 1990). Individuals or groups may change residence

seasonally to herd livestock. Or individuals may relocate multiple times during their lives, either within a political entity or across a regional or national boundary. Relocation may also be involuntary, as in the case of the slave trade (see contributions in Chapman and Hamerow 1997). Migration includes each of these types of movement, as neither the distance nor the reason for the move form critical parts of the definition.

Historical Background

Diffusionism provided the initial framework that archaeologists used to explain cultural evolution. During the late nineteenth and early twentieth centuries, scholars used migration to explain social change by making a direct connection between changes in artifact styles and ethnically distinct people (Trigger 2006). At the same time, studies of human skeletal variability relied on racial typologies, with migration and admixture figuring prominently in the influential work of Hrdlička and Hooton (Cook 2006; Armelagos and van Gerven 2003).

During the 1960s, the theoretical and methodological shift of processual archaeology seriously challenged the role of migration (and invasion) as an explanation for past sociocultural change (Binford 1968) and decoupled the simplistic link between artifacts and people (Washburn 1953). The emergence of a biocultural approach to analysis of human skeletal remains reflected these trends, explicitly incorporating population movement and relatedness (Buikstra 1977). But processual archaeology marginalized migration as an explanatory framework (Adams et al. 1978), and it only re-emerged in the 1980s (Binford 1980; Anthony 1990). Useful surveys of migration in archaeological explanation and the emergence of the bioarchaeological approach are found in Trigger (2006), Härke (1998), and contributions to Chapman and Hamerow (1997).

Research focuses not only on reconstructing patterns of population movement, but on how mobility articulates with social organization and identity (e.g., Knudson and Stojanowski 2009). Archaeological analyses used to reconstruct human mobility fall into three general categories (Table 1). None of these techniques provide simple "answers" about mobility or relationships between past peoples because each method incorporates assumptions that may result in more than one possible explanation. Archaeologists cannot

Human Migration: Bioarchaeological Approaches, Table 1 Types of analysis used to infer migration in bioarchaeology

Category	Techniques	Evidence for mobility
Osteological	• Biodistance – Cranial (including dental) and postcranial metric and nonmetric systematic variation	• Genetic relationships • Regional variation in cranial or dental modification/decoration
Biogeochemical	• Isotope ratios – Strontium ($^{87}Sr/^{86}Sr$) – Oxygen ($\delta^{18}O$) – Lead (^{204}Pb, ^{206}Pb, ^{207}Pb, and ^{208}Pb) – Sulfur ($\delta^{34}S$) – Carbon ($\delta^{13}C$) – Nitrogen ($\delta^{15}N$) • Trace element ratios – Sr/Ca, Ba/Ca	• Isotope values vary in water, rocks, and soils of different regions. Isotope ratios of Sr, O, Pb, and S track mobility. • Diets may vary regionally, and ratios of C, N, and S reflect different plants and proteins in the diet that may reveal migration. Ratios of elements may vary by region.
Genetic	• Mitochondrial (mtDNA) or nuclear (nDNA) sequences • Polymorphisms in biomolecules other than DNA • ABO blood groups, Rh and HLA antigens • DNA of pathogens	• Identifying haplogroups and historic individuals using ancient DNA (aDNA) • Emergence of new alleles, e.g., lactase persistence (Myles et al. 2005) • The movement of diseases can track movements of people

address mobility in the same ways that modern anthropologists, demographers, and geographers can. Therefore, multiple lines of evidence are fundamental to understanding past human mobility.

Osteological approaches are characterized by macroscopic examination of archaeological human remains (cf. Katzenberg and Saunders 2008) that assess biological and genetic distance among individuals and populations. So-called biodistance distance studies are based on assessment of skeletal metric and/or nonmetric traits. Although current research emphasizes population genetics-based perspectives (Konigsberg 2006; Heathcote 1978), there is some concern that typological (i.e., essentially "racial") approaches persist (Armelagos and van Gerven 2003, but see Stojanowski and Buikstra 2004). Mobility is inferred by deviations from regional variation and has been used to consider gender-specific postmarital residence patterns as well as regional gene flow and interaction (Konigsberg 2006).

Biogeochemical approaches to mobility (e.g., Bentley 2006) take advantage of differences in isotopic signatures in human tissues that reflect systematic environmental variability (Hoefs 2009; Faure and Mensing 2005). Trace element ratios, specifically strontium and barium, also are used to evaluate mobility (Burton et al. 2003). Early analysis of isotopes in archaeological material focused on paleoclimate and dietary reconstruction (e.g., Lee-Thorp 2008; Schoeninger et al. 2000). After Ericson (1985) suggested that strontium isotope ratios ($^{87}Sr/^{86}Sr$) could be used to examine past human residence patterns, it has become one of the most common archaeological biogeochemical techniques. Oxygen isotopes ($\delta^{18}O$), from skeletal carbonate or phosphate, have been also used extensively by archaeologists to identify prehistoric mobility (e.g., Evans et al. 2006). Other isotope systems such as hydrogen, lead, and sulfur also are used to identify migration (e.g., Sharp et al. 2003; Sharpe et al. 2016; Dupras and Schwarcz 2001; Carlson 1996) and multi-isotope applications are becoming increasingly common. Biogeochemical analysis has also been used with archaeozoological material to investigate mobility of pastoralists, as well as strategies used by hunter-gatherers (e.g., Evans et al. 2006; Bocherens et al. 2001; Balasse et al. 2002; Britton et al. 2011).

Genetic techniques were introduced to anthropology in the 1960s (Sarich and Wright 1967), who estimated a last common ancestor between humans and extant primates at just 5 million years ago, shockingly recent according to views at the time. Molecular archaeology emerged as a subdiscipline later, when Cavalli-Sforza et al. (1994) investigated variation in discrete biological factors. For example, allele frequencies such as ABO blood types were visualized geographically. The advent of DNA sequencing and the measurement of mutation rates allowed researchers to add divergence times between populations to this analysis. Cann et al. (1987) used differences in mitochondrial DNA (mtDNA) to suggest an African origin for modern humans c. 100kya. Improvements in technology allow researchers to focus on genetic diversity in modern populations around the globe (Renfrew and Boyle 2000; Cavalli-Sforza et al. 1994; Relethford 1998; Bellwood and Renfrew 2002) and to recover ancient DNA (O'Rourke et al. 2000). A significant milestone was achieved with a draft Neandertal genome (Green et al. 2010), followed by the mapping of many more complete ancient genetic sequences and mutations using smaller amounts of older, more fragmentary aDNA. Improvements to DNA sequencing have been extraordinarily fast, yet the techniques remain time consuming and expensive (Horsburgh 2015). Still, genomic databases continue to grow, as do theoretical limits on how far back aDNA can be recovered. Equally important, diverse ways to use DNA include tracking human migrations via their animals (Larson 2017). Most recently, aDNA of different body tissues such as dental calculus and the commensal bacteria in them adds to the growing body of archaeogenetic information on population differences. Finally, aDNA of pathogens in human tooth and bones is revealing how diseases spread with people around the world.

Using Bioarchaeological Techniques to Reconstruct Migration

Archaeologists attempt to situate evidence of past mobility within a larger contextual framework, but the nature and scale of major research questions varies considerably. At the broadest level are questions concerned with transformational dispersals in human history – from hominins leaving Africa to the spread of agriculture – that frequently utilize genetic analysis to reveal the structure of past human migration and interaction (Underhill and Kivisild 2007). Conversely, the most specific seek to understand how mobility articulates with local or regional social processes of economy, identity, and ritual. Research at this scale involves direct analysis of archaeological skeletal remains and may focus on the life histories of specific individuals. Biogeochemical data at this level only pertain to the period of formation of the sampled skeletal tissue (i.e., period of tooth formation). Table 2 outlines some recent applications of bioarchaeological methods to identify different types of mobility; it is by no means comprehensive but provides some examples of current research.

Bioarchaeological approaches to migration are currently limited by a number of factors. First, most biodistance studies compare morphological traits; however, similarities may result from the environment as well as shared genes. Incomplete skeletal remains also require estimation of missing data and may greatly reduce the sample size, a common problem in archaeological studies. Second, isotope variability does not necessarily correspond to cultural regions, and neighboring and distant regions may display similar ranges. Discussion about the best method to differentiate "local" from "nonlocal" individuals (cf. Price et al. 2002; Burton and Hahn 2016) ranges from statistical methods to complex equations used to map "isoscapes," or the extent of a range of isotope values (Bowen 2010; Wunder 2010). An issue affecting both biogeochemical and genetic analysis is diagenetic alteration in archaeological materials. Increasingly researchers prefer to obtain samples from teeth, as they are less susceptible to alteration in the burial environment (e.g., Trickett et al. 2003). Critiques of early studies involving aDNA also noted the possibility that the results included modern DNA, but next generation sequencing has transformed the field (Hofreiter et al. 2015).

Most studies now combine multiple lines of evidence focused on different aspects of population movement that reveal new and interesting information about topics as diverse as the slave trade, life as a gladiator, or even the mobility of extinct species human ancestors such as Neandertals. One example comes from intensive research on a Neolithic mummy in central Europe using a combination of bioarchaeological techniques to reconstruct the life history of a single individual.

Case Study: The Tyrolean Ice Man

In 1991, hikers discovered a 5200-year-old frozen mummy in the Ötzal Alps. But who was "Ötzi" and where did he come from? The artifacts provided a glimpse into his Copper Age origins, but scientists used isotopic, osteological, and genetic methods to identify Ötzi's homeland and to understand how he lived and how he died.

Where did Ötzi live? Strontium, lead, and oxygen isotope values in his bones and teeth show that he probably spent most of his life less than 60 km from his place of death (Müller et al. 2003). Analyses of his last meals, sampled from his intestinal tract, show that he traveled from lower elevations shortly before he died. Healed rib fractures and skeletal pathologies show that his lifestyle was active, and at times, dangerous (Zur Nedden et al. 1994). It is possible that tattoos on his legs, back, and hands were not simply decoration (Fig. 1), but evidence of therapeutic treatment for his arthritis and other ailments (Renault 2004) and recent high-tech mapping revealed 61 tattoos and their precise placements (Samadelli et al. 2015). Genetic analysis of Ötzi gut bacteria revealed one species that can lead to ulcers or even stomach cancer (Maixner et al. 2016). Sequences of mtDNA even revealed the types of fur used in Ötzi's clothes (cattle, sheep, and goat),

Human Migration: Bioarchaeological Approaches, Table 2 Selected recent bioarchaeological research on migration and mobility

Archaeological questions	Region/locality	Bioarchaeological techniques	References
Dispersal of modern humans	Eurasia	• mtDNA and Y-chromosome • aDNA (nuclear)	(Relethford 1998; Renfrew and Boyle 2000; Weaver and Roseman 2008; Green et al. 2010)
Spread of agriculture	Global	• mtDNA and Y-chromosomes • "classical" genetic markers • $^{87}Sr/^{86}Sr$, $\delta^{18}O$ • Craniometric analysis	(Richards 2003; Bellwood and Renfrew 2002; Ammerman and Cavalli-Sforza 1984; Burger et al. 2007; Haak et al. 2008; Pinhasi and von Cramon-Taubadel 2009)
Peopling of the Americas	East Asia Americas	• Craniometrics • Dental analysis • "Classic" genetic markers • mtDNA & Y-chromosomes	(Pitblado 2011; Schurr 2004)
Pastoral mobility	Eurasia	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$ • $\delta^{13}C$	(Bocherens et al. 2001; Balasse et al. 2002; Meiggs 2009)
Lifetime mobility	Eastern Mediterranean	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$	(Mitchell and Millard 2009)
	Imperial Rome		(Killgrove and Montgomery 2016; Lösch et al. 2014; Prowse et al. 2007)
	Bronze age Britain		(Evans et al. 2006)
	Mesoamerica – Maya heartland – Central Mexico	• $^{87}Sr/^{86}Sr$, $\delta^{18}O$, $\delta^{34}S$ • Biodistance analysis	(White et al. 1998; Price et al. 2000; Scherer 2007; Freiwald 2011; Cucina et al. 2017; Scherer and Wright 2015)
Slave trade	Yucatan Barbados South Africa	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$	(Mbeki et al. 2017; Price et al. 2006; Schroeder 2009)
Sacrificial burial	Mesoamerica South America	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$	(White et al. 2007; Knudson et al. 2009)
Kinship, postmarital population movement	Neolithic Europe Thailand US southwest	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$ • aDNA	(Bentley et al. 2007; Haak et al. 2008; Ezzo et al. 1997)
Identity and social hierarchy	Japan South America	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$ • dental ablation	(Kusaka et al. 2009; Knudson et al. 2017; Turner et al. 2009)
Disease transmission	New and old world "plagues"	• aDNA of humans and pathogens	(Wagner et al. 2014; Vågene et al. 2018)

and his hat and quiver (bear and roe deer) (O'Sullivan et al. 2016).

Who was he? An initial study of Ötzi's paternal genetic heritage linked him to modern populations in the Tyrolean Alps. Later studies tell us that he was blood group O, lactose intolerant, and susceptible to cardiovascular diseases, and most important to our understanding of migration patterns, that genetic heritage links him to modern populations. However, his maternal lineage is not found in later Neolithic or modern populations, revealing previously undiscovered ancient migration and demographic patterns (Coia et al. 2016).

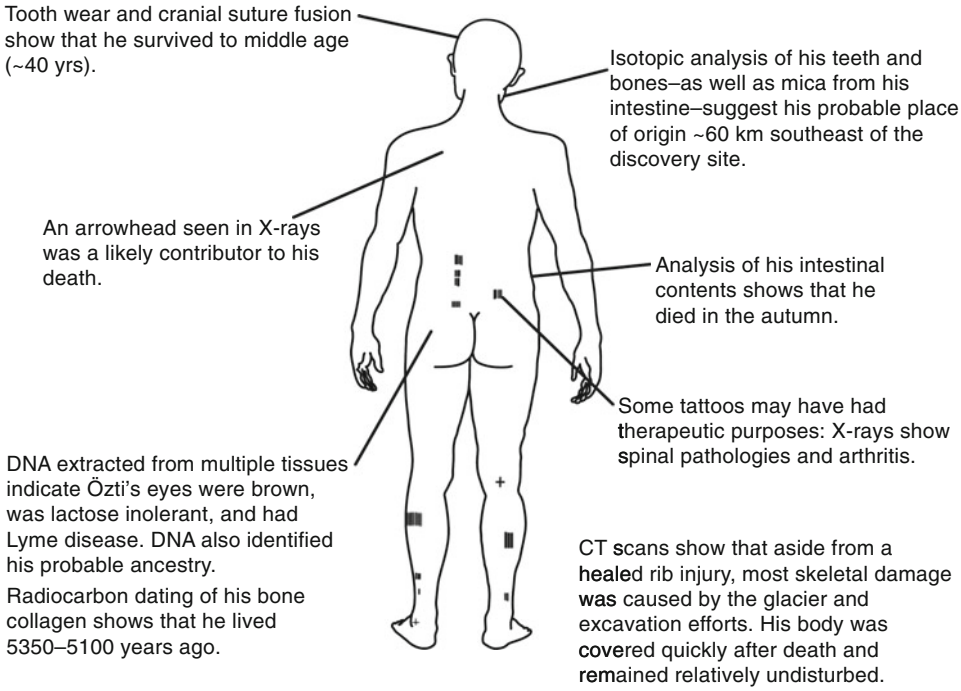

Human Migration: Bioarchaeological Approaches, Fig. 1 Bioarchaeological techniques used to reconstruct Ötzi's life history. (Adapted from Renault 2004)

Was Ötzi a migrant? Ötzi was not far from his place of birth when he died, and the circumstances of his death have prompted speculation that he was fleeing his home. He was wounded in multiple places in the days before his death, including his right hand, but most likely died from blunt force trauma and an arrow wound in his back that appears to have severed an artery (Nerlich et al. 2009).

Another example comes from the life and migration history of the Maya king K'inich Yax K'uk' Mo′ from the Classic period site of Copan in modern day Honduras. Bioarchaeological, isotopic, textual, and archaeological data suggest that he moved multiple times during his life and that his nonlocal origin was an important factor in his role as ruler. Other migrants have been identified at Copan, Tikal, and nearly every Maya site that has been studied to date (Cucina (ed) 2014), which allows researchers to place this study in a broader regional context and to suggest that migration was a common phenomenon in the Maya lowlands (Freiwald 2011).

The 2012 discovery of the grave of King Richard III in England provides the most recent example. His identity was confirmed by osteological analysis of his ailments, including severe scoliosis, and injuries consistent with a death on the battlefield. Recovery of aDNA provided his likely hair and eye color; his mtDNA matched that of a living relative, though his Y-chromosome haplotypes surprisingly ruled out matches with patrilineal family descendants. Isotope geochemistry results, including radiocarbon dating, were compared to historic texts to reveal when and where he lived, and even what he ate and drank (King et al. 2014).

Future Directions

Bioarchaeologists are expanding their collaborations with specialists at the cutting edge of research, from identifying historic individuals to the diseases that affected them. Providing

open-access availability to 3D scans of the skeletal remains for use in printing models of rare *Homo naledi* hominin bones, along with detailed publications and a documentary film, was a leap forward expanding the accessibility to bioarchaeological data. Other researchers followed with "print-your-own" Lucy (*A. afarensis*) skeletal remains. Libraries of printable bone models will make bioarchaeological materials widely available for comparison, although broad discussion about the ethics of what *can* be printed versus what *should* be printed is needed.

Investigation of other isotopes in skeletal material such as calcium or copper may provide new proxies for mobility (Jaouen and Pons 2017), and the use of isotopes other than Sr and O such as sulfur and lead to reconstruct population movement in different geographic regions is providing more baseline data for researchers (e.g., sulfur, Richards et al. 2001; Vika 2009). Predictive models developed for modern forensic studies aimed at finding the points of origin for migrants, missing persons, or genocides, and other conflicts also will prove crucial to archaeological studies of migration in coming years (Bartelink et al. 2014).

Advances in aDNA analysis will prove particularly relevant to understanding not only paleomigration, but its effects on both ancient and modern populations. Identifying pandemic diseases such as influenza and endemic ones such as tuberculosis help to reconstruct demographic histories and understand how the disease and our own immune systems have evolved over time (e.g., Wagner et al. 2014). Isotopic information bears on health matters as well, including studies of ancient lead (Budd et al. 1998). There also is an increasing recognition that no method is atheoretical and that any bioarchaeological data are embedded in questions that orient a particular research project. Ultimately, even the most advanced techniques are limited by the nature of the archaeological record, but the ability of archaeologists to identify past mobility and place it within a larger social context is stronger than ever.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Anthropological Genetics
- ▶ Archaeology as Anthropology
- ▶ Bioarchaeology in the Roman Empire
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone: Chemical Analysis
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Isotope Geochemistry in Archaeology
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Peopling of the Americas
- ▶ Provenance Studies in Archaeology

References

Adams, W.Y., D.P. Van Gerven, and R.S. Levy. 1978. The retreat from migrationism. *Annual Review of Anthropology* 7: 483–532.

Ammerman, A.J., and L.L. Cavalli-Sforza. 1984. *The Neolithic transition and the genetics of populations in Europe*. Princeton: Princeton University Press.

Anthony, D.W. 1990. Migration in archaeology: The baby and the bathwater. *American Anthropologist* 92: 895–914.

Armelagos, G.J., and D.P. van Gerven. 2003. A century of skeletal biology and paleopathology: Contrasts, contradictions, and conflicts. *American Anthropologist* 105: 53–64.

Balasse, M., S.H. Ambrose, A. Smith, and T.D. Price. 2002. The seasonal mobility model for prehistoric herders in the southwestern cape of South Africa assessed by isotopic analysis of sheep tooth enamel. *Journal of Archeological Science* 29: 917–932.

Bartelink, E.J., G.E. Berg, M.M. Beasley, and L.A. Chesson. 2014. Application of stable isotope forensics for predicting region of origin of human remains from past wars and conflicts. *Annals Anthropol Prac* 38 (1): 124–136.

Bellwood, P., and C. Renfrew, eds. 2002. *Examining the farming/language dispersal hypothesis*, Mcdonald institute monographs. Cambridge: McDonald Institute for Archaeological Research.

Bentley, R.A. 2006. Strontium isotopes from the earth to the archaeological skeleton: A review. *JAMT* 13: 135–187.

Bentley, R.A., N. Tayles, C. Higham, C. MacPherson, and T.C. Atkinson. 2007. Shifting gender relations at Khok Phanom Di, Thailand: Isotopic evidence from the skeletons. *Current Anthropology* 48: 301–314.

Binford, L.R. 1968. Some comments on historical versus processual archaeology. *Southwestern Journal of Anthropology* 24: 267–275.

Binford, L.R. 1980. Willow smoke and dogs' tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45: 4–20.

Bocherens, H., M. Mashkour, D. Billiou, E. Pelle, and A. Mariotti. 2001. A new approach for studying prehistoric herd management in arid areas: Intra-tooth isotopic analyses of archaeological caprines from Iran. *Earth and Planetary Science* 332: 67–74.

Bowen, G.J. 2010. Isoscapes: Spatial pattern in isotopic biogeochemistry. *Annual Review of Earth and Planetary Sciences* 38: 161–187.

Britton, K., V. Grimes, L. Niven, T.E. Steele, S. McPherron, M. Soressi, T.E. Kelly, J. Jaubert, J.J. Hublin, and M.P. Richards. 2011. Strontium isotope evidence for migration in late Pleistocene rangifer: Implications for Neanderthal hunting strategies at the middle Palaeolithic site of Jonzac, France. *Journal of Human Evolution* 61: 176–185.

Budd, P., J. Montgomery, A. Cox, P. Krause, B. Barreiro, and R.G. Thomas. 1998. The distribution of lead within ancient and modern human teeth: Implications for long-term and historical exposure monitoring. *Science of the Total Environment* 220 (2–3): 121–136.

Buikstra, J.E. 1977. Biocultural dimensions of archaeological study: A regional perspective. In *Biocultural adaptation in prehistoric America*, ed. R.L. Blakely, 67–84. Athens: The University of Georgia Press.

Buikstra, J.E., and L.A. Beck, eds. 2006. *Bioarchaeology: The contextual analysis of human remains*. Amsterdam: Academic Press.

Burger, J., M. Kircher, B. Bramanti, W. Haak, and M.G. Thomas. 2007. Absence of the lactase-persistence-associated allele in early Neolithic Europeans. *Proceeding of the National Academy of Science* 104: 3736–3741.

Burton, J.H., and R. Hahn. 2016. Assessing the "local" $^{87}Sr/^{86}Sr$ ratio for humans. In *Isotopic landscapes in bioarchaeology*, ed. G. Grupe and G.C. McGlynn, 113–121. Berlin: Springer.

Burton, J.H., T.D. Price, L. Cahue, and L.E. Wright. 2003. The use of barium and strontium abundances in human skeletal tissues to determine their geographic origins. *International Journal of Osteoarchaeology* 13: 88–95.

Cabana, G.S., and J.J. Clark, eds. 2011. *Rethinking anthropological perspectives on migration*. Gainesville: University Press of Florida.

Cann, R.L., M. Stoneking, and A.C. Wilson. 1987. Mitochondrial DNA and human evolution. *Nature* 325: 31–36.

Carlson, A.K. 1996. Lead isotope analysis of human bone for addressing cultural affinity: A case study from Rocky Mountain house, Alberta. *Journal of Archaeological Science* 23: 557–567.

Cavalli-Sforza, L.L., P. Menozzi, and A. Piazza. 1994. *The history and geography of human genes*. Princeton: Princeton University Press.

Chapman, J., and H. Hamerow, eds. 1997. *Migrations and invasions in archaeological explanation*, BAR international series. Vol. 664. Oxford: Archaeopress.

Coia, V., G. Cipollini, P. Anagnostou, F. Maixner, C. Battaggia, F. Brisighelli, A. Gómez-Carballa, G.D. Bisol, A. Salas, and A. Zink. 2016. Whole mitochondrial DNA sequencing in Alpine populations and the genetic history of the Neolithic Tyrolean iceman. *Scientific Reports* 6: 18932.

Cook, D.C. 2006. The old physical anthropology and the new world: A look at the accomplishments of an antiquated paradigm. In *Bioarchaeology: The contextual analysis of human remains*, ed. J.E. Buikstra and L.A. Beck, 27–71. Amsterdam: Academic Press.

Cucina, A., ed. 2014. *Archaeology and bioarchaeology of population movement among the Prehispanic Maya*. Cham: Springer New York.

Cucina, A., H. Edgar, and C. C Ragsdale. 2017. Oaxaca and its neighbors in Prehispanic times: Population movements from the perspective of dental morphological traits. *Journal of Archaeological Science: Reports* 13: 751–758.

Dupras, T.L., and H.P. Schwarcz. 2001. Strangers in a strange land: Stable isotope evidence for human migration in the Dakhleh Oasis, Egypt. *Journal of Archaeological Science* 28: 1199–1208.

Ericson, J.E. 1985. Strontium isotope characterization in the study of prehistoric human ecology. *Journal of Human Evolution* 14: 503–511.

Evans, J.A., C.A. Chenery, and A.P. Fitzpatrick. 2006. Bronze age childhood migration of individuals near Stonehenge, revealed by strontium and oxygen isotope tooth enamel analysis. *Archaeometry* 48: 309–321.

Ezzo, J.A., C.M. Johnson, and T.D. Price. 1997. Analytical perspectives on prehistoric migration: A case study from East-Central Arizona. *Journal of Archaeological Science* 24: 447–466.

Faure, G., and T.M. Mensing. 2005. *Isotopes: Principles and applications*. 3rd ed. Hoboken: Wiley.

Freiwald, C. 2011. Maya migration networks: Reconstructing population movement in the Belize River Valley during the Late and Terminal Classic. University of Wisconsin-Madison, Anthropology, Ph.D. Thesis.

Green, R.E., J. Krause, A.W. Briggs, T. Maricic, U. Stenzel, M. Kircher, N. Patterson, H. Li, W. Zhai, M.H.Y. Fritz, and N.F. Hansen. 2010. A draft sequence of the Neandertal genome. *Science* 328: 710–722.

Haak, W., G. Brandt, H.N. de Jong, et al. 2008. Ancient DNA, strontium isotopes, and osteological analyses shed light on social and kinship organization of the

H

later stone age. *Proceedings National Academy Science* 105: 18226–18231.

Hakenbeck, S. 2008. Migration in archaeology: Are we nearly there yet? *Archaeological Review Cambridge* 23 (2): 9–26.

Härke, H. 1998. Archaeologists and migrations: A problem of attitude? *Current Anthropology* 39: 19–45.

Heathcote, G.M. 1978. Problems in interpreting migrations through osteometry. In *Diffusion and migration: Their roles in cultural development*, ed. P.G. Duke, J. Ebert, G. Langemann, and A.P. Buchner, 45–54. Calgary: Archaeological Association, University of Calgary.

Hoefs, J. 2009. *Stable isotope geochemistry*. 6th ed. Berlin: Springer.

Hofreiter, M., J.L. Paijmans, H. Goodchild, C.F. Speller, A. Barlow, G.G. Fortes, J.A. Thomas, A. Ludwig, and M.J. Collins. 2015. The future of ancient DNA: Technical advances and conceptual shifts. *BioEssays* 37 (3): 284–293.

Horsburgh, K.A. 2015. Molecular anthropology: The judicial use of genetic data in archaeology. *Journal of Archaeological Science* 56: 141–145.

Jaouen, K., and M.L. Pons. 2017. Potential of non-traditional isotope studies for bioarchaeology. *Archaeological and Anthropological Sciences* 9 (7): 1389–1404.

Kaiser, E., J. Burger, and W. Schier, eds. 2012. *Population dynamics in prehistory and early history: New approaches using stable isotopes and genetics 5*. Berlin: Walter de Gruyter.

Katzenberg, M.A., and S.R. Saunders, eds. 2008. *Biological anthropology of the human skeleton*. 2nd ed. Hoboken: Wiley.

Killgrove, K., and J. Montgomery. 2016. All roads lead to Rome: Exploring human migration to the eternal city through biochemistry of skeletons from two imperial-era cemeteries (1st-3rd c AD). *PLoS One* 11 (2): e0147585.

King, T.E., G.G. Fortes, P. Balaresque, M.G. Thomas, D. Balding, P.M. Delser, R. Neumann, M. Knapp Parson, S. Walsh, and L. Tonasso. 2014. Identification of the remains of king Richard III. *Nature Communications* 5: 5631.

Knudson, K.J., and C.M. Stojanowski. 2008. New directions in bioarchaeology: Recent contributions to the study of human social identities. *Journal of Archaeological Research* 16: 397–432.

Knudson, K.J., and C.M. Stojanowski, eds. 2009. *Bioarchaeology and identity in the Americas*. Gainesville: University Press of Florida.

Knudson, K.J., S.R. Williams, R. Osborn, et al. 2009. The geographic origins of Nasca trophy heads using strontium, oxygen, and carbon isotope data. *Journal of Anthroplogical Archaeology* 28: 244–257.

Knudson, K.J., M. Giersz, W. Więckowski, and W. Tomczyk. 2017. Reconstructing the lives of Wari elites: Paleomobility and paleodiet at the archaeological site of Castillo de Huarmey, Peru. *Journal Archaeological Science: Reports* 13: 249–264.

Konigsberg, L.W. (2006). A Post-Neumann History of Biological and Genetic Distance Studies in Bioarchaeology. Bioarchaeology: the contextual analysis of human remains. J.E. Buikstra and L.A. Beck. Amsterdam, Academic Press: 263–279.

Kusaka, S., A. Ando, T. Nakano, et al. 2009. A strontium isotope analysis on the relationship between ritual tooth ablation and migration among the jomon people in Japan. *Journal of Archaeological Science* 36: 2289–2297.

Larsen, C.S. 2002. Bioarchaeology: The lives and lifestyles of past people. *Journal of Archaeological Research* 10: 119–166.

Larson, G. 2017. Reconstructing migration trajectories using ancient DNA. In *Human dispersal and species movement: From prehistory to the present*, ed. N. Boivin, R. Crassard, and M. Petraglia, 237–260. Cambridge University Press.

Lee-Thorp, J.A. 2008. On isotopes and old bones. *Archaeometry* 50: 925–950.

Lösch, S., N. Moghaddam, K. Grossschmidt, D.U. Risser, and F. Kanz. 2014. Stable isotope and trace element studies on gladiators and contemporary Romans from Ephesus (Turkey, 2nd and 3rd Ct. AD): Implications for differences in diet. *PLoS One* 9 (10): e110489.

Maixner, F., B. Krause-Kyora, D. Turaev, A. Herbig, M.R. Hoopmann, J.L. Hallows, U. Kusebauch, E.E. Vigl, P. Malfertheiner, F. Megraud, and N. O'Sullivan. 2016. The 5300-year-old helicobacter pylori genome of the iceman. *Science* 351 (6269): 162–165.

Mbeki, L., L.M. Kootker, H. Kars, and G.R. Davies. 2017. Sickly slaves, soldiers and sailors. Contextualising the Cape's 18th–19th century green point burials through isotope investigation. *Journal Archaeological Science: Reports* 11: 480–490.

Meiggs, DC. 2009. Investigation of neolithic herding practices by multiple isotope analysis: A case study at PPNB Gritille, southeastern Turkey. University of Wisconsin-Madison, Anthropology, Ph.D. Thesis.

Mitchell, P.D., and A.R. Millard. 2009. Migration to the medieval middle east with the crusades. *American Journal of Physical Anthropology* 140: 518–525.

Müller, W., H. Fricke, A.N. Halliday, M.T. McCullough, and J. Wartho. 2003. Origin and migration of the Alpine Iceman. *Science* 302 (5646): 862–866.

Myles, S., N. Bouzekri, E. Haverfield, et al. 2005. Genetic evidence in support of a shared Eurasian-north African dairying origin. *Human Genetics* 117: 34–42.

Nerlich, A.G., O. Peschel, and E. Egarter-Vigl. 2009. New evidence for Ötzi's final trauma. *Intensive Care Medicine* 35 (6): 1138–1139.

O'Rourke, D., M.G. Hayes, and S. Carlyle. 2000. Ancient DNA studies in physical anthropology. *Annual Review of Anthropology* 29 (1): 217–242.

O'Sullivan, N.J., M.D. Teasdale, V. Mattiangeli, F. Maixner, R. Pinhasi, D.G. Bradley, and A. Zink. 2016. A whole mitochondria analysis of the Tyrolean Iceman's leather provides insights into the animal

sources of copper age clothing. *Scientific Reports* 6: 31279. https://doi.org/10.1038/srep31279.

Pinhasi, R., and N. von Cramon-Taubadel. 2009. Craniometric data supports demic diffusion model for the spread of agriculture into Europe. *PLoS One* 4: e6747.

Pitblado, B.L. 2011. A tale of two migrations: Reconciling recent biological and archaeological evidence for the Pleistocene peopling of the Americas. *Journal of Archaeological Research* 19 (4): 327–375.

Price, T.D., J.H. Burton, and R.A. Bentley. 2002. The characterization of biologically available strontium isotope ratios for the study of prehistoric migration. *Archaeometry* 44: 117–135.

Price, T.D., V. Tiesler, and J.H. Burton. 2006. Early African diaspora in colonial Campeche, Mexico: strontium isotopic evidence. *American Journal of Physical Anthropology* 130 (4): 485–490.

Price, T.D., L. Manzanilla, and W.D. Middleton. 2000. Immigration and the ancient city of Teotihuacan in Mexico: a study using strontium isotope ratios in human bone and teeth. *Journal of Archaeological Science* 27 (10): 903–913.

Prowse, T.L., H.P. Schwarcz, P. Garnsey, et al. 2007. Isotopic evidence for age-related immigration to imperial Rome. *American Journal of Physical Anthropology* 132: 510–519.

Relethford, J.H. 1998. Genetics of modern human origins and diversity. *Annual Review of Anthropology* 27: 1–23.

Renault, L. 2004. Las tatuages d'Otzi et la petite chirgurie traditionelle. *L'Anthropologie* 108: 69–105.

Renfrew, C., and K.V. Boyle, eds. 2000. *Archaeogenetics: DNA and the population prehistory of Europe. Mcdonald institute monographs*. Cambridge: McDonald Institute for Archaeological Research.

Richards, M. 2003. The Neolithic invasion of Europe. *Annual Review of Anthropology* 32: 135–162.

Richards, M.P., B.T. Fuller, and R.E.M. Hedges. 2001. Sulfur isotopic variation in ancient bone collagen from Europe: Implications for human palaeodiet, residence mobility, and modern pollutant studies. *Earth and Planetary Science Letters* 191: 185–190.

Rouse, I. 1986. *Migrations in prehistory: Inferring population movement from cultural remains*. New Haven: Yale University Press.

Samadelli, M., M. Melis, M. Miccoli, E.E. Vigl, and A.R. Zink. 2015. Complete mapping of the tattoos of the 5300-year-old Tyrolean iceman. *Journal of Cultural Heritage* 16 (5): 753–758.

Sarich, V.M., and A.C. Wright. 1967. Immunological time scale for hominid evolution. *Science* 158: 1200–1203.

Schroeder, H. 2009. African slavery and forced migration to Barbados: an isotopic perspective. *Azania: Archaeological Research in Africa* 44 (3): 357–358.

Scherer, A.K., and L.E. Wright. 2015. Dental morphometric and strontium isotope evidence for population history at Tikal, Guatemala. In *Archaeology and Bioarchaeology of Population movement among the Prehispanic Maya*, ed. C. Cucina, 109–118. Cham: Springer.

Scherer, A.K. 2007. Population structure of the classic period Maya. *American Journal of Physical Anthropology* 132 (3): 367–380.

Schoeninger, M.J., M.J. Kohn, and J.W. Valley. 2000. Tooth oxygen isotope ratios as paleoclimate monitors in arid ecosystems. In *Biogeochemical approaches to paleodietary analysis*, ed. S.H. Ambrose and A.-M. Katzenberg, 117–140. New York: Kluwer Academic/Plenum Publishers.

Schurr, T.G. 2004. The peopling of the new world: Perspectives from molecular anthropology. *Annual Review of Anthropology* 33: 551–583.

Sharp, Z.D., V. Atudorei, H.O. Panarello, J. Fernández, and C. Douthitt. 2003. Hydrogen isotope systematics of hair: Archeological and forensic applications. *Journal of Archaeological Science* 30 (12): 1709–1716.

Sharpe, A.E., G.D. Kamenov, A. Gilli, D.A. Hodell, K.F. Emery, M. Brenner, and J. Krigbaum. 2016. Lead (Pb) isotope baselines for studies of ancient human migration and trade in the Maya region. *PLoS One* 11 (11): e0164871.

Stojanowski, C.M., and J.E. Buikstra. 2004. Biodistance analysis, a biocultural enterprise: A rejoinder to Armelagos and Van Gerven (2003). *American Anthropologist* 106: 430–432.

Trickett, M.A., P. Budd, J. Montgomery, and J. Evans. 2003. An assessment of solubility profiling as a decomination procedure for the $^{87}Sr/^{86}Sr$ analysis of archaeological human skeletal tissue. *Applied Geochemistry* 18: 653–658.

Trigger, B.G. 2006. *A history of archaeological thought*. 2nd ed. Cambridge: Cambridge University Press.

Turner, B.L., G.D. Kamenov, J.D. Kingston, and G.J. Armelagos. 2009. Insights into immigration and social class at Machu Picchu, Peru based on oxygen, strontium, and lead isotopic analysis. *Journal of Archaeological Science* 36: 317–332.

Underhill, P.A., and T. Kivisild. 2007. Use of y chromosome and mitochrondrial DNA population structure in tracing human migrations. *Annual Review of Genetics* 41: 539–564.

Vågene, Å.J., A. Herbig, M.G. Campana, N.M.R. García, C. Warinner, S. Sabin, M.A. Spyrou, A.A. Valtueña, D. Huson, N. Tuross, and K.I. Bos. 2018. Salmonella enterica genomes from victims of a major sixteenth-century epidemic in Mexico. *Nature Ecology & Evolution* 2: 520–528.

van Dommelen, P. 2014. Moving on: Archaeological perspectives on mobility and migration. Mobility & Migration. *World Archaeology* 46 (4): 477–483.

Vika, E. 2009. Strangers in the grave? Investigating local provenance in a Greek bronze age mass burial using $d^{34}S$ analysis. *Journal of Archaeological Science* 36: 2024–2028.

Wagner, D.M., J. Klunk, M. Harbeck, A. Devault, N. Waglechner, J.W. Sahl, J. Enk, D.N. Birdsell, M. Kuch, C. Lumibao, and D. Poinar. 2014. Yersinia

H

pestis and the plague of Justinian 541–543 AD: A genomic analysis. *TheLancet, Infectious Diseases* 14 (4): 319–326.
Washburn, S.L. 1953. The new physical anthropology. *Yearbook of Physical Anthropology* 7: 124–130.
Weaver, T.D., and C.C. Roseman. 2008. New developments in the genetic evidence for modern human origins. *Evolutionary Anthropology* 17: 69–80.
White, C.D., M.W. Spence, H.L.Q. Stuart-Williams, and H.P. Schwarcz. 1998. Oxygen isotopes and the identification of geographical origins: The valley of Oaxaca versus the valley of Mexico. *Journal of Archaeological Science* 25: 643–655.
White, C.D., T.D. Price, and F.J. Longstaffe. 2007. Residential histories of the human sacrifices at the moon pyramid, Teotihuacan. *Ancient Mesoamerica* 18: 159–172.
Wunder, M.B. 2010. Using isoscapes to model probability surfaces for determining geographic origins. In *Isoscapes*, ed. M.B. Wunder, 251–270. Dordrecht: Springer.
Zur Nedden, D., K. Wicke, R. Knapp, H. Seidler, H. Wilfing, G. Weber, K. Spindler, W.A. Muprhy, G. Hauser, and W. PLatzer. 1994. New findings on the Tyrolean "ice man": Archaeological and CT-body analysis suggest personal disaster before death. *Journal of Archaeological Science* 21: 809–818.

Human Remains from Modern Conflicts, the Archaeological Study of

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Introduction

The archaeological study of human remains in modern conflict contexts is a subdiscipline of physical anthropology, which unites certain aspects of battlefield archaeology, disaster archaeology, and forensics (Cox 2005; Gould 2007; Scott et al. 2009). It centers on the recovery and analysis of human remains from armed struggles, such as battleground cemeteries, as well as remains associated with massacres, genocides, terrorist acts, prisoners of war (POW), those missing in action (MIA), and those held in internment camps.

Human remains associated with armed conflicts exist from all time periods and regions of the world (Martin et al. 2013). They are both a classical archaeological topic and one which overlaps extensively with modern forensics (Blau and Ubelaker 2011). Some of the oldest sites with human remains which fall under the umbrella of conflict remains include those excavated by traditional archaeologists such as Jebel Sahaba, Sudan (~13,000 years bp) and Nataruk, Kenya (~10,000 years bp). However, innumerable ancient and historic site types are studied within this discipline, be they the battlefield remains of standing armies such as those of the ancient Egyptians or Romans; the results of raids and localized warfare among peoples such as the Vikings or the inhabitants of Chaco Canyon, or the result of institutionalized aggression such as human sacrifice among the ancient Mesoamerican peoples (see Fiorato et al. 2007; Scott et al. 2009; Ralph 2013; Nielsen and Walker 2014).

Examples of more recent types of conflict remains include the search for the remains of the Romanov family after their deposition and murder by the Bolsheviks (1918); mass graves of citizens, prisoners, and combatants from multiple countries engaged in the World Wars; those associated with the Armenian (1915), Greek/Pontic (1914–1922), Indonesian (1965–1966), Assyrian/Seyfo (1914–1920), Serbian (1941–1945), Ukrainian/Holdomor (1932–1933), Bangladesh (1971), Cambodian/Khmer (1975–1979), Guatemalan/Mayan "Silent Holocaust" (1960–1996), Kurdish/Anfal (1986–1989), Rwandan (1994), Bosnian (1995), and ongoing Rohingya/Myanmar Genocides; groups of Mexican students kidnapped and murdered by modern drug cartels (2014); and those still missing in action from historic US military engagements (Ferllini 2007; Gould 2007; Scott et al. 2009; Gonzalez-Ruibal and Moshenka 2015; Naimark 2016).

Typical site types associated with the study of conflict remains include military cemeteries, battlefield graves, mass burial pits, isolated graves in combat zones, the sites of bombings and other large-scale acts of violence, and wreckages (Blau and Ubelaker 2011; Gonzalez-Ruibal and Moshenka 2015).

Definition

Conflict remains refer broadly to the internment sites, associated material evidence, and biological remains of human beings whose death was a result of internecine warfare or intergroup aggression (Blau and Ubelaker 2011; Dupras et al. 2011). In modern forensic archaeology contexts, these remains are particularly associated with prisoners of war and those missing in action. Violent conflict is often the result of a perceived difference between groups leading to beliefs of supremacy among the aggressor (Tropp 2012; Arendt 2014). Examples of such differences include religious belief, ethnicity, race, disability, political belief, biological sex, or social status (ibid. Martin et al. 2017).

However, violence resulting in the accumulation of conflict remains may also be derived from more practical or economic considerations (Martin et al. 2017). These include factors such as retribution for past aggression or oppression, competition for resources, access to and control of localities (such as religious or ancestral sites), the operation of criminal enterprises, and empire-building or glutting of surplus resources. A conflict may involve aggression by a powerful group against a powerless or pacifistic one. Alternately, the conflict may arise from and be perpetrated by multiple sides (Ferllini 2007; Tropp 2012; Arendt 2014; Naimark 2016). Violence may occur in dramatic, isolated episodes, or it may be more deeply ingrained within a quotidian social structure (Martin et al. 2017).

Conflict remains are unique in that they are typically studied using archaeological methods, forensic methods, or some combination of the two. They are also unusual in archaeology in that they range from very ancient to essentially modern (Blau and Ubelaker 2011; Dupras et al. 2011). The archaeological study of older conflict sites may be strictly academic, with typical archaeological aims and questions leading to research that informs the general history, culture, and lifeways of the relevant time period or event (e.g., Fiorato et al. 2007). In such research, standard archaeological method is also likely to be employed in the retrieval and study of conflict remains. Examples of more "archaeological" studies have focused on remains such as groups of shackled skeletons from Phaleron, Greece (eighth to fifth centuries BC); a mass grave of deposed royalty in the Mayan city of Cancuén (~800 AD); the Ridgeway Hill Viking burial pit in Dorset (970–1025 AD); mass graves of Aztec human sacrifices beneath Tenochtitlan (~1480 AD); burials from the Battle of Towton during the English War of the Roses (1461 AD); those from the Battle of Dunbar during the Third English Civil War (1650 AD); mass graves in Mexico City from the Aztec conquest by the Spanish (sixteenth century AD); or American Civil War Battlefields (1861–1865 AD) (Fiorato et al. 2007; Scott et al. 2009; Martin et al. 2017; Ralph 2013; Nielsen and Walker 2014).

In many instances, the study of conflict remains is a more forensic discipline, focusing on positive identification of individuals, as well as the causation and sequence of events leading to their demise (Cox 2005; Dupras et al. 2011; Christensen et al. 2014). This is often done with legal implications in mind, as the ultimate goal may be the repatriation of remains or the prosecution of war crimes (Ferllini 2007). Such excavations and analyses are conducted by forensic specialists with training in archaeological technique and physical anthropology (Dupras et al. 2011). Accordingly, although using similarly rigorous technique and documentation, such projects focus less on traditional archaeological cornerstones such as general patterns of human behavior and site formation. Instead, only the evidence which leads to the location of remains and the recognition of individuals may be prioritized (Cox 2005). This type of research and excavation may be undertaken by private contracting firms or specialist government agencies devoted to the purpose such as the United States Defense POW/MIA Accounting Agency. Typically, this type of archaeology is employed for US military personnel whose bodies have not been recovered, and the victims of terrorist acts or modern genocide, rather than for ancient sites (Gould 2007).

Historical Background

Since archaeology's inception, the archaeology of warfare and to some extent the human remains such conflicts generate have been a cornerstone of most cultural studies (Scott et al. 2009; Martin et al. 2013). War and the creation of empire was 1traditionally a popular academic theme surrounding the classical civilizations of the ancient Mesopotamians, Egyptians, Chinese, Greeks, and Romans (Carman 2013). This is due in part to the ability of archaeologists to draw on written accounts of battles from many of these cultures, such as Thermopylae and Qadesh (Ralph 2013). It is also due to a fascination with the world of the Greeks, Romans, and Egyptians among early archaeologists and the Victorian society from whence they came. At its beginnings, however, battlefield archaeology was more often a focus of historians rather than archaeologists. Human remains themselves often faded into the background, as battlefields were sometimes considered to have limited material culture (Carman 2013).

In more recent times, the archaeological study of violence, conflict, and warfare have found increasing commonalities between previously disparate subdisciplines and regions, as well as undergoing an ideological shift with increased focus on the study of human remains and considered violence from new perspectives (Martin et al. 2017; Carman 2013). Often, early studies of historic violence were part of a narrative of imperialism used to perpetuate stereotypes about savagery or primitivism in tribal cultures, whereas the large-scale military operations of empires such as the Romans, were viewed as an indicator of social sophistication (Arkush 2012). Even when encountering Meso- and South American civilizations, which were architecturally imposing and elaborate in their social strata, early archaeologists still often perceived their cultural manifestations of violence as indicators of barbarism. This is in spite of the fact that they were also elaborate, large scale, and socially complex (ibid. Nielsen and Walker 2014).

The emergence of modern physical anthropology has contributed to the current practice of conflict archaeology (Gonzalez-Ruibal and Moshenka 2015; Martin et al. 2017). The ability to study evidence of trauma to archaeological human remains has both revealed previously hidden examples of conflict, such as historical domestic violence, and supplemented formerly established narratives of large-scale conflicts with the ability contradict or confirm written sources (ibid.). This has accompanied a general shift in archaeological studies away from a selective focus on masculine activities and overarching social themes such as empire-building (Arkush 2012).

The hybridized study of conflict remains has also been bolstered by necessity: the forensic emphasis of more modern cases has leant and urgency to the discipline and increased funding which has helped to improve methodology at a faster rate than many other fields of archaeology (Cox 2005; Dupras et al. 2011; Christensen et al. 2014). Following conflicts, both ancient and modern, soldiers, governments, and families have sought to bring the remains of their loved ones home and get answers surrounding their deaths (Carman 2013; Martin et al. 2017). A notable ancient example of this type of conflict remains is the mummy of pharaoh Seqenenre Tao (~1550 BC), whose body is thought to have been were brought back to Egypt for traditional entombment, following death during battle with the Hyksos. This practice is in evidence throughout the archaeological record, often growing more urgent in instances of terrorism or genocide, in which one group is considered to be comprised of innocent bystanders (Ferllini 2007).

Following the Second World War, the American government began to devote resources to the retrieval of soldiers' remains on a large scale (Scott et al. 2009; Dupras et al. 2011). Although this was an ongoing process that began on the heels of the war, it was increasingly realized that simply exhuming remains was insufficient to lead to the positive identifications that would enable families to be reunited with the remains of their loved ones and gain closure. Although forensic experts had the tools and experience needed to identify evidence in crime

scenes, they were unaccustomed to the conditions specific to excavating what had essentially become historic burials (Cox 2005; Dupras et al. 2011; Christensen et al. 2014). Because of this, the discipline yielded a set of specialists with hybridized archaeo-forensic skills. With the advent of the terrorist bombings of September 11, and an increased national interest in forensics, the study of conflict remains became an independent profession in its own right from the last decades of the twenty-first century to the present (Gould 2007).

Key Issues/Current Debates

Because of the legal implications of forensic cases surrounding human remains from conflict contexts, many of the key issues in the field pertain to the development and refinement of methodologies for generating positive identification of individuals, and the study of skeletal indicators of traumatic injuries or pathology that can provide information about the individual's death and, if applicable, battle and/or captivity (Cox 2005; Dupras et al. 2011; Christensen et al. 2014). Despite the sometimes narrow focus of the identification of conflict remains, many of the methodologies furthered within the field have wide applications for all archaeological studies of human remains.

Since preliminary identification of individuals is paramount in forensic archaeology, studies of osteological evidence for identifying sex, ethnicity, and improved means of sourcing DNA from fragmentary or compromised remains are among the foremost concerns of the field (ibid.). Methods for observing and differentiating the metric and nonmetric traits that aid in these identifications are constantly being refined.

Improving the understanding of the interment sites and factors affecting retrieval is another focus pertinent to this goal (Cox 2005; Adams and Byrd 2014). These include taphonomic studies, such as those focusing on dispersal of remains in aircraft crashes; relative decomposition rates of remains in mass burial pits versus single interments; decomposition rates in different soil types and environments; and dispersal by fauna and other forces in instances where burial does not take place (ibid. Dupras et al. 2011; Christensen et al. 2014). Because many conflict burials include mass graves, studies focusing on the excavation techniques that preserve individual contexts and the identification of individuals from comingled contexts are another cornerstone of the discipline (Adams and Byrd 2014).

Because establishing the cause of death is desirable, studies of trauma indicators to osseous remains are another central preoccupation (Cox 2005; Dupras et al. 2011; Christensen et al. 2014). This is true of both more classical battlefield archaeology, as well as forensic contexts. Osteological evidence of blunt force, sharp force, gunshot, and loading trauma may be observed during conflict for a variety of reasons (Cox 2005; Dupras et al. 2011; Christensen et al. 2014). Differentiating between defensive injuries can help to establish whether the victim of violence was able to fight back, and if so, to what extent. In the case of more historic remains, the study of injuries resulting from melee and ranged weapons such as arrows is more common. However, in modern forensic cases, gunshot trauma increases alongside other forms of weaponry still in use. Although most ancient remains will be only osseous, soft tissue may be present in the case of human remains from historic conflicts, opening new avenues into studies of soft-tissue trauma and pathologies. The burning of remains is another taphonomic/traumatic marker which receives study in the field, as remains may be burnt during bombing, plane crashes, or intentionally after death to obscure evidence (Schmidt and Symes 2008). The study of modern conflict remains also includes the osteological study of the relatively unique trauma that is associated with explosions and other high-force impacts (Cox 2005; Dupras et al. 2011; Christensen et al. 2014).

Finally, the veracity of records is an issue which arises in both classical conflict archaeology, as well as in archaeo-forensic cases (Scott et al. 2009). In ancient military situations,

records may misrepresent an event, to make a defeat appear less crushing. Sometimes, a group suffering more losses may even falsely portray themselves as the victor. In modern forensic cases, the truth may be purposefully obscured, particularly where crimes have been committed on a large scale (Ferllini 2007). As such, a common goal of both classical and forensic archaeology involving human remains will always be to arrive at the most objective picture of the events leading to their deposition. As with all cases where human remains are concerned, the careful and respectful treatment of the remains and the associated data is necessary to mitigate the numerous ethical issues which may arise from their disturbance and study.

International Perspectives

As conflict continues in the modern world, there are few modern cultures who are not affected on some level by ongoing instances of violence. Americans are well known for their dedication to retrieving all the remains of their war dead, whereas other western cultures typically do not pursue this archaeo-forensic goal (Gould 2007). Despite this, cultures which deal with instances of genocide or terrorism generally conduct forensic recoveries on the remains, in instances when the aggression has abated to the extent that doing so becomes feasible (Ferllini 2007). In recent years, this has been common in certain eastern European; meso- and South American; and Middle Eastern countries (Martin et al. 2017). Although professionals in these settings may employ aspects of the archaeological method, their focus may be even more forensic, depending on the resources and training available to them.

Future Directions

Many large-scale recovery operations surrounding the retrieval of war dead and the victims of genocide are considered to be ongoing until a point is reached where further recovery becomes infeasible (Gould 2007). As future incidents associated with war, mass murder, and terrorism occur, new recovery efforts will continue to be necessary.

Human remains associated with traditional warfare contexts continue to be a popular area of study within classical archaeology in most regions of the world (Carman 2013). Increasingly, historical narratives surrounding violence are being reinterpreted from local and minority perspectives, whereas many themes had historically focused on western or majority imperialism, nationalism, and conquest (Arkush 2012). Future studies will likely arrive at different interpretations surrounding more recent instances of violent behaviors (Martin et al. 2017). As various groups continue to interpret the violence in their past, they may include the human remains from more recent conflicts in their archeo-forensic studies, including their POWs and MIA individuals. There is still much to be learned in terms of narratives of historical events in warfare, when conflict remains are considered in a larger archaeological framework.

The retrieval of human remains from recent conflicts becomes more difficult as time passes, necessitating an increasing archaeological focus and improved forensic methods (Cox 2005). In addition to attrition through natural forces, more recent battlefield archaeology is an arena which attracts hobbyist metal-detectors and collectors of memorabilia. In many cases, sites are located through the cooperation of aging primary witnesses. As such, public outreach and ethnographic record keeping of salvage events are an essential component of resolving future and ongoing cases.

Cross-References

- ▶ Burned Remains in Forensic Contexts
- ▶ Ethics and Human Remains
- ▶ Human Skeletal Remains: Identification of Individuals

References

Adams, Bradley, and John Byrd. 2014. *Comingled human remains*. New York: Academic.

Arendt, Hannah. 2014. *On violence*. New York: Important Books.

Arkush, E. 2012. Violence, indigeneity, and archaeological interpretation in the Central Andes. In *The ethics of anthropology and Amerindian research: Reporting on environmental degradation and warfare*, ed. Richard Chacon and Ruben Mendoza. New York: Springer.

Blau, Soren, and Douglas Ubelaker, eds. 2011. *Handbook of forensic anthropology and archaeology.* Walnut Creek: Left Coast Press.

Carman, John. 2013. *Archaeologies of conflict*. London: Bloomsbury Academic.

Christensen, Angi M., Nicholas V. Passalacqua, and Eric J. Bartelink. 2014. *Forensic anthropology: Current methods and practice*. New York: Academic.

Cox, Margaret. 2005. *Forensic archaeology: Advances in theory and practice*. New York: Routledge.

Dupras, Tosha, John J. Schultz, and Sandra M. Wheeler. 2011. *Forensic recovery of human remains: Archaeological approaches*. Boca Raton: CRC Press.

Ferllini, Roxana. 2007. *Forensic archaeology and human rights violations*. Springfield: Charles C. Thomas.

Fiorato, Veronica, Anthea Boylston, and Christopher Knusel. 2007. *Blood red roses: The archaeology of a mass grave from the Battle of Towton AD 1461*. London: Oxbow Books.

Gonzalez-Ruibal, Alfredo, and Gabriel Moshenka, eds. 2015. *Ethics and the archaeology of violence*. New York: Springer.

Gould, Richard A. 2007. *Disaster archaeology.* Salt Lake City: University of Utah Press.

Martin, Debra L., Ryan P. Harrod, and Ventura R. Perez, eds. 2017. *The bioarchaeology of violence*. Tampa: University of Florida Press.

Naimark, Norman M. 2016. *Genocide: A world history.* Oxford: Oxford Press.

Nielsen, Axel E., and William H. Walker. 2014. *Warfare in cultural context: Practice, agency, and the archaeology of violence*. Tucson: University of Arizona Press.

Ralph, Sarah, ed. 2013. *The archaeology of violence: Interdisciplinary approaches*. Binghamton: Suny Press.

Schmidt, Christopher W., and Steven A. Symes. 2008. *The analysis of burned human remains*. New York: Elsevier.

Scott, Douglas, Lawrence Babits, and Charles Haecker. 2009. *Fields of conflict: Battlefield archaeology from the Roman Empire to the Korean War*. Washington, DC: Potomac Books.

Tropp, Linda R., ed. 2012. *The Oxford handbook of intergroup conflict*. Oxford: Oxford Press.

Human Remains in Museums

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Introduction

Human remains have long been acquired for study and display in public and private museums and those of universities and learned societies worldwide. They are today to be found in a range of collections, but particularly those associated with anatomy and the medical sciences, archaeology, anthropology, ethnography, and natural history. They have also, historically, been located in phrenology museums and were subject to acquisition as curios whether within small private collections or the larger cabinets of curiosity compiled by prominent individuals and monarchs of renaissance Europe. The contents of some of these curiosity cabinets are now to be found in museums today, and indeed sometimes formed the basis of their initial collections.

Definition

All types of human remains have been acquired by museums, including ancient and modern skeletal and soft tissue as well as remains crafted into (or incorporated within) objects. Some museums contain many different types of human remains, but, in general, the type of remain acquired depended upon the disciplinary interest and/or research focus of the collector or collecting institution. Thus, to provide a few examples, human remains of normal or pathological structure are generally found in the collections of anatomy, pathology, and the medical sciences; archaeologically excavated human remains are usually to be found in archaeology units or relevant university departments; and remains from non-European cultures that have been in some way changed by

the action of humans are often to be found in ethnography museums. Of course, in the larger regional or national museums, different types of human remains may have been obtained by different departments within a single institution.

Over the history of scientific interest in human remains, relevant disciplines have emerged and become redundant or are now taught in different ways and have a different research focus, and these changes have had consequences for the future and location of associated collections. Thus, for example, in the early nineteenth century, phrenological societies acquired crania and cranial casts in order to demonstrate that examination of head shape could determine individual and so-called racial character (MacKenzie 1820; De Guistino 1975). But as phrenology increasingly lost credibility and entered the realm of pseudoscience, the contents of some of these museums were absorbed into the expanding comparative anatomy (later termed physical anthropology) collections of the mid-nineteenth century. Thus, for example, the large collection of the Edinburgh Phrenological Society was transferred to Edinburgh University's Anatomy Department during this period. The skulls collected by phrenologists then became the focus of race-based science which sought to describe and understand "racial" diversity and origins, a central research interest for many anatomy departments at that time. These "race" collections were in the majority composed of crania (because it was thought that the skull most clearly exhibited racial characteristics) and commonly formed significant components of large and imposing anatomy museums that were architecturally and pedagogically central to medical schools during this period (Alberti 2011a).

"Race" collections account for a large number of curated human remains, and were compiled between the late eighteenth and early twentieth centuries to represent the diversity of humankind. In the United Kingdom, the majority of remains in these types of collections are European in origin but a large component was taken from geographical locations worldwide. Museums wishing only to display representative so-called racial types only acquired small numbers of crania, but those with a strong research agenda in this area compiled extensive collections for measurement and analysis that could number in the multiple thousands. At that time, the scientific significance of a collection was dependent upon its size and geographical diversity.

Remains were obtained from all the different places that the dead can be found. While the majority were taken from burial grounds, either through excavation or chance recovery, remains were also acquired before burial, such as from sites of violent death, and prison or hospital morgues. There is a small but significant number of individuals who were killed or executed for their part in resistance to colonial expansion and their skulls or preserved heads sent back to the UK (Turnbull 2002; Fforde 2004). Institutions in Europe used extensive collecting networks to obtain remains from around the globe. Thus, for example, universities were sent remains by past students, army medical museums relied on medical officers serving abroad, and learned societies utilized their international membership. Private collectors relied more heavily on purchase as well as expending considerable effort creating relationships with potential collectors "in the field." Associated documentation (e.g., donor correspondence and museum catalogs) can provide some indications of the historical responses of those whose dead were removed. Whether couched in terms of collectors having to be clandestine in the removal of remains, descriptions of unease and fear shown by local people at the disturbance of graves, overt warnings and threats to collectors, requests for remains to be returned, or outright opposition, the historical record contains ample evidence of local concern and resistance.

The nineteenth and early twentieth century research undertaken on these remains was deeply embedded in the race paradigm and consequently deeply racist in nature. Such research reified incorrect and preconceived notions of racial hierarchy that had been present for centuries. The so-called Order of Mankind, ranked different "races" on an hierarchical ladder which normally placed the European male at the top and others in descending order below, with typically Australian Aboriginal people or Tierra del Fuegians at the

bottom. After the introduction of Darwin's evolutionary theory, human remains were increasingly investigated for "evidence" of the evolutionary "stages" through which Europeans had passed (Haller 1971). Thus, for example, work was undertaken on skeletal remains to investigate the "lowly" physical characteristics of Aboriginal people (e.g., Duckworth 1908; Berry and Robertson 1911) and to identify physical and cultural "evidence" in the "lower" races to show that they were the modern representatives of past European populations (Sollas 1911). The legacy of this type of research, and the influence it had on the development of deeply oppressive legislation which impacted on colonized people, was to become a significant element in the concerted calls by various Indigenous peoples for the return of their ancestral remains which began in earnest in the 1980s (see below).

By the mid-twentieth century (and particularly in response to the atrocities of Nazi Germany), the scientific profession increasingly abandoned race as a valid biological concept (Reynolds and Liberman 1996) and moved on to different research questions that needed well-provenanced remains excavated with archaeological techniques. This combination of criteria was rarely found in the old "race" collections which became largely redundant during this period, as did the large pathology collections and those illustrating normal anatomy. This lack of use, coupled with the development of new teaching techniques and acute pressure for space, saw many anatomy museums dismantled. Their contents were either transferred to other museums or placed in store where they remained largely forgotten until indigenous interest in reclaiming the bones of their ancestors drove significant research into locating and provenancing collections in the 1990s.

The complex history of acquisition and transfer of collections is well illustrated by that of the Royal College of Surgeons of England. The College's new buildings in Lincoln's Inn Fields, London, were opened in 1813 and incorporated a central museum, the nucleus of which was formed by the anatomical collection of distinguished surgeon John Hunter (1728–1793), which had been purchased by the British Government in 1799. Published and unpublished catalogues of the collection chart rapid growth during the nineteenth century. Significant components included a substantial series of human remains from around the world (its "Human Osteology" series) as well as a large number and variety of pathological and anatomical preparations of humans and animals. The College relied largely upon the work of individuals collecting overseas, as well as obtaining remains acquired by scientific expeditions, by purchase from auction houses in London, and through international trade and exchange programs with other museums, such as The Auckland War Memorial Museum in New Zealand (Fforde and Hubert 2006; Tapsell 2005). It also purchased two significant "race" collections: that of the Anthropological Society in 1890 (approximately 300 skulls), and that of private collector Joseph Barnard Davis in 1867 (approximately 1,540 skulls). The College collection is typical in its composition. The majority of the remains in the osteological series were from Europe but a large proportion were from other countries, and most were represented by crania, although the museum also acquired a much smaller number of full and part skeletons as well as some soft tissue remains. By the time its 1907 catalogue had been published, the College probably contained the largest "race" collection in Britain, and perhaps in Europe (Flower 1907).

Interest in studying the collection declined in the first half of the twentieth century, and in 1941, the Museum received a direct hit in a bombing raid of London. Although a significant portion of the museum was destroyed, over 6,300 items in the "race" collection survived, with a subsequent report indicating that damage was geographically selective (Cave 1941: 8). After the war, the surviving "race" collection, with the exception of those remains that had once been part of John Hunter's museum, was transferred in stages between at least 1947 and 1955 to the Natural History Museum in London. The College's Hunterian Museum continues to curate human remains obtained for anatomical, pathological, and medical research over the past century.

Key Issues

Over the past 30 years, there has been increasing attention paid to the ethics of human remains in museums. The "race" collections of old have been the subject of intense debate, driven by the campaigning of various Indigenous groups (particularly in Australia, North America, South America, Scandinavia, and New Zealand) for the return of their ancestral remains removed so many years ago. Their requests, which articulate strongly held spiritual beliefs and obligations as well as deep concern about the theft and misuse of their ancestors' remains, were initially denied by almost all holding institutions which argued instead for continued retention based on scientific importance. The resulting debate was high profile and often contentious and became known as the "reburial" or "repatriation" issue (Layton 1989; Fforde et al. 2002). In some countries, it has driven change in museum and professional practice and policy and slow but increasingly successful rates of returns to Indigenous groups worldwide (Hubert 1989; Watkins et al. 1995; Watkins 2003; Fforde 2004; Hole 2007; Hemming and Wilson 2010). Campaigning by Indigenous groups and their supporters has meant that many in the archaeology, museum, and anthropology disciplines have closely scrutinized the history and practice of their professions and developed new policy in relation to contested human remains and cultural heritage (Phillips and Allen 2010). There has also been intense discussion about the ethics of display of Indigenous human remains and of human remains in general (Swain 2002; Alberti et al. 2009; Sayer 2010: 95–109).

The question of ethics has also arisen in relation to anatomy and pathology collections of less than a hundred years old, of which the work of the Human Tissue Authority (HTA) in the UK is an example. However, with the decline of the great anatomy museums of the nineteenth and early twentieth century, a perhaps more prominent issue has been the future of the large number of anatomical and pathological specimens that they once housed. No longer in high demand for teaching use, such items take up space and, if wet specimens, are costly to maintain. For these reasons, many pathology collections were destroyed in the late twentieth century, although some have been retained for teaching purposes and to illustrate medical history. Emerging research in the development and history of medical museums provides important context and information about the potential future of the human remains they contain (e.g., Reinarz 2005; Alberti 2011a, b).

Cross-References

- ▶ Australia: Indigenous Cultural Property Return
- ▶ Australia: Repatriation Acts
- ▶ Ethics and Human Remains
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ World Archaeological Congress (WAC): First Code of Ethics

References

Alberti, S. 2011a. *Morbid curiosities: Medical museums in nineteenth-century Britain*. Oxford: Oxford University Press.

Alberti, S. 2011b. Medical museums past, present and future. *Bulletin of the Royal College of Surgeons of England* 93 (2): 56–58.

Alberti, S.J.M.M., P. Bienkowski, M.J. Chapman, and R. Drew. 2009. Should we display the dead? *Museum and Society* 7 (3): 133–149.

Berry, R.J.A., and A.W.D. Robertson. 1911. The place in nature of the Tasmanian Aboriginal as deduced from a study of his Calvarium. Part 1. *Proceedings of the Royal Society of Edinburgh* 31: 41–84.

Cave, A.J.E. 1941. Museum. In *Scientific Reports 1940–1941*, 3–16. London: Royal College of Surgeons of England.

De Guistino, D. 1975. *Conquest of mind: Phrenology and Victorian social thought*. London/Ottawa: Croon Helm.

Duckworth, W.L.H. 1908. On the brains of Aboriginal Natives of Australia in the anatomy school, Cambridge

University. Part 1. *Journal of Anatomy and Physiology* XLII: 69–287.
Fforde, C. 2004. *Collecting the dead*. London: Duckworth.
Fforde, C., and J. Hubert. 2006. Indigenous human remains and changing museum ideolgy. In *A future for archaelogy: The past in the present*, ed. R. Layton, S. Shennan, and P. Stone, 83–96. London: UCL Press.
Fforde, C., J. Hubert, and P. Turnbull, eds. 2002. *The dead and their possessions*. London: Routledge.
Flower, W.H. 1907. *Cataloue of the Osteological Series Man, Part I, Volume II*. 2nd ed. London: Royal College of Surgeons of England.
Haller, J.S. 1971. *Outcasts from evolution. Scientific attitudes of racial inferiority, 1859–1900*. Chicago: University of Illinois Press.
Hemming, S., and C. Wilson. 2010. The first 'stolen generations': repatriation and reburial in NgarrindjeriRuwe (country). In *The long journey home: the meanings and values of repatriation*, ed. P. Turnbull and M. Pickering, 183–195. Oxford: Berghahn Books.
Hole, B. 2007. Playthings for the foe: The repatriation of human remains in New Zealand. *Public Archaeology* 6 (1): 5–27.
Hubert, J. 1989. A proper place for the dead: A critical review of the 'reburial issue'. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 131–166. London: Routledge.
Layton, R., ed. 1989. *Conflict in the archaelogy of living traditions*. London: Routledge.
Mackenzie, G. 1820. *Illustrations of phrenology*. Edinburgh.
Phillips, C., and H. Allen. 2010. *Bridging the divide: Indigenous communities and archaeology into the 21st century*. Walnut Creek: Left Coast Press.
Reinarz, J. 2005. The age of museum medicine: The rise and fall of the medical museum at Birmingham's School of Medicine. *Social History of Medicine* 18 (3): 419–437.
Reynolds, L.T., and L. Liberman, eds. 1996. *Race and other misadventures: Essays in honor of Ashley Montagu in his ninetieth year*. New York: General Hall Inc.
Sayer, D. 2010. *Ethics and burial archaeology*. London: Duckworth.
Sollas, W.J. 1911. *Ancient hunters and their modern representatives*. London: Macmillan & Co.
Swain, H. 2002. The ethics of displaying human remains from British archaeological sites. *Public Archaeology* 2: 95–100.
Tapsell, P. 2005. Out of sight, out of mind: Maori ancestral remains at the Auckland Museum. In *Looking reality in the eye: Museums and social responsibility*, ed. R. Janes and G. Conaty, 153–171. Glenbow: University of Calgary Press.
Turnbull, P. 2002. Indigenous Australian people, their defence of the dead, and Native title. In *The dead and their possessions*, ed. C. Fforde et al., 63–86. London: Routledge.
Watkins, J. 2003. Archaeological ethics and American Indians. In *Ethical issues in archaeology*, ed. L. Zimmerman, K.D. Vitelli, and J. Hollowell-Zimmer, 129–142. Plymouth: Altamira Press.
Watkins, J., L. Goldstein, K. Vitelli, and L. Jenkins. 1995. Accountability: Responsibilities of archaeologists to other interest groups. In *Ethics in American archaeology: Challenges for the 1990s*, ed. M. Lynott and A. Wylie, 33–37. Washington, DC: Society of American Archaeology.

Human Remains Recovery: Archaeological and Forensic Perspectives

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Introduction and Definition

Forensic archaeology involves the application of archaeological theory to scenes of crime, usually in the search for, and recovery of, buried human remains and associated evidence (Hunter and Cox 2005; Blau and Ubelaker 2009). This transfer from more conventional archaeology is not straightforward: there are a number of operational, legal, and procedural divergences from the parent which makes forensic archaeology a discipline in its own right. All archaeology involves the study of the shallow substrates; it bases its methodology on the principles of stratigraphy which are empirical. By nature, archaeology is an invasive and destructive process.

Stratigraphy is the result of formation processes by which surface deposits will accumulate, often unperceivably, over time in a given place. These deposits can reflect both human (cultural) or natural changes. Examples of cultural changes can include layers resulting from construction, fire, occupation, digging and filling pits, demolition, agriculture, and so on; examples of natural changes can include silting, movement of soil downhill, geological movement, erosion, or peat and soil formations. All these, individually or in

combination, can result in the development of layers of various thicknesses, characters, and properties. Interpreting what activities these layers reflect and the order in which they were created is the basis of archaeological study. Interpreting what the layers signify allows us to create a statement of what went on in a given place; examining the sequence of those layers provides us with a time line of their relative formation (Fig. 1). They all occur in past time, and it makes no difference to their study whether that was 10,000 years ago or yesterday morning – the same principles of investigation apply.

If a grave is dug into the ground, it creates an additional layer (i.e., the grave) in the statement of what went on in that place, and it adds a new point in the time line. In other words, the grave has a context in time and space. The grave also has boundaries – the grave walls, base and top of the grave fill. It needs to be viewed three-dimensionally as a sealed unit (rather like a coffin) inside which is contained the individual victim, material associated with the victim (clothes, jewellery, contents of pockets, etc.), and any evidence which may link the offender to the digging and infilling of the grave itself (e.g., hair, fibers, or anything deposited in the grave for concealment purposes). In many respects, the grave should be viewed as a mini crime scene. It makes no difference whether this is a single victim grave or a mass grave containing large numbers of victims. However, once human remains become removed from this burial context, all these associated evidences are, at best, minimized in value and at worse, lost completely. The burial context (the totality of the grave) is not only key to the integrity of the body and its associated materials but also fundamental to the veracity of evidence presented in court.

Unfortunately, most buried human remains are discovered accidentally during construction work, drainage, or even gardening, often being pulled out of the ground by the finder or the police. Instructions to police forces are to leave them where they are and *not* to remove them. This allows an archaeologist to evaluate the context of the grave in relation to surrounding layers. Sometimes this can be simple, for example, when a skeleton is located under a house foundation of known date, or more difficult when there are no clearly defined or identifiable layers surrounding the burial on which to base a context or relative date. Sometimes human bones are found scattered on the surface with no context at all. In such cases, it needs to be ascertained whether they were originally buried (i.e., with a context) and

Human Remains Recovery: Archaeological and Forensic Perspectives, Fig. 1 The photograph shows the formation of buried layers representing sequences of events

have been brought to the surface by scavengers or whether they belong to a surface deposition. This involves a wider landscape analysis in order to identify disturbances or other remains respectively. Formation processes occur all the time and are just as relevant to modern as to historical graves. Sometimes local events (e.g., ditch clearance, gravel spread, or reseeding) can have recorded (or remembered) dates that will give the grave a *terminus ante quem* (time before which); often perpetrators may attempt to disguise graves with paving or similar surfaces or by "importing" soils from elsewhere. All these activities leave discernible traces in or on the ground.

Key Issues

Locating Buried Human Remains

Locating remains below the ground surface is one of the cornerstones of archaeological practice. Over the years, archaeologists have adapted, developed, and honed various techniques in order to achieve this. The majority of methods are non-invasive (often referred to as "remote sensing") and have advantages and limitations according to environment, landscape, and operational conditions. Different techniques and strategies can be adapted according to merit depending on the character of location – these can vary from a small back garden to open moorland; they also depend on the questions being asked in a particular enquiry. It is sometimes forgotten that the application of these techniques in the discovery of buried human remains can differ from the same techniques used in the discovery of conventional archaeological remains such as buried walls, ditches, and pits. This difference is brought about by the decay dynamic of the buried human body. This decay process is well documented, but the speed at which it occurs varies according to, *inter alia*, the buried environment, climate, wrapping/clothing, and other factors, and as such the decomposition stages at which the effects of certain techniques may be optimized or minimized (e.g., liquidification, heat emission, skeletalization) may vary enormously (Boddington et al. 1987; Vass et al. 2002).

The main techniques used in landscape search and analysis are well documented and only need outlining here (Killam 1990; France et al. 1997; Ruffell and McKinley 2008; Cowley 2011). Aerial methods include photography, satellite imagery, and Lidar (see below). All have their advantages and limitations, but all of them (with the exception of thermal imaging) will be detecting not the buried body per se, but the disturbance made in burying it (i.e., the grave). When a grave is dug and filled in again, it can present a different base for surface vegetation simply because the fill of the grave tends to be looser, more aerated, and contains a mixture of all the soils lying adjacent in undisturbed ground. As a result, the surface vegetation may differ from the surrounding flora: Its growth may be enhanced or stunted, and it may attract different species or follow a differing flowering regime. The disturbance itself may have drawn distinctive subsoils to the surface such as chalk or colored clays.

Aerial imagery uses light (shadow), crop variation, and soil marks to locate disturbances; it may pick out topographical expressions caused by slight mounding on the ground surface or a sinking of the ground when the infilled soils of the grave begin to consolidate. Detecting these features depends on angle of light, season, and crop regime. If the conditions are not appropriate, the evidence of disturbance might be missed. On the positive side, this kind of evidence can be long term, which is why archaeological remains hundreds of years old can still be detected from the air providing the conditions are favorable.

Larger targets, particularly those of significant vegetation change such as mass graves, might also be detected by satellite imagery, depending on pixel resolution, using the same principles. Many mass graves, notably those in the former Yugoslavia from the 1990s, are approximately 3 m wide (roughly the bucket width of the mechanical excavator used in their construction), typically some 10–20 m in length, and are of appropriate size for vegetation change to be detected by satellite. Lidar is a relatively new asset and involves producing a digital terrain model (DTM) by firing multiple radar pulses from an aircraft in flight. Depending on the

number of points per meter reflecting from the ground, this may be able to identify subtle topographic change on the ground surface and can even penetrate tree canopies. The application is novel but has potential.

On the ground, geophysical survey has a role to play in targeting; it has the ability to detect shallow anomalies below the ground surface. It will not define what those anomalies represent, and it requires a relatively "quiet" and consistent geological background in the immediate surrounding area in order for the anomaly to be observable. The techniques used tend to be electrical (e.g., resistivity), magnetic (e.g., magnetometry), or electromagnetic (e.g., radar); they all respond to different characteristics of the substrates and are not substitutes for each other. Like other techniques, they all have advantages and limitations depending on environment and context. Ground penetrating radar (GPR) has become a popular choice for the simple reason that it has the ability to penetrate solid surfaces (e.g., patios, driveways, swimming pools) and can deliver data in "real time" (i.e., during the survey itself). All search methods share two common features: None of them are infallible, and the output is only as good as the person who interprets it.

Search assets are best used in combination and in a defined sequence. Search is as much about elimination as about discovery, and the cadaver dog can have a powerful role to play in this process. The cadaver dog, for example, can find a useful role in being directed to anomalies detected by GPR as a secondary source of validation. Targets will require venting (i.e., probing the ground to facilitate release of any gasses), and if the dog responds, the anomaly can be excavated or investigated further. A negative dog response can normally allow the anomaly to be eliminated. Neither GPR nor dog (or any other search asset for that matter) can be used with 100% confidence, but if they are used in combination, the probable likelihood of error is reduced to an acceptable level. Cadaver dogs can be used in a similar way to investigate freshly turned soils in a suspected garden or potential targets identified from aerial imagery. Although dog work requires venting probes to enter the ground, the technique is only mildly invasive. The use of complementary or sequential assets such as this is a realistic and practical operational procedure.

More invasive but more effective for larger areas of search is the technique of mechanical stripping. The use of heavy machinery to investigate a site can be very useful in cases where an allegation has been made of a burial located within an area that can only be generally defined or where an area needs to be eliminated with 100% confidence. The process requires the upper surface of the ground to be stripped off horizontally using a wide toothless ditching bucket, working on the principle that the disturbance caused by the grave digging will be visible within otherwise disturbed natural soils below (Fig. 2). Normally this can be achieved, and land eliminated, at a depth of around 0.3 m depending on conditions, but the process is invasive and has the potential to strip off some of the grave fill evidence as well. It is a compromise between, on the one hand, the need for speed and the efficient use of resources and, on the other hand, the necessity of discovering the body/ies. That said, mechanical stripping is a very effective tool and can be manipulated sensitively by an experienced operator.

Searching for human remains is a special exercise: in addition to assessing information provided by witnesses, it can involve the analysis of landscape, topography, and the definition of features on a landscape. The starting point for this is the map in its many forms. Maps provide basic landscape data, but other data sources such as surface geology and land use (which can inform feasibility of burial) also need to be incorporated if target areas are to be defined. The use of geographical information systems (GIS) has a major contribution to offer here in allowing the landscape to be converted into a DTM over which different layers of information can be draped (e.g., Orengo 2008). Not only can it incorporate layers such as geology and land use but it can also be used to generate view sheds and hence zones of the landscape which offer concealment from roadways or nearby houses. As a result of this, GIS can also be used to target particular landscape zones or to prioritize one zone over another on the basis of practical factors. Moreover, the results from

Human Remains Recovery: Archaeological and Forensic Perspectives, Fig. 2 Machine stripping of a suspect area to detect disturbances brought about by a clandestine burial

geophysics, line search, and dog deployment, etc., can also be added to the model to show, for example, areas covered and the degree of search thoroughness. GIS data can be repeatedly interrogated, or items added or deleted.

Excavating Clandestine Graves

Identification of the grave allows an archaeological strategy for recovery to be designed. All clandestine depositions are different and, although there is no "by-the-book" methodology, every recovery process will recognize common stratigraphic principles, the destructive nature of the process, and, as a result, the importance of making adequate records (Hanson 2004; Cheetham and Hanson 2009; Hunter 2009). An offender digging a grave will undertake three processes, usually in quick succession: the digging of a hole (the grave) and the depositing of spoil on the adjacent ground surface, the deposition of the victim in the grave, and the backfilling of the grave. The archaeologist will address the grave in reverse order, first by emptying (excavating) the grave and recovering evidence within the grave and the fill, then removing the body, and then recording the grave itself. In order to understand *how* the offender filled in the grave, it is often standard practice to excavate a half-section first: this involves excavating the grave from one half of the grave only; it allows the creation of a profile through the grave and shows, for example, tip lines, the presence of additional layers introduced to the grave fill, or any attempted concealment layers introduced by the offender. Sections provide a vertical view of the formation process which cannot be obtained in any other way.

Most grave fills are a mixture of the layers through which the grave has been dug. Excavation normally involves removing one layer at a time and recording each one individually by unique numbering and with a detailed description of its color, characteristics, and mineral inclusions. In a mixed grave fill, this is normally carried out by defining arbitrary layers as "spits," typically 10 cm deep, but recording each in the same way as a "real" layer. Objects which are recovered from the excavation can be associated with the layer or "spit" from which it derived. This allows a coarse reconstruction of where they were deposited in the grave fill. A more sophisticated method of recording can be achieved by electronic means, by deploying a total station electronic distance measurer (EDM) which can record points accurately and allow the shape of the grave and any associated objects to be reconstructed in three dimensions. It offers immense advantages but is

Human Remains Recovery: Archaeological and Forensic Perspectives, Fig. 3 The sides of the grave need to be followed carefully in order to avoid contamination and to record implement markings

not always viable in crime scene conditions located within enclosed spaces or where there are sight-line obstacles such as trees or buildings.

The edges of the grave need to be followed carefully using small hand implements (Fig. 3). This is not simply to ensure that the fill of the grave is not contaminated but also to preserve any implement marks. Often, especially in plastic soils such as clays, there may be impressions or tool marks surviving in the grave walls, or even footprints impressed into the grave floor. In some excavations of mass graves, the approach taken is to excavate a trench all around the grave giving a pedestal effect in order to facilitate access (Cox et al. 2007). This has its advantages, but it also has the effect of destroying marks in the grave wall. In deeper or larger graves, one solution is to dig a small platform to one side of the grave once the excavation has reached a depth of about 30 cm and the exposed part of the grave wall has been recorded, then continuing the process in stages until the excavation is complete. This allows any impressions in the grave wall to be recorded fully and also facilitates operational access to the grave itself.

Because excavation is a destructive process, it often requires specific forensic questions to be asked. These vary according to circumstance but can typically relate to the manner of grave creation and the implements used, whether the grave was dug in a hurry or carefully prepared, if there were any objects or trace evidence within the grave fill, or if the grave contained any foreign material that might lead the enquiry to a different location. There are also questions relating to the identity of the victim and the manner/cause of death, not to mention the overriding question as to who killed the victim. The answer to the last question may not be readily apparent from excavating the grave, but the evidence contained within the grave may provide new information that will contribute to an answer.

Archaeology is an interrogative exercise: The range of questions that need to be asked in a particular enquiry will inevitably influence the methodology. Finding the body is only a part of the process; being able to answer key questions such as these is why experienced archaeological input is so essential. Once a body has been lifted from a grave, the evidence has been largely destroyed and the opportunity lost. The need for formal recording systems is therefore paramount. This is not just a matter of written records per layer but also of detailed photography and of plans drawn to scale. These constitute the primary field record of work carried out and underpin both the archaeologist's account and the evidence given in court.

Soils and other material removed from the grave may need further investigation according

to questions being posed by the enquiry and according to potential survival (e.g., Janaway 2008). Sieving, for example, may be used for the collection of any small items (including bones) that may have been missed at the scene. Sieving according to layer or "spit" will ensure that any such items can be identified with a particular part of the grave. Depending on the state of the soils, sieving can be undertaken dry (i.e., by riddling through a mesh) or wet, whereby a jet of water is used to break down thick soils or clays through a grid. Mesh sizes vary according to what is been searched for: A 5–10-mm mesh will capture most larger objects, but smaller mesh sizes will be needed for tiny articles such as very small bones. The recovery of trace materials (e.g., human hair and fibers from the perpetrator which may have entered the grave fill) will require a more subtle approach, controlled laboratory conditions, and sieving down to levels of microns. Both hair and fibers are known to survive for variable lengths of time in buried environments, according to conditions.

The report of the excavation will incorporate all these evidence types measured against the methodology employed and the answers to specific questions asked. It will be open to cross-examination, and the archaeologist will be required to support his or her findings and interpretations on the basis of the records made. Once a grave has been excavated, there is no going back to do it again.

Cross-References

- ▶ Archaeology: Definition
- ▶ Excavation Methods in Archaeology
- ▶ Forensic Anthropology: Definition
- ▶ Spatial Analysis in Field Archaeology
- ▶ Surface Survey: Method and Strategies

References

Blau, S., and D. Ubelaker, eds. 2009. *Handbook of forensic archaeology and anthropology*. World Archaeological Congress Research Handbooks in Archaeology. Walnut Creek: Left Coast Press.

Boddington, A., A.N. Garland, and R.C. Janaway, eds. 1987. *Death, decay and reconstruction: Approaches to archaeology and forensic science*. Manchester: Manchester University Press.

Cheetham, P., and I. Hanson. 2009. Excavation and recovery in forensic archaeological investigations. In *Handbook of forensic archaeology and anthropology*. World Archaeological Congress Research Handbooks in Archaeology, ed. S. Blau and D. Ubelaker, 141–149. Walnut Creek: Left Coast Press.

Cowley, D.C., ed. 2011. *Remote sensing for archaeological heritage management*. Occasional Publication of the Aerial Archaeology Research Group 3. Brussels: Europae Archaeologiae Consilium.

Cox, M., A. Flavel, I. Hanson, J. Laver, and R. Wessling, eds. 2007. *The scientific investigation of mass graves: Towards protocols and standard operating procedures*. Cambridge: Cambridge University Press.

France, D.L., T.J. Griffin, J.G. Swanburg, J.W. Lindermann, G.C. Davenport, V. Trammell, C.T. Trammell, B. Kondratieff, A. Nelson, K. Castellano, D. Hopkins, and T. Adair. 1997. Necrosearch revisited: Further multidisciplinary approaches to the detection of clandestine graves. In *Forensic taphonomy: The postmortem fate of human remains*, ed. W.D. Haglund and M.J. Sorg, 479–509. Boca Raton: CRC Press.

Hanson, I.D. 2004. The importance of stratigraphy in forensic investigation. In *Forensic geoscience: Principles, techniques and applications*. Geological Society Publication 232, ed. K. Pye and D.J. Croft, 39–47. London: Geological Society.

Hunter, J. 2009. Domestic homicide investigations in the United Kingdom. In *Handbook of forensic archaeology and anthropology*. World Archaeological Congress Research Handbooks in Archaeology, ed. S. Blau and D. Ubelaker, 363–373. Walnut Creek: Left Coast Press.

Hunter, J.R., and M. Cox. 2005. *Forensic archaeology: Advances in theory and practice*. London: Routledge.

Janaway, R.C. 2008. The decomposition of materials associated with buried cadavers. In *Soil analysis in forensic taphonomy: Chemical and biological effects of buried human remains*, ed. M. Tibbett and D.O. Carter, 153–202. Boca Raton: CRC Press.

Killam, E.W. 1990. *The detection of human remains*. Springfield: Charles C. Thomas.

Orengo, H.A. 2008. Detection of body dump sites and clandestine burials: A GIS-based landscape approach. In *Digital discovery, exploring new frontiers in human heritage. Computer Applications and Quantitative Methods in Archaeology. Proceedings of the 34th Conference, Fargo, United States, April 2006*, ed. J.T. Clark and M. Hagemeister, 185–190. Budapest: Archaeolingua.

Ruffell, A., and J. McKinley. 2008. *Geoforensics*. Chichester: Wiley.

Vass, A., S.A. Barshick, G. Sega, J. Caton, J.T. Skeen, J.C. Love, and J.A. Synstelien. 2002. Decomposition chemistry of human remains: A new methodology for determining postmortem interval. *Journal of Forensic Sciences* 47: 542–553.

Further Reading

Haglund, W.D., and M. Sorg, eds. 2002. *Advances in forensic taphonomy: Method, theory, and archaeological perspectives*. Boca Raton: CRC Press.

Haglund, W.D., M. Connor, and D.D. Scott. 2001. The archaeology of contemporary mass graves. *Historical Archaeology* 35: 57–69.

Hunter, J., and B. Simpson. 2007. Preparing the ground: Archaeology in a war zone. In *Forensic archaeology and human rights violation*, ed. R. Ferlini, 266–290. Springfield: Charles C. Thomas.

Pye, K., and D.J. Croft, eds. 2004. *Forensic geoscience. Principles, techniques and applications*. Geological Society Publication 232. Bath: Geological Society Publishing House.

Human Remains: Ethical Issues and Historical Perspectives

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Introduction

Over the last few decades, there has been an increased acceptance of rights over cultural heritage within the field of archaeology, as alternative views are incorporated into research design and researchers relinquish sole custody of the archaeological record. However, this inclusion has brought about the intersection between vastly different opinions regarding the ethical treatment of the dead. What constitutes appropriate treatment of human remains varies from culture to culture, and the sensitivities surrounding their treatment often create ethical dilemmas and conflicts between stakeholders, which are less commonly found in other areas of archaeological study.

Definition

Ethics can be defined as a system of moral values that specify a particular code of conduct, often defining "right" and "wrong" (Goldstein and Kintigh 1990: 585; Mays 2010: 331, 347). However, as Goldstein and Kintigh state, ethical principles are "culturally constructed" and will vastly differ depending on the cultural group defining such principles (1990: 586; Sellevold 2010: 141).

Historical Background

The practice of collecting human remains for scientific pursuits can trace its roots back to the third century B.C. in Ancient Greece, where the bodies of condemned criminals were obtained for systematic dissections for anatomical knowledge (Walker 2008: 5; Von Staden 1992: 223). Such activities were discouraged in the following centuries due to religious beliefs regarding the body and the afterlife; however, during the Renaissance, the prevalence of anatomical studies began to increase as the cadaver's medical value was recognized (Walker 2008: 5; Lambert 2012: 18). The creation of "curio cabinets" containing human remains became a popular hobby among the wealthy, specifically those interested in anatomy and scientific examination (Walker 2008: 10). The need for "specimens" soon led to grave robbing, of primarily underprivileged and disadvantaged individuals, throughout the United States, Britain, and many other countries.

During the 1700s, scientific studies began to focus on human diversity and population differences, which led to the large scale collection of skeletal remains. Specifically, crania were sought for phrenology and racial classification studies, which focused on the idea of an evolutionary hierarchy and that racial intellect was dependent on cranial capacity and measurement (Dickerson and Ceeney 2014: 90; Walker 2008: 8; Lambert 2012: 19). Throughout the nineteenth and early twentieth centuries, vast collections of skeletal remains were stolen and collected from battlefields, cemeteries, and archaeological excavations as large, newly founded museums sought to augment their collections and to continue research on human remains (Walker 2008: 6). Throughout Europe, as archaeology became an established discipline, new interpretations based on racial segregation further exacerbated views of cultural

division such as "primitive" versus "civilized" (Holand and Somerseth 2010: 25).

During the last few decades, archaeologists have moved away from craniometry and studies on human variation to focusing on the way environmental and cultural conditions factor into human development (Martin et al. 2013: 31). Such topics include nutrition, disease, trauma, and violence (Martin et al. 2013: 31). New methodologies such as DNA and stable isotope analyses have allowed for in-depth studies on human adaptation and population health; however, until recently, the majority of these research studies on indigenous human remains have failed to incorporate and recognize external perspectives from native stakeholders, creating contention and conflict with local communities.

Key Issues/Current Debates

A large portion of archaeological collections containing human remains in museums across the globe are a product of colonial pursuits, racist ideology, and Western imperialism. Similarly, research to date has primarily focused on Western views rather than incorporating community-based, participatory research. Disagreements on the treatment of human remains have arisen between researchers and Indigenous communities as their culturally constructed sets of ethics conflict (Goldstein and Kintigh 1990: 586; Larsen and Walker 2005: 118; Scarre 2013: 673).

Traditionally, human remains have been viewed by the scientific community as objects of research with potential for understanding the overall history of the human species (Larsen and Walker 2005: 111, 113; Walker 2008: 13). They are considered to be a vital resource of mortuary information, and those working with skeletal remains often consider it their ethical responsibility to obtain as much data as possible from those remains in order to contribute to the overall archaeological record (Klesert and Powell 1993: 350; Sellevold 2010: 141).

In contrast, many Indigenous communities view continued excavation, retention, and study of human remains as disrespectful and highly offensive (Henderson 2009: 55). The dichotomy is further exacerbated by the overwhelming emphasis on research by Western science as opposed to the incorporation of native participation or ideas. Many native scholars have been highly critical of archaeologists, viewing their work as self-serving, racist, exclusionary, and lacking any real meaning to contemporary populations (Henderson 2009: 55; Walker 2008: 13; Zuckerman et al. 2014: 515). For many, the return of ancestral remains recognizes the wrongs suffered during colonialism and promotes the healing of native communities (Henderson 2009: 57; Mays 2010: 332).

Walker (2008) outlines three ethical principles which should be utilized when working with human remains: (1) human remains should be treated with dignity and respect, (2) descendants should have the authority to control the disposition of the remains of their relatives, and (3) owing to the importance for understanding the history of our species, the preservation of archaeological collections of human remains is an ethical imperative. While these principles can be applied to the overall treatment of human remains from any collection or country and are primarily from a bioarchaeologist's viewpoint, Walker recognizes there are intrinsic problems with such ethics, for example, when the preservation ethic conflicts with relinquishing control to the descendants (2008: 20). Additionally, the term "respect" is culturally defined and varies globally. Some archaeologists may maintain that they are being respectful of the dead, but that definition of respect is often not the same as that of the descendants of the remains.

There may also be situations where there is no surviving population of descendants who can provide a voice for the deceased or where political circumstances have silenced their voice. Zuckerman et al. (2014) propose the concept of relational ethics for working with the deceased, specifically those from disadvantaged or oppressed populations. This follows an idea of "ethics of social responsibility" where the human remains are not considered as specimens of information, but active participants in their storytelling and where the researcher acknowledges the

descendants' connection with the deceased (517). Additionally, such an approach would maintain that agency and value be attributed back to the remains and stories of oppression and power could be told, giving a voice to those who were silenced and who would otherwise be obscured from record, such as in forensic cases or in situations of genocide or war (517–518).

International Ethics and the Repatriation Movement

The strong response to the curation and study of human remains has been the cry for repatriation and reburial by indigenous parties, largely in countries such as the United States, Australia, and Canada, where European colonialism displaced and marginalized native communities and illicitly appropriated indigenous human remains (Bienkowski and Coleman 2013: 83; Henderson 2009: 56; Mays 2010: 333; Lambert 2012: 25). While often considered a more recent movement within archaeology, discussions of the ethical treatment of human remains began as early as the 1960s (see "▶ Repatriation Acts: Before NAGPRA"). The establishment of the American Indian Movement and intense activism by Native Americans in both the United States and Canada brought a focus on scientific colonialism, and tribal groups began lobbying for the return of their ancestors and cultural items in an effort to regain control over their cultural history (Ferguson 1996: 68; Zimmerman 2012: 99). In 1976, the first state reburial law was passed in Iowa in response to the unequal treatment of an inadvertent discovery in 1971 where Euroamerican remains discovered were reburied without study and the Native American skeletons were sent to the local museum for research purposes (Zimmerman 2005: 61; 2014: 2).

Throughout the 1980s, issues regarding reburial began to be globally discussed and the ethics of studying human remains became under scrutiny (Webb 1987: 296). Numerous archaeologists began recognizing indigenous communities' right to control their heritage and arguing for the incorporation of community-based research with the goal of collaborative assessment and mutual understanding (Pardoe 1990: 208). Indigenous considerations needed to be placed at the same level as scientific enquiry and for this to be done, archaeologists needed to concede not only ownership of the remains but embrace multiple perspectives of the archaeological record (Pardoe 1990: 222).

In 1986, the first meeting of the World Archaeological Congress (WAC) was held in Southampton, England. One major point at this international conference was the inclusion of indigenous and Third World peoples – without their representation, archaeology would fail to be considered truly world-wide (Zimmerman 1994: 5). Three years later, a special topic WAC Inter-congress was held in Vermillion, South Dakota, titled "Archaeological Ethics and the Treatment of the Dead." During this conference, the Vermillion Accord on Human Remains was adopted, outlining six principles of respect for both indigenous and scientific viewpoints (http://worldarch.org/code-of-ethics/). In 1990, WAC passed the First Code of Ethics in Barquesimeto, Venezuela, recognizing the importance of considering indigenous communities as equal research partners and recognizing their interest in preserving and investigating their own heritage (Zimmerman 2005: 64).

After several decades of lobbying by Native American communities, advocacy by numerous archaeologists, and the enactment of nearly 40 state repatriation laws, the United States Congress passed the National Museum of the American Indian Act in 1989 and the Native American Graves Protection and Repatriation Act (NAGPRA) in 1990. Addressing only the collections housed within the Smithsonian, the NMAI Act was designed to set forth procedures for repatriation of Native American human remains and cultural items. For all other institutions receiving federal funding, NAGPRA created a similar mechanism whereby Native American tribes and Native Hawaiian organizations may claim and receive ancestral remains, funerary objects, sacred objects, and items of cultural patrimony through repatriation. It is an important piece of human rights legislation which addresses the institutional treatment of Native American remains and the lack of

consideration for their beliefs (DeWitte 2015: 12). NAGPRA covers three main topics: (1) the inadvertent discovery of Native American, Native Alaskan, or Native Hawaiian remains on federal or tribal lands; (2) trafficking of Native American or Native Hawaiian remains; and (3) a requirement that federal agencies and institutions or museums receiving federal funding or having any other type of federal involvement assemble Inventories and summaries of their collections for publication in the Federal Register (Mays 2010: 340).

In 1991, the Royal Commission on Aboriginal Peoples was established in Canada which promoted the voluntary return of remains to appropriate First Nations communities (Mays 2010: 335). Ethical guidelines as developed in the Canadian Archaeological Association's 1996 *Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples* encourage consultation with indigenous communities on matters relating to heritage, excavation, and human remains (Hanna 2003: 242). Despite these efforts, there is no federal law in Canada which mandates the return of First Nations ancestors or requires repatriation. Henderson (2009: 58) states that the absence of such a law encourages the dismissal and disregard for First Nations perspectives. However, several provinces have heritage statutes that address treatment of human remains. These statues include mandates for protecting inadvertent discoveries of human remains and contacting the nearest First Nations communities once discoveries have been determined to be archaeological (Parks Canada, https://www.pc.gc.ca/en/docs/r/pfa-fap/sec7/decouv_discov3).

In 2006, the Tamaki Makau-rau Accord on the Display of Human Remains and Sacred Objects was adopted by the World Archaeological Congress (see ▶ "Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)"). Similar to the Vermillion Accord on Human Remains, these six principles discuss the culturally appropriate display of human remains, permissions which should be acquired from indigenous communities prior to research, and frequent consultation between parties to ensure transparency and accurate communication (http://worldarch.org/code-of-ethics/).

The General Assembly of the United Nations adopted the Declaration of the Rights of Indigenous Peoples in 2007, outlining both the collective rights of indigenous peoples and the rights of individuals (United Nations General Assembly 2007). Specifically, Articles 11 and 12 focus on the rights of indigenous communities to protect and develop all manifestations of their culture and control ceremonial objects and human remains for spiritual use and reburial (United Nations General Assembly 2007, Article 11 (1), Article 12 (1). Although this document has no legal enforcement, it reflects the commitment by the international signatories to promote and recognize indigenous parties' right to control and maintain their own cultural heritage.

In 2018, the Department of Arts and Culture within the Western Cape Government of South Africa released the Draft National Policy on the Repatriation and Restitution of Human Remains and Heritage Objects. This document was released in response to frequent requests made to the Government to repatriate the remains of South Africa individuals from South African and international museums (Draft National Policy on the Repatriation and Restitution of Human Remains and Heritage Objects, 2018). It discusses the challenging nature of repatriation and reburial, the management of skeletal remains and cultural items in South African museums, and procedures for making claims (https://www.westerncape.gov.za/assets/departments/cultural-affairs-sport/draft_national_policy_on_the_repatriation_and_restitution_of_human_remains_and_heritage_objects.pdf).

In 2007, the National Committee for Evaluation of Research Involving Human Remains was established in Norway. This was in response to a repatriation dispute between the living Sámi descendants, who asked for return for reburial of their ancestors' skeletal remains curated by University of Oslo's Department of Anatomy (Sellevold 2010: 140). The task of this committee is to consider and deliberate on the ethical considerations for research proposals involving human remains, particularly those of Sámi ancestors (Holand and Somerseth 2010: 21). Similar discussions have taken place in Sweden, where the repatriation and reburial of Sámi ancestors from

Swedish museums is being advocated for by Sámi communities and supported by the Swedish Sámi Parliament (Nilsson Stutz 2007: 1).

For indigenous populations in Australia, the deceased are considered living parts of the community and their reburial is an intrinsic part of spiritual wellness and the health of the relationship between the dead and their descendants (Bienkowski and Coleman 2013: 82–83). Human remains predating 1770 are legally considered to be aboriginal and indigenous groups have been working to remove collections from museums for reburial (Mays 2010: 334). Additionally, indigenous groups to Australia have been lobbying in a concerted effort with the Australian government for the return of Australian aboriginal remains curated in international museums (Mays 2010: 334).

In Israel, reburial efforts are stimulated by religious arguments, with Jewish communities objecting to the disturbance and handling of human remains (Mays 2010: 335). The "Halacha," or Jewish burial law, permits the relocation of human remains as part of salvage operations by the Israel Antiquities Authorities; however, the orthodox Jewish community opposes any excavations on burial grounds and strictly forbids scientific study or anything that might disturb the deceased (Nagar 2002: 87).

However, there are situations when the excavation of human remains is necessary, such as from erosion from climate change or areas slated for construction due to population expansion. In the United Kingdom, the majority of excavated human remains come from rescue or salvage operations ahead of urban development projects (Mays 2010: 336; Sayer 2010: 21). Despite the inevitable removal of these remains, ethical questions still arise regarding how the remains should be excavated from salvage projects, what should be done after they are removed from the ground, or if they should be reburied and by whom (Blau 2014: 2453). Often it is the opinion of the British public which is sought in making decisions about the treatment of remains, and while not uncontested, for the most part the public is supportive of the display of human remains in Britain (Sayer 2010: 96).

In working with collections or in countries that do not have histories of colonialism, codified systems of ethics, or where the treatment of human remains is highly varied, ethical guidelines still must apply. The treatment of human remains must still be respectful and the archaeologist should defer to the local community's definition of what respect is. Archaeologists should educate themselves on the local cultural protocols and histories, to obtain an understanding of the context in which communities develop their own ethical principles.

Additional efforts have been made by global organizations such the British Association of Biological Anthropology and Osteoarchaeology (BABAO), the American Association of Physical Anthropologists (AAPA), the Society of American Archaeology (SAA), and the American Anthropological Association (AAA), which have developed and integrated codes of ethics to guide archaeologists that work with human remains. Other national and international documents such as the Center for World Indigenous Studies' *International Convenant on the Rights of Indigenous Nations*, and the United Nations Education, Scientific, and Cultural Organization's *Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Cultural Property* have also been created to address indigenous rights to their cultural heritage (Hanna 2003: 238; Henderson 2009: 59; Scarre 2013: 667).

Future Directions

Going forward, it is likely that there will be vestiges of discord and disagreement when debating the ethical principles regarding the treatment of human remains. In situations of competing and conflicting ethical systems, Walker (2008) advocates for open communication and understanding to find solutions which are amenable for both parties, as opposed to polemics and "self-righteous posturing" (13). While even among descendant communities, there may not a consensus on the appropriate treatment of human remains (Turner and Andrushko 2011: 44), Henderson discusses how the improved understanding of Indigenous ethics would create opportunities

where communities exercise control over their heritage and their knowledge is respected and consulted (2009: 69).

Martin et al. (2013) suggest three questions every researcher working with human remains should ask prior to conducting their work: (1) What are the full implications of conducting this research? (2) How might the research impact the descendant and local communities? and (3) Are there potentially negative ways the information being collected and disseminated might be utilized by people outside the field of archaeology? (24). Despite their views on the importance of scientific inquiry, researchers working with collections of human remains have been forced to recognize that they share a mutual interest in those collections with indigenous communities and that in order for their work to remain relevant to those outside the discipline, they must consider the belief systems of the descendant populations and reflect on whether or not community members are likely to share the motivations driving their personal research.

Turner and Andrushko encourage the engagement and increased participation of local researchers and students in all aspects of the project in order to promote attitudes of collaboration and equality (2011: 57). They advocate for the dissemination of research findings not only to indigenous stakeholders, but to the general public as well in order to make their work more inclusive and relevant to those outside academia (2011: 57). While many consider this a vital part of any archaeologist's work with human remains to avoid being esoteric and to be able to connect their work with contemporary issues, it is also important to consider the wishes of the local community regarding whether or not any collected data should be disseminated outside of the community (Martin et al. 2013: 23, 25).

Global archaeology is moving towards becoming a more inclusive and participatory science, allowing for the framing of a more comprehensive and encompassing view of the past (Martin et al. 2013: 23). Martin et al. discuss how important the dialogue between native communities and archaeologists is so that the treatment of human remains is as individuals rather than as objects of study (2013: 42). Previously disenfranchised groups now can decide the disposition of their ancestors, which is seen as vital to the survival of indigenous communities (Walker 2008: 16). As Henderson discusses (2009), this is a "moment of possibility," where archaeologists and native communities can learn from one another's views of ethical responsibility and work towards amiable partnerships that are mutually beneficial (67). This type of relationship shifts control away from the archaeologist, so that the community can choose to become a vested partner while controlling the dissemination of their own cultural property (Hanna 2003: 251–252; Henderson 2009: 67–68).

Zimmerman discusses how archaeological ethics are "complicated and ever changing" and reminds us how every paradigm shift within the field is an important and vital process to better understanding the past and moving towards and ethic of collaboration (2012: 99–100). Rather than binaries, there has and will always be a continuum of opinion regarding what defines ethical treatment (Zimmerman 2012: 105). With the incorporation of new research questions, methods, and technologies, previously engrained ethics are being replaced by broader views surrounding collaboration and indigenous stewardship (Zimmerman 2012: 113).

Cross-References

- ▶ Repatriation Acts: Before NAGPRA
- ▶ Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)
- ▶ World Archaeological Congress (WAC)

References

Bienkowski, P., and E.B. Coleman. 2013. Contesting 'Claims' on human remains: Which traditions are treated as legitimate and why? In *Global ancestors: Understanding the shared humanity of our ancestors*, ed. M. Clegg, R. Redfern, J. Bekvalac, and H. Bonney, 81–101. Oxford: Oxbow Books.

Blau, S. 2014. Ethics and human remains. In *Encyclopedia of global archaeology*, ed. C. Smith, 2453–2458. New York: Springer.

DeWitte, S.N. 2015. Bioarchaeology and the ethics of research using human skeletal remains. *History Compass* 13 (1): 10–19.

Dickerson, A.B.., and E.R. Ceeney. 2014. Repatriating human remains: Searching for an acceptable ethics. In *The ethics of cultural heritage*, ed. T. Ireland and J. Schofield, 89–104. New York: Springer.

Ferguson, T.J. 1996. Native Americans and the practice of archaeology. *Annual Review of Anthropology* 25: 63–79.

Goldstein, L., and K. Kintigh. 1990. Ethics and the reburial controversy. *American Antiquity* 55 (3): 585–591.

Hanna, M.G. 2003. Old bones, new reality: A review of issues and guidelines pertaining to repatriation. *Canadian Journal of Archaeology* 27 (2): 234–257.

Henderson, J.Y. 2009. The appropriation of human remains: A first nations legal and ethical perspective. In *The ethics of cultural appropriation*, ed. J.O. Young and C.G. Brunk, 55–71. Chichester: Blackwell Publishing.

Holand, I., and I. Somerseth. 2010. Ethical issues in the semi-darkness: Skeletal remains and Sámi graves from Arctic Northern Norway. In *More than just bones: Ethics and research on human remains*, ed. H. Fossheim, 21–48. Oslo: The Norwegian National Research Ethics Committee.

Klesert, A.L., and S. Powell. 1993. A perspective on ethics and the reburial controversy. *American Antiquity* 58 (2): 348–354.

Lambert, P.M. 2012. Ethics and issues in the use of human skeletal remains in paleopathology. In *A companion to paleopathology*, ed. A. Grauer, 1st ed., 17–33. Hoboken: Blackwell Publishing.

Larsen, C.S., and P.L. Walker. 2005. The ethics of bioarchaeology. In *Biological anthropology and ethics: From repatriation to genetic identity*, ed. T.R. Turner, 111–119. Albany: State University of New York Press.

Martin, D.L., R.P. Harrod, and V.R. Pérez. 2013. *Bioarchaeology: An integrated approach to working with human remains*. New York: Springer.

Mays, S. 2010. *The archaeology of human bones*. New York: Routledge.

Nagar, Y. 2002. Bone reburial in Israel: Legal restrictions and methodological implications. In *The dead and their possessions: Repatriation in practice, policy, and practice*, ed. C. Fforde, J. Hubert, and P. Turnbull, 87–90. New York: Routledge.

Nilsson Stutz, L. 2007. Archaeology, identity, and the right to culture: Anthropological perspectives on repatriation. *Current Swedish Archaeology* 15: 1–16.

Pardoe, C. 1990. Sharing the past: Aboriginal influence on archaeological practice, a case study from New South Wales. *Aboriginal History* 14 (2): 208–223.

Sayer, D. 2010. *Ethics and burial archaeology*. London: Gerald Duckworth.

Scarre, G. 2013. 'Sapient trouble-tombs': Archaeologists' moral obligation to the dead. In *The Oxford handbook of the archaeology of death and burial*, ed. L.N. Stutz and S. Tarlow, 665–676. Oxford: Oxford University Press.

Sellevold, B. 2010. Ancient skeletons and ethical dilemmas. In *More than just bones: Ethics and research on human remains*, ed. H. Fossheim, 139–163. Oslo: The Norwegian National Research Ethics Committee.

Turner, B.L., and V.A. Andrushko. 2011. Partnerships, pitfalls, and ethical concerns in international bioarchaeology. In *Social bioarchaeology*, ed. S.-C. Agarwal and B.A. Glencross, 44–67. Hoboken: Wiley.

UN General Assembly, United Nations Declaration on the Rights of Indigenous Peoples (2007).

Von Staden, H. 1992. The discovery of the body: Human dissection and its cultural contexts in ancient Greece. *The Yale Journal of Biology and Medicine* 65: 223–241.

Walker, P. 2008. Bioarchaeological ethics: A historical perspective on the value of human remains. In *Biological anthropology of the human skeleton*, ed. M.-A. Katzenberg and S.R. Saunders, 3–40. Hoboken: Wiley.

Webb, S. 1987. Reburying Australian skeletons. *Antiquity* 61 (232): 292–296.

Zimmerman, L.J. 1994. Indigenous peoples and the world archaeological congress code of ethics. *Public Archaeology Review* 2 (1): 5–8.

Zimmerman, L.J. 2005. Maria Pearson's role in world archaeology. *Journal of the Iowa Archaeological Society* 52 (1): 61–66.

Zimmerman, L.J. 2012. On archaeological ethics and letting go. In *Appropriating the past: Philosophical perspectives on the practice of archaeology II*, ed. G. Scarre and R. Cunningham, 98–118. Cambridge: Cambridge University Press.

Zimmerman, L.J. 2014. Repatriation acts: Before NAGPRA. In *Encyclopedia of global archaeology*, ed. C. Smith, 1–6. New York: Springer.

Zuckerman, M., K.R. Kamnikar, and S.A. Mathena. 2014. Recovering the 'Body politic': A relational ethics of meaning for bioarchaeology. *Cambridge Archaeological Journal* 24 (3): 513–522.

Further Reading

Alfonso, M.P., and J. Powell. 2007. Ethics of flesh and bone, or ethics in the practice of paleopathology, osteology, and bioarchaeology. In *Human remains: Guide for museums and academic institutions*, ed. V. Cassman, N. Odegaard, and J. Powell, 5–20. Lantham: AltaMira Press.

Antoine, D. 2014. Curating human remains in museum collections: Broader considerations and a British museum perspective. In *Regarding the dead: Human remains in the British museum*, ed. A. Fletcher, D. Antoine, and J.D. Hill, 3–9. London: British Museum Press.

Bendremer, J.C., and K.A. Richman. 2006. Human subjects review and archaeology: A view from Indian country. In *The ethics of archaeology: Philosophical perspective on archaeological practice*, ed. C. Scarre

and G. Scarre, 97–114. Cambridge: Cambridge University Press.
Joy, J. 2014. Looking death in the face: Different attitudes towards bog bodies and their display with a focus on Lindow man. In *Regarding the dead: Human remains in the British museum*, ed. A. Fletcher, D. Antoine, and J.D. Hill, 10–19. London: British Museum Press.
Lackey, D.P. 2006. Ethics and native American reburials: A Philosopher's view of two decades of NAGPRA. In *The ethics of archaeology: Philosophical perspective on archaeological practice*, ed. C. Scarre and G. Scarre, 146–162. Cambridge: Cambridge University Press.
McGill, D., C. Colwell-Chanthaphonh, and J. Hollowell. 2012. Archaeological ethics. In *Encyclopedia of applied ethics*, ed. R. Chadwick, vol. 1, 2nd ed., 179–188. San Diego: Academic.
Morenon, E.P. 2002. Nagged by NAGPRA: Is there an archaeological ethics? In *Ethics and the profession of anthropology, second edition: Dialogue for ethically conscious practice*, ed. C. Fluehr-Lobban, 107–140. Oxford: AltaMira Press.
Powell, S., C. Elnora Garza, and A. Hendricks. 1993. Ethics and ownership of the past: The reburial and repatriation controversy. *Archaeological Method and Theory* 5: 1–42.
Scarre, G. 2006. Can archaeology harm the dead? In *The ethics of archaeology: Philosophical perspective on archaeological practice*, ed. C. Scarre and G. Scarre, 181–198. Cambridge: Cambridge University Press.
Tarlow, S. 2006. Archaeological ethics and the people of the past. In *The ethics of archaeology: Philosophical perspective on archaeological practice*, ed. C. Scarre and G. Scarre, 199–216. Cambridge: Cambridge University Press.
Young, J.O. 2006. Cultures and the ownership of archaeological finds. In *The ethics of archaeology: Philosophical perspective on archaeological practice*, ed. C. Scarre and G. Scarre, 15–31. Cambridge: Cambridge University Press.

Human Remains: Historic Cemeteries

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Introduction

The study of historic cemeteries is a developing subdiscipline of historic archaeology, focused on the material culture and human remains associated with temporally recent burial sites. Historic cemeteries are typically burial places conducting interments following the Judeo-Christian tradition, in Westernized countries and enclaves from the postmedieval period (in Europe, circa 1485 AD) to present (Cherryson et al. 2012; Baugher and Veit 2014). Such burials include those within church buildings and church yards, urban burial grounds, and true municipal cemeteries, as well as those serving historic forts, missions, institutional burial grounds, and family or town plots (ibid.; Cox 1998; Heilen and Gray 2010; Stojanowski et al. 2013).

Outside of Europe the historic period is more variable, depending on when the country in question was colonized or began to modify its burial traditions to conform to western or postmedieval norms. Outliers are to be found in the early exploration and missionization periods. For example, in the United States, missionization occurred in Florida in the late 1500s, with colonization in the northeast occurring in the 1630s (Stojanowski et al. 2013). The first historic burials in Canada likely date to the founding of the fort at Quebec in the 1530s and slightly later settlements in New Foundland. In Australia, historic cemeteries were founded in the 1790s, but burials associated with European exploration likely exist from earlier periods. In short, wherever people lived or traveled, it may be assumed that some people also died and were buried, bringing their burial traditions with them (Cherryson et al. 2012; Baugher and Veit 2014). Archaeologists as well as historians, art historians, and demographers study such sites via survey, the recording of monuments, subsurface testing, and subsurface excavation (Mytum 2000; Cherryson et al. 2012; Baugher and Veit 2014).

Historic cemeteries, despite occupying a relatively narrow and recent temporal range, encompass an eclectic variety of styles and burial behaviors. Classic examples of well-preserved historic cemeteries from the Puritan, Anglican, Catholic, Pioneer, and Victorian traditions include such sites as the Myles Standish Burying Ground, Duxbury; the Boothill Cemetery, Tombstone; Green-wood Cemetery, Brooklyn; the St. Louis Cemeteries, New Orleans; Glasnevin Cemetery, Dublin; the so-called Magnificent Seven cemeteries, London;

and Montmartre, Montparnasse, and Pere Lachaisse cemeteries in Paris (Cherryson et al. 2012; Baugher and Veit 2014). Many notable historic cemeteries, such as the African Burying Ground, New York, now exist solely as subterranean archaeological sites (Cheek and Roberts 2009).

Definition

Historic cemeteries encompass western-tradition human burial places from roughly 1500 to 1950 AD. Broadly, historic burial tradition includes subterranean or substructure burials, in a grave cut or vault, as well as above-ground vault and mausoleum burials (Cherryson et al. 2012; Baugher and Veit 2014; Springate 2014). The historic corpse has typically been prepared for burial via practices which range from washing, dressing, and laying out in the home by family members, to embalming or preparation by a professional undertaker in the later periods (Morely 1971; Gittings 1984). Individuals are usually placed in a wooden or metal receptacle such as a coffin or series of caskets (Springate 2014). They are generally either dressed or wrapped in a winding sheet and interred with a small quantity of personal effects, burial accoutrements, and/or ritual objects (Cox 1998; Baugher and Veit 2014).

Although single interments per receptacle and per grave are the ideal in this tradition, multiple burials also occur with high frequency (Gittings 1984; Cherryson et al. 2012). The marking of a grave's surface with a monument of wood, metal, or stone is often desirable, but unmarked graves and diverse marker-types are also common and normative (Heilen and Gray 2010; Baugher and Veit 2014). Secondary repositories for large quantities of bone, such as charnel houses and catacombs, fall within this tradition in some locales (Cherryson et al. 2012). It also includes cremation in later periods (Gittings 1984).

The time elapsing between death and burial varies highly by time period, social class, and the circumstances of the death. Obsequies range from minimalistic, stoic, and economical, as exemplified by the Puritan tradition; to lavish, effusive, and extravagant, as exemplified by British heraldic funerals and the Victorian Beautification of Death movement (Stannard 1977; Morely 1971; Gittings 1984). A wide variety of burial behaviors exist during the time period, depending especially on cultural background and religious affiliation. Funeral rituals during this time period are sufficiently diverse and nuanced to constitute their own field of study.

Historic cemeteries also include atypical and non-Judeo-Christian burial sites, provided they fall within the historic period, and are not more closely a continuation of another burial tradition under archaeological study. Examples of these diverse traditions and ethnic compositions include slave and freedmen's cemeteries; burial sites for immigrant laborers; Mormon pioneer cemeteries; historic catacombs and charnel houses; the burial sites of indigenous peoples who adopted western traditions; and mission or colonial cemeteries in "nonwestern" countries (Cheek and Roberts 2009; Davidson 1999; Stojanowski 2014). Some types of contemporaneous burials, such as military cemeteries, plague pits, infant cemeteries and Irish cillini, and prison or poorhouse cemeteries, are also considered historic but are frequently subsumed under a different umbrella of study (e.g., conflict remains, osteological studies of disease or poverty) because of their unique demographic characteristics (Mytum and Evans 2002; Grauer and McNamara 1995; Pfizenmaier 2016).

Historical Background

The evolution from medieval churchyard to modern cemetery followed an era of urbanization and sanitation reform (Wilson and Levy 1938; Mytum 1989; Cox 1998; Cherryson et al. 2012; Baugher and Veit 2014). Although occurring on different timeframes in different regions, this shift was generally characterized by an interdiction against intramural burial; closure of overcrowded churchyards; a transition to urban burial grounds; closing of the urban burial grounds; a transition to the garden cemetery; and a final evolution to the lawn cemetery as we know it today (ibid.).

Historically, many factors caused cemeteries to fall into disuse and resulted in the disinterment of

individual bodies (Cox 1998). Following medieval traditions, the earliest interments were found in church yards and the vaults beneath churches: the most prestigious and desirable location. The average plot was "sold" only for a short tenure: disinterment after a period of 5–10 years was followed by permanent interment in charnel houses or mass burial pits (Cherryson et al. 2012; Baugher and Veit, 2014). Multiple stacked burials were common, with some accounts stating that 15 or more people might share the primary grave (Cherryson et al. 2012). Reopening graves to add bodies disturbed those below. The shallow depth of the topmost burial often meant that remains would rise to the surface in the rain (ibid.; Mytum 1989).

Churchyards quickly became overcrowded and unsanitary (Mytum 1989). The result was a series of cemetery reforms that trended towards privacy and permanence in burial. Designated urban burials grounds on the outskirts of developed areas replaced closing churchyards (Wilson and Levy 1938; Mytum 1989; Cox 1998; Cherryson et al. 2012; Baugher and Veit 2014). Attempts were made to legislate factors such as depth of burial and number of interments within a single grave for reasons of public health (ibid.; Cherryson et al. 2012). However, as cities expanded rapidly, overcrowding and sanitation again became issues.

In major urban centers, wholesale attempts at burial ground clearance and relocation to catacombs were taking place in the late seventeen to mid-eighteen-hundreds. Two examples are St. Pancras, London, and Les Innocents, Paris (Cherryson et al. 2012; Boyle 2015). In similar cases in America, relatives responded to newspaper requests that they disinter their loved ones (Heilen and Gray 2010). Increasing mobility also resulted in independent disinterment of recent ancestors to be reburied where their descendants resettled. Theft of bodies for medical dissection was another circumstance leading to disinterment in the historic period (Richardson 1988).

As overcrowded urban burial grounds closed, the transition began to garden cemeteries outside of city boundaries (Cox 1998; Cherryson et al. 2012). During the Victorian period, these rambling, bucolic idylls were a nexus for the cult of mourning, where the living could commune with the dead in a rural setting (Morely 1971; Curl 2001). Following the World Wars, as people began to dwell on death in a more detached way, the modern lawn cemetery with its neat, manicured rows of graves arose (Gittings 1984; Cherryson et al. 2012; Stearns 2015; Lacqueur 2016).

Despite the historic relocation of some cemeteries, and some individual bodies, only small percentages of the total number of urban cemeteries and the total number of burials in any given cemetery appear to have been removed in the historic period in the USA and UK. While the surface features of some historic cemeteries are preserved, many fell into disuse and were forgotten, leaving subterranean features largely intact (Cherryson et al. 2012; Baugher and Veit 2014).

Burial tradition across this time period followed general rules but differed between ethnic groups, religious sects, and region. At the end of the Medieval period, funeral rituals were characterized by Catholic practice which took the form of prolonged intercession for souls presumably in purgatory (Gittings 1984; Cox 1998). Among practicing Catholics, these traditions continued throughout the historic period but were influenced to varying degrees by Protestant fashion.

During the early postmedieval period, two groups broadly characterized Protestant belief and burial tradition: Calvinists, or Puritans, and Anglicans. Without purgatory, anxieties about salvation and resurrection yielded two different deathways. The first was the Puritan horror of the corpse and professed, although not always factual, emphasis on simplicity in burial (Morely 1971; Stannard 1977). The Anglicans, by contrast, developed ostentatious heraldic funerals among the British nobility: a reaction to the finality of Puritan judgment, mingled with an attempt to retain some aspects of Catholicized tradition (Gittings 1984). Embalming arose during this time, due in part to the delay necessary to plan elaborate funerals and qualms about bodily decay (ibid; Richardson 1988).

During the 1600s, the aristocracy reacted to this manipulation of the corpse and the rigidity of burial protocols with the gradual popularization of less ostentatious "night funerals," allowing

them a more personal interaction with grief (Gittings 1984). At the same time, the lower classes were attempting to imitate the upper-classes' previously extravagant burials. This obsession with providing their loved ones with so-called "decent burial" often came at insurmountable personal expense (ibid.; Cherryson et al. 2012; Richardson 1988). During the Romantic and Victorian eras in the mid-seventeen to mid-eighteen hundreds, this fixation had evolved into the "Beautification of Death" movement, characterized by ritualized behavior and objects that idealized death and heaven, as well as prolonging the mourning and memorialization of the dead (Curl 2001).

Historic-period Catholic, Jewish, Africanized, Chinese, and Japanese burial traditions are found with some frequency in the archaeological record, depending on the country of study. These are marked by distinct material culture. Historic Jewish burials are characterized by coffins made without metal, contact with the soil, and burial in a shroud (Sayer 2012). Catholic burials are commonly accompanied by specific religious signifiers such as saint's medals, crucifixes, or floral halos for very young children (Heilen and Gray 2010; Stojanowski 2013). African burials may have associated ritual objects including the last items used by the deceased, or a shoe or plate of salt placed above the corpse (Davidson 1999; Cheek and Roberts 2009). Chinese burials sometimes include secondary interment and may result in archaeological features containing no remains at all. They may also contain more grave deposits, such as money or burnt offerings.

Archaeological study of historic cemeteries typically focuses on bioanthropological analyses of human remains, as well as interpretation of surface and subsurface material culture. Because historic cemeteries often contain abundant remains, the involvement of an experienced physical anthropologist is standard in their excavation and study (Cherryson et al. 2012; Boyle 2015). In addition to providing clues about individual identities and family relationships, the study of large groups of human remains from a single community and time period yields interesting information about pathology, demography, taphonomy, and osteometric and nonmetric traits in osteological populations. The increasing ease of DNA and isotopic studies even allows for a better understanding of topics such as migration and consanguinity.

Despite a wealth of burial traditions, some manifestations of material culture and burial practice are fairly universal to historic cemeteries (Cherryson et al. 2012). Although vaults and mausoleums are historic period features, subterranean interments (i.e., graves) are relatively more common. In certain locales, where, for example, the soil is saturated or rocky (e.g., Louisiana, west Texas), above ground vaults or burial in shallow graves beneath rock mounds may be normative. Despite the wisdom of graves being six feet deep, they vary in depth and dimension. This is contingent on soil quality, and the size of the individual to be buried. Typical subterranean interments are stone or brick lined cists, wooden vaults, or unadorned earthen pits (see Heilen and Gray 2010; Davidson 1999; Cheek and Roberts 2009). Such graves may include bricks, stones, or wooden props to stabilize the coffin during funerals. Objects such as the remnants of rope from lowering the coffin may also be found at their bottom. In some circumstances, burial in a shroud or a winding sheet was used in place of a coffin. Other contexts, such as paupers' pits and plague pits, may tend to include fewer encased burials, resulting in heavily comingled assemblages (Fowler and Powers 2014).

Historic coffins have many shapes but are often a simple rectangular; lozenge-shaped octagonal; or pinch-toe, wide-shouldered hexagonal box (Springate 2014). In later periods, a coffin is often nested inside an ornamental casket. Burial containers, where they are present, range from homemade, unadorned boxes, to mass-produced receptacles with ornamental hardware, lined interiors, and glass viewing windows. Lacquers, colorful paint, or upholstered exteriors were also popular (Heilen and Gray 2010). It is important to note that elaboration does not necessarily equate with price, and style does not neatly equate with date, as mass-produced burial containers and hardware had a long shelf-life in rural communities (Springate 2014).

In addition to human remains and burial receptacles, a number of other associated artifacts are common. Some form of attire is usually present. This may involve a shroud, a special or formal burial garb, or the clothes the deceased died in (Cherryson et al. 2012; Springate 2014). In the case of coffins with viewing windows, formal garb may exist only from the waist up. The joints including the jaw may be bound with cloth or other fasteners to prevent disarray during viewing and burial. Burial goods may constitute personal effects, as well as ceremonial items such as medallions, coronets, offerings, superstitious tokens, or the last objects used by the deceased (Heilen and Gray 2010; Davidson 1999; Cheek and Roberts 2009; Stojanowski 2013). Additionally burial containers may be upholstered or lines with flora, wood shavings, grass, wadded cloth, or even embalming bottles to prop up parts of the body (Springate 2014).

The surviving surface features associated with historic cemeteries likewise contain important information requiring archaeological study (Cherryson et al. 2012). Historic cemeteries are often mindfully landscaped spaces, including paths, fenced plots, occasional buildings, and decorative flora. Understanding the initial placement and movement of these is crucial to locating and interpreting the subsurface features (Mytum 2000; Baugher and Veit 2014). This is crucial as the spatial arrangement of graves may yield important information regarding family, social, and religious relationships, as well as date of death and use-history of the burial ground.

The study of gravestone iconography and manufacture is one of the earliest and most common occupations of historic cemetery archaeology (Dethlefsen and Deetz 1966; Mytum and Evans 2002). Such research provides information about religious beliefs and stylistic developments, as well as biographic and demographic information about the burials within the cemetery. It is important to note that not all burials initially included lasting monuments (Heilen and Gray 2010; Baugher and Veit 2014). Those that do may display incomplete or even intentionally inaccurate data, such as exaggerated age at death to increase the perception of an individual's venerability (Cox 1998). Some graves are completely unmarked from their inception, while others may be situated around a shared monument. Grave markers include elaborate headstones or monuments, simple rough field stones, wooden crosses or other markers, or even bespoke items like bedsteads and seashells (Heilen and Gray 2010; Davidson 1999; Cheek and Roberts 2009; Mytum 2009). As with burial hardware, graves markers and plots may be relatively simple in design, or they may involve footstones, capstones, wrought iron fencing, and other material culture.

Key Issues/Current Debates

Rapid changes in burial behavior and frequent site abandonment make historic cemetery studies a complex process. Much historical research has focused on the iconography and content of cemetery monuments from an art-historical perspective (Dethlefsen and Deetz 1966; Mytum and Evans 2002) and the social beliefs surrounding death (see Morely 1971; Stannard 1977; Gittings 1984; Richardson 1988).

True archaeological studies pertaining to the surface and subsurface material culture of historic cemeteries are gradually becoming dominant, and much of the work remains descriptive (e.g., Strangstad 2013; Mytum 2000; Stojanowski 2013; Baugher and Veit 2014). Many isolated excavation reports seek to elucidate the history of a particular site or answer questions of local historic interest (e.g., Miles and White 2008; 2015; Heilen and Gray 2010; Cheek and Roberts 2009; Davidson 1999). In the United States, many of the larger excavated cemeteries have been burials of slaves or freedman, so regional questions pertaining to the institution of slavery are common (Cheek and Roberts 2009; Davidson 1999). In the United Kingdom, the study of pathological conditions, such as mass plague burials, has been another major theme of study (Walker 2012; Fowler and Powers 2014).

Few works have focused on general issues related to the subsurface archaeology of historic cemeteries (e.g., Baugher and Veit 2014). The material culture of burial furniture is one area

which is beginning to receive attention (Springate 2014). As with most sites involving human burials, the ethics and legality of excavating human remains is another issue which is emerging, as more forgotten historic cemeteries are rediscovered and relocated (Sayer 2012; Ubelaker 2011; Boyle 2015).

Much ongoing research into larger questions explores whether written records from the historic period can be substantiated by the material culture of cemeteries and the human remains found within them (e.g., Grauer and McNamara 1995). Issues of demography, taphonomy, and pathology are among the more common topics. Comparative studies between poorhouse cemeteries are among these, as well as demographic studies exploring the suitability of historic cemeteries as comparative samples for taphonomic changes in bone (Grauer and McNamara 1995; Murphy 2016; Murphy and Chamberlain 2017). Historic cemeteries are uniquely suited to answer questions regarding the decomposition rates of human bodies, cause-specific mortality, attitudes toward death, historic burial traditions, and historical disease and trauma. This is because they contain human remains as well as material culture, which can often be compared to written records.

International Perspectives

What is considered to be of archaeological interest varies by country, as well as the legal process for dealing with recent burials, and the frequency with which they are encountered. Therefore, the concept of historic cemetery archaeology may be more common in westernized traditions, where historic period burials are distinct from older burial practices, and where it is more likely they will be excavated archaeologically. In studies of global funerary traditions in the modern era, many Asian, African, and Middle Eastern cultures have shown more continuity in burial practice (Stearns 2016). Countries such as Mongolia experienced a reversion to traditional deathways. Other countries such as Ghana have integrated unique modern adaptations to local traditions yet diverge drastically from and in many ways defy the "westernized" historic cemetery with its increasingly medical management of death (ibid., Laqueur 2015). Such practices contrast with the western shift towards the emotional depersonalization of death and prolonged mourning, as cemeteries themselves moved ever farther away from the sphere of the living.

Historic cemetery excavation often occurs in cases where such sites have been forgotten and rediscovered during construction (Baugher and Veit 2014; Boyle 2015). In locales with firmer religious-based burial laws (e.g., Scotland), regions where cemeteries were moved historically to catacombs (e.g., France), or areas with an abundance of space (e.g., Australia and rural parts of America), historic burial excavation remains uncommon (Cox 1998; Cherryson et al. 2012). This is because inadvertent disturbance may be rarer, and it may be considered inappropriate to excavate human remains when it occurs.

Many countries outside of the United States have an archaeological focus that is very ancient. The historical period may be neglected in these regions. Furthermore, the concept of the historic cemetery as a unique archaeological landscape may not exist where burials follow a continuous tradition. Therefore, they may be considered within a different subdiscipline, where they are studied at all. In these and other instances, the relocation of historic graves may be considered the provenience of funeral homes (Boyle 2015).

As the field expands, it is hoped that more comparative studies are made surrounding the variations in global deathways in response to the events of the eighteenth to twentieth centuries, integrating unique regional deathways, which are no less fascinating, but which may be initially perplexing to study under the same umbrella.

Future Directions

In the majority of cases, historic cemeteries are excavated not solely for academic study, but because their accidental discovery during construction necessitates it (Baugher and Veit 2014). Such cemeteries may be relocated by exhumation contractors, private cultural resource management firms, or academic excavations (Boyle 2015). This results in uneven treatment of the sites and

irregular collection of data no matter their archaeological significance. The laws dictating the treatment of historic burials also vary by country and by region, so the ethics of excavating cemeteries to an acceptable archaeological standard is a growing issue (Ubelaker 2011; Sayer 2012; Boyle 2015).

The ethical excavation of a historic cemetery is complicated by the fact that they are often discovered unexpectedly and contain a large number of surface and subsurface features (Ubelaker 2011; Cherryson et al. 2012). As each burial also represents the remains of a human being, potentially with living descendants, respectful treatment is preferable (Sayer 2012).

Unfortunately, because of their complexity, their excavation may need to be particularly slow in instances when development interests would prefer that they progress rapidly. Often, the sites encompass long use-periods (Boyle 2015). Many historic cemetery areas had dual functions as agrarian, religious, or social spaces, followed by periods of historic disuse, overbuilding, and modern repurposing (Cox 1998; Cherryson et al. 2012). Cemeteries are often heavily disturbed, due to their urban histories and the historic changes that brought about the development of the modern cemetery in the first place.

Because historic disturbances are typical, it has sometimes been assumed that cemeteries are unlikely to contain human remains after around 100 years, so there will be no subsurface archaeology left to consider (Batillo 2012). This is false. Even the oldest historic burials and many disturbed cemeteries contain well-preserved human remains, as well as material culture associated with the burials (Baugher and Veit 2014). "Airtight" Fisk caskets and other unique environmental circumstances sometimes may even result in the preservation of soft tissue (Springate 2014). Because of these factors, historic cemeteries are interesting not only for the information they yield about their time period and communities, but because they are well preserved osteological datasets which also may be large and complex.

As the issues pertaining to their excavation become more well known, and the data potential of such large osteological datasets with associated demographic records becomes better appreciated among archaeologists, it is expected that better standards of methodology and recording will result (Murphy 2016; Murphy and Chamberlain 2017). This should be accompanied by legislation stipulating the treatment of disturbed burials (Batillo 2012; Sayer 2012). Additionally, as the historic period moves farther away from the present, the study of historic sites in general is likely to become relatively more common.

References

Batillo, J.M. 2012. A critique of legal protection for human remains in Idaho with suggestions for improvement of current legislation. *Journal of Northwest Anthropology* 46 (2): 189–201.

Boyle, A. 2015. Approaches to post-medieval Burial in England: Past and present. In *The archaeology of death in post-medieval Europe*, ed. Sarah Tarlow, 39–60. Berlin: Walter de Gruyter GmbH & Co.

Cheek, C.D., and D.G. Roberts. 2009. *The archeology of 290 broadway*. Vol. I–IV. West Chester: John Milner Associates.

Cherryson, A., Z. Crossland, and S. Tarlow. 2012. *A fine and private place: The archaeology of death and burial in post medieval Britain and Ireland*. Vol. 22. Leicester: University of Leicester Archaeology Monograph.

Cox, M., ed. 1998. *Grave concerns: Death & burial in England 1700–1850*. London: Council for British Archaeology.

Curl, J.S. 2001. *The victorian celebration of death*. Thrup: Sutton Mill Publishing Ltd..

Davidson, J., M. 1999. Freedman's Cemetery (1869–1907): A chronological reconstruction of an excavated African-American Burial Ground, Dallas, Texas. Unpublished master's thesis, University of Arkansas, Little Rock.

Dethlefsen, E., and J. Deetz. 1966. Death's heads, cherubs, and willow trees: Experimental archaeology in colonial cemeteries. *American Antiquity* 31 (4): 502–510.

Gittings, C. 1984. *Death, burial, and the individual in early modern England*. London: Croom Helm.

Grauer, A.L., and E.M. McNamara. 1995. A piece of Chicago's past: Exploring childhood mortality in the dunning poorhouse cemetery. In *Bodies of evidence: Reconstructing history through skeletal analysis*, ed. Allison Grauer, 91–103. New York: Wiley-Liss.

Heilen, M., and M. Gray 2010. *Deathways and lifeways in the American Southwest: Tucson's historic almedastone cemetery and the transformation of a remote outpost into an urban city*. Vol. I–IV. Statistical Research, Inc. Reports. Tucson: Pima County Cultural Resource and Historic Preservation Office.

Laqueur, Thomas. 2015. *The work of the dead: A cultural history of mortal remains*. Princeton: Princeton University Press.

Miles, A., and W. White. 2008. *Burial at the site of the Parish church of St. Benet Sherehog before and after the great fire: Excavations at 1 poultry, City of London*, MOLAS Monography 39. London: Museum of London Archaeological Service.

Morely, J. 1971. *Death, heaven, and the victorians*. London: Studio Vista.

Murphy, Amanda. 2016. Missing, presumed dead: Deconstructing 'high' infant mortality with new data sets in historic cemetery populations. In *Beyond the bones: Engaging with disparate datasets*, ed. Madeleine Mant and Alyson Holland. New York: Academic Press.

Murphy, Amanda, and Andrew Chamberlain. 2017. Looking forward to look back: How investigations of historical burial populations can inform our interpretations of prehistoric burial practices. In *Engaging with the dead: exploring changing human beliefs about death, mortality and the human body*, ed. Jennie Bradbury and Chris Scarre. Oxford: Oxbow Books.

Mytum, Harold. 1989. Public health and private sentiment: The development of cemetery architecture and funerary monuments from the eighteenth century onwards. *World Archaeology* 21 (2): 283–297.

Mytum. 2000. *Recording and analysing graveyards: CBA practical handbook*. Council for British Archaeology.

Mytum, Harold, and R. Evans. 2002. The evolution of an Irish graveyard during the eighteenth century: The example of Killeevan, Co. Monaghan. *The Journal of Irish Archaeology* 11: 131–146.

Pfizenmaier, Sam. 2016. *Charterhouse square: Black death cemetery and Carthusian monastery, meat market and suburb*. London: Museum of London Archaeological Services.

Richardson, R. 1988. *Death, dissection, and the destitute*. London: Phoenix Press.

Sayer, Duncan. 2012. *Ethics and burial archaeology*. Bristol: Bristol Classical Press.

Springate, Megan. 2014. *Coffin hardware in nineteenth century America*. Walnut Creek: Left Coast Press.

Stannard David, E. 1977. *The Puritan way of death: A study in religion, culture, and social change*. New York: Oxford University Press.

Stearns, Peter. 2016. *Revolutions in sorrow: The American experience of death in global perspective*. New York: Routledge.

Stojanowski, Christoper. 2013. *Mission cemeteries, mission peoples: Historical and evolutionary dimensions of intracemetery bioarchaeology in Spanish Florida*. Talahassee: University of Florida Press.

Strangstad, L. 2013. *A graveyard preservation primer*. New York: Altamira Press.

Ubelaker, Douglas. 2011. United States of America. In *The routledge handbook of archaeological human remains and legislation*, ed. N. Marquez-Grant and L. Fibiger, 533–540.

Human Skeletal Remains: Identification of Individuals

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Identification Defined

Identification is defined as the act of establishing an identity that makes an entity definable and recognizable (Black 2007; see also Latham et al. 2017; Mallett et al. 2014). While identification may be important in cases involving the living (e.g., Black et al. 2010; Blau et al. 2006: 387), in archaeological and forensic cases, identification involves attributing a correct name to human remains. There are various circumstances where there may be a requirement to establish the identity of a deceased individual: following an unexplained natural death, homicide, suicide, or accident; in cases of death following political, ethnic, or religious violence; and mass disaster incidents. The attempted identification of historic figures has also been pursued (Blau et al. 2014; Bogdanowicza et al. 2009; Clark 2011; Stone et al. 2001).

While the cause and manner of death can be determined independently of identification, the absence of the name of the deceased person means there is no way to know who to talk to collect information about the person when they were alive (antemortem data) and therefore confirm or deny identification. The identification of a deceased person is important for a variety of legal, religious, cultural, and ethical reasons (Blau and Hill 2009). In fact, it has been argued that "[i]dentification of human remains is . . .as important as the collection of evidence for criminal investigations. It is a duty of investigators, in recognition of the right to know of concerned families, as enshrined in international

humanitarian law" (Tidball-Binz 2006: 389). Essentially, "human beings have the right not to lose their identity after death. . ." (Interpol 1996).

Identification Methods

The identification of a deceased person, whether a historic figure or recovered from a forensic context, is complex and often time-consuming. The process involves comparing information obtained from the analysis of the deceased person (postmortem data) with information obtained about the person when they were alive (antemortem data).

The forensic sciences play an integral part in the identification of deceased individuals. Decisions about which specific techniques to use in the identification process will, however, be influenced by variables such as the preservation and condition of the remains. Accurate and professional recovery of the remains is therefore paramount to ensure that as much information as possible is available to aid the identification process. In addition, the accuracy and quality of the antemortem information are also important variables in the identification process.

Positive Identification

International standards promote the positive identification of individuals. A positive, that is, confirmed identification is achieved when it can be demonstrated that there are enough unique data markers to conclude that the ante- and postmortem records are from the same individual. The primary methods of identification (or unique data markers) include fingerprints, DNA and dental comparison.

Presumptive Identification

In cases where no adequate antemortem records exist (e.g., in countries where people rarely visit a dentist or where fingerprints records are not routinely collected), it may only be possible to establish a possible or presumptive identity (e.g., Simmons and Skinner 2006). While no single factor alone justifies the identification, information such as age at death, sex, stature, associated clothing, jewelry, documents, etc., when considered together, are sufficient for a possible identification.

Exclusion

There will be some cases where the post- and antemortem information do not match, therefore resulting in an exclusion. For example, human remains are located in an area near where missing persons' files indicate that a 15-year-old girl was last seen alive. An analysis of the human remains indicates the individual was an elderly male. Thus, the results of the analysis allow the investigators to exclude the hypothesis that the remains are those of the missing teenager and seek other evidence to form a new proposition for identification.

Variables that Influence the Identification Process

It is important to recognize that the identification process is influenced by a number of variables:

- **Quality of the recovery of remains (completeness)**: In cases where the body is badly decomposed or fully skeletonized, unprofessional recovery may result in incomplete remains where essential parts for analysis and comparison (e.g., teeth) are missing.
- **Preservation/condition**: While the remains may be complete, differential preservation and the condition of the remains will affect the methods which can be considered for identification. Different techniques will be used depending on whether the individual is recently deceased (e.g., a fresh body) or whether significant time has passed (fully skeletonized). For example, a recently deceased person is typically visually identifiable, but it is not possible to use fingerprints for identification when the individual is fully skeletonized. Postmortem and/or perimortem trauma may affect the condition of the remains: in the case of a bomb blast with associated fire, it is possible that the dentition and DNA may be affected.

- **Quality and amount of antemortem data**: There may be cases where only general information such as the age and sex of the person is available, which does not provide enough detail for individualization. The nonexistence of or inability to locate medical and/or dental records may also make it impossible to reach a positive identification. In many instances, there will be no available information about what the deceased person was last wearing, i.e., their clothing and/or personal belongings.
- **Open or closed case**: A closed case refers to a situation where the exact number of missing individuals is known. An example is a plane crash where details of the number and names of people on the plane would have been submitted prior to flight departure. Following the disaster (whether accidental or human-induced), it is therefore possible to define the exact number of missing people and formulate a list of names of victims for which to obtain antemortem data. In contrast, an open case implies the exact number of individuals lost as a result of the disaster or atrocity is unknown because no manifest of missing persons exists. Terrorist bombings, tsunamis, earthquakes, public transport, and ferry disasters are all examples of open cases. In general, the number of persons reported to authorities as missing will exceed the actual number involved in the incident.

Cases Where Remains Cannot Be Identified

There will be situations where remains cannot be identified at the time of the investigation whether as a result of inadequate or absent antemortem data or a lack of resources which result in the inability to form an identification hypothesis. Decisions must then be made by the institution/organization responsible for the remains as to how to appropriately store the remains securely until new information or resources become available (e.g., Cordner et al. 2016).

Summary

The identification process involves the evaluation and integration of all available information. A successful outcome may be achieved through a multidisciplinary approach in which an assessment of the contextual information is taken into account. Whether resulting in a positive or presumptive identification or an exclusion, all available information must be assessed by the relevant experts. The choice of method used to identify an individual will depend on the context of the death of the person, preservation of the deceased, access to antemortem information, and available resources (e.g., DNA capabilities) (Blau and Hill 2009).

Cross-References

- ▶ Age Estimation
- ▶ Dental Anthropology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Facial Approximation and Craniofacial Superimposition
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Time Since Death in Bioarchaeology and Human Osteology

References

Black, S. 2007. Introduction. In *Forensic human identification*, ed. T. Thompson and S. Black. London: CRC Press.

Black, S.M., A. Aggrawal, and J. Payne-James. 2010. *Age estimation in the living*. Chichester: Wiley.

Blau, S., and T. Hill. 2009. Disaster victim identification: A review. *Minerva Medicolegale* 129: 35–46.

Blau, S., T. Hill, C. Briggs, and S. Cordner. 2006. Missing persons – Missing data: Examining the need for the collection of ante-mortem dental records of missing persons. *Journal of Forensic Sciences* 51 (2): 386–389.

Blau, S., L. Catelli, F. Garrone, D. Hartman, C. Romanini, M. Romero, and C. Vullo. 2014. The contributions of anthropology and mitochondrial DNA analysis to the identification of the human skeletal remains of

the Australian outlaw Edward 'Ned' Kelly. *Forensic Science International* 240: 11–21.
Bogdanowicza, W., M. Allenb, W. Branickic, M. Lembringb, M. Gajewskaa, and T. Kupiecc. 2009. Genetic identification of putative remains of the famous astronomer Nicolaus Copernicus. *Proceedings of the National Academy of Science of the United States of America* 106 (30): 12279–12282.
Clark, R. 2011. Forensic experts identify Ned Kelly's remains. http://www.robertclark.net/news/forensic-experts-identify-ned-kelly%E2%80%99s-remains/. Accessed 29 Sept 11.
Cordner, S., R. Coninx, H.-J. Kim, D. van Alphen, and M. Tidball-Binz, eds. 2016. *Management of dead bodies after disasters: A field manual for first responders*. https://www.icrc.org/en/publication/0880-management-dead-bodies-after-disasters-field-manual-first-responders. Accessed 11 Sept 17.
Interpol. 1996. Resolution No AGN/65/RES/13. http://www.interpol.int/Public/ICPO/GeneralAssembly/Agn65/Resolutions/AGN65RES13.asp. Accessed 12 Dec 08.
Latham, K., E. Bartelink, and M. Finnegan, eds. 2017. *New perspectives in forensic human skeletal identification*. London: Academic.
Mallett, X., T. Blythe, and R. Berry, eds. 2014. *Advances in forensic human identification*. London: CRC Press.
Simmons, T. and Skinner, M. 2006. The accuracy of ante-mortem data and presumptive identifications: appropriate procedures, applications and ethics. *Proceedings of the American Academy of Forensic Sciences* 12: 303–304.
Stone, A.C., J.E. Starrs, and M. Stoneking. 2001. Mitochondrial DNA analysis of the presumptive remains of Jesse James. *Journal of Forensic Sciences* 46 (1): 173–176.
Tidball-Binz, M. 2006. Forensic investigations into the missing. In *Forensic anthropology and medicine*, ed. A. Schmitt, E. Cunha, and J. Pinheiro, 383–408. Totowa: Humana Press.

Hunter-Gatherer and Midrange Societies: Uluṟu

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Introduction

Uluṟu (also known as "Ayers Rock" or "The Rock") is a sandstone monolith in the center of Australia. Uluṟu is located within the Uluṟu-Kata Tjuṯa National Park approximately 350 km southwest of Alice Springs and 4 km from the Ayers Rock Resort in the township of Yulara (Figs. 1 and 2). The surrounding environment consists of an extensive system of sand plains, dunes, and alluvial desert (Austral Archaeology 2006: 5). This landscape contains extensive archaeological sites and cultural material including numerous rock art sites, artifact scatters, camp sites and areas of occupation, grinding grooves, scared trees, and sites of historical significance. Uluṟu is an extremely significant and important place for the local Aboriginal group of Aṉangu people, who are guided by their Tjukurpa (traditional law) and continue to live there in the nearby community of Mutitjulu. Aṉangu means "people" in Yankunytjatjara and Pitjantjatjara, and today Aṉangu people proudly manage the National Park jointly with the Australian government. In 2015, Aṉangu celebrated 30 years since the official handback of these lands to Aboriginal people. According to Aṉangu elder T. Tjamiwa, the Park is like a table with one leg unless it is underpinned by Aboriginal law and ownership (Hill 1994: 7); stability comes from this.

Definition

The site of Uluṟu is a sandstone monolith, 9.4 km in circumference and in excess of 340 m high (Department of Environment 2008). The site obtains its name from the local Aṉangu people, who have practiced their culture, and continue to do so, in and around the site for millennia. Uluṟu is also commonly known as "Ayers Rock" on account of the first European to sight it and who named it, thus, the explorer William Gosse in 1873. Located within the Uluṟu-Kata Tjuṯa National Park (UKTNP), Uluṟu is in an area of Central Australia on the southwestern margins of the Lake Amadeus sedimentary basin (Hardy and Johnson 2006: 22). Thirty-two kilometers to the west of Uluṟu lie the 36 sandstone domes of Kata Tjuṯa (meaning "heads many" in the local language of Pitjantjatjara). This site is also known as "The Olgas" as referenced by Ernest Giles in 1872 after the then Queen of Württemberg.

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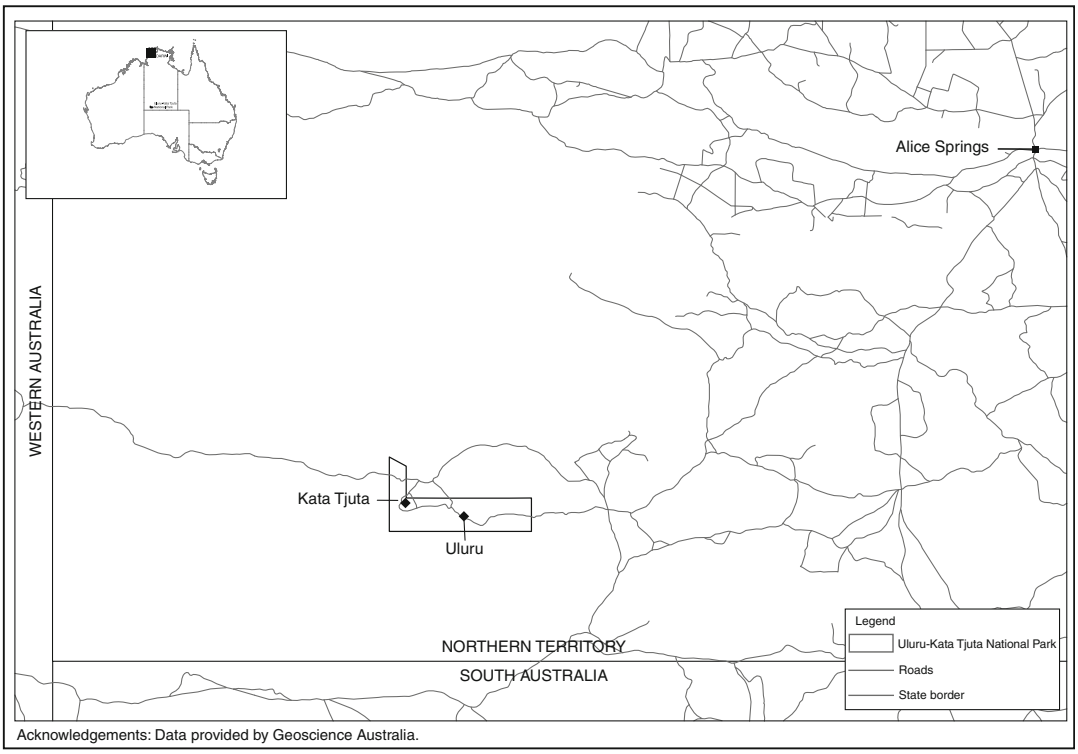

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 1 Map of Australia indicating the location of Uluṟu-Kata Tjuṯa National Park (With kind permission of Uluṟu-Kata Tjuṯa National Park)

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 2 Changing colors of Uluṟu (With kind permission of Uluṟu-Kata Tjuṯa National Park)

UKTNP was inscribed on the World Heritage List in 1987 for outstanding universal natural values and in 1994 for outstanding universal cultural values (Department of Environment 2008). This site was also listed on the National Heritage List of Australia in 2007. Both sites will be referred to by their Aṉangu names only throughout the rest of this entry.

Key Issues/Current Debates/Future Directions/Examples

This following information provides particulars about the site of Uluṟu – the environmental setting, the Aṉangu people, and the archaeological landscape. While this information is thorough, references are also contained below for additional and more comprehensive details.

The Environmental Setting

The landscape surrounding Uluṟu is dry and harsh due to the semiarid environment it lays within, containing complex dune systems, alluvial plains, abundant wildlife, and numerous vegetation species. UKTNP itself covers an area of approximately 1325 km^2 (UKTBoM and Parks Australia 2000: 3). The environmental context of the area is best described with discussion of the geological features, soil landscapes, climate and hydrological data, and the presence of specific vegetation, flora, and fauna species (Fig. 3).

The geological features of both Uluṟu and Kata Tjuṯa are classed as surface expressions of Mt. Currie conglomerate of Cambrian age, an arkose variant of the conglomerate, feldspar-rich sandstone (Hooper et al. 1972). Local outcrops of calcrete are found in the area and stone sources suitable for flaked tool manufacture including quartz, silcrete, and quartzite which are also regionally available (Hardy and Johnson 2006).

The landscape around Uluṟu contains three primary land systems as described in Allan (1984), while only two of these are detailed in Hooper et al. (1972). The first of these is the Gillen Land System, consisting of the sandstone ranges, their narrow gorges, gullies and creek lines, and associated gently sloping fans and alluvium of coarse-textured soils. These are surrounded by the Karee Land System that consists of the gently sloping plains fringing the fans and alluvium of the Gillen Land System. The final major land system covers most of the UKTNP and is the Simpson Land System, consisting of sand plains and dune fields (Austral Archaeology 2006; Hardy and Johnson 2006).

The climatic conditions and subsequent hydrology surrounding Uluṟu are what is to be expected within a semiarid environment. The average rainfall is around 220 mm in a year, and there is no predictability in the variation from year to year (Hardy and Johnson 2006). It is not unknown for rainfall to be over 500 mm for 3 years in a row and then 100 mm for the next 3-year period (Latz 2004). As the annual rainfall is quite low, movement of surface water is localized to within the park (Hooper et al. 1972).

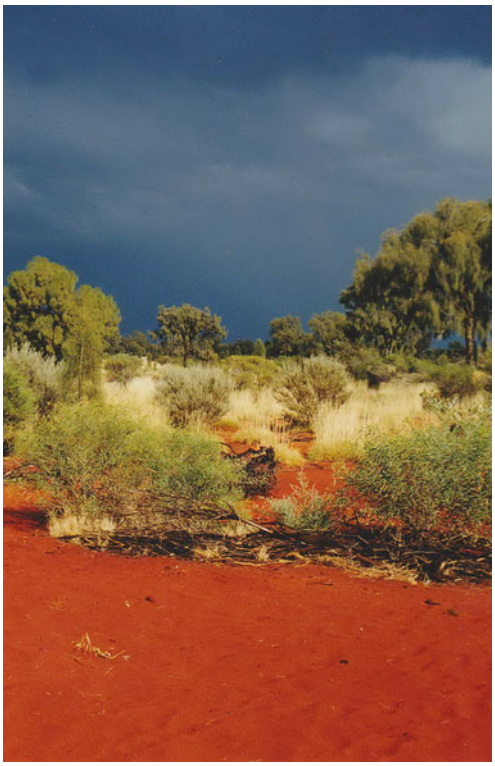

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 3 Flora and fauna found within the UKTNP (With kind permission of Uluṟu-Kata Tjuṯa National Park)

As Uluṟu lies within the Great Sandy Desert bioregion of the Northern Territory (Connell 2004), the vegetation present is one that exhibits tolerance to a semiarid environment. Austral Archaeology (2006: 5–6) lists a number of references for the floristic and vegetation patterns around Uluṟu. These include examples from Buckley (1981a, b), Allan (1984), Griffin (1984), Saxon (1984), and Reid et al. (1993). The vegetation present changes with the soil

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landscapes, moving from sandy to heavier red earths and the alluvial fans and plains. The majority of vegetation present is within the sandy soil landscape and reportedly includes species such as spinifex *(Triodia basedowii* or hard spinifex, *T. pungens* or soft spinifex, and to a lesser extent *Plectrachne schinzii* or feathertop spinifex), desert oaks *(Allocasuarina decaisneana)*, umbrella bush or sandhill wattle *(Acacia ligulata)*, honey grevilleas *(Grevillea eriostachya* and *G. juncifolia)*, desert hopbush *(Dodonaea viscosa)*, cassia *(Senna artemisioides)*, long-leaved desert fuchsias *(Eremophila longifolia* and *E. willsii)*, and the parrot pea *(Crotalaria cunninghamii)* (Austral Archaeology 2006). Within the other soil landscapes, there are also numerous species of mulga present *(Acacia aneura* and related species, as well as sandhill mulga *(Acacia ammobia))*, mallee eucalyptus, bloodwood *(Corymbia opaca)*, corkwood *(Hakea suberea)*, and witchetty bushes *(Acacia kempeana)*, as well as witchetty bushes, native fuchsias *(Eremophila gilesii* and *E. latrobe)*, native currant *(Canthium latifolium)*, cassia *(Senna artemisioides)*, woolly butt *(Eragrostis eriopoda)*, prickly wild tomato *(Solanum quadriloculatum)*, caustic bush *(Euphorbia tannensis)*, and a variety of grasses (Austral Archaeology 2006).

Faunal species present around Ulu̱ru include numerous species of reptiles, kangaroos, and other mammals, birds, and insects. A total of 46 species of native mammal are known to have existed in the area of UKTNP, although this is now reduced (Hardy and Johnson 2006). Currently the range of fauna within the park includes 178 birds, 77 recorded species of reptiles and amphibians – including 60 lizards, 13 species of snakes, and 4 frog species – and 21 mammal species (Department of Environment and Heritage 2012). A full list of mammal, reptile, and bird species present within the UKTNP and information (including A̱nangu names) can be found at http://www.environment.gov.au/parks/ulu̱ru/nature/fauna.html.

A̱nangu: The People and the Park

The A̱nangu are the local indigenous inhabitants of the area within and around Ulu̱ru-Kata Tju̱ta National Park. They are the traditional owners of the area and site custodians of the many sacred and special places located around the base of Ulu̱ru. Many live in the nearby Mutitjulu community, located on the eastern side of the great monolith and not far from the park headquarters and visitors center on the southwestern side. They also speak Pitjantjatjara and identify with the Pitjantjatjara/ Yankunytjatjara language group, with connection not only to this country but also to that to the west and south of the park in the "A̱nangu Pitjantjatjara Yankunytjatjara (APY) Lands."

Long-recognized for their connection to the country, the following extract for the UKTBoM Plan of Management (2000: xx) illustrates this:

> As a cultural landscape, the Park as we know it today represents the work of A̱nangu and nature throughout thousands of years. The landscape of the Park has been managed over this time using traditional A̱nangu methods governed by Tjukurpa, which is A̱nangu law. The Park contains some outstanding examples of the habitats of rare desert flora and fauna as well as the major geological features of Ulu̱ru and Kata Tju̱ta.
>
> A̱nangu believe the Park landscape was created at the beginning of time by ancestral beings and A̱nangu are their direct descendents and have lived here ever since.

A̱nangu take seriously their responsibility to look after the country. The history of the park has been one of struggle and survival, as they battled with many areas of government to manage their own country. In 1985, through their determination, their rights were acknowledged with the then governor-general formally granting title to the park to the Ulu̱ru-Kata Tju̱ta Aboriginal Land Trust (UKTBoM 2000: 9). Today, the park is leased back to the Australian government in a joint management arrangement between the parties.

Underpinning this arrangement is the vision of the Board of Management and this guides all of the work undertaken within the park (UKTBoM 2000: x):

> The Ulu̱ru-Kata Tju̱ta landscape is and will always be a significant place of knowledge and learning. All the plants, animals, rocks, and waterholes contain important information about life and living here now and for all time.

> Aṉangu grandparents and grandchildren will always gain their knowledge from this landscape.
>
> They will live in it the proper way. This is Tjukurpa.
>
> Together we will apply Aṉangu Tjukurpa and practice and relevant Piṟanpa [nonindigenous] knowledge to:• Keep Tjukurpa strong.
>
> - Support a healthy Aṉangu culture and society.
> - Look after country and protect a national symbol.
> - Protect World Heritage natural and cultural environments of the Park in harmony with Australian social and economic aspirations.

The responsibility in caring for the country is innate for Aṉangu, and with this comes the knowledge relating to resources and the use of certain areas for different activities. Resource variations can be identified by the different zones categorized by Aṉangu and include *puḷi* (rocky country, e.g., Uluṟu), *puṭi* (shrub land), *karu* (creek lines and runoff plains), *tali* (sand dunes), *pila* (spinifex plains and low areas between sand dunes), and *nyaṟu* (recently burnt country) (DEH 2006 in Hardy and Johnson 2006).

Management of the landscape relates to these zones and the vegetation types found within them. With practices proven over thousands of years, sites are looked after and managed with intricate fire regimes, the cleaning of waterholes, and other land management practices that help to control the environment and keep the land healthy (Hardy and Johnson). The use of fire is an integrally important part of maintaining the country, and Aṉangu are taught the correct way to burn and manage fire by their grandparents according to Tjukurpa (Muṭitjulu Community 1996: 49).

Aṉangu knowledge also enables people to travel through the landscape, utilizing resources as they move vast distances. Hardy and Johnson (2006) list the known uses of plants and resources in the area that have included:

- Food – seeds, fruit, greens, saps, and tubers
- Medicine
- Wood for making implements
- Water
- Resins/glues
- Fiber
- To aid in hunting/poison
- Ceremony and art
- Decoration
- Toys
- "Native tobacco"
- Shelter

Cultural traditions are strong within UKTNP and are still practiced today by Aṉangu people. The principles guiding this culture are known as "Tjukurpa." It is not restricted to dreaming stories or places. It is all encompassing and includes, but is not restricted to, language, rules of behavior, kinship systems, and the general guiding principles needed for life. Tjukurpa surrounds you when visiting, working, or living in UKTNP.

Tjukurpa is central to life at Uluṟu – it is the law, and it is the dreaming, the story, and the message (Mick Starkey 2006, personal communication). Aṉangu see Uluṟu and Kata Tjuṭa as part of a cultural landscape and reference is to the spiritual meaning of the park, and spiritual interpretation of the landscape, including geological features such as rock faces, boulders, and waterfalls, contains spiritual meaning. All plants and animals derive from the creative period of Tjukurpa as well (Austral Archaeology 2006).

Johnson (2006) writes that there is much evidence of Tjukurpa within the rock art sites around the base of Uluṟu. This includes representation of the stories of *Kuniya* (Woma python) and *Liru* (poisonous snake), as well as *Kurpany* (the spirit dog). Other motifs at public sites, such as those along the Mala Walk on the western side or near the Mutitjulu Waterhole on the southern side, include symbols for traversing waterholes in the surrounding country, as well as tracks of different types of animals such as the *mala* (rufous hare wallaby), *malu* (kangaroo), and *kaḷaya* (emu) (Figs. 4 and 5). Piti (large wooden bowl) and other manufactured goods are also evident. Through the process of working together, the piranpa (white people) can learn about Tjukurpa from the Aṉangu rangers and traditional owners, all guiding and learning from each other about their ways. There are a number of cultural protocols to work within the sites to ensure that Tjukurpa is looked after (Johnson 2006).

"Sorry Rocks"

A phenomenon that Aṉangu and the Park also have to manage is that of "Sorry Rocks." Since visitors first came to Uluṟu, many have taken pieces of the "Rock" home with them as souvenirs, only to find that this often brought "bad luck." Returning the rocks back to the landscape from which they came and apologetic letters accompanying them is what gave the souvenirs their name of "Sorry Rocks."

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 4 Tourists visiting the Mala Walk near The Climb (With kind permission of Uluṟu-Kata Tjuṯa National Park)

Hundreds of these Sorry Rocks have since been returned to the Park, providing Aṉangu and staff alike with a challenge for how to manage these. Foxlee (2008: xvii) examined this phenomenon and challenge as part of her doctoral research, stating that "For Anangu and Parks Australia, the sorry rock phenomenon presented a management issue and an interpretive challenge. The rocks belong at Uluṟu, not in the pockets and homes of visitors. While the return of such objects was welcomed, there was no simple solution for managing the temporary collection of these materials. The analysis of the sorry rock letters demonstrates that people removed rocks and sand from the Park to remember their experience, and as a means of engaging with the place on a personal level. In extreme cases, the lives of certain individuals who engaged in souveniring behaviour were physically and emotionally transformed by experiences of misfortune and loss. For some, the return of souvenired objects was undertaken: out of respect for the traditional owners of Uluṟu-Kata Tjuṯa National Park; as an opportunity to

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 5 Rock art on the Mala Walk (With kind permission of Uluṟu-Kata Tjuṯta National Park)

apologise; and as an attempt to make amends for actions of the past."

In her research, Foxlee used the Sorry Rocks as a medium for examining the complex relationships that exist between visitors, heritage management, and interpretation particularly in cross-cultural settings that recognize indigenous cultural heritage (Foxlee 2008: xvii). Today, many of the rocks are now on permanent display in the Park, providing an insight into the phenomenon and encouraging others who may consider souvenirs of their own, to consider the impact this has on Aṉangu, the cultural landscape, and their own lives.

The Archaeology

It is rather surprising that, however enchanting Uluṟu may seem, it has been the focus of only a limited amount of archaeological research, and these have predominantly been in the form of archaeological surveys either for UKTNP reference (Haskovec and Sullivan 1987; Haskovec 1989, 1991) or commissioned in response to development within certain sections of the park and required for management considerations (Thorley 2000; Austral Archaeology 2004; 2006; Hardy and Johnson 2006; Gunn 2007). This in part has been due to the concerns Aṉangu have expressed regarding archaeological excavations in their country both within and outside the park boundary, as this practice is not in keeping with Tjukurpa. The resulting research undertaken has focused solely on surface material culture remains and this is what is discussed here.

The types of sites recorded around Uluṟu have included rock art (paintings and petroglyphs), artifact scatters, campsites, and isolated artifacts (Thorley 2000; Austral Archaeology 2004; 2006; Hardy and Johnson 2006). The majority of artifacts recorded have been made of quartz and were flakes, cores, and flake fragments with isolated instances of silcrete, sandstone, and "tuff" flakes also recorded (Hardy and Johnson 2006: 31). All of the studies in question identified areas of high.

archaeological potential in and around the base of Uluṟu. Discussions with Aṉangu also indicated specific patterns of occupation and land use that included the area between the base of the rock (including shelters) and the first row of dunes (Austral Archaeology 2004). The resulting predictive general distribution model implies that occupation would have been focused on the areas at the base of the rock due to the available water and shelter from the weather and that this would have led to a greater density of artifacts being deposited, with the areas of the sand plains and dunes beyond used for hunting and foraging, potentially resulting in the deposition of a smaller number of artifacts in discrete activity focused areas (Hardy and Johnson 2006: 31).

Looking further afield to obtain a regional context, excavations have been undertaken in the MacDonnell Ranges near Alice Springs providing evidence of occupation in the Australian Arid Zone for minimally the last 22,000 years as evidenced by the presence of flaked stone artifacts, intact hearths, charcoal, grindstones, ochre, and emu eggshell (Austral Archaeology 2006). This excavation recorded periods of intensified occupation approximately 6000 years ago with the periods of most intensive use in the upper layers dating to post 1900 years ago (Smith 1987: 10 in Austral Archaeology 2006).

There continues today strong cultural connections between Aṉangu and the Arrernte people of the Central Desert and other communities to the north, south, east, and west. This is illustrated in shared stories, such as those of ancestral beings that have travelled in and around Uluṟu. This site, and that of Kata Tjuṯa, not only represents a meeting point, but both are important nodes in a great web of Tjukurpa paths (Breeden 1996: 19). Respectively, these paths have come from and spread out across the landscape linking the Aṉangu and Uluṟu-Kata Tjuṯa National Park to the wider communities and surrounding landscapes (Austral Archaeology 2006).

These stories are seen as part of the living landscape around Uluṟu in the form of the rock art present at locations such as the Mutitjulu waterhole and along the Mala Walk (Fig. 6). The battle between Kuniya and Liru is played out on the walls of the waterhole and retold in the paintings at the rock-shelter nearby (Fig. 7). Kurpany also appears here, and at other locations along the Mala Walk, as his travels took him around the

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 6 Mutitjulu waterhole (With kind permission of Uluṟu-Kata Tjuṯa National Park)

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 7 Rock art at Mutitjulu (With kind permission of Uluṟu-Kata Tjuṯa National Park)

rock. There are images of other Tjukurpa stories, maps for travelling through country from waterhole to waterhole, and one shelter referred to as "The Old Folks Home" where the elders used to sit with the young ones and teach them (Starkey 2000, personal communication). The paintings have been recorded in detail most recently by Gunn (2000) and Johnson (2001), and UKTNP undertakes a cultural heritage maintenance program with Aṉangu rangers leading the way, guided by their cultural knowledge and that of the elders, and learning the western scientific conservation and management strategies to support it.

Despite the acknowledged importance of Uluṟu by Aṉangu, other indigenous groups, and nonindigenous people of Australia,

archaeological research in and around Ulu̱ru as well as the greater UKTNP is limited. Under the guidance of A̱nangu and in keeping with Tjukurpa, further research is required to investigate land use patterns around Ulu̱ru and Kata Tju̱ta, as well as the broader landscape.

Cross-References

- ▶ Australian Rock Art
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Heritage Areas
- ▶ Heritage Landscapes
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Peoples, Working with and for
- ▶ Kakadu National Park: Rock Art
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art Sites: Management and Conservation
- ▶ Smith, Mike
- ▶ Sullivan, Sharon
- ▶ Veth, Peter M.

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References

Allan, G.E. 1984. Chapter 2. Fire history and land units of Ulu̱ru. In *Anticipating the inevitable: A path-burn strategy for fire management at Ulu̱ru (Ayers Rock – Mt Olga) National Park*, ed. E. Saxon. Alice Springs: CSIRO Division of Wildlife and Rangelands Research.

Austral Archaeology. 2004. *Ulu̱ru and Kata Tju̱ta National Park, Northern Territory: Aboriginal and historic heritage assessment*. Prepared by Austral Archaeology Pty Ltd for Connell Wagner Pty Ltd.

Austral Archaeology Pty Ltd. 2006. *Ulu̱ru-Kata Tju̱ta National Park, Northern Territory: Aboriginal archaeological assessment of proposed new sunrise viewing area*. Report prepared for Ulu̱ru-Kata Tju̱ta National Park.

Breeden, S. 1996. *Ulu̱ru; Looking after Ulu̱ru-Kata Tju̱ta – The Anangu way*. Marleston: J.B. Books Ltd.

Buckley, R. 1981a. Soils and vegetation of central Australian sandridges I. *Australian Journal of Ecology* 6: 345–353.

Buckley, R. 1981b. Soils and vegetation of central Australian sandridges II. Sandridge vegetation in the Ulu̱ru National Park area, Northern Territory, Australia. *Australian Journal of Ecology* 6: 391–404.

Connell, Wagner. 2004. *Ulu̱ru Kata Tju̱ta National Park environmental impact assessment proposed remediation of Ulu̱ru (Base Walk) and Kata Tju̱ta (Valley of the Winds) walking tracks*. Draft report prepared for Parks Australia North of the Department of Environment and Heritage.

Department of Environment. 2008. Ulu̱ru-Kata Tju̱ta National Park. Available at http://www.environment.gov.au/heritage/places/world/Ulu̱ru/index.html.

Department of Environment and Heritage. 2012. Available at http://www.environment.gov.au/parks/Ulu̱ru/nature/fauna.html.

Foxlee, J. 2008. *Stories in the Landscape: The sorry rock phenomenon and the cultural landscape of Ulu̱ru-Kata Tju̱ta National Park*. Doctor of Philosophy thesis. School of Social Sciences, College of the Arts, University of Western Sydney, Australia.

Griffin, G. 1984. Chapter 3. Vegetation patterns. In *Anticipating the inevitable: A path-burn strategy for fire management at Ulu̱ru (Ayers Rock – Mt Olga) National Park*, ed. E. Saxon. Alice Springs: CSIRO Division of Wildlife and Rangelands Research.

Gunn, R.G. 2000. *The rock art of Ulu̱ru – an archaeological study*. A report to the traditional owners and the cultural heritage unit, Ulu̱ru Kata Tju̱ta National Park.

Gunn, R.G. 2007. *Ulu̱ru-Kata Tju̱ta National Park – archaeological surveys and assessments: Ulu̱ru Base (north section) walking track upgrades, Wariyuki erosion controls, Kantju Gorge erosion control and Valley of the Winds walking track upgrades*. Report prepared for Ulu̱ru-Kata Tju̱ta National Park.

Hardy, V., and M. Johnson. 2006. *Archaeological assessment of stage one – Ulu̱ru sunrise development: proposed gravel stockpile area and Turkey's Nest Dam*. Report prepared for Ulu̱ru-Kata Tju̱ta National Park.

Haskovec I.P. 1989. *Cultural resource management at Ulu̱ru National Park: A report on a third field trip to Ulu̱ru National Park*. For Ulu̱ru National Park.

Haskovec I.P. 1991. A report on cultural resource management field work carried at Ulu̱ru National Park between 18. 29.4.91. For Ulu̱ru National Park.

Haskovec, I.P., and H. Sullivan. 1987. *Cultural resource management at Ulu̱ru National Park: A report on a second field trip to Ulu̱ru National Park*, 4–31 October 1987. For Ulu̱ru National Park.

Hill, B. 1994. *The rock: Travelling to Ulu̱ru*. St. Leonards: Allen & Unwin.

H

Hooper, P.T., P.K. Sallaway, P.K. Latz, K. Maconoche, W. Hyde, and L.K. Corbett. 1972. *Ayres rock – Mt Olga National Park environmental study, 1972*. Alice Springs: Arid Zone Research Institute, Department of the Northern Territory.

Johnson, M. 2001. *Rock art within sacred women's sites at Uluṟu*. Restricted access. For Uluṟu-Kata Tjuṯa National Park.

Johnson, M. 2006. Uluṟu-Kata Tjuṯa Site Management Manual. Prepared for the Uluṟu-Kata Tjuṯa National Park and the Director of National Parks, Canberra.

Latz, P.K. 2004. *Bushfires & bushtucker: Aboriginal plant use in Central Australia*. Alice Springs: IAD Press.

Muṯitjulu Community. 1996. *Mingkiri: A natural history of Uluṟu by the Muṯitjulu community*. Compiled by L. Baker. Alice Springs: IAD Press.

Reid, J., J. Kerle, and S. Morton, eds. 1993. *Uluṟu fauna: The distribution and abundance of vertebrate fauna of Uluṟu (Ayers Rock – Mount Olga) National Park, NT*, Kowari, 1–152. Canberra: Australian National Parks and Wildlife Service.

Saxon, E. (éd.) 1984. Anticipating the inevitable: A pathburn strategy for fire management at Uluṟu (Ayers Rock – Mt Olga) National Park. Alice Springs: CSIRO Division of Wildlife and Rangelands Research.

Smith, M.A. 1987. Pleistocene occupation in arid central Australia. *Nature* 328: 710–711.

Thorley, P. 2000. *Archaeological spot checks in Uluṟu and Kata Tjuṯa National Park*. Unpublished report provided by Park Management.

Uluṟu Kata Tjuṯa Board of Management (UKTBoM) & Parks Australia. 2000. *Fourth Uluṟu-Kata Tjuṯa plan of management*. Yalara (NT): Uluṟu-Kata Tjuṯa Board of Management and Parks Australia.

Further Readings

Abdel-Aziz, D. 1997. Monitoring of art sites at Uluṟu. For Uluṟu-Kata Tjuṯa National Park.

Austral Archaeology. 2004. Uluṟu and Kata Tjuṯa National Park, Northern Territory: Aboriginal and historic heritage assessment. Prepared by Austral Archaeology Pty Ltd. for Connell Wagner Pty Ltd.

Burke, H., and C. Smith. 2004. *The archaeologists field handbook*. Crows Nest: Allen and Unwin.

Connell, Wagner. 2004. Uluṟu Kata Tjuṯa National Park environmental impact assessment proposed remediation of Uluṟu (Base Walk) and Kata Tjuṯa (Valley of the Winds) walking tracks. Draft report prepared for Parks Australia North of the Department of Environment and Heritage.

Davison, G., J. Hirst, and S. Macintyre, eds. 2001. *The Oxford companion to Australian history*. Oxford: Oxford University Press.

Department of Services and Property. 1973. Ayers Rock – Mount Olga National Park land unit map. Alice Springs.

Flood, J. 1997. *Rock art of the dreamtime: Images of ancient Australia*. Sydney: Angus and Robertson.

Hall, N. 2001 *Rock art site monitoring and maintenance*. Canberra, Australian Heritage Commission.

Hall, N.E. 2002 Mutitjulu Kapi (Kuniya and Lira) Area: draft management plan. For Uluṟu-Kata Tjuṯa National Park, Uluṟu.

Hiscock, P., and P. Veth. 1991. Change in the Australian desert culture: A reanalysis of tulas from Puntutjarpa rockshelter. *World Archaeology* 22 (3): 332–345.

Hooper, P.T., P.K. Sallaway, P.K. Latz, K. Maconoche, W. Hyde, and L.K. Corbett. 2006. *Uluṟu-Kata Tjuṯa National Park: cultural heritage program site management manual. A guide to cultural site patrols and the cultural site management system*. Report prepared for Uluṟu-Kata Tjuṯa National Park.

James, S. 2007. Constructing the climb: Visitor decision-making at Uluṟu. *Geographical Research* 45 (4): 398–407.

Johnson, M. 2003. *Churchill fellowship report: The study of innovative conservation techniques and strategies for rock art, as well as the sites and landscapes containing them*. Report to The Churchill Fellowship Trust.

Kealy, A., C.L. Ogleby, M. Johnson, and R. (Ben) Gunn. 2000. Saving Uluṟu's story: Documenting aboriginal art. *GPS World* 11 (3): 24–37.

Kerle, A. 1995. *Uluṟu, Kata TjuXa and Watarrka; Ayers Rock/The Olgas and Kings Canyon Northern Territory*. Sydney: UNSW Press, National Park Field Guides.

Lambert, D., and G. Eldershaw. 1997. Uluṟu: Rock art conservation final report. For Uluṟu-Kata Tjuṯa National Park.

Layton, R. 1989. *Uluṟu: An aboriginal history of Ayers Rock*. Canberra: Aboriginal Studies Press.

Maclaren, G. 2003. *Cultural site management system (CSMS) support documentation*. Environmental systems solutions Pty ltd for Uluṟu – Kata Tjuṯa National Park.

Mulvaney, J., and J. Kamminga. 1999. *Prehistory of Australia*. St Leonards (NSW): Allen & Unwin.

North, D.N., and J. Clarke. 1991. *Conservation of rock art at Uluṟu National Park: Final report*. Fremantle: Corlab Pty Ltd.

Smith, M.A., M.I. Bird, C.S.M. Turkey, L.K. Fmeld, G.M. Santos, P.A. Hausladen, and M.L. Di Tada. 2001. New box AMS-^{14}C ages remove dating anomalies at Puritjarra rockshelter. *Australian Archaeology* 53: 45–47.

Smith, M.A. 1987. Pleistocene occupation in arid central Australia. *Nature* 328: 710–711.

Smith, M.A. 1989. The case for a resident population in the central Australian ranges during full glacial aridity. *Archaeology in Oceania* 24: 93–105.

Smith, M.A. 1993. Biogeography, human ecology and prehistory in the Sandridge deserts. *Australian Archaeology* 37: 35–50.

Sweet, I., and I. Crick. 1992. *Uluṟu and Kata Tjuṯa: A geological history*. Canberra: Australian Geological Survey Organisation.

Thorley, P. 2000. *Archaeological spot checks in Uluṟu and Kata Tjuṯa National Park*. Unpublished report provided by Park Management.

Uluṟu Kata Tjuṯa Board of Management & Parks Australia. 2007. *Cultural heritage action plan and cultural*

landscape conservation plan. Yalara (NT): Commonwealth of Australia.
Uluṟu statement [online]. Guardian (Sydney), No. 1779, 31 May 2017: 1. Availability: https://search-informit-com-au.virtual.anu.edu.au/documentSummary;dn = 848,804,816,455,978;res = IELAPA ISSN: 1325-295X. (Cited 26 Jul 18).
Uluṟu statement from the heart [online]. Indigenous Law Bulletin, Vol. 8, No. 29, Apr/Jun 2017: 8. Availability: https://search-informit-com-au.virtual.anu.edu.au/documentSummary;dn = 040444938637015;res = IELIND ISSN: 1328–5475. (Cited 26 Jul 18).
Veth, P. 1989. Islands in the interior: A model for the colonisation of Australia's arid zone. *Archaeology in Oceania* 24 (3): 81–92.
Veth, P. 1995. Marginal returns and fringe benefits: Characterizing the prehistory of the lowland deserts of Australia (a reply to Smith). *Australian Archaeology* 40: 32–38.
Veth, P., M.A. Smith, and M. Haley. 2001. Kaalpi: The archaeology of an outlying range in the dune fields of the western desert. *Australian Archaeology* 52: 9–17.
Veth, P., S. O'Connor, and L.A. Wallis. 2000. Perspectives on ecological approaches in Australian archaeology. *Australian Archaeology* 50: 54–66.
Waitt, G., R. Figueroa, and L. McGee. 2007. Fissures in the rock: Rethinking pride and shame in the moral terrains of Uluṟu. *Transactions of the Institute of British Geographers New Series* 32 (2): 248–263.

Hunter-Gatherer Settlement and Mobility

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Introduction

The study of hunter-gatherer mobility operates at the intersection of archaeology and social anthropology, with much information to be gained from both individual ethnographies and syntheses that extract recurrent relationships between the mobility pattern and, for example, the subsistence base. For reasons of brevity this entry focuses on insights obtained from the latter, though the reader is encouraged to consult original studies of particular societies, particularly when such societies do not appear to fit the generic patterns described. Hunter-gatherer mobility operates at various scales, and although it is motivated primarily by the need to gain adequate food and water, it is also shaped by the presence of other resources such as raw materials and of other human groups in the landscape.

Definition

For the purposes of this entry, hunter-gatherers can be defined as individuals who obtain most of their food from the hunting of wild animals and the gathering of wild plant foods. That the previous sentence reads *most* and not *all* is primarily due to the post-contact situation in which hunter-gatherers may live on *reservations*, receive government rations, or trade or exchange goods with neighboring agricultural populations. Mobility is here understood widely to include movements of individuals around a camp, movements of whole groups between camps, and forays into lands inhabited by related but distant groups of hunter-gatherers for purposes of trade, exchange, or knowledge acquisition. These three scales of mobility (which may in fact frequently overlap) are defined here as the micro-, meso-, and macro-scales, respectively.

Historical Background

The study of hunter-gatherer groups by anthropologists dates back to at least the nineteenth century, while the modern era, making explicit the study of modern hunter-gatherers as a means to elucidate aspects of the human past, was initiated by the seminal 1968 *Man the Hunter* volume, edited by Richard Lee and Irven De Vore (1968; see Myers 1988). The studies of Lee's Harvard group among the!Kung San of the Kalahari, many of which were reported in this volume, examined the hunter-gatherer way of life as a phase in the prehistory of all human groups and thus adopted an implicitly (and occasionally explicitly) evolutionary approach to the study of hunter-gatherer mobility. The evolutionary approach has persisted in the form of socioecological analyses and applications of optimal foraging theory, whereby models of the mathematically derived *optimal*

behavior in given situations are compared to actual behaviors in those situations. Evolutionary approaches have been particularly effective in allowing for the formation of general rules about hunter-gatherer adaptation that can be applied to analyses of the archaeological record.

Man the Hunter established an archetypal picture of hunter-gatherers in which males hunted, females gathered, and food was transported back to a *home base*, where it was shared among families or between close kin. This pattern of a sexual division of labor and the transport of food to a home base for sharing was quickly assimilated by archaeologists, particularly in M. D. Leakey's hugely influential publication of the earliest archaeological sites from Olduvai Gorge, Tanzania. Leakey developed a site typology for the Olduvai material in which one of the four site types, labeled the *living floor*, was a direct equivalent of the anthropologically documented *home base*. This typology was modified for the material at Koobi Fora (Kenya) and was then amplified into Isaac's (1978) *home base hypothesis*, which extrapolated from the site typology to suggest that many of the social facets documented among the! Kung were in fact present among two-million-year-old human ancestors.

The *home base hypothesis* attracted many detractors due to its extrapolations from the archaeology. Foremost among these was Lewis Binford, whose attempts to discredit Isaac's ideas led him to focus on the development of ways to relate the static patterns observed in the archaeological record to the dynamic processes in past societies that generated those patterns. A key element of this research program was ethnoarchaeology – the conduct of essentially anthropological fieldwork by archaeologically trained practitioners. Although Binford and many others had noted the value of published ethnographies, they were also aware that ethnographers were unlikely to collect data in forms amenable to comparison with archaeological data; specifically, the pattern-process link was absent, with ethnographers focusing relatively little on the use of everyday artifacts. Binford's studies of hunter-gatherers were conducted with a view to documenting archaeologically salient information and ushered in a new enthusiasm for hunter-gatherer studies among archaeologists.

Key Issues

Microscale Mobility

One of the enduring legacies of Binford's ethnoarchaeological work among the Nunamiut (Inuit) of northern Alaska was the establishment of the forager-collector continuum to describe differences in hunter-gatherer microscale mobility patterns. Foragers and collectors in Binford's (1980) terms were distinguished primarily by their settlement systems and therefore by the types of sites they would leave in the archaeological record; however, these systems also reflected fundamentally different types of mobility in terms of the way those site types articulated with the available subsistence resources (Grove 2010). Foragers are associated with high *residential mobility*, in which the whole group is moved from one camp to another, whereas collectors often practice higher levels of *logistical mobility*, in which task-specific subgroups disperse to collect resources that can be transported back to the camp. This distinction is often summed up by suggesting that foragers move people to resources, whereas collectors move resources to people (see Fig. 1).

Binford based his forager pattern on the Gwi San and his collector pattern on the Nunamiut, two groups living in very different, though equally extreme, environments. However, these groups were intended to represent ends of a continuum of hunter-gatherer adaptation rather than a dichotomy, and have found parallels in other, related schemes. In particular, Woodburn's (1982) distinction between immediate and delayed return foragers is an independently devised scheme that mirrors Binford's, and in Paleolithic archaeology, the distinction drawn by Lieberman and Shea (1994) between circulating and radiating mobility is based directly on Binford's (1980) work. Of particular relevance to archaeological applications of the collector/forager model is Binford's assertion that collectors will create a series of distinct site types that will

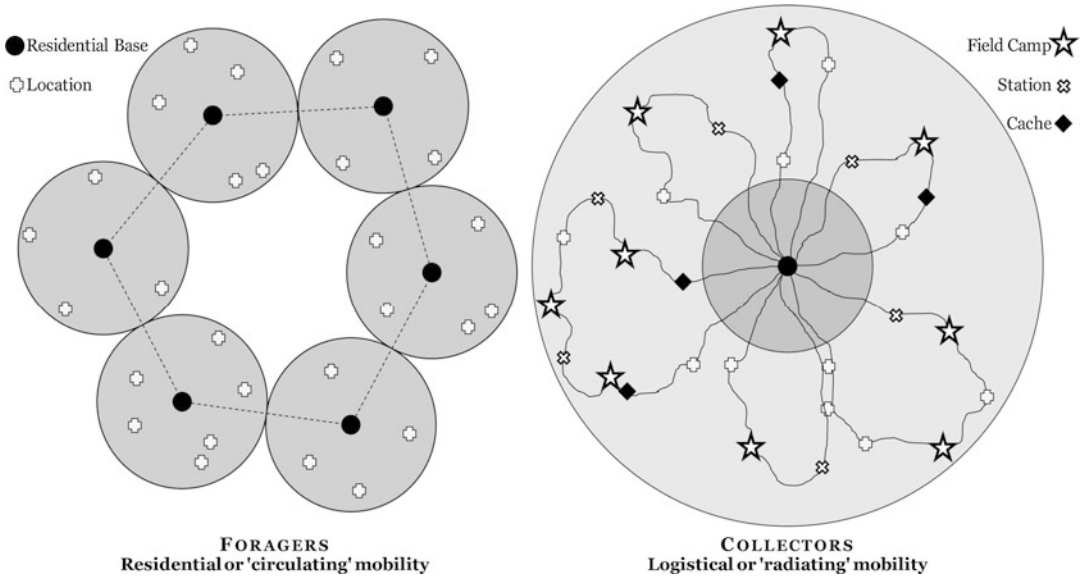

Hunter-Gatherer Settlement and Mobility, Fig. 1 Schematic of Binford's (1980) distinction between foragers and collectors. The figure shows part of a *seasonal round*; note that collectors produce three additional site types during their logistical movements away from the residential base

not be created by forager systems. Both collectors and foragers create *residential bases* – the equivalents to the home bases identified by Lee and De Vore and employed in archaeological reconstructions by Leakey and Isaac. Both also create *locations* – places where particular extractive tasks are carried out, though Binford notes that collector locations may be more visible to the archaeologist than forager locations due to the tendency for logistically organized groups to gather larger amounts of a given resource in a single trip. In addition to residential bases and field camps, collectors create the three additional site types, designated by Binford as *field camps*, *stations*, and *caches*.

A field camp is a temporary base for a group engaged in a logistical foray that keeps them away from the residential base for at least a single night, while a station is a site where a special-purpose task group would locate itself while gathering information on, for example, movements of game. The importance of information about the wider environment to hunter-gatherers is discussed further below. Finally, caches are relatively self-explanatory, being temporary stores of resources located away from the residential base. Note that the structured storing of food is exclusive to collectors and again parallels Woodburn's (1982) notion of a delayed return economy. Binford's (1980) critical insight regarding these site types, as they relate to the microscale mobility continuum from foragers to collectors, is that given locations may serve multiple purposes, being, for example, sequentially field camps, locations, and caches. Given that collectors produce a greater number of generic site types and that the site types a system produces can be combined in potentially any sequence, collectors should be identifiable in the archaeological record via greater intersite variability. Given this signature of a collector system, most archaeological uses of Binford's system have suggested that collectors do not appear until the Upper Paleolithic. In one contradiction to this pattern, Lieberman and Shea (1994) suggested that Neanderthals in the Near East practiced radiating mobility, whereas later modern humans resorted to circulating mobility as a result of climatic deterioration.

Mesoscale Mobility

While microscale mobility describes the way in which a hunter-gatherer group organizes itself to

ensure adequate resources are transported to the residential base, mesoscale mobility involves the movement of that base when resources are depleted. Micro- and mesoscale strategies are closely related since increasing logistical mobility at the microscale will tend to reduce residential mobility at the mesoscale. However, there is a qualitative difference between these two scales of mobility since the latter will involve relocation of the residential base, the main anchor of the group to the territory. The frequency and distance of residential moves will have profound consequences for the maintenance of material culture, with generic least-effort criteria suggesting that investment in site maintenance and structure will be reduced in highly mobile groups. Furthermore, toolkits of highly mobile foragers will either be streamlined, with only the most vital tools carried, or reduced to expedient manufacture, with simple tools made as and when they are needed. It is at the mesoscale that the fundamental assemblage variability of the residential base articulates with the mobility pattern.

As with microscale mobility, the foundational work on mesoscale relocation patterns was by Lewis Binford, in his seminal 1982 paper *The Archaeology of Place*. The fundamental advance of this paper was that it proposed three idealized relocation patterns – the half-radius continuous, complete-radius leapfrog, and point-to-point patterns – that, together with the microscale considerations discussed above, could be used to develop a relatively complete classification of hunter-gatherer mobility. The idealized patterns Binford proposed sought to directly link the quality of an environment (the richness of its resources) to the level and type of mobility practiced by the hunter-gatherers inhabiting it. Figure 2 shows the three patterns Binford (1982) proposed, each of which is briefly explained below. Each of the patterns is based around a simple idea of *economic zonation* around sites, with a nearby foraging zone and a more distant logistical zone which is exploited only partially from each site. The need to relocate is driven primarily by the depletion of resources within the foraging zone; when it is no longer energetically efficient to search for resources within this area or, equivalently, when this area has become so large that transport costs are prohibitive, it is time to move the residential base. The simple geometric theory developed by Binford (1982) suggests that the minimum distance the group should move would be twice the radius of their foraging area, thus ensuring that they do not traverse land from the new base that has been depleted during occupation of the old (see Fig. 2).

The first of Binford's patterns, the half-radius continuous pattern (Fig. 2a), is characteristic of high mobility groups (in the sense that they move the residential base often, rather than far) who do not develop the logistical radius to any great extent. The double-radius leapfrog pattern (Fig. 2b) is in many ways the quintessential expression of the geometric theory, with the size of the current foraging zone determining the distance of the next residential move. Note that while foraging zones, which are exploited intensively, must never overlap, logistical zones frequently do overlap, since they may contain limiting resources (e.g., sources of water or flint) that are non-depleting or recurrent. While the double-radius leapfrog pattern is common among hunter-gatherers in high-quality environments, an alternative known as the point-to-point pattern (see Fig. 2c) is more common in lower-quality habitats. When considered relative to the microscale patterns of mobility discussed above, it is suggested that there is continuum from half-radius continuous forager groups to point-to-point collector groups, though this relationship is anything but rigid. In both the double-radius leapfrog pattern and the point-to-point pattern, residential bases are located in areas that afford access to vital resources such as water, food, and fuel; however, in lower-quality habitats, the confluence of these key resources is rarer, requiring hunter-gatherers to engage in longer residential moves and to prospect beyond the logistical zone for future residential locations.

The geometric pattern of hunter-gatherer mesoscale mobility, as expressed ideally in Binford's complete-radius leapfrog pattern (see Fig. 2b), allows for the delineation of a number of basic hypotheses about the distances hunter-

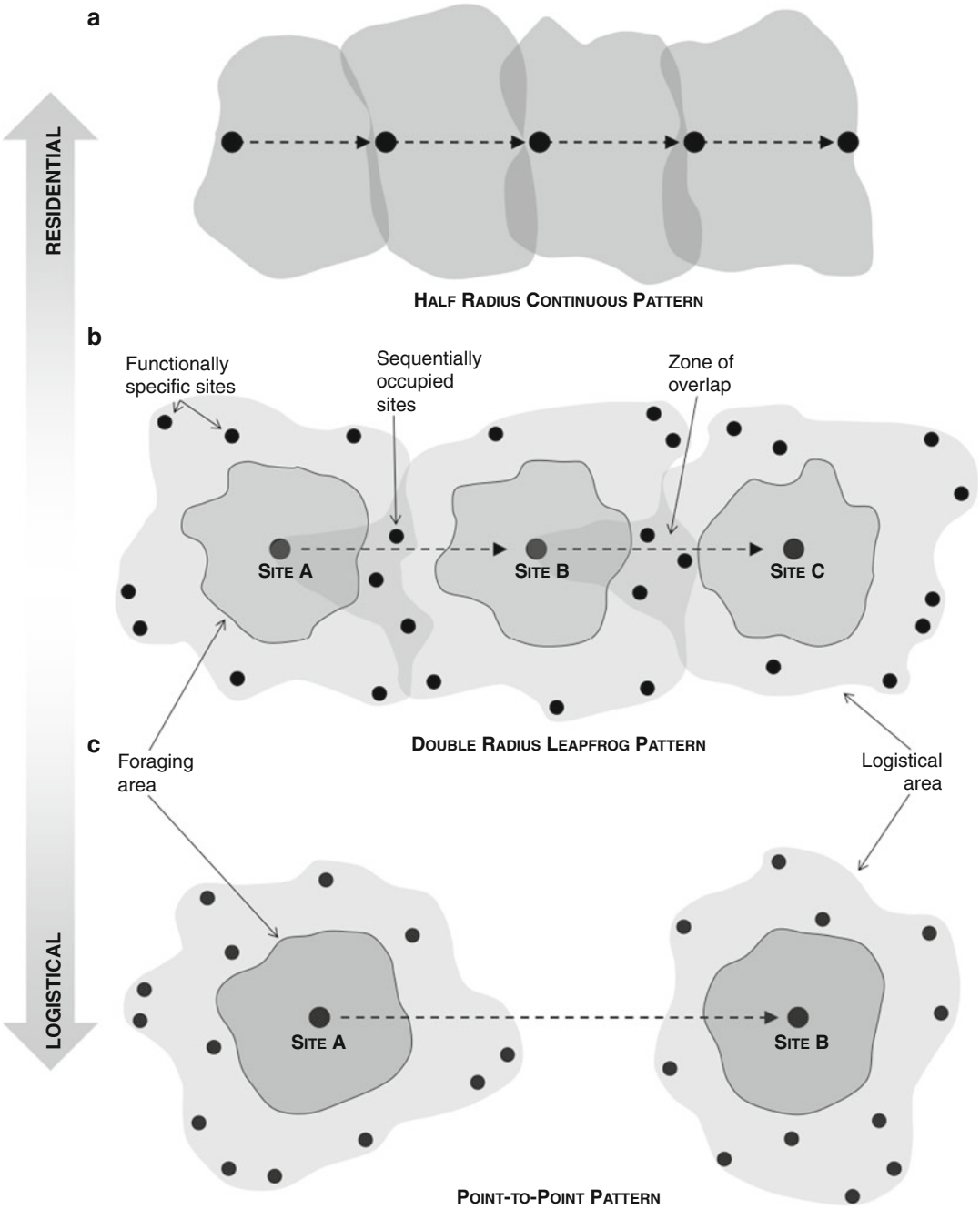

Hunter-Gatherer Settlement and Mobility, Fig. 2 Three modes of mesoscale mobility, after Binford (1982:10). Dashed arrows represent residential moves; see text for further details and discussion

gatherer groups should move depending on their size, the duration of site occupation, and the quality of the habitat surrounding the site. With all else equal, the foraging zone could be expected to increase with increasing group size, increasing duration of occupation, or with decreasing habitat quality; furthermore, given the relationship between the area and radius of a circle and the

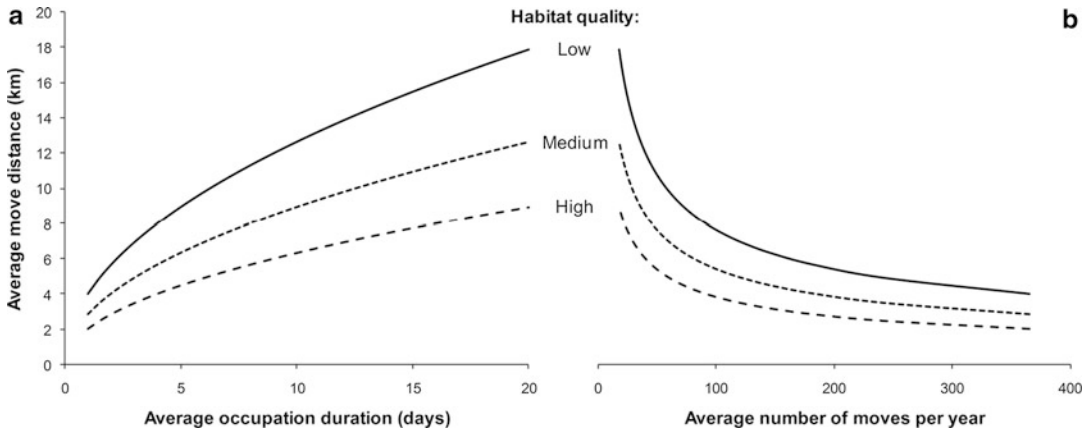

Hunter-Gatherer Settlement and Mobility, Fig. 3 Graph (**a**) shows the relationship between average occupation duration and average move distance as predicted by Binford's complete-radius leapfrog model for three arbitrary levels of habitat quality. Assuming that the average number of moves per year is equal to 365 divided by average occupation duration, graph (**b**) shows the relationship between this variable and average move distance. (After Grove (2009: 224))

requirement that a group should move at least twice the radius of the foraging zone, the form of these relationships can be quite accurately predicted (Grove 2009). Concentrating on mobility-specific variables, the average move distance – the first key index of mobility – can be expected to increase in proportion to the square root of average occupation duration (media object) or group size (or to decrease similarly in proportion to the square root of habitat quality). Similarly, since the average number of moves per year – the second key index of mobility – is simply 365 divided by average occupation duration (in days), we can expect average move distance to decrease in proportion to the reciprocal of Media object (see Fig. 3).

In testing these relationships with a large body of hunter-gatherer data, Grove (2009) found that habitat quality was by far the most important variable in determining mobility patterns, with occupation duration of importance only to groups heavily dependent on meat. This last result is likely due to the increased danger of insect-borne infection created by the buildup of carcass-processing detritus and, in certain environments, the risk of such detritus attracting potentially dangerous scavenging carnivores. Group size was found to have little effect on move distances, though this is in fact because group size variability is mediated in hunter-gatherers by frequency rather than distance of movement. As a generic characterization, larger groups move similar distances but move more frequently than smaller groups. In a detailed examination of data on the Dobe area!Kung collected by Yellen (1977), Grove (2009) was able to show that, at a finer scale, the size of the site (measured as the limit of the main artifact scatter) is determined by group size and occupation duration, the size of the foraging radius by habitat quality, and the size of the logistical radius by the percentage reliance on meat and the extent of logistical mobility. Thus, Binford's (1982) notion of *economic zonation* continues to be of considerable value in studies of hunter-gatherer mobility.

Macroscale Mobility

In addition to the relatively local foraging and logistical zones outlined by Binford and discussed above, hunter-gatherers range over vast areas of land and forge links with distant bands for the purposes of trade, exchange, and what we might loosely call *insurance*. Since the work of Wobst (1974), there has been considerable interest in such long-distance relationships between hunter-gatherer groups, and this interest has frequently extended into archaeological applications. Early ethnographers often sought to classify hunter-

gatherer groups into hierarchically inclusive series, with several families forming a band, several bands forming a clan, and so on up to the level of the tribe. The latter has traditionally been considered to equate to a language boundary; all those who speak a given language (or distinct dialect) belong to a given tribe, to the exclusion of those who speak other languages. This formation of boundaries sets up a situation in which tribes themselves (to the extent that they are genuinely coherent entities) may maintain equitable or hostile relations with neighboring tribes. In fact, hunter-gatherer mobility is for the most part facilitated by relatively equitable bonds, particularly where notions of common descent are reinforced by shared aspects of material culture. It should be noted, however, that before extensive contact with agriculturalists, some hunter-gatherer groups, notably aboriginal Americans, did reach population densities sufficiently high to lead to violent disputes over land and resources.

Archaeologists have examined patterns of prehistoric hunter-gatherer trade through the movement of artifacts, particularly in the Upper Paleolithic of Europe. Gamble (1982) suggested that the wide distribution of particular symbolic artifacts acted as a bonding mechanism such that groups traveling far, at low density, and encountering each other rarely would have some common ground with which to mediate social exchanges. From a different perspective, Vanhaeren and d'Errico (2006) attempted to map ethnolinguistic (i.e., tribal) boundaries in early Upper Paleolithic Europe by examining the areas associated with specific assemblages of bead types. Thus, hunter-gatherer mobility at this macroscale is characterized by a combination of both rigid and permeable boundaries, with archaeologists such as Gamble (1999) suggesting that the evolution of human society has in large part revolved around the establishment of equitable bonds with ever more distant groups, binding local bands into ever more inclusive networks. Records of the transport of artifacts and raw materials studied by several authors have broadly supported this thesis, with materials traveling further and further during the progression of the Paleolithic.

Though trade and exchange are valuable facets of macroscale hunter-gatherer mobility, they may in fact be undertaken merely to lubricate the more enduring, socioecological process of bond maintenance for *insurance* purposes. Binford has suggested that beyond the logistical zone is a much larger and more thinly exploited zone referred to among the Nunamiut as the *visiting* zone. Behavioral ecologists are beginning to realize that information about the surrounding habitat – including, crucially, the locations of conspecific groups within that habitat – is a vital currency for all animals. Among humans this need for knowledge is paramount and is reflected in the establishment of information-gathering *stations* among logistically organized groups. One undeniable difference between modern hunter-gatherers and other primates (and presumably, many of our hominin ancestors) is the tendency to transport food and other resources rather than relying on a feed-as-you-go subsistence pattern. Highly logistical collecting patterns are the antithesis of the generic primate pattern, but they rely on securing a great deal of intelligence about an ever larger area of habitat, and, with the risk of subsistence failure an ever-present concern, they rely also upon the need to develop equitable bonds with neighboring groups.

Whallon (2006) has argued that a vital purpose of long-distance mobility among modern hunter-gatherers is the establishment and maintenance of extended social networks that not only provide information about surrounding habitats but also act as *safety nets* in times of local resource scarcity. Whallon terms this *nonutilitarian mobility*, in recognition of the fact that it has an immediate energetic cost but may have a benefit only in times of crisis; such *insurance* may rarely be used, but if needed, it could be the difference between starvation and survival. Whallon (2006) makes a series of predictions about the value of nonutilitarian mobility to hunter-gatherers in specific situations which follow logically from ecological theory (Fig. 4). The boundary points can be summed up by noting that hunter-gatherer bands have most to gain from establishing equitable bonds with bands from adjacent regions when the correlation of resource availability *between* regions is low and

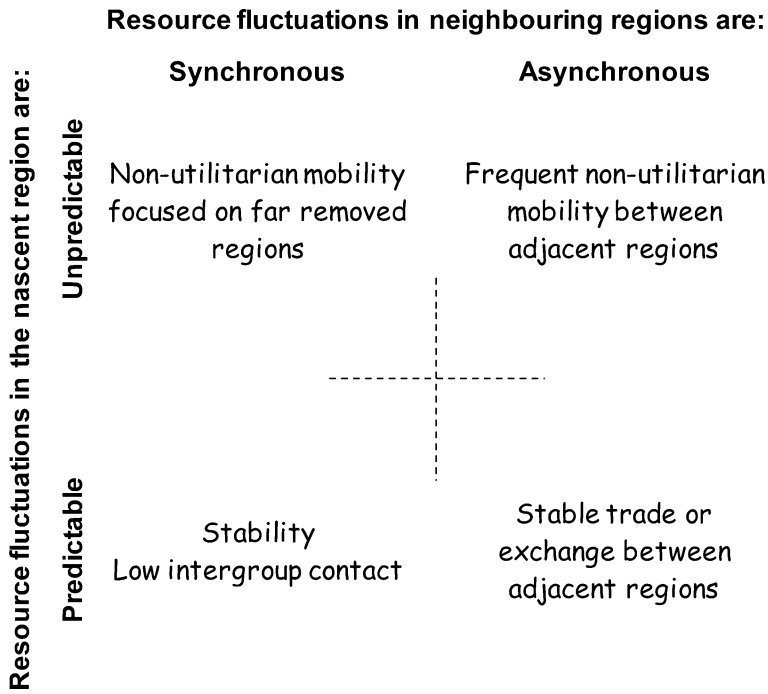

Hunter-Gatherer Settlement and Mobility, Fig. 4 Expected patterns of *nonutilitarian* mobility among hunter-gatherers in relation to synchrony of resource fluctuation between regions and predictability of resource fluctuations within regions. (Modified from Whallon (2006: 264))

resource availability *within* regions is unpredictable; on the contrary, when resources within a region are predictable or fluctuations in neighboring regions are in synchrony, there is little to gain from *nonutilitarian mobility* directed towards adjacent regions. Put simply, if the nascent region is highly predictable, there is little need to rely on distant neighbors, and if those neighbors experience temporally synchronous periods of resource stress, there will be little chance that they can help. In the latter case, hunter-gatherers may be forced to establish bonds with groups that are sufficiently distant to ensure asynchrony in resource fluctuations.

Harnessing Resources

As well as the three scales of mobility discussed above, a number of general findings that relate hunter-gatherer mobility to specific axes of regional ecology have been reported. Hunter-gatherers have often been divided into classes based on the extent of their mobility; for example, Murdock (1967) distinguishes between fully nomadic, seminomadic, semisedentary, and fully sedentary groups. Using a measure of *effective temperature* to classify environments into different types by habitat, Binford (1980) was able to show that hunter-gatherers in tropical forests and the extreme arctic tend to be highly mobile. By contrast, in temperate forests and deserts hunter-gatherers are spatially constrained by seasonally limiting resources (in particular water) and are therefore forced to rely on food storage as a substitute for mobility. This reliance on a particular limiting resource in a particular location has been referred to as *tethered nomadism* (Taylor 1972), with Kelly (1995) suggesting that most contemporary hunter-gatherers follow this pattern.

A further complex of ecologically based findings relevant to mobility, and with applications of particular importance to the archaeological record, revolves around the relationship between the position of hunter-gatherers within the *trophic pyramid* and its interaction with latitudinal gradients in productivity. The trophic pyramid, an idea due originally to ecologist Charles Elton, describes the fact that primary biomass (essentially plants; level 1 of the pyramid) is assimilated by herbivores (level 2), some of which are in turn predated upon by carnivores (level 3). Due to various factors, some energy is

lost at each level, meaning that there will be lower biomass at each higher level. For example, the weight of all the herbivores in a given area will be substantially less than the weight of all the plants in that area, but substantially more than the weight of all the carnivores in that area. Seen in terms of foraging, this relationship implies that carnivores must travel further to secure the requisite amount of food and that, consequently, they must live at lower real densities.

Although all humans are omnivores, one basic relationship that follows from the logic outlined above is that hunter-gatherer groups reliant on extensive hunting (i.e., those towards the top of the trophic pyramid) will need to cover larger territories in order to fulfill their energetic requirements (Kelly 1995). The problem with hunting is that it is a risky strategy; there is a substantial probability that on any given day, any given hunter will fail to make a kill. The element of risk leads not only to a focus on the sharing of hunted foods but also to a heavy reliance on low-risk plant foods to supplement hunted foods whenever possible. At low latitudes, most hunter-gatherers derive the vast majority of their calorific intake from low-risk, gathered plant foods. However, at higher latitudes, where effective temperatures are lower, edible plant foods are less available, with the knock-on effect that herbivores tend to be larger and more dispersed (Grove 2010). Thus, at higher latitudes, hunter-gatherers are forced to rely on greater proportions of meat and are simultaneously forced to cover much larger territories due to the low densities of their prey. This latitudinal relationship would have had profound effects on the mobility patterns and population dynamics of Paleolithic hunter-gatherers emerging from sub-Saharan Africa to colonize higher latitudes.

Given the latitudinal gradient in subsistence practices and its relationship to mobility patterns, it seems remarkable that hunter-gatherers today can exist in such extreme environments as, for example, north-western Alaska or the Siberian steppe. Whether these environments are suggestive of prehistoric hunter-gatherer adaptations in general is discussed further below, but one thing they do highlight is the possibility of specialization on particular kinds of food resources to lessen the burden of high mobility. Two types of prey provide consistent exceptions to the positive correlation between high latitude and high mobility among hunter-gatherers: migratory ungulates and aquatic resources. In the case of migratory animals such as reindeer, mass kills at natural *topographical funnels* such as river crossings or mountain passes, followed by storage of substantial quantities of the acquired meat, can mediate the need for high mobility for at least part of the year. Aquatic resources can be profitably harvested from a small number of localities, provided the area of water accessible to those localities is sufficiently large; unlike the case with hunting, catching fish in one place today does not reduce the probability of catching fish in that place tomorrow. In both these cases, hunters are effectively shifting the burden of high mobility onto their prey. Both Kelly (1983, 1995) and Grove (2010), using different datasets, have shown that groups reliant on a large proportion aquatic resources are far less mobile than groups heavily reliant on hunting at similar latitudes.

Current Debates

A debate persists in hunter-gatherer studies about the extent to which modern hunter-gatherers are suitable models for the humans of the Paleolithic. Of course the outcome of this debate does not affect the value of studying hunter-gatherers simply to learn more about them, but the fact remains that a lot of the research performed on hunter-gatherer datasets is designed to shed light, via archaeological studies, on our prehistoric ancestors. The lasting critique of Wobst (1978) has largely set the agenda for this debate, laying stress on the fact that surviving hunter-gatherer societies tend to exist only in areas that are not suitable for agriculture, and may therefore be quite dislocated from their traditional habitats. Furthermore, this process of isolation in *marginal habitats* leads to an ignorance of the spatially extensive structures that must once have characterized hunter-gatherer society, with Wobst suggesting that such ignorance is compatible with the (equally dubious) focus in

archaeology on the site as the unit of analysis. Effectively, the encroachment of agriculturalists has led to a disproportionate bias against the recovery of information on macroscale mobility patterns.

Wobst's (1978) observations are particularly germane given the increasing understanding that humans are quite unique in the scale of their social relations and that this expansion beyond the social scales experienced by our primate relatives may have come relatively late in human evolution (Gamble 1999). The study of primate groups has provided an interesting counterpoint to studies of modern humans, with many of the basic microscale structures found to be similar in hunter-gatherers, agriculturalists, and certain nonhuman primate species. In particular, the hierarchically nested groupings (with several families forming a band, several bands forming a clan, and so on) described by the likes of Murdock (1967) occur in a number of primate species, with more fluid patterns of aggregation and dispersion being relatively common, particularly among the great apes. The debate concerning which group or combination of groups (and, crucially, from which environmental setting) provide the best models for reconstructions of various periods in human evolution will doubtless continue alongside the hunter-gatherer studies of the future.

Future Directions

Hunter-gatherer mobility is a vitally important subject and will continue to be so, not least because mobility is to many researchers the fundamental characteristic of hunter-gatherers. Following the critique of Wobst (1978), archaeologists have attempted to reconstruct prehistoric mobility patterns from site distributions and have hypothesized about the evolution of trade and exchange in prehistory. Yet without hunter-gatherer data to ground such hypotheses, they remain essentially untested. Substantial collections of data on hunter-gatherer mobility patterns have been assembled, notably by Murdock (1967) and Binford (2001), and these remain as powerful resources for model building and generalization. The greatest challenge remains to accurately reconstruct the extent of precontact social interaction; evidence of this remains not only in the current macroscale mobility patterns but also in the evidence of oral testimony and folklore. The application of modern quantitative techniques such as network analysis to data on mobility, trade, and exchange should produce substantive insights into hunter-gatherer society, both prehistoric and modern.

Cross-References

- ▶ Binford, Lewis R. (Theory)
- ▶ Evolutionary Anthropology: Issues, News, and Reviews
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ Site Formation Processes

References

Binford, L.R. 1980. Willow smoke and dogs' tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45: 4–20.

Binford, L.R. 1982. The archaeology of place. *Journal of Anthropological Archaeology* 1: 5–31.

Binford, L.R. 2001. *Constructing frames of reference*. Los Angeles: University of California Press.

Gamble, C. 1982. Interaction and alliance in Palaeolithic society. *Man* 17: 92–107.

Gamble, C. 1999. *The Palaeolithic societies of Europe*. Cambridge: Cambridge University Press.

Grove, M. 2009. Hunter-gatherer movement patterns: Causes and constraints. *Journal of Anthropological Archaeology* 28: 222–233.

Grove, M. 2010. Logistical mobility reduces subsistence risk in hunting economies. *Journal of Archaeological Science* 37: 1913–1921.

Isaac, G. 1978. Food-sharing behavior of proto-human hominids. *Scientific American* 238: 90–108.

Kelly, R.L. 1983. Hunter-gatherer mobility strategies. *Journal of Anthropological Research* 39: 277–306.

Kelly, R.L. 1995. *The foraging spectrum: Diversity in hunter-gatherer lifeways*. Washington, DC: Smithsonian Institution Press.

Lee, R.B., and I. DeVore, eds. 1968. *Man the hunter*. Chicago: Aldine Transaction.

Lieberman, D.E., and J.J. Shea. 1994. Behavioral differences between archaic and modern humans in the Levantine Mousterian. *American Anthropologist* 96: 300–332.

Murdock, G. 1967. The ethnographic atlas: A summary. *Ethnology* 6: 109–236.
Myers, F.R. 1988. Critical trends in the study of hunter-gatherers. *Annual Review of Anthropology* 17: 261–282.
Taylor, W. 1972. The hunter-gatherer nomads of northern Mexico: A comparison of the archival and archaeological records. *World Archaeology* 4: 167–178.
Vanhaeren, M., and F. d'Errico. 2006. Aurignacian ethno-linguistic geography of Europe revealed by personal ornaments. *Journal of Archaeological Science* 33: 1105–1128.
Whallon, R. 2006. Social networks and information: Non-"utilitarian" mobility among hunter-gatherers. *Journal of Anthropological Archaeology* 25: 259–270.
Wobst, H.M. 1974. Boundary conditions for Paleolithic social systems: A simulation approach. *American Antiquity* 39: 147–178.
Wobst, H.M. 1978. Archaeo-ethnology of hunter-gatherers or the tyranny of the ethnographic record in archeology. *American Antiquity* 43: 303–309.
Woodburn, J. 1982. Egalitarian societies. *Man* 17: 431–451.
Yellen, J. 1977. *Archaeologicall approaches to the present: Models for reconstructing the past*. New York: Academic.

Hunter-Gatherer Subsistence Variation and Intensification

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Introduction

Approaches to hunter-gatherer subsistence have progressed significantly in recent decades. Stereotyped views of hunter-gatherers as simple, even backward representatives of an early stage of human social evolution have given way to more nuanced ones that reflect a growing recognition of the tremendous variation among hunter-gatherer groups (Kelly 2007). Since the 1960s, studies of hunter-gatherer subsistence have increasingly broadened their focus from men's role as hunters and sole providers, acknowledging the importance of plant foods, fish and shellfish, and women's contributions to the diet (Kelly 2007: 65). The 1966 "Man the Hunter" conference in Chicago, organized by Richard Lee and Irven DeVore, was pivotal in this regard, demonstrating empirically – and in stark contrast to all previous work on the subject – that hunter-gatherers were no less "affluent" than agricultural and pastoral societies (Finlayson 2012) and that gathering provided a substantial portion of the diet. The years since "Man the Hunter" have also seen a shift from preoccupation with social evolutionary stages and descriptive cultural histories toward identification and explanation of the processes that account for variation within and between hunter-gatherer societies, often approaching social organization and subsistence technologies from an ecological or evolutionary perspective. Postprocessual and revisionist scholars have contributed to our understanding of hunter-gatherer subsistence greater awareness of the social, historical, and symbolic aspects of diet and human–animal interactions and have advocated for increased contributions by and collaborations with indigenous groups. Feasting events, food sharing and storage, prestige foods, tabooed animals, circumscription, costly signaling, transmission of knowledge, trade, globalization, identity, individual agency, landscape use, and power and dominance are among the topics addressed from this diversity of perspectives using hunter-gatherer subsistence data.

Definition

Simply put, *subsistence* refers to the ways people meet their basic needs, particularly the procurement and processing of food. In practice, though, subsistence is tied to local ecologies, technology, sociopolitical organization, and connections to external groups, for example, and so has implications well beyond sustenance. Addressing such complex subsistence-related topics as gender division of labor and emergent inequality requires a

clear presentation of related definitions, theoretical concepts, and methodological approaches to hunter-gatherer subsistence.

Key Definitions for Hunter-Gatherer Subsistence Studies

Hunter-gatherers are defined in various ways, most often in terms of their subsistence economy, social organization, or ideology (Jordan 2009: 448). Here, we define hunter-gatherers as those people whose subsistence economies are based on wild (i.e., undomesticated) plants and animals (but see "Key Issues/Current Debates," below). Prior to approximately 12,000 BP, the entire human population relied on some form of hunting and gathering. Meta-analyses of hunter-gatherer subsistence variation indicate strong correlations between environment and diet and attempt to quantify them using measures of primary production (PP) and effective temperature (ET) (see "Explaining Variation," below) (Kelly 2007: 66–71). For example, in high-latitude regions such as the Arctic, where PP is low and much of the plant biomass inedible for humans, local human groups tend to rely heavily on meat. Conversely, in equatorial and lower latitude environments including tropical forests and temperate deserts, PP is higher and more of it is available to humans, resulting in generally greater reliance on plants. Aquatic resources are more often staples in colder climates such as coastal areas in northern latitudes than at lower latitudes even if they are similarly accessible (Kelly 2007: 71).

Anthropologists have used a variety of concepts to further categorize subsistence variability among hunter-gatherers. Woodburn (1980) distinguishes between immediate- and delayed-return hunter-gatherers on the basis of their consumption patterns. Immediate-return hunter-gatherers consume food shortly after they acquire it and rarely depend on any form of storage. Delayed-return hunter-gatherers typically live in seasonally variable environments and rely on storage technologies to survive the season(s) of low resource availability. Similarly, Lewis Binford's (1980) definition of *foragers* and *collectors* identified relative dependence on storage, combined with kind and degree of mobility, as a key distinction between hunter-gatherer groups. Foragers "move consumers to food," so to speak, exploiting the resources within a reasonable radius around a base camp until depleted and then moving the entire group to the next such location. Conversely, collectors tend to establish base camps in places with access to a variety of resources, perhaps located farther from camp than in the previous scenario, and rely on "task groups" to move food resources to consumers in a sometimes extensive system of logistical mobility. Some authors consider forager-like hunter-gatherers *resource diversified* and collector-like hunter-gatherers *specialized* (Chatters 1987), since the former are search oriented and take a wide range of resources on encounter while the latter deliberately pursue particular species.

Resource intensification is an important concept in hunter-gatherer subsistence studies. Boserup (1965) defined intensification as a process of extracting more energy (e.g., kilocalories) per unit of land in response to population growth and increasing resource competition. For Boserup, an economist interested in agricultural development, this equates to increased cropping frequency and use of multi-cropping tactics. Applied to hunter-gatherers, Boserup's intensification model predicts expanding diet breadth to include lower-ranked resources, such as small mammals or seeds. In both applications, intensification *increases* total productivity, but *decreases* productive efficiency, since it requires more intensive labor per unit energy extracted.

Optimal foraging models, initially developed in sociobiology and reframed by human behavioral ecologists to study human foraging behaviors, are an increasingly common tool for identification and explanation of resource intensification in the archaeological record (Kelly 2007). The "fine-grained prey" or "diet breadth" model is particularly useful for understanding resource intensification. In this model, resources are ranked according to their post-encounter energetic return rates (energy gained relative to energy expended in handling) and taken on encounter if they are a member of the optimal set – those resources that produce the optimal rate of energetic return (greatest energy per unit time). Diets broaden to

include lower-ranked resources when search costs for higher-ranked ones are high (i.e., they become scarce relative to human foragers). Broughton et al. (2011) showed recently that prey body size and return rate are strongly positively correlated, legitimating the common practice of using body size as a proxy for resource rank. Thus, an increase in small mammals or seeds – ostensibly low-ranked resources – in an archaeological record is often interpreted as evidence of decreased foraging efficiency. More specifically, an archaeological shift from reliance on hunting to plant-based subsistence is usefully viewed in light of Boserup's and more recent discussions of intensification. The intensification process has also been productively studied in reference to technological change that rearranges rankings of prey species. The best examples of this are associated with the evolution of Mesolithic fishing and grain harvesting and Northwest Coast maritime adaptations (Hayden 1981).

Archaeological Analyses of Subsistence

Subsistence practices can be interpreted through a variety of archaeological materials. For example, zooarchaeologists analyze animal remains recovered from archaeological deposits, identifying bones, teeth, shell, and other faunal materials to skeletal element and taxon. Cataloging the kinds and quantities of different skeletal parts and taxa, zooarchaeologists can address a variety of subsistence-related questions including dietary breadth and the relative importance of particular taxa, seasonal use of resources, gender division of labor, feasting behavior, trade (e.g., foraged resources exchanged for cultivated ones), and resource intensification, as well as changes in these behaviors through time.

In recent decades, paleoethnobotany has emerged as a vibrant field of study, able to address many of the same questions mentioned above and extending beyond them to include specific interactions between people and plants, environmental catalysts for dietary change, medicinal practices, plant resource domestication, and the transition to food production. Macrobotanicals, such as charred seeds and plant parts collected using the flotation method, and microbotanicals such as pollen and phytoliths, extracted from soil samples chemically or through ashing, are identified to taxon and their relative frequencies used to interpret prehistoric subsistence behaviors.

Both zooarchaeology and paleoethnobotany are aided by the relatively new and growing field of archaeochemistry, which produces valuable data previously unavailable through traditional archaeological methods. Archaeochemists extract anthropogenic residues from soils, coprolites, lithic tools, ceramics, and fire-cracked rock to reconstruct prehistoric diets and environments.

Conventional methods of addressing hunter-gatherer subsistence remain important as well. The spatial and temporal distributions, relative frequencies and kinds of projectile points, ceramics, basketry, storage features, and diagnostic site types, combined with ethnographic and ethnoarchaeological interpretations, form the foundation of many subsistence studies.

Historical Background

Enlightenment notions of progress and misinterpretations of Darwinian concepts, which at the time were still very new to science, led progressive social evolutionary theorists of the late nineteenth century to describe hunter-gatherers as modern representatives of a primitive human condition – the lowest rung on the human evolutionary ladder, at the top of which was nineteenth-century industrial Europe. Evident in the writings of Lewis Henry Morgan and E.B. Tyler, for example, is the resultant tendency to ignore variation in hunter-gatherer subsistence practices; treating, for example, all hunter-gatherers, living and prehistoric, as if they were cut from the same cloth. Viewed as socially backward and intellectually inferior, hunter-gatherers were pitied: Unable to achieve agriculture and its attendant social advances, hunter-gatherers' existence was characterized by "continual fear and starvation, a perpetual and barely adequate search for food" (Kelly 2007: 16). Subsistence differences between groups, when entertained at all, were attributed to contacted with more "civilized" neighbors.

At the turn of the twentieth century, ethnographer Franz Boas rejected the progressive social evolutionary notion of parallel evolutionism. He cultivated the opposing school of historical particularism – based on the idea that cultural traits including hunting and gathering are the product of groups' unique histories rather than of stages in an inevitable, stepwise evolutionary progression – and generated a large and prolific group of graduate students. Two such students, however, Clark Wissler and Alfred Kroeber, observed that, despite their particular histories, certain culture traits tended to cluster geographically, coincident with major food resources (i.e., bison in the Plains, salmon in the Northwest, and wild seeds in the Great Basin) (Kelly 2007: 40).

It may have been this vaguely ecological description of "culture areas" that led Julian Steward, a student of Kroeber's, to explore the relationship between society, technology, and environment, an approach he dubbed "cultural ecology" (1969). Steward took a comparative approach to the ways societies extracted energy from their environments. He believed that the interaction between technology and environment determined subsistence behavior and that, while common environments might lead to common subsistence behaviors, technology, as a product of groups' particular histories, made for important differences.

Lewis Binford and other "new archaeologists" of the 1960s were likewise interested in environmental explanations of hunter-gatherer subsistence. Binford in particular argued that all behavior was governed by lawlike principles that could be understood through scientifically rigorous methods, and many of his explanations of cultural change observed in the archaeological record were tied to evidence of environmental change.

While many of these interpretations were eventually rejected as environmentally deterministic, the new archaeologists – also referred to as processualists – spawned a distinct area of study, the focus of which was interpreting dynamic human behaviors (especially subsistence behaviors) from the static archaeological record. This "middle range" body of theory included studies of taphonomy, which are now a crucial means of distinguishing human from natural influences on the archaeological record of subsistence behaviors. It was also at this time that ethnoarchaeology became a mainstay of middle range research, applying ethnographic methods specifically to the study of behaviors that leave material residues (e.g., butchery and discard). For example, Binford's own observations of Nunamiut butchering gave archaeologists a "frame of reference" for interpreting patterned faunal remains.

In applications not entirely dissimilar to middle range theory in their attempt to reconstruct behaviors from patterns in the archaeological record, anthropologists of the 1980s and 1990s began to adopt models developed in sociobiology, establishing a new explanatory framework for the study of humans known as human behavioral ecology (HBE). Human behavioral ecologists use mathematical and conceptaul models to explore human decision-making in terms of particular currencies (e.g., kilocalories) and constraints (e.g., resource availability). Optimization models including diet breadth, patch choice, and central place foraging reduce complex human behaviors to a tractable number of variables, providing testable predictions that sometimes lead to surprising insights to human subsistence behaviors.

Optimal foraging models have also been at the forefront of intensification studies. Research of this kind got its start in California where archaeologists hypothesized that resource depression occurred during the precontact period prior to c. 1000 BP due to high population densities and competition for resources. It was not until populations declined due to drought during the Medieval Warm Period (c. 1000–1300 BP) that key resources rebounded. By the time Spanish explorers reached the central coast of California some 200 years later, the region seemed to be teeming with high-ranked game. This perception of precontact California persisted even among archaeologists until researchers including Terry Jones and William Hildebrandt used faunal evidence to challenge it, demonstrating there was indeed depression of high-ranked sea lions and fur seals and intensive use of more evasive harbor seals and sea otters. Jack Broughton also found

evidence of depression and intensification of resources in the San Francisco Bay during the late Holocene evidenced through decrease of large sturgeon and increase of low-ranked fishes through time.

Postprocessual and revisionist scholars reject the idea embraced by new archaeologists and human behavioral ecologists that cultures evolved simply as a way to adapt to the surrounding environment and that there are lawlike mechanisms governing human behaviors. Postprocessualists argue that intra-community dynamics tied to politics, socioeconomics, and ideology are also important variables that shape societies; cultural evolution is historically contingent. From this perspective, subsistence studies must go beyond strictly materialist, ecological, or environmental influences, to consider such things as social stratification and unequal access to resources within communities, feasting and other rituals tied to food, and food symbolism.

Key Issues/Current Debates

Hunter-Gatherer Subsistence Variation

Use of Ethnographic Data

Ethnographic and ethnoarchaeological methods have improved dramatically since the pioneering work of Franz Boas and his students, sometimes incorporating sophisticated technologies and techniques designed to capture invisible or elusive – but critical – aspects of foraging behavior. For example, Pacheco-Cobos et al. (2010) use global positioning systems and biotelemetry to track foraging pathways, energy expenditure, and overall foraging efficiency among men and women of an indigenous Mexican community. Yet even modern studies may fail to accurately characterize subsistence regimes; time-limited observations can mask important variation in daily, seasonal, and supra-annual foraging goals and decisions, for instance. When incorporated into broader comparative studies, mischaracterizations can obscure causes of subsistence variation.

Technology and technique may continue to close gaps in our knowledge of hunter-gatherer subsistence, or they may be outpaced by ethnographic subjects' adoption of "nontraditional" tools and practices, which, some might argue, would make them "inauthentic," inappropriate models of past behaviors. This may be a slippery slope, however, since it is clear that even relatively recent prehistoric innovations – including the bow and arrow – fundamentally changed foraging practices. Moreover, even some apparently "pristine" ethnographic hunter-gatherers (e.g., Kalahari Bushmen) shifted subsistence foci – from hunting and gathering to farming or herding and back again – several times in the past (Ames 2004), leaving students of subsistence variation caught between the impropriety of strict reliance on ethnographic data and an archaeological record that is often woefully incomplete. Yet, "there is no alternative to using our knowledge of modern peoples to help us penetrate the past" (Ames 2004: 366); success requires a body of theory equipped to manage the respective shortcomings of both records (see "Explaining Variation," below).

Defining "Hunter-Gatherer"

Some amount of reported subsistence variation is semantic. Definitions of "hunter-gatherer," for example, differ in their tolerance of 'inauthentic' behaviors, including market participation or trade for agricultural products, the tending of small gardens, or keeping of wild animals for milk or eggs, even whether a group engaged in these activities at some time in the past (see above; Ames 2004). What is more, some studies define "hunter-gatherer" in terms of social organization rather than subsistence economics, classifying variation along social dimensions such as group size and flexibility of membership, power structure, and the distribution of wealth.

Hunter-gatherers, however they may be defined, are often further distinguished based on the relative importance of particular foraging strategies (e.g., hunting versus gathering) or contributions of major food classes (e.g., terrestrial game, fish). Currently, there are no standards for these subdivisions, and dietary contributions, for

example, are as often reported in terms of net weight as in kilocalories, if they are quantified at all. Moreover, economic relationships with other groups can artificially inflate the importance of hunting, for example, if some portion of hunted resources is traded for carbohydrates (Kelly 2007).

Consensus among anthropologists may be untenable. Still, while explaining hunter-gatherer subsistence variation does require coherent classifications, internal consistency may be sufficient, and some bodies of theory are no less fruitful for their deliberate agnosticism toward prescriptive categories.

Explaining Variation

Two primary schools of thought approach hunter-gatherer subsistence variation in fundamentally different ways. Historicists focus on groups' particular histories, viewing subsistence in a socio-cultural context, with the aim of documenting variation and describing its historical origins. Conversely, materialists often take a comparative approach, viewing subsistence in an ecological or evolutionary context, with the goal of distilling and explaining subsistence differences. These perspectives produce very different assessments of hunter-gatherer subsistence variation.

The historical approach is fine-grained and particularistic, accounting for exceptional cases that do not fit materialist generalizations about subsistence and environment. However, particularistic studies also "maximize heterogeneity and mask similarities" between groups and, ultimately, lack explanatory power (Ames 2004: 370). While some historicists claim that the alternative, materialist perspective is callously reductionist and environmentally deterministic in its drive to explain variation, this is not necessarily so.

Materialists start from the premise that the global history of subsistence similarities is unlikely to be purely coincidental. Within the materialist school, however, there are various approaches to explaining these similarities, including ones that are, in essence, environmentally deterministic (though few anthropologists would self-identify as such). Leaving aside definitional inconsistencies, hunter-gatherer diets have reliably been shown to correlate with environmental variables. Effective temperature (ET) – an estimate of regional seasonality and productivity derived from the mean temperatures of the warmest and coldest months of the year – and primary productivity (PP) – net annual above-ground plant biomass – seem to account for much of the variation in subsistence foci (e.g., percent reliance on hunting; Binford 1980; Kelly 2007) and have been interpreted as the primary explanation for that variation. However, simply recognizing patterns and identifying important environmental variables falls short of explanation, particularly since strong correlations sometimes emerge only after a number of outlier groups are removed. It is also true that ET and PP are much better predictors of groups' reliance on plants than on animals (Kelly 2007) and that, alone, they simply cannot predict which of all available food items in an environment are exploited, when, how, and by whom, the important intercultural differences masked by the approach.

Human behavioral ecology capitalizes on documented patterns of diet–environment co-occurrence and attempts to address the very subtleties that a purely environmental approach cannot. Despite its strongly cohesive Darwinian paradigm, HBE permits considerable range in subsistence models. Historically, optimal foraging models have dealt in kilocalories, but the last 10 years have seen the inclusion of alternative currencies including nutrient complementarity and prestige. Recognition that hunter-gatherers may be hunting (or gathering) for social reasons rather than strictly for sustenance has led to both innovative research and heated debates.

Other areas currently generating interesting research are within-group specialization, particularly sexual division of labor; how an individual forager's diet breadth can change over the course of a single foraging bout and what effect this might have on long-term, material records of foraging; and the effects of cultural transmission on cross-cultural variation in tools, foraging techniques, and dietary composition, all of which are key to understanding subsistence variation.

Critics have argued that HBE models, designed to predict individuals' behaviors, may not be appropriate for archaeological analyses, which most often deal in population-level data, generated over long time spans and muddied by taphonomy. Models are deliberate simplifications of complex relationships between people and resources, and if the archaeological record represents "average" behaviors, HBE models can still be used to test hypotheses of prehistoric foraging. Ripe for development are models that predict the effects of group hunting, sharing, and tolerated theft on the material record and the range of subsistence behaviors not evident in the ethnographic record.

Intensification

Study of the process of intensification is primarily the province of archaeologists and historians. Unfortunately, intensification – particularly incipient intensification (e.g., flood irrigation, fertilization, swiddening) – is not always clear in the archaeological record. Even quantifiable aspects of dietary change, such as isotopic signals of increasing cultigen consumption, can be controversial since in situ intensification cannot always be distinguished from trade.

Though sometimes materially ambiguous, intensification is theoretically tractable in light of HBE: foragers should invest in activities that increase productivity per unit area when doing so improves overall subsistence returns. Importantly, foraging theory predicts that people may stop intensifying, perhaps returning to a previous state of unintensified hunting and gathering, if the initial pressure to intensify is relaxed. While HBE provides an explanation for intensification, it invites exciting research on proximate causes (e.g., environmental change, circumscription, *perceived* resource scarcity, technological adaptations) that will have important historical and cultural components.

International Perspectives

Subsistence studies remain at the forefront of hunter-gatherer research throughout the globe. In Australia, subsistence research utilizes optimal foraging theory to address adaptations to desert environments and resource intensification among Aboriginal communities during the late precontact and contemporary periods. Bird and Bleige Bird (e.g., 2005) use OFT to address food sharing, use of fire to improve foraging yields, and differential hunting strategies among men, women, and children. On a broader scale, O'Connell and Allen (2012) consider demographic pressure, climatic instability, and depletion of high-ranked resources as potential causal factors for the initial colonization of Sahul (Australia and New Guinea) by populations that traveled from the Asian mainland and through Wallacea c. 44,000–46,000 years BP.

Since the 1960s, hunter-gatherer research in Africa has generated both cutting-edge data and considerable controversy. Richard Lee's work among the Kalahari Bushmen challenged the long-held progressive social evolutionary notion that hunter-gatherers were forever toiling to eke out a living, while agriculturalists, through food production and relative independence from the whims of the environment, freed themselves to engage in intellectual pursuits. The!Kung data suggested instead that hunter-gatherers spend far less time in food procurement than agriculturalists, even making them the "original affluent society" (Jordan 2009). Further controversy was generated in the 1990s when a group of "revisionist" anthropologists argued that the Kalahari Bushmen were inappropriate models of a "pristine" hunter-gatherer lifeway given their long and complex history of interactions with neighboring agropastoralists and European colonists (Wilmsen 1989; see also "Key Issues/Current Debates," above). Like Lee's work during the 1960s, modern studies among African hunter-gatherers are on the cutting edge of subsistence research, incorporating research designed to probe more deeply into foraging costs and returns and food sharing, for example (Mitchell 2002).

Subsistence has been a primary focus of Americanist hunter-gatherer research for many decades, and the range of subsistence questions addressed is truly impressive. As one of the last major colonization events, the peopling of the New World has been an active area of study since the

discipline's beginnings and so has generated a large body of theory and data, much of which is subsistence based. The so-called Clovis-first hypothesis indicates that small groups of hunter-gatherers followed herds of Pleistocene megafauna (e.g., mammoths) across the Bering Land Bridge to the New World, perpetuating the stereotype that hunter-gatherers subsist primarily on meat procured by men. However, more recent research suggests not only that people may have colonized the New World via the coast, and so would have diets that included marine resources, but also that even fully "terrestrial" Paleoindians had rather broad diets. Indeed, the earliest widely accepted site in the New World, Monte Verde in Chile, shows extensive use of large and small animals, terrestrial plants and seeds, and seaweed. As more early sites like Monte Verde and the Gault site in Texas yield convincing evidence of very broad Paleoindian diets, our understanding of early Americans' subsistence behaviors will be refined. Many South Americanists also remain committed to understanding subsistence variability in relation to ethnic group identity (e.g., Cornejo & Sanduezar 2011).

Domestication of plants and animals has dominated subsistence research in the Near East at least since the 1960s. Recent investigations provide morphological evidence for plant domestication by 10,500 cal BP, and evidence for active management of wild plants and animals predates domestication by a 1000 years or more (Zeder 2011). New data indicate that domestication of plants and animals occurred simultaneously in different areas throughout the Near East rather than originating solely in the southern Levant. For example, domesticated einkorn, emmer, and pulses, as well as sheep, pigs, cattle, and potentially goats, appear to have originated in the central Fertile Crescent, near the upper portions of the Tigris and Euphrates Rivers (Zeder 2011: 230). It is now clear that human groups in the Near East combined hunting and gathering, cultivation of domesticates, and management of wild crops and animals for approximately 4000 years before developing subsistence economies based mainly on domesticated crops and animals.

Notable research in Eurasia investigates anatomically modern *Homo sapiens* and *Homo neanderthalensis* adaptations during the Pleistocene (Stiner & Kuhn 2006). Data imply that subsistence behaviors changed little during 200,000 years of the Middle Pleistocene; large-bodied prey species, as well as animals susceptible to over-predation, such tortoises, were hunted consistently. Nonetheless, hunting pressure appears not to have influenced prey population densities (i.e., animal frequencies do not change in the archaeological record) because *H. sapiens* and *H. neanderthalensis* populations were insufficiently large. During the transition to the Upper Paleolithic, however, there appear to have been localized depressions in both large and smaller mammal populations, perhaps due to increased human populations and overhunting. Another significant area of Eurasian subsistence research has concerned adaptations to high-latitude environments. Russian scholars have offered important insights into the world's earliest arctic adaptations. For example, the Yana RHS site in Siberia, which dates to c. 27,000 BP, demonstrates that people were adapted to high Arctic environments much earlier than previously assumed, with diets that included mammoths, horse, reindeer, bison, and hare (Pitul'ko et al. 2004).

Future Directions

Several lines of research will continue to move us beyond simple description and reductionism toward an ever more holistic understanding of hunter-gatherer subsistence variation. Continued development of technologies designed to track concealed aspects of the foraging calculus (e.g., energy expenditure, nutrient complementarity) will hone quantifications of relevant costs and benefits. Behavioral models of subsistence will be improved by incorporation of these data as well as by persistent attention to potential alternative currencies and constraints. Emergent

research on cultural and historical learning biases that help shape hunting technologies, approaches to storage and methods for improving nutrient bioavailability, for example, will surely help to explain subsistence variation among hunter-gatherers living in similar environments. Command of models that incorporate learning biases will be enhanced by attention to the findings of behavioral research laboratories that use game theory to understand strategic decision-making and to those in psychology and cognitive neuroscience aimed at understanding human perceptions and motivations.

Common to all of these research endeavors is the integration of historicist and materialist perspectives; it is clear that both are necessary to explain subsistence variation. Although archaeological applications are still few and fairly simple, there is a growing recognition that cultural transmission theory (CT) offers a principled means of uniting the two approaches. Like HBE, CT deals in mathematical models, formalizing the effects of culture and history (e.g., technology and subsistence practices) on the adaptive equation, but CT has the advantage of being able to connect individual behaviors with population outcomes by looking at different spatial and temporal scales. A truly modern approach to hunter-gatherer subsistence will incorporate both social and environmental variables to understand cross-cultural variability in foraging tools and practices, food preferences, labor specialization, and long-term subsistence change.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Behavioral Archaeology
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Mesoamerica: Subsistence Strategies by Region

References

Ames, K. 2004. Supposing hunter-gatherer variability. *American Antiquity* 69: 364–374.

Binford, L.R. 1980. Willow smoke and dogs tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45: 4–20.

Bird, D.W., and R. Bleige Bird. 2005. Evolutionary and ecological understandings of the economics of desert societies. In *Desert peoples: Archaeological perspectives*, ed. P.M. Veth, M. Smith, and P. Hiscock, 81–99. London: Blackwell Scientific.

Boserup, E. 1965. *The conditions of agricultural growth: The economics of agrarian change under population pressure*. Chicago/London: Aldine/Allen & Unwin.

Broughton, J.M., M. Cannon, F. Bayham, and D. Byers. 2011. Prey body size and ranking in zooarchaeology: Theory, empirical evidence, and applications from the northern Great Basin. *American Antiquity* 76: 403–428.

Chatters, J.C. 1987. Hunter-gatherer adaptations and assemblage structure. *Journal of Anthropological Archaeology* 6: 336–375.

Cornejo, L.E., and L. Sanduezar. 2011. North and south: Hunter-gatherer communities in the Andes mountains in central Chile. *Latin American Antiquity* 22: 487–504.

Finlayson, B. 2012. *Imposing the Neolithic on the past. Paper presented at the Society of American Archaeologists Conference*. Memphis.

Hayden, B. 1981. Research and development in the Stone Age: Technological transitions among hunter-gatherers. *Current Anthropology* 22: 519–548.

Jordan, P. 2009. Hunters and gatherers. In *Handbook of archaeological theories*, ed. R.A. Bentley, H.D.G. Maschner, and C. Chippindale, 447–465. Lanham: Rowman and Littlefield.

Kelly, R. 2007. *The foraging spectrum: Diversity in hunter-gatherer lifeways*. New York: Percheron Press.

Mitchell, P. 2002. *The archaeology of southern Africa*. Cambridge: Cambridge University Press.

O'Connell, J.F., and J. Allen. 2012. The restaurant at the end of the universe: Modeling the colonization of Sahul. *Australian Archaeology* 74: 5–17.

Pacheco-Cobos, L., M. Rosetti, C. Cuatianquiz, and R. Hudson. 2010. Sex differences in mushroom gathering: Men expend more energy to obtain equivalent benefits. *Evolution and Human Behavior* 31: 289–297.

Pitul'ko, V.V., P.A. Nikolsky, E.J. Girya, A.E. Basilyan, V.E. Tumskoy, S.A. Koulakov, S.N. Astskhov, E.Y. Pavolta, and M.A. Anisimov. 2004. The Yana RHS site: Humans in the arctic before the last glacial maximum. *Science* 303: 52–56.

Steward, J.H. 1969. Observations on bands. In *Contributions to anthropology: Band societies*. National Museum of Canada Bulletin, Vol. 228, ed. D. Damas, 187–190. Ottawa: National Museum of Canada.

Stiner, M.C., and S.L. Kuhn. 2006. Changes in the 'connectedness' and resilience of Paleolithic societies in Mediterranean ecosystems. *Human Ecology* 34: 693–712.

Wilmsen, E.N. 1989. *Land filled with flies: A political economy of the Kalahari*. Chicago: University of Chicago Press.

Woodburn, J. 1980. Hunters and gatherers today and reconstruction of the past. In *Soviet and western anthropology*, ed. A. Gellner, 95–117. London: Duckworth.

Zeder, M.A. 2011. The origins of agriculture in the Near East. *Current Anthropology* 52: 221–235.

Further Reading

Bettinger, R.L. 1991. *Hunter-gatherers: Archaeological and evolutionary theory*. New York: Plenum Press.

Bettinger, R.L. 2006. Agriculture, archaeology, and human behavioral ecology. In *Behavioral ecology and the transition to agriculture*, ed. D.J. Kennett and B. Winterhalder, 304–322. Berkeley: University of California Press.

Binford, L.R. 2001. *Constructing frames of reference: An analytical method for archaeological theory building using ethnographic and environmental data sets*. Berkeley/Los Angeles: University of California Press.

Binford, L.R. 1978. *Nunamiut ethnoarchaeology*. London/New York: Academic.

Codding, B., and T. Jones. 2007. Man the show off? Or the ascendance of a just-so-story: A comment on recent applications of costly signaling theory in American archaeology. *American Antiquity* 72: 349–357.

Gil, A., G. Neme, and R. Tycot. 2011. Stable isotopes and human diet in central western Argentina. *Journal of Archaeological Science* 38: 1395–1404.

Lee, R.B., and I. Devore, eds. 1968. *Man the hunter*. Chicago: Aldine.

Levi, T., F. Lu, D.W. Yu, and M. Mangel. 2011. The behavior and diet breadth of central-place foragers: An application to human hunters and Neotropical game management. *Evolutionary Ecology Research* 13: 171–185.

Marlowe, F.W. 2005. Hunter-gatherers and human evolution. *Evolutionary Anthropology* 14: 54–67.

Orians, G.H., and N.E. Pearson. 1979. On the theory of central place foraging. In *Analysis of ecological systems*, ed. D.J. Horn, G.R. Stairs, and R.D. Mitchell, 155–177. Columbus: Ohio State University.

Pearsall, D.M. 2001. *Paleoethnobotany: A handbook of procedures*. Walnut Creek: Left Coast Press.

Price, T.D., and J.H. Burton. 2011. *An introduction to archaeological chemistry*. New York: Springer.

Reitz, E.J., and E.S. Wing. 2008. *Zooarchaeology* Cambridge Manuals in Archaeology. Cambridge: Cambridge University Press.

Smith, E.A. 2000. Three styles in the evolutionary analysis of human behavior. In *Adaptation and human behavior: An anthropological perspective*, ed. L. Cronk, N. Chagnon, and W. Irons, 27–46. New York: Aldine.

Winterhalder, B. 1986. Diet choice, risk, and food sharing in a stochastic environment. *Journal of Anthropological Archaeology* 5: 369–392.

Winterhalder, B., and D.J. Kennett. 2006. Behavioral ecology and the transition from hunting and gathering to agriculture. In *Behavioral ecology and the transition to agriculture*, ed. D.J. Kennett and B. Winterhalder, 1–21. Berkeley: University of California Press.

Van Derwarker, A.M. 2010. *Integrating zooarchaeology and paleoethnobotany: A consideration of issues, methods, and cases*. New York: Springer.

Hunter-Gatherers, Archaeology of

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Introduction

The study of hunter-gatherer societies remains fundamental to archaeological research around the globe. Hunting and gathering societies have existed in virtually every environment from the extreme (e.g., arctic, subarctic, subantarctic, alpine, and desert) to the more benign (e.g., temperate interior forests and coasts). Hunting and gathering as an economic strategy dominates human history, given the relatively recent development and expansion of domesticated food production systems. Indeed a number of the world's regions (e.g., North American and Eurasian Arctic and Subarctic, Australia, Tasmania, Patagonia) were peopled by hunter-gatherers until colonization by European groups in the most recent centuries. Archaeologists engage in hunter-gatherer research to address many topics including human evolution, population movements and peopling events, ecological adaptation, forager-farmer interactions, social change, indigenous history, and socio-ideological landscape structure. The archaeology of hunter-gatherers is a dynamic field of study as exemplified by a wide range of

research agendas and debates among its major practitioners. This entry draws from recent works summarizing the current state of the art in hunter-gatherer archaeology (Bettinger 1991; Kelly 1995; Lee and Daly 1999; Binford 2001; Panter-Brick et al. 2001; Barnard 2004; Jordan 2008; Sassaman and Holly 2011) to outline current definitions of hunter-gatherers, historical perspectives, critical debates, international views, and future directions.

Definition

Hunter-gatherers are recognized as a highly diverse set of societies occupying every continent with the exception of Antarctica. However, scholars have struggled over a proper definition for hunter-gatherer. A common view is that hunter-gatherers represent the original human society. Social Darwinists viewed hunter-gatherers effectively as the basal rungs on a ladder of cultural progress (Bettinger 1991). The definition of hunter-gatherer as original human society was evident in neoevolutionary frameworks (e.g., egalitarian band), and later, "pristinist" views asserting some hunter-gatherer groups such as the Ju/'hoansi are in effect survivors from the Paleolithic (Kelly 1995).

A common approach has been to couch definitions in ecological terms primarily in reference to food. Discussions at the "Man the Hunter" conference in 1966 led to a portrayal of hunter-gatherers as people surviving on foods acquired from their surrounding environment. Subsequent research demonstrated that hunter-gatherers employ a diverse array of strategies to acquire, process, and consume those resources. Some hunter-gatherers move groups to food sources, acquire and consume the food, and then move on. In contrast, other hunter-gatherers send task groups from more stable home bases to acquire large quantities of food to be stored and consumed later. Recognition of these differences led to new types, known to James Woodburn as immediate and delayed return hunter-gatherers and Lewis Binford as foragers and collectors (Kelly 1995).

Scholars have also defined hunter-gatherers in sociopolitical terms, typically classifying them as people who live in small, egalitarian social units, typically families or "family bands," lacking formal defended territories, and maintaining flexible residential group membership (Lee and DeVore 1968). Marxian scholars identified a "hunter-gatherer mode of production" whereby hunting and gathering was merely the "glue" holding together the wider package of characteristics (Lee 1988; Panter-Brick et al. 2001). Archaeologists also recognized significant diversity in social organization among hunter-gatherers, leading to an additional typological distinction between generalized and complex hunter-gatherers (Price and Brown 1985).

Typological approaches have been critiqued on a number of grounds. Definitions emphasizing predation of non-domesticated food resources or lack of genetic manipulation of prey populations have not always held up well in the face of realities lived by many societies identified as hunter-gatherer. Some hunter-gatherers rely on nearby agriculturalists for some foods and tools by producing special products such as honey, rattan, or large game meat for trade. Some work part time for nearby farmers and pastoralists. Others maintain gardens, growing domesticated crops during certain seasons of the years. Finally, a few groups maintain herds of domesticated animals. Panter-Brick et al. (2001) suggest, however, that the actual percentage of those cultivated products in diets of hunter-gatherers is generally very low.

Critiques of typological definitions of hunter-gatherers have recently come from archaeologists in two distinct theoretical camps. Evolutionary archaeologists argue that social types are essentialist and do not reflect that fluid nature of human cultural evolution where change is constant (O'Brien and Lyman 2000). The primary goal of study within this framework is gaining an understanding of evolutionary origins of variability in cultural characters ranging from technologies to foraging strategies.

Archaeologists espousing a social theoretical framework have been more explicit in their critique of hunter-gatherers as ahistorical types (Sassaman

and Holly 2011). These archaeologists argue that hunter-gatherer societies as reconstructed from archaeological data or witnessed in the ethnographic record are the outcomes of history and thus continuously variable. While they have so far avoided some of the excesses of the "Revisionist" school of hunter-gatherer studies (Jordan 2008), they still seek to identify the impacts of historical contingency and individual/group agency on the history of small-scale human groups traditionally identified heuristically as hunter-gatherers.

Historical Background

Archaeological perspectives on hunter-gatherers have changed significantly over the past two centuries. In reviewing historical change in archaeological perspectives, it is critical to recognize that current perspectives are highly diverse, with many archaeologists still engaged in research drawing from older theoretical views. Social Darwinist views generally held that human societies were locked into particular stages of cultural evolution by mental constraints (Kelly 1995). If this was the case, then modern groups committed to such practices as residential mobility, foraging for non-domesticated foods and mandatory food sharing could be labeled survivals from the ancient past, held in place by their inherent inability to rise to a "higher" status. Change could only come with evolution of the brain or by replacement by another group existing at a different cultural level. While most twentieth-century scholars rejected the racialist and ethnocentric elements of social Darwinism, the presumption that historically recent hunter-gatherers represent survivals from the ancient past remained viable. Ethnoarchaeologists, for example, seeking analogies between the present and the past sought out examples of modern people still living in a state close to the Paleolithic. Practitioners of human behavioral ecology in archaeological research today have been critiqued for making such assumptions (Lee and Daly 1999).

The neoevolution and cultural ecology theoretical paradigms brought different perspectives on the nature of change in hunter-gatherer societies. While hunter-gatherers were still viewed as the original form of culture, there was a new perception that cultural change did not necessarily require biological evolution. Now change was driven by "prime movers" forcing hunter-gatherer groups into new, and sometimes less comfortable, modes of existence (Kelly 1995; Jordan 2008). A favorite topic was the transition from hunting and gathering to agricultural modes of existence. Some processual archaeologists influenced by these theoretical models looked to external causal factors such as population packing and environmental change, while others looked to internal processes such as technological innovation (Bettinger 1991; Kelly 1995).

The "revisionist" school painted hunter-gatherers as embedded in complex global web of relationships between human populations with widely varying political and economic interests. In accomplishing this, it offered a significant critique of so-called "pristinist" and "generalist" theories (inclusive of cultural ecology, neoevolution, processual archaeology, and human behavioral ecology). In its most radical form, the revisionists argued that the hunter-gatherers are the rural poor, the losers of Colonial and post-Colonial era struggles. Revisionist theorizing led to a significant new range of archaeological studies, not aimed at defining in situ change but looking at larger scale interactions and impacts of culture contact (Schrire 1984). However, the perception that modern hunter-gatherers were simply marginal survivors of the colonial era was not satisfying to all and led to significant debate, particularly over the interpretation of Kalahari hunter-gatherers (Jordan 2008).

An important outcome of the revisionist debate was the recognition among archaeologists that hunter-gatherers played a more active role in their own histories than had previously been given credit. Sassaman and Holly (2011) outline several means by which hunter-gatherers may be viewed as political actors interacting with wider social, political, demographic, and ecological forces to affect their own histories. Most fundamentally, these social theorists allow hunter-gatherers agency, positioning themselves for

social, economic, and political gain. They also recognize the potential for hunter-gatherers to engage in alterity or practices designed to write and rewrite their own histories. T.R. Kidder's studies of Poverty Point, a massive residential and ceremonial site occupied by hunter-gatherers in the southern United States, make this point particularly well.

Evolutionary archaeologists are not entirely at odds with the positions taken by social theorists. Both recognize the roles of agency and context in the development of history. Their goals differ in the sense that evolutionary theorists seek to understand the evolution of cultural characters, in essence ideas manifested in material things. Social theorists remain more interested in the motivations and practices of the cultural actors. Both seek to understand variability in hunting and gathering societies. Indigenous archaeology has brought additional views of hunter-gatherer variability (Lee and Daly 1999).

Key Issues/Current Debates

Several research issues are actively debated among hunter-gatherer archaeologists today. A fundamental issue that is now hotly debated concerns the evolution of *Homo sapiens* and the development of recognizably modern hunter-gatherer cultural patterns. While all researchers recognize that this process happened in Africa during the past 300,000 years, scholars differ in their opinions on the processes of change and the very definition of modernity in hunter-gatherer contexts. Two positions seem to have emerged. One suggests that the culture of modern hunter-gatherers, as characterized by the Upper Paleolithic of Africa and Eurasia at c. 10–50,000 years ago, could only evolve with biological changes to the brain between about 300,000 and 50,000 years ago. The opposing model suggests that the modern human brain was likely in place by c. 200,000 years ago, with the implication that the emergent Upper Paleolithic pattern was largely the result of cultural evolution.

Hunter-gatherers are at the center of research and debates over many of the world's great population expansions, including the dispersal of early *Homo sapiens* out of Africa, peopling of the Americas, and the movement of Thule Inuit groups across the North American Arctic. Common issues debated in each case concern timing and number of movements, group identities, and causal factors. Outcomes of New World research programs are pointing to complexity in the number, nature, and timing of the major movements. Social/agency theorizing has actually led to some breakthroughs, for example, in Thule Inuit archaeology. Scholars now recognize that the initial movement was probably driven primarily by individuals and groups seeking new sources of iron in the eastern portion of the Canadian Arctic rather than simply seeking to enhance their subsistence base (McGhee 2005).

Subsistence variability and intensification remain prominent topics in the literature, particularly associated with western North America, the eastern Mediterranean, and portions of East Asia. Debates have centered the economic and social logic behind prey choice decisions (Broughton and Cannon 2010). Scholars generally favor economic rationality as best understood using the diet breadth model of human behavioral ecology. However, an increasing number of researchers are offering alternative social perspectives. A good example of this is the debate over the role of costly signaling in the record of ungulate predation by hunter-gatherers of the desert west in North America. Another good example is the research and discussions associated with hunter-gatherer subsistence intensification in the millennia preceding the development of agriculture in the eastern Mediterranean region.

Emergent social complexity has been a central debate among hunter-gatherer archaeologists since the 1980s (Price and Brown 1985). The largest number of scholars seeks covering law-type explanations to the development of social inequality. Processual archaeologists look to underlying resource inequities between groups. Human behavioral ecologists base their models on adaptive decision making regarding optimum use and control of resources using sophisticated mathematical models. Political ecologists and evolutionary psychologists link emergent

inequality to the agency of persons with particular personality types (e.g., aggrandizers). Some social theorists and evolutionary archaeologists have proposed historical models arguing that inequalities arose in some places as historical accidents (Sassaman and Holly 2011). Inequality in hunter-gatherer contexts has been studied and debated most heavily in North America's Western Arctic, Pacific Northwest, California Coast, and Southeast regions, along with portions of Europe, the Near East, and East Asia.

International Perspectives

International scholars have a long history of contributions to hunter-gatherer studies in archaeology (Barnard 2004). Marxian perspectives on hunter-gatherers have been prominent across much of Eurasia (particularly Spain, Russia, and China) during the past century. Western perspectives (e.g., processual archaeology) have been important in the research of scholars in Western Europe, India, and Japan since the 1960s. Processual archaeology has also been influential in Australia and a number of South American countries. In the past two decades, international theoretical perspectives on hunter-gatherers have undergone a significant change with the rise of post-processualism in Western Europe and the development of indigenous archaeology in a number of other places. The rise of indigenous hunter-gatherer archaeologies has been particularly prominent in Australia, South Africa, and North America (Lee and Daly 1999) and has offered the opportunity for archaeological researchers to combine best elements of Western science with traditional knowledge of indigenous groups.

Empirical contributions are widespread around the globe. African scholars have for decades offered critical insight into the human evolution and the development of the world's earliest foraging societies. South Africa has also been the place where the most intense debates over the nature of historical hunter-gatherer societies have taken place (Lee and Daly 1999). European hunter-gatherer research continues to offer significant contributions to human evolution, currently addressing issues of Neandertal adaptations and extinction, Upper Paleolithic variability, and later hunter-gatherer interactions with early farmers. Asian scholars continue to offer new insight into forager-farmer transitions, maritime adaptations, and early Arctic adaptations and population movements. Australian researchers have pushed back dates of Australian colonization and have made important strides in understanding migrations, desert adaptations, and sacred landscapes. South Americanists continue to offer insight into hunter-gatherer engagements with rainforest ecosystems, adaptations to remote isolated environments (Patagonia), early use of marine resources, emergent social complexity, and early population movements in the Americas.

Future Directions

Archaeological discussions of hunter-gatherers will continue to emphasize the solving of major problems associated with human origins, migrations, subsistence variability, and social identity and change. However, these discussions will be increasingly impacted by a number of additional theoretical and political undercurrents.

Hunter-gatherer archaeology will benefit from a close consideration of commonalities between social/agency and evolutionary schools of thought (Jordan 2008). Each offers significant opportunities for insight into variability in hunter-gatherer societies, with a common focus on history of human cultural practices. Human behavioral ecology will also want a seat at this table given its interest in defining the microeconomic logic of human decision making. An important outcome of these discussions will be a demonstrated utility in expanding our understandings of particular histories of indigenous hunter-gatherer groups. Ecological researchers need to pay particular attention to strategies used by indigenous hunter-gatherers to actively manipulate resources within their environments. The time of ancient hunter-gatherers as

passive users of nature's offerings should be long gone.

Gender archaeology will be increasingly critical for comprehensive reconstructions of the past. Defining gendered activity variability in the archaeological record remains a daunting task, particularly when working with very ancient materials (e.g., Paleolithic). Recognition of gendered activity differences is more easily accomplished in later dating contexts where ethnographic analogies are more easily made. For example, on the floors of late precontact Pacific Northwest houses, it is possible to recognize spatial distinctions between hearth- and bench-associated activities, respectively, linked to female and male tasks. However, archaeologists have made significant advances to the point that discussions are even underway regarding changes in gendered activity structure between Middle and Upper Paleolithic camps.

Landscape archaeology will become central to reconstructing hunter-gatherer belief systems, land use practices, political relationships, and economic systems. As an increasing number of archaeologists are recognizing, hunter-gatherer landscapes carry meaning that goes well beyond that of ecology to include a wide range of sacred and spiritual connections. While ancient religions of hunter-gatherers have in many ways remained beyond archaeology's grasp, analysis of symbolic systems across landscapes offers the potential for significant new insights. This will provide more opportunities for archaeologists to advance our understanding of hunter-gatherers beyond ancient economists to more fully engaged human beings equivalent in cultural complexity to those of agricultural societies.

Achieving a comprehensive understanding of past hunter-gatherers will require knowledge beyond the standard training received by many archaeologists. Indigenous archaeologies offer the opportunity to gain new insight into aspects of the archaeological record (e.g., symbols, sacred connections, and traditional practices) not always recognized. Engagement by and with those with traditional knowledge can lead archaeology into entirely new worlds of the past. Indigenous archaeology also offers the opportunity for indigenous people offer their own conclusions about their past, something long overdue in many parts of the world. Archaeology thus becomes not just a science of the past but also a tool for cultural heritage research and education.

Cross-References

- ▶ Complex Hunter-Gatherers
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification

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References

Barnard, A. 2004. *Hunter-gatherers in history, archaeology, and anthropology*. Oxford: Berg.

Bettinger, R.L. 1991. *Hunter-gatherers: Archaeological and evolutionary theory*. New York: Plenum Press.

Binford, L.R. 2001. *Constructing frames of reference: An analytical method for archaeological theory building using ethnographic and environmental data sets*. Berkeley: University of California Press.

Broughton, J.M., and M.D. Cannon. 2010. *Evolutionary ecology and archaeology: Applications to problems in human evolution and prehistory*. Salt Lake City: University of Utah Press.

Jordan, P. 2008. Hunters and gatherers. In *Handbook of archaeological theories*, ed. R.A. Bentley, H.D.G. Maschner, and C. Chippindale, 447–466. Lanham: AltaMira Press.

Kelly, R.L. 1995. *The foraging spectrum: Diversity in hunter-gatherer lifeways*. Washington, DC: Smithsonian Institution Press.

Lee, R.B. 1988. Reflections on primitive communism. In *Hunter-gatherers: History, evolution and social change*, ed. T. Ingold, D. Riches, and J. Woodburn, vol. I, 252–268. Oxford: Berg.

Lee, R.B., and R. Daly. 1999. Introduction: Foragers and others. In *The Cambridge encyclopedia of hunters and gatherers*, ed. R.B. Lee and R. Daly, 1–22. Cambridge: Cambridge University Press.

Lee, R.B., and I. DeVore. 1968. Problems in the study of hunters and gatherers. In *Man the hunter: The first intensive survey of a single crucial stage of human development – man's once universal hunting way of life*, ed. R.B. Lee and I. DeVore, 3–12. New York: Aldine.

McGhee, R. 2005. *The last imaginary place: A human history of the Arctic world*. Chicago: University of Chicago Press.

O'Brien, M., and R.L. Lyman. 2000. *Applying evolutionary archaeology: A systematic approach*. New York: Kluwer/Plenum.
Panter-Brick, C., R.H. Layton, and P. Rowley-Conwy. 2001. *Hunter-gatherers: An interdisciplinary perspective*. Cambridge: University of Cambridge Press.
Price, T.D., and J.A. Brown. 1985. *Prehistoric hunter-gatherers: The emergence of cultural complexity.* Orlando: Academic Press.
Sassaman, K.E., and D.H. Holly. 2011. *Hunter-gatherer archaeology as historical process*. Tucson: University of Arizona Press.
Schrire, C. 1984. *Past and present in hunter-gatherer societies*. New York: Academic Press.

The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast

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Introduction

In Brazil, the mound-building cultures are among the oldest and the longest. Since the end of the Pleistocene until the last millennium before our era, these constructions were scattered throughout countless habitats, certainly with very distinct cultural particularities among those building societies that inhabited different regions in different periods.

Given the importance of these sites, for decades, most studies in Brazilian archaeology have focused on the understanding of the shell mounds, *sambaquis*, found along the Atlantic coast. However, despite the fact that *sambaquis* in inland areas have been located throughout the twentieth century, little attention has been given to their research and study. Generally, these riverine *sambaquis* were mentioned sparsely in the archaeological literature, described as ancient sites with old pottery production of approximately 7500 years BP to the Taperinha site in Northern Brazil (Roosevelt 1991, 1995).

However, in a very specific area in the south of the state of São Paulo, in southeast of Brazil, this picture is different. Research over the last 20 years points to a singular cluster composed of 40 fluvial *sambaquis* in a mountainous region cut by one of the few large basins that cross the Serra do Mar on the west/east axis. In a region of confluence of rivers in the middle of the Atlantic Rain Forest, close to other pre-colonial archaeological sites of the interior and also of large *sambaquis* from the coastal zone, the riverine *sambaquis* of the Ribeira Valley, in the state of São Paulo, is a reference in the cultural settlement with longer cultural continuity in South America. Dating around 10,000 years, they have become strategic sites for the understanding of the occupation of Brazilian southeastern area during the Holocene. The series of dates obtained for understanding the settlement setting of the riverine *sambaquis* associated with a detailed case study, a site with better preservation, in a geographical and chronological intermediate position. This brought information about the formative process of riverine *sambaquis* that later could also be observed in coastal *sambaquis*, in addition to allowing a broader debate on the relationship between the riverine *sambaquis* and inland and coastal groups.

Definition

For this discussion it is necessary to know that on the Brazilian coast, the most visible and numerous archaeological sites are the *sambaquis*, very specific kinds of shell mounds. In order of hundreds, these sites are artificial hills of varied dimensions (from 50 to 1000 m in length and 1 to 30 m in height), whose sediment is composed by more than 80% by shells of bivalve molluscs (Figuti 1991).

Historical Background

According to historical records, many *sambaquis* were quarried for colonial buildings; more recently many have been destroyed for the sake

of the expansion of coastal cities (Garcia 1972; Uchôa 1982). The *sambaquis* have complex structures that demonstrate building processes that varied between a few to hundreds of years of construction. In the past, archaeological literature recognized the existence of coastal *sambaquis* from the state of Espírito Santo to Rio Grande do Sul (southeast to south), but some *sambaquis* are also found spread on the north and northeast coast. About this occupation Figuti (2014) points out that there are two major clusters of coastal sites:

1. The northern *sambaquis*, found near the equatorial coast, or the Amazonian seashore, on the states of Pará and Maranhão
2. The south-southeast *sambaquis*, located on the tropical and subtropical latitudes

Regarding the first area, in spite of its importance for the beginning of the ceramic production in South America (the tradition Mina ceramics with 7500 years BP), just a few studies were developed on them pointing out and revealing those sites were built between 7000 and 900 years BP (Roosevelt 1991, 1995). On the other hand, long-term research carried on the south-southeast sites have shown they are preceramic fisher-gatherer sites, built between 8500 and 1000 years BP. More than 300 *sambaquis* in this area had no evidence of pottery.

Focusing on the occupation of the Brazilian southeast region during the archaic period, it is possible to note a contrast between the shore and inland. Dense at the coastal plains, where hundreds of *sambaquis* are found in the Ribeira de Iguape upper valley, in the South of São Paulo state, something different is observed: dozens of small mounds composed mostly of land snail shells, the riverine shell mounds.

The riverine *sambaquis* are in a subtropical area between 23° and 24° latitude S. They are spread over three areas of the Ribeira Valley (Barreto 1988): the south area, the Jacupiranga basin; the north area, which comprises the Juquiá basin; and the west area, which covers the medium-high Ribeira, near Itaoca (Fig. 1). These areas are in the Serra do Mar, a mountain range that marks the boundary between the sea-level coastal plain and the inland plateau. Its mean altitude varies from 500 to 1300 m. Before the colonization, Serra do Mar supported a rich and highly diversified ecosystem, composed mainly by a lush tropical rain forest, called Atlantic Rain Forest (*Mata Atlântica*).

According to Barreto (1988), the specificity of these areas would suggest an integrated system of settlement. Because of their proximity to big rivers, and the dates believed to be later than the coastal ones, the hypothesis of a coastal migration from the rivers to inland in order to reach better economic resources has been suggested.

She also suggested that it is possible to find some similarities between coastal and riverine *sambaquis* as a result of the coastal migration. This includes construction of the same kind of structure (the shell mounds), although on a different scale, as well as finding faunal remains from the coast in riverine *sambaquis*. In the riverine *sambaquis*, as in the coastal ones, there are a high number of burials. Thick layers composed of land snail shell form circular and convex shapes over the ground which can vary in size from 500 to 1900 m^2 (Figuti ibid).

The faunal remains found in the riverine *sambaquis* are mostly composed of land snail shells of *Megalobulimus* spp. and bones of terrestrial mammals. Fish, amphibian, bird, and reptile remains appear with variables and minor frequencies. It has been suggested that this assemblage could reflect the main diet of that population.

The riverine *sambaquis* present an abundant industry of faunal material (bones, teeth, antler, and shell), mostly used for projectile tips and adornments. Although few, the sea faunal remains as shark teeth beads, ray spine tips, and shells are present on these sites. The lithic industry remains are also abundant and are characterized by knapped tools and polished artifacts as arrowheads, mortars, and axes, which show significant techno-typological and quantitative inter-sites variations.

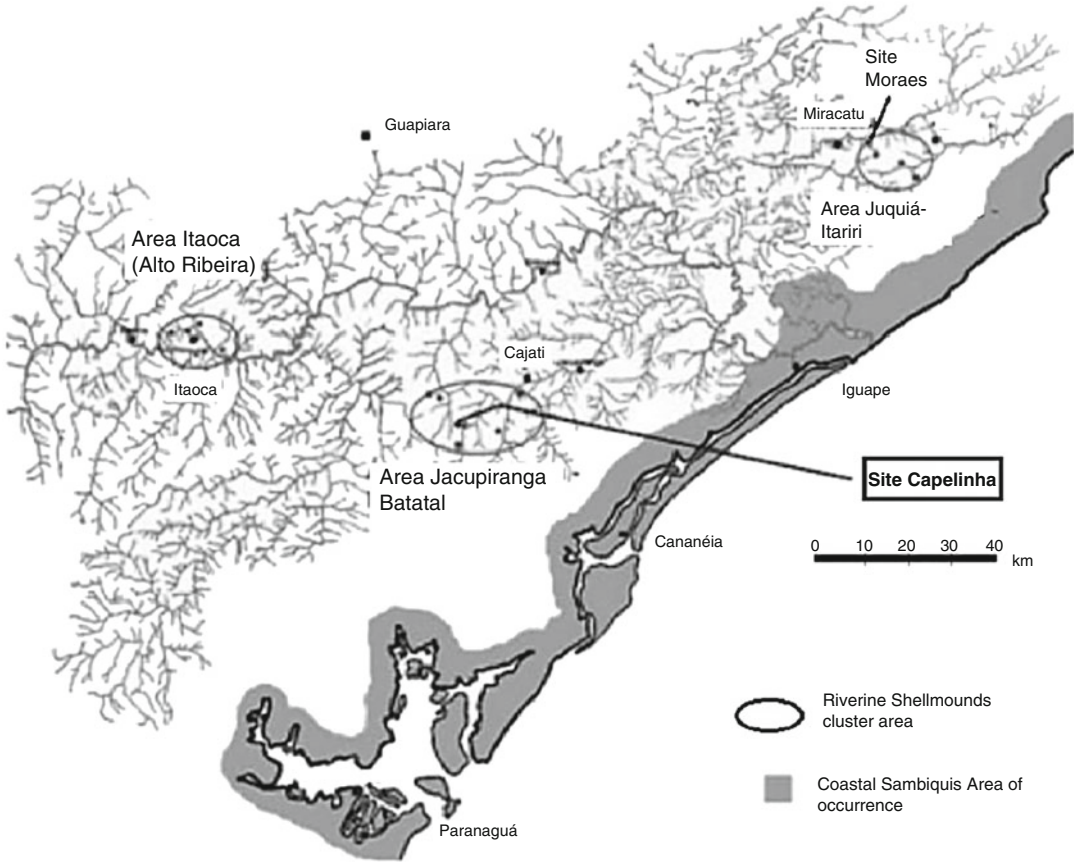

The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast, Fig. 1 Geographical distribution of riverine shellmounds and its relation with the coastal ones. (Source: Figuti 2004)

Key Issues/Current Debates

A project with the title of *Archaeological and Geophysical Investigations on Riverine Sambaquis of São Paulo* (IAGSFL) has been developed from 1999 to 2004 and carried on by Levy Figuti and Paulo DeBlasis from the Museum of Archaeology and Ethnology of the University of São Paulo, Brazil.

This project aimed at investigating the São Paulo state riverine *sambaquis* from different methodological approaches: geophysical, archaeological, and bioarchaeological (Figuti 2004). Regarding the structural and cultural characteristics of these sites, the project pointed out the preference of these groups for a settling of these sites on plains or low lands, with exceptions: some few sites are located on the top of mountains or valleys far from water resources.

This project generated a series of radiocarbon dates for 18 sites (Fig. 2); it was then tried to obtain samples from top and bottom of the sites from Jacupiranguinha (5), Juquiá (3), and Itaoca (10) areas (Map 1). According to Figuti et al. (2013), through examining the graphic and the table (Fig. 2), it is possible to distinguish three chronological assemblages or periods. The early period (10,500 to 9000 years BP cal. age) is represented by two sites from the south/Jacupiranguinha area. A millennium later, the second period (8000 to 3600 years BP cal. age) appears to be the riverine *sambaquis* expansion, counting nine sites in the three areas. 2000 years later, during the third period (1700 to 1000 years

Área	Site	Provenience	Deep (cm)	Conventional Age	Calibrated Age	Sample	Lab. No.
Jacupiranguinha	Capelinha I	J10	10-20	9,250 ± 50	10,560 to 10,250	shell	Beta 189331
Jacupiranguinha	Batatal I	S1	50-60	9,050 ± 100	10,415 to 9,915	shell	Beta 189329
Jacupiranguinha	Capelinha I	V'41 (sep.2)	0-30	8,860 ± 60	10,180 to 9,710	bone	Beta 153988
Jacupiranguinha	Capelinha I	R11	90-100	8,795 + 105 /- 100		coal	A 11239
Jacupiranguinha	Capelinha I	R11	80-90	8,500 ± 70		shell	A 11236
Juquiá	Laranjal	S1	40-50	6,980 ± 90	7,965 to 7,645	shell	Beta 189337
Jacupiranguinha	Capelinha I	Sep. 5	10-20	6,090 ± 40	7,020 to 6,850	bone	Beta 184619
Juquiá	Moraes	F19(Burial3.)	130	5,895 ± 45	6,777 to 6,665	bone	KIA 15561
Jacupiranguinha	Timbuva	S1	20-30	5,740 ± 50	6,660 to 6,410	shell	Beta 189339
Juquiá	Moraes	F07(Sep. 37)	35	5,420 ± 30	6,289 to 6,174	bone	KIA 20843
Juquiá	Alecrim I	S1	10-20	5,310 ± 50	6,250 to 5,940	shell	Beta 189330
Jacupiranguinha	Capelinha II	S1	30-40	5,000 ± 70	5,910 to 5,600	shell	Beta 189332
Juquiá	Moraes	F20 (Burial5)	100	4,985 ± 35	5,745 to 5,658	bone	KIA 15562
Jacupiranguinha	Capelinha III	S1	90-100	4,530 ± 50	5,320 to 4,990	shell	Beta 189333
Juquiá	Moraes	G26(Burial 25)	25	4,511 ± 32	5,200 to 5,048	bone	KIA 20844
Jacupiranguinha	Capelinha III	S1	90-100	4,500 ± 40	5,310 to 4,980	coal	Beta 189334
Itaoca	Estreito	Burial 6	130	4,124 ± 27	4,658 to 4,567	bone	KIA 20846
Itaoca	Tatupeva	S1N2	10-20	3,990 ± 70	4,800 to 4,770	shell	Beta-184623
Itaoca	Estreito	Burial 1	25	3,655 ± 26	4,011 to 3,893	bone	KIA 20845
Itaoca	Pavão II	S1	10-20	3,530 ± 70	3,980 to 3,640	shell	Beta 178127
Itaoca	Itaoca I	S3	50-60	1,730 ± 40	1,720 to 1,540	coal	Beta 189336
Itaoca	Gurutuba IV	S3	50-60	1,650 ± 40	1,620 to 1,430	coal	Beta 189335
Itaoca	Caraça	S5N8	70-80	1,607 ± 24	1,434 to 1,416	coal	KIA 20839
Itaoca	Pavão XVI	Burial 1	30	1,571 ± 24	1,525 to 1,408	bone	KIA 20842
Itaoca	Itaoca I	S1	20-30	1,460 ± 60	1,500 to 1,280	shell	Beta 178126
Itaoca	Lageado IV	S1	10-20	1,460 ± 60	1,500 to 1,280	shell	Beta 178128
Itaoca	Caraça	S5	10-20	1,300 ± 60	1,310 to 1,070	shell	Beta 178125
Itaoca	Guaracuí	S1	10-20	1,270 ± 70	1,300 to 1,050	coal	Beta-184621
Itaoca	Pavão III	Burial 1	20	1,219 ± 24	1,182 to 1,062	bone	KIA 20840

The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast, Fig. 2 Radiocarbon dates of riverine *sambaquis* obtained by IAGSFL. (Source: Figuti 2004)

BP cal. age), the sites are only at the western/Itaoca area. The authors suggest the expansion starts from the south to the north around 8000 years. Moreover, around 4500 years, the riverine *sambaquis* appear in the western area, and this place seems to be their last redoubt.

The critical point is that this group of sites has endured for 9000 years and seems to rival the coastal *sambaquis* (8000 years), providing a rare South American context of continuous human settlement occupation for almost all of the Holocene. The evidences from sites of the second and third periods are not conclusive on the genetic affiliation of the riverine *sambaquis*, but culturally they became unique, distinct from other inland groups and from the coastal *sambaquis* (Plens 2007). Overall, the series of dates show that the riverine *sambaquis* inhabitants in this area are among the earliest ones already known from all the territory, where is located the earliest burial in the São Paulo state – burial II – from Capelinha site (8869 years BP Beta 153,988) is the earliest one in the São Paulo state.

The early date associated with the craniometric data has indicated to be a paleo-indigenous occupation (Neves et al. 2005). According to the authors, the cranial morphology of this individual does not fit the mongoloid pattern, like other individuals of coastal and fluvial populations but, on the contrary, would have similarities with the cranial morphology presented by the individual of Lagoa Santa, Minas Gerais State (Southeast Brazil).

Given the original data generated by these investigations, the relationship between coastal and riverine *sambaquis* could be better understood. All the particularities of the riverine *sambaquis* were compared with the well-known data available from coastal *sambaquis*. Unfortunately, the Umbu Tradition has no well-preserved remains, other than lithic, in order to make a proper comparison with this group.

The IAGSFL identified the Moraes site as an archetypical riverine *sambaqui*, the mound shape was very distinctive and well preserved, and on the exposed surface was observed only the *sambaqui* occupation (frequently the riverine *sambaquis* were reoccupied by other hunter-gatherers and ceramists). Therefore, it was chosen for detailed research. In 2002, doctoral research by Cláudia R. Plens started to investigate the formation process of a riverine *sambaqui*, emphasizing questions related to food archaeology, from zooarchaeological and carbon and nitrogen analysis of human and faunal remains. The Moraes site was selected to obtain a global understanding of the formation process of a riverine shell mound due to its geographical position, in the middle among the other riverine shell mounds. In addition, it is the most preserved site of the medium period (6000–4000 years BP) and has better burial preservation compared to other sites. From the comprehension of the formation process of this site, it was possible to correlate the data and interpret the riverine shell mounds in the Ribeira Valley.

The Moraes Site

The Moraes site is located aside Moraes stream, tributary of São Lourenço river, in the municipality of Miracatu (UTM 23 J 0256908/7313340).

In the south area of the site, there is a granite/gneiss bedrock and an irrigation ditch; in the east we find the Moraes stream and in the north a plain terrain. In the west (north-south direction), a road has been built, exposing the site profile.

Nowadays, the site presents an elevation with 30 m of diameter and 2 m height all covered by low vegetation, and it is located in the middle of a banana plantation. In the last few decades, diverse plantations have been placed above the site. These plantations caused a series of taphonomical processes, which were particularly intense on the most recent layers.

The site was built above a paleobeach with alluvial sandy-clay sediment formed by Moraes stream. It is possible that this beach had higher dimensions than nowadays. However, this paleobeach is thicker under the archaeological site today because of the site protection from intemperisms. The paleobeach is discreet on the surroundings of the site due to intemperism and human actions that impacted the entire area.

On the top of the beach, there are four archaeological layers that compose the Moraes site (Profile 1):

1. Dark sandy-clay layer. Responsible by the cover of the site, this layer presents low quantity of archaeological remains and higher quantity of rubbles bigger than 1 cm. Its thickness varies between 10 and 30 cm.
2. Dark clay-sandy layer. Land snail shell concentrations were found at this layer and a high quantity of archaeological remains (lithic, osteodontokeratic, and malacologic artifacts and faunal remains). It was found high number of human burials. Its thickness varies in general between 50 and 100 cm.
3. Light gray clay-sandy layer. This layer has a similar composition on archaeological remains. Its thickness varies between 30 and 50 cm.
4. Yellow-orange clay layer. Part of the "paleobeach" is also compounded by sediment decomposition of the matrix rock next to the site. From an archaeological perspective, this layer is almost sterile; however, the first burials were deposited in this layer (Fig. 3).

Carbon dates on burials from different places in the site indicate that the site was built over a period of 2000 years (6000–4000 BP). Out of 51 excavated squares, 20 of them (39%) contained 41 funerary graves with single, double, and multiple burials. Due to disturbances in the funerary contexts, it was possible to identify the form of only 20 burials: 14 primary burials and 6 secondary burials. Among the primary burials, we could find double or multiple burials, and the most frequent position of the skeletons was that of lateral decubitus, followed by dorsal decubitus and even crouched position. Among the secondary burials, the osteological remains were arranged in small circular or oval pits.

Almost half of the burials presented some associated funeral furniture: ocher, large pebbles, howler monkey teeth collars, and polished axes (Figuti 2004).

A peculiar feature of this site is the infant burials. Children burials were found in all archaeological layers. We notice a greater tendency to place funerary adornments with the subadults (Plens 2007).

The faunal assemblage from the Moraes site was recovered from excavations carried out from 2001 until 2004, through artificial level of 10 cm; the remains were collected during the digging and from systematic sieving (screen of 4 mm).

Two indexes were considered for this report, Number of Identified Specimens (NISP) and the Minimal Number of Individual (MNI). The purpose of this analysis was to use the fauna's MNI as a general proportion estimative of the fauna assemblage by identified anatomical side in comparison with the NISP, to discuss amphibious and

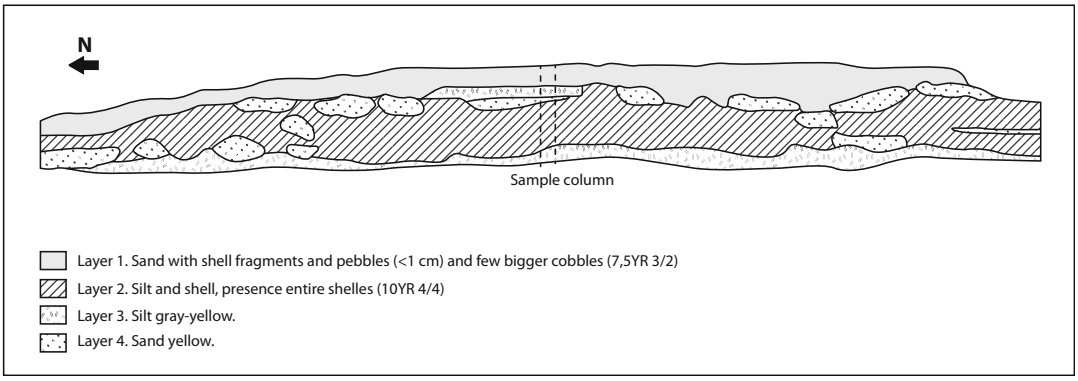

The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast, Fig. 3 Moraes site profile

mammal proportion (the most abundant classes present in the Moraes site).

Bones and permanent teeth samples of human individuals from Moraes site (6000–4000 years BP), Capelinha site (9000 years BP), and Estreito site (3000 years BP) were submitted to $^{12}C/^{13}C$ (^{13}C) and $^{15}N/^{14}N$ (^{15}N) analysis performed by *Beta Analytics Laboratory.* Also, faunal bone samples (mammals, amphibians, and fish) from Moraes site were submitted to the same laboratory for the same kind of analysis. In order to have the (^{13}C) and (^{15}N) stable isotopic signature of the land snail *Megalobulimus* sp., one alive specimen was taken from another riverine shell mound (Laranjal site), 5 km from the Moraes site. The *Megalobulimus* sp. specimen flesh was first lyophilized at the Faculdade de Ciências Farmacêuticas, Departamento de Tecnologia Bioquímico-Farmacêutica (USP), grounded at the Zooarchaeological Laboratory at the Museu de Arqueologia e Etnologia (USP) and then submitted to stable isotope analysis at CENA (USP).

The sambaqui sediment analysis indicates the predominance of the land snail shell, with an average ratio of 45.6%. The other significant components are bones (average ratio, 5.55%), clay (16.3%), and sand (32.3%). The riverine sambaqui sediment has a lower average density compared to the coastal ones; the main reason is that the *Megalobulimus* shell is large (6–10 cm long, 3–5 diameter) but lightweight, generating uncompressed deposits.

34,160 vertebrate fragments of all sizes and classes were identified on the faunal assemblage from the excavation of 50 m^2 of the site. The invertebrate remains (except *Megalobulimus*) recovered were mostly freshwater mussel shells (genus *Diplodon*, NISP = 2035) and some sea shells (59 oysters and 34 quahogs) and few crab pincers (7).

The evaluated fauna NISP indicates the predominance of mammals, followed in decreasing order by amphibious, bird, fish and reptiles. Taking into account that the riverine shell mounds are settled in a tropical rain forest environment, the Atlantic Forest, the high frequency of mammal (68%) is not surprising. However, the important presence of amphibious is an uncommon fact in archaeological sites (Fig. 4).

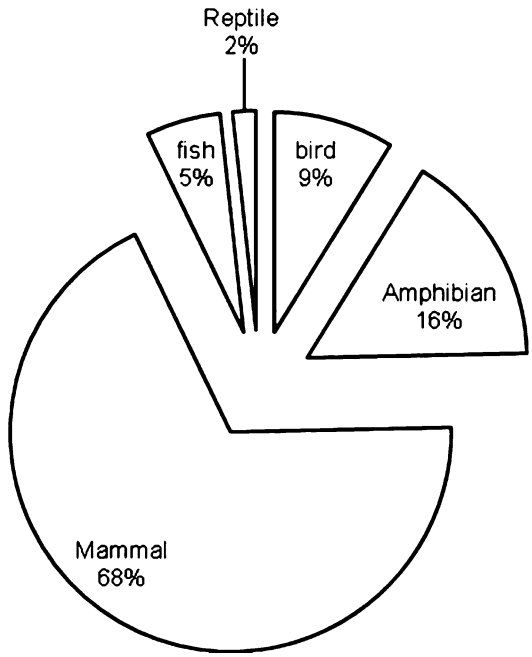

The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast, Fig. 4 NISP of vertebrate faunal assemblage of Moraes site by class of animals

The most recurrent fish remains in the collection came from freshwater fish, as catfish and suckermouth catfish (Pimelodidae *and* Loricariidae families). The amphibians could not be identified by species, just as member of the Anura order. Among the reptile, turtles and tegu lizard (*Tupinambis teguixin*) were identified. The bird remains could not be determined by specie. The fragments of those classes of animals were found in all squares and levels of the Moraes site.

On the other hand, the remains of mammals could be recognized in larger number of species. The mammals NISP is 2343 among which it was observed 198 individuals through MNI index (11 species and 2 orders). In decreasing order of mammal NISP are armadillo, howler monkey, peccary, spotted paca, guinea pig, Brazilian agouti, Brazilian tapir, opossum, and brocket deer, which presented different patterns of bone preservation. The remains of the armadillo

are predominantly represented by the preserved scutes. The major NISP is represented by the armadillo (*Dasypodidae),* which is the animal that presents the highest number of scutes by individual. However, the MNI index (calculated through bones) changes this species position to the 8th place, representing only five individuals.

In general, there is no variation between NISP and MNI indexes for the other species, except for the Brazilian guinea pig (*Cavia aperea*), the most significant case. The Brazilian guinea pig occupies the fourth according to the NISP, but the MNI grants it the first position as the most present species among the remains (Fig. 5).

The howler monkey (*Alouatta* sp.) presented more cranial evidence, probably due to higher conservation degree especially on teeth. Peccary (*Tayassu* sp.) remains follow the howler monkey with higher quantity of identified specimens from skulls, especially teeth. However, in this case the elevated presence of astragalus and calcaneus indicates that this animal might have been taken as a whole to the site.

The spotted paca (*Agouti paca*), guinea pig (*Cavia*), Brazilian agouti (*Dasyprocta* sp.), Brazilian tapir (*Tapirus terrestris*), and opossum (*Didelphis* sp.) exhibit higher teeth preservation in comparison to bones. In general, the main cause for the lower NISP for these animals is the high degree of bone fragmentation and also the similarity among rodent bones. The most identified specimens of brocket deer (*Mazama* sp.) were based on bones rather than teeth. In that case, the bone state preservation seems to be higher than for other animals, probably due to the compactness of these bones. The spotted paca was sparsely distributed throughout the site. Big size animals have presented a higher tendency of bone fragmentation, and this is probably the most important cause for the low rate of identified bone elements.

From the 20 graves found in the 51 excavated squares, 41 skeletons were identified. The fauna found in the squares with burials represent 71% (24,255 NISP) of total vertebrate NISP in the Moraes site (34,160 from 51 squares). Observing the faunal distribution, the concentration areas are located very close to the graves, around and above. In general, the analysis of faunal distribution by artificial levels enables us to correlate fauna concentration to burial areas. Even grids with no evidence of burials showed fragments of human bones on the profile, suggesting some connection between fauna and burials in these cases, as well.

Taxa	Popular name	NISP	%	MNI	%
Dasypodidae	Armadillo	845	35.87	76	37.44
Allouata sp.	Howler monkey	703	29.84	41	20.20
Tayassu sp	Peccary	198	8.40	12	5.91
Cavia aperea. Sp	Guinea pig	177	7.51	76	37.44
Micro rodents	-	174	7.39	30	14.78
Agouti paca	Spotted Paca	85	3,61	9	4.43
Mazama sp.	Brocket deer	65	2.76	9	4.43
Dasyprocta	Brazilian agouti	62	2.63	7	3.45
Tapirus terrestris	Brazilian tapir	24	1.02	3	1.48
Didelphis sp	opossum	13	0.55	5	2.46
Nasua nasua	Coati	5	0.21	2	0.99
Carnivorous	-	3	0.13	2	0.99
Eira barbara	Tayra	1	0.04	1	0.49
Speothos venaticus	Bush dog	1	0.04	1	0.49
Dasypodidae	Armadillo	-	-	7	3.45
Total		**2,343**	**100%**	**198**	**100%**

The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast, Fig. 5 Mammals NISP and NMI from Moraes site

Carbon and Nitrogen Isotope Analyses

The association of identification and spatial distribution of faunal remains with paleodiet, obtained by stable isotopes analysis of carbon and nitrogen from human bones and teeth and faunal bone samples, allowed to develop a discussion about the riverine shell mound group's consumption. Comparative data from the archaeological literature was used to complement the ratios obtained (De Masi 2002; Keegan and Deniro 1988), aiming at amplifying the discussion about stable isotopes from different environments.

The lyophilized samples of *Megalobulimus* spp. were submitted for three repetitions. However, the three values presented relatively similar indexes, and therefore it was selected the intermediary values for the chart construction. The results of stable isotope analysis of carbon and nitrogen of human individuals from three riverine shell mounds with different chronology (Dates: Moraes site (5895 years BP to 4511 years BP), Estreito site (4100–3600 years BP) and Capelinha site (9250 years BP)) (1) presented little variation on values of $\delta^{13}C$ and $\delta\ ^{15}N$ among the individuals: $\delta^{13}C$ (−19.2 and −21.4; pattern deviation = 0.86) and $\delta\ ^{15}N$ (9.6 to 11.9; pattern deviation = 1.04) for human bones and $\delta^{13}C$ (−21 to −23) and $\delta\ ^{15}N$ (11.9 a 12.6) for human teeth. These values, with variation lower than two points, indicate homogeneity in relation to food consumption for these groups during, at least, 7000 years (Table 5). Isotopic results from bones show that human individuals of the riverine shell mounds were a homogenous group, hypothesis corroborated by teeth results. The teeth cluster, not distant from human bone (lower than two points), is explained by the fact that dentine is formed during breastfeeding and, consequently, this fact led to an increase of proteic values (Fig. 6).

According to Lubell and Jackes (1994), stable isotopic data interpretations might occur through the reading of "trophic level effect," in which enrichment indicates the individual relation to the consumed items in 5% in carbon collagen fractioning and between 3% and 4% in relation to nitrogen. From Lubell's collagen fractioning interpretations of food consumption, it is possible to notice that just the spotted pacas (*Cuniculus paca*) have values compatible with the "trophic level effect" cluster of riverine *sambaquis*, among all the other animals analyzed. The other mammals were recovered at the Moraes site, in which collagen could be collected; a higher distance of 4‰ for nitrogen, sometimes reaching 8‰ (e.g., peccary case), was observed. Unfortunately, it was not acquired collagen

The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast, Fig. 6 Carbon and nitrogen stable isotopes (beta analytic [EUA]). Human skeletons, Moraes, Estreito and Capelinha 1 sites

Site	Unit	Grid	Level (m)	Material	$\delta^{13}C$	$\delta\ ^{15}N$	Code
Moraes	Child	F22	2.26-2.34	Human	12	-19.9	MO F22
Moraes	Burial 6 A	F11	2.65-2.80	Human	9.6	-	MO B6A
Moraes	Burial 6	F11	2.65-2.80	Human	12.1	-20.8	MO B6A
Moraes	Burial 7	F21	2.80	Human	11	-19.9	MO B7
Moraes	Burial 8	E-	2.38-2.46	Human	10	-20.4	MO B8
Moraes	Burial 8	E-	2.38-2.46	Human	12.8	-22.5	MO B8
Moraes	Burial 13	F20		Human	9.9	-	MO B13
Moraes	Burial 25	G27	1.73-1.93	Human	10.2	-	MO B25
Moraes	Burial 25	G27	1.73-1.93	Human	12.6	-21.8	MO B25
Moraes	Burial 25	E20/21	2.40	Human	11.9	-20.3	MO B31A
Moraes	Burial 32	F14	2.55-2.96	Human	10.3	-20.8	MO B32A
Moraes	Burial 35	E-F18	2/3 (1.72-	Human	10.6	-20.7	MO B35
Moraes	Burial 35	E-F18	2/3 (1.72-	Human	11.9	-21.4	MO B35A
Moraes	Burial.41	N30	1.63-1.79	Human	11.2	-20.9	MO B41
Estreito	Burial 6			Human	9.9	-	EST B6
Estreito	Burial 6			Human	11.4	-21.4	EST B6
Estreito	Burial 6 –	S4E4	2.00	Human	9.6	-	EST B6A
Capelinha	Burial 2	U 41		Human	10.9	-19.7	CAP1 B2

Fauna	Identification	Trench	Level (m)	$\delta^{13}C$	$\delta^{15}N$	Code
Brazilian tapir	Dente molar inferior	F14	1.95-2,05	-26.4	-	MO TATE 01
Peccary	Calcâneo direito	F14	1.84-1,95	-22.3	6.5	MO TAY 01
Howler monkey	Fragmento distal de	F14	1.95-2,05	-21.6	6.3	MO ALO 01
Armadillo	placa	P12	0.10-0,20	-	-	MO DAS 01
Spotted Paca	Dente molar e dente	P12	0.20-0,30	-22.2	8.7	MO CUPA 01
Guinea pig	Fragmento de	F14	2.48-2,60	-23.8	-	MO CAVI 01
Amphibians	Left humerus	F14	2.00-2,30	-21.8	-	MO ANF 01
Fish	vertebre	F14	2.30-2,45	-21.7	-	MO F15 01

The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast, Fig. 7 Carbon and nitrogen stable isotopes (beta analytic [EUA]). Fauna from Moraes site

Repetition	C content(%)	Carbon isotopic value (delta por mil)	N content(%)	Nitrogen isotopic value (delta por mil)
1ª	33,94	- 23.93	9.32	4.78
2ª	34,03	- 23.89	9.16	4.67
3ª	34,06	- 23.89	9.11	4.63

The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast, Fig. 8 Carbon and nitrogen isotopic determination (delta per mil in relation to PDB – Pee Dee Belemnite) and content of C (%) from liophilized samples of *Megalobulimus* sp.

preservation for Brazilian tapir, armadillo, guinea pig, and amphibians (Figs. 7, 8, and 9).

Looking carefully at the spotted paca case, it is possible to evaluate that, even though this animal appears on "trophic level effect" cluster of human individuals, this was probably not an important item of the daily food, once zooarchaeological indexes point to a maximum of five individuals by MNI. Spotted pacas are rodents of superfamily Cavioidea, and the Brazilian agouti, spotted pacarana, moco, prea, and capybara eat fruits, seeds, and succulent vegetables.

Unfortunately, there was no collagen preservation for stable isotope analysis for major MNIs, the guinea pig and the amphibians of the Moraes site. Further research may test the hypothesis that this animal was an important consumption item of riverine *sambaqui* groups. In relation to carbon "trophic level effect" of riverine *sambaquis*' human individuals, it is clear that there is no direct relation to C_3 or C_4. Its positioning is above CAM plant cluster. These plants are still unknown from the consumption perspective, and more studies on that must be carried out.

Discussion and Future Directions

After 6000 years BP, with the increase of humidity and density of the *Mata Atlântica Rain Forest*, the fauna diversification allowed the *sambaqui* groups to obtain new species as resource from this environment [e.g., monkey, an arboreal animal that needs a close forest to dislocate through branches, appears in high quantity from bottom to top of the Moraes site (6000–4000 years BP)].

Nonetheless, stable isotope data indicates that even though mammals had a significant presence in the Atlantic Forest, and in particular at the Moraes site, meat consumption of mammals does not seem to be intense. Data indicates that these mammal species were not consumed in every day meals but in a sporadic and restricted manner as a more elaborate meal, for instance, in celebration episodes, such as feasting meals during funerary rituals, or offerings to the dead. Moreover, isotope data indicates that although in high quantity in riverine *sambaqui* layers, the *Megalobulimus* land snail did not represent an important item of consumption. It appears that this resource was employed as a construction

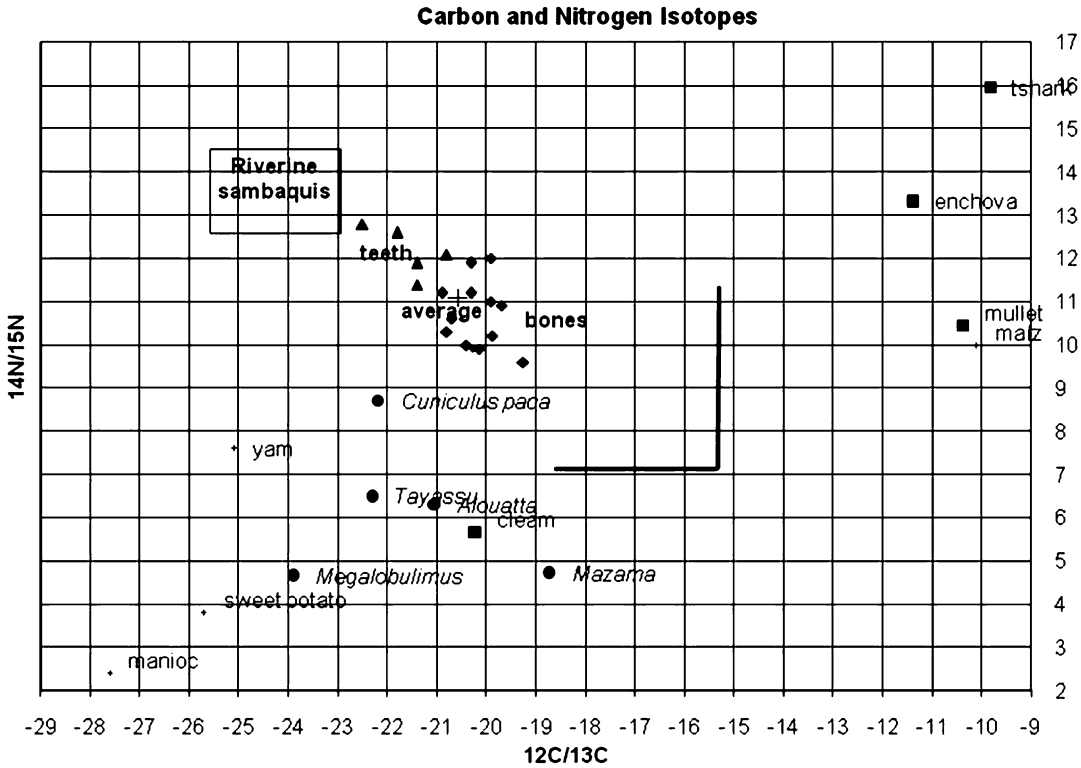

The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast, Fig. 9 Stable isotopes analyses on human bone and teeth and faunal bones

material rather than being present in the *sambaqui* as a result of "kitchen midden." The high intensity of resource catchment must have been caused by the necessity of bone preservation for the maintenance of the sacred place.

Lithic analysis led to some discussion in this perspective. The elevated burning traces in the lithic assemblage indicate high pit fire temperatures. However, just some thin layers of fire were found, and they could not have been enough to burn the quantity of lithics recovered at the site. This information suggests that lithics had been burned somewhere else and, then, taken and deposited in the site.

Among the lithic assemblage, mortars and pestles were objects with higher intensity of use traces. For this reason, these tools seem to characterize the importance on vegetable resources processing in the everyday life of this group, since they are generally employed on these activities. Disposal recurrence of characteristic daily lithic artifacts in a funerary context reveals the cultural concern of these groups in taking important objects from individuals' lives to the world of the dead.

As the isotopic data indicates the identified mammals from the Moraes site were not consumed as a staple food for this group, then other animals and especially vegetable resources may have played an important role in this perspective.

The comparison of isotopic values from the graph and archaeological literature indicates two hypotheses for vegetable use by this group. As carbon values are positioned inside the cluster related to CAM plants, this may indicate the intense consumption of these plants or an important consumption of both C_3 and C_4. In the last case, the mixed consumption of C_3 and C_4 may mislead the isotopic results taking the results to an intermediary position, above CAM plants values. Further, vegetable resource

The Hunter-Gatherers' Riverine Mound Builders from the Brazilian Atlantic Forest in the Southeast,

Fig. 10 Comparative table of cavity prevalence and frequency in coastal and riverine *sambaquis*. *Fonte Wesolowski (2007: 92)

Site	Number of observed individuals	Cavity prevalence (%)	Cavity frequency	Cavitye lesion media by individual
*MO-REC	14	50.00	8.85	2.71
*MO- ANT	20	50.00	8.24	2.05
*Enseada I	20	10.00	1.64	0.30
*FML -SCR	9	22.22	1.85	0.33
*Itacoara	26	11.54	1.27	0.23
Moraes	**8**	**87.5**	**18.05**	**3.5**

importance for riverine *sambaqui* consumption is corroborated by human dental data from the Moraes site.

The frequency and prevalence of cavities were assessed, based on data from eight individuals (one juvenile ±15–20 years old and seven adults ±25–40 years old). The result demonstrated cavity prevalence in the skeletal series in a percentage of 87.5% ({8/7}*100) and cavity frequency of 18.05% ({24/133}*100). From the eight individuals analyzed (5, 6a, 6b, 9, 12, 13, 17, and 35), seven have cavities, with one of these individuals having two extensive cavities (one with total crown destruction and one with 50% crown destruction). The other six individuals had cavities in the root (occasionally they compromised the crown teeth). In terms of media, each individual presented three cariogenic lesions (24/8).

To comprehend the values above, we compare this data with the analysis conducted by Wesolowski (2007: 153) from the coastal *sambaquis: Morro do Ouro* (recent and old layers), *Enseada I*, *Marechal Luz*, and *Itaocara* (ceramic) (Table 8) (Fig. 10).

Data from the table above indicates high cavity prevalence and frequency in the Moraes site individuals. In comparative terms, if coastal *sambaquis'* people present a "generalised consumption of starch consumption" (Wesolowski 2007), it is expected that people from Moraes would have an even high level of starch consumption. The high cavity prevalence and frequency is an uncommon phenomenon for hunter-gatherer groups in Brazil and indicates a diet high in carbohydrate and poor in protein levels.

The Formation Process

In relation to the formation process of the Moraes site, the results of the analysis indicate an increase in the amount of lithic material, osteodontokeratic and faunal (vertebrate) artifacts, and shells in relation to proximity to burial areas. The burials show differences in the body positioning, but there is homogeneity regarding burial structures, regarding the opening of delimited pits, recurrent deposition of shells from different environments (fresh and marine water), organized spatial distribution and coverage of fungal structures by *Megalobulimus* shells, in all areas and layers of the Moraes site, including layer 1.

The first groups to construct the mounds, 6000 years ago, chose an area where a paleobeach formed by a sandy-clayey sediment had been formed. On the south and east sides of the site, the paleobeach and rocks formed natural structures that helped protect the funerary mounds, thus preventing material from being carried into the stream. In that time, the stream was most likely larger due to the higher climatic humidity and the highest marine eustatic level (Plens 2007/8). This space is constituted by a natural landfill of sand and rocks, in an area of high humidity, which seems to have been the attraction of the place.

The burials followed a pattern: shallow graves were excavated for the deposition of the bodies or small pits for secondary burials. In each case, the grave was covered by a mix of sand, clay, and shells.

The materiality of the funerary rituals indicates that the preparation of the body and the interment process took a long time to be performed. The great flexion to which some bodies were

submitted in their graves indicates that there was a preliminary period for soft tissue decomposition to begin, allowing the bodies to be compressed in the graves (usually there was preservation of the ligamentous connections that maintained the anatomical connection of the skeletons). In these cases, the transport of the body, or bones, seems to have taken place from a temporary funerary area to the permanent one.

The burial rites involved the covering of bodies with ocher. In some bodies there is subtle evidence of this process, suggesting that the ocher has been used directly on the individual's skin and, with soft tissue decomposition, the dye has impregnated the bones. In other cases, in contrast, the impregnation of the pigment in the bones is high, which raises the hypothesis that in these cases, the painting was done directly on the bones. In order to perform this procedure/this act of the funerary rituals, the living should have to wait for the processes of decomposition of the flesh of the deceased to occur so that the bones could be handled later.

Innumerable artifacts were placed as grave goods, sometimes to the side and sometimes above the individual and/or on the grave. Recurrent throughout the site was the use of freshwater shells and a few items from mangrove and the seashore in the areas of burials, both on the floors where the bodies were disposed and on the mound structures that covered them.

The spatial dispersion of the fauna (Ferraz 2006; Plens 2007) shows that the largest percentage of fauna and 75% of the osseous industry was inside the burial layers.

Despite the numerous taphonomic processes that took place in the site, burials no. 5 and no. 27 present clear indications of animal offerings in the funerary space. In burial no. 5, peccary (*Tayassu* sp.) calcined bones were located associated with the adult human body. Near the burial no. 27, two concentrations of howler monkey (*Alouatta* sp.) were found, indicating that this animal was offered during mortuary rites (Plens 2007).

In the floors built for the deposition of burials, as well as above them, there is evidence of small fire pits without associated lithic structures. Several layers above the burials have evidence of burning, suggested by the presence of small coals and burning ground, which meant that, in some areas, fine soil lens became concreted.

The low number of bones with different degrees of burning, in contrast to the high number of burned lithic material, suggests that the main function of the fires was not to prepare the meat as food. The thickness of the firing lenses, sometimes a maximum of 1 cm, represents pit fires that have burned fast, indicating insufficient time for baking cakes or roasting meat. In addition, cut marks are very rare in the analyzed fauna.

After the opening of a grave, some special elements were laid, often bivalve freshwater shells, and a few marine bivalves and crustaceans, as well as adornments (tooth beads necklaces) and animal bodies, which were placed as offerings. Occasionally, there seems to have been pit fires on the side or above the layer that covers the body. Around the grave often mortars and other large lithic pieces were placed, which seems to be delimiting the burial, especially near the skull. Then the burials were covered by a heap of land snail shells, except in the burials of the layer 1.

According to the sedimentological analysis (Teixeira et al. 2014), the heaps mixed with sediment of alluvial origin, rich in clay, were used to cover these mounds, probably, to give stability to the shells.

On the other hand, the homogeneous distribution of flakes throughout the site indicates that there was no concern about placing them in specific spaces, suggesting that these materials were brought along with sediment from other areas outside the site and randomly accumulated.

According to data from the excavation and the site profile, there are no archaeological lenses that indicate successive returns for the celebration of other funeral rites, dedicated to the dead already buried, once the mound was covered.

The dates indicate that the first burials occurred on the paleobeach in the central part of the site, in a short time. However, the overlap of 400 years between the oldest burials of the central area and the burials of the northern periphery of the site reveals that the funerary area grew laterally with the extension of the mound structure to the sides.

The C14 dates from the upper burials at the central area indicate they were made 1000 years after the first ones, suggesting the beginning of the construction of the site. The dates of the later burials and their overlapping disposition configure the final structure of the site after 2000 years of activity. After a few hundred years, since the paleobeach was occupied by innumerable burials, the continuous funerary activities on the site led to the reoccupation of the space over the most ancient burials. In some cases, successive burials were performed without transgressing the space.

However, the opposite situation has occurred as well. The interpretation of the profile associated with the burial structures and the location of human and faunal bones indicates the opening of deeper graves for the earliest burials which partially interfered in the older structures, and the sediment removed from the graves was dispersed to the surroundings, as in the case of the burials of square F22 (central area).

Zooarchaeological data clearly shows the use of vertebrates and invertebrates related to burial areas in Moraes site formation. The distributive analysis of some species indicates that, in general, the animals were taken as a whole (entirely) to the site. All classes of animals were used in the funerary context, including amphibians which, as seen, were anthropically inserted in the site. In some cases, there are concentrations of bones of a single species indicating the deposition of whole specimens, beside or on a burial, as a funerary offering.

In addition to the intensive use of vertebrate remains for the composition of funerary spaces, the recurrent concern with the treatment of the space dedicated to the dead has made this society to mobilize in search of resources of different environments, such as freshwater shellfish, oysters, and marine crabs. The distributive analysis of this material clearly indicates that the use of these traces had as objective the composition of the mortuary space.

There are cases in which the distribution of the faunal fragments indicates that some areas of the Moraes site were privileged by the use of a high quantity of this material, such as burial no. 20 which received a large quantity of freshwater shellfish in the ornamentation of the burial space. The analysis of distribution of lithic material indicates differences in relation to the area of discard. Large-sized materials, such as mortars, manes, and axes, were located over burial areas (and in some cases scattered on the southern periphery of the site), while the flakes and other lithic refusal were widely dispersed in the site. However, the dispersion of the lytic material does not appear to form chipping areas or any other type of structure or organization; on the contrary, they appear to have been taken and deposited randomly, probably carried along with the sediment used to support the mound of shells.

The sedimentological analysis shows that although layer 1 of the site does not present the same amount of organic material visible macroscopically, the soil contents indicate that this component was important for the composition of this layer.

Taphonomic processes have been very intense in soil evolution in all layers of the archaeological site, and underlying it, through the percolation of P and clay that migrated from layer 1 to the other layers.

During the data treatment, an interesting set of correlations between Ca and Mg to be elucidated was verified: in the archaeological soil, there is an inversion of values between Mg and Ca that does not occur in the profile analyzed outside the Moraes site.

The analysis of the proportion of archaeological components indicates that shells and clay are the main elements in the composition of the layers, being followed directly by sand and to a lesser extent, but steadily, by the bones.

This analysis also indicates a strong correlation with the data obtained by sedimentology with regard to the percolation of clay from the first to the other layers, making the proportion of this component in the last layer higher than in the others.

The Riverine *Sambaquis* and the Mound Construction

If, as noted by several authors (Kneip 2004; Gaspar 2000; DeBlasis et al. 2007), the visibility

makes the coastal *sambaquis* an important element in the territorial control of these groups, in the case of riverine *sambaquis*, the visibility of their constructions does not seem to have had the same importance. The riverine *sambaquis* known today measure a maximum of 2 m in height and are usually inserted within mountainous valleys that prevent the visualization of these constructions from a distance. More than this, the lack of maintenance and cleaning of the riverine *sambaquis* makes the forest cover them, making them an integrated part of the natural landscape of the Atlantic Rain Forest.

The most important process in the construction of the riverine *sambaqui* seems to have been the integration of society in the maintenance and worship of the same monument. It is, therefore, a form of internal social control of these societies, and its execution depends on the time and energy expenditures of the society in the capture of resources of diverse environments (inland and coast) and, also, the network of contact with groups neighbors. About Moraes, it can be said that the process of reusing the same funeral space, for dozens of generations, is indicative of the recognition of an identity, whose link of ancestry is symbolized by the construction of a monument respected by the whole group.

What makes the riverine *sambaqui* monuments is the fact that dozens of generations have worshiped their ancestors in the same space, whose importance was transmitted between generations, especially oral memory, and not the visibility of buildings. As indicated throughout this paper, the main characteristic of the formation of the Moraes site is the construction of small clusters, whose purpose was to perform funerary rites, and where the materials used were mainly *Megalobulimus* shells, sediment transported from other areas, and smaller scale a wide range of faunistic remains of accentuated anatomical and taxonomic diversity, and lytic material and osteodontokeratic artifacts.

This pattern of archaeological site formation seems to be a common cultural denominator among riverine *sambaquis*, given the data generated by the IAGSFL project. Data from the excavations and the reading of the profiles of the sites Estreito, Pavão XVI, and Lajeado IV indicate a great similarity with the Moraes site: numerous burials with archaeofauna (vertebrates and invertebrates) and associated lithics. All other sites, even those with less evidence of burials, such as Caraça and Capelinha 1 and 2 also present clusters of *Megalobulimus* shells, with a large amount of archaeofauna and associated lytic material. In relation to the implantation of the sites, there seems to be a recurrence regarding the exploitation of wetlands.

The Distribution of Riverine *Sambaquis* on the Landscape

Through the surveys carried out so far, the riverine *sambaquis* of the Ribeira de Iguape Valley are distributed in three specific regions: the Jacupiranguinha basin, the Juquiá basin, and the Itaoca region (upper-middle Ribeira). Although the dates are quite diverse, the sites of the Jacupiranguinha basin (where the Capelinha site of approximately 9000 years BP is inserted) occupy an older chronological position between these three areas. The Juquiá basin presents sites with retreated dating, such as the Laranjal site (approximately 7000 years BP), and also intermediaries, such as the Moraes site (between 6000 and 4000 years BP). The Itaoca region has the most recent sites, between 4000 and 1000 years BP.

Considering the spatial distribution and location in the landscape, the Juquiá basin sites appear to form a territorial cluster defined by funerary sites, since in all the sites in question (Moraes, Laranjal, Alecrim I, and Miracatu), the occurrence was observed of burials. In this case, the Laranjal site, the only one located on top of a mountain, would be configured in a central position to the other sites. It is known that the Laranjal site has a dating of approximately 7000 years BP, that the Moraes site was used between 6000 and 4000 years BP, and that the site Alecrim I began to be built when funeral activities in the Moraes site were no longer exercised. In this model, the Laranjal site would occupy the central space in the

occupation of a given territory, and the other sites, such as Moraes, Alecrim, and Miracatu, would position themselves peripherally in this area.

The Riverine *Sambaquis* and the Neighboring Groups

As pointed out by the research, there is a constant relationship between riverine sambaquis and neighboring groups, either with coastal sambaquis through the architectural similarity of the site and in particular of the use of sambaqui as funeral area or with Umbu groups through the applicant, although low, presence of lithic industry associated with these groups.

If the genetic link between riverine sambaquis and one or other neighboring group is not conclusive about the affiliation of riverine sambaquis, culturally they have become unique, distinct from other groups in the interior and coastal sambaquis.

What can be said is that culturally the riverine *sambaquis* constituted groups that became unique, different from the other groups of the interior or coast, and developed a way of life of their own that lasted for at least 9000 years without having, during this time, a similarity to one or another tradition to the point of characterizing affiliation with other cultural groups.

Thus, it is possible to construct a model in which technological exchanges and acquisitions between riverine *sambaquis* with groups of the Umbu Tradition and coastal *sambaquis* characterize a network of intense contacts, and perhaps of interethnic marriages, with neighboring groups over millennia, and that the symbolic burden of bone preservation and social mobilization for ancestor worship comes from an earlier culture that gave rise to coastal and riverine *sambaquis* groups.

References

Barreto, Cristiana. 1988. *A ocupação pre-colonial do vale do Ribeira do Iguape, SP: os sítios concheiros do médio curso*. Master dissertation, Universidade de São Paulo.

DeBlasis, Paulo., Kneip,Andreas., Ybert-Scheel, Rita. Giannini, P.C., Gaspar, Maria Dulce. 2007. Sambaquis e paisagem: dinâmica natural e arqueologia regional no litoral do sul do Brasil. IN: Arqueología Suramericana, 3:28–61

De Masi, Marco Aurelio Nadal. 2002. *Pescadores Coletores da Costa Sul do Brasil*, Revista Pesquisas, Antropologia. São Leopoldo, Editora Unisinos, vol. 57.

Figuti, Levy. 1991. Les sambaquis COSIPA (4200 à 1200 ans BP): étude de la subsistance chez les peuples préhistoriques de pêcheurs-ramasseurs de bivalves de la côte centrale et l'état de São Paulo, Brésil. Tese de doutorado, Musée National d'Histoire Naturelle, Institut de Paléontologie Humaine, Paris.

Figuti, Levy. 2004. Investigações Arqueológicas e Geofísicas dos sambaquis fluviais do Vale do Ribeira do Iguape, Estado de São Paulo. Fundação de Amparo à Pesquisa do Estado de São Paulo. Relatório Final de Atividades do projeto Temático (Processo Fapesp no.99/12684-2).

Figuti, Levy; Plens, Cláudia Regina; DeBlasis, Paulo. 2013. Small Sambaquis and Big Chronologies: Shellmound Building and Hunter-Gatherers in Neotropical Highlands. Radiocarbon, 55(3): 1215–1221.

Figuti, Levy. 2014. Sambaquis: hunters-gatherer coastal archaeological depositis in Brazil. In: Nuria Sanz; Bernardo T. Arriaza; Vivien Standen. (Org.). The Chinchorro Culture: A comparative perspective. The archaeology of the earliest human mummification. 1ed. Arica: Andros Impresores, 1: 107–135.

Garcia, Caio Del Rio. 1972. *Estudo comparado das fontes de alimentação de duas populações pré-históricas do litoral paulista*. PhD dissertation, Universidade de São Paulo.

Gaspar, Maria Dulce. 2000. Sambaqui: arqueologia do litoral brasileiro. Editora Zahar, coleção Descobrindo o Brasil, Rio de Janeiro.

Keegan, William, and Michael Deniro. 1988. Stable carbon- and nitrogen-isotope ratios of bone collagen used to study coral-reef and terrestrial components of prehistoric Bahamian diet. *American Antiquity* 53: 320–336.

Kneip, Andreas. 2004. O Povo da Lagoa: uso do SIG para modelamento e simulação na área arqueológica do Camacho. Tese de doutorado, Museu de Arqueologia e Etnologia da Universidade de São Paulo.

Lubell, David, and Mary Jackes. 1994. The Mesolithic-Neolithic transition in Portugal: Isotopic dental evidence of diet. *Journal of Archaeological Science* 21: 201–216.

Neves, Walter; Okamura, Mercedes. 2005. Afinidades biológicas de grupos pré-históricos do vale do Rio Ribeira de Iguape (SP): uma análise preliminar. Revista de Antropologia (São Paulo), 48: 525–558.

Plens, Cláudia Regina. 2007. Sítio Moraes, uma biografia não autorizada: análise do processo de formação de um sambaqui fluvial [tese]. São Paulo:, Museu de Arqueologia e Etnologia.

Roosevelt, A. 1991. *Moundbuilders of the Amazon: Geophysical archaeology on Marajó Island, Brazil*. San Diego: Academic.

Roosevelt, A. 1995. Early pottery in the Amazon. Twenty years of scholarly obscurity. In *The emergence of pottery*, ed. W.K. Barnett and J.W. Hoopes, 115–131. Washington, DC/London: Smithsonian Institution Press.

Uchôa, Dorath Pinto. 1982. Ocupação do litoral sul-sudeste brasileiro por grupos coletor-pescadores holocênicos. *Arquivos do Museu de História Natural* 6–7: 133–143. Belo Horizonte: Universidade Federal de Minas Gerais.

Wesolowski, Veronica. 2007. *Cáries, desgaste, cálculus dentários e micro-resíduos do dente entre grupos pré-históricos do litoral norte de Santa Catarina: É possível comer amido e não ter cáries?* PhD dissertation, FIOCRUZ.

Hunting and Hunting Landscapes

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State of Knowledge and Current Debates

There is an increasing recognition that the study of human-animal-landscape interactions, as reflected in the zooarchaeological, artistic, and historical record, can provide important information about how people engaged with and perceived their surroundings as well as each other. Human responses to wild animals in particular have been shown to reflect individual, social, and cultural attitudes to the "natural world." Some of the most pivotal moments in the human story have been characterized by shifts in the relationship between humans and wild animals. For instance, the concept of domestication not only gave rise to the category of "wild" but also meant that it was no longer *necessary* to hunt in order to obtain meat. Yet people continued to do so. In some periods, hunting was a rare occurrence; in others, it became a frequent pursuit central to popular culture, evidenced by the art and literature of the time.

This entry seeks to review the evolution of hunting and hunting landscapes from the Epipaleolithic of Anatolia to the medieval period of England. Such a wide chronological and geographical remit clearly runs the risk of producing extremely superficial analysis, but conversely, by breaking down artificial spatiotemporal boundaries and considering the evidence from a wider viewpoint, it is hoped that new perspectives will emerge on a subject that has traditionally been compartmentalized by period and region (Cummins 1988; Birrell 1992; Barringer 2001; Hamilakis 2003; Atici 2009; Sykes 2011; Sykes et al. 2011; Arbuckle 2012). In an attempt to give focus to what could easily become an unwieldy subject, this entry concentrates specifically on the evidence relating to the European fallow deer, *Dama dama dama* (Fig. 1). Despite its name, this deer species is not of European origin: it is native to Anatolia but over the last 10,000 years has been transported by people around the world. As such, the cultural biogeography of fallow deer provides a unique opportunity to explore a variety of different hunting landscapes, created as this "wild" species passed gradually from being a free-living element of the fauna of its native range to an exotic species maintained in parks across northern Europe.

Definitions and Datasets

Given that the terms "landscape," "hunting," "wilderness," and "wild" are some of the most nuanced and contested in archaeological and anthropological discourse, it is perhaps best to start by making clear the definitions.

Here landscape is defined not simply as physical geography and environmental conditions, although these are important elements of landscape, but rather as how people perceive and understand their surroundings as a result of their engagement with them. This definition sees landscape and worldview as inseparable, each serving to constitute the other. Movement and mobility are also suggested as vital components of both landscape and worldview: the sayings "travel broadens the mind" and "fear of the unknown" are of direct relevance here. In general terms, mobile groups who travel across, and are familiar

Hunting and Hunting Landscapes, Fig. 1 Male fallow deer (*Dama dama dama*). (Photo: author)

with, wide spatial ranges or those communities involved (directly or indirectly) in long-distance trade/exchange will have a different perception and understanding of their worlds than those who live a more sedentary or insular lifestyle. Insular sedentism allows intense engagement with, and very detailed knowledge of, local surroundings, but as movement reduces, so mental geographies contract, giving rise to infrequently traversed and unfamiliar landscapes beyond the "known realm."

Often these outer realms are conceptualized as the "wilderness." This term is used here not to suggest some primordial landscape untouched by humans; instead, wilderness is defined according to its original meaning: etymologically it comes from the Old English *wildeoren*, meaning *wildern* (wild or savage) and *deor* (animal), denoting an area where wild animals are found in greater numbers. Of course, the term "wild" is also problematic, frequently set in opposition to the other problem child "domestic." This is not the place to deliberate over these two words; suffice to say that, for the purpose of this entry, wild animals are categorized as those that are acquired through hunting.

In terms of hunting, Cartmill's (1993: 197) definition is employed: that hunting is the killing of a special sort of animal, in a specific way, for a particular reason. Cartmill stresses that this killing must be premeditated, preceded by deliberate tracking/stalking under circumstances where it is theoretically possible for the animal to evade its pursuer, and that the death is brought about by direct human violence, without mediation by trap or snare. Such a definition is flexible enough to allow tame or even domestic animals to cross the boundary and become conceptually "wild" through the activity of hunting – e.g., as was seen at Neolithic Durrington Walls (UK) where several domestic cattle and pig bones had flint arrow/spear tips embedded in them, leading Albarella and Serjeantson (2002: 44) to suggest that these domesticates were ritually hunted.

Unfortunately, in the absence of skeletal evidence for weapon-inflicted injuries, it is almost impossible to separate the archaeological remains of animals that were hunted from those that were obtained through other mechanisms. It is, therefore, important to view the zooarchaeological data presented in Table 1 with caution. These data, which review the representation of European fallow deer (*Dama dama dama*) across space and time, need not represent the remains of hunted animals – some of the individuals may have been tamed and dispatched as though they were

Hunting and Hunting Landscapes, Table 1 Fallow deer representation as a % of the total NISP (number of identified specimens) for mammals, by geographical region, site, and period

No	Anatolia	Dating information	*n*	% dama	References
1	Karain B1	19,478–19,203 BP	10	0.05	Atici (2009)
1	OK1	19,842–19,002 BP	1191	27.8	Atici (2009)
1	Karain B2	19,275–18,965 BP	0	0	Atici (2009)
1	OK2	18,015–17,069 BP	297	1.8	Atici (2009)
1	OK3	15,706–15,118 BP	1015	6.8	Atici (2009)
1	Ok4	14,722–14,053 BP	222	10.3	Atici (2009)
1	OK5	14,056–13,710 BP	363	26.1	Atici (2009)
2	Bademağacı	ENI 7035–6705 BP	15	0.9	de Cupere et al. (2008)
2	Bademağacı	ENII	116	2.5	de Cupere et al. (2008)
2	Bademağacı	EN	3	2.3	de Cupere et al. (2008)
3	Ilıpınar	X c. 6100–5600 BCE	176	10.2	Buitenhuis (2011)
3	Ilıpınar	IX c. 6000–5600 BCE	215	14	Buitenhuis (2011)
3	Ilıpınar	IX–VIII 6000–5600 BCE	200	4	Buitenhuis (2011)
3	Ilıpınar	VIII–VII 5900–5600 BCE	38	3.4	Buitenhuis (2011)
3	Ilıpınar	VI/VA 5800–5400 BCE	623	14	Buitenhuis (2011)
3	Ilıpınar	VB	19	7	Buitenhuis (2011)
4	Fikirtepe	Neolithic	256	5.2	Boessneck and von den Dreisch (1979)
2	Bademağacı LN-ECh	LN-ECh	15	2.2	de Cupere et al. (2008)
5	Kumtepe A	4805–4370 BCE		14	Gündem (2010)
5	Ulucak	Chalcolithic	247	12.4	Gündem (2010)
5	Ulucak	EBA	228	19	Gündem (2010)
6	Küllüoba TP	3300–3000 BCE	3	0.6	Gündem (2010)
5	Kumtepe B	3370–2910 BCE	6	2	Gündem (2010)
6	Küllüoba EBA I	3000–2700 BCE		0.8	Gündem (2010)
5	Kumtepe C	Troy I		1	Gündem (2010)
5	Troy I	2920–2550 BCE	161	1.5	Gündem (2010)
6	Demircihüyük	EBA 3100–2400 BCE	2085	2.9	Rauh (1981)
7	Yenibademli	EBA II/Troy I	680	10	Gündem (2010)
6	Küllüoba EBA II	2700–2400 BCE		0.7	Gündem (2010)
5	Troy II	2550–2250 BCE	161	4.8	Gündem (2010)
5	Troy III	2250–2200 BCE	99	6.5	Gündem (2010)
2	Bademağacı	EBAII	9	2.7	de Cupere et al. (2008)
6	Küllüoba EBA III	2400–2000 BCE		0.7	Gündem (2010)
5	Troy VIII	Hellenistic	2570	24.6	Fabiš (2003)
	Mainland Greece	**Dating information**	***n***	**% dama**	**References**
8	Sitagroi	Neo I	2	0.1	Bökönyi (1986)
8	Sitagroi	Neo II	1	0.01	Bökönyi (1986)
8	Sitagroi	Neo III	15	0.1	Bökönyi (1986)
9	Dhimitra	MN	2	0.3	Yannouli (1994)
9	Dhimitra	Final Neolithic	6	0.3	Yannouli (1994)
10	Makri	5500–4000 BCE	51	9.7	Curci and Tagliacozzo (2003)
11	Vassilika	LMN-LLN	26	0.4	Yannouli (1994)
11	Thermi	LLN	2	0.08	Yannouli (1994)
8	Paradeisos	Late Neolithic	12	0.7	Larje (1987)

(continued)

Hunting and Hunting Landscapes, Table 1 (continued)

No	Anatolia	Dating information	*n*	% dama	References
8	Sitagroi	Neo-EBA (IV)	95	2.2	Bökönyi (1986)
8	Sitagroi	EBA	149	1.6	Bökönyi (1986)
12	Pentapolis	EBA	33	1.8	Yannouli (1994)
13	Kastanas	BA	100	11	Becker (1986)
13	Kastanas	BA	4865	39.6	Becker (1986)
9	Dhimitra	LBA	2	0.7	Yannouli (1994)
	Greek Islands	**Dating information**	***n***	**% dama**	**References**
14	Kalithies, Rhodes	Neolithic (I)	14	5.4	Halstead and Jones (1987)
14	Kalithies, Rhodes	Neolithic (II/III)	56	9.9	Halstead and Jones (1987)
15	Agios Petros, Sporades	E-M Neo	3	0.3	Schwartz (1985)
15	Agios Petros, Sporades	M-L Neo	3	0.3	Schwartz (1985)
15	Agios Petros, Sporades	Neo	1	0.5	Schwartz (1985)
16	Skala Sotiros	EBA	60	0.5	Yannouli (1994)
17	Knossos, Crete	Neolithic	2	0.01	Harris (in press)
17	Knossos, Crete	BA	19	0.5	Harris (in press)
17	Agia Triada EM, Crete	2700–2000 BCE	0	0	Wilkens (2003)
17	Agia Triada MM, Crete	2000–1570 BCE	1	0.4	Wilkens (2003)
17	Agia Triada MM3, Crete	1750–1570 BCE	2	0.9	Wilkens (2003)
17	Agia Triada LM, Crete	1570–1150 BCE	7	2.2	Wilkens (2003)
17	Chania (Ayia Aikaterini), Crete	LBA	195	6	Harris (in press)
17	Chania (Odos Daskaloyannis), Crete	LBA	227	12	Harris (in press)
17	Chania (Mathioudaki), Crete	LBA	18	5	Harris (in press)
17	Prinias, Patela Temple, Crete	Iron Age	11	2.4	Wilkens (2003)
17	Kavousi, Kastro, Crete	Iron Age	12	0.4	Harris (in press)
17	Knossos (sanctuary Demeter), Crete	Iron Age	1		Harris (in press)
17	Gortyn, Crete	Byzantine	3	0.1	Wilkens (2003)
	Roman Europe	**Dating information**	***n***	**% dama**	**References**
18	Settefinestre, Italy	First century BCE–CE	16	0.3	Carandini (1985)
19	Castagna, Sicily	Second century	1	1.6	Johnstone (1998)
19	Castagna, Sicily	Fifth–sixth century	2	2.3	Johnstone (1998)
20	Fishbourne	First century BCE–CE	7	0.08	Allen and Sykes (2011)
20	Fishbourne	First–second century	17	0.2	Allen and Sykes (2011)
20	Fishbourne	Second–third century	5	1.9	Allen and Sykes (2011)
20	Fishbourne	Third–fourth century	10	0.3	Allen and Sykes (2011)
21	Monkton, Isle of Thanet	Second–fourth century	9	0.5	Sykes et al. (2011)
22	Sparsholt	Third–fourth century	12	0.5	Weinstock *pers. comm.*
	England	**Date**	**n**	**% dama**	**References**
23	Carisbrooke Castle, Isle of Wight	Eleventh century CE	13	0.8	Ayton (2011)

(continued)

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Hunting and Hunting Landscapes, Table 1 (continued)

No	Anatolia	Dating information	*n*	% dama	References
23	Carisbrooke Castle, Isle of Wight	Twelfth century CE	11	0.9	Ayton (2011)
26	Launceston Castle	Twelfth century CE	1	0.5	Albarella and Davis (1996)
27	Guildford Castle	Twelfth century CE	3	1	Sykes et al. (2005)
27	Guildford Castle	Twelfth–thirteenth century CE	4	1	Sykes et al. (2005)
23	Carisbrooke Castle, Isle of Wight	Twelfth–fifteenth century CE	5	1.8	Ayton (2011)
27	Guildford Castle	Thirteenth century CE	89	7	Sykes et al. (2005)
26	Launceston Castle	Mid-thirteenth century CE	2	1.3	Albarella and Davis (1996)
26	Launceston Castle	Late thirteenth century CE	65	4.2	Albarella and Davis (1996)
27	Guildford Castle	Thirteenth–fourteenth century CE	31	9	Sykes et al. (2005)
28	Okehampton Castle	Pre-thirteenth century CE	48	3	Maltby (1982)
28	Okehampton Castle	Fourteenth century CE	322	28.4	Maltby (1982)
27	Guildford Castle	Fourteenth–fifteenth century CE	25	6	Sykes et al. (2005)
26	Launceston Castle	Fifteenth century CE	324	9.5	Albarella and Davis (1996)

domesticates, and we cannot be certain that they were hunted. There are other problems with this diachronic dataset, most notably, that it takes no account of inter-site variations in preservation or recovery. With these caveats in mind, however, the evidence in Table 1 can be examined to gain a broad-brush impression of the rise and fall of hunting cultures, the timing of the westward diffusion of fallow deer from Anatolia through the Mediterranean and mainland Europe, and the associated shifts in the status of the species.

In order to gain greater insights into hunting decisions and issue of seasonality, the demographic composition of the fallow deer assemblages is also considered, where possible. Fallow deer are highly sexually dimorphic, and therefore, osteometrics, derived from the online *Deer Bone Database* (n.d.), have been employed to examine male-female ratios as well as variations in the physical conformation of deer, which itself is related to landscape and environment.

To some extent, environmental conditions – geology, baseline vegetation, temperature, and aridity – are preserved in the very chemistry of the bones, and isotopic analyses of archaeological fallow deer remains can help to reconstruct human-animal-landscape interactions. Genetic analyses may also be useful in this respect, informing on population dynamics and episodes of translocation. At present, however, data from such scientific investigations are of limited availability, and although some reference will be made to them here, more emphasis is placed upon the historical and iconographic record. Artistic and textual evidence is patchy for the periods and regions under consideration but is available for the Bronze Age Aegean (Yannouli and Trantalidou 1999), Archaic, Classical, and Hellenistic Greece (Yannouli and Trantalidou 1999; Barringer 2001), some areas of the Roman Empire (Reinken 1997), and medieval northern Europe, in particular England (Sykes and Carden 2011). Anthropological studies are also employed, not as direct parallels for archaeological societies but rather as a mind-stretching exercise, to provide alternate perspectives on landscape, environment, and social attitudes to hunting (Cartmill 1993; Helms 1993; Ingold 2000; Willerslev 2007). By bringing these sets of evidence together and integrating them with wider archaeological knowledge, it is possible to examine how hunting and hunting landscapes varied across time and space.

The Hunting Landscapes of Epipaleolithic and Neolithic Anatolia

Current zooarchaeological evidence suggests that, as a result of the last glacial maximum (c. 20,000 years ago), the distribution of fallow deer became restricted to Anatolia (Masseti 2002). Certainly it is from this region that we have the best available dataset for analyzing human-dama-landscape relationships in the early postglacial period. Atici's (2009) examination of seven Epipaleolithic assemblages from two neighboring sites (Karain B and Ökuzini caves) in the western Taurus mountains provides a rare insight into the landscapes of the hunter-gatherers who occupied the area between 19,800 and 13,700 cal BP.

These broadly contemporary assemblages, situated just one kilometer apart (Fig. 2), reveal an interesting variation in fallow deer representation: while *Dama* are abundant at Ökuzini, comprising 27.8% of the mammalian material, they are almost completely absent from Karain B, where the assemblage is 99% caprine (Table 1). Admittedly a small number of fallow deer remains are represented at Karain B, but they are all antler fragments, so not direct evidence of hunting. Environmental conditions and topography alone cannot account for the inter-site variation, since both sites occupy the same ecotone with access to a variety of microenvironments – mountain slopes, valleys, the travertine plain, as well as areas of open grassland, marshes, and forest – and an equally wide range of prey. This led Atici (2009) to conclude that the differences in assemblage composition most probably reflect cultural preferences linked to seasonal hunting and mobility strategies. Aging data from the two sites suggest that, at least in the early postglacial phases (Karain B1/2 and OK1), occupation was seasonal, probably from late spring/early summer to October. The caprine mortality profiles also make clear that, although animals of all ages

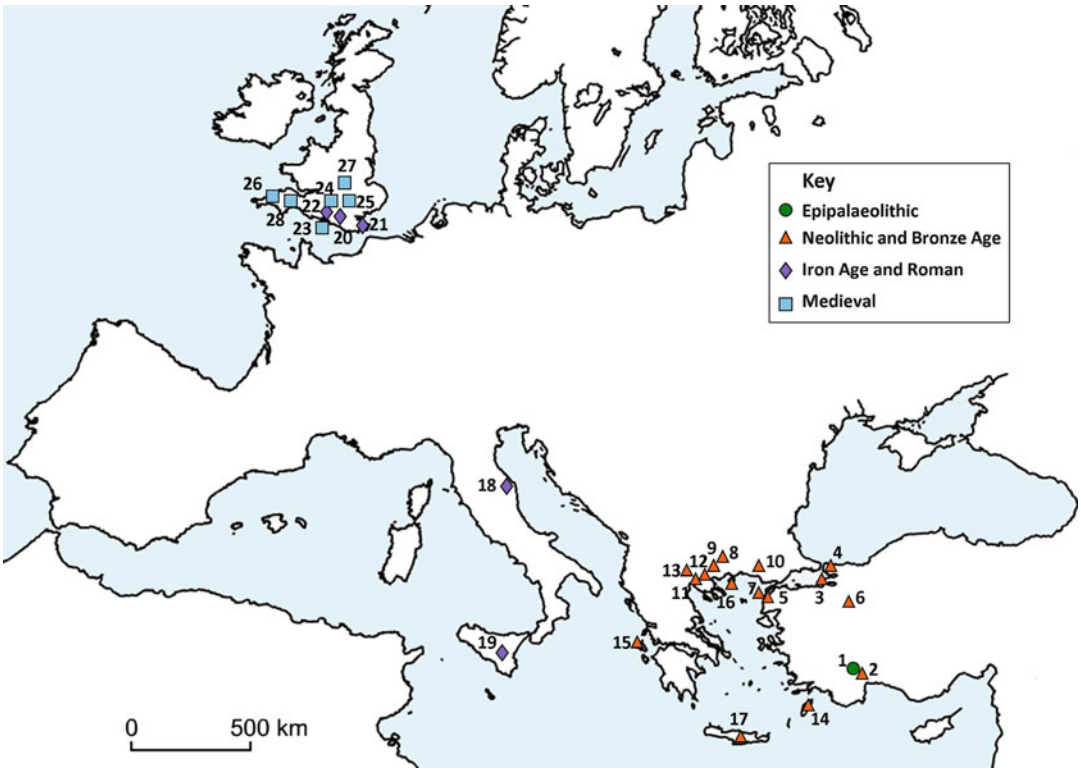

Hunting and Hunting Landscapes, Fig. 2 Map showing the location of the sites mentioned in Table 1

were represented, those between 2 and 4 years were targeted preferentially.

These data indicate that the Epipaleolithic hunters not only were highly skilled in their abilities to select out particular species and individuals but, perhaps more importantly, were taking a conscious decision about which animals *not* to kill. For instance, given the close proximity and environmental setting of Karain B and Ökuzini, we may assume that similar ranges of taxa were available at both sites; however, at Karain B, fallow deer appear to have been deliberately and persistently avoided throughout the site's 500 years of occupation. Assemblages such as Karain B are usually interpreted in economic terms, as "specialist sites" established to maximize returns from available resources. No doubt, effectiveness in hunting was a concern to the Epipaleolithic hunters, but the idea that optimal foraging was their main concern seems at odds with anthropological evidence pertaining to modern hunter-gather groups.

Across cultures, studies have demonstrated repeatedly that hunter-gatherers tend to perceive their landscape and environment not as economic resource but, in familial terms, as a parent who actively provides for them so long as the hunter-gatherers behave appropriately (Ingold 2000: 67; Willerslev 2007: 42). For instance, they should take no more than they need, are required to share out the resources they receive, and should ensure that they treat the animals with respect at all stages of their interaction – during hunting, butchery, consumption, and disposal (Ingold 2000: 67; Willerslev 2007: 35). If humans behave accordingly, the animals will give themselves up freely to the hunter, and once their soul has been released and reclothed with flesh, it will return to him in the future. However, poor treatment – such as overkilling, unnecessary violence, or wastefulness – ensures that the animals do not return and the hunter is never again successful. In order to coax animals into sacrificing themselves, hunter-gatherers frequently practice mimesis to "become" their quarry so they might better seduce them into giving themselves up. Based on the experiences of modern hunter-gatherers, the idea that fallow deer hunting at Ökuzini, and indeed caprine hunting at Karain B, took the form of an intense interpersonal dialogue is not unreasonable. This would suggest that hunting was controlled and restrained in ways different to those of an optimal foraging strategy. If mimesis was employed, the hunting landscape may even have been seen through the eyes of the quarry – a very different perspective on the world (Willerslev 2007: 106).

Such a situation is easier to comprehend for a period before the arrival of domestic dogs, which are absent from Anatolia before the twelfth millennium BCE (Arbuckle 2012: 210). Without the distraction of dogs, mimesis would have been easier to maintain, an important point given that this form of shape-shifting is often deemed dangerous, potentially leaving the hunter trapped in animal form (Willerslev 2007: 93). Even successful hunting is not without risk however. It is frequently reported, again cross-culturally, that hunters feel deep guilt about their kill and are fearful that the "animal masters" – the spirits who protect the animals – will seek vengeance (Willerslev 2007: 44, 79). If hunting in Epipaleolithic Anatolia was felt to incur a spiritual debt and overkilling was not acceptable, it stands to reason that deliberate non-killing (e.g., the avoidance of fallow deer at Karain B) would have been a prudent statement of respect. The need not to waste hunted animals could equally account for the high levels of bone fragmentation, indicative of intensive processing, seen at both Karain B and Ökuzini (Atici 2009: 22).

Taken together, the data from these sites can be interpreted as follows: that similar to modern hunter-gatherers, Epipaleolithic groups had an intimate relationship with their environment, their hunting landscapes constituted by specific, long-term, and repeated human-animal interactions that occurred at particular times and places (e.g., the seasonal hunting of caprines and fallow deer at Ökuzini and just caprines at Karain B). It seems feasible that these interactions were central to human culture – in the form of songs, dance, and stories – that, together with the group's mobility, ensured knowledge of and relations with the environment were maintained (Ingold 2000: 56–7).

It is clear from the later phases at Ökuzini that human mobility gradually reduced as occupation became longer in duration, evidenced by faunal indicators of seasonality (Atici 2009: 34). The zooarchaeological data also demonstrate a steady increase in the range of species that were hunted, with fallow deer, roe deer, and wild boar becoming better represented through the chronological sequence. This move towards sedentism and the hunting of a wider range of prey, undertaken from a single settlement base, indicates a change in human-animal-landscape relationships that must have altered the way that people perceived their environment. Knowledge of the site's immediate surroundings would have intensified, allowing far deeper relationships with their locality but at the expense of other places that were previously part of the group's familial landscapes. As mobility reduced and people "lost touch" with areas beyond their day-to-day range, these more distant areas presumably became unfamiliar, perceived as the dangerous dwellings of ancestors and spirits (Ingold 2000: 43).

The emergence of sedentary farming communities can only have accelerated the contraction of landscape knowledge and engagement. To some extent this is reflected by the zooarchaeological data for the Near East and Mediterranean: surveys of faunal representation show a gradual drop-off in wild animal representation from the ninth millennium BCE, with wild animals becoming scarce in zooarchaeological assemblages from about 7500 BCE (Vigne and Helmer 2007: 34; Arbuckle 2012: 217). Certainly this is the case at Bademağacı Höyük, an early Neolithic to Bronze Age settlement located approximately 30 km northeast of, and in an similar environmental setting to, Ökuzini and Karain B. Table 1 shows that, in contrast to the high frequency of fallow deer at Ökuzini, *D. d. dama* remains constitute just 0.9% of the earliest Neolithic assemblage from Bademağacı. If it is accepted that zooarchaeological assemblages reflect human-animal-landscape interactions, the Epipaleolithic to Neolithic decline in wild animal representation can be taken as evidence for a fundamental change in human experience and environmental engagement. An increasing focus on domestic animals and landscapes created something new: the "wild," which now existed beyond the Neolithic settlements and their daily activities. de Cupere et al. (2008: 383) concluded that hunting played only a minor role in the subsistence of Bademağacı's occupants and that the deer were probably hunted locally on the plain surrounding the settlement. Recent carbon and nitrogen isotopic analyses of the fallow deer from Bademağacı ($n = 34$) may confirm localized hunting, the results being more tightly clustered (suggesting similarity of baseline environment) than has been observed for any other *D. d. dama* population analyzed to date (Sykes et al. 2011; Madgwick et al. in press).

The low frequencies of fallow deer (and other wild animals) in Neolithic assemblages should not, however, be equated with a lack of social importance. Indeed, as wild animals and their habitats became less familiar to the Neolithic populations, the significance of both may actually have increased. Within farming societies, hunting is usually about more than the acquisition of meat – it is a special activity, often a ritualized expression of identity (be it status, religious beliefs, ethnicity, gender), power, authority, or landownership (Helms 1993; Hamilakis 2003; Sykes 2007a). The value placed upon hunting derives from its unpredictability and danger, with hunters traveling beyond the comfort of their settlements into unknown landscapes to confront unknown beings. In her analysis of traditional societies, Helms (1993: 153–7, 211) demonstrated that, across cultures, geographical distance is equated to supernatural distance and that the hunters' ability to successfully negotiate "outer realms" is frequently regarded as a sign of shamanic status or supernatural authority. Given this association, together with the fact that hunting requires violent engagement with potentially dangerous wild animals, it is unsurprising that hunting skill is often deemed an important trait of male leadership in warrior societies (Cartmill 1993; Helms 1993; Hamilakis 2003; Sykes 2011: 336).

The possibility that there was an association between hunting and masculinity in Prehistoric Anatolia is perhaps discernible in the zooarchaeological record. Figure 3a shows clearly

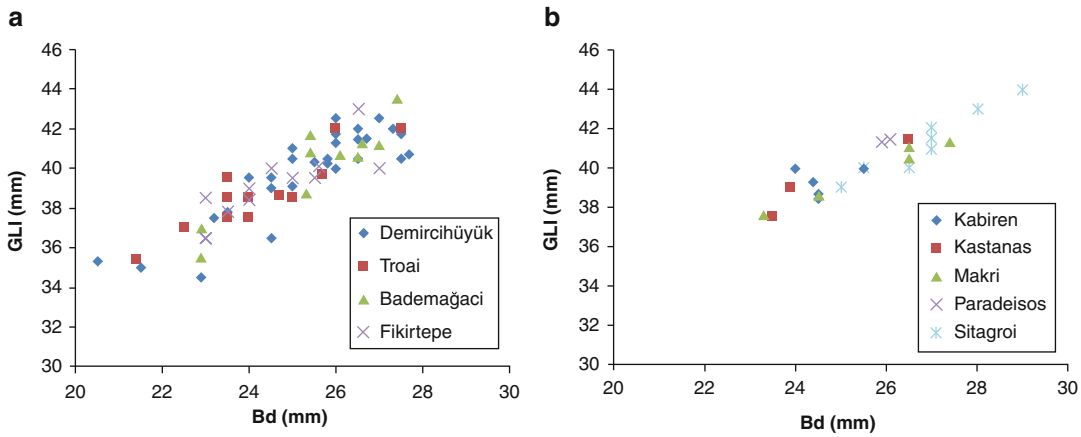

Hunting and Hunting Landscapes, Fig. 3 (**a**) Plot of astragali measurements – greatest lateral length (*GLl*) against distal breadth (*Bd*) – for fallow deer from Anatolia. (**b**) Plot of astragali measurements – greatest lateral length (*GLl*) against distal breadth (*Bd*) – for fallow deer from mainland Greece

that fallow deer bucks were preferentially hunted at Bademağacı, the distribution of astragali measurements suggesting a male-female ratio of 4:1. Male fallow deer are also overwhelmingly predominant at Neolithic Fikirtepe (Turkey) where very few females are represented (see Fig. 3a; Boessneck and von den Dreisch 1979). From an economic perspective, these male-dominated assemblages could be interpreted as evidence for optimal foraging, the hunters targeting animals with larger carcass weight. However, given the considerable anthropological evidence for hunting communities, it seems more likely that these sex ratios reflect the role of hunting as an expression of masculinity: men deliberately seeking to confront the larger and more violent male of the species.

Under such circumstances, the role of dogs as hunting companions is more logical. Rather than representing a distraction, as was suggested for the Epipaleolithic period, dogs would have been valuable assets for macho-based hunting, offering both assistance in tracking quarry and companionship but also protection if needed. Work by Bartosiewicz (1990) has demonstrated a positive correlation between the frequencies of dog and wild animals in Neolithic assemblages from Europe and the Near East, suggesting that the two are directly associated. No such trend is apparent for Bademağacı, for although dogs are represented throughout the site's occupation, their frequency does not increase in parallel with the remains of wild animals: Table 1 shows that the representation of fallow deer at Bademağacı increases to over 2% from the ENII phase onwards. Several other Neolithic and Chalcolithic sites – notably Ilıpınar, Fikirtepe, Kumtepe, and Ulucak – demonstrate even greater frequencies of *D. d. dama* bones. Interestingly, this upsurge in fallow deer hunting corresponds with the period in which fallow deer began to be transported, by people, outside their natural range.

Hunting Landscapes of the Aegean: Diaspora of Fallow Deer and a Common Aristocratic Culture

Reviews by Yannouli and Trantalidou (1999) and Masseti (2002) highlight that dama remains have been identified in Neolithic assemblages from the islands of Rhodes, Crete, Chios, Lesbos, the Cyclades, and Sporades. Fallow deer are not part of these islands' native fauna and so must have been imported from Anatolia as part of the Aegean-wide trading/communication network that developed during the period (Masseti 2002: 163–4; Barker 2005).

According to Masseti (2002: 164) and Barker (2005), fallow deer were exported specifically for hunting purposes, and it seems likely that their transportation was accompanied by the

establishment of a common hunting culture across the Aegean. Certainly, a Neolithic to Early Bronze Age increase in wild animal representation has also been widely observed for mainland Greece (e.g., Hamilakis 2003), and research by Yannouli (1994) has highlighted that, for sites in Macedonia at least, this is coincident with the emergence of fallow-focused hunting. At Sitagroi, for instance, *dama* are very poorly represented in the earliest Neolithic levels (0.01–0.1%) but become the dominant cervid species at the advent of the Bronze Age, accounting for 1.6–2.2% of the mammalian assemblage (Table 1). Metrical analysis demonstrates that, as in Anatolia, hunting strategies were highly selective, with an overwhelming predominance of fallow deer bucks at both Sitagroi and Paradeisos (Fig. 3b). If, as has been argued above, male-dominated assemblages reflect social rather than economic concerns, this would seem to support Hamilakis's (2003: 242) argument that hunting was becoming an important arena for the negotiation of power and gender roles, in particular masculinity, associated with the rise of warrior identities. The hunting of fallow deer, a species that was beginning to unite distant parts of the Aegean, may have enhanced further the significance of the activity. By allowing hunters to engage in a common, yet simultaneously exotic, set of cultural practices, the participants became active members of a world beyond the local – a situation that would have allowed mental geographies to enlarge.

Bronze Age perceptions of hunting landscapes are difficult to fathom, but the introduction of horses must have transformed the way in which hunts were conducted and experienced: expeditions could now take place at speed with participants afforded a new vantage from their position within a chariot or on horseback. It is clear from iconographic evidence that both horses and hounds were important components of Bronze Age hunting, one of the earliest and most detailed depictions of this association coming from the LCI site of Ayia Irini (Kea). Here miniature friezes are painted on the walls of what is thought to be a large banqueting hall (Marinatos and Morgan 2005: 120). Horses and chariots are shown adjacent to scenes where a fallow deer being chased by a hunting dog and another where a male helmeted hunter is shown carrying a dead deer slung from a pole. The rest of the fresco appears to illustrate men carrying drinking paraphernalia and cooking over tripod cauldrons. The relationship between these different scenes has been interpreted as evidence that, in the Bronze Age period, hunting and feasting went hand-in-hand (Wright 2004: 169).

In terms of landscape, the majority of Ayia Irini's frescoes provide considerable details of the surrounding sea, coast, marsh, plants, rocks, and sky. The one exception is the hunting scene, which is set apart by its barrenness: the dog and deer are painted on a plain background of yellow ochre. Marinatos and Morgan (2005: 120) argue that this juxtaposition represents the remote landscape of the deer hunt, suggesting that it took place away from the settlement and beyond the vision of the eye. The naturalistic style of the deer's representation led Marinatos and Morgan (2005: 121) to speculate further about the season of the hunt. The deer is shown to have a penile brush distinctive of a buck, but the lack of antlers, which today are shed in April, together with the illustration of the animal's spotty summer coat indicates a May-to-October setting. Is it possible that male hunters of the Bronze Age chose the summer months to hunt in the sparse wilderness before returning to feast?

This is certainly the interpretation of Koehl (1986) whose integrated analysis of the highly decorated Chieftain Cup recovered from Agia Triada (Crete) enabled him to speculate that Minoan boys were required to undergo a maturation ritual whereby they spent 2 months hunting in the wilderness before their reintroduction to society as men. On their return the initiated youth would be rewarded with three gifts symbolic of their new warrior status and their induction to the adult world of religion and banqueting: weapons, a sacrificial ox for feasting, and a drinking cup (Barringer 2001: 13). Koehl (1986) argues that the Chieftain Cup represents all three gifts: its decoration showing both the awarding of arms to a young man and the skins of the sacrificed oxen, while the object itself represents the third gift of

the drinking vessel. Admittedly, this coming-of-age ritual is not documented until the fourth century BCE, but at this point, it was understood to be a long-standing ritual of Crete (Barringer 2001: 13), and the suggestion is not out of line with the iconographic evidence (Marinatos and Morgan 2005) or that from the zooarchaeological record. By example, Table 1 shows that hunting took place at Agia Triada, where fallow deer are the best-represented cervid and their frequency gradually increases through time, perhaps reflecting population growth following the species' introduction to the island.

Frescoes from Agia Triada suggest that the Bronze Age population viewed fallow deer as something other than just quarry: one fresco fragment appears to depict a woman leading two fallow deer to an altar (Yannouli and Trantalidou 1999: 279). The possibility that more complex relationships with fallow deer gradually began to emerge is perhaps indicated by the zooarchaeological record. Several sites in Anatolia (e.g., Troy I–III), Greece (Kastanas), and Crete (Chania) show high frequencies of fallow deer (Table 1); however, by contrast to the Neolithic and Early Bronze Age assemblages, metrical analysis indicates a more equal male-female ratio (Fig. 3a, b; Harris in press). This shift in hunting strategy may simply be a product of more intensive hunting, but it could equally suggest that across the Aegean, and at approximately the same time, the status and significance of fallow deer were diversifying – no longer was buck-hunting the sole focus of human-dama relationships. Credence is added to this suggestion by the Linear B tablets of Pylos which list different kinds of deer: those that are wild, those that are domestic, and those used in games or for sacrifices (Yannouli and Trantalidou 1999: 254). The possibility that some deer were being tamed or even maintained in parks (Hamilakis 2003: 344) would have created new kinds of landscapes where people, presumably the elite, could regard deer at close quarters. Indeed, it is possible that emparked deer were used in staged hunts as a demonstration of elite power and authority, as was common in contemporary Anatolia and Mesopotamia (Arbuckle 2012: 217).

The role of deer hunting as an ideological and power-generating resource is widely accepted for Mycenaean societies, where depictions of deer and hunting scenes are amongst the most common themes in iconography (Hamilakis 2003: 243–4; Wright 2004: 160). The themes are very similar to those of Minoan iconography: the frescoes from Mycenaean Pylos (hall 46) are very reminiscent of those from Ayia Irini, again showing men and dogs hunting deer but also carrying tripods for cooking meat (Wright 2004: 160). The idea that hunting and feasting continued to be closely associated and central to elite culture finds support from the zooarchaeological record: several sizeable fallow deer assemblages from Chania (Crete) were recovered from large pits that also contained quantities of dining and drinking vessels, typical of feasting deposits (Table 1; Harris in press).

The zooarchaeological record for Crete suggests that the end of the Bronze Age brought a decline in fallow deer hunting: according to Table 1, *D. d. dama* frequencies drop off through the course of the Iron Age. The only site where they are well represented is Prinas, but here it should be noted that all the specimens came from temple contexts (Wilkens 2003: 86). A similar situation is true for the Iron Age remains from Knossos, which were recovered from the sanctuary of Demeter (Table 1).

Cultic significance may explain why fallow deer persist as a common iconographic motif, Yannouli and Trantalidou's (1999) detailed review demonstrating their continued representation through the Iron Age, Archaic, Classical, and Hellenistic periods. Barringer's (2001) study of hunting in Archaic and Classical Greece also highlights fallow deer as a frequently depicted quarry on Attic vases. She notes a strong association between the themes of hunting and warfare, a connection that apparently intensified around 520–510 BCE when a number of changes occur in both the design and form of the vessels. First, there is a shift in the ceramic forms on which hunting is depicted, the imagery becoming restricted almost exclusively to cups and other drinking paraphernalia typical of the aristocratic male symposium (Barringer 2001: 16). In terms of design, the traditional hunting weapons – spears

and tridents – are replaced by depictions of swords, weapons less conducive to hunting but typical of the period's military gear (Barringer 2001: 19). At approximately the same time, illustrations of communal hunts become less frequent, and the hunters appear more heroic in their stance and costumes (Barringer 2001: 32). Depictions of landscape also become more prominent, which Barringer (2001: 18) suggests may have been designed to emphasize the wild location of the hunt. Taking all these changes together, Barringer (2001: 16) argues that they reflect the aristocracy's attempts to deploy the symbolism of hunting and heroism in order to maintain power and social control at precisely the point when both were diminishing with the advent of democracy.

While fallow deer hunting continued to be aligned with masculinity and warfare – a theme reflected in the literature of Xenophon, Aristotle, and Plato (Barringer 2001: 11) – the Archaic and Classical period also saw fallow deer coming to represent women and children. This presumably resulted from the fallow deer's growing association with Artemis, the goddess of hunting, whose identity developed through the syncretism of Anatolian and Greek antecedents (Fischer-Hansen and Poulsen 2009: 12). This well-known connection between fallow deer and Artemis is often expressed artistically from the Archaic periods onwards (Yannouli and Trantalidou 1999: 258), and it is also from this point that votive deposits of dama bones are more common within cultic contexts. For instance, approximately 60 fallow deer astragali were recovered from the Korykeion Antron near Delphi, a cave associated with the cult of nymphs who were thought to protect children. A further 11 dama astragali were recovered from the Kabireion sanctuary at Thebes, and interestingly, metrical analysis indicates that all are from female individuals (see Fig. 3b). This is an important find suggesting that, by contrast to the buck-hunting of the Neolithic and Early Bronze Age, female deer were specifically targeted, perhaps with these particular rituals in mind.

If not already common in Anatolia, the concept of hunting fallow deer for cultic purposes may have been exported back to the species' homeland during the Hellenistic period. Table 1 shows that exceptionally high frequencies of fallow deer remains were recovered from the Greek phase of Troy (VIII) and, according to Fabiš (2003: 267), the majority came from sanctuary contexts. Again, Fabiš (2003: 274) stresses the links between fallow deer and Artemis, citing examples of iconographic evidence from the region that confirm the association. Given that the cult of Artemis was one of the most popular and widely established in antiquity (Fischer-Hansen and Poulsen 2009), it seems plausible that this was the very motivation for the human-assisted spread of fallow deer across the Roman Empire, an issue to which we now turn.

Roman Europe

The association of fallow deer with Artemis, or rather her later incarnation as the Roman goddess Diana, has been explored in depth by not only Yannouli and Trantalidou (1999) but also Reinken (1997). It is clear that the goddess and fallow deer are intimately linked; however, this relationship has actually obscured whether the cult was responsible for the spread of the species. This is because body parts, rather than living deer, appear to have been transported over considerable distances for use in ritual, magic, and medicine. For instance, fallow deer foot bones have been recovered from the Temple of Diana in Augst (Switzerland), and isotopic analyses of shed antlers and foot bones from a variety of north European contexts have returned values that indicate these body parts were imported from the Mediterranean or Anatolia (Madgwick et al. in press). Nevertheless, isotopic studies have also confirmed that the Roman period saw breeding populations of fallow deer established across the western Mediterranean and as far north as England. In the majority of cases and following Neolithic and Bronze Ages practices, the deer were introduced to islands: notably Sicily, the Balearics, and the Isle of Thanet, located in the English Channel (Masseti 2002; Sykes et al. 2011). These sea-bounded areas would have served as natural game reserves, large enough for the deer to roam free and be hunted as "wild" animals, as they were on Rhodes and Crete. Iconographic representations from the famous fourth-

century mosaics of Piazza Armerina (Sicily) depict wide-ranging hunts with deer being driven into nets by hunters on horseback (Dunbabin 2004: 146). The villa's *Mosaic of the Small Hunt* combines this imagery with scenes of votive offerings to Diana but also feasting, whereby the hunters picnic on the products of the hunt. According to Dunbabin (2004: 146), hunting scenes emerged as a popular motif from the third century onwards, when the possession of productive estates, hounds, horses, and leisure time were the defining traits of elite identity – hunting serving as the nexus through which all could be communicated.

The Roman period saw, therefore, not only the amalgamation of landownership, status, and hunting but also the use of this tripartite as an important motif in visual culture. It is perhaps no coincidence, then, that the first unambiguous evidence for the establishment of private game parks, known as *vivaria*, also dates to the Roman period (Sykes 2010).

In Italy, there is some suggestion that such a park may have been constructed at the grand villa of Settefinestre, built around 75 BCE near the costal colony of Cosa (Carandini 1985). The villa was set in a large estate that included orchards and a variety of walled gardens, spaces that could certainly have housed the fallow deer whose remains were recovered from the site (Table 1). More definitive evidence for the establishment of game parks is found at another lavish villa, Fishbourne Palace on the south coast of England. This site has produced the largest collection of *D. d. dama* remains from Roman England, but as Table 1 highlights, their remains are still very rare ($n = 38$). The exotic status of these animals was confirmed through strontium isotope analyses (a geochemical provenancing technique) of the available *D. d. dama* teeth from Fishbourne. This identified the presence of an individual that was imported to the site as a juvenile, perhaps a gift from across the empire; however, another deer was shown to have been born and raised at the palace (Sykes et al. 2006). More recent studies of bone chemistry (carbon and nitrogen isotope analyses) to examine the deer's diet have highlighted that most of the animals likely grazed close to the palace, perhaps within the formal gardens, but others must have been managed in the more "natural" southern garden, an area that gave the deer access to the nearby salt marsh, indicated by exceptionally high nitrogen values (Madgwick et al. in press).

The management of deer within enclosed areas marks a transition in the *dama*-human relationship, to a situation more akin to domestication. The paradoxical nature of parks, landscapes in which wild animals were maintained as domesticates, reveals something of the period's cultural ideology. *Vivaria* represent a landscape-based statement of human dominion over nature, reflecting the mind-set of the Romans who saw it as their spiritual duty to bring the wilderness to order (Cartmill 1993: 52). This is a key point which would seem to separate the Roman worldview from that of the preceding Iron Age, when no such concept of dominion existed. Indeed, it would seem that in the Iron Age, the wilderness was viewed a sacred space with cultural taboos placed on the hunting, trapping, and harvesting of all wild resources (Sykes 2010: 23–4).

Why such differences existed between Iron Age and Roman England can, most probably, be linked to inter-period variations in mobility, long-distance trade, and geographical knowledge. By contrast to the Roman period, Iron Age England was parochial and insular, and the areas beyond settlements seemingly represented the unknown outer realm, where votive deposits, sacrifices, and funerary rituals took place (Sykes 2010: 24). Increasing trade with the continent during the Late Iron Age and Roman period, followed by the arrival of new peoples and things, would have blown apart existing geographical knowledge, the "exotic" replacing the wilderness as the new outer realm. It is probably for this reason that, in the Roman period, exotic goods become common votive offerings whereas wild animals appear to lose their sacred status; their remains are found increasingly in domestic food deposits, particularly from elite sites (Sykes 2010: 28).

The hunting culture brought to England by the Romans was not to last however. Withdrawal of the empire in CE 410 and the associated decline in

international trade saw a reversion to Iron Age attitudes to hunting and the wilderness.

The Hunting Landscapes of Medieval England

The Early Anglo-Saxon period (fifth–seventh century CE) saw the return of taboos over the exploitation of wild resources with little evidence for hunting (Sykes 2011: 331). This is not to suggest that belief systems were identical to those of the Iron Age, as the avoidance of wild resources may reflect a new perception that the wilderness was a scary, rather than sacred place, inhabited by supernatural beings and monsters such as *Beowulf*'s Grendel. For whatever reason hunting declined, all the evidence, including new genetic data, suggests that fallow deer also went extinct in Anglo-Saxon England (Sykes and Carden 2011).

After a hiatus of several centuries, hunting gradually began to reemerge as a trait of elite male identity (Sykes 2011: 336). Evidence from documents, place names, and the zooarchaeological record indicates that woodland areas were increasingly set aside as private hunting reserves. It is uncertain whether these landscapes were enclosed by ditches or fences, but structures known as *haga* or *hai* were erected to ensnare deer, particularly roe deer, which were driven into them by trained hunting dogs and then dispatched with swords and knives (Sykes 2011: 341).

There is some evidence to suggest that Saxon hunting also took place on horseback (Sykes 2011: 341), although this form of long-distance hunting became common only after the Norman conquest of 1066, when the victorious Normans utilized hunting as an important mechanism for displaying their martial supremacy and control over the defeated Saxon population (Sykes 2007a: 96–7). Zooarchaeological evidence confirms that frequencies of wild animals increase dramatically on elite sites dating to the post-conquest period to levels far higher than was seen in the Roman period (Sykes 2007a: 65). Low-status sites demonstrate no such increase, a fact that must be associated with the introduction of new hunting laws and landscapes – forests, chases, and parks – that restricted hunting to the monarchy and aristocracy (Sykes 2007a). Forests were not necessarily densely wooded areas, as might be imagined, but rather legal spaces that were superimposed on top of the existing domestic landscape. Both forests and chases were unenclosed areas where the elite asserted their hunting rights over common waste and land owned by other people. As such, these hunting landscapes were unprecedented; for although landownership and hunting were conflated during the Roman period, this was not in any legal sense – the lower classes were still entitled to hunt. By forcibly restricting hunting to the elite, the Normans overturned the very "chain of being" central to Christian thought, placing the rights of wild animals and their habitats above those of the peasants and their fields, who were relegated down the chain to the lowly level of domestic (Sykes 2007b: 97).

The (re)introduction of parks to England imposed not only legal but also physical barriers to exclude the lower social echelons from hunting. Again, as in the Roman period, fallow deer were directly responsible for the reappearance of this new landscape, as is clear when the frequencies of parks and fallow deer are compared. The Domesday Survey of CE 1086 recorded just over 30 parks in England, but by CE 1300, this number had risen over 3000; the zooarchaeological representation of fallow deer grew in parallel, Table 1 showing low numbers in the earliest Norman contexts (e.g., 0.8% from eleventh-century Carisbrooke Castle, Isle of Wight) but large quantities on later medieval sites (e.g., 28% from fourteenth-century Okehampton Castle, Devon). Current evidence suggests that the inspiration for both parks and the fallow deer that stocked them came from Sicily, another island conquered by the Normans in CE 1060. At this point, Sicily had a preexisting culture of pleasure parks, developed while the island was under Arabic influence (Sykes 2007a: 74, 2007b: 59). It is reasonable to assume that the culture contact between two Norman kingdoms of England and Sicily encouraged the importation of parks and *D. d. dama* to Britain. However, it is important to recognize that the character of the earliest Norman parks would have been very

different to those of the later medieval period. For the first few decades after their introduction, fallow deer would have been a great rarity to be observed and admired rather than chased and eaten. Presumably many of the early "parks" actually functioned as menageries, such as Henry I's park at Woodstock (Oxfordshire) that was said to contain all manner of exotic animals gifted by members of the foreign elite as a symbol of political allegiance (Sykes 2007b: 59).

As fallow deer stock grew, so too did the size of some parks, particularly those in royal possession. These large areas could feasibly have supported a hunt on horseback, similar in form to those undertaken in unbounded landscape. That said, the majority of parks were far smaller, typically 100–300 acres, which would have dramatically limited the hunting experience. Many of these small parks were not only too small for full-scale hunting, but they were also of an inadequate size to support their stock: a plethora of medieval records detail the starvation of park deer (Birrell 1992). Lack of available nutrition may account for the significant size reduction seen for medieval fallow deer (compare Fig. 4 with Fig. 3a, b). Alternatively, this could equally reflect genetic change brought about through controlled breeding, as it is in the medieval period that we see the first iconographic evidence for coat-color variation (notably black and white fallow deer) which is usually a trait of domesticates (Masseti 2002: 140).

The fact that parks were stocked with captive, diminutive, selectively bred fallow deer has raised debate about the purpose and function of parks – were they really arenas for masculine hunting, status symbols of the landed elite, or simply game larders where venison could be stored on the hoof? In all probability parks served to provide all these social and economic purposes; however, increasingly, it is being recognized that parks were important hunting landscapes but for elite women, rather than men (Sykes 2007b: 54).

The level of female involvement in medieval hunting has been the subject of some controversy, with debate surrounding the medieval iconography that depicts women hunting. Some of the images are clearly jokes, ridiculing the idea that women could possibly take center stage in deer hunting, but others appear more realistic. In particular there are a number of manuscript illuminations that show women shooting arrows at deer (Sykes 2007b). Significantly, the cervid depicted in association with women is almost invariably fallow deer, identifiable by their distinctive spotty coat, palmate antlers, and prominent penile

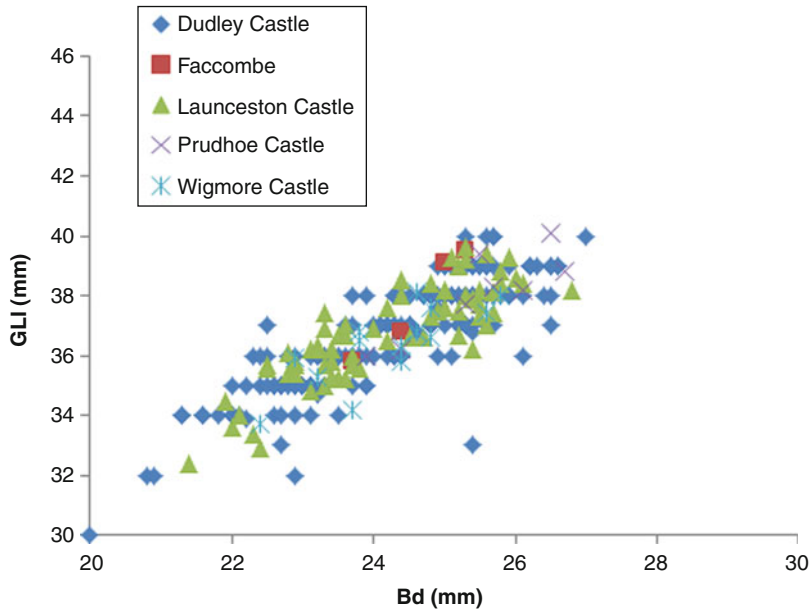

Hunting and Hunting Landscapes, Fig. 4 Plot of astragali measurements – greatest lateral length (*GLl*) against distal breadth (*Bd*) – for fallow deer from medieval England

"brush." While it is unwise to read medieval images at such a superficial level, it is interesting that women are so clearly associated with the species that was maintained within parks. Irrefutable evidence that parks were female-hunting landscapes can be found in the historical record. For instance, in John Coke's *Debate Between the Heralds* (cited in Cummins 1988: 7), the English herald states:

> we have also small parkes made onely for the pleasure of ladyes and gentylwomen, to shote with the longe bowe, and kyll the sayd beastes.

That parks were hunting spaces for elite women is perhaps unsurprising at a time when hunting was an important part of popular culture but also when courtly societies emphasized the seclusion of young aristocratic women. In order to ensure female chastity and purity, so essential to patrimony, their mobility and visibility were restricted in public arenas – parish churches, banquets, and even travel between households. It is highly unlikely that young women would have been encouraged to hunt in the wider landscape; more probable, it was within the confines of the park that ladies gained an education in hunting without fear of observation (Sykes 2007b: 54).

The situation in medieval England could not be further removed from that of Prehistoric Anatolia, but the contrast between the two exemplifies how human-animal-landscape interactions offer insights into the cultures under examination.

Discussion and Conclusion

From Epipaleolithic Anatolia, when the concept of "wild" did not exist because it was *all* that existed, to medieval England, where semi-domestic deer were housed in equally tame parks, the history of fallow deer and the landscapes in which they were hunted can be viewed as a record of social and cultural change. The journey between these two extremes was not, however, a linear evolution. It has been argued that the dynamics and social significance of hunting are connected to cultural worldview and wider attitudes to nature, which in turn correspond to the ebb and flow of human movement and/or long-distance contact.

It can be no coincidence that periods characterized by insular sedentism – notably the Iron Age and Anglo-Saxon periods of England – indicate an avoidance of wild animals and the "wilderness," with no obvious attempts to control or own elements of the natural world through the movement of exotica or the creation of parks. This contrasts dramatically with those periods characterized by movement, trade, or diaspora – the Epipaleolithic of Anatolia, the Neolithic and Bronze Age of the Aegean, or the Roman and Norman Empires – which are also those characterized by hunting cultures, many of which were responsible for the translocation of fallow deer. In these periods, mental geographies were broad and the wilderness was conceptualized as something to be engaged with, either as a statement of familiarity (e.g., for hunter-gatherers of Okuzini and Karain B) or to emphasize power, authority, and, particularly for the two Empires, control. However, even in periods where the prevailing worldview was one of human dominion over nature, wild animals were not perceived as inferior to people, far from it. The status attributed to hunting derived from the fact that the quarry and the landscape in which they dwelt were unpredictable and would not necessarily yield to an unworthy hunter. That respectfulness was key is reflected by the votive offerings of fallow deer and other wild animals, noted across the Bronze Age and later Aegean as well as the Roman Empire. The association between wild animals and ancient deities, most notably Artemis – goddess of wild animals – is in many respects similar to the "animal masters" of many modern hunter-gatherer groups; indeed, the ancestry of the goddess Artemis can most likely be traced back to the beliefs of Paleolithic hunter-gatherers (see Fischer-Hansen and Poulsen 2009: 12).

Remarkable continuity is apparent in the cross-cultural associations between hunting, masculinity, and warfare. The relationship becomes evident for the first time during the Neolithic and Bronze Age of both Anatolia and the Aegean, but the same concepts are then found recycled in Archaic, Classical, and Hellenistic Greece, reemerging after a hiatus in the later Roman and medieval periods. Contemporary

literature and, in particular, iconography highlight that the choice of hunting landscape is an integral part of this association: from the Minoan frescoes of Ayia Irini, through the representation of deer hunting on fifth-century BCE Attic pottery, to the fourth-century mosaics of Piazza Armerina (Sicily), all stress the "wildness" of the hunting landscape, setting it in opposition to, and away from, that of the domestic world. As much as scholars have critiqued the utility of binary oppositions (e.g., male-female, wild-domestic, outside-inside), they appear highly relevant in the context of hunting. Indeed, for Bronze Age and later Greek societies, there is some suggestion that it was only through spending time hunting, away from the domestic world, that boys were transformed into men capable of bearing arms. Here the killing of wild animals is clearly important, but the vital element of this rite of passage is the "outside" setting of the hunting landscape.

Confirmation of these binary oppositions is found by examining the evidence for later medieval England. As soon as fallow deer were enclosed within parks, they were no longer fitting quarry for men who continued to hunt "real" wild animals (red deer and roe deer) across unbounded forests and chases – there is little medieval iconography depicting aristocratic men hunting fallow deer, and literary references are also scarce (Birrell 1992: 122; Sykes 2007b: 52). Instead, parks with their domestic inhabitants became important hunting landscapes for aristocratic women. Within the confines of the pale, young ladies were able to ape Artemis and Diana, the virginal goddesses with whom fallow deer had become so closely associated.

The link with Artemis, in her various incarnations, seems to have been an important driving force for the diffusion of fallow deer from Anatolia. Paradoxically, however, anthropogenic transportation and emparkment of these deer gradually destroyed the very human-animal-landscape relationship that was initially sought for replication – the wild was tamed and the sacred became secular, a sad fall from grace for such a beautiful and culturally important species.

Cross-References

▶ Landscape Archaeology
▶ Landscape Domestication and Archaeology
▶ Social Zooarchaeology
▶ Zooarchaeology

References

Albarella, U., and S. Davis. 1996. Mammals and birds from Launceston Castle, Cornwall: Decline in status and rise in agriculture. *Circa* 12: 1–156.

Albarella, U., and D. Serjeantson. 2002. A passion for pork: Meat consumption at the British late Neolithic site of Durrington Walls. In *Consuming passions and patterns of consumption*, ed. N. Milner and P.T. Miracle, 33–49. Cambridge: McDonald Institute for Archaeological Research.

Allen, M., and N. Sykes. 2011. New animals, new landscapes and new world views: The Iron Age to Roman transition at Fishbourne. *Sussex Archaeological Collections* 149: 7–24.

Arbuckle, B.S. 2012. Animals in the ancient world. In *A companion to the archaeology of the ancient Near East*, ed. D.T. Potts, 201–209. Chichester: Wiley-Blackwell.

Atici, L. 2009. Implications of age structures for Epipaleolithic hunting strategies in the Western Taurus Mountains, southwest Turkey. *Anthropozoologica* 44 (1): 13–39.

Ayton, G. 2011. *Carisbrooke castle, Isle of Wight: The mammal and bird bones from the 2006 and 2008 evaluations*, Research department report series. Vol. 65. Portsmouth: English Heritage.

Barker, G. 2005. Agriculture, pastoralism and Mediterranean landscapes in prehistory. In *The archaeology of Mediterranean prehistory*, ed. E. Blake and A.B.. Knapp, 46–76. Oxford: Blackwell.

Barringer, J.M. 2001. *The hunt in ancient Greece*. London: John Hopkins.

Bartosiewicz, L. 1990. Species interferences and the interpretation of Neolithic animal exploitation. *Acta Archaeologica Academiae Scientiarum Hungaricae* 42: 287–292.

Becker, C. 1986. *Kastanas: Ausgrabungen in einem Siedlungshügel der Bronze und Eisenzeit Makedoniens 1975–1979 – Die Tierknochenfunde*. Berlin: Wissenschaftsverlag Volker Spiess.

Birrell, J. 1992. Deer and deer farming in medieval England. *The Agricultural History Review* 40 (2): 112–126.

Boessneck, J., and A. von den Dreisch. 1979. *Die Tierknockenfunde aus der Neolithischen Siedlung auf dem Fikirtepe bei Kadikoy am Marmarameer*. Munich: Institut für Palaeoanatomie, Domestikationsforschung und Geschichte der Tiermedizin.

Bökönyi, S. 1986. Animal remains. In *Excavations at Sitagroi: A prehistoric village in north-east Greece,*

Volume I, ed. M. Gimbutas and E.S. Elster, 63–132. Los Angeles: Institute of Archaeology, University of California.

Buitenhuis, H. 2011. Ilıpınar: The faunal remains from the late Neolithic and early Chalcolithic levels. In *Archaeozoology of the Near East VIII*, ed. E. Vila, L. Gourichon, A.M. Choyke, and H. Buitenhuis, 299–322. Lyon: Maison de l'Orient et de la Méditerranée.

Carandini, A. 1985. *Settefinestre: Una villa schiavistica nell'Etruria romana, III*. Modena: Panini Editore.

Cartmill, M. 1993. *A view to a death in the morning: Hunting and nature through history*. Cambridge: Harvard University Press.

Cummins, J. 1988. *The hound and the hawk: The art of medieval hunting*. London: Weidenfield and Nicholson.

Curci, A., and A. Tagliacozzo. 2003. Economic and ecological evidence from the vertebrate remains of the Neolithic site of Makri (Thrace-Greece). In *Zooarchaeology in Greece: Recent advances*, ed. E. Kotjabopoulou, Y. Hamilakis, P. Halstead, C. Gamble, and P. Elefanti, 123–131. London: British School at Athens.

de Cupere, B., R. Duru, and G. Umurtak. 2008. Animal husbandry at the early Neolithic to early Bronze Age site of Bademağacı (Antalya province, SW Turkey) evidence from the faunal remains. In *Archaeozoology of the Near East VIII*, ed. E. Vila, L. Gourichon, A.-M. Choyke, and H. Buitenhuis, 367–405. Lyon: Maison de l'Orient et de la Méditerranée.

Deer Bone. n.d.. Available at: http://www.nottingham.ac.uk/zooarchaeology/deer_bone/search.php. Accessed 7 July 2012.

Dunbabin, K.M.D. 2004. *The Roman banquet: Images of conviviality*. Cambridge: Cambridge University Press.

Fabiš, M. 2003. Troia and fallow deer. In *Troia and the Troad: Scientific approaches*, ed. G.A. Wagner, E. Pernicka, and H.-P. Uerpmann, 263–275. London: Springer.

Fischer-Hansen, T., and B. Poulsen, eds. 2009. *From Artemis to Diana: The goddess of man and beast*. Copenhagen: Museum Tusculanum Press.

Gündem, C.Y. 2010. Animal based economy in Troia and the Troas during the maritime Troy culture (c. 3000–2200 BC): A general summary for West Anatolia. Unpublished PhD dissertation, University of Tübingen.

Halstead, P., and G. Jones. 1987. Bioarchaeological remains from Kalythies Cave, Rhodes. In *I Neolithiki Periodos sta Dodekanisa*, ed. A. Samson, 135–152. Athens: Ministry of Culture.

Hamilakis, Y. 2003. The sacred geography of hunting: Wild animals, social power and gender in early farming societies. In *Zooarchaeology in Greece: Recent advances*, ed. E. Kotjabopoulou, Y. Hamilakis, P. Halstead, C. Gamble, and P. Elefanti, 239–247. London: British School at Athens.

Harris, K. In press. Hunting, performance and incorporation: Human-deer encounter in late Bronze Age Crete. In *Deer and people: Past, present and future*, ed. K. Baker, R.F. Carden, and R. Madgwick. Oxford: Windgather Press.

Helms, M. 1993. *Craft and the kingly ideal: Art trade and power*. Austin: University of Texas.

Ingold, T. 2000. *The perception of the environment: Essays in livelihood, dwelling and skill*. London: Routledge.

Johnstone, C. 1998. Technical report: Preliminary results from the investigation of vertebrate remains from Castagna, Sicily (site code: CA94). Reports from the Environmental Archaeology Unit, York 97/53.

Koehl, R.B. 1986. The chieftain cup and a Minoan rite of passage. *Journal of Hellenic Studies* 106: 99–110.

Larje, R. 1987. Animal bones. In *Paradeisos: A late Neolithic settlement in Aegean Thrace*, Medelhavsmuseet memoir, ed. P. Hellstrom, vol. 7, 89–117. Stockholm: Medelhavsmuseet.

Madgwick, R., N. Sykes, R. Symmons, J. Morris, and A. Lamb. In press. Fallow deer (*Dama dama dama*) management in Roman South-East Britain. *Archaeological and Anthropological Sciences*.

Maltby, M. 1982. Animal and bird bones. In *Excavations at Oakhampton Castle, Devon. Part 2 – The Bailey. Proceedings of the Devon Archaeological Society*, ed. R.A. Higham, vol. 40, 114–135.

Marinatos, N., and L. Morgan. 2005. The dog pursuit scenes from Tell el-Dabca and Kea. *British School at Athens Studies* 13: 119–122.

Masseti, M., ed. 2002. *Island of deer*. City of Rhodes: Environment Organisation.

Rauh, H. 1981. Knochenfunde von Säugetieren aus dem Demircihüyük (Nordwestanatolien). Unpublished PhD dissertation, Munich.

Reinken, G. 1997. Weider-Verbreitung. Verwendung und Namensgebung des Damhirsches Cervus dama l. in Europa. *Zeitschrift der Jagdwissenschaft* 43: 197–206.

Schwartz, C.A. 1985. Ayios Petros: The vertebrate and molluscan fauna final report. In *Agios Petros. A Neolithic site in the northern Sporades: Aegean relationships during the 5th millennium*, British archaeological reports international series, ed. N. Efstratiou, vol. 241, 151–163. Oxford: Archaeopress.

Sykes, N. 2007a. *The Norman conquest: A zooarchaeological perspective*, BAR international series. Vol. 1656. Oxford: Archaeopress.

Sykes, N. 2007b. Animal bones and animal parks. In *The medieval deer park: New perspectives*, ed. R. Liddiard, 49–62. Macclesfield: Windgather Press.

Sykes, N. 2010. Worldviews in transition: The impact of exotic plants and animals on Iron Age/Romano-British landscapes. *Landscape* 10 (2): 19–36.

Sykes, N. 2011. Woods and the wild. In *Handbook of Anglo-Saxon archaeology*, ed. H. Hamerow, D.A. Hinton, and S. Crawford, 327–345. Oxford: Oxford University Press.

Sykes, N., and R.F. Carden. 2011. Were fallow deer spotted (OE ∗pohha/∗pocca) in Anglo-Saxon England? Reviewing the evidence for *Dama dama dama* in early medieval Europe. *Medieval Archaeology* 55: 138–162. https://doi.org/10.1179/174581711X13103897378483.

Sykes, N.J., C. Ingrem, and K. Ayres. 2005. The bones and shell. In *A medieval royal complex at Guildford: Excavations at the castle and palace*, ed. R. Poulton, 116–132. Guildford: Surrey Archaeological Society.

Sykes, N., J. White, T. Hayes, and M. Palmer. 2006. Tracking animals using strontium isotopes in teeth: The role of fallow deer (*Dama dama*) in Roman Britain. *Antiquity* 80: 948–959.

Sykes, N.J., K.H. Baker, R.F. Carden, T.F.G. Higham, A.-R. Hoelzell, and R.E. Stevens. 2011. New evidence for the establishment and management of the European fallow deer (*Dama dama dama*) in Roman Britain. *Journal of Archaeological Science* 38 (1): 156–165. https://doi.org/10.1016/j.jas.2010.08.024.

Vigne, J.-D., and D. Helmer. 2007. Was milk a "secondary product" in the Old World Neolithisation process? Its role in the domestication of cattle, sheep and goats. *Anthropozoologica* 42 (2): 9–40.

Wilkens, B. 2003. Hunting and breeding in ancient Crete. In *Zooarchaeology in Greece: Recent advances*, ed. E. Kotjabopoulou, Y. Hamilakis, P. Halstead, C. Gamble, and P. Elefanti, 85–90. London: British School at Athens.

Willerslev, R. 2007. *Soul hunters: Hunting, animism, and personhood among the Siberian Yukaghirs*. Berkley: University of California Press.

Wright, J.C. 2004. A survey of evidence for feasting in Mycenaean society. *Journal of the American School of Classical Studies at Athens* 73 (2): 133–178.

Yannouli, E. 1994. Aspects of animal use in prehistoric Macedonia, northern Greece: Examples from the Neolithic and early Bronze Age. Unpublished PhD dissertation, St Edmunds College, University of Cambridge.

Yannouli, E., and K. Trantalidou. 1999. The fallow deer (*Dama dama* Linnaeus, 1758): Archaeological presence and representation in Greece. In *The Holocene history of the European vertebrate fauna*, ed. N. Benecke, 247–277. Berlin: Rahden.

Further Reading

Boessneck, J. 1973. *Die Tierknochenfunde aus dem Kabirenheiligtum bei Theben*. Munich: Institut für Palaeoanatomie, Domestikationsforschung und Geschichte der Tiermedizin.

Hydraulic Engineering: Geoarchaeology

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Introduction

Water is a fundamental structuring agent in the landscape, but unfortunately, the geoarchaeology of hydraulic installations and their deposits is an under-investigated topic, little mentioned in standard geoarchaeological texts. This entry summarizes key diagnostic features of water extraction and delivery systems, before providing examples of the resultant deposits and soils. In order to fully understand how water supply systems and their associated deposits developed, it is necessary to investigate them through long periods of time, not simply according to the "time slices" that are frequently the norm in academia. We are then able to tackle the long-term history and "evolution" of water systems as well as to relate them to the duration of sedimentary deposits associated with them.

The following approaches contextualize the geoarchaeology of hydraulic engineering:

(a) The geomorphological context which frames the development of irrigation systems. This includes riverine floodplains, alluvial fans, the terrain below or downstream of springs, areas of high water tables, enclosed basins, valley slopes, and so on. Not only does this "framing geoarchaeology" provide the physical context for hydraulic installations, it also supplies the opportunities for communities to develop different types of water supply systems as well as creating hazards that initiate episodic change such as floods, crevasse splays, and avulsions.

(b) The resultant deposits and soils. These include the deposits (or lack of them) which derive from the sediments transported and deposited by various water supply systems. On the one hand, these consist of sediments that clog irrigation systems (but which also deliver nutrients for agriculture), as well as deposits that are deliberately built up to form the medium for cultivation (e.g., terraces and check dams). In addition, deposits include chemical precipitates associated with water supply, particularly carbonate deposits (travertines) and salts.

Because human actions underpin hydraulic engineering works, the nature of these actions and the associated social processes must be considered as well. By no means all hydraulic works are planned or deliberately engineered; many

remarkably large systems began as small-scale systems and then were increased in size by gradual additions (Denevan 2001: 148), in which case it would have been necessary to increase the flow capacity.

Two broad levels of organizational scale are recognizable:

1. Those systems that show evidence for "bottom-up" development and which grew incrementally as a result of the actions of communities who built on preexisting natural circumstances to form initially small-scale systems. These organic systems can be argued to develop by way of niche construction as argued by evolutionary biologists and anthropologists (see below).
2. On the other hand top-down management tends to be associated with systems that are larger in scale but were not necessarily developed in one operation. They were often planned and "engineered" and their administration was partially controlled by a king or imperial ruler. Nevertheless, there is no direct relationship between authority, state formation, and the scale of irrigation systems. However, in the Middle East, with the expansion of the later empires, dating from the rise of the Assyrians around 1000 BCE, we see the proliferation of large-scale and frequently engineered systems that represent classic examples of top-down systems.

Definition

This entry primarily focuses upon water supply features: canals and other water channels, dams, terrace walls, wells, and reservoirs as well as their associated deposits and soils. Before describing these, however, it is necessary to define the geoarchaeological signatures of the features themselves as well as their state of survival in the landscape.

Diagnostic Features of Canals and Water Supply Systems

Figure 1 shows some basic water supply features in the Middle East together with their associated deposits. Although the functional part of such installations is frequently the void, either the canal that conducted the water flow or the well or qanat shaft that accessed the water table, the upcast deposits are frequently the most informative deposits, especially when sampling schemes need to be designed (Fish 1994: 57–61). Residual deposits were often dumped in sequence according to the history of excavation. Consequently those soils removed first were dumped initially upon a buried soil and were then followed by the products of the different geological strata encountered as the feature was dug to deeper levels. Finally, in the case of canals that transported a significant sediment load, the primary deposits were followed by secondary accumulations of silt, clay, and organic materials cleaned out of the canal itself. Very similar types of sequences can be recognized in both Old and New World canal deposits (Fish 1994: Fig. 3.2; Wilkinson 2003: 49).

Remote sensing methods are an indispensible tool for the geoarchaeological analysis of hydraulic systems especially for the recognition of canal spoil banks. Satellite remote sensing is becoming increasingly useful as high-resolution and multispectral images are becoming more cost-effective and archive images such as those of the CORONA series dating from the 1960s and 1970s become available. In addition, Shuttle Radar Topographic Mission (SRTM) data have been used to graphically illustrate a range of water supply networks including levees of canals and river channels that bifurcate across the seemingly flat plains of southern Mesopotamia.

A major challenge presented by early hydraulic networks is how to establish their date of use. Channel floor deposits can be of help, especially if they contain molluscs, bones, or charcoal that can be dated radiometrically, but because canals are frequently cleaned out, the channel deposits might only be the latest members in a long history of use (Purdue et al. 2010).

In lowlands, canals can form the most imposing features in the landscape, but their sheer scale can give a misleading impression of the size of the actual canal contained between the spoil banks. This is illustrated by a sketch section across a

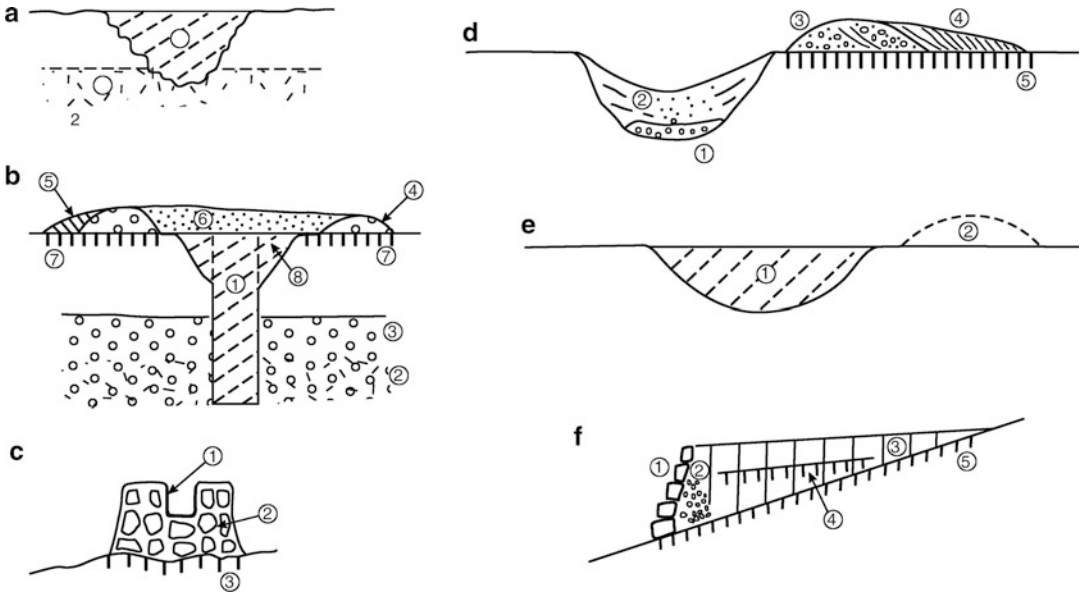

Hydraulic Engineering: Geoarchaeology, Fig. 1 Schematic sections of various types of water installation in the Middle East: (**a**) water hole, (*1*) fill, (*2*) water table (chemically reduced soil); (**b**) well, (*1*) fill within shaft, (*2*) water table within gravel (chemically reduced), (*3*) gravel, (*4*) initial gravel upcast, (*5*) clean out silts, (*6*) wind-blown sand, (*7*) buried soil, (*8*) cone of collapse; (**c**) masonry open channel, (*1*) waterproof plaster, (*2*) masonry with large cobbles, (*3*) buried soil; (**d**) earthen canal with spoil banks, (*1*) sand and gravel channel fill, (*2*) subsequent fills, (*3*) primary spoil from initial excavation, (*4*) secondary silt from cleaning out, (*5*) buried soil; (**e**) canal with spoil banks deflated, (*1*) fill, (*2*) location of deflated spoil banks; (**f**) terraced field, (*1*) terrace wall, (*2*) wedge of stones for subsoil drainage, (*3*) accumulated terrace deposits, (*4*) weak palaeosol, (*5*) pre-terrace palaeosol. (Modified from Wilkinson 2003: Fig. 4.1)

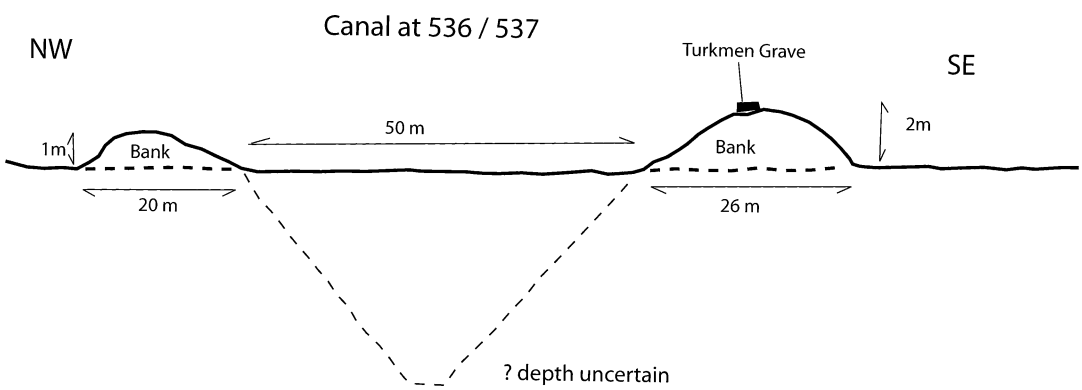

Hydraulic Engineering: Geoarchaeology, Fig. 2 Sketch section of a canal in NE Iran showing how the depth of the canal influences the scale of the canal cross section

canal in NE Iran (Fig. 2). The 50 m wide canal trace gives the impression that the canal itself was equally large. However, because we know that in the area in question the water supply (the Gorgan River) was some 10–12 m below ground level, it is clear that a large quantity of upcast would have been created to enable the canal to attain the water source at river level. In other words, the scale of the upcast is a product of the dimensions of the canal channel *and* the depth of the water source. In

Hydraulic Engineering: Geoarchaeology, Fig. 3 Canal trace at Pamukkale Turkey showing thick accumulations of calcium carbonate

the case of this particular canal (Fig. 2), the volume of upcast and the width of the canal at the surface diminished downstream as the canal channel approached the ground surface in the vicinity of the fields.

An important contextual feature of canals, dams, reservoirs, cisterns, and tanks is the presence of associated and functionally related installations such as kilns for the burning of lime used in the manufacture of cements and plasters. Not only are kilns of intrinsic technological interest, they also provide valuable materials in the form of charcoal or fired bricks that can be dated, by radiocarbon, OSL (Optically Stimulated Luminescence), or thermoluminescence. Such associational dates can be exceedingly valuable because they provide a date estimate for the initial phase of construction of the hydraulic feature or at least the first use of plaster and cement.

In addition to being recognized by their upcast deposits, some canals are evident as fossilized traces, the best examples being those of the Tehuacán Valley of Mexico which were fed by calcium carbonate-enriched spring waters. As a result of their resistance to erosion, these "travertine encrusted" canals stand up to 2 m above the surrounding ground surface (Doolittle 1990: 58–59). In the Middle East a remarkable series of such travertine encrusted canals, probably of Byzantine date, occur near Pamukkale in Turkey (Fig. 3). Although such features are not common, when they do occur, they can then be dated by Uranium series or radiocarbon methods.

The Geoarchaeology of Preservation

As a result of their location near to water courses, especially major rivers, engineered hydraulic systems are vulnerable to destruction or burial.

Canals that take their flow from fluvially dynamic rivers such as the Gorgan River in NE Iran (Fig. 4) are particularly vulnerable to riverine erosion, and the assessment of the relative completeness of canals and conduits is a major challenge for geoarchaeologists. In fact, in the Middle East complete water supply systems are relatively scarce, one of the rare examples known to the writer being the Abbasid period (c. ninth century CE) open channel *falaj* at Arja in northern Oman. This shows the complete sequence from the water capture area within a perennial wadi, the transport section downstream, as well as the irrigated fields and even a water mill (Wilkinson 2003: Fig. 9.12). In contrast, most water supply conduits leading to early Islamic Siraf on the Iranian coast have been expunged by the erosive rivers that surge down from the neighboring Zagros Mountains.

Despite their vulnerability to erosion, if water systems were constructed in relatively stable arid landscapes, specific installations can remain for long periods. Particular good examples are the

Hydraulic Engineering: Geoarchaeology, Fig. 4 CORONA image of the same canal system as illustrated in Fig. 2. Note the spoil banks to north and south and the large chunks of canal eroded by the meandering Gorgan River. (CORONA image courtesy of US Geological Survey)

water installations in the Wadi Ghuweir in the Jordanian desert where the combination of geomorphological stability and the absence of subsequent phases of cultural activity has left these PPNB water-gathering bunds relatively intact over some 10,000 years (Fujii 2011).

Historical Background

Geoarchaeological studies of ancient irrigation deposits extend back well before the term geoarchaeology was coined. For example, the classic studies of southern Arabian irrigated landscapes by Caton-Thompson and Gardner (1939) and Bowen (1958) provided a firm foundation for later studies. For Mesopotamia, the volume *Soils and Soil Conditions in Iraq* by the Dutch soil scientist, Peter Buringh (1960), went well beyond the cover title to provide insights into irrigated agriculture and the physical and cultural landscape which remain relevant today. Particularly important for an understanding of anthropomorphic soils of Central Asia are Soviet-era studies which were being published as early as the 1930s (Kovda and Lobova 1968). These monographs are not simply of historical interest, rather they demonstrate how thorough empirical studies of soil archives can provide significant insights into the long-term development of anthropomorphic soils. In the New World, although studies of early terraced fields extend back to the article by Cook published in the National Geographic in 1916, geoarchaeological studies of hydraulic landscapes and their deposits really picked up speed from around 1961 (Denevan 2001: 4–9).

Key Issues

Whereas, geoarchaeology conventionally concerns itself with geological applications to archaeological questions, the analysis of ancient hydraulic installations necessitates the inclusion of human agencies and community actions. Specifically, the management and development of water supply systems relates to the scale of the communities using or administering the systems, which, in turn, influences the scale of the installations as well as their deposits (although not necessarily in a linear way). In contrast to the earlier models of Wittfogel which see major hydraulic schemes as being a driving force behind early state development, many archaeologists now

consider small-scale actions by household size groups to be fundamental to hydraulic and other landscapes (Erickson 2006). This bottom-up perspective may encompass concepts such as "human niche construction" which provide a useful way of viewing the development of early small-scale water management systems.

This set of concepts, which developed out of evolutionary biology, incorporates the capacity of organisms including humans to modify their environment (e.g., via irrigation systems in Bali) in such a way as to influence their own evolution (Lansing and Fox 2011). This is illustrated for southern Mesopotamia where Buringh (1960) has suggested that by taking advantage of breaks in the banks of river levees, prehistoric communities manipulated the overflow waters that created crevasse splays so as to provide water for small irrigated gardens. These small-scale channels and patches became scaled up to eventually form much larger patterns of "herringbone" irrigation canals capable of supporting much larger populations than the original riverine environment.

Similarly, the point where rivers flowed out of mountains to preferentially deposit their sediments upon alluvial fans provided an ideal location for early prehistoric settlement. However, such situations, as described by the prehistorian Andrew Sherratt, could also result in the burial of both irrigated fields and associated occupation sites. Consequently, where human settlements developed in locations ideal for both irrigation and sedimentation, the landscapes can be referred to as "self-consuming."

In the Middle East, the growth of archaeological sites in areas of coalescing alluvial fans has probably severely retarded our understanding of the development of early irrigation settlements and such sites are relatively scarce. However, at Dar Khazineh and related sites in Khuzestan, SW Iran, small Late Susiana sites (c. 4800–4300 BCE) have been unveiled by intensive gully erosion from beneath a thick stratum of overlying sediments washed from the Zagros foothills. These investigations suggest that an unknown number of small agro-pastoral sites probably reliant on flood-recession cultivation lie buried within this sedimentary cover (Alizadeh et al. 2004).

Alternatively, where Hohokam settlements (CE 300 and 1500) developed on the alluvial piedmont zone (*bajadas*) of the Tucson basin of Arizona, they are much more visible. These sites, which occur at "gully-mouth fans" on *bajadas*, occur in analogous locations to Ak-Chin settlements farmed by historic Hopi communities (Waters 1992: 171–175). But because the Hohokam farmers located their settlements in areas suited to floodwater farming, their settlements also became buried as the gullies shifted position. In other words, in very different parts of the world and at different dates, very similar locations were selected for settlement and agriculture. However, the preservation of much larger numbers of Hohokam settlements in the SW USA has major implications for the development and demography of prehistoric settlement elsewhere. The comparative study of settlement in self-consuming landscapes is therefore an important priority for geoarchaeological research.

In the Yemeni highlands, where mountain valleys exhibited hundreds of walls and other built structures designed to intercept, redirect, and collect water downstream, long-term aggradation has been amplified by such programs of sediment interventions. For example, at Sedd Adhra 'ah, near Dhamar, some 6 m of anthropogenic sediments have buried a small check dam (dated by C-14 to c. 3000 BCE) and were later followed by sediments accumulated behind a major relict dam some 1,500–2,000 years old (Figs. 5 and 6). This sequence demonstrates how small-scale features eventually "scale up" to be succeeded by larger hydraulic features that reinforce earlier patterns of aggradation as well as how the cultural and sedimentary records coevolve in such deeply cultured landscapes (Wilkinson 2003).

On the other hand, engineered systems, often but not necessarily constructed by state-level rulers, can result in the construction of large-scale canal networks such as the Sasanian Nahrawan canal (Iraq: Adams 1965) or the Chicama-Moche inter-valley canal, constructed by the Chimú state (Peru: Denevan 2001: 152–157). Similarly, their deposits can be large in scale as well: for example, the cross profile of the Nahrawan canal is evident on SRTM

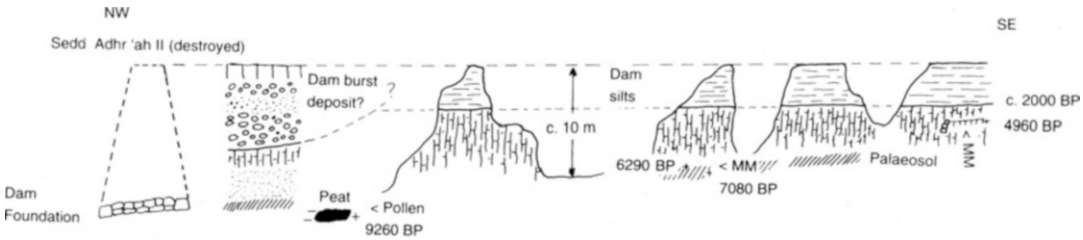

Hydraulic Engineering: Geoarchaeology, Fig. 5 Long section through a deep sequence of mainly anthropogenic fills and soils. Sedd Adhra 'ah, Yemen

Hydraulic Engineering: Geoarchaeology, Fig. 6 Detail of the valley floor check dam at the SE end of the Sedd Adhra 'ah sequence being cleaned for soil micromorphological samples

topographic images (Hritz 2010). However, in this case radar images distinguish several features: a broad levee perhaps of a preexisting river, which appears to have been taken advantage of by the canal engineers to form the foundation for the canal; a second more modest levee resulting from the canal itself; and third smaller distribution canals. Such top-down systems appear to be more amenable for satellite image analysis than those of smaller scale.

Where such large-scale canal networks derived their water from sediment-rich rivers, they create irrigated soils and associated deposits that blanketed virtually the entire landscape. These accumulations are well defined on soil maps, such as the FAO soil map of Khuzestan, Iran, where the surveyors distinguished between landscapes with "thick," "thin," or "absent" irrigation cover. Such maps are of immense value in identifying areas where archaeological sites may be obscured from view or as a starting point for geoarchaeological investigations.

Sediments and Soils Derived from Riverine Irrigation

Engineered hydraulic systems, be they large or small scale, play a fundamental role in sediment delivery, specifically by acting as huge sediment traps. However, the amount of sediment trapped depends upon catchment geology, land cover, and vegetation, as well as the nature of the water source. Whereas runoff systems or canals supplied by turbid rivers can be associated with significant long-term aggradation, hydraulic systems fed by springs or groundwater exhibit low sediment loads and limited aggradation but can be associated with significant amounts of chemical precipitates.

Irrigation-induced sedimentation is well known from southern Arabia with Marib (Yemen) supplying the best example. There, highly turbid waters diverted from the seasonal floods (*sayl*) of Wadi Dhanah by the first millennium BCE Marib Dam have created accumulations of up to 30 m of irrigation silts which extend over between 8,000 and 9,600 ha (Hehmeyer 1989). These deposits, which accumulated between 2000 BCE and 1000 CE, provide sedimentary archives containing evidence for the associated land use, including root casts of plants (probably date palms), circular impressions of bowls of fruit trees, as well as casts of fine root hairs of garden crops, cereals, and fodder plants (Hehmeyer 1989: 41). A characteristic feature of these irrigation silts is their distinctive rectilinear gullies eroded along less-resistant sand-filled irrigation channels which define the pattern of relict fields (Fig. 7).

Even more extensive spreads of relict irrigated soils cover most of the Mesopotamian plains in southern Iraq, but lacking the rectilinear erosion patterns, these are much more difficult to recognize. These riverine cultural landscapes form a complex mosaic of river/canal levees, levee slopes, and intervening flood basins or intermittent marshes (Buringh 1960).

Altogether, southern Mesopotamian landscapes result from both cultural and physical processes, which contribute to the coevolution of human practices of irrigation in association with anastomising river networks. So intimate is the connection between the human and physical systems that many Mesopotamian low sinuosity "rivers" are indistinguishable from canals (indeed the Sumerian language fails to make this distinction). Moreover, despite the extremely low gradient terrain, the distribution of irrigation water is made possible by directing water down levee slope canals that derive their water from the levee crest channel. Such levee slope canals, being steeper, are better for distributing irrigation waters than the gentle longitudinal gradients of the plains. Ironically, levee aggradation within this coevolutionary cultural landscape appears to have made irrigation much more sustainable in the long term.

Like their counterparts in central Asia, both the South Arabian and Mesopotamian landscapes reflect complex interactions between riverine, cultural, and aeolian processes. In southern Arabia, both lowland and highland soils have received long-term additions of aeolian silt, but in the immediate vicinity of eroded fields, sand dunes predominate as a result of the erosion of the silt beds. On the other hand in southern Iraq, aeolian dunes are composed of silt/clay aggregates (*parna*), as well as fragments of mollusc shells and small fragments of pottery and burned brick. The geoarchaeological cycle in these decidedly cultural landscapes is not simply one of progressive aggradation. Instead, aggradation appears

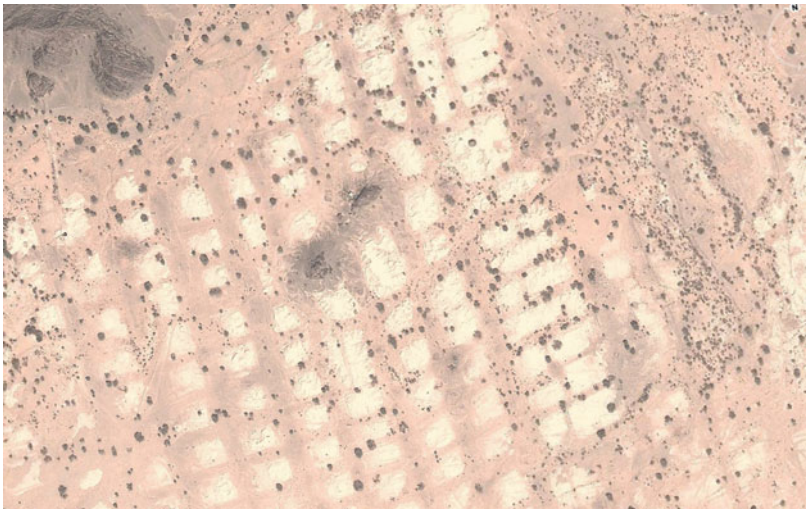

Hydraulic Engineering: Geoarchaeology, Fig. 7 Rectilinear erosion defining canals and field plots in Yemen. (Courtesy of Google Earth). The east–west extent of the fields is roughly 700 m (north to top), and each rectangular parcel measures c. 50 m east–west × 35–40 m north–south. *Dark masses* are outcrops of igneous rock

best developed where irrigation with turbid waters resulted in a steady input of sediment. However, where or whenever such input of water and sediment ceased, the landscape became desiccated resulting in a renewed cycle of aeolian degradation. Consequently, whereas parts of the landscape aggraded, other parts experienced aeolian degradation thereby resulting in a complex vertical or horizontal patterns of accumulation (Wilkinson 2003: 80–85). In addition, salts, ultimately derived from the irrigation waters, accumulate within the sediments and seriously depress crop yields especially in lower, less well-drained terrain.

Similar deep accumulations of irrigated soils occur in South America, Central Asia, and China. In Peru, the Palpa Valley in the hyperarid coastal desert received irrigation water from sediment-laden rivers over some 3,500 years (Hesse and Baade 2009). The 4 m accumulation of fine-grained irrigation deposits contain well-defined irragric anthrosols defined by the following characteristics: (1) absence of bedding or laminations; (2) common presence of artifacts or charcoal; (3) high loss on ignition, poor sorting, and high clay to silt ratios; and (4) presence of clods from agricultural turbation. These characteristics are similar to equivalent horizons in southern Mesopotamia, where irrigated soils not only blanket the entire terrain (Fig. 8) but are recognizable by their prismatic soil structure, gray-brown color, and inclusions such as broken shell fragments and artifacts.

Gorbunov's classic descriptions of irrigated soils of Central Asia demonstrate that natural soils were transformed by three main processes: (1) eluviation as a result of additions of water, (2) formation of a new "agro-irrigational" soil horizon by the intake of suspended particles and dissolved substances contained in the water, and (3) increased biological activity within the soil because of cultivated crops and farming practices (Gorbunov 1968: 35). These processes, operating over centuries or even millennia, resulted in the incremental accumulation of distinctive irrigation horizons which also included earthy materials from canal deposits, old mud brick materials, as well as potsherds, small fragments of burnt brick, charcoal, and bones. Such horizons have been reported from the ancient oases of Khwarizm, Bukhara, Samarkand, and Murgab (Gorbunov 1968: 39). Owing to the variety of natural environments encountered in central Asia, no single type of soil resulted from such anthropogenic processes; hence, they were classified into a number of types which include meadow oasis soils, takyr oasis soils, serozem oasis soils, and so on (Gorbunov 1968: 43).

The Geoarchaeology of Runoff Agriculture

Investigations of runoff agriculture have resulted in a number of classic hydrological and geoarchaeological studies (e.g., Bruins 1986). Runoff agriculture can also be argued to have developed as a result of "niche construction" because it builds upon an elemental model that occurs in nature (the source–sink model). This model perceives desert land surfaces as comprising a mosaic of patches, some of which shed water and others which receive the water that is shed (Wilkinson 2003: 154–155, with references). Water accumulated in the sinks promotes denser vegetation, increases litter, and raises organic matter, which, in turn, can reduce runoff. Ancient communities scaled this process up, so that the water shedding and receiving areas became larger.

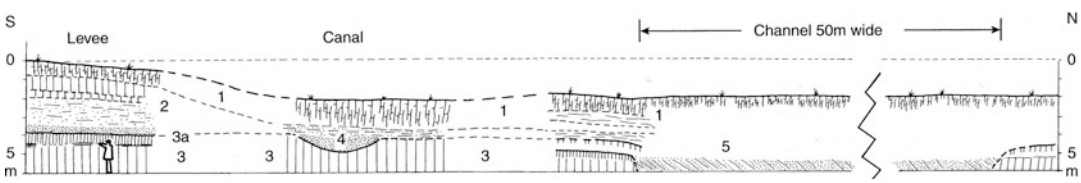

Hydraulic Engineering: Geoarchaeology, Fig. 8 Section through a Mesopotamian levee showing levee deposits (*2*) overlain by a late (Sasanian–Islamic) irrigated soil (*1*). The pre-4000 BCE palaeosol (*3*) leads up to a water channel of similar date (*5*). (From Wilkinson 2003: Fig. 5.4b)

The end product of this source–sink model includes the water supply cisterns of Islamic Arabia as well as the runoff systems of the Negev and southern Arabia (Wilkinson 2003: 154–155). This process of scaling up from small-scale features with small runoff areas to much larger contributory basins results in a continuum of features ranging from rain-fed terraces to the largest-scale diversion dams with catchment to field ratios in excess of 1:100. Because runoff and run-on areas are functionally and intimately connected, they form examples of geoarchaeological anthrosols or anthropic sediments in which physical and cultural factors are again intertwined.

Agricultural Terraces

Agricultural terraces, which belong to the lower end of the runoff spectrum, can result from the accumulation of colluvial deposits on hillslopes as a result of localized runoff, although some are engineered, planned, and built up by soil introduced from elsewhere. However, they are generally a product of the efforts of thousands of households who constructed vast numbers of walls to accumulate and thicken the soil to grow crops, a system of intensification often known as *landesque* capital (Erickson 2006). Whereas most examples of terraced fields in the Middle East were constructed in relatively moist regions where rainfall exceeded 400 mm per annum, in South America they tend to be built in semiarid regions and therefore required irrigation to maintain crop growth (Denevan 2001: 173). As with irrigation sediments, such accumulations behind terrace walls provide a rich archive of sedimentary history and soil formation (Fish 1994: Fig. 3.1). The complexities of terrace classification and construction are beyond the scope of this entry, but overall, terraced fields provide thicker soil horizons capable of holding more moisture and providing greater rooting depth. Although they play a role in soil conservation, this is probably a secondary effect.

Illustrative of the role of terrace accumulations in soil improvement are the terraces of the Peruvian Andes. In the Colca Valley terrace soils differ significantly from their non-terraced counterparts (Denevan 2001: 192–193): A horizons are thicker and phosphorous, nitrogen, and organic carbon levels are higher, as are earthworm activity, friability, and water capacity. These differences result from centuries, or more than a millennium, of agrarian use which includes the application of fertilizers, manure, hearth ash, garbage, and crop residues (Denevan 2001: 193; Sandor and Eash 1995).

Terraced fields and associated soils represent a fragile resource, in part because they must be maintained by a large, industrious population. Any change to this demographic, or perhaps to the climate or cultivation techniques, can destabilize the system so that the accumulated soils become gullied, terrace walls eroded, and the landscape fabric weakened (Pietsch and Mabit 2012). One outcome of terrace degradation is that more sediment is delivered to valley floors and drainage channels thereby contributing to the development of valley fills (Butzer 1982).

The Geoarchaeology of Drained Landscapes

Hydraulic engineering is not only limited to water supply, it has also played a crucial role in the drainage of both coastal and interior wetlands, especially in NW Europe. Although the Fenlands of eastern England were probably not drained during the Roman period (Rippon 2000: 76), examples of Roman drainage and associated sediments come from the coastal lowlands along the Severn Estuary, UK. This top-down and piecemeal land management and drainage system, together with its geoarchaeological archive, shows wide-ranging evidence for sedimentary structures and soil drainage in the form of "ripening" (Allen and Fulford 1986).

Paddy Soils

Rather than being a specific soil type, the term "paddy" refers to the land use associated with the growing of wet rice. Nevertheless, the associated soils have a long history extending back to the Chinese Neolithic c. 6000 BP. For example, at Chuodon in the Yangtze river, valley fields were associated with paddy soils, ridged boundaries, and irrigation ditches. Phytolith and soils analyses demonstrate that the Neolithic paddy soils exhibited increased organic carbon, total N, P, and S, all of which were higher than peat or moss of the same age (Lu et al. 2006).

As with many Asian soils which experienced agricultural intensification, paddy soils and their staple crop of rice underpinned agricultural and population expansion, first with the development of gley soils on the lowlands and later on to sandy soils and Pleistocene terraces (Barnes 2010: 330–331). However, according to estimates of future sea level rise, the "rice basket" of the Japanese coastal plains is at risk of being diminished if not lost, thereby forcing agriculture on to higher slopes and terraces. Along with other examples of intensively cultivated hydraulic soils, paddy soils have played, and continue to play, a crucial role in provisioning and sustaining human communities.

International Perspectives

Despite the high-quality research conducted by Soviet-era and other soil scientists during the early twentieth century, the later part of the century witnessed only sporadic investigations of irrigated anthrosols. This was despite the fact that the term geoarchaeology was coined at this time. Nevertheless, a recent upsurge in research on anthrosols of various types promises to improve matters, because as the examples from Japan and China illustrate, a wide range of soils developed under intensive cultivation are under investigation. Unfortunately the irrigated soils of southern Arabia and Iraq together with associated terrace soils have benefitted from only sporadic geoarchaeological investigations. In contrast, equivalent features in Latin America have received significant and growing attention; therefore, just as the anthrosols of the Amazon basin have garnered justified interest, we should now expect to see increased research on irrigated and other anthropogenic soils.

Future Directions

The geoarchaeology of hydraulic structures and associated soils and sediments should be a major priority not only for their intrinsic interest but also because of the understanding they contribute to sustainable agriculture. Of course, limited access to soil resources in conflict-ridden countries such as Yemen and Iraq will probably continue to inhibit research. Moreover, assessment of the associated landscapes is inhibited because agricultural activities over the last 40–50 years (or more) have expunged many diagnostic features such as canals and scrambled the associated soils so that they are less recognizable than hitherto. Nevertheless, the existence of high-resolution satellite images of the CORONA program dating from the 1960s and 1970s provides a record of what has been lost. Consequently more use should be made of integrated programs of landscape assessment that combine satellite imagery with fieldwork down to the scale of soil micromorphology.

Dating techniques such as AMS radiocarbon dating and OSL should continue to be important, and the latter technique, still underused, promises to contribute increasingly to the dating of sedimentary sequences. As is evident from studies such as Hesse and Baade (2009) and Sandor and Eash (1995), "conventional" techniques of soil analysis continue to yield important results and demonstrate that irrigated and anthropogenic soils have played a key role in the rise and sustenance of early states.

Because the landscape archaeology of ancient water management has been rather neglected (but see the journals *Water History* and *Geoarchaeology*), the framework of hydraulic engineering and the geoarchaeological context has also been under-investigated. Nevertheless, the situation is changing rapidly, and this topic should be much more thoroughly understood and appreciated in future. Finally, it is crucial to appreciate that the soils described here result from the coevolution of humans with their "natural" environment. Consequently concepts such as human niche construction need to be harnessed in order to bring a theoretical perspective to what continues to be a very empirical field of investigation.

Cross-References

► Aerial and Satellite Remote Sensing in Archaeology

▶ Aerial Archaeology
▶ Agrarian Landscapes: Environmental Archaeological Studies
▶ Anthropogenic Sediments and Soils: Geoarchaeology
▶ Geoarchaeology
▶ Landscape Archaeology
▶ Paddy Soils: Environmental Analyses
▶ Rivers: Environmental Archaeology

References

Adams, R. McC. 1965. *Land behind Baghdad*. Chicago: University of Chicago Press.

Alizadeh, A., N. Kouchoukos, T.J. Wilkinson, A. Bauer, and M. Mashkour. 2004. Human-environment interactions on the Upper Khuzestan Plains, southwest Iran. Recent investigations. *PaleOrient* 30 (1): 69–88.

Allen, J.R.J., and M.G. Fulford. 1986. The Wentlooge level: A Romano-British salt marsh reclamation in South East Wales. *Britannia* 17: 91–117.

Barnes, G.L. 2010. Landscape and subsistence in Japanese history. In *Landscapes and societies: Selected cases*, ed. I.P. Martini and W. Chesworth, 321–340. Dordrecht: Springer.

Bowen, R.L.B. 1958. Irrigation in ancient Qataban. In *Archaeological discoveries in South Arabia*, ed. R.L.B. Bowen and F.P. Albright, 43–131. Baltimore: Johns Hopkins University Press.

Bruins, H.J. 1986. *Desert environment and agriculture in the Central Negev and Kadesh-Barnea during historical times*. Nijkerk: Midbar Foundation.

Buringh, P. 1960. *Soils and soil conditions in Iraq*. Baghdad: Republic of Iraq, Ministry of Agriculture.

Caton-Thompson, G., and E.W. Gardner. 1939. Climate, irrigation and early man in the Hadramaut. *Geographical Journal* 93: 18–38.

Denevan, W.M. 2001. *Cultivated landscapes of Native Amazonia and the Andes*. Oxford: Oxford University Press.

Doolittle, W.E. 1990. *Canal irrigation in prehistoric Mexico: The sequence of technological change*. Austin: University of Texas Press.

Erickson, C.L. 2006. Intensification, political economy and the farming community: In defense of a bottom-up perspective of the past. In *Agricultural strategies*, ed. J. Marcus and C. Stanish, 334–363. Los Angeles: Cotsen Institute of Archaeology, UCLA.

Fish, S.K. 1994. Archaeological palynology of garden and fields. In *The archaeology of garden and field*, ed. N.F. Miller and K.L. Gleason, 44–69. Philadelphia: University of Pennsylvania Press.

Fujii, S. 2011. Domestication of runoff surface water: Current evidence and new perspectives from the Jafr pastoral Neolithic. *Neo-Lithics* 2 (10): 14–32.

Gorbunov, B.V. 1968. Irrigated soils of Central Asia. In *Geography and classification of soils of Asia*, ed. V.A. Kovda and E.V. Lobova, 34–45. Jerusalem: Israel Program for Scientific Translations.

Hehmeyer, I. 1989. Irrigation farming in the ancient Oasis of Marib. *Proceedings of the Seminar for Arabian Studies* 19: 33–44.

Hesse, R., and J. Baade. 2009. Irrigation agriculture and the sedimentary record in the Palpa Valley, southern Peru. *Catena* 77: 119–129.

Hritz, C. 2010. Tracing settlement pattern and channel systems in southern Mesopotamia using remote sensing. *Journal of Field Archaeology* 35 (2): 184–203.

Kovda, V.A., and E.V. Lobova, eds. 1968. *Geography and classification of soils of Asia*. Jerusalem: Israel Program for Scientific Translations.

Lansing, J.S., and K.M. Fox. 2011. Niche construction on Bali: The gods of the countryside. *Philosophical Transactions of the Royal Society B* 366 (1566): 927–934.

Lu, J., Z.H. Zhi-hong, L. Yang, X. Lin, Y. Dong, J. Ding, and Y. Zheng. 2006. Characteristics of soil fertility of buried ancient paddy at Chuodun site in Yangtze River Delta, China. *Agricultural Sciences in China* 5 (6): 441–450.

Pietsch, D., and L. Mabit. 2012. Terrace soils in the Yemen Highlands: Using physical, chemical and radiometric data to assess their suitability for agriculture and their vulnerability to degradation. *Geoderma* 185–186: 48–60.

Purdue, L., W. Miles, K. Woodson, A. Darling, and J.-F. Berger. 2010. Micromorphological study of irrigation canal sediments: Landscape evolution and hydraulic management in the middle Gila River valley (Phoenix Basin, Arizona) during the Hohokam occupation. *Quaternary International* 216: 129–144.

Rippon, S. 2000. *The transformation of coastal wetlands*. Oxford: Oxford University Press and British Academy.

Sandor, J.A., and N.S. Eash. 1995. Ancient agricultural soils in the Andes of southern Peru. *Soil Science Society of America Journal* 59: 170–179.

Waters, M.R. 1992. *Principles of geoarchaeology: A North American perspective*. Tucson: University of Arizona Press.

Wilkinson, T.J. 2003. *Archaeological landscapes of the Near East*. Tucson: University of Arizona Press.

Further Reading

Brown, A.G. 1997. *Alluvial geoarchaeology: Floodplain archaeology and environmental change*. Cambridge University Press.

Butzer, K.W. 1982. *Archaeology as human ecology*. Cambridge: Cambridge University Press.

French, C. 2003. *Geoarchaeology in action: Studies in soil micromorphology and landscape evolution*. London: Routledge.

Hypothesis Testing in Archaeological Theory

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Introduction

In 1962 there was a "revolution" or paradigm shift in American archaeology, which became known as new or processual archaeology. At the forefront was Lewis Binford, closely followed by his colleagues and students, particularly Sally Binford, James N. Hill, William Longacre, Kent Flannery, Patty Jo Watson, Steven LeBlanc, Charles Redman, and others. Their works became classics, including James N. Hill's seminal article on Broken K Pueblo (1968). The five major tenets of this novel approach, especially in contrast to traditional or "old" archaeology, are the following: (1) the questions archaeologists ask – how and why in addition to what, when, and where, that is, the study of cultural process in addition to culture histories; (2) the theories used to explain past lifeways (vs. a list of traits that represent beliefs, ideas, and societal norms), especially cultural ecology and the assumption that culture is the extrasomatic means of adaptation; (3) use of the scientific method – that is, testing hypotheses with independent data; (4) the assumption that variation and change are perceived as representing adaptations to changing environmental conditions vs. the traditional view of innovation and diffusion; and (5) going beyond detailing stratigraphy, classifying artifacts, dating and emphasizing norms at the expense of explaining variability, and using regional survey, systematic excavations, sampling, statistics, etc. This entry focuses on the third tenet, the scientific method, specifically hypothesis testing, and by doing so highlights how it can be used apart from new or processual archaeology for its own sake since it can strengthen any approach or theoretical explorations of past societies.

Definition

Theory is a broad level of explanation (e.g., theories about evolution). Middle-range theory, another concept coined by Binford, is the step-by-step process and justifications of a research design that connect data and theory to avoid leaps of logic. Method is the strategy used to explicate and support a theory, and one such means is the hypothesis testing method composed of "if. . . then. . ." statements, arguments of relevance, and test implications. For example, if Structure X served as a kitchen, then we should find evidence for cooking, storage, and serving activities. The argument of relevance is that throughout the world, people cook, store, and serve food in kitchens. Test implications include finding an oven or hearth, wide-orifice jars or containers used for cooking (burned on bottom, carbonized remains inside vessels) and storage (no burning), nonporous narrow-orifice jars or pitchers used for storing and pouring liquids, possible ladles and other stirring and serving implements, and bowls, dishes, and plates for serving the prepared foods.

By following this step-by-step procedure, others can replicate methods and come to the same results; in this case, that Structure X did or did not serve as a kitchen. How archaeologists explain the place of Structure X in their interpretative framework varies depending on their interests, research problem, and/or theoretical leanings.

Archaeologists generate hypotheses or expectations often through using ethnographic analogy; for example, we use bowls to contain hot or cold liquid comestibles such as soup, ice cream, punch, cereal with milk, and so on. This deductive reasoning stands in contrast to inductive reasoning, whereby one collects data, somewhat indiscriminately, and generates conclusions (i.e., inductive inferences; Hempel 1966: 10–11) once data are classified. That said, inductive reasoning can make deductive reasoning easier since some conclusions in turn become hypotheses; after all, patterns often are revealed while one counts and classifies data. Deductive reasoning takes ideas to the next level by generating questions and

testable hypotheses that are tailored to support or disprove the patterns in the data or generated from external ideas via the ethnographic record, ethnoarchaeology, experimental archaeology, current practices, and even Eureka moments. Hypotheses are set up in such a way to be supported (rather than proven) or disproven; in other words, they are falsifiable. In addition, hypotheses can always be supplanted by better ones as methods and techniques improve and ideas advance. It is a way to verify, or not, ideas that are generated to support or explain broader research questions.

A further way to strengthen theories or arguments is through generating and testing multiple or alternative hypotheses, which serves two major purposes: (1) shows peers that one is not invested solely in one idea; and (2) the hypotheses may turn out to explain different aspects of the research question or problem. Then of course there is the null hypothesis, which is a hypothesis completely opposite of what is actually expected, which only supports the main hypothesis if it is disproven. Alternative hypotheses also prevent biases and the collection of data that promotes one idea over another, not to mention promoting thoroughness (Chamberlin 1965[1890]). For example, using the kitchen hypothesis above, a null hypothesis would go something like this: if Structure X did not serve as a kitchen, then we would expect to find non-kitchen items (ritual objects, sleeping areas, public iconography, etc.). Alternative hypotheses could be, for example, the following: (1) if Structure X served as a storage room, then we would expect to find storage containers and no windows; (2) if Structure X served as a religious building, then we would expect to find ceremonial and religious paraphernalia (e.g., altar, incense burners), iconography, and seating; and (3) if Structure X served as a residence, then we would expect to find diverse ceramic/container types, sleeping, living, and cooking areas/furniture and utensils, etc.

No matter which hypothesis is supported (or refuted), one still has to explain it since data reflect human behavior and archaeologists are asking basically humanistic questions (Praetzellis 2000). For example, in a study on assessing ceramic variability in ancient Maya hinterland households to assess wealth and status (Lucero 2001), one of the original hypotheses was that elite residences should have larger and a greater number of vessels reflecting larger households consisting of family and nonfamily members. However, some of the smaller, commoner, houses had more vessels (though not necessarily larger vessels). This unexpected finding was explained by the fact that some commoner residences house more people to pool their labor and resources (this inference would have served as an excellent alternative hypothesis as well).

Using the hypothesis testing method prevents the collection of data just for the sake of collecting data; it requires scholars to start with a problem and devise hypotheses to address the problem, which in turn structures the type of relevant data to collect and process.

Historical Background

Walter W. Taylor in his 1948 *A Study of Archaeology* critiqued traditional archaeology (1983 [1948]), and rather than leave it at that, he suggested that archaeologists should take a "conjunctive approach" that combined the best of archaeology and anthropology. While he focused on American archaeology, the implications were international. He called for a well-rounded interdisciplinary approach to reveal past lifeways, including focusing on settlement patterns; subsistence; social, religious, and political organization; and diet through rigorous excavation and recording techniques. It was only through taking such an approach that archaeologists could present a fuller picture of past societies. Taylor's call to arms was not taken up until the 1960s with the advent of new archaeology advocated by Lewis Binford and his intellectual entourage.

In 1962, Lewis Binford published his now classic article, "Archaeology as Anthropology," in which he details the goals of what soon would be referred to as new archaeology. Archaeology's goal should not be to compile data just for the sake of compiling data without a framework to guide collecting strategies. Past societies are not

comprised of artifact lists; rather, artifacts are the remnants of once-living people who no longer have a voice. Artifacts are not history; they reflect the behaviors of the people who made them, which in turn reflects how people/society adapted to their particular environment, practiced their faith, and organized their economy, social interactions, and political systems – in other words, how they lived. It is up to the archaeologist to come up with the means to not only give voice to the past, but to do it in such a manner where peers can both understand and replicate results. Hypothesis testing accomplishes this goal.

Key Issues, Current Debates, and International Perspectives

There was a backlash to processual archaeology beginning in the 1980s, and critics absolved themselves of anything having to do with new archaeology (Earle and Preucel 1987). Some criticisms were valid, especially those regarding new archaeology's theoretical constructs (e.g., environment is the *key* factor) and some of the techniques used (e.g., statistics alone, models from the hard or physical sciences) (e.g., Hodder 1982, 1985, 1986). In doing so, however, some archaeologists have left themselves open to claims of fictionalizing the past, which is not the intent of sound scholarship. Using the hypothesis testing method allays this problem because it is about *replicable research*; it is about ideas that one attempts to confirm, but cannot prove. Other scholars should be able to use the same methods and come up with the same results; of course how people interpret those results is another matter entirely and depends on their theoretical interests. When a backlash occurred, many archaeologists were too ready to throw the baby out with the bathwater – specifically, the use of the hypothesis testing method because they did not evaluate it independent from processual archaeology rather than evaluating it as a method on its own merit. However, sound scholarship requires a degree of accounting to colleagues and peers, and hypothesis testing is critical for this end.

This point is illustrated using two recent papers: one on Classic Maya commoner cosmology and the other on ancient Maya witches.

A recent article (Lucero 2010) on Classic Maya commoners, summarized here, focuses on rituals that took place in the home to reveal the materiality of cosmology in the built environment. In the ethnographic present, Maya domestic ceremonies revolve around life, death, and renewal, which are reflected in the importance of dedication, ancestor veneration, and termination rites. Dedication ceremonies animate new houses and include the caching of objects under house floors. Ancestor veneration rites honor and thank ancestors and involve interring deceased family members with or without grave goods in house floors. Some Maya refer to children as *kexol*, or "replacements," signifying the connection between the living and the dead (Schele and Miller 1986: 266). Grave goods tell us much about the deceased family member; for example, among the Zinacantecos of Chiapas, grave goods "are said to possess the soul of their owner" (Vogt 1998: 28). Termination ceremonies deactivate or de-animate houses, thus releasing their soul before renewal, and include breaking objects, partially destroying houses, and burning incense. Renewal is necessary after the death of a family member when life must begin anew. The Maya conduct these ceremonies in memory of ancestors that all could witness, family and non-family alike.

Hypothesis: If pre-Columbian Maya practiced dedication, ancestor veneration, and termination rites in the home, then we should find caches, burials, and broken artifacts in the home. Argument of relevance: since these rites come from a long-standing tradition that is still practiced at present, the Maya likely practiced them in the past. Test implications (Table 1): caches should be found beneath floors consisting of burned or unburned whole objects such as jade items, obsidian, grounding implements, eccentrics, and ceramic vessels; burials, typically with grave goods, should be found under house floors, and deposits should be found on floor surfaces consisting of broken and burned items, such as ceramic vessels.

Hypothesis Testing in Archaeological Theory, Table 1 Revealing commoner ritual in the home

Hypothesized ritual	Test implications
Dedication	Whole objects sealed under floors
Ancestor veneration	Burials in floors with or without grave goods
Termination	Broken and burned items on floor surface

These test implications are evaluated at the ancient Maya minor river center of Saturday Creek, Belize. The Maya lived in this community from at least 900 BCE to 1500 CE in dispersed farmsteads consisting of solitary mounds and mound groups or *plazuelas* (Lucero 2006). A ball court, temples up to c. 10 m tall, and elite compounds comprise the site core. Archaeologists excavated two solitary mounds or commoner residences (SC-18 and SC-85), an eastern structure of an elite compound (SC-78), and a temple ball court (SC-3). This focus here is on the two smaller residences, which the Maya occupied from c. 400 to 1150 CE.

Under the floors in fill, archaeologists recovered obsidian blades, mano and metate fragments, polished bone and stone, bone needles, modified and unmodified marine shell, chert cores, spindle whorls, a celt, a bark beater, faunal remains, figurine fragments, ceramic discs, and a few small jade and hematite inlay or mosaic pieces. Twelve burials were recovered from the commoner houses, most with grave goods. Several deposits of smashed and burned vessels were found on floor surfaces. Evidence supports the hypothesis that the pre-Columbian Maya practiced dedication, ancestor veneration, and termination rites in the home.

Any archaeologist would recover the same materials and, by using the hypothesis testing method, come up with the same results – that the Maya cached items in floors and sealed them, interred the dead into house floors, and burned and broke items before putting down a new floor with its own caches. History and ethnography reveal that these ritual behaviors reflect dedication, ancestor veneration, and termination practices at Saturday Creek throughout the entire occupancy of the houses, over 600 years – from c. 400 to 1150 CE. Interpreting these results, however, can vary depending on the questions asked. The article's focus on materiality, memory, and cosmology shaped interpretations. Briefly, the Maya performed traditional rites for over a millennium, and they conducted them for family and members of the community to acknowledge a family's loss – and new beginning. People interred the dead to create ancestors who remained involved in the lives of the living. Domestic ceremonial practices, by their materiality, solidify inhabitants' ties to family and community. Building and destroying houses was closely tied to the life history of ancestors. Memory and place were created in the cycle of dedication, ancestor veneration, and termination rites. In fact, Maya occupied most houses continuously for centuries, suggesting that they became "a key element in the maintenance of cultural memory" (Chapman 2000: 4).

Another example of the hypothesis testing method concerns exploring ancient Maya witchcraft persecution (Lucero and Gibbs 2007), summarized here. Throughout the world, witchcraft persecution occurs in times of stress, including untimely deaths, drought, floods, famine, or disease. Witches are people who are blamed and punished, often violently, for perceived or real problems by community census.

There are various forms of witchcraft in the Maya ethnographic present, as was the case during the Colonial period. For example, among the Zinacantecos of highland Chiapas, Mexico, when people come to the Ceremonial center from different villages for major rituals, "There is always the danger... that harmful witchcraft rituals may be carried out by envious members of other lineages" (Vogt 2004: 44). Witchcraft accusations also take place within communities, and "If someone has sinned and is condemned by his kinsmen and neighbors as a witch..., public denunciation and ritual neglect may characterize the funeral, and the soul is banished to *K'atinbak*" – a "place warmed by bones" and "a deep hole inside the earth" (Vogt 1998: 29). In Chiapas, animal spirits or companions are associated with sorcery, and combat between them brings

misfortune and disease. In the Yucatán, it is believed that people can turn themselves into animals at night for evil purposes – that is, witchcraft.

People respond against witchcraft with violence. Spanish chroniclers noted that elderly Maya women were selected by villagers as scapegoats in times of trouble and stoned to death. For the Tzeltal Maya of Amatenango, Chiapas, of the 36 homicides recorded for 1 year in the late 1960s, over half had been accused as witches, and most were men ($n = 19$ or 53%). And of the nine *curanderos* (traditional healers) on the list, all had been accused of practicing witchcraft. In an Associated Press release dated September 16, 2002, a recent attack is detailed: "Unidentified gunmen burst into the home of an alleged practitioner of witchcraft in… Chiapas and shot to death four adults and wounded five other people, including two children." The same release also stated that there have been several "witches" killed in the past decade in Chiapas, a practice that also occurs throughout the rest of Mexico and Central America.

Evidence from ethnohistoric and ethnographic records also suggests a long history of the belief in witchcraft's association with openings in the earth. Caves, for example, are portals to the underworld or Xibalba and thus are sacred but dangerous places. Bishop de Landa in colonial Yucatán noted that people, particularly young boys, were sacrificed when the rainy season was overdue or during a famine; victims were thrown into *cenotes*, natural sinkholes – another portal to the underworld. In general, infants, children, and young adults may have been sacrificed as innocents, whereas some adults may have been killed/sacrificed as evildoers – that is, witches. In Zinacantan, people associate caves with witches and believe that witchcraft ceremonies take place within them. "Soul loss can… occur when an evil person performs a witchcraft ritual in a cave to "sell" the inner soul to the Earth Lord, who then uses the person as a servant" (Vogt 2004: 30). In the 1990s at the height of the paramilitary killings in Zapatista Chiapas by *cortacabezas* or headcutters, two male teenagers from San Pedro Chenalhó who had bragged about being Zapatista supporters were stoned to death for bringing disharmony to the community. The Maya unceremoniously dumped their bodies in a crevice, another kind of opening in the earth. In another case that took place in 1648 in Guatemala, people witnessed a battle between animal or spirit companions (a puma and jaguar) of two Pokomchi Maya. One died of his wounds, while the other eventually was hanged for the "murder," and his neighbors placed his body in a ditch in a shallow grave rather than in a church-sanctioned cemetery. These and other cases illustrate the belief in witchcraft and its association with violent death, non-funerary treatment, and openings in the earth, especially caves.

Lucero and Gibbs propose that witch killings have a long, pre-Columbian history. Witch killings actually might have been a community response in times of extreme stress where people felt they had no other choice but to sacrifice someone, usually a member of the their own community. It was not enough to kill witches; as dangerously animated items, they were deposited in dangerous places, safely away from the living – that is, in caves.

The challenge, however, is to distinguish ancestors and sacrificial victims from witches. This feat is particularly challenging since caves likely entombed ancestors, sacrificial victims, *and* witches. In fact, witches and sacrificial victims in one sense can be perceived as one and the same. People can be sacrificed for the same reasons witches are killed – to restore order. Sacrificial victims, however, are accorded respect after death, so they can enjoy the afterlife in paradise. Witches, in contrast, are malevolent and thus are treated differently after death.

Hypothesis: If ancient witches existed, then we should expect to find evidence of this in *peri-* and *postmortem* treatment of certain people. Specifically for the Maya case, if human remains in caves show evidence for violence and non-funerary treatment, then they might represent killed witches. Argument of relevance: since witches are typically violently killed and not buried with non-witches worldwide and in the Maya area at present, we should expect to find the same to have been the case in the past. Test implications (Table 2): distinguishing witches from sacrificial

Hypothesis Testing in Archaeological Theory, Table 2 Defining the dead

Hypothesized classification	Test implications
Ancestor	Buried, positioned, grave goods, no evidence of trauma
Sacrifice	Buried, positioned, grave goods or not, evidence of trauma
Witch	Not buried, not positioned, no grave goods, evidence of trauma

victims and ancestors in caves is possible through an analysis of the context of remains (buried or not), disposition of bodies (e.g., evidence of binding, proper placement), evidence for trauma, and the presence or absence of grave goods. Ancestors were buried in orchestrated positions with grave goods and without trauma, sacrificial victims were buried with or without grave goods with trauma, and witches were neither buried nor positioned, did not have grave goods, and show evidence for trauma.

Briefly summarized here is the context of skeletal data from two caves that represent the majority of lowland Maya cave deposits – Actun Tunichil Muknal and Actun Uayazba Kab in central Belize. They were predominantly used during the Classic period, especially in the Late Classic or 700–900 CE. Major differences between the two caves are the context of remains – surface or subsurface and presence or absence of trauma and grave goods. Most individuals in Actun Uayazba Kab, a shallow cave/rockshelter, were carefully placed and *buried* beneath a plaster floor, along with offerings. In contrast, Actun Tunichil Muknal goes deeper – 5 km – into the mountain, that is, closer to the sacred, and dangerous. Half of the 14 individuals, all found unburied, show evidence of cranial trauma. After they were killed, the Maya left the remains on the surface – without offerings. Evidence supports the hypothesis that ancient Maya witches existed.

Actun Uayazba Kab demonstrates more evidence for funerary rites and the creation of ancestors, who were kept relatively close to the living in a "lineage mountain" nearby a small center. In Actun Tunichil Muknal, the dead were not accorded traditional burial rites. By killing a witch, the Maya deactivated their evil power. The living left dead witches exposed to the elements or the perilous underworld without any protection. By offering such individuals, the living condemned their spirits to the malevolent gods of the underworld in hopes of restoring order.

The purpose of this exercise has been to demonstrate the importance of using the hypothesis testing method in archaeology. Methods are replicable, though interpretations can and do vary. Rigorous methodology is a must in a field where we give voice to the people of the past. Insulting their memory with insupportable claims is poor and irresponsible scholarship. Embracing new ideas, theories, and thinking outside the box are vital to give voice to the past. Giving power to that voice requires us to work largely inside the box, methodologically anyway.

Future Directions

It is critical that archaeologists, and all social scientists and humanists, teach their students the importance of using replicable methods; this will allow their peers to follow, step by step, how one obtained their results. This is what scholarship is all about; revealing to our best abilities the voices that have been quiet too long. This is a serious endeavor and one that requires rigorous methods. In fact, many archaeologists use hypothesis testing, whether or not they use the "terminology" or are even aware of it.

No matter one's theoretical interests (e.g., see Preucel and Mrozowski 2010), the undeniable fact (not a theory) is that archaeology deals with the material world into which archaeologists are attempting to breathe history and life. Archaeology is always borrowing theories and ideas from other disciplines, which is a critical component of fulfilling the goal of bringing the past back to life. But how one accomplishes this can be contentious unless peers are able to replicate results. The hypothesis testing method is such a method and its use allays this problem. Facts can be filtered through replicable methods to obtain results that will only enhance interpretations.

Cross-References

- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Field Method in Archaeology: Overview
- ▶ Middle-Range Theory in Archaeology
- ▶ Processualism in Archaeological Theory

References

Binford, L.R. 1962. Archaeology as anthropology. *American Antiquity* 28: 217–225.

Chamberlin, T.C. 1965 [1890]. The method of multiple working hypotheses. *Science* 148: 754–759.

Chapman, J. 2000. *Fragmentation in archaeology: People, places and broken objects in the prehistory of south eastern Europe*. New York: Routledge.

Earle, T.K., and R.W. Preucel. 1987. Processual archaeology and the radical critique. *Current Anthropology* 28: 501–538.

Hempel, C.G. 1966. *Philosophy of natural science*. Englewood Cliffs: Prentice-Hall.

Hill, J.N. 1968. Broken K pueblo: Patterns of form and function. In *New perspectives in archaeology*, ed. S. R. Binford and L.R. Binford, 103–142. Chicago: Aldine Press.

Hodder, I. 1982. *Symbols in action: Ethnoarchaeological studies of material culture*. Cambridge: Cambridge University Press.

Hodder, I. 1985. Postprocessual archaeology. In *Advances in archaeological method and theory*, ed. M.B. Schiffer, vol. 8, 1–26. New York: Academic.

Hodder, I. 1986. *Reading the past*. Cambridge: Cambridge University Press.

Lucero, L.J. 2001. *Social integration in the ancient Maya hinterlands: Ceramic variability in the Belize River area.* Anthropological Research Paper 53. Tempe: Arizona State University.

Lucero, L.J. 2006. *Water and ritual: The rise and fall of Classic Maya rulers*. Austin: University of Texas Press.

Lucero, L.J. 2010. Materialized cosmology among ancient Maya commoners. *Journal of Social Archaeology* 10: 138–167.

Lucero, L.J., and S.A. Gibbs. 2007. The creation and sacrifice of witches in Classic Maya society. In *New perspectives on human sacrifice and ritual body treatments in ancient Maya society*, ed. V. Tiesler and A. Cucina, 45–73. New York: Springer Press.

Praetzellis, A. 2000. *Death by theory: A tale of mystery and archaeological theory.* Walnut Creek: Altamira Press.

Preucel, R.W., and S.A. Mrozowski. 2010. The new pragmatism. In *Contemporary archaeology in theory: The new pragmatism*, ed. R.W. Preucel and S.A. Mrozowski, 2nd ed., 1–49. West Sussex: Wiley-Blackwell.

Schele, L., and M.E. Miller. 1986. *The blood of kings: Dynasty and ritual in Maya art*. New York: George Braziller.

Taylor, W.W. 1983[1948]. *A study of archaeology.* Carbondale: Southern Illinois University Center for Archaeological Investigations.

Vogt, E.Z. 1998. Zinacanteco dedication and termination rituals. In *The sowing and the dawning: Termination, dedication, and transformation in the archaeological and ethnographic record of Mesoamerica*, ed. S.B. Mock, 21–30. Albuquerque: University of New Mexico Press.

Vogt, E.Z. 2004. Daily life in a highland community: Zinacantan in mid-twentieth century. In *Ancient Maya commoners*, ed. J.C. Lohse and F. Valdez Jr., 23–47. Austin: University of Texas Press.

Iberia: Medieval Archaeology

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Introduction

Medieval archaeology in Iberia is a relatively young discipline that aims to study the societies of the Hispanic landscape during the millennium spanning from the fifth to the fifteenth centuries (the traditional key dates remain the fall of the western Roman Empire in 476, and the conquest of the Nasrid dynasty of Granada and the discovery of the Americas, both of which occurred in 1492) (Fig. 1). From its very beginnings (in Iberia), archaeological study has been oriented toward the study of the material manifestations of Islamic society (*andalusí* archaeology) and Christian society (early medieval archaeology and feudal archaeology). The three characteristics that define its practice are: its underdeveloped academic profile; the role that rescue archaeology has acquired in recent years; and a notable atheoretical quality which has manifested itself via a striking dependence on the paradigms and approaches favored by medievalists working with textual sources, as well as a lack of epistemological and methodological reflection.

Definition

Medieval archaeology in Iberia encompasses many "archaeologies" with different chronological and thematic concerns, all of which are the result of diverse conceptual and historiographical approaches and have had, until recently, different academic trajectories.

After the collapse of the Roman Empire, various Germanic groups occupied *Hispania* in the fifth century, although only the Sueves (in the northwest of the peninsula) and the Visigoths managed to establish stable kingdoms. Archaeological analysis of these early medieval centuries has given rise to a specific "archaeology of the Visigoths" which is profoundly marked by cultural historicism. Alternatively, the study of the origins of Christianity and its early monuments has produced a paleochristian archaeology characterized by art-historical concerns. All of these trends have been supplanted in the last three decades by "early medieval" archaeology, which has been oriented toward the social aspects of landscape study, and based upon data provided by numerous excavations in cities, monumental spaces, and rural areas.

One of the principal particularities of the Iberian peninsula during the Middle Ages is the coexistence, over many centuries, of feudal political formations alongside Islamic state-based polities, after the conquest of the Visigothic kingdom

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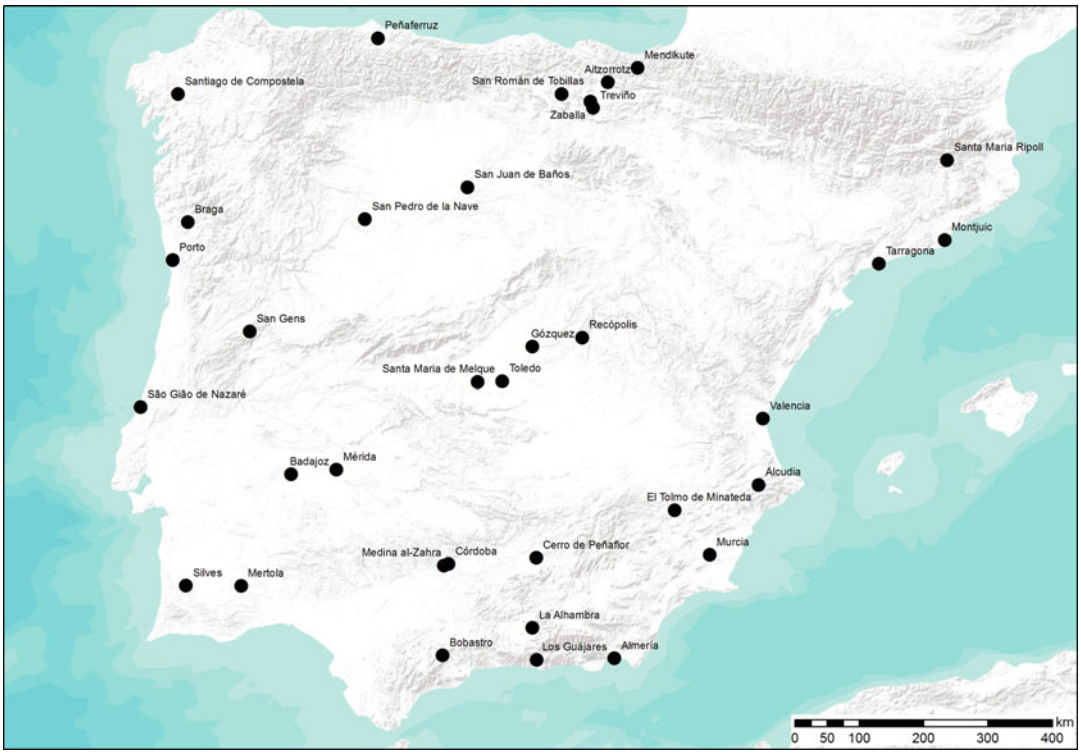

Iberia: Medieval Archaeology, Fig. 1 Principal sites mentioned in the text

in 711. The historical development of the territory dominated by the Islamic states, known as al-Andalus (in classical Arabic دلس), took the course it did in part as a result of the growing pressure exercised by feudal powers to the north (a process traditionally known as *reconquista*), and in part because of internal historical dynamics, which ultimately led, at the very end of the Middle Ages, to the defeat of the Nasrid Kingdom of Granada. *Andalusi* archaeology has been concerned primarily with the study and characterization of the state and society of al-Andalus.

Furthermore, the study of the northern kingdoms and their territorial expansion has been undertaken within the methodological context of feudal archaeology, which has explored the similarities and contrasts between medieval societies, focusing particularly on themes such as the formation of villages, the emergence of seigneurial powers, the process of *incastellamento*, the role of castles, and the study of medieval urbanism.

Such a division, in truth, is arbitrary and inexact, given that it marginalizes minority groups (Hebrews, Mozarabs ["Arabised" Christians] and *Mudéjares* [Muslims in Christian territory]) and, above all, fails to reflect the complex and changing reality of territorial control. On the other hand, although in academic circles, there has existed a profound disjunction between feudal and *andalusí* history and archaeology, a significant number of researchers have made use of this great diversity, employing comparative methods in order to overcome a certain idealized historicist backdrop and develop more complex theoretical insights. The influence of Italian medieval archaeology has played a key role in providing medieval archaeology in Iberia with a sound theoretical and methodological background.

The limited presence of medieval archaeology in the university sector (taught in only a dozen institutions in Spain and Portugal) has meant that museum-directed work and rescue archaeology have been fundamental in the study of medieval urban and rural contexts. In 1985, the Law of Spanish Historical Heritage and the Law of Portuguese Cultural Heritage were promulgated,

which have provided a solid platform for the development of rescue archaeology. The frenetic pace of urban building activity and the enormous number of public building projects undertaken in Iberia in the last 20 years have brought in their wake the excavation of a high number of medieval settlements, and even led to the discovery of a new type of settlement, known as the peasant farmstead and the peasant village. And although the majority of these findings remain unpublished, the qualitative leap to which the last few years have borne witness is striking.

On the other hand, the quantity of well-preserved medieval architectural monuments and the high number of restorations undertaken on these former has meant that in Iberia and Italy, the archaeological study of architecture has gained importance in recent years. The so-called Archaeology of Architecture, which supports its own specialist publication, has been applied both in the realization of studies that precede the restoration of buildings, and in the documentation and intensive study of groups of buildings, such as the early medieval churches of Spain.

Historical Background

The origins of medieval archaeology in Iberia can be found in the second half of the nineteenth century and the first decades of the twentieth, when the first antiquarian studies (largely numismatical and epigraphical) were undertaken, as were the first studies of monumental architecture, occasionally as part and parcel of restoration programs. These were years in which a certain arabism developed, closely linked to a romantic fascination with an exotic orientalism, and in which archaeological practice was closely identified with the history of art, and – more precisely – with the history of architecture. At the end of the nineteenth century and the beginning of the twentieth, the first excavations were carried out in places such as Medinat al-Zahra, Bobastro, or the Alhambra in the south, as well as in castles, monasteries, and necropolises in the northern areas of the peninsula (e.g., Mendikute, Aitzorrotz, Pamplona, Santa María de Ripoll), and from 1912, courses in Arabic archaeology were offered in the Central University of Madrid. However, the consolidation of History of Art as a discipline in its own right, and a burgeoning change in theoretical approaches, meant that by 1920, this first phase of medieval archaeology in Iberia was losing momentum, coinciding, in this regard, almost exactly with a similar process seen in Italy.

During the dictatorships of Salazar and Franco, medieval archaeology was strictly limited to that which focused on searching for signs of Visigothic presence in Spanish territory, and this outlook would dominate medieval studies until the 1970s and 1980s, while in Portugal, a great number of medieval monuments were restored in order to exalt the glory of the "national" past. Furthermore, during this period, architects like L. Torres Balbás or F. Hernández undertook studies of monumental *andalusí* complexes, such as the Alhambra or Madinat al-Zahra. It was with the arrival of democracy, both in Spain and Portugal, that the foundations of modern medieval archaeological study were laid. Among the reasons which help to explain this change, one can point to a process of renovation with regard to theoretical and epistemological approaches to medieval Hispanic societies, a growing sensitivity toward the post-classical heritage – which was especially affected by restoration work and urban archaeology – and which constituted the precedent for the legislation of the 1980s, and the emergence of a new generation of researchers who began to build their careers in the margins of the ever-dominant classical and prehistoric archaeology.

In Spain, the first meeting of medieval archaeologists took place in 1980 and this provided a platform for the foundation of the Spanish Association of Medieval Archaeology in the following year. The Association played a major role in the early years, given that it also oversaw the creation of the journal (*Boletín de Arqueología Medieval*, 1986) and the organization of national congresses in Medieval Archaeology held in Huesca (1985), Madrid (1987), Oviedo (1999), Alicante (1993), and Valladolid (1999). Nonetheless, the institutionalization of archaeology in the universities and the emergence of rescue archaeology in the

1990s posed a challenge to which the Association has been unable to adapt, and for this reason, it has now lost its function and purpose.

Throughout the early stages of medieval archaeology in Portugal, the achievements of some university lecturers (C. A. Ferreira de Almeida, H. Catarina o R. Varela) have been notable, as have initiatives from beyond the academic sphere, among which that led by C. Torres at the Mértola's Archaeological Site stands out (alongside its house journal *Arqueología Medieval*, published since 1992). In the 1990s, a whole series of congresses were held which allowed for the systematization of the archaeological study of the ceramic record (Tondela, 1992–2000), castles (Palmela, 2000), and Christian monuments (Lisbon, 1992), each of which was broached from a wide geographical and theoretical framework; the first studies of a certain stature were also produced in this period.

During the 1980s, the majority of studies were oriented toward the systematization of the ceramic record, the analysis of settlement patterns, and the creation of inventories within a wider framework of regional archaeological studies. Since the 1990s, substantial archaeological projects have begun to take place, as have intensive regional studies across the peninsula, which has allowed for the creation of a significant research agenda.

The publication in 1988 of the M. Barceló book under the provocative title of *Arqueología Medieval. En las afueras del medievalismo* marked a true turning point. This text, defined by the author as a "methodological reflection," aims to draw attention to the most theoretical and conceptual aspects affecting the growth of medieval archaeology, and affords methodological aspects of the discipline a secondary role. A strong denunciation is made of the way in which archaeology finds itself outside of mainstream "medievalism" (understood as the academic approach to medieval history), and relegated to the status of an auxiliary discipline, illustrative of thematic concerns raised in earlier times. On the other hand, the book reflects the notable influence that historical materialism has enjoyed in studies of medieval societies since the 1980s, and as such proposes an investigative program of conceptual complexity in which the archaeology of peasant society is proposed as one of the major research concerns. This was a time in which the practice of rescue archaeology (characterized by a notable empiricism, itself a reflection of the weak influence of academic training among archaeologists) truly took off.

During the 1990s, *andalusí* archaeology has experienced significant development in both Spain and Portugal, as can be evidenced by the convocation of a high number of meetings and the publication of the journal *Arqueología y Territorio Medieval* (Jaén 1993), with the result that works there from have begun to form part of a wider European debate on medieval societies.

Similarly, the profound innovation signaled by the application of the archaeology of architecture to churches such as San Juan de Baños, San Pedro de la Nave o São Gião de Nazaré, and the practice of urban archaeology in centers, such as Valencia, Tarragona, Recópolis, Mérida, Mertola o Braga, has had a profound impact upon the archaeological study of early medieval societies. In the last 15 years, the contribution of rescue archaeology has been equally decisive when it comes to the study of early medieval rural society.

Conversely, the emergence of the archaeological study of feudal societies has been slower, taking place over the last decade. The majority of these analyses have focused on the process of the formation of lordships, paying little attention to the later Middle Ages.

Key Issues

The Archaeological Study of *andalusí* Society: The Process of Islamisation

One of the principal contributions of Iberian medieval archaeology has been the study of the formation and articulation of *andalusí* state and society. Spanish historiography before the 1980s had questioned and underestimated the Islamic character of *andalusí* societies and a few scholars even went as far as denying that the Islamic conquest ever took place. The difficulties supposed by Arabic source material for most

"medievalists," together with the pervasive strength of nationalist conceptual frameworks, help to explain these limitations.

There are two major explanatory factors behind the subsequent renovation: On the one hand, we have the anthropological studies of P. Guichard, undertaken in the 1970s, which underlined the qualitative differences between Arabic and Berber tribal societies in al-Andalus, and Christian societies; second, the analyses of M. Acién delineated a process of transition during the Emiral period (755–929) which could be explained by way of reference to competition between various modes of production (tribal, feudal, and Islamic), and which was resolved by the imposition of a strong and hegemonic state in the tenth century (the Umayyad Caliphate, 929–1031) that prevented the consolidation of regional lordship in al-Andalus.

Building upon these suppositions, regional landscape studies have been undertaken in Granada, the Guadalquivir valley, and the Levante region, which have analyzed the transformation of rural settlements, cities, and the twin phenomena of production and circulation (of goods and peoples) throughout the period of Islamicisation. And although consensus has yet to be reached with regard to the weight of continuations (e.g., the persistence of feudal trends throughout the Emirate, the roots of which can be traced to the late Visigothic landowning class), it has been established that the Islamic invasion brought with it a profound social, economic, and political break. S. Gutiérrez has shown how numerous urban centers occupied in the Visigothic period were radically transformed during the Emirate (El Tolmo de Minateda (Fig. 2) and Recopolis are two such examples), only to be abandoned in the tenth century when other urban centers emerged to support the fiscal structures of the Caliphate (such as Murcia, Badajoz, and Almería). Other cities survived, like Mérida, Valencia, or Córdoba, but were notably transformed in architectural and urbanistic terms as complex multilevel dwellings ordered around a central patio were built, as can be seen in the Saqunda neighborhood of Córdoba. This urban network was articulated by a strong state-directed sociopolitical system that was most unlike that which we call the "feudal system." Rural settlements were also profoundly modified, thanks to various processes including the occupation of hill-top sites by peasant communities.

A second key factor in the archaeological study of *andalusí* society has taken the form of the analysis of rural landscapes, with the aim of shedding light on the fiscal system upon which the Caliphate and, later, the *taifa* kingdoms were built; thus, the material bases of *andalusí* society

Iberia: Medieval Archaeology, Fig. 2 The city of El Tolmo de Minateda (Albacete, Spain), according to Sonia Gutiérrez Lloret

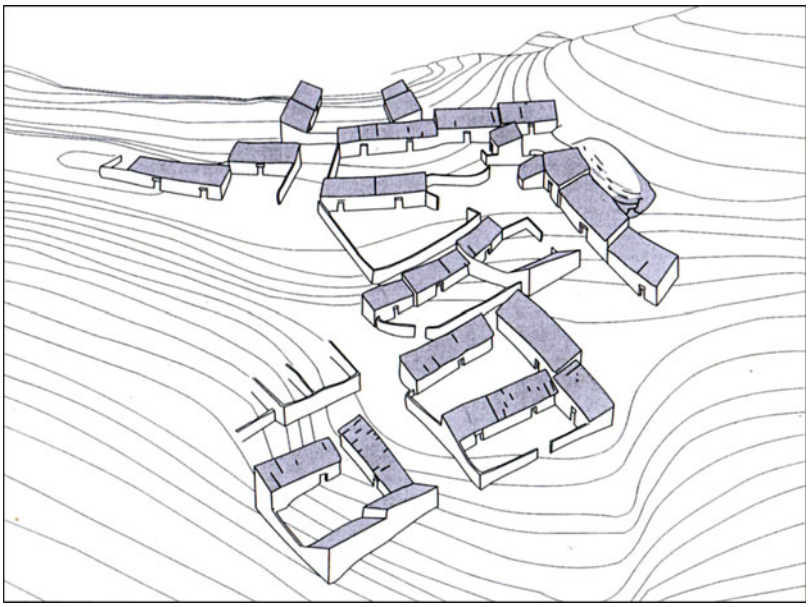

Iberia: Medieval Archaeology, Fig. 3 El Cerro de Peñaflor (Jaén, Spain)

might be better understood. Insofar as the study of rural spaces is concerned, great attention has been afforded, in methodological terms, to extensive place-name analysis and intensive excavation; in practice, both habitational spaces and irrigated farm systems have been studied.

Since the 1980s, preeminence has been given in the eastern peninsula to the dual phenomena of *huṣûn* (fortifications) and *qurà* (*alquerías* or concentrated residential areas), which have been considered key elements in the organization of the rural population. *Huṣûn* did not enjoy lordly associations, but were rather the fortifications of peasant communities or central points within a network of state-organized defensive structures. We are faced, therefore, with a society without lords. *Alquerías*, still poorly understood, were perhaps an expression of unequal peasant communities which were nonetheless characterized by strong internal cohesion, as we have seen in Los Guájares (Granada) or at the Cerro de Peñaflor (Jaén) (Fig. 3).

Furthermore, the study of irrigated land and the social practices which developed around the process of managing the water supply has been another fundamental theme of *andalusí* archaeology. M. Barceló has argued that horticultural products were impossible to store in large quantities and thus commandeer as rent, instead being consumed by peasant cultivators, and that this prevented the taking of rent by lords.

The Formation of Villages and Medieval Farmland

Until relatively recently, peasant areas of habitation and production in medieval Iberia were practically invisible. Only a few settlements characterized by dwellings with stone plinths or foundations, or irrigated cultivable plots, together made up the limited evidential base with which attempts to understand the medieval peasantry were made. On the other hand, Iberian medievalism has assumed – following the paradigm of R. Fossier – that early medieval rural society was disperse and quasi-nomadic, and that, accordingly, it was only with the implantation of feudalism in the eleventh century that sedentary social structures came about, as the peasant landscape was reordered under seigneurial lordship.

Nonetheless, the boom in rescue archaeology that has taken place since the mid-1990s, especially in the outskirts of large cities like Madrid and Barcelona (Fig. 4), allied to the carrying out of large-scale excavations, has obliged us to acknowledge the existence of significant village settlements, visible by way of structures

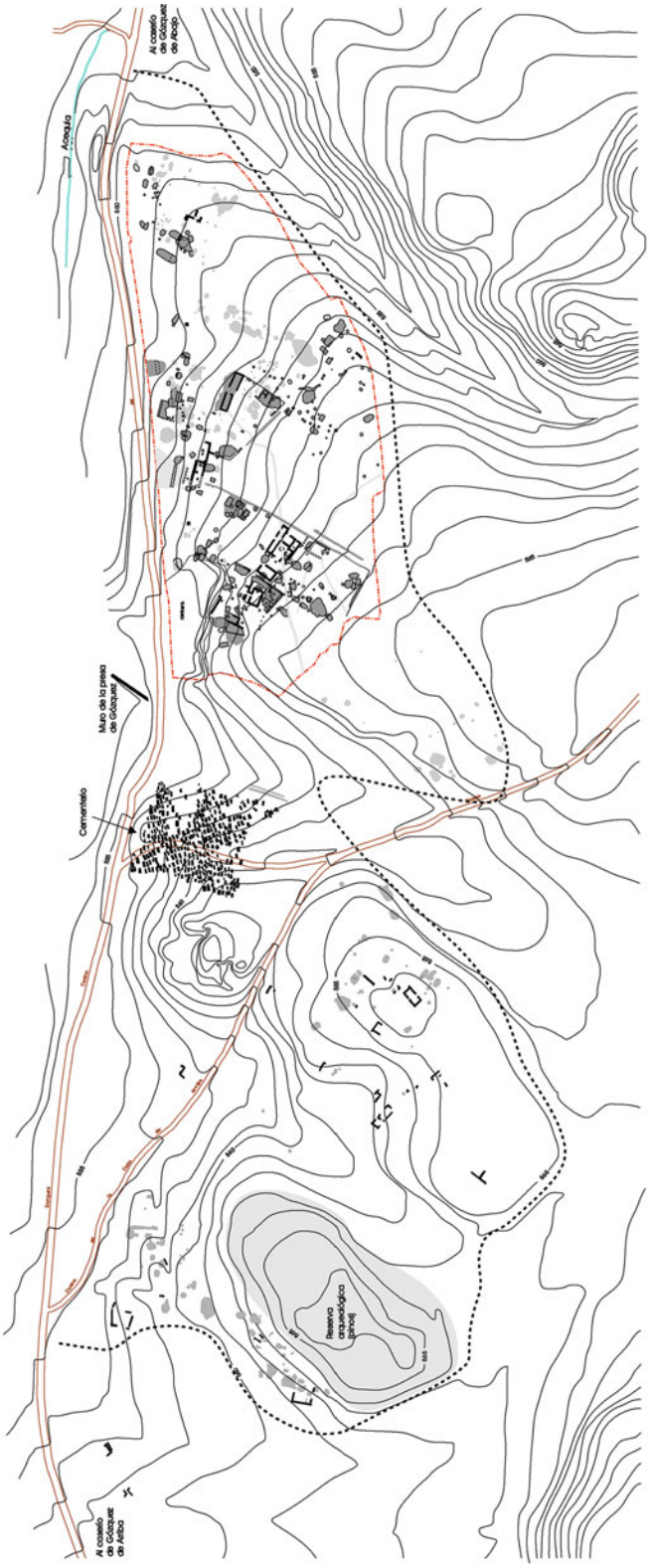

Iberia: Medieval Archaeology, Fig. 4 Village of Gózquez (Madrid, Spain)

Iberia: Medieval Archaeology, Fig. 5 Tenth-century agrarian spaces of Zaballa (Álava, Spain)

excavated in the substrate (silos, sunken featured buildings, wells, enclosed areas) and constructions with stone foundations which represent the dwellings of peasant communities. Similarly, it has been possible to recognize spaces which can be characterized as "intermediate areas," lacking in archaeological material, which have been identified as farmland. In places like Galicia, Asturias, or the Basque country, it has been possible, moreover, to identify terraced areas and farmland from the medieval period, thanks to extensive excavation and the analysis of the material from these agrarian sites (Fig. 5).

The formation of villages in the Iberian peninsula took place in the early Middle Ages, although there are important regional differences to bear in mind. The creation of village networks was the result of the emergence of a new post-imperial political order that is visible in parts of the Meseta (where Visigothic power structures were at their strongest) or in parts of Catalonia (around cities like Barcelona). We lack, on the other hand, networks of stable villages in other parts of Iberia where the influence of local and central powers is clearly marked. It was from the eighth century, in wide sectors of the northern peninsula, that village structures underwent consolidation, in accordance with the formation of emergent proto-statist realities. In other parts of Iberia, like the Upper Mondego in Portugal, the formation of such villages has only been verified from the tenth century (Fig. 6).

By exploiting various mechanisms and processes, sociopolitical elites dominated these villages, either though the collection of rent, the domination of community resources, or, lastly, dominance over people. A correspondence between the distribution of village networks and centers of power has also been noted.

The Archaeology of Feudalism

Once the lack of correspondence between the process of village formation and the affirmation of territorial lordships had been recognized, an archaeology of feudalism developed with the objective of discovering, via the archaeological record, the social mechanism by which new forms of lordly power was established in the post-Carolingian period. The main sites in which this archaeological practice has been developed have been centers of power, in particular castles or churches, although in the past few years, it has been possible to analyze the transformations that took place in peasant villages, which latter present the most fruitful landscape for the analysis of the social action of elites.

In several areas of the north of the peninsula, it has been possible to observe the formation, from the eighth and ninth centuries, of centers of local power articulated around castles (such is the case

of Peñaferruz in Asturias) or private churches whose owners have important resources (such as San Román de Tobillas in Álava). The capabilities of these local powers differ from territory to territory, in such a way that they seem to be much stronger in Asturias or Galicia when compared to the Castilian, Aragonese, or Catalan areas. From the tenth century, it is possible to trace a certain process of the growing strength of local aristocracies able to control entire peasant communities and to alter the landscape. In areas such as Álava, it has been possible to see how, at this time, private churches, such as that at Zaballa, were built in the heart of peasant villages and took on roles as centers for the collection of rents, thereby altering the built environment of the village. The castle of Treviño was also built in this century, bringing together a peasant community within a walled area dominated by a lordly residence where rents were collected, following a classical pattern of Mediterranean *incastellamento*. Likewise, sufficient indications exist to speak of *incastellamento* or even of forms of concentration of peasant settlement around churches and their sacred spaces, in a framework of *ensangrerament* (Fig. 7).

Iberia: Medieval Archaeology, Fig. 6 San Gens (Upper Mondego, Portugal)

Iberia: Medieval Archaeology, Fig. 7 Castle of Treviño (Burgos, Spain)

Another line of research that has acquired notable importance has been the analysis of the process of transformation of *andalusí* landscapes after the feudal conquest. In particular, very detailed studies have been carried out on the modifications of the urban fabric in centers such as Murcia via the analysis of the disarticulation of Islamic dwellings, the creation of great avenues and communal spaces, the establishment of ecclesiastical centers or the organization of urban spaces. Additionally, the processes by which hydraulic systems were adapted to new social and productive logics by means of the introduction of hydraulic mills and the dismantling of irrigated lands in the east of the peninsula have also been studied.

Future Directions

Perhaps the main challenge presented by Iberian archaeology in general, and medieval Iberian archaeology in particular, is that of confronting the study and the publication of the many archaeological contexts that have been analyzed via the prism of rescue archaeology in the last 15 years. In this period, thousands of archaeological interventions have taken place every year in medieval contexts, although we lack precise details regarding their number. The logic of the market has meant that priority has been given to interventions that have concentrated on the documentation of sites prior to their destruction, allowing only on very few occasions the undertaking of projects that maximize the value of the potential information that might be drawn from such sites. Now that the financial crisis has practically put an end to the progress of rescue archaeology in the last 15 years, the time has come to produce publications about the numerous interventions that have been carried out. We lack monographs and a critical mass of studies proportional to the work done during recent years and, thus, this is one of the main priorities for the next few years in many parts of Iberia. Moreover, this initiative should bring about the publication of a great number of studies.

The second course of action that must be promoted in the future is that of Science Archaeology. By way of example, although there have been some exceptions, there have not been many studies undertaken in recent years from the perspective of environmental archaeology. This is one of the fields in which the distance between the practice of historical archaeology in the north and south of Europe seems most evident. The lack of sophisticated programs of sampling and of a dense network of geoarchaeologist and bioarchaeologists working in medieval archaeological contexts explain these shortfalls. The scarcity of studies in fields, such as archaeobotany, archaeofauna, or physical anthropology, also explains the reasons why we currently lack monographs and territorial syntheses of substance. This tendency is reversing, thanks, in part, to the academic training of postdocs and researchers from abroad who are revitalizing our methodological outlook. Nevertheless, the de facto lack of Science Archaeology in Iberian universities greatly limits the speed with which change occurs.

Medieval Archaeology in Iberia is also defined by its atheoretical character, which is due, in turn, to the absence of debate regarding the construction of the archaeological record, and even to an explicit refusal to engage in theoretical reflection. The strong imprint of cultural historicism (which has marked the practice of "Visigothic archaeology"), an excessive dependency on the paradigms and concerns raised by the practitioners of medieval history, and the empiricism that in many occasions has led rescue archaeology, helps to explain this state of affairs. It is true, as has been pointed out here, that historical materialism and certain processual schools of thought enjoyed significant development in the 1980s and 1990s, with the creation of an archaeology of the state, and of the peasantry, although their influence has nowadays been severely limited. Post-processual approaches, on the other hand, continue to be a clear influence on the work of new researchers, although this tendency is in large measure determined by Anglo-Saxon trends. A critical reconsideration of how to interpret the archaeological records in its current context (characterized by the implosion of many post-processual schools of thought and the collapse of a particular way of doing archaeology in the light of the

developments of the last few decades) remains the fundamental challenge facing medieval archaeology in particular, and all archaeology in general.

In thematic terms, we can talk without exaggeration of a substantial research agenda, given that there are many projects currently underway. We do not yet have a detailed synthesis on the social and territorial transformations that took place in Portugal in the early Middle Ages, and this is in fact one of the few territories that C. Wickham did not include in his monumental work *Framing the Early Middle Ages*. Iberia remains, moreover, one of the most fertile territories of Europe when it comes to studying the process of state formation in the early Middle Ages, although we still lack a theoretical starting point and the empirical data with which to frame our analyses. We have sound studies at our disposal, as well as social theory, regarding the origins of the *andalusí* state, but analysis of the emergence of Asturian, Castilian, or Navarrese proto-state formations in northern areas, to cite only a few examples, is still underdeveloped. The study of the archaeology of centers of power is, undoubtedly, one of the best strategies to adopt as we continue to analyze these processes. Equally, the emergence of peasant communities that can be observed in large areas of Iberia between the fifth and eighth centuries contrasts markedly with the relative "silence" that characterizes other regions. Further to this, archaeology of the peasantry is allowing us to overcome the anachronistic ethnic approach that is still characteristic of the practice of "Visigothic archaeology."

Insofar as studies of *andalusí* society are concerned, one must concede that the high level of theoretical debate that had characterized research in the 1990s has now diminished as a result of the segmentation of research debates. Among the themes awaiting in-depth analysis, it would be useful to address the study of non-irrigated lands in the production processes of peasant communities, and the articulation of the city-*alquería* relationship; also useful would be intensive analyses of the inhabited and exploited spaces during the emiral and Caliphal periods, which might allow for the creation of analogies with insights which have already arisen from the study of urban centers.

There remains much to do with regard to the analysis of feudal societies. In diachronic terms, the study of the high Middle Ages (thirteenth to fifteenth centuries) continues to be penalized by an ingrained prejudice that has it that its greater wealth of written sources makes the use of archaeology unnecessary or too expensive, in spite of the fact that there exist urban records of great quality. For this reason, the focus of attention has fallen upon the study of the formation of feudal society in the high Middle Ages via the analysis of themes such as the formation of villages, the study of centers of power or the phenomenon of "*incastellamento*." The archaeological study of monastic lordships, the analysis of the forms of power over people and resources via the bioarchaeological record, research on grazing lands, or the extensive study of mountain areas through resources such as LiDAR are some of the themes in which work has begun and from which significant innovations may result in the next few years.

Moreover, another line of investigation which has been developing in recent years, although it has yet to be adequately systematized, is the archaeological analysis of minorities. For example, the archaeological study of Jewish settlements in Iberia now enjoys a great deal of evidential support, such as funerary sites at Montjuic (Barcelona) or Pamplona, Jewish quarters such as those of Lorca and Estella, or synagogues such as those of Alcudia at Elche, or Santa María la Blanca at Toledo. Nevertheless, we still lack adequate syntheses which go beyond empirical analyses to approach themes such as the exclusion and social articulation of these communities.

Cross-References

- ▶ British Isles: Medieval Archaeology
- ▶ Europe Incastellated: Medieval Archaeology
- ▶ France: Medieval Archaeology
- ▶ Italy: Medieval Archaeology
- ▶ Medieval Archaeology

Further Reading

Arqueologia de la arquitectura. n.d. Available at: http://arqarqt.revistas.csic.es/index.php/
Arqueologia Medieval. n.d. Available at: http://www.camertola.pt/info/publicacoes?tid=33
Arqueología Medieval. n.d. Available at: http://www.arqueologiamedieval.com
Arqueología Medieval. Revista Catalana d'Arqueologia Medieval. n.d. Available at: http://www.raco.cat/index.php/ArqueologiaMedieval
Arqueología y Territorio Medieval. n.d. Available at: http://www.ujaen.es/revista/arqytm/
Barceló, M., ed. 1988. *Arqueología medieval en las afueras del 'medievalismo'*. Barcelona: Crítica.
Boletín de Arqueología Medieval. n.d. Available at: http://aeam.es/publicaciones_revista.htm
Boone, J. 2009. *Lost civilization: Spain and Portugal's contested Islamic past*. London: Duckworth.
Caballero Zoreda, L., and P. Mateos Cruz, eds. 2000. *Visigodos y omeyas: un debate entre la Antigüedad Tardía y la Alta Edad Media*. Madrid: CSIC.
Congresos internacionales de cerámica medieval en el Mediterráneo. n.d. Available at: www.mmsh.univ-aix.fr/aiecm2
Debates de Arqueología Medieval. n.d. Available at: http://www.arqueologiamedievaldebates.com
Ferreira Fernandez, I.C., and S. Macias. 2011. Islamic and Christian medieval archaeology. In *The historiography of medieval Portugal (c. 1950–2010)*, ed. J. Mattoso, 153–178. Lisboa: Instituto de Estudos Medievais.
García Sanjuán, A. 2006. El concepto tributario y la caracterización de la sociedad andalusí: treina años de debate historiográfico. In *Saber y sociedad en al-Andalus. IV-V Jornadas de Cultura Islámica*, ed. A. García Sanjuán, 81–152. Huelva: Universidad de Huelva.
Gomes, R.V. 2002. O Século XX e a Arqueologia Muçulmana em Portugal. *Arqueologia e História* 54: 203–221.
Gutiérrez González, J.A. 2003. *Peñaferruz. El castillo de Curiel y su territorio*. Gijón: VTP.
Gutiérrez Lloret, S. 1996. *La Cora de Tudmir: de la Antigüedad Tardía al mundo islámico. Poblamiento y cultura material*. Madrid: Casa de Velázquez.
Izquierdo Benito, R. 2008. *La cultura material en la Edad Media. Perspectivas desde la arqueología*. Granada: Universidad de Granada.
Kirchner, H. (ed.) 2010. *Por una arqueología agraria. Perspectivas de investigación sobre espacios de cultivo en las sociedades medievales hispánicas*. British archaeological reports international series 2062. Oxford: Archaeopress.
Macias, S. 1996. *Mértola Islâmica. Estudo histórico-arqueológico do barrio da Alváçova (séculos XII-XIII)*. Mértola: Campo Arqueológico de Mértola.
Malpica Cuello, A., ed. 1998. *Castillos y territorio en al-Andalus*. Granada: Athos-Pérgamos.
Quirós Castillo, J.A. 2009. *The archaeology of early medieval villages in Europe*. Bilbao: University of the Basque Country.
Quirós Castillo, J.A., and B. Bengoetxea Rementería. 2010. *Arqueología III. Arqueología medieval y post-medieval*. Madrid: UNED.
Salvatierra Cuenca, V. 2013. La primera arqueología medieval española. Análisis de un proceso frustrado (1844–1925). *Studia Historica. Historia Medieval* 31.
Salvatierra Cuenca, V., and A. Canto. 2008. *Al-Ándalus. De la invasión al califato de Córdoba*. Madrid: Síntesis.
Torres, C. 1987. *Cerâmica islâmica portguesa*. Mertola: Campo Arqueológico de Mértola.
Torro, J., and E. Guinot. 2012. *Hidráulica agraria y sociedad feudal. Técnicas, prácticas, espacios*. Valencia: PUV.
Vallejo Triano, A. 2007. *La ciudad califal de Madīnat al-Zahrā' (Medina Azahara)*. Córdoba: Almuzara.
Vigil-Eescalera Guirado, A. 2007. Granjas y aldeas altomedievales al Norte de Toledo (450–800 d C). *Archivo Español de Arqueología* 80: 239–284.

Iberian Mediterranean Basin: Rock Art

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Introduction

Under this designation, a list of 757 sites located in the Mediterranean side of the Iberian Peninsula was declared World Heritage in 1998, as "the largest group of rock-art sites anywhere in Europe," "providing an exceptional picture of human life in a seminal period of human cultural evolution" (Criterion III: http://whc.unesco.org/en/criteria/). Today the list has been updated and it includes more than 800 rock art sites.

The nomination refers to the main post-Paleolithic rock art tradition of this region, also known as Levantine rock art (LRA). Nevertheless the sites on the list also contain rock art motifs of two other major post-Paleolithic rock art traditions known as Macroschematic and Schematic rock art. To be consistent with the UNESCO declaration, this entry will focus on Levantine rock art.

Definition

LRA is one of the three main post-Paleolithic rock art traditions depicted in open-air sites located along the major river basins of the Mediterranean side of the Iberian Peninsula.

LRA was scientifically documented in 1903, several years after the discovery of Altamira Paleolithic paintings, when the Spanish archaeologist Juan Cabré discovered some naturalistic red deer at La Roca dels Moros site (Calapatá, Teruel). More than a 100 years later, the number of sites

Iberian Mediterranean Basin: Rock Art, Fig. 1 Carabasses site (Vilafranca, Castellón). (Photo by I. Domingo)

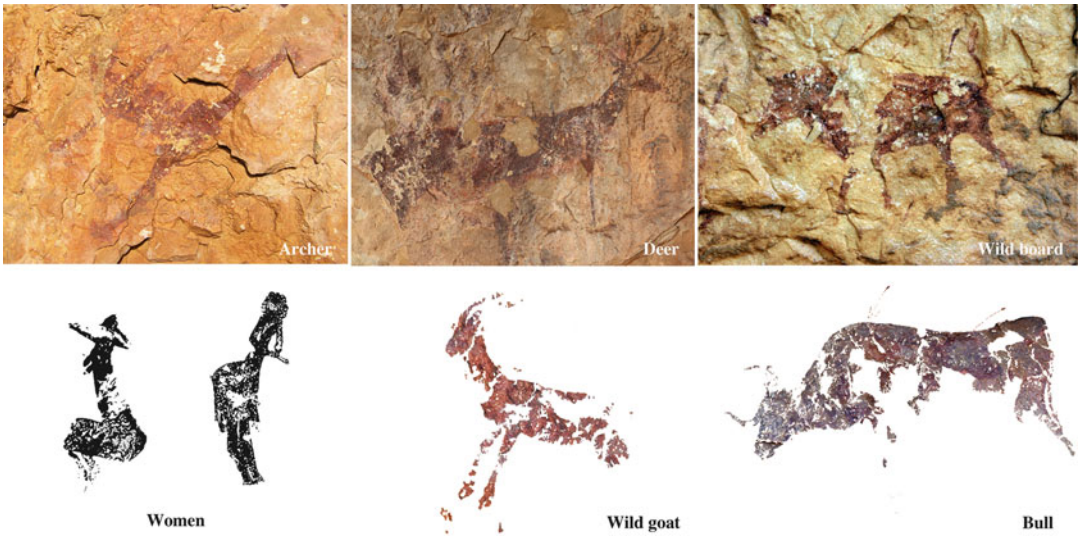

Iberian Mediterranean Basin: Rock Art, Fig. 2 Main motifs depicted in Levantine rock art panels. (Photos by I. Domingo)

has significantly increased to expand along a wide region of the Mediterranean side of Spain: from the Pyrenees to Almeria (Fig. 1).

In a broad term the corpus of Levantine art includes mainly painted, and rarely engraved, motifs depicting naturalistic animals (deer, wild goat, bulls, wild boar, horses, insects, and so on), humans (male and female and occasionally children), and their equipment (bows, arrows, different sorts of bags or baskets, clothing and adornments, and so forth) (Fig. 2).

Contrary to Paleolithic rock art, where internal details are depicted (such as eyes, mouth, and animal coat), LRA artists chose to depict flat silhouettes with very fine and modelling strokes. The species and sometimes the sex (especially for humans and deer) are identified according to the characteristic profile of their silhouettes.

Breast, skirts, and wide pants are usually interpreted as female wear, whereas their absence or the presence of weapons (bows and arrows) is considered characteristic of males, even when the sex is not explicitly represented.

Compared to Paleolithic rock art, LRA uses an exiguous number of painting techniques: solid infill, parallel-line infill, contours, and single brushstroke. The colors used are mainly red, black, and white, with a significant prevalence of the former. In the last few decades, bichrome paintings and engravings have also been discovered, although these two techniques are still uncommon and restricted to a limited number of sites and regions (Domingo 2012a).

From the point of view of composition, LRA is mainly an art of scenes, although examples of

Iberian Mediterranean Basin: Rock Art, Fig. 3 Hunting scene (Cova dels Cavalls site, Valltorta Gorge, Castellón). (Martínez and Villaverde 2002)

other compositional patterns also occur, such as several known cases of exclusive and isolated bulls.

Key Issues/Current Debates/Future Directions/Examples

Despite more than one hundred years of research on this art, key issues such as the main subject matter, the chronology, the identity of the authors, and the sequence of this art still inform major ongoing discussions.

For decades LRA has been characterized as dealing primarily with hunting scenes (Fig. 3).

However, hunting scenes are but one among a wide variety of subject matters which include different sorts of social activities: warrior parades and conflicts, humans collecting honey, climbers, and maternity scenes. Furthermore, recent studies have demonstrated that the former representations of humans in LRA are not linked to hunting activities and that hunting scenes emerge only in the middle part of the sequence.

Chronology

LRA was originally dated to the Paleolithic and described as a regional variant of the Franco-Cantabrian rock art from Eastern Spain. However, in contrast to the Paleolithic cave art, LRA was depicted in open-air rockshelter sites. Similarly, while Paleolithic rock art mainly depicts naturalistic animals, LRA includes both naturalistic animals and dynamic human figures interacting in all sorts of narrative scenes. Currently, it is accepted that these significant differences between Paleolithic and LRA are not due to regional but chronological differences. Superimpositions of LRA over Macroschematic rock art, with parallels in Early Neolithic ceramic decorations, provide a minimum date for this tradition or at least for some of the chronological phases identified within this tradition (Martí and Hernández 1988). Thus, it is widely accepted that Levantine rock art was produced during the Neolithic. Whether the artists were the last local hunter-gatherers marking their landscapes as a response to the arrival of Early Neolithic farmers from the Middle East or they were the newly arrived farmers exploring and

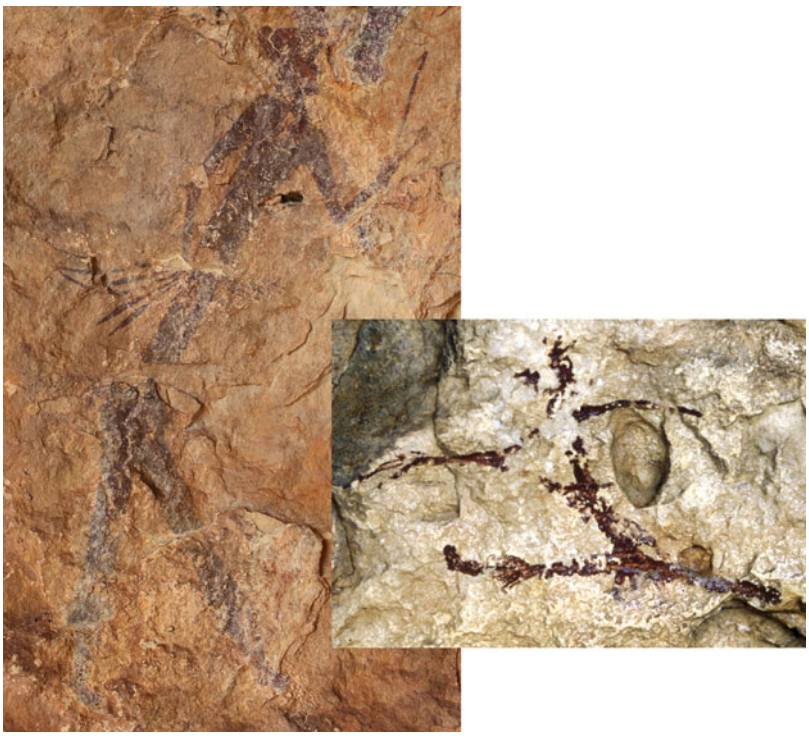

Iberian Mediterranean Basin: Rock Art, Fig. 4 Humans change significantly along the sequence, starting with naturalistic figures (*left*) (Tortosilla rockshelter, Ayora, Valencia). (Photo by I. Domingo) and ending with small linear ones (*right*) (Cingle de la Mola Remigia rockshelter, Ares del Maestre, Castellón). (Photos by V. Villaverde)

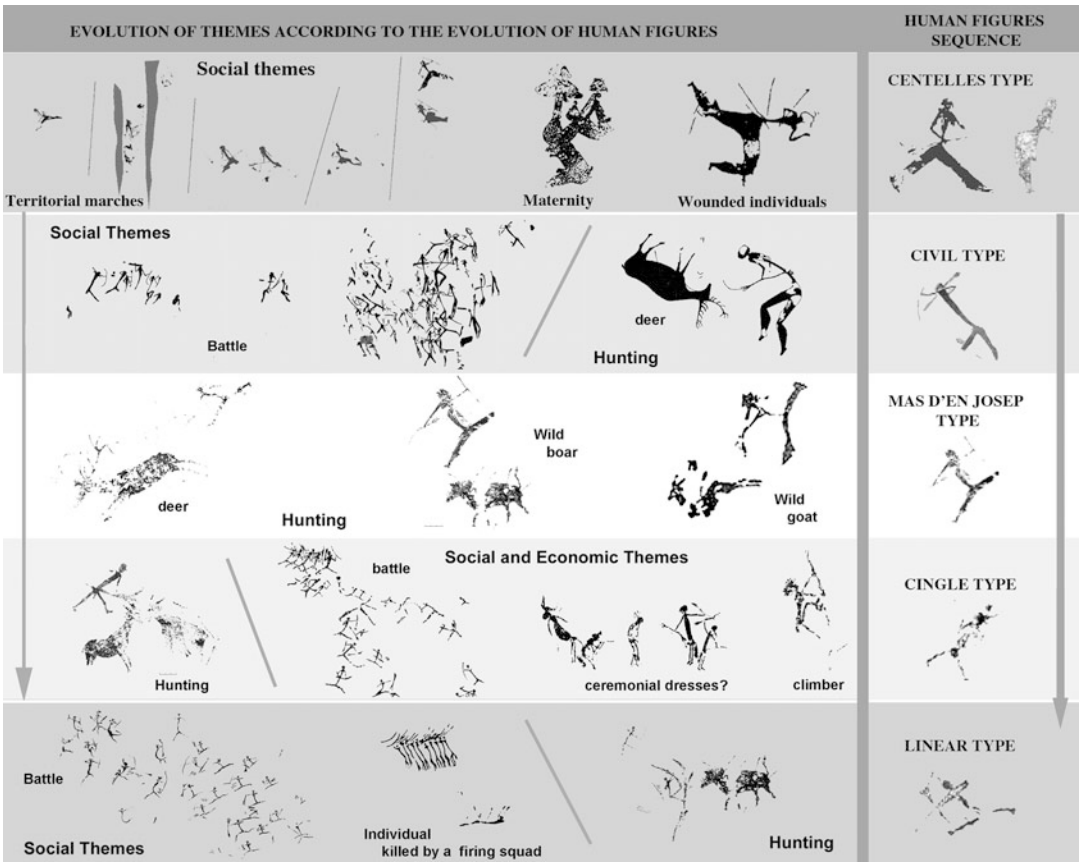

Iberian Mediterranean Basin: Rock Art, Fig. 5 Evolution of subject matters according to the stylistic sequence of human figures (Domingo 2012b)

marking their new landscape to secure access to new resources is still under discussion (for a further discussion, see Marti and Juan-Cabanilles 2002; Martí 2003; Utrilla and Martínez 2007a; Cruz and Vicent 2007; Villaverde et al. 2012).

Sequence

LRA sites are palimpsests, with motifs and scenes of different styles and sizes gradually added to the same panels along different periods. Superimpositions and important variations in style, techniques, patterns of composition, and subject matter provide an order of styles, evidence of a complex and lasting tradition.

Contrary to human figures, the naturalism of animals remains more or less consistent throughout the Levantine sequence. Thus, humans are key to analysing the evolution of this rock art tradition.

Formal variations of humans from the Valltorta-Gasulla complex of sites show an evolution of at least five stages, starting with large, naturalistic humans, with body volume, accurate proportions, and all sorts of adornments (bracelets, bags, headdresses), and ending with small, schematic figures which lack body volume and which are out of proportion (Domingo 2005) (Fig. 4).

Similar schemas have been also defined in other Levantine territories, such as Aragón (Utrilla and Martínez 2007) or the High Lands of the Segura River (Mateo 2006).

These five stages also reflect certain thematic patterns within the Levantine sequence. Interestingly, there is an absence of hunting scenes in the initial stylistic episode, focused on different sorts of social activities (human parades, maternity scenes, wounded individuals, death scenes) (Fig. 5).

When hunting is depicted later on in the sequence, it starts from the specialized hunting of a deer. Only later in the sequence, we observe a broadening and diversification of the species (deer, wild boar, and wild goat). At the end of the sequence, both social and hunting activities are depicted but also other new themes such as scenes with people collecting honey and climbers.

In the same way, mapping the geographic distribution of specific motifs, techniques, or subject matters allows us to identify different schools or territorial behavior. For example, while bulls are especially significant in Castellón, Teruel, and Albacete provinces, wild boars are almost unique to "el Maestrazgo" (Domingo et al. 2003). So common traits do not mask regional specificities and different rhythms of change throughout the Levantine territory.

Thus, talking globally about LRA in the twenty-first century is to accept that a common tradition spread along a wide territory of the Iberian Peninsula, but time and the territorial behavior of the human groups caused gradual changes within this tradition.

Levantine rock art should be described as a network of artistic territories resulting from different rhythms of change and adaptation.

Cross-References

- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ Rock Art, Forms of
- ▶ Spain: Archaeological Heritage Management
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Cruz, M., and J. Vicent. 2007. Rock art as an archaeological and social indicator: The neolithisation of the Iberian Peninsula. *Journal of Anthropological Archaeology* 26: 676–697.

Domingo, I. 2005. *Técnica y ejecución de la figura en el Arte Rupestre Levantino. Hacia una definición actualizada del concepto de estilo: validez y limitaciones*. València: Servei de Publicacions de la Universitat de València. Available at: http://hdl.handle.net/10803/10173

Domingo, I. 2012a. Human figures, techniques and territories: Towards a technical redefinition of Levantine rock art. In *The Levantine question. Post-Palaeolithic rock art in the Iberian Peninsula*, ed. J.L. García, H. Collado, and G. Nash, 117–144. Budapest: Archaeolingua.

Domingo, I. 2012b. A theoretical approach to style in Levantine rock art. In *A companion to rock art*, Blackwell Companions to Anthropology series, ed. J. McDonald and P. Veth, 306–322. Boston: Blackwell.

Martí, B. 2003. El Arte Rupestre Levantino y la imagen del modo de vida cazador: entre los narrativo y lo simbólico. In *Arqueología e Iconografía. Indagar en las imágenes*, ed. T. Tortosa and J.A. Santos, 59–75. Roma: L'Erma di Bretschneider.

Martí, B., and J. Juan-Cabanilles. 2002. La decoració de les ceràmiques neolítiques i la seua relació amb les pintures rupestres dels abrics de la Sarga. In *La Sarga. Arte rupestre y territorio*, ed. M.S. Hernández and J.M. Segura, 147–170. Alcoi: Ajuntament.

Martí, B., and M.S. Hernández. 1988. *El neolític valencià. Art rupestre i cultura material*. València: Servei d'Investigacions Prehistòriques. Diputació de València.

Martínez, R., and V. Villaverde. coord. (with the collaboration of Guillem et al.) 2002. *La Cova dels Cavalls en el Barranc de la Valltorta,* Monografías del Instituto de Arte Rupestre. Vol. 1. Tírig: Instituto Valenciano de Arte Rupestre.

Mateo, M.A. 2006. Aproximación al estudio de la figura humana en el arte rupestre Levantino del Alto Segura. *Cuadernos de Arte Rupestre* 3: 125–160.

Utrilla, P., and M. Martínez. 2007a. Arte Levantino y territorio en la España Mediterránea. *Fumdhamentos* V: 109–129.

Utrilla, P., and M. Martínez. 2007b. La figura humana en el arte Levantino aragonés. *Cuadernos de Arte Rupestre* 4: 163–205.

Villaverde, V., R. Martínez, P. Guillem, E. López, and I. Domingo. 2012. What do we mean by Levantine rock art? In *The Levantine question. Post-Palaeolithic rock art in the Iberian Peninsula*, ed. J.L. García, H. Collado, and G. Nash, 81–115. Budapest: Archaeolingua.

Further Reading

Alonso, A., and A. Grimal. 1996. *El Arte rupestre prehistórico de la cuenca del Río Taibilla (Albacete y Murcia): nuevos planteamientos para el estudio del Arte Levantino*. Barcelona: LEVANTINO.

Domingo, I. 2008. From the form to the artists: Changing identities in Levantine rock art (Spain). In *Archaeologies of art. Time, place and identity*, Series One World Archaeology, ed. I. Domingo, D. Fiore, and S. May, 99–129. Walnut Creek: Left Coast Press.

Domingo, I., E. López, V. Villaverde, P.M. Guillem, and R. Martínez. 2003. Las pinturas rupestres del Cingle del Mas d'En Josep (Tírig, Castelló). Consideraciones sobre la territorialización del arte levantino a partir del análisis de las figures de bóvidos y jabalíes. *Saguntum* 35: 9–50.

García, J.L., H. Collado, and G. Nash, eds. 2012. *The Levantine question. Post-Palaeolithic rock art in the Iberian Peninsula*. Budapest: Archaeolingua.

López, J.A., R. Martínez, and C. Matamoros. 2009. *El arte rupestre del Arco Mediterráneo de la Península Ibérica. 10 Años en la lista del Patrimonio Mundial de la UNESCO. Actas del IV Congreso. Valencia 3, 4 y 5 de diciembre de 2008*. Valencia: Generalitat Valenciana. Available at: http://www.cult.gva.es/dgpa/Descargas/Publicaciones/arte_rupestre/index.html

Utrilla, P., and V. Villaverde, coord. 2004. *Los grabados levantinos del Barranco Hondo* (*Castellote*, *Teruel*). Zaragoza: Gobierno de Aragón.

Viñas, R. 1982. *La Valltorta. Arte rupestre del Levante español*. Barcelona: Ed. Castell.

Ichthyoarchaeology

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State of Knowledge and Current Debates

Introduction

Fish remains include bones, otoliths, teeth, and scales, but their analysis has been a comparatively recent development within zooarchaeological research. Given their generally small size and the large taxonomic diversity fishes exhibit, the late implementation of adequate retrieval techniques and a general lack of reference collections no doubt contributed to that effect. Fish studies provide crucial evidence to address a variety of paleocultural and paleoenvironmental issues and have more recently helped raise awareness about the importance of historical and prehistoric fish assemblages to contribute to the conservation and management of aquatic resources (Cleyet-Merle 1990; Wheeler and Jones 1989).

Definition

The analysis of fish remains from archaeological sites for the purposes of reconstructing material and nonmaterial aspects of past human societies and the paleoecology of former fish populations and aquatic environments.

Historical Background

The earliest studies of archaeological fishes were carried out by zoologists around the mid-nineteenth century. The papers by Hermann Schlegel on the fishes from medieval Dorestad (1842) and of Japetus Steenstrup on those from the Ertebølle culture, around 1850, are credited as the pioneer works. During the ensuing century, and except for work done on French Magdalenian sites (Sauvage 1875) and the review by Clark (1948) on prehistoric fishing in Europe, archaeological fish studies remained the *Cinderella* of zooarchaeology.

During the 1950s and 1960s, coinciding with the development of zooarchaeology, papers that one could label ichthyoarchaeological were mostly written by paleontologists and ichthyologists with scarce interest for anthropological issues. These studies dropped sharply after the 1970s and have always been of restricted value to archaeologists. The exception was Flannery's 1968 paper on the broad spectrum revolution, where fishes were taken as evidence for a broadening of the human predatory niche starting with the Upper Paleolithic.

The 1970s witnessed a profound change in this state of affairs. Largely through the efforts of scholars such as Jean Desse in France and of Johannes Lepiksaar in Sweden, fish remains became the focus of interest of archaeologically minded scientists. Casteel's 1976 handbook, mostly concerned with methodological issues, contributed further, but it was the birth of the Fish Remains Working Group in 1981 that helped to consolidate ichthyoarchaeology as a subdiscipline within zooarchaeology. The 19 meetings of the FRWG, held between 1981 and 2017,

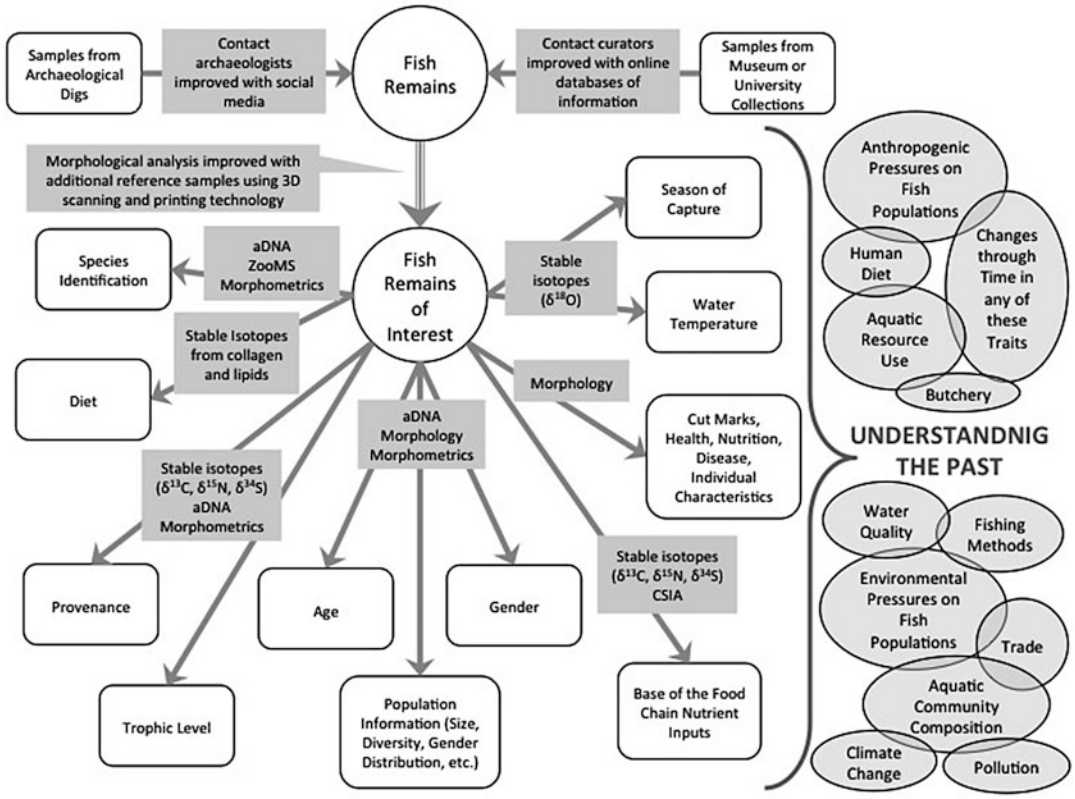

Ichthyoarchaeology, Fig. 1 An overview of the interplay between techniques and research questions ichthyoarchaeological analyses help address (Taken from Jones and Richter 2017)

have insured a fostering of cooperation among scholars and constitute the yardsticks where new analytical tools have been introduced and ideas confronted. There are now well over 100 ichthyoarchaeologists in the world representing some 40 countries. These have proved instrumental for grounding fishes firmly within the theoretical framework of archaeological research programs (Fig. 1).

Key Issues/Current Debates

Retrieval and Sampling

Few fishes feature large bones, most remains reaching only to a few centimeters. Such contingency precludes an adequate retrieval by hand. Indeed, hand-collected samples produced the biases that lurk behind some of the old "paradigms," like Roman fish-salting installations being exclusively devoted to the processing of tunas or fishing in Denmark during the Mesolithic being just focused on pike.

Although sieving is necessary to insure an effective recovery of remains, and experiments have shown that species richness and diversity increase significantly when sediments are sifted through meshes of 3–1 mm (Zohar and Belmaker 2005), the decision as to what kind of mesh size to use will depend on the fishes one is likely to encounter, the type of sediment, and the state of preservation of the remains. Bødker-Enghoff (2005) evidenced that only a mesh size of 0.6 mm was capable of retrieving significant amounts of remains from the smallest fishes, as is the case of the smelt (*Osmerus eperlanus* L.). In general, ineffective retrieval of material can be ascertained through the high percentage of identifiable remains, a preponderance of the most robust elements (e.g., vertebrae), and their large average size.

Given the nonrandom distribution of remains that many fish assemblages exhibit, sampling constitutes a crucial issue. An appropriate sampling strategy requires knowledge of various kinds. During Roman times, for example, the processing of tunas on the beach where the animals were landed meant that most of the skeletal remains never reached the salting factory. If ever to gain knowledge about Roman tuna catches, the archaeologist should thus insure surveys of the coastal zones around those factories, to spot and eventually excavate such "fish cemeteries" along with the excavation of the site proper.

Further sampling considerations should be taken into account when molecular analyses are intended on fish assemblages. Aside from the sensible practice of selecting well-preserved specimens – preferably freshly excavated – an important issue is for some molecular analyses, in particular isotopes, to focus on taxonomically identified remains. Fish species, even closely related ones, exhibit quite different ecologies. Even specimens from the same species often exhibit different ecological preferences depending on their age, size, or sex. This generates different molecular signatures even for animals living in a similar environment. Although this has been obvious from the start in the case of terrestrial faunas, fish are sometimes pooled into loosely defined groups such as "marine/freshwater," etc. when the reality is far more complex. Freshwater input, continental shelf extension, habitat depth, and mobility are some of the variables that have a major impact on fish molecular analyses. For these analyses to yield meaningful results in fish, different specimens from each of the identified species need to be taken into account. Meaningful sampling can be accomplished by selecting right or left specimens in the case of the parasagittal bones, elements of different sizes, or specimens from different contexts.

Taphonomy

Taphonomic data are crucial to correctly frame the analysis and interpretation of an archaeological fish assemblage. Although at most inland sites man has traditionally been credited as the main accumulator of fish remains, such is not necessarily the case at coastal deposits. Many piscivorous animals, in particular marine birds, accumulate large numbers of fish remains (Erlandson and Moss 2001). Likewise, natural deaths, including episodic mortalities along a seashore or deaths resulting from the drying out of isolated pockets of water, are documented at both the local and regional scale to produce fish accumulations. Setting apart such "background faunas" from the archaeologically meaningful ones is far from straightforward and involves a combination of actualistic data (e.g., documenting those species of fish that suffer these episodes or are the targeted prey of certain predators), and taphonomical analyses proper, including microspatial studies of remains in situ, conditions of preservation, presence of articulated specimens, etc. Gnaw marks and traces of digestion often prove ambiguous, given their limited potential to yield species-specific signatures.

Fish taken by humans exhibit many kinds of manipulative marks. In general, biostratinomic (i.e., pre-burial) signatures, associated with angling, gutting, de-fleshing, or cooking, are not that frequent. Often, it is to post-consumption processes that the analyst turns in order to gain information about the history of the fish deposit. These processes include trampling, scavenger attack, and fossil diagenesis (i.e., post-burial events). Only in industrial settings, where large numbers of fishes undergo a similar mass processing, or in large fishes, where butchering often implies hacking, can the analyst find clear signs of how were fishes handled prior to consumption.

Analysis of the sediment may prove helpful in explaining the taxonomical and/or skeletal composition of a fish assemblage. Barrett (1995) reported that a pH of 8 was the threshold below which otoliths were unlikely to survive in a deposit. These kinds of data are more useful as predictors of survivability when combined with ethnographic and contextual information. There also exist biological phenomena that dictate differences. Ossification is very different in the two main groups of fishes (i.e., bony and cartilaginous) but also in the different elements of any given skeleton. Here, lipidograms may provide

rough blueprints as to what one may expect in terms of relative abundances. Idiosyncratic features, such as the calcium resorption taking place in the cranial bones of salmonids when in freshwater, have led to remarkable misinterpretations (i.e., the pseudo-hypothesis of salmons being beheaded). Such contingencies, along with others such as how rapidly remains were buried after discard or how active were the fungi and bacteria in a particular soil, create skeletal and taxonomic abundance profiles that have little to do with human behavior. Provided with the adequate tools, the analyst should nevertheless manage to "read in-between the lines."

In the case of the preservation of biomolecules on fish remains, the general practice is to apply the same criteria defined for other groups. Some authors have nevertheless raised concern on the impact of traditional collagen preservation criteria on fish samples that should be taken into account in the interpretation of data (Szpak 2011; Guiry et al. 2016a, b).

Identification

Some 95% of the bones in a fish skeleton are not diagnostic and most remains survive only as fragments. Even diagnostic elements exhibit such anatomical and taxonomic variability to render identification an extremely laborious task (Fig. 2). Identification of fish remains needs to be carried out with an adequate reference collection, but what adequate means is not always clear. Indeed, since the ranges of most marine species have experienced dramatic shifts in the past (Kettle et al. 2010) and many species have been traded over long distances, building up a reference collection often requires incorporating species not present in the particular area one intends to investigate. It also proves useful to incorporate specimens of different sizes from the same species, given that size implies morphological differences in certain elements. Reference collections for the purposes of ichthyoarchaeology are still uncommon in museums, and this has forced many analysts to build up their own collections.

No practical alternative exists for the reference collection. Atlases and equivalent publications are rare and often not that useful, except perhaps for the experienced analyst. There exist logistic reasons for this being so (e.g., the impossibility of providing a comprehensive survey of taxa and elements), but more often these reasons have to do with practical considerations (e.g., fragments are never depicted). Fish bone morphology is a size-dependent variable so that one species may exhibit different morphologies with different sizes. This is a general phenomenon for vertebrates that grow throughout their life. In other instances, closely related species exhibit diagnostic morphologies only above a certain size threshold so that identification of juveniles only proceeds down to the level of genus or family. These taxonomic categories often prove far too coarse to provide data of interest, given the marked differences at the level of diet, distribution, and behavior that closely related species exhibit.

Among the alternative identification methods, frontal X-radiographs of vertebrae have proved of value in some cases (e.g., salmonids, gadids), less so in others (e.g., catfishes, characids). Radiographs are also impractical for reasons having to do with logistics and safety. For these reasons, they have been essentially abandoned although from time to time they resurface at the front line of research.

Current genetic methods enable highly specific identification from modern fish, yet ancient DNA fish studies are still lagging in development when compared with other vertebrates despite them having provided spectacular results in certain groups (Yang et al. 2004). Taxonomic diversity partly explains such state of affairs, as does the porous nature of fish bones that facilitates "drainage" of molecules into the sediment. Another major drawback is that, due to the conditions of preservation on many sites, success rates of fish DNA recovery are usually low (i.e., 2–5%). Although aDNA is not a viable alternative to osteology, it may often help address issues where the precise identification of certain remains could be of great relevance. Such would be the case of genetic traits not recorded on the skeletal elements that reveal the genetic structure and phylogeography of former fish populations.

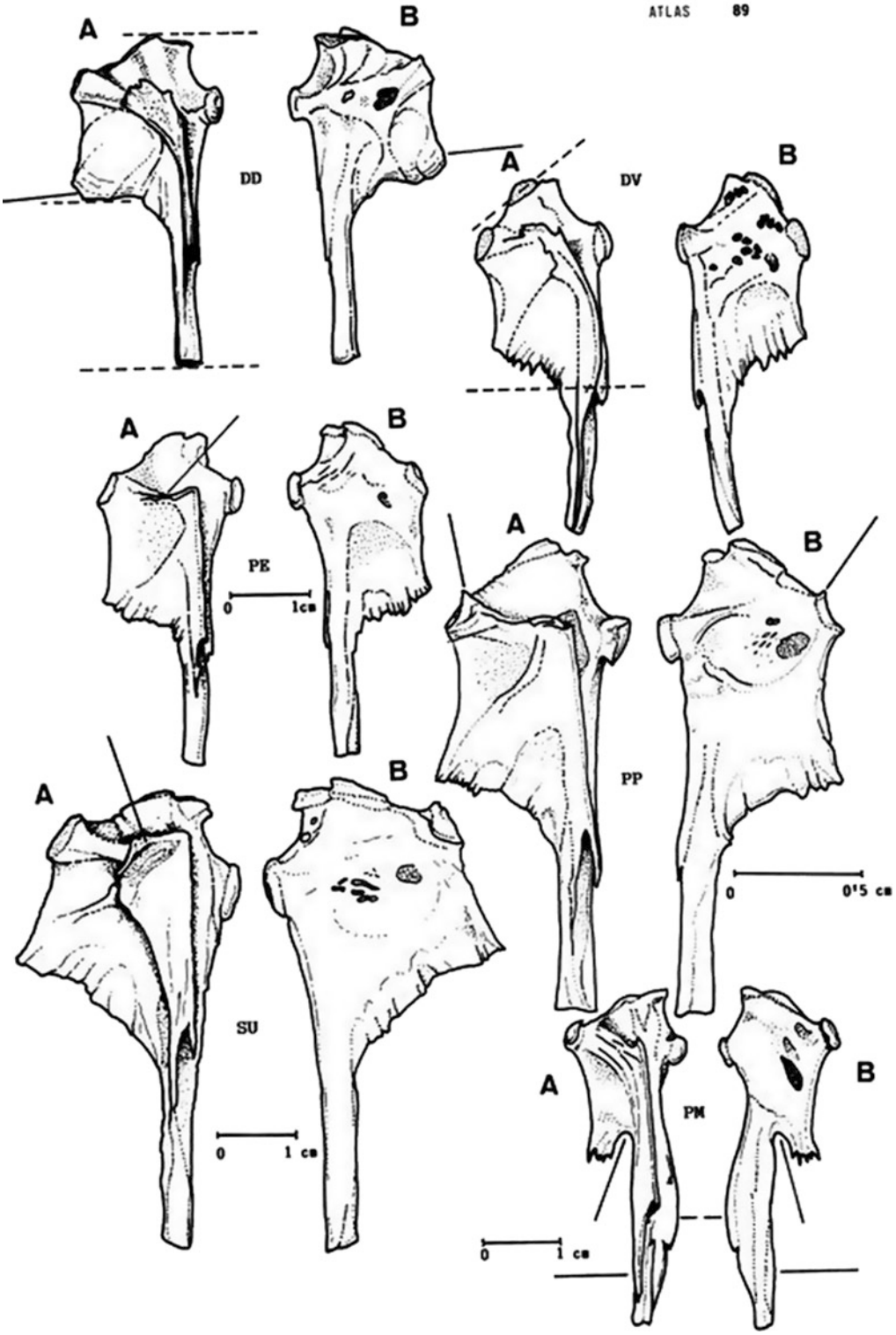

Ichthyoarchaeology, Fig. 2 (continued)

One promising technique of taxonomic identification is the "molecular barcode" of the bone collagen protein. *Zooarchaeology by Mass Spectrometry* (ZooMS) measures the differences between peptide masses in the collagen protein through mass spectrometry, identifying fish species in much the same way as DNA fingerprinting does (Collins et al. 2009; Richter et al. 2011). Given that sequences can be rapidly and cheaply identified, that collagen persists in most zooarchaeological samples, that the analyses require only a few milligrams, and that the specificities of its signatures are highly diagnostic, ZooMS should witness an explosive development in the not too distant future. Likewise, and given that presently only a few fish species have been fingerprinted, an important effort is devoted to enlarge the reference collections with fish taxa of archaeological relevance (K. Korzow-Richter and M. Collins, verb.com.).

Estimating Abundance and Importance

Of the major estimators of abundance, only the NISP (i.e., the number of identified specimens) and the MNI (i.e., the minimum number of individuals) have been regularly used by ichthyoarchaeologists. Given the large differences in the total number of elements among the various groups (i.e., vertebral counts range from 24 to 150), and that some species have a far larger number of diagnostic elements than others (up to 500 species-specific spines in the case of some porcupine fishes), the MNI or its equivalent alternatives, such as the MNE (i.e., the minimum number of elements), are to be preferred to the NISP. But this is only possible when samples are of a reasonable size (i.e., $\geq$500). When collections are small, interdependence presumably becomes less of a problem, and use of the MNI deflates specimen counts to ludicrously low values. Under such circumstances, analysts often turn to the NISP despite all of its inherent weaknesses.

Numerical abundance is but one way of assessing importance. Another estimator of importance is weight, often far too variable on most fishes to prove of help. Cultural indicators of importance, such as food avoidance behaviors, alternative names given to a particular species, or the prices species command on the market, depend on the availability of ethnographic and documentary records, neither of which proceed much beyond Classical Antiquity. In the case of fishes, one should also stress that social importance is not necessarily a reflection of economic importance, many species being esteemed only on account of their rarity, large size, or some extraordinary feature (e.g., poison).

An indirect way to address fish abundance, and occasionally importance, in archaeological fish assemblages is through molecular analyses. In this way, identification of osteomorphologically indistinguishable, closely related species can shed light upon the main targets of exploitation within a given species pool and contrast past to recent abundance of certain species as demonstrated for American salmonids (Speller et al. 2005). Still, the major contribution to former abundance estimation will come through population genetics studies allowing one to detect, among others, gene flow (bottlenecks) and genetic drift events linked with environmental and biogeographical phenomena as well as with human exploitation.

Size Estimation

The size of fishes provides crucial information not only about human choice, fishing technology, and selective behavior but often about the environment from where the fish assemblage was harvested.

Given that fishes grow throughout life, fish size reconstruction is a valuable provider of information in ichthyoarchaeological studies. The method rests on the relationship that exists between a particular dimension of a bone and the various lengths

Ichthyoarchaeology, Fig. 2 Hyomandibular bones of Mediterranean sea breams (Sparidae) and a grunt (Haemulidae, *lower right*). Although most of the diagnostic fish bones are quite easy to assign to family or even to genus level, assignal to species relies on very subtle differences that are often lost in the fragmented bones one retrieves in archaeological deposits (Taken from Roselló 1989)

(i.e., standard, fork, or total) of the animal. Matching archaeological specimens with their equivalents of known body size, either visually or through measurements, is the most straightforward procedure but requires large reference collections. The absence of precise equivalents renders the method unfeasible or turns it into a risky exercise of extrapolation. Another alternative is the power curve equation, using the least squares regression or an equivalent method. This one does by plotting specific bone measurements from specimens of known size against the original fish length. This is a laborious method requiring the preparation of a large number of specimens covering the whole size range of a species. This is not an easy task nowadays in the case of the largest animals. Regression equations describing such relationship are available for most of the main bones from most of the archaeologically relevant species. Large numbers of archaeological bone measurements can thus be converted into estimates of length, and these in turn used to calculate statistical parameters, such as the mean and standard deviation. These data provide the basis for reconstructing the size-frequency histogram, which represents the prehistoric fish catch (Fig. 3). One should stress that isolated values here only represent estimations. For such reason, it is advisable to allocate them within size classes that, depending on the size of the species, range from less than 1 to more than 10 cm.

The estimation of weight follows the same procedures as those of size but is far less accurate since depending on their condition, the time of the year, etc., fishes of identical size can have very different weights. Weight-frequency histograms

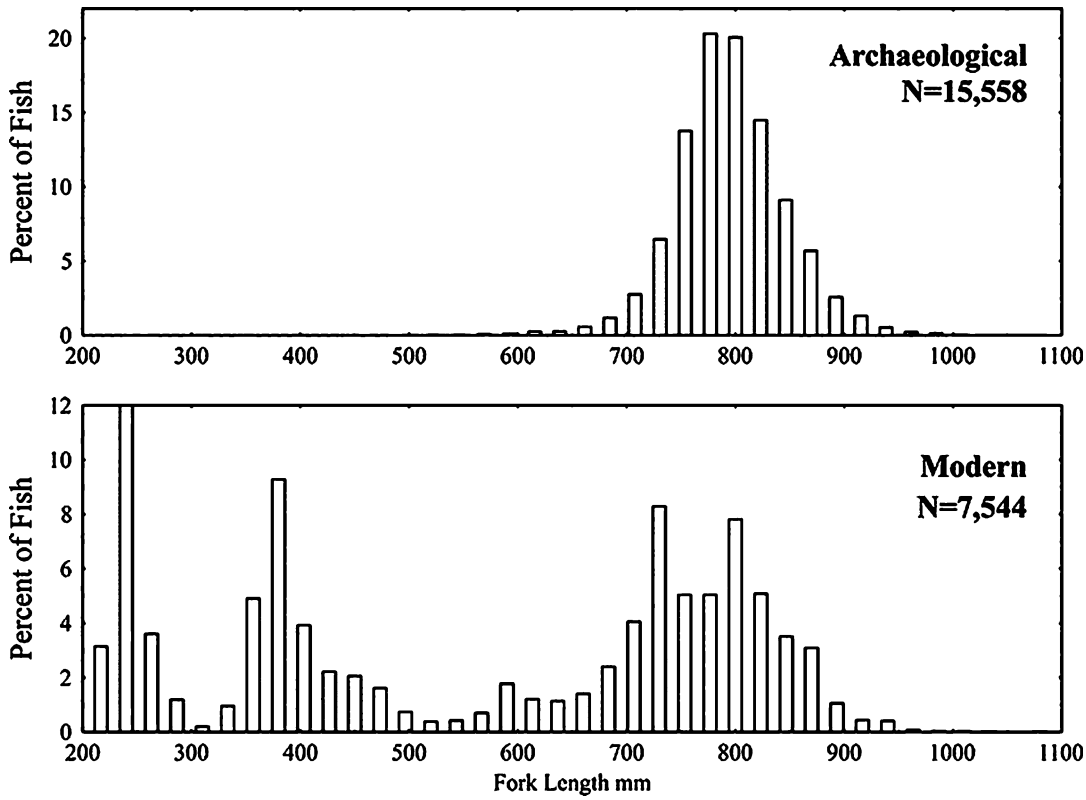

Ichthyoarchaeology, Fig. 3 Upper: Size-frequency histogram of barracouta (*Thyrsites atun*) fork lengths from the site of Long Beach (Otago, New Zealand) based on 15,558 bones. Lower: A modern trawled catch of barracouta from New Zealand. These data indicate that the prehistoric catch targeted only the largest specimens of the population (Taken from Leach 2006)

thus build on weight classes with far larger ranges than those for size.

Seasonality

Fish remains can presumably document whether a site was occupied on a permanent or a seasonal basis. However, in most cases, what the analyst manages to reconstruct is the scheduling in the catch of this specific sector within the overall animal exploitation strategy. This is possible because fishing is often a seasonal practice modulated by the migration of species during a particular time of the year, or the restriction, for human populations in the past, of marine navigation to the spring and summer months.

Seasonality is alternatively documented by the presence of certain species and the size distribution of the archaeological population and through skeletochronological techniques. These procedures rest upon actualistic studies that require a sound knowledge of the biology of the animals and how this changes from place to place (Fig. 4). Only well-dated levels, representing short-lived episodes, are likely to provide clear seasonal signatures as these tend to fade away when levels represent pooled averages from a wealth of episodic and non-episodic fishing events.

Seasonal fishing is exemplified by the presence of anadromous fishes, such as salmon and sturgeons, at inland sites. Equally informative are marine fishes such as sardines (*Sardina* sp.) and tunas (*Thunnus* sp.) that approach the shore to spawn with the onset of spring or summer. The best "bioindicators" are those species appearing only during a very short time (e.g., 1 or 2 weeks), such as the smelt. In general, the higher the latitude, the more concentrated the presence and the more reliable "bioindicators" are. The analyst only needs to insure that local fishing, not import, has been the reason for that presence. To this end, skeletal spectra, evidencing the presence of complete specimens, often prove helpful.

When fishing is conducted on a nonseasonal basis, fishes of many different sizes within the same species stand a chance of being collected. This creates a bell-shaped distribution of size classes (i.e., age groups or cohorts) devoid of marked peaks. Seasonal fishing, on the other hand, tends to concentrate on specific cohorts, producing size class histograms with

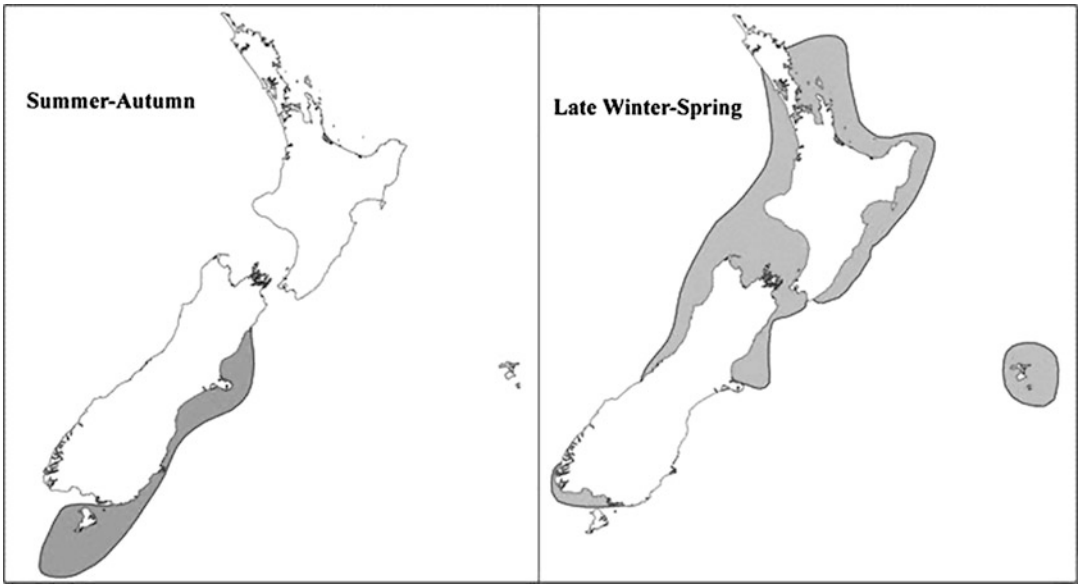

Ichthyoarchaeology, Fig. 4 The seasonal pattern of barracouta catches in New Zealand waters today. These maps provide the baseline to decide whether a particular coastal site was occupied at a specific time of the year or not (Taken from Leach 2006)

discrete peaks of abundance (i.e., non-normal distributions).

Within the realm of ichthyoarchaeology, skeletochronology, the study of the growth rings produced by organic structures, also aims at determining the moment of capture. Given that one can only assess this through the thickness of the last (i.e., outermost) growth ring, and that most archaeological specimens are eroded on their margins, the method is often of restricted value. These estimations also suffer from the small sample size that most archaeological collections exhibit and from a lack of comparative baseline data on modern samples to validate results. The few analyses carried out on modern otoliths evidence that the timing of the seasonal changes in the edges of these calcareous concretions is extremely variable, so that data from just one or very few elements is useless as a seasonality indicator. The fact that modern populations of the same species are subjected to different deposition patterns of the opaque/translucent layers adds far more uncertainty given that no reliable analogues exist for the archaeological populations. This methodology improves when combined with isotopic analyses of the otolith that provide further insights on seasonality. Measuring oxygen isotopic ratios along the growth increments allows one to more precisely define the season of capture (Hufthammer et al. 2010). The method is, alas, restricted to species that experience seasonal temperature fluctuations. Indeed, even on large archaeological assemblages, determining seasonality is impossible when the fishes were not captured during their period of fast growth. Given all these limitations, it should come as no surprise that skeletochronology is no routine procedure in ichthyoarchaeological research.

Trade and Processing

Throughout the Paleolithic and Mesolithic, the long-standing paradigm maintains that fishes were consumed either on or close to the spot they were fished. Although fish meat spoils fast when unprocessed, fresh fishes can still safely travel 25–30 km inland in a day and remain edible. The archaeological record evidences that prior to the Neolithic, non-local fishes are regular items in sites lying at short distances from the shore. The village of Dalma in SE Arabia (5000 BC) has been postulated to represent the earliest fish processing center in the world (Beech 2004). The earliest evidences of marine fishes transported far inland in this area date from the Iron Age (Rafaq, Oman peninsula first millennium BC), and it is from around this time that the first unequivocal evidences of long-distance fish trade (i.e., remains in amphorae) appear in the Mediterranean. Such trade has been often postulated to constitute a side effect of surpluses that resulted from improvements in fish catching methods (e.g., boats, seine nets) and methods for meat preservation (e.g., oil and vinegar). But preservation by drying, salting, or even smoking must have far deeper roots in time if one is to believe ethnographic data. The consensus nowadays thus concedes that there might exist additional, more complex socioeconomic reasons linked to human demography, such as the emergence of empires, regional markets, etc., that fostered such developments at a given time and place. But conclusive evidence on this subject is still scarce.

Once fish trade becomes firmly established, fish assemblages deriving from subsistence fishing need to be set apart from those resulting from fishing for export. Although no single signature suffices to set apart the two groups, the combined use of the estimators of abundance and species diversities (higher in "subsistence sites"), a balanced skeletal representation in subsistence settings that tends to be skewed in industrial settings (i.e., the "heads stay *vs.* tails travel" model of cod trade circuits; Perdikaris 1996), and a normal distribution of sizes (subsistence) versus clusterings around a single size (export) often allow the analyst to decide this. At sites where commercial fishing for export was practiced, one often finds highly standardized treatments of the fishes. These may involve cut-marks on the same portion of a particular element or the removal of some diagnostic portions of the skeleton as was often the case of the head in traded cod and the pectoral girdle in herring that were gutted prior to salting.

Molecular methods have more recently allowed ichthyoarchaeologists to reveal the provenience of specific fish remains. Polymorphisms on the mtDNA control region of the catfish *Clarias gariepinus* (Burchell 1822), for example, define regional haplotypes that have allowed analysts to determine that imports of this catfish into the Turkish city of Sagalassos originated on the Lower Nile (Arnt et al. 2003). Working on carp (*Cyprinus carpio* L.) teeth from this same site, Dufour et al. (2007) used stable isotope signatures ($\delta^{18}O$, $^{87}Sr/^{86}Sr$) to explore the origin of this intensively consumed fish during the Early Byzantine period to reconstruct trade networks. Using carbon and nitrogen stable isotope analyses of cod (*Gadus morhua* L.) populations from the NE Atlantic, Barrett and collaborators managed to not only reveal the provenience of specific bones on different sites but also to determine that the onset of long-distance trade for the species did not start until the thirteenth century AD (Barrett et al. 2011).

Fish Catching Methods

Fish catching methods can rarely be inferred from the fish assemblage because many species can be taken in a variety of ways (i.e., the problem of equifinality), whereas a hook of a given size and shape can take a large number of species (Morales 2010; Fig. 5a). Fishing gear provides less ambiguous information, but, except for items such as weights and hooks, executed on stone and metals, tackle made from perishable plant fibers is often lost. This would also be the case when fishes were captured with poison. Even when present, some gear might be easily missed for lack on an appropriate analogue (Fig. 5b). It is for such reasons that documentary and ethnographic records often prove instrumental for a correct interpretation of the evidence.

Occasionally, one is able to spot shifts in the fishing strategy through changes in the diversity of species or their size distribution. As a rule, people started to fish on shallow waters and later

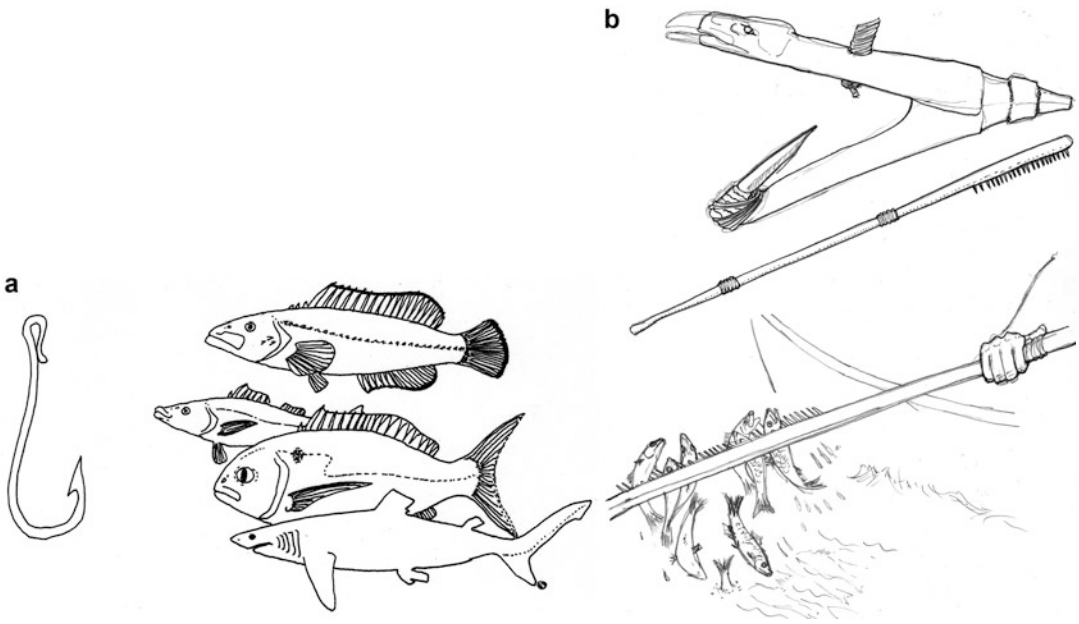

Ichthyoarchaeology, Fig. 5 (**a**) Identical gear, such as similar-sized hooks, allows people to fish a variety of size classes from many different species (Taken from Morales 2010). (**b**) The halibut hook (upper) and the herring raker (middle, bottom) were tackle used by the NW Pacific Indians that combined perishable (wood) and nonperishable (flint microliths) materials. Given that no present analogues for them exist today, archaeologists retrieving loose microliths in archaeological deposits would be incapable of inferring from them the existence of such specialized fishing. Drawings by A. Morales Muñiz inspired in artwork depicted in Stewart (1977)

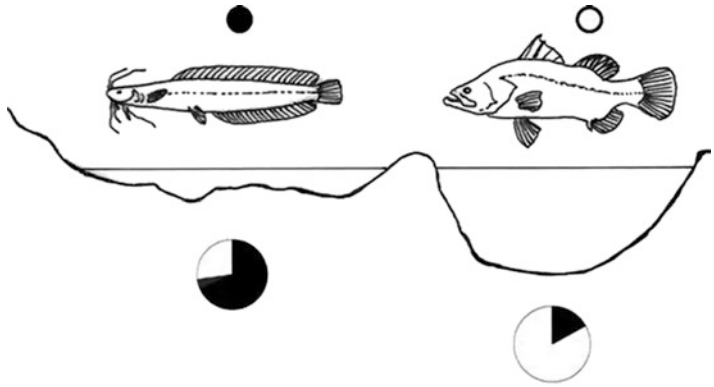

Ichthyoarchaeology, Fig. 6 The development of fishing in the Nile witnessed an early stage when species that inhabit the more readily accessible waters of the floodplain, such as the catfish, *Clarias gariepinus* (black circle), were preferentially taken. Later, as fishing technology and navigation improved, species inhabiting the main river channel, such as the Nile perch, *Lates niloticus* (white circle), are recorded in far greater numbers in the deposits (Taken, with modifications, from Van Neer 2004)

moved to less accessible zones. In the prehistoric Mediterranean, the long-standing paradigm held that the most littoral taxa, such as the groupers (Serranidae) and sea breams (Sparidae), were targeted previous to the Neolithic and offshore taxa, such as clupeids and scombrids, came later (Fig. 6). The paradigm also holds that improvements in fishing and navigation technology produced an increase in the number of fish taxa with time, but the data tell a different story. Indeed, recent syntheses evidence that at well-excavated Paleolithic sites, not only were fish diversities as high as or even higher than those from later time sites but also that early assemblages regularly incorporated small, offshore fishes such as clupeiforms (Morales Muñiz and Roselló Izquierdo 2016). New data are needed to settle this issue.

Cultural Issues

Nonmaterial aspects of human-fish relationships proceed beyond the simple equation "animal equal meat," but being dictated by complex epiphenomena for which analogical frames of reference are often lacking, most of these issues are difficult to address. Ethnographic, ethnohistorical, and – in the more recent periods – documentary data provide frames that allow ichthyoarchaeologists to proceed beyond strictly actualistic models often skewed toward modern, western-centered standards. The three major conceptual domains archaeological fish assemblages help address refer to status, ethnicity, and symbolism.

Ichthyoarchaeologists often make use of fish bones to infer the status of people that inhabited a particular site. Without reliable knowledge of consumer preferences, alas, even for collections where context is well documented, social class assignment can be risky. In this way, although the distinction of fishes for the rich ("feasting") and for the poor ("fasting") is routine in archaeology, and although historic sources indicate that, at least in Europe, the rich preferred fresh, rare, and large fish, matters are often not so straightforward. One traditional indicator of high status, for example, is the presence of fishes imported from distant lands. Recent research on the subject, while not denying that possibility, stresses the need to be careful with simplistic interpretations given that products such as the lower-quality fish sauces of the Roman world or processed herring in medieval Europe were readily accessible to all levels of society (Van Neer and Ervynck 2004). On methodological grounds many problems remain. In this way, even within the same manor, fish remains eaten by the rich, and those eaten by their servants often ended up in the same dumpyard, making it difficult to know who ate what. Documentary data reveal other limitations such as the "rich/poor" dichotomy, itself being a

poor reflection of social class and status, the division of consumers being often far more refined. In the Netherlands and Flanders during the Modern Age, for example, no less than seven social groups were recognized of account of the fish consumed (Bennema and Rijnsdorp 2015). Those documents reveal quite distinctive fish consumption practices within the poor classes depending on whether these were fishermen or not and also that skippers and their families (i.e., middle classes) were the ones consuming rare species that were (sic.) "*too good for the rich and wealthy*" (Bennema and Rijnsdorp 2015). Similar problems are faced by analyses aimed at spotting differences in the diet and the use of space according to gender or age within a given social/economic group. These studies are still scarce despite ample ethnographic and actualistic data highlighting the role women played on activities such as fixing the nets, preparing fish for consumption, etc. (Insoll 2001). Clearly, a lot of idiosyncrasy is inherent to any fish assemblage when considered from a social standpoint, and a lot of work lies ahead if one ever wants these issues to become meaningful and productive routines for ichthyoarchaeologists.

From a strictly biogeographical perspective, the sheer taxonomic diversity of fishes from any given area confers fish assemblages a *regional signature* (i.e., ethnicity, in a rather loose sense of the term) that, depending on its specificity, may prove of help to explore phenomena such as provenience and trade. Such would be the case for the lands of the Roman Empire of the three groups associated with the Roman commercial fisheries (i.e., bluefin, *Thunnus thynnus* L., mackerels *Scomber* sp. and sardine) and of cod and herring (*Clupea harengus* L.) in the NE Atlantic from the medieval period onward. Occasionally, such signatures can be quite restricted. Starting with the third century AD, the Roman provinces bordering the North Sea developed their own fish sauces from local species such as the smelt and sprat (*Sprattus sprattus* L.) that were absent or rare in the Mediterranean (Van Neer and Lentacker 1994).

The clearest instances of ethnicity sensu stricto are inferred on fish deposits when food taboos and religious practices modulate consumption. In many societies, from the Vikings to the Maoris, eels were taboo because of scavenging on drowned people. In medieval Iberia, *Haram/makruk* (forbidden/unclean) fish, with snake-shaped bodies or with bodies devoid of scales, and specific ways of filleting fish, allow analysts to typify deposits as Christian or Islamic (Morales Muñiz et al. 2011). These same fishes are non-*kosher* for Jews, and Jewish deposits in European cities have been also recognized for their absence of non-*kosher* taxa. Matters become complicated when fishes from different communities end up in the same deposit and also when people exhibit a wide range of tolerance to feeding precepts.

Symbolism is undoubtedly the most difficult cultural aspect to address with archaeological animal remains, and fish constitute no exception to the rule. Because of the inherent variability on how each group categorizes fish species, neither ethnographic nor ethnohistorical and archaeological data, taken in isolation or combined, constitute a guarantee to correctly interpret fish assemblages from a symbolic standpoint. Not surprisingly, the scarce studies thus far available concentrate on one or very few fish categories and deal with data that reach into times where ethnographic and ethnohistoric analogues may prove relevant. Peres and Deter-Wolf (2016) have ethnohistorically reinterpreted the use of garfish (Lepisosteidae) by the American Southeast Indians evidencing that these fishes were variously used for making ritual tools (sacred bundles), totems, and talismans and for scratching and tattooing bodies or as items for votive deposits, builder's rites, etc. Flesh was considered of poor quality and often discarded. The traditional archaeological interpretation of associating their remains with feasting events is thus probably misfocused and in need of a revision. Aboriginal cultures deeply associated with the sea as Polynesians, Aleuts, and Northwest Pacific Indians have a wealth of legends, myths, and uses for fish that transcend material aspects. Even in these cases, a correct symbolic interpretation of fish assemblages would call upon for more archaeological context than that normally documented on hunter-gatherer sites.

International Perspectives

From total neglect to full integration into archaeological research, a series of "methodological stages" can be defined in the development of ichthyoarchaeological research for any given area on the basis of output. Interest in fishes without the implementation of the adequate retrieval methods, for example, results in extremely poor and heavily biased samples of scarce scientific value where fish remains often are listed as "*Pisces* indet.." Once the problem of retrieval is solved, the lack or inadequacy of the reference collection is manifested in that bone reports can rarely proceed beyond the level of family, being thus of rather restricted value. This stage often corresponds with areas where the potential number of ichthyoarchaeologically meaningful species is high (e.g., coral reefs, tropical freshwaters) and many are osteologically difficult to set apart from each other. Only when fine retrieval produces large, contextually and temporally well-defined, samples and a good reference collection is at hand, can the full potential of ichthyoarchaeological research come to effect. As of this writing, despite the explosive development of ichthyoarchaeology in certain areas of Central and South America or the South Pacific, there still remain huge pockets of unexplored territory, mostly in tropical Asia and Africa.

From a geographical standpoint, the search for patterns that integrate data into regional models is feasible only once the number of sound, local, studies reaches a certain threshold. Very few areas in the world, mostly in the temperate latitudes, have reached such a level of integration. As regional trends emerge throughout the world, one could foresee a time when these would merge into an all-encompassing worldwide picture. This would allow for a better framing of variability from both the vertical (i.e., temporal) and horizontal (i.e., spatial) standpoints. Researchers would then be in a more adequate position to explore how the interaction between fish populations and people contributed to shape both human evolution and that of aquatic environments.

An apparently secondary, yet crucial, issue this development of ichthyoarchaeology on a progressively global scale raises is that of nomenclature. Indeed, the inertia on many publications from the English-speaking countries has been to concede preference to common names over scientific ones. Such practice is not too troublesome when papers refer to fishes from ichthyologically well-known regions, such as Western Europe or North America where most species have a common name in most languages. In ichthyologically worse documented regions, often coinciding with areas of high fish diversity, as is the case of the Amazon basin, China, etc., most fishes do not have a common name, or if they do, this is often in a local language that scholars are unacquainted with. The use of generic names such as "grunts," "snappers," etc. does not help either because these can refer to different taxa in different countries, even English-speaking ones. For these reasons, ichthyoarchaeological publications need to provide the scientific names of the taxa they report.

Future Directions

Ichthyoarchaeology has been traditionally addressing archaeological questions, and it seems that it will go on that way in the future. However, fish remains from archaeological sites represent an important source of knowledge for researchers in the Life Sciences, and it will only be a matter of time before a systematic collaboration between the two fields emerges. Researchers and policy makers in the Life Sciences require adequate baselines to issue guidelines for the appropriate conservation of species and a sustainable use of resources. The research likely to emerge from that collaboration would benefit from the fact that ichthyoarchaeology has the potential for providing a far deeper time scale, thus baselines closer to the original (i.e., "pristine") conditions, than the time frame available for researchers and policy makers thus far.

One field where ichthyoarchaeology has already made some progress is that of ***Fisheries Research***. Fishing by humans represents a new kind of pressure on fish populations, and determining since when and how have these pressures been exerted and how have fishes responded to them constitute largely unexplored, yet promising fields of research. The baselines for studying these phenomena are mostly drawn from data and

models from fisheries biology. Given that systematic catch statistics are only available for the past century or so, many of these contributions focus on determining the antiquity of intensive exploitation of commercial stocks. Large-scale fishing has been loosely documented throughout the Mediterranean since ca. 1000 BC, but the work by Barrett et al. (2004) has been the first to demonstrate that in England the clearest changes in marine fishing occurred rapidly around AD 1000 (i.e., the so-called Fish Event Horizon) and that these involved substantive increases in the catches of cod and herring. Still, most of these studies do not often proceed beyond qualitative terms (Fig. 7). In order to address the impact of past fisheries quantitatively, large numbers of well-excavated, primary deposits, covering the appropriate time intervals and featuring large assemblages of fishes, will be required. These assemblages should produce high-resolution catch composition if they are able to provide statistically relevant data about size ranges and other biological parameters such as sex (Fig. 8). In the meantime, historical studies of fish landings and catching effort (Øiestad 1994, Jackson et al. 2001, see also papers on issue no. 87 of *Fisheries Research* 2007) are already providing a broader perspective of human impact on fisheries.

Even though the intensification of fishing spelled disaster for some species, fishing is not the only way through which humans have shaped fish abundances and distributions in the past. Pollution, habitat degradation, civil engineering works, or even species translocations may have had more pervasive effects not only on fish populations over time but, more importantly, on the aquatic food-web structure that supported them. For such reasons, a second area where ichthyoarchaeology is likely to make a meaningful contribution to the Life Sciences is that of **Conservation** (Rick and Erlandson 2008). Some historical ecology researchers have addressed topics such as the contamination of freshwater bodies or the impact of watermills on salmon

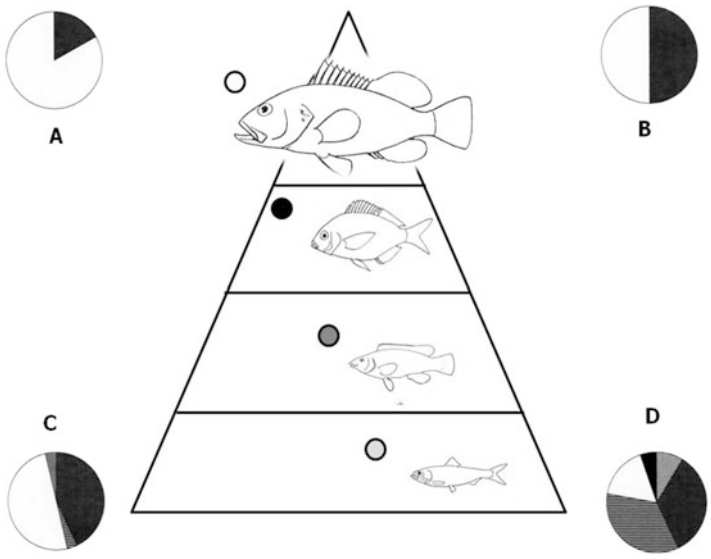

Ichthyoarchaeology, Fig. 7 "Fishing down the food web" is a popular theory on the development of fishing that has lately gained ground within ichthyoarchaeologists. This hypothesis maintains that, in the "pristine" environments of the Upper Paleolithic, people tended to concentrate their fishing on large, predatory, fishes such as the salmons and the groupers (black circle; condition depicted in (**a**), and as these stocks became (locally) depleted, they (progressively) turned to species lower down the food chain, thus more abundant (white and gray circles; conditions depicted in **b**, **c**, and **d**). While there exists historical evidence testifying to the validity of some of these postulates, it is equally true that the idiosyncratic variability most sites exhibit demonstrates that there is a lot more to species shifts in the past than a mere human-dictated directional trend and also that absences of small-sized species at the base of the food chain (light gray) may even represent instances of not sieving with the appropriate mesh size

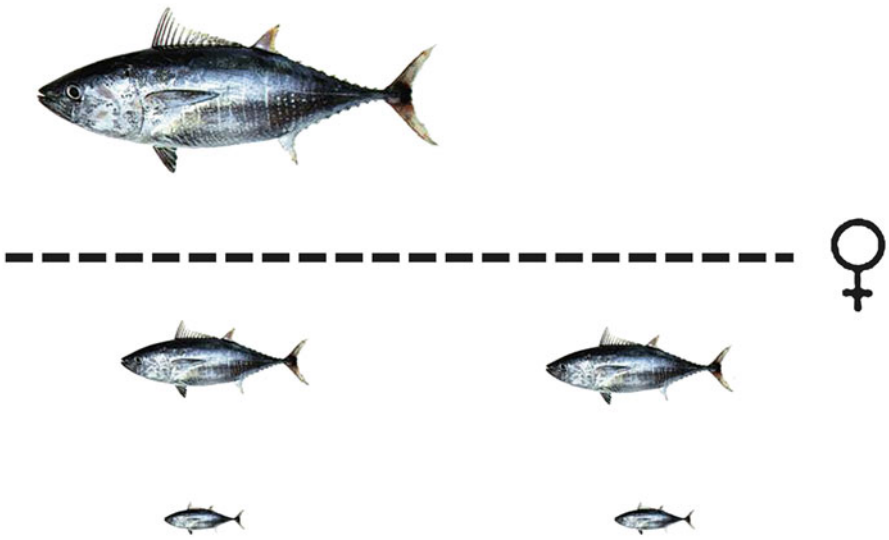

Ichthyoarchaeology, Fig. 8 Many fish species change sex as they grow. In protandrous species – i.e., those where males turn into females after reaching a particular size (dotted line) – a systematic removal of the largest specimens can have dramatic consequences for the viability of the stocks unless the animals are able to accommodate their ontogeny to the fishing pressures

populations (e.g., Hoffmann 1996; Lenders et al. 2016). Some of these changes have been recorded in the archaeological record, either as faunal turnovers, such as that of pollution-tolerant eels and cyprinids replacing salmonids in the rivers crossing past Middle Age cities in Europe, or through local extinctions of species such as Atlantic salmon (*Salmo salar* L.). These data are providing a broader perspective of human impact on aquatic environments, yet seldom have they been of use in fish habitat restoration efforts though the few contributions in this field look promising (Butler 2011). Isotopic analysis have proved useful in reporting anthropic effects – organic pollution, deforestation, fertilizers, etc. – in both freshwater and marine ecosystems (Dufour et al. 2007; Fuller et al. 2012; Häberle et al. 2016). These studies have also clarified a wealth of secondary issues such as the nonmigratory nature of the Atlantic salmon from Lake Ontario in the past (Guiry et al. 2016b).

The consequences of human fishing pressure on past stocks such as the impact on food webs remain unexplored. The rigorous approach of Braje et al. (2017), combining the study of size reduction and nitrogen ratios from bulk collagen isotopic analysis through time, paves the way on how can ichthyoarchaeology be used to create historical baselines for present-day fisheries and conservation research studies. Another fruitful line of research revolves around the fishing-down-the-food-web proposal (Pauly et al. 1998; Fig. 7). Compound-specific isotope analysis (CSIA) of nitrogen stable isotopes ($\delta^{15}N$) offers a method to address longer-term disruptions in aquatic food webs in order to assess the nature and intensity of "top-down" effects such as overfishing and "bottom-up" effects such as climate change and pollution. This technique focuses on individual organisms and species, not requiring the sampling of organisms from other trophic levels that the bulk isotope approach demands. Despite it being a recent application in archaeology, CSIA allows trophic level to be more accurately estimated and may emerge as a powerful tool to explore the structure of pristine fisheries and their evolution through time.

One major problem most fish collections exhibit is their small size. This often precludes the application of quantitative techniques and obtaining consistent patterns. Likewise, for syntheses to prove of value, large volumes of

cumulative data are needed. Meta-analysis (i.e., analyzing data pooled together in chronological and spatially meaningful ways) is one way of doing so and an area where future developments in ichthyoarchaeological research are likely to take place (analytical packages, such as *archSeries* being already freely available on the Internet). In a seminal contribution on the fish remains from urban London, meta-analyses allowed Orton et al. (2017) to evidence that the sudden onset of marine fishing, the aforementioned Fish Event Horizon, predated any visible decline in deposition of freshwater fish, thus could not have been driven, as has been suggested, by a previous depletion of inland fisheries.

From the standpoint of methods, the explosion that is taking place in the discipline will involve the mass deployment of **molecular techniques**, including stable isotopes, DNA, collagen, and geochemical analyses. Such deployment will not only allow for the identification of many otherwise unidentifiable remains but also help in the resolution of past biogeographic patterns and the recent evolution of fish populations. Still, in the case of stable isotope analyses, while the factors affecting the C and N isotopic values are fairly well understood, their interaction is still far from clear. A better understanding of these interactions, and how specific factors play out in isotope values across former aquatic ecosystems, would greatly enhance the value of isotope studies in ichthyoarchaeology. In general, we have seen that molecular techniques are being applied to archaeological fish remains at a far lower pace than is the case for other vertebrates. The difficulties one needs to circumvent in order to change such state of affairs can be grouped into four categories:

1. Diversity: Paleogenetic studies require genetic/genomic libraries (sequences of reference), thus a previous and intensive research effort to fingerprint modern specimens. This is a slow process in the case of speciose groups that restricts the explanatory power of the analyses thus far published. Mitochondrial analyses are not often very effective on many fish species given the mobility and admixture their populations exhibit. Lastly, only a small proportion of fish taxa have been genomically studied. This restricts the range of target species to incorporate into archaeological studies and demands for specific genetic programs to be incorporated to archaeological projects, something not always understood on the part of project evaluators.
2. Size: Given that some molecular analyses require a large amount of bone in order to be successful, the generally small size of fish skeletal elements even makes it difficult to insure reliable extractions.
3. Histology: The singular mineral and protein structure of fish bone affects preservation, thus the success of conventional retrieval and extraction protocols developed for terrestrial vertebrates. Protocols need to accommodate to fish tissues to insure success, a slow and time-consuming process (Szpak 2011; Guiry et al. 2016a).
4. Ichthyoarchaeologists: Specialists play an instrumental role in fostering research. Among others, a successful molecular analysis on fishes should start with a clear ichthyoarchaeological question, the evaluation on what method could yield better information or key data, and most importantly, a selection of well-preserved samples from meaningful sites/contexts/levels. As of this writing, many ichthyoarchaeologists are not knowledgeable in these areas, and their collaboration with molecular archaeologists has been slight.

In terms of conventional identifications, online atlases, such as that available at the Archaeological Fish Resource site (http://fishbone.nottingham.ac.uk), though still in an incipient stage, are bound to become essential tools. One can foresee a time, as digitized images allow for the rotation of the elements, incorporate fragments and bones from fishes with different sizes, etc. when digital atlases will take the place of the conventional reference collection. This would enhance the labor of researchers in the field and of those forced to identify samples in their countries of origin.

One final tool to carry out identifications is that of Geometric Morphometrics (the quantitative

analysis of form, a concept that encompasses size and shape). Although GM may be of restricted use to set apart similarly looking bones from different species, it may nevertheless prove more useful in describing ontogenetic changes (developmental changes in form) taking place within bones from the same species. One hopes that future developments within GM are likely to come out with solutions to long-standing problems of identification of fish remains.

Cross-References

- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Zooarchaeology

References

Arnt, A., W. Van Neer, B. Hellemans, J. Robben, F. Volckaert, and M. Waelkens. 2003. Roman trade relationships at Sagalassos (Turkey) elucidated by ancient DNA of fish remains. *Journal of Archaeological Science* 30: 1095–1105.

Barrett, J.H. 1995. "*Few know an earl in fishing clothes" Fish middens and the economy of the Viking Age and Late Norse earldoms of Orkney and Caithness, North Scotland*. PhD thesis, University of Glasgow.

Barrett, J.H., A.M. Locker, and C.H. Roberts. 2004. The origins of intensive marine fishing in medieval Europe: The English evidence. *Proceedings of the Royal Society, London B* 271: 2417–2421.

Barrett, J.H., D. Orton, C. Johnstone, J. Harland, W. Van Neer, A. Ervynck, C. Roberts, A.M. Locker, C. Amundsen, I. Bødker Enghoff, S. Hamilton-Dyer, D. Heinrich, A.K. Hufthammer, A.K.G. Jones, L. Jonsson, D. Makowiecki, P. Pope, T.C. O'Connell, T. de Roo, and M. Richards. 2011. Interpreting the expansion of sea fishing in medieval Europe using stable isotope analysis of archaeological cod bones. *Journal of Archaeological Science* 38: 1516–1524.

Beech, M.J. 2004. *Abu Dhabi Islands Archaeological Survey Monograph 1 – In the land of the ichthyophagi: Modelling fish exploitation in the Arabian Gulf and Gulf of Oman from the 5th millennium BC to the Late Islamic Period*, British Archaeological Reports International series S1217. Oxford: ArchaeoPress.

Bennema, F.P., and A.D. Rijnsdorp. 2015. Fish abundance, fisheries, fish trade and consumption in sixteenth-century Netherlands as described by Adriaen Coenen. *Fisheries Research* 161: 384–399.

Bødker-Enghoff, I. 2005. Viking Age fishing in Denmark, with particular focus on the freshwater site Viborg, methods of excavation, and smelt fishing. In *The role of fish in ancient time*, ed. H. Hüster-Plogmann, 69–76. Rahden/Westf: Verlag Marie Leidorf Gmbh.

Braje, T.J., T.C. Rick, P. Szpak, S.D. Newsome, J.M. McCain, E.A.E. Smith, M. Glassow, and S.L. Hamilton. 2017. Historical ecology and the conservation of large, hermaphroditic fishes in Pacific Coast kelp forest ecosystems. *American Association for the Advancement of Science* 3: e1601759.

Butler, V.L. 2011. Anadromous salmonids in the Upper Klamath basin before hydro-development? Identification of Pacific salmonid (*Onchorhynchus* spp.) species and life history through mtDNA and geochemical analysis of archaeological remains. *Paper presented at the 16th Meeting of the ICAZ Fish Remains Working Group, Jerusalem*, October 23rd–30th, 2011.

Casteel, R.W. 1976. *Fish Remains in archaeology and paleoenvironmental studies*. London: Academic Press.

Clark, J.G.D. 1948. Development of fishing in Prehistoric Europe. *The Antiquaries Journal* 28 (1–2): 45–48.

Collins, M., J. Harland, M. Buckler, and A. Jones. 2009. ZooMS: Zooarchaeology by mass spectrometry, collagen as a molecular fingerprint for fish remains? In *Fishes-culture-environment through archaeoichthyology, ethnography and history*, ed. D. Makowiecki, S. Hamilton-Dyer, N. Trzaska-Nartowski, and N. Makohonienko, vol. 7, 191–193. Poznan: Environment and Culture.

Dufour, E., C. Holmden, W. Van Neer, A. Zazzo, W.P. Patterson, P. Degryse, and E. Keppens. 2007. Oxygen and strontium isotopes as provenance indicators of fish at archaeological sites: The case study of Sagalassos, SW Turkey. *Journal of Archaeological Science* 34: 1226–1239.

Erlandson, J.M., and M. Moss. 2001. Shellfish feeders, Carrion eaters and the archaeology of aquatic adaptations. *American Antiquity* 66 (3): 413–432.

Flannery, K.V. 1968. Origins and ecological effects of early domestication in Iran and the Near East. In *The domestication and exploitation on plants and animals*, ed. P.J. Ucko and G.W. Dimbleby, 73–100. London: Gerald Duckworth & Co Ltd.

Fuller, B.T., G. Müldner, W. Van Neer, A. Ervynck, and M.P. Richards. 2012. Carbon and nitrogen stable isotope ratio analysis of freshwater, brackish and marine fish from Belgian archaeological sites (1st and 2nd millennium AD). *Journal of Analytical Atomic Spectrometry* 27: 807–820.

Guiry, E.J., P. Szpak, and M.P. Richards. 2016a. Effects of lipid extraction and ultrafiltration on stable carbon and nitrogen isotopic compositions of fish bone collagen. *Rapid Communications in Mass Spectrometry* 30 (13): 1591–1600.

Guiry, E.J., S. Needs-Howarth, K.D. Friedland, A.L. Hawkins, P. Szpak, R. Macdonald, M. Courtemanche, E. Holm, and M.P. Richards. 2016b. Lake Ontario salmon (*Salmo salar*) were not

migratory: A long-standing historical debate solved through stable isotope analysis. *Nature Scientific Reports* 6: 36249.

Häberle, S., B.T. Fuller, O. Nehlich, W. Van Neer, Jö. Schibler, and H. Plogmann. 2016. Inter-and intraspecies variability in stable isotope ratio values of archaeological freshwater fish remains from Switzerland (11th–19th centuries AD). *Environmental Archaeology* 21: 119–132.

Hoffmann, R.C. 1996. Economic development and aquatic ecosystems in medieval Europe. *The American Historical Review* 101: 631–669.

Hufthammer, A.K., H. Høie, A. Folkvord, A.J. Geffen, C. Andersson, and U.S. Ninnemann. 2010. Seasonality of human site occupation based on stable oxygen isotope ratios of cod otoliths. *Journal of Archaeological Science* 37: 78–83.

Insoll, T. 2001. *Archaeology and world religion*. London: Psychology Press.

Jackson, J., M. Kirby, W. Berger, K. Bjorndal, L. Botsford, B. Bourque, R. Bradbury, R. Cook, J. Erlandson, J. Estes, T.P. Hughes, S. Kidwell, C.B. Lange, H.S. Lenihan, J.M. Pandolfi, C.H. Peterson, R.S. Steneck, M.J. Tegner, and R.R. Warner. 2001. Historical overfishing and the recent collapse of coastal ecosystems. *Science* 293: 629–637.

Kettle, A.J., E. Roselló-Izquierdo, A. Morales-Muñiz, D. Heinrich, and A. Vollestad. 2010. Refugia of marine fish in the Northeast Atlantic during the last glacial maximum: Concordant assessment from archaeozoology and palaeotemperature reconstructions. *Climate of the Past Discussions* 6: 1–39.

Lenders, H., T. Chamuleau, A. Hendriks, R. Lauwerier, R. Leuven, and W. Verberk. 2016. Historical rise of waterpower initiated the collapse of salmon stocks. *Nature Scientific Reports* 6: 29269.

Morales, A. 2010. Inferences about prehistoric fishing gear based on archaeological fish assemblages. In *Ancient nets and fishing gear: Proceedings of the International Workshop on" Nets and Fishing Gear in Classical Antiquity: A First Approach", Cádiz, November 15–17, 2007*, ed. T. Bekker-Nielsen and D. Bernal Casasola, vol. 2, 25–53. Aarhus: Aarhus University Press & Servicio de Publicaciones, Universidad de Cádiz.

Morales Muñiz, A., and E. Roselló Izquierdo. 2016. Fishing in Mediterranean prehistory: An archaeoichthyological overview. In *The Inland Seas: Towards an ecohistory of the Mediterranean and the Black Sea*, Geographica Historica 35, ed. T. Bekker-Nielsen and R. Gertwagen, 23–56. Stuttgart: Franz Steiner.

Morales Muñiz, A., M. Moreno García, E. Roselló Izquierdo, L. Llorente Rodríguez, and D.C. Morales Muñiz. 2011. 711AD: ¿El Origen de una Disyunción Alimentaria? *Zona Arqueológica* 15 (2): 301–319.

Øiestad, V. 1994. Historic changes in cod stocks and cod fisheries: Northeast Arctic cod. In *ICES Marine Science Symposia*, vol. 198, 17–30. Copenhagen: International Council for the Exploration of the Sea, 1991–1994.

Orton, D., J. Morris, and A. Pipe. 2017. Catch per unit research effort: Sampling intensity, chronological uncertainty, and the onset of marine fish consumption in historic London. *Open Quaternary* 3 (1): 1–20.

Pauly, D., V. Christensen, J. Dalsgaard, R. Froese, and F. Torres. 1998. Fishing down marine food webs. *Science* 279: 860–863.

Perdikaris, S. 1996. Scaly heads and tails: Detecting commercialization in early fisheries. *Archaeofauna* 5: 21–33.

Peres, T. and A. Deter-Wolf. 2016. Reinterpreting the use of garfish (Lepisosteidae) in the archaeological record of the American Southeast, In People with Animals: Perspectives & Studies in Ethnozooarchaeology, ed. L. Broderick, 103–113. Oxford: Oxbow Books.

Richter, K.K., J. Wilson, A.K. Jones, M. Buckley, N. van Doorn, and M.J. Collins. 2011. Fish'n chips: ZooMS peptide mass fingerprinting in a 96 well plate format to identify fish bone fragments. *Journal of Archaeological Science* 38: 1502–1510.

Roselló, E. 1989. Arqueoictiofaunas ibéricas: Aproximación Metodológica y Bio-cultural. Publicaciones Universidad Autónoma de Madrid. Madrid.

Sauvage, H.E. 1875. Essai sur la pêche pendant l'époque du renne. *Materiaux pour l'histoire de l'homm, 2e série* 6: 308–315.

Stewart, H. 1977. Indian fishing. University of Washington Press, Seattle.

Szpak, P. 2011. Fish bone chemistry and ultrastructure: Implications for taphonomy and stable isotope analysis. *Journal of Archaeological Science* 38 (12): 3358–3372.

Speller, C.F., D.Y. Yang, and B. Hayden. 2005. Ancient DNA investigation of prehistoric salmon resource utilization at Keatley Creek, British Columbia, Canada. *Journal of Archaeological Science* 32 (9): 1378–1389.

Van Neer, W. 2004. Evolution of prehistoric fishing in the Nile Valley. *Journal of African Archaeology* 2(2): 251–269.

Van Neer, W., and A. Ervynck. 2004. Remains of traded fish in archaeological sites: Indicators of status, or bulk food? In *Behaviour behind bones. The zooarchaeology of ritual, religion, status and identity*, ed. S. Jones O'Day, W. Van Neer, and A. Ervynck, 203–214. Oxford: Oxbow Books.

Van Neer, W., and A. Lentacker. 1994. New archaeozoological evidence for the consumption of locally-produced fish sauce in the Northern Provinces of the Roman Empire. *Archaeofauna* 3: 53–62.

Yang, D.Y., A. Cannon, and S.R. Saunders. 2004. DNA species identification of archaeological salmon bone from a Pacific Northwest coast of North America. *Journal of Archaeological Science* 31: 619–631.

Zohar, I., and M. Belmaker. 2005. Size does matter: Methodological comments on sieve size and species richness in fishbone assemblages. *Journal of Archaeological Science* 32: 635–641.

Further Readings

Cleyet-Merle, J.J. 1990. *La Prehistoire de la Péche*. Paris: Editions Errance.

Jones, A.K.G., and K.K. Richter. 2017. Widening the net: New approaches to the identification of fish remains from archaeological sites. In *ICAZ FRWG Conference Proceedings 2015*, ed. S. Gabriel. Lisbon.

Leach, F. 2006. Fishing in pre-European New Zealand. *Archaeofauna* 15: 1–266.

Rick, T.C., and J.M. Erlandson, eds. 2008. *Human impacts on ancient marine ecosystems: Regional case studies and global perspectives*. Berkeley: University of California Press.

Wheeler, A., and A.K.G. Jones. 1989. *Fishes*. Cambridge: Cambridge University Press.

Iconography in the Roman World

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Introduction

The Roman world was populated by images. They could be encountered everywhere, in both public and private areas, as decorative aspects of buildings or decorations on individual objects, during shows, and on enduring monuments. These images carried political, cultural, and ethical messages that were relevant for the public discourse, which promoted in a propagandistic way values that were depicted as building blocks of the collective identity. They were also relevant for the private discourse for their contribution to the illustration of the personal interests of owners and consumers. The Roman culture was a visual culture, the interaction between image and spectator was very close, and images were one of the most direct and efficient communication channels.

Definition

For this entry, we have chosen to consider as "Roman iconography" the ensemble of images and figurative representations that were popular in the Roman world of the Republican and Imperial periods. The use of a more specific definition to narrow the investigation to topics considered more authentically Roman, in other words without immediate and recognizable Greek precedents (state-level ceremonies and portraiture), would be misleading. In fact it is very difficult to draw a distinction between the two iconographic traditions; it would be impossible to reconstruct the imaginary of an era and its political, cultural, and social evolution. Nevertheless, the studies of Paul Zanker on the creation of the new visual language in the Augustan period constitute an exemplary body of work (Zanker 1987).

When we deal with iconography in the Roman world, we have to face the problem of the close relationship between reality and representation, the key role of images in the preservation of memories related to an event or a person, the indissoluble connection between an image and its model, and the ability to recreate the illusion of the presence of a person by means of a static statue. Consequently, an image could evoke strong reactions in spectators (Gregory 1994). The power of the image widens beyond its religious and propagandistic meaning, as demonstrated by the various ways in which images have been condemned in the Roman society. Here we can recall the sanctions against memory (referred to by scholars as *damnatio memoriae*) imposed on the names and images of unpopular emperors, disgraced family members, and usurpers for reasons of politics and ideology (Varner 2004).

Romans themselves were conscious of the importance of images in their society; the Greco-Roman culture of the Imperial period focused its attention on the meaning of images with the conviction that they covered a role of primary importance for the *paideia*. The idea that the role of imagination (*phantasia*) could bring the artist closer to the poet was shared by intellectuals. The description of images (*ekphrasis*) became an autonomous genre in the second century BCE; several authors adopted it as their subject such as Philostratus the Elder and Philostratus the Younger and Callistratus. Their works offer a very

interesting summary of ancient iconographic and iconological thought and of its exegetic methodology (Abbondanza 2008).

Another important field of investigation is the ancient reaction to pantomime and the meaning of the mythological *tableaux vivant* performed by dancers: Plutarch, Lucian, and most of all Libanius (*Orationes* 64.118) have in fact described the connection between pantomime and images, granted by the analogy between durable iconographies, represented through monuments, buildings and objects, and ephemeral iconographies, visible at theatrical performances, rituals, and public ceremonies.

Key Issues

A Ceremony That Generates Images: The Triumph

In public art, the interaction between the reality of state's ceremonies and their idealized representation was constant as we can deduce by a brief analysis of the triumph, a ceremony capable of generating a wide iconographic repertoire (La Rocca and Tortorella 2008). The triumph itself was a sumptuous and multimedia scenographic show; images had a prominent role in this scenario: statues and paintings were exhibited in the parade (the so-called *tabulae pictae*, painted panels representing the highlights of military campaigns, together with the personifications of defeated populations and the artworks taken away from the enemy) together with real *tableaux vivants* composed by the prisoners wearing their national costumes (Fig. 1c) or by the triumphator driving the *quadriga* (chariot) wearing the characteristic triumphal clothing, especially the *toga picta* (Fig. 1b–f).

The Roman triumph was also a subject for iconography. The parade was part of the standard repertoire of Roman public art, the ceremony could have been depicted in its entirety (cf. the processions illustrated in the "small friezes" of the Arches of Titus and Septimius Severus in Rome and the Arch of Trajan in Benevento (Fig. 1e)), or just some of the main monuments of the parade became subject of iconography (the two reliefs illustrating the exhibit of the war chest (Fig. 1d) and the *quadriga* of Titus (Fig. 1a) located in the *fornices* of the Arch of Titus provide a good synthesis of Jewish triumph in 71 CE). Besides, the triumphator could have been depicted wearing his triumphal costume (cf. the statues of the *triumphali ornatu* and the use of the triumphal crown) and the *tabulae pictae* could have been transformed into monuments.

The historical reliefs depicting the Parthian war of 198 CE on the Arch of Septimius Severus are probably the marble copy of the paintings sent to the senate by the emperor together with the written reports of the military campaign (Herodian *Ab Excessu Divi Marci* 3.9.12). The transposition of these images on the triumphal arches erected along the very same itinerary followed by the ceremony increased the sense of correspondence between reality and representation, highlighting also the themes of eternality and universality of Rome's victory. The iconography of the Roman triumph exploited the qualities of images to communicate a message and the relationship between reproduction of a specific and unique ceremony and the symbolic meaning of its never-ending repetition in the many triumphs celebrated in Rome for centuries.

Costumes and Statuesque Types in Portraiture

Another key ceremony that helps to understand the connection between reality and representation in the Roman world is the funerals of nobles; they had an important role in the transmission of gentilician memory since the Republican period. As has been reported by ancient historians (Polybius *Historiae* 6.53.6-8; Diodorus Siculus *Bibliotheca Historica* 31.25.2), during funeral processions, actors represented the deceased's ancestors, wearing costumes (*habitus*) that recalled the public role of the ancestors at the peak of their political career while also wearing a mask depicting their features. In Roman society, in fact, social, political, public, and private status were expressed through clothing; accordingly, matters related to costume were often at the center of public debate as shown by the identity meaning attributed to the toga in opposition to the Greek cloak/*pallium* (Cadario 2010).

Iconography in the Roman World, Fig. 1 The iconography of triumph. (**a**) Titus on triumphal quadriga (relief, Rome, Arcus of Titus). (**b**) Octavian on triumphal quadriga (Denarius struck by Octavian). (**c**) Triumphal procession with prisoners (relief, Rome, Museo Nazionale Romano). (**d**) Triumphal procession with spoils (relief, Rome, Arcus of Titus). (**e**) Trajan on triumphal quadriga ("small" frieze, Benevento, Arcus of Trajan). (**f**) Marcus Aurelius on triumphal quadriga (relief, Rome, Musei Capitolini)

The creation in portraiture of a language related to the bodies of statues comes from the close relationship between costume and social identity/*status* and from the relation between choice of the statuary type and the motivations behind the dedication of a statue (Fejfer 2008; Cadario 2011). This language was based on the functional distinction between the statue's face that had to depict features and character of the person and its body that had to give more "objective" information about public role, career, and deeds. This language of bodies was codified between the end of the Republic and the beginning of the principate. It was based on a conventional repertoire of statuary types; often of Greek origin, it was changed in its format, costume (*habitus*), posture, gestures and "attributes" (*insignia*), and objects held by the subject (patera, scroll, lituus, wand, globe, lightning, weapons) or used as support located at the side or underneath a foot (armor, shield, *rostrum*, barbarian prisoner). Colors could also give important information; for example, they could help in distinguishing various kinds of toga while the choice of the statuary kind was done taking also into account the location, an essential part of the symbolic evaluation of the statue's dedication.

The diffusion of imperial statues and their frequent reunions displaying cycles of various members of a dynasty in power led to a clearer standardization of the bodies' language and an increasing internal diversification of repertoire to be able to express through the statuary types the internal hierarchies among the honored as much as their specific merits and public roles. The buyers were taking into account the reciprocal hierarchy and the meaning of each statuary type when they had to establish the modalities to honor the person.

The formats of Roman portraits, recalled also by Pliny the Elder (*HN* 34.18-20) in hierarchical order, included statues on cart (*quadriga* or *biga*) and equestrian statues (Fig. 2a), in sitting position (Fig. 2g) and standing. To these full-figured images we have to add the so-called abbreviate (*imagines clipeatae* (Fig. 2i), busts, herm) formats; in this case, more importance was given to the face, and the size of these statues offered the advantages of handiness and cheapness and they were mainly used in private funerals. For what concerns male costumes in portraits, at least in the western part of the empire, they were toga, armor, and nudity, respectively, symbolic of civilian, military, and "heroic" conditions. Other costumes, such as the *pallium* (the Greek cloak), were excluded from the public image in Rome, but not in the Greek cities, where they continued to illustrate the condition of good citizen; others, such as statues with Lupercus's or hunting clothes were much more rare. On the other hand, when it comes to female portraits, statuary types gave little importance to the realism of the costume (with a few exceptions: vestal portraits and those where the subject was wearing a *stola*); they rather prefer to take inspiration from the repertoire of Greek sculpture masterpieces to emphasize qualities (fertility or beauty) or virtues (chastity) and sometimes to give to the subject the appearance of a goddess.

Toga was the Roman civilian robe by excellence at least at official ceremonies, it was symbol of citizenship, complex distinctions of rank, class, and age (children wore an amulet around the neck (*bulla*), while triumphal statues wore the *toga picta*, identifiable by the colors). Accordingly, the statue with a toga was the most diffused and appreciated at all social levels; it was adopted by both *élites* to indicate their career and "provincials" to show their new status of freeing or citizenship. The costume changed over the centuries; its drapery evolved depending on fashion, political, social, and cultural reasons (Fig. 2b, c).

The cuirassed and naked statues, both borrowed from the Hellenistic world, if compared to the ones with togas, gave less specific information about the rank and career of the subject honored, but they assigned him warrior charisma and a superhuman aura. The cuirassed statue (Fig. 2d), born as a royal costume, was mainly used to highlight duties and military merits, its main public use was progressively limited to emperors and imperial family members. This statuary type also

offered the advantage of using the armor's surface for decorations illustrating typical topics of military propaganda; in this way, the cuirassed statue became a very efficient figurative *medium* such as in the breastplate of Augustus' statue from Prima Porta; the restitution of Crassus' legionary standards to the Roman people (20 BCE) has been placed in a cosmologic contest coherent with the beginning of the new golden age granted by the Augustan peace (Fig. 2h).

Nudity has been considered a costume that did not belong to the Roman tradition until the second century BCE when the prejudice against athletic nudity was overcome. After this, weapons were exhibited to add military charisma to the representation. The message, in naked or semi-naked portraits, was symbolized by the objects carried by the subject or used as a support and by the drape of the cloak; the drape could suggest heroic or divine characteristics. Statues with the cloak worn around

Iconography in the Roman World, Fig. 2 Language of bodies in Roman portrait. (**a**) Equestrian statue of M. Nonius Balbus from Herculaneum (Napoli, Museo Archeologico). (**b**) Republican togate statue, the so-called Arringatore (Florence, Museo Archeologico). (**c**) Togate statue of Augustus from Via Labicana (Rome, Museo Nazionale Romano). (**d**) Cuirassed statue of Drusus Maior from Caere (Rome, Musei Vaticani). (**e**) Hip-mantle nude statue of Divus Claudius (Ancient Olympia Museum). (**f**) Nude statue of Gaius Caesar (Ancient Corinth Museum). (**g**) Seated togate statue (Rome, Museo Nazionale Romano). (**h**) Breastplate of Augustus' cuirassed statue from Prima Porta (Rome, Musei Vaticani). (**i**) Imago clipeata with a togate bust from Cuma (Museo Archeologico dei Campi Flegrei)

the hips (*Hüftmantel*) (Fig. 2e) were more prestigious if compared to those that were completely naked (Fig. 2f). These considerations over the meaning of the costumes chosen are valid for statues as well as for images with the toga, *lorica*, or nudity included in reliefs, coins, or paintings.

"Roman" Iconographies: Public Ceremonies, Ludi, and Scenes of Work

The tendency to create a repertoire common to the entire empire is also present in another important aspect of Roman art (Elsner 1998: 27–51). The representation of significant historical events and the reproduction of main ceremonies and institutions typical of the public life constitute a key component of Roman art and iconography (Alfoldi 1999; Holliday 2002). A single historical event could have been represented to amplify, through its replica, its meaning in the political competition. When the Numidian king Bocchus delivered Jugurtha to Sulla in 105 BCE, he had the scene engraved on the ring that he then used as a seal; in 91 BCE, Bocchus represented the event with a statuary group, the *monumenta Bocchi*, erected in the *area Capitolina*; Marius tried to destroy it, while Sulla restored it (82–80 BCE). Finally, Faustus, Sulla's son, reproduced again the handover of Jugurtha on a coin minted in 56 BCE (*RRC* 426) (Fig. 3), probably copying the image originally created for the signet ring. The same iconography was replicated through different *media*, in both private and public contexts, in two or three dimensions, for almost 50 years covering an important role of propaganda during the first half of the first century BCE.

Iconography in the Roman World, Fig. 3 Denarius struck by Faustus Cornelius Sulla

The ceremonial and military functions of the state usually celebrated the commitment of the emperor, the army, and that of the most important state magistrates, all the while carrying a propagandistic content. The language used was cultured due to the level of the clients. The most frequently attested iconographies (scenes of triumph, battle, clemency and barbarian subjection, speech to troops (*adlocutio*), return and departure for the war (*adventus et profectio*), sacrifice, civilian oration, food distribution, apotheosis, etc.) were represented through various figurative media and realized at various scales according to the space available. Coins in particular provide an excellent source of information since they reproduce on a small scale a basic version of the same iconographies of the official historical reliefs together with legends that nowadays can be almost used as captions of the reliefs, too. So the legend *decursio* on a Neronian *sestertius* representing a single galloping horseman(*RIC*[1] 145) explains also the two horsemen "carousel" scenes located on the panels at the base of the Column of Marcus Aurelius, next to the apotheosis of Antoninus Pius and Faustina Maior: these two reliefs represent only a more elaborate version of the same subject.

A ceremony could have also been represented in a symbolic way, for instance, reproducing just the objects used during the ceremony and/or one or more categories of the participants. The iconographical scene of the sacrifice is a good example of this (Ryberg 1955). The various phases of the Roman ritual had been carefully selected to attribute to each one of them a direct or indirect easily recognizable iconography (Huet et al. 2004). The images of the procession of victims (Fig. 8) and musicians recalled the preliminary rituals (*praefatio*); libation was illustrated by the figure of the officiant of the ceremony pouring the contents of the *patera* over the altar; the killing (*immolatio*) and examination of the victim's viscera were represented by the *victimarius* depicted in the act of striking the figure of the already dead

animal; only the final banquet was not represented. Usually more actions, consecutive during the ritual, were represented in the same scene as shown by the Altar of the *Qurtii* from Angera (Fig. 4): libation was located at the center to highlight the figure of the ceremony's officiant or sponsor; the figures of some of the assistants, such as the flautist and one of the sacrificial victims, were used to refer to the previous and successive scenes of the ceremony (*praefatio et immolatio*).

Other iconographies were part of this official repertoire, they did not describe specific ceremonies, and consequently, they could be used in various scenes to introduce a reminder of the Roman ideology of victory. Those are images of trophies, often accompanied by winged victories, and prisoners of war. Images of prisoners, wearing different ethnic costumes to distinguish eastern and northern barbarians and depicted at the moment of defeat or clemency, and finally the images related to the personification of subdued populations and provinces were useful to mark the geographical extent of the empire.

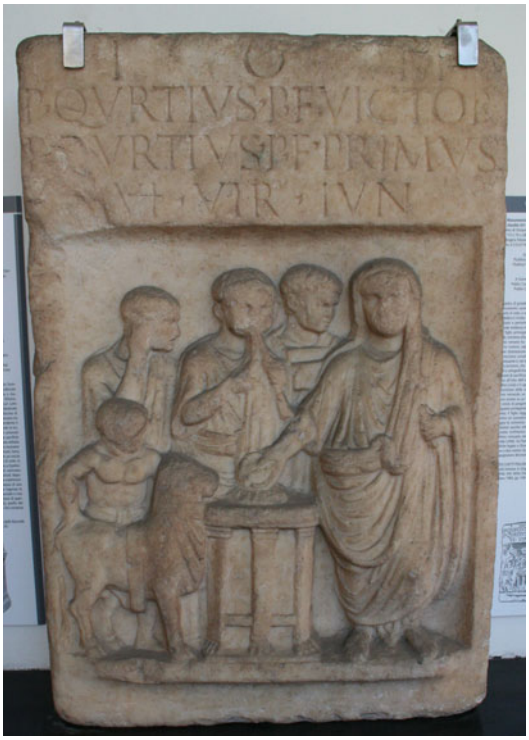

Iconography in the Roman World, Fig. 4 "Ara" of the Qurtii from Angera (Milan, Museo Archeologico)

Other images, usually excluded from official art, show salient moments of civilian life. The people who promoted the games (*editores*) were often those who started this iconographic tradition with the intention to immortalize their generosity (*liberalitas*). The procedure was similar to the state's ceremonial but simplified; an iconographic *koiné* was created for each *ludus*, and it was realized through various figurative media and constituted by the representation of the show by a selection of its most relevant moments: *munera gladiatoria* were represented by the duels between gladiators, with different contexts and participants according to the specialty (Fig. 5a). In the *venationes* (scenes of hunting), the moment of the fight against the animal was depicted (Fig. 5a); circus games were represented by the initial processions and racing *quadriga*, and the background was often the one of the architectonic and sacred landscape of the Circus Maximus in Rome (Fig. 5b). The athletic games were summarized in the sequence of the three most violent matches: boxing, *pankration*, and wrestling; these events reminded viewers of the earlier Greek iconographic tradition (Fig. 5c).

Finally, we have to recall the "public" repertoire of iconographies related to the lives of common people, often depicted with a more simple and "popular" language (Clarke 2003). The representation of people in funeral contexts was in fact not just the privilege of the elite, as demonstrated by the discussion of the tomb of the literary character Trimalchio, who was a freedman (Petronius *Satyricon*, 71.5-8). The representation of various scenes of work depicted the person who died performing actions related to his or her profession (*res gestae*) (Zimmer 1982); these iconographies provide us with information about daily life in the Roman world. The biographical sequences depicted on sarcophagi were similar, as they represented the life of the deceased through a selection of meaningful episodes: scenes of the daily life of women or children, comedic scenes, and convivial scenes that updated the Greek iconography of the symposium through the

Iconography in the Roman World, Fig. 5 The iconography of the ludi. (**a**) Amphiteatral games: munus gladiatorum and venatio (funerary relief from Pompeii). (**b**) Circus games (picture from a mosaic in Luni). (**c**) Athletic games (sarcophagus, Rome, Museo Gregoriano Profano). (**d**) Damnatio ad bestias (mosaic from El Djem, Thysdrus)

introduction of new contexts, the *triclinium* first and the *stibadium* afterward (Dunbabin 2003).

The creation of these new images often happened through a process of transformation (or Romanization) of Greek models and figurative types, adapted to the new contents and sociopolitical context by including appropriate details. The iconography of hunting in the Hellenistic period was usually reserved for the image of the king, mostly in Macedonian contexts (e.g., Alexander the Great) to illustrate the courage (*areté*) that justified his role. This aspect is present in Rome in rare images of aristocrats or emperors hunting, such as the eight circular reliefs (roundels) of the Hadrianic period that decorate the Arch of Constantine. In the iconography of *venationes*, the Hellenistic tradition had been deeply transformed by the new context of the amphitheater;

Iconography in the Roman World, Fig. 6 Capture of beasts (mosaic from Piazza Armerina's Roman villa)

extraordinary creativity was displayed by the variety of prey hunted by the *venatores* (cf. the mosaics of the Zliten villa (Libya) or the relief from Obzor (Thrace), today in Sofia, Bulgaria) and the cruelty of death sentences executed by beasts (*damnatio ad bestias*) (Fig. 5d).

Another activity apparently marginal as the capture and transportation of exotic beasts has been the object of a complex and detailed representation attested by some of the mosaics of the Imperial Roman villa in Piazza Armerina, Sicily (Fig. 6). The repertoire of the iconography of hunting in the Roman world was very complex and efficient in its illustration of hunting roles in society at that time.

"Greek" Iconographies: Divinities and Images of Myth

A substantial portion of the images of the Roman repertoire derived from Greek models; in this way, the Classical world often shows a millenary iconographic continuity. The transmission of this heritage to Rome started during the Archaic period, facilitated in part by Etruscan influence, and continued during the Late Republic, when Rome itself gradually became one of the main artistic centers of the Hellenistic world (Pollitt 1978). The authority attributed to the Greek culture influenced the iconography of the Roman pantheon (from cult statues to votive images) and the main cults (such as the Dionysiac cult) and myths; these images of Greek origin were often used in new contexts, thereby gaining new meaning. For instance, the many Roman copies of Greek masterpieces, used as statuary ornaments in villas and *domus*, are examples of statues that were meant to be displayed in temples, sanctuaries, theaters, and agorai, but often ended up in private spaces. The athletes' images were used in many villas to reproduce Greek gymnasia on a small scale; for example, in the peristyle of the Villa of the Papyri in Herculaneum, the two statues representing runners at the start of a race, copies of an original dated between the end of the fourth century BCE and the beginning of the third century BCE, were meant to recreate the atmosphere of a competition in the space between the arcade and the big *natatio* (Romano and Warden 1994). The original meaning was consequently changed by the new context.

For what concerns mythological scenes, their repertoire, originally from Greece, was increased by the new iconographies in the Roman world (e.g., images of Roman myths such as the nursing of Romulus and Remus or the romance of Dido

and Aeneas). These images related to myths were also modified by the new context of use and progressively became "cultural icons" (Zanker 2002). Their symbolic meaning was connected with the person who commissioned them to decorate the walls of his residence or to the deceased who chose them for his funeral monument. Their naturalism could attract the observer and induce him to believe to be living in the imaginary world of the Greek myth, or it could recall a series of intellectual connections to understand a decorative plan usually based on the combination of different myths. This phenomenon was related to painting and sculpture and it led to new iconographies related to the reinterpretation, often sophisticated, of Greek myths (such as the eight reliefs of the Palazzo Spada (Fig. 7), executed for a villa in the second century CE (Newby 2002)).

The most interesting result of this recontextualization was the new biographical cycles of gods and heroes, such as the one imagined by Longus (*Erotica* 4.3.2) in a temple of Dionysus in Mytilene (on the island of Lesbos) depicting the god in a series of consecutive scenes. The combination of the creation of a visual language and its inclusion into a narrative dimension is an important development introduced by the Romans in the iconography of mythology. In the exemplary case of Achilles, the existing images of various episodes of his life, often of Classical or Hellenistic origin and represented through different figurative meanings in the

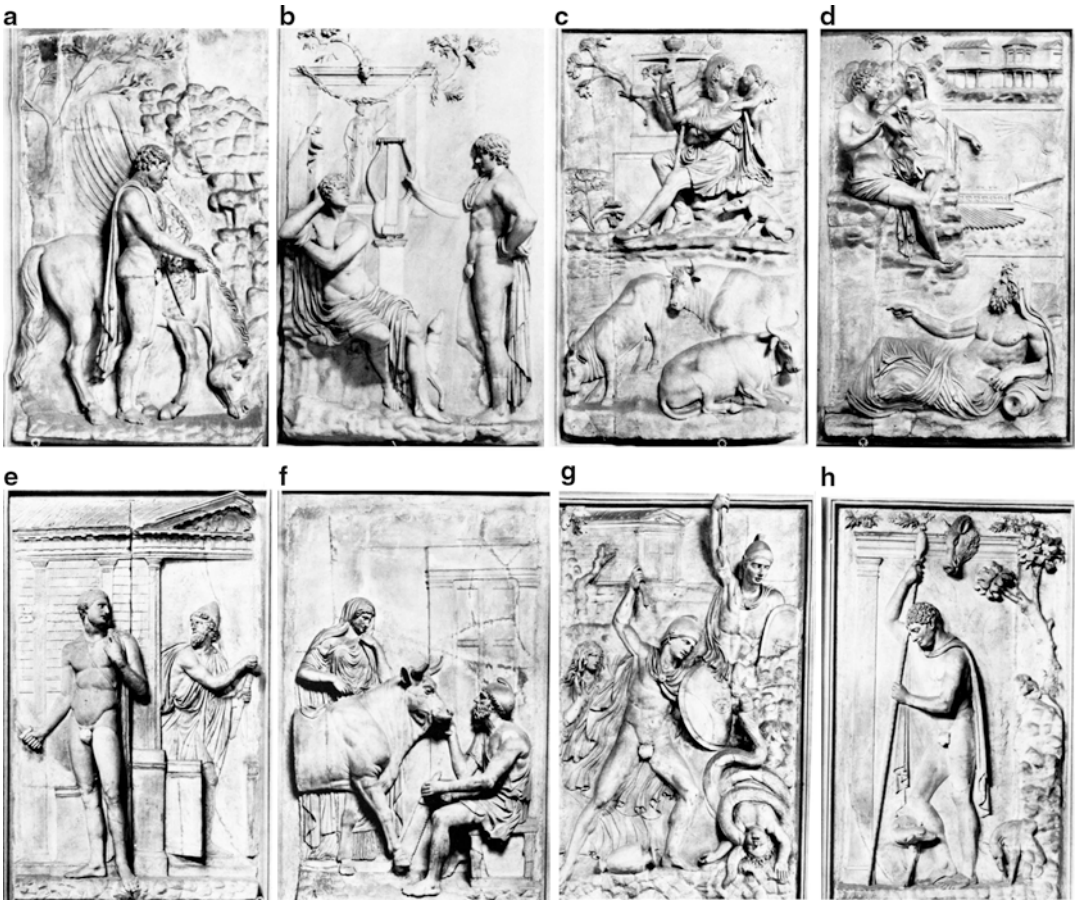

Iconography in the Roman World, Fig. 7 The reliefs from Palazzo Spada (Rome, Palazzo Spada). (**a**) Bellerophon and Pegasus. (**b**) Amphion and Hermes (?). (**c**) Paris and Eros. (**d**) Paris and Oenone. (**e**) Diomedes and Odysseus. (**f**) Pasiphae and Daedalus. (**g**) Death of Opheltes. (**h**) Dying Adonis (?)

Imperial period, were little by little reunited into a very articulated biographic cycle (birth, *paideia* with Chiron, life at Scyrus, and the Trojan War) in Late Antiquity. New scenes were introduced to fill the voids in the figurative reconstruction of the hero's life. This repertoire had been replicated with different typologies of objects (Ghedini 2009). The figurative cycle of Mithras was new in its contents and iconographies; it described the deeds of the god next to the big tauroctony scenes.

Images of Context

As has been observed, Roman iconography provided a variety of subjects that helped construct important relationships between images and memories, as well as events both actual and mythical; these iconographies serve to guarantee the messages and provide other meaningful characteristics. The standardization of this repertoire is a general phenomenon that concerns state-level ceremonies, the images of games (*ludi*), and mythological scenes as well as a general tendency to include these images in brief cycles, usually composed of a series of scenes separated one from the other. The iconography was in fact also influenced by the patterns of narration in which it was included since they could modify the scheme (Brilliant 1984). A long continuous frieze, such as the exceptional one depicted on the Column of Trajan, had a size that made the difference in the representation if compared to the narration through separate scenes/panels or to single reliefs; on the other hand, the space available in sarcophagi was often a composition of sequences where various scenes were arranged into a hierarchical order.

The introduction into different narrative forms could change, even deeply, the iconography: the *suovetaurilia* (Vermarseren 1957) was a Roman ritual of purification; its distinctive element was the presentation of the three sacrificial victims (pig, ram, and bull). They usually are presented in a sequence, as in the Altar of Domitius Ahenobarbus (Fig. 8a) (the order is reversed in this case) or as in a relief of the base of the Decennaliain the Louvre in Paris (Fig. 8b) (with the three victims in the "correct" order). On the Column of Trajan, the *suovetaurilia* is represented through three different scenes, each one placed at the beginning of one of the years of the Dacian war; if we look at all of them at the same time, we see the progressive advancement of a procession around the *castra* (Fig. 8d–f). The Trajanic frieze, using a bird's-eye view, could show the itinerary of the procession and recall that the ritual had the aim of purifying the participants within it. The limited space of the panel of one of the Aurelian reliefs reused on the Arch of Constantine led to a different composition again; the three animals are almost overcome by the procession, depicted illusionistically as if they are advancing from the back of the relief ground (Fig. 8c). The same iconography has led to interpretation and compositions each very different one to each other due to the narrative form. These solutions gave different information to the spectator: for instance, the emphasis of the itinerary of the procession around the *castra* of the Column of Trajan clarified that the ritual of purification, conducted by the emperor, concerned the military.

Finally, we have to mention the importance of where the images were located; their location was regulated with the aim to achieve a correspondence with the buildings and the rest of the decorative plan. Vitruvius (*Arch*. 7.5.6) promoted the relationship between the statuary type and the functions (*proprietates*) of their location. The location in a public or private context could influence even deeply the iconography: for instance, the increasing violence in scenes depicting *venationes* and *munera gladiatoria* between the second and the fourth centuries CE and their location in high-class villas and houses. These were private spaces designed for pleasure (*otium*) that evidently was nourished also by the memory of the bloodshed during the *ludi*; the kind of space where the images were located led to the major cruelty visible in the images (Papini 2004).

Future Directions

It is possible to fully understand the meaning of an image only if the image exists within a context (Rose 2010); the context is not just the physical

Iconography in the Roman World, Fig. 8 The iconography of the suovetaurilia. (**a**) Suovetaurilia procession in the so-called Altar of Domitius Ahenobarbus (Paris, Louvre). (**b**) Tetrarchic Decennalia Base with suovetaurilia scene (Rome, Forum). (**c**) Relief of Marcus Aurelius celebrating a suovetaurilia (Rome, Arcus of Constantine). (**d**–**f**) Scenes representing suovetaurilia in the Trajan's column frieze (Rome)

context of use (buildings or objects) but also the social and cultural context where the image was created and produced. If images do not have a dialogue with what surrounds them, they are mute: we must consider the iconographic tradition of their context, the formal language chosen for their representation, their relationship with the literary tradition, the function of the figurative media adopted, the material context in which they were produced and circulated, the kind of clients and public that will enjoy them, taking into account a different perception of the images according to the social class and cultural competence of the viewer.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Amphitheater
- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Economy, Roman
- ▶ Iconography in the Roman World
- ▶ Infrastructure in the Roman World: Roads and Aqueducts
- ▶ Italy, Sicily, Malta, and the Lipari Islands: Prehistory
- ▶ Maps, Cartography, and Worldview in the Roman World
- ▶ North Africa, Roman
- ▶ Numismatics, Roman Imperial
- ▶ Numismatics, Roman Republican
- ▶ Romanization
- ▶ Topography of Rome

References

Abbondanza, L. 2008. Introduzione. In *Le immagini*, ed. L. Abbondanza, 3–99. Turin: N. Aragno cop.

Alföldi, M.R. 1999. *Bild und Bildersprache der römischen Kaiser: Beispiele und Analysen*. Mainz am Rhein: P. von Zabern.

Brilliant, R. 1984. *Visual narratives: Storytelling in Etruscan and Roman art*. Ithaca: Cornell University Press.

Cadario, M. 2010. Quando l'habitus faceva il romano (o il greco). Identità e costume nelle statue iconiche tra II e I sec. a.C. In *I giorni di Roma. L'età della conquista*, catalogo mostra Roma, ed. E. La Rocca, C. Parisi Presicce, and A. Lo Monaco, 115–124. Milan: Electa.

Cadario, M. 2011. Il linguaggio dei corpi nel ritratto romano. In *Ritratti le tante facce del potere*, catalogo della mostra Roma, ed. E. La Rocca, C. Parisi Presicce, and A. Lo Monaco, 209–221. Rome: Mondo Mostre.

Clarke, J.R. 2003. *Art in the lives of ordinary Romans. Visual representation and non-elite viewers in Italy, 100 B.C. – A.D. 315*. Berkeley/Los Angeles: University of California Press.

Dunbabin, K.M. 2003. *The Roman banquet. Images of conviviality*. Cambridge: Cambridge University Press.

Elsner, J. 1998. *Imperial Rome and Christian triumph: The art of the Roman Empire AD 100-450*. Oxford: Oxford University Press.

Fejfer, J. 2008. *Roman portraits in context*. Berlin/New York: Walter de Gruyter.

Ghedini, F. 2009. *Il carro dei Musei Capitolini: Epos e mito nella società tardo antica*. Rome: Quasar.

Gregory, A.P. 1994. Powerful images: Responses to portraits and the political uses of images in Rome. *Journal of Roman Archaeology* 7: 80–99.

Holliday, P.J. 2002. *The origins of Roman historical commemoration in the visual arts*. Cambridge: Cambridge University Press.

Huet, V., et al. 2004. Les sacrifice dans le monde romain. In *Thesaurus Cultus et Rituum Antiquorum, Lexikon antiker Kulte und Riten (ThesCRA) I*, ed. J.C. Balty et al., 183–236. Los Angeles: J. Paul Getty Museum.

La Rocca, E., and S. Tortorella, eds. 2008. *Trionfi romani*. Milan: Electa.

Newby, Z. 2002. Reading programs in Greco-Roman art. Reflections on the Spada reliefs. In *The Roman gaze: Vision, power, and the body*, ed. D. Fredrick, 110–148. Baltimore: Johns Hopkins University Press.

Papini, M. 2004. Munera gladiatoria e venationes nel mondo delle immagini. *Atti Accademia Nazionale dei Lincei. Memorie* 19 (1): 7–221.

Pollitt, J.J. 1978. The impact of Greek art on Rome. *Transactions of the American Philological Association* 108: 155–174.

Romano, D.G., and P.G. Warden. 1994. The course of glory: Greek art in a Roman context at the villa of the Papyri (Herculaneum). *Art History* 17 (2): 224–250.

Rose, C.B. 2010. Iconography. In *The Oxford handbook of Roman studies*, ed. A. Barchiesi and W. Scheidel, 49–76. Oxford: Oxford University Press.

Ryberg, I.S. 1955. *Rites of the state religion in Roman art*, MAAR 22. Rome: American Academy in Rome.

Varner, E.R. 2004. *Mutilation and transformation. Damnatio memoriae and Roman imperial portraiture*, Monumenta Graeca et Romana 10. Leiden: E. J. Brill.

Vermarseren, M.J. 1957. The Suovetaurilia in Roman art. *BABesch* 32: 1–12.

Zanker, P. 1987. *Augustus und die Macht der Bilder*. München: C. H. Beck.

Zanker, P. 2002. *Un'arte per l'impero. Funzione e intenzione delle immagininel mondo romano*. Trans. E. Polito. Milan: Electa.

Zimmer, G. 1982. *Römische Berufsdarstellungen*. Berlin: Mann.

Further Reading

Bianchi Bandinelli, R., and M. Torelli. 1976. *L'arte dell'antichità classica. Etruria e Roma*. Torino: UTET.

Cadario, M. 2004. *La corazza di Alessandro. Loricati di tipo ellenistico dal IV sec. a.C. al II d.C.* Milano: LED.

Carandini, A., A. Ricci, and M. De Vos. 1982. *Filosofiana. La villa di Piazza Armerina*. Palermo: Flaccovio.

Hassel, F.J. 1966. *Der Trajansbogen in Benevent. Ein Bauwerk des römischen Senates*. Magonza: Philip von Zabern.

La Regina, A., ed. 2001. *Sangue e arena*, catalogo mostra Roma. Milano: Electa.

La Regina, A., ed. 2003. *Nike. Il gioco e la vittoria*, catalogo mostra Roma. Milano: Electa.
La Rocca, E., S. Tortorella, and A. Lo Monaco, eds. 2010. *I giorni di Roma. L'età della conquista*, catalogo mostra Roma. Milano: Skira.
La Rocca, E., S. Tortorella, and A. Lo Monaco, eds. 2011. *Ritratti le tante facce del potere*, catalogo mostra Roma. Rome: Mondo Mostre.
Luni. 1985. *Luni, guida archeologica*. Sarzana: Editore Zappa.
Settis, S., ed. 1989. *La Colonna traiana*. Roma: Einaudi.

Iconography, Etruscan

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Introduction

The Etruscan culture lasted from c. 1000 to c. 30 BCE. The prehistoric and protohistoric period, also known as the Proto-Villanovan (final Bronze Age) and Villanovan culture (Iron Age), lasted from c. 1000 until c. 700 BCE and the historical period from c. 700 BCE until the reign of the Roman emperor Augustus (r. 31 BCE–CE 14). The artistic and artisanal output of the Etruscans, who lived mainly in *Etruria*, the area between the Arno and Tiber rivers, in the Po valley and in parts of Campania, is enormous. Vases, wall paintings in tombs and temples, stone reliefs, bronzes, terracottas, sarcophagi, funerary urns, and pieces of minor art (engraved mirrors, appliqués, gems, scarabs, ring stones, *bullae*, molds, stamps, coins) yield thousands of figurative scenes from the quotidian, magisterial, funerary, and mythological domains. They raise many questions. Were they intended as merely decorative or as meaningful? Did they have only one meaning or were they polysemantic? What is the origin of the mythical scenes? How and why were they chosen? Which non-Greek, typically Etruscan iconographic phenomena can be detected? Until the 1970s, some scholars presumed that the Etruscans did not understand and therefore banalized Greek myths. Recent research, however, makes clear that though some scenes may show evidence of misunderstandings or conflations (see below), most others make sense and frequently harbor a moralistic, ideological, propagandistic, or possibly political meaning (Krauskopf 1974; Massa-Pairault 1992; Menichetti 1994; Massa-Pairault 1999; van der Meer 2004).

Definition

Iconography is not taken as image, portrait, statue, or the description and interpretation of images here but rather as iconology. The latter term means the study of images on all levels, in widening circles, that is in relation to the image bearers (monuments or artifacts), their micro-context (in the case of a poly-scenic iconographical program), function and macro-context (city or settlement, sanctuary, necropolis, tomb), and period, society, group, patron, and artist (style). Most images are the products of elite and middle class society, while few can be related to the lower classes. Changes in society and politics are often reflected by art and image, although some themes like those of the banquet and symposium attest to tradition and homeostasis in elite contexts, from prehistory to the first century BCE.

Historical Background

The oldest figurative scenes on artifacts of the prehistoric period can be dated after c. 800 BCE. They are rendered in a local geometrical style, mostly on biconical funerary urns, in weapons, and in the minor arts, showing symmetrical scenes of leave-taking or meeting (shaking hands), hunting, ritual dances, and weaving, often gender-related. The hunting of a boar by a lone man may be an example of self-representation and heroization. Human figures are rendered in profile or in frontal view. Contacts with the Greek Euboean colonies Kumai and Pithekoussai in Campania after c. 750 BCE led to the introduction

of the Greek geometric style, resulting in the appearance of mythological scenes of Greek origin during the Orientalizing period (c. 700–600 BCE). Sources of inspiration for these scenes included imported ceramics, itinerant Phoenician and Greek artists, and oral tradition. The immigrant Euboean potter Aristonothos depicted a Greek myth (Odysseus and Polyphemos) on one side of a vase but an Etruscan sea battle on the other side, thereby conforming to the wishes of his Italic patron. In the following Archaic period (c. 600–480 BCE), Etruscan gods, some with names of Italic origin like Menerva, were rendered for the first time in anthropomorphic fashion as statues or images, primarily due to the adoption of representations seen on imported Corinthian, Attic, and other Greek vases. The fifth century BCE was a period of crisis, especially along the Tyrrhenian coast, whereas the fourth century heralded a kind of artistic rebirth, with strong influences from Greek southern Italy, especially Apulia. The gradual reduction of the Etruscan states by Rome, between 396 and 240 BCE, did not result in immediate Romanization and Latinization. The importation of artists from Greek areas to Rome and Etruria in the Hellenistic period (c. 330–30 BCE) caused the introduction of successive, stylistic, and compositional models from Tarentum, Pergamon, Rhodes, Athens, and Rome itself. Distinct Etruscan art and imagery disappeared around 30 BCE, around the time when Latin replaced the Etruscan language. Although Etruscan iconography is heavily indebted to Greek art, countless scenes show a process of adaptation, reinterpretation, and original creativity.

Key Issues

Etruscan images, both originals and those (often partly) copied directly or indirectly from Greek archetypes and transmitting models, exhibit interesting characteristic phenomena which are presented in the following overview. The phenomena, some of which partly overlap, follow an internal chronological order.

Self-Representation and Identification

As stated above, self-representation is already visible in prehistoric artifacts. In the seventh century BCE, non-mythical scenes portray quotidian activities and funerary rituals. Some of them evidently have more than one meaning. A famous Etrusco-Corinthian jug dated to c. 620 BCE from a grave at Tragliatella, a settlement near Cerveteri, depicts the meeting between an Etruscan warrior and his wife (*Ammarce* (which should perhaps be read as *Mamarce*) and *Thesathei*), a cavalry engagement of two men in a labyrinth (*truia*), two couples making love, seven identically armed marching or dancing warriors, and the abduction of a woman overseas (*ThesCRA* I, s.-v. Processions, Etr. 34; van der Meer 1986: 169, Fig. 1). There is consensus now that some scenes of the narrative are influenced by the adventures of Theseus and Ariadne. This implies that the deceased wished to present themselves as heroic aristocrats. The *truia* vase shows that the iconographic program is the result of a creative, eclectic process.

Since several other scenes of Greek origin (e.g., Odysseus, the Argonauts) occur on Etruscan vases and on an ivory *pyxis* (round toilet box) from Pania near Chiusi, the choice of Greek myths may also have been influenced by the fascination for heroes traveling overseas, which is understandable since the Etruscans were first-class seamen and pirates.

The need for comparison and identification is present in later centuries too. The painted program of the François Tomb at Vulci, dated to c. 340–310 BCE (Massa-Pairault 1992: 119, Figs. 104–108), shows that the deceased Vel Saties and his companion compared themselves to or identified themselves with Greek heroes, namely, the wise Nestor and his friend, Phoinix. Symmetrical scenes showing men from Vulci slaughtering a king of Rome, thus representing sixth-century BCE history on one wall, and Achilles slaughtering Trojan prisoners on the opposite wall suggest that men from Vulci in the past and present are intended to be compared to successful Greeks on the one hand and the defeated Trojans with the Romans *cum suis* on

the other hand. The *heroon* of Aeneas at Lavinium (Latium), dated to c. 330 BCE, proves that the Romans connected their own origins with the city of Troy. Apart from reproducing the glorious past, the visual program of the François Tomb betrays wishful thinking, understandable in light of Rome's threatened conquest of Vulci. Identification is also seen in the names of supposed founders of Etruscan cities, who are always Greeks. This creation of roots probably originated in the fourth century BCE. Elite families also chose their own Greek hero. Laris Pulenas, a *haruspex* (seer) represented as a male figure on the lid of a Tarquinian sarcophagus dated to c. 250 BCE, presents the famous Greek seer Polles, called *Pule* in Etruscan, as his ancestor in his funerary inscription, something akin to a modern resumé. Daidalos (Etr. *Taitale*; *Taitle*), the famous inventor, served as a popular example for artisans and craftsmen. His images are common on artifacts from the seventh to the first century BCE (van der Meer 1977/8: 65; 108–109, Figs. 30–33). They testify to a *longue durée* identification, which persists until Late Antiquity.

Identification or association is also shown in incised images that appear on mirrors, like one from Perugia showing *Lasa Achununa* (Lasa (the) "Achu-nian") and *Atunis* (Adonis), which was found in the necropolis of a family called *Achu*. *Lasa*, assistant of *Turan* (Aphrodite), is a good example of another frequent phenomenon on mirrors: substitution (van der Meer 1995: 195, Fig. 93). The famous Bronze Liver of Piacenza, dated to c. 100 BCE, shows a similar replacement. In the inscribed pantheon, Lasa is mentioned but Turan is absent (Maggiani 1982 [1984]: 55–57, Fig. 1). The question of whether archaic terracotta statue groups (Massa-Pairault 1992: 61–62, Fig. 43) and reliefs of temples in Rome and Latium representing Herakles and an armed goddess (Athena?) attest to an identification wished by a king (such as that of the tyrant Peisistratos in Athens) has not yet been satisfactorily answered (Lulof 2000). More personal objects like fifth-century BCE scarabs show a plethora of Greek heroes with inscribed Etruscanized names, but Krauskopf's hypothesis that the bearers identified themselves with heroes is not convincing since men like Kapaneus were "bad guys" (Krauskopf 1999: 405–421).

Moralizing Images

One of the earliest examples of a moralistic narrative can be found in the painted program of the Tomb of the Bulls at Tarquinia, dated to c. 540 BCE (Brendel 1978: 167, Fig. 109). The frieze on the rear wall of the second room shows a heterosexual group in action and the erotic union of two homosexual men. In the first scene, a recumbent cow lies quietly, her back turned to the group; in the second, an aroused bull with a bearded man's face, which looks like the head of the libidinous Greek river god Acheloös, is about to attack the two men. So, evidently, at least in this funerary context, heterosexuality was seen as reproductive and homosexuality as non-fertile and therefore undesirable.

The roofs and pediments of Etruscan temples were decorated with terracotta statues or groups in the archaic and classical period, so-called *antepagmenta* (rectangular plaques in a pediment) and antefixes (vertical roof tile covers). A fascinating *antepagmentum* belonged to temple A at Pyrgi, the harbor city of Cerveteri (Brendel 1978: 234–235, Figs. 163–164). The temple, now dated to c. 470 BCE, was probably dedicated to the Aurora-like *Thesan*, whom ancient Greek writers assimilated with the Greek goddess Ino/Leukothea (Polyaenus, *Strategemata* 5.21). The tympanum plaque features the Seven against Thebes in overlapping groups. Zeus strikes one of them with his lightning bolt, and Athena withdraws the potion of immortality which was destined for one of the Seven, because of his cannibalistic behavior. The theme was probably chosen to show the *hybris* (recklessness; pride) of warriors and the punishment of bad behavior by the gods. Apart from the moralizing warning, the link with Thebes may have been important: Ino/Leukothea, goddess of light, was strongly worshipped in Thebes.

In the Hellenistic period, four scenes of the Theban Seven are also visible in the northern, completely filled pediment of the temple of *Tina* (Zeus) at Talamone, dated to c. 150 BCE (van der

Iconography, Etruscan, Fig. 1 Volterran urn showing Orestes and Pylades twice (Volterra, Museo Guarnacci, inv. 345; photo Dainelli, Volterra)

Meer 1977/8: 104, Fig. 19 (drawing); *LIMC* I,1 s. v. Amphiaraos 45 (photo)). Here too the tragic consequences of a battle between brothers is shown, obviously with a message: the bad men, Oedipus' sons, kill each other, and a good man, Amphiaraos, a seer, is saved by Zeus from death by letting him disappear into the earth. Oedipus' sons and Amphiaraos also appear in the paintings of the François Tomb mentioned before. In addition, the funerary urns from Chiusi, Volterra, and Perugia dated to the second and first centuries BCE, with schemes similar to those at Talamone, also frequently show Theban scenes. They may have been chosen because of the Etruscan fascination for chains of successive, fatal events. Steuernagel (1998) presumes that the urn images encouraged the elite to stick to the old aristocratic sacrificial rituals and values (cf. Stevens 2010: 77–110).

A terracotta *akroterion* from the top of the pediment of a small temple in the sanctuary in the Cannicella necropolis at Orvieto, dated to c. 480 BCE, shows Orestes killing his unfaithful mother Klytaimnestra, a theme which is also present on some bronze mirrors. In both contexts, we may assume that the images contain a warning against the consequence of adultery (Stopponi 1991: 1103–1161, Fig. 17; 25–27). On an alabaster urn from Volterra (c. 200 BCE; Fig. 1), the matricide is shown in two scenes, like Etruscan inscriptions which are read from right to left, Orestes (inscribed *Urste*) and Pylades (*Puluctre*) about to kill Klytaimnestra (*Clutmsta*) and her lover Aigisthos, and their kneeling on an altar, threatened from below by two Underworld demons, *Charun* (derived from the Greek Charon) wielding a hammer and *Vanth*, his female colleague, holding a torch. This sequence proves a rather good knowledge of successive episodes of one Greek tragedy. The type of altar and the Etruscan demons lend the scenes a local flavor. The asylum-seeking eventually brings about the salvation of the avengers (for possible literary or theatrical influences on urn reliefs, see below).

Some bronze mirror engravings may harbor a moral message, too. One dated to c. 450 BCE shows a standing, almighty *Turan* (Aphrodite) and a seated, boyish Alexandros (Paris) trying to seduce Helena, who is lying in bed with her baby Hermione (*LIMC* IV,1, s.v. Helena/Elina 5 (with figure)). The sphinx hovering over the scene foretells the disastrous consequence of adultery and abduction: the Trojan War.

Domestication

In many mythological scenes, the core is Greek with inserted or added figures of Etruscan origin.

Iconography, Etruscan, Fig. 2 Volterran urn depicting the assault on Thebes (Volterra, Museo Guarnacci, inv. 370; photo Dainelli, Volterra)

The addition and consequent hybridization mean that Greek myths were reinterpreted by Etruscan artists, in other words, the scenes received an Etruscan flavor (van der Meer 1995; de Grummond 2006). In scenes on mirrors showing the birth of *Menerva* (Athena) from the head of *Tina* (Zeus), the upper god is assisted by Etruscan goddesses like *Thanr* and *Thalna* in the role of midwives (*LIMC* II,1, s.v. Athena/Menerva 218 (with photo)). The embracing of *Tina*'s belly by *Thalna* as if he were giving birth like a sitting woman, an activity which does not appear in comparable Greek vase scenes, proves that the engraver inserted the local delivery practice, thereby showing that he had understood the myth. Many fourth- and third-century BCE mirror scenes of Greek origin show another frequent form of domestication, namely, the insertion of the façade of a house, palace, or temple into the background, a decor which is absent in comparable older or contemporaneous Greek representations (van der Meer 1995).

Hellenistic stone urns from Volterra and Perugia show a similar domestic element. The assault of the Seven takes place against a Thebes represented with an Etruscan city gate instead of a Greek one, thus situating the tragic attack in a local context (Fig. 2).

Actualization

Images are products of their time. A shift in the rendering of a theme is an indication of a changing custom. Etruscan banquet and symposium scenes initially show the participants sitting down (Tuck 1994), whereas after c. 580 BCE, they are reclining on wooden beds. The change is due to the imitation of the Greek custom, which became in vogue in the same period. The schemes may have been copied from depictions of *klinai* (dining couches) on imported Greek vases, among others, because young male assistants carrying wine to reclining couples are rendered nude, whereas in reality they were dressed (Diodorus Siculus, 5.40).

Even military events may have left traces on artifacts. It has been suggested that bronze mirrors dated to c. 470–450 BCE showing Eos with her dead son Memnon in her arms (*LIMC* III,1, s.v. Eos/Thesan 23–25 (with figure); cf. Brendel 1978: 287, Fig. 203) may reflect the loss of young soldiers during the fatal naval battle of the Etruscans and Greeks from Syracuse off Kumai in 474 BCE.

The theme of Achilles killing Trojans on Etruscan stone sarcophagi is often related to the cruel slaughtering of Roman soldiers by the Tarquinians in 356 BCE, described by Livy in his *Ab urbe condita* 7.15.9–10 (van der Meer 2004: 32–33).

In painted banquet/symposium scenes in archaic and classical period tombs at Tarquinia, women recline with their husbands, but at the end of the fourth century BCE, they are depicted sitting at their husbands' feet (Brendel 1978: 340, Fig. 265). This change may be due to Rome's conquest of Tarquinia. The Etruscan elite was probably forced to change a custom that was not considered acceptable in Roman society.

The effects of historical events are visible on Hellenistic urns too. Two urns of *marmo alabastrino*, still present in the Tomba della Pellegrina at Chiusi belonging to the *gens* Sentinate (c. 250–230), depict a battle between Celts and others, possibly a reminder of the fierce battle at Sentinum (in Umbria) between Celts, assisted by Umbrians and Etruscans, and Romans in 295 BCE. The Sentinate family may have originated from Sentinum, where their ancestors may have participated in the battle won by the Romans (Maggiani 1990: 207, Fig. 16; pl. 4, 4).

The enormous number of terracotta urns from Chiusi featuring the historical Athenian farmer Echetlos or an Etruscan farmer fighting with his plow against enemies is often assumed to reflect and symbolize the battle of farmers against the agrarian reforms of the Gracchi in the second century BCE (*LIMC* III,1 Echetlos 2; de Grummond 2006: 199, Fig. VII.28).

Symmetry

Symmetry is a frequent phenomenon from prehistory onward. It is found on Villanova ash urns showing two humans sitting opposite one another, right above the remaining handle. Similar compositions are found in archaic tomb paintings, e.g., mourners to the left and right of a fictive door to the Underworld (Brendel 1978: 169, Fig. 110); Castor and Pollux, both with a horse (e.g., Brendel 1978: 192, Fig. 127); and thematically related scenes (dance, procession, sport) on the long walls leading toward the eye-catching rear wall. The thematic symmetry in the François tomb has already been mentioned. Some bronze mirrors exhibit a similar phenomenon. The most instructive example is the famous *Athrpa* mirror, now in Berlin (Brendel 1978: 366, Fig. 284). In the center stands a winged woman labeled *Athrpa* (Atropos) holding a small hammer in her right hand. Above her the head of a boar is visible. On the left are *Turan* and *Atunis* (Aphrodite and Adonis); on the right is another couple, *Meliacr* and *Atlenta* (Meleagros and Atalanta). In ancient Greek literature, these couples are never mentioned together. The engraver combined them intentionally because the two men, Adonis and Meleagros, were killed in confrontations with boars. Atropos ("the Irreversible") is one of the three Greek *Moirai*, the goddesses of fate, who announce death. In Greek art, she uses scissors as one of three goddesses of fate but on the mirror a hammer, probably to pin the boar's head to an invisible wall. For *Athrpa*, the engraver used an exchangeable scheme; he copied her from Greek Nike, goddess of victory, as represented on silver coins from Syracuse, dated to c. 310 BCE. On these, Nike carries a hammer and is about to attach spoils to a *tropaion*, a bare trunk, which indicates the turning point in a battle. In a similar way, the Aphroditic goddess *Lasa* holding a scroll, a *liber fatalis*, stands between two Greek heroes on another mirror (van der Meer 1995: 222–227, Figs. 105–106; Harari 1995: 103–111).

Thematic symmetry is also present on several stone relief sarcophagi, dated to the end of the fourth century BCE. A sarcophagus from Torre San Severo near Orvieto – decorated on all four sides – for instance, shows Achilles killing Trojans on one long side and Achilles' son Neoptolemos killing the Trojan princess Polyxena on the other side, both in similar schemes. Not only do these scenes have a common theme, but they

also represent a chain of fatal events. The short sides show successive stories pertaining to Odysseus: his visit to Kirke and his sacrifice to the spirits of the deceased in order to gain information from the shade of the seer Tiresias as to how he could return to his home in Ithaka (van der Meer 2004: 29–39, Figs. 7–8, and 30). The latter sequence has a positive message: salvation. Rescue scenes are common on Hellenistic urns too, the most popular themes being the recognition of Paris and the sacrifice of Iphigeneia (see below).

Some symmetries seem to be gender-related. The famous sarcophagus with Amazonomachies painted on all four sides which belonged to an elite woman shows losing Amazons on two sides but victorious ones on their opposite sides (Brendel 1978: 342, Fig. 266, 384, and 296; *LIMC* I,1 Amazonae etruscae 29 (photo)). Amazon victories are absent from Greek visual art.

Symmetry is also common on sarcophagi and urns bearing a so-called heraldic scheme: a *patera* flanked by griffins or sea monsters. The wine cup may hint at the joys of the symposium which awaits those who travel to the Blessed Islands in the Underworld (van der Meer 2004: 111–118).

The most recent mirrors without inscriptions, found in third-century BCE male graves, very frequently show Castor and Pollux in a mirrored scheme, indicating a hero of mortality and one of immortality. The image probably represented the hopes of an eternal afterlife.

Conflation

Conflation may have been the consequence of the artist's amalgamation of elements from two myths or parts of two or more models. This happened when stories had a similar content or heroes played a similar role. The best example of this is an engraved scene on a now lost inscribed mirror (Fig. 3) featuring from left to right *Mine* (Minos), *Menrva* (Athena), *Vile* (Iolaos), *Ariatha* (Ariadna), *Hercle* (Herakles), and *Thevrumines* (the Bull (*thevru*; from Greek *tauros*) of Minos (*Mine*): Minotauros). In Greek myth and art, it is Theseus who kills the Minotaur. The engraver made the error because he also had vague knowledge of Herakles slaying a bull (van der Meer 1977/8: 85). Female names Ariadna and Klytaimnestra are transformed so that they end like Etruscan female first names do, on – *tha*/*ta*: *Aria-tha, Clutms-ta*. The transition from *Clutum-* to *Clutm-*, evidence of the syncopation that took place after c. 460 BCE, is a strong indication that the owners of mirrors, usually women, liked to converse about myths.

Iconography, Etruscan, Fig. 3 Drawing of a lost bronze mirror showing Herakles and the Minotaur (from *BABESCH* 52–53, 1977–78, 129, Fig. 100)

The Transmission of Themes and Schemes

Etruscan images are mono- or poly-scenic. Polyscenic scenes, like Odysseus's escape from Polyphemos' cave and his getting past the dangerous Skylla, a barking sea monster, on the ivory *pyxis* mentioned before (Krauskopf 1974: pl. 2–3), are quite exceptional because the combination of two successive, narrative scenes has no parallel in contemporaneous Greek visual art. While the escape scene occurs on Greek vases, the Skylla scene is absent. This may imply that the ivory carver also had oral information about the myth, ultimately based on Homer's *Odyssey*, and thus created his own little narrative, cyclic representation.

Places where Etruscan and Greeks met frequently were in the first place sanctuaries near

the harbors of Tarquinia and Cerveteri. Myths and rituals, e.g., of Adonis, were introduced by Greek merchants from Ionia, the Greek islands, and Athens but reinterpreted by the Etruscans. Although there was a language barrier, they must have talked about myths. The frequent Atunis (Adonis) scenes on fourth-century BCE mirrors have elements in common with images on two gilded, red-figure *hydriai* of the Athenian Meidias Painter dated to c. 410 BCE featuring the beautiful heroes Adonios and Phaon, vases which were found in the tomb of a priestess of Turan (Aphrodite) at Populonia: the presence of musical instruments, a magic bird (a wryneck; *iynx*) and a *rhombos* (magical turning wheel). Comparison shows that the mirror engravers added non-Greek elements like an *alabastron* (perfume vase) and a spatula, objects not present on the Meidias vases but which obviously belonged to the Etruscan *mundus muliebris* (Brendel 1978: 364, Fig. 364). The comparison does not mean that engravers saw Meidias's vases but Meidias's motifs may have been transmitted by memory, textiles, or other image carriers.

The phenomenon of presenting successive scenes from a single myth also occurs on so-called stone hall sarcophagi from the fourth and third century and urns from the second and first century BCE, particularly those depicting Trojan and Theban stories (Brendel 1978: 385, Fig. 297). There are some indications that papyri illustrated with successive epic scenes were used. An alabaster urn from Volterra bears two successive scenes from the *Iliad* books 3 and 4 that are also visible on a marble plaque (the so-called *Tabula Iliaca Capitolina*) which illustrates the main scenes of the 24 books of the epic in small panels furnished with Greek texts (Squire 2011). The *Tabula* dates to the period of Augustus. Since the makers of the urn and the *Tabula* cannot have seen each other's work, a common source must be postulated. The back of the *Tabula* bears an acrostic which is similar to that of Eudoxos in an illustrated, astronomical papyrus, dated to c. 165 BCE. This coincidence suggests that a multi-scene papyrus or another, similar image carrier functioned as a model for both the maker of the urn and the maker of the *Tabula* (van der Meer 1977/8: 77–78; 120, Figs. 72–75; for cyclic scenes, see also Maggiani 2000: 9–18).

Many urns from Volterra and Perugia depict themes which are present in Roman tragedies of the second century BCE, especially those of Ennius, who used tragedies of Euripides but added realistic Roman elements. On many urns from Perugia showing the Sacrifice of Iphigeneia, one of the soldiers, probably Achilles, is about to cast a stone, a detail present in Ennius' *Iphigenia* but not in Euripides' tragedy (van der Meer 1991: 119–136, Fig. 1, pl. 36). It seems likely that Etruscans performed tragedies based on Roman versions, since the stone theater in an extra-urban hill sanctuary in Castelsecco, near Arezzo, dates from c. 150 BCE, a period when the Etruscan language had not yet been replaced by Latin. In addition, stone theater-like tribunes in front of tombs, and many terracotta masks found in tombs, suggest that theater plays were not only performed in sanctuaries but also in necropoleis.

Current Debates

Elucidating the semantic content(s) of images is a fascinating research challenge. More theoretical and methodical reflection is needed in order to avoid the danger of overinterpretation (Spivey 1994: 213–215; as for theory, see Junker 2005: 108–118). The introduction of an "internal combinatory" method by de Grummond (2006: 15–18), implying the comparison of series of similar Etruscan images, is a step forward, but it should not be applied without paying attention to possible Greek sources. The current debate is focused on the possibly polysemous character of many images, especially those that have been borrowed from Greek sources. Another aspect concerns the way schemes and themes were transmitted: by itinerant artists, imported artifacts, visual models (textiles, papyri, parchments, and molds), memory, and oral information and possibly by literary sources, tragedies, or even performed stage plays.

International Perspectives

For further iconological research, it is a conditio sine qua non that the *Corpus Speculorum Etruscorum (CSE)* and the *Corpus delle urne etrusche di età ellenistica (CUE)* should be completed. Modern research like microscopic analysis, the use of databases, statistics, and the study of the metal composition of artifacts, e.g., of mirrors (see Wiman 1990), will add information on artistic centers, workshops, engravers, and their modus operandi. In addition, more collaboration between experts of different disciplines, especially the exact sciences, languages, epigraphy, art history, and the archaeologies of Egypt and the Near East, is needed.

Cross-References

- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ Iconography in the Roman World
- ▶ Terracotta Architectural Sculpture in Classical Archaeology
- ▶ Tombs, Etruscan

References

Brendel, O.J. 1978. *Etruscan art*. Harmondsworth: Penguin Books.

de Grummond, N.T. 2006. *Etruscan myth, sacred history, and legend*. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Harari, M. 1995. Ipotesi sulle regole del montaggio narrativo nella pittura vascolare etrusca, *in Modi e funzioni del racconto mitico nella ceramica greca, italiota ed etrusca dal VI al IV secollo a.C.* (Atti del Convegno Internazionale, Raito di Vietri sul Mare, 1994), 103–111. Salerno: Edizioni 10/17.

Junker, K. 2005. *Griechische Mythenbilder: Einführung in ihre Interpretation*. Stuttgart: J. B. Metzler.

Krauskopf, I. 1974. *Der thebanische Sagenkreis und andere griechische Sagen in der etruskischen Kunst*. Mainz am Rhein: Verlag Philipp von Zabern.

Krauskopf, I. 1999. Gli scarabei etruschi. In *Le mythe grec dans l'Italie antique: fonction et image. Actes du colloque international organise par l'Ecole francaise de Rome*, ed. F.H. Massa-Pairault, 405–421. Rome: Publ. Collection de l'École francaise de Rome.

Lulof, P. 2000. Archaic terracotta acroteria representing Athena and Heracles: Manifestations of power in central Italy. *Journal of Roman Archaeology* 13: 207–219.

Maggiani, A. 1982 [1984]. Qualche osservazione sul fegato di Piacenza. *Studi Etruschi* 50: 53–88.

Maggiani, A. 1990. Alfabeti etruschi di età ellenistica. *Annali della fondazione per il Museo "Claudio Faina"* 4: 177–217.

Maggiani, A. 2000. Assassinari all'altare'. Per la storia di due scheme iconografici greci in Etruria. *Prospettiva* 100: 9–18.

Massa-Pairault, F.-H. 1992. *Iconologia e politica nell'Italia antica. Roma, Lazio, Etruria dal VII al I secolo a.C.* Milan: Longanesi. & C.

Massa-Pairault, F.-H., ed. 1999. *Le mythe grec dans l'Italie antique. Fonction et image*. Actes du colloque, Rome 1996. Rome: École Française de Rome.

Menichetti, M. 1994. *Archeologia del potere, re, immagini e miti a Roma e in Etruria in età arcaica*. Milan: Longanesi & C.

Spivey, N. 1994. Review of F.-H. Massa-Pairault. Iconologia e Politica nell'Italia Antica: Roma, Lazio, Etruria dal VII al I Secolo a.C. *Journal of Roman Studies* 84: 213–215.

Squire, M. 2011. *The Iliad in a nutshell: Visualizing epic on the Tabulae Iliacae*. Oxford: Oxford University Press.

Steuernagel, D. 1998. Menschenopfer und Mord am Altar. *Griechische Mythen in etruskischen Gräbern*. DAI Palilia 3. Wiesbaden: Reichert.

Stevens, N.L.C. 2010. Catalogue of the Etruscan alabaster urns with mythological representations from Chiusi. *BABesch* 85: 77–110.

Stopponi, S. 1991. Un acroterio dal santuario di Cannicella ad Orvieto. *Archeologia Classica* 43: 1103–1161.

Tuck, A.S. 1994. The Etruscan seated banquet: Villanovan ritual and Etruscan iconography. *American Journal of Archaeology* 98 (4): 617–628.

van der Meer, L.B. 1986. Le jeu de truia: le programme iconographique de l'oenochoe de Tragliatella. *Ktema* 11: 169–178.

van der Meer, L.B. 1977/8. Etruscan urns from Volterra. Studies on mythological representations. *Bulletin Antieke Beschaving* 52/3: 57–131.

van der Meer, L.B. 1991. Iphigenia aulidensis on Etruscan urns from Perugia. *Studi Etruschi* 47: 119–136.

van der Meer, L.B. 1995. *Interpretatio etrusca. Greek myths on Etruscan mirrors*. Leiden: Brill, (formerly Amsterdam: Gieben).

van der Meer, L.B. 2004. *Myths and more on Etruscan stone sarcophagi (c. 350–c. 200 B.C.)*. Louvain/Dudley: Peeters.

Wiman, I.M.B. 1990. *Malstria – Malena. Metals and motifs in Etruscan mirror craft*. Göteborg: Paul Åströms Förlag.

Further Reading

CSE: 1981 –. *Corpus Speculorum Etruscorum*.

Haynes, S. 2000. *Etruscan civilization: A cultural history*. Los Angeles: The J. Paul Getty Museum.

LIMC. 1981–2009. *Lexicon Iconographicum Mythologiae Classicae*. Zurich/Munich: Artemis Verlag.

Martelli, M., ed. 1987. *La ceramica degli Etruschi. La pittura vascolare*. Novara: Istituto geografico de Agostini.
Steingräber, S., ed. 1984. *Catalogo ragionato della pittura etrusca*. Milan: Jaca Book.
ThesCRA. 2004–2006. *Thesaurus Cultus Rituumque Antiquorum*. Vol. 6 vols. Los Angeles: J. Paul Getty Museum.
Torelli, M., ed. 2000. *Gli Etruschi. Catalogo della mostra* (Venezia). Milan: Bompiani. (in translation: 2001. *The Etruscans*. London: Thames & Hudson 2001).

Ideology and Materiality in Archaeological Theory

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Introduction

The notion of ideology has been wielded by a vast range of archaeologists studying every conceivable period and subject, and it has been defined in an equally vast range of forms. In various hands, ideology looms as instrumental misrepresentations of objective reality, a structured body of ideas imposed on a group of people, or a general worldview shared by a society. It is not necessary or even desirable to develop a single definition of ideology, but many analyses of ideology risk reducing it simply to generalized ideas and practices, and others detach it from any concrete power relationships. This entry focuses on scholarship that defines ideology as a body of representations that mystifies and masks concrete power relationships, typically to promote the interests of a particular social collective. This approach situates ideology squarely within relations of inequality, assuming that dominant representations of reality rationalize, disguise, and distort lived inequalities, and it focuses on how archaeologists can examine the ways goods and material discourses are defined and contested as ideological mechanisms. The interests of dominant collectives are opposed in modest and consequential ways to the interests of other social collectives, and ideology always is embedded in (and attempting to rationalize and reproduce) those power inequalities. Certainly nothing could be more material than such power, so archaeological scholarship on ideology has powerful potential to examine how goods are implicated in systems of inequality, variously reproducing them, negotiating inequality, or being wielded against dominant interests.

This entry places emphasis on the political implications of archaeological research on ideology. Nearly all scholarship on ideology is rooted in a critical philosophical tradition that views analysis of ideology as having contemporary political import, if not activist implications, so much of this archaeological scholarship consciously positions itself as a critique of contemporary ideologies as well as their historical precedents. Some archaeologists do that by stressing the many different ways humans have organized societies and power relations over millennia, others examine inequality in broadly defined complex societies, and still other scholars do it by tracing the concrete historical precedents of the contemporary world since the emergence of colonization. Regardless of context, ideology in any archaeological case study is significant as a critical framing mechanism that calls into question any representation of the relationship between consciousness and experience. By nearly any account, an archaeological focus on ideology provides a powerful framework to interpret the representation of inequality and relationships between materiality, structuring social systems, and representation of social life.

Key Issues/Current Debates/Future Directions

Relationship Between Power and Reality

Few archaeologists dispute the realities of inequality over the full breadth of complex societies, although that inequality encompasses a range

of contextually distinct power relationships ranging from profound exploitation to socially condoned systems of privilege and rank. Ideology is a body of beliefs that represents inequality and attempts to rationalize it or otherwise represent it in ways that aspire to reduce if not eliminate resistance. Some ideologies are dubbed "vulgar" in the sense that they are clearly rooted in one dominant group, obvious in their messages and intent, and likely visible to a vast range of people. However, attention here is focused on ideologies that are more accurately described as "non-vulgar" in their tendency to be marked as "common sense" assumptions beyond any critical apprehension. This breaks from the simplistic caricature of ideology simply as a vulgar "false consciousness" in which the masses are depicted as irrationally and more or less completely accepting the contrived class interests of the bourgeoisie.

The term ideology occasionally appeared in archaeological scholarship throughout the twentieth century, but it routinely referred to a general body of core beliefs or the broader world of ideas (cf. Eagleton 1991; Bernbeck and McGuire 2011: 45). Most contemporary definitions of ideology build on or are at least indebted to Marxian theory, where ideology is defined as an imagined relationship between consciousness and reality (Bernbeck and McGuire 2011: 17–19). In the 1980s a series of archaeological scholars began to use the notion of ideology to describe discourses of mystification, borrowing a belief most closely linked to Frankfurt School critical theorists. Critical theories tend to acknowledge that all perceptions of the relationship between reality and consciousness are mediated by ideology (Bernbeck and McGuire 2011: 24). Frankfurt School critical theory approaches scholarship on ideology as a contemporary intervention that raises consciousness of inequalities, reveals ideological fallacies, and fosters political action against such inequalities.

The most persuasive 1980s definitions of ideology firmly root it in relations of power and conflict and stress the connection between ideologies in the past and present. For instance, Mark Leone's archaeological analysis of ideology in the colonial Chesapeake borrowed from the French structural Marxism of Louis Althusser as well as Frankfurt School critical theory. Leone argued, following Althusser, that ideology was "those things that are taken by a society as given" (Leone 1984: 25). Those assumptions in Leone's formulation were class-interested representations of colonial elite that obscured the profoundly exploitative nature of inequality in the eighteenth-century Chesapeake. Leone argued that the elite's ideological representations of their power were designed to "naturalize and thus mask inequalities in the social order," with the intention to "disguise the arbitrariness of the social order, including the uneven distribution of resources, and it reproduces rather than transforms society (Leone 1984: 26)." Leone deployed this framework in an analysis of Chesapeake formal gardens and subsequently extended it to everyday commodities (Leone et al. 1987), arguing that the elite struggled to define artifacts of all scales in ways that reproduced inequality and their existing dominance. He argued that the gentry built Chesapeake formal gardens in the 1760s and 1770s to display their mastery of natural law and rationalize their material wealth and claims on political power. Some scholars are skeptical that nonelite accepted such representations of class power, and Leone (2005: 82) contends that it "did not matter whether slaves, free African Americans, or poor white people believed in the ideas on display, but it did matter whether middle- and upper-class people were impressed." Gardens viewed this way were mechanisms of ideological class consolidation rather than emulative models for the masses.

Leone asserted that such scholarship on inequality could be used to illuminate how contemporary capitalist inequalities have developed over more than 250 years. Many scholars examining ideology agree that self-reflection and consciousness promote activism against ideological inequalities. This sort of critical Marxian scholarship is often referred to as emancipatory. Dean Saitta (2005) argues that Marxism offers a powerful framework for an archaeology of tribal societies that is both explanatory and emancipatory; i.e., there is a concrete explanatory rigor in Marxism as well as a dimension that fosters critical

self-consciousness leading to change that might be considered emancipation. Saitta advocates examining tribal societies (e.g., Mississippians) as class societies in which surplus labor is appropriated in many different ways that range from collective to exploitative appropriation that was rationalized ideologically in many different forms. Yet he underscores that there is potential emancipatory impact in an archaeological picture of class in tribal societies that reveals the vast complexity in the ways societies produce and distribute social surplus. For Saitta, much of the power in an analysis of ideology is its power to erode widely accepted but largely unexamined assumptions about complexity and class by both archaeologists and contemporary constituencies.

Archaeologists have sometimes expressed skepticism that such ideologies were embraced by all consumers, casting doubt on the extent to which ideology determines everyday agency. Archaeological material culture certainly reveals widespread resistance to and breakdowns in ideological practices. Michel de Certeau (1988) stressed human agency within dominant ideology, laying a theoretical groundwork for archaeologists that resists the most deterministic notions of ideology. Certeau argues for "two logics of action" that he refers to as the strategic and the tactical. Tactics are opportunistic spontaneous actions, operating free in space, that subvert dominant strategic discourses. Tactics introduce plurality and individual creativity in the construction of meaning and action within an oppressive system, but they subvert that system through their ability to redefine what a commodity means and how it is used.

Archaeologists interested in such a picture of everyday life have often focused on the contradictions between ideological representation and everyday life practices. Archaeological scholarship on race and consumption, for example, has probed how African Americans resisted racist representations by literally buying into consumer culture. African Americans acquired commodities and embraced the role of consumer as a mechanism to defy racist stereotypes that assumed African Americans were not racially capable of participating in consumer culture (Mullins 1999). The challenge in such research is that the consumption of marginalized racial and ethnic collectives countered blatant ideological misrepresentations of those groups, but consumption demanded a commitment to wage labor inequalities, and goods brought with them social assumptions about behavior and identity that were not wholly empowering. James Symonds (2004) examines how archaeologies of urban working-class life in the United Kingdom, United States, and Australia collectively reflect the ways everyday life broke sharply from the poverty "myths" favored by contemporary observers and persistently misrepresented in heritage discourses. In similar ways, Rebecca Yamin's (2001) work in the Five Points neighborhood of New York City aspires to demonstrate how working peoples' lives were radically unlike the class-interested caricatures of social reformers who ostensibly hoped to contain poverty if not eliminate slums.

Most of these archaeologists share an interest in using archaeological material culture to bridge between past and present and counter historical narratives that reproduce if not perpetuate ideological distortions. Some scholars call this the archaeology of the "contemporary past," eliding the facile division between past and present and focusing on the ways historical narratives distort past experiences and their connection to the contemporary world. Laura McAtackney (2011), for instance, investigates the origins of Belfast, Ireland, in the seventeenth century, examining how walls have partitioned the city in particular ways over the subsequent centuries and remain boundary markers in the contemporary world. Since the 1960s, temporary walls have been used to divide ethnic and nationalist collectives in Belfast, often at the behest of those Belfast communities, but McAtackney argues that they pass largely ignored. Inelegantly known as "peace lines," these walls are ideologically designed to be expressions of control, and McAtackney examines how wall murals are used to both reaffirm

and challenge social and political control. McAtackney concludes that walls and their memorial murals permit communities to maintain identity distinctions, but at the same time they perpetuate longstanding tensions and hinder communication across lines of spatial and social difference. Such studies that aspire to bridge between past and present often illuminate ideologically laden heritage narratives and use materiality to erode dominant narratives. For instance, Adrian Myers' (2008) analysis of German concentration camps argues that the heritage of the camps inevitably cannot include the voices of the scores of prisoners who perished, and he advocates a material analysis to temper narratives that ignore the voices of the subaltern. Myers reasons that much of the material record of everyday goods reworked by prisoners or camp graffiti reveals the complicated range of ways prisoners resisted and negotiated imprisonment.

Archaeological scholarship on ideology aspires to underscore how society represents itself to its members, illuminating the ways that distinctions in privilege, power, and structural inequalities are explained. Many of these legitimizing and masking explanations are accepted very broadly in societies. But over time many of them erode as well, because rationalizations of inequality are constantly under fire and rarely accepted wholesale. Archaeology provides especially powerful material examples to illuminate how such ideological discourses are represented in symbolic and material form, revealing the ways various social agents accept ideologies as well as how some members reject ideological claims. The central thread in perhaps all the archaeological scholarship on ideology is its ambition to illuminate contemporary social inequality, sometimes by examining the many different ways past societies have represented inequalities and sometimes by revealing the very historical roots of contemporary ideological practice. It is difficult to fathom any scholar of complex societies and inequality ignoring the powerful framework ideology provides to analyze the representation of inequality and social life.

Cross-References

- ▶ Critical Theory in Archaeology
- ▶ Material Culture and Education in Archaeology
- ▶ Materiality in Archaeological Theory
- ▶ Power and Knowledge in Archaeology

References

Bernbeck, R., and R. McGuire. 2011. *Ideologies in archaeology*. Tucson: University of Arizona Press.

Certeau, M. 1988. *The practice of everyday life*. Berkeley: University of California Press.

Eagleton, T. 1991. *Ideology: An introduction*. London: Verso.

Leone, M.P. 1972. *Contemporary archaeology: A guide to theory and contributions*. Carbondale: Southern Illinois University Press.

Leone, M.P. 1984. Interpreting ideology in historical archaeology: Using the rules of perspective in the William Paca garden in Annapolis, Maryland. In *Ideology, power and prehistory*, ed. D. Miller and C. Tilley, 25–35. Cambridge: Cambridge University Press.

Leone, M.P. 2005. *The archaeology of liberty in an American capital: Excavations in Annapolis*. Berkeley: University of California Press.

Leone, M.P., et al. 1987. Toward a critical archaeology. *Current Anthropology* 28 (3): 283–302.

McAtackney, L. 2011. Peace maintenance and political messages: The significance of walls during and after the Northern Irish 'troubles'. *Journal of Social Archaeology* 11: 77–98.

Mullins, P.R. 1999. *Race and affluence: An archaeology of African America and consumer culture*. New York: Kluwer/Plenum Press.

Myers, A.T. 2008. Between memory and materiality: An archaeological approach to studying the Nazi concentration camps. *Journal of Conflict Archaeology* 4 (1): 231–245.

Saitta, D.J. 2005. Marxism, tribal society, and the dual nature of archaeology. *Rethinking Marxism* 17 (3): 385–397.

Symonds, J. 2004. Historical archaeology and the recent urban past. *International Journal of Heritage Studies* 10 (1): 31–48.

Yamin, R. 2001. Becoming New York: The Five Points neighbourhood. *Historical Archaeology* 35 (3): 1–6.

Further Reading

Althusser, L. 1972. *Lenin and philosophy, and other essays*. New York: Monthly Review Press.

Miller, D., and C. Tilley. 1984. *Ideology, power, and prehistory*. Cambridge: Cambridge University Press.

Ikawa-Smith, Fumiko

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Basic Biographical Information

Fumiko Ikawa-Smith is an anthropologist and prehistorian (Fig. 1). She is an Emeritus Professor at McGill University, Canada. She was born in 1930 and is the eldest daughter of the Buddhist historian Ikawa Joukei. Under the oversight of her mother, who was a high school teacher, Fumiko began studying English at an early age. She graduated from Tsuda College in 1953. Her graduate thesis was on critical essays by the British poet T. S. Elliot. Taking advantage of her proficiency in English, she was able to get a clerical position under ethnologist Oka Masao in the Department of Sociology at Tokyo Metropolitan University. She gained a strong interest in anthropology while assisting Oka with his lectures and research. In 1954 she resigned her position and began studying anthropology as a graduate student at the same university, with the focus on the ancient civilizations of Central America. At the same time, she met anthropologist Clyde Kluckhohn who was in Japan leading a series of seminars on American Studies. Through Kluckhohn, she gained direct contact with American anthropology, and with the help of Kluckhohn's wife, Ikawa took a leave of absence and obtained a Fullbright Scholarship to study at Harvard University. Though the study abroad was intended to last only 1 year, Ikawa has continued to study in the North America to this day.

Ikawa-Smith, Fumiko, Fig. 1 Fumiko Ikawa-Smith at Vladivostok in 2003. (© Robert E. Ackerman)

At Harvard, Ikawa initially aimed to specialize in Central America under Gordon Willey but switched to the study of Early Paleolithic cultures in East Asia after studying with Hallam Movius. At the same time, more material for the study of the Paleolithic in Japan was becoming available. In 1959, she married the prehistoric archaeologist Philip E. L. Smith whom she met at Harvard University. After the birth of their child, they moved to Canada where Philip was to teach at the University of Toronto. In 1962–1963, she accompanied Philip on his excavation in Egypt, and upon returning to Canada, she was responsible for organizing the artifacts. Following that, she served as a Lecturer in the Department of Anthropology at the University of Toronto. They moved to Montreal in 1966, where Philip taught at l'Université de Montréal while Fumiko at McGill University. After a few years of part-time teaching, she was appointed Assistant Professor of Anthropology in 1970, Associate Professor in 1974, and Professor in 1979. In the meantime, she obtained a doctorate from Harvard University in 1974 for her dissertation on the Early Paleolithic cultures of Japan. Before her retirement in 2003, she served as the Chair of the Anthropology Department, 1975–1980; Director of the Centre for East Asian Studies, 1983–1988; and Associate Vice-Principal (Academic) of the University in 1991–1996. In 2005, she was awarded the Japanese national decoration of The Order of the Sacred Treasure, Gold Rays with Rosette, for distinguished contribution to the cultural interaction between Canada and Japan. She is currently Professor Emerita at McGill University.

Major Accomplishments

One of Dr. Ikawa-Smith's greatest contributions to global archaeology was to provide a linguistic

bridge between Japan and the rest of the world in the decade that followed WWII. She played a major role in stimulating interest in the study of the Paleolithic period in Japan and emphasized Japan's unique capacity to fill in the knowledge gap between the Paleolithic period in China and the colonization of the Americas. Due to language barriers, little progress had been made in the 10 years following the first discovery of a Paleolithic site in Japan in 1949 at Iwajuku. It was in light of this that in 1960, along with Chosuke Serizawa, Dr. Ikawa-Smith coauthored an English language paper that introduced the available material for the study of the Paleolithic period in Japan and its position in East Asia (Serizawa and Ikawa 1960). This paper was highly regarded throughout the Americas. Because of her unique position, progress began to be made. Additionally, Dr. Ikawa-Smith also tried to bridge Japan's more historical approach to archaeology with America's anthropological approach. All of this was made possible by her archaeological education in the United States as well as her contact with Chosuke Serizawa, who encouraged a wider view of the world.

Dr. Ikawa-Smith's activities were not limited to spreading information from Japan to the rest of the world, however. Archaeology within Japan was stimulated by her paper in 1976 that introduced into Japanese Paleolithic studies the perspective of processual archaeology (Ikawa 1976). The work of her husband Philip, who tried to clarify the cultural origins of farming using an archaeological approach based on cultural anthropology, may have had an influence on her interest in the food habits of Paleolithic hunter-gatherers. In addition to this, Dr. Ikawa-Smith's work promoted discussions on research into the Paleolithic and Jomon periods in Japan from the perspectives of gender and national identity.

In 1973, Dr. Fumiko Ikawa-Smith organized the symposium "The Early Palaeolithic in Southeast Asia" to assist in disseminating information on East Asian archaeology to the West. Later, she worked alongside Gina Barnes and Sarah Nelson, both of whom also specialize in the study of ancient East Asia, to establish a research network for the study of East Asian archaeological data. In 1996, this group established the Society for East Asian Archaeology. Dr. Ikawa-Smith's broad range of international activities have had a profound influence on Japanese researchers, including but by no means limited to Junko Habu who graduated from McGill University with a doctoral degree in Jomon Culture and who now a professor in the Anthropology Department at the University of California, Berkeley.

Cross-References

- ► East Asia: Paleolithic
- ► Movius, Jr., Hallam L.
- ► Periodization in Japanese Prehistoric Archaeology

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References

Ikawa, F. 1976. Kyusekki bunka kenkyu no hoho-ron [Methodology of Palaeolithic studies.]. In *Nihon no Kyusekki Bunka*, Japanese Palaeolithic cultures, ed. M. Aso, S. Kato, and T. Fujimoto, vol. 5, 19–70. Yuzankaku: Tokyo. (in Japanese).

Serizawa, C., and F. Ikawa. 1960. The oldest archaeological materials from Japan. *Asian Perspectives* 2 (2): 1–39.

Further Reading

Ikawa-Smith, F., ed. 1978. *Early Palaeolithic in South and East Asia. World anthropology: Papers from a pre-congress conference of the 9th international congress of anthropological and ethnological sciences in Chicago*. The Hague: Mouton.

Ikawa-Smith, F., ed. 2008. Serizawa Chosuke sensei to Kanada ni okeru Nihon Kokogaku Kenkyu [Professor Serizawa and archaeological studies on Japan in Canada.]. In *Koko Minzoku Rekisi Gaku Ronso* [*A collection of papers on archaeology, ethnology, and history*], ed. Publication Committee for Memorial Essays for Professor Serizawa, 723–9. Tokyo: Rokuichi Shobo. (in Japanese).

Ikawa-Smith, F., ed. 2009. Living on the edge of the continent: The Japanese Archipelago 30,000–8,000 cal. B.C. In ed. J. Cassidy, R. Ackerman, and I. Ponkratova. Maritime adaptation and seaside settlement in northeastern Asia during the Pleistocene-Holocene boundary. *Journal of North Pacific Prehistory* 3: 49–69.

Ikawa-Smith, F., ed. 2011. Practice of archaeology in contemporary Japan. In *Comparative archaeologies:*

A sociological view of the science of the past, ed. L.-R. Lozny, 675–705. New York: Springer.
Kameda, K. 2001. Ikawa Fumiko [Fumiko Ikawa-Smith.]. In *Tsuda Umeko no Musume-tachi. [Daughters of Umeko Tsuda.]*, ed. S. Kawamoto, K. Kameda, and Y. Takakuwa, 179–186. Tokyo: Domes Shuppan. (in Japanese).
Publication Committee for Doctor Joukei Ikawa's Seventy-seventh Birthday Memorial Essays. 1974. *Nihon Bunka to Jodo-kyo Ronko. [A collection of papers on Japanese culture and pure land buddhism]*. Kyoto: Naigai Insatsu. (in Japanese).

Ikram, Salima

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Basic Biographical Information

After double majoring in history as well as classical and Near Eastern archaeology at Bryn Mawr College (USA), Salima Ikram received her M. Phil. (in museology and Egyptian archaeology) and Ph.D. (in Egyptian archaeology) from Cambridge University (UK). Today she is distinguished university professor of Egyptology at the American University in Cairo. Although Dr. Ikram initially trained as a general archaeologist/Egyptologist, she moved to focusing on mortuary archaeology and archaeozoology, as well as being actively involved in rock art and museological projects.

Major Accomplishments

Dr. Ikram directed the Animal Mummy Project (Ikram and Iskander 2002; Ikram 2005 and 2015) and codirected the Predynastic Gallery Project, the Egyptian Museum Chariot Project (Veldmeijer and Ikram 2018), and the Amenmesse Project of KV10 and KV63, as well as being involved in several exhibitions at the Egyptian Museum in Cairo and consulting and working on exhibitions at other museums in Egypt, Europe, and the USA. She has participated in several excavations in Egypt where she has worked at sites from Alexandria to Aswan in various capacities. She has also worked in the Sudan and Turkey; in Turkey, she was chief archaeozoologist at the site of Kinet Höyük, ancient Issus. In Egypt, her focus has been on mortuary (Ikram and Dodson 1998; Dodson and Ikram 2008; Ikram 2013) and ritual sites, with an increasing emphasis on animal mummies (Ikram 2012a; 2005/2015), one of her specialties, and a subject that has enjoyed a renaissance as a scholarly and popular focus due to her research. The focus on animals also encompasses food and foodways in ancient Egypt (Ikram 1995; 2012b; 2013). Dr. Ikram also codirected the North Kharga Oasis Survey in Egypt's Western Desert (Rossi and Ikram 2018) and directs the North Kharga Oasis Darb Ain Amur Survey (Ikram 2009a, b). This project has widened her interests to include environmental archaeology, rock art, and cultural heritage issues (Ikram the protection and presentation of sites in Egypt's Western Desert, with a pilot heritage management project being carried out at the site of Qasr el-Lebekha. In addition to archaeological and museological work, she has taught at the American University in Cairo since 1995 and has been instrumental in establishing an M.A. program in Egyptology and Coptology there. She is also very interested in engaging younger audiences and has written a series of children's books (Ikram 1997a–c, 1998, 1999; Bowditch and Ikram 2018)

Cross-References

► Cat: Domestication
► Dog: Domestication

References

Dodson, A., and S. Ikram. 2008. The tomb in ancient Egypt. London: Thames and Hudson.
Bowditch, E. U. and S. Ikram. 2018. Fun Things to Do With Dead Animals. Egyptology; Ruins; My Life. Cairo: American University in Cairo Press.
Ikram, S. 1995. *Choice cuts: Meat production in ancient Egypt*. Leuven: Peeters.
Ikram, S. 1997a. *Egyptology*. Dokki: Hoopoe.
Ikram, S. 1997b. *Land and people*. Cairo: Hoopoe.
Ikram, S. 1997c. *The pharaohs*. Cairo: Hoopoe.
Ikram, S. 1998. *Gods and temples*. Dokki: Hoopoe.

Ikram, S. 1999. *Mummies and tombs*. Cairo: Hoopoe.
Ikram, S. 2003a. *Death and burial in ancient Egypt*. Harlow: Longman.
Ikram, S. 2005 and 2015. *Divine creatures: Animal mummies in ancient Egypt*, 2nd edn. Cairo: American University in Cairo.
Ikram, S. 2009a. Drawing the world: Petroglyphs from Kharga Oasis. *ArchéoNil* 19: 67–82.
Ikram, S. 2009b. A desert zoo: An exploration of meaning and reality of animals in the rock art of Kharga Oasis. In *Desert animals in the eastern Sahara: Status, economic significance, and cultural reflection in antiquity. Proceedings of an interdisciplinary ACACIA workshop held at the University of Cologne December 14–15, 2007*, Colloquium Africanum 4, ed. H. Riemer, F. Förster, M. Herb, and N. Pöllath, 263–291. Köln: Heinrich-Barth-Institut.
Ikram, S. 2011. Collecting and repatriating Egypt's past: Toward a new nationalism. In *Contested cultural heritage. Religion, nationalism, erasure, and exclusion in a global world*, ed. H. Silverman, 141–154. New York: Springer.
Ikram, S. 2012a. An eternal aviary: Bird mummies from ancient Egypt. In *Between heaven and earth: Birds in ancient Egypt*, ed. R. Bailleul-LeSuer, 41–48. Chicago: Oriental Institute.
Ikram, S. 2012b. *Food, drink and feasting (Egypt)*. Wiley Online Library. https://doi.org/10.1002/9781444338386.wbedh/505.
Ikram, S. 2013. The mummification of Djau. In *Deir el-Gebrawi III, the southern cliff: The tomb of Djau/Shemai and Djau*, ed. N. Kanawati, 60–63. Oxford: Oxbow.
Ikram, S., and A. Dodson. 1998. *The mummy in ancient Egypt: Equipping the dead for eternity*. New York: Thames & Hudson.
Ikram, S., and N. Iskander. 2002. *Catalogue général of Egyptian antiquities in the Cairo museum*. Cairo: Supreme Council of Antiquities.
Rossi, C. and S. Ikram. 2018. North Kharga Oasis Survey. Explorations in Egypt's Western Desert. Leuven: Peeters/British Museum.
Veldmeijer, A. J. and S. Ikram, eds. 2018. (eds.), Chariots in Ancient Egypt: The Tano Chariot: A Case Study. Amsterdam: Sidestone.

Ileret Footprints

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The Koobi Fora Formation, located in the Turkana Basin of northern Kenya, is one of the richest and most famous hominin fossil beds in east Africa (Harris et al. 2006). Two footprint sites have been excavated in this basin to date one close to Ileret and a second slightly younger site close to Koobi Fora.

The tracks close to the village of Ileret data from ~1.52 Ma and were reported in 2009 within the Okote Member of the Koobi Fora Formation (FwJj14E; lat 4°18′ 18′ 44″N, long 36°16′ 16′ 16″E; Bennett et al. 2009). They are younger than the mid-Pliocene (3.66 Ma) tracks at Laetoli (Leakey and Hay 1979) but are the oldest in the world attributed to the genus *Homo*. This site has been excavated since 2006, and during 2013/2014 additional satellite excavations were dug (Roach et al. 2016; Hatala et al. 2016a, 2017). The main site consists of an eroding bluff of sediment capped unconformably by Holocene sediments (Galana Boi Formation; Feibel et al. 1989). Within the main site, two hominin track-bearing horizons are known with more isolated tracked horizons between. The sedimentary succession consists of over 9 m of fine-grained, normally graded, silt and sand units (0.1–0.5 m) between thicker (0.5–2.0 m) paleosols. Isaac and Behrensmeyer (1997) suggest that the sediments around Ileret form part of a low-energy fan delta with numerous seasonally dry distributaries draining into a more stable lake body that may have gradually transgressed over at least part of this area (Fig. 1). There is no clear evidence of this transgression at FwJj14E, and track-bearing horizons consist of fining-upward waning sheet flood deposits in which course sand drapes underlying deposits (and/or the previous flood cycle) fining upward to fine silts which appear to have been emergent but are not unduly desiccated. They may be representative of either crevasse splays or more simply over-bank floods on a low-lying flood- or delta plain. These deposits are interbedded with thicker more massive fine sand units which show evidence of paleosol development. The paleosols are indicative of wet-dry seasonal conditions as described by Wynn (2004) more generally within the Koobi Fora Formation. Within this succession, there are three re-worked volcanic ashes; the upper ash (Northern Ileret Tuff) forms a prominent landscape benchmark that correlates with nearby sites containing traces of hominin activity including cut bones. The ash layers have been

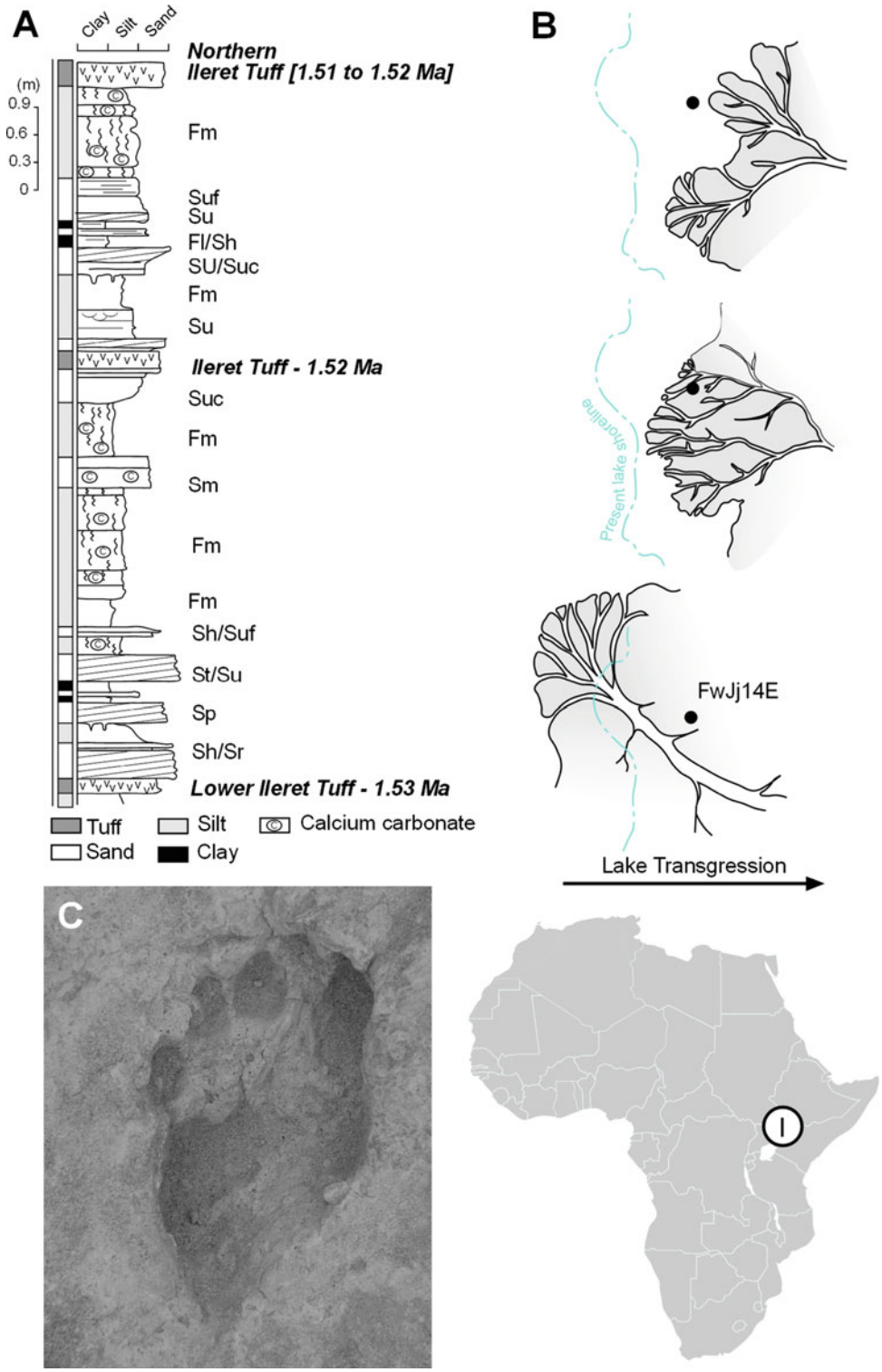

Ileret Footprints, Fig. 1 Sedimentology at FwJj14E from Bennett et al. (2009) and paleogeographical reconstruction based on the work of Isaac and Behrensmeyer (1997)

correlated geochemically to dated tuffs within the Turkana Basin thereby providing an age of 1.51–1.52 Ma for the upper tuff and 1.53 Ma for the lower tuff (Bennett et al. 2009).

The original hominin tracks were described by Bennett et al. (2009) and subsequently by Dingwall et al. (2013) and most recently by Hatala et al. (2016a, 2017) who also records additional hominin tracks found at the satellite excavations. There is a broad consensus that the hominin tracks were made by *Homo erectus*, although the possibility of other track-makers such as *Paranthropus boisei* cannot be excluded completely (Dingwall et al. 2013; Hatala et al. 2016a). Dingwall et al. (2013) estimates walking speeds of between 0.45 and 2.2 ms^{-1} made by heavy (41.5–60.3 kg), tall individuals (1.526–1.858 m).

Modern human footprints reflect the distinct anatomy and function of the human foot, which is characterized by a fully adducted hallux, large and robust calcaneus and tarsal region, a pronounced medial longitudinal arch, and short toes. Footprints reflect the pressure distribution as the foot makes contact with a substrate mediated by the sediment's geomechanical properties (Bates et al. 2013). During normal walking, the heel makes first contact with the ground. This is followed by contact with the lateral side of the foot and metatarsal heads, after which weight transfers medially along the ball of the foot with peak pressure under the medial metatarsal heads, and finally ending with toe-off pressure under the hallux. The distribution and pattern of depth within a footprint generally reflects this typical pattern of weight transfer, although will appear different when corrections are being made for balance. This allows biomechanical inferences to be made from sets of footprints. The prints at Ileret have (Bennett et al. 2009) (1) a well-defined hallux which is in line with the lateral toes, (2) visible lateral toe impressions that vary in depth of indentation, (3) a well-defined ball beneath the first and second metatarsal heads, and (4) and a visible instep reflecting a medial longitudinal arch. The angle of hallux abduction, relative to the long axis of the foot averages 14° compared to 8° for modern prints and 27° for the Laetoli prints (Bennett et al. 2009). The morphology of the Ileret prints suggests that the feet of these hominins had functional medial longitudinal arches and a modern humanlike toe-off mechanism and therefore operated in a biomechanical fashion akin to that of modern humans (cf. Hatala et al. 2017).

The significance of the Ileret footprints lies in the fact that they provide evidence of a modern foot function on one side of the transition from the *Australopithecus* to *Homo* genus. This transition is one of the most significant events in human evolution (McHenry and Coffing 2000; Pontzer 2007; Ruff et al. 1993): longer lower limbs lowered energetic cost (Pontzer 2007); archaeological indications of activity occur in a much wider variety of ecological settings; and there is evidence of transport of resources over long distances. Together these are consistent with a transition to endurance walking and running. Recent work involving the Ileret tracks by Bennett et al. (2016) suggests that foot function did not change across this evolutionary transition, although not all parties agree with this interpretation preferring a more primitive function for the earlier Laetoli tracks (Hatala et al. 2016b).

Recently, Hatala et al. (2016a) have argued that the sub-parallel nature of the track at Ileret, and their consistently large size which is attributed to them being males, coupled with similar levels of track deterioration implies near-simultaneous imprinting by groups hunting in coordinated groups. As such, they claim evidence for social organization within *Homo erectus* which is consistent with evidence from elsewhere in the East African Rift of ambush hunting (Kübler et al. 2015). This interpretation is complimented by the work of Roach et al. (2016) who discuss the wider implications of the animal tracks present and advance a paleoenvironmental interpretation. Their interpretation is based on the assumption that the tracks are ephemeral and deteriorate quickly after formation, and therefore tracks with similar levels of preservation can be assumed to have been imprinted either simultaneously or in close temporal proximity. While they do not publish a detailed taxonomic list, nor describe the tracks assigned to each taxon in detail, they do state that the most frequently recovered tracks are Bovidae and Suidae, hippopotami, crocodile, and

various water birds which they suggest are indicative of a stable water body (Lake Lorenyang; Feibel et al. 1989). No sedimentological data is advanced to confirm this however. They use the contrasting orientation of hominin and animal track directions to suggest that the hominins were moving shore-parallel, a strategy that is consistent with predator/hunter behavior. In particular they contrast track abundance/density with that obtained from skeletal remains (Fig. 2) and point to the fact that hominin tracks occur much more frequently in the record than is consistent with the skeletal remains recovered. They suggest that this is due to frequent imprinting as groups of *Homo erectus* moved along the former lakeshore in hunting groups. It is an interesting hypothesis although it depends on the contemporaneity of the tracks and that the group occupying the area may have either transited just once or took a different path each time. A single or small number of

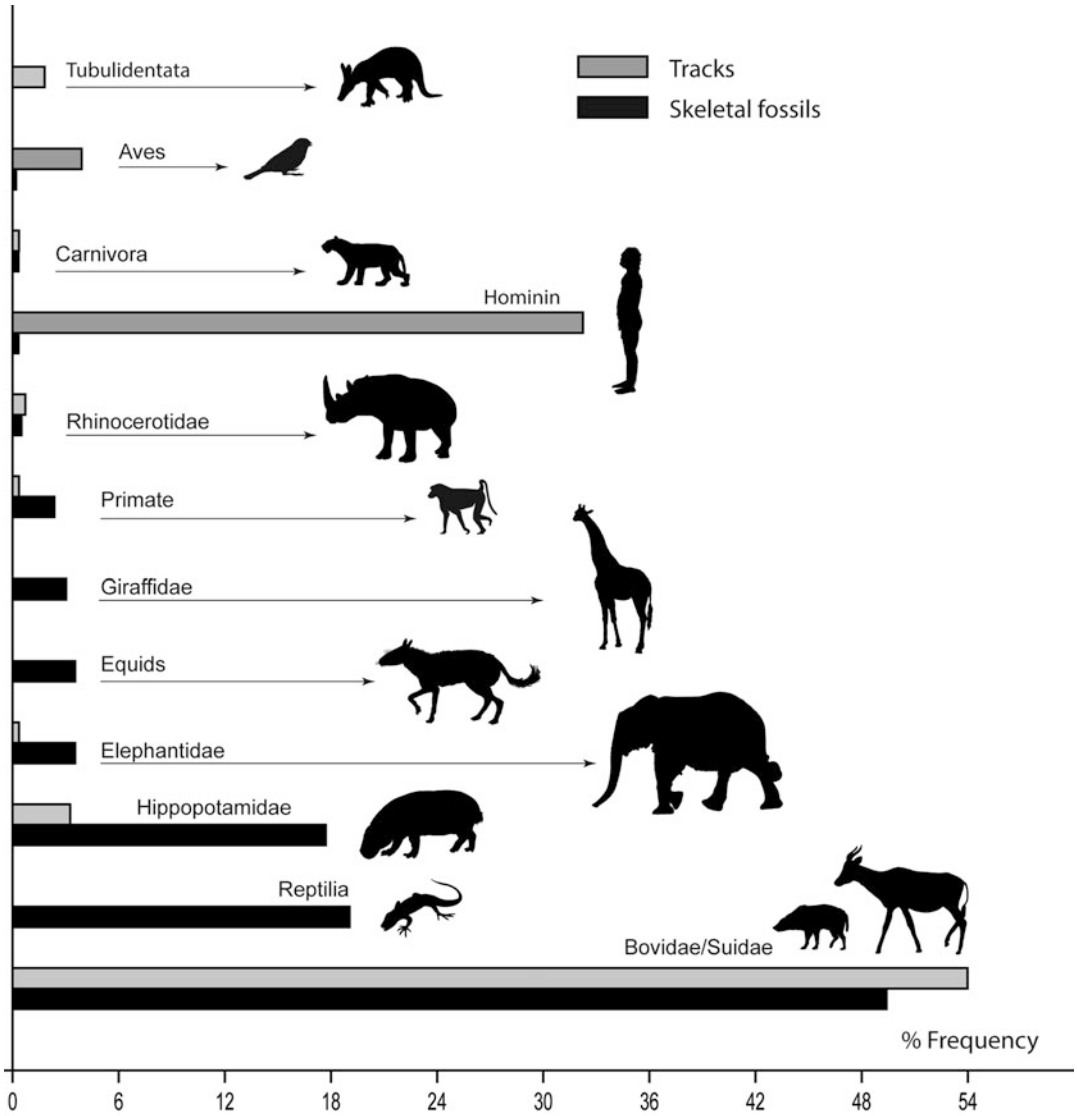

Ileret Footprints, Fig. 2 Faunal diversity based on vertebrate tracks and bone walks modified from Roach et al. (2016). (Animal images are from http://phylopic.org/)

track-makers could also build up a similar set of tracks. While the footprint maps within Hatala et al. (2016b) show a series of sub-parallel tracks, they overlap and show movement in both directions. Cross-cutting trackways have been described previously (Bennett et al. 2009; Dingwall et al. 2013). The leap to social organization and to predominantly male hunting groups may be a bit of a stretch on the available evidence. Nonetheless, it is an exciting and interesting use of tracks and complements recent work in Ethiopia (Altamura et al. 2018)

In conclusion, it is worth noting that Ileret is one of two footprint sites in the Turkana Basin. The second footprint site 45 km to the south of Ileret was first reported in Behrensmeyer and Laporte in 1981 (Behrensmeyer and Laporte 1981) and consists a single trail of poorly defined prints which were imprinted subaqueously (GaJi10; lat 3°44′ 44′ 15″N, long 36°55′ 55′ 48″E). The footprint surface occurs below a prominent tuff, sampled and correlated by Bennett et al. (2009) to the Akait Tuff and dated to 1.435 Ma. Re-excavation of these prints by Bennett et al. (2009) uncovered four of the original seven prints, and the two best-preserved examples are comparable to those at FwJj14E. Further excavation in adjacent areas has so far failed to uncover additional hominin footprints but has revealed an extensive surface of animal tracks dominated by the prints of swimming hippopotami (Bennett et al. 2014). The presence of two sites with the Turkana Basin hints at the potential for further discoveries in the coming years.

References

Altamura, F., M.R. Bennett, K. D'Août, S. Gaudzinski-Windheuser, R.T. Melis, S.C. Reynolds, and M. Mussi. 2018. Archaeology and ichnology at Gombore II-2, Melka Kunture, Ethiopia: Everyday life of a mixed-age hominin group 700,000 years ago. *Scientific Reports* 8 (1): 2815.

Bates, K.T., R. Savage, T.C. Pataky, S.A. Morse, E. Webster, P.L. Falkingham, L. Ren, Z. Qian, D. Collins, M.R. Bennett, and J. McClymont. 2013. Does footprint depth correlate with foot motion and pressure? *Journal of the Royal Society Interface 10* (83): 20130009.

Behrensmeyer, A.K., and L.F. Laporte. 1981. Footprints of a Pleistocene hominid in northern Kenya. *Nature* 289 (15): 167–169.

Bennett, M.R., J.W.K. Harris, B.G. Richmond, D.R. Braun, E. Mbua, P. Kiura, D. Olago, M. Kibunjia, C. Omuombo, A.K. Behrensmeyer, et al. 2009. Early hominin foot morphology based on 1.5-million-year-old footprints from Ileret, Kenya. *Science* 323 (5918): 1197–1201.

Bennett, M.R., S.A. Morse, and P.L. Falkingham. 2014. Tracks made by swimming hippopotami: An example from Koobi Fora (Turkana Basin, Kenya). *Palaeogeography, Palaeoclimatology, Palaeoecology* 409: 9–23.

Bennett, M.R., S.C. Reynolds, S.A. Morse, and M. Budka. 2016. Footprints and human evolution: Homeostasis in foot function? *Palaeogeography, Palaeoclimatology, Palaeoecology* 461: 214–223.

Dingwall, H.L., K.G. Hatala, R.E. Wunderlich, and B.G. Richmond. 2013. Hominin stature, body mass, and walking speed estimates based on 1.5 million-year-old fossil footprints at Ileret, Kenya. *Journal of human evolution* 64: 556–568

Feibel, C.S., F.H. Brown, and I. McDougall. 1989. Stratigraphic context of fossil hominids from the Omo group deposits: Northern Turkana Basin, Kenya and Ethiopia. *American Journal of Physical Anthropology* 78: 595–622.

Harris, J.M., M.G. Leakey, and F.H. Brown. 2006. A brief history of research at koobi fora, Northern Kenya. Ethnohistory|Durham: Duke University Press.

Hatala, K.G., B. Demes, and B.G. Richmond. 2016a. Laetoli footprints reveal bipedal gait biomechanics different from those of modern humans and chimpanzees. *Proceedings of the Royal Society B* 283 (1836). https://doi.org/10.1098/rspb.2016.0235.

Hatala, K.G., N.T. Roach, K.R. Ostrofsky, R.E. Wunderlich, H.L. Dingwall, B.A. Villmoare, D.J. Green, J.W. Harris, D.R. Braun, and B.G. Richmond. 2016b. Footprints reveal direct evidence of group behavior and locomotion in *Homo erectus*. *Scientific Reports* 6: 28766.

Hatala, K.G., N.T. Roach, K.R. Ostrofsky, R.E. Wunderlich, H.L. Dingwall, B.A. Villmoare, D.J. Green, D.R. Braun, J.W. Harris, A.K. Behrensmeyer, and B.G. Richmond. 2017. Hominin track assemblages from Okote member deposits near Ileret, Kenya, and their implications for understanding fossil hominin paleobiology at 1.5 Ma. *Journal of Human Evolution* 112: 93–104.

Isaac, G.L.I., and A.K. Behrensmeyer. 1997. Geological context and palaeoenvironments. In *Koobi Fora research project, volume 5, Plio-Pleistocene archaeology*, ed. G.L.I. Isaac, 12–70. Oxford: Clarendon Press.

Kübler, S., P. Owenga, S.C. Reynolds, S.M. Rucina, and G.C. King. 2015. Animal movements in the Kenya Rift and evidence for the earliest ambush hunting by hominins. *Scientific Reports* 5: 14011. https://doi.org/10.1038/srep14011.

Leakey, M.D., and R.L. Hay. 1979. Pliocene footprints in the Laetolil Beds at Laetoli, northern Tanzania. *Nature* 278 (5702): 317–323.

McHenry, H.M., and K. Coffing. 2000. Australopithecus to *Homo*: Transformations in body and mind. *Annual Review of Anthropology* 29: 125–146.

Pontzer, H. 2007. Effective limb length and the scaling of locomotor cost in terrestrial animals. *Journal of Experimental Biology* 210: 1752–1761.

Roach, N.T., K.G. Hatala, K.R. Ostrofsky, B. Villmoare, J.S. Reeves, A. Du, D.R. Braun, J.W. Harris, A.K. Behrensmeyer, and B.G. Richmond. 2016. Pleistocene footprints show intensive use of lake margin habitats by *Homo erectus* groups. *Scientific Reports* 6: 26374.

Ruff, C.B., E. Trinkaus, A. Walker, and C.S. Larsen. 1993. Postcrania rovusticity in *Homo*. I: Temporal trends and mechanical interpretation. *American Journal of Physical Anthropology* 91: 21–53.

Wynn, J.G., 2004. Influence of Plio-Pleistocene aridification on human evolution: Evidence from paleosols of the Turkana Basin, Kenya. *American Journal of Physical Anthropology* 123: 106–118.

Imaging Techniques in Bone Analysis

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Introduction

The main medical radiological imaging techniques used for forensic examination of skeletal material may be summarized as follows:

Radiography: The term radiography is generally used to describe a static or "still" two-dimensional image produced by means of a single exposure to X-rays (an energy form of ionizing radiation). Such images are now usually recorded and stored digitally but were previously recorded photographically on X-ray film.

Fluoroscopy: The term fluoroscopy is used to describe a two-dimensional image directly visualized in real-time motion produced by a continuous exposure to X-rays.

Tomography: Tomography employs a moving X-ray tube and image receptor to create an image of a plane or "slice" within an object. Originally developed in the 1930s to overcome the limitations of radiography as a two-dimensional imaging method, the application of digital detectors and computer science led to the development of:

Computed Axial Tomography: CAT or CT scanning employs a computerized X-ray machine that uses an array of photoreceptors to detect minute differences in attenuation of X-rays emitted by an X-ray tube as it rotates around the body or body part. A computer generates an image of the body part in the axial or cross-sectional plane, and modern multi-detector (MDCT) scanners permit multi-planar, multidirectional sectional images to be displayed and/or reconstructed as three-dimensional images.

Definition

The examination of skeletal material should be divided into two general categories: *macro-* and *microradiography*. Historically, plane radiographs were examined by placing the film on an illuminator or viewing box. A hand lens may have been used to magnify a particular region of interest, but generally the structures under consideration where large enough to be easily demonstrated without magnification. Today, the resolution available with computed tomography (CT) is sufficient to provide two-dimensional sections and three-dimensional images that also do not require magnification. For the purpose of this chapter, images that can be viewed without the need of magnification have been categorized as *macroradiography*.

Microradiography has a long history. With contact microradiography, the object under

examination, usually less than a centimeter in diameter, is placed directly on the image receptor, and the resulting image is primary viewed under magnification (Conlogue and Marcinowski 1986). Today, micro-CT has expanded the possibilities and eliminated the need to physically section an object in order to demonstrate internal structure.

Application of Macroradiography Techniques

Radiological imaging has the advantage of enabling the examination of remains in a variety of states of decomposition from fully fleshed to completely skeletonized. As such, it affords the opportunity to obtain a considerable amount of data without the need to clean and/or completely deflesh the remains. It provides the investigative team with a rapid method of triage and classification by answering a number of fundamental questions:

Establishing Context

Human Versus Nonhuman

In most cases involving nonhuman (animal) bones, a simple visual examination is all that is necessary for the trained anatomist or forensic anthropologist (or osteologist) to determine nonhuman characteristics. In some cases, however, the most distinctive parts of the bones, the articular surfaces, may be missing due to fragmentation, decomposition, or animal activity, and in such cases radiographic examination of the bone structure and trabecular pattern can be useful to determine human from nonhuman remains (Brogdon 2011a; Chilvarquer et al. 1987).

Recognition of Commingling

In cases involving large amounts of fragmented remains, remains may be commingled and mixed with large amounts of debris and artifacts. Physical examination of such remains, particularly in cases involving exhumation or fire damage where there is a uniformity of discoloration of all samples retrieved, is both difficult and time-consuming. In such cases, radiological examination can prove useful to the forensic pathologist and/or anthropologist both in determining the presence of one or more individuals but also in identifying and locating small body parts, which may otherwise be overlooked in the absence of a thorough and time-consuming fingertip search.

Location and Retrieval of Artifacts/Evidence

In the same way, X-ray imaging can be utilized to detect and retrieve various objects that have been recovered together with the remains during excavation or body recovery. This can be helpful especially when body fragmentation is extensive and has proved particularly useful in mass fatality incidents (Viner and Lichtenstein 2011) or where the body has been exhumed. In the latter case, it may also be useful to radiograph the associated debris excavated with the body in order to detect small items such as jewelry or other personal effects which may have become disassociated from the body during decomposition – a technique referred to by Wessling as "The third method of Sieving" (Tonello 1998; Viner 2008; Wessling and Loe 2011) (Fig. 1).

Human Identification

Establishing the Biological Profile (Age, Sex, Stature, and Ancestry)

In the same way that a physical examination of the defleshed skeleton allows the forensic anthropologist and/or odontologist to estimate age at the time of death, so can skeletal radiography deliver the same information in the case of less decomposed remains by analysis of the state of maturation of dental structures, ossification sites, and degenerative changes. Similarly, radiologic examination of the pelvis, skull, and mandible can assist with the differentiation of sexes in cases where direct physical examination and measurement are not possible (Brogdon 2011a).

Estimations of stature are often made by direct measurement from unfleshed human remains. The same measurements can be made radiographically, provided that correction for magnification

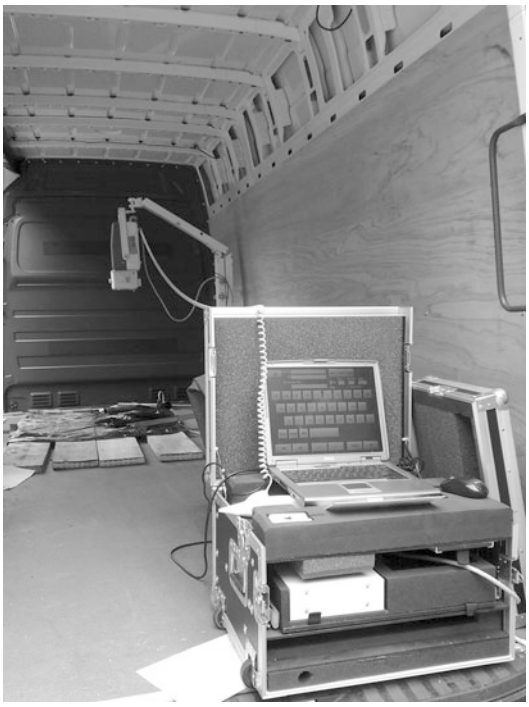

Imaging Techniques in Bone Analysis, Fig. 1 A portable direct digital X-Ray system being used on-site to examine remains. In this particular case, the unit is located in the back of a van and is being powered by a small generator. (Image provided by kind permission of Reveal Imaging Ltd)

is made (Brogdon 2011a). This can either be achieved by means of an adapted radiographic technique, applying a simple correction factor or utilizing modern imaging techniques such as CT scanning and digital radiography. CT scanners and digital X-ray systems can be calibrated to undertake this correction calculation automatically, thus allowing measurements to be made directly from the image. In the case of CT scanning, a scanogram is performed using the scanner to undertake an automated version of the manual process described above. Digital X-ray machines using a slit beam can also be used to take direct measurements, and many other direct digital X-ray machines can be calibrated so as to render accurate anatomical measurements from the resultant images.

Similar methods to those used by forensic and physical anthropologists to make an assessment about ancestry from skeletal remains can be applied radiographically with fleshed remains. In particular, examination of the skull and mandible, the distal end of the femur, and the ratio of long-bone length can be useful in determination of population ancestry (Brogdon 2011a).

Positive Identification of Individuals by Comparison of Antemortem and Postmortem Radiological Data

Radiological identification of human remains requires specific and unique findings on postmortem images to be matched exactly with antemortem images of the individual. In some cases, identification can be made from a series of relatively common or nonspecific pathological anatomical changes that appear in identical locations in ante- and postmortem images. In other cases, a single unique feature is sufficient (Brogdon 2011a).

Medical imaging has long been used for the identification of human remains and is well documented. Radiology is used extensively in anthropological and odontological assessment of postmortem and antemortem radiographs, records, or other images for concordance as they represent an excellent source of data for comparison of anatomical features (Fig. 2). Many specific cases have been reported in which radiology has played the leading role in the identification of human remains (Kahana and Hiss 1997; Viner and Lichtenstein 2011).

Analysis of Injuries

Interpretation of Trauma

Radiology can be used to assist in determining the manner of death or the extent and mechanism of trauma. In cases of extensive trauma, individual demonstration of all fractures present after a fatal accident may be a time-consuming process, and radiological examination simplifies the procedure. In addition, some fractures are difficult to demonstrate and are more adequately demonstrated using radiological methods such as X-ray or CT scanning.

Radiological examination may yield far more than simply demonstrating the presence of fractures. It may be able to demonstrate the nature of

Imaging Techniques in Bone Analysis, Fig. 2 Healed fractures such as this fracture of the tibia can enable an identification to be made via comparison of antemortem and postmortem images. Two projections of any fracture site, in the anterio-posterior (**a**) and lateral (**b**) should be made during post mortem examination. These are standard projections that are used in orthopaedic radiography to assess the healing fracture and post-mortem films can thus be compared with any ante-mortem images that may be available

Imaging Techniques in Bone Analysis, Fig. 3 "Defence fracture" of the ulna caused by blunt force trauma to the forearm. (Image provided by kind permission of the United Nations International Criminal Tribunal for the Former Yugoslavia)

the trauma that caused the fracture by determining the direction and impact of the force and in some cases may enable a fracture that has been caused by an assault to be differentiated from trauma sustained following an accidental fall (Fig. 3). MDCT scans and surface scanning techniques may also allow three-dimensional modeling to identify directions of impact and size and shape of weapons used to inflict trauma (Nather et al. 2011; Buck et al. 2011).

Radiology may also be of significance in proving the infliction of injury at various times by demonstrating healing and fresh fractures, and such evidence is essential to the concept of systematic abuse or torture (Brogdon et al. 2003). In some cases it may be particularly useful to identify perimortem trauma as fresh callus formation may be used for stable isotope analysis to determine the geographic region in which the deceased was living in the time leading up to their death by means of analyzing the bone mineral content.

The most obvious use of X-rays in cases of suspected homicide is to demonstrate the presence of bullets and other missiles within the body. Projectiles may be found some considerable distance away from the entry site, and radiography can be used to locate these. The deployment of a dynamic imaging method, such as fluoroscopy, will accelerate the process of retrieving ballistic material. This is particularly true when the body is partially decomposed and subjected to fire or has been exhumed. In such cases, physical examination

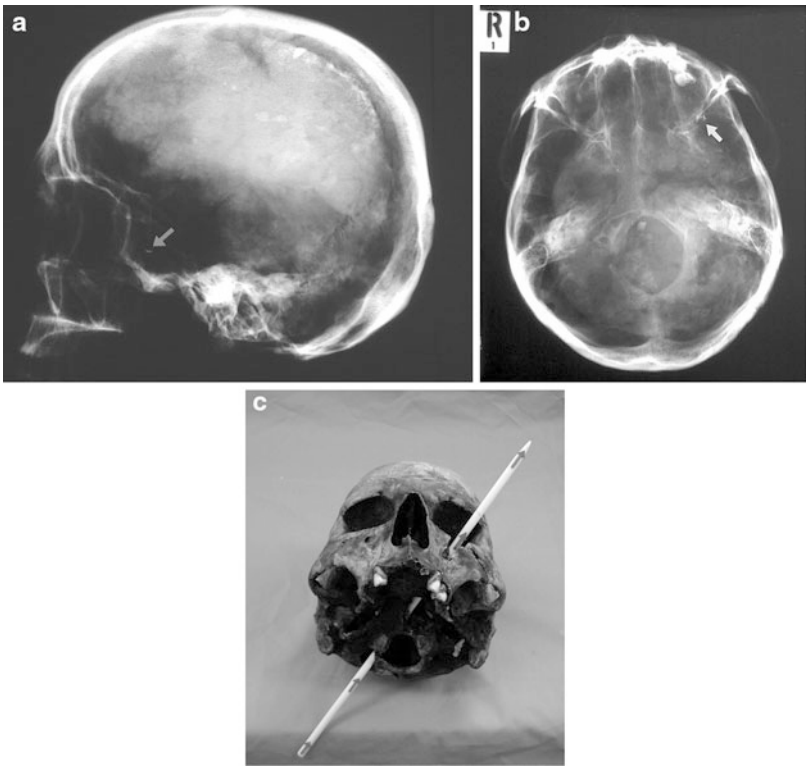

Imaging Techniques in Bone Analysis, Fig. 4 Lateral (**a**) and submento-vertex (**b**) projections of the skull reveal ballistic traces within the skull in the area of the left orbit, confirming the path of a bullet from its entry site in the occipital bone to its exit through the left orbit (**c**). (Image provided by kind permission of the United Nations International Criminal Tribunal for the Former Yugoslavia)

and location of ballistic material is often hindered by uniform discoloration and can be a time-consuming process. Even if the projectile is recovered without the aid of radiography, fragments of bullets or of bomb casings or contents can easily be missed in an unaided dissection, and important information for the ballistic expert may be lost.

The determination of other causes of death is also assisted by the use of X-rays. Of significance is the radiography of the larynx in cases of strangulation in which fractures of the thyroid cartilage or hyoid bone can be demonstrated, particularly if the cartilages are calcified (reference), a process which increases with age. Radiology has proved particularly useful in assessing and documenting trauma in mass fatality incidents (Alexander and Foote 1998; Harcke et al. 2002; Viner and Lichtenstein 2011), and radiological methods have also been employed extensively in the investigation of war crimes and human rights abuses involving the exhumation of buried human remains where radiology will assist in the location of ballistic material, the evaluation of gunshot and/or explosive injuries, and the investigation and documentation of any antemortem trauma (Tonello 1998; Viner 2008) (Figs. 4 and 5).

Key Issues and Examples of the Application of Macroradiography Techniques

For all its disadvantages, film is still the recording media of choice under certain circumstances, e.g., a sample consisting of a few small objects. Choices of recording media are not limited to medical radiographic film, and indeed, film intended for industrial applications has several advantages over its medical counterpart. Although it requires more radiation, the film provides greater resolution and a longer scale of contrast, more shades of gray. In addition, since X-ray and light are both forms of electromagnetic radiation, various types of sheet film or paper employed in

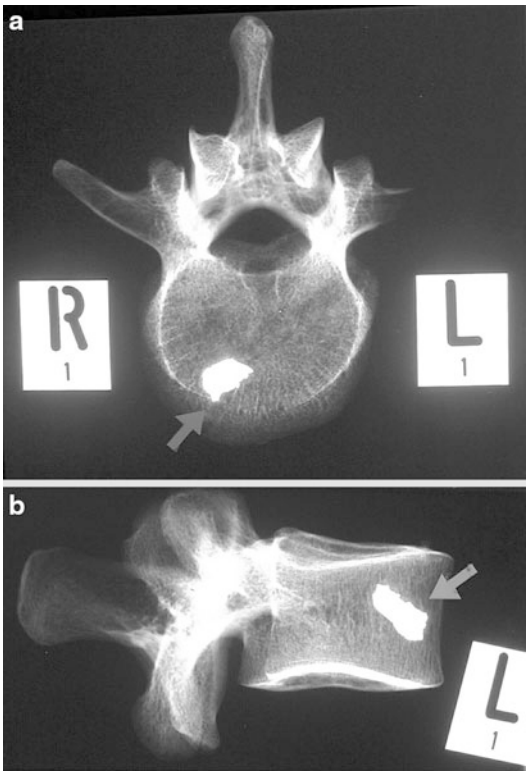

Imaging Techniques in Bone Analysis, Fig. 5 Initial x-ray examination of human remains revealed a ballistic fragment in the spine. This was further documented and localised by radiography of the lumbar vertebra prior to retrieval. Localisation is facilitated by two projections taken at 90°; in this case supero-inferior (**a**) and Lateral (**b**) projections. (Image provided by kind permission of the United Nations International Criminal Tribunal for the Former Yugoslavia)

Imaging Techniques in Bone Analysis, Fig. 6 A severed bound foot of a Chinese woman from the Mütter Museum, College of Physicians of Philadelphia, Philadelphia, Pennsylvania recorded on Polaroid Type 804 film

photography are capable of providing satisfactory results. Until 2009 when manufacturing ceased, Polaroid™ 8″ × 10″ types 804 and 805 produced excellent results (Fig. 6). Ilford™ photographic paper loaded in a screen cassette and in a non-screen film holder both provided images with exceptional detail resolution and contrast (Conlogue and Beckett 2010).

With only a few images to process, large tanks normally used to manually process exposed film are not necessary. Photographic trays typically employed to process photographic prints can serve to process radiographic film as large as 14″ × 17″ (35.6 × 43.2 cm). For smaller size film, disposable plastic containers are inexpensive and available a large food or discount stores.

When the size of the sample or object to be examined is large, digital radiography becomes the more realistic option for several reasons. Firstly, manually processing more than a few large format (14″ × 17″ [35.6 × 43.2 cm]) films is a cumbersome undertaking. Secondly, a large film requires at least 5 gallons (22 l) of water to be considered thoroughly washed prior to drying.

In the medical arena, film has gradually been replaced by a digital recording media. Although the initial outlay is expensive, the advantages of the digital approach, such as post-processing of

the image therefore eliminating the need to repeat an exposure, have reduced patient exposure and increased patient throughput.

Digital radiography can be divided into two categories: direct digital radiography (DR) and computed radiography (CR). With DR, the imaging plate is either directly or remotely connected to a computer. Within seconds of the exposure, the image will appear on the computer monitor. In most systems, the X-ray unit is an integral component and therefore increases the overall cost. In the case of CR, any X-ray source can be used. Following an exposure, the imaging plate is placed into a device called a reader in which the imaging plate is scanned by a narrow laser beam that transforms the X-ray energy trapped within the surface of the plate into visible light and then to an electrical signal and finally an image on the computer monitor. Because the CR process has several steps, the resulting image may be as long as 2 min following the exposure.

Each system has advantages and disadvantages. The principle advantage of DR is the short duration between the exposure and appearance of the image. With less time between exposures, more images can be acquired in a day. For example, during a 9-day radiographic examination of skeletal remains under St Bride's Church in London, a total of 1,192 exposures were made, averaging 132 images per 6-h day or 22 exposures per hour. Similar types of studies using film had a much lower number of images per day. In Guanajuato, Mexico, films were taken of mummified remains in the *Museo de Momias* and transported three times a day to be processed at a local hospital located 30 min away. Working 8-h days over a 5-day period, a total of 196 radiographs were taken. Unfortunately, either the temperature of the chemistry in the automatic processor or a fluctuation of the electricity supply to the X-ray unit changed between the second and third batch of film because the entire third batch had to be repeated.

Another advantage of DR is that the object does not need to be moved to process the image. If the image shows a less than optimal position, a slight adjustment of the object can be achieved within a minute or so of the first exposure. Even when a study is conducted in an imaging facility with an automatic processor in the next room, a repeat of a radiograph taken with film would take much longer. In order to process the image, the object would need to be removed from the cassette. The cassette is then brought to the darkroom and the film placed into the processing unit with at least a 90 s wait until the processed image can be examined. If a repeat exposure is necessary due to poor positioning, it is less likely to be as easily corrected because the object was removed in order for the film to be processed.

A third advantage is demonstrated if a repeat is necessary due to a poor exposure setting. Since the raw data from the plate is digitized prior to processing by the computer, algorithms within the computer software can manipulate the data, within limits, to insure an acceptable image.

There are several disadvantages of a DR system, the principle drawback being cost. As previously indicated, most systems require the X-ray source be integrated into an entire DR system. In addition, the X-ray tube support that is designed for mobile radiography will add about another 80 lbs (36 kg) to the overall weight of the system. If the study is in a remote location, the additional weight can become problematic. Another cost-related disadvantage is the expense for replacing a damage imaging plate. Once the plate is damaged, no more images can be acquired until the plate has been replaced.

The DR system cannot permit a multiple exposure to be taken on a plate before it is processed. The system is designed to transmit the data as soon as an exposure has been taken. However, there are certain situations when multiple exposures are necessary. If the object to be radiographed is sufficiently dense to require an exposure that exceeded the maximum output of the X-ray unit and film is the recording media, multiple exposures can be taken with an adequate interval between exposures to insure that the X-ray tube will not be damaged. Multiple exposures may also be necessary in a situation where the distance between the X-ray source and the image receptor is great. Because the X-ray beam diverges from the source, if the distance is doubled to the image receptor, four times the exposure

is required. In a study of 18 mummies at the Detroit Science Museum, a 168 in. (427 cm) distance between the X-ray source and the image receptor was required for the X-ray beam to cover the entire individual. Since the study area was in a warehouse, there was no restriction due to the ceiling height, and the X-ray tube was attached to the tines of a forklift (Fig. 7). The resulting radiographs, recorded on film, were digitized and electronically "stitched together" to produce a single image of each mummy.

Computed radiography (CR) is the less costly alternative to DR, and the plates can be used when multiple exposures are needed. An additional advantage is that there are CR systems for both medical and industrial applications. The medical systems require less radiation to produce a satisfactory image; however the industrial systems not only have increased resolution but also more algorithms or mathematical manipulations of the raw data.

Imaging Techniques in Bone Analysis, Fig. 7 The tines of a fork lift truck were used to support the x-ray tube (A) above the mummy (B) to achieve the distance necessary to radiograph the remains in a single radiograph

A single "seamless" image of a mummified individual in the Mütter Museum at the College of Physicians in Philadelphia, Pennsylvania, provides an excellent example. To image the individual known as the "Soap Lady mummy," four Fuji™ industrial CR plates were taped to a sheet of chipboard. Once in place, the plates were exposed to fluorescent light for 30 min to insure there was no residual energy on the plate surface, and then the board with the attached plates was covered with black gardening plastic. A total of 12 exposures were made using 86 kVp at 34 mAs. In a make-shift darkroom, the plates were removed from the board, placed into a light-tight box, and transported for processing approximately 200 miles to the Fuji™ Research and Development testing facility in Stamford, Connecticut. The images were downloaded onto a DVD and later stitched together using a photographic enhancing program to produce a single image of the entire mummy (Conlogue et al. 2010).

This example demonstrates another advantage of the CR approach. The plates can be taken to a location exposed and then transported to another site to be processed by the reader. Less than 24 h elapsed between the exposures in Pennsylvania and the time the plates were placed into the reader in Stamford, Connecticut. In another study, a Konica™ medical CR plate was used to image a lateral skull of a formalin-preserved cadaver where the arterial vessels were injected with barium- and gelatin-based contrast media. Two plates were exposed using identical technical factor: one was processed immediately and the other approximately 2 weeks later. Although visually the images appear almost identical, the numerical representation of the exposure, known as the "S" value, indicated the plates were losing the charge over time (Fig. 8).

The ability to correct a poor exposure is incorporated in both DR and CR algorithms that are used to generate an image. An example is demonstrated by an underexposed lateral chest image of a mummy captured on a Fuji™ industrial radiography CR plate (Fig. 9). If film had been the recording media, the only option would be a repeat. If this was the appearance of a batch of

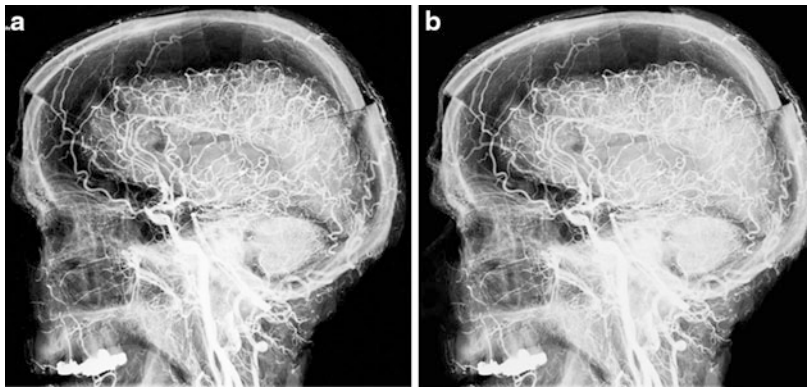

Imaging Techniques in Bone Analysis, Fig. 8 Two lateral skull projections of a formalin preserved individual with the arterial system filled with a barium gelatine compound. An S value of about 200 indicates a satisfactory exposure (**a**). As the S value increases, it indicates an under exposure (**b**). However, the algorithm employed to process the data will make adjustments, within limits, to insure the resulting images look similar

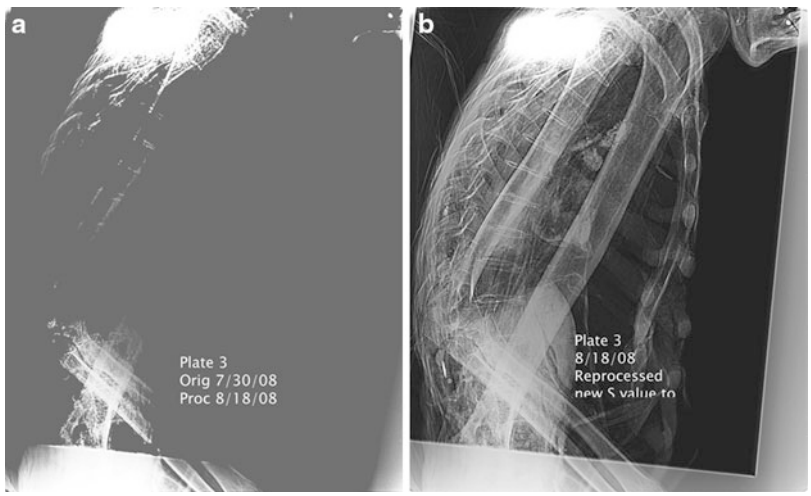

Imaging Techniques in Bone Analysis, Fig. 9 (**a**) A lateral chest radiograph of a mummy identified as George/Fred that was processed 20 days following the exposure. (**b**) The original data reprocessed to produce an acceptable image

films processed, the entire group would need to be repeated and possibly an entire day of work lost.

Everything discussed to this point represents two-dimensional imaging. The primary disadvantages of this approach are superimposition of structures and magnification. Because of superimposition, at least two images at right angles to each other must be obtained to determine the relative position of structures within an object. Objects, such as skulls, necessitate multiple images in order to understand complex internal structures. Similarly magnification is inherent to all radiographs regardless of the recording media. The further a structure is away from the image receptor, the greater the magnification. Therefore, without knowing the distance an internal structure is above the receptor, it is not possible to obtain an accurate measurement of the structure. The process is more complex if the internal structure of interest is not parallel to the image receptor. The portion of the structure closer to the imaging plane will be less magnified than regions farther away. This will result in unequal magnification, more correctly termed distortion. Since it is very difficult to get an internal structure parallel to the image receptor, distortion of some structures within a complex object is always present in a two-dimensional (2D) imaging.

In the 1930s a technique was developed in an attempt to eliminate or at least minimize

this problem of creating a two-dimensional image of a three-dimensional object. The approach, termed tomography, involved an equipment modification that incorporated a coordinated movement between the X-ray source and the image receptor. In the most basic configuration, during the exposure, the X-ray tube moved in a linear arc opposite in direction from the motion of the image receptor, originally film (Fig. 10). A plane was created, within the patient and parallel to the surface of the film, termed the focal plane. Structures in the plane were in focus whilst those above and below the focal plane were blurred. Prior to the next exposure, by raising or lowering the patient, different levels within the individual were brought into the focal plane and visualized (Fig. 11a, b). Tomography became an important imaging modality until the advent of another tomographic innovation, computed axial tomography (CAT) scan, that replaced film with a detector and processed the imaging data through a computer to create sections perpendicular to the table top.

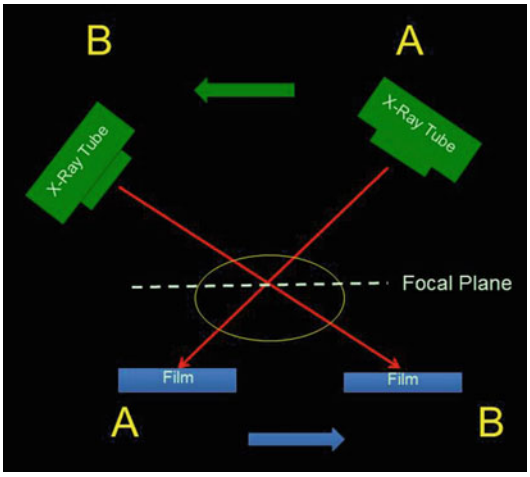

Imaging Techniques in Bone Analysis, Fig. 10 Basic tomography relied on appositional movement of the X-ray tube and image receptor to create a focal plane within the patient

Within the past decade, tomographic principles have been incorporated into digital imaging for various clinical applications. One such unit is the XPERT® 80 Cabinet X-ray System developed by Kubtec Medical Imaging. This unit is a cabinet tomosynthesis radiographic system, designed to examine breast tissue in the laboratory following surgery to compare the images to the preoperative mammogram and determine the effectiveness of the operative procedure. As such, it is a self-contained lead-lined unit and requires no special installation, and because of the 50 μm focal spot size and the ability to generate both 3D and 2D images, the system has nonclinical applications in various scientific disciplines including bone analysis in anthropology and forensics. To

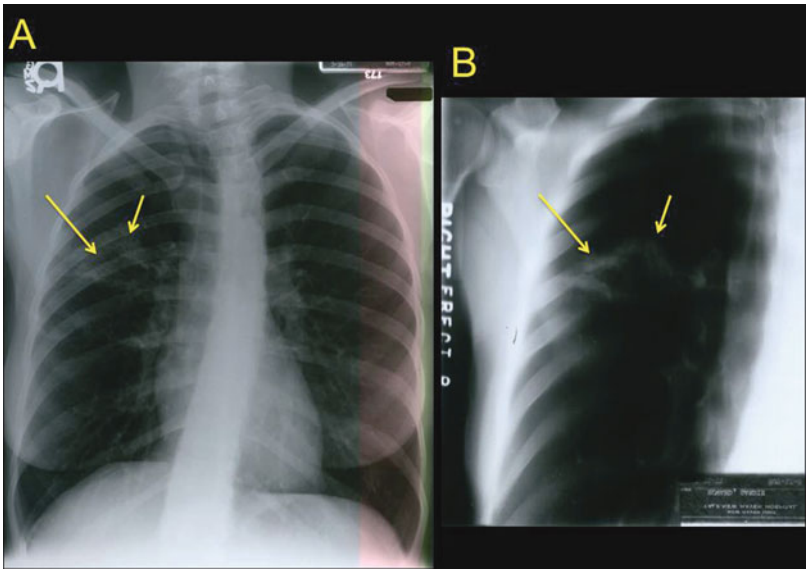

Imaging Techniques in Bone Analysis, Fig. 11 (**a**) A posterior-anterior, PA, chest with a cavernous tubercular lesion revealed in the right lung (yellow arrows). (**b**) A tomographic image more clearly demonstrating the cavity (yellow arrow) with the blurring of structures above and below the lesion

accommodate this application, Kubtec produced another model, the Parameter® 3D Tomosynthesis System, and this was employed in the following two studies.

The first involved a demonstration of the development of dentition in fetal skulls and compared these to known gestational ages (Fig. 12a, b). Without repositioning the skull, all the developing dentition, parallel to the image detector, was easily demonstrated by scrolling through the slices. The systems primary limitation was the small size of the 5 × 6 in. (12 × 15 cm) detector.

The second study examined the ability of the system to detect a simulated occult fracture in a fetal pig. In cases of child abuse, occult fractures can be difficult to demonstrate with lower-resolution, clinical computed radiography (CR) or direct digital radiography (DR) systems. In order to mimic the condition, a small incision was made in a fetal pig, and two ribs were cut using scissors (Fig. 13a). The composite image not only revealed the fractures but also exhibited the vinyl material injected into the arteries and veins of the fetal pig (Fig. 13b). The latter provided an excellent example of the wide latitude of a digital imaging system, and the 1.0-mm-thick slice clearly visualized the rib fracture (Fig. 13c). Finally, since the photograph and the slice demonstrating the fracture can be electronically superimposed, it was possible to see the relationship between the incision and the rib fractures (Fig. 13d).

Computed tomography eliminates both superimposition and magnification. Identical to DR and CR, because the data are processed by a computer, the appearance of the image can be modified by post-processing manipulation. However, unlike all 2D radiography, where the X-ray beam covers a large area, for example, a 14 × 17 in. (35.6 × 43.2 cm) plate, the beam emitted from the CT X-ray tube is very restricted or collimated, in certain systems as small as 0.5 mm, to expose only a narrow array of detectors. The result of this highly collimated beam is the ability to differentiate tissue with only slight differences in density, such as white and gray matter of the brain.

Possibly one of the most important aspects of CT is that the data is quantitative rather than qualitative. Prior to being displayed, all the data is standardized to a known density, and water is assigned a CT number, also termed a Hounsfield Unit (HU), of "0". All tissues less dense than water have a negative value. Air has an assigned value of −1000. Tissues more dense than water have a positive value. With this innovation it is now possible to characterize tissue and get the same CT number regardless of the unit it was scanned on. On a living patient, a decrease in cortical bone density might suggest osteopenia.

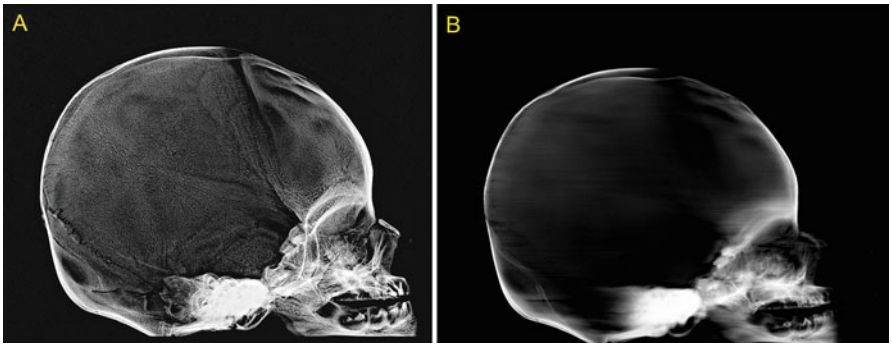

Imaging Techniques in Bone Analysis, Fig. 12 (**a**) A composite image created by stacking all the sections acquired with the Parameter® 3D Tomosynthesis System. Note the high resolution in the developing membranous bone of the skull and ossification of the developing crowns of the dentition within the crypts of this 32–36-week gestation dry fetal skull. (**b**) A 1.0-mm-thick section elimination the superimposition of the surrounding structures to more clearly demonstrate the developing crowns

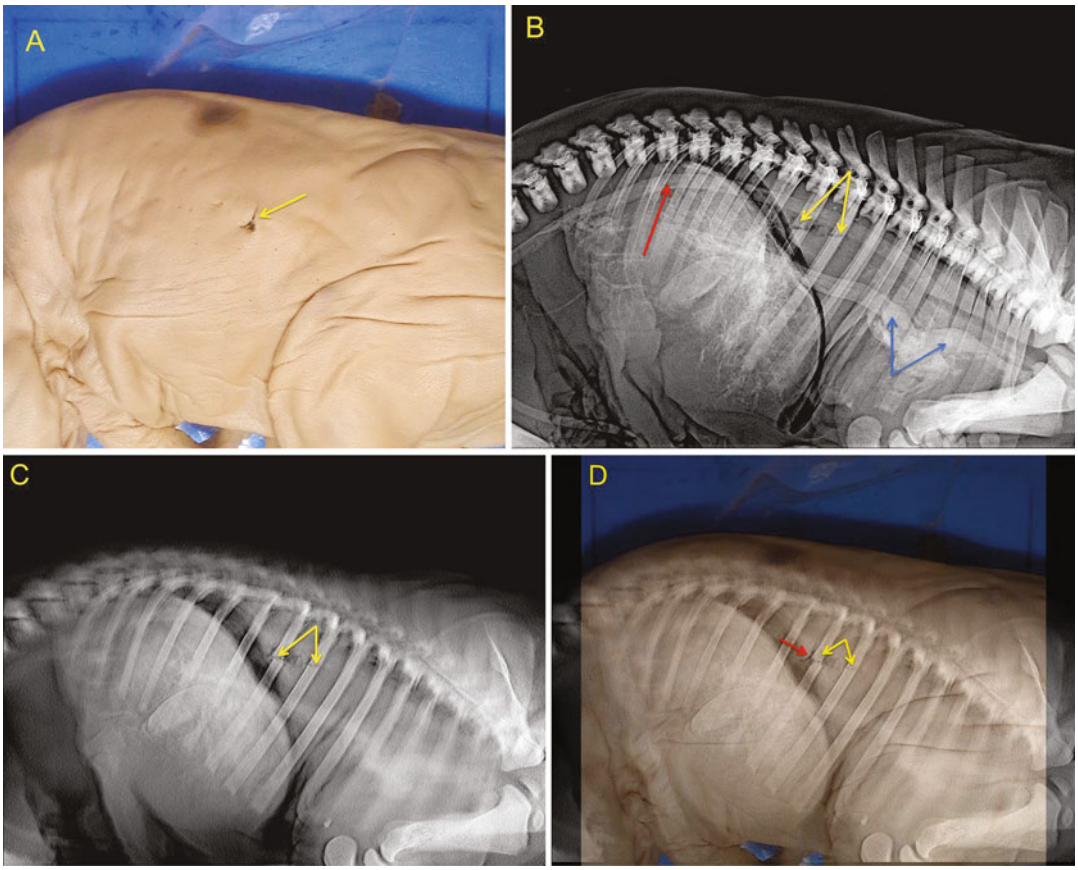

Imaging Techniques in Bone Analysis, Fig. 13 (**a**) Since the Parameter® 3D Tomosynthesis System is equipped with a camera, it was possible to document the site of the incision (arrow). (**b**) The fractured ribs (yellow arrows) were seen on the composite image in addition to the vinyl material injected into the aorta (red arrow) and superior and inferior vena cavae (blue arrow). (**c**) The 1.0-mm-thick slice that included the fractured ribs clearly demonstrated the fractures (arrows) eliminated the superimposed structures. (**d**) The photograph of the incision (red arrow) superimposed of the tomosynthesis slice revealing the fractures (yellow arrows)

Operational Considerations for the Use of Radiography Techniques in the Archaeological Context

The value of radiography in the examination of mummified and skeletal remains is indisputable. Over the past several decades, radiography has become more available due to technical innovation in hardware development which has resulted in plane radiography tubes as small as 10 kg. In addition, digital imaging receptor systems have replaced film, and software development has enabled post-processing image manipulation. The latter has virtually eliminated repeat radiographs due to improper exposure factor setting. In the clinical setting, these advances have resulted in the ability to examine more patients per unit time, a concept termed patient throughput. However, all these advances have been created specifically for the clinical setting with the focus on reducing patient dose while sacrificing image resolution. Unfortunately, when not dealing with living tissue, the opposite is the objective: maximize resolution with little regard for dose. The latter is particularly true since it has been documented that radiation dose does not affect the recovery of ancient DNA (Fehren-Schmits et al. 2016; Ziegler et al. 2013).

That concept of throughput can be easily integrated into anthropological field studies that

utilize radiography. Incorporating this clinical concept will not only increase the productivity, making the use of radiography more cost effective, but also increase the resolution of the acquired images. In order to do so, four specific requirements must be met as outlined below. These are followed by an example of a study of mummified remains in Gangi, Sicily, in 2015.

1. A radiographer, an individual schooled in the science and art of radiography, should be brought in during the early stages of project development. As the hardware and software innovations, including icons for specific body parts, have been developed and configured for living individuals, the radiographer, acting as a consultant, will need to modify or adapt these preset protocols for the specific needs of the project.
2. An X-ray source/sources should be selected by the radiographer consultant. It must be lightweight making it easy to manipulate. The support for the X-ray source should be specifically created for the intended application of the study.
3. In imaging receptor should also be selected. As discussed previously, digital imaging receptors have replaced film in radiography and the advantages and disadvantages of the two categories of digital systems, DR and CR, considered. However, from the prospective of the radiographer consultant considering the study objectives, the primary application dissimilarities will be reiterated. With DR, within several seconds of the termination of an exposure, the data will be transformed into an image that appears on the laptop screen. However, if multiple exposures are necessary, for example, a radiographic study of a mounted skeleton, CR will permit as many exposures as necessary. The skeleton of the Centaur at the Barnum Museum in Bridgeport, Connecticut, required 32, 14 × 17 in. (36 × 43 cm) CR image receptors to cover the entire object (Fig. 14). In order to cover the whole skeleton with the X-ray beam, an 18-foot (5.5 m) source-to-image receptor distance (SID) was required necessitating three exposures at 56 kVp and 40 mAs. The 32 images were stitched together using Photoshop™ (Fig. 15). Thus, if obtaining a long enough exposure time is likely to be an issue, CR would be preferred.

However, CR cassettes must be placed in a reader in order to "develop" the image. This necessitates an additional step which increases the examination time. Additionally, if a repeat image is required due to inadequate positioning of the material, the plate has to be repositioned under the object. DR eliminates

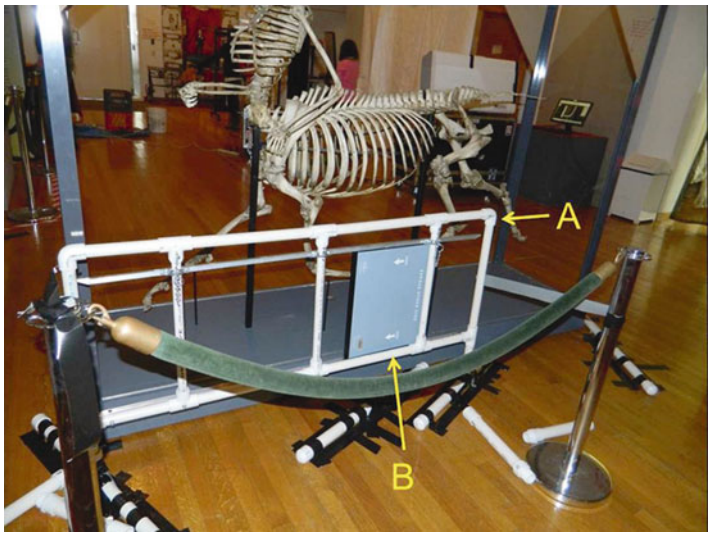

Imaging Techniques in Bone Analysis, Fig. 14 An PVC pipe frame (A) was constructed to hold the CR image receptor (B) in each of the 32 positions required to produce a complete radiograph of the Centaur

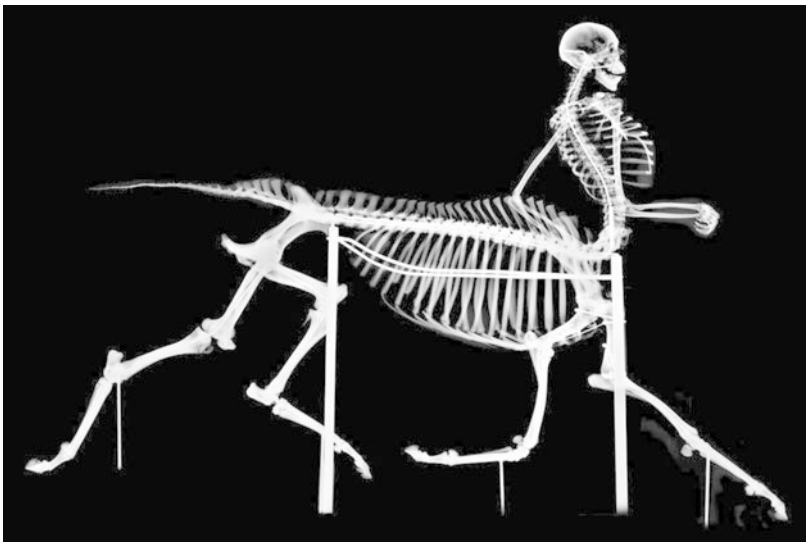

Imaging Techniques in Bone Analysis, Fig. 15 The 32 CR images stitched together using Photoshop™

both these drawbacks and is thus more suited to rapid throughput.

4. Prior to the onset of the imaging process, it should be decided which material should be included in the study, and the radiographer should determine the number of projections to be taken and the most appropriate imaging methodology. An approximation of "time per case" can then be generated.

   Once that has been determined, a system of workflow should be devised so that the material to be examined can be *queued-up* in anticipation of the radiographic phase of the project.
5. Ideally, there should be a team consisting of a radiographer and assistants (possibly student radiographers or anthropologists) to operate the equipment and position the material/objects in the study. With one individual entering the data into the computer while the other person focuses on positioning, more material can be processed within a short timeframe.

An example of the process, as previously indicated, was the 2015 study in Sicily. A total of 60 mummified priests dating to the early eighteenth and nineteenth centuries were located in the burial crypts of the *Chiesa Madre di Saint Nicolo*. Some were embalmed, while others dried, but all were maintained in an upright position in the basement of the Church. The goal was to examine as many of the mummies as possible in the 3-day period allotted for the project. Since all the remains were in a fragile condition, it was necessary to minimize movement once removed from their respective niches along the wall (Fig. 16).

It was decided that the radiographic component of the study would be optimized by creating two X-ray stations: one for lateral projects, while the other would be solely for anterior-posterior, AP, imaging. Utilizing two stations eliminated not only the need to move the remains to acquire the necessary positioning but also to change the position of the X-ray source from a horizontal to vertical directed X-ray beam. Therefore it contributed to decreasing the time required to complete the examination.

The lateral station was established using a Sedecal SP-HF 4.5 kW output X-ray source and a Cannon Lanmix™ CXDI direct digital radiographic (DR) plate. The unit was set to operate at a focus to film/receptor distance (FFD) of 6 ft (1.8 m) with a kilovoltage of 55 kVp and 5 mAs (Fig. 17a, b). The mummies were placed on a melamine tabletop which was laid directly on the floor. The imaging plate was positioned to the side of the tabletop and the central beam directed

Imaging Techniques in Bone Analysis, Fig. 16 The mummified priests within their niches in the crypt of *Chiesa Madre di Saint Nicolo*

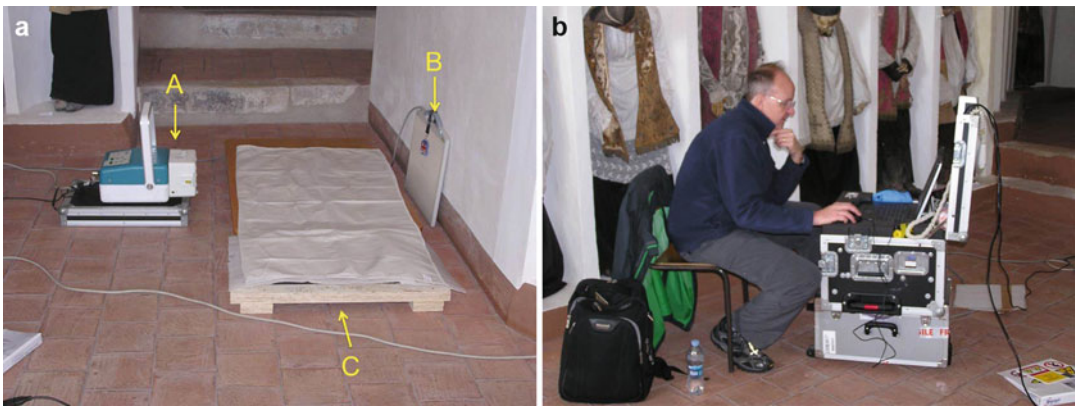

Imaging Techniques in Bone Analysis, Fig. 17 (**a**) The lateral radiograph station consisting of the X-ray source (A), DR plate (B), and the table for the mummy (C). (**b**) One of the authors manipulating the laptop computer to control the lateral station from a safe distance

perpendicular to the plate, thus achieving the horizontal beam lateral projection. Additional support for positioning the mummies was achieved through the use of foam pads as required.

The other station employed a Kubtec 100HF; 3.0 kW output X-ray source was bolted to the base of a bathtub seat (Fig. 18). A 95-in. (241 cm) SID was attained by inserting telescopic tubular poles into each of the legs of the bathtub seat. At that SID, an area of 38 in. (97 cm) was exposed, eliminating the need to move each mummy more than once during each AP imaging session. A mummy table was created using a PVC pipe frame with clear upholstery plastic stretched over the frame. Under the frame, paper covered the floor to protect the Kubtec DIGIVIEW™ 430 DR (Fig. 19). The latter was exposed using 60 kVp at 50 mAs. Three different images were acquired without moving the mummy, therefore providing the opportunity to "stitch" the three images together to produce a single image of a large portion of the mummy.

The team consisted of two senior radiographers, both with experience in forensic and anthropological radiography, and three student radiographers. Students rotated between stations,

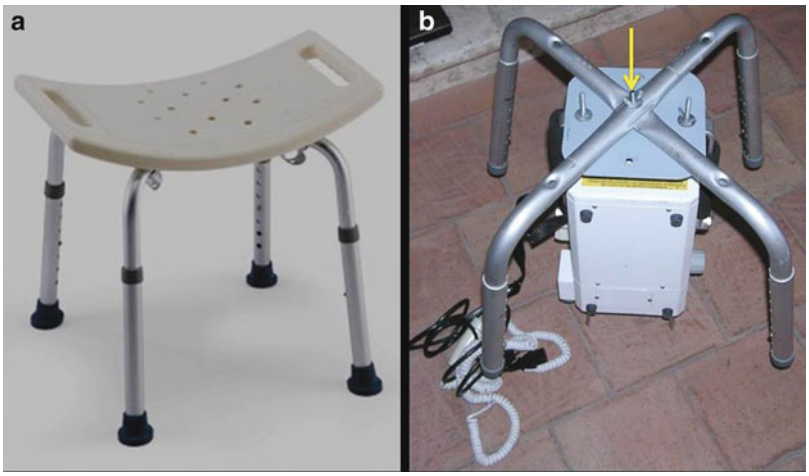

Imaging Techniques in Bone Analysis, Fig. 18 The X-ray source support system began with a basic bathtub seat (**a**). With the seat portion removed, the X-ray source was bolted (arrow) into the leg portion of the device (**b**)

but each position always had at least one radiographer and one student. Over the two-and-a-half day period, 245 images were acquired at the AP station, while 326 were obtained at the lateral site (DiCesare et al. 2016).

The images were reviewed by a radiologist and an anthropologist in order to arrive at a diagnosis by consensus (Catapano et al. 2016) and document pathology (Fig. 20a, b). However, aside from the strictly pathologic findings, the advantages available with the digital imaging system need to be considered. The latitude, the ability to demonstrate a wide range of densities, is far superior with a digital image receptor than would be possible with film (Fig. 21). The same image also demonstrated the edge enhancement properties of the algorithm manipulating the data to produce the image. Because it was intended for nonclinical applications, the Kubtec DIGIVIEW™ 430 DR system provides even higher resolution with 100 μm pixels than the Cannon system commonly employed in clinical imaging. The higher-resolution, wider-latitude, edge enhancement properties and the ability to quickly toggle between positive and negative images were clearly seen by the AP images demonstrating the patterns in the priest's vestments (Fig. 22a, b).

Finally, the two stations approach undoubtedly saved a tremendous amount of time and eliminated the need to move the remains more than necessary. However, the importance of capturing two projections could not have been more clearly established by view of the AP projection of the mummy with the wax mask (Fig. 23) and comparing to the lateral view (Fig. 21).

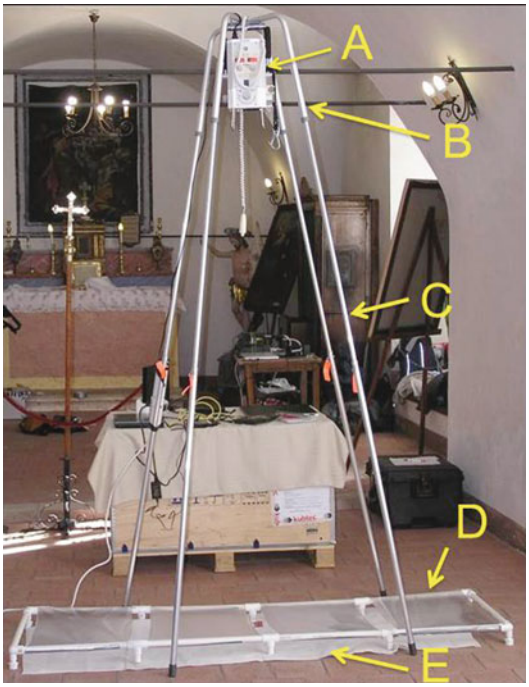

Imaging Techniques in Bone Analysis, Fig. 19 The AP station with the X-ray tube (A) mounted to the legs of the bathtub seat (B). In order to reach the desired SID, telescopic tubular poles (C) were inserted into each of the bathtub seat legs. A mummy table was constructed out of a PVC pipe frame (D) with clear upholstery plastic stretched over the top. Finally, a sheet of paper (E) was placed on the floor under the table frame to protect the DR plate

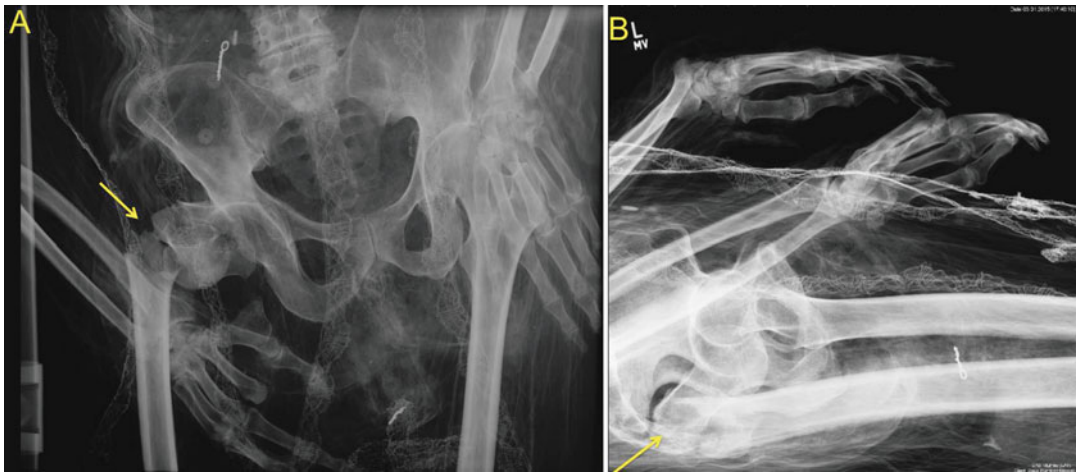

Imaging Techniques in Bone Analysis, Fig. 20 (**a**) An intertrochanteric fracture of the right femur. (**b**) The fracture was displaced posteriorly

Summary

Radiology has a wide range of applications in the identification and analysis of skeletal remains and associated artifacts and personal effects. It is an invaluable aid in the initial examination of suspected remains and related debris, enabling context to be established and facilitating the rapid identification and retrieval of small skeletal elements and artifacts.

Its applications for human identification and analysis of trauma are especially valuable in situations involving partial decomposed remains or those which have been subjected to fire or fragmented by explosion. From assisting the determination of a biological profile through to determining a positive identification through comparison of antemortem and postmortem images, radiology is an essential tool in the analysis of human remains, and its application and deployment should be readily accessible.

Access to modern cross-sectional radiological techniques such as MDCT and micro-CT scanning is steadily improving as the technology becomes both more economical and widely available. Single-plane radiography techniques have been revolutionized by the availability of digital detectors and developments in battery technology which makes radiography possible in even the most remote and logistically challenging environments, and application of digital technology to "older" techniques such as linear tomography is opening up new possibilities.

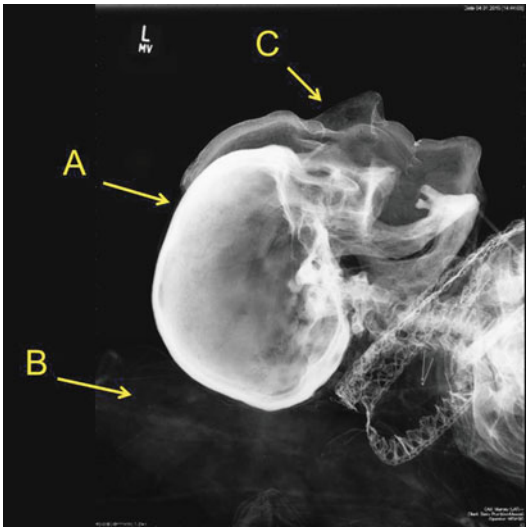

Imaging Techniques in Bone Analysis, Fig. 21 Digital image receptors are capable of capturing a wide range of densities from the very dense bone of the skull (A) and the foam sponge supporting the skull (B) to the wax mask covering the face (C). Also note the sharp delineation of the edges of the mask

Greater levels of accuracy and the ability to examine subjects and display images in multiple

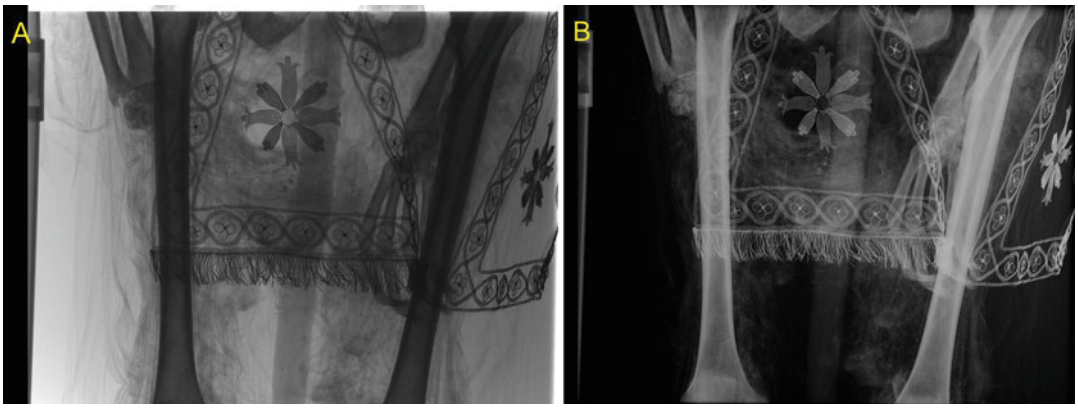

Imaging Techniques in Bone Analysis, Fig. 22 Positive and negative images reveal different detail within the priest's clothing

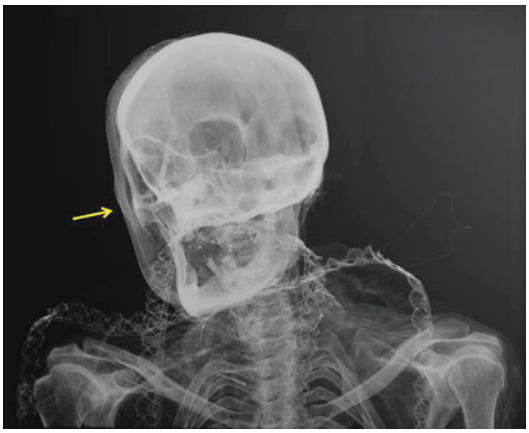

Imaging Techniques in Bone Analysis, Fig. 23 Because the skull was slightly rotated, the edge of the mask (arrow) can be seen

planes and in three dimensions offer an increasingly wide range of applications to the archaeologist and forensic investigator.

Cross-References

- ▶ Age Estimation
- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Bone, Trauma in
- ▶ Burned Remains in Forensic Contexts
- ▶ Commingled Remains
- ▶ Dental Anthropology
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology and Archaeology in Disaster Response
- ▶ Forensic Anthropology: Definition
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition
- ▶ Stature Estimation
- ▶ Taphonomy: Definition

References

Alexander, C.J., and G.A. Foote. 1998. Radiology in forensic identification: The Mt Erebus disaster. *Australasian Radiology* 42 (4): 321–326.

Brogdon, B.G. 2011a. Radiological identification: Anthropological parameters. In *Brogdon's forensic radiology*, ed. M.J. Thali, M.D. Viner, and B.G. Brogdon, 2nd ed., 85–106. Boca Raton: CRC Press.

Brogdon, B.G. 2011b. Radiological identification of individual remains. In *Brogdon's forensic radiology*, ed. M.J. Thali, M.D. Viner, and B.G. Brogdon, 2nd ed., 153–176. Boca Raton: CRC Press.

Brogdon, B.G., H. Vogel, and J.D. McDowell. 2003. *A radiologic atlas of abuse, torture, terrorism, and inflicted trauma*. Boca Raton: CRC Press.

Buck, U., S. Nather, and M.J. Thali. 2011. Using real 3D data for reconstruction. In *Brogdon's forensic radiology*, ed. M.J. Thali, M.D. Viner, and B.G. Brogdon, 2nd ed., 461–472. Boca Raton: CRC Press.

Catapano, A., J. Curry, R. Gonzalez, G. Conlogue, M. Viner, D. Piombino-Mascali, and R. Beckett. 2016. *A differential diagnosis of spinal pathology among the Gangi mummies*. 42nd Annual Meeting of the Paleopathology Association. Atlanta, Georga.

Chilvarquer, I., J.O. Katz, D.M. Glassman, T.J. Prihoda, and J.A. Cottone. 1987. Comparative radiographic study of human and animal long bone patterns. *Journal of Forensic Science* 32 (6): 1645–1654.

Conlogue, G., and R. Beckett. 2010. Conventional radiography. In *Paleoimaging: Field applications for cultural remains and artifacts*, ed. R.G. Beckett and G. Conlogue. Boca Raton: CRC Press.

Conlogue, G., and F. Marcinowski. 1986. Microradiography: A theoretical basis and practical applications. *Radiologic Technology* 58: 301–309.

Conlogue, G., T. Blyth, J. Li, R. Beckett, A. Dhody, R. Gonzalez, F. Cerrone, and M. Schlenk. 2010. *Revealing rer secrets one modality at a time*. Paper presented at the 37th Annual North American Paleopathology Association meeting, Albuquerque.

DiCesare, A., D. Piombino-Mascali, R. Beckett, M. Viner, G. Conlogue, A. Catapano, J. Curry, and K. Harper-Beckett. 2016. *Implementation of dual imaging stations to achieve increased productivity for a large scale radiographic examination of mummified remains*. 42nd Annual Meeting of the Paleopathology Association. Atlanta, Georga.

Fehren-Schmits, L., J. Kapp, K.L. Ziegler, K.M. Harkin, G. P. Aronson, and G. Conlogue. 2016. An investigation into the effects of X-ray on the recovery of ancient DNA from skeletal remains. *Journal of Archaeological Science* 76: 1–8.

Harcke, H.T., J.A. Bifano, and K.K. Koeller. 2002. Forensic radiology: Response to the Pentagon Attack on September 11, 2001. *Radiology* 223 (1): 7–8.

Kahana, T., and J. Hiss. 1997. Identification of human remains: Forensic radiology. *Journal of Clinical Forensic Medicine* 4 (1): 7–15.

Nather, S., U. Buck, and M.J. Thali. 2011. Photogrametry based optical scanning. In *Brogdon's forensic radiology*, ed. M.J. Thali, M.D. Viner, and B.G. Brogdon, 2nd ed., 365–388. Boca Raton: CRC Press.

Tonello, B. 1998. *Mass grave investigations*. Paper presented at the Imaging Science & Oncology, British Institute of Radiology, Birmingham, UK.

Viner, M.D. 2008. The use of radiology in mass fatality incidents. In *Recovery, analysis and identification of co-mingled human remains*, ed. B. Adams and J. Byrd, 145–179. Totowa: Humana Press.

Viner, M.D., and J.E. Lichtenstein. 2011. Radiology in mass casualty situations. In *Brogdon's forensic radiology*, ed. M.J. Thali, M.D. Viner, and B.G. Brogdon, 2nd ed., 177–198. Boca Raton: CRC Press.

Wessling, R., and L. Loe. 2011. *The Fromelles Project: Organizational and operational structures of a large scale mass grave excavation and on-site anthropological analysis*. Paper presented at the American Academy of Forensic Sciences 63rd scientific meeting, Chicago.

Ziegler K.L., G. Conlogue, R. Beckett, T. Blyth, G.P. Aronson, and L. Fehren-Schmitz. 2013. An investigation into effects of x-ray on the recovery of DNA from skeletal remains. *Am J Phys Anthropol* 150 (S56): 299.

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes

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Introduction

Archaeological sites and landscapes exist across the globe at every scale and in every environment, from urban to desolate desert. They include sites with aboveground ruins, ones without visible traces of human occupation or activity, and others that have been occupied and built upon time and again through to the present day with constructions in service to tourism and development. Archaeological sites and landscapes represent the layering of history and transformations of the land by human use, and among all the categories of heritage under threat, they are a resource that is increasingly in jeopardy. Since time immemorial, archaeological sites have been exploited for treasure, looted for objects, destroyed in idle curiosity, and mined to recycle their materials for new construction. So great are the remains of ancient cultures as to seem literally inexhaustible. Not only do we know now that all resources can be depleted but, with population growth, global climate change, and rising sea level, a tipping point may be coming with ultimate consequences that cannot be predicted. Is consumption of the archaeological heritage any different? Our ability in modern times to obliterate what came before us is

formidable and belies the notion of inexhaustible archaeological heritage.

Beyond the spade and trowel approach to revealing buried remains, archaeologists have long realized that understanding the past requires consideration of all physical scales, from the microlevel of pollen analysis to landscapes and regions, and have developed techniques and the necessary interdisciplinary methods to study this continuum. In tandem with this holistic research method, preservation and management of archaeological sites have evolved in a similar and increasingly integrated manner, based on broad considerations of the site in its larger archaeological and natural context, as well as in its contemporary social context of use for tourism, recreation, and education.

Conservation is a catchword in ecology and biodiversity. The concepts and methods of these fields need to be integrated thoroughly with site and landscape preservation, for lost sites, like extinct species, can never be regained, and landscapes, like ecological habitats, are the appropriate scale at which to address preservation. This sturdy belief in the connectedness of the natural and cultural heritage worlds has yet to be fully translated into reality by planners and decision-makers. Increasingly, archaeological sites and landscapes have also come under the purview of urban planners through the realization that they are not isolated, immovable "artifacts," but are a part of the urban fabric and may also be connected with the local community, such as the African Burial Ground National Monument in New York City. The lack of integrated conceptual thinking among various professionals (archaeologists, ecologists, urban planners, conservators) and stakeholder constituencies (cultural descendants, local communities, regional and national governments) remains a distinct challenge in protecting and preserving this heritage.

Definition

An archaeological site exists in a setting, usually a landscape, either natural or created. Considered as a whole, an archaeological site and its landscape comprise a repository of information about activities of people over time and their effect on the natural environment. Physical scales vary, and either site or landscape may dominate. On the one hand, the site and landscape may be of the same scale, as, for example, at Angkor in Cambodia; on the other, the site may be a rock overhang with painting in an extensive natural landscape, as is the case for rock art sites throughout the world (Fig. 1). From a preservation perspective, it is important to regard both as one. Site and landscape have relational values – topographic and geomorphological features, ecological attributes, archaeological resources, and research potential.

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 1 Traditional owners guiding visitors to rock art sites in the tableland above the floodplain at Gunbalanya, Arnhem Land, N.T., Australia, help ensure a sustainable future for the sites and community. (Photo: 2012, J. Paul Getty Trust)

It is the role of the archaeologist to define the extent of both site and landscape. The field of landscape archaeology is premised on landscape being important to archaeology's goal (Anschuetz et al. 2001). Archaeological sites and landscapes may themselves be considered a subset of cultural landscapes (Fowler 2003).

Historical Background

Threats to archaeological sites and landscapes in the contemporary world come from many sources, and the approaches to preserving them have become commensurately complex and wide-ranging. In the 1970s, mainly in response to the destruction of archaeological resources from uncontrolled development pressures, there began to emerge a philosophy of conservation, referred to as the "conservation ethic," first put forward by William Lipe (1974). The approach heralded a paradigm shift in the conduct of archaeological research, in which a conservation model was advocated to replace the "exploitative model," based on excavation that had guided the practice and theory of archaeology and was now seen as a contributor to the loss of archaeological heritage.

The conservation ethic argued for the use of nondestructive techniques of investigation over excavation of sites. When excavation does take place, it advocated that priority should be given to sites that are threatened, research-based excavation be limited to the minimum necessary to answer research questions, and excavation proceed slowly, with time and staff devoted to specialist's studies and retrieval techniques that enhance the quantity and quality of information. These practices have become fairly standard in archaeology. They can be seen in the growth of contract archaeology in the 1970s and 1980s, spurred on by the passage of legislation requiring impact assessments prior to development, and they are evident in the use of tools such as GIS (geographic information systems) and various remote sensing techniques such as aerial photogrammetry, laser scanning, satellite imagery, and multi- and hyper-spectral data collection (Cowley and Sigurðardóttir 2010). Research excavation has been curtailed in many parts of the world, with a much greater emphasis on conservation of the resource. Along with more limited excavation, there has also come stricter enforcement of mandatory conservation and publication by the archaeologist who seeks to excavate. Against this backdrop arose the allied field of archaeological heritage management (or cultural resource management), whose precepts are reflected in the *ICOMOS Charter for the Protection and Management of the Archaeological Heritage* (1990).

Key Issues/Current Debates

Values of the Archaeological Heritage

Values are the raison d'être for conservation. Archaeological sites and landscapes in all their diversity have multiple values. These values have been enumerated by many authors who stress authenticity and integrity as essential attributes when discussing conservation and management (e.g., Lipe 2009). It is acknowledged that values are ascribed by society and thus may be expected to differ between cultures; they are not immutable and may shift in response to societal changes. In contemporary thinking, social values broadly writ (associative, symbolic, educational, spiritual) have come to take precedence as societal use of sites (and the economic benefits derived from using them) have become a form of legitimization and justification for preservation and as the claims of descendant communities for a stake in their ancestral places have been voiced.

For archaeologists, historians, and scholars whose professional lives depend on archaeological sites, historical and artistic values have been enduring core values. More than other categories of cultural heritage, archaeological sites are repositories of information and artistic creation essential to understanding and interpreting the past. For this reason alone, historical and artistic values, which have been central to informing conservation decisions in the past, will continue to be of fundamental importance to guide decision-making.

Also of fundamental importance is research value. This is the potential of a site to yield new

information and answer research questions. Research value is often not considered adequately when making decisions about the future of a site or landscape. There is a tendency to plan for and manage sites based on their revealed or known values, but it is equally important for many types of archaeological sites to be protected and managed for their future potential to yield information. Among these, for example, are wetland sites which may preserve organic remains and archaeological landscapes such as battlefields and cemeteries. Sites with high research potential often need protection against looting, poor excavation strategies, erosion, agricultural activity, and so forth, or need prioritization for excavation if threatened.

The visual values of an archaeological landscape may be among its most important attributes (Fig. 2). The past tendency to focus on the site to the exclusion of its setting has changed in recent times and the 3-dimensional nature of the landscape, its topographic features, scenery, and ecology, now receives more attention. This includes the sky, as, for example, at Chaco Culture National Historical Park, where the night sky is interpreted by staff and volunteers as an aesthetic and educational value for city dwellers and the young, some of whom may never have seen a night sky without light pollution.

Conservation and Management of the Archaeological Heritage

The practice of archaeology with a conservation ethic contributed significantly to protecting and preserving archaeological sites and landscapes, but cannot address the full spectrum or magnitude of threats. War and its frequent fellow-traveler looting, and natural threats from fire, flood, tsunami, and earthquakes, being immediate, can devastate sites, while the slower processes of pollution, weathering, and erosion take their toll (Fig. 3). To these threats may be added the effects of climate change, which are certain to be severe. Contributing to deterioration has been the post-excavation neglect of sites, especially in parts of the world where archaeological sites have extensive architectural remains, such as the Mediterranean, Near East, Central Asia, China, the southwestern United States, Mexico, and Central America. With few exceptions, only those sites with proven touristic potential have been provided with a modicum of maintenance and protection. These sites are a minority and they are not immune from causes of deterioration and from the unintended consequences of mass tourism.

Conservation science and technology and increasingly sophisticated methods of site stabilization and treatment have made real strides in

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 2 Pueblo Bonito, one of the several "great houses," is set an exceptionally beautiful and archaeologically rich landscape at Chaco Culture National Historical Park, New Mexico. (Photo: 1993, J. Paul Getty Trust)

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 3 An excavated structure at the site of Joya de Cerén, El Salvador, that was buried in volcanic ashfall. Structures are "wattle and daub" type and suffer from drying at the top and excessive moisture at the bottom. (Photo: 2001, Richard Ross, photographer, J. Paul Getty Trust)

recent decades, but are sometimes seen as the panacea that will save for the future what is precious and valued today, if only the resources could be mustered to undertake the necessary conservation programs. The sad truth is different however – all cultural resources deteriorate no matter what is done. The best that can be hoped for is that rates of loss can be slowed by preventive measures, by wise use, by appropriate interventions and custodianship, and by prioritization for protection and treatment. Regional surveys are the most fruitful approach to assess risk and establish priorities for protection and conservation, as, for example, in the survey of megalithic art in the Galicia region of Spain (Carrera Ramírez and Fábregas Valcarce 2003). True integration of conservation into the research and excavation plan at the outset remains a goal to be achieved, but notable exceptions, exemplified at the site of Tell Mozan/Urkesh in Syria (Buccellati 2006), demonstrate the benefits for archaeology, the site, and the local community (Fig. 4).

Management of archaeological sites is essential to long-term care and sustainable use of sites. Like science in the service of conservation, management is a tool for preservation. Underlying the management approach is a reductionist process. It is powerful because it allows one to understand how things work – as it does in scientific investigation. From the reductionist analysis is derived the management plan. It determines the values; examines the significance to various interest groups and constituencies (including the obligation to future generations); assesses threat and risk; determines causes of deterioration and their rates wherever possible and derives a prognosis; develops a conservation strategy (which may include development for display or education; or reburial); considers constraints and side effects of proposed technical interventions; communicates the written plan to stakeholders; and implements the program, with assurance that documentation, management, future monitoring, and maintenance have been secured. Also, it should not be

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 4 The site of Tell Mozan/Urkesh in northern Syria, with its mudbrick walls protected and interpreted by fitted tarpaulin covers, exemplifies excavation working hand in hand with conservation. (Photo: 2006, IIMAS – The International Institute for Mesopotamian Area Studies)

forgotten that when sites are lost or damaged, the final line of defense should be the survival of their documentary record. Each of the elements in the analysis requires its own specialized field of expertise. Essentially, the preservation and management of sites require a vision that is encompassing and holistic (Demas 2002). Various charters have sought to promote this; the *Burra Charter* (the *Australia ICOMOS Charter for Places of Cultural Significance*) may be mentioned as one of the most effective.

The interface between a site and its management with stakeholders and traditional owners, both local and more broadly defined as the "public," is often crucial to sustainability of desired outcomes (see, e.g., Fig. 1). Numerous examples have shown how understanding the "social landscape" of a place is as important as its archaeological and natural landscape (Egloff 2006), but stakeholder relations may also be fraught when, as is frequently the case, conflicting interests bear upon access, use, benefit, and so on. Patient negotiation, understanding of different objectives, and time are needed for satisfactory resolution, as in the cases of the Côa Valley Archaeological Park, Portugal (Batarda Fernandes et al. 2008), and the "flagship" monument of Stonehenge, which endured many years of planned improvements without resolution (Baxter and Chippindale 2002). The unwise assumption of officials, on the other hand, that local communities are irrelevant has led to vandalism of one of the most important heritage sites in Zimbabwe (Taruvinga and Ndoro 2003).

Monitoring and maintenance of an archaeological site and its landscape are fundamental management responsibilities. Maintenance is a routine activity, whose absence constitutes one of the greatest and least recognized threats to long-term preservation. Analysis of the failure of maintenance at the large site of Herculaneum and the structured public/private partnership designed to meet the conservation and management challenges exemplifies the problem (Thompson 2007).

Monitoring is not an end in itself. Its purpose is to provide information on the condition of the heritage place, or the quality of the visitor experience, or effectiveness of management itself, in order that certain necessary actions should follow. Yet, systematic monitoring does not have a good track record. Why should this be so? More to the point: what explicit link in the design of monitoring is made between monitoring as an activity and the follow-through to redress a threat or to halt continuing damage? How often do monitoring reports end up on the shelf because no

mechanisms or management policies have been established to act upon the findings and recommendations?

This point is not trivial when one thinks about the sequence: monitoring data and information require processing and assessment, followed by a decision as to what action should be taken; next is the identification and garnering of resources (human and financial) to act upon the decision, followed by implementation to reverse or halt the situation. The process is then repeated with a new cycle of monitoring. Too often there is a break in the chain and the only result is inaction. Monitoring programs need to be conceived integrally and coupled directly with mechanisms for implementation. This is a perceptual and management problem. With the many threats to cultural and natural heritage areas becoming more acute, it is no longer good enough to think of monitoring as an "exercise" – it is a vital need. Natural areas have been generally more effectively monitored than cultural ones, ultimately as a result of greater awareness and support from the profession and the community at large. Monitoring must progress from reactive to proactive mode – it cannot continue to remain the orphan of heritage management (UNESCO World Heritage Centre and ICCROM 2004). At the scale of the landscape, satellite imagery and GIS (Fig. 5) have become essential planning and monitoring tools (Hernandez 2004).

Buffer zones as protection for heritage sites are important where encroachment, development, and competing land use are threats. A buffer zone is

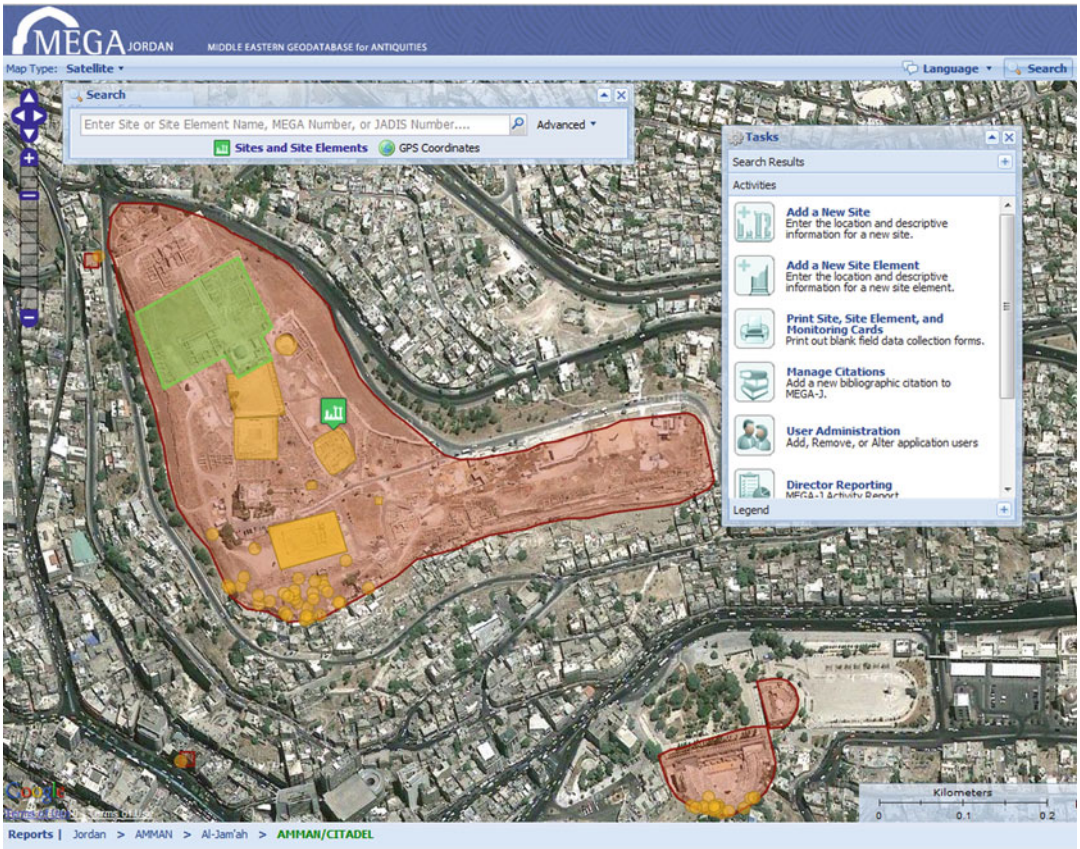

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 5 The MEGA-Jordan web user interface, utilizing open source software and Google Earth satellite images, displays a site's recorded boundary and site elements and data for site planning and monitoring. (Photo: 2012, J. Paul Getty Trust)

required for World Heritage list inscription, though it is not a formal component of the property. A buffer zone should be larger, but is often smaller, than the known extent of an archaeological site. Under the best circumstances, the zone may enhance the site and landscape and protect its visual catchment and function as a refuge for the natural environment and ecological diversity. Nonetheless, a number of important constraints have emerged in the application of buffer zones that reveal complexities of what is a seemingly straightforward concept. These may be inaccessibility to the site of surrounding community engendering a sense of exclusion, not participation, leading to alienation and hostility; management by different jurisdictions under different sets of regulations; resentment when competition for land use is strong; and poor understanding at the local level of the buffer zone's purpose. The term itself is not apposite, implying a reactive attitude to buffeting by extraneous forces ranged against those of preservation. These matters have been well dealt with in a number of studies of the operational constraints of buffer zones (Foster and Linge 2002; Martin and Piatti 2009).

Impact of Urban and Rural Development on the Archaeological Heritage

Urban development and rural development have had enormous consequences for archaeological sites and landscapes in the post-WWII period. This era of large-scale development impacts on archaeological sites and landscapes began with the Aswan High Dam and the UNESCO led international mission to rescue the Abu Simbel temple. This level of international cooperation has never been repeated. Along with population growth, tourism and its requisite infrastructure, rising sea level, and greater competition for water and arable land are all likely to lead to greater impacts on sites. Consequently, construction of water storage and distribution engineering works are to be expected in an attempt to meet economic growth. The impacts on sites and landscapes will be immense. Already we have seen the effects on sites and monuments of the Three Gorges Dam on the Yangtze River (Wang 2008) and the Zeugma dam project on the Euphrates in Turkey (Kennedy 1998). In Western Australia, the extensive petroglyph landscape on the Burrup Peninsula has been the subject of protracted and bitter struggle between preservationists and developers (Bednarik 2006).

Among key issues facing decision-makers are large-scale archaeological sites in heavily populated urban areas. Sites of great significance across the broad sweep of China's long history, such as Neolithic Liangzhu in Zhejiang province and the Qin, Han, and Tang dynastic remains in Xi'an (Fig. 6), pose challenges because of their great extent and the social and socioeconomic

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 6 Daming Palace Archaeological Park in Xi'an, Shaanxi Province, in its urban context. Residents and factories were relocated to allow development and interpretation of the site. (Photo: 2012, J. Paul Getty Trust)

impacts of conserving them. Moreover, the absence of visible aboveground remains means that when excavated and protected, a new landscape requiring interpretation is created. Liangzhu, in the Yangtze River basin within the municipal area of modern-day Hangzhou, with remains dating from 3000 to 2000 BCE, is important for study of the late Neolithic period and the development of Chinese culture. Heavily populated, in a country undergoing rapid development and urbanization, the site, covering an area of 60 km^2, is threatened by construction, earth moving, and other large-scale development works. Balancing the needs of the inhabitants with protection will result in constraints on activities, including industry and agriculture and some relocation of population to newly planned townships. Local inhabitants are reportedly ambivalent about preservation of the site, hoping, but skeptical, on the one hand for benefits from tourism but fearful about restrictions on their way of life and relocation (Chen 2006). In the case of Xi'an, efforts to preserve parts of the immense ancient landscape include incorporating significant elements into the urban fabric, returning land to use for farming after trial excavations, and demarcating parts of protected sites for nonintrusive public recreation by local residents, many of whom were displaced to create a protected zone.

In recent years, a consortium of professionals has begun to look for viable models for preserving threatened urban sites in situ rather than resorting to salvage archaeology. Like so many currents today, this initiative involves expertise from a wide range of subject areas and a concerted effort to establish a research framework within which questions can be answered, and while starting in a European context, it has become increasingly more international in scope (Kars and van Heeringen 2008).

Impacts of Tourism on the Archaeological Heritage

To the twin threats of construction and human development pressures, mass tourism may be added to the devastation matrix for the archaeological heritage. Tourism in its various guises is one of the largest industries in the world. Tourism to archaeological sites, notably those with World Heritage status, has burgeoned, while shifting from one region to another during crises, whether from political unrest or epidemics. When stability returns, tourist numbers rapidly rebound. The impact of mass tourism on sensitive sites and their surrounds degrades the cultural resource and the visitor experience. Iconic sites bear the brunt of the relentless flow of often one-time visitors: one thinks of Machu Picchu, Stonehenge, Angkor, and the Valley of the Kings (Fig. 7). The

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 7 Visitors to the Valley of the Kings on the West Bank of Luxor preparing to take electric vehicles from the visitor center to the tombs in the distance. (Photo: 2003, J. Paul Getty Trust)

multiple impacts of tourism on the site of Angkor and its environs have been intensively studied. Among the many problems resulting from the great increase in tourism over the past 10–15 years have been developments that service international tourists, pollution, sociocultural deterioration resulting from benefits not accruing to local population, and rising land prices that force people out. The economic benefit cycle is largely in favor of foreign and local business elites. This situation equates to exploitation of the site and of the local inhabitants. There are some positive developments, however: traditional crafts promotion, organic farming, and forest regeneration, but these may be too little, too late to counter the influences of development and mass tourism (Miura 2007).

Egypt exemplifies the forces of uncontrolled development, population pressures, mass tourism, and poverty on iconic archaeological landscapes. Encroachment and population pressure at the Giza plateau, as visitors to the pyramids can attest, has overwhelmed the setting to the extent that Egypt's national authority, the Supreme Council of Antiquities, has constructed a wall to limit further advances. At Qurna, on the West Bank at Luxor, the situation is somewhat different. Here the Qurnawis have lived above the Tombs of the Nobles for generations and were famed as tomb robbers, which may have been true in the late nineteenth and early twentieth centuries, but this can scarcely be said of them today. Instead, they now provide skills and labor to archaeologists and the SCA and offer trinkets to tourists. For decades they have successfully resisted efforts to be moved from the site. Periodic attempts to move them have led to bloodshed and deaths until recently when through temptation (new housing located to the north) and coercion (demolition of their houses), the population has been mostly moved leaving a few mudbrick structures on the hillside to provide a visual backdrop for tourists on the way to the Valleys of the Queens and Kings (Fig. 8). The connection between community and culture has been broken here, and the livelihood of a traditional community that lived in proximity to and in context with the ancient archaeological landscape has been greatly diminished (van der Spek 2011). What remains is rubble on a bulldozed hillside.

Tourism is a juggernaut fueled by the forces of economic growth and often is justified as a means of poverty alleviation by development agencies, without due consideration for the negative impacts on local communities and archaeological sites, especially in contexts where regional planning and coordination among agencies are inadequate to nonexistent. Ranged against these forces are national and local preservation authorities who generally have inadequate power to balance the

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 8 Theban mountain and archaeological landscape of the West Bank of Luxor, showing the Valley of the Queens and Deir el-Medina in the center of the image and some of the Qurna village houses below. (Photo: 2007, J. Paul Getty Trust)

scales. Guidelines and tools to limit visitor capacity exist but are often not applied or cannot be validated by adequate study and scientific data to show the degradation to the site and its setting. Better methodologies and flexible policies need to be developed, building on concepts such as the limits of acceptable change developed for natural sites (McCool and Cole 1998). Natural sites can regenerate when allowed to by closure of damaged parts; but cultural resources such as archaeological remains cannot do so – all damage is irreversible and cumulative. Restoration of damage at archaeological sites is a poor substitute for preservation of the original, and over time, with repeated repairs, the sites' authenticity is inevitably degraded.

International Perspectives

Countries may differ markedly in the particular threats to their heritage and in the approaches to protection and preservation. Countries struggling under the burden of poverty are severely hampered by inadequate budgets and with few trained, motivated professionals cannot cope well with the demands of cultural resource management. Many such countries are rich in archaeological heritage. It behooves wealthier countries to provide assistance, and many do, through UNESCO and various national and private programs and aid agencies and development banks. Some successful models exist, but often these are focused on high-visibility sites with less emphasis on prosaic, intangible though essential needs such as inventory, documentation, and training. Ultimately, however, it is the national authority that must provide direction and coordination and establish priorities and policies within which agencies and individuals can work toward a common purpose.

Despite a number of shortcomings in protecting its archaeological heritage, China has shown some ways forward. It has an exemplary national inventory process that continuously identifies and records sites; an ambitious program of surveying, documenting, and nominating for World Heritage listing sites, landscapes, and monuments on a regional scale, such as the ancient Silk Road, the Great Wall, and the Grand Canal; and a national policy to prioritize salvage excavation and a research and planning strategy to deal with its so-called big-scale archaeological sites, such as Xi'an and Liangzhu as part of state-level 5-year planning. There are fault lines in these strategies but they constitute a pragmatic attempt to deal with big-scale problems employing nationally constructed solutions that seek to balance the strong desire to preserve their past and the needs of contemporary society to develop. What has not yet been tackled in any meaningful way is mass tourism, reaching crisis levels at some archaeological sites and created in part by a national policy that identified tourism as a pillar industry (Sofield and Li 2011).

Although the example of China presents a different context and utilizes different strategies, it has parallels with efforts undertaken in the United States in response to destruction of archaeological sites due to development. In the USA, passage of the National Environmental Policy Act (1969) requiring impact assessments and public input to the process, growth of private contract archaeology services, restriction on excavation by public agencies, development of cultural resource management policies, and theoretical developments within the academy, all emerged in the decades of the 1960s and 1970s. The US model is an eclectic mix of national and private efforts, whereas China is a top-down approach, but both aim to address large-scale problems and establish priorities for protecting sites.

Egypt exemplifies an archaeological heritage at the mercy of unsustainable development, human population pressures, poverty, and mass tourism, coupled with weaknesses in civil institutions, which has forced the national and site authorities into a reactive position. Archaeologists have long been part of the problem, driven by their narrow, individual objectives, but they have begun to become part of the solution, willingly or not, as they take on conservation responsibility for their excavations, find alternatives to large-scale excavation, and rally to the defense of local populations and preservation of the resource beyond their archaeological "concessions." While individual missions and archaeological

schools can achieve considerable results when working in a coordinated fashion, it is clear that research, planning, and policy development on the one hand and interagency cooperation on the other are required at the regional and national level to address the many challenges at hand.

Future Directions

As the threats to the archaeological heritage become more complex, interconnected, and larger than any one profession can handle, so too must the responses be equal to the task. It is clear that more holistic thinking and integrated regional and urban planning and working across disciplines in unfamiliar territory are where the future lies. National surveys to identify, document, inventory the resource, and establish priorities for salvage and research excavation are still sorely lacking in a field accustomed to setting its own research priorities based on very different criteria of the academy.

Appropriate approaches need to address the greatest threats. Globally archaeological sites are being lost to development on an unprecedented level. In the absence of systematic inventory in many countries with a rich heritage, sites may simply disappear without record or trace. Prosaic matters of inventory, investigation, documentation, monitoring, and maintenance are low on the priority list in many countries. Archaeology would be well served by seeking out broader partnerships to bring to bear the new technological tools for recording and to engage with environmentalists, ecologists, tourism, and wider stakeholder bases in the management and wise use of sites.

Cross-References

- ▶ Aerial Archaeology
- ▶ African Diaspora Archaeology
- ▶ Archaic *Homo sapiens*
- ▶ Architectural Sites: Monitoring
- ▶ Australopithecines
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Battlefield Archaeology
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Burrup Peninsula
- ▶ Cambodia: Cultural Heritage Management
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ China: Cultural Heritage Management
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Native Americans
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Environmental Archaeology and Conservation
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Areas
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage: History and Context
- ▶ Historical Ecology in Archaeology
- ▶ Indigenous Peoples, Working with and for
- ▶ Intangible Cultural Heritage
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ Landscape Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)

▶ Machu Picchu: Geography and Culture
▶ Nonstructural Sites: Monitoring
▶ Peru: Cultural Heritage Management and Education
▶ Prehistoric Human Footprint Sites
▶ Recording in Archaeology
▶ Sacred Site Conservation and Preservation
▶ Sacred Sites in Indigenous Archaeology
▶ Site Formation Processes
▶ Sustainability and Cultural Heritage
▶ Trackways in Archaeological Conservation and Preservation
▶ Zoning: Boundary Areas and Buffer Zones

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References

Anschuetz, K., R. Wilshusen, and C. Scheick. 2001. An archaeology of landscapes: Perspectives and directions. *Journal of Archaeological Research* 9 (2): 157–211.

Batarda Fernandes, A.P., M. Mendes, T. Aubry, J. Sampaio, R. Jardim, D. Correia, Â. Junquerio, D. Bazaréu, F. Dias, and P. Pinto. 2008. The evolving relationship between the Côa Valley Archaeological Park and the local community: An account of the first decade. *Conservation and Management of Archaeological Sites* 10 (4): 330–343.

Baxter, I., and C. Chippindale. 2002. From 'national disgrace' to flagship monument: Recent attempts to manage the future of Stonehenge. *Conservation and Management of Archaeological Sites* 5: 151–184.

Bednarik, R.G. 2006. *Australian apocalypse. The story of Australia's greatest cultural monument* (Occasional AURA Publication 14). Melbourne: Australian Rock Art Research Association.

Buccellati, G. 2006. Conservation qua archaeology at Tell Mozan/Urkesh. In *Of the past, for the future: Integrating archaeology and conservation: Proceedings of the conservation theme at the 5thWorld Archaeological Congress*, Washington, DC, 22–26 June 2003, ed. N. Agnew, and J. Bridgland, 73–81. Los Angeles: Getty Publications.

Carrera Ramírez, F., and R. Fábregas Valcarce. 2003. The protection and management of the megalithic art of Galicia. *Conservation and Management of Archaeological Sites* 6 (1): 23–37.

Chen, T. 2006. Planning for conservation of China's prehistoric sites: The Liangzhu site case study. In *Of the past, for the future: Integrating archaeology and conservation: Proceedings of the conservation theme at the 5th World Archaeological Congress*, Washington, DC, 22–26 June 2003, ed. N. Agnew, and J. Bridgland, 286–290. Los Angeles: Getty Publications.

Cowley, D.C. & K.H. Sigurðardóttir. 2010. Remote sensing for archaeological heritage management. In *Proceedings of the 11thEAC Heritage Management Symposium*, Reykjavik, Iceland, 25–27 March 2010, ed. D.D. Cowley, 43–55. Budapest: Europae Archeologiae Consilium.

Demas, M. 2002. Planning for conservation and management of archaeological sites: A values-based approach. In *Management planning of archaeological sites, an international workshop organized by the Getty Conservation Institute and Loyola Marymount University*, 19–22 May 2000, ed. J.M. Teutonico, and G. Palumbo, 27–54. Los Angeles: The Getty Conservation Institute.

Egloff, B. 2006. Introduction. Finding common ground: The role of stakeholders in decision-making. In *Of the past, for the future: Integrating archaeology and conservation: Proceedings of the conservation theme at the 5thWorld Archaeological Congress*, ed. N. Agnew, and J. Bridgland, Washington, D.C., 22–26 June 2003, 85–86. Los Angeles: Getty Publications.

Foster, S., and L. Linge. 2002. World heritage site buffer zones, statements of fact or aspiration? *Conservation and Management of Archaeological Sites* 5: 141–150.

Fowler, P.J. 2003. *World heritage cultural landscapes 1992–2002*. Paris: UNESCO World Heritage Centre.

Hernandez, M. 2004. *Use of satellite imagery and geographical information systems to monitor world heritage sites. Monitoring world heritage, shared legacy, common responsibility associated workshops*, 11–12 Nov 2002 (World Heritage Papers 10), 98–105. Paris: UNESCO World Heritage Centre and ICCROM.

Kars, H., and R.M. van Heeringen, eds. 2008. *Preserving archaeological remains* in situ: *Proceedings of the 3rd Conference,* 7–9 December 2006, Amsterdam (Geoarchaeological and Bioarchaeological Studies 10). Amsterdam: Institute for Geo- and Bioarchaeology, VU University.

Kennedy, D., ed. 1998. *The twin towns of Zeugma on the Euphrates: Rescue work and studies* (Journal of Roman Archaeology Supplementary series 27). Portsmouth: Journal of Roman Archaeology.

Lipe, W.D. 1974. A conservation model for American archaeology. *The Kiva* 39: 213–245.

Lipe, W.D. 2009. Archaeological values and resource management. In *Archaeological & cultural resource management*, ed. L. Sebastian and W.D. Lipe, 41–63. Santa Fe: School for Advanced Research Press.

Martin, O., and G. Piatti, eds. 2009. *World heritage and buffer zones, International Expert Meeting on World Heritage and Buffer Zones*, Davos, Switzerland, 11–14 March 2008 (World Heritage Papers 25). Paris: UNESCO World Heritage Centre.

McCool, S., and D.N. Cole. 1998. Experiencing limits of acceptable change: Some thoughts after a decade of implementation. In *Proceedings-limits of acceptable change and related planning processes: Progress and*

future direction, Missoula, Montana, 20–22 May 1997 (Gen. Tech. Rep. INT-GRT-371), 7278. Ogden: U.S. Department of Agriculture, Forest Service, Rocky Mountain Rescue Station.

Miura, K. 2007. A note on the current impact of tourism on Angkor and its environs. *Conservation and Management of Archaeological Sites* 8: 132–135.

Sofield, T., and S. Li. 2011. Tourism governance and sustainable national development in China: A macrolevel synthesis. *Journal of Sustainable Tourism* 19: 501–534.

Taruvinga, P., and W. Ndoro. 2003. The vandalism of the Domboshava rock painting site, Zimbabwe. *Conservation and Management of Archaeological Sites* 6: 3–10.

Thompson, J. 2007. Conservation and management challenges in a public/private partnership for a large archaeological site (Herculaneum, Italy). *Conservation and Management of Archaeological Sites* 8: 191–204.

UNESCO World Heritage Centre and ICCROM. 2004. *Monitoring world heritage* (World Heritage Papers 10). Paris: UNESCO World Heritage Centre.

van der Spek, K. 2011. *The modern neighbors of Tutankhamun: History, life, and work of the villages of the Theban West Bank*. Cairo: The American University in Cairo Press.

Wang, C. 2008. A cultural record of the Three Gorges. *Museum International* 60: 108–113.

Further Reading

Aydogdu, M. H. 2004. Approach to cultural heritage of the GAP region in Turkey. In *Apparati musivi antichi nell'area del Mediterraneo: Conservazione programmata e recupero: Contributi analitici alla carta del rischio: Atti del I convegno internazionale di studi, la materia e i segni della storia*, Piazza Armerina, 9–13 Aprile, 2003, ed. G. Meli. Palermo: Libreria D. Flaccovio Editrice.

Brent, M. 2003. International models of protected landscapes. *The George Wright Forum* 20: 33–40.

Butland, R. 2005. Peripheral vision: Implications of spatial contextualization for communities surrounding heritage sites. *The Historic Environment* 19: 30–35.

Chadburn, A. & D. Batchelor. 2000. Preserving the earthen monuments in the Stonehenge and Avebury archaeological landscapes. In *Terra 2000: 8th International Conference on the Study and Conservation of Earthen Architecture*, Torquay, Devon, UK, May 2000, preprints, ed. English Heritage, 26–30. London: Earthscan Ltd.

Cogotti, M., and G.P. Cantiani. 2001. Criteri tecnici e metodologia operative per il monitoraggio, il restauro e la gestione dei parchi storici delle ville tuscolane. In *Il governo dei giardini e dei parchi storici: Restauro, manutenzione, gestione*, ed. F. Canestrini, F. Furia, and M.R. Iacono, 265–273. Naples: Edizioni Scientifiche Italiane.

Coles, J.M. 1988. The peat bog. *Report (Council for British Archaeology)* 38: 68–73.

Comer, D. 2006. Monitoring of landscape change at world heritage sites: Prologue to proactive management. In *Of the past, for the future: Integrating archaeology and conservation, proceedings of the conservation theme at the 5thWorld Archaeological Congress*, Washington, DC, 22–26 June 2003, ed. N. Agnew, and J. Bridgland 163–172. Los Angeles: The Getty Conservation Institute.

Darvill, T. 1987. Archaeological resource management. In Ancient monuments in the countryside: An archaeological management review (Archaeological Report (English Heritage) 5), ed. T. Darvill, 25–31. London: Historic Buildings and Monuments Commission for England.

Hanekom, P., F. Jiyane, and M. Worsnip. 2005. Sterkfontein, cradle of humankind. *World Heritage Review* 40: 72–79.

Kelleher, M. 2003. Changing approaches to management at Tsankawi Mesa of Bandelier National Monument. *The George Wright Forum* 20: 58–64.

Lambrick, G. 2004. The management of archaeological sites in arable landscapes, in T.J.P. Nixon (ed.) *Preserving archaeological sites in situ? Proceedings of the 2nd conference*, 12–14 Sept 2001, 188–196. London: Museum of London.

Lennon, J. 2003. Values as the basis of management of world heritage cultural landscapes, in Cultural landscapes: The challenges of conservation: World heritage 2002: Shared legacy, common responsibility: Associated workshops 11–12 November 2002, Ferrara, Italy (World Heritage Papers 7), 120–125. Paris: UNESCO World Heritage Centre.

Matero, F. 2006. Making archaeological sites: Conservation as interpretation of an excavated past. In *Of the past, for the future: Integrating archaeology and conservation, proceedings of the conservation theme at the 5thWorld Archaeological Congress*, Washington, DC, 22–26 June 2003 (Getty Conservation Institute Symposium Proceedings series), N. Agnew, and J. Bridgland, 55–63. Los Angeles: The Getty Conservation Institute.

Mitchell, B. 2003. International models of protected landscapes. *The George Wright Forum* 20: 33–40.

Miura, K. 2005. Conserving of a 'living heritage site': A contradiction in terms? A case study of Angkor world heritage site. *Conservation and Management of Archaeological Sites* 7: 3–18.

Myers, D., S.N. Smith, and M. Shaer. 2010. *A didactic case study of Jarash archaeological site, Jordan: Stakeholders and heritage values in site management*. Los Angeles: The Getty Conservation Institute.

Paige, R. 2009. *National park service cultural landscapes inventory professional procedures guide*. Washington, DC: National Park Service; U.S. Department of the Interior.

Phillips, A. 2003. Cultural landscapes: IUCN's changing vision of protected areas. In *Cultural landscapes: The challenges of conservation: World heritage 2002: Shared legacy, common responsibility, associated*

I

workshops, 11–12 Nov 2002, Ferrara, Italy (World Heritage Papers 7), 40–49. Paris: UNESCO World Heritage Centre.
Porter, R., and T. Sandwith. 2005. uKhahlamba/Drakensberg Park: Protecting "the roof of Africa". *World Heritage Review* 40: 6–15.
Powell, W.L. 1998. The struggle to preserve Gettysburg. *English Heritage Conservation Bulletin* 34: 6–7.
Sienkewicz, J.A. 2006. The historic American landscapes survey documents congressional cemetery in Washington, DC. *CRM: The Journal of Heritage Stewardship* 3 (2): 103–106.

Imperative Military Necessity: Hague Convention (1954) and Its Protocols

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Introduction

The Law of Armed Conflict (LOAC), also known as International Humanitarian Law (IHL), is a branch of international law that seeks to limit the effects of armed conflicts for humanitarian reasons. IHL protects persons who are not or no longer participating in hostilities and restricts the means and methods of warfare. Therefore, under the LOAC, the right of belligerents to adopt means of injuring the enemy during an armed conflict is limited. In this sense, IHL is a compromise based on a balance between the requirements of humanity and the principle of military necessity (Pictet 1987). The LOAC allows belligerents a certain liberty in keeping with the demands of military necessity, which is also limited by considerations of humanity (Dinstein 2004).

Cultural property is protected in the event of armed conflict under IHL, by treaty and customary law. The 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954 Hague Convention) (see Schipper's entry ▶ "Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)") establishes that States have a duty to respect cultural property and to refrain from using such property and its surroundings in any way that may expose it to destruction or damage and from any act of hostility. This duty has only one exception: States may waive the prohibition in cases where "imperative military necessity" requires it. Furthermore, Chap. II of the 1954 Hague Convention establishes a special regime of protection for a limited number of cases. Cultural property placed under special protection has immunity, as stated by Article 9 of the convention. In order to lift such immunity, the convention establishes a higher standard of military necessity, called "unavoidable military necessity."

Definition

Military necessity is a paramount notion when it comes to the protection of cultural property; however, the 1954 Hague Convention and its Protocols are not clear about what this means or what the difference is between the different standards of military necessity it contains. Article 6 of the 1999 Second Protocol to the 1954 Hague Convention (Second Protocol) sheds some light on its meaning by stating that imperative military necessity may only be invoked when there is "no feasible alternative available to obtain a similar military advantage to that offered by directing an act of hostility against that objective." Furthermore, Article 6 requires that the property in question has, by its function, been made into a military objective. According to Article 42 of Additional Protocol I to the 1949 Geneva Conventions and relating to the protection of victims of international armed conflicts, "[i]n so far as objects are concerned, military objectives are limited to those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage." Article 6 of the Second Protocol to the 1954 Hague Convention also requires that the decision to attack cultural property be taken by a certain level within the chain of command, as well as an effective warning, whenever circumstances permit.

Historical Background

The idea of necessity as an exculpatory ground in the context of armed conflict can be traced back to antiquity. For instance, Thucydides describes that the Athenians justified occupying a temple and removing water from its sacred well as reference to the necessities of war. In one of its passages, the author explains that the Athenians considered they had done no wrong since "for the water, they meddled with it upon necessity (...) for whatsoever is forced by war or danger hath in reason a kind of pardon even with the god himself; for the altars, in cases of involuntary offences, are a refuge, and they are said to violate laws that are evil without constraint, not they that are a little bold upon occasion of distress" (*History of the Peloponnesian War* 4.98).

The notion of military necessity can also be traced back to the nineteenth-century German doctrine of *Kriegsräson*, so-called in virtue of the maxim *KriegsräsongehtvorKriegsmanier* (the necessities of war take precedence over the laws of war). *Kriegsräson* is previous to the codification of IHL, which means it belongs to a time when armed conflicts were regulated by simple uses alone, not by the laws and customs of war (Dunbar 1952). This doctrine was utterly rejected in the trials conducted under the Control Council law No. 10 after Nuremberg.

In 1864, Francis Lieber, a German lawyer who fought for Prussia in the Napoleonic Wars and in the American War of Independence, wrote by request of then President Abraham Lincoln the "Instructions for the Government of Armies of the United States in the Field, General Order № 100." The instructions, commonly known as the "Lieber Code," were the first attempt to codify the laws and customs of war. Articles 34 and 35 of the Code refer to military necessity as "the necessity of those measures which are indispensable for securing the ends of the war, and which are lawful according to the modern law and usages of war."

In 1907, during the Second International Peace Conference, States adopted the IV Convention respecting the Laws and Customs of War on Land, and its annex, the 1907 Hague Regulations. According to Article 23(g) of the 1907 Hague Regulations, it is prohibited "to destroy or seize the enemy's property, unless such destruction or seizure be imperatively demanded by the necessities of war." Military necessity was often used as a justification for the extensive destruction of cultural property perpetrated during World War I (Forrest 2010).

As a response to the events of World War II, which was marked by the massive and indiscriminate bombardment of both civil and military objectives, as well as acts of pillage and illegal export of movable cultural property, States adopted the 1954 Hague Convention, which in Article 4(2) includes the exception of military necessity. Furthermore, after World War II, the Allied Control Council issued in 1945 Control Council Law No. 10, which allowed the occupying powers to try alleged war criminals in their occupation zones. These trials were commonly known as the "subsequent Nuremberg trials," since they took place after the trials held by the International Military Tribunal at Nuremberg (IMTN). In the case known as the "hostages trial" (United States v. Wilhelm List et al. 1949a), the US Nuremberg Military Tribunal held in 1948 that "military necessity permits a belligerent, subject to the laws of war, to apply any amount and kind of force to compel the complete submission of the enemy with the least possible expenditure of time, life and money." In the 1980s and 1990s, the events of the war in Iraq and Kuwait showed there were many problems regarding the implementation of the 1954 Hague Convention. Thus, in the 26th session of the UNESCO General Conference, after noting that the existing international system for the protection of cultural property was not entirely satisfactory, the UNESCO created a group to study the possibility of amending the Convention or complementing it by means of a Second Protocol. The group was directed by Prof. Patrick Boylan, who in its 1993 report concluded that, in case of an amendment, the notion of military necessity should be eliminated (Boylan 1993). This opinion was shared by many States, who considered that the exception weakened the protection of cultural property in the event of armed conflict (O'Keefe 2004). In 1999, the Second Protocol to the 1954 Hague Convention was

adopted. Although the notion of military necessity was not eliminated, attempts were made to further specify the meaning of this exception and reduce ambiguities. Neither the 1954 Hague Convention nor the Protocols explain what the difference between imperative and unavoidable military necessity is. Furthermore, the whole body of LOAC is filled with different standards of military necessity with no reference to their meaning. For instance, Article 54 of the 1907 Hague Regulations Concerning the Laws and Customs of War on Land (1907 Hague Regulations) refers to "absolute" necessity, and Articles 33 and 34 of the 1949 I Geneva Convention on Wounded and Sick in Armed Forces in the Field mention "urgent" military necessity. Whereas some authors consider that the different standards simply emphasize the severity of the necessity contemplated (McCoubrey 1991), others consider that these qualifications should be ignored for being redundant (Dinstein 2010).

Military necessity was originally coined as an exception to certain specific IHL rules, operating on a state-to-state basis. However, it can also operate as an exception under international criminal law (i.e., the branch of international law that deals with the responsibility of individuals for the commission of international crimes) to justify a conduct which would otherwise be criminal. Indeed, the Statute of the IMTN and the International Military Tribunal for the Far East (IMTE) provide that war crimes include "plunder of public or private property, wanton destruction of cities, towns or villages, or devastation not justified by military necessity." Similarly, Article 2(d) and 3(b) of the Statute of the International Criminal Tribunal for the Former Yugoslavia (ICTY) consider a war crime the "extensive destruction and appropriation of property, not justified by military necessity and carried out unlawfully and wantonly." Finally, the Statute of the International Criminal Court (ICC) established as a war crime the "extensive destruction and appropriation of property, not justified by military necessity and carried out unlawfully and wantonly" (Art. 8.2.a.iv), "destroying or seizing the enemy's property unless such destruction or seizure be imperatively demanded by the necessities of war" (Art. 8.2.b.xiii), and "destroying or seizing the property of an adversary unless such destruction or seizure be imperatively demanded by the necessities of the conflict" (Art. 8.2.e.xii).

Key Issues/Current Debates

The notion of military necessity has served several purposes and has been interpreted in different ways throughout history. According to the theory of *Kriegsräson*, "any given military action that is in fact materially necessary for the successful prosecution of war overrides and renders inoperative any provisions of the laws and customs of war that prescribe contrary action" (Hayashi 2010). In the German High Command Trial, the US Military Tribunal held that if military necessity conferred a belligerent the right to do anything which contributes to win the war, "such a view would eliminate all humanity and decency and all law from the conduct of war and it is a contention which this Tribunal repudiates as contrary to the accepted usages of civilized nations." At present, this theory is widely discredited.

According to a different current, IHL violations are justified only when the very survival of the State is at stake. This theory was rejected by the US Military Tribunal in the Krupp case, in 1948, where the Tribunal affirmed that the "rules and customs of warfare are designed specifically for all phases of war. They comprise the law for such emergency. To claim that they can be wantonly –and at the sole discretion of anyone belligerent– disregarded when he considers his own situation to be critical means nothing more or less than to abrogate the laws and customs of war entirely." Those who sustain this theory note the advisory opinion delivered by the International Court of Justice on the legality of the threat or use of nuclear weapons, where the Court stated that it could not "conclude definitively whether the threat or use of nuclear weapons would be lawful or unlawful in an extreme circumstance of self-defense, in which the very survival of a State would be at stake." However, other authors consider that this interpretation of the Court's decision is actually inaccurate, since the Court was not referring in this paragraph to the notion of military necessity or the violation of IHL

norms, but to the violation of the prohibition of the use of force and the exception of self-defense (Dinstein 2010).

A third stream considers that military necessity operates as the measure of what is legal or permitted; it is in these terms that the Lieber Code is expressed. As a consequence, only those acts which are necessary to the attainment of a military goal would be permitted, therefore excluding acts which do not qualify as a "necessity," such as cruel acts, revenge, mere convenience, etc. Just like the doctrine of *Kriegsräson*, this theory is previous to the systematization and establishment of recognized rules of IHL, which is why, in that context, military necessity did not work as a habilitating institute but, quite to the contrary, it had a limiting effect (Dunbar 1952).

Finally, most scholars (Pictet 1987; Dunbar 1952; Dinstein 2004; Hayashi 2010) consider that military necessity has a double function: on the one side, it is a principle underlying the whole body of IHL; on the other side, it works as an exception when the norm which prohibits a certain conduct expressly provides for its derogation in cases of military necessity. Both functions are intrinsically connected. In effect, IHL rules are the result of the tension between the principles of humanity and military necessity. Since every norm already accounts for military necessity, de novo invocations – that is, invocation in cases where military necessity is not expressly included as an exception to the protective rule – are strictly prohibited. Therefore, the exception of military necessity must be expressly included in the norm.

The idea of necessity as a justifying notion does not appear exclusively in IHL, but in several areas of international law as well. For instance, the International Law Commission's articles on responsibility of States for internationally wrongful acts consider state of necessity as one of the circumstances precluding the wrongfulness of an act. There are many similarities between the two notions, which may sometimes lead to confusion. However, state of necessity is a circumstance precluding wrongfulness (in other words, a secondary norm), whereas military necessity is an exception that operates within the primary norm which determines the prohibition of a certain conduct, so that there is no actual violation. State of necessity precludes the wrongfulness of a conduct although the violation of an international obligation persists (in fact, the violation of an international obligation is a constitutive element of the notion of necessity), whereas military necessity determines that there is no violation of the primary norm.

International Perspectives

Military necessity is a foundational notion of IHL. Particularly regarding the protection of cultural property in the event of armed conflict, it marks the limit of what is permitted and what is prohibited. In this sense, its relevance is associated with traditional conflicts between States, or international armed conflicts, by acting as an exception to the protective rule and, therefore, in the absence of a violation to an international obligation, by excluding the international responsibility of States. However, it is also relevant in the context of non-international armed conflicts, where non-State armed groups are a party to the conflict, since absence of military necessity usually constitutes one of the elements of the war crime of wanton destruction of cultural property.

Future Directions

Given the ambiguity of the notion, military necessity has been invoked to justify any measure. The rejected doctrine of *Kriegsräson* is an extreme example of the manipulation this notion can be subject to. For this reason, it has been severely criticized by human rights defenders, NGOs, and some States. However, a certain degree of ambiguity is unavoidable. Indeed, military necessity is an open norm, designed to rule in those situations which cannot be foreseen. Thus, its very nature makes it impossible to give a complete and all-encompassing definition of these notions.

In this context, a possible approach could be to focus on the case-law of international and domestic tribunals, as guidelines to identify the elements that constitute the notion of military necessity. In

this sense, some of the requirements that different tribunals have identified are that the measure (the act affecting cultural property) must be taken for a specific military purpose; that the measure must be materially relevant to the attainment of such purpose; that of those materially relevant measures that were reasonably available, the measure taken was the least injurious; that the injury that the measure would cause must not be disproportionate to the gain that it would achieve; that the military purpose for which the measure was taken was in conformity with the International Humanitarian Law; and that the measure was otherwise in conformity with IHL (Hayashi 2010).

Cross-References

► Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)

References

Boylan, P.J. 1993. Review of the convention for the protection of cultural property in the event of armed conflict (the Hague convention of 1954). UNESCO doc. CLT-93/WS/12.

Dinstein, Yoram. 2004. *The conduct of hostilities under the law of international armed conflict*. New York: Cambridge University Press.

Dinstein, Yoram. 2015. Military necessity. In *Max Planck encyclopedia of public international law.*

Dunbar, Norman. 1952. Military necessity in war crimes trials: Notes. *British Yearbook of International Law* 29: 442–452.

Forrest, C. 2010. *International law and the protection of cultural heritage*. London: Routledge.

Hayashi, Nobuo. 2010. Requirements of military necessity in international humanitarian law and international criminal law. *Boston University International Law Journal* 28: 39–140.

International Court of Justice. Advisory Opinion on the legality of the threat or use of nuclear weapons. 8 July 1996.

McCoubrey, Hilary. 1991. The nature of the modern doctrine of military necessity. *Military Law and the Law of War Review* 30: 215–252.

Pictet, Jean. 1987. *Commentary on the additional protocols*. Geneve: Martinus Nihjoff Publishers.

United States Nuremberg Military Tribunals. United States v. Wilhelm List et al (Hostages Trial). Case N. 47. 19 February 1947. In The United Nations War Crimes Commission. 1949a. *Law Reports of Trials of War Criminals*, Vol. VIII. London: Her "Majesty's Stationery Office".

United States Nuremberg Military Tribunals. United States v. Wilhelm Von Leeb et al. (High Commands Trial). Case No. 72. 28 October 1948. In The United Nations War Crimes Commission. 1949b. In *Law Reports of Trials of War Criminals*, Vol. XII. London: Her Majesty's Stationery Office.

United States Nuremberg Military Tribunals. United States v. Alfred Felix Alwyn Krupp von Bohlen und Halbach et al. Case No. 58. 30 June 1948. In The United Nations War Crimes Commission. 1949c. In *Law Reports of Trials of War Criminals*, Vol. XX. London: Her "Majesty's Stationery Office".

Further Reading

Carnahan, Burrus. 1998. Lincoln, Lieber, and the laws of war: The origins and limits of the principle of military necessity. *American Journal of International Law* 92 (2): 213–231.

Chamberlain, Kevin. 2010. Military necessity under the 1999 second protocol. In *Protecting cultural property in armed conflict: An insight into the 1999 second protocol to the Hague convention of 1954 for the protection of cultural property in the event of armed conflict*, ed. Nout Van Woudenberg and Liesbeth Lijnzaad, 43–50. Leiden: Martinus Nijhoff Publishers.

Downey, William. 1953. The law of war and military necessity. *American Journal of International Law* 47: 251–262.

Forrest, Craig. 2007. The doctrine of military necessity and the protection of cultural property during armed conflicts. *California Western International Law Journal* 37 (2): 177–219.

Green, Leslie. 2008. *The contemporary law of armed conflict*. Manchester: Manchester University Press.

Hayashi, Nobuo. 2013a. Contextualizing military necessity. *Emory International Law Review* 27: 189–283.

Hayashi, Nobuo. 2013b. Military necessity as normative indifference. *Georgetown Journal of International Law* 44 (2): 675–782.

Henckaerts, Jean-Marie, and Louise Doswald-Beck. 2007. *Customary international humanitarian law.* Cambridge: Cambridge University Press.

Henderson, Ian. 2009. *The contemporary law of targeting: Military objectives, proportionality, and precautions in attack under additional protocol I.* Leiden: Martinus Nijhoff.

Hladik, Jan. 1999. The 1954 Hague convention for the protection of cultural property in the event of armed conflict and the notion of military necessity. *International Review of the Red Cross* 81 (835): 621–636.

O'Keefe, Roger. 2004. *The protection of cultural property in armed conflict*. Cambridge: Cambridge University Press.

Schmitt, Michael. 2010. Military necessity and humanity in international humanitarian law: Preserving the delicate balance. *Virginia Journal of International Law* 50 (4): 795–839.

Solis, Gary. 2010. *The law of armed conflict: International humanitarian law in war*. Cambridge: Cambridge University Press.
Toman, Jiri. 1996. *The protection of cultural property in the event of armed conflict*. Aldershot: UNESCO.
Visscher, De, and Charles. 1917. Les lois de la guerre et la théorie de la nécessité. *Revue Générale de Droit International Public* 24: 74–108.

Imperial Cult, Roman

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Introduction

Although there was a strong and ancient tradition in Roman culture of honoring the spirits of the dead (*Manes*), prior to the third century BCE, the Romans did not deify mortals. They did honor the *Genius* of a living man (just so, the *Juno* of a woman); these terms, however, denoted a divine force present in every human but at the same time distinct from him, and their worship should therefore not be considered equivalent to the worship of deified humans. The actual deification of individuals only came into practice following contact with Hellenistic cultures as the empire expanded; the concept of worshiping the emperor as a deity seems generally to have been an outgrowth of the Greek practice of deifying heroes and Hellenistic kings. The development of those earlier cults of heroes and kings, as well as later divine honors offered to prominent Romans, has been seen by modern scholars as adaptation by the Greeks of the cults of their traditional Olympian gods in order to express their relationship to new types of power.

Definition

The terminology "imperial cult" is used by modern scholars to refer to the practice in the Roman Empire of worshiping the emperor and certain members of the imperial family. There was no cult designated by that name in antiquity. Nevertheless, worship of the emperor, which began with the deification of Augustus in 14 CE and continued throughout the imperial period, was an important aspect of the religious and political life of the empire, and it is convenient to assign it a name in order to facilitate discussion.

Historical Background

The first Romans for whom we have evidence of divine honors were M. Claudius Marcellus, for whom a festival was established in Syracuse, Sicily (212 BCE), and, in the East, the consul Titus Quinctius Flamininus (ca. 191 BCE), on whom honors were bestowed in Greece. Importantly, although the Greeks occasionally offered temples in addition to divine honors to Roman dignitaries and officials (Cicero (106–43 BCE), e.g., refused such an offer), there is no evidence that any were actually built. The Senate voted a cult and a *flamen* (that is, a priest – in this case, Marcus Antonius) for C. Julius Caesar (100–44 BCE) a short time before his assassination, and Caesar was officially deified after death; those divine honors served as models of appropriate behavior toward the emperors throughout the imperial period. Augustus (r. 27 BCE–CE 14) was offered divine honors from the eastern provinces of Asia and Bithynia while living, which he accepted with the stipulation that the cult include Roma as a partner goddess, a precedent that was followed by several of his successors. Augustus refused deification in Rome itself during his lifetime but permitted the establishment of a cult of the *Genius Augusti* by 12 BCE (see esp. Taylor 1975). Following his death in 14 CE, Augustus received honors similar to those bestowed on Julius Caesar, including a temple, a *flamen*, and the establishment of a college of priests for his cult, the *Sodales Augustales*, whose members were drawn from the ranks of the Senate.

Technically speaking, the emperor could only become a god (*divus*) and be the recipient of an official cult after death, following an apotheosis as declared by a decree of the Senate (note, however,

that *divus/divi* is still distinct from *deus/dei*, the term for the traditional gods). In practice, this rule was only ever observed in Rome and some of the western provinces (see below). In contrast, in the Hellenized provinces from the time of Augustus, the living emperor could be referred in Greek *theos,* a god. From its beginning, the emphasis of the imperial cult in the East was heavily oriented toward the current, living ruler, with little regard for the official lists of *divi* issued by the Senate.

Political Aspects of the Cult. An important aspect of the imperial cult was its political nature. Emperor worship was seen by provincial populations as an opportunity to display their allegiance to the ruler in a formalized civic fashion. Some emperors no doubt encouraged it as a means of symbolically illustrating their power far from the capital, and it seems that institution of the cult at a provincial level was an important step in the development of new provinces, especially in cases in which they had been "wild" at the time of their accession by the empire (Fishwick 1987: 148). Further, the cult provided a system within which local aristocracy could relate to Rome and publicly prove their loyalty as well as achieve recognition and social status through participation in the imperial priesthood. By the third century, Cassius Dio (51.20.7) was able to consider worship of the emperor to be one aspect of religion shared by everyone in the empire. Such a factor could prove a very powerful tool for generating a sense of commonality among the peoples of far-flung territories who observed a wide range of religious practices. Judicial and military oaths were sworn to the *Genius* of the emperor, and in some instances the cult was used as a litmus test to prove the loyalty of Roman subjects or to ascertain whether they were adherents of cults considered inimical to the Roman state. In particular, the requirement that individuals offer prayers to or for the emperor in the presence of a government representative was used to discover or prove the identities of Christians, a process discussed in letters the provincial administrator Pliny the Younger (ca. 61–112) wrote to the emperor Trajan (*Epist*. 10.96), and elsewhere. These political aspects of the cult should not, however, be understood to lessen or negate the religious content of imperial worship.

We are particularly well informed about the political significance of the cult in the Greek East, where it provided a framework for negotiating the relationship between the dominant Hellenized culture – which was organized on a city-based system – and the centralized power of Rome. Leagues of cities called *koina* were a feature of the Hellenistic world, and in the imperial period, many of these leagues were organized around participation in the imperial cult. These *koina* competed among themselves for the honor of hosting imperial cult temples, and the cities that won the honor served as the caretakers or wardens of those temples for the entire *koinon.* From the time of Hadrian (r. 117–38 CE), the term *neokoros* (temple warden) was used as a regular, honorific civic title claimed by those cities that had an imperial temple at which a provincial festival took place (the term appears earlier but its meaning was standardized during Hadrian's reign). To be *neokoros* brought a city great prestige, and the title was vaunted in inscriptions and on coinage, a fact that aids us in assessing the range and location of the cult (see esp. Burrell 2004).

In general, though individual emperors had different preferences and also had to be aware of implications for the specific political climate in which they reigned, the tendency to accept divine honors while living became more common as the imperial period progressed (on the evolution of imperial images as a reflection of this shift, see Pollini 2012). Though always more popular in the eastern provinces, altars and temples were dedicated to the living emperor in the West as well, beginning perhaps with a foundation in honor of Claudius (r. 41–54 CE) (at Camulodunum in Britain) but certainly by the reign of Vespasian (r. 69–79 CE) (at Tarraconensis and (probably) Lusitania in Spain and possibly at Narbo in Gallia Narbonensis). As Beard, North, and Price have shown (Beard et al. 1998), whether a particular area of the empire chose to worship the living emperor or to follow Rome in worshiping only deceased and formally deified rulers had less to do with geographical location than with conceptual closeness to Rome. Thus, for example, cults to the

living emperor were established in the West in Germany among the un-Romanized tribes following their conquest by Rome. In addition, practice was dependent on the status of the worshipers who established a particular cult center, especially in the early years of the empire. Therefore, Roman citizens in areas outside Rome, both in colonies and in the provinces, followed Roman tradition in worshiping the emperor, whereas noncitizen subjects of Rome followed local custom. Thus, the Roman citizens in Ephesus in the Augustan period worshiped at a temple dedicated jointly to Divus Julius (Caesar) and the goddess Roma, while noncitizens were free to pay cult to the living emperor. This distinction between worship by Romans and non-Romans later blurred as citizenship became more common in the provinces.

The standard process of establishment of the cult also differed in the East and the West. In formerly Greek areas, the impetus to establish a cult and an altar or temple was almost always local, with the emperor choosing to accept or reject offers as he deemed appropriate. In the West, though there is some evidence of local initiative in establishing the cult in certain cases (e.g., the temple of Augustus at Tarraco in Spain, granted under Tiberius), Rome was more heavily involved in its development and content and, in some areas, seems even to have imposed the cult.

Imperial Cult, Roman, Fig. 1 The head of a priest of the imperial cult in Ephesus in Asia Minor (first c. CE, now in the Ephesus Archaeological Museum, Selçuk). He wears a crown decorated with busts of the imperial family, a common feature of imperial cult priest regalia that is also known from literary descriptions. The heads of the busts were almost certainly destroyed intentionally, probably by Christians. (Photo © Candace Weddle Livingston)

Rites of the Cult. Imperial worship included features of cult rites generally seen in the Roman system. Temples and altars were consecrated to deified emperors and family members. Eleven of the latter were established in the first half of the first century, but their number then decreased markedly, with only four being established after that point. Priests were appointed, drawn from the elite citizenry of the cities in which the cult was celebrated (Fig. 1). The majority of surviving evidence for the priesthood consists of honorific inscriptions noting that individuals had attained the office and specifying the details of their munificence toward their community in providing sacrifices, feasts, and games in connection with the cult. Otherwise, evidence for the range of priestly functions is limited. Their position was one of political as well as religious prestige, as suggested by their appearance in lists of ambassadorial groups and embassies to the emperor. Priestesses served in the cults of the female members of the imperial family, although in one example from Aphrodisias a woman held the priesthood of the emperors, indicating that the gender division was not strict. The titles of some other imperial cult actors are also known from inscriptions, including in the Greek world the *prothytes*, an official of unknown responsibilities related to sacrifices whose title is found only in the context of this cult. Important civic bodies perhaps (as suggested by their name) associated with the cult were the *Augustales*, often understood by scholars to have been associations of ex-slaves who seem to have held responsibilities toward the deified imperial family that included sponsorship of games, building repair, and erection of statues. Though they were active mainly in the West, fraternities of

Augustales are attested in some Roman colonies in the eastern parts of the empire. Beard, North, and Price have urged caution in defining them as associated specifically or exclusively with the imperial cult and have shown that their membership included freeborn as well as freedmen (Beard et al. 1998: 358).

Imperial cult worship included prayers addressed and hymns sung to the *divi*, often accompanied by a range of traditional sacrifices, including offerings of wine or water, ritual cakes, incense, and live animal victims. Oxen were the normal victims offered to a divinized emperor, cows being appropriate for imperial women. Inscriptional evidence indicates that animal sacrifices took place within the cult on a scale up to and exceeding a *hekatomb*, the Greek word for a sacrifice of approximately 100 bovines, though this must have been an exceptional occurrence. The sacrifices took two forms: offerings made directly to the living emperor (or to him and his predecessors as a group) and offerings made to other gods on behalf of the emperor (*pro salute*) to ensure his health and continued reign. Of particular importance in the latter category were yearly *vota* offerings performed on January 3 in both Rome and the provinces to petition the gods for the well-being of the emperors. Interestingly, surviving literary and epigraphical evidence includes only one instance of sacrifice *to* the emperor being performed by a priest of the imperial cult; all other instances of sacrifices performed by imperial cult priests are noted as being completed on the emperor's behalf. In general, it seems that sacrifices to the emperor were less frequent than those directed to other deities for his benefit.

Celebration of the cult was often carried out in the context of imperial festivals. These events, which were held on a regular schedule and could happen monthly, yearly or, for major festivals, biennially or quadrennially, included games and contests as well as processions, sacrifices, and accompanying feasts that often lasted for several days. In the eastern parts of the empire, almost all gladiatorial competitions and wild animal fights were staged within the context of the imperial cult. Festivals were commonly linked to important days in the life of the honoree including birthdays, ascension days, and occasions of good news communicated from Rome to the cities of the empire (e.g., a military victory or the birth or coming-of-age of an imperial heir). A visit by the emperor to a city also resulted in cult celebration (as did, beginning in the third century, the arrival of his image). In some cases, an imperial visit led to the foundation of a new cult sanctuary or provided an opportunity for the consecration of a previously constructed sanctuary by the emperor for whose cult it was built.

The activities of the imperial cult also included Mysteries, about which we have less information. That they formed a regular part of worship within the cult is evidenced by a surviving cult calendar inscribed on an altar of the imperial choir of Augustus and Roma at Pergamum in Asia Minor, on which the Mysteries appear as one of the four most important annual cult festivals. It is also clear on the evidence of this inscription, which includes some details of expenditures on items for the celebration of the Mysteries, that those rites included small-scale sacrifices of incense and cakes. The specification that lamps be provided for the proceedings suggests that the cult image of the emperor was dramatically revealed from the darkness at some point during the ceremonies, an aspect known from other similar Greco-Roman contexts such as the Eleusinian Mysteries (Friesen 2001: 115). The title *sebastophant* (compare the *hierophant* at Eleusis and in other mystery cults) is known from inscriptions, but his duties are not specified.

Chronological Scope. The imperial cult endured as an important aspect of the Roman religious landscape throughout the imperial period, though it did not remain static. Generally speaking, from the birth of the cult under Augustus, a pattern has been noted: a gradual shift from cults of individual emperors toward generic cults of the collective emperors, with Caracalla (r. 198–217) being the last emperor for whom we know of an individual temple or priesthood. Price (1984a) has convincingly interpreted this gradual development as a strengthening of the institution of the imperial cult rather than as a decline in willingness to deify individual rulers.

The end of the cult is difficult to trace. The political and economic unrest of the third century CE affected not only the construction of new sanctuaries but also the celebration of established festivals, which were expensive to organize. The heavily centralized government instituted at the end of that century by Diocletian (r. 284–305) must also have strongly impacted the practice of the cult, particularly in provinces in which impetus for cult celebrations was primarily driven by local devotion. However, important evidence for the continued relevance of the cult in this period is preserved in the province of Egypt at Luxor (see below). The rise of Constantine (r. 307–337 CE) and the increasing political power of Christianity altered the nature and structure of the cult. Constantine's view of the cult is perhaps illustrated by the fact that he allowed a group of towns in Umbria to build a temple in honor of his family but forbade them to offer sacrifices there. Scholars have noted, however, the continuation of certain aspects of the cult in Byzantine court ceremonial, as well as in royal ceremonies of other monarchies through the medieval period, such as those of the Frankish kings.

Archeological Evidence for the Imperial Cult

Worship of the emperor took a variety of forms in different areas of the empire, and archeological evidence has helped clarify the practice and meanings of the cult within various communities in Roman society. Evidence for the cult is rich and varied but also fragmentary, particularly so for the tumultuous third century. The remains of several cult temples have been identified, especially in the eastern provinces of the empire, as have cult statues of imperial family members; images of temples and statues struck on coins provide further evidence. In addition, thousands of inscriptions related to the cult have been recovered, ranging from records of temple dedications to lists of cult regulations. Most of the latter date to the time of Augustus and his early successors. Although the evidence is inconclusive, it is likely that the cult was eventually present in every province of the empire.

Physical evidence for the cult is richest in Asia Minor (modern Turkey), where the results of survey and excavation carried out since the late nineteenth century have clarified both the broad picture of the spread and penetration of the cult and details of its rites and role in the eastern provinces. Surveys show a very wide diffusion of the cult as measured in epigraphical attestation of temples, altars, and priests. The general pattern of the evidence also strongly suggests that the cult was primarily urban and was practically nonexistent in rural areas. This is probably a by-product of the fact that the cult was largely perpetuated and administered by the elite (though there is ample evidence for the participation of individuals from all levels of society). It also highlights the extent to which the cult was derived from and dependent on Greek culture (which emphasized the importance of the city as an institution), reflected a reciprocal relationship with Rome, and required civic organization to function. All of those elements were absent from the more remote areas of the eastern provinces.

Cult Buildings. Following the precedent set by Augustus's construction of a temple to the deified Julius Caesar after his death, nine temples for deceased emperors (sometimes shared with their deified spouses) were constructed in Rome itself. Of these, the best preserved is the temple of Antoninus Pius (r. 138–61 CE) and his wife Faustina the Elder in the Forum Romanum, which was converted into the church of San Lorenzo in Miranda sometime prior to the eleventh century. Elsewhere in the West, temples and altars dedicated to the emperors were constructed from an early date. The first of these was a large and lavish altar to Rome and Augustus consecrated in either 12 or 10 BCE in Gaul at Lugdunum (modern Lyon); its appearance is known from local coinage and from limited archeological remains, which include columns from a later update of the altar under Hadrian that were reused in the eleventh century as supports for the cupola of the Church of St. Martin in Ainay. The altar is notable not only for its scale and opulence but also because of its role as a potent political symbol: it served as a location for 60 Gallic tribes to pledge their allegiance to Rome on a yearly basis. A similar foundation in the Two Germanies at modern Cologne followed

shortly. The cult is also attested in Spain by the reign of Tiberius (r. 14–37 CE) and in Africa Proconsularis under Vespasian, although the dates for the first appearance of the cult in those provinces are unclear. The discovery at Narbonne in 1888 of a fragmentary bronze tablet bearing regulations pertaining to the provincial imperial cult there under Vespasian, a text now known as the *Lex Narbonensis* (*CIL* 12,6038 = *ILS* 6964), provided some specific details such as the cult's festal calendar. It also confirmed the establishment of a cult that included both the Julio-Claudian rulers and the founder of the new Flavian dynasty.

In Asia Minor, 156 temples and shrines have been identified from extant remains, inscriptions, and numismatic and literary evidence, including 52 major neokorate temples in 35 cities. In general, the construction of temples (referred to as *Kaisareion* or *Sebasteion* in the East) reached an apogee in the first half of the second century, which reflects a general increase in civic construction empire-wide during that period. The number of epigraphically attested temple constructions decreases greatly for the second half of the second century and especially for the unsettled third century (however, because the foundation date of a significant number of temples cannot be determined, scholars should be cautious of drawing broad conclusions from the evidence). The forms of the shrines ranged from simple buildings to grand temples on the model of those of traditional gods. Most held images of the emperor and other members of the imperial family.

In addition to individual imperial cult constructions, cult buildings or sacred areas could be associated with sanctuaries of traditional gods, though the imperial *divi* were usually subordinated in some way to those deities. The deified emperor and his family sometimes shared the space of such temples with their traditional occupants, in which case the *divi* appeared either as statues inside the temple itself or in their own building within the bounds of the temple complex. There is evidence in several cases that traditional temples were altered or received structural additions in order to accommodate imperial areas. In other cases, the emperor was associated with the traditional gods in subtler ways, such as through dedicatory inscriptions mentioning both, or by representation in decoration on the exterior of temple buildings.

A particularly interesting example of the alteration of an existing temple – though of a foreign rather than a Roman god – is found in Egypt, where at the turn of the fourth century, an imperial cult chamber with a fine fresco of the first Tetrarchy was constructed within Luxor Temple. Recent restoration (2005–2008) and archeological analysis are clarifying the process by which the imperial cult was overlaid onto the temple that served as the site of the annual regeneration ceremony of the Egyptian state god Amun-Re, reborn yearly in the person of the pharaoh. The selection of the site clearly invited a comparison between the divine aspects of the pharaoh and those of the Roman heads of state, while simultaneously asserting Roman dominance over Egypt and her traditional gods (see Jones and McFadden 2015).

Epigraphical evidence is key to our knowledge of imperial cult sanctuaries. It is not, however, always possible to confirm the evidence of inscriptions in the archeological record. In some instances, it seems likely that the right to construct a temple was granted to a city or province, as indicated by an inscription, but that changing political winds prevented its construction. We are on firmer ground when considering inscriptions that have a high likelihood of having been dedicated or placed after a temple was completed. For example, bases for statues commissioned to celebrate the dedication of a neokorate temple and inscribed with information about the donors of the statues (often, at least in the Hellenistic East, civic or provincial bodies recognizing the granting of a temple to a neighboring body) have been discovered in several cities in Asia Minor. Unfortunately, in many cases the inscriptions are no longer in situ and therefore cannot indicate the location or secure the identification of the temple.

Numismatic finds are helpful in filling the gaps in our evidence, often indicating which temples were constructed and, in some cases, providing details of their appearance. Again, the evidence is particularly rich in the East. Because the granting of a neokorate temple was a high honor for a city or province, it was common for coinage to be

issued featuring the new title of the city (*neokoros*) and, often, an image of the temple itself. In some cases, however, minting of coins may have preceded the actual construction of a temple by a considerable amount of time, meaning that the appearance of temples depicted on coins may be either standardized or based on other existing temples in the area. As with epigraphical evidence, it also seems to be the case that coins were issued for neokorate temples that were never constructed.

The imperial cult was not confined to the precincts of temples. Often, areas for imperial cult ceremonial were installed in civic structures such as (in the East) council houses. Other sites for imperial cult worship included gymnasia, stadia, theaters, and baths. In the East, some cult-related athletic competitions may have taken place in gymnasia, following the Hellenistic model in which competitions in honor of kings were conducted there. The cult was similarly associated with stadia, which served as sites for athletic and musical competitions and animal fights staged as part of cult festivities. However, it is difficult – in many cases impossible – to separate archeological evidence for imperial cult-related events that occurred in gymnasia and stadia from evidence for activities staged as part of other festivals. Literary evidence for sacrifices to the imperial family in theaters and for the placement of their images there is corroborated by the discovery of imperial statues in a theater on Thera and of a decorative frieze with sacrificial and imperial imagery at Hierapolis in Asia Minor. Porticoes were also sites of significance for the cult; some porticoes were purpose-built for the imperial cult, sometimes adjoining a *Sebasteion*. Although this was most common in the Greek East, it is also seen in Italy and North Africa.

In Asia Minor, there is evidence that some type of imperial cult-related activity was carried out in dedicated areas in bath complexes. Dubbed *kaisersäle* ("imperial halls") by archeologists, these spaces range from small rooms to large, richly decorated halls. Particularly fine examples have been excavated at Ephesus and Sardis (Fig. 2). Their identification as *kaisersäle* has been deduced primarily from the presence of inscriptions referring to the *Sebastoi*, and several have niches that probably held images of the imperial family. At least ten of these rooms have been identified so far, one (at Ephesus) with an intact altar, but none with which a surviving imperial statue can be firmly associated. Their function remains a matter of debate.

Cult Images. Imperial cult images took several forms and were displayed in a variety of ways. Some temples arrayed a range of figures along the walls to which additions could be made as necessary, with the scope of representation in some cases even including members of several dynasties. Other shrines exhibited a limited number of colossal figures. Archeological evidence for cult images includes actual statues and fragments thereof, as well as inscribed bases and numismatic representations.

As in the cults of the traditional gods, images of the emperor and the imperial family served as loci for their veneration. Cult images could portray the emperor in a variety of forms, following the standards of Roman portraiture. The objects of cult could be shown cuirassed, nude, or in civilian clothing (that is, the Roman toga or, more rarely and only in the East, in Greek dress). In some cases, the emperor was depicted with covered head (*capite velato*), offering sacrifice as a priest in his own cult; a few imperial temples in Asia Minor had cult statues of this type. Though it is sculptures that have survived in the archeological record, we know from textual sources that paintings of the imperial family also served as cult images, especially in instances when the imperial image needed to be carried to a location for veneration. Cult images ranged in size from busts to colossal statues measuring 7–8 m in height (Fig. 3). In addition to examples located inside temples, imperial cult images were displayed in public areas and carried in procession on important occasions and during imperial cult festivals.

Key Issues/Current Debates

Much modern scholarship on the imperial cult, especially prior to the last decades of the twentieth century, focused on the question of whether the

Imperial Cult, Roman, Fig. 2 View of the central section of the so-called *kaisersaal* in the baths at Sardis in Asia Minor, with a niche for an imperial statue?. (Photo © Candace Weddle Livingston)

imperial cult should be considered *religio*, and cult actions therefore understood as expressions of authentic religious belief, or whether it was a purely political construct in which ritual actions expressed only fealty. The apparent need to understand the two as mutually exclusive arises from Christianizing notions of religious faith as something separate from earthly concerns and, especially, from political thought. An important by-product of this earlier scholarship was the erroneous notion that the imperial cult, with its apparently "faithless" political nature, was a symptom of the decline of classical Greco-Roman religion leading to the eventual "triumph" of Christianity (see esp. *contra* Price 1984a). More recently, scholars have preferred to view the development of the cult as one element of a general restructuring of the Roman religious system at the time of the early principate (Beard et al. 1998).

Another debate involves the nature of the Roman emperor's divinity: was he considered a

Imperial Cult, Roman, Fig. 3 Head and arm of a colossal imperial cult statue of Domitian or Titus, from the Flavian temple at Ephesus (first CE, now in the Ephesus Archaeological Museum, Selçuk). (Photo © Candace Weddle Livingston)

god while living or only after his death? Questions of individual belief are notoriously tricky and ultimately unresolvable, but it is possible to interrogate to some degree the concept of the deification of the emperor as expressed in official language (see esp. Price 1984b) and illustrated in details of cult ceremonial. In brief, the dual nature of the types of sacrificial rites practiced in the cult (that is, the fact that they were offered both directly *to* and *on behalf of* the emperor) suggests that the living emperor occupied a role between that of men and that of the gods. Recent studies of the development of imperial images within the context of the cult, beginning with Divus Julius, have helped illuminate the process by which the Romans came to terms with this new concept of the role of the emperor and developed a standard visual vocabulary for his portrayal in public and private art (Pollini 2012; Koortbojian 2013).

A final pressing issue related to the archeological evidence for the imperial cult is the fact that many of the immovable surviving remains of imperial cult structures are located in the eastern provinces of the empire, including the former province of Syria (on which, see esp. Segal 2013), where archeological sites and cultural heritage are under imminent threat at the hands of the Islamic State (Daesh or ISIS) and other militant groups, raising preservation issues of grave concern for the international community.

Future Directions

Although many details of the imperial cult remain unclear, archeological and literary evidence indicate that it was an important part of the fabric of political and social life in the imperial period. Excavation and publication of numerous related sites throughout the empire continue, as does new study of literary and epigraphical evidence for the cult. In addition to shedding light on ritual practice and its relationship to imperial power, future study of the cult may help clarify aspects of the process of power negotiations between Rome and her provinces.

Cross-References

► Architecture, Roman
► Baths and Bathing, Greek

▶ Baths and Bathing, Roman
▶ Cross-Cultural Interaction in the Greek world: Culture Contact Issues and Theories
▶ Eastern Provinces of the Roman Empire, Archaeology of the
▶ Greek Houses, Archaeology of
▶ Hellenistic and Roman Anatolia, Archaeology of
▶ Iconography in the Roman World
▶ North Africa, Roman
▶ Numismatics, Roman Imperial
▶ Religion, Greek, Archaeology of
▶ Romanization
▶ Topography of Rome
▶ Western Roman Provinces, Archaeology of the

References

Beard, M., J.A. North, and S.R.F. Price. 1998. *Religions of Rome*. Vol. 2. Cambridge: Cambridge University Press.
Burrell, B. 2004. *Neokoroi: Greek cities and Roman emperors*. Leiden: Brill.
Fishwick, D. 1987–2005. *The imperial cult in the Latin West: Studies in the ruler cult of the western provinces of the Roman empire.* 4 vols. Leiden: Brill.
Friesen, S.J. 2001. *Imperial cults and the apocalypse of John: Reading revelation in the ruins*. Oxford: Oxford University Press.
Jones, M., and S. Mcfadden, eds. 2015. *Art of empire: The Roman frescoes and imperial cult chamber in Luxor temple*. New Haven: Yale University Press.
Koortbojian, M. 2013. *The divinization of Caesar and Augustus: Precedents, consequences, implications*. New York: Cambridge University Press.
Pollini, J. 2012. *From republic to empire: Rhetoric, religion, and power in the visual culture of ancient Rome*. Norman: University of Oklahoma Press.
Price, S.R.F. 1984a. *Rituals and power: The Roman imperial cult in Asia Minor*. Cambridge: Cambridge University Press.
Price, S.R.F. 1984b. Gods and emperors: The Greek language of the Roman imperial cult. *The Journal of Hellenic Studies* 104: 79–95.
Segal, A. 2013. *Temples and sanctuaries in the Roman East: Religious architecture in Syria, Iudaea/Palaestina and Provincia Arabia*. Oxford: Oxbow Books.
Taylor, L.R. 1975. *The divinity of the Roman emperor*. Philadelphia: Porcupine Press.

Further Readings

Bickerman, E.J., and W. den Boer, eds. 1973. *Le Culte des souverains dans l'Empire Romain: sept exposés suivis de discussions*. Geneva: Fondation Hardt.
Cannadine, D., and S.R.F. Price. 1987. *Rituals of royalty: Power and ceremonial in traditional societies*. Cambridge: Cambridge University Press.
Clauss, M. 2001. *Kaiser und Gott: Herrscherkult im römischen Reich*. Munich: K.G. Saur.
Friesen, S.F. 1993. *Twice Neokoros: Ephesus, Asia, and the cult of the Flavian imperial family*. Leiden: Brill.
Friesen, S.F. 1995. The cult of the Roman emperors in ephesos: Temple wardens, city titles, and the interpretation of the revelation of John. In *Ephesos: Metropolis of Asia*, ed. H. Koester, 229–250. Cambridge, MA: Harvard University Press.
Gradel, I. 2002. *Emperor worship and Roman religion*. Oxford: Clarendon Press.
Price, S.R.F. 1980. Between man and god. Sacrifice in the Roman imperial cult. *The Journal of Roman Studies* 70: 28–43.
Price, S.R.F. 1999. Imperial cult. In *Late antiquity: A guide to the postclassical world*, ed. G.W. Bowersock, P. Brown, and O. Grabar, 510–511. Cambridge, MA: Belknap Press of Harvard University Press.
Small, A., ed. 1996. *Subject and ruler: The cult of the ruling power in classical antiquity*. Ann Arbor: Journal of Roman Archaeology.
Scott, K. 1975. *The imperial cult under the Flavians*. New York: Arno.
Weinstock, S. 1971. *Divus Julius*. Oxford: Clarendon Press.

Imperial Iconography of Byzantium

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Introduction

The iconography of the *basileus* enumerates the formal solutions used to describe the portraits of Eastern Roman emperors; the phenomenon is present during the entire "Byzantine Millennium" (Beck 1981). However, the title "*basileus*" can be used just after Heraclius's kingdom (610–641) when it replaces the title of *Augustus*; until that date the definition "imperial iconography" is in use.

Definition

In the Late Antiquity, the image of the emperor and its criteria of representation were revised. The

change took place at a time of transition when the Roman monarchy used pagan motifs, which assumed various and unpredicted meanings, together with Christian motifs. In this way the official *bildprogramm* that introduces formal traditions of the "plebeian language" into the imperial art is redefined (Bianchi Bandinelli 1967, 7–19). These images represent the result of the search for a formal legitimization of the absolute power of the emperors and they are produced to gain public consent: they are elaborated to transmit specific feelings and to strengthen a sense of safety in the community at a time of general instability. In the Late Antiquity, the imperial iconography affects the emotional side of the public and addresses the change of power's perception in the collective subconscious.

Power is represented as a supernatural concession and the person who detains it has to be consequently represented as a supernatural being; this is how the figure of the divine monarch emerges. The imperial iconography has the responsibility to manage this sacred trait and the irrational feelings brought by the mystery of royalty. Under the influence of Neoplatonic criteria, the numeric criteria of proportions are not enough anymore in order to describe the ideal of beauty nor to regulate appearance, shape and balance of the human body (Plotinus, *Enneadi* 1. 6. 8–9). Art has to tackle root causes and erase any carnal element. Iconography overcomes the classical point of view, despite being in continuity with the tradition, through a set of descriptive formulas and rules able to interpret the formal legacy of the classic period. In order to do so, the iconography reinvents the imperial *silhouette* and reinterprets the classical prototypes into drawings not respecting their original proportions. For example, as a result of the transcendent conception of power, the figure of the sovereign is depicted larger than the others. Dimensional gigantism is combined with the alteration of proportions and the anatomical simplification in which the head is usually emphasized. The frontal prospective refers to a symbolic language to communicate the superior *status* of the person represented. The most common form of representation presents a face characterized by very big eyes and a hieratic expression, an elaborated hairstyle and a peaceful attitude, which the body presents the *imperialia insignia*. Through iconography the sovereign and his people visually meet each other, the cult of imperial images and especially of the sovereign's portraits expresses how meaningfully the remoteness of the emperor was perceived.

At some point the imperial iconography creates an image that is compatible with the Christian theory by using the format of the Late Antiquity. Starting from the early Byzantium, the proportion of the articulations is revised by making them longer and that's how the figure of the Adamic man emerges: his face is a long oval and his very small ears want to give the idea of a sovereign whose attention is totally focused on the inner world. Almost represented as a saint, despite wearing a beard, he looks "androgynous" and "ephebic" (Zibawi 1993, 65); the iconography shows that the emperor is the first to be subjected to God's salvation. The person is depicted as a highly spiritual being by representing the *vir spiritualis*. The iconography provides a formal representation of the Christian vision of a transcendent sovereign. As summarized by the deacon Agapitus (*Expositio capitum admonitoriorum*, PG 86 1. 21. c. 1172), "concerning the physical body the emperor looks as any other man, in terms of power of dignity he is the closest to God." The official images have the goal to extend the "mystic materialism" to the art (Gass 1849, 49).

The representation interprets the features of the person portrayed, but it also keeps a relation of similarity so that it's possible to recognize the subject. The connection with the prototype opens the doors to "dissimilar similarities" that place the representation into a surreal dimension (Michelis 1955, 73). Resemblance and the relation of the representation with the person portrayed explain why people would 'fight' against these works of art as if they were human. People would in fact destroy or celebrate imperial portraits. The damnation prescribes the elimination of all images and name of the sovereign from public monuments but not from coins. We can then understand why Andronicus I, in order to gain the favor of the public, asked to be represented as a farmer with a sickle in his hands

and, for the same reason, had the Empress Xenia not depicted in all her beauty.

The application of codified rules to the imperial representation leads to a *ius immaginum*. For instance, the effigy displayed in a forum or other suitable place had not to be close to inappropriate images such as those of actors or dancers (*C. J.*, 1. 29. 5). Effigies could also benefit of the right of asylum gained *per amplexum*, for a good cause (*C. J.*, 1. 24. 1–4; 1. 25. 1a, 386).

The Historical Background

The systematic study of the iconography of *basileus* started in the first half of the twentieth century when Grabar edited a volume that summarized the topic and adapted the so-called "imperial mysticism" to the Eastern Roman Empire'art (Grabar 1936). This area of study established itself through Byzantine studies and it continued with Gerke, L'Orange, Dvornik, and Underwood. Those researchers organized an important convention on the topic at the Dumbarton Oaks in the 1950s.

The iconography of *basileus* expresses by images the thoughts of political scientists on the "sacred" royalty; Carile wrote about a *basileus* initiated to the "mystery of royalty" in 2002 (Carile 2002, 53–95). The topic was then summarized in 2007 by Winter with the expression "touched by God" (Winter 2007).

The iconography of *basileus* outlines a path that necessarily goes through the *habitus* and the *Herrschaftssymbolik* (signs of power). Those elements have been first recorded by Galavaris in 1958 (Galavaris 1958, 99–117) and Pertusi in 1976 (Pertusi 1976, 481–568). Regarding the *Herrschaftssymbolik* of the Late Antiquity, we can point out the recent book conceived and developed by Panella; this publication includes a contribution by Ricci dedicated to the scepter (Ricci 2011, 191–198). In an essay of 2003, Parani has philologically reconstructed the form of insignias (Parani 2003); we can also find essays that analyze specific insignias. In 1935–1936, Condurachi has studied the meaning of *loros* (Condurachi 1935–1936, 35–37). The *orbs* have been the object of Schramm's studies in 1958 (Schramm 1958, 135–156). Crowns have also fascinated many researchers; there was an exhibition dedicated to them and a publication with the minutes of a convention on the topic with contributions by Carile, Piras, Gariboldi and Ghini (AA VV. 2000). Its updated version, the *Kamelaukion*, has attracted the interest of Piltz in 1977 (Piltz 1977). Dagron reconstructs the development of the map in the *akakia* in 2007 (Dagron 2007, 203–220).

The Key Issues/Current Dabates

The doctrinal debate focuses on the interpretation of the imperial figure and on the analysis of the *silhouette* as an ensemble of patterns that are mechanically repeated by setting up, almost unconsciously, a set of rules. This allows us to detect the frequency in the use of certain models as a result of the negotiation between the "producers" and the public as a "consumer." The repetition of the same patterns seems to validate the stereotype of a static Byzantine art, as static as the eastern Roman society pretends to be. In fact the immobility of the Byzantine society is just a myth as proven by an analysis of the outfit of the subjects represented. Clothes follow the fashion of the time and allow us to determine a quite precise chronology of the documents.

The International Prospectives

The iconographic production provides us with a large amount of data; by looking at those data, we can come to the conclusion that when it comes to official images, the iconographic representation usually depicts just one or two essential characters isolated from the overall context; solutions that show the expression of power through *locus* of *majestas* is also preferred. The enthronization of the sovereign is a 'classic' image where the main character is located at the center of the world

(De Champeaux 1981, 394). According to the modality of representation, we can find more emperors sitting side by side to symbolize cooptation or succession.

The iconography produced by the Tetrarchy is centered around the two *Augusti* and the double throne that modifies the function of the consular formula, while the *Dominato* develops the *locus* of the enthronization from the representation of the magistrate that presides the urban games over the *sella curulis*. On the "a gold," coin issued by the Constantinople Mint, a hieratic Constantine the Great is depicted seated on a throne between his sons as *majestas domini*. It is a frontal portrait of the emperor; he holds the scepter with the right arm as a reference to *Jupiter Conservator*. Constantine is not depicted as a naked god, but he wears the civil *habitus* of emperor. The imperial holiness is expressed by the light that surrounds the figure of the emperor. A modality that indicates the divine *sother* and that we can also find in Giovianus iconography.

The *locus* of the enthronization loses its strength and it is not frequently used in Byzantium in the fifth to sixth century. Despite that we can mention the gold coin of Valentinian I and Valens of the Mint of Constantinople at Dumbarton Oaks, both depicted on the double throne wearing consular clothes, we can also admire the representations of Theodosius and Valentinian II of the Mint of Milan seated on a double throne wearing chlamys.

During the Early Byzantium, the proxemics of the enthronization as seen in the *Jovius type* is also used with Justinian I in a *follis* of the Mint of Antiochia: it is a solemn and frontal perspective; the emperor wears *vestis civilis* and holds the orb and the long scepter.

He is also represented in another coin issued by the Mint of Constantinople with Justin I; they both sit in *majestas* on a double throne with the orb.

Justin II is depicted in follies with his wife Sophia since they didn't have any heir. Maurice is also represented with his wife Constantina.

At a certain point, the secular image of the *majestas* on the throne is transferred to the Christian imaginary, since then the *basileus* is always represented standing.

During the Middle Byzantium, the Macedonian dynasty restores the previous model. Basil I gains the throne after the killing of the predecessor Michael III and he chooses to be represented on the throne. His son, Leo VI, will also decide to be represented on a double throne with his heir.

The *topos* of the enthronization survives in the miniaturistic style of the Middle and Late Byzantium. At the end of the Middle Byzantium, Nikephoros Botaneiates asked to be represented in the miniature at the f. 79 of the Code Coislin seated on a throne with the shape of a lyre among eunuch and bearded dignitaries (Fig. 1).

During the Late Byzantium the visual document at the f. 5 of the Ms. Gr. 1242 represents the co-emperor John VI Kantakouzenos presiding a council among bishops and other dignitaries. In these cases, the iconographic choice shows the versatility of the initial *locus* and the possibility to add ancillary elements (Fig. 2).

The iconography of the Byzantine *majestas* also includes the half body representation of the emperor full face. He is depicted standing tall; his figure is still. This *locus* becomes a classic with the only variants of a slight tree quarter, which we can find on seals of Palaiologos' era at the Vatican and a full three quarter in the *Deesis*'s scenes.

The standing figure of the emperor was already present among the sculptures of the Late Antiquity and it can include the garment of *paliatus* as in the statue of the Emperor Julian at the Louvre or as in the Valentinian II of Aphrodisia in *vestis triumphalis*.

The Diptych of Anicius Petronius Probus dated 406 AD instead shows us the image of the Emperor Honorius wearing military clothes.

The image of the standing emperor establish itself as an autonomous pattern just in the Middle Byzantium and the visual documents, especially in numismatic, show two main descriptive typologies: the monarch wearing a chlamys or a *loros*.

The iconography cannot be diminished as motionless and homogenous since the tradition of the representation of the *basileus* is not homogenous. The iconography of Late Antiquity taps

Imperial Iconography of Byzantium,
Fig. 1 Nikephoros Botaneiates enthroned, miniature of the Code of Homilies of John Chrysostom, Manuscript Coislin, f. 79, *Bibliothèque nationale de France*, Paris, (https://it.wikipedia.org/wiki/Niceforo_III_Botaniate#/media/File:Jean_Chrysostome_Hom%C3%A9lies_btv1b8470047d.jpg)

into the Hellenistic shapes and in the so-called sub-ancient, present in provincial styles, which adds a popular expressivity at the expense of naturalism. Motifs such as large eyes in ecstasy, volitive expressions of the face and eloquent gestures all depicted with vibrant colors. The formal modules are blended with the elegance so appreciated by the refined court; the latter was very useful to optimize the esthetic result of the imperial figure.

These motifs became a cachet of the iconographic repertoire and were passed to the Early Byzantium, when they had been renewed by the repetition of a series of stylistic features that suggest an "eternal Hellenism" (Kitzinger 1967, 357–388): a Hellenism that leads to a series of so-called renascences.

From the end of the Early Byzantium until the "renascence" of the Palaiologos, the iconography of the *basileus* employs stylistic features that recall a medieval Hellenism reduced to part of the body engaged in movements that often appear mechanical. Standardized poses are chosen for artistic reasons and make the narrative of the representation more powerful.

In order to give a more accurate timeframe to these representations, it is necessary to analyze the evolution of all the things worn by the *basileus* and his insignias.

The iconography of the Early Byzantium doesn't follow the classical ideas of simplicity when it comes to clothes; in fact, it favors complexity and ostentation. So we can find three types of garments: military uniform, triumphal outfit and civil costume.

Military uniforms are an essential part of the representation of a monarch that faces the army, as recalls Theophylact of Ohrid (*Opera*, vv 21–23; Gautier 1980). Looking at his image, it can be noted how his military costume looks more like a parade costume, not very functional for a battle; nevertheless by wearing it, the emperor can be easily identified as victorious while leading his army.

Imperial Iconography of Byzantium, Fig. 2 John VI Kantakouzenos presides over a council of bishops and other dignitaries, miniature, Ms. Gr. 1242, f. 5, *Bibliothèque nationale de France*, Paris, (https://upload.wikimedia.org/wikipedia/commons/2/22/John_VI_Kantakouzenos.jpg)

The military garments of the Late Antiquity include an armor, a *paludamentum*, a not very long purple cape and shoes, such as *coturni* decorated with lion cubs' skin. The effigies also include a diadem called *toupha* or *pilleus pannonicus* (cylindrical headpiece) as in the Tetrarchs' representation of Venice. The helm appears in the Constantinian numismatic. Under the influence of Ambrose (*De obitu Theodosii*, 40–48), the helm is often used by Justinian and Maurice.

The Barberini ivory can be considered a paradigmatic representation of the military clothing in the Late Antiquity and Early Byzantium. It represents the Emperor Anastasius holding a diadem; he wears a tunic under his armor and a cape (*paludamentum*) fastened on one shoulder; the tight armor has thin *segmenta* (strips of leather) and shows the shape of the muscles beneath it; and his boots are decorated with ornamental lion's heads (Fig. 3).

Military clothing changes in the Middle Byzantium. The new style can be seen in a miniature of the *menologium* of Basil II, BNM, Ms. Gr. 17 at f. 3r (Fig. 4). The tunic is dark purple, it has long sleeves down to the knees and it is decorated by *armillae* and a golden *lacinia*. The armor is made of golden scales and covers half of the quadriceps; the parade shafts are embellished with pearls. The large purple cape is tight on the chest. The miniature of the *Skylitzes Matritensis* that depicts Theophil presents a similar armor, so we can deduce that military clothing didn't change much until the beginning of the Last Byzantium.

The imperial outfit of Late Antiquity includes the use of a triumphal robe that follow the *formula consulatus*, which is decorated with precious details such as pearls and jewels on the *trabea* and purple sandals, while the ordinary consul wears white leather *calcei*. Synesius said that the sovereign wears a triumphal outfit (*De regno*

Imperial Iconography of Byzantium,
Fig. 3 Barberini ivory, anonym emperor often identified with Anastasius (https://it.wikipedia.org/wiki/Avorio_Barberini#/media/File:Diptych_Barberini_Louvre_OA9063_whole.jpg)

c. 16) every time he goes to the senate and his clothing is so distinctive that becomes *locus*. According to Dionysius of Halicarnassus (*Antiquitates romanae* 3. c. 61. 1), the toga decorated with palm trees (*vestis palmate*) is similar to the "χιτώνα τε πορφυρούν χρυσόσημον" of the early Roman kings; this robe is called *toga picta* by Ausonius (*Liber proptrepticus ad nepotem* 13. 90) because of its purple color.

The *trabea* of Late Antiquity is a circular cloth that it is wrapped around the body several times to reshape the shoulders and its components are the *balteus*, the *remeatio* (at the back) and the *tabula* (from the shoulder to the chest); there is also a train that goes on the arm: the *falda*. The material is usually embellished by a motif of small roses in geometrical shapes; this motif is called *segmenta*. The ornaments can also present anthropomorphic and aniconic motifs as the busts inscribed on the *trabea* of the emperor-consul Constantius II, which appears at the f. 20 in the calendar of Philocalus.

A purple surcoat is added to the ensemble of the Late Antiquity: the *colubium*, this garment is enriched by gold braids around the neck and along the bottom edge together with rich trimmings. Surcoats don't have sleeves in Eastern countries, while they have very short sleeves in Rome. According to Lydus (*De Magistratibus* 2. c. 2), a triumphant Justinian wears a purple tunic, a gold woven *colubium* and a *loros*. The choice of a different name for piece of clothing such as the *trabea* is an evidence of the intention to create the *loros* costume as a distinct outfit, which matures in Early Byzantium. When the consular office was suspended by Justinian, the *vestis triumphalis* didn't disappear but gradually was not part anymore of the triumphal rite. Those garments found a new context and meaning in the Christian environment and became the Eastern *habitus* of *basileus*.

During the Late Antiquity, the emperor also wears "civil clothes" when representing the maximum authority in the administration of the state.

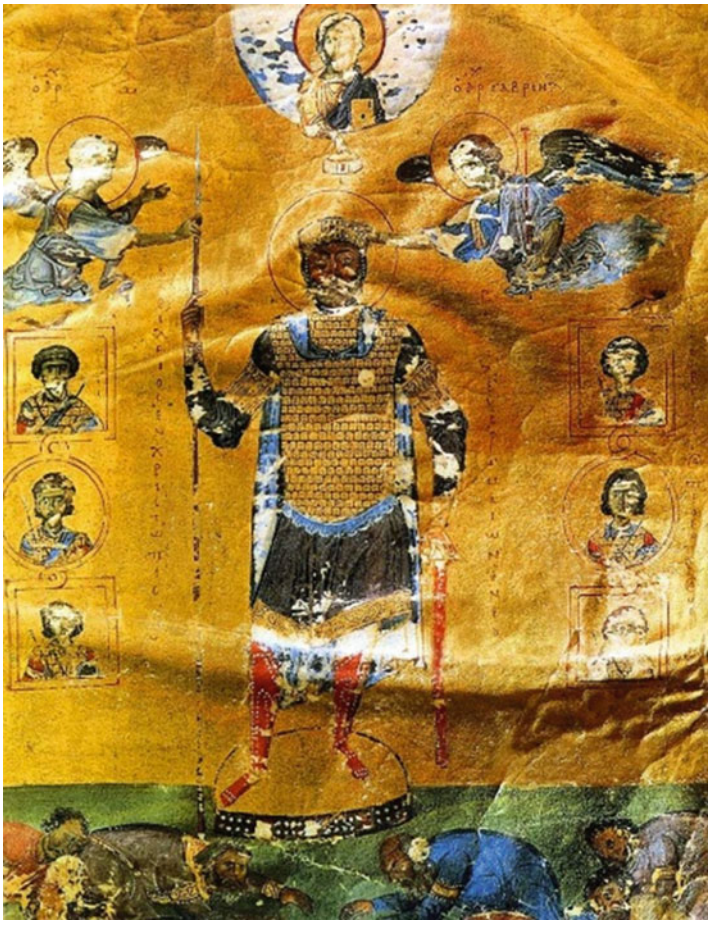

Imperial Iconography of Byzantium, Fig. 4 Triumphant Basil II, Psalter of Basil II, BNM, Ms. Gr. 17, f. 3r (https://commons.wikimedia.org/wiki/File:BasilII.jpg)

As a public official, he wears a short white tunic made of silk decorated by gold *segmenta* (*clavi*). Lydus (*De magistratibus* 1. c. 17) provides us with a detailed description of the outfit: a purple chlamys embellished by a *segmentum* or *tablion* (*De magistratibus* 2. c. 13), a fibula (mentioned by John Chrysostom in *epistula II ad Thessalonicensis* c. 2), among other *imperialia insignia* and the sovereign holds the chlamys on the right shoulder. This garment is a *status symbol* of Early Byzantium too, with its purple *campagi* adorned with precious stones and the *stemma* (a crown). The red leather belt, called *cingulus* or ζώυη, together with the golden brooch, is also a symbol of the status of *illustres*. This outfit is known as chlamys costume.

The *basileus*' iconography of the Middle Byzantine period shows a very large imperial wardrobe (Constantinus Porphyrogenitus, *Liber de caerimoniis* 1. 46. 37). Among those garments, there is the *skaramagion*, a long and tight tunic with a narrow waistline. This tunic in purple and the *loros* are usually worn at Easter; it is a classic *locus* to see them worn by the *basileus* when he indicates the *Typus Christi*.

By looking at the *Constitutum Constantini* and considering the wrong reference to the *frigium*, we can deduce that the *loros* represents the funeral bandages illuminated by the light of the Risen Christ and Sun of Justice (*Constitutum Constantini* 257). The *loros* also assumes a "Y" shape and from being a large circular cloth, it is turned into a scarf worn around the body. The folds crossing the chest remind of the *remeatio* and the *balteus* of the *trabea* and the drap on the left arm looks like a *falda*.

Toward the end of the Middle Byzantine period, the *loros* is transformed into a long

scapular and it is combined with a *maniakis* (collar). The edge of the back side of the scapular is worn around the waist and on the left forearm; it replaces the *falda*. We can admire this style in the representation of John II Komnenos in the mosaics of S. Sophia's gallery (Fig. 5) and in a miniature at the f. 2 of the Cod. Vat. Gr 1176.

The iconography of the *basileus* also presents the *divitision* over the *skaramagion*; this robe recalls the Western Dalmatian garments. This combination together with the chlamys are the outfit worn at the most important parties and it is called the chlamys costume.

A rare element in the wardrobe of the *basileus* is the *thôrakion*, a sort of armor that in the tenth century was basically a corselet made of material cut in an oval shape and decorated with a golden thread, more common among the *basilissa* rather than among *basileus*. Another garment that seldom makes its appearance is the *kolobion*; in fact, the only thing that differentiates it from the *skaramagion* is the *clavi* at shoulder height. This element is present until the last period of the Byzantine Empire and it is somehow similar to the monastic *habitus*, the dark *sakkos* (ῥῦοχον κόκκινον) that we can find in the *basileus*' iconography of the same period.

Imperial Iconography of Byzantium, Fig. 5 John II Komnenos, mosaic, Gallery of Santa Sophia, Istanbul, (https://it.wikipedia.org/wiki/Giovanni_II_Comneno#/media/File:Jean_II_Comnene.jpg)

The chlamys costume goes out of fashion under Manuel I Komnenos and it is replaced by the *loros* costume. The last iconographic representation of the chlamys is in a manuscript of the Vatican (Gr 6c6 at f 2r of the 1109–1111), where Alexander I Komnenos is still wearing it. Iconographic documents with chlamys costume produced after this date replicate a model that is out of fashion, but they mirror what is still a common social expectation. Several visual documents attest the interchangeable use of *loros* costume and chlamys costume, despite the strict rules of the protocol. The combination of the two in the iconography is probably due to an iconographical license due to the transitional period. We find examples of this transition in numismatic representations and in the tonds at the Dumbaton Oaks and Calle Angaran in Venice.

According to Parani the recapitulation of Constantinople in 1204 leads to the decline of the chlamys costume since it represents an emperor administrating a system that is collapsing.

The *basileus*' iconography switches to a more efficient formula by depicting a victorious emperor, protector of its people and peacemaker, a *Typus Chisti* explained by the *loros* costume (Parani 2003, 15–16).

In the last period of the Byzantine Empire, the *loros* evolves and it is called *diadema*. The new version is a belt with a wide drapery that is worn on the left forearm as a reminder of the *falda.*

The chlamys is now a piece of garment used by members of the court who have lower positions, *despotes* and *sebastokrator*, as attested in the miniature at the f. 2 of the Code Ivories a53 (Fig. 6). The chlamys was also called *porphyras* during Palaiologos' time.

With the redefinition of the insignias of power between the Medium Byzantine period and the beginning of the Last Byzantine period, the name purple *pedilia* is changed into *tzangia*. The iconographic documents of Palaiologos' time show shoes embellished with pearls and cross-shaped jewels; from literary sources, we also came to know of golden embroidered eagles and pearls even on socks.

Imperial Iconography of Byzantium,
Fig. 6 Manuel II Palaiologos and his family, 15th sec., miniature of the Code Ivoires a 53, (o 100) f. 2, Louvre, Paris (https://it.wikipedia.org/wiki/Manuele_II_Paleologo#/media/File:Manuel_IIHelena_sons.JPG)

The most important element in the representations is the crown. Constantine, as *ierofantes*, introduces the *teniè*-diadem, a sign of sacrality similar to the sacerdotal *infula*. The corona triumphalis is so replaced as a symbol of the *status* of "universal bishop" (Eusebius Caesariensis, *Vita Constantini* 4. 24). In the Late Antiquity, there are two variations of this kind of *insignia*: one with a hinge closure worn on the head by Magnentius in the Vienne lapidary and by the sculpture of Valentinian II of Budapest. The other one has a seam at the back of the head and is embellished with pendants that rarely appear on sculptures.

During Early Byzantium with Justinian I and probably even with Anastasius I, we have a crown in the shape of a rigid ring decorated with jewels, *prependulia* (short pearl pendants on the sides) differentiate it from the Greek *stephanos*.

A variation of the *insignia* presents peacock's feathers; this ornament is called *toupha* and is worn by triumphant emperors. Procopius of Caesarea (*De aedificiis* 1. 2. 10–12) described this as a detail of the statue of Justinian I at the *Augusteon* and it is also present in a drawing at the f. 144v of the Cod. Ital. III of Budapest dated 1340.

Starting from Heraclius, the crown is made of several plates hold together by seams; the model is probably inspired by the *insignia* of the Sasanid and Kushan kings.

During the Middle Byzantium, the *insignia*, worn by Constantine IX in the mosaic of S. Sophia's gallery, reminds the crosses that decorate the crowns of the *pentapirgion*; it presents a golden ring embellished with pearls and jewels. In the

middle of which stands a larger gem encircled by pearls and surmounted by a cross, *prependulia* (called *ormathoi* at that time) decorate the sides (Fig. 7).

At the end of Middle Byzantium, under Alexius Komnenos the crown is called *kamelaukion* and assumes a spherical shape. Such a change took time to become popular and in the iconography of the *basileus* intended for a wide circulation, appears only on the Palaiologos' numismatics.

The iconography of the *basileus* includes the use of the orb as a symbol of sovereignty over all things and distinctiveness of the "human kingdom." This *insignia* has not been recorded by John Crysostom (*De Perfecta Charitate* 6 PG 56. 287 a) among the insignias of power of Late Antiquity, and this leads to question its use. On the other hand, this symbol is valued in numismatic. The cross on the orb becomes a sign of power that gives strength. The word "PAX" is written on a coin of Justinian II and reminds to a *pacificator orbis* emperor.

Imperial Iconography of Byzantium, Fig. 7 Constantine IX Monomachos, mosaic, Gallery of Santa Sophia, Istanbul, (https://it.wikipedia.org/wiki/Costantino_IX_Monomaco#/media/File:Emperor_Constantine_IX.jpg)

During Middle Byzantium a mosaic in S. Sofia depicts Alexander, the son of Basil I, wearing his Easter clothes and showing the orb and the *akakia* as an alternative to the scepter with the cross (Fig. 8).

Akakia (guilelessness) and *anexikakia* (forbearance) (Philoteus, *Kletorologion* 8–9) are an *insignia* that symbolizes the limits of the powers of the sovereign. The *akakia* is represented as a purple cylinder, referred to as a map by the scientific literature; it is hold by the "man of power." In the diptychs it is described as accurately folded. It is possible to see it on the consular ivories at the right side of the magistrate that organizes the games. The *album pannulum* also becomes purple when it is hold by the emperor. There is a clear distinction between the *akakia*, which is a sign of instability of power that is transmitted from one person to the other and the handkerchief. During

Imperial Iconography of Byzantium, Fig. 8 Alexander, mosaic, tenth century, Santa Sophia, Istanbul (https://it.wikipedia.org/wiki/Alessandro_(imperatore)#/media/File:Alexandros_mosaic_Hagia_Sophia_edit.jpg)

the Middle Byzantium, the *akakia* is also described as a golden box that contains soil. We also know of an *insignia* called μαξιλάρια, a pillow filled up with sand or soil. The *akakia* can also be represented as the roll of the law of salvation, law enforced by the Christian emperor: an *insignia* that reinforces the Easter *Christomimesis* (Dagron 2007, 218).

The symbol of the cross as a trophy highlights the religious pietas of the *basileus* in his official image as an "orthodox" sovereign; the cross represents his faith in Christ. The processional cross was introduced by Theodosius II, while Leo I used a golden *stauròs* (cross) at imperial processions. In a solidus (gold coin) issued by the Mint of Constantinople Irene holds a simple cross compared to the one of Justinian II, which holds the Calvary in his hand. Theophil introduces a cross characterized by the so-called "patriarchal" shape; this cross is made of a double crosspiece.

With Constantine IX the cross-shaped *Cymatium* of the scepter is decorated too by a motif that reminds to the cross anchor as attested by a *Histamenon Nomisma* (gold coin of the IX century) issued by the Mint of Constantinople.

A long two spheres scepter is a symbol of the dead sovereigns in the roman imperial iconography; it represents their divine nature. This *insignia* is not reserved to the sacred imaginary. Trajan wanted to be depicted on a coin with the two spheres scepter seated on the *sella curulis*. The *insignia* appears during Late Antiquity on the gold coins of Constantine the Great and on those of his children Constantius II and Constans. The scepter also appears in the Rothschild cameo of the 398 AD and Honorius holds it in the diptych of Probus dated 406 AD.

A modified version of the two spheres scepter is hold by the emperor when wearing military clothes; this is also the characteristic of the *Prince Juventutis* since Domitian.

During the Early Byzantium, this specific scepter is attested in the consular diptych in Museum of Bargello dated 500 AD; in this representation an empress holds it with her left hand; it will later appear in the coins of Justin II and Constantine IV.

Despite the pagan origin, this *insignia* is perceived as Christian; it is in fact often mistaken with Moses' rod. It is considered a religious symbol carried by the emperor in order to represent his function as spiritual guide with *in sacris* powers. It doesn't have to be confused with the *narthex* given to *deputatos* at the end of the Middle Byzantium. Moses' rod is on the other hand symbolized by a stick with plume or tipped with a flower as those represented in the coins of Constantine VII and Constantine IX. Under the rule of the Komnenos, a new variation of the scepter with three globes placed one on top of the other also appears on the coins.

It is also worth mentioning the *labarum*, an *insignia* that according to Eusebius' contested statement was ordered to be made by Christ (*Vita Constantini* 1. 29. 60). In the *labarum*, a long *stulis* (spear) is crossed by a transverse bar; at the top of this bar, there is the *supparum*, a purple veil. The *insignia* that accompanied Constantine after his success in the Late Antiquity disappears and it is then introduced again under the rule of Theophil. This revival under the Macedonian dynasty has been defined as "nostalgia of the symbols of Constantine" (Galavaris 1958, 108).

The Future Developments

The future research will look at the connections between the iconography of the *basileus* and local monarchs of the Byzantine *koiné* area. The latter are in fact inspired and shaped by the criteria of representation of the *basileus*, as a consequence the *silhouette* of the local royalty and its insignias are directly dependent on it.

Cross-References

► Eastern Provinces of the Roman Empire, Archaeology of the

Bibliography

AA VV. 2000. *La corona e i simboli del potere*. Rimini-Siena: Il Cerchio.

Beck, Hans Georg. 1981. *Il Millennio bizantino*. Roma: Salerno Editrice.

I

Bianchi Bandinelli, Ranuccio. 1976. Arte Plebea. *Dialoghi di Archeologia* 1: 7–19.
Carile, Rocco Antonio. 2002. La sacralità rituale dei βασιλεῖσ bizantini. In *Per me reges regnant. La regalità sacra nell'Europa medievale*, ed. Franco Cardini and Maria Saltarelli, 53–95. Rimini-Siena: Il Cerchio.
Condurachi, Emil. 1935–1936. L'origine et l'évolution du loros impérial. *Arta si Archeologia* 11–12: 37–35.
Dagron, Gilbert. 2007. From the mappa to the akakia: Symbolic drift. In *From Rome to constantinople*, ed. Hagit Amirav and Bas Ter Haar Romeny, 203–220. Leuven-Paris-Dudley: Peeters Publishers.
De Champeaux, Gérard. 1981. *I simboli del medioevo*. Milano: Jaka Book.
Enrst, Kitzinger. 1967. On the interpretation of stylistic changes in late antique art. *Brucknell Review* 15 (3): 1–10.
Galavaris, George. 1958. The symbolism of the imperial costume as displayed on byzantine coins. *American Numismatic Society, Museum notes* 8: 99–117.
Gass, Wilhelm. 1849. *Die Mystik des Nikolaus Cabasilas vom Leben in Christo*. Greifswald: C.A. Koch.
Gautier, Paul. 1980. *Theophylacti Achridensis Opera I. Discours, traites, poesies*. Thessalonique: Association de recherches Byzantines.
Grabar, Andre. 1936. *L' empereur dans l'art byzantine*. Paris: Les Belles Lettres.
Michelis, Panagiōtēs Andreou. 1955. *An aesthetic approach to Byzantine Art*. London: Dufour Editions.
Parani, Maria G. 2003. *Reconstructing the reality of images: Byzantine material culture and religious iconography 11Th–15th centuries*. Leiden-Boston: Brill.
Pertusi, Agostino. 1976. Insegne del potere sovrano e delegato a Bisanzio e nei paesi di influenza bizantina. In *Simboli e simbologia nell'alto Medioevo*, 481–568. Spoleto: Centro italiano di studi sull'alto Medioevo.
Piltz, Elisabeth. 1977. *Kamelaukion et mitra. Insignes byzantins impériaux et ecclésiastiques*, Uppsala studies in the history of art, nova series 15. Stoccolma: Almqvist & Wiksell.
Ricci, Marco. 2011. Elementi per la ricostruzione delle insegne. In *I segni del potere: realtà e immaginario della sovranità nella Roma imperiale*, ed. Clementina Panella, 191–198. Bari: Edipuglia.
Schramm, Percy Ernst. 1958. *Sphaira, Globus, Reichsapfel. Wanderung und Wandlung eines Herrschaftszeichens von Caesar bis zu Elizabeth II*. Stuttgart: Oldenbourg Wissenschaftsverlag GmbH.
Winter, Irene J. 2007. Touched by the gods: Visual evidence for the divine status of rulers in the ancient near east. In *Religion and power. Divine kingship in the ancient world and beyond*, ed. Nicole Brisch, 75–103. Chicago: Oriental Institute Press.
Zibawi, Mohammed. 1993. *Icone, senso e storia*. Milano: Jaka Book.

In Situ Preservation of Shipwreck Artifacts

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State of Knowledge and Current Debates

Introduction

One of the consequences of adoption of the 2001 UNESCO Convention on the Protection of Underwater Cultural Heritage is that the convention's strong emphasis on nonintervention on the site of an historic shipwreck can at times lead practitioners and heritage managers down to a very narrow management path (UNESCO 2001). The argument that there is a sufficient body of knowledge on naval architecture as to render detailed site recording obsolete misses the point of maritime archaeology as a discipline. If work on in situ corrosion surveys of shipwreck sites is precluded on the basis that even this form of minimalist intervention is not essential, the loss of data about the present and long-term corrosion of metals on a shipwreck site will condemn management into making misinformed judgements. The arguments put forward in the body of this chapter make a compelling argument as to why the corrosion and concretion matrices on artifacts present a highly valuable data set of unique cultural insight into the fabrication, use, and decay of the variety of elements that make up a shipwreck. Judgements made without full evidence of site formation and disintegration processes are prone to systematic errors which will ultimately hasten the demise of the wreck site and with it much of the loss of cultural information. To disregard this record of deterioration is akin to cultural vandalism.

Analysis of Corrosion Profiles to Provide Site History

All metals used in the construction of ships and their fittings were commonly mined as oxides,

sulfides, chlorides, and carbonates. Metals are formed when chemical reducing agents, such as charcoal or coke, react at high temperatures and transfer electrons into the minerals and so create the parent metals. The inherent reactivity of elements is modified by alloying them with other metals, in the case of formation of bronzes from copper and tin making objects more able to be cast or fashioned into functional objects (Tylecote 1977). Addition of unreactive carbon to iron results in a vast array of functional alloys ranging from wrought iron, cast irons, to structural steels. A variety of heat treatments can alter the microstructure of the iron-carbon alloys which in turn affects not only their hardness and ductility but also the rate at which phases with dissimilar composition corrode. Preferential corrosion reactions are most commonly manifested in the form of graphitization of cast iron, where the outermost parts of the surface have lost all or most of their iron content. It is the preservation of this layer that is vital for conservation of cast iron artifacts since all foundry marks are retained in the degraded matrix. These layers also provide an accumulation index of the corrosive forces on the wreck site (MacLeod 2006).

When metals are fabricated through hammering, drawing, and rolling, the underlying microstructure changes, and if the imparted stresses are not relieved by heat treatment after fabrication, stress corrosion will manifest itself as a series of finely etched lines on copper fastening bolts or as cracks around the heads of drifts and clinch rings. Corroded silver coins can show up corrosion stress patterns imparted by defects in the rolling phases if the coins are circulated in an unannealed state after manufactures (North and MacLeod 1987). However, practitioners have cause to be grateful for the varying degrees of technical skill associated with artifact manufacture since preferential corrosion along stress or compositional gradients produces decay patterns that enable rapid nondestructive analysis of the methods of artifact manufacture. All metals on shipwreck sites have a variety of different phases of varying corrosion resistance which are very sensitive to changes in the amount of water movement across a site which can result in banded layers of corrosion products. The varying depth of archaeological sediment on the wreck of the American China Trader *Rapid* (1811) resulted in preferential corrosion of the copper-rich alpha phase in exposed conditions and corrosion of the ($\alpha + \delta$) eutectoid when the bronzes were corroded in a low-oxygen microenvironment under several centimeters of sediment (Taylor and MacLeod 1985). When metals of significantly dissimilar electrochemical potential (voltage) are contiguous, the more reactive metals, such as iron alloys connected to copper alloys, will be preferentially corroded which often results in the complete mineralization of the iron phases and cathodically protected copper alloys. This form of reaction most commonly occurs with iron clappers in bronze bells and with iron frames connected to bronze rudder fittings in composite shipwrecks – the archaeological advantage of such processes is that the concreted iron fittings can be replicated through creating cast replicas of the interior of the concretion, while the protected components typically need one-tenth the amount of treatment time as identical alloys from other shipwrecks (MacLeod 1987) (Fig. 1).

Proximity corrosion is galvanic coupling through the matrix of artifacts, ballast mounds, and marine concretions found on historic shipwreck sites and on offshore production platforms and can be used to explain apparently anomalous corrosion performance of ordnance (North 1989).

In Situ Preservation of Shipwreck Artifacts, Fig. 1 Bronze dovetail fittings from the wreck of the *Rapid* (1811) showing differences in corrosion mechanism between partially aerobic (*vertical fittings*) and fully aerobic (*horizontal*) burial microenvironments. (Photo: Patrick Baker, Western Australian Museum)

Cannon on the *Rapid* (1811) wreck site at Point Cloates in Western Australia exhibited corrosion rates up to three times higher than that observed on guns in a similar archaeological profile owing to the proximity of thousands of copper nails, drifts, and spikes in the carpenter's store (Carpenter and MacLeod 1993). Galvanic corrosion can be more subtle in its effect for when the relative corrosion rates of the boiler water feeder heater, with its attached copper heating coil, were compared with the engine, which was in a similar burial and current microenvironment, the cast iron water heater was corroding at 0.196 mm. year$-^{1}$ which is double that of the engine whose long-term corrosion rate was 0.094 mm. year$-^{1}$ (MacLeod 1990). Sixteen corrosion layers of the copper (I) sulfide Cu_2S chalcocite found on a brass tallow pot followed the Liesegang pattern of periodic precipitation covering the 112 years of immersion, i.e., an average of a 7-year cycle. The wreck site of the SS *Xantho* (1872) is subject to changes of ±2 m in the sediment depth; thus, the corrosion bands are due to anaerobic corrosion when the engine is periodically buried since the normal cathodic protection provided by the cast iron engine is lost under the impact of the sediment on the Penn horizontal trunk engine (MacLeod et al. 1986) (Fig. 2).

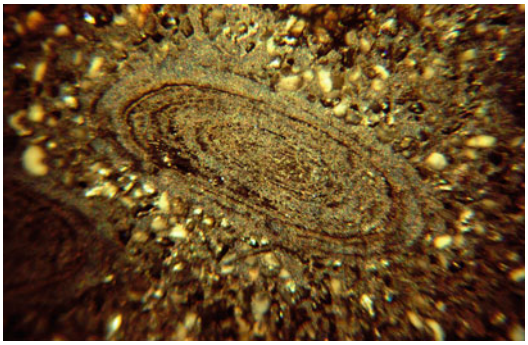

In Situ Preservation of Shipwreck Artifacts, Fig. 2 Corrosion bands on a brass tallow oil pot from the *Xantho* (1872) wreck showing chalcocite (Cu_2S) bands formed when the engine was reburied every 7 years. (Photo: Western Australian Museum)

In Situ Corrosion Measurements and Development of Site-Specific Data

In situ corrosion studies provide data to give an insight into the past and present rates of deterioration of the metallic components. Information pertaining to the corrosion potential (E_{corr}), the pH, and the profile thickness of the combined layers of corrosion and concretion (t_{mm}) provide a remarkable insight into the decay processes. Corrosion of metallic artifacts, including whole iron and steel ships, is dominated by the reaction between the underlying metal and the amount of dissolved oxygen that is passing the concreted metal surface. Marine concretions consisting of an admixture of metal corrosion products and the reaction products of these compounds, with the calcareous substrates deposited by encrusting marine organisms, are electrically conducting. This matrix provides a path for electrons to move from the corroding metal to the dissolved oxygen in the immediate vicinity of the artifact. The voltage of the corrosion cell (E_{corr}) depends on the nature of the underlying metallic object and the flux of dissolved oxygen to the concretion interface. In anaerobic environments the corrosion potential still depends on the oxidation of metal and but it is the reduction of water and not that of dissolved oxygen which is the cathodic process. The voltage is normally measured using a platinum electrode and a reference electrode such as silver/silver chloride (Ag/AgCl) which is separately calibrated to correct for sites which have different temperatures and salinity of the seawater. Details of the methodologies involved in drilling through the concretion and corrosion layer have been previously reported (MacLeod 1989, 2006).

Entrained water reacts with metal corrosion products underneath the protective cover of the concretion to produce a series of mixed chloride and hydroxide species and free hydrogen ions. There is a direct relationship between the underlying metal corrosion rate and the pH of the metal interface which is measured directly after the concretion layer has been drilled through (MacLeod 1995, 2006). Different alloys have their own

characteristic pH values so data from different wreck sites need to be grouped according to the same type of basic composition. After decades of immersion, metals can be considered to be corroding at a quasi-equilibrium rate and that the pH relates to the local corrosion cell, whereas the E_{corr} value can be a reflection of a larger area where structural components are electrically connected to each other with sound metal to metal bonds. A corollary of the common nature of the composition of the concretion layer is that thicker total concretion and corrosion thickness or t_{mm} values reflect underlying differences in the local corrosion rate. Data obtained on the wreck of the USS *Arizona* (1941) in Pearl Harbor (Johnson et al. 2006) and from the shallow water wreck of the breastwork Monitor-style warship HMVS *Cerberus* (1926) in Port Phillip Bay (MacLeod and Steyne 2011) has shown that that thicker concretions correlated well with more anodic (more corrosive) values of E_{corr} and with lower pH or more acidic microenvironments due to increased corrosion rates. Thus, protuberances on the sides of iron ships, irregular lumps on cannon, and other artifacts are due to the effects of localized or pitting corrosion of the underlying metal which act as indicators of where not to attach lifting bags during recovery operations.

Effects of Temperature, Salinity, and Stress on Iron Corrosion Rates

Iron shipwrecks provide a wealth of cast iron fittings from which it is possible to obtain a series of corrosion profiles, after removal of the concretion layer and drilling into the graphitized zone of the artifact and the recording of the corresponding pH and E_{corr} data. Linear regression analyses of the data show that the logarithm of the corrosion rate, measured in mm year^{-1} of immersion, is directly proportional to the E_{corr} values in the form of Eq. 1:

$$log\ d_g = a\ \mathrm{E_{corr.}} - b \qquad (1)$$

where d_g is the corrosion rate of the graphitization depth in mm (hence the subscript g) divided by the time lapse between the date of wrecking and the date of recording the data. The value of b depends on the amount of water movement on the wreck site which is also dependent on the water depth and wave action. The constant a is determined by the concentration of dissolved oxygen, which in turn is dependent on both the temperature and the salinity of the water, as reported by MacLeod in 1995. The value of a is given by relationship shown in Eq. 2:

$$\partial\, log\ d_g / \partial \mathrm{E_{corr.}} = 10.33\ log\ [\mathrm{O_2}] - 4.57 \qquad (2)$$

where the concentration of oxygen is recorded in cm^3 dm^{-3}. This equation enables the impact of any seasonal differences in salinity and temperature to be calculated and incorporated into the interpretation of the in situ corrosion data. The shift in the value of E_{corr} needed for a tenfold increase or decrease in corrosion rate is the reciprocal of a, the value of which ranges from 420 mV at 28 °C to 327 mV at 18 °C. Within the accuracy of ±0.002 V for repeated measurements of the same object over several years, a change of only 3 mV equates to 1.6% for the warmer site and 2.1% for the cooler site.

The Japanese iron shipwrecks in Chuuk Lagoon in the Federated States of Micronesia provide a series of corrosion experiments where the impact of the site deposition processes can be assessed through the way in which the corrosion rates vary according to the wreck orientation. Since most of the wrecks were created during "Operation Hailstone" bombing raids in 1944 (Jeffery 2004), there are major parts of the hull plates that are still electrically connected to each other which makes the interpretation of the E_{corr} values difficult. However, this is not the case with the pH values which showed there were linear correlations between the log of the annualized depth of corrosion, d_g, and the pH of the concreted metal. In the case of cast iron fittings on the torpedoed wreck of the *Fujikawa Maru*, the relationship took the form of Eq. 3:

$$^{Fujikawa\ Maru}\log\ d_g = 0.758 - 0.260\ \mathrm{pH} \qquad (3)$$

I

Thus, analysis of the pH values of the corroding hull plates provides heritage managers and archaeologists with an insight into the materials performance and the consistency of the corrosion microenvironment. Similar correlations between the pH and the depths of graphitization have been found for iron cannon from the Cromwellian shipwreck *Swan* (1653), but in this case, the strong currents associated with the ebb tide in the Sound of Mull and the higher concentration of dissolved oxygen in the colder Scottish waters meant that the corrosion rates were much higher than in the sheltered very warm waters of Chuuk Lagoon (MacLeod 1995).

Effect of Water Depth on Corrosion Rate

Although MacLeod had previously developed equations that indicated that the corrosion rate for historic iron shipwrecks in the open ocean fell off as a quadratic function of increased water depth (MacLeod 1998), the elimination of so many of the site variables in the Chuuk shipwrecks enabled a new understanding to be developed. The Japanese shipwrecks sunk in 1944 all followed the same logarithmic relationship between the corrosion rate and the water depth over the first 20 m, as given by Eq. 4:

$$^{\text{Chuuk } 0-20\text{ m}}\log\, d_g = -0.731 - 0.0181\, d \quad (4)$$

with the corrosion rates (mm/year) determined through the extent of graphitization of cast iron elements on the wrecks and d is the depth (meters) at which the depth of graphitization was measured. The R^2 value for this relationship is 0.9849, which is a remarkably good fit given the very different nature of the sites and the errors associated with determining average long-term corrosion rates. The slope of -0.0181 ± 0.0010 for the logarithmic corrosion plot means that the corrosion rate falls by approximately 4.2% per meter. The intercept, i.e., the corrosion rate at the seawater–air interface, had a value of -0.731 ± 0.012, which equates to an annual corrosion rate of 0.186 ± 0.005 mm/year for wrecks laying half in and half out of the water. The logarithmic drop-off in corrosion rate with increasing water depth makes good sense in terms of the rate at which wave action and thus the flux of dissolved oxygen fall off with increasing water depth. When the data from open-ocean shipwrecks was replotted, there was also a linear relationship between the logarithm of the corrosion rate and water depth, given by Eq. 5:

$$^{\text{Open-ocean}}\log\, d_g = -0.630 - 0.0156\, d \quad (5)$$

The corrosion Eqs. 4 and 5 make intuitive sense since the decay mechanism of corrosion is being controlled by the flux of dissolved oxygen which is not unexpected as the basic relationships should be very similar in both these types of environments. With the acquisition of corrosion data from the wrecks of the USS *Monitor* (1862) and the submarine HMAS AE2 (1915), both at a depth of 72 ± 2 m, it was found that Eq. 5 predicted the corrosion rates to within 5% of that which was experimentally measured with ultrasonic metal thickness gauges (MacLeod et al. 2008; MacLeod 2010a). Because the data is empirical, all the natural variations in colonization, water temperature, dissolved oxygen, and water movement have all been integrated into the observed corrosion profiles (Fig. 3).

The differences between the Chuuk slope (Eq. 4) and the open-ocean slope (Eq. 5) are statistically significant which means that the corrosion rate for shipwrecks in Chuuk Lagoon decreases 16% more than for open-ocean wrecks per meter of increased water depth. The lower corrosion rate of the Chuuk sites is due to the more sheltered nature of the lagoon waters which also has a low diurnal tidal range. The differences in the intercept values of the equations equate to Chuuk wrecks having a 21% lower corrosion rate for wrecks in the splash zone. Previously torpedoed and repaired vessels, such as the *Shinkoku Maru* and the *Yubae Maru*, appear to be corroding faster than vessels that had no previous history of physical damage. It is likely that stresses in the steel, from the accumulation of either stress from having been blown up and repaired or the stresses associated with the catastrophic shipwrecking processes, are being reflected in elevated corrosion rates.

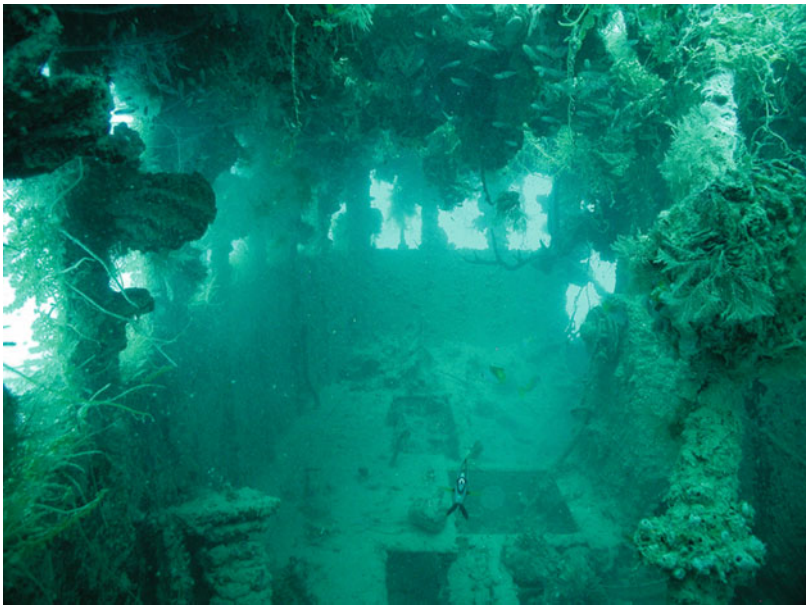

In Situ Preservation of Shipwreck Artifacts, Fig. 3 View from interior of bridge on the *Fujikawa Maru* in 2002 during initial corrosion survey. (Photo: Bill Jeffery)

Concretion Microenvironment

After many years of hydrolysis of corrosion products underneath the protective concretion cover, the interstitial solutions become rich in chloride ions and hydrogen ions as the concretion acts like a semipermeable membrane (North 1976). The bore solution from a sealed iron cannon recovered from the turbulent *Zuytdorp* (1712) site had zero dissolved oxygen and a chloride content of 54,593 ppm, which is nearly three times as much chloride as in normal seawater (MacLeod 1996). The concentration of $FeCl_2$ solution was 1.54 M, and the pH of 4.8, due to the hydrolysis of the ferrous chloride primary corrosion products, is consistent with the species distribution reported by Man-Seung (Man-Seung 2004). As the corrosion products diffuse away from the metal surface and approach the cathodic outward surface, the residual oxygen concentration increases to allow the formation of green rust of the general formula $\{Fe^{II}{}_3Fe^{III}(OH)_8\}^+\{Cl.H_2O\}-^1$, but these products exert minimal influence on the corrosion mechanism. Analysis of the pH data from the *City of Launceston* wreck showed that certain parts of the wreck were corroding at a faster rate and that these zones correlated with localized turbulence associated with the currents in and around the high profile of the intact clipper-styled iron steamship. Measurement of residual metal thickness of the hull plates in these zones confirmed that the pH values were indicative of long-term corrosion trends (MacLeod 2002).

Monitoring Changes on Wreck Sites

Through periodic assessments of shipwreck sites, it is possible to determine if there are any changes occurring that are otherwise not readily discerned by a diver swimming across a wreck site. During an 18-year program on the wreck of the *City of Launceston* (1865), the cessation of scallop dredging resulted in a 22% drop in corrosion rate, due to improvements in water clarity which lead to more effective covering by marine growth. Allocation of extra resources to a 2-year program of detailed mapping of the wreck site resulted in an unanticipated increase of 43% in the corrosion rate, slightly exceeding the value when the scallop dredging was active. It was extensive hand clearing of the weed like marine growth from the surface of the vessel that caused the increase in corrosion rate. It took an extra 4 years before the site settled down to its previous lower corrosion rate (MacLeod 2010b) (Fig. 4).

Over a 5-year period, a series of in situ conservation surveys were performed on a selected number of World War II Japanese wrecks located in Chuuk (Truk) Lagoon. The biodynamic relationship between the concretion thickness, the nature

of the colonizing organisms, and the concomitant effect on the underlying metal corrosion rate showed that the amount of light falling on a canted side of a shipwreck had a measurable effect on the extent of corrosion. The impact of the corals being the dominant sedentary epifauna on the sunny side meant that the branching nature of the corals causes localized increases in turbulence and hence corrosion rate (MacLeod et al. 2007). While the protective nature of the concretion cover is still beneficial, the changes in rugosity, or surface roughness, have a direct bearing on the corrosion mechanism and the intensity of the corrosion process. The differences in colonization result in systematic differences in the corrosion potentials and the pH of the iron underneath the concretion (Figs. 5 and 6).

In Situ Preservation of Shipwreck Artifacts, Fig. 4 Zinc anode connected to frame amidships lying on the deck of the *City of Launceston* (1865). (Photo: Heritage Victoria)

In Situ Preservation of Shipwreck Artifacts, Fig. 5 Undisturbed marine concretion on the *Fujikawa Maru* just below gunwale. (Photo: Earthwatch Foundation)

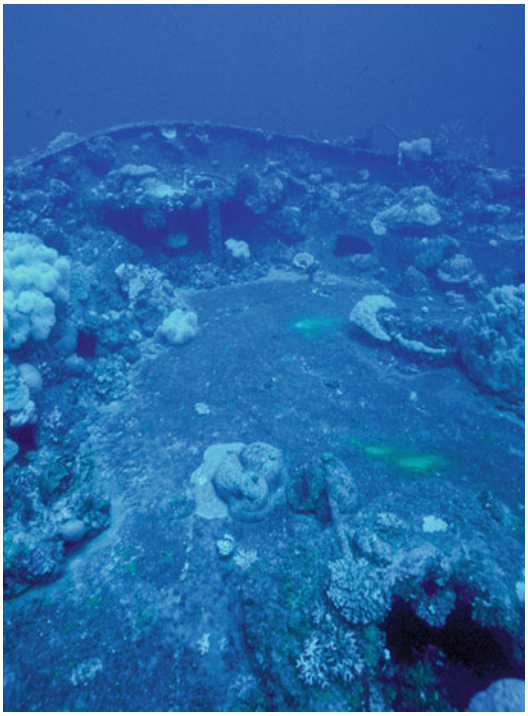

In Situ Preservation of Shipwreck Artifacts, Fig. 6 The bow denuded of protective cover after an episode of "dynamite fishing" in 2004. (Photo: Bill Jeffery)

A previously undisturbed small fishing vessel was located in 2006 adjacent to a WWII dock on Tonoas Island and reported to the Chuukese authorities. The unnamed vessel, called the *Tonoas dock boat*, was used as a yardstick in the evaluation of the combined impacts of natural deconcretion events, due to typhoon damage, and the impact of "dynamite fishing" on the popular dive wrecks of the *Fujikawa Maru* and the *Susuki* patrol boat. Analysis of the concretion thickness on the *Susuki* patrol boat and the *Fujikawa Maru* showed that there were multiple layers of marine growth, with some areas having a series of up to five terraces representing marine concretion of varying ages on the *Fujikawa Maru*. While differences in the phosphorus content of the structural steels can account for some of the variations in thickness value t_{mm} of the concretion and corrosion matrix (MacLeod 1988), the most likely explanation is due to the impact of "dynamite fishing" which causes localized disbondment of the concretion as the explosion shock waves hit the surface (MacLeod et al. 2011).

When the *Fujikawa Maru* was originally inspected in 2002, it had a different corrosion mechanism to all other historic iron shipwrecks in that the slope of the Pourbaix or E_{corr} versus pH diagram was −0.059 V/pH instead of −0.028 ± 0.002 V/pH (Pourbaix 1974; MacLeod 2005). When the site was revisited in 2006, the corrosion mechanism had changed over to that of other iron wrecks. The initial relationship between E_{corr} and pH on the *Fujikawa Maru* is probably a reflection of the low stress microenvironment of the wreck, with its keel firmly supported by the seabed, whereas all the other wrecks were lying on their sides, upside down or on sloping substrates. Thus, the precise physical orientation of an iron shipwreck exerts a major influence on the way in which the vessel will corrode (MacLeod 2006).

The Impact of Explosions and Anchoring on Corrosion Rate

In order to determine the impact of human activities such as the use of explosives on wreck sites and the indiscriminate use of the wrecks as tie off points, the general Chuuk Lagoon corrosion equation (Eq. 4) was used to convert E_{corr} values from the *Tonoas* dock boat, the *Susuki* patrol boat, and the *Fujikawa Maru* into corrosion rates: the results are summarized in Table 1. When this information was meshed with local stories of when the wrecks had been last dynamited, it was possible to discern how long it takes before a wreck begins to recover from such events. Chuukese heritage professionals gave unofficial reports that the *Susuki* patrol boat was relatively undisturbed before the initial site inspection in 2002. Some time prior to the measurements in July 2006, there was a "deconcreting" event, but by the time the site was assessed, some recolonization of the wreck had taken place.

Around July or August 2006, a deconcreting event had taken place which caused an increase in the corrosion rate. In addition to the damage from "dynamite fishing," the *Susuki* patrol boat is also heavily impacted by novice divers during day- and nighttime visits since the dive supervisors regularly report that tourists break off corals as they adjust their buoyancy and try to hold on as they adjusted their buoyancy. By the time of the

In Situ Preservation of Shipwreck Artifacts, Table 1 Summary of observed and predicted corrosion rates for the three Chuuk shipwrecks

Wreck	Mean depth m	Mean depth graphitization mm	Calculated corrosion rate, mm/year	Observed rate mm/year	% corrosion rate over expected on depth
Fujikawa Maru	15.4	8.3 ± 2.4	0.098	0.143	46
Tonoas dock boat	14.4	5.0 ± 1.7	0.102	0.081	−20
Susuki patrol boat	7.2	10.0 ± 3.4	0.138	0.161	17

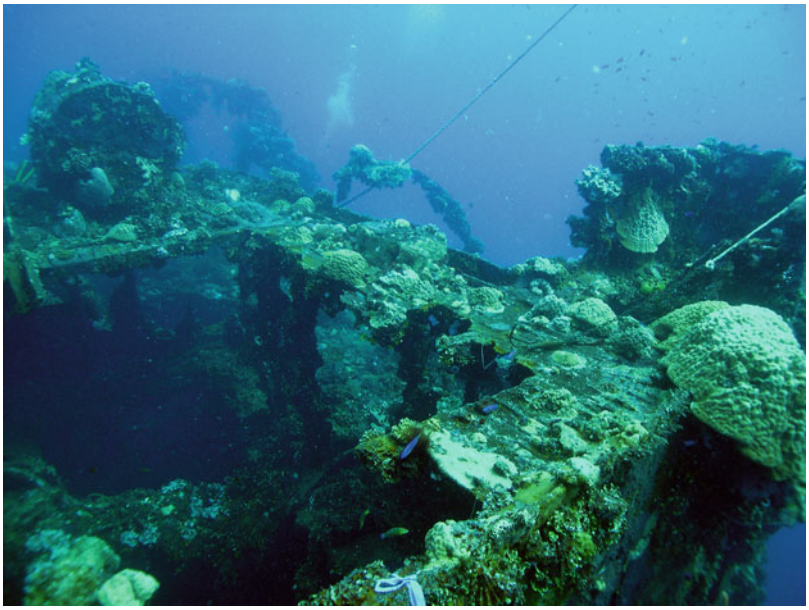

In Situ Preservation of Shipwreck Artifacts, Fig. 7 Collapse of the *Fujikawa Maru* bridge structure (August, 2007)

final set of measurements in August 2007, the site had begun to recover, and so the E_{corr} values had fallen from their dangerously high levels to somewhere approaching the original 2002 values. This oral history from the Chuukese staff shows that the wreck sites are in a dynamic equilibrium with the marine environment and that when damage occurs there can be relatively rapid recovery to pre-disturbance levels, but the continued practice of "dynamite fishing" results in permanent damage to the longevity of the wreck. The data from the three wrecks provides a direct comparison of the way in which the corrosion rate varies in response to the combination of damage from boat moorings, from divers breaking off the corals, and from the large impact of "dynamite fishing" on the corrosion rate (MacLeod et al. 2011) (Fig. 7).

The corrosion rate of the *Fujikawa Maru* is 46% above that calculated using the Chuuk shipwreck corrosion Eq. 4, while the *Susuki patrol boat* is 17% higher. Both of these vessels have suffered from increased corrosion as a result of multiple deconcretion episodes. The location of the *Fujikawa Maru* in the shipping channel results in a higher dissolved oxygen flux over the site which also leads to a great number of fish. This combination makes the *Fujikawa Maru* more prone to being hit by "dynamite fishing" activities than the more sheltered *Susuki* patrol boat site which has less abundant marine life. In addition the *Fujikawa Maru* is the most popular wreck site in the lagoon and is thus subjected to inadvertent diver damage. The damage to the concretion is consistent with physical impact of either shockwaves from dynamite fishing or from severe

tropical storms. It is likely that most of the dozen wrecks from which data had been collected had all been subjected to "dynamite fishing" events during their history since 1944. Because the general corrosion equation for Chuuk Lagoon was developed before the *Tonoas* dock boat site was found, the observed corrosion rate was 20% less than predicted.

The net effect of the episodic localized loss of this protective layer of marine concretion from the surface of the vessels is increased corrosion and loss of the underlying metal corrosion products which removes the archival record of the microenvironment and causes increased stress on the wrecks. Based on results from corrosion data collected in 2008, many of the wrecks in Chuuk Lagoon will begin to undergo significant collapse in the next 4–9 years. This has major implications for the management of the sites and for the safety of divers undertaking penetration dives. In addition, there is the risk of perforation of fuel bunkers on some vessels, possibly releasing petrochemicals into the fragile ecosystem potentially causing significant environmental damage in Chuuk Lagoon.

Impact of Intense Weather Events: The Case of Cyclone Yasi and the SS *Yongala* (1911)

A total of 122 passengers and crew perished in the wreck of SS *Yongala* (1911), and with the advent of charter boats and popularization through social media and diving networks, the wreck has become one of the top ten "must see" dive sites in the world. Until the introduction of proper mooring buoys, there was significant anchor damage to the protective concretion on the *Yongala* by more than 1,400 diving charters each year to the site which lies in the open waters of the Great Barrier Reef Marine Park off the Queensland coast (MacLeod and Viduka 2010). The heavily concreted shipwreck rests in 27–30 m of water, sitting approximately 14 m above the seafloor. The high physical profile of an intact iron steamship, warm tropical waters, and characteristic two-knot current that flows throughout the year have resulted in a veritable cornucopia of marine life. The initial assessment in 2005 was followed by intense wave action resulting from Cyclone *Larry* which partially deconcreted the stern in 2006 and exposed new holes in the remaining deck "plate." Three sets of in situ measurements were collected in 2007 which indicated that the wreck was beginning to recover from the impact of the previous cyclone. There was increased thickness of the concretion layers over previously damaged areas. Analysis of the corrosion potential, pH, and plate perforation data confirmed that the superstructure deck and hull plates are all highly corroded and that the most extensive corrosion is on the portside gunwale. The high corrosion rates found at the forward end of the forecastle deck and at the stern near the rudder are consistent with the exposed locations which lie proud of the seabed where there is significant water movement across the site (Fig. 8).

The naturally occurring cyclonic damage has resulted in accelerated corrosion of the wreck in much the same fashion as the "dynamite fishing" in Chuuk has accelerated the decay of the Japanese WWII shipwrecks. The 2007 data showed that the *Yongala* bow was corroding at a higher rate than the stern and that its unsupported nature placed increased stress on the hull and this manifested itself in increased corrosion on the residual metal structure. Changes in the souring have also been significant factors in accelerating the corrosion of this historically significant iron shipwreck. The impact of a second cyclone was dramatic when cyclone *Yasi* hit Queensland coastal communities and hinterland in February 2011. Although the center of the intense cyclone was hundreds of kilometers north of the site, deep ocean waves wrenched massive amounts of concretion from the wreck, and the bow has collapsed and dropped several meters to rest on the seabed. The *Yongala* moved from about 60° before the storm to 80° from the vertical, after the extreme weather event. The concreted hull plates have collapsed in sections and this has opened up the interior of the wreck to direct action of the prevailing currents. Without direct intervention and active site management, the wreck will now undergo a relatively dramatic change in its physical form as elements begin to become disconnected and move across the site. The lesson from the in situ corrosion studies on the *Yongala* is that

In Situ Preservation of Shipwreck Artifacts, Fig. 8 *Yongala* bow after the impact of cyclone Yasi. (Photo: Museum of Tropical Queensland)

such data can lead to the development of predictive models of site collapse that can also be reverse engineered into determining the likely causes of wreck formation processes on other historic shipwrecks.

Sacrificial Anodes and Artifact Stabilization

Although the successful in situ treatment of historic shipwreck cannon and anchors, marine engines, and even the remarkable steam-driven submarine *Resurgam* has been reported by Gregory and MacLeod (Gregory 1999, 2000; MacLeod 1992, 1996), some elements of the shipwreck community remain skeptical about the efficacy or efficiency of such processes. Conservators and maritime archaeologists need a method of determining how an in situ treatment is progressing and when it will be finished. Recent work by the author has shown that the Cartesian (arithmetic) product of the pH and corrosion potential is dependent on the burial environment. This data provides a special insight into the state of decay of the objects since all aerobically corroded iron artifacts have a common value when the two in situ parameters are multiplied together. The wreck of the *Swan* (1653) at Duart Point, Isle of Mull, Scotland, is instructive as the site has seen the successful application of anodes to several cannon after the pre-disturbance corrosion survey was conducted. When the treatment data is plotted on a Pourbaix diagram, all the guns had a common slope with an average value of −0.087 V/pH which is consistent with the following corrosion reaction taking place, during the treatment phase, viz.,

$$Fe + 2H_2O \rightarrow HFeO_2^- + 3H^+ + 2e^- \qquad (6)$$

Equation 6 has a predicted slope of $-{}^3/_2{}^*0.0568$ or −0.085 V/pH at a seawater temperature of 13 °C. The data strongly suggests that the underlying passive corrosion process produces the hydrogen ferrate ion $HFeO_2-$ and not the normal ferrous ions associated with corrosion in the absence of anodes. The corrosion process is no longer controlled by the oxidation of iron to produce $FeCl^+$ species (Man-Seung 2004) but the underlying corrosion process is the very slow oxidation of iron under alkaline conditions. In other words, the monitoring of the in situ corrosion parameters has shown that the iron is in a passive state, the desired outcome of all conservation treatments (Fig. 9).

Determining the End Point of an In Situ Treatment

Analysis of data from pre-disturbance surveys on iron artifacts indicates that the common solution microenvironment underneath the concretion consists of $FeCl^+$ in equilibrium with a small

In Situ Preservation of Shipwreck Artifacts, Fig. 9 Diver attaching a zinc anode to a cannon on the *Swan* wreck site, Sound of Mull, Scotland. (Photo: Colin Martin)

percentage of $FeCl_2$ and a trace of $FeOH^+$ (Man-Seung 2004). For the convenience of discussion, the Cartesian product of the pH and E_{corr} can be described as a "corrosion indicator" (CI) which has a median pre-disturbance value of -3.6 ± 0.4 from wreck sites which range from the wreck of the *Swan* in 1653 through the USS *Monitor* (1862) turret, the hull of the Civil War submarine *H. L. Hunley* (1864), to the anchors and cannon from the HMS *Sirius* (1770), and the hull plates of the *City of Launceston* wrecked in 1865 in Port Phillip Bay, Victoria, Australia (MacLeod 2010b). The site variables such as temperature, the dissolved oxygen content, and the salinity all impact on the pH and E_{corr} values, but these factors essentially cancel out each other to provide the basis for a common value which simply reflects the common corrosion mechanism. By monitoring the E_{corr} and pH through routine visits to the wreck sites, the CI value of artifacts undergoing treatment can be determined. A detailed discussion of how the end point of the treatment value for the corrosion indicator was developed has been previously reported (MacLeod 2013), but when the end point CI value of -7.3 ± 0.2 is reached, the bulk of the chlorides have been removed from the object, the surface pH has become more alkaline than the surrounding seawater, and the overall corrosion rate has fallen to quite low values. One impact of the knowledge of the end point for in situ treatment of iron artifacts is that it became apparent that the *Cerberus* gun barrels were completed after approximately 3 years of stabilization with zinc anodes. The short treatment time is due to the fact that they had only been exposed to general marine atmospheric corrosion while located in their twin turrets on the 1870s built Monitor-style warship (MacLeod and Steyne 2011).

Artifacts corroding in a buried or partly buried marine microenvironment have a different corrosion mechanism to those objects lying proud of the seabed. Under low-oxygen or anaerobic conditions, the principal corrosion product is magnetite Fe_3O_4 and the cathodic process involves reduction of either hydrogen or water. The different mechanism is reflected in different pre-disturbance values of the corrosion indicator. Examples of this type of microenvironment are found for the wrecks of the Australian WWI submarine HMAS *AE2* (1915) in the Sea of Marmara and the submarine *Resurgam* (1880) off the coast of North Wales where the median CI value for the two submarines was -4.6 ± 0.1, which is typical for a partly stabilized aerobically corroded iron artifact (Gregory 2000; MacLeod 2010b). Although the SS *Xantho* was periodically buried and exposed, all the pre-disturbance values relate to the extended aerobic microenvironment with a CI value of -3.3 for the historic Penn of Greenwich engine (MacLeod 1986; McCarthy 1988). The value of the product of E_{corr} and pH changes during in situ conservation treatment with sacrificial anodes and reaches a minimum at which point the treatment is completed, i.e., the end point. Treatment times vary according to the water depth and are more rapid on shallower sites and shorter for more extensively corroded artifacts.

The model was developed using data from the corroded guns on the wrecks of the pinnace *Swan* (1653), the Monitor-styled warship HMVS *Cerberus* (1926), and a series of wrecks in Australia and the United States of America (MacLeod 2013).

Treatment Kinetics for Cannon on the *Swan* (1653)

Data collected by Gregory and MacLeod on the *Swan* wreck site has been of significant value in determining the factors that control the rate at which the artifacts are going to be treated by the anodes (Gregory 1999; MacLeod 2013). Because the efficacy of anodes depends on the ratio of the surface area of the object to the anode, changes in the pH and E_{corr} values during treatment cannot normally be compared owing to the different surface area of object to anode ratios used on different sites. Since all the anodes used on the cannon on the *Swan* had very similar surface area ratios, the data from the changing values of the corrosion indicator provided some useful clues to the overall kinetics of the treatment process. As electrons flow into the cannon and anchors, the unbound hydrogen ions are reduced to hydrogen gas, with a concomitant increase in the pH. The cannon showed a linear increase in pH with time, and the slopes of the pH versus time plots are dependent on the d_g values or the annualized long-term corrosion rate according to Eq. 7:

$$\partial pH/\partial t = 4.47\, d_g - 0.007 \qquad (7)$$

The linear regression for Eq. 7 had an R^2 of 0.9315, and the standard error associated with the slope was ±0.54 (12%) and the intercept error was ±0.086. When the E_{corr} data from the *Swan* was combined with the pH during treatment, it was found that the corrosion indicator value became increasingly negative as time increased according to Eq. 8:

$$CI_{Duart} = -3.35 - 0.72\, t \qquad (8)$$

where t is the treatment time in years and the R^2 value of 0.9602 was associated with the linear regression equation number eight which shows a very good correlation of the data. If the amount of time for completing the in situ conservation of the object(s) is required, then substitution of the end CI value of 7.4 into the above equation gave a predicted treatment time of 5.65 years. Thus, through periodic measurements of the normal in situ corrosion parameters, it is possible to determine the percentage of the conservation program that has been achieved by the artifact(s). Since the predicted treatment time for the guns and anchor at the *Swan* wreck site is now well past, the in situ conservation treatment will have been completed, and the site kept in a state of suspended animation until there is a compelling need for additional excavation and a home for the conserved artifacts are established as part of a properly curated exhibition in a venue that fits for the purpose. The archaeological director reports that the anodes are now corroding away at a much reduced rate which also supports the understanding that the conservation process has been completed (C.J.M. Martin, *pers. comm*. 2011).

Similar analyses of data on the speed at which the corrosion indicator moved toward the end value of -7.4 ± 0.3 were conducted for the *Sirius*, *Xantho*, and *Cerberus* sites and showed that the corrosion indicator moved faster toward the completion value as the depth (d) became shallower in accordance with Eq. 9:

$$\partial CI.y^{-1}/\partial d = -1.39 + 0.18\, d \qquad (9)$$

This relationship means that in situ conservation treatments will work fastest at shallower depths since increased wave action, brought about by wind driven events, will increase the flux of dissolved oxygen to the corroding anodes and make them work more efficiently. This relationship enables conservators, site managers, and maritime archaeologists to predict how fast the artifacts can be treated based on the water depth in meters.

Methodologies for In Situ Preservation of Organic Materials

One critical factor in modelling the preservation of objects from an archaeological site is the applicability of data recovered from post-burial

environments of model artifacts. It is a problem common to all of corrosion and archaeological sciences, but so long as data is compared with other appropriate subsets from a similar microenvironment, then the conclusions drawn have a reasonable chance of being valid. Although the literature abounds in numerous reports of such activities, the work at the National Museum of Denmark and at the Western Australian Maritime Museum are instructive and complement the data from the Marstrand Reburial and Analyses of Archaeological Materials (RAAR) project in Sweden as they are all pointing practitioners down on more sustainable paths.

The concept of reburial of ship timbers in the marine environment was established by the Dutch pioneer De Jong and by Kirsten Jespersen in Denmark, but the effectiveness of the methodology was not fully developed, so the impact of the reburial on archaeological timbers was poorly characterized. This lack of detailed understanding was overcome by Gregory as he developed a methodology using standard modern oak and a cellulose-based canvas as means of assessing deterioration in the first stages of decay. If the initial rapid decay of artifacts can be effectively modelled and understood, it makes the task of predicting the long-term future much more attainable. Since most degradation mechanisms by molds, fungi, wood-boring molluscs involve the organisms respiring in an oxygenated environment, the first samples were located at the oxygenated seawater interface, the next cohort just below the surface at a depth of a few centimeters and below 50 cm to gauge the change in mechanism of going to a completely anaerobic microenvironment. His work pointed out the many pitfalls of attempting to interpret short-term field experiments on standardized timber coupons, but it did show that the least degradation was obtained on samples buried deeper than the 50 cm layer of sediment (Gregory 1998). The impetus for the determination of the optimum reburial microenvironment for the National Museum of Denmark was the presence of more than 5,000 Iron Age wooden artifacts in a waterlogged meadow site, Nydam Mose, located in Southern Jutland, Denmark. To treat all of these materials was questionable in terms of the capital and maintenance costs of the collection and the fact that when left undisturbed and maintained in a stable anoxic aqueous microenvironment, the timber artifacts appeared to have excellent preservation. Monitoring the dissolved oxygen levels, the redox potential, and the quantities of salts has provided good insights into the major role of erosion bacteria in controlling the biodeterioration of the waterlogged organic remains and of the importance of maintenance of the water table (Gregory et al. 2001). Recent work in England on finding the correct turning point for burial depth of organic remains indicates that depths in excess of 2 m may be required to ensure that the overall rate of all bacterial attack, both aerobic and anaerobic, on the structural components of the wood is at a minimum (Hogan et al. 2001).

The shipwreck *James Matthews* (1841) in Cockburn Sound near Fremantle had for many years been in a stable burial environment under at least a meter of sand, but it was being subjected to a combination of natural erosion and increased industrial activity, since it is located next to a retrieval jetty for harvesting dumped shell materials for a local cement works. The systematic approach shown by Richards and her team in establishing the pre-disturbance conditions for the microbiological, electrochemical, and physical oceanography of the site shows the depth of knowledge that is needed before informed decisions can be taken on the efficacy of reburial in situ conservation plans (Godfrey et al. 2005). The wreck has been able to be stabilized through the use of sediment-filled road crash barriers, covered with geotextile to minimize loss of sediment during storm surge (Winton and Richards 2005). A long-term approach to monitoring the efficacy of interventions on a wreck site has proven to be very useful in that data collected over a period of more than 5 years has shown the complex relationships between the natural balance of microbiological populations and a variety of wood-boring molluscs and marine fungi (Fig. 10).

Richards work on assessment of changes wrought by various interventions is highly regarded for its direct relevance since samples of the ships timbers were able to be taken for

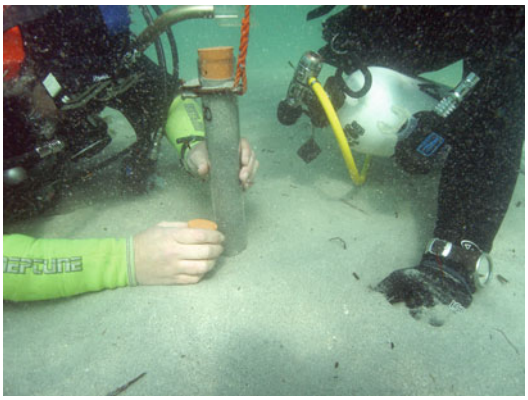

In Situ Preservation of Shipwreck Artifacts, Fig. 10 In situ assessment of hull timbers on the *James Matthews* (1841) wreck. (Photo: Jon Carpenter)

destructive analysis rather than using modern test specimens of timbers pertaining to the period of construction of the vessel which had only been exposed for a few years. Through direct engagement with the maritime archaeological site manager, a unique insight into site degradation and formation processes has been able to be developed. It is only through all the data from sediment cores, microbiological assays, analysis of the wood degradation mechanisms, and the microelectrodes that quantified the variations in dissolved oxygen and redox potentials that the total picture can be obtained. Richards clearly established that canvas-based sandbags were useless and that the partially filled synthetic sandbags need to be carefully chosen for the stability of the parent polymer, but they were nevertheless useful in providing temporary protection of the site. The additional data gathered after the initial study into the use of road crash barriers strongly supports this form of site stabilization. It is important to remember how to weigh up initial capital cost with the outcome which is the preservation of a unique historic wooden sailing vessel that once took African slaves to the plantations in the Americas (Richards et al. 2009).

Following industrial pressures of seabed dredging to improve harbor and ferry access through a series of archipelagic channels which would profoundly affect a series of shipwreck sites, the Marstrand reburial project was born in which it was bravely heralded that the research design would be transgenerational in that 50 years of data would be needed to fully ascertain the efficacy of the proposed methods of in situ stabilization. The findings of the first 3-year analysis of the data indicate, somewhat surprisingly, that reburial is not a good option for glass and fibrous materials but indications are that it is an option for some metals and inorganic matrices such as porcelain, stoneware, and clay pipes as well as for wood (Nystrom et al. 2009). The RAAR project has already achieved some significant milestones in that it has demonstrated the viability of collecting localized microenvironment physical chemical parameters of dissolved oxygen, pH, and redox potentials in that they provide comparable data with that obtained from fixed data loggers operating underwater in situ. The data has also produced a very sound set of guidelines about the precise location and positioning of samples of different types of materials found on historic shipwrecks, but in this instance simulated by modern coupons made from representative alloys or wood samples. Although funding for the continuation of the project is somewhat problematic, the data already reported is of considerable value as it points out all the pitfalls of reburial projects which are of immense assistance to heritage managers in determining which artifacts should be recovered and conserved (Nyström Godfrey 2009).

Cross-References

- ▶ Australia: Cultural Heritage Management Education
- ▶ Australia: Maritime Archaeology
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Dating Techniques in Archaeological Science
- ▶ Ship Archaeology

References

Carpenter, J., and I.D. MacLeod. 1993. Conservation of corroded iron cannon and the influence of degradation on treatment times. In *ICOM-Committee for Conservation, Preprints 10th Triennial Conference, Washington, Volume II*, 759–766. Paris: ICOM.

Godfrey, I.M., E. Reed, V.L. Richards, N.F. West, and T. Winton. 2005. The *James Matthews* shipwreck – Conservation survey and in-situ stabilisation. In *Proceedings of the 9th ICOM Group on Wet Organic Archaeological Materials Conference, Copenhagen, 2004*, ed. P. Hoffmann, K. Strætkvern, J.A. Spriggs, and D. Gregory, 40–76. Bremerhaven: The International Council of Museums, Committee for Conservation Working Group on Wet Organic Archaeological Materials.

Gregory, D. 1998. Reburial of timbers in the marine environment as a means of their long-term storage: Experimental studies in Lynæs Sands, Denmark. *International Journal of Nautical Archaeology* 27 (4): 343–358.

Gregory, D. 1999. Monitoring the effect of sacrificial anodes on the large iron artefact on the Duart Pt wreck, 1997. *International Journal of Nautical Archaeology* 28 (2): 164–173.

Gregory, D. 2000. In-situ corrosion studies on the submarine *Resurgam*: A preliminary assessment of her state of preservation. *Conservation and Management of Archaeological Sites* 4 (2): 93–100.

Gregory, D., H. Matthiesen, and C. Bjordal. 2001. In-situ preservation of artefacts in Nydam Mose: Studies into environmental monitoring and deterioration of wooden artefacts. In *Proceedings of the 8th ICOM Group on Wet Organic Archaeological Materials Conference, Stockholm 2001*, ed. P. Hoffman, J.A. Spriggs, T. Grant, C. Cook, and A. Recht, 213–223. Bremerhaven: Druckerei Ditzen GmbH und Co. KG.

Hogan, D.V., P. Simpson, A.M. Jones, and E. Maltby. 2001. Development of a protocol for the reburial of organic archaeological remains. In *Proceedings of the 8th ICOM Group on Wet Organic Archaeological Materials Conference, Stockholm 2001*, ed. P. Hoffman, J.A. Spriggs, T. Grant, C. Cook, and A. Recht, 187–212. Bremerhaven: Druckerei Ditzen GmbH und Co. KG.

Jeffery, B. 2004. World War II underwater cultural heritage sites in Truk Lagoon: Considering a case for World Heritage listing. *International Journal of Nautical Archaeology* 33: 106–121.

Johnson, D.L., B. Wilson, J.D. Carr, M.A. Russell, L.E. Murphy, and D.L. Conlin. 2006. Corrosion of steel shipwrecks in the marine environment: USS *Arizona* – Part II. *Materials Performance* 45 (11): 54–57.

MacLeod, I.D. 1986. Conservation of the steam ship "Xantho". *ICCM Bulletin* 12 (3–4): 66–94.

MacLeod, I.D. 1987. Stabilization of corroded copper alloys: A study of corrosion and desalination mechanisms. In *ICOM Committee for Conservation Preprints, Sydney, September 1987*, 1079–1085.

MacLeod, I.D. 1988. Conservation of corroded concreted iron. *Proceedings of Conference 28, Australasian Corrosion Association*, *Perth, volume 1* 2–6: 1–9.

MacLeod, I.D. 1989. The application of corrosion science to the management of maritime archaeological sites. *Bulletin Australian Institute Maritime Archaeology* 13 (2): 7–16.

MacLeod, I.D. 1990. Conservation management of iron shipwrecks: SS *Xantho* (1872). *Preprints 5th National Conference on Engineering Heritage*, Perth, December 1990, 75–80.

MacLeod, I.D. 1992. Conservation management of iron steamships – The SS *Xantho* (1872). *Multi-Disciplinary Engineering Transactions GE* 1: 45–51.

MacLeod, I.D. 1995. In-situ corrosion studies on the Duart Point wreck 1994. *International Journal Nautical Archaeology* 24 (1): 53–59.

MacLeod, I.D. 1996. In-situ conservation of cannon and anchors on shipwreck sites. In *Conservation of archaeological sites and its consequences*, ed. A. Roy and P. Smith, 111–115. London: IIC.

MacLeod, I.D. 1998. In-situ corrosion studies on iron shipwrecks and cannon: The impact of water depth and archaeological activities on corrosion rates. In *Metal 98 Proceedings of the ICOM -CC Metals Working Group Conference, Draguignan-Faginère France 1998*, ed. W. Mourey and L. Robbiola, 116–124. London: James & James.

MacLeod, I.D. 2002. In-situ corrosion monitoring of the iron shipwreck *City of Launceston* (1865). In *Preprints for ICOM-CC Triennial Meeting, Rio de Janeiro, Brazil September 2002, Volume II*, 871–877. Paris: ICOM.

MacLeod, I.D. 2005. A new corrosion mechanism for iron shipwrecks in seawater: A study of the Fujikawa Maru (1944) in Chuuk Lagoon, Federated States of Micronesia. In *Preprints for ICOM-CC Triennial Meeting, Den Haag, The Netherlands, September 2005, Volume II*, 310–316.

MacLeod, I.D. 2006. Corrosion and conservation management of iron shipwrecks in Chuuk Lagoon. *Conservation and Management of Archaeological Sites* 7: 203–223.

MacLeod, I.D. 2010a. Corrosion and conservation management of the HMAS *AE2* (1915) submarine in the sea of Marmara, Turkey. In *METAL 2010, Proceedings of the Interim Meeting of the ICOM-CC Metal Working Group, Charleston, South Carolina 11–15 October 2010*, ed. P. Mardikian, C. Chemello, C. Watters, and P. Hull, 56–62. Paris: ICOM.

MacLeod, I.D. 2010b. Assessment of the impact of scallop dredging, site clearance and cathodic protection on the *City of Launceston* (1865) in Port Phillip Bay. In *Final report on SS City of Launceston* (1863–1865) *excavation and conservation 1997–2009*. Australasian Institute for Maritime Archaeology, Special Publication, ed. R. Anderson, 94–103. Sydney: AIMA.

MacLeod, I.D. 2013. Calculation of treatment times for corroded marine iron artefacts undergoing in-situ conservation with sacrificial anodes through monitoring the pH and corrosion potentials. *International Journal of Nautical Archaeology*.

MacLeod, I.D., and H. Steyne. 2011. Managing a monitor – The case of HMVS Cerberus in Port Phillip Bay: Integration of corrosion measurements with site management strategies. *Conservation and Management of Archaeological Sites* 13 (4): 334–361.

MacLeod, I.D., and A. Viduka. 2010. Assessment of the impact of diving tourism and cyclones on the SS

Yongala (1911) shipwreck in the Great Barrier Reef from in-situ corrosion data. *AICCM Bulletin* 32: 134–143.

MacLeod, I.D., N.A. North, and C.J. Beegle. 1986. The excavation, analysis and conservation of shipwreck sites. In *Preventative measures during excavation and site protection*, 113–132. Rome: ICCROM.

MacLeod, I.D., M. Beger, V. Richards, B. Jeffrey, and M. Hengevald. 2007. Dynamic interactions of marine ecosystems with wrecks in Chuuk Lagoon, Federated States of Micronesia in Metal 07. In *Preprints for ICOM-CC Metals Working Group Meeting, Armsterdam*, ed. C. Degriguy, B. Ankersmir, I. Yolanda, and R. VanLangh, vol. 3, 51–54.

MacLeod, I.D., D. Cook, and E. Schindelholz. 2008. Corrosion and conservation of the American civil war ironclad USS *Monitor* (1862). In *Preprints for ICOM-CC Triennial Meeting, New Delhi, India, September 2008*, 279–285.

MacLeod, I.D., V.L. Richards, and M. Beger. 2011. The effects of human and biological interactions on the corrosion of WWII iron shipwrecks in Chuuk lagoon. In *18th International Corrosion Congress, Perth, November 2011 Paper 124*, 1–12.

Man-Seung, L. 2004. Chemical equilibria in ferrous chloride acid solution. *Metals and Materials International* 10 (4): 387–392.

McCarthy, M. 1988. SS *Xantho*: The pre-disturbance, assessment, excavation and management of an iron steam shipwreck off the coast of Western Australia. *International Journal of Nautical Archaeology* 17 (4): 339–347.

North, N.A. 1976. Formation of coral concretions on marine iron. *International Journal of Nautical Archaeology* 5 (3): 253–258.

North, N.A. 1989. Proximity corrosion. *Corrosion Australasia* 14 (5): 8–11.

North, N.A., and I.D. MacLeod. 1987. Corrosion of metals. In *Conservation of marine archaeological objects*, ed. C. Pearson, 90–91. London: Butterworths.

Nyström Godfrey, I. 2009. Reburial and analyses of archaeological remains (RAAR). Investigations of the effects of burial on materials used at archaeological excavations to separate and mark objects. In *Proceedings of the 10th ICOM Group on Wet Organic Archaeological Materials Conference, Amsterdam, 10–15 September 2007*, ed. K. Straetkvern and D.J. Huisman, 215–251. Amersfoort: Rijksdienst voor Archeologie, Cultuurlandschap en Monumenten (RACM).

Nyström Godfrey, I., T. Berstrand, C. Gjelstrup Björdal, T. Nilsson, C. Bohm, E. Christenssen, D. Gregory, E.E. Peacock, V. Richards, and I.D. MacLeod. 2009. Reburial and analysis of archaeological remains – The RAAR project. Project status and cultural heritage management implications based on the first preliminary results. In *Proceedings of the 10th ICOM Group on Wet Organic Archaeological Materials Conference, Amsterdam, 10–15 September 2007*, ed. K. Straetkvern and D.J. Huisman, 169–196. Amersfoort: Rijksdienst voor Archeologie, Cultuurlandschap en Monumenten (RACM).

Pourbaix, M. 1974. *Atlas of electrochemical equilibria in aqueous solutions*. 2nd ed. Houston: NACE.

Richards, V., I. Godfrey, R. Blanchette, B. Held, D. Gregory, and E. Reed. 2009. In-situ monitoring and stabilisation of the *James Matthews* site. In *Proceedings of the 10th ICOM Group on Wet Organic Archaeological Materials Conference, Amsterdam, 10–15 September 2007*, ed. K. Straetkvern and D.J. Huisman, 113–160. Amersfoort: Rijksdienst voor Archeologie, Cultuurlandschap en Monumenten (RACM).

Taylor, R.J., and I.D. MacLeod. 1985. Corrosion of bronzes on shipwrecks: A comparison of corrosion rates deduced from shipwreck material and from electrochemical methods. *Corrosion* 41: 100–104.

Tylecote, R.F. 1977. Durable materials for sea water: The archaeological evidence. *International Journal Nautical Archaeology* 6 (4): 269–283.

UNESCO. 2001. *Convention on the protection of underwater cultural heritage*, 1–32. Paris.

Winton, T., and V. Richards. 2005. In-situ containment of sediment for shipwreck reburial projects. In *Proceedings of the 9th ICOM Group on Wet Organic Archaeological Materials Conference, Copenhagen, 7–11 June 2004*, ed. P. Hoffmann, K. Strætkvern, J.A. Spriggs, and D. Gregory, 77–89. Bremerhaven: The International Council of Museums, Committee for Conservation Working Group on Wet Organic Archaeological Materials.

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Basic Biographical Information

Jale İnan was born in 1914 in İstanbul. Her father, Aziz Ongan, who was one of the very first archaeologists born in Turkey, was the cofounder and a long-term director of the İzmir Archaeology Museum. After her graduation from Erenköy High School for Girls in 1934, with a scholarship from the Alexander Von Humbolt Foundation,

Jale İnan went to Berlin, Germany, to study archaeology. A year later, she was awarded the Turkish Republic Scholarship and overcame severe hardships during World War II to complete her undergraduate education. Under Prof. Dr. Rodenwalt's supervision, she finished her Ph.D. dissertation entitled *Art Historical Study of The Sacrificial Action on Roman Coins*. Inan returned to Turkey in 1934 and before the Classical Archaeology Department was established, she began to assist Prof. Dr. C. Bosch in the Ancient History Department.

The Classical Archaeology Department was formed in 1946 and Jale İnan became Arif Müfid Mansel's assistant. Along him, she helped to build the new department and establish a tradition of excellence. She was promoted as associate professor in 1953 and as professor in1963. Inan become the head of the Classical Archaeology Department in 1975 and retained status quo until her retirement in 1983.

Major Accomplishments

Since 1946, Jale İnan participated in the excavations of Side and Perge led by Arif Müfid Mansel where she served as vice director. Afterward she took charge of excavations at Side between 1974 and 1980 and Perge from 1974 to 1980. She also carried out salvage excavations in ancient sites as Kremna and Pamphylia Seleukeia (1970–1979). Inan also chaired the excavation and restoration studies in the Temple of Apollo, Side. In addition, she played a major role in the repair and restoration of Side's Roman bath construction as a representative museum. She wrote numerous significant articles and books on the art of ancient sculpture.

Jale İnan's publications filled in major gaps in the study of Roman and Early Byzantine portraiture and are important reference sources. Her research in Europe resulted in identification of the fragments of statues from Side/Perge ancient sites and was integral in having them brought to Turkey and restored and displayed.

Cross-References

► Hellenistic and Roman Anatolia, Archaeology of
► Survey Archaeology in the Roman World

Further Reading

Inan, J. 1988. Side Apollon Tapınağı Resterasyonu 1986. (Yılı Çalışmaları IX). *Kazı Sonuçları Toplantısı* II: 173–194.

Inan, J. 1989a. Perge Kazısı 1987 (YılıÇalışmaları X). *Kazı Sonuçları Toplantısı* II: 197–245.

Inan, J. 1989b. Side Apollon Tapınağı Resterasyonu 1987 (YılıÇalışmaları X). *Kazı Sonuçları Toplantısı* II: 247–270.

Inan, J. 1990a. Perge'de ilk rastlanan Nemesis tipi. *X. Türk Tarih Kongresi*: 179–181.

Inan, J. 1990b. Neue Forschungen zum Sebasteion von Bubon und seinen Statuen. In *Akten des XI. Internationalen Lykien Symposium*, 213–239.

Inan, J. 1992a. Perge'debulunan Naukydes' in Diskobol Heykeli. In *Hittite and other Anatolian and Near Eastern studies in honour of Sedat Alp*, 323–332.

Inan, J. 1992b. Herakles Statue vom Types des Herakles Phernesia aus Perge. In *Festschrift für M. Wagner zum 90. Geburtstag*, 223–232.

Inca State and Empire Formation

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Introduction

In 1532, when Francisco Pizarro's rag-tag band of conquistadors captured and executed Atahuallpa, the last independent Inca emperor was overlord of the largest native civilization to develop in the Americas (Fig. 1). Although Atahuallpa had recently turned the might of the Inca military machine away from a grueling expansion campaign on the northern frontier to contend with his half brother, Huascar, for the imperial title,

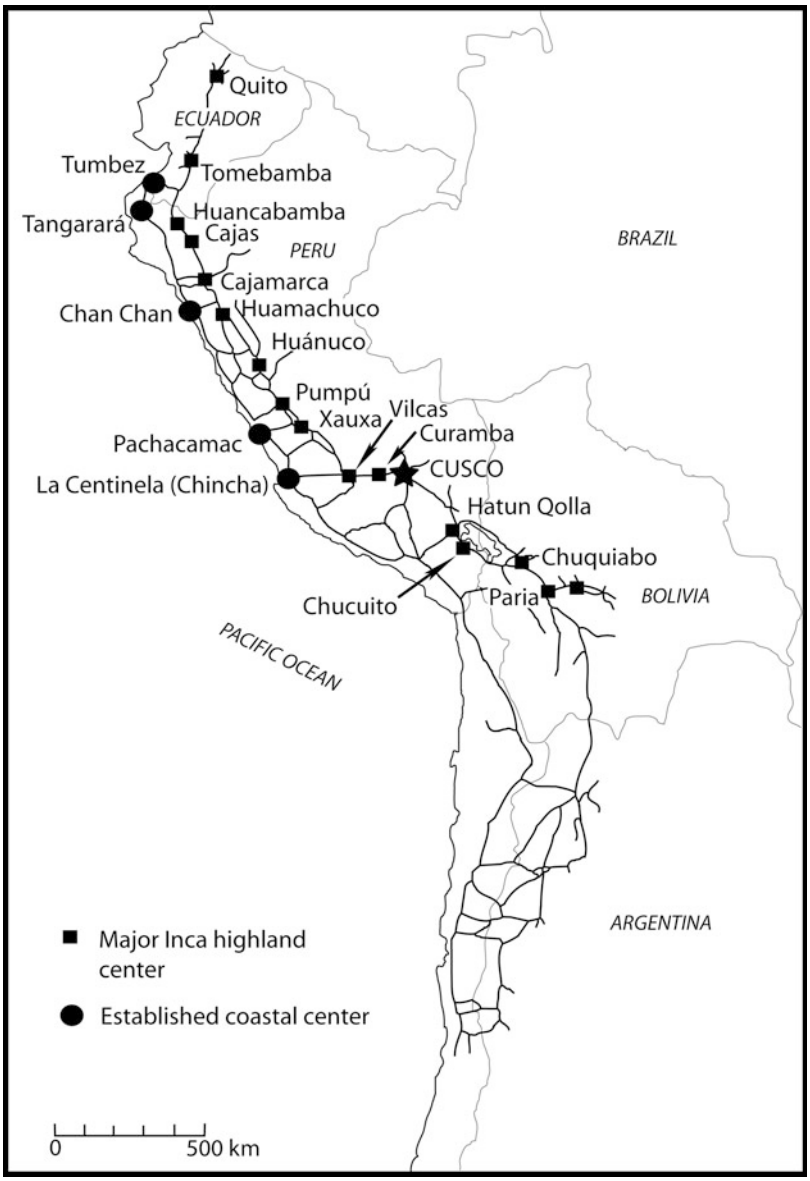

Inca State and Empire Formation, Fig. 1 Map of Inca territory at the time of the European invasion

the Incas were still in the process of territorial expansion and provincial consolidation when the foreign invasion interrupted their dynasty. Tawantinsuyu, the Inca "Realm of the Four Quarters," had a population comparable to that of Spain at the time, one that spoke dozens of languages and dialects and lived across some of the planet's most diverse landscapes. The conquering Spaniards did not stop to ponder what factors enabled Inca imperial unity, or to reflect on the rapidity of the Inca military achievement (much of the empire's territory had been annexed in the lifetimes of the oldest living informants). A generation later, the chronicler Juan de Betanzos recalled (1996[1550s]: 3) that the Spaniards "paid less attention to fact finding than to subduing and acquiring the land and... because they were unaccustomed to dealing with the Indians... they did not know how to make inquiries and ask questions because they lacked an understanding of the language. Moreover, the Indians were afraid to give them a full account."

Definition

The question of Inca origins is saturated with ideologies of imperial self-justification found among Incas and Spaniards in the late sixteenth and early seventeenth centuries. Inca informants and Spanish writers alike sought to colonize the past to promote their own immediate interests – to see the rise of the Incas as the realization of the ideals of civilization, or as a descent into tyranny and demonically inspired depravity. Although archaeology is constrained by its own incompleteness and bias, recent decades of research have established independent evidence of the remains of the Andean world at the time of Inca origins. Today, Inca scholars are in a position to offer a much more solid narrative on the origins of this impressive society.

The Incas were not the first Andean civilization, but their state formed during uncertain times, when many Andean societies had turned away from political hierarchies and central institutions. As climatic conditions fluctuated around CE 1000, most highlanders focused on social networks that could labor across a diverse set of resources, and they defended their homes, pastures, and fields from local rivals as populations grew to strain resource availability. Rather than manage risk through diversity, the Incas and a few of their neighbors focused on surplus production, and as populations grew their leaders organized the construction of new irrigation canals and agricultural terraces to cultivate maize and other crops. Inca society eventually grew to be larger and more hierarchical than its neighbors, and its leaders began to establish formal ties to groups across the Cuzco region, relationships that brought labor tribute and turned the growing city of Cuzco into a ceremonial center where labor was reciprocated through rituals and festivities. Whereas marriage allies augmented labor available for royal projects, Inca enemies became targets for conquest, and a century or more saw Inca armies reduce many groups to tributary status, opening up new lands for intensification and royal estate construction. The Incas raided their most powerful rivals for generations before finally conquering them on the eve of the first imperial campaigns.

By CE 1400, the Inca ruler was the most powerful lord in the central highlands, and the state controlled a large population that provided labor on improved farmlands to produce massive surpluses for state functions and religious offerings and to supply large armies on extended campaigns. A state conquest ideology would have been necessary to justify imperial entanglements beyond the Cuzco region, and the ruler who wished to lead Inca armies beyond traditional boundaries would need charisma and political savvy to encourage Inca nobles and commoners to labor harder and risk their lives to support expansion. Undoubtedly, this is where stories of external threats, challenges to the Inca paramount title, and assertions of divine patronage would have been influential, but these claims alone were not sufficient to launch the juggernaut of empire.

Historical Background

The Spanish crown only began to address the question of Inca origins seriously in the 1550s, as part of a debate over whether military conquests in the Americas were just (Covey 2006a). To collect narratives of the Inca past, chroniclers turned to indigenous informants, including members of royal Inca lineages who provided particularly detailed narratives of their ancestors' feats. The Incas did not preserve their histories in writing prior to the European invasion; instead, they relied on the memories of oral history specialists – who were aided by the *khipu*, a collection of knotted cords that could be used to record some information – as well as periodic ceremonial performances that celebrated a ruler's conquests. Private histories of the Inca nobility served as the basis for "official" state accounts that periodically purged and reorganized the master narrative. Inca elites approached the transcription of Spanish accounts of their dynasty as a comparable project, one that offered a means of solidifying their status on the emerging colonial landscape.

The corpus of colonial Inca sources is a complex collection of archival documents and published chronicles that can be divided roughly

into four principal periods (Table 1). It is important to recognize that many sources available for study today were not published until the nineteenth or twentieth century. Eyewitness accounts written before 1550 generally show limited regard for Inca history, emphasizing the military exploits of Spaniards during the conquest and subsequent civil wars of the 1540s and early 1550s. Spaniards wrote the first detailed narratives of the Inca dynasty in the 1550s (e.g., Betanzos, Pedro de Cieza de León, Bartolomé de Las Casas), but these were generally not published at that time. By the 1560s, the Spanish crown began to assert control over publications about the Inca past, decreeing that a royal chronicler be sent all manuscripts so that an official account could be kept. The creation of an "official" Inca chronicle – the unpublished 1572 account of Pedro Sarmiento de Gamboa – and censorship of other sources established Spanish royal control over the Inca past, which only relaxed after the death of Philip II in 1598. The first indigenous accounts of the Inca past were written in the early seventeenth century, and some of the earliest manuscripts finally found their way into publication in secondary sources that excerpted them, often without attribution. Few scholars consider materials produced after the 1650s to be part of the body of primary documents.

Considering the diverse corpus of Inca chronicles and the different contexts under which different sources were written, the discussion of Inca origins requires attention to a number of interrelated questions that colonial documents and archaeological data address in different ways. Early colonial writers were most concerned with understanding when "civilization" and "good government" were first established in the Andes, and with establishing how far back into the past the Inca dynasty could be credited with imperial conquests. This entry addresses these highly political colonial-era themes in light of a large body of archaeological data collected in recent decades.

Inca State and Empire Formation, Table 1 Key periods of Inca historiography (dates approximate)

Dates	Sources
1532–1550	Eyewitness accounts
1550–1565	Early dynastic histories
1565–1600	Crown-controlled histories
1600–1650	Indigenous and secondary accounts

Key Issues/Current Debates

The Incas claimed to be the first and only civilization to develop in the Andes. After the time of creation, the first ancestors emerged onto the wild landscapes of the region, taming them and establishing the trappings of human life. Indigenous chroniclers recount that the land eventually became overpopulated, leading people to abandon good farmland and seek mountaintop fortresses as conditions of universal warfare descended on the Andean world – Felipe Guaman Poma de Ayala (2009[1615]) called this time "The Age of the Enemy" (*aucapacha*) (Fig. 2). Inca order brought

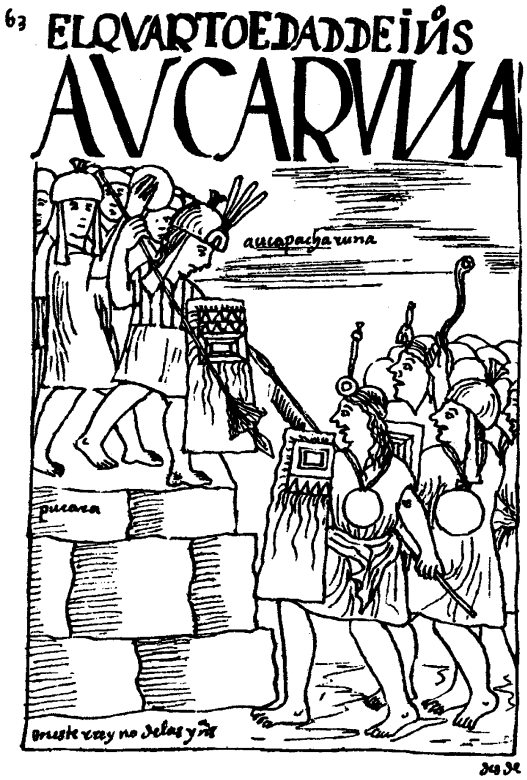

Inca State and Empire Formation, Fig. 2 Guaman Poma de Ayala's depiction of universal warfare before the Incas established the first and only Andean civilization

the fighting to an end, establishing civilized government and permitting people to return to the places that their ancestors had selected to settle.

Archaeologists have known for more than a century that the material record contradicts the indigenous Andean account of the rise of civilization. Excavation work on the Pacific coast and in the highlands has identified urban centers that predate the Incas by centuries, and archaeological data offer detailed reconstructions of earlier states, such as Moche and Chimú on the coast, and Wari and Tiwanaku in the highlands. Because Inca expansion was so rapid and subsumed the core territories of all states that came earlier, some scholars have pondered the extent to which the Incas inherited or appropriated the institutions of their predecessors. The emergence of the Inca dynasty as a leading power in the Cuzco region followed a period of more than 200 years of balkanization after the disintegration of the Wari and Tiwanaku states. Although the Incas may have retained some practices regarding labor coordination and agricultural intensification that Wari colonists brought to the Cuzco region from CE 600 to 1000, Inca religion, economy, and state infrastructure are different in many ways from the practices of earlier states.

Despite recognizing the flaws in the indigenous story of creation cycles and the rise of Inca civilization, archaeologists have often invoked the Andean concept of universal warfare when describing the archaeological evidence from the central highlands after CE 1000. With the onset of more arid and fluctuating climatic conditions around that time, most highland populations abandoned intensive agricultural practices in favor of mixed farming and herding. Local economies emphasized kin-based production of diverse resources as a principal risk management mechanism, and many communities settled in locations offering maximum local environmental diversity, as well as natural defenses against predation of the resources needed to survive. Many highland regions saw a shift to hilltops and ridges, with settlement hierarchies indicating an absence of centralized political administration. Population growth from CE 1000 to 1200 in many parts of the highlands attests to the adaptive success of this new economic regime, but extensive subsistence practices required large catchment areas, and some societies became victims of their own successes – increased conflict marked the final years before Inca conquest. Radiocarbon dates suggest that warfare escalated in frequency and scale in many regions after CE 1200 or so, and fortifications (*pucaras*) are common across the central highlands during this time. Thus, indigenous chroniclers such as Guaman Poma de Ayala are correct that the Inca empire emerged on a densely populated, decentralized highland landscape that was plagued by frequent raiding and warfare; but these were the long-term results of successful social adaptations tied to the collapse of earlier states, rather than the progression from a natural condition to a civilized one. It is noteworthy that the Cuzco Valley and some nearby areas represent a rare exception to the *aucapacha* model – the most powerful groups in the region lived in large valley-bottom settlements in close proximity to fertile maize lands.

The general trends in highland settlement patterns in the Late Intermediate Period – diversity-oriented economies, defensive settlements, and regional decentralization – offer a context for considering Inca accounts of their ancestral origins. Inca nobles claimed that their ancestors had been present for universal creation, making particular links to the celebration of regional pilgrimages in the Lake Titicaca region (Bauer and Stanish 2001). At a more local level, they claimed that the ancestral male–female pairs who founded their dynasty had emerged from a cave in a place called Pacarictambo, located to the south of the Cuzco Valley (Bauer 1992) (Fig. 3). The Inca ancestors journeyed northward in search of fertile maize lands where they could settle, conquering local groups and establishing shrines along their route. It is said that Manco Capac, the first king, knew to settle in Cuzco when a golden staff that he carried sank into the deep soil of the valley (Sarmiento de Gamboa 2007[1572]: Chap. 13). Indigenous accounts of the first Inca (e.g., Garcilaso de la Vega 1966[1609]: Book I, Chap. 18) identify prominent counterparts – other rulers with the kingly title "capac" – living to the northwest and southeast of the Cuzco Basin.

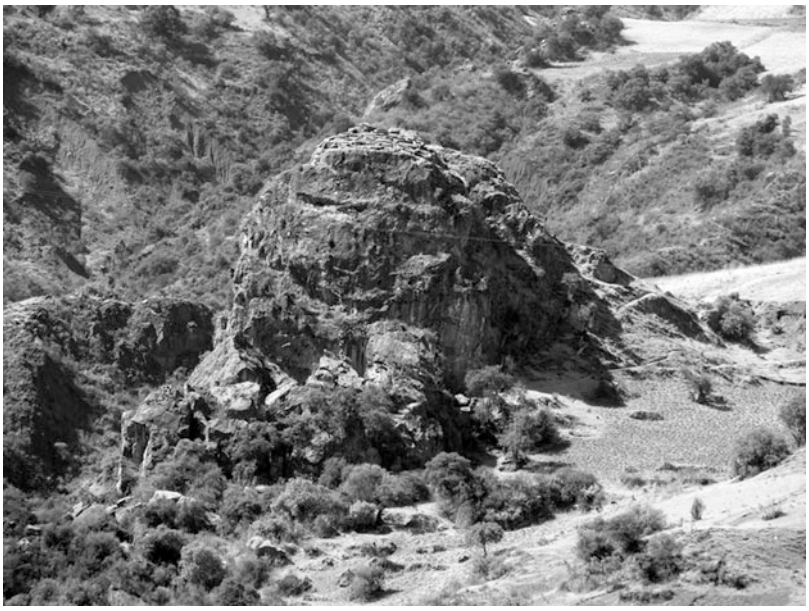

Inca State and Empire Formation, Fig. 3 The rock of Poma Orqo, celebrated in imperial times as the place of emergence of the first Inca royal ancestors

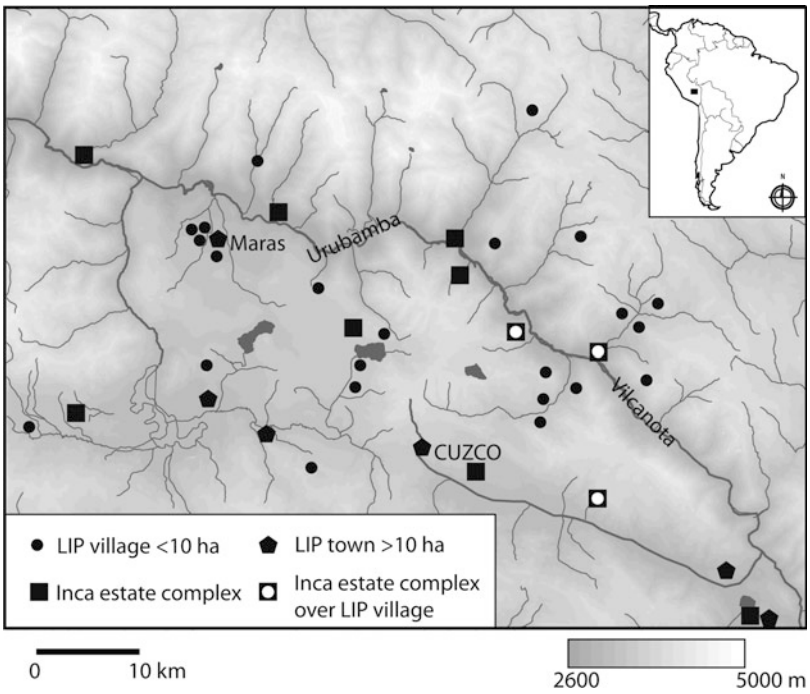

Inca State and Empire Formation, Fig. 4 Important settlements of Late Intermediate Period (CE 1000–1400) Cuzco. The Incas and their most powerful rivals were valley-bottom farmers living in large communities

Although the Inca ancestral origin story contradicts key archaeological facts, it preserves some important truths that are borne out in the settlement pattern data. The Incas were valley-bottom maize farmers, as were their most powerful early rivals. As Fig. 4 shows, there is an axis of large valley-bottom settlements occupying some maize-producing areas in the Cuzco region, which includes the Cuzco Basin and the areas where Inca myths identify rival kings. These communities lack evidence of defensive works and suggest that surplus maize production was a key risk

management strategy. This subsistence pattern is virtually nonexistent elsewhere in the Andean highlands at this time.

International Perspectives

Inca narratives of imperial origins present a paradoxical stance regarding threats from rival polities – on the one hand, the Incas claimed to be the only Andean civilization; but on the other hand, they justified the expansion of their empire as a strategy for defending themselves from the imperialistic designs of rival groups. Just as archaeologists have been willing to build interpretive models around the flawed account of universal warfare in the pre-Inca Andes, many have accepted the Inca claim of defensive imperialism, which was allegedly catalyzed by the invasion of the Cuzco region by Chanca armies in the early fifteenth century. Viewing Inca imperial origins as the outcome of a single battle lends itself to a historicist reading of Inca imperial origins, where a single charismatic ruler named Pachacutic Inca Yupanqui repelled the invading Chancas and then proceeded single-handedly, and without precedent, to create imperial institutions and to lead campaigns of conquest.

This interpretation of Inca origins owes much to the pioneering work of John H. Rowe (e.g., 1945), who identified Pachacutic as the Inca who founded the empire and who established a dynasty whose exploits can be largely treated as historical. Rowe accentuated the historicity of the imperial Inca rulers – Pachacutic, Tupa Inca Yupanqui, Huayna Capac, Huascar, and Atahuallpa – by promoting calendar dates from the 1586 chronicle of Miguel Cabello Balboa (a source that is otherwise largely ignored for its content). The year 1438, said to be the accession of Pachacutic, came to mark the sudden florescence of the Incas as an imperial society – and their emergence from the shadows of legend into the historical realm.

Although archaeological data are better suited to addressing processes than historical events, recent research in the Andean highlands has revealed the Inca claim of defensive imperialism to be a chimera, invented as part of the imperial conquest ideology. The homelands of the groups said to have threatened the existence of Inca society have been found to be far less powerful than described in the sixteenth century. Regional settlement patterns in the Chanca homeland exhibit defensive settlement and regional decentralization that are common across most parts of the Andean highlands during the Late Intermediate Period (Bauer et al. 2010). The same is true for the Colla region of the Titicaca Basin – although Inca informants claimed that their early campaigns there were motivated by the imperial designs of the Colla ruler, their descriptions of expansionist kingdoms are utterly at odds with the archaeological evidence (Arkush 2011).

Rowe's historicist paradigm was based on the writings of early colonial Spanish writers who thought about history in terms of dynastic lists and who approached the question of Inca imperial origins by asking which king created the empire and led the Incas out of Cuzco on their first imperial campaigns. Explaining the unprecedented and meteoric rise of a great man led many writers to invoke supernatural explanations that modern scholars would not take at face value. For example, Pachacutic won his victory over Chanca invaders not as a general commanding Inca troops, but with the aid of an army of fieldstones that were transformed into human warriors and armed by the creator, Viracocha, who had appeared to the young Inca prince before the battle to promise him victory and imperial success. Today, many scholars emphasize a sudden flourish of Inca imperial power under Pachacutic, but they downplay the acts of divine intervention that the colonial sources employ to explain that transformation.

Contrasting with writers who were preoccupied with a single great man, the early colonial jurist Polo de Ondegardo framed the issue in terms of social transformations and changes in the balance of power in the Cuzco region. To answer how the Incas had conquered the Andean region in just a few generations, he wrote in 1571 (1916: 51) that "these Incas conquered through violence and warfare. . . and thus the only difficulty was in conquering those neighboring polities of the Cuzco region, because afterwards, all the

conquered groups went with them [the Incas], and it was always a much larger force than the others [i.e., opposing local groups]." If the key to Inca success was the conquest and consolidation of the Cuzco region, many chronicles fall short of explaining these processes. Indigenous chronicles claim that Manco Capac, the founder of the Inca dynasty, unified the Cuzco region under Inca ruler during his lifetime, allowing the Incas to expand as an empire from the earliest generations. This claim cannot be reconciled with the archaeology of the Andes in the centuries before the Spanish conquest, a fact that motivated Rowe to propose a later origin for the empire. The chronicles that describe imperial origins through the heroic accounts of Pachacutic (or his father, Viracocha Inca) focus on supernatural forces instead of social power, also falling short of a convincing explanation. In recent decades, new archaeological data and a process-based reading of the chronicles have developed a more nuanced sense of the processes of Inca state formation and the development of the institutions and strategies that enabled rapid imperial expansion.

Multiple Inca dynastic narratives describe how the Incas came to dominate the Cuzco region during the three or four generations before the first imperial campaigns. By studying Inca state formation as a long-term process affecting the Cuzco Valley and neighboring areas, the documentary record can be studied alongside the regional archaeological database, which offers coarse-grained perspectives on settlement pattern changes before and after Inca conquest (Bauer and Covey 2002; Covey 2006b). The chronicles describe several important ways that Inca society changed in the generations leading up to territorial expansion beyond the Cuzco region. Among these are royal marriage alliances, intensification of agricultural production, and military conquest. Whereas the first three or four Incas took their principal wives from villages in the Cuzco Basin, the generations that followed made strategic alliances with groups living in the surrounding region. These marriages consolidated the labor tribute owed to the ruler and his wife (or wives), which royals invested in new agricultural canals and terraces that they passed on to their descendants. The earliest known royal estate resources are found in the Cuzco Basin, but military conquests in the surrounding region brought new development opportunities in the neighboring Vilcanota-Urubamba Valley, where at least six generations of Inca rulers established valley-bottom maize lands (Covey 2006b). The chronicles describe military engagements developing into logistically sophisticated campaigns that conquered multiple holdout communities and reduced them to tributary service.

The archaeological evidence from Late Intermediate Period Cuzco augments documentary perspectives on Inca social transformation. Pre-Inca settlement patterns include scattered high-elevation villages like those seen across most of the highlands from CE 1000 to 1400, especially to the north and south of the Cuzco Valley (Bauer 1992; Covey 2006b). The Inca impact on these regions varied. To the south, the royal celebration of the Pacarictambo origin myth led to the construction of a new installation at Maukallaqta, associated with the Poma Orqo rock outcrop and the places mentioned in the ancestral migration to Cuzco. Despite the royal promotion of this new pilgrimage route, local settlement patterns remained largely unchanged, with existing villages simply connected by roads. In the Sacred Valley to the north of Cuzco, however, major resettlement occurred as the focus of population shifted from mountains and ridgetops to country palaces and scattered small settlements located around new valley-bottom fields built by royal lineages. Royal estate construction in the Sacred Valley began after the conquest of local populations, which is said to have occurred prior to the first imperial campaigns.

Contrasting with the highland pattern of decentralized and defensive settlement, the Cuzco Basin and areas to the east and west constitute an axis of large valley-bottom settlements located near fertile maize lands. Settlement in these areas was more nucleated and hierarchical, and presumably focused on surplus agricultural production on improved farmlands. The Inca impact across these areas was not uniform. Some areas show evidence of widespread site abandonment, such as the Maras area to the northwest of

Cuzco, where the settlements of a significant Inca rival were replaced by facilities associated with royal estates. In other parts, such as the area around the town of Anta, where honorary Inca groups lived, large villages exhibit settlement continuity from the first millennium BCE through the Inca period. A third pattern of valley-bottom occupation involved resettlement of areas lying between Inca territory and the lands of powerful rivals, which were presumably too dangerous to occupy and farm during conflicts with neighboring groups. This has been observed in the Oropesa Basin to the southeast of Cuzco (Bauer and Covey 2002).

Future Directions

Together, the chronicles and archaeology describe Inca origins as a regional process that affected Cuzco's different groups to varying degrees. A centralized state government was established in the Cuzco Basin well over a century before the first imperial campaigns, and the combination of marriage alliances, military campaigns, royal intensification projects, and resettlement of local populations increased the population providing labor service to Inca rulers, while also honing military tactics and ideological justifications for conquest warfare and subsequent economic intensification. The final consolidation of Inca rule over the Cuzco region coincided with the first imperial campaigns around CE 1400.

Although much progress has been made toward reconciling the documentary and archaeological records from the Cuzco region, there are still important avenues for future research to clarify aspects of Inca origins. Cutting-edge climate science in the south-central Andean highlands is reconstructing the environmental conditions under which the maize-farming Incas expanded into the lands of their neighbors, and modeling settlement pattern shifts with changing environmental conditions is a significant interdisciplinary task that lies ahead. Archaeological data are scarce in the areas lying immediately beyond the Inca imperial heartland, making it difficult to reconstruct and date the degree to which the conquest of the Cuzco region corresponds to the timing of the first imperial expansion campaigns. Finally, there is much to be learned about daily life in the Cuzco region before and after Inca unification of the region, and more domestic excavations are necessary to understand the true impacts of Inca rule on everyday life.

Cross-References

- ▶ Landscape Archaeology
- ▶ Machu Picchu: Geography and Culture
- ▶ South American Rock Art

References

Arkush, E.N. 2011. *Hillforts of the ancient Andes: Colla warfare, society, and landscape*. Gainesville: University Press of Florida.

Bauer, B.S. 1992. *The development of the Inca state*. Austin: University of Texas Press.

Bauer, B.S., and R.A. Covey. 2002. Processes of state formation in the Inca heartland (Cuzco, Peru). *American Anthropologist* 104: 846–864.

Bauer, B.S., and C. Stanish. 2001. *Ritual and pilgrimage in the ancient Andes: The Islands of the Sun and Moon*. Austin: University of Texas Press.

Bauer, B.S., L.C. Kellett, and M. Aráoz Silva. 2010. *The Chanka: Archaeological research in Andahuaylas (Apurímac), Peru*. Los Angeles: Cotsen Institute of Archaeology Press.

Covey, R.A. 2006a. Chronology, succession, and sovereignty: The politics of Inka historiography and its modern interpretation. *Comparative Studies in Society and History* 48: 166–199.

Covey, R.A. 2006b. *How the Incas built their heartland: State formation and the innovation of imperial strategies in the Sacred Valley, Peru*. Ann Arbor: University of Michigan Press.

de Betanzos, J. (1996[1550s]). *Narrative of the Incas*. Translated and edited by R. Hamilton. Austin: University of Texas Press.

de Ondegardo, P. 1916[1571]. *Relación de los fundamentos acerca del notable daño que resulta de no guardar a los Indios sus fueros* (Colección de Libros y Documentos Referentes a la Historia del Perú, serie I, 3): 45–188. Lima: Sanmartí.

Garcilaso de la Vega, "El Inca". 1966[1609]. *Royal commentaries of the Incas and general history of Peru, Part I*. Translated by H.V. Livermore. Austin: University of Texas Press.

Guaman Poma de Ayala, F. 2009[1615]. *The first new chronicle and good government: On the history of the*

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world and the incas up to 1615. Translated and edited by R. Hamilton. Austin: University of Texas Press.
Rowe, J.H. 1945. Absolute chronology in the Andean area. *American Antiquity* 10: 265–284.
Sarmiento de Gamboa, P. 2007[1572]. *The history of the Incas*. Translated and edited by B.S. Bauer & V. Smith. Austin: University of Texas Press.

Further Reading

Bauer, B.S. 2004. *Ancient Cuzco: Heartland of the Inca*. Austin: University of Texas Press.
Covey, R.A. 2008. Multiregional perspectives on the archaeology of the Andes during the late intermediate period (c. AD 1000–1400). *Journal of Archaeological Research* 16: 287–338.

India: Historical Archaeology

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Introduction

The roots of Indian historical archaeology rest in late eighteenth and early nineteenth century antiquarian research, a collaborative enterprise driven mostly by questions of historical interest for which archaeological evidence played an important role. The results of these investigations brought India's rich history, ancient and diverse literary traditions, and spectacular archaeological sites and monuments onto the world stage. They also gave India's colonial government its main rationale for direct involvement in archaeology and the creation of early national policies concerning archaeological sites and monuments.

India's archaeological horizons expanded considerably in the twentieth century as research revealed the temporal depth and richness of its past. By mid-century, the focus turned increasingly to work on questions of prehistory and protohistory, which now consume far greater attention and resources than historical archaeology. The latter subfield, however, will play a larger role in twenty-first century Indian archaeology as the nation addresses such issues as heritage conservation, tourism development, and identity in a rapidly changing and diverse country.

Indian historical archaeology today faces many of the same challenges as other countries. The sites and monuments that are the primary archaeological objects of its research are often either part of crowded urban landscapes; highly visible and, consequently, vulnerable features of the rural countryside; or are still in active daily use. As elsewhere too, these sites are being destroyed at a rapid rate (Fig. 1). On the historical research side of the picture, India shares with other former European colonies the problem that many primary documents relevant to historical archaeology do not reside there, but are in Europe, principally in

India: Historical Archaeology, Fig. 1 The recent past is just as endangered as that which is thousands of years old. This unique early twentieth century roadside shrine, which has Mysore State constables for door guardians, is threatened by simple benign neglect and encroaching urban developments. (Photo by Barry Lewis)

British archives. The effects of these challenges are compounded by India's recent rapid economic growth, its significant urban and rural infrastructure problems, its complex central and state government bureaucracies, and its population density, which is growing at a rate that, if sustained, will result in India overtaking China as the world's most populous country by 2021.

Definition

In common with most European countries, India takes a broad view of the domain of historical archaeology. As practiced, it is best defined as the study of that part of the archaeological record for which there exists contemporary documentary evidence. Such evidence spans most of the last 3,000 years (Chakrabarti 2006: 287, 315), but the boundary between Indian history and prehistory is a fuzzy one.

Elsewhere, notably in parts of the Americas and Australia, the term "historical archaeology" is increasingly associated with the period of European colonial expansion, or roughly the past 500 years (Orser 1996: 23–8). While India has much to contribute to the latter research, this represents only one theme in a large and more complex research field (Fig. 2).

Historical Background

Late eighteenth and early nineteenth century antiquarians in India were committed to the Enlightenment belief in the interpretive value of reason as the primary means to understand the order of a knowable world. And there was plenty to know in India, for ruined cities, ancient monuments, art, undecipherable inscriptions, epic poems, and diverse literary traditions in a host of languages seemed to present themselves at every turn. Challenged by the evidence of India's past, these early scholars sought to construct an understanding of Indian history that mapped ancient texts and other documentary evidence onto the archaeological record (Chakrabarti 2010: 4–5, 9).

Questions about India's past attracted little government interest and support, except in such specialized areas as legal systems and land tenures. Antiquarian research was centered in a few scholarly organizations, the most famous of which was the Asiatic Society of Bengal, which formed in early 1784 under the leadership of William Jones. In South India, the less formally organized, but productive research of Indian and European philologists and antiquarians such as Colin Mackenzie and other members of the "Madras School of Orientalism," turned equally fertile ground (Trautmann 2009).

India: Historical Archaeology, Fig. 2 In rural India, the material remains of the past weave in and out of the present. This isolated tree and the carved stones placed against its trunk are a modern Naga shrine, which was created with *nagakal* (snake stones) recycled from an old shrine. (Photo by Barry Lewis)

Brilliant and committed though the antiquarians were, their work did not directly result in the creation of a distinct scholarly discipline of archaeology. They lacked a clear understanding of how old the "past" may be, practical methods that would enable them to reconstruct the past from archaeological evidence and relate it to the relevant documentary evidence, and essential concepts of time, space, and culture upon which to build basic interpretive frameworks for this past.

The creation of the Archaeological Survey of India (ASI) in the early 1860s marked the beginning of direct government involvement in archaeology, the first professional archaeologists, and the first steps toward a national policy concerning historical sites and monuments. Most research continued to emphasize historical questions, but archaeology's role was typically as a "handmaiden to history" (Trautmann and Sinopoli 2002: 499, 501), which often amounted to little more than illustrating history books with interesting photographs, drawings, and descriptive details.

The first half of the twentieth century was a high water mark for the ASI and for Indian archaeology generally. ASI announcement in 1924 of the discovery of the Indus civilization astounded the archaeological world and pushed back the dating of the emergence of urban society by several millennia. Although the nature and complexity of Indus society continues to be the object of considerable discussion, the discovery ensured that Indian archaeology had a seat at the table of international inquiry into the origins of civilization (Paddayya 2002: 143). It also pulled resources away from research on the historical periods and contributed in some respect to the growing sentiment of Indian nationalism and the push for independence.

Archaeology in the mid-twentieth century turned increasingly to research on protohistory and prehistory, sometimes to the near exclusion of questions of historical interest (Chakrabarti 2003: 1, 9). The focus shifted again in the late twentieth century when renewed interest in historical archaeology began to develop and expand its role as an active partner in the construction of historical perspectives (Trautmann and Sinopoli 2002: 517–8). This trend has opened a continuing dialogue as archaeologists, historians, politicians, and the public alike address fundamental questions such as who owns the past, the role of the past in modern identity politics, the public representation of the past in everything from heritage sites to school textbooks, and what should be national priorities and policies for the conservation of the archaeological record in a rapidly changing country.

Key Issues/Current Debates

India faces several challenges that have significant implications for historical archaeology, if not the entire discipline. These challenges include the impact of modern political agendas and religious fundamentalism on historical archaeology, the need for strong professional archaeological leadership, and the development of a sense of shared stewardship for India's past. Each challenge is considered briefly in turn, below.

Indo-Aryan Debate

Discovery of the Indus civilization had a strong impact on Indian national identity. The effects of this discovery were so great that, following Independence in 1947, when the most famous Indus sites became part of the new nation of Pakistan, Indian archaeologists launched major research efforts to discover comparable sites within the redefined boundaries of India (Chakrabarti 2003: 1; Rajeeve 2006). Fortunately, while it was an instance of archaeological research motivated mostly by national pride, it was also quite productive.

Recent examples of the sociopolitics of Indian archaeology have not been so simple or easy to work through. Current hot button issues include the language of the Indus script, the "Aryan Migration," the relationship between the Indus civilization and the Vedas, and the interpretive value of India's most ancient writings as historical texts.

Strictly speaking, the Indus civilization does not fall within the purview of historical

archaeology. Although authorities generally agree that it was a literate society, its script is undeciphered and may remain undecipherable given the few data at hand. Nevertheless, the many attempts made to read the Indus script have also fed a long-standing controversy about the origins of Indian civilization, whether it was a largely indigenous development or one that can be explained by the migrations of Indo-European speakers (the so-called Aryans) into the subcontinent (Trautmann 2005; Chakrabarti 2008). DNA evidence, which could potentially clarify the issue, has, thus far, proved to be equivocal.

The debate is further complicated by controversy that surrounds the possible relationship between the Indus civilization and ancient texts called the Vedas. Did the Indus civilization rise and fall before the Vedas, or was it the Vedic civilization (Trautmann 2005: xxxvi)? And, do the ancient texts possess interpretive value? Scholarly opinions of the value of the Vedas as historical texts range from positive to nil. Answers to these questions have implications for major issues in national politics, religion, and Indian identity (Chakrabarti 2008). They have even spilled over into heated controversies about how such topics are treated in school textbooks (Viswesvaran et al. 2009). These issues have no easy resolution, and historical archaeology is caught in the middle of the debate.

Archaeological Leadership and the ASI

The Archaeological Survey of India (ASI) celebrated its 150th year of operation throughout 2012. The ASI is India's key archaeological institution and one of the world's largest archaeological agencies. Founded in 1861, its government mandate and budget place the ASI at the center of Indian archaeology. Most states have archaeology departments, but their budgets, staff training, and priorities vary greatly within the limits set by state antiquities and monument legislation and appropriations. At least 25 universities also have archaeology programs, often as part of history departments. While some of these programs, such as that at Deccan College, enjoy international research reputations, others lack the support necessary to maintain active fieldwork (Chakrabarti 2006: 510–3).

ASI leadership, which should be of the highest quality, faltered over the past couple of decades (Lahiri et al. 2002). No single reason adequately explains the lapse. For more than 12 years, the ASI director general, who reports to the Ministry of Culture, was not an archaeologist, but a career civil servant deputed from the ranks of the Indian Administrative Service. Many ASI staff and line positions went unfilled. Few excavations and other research were published. The ASI handling of the Ayodhya controversy, the flashpoint of which was the destruction of a sixteenth century mosque by a mob in 1992, also left it open to criticism at several levels (Guha 2005; Chadha 2010: 230–1).

The ASI is working to reclaim its former leadership role. The current ASI director general is a qualified professional archaeologist, and recent changes in the upper echelon of the organization ensure that qualified candidates can now realistically aspire to the top ASI post. Moribund publications such as *Ancient India* and *Epigraphia India* have been relaunched, and the entire run of the journal *Indian archaeology – a review* has been placed online. The ASI website has become a useful and frequently updated information source, and the various ASI circles, or regional divisions, have implemented their own websites. ASI-administered financial assistance to state archaeology departments and universities was announced in late 2011 by the Ministry of Culture, which also proposed to create archaeological fellowships for young scholars.

Heritage and the Commitment to Stewardship

India needs a comprehensive, feasible national policy for the care of its cultural heritage, one that encourages the development of a widely shared sense of stewardship of the past (Fig. 3). Its rapidly growing population and the attendant sprawl of cities and towns, industrial development, and even changes in agricultural technology are destroying archaeological sites in every part of India. It is unquestionably true that the prosperity and well-being of today's India is of far greater

India: Historical Archaeology, Fig. 3 Political party slogans and other graffiti deface a late medieval fort gateway at Mudgal in northern Karnataka. Cultural heritage education in the schools may help to curtail such vandalism by instilling in students a conservation ethic and a sense of stewardship of the past. (Photo by Barry Lewis)

India: Historical Archaeology, Fig. 4 Remains of the tomb or *samadhi* of an early Chitradurga king rest largely forgotten in the middle of a cultivated field. Like hundreds of thousands of sites, it has yet to be documented in state or national databases. (Photo by Barry Lewis)

concern than the care of its ancient sites, but, while it is easy to concede this point, it is equally clear that the destruction of the nation's cultural heritage must be controlled as much as possible for the public good and for the understanding of India's past by future generations.

On the legislative side, the Indian government recently took several measures to support heritage conservation. Several new initiatives encourage active cooperation between the ASI, state archaeology departments, universities, and non-governmental organizations like the Indian National Trust for Art and Cultural Heritage (INTACH). Government also announced the creation of a National Mission on Monuments and Antiquities in 2007. Its mandate is to construct a cultural heritage database of sites, monuments, antiquities, and art treasures and actively promote a national awareness of India's cultural heritage (Fig. 4). In 2010, a major amendment to The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act of 1958 created the National Monuments Authority, which adds teeth to existing legislation that protects

the immediate vicinity of national monuments and sites from unauthorized encroachments.

More than anything else, education will help to ensure that citizens become proactive stewards of the past for the sake of future generations. Promotion of a conservation ethic and pride in India's diverse cultural heritage in the classroom, a concerted effort by archaeologists to communicate what they do to local audiences and in local languages, prompt publication of research, encouraging the awareness of regional heritage priorities, and programs among local bodies such as village panchayats – all of these activities can make a difference.

International Perspectives

Archaeology was a European invention in India (Paddayya 2002: 119), and there is a long tradition of international collaboration, research funding, and training. In the best examples of international participation, such as the interdisciplinary project centered for more than 20 years around the ruins of the late medieval city of Vijayanagara (Fig. 5), the nation, its citizens, the historical and archaeological resources, and world archaeology derive considerable benefit from the relationship (Trautmann and Sinopoli 2002: 513–5). Regrettably, there are also counterexamples of international collaboration, which generate hard feelings in a country where the inequities of colonialism are still part of living memory (e.g., Chakrabarti 2003).

The future of international involvement in Indian archaeology clearly depends on the forging of long-standing research commitments in which Indian scholars are engaged in full collaborative partnership and where the international team brings skills, technology, or perspectives that are not readily available within India itself. While the *information* about India's past (about every country's past) may be said to belong to the world, Indian scholars must remain the primary creators of this information.

Future Directions

After decades in which prehistory and protohistory dominated Indian archaeology, historical archaeology is again emerging as an important research focus. However, its proper domain is now considered to be much broader than the fabled cities, palaces, and dynastic histories that interested the antiquarians of two centuries ago

India: Historical Archaeology, Fig. 5 Kota Shankara gateway at Vijayanagara, Bellary district, Karnataka. An ASI protected monument and UNESCO World Heritage site, the central core of Vijayanagara covers more than 25 km^2; archaeologists estimate that its fortified "metropolitan region" is roughly 600 km^2. Immense archaeological sites like Vijayanagara pose extraordinary heritage conservation challenges. (Photo by Barry Lewis)

India: Historical Archaeology, Fig. 6 A "hero stone" or *virakallu* that vandals uprooted and left abandoned among the ruins of a fourteenth century fort. It may eventually find its way into a local museum or collection or enter the pipeline that feeds the world market of stolen antiquities. (Photo by Barry Lewis)

(Settar and Korisettar 2002: xvi). The breadth of current research responds in part to the widely perceived need for perspectives of the past that speak equally to every Indian without prejudice, rancor, or disrespect. It is only then that researchers can expect the public to fully appreciate their cultural heritage, the value of archaeology, and why archaeology may deserve their support (Fig. 6).

Historical Evidence Is More than Texts

Indian history is based mostly on the authority of sources such as ancient texts, dynastic lists, inscriptions, coins, and the like (Chakrabarti 2010: 1–3). Historical archaeology's often-mentioned "handmaiden" role in the construction of history is due in no small part to its ready acceptance that this is the best part that archaeology can play (Ray & Sinopoli 2004). These constraints are largely self-imposed.

There are good reasons to cast widely for new types of sources that meet the criteria of valid and reliable primary evidence. For example, among nonliterary textual sources for precolonial and colonial India, historical archaeologists may find much of research value in relatively unexplored village-level records such as the *kaditas* or "black books" of the South (Hatti and Heimann 1991), *khanasumari* or house census records (Peabody 2001), and the archives of monasteries and *mathas*. Even the ocean floor is yielding valuable historical archaeological evidence as researchers investigate maritime and drowned terrestrial sites along India's thousands of kilometers of coastline (Gaur and Vora 2011).

Among other major sources that most researchers have yet to tap, historical cartography and high-resolution digital aerial imagery of India's landscape hold extraordinary promise for historical archaeology. As recent as the 1990s, it was hard to acquire aerial imagery in India, and inexpensive global positioning system (GPS) devices were no more accurate and precise than within tens of meters. Now, Google Earth and other spatial websites can show detailed images of most places on Earth at the expense of a few mouse clicks, and readily available GPS technology offers submeter accuracy. For those archaeologists who master the necessary technical geographic information systems (GIS) skills or whose research budgets can afford to pay for this expertise, a whole new world of historical archaeological spatial studies lies at their feet.

For their part, historians also have an important part to play in the creation of archaeological evidence. Harding's (1997–1999) exhaustive study of East India Company smallarms is a good example of historical research that has significant archaeological implications. By limiting his research to firearms, a category of material culture that played an important role in the establishment of British hegemony in India and elsewhere, Harding succeeds in placing it into social, political, and technological context in a way that earlier researchers could only imagine. Now, archaeologists and historians alike, when they walk the field

at Assaye or the fort walls at Srirangapatna, have a much more robust basis with which to evaluate the documented contribution made by infantry to these battles.

Historical Archaeology and the Rules of Evidence

Historical archaeology often gets little respect among historians, and even among some archaeologists, partly because its results sometime merely reaffirm that which we felt we already knew, and partly because these results often appear to be only weakly supported by convincing evidence that permits no other interpretation.

In historical archaeology, as in every research field, the power of an explanation, interpretation, or claim rests on the quality of the evidence that supports it. Many historians everywhere take a skeptical view of archaeological interpretations because they often appear to be based on little more than conjecture and personal bias (Henige 2005). This view can change only when it is standard practice for historical archaeologists to demonstrate unequivocally the validity and reliability of their research results. Each claim must meet the rules of evidence of both history and archaeology; such rules are not trivial, nor do they vary with the race, ethnicity, religion, gender, or political views of the researcher. If an interpretation fails to meet the rules of evidence, then it must be discarded. There is no middle ground.

These comments about the rules of evidence are particularly relevant to the situation of historical archaeology in India today (e.g., Guha 2005). Is archaeological evidence to be determined by political or religious ideologies or by the same standards and conventions that scholars demand of each other in the rest of the world? The answer will determine much of the future of Indian historical archaeology.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Archival Research and Historical Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Historical Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ Nationalism and Archaeology
- ▶ Postcolonial Archaeologies

References

Chadha, A. 2010. Commentary: Archaeological survey of India and the science of postcolonial archaeology. In *Handbook of postcolonial archaeology*, World archaeological congress research handbooks in archaeology, ed. J. Lydon and U.Z. Rizvi, 227–233. Walnut Creek: Left Coast Press.

Chakrabarti, D.K. 2003. *Archaeology in the Third World: A history of Indian archaeology since 1947*. New Delhi: D.K. Printworld.

Chakrabarti, D.K. 2006. *The Oxford companion to Indian archaeology: The archaeological foundations of ancient India, Stone Age to AD 13th century*. New Delhi: Oxford University Press.

Chakrabarti, D.K. 2008. *The battle for ancient India: An essay in the sociopolitics of Indian archaeology*. New Delhi: Aryan Books International.

Chakrabarti, D.K. 2010. *India: An archaeological history: Palaeolithic beginnings to early historic foundations*. 2nd ed. New Delhi: Oxford University Press.

Gaur, A.S., and K.H. Vora. 2011. Maritime archaeological studies in India. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 513–534. Oxford: Oxford University Press.

Guha, S. 2005. Negotiating evidence: History, archaeology and the Indus civilisation. *Modern Asian Studies* 39: 399–426.

Harding, D.F. 1997–1999. *Smallarms of the East India Company, 1600–1856,* 4 vols. London: Foresight Books.

Hatti, N., and J. Heimann. 1991. The return of the "black books": A unique, new source-material for reinterpretation of south Indian history. *Scandinavian Economic History Review* 39: 42–89.

Henige, D.P. 2005. *Historical evidence and argument*. Madison: University of Wisconsin Press.

Lahiri, N., V. Sethi, and B. Purushartha. 2002. Historical archaeology of India: An outline of the work of the Archaeological Survey of India. In *Archaeology and historiography: History, theory and method, Indian archaeology in retrospect*, ed. S. Settar and R. Korisettar, 71–115. New Delhi: Manohar.

Orser, C.E. 1996. *A historical archaeology of the modern world*. New York: Plenum.

I

Paddayya, K. 2002. A review of theoretical perspectives in Indian archaeology. In *Indian archaeology in retrospect: Archaeology and historiography: History, theory, and method*, ed. S. Settar and R. Korisettar, 117–157. New Delhi: Manohar.

Peabody, N. 2001. Cents, sense, census: Human inventories in late precolonial and early colonial India. *Comparative Studies in Society and History* 43: 819–850.

Rajeeve, C.B. 2006. Preface. In *Indian archaeology 2000–2001 – A review*: unpaginated. New Delhi: Archaeological Survey of India.

Ray, H.P., and C.M. Sinopoli, eds. 2004. *Archaeology as history in early South Asia*. Delhi: Indian Council of Historical Research.

Settar, S., and R. Korisettar. 2002. Introduction. In *Indian archaeology in retrospect: Archaeology and historiography: History, theory, and method*, ed. S. Settar and R. Korisettar, xi–xix. New Delhi: Manohar.

Trautmann, T.R. 2005. Introduction. In *The Aryan debate*, ed. T.R. Trautmann, xiii–xliii. New Delhi: Oxford University Press.

Trautmann, T.R. 2009. *The Madras School of Orientalism: Producing knowledge in colonial south India*. New Delhi: Oxford University Press.

Trautmann, T.R., and C.M. Sinopoli. 2002. In the beginning was the word: Excavating the relations between history and archaeology in South Asia. *Journal of the Economic and Social History of the Orient* 45: 492–523.

Viswesvaran, K., M. Witzel, N. Majrekar, D. Bhog, and U. Chakravarti. 2009. The Hindutva view of history: Rewriting textbooks in India and the United States. *Georgetown Journal of International Affairs* 10: 101–112.

Further Reading

Andrén, A. 1998. *Between artifacts and texts: Historical archaeology in global perspective*. New York: Plenum.

Archaeological Survey of India. http://asi.nic.in/. Accessed 24 May 2012.

Archaeological Survey of India. Project document: National mission on monuments and antiquities. http://asi.nic.in/nmma/Minutes_of_finance_commitee.pdf. Accessed 24 May 2012.

Chakrabarti, D.K. 2011. *The geopolitical orbits of ancient India: The geographical frames of the ancient Indian dynasties*. Oxford: Oxford University Press.

Gazette of India, Extraordinary. 2010. *The Ancient Monuments and Archaeological Sites and Remains (amendment and validation) Act, 2010. part II, section I, 30 March 2010*. New Delhi: Ministry of Law and Justice, Government of India http://asi.nic.in/minutes/AMASR_Act2010_Gazette_Notification.pdf. Accessed 25 May 2012.

Gregory, I.N., and R.G. Healey. 2007. Historical GIS: Structuring, mapping and analysing geographies of the past. *Progress in Human Geography* 31: 638–653.

Guha-Thakurta, T. 2004. *Monuments, objects, histories: Institutions of art in colonial and postcolonial India*. New York: Columbia University Press.

Indian archaeology – A review. http://asi.nic.in/asi_publ_indian_archaeology.asp. Accessed 24 May 2012.

Indian National Trust For Art and Cultural Heritage (INTACH). http://www.intach.org. Accessed 24 May 2012.

Lahiri, N. 2000. Archaeology and identity in colonial India. *Antiquity* 74: 687–692.

Mantena, R.S. 2012. *The origins of modern historiography in India: Antiquarianism and philology, 1780–1880*. New York: Palgrave MacMillan.

Nair, J. 2003. Bulldozing the past into existence. *Economic and Political Weekly* 38: 4207–4209.

Paddayya, K. 1996. Modern impacts on archaeological sites in India: A case study from the Shorapur Doab, Karnataka. *Man and Environment* 21: 75–88.

Parliament of India. 2005. 91st report on the functioning of the Archaeological Survey of India. http://164.100.47.5/book2/reports/t_and_t/91streport.htm. Accessed 25 May 2012.

Selvakumar, V. 2006. Public archaeology in India: Perspectives from Kerala. *India Review* 5: 417–446.

Selvakumar, V. 2010. The use and relevance of archaeology in the post-modern world: Views from India. *World Archaeology* 42: 468–480.

Sengupta, G., and S. Chakraborty, eds. 2008. *Archaeology in early historic South Asia*. New Delhi: Pragati.

Settar, S., and R. Korisettar, eds. 2002. *Indian archaeology in retrospect, volume 4: Archaeology and historiography: History, theory, and method*. New Delhi: Manohar.

State Archaeological Legislation. http://asi.nic.in/asi_mission_legislations.asp. Accessed 25 May 2012.

Thapar, R. 2005. Politics and the rewriting of history in India. *Critical Quarterly* 47: 195–203.

Vijayanagara Research Project. http://www.vijayanagara.org. Accessed 24 May 2012.

Indian Ocean: Maritime Archaeology

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Introduction

The Indian Ocean is the Earth's third largest oceanic division and covers approximately 20% of its surface, with an estimated area of 28,350,000 mile^2 (73,427,795 km^2). It is bounded by three continents – Asia to the north, Africa to the west, and Australia to the east – and shares its southern

boundary with the Southern Ocean and Antarctica (Fig. 1). At its widest point, the Indian Ocean extends nearly 6,200 miles (9,977 km) between the southern tips of Australia and Africa. Small islands dot the Indian Ocean's continental rims, and several island nations, including Madagascar, Sri Lanka, and Mauritius, as well as the Maldives, Seychelles, Comoros, and Indonesian archipelagos, either border or are included within its waters. The Red Sea and Persian Gulf are both considered extensions of the Indian Ocean.

All of the world's earliest civilizations, including those in Mesopotamia, ancient Egypt, and the Indian subcontinent, developed around the Indian Ocean. Its waters are considerably calmer than those of both the Atlantic and Pacific Oceans, and characterized by powerful monsoons with prevailing winds that undergo predictable alternating seasonal shifts. As a consequence, the Indian Ocean hosted some of the world's first maritime trade networks, including those that developed between Mesopotamia and the Indus Valley c. 2500 BCE. Over the course of subsequent centuries, vessels embarked from ports in such diverse locales as Greece, Egypt, India, Persia, Indonesia, China, Portugal, the Netherlands, France, and Great Britain to engage in voyages of commerce, exploration, colonization, and warfare throughout its vast waters (Rais 1986: 13–36). Evidence of these and other cultures, and their interactions with one another and the larger Indian Ocean maritime landscape, are represented by a wide array of cultural heritage, including shipwrecks, submerged settlements, inundated landscapes, and abandoned infrastructure.

Definition

Keith Muckelroy (1978) originally defined the discipline of maritime archaeology as "the scientific study of the material remains of man and his

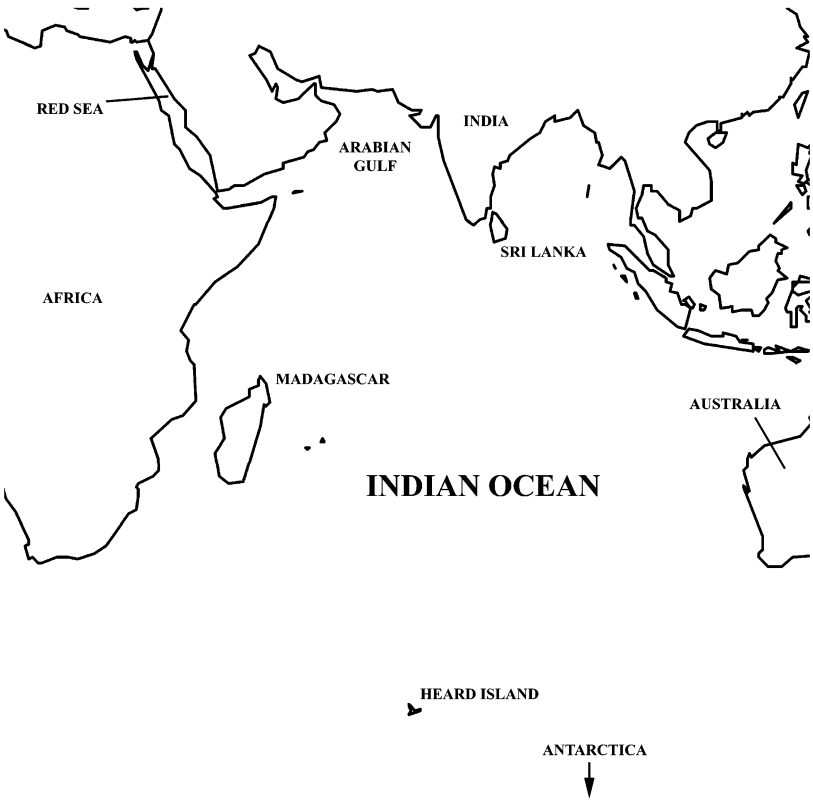

Indian Ocean: Maritime Archaeology, Fig. 1 Map of the Indian Ocean, showing its geographical boundaries (author)

activities on the sea." This has subsequently been expanded and refined to include "human interaction with the sea, lakes, and rivers through the archaeological study of material manifestations of maritime culture" (Delgado 1997: 259). Using these explanations as a benchmark, maritime archaeology in the Indian Ocean may be regarded as the efforts of individuals and organizations to conduct scientific investigation of the material remnants of the Indian Ocean's maritime past, including – but not limited to – evidence of trade, commerce, exchange, conflict, water transport technology, seafaring, coastal settlement, port and harbor infrastructure, and inundated landscapes.

Historical Background

At present, maritime archaeological studies have either occurred, or are ongoing, within Indian Ocean waters or coastal zones in the following places: Australia, Heard Island, India, Sri Lanka, Yemen, Egypt, Sudan, Eritrea, Kenya, Tanzania, the Seychelles, Mozambique, Madagascar, Mauritius, and South Africa. This number represents only 15 of the 44 nations and territories that share one or more coastlines with the Indian Ocean, and a very small overall percentage of the potential archaeological sites that are believed to exist within the oceanic division as a whole. Nonetheless, the discipline has clearly undergone significant expansion and development in the region over the past four decades, as evidenced by the research projects outlined below.

Australia and the Australian Antarctic Territory

Maritime archaeology in the Indian Ocean has its roots in the 1963 discovery of the shipwrecked United Dutch East India Company (VOC) vessels *Batavia* (1629) and *Vergulde Draeck* (1656) by recreational divers in waters of the Australian state of Western Australia. In the wake of extensive looting of cultural material from these sites, the finders of *Vergulde Draeck* transferred ownership of the wreck to the Western Australian Museum (WAM), which in turn pressed for protective legislation of all historic shipwrecks within the state's waters. Significantly, this action led to the development of a research-based maritime archaeology program at WAM, as well as federal legislation (the *Historic Shipwrecks Act* 1976) intended to protect historic shipwreck sites throughout Australia. Since the early 1970s, WAM researchers have conducted maritime archaeological investigations within coastal and offshore waters bordering Western Australia, and have assisted other Indian Ocean nations with the development and expansion of their own maritime archaeology programs and research (Staniforth 2011: 562–564, 576).

In the 1980s, a series of archaeological surveys were initiated at Heard Island, located within the sub-Antarctic region of the southwest Indian Ocean. Managed as part of the Australian Antarctic Territory, the island enjoys UNESCO World Heritage status and features a wide array of maritime heritage associated with sealing activities that occurred there between 1854 and 1877 (Fig. 2). Systematic investigation of these sites continued into the mid-2000s and included in situ documentation of artifact scatters, building foundations, tryworks, and a sealer's cemetery (Woehler 2004).

India

The emergence of maritime archaeology in India began with efforts to locate submerged elements of the ancient city of Dwarka in the late 1970s. Discovery of port infrastructure and several large stone anchors in the zone immediately offshore of the site's terrestrial components prompted a comprehensive investigation of these and other underwater features. It also served as a catalyst for the establishment of India's Marine Archaeology Centre (MAC) within the National Institute of Oceanography in 1981. In subsequent years, two other maritime archaeology centers were established at Tamil University and Andhra University, and an Underwater Archaeology Wing was created within India's national archaeology institute, the Archaeological Survey of India (Tripati et al. 2004).

Since the 1980s, maritime archaeological surveys and excavations have focused on several

Indian Ocean: Maritime Archaeology, Fig. 2 Trypots and tryworks associated with sealing activities at Heard Island between 1854 and 1877. (Image courtesy Eric J. Woehler, University of Tasmania)

locations dotting India's coast, including Poompuhar and Mahabalipuram. These sites include the remnants of ancient submerged ports established during India's early Christian era (seventh and eighth century CE). Features encountered at Poompuhar in both the intertidal and immediate offshore zones include remnants of brick structures, terracotta ring wells, and ceramics. Investigations at Mahabalipuram have revealed substantial submerged structural remains, including a portion of collapsed wall, dressed stone blocks, and an architectural assembly comprising steps and an associated platform (Sundaresh and Gaur 2011). These features may be associated with ornately carved stone temples reportedly observed near Mahabalipuram's shoreline by the first Europeans to travel to the region. Today, only one of the "Seven Pagodas" remains and was declared a UNESCO World Heritage Site in 1984. If their identity is confirmed, submerged elements of the site would be conferred the same status and degree of protection as their terrestrial counterparts, which would make Mahabalipuram the world's first – and currently only – World Heritage Site to specifically include underwater cultural heritage.

Historic shipwrecks have also been a focus of Indian maritime archaeology, and include efforts to identify and assess a number of wreck sites within the waters surrounding the historic port city of Goa (Tripati 2011). One of the more notable examples was discovered during a survey of Sunchi Reef, near the entrance to Goa Harbour. Archaeologists affiliated with MAC encountered the remains of a wooden-hulled vessel containing a variety of artifacts, including firearms, cannons, Chinese ceramics, and elephant tusks. Analysis of these items indicates the site represents an early seventeenth-century ship engaged in Indo-Portuguese trade and commerce (Fig. 3).

Sri Lanka

The 1963 discovery of an early eighteenth-century shipwreck at Great Basses Reef near Galle on the southwest coast of Sri Lanka was perhaps the first instance in which that nation's potential underwater cultural heritage was considered or even acknowledged; however, it was not until the early 1990s that the Sri Lankan government undertook an initiative to develop a program in maritime archaeology. With the advice and assistance of staff affiliated with WAM, a series of archaeological investigations have been carried out in Galle Harbour since 1992. These efforts resulted in the discovery, assessment, and identification of a wide range of maritime heritage sites,

Indian Ocean: Maritime Archaeology, Fig. 3 Fragments of Chinese porcelain recovered from the seventeenth-century shipwreck site at Sunchi Reef, India. (Image courtesy of Sila Tripati, Marine Archaeology Centre, National Institute of Oceanography)

including Indo-Arabian stone anchors, the seventeenth-century VOC shipwrecks *Avondster* and *Hercules*, and wrecks of a number of nineteenth-century iron steamships (Anderson et al. 2007).

In an effort to extend Sri Lanka's maritime cultural heritage management capacity, a national Maritime Archaeology Unit (MAU) was established in 2001. Its first major initiative was to excavate *Avondster*, as portions of the site were increasingly exposed and vulnerable to a variety of potentially destructive site formation processes. Between 2001 and 2004, MAU excavated sections of the vessel, surveyed and recorded its exposed remains, conserved collected artifacts, and prepared the latter items for display at the National Maritime Museum in Galle. The *Avondster* Project also served as a training program for MAU staff members, who received instruction in maritime archaeological methods and artifact conservation from experts affiliated with WAM, the Amsterdam Historical Museum, University of Amsterdam, James Cook University, and the Mexican Institute of Anthropology and History (Parthesius et al. 2005).

The Western Indian Ocean and Red Sea

In the Western Indian Ocean, the earliest systematic archaeological investigation of an underwater site is that of *Santo António de Tanná* (commonly referred to as the 'Mombasa Wreck'), a Portuguese frigate that sank while assisting in the defense of Fort Jesus, Mombasa Island (Kenya), in 1697. Recreational divers discovered the wreck in the 1960s, recovered a handful of artifacts, and brought them to the attention of the Fort Jesus Museum (FJM). An exploratory investigation of the site was organized by FJM in 1970, and artifacts recovered during this project confirmed its identity. In 1976, FJM requested assistance from the Institute of Nautical Archaeology (INA) at Texas A&M University to conduct a more comprehensive visual survey and assessment of the wreck. The results of this project, coupled with the significance of the material culture recovered during the 1970 investigation, motivated the National Museums of Kenya (NMK) to pursue further survey and excavation of the site. At NMK's urging, *Santo António de Tanná* was the subject of four seasons of field research organized by INA between 1977 and 1980. A conservation laboratory was established at FJM to treat over 6,000 finds recovered from the wreck site, and remains the only facility of its kind in East Africa (Piercy 2005; Lane 2012: 10–14).

In the same year *Santo António de Tanná* was identified, WAM maritime archaeologists conducted a survey of the remnants of an early European shipwreck at Boudeuse, a low-lying cay near Admiral Island in the Seychelles. Fishermen located the site in the early 1970s, and by the time

it was archaeologically surveyed, it had been subjected to extensive salvage that severely damaged its remaining hull structure and resulted in the recovery of at least 30 cannon and other artifacts, the majority of which have ended up in private collections. Despite these issues, enough evidence was collected to tentatively identify the wreck as *Santo António*, a Portuguese *nau* lost in 1589 (Lane 2012: 16).

For much of the 1980s, maritime archaeology in the Western Indian Ocean effectively ground to a halt; however, interest in the region and its underwater cultural heritage revived as a consequence of projects undertaken by organizations in Europe and the United States, as well as local institutions (Lane 2012: 31). In 1987, archaeologists affiliated with the French Department of Marine Archaeological Research located remnants of *Sussex*, a British East India Company vessel that sank near Bassas d'India in the Mozambique Channel in 1738. Subsequent investigations at the site resulted in the recovery of portions of the ship's Chinese porcelain cargo and other artifacts, while a survey of the surrounding reef led to the discovery of a cannon and two anchors that may be associated with *Santiago*, a Portuguese carrack lost at Bassas d'India in 1585 (Lane 2012: 19).

In 1990, scientists conducting a marine biology survey in Tanzania's Mafia Archipelago relocated an historic shipwreck that had been discovered by recreational divers near Juani Island in 1977. Among the many objects associated with the site were ten bronze cannons, three anchors, and a bronze bell bearing the inscription "H. . .&B H Co. 180_." Although now located within the boundaries of Mafia Marine Park, the shipwreck is yet to be comprehensively surveyed and identified (Lane 2012: 16).

Recreational divers were also responsible for the 1995 discovery of a shipwreck at Black Assarca Island off the coast of Eritrea. The mound of amphorae and scattered ceramics that comprise the site were investigated by INA in 1997, with support from the Eritrean Ministry of Marine Resources and the British Institute in Eastern Africa (BIEA). Based on comparison of the wreck site's ceramic assemblage with comparable pottery from terrestrial sites in Eritrea, Ethiopia, and Egypt, it has been tentatively dated to between the fifth and seventh centuries CE (Pedersen 2008; Lane 2012: 15).

INA archaeologists were also instrumental in the investigation of an Ottoman period shipwreck near Sadana Island, located along the Egyptian Red Sea coast. Excavations at the site between 1994 and 1998 resulted in the recovery of over 3,500 artifacts, one-third of which comprised Qing dynasty porcelain intended for the Middle Eastern market. The wreck's surviving hull remains are indicative of a large, three-decked vessel of Muslim ownership and likely Egyptian origin. In many respects, the Sadana Island site compares favorably to another shipwreck excavated near Sharm el-Sheikh in the early 1970s (Blue 2011: 504–505).

Between 1996 and 1999, a series of preliminary shipwreck surveys were initiated in the waters surrounding Ilha de Moçambique, a UNESCO World Heritage Site that was settled by Swahili peoples from the beginning of the first millennium CE until the late fourteenth century, after which it functioned as a shipbuilding center, trading port, and naval base for the Portuguese until the 1800s. Archaeologists affiliated with Eduardo Mondlane University organized and initiated the project with support from Brown University and the U.S. National Park Service. A number of historic shipwreck and other submerged sites were discovered as a consequence of these efforts (Lane 2012: 16–17).

In the early 2000s, maritime archaeology in Kenya was revived in a series of research projects undertaken by the University of Ulster's Centre for Maritime Archaeology (CMA) in collaboration with the NMK's Coastal Archaeology Unit, Tanzania's Department of Antiquities, the National Corporation of Antiquities and Museums of Sudan, University of Khartoum's Department of Archaeology, and the BIEA. The first of these involved systematic surveys of Mombasa Island and Harbor utilizing an integrated, interdisciplinary maritime landscape approach. Subsequent investigations included a marine geophysical survey of the Zanzibar Channel off Tanzania, and maritime landscape-based

investigations of the medieval town and port of Suakin on Sudan's Red Sea coast (Breen and Lane 2003; Lane 2012: 27–28).

Excavations at Myos Hormos and Berenice (Islamic *Queseir al-Qadim* and *Medinet-el Haras*, respectively) on the Egyptian Red Sea coast have provided valuable insight into harbors and their role in the facilitation and development of maritime commerce between Roman Egypt and trading centers in Arabia and India. Features encountered at Myos Hormos include part of a late first century BCE to early third-century CE Roman waterfront, jettisoned first-century CE amphorae near the entrance to the harbor, and a late first-century BCE or early first-century CE wharf or jetty comprised of numerous amphorae arranged in rows and buried beneath a packed earth surface. Functionally similar structures encountered at Berenice that comprise several large, linear coral blocks have been interpreted as seawalls or quays. These would have been used as moorings for vessels visiting the harbor and were constructed during the first and fifth centuries CE (Blue 2011: 499–500).

Recent archaeological investigations on Eritrea's Buri Peninsula have resulted in evidence for early human activity and adaptation in coastal environments. For example, at Abdur on the eastern side of the Gulf of Zula, Paleolithic handaxes and other stone artifacts dating to the Middle Stone Age were discovered in association with discarded marine mollusks and crustaceans – some of which appear to have been harvested and processed on site. Subsequent excavations at Asfet, Gelalo, and Misse East in 2005 and 2006 revealed early-middle Holocene occupations characterized by Later Stone Age artifacts discovered in association with marine shell. Taken as a whole, these studies provide evidence of early human exploitation of marine food resources, as well as some of the earliest coastal migrations of humans out of Africa (Beyin 2011; Blue 2011: 497).

Madagascar has hosted two maritime archaeology projects in recent years. The first, conducted in conjunction with terrestrial-based research that addressed the island's eighteenth-century Antandroy Kingdom, resulted in the discovery of four cannons and an anchor in shallow waters near Belitsaky on the southern coast. These objects are believed to represent *Degrave*, a British vessel that wrecked in 1703. In 1999, the wreck of a wooden vessel believed to be HMS *Serapis*, a British warship captured by American naval commander John Paul Jones during the American Revolution, was located at Île Sainte Marie. A team comprising American maritime archaeologists and researchers at the University of Madagascar conducted an excavation at the site in 2004 (Fig. 4); material culture recovered during these investigations was analyzed and conserved at the University of Antananarivo's Museum of Art and Civilization (Lane 2012: 20–21).

Between 2006 and 2008, researchers affiliated with the French not-for-profit organization Groupe de Recherche en Archéologie Navale located and investigated *L'Utile*, a ship owned by France's *Compagnies des Indes Orientales* that wrecked near Tromelin Island in 1761 while en route from Madagascar to Mauritius. The project was part of a broader UNESCO initiative to research the history of slavery in the Western Indian Ocean. Remnants of the wreck site comprised a widely scattered artifact assemblage, including iron cannons and anchors. In conjunction with the shipwreck survey, excavations were conducted on Tromelin Island in an effort to locate *L'Utile*'s survivors' camp (Marriner et al. 2010; Lane 2012: 20).

South Africa

Maritime archaeology has existed as a discipline in South Africa since the late 1980s; however, most research until very recently has focused on historic shipwrecks. While the vast majority of these studies have been restricted to the waters around Cape Town and along the nation's Atlantic (west) coast, a handful of wreck sites have been investigated in coastal areas that border the Indian Ocean. These include the British East India Company vessel *Arniston* (1815) and Royal Netherlands Navy ship *Amsterdam* (1817), lost on the south coast near Waenhuiskrans and at Algoa Bay, respectively. Remains of the Dutch warship *Bato* (1806) and British vessel *Brunswick* (1805) have

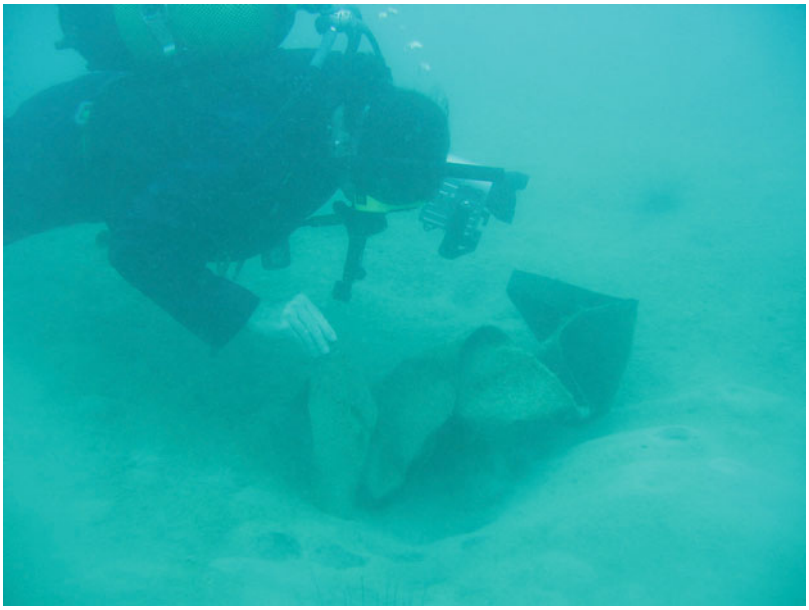

Indian Ocean: Maritime Archaeology, Fig. 4 A maritime archaeologist inspects a section of copper hull sheathing associated with the suspected HMS *Serapis* shipwreck site in Madagascar. (Image courtesy of Michael Tuttle, Serapis Project)

been located and investigated at False Bay, as has an as-yet unidentified nineteenth-century wreck site embedded in the beach at Plettenberg Bay (Werz 2011: 482).

Recent investigations at a handful of locations along South Africa's southern coast have expanded maritime archaeology's application and capacity to answer questions about the nation's earliest inhabitants. These sites comprise large shell middens associated with Middle to Late Stone Age occupations. Significantly, their material culture assemblages have provided evidence of shellfish extraction and use as an important subsistence and tool manufacturing strategy among pre-farming communities (Steele and Klein 2008; Lane 2012: 33).

Key Issues/Current Debates

Perhaps the most imminent issue currently confronting maritime archaeology in the Indian Ocean is the threat posed by commercial salvors to historic shipwreck sites within its waters. As noted previously, damage to the region's underwater cultural heritage at the hands of both recreational divers and treasure hunting concerns is by no means a recent phenomenon, and in many countries served as the catalyst for the creation of viable maritime archaeology projects and/or programs. In some locales, promotion of maritime archaeology and research-based initiatives has led to the complete, or near-complete, eradication of commercial activities.

Other nations, by contrast, have followed a very different path. One notable example is Mozambique, where a Portuguese salvage company has entered into an exclusive agreement with the nation's Ministry of Culture to conduct surveys and excavations of shipwreck sites around Ilha de Moçambique and along the adjacent mainland coast. Despite claiming to be a legitimate archaeological research organization, the company has insufficiently published results of its findings, limited access by other researchers to the sites it has investigated, and engaged in the sale of recovered artifacts (Lane 2012: 17–19). In addition, the scope of "research" it has carried out appears to be limited to European vessels that carried valuable commodities, and many of the sites it has salvaged have been abandoned without follow-up efforts at stabilization or preservation.

Another major issue facing maritime archaeology in the Indian Ocean has been the failure of all

but one nation in the region to accept or ratify the 2001 UNESCO *Convention on the Protection of the Underwater Cultural Heritage* (CPUCH). The lone exception, the Islamic Republic of Iran, has not yet conducted maritime archaeological research in the Persian Gulf, although a 2007 collaborative project between Iranian and British archaeologists to investigate submerged portions of the sixth-century CE Wall of Tammishe in the Caspian Sea holds promise for similar projects elsewhere in Iranian waters (Rekavandi et al. 2008). There is a clear need among Indian Ocean nations to revise their existing heritage legislation and/or adopt CPUCH. Doing so could enable each country in the region to create and/or develop its own maritime archaeology capacity, confront existing and emerging threats to its maritime heritage, and provide a framework for regional and international collaboration among relevant governmental agencies and research institutions.

Potential threats to the Indian Ocean's maritime heritage from significant seismic events and other natural phenomena, while infrequent, are nonetheless a very real concern and warrant brief mention here. In December 2004, an earthquake-generated tsunami that originated in Indonesia devastated coastal areas in several Indian Ocean nations. Among those affected was Sri Lanka's MAU, which lost its office and conservation facilities, equipment, archived site data, and numerous artifacts – including several conserved examples from *Avondster* that were being prepared for exhibition. Thankfully, no fatalities occurred among MAU staff and volunteers, and the unit's functional capacity was restored in a relatively short amount of time.

International Perspectives

As the birthplace of maritime archaeology in the Indian Ocean, Australia has assumed a leading role in promoting the discipline's development throughout the region. Australian maritime archaeologists conducted one of the first shipwreck investigations in East African waters, were instrumental in the establishment of Sri Lanka's MAU and Galle Harbour's maritime heritage survey, and provided assistance to the Sri Lankans in the wake of the 2004 tsunami. Heritage legislation created in Australia for the protection of historic shipwrecks and other maritime archaeological sites has in some cases provided a model for similar laws enacted in Indian Ocean nations. Similarly, Australian maritime archaeologists have advised their regional colleagues in the development and application of maritime heritage guidelines and statutes.

In 2009, the Maritime Archaeology Program at Flinders University in South Australia hosted an Australian Leadership Awards fellowship program that instructed practicing archaeologists from the Asia-Pacific region in underwater cultural heritage legislation and management and maritime archaeology field methods (Fig. 5). Included among the participants were individuals from three nations – Sri Lanka, Indonesia and Thailand – that share a border with the Indian Ocean. Australian maritime archaeologists were also instrumental in organizing the inaugural Asia-Pacific Regional Conference on Underwater Cultural Heritage. This meeting, held in Manila in 2011, counted maritime archaeologists from India, Sri Lanka, Tanzania, Kenya, Thailand, and Indonesia, among its attendees.

Future Directions

Australia, India, and Sri Lanka continue to develop their existing governmental and academic programs in maritime archaeology, and have embarked on efforts to conduct comprehensive surveys to inventory and assess maritime heritage under their purview. In the Western Indian Ocean and Red Sea regions, the Antiquities departments of Tanzania, Mozambique, and South Africa are being assisted by the Netherlands' Centre for International Heritage Activities to establish a regional Maritime and Underwater Cultural Heritage program and promote the development of maritime archaeology within these countries. Initiatives spearheaded by this collaborative effort include dive training, practical courses in maritime archaeological methods and legislation, and the development of designated underwater sites for heritage tourism. NMK

Indian Ocean: Maritime Archaeology, Fig. 5 Members of the 2009 Australian Leadership Awards fellowship program in maritime archaeology and underwater cultural heritage management participate in a magnetometer survey training exercise at Sceale Bay, South Australia. (Image courtesy of the Maritime Archaeology Program, Flinders University)

recently created a position for a "marine archaeologist" at the Fort Jesus Museum, maintains an inventory of historic shipwrecks in Kenyan waters, and is currently collaborating with the Chinese government and the School of Archaeology and Museology at Peking University to search for shipwrecks and terrestrial sites associated with the fifteenth-century voyages of Admiral Zeng He to East Africa (Lane 2012: 32).

Another collaborative venture that continues to gain traction is the work of CMA staff and students to apply maritime cultural landscape approaches to the inventory and investigation of maritime archaeological sites in Kenya, Tanzania, and Sudan. University of Ulster doctoral students have conducted maritime landscape studies in the Mafia Archipelago, and among several settlements along the Kenyan and Tanzanian coasts. In Eritrea, a joint effort organized by the University of Southampton and Eritrea's University of Asmara has utilized maritime landscape perspectives to investigate Adulis, a Red Sea port occupied by both the Romans and the Aksumite Kingdom during ancient times (Blue 2011: 503; Lane 2012: 28–31). Recently, the Institute for Arab and Islamic Studies at the University of Exeter has embarked on a 3-year, multidisciplinary, multi-period project that focuses on the maritime traditions of the peoples of the Red Sea and Arabian-Persian Gulf. The past 2 years have witnessed the commencement of underwater archaeological surveys in the waters surrounding the island of Réunion. This project, coordinated by the French *Institut National de Reserches Archéologiques Préventives*, is being carried out as part of a larger archaeological resources assessment of the island, and is among the latest in an increasing trend of maritime archaeology initiatives in and around the Indian Ocean.

Cross-References

- ▶ Australia: Maritime Archaeology
- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Conservation in Museums
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ East Africa: Museums
- ▶ East and Southern African Neolithic: Geography and Overview
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Islamic and Maritime Archaeologies
- ▶ Maritime Landscapes
- ▶ Muckelroy, Keith (Underwater and Maritime Archaeology)
- ▶ Red Sea: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ South Africa: Maritime Archaeology
- ▶ Southern Africa: Historical Archaeology

▶ Southern Ocean and Antarctic Maritime Archaeology
▶ Underwater Sites in Archaeological Conservation and Preservation

References

Anderson, R., J. Green, and C. Souter. 2007. *Galle Harbour maritime archaeological impact assessment report for Sri Lankan Department of Archaeology*. Fremantle: Department of Maritime Archaeology, Western Australian Museum.

Beyin, A. 2011. Early to Middle Holocene human adaptations on the Buri Peninsula and Gulf of Zula, coastal lowlands of Eritrea. *Azania: Archaeological Research in Africa* 46 (2): 123–140.

Blue, L. 2011. The Red Sea. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D. Hamilton, 495–512. Oxford: Oxford University Press.

Breen, C., and P.J. Lane. 2003. Archaeological approaches to East Africa's changing seascape. *World Archaeology* 35: 469–489.

Delgado, J.P. 1997. Maritime archaeology. In *Encyclopedia of underwater and maritime archaeology*, ed. J.P. Delgado, 259–260. New Haven: Yale University Press.

Lane, P.J. 2012. Maritime and shipwreck archaeology in the western Indian Ocean and southern Red Sea: An overview of past and current research. *Journal of Maritime Archaeology* 7: 9–41.

Marriner, N., M. Guérout, and T. Romon. 2010. The forgotten slaves of Tomelin (Indian Ocean): New geoarchaeological data. *Journal of Archaeological Science* 37: 1293–1304.

Muckelroy, K. 1978. *Maritime archaeology*. New York: Cambridge University Press.

Parthesius, R., K. Millar, and B. Jeffery. 2005. Preliminary report on the excavation of the 17th-century Anglo-Dutch East Indiaman *Avondster* in Bay of Galle, Sri Lanka. *International Journal of Nautical Archaeology* 34 (2): 211–232.

Pedersen, R.K. 2008. The Byzantine-Aksumite period shipwreck at Black Assarca Island, Eritrea. *Azania* 43: 77–94.

Piercy, R.C.M. 2005. The tragedy of the *Santo António de Tanná*: Mombasa, Kenya. In *Beneath the Seven Seas*, ed. G. Bass, 172–179. London: Thames & Hudson.

Rais, R.B. 1986. *The Indian Ocean and the superpowers: Economic, political and strategic perspectives*. Surry Hills: Croom Helm.

Rekavandi, H.O., E.W. Sauer, T. Wilkinson, G.A. Abassi, S. Priestman, E.S. Tamak, R. Ainslie, M. Mahmoudi, N. Galiatsatos, K. Roustai, J.J. van Rensburg, M. Ershadi, E. Macdonald, M. Fattahi, C. Oatley, B. Shabani, J. Ratcliffe, and L.S. Usher-Wilson. 2008. Sasanian walls, hinterland fortresses and abandoned ancient irrigated landscapes: The 2007 season on the Great Wall of Gorgan and the Wall of Tammishe. *Iran* 46: 151–178.

Staniforth, M. 2011. Australian maritime archaeology. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D. Hamilton, 561–587. Oxford: Oxford University Press.

Steele, T.E., and R.G. Klein. 2008. Intertidal shellfish use during the Middle and Later Stone Age of South Africa. *Archaeofauna* 17: 63–76.

Sundaresh, and A.S. Gaur. 2011. Marine archaeological investigations on Tamil Nadu Coast, India: An overview. In *Proceedings of the inaugural Asia Pacific regional conference on underwater cultural heritage*, ed. M. Staniforth, J. Craig, S. Clyde Jagoon, B. Orillaneda, and L. Lacsina, 233–248. Manila: National Museum of the Philippines.

Tripati, S. 2011. An overview of shipwreck explorations in Goa waters. In *Proceedings of the inaugural Asia Pacific regional conference on underwater cultural heritage*, ed. M. Staniforth, J. Craig, S. Clyde Jagoon, B. Orillaneda, and L. Lacsina, 221–232. Manila: National Museum of the Philippines.

Tripati, S., A.S. Gaur, and Sundaresh. 2004. Marine archaeology in India. *Man and Environment* 29 (1): 28–41.

Werz, E.J.S. 2011. Southern African shipwreck archaeology. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D. Hamilton, 473–494. Oxford: Oxford University Press.

Woehler, E. 2004. Reconstructing the lives of Heard Island's sealers. *Australian Antarctic Magazine* 7: 19.

Indigenous Archaeological Organizations

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Introduction and Definition

Indigenous archaeological organizations can be divided into three categories: those explicitly dedicated to supporting community-based and

Indigenous archaeology, groups that are smaller sections of larger archaeology or anthropology professional societies, and organizations that have an explicit concern with Indigenous people in archaeology and historic preservation. Each supports Indigenous archaeology in different ways. What the organizations have in common is supporting the value that these communities bring to understanding the past and the engagement of Indigenous people with archaeology. There are several entries in this volume that provide background on Indigenous archaeology (please see the Cross-Reference section) as well as Atalay 2006 and Nicholas 2014.

Examples

Organizations Devoted to Indigenous Archaeology

Closet Chickens

A mentoring and support organization called the Closet Chickens was formed in 2001 to provide a place for discussion among Native American archaeologists. The group was formed after a conference at Dartmouth College, titled "On the Threshold: Native American Archaeologist Relations in the Twenty-First Century." At the conference, discussions centered on the ideas and perspectives participants had about being Native American archaeologists. Afterward, the conversation continued via e-mail and resulted in the decision to continue discussions as a more formal group. One of the group's major goals is to increase Native American participation in all levels of archaeology. The group includes members who are not Native Americans but support Native American inclusion in archaeology and approach archaeology from a collaborative perspective (Fig. 1). Outside of conferences, group members primarily communicate via an e-mail LISTSERV that was established when the group was formed in 2001. Members use the LISTSERV to share concerns and gain perspectives from others in the group, to share recent work and publications, and to organize conference sessions and publishing opportunities. As of August 2017, the e-mail list for the group has 56 members.

Indigenous Archaeological Organizations, Fig. 1 Members of the Closet Chickens present at the Society for American Archaeology 2011 Annual Meeting in Sacramento, California. (Photo credit: Marge Bruchac)

Sections of Larger Organizations Concerned with Indigenous Archaeology

Society for American Archaeology Committee on Native American Relations

The Committee on Native American Relations (CNAR) within the Society for American Archaeology (SAA) was formed in 1995 and is charged with bringing information to the SAA Board of Directors about issues of concern to Native Americans (Watkins 1995). The committee promotes understanding within Native communities about the value and relevance of archaeology, as it aims to foster better working relationships between Native American communities and archaeologists. The CNAR assists the SAA in being active rather than reactive to Native American issues, works with other SAA committees, and encourages Native American involvement in SAA to the greatest extent possible. The committee is composed of SAA members, and most often, a majority of the members are Native Americans. The committee emerged from a prior Task Force on Native American Relations when the SAA Executive Board felt that the work of the Task Force should continue.

Starting in 2008, the CNAR along with the Indigenous Populations Interest Group (described below) has hosted an annual reception for Native Americans, First Nations, and other Indigenous peoples who are participants or attendees at the Annual SAA Meetings. A central aspect of the reception is the acknowledgement of tribal peoples and the homelands where the meetings are being held. The reception ensures inclusion of these tribal communities at the annual meetings. It is notable that in 2008, the year of the first annual SAA Native American Reception, the SAAs were held in Vancouver on unceded Aboriginal territory. Due to the work of the CNAR and the Indigenous Populations Interest Group, the SAA meetings that year opened with a welcoming and witnessing ceremony with representatives from the Musqueam and Squamish First Nations whose land the meetings were held upon.

A second key aim of the reception is to provide networking for Native Americans and Indigenous archaeologists. Such networking has helped to build and nurture community-based research partnerships between Native American communities and Indigenous archaeologists.

Society for American Archaeology Native American Scholarships Committee

The SAA Native American Scholarships Fund (2017) is an endowment established in 1998 to foster a sense of shared purpose and positive interaction between archaeologists and Native Americans. Scholarships are open to all Native peoples from anywhere in the Americas, Alaska Natives, Native Hawaiians, and Indigenous Pacific Islanders and support archaeological training and study. The committee oversees the selection of awardees for four different competitive scholarships: SAA Arthur C. Parker Scholarship, several NSF Scholarships for Archaeological Training, SAA Native American Undergraduate Archaeology Scholarship, and the SAA Native American Graduate Archaeology Scholarship. Funding for the scholarships derives from book royalties donated by SAA members, a NSF grant awarded each year to the SAA, and a silent auction held during the annual meeting.

Society for American Archaeology Indigenous Populations Interest Group

The Indigenous Populations Interest Group (IPIG) within the Society for American Archaeology exists to promote the involvement of Indigenous communities in archaeologically driven research. As an interest group, membership is open to any interested member of the SAA, Native American, or non-Native American. The IPIG raises funds through a modest membership fee, and this money is applied toward the annual reception described above. At present the IPIG has around 200 members who meet at the annual SAA meeting to discuss topics of interest to group members. The IPIG is led by a volunteer member who organizes the annual meeting and the SAA Native American Reception.

Organizations Explicitly Supporting Indigenous Archaeology

The World Archaeological Congress (WAC) is a nongovernmental, not-for-profit organization and is the only representative worldwide body of practicing archaeologists (WAC 2011). The WAC's Code of Ethics (2017) commits to social justice for Indigenous communities, notes the obligation of its members to Indigenous peoples, describes how Indigenous cultural heritage belongs to Indigenous communities, acknowledges the special importance of human remains and sacred sites for Indigenous peoples, and recognizes the authority of Indigenous communities with regard to interpretation, study, exhibition, curation, and management of Indigenous cultural heritage. In addition to an Indigenous representative on the Executive Board, WAC has an Indigenous Council, composed of eight representatives from Indigenous communities worldwide. The WAC Code of Ethics begins with the understanding that WAC members are expected to view Indigenous peoples as the proper experts on Indigenous culture and are required to afford these people respect. Two WAC accords, the Vermillion Accord on Human Remains and the Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects, provide guidance for members on how to work with human remains and sacred material. A third WAC accord, Accord on the Protection of Cultural Property in the Event of Armed Conflict, forefronts the extreme physical and psychological trauma that comes from the purposeful destruction of cultural heritage during armed conflicts. The WAC membership is global and a large percentage of members identify as Indigenous. The 2005 WAC Inter-Congress in Auckland, New Zealand, was notable because the majority of the participants were Indigenous.

Other Organizations Supporting Indigenous Archaeology

A number of other organizations include a significant number of participants that support Indigenous archaeology but have other primary focuses. Two such organizations are the Association for Indigenous Anthropologists (AIA), found within the American Anthropological Association, and the National Association of Tribal Historic Preservation Officers (NATHPO).

Related Work

Intellectual Property Issues in Cultural Heritage

The Intellectual Property Issues in Cultural Heritage (IPinCH): Theory, Practice, Policy, and Ethics was a 7-year international research initiative based at Simon Fraser University, in British Columbia, Canada (IPinCH 2016). While not a formal organization in itself, the IPinCH project supported research into cultural issues of importance to Indigenous communities. IPinCH was a collaboration between community members, scholars, Indigenous organizations, policy makers, and heritage professionals. A number of symposia reports were produced on topics ranging from treaty relations to genetics and identity to the role of intangible knowledge in support of repatriation. The project was completed in 2017, but information about the projects, including the information produced by IPinCH, can be accessed at https://www.sfu.ca/ipinch/.

Cross-References

- ▶ Closet Chickens
- ▶ Community Archaeology
- ▶ Society for American Archaeology (SAA)
- ▶ Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC): First Code of Ethics

References

Atalay, S. 2006. Introduction: Decolonizing archaeology – Efforts to transform a discipline. *American Indian Quarterly* 30: 269–279.

IPinCH, Intellectual Property Issues in Cultural Heritage: Theory, Practice Policy and Ethics. 2016. Available at https://www.sfu.ca/ipinch/. Accessed Aug 2017.
Nicholas, G.P. 2014. Indigenous archaeology. Oxford University Press.
Society for American Archaeology Native American Scholarships 2017. Available at http://saa.org/AboutheSociety/Awards/SAANativeAmericanScholarships/tabid/163/Default.aspx. Accessed Aug 2017.
WAC Code of Ethics. 2017. Available at http://worldarch.org/code-of-ethics/. Accessed Aug 2017.
Watkins, J. 1995. Committee on Native American relations. *Society for American Archaeology Bulletin* 13 (4): 14–15.
World Archaeological Congress. 2011. Available at http://www.worldarchaeologicalcongress.org. Accessed Dec 2011.

Indigenous Archaeologies

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Introduction

With the recognition that archaeology has been used as a colonial and imperialistic tool, archaeologists worldwide have begun to redefine archaeological methods and theories to include multiple voices in the interpretation of the past (Preucel 1991). The last 30 years has seen an increase in the incorporation of Indigenous descendant communities as well as other marginalized populations in all stages of archaeological research. Indigenous Archaeology stems from this self-reflexive task and attempts to decolonize research agendas to acknowledge issues such as power, control, and authority in archaeological interpretation. Indigenous Archaeology practitioners state that Indigenous people *must* have a seat at the research table because their participation creates a more inclusive and nuanced depiction of the past (Nicholas and Andrews 1997; Smith 1999; Watkins 2001).

Definition

Indigenous Archaeology was first defined by George Nicholas in 1990 as "archaeology done with, for and by Indigenous people" (Nicholas and Andrews 1997: 3). Since that time a number of scholars have attempted to expand and identify its basic theoretical tenets and methods. Claire Smith and Martin Wobst (2005: 15) see Indigenous Archaeology "as an archaeology that is informed by indigenous values and agendas. Archaeological research is not *about* Indigenous peoples but is conducted *with* and *for* Indigenous peoples. Indigenous community members need to conduct and interpret the archaeological data for themselves but not at the exclusion of non-Indigenous researchers." Indigenous Archaeology "moves indigenous concerns to the center and orients archaeology to Indigenous systems of knowledge and power" (Smith and Wobst 2005: 15).

Wobst (2005: 29) further sees Indigenous Archaeology as a "decolonized archaeology that helps indigenous people obtain control over their material patrimony and where non-indigenous people can learn to use non-colonizing, non--statistic, non-capitalist ways of interacting with artifacts." An Indigenous Archaeology approach removes the lines between nature and culture and artifact and non-artifact in order to orient archaeology to an Indigenous perspective. Indigenous Archaeology embraces the study of the non-material, incorporating such subjects such as folklore, oral history, music, and dance. These nonmaterial subjects "may include stars and alignments, fauna and flora, geomorphology, and landscapes, colors, sounds and smells. We will have to allow for the 'natural' (that is 'non-artefactual') and 'cultural' (that is, 'artefactual') variables to be enculturated, to be significant to human action, and to articulate, like artifacts, with social life" (Wobst 2005: 28).

Nicholas (2008: 1660) defines Indigenous Archaeology as including eight principle characteristics: "(1) The proactive participation or consultation of Indigenous peoples in archaeology

(2) A political statement concerned with issues of Aboriginal self-government, sovereignty, land rights, identity, and heritage (3) A postcolonial enterprise designed to decolonize the discipline (4) A manifestation of Indigenous epistemologies (5) The basis for alternative models of cultural heritage management or stewardship (6) The product of choices and actions made by individual archaeologists (7) A means of empowerment and cultural revitalization or political resistance (8) An extension, evaluation, critique, of current archaeological theory."

Indigenous Archaeologies

In recent years, a number of scholars have begun to use the term "Indigenous Archaeolog*ies*" to signal that there is no single coherent theory or set of methods used within an Indigenous Archaeology approach. Instead, the term Indigenous Archaeologies reflects the "different experiences and approaches that have manifested themselves in a range of different practices" (Atalay 2008: 29). Each person and community interacts with the world around them differently, and these interactions are dynamic; they have changed, and continue to change, through time and space. "The plural form acknowledges the fact that different materialities exist around the globe and through time; and all these materialities are important building stones and points of reference toward theories of human materiality" (Wobst 2010: 18–9). Thus, the methods and tools used within an Indigenous Archaeologies paradigm will be influenced and controlled by an Indigenous perspective that is shaped by their experiences, history, and beliefs.

Historical Background

From archaeology's beginning as a discipline, Indigenous populations have been involved in its practice: as willing participants providing information on the location of archaeological sites, by practicing archaeology themselves (e.g., Arthur C. Parker), or through their objections to the wanton destruction of their community's traditional cultural places and items (e.g., Deloria 1969). As many minority and marginal communities worldwide attempted to fight for their basic human and civil rights in the 1960s and 1970s, Indigenous peoples questioned the relevancy of the archaeological research being mined from their communities. Some scholars have argued that academic studies have historically been used to support governmental policies that limited, removed, and suppressed Indigenous and other marginalized communities' rights and expressions of culture (Arnold and Hassman 1995; Fawcett and Kohl 1995; Lurie 1999: 108).

Spurred by postmodernism, feminist and Marxist thought, and changing political and social contexts worldwide, scholars started to review the production and reproduction of knowledge and power in archaeology. They questioned the obvious silence, or purposeful silencing, of Indigenous and other marginalized communities' perspectives in academic disciplines and governmental structures and policies (Deloria 1969; Smith and Warrior 1996). Scholars also started evaluating the impacts their research had on the communities under study and their own role as scholars in contributing to this silence. Indigenous Archaeology developed as a response to the academic appropriation of Indigenous pasts and to "address the need for decolonization. . .the lack of Native people in the ranks of professional archaeology (even though the discipline in North American thrives on the pasts of their ancestors), and Indigenous communities' desire to protect, manage, and even study their own heritage" (Silliman 2010: 218).

Postcolonial critiques further called for the decolonization of archaeological research and the creation of agendas that respond to Indigenous goals with Indigenous communities directing that research (Smith 1999: 142). L. Smith (1999: 142) lists 25 "projects" that Indigenous communities should be engaged in that supports the "reclaiming, reformulating, and reconstituting"

of Indigenous cultures and languages. The projects speak to themes such as "cultural survival, self-determination, healing, restoration, and social justice" (Smith 1999: 142).

Current Debates

Although a number of scholars are applying an Indigenous Archaeology approach to their work, others have questioned its usefulness. In his article "Aboriginalism and the Problems of Indigenous Archaeology," Robert McGhee argues that Indigenous Archaeology "assumes that Indigenous societies and cultures possess qualities that are fundamentally different from those of non-Aboriginal peoples" and that this "bears little resemblance to any reality" (McGhee 2008: 579). He sees an Indigenous Archaeology approach as a way to "appease Indigenous opposition" and that "such efforts are not only theoretically unsound, but are detrimental to both archaeology and to Indigenous communities" (McGhee 2008: 580). In particular, he argues that "proponents" of Indigenous Archaeology are essentializing Aboriginal communities by assuming that members of Indigenous populations have "unique qualities and abilities . . . and have a special relationship with and understanding of the natural world" (McGhee 2008: 583). McGhee also questions Indigenous Archaeology's sharing of authority and control over the use and interpretation of archaeological resources. He argues that by appeasing Indigenous community's claims to their "ethnically based rights," it strips archaeology of its "scientific attributes that make it a particularly powerful narrator of the past" (McGhee 2008: 591, 595).

Stephen Silliman (2010) and other Indigenous Archaeology practitioners who have shaped its development (e.g., Colwell-Chanthaphonh et al. 2010; Wilcox 2010) have criticized McGhee's position as a mischaracterization of the origins, objectives, and contributions of Indigenous Archaeology based on his limited review of a small number of academic writings on the subject. They argue that McGhee assumes that including Indigenous views (which he thinks are based in religious faith) into the practice of archaeology would exclude all other, and particularly scientific, perspectives. They collectively argue that if McGhee had delved further into the literature, he would find many successful and scientific examples of Indigenous Archaeology projects that contribute to the understanding of the Indigenous past without the exceptionalism that he fears. Indigenous Archaeology at its very core is community-based archaeology, one that "attempts to tell useful, respectful, and peopled histories that resonate with communities' senses of themselves, their pasts and futures, and their particular needs" (Silliman 2010: 218).

Colwell-Chanthaphonh et al. (2010: 232) reminds McGhee that Indigenous populations do have special rights to their participation within archaeological practice due to the numerous treaties, laws, and mandates that dictate such involvement. These rights are not ethnically based rights, "but long-established legal rights derived from the unique political status Indian tribes have in the United States formed over the centuries" (Colwell-Chanthaphonh et al. 2010: 232–233). Additionally, Colwell-Chanthaphonh et al. (2010: 233) contend that sharing authority with Indigenous communities does not change scientific attributes, but "merely asks people to recognize the impact that the practice of archaeology has had on descendant groups and the implications of perceiving Western science as the only 'real' way to explain things."

International Perspectives

The incorporation of Indigenous perspectives into archaeology is not solely limited to the discipline as it is practiced in the United States, Canada, and Australia. It is a worldwide movement as Indigenous peoples come forward to share their experiences interacting with archaeologists in their home countries and demand their voices be heard (see Smith and Wobst 2005; Bruchac et al. 2010 for numerous examples). Many are fighting for their basic human rights as they attempt to protect the bones of their ancestors and their cultural heritage.

Through its congresses and inter-congresses, the World Archaeological Congress (WAC) provides an international forum in which Indigenous and non-Indigenous people can exchange the results of their archaeological research; provide or obtain professional training and public education for disadvantaged nations, groups, and communities; help to empower and support themselves and members of Indigenous groups; and discuss strategies to conserve and protect archaeological sites. Since 1989, WAC has provided rich discussions about the ethics and treatment of the dead, the politics of the past, and the relationship among Indigenous people and archaeology (Smith and Wobst 2005: 5). Most importantly, WAC provides a network of well-attuned Indigenous scholars and like-minded individuals that Indigenous community members can turn to for professional advice, support, and encouragement.

Future Directions

The future of archaeology lies in the acceptance, incorporation, and integration of the multiplicity of voices to narrate the stories of the past. Archaeology cannot and should not support separate but equal research agendas with "scientific archaeology" running parallel to "Indigenous archaeology" or "feminist archaeology" (Martinez 2010: 219). Rather, archaeology needs to become a *communilog*: an area for discussion where all stakeholders participate and are self-critical to ensure that their research will not adversely affect the archaeological or descendant communities' rights (Martinez 2010: 219). There is room for everyone to participate in Indigenous archaeology. Indigenous Archaeology is just good archaeology (Martinez 2010: 219).

Changing Archaeological Pedagogy

In order to make Indigenous Archaeology mainstream, changes in current archaeological pedagogy are needed. Archaeologists need to "see themselves linked to the past that they are interpreting. Rather than seeing themselves removed from their research, they [should] see themselves as the end product of this historical process" (Benavides 2001: 2360). An archaeologist cannot speak ethically about a community's past if they do not engage its present and understand their role in it.

A number of archaeology field schools, initial training ground for future archaeologists, have begun to incorporate Indigenous perspectives into their syllabi by not only inviting Indigenous leaders and community members to discuss how archaeological projects impact their lives but also, and most importantly, having them as equal research partners who shape the research questions, participate in data collection, interpretation, and publishing (e.g., see Parrish et al. 2000; Silliman 2008; Martinez 2012). Exposure to working with Indigenous communities will allow students to understand the political and social context that they find themselves while practicing archaeology in their home country. They will also be exposed to the history and cultural setting of the Indigenous community whose material they will be working with.

Training Indigenous Archaeologists and Indigenous Community Members in Archaeology

Training Indigenous community members in archaeology to serve in the academy and/or to more actively participate in the cultural resources management process is essential to bringing an Indigenous Archaeology approach forefront. More indigenous archaeologists will help to create better working relationships between Indigenous communities and archaeologists by forcing archaeologists to confront and address Indigenous perspectives every day. While professors train Indigenous students in archaeology, Indigenous students in turn expose the professor to Indigenous issues and viewpoints. As Indigenous students move through the academy and become professors themselves, they will be able to train the next generation of archaeologists.

With government-mandated consultation for development projects becoming more common worldwide, Indigenous nations have become overwhelmed with the number of technical anthropological reports submitted to them for

review and comment. Although some Indigenous community members have had "on the job training" in archaeological methods and theories, many lacked the background to decipher the archaeological reports given to them. Indigenous community members trained in archaeological method and theory and the numerous national, state, and local cultural resource laws (with particular attention understanding the specialized jargon) are empowered to participate on an equal footing with academically trained archaeologists. It is imperative for Indigenous community members to be able to translate documents into their community's language (traditional or otherwise) so that the community can more effectively articulate potential project impacts to sites, places, and practices important to the Indigenous community.

None of these future paths can be obtained unless archaeology recognizes that Indigenous Archaeology should not be solely applied to and done by Indigenous populations, but by, with, and for *all* of the communities that they study.

Cross-References

- ▶ Atalay, Sonya
- ▶ Deloria Jr., Vine
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for
- ▶ Nicholas, George P.
- ▶ Parker, Arthur Caswell
- ▶ Postcolonial Archaeologies
- ▶ Smith, Claire
- ▶ Wobst, H. Martin
- ▶ World Archaeological Congress (WAC)

References

Arnold, B., and H. Hassman. 1995. Archaeology in Nazi Germany: The legacy of the Faustian bargain. In *Nationalism, politics, and the practice of archaeology*, ed. C. Fawcett and P. Kohl, 70–81. Cambridge: Cambridge University Press.

Atalay, S. 2008. Multivocality and indigenous archaeologies. In *Evaluating multiple narratives*, ed. J. Habu, C. Fawcett, and J.M. Matsunaga, 29–44. New York: Springer.

Benavides, O.H. 2001. Returning to the source: Social archaeology as Latin American philosophy. *Latin American Antiquity* 12 (4): 355–370.

Bruchac, M., S.M. Hart, and H.M. Wobst, eds. 2010. *Indigenous archaeologies: A reader in decolonization*. Walnut Creek: Left Coast Press.

Colwell-Chanthaphonh, C., T.J. Ferguson, D. Lippert, R.H. McGuire, G.P. Nicholas, J.E. Watkins, and L.J. Zimmerman. 2010. The premise and promise of indigenous archaeology. *American Antiquity* 75 (2): 228–238.

Deloria, V., Jr. 1969. *Custer died for your sins: An Indian manifesto*. New York: Macmillan.

Fawcett, C., and P. Kohl. 1995. Archaeology in the service of the state: Theoretical considerations. In *Nationalism, politics, and the practice of archaeology*, ed. C. Fawcett and P. Kohl, 3–20. Cambridge: Cambridge University Press.

Lurie, N. 1999. Sol Tax and tribal sovereignty. *Human Organization* 58 (1): 108–117.

Martinez, D. 2010. (Re)Searching for the ancestors through archaeology. In *Being and becoming indigenous archaeologists*, ed. G. Nicholas, 210–221. Walnut Creek: Left Coast Press.

Martinez, D. 2012. A land of many archaeologists: Archaeology with Native Californians. In *Contemporary issues in California archaeology*, ed. T.L. Jones and J.E. Perry, 210–221. Walnut Creek: Left Coast Press.

McGhee, R. 2008. Aboriginalism and the problems of Indigenous archaeology. *American Antiquity* 73 (4): 579–597.

Nicholas, G. 2008. Native peoples and archaeology. In *Encyclopedia of archaeology*, ed. D. Pearsall, vol. 3, 1660–1669. New York: Academic.

Nicholas, G., and T. Andrews. 1997. Indigenous archaeology in a post-modern world. In *At a crossroads: Archaeology and first peoples in Canada*, ed. G. Nicholas and T. Andrews, 1–18. Burnaby: SFU Archaeology Press.

Parrish, O., D. Murley, R. Jewett, and K. Lightfoot. 2000. The science of archaeology and the response from within Native California: The archaeology and ethnohistory of Me?tini village in the Fort Ross State Historic Park. *Proceedings of the Society for California Archaeology* 13: 84–87.

Preucel, R.W., ed. 1991. *Processual and postprocessual archaeologies: Multiple ways of knowing the past*, Occasional Paper. Vol. 10. Carbondale: Center for Archaeological Investigations, Southern Illinois University.

Silliman, S., ed. 2008. *Collaborating at the trowel's edge: Teaching and learning in indigenous archaeology*, Amerind Studies in Archaeology. Vol. 2. Tucson: University of Arizona Press.

Silliman, S. 2010. The value and diversity of Indigenous archaeology: A response to McGhee. *American Antiquity* 75 (2): 217–220.

Smith, L. 1999. *Decolonizing methodologies: Research and indigenous peoples*. New York: Zed Books.
Smith, P.C., and R.A. Warrior. 1996. *Like a hurricane: The Indian movement from Alcatraz to Wounded Knee*. New York: New Press.
Smith, C., and H.M. Wobst. 2005. Decolonizing theory and practice. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 5–16. New York: Routledge.
Watkins, J. 2001. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: Alta Mira Press.
Wilcox, M. 2010. Saving indigenous archaeology from ourselves: Separate but equal is not scientific archaeology. *American Antiquity* 75 (2): 221–227.
Wobst, H.M. 2005. Power to the (indigenous) past and present! Or: The theory and method behind archaeological theory and method. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 17–32. New York: Routledge.
Wobst, H.M. 2010. Indigenous archaeologies: A worldwide perspective on human materialities and human rights. In *Indigenous archaeologies: A reader on decolonization*, ed. M. Bruchac, S. Hart, and H.M. Wobst, 17–27. Walnut Creek: Left Coast Press.

Further Reading

Atalay, S. 2006. Special issue: Decolonizing archaeology. *American Indian Quarterly* 30 (3/4).
Atalay, S. 2012. *Community based archaeology: Research with, by and for indigenous and local communities*. Berkeley: University of California Press.

Indigenous Archaeologies in Archaeological Theory

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Introduction and Definition

Indigenous archaeology comprises a broad set of ideas, methods, and strategies applied to the discovery and interpretation of the human past that are informed by the values, concerns, and goals of Indigenous peoples. It has been defined, in part, as "... an expression of archaeological theory and practice in which the discipline intersects with Indigenous values, knowledge, practices, ethics, and sensibilities, and through collaborative and community-originated or -directed projects, and related critical perspectives" (Nicholas 2008: 1660). This multifaceted approach to heritage has multiple goals in addressing a wide range of topics (Table 1) – from differences between Indigenous and Western epistemologies, to inequalities in representation, decision-making, and benefits flow, and to challenges relating to indigeneity and racialism – and assumes different forms and strategies in a variety of circumstances.

Indigenous archaeology has a dual, sometimes contradictory, nature since it may utilize the spectrum of methods employed in archaeology, ethnoarchaeology, ethnohistory, and related fields while also challenging them as an exclusive means to discover and interpret past lifeways. Although explicitly acknowledging the contentious, colonialist history of Indigenous peoples' relations in so-called settler states, a history that resulted in the loss of land, rights, and sovereignty for many groups, Indigenous archaeology lacks a single pan-Indigenous perspective or a cohesive set of goals, practices, and ideals. This can viewed as a strength, as well as the reason the term is sometimes pluralized. However, one commonality is that Indigenous archaeologists seek to mobilize knowledge about the past by ensuring that (a) archaeological practices are respectful of

Indigenous Archaeologies in Archaeological Theory, Table 1 Some topics of interest in Indigenous archaeology

Material culture
Past and present environments and ecology
Ethnicity and ethnogenesis
Indigeneity
Materiality
Relationships between tangible and intangible heritage
Sacred places, the cultural landscape
Intellectual property issues
Role of oral history and traditional knowledge
Decolonization
Power relations and the legacy of scientific colonization
Stewardship and heritage management
Bioarchaeology and genetics
Reburial and repatriation
Agency

I

local values, including treatment of ancestors (i.e., "human remains") and their belongings ("artifacts"), (b) local definitions of "significance" are employed in the identification and protection of heritage sites, and (c) the results of archaeological investigations are relevant to the living community, which is the primary beneficiary.

Indigenous archaeology does not necessarily reject the tenets of scientific inquiry, but does challenge the legacy of scientific colonialism and the hegemony of Western knowledge. Western knowledge tends toward a reductionist, hierarchical model of description and classification, coupled with a Cartesian sense of order and a search for universalist explanation; the focus is on things and other empirical measures. In contrast, Indigenous epistemology tends to be more particularistic and situational, composed of different bodies of knowledge (e.g., *Qaujimajatuqangit* ["Inuit traditional knowledge"]), and emphasized relationships between people and their relations, with each other, with ancestors and other-than-human beings, and with the land.

Indigenous archaeology both reflects and articulates with a variety of theoretical approaches in archaeology and heritage studies, ranging from the interpretative to the reflexive to the transformative. These include Marxist theory, cultural relativism, feminist theory, and postcolonial theory, as well as explicitly Indigenous constructs and practices. These various strategies are important in addressing the nature of "heritage," the degree to which it is integrated into people's lives, who benefits from it, and who controls access to it. Conceptions of law, sovereignty, property, identity, time, and wellbeing all converge to define heritage values and their tangible expressions.

Historical Background

The emergence of Indigenous archaeology in North America, Australia, and elsewhere by the 1980s was associated with a series of political events, cultural revitalization movements, and both lay and legislative efforts to reclaim land and religious freedom at the local and national levels. It does have a much longer developmental history. In the United States, for example, the American Indian Movement of the 1970s drew attention not only to the social and economic distress encountered by American Indian groups but also to the inequitable practice of archaeology in relation to American Indian cultural and human remains. National Repatriation Legislation of the 1990s (the National Museum of the American Indian Act of 1989 and the Native American Graves Protection and Repatriation Act of 1990) was derived largely from the American Indian Religious Freedom Act of 1978.

Coincident with these events was a series of developments in anthropology that included a shift toward a more subjective and critical orientation (e.g., Hymes 1974; Marcus and Fischer 1986) and increasing interest in applied anthropology. These trends were soon also apparent within archaeology and especially by the emergence of postprocessual archaeology in the 1980s (Hodder 1991). The particularistic, reflexive, and agency-directed orientation of this new approach marked a significant expansion of archaeological thought and practice, one that both extended and challenged the descriptive, normative approach of cultural history and the more science-orientated search for generalizations about human behavior and middle-range correlations between material culture and activity through processual archaeology. Postprocessual archaeology soon emerged as a suite of somewhat like-minded strategies – interpretive, critical, structural, Marxist, feminist, and Indigenous – that were relativistic and self-critical and recognized that archaeology was neither politically nor culturally neutral. Somewhat ironically, the development of this humanistic enterprise was aided by David Clarke's (1978) concerted attempts to make archaeology more analytical (and self-critical) and was furthered by his student Ian Hodder's efforts to use an ethnoarchaeological lens to relate material culture to ethnicity, among other goals.

The development of Indigenous archaeology must also be viewed in relation to Indigenous values, histories, worldviews, and ontologies (cf. Watkins 2000). There may be fundamentally different conceptions of heritage, for example, coupled with the absence of the familiar dichotomies that comprise Western worldview (Fig. 1). Thus, for Indigenous communities, the "real" and

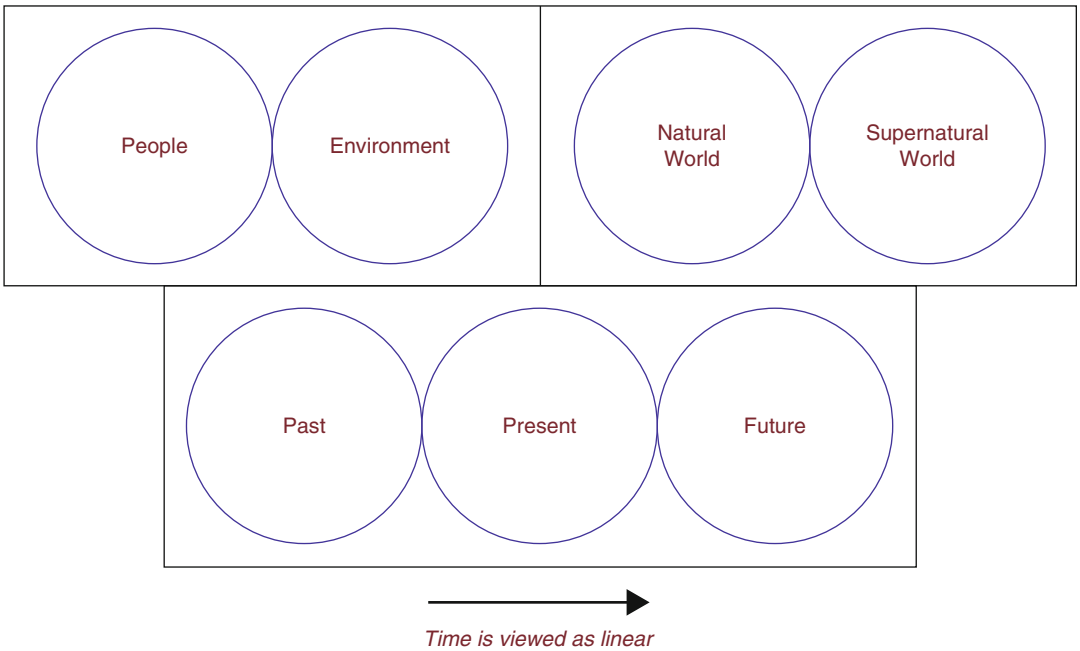

Indigenous Archaeologies in Archaeological Theory, Fig. 1 Idealized Western worldview

"supernatural" may be part of the same dimension (Fig. 2), meaning that ancestral beings are part of *this* existence, not a different realm. This helps to explain why issues of reburial, repatriation, and the protection of the cultural landscape are so important to Indigenous peoples and has substantial implications for CRM/heritage management. Furthermore, individuals in many Indigenous communities believe that they do not need archaeology to tell them what they already know about the past through other means.

Thus, Indigenous archaeology represents the convergence of two different paradigms, one based in Indigenous epistemology and the other in the Cartesian empiricism of the West, as well as the intersection between identity, politics, religion, and science at the local, regional, and global scale.

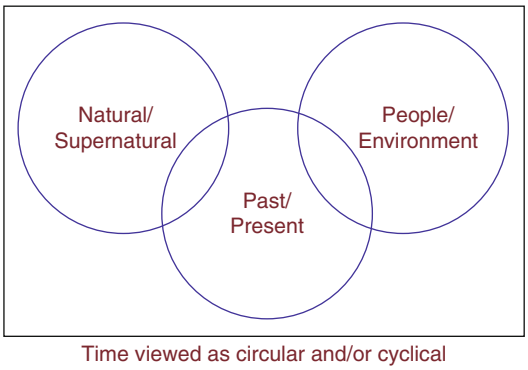

Indigenous Archaeologies in Archaeological Theory, Fig. 2 Idealized Indigenous worldview

Key Issues

Theoretical Resonances

Characterizing the "theoretical nature" of Indigenous archaeology is not easy, given its multiple, sometimes contradictory, goals and applications (see McNiven 2016 for recent assessment). Nevertheless, there are a number of theoretical orientations and influences, clearly overlapping, that are significantly linked to or resonate strongly with Indigenous archaeology. These are Indigenous epistemologies and ontologies and interpretive, Marxist, critical, feminist, and postcolonial theory and practice (Nicholas and Hollowell 2007):

> Indigenous epistemology and ontology is concerned with ways of knowing based on local explanations and worldview. It is difficult

to generalize the wide range of Indigenous epistemological concepts, but many groups seem to share similar viewpoints that integrate the concepts of stewardship toward nature with one of shared use. Stories of creation often characterize humanity's relationship to the environment as an interactive one. That is, in creating the world, the animals established relationships with humans that gave humans responsibilities for maintaining a balanced world. Nature was often seen not as something to be 'conquered' or 'tamed,' but something to be aware and a part of. Humans were not outside of nature, but rather an active participant within it. In contrast to Western science, native science (see Cajete 1999) does not necessarily try to identify 'universal rules' for how things operate but rather focuses on situations of immediacy to particular groups of people. Observation over generations creates an intimate knowledge not only of plants and animals that exist but also the local ecological factors that influence the locations and actions of these communities, the local weather and seasonal patterns, and the interactions between those communities and the human ones. Each human group, therefore, is tied to its environment with its local ecology that does not necessarily govern its roles and responsibilities, but one which deeply influences the ways that the community integrates social, religious, and cosmological aspects of its culture with that of its environment. Populations utilize resources in such ways that contribute to the maintenance of those resources, and acknowledge the integration of nature and culture and of past, present, and future.

Interpretive archaeological theory, the cornerstone of postprocessualism, acknowledges that interpretation is a subjective exercise influenced by contemporary cultural values and historical contingency. It thus foregrounds reflexivity, dialogue, multivocality, and recognition of relative and situated nature of knowledge in seeking meaning in the archaeological record. For Native Americans 'there is a direct link between these calls for interpretations in archaeology and reburial issues, land claims, public archaeology, the presentation of the past, and so on' (Hodder 1991: 16). Phenomenological approaches, focusing on the experiential, are sympathetic to Indigenous perceptions, values, and actions relating to objects, places, and spaces, but may be viewed by some as yet another type of appropriation of local values.

Marxist theory provides a broad pallet of ideas of interest to archaeology. Those focusing on economics, cultural materialism, and cultural evolution generally are of little interest here. What is pertinent instead are Marxism's goals of knowing, critiquing, and changing the world by exposing power relations and inequalities, for example, and then identifying the means for social change through praxis— theoretically informed action (McGuire 2008). Marxism's interest in the dialectic, defined by oppositions or contradictions, both reveals and helps to explain the tensions encountered in the practice of archaeology. For example, we can view archaeologists as the bourgeoisie, monopolizing the means of knowledge production and being the primarily beneficiaries, and Indigenous peoples as the proletariat, still with limited means to, and benefits from, that knowledge production.

Critical archaeology, strongly aligned with Marxism, offers a cogent critique of the past (historical, archaeological) and of our knowledge of it and questions the political neutrality, norms, and class-based structure of science, history, and archaeology (e.g., Leone 1998). Like interpretive archaeology, it offers a critical analysis of historical ideological influences on the production of knowledge and the construction, presentation, and use of the past. Such analyses have emancipatory potential for marginalized and disenfranchised peoples by questioning both the circumstances in which their histories have been created (by others) and the assumptions made about their lifeways, actions, and motivations.

Feminist archaeology also challenges inequality and bias and evaluates knowledge claims relating to another marginalized group, women. Ambiguity and role of partial and/or situated knowledges are acknowledged, as is the fact that cultural systems are contingent and negotiated (Conkey and Gero 1997). Feminist archaeology promotes less hierarchical structure in fieldwork and the incorporation of multiple interpretations into the analysis. An early application of feminist practice in Indigenous contexts is Janet Spector's (1993) landmark study of a Wahpeton Dakota Village. Mainstream archaeology's reaction to Indigenous archaeology has been similar to its reaction to feminist archaeology. There are striking parallels between the two in terms of their developmental history, the critiques they offered, the body of new methods and theory that each developed, and their persistent marginal status within the discipline, rather than as approaches that are broadly transformative (Conkey 2005).

Finally, postcolonialism incorporates elements of the theoretical positions already noted, situating them explicitly in the context of colonialism and its consequences (see Lydon and Rizvi 2010 for examples). Indigenous archaeology is in fact very much a response to colonialism,

which is responsible for the application of the "indigenous" adjective that collected many distinct peoples into a single identity defined in contract to Europeans. Topics of interest to or incorporated by Indigenous archaeology include hybridity and continuity, identity, nationhood, resistance, and diaspora. Research relating to these and other topics has connected Indigenous peoples to other colonized peoples elsewhere in the world.

Indigenous archaeology resonates very strongly with these approaches, although connections can easily be found with other archaeological approaches, such as symbolic and structural archaeology (which some include within post-processualism). Structural approaches, for example, utilizing ethnohistoric and contemporary Indigenous sources relating to worldview, have been used in the interpretation of household space and settlement patterns in Canada (Oetelaar 2000). Martindale and Nicholas (2014) suggest bridging the universalist/particularistic divide using the notion of federated knowledge to connect multiple standpoints of interpreting and valuing heritage, archaeological or otherwise, while avoiding the usual asymmetry of power usually attributed to a Western vs. Indigenous knowledge comparison.

Not surprisingly, to date there have been generally very few explicit examples of Indigenous archaeology's connections with processual, evolutionary, or behavioral archaeology, all of which tend to operate at the scale of populations and which are seen to contribute little to the goals of Indigenous archaeology or to the needs of descendant communities. Indigenous archaeologists often utilize many of the basic tools of traditional (i.e., inductive, culture history oriented) archaeological inquiry in locating, describing, dating, evaluating, and interpreting heritage sites, but these may be customized to local conceptions of heritage or augmented by oral histories. While there has been a significant rise in tribal offices and Indigenous-led companies involved in heritage management projects that are producing "archaeological data," their alignment with Indigenous needs, values, and decision-making creates a hybrid approach to heritage management that includes more community involvement and benefits flow.

Realms of Application and Practice

There are four primary categories within which Indigenous archaeology – reactive, interpretive, reflexive, and transformative – in which theory intersects with practice. This overview is illustrative, not exhaustive.

Reactive

Many of the earlier manifestations of Indigenous archaeology were "reactive" against Western science and its applications through archaeology. Vine Deloria Jr. (1969) was the first to call attention to anthropology's often negative impact on American Indian groups in his landmark volume *Custer Died for Your Sins: An Indian Manifesto.* Shortly thereafter, archaeologists such as Thomas King, Eldon Johnson, and Roderick Sprague began calling attention to the issues American Indians were raising in reaction to the practice of archaeology; the suppression of Indigenous minorities included being distanced from their heritage. Many anthropologists and archaeologists provided supportive information for Indigenous land claims in the United States, Canada, and Australia in the twentieth century, but the Indigenous groups with a vested interest in the outcome, felt obliged to actively participate in the process, especially in relation to heritage preservation, education, community history and traditional knowledge, cultural revitalization, and repatriation of knowledge and objects of cultural patrimony.

In more academically focused questioning, Indigenous communities have demonstrated concern over the biases or limitations associated with traditional archaeological survey and site sampling methods, as well as with the adequacy of site significance evaluations and predictive models (especially when the latter are seen or believed to contradict community knowledge of traditional or precontact land-use practices) developed by archaeologists and presented as somehow more valid than those of the contemporary Indigenous populations. In addition, Indigenous groups have often questioned archaeology's claim to "stewardship" over the archaeological heritage, as well as the arbitrary divisions between "prehistoric" and "historic," and "archaeology" and

"history." Reactions to the limitations of traditional archaeology have also included extensive and concerted efforts by Indigenous groups to achieve greater participation in archaeological practice and decision-making in cultural resource management.

Interpretive

Indigenous archaeology projects frequently seek a congruence of oral histories, ethnohistorical sources, and archaeology, albeit not necessarily with equal levels of emphasis. This is illustrated in the contributions of Robert Hall, an Indigenous scholar whose collection of essays, *An Archaeology of the Soul: North American Indian Belief and Ritual* (1997), brought a new understanding of ancient ceremonialism informed by Native American beliefs and provided a foundation for more recent studies of Hopewell ritual. Oral histories have been especially important in defining heritage objects and places, including entire landscapes (e.g., as evident in the American Southwest and throughout Australia), but also connect Indigenous archaeology to the realm of landscape archaeology (David and Thomas 2008). Some scholars have challenged the use of oral histories in interpreting the archaeological record (e.g., Mason 2006) on the basis of subjective bias and other issues. Notably, validation of Indigenous knowledge by archaeological methods and data may not be important to local communities who are satisfied with their knowledge of the past through other means.

Political issues aside, Indigenous archaeology has in some cases forced archaeologists to reevaluate their interpretations of material culture or to consider alternative explanations informed by oral histories, folklore, traditional knowledge, and religious beliefs that may previously have been overlooked. Likewise, greater awareness has emerged as to the "tyranny" of Western values imposed upon ancient lifeways in the interpretation of archaeological remains. Indeed, alternative explanations of the past, informed by Indigenous sensibilities, can be construed as multiple working hypotheses that offer scholars ideas they might not otherwise have considered.

Reflexive

The emphasis on subjective perspectives and local values in Indigenous archaeology has, in some regards, helped to engage archaeological practice with descendant communities by emphasizing ethically and culturally appropriate behavior at all stages of research. This relates to a more extensive movement worldwide, championed by Maori scholar Linda Tuhiwai Smith, among others, to replace the methodologies of Western-based research with those more appropriate to Indigenous communities by asking the following: "Whose research is it? Whose interests does it serve? Who benefits?" (1999: 10). Increasing benefit sharing, community participation, and flexibility in the research process, along with recognition of the subjectivity of science, is a prominent feature of Indigenous archaeology.

Indigenous archaeology is necessarily reflexive in its nature as practitioners seek to identify the tools of Western science most conducive to their needs or personally evaluate what they're involved with in cross-cultural contexts. It is necessarily very collaborative, generally guided by strong community direction in setting project goals and identifying appropriate methodologies (e.g., Atalay 2012; Colwell-Chanthaphonh and Ferguson 2007; Watkins 2017). These often include standard archaeological survey, testing, and excavation methods that may be adjusted to local needs and coupled with ceremonial activities to honor ancestors and placate spiritual beings. Respect and trust are essential in the cross-cultural collaborations that are such a frequent element of Indigenous archaeology.

Transformative

Indigenous archaeology has been transformative in two substantive ways. The first is that it has provided Indigenous communities with a set of concepts and tools derived from Western science that can aid in identifying, protecting, and promoting aspects of their heritage in ways that are relevant to them. Here, the popular notion of archaeology for the sake of new knowledge from old things is eclipsed by an archaeology done for the sake of better people's lives and those of future generations (e.g., Atalay et al. 2014; McAnany

and Rowe 2016; Watkins 2017). This challenges the lasting legacy of scientific colonialism by ensuring that descendent communities are the primary beneficiaries of research conducted on their heritage. It is a project very much directed to the goal of decolonizing the academy by confronting long-standing imbalances regarding who makes decisions and who benefits, although often the rhetoric of "decolonization" has offered little practical means to achieve its goals.

The second transformation has been an appreciable broadening of the scope of archaeological theory and practice as a result of engagement – sometimes voluntary, sometimes forced – with the ideas, values, interests, and needs of Indigenous peoples. Coupled with ideas drawn from other approaches of postprocessual archaeology, many archaeologists have sought a more complete and critical understanding of the nature of archaeological knowledge and scientific objectivity that they want to activate through praxis (see McGuire 2008: 80). As a result, archaeology has gradually become more representative and responsible, with increased attention to ethics and issues of social justice, which is evident in the goals, structure, and code of ethics of the World Archaeological Association.

Current Debates and Future Directions

Indigenous archaeology is today part of the archaeological landscape but remains very much a project under development. It came into being during a time of social and political turmoil as economic and social minorities questioned the status quo of the governments and academies around them and soon after became engaged with discussions about the nature of archaeological knowledge and questioned Western conceptions of "the past." Always positioned at the margins of mainstream research, it has unfolded in such a variety of ways in different contexts that some contend it is rightly pluralized – "Indigenous archaeologies." As an element of post-processualism, but also in its own right, Indigenous archaeology has contributed to a broadening (and questioning) of archaeology theory and practice in ways that have been culturally enlightening and politically challenging.

Formed as it was during this time of social (and intellectual) unrest, it emerged in response to the Indigenous people's attempts to regain control over their own affairs and heritage as well as ideas emerging from within archaeology. It brings together Indigenous worldviews, political ideas, and socioeconomic thrusts for self-governance with a suite of archaeological ideas drawn from alternative approaches to archaeology. The result is an approach to archaeology that foregrounds multiple non-Western interests and values and respects (indeed requires) multivocality while integrating existing methodological ideas and interpretative universes. The questioning of basic principles and goals in archaeology, not limited to Indigenous contexts, has strengthened archaeology while also making it somewhat more relevant to descendant communities.

There have been a growing number of practitioners of Indigenous archaeology since its inception. While not all those who practice this are themselves Indigenous, the increase in the number of Indigenous persons attaining training in archaeology (experiential as well as academic) has led to a significant increase individuals who are trained to be able to integrate Western scientific methodologies with an understanding of Indigenous concepts about the natural world and humanity's place within it. These individuals are now aided by the immediacy of contact and knowledge exchange through the Internet and electronic Listservs (such as the ▶ Closet Chickens) that allow knowledge and experiences to be shared on a previously unknown global scale.

Indigenous archaeology has, and continues to face, a variety of challenges. Some critics have claimed it is a nonscientific exercise in political correctness or have leveled charges of exceptionalism and theoretical bankruptcy (McGhee 2009). Others have suggested that it eschews empiricism and embraces an extreme form of relativism. Some of these charges, especially relating to the lack of scientific goals or rigor, are reminiscent of early criticisms of feminism and post-processualism and harken back to the issues brought to the forefront by Trigger (1980) in his

call for recognition that archaeology has never been neutral or apolitical. Some explanations by Indigenous peoples of how things were in the past are, in fact, embedded in religious belief and thus do fall outside the realm of Western notions of science and history. What often has gone unacknowledged is that processual archaeology and postprocessualism may have more in common than recognized (Van Pool and Van Pool 1999) and simply operate at different scales. Furthermore, Indigenous archaeology may represent an extension of traditional archaeological methods conducted with, for, or by communities in CRM surveys, a pursuit of land claims, or supplementing or validating traditional histories.

Should Indigenous archaeology retain an identity separate from the mainstream, or should it be integrated? While this same question continues to be debated in feminist archaeology, it is complicated here by differences between Western and Indigenous values, worldviews, and so forth. Cree scholar Willie Ermine's (1995) consideration of the metaphysics of "inner space" allows for a more subjective insight into one's relationship with the scientific world. He offers the notion that an individual's experience through inward exploration, enhanced by working with elders and practitioners, can lead to a personal context within which to gain knowledge, as another way that Indigenous research paradigms can operate. His discussion of the space between these knowledge systems can provide a mechanism for Indigenous peoples who want to participate in archaeology but who feel uncomfortable or unwelcome in other settings. At the same time, Indigenous archaeology must have a presence in the broader discourse relating to both archaeological theory and practice.

The rise of Indigenous Studies programs in North America and other formerly colonized nations has also increased the reach of programs such as Indigenous archaeology. The availability of college-educated individuals provides not so much "experts" on Indigenous ideas and issues as much as individuals who possess the sorts of credentials recognized by administrators outside or the community. In this regard, the development of Indigenous Studies programs provides more nuanced perspectives that can influence a wider body of students than previously; individuals from Indigenous backgrounds who attend such programs are exposed to role models and ideas that expand upon Western concepts and integrate alternative means of understanding and talking about things.

Conclusions

Indigenous archaeology, as a recognized approach to interpreting, presenting, and discussing the human past, is growing stronger as more and more people become active in practicing the methodologies it proposes. However, as various subdisciplines and approaches to the study of the human past arise, practitioners must question the extent to which approaches might purposefully or inadvertently contribute to a weakening of the discipline through essentialism and Balkanization. To prejudge one perspective over another, regardless of the intent or purpose, creates an artificial hierarchy that threatens not only scientific exploration but also the development of alternative means of understanding how worldviews intersect or clash. Yet, with the growth of alternative means of knowing the lives and cultures of those who have gone before, Indigenous archaeology offers contemporary peoples alternative and more nuanced perspectives on the global past.

Cross-References

- ▶ Closet Chickens
- ▶ Indigenous Archaeological Organizations
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for
- ▶ Postcolonial Archaeologies
- ▶ Sacred Sites in Indigenous Archaeology

References

Atalay, S. 2012. *Community-based archaeology: Research with, by, and for indigenous and local communities*. Berkeley: University of California Press.

Atalay, S., L.R. Clauss, R. McGuire, and J. Welch. 2014. *Transforming archaeology: Activist practices and prospects*. Walnut Creek: Left Coast Press.

Cajete, G. 1999. *Native science: Natural laws of interdependence*. Santa Fe: Clear Light Books.

Clarke, D.L. 1978. *Analytical archaeology*. rev ed. Chicago: University of Chicago Press.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2007. *The collaborative continuum: Archaeological engagements with descendant communities*. Walnut Creek: AltaMira Press.

Conkey, M. 2005. Dwelling at the margins, action at the intersection? Feminist and indigenous archaeologies. *Archaeologies* 1: 9–59.

Conkey, M., and J. Gero. 1997. Programme to practice: Gender and feminism in archaeology. *Annual Reviews in Anthropology* 26: 411–437.

David, B., and J. Thomas, eds. 2008. *Handbook of landscape archaeology*. Walnut Creek: Left Coast Press.

Deloria, V., Jr. 1969. *Custer died for your sins: An Indian manifesto*. Norman: University of Oklahoma Press.

Ermine, W. 1995. Aboriginal epistemology. In *First nations education in Canada: The circle unfolds*, ed. M. Battiste and J. Barman, 101–112. Vancouver: UBC Press.

Hall, R. 1997. *An archaeology of the soul: North American Indian belief and ritual*. Urbana: University of Illinois Press.

Hodder, I. 1991. Interpretive archaeology and its role. *American Antiquity* 56: 7–18.

Hymes, D., ed. 1974. *Reinventing anthropology*. New York: Vintage Books.

Leone, M. 1998. Symbolic, structural, and critical archaeology. In *Reader in postprocessual archaeology*, ed. D. Whitley, 49–68. New York: Routledge.

Lydon, J., and U. Rizvi, eds. 2010. *Handbook of postcolonial archaeology*. Walnut Creek: Left Coast Press.

Marcus, G.M., and M.M. Fischer. 1986. *Anthropology as cultural critique: An experimental movement in the human sciences*. Chicago: University of Chicago Press.

Martindale, A., and G. Nicholas. 2014. Wayfinding: Archaeology as federated knowledge. *Canadian Journal of Archaeology* 38 (2): 434–465.

Mason, R.J. 2006. *Inconstant companions: Archaeology and North American Indian oral traditions*. Tuscaloosa: University of Alabama Press.

McAnany, P., and S.M. Rowe. 2016. *Archaeology in society: Maya cultural heritage: How archaeologists and indigenous communities engage the past*. Lanham, MD: Rowman and Littlefield.

McGhee, R. 2009. Aboriginalism and the problem of indigenous archaeology. *American Antiquity* 73 (4): 579–597.

McGuire, R.H. 2008. *Archaeology as political action*. Berkeley: University of California Press.

McNiven, I. 2016. Theoretical challenges of indigenous archaeology: Setting an agenda. *American Antiquity* 81 (1): 27–41.

Nicholas, G.P. 2008. Native peoples and archaeology. In *Encyclopedia of archaeology*, ed. D.M. Pearsall, 1660–1669. New York: Elsevier.

Nicholas, G.P., and J. Hollowell. 2007. Ethical challenges to a postcolonial archaeology: The legacy of scientific colonialism. In *Archaeology and capitalism: From ethics to politics*, ed. Y. Hamilakis and P. Duke, 59–82. Walnut Creek: Left Coast Press.

Oetelaar, G.A. 2000. Beyond activity areas: Structure and symbolism in the organization and use of space inside tipis. *Plains Anthropologist* 45 (171): 35–61.

Smith, L.T. 1999. *Decolonizing methodologies: Research and indigenous peoples*. London: Zed Books.

Spector, J. 1993. *What this awl means: Feminist archaeology in a Wahpeton Dakota village*. Minneapolis: Minnesota Historical Society.

Trigger, B. 1980. Archeology and the image of the American Indian. *American Antiquity* 45 (4): 662–676.

Van Pool, T., and C. Van Pool. 1999. The scientific nature of postprocessualism. *American Antiquity* 64 (1): 33–53.

Watkins, J. 2000. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: AltaMira Press.

Watkins, J. 2017. Research, representation, redemption, and redefinition: Archaeology and community relationships in 21st-century America. In *The Routledge companion to contemporary anthropology*, ed. S. Coleman, S.B. Hyatt, and A. Kingsolver, 264–282.

Further Reading

Atalay, S., ed. 2006. Decolonizing archaeology. *American Indian Quarterly* 30 (3&4): 269–503.

Colwell-Chanthaphonh, C. 2012. Archaeology and indigenous collaboration. In *Archaeological theory today*, ed. I. Hodder, 2nd ed., 267–291. Cambridge: Polity Books.

Gnecco, C., and P. Ayala, eds. 2011. *Indigenous peoples and archaeology in Latin America*. Walnut Creek: Left Coast Press.

Nicholas, G.P. 2010. Seeking the end of indigenous archaeology. In *Bridging the divide: Indigenous communities and archaeology into the 21st century*, ed. H. Allen and C. Phillips, 233–252. Walnut Creek: Left Coast Press.

Nicholas, G.P. 2017. Touching the intangible: Situating material culture in the realm of Indigenous heritage research. In *The Routledge companion to cultural property*, ed. J. Anderson and H. Geismar, 212–231. London and New York: Routledge.

Patterson, T. 1994. Social archaeology in Latin America: An appreciation. *American Antiquity* 59 (3): 531–537.

Schmidt, P.R., ed. 2009. *Postcolonial archaeologies in Africa*. Santa Fe: School of American Research.

Schmidt, P.R., and T. Patterson, eds. 1995. *Making alternative histories: The practice of archaeology and*

history in non-western settings. Santa Fe: School of American Research.
Smith, C., and H.M. Wobst, eds. 2005. *Decolonizing archaeological theory and practice*. New York: Routledge.
Watkins, J. 2005. Through wary eyes: Indigenous perspectives on archaeology. *Annual Review of Anthropology* 34: 429–449.
Wobst, H.M. 2005. Power to the (indigenous) past and present! Or: The theory and method behind archaeological theory and method. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 17–32. New York: Routledge.

Indigenous Archaeologies: Australian Perspective

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Introduction

Indigenous archaeologies is a methodological approach that not only emphasizes collaboration with Indigenous peoples at every stage of research but also seeks to privilege Indigenous philosophies and knowledges in order to decolonize archaeological research and practice. Within the Australian context, the foundations of Indigenous archaeologies emerged in response to historical inequalities and continuing colonial nature of traditional archaeological research, which were at the forefront of debates within the discipline in the 1980s. The resulting emergence of "community-based archaeologies" in the 1990s coupled with the influence of postcolonial critiques of archaeological practice within international literature provided the basis for Indigenous archaeologies in Australian to establish its roots. Some of the critical issues that have been debated under the rhetoric of Indigenous archaeologies within Australia include repatriation of human remains and cultural objects; culturally appropriate archaeological methods from collecting institutions and practices; ethical standards and codes of ethics; intellectual and cultural property rights; cultural heritage management and legislative frameworks; as well as the impact of development and mining on cultural and archaeological sites of significance. Today, Indigenous archaeologies forms a large subfield of Australian archaeology where Aboriginal and Torres Strait Islander peoples' knowledge, interests, and concerns are considered crucial to the broader archaeological inquiry, despite the still-developing nature of the theoretical framework within an Australian context.

Definition

Indigenous archaeologies is not archaeological practice about Indigenous peoples, but rather practice that "is informed by Indigenous values and agendas" (Smith and Wobst 2005, 15). Indigenous archaeologies emphasizes a number of key objectives that seeks to challenge, reconceptualize, and transform traditional archaeological practices, including archaeological research that is initiated and controlled by Indigenous people while privileging Indigenous philosophies, interests, aspirations, agendas, and concerns (see Atalay 2007, 2008; Nicholas 2008, 2010; Nicholas and Andrews 1997; Smith and Wobst 2005; Watkins 2000). As a result, Indigenous archaeologies is considered to be a "change in mindset" (Smith and Wobst 2005, 7) toward Western forms of archaeological practices that can only emerge by undertaking collaborative or community-initiated research. In doing so, Indigenous archaeologies is considered a tool for engaging in the broader "decolonization project" in Indigenous research that has global significance for the recognition of Indigenous rights (Nicholas 2010).

Similar to gender, feminist, and queer archaeologies, Indigenous archaeologies is distinguished from other types of traditional archaeological practice both in terms of its ideological and methodological approach, which continues to broaden both theoretically and practically as Indigenous peoples progressively engage and thus transform

archaeological theory and methods. Nicholas (2008, 1660) presents the broad scope of Indigenous archaeologies in the following way:

> Indigenous archaeology is an expression of archaeological theory and practice in which the discipline intersects with Indigenous values, knowledge, practices, ethics, sensibilities, and through collaborative and community-originated or-directed projects related critical perspectives. Indigenous archaeology seeks to (1) make archaeology more representative of, responsible to and relevant for Indigenous communities; (2) redress real and perceived inequalities in the practice of archaeology; and, (3) inform and broaden the understanding and interpretation of the archaeological record through the incorporation of Aboriginal worldviews, histories, and science. In its broadest sense, Indigenous archaeology may be defined as any one or more of the following: (1) the active participation or consultation of Indigenous peoples in archaeology; (2) a political statement concerned with issues of Aboriginal self-government, sovereignty, land rights, identity, and heritage; (3) a post-colonial enterprise designed to decolonise the discipline; (4) a manifestation of Indigenous epistemologies; (5) the basis for alternative models of cultural heritage management or stewardship; (6) the product of choices and actions made by individual archaeologists; (7) a means of empowerment and cultural revitalisation or political resistance; and (8) an extension, evaluation, critique, or application of current archaeological theory.

Indigenous archaeologies is more than "just" an investigation of the past by archaeologists. It is a social, cultural, and political movement that can be a powerful tool for Indigenous peoples in redressing wrongs of the past, reclaiming cultural identity, reaffirmation, cultural revitalization, and maintaining heritage. As described by Piikani nation archaeologist Eldon Yellowhorn (2006, 137), internalist archaeology has reconceptualized archaeological practice from an Indigenous perspective which reclaims the archaeological record and connections to land through oral narratives in the local archaeological record.

In Australia, archaeological research done under the auspices of Indigenous archaeologies may seek to utilize creation knowledge, oral histories, lived experiences, and understandings to complement the knowledge derived from archaeological traces and interpretations of the past. Indigenous archaeologies in Australia will also draw upon non-Indigenous written texts from various disciplines including anthropology, history, linguistics, politics, sociology, and cultural studies to form a more comprehensive version about the past that privileges Indigenous philosophies, knowledges, and understandings.

Historical Background

While Indigenous peoples have never been passive bystanders to archaeology, archaeologists, and the closely related collecting activities of non-professional amateurs, the formative years of Australian professional archaeology are characterized by research that was mostly undertaken "on and about" rather than "with, for and by" (Nicholas and Andrews 1997, 3) Australian Aboriginal people; however, some exceptions exist. During her regional field surveys of the New England area of northeast New South Wales during the 1960s, pioneering Australian archaeologist Isabel McBryde sought out and interviewed local Aboriginal community members, "with the belief that a conversation over a cup a tea could yield as much historical insight as a week in the field" (Griffiths 2018, 44). McBryde would later go on to strongly advocate for Aboriginal people's involvement in site protection as a means to control their own heritage. McBryde, however, considers her proudest achievement is the number of Aboriginal students she helped who become archaeologists, including Robyn Bancroft, Mark Dugay-Grist, and Dave Johnson (Griffiths 2018, 49). In the early 1990s, while head of the Department of Archaeology at ANU, McBryde hosted the first major cohort (approximately 10) of Indigenous students undertaking archaeology (Kellie Pollard, 2010, personal communication). Many of these students completed their undergraduate degrees and constituted the largest group of Indigenous Australians to receive academic training as archaeologists.

During the 1960s when Australian professional archaeology was still in its infancy, Indigenous peoples were strongly advocating for basic human rights and were officially recognized in the Australian constitution during the 1967

Referendum (the 1967 Referendum meant that laws could be made [for the better or detriment] on behalf of Aboriginal and Torres Strait Islander people and that they could be counted in the census). Although this was a symbolic gesture, ideologies about the "extinction" of "traditional" Indigenous people were still prevalent. The following year Australian geomorphologist Jim Bowler discovered Mungo Lady's eroding burial at Lake Mungo in western New South Wales, which triggered further archaeological investigations in the area that continue today. In the mid-1970s, radiocarbon dates at Lake Mungo pushed the human occupation of Australian back to 36,000 BP, receiving international media coverage and garnering great public interest in Australia's Aboriginal heritage. With the changing political landscape within Australia during the 1960s and 1970s, including increased Aboriginal political movements to reassert and regain control over their heritage, culture, and identity, archaeological investigations at Lake Mungo became a focal point for debates around "who owns the past." In the decades that followed, the fate of Mungo Lady and Mungo Man's ancestral remains was also at the center of repatriation debates, culminating in their eventual return to the Paakantji, Mutthi Mutthi, and Ngyiampaa Aboriginal communities in 1992 and 2017.

In the early 1980s, the Australian archaeological profession experienced a watershed moment in the form of a speech entitled "Our Heritage, Your Playground" delivered by Tasmanian Aboriginal woman Rosaline Langford (1983) at the Australian Archaeological Association meeting in Hobart. In delivering this speech, Langford held archaeologists accountable for their past practices by arguing:

> The issue is control. You seek to say that as scientists you have a right to obtain and study information of our culture. You seek to say that because you are Australians you have a right to study and explore our heritage because it is a heritage to be shared by all Australians, white and black. From our point of view we say you have come as invaders, you have tried to destroy our culture, you have built your fortunes upon the lands and bodies of our people and now, having said sorry, want a share in picking out the bones of what you regard as a dead past. We say that it is our past, our culture and heritage, and forms part of our present life. As such it is ours to control and it is ours to share on our terms. That is the Central Issue in this debate. (Langford 1983, 2)

This speech and the growing sentiment surrounding it promoted further debates and discussion around "who owns the past," laying the groundwork for forging relationships between archaeologists and Indigenous peoples. As pointed out by anthropologist Gary Jackson and Australian archaeologist Claire Smith and (2005), significant changes emerged at this time contributing to the early stages of Indigenous archaeologies. These were identified as obtaining permission for fieldwork from Indigenous communities, involvement of Indigenous colleagues, access to sites and knowledge, control over publications, and dissemination of knowledge. Several key organizations and documents were also produced including the Australian Archaeological Association's (AAA) Code of Ethics in 1991, following the adoption of a similar code internationally by the World Archaeological Congress (WAC) in 1990, which began to shape archaeological research and "best practice." In response to the continuing colonial nature of archaeological practice, important postcolonial critiques of archaeological and related practices also emerged. In association with the emerging cultural heritage management (CHM) sector, the social, political, and theoretical movements of this period provided a platform for the development of "community-based archaeology" (see Greer et al. 2002). As Australian archaeologist Shelley Greer (2010, 48) points out, "the community-based response was to turn away from universalist archaeological concerns to documenting local Indigenous interests in heritage. Archaeology was put in the *service* of local Indigenous heritage, often engaging with anthropology in order to better understand and appreciate Indigenous practice." While community-based archaeologies provided the basis for Indigenous archaeologies to establish its roots, the influence of emerging international literature, particularly from the United States (see Nicholas and Andrews 1997; Watkins 2000), allowed Indigenous archaeologies within an

Australian context to flourish. Given the similarities that exist between Indigenous archaeologies and community-based archaeologies, these terms are often used interchangeably to refer to the same approach; however, Choctaw nation archaeologist Dorothy Lippert (2016) maintains Indigenous archaeologies is distinct from community-based archaeology due to its efforts to decolonize the discipline as well as work collaboratively with Indigenous communities.

Key Issues/Current Debates

While Indigenous archaeologies exist as a subfield within Australian archaeology, many would argue the principles of Indigenous archaeologies are today integrated as part of standard archaeological practice; however, the current debates that emerge from contemporary practice are still focused on primary issues including "who owns the past," demonstrating ongoing engagement with Indigenous peoples and the approaches of Indigenous archaeologies is still required to further decolonize the discipline. In other words, simply working collaboratively with Indigenous peoples does not necessarily result in archaeological practice that is decolonized; reflexivity is the key to ensure archaeological practice is ethically, politically, and socially engaged with Indigenous interests, aspirations, and agendas. As Gabrieliño (Tongva) nation archaeologist Desireé Reneé Martinez (2014, 3776) points out, "an archaeologist cannot speak ethically about a community's past if they do not engage its present and understand their role in it."

Consequently, Greek archaeologist Yannis Hamilakis (2007, 23–25) argues archaeologists have ceased to engage in the ethical or political implications of archaeology, with politically engaged archaeology now absent from the discipline. Recent critiques regarding the ethical and political nature of archaeology claim the adoption of ethical codes and best practice doctrines by the World Archaeological Congress (WAC), the Australian Archaeological Association (AAA), and other organizations have effectively "closed-off" or sanctioned the politics of archaeological practice from further consideration (Hamilakis 2007). Hamilakis (2007, 23) refers to ethical codes as a "decoy" used to avoid the political nature of archaeology. Furthermore, he interprets ethical codes:

> . . .as a tool, as a purely technical device, that can be used to achieve something else, most commonly to continue doing archaeology as normal, to declare that it is 'business as usual', now with the additional advantage of a clear ethical consciousness. (Hamilakis 2007, 24)

In many respects the same argument could be made in regard to the adoption of the collaborative approach of Indigenous archaeologies, which also allows archaeology to carry on "business as usual" under the assumption that archaeological practice is universally beneficial to those with whom one is collaborating (cf. Hamilakis 2007, 24). In-line with this argument, adopting a collaborative approach does not necessarily guarantee research is ethically, politically, and socially engaged with the concerns of collaborative partners.

Others argue a reflexive approach is essential to consider the ways in which positivist assumptions influence archaeological practice, in order to address the marginalization of Indigenous philosophies and interests (Giddings 2006, 200). A reflexive approach also allows for consideration of the asymmetrical power structures and unethical tendencies that are maintained by positivism, including the privileged position of a researcher to produce knowledges that may marginalize Indigenous philosophies and interests despite a collaborative approach (cf. Smith 1999, 176). Without such, positivism can remain the dominant paradigm through which the results of collaborative archaeological practice are interpreted. In doing so, the collaborative approach of Indigenous archaeologies is no more than "positivism dressed in drag," where positivism is simply given a "new guise" in order for research to proceed (Giddings 2006, 198, 200). That being said, researchers occupy a unique position in knowledge production with the capacity to engage with the ethical and political nature of their research, to undertake research that is ethically and politically responsible in order to

challenge this marginalization (Hemming et al. 2010, 101). According to Hemming et al. (2010, 96–97), research that seeks to challenge the marginalization of Indigenous rights, responsibilities, and interests is the basis for research that is ethically, politically, and socially engaged. The combination of collaborative and reflexive approaches is essential in order to undertake ethical and politically engaged research. Without a reflexive approach, we pat ourselves on the back for being progressive and fail to engage with ongoing ethical and political nature of our research. Therefore, collaborative and reflexive approaches go hand in hand to ensure an ethically, politically, and socially engaged archaeology is ethically, politically, and socially responsible archaeology.

In addition to this, the politics of representation and the relationships between archaeologists and Indigenous peoples have been explored (see Davidson et al. 1995). This relationship began as early as the 1930s with Indigenous peoples as "informants" and slowly progressed to involving Indigenous peoples throughout all aspects of the research process including the research design, consultation, ethics, fieldwork, and dissemination of information. It is this relationship and its development that continues to be a topical issue. Smith et al. (1994, 13) suggest that the traditional strength of Australian archaeology has been the analysis of sociopolitical issues including the relationships between archaeologists and Indigenous peoples and the change in power and control Indigenous communities have reclaimed over their cultural heritage. This type of Indigenous archaeologies which has also been termed "community-based archaeology" (Greer et al. 2002) began to shape much of the standard of archaeological research within Australia. During the 1980s and 1990s, debates related to ethics and the repatriation of "Old People's" remains placed pressure on disciplines such as anthropology and archaeology to become more culturally inclusive with research practices and ethics which included the deconstruction of past processual practices and decolonizing archaeology itself (see Smith 1999; Smith and Wobst 2005). Some of the key issues that continue to be debated include:

- The repatriation of human remains and cultural objects from collecting institutions
- The process of archaeological research, practices, and ethical standards
- Intellectual and cultural property rights
- Cultural heritage management and legislative frameworks
- The impact of mining, industrial waste and natural resource management, and housing development on cultural and archaeological sites of significance

International Perspectives

Internationally Indigenous archaeologies was first defined by American and Canadian archaeologists George Nicholas and Thomas D. Andrews (1997, 3) as archaeological practice undertaken "archaeology with, for and by Indigenous peoples." Indigenous archaeologies was later popularized by the publication of *Indigenous Archaeology: American Indian Values and Scientific Practice* (2000) by Choctaw nation archaeologist Joe Watkins. The World Archaeological Congress (WAC) has also played a significant role in the development of Indigenous archaeologies, with WAC conferences providing an international forum to discuss ideas and opportunities for Indigenous archaeologists (i.e., archaeologists who identify as Indigenous) to share their experiences. During the 2016 WAC conference in Kyoto, Japan, Choctaw nation archaeologist Dorothy Lippert expressed the importance of WAC in her personal and professional development due to these international networking opportunities (Lippert 2016).

As the pluralized nature of Indigenous archaeologies suggests, there are varying ways to undertake Indigenous archaeologies that reflect the dynamic experiences, knowledges, and cultures of Indigenous peoples globally this approach seeks to privilege (Atalay 2008, 30). Despite this, the experiences within Australia are similar to those internationally, and the approaches utilized in Indigenous archaeologies are often developed using models from Indigenous researchers, such as *Decolonizing Methodologies: Research*

and Indigenous Peoples by Maori academic Linda Tuhiwai Smith (1999), as well as Indigenous archaeologists themselves (i.e., Indigenous peoples who are formally trained in archaeology). Specifically, the Indigenous research agenda described by Maori academic Linda Tuhiwai Smith (1999, 116–117) has helped inform the way in which many Indigenous peoples are approaching archaeology in Australia. Smith's (1999) "Indigenous Research Agenda" privileges Indigenous epistemologies and acknowledges that Indigenous researchers also have a responsibility to ensure that research is conducted in culturally appropriate ways. Such an agenda ensures that elders or senior leaders are not simply entering into a process of "negotiation," but rather have complete control over the research process including proposals, development, methodology, interpretations, and the dissemination of information back to the community in a culturally appropriate and comprehensive manner. This approach considers complex issues relating to power imbalances and thus draws upon critical theory, postcolonial theory, standpoint theory, and a decolonization of research practice (Atalay 2007, 2008; Smith 1999; Smith and Wobst 2005; Watkins 2000). Therefore, it is an Indigenist framework developed for and by Indigenous peoples that is theoretically situated within post-processual and interpretative archaeologies – which ultimately reject a positivist view of science in search of new meanings and interpretations of the past. The issues that "Indigenous archaeologists" encounter in the research process are experiences discussed by many North American archaeologists (i.e., Nicholas 2010; Watkins 2000) and are critical for understanding relationships between the researcher and the "subject" in any research project involving Indigenous peoples.

Furthermore, Anishinaabe kwe nation archaeologist Sonya Atalay (2007) has discussed the use of Indigenous archaeologies for broader contexts. She highlighted the importance of "community-based participatory research" in Turkey, which involved archaeologists working closely with local people in understanding their cultural heritage. Atalay (2007, 253) argues that "Indigenous archaeology" is on the periphery of mainstream archaeological practices and is essentially a "practice that foregrounds knowledge and experiences of Indigenous peoples to inform and influence Western archaeologies as part of the decolonisation of the discipline." It is an approach that has global implications and can extend beyond Indigenous communities (i.e., local communities) – such as how it was applied by Atalay at Catalhoyuk, Turkey. It is evident through her research that some key components of this approach include identifying her privileged position, foregrounding local knowledge and experiences, the practicing of socially just research that has positive effects on contemporary communities, collaborative archaeology and the incorporation of worldviews, positive processes of decolonization, long-term goals and programs, working with communities to develop research questions based on community needs, using local knowledge about the best way to conduct research, and a flexible research plan and strategy. All these components are key to any research project regardless of ethnicity and therefore challenge the concept of "Indigenous archaeologies."

Future Directions

While Indigenous archaeologies as a methodological approach has progressed since it developed in the 1990s, some maintain Indigenous archaeologies is still developing. Choctaw nation archaeologist Dorothy Lippert (2016) argues Indigenous archaeologies "is not widespread. . . [and] we need to think about how Indigenous archaeology draws in and addresses colonial legacies and seeks to dismantle power structures that prevent Indigenous people from fully participating in sciences." In the article "Theoretical challenges of Indigenous archaeology: setting the agenda," Australian archaeologist Ian McNiven (2016) points out that Indigenous archaeologies has focused on collaborative aspects of archaeological practice and the move toward decolonization. As a result, the theoretical framework for Indigenous archaeologies is still yet to be defined and remain mostly

aspiration (also see Atalay 2008, 29). In addition to this, the contribution of Indigenous archaeologies to archaeological interpretation also remains underdeveloped, with Western archaeological knowledges maintaining an overall privileged position in the interpretation of archaeological materials. In order to address this lack of theorization as well as the privileged position archaeological knowledges maintain, McNiven (2016) argues addressing the dichotomies that lie at the heart of Western archaeological practice is key for producing understandings that privilege Indigenous philosophies and understandings.

Despite this, the exact constituents forming Indigenous Australian archaeologies are still in a process of discussion, debate, and transformation as more Indigenous peoples became actively involved in education, training, and research in archaeology and cultural heritage. With these arguments in mind, the full potential of Indigenous archaeologies in Australia has yet to be realized, partly due to the underrepresentation of Indigenous people within the discipline. For the most part, Indigenous archaeologies within an Australian context mostly refers to collaboration between non-Indigenous archaeologists and Indigenous community, rather than Indigenous archaeologists working for Indigenous communities (McNiven 2016, 28). This observation is supported by a decade-long survey undertaken by the Australian Archaeological Association (AAA), which reports the participation of Indigenous Australians in professional archaeology is low with Indigenous archaeologists (i.e., archaeologists who identify as Indigenous) comprising 2.3% of respondents in 2005 compared to 2.8% of respondents in 2015 (Mate and Ulm 2016, 171); however, this low percentage seems to reflect the low participation rates in the survey rather than being an accurate reflection of the archaeological profession, where it is estimated more than 20 archaeologists who identify as Indigenous are active in Australia (Mate and Ulm 2016, 172). Overall the survey concludes "the continued low participation rates of professionally qualified Indigenous archaeologists remain a challenge for the discipline" (Mate and Ulm 2016, 181).

In order to support and increase the number of Indigenous people participating in the archaeological profession, the Australian Archaeological Association (AAA) funds an Indigenous subsidy scheme for attendance to its annual conference, includes Indigenous Liaison Officer positions on its national executive committee, and is currently drafting a Reconciliation Action Plan (RAP); however, the AAA does not offer study scholarships equivalent to the Society for American Archaeology's (SAA) Native American Scholarships Fund, which was established in 1998 to support Indigenous peoples of America, Alaska, and Hawaii in their undergraduate and graduate archaeology education. In 2010 the Australian Indigenous Archaeologists' Association (AIAA) was established with the support from the Australian Archaeological Association (AAA) in hopes of promoting the active engagement of Indigenous people in archaeology and increasing the number working as professional archaeologists; however, the impact this organization has had on increasing participation rates of Indigenous people within the archaeological profession is hard to measure. Despite this, the AIAA has organized a number of sessions at the AAA's annual conference specifically to showcase archaeological practice and research undertaken by Indigenous peoples across Australia.

In recent years, a small number of Indigenous Australians have either embarked upon and completed PhDs in archaeology; however, comparing this to US situation where at least 20 Indigenous people have PhDs in archaeology (Lippert 2016), the small number of Indigenous peoples who have completed formal degrees in archaeology continues to be evident. Although the reasons for this have not been clearly identified and there have been no studies to address the issues to date, there are several reasons including the immediate employment of Indigenous graduates in government agencies and other organizations, the attractiveness of private consulting, and the commitment that Indigenous people already have in regard to caring for country as well as the fact that there may be few opportunities to leave current cultural and family obligations to undertake

full-time studies. What is evident is that Indigenous people engaging in the research, management, and protection of cultural heritage within their communities do not have the time or resources to leave the community to pursue academic scholarship – particularly the sustained study that is required for a doctoral thesis. Increasing participation and retention of Indigenous peoples in archaeology, cultural heritage management, and environmental sciences is therefore of critical importance. The representation of Indigenous archaeologists across all year levels (undergraduate through to research higher degree) must occur, as well as in all sectors that involve care, management, protection of Indigenous cultural heritage, as well as intellectual engagement through academic- and community-driven research projects. What is required is a stronger commitment to training cultural heritage "caretakers" through the implementation of archaeology and cultural heritage scholarships, cadetships, and research awards that plan for success across all degree programs from undergraduate to doctorate level.

In summary, Indigenous archaeologies within Australia have undergone significant change, transformation, since the initial development of Australian archaeology as a discipline in the 1950s; however, there is still a gross underrepresentation of Indigenous peoples participating in the discipline despite archaeology being professionally practiced in Australia for over 50 years. Although there is greater public awareness of the importance of Indigenous people, culture, and knowledge in Australia, mining exploration and urban development continue to impact on Indigenous cultural heritage and archaeological places of importance to our shared history. The complexities of these issues continue to be discussed and debated, and what becomes apparent is the continuous struggle for Indigenous recognition in a period of great political uncertainty for Indigenous communities who continue to feel the impact of colonialism. There will continue to be challenges for Indigenous archaeologies in Australia until issues of nationalism and representation of Indigenous peoples as a First Nation are negotiated. In short, it would seem that Australia is yet to realize the full potential of undertaking archaeology "with, for, and by" Indigenous peoples.

Cross-References

- ▶ Atalay, Sonya
- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for
- ▶ Lippert, Dorothy T.
- ▶ McBryde, Isabel
- ▶ Nicholas, George P.
- ▶ Postcolonial Archaeologies
- ▶ Smith, Claire
- ▶ Watkins, Joe (Indigenous Archaeology)
- ▶ World Archaeological Congress (WAC)

References

Atalay, S. 2007. Global application of Indigenous archaeology: Community based participatory research in Turkey. *Archaeologies – Journal of the World Archaeological Congress* 3: 249–270.

Atalay, S. 2008. Multivocality and Indigenous archaeologies. In *Evaluating multiple narratives*, ed. J. Habu, C. Fawcett, and J.M. Matsunaga, 29–44. New York: Springer.

Davidson, I., C. Lovell-Jones, and R. Bancroft. 1995. *Archaeologists and aborigines working together*. Armidale: University of New England Press.

Giddings, L.S. 2006. Mixed-methods research: positivism dressed in drag? *Journal of Research in Nursing* 11 (3): 195–203.

Greer, S. 2010. Heritage and empowerment: Community-based Indigenous cultural heritage in northern Australia. *International Journal of Heritage Studies* 16 (1–2): 45–58.

Greer, S., R. Harrison, and S. Mcintyre-Tamwoy. 2002. Community-based archaeology in Australia. *World Archaeology* 34: 265–287.

Griffiths, B. 2018. *Deep time dreaming: Uncovering ancient Australia*. Carlton: Black Inc.

Hamilakis, Y. 2007. From ethics to politics. In *Archaeology and capitalism: From ethics to politics*, ed. Y. Hamilakis and P. Duke, 15–40. Walnut Creek: Left Coast Press.

Hemming, S., D. Rigney, and S. Berg. 2010. Researching on Ngarrindjeri Ruwe/Ruwar: Methodologies for positive transformation. *Australian Aboriginal Studies* 2: 92–106.

Jackson, G., and C. Smith. 2005. Living and learning on aboriginal lands: Decolonizing archaeology in practice. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 328–351. London/New York: Routledge.

Langford, R. 1983. Our heritage, your playground. *Australian Archaeology* 16: 1–6.

Lippert, D. 2016. Indigenous archaeologies and the World Archaeological Congress: The past, the present and the future. Paper presented at World Archaeological Congress, Kyoto.

Martinez, D.M. 2014. Indigenous archaeologies. In *Encyclopedia of global archaeology*, ed. C. Smith, 3772–3777. London: Routledge.

Mate, G., and S. Ulm. 2016. Another snapshot for the album: a decade of Australian archaeology in profile survey data. *Australian Archaeology* 82 (2): 168–183.

Mcniven, I. 2016. Theoretical challenges of Indigenous archaeology: Setting the agenda. *American Antiquity* 8 (11): 27–41.

Nicholas, G.P. 2008. Native peoples and archaeology. In *Encyclopaedia of archaeology*, ed. D. Pearsall, vol. 3, 1660–1669. New York: Academic.

Nicholas, G.P. 2010. *Being and becoming Indigenous archaeologists*. Walnut Creek: Left Coast Press.

Nicholas, G.P., and T.D. Andrews, eds. 1997. *At a crossroads: Archaeology and first peoples in Canada*. Burnaby: Archaeology Press.

Smith, L.T. 1999. *Decolonizing methodologies: Research and Indigenous peoples*. New York: Zed Books.

Smith, C., and M. Wobst. 2005. Decolonizing archaeological theory and practice. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 4–14. London/New York: Routledge.

Smith, C., H. Burke, and C. Lovell-Jones. 1994. Beyond the looking glass: Some thoughts on sociopolitics and reflexivity in Australian archaeology. *Australian Archaeology* 38: 13–22.

Watkins, J. 2000. *Indigenous archaeology: American Indian values and scientific practice*. Lanham: AltaMira Press.

Yellowhorn, E. 2006. Understanding antiquity. *Journal of Social Archaeology* 6: 307–327.

Further Reading

Atalay, S. 2006. Indigenous archaeology as decolonizing practice. *American Indian Quarterly* 30 (3): 280–310.

Atalay, S. 2012. *Community-based archaeology: Research with, by and for Indigenous and local communities*. Berkeley: University of California Press.

Byrne, D. 1998. Deep nation: Australia's acquisition of an Indigenous past. *Aboriginal History* 20: 82–107.

Colwell-Chant Haphonh, C., and T.J. Ferguson. 2008. *Collaboration in archaeological practice: Engaging descendant communities*. Lanham: AltaMira Press.

Hamilakis, Y. 2005. Whose world and whose archaeology? The colonial present and the return of the political. *Archaeologies: The Journal of the World Archaeological Congress* 1: 94–101.

Hemming, S., and T. Trevorrow. 2005. Kungan Ngarrindjeri Yunnan: Archaeology, colonialism and reclaiming the future. In *Indigenous archaeologies: Decolonising theory and practice*, ed. C. Smith and M. Wobst, 243–261. London: Routledge.

Lippert, D. 1997. In front of the mirror: Native Americans and academic archaeology. In *Native Americans and archaeologists: Stepping stones to common ground*, ed. N. Swidler and S.F.A. Archaeology, 120–127. Walnut Creek: AltaMira Press.

Million, T. 2005. Developing an aboriginal archaeology: Receiving gifts from White Buffalo Calf woman. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 43–55. London: Routledge.

Nicholas, G. 1997. Education and empowerment: Archaeology with, for, and by the Shuswap Nation. In *At a crossroads: Archaeology and first peoples in Canada*, ed. G. Nicholas and T. Andrews, 85–104. Burnaby: Archaeology Press.

Nicholas, G. 2001. The past and future of Indigenous archaeology: Global challenges, north American perspectives, Australian prospects. *Australian Archaeology* 52: 29–40.

Nicholas, G., and J. Hollowell. 2007. Ethical challenges to a postcolonial archaeology: The legacy of scientific colonialism. In *Archaeology and capitalism: From ethics to politics*, ed. Y. Hamilakis and P. Duke, 59–82. Walnut Creek: Left Coast Press.

Riches, L., ed. 2004. *Exploring encounter: A new relationship between archaeologists and indigenous people? Archaeology from Australia*. Melbourne: Australian Scholarly Press.

Silliman, S. 2008. Collaborative Indigenous archaeology: Trowelling at the edges, eyeing the centre. In *Collaborating at the Trowel's edge: Teaching and learning in Indigenous archaeology*, ed. S. Silliman, 1–24. Tucson: University of Arizona Press.

Silliman, S. 2010. The value and diversity of Indigenous archaeology: A response to McGhee. *American Antiquity* 75 (2): 217–220.

Wilson, C. 2007. Indigenous research and archaeology: Transformative practices in/with/for the Ngarrindjeri Community. *Archaeologies* 3: 320–334.

Wiltshire, K.D. 2011. Changes in mindset: The development of a collaborative research methodology. *Archaeological Review from Cambridge* 26 (2): 31–43.

Indigenous Archaeologies: North American Perspective

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Introduction

"Indigenous archaeology" can be conceived of as a suite of responses to the legacy of colonialism in archaeology, while also reflecting a broadening and reconstitution of existing theory and practice designed to make the discipline more relevant and satisfying to descendant communities. It is an entity that is also defined by its engagement, often simultaneously, with issues relating to identity and ethnicity, the nature of knowledge, the flow of benefits derived from archaeological research, the indivisibility of tangible and intangible heritage, and different ways of knowing the world. Indigenous archaeology, depending upon who is involved and in what context, may be as much about the recovery of objects and information about past lifeways as it is about the sociopolitics of the endeavor and equally as much about community direction and involvement as it is about the decisions and choices of those individuals involved. It is thus very much a multifaceted and reflexive endeavor in which Indigenous epistemology(ies) intersect with archaeological practice in sometimes controversial, frequently challenging, but ultimately always enlightening ways (Fig. 1).

Definition

The term "Indigenous archaeology" and what it represents as an alternative means of examining the archaeological record are relatively recent developments, although there is some overlap with long-standing attempts toward archaeology's more open engagement with its various publics/constituents (e.g., "community," "vernacular"). The term is often pluralized to acknowledge its diverse applications in specific contexts, each shaped by the particular goals of the practitioners, by the methods employed, and by the distinct community values and historical circumstances that shape each project.

Indigenous Archaeologies: North American Perspective, Fig. 1 Davina Two Bears (Navajo Nation) is one of a growing number of Indigenous archaeologists now pursuing a career in archaeology (Photo courtesy of Davina Two Bears)

The earliest known use of the term referred simply to the Aboriginal (vs. European) component of a North American archaeological site (Dewhirst 1980), which is coincidentally the primary usage still in Australia. The term was not used with some consistency in its modern connotations until the late 1990s, with Nicholas and Andrews' (1997a: 3, note 5) reference to "archaeology with, for, and by Indigenous peoples." It was subsequently popularized by the publication of Joe Watkins' volume, *Indigenous Archaeology: American Indian Values and Scientific Practice* (2000), which critically explored late-twentieth-century relations between archaeologists and Native Americans, particularly in the context of reburial, repatriation, and cultural resource management. More recently, Nicholas (2008:1660) offered the first full definition: "Indigenous archaeology is an expression of archaeological theory and practice in which the discipline intersects with Indigenous values, knowledge, practices, ethics, and sensibilities, and through collaborative and community-originated or -directed projects, and related critical perspectives." Indigenous archaeology has now become a common-enough presence to warrant frequent mention in archaeology textbooks, despite the fact that some critics, Indigenous or otherwise, dismiss it as political posturing.

Indigenous archaeology is distinguished from other forms of archaeology that engage directly with descendant communities by its commitment to a particular, ethnically defined population. In this it is similar to feminist archaeology, which also has a comparably selective focus, but importantly both include practitioners who are not Indigenous or female, respectively. Of course, the notion of "indigeneity" is fundamental to Indigenous archaeology. The question of "who is Indigenous?" is always situational, necessarily framed in opposition to another entity, which historically has most often been a more dominant, colonizing society (Hillderdal et al. 2017). "Indigenous" thus generally refers to (formerly) disempowered, disenfranchised, or colonized peoples, although this is not the case in some parts of the world where indigenes may represent the state. Arguments that the people of Ireland, China, or India, for example, are "Indigenous" do have merit, but this falls outside of the realm of "Indigenous archaeology" as the term is employed here.

Historical Background

Indigenous archaeology generally refers to projects and initiatives associated with and especially those initiated by Aboriginal peoples in the United States, Canada, and Australia, but it also may include others (e.g., African Americans) who might be classified as "descendant communities." However, expressions of Indigenous archaeology also appear widely elsewhere, including in parts of Africa (e.g., South Africa, Kenya), New Zealand and the Pacific Islands, northern Europe, Siberia, and Central and South America (e.g., Nicholas 2010; Gnecco and Ayala 2011; Kato 2017). This has created discussion around "Who is 'Indigenous'?" and why some individuals do not consider themselves as such. In Central America, for example, only a small percentage of the native-born population currently self-identifies as "Indigenous," clearly reflecting important political and social issues regarding identity and self-representation.

The history of anthropology has been intertwined with the West's interest/fascination with the "Other," and foremost here were Indigenous peoples, especially in Africa, the Americas, and the Pacific. Many of the first "modern" anthropologists were also directly involved with archaeological pursuits, which led them to work closely with members of Aboriginal communities in the late nineteenth through early-to-mid-twentieth century. In North America, they included Franz Boas, Harlan Smith, Jesse Fewkes, Frank Cushing, Alanson Skinner, Arthur C. Parker (of Seneca descent), Julian Steward, and William Duncan Strong. Much of the impetus for these studies was aligned with the notion of procuring information before traditional lifeways were lost to "progress" and the ethnographic, archaeological, linguistic, and biological data obtained have proved to be of immense value to

anthropology but also often problematic to the relevant contemporary populations.

At the time, the community members who aided anthropologists and archaeologists did so primarily as paid or volunteer guides, laborers, and so forth. Most often unnamed, these individuals contributed substantially to the success of the projects and to the reputation of the directors. Only much later did the information gleaned from these studies come to have great value to those communities, sometimes a century or more later, to restore or augment traditional knowledge that no longer flowed from generation to generation. Nonetheless, Indigenous communities have generally benefitted little from these interactions. Furthermore, there was little, if any, opportunity to comment on, let alone influence, the type of research being conducted on their cultural heritage or involvement in decisions regarding the objects and information obtained. Indeed, throughout the twentieth century, increasing complaints were raised that anthropology and archaeology were continuing the colonial legacy of earlier times and that these disciplines were harmful and disturbing to many and were of little relevance or value to contemporary Indigenous populations.

By the 1960s, the increasing move toward cultural revitalization and politicization of Indigenous groups, coupled with a rapidly approaching postcolonial, postmodern world order and changing public attitudes in the wake of the Vietnam War and other events, contributed to the emergence of Indigenous archaeology in North America. Comparable situations emerged elsewhere, including the Outstation Movement in Australia and the independence of Zimbabwe (formerly Rhodesia) in Africa. Indigenous peoples not only demanded restoration of their lands and their rights but also more control over their own affairs, including those relating to archaeological sites and other aspects of their cultural heritage (Fig. 2).

During the latter part of the twentieth century, major changes took place in the relationship between Indigenous peoples and the dominant society. In the Americas, demands for tribal recognition, land rights, national sovereignty, and/or acceptance of ethnic identity and values were often as much inspired by cultural heritage issues as they were by calls for social justice and restitution. In the United States, for example, Vine Deloria Jr. clearly articulated aspects of Native American dissatisfaction, questioning the legitimacy and practice of anthropology and archaeology and the callous treatment of ancient human remains by scholars and museums. Following a decade of growing social and political dissatisfaction, the emergence of the American Indian Movement in the early 1970s brought national attention to many of the concerns of Native Americans, which ranged from issues of poverty, unemployment, and living conditions to what was seen as the desecration of ancestral remains and places of cultural significance by both archaeology and land developers. Increasing political clout and support from a sympathetic public resulted in the passage of federal legislation such as the

Indigenous Archaeologies: North American Perspective, Fig. 2 Robert Hall, of Stockbridge Mohican descent, here pictured during a Smithsonian Institution River Basin Survey in 1947, would later integrate Indigenous histories and religious knowledge into archaeological interpretation (Photo courtesy of Robert Hall)

American Indian Self-Determination and Education Assistance Act (1975) and the *American Indian Religious Freedom Act* (1978) in the United States. In other parts of the world, comparably significant federal legislation or court rulings on Indigenous rights were passed in New Zealand (*Treaty of Waitangi Act* [1975]), Australia (*Mabo v Queensland* [1992]), and Canada (*Delgamuukw v Regina* [1997]).

Relations between Indigenous Mexicans and archaeologists have followed a much different trajectory than in the United States and Canada. As Randall McGuire points out, Mexican archaeology has long been dominated by either a US imperialist agenda or a local nationalist that employed the concept of *indigenismo* to "glorify" mestizos (people of mixed Indian and European ancestry) as "the people of the nation" (2008: 152). As a result, there have been far fewer opportunities for Indigenous engagement with archaeology in northern Mexico and sometimes greater liability. Although this is changing, the situation is still well behind Maya involvement in archaeology in southern Mexico (McAnany and Rowe 2016).

Key Issues

In Boasian historical particularistic fashion, there can be no one history of the development of Indigenous archaeology. However, three themes have figured prominently in its emergence: (1) the treatment of ancestral remains (and sacred objects and places), (2) participation (or not) in archaeological/heritage management, and (3) cultural heritage and legislative concerns about the ownership of cultural and intellectual property. The examples provided for each are necessarily illustrative, not comprehensive.

Proper Care of Ancestors and Ancestral Remains

Perhaps the most contentious aspects of archaeology in the view of many Indigenous peoples have been the treatment of human remains and burial sites. From a scientific perspective, these are of immense scientific value, which led to the collection and study of skeletal remains by eighteenth- and nineteenth-century antiquarians and anatomists and later by archaeologists. Both ancient and recent skeletal remains were routinely sought and collected, including even the bodies of warriors who had died in battle with US military forces. These attitudes and practices were (and remain) a direct affront to their fundamental values, beliefs, and worldviews of living Native Americans.

In the 1970s, the American Indian Movement and various groups and individuals took direct action against archaeologists investigating human remains, but with little lasting effect. Reburial and repatriation issues subsequently rose to national and international prominence in the 1990s in response to the highly publicized looting of the Slack Farm site in Kentucky (1988) and similar events. The discipline examined its relationships with Indigenous populations in response to charges that it continued to exist within a structure of scientific colonialism and attitudes toward Aboriginal rights began to change from an institutional perspective. The adoption of the Vermillion Accord on Human Remains by the World Archaeological Congress in 1989, and the passage of the *National Museum of the American Indian Act* (1989) and the *Native American Graves Protection and Repatriation Act* [NAGPRA] (1990) in the United States directly addressed Indigenous concerns about the treatment of the dead, with scientific values no longer being the primary point of reference (Fig. 3).

For perhaps the majority of archaeologists, the reburial and repatriation "controversy" was largely unexpected and caused great consternation and confusion within the discipline. Some very vocally wondered if NAGPRA marked the end of archaeology at the expense of political correctness, while others seemed oblivious to it. In the years following the passage of NAGPRA, there was (and continues to be) widespread discussion about the goals and benefits of the scientific quest for knowledge relative to the need of descendant populations to have at least some control of their own heritage. This debate rose to international

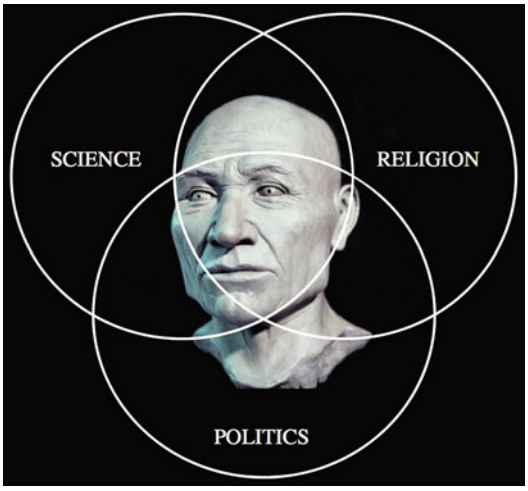

Indigenous Archaeologies: North American Perspective, Fig. 3 The controversy involving Kennewick Man (the "Ancient One"), exemplifies different value systems between Western and Indigenous cultures (Composition by George Nicholas; base image courtesy of James Chatters)

prominence with the Kennewick Man (the "Ancient One") case (1995–2017), which was significant not so much for revealing differences in attitudes toward research involving human remains *between* scholars and descendant communities but especially so *within* each of those groups. Over the last decade, much of the rhetoric has softened as cooperative, and in some cases, collaborative projects with Indigenous communities have developed that involve ancestral sites and human remains (and which may include radiocarbon dating and aDNA analysis). No less important has been increased dialogue between archaeologists, between Indigenous peoples and archaeologists, and within Aboriginal communities as to the nature of archaeological research and the questions of what constitutes "heritage" and who benefits from research in this realm – an often-challenging discourse but one that always yields valuable (if often unexpected) outcomes.

CRM and Heritage-Related Developments

The care of ancestral sites has figured prominently in both the origins of and goals of Indigenous archaeology. By the mid-1960s, the preservation of archaeological sites was increasingly a focus of attention of CRM and heritage legislation in North America and elsewhere (e.g., *National Historic Preservation Act*, US (1966); *Australian Heritage Commission Act* (1975); and the *Canadian Environmental Assessment Act* (Reference Guide of Physical and Cultural Heritage Resources) [1996]). Such legislation was aimed at broad public values, but did not specifically address the concerns or desires of the Indigenous minority whose ancestors created the vast majority of archaeological sites in formerly colonized countries and who lacked the authority to make decisions about the preservation and management of their own heritage.

Some of the earliest instances of direct and meaningful involvement of tribal peoples in archaeology occurred in the United States. For example, Wendorf et al. (1956: II–IV) detail the manner by which the Navajo Nation may have given contract or salvage archaeology its start. From 1950 to 1953, El Paso Natural Gas paid for the archaeological work required for a gas transmission line from northwestern New Mexico across Arizona, directly employing five archaeologists and Navajo labor assistance as needed on salvage excavations. The program provided another benefit when the New Mexico District Engineer of the Bureau of Public Roads proposed and then supported the development of a similar archaeological program in connection with road construction in New Mexico, which led to the establishment of Highway Salvage Archeology in New Mexico on April 15, 1954 (Wendorf et al. 1956: VII).

Formal tribal involvement in archaeology in the United States subsequently began with the Zuni Archaeology Program (in 1975) and the Navajo Nation Historic Preservation Department (in 1978) as the first major initiatives to address specific concerns of Indigenous peoples relating to CRM and also to provide archaeological training. During the 1980s and 1990s, state government agencies and Indigenous organizations began to establish programs to train community members to monitor CRM projects. College- and university-level archaeology programs provided new opportunities for Indigenous people to gain access to important tools.

In recent years, changes in heritage legislation in North America now may require that archaeologists consult with Indigenous governments and organizations and to adhere to established protocols and permitting systems for field and research projects in their territory or for studying human remains. While well meaning, this consultation is sometimes severely hampered by the inability of Indigenous groups to respond to multiple requests to review reports, comment on actions, or even to answer information requests owing to limited human resources and other priorities confronting the community (e.g., inadequate housing, unemployment). For some, consultation does not go far enough, and what is considered desirable are more collaborative ventures in which the communities are equal partners in project development, operation, evaluation, and decision-making at the onset rather than as an afterthought (e.g., Dowdall and Parrish 2003). Others contend that Indigenous peoples should even take the lead in caring for their own heritage. In the United States, more than 175 tribes (as of October 2017) have taken on the responsibilities of the State government in managing impacts of federal projects on their heritage. In British Columbia, a significant number of First Nations have established their own heritage permitting systems (that the province acknowledges), along with many First Nations individuals now working as archaeologists.

Access to and Control over Tangible and Intangible Heritage

Throughout the early parts of the twentieth century, Indigenous peoples have been able to achieve greater and more meaningful control over tangible and intangible cultural heritage through various avenues, although there have been regular setbacks when legislation has been changed or legal precedents overturned. New or broadened legislation has ensured greater direct Aboriginal involvement, such as the requirement for First Nations in British Columbia, Canada, to review archaeological permit applications (*Heritage Conservation Act* 1996). In the United States, a 1992 amendment to the *National Historic Preservation Act* has allowed tribes to establish their own Tribal Historic Preservation Offices, enabling direct tribal involvement in heritage preservation on tribal lands.

A larger question involves who has access to, controls, and benefits from information derived from archaeological research and the control of traditional knowledge, especially for Indigenous peoples and other heritage-based communities who have historically had limited control over their heritage (Nicholas and Markey 2014). The appropriation, commodification, and unwelcome or inappropriate use of objects, images, and information relating to artifacts, sites, rock art, and other iconography is of great concern to Indigenous peoples, especially those who do not distinguish between tangible and intangible heritage or even between cultural and biophysical heritage. The costs to individuals, clans, and communities may be very high (e.g., loss of control over proper care of heritage, diminished respect for the sacred, the commercialization of cultural distinctiveness, improper/dangerous uses of special or sacred symbols by the uninitiated). In these examples, efforts to exercise control over tangible items define these conflicts less so than divergent views concerning the validity and appropriate applications of knowledge.

These issues are not restricted to modern times, but extend back well over a century in some cases, such as the case of ethnographer Frank Cushing who published information he obtained as an initiated member of the Zuni Priesthood of the Bow. Rights to intellectual property (from ownership of songs and images to control of traditional knowledge), as well as the recognition that tangible and intangible heritage may be one and the same, have long been integral elements of Indigenous societies. Such customary laws and values influence or direct Indigenous archaeological initiatives today. This may be evident in community specific and/or situational notions of appropriate care for/stewardship of heritage and indeed what constitutes "heritage." In the context of evaluating and protecting archaeological and heritage sites, Indigenous archaeology proponents may thus

seek criteria for "site significance" different from those of more traditional CRM policy and practice.

Current Debates

Some aspects of Indigenous archaeologies remain controversial, even in jurisdictions (such as the United States, Canada, and Australia) where real progress has been made in some sectors. The two decades-long debate over the fate of Kennewick Man indicated that issues related to the control by Indigenous groups (or by governments) of access by archaeologists to sites, objects, and human remains are still very much alive. A recent exchange in *American Antiquity* (see McGhee 2008, 2010; Colwell-Chanthaphonh et al. 2010, among others) explored many related concerns but focused on McGhee's arguments about two core issues: (1) Indigenous communities' power to control access and (2) the basis on which Indigenous peoples were accorded rights not held by other members of society. McGhee's concern was that such power could be used against science and, as a result, that society as a whole would be diminished because accounts different from those advanced by Indigenous communities would be suppressed. These are important issues with no easy answers: such control might be seen to be a continuation of the way the system has operated in the past, but merely with the population controlling the resources reversed.

A second issue, relating to this, concerns the recognition of specific descendant communities in the codes of ethics of the main archaeological organizations in North America. The first principle of the Society for American Archaeology's Code of Ethics (Stewardship) notes that "Stewards are both caretakers of and advocates for the archaeological record *for the benefit of all people*" (emphasis added) but fails to acknowledge any special connection that Native Americans have to that record. By contrast, the Canadian Archaeological Association fully acknowledges that distinction in its "Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples," which identifies consultation, Aboriginal involvement, sacred sites and places, and communication and interpretation as necessary considerations for ethical practice. The recognition (or not) of the historical connections of descendant communities to the archaeological record, and the rights and responsibilities embedded in those connections, continues to be much debated in the context of Indigenous archaeology.

Another issue is the continuing effort to identify and address inequities that have long existed within the discipline, which have limited the ability of Indigenous peoples to have some control over their heritage and to benefit in the flow of research benefits. This follows the initial discourse on the sociopolitics of archaeology that first emerged in the 1980s in the context of critical and feminist archaeologies and that subsequently expanded with the concerns raised by Indigenous peoples and others regarding: (1) their absence or exclusion as participants in archaeology and (2) the persistent legacy of scientific colonialism in the discipline. Questions have subsequently been raised as to the role of archaeologists as gatekeepers of knowledge of the past, who not only controlled the flow of information but who generally were also its primary beneficiaries. It became evident that descendant communities were often shut out of decisions made as to their ancestral sites and received little social or economic benefits from research on their heritage. Despite the greater participation today of Native Americans, First Nations, Inuit, and Métis, it is very difficult to effect meaningful progress in these areas because most archaeologists are unwilling to share or relinquish decision-making, even when they support the increased participation of Indigenous peoples in archaeology.

Finally, there is the outstanding question of whether Indigenous archaeology should be distinct from "mainstream" archaeology or part of a more inclusive, less balkanized archaeology (Nicholas 2008). The development of Indigenous archaeology has followed a course quite similar to that of feminist archaeology, and although each

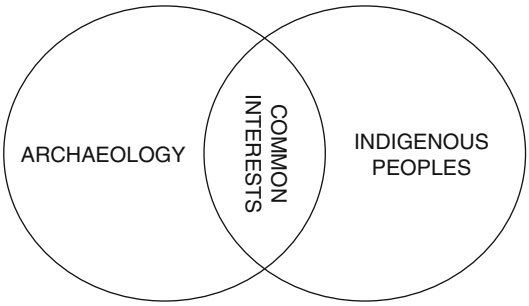

Indigenous Archaeologies: North American Perspective, Fig. 4 Common interests between traditional archaeology and Indigenous peoples may be less common than many realize

today is recognized as distinct entities, both remain on the margins of "mainstream" archaeology. While this has the advantage of offering a safe haven for those who promote strategies and perspectives influenced by Indigenous epistemologies and largely postprocessual methodologies (see the entry on Indigenous Archaeologies in Archaeological Theory in this encyclopedia), this positioning lessens the contributions of Indigenous archaeology to the discipline and ghettoizes it, so that its practitioners frequently tend to be "preaching to the converted." Indigenous archaeology will likely continue to have a dualistic presence, as would be illustrated in a Venn diagram that includes a partial overlap with the discipline (Fig. 4).

Future Directions

Indigenous archaeology grew out of efforts by marginalized peoples worldwide to challenge the imposition of archaeology on their lives and heritage. It has in a relatively short time developed into a distinct body of methods and theory(ies) designed to promote ethical and inclusive practices that will further broaden and democratize the discipline and stimulate new ideas that will significantly increase the scope of archaeology as a socially relevant, responsible, satisfying, and still scientifically sound discipline.

A growing number of archaeologists now make concerted efforts to include Indigenous perspectives within archaeological practice and interpretation. Initial volumes that tried to include Indigenous voices were generally collections of individual perspectives (Nicholas and Andrews 1997b; Swidler et al. 1997; Dongoske et al. 2000). More recent publications describe interactions between archaeologists and Indigenous groups (Ferguson and Colwell-Chanthaphonh 2006; Kerber 2006) and offer examples of active collaboration between archaeologists and underrepresented Indigenous populations indicative of the expanding approach to involving communities at the very heart of archaeological practice (Colwell-Chanthaphonh and Ferguson 2008; Silliman 2008).

International discussion on the situation among archaeologists and Indigenous communities (see the entry on ▶ "Indigenous Archaeologies: Australian Perspective" in this encyclopedia) is flourishing. Such edited volumes as Smith and Wobst (2005), Phillips and Allen (2010), and Bruchac et al. (2010) indicate that Indigenous archaeology is not a localized movement, but rather a global one. In Japan, Kato (2017) has initiated an Indigenous archaeological program to increase Ainu involvement and interaction with Japanese archaeology on the island of Hokkaido. There are also significant advances in both community-led and collaborative projects in Central and South America (e.g., Gnecco and Ayala 2011; McAnany and Rowe 2016), Africa (Schmidt and Pikirayi 2016), and elsewhere. This has been aided by the political and educational accomplishments of Indigenous governments, organizations, and communities in many parts of the world, often after countless years of struggle, as well as by developments within the fields of anthropology and archaeology, which are more responsive and inclusive than ever before. There are also today an increasing number of archaeologists who are Indigenous. Nicholas' (2010) edited volume of autobiographical accounts of 37 Indigenous archaeologists is but a sampling of a much larger and growing number. In their

Indigenous Archaeologies: North American Perspective, Fig. 5 The first all-First Nations CRM crew in Canada, directed by Nola Markey (O-Chi-Chak-Ko-Sipi First Nation). Spences Bridge Crew, British Columbia, 2006: Rhonda Billy, Mary Suchell, Brian Michele, Crystal Swayze, Matilda Abott, John Shackelly, Vince Wilson, Josie Billy, Bernice Garcia, Nola Markey, Basil Wilson (Photo courtesy of Nola Markey)

capacity as university professors, community heritage managers, or full or part-time CRM archaeologists, they are making substantial contributions by making archaeology more representative, by bridging different worldviews and legal regimes, and by serving as role models for others (Fig. 5).

The participation of Indigenous North Americans in the process of archaeology, and increasingly in setting its direction, has been a crucial step in helping archaeology move beyond the legacy of colonialism by ensuring the participation of descendant communities in meaningful and satisfying ways. As a result of what has now been achieved, we can no longer refer to "Indigenous peoples and archaeologists" without acknowledging that the latter category now includes a growing number of Indigenous archaeologists and archaeologists of Indigenous heritage in North America and elsewhere.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Cultural Heritage Management and Native Americans
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for

References

Bruchac, M.M., S.M. Hart, and H.M. Wobst, eds. 2010. *Indigenous archaeologies: A reader on decolonization*. Walnut Creek: Left Coast Press.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2008. *Collaboration in archaeological practice: Engaging descendent communities*. Lanham: AltaMira Press.

Colwell-Chanthaphonh, C., T.J. Ferguson, D. Lippert, R.H. McGuire, G.P. Nicholas, J. Watkins, and L. Zimmerman. 2010. The premise and promise of indigenous archaeology. *American Antiquity* 75 (2): 228–238.

Dewhirst, J. 1980. *The indigenous archaeology of Yuquot, a Nootkan outside village*. Ottawa: National Historic Parks and Sites Branch, History and Archaeology.

Dongoske, K.E., M. Aldenderfer, and K. Doehner, eds. 2000. *Working together: Native Americans & archaeologists*. Washington, DC: Society for American Archaeology.

Dowdall, K., and O. Parrish. 2003. A meaningful disturbance of the earth. *Journal of Social Archaeology* 3 (1): 99–133.

Ferguson, T.J., and C. Colwell-Chanthaphonh. 2006. *History is in the land: Multivocal tribal traditions in Arizona's San Pedro Valley*. Tucson: University of Arizona Press.

Gnecco, C., and P. Ayala, eds. 2011. *Indigenous peoples and archaeology in Latin America*. Walnut Creek: Left Coast Press.

Hillderdal, C., A. Karlstöm, and C.-G. Ojala. 2017. *Archaeologies of "us" and "them" Debating history, heritage and indigeneity*. London/New York: Routledge.

Kato, H. 2017. The Ainu and Japanese archaeology: A change of perspective. *Japanese Journal of Archaeology* 4: 185–190.

Kerber, J.E., ed. 2006. *Cross-cultural collaboration: Native peoples and archaeology in the northeastern United States*. Lincoln: University of Nebraska Press.

McAnany, P., and S.M. Rowe. 2016. *Archaeology in society: Maya cultural heritage: How archaeologists and indigenous communities engage the past*. Lanham: Rowman and Littlefield.

McGhee, R. 2008. Aboriginalism and the problems of indigenous archaeology. *American Antiquity* 73 (4): 579–597.

McGhee, R. 2010. Of strawmen, herrings, and frustrated expectations. *American Antiquity* 75 (2): 239–243.

McGuire, R.H. 2008. *Archaeology as political action*. Berkeley: University of California Press.

Nicholas, G.P., ed. 2010. *Being and becoming indigenous archaeologists*. Walnut Creek: Left Coast Press.

Nicholas, G.P. 2008. Native peoples and archaeology. In *Encyclopedia of archaeology*, ed. D.M. Peasall, 1660–1669. New York: Academic Press.

Nicholas, G.P., and T.D. Andrews. 1997a. Indigenous archaeology in the postmodern world. In *At a crossroads: Archaeologists and first peoples in Canada*, ed. G.P. Nicholas and T.D. Andrews, 1–18. Burnaby: Archaeology Press, Simon Fraser University.

Nicholas, G.P., and T.D. Andrews, eds. 1997b. *At a crossroads: Archaeologists and first peoples in Canada*. Burnaby: Archaeology Press, Simon Fraser University.

Nicholas, G.P., and N.M. Markey. 2014. Traditional knowledge, archaeological evidence, and other ways of knowing. In *Material culture as evidence: Best practices and exemplary cases in archaeology*, ed. R. Chapman and A. Wylie, 287–307. New York: Routledge Press.

Phillips, C., and H. Allen, eds. 2010. *Bridging the divide: Indigenous communities and archaeology into the 21st century*. Walnut Creek: Left Coast Press.

Schmidt, P.R., and I. Pikirayi, eds. 2016. *Community archaeology and heritage in Africa: Decolonizing practice*. New York: Routledge.

Silliman, S., ed. 2008. *Collaborating at the trowel's edge: Teaching and learning in indigenous archaeology*. Tucson: Amerind Studies in Archaeology, University of Arizona Press.

Smith, C., and H.M. Wobst, eds. 2005. *Indigenous archaeologies: Decolonizing theory and practice*. New York: Routledge.

Swidler, N., K.E. Dongoske, R. Anyon, and A.S. Downer, eds. 1997. *Native Americans and archaeologists: Stepping stones to common ground*. Walnut Creek: AltaMira Press.

Watkins, J. 2000. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: Altamira Press.

Wendorf, F., N. Fox, and O.L. Lewis. 1956. *Pipeline archeology: Reports of salvage operations in the southwest on El Paso natural gas company projects 1950–1953*. Santa Fe: Laboratory of Anthropology and the Museum of Northern Arizona, and Flagstaff.

Further Reading

Atalay, S. 2006. Indigenous archaeology as decolonizing practice. *American Indian Quarterly* 30 (3&4): 280–310.

Biolsi, T., and L.J. Zimmerman, eds. 1997. *Indians and anthropologists: Vine Deloria Jr. and the critique of anthropology*. Tucson: University of Arizona Press.

Brown, M. 1998. *Who owns native culture?* Cambridge, MA: Harvard University Press.

Budwha, R. 2005. An alternate model for First Nations involvement in resource management archaeology. *Canadian Journal of Archaeology* 29: 20–45.

Colwell-Chanthaphonh, C. 2009. *Inheriting the past: The making of Arthur C. Parker and indigenous archaeology*. Tucson: University of Arizona Press.

Conkey, M. 2005. Dwelling at the margins, action at the intersection?: Feminist and indigenous archaeologies. *Archaeologies* 1 (1): 9–59.

Ferguson, T.J. 1996. Native Americans and the practice of archaeology. *Annual Review of Anthropology* 25: 63–79.

Ferris, N. 2003. Between colonial and indigenous archaeologies: Legal and extra-legal ownership of the archaeological past in North America. *Canadian Journal of Archaeology* 27 (2): 154–190.

Lyons, N. 2013. *Where the wind blows us: Practicing critical community archaeology in the Canadian north*. Tucson: University of Arizona Press.

Murray, T. 2011. Archaeologists and indigenous people: A maturing relationship? *Annual Review of Anthropology* 40 (1): 363–381.

Nicholas, G.P. 2010. Seeking the end of indigenous archaeology. In *Bridging the divide: Indigenous communities and archaeology into the twenty-first century*, ed. H. Allen and C. Phillips, 233–252. Walnut Creek: Left Coast Press.

Watkins, J. 2003. Beyond the margin: American Indians, first nations, and archaeology in North America. *American Antiquity* 68 (2): 273–285.

Watkins, J. 2005. Through wary eyes: Indigenous perspectives on archaeology. *Annual Review of Anthropology* 34: 429–449.

Wilcox, M.V. 2009. *The pueblo revolt and the mythology of conquest: An indigenous archaeology of contact*. Berkeley: University of California Press.

Indigenous Collaboration in Archaeology Education

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Introduction

During the last decades, several indigenous peoples and archeologists worldwide have committed themselves in the development of indigenous archaeologies. While engaging in reciprocal cooperation and exchange, they have triggered new investigation prerogatives in field research and in the interpretation and spreading of archaeological data and heritage management. Some indigenes have also acquired academic formation and became researchers of their own historical vicissitudes, assessing archaeological methods, techniques, and data storing and interpretation (Nicholas 2010). Indigenous oral history, cosmology, values, and knowledge have been incorporated within the construction of knowledge on the past. It may be said that, within their variegated manifestations, indigenous archaeologies are establishing themselves as critical and alternative approaches to traditional archaeological practices. Consequently, the parameters of archaeology education should be rethought and re-elaborated for the twenty-first century.

Definition

Indigenous archaeologies are carried out with, for, and by indigenous peoples. Research is not merely performed on them but aims at the production of knowledge with, for, and by indigenes. The following aspects must be taken into account: (1) the collaboration and dialogue with indigenous populations so that critical commitment and interactions could be achieved during the whole process involving the construction and broadcasting of archaeological knowledge, (2) the development of research issues and programs that would benefit indigenous population and would be approved by them, (3) the incorporation of indigenous perspectives in the investigation and interpretation of archaeological reports through the construction of mutual education between archaeologists and indigenous communities, (4) the respect toward local cultural rights for the management of cultural heritages, (5) the coupling of indigenous modes with the Western scientific type of approach, and (6) an assessment of how archaeological practice influences the populations' cultural dynamics (Atalay 2012; Kerber 2006; Colwell-Chanthaphonh and Ferguson 2008; Silliman 2008). As all pedagogical scholarships in archaeology in a wide sense, archaeological education will be strongly affected by these modes of archaeological practices.

Key Issues/Current Debates/Future Directions/Examples

As from the 1950s, archaeology has been transforming itself deeper and deeper, especially through postcolonial criticism, with an impact on the theoretical and methodological debate in the human sciences which triggered a gradual revision and redefinition of their practice from the perspectives of new ethical and scientific parameters. Among other items, multivocality and reflexivity as basic components of archaeological practices may be highlighted as from the elaboration of the project up to the publishing of research findings (Haber and Shepherd 2016; Habu et al. 2008). It is highly important to salient the defense of archaeological theories, methods, and practices that merge Western and non-Western knowledge and principles in the building of knowledge on past events and, at the same time, take into account differences and diversities of the points of view of the subjects involved in archaeological heritage management with more inclusive and democratic policies (Rubertone 2008). Archaeological practices would also consider the complex interrelationships (social, cultural, political, economical, and ideological) between agents and archaeological material at the local, regional, national, and world levels (Meskell 2009).

The "de-colonization of archeology" is experienced worldwide and within different research contexts as, for example, in Australia, New Zealand, United States, Latin America, and Africa (Colwell-Chanthaphonh and Ferguson 2008; Green and Green 2013; Haber and Shepherd 2016; Oland et al. 2012; Phillips and Allen 2010; Silimann 2008; Silva and Noelli 2015; Smith and Wobst 2005). New archaeological practices forward very different types of development and results. In fact, they reveal the possibility of several archaeologies and multicultural perspectives on the archaeological report. Contrastingly to archaeological research without interlocutors, in which archaeologists fail to build a dialogic relationship between them and the local community and in which bureaucratically established aims need not be changed, indigenous archaeologies redefine the several aspects of research, interpretation, and archeological heritage management and thus the parameters of archaeological education.

Within the present perspective in which several archaeological heritage appropriations are performed, archaeologists are the main agents of the archaeological record's valorization. Their expertise is of paramount importance in debates on the management of cultural heritage, the preservation of the environment, and the identification of historical and meaningful places. Their professional activities develop toward public policies, and frequently they are invested with the role of facilitators or mediators in the relationship between the different stakeholders involved in issues on cultural heritage (Fairclough et al. 2010; Liebmann and Rizvi 2008; Rubertone 2008).

The twenty-first century archaeologists should be prepared in theory and methodology to comply with their profession's new demands. The teaching and learning of archaeology should be adapted to these paradigmatic changes in archaeological practices. The future of archaeology during the twenty-first century will surely be defined by its commitment by the explanation of different cultural trajectories and processes within the context of identity and cultural heritages in the past and in the present.

Cross-References

- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ Postcolonial Archaeologies

References

Atalay, S. 2012. *Community-based archaeology. Research with, by, and for indigenous and local communities*. Berkeley: University of California Press.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2008. *Collaboration in archaeological practice. Engaging descendent communities*. Lanham: Altamira Press.

Fairclough, G., R. Harrison, J.H. Jameson Jr., and J. Schofield, eds. 2010. *The heritage reader*. London: Routledge.

Green, L., and D.R. Green. 2013. *Knowing the day, knowing the world*. Tucson: The University of Arizona Press.

Haber, A., and N. Shepherd. 2016. *After ethics. Ancestral voices and post-disciplinary worlds in archaeology*. New York: Springer.

Habu, J., C. Fawcett, and J.M. Matsunaga, eds. 2008. *Evaluating multiple narratives. Beyond nationalist, colonialist, imperialist archaeologies*. New York: Springer.

Kerber, J.E. 2006. *Cross-cultural collaboration. Native peoples and archaeology in the northeastern United States*. Lincoln: University of Nebraska Press.

Liebmann, M., and U.Z. Rizvi, eds. 2008. *Archaeology and the postcolonial critique*. Lanham: Altamira Press.

Meskell, L., ed. 2009. *Cosmopolitan archaeologies*. Durham: Duke University Press.

Nicholas, G., ed. 2010. *Being and becoming indigenous archaeologists*. Walnut Creek: Left Coast Press.

Oland, M., S.M. Hart, and L. Frink. 2012. *Decolonizing indigenous histories. Exploring prehistoric/colonial transitions in archaeology*. Tucson: The University of Arizona Press.

Phillips, C., and H. Allen, eds. 2010. *Bridging the divide. Indigenous communities and archaeology into the 21st century*. Walnut Creek: Left Coast Press.

Rubertone, P. 2008. *Archaeologies of placemaking*. Walnut Creek: Left Coast Press.

Silliman, S.W., ed. 2008. *Collaborating at the Trowel's edge: Teaching and learning in indigenous archaeology*. Tucson: Arizona University Press.

Silva, F.A., and F.S. Noelli. 2015. Mobility and territorial occupation of the Asurini do Xingu, Pará, Brazil. An archaeology of the recent past in the Amazon. *Latin American Antiquity* 26 (4): 493–511.

Smith, C., and M. Wobst, eds. 2005. *Indigenous archaeologies*. London: Routledge.

Indigenous Intellectual Property Issues in Archaeology

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Introduction

Interests over heritage and intellectual property (hereafter IP) of indigenous peoples have arisen over the past 25 years in response to the increasing empowerment of indigenous societies. This empowerment has emanated, in different degrees and context, from the spread of democracy, the strengthening of the rule of law, the reinforcement of human rights, and more inclusive political scenarios around the world. The issue of IP has then interested both indigenous populations exercising their rights in such a context and legal researchers and social scientists, especially archaeologists, who monitor and interpret these developments (Anderson 2009, 2010; Atalay et al. 2014; Nicholas et al. 2010). On a broader perspective, sociologists have advanced the idea of the persistent imperial forms in Western democratic states which continue to affect, more than any other group, indigenous populations by imposing formal laws to the detriment of native laws (Tully 2000; Simpson 2008: 517).

Definition

The main issue in IP rights is claiming control and ownership of objects, values, and traditions which are at the core of indigenous societies' cultural heritage. Indigenous groups have initiated processes of reclaiming and restoring their traditions and ways of life. The initial movements were inward focused on cultural survival strategies and were followed by externally focused efforts to prevent loss of traditional knowledge (also known as folklore; hereafter TK), traditional cultural expressions (hereafter TCE), sacred sites, etc., using the tools of the dominant society and the international courts – property laws and conventions. Overall, these cultural survival movements were aimed at controlling the IP rights of the material and immaterial traditions at the heart of their society. Both stages are a result of community empowerment built on the often tense relationship between the observers (Western researchers and government enforcers) and the traditionally "observed" indigenous groups. Yet, despite these tensions and power imbalances, indigenous populations are experiencing increasingly favorable conditions as they move to secure rights to their IP through legal and non-legal means (Anderson 2005, 2009, 2010; Holcombe and Janke 2012; Janke 1999; Torsen and Anderson 2010).

Over the last several decades, processes of archaeological site protection and museum heritage repatriation (in the United States) and mutual understanding processes between indigenous groups and museums (in Canada) were pursued in earnest for the benefit of indigenous populations. At another level, new treaties (in Canada) were pursued to resolve the land rights of indigenous groups. The latter are essential: landscapes embody an important component in preserving and developing traditions. This is particularly difficult when indigenous communities have to confront with extractive industries eager to exploit their lands. At the most basic level, this process entails establishing a legal defense strategy for their creations and knowledge. At a higher level, it implies defending their ancestral lands (which are often under government control until the treaties are drawn).

Intellectual property is a central concept in today's Western society built on the idea that intellectual creations are the property of the creator (individuals or corporations). As such, IP laws entitle creators of assets such as songs and written works, either published or unpublished, to be copyrighted. In addition, other IP assets can be patented (technical inventions, in the realm of tangible assets) or trademarked (words, phrases, or logos that represent a brand) (Torsen and Anderson 2010).

Key Issues/Current Debates

What is the current IP status of TK in indigenous societies? Traditional knowledge is the broad and varied range of traditions and expressions that define the cultural makeup and dynamics of indigenous groups. This knowledge includes songs and rhythms, signs and icons, medicinal plant potions and food recipes, rituals, ceremonies and dances, oral poetry, stories and legends, and handicraft techniques created by ancestors and transmitted through generations. However, in most cases, this knowledge is not published and copyrighted (let alone patented as IP). Traditional knowledge includes then a broad range of cultural products that are witness to the long-timed and fruitful cultural endeavors of indigenous groups. Most indigenous groups consider themselves caretakers of community knowledge rather than owners of knowledge. Using the Western sense of property ownership, TK is considered to be "owned" by the group rather than by the individual. Yet this notion of group ownership has one practical issue quite alien to Western mores: TK is usually inalienable – not to be sold or given away by an individual group member. Thus, Western laws designed to protect knowledge are not well suited to protect TK and TCEs. Much of the TK and TCEs collected by western researchers and institutions were obtained without community consent.

In Western as well as in indigenous societies, intangible and tangible assets are tightly linked in the creative process. The ideal scenario is for creators to be able to control the reproduction, distribution, and consumption of their creative work and usufruct the gains or royalties from its sharing, rental, or sale. In this sense IP is defined here to include both types of assets: the ideas or concepts that result in material goods produced by the standards and procedures intrinsic to an intellectual asset. For example, the making of the hallucinogenic potion *Ayahuasca* requires a set of ritual, social, and technical skills devised and transmitted in secrecy by the shamans of Amazonian groups. On one hand, protections should exist to cover the rules and concepts that drive the production and consumption of the potion, and on the other hand, laws should exist to protect the potion itself. The complete process would fall into the realm of IP rights and would be proprietary to the group. This raises the question: Is *Ayahuasca* is as well protected as Coca-Cola? This is not the case.

In a debate involving IP rights, Michael Brown asked the important question: "Can Culture be Copyrighted?" (Brown 1998). Today Western cultural creations are widely copyrighted, trademarked, or considered trade secrets, with defined terms of limitation for certain creations (e.g., a literary work vs. the recipe for Coca-Cola). How should twenty-first-century societies with considerable advances in the issues of equal rights and ethnic self-determination (more so in the so-called First World countries) deal with indigenous societies that have a longer tradition in the use of their creations?

These are societies where knowledge is transmitted in an active legacy mode, within the community and without contracts or wills. Brown was skeptical about the IP proposals for indigenous groups (that is to say, IP rights in a Western mold) but eager to explore "basic mechanisms for the compensation of native peoples for commercial use of their scientific knowledge. . . and artistic creations" (Brown 1998: 204). Indeed, many of the legal disputes and grievances by indigenous groups are related, for example, to the patenting of medicinal and agricultural plants discovered, domesticated, or used for centuries. This said, Brown thought that a broad debate about securing ethical standards for cultural appropriation was not very propitious as it would set further apart indigenous circles from Western ones (Brown 1998: 195). Clearly, this is indeed what many wish to achieve while securing control of their IP. Brown is not sure about inherent, permanent right of cultural ownership and rather proposes to look into scenarios of joint stewardship. Is there a possible common ground to the needs of Western and indigenous societies to control their IP? Yes, but this ground diverges when "business" models might be considered to exploit IP. The international trend is slowly moving toward the more difficult stand: complete

control of the IP by their indigenous creators (Conway-Jones 2005). However, much reticence to this trend comes from institutions such as museums which seem to endlessly depend on their inalienable possession of artifacts (while opposing the inalienability of indigenous property).

The challenges indigenous groups face are related to legal issues in Western bureaucracy (Barrera-Hernández 2010). Why is it more difficult for indigenous groups to defend their intellectual rights? Why are their IP and their wish for self-determination (often leading to physical isolation) seldom accepted by Western society? Is their rebuff of the endless creativity cycle and drive to innovation proper to Western societies a problem? The indigenous realm will have, in most cases, the social backup and a tight network to pursue traditions flourished from decades of knowledge of their landscape, to recreate their vision of the world and their native identity and therefore own their traditional knowledge. What is it that they need to secure their IP and the survival of their cultural structures?

The Legal Background

Intellectual property law intersects with the discipline of archaeology across a full spectrum of activities: research, analysis, interpretation, curation, and repatriation. Archaeology will often rely on both tangible and intangible forms of indigenous knowledge. Throughout the world, indigenous knowledge, traditions, and sacred sites are at risk due to past and contemporary archaeological practices (see Oguamanam 2006; Yupsanis 2012). Current IP laws, international conventions, and academic traditions (by archaeologists) are primarily aimed at protecting artifacts, structures, and human remains. Indigenous IP has very limited protections.

The full recognition of IP rights in Western societies is backed by important legal instruments that guarantee to creators or inventors a degree of exclusive rights (with a set of time limits) and control to a wide range of tangible or material assets. These rights would also include assets such as music or recipes which in many cases – when ingredients, notes, and lyrics are not published – would be considered intangible or immaterial property. Although both Western and indigenous societies have creations in the intangible realm, it has been extremely difficult for the latter to attain the same level of control of intellectual creations.

Intellectual property law has its origins in the Statute of Anne of 1710 in Great Britain. This British copyright law was based on eighteenth-century European concepts of property, labor, and ownership centered on the individual. Early copyright laws were oblivious to indigenous cultural knowledge or traditional customary laws (Nicholas et al. 2010: 119; Torsen and Anderson 2010: 14). Since then IP laws have evolved based on distinct policies by nation-states with limited consideration and often ignoring indigenous concerns (Torsen and Anderson 2010: 20). While copyright laws are applicable and vary by nation, the Berne Convention establishes minimum standards of protection between states. More specifically, the 1995 Agreement on Trade-Related Aspects of Intellectual Property (TRIPS) provides multilateral protection for copyrights, trademarks, and patents (IP laws). Most countries are bound by TRIPS as members of the World Trade Organization (Torsen and Anderson 2010: 23). The 1996 World Intellectual Property Organization Copyright Treaty extends copyright protections further to compilations of data in digital form such as databases.

Intellectual property laws define the owner, author, user, and creator of works and expressions providing exclusive rights to the owner. Copyright laws provide protections for literary and artistic creations focusing on the form of expression rather than the content of the works. As such, indigenous knowledge and TCEs recorded in written, audio, or visual forms by archaeologists, often without informed consent, become the protected property of the archaeologist or the institution for which they work with no rights or benefits attributed to the traditional or indigenous community from which they were appropriated. Even when traditional knowledge is exchanged by

indigenous people to facilitate the repatriation of their ancestors and cultural materials, there is a risk of losing their rights to the TK if it is not clearly indicated that is confidential information that belongs to the community.

An additional concern with copyright law is that it does not prevent people from copying an idea, style, or method derived from an indigenous work. Copyright law only prohibits the copying of the actual work or TCE. Thus, TCEs in the form of stories, images, and material culture (tangible and intangible heritage) shared by archaeologists through public outreach, reports, and conferences can be misappropriated by nonindigenous people and transformed into consumer products, promotional materials, or other forms of expression without the consent of indigenous communities. TCEs are both cultural and economic resources for the community, and benefit from the use of TCEs should go to the community.

Copyright laws also make it very difficult for indigenous people to gain access to traditional knowledge and TCEs embedded in copyrighted materials. Most indigenous peoples do not own the collections stored in museums and other institutions. These collections often contain secret, sacred, or restricted information that may be subject to customary laws and practices (Torsen and Anderson 2010: 11). Without ownership rights, indigenous communities may be prevented from gaining access to audio, visual, written, and digitized representations of TCEs and TK that are important to the cultural survival of their communities. In some cases, access to copyrighted material is negotiated between owners and indigenous communities. This process is often time-consuming and expensive for indigenous communities as original property owners may now be deceased, difficult to reach, or may speak a foreign language (Torsen and Anderson 2010: 10).

Patent laws also pose problems for indigenous communities. Patents provide exclusive rights for a new product or process or a new technical solution to a problem. Traditional knowledge about biocultural materials and DNA/genetic information derived from indigenous peoples can be patented by corporations without benefit to indigenous peoples (Holcombe and Janke 2010).

United Nations Organizations Conventions

Despite the problems that IP laws pose to the tangible and intangible heritage of indigenous peoples, several UN conventions have been adopted that recognize indigenous values, knowledge, and rights to cultural survival.

The UN International Labor Organization (ILO) Convention of 1957 first recognized "indigenous and tribal" populations (usually minorities) as citizens of nations. Yet, this same ILO instrument promoted as well a destructive policy of integration and assimilation of these minorities into dominant societies. In contrast, the ILO Convention of 1989 promoted pluralism, self-sufficiency, group identity, and collective rights of indigenous peoples (Anaya 2004: 58–59). This convention also affirms that indigenous peoples are entitled to a harmonious relationship with natural resources following traditional patterns of use and land tenure (Anaya 2004: 144). Moreover, this last document encourages governments to work with indigenous peoples to protect their rights and their integrity and reject their discrimination. This UN declaration has been instrumental in the preservation of sacred sites in Australia and enabling indigenous people to gain access to sacred sites and burial grounds in Canada (Anaya 2004: 39–140).

The 2007 United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP or The Declaration) includes provisions expressed as rights: when put into effect by signatory countries, they extend protection for intangible cultural heritage. These provisions include indigenous peoples' rights to (1) "revitalize, use, develop, and transmit to future generations their histories, languages, oral traditional philosophies. . . and to designate and retain their own names for communities, places, and persons"; (2) "maintain, protect, and develop the past, present, and future manifestations of their cultures, such as archaeological and historical sites, artifacts, designs, ceremonies, technologies, and visual and performing arts and literature"; and (3) "maintain, control and develop their IP over such cultural heritage, traditional

knowledge, and traditional cultural expressions" (Nicholas et al. 2010: 123).

The 2007 UNDRIP and the 1989 ILO Convention both provide for the rights of indigenous people to be consulted and involved in activities that impact their heritage, traditional territories, lifestyles, and identities (Nicholas et al. 2010: 123). This is one of the most important instruments in the process of empowerment. However, it is a non-binding convention in UN member countries.

Finally, the Convention on Biological Diversity (CBD) provides protection for natural resources and genetic diversity which are critical to the continuity of indigenous cultural practices and the cultural survival of indigenous peoples. Although this convention is intended to promote global conservation efforts and genetic biodiversity, it may also have a direct impact on bioarchaeology research focused on the study of skeletal remains with the aim of understanding health and demographic issues. While not directly related to conventional issues of IP, the CBD may be a tool that indigenous groups can leverage to restrict the study of human remains and genetic material for ideological and ritual reasons in countries that are parties to the CBD.

Case Studies on Cultural Affiliation, IP, and TK

Indigenous populations challenge issues on IP in different spheres (see Mikkelsen 2012). Indigenous populations have sought ways to secure IP over their material and immaterial traditions, and they have also confronted situations that put that very same IP at risk. These issues are often the result of the historical circumstances of overtly imperialistic strategies in the last two centuries.

The conflict of indigenous groups claiming property to their IP occurs in different degrees around the world; that is, today indigenous groups confront different issues and have adopted different strategies to address their problems. Western powers dominated the world, starting and ending at different periods of time, with somewhat different imperial institutions. The different historical pathways and the distinct dominating strategies of the Spanish, British, and other empires have led to a diverse status for indigenous societies. This historical background is central to explaining the different challenges faced and acknowledged by indigenous populations. Indeed it will explain often their different attitudes toward their heritage and traditions: for example, some indigenous groups are worried about their material culture, while others are not. Archaeologists, who work, say, in British Columbia or in Bolivia, would witness these distinctions in the field: the challenges and demands by local groups in each region will be distinct. Indeed, their concern of IP over cultural material assets will differ: the issues of repatriation and research of indigenous sites, artifacts, and remains that are essential to North American groups are not a concern for a great majority of Andean South American groups. These issues are of more concern for minority groups in the Amazonian basin, who are attempting to stop the encroachment of their territories aimed at the extraction of goods and resources (Huertas Castillo 2004). Again, the attitudes toward their cultural heritage and concerns with ancestry will relate to historical issues, namely, the degree of integration into the mainstream society. In the case of Peru and Andean indigenous populations, they are today immersed in a market-oriented, Westernized, and neoliberal society, with some remnants of community-oriented tasks at the local level. Their level of *integration* with the current national society is an indicator of their concerns over heritage.

In the United States, archaeological site protection and resource protection laws were primarily focused on the rights of institutions rather than indigenous populations until the passage of the Native American Grave Protection and Repatriation Act (NAGPRA) in 1990. This Act was enacted to facilitate the repatriation of indigenous human remains, funerary objects, sacred objects, and objects of cultural patrimony from federally funded US museums. The Act had the important participation of indigenous people within the US borders, yet it contains ambiguous language and unfinished regulations that lead to sometimes contentious situations in the repatriation process.

The implementation of NAGPRA required two things, namely, (1) a thorough documentation of the artifacts in museums before the repatriation of the cultural assets to the descendant populations and (2) that federally recognized Tribes and native Hawaiian organizations must demonstrate cultural affiliation with their ancestors. This puts indigenous people in the difficult position of sharing TK and IP and the ritual and sacred meaning of artifacts with institutions and government agencies; it affects the very issue of IP control (Brown and Bruchac 2006). It implies that indigenous people must demonstrate kinship to the individuals or affiliation to the objects which were obtained decades or centuries earlier often under coercion to their ancestors. The proof of kinship is compared with the names and places recorded by the original collector many generations ago. There is an imbalance in this repatriation process, putting the burden of proof on indigenous groups to demonstrate ancestral links, cultural continuity and uninterrupted transmission, when, unfortunately, the social cohesion of these groups have been undermined by decades of neglect and social problems. In this scenario, museums, often with the participation of archaeologists, maintain possession and control of artifacts as well as the photographic, descriptive, and audio records (say, of traditional songs) in their collections.

By example, in February 1996, the mayor of Providence, Rhode Island, announced the sale of a carved wooden spear rest then in the possession of the city-run Museum of Natural History. From the museums' perspective, the utilitarian spear had been used on war canoes in the South Seas. However, from the perspective of *Hui Mãlama I Nã Kupuna O Hawai'i Nei* (group caring for the ancestors of Hawaii) and the Office of Hawaiian Affairs (OHA), the spear was an idol from the Sandwich Islands, the name given to the Hawaiian Islands in the 1770s by Captain James Cook. Both institutions wrote to the mayor of Providence disagreeing: "The fact that the ki'i lã'au was designed to hold, guard, and protect the spears of a kaua ali'i does not mean that it is utilitarian and therefore secular, having no religious significance. Such statements reveal a fundamental misunderstanding of the ki'i lã'au as well as the Western tendency to create differentiations where none exist" (Hui Mãlama 1996). So they claimed that the item is a *ki'i lã'au*, an object of cultural patrimony and a sacred object, which probably belonged to a warrior chief and possibly a ruling chief. Such an item would be an *'aumakua* image created by the *kaua ali'i* for the purpose of housing an ancestral spirit to care for his spears (Hui Mãlama 1996).

Hui Mãlama and the OHA urged a halt to the sale, claiming that the item fell under the protection of NAGPRA. Despite a brief period of consultation where culturally sensitive information was exchanged by the indigenous participants, the Museum formally rejected the NAGPRA claims. The dispute was vented in 1997 in the NAGPRA Review Committee meeting. Once again, the indigenous representatives shared culturally sensitive information about their ancestors, spiritual beliefs, as well as prayers and songs (National Park Service 1997a). The review committee agreed that the *ki'i lã'au* is a ceremonial object and recognized the reasonable kinship and cultural relationship between the OHA and *Hui Mãlama* and the native Hawaiians who created and used the carved wooden figure. Yet, the NAGPRA Review Committee took a narrow view of property law and determined that "there was insufficient information presented regarding the circumstances of the acquisition of the carved wooden figure to make an advisory finding concerning right of possession to the object as defined by NAGPRA" (National Park Service 1997b). The review committee recommended that the city of Providence reconsider its determination as the item is considered a sacred object under NAGPRA. Ultimately, the case was settled in 1998 with the Hawaiian organizations negotiating with the city of Providence to return the *ki'i lã'au* to Hawaii for permanent display.

This case raises many issues with the use of NAGPRA as a tool to repatriate culturally sensitive items. Fear of NAGPRA violations may convince reluctant museums to consult with federally recognized tribes and native Hawaiian organizations. Yet, implementation of NAGPRA is based on variable interpretation of cultural meaning and affiliation coupled with tight

interpretation of property laws by museums and the US federal government. In addition, the unequal exchange of information required to facilitate the repatriation process places TK and indigenous IP at risk. Many questions are left unresolved by this case: who gets to determine if an item is utilitarian or sacred? Can an item be both utilitarian and sacred, changing meaning based on its context of use? How can indigenous people demonstrate their cultural affiliation to their ancestors and culturally significant items without losing their IP rights?

In the case of sacred sites, natural resources, and landscapes, problems also arise when Western archaeological knowledge is used as a tool to restrict indigenous rights and contradict indigenous knowledge. By example, in a case from southeastern Australia, archaeological reports and interpretations of cultural landscapes were privileged over local indigenous knowledge in the construction of the Hindmarsh Island Bridge (Hemming and Treverrow 2005). The Ngarrindjeri nation is the traditional owner of this territory. In an effort to halt construction, Ngarrindjeri elders shared their TK about the cultural sensitivity of the area to be developed to protect the traditional Goolwa landscape. The authenticity of Ngarrindjeri knowledge was contested by local government council, which chose to rely on a natural resource management plan to avoid sites of significance. The council claimed that Ngarrindjeri people were no longer traditional and had devalued their knowledge of cultural landscapes and practices. The protests of the Ngarrindjeri people were ignored, and the development of the bridge resulted in the desecration of a Ngarrindjeri burial site.

In this case, the Ngarrindjeri leaders aimed to change the way nonindigenous people behave toward indigenous communities and traditional knowledge, namely, by privileging indigenous knowledge over Western archaeological. Rather than prosecute the council under the Aboriginal Heritage Act 1988 (SA), the Ngarrindjeri elders negotiated an agreement with the council that included an apology to the Ngarrindjeri people and changes to the way archaeology is practiced in the region.

An important case of the joint work between indigenous populations and "managers" is the grassroots resource preservation project in Kyrgyzstan (Pyburn 2009). The objective of the "Silk Roads" project, funded by IPinCH, has encouraged a public conversation about IP and cultural heritage in Kyrgyzstan. Indeed, its positive advances led to the inclusion of the Silk Roads sites on Kyrgyzstan's tentative list for UNESCO World Heritage status. This is an excellent case of a regional-scale project involving several sites. Again, the importance of the historical context: today's scenario of low awareness on heritage and traditions is the result of Soviet-era policies of creating a multiethnic nation with a Russian overarching tradition. In this case, Kyrgyz stakeholders from various backgrounds designed a series of small-scale, sustainable community-based projects aimed at the preservation and educational use of IP and cultural heritage. One of the projects along the road wished to improve the protection of a cultural heritage asset: an ancient temple with a strong local spiritual significance. The site was left unprotected after research and was in dire need of a plan to save it. The steps applied in the task were designed by the site director with the informed support of the people of Uzgen who debated and approved the measures. Arguments in the process included the cultural and spiritual importance of the site. Again, remember that these post-Soviet societies turned from an atheist society toward the rediscovery of traditional religions. The structure represents that long-appeased past.

Future Directions

The issues of controlling a group's IP also involve the management process that integrates indigenous populations and outsiders (mostly researchers). In many cases, the TK of indigenous communities is shared with archaeologists to aid in the protection of cultural landscapes and resources. The sharing or full protection of traditional knowledge is the prerogative indigenous societies have once they are in full control of their IP; it is not unlikely that parts of that

knowledge will be kept private as occurs with rituals and legends. The involvement of archaeologists is sometimes problematic, as they are made privy to this TK. Archaeologists can address this issue by choosing not to report or publish information related to TK or report on tangential outcomes after consulting with indigenous communities regarding what information is shared with the governments and the public. Another option is to coauthor reports with indigenous communities, enabling the communities to determine the appropriate level of disclosure of cultural information. In all cases, indigenous-centric archaeology protocols should be developed to supplement limited IP protections as nonlegal instruments to guide research and management, as has happened for the case of repatriation of indigenous artifacts in Canada. The examples have shown propitious room for arrangements away from the formalities and contradictions of the legal system.

Where are indigenous populations heading with their contentious but logical issues regarding the IP of their heritage? They are headed toward scenarios where they are able to legally contest, transmit, and uphold their concerns to the society at large. Increasingly, indigenous populations are gaining allies among archaeologists, heritage professionals, ecologists, economists, and global organizations who share a common interest in the protection and preservation of indigenous tangible and intangible heritage. While the motivation for joint research varies, this process has produced a more balanced approach based on a new gauging of indigenous and Western prisms in the study of indigenous societies. Yet, at the local and national level, indigenous populations continue to fight for cultural survival and sovereignty on a daily basis.

In many regions, there is still incomprehension among Western-trained archaeologists, heritage professionals, and governmental organizations, let alone society at large, as to why indigenous populations deserve the privileges of self-governance (in the best case scenario) and why they aim to block governmental decisions that would not only benefit them directly but also benefit society at large in financial terms. However, the crux is in the benefit to their IP and TK on the long term or, put plainly, the endurance of society and landscape. Rather, any *financial* benefits, in more discreet but sustainable fashion, could be obtained from working with indigenous populations on the development of biodiversity initiatives, ecotourism, archaeotourism, and indigenous arts and crafts programs that would benefit local and national economies.

Put into a historical context, current resistance to indigenous IP rights equates with the same suspicion which led the British Empire to forbid traditional rituals such as the potlatch, viewed as an incongruent waste of riches "not befit to British subjects," as it was put at the time. To put it in today's perspective, we can see the same resistance to indigenous rights and knowledges in the building of pipelines that cut through pristine forests, waterways, and ancestral lands of British Columbia and the United States. The lack of long-term vision toward ecological and cultural issues stems from a short-term dominant market economy focus, with limited financial benefits and significant risks for the very society at large.

Recently, in contested situations where it is too time-consuming or expensive for indigenous populations to fight for their IP rights in the courts, many groups are turning to the development of cultural protocols as nonlegal means of protecting cultural landscapes, knowledge systems, and intellectual properties. Cultural protocols are sets of guidelines developed by indigenous communities with or without the involvement of outsiders (archaeologists, scientists, business people, and government officials) to increase cultural sensitivity and understanding of cultural traditions, landscapes, and/or biocultural resources. Increasingly, archaeologists are working with indigenous populations to develop cultural protocols and research protocols for the protection of sacred sites and TK (Newsom 2014). The goal is to acknowledge and protect indigenous IP while changing behaviors and attitudes among outsiders, ultimately benefitting indigenous populations and the society at large. Although protocols are often

non-binding, they provide a flexible mechanism for advancing indigenous populations interests in controlling access to tangible and intangible heritage while renegotiating unequal knowledge-sharing practices (Bannister 2009: 287; Torsen and Anderson 2010: 76).

The issue of indigenous IP is embedded in a long link of themes from the survival of ecosystems to the reproduction of cultural traditions. All the links are intertwined in the deeply ritual world vision of indigenous populations, and as such the very subsistence of pristine forest trickles down to the survival of those traditions. The historical context of the early twenty-first century is on the side of indigenous populations, but not without important obstacles to surmount.

Cross-References

- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Intangible Cultural Heritage
- ▶ Intellectual Property Issues in Cultural Heritage (IPinCH) Project
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)

References

Anaya, S.J. 2004. *Indigenous peoples in international law*. New York: Oxford University Press.

Anderson, J.E. 2005. The making of indigenous knowledge in intellectual property law in Australia. *International Journal of Cultural Property* 12: 347–373.

Anderson, J.E. 2009. *Law, knowledge, culture: The production of indigenous knowledge in intellectual property law*. Cheltenham: Edward Elgar.

Anderson, J.E. 2010. *Indigenous/traditional knowledge and intellectual property*. Durham: Duke University School of Law, Center for the Study of the Public Domain. Available at: http://web.law.duke.edu/cspd/itkpaper2. Accessed 7 Nov 2012.

Atalay, Sonya., L.R. Clauss, R.H. McGuire, and J.R. Welch. 2014. Transforming archaeology. In *Transforming archaeology: Activist practices and prospects*, ed. S. Atalay, L.R. Clauss, R.H. McGuire, and J.R. Welch, 7–28. Walnut Creek: Left Coast Press.

Bannister, K. 2009. Non-legal instruments for the protection of intangible cultural heritage: Key roles for ethical codes and community protocols. In *Protection of first nations cultural heritage: Laws, policy, and reform*, ed. C. Bell and R. Paterson, 278–308. Vancouver: UBC Press.

Barrera-Hernández, L. 2010. One step forward, two steps back Peru's approach to indigenous land and resources and the law. In *Comparative perspectives on communal lands and individual ownership. Sustainable futures*, ed. L. Godden and M. Tehan, 167–185. London: Routledge.

Brown, M. 1998. Can culture be copyrighted? *Current Anthropology* 39: 193–222.

Brown, M., and M.M. Bruchac. 2006. NAGPRA from the middle distance: Legal puzzles and unintended consequences. In *Art, imperialism and restitution*, ed. J.-H. Merryman, 193–217. Cambridge, UK: Cambridge University Press. Available at: http://web.williams.edu/go/native/Brown_HeritageProtArts.htm. Accessed 7 Nov 2012.

Conway-Jones, D.M. 2005. Safeguarding Hawaiian traditional knowledge and cultural heritage: Supporting the right to self-determination and preventing the co-modification of culture. *Howard Law Journal* 48: 737–762.

Hemming, S., and T. Treverrow. 2005. Kungun Ngarrindjeri Yunnan: Archaeology, colonialism and re-claiming the future. In *Indigenous archaeologies: Decolonising theory and practice*, ed. C. Smith and H.M. Wobst, 243–261. New York: Routledge.

Holcombe, S., and T. Janke. 2012. Patenting the Kakadu plum and the Marjarla tree: Biodiscovery, intellectual property and indigenous knowledge. In *Intellectual property and emerging technologies: The new biology. Queen Mary studies in intellectual property*, ed. M. Rimmer and A. McLennon. Cheltenham: Edward Elgar.

Hopi Tribe. 2017. *Protocol for research, publication and recordings: Motion, visual, sound, multimedia and other mechanical devices*. Kykotsmovi: Hopi Cultural Preservation Office.

Huertas Castillo, B. 2004. *Indigenous peoples in isolation in the Peruvian Amazon: Their struggle for survival and freedom*. Copenhagen: International Work Group for Indigenous Affairs. Available at: http://www.iwgia.org/publications/search-pubs?publication_id=118. Accessed 7 Nov 2012.

Hui Mālama I Nā Kupuna O Hawai'i Nei, and the Office of Hawaiian Affairs. 1996. Dispute over a native Hawaiian sacred object currently in the possession and control of the Museum of natural history at Roger Williams Park Providence, Rhode Island. October 15. Available at: http://huimalama.tripod.com/kii.html. Accessed 7 Nov 2012.

Janke, T. 1999. *Our culture: Our future–report on Australian indigenous cultural and intellectual property rights*. Sydney: Australian Institute of Aboriginal and Torres Strait Islander Studies and the Aboriginal and Torres Strait Islander Commission.

Mikkelsen, C. 2012. *The indigenous world 2012*. Copenhagen: International Work Group for Indigenous Affairs. Available at: http://www.iwgia.org/publications/search-pubs?publication_id=573. Accessed 7 Nov 2012.

National Park Service. 1997a. *Minutes: Native American graves protection and repatriation review committee thirteenth meeting: March 25–27*. Norman: U.S. Department of the Interior. Available at: http://www.cr.nps.gov/nagpra/REVIEW/meetings/MINUTES.HTM. Accessed 12 Nov 2012.

National Park Service. 1997b. *Federal register. Native American graves protection and review committee: Findings 62: 23794-5*. Norman: U.S. Department of the Interior.

Newsom, B. 2014. Developing policies and protocols for the culturally sensitive intellectual properties of the Penobscot Nation of Maine. Available at: http://www.sfu.ca/ipinch/project-components/community-based-initiatives/developing-policies-and-protocols-culturally-sensitiv/

Nicholas, G., C. Bell, R. Coombe, J.R. Welch, B. Noble, J. Anderson, K. Bannister, and J. Watkins. 2010. Intellectual property issues in heritage management, part 2: Legal dimensions, ethical considerations, and collaborative research practices. *Heritage Management* 3: 117–147.

Oguamanam, C. 2006. *International law and indigenous knowledge: Intellectual property rights, plant biodiversity, and traditional medicine*. Toronto: University of Toronto Press.

Pyburn, A.K. 2009. Practising archaeology – As if it really matters. *Public Archaeology: Archaeological Ethnographies* 8: 161–175.

Torsen, M., and J. Anderson. 2010. *Intellectual property and the safeguarding of traditional cultures: Legal issues and practical options for museums, libraries and archives*. Geneva: World Intellectual Property Organization.. Available at: http://www.wipo.int/freepublications/en/tk/1023/wipo_pub_1023.pdf. Accessed 7 Nov 2012.

Tully, J. 2000. Struggles of indigenous peoples for and of freedom. In *Political theory and the rights of indigenous peoples*, ed. D. Ivison, P. Patton, and W. Sanders, 36–59. New York: Cambridge University Press.

Yupsanis, A. 2012. Cultural property aspects in international law: The case of the (still) inadequate safeguarding of indigenous peoples' (tangible) cultural heritage. *Netherlands International Law Review* 58: 335–361.

Further Readings

Simpson, M. 2008. "Other worlds are actual": Tully on the imperial roles of modern constitutional democracy. *Osgoode Hall Law Journal* 46: 509–533. Available at: http://www.ohlj.ca/documents/509Simpson.pdf. Accessed 7 Nov 2012.

Theurich, S. 2009. Art and cultural heritage dispute resolution. *WIPO Magazine* 4: 17–19. Available at: http://www.wipo.int/wipo_magazine/en/2009/04/article_0007.html. Accessed 7 Nov 2012.

Indigenous Knowledge and Traditional Knowledge

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Introduction

Over time, Indigenous peoples around the world have preserved distinctive understandings, rooted in cultural experience, that guide relations among human, nonhuman, and other-than-human beings in specific ecosystems. These understandings and relations constitute a system broadly identified as Indigenous knowledge, also called traditional knowledge or aboriginal knowledge. Archaeologists conducting excavations in Indigenous locales may uncover physical evidence of Indigenous knowledge (e.g., artifacts, landscape modifications, ritual markers, stone carvings, faunal remains), but the meaning of this evidence may not be obvious to non-Indigenous or non-local investigators. Researchers can gain information and insight by consulting Indigenous traditions; these localized knowledges contain crucial information that can explain and contextualize scientific data. Archaeologists should, however, strive to avoid interference with esoteric knowledges, sacred sites, ritual landscapes, and cultural property. Research consultation with local Indigenous knowledge-bearers is recommended as a means to ensure ethical practice and avoid unnecessary harm to sensitive sites and practices.

Definition

Traditional Indigenous knowledge can be defined as a network of knowledges, beliefs, and traditions intended to preserve, communicate, and contextualize Indigenous relationships with culture and landscape over time. One might distinguish "knowledge" as factual data, "belief" as religious concepts, and "tradition" as practice, but these terms are often used imprecisely and

interchangeably to describe Indigenous epistemologies. Indigenous knowledges are conveyed formally and informally among kin groups and communities through social encounters, oral traditions, ritual practices, and other activities. They include oral narratives that recount human histories, cosmological observations and modes of reckoning time, symbolic and decorative modes of communication, techniques for planting and harvesting, hunting and gathering skills, specialized understandings of local ecosystems, and the manufacture of specialized tools and technologies (e.g., flint-knapping, hide tanning, pottery-making, and concocting medicinal remedies).

Indigenous communities have devised distinctive methods of encoding useful data within philosophies of thought and modes of activity that are linked to particular landscapes. This data includes geographical, genealogical, biological, and other evidence that maps human relations to flora and fauna, land and water, and supernatural forces. Knowledge is often passed on through regular Indigenous performances – including oral traditions, song, dance, and ceremony – that convey both literal and metaphorical truths about these relations. Skilled individuals and families are entrusted to maintain these traditions; some are specialists who protect esoteric knowledges. Although many aspects of traditional knowledge have been identified and recorded through ethnographic and ethnohistorical research, some are still unknown to outsiders.

Individual ethnic and tribal communities, in different regions of the world, have preserved different versions of traditional knowledges. While these knowledges might share some things in common, they do not comprise a single (or simple) tool kit. Indigenous knowledges can be envisioned as an hereditary system of learned awareness and skill that enables wisdom to be gained and tools to be constructed, as needed, from the materials at hand. These knowledges are rooted in a particular place or ecosystem, but they are not necessarily static or fixed. Religious knowledges, for example, are quite portable and can be used to mediate human encounters with ancestral spirits and other-than-human beings, wherever these encounters might take place.

Indigenous Knowledge and Traditional Knowledge, Fig. 1 Roger Paul (Passamaquoddy), shown constructing the frame for a Wampanoag *wetu* (shelter) beside the Penobscot River in Maine, during a Wabanaki Writers retreat in 2009. (Photograph by Margaret M. Bruchac)

Ecological knowledges are also portable, in that they call for reliance upon local resources and careful observations of the interactions between living beings and natural processes within an ecosystem (any ecosystem) to ensure human survival (Fig. 1).

Knowledge Keepers

Some traditional understandings are common knowledge, shared by all members of a tribal community, ethnic group, kin network, or family. Many of these are learned through phenomenological experience and everyday activities. More specialized types of information are preserved by gatekeepers (e.g., tribal leaders, ritual practitioners, medicine people) who have vested interests in, deep experience with, and long-standing connections to significant sites. Keepers of oral traditions are often carefully trained to link parts of traditional narratives to specific events and

locales, and cultural coherence is ensured by regular repetition (Vansina 1985). In Native American communities, these people are often selected as children and carefully trained up by elders. In Australian communities, there are gatekeepers identified as "Traditional Owners" who may inherit this role within a family line; it is their responsibility to monitor and mediate human interactions with the ancestral landscape (Smith and Wobst 2005). Among the Maori, specific categories of specialized, protected knowledges are entrusted only to select members of a group (Smith 2012). In general, Indigenous knowledge-keepers and traditional elders are afforded considerable respect in their home communities; in the academy, however, they have not yet gained the same degree of status afforded to scientific knowledge-keepers.

Traditional Ecological Knowledge

Traditional ecological knowledge (also called traditional Aboriginal knowledge) can be defined as practical applied Indigenous knowledge of the natural world. This is more than a mere collection of primitive survival tactics; it is a system of awareness that offers both moral guidelines and practical advice. Local practitioners conduct their activities (e.g., plant medicine, shelter construction, hunting skills, craft manufacture) using natural materials; they must rely upon intimate understandings of local flora and fauna to collect the necessary resources. Traditional ecological knowledges emerged from environmental understandings shaped over time by incremental learning (including trial and error and experimentation), and they crosscut the scientific disciplines of biology, botany, geography, and cosmology (Augustine 1997; Berkes 2012). Some evidence suggests Indigenous overuse of fragile environments, but in general (in the precolonial era), Indigenous peoples endeavored to maintain traditional landscapes. They did not depend upon large-scale resource extraction and development; instead, they maintained unique floral and faunal communities through measured harvests and ritual activities that emphasized reciprocity (Apffel-Marglin 2011). Among many Indigenous groups, proper attention to local spirits is believed to be an essential element of long-term lifeways (Berkes 2012; Smith 2012). The religious tenets of ecological awareness (identified as sacred ecology) were encoded in instructive narratives and dynamic interactions with local environments, intended to ensure long-term survival (Berkes 2012: 219). Human health was a natural by-product of environmental health.

Stephen Augustine (*Mi'kmaq*) identifies traditional knowledge as a system that derived from the survival tactics that Indigenous peoples perfected over generations, preserved in collective memory and community teachings:

> This knowledge is exercised within the context of the social values and philosophies of the tribe. . .The fact that Native science is not fragmented into specialized compartments does not mean that it is not based on rational thinking, but that it is based on the belief that all things are connected and must be considered within the context of that interrelationship. (Augustine 1997: 1)

Gregory Cajete (*Tewa*) identifies this expansive mapping of knowledge as "Native science":

> Native science is the collective heritage of human experience with the natural world; in its most essential form, it is a map of natural reality drawn from the experience of thousands of human generations. It has given rise to the diversity of human technologies. . .in profound ways Native science can be said to be "inclusive" of modern science, although most Western scientists would go to great lengths to deny such inclusivity. (Cajete 2000: 3)

Traditional ecological knowledge, as a system, links sophisticated philosophies with practical measures as a means to mediate and moderate human interactions with ancestral landscapes. Some of the archaeological evidence from remote areas, where subsistence lifeways are the norm, suggests ancient continuities with the far distant past (see discussions of *Dene, Inuit*, and *Gwich'in* archaeology in Nicholas and Andrews 1997). Some ancient Indigenous stewardship practices appear to be equivalent with (if not superior to) modern conservation approaches (Nicholas and Andrews 1997; Apffel-Marglin 2011; Sillar and Fforde 2005).

Traditional ecological knowledges can inform everyday and ritual activities, in public and private venues. Some ritualized activities aim to

combine the knowledge and phenomenological experiences of multiple individuals for maximum effect. For example, in preparation for hunting, individuals may prepare their tools in a traditional location. The movements of the stars, measured by means of standing stones, may be used to predict the appropriate time and season to hunt. Traditional knowledge-bearers may utilize forms of divination, and a group might join together in dance to call the game. The products of the hunt may be selectively offered as reciprocal gifts to the forest or ritually shared at a community feast. The people who engage in these activities are not naively requesting favor from unseen forces; their actions are guaranteed success only if participants are keenly aware of the relevant ecological data (e.g., season, weather conditions, and general health of animal populations) before they begin. Evidence of these activities, in markers left on the landscape – piles of debitage, stone carvings, dance circles, and bone collections – may be encountered in later archaeological investigations (Fig. 2).

The precepts of traditional ecological knowledge can thus provide context and explanations for artifacts, site modifications, and evidence that might otherwise appear mysterious. As examples, consider two geographically different cases: Inuit hunters in the Arctic, who learn to respect the potential animacy (and inherent danger) of certain weapons and tools in an extreme climate; and medicinal practitioners in the Amazon rainforest, who develop exquisite senses of smell to distinguish among many different varieties of potentially poisonous plants. One might encounter archaeological remains reflecting these different knowledges: a tool scratched with symbols and a bundle of leaves. In their time, these distinct regional knowledges shaped the circumstances of survival; in our time, an awareness of these knowledges provides a crucial framework that situates and explains these people from the past.

Indigenous Knowledge and Traditional Knowledge, Fig. 2 Maritime archaic toggling harpoon point, housed in the collections of Memorial University, St. John's, Newfoundland, Canada. (Photograph by Margaret M. Bruchac)

In summary, traditional ecological knowledges include sophisticated site-specific and culture-specific instructions, embedded in the landscape and evidenced in unique skill sets, activities, and localized knowledges. If followed properly, these instructions are intended to ensure both short-term survival and long-term human health, community sustainability, and preservation of unique ecosystems (Apffel-Marglin 2011; Berkes 2012).

Oral Traditions

Oral traditions, whether communicated as historical narratives or mythical stories, constitute a form of traditional knowledge that can teach, carry, and reinforce other knowledges. Among Indigenous groups, oral traditions serve as the collective memories of ethnic, tribal, and kinship groups, a formal "corpus relating to the whole society" (Vansina 1985: 19). Oral traditions can blur the boundaries of narrative and performance in that they are both product and process, object, and experience. Although they may be characterized as fragile or malleable, these traditions are not simple hearsay or personal reminiscence; they are community memories, regularly recounted and periodically verified by knowledgeable elders.

Indigenous oral traditions often contain insightful explanations that focus on details: origin stories referencing natural and constructed features of the landscape, descriptions of the beings that inhabit this landscape, articulations of the reciprocal relations among these beings, and traditional beliefs that guide human interactions with place. Oral traditions can also include supernatural data: stories of encounters between

human and nonhuman beings in the distant past, messages delivered by animal intelligences, and spiritual visions and transformations (Cajete 2000; Bruchac 2005; Vizenor 2008). Some of the most ancient oral traditions record the actions of other-than-human beings who moved glaciers, rivers, and rocks, actively sculpting the Indigenous homeland. Some of the more recent ones explain distinctive place names that map and mark human geographies.

This information is typically passed on through acts of storytelling that are both literal and metaphorical, as they verbally reconstruct connections with the past (Bruchac 2005; Johnson 2007; Vizenor 2008). As Gerald Vizenor (*Anishinaabe*) articulates it, oral traditions in the hands of a skilled teller – a storier – can evoke elemental realizations:

> Native storiers of survivance are prompted by natural reason, by a consciousness and sense of incontestable presence that arises from experiences in the natural world, by the turn of the seasons, by sudden storms, by migration of cranes. . .by the favor of spirits in the water, rimy sumac, wild rice, thunder in the ice, bear, beaver, and faces in the stone. (Vizenor 2008: 11)

"Survivance" is more than mere survival; it is the active continuation of traditions that preserve the knowledges of these connections, including regular discourse with the ancestors to maintain a conscious "sense of presence over absence" (Vizenor 2008: 1).

Indigenous peoples may combine the narration of these traditions with other activities and symbols – ritual practice, dance, music, art, rock carvings, and mock combat – that ritually reenact or engage with ancestral beings or other creatures. Since many of these characters are represented in symbols or totems, archaeologists should familiarize themselves with kin groups and social markings of the population under study. Particular plots, characters, symbols, or other elements of traditional narratives may appear in ethnohistorical records that can shed light on archaeological remains (Bruchac 2005).

In Native American contexts, some individuals were destined from birth to become oral tradition-keepers, historians, and interpreters (Vizenor 2008: 12). In African communities, *griots* learned to recount geo-biographical narratives that recorded the lineage of key family groups and the length of residence in particular regions (see, e.g., discussions of Kenya and other African locales in Sefa Die et al. 2000). Oral traditions may speak of a particular family, lineage, language, or region or serve as markers of distinct Indigenous identities. From the colonial era to the present, oral traditions have also been employed as a means of identification and a form of resistance to colonial domination (Bruchac 2005; Johnson 2007; Vizenor 2008).

Oral traditions can have both practical and ritual aspects. On a practical level, Indigenous peoples have developed technologies that enable successful hunting and gathering. Yet, they recognize that animals, birds, and other beings have agency and traditions of their own. They expect to interact with these beings not only in the flesh but also through dreaming and ritual encounters (Apffel-Marglin 2011; Augustine 1997; Johnson 2007). Ritual activities provide a means of communicating with elemental spirits and worldly beings that have intelligences of their own (Apffel-Marglin 2011). Narratives of these encounters remind us that human relationships are inextricably intertwined with these beings and places.

Oral traditions, as products of human expression, may seem too ephemeral in locales where Indigenous agents are absent or silent. Yet, as a potential source of data, they should not be overlooked. Even when collected at a distance in time and space, local stories may still contain crucial data (e.g., site descriptions, explanations of practices, memories of social activities) that can map and mark a significant Indigenous site (Bruchac 2005).

Historical Background

Indigenous knowledges that predate colonialism were once regarded as primitive and unsophisticated; this cultural bias historically obscured both the structure and practice of these knowledges. Western practitioners posed a serious threat to

the integrity of Indigenous cultural traditions and territory, by regarding them as public scientific property. Archaeologists conducted investigations in destructive and ethically questionable ways. The damage included desecration of burial places, theft of cultural property, imposition of nationalist ideologies, interference with traditional activities, damage to local ecosystems, misrepresentations in museums, and general disrespect for Indigenous culture and property.

During the early years of archaeology, scientists were largely unaware of the validity of Indigenous knowledges, and intellectual exchanges between Indigenous and European knowledge-bearers were less than ideal. Indigenous peoples were largely treated as objectified subjects rather than participatory colleagues. Indigenous beliefs and traditions were regarded as religious superstitions when compared to both imperialist ideologies and larger organized religious movements. In North and South America, Australia, and New Zealand, Indigenous peoples were politically disempowered and living in a hostile atmosphere that made it difficult for traditional communities to maintain cohesion. Among the Maori, colonization directly interfered with the authority of traditional leaders and traditional knowledge, stripping away Maori control of their land and destiny (Smith 2012: 175).

Broadly speaking, all human knowledges are rooted in traditions passed on from one generation to the next, one community to another. In this regard, scientific approaches to archaeology could be considered a body of traditions that emerged from the distinctive social relations and exercises of power that developed in the environments of modern European academies. Within those academies, a mode of research was devised – the scientific method – that is prized for its presumed objectivity. The data collected is, however, catalogued and classified in ways that are somewhat detached from practical and sensory experience (Apffel-Marglin 2011; Smith 2012). Scientific models of thinking and organizing rely upon disciplinary divisions that segregate the natural world and products of human experience into disparate parts that do not reflect their places of origin (e.g., the use of Latin names for flora and fauna). Indigenous knowledges, by comparison, are inherently holistic and integrative, being rooted in sensory awareness and human experience of the complex relationships among multiple organisms in distinct ecosystems (Augustine 1997; Apffel-Marglin 2011; Smith 2012). Indigenous knowledge is not wholly unscientific, and concepts of "science" and "tradition" need not stand in opposition, since these are potentially complementary ways of organizing human understandings and interactions with the natural world.

For much of the nineteenth and twentieth centuries, anthropological studies of Indigenous knowledge largely focused on data that was useful to Western scientists. Ethnographic studies recorded biological identifications, hunting activities, naming practices, and linguistic structure as discrete bodies of data, without full consideration for the Indigenous philosophies that guided complex relationships among these forms of knowledge. During the early twentieth century, Native American individuals often served as informants and assistants at archaeological sites, but the relations between these individuals and the actual keepers of sacred knowledges are still open to question. Archaeological sites were particularly vulnerable to pot-hunting by amateurs (and some professionals) who disarticulated remains and removed cultural objects in the search for valuable specimens. These interferences damaged the integrity of sites and destroyed some of the evidence of Indigenous knowledges. As archaeologists moved to professionalize, national organizations pressed for legislation to protect the scientific value of Indigenous sites (e.g., the American Antiquities Act of 1905). Despite this effort, Indigenous consultation was not routine in the practice of archaeology until human rights issues came to the fore in the 1970s.

Key Issues/Current Debates

The fraught relationships between Indigenous peoples and archaeologists have shifted dramatically in recent decades, as a direct result of increasing attention to the ethics of practice and the inclusion of Indigenous people as research

partners (Nicholas and Andrews 1997; Smith and Wobst 2005; Schmidt 2009; Nicholas 2010). Practitioners of Indigenous archaeologies have often insisted that Indigenous knowledges be placed foremost when excavating Indigenous sites. Indigenous activists have also called for corrections to the many distortions of oral traditions and local knowledges that have influenced both public views of the Indigenous past and Indigenous views of themselves (Nicholas 2010; Smith 2012). As Linda Tuhiwai Smith (*Maori*) explains, these distortions are ideologically laden with colonial influences and have trapped people within a vision that "does not connect with either our oral traditions or our lived reality" (Smith 2012: 172).

In some regions, Indigenous people are exerting influence as sovereign nations to challenge the presumed exclusivity of state control and scientific ownership of heritage. Archaeologists can no longer assume sole authority in the field, and they should be prepared to encounter and negotiate potential disputes, not only over the ownership of sites and materials, but over the application of differing forms of knowledge (Smith and Wobst 2005; Atalay 2012). Indigenous ecological knowledges are likely to be called out as evidence in disputes over development or archaeological research in sensitive sites.

Among Native American and First Nations people in the United States and Canada, the continuation of traditional practices (e.g., ritual activities, seasonal hunts and harvests) may provoke conflicts with state and national conservation agencies and policies. Conservationists typically privilege romantic visions of uninhabited wilderness, rather than Indigenous visions of sustainable hunting, fishing, and harvesting (Apffel-Marglin 2011: 23). South American Indigenous activists face similar struggles in protecting traditional landscapes and practices. Traditional sites need protection and verification (which can sometimes be provided by archaeological surveys), but exposure may invite cultural and economic exploitation (bio-prospecting, bio-piracy, tourism, development). There is also the risk that exposure and development may interfere with the delicate balance of natural world forces (weather, water, climate, spirits) that ensure community safety (Apffel-Marglin 2011).

In recent decades, there has been considerably more awareness of Indigenous knowledge and more effort to ensure community involvement (Sillar and Fforde 2005; Menzies 2006; Atalay 2012). Traditional knowledges have informed archaeological studies of Indigenous religions, rock art, ritual, and sacred landscapes, improving the accuracy and complexity of these fields of study (Berkes 2012). Archaeological evidence of sustainable ancient practices not only testifies to long-term Indigenous habitation; it can also inform future policies in cultural resource management (Nicholas and Andrews 1997).

In some cases, however, the stereotypes (e.g., the paradigm of simplistic practice) persist, obscuring the evidence of subtle yet significant activities (Apffel-Marglin 2011). Oral traditions that record the details of sacred landscapes and ceremonial complexes may be missed by scientists in search of more recognizable evidence of human constructions. In the Andes, for example, channels constructed for the ritual conveyance of water spirits may be misunderstood as simple irrigation lines (Apffel-Marglin 2011). In Aboriginal Australia, cultural landscapes with minimal modification that house potent spirits and inspire instructive dreamings (see examples of *Barunga* and *Ngarrindjeri* lands in Smith and Wobst 2005) may not be recognized by outsiders as sacred.

As decolonizing scholars have noted (e.g., Augustine 1997; Smith and Wobst 2005; Nicholas 2010; Apffel-Marglin 2011; Smith 2012), the inclusion of Indigenous knowledge is not without controversy. Critics have questioned the veracity of Indigenous knowledges, challenged the qualifications of community experts with no apparent scientific training, and questioned the degree to which Indigenous peoples should be allowed to exert control over scientific research. Some wonder whether knowledges indigenous to one locale have any usefulness outside of that limited sphere (Ellen et al. 2000: 17). These concerns suggest

that Indigenous knowledges deserve closer study and better analysis. Anthropological and Indigenous scholars are addressing these concerns by codifying the tenets of Indigenous knowledge (e.g., Cajete 2000; Sefa Die et al. 2000; Smith and Wobst 2005; Berkes 2012; Smith 2012). They are also demonstrating that, in many cases, scientific knowledges can be expanded and improved through articulations with the perspectives and substance of Indigenous knowledges.

International Perspectives

In the postcolonial era, traditional knowledges are providing more than just explanations for past practices; they are informing many of the new protocols and agreements designed to govern the protection of Indigenous natural resources, cultural knowledge, and intellectual property. Not surprisingly, the new level of respect afforded to traditional knowledges roughly parallels the increase in collaborative Indigenous archaeologies. The protection of Indigenous rights (including guaranteed access to traditional landscapes and more conscientious cultural resource management) is now a crucial area of concern in international environmental law (Ellen et al. 2000; von Lewinski 2004; Menzies 2006). Concepts of intellectual property have been extended to include oral traditions, folklore, ecological knowledge, Indigenous languages, and traditional names.

In diverse locales (e.g., forest management in India, rubber production in South America, controlled fires in the Philippines), state officials are now relying upon Indigenous peoples to use traditional knowledges to identify and prevent future environmental threats (Ellen et al. 2000). In Latin America, many Indigenous peoples are exerting local knowledges as a means of reinterpreting the past and reclaiming control of ancient landscapes. In Amazonia, Bolivia, Colombia, Mesoamerica, and elsewhere, marginalized communities are collaborating with archaeologists to reassert their identities and reframe problematic state representations of their past (Gnecco and Ayala 2011). This suggests the need for a wholesale decolonizing of knowledge while rethinking our relationships with natural phenomena (Gnecco and Ayala 2011: 34).

Efforts in some regions have been more collaborative than others. In Canada, mainstream scientists have reached out to Aboriginal knowledge-keepers and First Nations tribal leaders to develop joint strategies to address climate change, habitat loss, and other damages caused by unchecked resource extraction and modern development. Both Indigenous and non-Indigenous communities stand to benefit from efforts that encourage sustainable use of local resources. In the Aboriginal Provinces of *Nunavut* and *Nunatsiavut*, for example, governmental agencies such as the Renewable Resources Division strive to develop policies that deliberately integrate Indigenous and scientific approaches to site preservation and wildlife conservation. Traditional landscapes are recognized as potentially fragile ecosystems, but they are also seen as living homelands for Aboriginal people who can be trusted to continue their traditional lifeways (including seasonal harvests and hunting) in a responsible manner that considers the health of future generations.

In recent decades, as a direct result of increased political engagement with Indigenous communities around the world, states and institutions have devised protocols to mediate relations among Indigenous peoples and scientists. The 1991 World Archaeological Congress code of ethics, for example, unambiguously acknowledges Indigenous peoples as the originators and owners of their traditional knowledges and cultural heritage (World Archaeological Congress 1991). The United Nations' *Declaration on the Rights of Indigenous Peoples*, adopted by the General Assembly on September 13, 2007, recognizes Indigenous ownership and validates traditional practices as contributors to "sustainable and equitable development and proper management of the environment" (United Nations 2008). Articles 11 and 31 identity these rights as follows:

> *Article 11.*
> 1. Indigenous peoples have the right to practice and revitalize their cultural traditions and customs. This includes the right to maintain, protect and develop the past, present and future manifestations of their cultures, such as archaeological and historical sites, artefacts, designs, ceremonies, technologies. . .
> *Article 31.*
> 1. Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions.

The Declaration also indicates that states are expected to provide restitution in instances where traditional culture and cultural manifestations have been taken without consent (United Nations 2008).

In Oceania and in the Americas, tribal leaders and tradition-bearers are reaching out to non-Indigenous peoples (including the scientific community and state agents), offering to share traditional knowledges to ensure mutual survival (see examples in Smith and Wobst 2005; Nicholas 2010; Atalay 2012; Smith 2012). As one such example, the *Haudenosaunee* (also known as the Six Nations Iroquois, a tribal confederacy in the northeastern United States and Canada) are re-awakening the agreement known as the "Two-Row Wampum." This diplomatic tradition invites two disparate cultures to coexist, side by side, without undue interference with one another. This ideal parallels some of the current efforts to integrate scientific and Indigenous knowledge. Caution is still needed, however, since archaeological applications of Indigenous knowledge (when used to locate sensitive areas, identify material culture, or map future developments) should be conducted in ways that protect the security of traditional landscapes and lifeways and avoid further damage to the Indigenous (Fig. 3).

Future Directions

Archaeologists have much to gain from recognizing the data and philosophies preserved within Indigenous traditional knowledge. Oral traditions can preserve records of ancient landscapes, and traditional ecological knowledges can explain human interactions with those landscapes. Wisdom gained in one locale may be used to interpret a related locale or to articulate linkages among past, present, and future generations. Indigenous ways of knowing are not, however, static fossils or reinvented memories. Despite the damage (and, in some cases, outright destruction) caused to Indigenous ecosystems and cultures by European colonization, many traditional practices

Indigenous Knowledge and Traditional Knowledge, Fig. 3 Peter Jemison (Seneca), tribal Faithkeeper and member of the Haudenosaunee Standing Committee on Burial Rules and Regulations, rolling up a modern version of the traditional Two-Row Wampum belt. (Photograph by Margaret M. Bruchac)

have persisted with a surprising degree of coherence (e.g., Augustine 1997; Apffel-Marglin 2011; Smith 2012). A considerable volume of data has been retained within Indigenous languages and philosophies. Indigenous peoples have also devised modern applications for traditional knowledge in the wake of colonization, by utilizing new resources (including manufactured and recycled materials) to produce traditional tools and crafts. Indigenous knowledges that emphasize experiential awareness can be helpful in multiple settings, since they readily allow for the incorporation of new data in response to new environments.

Indigenous people are increasingly being recognized, not just as cultural informants or site monitors, but as intellectual partners in the archaeological enterprise. Dozens of Indigenous people have become professional archaeologists (some of their work can be glimpsed in Smith and Wobst 2005; Schmidt 2009; Nicholas 2010). Their collective insistence upon collaboration, consultation, and respect for cultural tradition (reinforced by new legal protocols) has altered the routine practice of archaeology among the Indigenous and promises to inspire better understandings (e.g., Schmidt 2009; Nicholas 2010; Gnecco and Ayala 2011; Atalay 2012). The insights that emerge from these collaborations will continue to inform, expand, and complicate scientific understandings of the Indigenous past and present.

Cross-References

- ▶ Community Engagement in Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Holographic Epistemology: Native Common Sense
- ▶ Indigenous Archaeologies
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation: Overview
- ▶ Sacred Sites in Indigenous Archaeology
- ▶ Stakeholders and Community Participation
- ▶ United Nations Declaration on the Rights of Indigenous Peoples (2007)

References

Apffel-Marglin, F. 2011. *Subversive spritualities: How rituals enact the world*. New York: Oxford University Press.

Atalay, S. 2012. *Community-based archæology: Research with, by, and for indigenous and local communities*. Berkeley: University of California Press.

Augustine, S.J. 1997. *Traditional Aboriginal knowledge and science versus occidental science*. Paper prepared for the Biodiversity Convention Office of Environment Canada. Available at: http://www.nativemaps.org/?q=node/1399. Accessed 7 Mar 2013.

Berkes, F. 2012. *Sacred ecology*. New York: Routledge Press.

Bruchac, M.M. 2005. Earthshapers and placemakers: Algonkian Indian stories and the landscape. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 56–80. London: Routledge Press.

Cajete, G. 2000. *Native science: Natural laws of interdependence*. Santa Fe: Clear Light Publishers.

Ellen, R., P. Parker, and A. Bicker. 2000. *Indigenous environmental knowledge and its transformations: Critical anthropological perspectives*. Amsterdam: Harwood Academic.

Gnecco, C., and P. Ayala. 2011. *Indigenous peoples and archaeology in Latin America*. Walnut Creek: Left Coast Press.

Johnson, D.M. 2007. Reflections on historical and contemporary indigenist approaches to environmental ethics in a comparative context. *Wicazo Sa Review* Fall 2007: 23–55.

Menzies, C.R. 2006. *Traditional ecological knowledge and natural resource management*. Lincoln: University of Nebraska Press.

Nicholas, G.P. 2010. *Being and becoming indigenous archaeologists*. Walnut Creek: Left Coast Press.

Nicholas, G.P., and T.D. Andrews. 1997. *At a crossroads: Archaeology and First Peoples in Canada*. Burnaby: Archaeology Press.

Schmidt, P., ed. 2009. *Postcolonial archaeologies in Africa*. Santa Fe: School for Advanced Research.

Sefa Dei, G.S., B.L. Hall, and D.G. Rosenberg. 2000. *Indigenous knowledges in global contexts: Multiple readings of our world*. Toronto/Buffalo: University of Toronto Press.

Sillar, B., and C. Fforde, eds. 2005. *Conservation, identity and ownership in indigenous archaeology*. London: Earthscan/James and James.

Smith, L.T. 2012. *Decolonizing methodologies: Research and indigenous peoples*. 2nd ed. London: Zed Books.
Smith, C., and H.M. Wobst, eds. 2005. *Indigenous archaeologies: Decolonizing theory and practice*. London: Routledge.
United Nations. 2008. Declaration on the Rights of Indigenous Peoples. Available at: http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf. Accessed 1 Mar 2013.
Vansina, J. 1985. *Oral tradition as history*. Madison: University of Wisconsin Press.
Vizenor, G. 2008. Aesthetics of survivance. In *Survivance: Narratives of Native presence*, ed. G. Vizenor, 1–23. Lincoln: University of Nebraska Press.
von Lewinski, S., ed. 2004. *Indigenous heritage and intellectual property: Genetic resources, traditional knowledge, and folklore*. The Hague/New York: Kluwer Law International.
World Archaeological Congress. 1991. World Archaeological Congress Code of Ethics. Available at: www.worldarchaeologicalcongress.org/site/about_ethi.php#code1. Accessed 30 Mar 2010.

Further Reading

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2008. *Collaboration in archaeological practice: Engaging descendant communities*. Lanham: AltaMira Press.
Denzin, N.K., Y.S. Lincoln, and L.T. Smith, eds. 2008. *Handbook of critical and indigenous methodologies*. Thousand Oaks: Sage Publications.
Dongoske, K.E., M. Aldenderfer, and K. Doehner, eds. 2000. *Working together: Native Americans and archaeologists*. Washington, DC: Society for American Archaeology.
Fixico, D. 2003. *The American Indian mind in a linear world: American Indian studies & traditional knowledge*. New York: Routledge Press.
Hays-Gilpin, K., and D.S. Whitley. 2008. *Belief in the past: Theoretical approaches to the archaeology of religion*. Walnut Creek: Left Coast Press.
McNiven, I., and L. Russell. 2005. *Appropriated pasts: Indigenous people and the colonial culture of archaeology*. Lanham: AltaMira Press.
Peck, T., E. Siegfried, and G.A. Oetelar, eds. 2003. *Indigenous people & archaeology: Proceedings of the 32nd Annual Chacmool Conference*. Calgary: The Archaeological Association of the University of Calgary.
Schmidt, P.R., and T.C. Patterson, eds. 1995. *Making alternative histories: The practice of archaeology and history in non-Western settings*. Santa Fe: School of American Research Press.
Swidler, N., K.E. Dongoske, R. Anyon, and A.S. Downer, eds. 1997. *Native Americans and archaeologists: Stepping stones to common ground*. Walnut Creek: AltaMira Press.
Watkins, J. 2000. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: AltaMira Press.

Indigenous Method and Theory in Archaeology

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State of Knowledge and Current Debates

Indigenous method and theory (IMT) in archaeology, carried out by Indigenous scholars and communities, is an act of reclaiming, revivance, and retelling, weaving Indigenous knowledge into discussions of Indigenous histories. IMT foregrounds Indigenous identities and empowers Indigenous communities, when Indigenous scholars and communities are in power and control of archaeological design and interpretations. IMT in archaeology weaves Indigenous knowledge through sacred sites, stories ancestors left on the land, and creates a richer more informed view of the Indigenous past. IMT recognizes Indigenous elders, storytellers, and community scholars as knowledge holders (Wilson 2007a, 325) that are the center of community histories, rather than informants who are outside the processes of knowledge production.

Indigenous archaeology has been described as archaeology with, for, and by, Indigenous people (Atalay 2006, 283). The differences between, with and for, and by Indigenous people are critical to Indigenous people and society in general. Not all archaeological projects with, and for, Indigenous communities, or by Indigenous archaeologists and communities are framed in IMT.

Archaeology for and with Indigenous people is a place of weaving Indigenous knowledge, oral traditions, and respect and relationality into archaeological research and discussions. Archaeology projects with and for Indigenous communities may or may not include Indigenous cultural practices and ceremonies, depending on the leadership and design of the archaeological project.

It is important to remember, however, where IMT springs from. It springs from centuries of

Indigenous ways of knowing, being, and doing; it springs from centuries long oppression, and from revival and reclamation of humanity and identity. For many Indigenous scholars who brought IMT into Western academies, it grew from powerful forms of resistance, from counter stories reviving civilized humanities from a dehumanized past. Linda Smith (1999, 4) argued: "The past our stories local and global, the present our communities, cultures, languages and social practices all may be spaces of marginalization, but they have also become spaces of resistance and hope."

Archaeology by Indigenous people is a political act (Tur et al. 2010) of reclaiming voice, sovereignty, humanities, identities, places, intellects, and spirituality. As Smith (1999) argued, reclaiming history is a critical and essential aspect of decolonization. To understand decolonization, it is imperative to understand historical and ongoing colonization. This is a starting place for anyone seeking to carry out research as ceremony framed in IMT. There is now a rich body of literature authored by Indigenous scholars, to inform our understanding of paths to decolonization, and the important differences in research and archaeology for and with Indigenous communities, and archaeology by Indigenous scholars and communities.

Archaeology framed in IMT acknowledges archaeological sites as sacred spaces (Parrish et al. 2000, 84). Land, cultural sites, and material (artifacts and ecofacts) are sacred and carry spiritual and cultural meanings (Atalay 2006, 282). In a collaborative archaeological project with the Kashaya Pomo community in California, cultural protocols were followed by archaeologists, students, and community members while working at the Metini Village site during a field school class taught by Kashaya Pomo elders and tribal scholars, as well as archaeologists from the State Park and University of California Berkeley.

Parrish et al. (2000, 84) discussed the need for an understanding of Kashaya Pomo negotiation of sacredness central to Kashaya Pomo problem solving within human and spiritual landscapes. Research by Indigenous archaeologists and communities, framed in IMT, where Indigenous people are in control of the design and discussions have been discussed as situated along paths leading to self-determination and sovereignty (Steeves 2015b, 4). It is most often, if not always, a political act of resistance and rhetorical sovereignty. It is a reclaiming and reviving of Indigenous ways of knowing, being, and doing. It is a weaving of knowledge, oral traditions, and stories on the land (archaeology sites) that Indigenizes archaeology, the academy, and education.

In academic and community scholarship, all researchers tell stories no matter what theoretical or methodological frame they choose to apply, or how they report their research findings. However, depending on the method and theory that the research is framed in, there is a great difference in the telling of stories. Indigenous scholars often present their research as storytelling; this reflects where the storytellers are in their lives (Wilson 2008, 6), "Location" "in Indigenous research, as in life, is a critical starting point" (Sinclair 2003, 122). In IMT, *Research is Ceremony* (Wilson 2008, 6) and is framed in respect, relationality, and reciprocity. In processes of resistance, resurgence, and reclamation, stories lay the foundational framework for "Indigenous sovereignty and the reclamation of material ground" (Sium and Ritskes 2013, 111). In narratives of research, Indigenous scholars framing their research through IMT most often begin a research story by sharing their place in life and in the research (Steeves 2015b; Yellowhorn 2002; Reimer 2012). In sharing details of who they are, they claim their ancestry, acknowledge their ancestors, and declare their positions as researchers and authors. They intentionally locate themselves as Indigenous people first and researchers second; this presents the ways of being, knowing, and doing that their research is based in. This allows others to be informed of relations that might exist and their research as relational and applied. In providing this background and these details, they are "identifying, defining, and describing the elements of Indigenist research" (Irabinna Rigney 1997; Martin-Booran Mirraboopa 2003, 3).

Indigenous ways of knowing, and sharing research results are very diverse. In Australia, Aboriginal people use the term "yarning"; it is a storytelling, a way of sharing information, passing

on histories and knowledge, and a way of connecting with the Nyoongah culture (Bessarab and Ng'andu 2010, 38). Yarning is an Aboriginal way of telling and sharing stories (Terszack 2008, 90). It is not a one-way process but reciprocal and mutual (Bessarab and Ng'andu 2010, 38). In working with and for Indigenous people, it is important that researchers become knowledgeable regarding Indigenous communities languages and terminology used to share knowledge. Indigenous understanding considers and links the physical, human, and sacred worlds (Institute for Aboriginal Development 2000); this is a way of knowing that is foreign to most Western researchers and epistemologies. An informed understanding of how Indigenous people view, understand, and discuss their worlds is central to research and discussions of Indigenous histories, lands, and oral traditions (Mihesuah 1998). Gegeo and Watson-Gegeo 2001 discussed applications of Indigenous epistemologies to research projects in the Solomon Islands.

> From the Kwara'ae standpoint, indigenous ways of creating knowledge are part of the kula 'point, part, place' system or mosaic of cultural knowledge that includes the whole person, family, kin group, and society (see Watson-Gegeo and White 1990). As a concept, indigenous epistemology focuses on the process through which knowledge is constructed and validated by a cultural group, and the role of that process in shaping thinking and behavior. (Gegeo and Watson-Gegeo 2001, 58)

Indigenous scholars have consistently discussed research framed within Indigenous methodologies as counter stories, and powerful forms of resistance (Brown and Strega 2005; Smith 1999, 2). Stephanie Kennedy specifically explored Indigenous archeology as a form of resistance to dominant Western science (Kennedy 2010, 5). Indigenous archaeology by Indigenous communities seeks to carry out respectful research, to restore knowledge of places that have been historically distorted, erased, and denied in anthropological knowledge production (Gnecco and Ayala 2011, 53). Indigenous methodologies create a site for the critical analysis of the intersections of Indigeneity, gender, race, colonialism, and class (Byrd 2009, 15). Angela Wilson (2004, 359) stated that Indigenous knowledge recovery is an Anticolonial process. It is a project that "gains momentum from the anguish of the loss of what was and the determined hope for what will be" (Wilson 2004, 359). It springs from centuries of "colonialism's efforts to methodologically eradicate Indigenous ways of knowing, being, and interacting with the cosmos" (Gnecco and Ayala 2011, 60). The recovery of indigenous histories works to recreate and revalue, that which has been erased, denied, and denigrated, as it measures the silence of academics (Gnecco and Ayala 2011, 25).

Margaret Kovach (2005) offers the following as an explanation of what represents an Indigenous epistemology (26):

> It includes a way of knowing that is fluid (Little Bear 2000) and experiential, derived from teaching transmitted from generation to generation by storytelling… It emerges from traditional languages emphasizing verbs, not nouns (Cajete 2000). It involves a knowing within the subconscious that is garnered through dreams and visions (Castellano 1999). It is the knowledge that is both intuitive and quiet. Indigenous ways of knowing arise with the human world, the spirit, and the inanimate entities of the echo system (Battiste and Henderson 2000). Indigenous ways of knowing encompass the spirit of collectivity, reciprocity, and respect (Wilson 2001). These ways of knowing are both cerebral and heartfelt. As the elders say, "if you have important things to say speak from the heart." (Kovach 2005, 27)

Archaeology in the Western Hemisphere (the Americas) developed and grew from Indigenous places on the land. Indigenous places have been highly contested since ships first sailed from the Eastern Hemisphere seeking new lands and all they held. Scholars often use the term, place; it is their rhetorical sovereignty, their right to discuss lands, places, and people as they choose. Indigenous as a place or identity is not essentializing. As argued by McGhee (2008, 584), it is an acknowledgment of Indigenous peoples presence on the land; it is a claiming and reclaiming, and a right of rhetorical sovereignty to discuss ancestral areas as Indigenous places. In a reply to McGhees' discussion of Indigenous archaeology, as essentialist Western and Indigenous scholars (Colwell-Chanthaphonh et al. 2010) critiqued McGhee's discussion:

> Indigenous rights are not founded on essentialist imaginings. Rather, the legacies of colonialism, sociopolitical context of scientific inquiry, and insights of traditional knowledge provide a strong foundation for collaborative and community-based archaeology projects that include Indigenous peoples. (Colwell-Chanthaphonh et al. 2010.

> Anyone who has visited more than one Indigenous community will soon realize that in spite of what acculturationists have written about the perpetually vanishing savage (a position that merely enhances the position of researcher as conservator), many Indigenous Peoples continue to exhibit, maintain and assert fundamentally different values attitudes and beliefs than our Western contemporaries. (Wilcox 2010, 225)

Wilcox addressed issues of Indigenous erasure in acknowledging Western archaeological assumptions of the perpetually vanishing savage. Western archaeological discussions have often described Indigenous communities as mysteriously disappearing from specific places or areas. Without the knowledge of contemporary Indigenous communities regarding their ancestors places on the land, communities and histories are erased, and links to the land cleaved through Eurocentic and uninformed assumptions. IMT with, by, and for Indigenous people works to re-link ancestral and descendant communities through a holistic body of knowledge and data. There may be many stories on the land (archaeology sites) that are not currently linked to a contemporary descendant communities. However, that in itself does not in any scientific or theoretical way support assumptions that entire communities mysteriously disappeared. In archaeology, we follow people's paths across places seeking to understand human movements across time and place. If we assumed that entire communities actually disappeared without leaving a trace, why would archaeologists seek to link people across time and place. People live and die in places; evidence of this is found across millions of years. It is not that entire communities just disappeared, but that we cannot find their stories on the land, for many reasons, lack of funding, lack of technology, lack of IMT, and Indigenous archaeology. In many if not all Indigenous worldviews and in IMT, respect and responsibility acknowledges Indigenous communities as having lived in, and often continuing to reside in specific places on the land in the physical and spiritual world (Rika-Heke 2010, 202).

Regarding Indigenous places, Basso discussed places in relation to people across time and space as practices as old as people and places.

> What do people make of places? The question is as old as people and places themselves as old as human attachments to portions of the earth. (Basso 1996, Xiii)

There are many Indigenous scholars across diverse fields of the academy working to reclaim and revive Indigenous knowledge, languages, and identities, to rewrite the past, present, and future. IMT is reviving and reclaiming by Indigenous people who have a first-hand experience of the impacts of colonization of their homelands, identities, and cultures. Indigenous research methodologies are those that enable and permit Indigenous researchers to be who they are while engaged actively as participants in research processes that create new knowledge and transform who they are, and where they are (Weber-Pillwax 2001, 174). IMT in archaeology brings the voices and memories of the people, to places on the land, linking ancestral knowledge to contemporary people Indigenous ways of being, doing, and knowing bring much-needed counter-discourses to a field of study known for its oversimplified and dehumanized views of the Indigenous past (LaRocque 2011, 4).

> Indigenous research is ceremony and must be respected as such. A ceremony according to Minnecunju Elder Lionel Kinunwa, is not just the period at the end of the sentence. It is the required process and preparation long before the event. It is, in Atkinson's (2002) translation, dairy, the many ways and forms, and levels of listening. It is in Martin's (2003) terminology, Way of Knowing, Way of Being, Ways of Doing, It is the knowing and respectful reinforcement that all things are related and connected. It is the voice of our ancestors that tells us when it is right and when it is not. Indigenous research is a life-changing ceremony. (Wilson 2008, 61)

Research framed in IMT is a praxis that weaves through institutional and public spaces to create social change. McGuire (2008, 3) argued that "Praxis becomes emancipatory when it advances

Indigenous Method and Theory in Archaeology, Table 1 Indigenous and Western sciences

TEK Indigenous sciences	Western science
Oral tradition	Written tradition
Holistic approach	Reductionist
Learned from observation and experience	Taught and learned: Mainly analytically
Environment as part of social and spiritual relationships	Hierarchical and compartmentalized organization
Based on cumulative, collective experience	Based on laws and theories
Mainly qualitative	Mainly quantitative
Data generated by resource users	Data collected by specialists or experts
Long time within one location	Short time-series over a large area
Integrated and applied to daily living and traditional subsistence practices	Hypothesis falsification and model

Compiled by Steeves 2015b

Indigenous Method and Theory in Archaeology, Table 2 Common ground TEK and Western science

Knowledge is always subject to modification or improvements
Empirical observations in natural settings
Pattern recognition
Verification through repetition
Inference and prediction

Compiled by Steeves 2015b

the interests of the marginalized and the oppressed against the interests of the dominant." Such social change addresses the past real-world consequences of colonial archaeology and addresses colonization in the present. Beyond a method or theory, it is drawn from a way of life, from centuries of living and being and respecting all clans, and the land.

A brief comparison of Indigenous and Western research methodologies highlights the importance of understanding the difference between the two, though there are also other methodologies and other ways of carrying out Western research that are not included here (Tables 1 and 2).

In discussing IMT, it is important to also briefly review what IMT is not. It is not researchers or academics whether Indigenous or non-Indigenous discussing Indigenous knowledge, culture, or ways of being, doing, or knowing. IMT is not Indigenous or non-Indigenous scholars discussing research through Western frames of thought. Being Indigenous does not automatically frame one's research and discussions in IMT (Tur et al. 2010). Including Indigenous knowledge or thought in a research project or paper is not IMT. It is not just about including the voices of Indigenous communities who are studied and researched; it is about applying principles of Indigenous cultural practices and ceremonies to research. Indigenous archaeology framed in IMT is focused on "finding ways to create counter-discourse that speak back to the power of colonialist and imperialist interpretations of the past" (Atalay 2006, 294); it is not simply interpreting the past.

Among Indigenous communities, a research project begins with and ends with ceremony, as Shawn Wilson (2001) so eloquently stated with prayers, dreaming, singing, and dancing for many cultural ways are woven throughout acts of respect for traditional ways of gathering knowledge. IMT is an intentional framing of research and discussions, through Indigenous ways of being, doing, and knowing, through *Research as Ceremony*. Shawn Wilson and other Indigenous scholars discuss the four bases of IMT as the 4 Rs.

Relationally- "An Indigenous paradigm comes from the fundamental belief that knowledge is relational, is shared with all creation, and therefore cannot be owned or discovered. Indigenous research methods should reflect these beliefs and the obligations they imply" (Wilson 2001).

Respect- All living things are respected and are related. In the Indigenous world, all beings have agency and equality humans, are but one member of many species with rights deserving of respect, and with the abilities of culture, language, and agency (Preston 1999, 36).

Reciprocity- If research is not done for a good reason to support or benefit our relations, we should not do it. Our focus is not first on the

research, but on what it will give to those we are working with, or for, or for a greater good (Weber-Pillwax 2001).

Responsibility- Indigenous researchers have a responsibility to all generations, past, present, and future, to carry out research in an ethical manner, respectfully as responsible for all our relations.

> Indigenous peoples' interests, knowledge, and experiences must be at the center of research methodologies and construction of knowledge about indigenous peoples. Lester-Irabinna Rigney (1999, 119). (Narungga Nation, Australia)

> Indigenous approaches to research on Indigenous issues are not meant to compete with, or replace, the Western research paradigm; rather challenge it and contribute to the body of knowledge of Indigenous peoples about themselves and for themselves, and for their own needs as people, rather than as objects of investigation. (Porsanger 2004)

For Indigenous researcher's empirical knowledge and informed understandings of oral traditions are crucial to research, as are cultural knowledge's, cultural protocols, and community guidance (Smith 1999, 15; Wilson 2008, 58). Eldon Yellowhorn (Blackfoot) highlighted the importance of cultural traditions in an *Internalist Archaeology* (Yellowhorn 2002, IV). Yellowhorn stated, "archaeological interpretations begin with a study of oral traditions, which are records of ancient history, cultural tradition motivates fieldwork" and, "appropriates the methods of archaeology to study local histories" (Yellowhorn 2002, IV).

> Roger Echo-Hawk stated:
>
> Archaeologists frequently say that the sites they excavate and the artifacts they recover can speak to us across the centuries. In oral traditions, we can hear the echoes of the actual voices of the people who made those artifacts and who were the original owners of the skeletons. As researchers explore the contribution to the history of oral traditions in Africa, Australia, and the Americas, it has become increasingly difficult to ignore arguments that historical information has been preserved through verbal means for great lengths of time. (Echo-Hawk 2000, 285)

Though not claiming to frame his discussion in Indigenous methodologies, Vine Deloria Jr. (1995) spoke clearly through Indigenous epistemologies and satirical, critical thought. His critique of archaeology in the Americas shook the field and moved the discipline toward reflective thought and new beginnings where IMT became a distinct possibility.

The impact of a colonial and Eurocentric archaeological knowledge production on Indigenous peoples has been discussed by a few archaeologists who recognize that the archaeological record used to interpret and construct the past has power in the present (McGuire 1992, 828; Smith and Wobst 2004b, 393).

> The relations amongst traditional knowledge, Native voices, and archaeological work are structured by inequalities that affect the lives and ongoing resistance of indigenous communities and emerging nations. This suggests that archaeological studies in Indian country should always be critical, confronting silences, building new approaches that are collaborative and grounded, and recovering counterfactual histories to challenge neocolonialist discourse. (Handsman 2003, 28)

Western archaeology has been discussed as an inherently political act (Jackson and Smith 2005, 329), one that often erased Indigenous humanity and agency. IMT by Indigenous scholars, and in some cases with and for Indigenous communities, is also a political act, one that re-claims Indigenous communities agency and self-determination. Indigenous or colonized communities reclaiming agency and self-determination are not just a political act; it is an important piece of healing or rehumanizing landscapes and protecting cultural and spiritual sites. Eduardo Duran (2006, 1) addresses the path of critical inquiry as one which leads to a liberation discourse, and new narratives of healing. Beyond a beginning of healing discourses, Duran reaches into the very heart of academia, and reminds us this is not just a healing for those impacted by colonial histories, critical scholarship of our own field is a path to liberating ourselves and the academy (Duran 2006, 1).

> The research we do as Indigenous people is a ceremony that allows us a raised level of consciousness and insight into our world. Let us go forward together with open minds and good hearts as we further take part in this ceremony. (Wilson 2008, 11)

Indigenous ways of telling stories may be woven metaphors linking minds, hearts, and histories to the land, and the land to the people. To understand IMT, you must first come to know the people, to understand the ongoing impacts of colonization (Tur et al. 2010), and what it is to have your history and humanity erased. Then you may begin to understand what IMT is, and where it has come from, and why it is so very pivotal to Indigenous resurgence, revival, and reclamation.

Indigenous communities and scholars who frame archaeological research in IMT, are not just gathering material evidence of their ancestors' histories on the land, they are gathering medicines for healing their communities. They are creating counter stories to archaeological narratives that disconnect them from their homelands, ancestors, and identities. Donald Julien et al. (2010, 165) discussed how the language used by Western scholars can alienate people from their lands and ancestors. Julien et al. (2010, 165) argued that language that alienates people from their ancestry and lands breaks their relationship to lands and ancestors and thus breaks their spirits as well. Julien et al. (2010), in community work at the Debert archaeological site in Eastern Canada, a project which has grown to include the Mi'kmaw community, stated:

> The Mi'kmaw set their highest priorities in understanding their culture and history, to bring healing to both the individual and the community. …. transferring cultural knowledge, language, and community histories to the next generation is critical to the health and wellbeing of individuals and communities. (Julien et al. 2010, 163)

IMT in academia is one flame of the Eighth Fire. It is one medicine in a bundle, a medicine of healing historical and intergenerational trauma. It is framed in cultural practices that are thousands of years old; it acknowledges, respects, and begins with ceremony. It weaves through stories and Indigenous ways of being, doing, and knowing held in hearts and on the land. Leanne Simpson (2008, 14) discussed an Anishinaabe prophecy, predictions which have foretold history since creation:

> The latter part of that prophecy relays that we are currently living in a time of the Seventh Fire, a time when, after a long period of colonialism and cultural loss, a new people, the Oshkimaadiziig, emerge. It is the Oshkimaadiziig whose responsibilities involve reviving our language, philosophies, political and economic traditions, our ways of knowing, and our culture. The foremost responsibility of the "new people" is to pick up those things previous generations have left behind by nurturing relationships with Elders that have not "fallen asleep." Oshkimaadiziig are responsible for decolonizing, for rebuilding our nation, and for forging new relationships with other nations by returning to original Nishnaabeg visions of peace and justice. According to the prophecy, the work of the Oshkimaadiziig determines the outcome of the Eighth Fire, an eternal fire to be lit by all humans. It is an everlasting fire of peace, but its existence depends on our actions and choices today. In order for the Eighth Fire to be lit, settler society must also choose to change their ways, to decolonize their relationship with the land and with Indigenous nations, and to join us in building a sustainable future based upon mutual recognition, justice, and respect. (Simpson 2008, 14)

IMT in archaeology, and in all research, is carried out as ceremony and is orientated to addressing issues that remain critical to Indigenous communities, healing, emancipation, self-determination, and decolonization. Indigenous research is clearly focused on directions of decolonizing, re-writing, re-claiming, reviving, and self-determination (Wilson 2007a, 330) along paths of healing. To acknowledge connections between contemporary Indigenous people and ancient ancestral landscapes and to transfer Indigenous histories to the next generation is to acknowledge and support cultural continuity and healing (Steeves 2015b). There are thousands of Indigenous communities on a global scale. Thus, there may be many variations of IMT (Smith and Wobst 2004b, 393), with similar frames of respect, relationality, responsibility, and reciprocity, woven through cultural practices and storytelling.

Indigenous archaeology, or archaeology by, with, and for Indigenous communities, has become a way of reclaiming and reviving cultural practices and Indigenous knowledge in many colonized areas of the world. Though academia and archaeology still have a long way to go to create an archaeology that acknowledges the rights of Indigenous people, and is relevant to them, there are examples of decolonization and growth within the field. Norwegian

archaeologists working among the Saami have used oral histories, myths, and legends in understanding the past from a purely Saami perspective (Chirikure et al. 2008, 6; Damm 2005). For examples of archaeological projects within IMT, see further readings.

IMT starts within Indigenous oral traditions, cultural practices, community-centered research, and ceremony. For Indigenous communities, it is one path of many along ceremonies of healing and revivance. There are many reasons why Indigenous method and theory are important to both Indigenous and non-Indigenous scholars and communities, an understanding of alternatives to Western thought regarding Indigenous histories is pivotal education and to decolonizing the academy.

"Indigenous methodologies prompt Western traditions to engage in reflexive self-study, to consider a research paradigm outside the Western tradition that offers a systematic approach to understanding the world. It calls for the non-Indigenous scholar to adjourn disbelief and, in the pause, consider alternative possibilities" (Kovach 2009, 29).

It is important to re-write Indigenous histories from an informed Indigenous perspective (Byrd 2011, xxx). An Indigenous view of the past creates a dialog which forms the basis of an empowered identity from which Indigenous people can challenge historical erasures of communities, peoples, and places (Steeves 2015a). Indigenous knowledge, cultural practices, and histories are centered in a lived experience flowing across thousands of years of memories held in the land, stories, songs, art, and ways of being, doing, and knowing. Archaeology by, with, and for Indigenous communities framed in Indigenous methodologies, and carried out through Indigenous communities cultural protocol, creates a holistic and rich view of Indigenous communities across time and place.

Cross-References

► Archaeology and Art
► Oral Tradition: Ancient Greece

References

Atalay, S. 2006. Indigenous archaeology as decolonizing practice. *American Indian Quarterly* 30: 280–310.

Atkinson, J. 2002. *Lifting the blankets*. Unpublished doctoral dissertation. Brisbane. Queensland University of Technology.

Barnhardt, R. 2005. Indigenous knowledge systems and Alaska Native ways of knowing. *Anthropology & education quarterly* 36(1):8–23.

Basso, K.H. 1996. *Wisdom sits in places: Landscape and language among the Western Apache*. Albuquerque: University of New Mexico Press.

Battiste, M., and Y. Henderson, eds. 2000. *Protecting indigenous knowledge and heritage: A global challenge*. Saskatoon: Purich Publishing LTD.

Bessarab, D., and B. Ng'andu. 2010. Yarning about yarning as a legitimate method in indigenous research. *International Journal of Critical Indigenous Studies* 3 (1): 37–50.

Brown, L.A., and S. Strega, eds. 2005. *Research as resistance: Critical, indigenous and anti-oppressive approaches*. Toronto: Canadian Scholars' Press.

Byrd, J.A. 2009. 'In the City of Blinding Lights': Indigeneity, Cultural Studies and the Errants of Colonial Nostalgia. *Cultural Studies Review* 15(2):13–28.

Cajete, G. 2000. *Native science: Natural laws of interdependence*. Santa Fe: Clear Light.

Castellano Brant, Marlene. 1999. Renewing the relationship. A perspective on the impact of the Royal Commission on aboriginal peoples. In *Aboriginal self Government of Canada*, ed. John H. Hylton. Saskatchewan: Purich Publishing, Ltd.

Chirikure, S., G. Pwiti, C. Damm, C.A. Folorunso, D.M. Hughes, C. Phillips, . . . and G. Pwiti (2008). Community involvement in archaeology and cultural heritage management: An assessment from case studies in Southern Africa and elsewhere. *Current Anthropology* 49 (3): 467–485.

Colwell-Chanthaphonh, C., T.J. Ferguson, D. Lippert, R.H. McGuire, G.P. Nicholas, J.E. Watkins, and L.J. Zimmerman. 2010. The premise and promise of indigenous archaeology. *American Antiquity* 75 (2): 228–238.

Damm, C. 2005. Archaeology, ethnohistory, and oral traditions: Approaches to the indigenous past. *Norwegian Archaeological Review* 38 (2): 73–87.

Deloria, V. 1995. *Red earth, white lies: Native Americans and the myth of scientific fact*. Golden: Fulcrum Publishing.

Duran, Eduardo. 2006. *Healing the Soulwound: Counseling with American Indians and other native peoples*. New York: Teachers College Press.

Echo-Hawk, Roger. 2000. Ancient history in the New World: Integrating oral traditions and the archaeological record in deep time. *American Antiquity* 65 (2): 267–290.

Gegeo, D.W., and K.A. Watson-Gegeo. 2001. "How we know": Kwara'ae rural villagers doing indigenous epistemology. *The Contemporary Pacific* 13: 55–88.

I

Gnecco, C., and P. Ayala. 2011. *Indigenous peoples and archaeology in Latin America*. Walnut Creek: Left Coast Press.

Handsman, R.G. 2003. *Towards archaeological histories of the Nipmuc Indian Community in the "Lost Century"* (1820–1920). A theoretical foundation for indigenous archaeologies.

Institute for Aboriginal Development. 2000. Aboriginal art and culture Center-Alice Springs. http://www.aboriginalart.com.au/culture/dreamtime.html

Irabinna Rigney, Lester. 1997. 'Internationalism of an aboriginal or Torres Strait islander anti-colonial cultural critique of research methodologies, a guide to Indigenist research methodology and its principles' In Research and Development in Higher Education, Advancing International Perspectives. Higher Education Research and Development *Society of Australia, Annual international conference proceedings* 20, 629–636.

Jackson, G., and C. Smith. 2005. Living and learning on aboriginal lands; In: Claire Smith & Hans Martin Wobst (eds) Indigenous Archaeologies: Decolonizing Theory and Practice. Routledge. pp. 328–351 (2005)

Julien, D.M., T. Bernard, and L.M. Rosenmeier. 2010. Paleo is not our word: Protecting and growing a Mi' kmaw place. In *Indigenous archaeologies. A reader on decolonization*, ed. M. Bruchac et al. Walnut Creek: Left Coast Press.

Kennedy, Stephanie M. 2010. Indigenous archaeology: Historical interpretation from an emic perspective. *Nebraska Anthropologist* paper 55. Digital Commons @ University of Nebraska-Lincoln. http://digitalcommons.unl.edu/nebanthro/55

Kovach, M. 2005. Emerging from the margins, indigenous methodologies. In *Research as resistance, critical, indigenous, and anti-oppressive approaches*, ed. Leslie Brown and Susan Strega. Toronto: Ontario, Canadian Scholars Press.

Kovach, M. 2009. *Indigenous methodologies*. Toronto: Universtiy of Toronto Press.

LaRocque, E. 2011. *When the other is me: Native resistance discourse, 1850–1990*. Winnipeg: University of Manitoba Press.

Little Bear, Leroy. 2000. Jagged worldviews colliding. In *Reclaiming indigenous voice and vision*, ed. M. Battiste. Vancouver: UBC Press.

Martin, K. 2003. *Aboriginal people, aboriginal lands and Indigenist research: A discussion of research pasts and neo-colonial research futures*. Unpublished masters thesis. Townsville, James Cook University.

Martin-Booran Mirraboopa, Karen. 2003. Ways of knowing, ways of being and ways of doing: A theoretical framework and methods for indigenous re-search and Indigenist research… voicing dissent, new talents 21C, next generation Australian studies. *Journal of Australian Studies* 76: 203–214.

McGhee, R. 2008. Aboriginalism and the problems of indigenous archaeology. *American Antiquity* 73(4): 579–597.

McGuire, Randall H. 1992. Archaeology and the First Americans. *American Anthropologist* 94(4): 816–836.

McGuire, Randall H. 2008. *Archaeology as political action*. Berkley: University of California Press.

Mihesuah, D.A., ed. 1998. *Natives and academics: Researching and writing about American Indians*. Lincoln: University of Nebraska Press.

Parrish, O., D. Murley, R. Jewett, and K. Lightfoot. 2000. The science of archaeology and the response from within native California: The archaeology and Ethnohistory of Me?tini Village in the Fort Ross State Historic Park. *Proceedings of the Society for California Archaeology* 13: 84–87.

Porsanger, J. 2004. An essay about indigenous methodology. *Nordlit* 8 (1): 105–120.

Preston, Susan M. 1999. Meaning and representation. *Landscape in the oral traditions of the Eastern James Bay Cree*. Unpublished master's thesis, University of Guelph.

Reimer, R. 2012. *The mountains and rocks are forever: Lithics and landscapes of skwxwú7mesh uxwumixw*. (Doctoral dissertation).

Rigney, Lester-Irabinna. 1999. Internationalization of an indigenous anticolonial cultural critique of research methodologies. *Wicazo SA Review, Fall* 14 (2): 109.

Rika-Heke, M. 2010. Archaeology and Indigeneity in Aotearoa/New Zealand. In *Bridging the divide: Indigenous communities and archaeology into the 21st century*, vol. 197. Walnut Creek: Left Coast Press.

Simpson, Leanne. 2008. Oshkimmadiziig, the new people. In *Lighting the eighth fire: The liberation, resurgence, and protection of Indigenous Nations*, ed. Leanne Simpson. Winnipeg: Arbeiter Ring Publishing.

Sinclair, R. 2003. Indigenous research in social work: The challenge of operationalizing worldview. *Native Social Work Journal* 5: 117–139.

Sium, A., and E. Ritskes. 2013. Speaking truth to power: Indigenous storytelling as an act of living resistance. *Decolonization, Indigeneity, Education & Society* 2(1):3.

Smith, C., and H.M. Wobst, eds. 2004a. *Indigenous archaeologies: Decolonising theory and practice*. London: Routledge.

Smith, C., and H.M. Wobst. 2004b. 21 the next step: An archaeology for social justice. In *Indigenous archaeologies: Decolonising theory and practice*, vol. 369. London: Routledge.

Smith-Tuhiwai, L.T. 1999. *Decolonizing methodologies: Research and indigenous peoples*. London: Zed books.

Steeves, P.F. 2015a. Decolonizing the past and present of the Western hemisphere (The Americas). *Archaeologies* 11 (1): 42–69.

Steeves, P.F. 2015b. *Decolonizing indigenous histories, Pleistocene archaeology sites of the Western Hemisphere*. State University of New York at Binghamton.
Terszack, M. 2008. *Orphaned by the colour of my skin: A stolen generation story*. Maleny: Verdant House.
Tur, S.U., F.R. Blanch, and C. Wilson. 2010. Developing a collaborative approach to standpoint in indigenous Australian research. *The Australian Journal of Indigenous Education* 39 (S1): 58–67.
Watson-Gegeo, K., and G. White. 1990. *Conflict discourse in Pacific societies*. Palo Alto: Stanford University Press.
Wilcox, M. 2010. Saving indigenous peoples from ourselves: Separate but equal archaeology is not scientific archaeology. *American Antiquity* 75 (2): 221–227.
Wilson, S. 2001. What is an indigenous research methodology? *Canadian Journal of Native Education* 25 (2): 175–179.
Wilson, Waziyatawin A. 2004. Indigenous knowledge recovery is indigenous empowerment. *American Indian Quarterly* 28 (3/4): 359–372.
Wilson, C.L. 2007a. Indigenous research and archaeology: Transformative practices in/with/for the Ngarrindjeri community. *Archaeologies* 3 (3): 320–334.
Wilson, C. 2007b. Ngarrindjeri experiences of repatriations: Engaging in an effective consultation process for returning old people. *Indigenous Law Bulletin* 6 (29): 16.
Wilson, S. 2008. *Research is ceremony: Indigenous research methods*. Halifax: Fernwood Publishing.
Yellowhorn, Eldon. 2002. Awakening Internalist archaeology in the aboriginal world. Unpublished PhD Dissertation. Department of Anthropology, McGill University.

Further Reading

Atalay, S. 2008. Multivocality and indigenous archaeologies. In *Evaluating multiple narratives*, 29–44. New York, NY: Springer.
Battiste, M., ed. 2000. *Reclaiming indigenous voice and vision*. Vancouver: UBC Press, University of British Columbia.
Bendremer, J.C. 2008. Hie tribe and the trowel an indigenous archaeology and the Mohegan archaeological field school. In *Collaborating at the Trowel's Edge: Teaching and Learning in Indigenous Archaeology*, ed. Jeffrey C. Bendremer and Elaine L. Thomas, vol. 2, 50. Tucson University of Arizona Press.
Bray, T.L., ed. 2001. *The future of the past: Archaeologists, native Americans, and repatriation*. New York: Taylor & Francis.
Bruchac, M., S. Hart, and H.M. Wobst, eds. 2016. *Indigenous archaeologies: A reader on decolonization*. Abingdon: Routledge.
Byrd, Jodi A. 2011. *The transit of empire: Indigenous critiques of colonialism*. Minneapolis: University of Minnesota Press.
Chilisa, Bagele. 2012. *Indigenous research methodologies*. Los Angeles: Sage.
Denzin, N.K., Y.S. Lincoln, and L.T. Smith, eds. 2008. *Handbook of critical and indigenous methodologies*. Los Angeles: Sage.
Foley, D. 2003. Indigenous epistemology and indigenous standpoint theory. *Social Alternatives* 22 (1): 44.
Gegeo, D.W., and K.A. Watson-Gegeo. 2001. "How we know": Kwara'ae rural villagers doing indigenous epistemology. *The Contemporary Pacific* 13: 55–88.
Haber, A.F. 2007. Reframing social equality within an intercultural archaeology. *World Archaeology* 39 (2): 281–297.
Isaacson, K. 2010. Archaeological reflections of a 68-year-old bushman. In *Being and becoming indigenous archaeologists*, 139. Walnut Creek: Lest Coast Press.
Kato, H. 2009. Whose archaeology?: Decolonizing archaeological perspective in Hokkaido Island. *Journal of the Graduate School of Letters* 4: 47–55.
Lydon, J., and U.Z. Rizvi, eds. 2016. *Handbook of postcolonial archaeology*. London: Routledge.
Oxenham, D. 2000. *Aboriginal terms of reference: A course paper for the indigenous studies program*. Perth: Gunada Press, Curtin Indigenous Research Centre, Curtin University.
Phillips, C., and H. Allen, eds. 2010. *Bridging the divide: Indigenous communities and archaeology into the 21st century*. Vol. 60. Walnut Creek: Left Coast Press.
Rigney, L.I. 1997. Internationalisation of an indigenous anti-colonial cultural critique of research methodologies: A guide to indigenous research methodology and its principles. *The Journal for Native American Studies, WICAZO SA Review* 14 (2, Fall edition): 109–121.
Silliman, S.W., ed. 2008. *Collaborating at the trowel's edge: teaching and learning in indigenous archaeology*. Vol. 2. University of Arizona Press.
Smith, C., and Wobst, H. M. eds. 2004. Indigenous archaeologies: Decolonising theory and practice. London: Routledge.
Solomon, M., and S. Forbes. 2010. Bridging the Divide: Indigenous Communities and Archaeology into the 21st Century. *Indigenous Archaeology* 60: 213.
Watkins, J. 2001. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: AltaMira Press.
Weber-Pillwax, C. 2001. What is Indigenous research?. *Canadian Journal of Native Education* 25(2):166.
Wingard, B., and J. Lester. 2001. *Telling our stories in ways that make us stronger*. Adelaide: Dulwich Centre Publications.
Youngblood Henderson, J.S. 2000. Ayukpachi: Empowering Aboriginal thought. In *Reclaiming Indigenous voice and vision*, ed. M. Battiste, 248–278. Vancouver: UBC Press, University of British Columbia.

Indigenous Peoples and the Challenges of Genetic/DNA Studies

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Introduction

All human societies have developed ways of explaining the natural world around them, resulting in different belief systems that also provide a framework for sociopolitical structures and physical and spiritual connections. Archaeology examines material evidence of the past, and archaeological methods have arisen through theoretical and technological science-based endeavor. Genetic analyses probe the essential molecules of organisms that are templates for life, presenting personal and societal challenges. Indigenous knowledge includes scientific knowledge acquired by experience and application to the needs and circumstances of communities that are not necessarily grounded in the ways of western science. Indigenous peoples have lived through recent histories of colonization while retaining much of their culture and belief systems which is a tribute to resilience, survival, and an indication that western-based science should not and does not always replace those belief systems. Indigenous perspectives from the living descendants of the first Australians serve to exemplify the contrast between traditional belief systems and the challenges presented by western science. The issues that arise are similar to those experienced by other indigenous peoples but also take on specific meaning for regional groups depending on their experience and exposure to the dominant culture of the colonizers.

The western scientific method of explaining the natural world is to propose ideas or hypotheses and test them by the acquisition of evidence that can be analyzed and evaluated. Using the methodologies of the time, data emerge, accumulate, and provide material for intellectual interpretations that in turn gives rise to new or revised hypotheses. These dynamic principles have become the hallmark of *western science*. Technological advances have arisen from scientific endeavor and, in turn, provide tools for the ongoing process of investigation. Technologies that allow biological investigation of living and past organisms have developed very quickly over the last 300 years. The scientific basis of *ancestry-related genetics research* is embedded in an evolutionary paradigm that assumes that all living organisms evolved over millions of years. That paradigm in itself is based on scientific evidence of the history of our planet derived from many disciplines, especially geology, paleontology, and chronology. Gene technology improvements have accelerated over the last 50 years, allowing detailed description of the essential building blocks of life, DNA, in living organisms and the genetic diversity that abounds within and between species. However, just how the vast, accumulating databases from DNA studies help us to know biological systems and how they react with environmental influences in time and space is only partly understood. The applications of genetic research may be directed at conservation biology, veterinary science, evolutionary biology, developments in primary industry, and, in the case of human genetic studies, forensic investigation, the probing of ancestral relationships and in medical research.

An indigenous perspective of the Australian past is drawn from a tradition of deep oral history and spiritual connection to country, language, traditional ties, and social structure. Among Aboriginal Australians, there is a commonly held view that ancestors originated in Australia; therefore, any alternative explanation of origin, including views held by different religions, presents a conflict. However, there is a growing acknowledgement and appreciation of western science within

the Australian Aboriginal community. The imposition of western scientific methodology provided different tools, so that a plethora of ethnographies and linguistic and archaeological studies eventuated that demanded evidence of human habitation and forced dates upon the story, not required for indigenous concepts of origin. Over the last 200 years, accumulated scientific information shows strong support for a very long human presence in Australia but not of an in situ origin, recognizing that Australian Aboriginal peoples are one of the oldest living cultures on earth outside sub-Saharan Africa. Genetic studies support archaeological evidence, demonstrating that anatomically modern humans were living in Australia, the world's largest island continent, while Neanderthals and ancient Asian peoples were in Europe, Asia, and islands to the north. Within the social milieu of Australia today, many Aboriginal and Torres Strait Islander people enjoy their heritage and reconcile it with knowledge acquired through science, while others find it difficult.

Over several decades, scholars have studied skeletons of Australian Aborigines and developed theories that have tested models of human evolution and at the same time created confusion for many indigenous people. In several instances, the skeletal remains of the Australian Aboriginal people have been at the center of the human evolutionary debate. Biological data collected from skeletal remains are deemed important in linking anatomically modern humans (AMH) to *Homo* lineages of the distant past and understanding how ancient peoples were dispersed throughout the globe. In more recent times, DNA analyses on both the living and the dead have also been used to inform us of the human evolutionary story, and this development has presented additional challenges. These DNA studies are for the most part controlled by western-based research. The technology that enables these studies has accelerated the accumulation of genetic data about skeletal material and living humans that impact on the lives of indigenous peoples who may not be ready to see beyond the perceived risks, to the benefits that may flow.

Are these contrasting approaches reconcilable? This entry reflects on the contribution made by science-based research about skeletal material from Australian Aboriginal people as well as DNA studies from the living and the insights that have been gained from the collected data. Importantly, the discussion includes an indigenous perspective that explores the understanding held by living Aboriginal people regarding their ancestors from a geographical region in southeastern Australia (Fig. 1). By so doing, we obtain a guide to an indigenous perception of the importance that these data hold for people. A particular concern is to address the challenges that genetic research has for Australian indigenous peoples in the context of multidisciplinary investigations of past peoples, their relationship with their ancestors and with contemporaneous neighboring groups, and their place among other people of the world. It is an area needing the input of Aboriginal and Torres Strait Islander Australians, and it is timely for these challenges to be discussed appropriately.

Definition

Indigenous peoples are those deemed to be the earliest (first) inhabitants of a geographic region and in the current global context, before the intrusion of recent incoming peoples (for Australia 1788).

Archaeology endeavors to recover the material remains of past and present populations and study and interpret the remains, the activities, and the cultural practices that relate to the people who were responsible for the items and/or belief systems.

Genetic/DNA studies examine the molecular structure of deoxyribonucleic acid (DNA), the molecule that provides a template for life (cross-reference). DNA is inherited over generations, for an individual from both parents (nuclear DNA) and also maternally (mitochondrial DNA). Studies of variation and patterns in DNA may be used to explore questions of past and living populations.

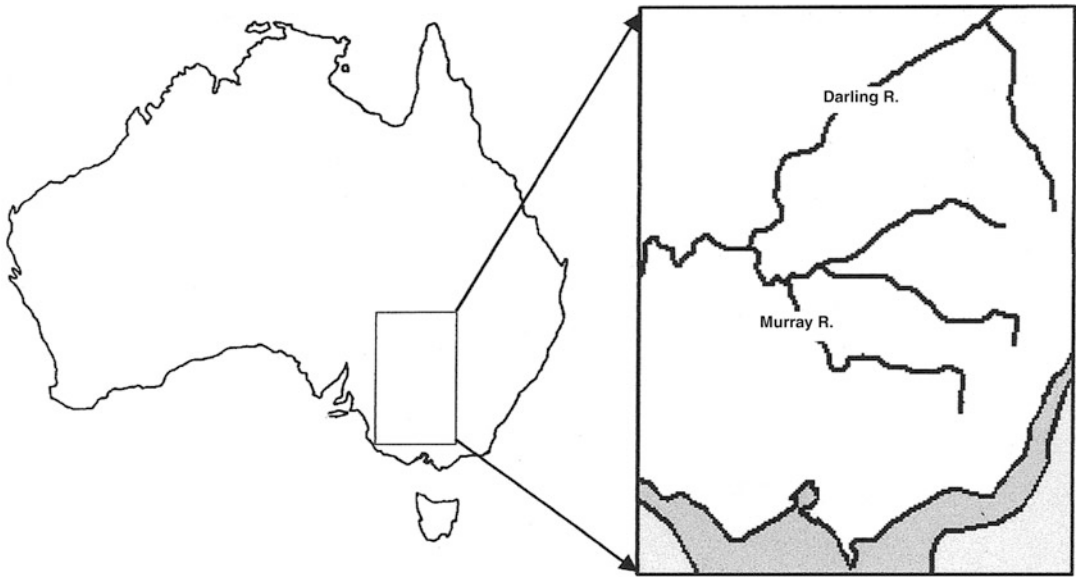

Indigenous Peoples and the Challenges of Genetic/DNA Studies, Fig. 1 The enlarged area shows the Murray-Darling region of southeastern Australia discussed in the text. Aboriginal Australians have been involved with western scientists in research that includes genetic, anthropological, archaeological, and linguistic studies. Details of those studies and many others from the Australian continent can be accessed through the references provided

Historical Background

Australia's archaeological record from many studies (see, e.g., Bowler et al. 1970; O'Connell and Allen 2004) set the scene for population genetics in the 1980s by showing the richness and diversity of the continent's habitation history. Discovered and studied skeletal material shows variation in morphology ranging from extremes of ruggedness to comparative "gracility" that has added to the debate about origins, namely, whether the extremes represent descent from different ancestors or whether they simply fall within the range of normal variation. Indigenous Australians, including indigenous archaeologists, also recognize the physical variation between peoples and are aware that morphological features of some Australian Aboriginal cranial material have attracted scholars from both sides of the academic divide. While understanding the two models that have been hotly debated for the greater part of the last 30 years or more, some indigenous scholars and respected Elders have come to hold the view that by using whatever technical tools available, benefit flows to indigenous people by helping nonindigenous people to understand the history, richness, and essence of "indigeneity." For Aboriginal and Torres Strait Islanders, the notion of ancestors coming from somewhere over the sea is not so removed from that derived from western science. How people got to Australia is one of the greatest journeys about men, women, and children of the ancient past venturing into new lands. Respect for both the traditional and contemporary views can coexist, so that an indigenous person can believe that use of techniques such as DNA analysis is of value and see it as a useful gift of the modern world. So in Australia today, indigenous opinions vary, some believing only that they originated in Australia while others think that their world is here in Australia and also believe in descent from a hominid cradle in Africa. In many ways, contemporary Australian Aboriginal society has been brought to life through these works, and DNA studies complement and enrich the continuing story. It will be through further research, including genetic studies, that the journey of Aboriginal Australians to the continent will be understood and hence contribute to the greater story of hominid movement around the globe.

The foundations for human ancestry-related genetic analyses were derived from population studies in many other species that demonstrated the remarkable heritability of genetic material and, once the structure of DNA became known, established sound methodologies for studying diversity within and between species. The earliest genetic evidence of the genus *Homo* (Cann et al. 1987) and many studies that followed supports the idea that humans evolved in Africa and spread throughout Eurasia before dispersing into all other parts of the populated world. Recent genetic evidence confirms previous work that supports the contention that Aboriginal Australians of today descend from the earliest humans to occupy Australia and therefore represent one of the oldest continuous populations outside Africa (van Holst Pellekaan 2011). The timing for human dispersals remains contentious. Genetic studies that include Aboriginal Australians are not representative of the whole continent but are valuable because they confirm the presence of very ancient Australian maternal lineages, some of which have ancestral connections with people from Papua New Guinea and others are Australian specific indicating that Australia was settled very early in the diasporation of modern humans (van Holst Pellekaan et al. 2010; van Holst Pellekaan 2011). Genetic signatures indicate that people may have entered at different parts of the northern shores around similar times, moved on, and then underwent a period of relative genetic isolation when sea levels rose. Importantly, some of the participants in these genetic studies belong to the Darling River region, part of a well-studied area that is useful to consider as an interface between western science and indigenous involvement, which has increased significantly in heritage management over the last two decades.

A Regional Study Area Example from Australia

By examining the experiences of a well-studied geographic region encompassing present-day northwest Victoria, western NSW, and South Australia (see Fig. 1), the impact of western science on the living descendants of the first Australians serves to illustrate how belief systems can accommodate different ways of explaining the world. The region is important, firstly, because early exploration of Australia resulted in valuable written observation and ethnographic records exemplified in Blandowski's work of 1841 (Allen 2010); secondly, archaeology has revealed and dated many sites (Ross 1981; Pardoe 1995; Grist 1995); and thirdly, human skeletal morphology and *genetic studies* have included participation from strong family lineage members (Pardoe 1995: 697; van Holst Pellekaan et al. 2010). These studies have served to demonstrate that the region was rich in resources during the Pleistocene and into the Holocene supporting many inhabitants. Soon after European colonization, around 1850, the occupants were from many language groups in the area whose descendants now identify as, for example, the Nyeri-Nyeri, Yitha-Yitha, Wemba-Wemba, Mutti-Mutti, Letyi-Letyi, Maraura or southern dialect of Paakintji, and linguistically more distantly related Nyemba. Hercus (2010) names three distinguishable language subgroups in the country around the Murray-Darling junction: the Kulin languages of Victoria, the Murray River languages, and the Paakintji or Darling River languages within which many related dialects have been identified, despite the losses resulting from colonization.

Explorers' observations from the 1830s (see also Hope 1998 and references therein) provided general observational reports about inhabitants of the broad region. Perhaps one of the most informative is the 1841 illustrated narrative by William Blandowski, some of which is recently republished (Allen 2010) and highly valued among people of the area. Reproductions of Blandowski's illustrations provide an extensive visual description of people, customs, and lifestyles. Blandowski showed the presence of fully developed hunter/gatherer societies with well-established boundaries between neighbors. It is important to understand that while specific names of Aboriginal people pictured are usually unknown, their regional and, in some cases, specific language affiliation (e.g., Nyeri-Nyeri) are acknowledged. For descendants of these people, this provides a personal link (Dugay-Grist 2010). For the Nyeri-Nyeri descendants who retain stories of named old people that have been handed

down over 200 years, a link between traditional stories and the present is strengthened, connecting to land, in turn to other country and their people. Despite the colonization experience, these links contribute to the conduct/management of lives today.

Archaeological richness abounds in the area along and to the east of the Darling River including sites at Lake Mungo and within the broader Willandra World Heritage Area. Dozens of scholars and indigenous people have been involved in working together after the discovery of Lake Mungo burials that have been variably estimated to be 40,000–50,000 years (Bowler et al. 2003) and ~62,000 years old (Thorne et al. 1999) and which include the oldest known cremation in the world. Skeletal material shows morphological variation and there is evidence of changing resource management as the ephemeral lake system, once a rich and wet environment became more arid (Hope 1981). As in other parts of the world, changing conditions during the Pleistocene influenced the rate of population growth, also likely to have varied across the Australian continent (O'Connell and Allen 2004). At the south of the Murray River in northwest Victoria, over almost a quarter of a century, substantial mapping, protection, and recording of important sites within the region specified have contributed to our overall understanding of the human occupation within Australia and furthered our understanding of the journey to Australia by the Australian Aboriginal people (Pardoe 2006). Within the region identified, there are Holocene sites and others within a few thousand years of the terminal Pleistocene.

DNA from living Aboriginal Australians from the Darling River country has contributed greatly to knowledge of genetic diversity in Australia (van Holst Pellekaan et al. 2010) complementing this already powerful background of a Pleistocene presence in the Darling River area from archaeology. Participant families from the Paakintji, Nyemba, and Mutthi-Mutthi language clusters contributed DNA samples that have been extensively studied for maternal ancestry (mitochondrial/mtDNA) and genome diversity (van Holst Pellekaan et al. 2010; McEvoy et al. 2010). The results provide genetic evidence of maternal ancestry that are strong signatures of the past likely to represent descent from early lineages in Australia who made their way into the region, further diversity being generated into branches of a regional "tree." Direct maternal lineages shown by mtDNA are called "haplotypes," and where they show shared characteristics demonstrating common ancestry further back in time, they are called "haplogroups," more clearly thought of as "superfamilies." In the region described in this entry, these haplogroups/superfamilies are called M42a, S1a, P4b, and some that are not easily defined without representation from a broader area. It is suggested that at least eleven maternal lineages from mt haplogroup P4b descend from founders in the Darling region, reflecting an ancient local presence and are distinct from other P haplogroups in northern Australia and New Guinea. Most of these lineages are from several Paakintji-related language groups, and one haplotype (14) is thought to have been from the Wangkumara language group, traditionally located considerably further to the northwest. Cautiously taking all dating methods into account, even a conservative estimate supports an ancestral presence for ~25,000–30,000 years. M42a is very strong and includes representatives from both Nyemba, Gurnu, and possibly western Wiradjiri peoples, and ancient S1a is part of a superfamily seen in southern Paakintji, Tasmania, central and northern Australia (van Holst Pellekaan et al. 2010; van Holst Pellekaan 2011). Anecdotally supported, there are likely to be members of this lineage in South Australia but participation has not yet occurred.

A more extensive study using some of the Darling River samples examined variation across the complete biparentally inherited genome (McEvoy et al. 2010). These data support a model of some connection with people of Papua New Guinea but are harder to interpret locally because of the complexities of biparental inheritance and post-colonization mixing with Europeans. The value of these data for future

disease-associated studies is yet to be appreciated fully because the data sets need to be explored in many ways along with phenotypic information and with other sample groups if they become available. In summary, the mtDNA studies from the Darling River region show how valuable they are for exploring the relationships between Aboriginal people and the dispersal of peoples within Australia, and if genetic data from other Australian regions, especially of near neighbors, were to become available, another contribution can be made to the story of the past.

Key Issues/Current Debates

- *One legacy of the past* is an entrenched perception for many Aboriginal Australians that western scientists are intent on showing a hierarchy of peoples where indigenous groups are at the bottom. The effort of many researchers over recent decades has been to show that this attitude of the past does not drive research today and is neither accurate nor useful, and yet the perception persists. Unhelpfully, the presentation of the Human Genome Diversity Project (HGDP) to indigenous Australians in 1997 perpetuated this perception and that of the notion that indigenous people are "vanishing" peoples. It is so well remembered today that the experience and publicity that it generated is frequently raised and has set back the efforts of many Australian scientists who have worked hard with Aboriginal organizations and individuals to present the benefits of genetic research, to involve participants in projects and to deal together with the negative concerns.
- *Uneven responses from Aboriginal and Torres Strait Islander peoples*. Aboriginal people have been involved with professional organizations such as the Australian Institute of Aboriginal and Torres Strait Islander Studies and the Australian Archaeological Association in the development of guidelines for ethical conduct in research for some decades (AAA 2004; AIATSIS 2011). In the case of genetic research, response is also uneven. The value of work already done is not disputed by the Aboriginal people involved or seeking inclusion, and there are a growing number of indigenous groups in Australia making use of DNA and attempting to use this data to better understand their ethos and how they are placed within a global context.

  > It is the view of my people that we are now in a golden age with technology and as such we enjoy, appreciate and employ people to carry out studies in consultation with us regarding our heritage. (Dugay-Grist, *pers.comm.*)

However, there is still resistance to genetic research by others, many of whom are reluctant to take the opportunity to engage in dialogue. If this resistance persists, the extra richness contributed to history by western science may never reach many of those to whom it is bequeathed by ancestors. Presently many Aboriginal societies of Australia are lacking knowledge of the views and studies of academia relating to their ethos.

- *Ancestry-focused genetic research* may be seen as a threat to traditional belief systems, and it must be acknowledged that for all peoples, contrasts between science and religion present challenges. In Australia, these conflicts began with the impositions that included the conversion to other religions during colonization. In practice, many Aboriginal Australians show an ability to accommodate their sense of creation by ancestral beings in the natural world, known as the Dreaming, scientific knowledge, and spiritual experiences into their belief system. Conflict of this nature has not arisen in many research projects where scientific evidence is used to reinforce and emphasize the ancient history of Aboriginal people in Australia.
- *Is ancestry-related genetics separate from genetics for health*? Not essentially, because although the focus of studies may be centered around specific questions, the data that are generated from DNA studies can be interrogated for separate questions. This issue has become more relevant as complete genome studies become available. Thus, the raw data

from a study such as that by McEvoy et al. (2010) confirms deep ancestral history and connection with other peoples from Papua New Guinea, but with further work, the results of the study should also be useful for exploring genetic variation in regions of the genome relevant to health and well-being. Aboriginal Australian people are not being *singled* out in genetics research but are being *left* out of medical epidemiological studies, and this may constitute another form of disadvantage. Until we understand the extent of genetic diversity in all populations, we will not know if there are specific variations in the genomes, resulting from a long period of adaptation to conditions and lifestyle that we need to understand for relevance to health. Since colonization, a different lifestyle was foisted on people, diet, and activity, and social circumstances changed dramatically. Both human settlers and introduced animals brought different pathogenic organisms, the adverse effects of which were influenced by social degradation and disadvantage. Fundamental understanding of genetic variation, ancestral and present, is a baseline step to working out details of cellular mechanisms, influenced by aspects of the social and physical environment that in turn influence wellness and illness.

- *Identity*, *rights*, *and connectedness*. For some, there is a fear that genetic research might produce results that *erode identity*, especially where colonization has imposed separation of families, mixed partnerships, and forced relocation. There is concern for some that native title claims might be threatened by genetic research (not part of the criteria for claimants). The inclusion of admixture estimates in published reports has raised comments from several critics, who again raise the issue of a potential return to classification of people based on blood quotient or genetic quotient estimates. A paucity of indigenous control or involvement in genetic projects that tend to be proposed by scientists from western style institutions is one reason why lack of accurate information tends to exacerbate these concerns. The long-term *custody* of samples, data, and confidential information in relation to DNA studies requires resolution.

Challenges for Western Scientists

- These include lack of experience and understanding of indigenous issues on the part of researchers trained strictly in science subjects that do not include social perspectives, and difficulty in explaining complexities of DNA, inheritance patterns, and technical and analytical methods. There is a need to report results in a culturally sensitive manner that does not compromise accuracy. Reporting may not give results that "suit" expectations. For example, skeletal DNA may be studied at the request of communities who are wondering if the remains can be shown to be closely related or ancestral remains. A potential conflict of interest can be avoided if the community/families understand what sort of outcome might be expected and realize that negative or "non-matches" do not necessarily exclude relationships that are generated nonbiologically, highlighting the need for clear explanation before projects are undertaken.
- Western scientists are also working in a research environment that requires success in funding submissions to cover costs of research and time frames that do not always allow for lengthy delays. Thus, Aboriginal people who become involved in research projects also have a responsibility to respond to requests and agreed tasks in a timely manner if research is supported. Lack of or negative response from indigenous organizations who act as "gatekeepers" does not always equate with wishes of participants and may result in loss of hard-earned funding.
- *Data sharing*. The secondary use of data that is generated from projects goes beyond the immediate published reports that emanate from discrete projects. The expectation within the scientific and academic communities that results be made available to other legitimate researchers has resulted in large databases that are accessible also to the public. There are strong arguments against this policy from many quarters and the issue is not resolved.

International Perspectives

Indigenous peoples in all continents, with familiar experiences of colonization by the now dominant "others," have been included in archaeological and genetic studies, enriching the story of human dispersal. Many of the issues that are raised by Aboriginal Australians have parallels elsewhere, and there are similarly uneven responses to research. Two contrasting cases from the north American continent were addressed by McInnes (2011) describing the positive experiences of one study that investigates cardiovascular conditions in a Canadian First Nations community who have played an active role in developing the research. Canadian guidelines for researchers are extensive and freely available as models for ethical conduct in any context, stressing respect, partnerships, and collaboration. Even with good intentions on the part of researchers, projects can founder as in the case of the Havasupai v. Arizona State University (McInnes 2011) where original consent was broad, apparently including the study of causes of "behavioral/medical" conditions, but it would seem that discussions with communities centered on diabetes research which became the part well understood. When other projects used the same samples, the community felt wronged, stigmatized, and offended. This unfortunate situation resulted in a well-intended research project foundering and the institution taken to court by the indigenous community.

Future Directions

- Researchers need to *understand the concerns of indigenous peoples*, acknowledge the hurts of the past, take time to study their culture, show respect for indigenous knowledge, and refrain from inappropriate language such as telling them that they will "vanish." We are all a product of mixed ancestry through different pathways. Indigenous Australians, like other indigenous populations, are deeply spiritual people who hold on to their creation stories and believe that much of their landscape is due to good and evil events of great import. DNA studies can easily fit into both the spiritual and everyday part of indigenous people's lives. Within most cultures, there is nothing that excludes such studies as long as it is done in consultation with those peoples and respect is shown for the wishes that may arise.
- Successful strategies are *preparedness to engage personally* with communities by close contact throughout planning and implementation of projects, where possible including indigenous personnel in the team. Building trusting relationships with clearly understood rights and responsibilities for both researchers and indigenous participants is essential. It is abundantly clear that, for consultation and negotiation to succeed, researchers need to demonstrate willingness and ability to meet with and engage Aboriginal people and organizations frequently, in their own place, on their own terms, and with appropriate explanatory documents. In turn, reciprocal respect from Aboriginal people should include honoring arranged consultations and responses to researchers in a timely manner.
- *Appropriate explanations* to outline the project, benefits, and risks are more successful if researchers enlist the assistance of indigenous people in the development of documents, diagrams, and dissemination of results. Information that states clearly the intention and possible outcomes of the research needs to be available in language suited to the needs of people with different education experiences, as well as conforming to the expectations and demands of the law and institutional and regional ethics committees. This may require sets of information at different levels of language that at the same time give the essential accurate information, and it may mean frequent repetition of verbal explanations. It is a long-term commitment, as ongoing progress reports to the communities and individual participants are necessary to maintain trust between parties.

Genetic heritage and belongingness: The history written in our genes tells us about immediate genealogies and also distant relationships that are far deeper than those defined by shared

cultures, language, or local community. Genetic diversity reflects a great time depth because it is not generated as quickly as language and cultural diversity, yet our sense of "belongingness" identifies with these more recently acquired attributes. It is not necessary to allow concerns about global origins obscure the value of exploring indigenous connections within Australia. Surely these are of interest to people, for whom remembered stories about connections with neighbors may be explored with DNA technology. Aboriginal Australians will be enriched if they locate more of the ancestral remains in institutions throughout the world and in the Australian landscape in conjunction with the relevant Aboriginal community to appreciate the value of the human evolutionary story that complements the connection to land.

The human colonisation of Australia stands as an ever unfolding global saga. It provides the virtual bookend to the world's greatest migration story, a story that illuminates the very nature of what it means to be human. In that context, for myself of latter-day European descent, it constantly poses that challenging question "Who am I" in this strange land. The answer to that question can only be sought by placing my own ancestral origins in the total context of that mega-migration event that changed the face of Australia some 50–60,000 years ago.

Jim Bowler (*pers. comm*. July 2008).

Cross-References

- ▶ Australia: Indigenous Cultural Property Return
- ▶ Australia's Archaeological Heritage
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ First Australians: Origins
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Stakeholders and Community Participation

References

AIATSIS. 2011. AIATSIS Research Ethics Committee Charter. Available at: http://www.aiatsis.gov.au/research/ethics.html (accessed 10 January 2012).

Allen, H., ed. 2010. *Australia. William Blandowski's illustrated encyclopaedia of Aboriginal Australia*. Canberra: Aboriginal Studies Press.

Australian Archaeological Association Inc. (AAA). 2004. Code of Ethics. Available at: http://www.australianarchaeologicalassociation.com.au/ethics#indigenous (accessed 10 January 2012).

Bowler, J.M., R. Jones, H. Allen, and A.G. Thorne. 1970. Pleistocene human remains from Australia: A living site and human cremation from Lake Mungo, western New South Wales. *World Archaeology* 2: 39–60.

Bowler, J.M., H. Johnston, J.M. Olley, J.R. Prescott, R.G. Roberts, W. Shawcross, and N.A. Spooner. 2003. New ages for human occupation and climatic change at Lake Mungo, Australia. *Nature* 421: 837–840.

Cann, R.L., M. Stoneking, and A. Wilson. 1987. Mitochondrial DNA and human evolution. *Nature* 325: 31–61.

Dugay-Grist, M. 2010. Time separates people, knowledge binds people. In *Australia. William Blandowski's illustrated encyclopaedia of Aboriginal Australia*, ed. H. Allen, 1–2. Canberra: Aboriginal Studies Press.

Grist, M.J. 1995. *An archaeological investigation into the "no stone saga" of Northwest Victoria: A study of the Berribee quarries in the landscape*. Unpublished Honours dissertation, Australian National University Canberra.

Hercus, L. 2010. Aboriginal people and languages of the Murray in the 1850s. In *Australia. William Blandowski's illustrated encyclopaedia of Aboriginal Australia*, ed. H. Allen, 169–173. Canberra: Aboriginal Studies Press.

Hope, J., ed. 1981. *Darling surveys 1*. Occasional Papers in Prehistory 3. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University.

Hope, J. 1998. *Lake Victoria: Finding the balance.* Cultural Heritage Report. Background Report 1 Lake Victoria EIS. Canberra: Murray-Darling Basin Commission.

McEvoy, B.M., J.M. Lind, E.T. Wang, R.K. Moyzis, P.-M. Visscher, S.M. Van Holst Pellekaan, and A.N. Wilton. 2010. Whole-genome genetic diversity in a sample of Australians with deep Aboriginal ancestry. *American Journal of Human Genetics* 87: 297–305.

McInnes, R. 2011. Culture: The silent language geneticists must learn – Genetic research with indigenous populations. 2010 presidential address. *American Journal of Human Genetics* 88: 254–261.
O'Connell, J.F., and J. Allen. 2004. Dating the colonization of Sahul (Pleistocene Australia-New Guinea): A review of recent research. *Journal of Archaeological Science* 31: 835–853.
Pardoe, C. 1995. Riverine biological and cultural evolution in southeastern Australia. *Antiquity* 69 (265): 696–713.
Pardoe, C. 2006. Becoming Australian: Evolutionary processes and biological variation from ancient to modern times. *Before Farming* [online version] 1: article 4.
Ross, A. 1981. Holocene environments and prehistoric site patterning in the Victorian Mallee. *Archaeology in Oceania* 16 (3): 145–155.
Thorne, A.G., R. Grun, G. Mortimer, N.A. Spooner, J.J. Simpson, M. McCulloch, L. Taylor, and D. Curnoe. 1999. Australia's oldest remains: Age of Lake Mungo 3 skeleton. *Journal of Human Evolution* 36 (6): 591–612.
Van Holst Pellekaan, S. 2011. Genetic evidence for the colonization of Australia, Quaternary International. https://doi.org/10.1016/j.quaint.2011.04.014. (accessed 25 November 2011).
Van Holst Pellekaan, S., P.Y. Liu, and A. Wilton. 2010. Genetic heritage in the Darling River Aboriginal peoples captures ancient presence and post-contact survival. *Before Farming* 4: article 1.

Further Reading

Canadian Institutes of Health Research. 2007. CIHR guidelines for health research involving Aboriginal people. Available at: http://www.cihr-irsc.gc.ca/e/29134.html
Eyre, E.J. 1840–41. Journals of expeditions of discovery into Central Australia. Available at: http://freeread.com.au/ebooks/e00048.html (accessed 9 January 2012).
Indigenous Peoples Council On Biocolonialism. n.d. Available at: http://www.ipcb.org/ (accessed 30 October 2010).
Jacobs, B., J. Roffenbender, J. Collmann, K. Cherry, L.L. Bitsoi, K. Bassett, and C.H. Evans Jr. 2010. Bridging the divide between genomic science and indigenous peoples. *Journal of Law, Medicine and Ethics* 38: 684–696.
Mitchell, T. 1839. *Three expeditions into the interior of eastern Australia*. London: T. & W. Boone. Available at: http://freeread.com.au/ebooks/e00035.html (accessed 9 January 2012).
Mello, M.M., and L.E. Wolf. 2010. The Havasupai Indian tribe case – Lessons for research involving stored biological samples. *New England Journal of Medicine* 363 (3): 204–207.
Sturt, C. 1833/1999. *Two expeditions into the interior of southern Australia*. (First published Smith, Elder & Co.; first edition by Corkwood Press, North Adelaide). Available at: http://freeread.com.au/ebooks/e00058.html (accessed 9 January 2012).

Indigenous Peoples, Working with and for

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Introduction

It is a universally acknowledged fact that archaeology has a very deep colonial heritage, especially in the former colonized regions of the world (Shepherd 2002; Watkins 2005; Atalay 2006; Smith and Jackson 2006; Schmidt 2009). Indeed, the roots of archaeology as a discipline can be traced to nineteenth-century Europe where the emerging middle classes got fascinated with their past (Trigger 1984). When the colonial project escalated from the nineteenth century resulting in the colonization of most of the world by European powers, European men and women got enchanted with the history and past of the colonized (Pwiti and Ndoro 1999). In the case of Africa, it was only a few colonial officials and peripatetic scholars who were involved with the study of the past. As with other regions such as North America and Australasia, this early development of archaeology had little to do with the interests of indigenous people. The information generated was often used to control and better govern the colonies as well as provide some entertainment and amusement for the colonizers (Chirikure and Pwiti 2008). Clearly, in colonial times, archaeology was hardly conducted for indigenous peoples.

A comparative study of the archaeology that was practiced during the colonial times, irrespective of geographical location in the world, exposes cadastral points that map well into Bruce Trigger's colonialist archaeology (Garlake 1973; Trigger 1984). The discipline was practiced by the colonizers and their dependants with little meaningful involvement of the local people, who were thought to be uninterested in their past. An archival study of early excavations carried out in different parts of Africa has

unearthed photographs which captured identical moments in the history of our discipline in colonial Africa. Most Africans were employed as laborers in the excavation of prominent sites such as Great Zimbabwe (Caton-Thompson 1931) and Mapungubwe (Fouche 1937) as well as some Swahili towns of east Africa. The same can be said of West and North Africa. The National Museums and Monuments of Rhodesia, a body tasked with the administration of archaeology, only employed blacks as assistants for most of the twentieth century. Black archaeologists only joined the organization at independence in 1980.

Local people were only valued for their labor and historical knowledge such that their names did not even feature in site reports (Shepherd 2002; Chirikure et al. 2010). For example, in his Great Zimbabwe excavation report, Robinson (1961) states that he was assisted by six Africans, of which the most intelligent was a Rozwi one. Because their names were not recorded, we do not know them, but the resulting publications have immortalized Robinson's name. To make matters worse, the same archaeologists were "knowledge parasites" for they depended on locals for interpretive leads. In fact, Caton-Thompson (1931) made it clear that it was impossible to interpret Great Zimbabwe as an outsider without understanding the African value system, but luckily for her, she got most of the inside information from the unsung heroes – her laborers. These indigenous people were not considered as consumers of the past, neither were they seen as knowledge producers – they were just mere assistants. This lack of meaningful involvement has created a fundamental problem that haunts archaeology to this day – that is, the failure to attract indigenous archaeologists. In fact, most post-colonial archaeologies are all meant to redress this (see Schmidt 2009). Atalay (2006) has identified the same problem in the United States where Native Americans seem to lack an interest in the subject.

Bureaucratic structures were also created to administer the protection of the past, its study, and display. Legislations were established that institutionalized archaeology as a discipline and also established museums as administrative centers. By 1969, South Africa had improved earlier antiquities legislations and promulgated the 1969 National Monuments Act, which also led to the establishment of the National Monuments Council. Other countries such as Rhodesia and Botswana also followed and established similar laws. The colonial legislation had no place for indigenous communities or their values. In fact, the laws criminalized the use of archaeological places by local communities (Chirikure and Pwiti 2008). Although the legislation in South Africa and Botswana has since been amended, colonial legislation is still in operation in Zimbabwe, where the only amendment was the name change from Rhodesia to Zimbabwe. There is no big difference between the new legislation and the old because the rights of local communities and indigenous groups are limited. Besides, the same bureaucratic infrastructure operates in independent countries, which is why recruiting indigenous people into archaeology in countries such as South Africa has been an uphill task (Schmidt 2009).

Colonialism destroyed the fabric of communities through the imposition of borders and boundaries. Land alienation also had the same effect which was not reversed at independence (Pwiti and Ndoro 1999). This resulted in different indigenous groups being exposed to the heritage of other groups which they had no relationship with. Because it was not their past, they simply ignored or disrespected the archaeology of others. Post-independent Zimbabwe saw an upsurge in black archaeologists who are now employed in most countries in southern Africa. Botswana and Kenya have also witnessed this development just as Nigeria and Senegal in West Africa. The archaeology is still practiced along the colonial lines; what is changing is the color of archaeologists. As such, there is a need for massive programs in decolonizing African archaeology, its methodologies, and its outputs (Schmidt 2009). Lane (2011) has lobbied for the production of multiple archaeologies to make sure that all voices, both dominant and dominated are heard. Given the dominance of the academy which appropriates heritage for its own purposes, there

is need for a seismic shift towards practicing an archaeology that is for, with, and by the local people (Atalay 2006). That way, archaeologists will be working with and for indigenous peoples. This contribution seeks to discuss the concept of working with and for indigenous peoples from an African perspective. It also outlines some of the inherent structural challenges and suggests some paths to be navigated as the present unfolds into the future.

Definition

Who Are Indigenous Peoples? Are They Identical Across the Whole World?

A question that elicits different responses from archaeologists in the different continents is what is indigenous archaeology? According to Watkins (2005), indigenous archaeology is that which is done by, with, and for indigenous people. This definition makes strong sense if the colonial ancestry of archaeology is considered. Archaeology had no place for indigenous peoples who despite providing knowledge that was used to interpret the past were often challenged for being unscientific. Thus indigenous archaeology is a form of archaeology premeditated to restitute and empower the indigenous people to control their own destiny (Schmidt 2009). Indigenous archaeology seeks to tilt the balance of power in world archaeology in the direction of the previously colonized and marginalized peoples. It seeks to achieve this through doing archaeology by, for, and with indigenous people. The most important issue in indigenous or postcolonial archaeology is the definition of the concept of indigenous.

Watkins (2005) presents a number of definitions on what does it means to be indigenous. He draws from the International Labour Organization definition which states that people may be "regarded as indigenous on account of their descent from the populations which inhabited the country, or a geographical region to which the country belongs, at the time of conquest or colonization or the establishment of present State boundaries and who, irrespective of their legal status, retain some or all of their own social, economic, cultural, and political institutions". There are four general distinguishing factors for indigenous people: descent from the "first comers" on the land, lack of economic and political power, cultural uniqueness or non-domination, and some form of group identity (Watkins 2005). The issue of indigenous has political connotations for it implies marginalization, disempowerment, and lack of independence. In many ways, indigenous peoples are treated as second-class citizens on account of their ancestry and political and economic inferiority.

A global identification exercise would list the Sami of Northern Europe, the so-called First Nations of Canada, Native Americans, Aborigines of Australia, the Maori of New Zealand, the San and Khoisan of southern Africa, the Pygmies of Central Africa, and Hadza and Dorobo of East Africa as the quintessential indigenous peoples. This identification of who is indigenous is very problematic for sub-Saharan Africa. In regions such as southern Africa, the precolonial populations consisted of black agriculturalists who occupied the summer rainfall areas. These practiced sedentism, cultivated seasonal crops, worked metals, and made pottery. Then, there are also the so-called hunter-gatherers who were mobile, non-sedentary, and subsisted on hunting and gathering. In the Cape region of South Africa and Namibia, there are also the Khoisan and Damara-Nama peoples who were pastoralists. The archaeologist Huffman (2007) clearly makes the point that this division of African groups prevailed at the time of contact and has deep roots. For example, the black agriculturalists are believed to have migrated from North West Africa, populating southern Africa by the first millennium CE. This means that when colonialism began, these groups were on the landscape for close to a 2000 years. They had complex relationships with hunter-gatherers, lived with them, and traded with them (Schmidt 2009). Among many sites, the Iron Age settlement of Bosutswe in Botswana seem to have been occupied by both farmers and hunter-gatherers. If we revisit the criteria used to identify who is indigenous, we realize that because Europeans found hunters

and gatherers on the landscape at contact, they also thought that they were marginalized and culturally pristine. This way of thinking is ethnocentric and was shown to be untrue by Wilmsen (1989), Hall and Smith (2000), and Manyanga (2007) who encountered archaeological sites that have hunter-gatherer and farmer material culture. It therefore means that any definitions of indigenous that privileges the so-called minorities and ignores the farming majority are missing the point. In fact, how can people who have lived in an area for 2000 years or more not be regarded as indigenous? By failing to view all Africans both farmers and hunter-gatherers, as indigenous we will be imposing a western worldview which dichotomizes nature (bushman) and (culture) farmers. In any case, in a region such as southern Africa, the division between hunter-gatherers and farmers has disappeared in the last century such that if indigenous archaeology is to be successful, it has to consider all the nonwhite people as indigenous. This is the premise adopted by a collection of essays in Schmidt (2009).

Controversial as this may sound, there are very few black archaeologists in countries such as South Africa, and to push for an archaeology that favors only the Khoisan and San descendants would turn the already dire situation into a crisis of cataclysmic proportions. Thus, if indigenous archaeology is to develop in Africa, the definition of indigenous must be broadened up and the rest of the world must see the situation from the complexities of Africa and not from the lenses of their own areas.

The people of sub-Saharan Africa have all been marginalized in the production of the past such that including all sections of the previously disadvantaged will decolonize the discipline and take it forward. In any case, the concepts of indigenous archaeology in places such as Australia do not look at which Aboriginal group was dominant in precontact times; Aborigines are Aborigines. While groups such as the San should not be neglected wherever they still exist; attention should not only be solely focused on them. Such a broad-based approach will create a conducive climate for the successful takeoff of indigenous archaeology in Africa.

Historical Background

Working with and for Indigenous People

Although there is a union of thought between the different practitioners of indigenous archaeology with regard to the need to meaningfully bring the marginalized into the center of archaeology knowledge production and dissemination, a number of approaches have been developed to realize this end (Chirikure and Pwiti 2008). The approaches differ from country to country and continent to continent. The most common method of working with indigenous people is that of collaborations in archaeological research and heritage protection. This working together is often precipitated by legal requirement which make it mandatory for researchers to demonstrate a strong local community component in their research teams. This will also produce in some cases the joint ownership of results. According to Nicholas (2001: 163), in British Columbia, "consultation with the appropriate First Nation is now a prerequisite for obtaining an archaeological permit. This requirement occurred in response to demands for greater Aboriginal representation, and overall, has had a positive impact on the discipline as it makes archaeologists more responsive to contemporary needs and their work more relevant." The Secwepemc Ethnobotany Project that ran between 1991 and 1998 in Canada also had representatives of indigenous people in the design of the project and gave them some ownership of the results. In Australia, Smith and Jackson (2006) also meaningfully collaborated and worked with the Barunga-Wugularr communities of the Northern Territory and the Ngadjuri people of Burra, South Australia. This working together involves joint project design and control over the results of the research. Nicholas (2001) also discusses the importance of workshops between indigenous communities and academics which bring the worldview of the local people into consideration. All these are successful cases of working with and for indigenous people.

Indigenous worldview – the set of beliefs, values, knowledge, and behavior by which people make sense of the world around them – is critical in knowledge production. Such a worldview is a

necessary guide not just for interpretation but also for managing the heritage. The Clanwilliam Living Landscape Project directed by John Parkington of the University of Cape Town in South Africa uses indigenous people to interpret sites as well as to earn a living through their traditional crafts. Although Parkington acts mainly as the fund-raiser, indigenous people run the project and gain immensely from economic opportunities created through interpreting and protecting their past. This is a strong example of working for the indigenous peoples because they control knowledge production and benefit socially and economically from it.

In Mozambique, archaeologists conscious of the lack of involvement of indigenous peoples in the protection of sites have worked with spiritual and traditional leaders to protect the sites. Jopela (2011) discusses the use of spirit mediums in protecting the rock art sites of Chinyamapere in Mozambique. The spirit medium organizes people and controls access and thus hold custodial rights on behalf of the community. Archaeologists are also working as advisers to local communities. The archaeologist Peter Schmidt of the University of Florida, Gainesville, is advising indigenous people in areas that he carried out research in Tanzania to develop archaeological tourism in the country. The archaeotourism project is directed by the indigenous people, and they consult Schmidt when the need arises. After working with indigenous people, he is now working for them.

Training and publications are two of the areas that are crucial in developing indigenous archaeology and indigenous peoples. Nicholas discusses a robust training program of indigenous people in Canada. Many First Nation peoples are getting graduate degrees which place them at the nexus of knowledge production. There are also publications which are designed to give voice to indigenous peoples. There is the *American Indian Quarterly* which publishes important studies on indigenous archaeology and related subjects. The journal *Archaeologies* which is owned by the World Archaeological Congress also publishes works which support indigenous views of the past. However, such outlets are very few in Africa which deprives indigenous archaeologists of opportunities to disseminate their archaeological results which may not necessarily be, in tandem with established positions (Schmidt 2009).

The use of language which respects and does not denigrate indigenous people is one way of working for indigenous communities. For example, while other researchers do not give the names of their informants, Schmidt has always provided the names of Tanzanian master smelters and has respected the knowledge contained in their oral traditions. This respect for local people and local knowledge is very important in empowering indigenous communities. Thus, working with and for the indigenous people requires well-meaning endeavors in decolonizing the practice of the subject, thereby making sure that local people meaningfully participate, benefit, and play a meaningful role in protecting their past.

Key Issues/Current Debates

Regardless of how colonialism developed in the different parts of the world, the common denominator is the fact that archaeology developed as a western curiosity with no meaningful involvement of the local communities. Furthermore, archaeology developed very closely with the colonial states, often creating information which was used to suppress and dominate local populations. Not surprisingly, in many postcolonial contexts, it is important to redress the omissions of the colonial period through collaborating and working with local communities. This collaboration must be meaningful and not half hearted. Extremists may argue that even in colonial times, archaeologists in regions such as east and southern Africa and North America were using oral traditions and ethnographies to understand the past (see McGhee 2008). Schmidt's well-known study of iron working in Tanzania is just but one of the many examples (see Schmidt 2009). Similarly, Huffman's work (2007) combines Shona history, anthropology, philosophy with Portuguese documents, and Venda anthropology to understand the spatial organization of the elite Zimbabwe settlements. Schmidt (2009) has realized that although he was

using oral traditions to incorporate indigenous perspectives into the study of the past, more was needed in the form of collaboration. This is no wonder why he is helping communities to chart their own destiny as far as the study and use of the past is concerned. This is a very beneficial way of working with and for the communities.

Then, there are some who still view archaeology as a science which produces general laws for predicting human behavior. Such works, although they draw from oral histories, ethnographies, and the so forth, challenge the same sources for being unscientific. Obviously, there are so many colonial overtones to this kind of approach which unfortunately still dominate southern African archaeology. Lane (2011) has criticized such approaches for perpetuating images of a timeless and unchanging Africa under the guise of science. Ironically, if indigenous people write their own perspectives, they are criticized heavily and rebutted, but it is fine for the dominant approaches to use interviews from such people. This means that indigenous people cannot write about their past, but they must provide information to the dominant to write it for them. This is one reason why it is very difficult to develop an indigenous archaeology in southern Africa. This is a fundamental point missed by McGhee (2008) in his critique of indigenous archaeology. To say that indigenous people must be meaningfully involved in knowledge production and dissemination is not to say that nonindigenous peoples must not write about the past of indigenous people. There is a fundamental flaw in the status quo where there are very few indigenous archaeologists. What proponents of indigenous archaeology are saying is that we must make sure that we involve indigenous people and train them in the study and writing of the past in order to bring their perspectives to the fore. This is tantamount to decolonization of the discipline.

There is nothing new in this argument; in contexts such as mining, companies are now creating partnerships with host communities and indigenous groups to develop and empower those communities. Gone are the days when areas around mines remain underdeveloped while their resources are enriching other regions. As such, it is important to make sure that those who work with communities transfer some benefits. Of course, the resources that archaeology has are not comparable to those of mining houses, but it is important for us to do our part with the little that we have.

For working with and for indigenous people to be fully established as a way of studying the past, there is need to train a number of indigenous archaeologists. This can promote a decolonization of the discipline. Countries such as Zimbabwe, Tanzania, Nigeria, and Kenya have trained indigenous archaeologists who are giving different perspectives on the past. The only problem, however, is that they are part of the academy; they publish in international journals which may not publish results that are thought to be radical. There have been recent cases of situations where big international journals have made defendants of established positions referees of papers that are revisionist in nature and motivated by indigenous experiences. Because the indigenous perspectives challenge the dominant position, often they are not published because experts do not like them. This means that indigenous peoples cannot establish research agendas; they are conditioned by the thoughts of the experts. Although, there are some journals which welcome different viewpoints and are a source of hope, this scientific autocracy is perhaps one single most important factor that stunts the growth of indigenous perspectives in southern Africa.

International Perspectives

The definition of who is indigenous and who is not is very crucial because in sub-Saharan Africa, the way indigenous is defined has potential to include and exclude some local groups of people. This is where local contexts and histories are crucial in understanding the cultural development of a region. In regions such as southern, eastern, and central Africa where there are minorities such as the San, the Pigmies, and the Hadza, adopting a narrow definition will make these people the only indigenous ones. And yet, there are other groups particularly those practicing a pastoral or mixed

agricultural way of life who also have a deep history in these areas. The Bantu people have been resident in sub-Saharan Africa for a very long time. There are also indications that often if people had lost their animals, they could become hunter-gatherers. All this indicates the fluid nature of the division between who is indigenous and who is not. As such, for indigenous archaeology to take place in Africa, it must be applied to all black people that way people can identify with it. This is no wonder why Watkins (2005) failed to find many examples of indigenous archaeology in Africa. The most important point therefore is that the definition of indigenous differs from context to context and continent to continent. In Africa, virtually all black people were colonized and suffered the excesses of colonialism. These people were all excluded in the production of their past. It is important to have them on board in the researching of the past.

There are some researchers who may feel that archaeology is a science and the production of the past must follow scientific principles (Huffman 2007). Therefore, methodologically, if local communities cannot fit into a researcher's methodology, then they must be excluded. Research is all about making predictions and validating them with data. An extension of this view argues that indigenous archaeology privileges one group of people at the expense of others in the study of the past (McGhee 2008). These standpoints miss the point that indigenous archaeology is restitutional in letter and spirit. It seeks to empower groups of people who were historically marginalized from the production and consumption of their past. This is an ethical standpoint which aims to bring more people into the study and communication of the past. There are very few black archaeologists in sub-Saharan Africa who are writing the past from their own point of view. The majority lack access to high-profile publications which silences their thoughts. It is not that they agree with narratives that were written by colonialists to their ancestors' total exclusion; often, their ideas are challenged for being unscientific. If archaeology is to transform so that it can be sensitive to the needs of local people, archaeologists must work with and for local people. As such, one can practice scientific archaeology but still work with and for local people. What is ethically inappropriate is that as researchers we profit in terms of career development but without involving any of the communities we work for. Colonialism in Africa lasted for many years, and it will take a longer time to reverse some of its excesses. Indigenous archaeology is one of those ways in which local people can be empowered to master their own destiny. That way, we will be able to incorporate different versions of the past rather than those informed by what we think is important as scientists.

Future Directions

One of the major goals of postcolonial archaeology is to transform archaeology from an elitist, almost colonial discipline into a decolonized practice where multiple perspectives flourish. One way of achieving this is to work with and for indigenous peoples. Working with and for indigenous people is not a one-way traffic; it needs the commitment of the indigenous people, the archaeologists, and all stakeholders. Collaboration in research projects and control of access are some of the ways used to ensure that archaeologists work for and with indigenous people. This has created some good results in Canada, Tanzania, South Africa, and Australia. The only challenge appears in issues such as copyright and publications. Is it possible for a researcher working in a community to coauthor the resulting publications with all the members? Is coauthorship an issue or what matters is whether the author has deposited the material in communities? Some archaeologists distribute their books in the communities which they work and this helps, but there would be need for more information storage. Given that archaeology is often seen as a luxury, who will build local storage facilities? Publications are also an important issue, indigenous people do not have control, and as such, multiple perspectives may be ruthlessly strangled in cases where researchers seek dominance at the expense of studying the past. Despite the challenges, the outlook for postcolonial archaeology and its emphasis on working with and for indigenous communities is bright.

Cross-References

- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Holographic Epistemology: Native Common Sense
- ▶ Indigenous Archaeological Organizations
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies
- ▶ Indigenous Peoples, Working with and for

References

Atalay, S. 2006. Indigenous archaeology as decolonizing practice. *American Indian Quarterly* 30 (3/4): 280–310.

Caton-Thompson, G. 1931. *The Zimbabwe culture: Ruins and reactions*. Oxford: Clarendon Press.

Chirikure, S., and G. Pwiti. 2008. Community involvement in archaeology and cultural heritage management: An assessment from case studies in southern Africa and elsewhere with comments and reply. *Current Anthropology* 49 (2): 467–485.

Chirikure, S., M. Manyanga, W. Ndoro, and G. Pwiti. 2010. Unfulfilled promises? Heritage management and community participation at some of Africa's cultural heritage sites. *International Journal of Heritage Studies* 16 (1–2): 30–44.

De Jesus Jopela, A.P. 2011. Traditional custodianship: A useful framework for heritage management in southern Africa? *Conservation and Management of Archaeological Sites* 13 (2–3): 103–122.

Fouche, L. 1937. *Mapungubwe*. Cambridge: Cambridge University Press.

Garlake, P. 1973. *Great Zimbabwe*. London: Thames and Hudson.

Hall, S., and B. Smith. 2000. Empowering places: Rock shelters and ritual control in farmer-forager interactions in the Northern Province. *South African Archaeological Society Goodwin Series* 8: 30–46.

Huffman, T.N. 2007. *Handbook to the Iron Age: The archaeology of pre-colonial farming societies in southern Africa*. Pietermaritzburg: University of KwaZulu-Natal Press.

Lane, P.J. 2011. Possibilities for a post-colonial archaeology in Africa: Indigenous and usable pasts. *World Archaeology* 43 (1): 7–25.

Manaynga, M. 2007. *Resilient landscapes*. Uppsala: Societa Archaeologica Uppsaliensis.

McGhee, R. 2008. Aboriginalism and the problems of Indigenous archaeology. *American Antiquity* 73 (4): 579–597.

Nicholas, G.P. 2001. The past and future of Indigenous archaeology: Global challenges, North American perspectives, Australian prospects. *Australian Archaeology* 52: 129–139.

Pwiti, G., and W. Ndoro. 1999. The legacy of colonialism: Perceptions of the cultural heritage in southern Africa, with special reference to Zimbabwe. *African Archaeological Review* 16: 143–153.

Robinson, K.R. 1961. Excavations on the Acropolis Hill. *Occasional Papers of the National Museum of Southern Rhodesia* 3A: 159–192.

Schmidt, P.R. 2009. *Postcolonial archaeologies in Africa*. Santa Fe: School of Advanced Research Press.

Shepherd, N. 2002. The politics of archaeology in Africa. *Annual Review of Anthropology* 31: 189–209.

Smith, C., and G. Jackson. 2006. Decolonizing indigenous archaeology: Developments from down under. *American Indian Quarterly* 30 (3/4): 311–349.

Trigger, B. 1984. Alternative archaeologies: Nationalist, colonialist and imperialist. *Man* 355–370.

Watkins, J. 2005. Through wary eyes: Indigenous perspectives on archaeology. *Annual Review of Anthropology* 34: 429–449.

Wilmsen, E. 1989. *Land filled with flies: A political economy of the Kalahari*. Chicago: University of Chicago Press.

Indonesia's World Heritage

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Introduction

The Republic of Indonesia counts around 17,000 islands and a rich cultural heritage that bears clear traces from a long history of trade and exchange across the archipelago and with the wider Indian Ocean region. Until 2012, the country's cultural World Heritage sites – Borobudur Temple Compounds (1991), Prambanan Temple Compounds

(1991), and Sangiran Early Man Site (1996) – were all located in Central Java. Another 19 sites, more spread across the main islands, are on UNESCO's Tentative List.

Historical Background

Most of Indonesia's cultural World Heritage sites so far are located in the central part of Java, the fifth largest and most populated island of the archipelago (including the capital, Jakarta). Only in 2012, the "Cultural Landscape of Bali Province: the Subak System as a Manifestation of the Tri Hita Karana Philosophy" was added to the list. The earliest signs of habitation in this fertile volcanic area are prehistoric. In the 1930s, the German paleoanthropologist Gustav von Koenigswald started a systematic geological survey of Java. At Sangiran, nearby the city of Solo (Surakarta), this led to the discovery of over 50 fossils of *Meganthropus paleo* and *Pithecanthropus erectus* ("Java man," now reclassified as part of the species *Homo erectus*). The outstanding hominid fossils and artifacts found nicely illustrate the development of *Homo sapiens sapiens* from the Lower Pleistocene to the present. For this reason alone, Sangiran has become one of the world's key sites for the understanding of human evolution.

From the seventh century CE, Central Java was dominated by Hindu and Buddhist kingdoms (Salazar 2016). This led, in the mid-eighth century, to the construction of Borobudur, the lower terraces of which have the typical trademarks of Javanese Hindu architecture. While the basic plan was kept, during the construction phase builders changed it from either a prehistoric Indonesian or Hindu monument into a Buddhist shrine, with 2,672 relief panels, 504 Buddha statues, and a central dome on top. Seen from the air, the structure looks like a giant Buddhist mandala. Close to Borobudur, near the village of Prambanan, a large group of Hindu temples was erected. The complex, one of the largest in Southeast Asia, was consecrated in the mid-ninth century, after a construction period of around 25 years. One century later, the Hindu court and most of the population moved to East Java, and the 224 temples were left behind. The structures themselves collapsed during an earthquake in the sixteenth century. Borobudur was abandoned around the same time, too, probably after a series of eruptions from nearby Mt. Merapi, and lay buried for centuries under layers of volcanic ashes.

Islam, coming mainly via India, gained ground in the inner areas of Java during the sixteenth century. The Dutch began to colonize the archipelago in the early seventeenth century. Cornelis A. Lons, an officer of the Dutch East India Company who made an excursion to Prambanan in 1733, reported about the damaged statues he found among the piles of stone blocks. During the brief British presence on the island under Sir Thomas Stamford Raffles (1811–1816), a full survey of the ruins was commissioned. Raffles, who had a personal interest in Javanese antiquities, also ordered the excavation of Borobudur. The work was started by the Dutch engineer Hermann Cornelius and continued for many decades by the Dutch East Indies government. The public appreciation of Borobudur and Prambanan, however, developed rather slowly. For a long time, colonial residents carried off sculptures for garden ornaments or "souvenirs," while local villagers used foundation stones for construction material, and "trophy hunters" and thieves tried to make a profit out of what they could take away from the monuments.

Indonesia's legal framework for cultural heritage preservation and management goes back to the colonial period (Kagami 1997). In 1901, the Committee for Archaeological Research on Java and Madura was set up by the then Dutch East Indies government. In 1931, an ordinance on monuments (Monumenten Ordonnantie S. No. 238: 1931) was established, with the aim of preserving historical monuments (mainly within the colonial domain). Even though the intentions were different, these policies were taken over by the Indonesian government after independence in 1949. While the colonial government had adopted such policies to demonstrate and justify its presence as the preserver of Indonesian cultural heritage, the Indonesian government does it mainly to assert its sole sovereignty over its "national

patrimony." Indonesia signed the 1972 UNESCO World Heritage Convention in 1989. Shortly afterward (in 1992), a new law concerning items of cultural property was enacted to replace the former ordinance (Ministry of Culture and Tourism 2003).

Key Issues/Current Debates

UNESCO Involvement

Barely 2 years after independence (in 1951), a UNESCO Office was established in Jakarta. Although serving the wider Southeast Asia region, the office helped in bringing Indonesia's magnificent cultural heritage under global attention. In 1972, UNESCO launched a 25-million USD safeguarding campaign to restore Borobudur (the second action of its kind after the 1960s operation in Egypt to relocate Abu Simbel). Concurrent with the elevation of Borobudur and Prambanan to World Heritage sites in 1991, UNESCO collaborated with UNDP and the former Indonesian Directorate General of Tourism in the ambitious Cultural Tourism Development Central Java-Yogyakarta Project (1991–1994). The intergovernmental organization was also involved in the rehabilitation of the structurally damaged Prambanan Temple complex after the 2006 earthquake and the more recent cleaning up of volcanic ashes at Borobudur caused by multiple eruptions of nearby Mt. Merapi.

UNESCO's involvement has not always been perceived positively at the local level, mainly because people feel left out in the conservation of the sites, leading to conflicts as "classical"/high culture is preserved over vernacular/low culture (Wall and Black 2004). At Prambanan, for example, there is an ongoing conflict with the local community regarding the name of the complex. While it was inscribed on the World Heritage list as "Prambanan Temple Compounds" (No. 642), the people of Prambanan village have always referred to it as *Candi Rara* (or *Loro*) *Jonggrang* (Javanese for "temple of the slender maiden"). This refers to a popular legend relating that the statue in the north chamber of the central Shiva shrine does not represent the Hindu goddess Durga but the Javanese princess Loro Jonggrang. The tensions recently intensified when, in accordance with Article 268 of UNESCO's Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO 2008: 69), the text "Candi Rara Jonggrang" on a newly placed signboard was replaced by "Candi Prambanan." Through initiatives such as the 2008 Prambanan Camp for World Heritage Volunteers, which enabled to increase the heritage awareness of local youth, the negative perception of UNESCO was somewhat adjusted.

Tourism

Tourism is not much of an issue at the archaeological site of Sangiran (and its nomination as World Heritage has not brought any substantial change in that respect). At Borobudur (the single most visited tourism attraction in Indonesia) and Prambanan, in contrast, the challenges related to tourism are ongoing. Much has to do with the ways in which both sites are managed. The park surrounding the monuments and the related infrastructure (ticket booths, interpretative services, and parking lots) is administered by PT Taman Wisata, a state-owned enterprise. Souvenir stands, food stalls, and other tourism-related structures outside the main grounds fall under the control of the Provincial Tourism Office of the province in which they are located (Borobudur is in Central Java, while Prambanan is in Yogyakarta). The actual monuments, however, resort under the responsibility of the National Archaeology Department of Indonesia (and, with the ongoing process of regional autonomy, increasingly the provincial archaeology departments). Not surprisingly, this fragmented distribution of authority leads to multiple problems, including the development of ill-planned tourism infrastructure (Salazar 2010a). As there is no limit on visitor numbers, vandalism is a serious issue at both Prambanan and Borobudur. There is little if any on-site interpretation available, and the general disrespect for the sites is a major problem among domestic tourists, who comprise around 80% of all visitors. In addition, local tour guides have a hard time handling the increasingly diverse group of international tourists (Salazar 2008, 2010b). Tourism development at both sites has been

severely criticized for not including the local community (Hampton 2005).

Environment

Indonesia's cultural World Heritage sites are located in an environmentally fragile area, known as the Pacific Ring of Fire, where a large number of volcanic eruptions and earthquakes occur. In fact, Mount Merapi (25 km from Prambanan and 28 km from Borobudur) is one of the most active volcanoes in the world. In 2010, Borobudur was heavily affected by a 2.5-cm layer of acidic volcanic ash falling on the complex. In addition to the numerous earthquakes, causing stones to fall down and arches to crumble, the soft soil and heavy rains have led to the destabilization of the structure. The main complex at Prambanan was badly damaged during the 2006 earthquake, with large pieces of debris, including carvings, scattered over the ground and the structural damage being more extensive than originally thought. Only in 2010, the main temples were reopened to the public.

Economy

Indonesia's World Heritage generates both benefits and costs (Hampton 2005). Over time, there have been remarkable shifts in the (economic) value attached to the country's patrimony (Salazar 2011). In preparation for Prambanan to become recognized as World Heritage, the Indonesian authorities removed the market that had sprung up near the temple and transformed the surrounding hamlet and rice paddies into an archaeological park. Villagers, however, benefit economically from the souvenir stalls at the entry of the park, by their work inside the complex (as guides, watchmen, cleaning personnel, etc.) and by participating in the Ramayana Ballet, which is performed every night at the open-air and indoor stages on the west side of the complex. Borobudur has a similar history of challenges and opportunities. In 2003, for instance, the local community heavily protested against a provincial government plan to build a three-story art mall, known as "Java World," next to the protected monument because this would take away even more from their scarce benefits. The values of tourism for economic development, preservation of a cultural icon, and social justice for hundreds of poor hawkers brutally clashed in the controversy over Java World (Silver 2007). At both Prambanan and Borobudur, there is a continuous problem with vendors harassing visitors inside the park to buy their trinkets. Unregulated, predatory commercialization forms a serious threat to the cultural assets of the sites.

Religion

Indonesia is the country with the largest Muslim population in the world. Islam stands as a religion quite different from the religions of the Javanese people during the pre-Islamic period. The fact that Prambanan and Borobudur are located in what is now a predominantly Muslim area adds to the complexity of managing, maintaining, and interpreting the temple compounds. In 1985, Muslim fundamentalists who viewed Borobudur as a symbol of Indonesia's pre-Islamic pagan past bombed nine stupas on the upper terrace. The militants perceived the government's renovations of the site (largely for purposes of tourism) as emblematic of the state's refusal to embrace Islamic law. They therefore selected Borobudur as a target, and, in response, the government made it clear that all temples on Java were to be considered as heritage monuments, not religious or sacred sites where ritual activities are held (or, according to the ICOMOS description, as "religious complexes"). Recent Islamic terrorism attacks have mainly targeted tourism infrastructure (e.g., the Bali bombings), not heritage sites.

In order to accommodate the religious needs of the many Muslims working at and visiting the sites, a *musholla* (small building where Muslims perform their religious duties) was built right next to the entry gates. It is odd that, while visiting either Prambanan or Borobudur around prayer time, one can hear the Islamic call to prayer far into the compound. In contrast, the restoration of Borobudur and Prambanan has led to a revival of both sites as places of worship and pilgrimage for Buddhists and Hindus, respectively. Indonesia's official state policy (known as *Pancasila*) remains one that promotes religious freedom. Ironically, the ongoing process of democratization, started

after the fall of Suharto in 1998, has facilitated the spread of Muslim fundamentalism and increased the calls to have Muslim heritage such as the Great Mosque of Demak (since 1995 on the tentative list) included on the World Heritage list. It remains to be seen which influence religious fundamentalism will have on the archaeological excavation site and museum of Sangiran.

Politics

It is no coincidence that most of Indonesia's cultural World Heritage sites are situated on Java. After all, it is the central government in Jakarta that proposes candidates to UNESCO. During Major General Suharto's New Order era (1966–1998), the government (led by Javanese) strongly favored Central Java in their (re)invention of Indonesia, promoting it as the cultural heart of the nation (Dahles 2001). This serves as a reminder that, ultimately, a World Heritage site is the product of agency at the national level. Besides, the Indonesian government has its own heritage politics and national list of heritage conservation. The politics of heritage and the tensions between local, national, and international stakeholders have been at play across the archipelago. The case of the Tana Toraja settlements in the highlands of Sulawesi, on UNESCO's Tentative List, painfully illustrates that cultural heritage sites are often not the newly threatened landscapes of tradition they are imagined to be (Adams 2003). An even more problematic example is that of Pura Besakih, Bali's most celebrated temple complex, which underwent three failed attempts (mainly due to strong local protests) to establish it as World Heritage (Hitchcock and Darma Putra 2005). More generally, the democratic reforms and the shifting of power from the central government to the local level during the last decade have fueled an intense new "localism" that has had direct (and often negative) implications on cultural preservation (Silver 2007).

Future Directions

The Indonesian government has successfully managed to use the most iconic historical monuments within the country for tourism development while at the same time trying to intervene in their management in the name of their preservation as part of the nation's patrimony. These processes do not take a single course, but, rather, proceed in parallel, mutually influencing each other. Short-term gains in both must be assessed against long-term consequences. The promotion of the development of national culture has been one of the most crucial tasks of the Indonesian government since independence, as is clearly stated in Article 32 of the Constitution: "the Government shall develop the National Culture of Indonesia." However, the ongoing process of political decentralization (started in 2001) is adding to the number of political stakeholders involved and, consequently, making the management of World Heritage sites even more complex than it was before (Salazar 2010a).

With a view to enhancing the capacity of the Indonesian national and local authorities to improve the state of conservation (management) at Borobudur, the World Heritage Centre has developed a technical cooperation project under the Netherlands Funds-in-Trust with UNESCO. As long as such initiatives leave out the local communities as active stakeholders, they are doomed to fail. A reason for the lack of enough safeguards to protect the cultural values of sites is to be found in an underdeveloped understanding and therefore lack of appreciation of the value of these cultural resources by both the local community and the tourist alike. The UNESCO "Community Empowerment Through Heritage Education" program at Indonesia's three World Heritage sites is a good step in dealing with this issue. Finally, increased attention will be needed to address the fact that Indonesian World Heritage sites, despite their proclaimed universal value, have different meanings for different groups of visitors (Salazar 2008).

Cross-References

▶ Archaeology and Anthropology
▶ Holographic Epistemology: Native Common Sense

▶ South and Southeast Asia: Historical Archaeology
▶ UNESCO World Heritage Convention (1972)
▶ UNESCO's World Heritage List Process
▶ World Heritage Objectives and Outcomes

References

Adams, K.M. 2003. The politics of heritage in Southeast Asia: Interplaying the local and the global. *Indonesia and the Malay World* 31: 91–107.

Dahles, H. 2001. *Tourism, heritage and national culture in Java: Dilemmas of a local community*. Richmond: Curzon Press.

Hampton, M.P. 2005. Heritage, local communities and economic development. *Annals of Tourism Research* 32: 735–759.

Hitchcock, M., and I.N. Darma Putra. 2005. Pura Besakih: A world heritage site contested. *Indonesia and the Malay World* 33: 225–237.

Kagami, H. 1997. Tourism and national culture: Indonesian policies on cultural heritage and its utilisation in tourism. In *Tourism and cultural development in Asia and Oceania*, ed. S. Yamashita, K.H. Din, and J.S. Eades, 61–82. Bangi: Penerbit Universiti Kebangsaan Malaysia.

Ministry of Culture and Tourism. 2003. *Compilation of law and regulation of the Republic of Indonesia concerning items of cultural property*. Jakarta: Ministry of Culture and Tourism.

Salazar, N.B. 2008. "Enough stories!" Asian tourism redefining the roles of Asian tour guides. *Civilisations* 57: 207–222.

Salazar, N.B. 2010a. *Envisioning Eden: Mobilizing imaginaries in tourism and beyond*, New directions in anthropology 31. Oxford: Berghahn.

Salazar, N.B. 2010b. The globalisation of heritage through tourism: Balancing standardisation and differentiation. In *Heritage and globalisation*, Key issues in cultural heritage 4, ed. S. Labadi and C. Long, 130–147. London: Routledge.

Salazar, N.B. 2011. Shifting values and meanings of heritage: From cultural appropriation to tourism interpretation and back. In *Cultural heritage and economic encounters in the age of global tourism*, Society for economic anthropology monograph series 29, ed. S.M. Lyon and C.E. Wells, 28–59. Lanham: Altamira.

Salazar, N.B. 2016. One list, a world of difference? The dynamics of global heritage at two neighbouring properties. In *World heritage on the ground: Ethnographic perspectives*, ed. C. Brumann and D. Berliner. Oxford: Berghahn.

Silver, C. 2007. Tourism, cultural heritage, and human rights in Indonesia: The challenges of an emerging democratic society. In *Cultural heritage and human rights*, ed. H. Silverman and D.F. Ruggles, 78–91. New York: Springer.

UNESCO. 2008. *The operational guidelines for the implementation of the World Heritage Convention*. Paris: UNESCO World Heritage Centre.

Wall, G., and H. Black. 2004. Global heritage and local problems: Some examples from Indonesia. *Current Issues in Tourism* 7: 436–439.

Indo-Pacific Prehistory Association (IPPA)

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Basic Information

The Indo-Pacific Prehistory Association (IPPA) was founded in 1976 at a meeting of Indo-Pacific scholars held during the 9th Congress of the *Union International des Sciences Préhistoriques et Protohistoriques* (UISPP) in Nice, southern France. The association, however, has much earlier antecedents and traces its origins back to a meeting organized in 1929 by P.V. van Stein Callenfels during the Fourth Congress of the Pacific Science Association in Batavia (now Jakarta). Its immediate antecedent was founded, as the Far-Eastern Prehistory Association (FEPA), at a meeting in Manila in 1953.

Major Impact

With the creation of the current Indo-Pacific Prehistory Association in 1976, a number of goals were outlined:

1. To promote cooperation in the study of the prehistory and related subjects of eastern Asia and the Pacific and prehistorically related areas.

2. To help maintain direct communication among scholars working in the field of east Asian and Pacific prehistory through periodic congresses, regional meetings, colloquia, symposia, and the publication of the IPPA Bulletin. East Asia here includes Pakistan and north from there roughly along the line of 70° longitude and to the east.
3. To uphold and improve legal and scientific methods of prehistorical and related research in the field and in the laboratory and to help the countries in the IPPA area prevent illegal excavation and illegal trade in antiquities.

During the 35 years that have passed since that momentous gathering in Nice, IPPA has addressed itself without pause to the production of its annual Bulletin and its congresses (Pune, India, 1978; Dunedin, New Zealand, 1983; Peñablanca, Philippines, 1985; Tokyo and Guam 1987; Yogyakarta, Indonesia, 1990; Chiang Mai, Thailand, 1994; Melaka, Malaysia, 1998; Taipei, Taiwan, 2002; Manila, Philippines, 2006; Hanoi, Vietnam, 2009). The next conference will be at Angkor in Cambodia in 2014. Delegate enrolment at the most recent congress, in Hanoi, was over 600.

However, the second part of our third goal, that of preventing illegal activities, has never been developed until now, partly because the voluntary staff of IPPA have never had time or resources to invest in a problem that now threatens the survival, in some parts of the world, of any meaningful archaeological record at all. It is intended that this will become a significant role for IPPA in the future, as part of a move for IPPA to engage with the cultural heritage management sector.

Structure and Funding

The constitution of the association specifies a president, a secretary-general, and an executive committee of eight members. The latter must contain at least one member from each of the four general areas covered by IPPA: Northeast Asia (the former USSR territories east of 70° longitude, with Korea, Japan, and China), Southeast Asia (including Madagascar), South Asia (India, Pakistan, Sri Lanka, Bangladesh, Nepal, and Bhutan), and Oceania (Australia, New Zealand, and the Pacific Islands).

In 2010, Ian Lilley was appointed secretary-general to replace Peter Bellwood, who had held the position (originally as secretary and editor) since the Pune conference of IPPA in 1978. A new committee of eight has been elected (2010), and the editorship of the IPPA Bulletin is now in the hands of Peter Lape and Ben Marwick at the University of Washington in Seattle. IPPA has played a major role in the past in bringing students and younger archaeologists from the IPPA countries to its conferences, and in helping these scholars publish their research in the IPPA Bulletin for an international audience. In future, the publication effort will be integral to IPPA's stronger role in regional cultural heritage management.

IPPA is funded only by membership fees and IPPA Bulletin sales and has never had major institutional financial support. The Australian National University has assisted in the past through the provision of an association web site, a URL for the IPPA Bulletin (which is now being moved to Seattle), an email address, and a taxation-exempt university account to hold membership and conference income. A number of international foundations such as Ford, Wenner-Gren, Chiang Ching-kuo, and the Asian Cultural Council have helped to fund attendance at conferences by scholars from developing countries in the past.

Conclusion

IPPA has had no cultural heritage function until now, but future plans will see the organization support initiatives in cultural heritage management throughout its area of responsibility, beginning with a focused workshop at the 2014 Congress in Cambodia.

Cross-References

► Cultural Property, Trade, and Trafficking: Introduction
► East Asia: Paleolithic

Further Reading

Golson, J. 1998. From FEPA to IPPA, the remaking of an institution. *IPPA Bulletin* 17: 3–12. (For a history of the Association to 1998).

Indo-Pacific Prehistory Association (IPPA). n.d. Official website. Available at: http://arts.anu.edu.au/arcworld/ippa/ippa.htm

IPPA Bulletin. n.d.-a. Available at http://ejournal.anu.edu.au/index.php/bippa/ (volumes 1–29 only) and at https://digital.lib.washington.edu/ojs/index.php/BIPPA/issue/archive (volumes 6 to 31; future issues will be found at this URL).

IPPA Bulletin. n.d.-b. New website (developed at the University of Washington in Seattle). Available at https://digital.lib.washington.edu/ojs/index.php/BIPPA/login

Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology

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Introduction

Inductively coupled plasma-mass spectrometry (ICP-MS) is a multi-elemental analytical method with very good sensitivity. It is able to determine the concentrations of almost all the elements in the periodic table except hydrogen, carbon, nitrogen, oxygen, some of the halogen elements, and a few others. Limits of detection are below the ppb level for sample solutions and in the range of ppm or below depending on the element when connected to a laser ablation (LA) system for the direct analysis of solid samples. ICP-MS with introduction of acid digested samples can be considered as a bulk analytical method, while LA-ICP-MS is punctual and capable of targeting a very specific region on the surface of an object. The microsampling performed with a laser ablation system leaves no visible trace at the surface of the artifact, making LA-ICP-MS virtually nondestructive. ICP-MS with sample solution or LA has opened up new avenues of research in archaeology based on trace element fingerprinting.

Key Issues

Description of the Instrumentation

An ICP-MS is comprised of two main parts: (1) the inductively coupled plasma, which decomposes, atomizes, and ionizes the material to be analyzed in a very hot environment (temperatures can reach 10,000 K) that is sustained with a radiofrequency electric current produced by an induction coil wrapped around a series of concentric quartz tubes called the plasma torch; (2) the mass spectrometer, which filters the ions according to their charge-on-mass-ratio. For elemental analysis in archaeology, three types of mass spectrometers are typically used. Quadrupole and magnetic sector mass spectrometers are, by far, the most widely spread even if a few archaeometry laboratories are now equipped with time of flight (TOF) mass spectrometers.

Quadrupoles are composed of four metallic rods arranged so as to leave a free path between them. Voltages are applied to these rods. For given voltages only ions with a certain mass-on-charge ratio travel down the central path between the rods before reaching the detector. All other ions are deflected. Voltages vary so as to scan the entire mass range.

In a high-resolution magnetic sector MS, ions are accelerated by a high voltage and pass through a series of ion optics, an electrostatic analyzer (ESA), and finally a magnet. By varying the strength of the magnet, the ions are separated according to their mass-on-charge ratio. They travel through a slit into a detector, which records a small atomic mass range at a given time. By varying the magnet and ESA settings, the entire mass range can be scanned within a relatively short time.

A TOF mass spectrometer permits the simultaneous detection of a full mass spectrum in approximately 30 μs, whereas quadrupole and high-resolution magnetic sector mass spectrometers are sequential analyzers. With TOF-MS, a pulsed electric field accelerates the ions to the

same kinetic energy with the velocity of the ions depending on their mass-on-charge ratio. The time it takes for the different ions to reach a detector is then measured, the lighter particles moving faster than the heavier ones.

To avoid ions colliding with other molecules, the mass spectrometer is kept in a vacuum. An interface insures the transfer of the ions from the plasma at atmospheric pressure to the mass spectrometer maintained in a low pressure environment. The difference of pressures between the plasma and the mass spectrometer creates a supersonic jet, and the ions are accelerated as they go through the interface. They are then focused by a series of lenses and mirrors before entering the mass spectrometer.

Either liquid or solid samples can be analyzed with ICP-MS. In the first case, a few milligrams of the material to analyze is dissolved with ultrapure concentrated acids. To improve the process, it is sometimes necessary to use a microwave digestion system, which is a device that heats (under pressure) the acid solutions. After dilution, by means of a peristatic pump, the acid solution containing the dissolved sample is aspirated through a nebulizer with high velocity argon, forming a fine mist. A spray chamber removes and drains the larger droplets and only the smallest ones reach the plasma.

Laser ablation (LA) is used for the direct introduction of solid samples in the ICP-MS. In a standard setting, the object to analyze is placed in a chamber without any specific preparation. The size of the chamber limits the size of the objects. The chamber is usually a cylinder with a diameter of 5–6 cm and a height of 5 cm. A CCD camera connected to a computer allows the visualization of the surface of the sample. The laser beam interacts with the surface of the objects, vaporizing a small quantity of material that is flushed by a gas carrier, which is generally argon or helium. The parameters of ablation depend on the material and on the instrumentation. The diameter of the laser beam ranges from about 50 to 100 μm. The trace left at the surface of the object by the laser is generally invisible to the naked eye. A pre-ablation is set up to clean the surface of the object in order to remove contamination and to avoid eventual corrosion, which affects the results of the analysis.

Quantitative Results

To obtain reliable quantitative results, the use of internal and external standardizations is imperative with ICP-MS or LA-ICP-MS. To improve the reproducibility of measurements, an internal standard is required to correct possible instrumental drifts or changes in the sample introduction system's efficiency. For solutions, the internal standard, an element absent in the sample, is spiked in each sample and standard solution. For solid samples, the internal standard has to be an element already present in the material since no addition is possible. The chosen element has to have a relatively high concentration in each sample so its measurement is as accurate as possible. In order to obtain absolute concentrations for the analyzed elements, the concentration of the internal standard has to be known. Its concentration is either measured with another analytical technique or calculated assuming that the sum of the concentrations of the measured elements, in weight percent, is 100% (Gratuze 1999).

Quantitative results are obtained by comparing the signal intensity measured for a given element in a sample to the signal intensity for the same element in a standard solution or a standard reference material (SRM) with certified concentrations. To prevent matrix effects, the compositions of the standards have to be as close as possible to those of the samples.

In an unknown sample, when using LA-ICP-MS, concentrations in weight percent of element or of oxide are calculated assuming that the sum of their concentration is equal to 100% (Gratuze 1999):

$$\%Y = \frac{\frac{I_Y}{I_{(Int\ Std)} * K_Y}}{\sum \frac{I_X}{I_{(IntStd)} * K_X}} \qquad \%Y_mO_n = \frac{\frac{I_Y \times \alpha_Y}{I_{(Int\ Std)} \times K_Y}}{\sum \frac{I_X \times \alpha_X}{I_{(IntStd)} \times K_X}}$$

I_y, I_x, and $I_{(Int\ Std)}$ are the signal intensities corrected from the blank measured for the internal standard (Int Std) and elements Y and X in the sample. α_y and α_x are the conversion factor from element to oxide for element Y and X. K_y and K_x

are the response coefficient factor for element Y and X, calculated as follows:

$$K_Y = \frac{I_{Ystd} \times [\text{Int Std}]_{std}}{I_{(\text{Int std})_{std}} \times [Y]_{std}}$$

I_{Ystd} and $I_{(\text{Int std})\ \text{std}}$ are the signal intensities corrected from the blank measured for the internal standard (Int Std) and elements Y in the SRM and $[Y]_{std}$ and $[Int\ Std]_{std}$ are the concentration of the internal standard and element Y in the SRM. This approach assumes that the oxidation state of each element is known and ignores the presence of elements such as sulfur or the presence of water.

Other factors affecting quantitative results are the presence of isobaric (two isotopes at the same mass) and polyatomic (oxide, argide, etc., at the same mass as an isotope of interest) interferences and laser-induced elemental fractionation causing the preferential ablation of some elements. Several strategies are available to avoid interferences such as, for example, choosing a non-interfered isotope or operating the mass spectrometer at a higher resolution to resolve two peaks with close masses. Some quadrupole ICP-MS are equipped with a collision/reaction cell where polyatomic species are eliminated through collision or reaction with gases such as helium, oxygen, ammonia, and so on. Fractionation will depend on the sample matrix but also on the laser wavelength, ablation parameters, and acquisition time.

Applications

Applications in the field of archaeology involving ICP-MS began being developed in the 1980s. However, it is only after LA attachments came into use, giving archaeologists a virtually nondestructive analytical tool, that the full potential of this analytical approach was explored for the study of ancient materials (Gratuze et al. 1993; Telouk 1993). One of the difficulties is that, if ICP-MS can measure bulk compositions for materials as heterogeneous as ceramics or soils, the microscopic sampling performed with a laser is only representative of the artifact providing it has a fairly homogeneous composition. Another difficulty regarding quantitative analysis with LA-ICP-MS is the need for matrix matched standard reference materials (SRM). Archaeological samples have compositions that can be extremely complex due to the use of non-refined raw materials. They contain a wide range of elements not always present in modern materials.

Natural and synthesized glasses are reasonably homogeneous materials, and several SRM containing a wide range of elements of interest for archaeological study are available prompting the rapid multiplication of LA-ICP-MS analysis of glass. Trace element compositions have been shown to be vital for distinguishing several primary glass production workshops (Dussubieux et al. 2009).

If LA-ICP-MS provides the best results with such a material as glass, metals are more challenging. Ancient gold was the first metal to be investigated extensively with LA-ICP-MS due to its value and its high potential for revealing aspects of ancient economies. By determining major and minor elements, gold fineness can be easily assessed. Determining trace elements can help in tracking changes in ore supplies (Guerra and Calligaro 2004). The presence of inclusions of platinum group elements in gold objects can give clues about the provenance of the metal, but also is a source of heterogeneities that can affect measurements with LA-ICP-MS. To overcome this challenge, elemental ratios rather than absolute concentrations are taking into account (Jett et al. 2007). Silver and iron-based artifacts have raised less interest, but several articles demonstrate the feasibility of determining their composition using LA-ICP-MS. Technical issues regarding iron (Devos et al. 2000) and silver (Sarah et al. 2007) artifacts were addressed using LA-ICP-MS, and authenticity verification for silver objects was performed (Devos et al. 1999). The development of a LA-ICP-MS protocol for ancient copper alloys is more recent. The presence of thick layer of corrosion at the surface of copper-based artifacts and the immiscibility of some elements, such as lead in copper, may affect LA-ICP-MS measurements. Performing a "cleaning" ablation with a larger diameter beam prior to the ablation undertaken for the measurement of the composition of the objects is usually sufficient to

reach the uncorroded metal (Dussubieux et al. 2008). A basic knowledge of metallurgy is necessary for an accurate data interpretation.

Ceramic study plays a central role in many archaeological projects, because of the ubiquity of this material. The elemental composition of ceramic samples may reveal the provenance of the artifacts when data about possible clay sources are available or at least indicate whether a unique source or a variety of sources were used for ceramic procurement at a given site. Instrumental Neutron Activation Analysis (INAA) was, for years, the analytical technique of choice to measure the composition of ceramics, because of the large number of elements it could determine and its good sensitivity. However, this method suffers from major inconveniences: it requires access to a nuclear reactor, it produces radioactive material as a byproduct, and artifacts are irremediably damaged or destroyed. In more and more instances, LA-ICP-MS is proposed as an alternative to INAA for ceramic analysis. The use of laser ablation for sampling instead of acid digestion to dissolve a small quantity of ceramic saves the long and tedious process of sample preparation but faces many challenges due to the heterogeneous nature of the material. In many cases, ceramic compositions as measured by INAA and LA-ICP-MS lead to similar groupings providing that only clay is targeted unless the temper is extremely fine-grained and indistinguishable from the clay. The composition of the ceramic is calculated from the average of the multiple measurements carried out on each sample after elimination of any "abnormal" measurements due to the ablation of temper grains or from any other heterogeneity in the ceramic fabric under the sample surface (Dussubieux et al. 2007; Vaughn et al. 2011). Any contribution from the temper that may subsist will appear in the composition causing a dilution effect of the clay composition that can be corrected using a dilution correction (Harbottle 1976; Mommsen 2007).

While glass, metals, and ceramic are now materials routinely analyzed using LA-ICP-MS, other materials need to be considered on a more case-by-case basis such as stones, soils, or biogenic materials. Speakman and Neff (2005) proposed a range of applications including the materials mentioned above as well as jade, chert, pigments, and human dental enamel. Since then, the list of materials investigated with LA-ICP-MS keeps getting longer and longer (Resano et al. 2010).

Current Debates and Future Directions

The use of laser ablation with ICP-MS in archaeology has permitted a range of applications that keeps expanding as the laser technology itself improves with the increasing availability of lasers with shorter wavelengths (213 nm, 193 nm) and, more recently, the use of femtosecond lasers. These lasers, with improved ablation characteristics, limit or eliminate fractionation problems encountered with some matrices (e.g., metals).

The size of the chamber of the laser ablation system commercially available limits the size of the objects that can be analyzed nondestructively. Rather than placing the objects into a cell, different experimental solutions were proposed to ablate directly the surface of a large object placed under an open ablation cell (Wagner and Jędral 2011). More recently, direct atmospheric sampling was tested successfully on some ancient artifacts eliminating some of the problems that may occur when attaching an open ablation cell on especially fragile objects (Kovacs et al. 2010).

As portable analytical methods are gaining more and more ground in the toolkits of the archaeologists, efforts are currently being made to design a portable laser ablation system for in situ sampling of artifacts that cannot be taken to a lab (Glaus et al. 2012).

If the laser itself is important, the way it is used for sampling can be modulated to the specific need of the artifact to be investigated and the questions to be addressed. Composite artifacts can be analyzed with LA-ICP-MS by targeting with the laser areas that look visibly distinct. However, in certain cases, when different compositions do not yield visual changes at the surface of the object

or when surface and core compositions are different, the standard sampling approach using single point or scan sampling will fail giving an accurate compositional picture of the object. The difficulty of mapping an artifact or portion of an artifact lies first in the large quantity of data generated that needs to be processed. A simplified calculation approach was developed for glass, and the results are displayed in a meaningful way using software specially designed for this purpose (Triglav et al. 2010). Depth profile analysis faces different challenges. One of them is fractionation that occurs for some elements after several minutes of ablations. A standardization procedure with calculation of the concentrations is used to offset the fractionation effects on the concentrations. Memory effects are limited by the design of small volume cells.

On the ICP-MS front, the future will certainly see more and more applications dealing with isotope analysis (Resano et al. 2010). Indeed, in many cases, information provided by elemental analysis is not sufficient to be able to provide any provenance hypothesis. The measurements of isotope ratios of elements, such as lead or strontium, have been successfully used in the past to source raw materials; however, it requires a labor and cost intensive sample preparation as well as high-resolution mass spectrometers. Some laboratories are exploring the use of LA-ICP-MS for isotope analysis as a nondestructive alternative for some applications that do not require the highest precision.

Conclusion

Over the past 20 years, new areas of research have been developed and explored in the field of archaeology, based on the trace element signature of artifacts and raw materials determined with ICP-MS. ICP-MS, when used in conjunction with laser ablation, combining minimally destructive sampling with high accuracy, good precision, and low detection limits, is an extremely attractive analytical method to archaeologists. Being a relatively low cost analytical method with a high sample throughput, large numbers of objects, up to several hundreds, can be studied. This permits a more comprehensive temporal and spatial sampling of a given type of artifact. The large bodies of data generated are also better tools to reveal patterns in connections with trade and exchange when examined using appropriate statistical treatments.

Cross-References

► Ceramics: Scientific Analysis
► Provenance Studies in Archaeology

References

Devos, W., C. Moor, and P. Lienemann. 1999. Determination of impurities in antique silver objects for authentication by laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). *Journal of Analytical Atomic Spectrometry* 14: 621–626.

Devos, W., M. Senn-Luder, C. Moor, and C. Salter. 2000. Laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) for spatially resolved trace analysis of early-medieval archaeological iron finds. *Fresenius' Journal of Analytical Chemistry* 366: 873–880.

Dussubieux, L., M. Golitko, P.R. Williams, and J. Speakman. 2007. LA-ICP-MS analysis applied to the characterization of Peruvian Wari ceramics. In *Archaeological chemistry: Analytical methods and archaeologicalinterpretation*. ACS Publication series 968, ed. M.D. Glascock, R.J. Speakman, and R.S. Popelka-Filcoff, 349–363. Washington, DC: American Chemical Society.

Dussubieux, L., A. Deraisme, G. Frot, C. Stevenson, A. Creech, and Y. Bienvenu. 2008. LA-ICP-MS, SEM-EDS and EPMA analysis of northeastern American copper-based artefacts: Impact of corrosion and heterogeneity on the reliability of LA-ICP-MS compositional results. *Archaeometry* 50: 643–657.

Dussubieux, L., P. Robertshaw, and M. Glascock. 2009. LA-ICP-MS analysis of African glass beads: Laboratory inter-comparison with an emphasis on the impact of corrosion on data interpretation. *International Journal of Mass Spectrometry* 284: 152–161.

Glaus, R., J. Koch, and D. Günther. 2012. A portable laser ablation sampling device for elemental fingerprinting of objects outside the laboratory with laser ablation inductively coupled plasma mass spectrometry. *Analytical Chemistry* 84 (12): 5358–5364.

I

Gratuze, B. 1999. Obsidian characterization by laser ablation ICP-MS and its application to prehistoric trade in the Mediterranean and the Near East: Sources and distribution of obsidian within the Aegean and Anatolia. *Journal of Archaeological Science* 26: 869–881.

Gratuze, B., A. Giovagnoli, J.-N. Barrandon, P. Telouk, and J.-L. Imbert. 1993. Apport de la méthode ICP-MS couplée à l'ablation laser pour la caractérisation des archéomatériaux. *Revue d'Archéométrie* 17: 89–104.

Guerra, M.F., and T. Calligaro. 2004. Gold traces to trace gold. *Journal of Archaeological Science* 31: 1199–1208.

Harbottle, G. 1976. Activation analysis in archaeology. In *Radiochemistry*, ed. G.W.A. Newton. London: The Chemical Society.

Jett, P., L. Brostoff, and L. Dussubieux. 2007. Technical study and elemental analysis of Chinese gold from the late eastern Zhou period. In *Scientific research on thesculptural art of Asia. Proceedings of the Third Forbes Symposium at the Freer Gallery of Art*, ed. J. Douglas, P. Jett, and J. Winter, 53–62. Washington, DC: Freer Gallery of Art, Smithsonian Institution.

Kovacs, R., K. Nishiguchi, K. Utani, and D. Günther. 2010. Development of direct atmospheric sampling for laser ablation – Inductively coupled plasma – Mass spectrometer. *Journal of Analytical Atomic Mass Spectrometry* 25: 142–147.

Mommsen, H. 2007. The importance of the 'best relative fit factor' when evaluating elemental concentration data of pottery demonstrated with Mycenaean sherds from Sinda, Cyprus. *Archaeometry* 49: 359–371.

Resano, M., E. García-Ruiz, and F. Vanhaecke. 2010. Laser ablation-inductively coupled plasma-mass spectrometry in archaeometric research. *Mass Spectrometry Reviews* 29: 55–78.

Sarah, G., B. Gratuze, and J.-N. Barrandon. 2007. Application of laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) for the investigation of ancient silver coins. *Journal of Analytical Atomic Spectrometry* 22: 1163–1167.

Speakman, R.J., and H. Neff, eds. 2005. *Laser ablation-ICP-MS archaeological research*. Alburquerque: University of New Mexico Press.

Telouk, P. 1993. Développement de la spectrométrie ICP-MS dans le domaine de l'archéologie et de la géologie – Utilisation de l'ablation laser. Unpublished PhD dissertation, Université Claude Bernard.

Triglav, J., J.T. Van Elteren, and V.S. Šelih. 2010. Basic modeling approach to optimize elemental imaging by laser ablation ICPMS. *Analytical Chemistry* 82: 8153–8160.

Vaughn, K., L. Dussubieux, and P.R. Williams. 2011. A pilot compositional analysis of Nasca ceramics from the Kroeber collection. *Journal of Archaeological Science* 38: 3560–3567.

Wagner, B., and W. Jędral. 2011. Open ablation cell for LA-ICP-MS investigations of historic objects. *Journal of Analytical Atomic Spectrometry* 26: 2058–2063.

Industrial Archaeology

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Introduction

The earliest periods of human history are still defined by the archaeological evidence for fundamental changes in the materials from which people made objects and the increasingly refined methods they used to make them. The importance of conserving and studying the evidence for these changes is universally accepted as a legitimate archaeological activity. From the medieval period onward in Europe, innovations in the use of mechanical energy as well as extended commercial activity created the conditions toward the end of the eighteenth century for an equally fundamental change in the methods of manufacturing objects, resulting in an economic and social transformation sufficiently rapid and profound as to deserve the term "industrial revolution." This signified the beginning of a historical phenomenon that has affected an ever-greater part of the human population, the landscape, and even the climate of our planet and continues to the present day.

However, at least in the western hemisphere, it was not until the physical evidence for the innovations that triggered this change – water- and steam-powered machines, mills and factories, iron furnaces and pottery kilns, canals and railways, and the houses in which the workforce lived – came under threat in the middle of the twentieth century that much attention was paid to the need to study, record, and even conserve them. Unlike most pre-medieval industrial sites, much of the physical evidence was still above ground, although in many cases rusting away or becoming ruinous. As a result, industrial archaeology, as the discipline embracing such activity came to be called, was from the beginning as much about saving what was under threat as studying this material culture to further our understanding of the causes and consequences of industrialization. Obviously, the

two aspects come together: it is impossible to conserve and interpret industrial structures and objects unless they are understood through archaeological and historical study. Yet the popular and even the professional conception of industrial archaeology has tended to adopt its meaning as a movement to conserve the industrial past, which would be better termed "industrial heritage," rather than its meaning as the study of the ways people worked in the recent past. This emphasis on conservation and preservation of sites currently distinguishes industrial archaeology from both post-medieval and historical archaeology and had until the last decade of the twentieth century hindered its acceptance among professional archaeologists. On the other hand, industrial heritage preservation has always attracted a great deal of interest and support from the voluntary sector as well as public bodies with an interest in their tourist potential. However, the increase in archaeological work on brownfield sites as part of developer-funded archaeology has begun to redress this balance; in the first decade of the twenty-first century, roughly 30% of all professional archaeology done in the UK examined archaeological deposits that included material from the classic period of industrialization, and industrial archaeology is now widely recognized as a legitimate archaeological activity and not just a form of heritage conservation (Fig. 1).

Industrial Archaeology, Fig. 1 Museum of London Archaeology excavated in 2011 the remains of the impressive hydraulic accumulator used for goods lifting between the floors of at the Somers Town Goods Yard near St. Pancras Station (©MOLA)

Definition

Some early practitioners of industrial archaeology argued that the discipline was a thematic rather than a chronological one and could range from the prehistoric to the modern period (Raistrick 1972). However, the rapid decline of many traditional industries and the growing recognition of the historic value of textile mills, iron works, and transport networks have led to a general acceptance that industrial archaeology involves the systematic study of standing as well as subsurface structures of the classic period of industrialization from the early modern and modern periods, mainly the early eighteenth to the twentieth century. What characterizes this period is capital investment on a large scale in both buildings and equipment and the organization of the labor force to maximize production. It is with these developments that industrial archaeology is largely concerned, although it must be recognized that "industrialization" began earlier in some industries than others and that therefore an interpretation of a particular site or industry may need to go back to the sixteenth century or earlier. Equally, it is clear that the domestic or home-based method of production continued to coexist with large-scale factory-type production well into the nineteenth century, albeit with many changes in the lifestyle of the workforce (Barnwell et al. 2004).

Industrial archaeology is necessarily an interdisciplinary activity, requiring familiarity with normal archaeological techniques such as landscape surveying, artifact recognition, measured survey, and excavation. However, the discipline has its own needs and skills driven by the material

culture of industrialization. These include some knowledge of the technology and science of the period, an understanding of the contemporary documentary material available to augment archaeological fieldwork, and the ability to record standing industrial buildings and structures and to understand their function within what is often a sequence of industrial processes (Palmer and Neaverson 1998; Palmer et al. 2012).

Historical Background

Industrial archaeology as a discipline originated in the UK in the 1950s, after the postwar preoccupation with renewal had led to the destruction of much of the landscape associated with early industrialization. It is generally agreed that the term was first used in print in 1955 by Michael Rix, staff tutor in architectural history in the University of Birmingham's Department of Extramural Studies, where the surrounding Black Country was witnessing some of the worst of the devastation. Although the efforts to save industrial buildings and structures might more appropriately be termed "industrial heritage," Rix emphasized the importance of an archaeological approach to industrial sites: "the prime task of the industrial archaeologist at the moment is an archaeological one and that is in fieldwork." He also posed a challenge to the archaeological community: "industrial archaeology serves as a useful reminder to the whole archaeological world that the *terminus post quem* of archaeological research is not 55 BCE nor CE 410. The *terminus post quem* of archaeological research is today" (Rix 1967: 18). The cause was taken up by the Council for British Archaeology, which itself had been founded in 1944 in response to wartime devastation and had established its role as a forum for representing the views, ideas, and policies of British archaeology to the government, the media, and the public. The statutory bodies, however, failed to respond to the call to record and save industrial monuments, with the notable exception of Northern Ireland where a publically funded survey had been set up as early as 1956 (McCutcheon 1980). As a result, the early surveys of industrial monuments in the rest of Britain were undertaken largely by volunteers. Their records were collated by Dr. Angus Buchanan at the University of Bath from the mid-1960s, eventually being taken over as part of the National Monuments Record, and many published gazetteers of industrial sites by county followed (Buchanan 1972; Cossons 2000; Palmer 2019).

Similar inventory work on industrial sites followed in Europe, generally with more professional and less amateur involvement than in the UK. Although French historians had for a long time been interested in industrial history, little notice was taken of the industrial sites themselves until the 1970s, and it was not until 1983 that the *Inventaire Générale* began to include industrial sites with the foundation of an industrial heritage group within it, the *Cellule du Patrimoine Industriel*. A long-term project to create a national database of French industrial sites was initiated in 1986, and a similar database project was begun in the Netherlands where responsibility for the industrial heritage passed to the Netherlands Federation of Industrial Heritage, formed in 1984. In Belgium, various categories of industrial buildings were surveyed, particularly water mills and windmills, and a national survey published by Patrick Viaene in 1986. The Scandinavian countries have an important industrial heritage, particularly in mining of copper and iron (Fig. 2), which largely through the efforts of Marie Nisser were increasingly recognized as significant by their governments, while in Denmark, industrial sites, including those of the twentieth century, have been recorded by its National Culture Heritage Agency.

In areas of the world with a shorter written history than Europe, the discipline of historical archaeology was taken to embrace the study of industrial sites and artifacts. It was pointed out in *Australian Pioneer Technology*: *Sites and Relics* (Birmingham et al. 1979) that the use of the term "industrial archaeology" in Australia was inappropriate since the time span of British industrial archaeology embraced the whole of Australian history since European settlement. In the USA, too, many historical archaeologists did not see the need for a different term for the study of industrial sites, since again the majority of their work was

Industrial Archaeology, Fig. 2 Copper mining and smelting have dominated the Norwegian town of Røros since its foundation in the late seventeenth century. Below the slag heaps are the ramshackle wooden workers' houses with their grassed roofs, while the company town is dominated by the late eighteenth-century Baroque church. Mining continued in Røros well into the twentieth century, but the importance of the town's historic remains was carefully conserved and accorded World Heritage status in 1980

concerned with the post-1492 colonial era although generally dealing only with subsurface structures and buried artifacts. Nevertheless, surveys of engineering structures in the USA had been carried out since the 1930s by the Historic American Buildings Survey (HABS), set up as a means of providing work for unemployed architects during the Depression. A pioneering survey of New England textile mills was undertaken by HABS in 1967–1968 (Fig. 3). This was followed by the creation in 1969 of the Historical American Engineering Record (HAER) under the aegis of the National Park Service. The records of these two bodies are maintained by the Library of Congress in what is termed "preservation by documentation" and are among the most heavily used collection in its Prints and Photographic Division. In Australia, the Australian National Trust published lists of industrial sites from the 1960s and went on to conserve many of them at state level, notably the important mining landscapes of gold, copper, and silver at Moonta and Ballarat.

In Britain and Europe, aboveground remains undoubtedly formed the basis of most industrial archaeology in the first half century of its existence as a discipline, and the material culture of the workforce, which might have been obtained through systematic excavation, was neglected. The economic historian Walter Minchinton stated confidently in 1983 that "Industrial Archaeology is not primarily about excavation. The aim of industrial archaeologists is to identify structures, buildings and artifacts early enough to ensure their preservation before they are demolished or destroyed" (Minchinton 1983: 125). On the other hand, Donald Hardesty, in his classic *The Archaeology of Mining and Miners*: *A View from the Silver State* (1988), pointed out that so often the standing buildings, machinery, and landscape features characteristic of many British industrial sites did not survive on US mining sites but "they are rich in trash dumps, residential house foundations, privies and other remains of the miners themselves" and that therefore excavation was

Industrial Archaeology, Fig. 3 Suffolk Mill, Lowell, Massachusetts, on one of the many canals which power turbines for water power for cotton manufacture throughout the city. Built in the 1830s by the Suffolk Textile Company, the mill was taken over by the Wannalancit Textile Company but closed in 1981 and is now in use as both university premises and offices

essential. As he suggested, early industrial archaeology concentrated on the technological analysis of specific industrial sites and areas and failed to consider the behavioral aspects of material culture or the processes of culture change. This justifiable criticism began to be remedied in the 1990s and 2000s, when post-processual approaches in archaeological interpretation led to increasing concern with questions of power and inequality, labor relations, and class formation which are central research themes for industrial archaeology, as in Paul Shackel's *Culture Change and the New Technology*: *An Archaeology of the Early American Industrial Era* (1996). This development clearly brought industrial archaeology into a much closer relationship with the existing subdiscipline of historical archaeology, as already practiced in North America and Australasia. In the UK, too, the excavation of industrial sites and the subsequent classification and identification of recovered artifacts has now become standard practice among professional and even many volunteer archaeologists. An article by Palmer and Orange in 2016 contrasted the attitude of historical and industrial archaeologists to industrial sites over a period of 50 years (Palmer and Orange 2016).

Key Issues/Current Debates

Although the discipline of industrial archaeology has developed a great deal over the past two decades, there are still key issues to be resolved. These can be divided into the largely positive and the largely negative, although each impinges on the other.

On the positive side, the debate over whether anything can be learnt from the excavation of industrial sites has been largely resolved and is now part of normal archaeological practice on brownfield sites. There are, though, several problems that distinguish the excavation of historic-period industry from earlier industries and landscapes, namely, the scale of such sites, the formation processes involved, the contamination

encountered, and the presence of standing buildings. The typical large-scale manufacturing processes of the industrial revolution have all left substantial foundations of the process buildings involved, containing, for example, working floors, furnaces, and kiln bases, and substantial foundations for power systems such as wheel pits, engine houses, boilers, and flues. The excavation of such sites frequently produces large quantities of process residues which can be bulk sampled for scientific analysis as part of a program of research that answers questions about the date, origin, and use of such materials and by implication the nature of the activity from the sample area (English Heritage 2018) (Fig. 4). The availability of labor and the arrival of steam-powered and later combustion engine-powered earth-moving machinery meant that many industrial-period manufacturing sites saw extensive earth-moving which radically changed the look of many preindustrial landscapes; often these changes can only be recorded by combining landscape survey data with the excavation evidence. A major health and safety concern on excavations involving historic industries is contamination, and suitable precautions need to be taken as part of a risk assessment. The cost of large-scale excavations of industrial sites is often very high, but even so many city center sites in the UK have been excavated by professional archaeologists, such as the enormous project to record the archaeology affected by the completion of the M74 motorway round Glasgow (Nevell 2016).

One of the outcomes of developer-funded archaeology, however, has been the fragmentation of archaeological study and the consequent lack of synthesis, which is as true for the industrial period as for earlier periods of archaeology. One solution to this in the UK has been the development of both period-based and regional research frameworks which help to establish the significance of sites and set them in some sort of context. The Association for Industrial Archaeology produced such a

Industrial Archaeology, Fig. 4 The man engine and spoil heaps of the Allihies copper mines on the west coast of County Cork in Ireland. The landscape demonstrates the quantity of process residues usually found on such sites which can reveal considerable evidence about the nature of the activity on such sites

research framework which dealt with a range of approaches to the study of industrial sites and structures and also proposed a list of questions which might be considered when such sites are treated archaeologically, to help further our understanding of the process of industrialization (Gwyn and Palmer 2005). The Historical Metallurgy Society followed with a research framework in 2008 (Bayley et al. 2008). Such research frameworks help to combat the tendency among industrial archaeologists to interpret sites in terms of technological paradigms and encourage them to see their sites in a wider context, both nationally and internationally.

One of the negative issues on a global front is a decline in new entrants into work on industrial archaeology, even in the UK where the industrial heritage is generally recognized as a key element of Britain's contribution to world culture. Many university-based archaeology courses now include some industrial archaeology, usually under the broader term of historical archaeology, but there are few staff members who have the necessary knowledge to acquaint students with the fundamental principles of the discipline. Even at the postgraduate level, there are few courses available. The pioneering master's degree course at the Ironbridge Institute in the UK, now based in the University of Birmingham, concentrates more on general heritage management. The Master of Science in Industrial Archaeology at Michigan Technological University in the USA is one of the very few which trains students in the archaeology of industrial sites, while the Institute of Industrial Archaeology, History of Science and Technology at the German Technical Museum of Freiburg concentrates more on the aboveground structures in its bachelors' and masters' courses. Professional archaeologists in most areas have, therefore, to develop the skills necessary for industrial archaeology in the course of their working lives, or through distance learning or continuous professional development courses, which remain few in number.

Finally, standing structures are frequently found on industrial sites, and the study and understanding of the buildings of industry have formed a central feature of industrial archaeology since the inception of the subject. Since industrial buildings and process structures tend to be spread over a large area, it is necessary at the outset to identify the types of buildings surviving on a site and to prioritize the recording appropriately. It is important to be able to recognize the significant features of industrial buildings which indicate their past functions as well as the remains of the long-gone fixtures and fittings (Richards 1958). As in the case of excavation of industrial sites, this is an acquired skill for which training is needed and the Council for British Archaeology's *Industrial Archaeology: A Practical Handbook* provides a helpful guide (Palmer et al. 2012). However, traditional industries continue to contract, and the future for many of these buildings lies in their adaptive reuse. Large industrial buildings are particularly difficult to adapt for modern purposes, while the sheer scale of some historic industrial processes, such as mining, quarrying, and mass production, can be a conservation challenge in itself. In England, English Heritage identified the industrial heritage as the theme for its 2011 Heritage at Risk program, pointing out that nearly 11% of grade I and II∗ industrial buildings are at risk, far higher than the 3% of grade I and II∗ buildings of other types which are at risk in England (English Heritage 2011). The high costs of conversion and, in some cases, decontamination remain a deterrent to many developers, particularly if the buildings are in areas of low property values. Nevertheless, there are many examples of successful reuse around the world, even such difficult sites as iron furnace complexes at Sloss in Birmingham, Alabama, USA, and Duisberg in the Ruhr district of Germany. Where adaptive reuse proves impossible, then preservation by record remains the only option, and it is essential to ensure that this is done before demolition.

International Perspectives

In 1983, the journal *World Archaeology* devoted a volume to industrial archaeology (Vol. 15. No. 2, 1983). In his overall survey of world industrial archaeology, Minchinton suggested that industrial archaeology had been one of the more

successful British postwar exports but that he hoped that a similar survey in 10 years' time would be able to report on a more extensive geographical activity, a widened topical scope, and a greater professionalism in industrial archaeology throughout the world (Minchinton 1983: 134). On the whole, these three objectives have been achieved. The Web site of the International Committee for the Conservation of the Industrial Heritage, TICCIH, founded in 1978, includes a list of those countries undertaking recording of the industrial heritage. For example, the Society for Industrial Archaeology in the USA, formed in 1971, and the Association for Industrial Archaeology in the UK, dating from 1973, both seek to promote the study and practice of industrial archaeology, as do the *Comité d'information et de liaison et de promotion de l'archéologie industrielle* (CILAC) in France, founded in 1978, and the *Asociación Vasca de Patrimonio Industrial y Obra Pública* (*AVPIOP*) in Spain, founded in 1984. The narrow concentration on the archaeology of production which marked the early years of industrial archaeology has been considerably widened to include the archaeology of consumption, with consideration of the significance, use, and distribution of the artifacts of the period as well as the social context of their manufacture. Finally, as suggested earlier, the rapid decline of traditional industry, especially in the western hemisphere, has led to a far greater participation by professional archaeologists on historic-period industrial sites, especially in the context of developer-funded archaeological excavation. However, individual countries tend to concentrate on their own particular sites and products, and more comparative studies are needed to explore the importance of technology transfer and the impact of global trade (Palmer and Neaverson 2000) (Fig. 5). TICCIH, as the

Industrial Archaeology, Fig. 5 Linares in the Andalusian province of Jaén in Spain became an important center in the nineteenth century for the mining and smelting of lead. The Cornish engine houses on this site of La Tortilla demonstrate the transfer of mining technology, which was replicated in many other parts of the world

recognized advisor to ICOMOS on industrial heritage, could do more to facilitate this. The Nizhny Tagil Charter, passed by the assembled delegates at the triennial National Assembly of TICCIH held in Moscow on July 17, 2003, concentrates more on industrial heritage than the comparative study of industrial archaeology, which is anyway necessary for site interpretation (Nizhny Tagil Charter 2003). TICCIH has also widened its scope to recognize the differences from Europe in the physical manifestations of industrialization and industrial heritage of Asia, expressed in the Taipei Declaration for Asian Industrial Heritage (Taipei Declaration 2012).

The international value of the industrial heritage has also been recognized through the designation by the United Nations Educational, Scientific and Cultural Organization (UNESCO) of more than 60 World Heritage Sites since 1978 whose significance is mainly industrial. The distribution of these on a global basis is uneven, depending on when specific countries became members of UNESCO or, in some cases, withdrew from the organization for political reasons; the USA was not a member from 1985 to 2003, for example. The sites range from Røros Mining Town in Norway, inscribed in 1980; the Ironbridge Gorge in the UK, including the world's first iron bridge of 1779 (Fig. 6), which was inscribed in the first tranche of UK World Heritage Sites in 1986; the UK's pioneering textile sites of the Derwent Valley, New Lanark, and Saltaire in 2001; the Humberstone and Santa Laura Saltpeter Works in the Atacama desert of Chile, inscribed in 2005; the Iwami Ginzan Silver Mine and its cultural landscape in Japan in 2008; and the Erzgebirge/Krušnohoří Mining Region, inscribed in 2019. The pace of such designations has decreased in

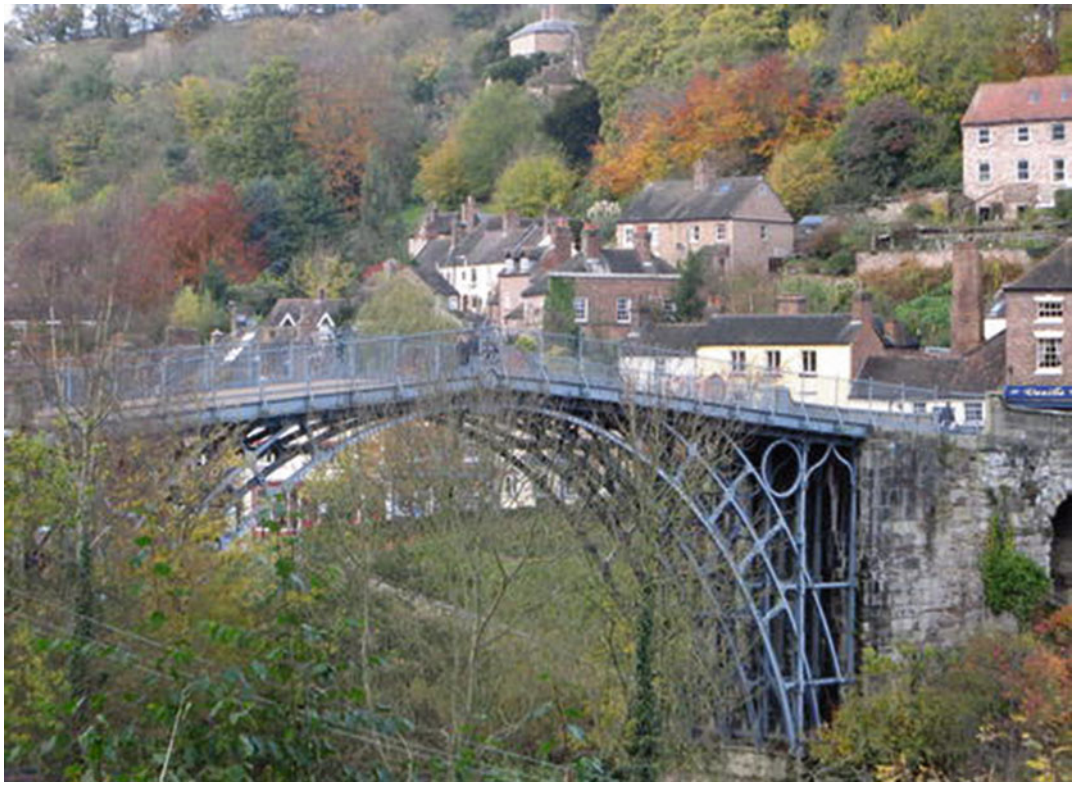

Industrial Archaeology, Fig. 6 The Ironbridge across the Severn Gorge in Shropshire, the world's first iron bridge, cast in Abraham Darby's Coalbrookdale foundry in 1777 and erected in 1779. Now in the care of English Heritage, the bridge was originally saved by the Ironbridge Gorge Museum Trust and is the centerpiece of an industrial landscape accorded World Heritage status in 1986

recent years with the recognition of the need to ensure adequate management of inscribed sites, especially industrial ones, where the balance between heritage value and modern redevelopment is often difficult to maintain.

Future Directions

Industrial archaeology has been extremely successful in achieving what its pioneers set out to do – achieve recognition for the importance of the remains of the industrial past and where possible their survival in the contemporary landscape. Nevertheless, as the 2011 English Heritage "Industrial Heritage at Risk" initiative has shown, the industrial heritage remains at risk from many quarters, not just neglect and redevelopment. The global recession has led to massive funding cuts which impact on archaeological services, and it is not clear how far current levels of protection for archaeological sites within the planning process will be maintained.

Nevertheless, the discipline has matured in the half century of its existence, moving away from technologically dominated explanations of the remains of the industrial past toward a greater concentration on the social context of industrialization, with, for example, studies of workers' housing and the spatial analysis of mills and factories to try to understand how people and machines functioned as a whole (Fig. 7). Studies of industrial landscapes have explored ways in which these not only manifest the physical remains of industrial processes but also embody evidence for past hierarchical power relations in the layout of settlements. The dawn of a new century has also led to a greater interest in the

Industrial Archaeology, Fig. 7 Blind-back housing in the Kartuizerlaan beluik in Ghent, Belgium. Built as workers' housing in between cotton mills in the nineteenth century, many of the beluiks have been adapted for modern gated housing

Industrial Archaeology, Fig. 8 Pozo n° 5 at La Reunión, a coalmine worked in the past by the railway company MZA (Madrid-Zaragoza-Alicante) and located in Villanueva del Río y Minas in the province of Seville, Andalucía. The ornamental tower is an electricity generating station dating from 1926. The site is listed as "Bien de Interés Cultural," the highest category in Spain, but there is currently no conservation being undertaken

industrial remains of the twentieth century, particularly in countries where industrialization came rather later than in the UK where concern for the eighteenth-century structures dominated the early years of the discipline.

Nevertheless, industrial archaeology remains a discipline in tension, which seeks to maintain a balance between investigative archaeological techniques which can lead to destruction of sites and the preservation of sites and structures for posterity (Fig. 8). It will doubtless continue to do so, and its vigor lies in both the continuing participation of volunteer activists like those who saved industrial sites in the middle of the twentieth century and valuable work of professionals who have increasingly undertaken recording and excavation of industrial sites as part of their normal routine.

Cross-References

- ► Arqueologia Industrial
- ► Association for Industrial Archaeology (AIA)
- ► Council for British Archaeology (CBA)
- ► Historical Archaeology
- ► Historical Metallurgy Society Ltd.
- ► Industrial Heritage in Archaeology
- ► Ironbridge Gorge Museum Trust (IGMT)
- ► Landscape Archaeology
- ► Modern World: Historical Archaeology
- ► Museos de Real de Monte
- ► Palmer, Marilyn
- ► Post-Medieval Archaeology
- ► Society for Industrial Archeology (SIA)
- ► Volunteers in Archaeology
- ► World Heritage Objectives and Outcomes

References

Barnwell, P.S., M. Palmer, and M. Airs, eds. 2004. *The vernacular workshop*, Council for British archaeology research reports. Vol. 140. York: Council for British Archaeology.

Bayley, J., D. Crossley, and M. Ponting, eds. 2008. *Metals and metalworking: A research strategy for archaeometallurgy*, Historical metallurgy society occasional publication. Vol. 6. Wakefield: The Charlesworth Group.

Birmingham, J., R.I. Jack, and D. Jeans. 1979. *Australian pioneer technology: Sites and relics*. Richmond: Heinemann.
Buchanan, R.A. 1972. *Industrial archaeology in Britain*. London: Pelican.
Cossons, N., ed. 2000. *Perspectives on industrial archaeology*. London: Science Museum.
English Heritage. 2011. Industrial heritage at risk. Available at: http://www.english-heritage.org.uk/caring/heritage-at-risk/industrial-heritage-at-risk/. Accessed Dec 2011.
English Heritage. 2018. Science for historic industries; guidelines for the investigation of 17th- to 19th-century industries. https://historicengland.org.uk/images-books/publications/science-for-historic-industries/
Gwyn, D., & M. Palmer. (ed.) 2005. Understanding the workplace. A research framework for industrial archaeology in Britain. *Industrial Archaeology Review* 27. Available at: https://doi.org/10.1179/030907205X50441. Accessed 4 May 2012.
Hardesty, D. 1988. *The archaeology of mining and miners: A view from the silver state*, Special publication number. Vol. 6. Ann Arbor: The Society for Historical Archaeology.
McCutcheon, W.A. 1980. *The industrial archaeology of Northern Ireland*. Belfast: HMSO.
Minchinton, W. 1983. World industrial archaeology: A survey. *World Archaeology* 15: 125–136. Available at: https://www.jstor.org/stable/124646. Accessed 20 Mar 2012.
Nevell, M. 2016. *The birth of industrial Glasgow*. Edinburgh: The Society of Antiquaries of Scotland.
Nizhny Tagil Charter. 2003. Available at: http://www.mnactec.cat/ticcih/industrial_heritage.htm. Accessed 30 Apr 2012.
Palmer, M. 2019. Industrial archaeology. Oxford bibliographies. https://doi.org/10.1093/OBO/9780199766567-0181. https://www.oxfordbibliographies.com/view/document/obo-9780199766567/obo-9780199766567-0181.xml?rskey=LSVhSm&result=104#firstMatch
Palmer, M., and P.A. Neaverson. 1998. *Industrial archaeology: principles and practice*. London/New York: Routledge.
Palmer, M., and P.A. Neaverson. 2000. *From industrial revolution to consumer revolution; international perspectives on the archaeology of industrialization*, Transactions of the TICCIH millennium congress. Leeds: Association for Industrial Archaeology.
Palmer, M., and H. Orange. 2016. The archaeology of industry; people and places. *Medieval Archaeology* 50 (1): 73–91. https://doi.org/10.1080/00794236.2016.1169812.
Palmer, M., M.D. Nevell, and M. Sissons. 2012. *Industrial archaeology: A handbook*, Council for British archaeology practical handbook. Vol. 21. York: Council for British Archaeology.
Raistrick, A. 1972. *Industrial archaeology: An historical survey*. London: Eyre Methuen.
Richards, J.M. 1958. *The functional tradition in early industrial buildings*. London: The Architectural Press.
Rix, M. 1967. *Industrial archaeology*. London: The Historical Association.
Shackel, P.A. 1996. *Culture change and the new technology: An archaeology of the early American industrial era*. New York: Plenum Press.
Taipei Declaration on Industrial Heritage. 2012. http://ticcih.org/about/charter/taipei-declaration-for-asian-industrial-heritage/

Further Reading

Barker, D., and D. Cranstone, eds. 2004. *The archaeology of industrialization*, Society for post-medieval archaeology monograph. Vol. 2. Leeds: Maney.
Casella, E.C., and J. Symonds, eds. 2005. *Industrial archaeology: Future directions*. New York: Springer.
Horning, A., and M. Palmer, eds. 2009. *Crossing paths or sharing tracks?* Society for Post-Medieval Archaeology Monograph. Vol. 5. Woodbridge: Boydell and Brewer.
Knapp, A.B.., V.C. Pigott, and E.W. Herbert, eds. 1988. *Social approaches to an industrial past: The archaeology and anthropology of mining*. London: Routledge Press.
Rynne, C. 2006. *Industrial Ireland 1750–1930: An archaeology*. Cork: The Collins Press.
Trinder, B., ed. 1992. *The Blackwell encyclopaedia of industrial archaeology*. Oxford: Blackwell.

Industrial Archaeology, Australia

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Introduction

Since colonization in 1788, the Australian continent has been part of the global economy. Industry has left substantial traces in the landscape, deforestation, infrastructures, and industry-specific artifacts, some of which have been archaeologically investigated. Archaeological research is usually undertaken as part of heritage management plans or as part of large-scale development, especially in the mining industry.

This entry discusses industries created between 1788 and 1901, excluding defense.

Definition

Industrial archaeology deals with the material remnants of an organized system of labor and its people. Industry has been a major component of

Australia's settler history, and there are significant remains, some of which have been investigated archaeologically.

Historical Background

Academic Teaching and Publishing

Industrial archaeology was at first a fieldwork exercise for external or undergraduate students and did not become an academic discipline – under the rubric "historical archaeology" – until the 1970s. It is now widely taught, still as part of historical archaeology, because the two cannot be dissociated given the importance of industry to Australia's settler history (Connah 1993). Academic theses often deal with specific sites or processes, and much of that research is published in *Australasian Historical Archaeology* established in 1983 (AHA, online, indexed) or in the *Journal of Australasian Mining History*, established in 2003 (JAMH, online). Researchers also publish internationally (e.g., Stuart 2013).

Corporate Work

Australia has several specialist consulting firms with well-qualified personnel. They usually undertake archaeological investigation as part of a heritage listing – at national, state, or local level. Many projects include parallel studies of Indigenous and settler sites. Reports are part of the listing and may be available on the relevant authority's website (e.g., Vines and Yugovic 2011; Bell 1995). Consultant reports for private firms are often confidential, but parts may be published in academic journals.

Sites of national significance are listed on the National Heritage List (NHL, online) which gives full details and references. Significant engineering heritage is recognized by Engineers Australia (EHRP, online).

Australia's Industrial Development

Britain's colonization of Australia was part of a larger, global enterprise. The penal colonies (1788–1869) operated on an industrial basis from the start, insofar as all aspects of life were controlled by the state, acting as an employer. Manufacturing was not encouraged, and any useful raw materials were to be processed in Britain. Industrial processes were minimal and most work was still done by hand. Convicts built roads and harbors, made bricks, felled timber, and operated coal mines in the first stages of settlement (Gojak 2001).

By the 1830s many convicts had served their jail time but were still stranded in an environment very different from their homelands. The settler population now included former British military personnel and free emigrants, some of whom had come to join convict relatives, others to escape grinding poverty in Britain and Ireland. All of these people applied for grants of land from the colonial government. There was a general and unjustified feeling of optimism. The settlers were encountering unknown conditions and, disastrously, did not understand about the climatic effects of the El-Niño Southern Oscillation (ENSO), which may cause severe and prolonged droughts. As a result, much of the nineteenth and early twentieth centuries were periods of agricultural boom-and-bust.

Pastoralism: Sheep, Cattle, and Camels

By the 1820s there had been substantial exploration of the southeastern coastal areas, and it had become obvious that much of its hinterland could feed domesticated livestock. This was the start of what would become a key industry: wool production. Enormous tracts of land were given to entrepreneurs, such as the Australian Agricultural Co., granted 1 million acres in 1824 in New South Wales (NSW), or the Van Diemens Land Co., granted 250,000 acres in 1825 in what is now Tasmania (Tas). Other pastoralists, the "squatters," simply seized land. The effect on the Indigenous population was disastrous, with destruction of habitat, dispossession, thefts of women, and massacres (e.g., Myall Creek, NSW, see Lydon and Ryan 2018). Successive governments generally ignored these crimes, and impunity remained the norm well into the twentieth century, as wool was so profitable and developed so rapidly: Australia's exports rose from 8000 bales in 1830 to 137,000 in 1850. Sheep numbers rose from 1 million in 1830 to an all-time high of 85 million

in 1890, by which time much of the continent had been opened up for stock raising.

From an archaeological point of view, there are two salient characteristics of pastoralism: changes in the landscape and the development of a layout for sheep "stations," including paddocks, shearing sheds, men's quarters, and an owner's or manager's "homestead." These structures were usually made of wood and recycled as required, so that few stations are still in their original condition. They are, however, well documented through business records, images, newspaper articles, and personal recollections, e.g., the Brickendon Estate, Tas, now on the National Heritage List (NHL).

Cattle pastoralism followed sheep pastoralism in much the same areas where appropriate fodder and water were available; however, meat was not exportable until the development of suitable refrigeration techniques in the 1880s. At around the same time, it became possible to sink "bores" into the aquifer – the Great Artesian Basin, c. 65,000 km^2 – which underlies about one fifth of Australia's landmass. Groundwater is pumped up through metal windmills which are now one of the most distinctive features of pastoral stations. Four thousand seven hundred bores are said to have been drilled, enabling a massive expansion of cattle-raising, which today is still concentrated over the Basin, and supporting up to 16 million head of a total herd of 26 million.

The layout of a cattle station is very similar to that of a sheep station. Both covered a lot of land, and the animals were managed by stockmen who had to be proficient on horseback, so an ancillary form of pastoralism was that of horse breeding. The "Walers" – horses crossbred in New South Wales – proved to be good cavalry mounts and were supplied to the British forces in India for almost a century (1840s–1930s). Stock horses were similar to the Walers and many were taken by their owners to serve in World War I. The stockman has been mythologized almost as much as American cowboys and gauchos and is now celebrated in the Stockman's Hall of Fame at Longreach, Queensland (Qld).

Camels were used as pack-animals in the arid zones of central and Western Australia. They were introduced in the 1860s, along with their handlers, usually referred to as "Afghans." Over time camels were more widely used, and between 1906 and 1910 they were employed by the government of Western Australia (WA) in an ambitious though ultimately useless project, the Canning Stock Route (CSR). The CSR, named after its surveyor, was an 8 km-wide track driven through desert to bring livestock 1770 km from northern WA properties to the southern markets. The industrial remains are those of the track itself and of wells and troughs sunk at regular intervals (Grimwade 1998; Bianchi 2013). As local Indigenous people were coerced into giving information about finding water, the heritage-listed route also has a substantial Indigenous history.

Pastoralism required a significant amount of seasonal labor, for fencing, mustering, shearing, and moving stock. Much of this labor was supplied by itinerant workers, moving from station to station, where they were housed, fed, and paid. Disputes over wages, especially for shearing, led to the formation of unions and a major strike in 1891, when 4500 workers gathered at Barcaldine, Qld (Egloff et al. 1991). However, in northern and Western Australia, much of the work was done by local Indigenous people, living in camps where they were given minimal supplies of tea, flour, and sugar, but had neither wages nor civil rights (Morgan 1989). These conditions prevailed until the 1960s when Indigenous workers took political action by walking off the stations (NHL, under Wave Hill Walk-Off). This was the start of an Australia-wide change of policy toward Indigenous people.

Food Production

Although much of Australia's land area, 762 million hectares, is arid or dry land, there is abundant rainfall along the eastern and southeastern coasts, and, overall, about 200 million hectares are suitable for cultivation. Given that the climate zones range from tropical to cool temperate, those areas can produce a wide variety of food, and today Australia exports wheat, raw sugar, wine, fruit, and dairy products. Wheat is produced through rain-fed agriculture in the "sheep-wheat belt" where seasonally fallow land serves as pasture

for sheep. Today these areas carry over two-thirds of the total flock of 72 million sheep.

Food production is inevitably localized, and most regions will have their own specialized sites, museums, or heritage trails. Few have been investigated archaeologically, but the potential is there, as food industries have developed in situ and retained traces of their past. Cheese, for instance, has been made at Bega in southeastern NSW since the 1860s, while wine has been produced in the Hunter Valley, in NSW, since the 1820s and in the Barossa Valley in South Australia (SA) since the 1850s. A report on Tasmania's apple industry, which has operated since the 1830s, identified 2000 places, of which 446 have survived (McConnell and Servant 1999). Breweries were created in the larger towns, and many of their buildings have been retained.

Some industries are well documented historically but understudied archaeologically. This is particularly true of the Queensland sugar plantations which were worked by indentured Pacific Islanders from 1860 to 1900. Substantial relics include a kilometer-long causeway, manually constructed in 1884, at Habana, near Mackay, and a small stretch of the much longer Sugar Wagon Trail, also built in 1884, to bring sugar from the Yeppoon Mill to the coast near Rockhampton over 45 km away.

Communications

Railways have been keys to Australia's industrial development, since so much production was intended for export. Stock could be walked ("droved") to the ports, but it was impracticable to transport large quantities of wool, wheat, or flour by bullock cart. Accordingly, the early railways mirrored the pattern of pastoral and mining development and, regrettably, of colonial rivalries, each colony determining its own routes and gauges, a situation which was not normalized until the 1970s (Cremin 2001: 62–63). Equipment was imported from Britain. In the wheat belt, the railway stations are flanked by flourmills, generally quite substantial buildings. The railways enabled small towns to survive, and today many of these towns have railway preservation societies which maintain both tracks and engines. City railway stations were monuments of civic pride, and are all conserved, some with innovative remodeling, such as the Eveleigh Carriage Works in Sydney (1888–1989) which has been repurposed into a cultural venue.

An important development for colonial Australia was the Overland Telegraph which enabled it to communicate with Britain. It ran north 3178 km from Port Augusta, SA, to Darwin, right through the deserts of central Australia, with repeater stations every 120 km (Cremin 2001: 10–12). At the newly created settlement of Darwin (then called Palmerston), it linked up with a submarine system going via Indonesia and India to Suez. Built in 26 months, it was an astonishing achievement which enabled politicians and investors in Britain to keep track of Australian developments. At a humbler level, it also provided some services to isolated communities. In 1877 it was supplemented by one running across the Nullarbor between South and Western Australia, which in 1889 ran its own line from Perth to Java via Broome (EHRP, under Broome Court House).

Maritime Industries

As an island colony, eighteenth and nineteenth century Australia was totally dependent upon sea traffic, which was supposedly regulated by Britain. However, American and French ships could avoid whatever regulations were in place, and in practice there was quite a lot of non-British presence in Australian waters. Locally built ships carried the coastal trade. All colonial (now state) capitals were close to the coast, with ports that had appropriate harbor, revictualling, and storage facilities, wool warehouses being particularly impressive buildings. The oldest and best-studied harbor is that of Sydney, which was created in 1788 (Kelly 1997; Johnson and Parris 2008) and has managed to preserve many traces of the convict period around Sydney Cove. Hobart, Tas, was founded in 1803 and Darwin, NT, in 1870.

The other capitals, Adelaide, SA, Brisbane, Qld, Melbourne, Vic. and Perth, WA, were on rivers some kilometers inland. A convict settlement was created in 1823 at Moreton Bay, which served as port for Brisbane; Fremantle Port and Perth town were created together in 1829, and

Port Adelaide was created in 1836, but Melbourne, which had been settled overland rather than by sea, did not get a seaport until 1877. All of these places contain substantial heritage items and museums. There were few inland ports, but the one at Echuca, Vic, was vital to the wool trade, with wool carried on paddle steamers. It operated between 1867 and the 1880s when the railways took over (NHL, under Echuca Wharf).

Whaling and sealing were important industries throughout the nineteenth century and have been very well studied (Lawrence and Staniforth 1998; Paterson 2006). A less well-known industry, but longer-lasting, has been pearling, carried out all along the northern coasts since the 1860s. The first divers were unpaid Indigenous people with some indentured labor from the Pacific and Indonesia, but after the 1880s the industry employed Japanese and Chinese deep-sea divers (Edwards and Yu 2018). It has been largely responsible for the growth of Broome, WA.

Mining

Mining, both Indigenous and immigrant, is by far the most studied aspect of Australian industrial archaeology. Mine shafts for extracting silica were dug into Koonalda Cave, SA, over 20,000 years ago (NHL under Koonalda), and there is a millennia-long tradition of Indigenous ochre mining (NHL, under Wilgie Mia Ochre Mine; Sagona 1994). Colonial mining started in 1796 with the discovery of coal in the Hunter Valley of New South Wales – presciently named by Captain James Cook in the 1770s. The convict establishment at Newcastle, NSW, exported coal to British India and is still a major coal port. The first metal ores were found in South Australia, silver-lead (1841) and, more significantly, copper from 1843 which enabled the colony to survive, with an influx of copper miners from Cornwall, led by their "captains" (NHL, under Australian Cornish Mining Sites). The next breakthrough was the discovery of gold in 1851 in both NSW and Victoria, precipitating "rushes" that effectively peopled Australia. Victoria's population went from 10,000 in 1840 to 500,000 in 1860. The new immigrants came from all walks of life, from dockworkers to lawyers, and started to assert civil rights which up till then had been strictly controlled by Britain (NHL, under Eureka Stockade Gardens).

The colonies now had economic clout, as the hunt for minerals spread across the continent in a "rush that never ended" (Blainey 2003). Silver was discovered on pastoral stations in the extreme west of NSW at Silverton in 1881, and in 1883 at Broken Hill, which is said to have one of the world's largest deposits of zinc and lead (NHL, under City of Broken Hill). A public company was formed in 1885 (now BHP Billiton), but there were problems with processing sulfide ores that were not resolved until 1903. The discovery of gold at Kalgoorlie, WA (1893), opened up a hitherto underpopulated region of southeastern Western Australia. A major spin-off from that was the construction between 1896 and 1903 of a 560 km-long pipeline bringing water from Mundaring Weir, near Perth (NHL, under Goldfields Water Supply Scheme). Opal was picked up around the Great Artesian Basin region from the 1880s, but not effectively mined until the 1910s.

From the archaeological point of view, there are mining remains almost everywhere in rural Australia. Ghost towns are numerous though not usually spectacular, as everything portable has been removed –some are now within national parks, e.g., Mt. Alexander, Vic. or Hill End, NSW. Other mines are being reworked, e.g., Cadia, NSW. There are also substantial remains of the early attempts at ironmaking, which culminated in the creation of the first steelworks at the coal town of Lithgow, NSW, in 1901 (Jack and Cremin 1994).

The sudden wealth brought about by mining had an enormous effect on social life. Government control ensured the creation of reasonably ordered towns to which mineral seekers were encouraged to bring their families (e.g., Lawrence 2005). However, increased Chinese immigration caused conflict, resulting in the infamous White Australia Policy (1901–1973). Optimism in the mining and allied industries led to confident and strong popular movements, especially at Broken Hill and Kalgoorlie. All of this hastened the rise of self-government, eventually leading to the Federation of the various colonies into the Commonwealth of Australia in 1901 (Cremin 2001).

Key Issues/Current Debate

The perennial problem is the cost of industrial archaeology. Few institutions want to invest in it, unless forced to do so by heritage legislation. There are also negative views of industry, particularly if it was dangerous or dirty. Attitudes can be changed but it takes time, which most archaeologists don't have. However, the booming interest in both local and family histories means that many Australians, including Indigenous people, find a personal resonance in private research on specific places and processes.

International Perspectives

Australia's industrial archaeology is well within international norms. Because of Australia's entangled Indigenous and immigrant histories and also its "dark" past as a penal colony, it has been innovative in the recognition of the social effects of industrialization and also in an understanding of globalization. However, it has paid relatively little attention to the environmental effects of industry.

Future Directions

Australian industrial archaeology will become more global, and it is likely there will be more comparative research into similar colonial societies, such as Argentina, South Africa, or Siberia. There will be more research into the history of minority groups involved in the various industries and, perhaps, some reflection on modern industry's role in the Anthropocene.

Cross-References

- ▶ Environmental Archaeology and Conservation
- ▶ Glass: Conservation and Preservation
- ▶ Historical Archaeology
- ▶ Society for Historical Archaeology (SHA) (Modern World Archaeology)

References

Bell, P. 1995. Devonport mine near Black Bluff, Tasmania. Available at: http://flinders.academia.edu/PeterBell. Accessed 20 Dec 2018.

Bianchi, P. 2013. *'Work completed, canning': A comprehensive history of the canning stock route 1906–2010*. Carlisle: Hesperian.

Connah, G. 1993. *The archaeology of Australia's history*. Melbourne: Cambridge UP.

Cremin, A., ed. 2001. *1901: Australian life at Federation*. Kensington: UNSW Press.

Edwards, T., and S. Yu. 2018. *Lustre: Pearling and Australia*. Welshford: W.A. Museum.

Egloff, B., M. O'Sullivan, and J. Ramsay. 1991. Archaeology of the 1891 shearers' war: The main strike camp at Barcaldine, Queensland. *Australasian Historical Archaeology* 9: 63–75. Available at: http://www.asha.org.au/journal-back-issues.html Accessed 10 Dec 2018.

Gojak, D. 2001. Convict archaeology in New South Wales: An overview of the investigation, analysis and conservation of convict heritage sites. *Australasian Historical Archaeology* 19: 73–83. Available at: http://www.asha.org.au/journal-back-issues.html Accessed 10 Dec 2018.

Grimwade, G. 1998. The canning stock route: Desert stock route to outback tourism. *Australasian Historical Archaeology* 16: 70–79.

Jack, I., and A. Cremin. 1994. *Australia's age of iron. History and archaeology*. South Melbourne: Oxford UP.

Johnson, W., and R. Parris. 2008. *A history of Sydney's Darling Harbour*. Sydney: Sydney Harbour Foreshore Authority.

Kelly, M. 1997. *Anchored in a small cove: A history and archaeology of The Rocks, Sydney*. Sydney: Sydney Cove Authority.

Lawrence, S. 2005. Colonisation in the industrial age: The landscape of the Australian gold rush. In *Industrial archaeology: Future directions*, ed. E.C. Casella and J. Symonds, 279–298. New York: Springer.

Lawrence, S., and M. Staniforth. 1998. *Archaeology of whaling in southern Australia and New Zealand*. Gundaroo: ASHA & AIMA.

Lydon, J., and L. Ryan. 2018. *Remembering the Myall Creek massacre*. Kensington: NewSouth.

McConnell, A., and N. Servant. 1999. *History and heritage of the Tasmanian apple industry: A profile*. Report of the Queen Victoria Museum and Art Gallery. Launceston: QVMAG.

Morgan, S. 1989. *Wanamurraganya: The story of Jack McPhee*. Fremantle: Fremantle Arts Centre.

Paterson, A. 2006. The Sleaford Bay Tryworks: Industrial archaeology of shore based whaling stations. Available at: https://ehlt.flinders.edu.au/archaeology/department/publications/MAMARS/index.php. Accessed 10 Dec 2018.

Sagona, A. 1994. The quest for red gold. In *Bruising the red earth: Ochre mining and ritual in Aboriginal Tasmania*, ed. A. Sagona, 8–38. Carlton: Melbourne

UP. Available at: http://unimelb.academia.edu/AntonioSegona Accessed 10 Dec 2018.
Stuart, I. 2013. Identifying industrial landscapes. In *Industrial heritage re tooled: The TICCIH guide to industrial heritage conservation*, ed. J. Douet, 48–54. Lancaster: Carnegie. Available at: http://sydney.academia.edu/Iain.Stuart Accessed 10 Dec 2018.
Vines, G., and G. Yugovic. 2011. *Fossil Beach Cement Works heritage study*. Report for Mornington peninsula shire. Biosis Research. Available at: https://www.mornpen.vic.gov.au/files/assets/public/new-website-documents/building-amp-planning/heri. Accessed 10 Dec 2018.

Further Reading

AHA=Australasian Historical Archaeology. Back issues available at: http://www.asha.org.au/journal-back-issues.html
Bashford, A. 2013. In *The Cambridge history of Australia*, vol. 1, chapters 3–5 and 7, ed. S. Macintyre. Cambridge, UK: Cambridge UP.
Blainey, G. 2003. *The rush that never ended: A history of Australian mining*. 5th ed. Carlton: Melbourne UP.
Blewett, R.S., ed. 2012. *Shaping a nation: A geology of Australia*. Canberra: Geoscience Australia and ANU E Press.
EHRP=Engineering Heritage Recognition Programme. https://portal.engineersaustralia.org.au/system/files/engineering-heritage-australia/nomination-title/
JAMH=Journal of Australasian Mining History. Back issues available at: http://www.mininghistory.asn.au
Karskens, G.E. 2009. *The colony: A history of early Sydney*. Sydney: Allen & Unwin.
NHL=National Heritage List. Available at: http://www.environment.gov.au/heritage/places/national-heritage-list. Accessed 10 Dec 2018.
Pearson, M., and J. Lennon. 2010. *Pastoral Australia, fortunes, failures and hard yakka: A historical overview 1788–1967*. Collingwood: CSIRO.

Industrial Heritage Association of Ireland (IHAI)

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Basic Information

The present Association was formed in 1997, although there had been a similar grouping of persons with an interest in industrial heritage operating in the 1970s. The focus of the Association is based on making the general public more aware of their industrial heritage, of assisting them in understanding the importance to future generations of conservation, preservation, survey, and identification of important sites, and to this end aims to recruit members and identify those who would actively participate and inform on industrial heritage throughout the island of Ireland. The Association was incorporated into a limited liability company in 2005. An Executive Committee, comprising the Officers of the Association (president (Brendan Delany in 2013), vice-president, secretary, and honorary treasurer) and up to ten ordinary members, elected by members at the Annual General Meeting is responsible for administration of the Association and its affairs.

Major Impact

Since the Association was formed, it has organized excursions to industrial heritage sites, and its members have conducted surveys and contributed through a regular newsletter to matters of industrial interest. Its members are provided with a forum on its website www.ihai.ie to enable them to discuss industrial heritage matters, and various papers have been written by members and those associated with industrial archaeology and presented at conferences held at irregular intervals (see Further Reading).

The Association held an important Networking Conference in conjunction with the Heritage Council, which was held at Dublin Castle in November 2006. In this the Environment and Heritage Service (Northern Ireland) and the Office of Public Works participated. The results of the Conference have provided some understanding in government circles of Ireland's industrial heritage and its importance in tourism and in cross border connections. A Working Heritage Report was adopted by the Heritage Council, but regrettably the report has not yet been acted upon to any significant extent.

The issues which emanated from this Report constitute some of the current aspects that are so

important for further progress towards an assimilation of the subject by responsible bodies:

- Raise awareness of the work done by many groups and agencies.
- Promote an integrated approach to the conservation of industrial heritage.
- Involve all parties in debate, discussion, and policy formation.
- Identify the main issues facing the sector.
- Encourage a survey of industrial heritage, to add to the Northern Ireland survey.
- Become an umbrella to represent the sector, be a channel for enquiry, and be a referral point.

The Association has enlarged its membership and widened its publicity towards representation on industrial heritage. It now, with the help of other interested parties, plans to provide a platform for industrial archaeological studies in conjunction with leading technological companies, who are aware of the importance of the past that made their future possible, and are prepared to address and support the Association's activities.

In today's world new technology becomes old even more quickly, and the Association intends to continue to archive material from past industries.

Cross-References

► Arqueologia Industrial
► Association for Industrial Archaeology (AIA)
► Industrial Archaeology

Further Reading

Hamond, F., and M. McMahon. 2002. *Recording and conserving Ireland's industrial heritage: An introductory guide*. Dublin: Heritage Council Available at: http://www.heritagecouncil.ie/fileadmin/user_upload/Publications/Archaeology/Industrial_Heritage_Guide.pdf.

Industrial Heritage Association of Ireland. 1997. *Power from steam*. Dublin: The Industrial Heritage Association of Ireland (available upon request; email to info@ihai.ie).

Industrial Heritage Association of Ireland. 1998. *Taking stock of Ireland's industrial heritage*. Dublin: The Industrial Heritage Association of Ireland (may be downloaded free from http://www.ihai.ie/).

Industrial Heritage Association of Ireland. 2000. *The industrial heritage of North East Ireland*. Dublin: The Industrial Heritage Association of Ireland (available upon request; email to info@ihai.ie).

Industrial Heritage Association of Ireland. 2009. *Archaeology of Irish industry: recent excavations*. Dublin: The Industrial Heritage Association of Ireland (available upon request; email to info@ihai.ie).

Industrial Heritage in Archaeology

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Introduction and Definition

Industrial heritage in the simplest sense is the aggregate remains of industrial societies. In practice, it is the study and/or reuse of these remains. Industrial heritage encompasses a broad array of objects, structures, landscapes, and historical practices including all of the social and material culture directly or indirectly related to the people engaged in the production and management of infrastructure and transportation and the production and distribution of raw materials, objects, and energy. While the industrial heritage is manifest in specific things, this heritage is primarily engaged for study and documentation, conservation, and commemoration. Industrial archaeology (IA) is the study and documentation of this social and material culture and is generally administered by historians and archaeologists specifically trained to access industrial heritage and industrial landscapes. Conservation relies on the work of industrial archaeologists but incorporates issues of value and significance to determine the long-term consequences of industrial places often balancing value with environmental risks and the adaptability and market value of conserved places. Conservation practitioners include

architects, historic architects, engineers, historians, curators, educators, conservators, property developers, government promoters, financiers, and potential end users. Commemoration is the public celebration, interpretation, or acknowledgement of significant things, places, or events be they of local importance or demonstrating outstanding universal value and eligible for world heritage nomination. Commemoration includes memorial plaques, museums, festivals, and more personal pursuits like art, photography, and urban exploration. Commemoration has implications for identity on the local level and tourism and economic redevelopment in the case of regional, national, or world heritage.

The International Committee for the Conservation of the Industrial Heritage (TICCIH), the body designated to advise the International Council on Monuments and Sites (ICOMOS) on industrial heritage, defined the field as:

> *Industrial heritage* consists of the remains of industrial culture which are of historical, technological, social, architectural, or scientific value. These remains consist of buildings and machinery; workshops; mills; factories; mines and sites for processing and refining; warehouses and stores; places where energy is generated, transmitted, and used; transport and all its infrastructure; as well as places used for social activities related to industry such as housing, religious worship, or education.
> *Industrial archaeology* is an interdisciplinary method of studying all the evidence, material and immaterial, documents, artifacts, stratigraphy and structures, human settlements, and natural and urban landscapes, created for or by industrial processes. It makes use of those methods of investigation that are most suitable to increase understanding of the industrial past and present.
> The *historical period* of principal interest extends forward from the beginning of the Industrial Revolution in the second half of the eighteenth century up to and including the present day while also examining its earlier pre-industrial and proto-industrial roots. In addition, it draws on the study of work and working techniques encompassed by the history of technology (TICCIH 2003).

Historical Background

The roots of industrial heritage (IH) started with the recognition of value in what had been overlooked industrial landscapes. At the core of IH was the understanding that from the 1750s, profound technological, social, and economic changes spread across Britain ultimately altering the fabric of life, the environment, and the physical and financial well-being of vast number of people. This change, highlighted by the reorganization of power, production, technology, and labor, became known as the Industrial Revolution which was distinctly British at its start but quickly spread across the world. While the debate continues as to whether the Industrial Revolution was actually revolutionary or whether it truly began in the 1750s, the mid-eighteenth century was the point that the physical industrial record became more prominent and cultural changes, which continued to have a profound impact into the twenty-first century, came more rapidly.

The field began with the formation of a practice, industrial archaeology (IA), in Britain in the 1950s. Like other archaeological and historical disciplines, IA began as an amateur pursuit led by interested individuals. Its early advocates reacted to dramatic changes in the 1950s British landscape and the loss of industrial material culture as new, postwar demolition and construction encroached on former industrial areas heretofore not considered significant. Key structures were being demolished with little consideration or reverence for their actual significance to British history. Public reaction grew from these dramatic landscape changes and led to stronger identification, recognition, and protection programs for the extant material evidence of this clearly definable economic era. Neil Cossons, former director of Ironbridge Gorge Museum Trust and later chair of English Heritage, wrote in the revised second edition of the *BP Guide to Industrial Archaeology* (originally published in 1975) that "IA was born, not out of a detached or academic interest but on a

wave of emotional enthusiasm and a less defined but clearly deep-seated feeling that a vital part of the past was being destroyed.. .The postwar years, dominated with a preoccupation with renewal and a new foundation for future prosperity, saw the destruction of much that was old" (Cossons 1987: 11).

By 1979, Kenneth Hudson, a former BBC correspondent who wrote several works on industrial heritage including the seminal publication *Introduction to Industrial Archaeology* (1963), stated that IA had evolved through three developmental phases. Stage one, he wrote, was the formation period in the 1950s bringing the plight of industrial heritage to the attention of a wide audience. Stage two, which lasted through the 1960s and into 1970s, entailed a sizable portion of volunteers, initially in Britain, identifying extant heritage and creating national lists with an emphasis on buildings and machinery. Stage two also witnessed IA spread to other industrial countries across the world. Stage three, Hudson argued, developed from the realization that there was an enormous collection of data generated in stage two in need of a more structured analysis (Hudson 1979: 2–3).

By the 1970s, a professional discipline was formalizing. In 1969, the US National Park Service created the Historic American Engineering Record to formally document significant industrial and engineering works in the United States and maintain those records in a long-term archival format in the Library of Congress (see Figs. 1 and 2). In 1971, a dedicated group of US archaeologists, museum curators, engineers, and historians met in Washington, D.C., and established the Society for Industrial Archeology (SIA) to "promote the study,

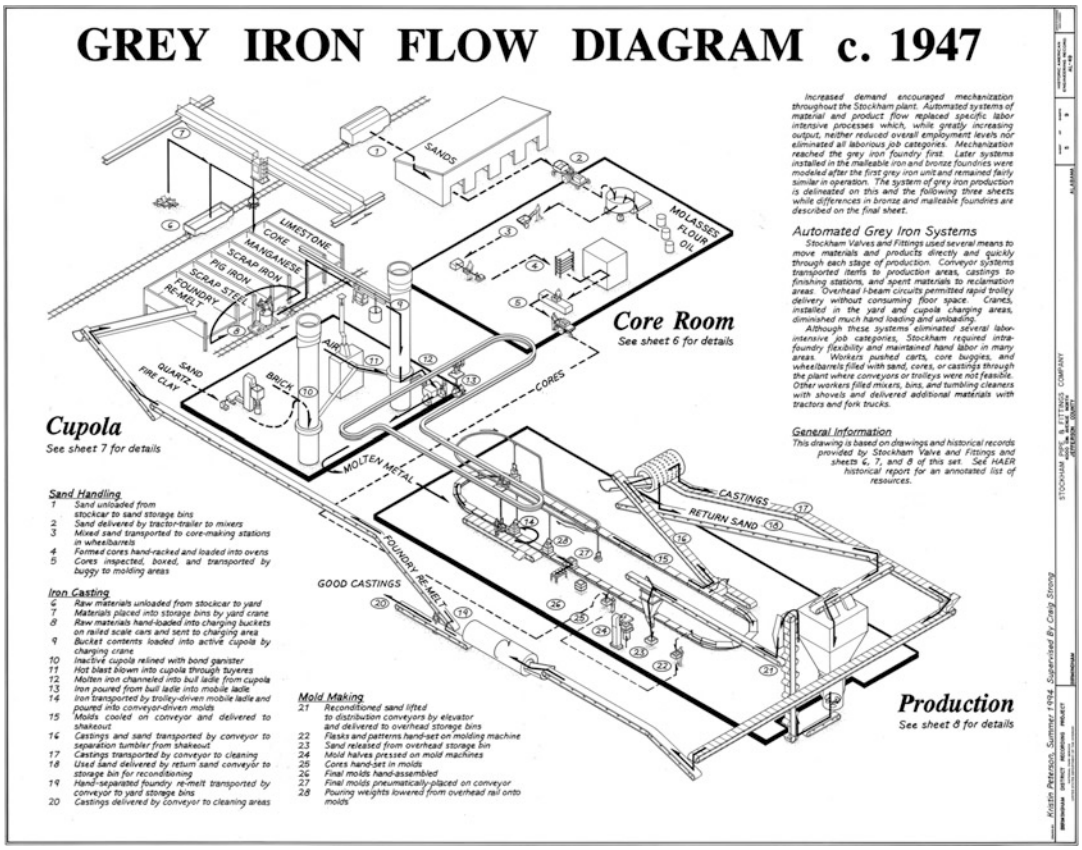

Industrial Heritage in Archaeology, Fig. 1 Typical HAER architectural rendering of an industrial process showing the "Gray Iron process c. 1947" at Stockham Valves and Fittings foundry in Birmingham, Alabama. (Delineator Christen Peterson, 1994. US National Park Service, Historic American Engineering Record)

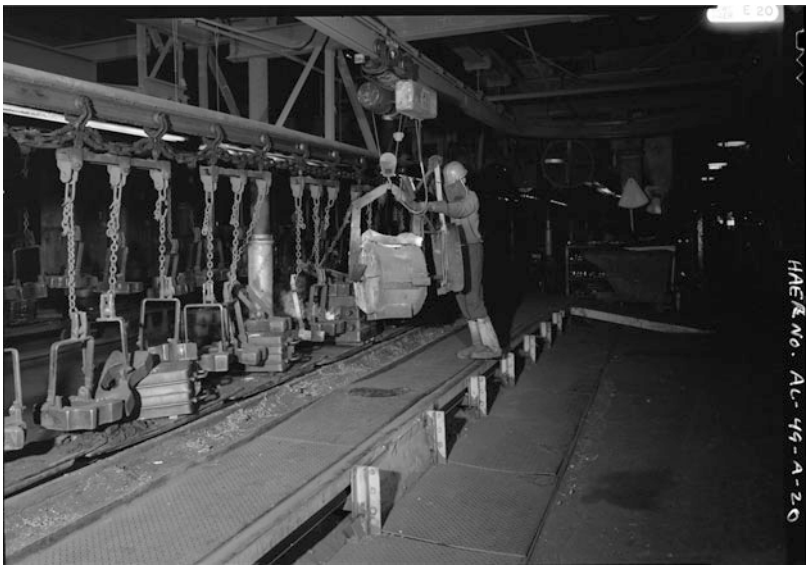

Industrial Heritage in Archaeology, Fig. 2 HAER image of Stockham Valves and Fitting foundry in Birmingham, Alabama, titled "Interior View with Iron Pourers Filling Completed Molds on Grey Iron unit No. 1 Mold Conveyor." HAER ALA,37-BIRM,45A-20. (Jet Lowe photographer, 1994. U.S. National Park Service, Historic American Engineering Record)

appreciation, and preservation of the physical survivals of our industrial and technological past" (SIA n.d.). Its mission would be:

> to encourage the study, interpretation, and preservation of historically significant industrial sites, structures, artifacts, and technology. By providing a forum for the discussion and exchange of information, the Society advances an awareness and appreciation of the value of preserving our industrial heritage. (SIA n.d.)

In 1969, the Council of British Archaeology proposed forming a national society made up of the smaller clubs documenting industrial sites. In 1973, they formed the Association for Industrial Archaeology to "sponsor research and reward excellence, pool knowledge and set standards of recording, encourage research and publication and assist preservation through a restoration grants programme" (AIA 2015). The organization expanded its mission to support conservation by monitoring applications for industrial site demolition or modification. Other national groups followed including the Japan Industrial Archaeology Society (1977) and Comité d'Information et de Liaison pour l'Archéologie, l'Étude et la Mise en Valeur du Patrimoine Industriel (CILAC) in France (1979).

On the global stage, the International Congress on the Conservation of Industrial Monuments formed at a meeting held in Ironbridge (UK) in 1973 and started holding triennial congresses focusing on international issues. In 1978, the group renamed itself the International Committee for the Conservation of the Industrial Heritage (TICCIH), which, in 2000, entered into a formal agreement with the International Council on Monuments and Sites (ICOMOS) to consult on industrial world heritage nominations and promote industrial heritage conservation (ICOMOS and TICCIH 2000). TICCIH:

> is the international organisation for industrial archaeology and the industrial heritage. Its aim is to study, protect, conserve and explain the remains of industrialization (TICCIH n.d.). [TICCIH was] established for the primary purpose of achieving cooperation at an international level in the preservation of industrial monuments and artefacts and in fostering an understanding between nations of the historical, scientific and educational value of mankind's industrial heritage. (ICOMOS and TICCIH 2000)

During Hudson's third stage in the 1980s and early 1990s, IA became a more codified practice with the creation of academic programs in industrial archaeology at Rensselaer Polytechnic Institute (NY), University of Birmingham's Ironbridge Gorge Institute (UK), West Virginia University (WV), Michigan Technological University (MI), and later programs in Leicester (UK) and Manchester (UK) universities. These programs, led by academics working in and continually defining (and redefining) the field, began incorporating

more anthropological themes asking critical questions about places, practices, and industrialization's effects on human conditions. These programs also provided specialized training to new professionals entering the field and those working in cultural resource management who may encounter industrial heritage. Neil Cossons wrote in 1987, demonstrating that IA was evolving a much more rigorous approach to understanding industrial heritage, that:

> Industrial archaeology is a cultural archaeology, the study of the culture in which industry has been dominant and in particular its physical manifestations and the light they shed upon our understanding of industrial society. (Cossons 1987: 10)

In the 1990s, the field of industrial heritage expanded with a newer focus on conservation and commemoration. If Hudson's first, second, and third phases of industrial archaeology focused on identification and study, the new focus, the fourth phase, attempted to answer the question: How do we preserve and integrate these places culturally? The preservation of industrial heritage was not new in the 1990s. In 1925, one of the first industrial museums in the United States opened at Old Slater Mill, in Pawtucket, Rhode Island. Owners of the historic Cornwall Iron Works donated the monument to the Commonwealth of Pennsylvania in 1932, and the Henry Ford Museum (Dearborn, Michigan) of industry and technology opened to the public in 1933. The US National Park Service reconstructed Saugus Iron Works National Historic Site (Saugus, Massachusetts) in the 1950s after extensive archaeological excavations that began in the 1940s. The Iron Bridge Gorge Museum Trust (Shropshire, GB) was formed in 1967, Eckley Miners Village (Weatherly, Pennsylvania) was preserved in 1971, and the 100-year-old Birmingham, Alabama, blast furnace complex, Sloss Furnaces, became a historic site in 1971.

While these key places had been preserved because of their significance and became important museums and historic sites, the 1990s saw a greater focus on economic regeneration and reaching broader audiences. The western world had been completely transformed by industry which created huge collections of buildings and completely altered landscapes – not all of which were significant. Further, western industrial decline began in the 1950s with key industries witnessing significant declines in the 1980s and left behind "rust belt" cities with aging populations and limited prospects for new economic development. While this triggered and sustained the academic side of IH, it also left behind devalued landscapes and souring economies with increasing interest in conservation and reuse, tourism, and economic regeneration as salves to spur new development and lure tourist dollars.

From the 1980s to the 2000s, adaptive reuse of former industrial sites became a popular and economically attractive means to conserve large sites and appeal to a broad, less historically inclined audience. The Sloss Furnaces development included a stage in one of its former cast sheds for concerts and maintains an active arts and festival program. The former extensive Bethlehem Steel plant (PA) has been redeveloped with a casino, shopping mall, and concert venue with the National Museum of Industrial History and the extant bank of blast furnaces reflecting the regions industrial past. Park Fundidora in Monterrey, Mexico, which preserved parts of one of the largest Latin American steel mills, also included open parkland, an amphitheater, and hotels and is connected to the city center via a man-made river way (see Fig. 3). The Tate Modern Gallery in London and the Capitoline Museum, Centrale Montemartini, in Rome, were both installed in former power plants, and the Musee d'Orsay was installed in a former Paris train station – each with much of the original fabric intact. Further, throughout North America and Europe, former industrial buildings have been converted into lofts and office buildings, and some US states have even passed legislation that allows tax credits for former mill and brownfield redevelopments (Morin, Left Coast Press 2013b). In other cases, buildings have simply been left on the landscape and have become welcome subjects for an increasing interest in industrial ruins and urban exploration (Cossons 2007: 17).

In addition to new industrial heritage developments and experiences, universities introduced

Industrial Heritage in Archaeology, Fig. 3 Aerial image of Park Fundidora, Monterrey, Mexico, developed as a large state-municipal park and recreation space with a steel museum located in and around the former blast furnace number three. Image shows the large enclosed amphitheater, partial remains of the former steel mill, and view of the city. (Bode Morin Photographer, 2010)

several new academic graduate programs in the 2000s with a broader focus on heritage management topics including adaptive reuse, museum studies, and conservation planning. The Ironbridge Institute offers graduate courses in heritage management and historic environment conservation, and the University of Leicester offers graduate degrees in museum studies interpretation, representation, and heritage. Michigan Technological University's master's program in industrial archaeology has grown to include a Ph.D. in industrial heritage and archaeology. Erasmus Mundus, a joint program with the Sorbonne (France), E'vora (Portugal), and Padua (Italy) universities, offers a master's degree in "Techniques, Heritage, and Industrial Landscapes (History, Enhancement, Education)" and a Ph.D. in applied history HTPS (History, Technology, Heritage, Sustainability). Vrije Universiteit, in Brussels, has a course in "Industrial Archaeology and Industrial Heritage," and the Conservatory of National Arts and Crafts (Paris) offers courses in the history of technology and the conservation of industrial heritage (TICCIH n.d.).

Since 1990, there has been an ever-increasing awareness of the value of industrial heritage and the importance of creating regional identities and commemorating significance. Terms like "Copper Country," "Iron Bridge Gorge," "the Ruhr," "the Anthracite Region," and "Fordlandia," all were historic references that have become brands celebrating the heritage of industrial regions. The European Union designated 2015 the year of industrial heritage, and many preserved industrial sites have become a vital part of heritage tourism. The European Route of Industrial Heritage

(ERIH), established in 1999, was developed with common branding and experiences but on an enormous scale that in 2018 included more than 1600 sites in 47 countries with 13 regional routes and 104 anchor sites (European Route of Industrial Heritage n.d.).

On an international scale, the United Nations Educational, Scientific and Cultural Organization (UNESCO) has inscribed numerous industrial sites recognized for their outstanding universal value on the World Heritage List. Part of the World Heritage Convention is to promote conservation efforts with renewed interest in significant regions and places leading to new developments, infrastructure, and tourism revenue (although in some instances, the influx of tourists to World Heritage Sites has been detrimental to conservation). TICCIH has been a strong proponent of identifying and promoting industrial sites for inclusion in the World Heritage List. Of the 832 cultural properties in 167 countries on the World Heritage List of 2018, at least 113 are identified as having industrial components or themes (UNESCO n.d.) (See Fig. 4).

The growth of heritage tourism in the United States and the expense of creating new national parks have encouraged the formation of National Heritage Areas, which with US National Park Service supports are largely local efforts to identify participating historic sites within a specific geographic area that contribute to a particular theme. The independent heritage areas, similar to ERIH, develop uniform branding, economic development systems, and heritage experiences to encourage visitors to travel to, stay in, and spend money in their region. Of the 49 US heritage areas in 2018, at least 17 had industrial themes including MotorCities (Detroit), Rivers of Steel (Pittsburgh), National Aviation (Dayton), National Coal (WV), and the Oil Region (PA) (National Heritage Areas n.d.).

The reuse role of former industrial structures is further reflected and enhanced by the greater inclusion of developers, architects, and landscape architects in international heritage conferences, showcasing not just specific conservation projects but redevelopment and tourism enhancement projects. At the 2009 TICCIH world congress in Germany, 19 of the 29 sessions of the scientific program dealt specifically with heritage issues of preservation, redevelopment, and reuse. The program included the sessions: "Creative Re-Use: Industrial Heritage, Building Assessment, Real Estate and Brownfield Redevelopment," "Industrial Heritage Tourism," "Management of Cultural and Environmental Areas," and "Large Scale Industrial Heritage Projects – Concepts and Problems" (TICCIH 2009).

Industrial Heritage in Archaeology, Fig. 4 The Big Pit, National Coal Museum part of the Blaenavon World Heritage Site, Blaenafon, Torfaen, Wales. The site offers underground tours, interpreted educational experiences, and conserved mining structures meeting the condition of outstanding universal value. (Bode Morin photographer, 2006)

Key Issues and Current Debates

The biggest issue facing the field is the continued debate over what to do with and how to manage these places. Industrial buildings and landscapes are inherently large. They can take up several city blocks or encompass multiple square miles.

Their size often makes them difficult to manage, especially when they become unused, and very costly to conserve and maintain especially in areas of declining economies. Further, their mere existence as a long-used industrial site prior to meaningful pollution regulations often means significant environmental problems. In the United States, the Comprehensive Environmental Response, Compensations, and Liability Act better known as "Superfund" was created in 1980 specifically to address abandoned hazardous landscapes resulting mostly from industrial activity. Further, many western countries have laws that mandate remediation or demolition soon after the active life of industrial places end. In the United States, for example, the 1977 Surface Mining and Control Act required that all then active coal processing plants be demolished at the end of their operations. These laws, while intended to protect human health and the environment, can create major hurdles in long-term preservation planning especially if used as a political argument in contentious debates (Morin, Tennessee 2013a).

Related to the environmental issues, large, closed, and unmaintained industrial sites are not always appreciated by all people equally, and a site's perceived value varies greatly. Some people may view industrial remains as blight in need of demolition, remediation, and redevelopment. Others see heritage value in wastepiles and the detritus of industrial activity and believe that restoration and reuse are the best courses for remembrance, identity, and economic revitalization. Others even see industrial remains as sources for unique photographic backgrounds hence the term "ruin porn." All of these reactions tend to complicate arguments for significance because not all people value the landscape the same and often some sort of consensus is needed when large remediation or conservation projects demand public support and financing (Morin, Tennessee 2013a). Further, with the growth of the academic fields of environmental and envirotech history, several studies explore the broader effects of industrial activity, namely, environmental destruction, waste generation, and the long-term effects of toxic chemicals (see Quivik 2000). Museums too started to explore issues of contamination and regeneration at former industrial sites and the broader effects of industrialization on communities (see Shrinking Cities n.d.).

The third main debate centers on the field's broad interest groups and the perceived extent of academic rigor. Perhaps more than other discipline, industrial heritage encompasses a broad array of professions including archaeologists, historians, architects, museum professionals, and engineers each with a particular interest brought to bear on industrial remains and a very active nonprofessional or avocational contingent. This eclectic mix tended toward discursive objectives as opposed to disciplines of like-trained professionals following a uniform methodological approach. This debate shows up in questions asking whether this is an archaeological field or a preservation field, whether it is a course of anthropologic study or primarily a documentation practice, and whether it is an academic field or an economic model for redevelopment. This issue within industrial archaeology, however, was addressed in the 1990s during Hudson's phase three with the demonstration that amateur groups were quite capable of providing quality work and the growth of academic programs, conferences, and journals with a clear commitment to pursuing academic questions (Cossons 2007: 13). However, the debate within conservation continues as the future of evermore complex sites is contested.

These latter evolutions of the field, however, did not eliminate or marginalize the nonprofessional. It is true that the creation of lists slowed down as the number of undocumented sites shrank effecting a similar slowdown in the traditional role for the nonprofessional. However, new roles, especially in the creation and commemoration of heritage, opened for them. Heritage interpretation and preservation had always been an important part of industrial heritage, and many of the British societies and clubs worked to not only document sites but also make them available for public tours and educational experiences; those key experiences were primarily volunteer-led museum or education-related (Linsley 1980: 43). Today, branded tourist experiences are as equally geared toward history as identity and

entertainment marketing in regional areas. This approach is augmented by the promotion of regional and World Heritage Sites, sociological studies into community memory and identity, and the need to broaden the experience of traditional museum goers and expand the industrial heritage constituency to include other members of the community who may not be as topically inclined. This newer movement increasingly includes new arts and entertainment experiences – some on a grand scale.

Future Directions

The field today seems to be focusing more clearly on its multiple roles. On the one hand, the academic side is continuing to evolve and ask serious questions of the material culture and newer studies influenced by trends in historical archaeology, for example, began to focus on Marxist approaches of class and status, gender, and resistance demonstrated in industrial site material culture (Palmer 2005). On the other hand, the heritage side can be argued to be flourishing, as far as development money is available for reuse projects, and reaching a broader more popular audience. From the UNESCO World Heritage List to recognitions of the value of industrial heritage by the European Union and the US National Trust for Historic Preservation, which included several industrial heritage sessions at its 2011 conference, the greater appreciation of industrial heritage is demonstrated among others not necessarily inclined to appreciate industrial sites and histories. But this new appeal is centered on a newer appreciation for heritage and reuse projects that have broad community benefits but do not necessarily reflect renewed interest in traditional forms of IA. While this could be a symptom of general deindustrialization, the declining need for nonprofessional documentation services, or simply a means to attract a larger audience to the field, it may be seen as diluting the broader historic and scientific focus of the field. Or maybe industrial heritage has simply fulfilled its first mission to recognize significant industrial sites, document the most important of those, and argue for a broad preservation plan and is now focusing on using those sites being preserved in new ways and settling in on more complex ways to understand the material culture and its effects on contemporary culture.

References

Cossons, N. 1987. *The BP book of industrial archaeology*. 2nd ed. Newton Abbot: David & Charles.

Cossons, N. 2007. Industrial archaeology: The challenge of the evidence. *The Antiquaries Journal* 87: 1–51.

European Route of Industrial Heritage. n.d. Available at: http://www.erih.de/. Accessed 25 Jan 2018.

Hudson, K. 1979. *World industrial archaeology*. Cambridge, MA: Cambridge University Press.

ICOMOS and TICCIH. 2000. Collaboration agreement between ICOMOS and TICCIH.

Linsley, S.M. 1980. Preservation in industrial archaeology. *Industrial Archaeology Review* 5: 41–50.

Morin, B. 2013a. *Legacy of American copper smelting: Industrial heritage versus environmental policy*. Knoxville: University of Tennessee Press.

Morin, B. 2013b. Fiscal and financial incentives. In *Industrial heritage re-tooled: The TICCIH guide to industrial heritage conservation*, ed. James Douet. Walnut Creek: Left Coast Press.

National Heritage Areas. n.d. Available at: http://www.nps.gov/history/heritageareas/. Accessed 25 Jan 2018.

Palmer, M. 2005. Industrial archaeology: Constructing a framework of inference. In *Industrial archaeology future directions*, ed. E.C. Casella and J. Symmonds, 59–76. New York: Springer.

Quivik, F. 2000. Landscapes as industrial artifacts: Lessons from environmental history. *IA: The Journal of the Society for Industrial Archeology* 26: 55–64.

Shrinking Cities. n.d. Available at: www.shrinkingcities.com. Accessed 29 Jan 2018.

Society for Industrial Archaeology. n.d. Available at: www.sia-web.org/. Accessed 29 Jan 2018.

The Association for Industrial Archaeology (AIA). 2015. https://industrial-archaeology.org. Accessed 17 Jan 2018.

The International Committee for the Conservation of Industrial Heritage. 2003. *The Nizhny Tagil Charter for the Industrial Heritage*. TICCIH. Houghton, MI: The International.

The International Committee for the Conservation of Industrial Heritage. 2009. Third announcement-provisional program. In *Industrial heritage ecology and economy, XIV International TICCIH Congress in Freiberg, Germany*. Houghton, MI: The International.

The International Committee for the Conservation of Industrial Heritage. n.d. Available at: http://www.ticcih.org/. Accessed 8 Jan 2012.

UNESCO. n.d. World heritage list. Available at: http://whc.unesco.org/en/list. Accessed 25 Jan 2018.

Further Readings

Casella, E.C., and J. Symonds, eds. 2005. *Industrial archaeology future directions*. New York: Springer.

Douet, J., ed. 2013. *Industrial heritage re-tooled: The TICCIH guide to industrial heritage conservation*. Walnut Creek: Left Coast Press.

HABS/HAER. n.d. Available at: http://www.loc.gov/pictures/collection/hh/. Accessed 29 Jan 2018.

Hudson, K. 1965. Growing pains of industrial archaeology. *Technology and Culture* 6: 621–626.

Morin, B. 2013. *Legacy of American copper smelting: Industrial heritage versus environmental policy*. Knoxville: University of Tennessee Press.

Orange, H. 2008. Industrial archaeology: Its place within the academic discipline, the public realm and the heritage industry. *Industrial Archaeology Review* 30: 83–95.

Palmer, M. 1990. Industrial archaeology: A thematic or period discipline? *Antiquity* 64: 275–285.

Infrastructure in the Roman World: Roads and Aqueducts

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State of Knowledge and Current Debates

Roads in the Roman World

Introduction

The Roman road system, together with the sea transport network, represents one of the essential structural means, *moles necessariae* (Plin. *HN* 30.75), through which the Roman state at first established itself and then maintained its empire. In the meanwhile, the Roman civilization, thanks in part to its road system, succeeded in assimilating, merging, and transforming even the most dissimilar and distant cultural and economic influences and contributions; all of them helped the Roman civilization to take on that character of universality which enabled it to endure (Quilici 1990: 11, 22). The construction of Roman roads is governed by a strong process of abstraction which simplifies the complexity of landscape in order to get an environmental model and tool able to organize and manage space. The land is deprived of its natural features and is isolated from its context. The "milestones of nature," such as trees, rivers, hills, rocks and so on, are no longer suitable to fix a point in space, due to their continuous transformation; thus, they give way and are replaced by the well-defined milestones of the Roman state. They are stone markers set up on a roadside to indicate the distance in miles. A milestone fixes once and for all a point in space and thus it also marks time. This way, huge territories take on for the first time a definite outline; permanent military and economic landmarks and travelling times are fixed more precisely (Cat. *Orig*. 1.6; Dion. Hal. *Ant*. Rom. 2.49; Strabo 5.2.10: 20–25). The measurement of distances and the fact to have well-defined/certain points of reference on the soil is the basis of an effective planning of political, military, economic, and administrative activities. This approach of the Romans to the awareness and organization of territory arises from a complex scientific system, resulting from a mixture of geometry, engineering, geography, ethnography, and economics: this approach enables them to coherently redefine and contextualize space, by adapting it to the needs of the Roman state.

Historical Development

Rome's position at the main ford of the lower course of the river Tiber situates it near to important routes of human transhumance (Quilici 1990: 13). These overland routes linked the populations of Latium, Sabina, Etruria, and Campania along the valleys of the Tiber, Anio, Sacco, and Liri rivers. Rome became in turn an important hub, thanks to its favorable position (Cic. *de re pub*. 2.4–6; Liv. 5.54.4). Already in the fifth century BCE, the laws of the Twelve Tables regulated, in a special paragraph, the road size (Paul., Fest., 508.22). The Roman road system passed in a short time from a series of roads radiating from its center to the near cities, which were called with the name of the city to where they led (*ViaOstiensis* leading to Ostia, *Via Ardeatina* leading to Ardea, *Via Tiburtina* leading to *Tibur*, *Via Collatina* leading to *Collatia*, and so on), to a long-distance and really extended road network. At the end of the fourth century BCE, that was going to become a long-distance and remarkably

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vast route. The construction of roads started at the end of the fourth century and continued for all the third century BCE following step by step the territorial expansion of the Roman state and, above all, the creation of strategic bases such as the *coloniae maritimae*. These settlements needed to be linked to Rome to answer in full the military, economic, and trade requirements of both colonies (*coloniae*) and allied cities (*socii*). *Tarracina Anxur*, founded in 329 BCE, was connected to Rome by the *Via Appia* in 312 BCE, while *Cosa*, a colony of 273 BCE, was connected to Rome by means of the *Via Aurelia*. From the third century BCE, the *Appia*, *Latina*, *Tiburtina* and *Valeria*, *Salaria*, *Flaminia*, *Aemilia*, *Postumia*, *Aurelia*, *Cassia*, and *Clodia* roads, along with the two roads called *Popilia*, played primary roles in the unification of the Italian peninsula. In particular, the most important roads in military, colonial, and economic terms were the great roads leading to the Etruscan territories between the third and the second centuries BCE (the *Via Aurelia* coast road, the *Via Amerina*, *Via Clodia*, and *Via Cassia*) and the pathways built towards northern Italy: the *Via Flaminia*, probably built by Gaius Flaminius during his censorship in 220 or 219 BCE, that was the axis for the colonization of the *Ager Gallicus* and for the conquest of *Gallia Cisalpina* that led to *Ariminum*; the *Via Aemilia*, built by the consul *Marcus Aemilius Lepidus* in 187 BCE, linking *Ariminum* to *Placentia*, on which the land divisions of the fertile territories of the Po valley were based; and the *Via Postumia*, which established the boundary line between the Roman world and the subalpine regions around the second half of the second century BCE, when it was built by Spurius Postumius Albinus. This road connected *Genoa* to the Ligurian sea and *Aquileia* at the northern end of the Adriatic. Finally, the *Via Popilia* road, built in 132 BCE between *Ariminum* and *Padua* by P. Popilius and finished by T. Annius, led to the southern end of peninsula (Quilici 1990: 17). From a building viewpoint, the first roads were a mere adjustment and integration of previous routes, and they did not possess the permanence that would be the distinguishing feature of the Roman roads for centuries, that is, the paving with *lapidibus perpetuis*, according to the well-known definition of the *lex Iulia municipalis* of the first century BCE (*CIL* I, 206). The presence of such paving demonstrates the existence of a codified building technique that complied with standard procedures. As the building techniques developed, roads become "living beings" (Quilici 1990: 11) and soon began to be surrounded not only by spontaneous settlements but also by elements at the basis of civil life and organizing territories such as *castella*, *conciliabula*, *fora*, and *vici* (Becker 2002; Gros and Torelli 2007). Roads, in the Roman world, created a community. Towards the end of the Republic, the road system connected Rome to all the main cities of the peninsula. Two important routes, the *Via Domitia* and the *Via Egnatia* (Fasolo 2005), led to the farthest western territories of the Roman Mediterranean. In the imperial period, the road system became widespread also across the provinces as it was across Italy, with an overall extension of more than 120,000 km.

Law System

In the Republican age, the skills about the construction of public roads, *viae publicae* and *militares*, fell within the competence of the Senate (Pekàry 1968: 75), which allocated funds from the public treasury (*aerarium*) necessary for the upkeep of the infrastructure. Later, funds coming from public revenues were used (S.H.A. *Pertinax*, 9; Suet. *Aug*. 30.3; *CIL* V 8102, 8103, 8106). Evidence coming from milestones as well as from the historical and literary sources suggests that the magistrate in charge generally was a consul or a *praetor* and later a proconsul, that is, a magistrate having *imperium* who, as Ulpian points out, had the *ius publicandi*, that is, the power to dispossess people of lands and properties for public needs (Pekàry 1968: 49; Radke 1971: 41; Suet. *Vesp*. 5; Plin. *HN* 18.11; Ulp. *Dig*. 43.8.2.22; *Thes. Ling. Lat*. 4.571). Of course, the construction of roads could be also authorized by a law, such as *Lex Sempronia viaria*, issued by the tribune Caius Gracchus (Plut. *CG* 7; App. *Bell. Civ*., 1.23). Romans classified roads according to the juridical or administrative use they made of the same: *privatae*, that is, built by private citizens on their own lands (Ulp. *Dig*. 43.8.2.21–23);

publicae, if all the people were allowed to pass through (*publice ire*), to transport goods (*publice commeare*), and if it had been constructed on public soil by a public authority (*publice munire*) (Fest. 508.20; Sic. Flac. *De Cond. Agr. Gromat*. 1.146.2; Ulp. *Dig*. 43. 8.2.21; Isid. *Or*. 15.16.5); *militares*, that is, very strategic roads that crossed regions, not only public but also of great public interest, having special features (Rebuffat 1987: 52–67); and *vicinales*, connecting rural villages (*vici*) among them and to the main routes, as they depended, from an administrative viewpoint, on the local authorities. Similar to the latter were also the *Viae agrariae* (Ulp. *Dig*. 43.8.2.22), the *Viae rusticae* (Ulp. *Dig*. 43.8.2.22), and the *Viae paganicae* (Chevallier 1997: 33). Traffic on the aforementioned roads was free. Quite strict rules were imposed to safeguard the integrity and the use of such infrastructure. It was forbidden to occupy a road, to widen or to narrow it, to modify its level, to pave it or vice versa to remove the existing pavement (Ulp. *Dig*. 43.11.1–2), to unload earth (Ulp. *Dig*. 43.7.2; 8.10.2) or litter it, or anyway to damage it (Ulp. *Dig*. 43.8.2.35). Some traders, such as blacksmiths, were permitted to show and advertise their handicrafts, such as wheels, along them or, in the event of *fullones*, to spread out linen along the route, provided that this did not hinder circulation (Ulp. *Dig*. 43.10.4).

Construction

The ancient epigraphic, historical, and literary sources, though providing a quite wide range of phrases to indicate the construction of a road such as *viam innovare*, *instituere*, *munire* (Cat. *Agri*. 2.4), *sternere*, and *struere*, generally give a few indications without providing a detailed description of the road building technique. Only the first-century CE poet Statius (*Silv*, 4.3.40 ff) gives a description of the coast road between the mouth of the river *Volturnus* and *Puteoli*, the *Via Domitiana*. Other details may be inferred by analogy from some selections of Vitruvius (*Arch*. 7.1) and Pliny the Elder (*HN* 36.186), devoted to building paving systems. Most of the information used to reconstruct the Roman road technique comes from the archaeological research carried out on surviving routes (in particular from the documentation of some portions of the *Viae* Salaria, Appia, Flaminia, Aemilia, and Postumia). We have to assume that the road builders studied the soil, paying special attention to the stability of foundations. One of the aspects taken into due consideration by road builders was the one linked to the protection of roads from superficial water seepage, which could cause instability. Roads were designed, and the road construction sites were superintended, by civil or military architects and engineers, often called back to service, *evocati* (Vitr. *Arch*. 1.praef.2); *Firmitas*, *utilitas*, and *venustas* (solid, useful, able to endure the passing of time, beauty, graceful) were the three inspiring principles of their school. The implementation of works, performed according to circumstances, with or without the contribution of the cities involved in the route, was committed to troops, thus rescued from idleness (Liv. 39.2.3); to subject populations (Tac. *Ann*. 1.20.1; Cic., *Pro Plancio* 8.17); or to manpower found by private contractors. Works were supervised by *quaestores* (treasurers) and *praefecti fabrum* (supervisors of craftsmen). The task of defining the route was committed in particular to land surveyors, who used precision instruments and procedures known also in other fields (Blume et al. 1848–1852). The final route was fixed on the ground by means of further alignment of points along which two parallel trenches were carved. The Romans generally tried to reach their various destinations by the most direct and inexpensive means, by avoiding to modify the soil's morphology but also avoiding dangerous sites which could jeopardize the same route (i.e., valley bottoms that were subject to flooding). Due to this, the Romans had sometimes to remarkably extend the routes (Quilici 1990: 20–3). The allowed radiuses of curvature were small, probably because of the structural features of chariots. Yet, soil sometimes imposed special solutions as well as the unavoidable implementation of special engineering works. Some of them, for example, many bridges, still arise admiration and are perfectly working still today (Galliazzo 1994–1995). The most frequent cases were linked to the crossing of marshy areas and to the overcoming of natural gradients

and obstacles: bridges, some of which remain in use, in the most suitable passageways; road embankments; viaducts; or, where it was not possible to build them, wooden structures, road substructions downhill, retaining walls uphill, soil removals, performance of cuttings in the rock, or drilling of galleries (Quilici 1990: 22). As regards the real route, the reconstructed building sequence contemplated, as a first step (*primus labor*), the delimitation of the route's edges by means of two parallel furrows in the soil (*inchoare sulcos et rescindere limites*). A ditch was excavated inside them that reached a basis solid enough to bear the weight of the road surface (*alto egestu penitus cavare terras*). With a procedure very similar to the one described by Vitruvius for the casting of concrete, the ditch or *gremium* was then filled up, *mox haustas alter replere fossas*, with layers of material, usually four in number; yet, their number, shape, contents, and thickness were affected and determined by the specific soil conditions as well as by the available building materials. The entire filling procedure of the ditch, whose overall depth could even exceed 1.5 m, should ensure uniformity to the road surface, by preventing the creation of chasms and collapses (*ne nutent sola*, *ne maligna sedes/et pressis dubium cubile saxis*). The foundations consisted of a layer of at least 30 cm thick, similar to *statumen*, that was made up of medium- to large-sized stones aimed at consolidating the natural soil. Over it, the *rudus*, that is, a mass of cobblestones, bound with clay, (seldom with mortar) was cast, hammered with maces in order to be made firmer, and arranged on horizontal layers. This layer of finer material, which was aimed at drainage, was covered in turn by the *nucleus*, made up of ballast with large gravel smoothed by means of pile drivers (*fistucatio*) and rollers (*ingenti aequanda cylindro*), and whose ridge was slightly bent in order to accompany the laying of the *summum dorsum*, *crusta*, or *pavimentum*. This way, the rainwater flowed in the bumps alongside the road, immediately after the pavement or *crepidines* that sometimes came alongside it. The *pavimentum* could be made up of mere dirt (and in that case it was called *Via terrena*), of gravel or crushed stones (and in that case roads were called *Viae glarea stratae* or *glareatae*), of polygonal and uneven slabs of basalt, or, if available, of limestone, smoothed in the upper part and wedge-shaped in the lower part, accurately laid (*Viae silice* or *lapidibus stratae*). The paving procedure was called, for sake of precision, *silice sternere; lapide, saxo quadrato sternere*. Statius celebrates with pride the *ingenti plaga marmorata dorso*. Sometimes, especially on steep routes, some parallel ruts were excavated in the pavement to lead the wheels of vehicles, by preventing thus their going off the road, in particular in case of ice. The width of the *Via publica*, unlike the private one (whose minimum width was established by law), depended *quantum ratio utilitatis permittit* upon the various conditions and needs, just like the pavements which sometimes came alongside it. Width was extended in the busiest areas and at all events it was such as to allow the transit of vehicles. The construction was followed by the laying of stones which delimited the route and of milestones and mounting blocks which made getting on and off a horse easier.

Milestones

Distances along the route were indicated by large boundary stones up to 3 m high and with a diameter of 60–80 cm, driven into the ground beside the road at the distance of a Roman mile from each other (1478.5 m) and therefore called "milestones." The earliest known milestones date between the third and second century BCE (*ILLRP* 1277; *CIL* I^2 21; *CIL* I^2 22, 617, 618, 619, 620) and have a cylindrical shape. Generally speaking, a milestone carries the name of the person who laid it down and this name may not coincide with the road builder or restorer, as well as his office and the distance from the beginning of the road or from a nearby center and, in case, the reason why that road had been constructed or restored. According to Strabo (5.3.8), the habit of signalling with regularity the distance covered or still to be covered was a Roman innovation, introduced or at least made official and mandatory in the second half of the second century BCE by means of the *Lex Sempronia viaria* of Caius Gracchus (Plut. *C. Gracc*. 7).

Management

It was only a strong organization system that allowed the Roman road network to remain in use for such a long time. In the Republican period, after the conclusion of the construction works, the *aediles* living within ten miles of Rome were in charge of the management of roads (*Lex Iulia municipalis*, FIRA, I, n. 12. *CIL* I^2, 21, 22, 829). In any event, such tasks, together with other administrative functions, were also within the discretion of the ordinary magistrates having *aedilicia potestas*. The extension of the road system soon implied the creation of some officers specifically devoted to the care of roads, called *curatores viarum*, who appear in the sources from the first century BCE. At the end of Republic, the activity of such *curatores* went along with the evergetism of some renowned public personalities. Marcus Agrippa restored the entire Roman road system at his own expense and Augustus restored the *Via Flaminia* in 27 BCE. The creation of the duty of *cura viarum* is attributed to Augustus in 20 BCE; this fell under the direct purview of the *princeps* (Suet. *Aug*. 37). He gave directions to a *collegium* of *curatores*, whose number was unknown. They were selected at first from among the *praetores* (*CIL* I^2, 200, 744, 751, 808, Plut. *Caes*. 7; Cic *ad Att* 1.1.12; Appian. *Bellum Civile* 2.27). Later, the *curatores viarum* reported to the praetorian prefect. As they were fully responsible for the complex management of the road system, their duties included the control, maintenance, and restoration of roads and annexed works; property protection; and the enforcement of the police regulations. Their office also included financial duties. With regard to scope, it could range from one or more roads to the whole road system. The mandate of *curatores* was more prolonged and more variable in time when compared to that of the other magistrates; it could be extended up to 11 years, and it was clearly influenced by specific needs in order to ensure a proper exercise of their functions. In the provinces, the *cura viarum* was entrusted to governors. Starting from the second century CE, the *cura viarum* changed from *honores* into *munera*, thus becoming a basic stage of the *cursus honorum*.

The *Cursus Publicus*

The relationship between the central government and the provinces of the Empire was kept by means of a state service that ensured the land and sea (*CIL* 14.2045; Sen. *Ep*. 67) transmission of all information and of the land mail, the *cursus celer* or *velox* (Amm. 21.9.4), as well as the transport of people and goods *ex causis necessariis* (of public interest), the *cursus tardus* or *clabularis* (*Cod. Theod*. 8.5.62). The service took place thanks to an organization widespread all over the Empire, hinging on *mutationes*, *mansiones*, *praetoria*, and *palatia* able to provide full assistance along all the routes (Cuntz 1929: 130; Seek 1846–1851; Holmberg 1933; Pflaum 1940: 189–390; Pekáry 1968; Quilici 1990: 92; Uggeri 1995: 140–144). Scholars agree upon the origin of the wide administrative plan conceived and started by Caesar and implemented by Augustus already in the first years of his kingdom. Caesar mentioned a system he himself devised, with horse soldiers, *dispositi equites* (Caes. *bell. Civ.*, 3101; Liv. 27.43), who, placed at a certain distance from each other, had the task of quickly conveying the news of his victories; yet, a similar structure probably already existed long before. Under Augustus, such horse couriers became more numerous; they were called *iuvenes* and their most difficult task, in addition to the mere delivery of correspondence, was that of informing the emperor of the events occurring in the provinces. The main roads were equipped with *stationes*, which is to say places to stop and change horses and draught animals; the local populace supported the cost of these *stationes*.

The main sources to reconstruct the structure of the cursus publicus (corsive) in the Augustan period are a passage from Suetonius (*Aug*. 49.3), the edict of Sextus Sotidius Strabo Libuscidianus, quoted in an inscription found in Burdur (*S.E.G.* 26, 1979, n. 1392) and a reference to such measure that can be found in a passage from Procopius (*Arc*., 30, 2). In the light of the above-mentioned documents, the Augustan institution seems to be the first of all not only a mail service but rather a true information service and a transmission of directions by means of couriers, *ut adnuntiari cognoscique posset* (Suet. *Aug*. 49.3), that was

essential for the security of State. According to the edict of Sextus Sotidius, the main users of such a service were travellers for reasons of State provided with a special permit referred to as *diploma* (Tac. *Hist*. 2.54; Plin. *Epist*. 10.45, 46, 64, 120, 121), a written authorization bearing the imperial seal (Suet. *Aug*. 50). To such travellers, listed in the edict according to a hierarchical order, cities and villages had to supply up to ten chariots and as many mules (a number that could be doubled in case of donkeys). Users had to pay for the services supplied for a precise distance (that in the edict at all events did not exceed 40 *stadia*). No one could benefit from free-of-charge vehicles. Private citizens, especially if they were merchants transporting goods for private purposes, could not be supplied by these means. The members of the *comitatus*, those who supplied their services in the provinces, together with the *liberti*, the Emperor's servants and animals, could benefit from the free accommodation in the *mansio*. In the Imperial period, the granting of permits to use the service, called *evectiones*, was progressively extended to soldiers as well as to the wives and sons of the people having the right, thus becoming a privilege difficult to be both granted and controlled. As a consequence of this, there was also an increase in the number of abuses and outrages to the detriment of local communities, which had heavy duties and obligations for the management of the service. Thus, emperors such as Trajan, under whom the definition of such service as *cursus publicus* appeared for the first time, had to intervene in order to curb such abuses. Also the future emperor Pertinax (SHA *Pert*. 1.6) was forced to continue his journey on foot, as he was found unprovided with any permit. Under Nerva the operational costs became the charge of the imperial tax office. Under Hadrian, the *cursus publicus* became widespread throughout the Empire. In the Constantinian period, the *clerici* of the *ecclesia catholica* began to use the *cursus publicus* both on the occasion of events such as councils, synods, and consecrations and when they had to take part in the most various official celebrations, within the framework of a progressive increase in privileges and exemptions. Also in this case, the achievement of *evectiones* and *tractoriae*, which is to say food during journeys, degenerated into abuses. The *clerici*, Ammianus Marcellinus remarks (Amm. 21.16.18), crowded the roads on the pretext that they had to attend to councils at the expenses of State from one hand to another of the Empire. We do not know in detail the structure and regulations of such service. At first, the management was undertaken by Augustus, who entrusted two *praefecti* of *praetorium* also with the task of supervising and controlling the *liberti*. With Hadrian, the figure of the *praefectus vehiculorum* was introduced, who had the task to supervise the overall progress of the service and the conditions of roads and of *stationes*. Within this organizational structure, the post houses, *mutationes*, and *mansiones* were essential for the efficiency of service. They were subdivided into premises for accommodations, stables, and warehouses; there were also very often bathing facilities. In the late Republican period and during the principate, their management was committed to the contractors who won the public bidding. Contractors, which in the first three centuries of the Empire managed the *stationes*, were replaced in the Constantinian period by the *mancepes* or *praepositi mansionum*. The praepositus was generally a curial and a member of a city council that was equivalent to the Roman Senate, having religious, administrative, and financial duties, particularly wealthy and, for this reason, obliged to comply with his obligations towards the city and the State. Among the main duties of the *praepositus* were the procurement of animals, their custody and care, their recovery in the case of theft, the obligation to assign them to authorized travellers, and the control that no more than five of them (i.e., the eighth part of the equipment of each *statio*) could go out from the *mansio* daily. Letters kept in leather bags were delivered by the *tabellarii* (Cic. *Phil*. 2.31; *Att*. 12.1; Plin. *Ep*. 10.64), assisted by *cursores*, *speculatores*, *veredarii*, and couriers who carried the most urgent messages on horseback. Similar tasks were carried out in this field of the imperial administration by the *frumentarii* and, with Constantine, by the *agents* (*Cod. Theod*. 6.27.1–3), who transmitted the imperial autographs, and the *principes agentium*, who performed supervision

and control. Under Constantine, the compliance with regulations was verified by *curiosi* (inspectors). For the performance of their tasks, the *mancipes*, the *curiales*, or even the *praepositi mansionis* availed themselves of *stationarii*. The care of draught animals was remitted to the *stratores* and to the *muliones*. The *hippocomi* had the task of accompanying travellers from a *statio* to another and of taking vehicles back. In addition to them, there were the chariot drivers or *carpentarii*; the people in charge of the care and transport of luggage, the *bastagarii*; and for the most burdensome tasks, the *catabolenses*. Special escorts protected travellers from *latrones* and *grassatores* who swarmed in the roads. There were essentially two kinds of journeys permitted by the service: the *cursus celer* or *velox*, for which light coaches (*redae*) were used, and the *cursus tardus*, for which heavy coaches were used, suitable for the freight of goods. Private citizens, on the contrary, used their own couriers (*tabellarii* and *cursores*) or they resorted to the trade flows to forward goods and correspondence.

Speed

The sources reveal some hints on travelling times in the ancient world that, at all events, were not always the same, due to a series of variables. While a traveller on foot generally covered a distance of 20–25 miles (30–35 km) *per diem*, the horse couriers of the *cursus publicus* usually managed to average 5 miles per hour, totalling 50 miles per day (75 km). We learn from Ovid (*Trist*. 4.5.1–8) that it took 9 days for a letter to go from Brundisium to Rome, which were 365 miles distant, one from the other. We also learn that it took 9 days for a letter to reach Trajan from Bithynia in Asia Minor. According to Plutarch (*Cato Maior* 14.4), Cato was certainly faster if compared to such averages, since in 191 BCE, he covered the distance between Brundisium and Rome in 5 days, by averaging 80 miles a day (about 120 km). Caesar was even faster, as in 58 BCE he reached Geneva (800 miles from Rome) in 8 days (Plut. *Caesar* 14.4), just like Tiberius, who rushed in 24 h from Pavia to Thuringia, a distance of 200 miles, in order to see his dying brother, Drusus. Journeys with chariots were obviously longer (Plin. *HN* 7.84; *Val. Max*. 5.5.2). The *carruca* averaged 5 miles per hour. It took 7 days for Cicero (*Att*. 5.4–6) in 51 BCE to cover the distance of *Via Appia* from Beneventum to Tarentum, presumably by chariot. Until the route reached Venosa, the mountain route forced him to average 19 miles a day, whereas in the plain he managed to average 32 miles *per diem*. Horace, instead, covered the distance between Rome and Brundisium, by passing through the future *Via Appia Traiana*, in 15 days. Cicero (*Pro Rosc*. 7.19) covered 56 miles (83 km) separating Rome from Amelia along the *Via Cassia* and *Via Amerina* in a 10-h night journey using a light chariot.

Aqueducts

Aqueducts, constructed on high arcades (*arcuationes*) which still today cross the Roman countryside, are among the most impressive and original creations of Roman architecture and civil engineering. The Romans inherited the technical achievements about water conveyance techniques that were very popular in the Mediterranean area and in the Near East (the aqueduct of Jeruan Ninive, the hydraulic works of Jerusalem in 700 BCE, the tunnel of Eupalinos of Megara in Samos in 530 BCE, the Hellenistic works of Patara and Pergamon). Above all, as many classical authors remind, the Romans were the followers of the great Etruscan engineering. In fact, the Etruscans implemented the first hydraulic works in Rome (the reclamation of the Roman Forum, the construction of the Cloaca Maxima under Tarquinius Priscus and Tarquinius Superbus), besides the huge reclamation and canalization works implemented in their own country and in the Po valley. Varro maintains that water divining, originated in Etruria (Varro *Men*. Frag. 444); the Romans created an awareness of water as a public asset. The first urban water distribution network they created was made up of architectural works, urban spaces, and works of art. This network was able to ensure citizens a *per capita* quantity of water that was the double of the quantity available to a modern Roman citizen. In the territories of the Roman Empire, aqueducts numbered about 200 (at Antioch on the Orontes,

Merìda, Ephesus, Berenice, Tarraco, Segovia, Carthage). Such monuments are kept until nowadays and sometimes used to feed some fountains of the modern Rome. A series of historical, literary, and technical written sources (Frontinus, Pliny, Vitruvius, Procopius) are the basis of our reconstruction of the building techniques used by Romans.

The first step for the creation of an aqueduct was the search for and the determination of a rich spring. The methods used were the examination of the soil geomorphology and of vegetation (Vitr. 8.1). After detecting the presence of water, the latter was then subjected to an organoleptic test so that its salubrity as well as its limpidity of the water could be assessed, by taking the health of the inhabitants living very close to the spring into consideration. Nevertheless, Frontinus remembers, the discovery of the spring of *Aqua Virgo* occurred casualty. A young girl – hence the name *Aqua Virgo* – is said to have indicated certain water veins to some soldiers, involved in looking for springs. When they followed these up and dug, they found an enormous quantity of water. The event was recorded by a painting in a small shrine set up near the source (Frontin 1.10).

The water collection procedures varied. In some cases (*Anio Novus*, *Marcia*), springs were collected in a masonry tank coated with a waterproof layer of *opus signinum*. They flowed then into a *piscina limaria* (settling tank) from which the canal (*specus*) branched off.

The conveyance of water to its users, sometimes over great distances, was performed by means of an open conduit system, which is to say, by exploiting the force of gravity. Water flowed thanks to the force of gravity in a canal to which the Roman engineers ensured a suitable slope (*declivitas*) preventing water from reaching a speed that could jeopardize the stability of that structure, in the presence of a constant slope. Thanks to this criterion, the height of the aqueduct progressively decreased from the spring along its route, by forcing the route to meander.

It was essential to maintain slopes *mensura declivitatis*, that is, the optimal required slope, so that the topographic drop may enable water to flow without excessive or poor speed between the spring and the place where water was used (Vitr. VIII, 6,1). This was attained thanks to some topographic tools such as *chorobates*, but also the *dioptra* and the *libra acquaria*, as well as the use of arches. The oscillation of slopes of the Roman aqueducts is remarkable and sometimes diverges very much from the theoretical directions of Vitruvius who suggested slopes not lower than 5%, of Pliny, and Frontinus, respectively.

The water flow was funneled to a masonry canal, called the *specus*. When it was underground, especially far from cities, or in other tunnels, such a canal had some vertical wells, *lumina*, at regular intervals, which linked it to the surface.

The walls of the canal were built either with stone (i.e., tufo). The conduit covering could be, in the same aqueduct, sometimes flat and some other times a sloping roof or an ogival arch. The width of the canal section was proportional to the flow and at all events it sometimes varied for no apparent reason.

Some settling tanks were arranged at regular intervals along the route, where there were often the massive structures of *dividicula* or *castella* which enabled the collection of water.

When the aqueduct had to cross rivers or valleys, and at all events to ensure the required slope, the engineers resorted to the typical structures of Roman architecture, that is, the arch with a series of arcades, often multilevel. In the Segovia aqueduct, the arches reached 50 m in height, whereas in the *Anio Novus* in Rome, they reached 32.3 m in height, for 9.593 km of length. The material most commonly used was *peperino* and only centuries later it was reinforced with some restoration works in concrete and masonry.

The Aqueducts in Rome

Aqua Appia (312 BCE)

The most ancient aqueduct of Rome carried water from the springs of the *Prenestini* mountains; prior to its construction, the city had relied upon wells and the water of Tiber river. The aqueduct covers a route of about 16 km, most of it

subterranean, and could carry an estimated 73,000 m^3 of water per day.

Anio Vetus (272 BCE)

The *Anio Vetus* followed a course of about 64 km from the Anio river to Rome and carried 176,000 m^3 of water per day.

Aqua Marcia (144 BCE)

The *Aqua Marcia* stretched from the springs of the Anio valley to the Capitoline Hill, covering a route of about 91 km and carrying 187,000 m^3 of water per day.

Aqua Tepula (125 BCE)

The *Tepula* carried 18,000 m^3 of water per day from its springs to Rome; the water is warm at its source in the Alban Hills, thus explaining its name.

Aqua Julia (33 BCE)

It came from the territory of Tusculum, with a route of 22 km, and it provided Rome with about 48,000 m^3 of water per day.

Aqua Virgo (19 BCE)

It provided 100,000 m^3 of water per day after a route of about 20 km from the Alban Hills. It was restored in 1453 CE and today still feeds the Trevi Fountain in Rome.

Aqua Alsietina (2 BCE)

It was probably built to feed the *Naumachia* shows, which took place in Trastevere. Its length was about 33 km and its flow 16,000 m^3, carrying non-potable water.

Aqua Claudia (38–52 CE)

It is the most impressive aqueduct as it stretches for 16 km on 64 big arches. It carried 184,000 m^3 of water per day from the valley. It fed the lake of the emperor Nero's *Domus Aurea*.

Anio Novus (38–52 CE)

With its route of 86 km from the Anio valley, partly shared with that of the *Aqua Claudia*, it provided Rome with 190,000 m^3 of water per day.

Aqua Traiana (109 CE)

The aqueduct that fed the Baths of Trajan collected the water coming from springs of the area of Lake Bracciano after a route of about 32 km.

Aqua Alexandrina (226 CE)

The last of Rome's aqueducts, it fed the Severan public baths (*thermae*) with a super-elevated route, coming from the springs of Pantano Borghese.

Cross-References

- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Romanization
- ▶ Topography of Rome

References

Becker, H.W. 2002. The Etruscan *Castellum*: Fortified settlements and regional autonomy in Etruria. *Etruscan Studies* 9: 85–95.

Blume, F., F. Lachmann, and A. Rudorff. 1848–1852. *Gromatici Veteres. Die Schriften der römischen Feldmesser*. Berlin: Reimer.

Chevallier, R. 1997. *Le voies romaines*. Paris: Picard.

Cuntz, O. 1929. *Itineraria romana, Volume I*. Lipsiae: in aedibus B. G. Teubneri.

Fasolo, M. 2005. *La viaEgnatia, Volume I*. Roma: Iger.

Galliazzo, V. 1994–1995. *I ponti romani*. Treviso: Canova.

Gros, P., and M. Torelli. 2007. *Storia dell'urbanistica: Il mondo romano*. 2nd ed. Bari: Laterza.

Holmberg, E.J. 1933. *Zur Geschichte des cursus publicus*. Uppsala: A.-b. Lundequistska bokhandeln.

Pekàry, T. 1968. *Untersuchungen zu den römischen Reichsstrassen*. Bonn: R. Habelt.

Pflaum, H.G. 1940. *Essai sur le Cursus Publicus sous le Haut-Empire Romain*. Paris: Imprimerie Nationale.

Quilici, L. 1990. *Le strade. Viabilità tra Roma e Lazio*. Roma: Quasar.

Radke, G. 1971. Viae Publicae Romanae. In *Realencyclopädie der Classischen Altertumswissenschaft*, vol. XIII, 1417–1686. Stuttgart: Metzler.

Rebuffat, R. 1987. Via Militaris. *Latomus XLVI* 1: 52–67.

Seek, O. 1894. Cursus publicus. In *Realencyclopädie der Classischen Altertumswissenschaft*, vol. IV, 1846–1851. Stuttgart: Metzler.

Further Reading

Adam, J.P. 1984. *La construction romaine. Matériaux et techniques*. Paris: Picard.

Aicher, P. 1995. *Guide to the aqueducts of ancient Rome*. Wauconda: Bolchazy-Carducci.

Ashby, T. 1935. *The aqueducts of ancient Rome*, ed. A. Richmond. Oxford: Clarendon Press.

Callebat, L. 1973. *Vitruve de l'architecture. Livre VIII*. Paris: les Belles Lettres.

Crow, J. 2008. *The water supply of Byzantine Constantinople*. London: Society for the Promotion of Roman Studies.

Eschebach, H. 1979. Die Gebrauchswasserversorgung des antiken Pompeji. *Antike Welt* 10 (2): 3–24.

Fassitelli, E. 1972. *Tubi e valvole dell'antica Roma*. Milano: Edizioni Petrolieri d'Italia.

Fernandez Casado, C. 1983. *Ingeniería hidráulica romana*. Madrid: Ediciones Turner.
Germain de Montauzan, C. 1909. *Les aqueducs antiques de Lyon: étude comparée d'archéologie romaine*. Paris: E. Leroux.
Grenier, A. 1960. *Manuel d'archéologie gallo-romaine 4, Les monuments des eaux. 1, Aqueducs-thermes*. Paris: A. Picard.
Grewe, K. 1986. *Atlas der römischen Wasserleitungen nach Köln*. Rheinische Ausgrabungen 26. Köln-Bonn.
Grimal, P. 1961. *Frontinus Le aqueducs de la ville de Rome*. Paris: les Belles Lettres.
Hodge, A.T. 1992. *Roman aqueducts & water supply*. London: Duckworth.
Lanciani, R. 1975. *Le acque e gli acquedotti di Roma antica*. Roma: Quasar.
Liberati Silverio, A.M., and G. Pisani Sartorio. 1992. *Il trionfo dell'acqua: atti del convegno "Gli antichi acquedotti di Roma: Problemi di conoscenza, conservazione e tutela", Roma 29–30 ottobre 1987*. Roma: A.C.E.A.
Miller, K. 1916. *Itineraria Romana. Römische Reisewege an der Hand der Tabula Peutingeriana*. Stuttgart: Strecker und Schröder.
Pace, P. 1986. *Gli acquedotti di Roma e il De aquaeductu di Frontino (XVI Congresso Intern. sugli Acquedotti, Roma, 3–7 nov. 1986)*. Roma: Art Studio S.Eligio.
Secchi, A. 1876. *Intorno ad alcune opere idrauliche antiche rinvenute nella campagna di Roma. Estratto dagli Atti dell'Accademia pontificia de' Nuovi lincei, anno XXIX, sess. V del 23 aprile 1876*. Roma: Tip. delle scienze matematiche e fisiche.
Tölle-Kastenbein, R. 1990. *Antike Wasserkultur*. München: Beck.
Uggeri, G. 1995. Le stazioni postali romane nella terminologia tardoantica. In *Mélanges Raymond Chevallier* II. *Caesarodunum* XXIX, 137–40. Tours.

Inner Ionian Sea Archipelago: Archaeological Survey

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Introduction

Meganisi and its satellite islands lie in the Inner Ionian Sea Archipelago, a relatively short distance from Aetoloakarnania and Lefkas (Fig. 1). The abundance of top-quality flint and the presence of small wetlands and karstic cavities were the first points that attracted our attention to this corner of western Greece. But there was something more. In the Pleistocene, the short distance between these islands and the neighboring Lefkas and Aetoloakarnanian coast, combined with the shallow seabed in this area, meant that changes in sea level during glacial and interglacial periods would have caused the islands to become alternately connected to and isolated from the larger landmasses. Thus, over time, new living conditions and environments were constantly created for the Paleolithic communities of southeast Europe, which responded to these in their turn. The islands of the archipelago form fragments, the higher tips, of the original Pleistocene landscape, a large part of which now lies submerged under the sea. It was only after the first millennia of the Holocene that the coastline assumed its present form and offered to the communities of late prehistoric and historical times a new set of insular attractions (Fig. 2). Marine and fresh water resources have been bountiful, and it is no coincidence that the coastline of our research area is today protected by Natura 2000. From a diachronic perspective, then, Meganisi and its neighbors posed a methodological challenge for the realization of a hybrid island archaeology – alternating as it was between mainland and islands, passing points, and landing places – on a small and viable spatial scale.

Key Issues

The project was a University of Crete initiative undertaken in collaboration with the Greek Ministry of Culture. It had two main objectives: (1) the study of the archipelago's prehistoric and historical trajectories and links to the trajectories of the larger landmasses to the east and west (*regional* scale) and (2) the identification of prehistoric sites that could be further tested by excavation in the future (*site* scale). The *project design* comprised *archaeological survey* to shed light on human activity through time and space as well as *archival*

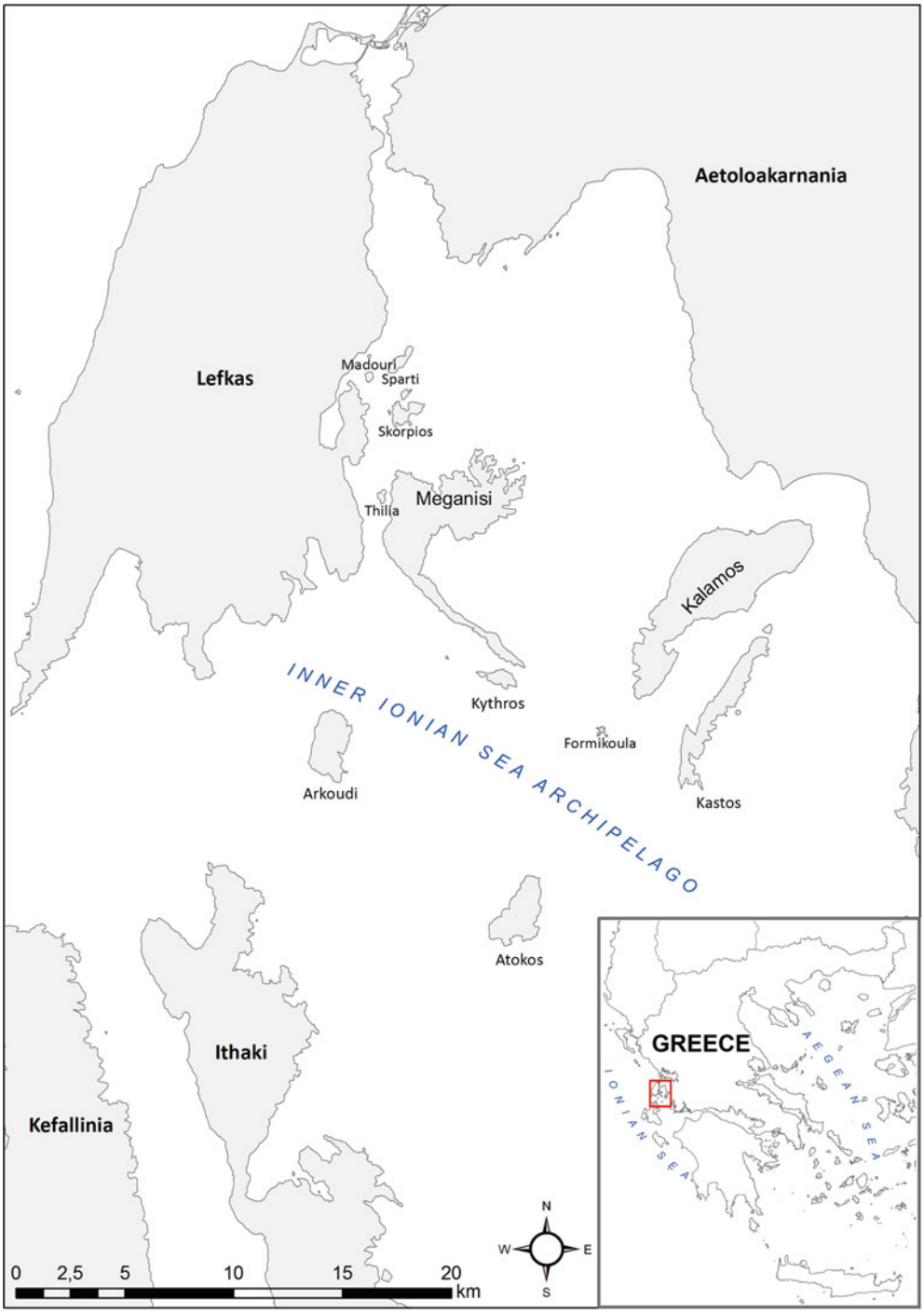

Inner Ionian Sea Archipelago: Archaeological Survey, Fig. 1 Map showing the area of study, the Inner Ionian Sea Archipelago in west Greece, delimited by the mainland Greece (Aetoloakarnania), Lefkas, and the northern tips of Kefallinia and Ithaki

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Inner Ionian Sea Archipelago: Archaeological Survey, Fig. 2 Panoramic view of the Inner Ionian Sea Archipelago taken from east Lefkas. (Photo courtesy of Costas Zissis)

Inner Ionian Sea Archipelago: Archaeological Survey, Fig. 3 A 1729 map of the survey region by Santo Semitecolo. (Map courtesy of the Lefkas Historical Archive)

and anthropological research to reconstruct natural and cultural landscape history. It was guided by interdisciplinary collaboration of archaeologists working with specialists in geology, geography, oceanography, biology, social anthropology, and architecture.

The *archaeological survey* was conducted in Meganisi, Thilia, Kythros, Petalou, Nisopoula, Formikoula, Atokos, and Arkoudi in two field seasons in summers 2010 and 2011. A geographical information system (designed in ArcGIS 9.3) provided the platform for the work in the lab and the field. At the outset, multiple layers of *cartographic information*, in the form of topographic maps (1:5,000), historical maps (Fig. 3), geological maps, and satellite images,

were compiled, superimposed, and consulted. As surface inspection progressed, data on finds, sites, and monuments was also gradually integrated. The larger islands were divided into 100 × 60 m transects with a numeric designation (Fig. 4a); the smaller islets were explored as individual transects. Information on place names, landscape features (e.g., a doline, a cave), and structures (e.g., a threshing floor), collected by local informants or through surface

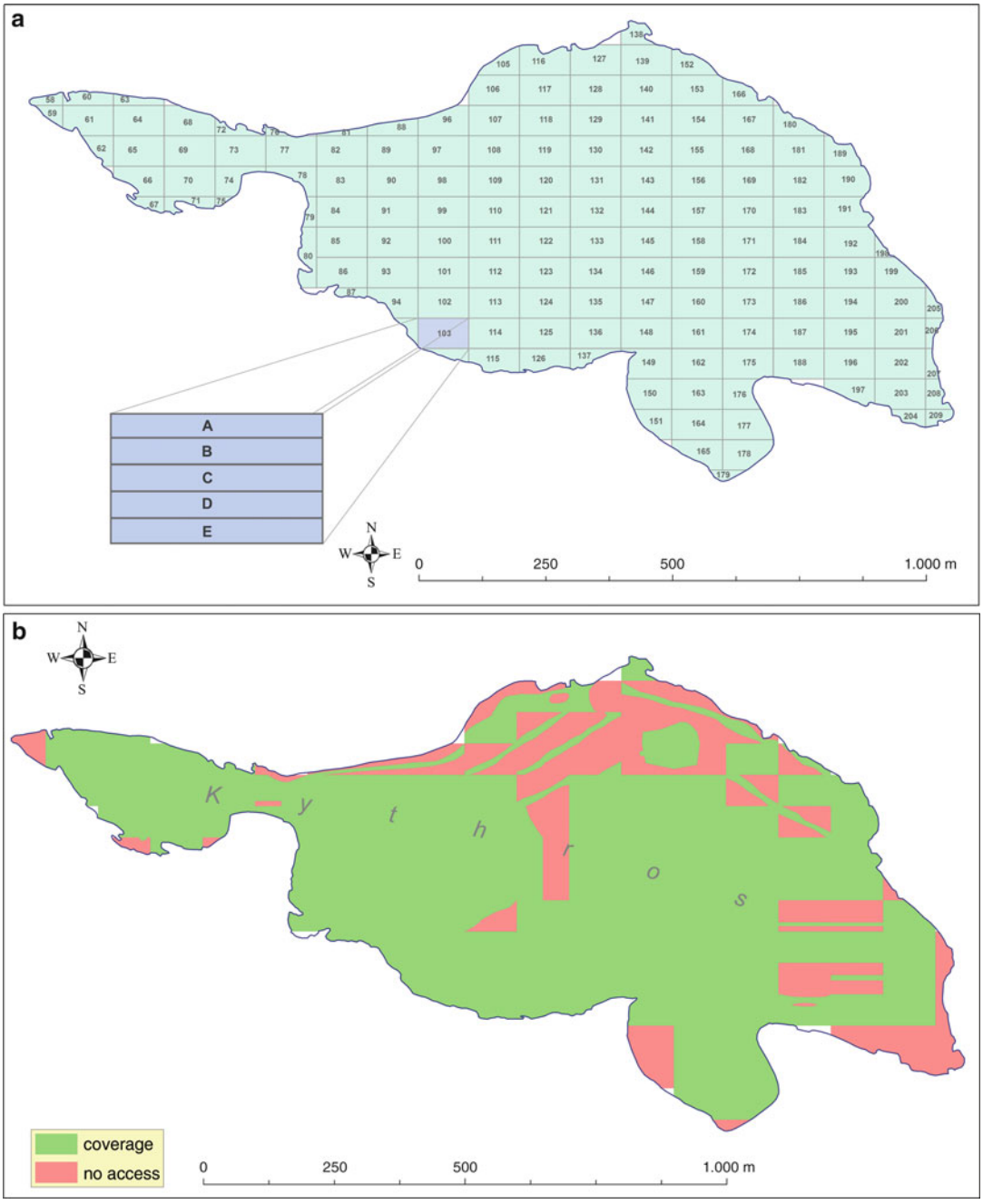

Inner Ionian Sea Archipelago: Archaeological Survey, Fig. 4 *Top*: the Kythros grid. *Bottom*: map showing the coverage at Kythros (*green*) and the areas with no access (*brown*)

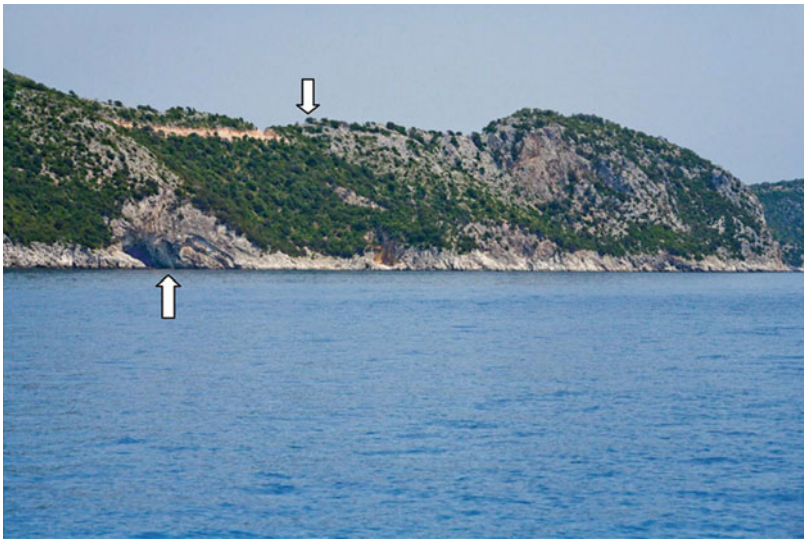

Inner Ionian Sea Archipelago: Archaeological Survey, Fig. 5 The steep relief at southwest Meganisi. *Arrows* showing a coastal cave with submerged floor and a multiperiod site on *top* of a limestone cliff near the recently opened road

exploration, was mapped on transects and guided the priorities of research.

Surface exploration proceeded in *transects* by teams of 5 fieldwalkers spaced at 12-m intervals. Team members walked in parallel lines, each scanning the ground to right and left (Fig. 4a). They collected and bagged all artifacts seen on the surface and recorded visible structures or architectural remains. Each team worked with a coordinator, an experienced archaeologist responsible for positioning his/her team in the field with the aid of a portable GPS, compass, satellite, and topographic maps of the day's plan of coverage. Upon completion of a few transects, the teams stopped for evaluation. At this point coordinators wrote in the day book, made plans of any notable structures, and sorted finds. Leaving behind the natural flint debris was necessary since students were often unable to distinguish those from artifacts in the course of ground scanning. Under a tree or in the open air, these stops for inspection, find sorting, and evaluation were opportunities to teach students the archaeology fundamentals and the nature of the materials.

Sites were designated on the basis of three criteria set up by the pioneering work by Cherry et al. (1991) at Keos Island: high artifact *density*, *continuity* in artifact distribution over a contiguous area, and *discreteness*, that is, the area has a distinct edge, beyond which artifact density falls of markedly. Site coordinates were recorded with a portable GPS and transferred to the GIS database.

The original plan was to cover one third of the archipelago's 30 km^2. In practice, a little less than 7 km^2 was examined. Vegetation, steep relief, and seabird habitats proved to be the major obstacles to meeting our original coverage plan (Figs. 4b and 5). Although team coordinators were prepared for the topographic and accessibility conditions of the next day's assigned units of work, more often than not the satellite images (even those only a few years old) were depicting a landscape that had changed dramatically due to either vegetation overgrowth (western Greece receives more rain than any other part of the country) or intense construction activity and road opening especially along the coastal areas of Meganisi. In the smaller islands covered by thick and thorny vegetation, fieldwalking could only take place along paths created by grazing animals or water erosion.

Future Directions

However the results were positive. The survey recovered 20,000 artifacts and 30 sites dating from the Paleolithic to the twentieth century, with a hiatus between Late Antiquity and the eighteenth century. The finds bridge the gap

between the archaeological record of the Ionian Sea and that of mainland Greece (e.g., Bailey et al. 1997; Forsén and Tikkala 2011; Wiseman and Zachos 2003). More importantly they lend themselves to discussing and interpreting the island record in terms of cultural and natural events that are distinctive to the coastal areas of Western Greece. Working on very small islands in a geologically active part of the world, we have been aware that archaeological site preservation and visibility is largely dependent upon eustatism, tectonic movements (including coastal uplift or subsidence and local sea-level rates of change) and high-energy events (including wave action and tsunamis). Thus although the Inner Ionian Sea Archipelago survey begun on land, we have developed a special interest in the sea and in the information still locked up on the drowned prehistoric landscapes of the Ionian shelf.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Glacial Landscapes: Environmental Archaeology
- ▶ Greek Islands (Excluding Crete), Archaeology of
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Submerged Prehistoric Landscapes
- ▶ Surface Survey: Method and Strategies
- ▶ Survey Archaeology in the Greek Aegean World

References

Bailey, G., T. Cadbury, N. Galanidou, and E. Kotjabopoulou. 1997. Rockshelters and open-air sites: Survey strategies and regional site distributions. In *Klithi: Palaeolithic settlement and Quaternary landscapes in northwest Greece. volume 2: Klithi in its local and regional setting*, ed. G. Bailey, 521–536. Cambridge: MacDonald Institute for Archaeological Research.

Cherry, J.F., J.L. Davis, E. Mantzourani, and T.M. Whitelaw. 1991. The survey methods. In *Landscape archaeology as long-term history: Northern Keos in the Cycladic Islands from earliest settlement until modern times*, Monumenta Archaeologica, ed. J.F. Cherry, J.L. Davis, and E. Mantzourani, vol. 16, 13–35. Los Angeles: Institute of Archaeology, University of California.

Forsén, B., and E. Tikkala, eds. 2011. *Thesprotia Expedition II Environment and settlement patterns*, Papers and Monographs of the Finnish Institute at Athens. Vol. XVI. Foundation of the Finnish Institute at Athens: Helsinki.

Wiseman, J., and K. Zachos, eds. 2003. *Landscape archaeology in southern Epirus, Greece I*, Hesperia Supplement. Vol. 32. Athens: The American School of Classical Studies at Athens.

Further Reading

Bintliff, J. 2000. Beyond dots on the map: Future directions for surface artefact survey in Greece. In *The future of surface artefact survey in Europe*, Sheffield Archaeological Monographs, ed. J. Bintliff, M. Kuna, and N. Venclov, vol. 13, 3–20. Sheffield: Sheffield Academic Press.

Bintliff, J., and A. Snodgrass. 1988. Off-site pottery distributions: A regional and interregional perspective. *Current Anthropology* 29 (3): 506–513.

Dunnell, R.C., and W.S. Dancey. 1983. The siteless survey: A regional data collection strategy. *Advances in Archaeological Method and Theory* 6: 267–287.

Gallant, T.W. 1986. Background noise' and site definition: A contribution to survey methodology. *Journal of Field Archaeology* 13: 403–418.

Keller, D.R., and D.W. Rupp. 1983. *Archaeological survey in the Mediterranean region*, British Archaeological Reports International series S155. Oxford: Archaeopress.

Institute for Archaeologists (IfA)

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Basic Information

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Mission Statement: "We advance the practice of archaeology and allied disciplines by promoting professional standards and ethics for conserving, managing, understanding, and promoting enjoyment of heritage."

The Institute of Field Archaeologists (IFA) was founded in 1982 in order to facilitate self-regulation within archaeology and related disciplines through the setting of ethical and quality standards in archaeology, http://www.archaeologists.net. Over the last 27 years, the Institute's *Code of Conduct*, *Standards and Guidance* and Registered Organizations scheme have become the benchmarks of professional practice in archaeology in the United Kingdom. In 2009, IfA changed its name to the Institute for Archaeologists to better reflect its range of membership, which includes curators, contractors, consultants, and academics working in all areas of the historic environment. The Institute is governed by an elected Council, supported by a range of voluntary committees, area and special interest groups, and a small number of dedicated staff.

The Institute for Archaeologists provides a range of services for its members, and most importantly a voice for the sector. It represents around 3,000 individuals and 70 Registered Organizations that have shown their commitment to meeting IfA standards. Individual membership is awarded at five grades: Student, Affiliate, Practitioner, Associate, and Member. The last three are corporate grades and membership is assessed by a committee of peers on the basis of a portfolio of evidence demonstrating technical and ethical competence. Members agree to be bound by the *Code of Conduct* and by-laws of the Institute and a disciplinary procedure is in place to deal with allegations that the *Code* has been breached. A compulsory Continuous Professional Development scheme allows for ongoing assessment of members' skills and competence and ensures that these are kept up to date.

The IfA also operates a quality assurance scheme for organizations – the Registered Organization scheme. Those organizations who are registered with the IfA (identifiable by their use of the IfA kitemark) have formally resolved to carry out their work in line with the IfA *Code of Conduct* and other by-laws. The work is controlled by a full Member (MIfA) of the IfA, their status as a Registered Organization is reviewed regularly by the Institute, and any complaints are investigated and appropriate action taken. Anyone wishing to secure the services of an archaeologist is strongly recommended to contact a Registered Organization.

Major Impact

The Institute for Archaeologists exists to advance the practice of archaeology and allied disciplines by promoting professional standards and ethics for conserving, managing, understanding, and promoting enjoyment of heritage.

As well as accrediting individuals and organizations, the IfA continues to develop and promote standards and good practice guidance and has a vital role in promoting the interests of archaeology and archaeologists to government, policy makers, and industry. In particular, IfA works closely with other sector bodies to lobby government on key areas of legislative and policy change. The IfA publicizes the work that it does through its in-house magazine *The Archaeologist* and Yearbook, through a range of professional practice papers, and through an annual conference. For more information, see http://www.archaeologists.net/publications.

IfA's suite of *Standards and Guidance* covers the majority of activities concerned with recovering information from the historic environment. These documents are widely used as a quality measure within the archaeology sector in the United Kingdom and further afield. The full suite of *Standards and Guidance*, along with other IfA Codes and by-laws, can be downloaded from the IfA website at http://www.archaeologists.net/codes/ifa.

IfA's technical and ethical standards underpin the practice of cultural heritage management in the United Kingdom. Its Code of Conduct and Standards and guidance provide the basis by which quality is assured across the sector through published standards for person (IfA membership, organizational registration) or for process and product (Standards and guidance).

Cross-References

▶ Cultural Heritage Management Quality Control and Assurance

Further Reading

Institute for Archaeologists. n.d.-a. Publications. Available at: http://www.archaeologists.net/publications

Institute for Archaeologists. n.d.-b. Codes, standards and guidelines. Available at: http://www.archaeologists.net/codes/ifa

Institute for Canine Forensics

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Basic Information

Our Beginnings

The Institute for Canine Forensics (ICF) was established in 1997 and is a nonprofit organization located in the San Francisco Bay Area of California, USA. Our original search and rescue-based handlers were curious to learn if our dogs could find and alert on historic human remains. Dogs have been used to detect human remains for many years. Prior to the early 1990s, the capabilities of the dogs to detect the fragile scent of historic and prehistoric human burials and cremains, hundreds to thousands of years old, had barely been explored.

Our Mission

We promote and elevate professionalism in the use of specially trained canines for historic and prehistoric human remains detection.

We have developed advanced techniques using canines as an archaeological tool to assist cultural resource management firms, native tribes, universities, churches, and government agencies in the preservation of sacred human burials and cemeteries.

Our Training

A Historic Human Remains Detection (HHRD) dog is trained using old human bones, teeth, and very old cemeteries which give off a much weaker scent than that of decomposing human remains. Our dogs are trained to perform a passive alert, either a sit or down, at the strongest location of historic and prehistoric human remains scent. Searching for this weak scent requires the dog to work slowly and methodically, keeping its nose just above the ground. Our dogs are never cross-trained to detect other odors.

Intense training is required to reach certification and to maintain the skills of these very specialized teams. Training standards were developed, testing is conducted on a double-blind basis, and proctoring is done by an outside evaluator. Our handlers train several days a week, and training requirements are such that every required skill must be trained at least biannually, facilitating an ongoing certification program. Full recertification is done annually.

Utilizing Historical Human Remains Detection Dogs

Over the years we have worked with Native American tribes, forensic anthropologists, archaeologists, and other scientific disciplines to design and refine our noninvasive approach for locating historic and prehistoric human remains. We are focused on our training and search protocols and specialize specifically in detecting this very old, faint human scent.

We advocate a teamwork approach and emphasize cooperation among the multiple experts, disciplines, and agencies that we work with. Our website highlights recent projects, clients, published papers, newsletters, and news articles that are intended for networking nationally and internationally to inform and promote the exchange of new ideas and discoveries in our field.

The need to educate archaeologists in this field was critical. This is another "tool" in the archaeologists' toolbox. It is a noninvasive tool that adds another layer to the oral, written, physical, and protective efforts already used.

ICF's Practices and Procedures can be obtained upon request at info@ICFK9.org.

Major Impact

The Institute for Canine Forensics' specially trained canine teams offer a completely noninvasive method to detect historic and ancient human burials. It is a cost-effective method of locating cremations and inhumations. ICF works hand in hand with native tribes, forensic anthropologists, archaeologists, cultural resource management organizations, and other scientific disciplines and technologies.

Cross-References

- ▶ Battlefield Archaeology
- ▶ Environmental Archaeology and Conservation
- ▶ Glass: Conservation and Preservation
- ▶ Historical Archaeology
- ▶ Society for Historical Archaeology (SHA) (Modern World Archaeology)

References

Carey L. Baxter, and Michael L. Hargrave. Guidance on the Use of Historical Human Remains Detection Dogs for Locating Unmarked Cemeteries, US Army Corps of Engineers, December 2015. https://apps.dtic.mil/docs/citations/AD1001858

Lynn H. Gamble Department of Anthropology, University of California, Santa Barbara, "Archaeology of the Kumeyaay, Contributions to the Prehistory of Cuyamaca Rancho State Park San Diego County, California" Publication in Cultural Heritage Number 34, 2017. https://www.parks.ca.gov/?page_id=29812

Mark Hylkema Santa Cruz District Archaeologist, California State Parks, "Shipwrecks and Lime Kilns: The Hidden History of the 19th Century Sailors and Quarrymen of the Central Coast" California State Parks, Publications in Cultural Heritage Number 35, 2018, Perils of a Leeward Shore: Archaeology, History and Stabilization of the Franklin Point Historic Shipwreck Cemetery, (CA-SMA-207/H), Ano Nuevo State Park. https://www.parks.ca.gov/?page_id=29986

Further Reading

Grebenkemper, John. 2018. Starved Camp of the Donner Party. *Overland Journal* 36 (2): 77–82. Three members of the Donner Party died in a massive snowstorm while traveling with a rescue party near Donner Summit. This describes the canine search for the location where these people died. Published Papers at https://www.icfk9.org/test-page-papers for pdf version.

Grebenkemper, John, and Kristin Johnson. 2015. Forensic Canine search for the Donner Family winter camps. *Overland Journal* 33 (2): 64–89. A five-year search with forensic canines located areas of death that likely correspond to the three Donner family camps at Alder Creek. Published Papers at https://www.icfk9.org/test-page-papers for pdf version.

Grebenkemper, John, Kristin Johnson, and Adela Morris. 2012. Locating the grave of John Snyder. *Overland Journal* 30 (3): 92–108. Forensic canines locate the grave of John Snyder who died on October 5, 1846 in central Nevada. Published Papers at https://www.icfk9.org/test-page-papers for pdf version.

Keck, G. 2019. Recovering ashes from ashes. *American Archaeology Magazine*, Fall, p. 32. https://www.icfk9.org/news-articles

News Articles

Far Western Anthropological Research Group, INC. Far Western and Institute for Canine Forensics Identify Emigrant Grave, July 2017. http://farwestern.com/far-western-and-icf-identify-emigrant-grave/

Los Angeles Times. Search dogs and archaeologists look for cremated remains amid a wildfire's debris December 6, 2018. https://www.latimes.com/nation/la-me-woolsey-fire-cremains-recovery-20181206-story.html

National Geographic Forensic Dogs Locate Spot Where Amelia Earhart May Have Died July 7, 2017. https://news.nationalgeographic.com/2017/07/forensic-dogs-amelia-earhart-spot-where-died/

The Washington Post. Dogs help wildfire survivors recover their most precious possessions: Human Cremains, December 29, 2018. https://www.washingtonpost.com/national/dogs-help-wildfire-survivors-recover-their-most-precious-possessions-human-cremains/2018/12/29/cded553c-0473-11e9-9122-82e98f91ee6f_story.html?utm_term=.801d90073814

Institute of Nautical Archaeology (INA)

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The Institute of Nautical Archaeology (INA) is a 501(c)3 nonprofit research organization based in College Station, Texas, USA, and Bodrum,

Turkey. INA was founded by Dr. George F. Bass in 1972 as the American Institute of Nautical Archaeology (AINA); in 1979, the name was shortened to Institute of Nautical Archaeology (INA) to reflect its international staff and board of directors (Fig. 1). Having spent much of the 1960s pioneering the scientific underwater excavation of ancient shipwrecks in Turkey (Cape Gelidonya, Yassıada) and running an underwater section of the University Museum, with excavations in Cyprus (Kyrenia) and Italy (Porticello), Bass resigned from a faculty position at the University of Pennsylvania in 1973, and with the help of Michael Katzev, director of the Kyrenia shipwreck excavation, secured seed funding for a fledgling institute (Bass 1966, 1972). Bass served as AINA president, Katzev as vice-president, and Cynthia Eiseman as executive director.

In 1976, INA moved to Texas and affiliated with Texas A&M University (TAMU), where a graduate Nautical Archaeology Program (NAP) was established as an independent academic unit. Core NAP faculty included Bass, Donny L. Hamilton, J. Richard Steffy, and Frederick van Doorninck. In the early 1990s, sizable donations made by INA Directors and matched by TAMU led to the establishment of 8 faculty endowments and 2 student scholarships to support fieldwork and research. Today, NAP has 7 full-time faculty and ~50 graduate students completing either an M.S. in Maritime Archaeology and Conservation or a Ph.D. in Anthropology with a specialization in Nautical Archaeology. The NAP curriculum includes courses in ship design and construction, naval treatises and maritime communities, the conservation, recording, and analysis of artifacts from underwater environments, and seminars in preclassical, classical, medieval, and New World seafaring. NAP students receive field training on INA-sponsored shipwreck excavations around the world, which are directed by NAP faculty or by some of INA's more than 50 research associates. The synergistic nature of the INA-NAP relationship is evidenced by the fact that many INA research associates are NAP graduates (Hamilton 2005).

For almost 50 years, through its partnership with NAP, INA has advanced the field of underwater archaeology not only in the USA, by training future academics, museum curators, and state and federal underwater archaeologists, but also around the world, by training students from nearly two dozen countries. In North America (Bass 1988), INA archaeologists have explored or excavated shipwrecks of the Revolutionary War (*Charon*, *Defence*) and Civil War (*Denbigh*), as well as eighteenth-century merchantmen and transports (Ronson Ship, Clydesdale Plantation, Browns Ferry) and nineteenth-century steamboats (*Heroine*, Shelburne Shipyard, Yukon River). In the 1980s, INA researchers excavated two sixteenth-century Iberian shipwrecks in the Atlantic, at Highbourne Cay, Bahamas, and Molasses Reef in the Turks and Caicos. In the Caribbean, INA archaeologists have surveyed, excavated, and recorded seventeenth-century shipwrecks in Bermuda (Western Ledge Reef, *Warwick*), the Dominican Republic (Monte Cristi), and Tobago (Rockley Bay). INA archaeologists also excavated the submerged city of Port Royal, Jamaica, sunk by a massive earthquake in 1692, the Portuguese frigate *Santo Antonio de Tanna*, wrecked off the coast of Mombasa, Kenya in 1697, and the Ottoman frigate *Ertuğrul* lost in a typhoon off Kushimoto, Japan, in 1890.

INA is perhaps best known, however, for the excavation of ancient shipwrecks in the Mediterranean. Since Bass' seminal 1960 excavation of the Late Bronze Age shipwreck at Cape Gelidonya, INA archaeologists working in Turkey have excavated, conserved, studied, and published the remains of a dozen ships from the Bronze Age (Uluburun, Şeytan Deresi), Archaic Greece (Pabuç Burnu), Classical Greece (Tektaş Burnu), Hellenistic Greece (Kızılburun), as well as the Byzantine (Yassıada, Bozburun, Yenikapı), and medieval periods (Serçe Limanı). Many of these wrecks and their associated artifacts are on public display in the Bodrum Museum of

Institute of Nautical Archaeology (INA), Fig. 1 INA logo

Institute of Nautical Archaeology (INA), Fig. 2 Aerial view of INA's Bodrum Research Center in Turkey

Underwater Archaeology in southwestern Turkey (Bass 2005).

In 1995, INA opened the Bodrum Research Center (BRC), which serves as an overseas, representative office of INA in Turkey. The BRC is home to artifact and wood conservation laboratories, a dormitory and guest suite, staff offices, and a 10,000-volume research library. The BRC is staffed year-round by 20 Turkish citizens and accommodates visiting scholars, researchers, and students. In 2016, INA built and launched a 23 m (75 ft)-long archaeological research vessel named *Virazon II* which replaced *Virazon*, the 1953 US Army T-Boat that was acquired by INA in 1980 and supported many INA excavations in Turkey. INA archaeologists have also directed or codirected shipwreck surveys and excavations in Albania, the Azores, Bulgaria, Croatia, Egypt, Greece (Fourni, Danaos project), Israel, Italy (Secca di Capistello, Marzamemi), and Spain (Bajo de la Campana, Finisterre).

INA is administered by officers and a Board of Directors. INA committees provide funding annually for survey, excavation, research, and publication; in 2018, these awards totaled $125,000. INA-excavated shipwrecks are published in the Ed Rachal Nautical Archaeology Series of TAMU Press, which presently includes more than 30 titles. Interim field reports appear in the *INA Quarterly* (published since 1974) and in the monthly *INA Insider* e-newsletter, both of which are benefits of INA membership (Fig 2).

Cross-References

- ▶ Bass, George Fletcher
- ▶ Cape Gelidonya Shipwreck Excavation
- ▶ Kyrenia Shipwreck Excavation

References

Bass, George F. 1966. *Archaeology under water*. New York: Praeger.

Bass, George F. 1972. *A history of seafaring based on underwater archaeology*. New York: Walker.

Bass, George F. 1988. *Ships and shipwrecks of the Americas: A history based on underwater archaeology*. New York: Thames and Hudson.

Bass, George F. 2005. *Beneath the seven seas: Adventures with the Institute of Nautical Archaeology*. London: Thames and Hudson.

Hamilton, Donny L. 2005. The Institute of Nautical Archaeology & The Nautical Archaeology Program: A history of both institutions, their interaction, and their role in student education. *INA Quarterly* 32 (2): 14–21.

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology

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Introduction

The history of human settlement in Southeast Asia, which stands at the crossroads of a huge Asian continent and multiple archipelagos that open the way to the Pacific world, is a history of geography – *lato sensu* – and of chronology. The two dimensions of time and space indeed take on a particular significance in this region, as it has been demonstrated since the great scientific revolution of the second half of the nineteenth century. Bearing testament to this, in particular, are the concurrent works of Darwin on evolution and natural selection and of Wallace on the areas of geographic distribution of living species, but also of the geologist Lyell, whose major contribution was to anchor the evolution of species in time.

This history involved multiple actors, especially during the last millions of years. Of the two principal actors, geotectonic, in particular, has modeled a chain of nascent mountains near the contact zone of tectonic plates, many of which became island arcs with or without volcanic activity. We must also take into account the major climatic cycles (alternating glacial-interglacial), which profoundly changed the morphology of the region according to the variations in sea level that could exceed 100 m. It is clear that such fundamental changes, relative to the functioning of the Earth system, resulted in a number of transformations in the landscape, in the rhythm of monsoons, and, thus, the nature and extension of ecosystems. Some were definitive, others reversible or cyclic, but all are, to varying degrees, at the origin of biogeographic situations that can be observed today, or that research seeks to reconstruct in the past.

This history is thus primarily about time, climates, and environments, punctuated by the emergence of lands, the extension of the continental shelves in turn emerging and submerging, by the establishment and the more or less long durability of contacts and corridors between the latter and the archipelagos. Evidently, and beyond the purely physical elements, the passages and biogeographic barriers were for many constituted by the expansion and fragmentation of vegetation formations, such as mangrove forests or humid tropical forests.

Humans have no more escaped the environmental constraints nor their perpetual evolution than any other living creatures. This observation seems particularly well founded with respect to the earliest phases of human settlement in these lands. Human evolution, adaptation, and endemism must thus be envisaged clearly from the biogeographic perspective that directs other naturalist studies. The genus *Homo*, however, remains a special case. Notably, due to its complex social organization, it possesses the means to adapt its technical and subsistence behaviors and to not see its existence as dependent upon the presence of a limited number of well-defined environments, as is the case for many other living beings.

The meaning of Prehistory in Southeast Asia is remarkable in many regards. Firstly, it reflects an important part in the history of the descendants of the first representatives of genus *Homo* outside of Africa, called *Homo erectus* in Asia. Having travelled in the southern part of Eurasia, these hominids, for the first time, crossed the Equator southward. They were also the first, in the history of humanity, to become islanders.

But this Paleolithic human adventure in Southeast Asia, so strongly influenced by its biological as much as its geographical context, still recounts and holds numerous events associated to the

emergence of endemic forms of hominids. Researchers give them a special taxonomic status and see the coexistence, even the cohabitation, of groups intended for near extinction with the first *Homo sapiens* who conquered the archipelagos. They also ascribe to the *Homo sapiens* the command of natural processes such as the "taming" of animals and useful plants, which probably developed in a very early way in the archipelagos.

Definition

Although research, notably since the 2000s, has seen a revival in activity in continental Southeast Asia, the majority of data relating to the earliest phases of Prehistoric chronology concentrates on the archipelagos connected to the Sunda plateau (Fig. 1a), i.e., the southeastern end of Eurasia, partly submerged today by shallow seas (the South China Sea, the Java Sea).

Along the Sunda block, which includes the large western Indonesian islands (Sumatra, Java, and Borneo), the Malay and Indochinese peninsula as well as Thailand, island arcs (external non-volcanic arc, internal volcanic arc) mark the subduction zone of the Australia-Indian Ocean plate under the Eurasian plate. To the southeast lies the Sahul shelf, which includes New Guinea and Australia. Finally, the northeastern region, which includes the island of Sulawesi, the islands of eastern Indonesia, and the Philippine archipelago, is marked by a very complex geotectonic activity, particularly bringing into play the Philippine and Pacific plates.

This configuration is partly the origin of the biogeographic provinces such as Wallacea. The latter is limited to the east of the Sunda block by the Wallace Line, passing through the Makassar Strait, which connects the Celebes and Java seas. Measuring only about 15 km in its width, this straight can reach depths of more than 2,000 m.

Geotectonic activity is extremely important, as indicated by the speed at which plates can move, as this can exceed 10 cm/year, as well as the large number of still active volcanoes. It is within the context of this dynamic interplay that we need to consider the different phases of settlement across the region: For example, the internal volcanic arc of Sunda (Fig. 1a), which includes the island of Java, has most likely functioned in its current configuration for the last 2 million years (Ma). The vast majority of ancient fossil sites are linked to its activity.

The intention here is to cover the largest part of the Quaternary, beginning with the Gelasian, around 2.6 Ma, naturally considered under the aspect of climate chronology, which best illuminates the changing geography of the region. This is particularly demonstrated by the establishment of cycles of duration close to 100,000 years at the beginning of the Middle Pleistocene (c. 0.8 Ma). A climatic optimum and high sea levels are found at the beginning of the Upper Pleistocene (which begins around 130,000 years, at the isotopic stage 5 -MIS 5 – of the marine isotopic chronology). The regional "Paleolithic" continues into the Holocene (well after the deadline conventionally set at 11,700 years).

These classic boundaries take on all their meaning here, because the eustatic oscillations are linked to them. Within the order of a few tens of meters in the Lower Pleistocene, they were able to reach 120 m as early as the beginning of the Middle Pleistocene (Fig. 1b). The geographic consequences were immense, affecting the land surface (the opening of land bridges connecting the islands, connecting the archipelagos to the mainland) as much as the volume of water subject to evaporation in the intertropical zone, hence clearly influencing precipitation.

Historical Background

The sites involved mainly include:

- In the areas with high tectonic and volcanic activity, or high subsidence, thick (volcano-) sedimentary series, as is the case on the island of Java (Fig. 2a).
- Alluvial systems formed along the major rivers which, it must be noted, are often more favorable to the conservation of stone tools than

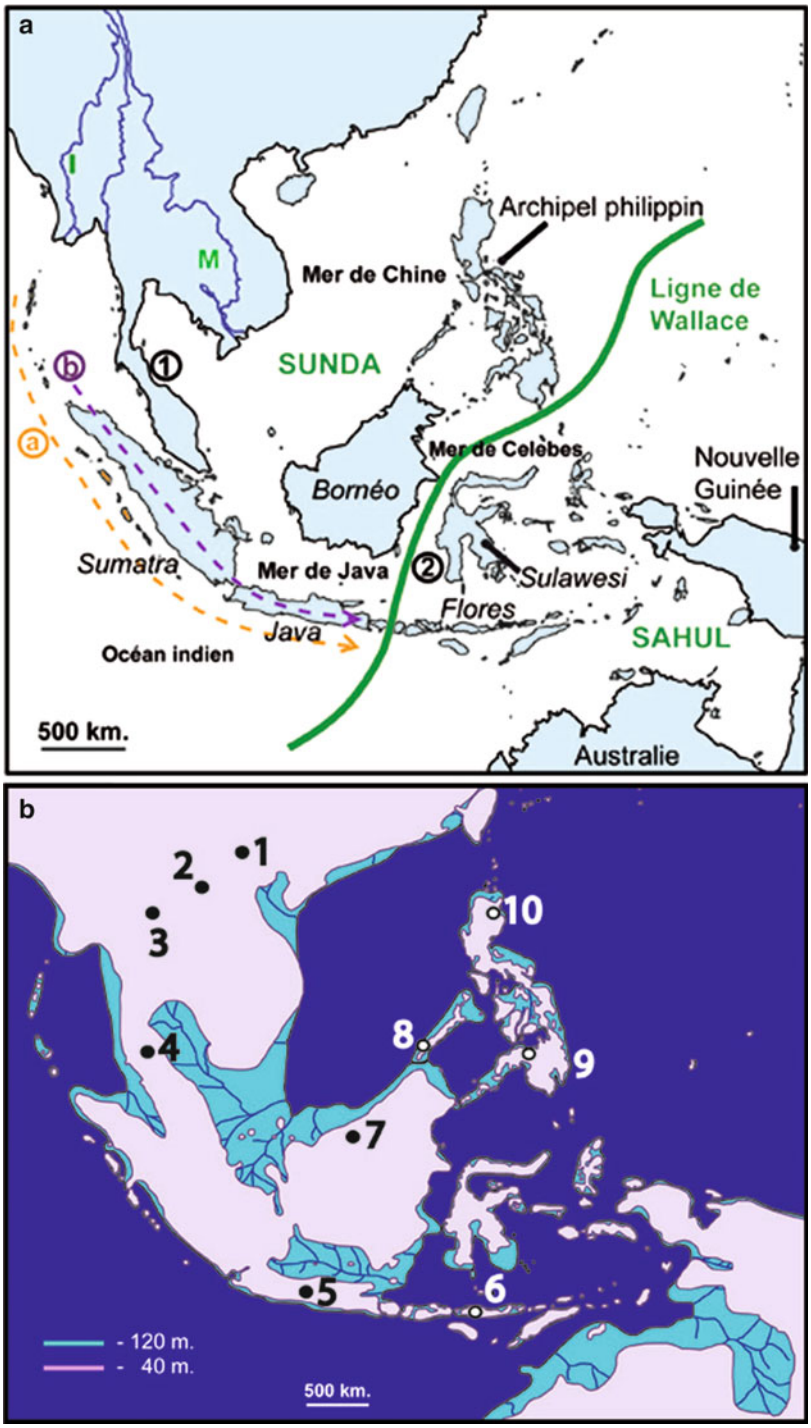

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology, Fig. 1 (**a**) Map of Southeast Asia. *a* – External non-volcanic arc. *b* – Internal volcanic arc. *1* – Isthmus of Kra. *2* – Macassar Strait. *I* – Irrawady. *M* – Mekong. (**b**) Land Bridges. *1* – Tham Khuyen –Northern Vietnam. 2 – Tam Pa Ling – Northern Laos. *3* – Thum Wiman Nakin –Northern Thailand. *4* – Moh Khiew – Southern Thailand. *5* – Sangiran – Java (Indonesia). *6* – Liang Bua – Flores (Indonesia). *7* – Niah – Sarawak (Malaysia). *8* – Tabon – Palawan (Philippines). *9* – Mindanao (Philippines). *10* – Callao – Luzon (Philippines). (© Bathymetric limit according to Voris 2006)

fossils, whether they are alluvial terraces or flood plain deposits. These alluvial systems are equally found in mainland Southeast Asia (Mekong and Irrawady valleys (Fig. 1a)) as in the islands (the archipelagos of Indonesia and the Philippines).

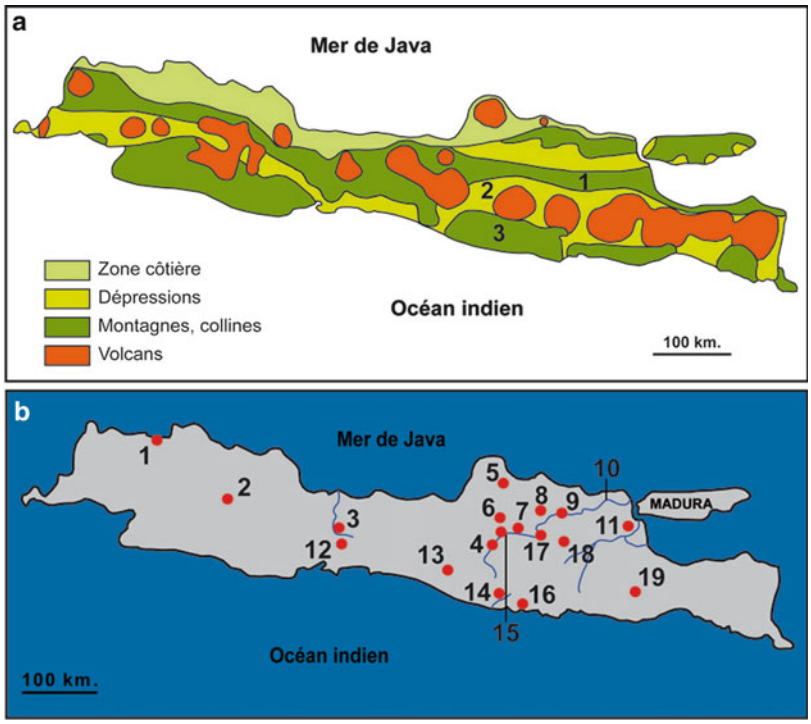

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology, Fig. 2 (**a**) Geological Map of Java. *1* Kendeng Hills. *2* Sangiran Dome. *3* Southern Mountains. (**b**) Location of prehistoric sites in Java. *1* Jakarta. *2* Bandung. *3* Bumiayu. *4* Solo. *5* Pati-Ayam. *6* Miri. *7* Sambungmacan. *8* Ngawi. *9* Ngandong. *10* Solo River. *11* Mojokerto. *12* Semedo. *13* Yogyakarta. *14* Punung and Baksoka River. *15* Sangiran. *16* Pacitan. *17* Trinil. *18* Kedungbrubus. *19* Wajak

- Karstic massifs, widely represented, within which a number of types of deposits can be found, such as classic cave fillings (Fig. 3), with their sediment having undergone some solifluxion or even been transported by the racking at a lower level of the karst; alluvial deposits trapped in the cavities; archaeological soils under porches, positioned as rockshelters; fillings of fissures and accumulation of fossils where often one can discover mainly teeth because of the destructive activity of hystricidés (porcupine), these last fillings being able to be cemented in breccias etc.

The Ape-Man of the Sunda Islands

Human paleontology was, in fact, born in Southeast Asia in the late nineteenth century. The historical context of research has thus been guided, since its inception, by the search for human fossils. Influenced by the ideas of Darwin and Wallace as professed by Ernst Haeckel, the Dutch medical anthropologist Eugene Dubois undertook, as early as 1887, research in Sumatra of the "missing link" between an ape ancestor and a human, known to have lived in the forests which are now home to the great anthropoid apes such as *Pongo* (derived from the name "orangutan," meaning the man of the forest in Malay). Only a few discoveries of Neanderthals were known – and debated – at the time.

These first discoveries of fossils – notably elephants – in the caves of the island demonstrated, to the eyes of the European scientific community, that a passage really existed in the past between the islands and the continent. Dubois was then notified of the discovery, in a karst massif in eastern Java (Wajak near Tulungagung (Fig. 2b)), of a highly mineralized skull which proved to belong to our species, *Homo sapiens*.

Later on, he drew inspiration from the recounting, in classic Javanese literature, of the discovery of many bone fossils in sedimentary horizons associated with the chain of hills known as Kendeng (Fig. 2a), which crosses the central and eastern parts of the island from west to east.

These fossils were related to the remains of victims of the great mythical battles in the Hindu tradition. The Javanese painter Raden Saleh (1811–1880), who spent a long time in Europe,

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology, Fig. 3 The cave of Song Terus (Java). Traces of human presence since 350 ka, occupation of the cave since MIS 5. (**a**) Excavation of cave (burial appears in K9 square). (**b**) *Homo sapiens* burial *c. 9300 BP*. Objects associated to the burial: (**c**) face of *Trachypithecus* (cercopithecid). (**d**) Tiger's upper jaw bone. (**e**) Elephant's milk molar. (© Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

even organized excavations near Kedung Brubus. He subsequently sent his discoveries to Karl Martin, a Dutch geologist, who had already noted the relatedness with the Indian fossil deposits of the Siwaliks, in the foothills of the Himalayas, where Richard Lydekker had described a maxillary ape.

Between 1889 and 1891, Dubois also discovered a fragment of human mandible at Kedung Brubus, then during extensive excavations on the site of Trinil (Fig. 4), in ancient volcano-sedimentary layers, a skullcap (first attributed to a gibbon), and then a human femur. In 1894, Dubois published the discovery of *Pithecanthropus erectus*, human's ancestor, and the fossil of Trinil (conserved in the NCB Naturalis in Leiden) since became the holotype of *Homo erectus*.

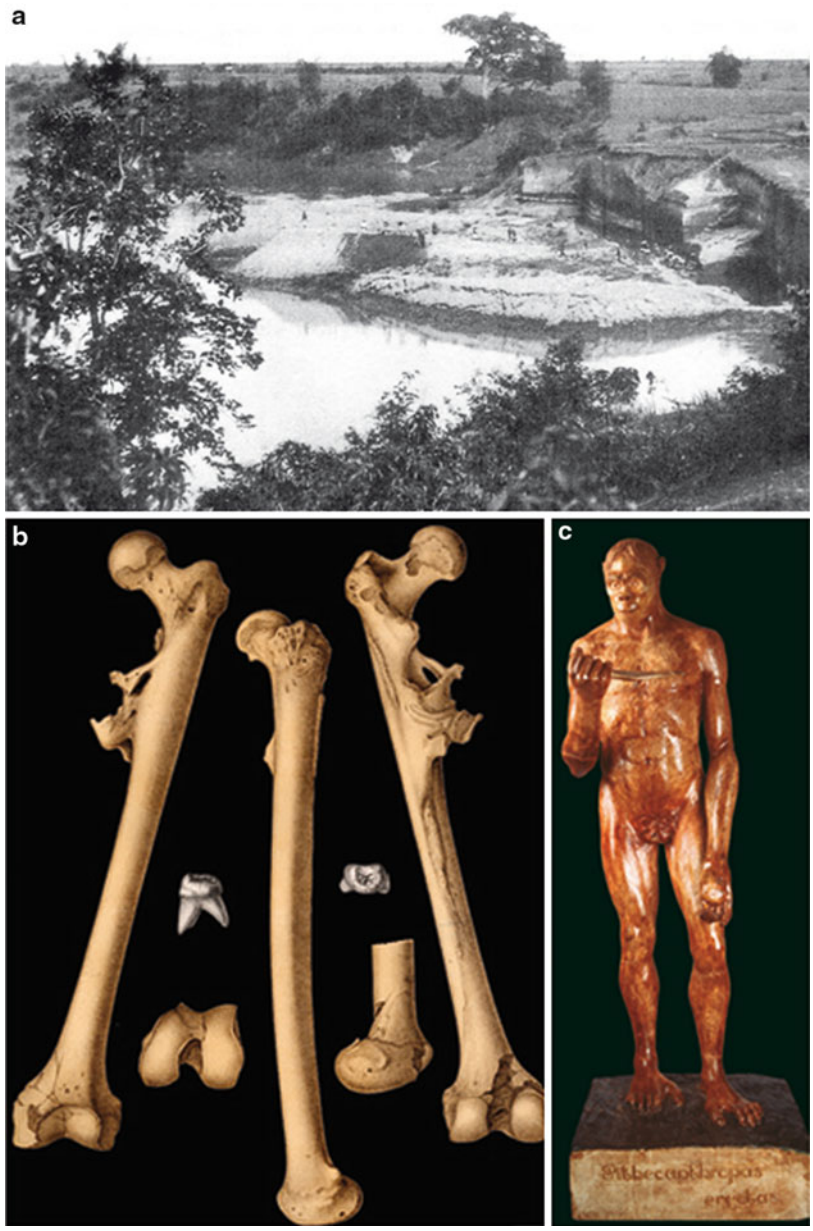

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology, Fig. 4 Trinil and the excavations of Eugène Dubois. (**a**) Eugène Dubois excavation. (**b**) The femur of *Pithecanthropus erectus*. (**c**) Reconstitution of "Pithecanthropus" from Java by Eugène Dubois in 1900 (Documents NCB Naturalis, Leiden)

Multiple Paleoanthropological Discoveries

Homo erectus

The heated debates that followed the publication of Dubois aroused new research, directly in Southeast Asia as well as in other regions. The first half of the twentieth century thus saw the rise of diverse hominid taxons, such as *Australopithecus africanus* (1924) and *Sinanthropus pekinensis* (1926, Chinese *Homo erectus.)*. Naturally, research intensified in Southeast Asia.

In Java, the Dutch colonial office of mining research encouraged some of its members to continue work on stratigraphy and paleontology, and recruited someone who would become one of the major figures of human paleontology and prehistory in Southeast Asia, Ralph von Koenigswald. Thus were brought to light, in east Java, during the

1930s, human fossils of the Solo river, near Ngandong (a series of 11 skullcaps associated with some postcranial fragments, whose brain is much more developed than the fossil of Trinil, Grimaud-Hervé 1997) and also the Mojokerto juvenile skull.

During the same period, Von Koenigswald initiated his surveys in the Sangiran dome (Central Java), which much later (1996) became included on the World Heritage List. He discovered, within a few years, the first reference points for a series of *Homo erectus* ranging along the Lower Pleistocene, including the most robust and archaic fossils, originally called *Meganthropus palaeojavanicus*, such as Sangiran 4 and Sangiran 31 (Fig. 5c) and of the Middle Pleistocene (fossils similar to the Trinil specimen, such as Sangiran 2 and Sangiran 17 (Fig. 5a)).

It is in this way that very rapidly, the island of Java alone brought information on the very long existence of the taxon *Homo erectus* in island environments. Several sites have been discovered since the Second World War (Pati-Ayam, Sambungmacan, Ngawi, Miri, Semedo). The current dates place the totality of fossils between 1.5 Ma (the most archaic fossils of Sangiran, Mojokerto) and the end of the Middle Pleistocene (or even the first half of the Upper Pleistocene for the late *Homo erectus* of the Solo river, of Ngawi and Sambungmacan (Fig. 5b)). Between these two groups a homogenous population (nearly 50% of the inventory known) takes place, whose characteristics are very similar to those of the holotype, which dates from the late Lower Pleistocene and early Middle Pleistocene (near 0.8 Ma).

It is natural that the paleoanthropological record is not as developed east of the Wallace Line (Bellwood 2007), although archaeological evidence of human presence exists (it was probably *Homo erectus* who crossed the filter of the straits during periods of very low sea level at the beginning of the Middle Pleistocene, Morwood et al. 1999). They were the possible ancestors of *Homo floresiensis* (Fig. 5d (cf. *infra*)). More surprisingly, the exploration activity in mainland Southeast Asia, and notably in the Indochinese peninsula, was not successful despite the active search for old human fossils since the beginning of the twentieth century. Only very fragmentary remains, whose nature or stratigraphic position remains contested, were published (Zeitoun et al. 2008). The "best" reference point between the

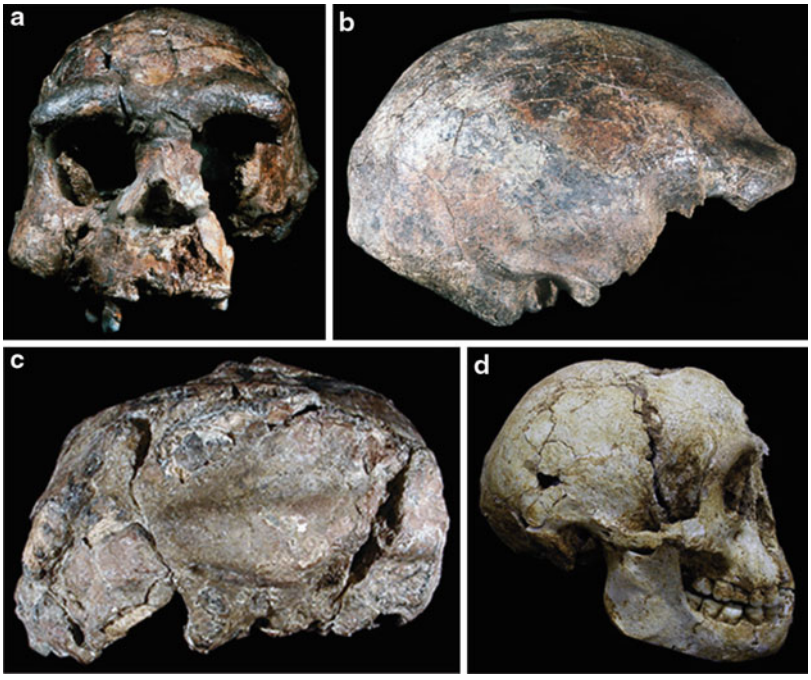

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology,
Fig. 5 *Homo erectus* of Java – *Homo floresiensis*. (**a**) Sangiran 17. (**b**) Sambungmacan. (**c**) Sangiran 31. (**d**) *Homo floresiensis*. (© Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

"*Sinanthropus*" and the "*Pithecanthropus*" remains the presence of teeth (cf. *Homo erectus*) discovered in the breach of the Tham Khuyen cave in North Vietnam, in Lang Son province near the Chinese border, dated to around 0.5 Ma, and in Thum Wiman Nakin (in the center-north of Thailand, probably toward the end of the Middle Pleistocene).

Homo Sapiens, But Also Other Humankinds?

Homo sapiens, which were probably the only hominids to have, thanks to their social organization, the ability to organize ferry crossings, populated Australia in the Upper Pleistocene, more than 50 ka ago (O'Connell and Allen 2004). The research of their traces in mainland and island Southeast Asia thus represents a challenge for researchers. Sites appear scattered throughout the zone. Among the most famous discoveries, from a historical perspective, are those of Wajak (East Java), Niah (*deep skull*, Sarawak, Borneo, whose ancient age – c. 40 ka – has been recently confirmed, Barker et al. 2007), Moh Khiew (Thailand, Malaysian peninsula, around 28 ka), and Tabon (Palawan, Philippines, Dizon et al. 2002 (Fig. 6)), of which some fossils

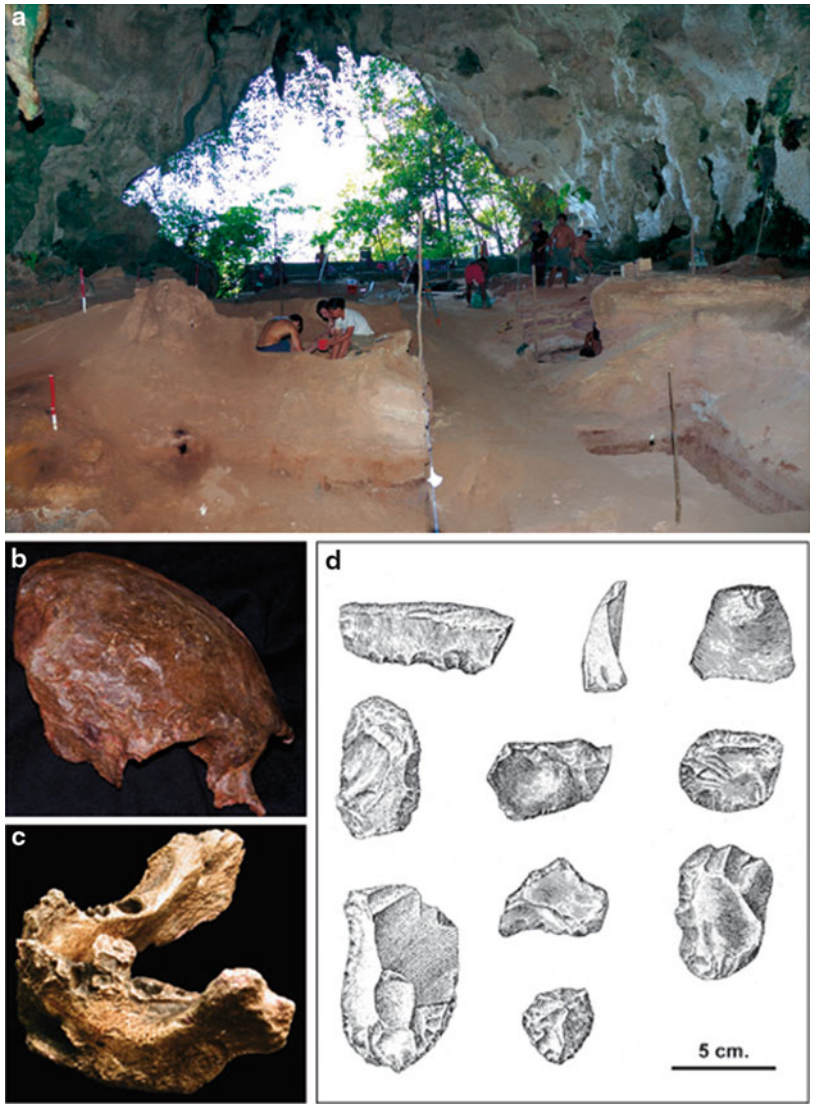

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology,
Fig. 6 Tabon Cave (Lipuun Point, Palawan, Philippines). Occupation of archipelagos by *Homo sapiens* since 35 ka. (**a**) Cave. (**b**) Human frontal. (**c**) Human mandible. (**d**) Lithic tools. (© National Museum of the Philippines)

seem associated with archaeological horizons older than 30 ka.

Beyond the discoveries or new fossil studies, at stake is the anatomic and taxonomic characterization of those which are not directly related to Homo sapiens (late *H. erectus* or endemic forms) as well as their precise dating (Yokoyama et al. 2008). The latter depends on the establishment of a convergence between, on the one hand, direct analyses, such as ^{14}C dating, uranium series (U/Th), combined analyses by uranium series/electron spin resonance (ESR), which often open a debate on the model of incorporation of uranium or about the meaning of dosimetric measures in the environment, and on the other hand, analyses carried out on their context (^{14}C, OSL, ESR etc.).

All fossils dating from 100 ka until the first part of the Holocene (before 6,000 years) reflect the rare elements of a puzzle which corresponds to a possible early arrival of our species in Southeast Asia (from southern China to the archipelagos). Its expansion took place during the second part of the Upper Pleistocene (including the recent discovery of Tam Pa Ling in Laos, c. 46 ka, Bacon et al. 2012) and the last glacial maximum (LGM). Then, a redistribution of groups occurred during the rise of sea levels at the beginning of the Holocene (Détroit 2002).

Also included in this fossil register are the remarkable discoveries published in the last few years, concerning the sites of the Upper Pleistocene such as that of *Homo floresiensis* (Liang Bua, Flores, Morwood et al. 2004) or that of Callao cave, in the north of the island of Luzon, in the Philippine archipelago, whose metatarsal would come within the limits of morphological and dimensional variability of *Homo habilis* and *Homo floresiensis*.

With the oldest fossils reputed to belong to the *Homo sapiens* species, these last discoveries open a debate relating to the coexistence, particularly in island environments, of the last *Homo erectus* and the first *Homo sapiens*.

Humans and Animals

The separation between biogeographic provinces of Indochina and Sunda takes place at the level of the Isthmus of Kra (Fig. 1a), a barrier which could have had a southern position before the Upper Pleistocene (Tougard 2001).

Since the beginning of research in the islands of Southeast Asia, it appears that the understanding of complex phenomena that led to the colonization of the region by the hominids, from the chronological as well as the paleoenvironmental aspects, passed by the interpretation of associated fauna, most notably continental mammals.

The dispersals of these mammals seem to have followed two routes according to the period, the route called Siva-Malayan (India-Malaysia) and the one called Sino-Malayan (China-Malaysia). These migrations have so far never included, for obvious paleoenvironmental reasons, families such as the equine, camelids, or giraffidae.

According to the period and the degree of exondation on the plateau, the animals were able to reach the archipelagos either by chance, or by crossing modest straits, or by way of real corridors. Dispersals and endemism were thus responsible of the nature of fossil assemblages in the deposits.

The first biostratigraphic schemes established before absolute dating methods were implemented, distinguished, in Java: Lower, Middle, and Upper Pleistocene, in the form of a classic triptych created by von Koenigswald and including fauna called Djetis, Trinil, and Ngandong. Stemming from stratigraphic localities discovered in East Java, these associations applied to sites in central Java were used to define the stratigraphy of the sites such as the dome of Sangiran (which, in turn, used until recently the toponyms of the eastern part of the island: formations of Pucangan, Kabuh and Notopuro).

The 1980s allowed for the reevaluation of this biostratigraphy by taking into account the paleobiogeographic aspects (de Vos et al. 1982) and definition of several horizons, named:

- Satir, near Bumiayu (central Java), typical island fauna including the *Mastodon* (c. 1.5–2 Ma)
- Ci Saat (same region), later in the Lower Pleistocene (Fig. 7), but reflecting the arrival of carnivores, of *Stegodon* and probably *Homo erectus*

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Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology, Fig. 7 Hexaprotodon sivalensis (Sangiran, Java, c. 1.2 Ma). (**a**) Original fossil. (**b**) Reconstitution of the hippopotamus after casting. (© Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

- Endemic fauna of Trinil, dating from the end of the Lower Pleistocene
- The association of Kedung Brubus, at the very beginning of the Middle Pleistocene (large exchanges with the continent, marked notably by the arrival of *Elephas*), followed toward the end of this period by the Ngandong fauna
- The fauna of Punung (beginning of the Upper Pleistocene), including species adapted to the tropical rainforest (such as *Pongo*, *Helarctos* and *Symphalangus*).

These horizons, with the exception of the fauna of Punung, mainly reflect an Indian origin until the beginning the Upper Pleistocene.

The situation becomes more complex for the islands located to the East of the Wallace line, sometimes due to a lack of documentation on the faunal groups themselves (either in representativeness, or from a chronological point of view), but more often because of the evident multiplicity and the complexity of the dispersal events. In fact, in these islands, evolution was often synonymous with endemism as was the case for the fauna of Sulawesi, or of relative poverty, like in the Philippines, which deliver, in a remarkable fashion, dwarf forms.

A Cultural Register to Construct

The archaeological aspect of the regional Paleolithic is considered in the context of another entry in this volume, but it is important to note here that a number of available reference points have been discovered since the beginning of the twentieth century. Von Koenigswald was in this regard a pioneer in his quest for the culture of the "*Pithecanthropus*" of Java, which he searched for, in the 1930s, in the chains of hills surrounding sedimentary basins where fossils were found. He thus brought to light the lithic assemblage of Patjitan (Fig. 2b), in the Southern Mountains of Java, as well as a small flake industry in the dome of Sangiran. Other discoveries followed, emphasizing the succession of migrations from the mainland to the islands, and between the islands themselves. The chronology of this story is still the subject of debates. Among the latter are the discoveries, in the 1950s–1970s, of the Cabalwanien, which was identified north of the island of Luzon (possible relation with fossils of the Middle Pleistocene) and Theodor Verhoeven's finds in Flores (Eastern Indonesia), which have

contributed to revealing that *Homo erectus* was able to cross the Wallace line from west to east.

Key Issues and Current Debates

Current Challenges Linked to Human Evolution

These issues were, for the most part, outlined above and remain a central concern of researchers (Widianto and Simanjuntak 2010):

- It is striking to note that the age of the first islanders (c. 1.5 Ma) is only slightly younger than the age of the most ancient fossils known outside of Africa (e.g., Dmanisi, Georgia) and that the oldest island *Homo erectus* present quite specific characteristics (cf. notably the robustness of the mandicatory system), whose connection with a possible adaption in colonized environments would be appropriate to study.
- Exchanges with mainland Asia occurred during different periods, in the same way for humans as for fauna, and were particularly intense at the dawn of the Middle Pleistocene. At this time, the hominids were probably able to cross, with several faunal taxa, the Wallace line. However, the fossil register of the Southeast Asian mainland is almost nonexistent and no human fossil has yet been unearthed in eastern Indonesia. Comparative studies, either between mainland and island *Homo erectus*, or within the register of *Homo erectus* dating between 1 Ma and 0.7 Ma in island environments, should make it possible to find traces of these mainland-archipelago contacts (Kaifu et al. 2008).
- The end of the middle Pleistocene and the Upper Pleistocene also poses important questions about the causes of extinction for the latest *Homo erectus* (a phenomenon no doubt comparable, in certain respects to the extinction of the Neanderthal lineage in Western Europe). This extinction should be seen in parallel with the arrival of the first modern humans and also with the evolution of particular forms of hominids (cf. *Homo floresiensis*).
- Finally, there now exists a scientific synergy between different regional scientific programs, which can identify the mosaic of developed settlements since the beginning of the Holocene in the region, after the sharp rise in sea level that completely reallocated the territories.

Stratigraphy and Geochronology

These disciplines aim to describe the context of the distribution of hominids and the major archaeological sites, for which (cf. *infra*) the resolution power of biostratigraphy is insufficient. The long stratigraphic references are few and, for many, draw on fundamental work carried out before the Second World War. The precision of the chronological framework today involves the implementation of diverse methods, including the following:

- Paleomagnetism.
- Argon, fission tracks or luminescence (OSL) methods when volcanic effluents are present and we can evaluate the penecontemporaneity of the analyzed material and of the sedimentary matrix. This is not always the case in very actively volcanic regions, where deposits regularly reshuffle older volcanic elements, stemming from the volcanic cones themselves.
- ESR dating on quartz grains bleached by sunlight and combined U/Th- ESR analyses on fossil teeth.
- For more recent times, particularly in karst environments, the dating of speleothems (U/Th) and radiocarbon can be added.

The progress achieved in recent decades provides more accurate chronologies, but the complexity of the dynamics of the deposits (cf. example of volcanic effluents above) involves the simultaneous implementation of all possible methods.

The Reconstruction of Landscapes

The major goal is here to identify, in the sedimentary and diagenetic dynamics, the climatic events that have affected the region. The phases of expansion and fragmentation of the forest have had a very important impact on the evolution and

behavior of hominids and are linked, beyond climate change, to the tectonic (synorogenic erosion) and volcanic (the overload of rivers with eruptive material) evolution of the region (Sémah et al. 2001).

Beyond these classic sedimentological descriptions, paleobotany (continuous pollen records (Fig. 8) and phytoliths study) is combined with paleopedology (micromorphological analyses addressing shorter periods clearly more scattered in time).

The records enable to follow the progressive emersion of reliefs in Java (the filling of lagoons, the development of mangrove forest) as well as the dynamic distribution of vegetal formations. In this way, it appears that the tropical rain forest dominated during the Lower Pleistocene, even though it was subject to repetitive destructions because of volcanic eruptions. The opening of the landscape during "glacial" periods (especially during the Middle Pleistocene) restricted the rain forest to galleries along the watercourses. At certain times (marked by pedogenic formations), the fragmentation of the forest could even leave room for open, savannah-like patches. These "dry" episodes are underlined by the importance of sedimentation phases, the opening of the forest allowing more severe erosion during the rainy season (seasonality persisted during "glacial" periods).

At the regional level, the reconstruction of the landscapes that may have existed on the Sunda shelf during the maximum exondation (e.g., beginning of the Middle Pleistocene and LGM) is crucial to provide us with information about the migration of fauna and hominids. Particularly

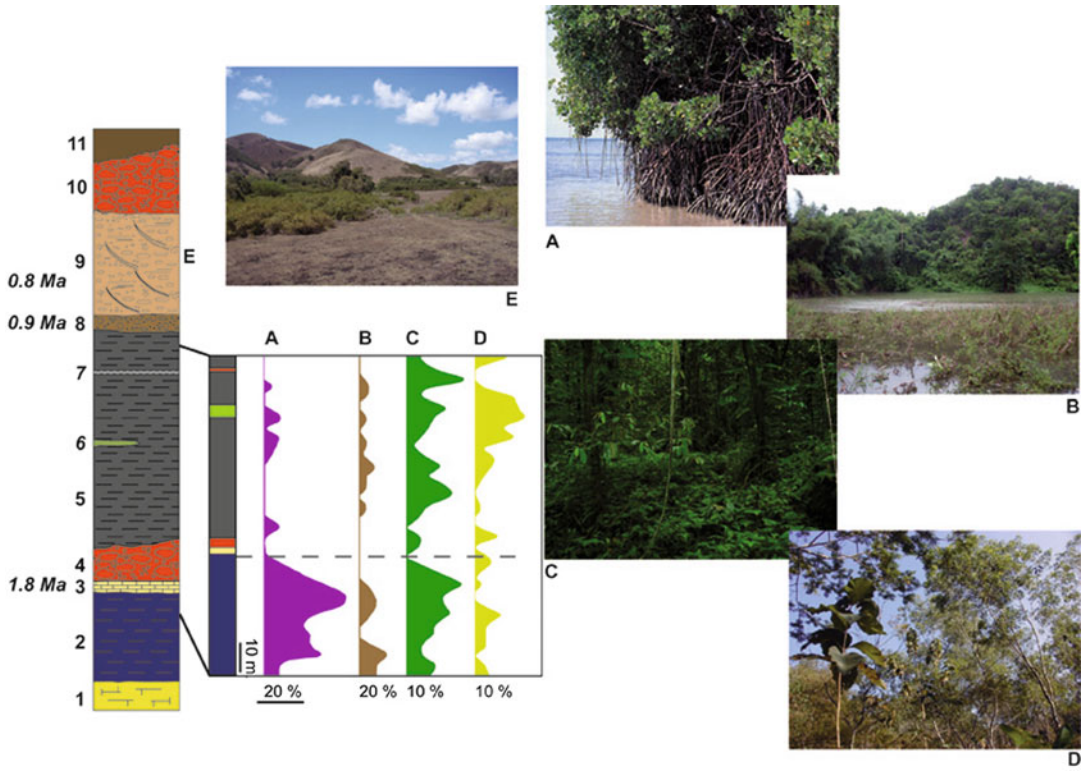

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology, Fig. 8 Vegetal Paleoenvironments of the Sangiran Dome (Java). *1* Kalibeng – yellow marl. *2* Kalibeng – blue clay. *3* Transition limestone. *4* Lower Lahar. *5* Pucangan – black clay. *6* Diatomites. *7* Tuf. *8* Grenzbank. *9* Kabuh. *10* Notopuro – upper Lahar. *11* Terraces. (**a**) Mangrove. (**b**) Swampy forest. (**c**) Rainforest. (**d**) Seasonal forest. (**e**) Savannah. According to pollen studies (A.-M. Sémah). (Photographs: A.-M. Sémah)

here, the hypothesis on the past existence of a "savannah corridor," which might have developed along the principal rivers draining the waters from the great massifs of Java, Borneo, and Sumatra, favoring migrations in this way, awaits confirmation. Similarly, the description of the intense development phases of the rainforest (MIS 5–125 ka, Holocene climatic optimum around 8 ka) is also fundamental to understanding human migrations.

The Biostratigraphic Framework and the Meaning of Taphonomic Assemblages

The study of vertebrate faunas has been the object of a special effort. The current landmarks in Java can be qualified as solid. In fact, they are based on collections harvested with a good stratigraphic control and an approach that is in line with the regional naturalists' concerns: integrating paleoecological reconstructions, phenomena of dispersals and migration, adaptation as well as evolution in isolated environments (endemism, vicariance). Their results are coherent with the climatic and paleoecological history of the region, particularly demonstrating (de Vos et al. 1994):

- Narrow passages to the south and southeast of the Sunda shelf during the Lower Pleistocene
- More sustained exchanges with the mainland during the installation of the climatic conditions of the Middle Pleistocene (climatic contrasts actually started with the MIS22 stage (Sémah and Sémah 2012), c. 0.9 Ma) when major climatic cycles acquired a length of about 100 ka
- Significant changes in the composition of faunal assemblages during the Upper Pleistocene, with an association perfectly adapted to the rainforest during stage MIS 5, then relative impoverishment of fauna during the last glacial maximum, followed by a new adaptation to a forest environment at the beginning of the Holocene

These landmarks, however, constitute only an incomplete framework that requires the reconstruction of its history with a temporal resolution as fine as possible: Only ongoing fieldwork can bring an answer here, by developing and using a register backed up by statistically representative collections (Moigne et al. 2004). Similarly, the nature of the relationship between the archipelagos on both sides of the Wallace Line (van den Bergh et al. 2001) should be described more accurately, for example, with regard to the number and duration of endemic periods in Sulawesi (an island which occupies a central place in the zone under study) and the different routes which facilitated colonization of the Philippine archipelago (passage from south toward the north via Borneo and the Palawan ridge or passage via the chain of southern islands near Mindanao). Comparative research between Pleistocene fossils in the Indochinese and Sunda provinces is now starting to produce a dynamic vision of their borders, suggesting in particular the late onset of the Isthmus of Kra operating as a biogeographic barrier during the Quaternary.

Such results are fundamental to understanding the ecological constraints which weighed on human groups and animals (animals' level of dependence on ecosystems being higher).

Modern methods of taphonomic study are developing today in Southeast Asia. They help to better understand the significance of collected palaeontological assemblages, and also illustrate, in the archaeological horizons or those that are derived from them, the behavior of the hominids with respect to their faunal environment.

International Perspectives

Beyond the concern to conduct research at the international level, the focus on conservation is certainly a major issue at all levels. Multiple factors related to the limited number of researchers or the difficulties of the terrain mean that the sites of Southeast Asia are still very far from having been discovered or exploited to their true value. Sites that are known, sometimes for over a century, have shown all the potential that further research may still bring to their interpretation.

International meetings organized under the auspices of UNESCO clearly show that there are few properties that meet all the criteria required

for registration, either through the World Heritage framework or through more thematic programs.

The direct access to scientific information is often put in danger:

- At the level of sites, due to the mere fact of very active erosion in tropical region and of significant development (e.g., public infrastructures) carried out there
- At the level of movable heritage, through the great dispersion of collections

Objects and data collected during the colonial era, for example, are scattered within museums in many countries. However, some states still lack the resources for heritage management, which underlines the international responsibility on the matter. Initiatives taken by regional governments should thus be optimized by a genuine dynamic cooperation, allowing for the sharing of experience and access to data, which have a significant impact on foreseeing the scientific research programs.

This perspective of conservation cannot be separated, in the long term, from questions relating to the preservation of ecosystems and the biodiversity in a zone not only subjected to important development initiatives, but also to a number of major risks, including global climate change.

It is important to complement this reflection on the preservation of existing environments with the memory of an exceptional history, built over nearly a million and a half years ago by conquest, migration, coexistence, adaptation, or resilience of different groups of hominids.

Future Directions

Southeast Asia, when considered as a bridge between mainland and archipelagos, represents a fantastic natural laboratory for the study of biodiversity, as much in its current configuration as in the long term, within which human adventure plays a very special part.

Expected orientations for research involve the integrated construction of an interdisciplinary framework, which would definitely place human evolution (*lato sensu*) within a naturalist and cultural perspective. As such, there is much to be expected from the development of archaeological research in a real paleobiogeographic perspective, including from the cross-sectoral perspective of linking prehistory to biology. The chronological approach to the fragmentation of the rainforest, for example, as a result of climate forcings, could explain the diversification of some populations, or initiate new hypotheses on some speciation. A similar approach can be implemented, in coastal areas, by identifying in the records the oscillations of sea level. In contrast, work on the biological diversification based on current populations could help interpret some human replacements recorded on prehistoric sites.

The desired effect of synergy should thus result from the intersection of data relating to the evolution of climate and of environments, as indicated by mineral, biological and cultural markers in the sedimentary records, with data provided by diverse approaches of extant populations on the other hand (analysis of patterns of endemism, of population and habitat fragmentation, and cytogenetic studies).

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Central Asia: Paleolithic
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ East Asia: Paleolithic
- ▶ Insular Southeast Asia in the Lower Paleolithic
- ▶ Island Southeast Asia: Neolithic
- ▶ Island Southeast Asia: Rock Art
- ▶ South Asia: Paleolithic
- ▶ West and Central Asia: Early Homo Fossil Records

References

Bacon, A.-M., F. Demeter, E. Patole, and M. Duringer. 2012. *Les sites de Tam Hang, Nam Lot et Tam Pà Ling au nord du Laos. Des gisements à vertébrés du Pléistocène aux origines des Hommes modernes*. Paris: Editions CNRS.

Barker, G., H. Barton, M. Bird, P. Daly, I. Datan, A. Dykes, L. Farr, D. Gilbertson, B. Harrison, C. Hunt, T. Higham, L. Kealhofer, J. Krigbaum, H. Lewis, S. McLaren, V. Paz, A. Pike, P. Piper, B. Pyatt, R. Rabett, T. Reynolds, J. Rose, G. Rushworth, M. Stephens, C. Stringer, J. Thompson, and

C. Turney. 2007. The 'human revolution' in lowland tropical Southeast Asia: The antiquity and behavior of anatomically modern humans at Niah Cave (Sarawak, Borneo). *Journal of Human Evolution* 52: 243–261.

Bellwood, P. 2007. *Prehistory of the Indo-Malaysian archipelago*. 3rd ed. Canberra: ANU E Press.

Detroit, F. 2002. Origine et évolution des *Homo sapiens* en Asie du Sud-Est: Descriptions et analyses morphométriques de nouveaux fossiles. Unpublished PhD dissertation, Muséum national d'histoire naturelle de Paris.

De Vos, J., H.S. Sartono, and P.Y. Sondaar. 1982. The fauna from Trinil, type locality of *Homo erectus*: A reinterpretation. *Geologie en Mijnbouw* 61: 207–211.

De Vos, J., P.Y. Sondaar, G.D. Van den Bergh, and F. Aziz. 1994. The *Homo* bearing deposits of Java and its ecological context. *Courier Forschungsinstitut Senckenberg* 171: 129–140.

Dizon, E., F. Detroit, F. Sémah, C. Falgueres, S. Hameau, W. Ronquillo, and E. Cabanis. 2002. Notes on the morphology and age of the Tabon Cave fossil *Homo sapiens*. *Current Anthropology* 43 (4): 660–666.

Grimaud-Hervé, D. 1997. *Evolution de l'encéphale chez Homo erectus et Homo sapiens. Les cahiers de Paléoanthropologie*. Paris: CNRS.

Kaifu, Y., F. Aziz, E. Indriati, T. Jacob, I. Kurniawan, and H. Baba. 2008. Cranial morphology of Javanese *Homo erectus*: New evidence for continuous evolution, specialization, and terminal extinction. *Journal of Human Evolution* 55 (4): 551–580.

Moigne, A.-M., R. Due Awe, F. Sémah, and A.-M. Sémah. 2004. The cervids from the Ngebung site ("Kabuh" series, Sangiran dome, Central Java) and their biostratigraphical significance. *Modern Quaternary Research in S-E Asia* 19: 31–44.

Morwood, M.J., F. Aziz, P. O'Sullivan, D.R. Hobbs Nasruddin, and A. Raza. 1999. Archaeological and paleontological research in central Flores, east Indonesia: Results of fieldwork 1997–98. *Antiquity* 73: 273–286.

Morwood, M.J., R.P. Soejono, R.G. Roberts, T. Sutikna, C.S. Turney, K.E. Westaway, W.J. Rink, J.-X. Zhao, G.D. Van Den Bergh, R. Awe Due, D.R. Hobbs, M.W. Moore, M.I. Bird, and L.K. Fifield. 2004. Archaeology and age of a new hominin from Flores in eastern Indonesia. *Nature* 431: 1087–1091.

O'Connell, J.F., and J. Allen. 2004. Dating the colonization of Sahul (Pleistocene Australia–New Guinea): A review of recent research. *Journal of Archaeological Science* 31 (6): 835–853.

Sémah, A.-M., and F. Sémah. 2012. The rain forest in Java through the Quaternary and its relationships with humans (adaptation, exploitation and impact on the forest). *Quaternary International* 249: 120–128.

Sémah, F., A.-M. Sémah, and T. Djubiantono. 2001. From the shorelines to the slope of the volcanos: The long Pithecanthropus' treck. In *Sangiran: Man, culture and environment in Pleistocene times*, ed. T. Simanjuntak, B. Prasetyo, and R. Handini, 195–218. Jakarta: EFEO/Yayasan Obor.

Tougard, C. 2001. Biogeography and migration routes of large mammal faunas in South-East Asia during the Late Middle Pleistocene: Focus on the fossil and extant faunas from Thailand. *Palaeogeography, Palaeoclimatology, Palaeoecology* 168: 337–358.

Van Den Bergh, G.D., J. De Vos, and P.Y. Sondaar. 2001. The Late Quaternary paleogeography of mammal evolution in the Indonesian Archipelago. *Palaeogeography, Palaeoclimatology, Palaeoecology* 171: 385–408.

Widianto, H., and T. Simanjuntak. 2010. *Sangiran answering the world*. Conservation Office of Sangiran Early Man Site.

Yokoyama, Y., F. Falgueres, F. Sémah, T. Jacob, and R. Grun. 2008. Gamma-ray spectrometric dating of late *Homo erectus* skulls from Ngandong and Sambungmacan, Central Java, Indonesia. *Journal of Human Evolution* 55 (2): 274–277.

Zeitoun, V., H. Forestier, and S. Nakbunlung. 2008. *Préhistoires au sud du Triangle d'Or*. Montpellier: IRD Editions.

I

Insular Southeast Asia in the Lower Paleolithic

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State of Knowledge and Current Debates

Introduction

Since the end of the nineteenth century, the "Pithecanthropus" of Java (*Homo erectus*) profoundly marked the history of science and

definitively rooted Southeast Asian prehistory in a paleobiogeographic perspective (Fig. 1).

Any approach to the Paleolithic period is thus linked to issues of adaptation to the different natural environments encountered by hominids. The latter, evidently, followed identical migration routes to those of continental vertebrate fauna originating from the Asian mainland whose affinities, according to the period, were Indian or Chinese.

One of the major issues that arise is, of course, distinguishing a possible "human" special feature within these episodes of dispersion which, for the most recent periods, reflect an organization that allows the use of the term "migration." Resolving this question involves the study, and then the connection, of several archaeological records appropriately integrated into the paleoenvironmental framework.

However, it should be recognized that only around a dozen or more suitably documented records are available, a number which should be seen within the context of the immensity of the region under consideration (more than 20 million km^2). The sites under investigation are moreover spread over a history which began in the Lower Pleistocene, some 1.5 Ma ago, with the arrival on the island of Java of the first islander in the history of humanity, and which ended with the dissemination of Neolithic traditions coming from continental Asia in the archipelagos a few thousand years ago.

This history has featured successively but also sometimes concomitantly:

- *Homo erectus* belonging to very different groups: the latest forms from the Solo River, which were extinct at the end of the Middle Pleistocene (or according to some).
- Researchers, during the Upper Pleistocene, differ considerably from robust and archaic forms of the Lower Pleistocene (see "Meganthropus"); these *Homo erectus* were able, on certain occasions, to cross biogeographic boundaries as shown by the early population on the island of Flores in East Indonesia.
- *Homo sapiens* distributed between (1) the very first immigrants who could have arrived in the region at the beginning of the Upper Pleistocene; (2) populations who occupied not only

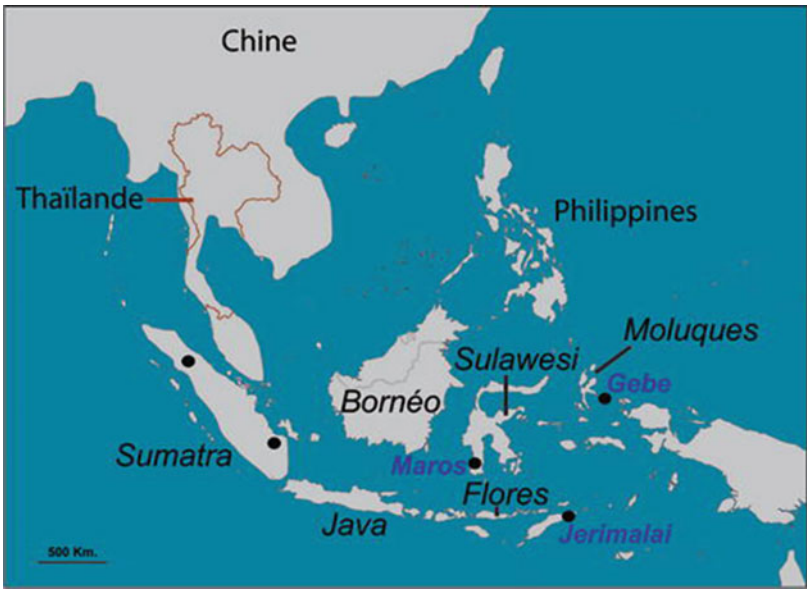

Insular Southeast Asia in the Lower Paleolithic, Fig. 1 The islands of Southeast Asia, map of localization of sites

the Indochinese province but the entire Sunda region, emerged during the Last Glacial Maximum, and spread across it owing to the creation of vast zones of circulation on the subcontinent; and (3) groups which occupied the islands during the great geographic upheaval which took place at the beginning of the Holocene, with the submersion of vast stretches of the mainland.
- Other hominids (see *Homo floresiensis*), still mysterious in many respects, stemming from a very localized endemic evolution, which could not have occurred on the island of Flores alone.

Faced with such geographic, chronological, and evolutionary diversity, the few available archaeological records today must certainly be treated with caution, without relinquishing the pursuit of research on how their characteristics may reflect a regional phenomenon.

Definition

It seems relatively easy to speak of the "Lower" Paleolithic in the islands of Southeast Asia, the use of the term being made easier when the archaeological discoveries were linked to a context where only *Homo erectus* would have been able to intervene. In the current state of research, this qualifier can be used for sites dating to the Lower Pleistocene and the Middle Pleistocene.

By contrast, going further in the periodization proves to be very tricky. Earliest attempts at subdividing the prehistory of Southeast Asia, whose mosaic characteristics appear more evident every day, or constructing a cultural chronology similar to that of Western Europe, have proved erroneous and unsuccessful. It is thus appropriate here to banish the terms "Middle Paleolithic," "Upper Paleolithic," or "Mesolithic," which, by the way, often pose problems for researchers: thus, the frequent usage, for lack of a better term, of "preneolithic" can be found to describe some features from the beginning of the Holocene and prior to contact with Austronesian groups or with other carriers of Neolithic traditions.

Rather than end with a "periodization," the current work has thus as its principal aims:

- To clearly show the relationship between an archaeological horizon and a particular hominid (a sometimes difficult task during the first part of the Upper Pleistocene)
- To search for solid chronological records to better situate the wide diffusion of practices such as the development of habitats in caves or the systematic use of fire
- To stress important innovations linked to *Homo sapiens*, such as the construction of sophisticated tools in hard animal materials, the concretization of symbolic behaviors, or even the practice of organized sea crossings

Thus, in the present article, the upper chronological limit of the corpus will remain somewhat vaguely defined, but in order to reflect the current state of research and its orientation, it will mention several deposits in the second half of the Upper Pleistocene.

In such a configuration, a number of archaeological assemblages retain from the time of their discovery a name based on a toponym. Rare are those that, following the example of Hoabinhian discovered on the continent (North Vietnam), represent a regionally meaningful cultural facies.

Following the example of Anyathian defined in the Irrawaddy valley in Burma, we also speak of "Patjitanian," "Cabengian," or "Cabalwanian" in the Southeast Asian islands. These designations do not contribute substantially to studies, and the latter must focus rather on the meaning of assemblages in given geographic and paleoecological contexts.

It is necessary to recall in the last resort that in Southeast Asia, and perhaps more than anywhere else, the description of "Paleolithic" features should not refer to only stone tools, which unfortunately are often the only ones preserved, particularly in alluvial sites which are the most frequent. Although the technical and subsistence strategies of human groups would naturally use

lithic materials whenever available, it is far from being the only one used. Several publications have, for example, evoked the importance since the Paleolithic of bamboo, almost ubiquitous grass trees.

Historical Framework

Interest in the behavior of hominids in insular Southeast Asia has been aroused since the end of the nineteenth century with the discovery by Dubois of the *Pithecanthropus erectus* (today the holotype of *Homo erectus*). The reconstruction presented by the discoverer during the Exposition Universelle in Paris in 1900 shows this hominid looking intently at the tool he is holding in his right hand.

However, during this time, the archaeologists working in the Indonesian and Philippine archipelagos mainly concentrated their attention on the tools that appeared the most meaningful, such as polished Neolithic axes. Neither the initial excavations at Trinil site (Fig. 2b) nor those developed at the beginning of the 1900s, during the great pluridisciplinary expedition of Selenka, were able to draw sufficient attention to the taphonomy of the explored horizons, and many behavioral data may thus have escaped the researchers.

At the end of the 1920s, Ralph von Koenigswald very quickly associated the search for artifacts with his paleontological and paleoanthropological work in Java. As a result he discovered, in the upper valley of the Baksoka River (in the Southern Mountains of eastern Java), the so-called Patjitanian industry (Fig. 3b, c) on pebbles and large flakes (Bartstra 1976), which, being encouraged in this direction by Pierre Teilhard de Chardin, he was to attribute to *Homo erectus*. Similarly, he highlighted an industry of small flakes in the Sangiran dome (in the center of the island of Java, the richest site of hominids in Indonesia), called the "Sangiran flakes," the majority of which is made of allochthonous rocks, coming from the Southern Mountains of Java (von Koenigswald and Gosh 1973).

Robert van Heekeren, in his review of the prehistory of Indonesia in 1957, also mentioned the isolated discovery of bolas at the Sangiran site and described several pieces (including a bone industry) recovered in the eastern part of Java (Watualang), renowned for being contemporary to the "Solo river Men". However, the lack of documentation on the context of these objects does not permit any firm correlation with the site of Ngangdong, which yielded 11 fossils (mostly skullcaps) of derived *Homo erectus* (nevertheless, the presence of bolas in the sedimentary horizons excavated at this time in Ngangdong has now been proven).

The discoveries have multiplied in Indonesia and the Philippines (Figs. 1, 2a/c, 3a, and 4a–e) since the end of the Second World War, particularly with the characterization of Cabalwanian pebble tools in Cagayan Valley in the north of the island of Luzon, but also with the find of pebble tools and flakes in the collection assembled during the 1920s by Henry O. Beyer in the southern part of the island, or even with the industry of Cabenge discovered in the valley of Walanae in Sulawesi. Owing to the difficulty in obtaining radiometric dating at the time, their age gave rise to debates, often poorly argued, in the scientific literature, sometimes making a similar techno-complex oscillate between the Lower Pleistocene and the start beginning of the Holocene!

These discoveries were also addressed, in a quasi-systematic way, by taking into account the theory of Hallam Leonard Movius (1944), according to which east Eurasia stood out as much by the absence of bifaces as by the persistence of choppers and chopping tools. It is not possible here to address the question in detail, but rather than the controversy surrounding the "Movius Line" for several decades, one must remember that the reflections that it aroused on the meaning of the lithic assemblages proved rewarding at the level of Eurasian prehistory as a whole.

The Hoabinhien was brought to light as early as the 1920s in the eponymous province of North Vietnam by Madeleine Colani and then accepted as characteristic Paleolithic during the 1st Congre's pre'historique d'Extrême-Orient in Hanoi in 1932. Its extension toward the archipelagos was

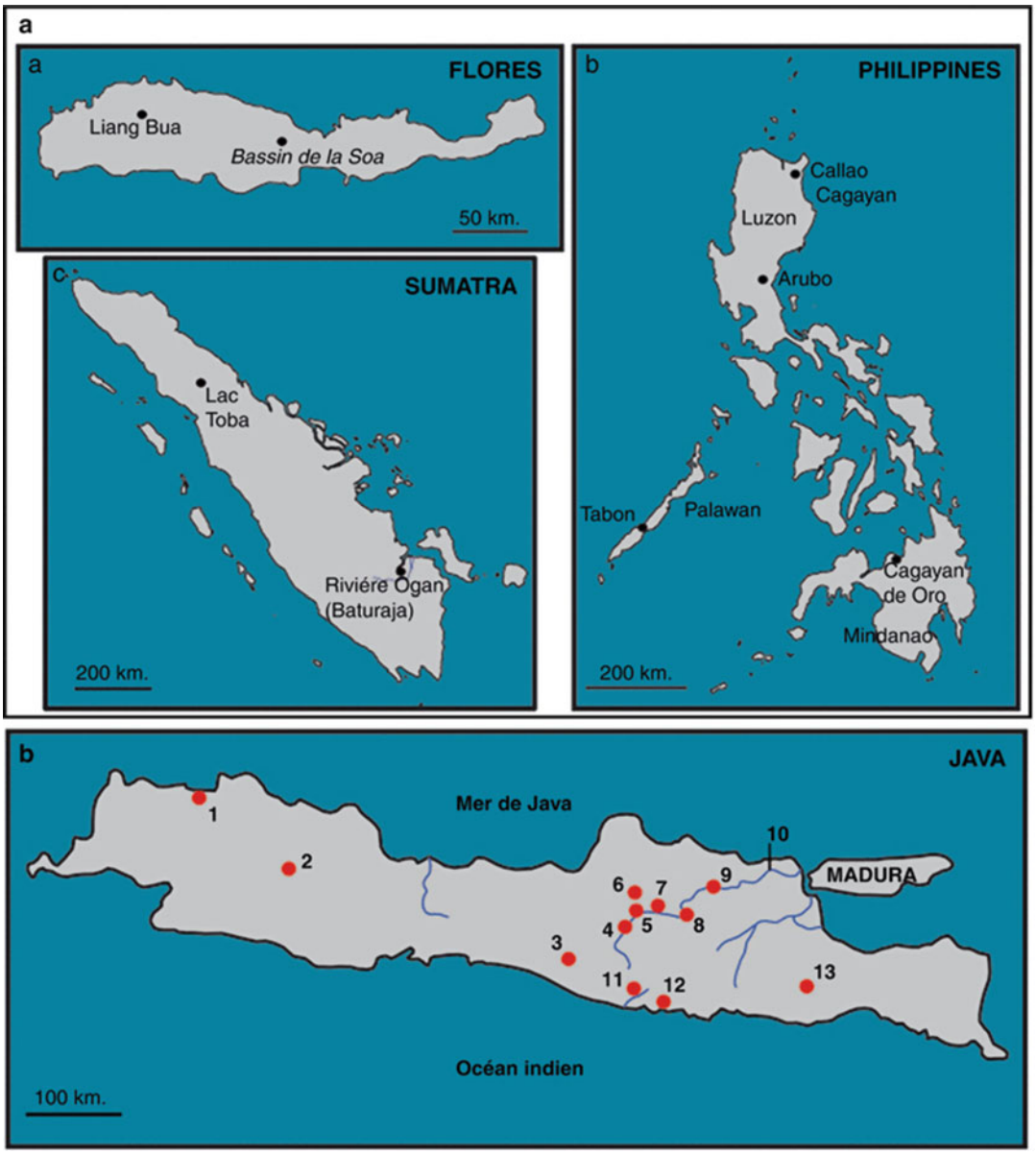

Insular Southeast Asia in the Lower Paleolithic, Fig. 2 (**a**) Detailed localization of sites. (**a**) Flores, (**b**) Sumatra, (**c**) Philippine Archipelago. (**b**) Location of sites in Java. (1) Jakarta, (2) Bandung, (3) Yogyakarta (4) Solo, (5) Sangiran, (6) Miri, (7) Sambungmacan, (8) Trinil, (9) Ngandong, (10) Solo River, (11) Punung and Baksoka River, (12) Pacitan, (13) Wajak

recognized by Pieter Vincent van Stein Callenfels, highlighting the numerous "sumatralithes" (unifacial pebble tools) in the shell middens in the north of Sumatra.

Finally, it is worth recalling, sidelining the subject of the "Lower Paleolithic" discussed here, that the archaeological record recognized at an early stage includes characteristics formerly called

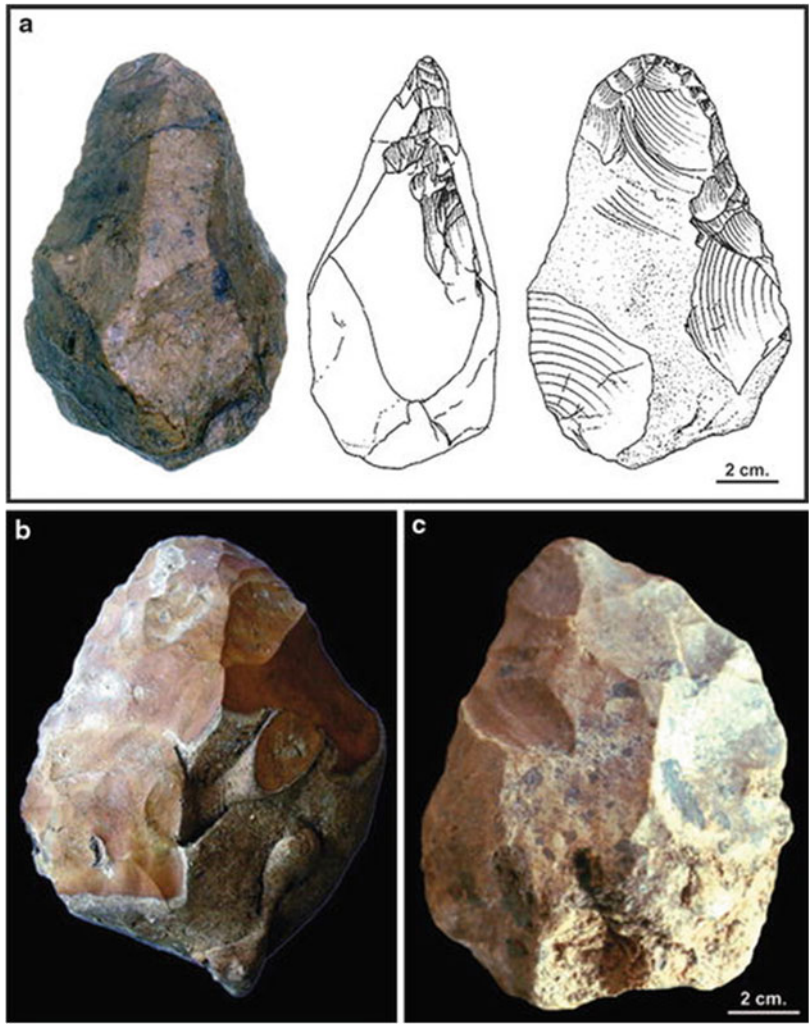

Insular Southeast Asia in the Lower Paleolithic, Fig. 3 Hand axes of Indonesia and the Philippines. (**a**) Arubo (Luzon, Philippines), (**b**) Koboran (Punung, Pacitan, Indonesia), (**c**) Baksoka River (Pacitan, Indonesia) (© **a** Alfred Pawlik; © **b**, **c** Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

"Mesolithic." Indeed the van Stein Callenfels' excavations in Sampung Cave in East Java grounded the research concerning the beginning of the Holocene period during the first half of the twentieth century. Although the reduction by-products were not collected then, in preference for more elaborated pieces, the Sampung site marks, however, the era during which the importance of man-environment relationships in the prehistory of the archipelagos was highlighted. This site has shown the emergence of an industry made on hard animal materials and enabled the first description of fauna from this period, which would become the subject of several studies developed today.

Major Questions or Debates

The Question of Origins

Many discoveries, mainly in alluvial formations, can be described as "Lower Paleolithic." However, because of the weakness – or lack – of stratigraphic control, debates about their age most of the time prevent accurately situating the arrival of the first islanders during the Lower Pleistocene. At Bukit Bunuh, in the Lenggong Valley (Malaysian peninsula site), the presence of knapped lithic elements dating to a very ancient period (1.8 Ma) has been indicated, but, nonetheless, characterizing these pieces is tricky due to discoveries their position trapped in a breach of

impact (suevite). The same authors subsequently described an assemblage on this site dating between around 300 and 600 ka.

The site that has yielded the greatest number of "archaic" *Homo erectus* is to this day the Sangiran dome, at the center of Java. These are associated

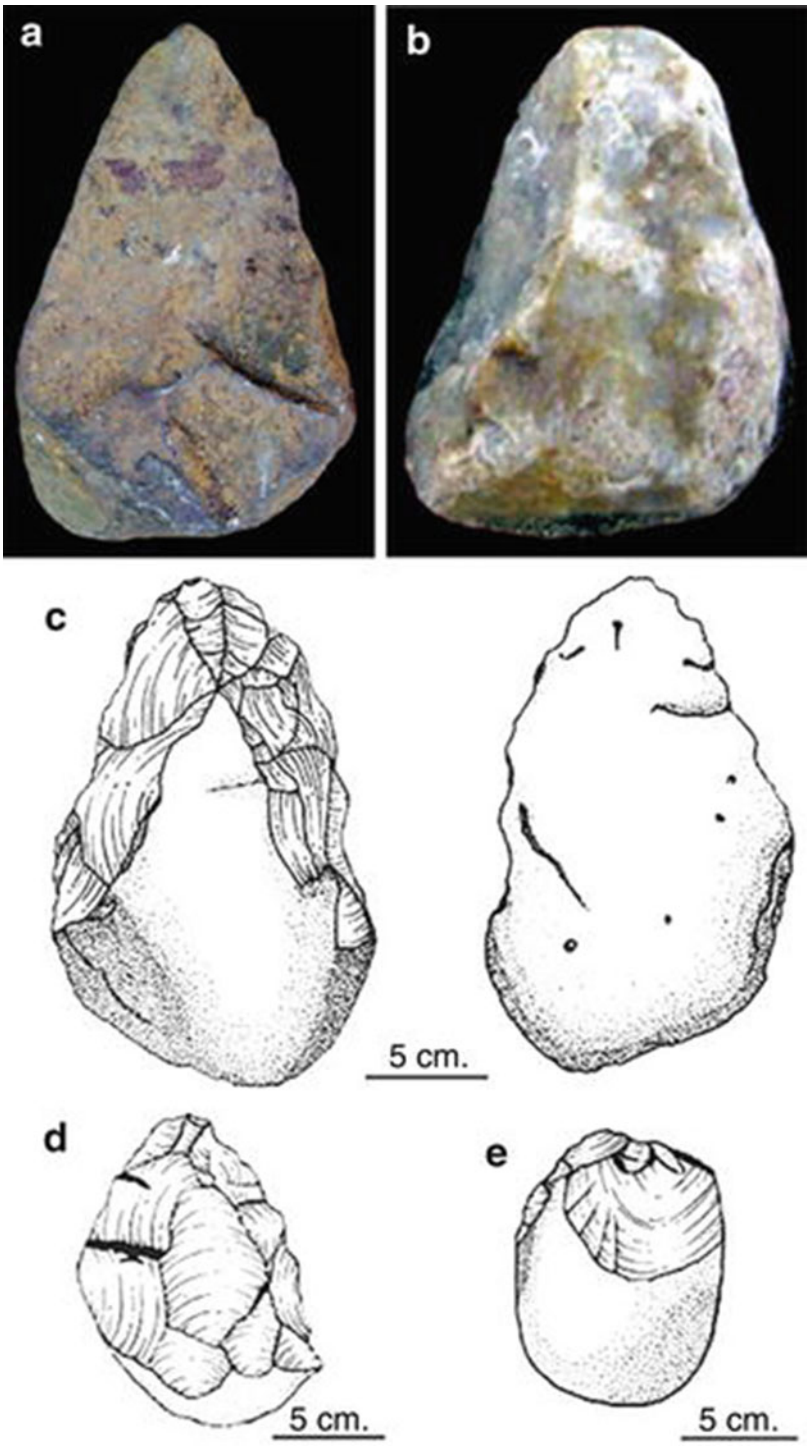

Insular Southeast Asia in the Lower Paleolithic, Fig. 4 Artifacts from the Lower Paleolithic in the Philippines. (**a**, **b**) Cagayan (Luzon), (**c**–**e**) Cagayan de Oro (Mindanao) (© University of the Philippines – ASP)

with fossil-bearing sedimentary layers (called Pucangan or Sangiran, dated between 1.8 and 1 Ma) primarily deposited in marshy environments, and where no archaeological horizon (in place or reworked) could be observed.

Only rare behavioral clues have been published on these first islanders, relating to marks on fossil bones that may have possibly been linked to the use of tools made of shell or to the analysis of dental micro-erosion of hominid fossils.

It is toward the end of this Pucangan period, that, in the mid-2000s, several "Sangiran flakes" were discovered in conglomerate lenses at the Dayu site; they are today the oldest lithic artifacts known in Java (Widianto 2006). The latter are also found in the upper conglomeratic layers which mark the end of the Upper Pleistocene (Grenzbank zone of von Koenigswald). The Grenzbank largely corresponds to the synorogenic erosion deposits linked to the last uplift of the hills ranges which frame the Solo depression (Kendeng hills to the north and Southern Mountains). It is expected, considering the deposition environment, that the flakes present the patina and wear linked to fluvial transport. Naturally, their size is identical to that of the sediment matrix, and therefore, we cannot know if these were transported artifacts or if they were manufactured locally from available small blocks of raw material.

At the same time, the layers that folded during the last uplift of the Kendeng hills have yielded some poor quality limestone artifacts as well as fossils at Miri (Kedung Cumpleng site) in an alluvial delta environment. This reflects the milieu of life for hominids on reliefs emerged at the end of the Lower Pleistocene, not long before the central region of Java acquired its current tectonic configuration.

The Beginning of the Middle Pleistocene in Java

The settling of climatic conditions that characterizes the Middle Pleistocene, from the isotopic stage MIS 22 for the earliest, marked a major stage in the paleobiogeographic evolution of the region and correlatively in the history of its peopling. It is in fact during this period that the largest land bridges on the Sunda plateau were exposed, the nature of fauna evidencing important exchanges between the continent and the archipelagos. Accordingly, the dispersion of hominids has thus been facilitated by:

- The opening of the landscape, generally considered as favorable to the development of human groups.
- But also the balance which was established in the geographic configuration of the Sunda shelf. Waters flowing from the emerged massifs (Java, Sumatra, Borneo) joined and structured the corridors along important rivers, bordered by gallery forests providing to the shifting humans vital resources, catering for their subsistence and technical needs.

Many deposits within the Sangiran dome yielded in situ or very slightly reworked archaeological horizons, such as the site of Ngebung (Fig. 5). Others (Pucung, Grogolan Kulon (Fig. 6)) derive from the direct destruction of archaeological soils and thus enable, particularly in the case of Pucung, a representative and qualitative approach of these despite a disturbed spatial distribution. Worth noting in these horizons is the simultaneous occurrence of faunal remains showing traces of human activity, sometimes the remains of the hominids themselves, traces of plant elements (bamboo casts in clay formations), and stone tools.

They are included in the layers known as of Kabuh – or Bapang – whose age corresponds to the very beginning of the Middle Pleistocene.

Some dating of volcanic effluents such as pumice gives a more remote age (Lower Pleistocene), but the primary character of the dated elements remains subject to debate. Efforts to date the sites thus combine several approaches: comparative dating methods by potassium argon on pumices but also on potassium-rich mineral grains collected from tuffaceous layers contemporary to eruptions, dating by electron spin resonance (ESR) of bipyramidal quartz of volcanic origin,

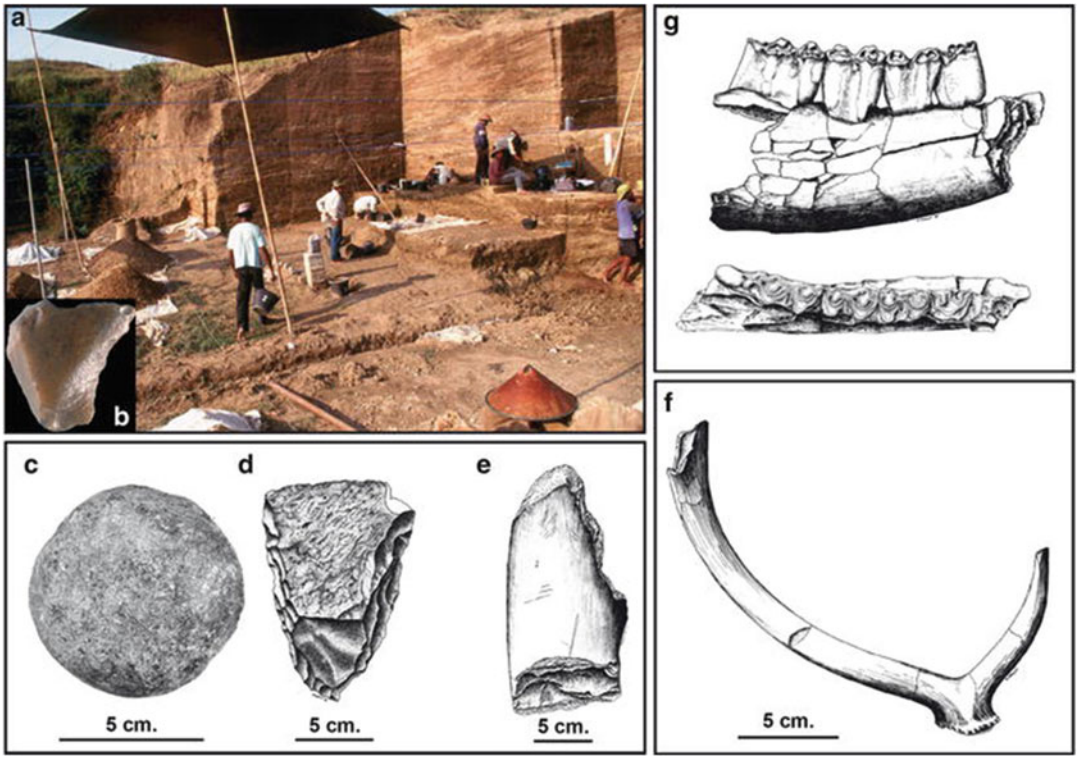

Insular Southeast Asia in the Lower Paleolithic, Fig. 5 Ngebung site (Sangiran dome, Java, 800 ka). (**a**) Excavation, (**b**) flake on chalcedony, (**c**) bola, (**d**) cleaver in andesite, (**e**) probably utilized Stegodon tusk large flake, (**f**) Axis lydekkeri ngebungensis (Cervidae), (**g**) bovid mandible (© Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

and dating by combined uranium series (U/Th) and ESR on tooth enamel of large herbivores.

Lithic tools are represented by "Sangiran flakes" (including small cores and retouched pieces) on allochthonous rocks, with different degrees of patina and wear (from very fresh to very rolled). This observation, made in the 1990s, and confirmed by the discoveries of Dayu mentioned above, closed the debate on the age of the "Sangiran flakes" as defined by von Koenigswald, whose dating was often questioned in the literature: these fragments, regardless of their geographic origin, are indeed the work of *Homo erectus*.

Extensive use was made of rocks available nearby; at Ngebung there appear numerous pebbles of andesite of poor quality, probably collected from the river levels eroding the lahars. These pebbles were used for some of them as simple manuports, for others trimmed by knapping into "horsehoofs" or shaped along a chain of operations whose products ranging from polyhedrons to the perfect bolas (Fig. 5c) through more or less regular spheroids.

In the 1970s, R.P. Soejono discovered, in a test pit excavation in Ngebung, a chopper on metamorphic rock. The group of sites known today regularly yields artifacts in quartz, quartzite, and hard fine-grained andesite which were made on blocks whose size sharply contrasts with the granulometric size of the surrounding deposits in the Kabuh layers. The location of the outcrops provides a good idea of the extent of the territories in which the raw material was harvested, whose radius could probably be up to 25 km.

Insular Southeast Asia in the Lower Paleolithic, Fig. 6 Grogolan Kulon site (Sangiran dome, Java, Early Middle Pleistocene). (**a**) Large flake, (**b**) polyhedron quartzite, (**c**) pebble tool (Photographs by Truman Simanjuntak)

These imported materials were used as hammers and as supports in making choppers and chopping tools or bolas (sometimes not pecked, notably on fine-grained quartzite). But we also find sharp tools like cleavers on large flakes (including a large Kombewa-type flake). In Ngebung, a large flake in proboscidian ivory (Fig. 5e) was also found (Sémah et al. 1992).

Behavioral differences appear between the sites, which remain to be analyzed with more precision, such as the average mass of bolas, which varies by assemblage between 350 and more than 800 g, or the raw materials used to make them.

These are key sites. They are the oldest which offer a new insight, unknown up until the end of the twentieth century, on the lifestyle of the "Pithecanthropus" of Java, their subsistence and technical behaviors (hunting seems certain), and the extension of their territories. Similarly, it is important to mention a recent study on the

ancient collection made by Eugène Dubois in Trinil, which shows the high probability of exploitation of aquatic resources (notably mollusks) by *Homo erectus* from the end of the Lower Pleistocene.

Diffusion of the Acheulean Toward the Archipelagos

The recurrence of lithic pieces described above, in excavations undertaken in Sangiran, appears today to indicate diffusion toward the archipelagos of the Acheulean tradition at the dawn of the Middle Pleistocene. While the presence of bifaces is substantiated in East Asia (China and Korea), reference points are still lacking between the Acheulean sites of India such as Attirampakkam (around 1.5 Ma) and the Southeast Asian archipelagos. The few discoveries made in northern Thailand remain contested from a chronological point of view and hardly distinctive from a typological perspective.

The deposits of the Sangiran dome raise the question of the distribution of the "Large Flake Acheulean" (Mishra et al. 2010) and imply addressing anew a number of discoveries made in alluvial environments (and still poorly dated) such as tools on large flakes and bifacial pieces found within the Patjitanian industry in the valley of the Baksoka River in East Java. Several distinctive pieces (hand axe, cleaver on flake) were also mentioned in South Sumatra (Fig. 2a/b), in the alluvia of tributaries of the Ogan River (karst massif of Baturaja).

This perspective can also be taken beyond the Wallace Line, from the Walanae River terraces in Sulawesi (Cabengian assemblage) all the way to the Soa Basin in Flores (Fig. 2a/a), where in 1970 Theodor Verhoeven drew attention to shaped pieces associated with ancient fauna (assumed to belong to the Middle Pleistocene).

Von Koenigswald quickly brought them together with the "Sangiran flakes." The intensification of research in the Soa Basin allowed for the identification of several sites (Mata Menge, Boa Lesa, Wolo Sege) dated between 0.8 and 1 Ma by argon methods and fission tracks (Brumm et al. 2010).

The tools collected include, besides pebbles, mainly medium-sized flakes resulting from the reduction of blocks, and are easily transportable from where they were produced with the possibility of being retouched thereafter.

A comparable behavior was noted in the horizons where the *Homo floresiensis* fossil was discovered (Liang Bua, Upper Pleistocene), which allowed the authors to assume some continuity in acquisition strategies and the treatment of raw materials in Flores throughout the Middle and Upper Pleistocene (this hypothesis supports that of a long endemic evolution on the island).

In the Philippines, the Kalinga site in North Luzon attests overseas dispersal of hominins in the early Middle Pleistocene around 700 ka. The lithic assemblage associated with numerous faunal remains only comprises small flakes (Ingicco et al. 2018). Other assemblages still lack chronological data especially the unifacial pebbles of Cagayan (Cabalwanian, north of Luzon island (Fig. 4a, b)), the "Acheulean" pieces from the Arubo site (central part of the island, biface and "horsehoof" (Fig. 3a), and the pebble tools of Huluga (Cagayan de Oro, north of Mindanao island (Fig. 4c–e)) (Dizon and Pawlik 2010).

The data collected, notably in Flores, implies that *Homo erectus*, during the establishment of the specific paleogeographical conditions of the Middle Pleistocene, was also able to cross the narrow channels of sea in order to populate the eastern islands. Many speculations accompany this assertion, such as the visibility of reliefs (volcanoes) which could have represented an incitement to cross. This adventure seems surprising if we refer to the reliability of the Wallace Line considered as a biogeographic boundary. However, it is no more spectacular than what the first *Homo erectus* experienced about 1.5 Ma ago, as they successfully passed the filters separating the continent from the first hospitable reliefs appearing on Java.

The Industries at the End of the Middle Pleistocene

The sites from the Lenggong Valley in Peninsular Malaysia (Majid 2001), recently classified on the

World Heritage List, represent a potential link with the abovementioned sites. In Bukit Jawa, during the construction of a highway, the identification of a workshop became the object of rescue excavations on the periphery of a relief formerly surrounded by a lake. It yielded a very high number of artifacts on pebbles and large flakes, often knapped on an anvil, and its age could be as old as 200 ka. The Kota Tampan site, where stone knapping workshops were also excavated, occupies a comparable geomorphological position and presents a more sophisticated lithic industry but involving comparable reduction methods.

Made by knapping on an anvil or by direct percussion, the tools on pebbles or flakes (mainly notches and denticulates) show the use of quartz but also the search for good quality quartzite. The overlying layers at some archaeological horizons were dated (luminescence, OSL) to more than 70 ka, linking the abandonment of the site with the major eruption of the Toba volcano in North Sumatra (Fig. 2a/b). The Lenggong Valley also contains many other sites that are more recent.

Several other lithic assemblages on flakes were discovered in alluvial systems of east and west Indonesia and are attributed to the Middle or Upper Pleistocene. The majority, however, lack precise stratigraphic and chronological context, owing as much to the rarity of research as to the difficulty of finding well-defined stratigraphic horizons in highly dissected alluvial layers, most often reduced to the state of geomorphologic berms. In particular, mention must be made of the presence of some knapped pieces, including a chopper on a large andesite flake, on the site where the Sambungmacan skullcap was discovered in 1973, belonging to the late *Homo erectus* group from the Solo River. In the karst massif of Punung (east of Java island), the Song Terus cave (Fig. 7) was the object of a study on its deep filling which demonstrated an old opening onto the neighboring valley. The filling of the cave thus trapped alluvial layers which contained abundant artifacts and some fossils (Sémah et al. 2004). This alluvial series could be dated back to more than 300 ka (dating combining U/Th and ESR methods) in its deepest area. It ends with isotopic stage MIS 5 (the U/Th speleothem dates are between 120 and 85 ka), with the disappearance of all fluvial influence and the outlining of the oldest occupied surface in the cave known in the region studied, toward 85 ka.

The lithic industry associated with these deep levels is homogenous throughout the entire period. It is characterized by the opportunistic production of flakes of medium or small size, an important proportion of which (including cortical flakes) was retouched. The tools include typically denticulated scrapers, as well as notches, becs, scrapers, and borers. Composite tools are common. Tools on pebbles, cores, or large flakes are rare, probably because of the limited granulometric size of the encasing alluvial layer.

Homo sapiens of the First Part of the Upper Pleistocene

These sites open up perspectives on the period during which *Homo sapiens* conquered the archipelagos, but the association between technocomplexes and human fossils remains too tenuous to be able today to claim a detailed description of the behavior of the first representatives of our species. Some continuity reflected by lithic technology appears notable but still requires interpretation. Such is the case of the karst of Punung in East Java (until the end of MIS 5), where it is difficult to attribute the very first occupation floor in the cave to the last *Homo erectus* or to the early arrival of *Homo sapiens*.

Similarly, in the valley of Lenggong in Peninsular Malaysia, where, as mentioned above for Flores, continuity in lithic reduction modes could well have been dictated by nature and the locations of raw material sources. One of the characteristics of these tools in the region of Punung, from the end of the Middle Pleistocene until the Holocene, is the frequent recycling of older artifacts, either by resharpening or their use as cores.

Diversification seems to be more evident at the end of MIS 3 and during MIS 2, possibly linked to the ease of circulation on the emerged corridors,

Insular Southeast Asia in the Lower Paleolithic, Fig. 7 Song Terus cave (Punung, Pacitan, Java, Indonesia). Human presence for more than 300 ka; occupation floors from 85 ka. (**a**) Excavation, (**b**) tool on bone (Holocene), (**c**) tool on shell (Holocene), (**d**) core (Holocene), (**e**, **f**) retouched flakes of the Terus level (Late Middle Pleistocene) (© Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

crossing of the narrow straits toward the eastern islands, and the variety of tropical ecosystems which humans began exploring and exploiting.

The data accumulated during recent decades are still scattered but contribute to stressing the importance of research efforts in the field, combining archaeology and chronology. They clarify diverse aspects relative to the movement and adaptation of modern humans in the archipelagos, such as the specific exploitation of environments in Sarawak (island of Borneo, Niah Cave; Barker et al. 2011), the apparent occasional use of caves as short-term shelters and, more rarely, workshops in the karst massif of Punung in Java (Forestier 2000). They also highlight the diversity of human species in this time period including not only *Homo sapiens* and *H. floresiensis* but also *H. luzonensis* from Callao Cave (Fig. 2a/c) to the north of Luzon island (around 67 ka ago; Detroit et al. 2019). It is worth mentioning the likely presence of a Levallois reduction in South Sulawesi (Maros karst (Fig. 1), Leang Burung 2; Glover 1981); the occupation of the Tabon Caves (Palawan Island (Figs. 2a/c and 8)) nearly 35 ka ago, as hearths and associated flake assemblages (Patole-Edoumba et al. 2012); the traces left by the first navigators passing through the Moluccas archipelago (caves of Golo and Wetef on the island of Gebe; Bellwood et al. 1998); or in East Timor (Jerimalai shelter, O'Connor et al. 2011 (Fig. 1)), where the oldest traces of deep sea fishing can be found.

International Perspectives

The ideas expressed by Movius on the regions situated beyond the "hand axe limit" seem obsolete today. However, it is undeniable that the perspective that it opened during the 1940s on early prehistory of Eurasia led to genuine incentives for the development of research (Simanjuntak et al. 2010).

A "continental" point of view continues to guide some work, notably research into the mechanisms of diffusion and local specialization of the Acheulean tradition, as well as research for older evidence of systematic fire use. But it seems difficult today to follow Movius's idea in his perception of the whole region under study as a simple isolate or even as an evolutionary cul-de-sac.

On the contrary, the chronological and geographic mosaic of settlements in the Southeast Asian islands during the Pleistocene has already confirmed its potential. The region contains some of the earliest evidence of adaptation to tropical, continental, and aquatic environments and their exploitation during the Lower Pleistocene. At the dawn of the Middle Pleistocene, clearly, the question of the modalities used to cross the straits, resulting in the installation of groups on the Lesser Sunda Islands, begs an answer. The second half and end of the Upper Pleistocene are rich in innovations which would contribute to the debate of "cultural modernity". As, for instance, the organized navigation, these innovations concern the understanding and mastery of a number of natural processes (Bellwood 2007). They enabled the colonization of new lands and a targeted exploitation of their resources, prefiguring in many cases the domestication of the environment.

Future Orientations

The practical orientations for research are modeled on the statement of the potential of sites, which has been summarized here.

The question of technical behavior and subsistence of the oldest *Homo erectus* which populated the archipelagos involves going through the same approach for formations such as the deposits of Pucangan in Sangiran as that which could have taken place within the volcano-fluviatile layers of the end of the Lower Pleistocene. The first direction to follow is certainly that of paleontology and taphonomy in order to obtain a real view of the content and the mechanisms for the deposition of the richest fossil-bearing strata.

The second perspective concerns the entire documented archaeological record from the beginning of the Middle Pleistocene to the beginning of the Holocene. The natural tendency, as a result of the small number of studies and their dispersion, is always to give a particular meaning to a determined point in space/time, especially in

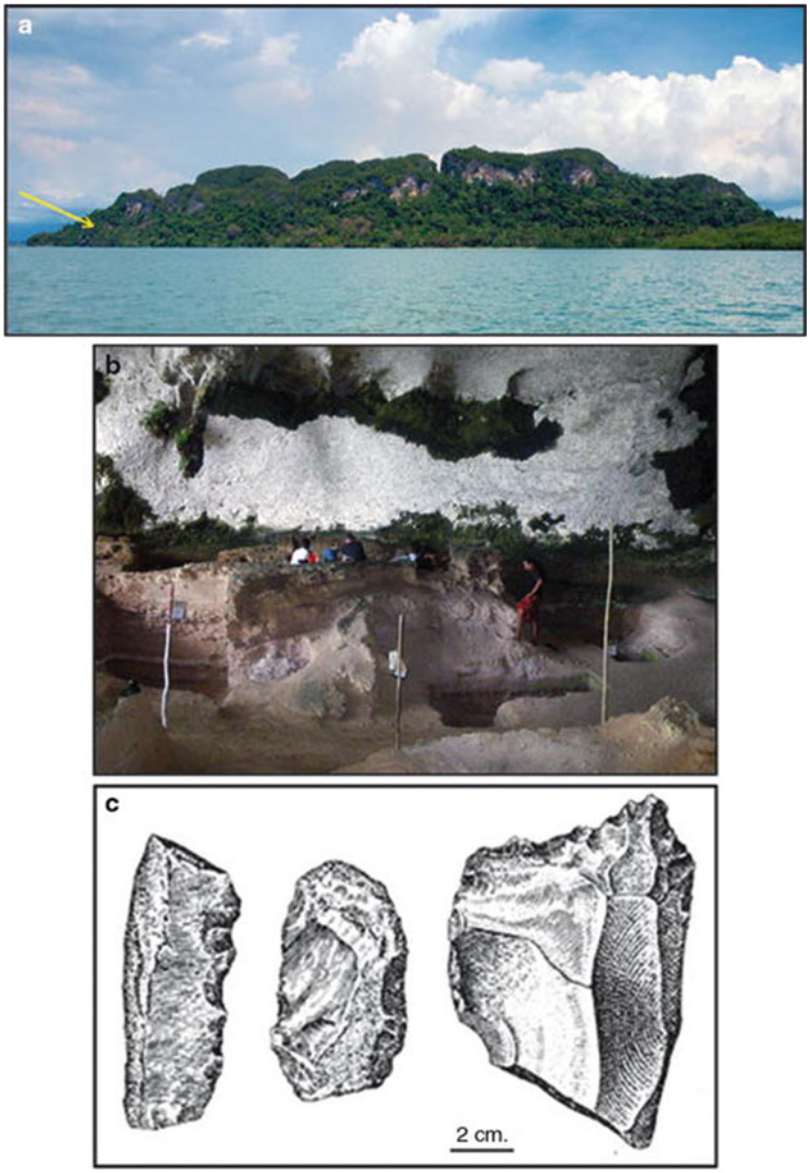

Insular Southeast Asia in the Lower Paleolithic, Fig. 8 Tabon cave (Lipuun Point, Palawan, Philippines). (**a**) Lipuun point, (**b**) excavation, (**c**) flake tools (according to Fox 1970) (© Eusebio Dizon – National Museum of the Philippines)

terms of adaptation to very local conditions. Testing the solidity of such preliminary models requires a multiplication of quasi-synchronous markers in the same region, the careful description of the differences in context between them, and an attempt to find the constants in terms of adaptation or cultural choices (Simanjuntak et al. in press).

Taking into consideration international perspectives, these future orientations must also enable, at the level of the whole region, the implementation of a common policy of conservation and interpretation, which could easily take the form of thematic nomination (and not of isolated sites) to the World Heritage List. Such an appreciation of prehistoric heritage will go beyond its

scientific interest. As a true narration of entire chapters of human history, it will echo the discourse, very often ancestral, which local communities have developed in order to substantiate deep cultural roots in their territories.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Central Asia: Paleolithic
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ East Asia: Paleolithic
- ▶ Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
- ▶ Island Southeast Asia: Neolithic
- ▶ Island Southeast Asia: Rock Art
- ▶ South Asia: Paleolithic
- ▶ West and Central Asia: Early Homo Fossil Records

References

Barker, G., L. Lloyd-Smith, H. Barton, F. Cole, C. Hunt, P.J. Piper, R. Rabett, V. Paz, and K. Szabo. 2011. Foraging-farming transitions at the Niah Caves, Sarawak, Borneo. *Antiquity* 85 (328): 492–509.

Bartstra, C.J. 1976. *Contributions to the study of the Palaeolithic Patjitan culture, Java, Indonesia, Part I.* Leiden: E.J. Brill.

Bellwood, P. 2007. *Prehistory of the Indo-Malaysian archipelago*. 3rd ed. Canberra: ANU E Press.

Bellwood, P., N. Goenadi, G. Irwin, G. Gunadi, W. Agus, and D. Tanudirjo. 1998. 35000 years of prehistory in the Northern Moluccas. In *Bird's head approaches (Modern quaternary research in Southeast Asia 15)*, ed. G.J. Bartstra, 233–275. Balkema: Rotterdam.

Brumm, A., G.M. Jensen, G.D. Van Den Bergh, M.J. Morwood, I. Kurniawan, F. Aziz, and M. Storey. 2010. Hominins on Flores, Indonesia, by one million years ago. *Nature* 464: 748–752.

Détroit, F., A.S. Mijares, J. Corny, G. Daver, C. Zanolli, E. Dizon, E. Robles, R. Grün, and P.J. Piper. 2019. A new species of Homo from the Late Pleistocene of the Philippines. *Nature* 568: 181–186. https://doi.org/10.1038/s41586-019-1067-9.

Dizon, E., and A.F. Pawlik. 2010. The lower Palaeolithic record in the Philippines. *Quaternary International* 223–224: 444–450.

Forestier, H. 2000. De quelques chaînes opératoires en Asie du sud-est au Pléistocène supérieur final et au début de l'Holocène. *L'Anthropologie* 104: 531–548.

Fox, R.B. 1970. *The Tabon Caves: archaeological explorations and excavations on Palawan Island*. Monograph of the National Museum of the Philippines: Manila.

Glover, I. 1981. *Leang Burung 2: An upper Palaeolithic rock shelter in South Sulawesi, Indonesia*, Modern quaternary research in Southeast Asia 6, 1–38. Rotterdam: Balkema.

Ingicco, T., G.D. Van Den Bergh, C. Jago-on, J.J. Bahain, M.G. Chacon, H. Amano, H. Forestier, C. King, K. Manalo, S. Nomade, A. Pereira, M.C. Reyes, A.M. Semah, Q. Shao, P. Voinchet, C. Falgueres, P.C.H. Albers, M. Lising, G. Lyras, D. Yurnaldi, P. Rochette, A. Bautista, and J. De Vos. 2018. Earliest known hominin activity in the Philippines by 709 thousand years ago. *Nature*. https://doi.org/10.1038/s41586-018-0072-8.

Majid, Z. 2001. Man and technology in Late Pleistocene Malaysia. In *Sangiran: Man, culture and environment in Pleistocene times*, ed. T. Simanjuntak, B. Prasetyo, and R. Handini, 185–192. Obor: EFEO/Yayasan.

Mishra, S., C. Gaillard, C. Hertler, A.-M. Moigne, and H.T. Simanjuntak. 2010. India and Java: Contrasting records, intimate connections. *Quaternary International* 223–224: 265–270.

Movius, H.L. 1944. Early man and Pleistocene stratigraphy in southern and eastern Asia. *Papers of Peabody Museum* 19 (3): 1–125.

O'Connor, S., R. Ono, and J. Clarkson. 2011. Pelagic fishing at 42,000 years before the present and the maritime skills of modern humans. *Science* 334 (6059): 1117–1121.

Patole-Edoumba, E., A. Pawlik, and A.S. Mijares. 2012. Evolution of prehistoric lithic industries of the Philippines during the Pleistocene. *Comptes Rendus Palevol* 11: 213–230.

Sémah, F., A.-M. Sémah, T. Djubiantono, H.T. Simanjuntak. 1992. *Did they also make stone tools?* Journal of Human Evolution 23: 439–446.

Sémah, F., A.-M. Sémah, C. Falgueres, F. Detroit, X. Gallet, S. Hameau, A.-M. Moigne, and T. Simanjuntak. 2004. *The significance of the Punung karstic area (Eastern Java) for the chronology of the Javanese Palaeolithic, with special reference to the Song Terus cave (Modern quaternary research in Southeast Asia 18)*, 45–62. Balkema: Rotterdam.

Simanjuntak, H.T., F. Sémah, and C. Gaillard. 2010. The Palaeolithic of Indonesia: Nature and chronology. *Quaternary International* 223: 418–421.

Simanjuntak, H.T., F. Sémah, and A.-M. Sémah. in press. *Tracking evidence for modern human behavior in Palaeolithic Indonesia*. Bulletin of the National Science Museum. Tokyo.

Von Koenigswald, G.H.R., and A.K. Gosh. 1973. Stone implements from the Trinil beds of Sangiran, Central Java I. Proceedings Kon. *Nederlands Akademie Van Wetenschappe B* 76 (1): 1–34.

Widianto, H. 2006. The oldest Homo erectus stone tools in Java: From the lower Pleistocene Pucangan formation in Sangiran. Paper presented at the 18th Congress of the Indo-Pacific Prehistory Association, Manila 20–26 March 2006.

Intangible Cultural Heritage

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Introduction and Definition

In its most literal form, intangible cultural heritage (ICH) can be defined as heritage that has no material form, such as a belief system transferred through word of mouth, like a song of creation or a language without written form. However, the destruction of tangible heritage physical can have an effect on these more ephemeral heritages (for instance, landscape cues used in the singing about the creation of the land, local mountains, and river bends) and leaves the stories more open to dispute. In such ways the intangible is directly connected to the tangible.

The emergence and relevance of ICH is linked to philosophical traditions such as those of Bourdieu, Heidegger, and Merleau-Ponty that eventually found their way into archaeology and anthropology in the twentieth century. This more holistic approach toward cultural heritage and its management grew out of the *interpretative tradition*. Specifically, the part is understood within the whole from which it originated, and the whole is understood from the part in which it finds expression (Droysen 1977: 35 in Johnson & Olsen 1992: 421). Such approaches led to questioning the unnecessary division between nature and culture. In the same way, the tangible in heritage cannot be understood without the intangible, for they are all part of the larger system of human experience which is heritage.

Key Issues/Current Debates/Future Directions/Examples

There are many useful papers tracking the history of the adoption of ICH from different angles within UNESCO (including Aikawa 2004 and Munjeri 2004) and from without (Francioni 2004; Ahmad 2006). These also discuss the different aspects of the final UNESCO convention on ICH. This entry will focus on how ICH came into the consciousness of the modern international political arena, as highlighted by these and other papers.

In 1971, UNESCO drafted its first international instrument related to ICH (document B/EC/IX/II-IGC/XR.I/15). It aimed at establishing the protection of folklore (Aikawa 2004: 138). Francioni (2004: 2–3) showed that the international legal interest in such protection actually stemmed from World War I and became more fully manifested after World War II. In 1948, the United Nations (UN) *Universal Declaration of Human Rights* upheld that "the concept of human dignity":

> includes peoples' entitlement to the respect of the cultural heritage that forms an integral part of their identity, history and civilization. Destruction or desecration of *symbolic* objects and sites that *are essential to the enactment of a people's culture* (Francioni 2004: 4; fn 7,8,9 for full referencing of this declaration).

Importantly, the above statement affirms the relevance and importance of intangible and tangible values and behaviors for humanity as a collective as well as its deconstructed cultural parts. Thus, *all* people and their cultural *behaviors* and *places* matter. Significantly, *living* aspects of culture matter, not only those that were created in the past and bestowed to us by our forebears. Such agreements have "provided the foundation for the gradual building up of a movement toward the recognition of a distinct and enhanced status of indigenous peoples" (Francioni 2004: 3).

From 1971 on, several years of debate ensued on how to protect ICH either through a separate normative instrument or via Intellectual Property Rights (Francioni 2004: 15; Aikawa 2004: 138). In 1989, the Recommendation on the Safeguarding of Traditional Culture and Folk Law was published. Unfortunately it was not binding and UNESCO and others struggled with how to define ICH, what kinds of things should/could be protected,

and how to create explanations of how to protect what (Francioni 2004: 15–6; Aikawa 2004: 139–41).

From 1990 on, many other influences were brought to bear on the creation of a more holistic CHM identity and strategy. *The United Nations Convention on Biological Biodiversity* (1992) was responsible for highlighting the significance of ICH further through emphasizing the significance of traditional, indigenous knowledge and practices upon the conservation and sustained use of biodiversity. This, along with The United Nations Draft Declaration on the Rights of Indigenous Peoples, had two major effects. They were catalysts of winning support for the recognition of the ICH of indigenous peoples and highlighted the significance and relevance of cultural diversity and the engagement of "the many" in decision making.

In the years up to 1998, as well as in the same year, intergovernment meetings were debating the notion of heritage and the limitations of seeing it as synonymous with the tangible. The *Intergovernmental Conference on the Cultural Policies for Development* (Stockholm, 30th March–2nd April, 2008, P16 Recommendation Objective 3.3) recommended that states renew "the traditional form of heritage", namely that which "must be understood as all natural and cultural elements, tangible versus intangible, which are inherited or new." This is/was seen as indigenous peoples' holistic conception of heritage.

Cultural diversity and engagement of "the many" are social forms of "plurality," the significance of which has been much debated in political/social philosophy. Plurality in these forms is now seen as a fundamental working principle for environmental health globally (biodiversity) as well as for the notion of cultural heritage (cultural diversity) and its management. In 2001, UNESCO adopted the *Universal Declaration on Cultural Diversity*. This provided strength of argument that the future of cultural heritage can only be decided by many voices and is seen as pivotal to humanity's survival and strength as a whole.

Despite these constant "reawakenings," progress was generally slow through the second half of the twentieth century. This can be seen as a result of a very fundamental social phenomenon in itself. European and other highly urbanized societies' ideologies changed in the mid-twentieth century to the mid-1980s. It was during this time that processual philosophy was strong (understanding society as a series of processes) and science and the tangible held sway. Things could not be "true" or confirmed if they were not material, so perhaps we could only be certain about material heritage. It was during the 1980s that a large number of individuals began to debate the dominance of the positivist view of the world (post-processual) and things that were physically created by people as opposed to the "natural" in CHM and archaeology.

Linked to these ideas, Munjeri points out that CH practitioners, thinkers, and the public tended to see CH as a stable and static "authentic" entity (2004: 13). Heritage was qualified and reduced to "types" where authenticity was identified only through physical qualities like its "authenticity of materials" or design. Such value judgments place these forms of heritage into the past and associate their past visible value with the current visible value.

To further understand how it took so long for these ideas to become a central UNESCO canon during these times requires a solid study of the documentation that came out of the various UNESCO and other international meetings. This is recommended for those readers who wish to understand in what ways the representatives of various countries saw and understood things differently from each other, including the importance of the protection of ICH. Many of these differences are retained today. So altogether, lack of recognition, political and philosophical wrangling and issues surrounding authenticity, slowed the progress of the understanding, adoption and use of the intangible in heritage. Regardless, the

Operational Guidelines for the Implementation of the World Heritage Convention have progressively encompassed intangible aspects embodied in natural and cultural sites.

In the late twentieth century, works appeared that emphasized the place and importance of nature and/or critiqued those traditions that have devalued it or felt that its "form" has been misunderstood (Vogel 1996). Further, the understanding of the notion of special places as non-physical entities (being special due to the practices that were held there), and the acknowledgement of the significance of living cultures as part of the heritage of humanity, led away from "European" ideologies of grandiose structures and concentration on the past (Munjeri 2004: 14–16). In the last 20 years, some CH specialists see ICH as enveloping the tangible or indeed that the tangible is the physical manifestation of the intangible. Others describe it as the framework within which the tangible takes shape and significance. Munjeri upholds that heritage is a tripartite whole that he calls the equilateral triangle of natural, cultural, and spiritual and that these are parts of the greater whole in which ICH is enmeshed.

In a world debating ideas like these, several countries requested UNESCO to develop a *new international normative instrument related to ICH*. In 1999, the *Global Assessment of the 1989 Recommendation* revisited the 1989 instrument and examined the efficacy of its application among Member States (MS). By 2003, the MS found enough common ground to adopt an *International Convention for the Safeguarding of the Intangible Cultural Heritage*. This document contains the current definition of ICH by UNESCO (article 2):

> The "intangible cultural heritage" means the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity. For the purposes of this Convention, consideration will be given solely to such intangible cultural heritage as is compatible with existing international human rights instruments, as well as with the requirements of mutual respect among communities, groups and individuals, and of sustainable development (UNESCO 2003).

Cross-References

- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Tangible Heritage in Archaeology

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References

Ahmad, Y. 2006. The scope and definitions of heritage: from tangible to intangible. *International Journal of Heritage Studies* 12 (3): 292–300.

Aikawa, N. 2004. An historical overview of the preparation of the UNESCO International Convention for the Safeguarding of the Intangible Cultural Heritage. *Museum International* 56 (1–2): 137–149.

Francioni, F. 2004. Beyond state sovereignty: the protection of cultural heritage as a shared interest of humanity. *Michigan Journal of International Law* 25 (4): 1209–1228.

Johnsen, H., and B. Olsen. 1992. Hermeneutics and archaeology: On the philosophy of contextual archaeology. *American Antiquity* 57 (3): 419–436.

Munjeri, D. 2004. Tangible and intangible heritage: From difference to convergence. *Museum International* 56 (1–2): 12–20.

Vogal, S. 1996. *Against nature: The concept of nature in critical theory*. New York: State University of New York Press.

UNESCO. 2003. Text of the Convention for the Safeguarding of Intangible Cultural Heritage. Available at http://www.unesco.org/culture/ich/index.php?pg=00006.

Further Reading

Kato, K. 2006. Community, connection and conservation: intangible cultural values in natural heritage – the case of Shirakami-sanchi World Heritage Area. *International Journal of Heritage Studies* 12 (5): 458–473.

Larsen, K.E., ed. 1994. *The Nara conference on authenticity in relation to the World Heritage Convention*. Trondheim: Tapir Publishers.

Tokoro, I. 2001. The Grand Shrine of Ise: The preservation by removal and renewal. In *Historical cities and sacred sites: Cultural roots for urban futures*, ed. I. Serageldin, E. Shluger, et al., 22–29. Washington, DC: International Bank for Reconstruction/World Bank.

UNESCO. 2001. *First proclamation of masterpieces of the oral and intangible heritage of humanity*. Paris: UNESCO.

Intellectual Property Issues in Cultural Heritage (IPinCH) Project

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Basic Information

Description

The Intellectual Property Issues in Cultural Heritage (IPinCH) project (2008–2016) was an international, multidisciplinary research project examining intellectual property (IP)-related issues emerging within the realm of heritage, especially those affecting Indigenous peoples (Fig. 1). These include complex and often difficult questions about who has rights to and responsibilities relating to use of and benefits from tangible and intangible cultural heritage, including artifacts, archaeological sites, and associated traditional knowledge (e.g., images, songs, stories) and values (Nicholas and Bannister 2004). To address these issues, IPinCH was designed to assist scholars, institutions, descendant communities, policymakers, and other stakeholders in negotiating equitable, appropriate, and successful research policies and practices involving cultural heritage, including archaeology. The project also generated insights on the nature of knowledge, extending understanding of IP and contributing to scholarly discussions of culture-based rights claims.

Intellectual Property Issues in Cultural Heritage (IPinCH) Project, Fig. 1 The IPinCH logo, "Perpetuation", was designed by lessLIE (Leslie Sam), a Coast Salish artist who works at the interface of traditional and modern values, modes of expression, and social and political inequities (The image is used with the permission of the artist who was an IPinCH affiliate)

IPinCH was a collaboration among scholars, researchers, and Indigenous groups from across the globe. Team members from diverse fields – including anthropology, archaeology, ethics, ethnobiology, Indigenous studies, heritage management, information management, law, and museum studies – worked with professional and community practitioners and policymakers from agencies and institutions operating at local, national, and international levels. A critical aspect of the project was the involvement of Indigenous partners and organizations from Canada, the United States,

Australia, New Zealand, South Africa, Botswana, Japan, and Kyrgyzstan. The project was based at Simon Fraser University (Canada), with George Nicholas as project director.

The conception of IPinCH emerged from discussions in the early 2000s between archaeologist Nicholas, cultural anthropologist Julie Hollowell, and ethnobiologist Kelly Bannister and was influenced by Michael Brown's article "Can Culture Be Copyrighted" (1998) and Catherine Bell's Project for the Repatriation of First Nation Heritage in Canada (2000–2009) (Bell and Napoleon 2008; Bell and Paterson 2009), as well as by conversations with colleagues who were encountering intangible heritage-related issues in their work. An 8-year $2.5 million grant was awarded by the Social Sciences and Humanities Research Council of Canada to support the project from 2008 to 2016 as part of its Major Collaborative Research Initiative program.

Project Organization and Research Methodology

At the core of the project was a steering committee composed of Nicholas, Hollowell, Bannister, legal scholar Catherine Bell, and archaeologists Joe Watkins and John Welch, which provided direction and oversight, assisted closely by a student representative and project staff. A grounded critical theory orientation aimed for ongoing evaluation of the projects by naiveness to the varied needs of team members and partners and to changing circumstances affecting the research environment. A project ethnographer provided feedback on communication and knowledge flows within the project to aid IPinCH in meeting its goals and setting priorities. Guidance at the broader level was provided by an international project advisory board. Communication and outreach tools include a still-active project website (www.sfu.ca/ipinch), newsletters, monthly digest, and variety of social media for sharing news within the project and with the broader public. Over the course of the project, the team grew through the addition of 140 associate members and affiliated students.

Addressing Community Heritage Needs at Ground Level

Twelve IPinCH-funded *community-based initiatives* (Table 1) were situated within Indigenous communities around the world (Hollowell and Nicholas 2009). Each project was co-developed with community partners who are fully involved in developing research questions, methods, and outputs and reviewing project data before being made public. These community-based initiatives targeted a wide range of issues, including developing protocols to work with ancestral remains (Schape et al. 2015), educational programs (Abdykanova et al. 2016), integrating traditional cultural principles and ways of knowing in local management decisions and government consultations (Carcross-Tagish First Nation et al. 2016), developing means to repatriate and restore to community knowledge from materials in museum collections (Arnold 2014), and creating co-management plans with state agencies to protect the intangible values of culturally significant places (Atalay et al. 2016).

In general, these initiatives were self-sustainable, culturally appropriate, and community-embedded projects that addressed the preservation and educational use of IP and cultural heritage. In a number of these projects, elders and youth worked together to collect, inventory, and preserve traditional knowledge (e.g., Thorpe and Solomon 2014). Other projects were undertaken in collaboration with the Ainu of Northern Japan (on conceptions of heritage), the Tlingit and Haida of the Pacific Northwest (on precontact resource harvesting), and the San of Southern Africa (on cultural tourism).

What these projects revealed includes:

- On-the-ground studies reveal different conceptions of "heritage," "property," and what constitutes proper care, as well as responsibilities to and relationships with "heritage."
- Repatriation of heritage is not limited to material items but also information and knowledge.
- The need/demand for Indigenous-based heritage models is substantial and urgent.

Intellectual Property Issues in Cultural Heritage (IPinCH) Project, Table 1 IPinCH-funded community initiatives

"A Case of Access: Inuvialuit Engagement with the Smithsonian's MacFarlane Collection" (Northwest Territories, Canada) – Repatriation and restoration to community of knowledge from museum collections
"Education, Protection and Management of *ezhibii-gaadek asin* (Sanilac Petroglyph Site)" (Michigan, USA) – Co-management of petroglyphs and their intangible values
"Cultural Tourism in Nunavik" (Québec, Canada) – Protection of Inuit language and heritage in the context of cultural tourism
"Developing Policies and Protocols for the Culturally Sensitive Intellectual Properties of the Penobscot Nation" (Maine, USA) – Long-range stewardship plan and research protocols for tribal intellectual property
"Grassroots Heritage Resource Preservation and Management in Kyrgyzstan:" (Kyrgyzstan) – Developing sustainable community projects that preserve and teach about intellectual property and cultural heritage
"Hokotehi Moriori Trust: Heritage Landscape Data Base" (Rehoku, New Zealand) – Database of traditional knowledge of cultural landscape that brings together elders and youth
"Secwepemc Territorial Authority – Honoring Ownership of Tangible/Intangible Culture" (British Columbia, Canada) – Exploring "cultural heritage" when Secwepemc peoples have economic, political, and legal authority
"The Journey Home – Guiding Intangible Knowledge Production in the Analysis of Ancestral Remains" (British Columbia, Canada) – Developing protocols for acceptable methods of study of ancestral remains before reburial
"The Ngaut Ngaut Interpretive Project" (South Australia) – Development of culturally sustainable interpretive content online for important heritage site through a community-based approach to interpretive materials
"Treaty Relations as a Method of Resolving IP Issues" (Canada) – Using the nineteenth-century treaties as a framework for resolution of outstanding intellectual property and heritage issues today
"Yukon First Nations Heritage Values and Heritage Resource Management" (Yukon, Canada) – Identifying local conceptions of heritage values in aid of self-governing Yukon First Nations' management of their heritage resources
"The History and Contemporary Practices of the Hopi Cultural Preservation Office" (Arizona, USA) – An examination of the Hopi Tribe's navigation between radically different conceptualizations of Hopi cultural knowledge and those informing Euro-American interests

- A different research process is needed in which direction comes from heritage holders.
- Community-based research requires developing mutual understanding of needs, goals, methods, and outcomes, as well as trust and respect.
- University policies generally foreground researcher's interests over the community's and that university ethics review criteria and policies must adjust to new needs.
- Cross-cultural differences matter.

Research Themes During the lifetime of the project, IPinCH maintained seven topical working groups, from which these primary research themes were drawn: (1) Bioarchaeology, DNA, and Indigeneity; (2) Commodifications of Cultural Heritage; (3) Community-Based Cultural Heritage Research; (4) Cultural Tourism; (5) Indigenous Peoples, Cultural Heritage, and the Law; (6) Indigenous Research Ethics; and (7) Safeguarding Indigenous Heritage. Working group research was innovative and collaborative, involving scholars, students, and research partners from around the world to explore the topics listed relative to theory, practice, policy, and research on IP issues in cultural heritage.

Research efforts and output relating to these themes took a variety of forms, depending upon whether they were directed to academics and researchers, Indigenous and other descendant communities, policymakers, or the public at large. There was extensive academic output and conference sessions, along with a public lecture series on "Protecting Indigenous Cultural Heritage," and combined workshops/public symposia on "Cultural Commodification, Indigenous Peoples, and Self-Determination" and "DNA and Indigeneity: The Changing Role of Genetics in Indigenous Rights, Tribal Belonging, and Repatriation" (see Walker et al. 2016). IPinCH also produced an array of Fact Sheets and blogs, >100 videos and podcasts, newsletters, conference proceedings, and reports on the community-based initiatives. All are available on the IPinCH website.

Major Impact

The IPinCH project was an unconventional academic research project that sought a more complete understanding of the complex IP issues that increasingly affect Indigenous knowledge systems and research relationships. It offered assistance and resources to diverse stakeholders to better understand and address these concerns.

The project also helped to build capacity both within communities and in the academy. Approximately one quarter of the IPinCH project budget was committed to student support and training. Research fellowships supported graduate students and postdoctoral scholars in investigating specific IP issues. Students, scholars, and others interested in these issues had the opportunity to become IPinCH associates and participate in working groups and other project initiatives and events.

The insights gained through collaborative projects developed with Indigenous partners have helped to catalyze new theoretical insights, policy development, and more accountable research relationships. These promote better understanding in both the nature of Indigenous intellectual property and notions of heritage in which tangible/intangible "property" is indivisible. This research also revealed substantial challenges in funding community-based studies through conventional academic channels that foreground university interests, with considerable time and effort directed to implement ethics reviews and grant transfers and to ensure that community partners retained ownership and full control of research results.

Knowledge mobilization and activism were important components of IPinCH. For example, in 2014 IPinCH team members developed the *Declaration on the Safeguarding of Indigenous Ancestral Burial Grounds as Sacred Sites and Cultural Landscapes* (https://www.sfu.ca/ipinch/resources/declarations/ancestral-burial-grounds/) as an intervention in the desecration of an ancestral First Nations burial ground in British Columbia. This document articulated the growing global consensus around the importance of protecting Indigenous ancestral burial sites and called on all levels of government, heritage professionals, and others to work together to ensure such sites are not subject to alteration or damage. It served to remind non-Indigenous governments in Canada of their legal and ethical obligations with respect to First Nations' sacred sites in which human remains of cultural and spiritual significance are interred. The Declaration received endorsements from leading professional organizations around the world, as well as a large number of scholars and private citizens, and is thought to have had a significant influence on encouraging the BC government to resolve the situation.

IPinCH was itself a case study in alternative research ethics and practice. Shifting control over the research process to community partners revealed significant tensions between the project, university policies, and funding agencies. Some of the IPinCH-supported projects literally took years to have funding and ethics applications approved, pointing to the need for revised university policy. To aid that process, and to share lessons learned, IPinCH hosted a national research ethics conference, "'Working Better Together' Indigenous Research Ethics Conference," which brought together scholars, practitioners, students, administrators, and policymakers of diverse cultural and professional backgrounds from across Canada to explore what it means to work collaboratively in Indigenous research.

In 2013, George Nicholas and IPinCH were awarded Canada's Social Science and Humanities Research Council's inaugural Partnership Impact Award for its outstanding innovative approach to cultural heritage research that encouraged Indigenous community partners to drive the research process and share intellectual leadership and resources.

Since the formal completion of the IPinCH project, many team members continue to pursue related research and outreach on such topics as cultural appropriation, research ethics, human rights, sovereignty-based heritage, and heritage as a human right.

Cross-References

- ▶ Community Archaeology
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Indigenous Archaeologies
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working With and For
- ▶ Intangible Cultural Heritage
- ▶ Nicholas, George P.
- ▶ Stakeholders and Community Participation
- ▶ Tangible Heritage in Archaeology

References

Abdykanova, A., K. Tabaldiev, A. Zhumbaeva, and K.A. Pyburn. 2016. Grassroots resource preservation and management in Kyrgyzstan: Ethnicity, nationalism and heritage on a human scale. Available at http://www.sfu.ca/ipinch/sites/default/files/resources/reports/kyrgyzstan_report_2016.pdf

Arnold, C. 2014. A case of access: Inuvialuit engagement with the Smithsonian Institution's Macfarlane collection. Available at http://www.sfu.ca/ipinch/sites/default/files/resources/reports/acaseofaccess_finalreport_2014.pdf

Atalay, S., S. Martin, and W. Johnson. 2016. Education, protection and management of *ezhibiigaadek asin* (Sanilac Petroglyph Site). Available at http://www.sfu.ca/ipinch/sites/default/files/resources/reports/ezhibiigaadek_asin_finalreport_2016.pdf

Bell, C.E., and V. Napoleon, eds. 2008. *First nations cultural heritage and law: Case studies, voices, and perspectives*. Vancouver: UBC Press.

Bell, C.E., and R.K. Paterson, eds. 2009. *Protection of first nations cultural heritage: Laws, policy, and reform*. Vancouver: UBC Press.

Brown, M. 1998. Can culture be copyrighted. *Current Anthropology* 39: 193–222.

Carcross-Tagish First Nation, Champagne & Aishihik First Nations, Ta'an Kwach'an Council, Tr'ondek Hwech'in First Nation, S. Greer, and C. Bell. 2016. Yukon first nations heritage values and resource management: Perspectives from four Yukon first nations. Available at http://www.sfu.ca/ipinch/sites/default/files/resources/reports/yfn_ipinch_report_2016.pdf

Hollowell, J., and G. Nicholas. 2009. Using ethnographic methods to articulate community-based conceptions of cultural heritage management. *Public Archaeology: Archeological Ethnographies* 8: 141–160.

Nicholas, G., and K. Bannister. 2004. Copyrighting the past? Emerging intellectual property rights issues in archaeology. *Current Anthropology* 45: 327.

Schape, D.M., S. Rowley, and Stó:lō Xyolhmet S'olhetawtxw Sq'éq'ip (Stó:lō House of Respect Committee) Members. 2015. *The Journey Home – Guiding Intangible Knowledge Production in the Analysis of Ancestral Remains*. Available at http://www.sfu.ca/ipinch/resources/reports/journeyhome/

Thorpe, S., and M. Solomon. 2014. *Moriori cultural data base: IPinCH case study final report*. Hokoteki Moriori Trust and IPinCH Project. Available at http://www.sfu.ca/ipinch/project-components/community-based-initiatives/moriori-cultural-database/

Walker, A., B. Egan, and G. Nicholas (eds). 2016. *DNA and indigeneity: The changing role of genetics in indigenous rights, tribal belonging, and repatriation. Symposium proceedings*. Available at http://www.sfu.ca/ipinch/sites/default/files/resources/reports/dnaindigeneity_proceedings_2016.pdf

Further Reading

Anderson, J. & Christen, K. n.d. Local contexts website. Available at http://localcontexts.org

Anderson, J., and H. Geismar, eds. 2017. *The Routledge companion to cultural property*. London and New York: Routledge.

Atalay, S. 2012. *Community based archaeology: research with, by, and for indigenous and local communities*. Berkeley: University of California Press.

Brown, M. 2003. *Who owns native culture?* Cambridge: Harvard University Press.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2008. *Collaboration in archaeological practice: engaging descendant communities*. Lanham: AltaMira Press.

Hollowell, J. 2011. A collaborative cultural heritage project: Intellectual property issues in cultural heritage. *Archaeologies* 7: 449–453.

Nicholas, G., C. Bell, K. Bannister, S. Ouzman, and J. Anderson. 2009. Intellectual property issues in heritage management, Part 1: Challenges and opportunities relating to appropriation, information access, bioarchaeology, and cultural tourism. *Heritage Management* 2: 261–286.

Nicholas, G., J. Welch, J. Watkins, R. Coombe, C. Bell, J. Anderson, B. Noble, and K. Bannister. 2010. Intellectual property issues in heritage management, Part 2: Legal dimensions, ethical considerations, and collaborative research practices. *Heritage Management* 3: 117–147.

Nicholas, G., A. Roberts, D. Schaepe, J. Watkins, L. Leader Elliot, and S. Rowey. 2011. A consideration of theory, principles and practice in collaborative archaeology. *Archaeological Review from Cambridge* 26: 11–30.

Nicholas, G., B. Egan, K. Bannister, and E. Benson. 2015. Intervention as a strategy in protecting indigenous

cultural heritage. *The SAA Archaeological Record* 15 (4): 41–47.
Riley, M., ed. 2004. *Indigenous intellectual property rights: legal obstacles and innovative solutions*. Lantham: AltaMira Press.
Roth, S.., and IPinCH Team. 2016. *Think before you appropriate. A guide for creators and designers*. Available at http://www.sfu.ca/ipinch/resources/teaching-resources/think-before-you-appropriate/
Solomon, M., and S. Thorpe. 2012. *Taonga Moriori*: Recording and revival. *Journal of Material Culture* 17: 245–263.

Interculturality and Archaeology

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Introduction

Interculturality results when people from different cultures come together in the same place and interact. In a perfect world, the members of diverse cultures would be able to coexist in harmony, learning new ideas and innovative ways of doing things from one another. History has demonstrated, however, that the actual circumstances of cultural contact often result in conflict and control as one culture (typically the more technologically sophisticated) seeks to assert domination over cultures they regard as inferior. Archaeologists, especially historical archaeologists who have the advantage of working equally with excavated and textual information, have been adept at examining the details of interculturality by investigating cultural transmission and rejection in terms of moveable (e.g., ceramics, clothing) and immovable (e.g., houses, plazas) material culture.

Definition

On the most basic level, cultures are composed of individuals who share ways of doing things, general religious beliefs (such as monotheism), language (even dialects of the same language), dress, and so forth. Much culture is based on tradition, or "the way things have always been," even though cultures inevitably change through time. Interculturality occurs when groups with different cultural traditions come into direct, sustained contact. As members of distinct cultures, the various individuals can constructively interact for the betterment of all or they can come into conflict.

Constructive interculturality might be termed "positive interculturality." Regrettably, however, interculturality has been difficult to effect when one of the cultures in contact perceives itself as more powerful, wiser, or divinely unique. Significant problems can arise because of a culture's preconceived ideology of superiority. Many of the beliefs about superiority/inferiority are based on what most people refer to as "race." Anthropologists determined long ago that race does not exist as a biological fact. Rather, peoples in different genetic populations share the same physical attributes because of the complex interactions between genetics, environment, and climatic conditions. Nonetheless, people tend to believe that they perceive distinct human "races" because of the racialization process, and so the process has played a historical major role in making positive interculturality difficult to put into practice in many situations. The racialization process constitutes an element of what might be termed "negative interculturality."

Examples

The racialization process has made interculturality difficult to sustain in living populations, particularly during the nineteenth-century diasporas that took millions of immigrants to the United States. The unfair conditions the immigrants faced, however, does not mean that they did not coexist with other immigrants and learn from them despite the cultural differences between them. In this sense, positive and negative interculturality can occur side by side in any social environment in the same way that

views about interculturality can exist through time as cultural tradition.

Interculturality marked the late nineteenth-century history of New York City, for example, even though the different nationalities (representing distinct cultures) often lived in their own neatly demarcated neighborhoods, worshipped in their own churches (often using native languages in their liturgies), built social organizations designed to protect the neighborhood and to promote ethnic pride, and even created gangs for the purposes of organized crime. Interculturality was constantly practiced in a multicultural place like nineteenth-century New York City. Millions of immigrants entered the city during the nineteenth century, with the largest European in-migration occurring during the last half of the century. The earliest unwilling immigrants, of course, were enslaved men and women who arrived either directly from Africa or from Africa by way of the Caribbean and who were imported as chattel. These individuals labored along the docks, served dinners in elite restaurants, and helped their masters get dressed in the morning. Archaeologists have repeatedly demonstrated the ways in which interculturality was enacted in plantation and urban settings as European American slave owners, overseers, merchants, and artisans learned from African craftspersons, midwives, healers, and cooks. At the same time, individuals of African descent and heritage adopted European languages, housing forms, and religion, even as they may have modified each custom to create new "creolized" cultural expressions that openly proclaimed new social identities. New York City experienced a huge influx of European-born immigrants in the late nineteenth century, first principally from Ireland (as families fled the horrors and deprivation of the Great Famine of 1846–1850) and Germany (as individuals fled the oppression that followed the failed 1848 revolutions). Before the end of the century, so-called "new" immigrants arrived from southern and eastern Europe as well as from other countries that were experiencing difficult economic circumstances or tense political climates. Many people went to the United States simply to find a better way of life, even though the reality seldom fit the dream.

Throughout the nineteenth century, thousands of Chinese and Japanese immigrants also entered the western United States to find labor with mining companies or with the railroads. These immigrants initially settled in large urban centers like San Francisco but steadily moved east, eventually arriving in New York City and other eastern cities. Interculturality during mass migration was made difficult in the United States because of perceived differences between "race" (individuals of African and Asian descent had physical characteristics that were different than those of the upper-class, elite, "white" Brahmins who ruled the nation), religion (Irish, Italians, some Germans, and others professed the Roman Catholic faith rather than the Protestantism of the ruling class), and tradition (Jews, Lithuanians, and others dressed in ways that were perceived as "foreign" to the elite). During this era, elite, well-educated whites created a number of exclusionary organizations formed around the principles of limiting immigration of "foreign undesirables," denying opportunities for advancement to immigrants, and denigrating the Catholic faith. These actions were explicitly designed to implement negative interculturality on a national scale. Their efforts were successful to a point, but positive interculturality nonetheless occurred as different peoples interacted in the course of everyday life in the crowded environment of New York. New York City tenements were important physical sites of interculturality as people from diverse cultures lived tightly packed in adjacent apartments. Tenements were small, poorly ventilated, and badly built, and the residents of the various apartments were collectively forced to use a small number of outdoor privies built in the tiny backyards. Families from diverse parts of the world commonly lived in the same buildings, and given the thin nature of the walls, the members of the various cultures could experience other cultures without perhaps even realizing it. Even though some neighborhoods could be demarcated as "belonging" to Russian Jews, former Irish nationals, or southern Italians, members of each culture could reside in the same tenement. For

example, writing in 1900, one person intimately knowledgeable about the conditions of New York's tenements observed that as many as 70 families could live in a single building.

An important archaeological project focused on New York's tenements was conducted in 1991–1992 by archaeologists from Historic Conservation and Interpretation, Inc. The project was designed to salvage information from the historic Five Points district of lower Manhattan on behalf of the General Services Administration who was overseeing the construction of a new federal courthouse. The archaeologists collected almost one million artifacts from the excavation. Archaeologists working with John Milner Associates, led by Rebecca Yamin, conducted the laboratory research, interpreted the materials, and prepared the seven-volume site report. Historical research conducted in conjunction with the excavation supports the contention that tenements were sites of interculturality. For example, in the one block that was the focus of the project, researchers discovered that Irish immigrants (from almost every part of Ireland), Jews from Czarist Russia and Poland, Italians, and African Americans all lived in the block's tenements during the nineteenth century. The historical records were so rich that the researchers were able to pinpoint the location of different families and even to demonstrate the great amount of transition in the buildings through the years.

Cross-References

- ▶ Ethnic Identity and Archaeology
- ▶ Holographic Epistemology: Native Common Sense
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ Local Discourses in Archaeology
- ▶ Multicultural Archaeology
- ▶ Multivocality and Archaeology
- ▶ Overseas Chinese Archaeology
- ▶ Plantation Archaeology
- ▶ Race in Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Social Memory in Archaeological Theory
- ▶ Urban Archaeology
- ▶ Urban Archaeology at Five Points
- ▶ Urban Archaeology in Twenty-First Century Perspective

Further Reading

Griscom, J.H. 1845. *The sanitary conditions of the labouring population of New York*. New York: Harper and Brothers.

Orser, C.E., Jr. 2007. *Archaeology of race and racialization in historic America*. Gainesville: University Press of Florida.

Riis, J.A. 1890. *How the other half lives: Studies among the tenements of New York*. New York: Charles Scribner's Sons.

Yamin, R., ed. 2000. *Tales of five points: Working-class life in nineteenth-century New York*. West Chester: John Milner Associates.

Interculturality and Political Action in Undisciplined Archaeology

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Introduction

Multivocality and Interculturality

Multivocality, as an orientation within postcolonial archaeology, is based upon several key assumptions of multicultural relativism. The call to multivocality often fails to address key underlying problematics rooted within the hegemonic epistemic framework from which archaeological practice is ethically justified as a pluralistic practice. By encouraging practitioners to embrace difference without also necessarily acknowledging the mutually constitutive relationships between frequently unequal partners, this risks producing a form of inclusion that potentially hinders both

the counter-hegemonic vocality of dissident voices and political agency outside of the framework of multiculturalism. In such a way, archaeological practice risks reproducing the very privileged position multivocality attempts to undo, reproducing, in turn, epistemological suppositions about what inclusion necessarily entails. In this entry I intend to dig deeper into the character of the intercultural relationship of archaeological knowledge and disciplinary practice. Focusing upon the conditions of political action resistant to postcolonial intervention and the construction of counter-hegemonic intersubjectivities, I will discuss the mutually constitutive character of thought in the context of work in the Kolla territory of Catamarca, in the northwest of Argentina.

Key Issues/Current Debates

Social and Scientificist Archaeologies

It might seem usual that an archaeologist wonders about the sense of archaeology, particularly about its social sense. What is it useful for, the researcher asks her/himself, eager to find a way to justify her/his science, her/his practice, and her/his life, in terms of utility for the society in which she/he lives. The value of knowledge by itself, of history as teacher of life (*magistra vitae*), and of the archaeological as cultural patrimony and significant identity, the transformation of the past and/or the archaeological in the pursuit of development, or the pure and simple amusement of those who practice it and the curious interest of the public are various. And these values are independent of the reasons, senses, or utilities that archaeologists have elaborated to give their science a place in the present time, as if it did not yet well belong here as a sociocultural artifact. Those more compromised with the present society qualify their science with some very appropriate phrases: social, socially useful, and with social commitment. In my opinion, every justification of *social archaeology* characterized by applying the science to a project of social intervention with an ostensibly altruist goal frequently recapitulates the very colonial logics it seeks to elude, because the interventions into new social contexts works to conceal and ultimately naturalize its own former social relationships. As with s*ocial archaeologies*, also *scientificist archaeologies*, justifying science as a value in itself prey on the denial of the social relationships from which they inevitably emerge, although they do not deform such denial by pretending a commitment to the society with which they were already related by hiding their structural relationships. These scientificist archaeologies produce colonial discourses which, put into projects by other archaeologies or by non-disciplinary agents, end up in joining their political practice to the already mentioned social archaeologies.

Beyond the good or bad intentions of the archaeologist, and beyond more or less explicit or active social commitments, the archaeological project carries the violence of placing in the objects, the archaeological "thing," within the space of metaphysical rupture according to which colonial subjectivity is constituted as hegemonic event in culturally heteroglossic contexts (Haber 1999). That is, archaeology reproduces its basic assumption – object and method – through which the colonial difference in the subjectivity of the archaeologist, but also of the descendants and the public, is taken to the objective world, consolidating a division between knowledge and social relationships (Haber 1999). Colonial difference (Walsh 2006), a power differentiator attendant to the difference in the nature of peoples, is placed within the nature of objects – particularly those objects that signify and mark the nature of peoples. Colonial epistemic violence originally exerted over people is transposed to the world of objects, objectified, naturalized, manipulated, and methodologically modulated.

Colonial/Modern Epistemes and Knowledge/Power

As an example, I transcribe some paragraphs from a 1904 field report by Carlos Bruch, entomologist in La Plata Museum, Argentina, detailing an 1898 archaeological expedition to Hualfín, in the province of Catamarca (Bruch 1904). This is the first text published on the archaeology of Hualfín, later to become an area of choice of Argentine

archaeologists, being in time referred to as the *valle maestro* (master valley) because, due to the seriation of the sepulchers existing there, a historical-cultural sequence was elaborated that was, at its turn, the master sequence then extended to the rest of the Andean provinces in Argentina (González and Cowgill 1975).

Bruch's language is characteristic of the archaeology of the early twentieth century. For instance, descriptions abound and some expressions now considered politically incorrect are not hidden. But behind the appearances, what I find of interest in Bruch's text, as with any early text in general – written when the disciplinary habitus had not yet been institutionalized – is that they show with certain clarity the literary procedures through which objects of knowledge are incorporated into specific semantic networks, which, later, turned into a formalized disciplinary language, survive in more naturalized ways (Haber 1995). That is, in this text there is an antiquated flavor, but that is not what strikes my attention here. What is actually of critical importance, behind the anachronistic language, is the kernel of present discourse: the relationships between objects and agents that exist here are the same ones that exist between knowledge and society in current archaeology. Returning to the report of Bruch, Bruch writes:

> On the 18th January I arrived for the second time in Hualfín. The poplars and the willows, characteristic of Catamarca's towns, form there the fences of vast properties and farms extending both sides of the river; the far-off hills and the Colorado hill showing itself over the fluvial terraces as an immense fortress; everything contributes to give the arid and monotonous landscape a picturesque aspect which the traveler remembers in awe after his visit.
>
> And if you later look at the properties around, you soon discover the ruins and cemeteries, last vestiges of the primitive owners; remains of a numerous tribe: old Hualfines.
>
> Helped by a labourer, my guide and companion during the trip, I started excavation on the following day, the results of which I will mention in the order in which they happened.
>
> Over the small terrace on the right and next to the house of Mr. Leguizamón, there are some ruins of stone walls, next to which I observed various ovals, formed by stone lines of regular size half-buried. Assuming they could be tombs, I excavated the first and I tripped on the surface of a quantity of fragments of clay pots, mixed with rocks and the bones of a skeleton, the skull of which I found 50 cm below the surface. Then I discovered a big clay pot and next to it a well-preserved skeleton.
>
> The sepulcher was 80 cm deep and had been lightly built of a wall of oval-shaped stones marked in the surface by other stones (Fig. I).
>
> The pot (N° 1) is 60 cm tall; its surface is rough, not well polished, made of well-cooked brick-colored clay, with two small rounded and wide hands, and horizontally placed almost in the top third portion. Below the mouth there is a face represented in relief: the strips running irregularly in vertical direction are painted in black. I found an empty pot covered with a lid which must have probably been the bottom part of another very similar to this I described, that is, a *puco* or bowl (Bruch 1904).

Bruch then follows with the rest of his findings, sepulcher by sepulcher, pot by pot. As a sample perhaps this was enough. The description of what Bruch finds in the sepulchers is his way to get to know the past of Hualfín, with an old-fashioned style but a modern epistemic frame: material remains are a means to know the past: a past already gone and which can be known with the study of its "last vestiges," the remains and ruins. These remains and ruins allow Bruch to know, they are here telling him that, in the past, there stood the former populated tribe of the Hualfines, owners of the land of Hualfín. The relationship of the Hualfines with Hualfín, which Bruch enunciates as that of past inhabitation and ownership, turns out to be analogous to another such relationship, the one Bruch sees from the top of a hill, and which is signaled by the rows of poplars and willows, limits of the properties in Hualfín when Bruch conducts his field research. Two social relationships happen one after the other in time, although Bruch does not tell us how or why. A succession in time does not mean anything but the time passing; there is nothing to indicate the influence linking Bruch with the Hualfín, and there is no relationship of knowledge articulated, no matter the social relationships with the owners and between them. Let us observe the end of Bruch's text:

> In order to grasp at least a tiny graphic idea of the Quechua population inhabiting the Calchaqui regions today, a population which can be considered descendants of that civilized nation, we

represent, in picture IV, two sketches which I had occasion to draw in Hualfín, in the house of Mr. Leguizamón.

Number 1 is a well-developed thirteen-year-old girl. The head is pretty big and round, the hair is black and stiff, irregularly cut and extending long through the forehead, where it forms an irregular limit. No artificial deformation of either the forehead or the occiput is noticed, or of the scalp in general. The groove of the eye is small; the mongolic fold well pronounced, the lacrimal caruncle being the most part of the upper eyelid. The base of the nose is very wide, but not too low; the side wide and straight; the tip quite wide, rounded; nostrils visible from the front. The mouth and the jaw, in general, are salient; lips somewhat thick. Of the ear we can distinguish only a little, being quite disfigured by a mange eruption.

Number 2 is a middle-aged man, robust and well-developed. The scalp is of interest, mainly due to it characteristic hypsicephalic shape. The forehead goes obliquely backwards; occiput quite perpendicular upwards. The narrowness of the cerebral capsule and of the whole scalp, compared to his height, is surprising. It is always interesting to observe in the living this scalp shape, which we are used to see only in the dead material. Not taking this into account, the considerable height and the pronounced narrowness are a distinctive feature of this individual's head.

Going through the details, the hair is black, well developed; the forehead is very narrow and relatively high; the limit of the hair is irregularly lost.

Supra-orbital arches of the frontal bone do not come out. The groove of the eyes is oblique, very narrow, thus the pupil, very deep in the orbit, is not so visible. This impression is even more pronounced in the base of the nose -which is very high- and by the very salient zygomatic arches.

The nose is of medium to small proportion, the right side with a little elevation at the half.

The mouth part is not salient; lips being narrow and the upper lip very well arched. Cheeks are deep-set.

Over the upper lip there is a slight inflammation and in the middle part of the inferior lip, a small lock of hair (*mosca*); over the chin a true goat beard.

The ear is totally stuck in the scalp and the antehelix comes out a little in the middle; but apart from this there are no specificities.

Reserved, taciturn physiognomy" (Bruch 1904).

Almost at the end of his report, Bruch brings other objects, this time subjects-objects that, in Bruch's words, are related to the past in a different way to knowledge: they are the descendants of the former owners. Are these, then, the inheritors of Hualfín? Well, not exactly, and here is an unspoken relationship. Descendants appear in the text as objects assisting knowledge of the past "in order to give us at least a hint of what they were like" (Bruch 1904), that is, their link with Hualfín is in the order of knowledge, not in the order of society. They are not the agents who own the lands divided by the rows of trees, but the objects appearing to help us know their ancestors, the former owners. That is why they do not speak, and they do not even have a name, because Bruch's interest in them is not in what they say as agents of history, but in what they are as objects of history, a history that can be known and told by observing and describing the remains and ruins of their ancestors, as Bruch says, "the last vestiges."

Between mute descendants and ancestor-owners, there is a gap, a metaphysical rupture, which can only be mediated by knowledge or, more specifically, by a particular kind of knowledge, the study of the mute material remains. This metaphysical rupture between history and the descendants is what makes them irrelevant as agents of history or as agents of society: the land of their ancestors taken by colonial violence; they are also deprived of the word about their relationship to their ancestors, to the remains and ruins, by an epistemic violence (Spivak 1988) that Bruch, and this tradition of archaeology as a whole, institutionalized.

Knowledge of the history of Hualfín that Bruch begins is heir to a tradition that, 25 centuries before, was started by Herodotus of Halicarnassus, who established as a theoretical-methodological basis of Western historiography, a hierarchy of the sources of knowledge in which the testimony in their own language on the gaze over others prevails (Abercrombie 1998). For Herodotus, only those testimonies based on direct eyewitness were valid and would be considered, subordinating thus other sources of knowledge, such as oral memory. History was, moreover, a business run by members of the same linguistic-cultural region (also a political-military region); it had to do with war relationships between this and the barbarians that, by virtue of their linguistic and cultural difference, were the object of war rather than dialog, the peoples without language. Combining these two structures, the logical result is

that the history of the war against the Persians excluded the voice, the look, and the memory of the Persians and that history inhabited a particular dwelling, "ours," that of the victorious conqueror, and from this dwelling history was written, even when it was ostensibly written as a mere knowledge relationship of the facts of the past.

Bruch relates himself to the remains and ruins in the same way as he relates with descendants: material remains and descendant remains are there, and Bruch is here to know the past through them. The fact that the remains are in Hualfín, as well as the descendants, does not affect Bruch except as a knower, that is, by taking the role of a knower he denies any other ontological or social relationship between the living and the dead (Haber 2009). It is not that Bruch should be held responsible for the colonial violence exerted over the ancestors of the descendants, but that his delimitation of the relationship in terms of a knowledge relationship, that is, not a social one, also delimits the social relationship between ancestors and descendants: between those who suffer the consequences of colonial horror that he describes as mute, reserved, and taciturn objects and those who enjoy the benefits of those same consequences, the landowning elite who hosted him in their houses, whose dividing tree rows he observes, and whose laborers posed for his photographs and excavated the sepulchers of their ancestors. This is a delimitation that archaeology naturalizes not in its theories or its thematic contents, but in its disciplinary frames: the subject matter – the long gone past – and the method, material remains, mute, and inert matter. This marks a delimitation which excludes the social and ontological relationship existing between ancestors and descendants and which ultimately perpetuates the present consequences of colonialism.

Bruch seems safe from the machinery that builds subjectivities divided from history. I say "seems" because the sin of *hubris* is soon discovered by the inhabitants in the Olympus, who claim which all mortals should know: archaeology, even as a business aimed at knowledge, must be justified for the present society. Bruch's last phrase reveals himself trapped in the hegemonic erasure of history: "Of course there is a lot to be found out about those regions, which yet hide the richness of *our* prehistory" (Bruch op.cit., italics added).

Bruch enunciates prehistory in the first person plural, including himself in a "we" that relates then, to the past of Hualfín, in ways which, delimited or not by knowledge, are enough to define a collective "we," an agent of prehistory, unveiling thus the metaphysical character of the fracture, that is, the colonial subjective difference transposed to the objective world, because a collective of knowers – the collective of archaeologists – is not under consideration here, but of a social collective, the Argentinians, who consider themselves agents of a history they describe as object. The same as Herodotus with his methodological premises, Bruch, and archaeology after him, uses his premises in such a way that, under the pretext of knowing a past, he constitutes his own identity, his own home address: archaeology unveils the historical richness of the liberal Argentine nation that, at the same time, recapitulates European colonization and Western civilization.

What Bruch's text illustrates is the procedure by which the modern archaeological discipline incorporates and reproduces the specific place from which it develops as a discursive practice of the histories and cultures of the others; this is not just in the choice of one or another theory, one or another paradigm, but in the delimitation of its subject matter and its basic methodology. A place whose representation under universal interests of knowledge is nothing but a mystification of concrete social relationships, a cared-for blindness towards their own social and historical conditions. The fact that, from then on, archaeology is considered a purely scientific practice is nothing but the remark of this modern discipline. From this point, from that particular social and historical place of which it is blind, archaeology intends to instrumentalize itself towards intervening in the transformation of social situations, thus the activation of such discourse in a colonial project. But in order to understand the circumstances in which such a process of post-disciplinary instrumentalization of archaeology works, it is necessary to research deeper into the postcolonial context in which life's discipline gives birth to its

regulation, because state and science do not discipline social relationships now so much as they modulate them (Lazzarato 2006). That which modernity had enthroned as the primary relationship with the world, that is, knowledge, is reconsidered in postcolonial moments as the pole of hegemonic normality from which science and state modulate social relationships. Life, permeated now more than ever, faces the penetrating strength of the free market.

Archaeology, in effect, functions to discipline the relationship with history and the ancient world; so long as it is posited in terms of rigorous knowledge, the metaphysical and essential break between history and its consequences has produced agents estranged from memory as well as mute, methodologically easy-to-manipulate material objects, not linked to social relationships. Agents and objects distanced from each other through a Cartesian discipline are reconnected when incorporated as agents and objects of an emergent neoliberal faith, according to which the free market replaces Christ and the reason as poles of hegemonic normality, re-magnetizing and reorienting preceding discursive and disciplinary regimes.

Archaeologies oriented to tourism development, to the production of new market goods, and to the growing market integration of farming and/or indigenous peoples, and the administrative regulation under the scheme of impact assessments of colonial megaprojects such as those of the mining and extractive industries, proliferate nowadays in the ever expanding field of social archaeologies, a space which was formerly taken by archaeologies oriented towards spreading in society the creed of disciplinary knowledge. It is not that archaeology has stopped its tribute to the expansion of colonial borders, but it renews its services as this border rearticulates under new mechanisms directed to old goals: the land of the blood and the blood of the land.

Having reached this seeming endpoint, the question arises: over what and whom is that border growing? If upon each side of this emergent border the same denomination existed, there would not be any sense in talking about a border, about new markets or different developments. On the other side there is that which maintains more or less manageable links with the forces of the free market, that which is to a great extent dominated and contained, and that which is designated by the hegemonic place of power and science, which Bruch describes as reserved and taciturn. What knowledge is it that the reserved ones keep to themselves? From what/who are they withholding? If they are taciturn, what is the implicit message in this silence? For colonial figures such as Bruch, what could barbarians talk about, can they enter within the epistemic field, and when their speech manifests as noise? This tacit place of withholding is a discursive space marking a critical point of entry for the genealogical examination of power at work in archaeological practice.

Undisciplining Archaeology in the Puna de Atacama

From the mid-1980s, I started research in the region of Antofagasta de la Sierra, in the Puna of Atacama. Early research concentrated on understanding the ethnography of the relationships between local population (mainly adult males) and flock animals (sheep and llama), pastures, as well as vegetation and landscape. Back then my aim was to pursue ethnography as a means for archaeological interpretation, inserted into what processual archaeology understood as ethnoarchaeology (Haber 2001). Only a few of the assumptions guiding this initial program remained in the wake of being confronted with local knowledge. None of the avenues for the observation of reality (e.g., economic strategies) or the enunciation of categories for the objects under research (e.g., shepherds) manifested in the conversations I had with my field teachers. Waste management, for instance, would have only been superficially and acceptably considered within the pattern of bone disposal, objects, people, and their movements seemed to obey to logics completely unrelated to the strategies and logistics I was initially determined to discover as a contribution to my discipline. All of this made me, progressively, leave aside the restrictive aspects of archaeological practice which had been imposed upon me. The discipline was not in the

least prepared to listen to the people or to question disciplinary assumptions from the local perspective and/or indigenous knowledge that confronted a great deal of institutional disciplining. I was forced to academically distance myself once I began to question the assumptions then held (and still existing) on the domestication and pasturing of llama, taking into consideration instead the meaning frames provided by the Aymara and Quechua languages and by the semiosis of local practice in relating with these animals (Haber 2001).

Through the 1990s I undertook my doctoral research, in the same region but in a different area – Antofalla. I intended to examine the past by putting into play theoretical-methodological resources which would not presume an economic-liberal logic, an evolutionist linearity, or a history determined by external forces such as evolution and empires. I believe the most valuable feature of this research was to put, in a house I excavated in, the place from where to look at the world and tell the history. And history, seen and told from that house, had a very different flavor to that with which was being told at the time. The histories of that time highlighted the continuities of farming life over the succession of cultures, periods, and stages of growing complexity. From the house, the smell of food, the shovel with which ditches had been dug to water crops, and what the talk on the neighbors was were more important than the domination of humans over animals, empires over towns, and functions over meanings. This was also, to a great extent, a disciplinary research, in that its aim was to know the remote past through its mute objects and their relationships. When I put those objects in conversation, I did it, when I could, through my dialogs with local knowledge, but I also kept within myself and took strength as interpreter and mediator, intentionally not listening to local memory techniques. This research also had the virtue of incorporating local theories to the relationships between beings in the world confronted by Western theories, but even so, I continued as a mediator between local knowledge and the archaeological. I obtained my Ph.D. with this research and then I was ready to learn.

One of the main sites of learning for me was the public hearing held in Antofagasta de la Sierra in October 2002, in which the government of the province of Catamarca put forward the project for the creation of Las Parinas National Park for the consideration of the local population. A couple of years before, the project of creating the park was being prepared, but I did not take part in it nor was I invited to do so, as I believe, because I did not clearly express myself in favor of the idea when I was consulted by the senator who promoted the initiative. Some weeks before the public hearing in Antofagasta de la Sierra, there was a meeting at the National University of Catamarca in which technicians and officials of the Secretary of the Environment of the Province of Catamarca presented the project. A group of students from Antofagasta living in the city had been invited to the meeting, and my suspicion about the project and its future grew when I could confirm that in Antofagasta no one was aware of it.

Several researchers were invited to the public hearing, including the four directors of archaeological research teams in the area where the park was to stand; some biologists, ecologists, and ornithologists; as well as officials from the National Park's Administration. In the group of technicians and academics, voices were heard clearly from those in favor of the park, to those worried about the lack of awareness on the part of the locals. Among the locals, on the other hand, there was great mistrust expressed in fears as to landownership and the possibility of the field being fenced. As I saw it, these fears were easily defused by the project creators, but the distress remained without the people being able to express it.

With two colleagues, I took part in an informal meeting held in a private house, where some of the most well-known elders in town were congregated. They said they disagreed with the project and mistrusted it: "if we are the ones who give protection, why do we have to see them come and tell as how we have to do things?" The place from where their rejection of the park emerged was the same local theory of relationality that appeared in my ongoing research. According to such a theory,

appropriate relationships between beings are always reciprocal and asymmetrical and consist of a complex mixture of upbringing, respect, love, and fear, all occurring at once. Thus, ownership and love, caretaking and breeding, and agriculture and ritual are enacted as part of the same kind of appropriate relationships. Conversations evolved, comparing the local vision to the vision of the promoters of the park (which could be called a *modern* one), according to which the land is there to be known by the scientists, who determine how to manage it. This transformation that can seem obvious for an academic context, so natural as a hegemonic practice, is not as intuitive for those who are debating resistance to modernizing discourses from the other side of the colonial border. Revealing and moving as the knowledge about the local theory of upbringing of life seemed to me, in that context, putting into words academic assumptions as to their link to the environment in terms of a theory was also enlightening, because enunciating the hegemonic position can produce its detachment from its presumed site of normality (Castro-Gómez and Grossfoguel 2007). Protection and breeding (local) relationships were compared to biopolitical hegemonic (state) relationships, these being the ones that gave substance to projects centered around the production of life.

Local vocality was strongly expressed in the following public meeting: the park was rejected by the population, which adopted, apart from that, other meaningful political gestures – such as spitting at the French ambassador who had politically promoted the National Park, because of an international touristic project involving his own company, and ultimately throwing him out of the town. It was witnessing these 2002 events that allowed me to understand the extent to which local frameworks were intimately intertwined with the reproduction of local life and the particular quality of suffering when life was at risk due to colonial projects. I also examined how politically positioned academic disciplines are, and among them archaeology, certainly functioning as a key part of the colonial arsenal. From there, I noticed the urgent need not just to deconstruct the disciplinary framework in terms of a critique of possible knowledge conditions as I had done thus far, but the need to take such a deconstructive project in the direction of my current work, a positive project of disabling the colonizing aspects of disciplinary practice and knowledge (see Haber 2009). And this is a collective task, not simply because of the quantity of people involved, but because it is a task of decolonial activation since it is collaboratively done with populations affected by colonial projects.

Where does archaeology stand in these postcolonial encounters? As I have stated so far, archaeology occupies a privileged place in the colonial arsenal. That is why it is necessary to deactivate it, in addition to locating and delimiting its work. And for archaeology, there is no better medicine than local interlocution, that is, to make archaeology have a conversation with the silenced voices over which it has been built. That is precisely what I intend to do in different fields of activity. With my students of "research design," we try to structure archaeological research as having dialogs with local contexts and voices, having the archaeologists communicate with the locals in their terrain, but firstly with their own town. In the 2006 edition of the course, I was guiding my student Daniela Fernández to begin researching methodological procedures and assumptions in the studies of archaeological impact. My guiding rationale in the context of best field practices was that by raising the quality and standards of such projects to the levels equivalent to those of the home countries of mining companies, including ethnic-relevance criteria and not just academic ones for the consideration of the affected cultural patrimony, and making impact studies easily controllable by the interested parties, then at least one of the aspects of large-scale mining could be controlled that which is concerned with cultural patrimony. Daniela then gave her vision of the issue as an inhabitant of Andalgalá, the town soon to be significantly impacted by a large-scale mining project whose 3.6 km wide open pit will be set only 20 km from the town: the sense of cultural patrimony disappears if the heirs of that patrimony disappear. Who is the archaeologist to say where our patrimony is located, Daniela asked, to say what is worth saving and what is not? Who is

the archaeologist to intervene in safeguarding our patrimony in the procedure by which he gives a permit to a project, the same that will lead us to death? Why do they measure the impact over my patrimony of a project that will terminate my offspring? Archaeological patrimony and cultural patrimony are not different from the land or the community; you cannot save one of them by destroying the other. Again archaeology, construed from the local viewpoint, loses the commonsensical autonomy that justifies its modes of intervention, be it as discourse or as project, in local life. This circumstance, as Wilhelm Londoño suggests, is the starting point of an alternative definition (*pers. comm*. 2012), another way of calling what I am naming here "intercultural."

As the reading of Bruch's text informed by local conversations shows us, the discourse of cultural patrimony goes hand in hand with the denial of the patrimonial relationship between ancestors and descendants of the same land. That is why the epistemic de-linking work (Walter Mignolo and Catherine Walsh) as well as the task of distinguishing the thought not from the contents but from the terms in which Western thought is contained; I repeat, the epistemic de-linking work is just the visible tip of the iceberg. Such a de-linking exists only if it occurs in conversation with local knowledge, because they are the ones intimidating epistemic safety, shaking the basis, and questioning not just of thought categories (the coloniality of knowledge) but the ontological place of thought (the coloniality of being). However, knowledge presupposes a de-linking from modern categories, as a leap into the void, and it is a thought located from places-other, already attached to the place, to the land. Thus, de-linking, if it occurs while listening to the Other in the field (developing social relationships) and not just interpreting the Other in an office (developing knowledge relationships), implies a relinking from a place which is not the border itself but the other side of it, the other side of the metaphysical rupture.

The archaeological-it, for example, is on the Other side something linked to local vital relationships, although by following a relationship of networks and theories completely different to the disciplinary ones. With those assumptions, my relationship to Antofalla advanced along local political strategies of presentation before the government as an indigenous community which claimed the communal property of their land. Following this, what archaeology considers its subject matter of study, and that in an intercultural dialog would lead to de-linking, is, in Catamarca's local communities, already linked to life-in-relationship; it is an integral and vital part of the territory, this last taken not only as a geographical space where a community is located but as the time-space that interacts as an agent which is sensitive, protective, powerful, and demanding of hierarchical reciprocity obligations with a collective of people.

I saw myself involved in local political strategies, neither as researcher or militant, because both roles instrumentalize the relationship, the link, following their own aims, of knowledge and ideology. This happened more due to the fact that my role of inhabitant makes me a part of these relationships, and from there my interest could be put with (i.e., composed together with) those of the community, as I am an active part of the processes. The times of these processes cannot entirely be managed by me; they are, on the contrary, as in any relationship formed by different people, very uncertain. The community has its own times and processes, many times different to mine and even opposite to my own political logic.

Can I say I have a social commitment to this community? No. What I have, or, better, what we have, are social relationships. Of mutual knowledge, of interests sometimes shared, of comradeship, mostly of friendship. I feel that friendship with actual people is what moves me, more than the objective of improving the people's life. I do, instead, feel politically committed to decolonize my own place, to decolonize myself, or subordinate, as well as subordinating relationships. In this way I understand archaeology as a political practice. I am not interested in moving my academic and intellectual resources to reach politically defined aims, but intercultural interlocution politically moves my academic and intellectual

resources to the point of demanding political, cultural, and ontological positions.

Many of the relationships of the communities with the meaningful lives in their territories have suffered colonial extirpation politics. The judicial apparatus of the state, with its regulations for mining and for fauna, environment, and cultural patrimony protection, together with migratory and customs politics, establishes as a felony the relationships of Antofalla people with minerals, *vicuña*, birds and their eggs, the ancient, and the Chilean and Bolivian, recapitulating the legal and political context of Spanish dominion, when relationships with the gods and the language were also repressed. Taking all of this into account, almost everything people practice as culturally meaningful engagements with local cosmologies and landscapes necessarily enters into what the state typifies as a felony. Since the phonetic resemblance between the English language *de-linking* and the Spanish language *delinquir*, i.e., to commit an offence punished by law, I would like to play here with a possible alternative meaning of epistemic de-linking. Some years ago I met one of my peasant teachers while he was gold panning in an abandoned mine whose archaeology I was researching. Even as I was the intruder in his land, I had state permits for the excavation, while he hadn't any legal protection for the gold panning. As it is the case when someone hunts for a *vicuña* either to make an offering to *Pachamama* or Holy Mother Earth, or feed the earth, or receive the souls and feed them, or celebrate the ancients that grant treasure, this was a situation in which de-linking implied the separation of the judicial and the disciplinary categories for the enunciation of the world, from the things as they are presented in the world which implied a crime or, at least, an active complicity in the illegal. A couple of years later, I came across Andrés (Fictitious name) and we had a conversation in which he asked me if I could tell him the truth – given the fact that I was an archaeologist and university professor – whether or not the ore vein grew at night. His question demanded from me a political, epistemic, and ontological repositioning. Being an academic and thus forced to be permanently serving the truth, I understood the enormous degree of demand the question implied. The appropriate care and feeding relationships with the ore vein to make it develop, and at the same time give origin to rights that, far from being made objects in titles, are intersubjectively constituted: the protector is the owner, that is, he loves his creature, who at the same time breeds the breeder and is, finally, his owner. Andrés was asking me about my position in relation to local theory and as to the colonial differential in that theory whose rights are subordinate, and another theory, the state and science theory, which establishes physical-chemical and property relationships, sustained in mercantile acquisition. I often remember this situation because it eloquently exemplifies the circumstance by which there is no neutral place for archaeology, and that being already constituted in the field of power, it cannot be separated from its origin without linking it at the same time to a network of meaningful relationships. These, even when local, can also be mine to the extent to which the intercultural practice has as a precondition the opening towards transformation, to inhabiting the conversation. The immense literary task of archaeology, perhaps the most politically significant of all that can be proposed, consists in narrating the departure from one's own home address of thought and writing.

And it could not be otherwise. Because undoing that which had been sustained in the denial of intersubjective communication, as in the case of archaeology, means entering the conversation, having a dialog with the objective world where the difference that constitutes colonial subjectivity had been transposed as if it were a metaphysical rupture, sooner or later, moves that subjectivity. Intercultural research consists in a conversation about biopolitical techniques for the disciplining of relationships with the gods and people, and that is why it is a conversation that moves our relationship with them. To move the home address of writing is as much an effect as an effectuation of intercultural archaeology, as much a description of the place of the thought and the practice as a political provocation of my own ignorance.

In addition to describing my place in archaeology, I could describe it as undisciplined,

intercultural, and subjunctive. It is *undisciplined* of its most basic and permanent disciplinary assumptions, its objects and methods. It is undisciplined with regard to its assumptions about inert materiality and temporal linearity as the prime organizing modalities of the archaeological past. It is *intercultural* because it develops in open transformative conversation between frames of meaning and cultural assumptions, in a conversation which is in charge of the power differential historically built, a conversation as much inter as intra-subjective, because in post-colonial contexts we are all diglossic. It is *subjunctive* because it does not intend for the indicative description of an external reality, but it acts on as much internal as external a reality.

Future Directions

Now I would like to finish as I started, and for that I would have to emphasize that the description of some of my practices does not try to be a justification of my archaeology in terms of a commitment to the well-being of anyone, but nor is my field practice based in an aseptic commitment to an imagined truth of the object. If such a commitment exists, it does so with inhabitation. Inhabiting is always-already local and relational; it happens in a place and in conversation. The necessary location of inhabitation makes it impossible for me to theorize beyond the locality of my home address, but it is in that scale that the conversation seems relevant to me. A conversation in which other times and other spaces knit their voices, they are located. Being an inhabitant, being there, bringing up the local life, all these define to a great extent my way of doing archaeology. No science can ask for a complete justification in an unfair world. I may be interested in other mythologies; they can propose versions of the world to me that originate the inside of things and give myself and my world some good and necessary subversions. At moments in which faith in the free market seems to replace faith in reason (which in time replaced faith in salvation), a return to the land feels necessary. Intercultural archaeology becomes a conversation which feeds an emergent counter-hegemonic, decolonial, and anti-capitalist sensibility. An old-fashioned conversation emerges, one outside any one normal framework, one fundamentally constitutive, a conversation with that thirteen-year-old girl and that middle-aged man whose teachings Bruch did not acknowledge in Hualfín, with their ancestors and ancient gods, those who survived protected by the shadows, buried in sands and bushes, named in silence, and fed in secret.

Cross-References

- ► Culture in Archaeology
- ► Multicultural Archaeology
- ► Postcolonial Archaeologies

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References

Abercrombie, T. 1998. *Pathways of memory and power*. Madison: University of Wisconsin Press.

Bruch, C. 1904. Descripción de algunos sepulcros calchaquís resultado de las excavaciones efectuadas en Hualfin (provincia de Catamarca). *Revista del Museo de La Plata* XI.

Castro-Gómez, S., and R. Grosfoguel. 2007. *El giro decolonial*. Bogotá: Siglo del Hombre Ed.

González, A.R., and G. Cowgill. 1975. Cronología arqueológica del Valle de Hualfín, Provincia de Catamarca, Argentina. Obtenida mediante el uso de computadoras. *Actas Primer Congreso de Arqueología Argentina*. (Rosario): 383–404.

Haber, A. 1995. Supuestos teórico-metodológicos de la etapa formativa de la arqueología de Catamarca (1875–1900). *Publicaciones CIFFyH* 47: 31–54.

Haber, A. 1999. Caspinchango, la ruptura metafísica y la cuestión colonial en la arqueología sudamericana: el caso del noroeste argentino. *Revista do Museuda Arqueología e Etnologia. Suplemento* 3: 129–142.

Haber, A. 2001. Observations, definitions and pre-understanding in the ethnoarchaeology of pastoralism. In *Ethnoarchaeology of Andean South America*, International monographs in prehistory, ethnoarchaeological series, ed. L. Kuznar, vol. 4, 31–37. Michigan: International Monographs in Prehistory.

Haber, A. 2009. ¿Adónde están los 99 tíficos? Notas de campo de arqueología subjuntiva. In *Sed non satiata II*, 103–120. Catamarca/Córdoba: Facultad de Humanidades, Universidad Nacional de Catamarca – Encuentro.

Lazzarato, M. 2006. *Políticas del acontecimiento*. Buenos Aires: Tinta Limón.

Spivak, G. 1988. Can the subaltern speak? In *Marxism and the interpretation of culture*, ed. C. Nelson and L. Grossberg, 271–315. Chicago: University of Illinois Press.

Walsh, C. 2006. Interculturalidad y colonialidad del poder. In *Interculturalidad, descolonización del estado y del conocimiento*, ed. C. Walsh, A. García Linera, and W. Mignolo, 21–70. Buenos Aires: Ediciones del Signo.

Further Reading

Mignolo, W. 2006. El desprendimiento. Pensamiento crítico y giro descolonial. In *Interculturalidad, descolonización del estado y del conocimiento*, ed. C. Walsh, A. García Linera, and W. Mignolo, 9–20. Ediciones del Signo: Buenos Aires.

Interdisciplinarity and Archaeology

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Introduction

Archaeology is a scientific field which since its first inception has always been interdisciplinary. Archaeology draws on the knowledge, data, and methodological techniques from a variety of different disciplines within the human, social, and natural sciences. These include anthropology, art history, chemistry, geology, genetics and molecular biology, heritage studies, history, indigenous studies, information technology, museology, palynology and botany, paleontology, philosophy, psychology, and zoology. In short, if the knowledge and methods of any particular discipline can be applied to the study of the human past or human ancestry, then they can be incorporated into the archaeological toolbox. The interdisciplinary nature of archaeology brings with it a host of discipline-specific ethical considerations, notwithstanding the existing key ethical dilemma of archaeology, relating to who owns the past. Further to this, the effective communication of interdisciplinary research to the public, and its relevance to society, plays a key role in the ongoing drive for innovation and thus interdisciplinarity in archaeology.

Definition

"Interdisciplinary" is defined as involving two or more academic or scientific disciplines. "Interdisciplinarity" is defined in this entry as combining two or more (usually) academic disciplines into one project or activity.

Historical Background

Historically speaking, the field of archaeology has always been interdisciplinary, first drawing on the disciplines of history, cultural anthropology, and geology for methods and interpretation. For example, the ethnography of modern day hunter-gatherer societies has a long history of being used by archaeologists as a proxy to interpret archaeological material from past, long extinct, and usually prehistoric, hunter-gatherer societies in the absence of historical records (Pluciennik 2014). There is an entire sub-discipline of archaeology dedicated to the archaeology of the historical period, after the advent of writing, known as historical archaeology, where documentation can be used to interpret (or as a part of) the archaeological record (Hicks and Beaudry 2006). Archaeology as a discipline started through the collection of artifacts from past societies, typically those relating to classical history or myth (Bahn 2014). It was then the domain of antiquarians who collected artifacts for personal display and was usually the domain of the wealthy. Archaeology would then be significantly changed in the nineteenth century CE by the development of stratigraphy, a branch of geology where the relative position of sediment layers and their relationship to the geological timescale have been co-opted in archaeology for the analysis of the order and position of layers of archaeological remains (Balme and Paterson 2014). The increasing professionalization of the discipline in the early twentieth century CE, the development of the grid system

of excavation, and the use of absolute methods of dating material (such as through radiocarbon) would then lead to the emergence of the modern discipline of archaeology as we recognize it today (Bahn 2014). Interdisciplinarity in archaeology has also been a driving force to shape archaeological theory, with the use of radiocarbon dating and ethnography being linked to the rise of processual archaeology and the incorporation of theoretical approaches from fields such as philosophy, gender theory, and sociology incorporated into post-processual archaeological frameworks. The modern discipline of archaeology draws on the techniques and knowledge of a wide variety of different disciplines, from tracing diet and origin through chemical analysis of isotope ratios, using microscopy to analyze tool marks on hand axes, mapping sites using geographical information software such as ArcGIS or LIDAR, and through the interpretation of past societies using archaeological theories drawn from psychology and philosophy. Thus, it should not be altogether surprising that with the constant advances in modern science and technology and the demands for innovation within the scientific and academic spheres, the interdisciplinarity of archaeology continues to increase over time.

Key Issues/Current Debates

The persistence of archaeology as a discipline is deeply rooted in the public interest in the human past and what makes us unique. Without this interest, there would be a critical lack of funding for archaeological projects, programs, and public museums. Therefore, it is not surprising that the interdisciplinary nature of archaeology is also the result of public interest and engagement. Interdisciplinarity in archaeology relates not only to integrating different types of disciplinary knowledge to the study of the past but also the effective communication of this knowledge to different audiences, be they academics from other disciplines, the general community, stakeholders, government, or industry (Frodeman et al. 2017). In this way interdisciplinarity is a form of academic innovation meant to increase the relevance of our work to the audience it is presented to, a bridge if you will, between academics and wider society (Frodeman et al. 2017). Innovative uses of techniques and knowledge from other disciplines help to keep the field of archaeology fresh and relevant to the general public and bolster public interest (and funding) for our work, thus keeping the discipline alive. One example of this is the use of virtual reality in museum exhibitions to reconstruct sites and give audiences an in situ glimpse of areas that are at risk of destruction or are inaccessible to the general public, such as the Mogao Grottoes in Dunhuang, China (Greuter et al. 2016).

Research projects that are interdisciplinary are generally perceived as being more widely relevant to society. Take, for example, a standard archaeological excavation of a rock shelter in the middle of the Australian desert. This may be of interest to archaeologists, indigenous communities, or members of the public with a general interest in the past. If the project also involved artistic and chemical analyses of the rock art of the cave, those with an interest in rock art would also become engaged, in addition to those with an interest in chemistry. Add in ancient DNA analysis and you have the attention of a lot more of the public, due to the "sexiness" (for lack of a better word) of the science and the current public interest in ancestry studies. This interdisciplinarity also provides more information on the past use of the rock shelter than a traditional excavation alone as it is more comprehensive, and it may also better serve the local indigenous community working to protect their cultural heritage within a legal system which privileges science over oral history (McNiven and Russell 2007). Interdisciplinary projects in archaeology are now more increasingly commonplace and often are a requirement for receiving competitive grant funding – see, for example, the Australian Research Council's *Statement of Support for Interdisciplinary Research* (2018). The reason for this relates back to the push for innovation and the wider marketability and relevance of archaeology to society. This entry will touch on some of the more recent interdisciplinary approaches to archaeological knowledge and practice, such as archaeogenetics,

cultural heritage management, digital archaeology, and human remains recovery and analysis. These have been selected as they are not only interdisciplinary but also attract significant community or media attention and often involve community collaboration.

Ancient DNA and Archaeogenetics

The ability to extract and sequence DNA has led to the creation of a completely new sub-discipline of archaeology known as archaeogenetics. Archaeogenetics utilizes techniques and tools from the molecular sciences to analyze the genome of past humans, animals, bacteria, and plants to gain a potential plethora of information about the past (Matisoo-Smith and Horsburgh 2012). Advances in molecular science have also allowed for the analysis of trace amounts of DNA to be sequenced relatively affordably, when previously large samples were required and sequencing was time- and cost-intensive. DNA analysis can be completed through the extraction of DNA from archaeological material, such as the skeletal remains from a burial. Archaeogenetic research can be done through comparison of the DNA extracted from past populations, with DNA obtained from living populations, in order to estimate the timing of migration events and trace lineages back to an origin point (Matisoo-Smith and Horsburgh 2012). DNA can also be used to link living populations to past populations and has been used in legal proceedings to determine shared ancestry between a living community and excavated skeletal remains and to determine if contested skeletal material should be repatriated to a given community claiming to be their descendants (Matisoo-Smith and Horsburgh 2012). Archaeogenetic studies are not merely the work of archaeologists with knowledge of molecular techniques; however, some are completed by molecular biologists without any archaeological knowledge. When interdisciplinary collaboration between molecular scientists and archaeologists does not occur, mistakes can be made; molecular biologists may neglect the context of the material being analyzed or not have access to reports or archaeological literature, while archaeologists may lack fundamental knowledge about methodology, genetic study design, and particular caveats to molecular science research (Lebrasseur et al. 2018). An example of this is shown in an archaeogenetics study of Neolithic graves from the Carpathian basin which were misdated to 6000 years earlier than they should have been, due to the molecular scientists not fully incorporating the archaeological literature and grave context of the skeletons that was used for the genetic analyses (Bánffy et al. 2012).

With DNA testing becoming more accessible to the general public, it is possible to send a mouth swab off for analysis and have your DNA assessed in terms of your ancestry, with the subsequent report including mitochondrial DNA, haplotype analysis, and percentage of Neanderthal or Denisovan DNA. This is usually without proper archaeological context, and usually with insufficient explanation of the caveats of the method, and can lead to problematic interpretations of ancestry (Royal et al. 2010). However, the demand and use of these publically accessible DNA testing kits clearly illustrate the public interest in ancestry studies and thus the interest in interdisciplinary archaeogenetic studies which provide much of the contextual information that is used for the ancestry reports. Furthermore, the media attention surrounding molecular studies of human origins and hominin genomes shows that the interdisciplinarity of archaeogenetics has considerable relevance to the community.

Cultural Heritage Management

Cultural heritage management is an interdisciplinary application of multiple fields of expertise, drawing on the practices of conservation, anthropology, indigenous studies, restoration, museology, archaeology, history, and architecture. Traditionally concerned with identifying, interpreting, maintaining, and preserving sites of significant cultural importance or physical heritage, cultural heritage management is also applied to intangible heritage, such as preserving traditional culture, languages, and skills (Brockwell et al. 2013). Cultural heritage management also overlaps with public archaeology, as much of the interest and the push for the preservation of cultural heritage come from public interest and

demand (Smith and Waterton 2013). Thus, the interdisciplinarity of cultural heritage management comes not only from the interdisciplinary application of these complementary fields under the title of cultural heritage management for the preservation of cultural heritage but also the effective communication of cultural heritage management projects and results to various stakeholder groups and the broader community. Stakeholders in cultural heritage management projects can include industry, such as mining/construction, agriculture, and tourism, government departments, academic institutions, indigenous/traditional owner groups, and the broader local community (Smith and Waterton 2013). Tangible cultural heritage management projects can include surveys to determine if any archaeological material is present prior to construction or demolition, rescue and salvage excavations to prevent the destruction of archaeological material without study, heritage curation and interpretation of material or sites, preservation, and restoration of sites. Increasingly, cultural heritage management is becoming more community focused, with a push toward greater collaboration and communication throughout all stages of cultural heritage management projects with the community (Brockwell et al. 2013). This allows for interdisciplinarity between the community and the cultural heritage management, thus building on the relevance of cultural heritage management to the community and ensuring the ongoing survival and funding of cultural heritage management projects.

Digital Archaeology

The increasing digitization of the modern world and the almost ubiquitous access to the Internet have introduced an interdisciplinary and highly innovative field of digital archaeology, combining archaeology with information technology and computer science (Evans and Daly 2006). The term digital archaeology can refer to the study of the recent past using technology, but it can also refer to the digitization of archaeological materials and records both during and after fieldwork. Digital archaeology allows archaeologists to produce digital copies and repositories of data, through such methods as photography, laser scanning, radiography, 3D modeling, and virtual/augmented reality (Evans and Daly 2006). The digital data can be shared between researchers and made available for the public to view via the Internet. The ethical issues with digital reconstructions of sites or materials are similar to that usually faced in archaeology, including who has ownership of the digital material, who controls the access to it, and is it ethical to restrict access to a digital reconstruction of a public site? However, digitizing archaeological material or data also allows for the public to view and experience sites that they otherwise would not be able to access, either due to location or due to other restrictions (Evans and Daly 2006). One poignant example of this is the photogrammetric reconstructions of the now destroyed site of Palmyra in Syria (Wahbeh et al. 2016). By making the material more widely accessible to the public, digital archaeology also makes it more relevant to them, being something that they can access and experience. Digital reconstructions can also be made interactive, a method which facilitates the effective communication of archaeological research data and interpretations between academics and the public, removing scientific jargon and making the transmission of information interesting and relevant to casual viewers.

Human Remains Recovery, Physical Anthropology, and Osteoarchaeology

The excavation and analysis of human skeletal remains can fall under both the disciplines of anthropology and archaeology (Lewis et al. 2012). The delineation between the two disciplines is unclear, as in the United States archaeology is considered a sub-discipline under the umbrella of anthropology alongside cultural anthropology and physical anthropology, yet in other countries (such as Australia), they are complementary yet separate disciplines. However, the analysis of skeletal remains brings with it the ethical issues regarding ownership of the past and respect for the dead and can cause ideological conflict between archaeologists/scientists who wish to preserve or study the remains and cultural groups who wish for the remains to be undisturbed, returned, and/or reburied

(White and Folkens 2005, and see ▶ "Human Remains: Ethical Issues and Historical Perspectives"). This is not just an issue faced by archaeologists working on indigenous sites but can also occur in communities with religious or cultural objections who view the excavation of burials as desecrating a grave or against their faith. In this, the wishes of the community should be respected. However, it can be particularly difficult for scientists who wish to study the remains for information regarding the past population (White and Folkens 2005). Technology has advanced, and with digital archaeological methods, there are innovative new ways to study human remains with minimal disturbance or potential destruction, such as laser scanning and computed tomography (CT). High-resolution CT scans can be compiled to produce 3D reconstructions of skeletal remains, which can be studied virtually or 3D printed and analyzed in the same manner that traditional casts used in the past (Thompson and Errickson 2017). This allows for analysis long after the remains have been repatriated and reburied. They can also be made available for study through online repositories, thus allowing for greater access for international scholars without having to travel to a museum to view the material. The interdisciplinarity of archaeological human remains recovery and osteological analysis is not only shown through the application of physical anthropology to analyze recovered skeletal material (known also as osteoarchaeology), or the digitization of skeletal material using techniques from digital archaeology, but through the collaboration and the communication at all stages of the project between researchers and stakeholder groups. Increasingly, this collaboration allows for greater interdisciplinarity particularly in the analysis of indigenous remains, where cultural practices and community concerns should be heeded and respected by archaeologists working with the material. Often destructive analysis of remains through methods such as isotopic or DNA analyses, or even long-term study of the remains, is not permitted by community groups; however, with effective communication, collaboration, and respect between researchers and the community, compromises can sometimes be reached, or alternatives such as CT scanning can be agreed upon, provided that the relevance to the community group is clearly understood.

International Perspective

In the past there has been a tendency to assume that Western scientific knowledge and interpretations trump that of the indigenous people of a given area (Scarre 2006). This colonialist view has a long and toxic history, both in Australia and across the world, and has led to significant distrust between some indigenous groups and scientists. This is particularly evident when the results and interpretations of archaeological work come into conflict with the beliefs of the local indigenous communities (Scarre 2006). One needs to only look at the protracted legal proceedings regarding Kennewick Man in the United States as a case study, where archaeological interpretation was, at the time, in conflict with indigenous knowledge and led to a messy debate over who has custodianship over the past and which form of knowledge is more important (Burke et al. 2016). In the instance of Kennewick Man, the increasing interdisciplinarity of archaeology proved incredibly relevant to the indigenous community, when an archaeogenetic study linked one of the indigenous communities to Kennewick Man via DNA, thus leading to the repatriation of the remains to the community for burial (Burke et al. 2016). As the interdisciplinarity of archaeology has increased, it has also become increasingly important, and rightly so, that archaeologists respect the wishes and cultural knowledge of indigenous communities, even if they find themselves in disagreement. However, increasingly in Australia archaeological studies of indigenous sites are often merely confirming what the indigenous people have already known through their own oral histories and cultural traditions, often for the sake of working within a Western legal system which again privileges scientific fact over indigenous knowledge (Mitchell et al. 2013). Thus, there is a growing push to decolonize archaeological science, through increasing collaboration with indigenous groups (particularly from the

beginning of projects) and the incorporation of their extensive traditional knowledge and stories as being equally valid and complementary sources of information about the past (Bruchac et al. 2010). For the sake of interdisciplinarity, indigenous traditional knowledge can be viewed as its own academic discipline, and thus archaeological research can, and should, incorporate this rich source of knowledge into projects and in communication with the public to further decolonize archaeology.

Future Directions

With the rapid increases in technology and the apparent push for ongoing innovation, it is hard to predict the future of interdisciplinarity in archaeology. On one hand, the push for innovation in most disciplines is fueled by the fear of a lack of future security, be it consumer interest or secure funding. On the other hand, interdisciplinarity can decrease as the academic community becomes more insular and picks up the markers of disciplinary culture, such as discipline-specific jargon, closed academic communities, journals, and conferences. The challenge for archaeology as an interdisciplinary field is to ensure that the interdisciplinarity of projects is maintained and practiced in the best interest of the community, with effective communication and collaboration. This open communication, a form of public archaeology if you will, ensures that the interdisciplinarity of projects does not form closed disciplinary fields with little to no communicated relevance to the community and other non-academic stakeholders, who drive the demand for interdisciplinarity and are often sources of funding for archaeological work. From an Australian perspective, the future direction of interdisciplinarity in archaeology is already underway, with increased collaboration and communication with community groups, in particular indigenous groups with the decolonization of the discipline, and the incorporation of traditional indigenous knowledge systems and beliefs as a valid source of archaeological data. It is important to recognize the many tools and sources of knowledge at our disposal and understand that the discipline of archaeology has always been interdisciplinary, and it is through this interdisciplinarity that we will continue to be relevant within society.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Decolonization in Archaeological Theory
- ▶ Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation
- ▶ Human Remains: Ethical Issues and Historical Perspectives
- ▶ Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues
- ▶ Public Archaeology, The Move Towards
- ▶ Public Involvement in the Preservation and Conservation of Archaeology

References

Bahn, P.G. 2014. *The History of Archaeology: An Introduction*. New York: Routledge.

Balme, J., and A. Paterson. 2014. *Archaeology in practice: A student guide to archaeological analyses*. Chichester: Wiley.

Bánffy, E., G. Brandt, and K.W. Alt. 2012. 'Early Neolithic' graves of the Carpathian Basin are in fact 6000 years younger – Appeal for real interdisciplinarity between archaeology and ancient DNA research. *Journal of Human Genetics* 57: 467.

Brockwell, S., S. O'Connor, and D. Byrne. 2013. *Transcending the culture–nature divide in cultural heritage: Views from the Asia–Pacific region*. Canberra: ANU E Press.

Bruchac, M.M., S.M. Hart, and H.M. Wobst. 2010. *Indigenous archaeologies: A reader on decolonization*. Walnut Creek: Left Coast Press.

Burke, H., C.E. Smith, D. Lippert, J.E. Watkins, and L.J. Zimmerman. 2016. *Kennewick man: Perspectives on the ancient one*. London: Routledge.

Evans, T.L., and P.T. Daly. 2006. *Digital archaeology: Bridging method and theory*. New York: Routledge.

Frodeman, R., J.T. Klein, and R.C. Dos Santos Pacheco. 2017. *The Oxford handbook of interdisciplinarity*. Oxford: Oxford University Press.

Greuter, S., S. Kenderdine, and J. Shaw. 2016. Pure land UNWIRED: New approaches to virtual reality for heritage at risk. In *Creative technologies for multidisciplinary applications*, ed. A.M. Connor and S. Marks, 76–98. Hershey: IGI Global.

I

Hicks, D., and M.C. Beaudry. 2006. *The Cambridge companion to historical archaeology*. Cambridge: Cambridge University Press.
Lebrasseur, O., H. Ryan, and C. Abbona. 2018. Bridging archaeology and genetics. In *Environmental archaeology: Current theoretical and methodological approaches*, ed. E. Pişkin, A. Marciniak, and M. Bartkowiak, 111–132. Cham: Springer International Publishing.
Lewis, B., R. Jurmain, and L. Kilgore. 2012. *Understanding humans: An introduction to physical anthropology and archaeology*. Belmont: Cengage Learning.
Matisoo-Smith, E., and K.A. Horsburgh. 2012. *DNA for archaeologists*. Walnut Creek: Left Coast Press.
McNiven, I.I., and L. Russell. 2007. Toward a postcolonial archaeology of indigenous Australia. In *Handbook of archaeological theories*, ed. R.A. Bentley, H.D.-G. Maschner, and C. Chippindale, 423–443. New York: AltaMira Press.
Mitchell, M., D.R. Guilfoyle, R.D. Reynolds, and C. Morgan. 2013. Towards sustainable community heritage management and the role of archaeology: A case study from Western Australia. *Heritage & Society* 6: 24–45.
Pluciennik, M. 2014. Historical frames of reference for 'Hunter-gatherers'. In *The Oxford handbook of the archaeology and anthropology of hunter-gatherers*,- ed. V. Cummings, P. Jordan, and M. Zvelebil, 55–68. Oxford: Oxford University Press.
Royal, C.D., J. Novembre, S.M. Fullerton, D.B. Goldstein, J.C. Long, M.J. Bamshad, and A.G. Clark. 2010. Inferring genetic ancestry: Opportunities, challenges, and implications. *American Journal of Human Genetics* 86: 661–673.
Scarre, C. 2006. *Ethics of archaeology philosophical perspectives on archaeological practice*. West Nyack: Cambridge University Press.
Smith, L., and E. Waterton. 2013. *Heritage, communities and archaeology*. Sydney: Bloomsbury Publishing.
Thompson, T., and D. Errickson. 2017. *Human remains: Another dimension: The application of imaging to the study of human remains*. London: Elsevier Science.
Wahbeh, W., S. Nebiker, and G. Fangi. 2016. Combining public domain and professional panoramic imagery for the accurate and dense 3d reconstruction of the destroyed Bel Temple in Palmyra. *ISPRS Annals of Photogrammetry, Remote Sensing & Spatial Information Sciences* 3: 81–88.
White, T.D., and P.A. Folkens. 2005. *The human bone manual*. Burlington: Elsevier Science.

Further Reading

Frodeman, R., J.T. Klein, and R.C. Dos Santos Pacheco. 2017. *The Oxford handbook of interdisciplinarity*. Oxford: Oxford University Press.
Scarre, C. 2006. *Ethics of archaeology philosophical perspectives on archaeological practice*. West Nyack: Cambridge University Press.

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ICCROM, Rome, Italy

Basic Information

The International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM; http://www.iccrom.org) was established in 1959. Its creation was agreed upon at the 9th UNESCO General Conference in New Delhi in 1956 at a time of mounting interest in the protection and preservation of cultural heritage and in the spirit of the 1954 *Hague Convention*, the first UNESCO Convention on the protection of cultural heritage in the event of armed conflict. In line with its mandate to promote the conservation of all types of cultural heritage, both movable and immovable, ICCROM has always considered archaeology as one of its most substantial fields of interest. Such a tenet is reflected in the variety of professional archaeologists who have directed the organization over the years (Cevat Erder, Nicholas Stanley-Price, Mounir Bouchenaki, and Stefano De Caro). Harold Plenderleith, a British chemist and former Keeper of the Restoration Laboratory at the British Museum, was the first Director of the "Rome Center," as it was then called. This was thanks to his heavy involvement in the conservation of important archaeological material from such sites as Tutankhamen's tomb and Ur, in addition to his scholarly publications such as his comprehensive book, *The Conservation of Antiquities and Works of Art: Treatment, Repair, and Restoration* (1957; revised with A.E.A. Werner in 1971). ICCROM's statuary functions focus on training, information, research, advocacy, and cooperation.

Major Impact

Since its inception, ICCROM has been heavily involved in training and capacity-building in the field of conservation. The active participation of Plenderleith in the International Campaign to Save the Monuments of Nubia in the early 1960s, together with eminent Italian experts such as Paolo and Laura Mora, helped lead to a fruitful collaboration between the Rome Center and Italy that resulted in the establishment of specialized courses launched in 1968 on mural paintings conservation, organized jointly with the *Istituto Centrale per il Restauro*.

Archaeology, understood in terms of ancient architecture in a central hub of the ancient world such as Rome, has also constituted an essential component of the courses on architectural conservation that have formed the core of training launched by ICCROM: the international course on Architectural Conservation (ARC) from 1965 until 1998 and the international course on the Conservation of Built Heritage, organized on biennial basis since its launch in 2007. Archaeology was also a key component of the conceptual reading of Italian and European historic cities and as a tool for their conservation. It was one of the main topics of the "Urbanological International Seminar," held in the town of Jesi, in the Italian Marche region, in 1969 (Fig. 1).

International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation), Fig. 1 ICCROM logo

Based on a proposal of the then Director of ICCROM, Bernard Feilden and Vassos Karageorghis, Director of Antiquities of Cyprus, and at that time, Vice-President of the ICCROM Council, a conference on "The Conservation on Archaeological Excavations" was organized in Cyprus in 1983. The main aims of the conference were twofold: to review responsibilities in the field of conservation, with particular reference to the 1956 UNESCO *Recommendation on International Principles Applicable to Archaeological Excavation*, and to discuss the basic principles of conservation at an excavation. Fifty-six delegates, including representatives of UNESCO, ICOM, ICOMOS, and those from the Departments of Antiquities of many European and Near Eastern countries (Cyprus, Egypt, Greece, Israel, Italy, Jordan, Arab League (Libya), Portugal, and Spain), took part in the discussion on the principles of conservation. The proceedings of the conference include recommendations on the topic promulgated by the twelfth session of the General Assembly of ICCROM, held in Rome from 10 to 12 May 1983 (Stanley-Price 1984). The Conference of 1983 laid the foundation for a series of initiatives that have developed over time, addressing specific issues related to the conservation of archaeological heritage.

Regarding mosaics, the international course on the Safeguarding of Archaeological Mosaics (ICCROM, Rome, 18 September–13 October 1989) is a forerunner of a program that was later developed during a forum on "Conservation of archaeological sites. Techniques, strategies and tools: the case of mosaics" (ICCROM, Rome, 30 November 1992). The theme was taken up again in 2007, when the first planning meetings for the MOSAIKON program were carried out by ICCROM, in collaboration with the Getty Conservation Institute (GCI) and the International Committee for the Conservation of Mosaics (ICCM).

In parallel, as part of its activities at the regional level, ICCROM has been developing integrated programs for managing sites of cultural interest, involving specialized training and broader capacity building. In November 1997, as

a result of the collaboration on PAT96 (the first Pan-American Course on the Conservation and Management of Earthen Architectural and Archaeological Heritage), the International Centre for Earth Construction – School of Architecture of Grenoble (CRATerre-EAG), the GCI, and ICCROM established the collaborative initiative, named Project Terra. It was under the auspices of Project Terra and in partnership with the INC-LL (*Instituto Nacional de Cultura-La Libertad* (INC-LL), a regional agency of the *Instituto Nacional de Cultura del Peru*) that the *Segundo Curso Panamericano sobre la Conservación y el Manejo del Patrimonio Arquitectónico Histórico-Arqueológico de Tierra*, PAT99, was hosted in Trujillo, Peru, in late 1999.

The ATHAR program on the conservation of archaeological heritage in the Arab Region (initially in Syria, Lebanon, and Jordan) was launched through a coordination/planning meeting on "Education and Curricula Design in the Field of Heritage Site Conservation," held in Beirut, Lebanon, from 16 to 17 September 2004. The program has since expanded to other countries and has recently established a Regional Centre for the Management and Conservation of Cultural Heritage in the Arab States and based in the Emirate of Sharjah. For the establishment of the ATHAR Centre, an Agreement of Implementation was signed between the Government of Sharjah, UAE, and ICCROM on 11 September 2011.

In the same period, a series of training initiatives were launched in Southeast Europe, starting with an introductory course in Archaeological Conservation, held in Belgrade, Serbia and Montenegro, from 4 to 6 December 2004. This pilot initiative was followed by a series of regional courses on Archaeological Conservation in Southeast Europe, held in Serbia and Montenegro (2006) and in Albania (2007).

In Asia, ICCROM contributed to the "Training Course on Preservation and Restoration of Cultural Heritage in the Asia-Pacific Region – Archaeological Research Methodology and Analytical Methods of Ancient Remains." The course, held in Nara, Japan, from 23 October to 3 November 2004 was jointly organized by the Asia-Pacific Cultural Center for UNESCO (ACCU), ICCROM, and the National Research Institute for Cultural Properties in Japan. In April 2006, ICCROM contributed to the International Conference on "From Concept of the Past to Practical Strategies: The Teaching of Archaeological Files Techniques," held at Beijing University, China. The following training activities subsequently took place in the region: "Training Course on Cultural Heritage Protection in the Asia-Pacific Region – Research, Analysis and Preservation of Archaeological Sites and Remains," organized by ACCU in collaboration with ICCROM and held from 9 Sept to 9 Oct 2008 in Nara, Japan; the CollAsia 2010 International Course on "Conservation of Underwater Archaeological Collections," Manila and Subic Bay, Philippines, 7–25 September 2009; and the "Training Course on Cultural Heritage Protection in the Asia-Pacific Region – Research, Analysis and Preservation of Archaeological Sites and Remains," Nara, Japan, 7–10 September 2010.

In the Mediterranean, ICCROM activities pertaining to archaeology and conservation have involved numerous initiatives. These include technical missions, such as that to aid in the evaluation of conservation tests at the Archaeological Park of Foz Côa, in Portugal, 15–19 May 2006; the 18th Conference on Archaeology and Cultural Heritage in the Arab Region, held by ALECSO from 19 to 21 November 2007 (this included a special session on training in the conservation of World Heritage sites in the Arab Region organized by the ATHAR program and collaboration between ICCROM, ALECSO, and the World Heritage Centre); the Fifth International Conference on Science and Technology in Archaeology and Conservation in Baeza, Spain, 8–10 July 2007; a Seminar on Archaeological Site Management organized by the Aristotle University, Thessaloniki, Greece, from 1 to 3 February 2008; the Sixth International Conference on Science and Technology in Archaeology and Conservation in Rome, Italy, on 9 December 2008; a seminar on archaeology and education, "Creating Links of the Past to the Future: Cultural Heritage and Civil Society," in Barcelona, Spain, 31 March–1 April 2011; and the ICOMOS Hellenic and ICAHM Regional Conference on "The Future of Protection Heritage Management for Archaeological Heritage in Times of Economic Crisis," held in Athens, Greece, 23–25 May 2012.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Heritage Conservation Training
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Museums)
- ▶ International Council of Museums (ICOM)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ Jokilehto, Jukka

References

Canti, M., M.L. Polichetti, and S. Santini, eds. 2012. *Il seminario urbanologico di Jesi – attualità di una esperienza*. Jesi: Rotary Distretto 2090.

Plenderleith, H.J. 1957. *The conservation of antiquities and works of art*. ICCROM XXI 4a. London/New York/Toronto: Oxford University Press.

Plenderleith, H.J., and A.E.A. Weiner. 1971. *The conservation of antiquities and works of art*. London: Oxford University Press.

Stanley-Price, N. ed. 1984. *Conservation on archaeological excavations with particular reference to the Mediterranean area*. ICCROM VII D 33. Rome: ICCROM.

Further Reading

Jokilehto, J. 2011. *ICCROM and the conservation of cultural heritage: A history of the organization's first 50 years, 1959–2009*. Rome: ICCROM.

International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Museums)

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Basic Information

The decision to found the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) was made at the 9th UNESCO General Conference in New Delhi in 1956, at a time of mounting interest in the protection and preservation of cultural heritage. ICCROM was subsequently established in Rome in 1959 at the invitation of the Government of Italy. It is the only institution of its kind with a worldwide mandate to promote the conservation of all types of cultural heritage, both movable and immovable. ICCROM aims at improving the quality of conservation practice as well as raising awareness about the importance of preserving cultural heritage. It contributes to preserving cultural heritage through five main areas of activity: training, information, research, cooperation, and advocacy.

ICCROM is an intergovernmental organization (IGO), existing to serve the international community as represented by its member states. Its intergovernmental status and constantly updated network of specialized conservation institutions and experts enable it to collaborate closely with organizations such as UNESCO and its World Heritage Committee, to which it is an advisory body. It is governed by a General Assembly consisting of delegates from all its member states, now numbering 129. The GA determines the general policies of ICCROM; it approves its biennial program of activities and budget, elects the council members, and appoints the director general. Other functions include approving reports on council and secretariat activities, determining member state contributions, adopting ICCROM's financial regulations, and approving changes to the statutes. The general assembly meets in ordinary session every 2 years.

The ICCROM Council has 25 members elected by the General Assembly. The members of council are chosen from among the best-qualified experts in the field of conservation and restoration of cultural property, taking into consideration the desirability of achieving equitable representation of the major cultural regions of the world and an appropriate coverage of the different fields of specialization relevant to the work of ICCROM. The secretariat of ICCROM consists of the director general and staff. The director general is responsible for the execution of the approved program of activities.

Major Impact

ICCROM has always devoted particular attention to interdisciplinary collaboration in conservation, involving scientists, conservators, restorers, archaeologists, art historians, curators, architects, engineers, city planners, and other allied professions. Exploring conservation issues in research meetings and seminars has led to publications, guidelines, and international training programs. The Center has established an international library and documentation center, which has become an indispensable resource of reference for research and training.

Regular Rome-based activities have increasingly been complemented by long-term international and regional programs. Together, these form a worldwide platform, combining technical cooperation with research, training, provision of information, exchanges of personnel, and raising awareness about heritage conservation. The development of long-term programs in collaboration with several partner organizations has increasingly emphasized the sustainable management of heritage resources and the strengthening of institutions in member states to this end. New Strategic Directions were adopted in 2010 and the Center will be moving to new up-graded premises in 2013. Further information is available on the website http://www.iccrom.org.

Cross-References

► International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)

Further Reading

International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM). n.d. Available at: http://www.iccrom.org

International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)

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Basic Information

The International Scientific Committee on Archaeological Heritage Management (ICAHM; http://www.icomos.org/icahm/) was established in 1990 by means of the ICAHM charter. This charter is the only international document that deals exclusively with archaeology, save the UNESCO *Recommendation on International Principles Applicable to Archaeological Excavation* of 1956 (New Delhi). The ICAHM charter is binding for the professional members of ICOMOS. The New Delhi recommendation, on the other hand, is to be honored by all state parties of UNESCO and grew out of the *Cairo Act* of 1937 of the League of Nations and earlier recommendations of the League of Nations Assembly of 1932.

In 1985, the Nordic countries convened an organizational meeting in Stockholm to prepare a draft charter for archaeological heritage management. The first draft was presented to the ICOMOS membership in 1987 at the 8th General Assembly in Washington, D.C. In 1990, at the 9th General Assembly in Lausanne, ICOMOS accepted ICAHM's 1990 ICOMOS Charter for the Protection and Management of the Archaeological Heritage, which not only defined for the

first time the aims and the role of archaeological heritage management internationally but made ICAHM one of the ICOMOS scientific committees. The charter stressed the integration of archaeological programs and planning, the creation of inventories, the importance of in situ preservation, and, when this is not possible, the responsibility of developers to ensure that proper archaeological investigations take place. Its influence is seen in the 1997 Code of Practice of the European Association of Archaeologists and in the 1992 European Convention on the Protection of the Archaeological Heritage (the Malta Convention) from 1992.

Of the almost 1,000 sites on the World Heritage List, approximately 80% are inscribed because of cultural values. Many of these (e.g., Petra, Machu Picchu, Pompeii, Angkor) are explicitly seen as archaeological sites, but all contain valuable archaeological components. In every historic city, there is a "city beneath the city," an archaeological trove. Further, many sites inscribed on the World Heritage List due to their outstanding natural resources also contain archaeological sites. Therefore, ICAHM has become perhaps the most active of the scientific committees.

Major Impact

ICAHM is primarily concerned with the implementation of Article 5 of the World Heritage Convention in regard to archaeological sites. Article 5 charges each signatory to the Convention to develop the capacity to manage, conserve, and preserve natural and cultural resources within state boundaries. ICAHM has focused on the following:

- To establish, promulgate, and encourage adherence to high standards and best practices for (a) management of archaeological sites and resources, (b) archaeological research, and (c) aspects of cultural resource management
- To develop and enhance a network of professional archaeologists and archaeological site managers for the purpose of transmitting theoretical and practical skills and encouraging high standards and best practices for (a) management of archaeological sites and resources, (b) archaeological research, and (c) aspects of cultural resource management
- To organize conferences and workshops, to produce publications, websites, and other mechanisms utilizing a variety of media to promulgate high standards and best practices for (a) management of archaeological sites and resources, (b) archaeological research, and (c) aspects of cultural resource management
- To provide the best qualified ICAHM Expert Members for desk audits and site visits to archaeological sites that have been nominated for inscription on the World Heritage List
- To provide the best qualified ICAHM Expert Members for monitoring of condition of archaeological sites that are inscribed on the World Heritage List
- To encourage the nomination of appropriate archaeological sites to the World Heritage List and to assist in nominations by contributing to comparative studies, giving advice about the preparation of nomination dossiers, management plans, or other relevant steps

In 2008, with the adoption of the Eger-Xi'an Principles, the role assigned to scientific committees in the work of ICOMOS was enlarged substantially. In response, ICAHM has greatly expanded membership, reinstituted international symposia, and has begun a publication series in collaboration with Springer Press, entitled *Multidisciplinary Studies in Archaeological Heritage Management*.

Before 2008, ICAHM had held two international symposia. The first was held in Stockholm from 12 to 16 December 1988, titled *Archaeology and Society: Large Scale Rescue Operations—Their Possibilities and Problems*. Edited by Gustaf Trotzig and Gunnel Vahlne, the papers were published in 1989 by the Nordic Secretariat of ICAHM. The second ICAHM symposium, *Archaeological Remains: In Situ Preservation*,

was held in Montreal from 11 to 15 October 1994. The papers were edited by Claire Mousseau and published in 1996 with support from the Ville de Montréal, Canadian Heritage, Hydro-Québec, and the Government of Québec.

In December of 2011, ICAHM held an international symposium in conjunction with the ICOMOS General Assembly Meeting in Paris, entitled *The Archaeology of Interdependence*. The papers are being published in the ICAHM publication series under that title. ICAHM sponsored the First International Conference on Best Practices in the Management of Archaeological World Heritage Sites in Menorca, Spain, in April of 2012. Selected papers from that conference are in press. The conference also produced the Menorca Statement, which promulgates ICAHM's intent to develop best practices for the management of archaeological sites and to refer to these when reviewing nominations of archaeological sites to the World Heritage List. The Statement also suggests that nomination dossiers include a plan, timetable, and estimated cost for developing adequate management capacity if this capacity is not fully in evidence. The nomination can then be used to generate necessary support for capacity building from a wide range of institutions beyond UNESCO.

Much of the concern about inadequate management capacity stems from damage at archaeological World Heritage Sites that results from a lack of visitor flow management and rapid site development. The first of four ICAHM Springer publications dealing with this was released in 2012, entitled *Tourism and Archaeological Heritage Management at Petra: Driver to Development or Destruction?* The subsequent three will examine this issue at Angkor, Machu Picchu, and Pompeii.

Mapping Archaeological Landscapes From Space: In Observance of the 40th Anniversary of the World Heritage Convention was published in the ICAHM/Springer series in 2013. ICAHM seeks to encourage nondestructive archaeological research methods and will nurture development and application of such technologies. It has cosponsored several training courses and workshops on these technologies in collaboration with NASA at the University of California, Berkeley; Johns Hopkins University; and Pontifical Catholic University of Peru, in Lima.

International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation), Fig. 1 ICAHM logo

ICAHM has been vocal on many issues since 2008 by means of press releases and letters to concerned parties. Among these are the looting of archaeological sites; the production of popular television shows that celebrate looting, such as the Spike TV series *American Diggers* and National Geographic series *Diggers*, enforcing international agreements that forbid or discourage the trade in looted artifacts; and the need to provide benefit to communities near archaeological sites as opposed to international hotel and restaurant chains.

Providing assistance to States Parties nominating or wishing to nominate archaeological sites to the World Heritage List is an important ICAHM program. ICAHM has provided assistance to specific sites, such as Poverty Point in the United States and the Jomon sites in Japan, and has begun an Africa Initiative that will work with States Parties in Africa to identify candidates for inscription.

ICAHM held an international conference in Cuzco, Peru, 27–30 November 2012, with the theme: *The UNESCO World Heritage Convention on its 40th Anniversary*. Over 100 papers were presented, and selected papers will be published in several volumes of the ICAHM Springer series (Fig. 1).

Cross-References

- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)

► International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

Further Reading

Comer, D. 2012. *Tourism and archaeological heritage management at Petra: Driver to development or destruction?* New York: Springer.

Comer, D., and M.J. Harrower, eds. 2013. *Mapping archaeological landscapes from space: In observance of the 40th anniversary of the World Heritage Convention*. New York: Springer.

Mousseau, C., ed. 1996. *Vestigesarchéologiques: La conservation in situ/archaeological remains: In situ preservation*. Ottawa: ICAHM.

Trotzig, G., and G. Vahlne. eds. 1989. *Archaeology and society: Large scale rescue operations – Their possibilities and problems*. ICAHM Report 1. Stockholm: Nordic Secretariat of ICAHM.

International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)

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Basic Information

ICAHM is an International Scientific Committee (ISC) of ICOMOS. It was founded in 1987 at the 8th ICOMOS General Assembly in Washington, DC. The idea to develop such a body took a decade to bear fruit and was advanced by the UK's Henry Cleere and Sweden's Margareta Björnstad in particular. After ICAHM was established, key members drafted the *Charter for the Protection and Management of the Archaeological Heritage*, which was ratified in 1990 by the ninth ICOMOS General Assembly in Lausanne, Switzerland. Until 2008, the activities and membership of ICAHM were highly restricted by ICOMOS rules, as they were for all ISCs. In 2008, ICOMOS adopted the Eger-Xi'an principles for the International Scientific Committees. These principles dramatically freed up both membership eligibility and the range of activities the ISCs could pursue. ICAHM now has well over 200 members and is involved in initiatives in many parts of the world.

Major Impact

ICAHM was established to assist ICOMOS in advising the UNESCO World Heritage Committee on the management of archaeological heritage. This involves providing input to World Heritage Committee discussions concerning the inscription of archaeological resources on the World Heritage List, monitoring the physical condition of listed archaeological heritage and identifying listed properties that are in danger of being delisted because their condition has been allowed to deteriorate beyond acceptable limits. ICAHM's mandate also includes improving the management of all archaeological resources around the globe, whether or not they are World Heritage sites or even potentially eligible for listing. This is because the World Heritage Convention requires its signatories to help preserve the world's cultural and natural heritage, not just the sample of places that is on the World Heritage List.

ICAHM is especially concerned with the quality of work in archaeological heritage management in large projects in developing countries. For that reason, the committee not only continues to help develop standards and best practices but also discusses with various professional groups around the world ways in which professionalism can be advanced. On that basis, ICAHM collaborates with an array of international, regional, national, and local organizations that pursue related goals. ICAHM is unique among them in its focus on the development and propagation of effective and efficient *international* archaeological resource management standards and practices.

ICAHM's formal mandate covers three areas of activity: the management of archaeological sites and resources, archaeological research, and

aspects of cultural resource management. In these three connections, the committee's functions are to:

- Establish, promulgate, and encourage adherence to high standards and best practices
- Develop and enhance a network of professional archaeologists and archaeological site managers for the purpose of transmitting theoretical and practical skills and encouraging high standards and best practices
- Organize conferences and workshops, to produce publications, websites, and other mechanisms utilizing a variety of media to promulgate high standards and best practices
- Provide the best qualified ICAHM Expert Members for desk audits and site visits to archaeological sites that have been nominated for inscription on the World Heritage List
- Provide the best qualified ICAHM Expert Members for monitoring of condition of archaeological sites that are inscribed on the World Heritage List
- Encourage the nomination of appropriate archaeological sites to the World Heritage List
- Assist in nominations by contributing to comparative studies, giving advice about the preparation of nomination dossiers, management plans, or other relevant steps

There are four categories of membership. Experts include members selected by each national ICOMOS committee, who are voting members, as well as members of ICOMOS who have shown to the satisfaction of the ICAHM Executive Committee that they are competent in archaeological heritage management with a reasonable degree of professional experience, sufficient educational training, and, most importantly, a willingness to participate in ICAHM activities. Associates are members of ICOMOS who wish to build up their interest and expertise in the field of archaeological heritage management through participation in ICAHM activities. Institutional members are sought by the executive committee on a case-by-case basis. Affiliates are not members of ICOMOS but, in keeping with the Eger-Xi'an principles, are able to satisfy the executive committee that they would otherwise qualify as either an expert or associate. As encouraged by ICOMOS, the ICAHM executive is also creating a network of individual and institutional corresponding members who are engaged in relevant but not directly heritage-related activities.

ICAHM's *raison d'etre* is to advance heritage management in general by promoting *archaeological* heritage management in particular. This is an important role in a world often dominated by the interests of architecture and art history.

Cross-References

- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Cleere, Henry
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

Further Reading

International Committee on Archaeological Heritage Management (ICAHM). n.d. Official website. Available at http://www.icomos.org/icahm/

International Committee on the Underwater Cultural Heritage (ICUCH)

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Basic Information

The International Committee on the Underwater Cultural Heritage (ICUCH) (http://icuch.icomos.org/) is the committee of the International Council on Monuments and Sites (ICOMOS) that addresses issues relating to the (international)

protection and management of underwater cultural heritage. As such it is both an ICOMOS International Scientific Committee and ICOMOS's taskforce for the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001). ICUCH has a global membership of professionals and has the mission to assist UNESCO in promoting the protection and sound ethical management of underwater cultural heritage. It focuses on international cooperation, legislative issues, and quality standards for interventions and training and closely cooperates with regional and topical NGOs in raising public awareness and counteracting the detrimental PR and activities of the treasure-hunting industry.

Major Impact

The International Committee on the Underwater Cultural Heritage (ICUCH) was established in 1991 with the specific purpose of defining minimum standards to which future dealings with the world's underwater cultural heritage should answer. The underwater world was rapidly opening up and being explored, both within and outside national jurisdictions. Many activities developed that would not befit archaeology or heritage management on land (Henderson 1993). Legal disputes had arisen, and although lawyers had addressed some of the issues and their possible solutions in organizations such as the International Law Association (ILA), they could not refer to a doctrinal text that could be supported by archaeologists and heritage professionals worldwide. Graeme Henderson, director of the Western Australian Maritime Museum, was commissioned by ICOMOS to find and invite the first 18 ICUCH members from 18 different countries around the world and agree their membership with their respective national committees. The working group thus formed prepared the text that was adopted at the 11th General Assembly of ICOMOS in Sofia, Bulgaria, in 1996 as the Charter for the Protection and Management of the Underwater Cultural Heritage. Since then, the Sofia Charter has had significant impact.

In 1997, UNESCO's General Conference decided that a binding legal instrument should be elaborated to find consistency in approaches toward the underwater cultural heritage. In the meantime, the original group of 18 ICUCH members had been refreshed through elections and extended to 24. Under its second president, Robert Grenier, ICUCH assisted at the complicated negotiations, through which such a binding legal instrument was elaborated for UNESCO. In 2001 this led to the adoption of the Convention on the Protection of the Underwater Cultural Heritage into which the principles of the Sofia Charter have been incorporated. The Convention entered into force in January 2009. ICUCH is committed to help in its promotion and implementation and is a statutory advisor to the Scientific and Technical Advisory Board that was established by the meeting of States Parties to the Convention. The number of States Parties is gradually rising and is presently around 60 (status July 2018).

In conjunction with the UNESCO secretariat, ICUCH has elaborated the UNESCO Manual for Activities directed at Underwater Cultural Heritage that was published in English, Spanish, and French in 2013, in Chinese and Italian in 2014, and in Arab in 2016 (Maarleveld et al. 2013).

In 2009, ICUCH saw a major restructuring. New statutes were adopted and a wider membership is envisaged. Nevertheless, ICUCH membership is not as open to all ICOMOS members as membership to other ICOMOS International Scientific Committees. The reason for this is as unfortunate as it is real: people with connections to treasure hunting in maritime archaeology aspire to enhance their credibility by membership of a committee such as ICUCH, and as such, membership must be controlled. An intricate ballot system is therefore in place which among other things requires public and recognized adherence to the 1996 Charter. Among other things this implies standing free from involvement in or promotion of funding of activities through the sale of artifacts. Decisions on membership are made by the Bureau. Besides high professional standards, the basis for ICUCH's credibility as a global organization is regional representation. The Bureau has nine members, with the proviso that these include at least one member from each of the five UNESCO regions. Three of the nine bureau posts are up for election every year. As the number

of well-qualified professionals in underwater archaeology and heritage management is still limited, some regional distortion in the general membership nevertheless occurs. The priority in accepting new members lies with underrepresented regions and non-represented states, especially states that have ratified the 2001 Convention.

ICUCH is a formal advisor to the Scientific and Technical Advisory Body of the Meeting of States Parties of the 2001 Convention and assists the UNESCO secretariat in regional meetings and in training programs. The establishment of curricula and handbooks and operating as a clearinghouse for information and quality control is a role it can play thanks to close cooperation with topical and regional organizations such as the International Congress of Maritime Museums (ICMM), the Nautical Archaeology Society (NAS), the Advisory Council on Underwater Archaeology (ACUA), the Society for Historical Archaeology (SHA), the Australasian Institute for Maritime Archaeology (AIMA), the UK-based Joint Nautical Archaeology Policy Committee (JNAPC), and many others. Publications for which ICUCH's input has been crucial include a Heritage at Risk volume (Grenier et al. 2006) and a Training Manual for the UNESCO Foundation Course on the Protection and Management of Underwater Cultural Heritage in Asia and the Pacific (Manders and Underwood 2012).

Cross-References

- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO (1972) and Malta (1992) Conventions

References

Henderson, G. 1993. Between the devil and the deep blue sea: Maritime archaeology and museums. *The Bulletin of the Australian Institute for Maritime Archaeology* 17: 45.

Maarleveld, T.J., U. Guérin, and B. Egger, eds. 2013. *Manual for activities directed at underwater cultural heritage. A guide on the rules annexed to the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage*. Paris: UNESCO.

Manders, M.R., and C.J. Underwood, eds. 2012. *Training manual for the UNESCO foundation course on the protection and management of underwater cultural heritage in Asia and the Pacific*. Bangkok: UNESCO.

Further Reading

Dromgoole, S., ed. 2006. *The protection of the underwater cultural heritage: National perspectives in light of the UNESCO Convention 2001*. Leiden: Martinus Nijhoff.

Grenier, R., D. Nutley & I. Cochran. (ed.) 2006. Underwater cultural heritage at risk: Managing natural and human impacts. Paris: ICOMOS. Available at: http://www.international.icomos.org/risk/2006/fulldocan.pdf. Accessed 14 Jul 2018.

Maarleveld, Th.J. 2011. Ethics, underwater cultural heritage, and international law. In *The Oxford handbook of maritime archaeology: Chapter 40*, ed. A. Catsambis, B. Ford, and D.L. Hamilton. New York: Oxford University Press.

International Conventions and Charters and Archaeology Presentation

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How International Conventions and Charters Have Influenced Archaeology Interpretation and Presentation

To a large extent, the drawing up of new charters and conventions is the result of the extension of the concept of heritage. What sometimes appears to be

a proliferation may simply be a reflection of new realities that are more varied and complex. —Jean-Louis Luxen (2004)

Introduction

The public interpretation and presentation of archaeological heritage has become an essential component in the conservation and protection of cultural heritage values and sites. We can trace the conceptual roots of modern guidelines for public interpretation and presentation of archaeological heritage back to the late nineteenth century (Getty Conservation Institute 2015). By the early twenty-first century, the mechanisms and processes of public interpretation had reached a heightened level of sophistication and effectiveness. In the international arena, several leading organizations emerged that carry the banner of interpretation principles for access, inclusion, and respect for multiple points of view. These principles emphasize the importance of community engagement and participation in all phases of program planning, development, and delivery. Conventions and charters have been two of the most commonly used categories of international documents to frame standards and guidelines for archaeological heritage management and presentation. However, international documents that specifically addressed the presentation and interpretation of archaeological heritage did not take shape until the late twentieth century.

Conservation and Protection Through Public Presentation

The 1930s was the beginning of an expansion of the concepts of heritage, and heritage conservation has lasted to the present day; an evolving list of international documents, conventions, and charters has led to more recent discussions and debates about resource significance. Concerns for relevancy, community engagement, inclusion, and power sharing led to calls for the promulgation of principles of interpretation and presentation that go beyond a recitation of facts. Our standards today call for effective interpretation approaches that facilitate opportunities for people to form tangible and intangible links to resource meanings, values, and attributes of authenticity. Going beyond a recitation of facts, modern interpretation and presentation programs seek to connect resource meanings to audience experiences, demonstrate relevancy, and promote public stewardship.

As a specialty within the sphere of public archaeology and cultural heritage management, the public interpretation of archaeological and cultural sites has become an essential component in the conservation and protection of cultural heritage values and sites. Beginning in the 1960s and 1970s in the United States, and developing later in other parts of the world, legal frameworks emerged to identify and protect cultural heritage assets. The resultant rapid accumulations of archaeological and historical site information and artifact assemblages led to heightened public and professional awareness and concern for protection and preservation. In the face of an increasing public interest and demand for information, archaeologists and their cultural heritage colleagues began to more actively collaborate to devise the effective strategies for public presentation and interpretation. Until the 1990s, publications on public presentation and interpretation strategies and standards were rare and largely relegated to isolated accounts and academic gray literature.

However, by the latter part of the twentieth century, many archaeologists were addressing the contemporary context of their research as part of a growing practical and ethical awareness. The 1990s saw the emergence of greater energy and funding devoted to the public interface of archaeology as the professional community realized that intellectual introversion was no longer acceptable and that more attention should be paid to the mechanisms, programs, and standards of public interpretation and presentation. Inspired by visionaries such as Freeman Tilden (1957), interpretation practitioners increasingly rejected programs and presentations that did not attempt to go beyond a recitation of facts. Only programs that facilitated and provoked emotional and

intellectual connections of the audience to meanings inherent in the resource were deemed acceptable (Jameson and Baugher 2007).

By the early twenty-first century, the mechanisms and processes of public interpretation had reached a heightened level of sophistication and effectiveness. In North America, the US National Park Service (NPS) and the National Association of Interpretation (NAI) took the lead in standards development. NPS, through its Interpretive Development Program (IDP), promulgated a multifaceted, delivery mode specific, employee training program (Jameson 1997, 2007). NAI, a nongovernmental and nonprofit, independent organization, provides a number of training and certification opportunities and is a major advocacy group for standards development among both government and nongovernment organizations and agencies. The NAI annual Interpreters Workshop and International Conference are major conference events among professional interpreters.

The evolving philosophies of NPS, NAI, and similar advocacy groups have emphasized that, at historic sites, monuments, and parks, the process of effective interpretation allows each visitor to find an opportunity to personally connect with a resource or place. Each individual may connect to the place in a different way, and some may not connect immediately, but everyone should have an opportunity to explore how that special site or place is meaningful to him or her. The goal of interpretation, then, is to increase each visitor's enjoyment and understanding of the site, monument, or park and to allow visitors to care about the parks on their own terms. Many have argued that such personal connections are crucial in gaining public support for conservation.

In the international arena, leading organizations have emerged that are carrying the banner of interpretation principles for access, inclusion, and respect for multiple points of view. The NAI International Conference, held annually in different parts of the world, promotes international partnerships and instigation of interpretative facilities to enhance tourism experiences, benefit local economies, and sustain sensitive interpretation of heritage resources. Interpret Europe, an independent organization established in 2010, espouses similar best practice principles in making interpretive programs locally relevant and sensitive to differences of culture, age, and gender and in organizing complex networks and maintaining a database of best practices (Interpret Europe 2019). National organizations such as Interpretation Australia have been leaders in establishing communication networks and online access to information on best practices guidelines and case studies.

The International Council on Monuments and Sites (ICOMOS) is a global nongovernmental organization associated with UNESCO. ICOMOS charters compliment UNESCO Conventions in providing context and protection guidelines for cultural heritage (ICOMOS n.d.). Its creation in 1965 is the logical outcome of the first interviews that architects, historians, and international experts began early in the twentieth century and that materialized in the adoption of the Charter of Venice in 1964. Its mission is to promote the conservation, protection, use, and enhancement of cultural heritage monuments, building complexes, and sites. Through numerous charters, studies, conferences, symposia, and discussions since 1965, ICOMOS has gradually evolved a more holistic philosophy of cultural heritage protection and interpretation.

ICOMOS works for the conservation and protection of cultural heritage places and is the only global nongovernment organization of its kind. ICOMOS boasts a network of over 10,000-member interdisciplinary experts such as architects, historians, archaeologists, art historians, geographers, anthropologists, engineers, and urban planners. ICOMOS expert members participate in the development of doctrine, evolution and distribution of ideas, and advocacy.

As the Advisory Body of the World Heritage Committee for the implementation of the World Heritage Convention of UNESCO, ICOMOS reviews nominations for World Heritage Site status and ensures the conservation status of properties. Through its national committees and international scientific committees (ISCs), ICOMOS provides leadership and example for

best practice in cultural heritage conservation and presentation (ICOMOS 2018).

Terminology and Categories of International Documents

For the uninitiated, and even for the more experienced, the vast labyrinth of international heritage conservation documents can be daunting to comprehend. To provide clarity of terminology, some definitions and explanations are warranted.

Created within sources of legal authority, "conventions" and "recommendations" derive from intergovernmental organizations such as UNESCO, the Council of Europe, and other governmental and international agencies. Once conventions are signed and ratified, they are binding for the member states. "Recommendations," though not binding in terms of force of law, can nevertheless represent highly recommended management guidelines of public authorities and other stakeholders. "Conventions" and "recommendations" are invariably subjected to meticulous preparations and comprehensive consultations between states to ensure the widest possible consensus (Luxen 2004).

"Charters," "principles," and "codes of ethics," on the other hand, represent moral rather than legal authority. These documents commonly establish principles, definitions, and codes of conduct that professionals and specialists set for themselves as guidelines for best practice. This self-regulatory, collective approach provides flexibility and adaptability to change. To acquire strong moral credibility, these norms need to be the outcome of very broad consultations involving as many professionals as possible from all regions of the world (Luxen 2004).

An inducing relationship has sometimes developed between charters and conventions and other documents of varying origins and scopes. Commonly, later documents and charters have built on, expanded, and been inspired by earlier documents of related themes. For example, the ICOMOS Venice Charter (1964) codified internationally accepted standards of conservation, and precipitated, with expanded definitions of concepts such as "heritage" and "authenticity," the UNESCO World Heritage Convention (1972) and the ICOMOS NARA Document on Authenticity of 1994 (Taylor 2004). Another example is the ICOMOS Charter on Underwater Cultural Heritage (1996) that precipitated UNESCO's Convention on the Protection of Underwater Cultural Heritage (2001). All these categories of documents form a considerable corpus of norms that complement national and regional legislative mandates in each country.

History of International Conventions and Charters Related to Cultural Heritage Conservation

To understand the advance of archaeological heritage interpretation and presentation standards and guidelines, it is useful to review the historical development of documents and philosophies that reflect incrementally expanding concepts and definitions of cultural and archaeological heritage, its components, meanings, and attributed values (Getty Conservation Institute 2015). Historically, beginning in the nineteenth century, there are a great number of international conventions, charters, policies, and recommendation documents that have addressed the treatment and protection of archaeological objects and information. The Principals of the Society for the Protection of Ancient Buildings as Set Forth upon its Foundation (The SPAB Manifesto) of 1877 championed preservation of original fabric versus poorly conceived restorations. The Recommendations of the Madrid Conference (1904) emphasize the importance of minimal intervention in dealing with ruined structures and of finding a functional use for historic buildings or adaptive reuse in modern parlance. Both documents addressed preservation of architectural remains.

The Charter of Athens (1933), significant in that it advanced concepts that are today referenced as elements of "intangible heritage," promoted the preservation of urban architectural heritage and defined the built heritage as possessing spiritual, cultural, and economic values.

The Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954) echoed international sentiments following World War II to prevent theft and vandalism of cultural institutions and property (not just buildings) during armed conflicts. It established an "International Register of Cultural Property under Special Protection." The UNESCO "Recommendation on International Principles Applicable to Archaeological Excavation" (1956) called for states to create a licensing or monitoring authority to document activities and finds. Significantly for this discussion of the development of presentation and interpretation guidelines, it also called for states to undertake educational efforts to promote respect for remains of the past.

The ICOMOS Venice Charter, "International Charter for the Conservation and Restoration of Monuments and Sites" (1964), is important in that it codifies internationally accepted standards of conservation practice relating to architecture and sites. It sets forth principles of conservation based on the concept of authenticity and the importance of maintaining the historical and physical context of a site or building. The Venice Charter states that monuments are to be conserved not only as works of art but also as historical evidence. It also sets down the principles of preservation, which relate to restoration of buildings with work from different periods. The Venice Charter, together with the UNESCO World Heritage Convention of 1972, continues to be a crucially influential international conservation document.

Council of Europe's "European Convention on the Protection of the Archaeological Heritage" (1969) calls for the application of scientific methods to archaeological research and an end to illegal excavations as two important principles for safeguarding archaeological heritage. It makes several recommendations, including the creation of "reserve zones" for preservation of evidence to be excavated at a later time, preparation of inventories of publicly and privately held archaeological objects, and exchange of these materials where possible for scientific and educational purposes.

The UNESCO "Convention Concerning the Protection of the World Cultural and Natural Heritage" (World Heritage Convention), adopted in 1972, promotes an international perspective on cultural heritage by inviting member states to submit an inventory of properties forming its national cultural and natural heritage to be included in a list of World Heritage sites. The convention encourages national efforts at protecting cultural and natural heritage and promotes international recognition and cooperation in safeguarding worldwide heritage sites. The Operational Guidelines for the Implementation of the World Heritage Convention outline the criteria to be met by sites on the World Heritage List.

In 1990, inspired by the success of the Venice Charter, the ICOMOS International Committee on Archaeological Heritage Management (ICAHM) created the "Charter for the Protection and Management of the Archaeological Heritage." The charter was created in response to the increasing threats to archaeological sites worldwide from looting and land development. The Charter attempts to establish principles and guidelines of archaeological heritage management that are globally valid and can be adapted to national policies and conditions. It lays out general principles for investigation, maintenance, and conservation as well as architectural reconstruction. It also notes the importance of high academic and professional standards in relevant fields of expertise and the need for international cooperation.

The Promulgation of International Presentation and Interpretation Guidelines

International documents that specifically addressed the presentation and interpretation of archaeological heritage did not take shape until the late twentieth century. The ICOMOS Charter on Cultural Tourism of 1999 encouraged the development of measurable goals and strategies relating to the presentation and interpretation in the context of their preservation and conservation.

The ICOMOS Australia National Committee's Charter for the Conservation of Places of

Cultural Significance (The Burra Charter), first issued in 1979 and revised significantly in 1999 and 2013, is a national charter that establishes principles for the management and conservation of cultural sites in Australia. The Charter is particularly significant for its definition of cultural significance and the standards it outlines for using cultural significance to manage and conserve cultural sites. It provides an example of how international principles can be adapted to the values and needs of a nation or cultural groups within that nation. Significantly, it contains a definition of interpretation (Article 1.17): "Interpretation means all the ways of presenting the cultural significance of a place," with an explanatory note: "Interpretation may be a combination of the treatment of the fabric (e.g., maintenance, restoration, reconstruction); the use of and activities at the place; and the use of introduced explanatory material." Article 24.1, "Retaining associations and meanings," states that "Significant associations between people and a place should be respected, retained and not obscured. Opportunities for the interpretation, commemoration and celebration of these associations should be investigated and implemented." Article 24.2 states that "Significant meanings, including spiritual values, of a place should be respected." Article 25, "Interpretation," states, "The cultural significance of many places is not readily apparent and should be explained by interpretation. Interpretation should enhance understanding and enjoyment and be culturally appropriate."

The Council of Europe's Convention on the Value of Cultural Heritage for Society (Faro Convention of 2005) went into effect in 2011. It expands on the notions of heritage protection and conservation to pose the questions of why, and for whom, the heritage values are transmitted. Drawing on the United Nations' "Universal Declaration of Human Rights," it promotes the idea that knowledge and use of heritage are part of a citizen's right to participate in cultural life. The text presents heritage both as a resource for human development, the enhancement of cultural diversity, and the promotion of intercultural dialogue and as part of an economic development model based on the principles of sustainable resource use (Council of Europe 2012).

The ICOMOS Charter on Interpretation and Presentation of Cultural Heritage Sites (2008)

Unquestionably, the most important international document to date relating to interpretation and presentation of archaeological heritage sites is the 2008 "ICOMOS Charter on the Interpretation and Presentation of Cultural Heritage Sites," sometimes referred to as the "Ename Charter," referring to the place in Belgium where the first drafts of the charter were prepared. Largely avoiding the questions of the "how and when" of interpretation, as emphasized by NPS and NAI, the Charter lays out seven principles, or key ingredients, of interpretation and presentation in reference to the conservation, education, and stewardship messages that represent the transcendent humanistic values of the resource. The seven basic principles for interpretation provide an outline of professional and ethical standards. The principles place emphasis on the essential roles of public communication and education in heritage preservation and are presented under the following basic headings: Access and Understanding; Information Sources; Context and Setting; Authenticity; Sustainability; Inclusiveness; and Research, Education, and Training.

On the surface, the principles are generally commonsensical in terms of conditions and prescriptions for effective public interpretation. Just how the principles are articulated at local settings, however, will determine how well they are received in international circles and whether they are considered desirable, practical, and feasible. In countries with little or no tradition of multiculturalism, poor human rights histories, and poorly developed infrastructure, practical applications of the Charter are especially challenging (Jameson 2008).

The Ename Charter, to avoid appearances of being overly prescriptive and culturally or linguistically biased, does not address methodology, or the content of interpretive messages, or

suggest philosophical approaches other than those implied by the Principles. Rather, it attempts to consciously avoid interpretive content descriptions, specific narratives, or educational and technological constructs. Originally drafted and promoted by the Ename Center for Public Archaeology and Presentation in Belgium, and subsequently revised under the auspices of the ICOMOS International Committee on Interpretation and Presentation of Cultural Heritage Sites (ICIP), the Charter continues to be scrutinized by the international community of interpretation experts.

The ICIP, in addition to promoting the development, adoption, and application of the Charter principles, studies the evolving techniques and technologies of public interpretation and presentation, evaluating their potential to enrich contemporary historical discourse and to heighten sensitivity to the universal values and particular modes of human expression embodied in cultural heritage sites. The work of the committee explicitly focuses on the experiential dimension of visits to cultural heritage sites, particularly by means of various media and methods of public communication (ICIP 2015). The business of formulating best practices in interpretation and presentation at a cultural setting, country, or institution is one of the chief activities of ICIP- sponsored events. The sessions, seminars, and workshops organized by ICIP members, in association with interdisciplinary colleagues, serve as experiments in formulating best practices (Silberman 2009: 7–8).

Conclusions

With conceptual roots going back to first half of the twentieth century, the public interpretation and presentation of cultural heritage sites has become an essential component in the conservation and protection of cultural heritage values and sites. By the early twenty-first century, the mechanisms and processes of public interpretation had reached a heightened level of sophistication and effectiveness. In the international arena, a number of leading organizations have emerged that are carrying the banner of interpretation principles for access, inclusion, and respect for multiple points of view. These principles emphasize the importance of community engagement and participation in all phases of program planning, development, and delivery.

Conventions and charters have been two of the most commonly used categories of international documents to frame standards and guidelines for archaeological heritage management and presentation. Not until the late twentieth century did international documents that specifically addressed the presentation and interpretation of archaeological heritage come into being.

The 1930s was the beginning of an expansion of the concepts of heritage and heritage conservation has lasted to the present day; an evolving list of international documents, conventions, and charters has led to more recent discussions and debates about resource significance. Later in the century and into the twenty-first century, concerns for relevancy, community engagement, inclusion, and power sharing led to calls for the promulgation of principles of interpretation and presentation that go beyond a recitation of facts.

The most important international document to date relating to interpretation and presentation of archaeological heritage sites is the ICOMOS Charter on the Interpretation and Presentation of Cultural Heritage Sites (2008). The Charter lays out seven principles of interpretation and presentation in reference to the conservation, education, and stewardship messages that represent the transcendent humanistic values of the resource. These principles provide an outline of professional and ethical standards, placing emphasis on the essential roles of public communication and education in heritage preservation. Future articulation and implementation of the principles will be characterized by site, program, and cultural nuances so that strategies that are effective in on area or country may not be as viable in another.

In the West, we must remind ourselves that most of these interactions occur in countries from the Western cultural tradition and stem

from the predominately Western ideas of equal treatment, ethnic sensitivity, and accountability for multiple points of view that are constantly and openly debated. Many of the categories used in international charters and documents, such as world heritage site, national park, and national monument, are notions of commemoration originating in the West. As we enter discussions of international and universal relevance, we need to be cautious in avoiding terminology that can appear, to a non-Westerner, to be patronizing and insensitive. Some of the terminology used in these documents may not always have relevancy in areas outside the Western cultural tradition. Multiculturalism may be rejected altogether as invalid or undesirable by some cultures and countries, making preconditions for inclusive heritage interpretation and presentation more challenging.

Cross-References

- ▶ Archaeology and Art
- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Contemporary Past, Archaeology of the
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management Technology and Training
- ▶ Global Archaeology
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values and Education
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Reflexive Approaches in Archaeology, Development of
- ▶ Site Visitation and Interpretation: Management
- ▶ US National Park Service and World Heritage
- ▶ United States: Cultural Heritage Management
- ▶ United States: Cultural Heritage Management Education
- ▶ Volunteers in Archaeology
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management
- ▶ World Heritage Education, Training, and Capacity Building

References

Council of Europe. 2012. Council of Europe framework convention on the value of cultural heritage for society, CETS No.: 199. https://rm.coe.int/1680083746. Accessed on 10 July 2019.

Getty Conservation Institute. 2015. Cultural heritage policy documents. http://www.getty.edu/conservation/publications_resources/research_resources/charters.html. Accessed on 12 July 2019.

ICIP (International Committee on the Interpretation and Presentation of Cultural Heritage Sites). 2015. http://icip.icomos.org/ENG/home.html. Accessed on 12 July 2019.

ICOMOS. 2018. Introducing ICOMOS. https://www.icomos.org/en/about-icomos/mission-and-vision/mission-and-vision. Accessed on 11 July 2019.

ICOMOS. n.d. International Charters and other Instruments. https://www.usicomos.org/charters-and-legislation/. Accessed on 12 July 2019.

Interpret Europe. 2019. European projects on heritage interpretation 2016–2018. http://www.interpret-europe.net/top/projects.html. Accessed on 4 July 2019.

Jameson, J.H., ed. 1997. *Presenting archaeology to the public: Digging for truths*. Walnut Creek: AltaMira Press.

Jameson, J.H. 2007. Standards for the public interpretation of archaeology. In *Encyclopedia of archaeology*. New York: Elsevier.

Jameson, J.H. 2008. Cultural heritage management in the United States: Past, present, and future. In *The heritage reader*, 42–60. London: Routledge.

Jameson, J.H., Jr., and S. Baugher. 2007. Public interpretation, outreach, and partnering: An introduction. In *Past meets present: Archaeologists partnering with museum curators, teachers, and community groups*, ed. J.H. Jameson Jr. and S. Baugher, 3–17. New York: Springer.

Luxen, Jean-Louis. 2004. Reflections on the use of heritage charters and conventions in conservation. GCI Newsletter 19, 2: 4–9. https://www.getty.edu/conservation/

I

publications_resources/newsletters/19_2/feature.html. Accessed 14 July 2019.
Silberman, N.A. 2009. Process not product: The ICOMOS Ename Charter (2008) and the practice of heritage stewardship. From the *Selected works of Neil A. Silberman*, July:7–8. University of Massachusetts, Amherst.
Taylor, Ken (2004). Cultural heritage management: A possible role for charters and principles in Asia. International Journal of Heritage Studies, 10, 5, 417–433. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.457.9350&rep=rep1&type=pdf. Accessed on 13 July 2109.
Tilden, F. 1957. *Interpreting our heritage*. North Carolina: University of North Carolina Press.

International Conventions Pertaining to Heritage Policy: Introduction

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Introduction

Efforts to develop policies for the protection of cultural heritage at the international level are dominated by six major conventions that have entered into force during the half century between 1956 and 2006. Each convention is dedicated to protecting cultural heritage either of specific types or under specific conditions: heritage at risk during armed conflict (1954 Hague Convention); cultural objects threatened by theft, looting, and other illicit movement (1970 UNESCO Convention, 1995 UNIDROIT Convention); cultural and natural sites of "outstanding universal value" (1972 World Heritage Convention); underwater cultural heritage (2001 Underwater Convention); and intangible heritage (2003 Intangible Heritage Convention). All of these treaties were adopted under the auspices of UNESCO, the United Nations Educational, Scientific and Cultural Organization, with the exception of the 1995 UNIDROIT Convention, which was developed at the request of UNESCO by UNIDROIT, the International Institute for the Unification of Private Law. (For texts of the conventions and related commentary, see Prott and O'Keefe (2010) and the website of the UNESCO's Culture Sector (UNESCO n.d.)).

In international law, conventions are treaties, legal agreements between nations that give their consent to be mutually bound. The process of developing a convention that is approved by multiple states is normally a lengthy and challenging enterprise that follows a specific framework within international law, including procedures and terminology that may be baffling to a non-specialist (Forrest 2010: 32–56). Nations that ratify conventions are known as *States Parties*. *Signature* and *ratification* of a convention are not necessarily the same thing: in some treaties, like the 1954 Hague Convention and its protocols, signature means approval of the adopted text, an intention to move towards ratification, and a pledge not to thwart the goals of the convention pending ratification. So, for example, both the United States and the United Kingdom signed the convention on armed conflict in 1954; however, the United States did not ratify it until 2009, and the United Kingdom has yet to ratify it, although it has declared its intention to do so. In the remaining UNESCO cultural heritage conventions, signature was not required at the time of adoption of the convention text. In all cases, *ratification* signals a nation's formal agreement to be bound and is evidenced by the deposit of *instruments of ratification*. In addition to ratification, the terms *accession*, *acceptance*, and *approval* may also be used to signify a state's agreement to be bound to the terms of a convention; there may be slight differences of meaning among these terms from convention to convention, but in the end, they all denote ratification.

When States Parties deposit their instruments of ratification, they may (unless specifically prohibited by the terms of the convention itself) make unilateral declarations that limit, qualify, or interpret certain aspects of the convention. These

reservations sometimes have a profound effect on the implementation of the treaty. For example, when the United States announced its "acceptance" of the 1970 UNESCO Convention on the illicit movement of cultural property, it published one reservation and six "understandings" (O'Keefe 2000: 106–109). These statements were considered to qualify the US acceptance of the convention so drastically that some have questioned whether it has even implemented the convention (Prott and O'Keefe 1989: 794–796).

International conventions do not go into effect, that is, are not binding on assenting nations until a specified number of States Parties have ratified. *Entry into force* is specified in the text of each convention. For example, the 1954 Hague Convention on armed conflict entered into force in 1956, 3 months after the ratification of the convention by the fifth state. The Intangible Heritage Convention was adopted in 2003 and entered into force in 2006, 3 months after the ratification by the 13th nation.

Although the six cultural heritage conventions constitute an impressive body of international law, they do not comprise a comprehensive or coherent system of either heritage protection or policy. Each was developed in response to particular concerns during a specific period of recent history. Given the multiplicity of national legal systems, interests, and perspectives that were involved during the creation of the various conventions, it is not surprising that there is no unitary vision of what cultural heritage is or how it should be protected. Even the terminology relating to what we term "cultural heritage" differs from convention to convention and reflects evolving perspectives on the notion of tangible and intangible heritage. For example, both the 1954 Hague Convention and 1970 UNESCO Convention use "cultural property," but in the earlier treaty, the term refers to "movable or immovable property of great importance to the cultural heritage of every people" (Article 1), while the later convention defines the same term in a more nationalistic sense as "property which, on religious or secular grounds, is specifically designated by each State as being of importance. . ." (Article 1). The 1972 World Heritage Convention and the 2001 Underwater Convention both use "cultural heritage," while the 1995 UNIDROIT Convention prefers "cultural objects."

Key Issues/Current Debates/Future Directions/Examples

Armed Conflict

The earliest of the cultural heritage conventions also has the deepest roots. The 1954 Hague *Convention for the Protection of Cultural Property in the Event of Armed Conflict*, along with the simultaneously adopted *Protocol to the Convention for the Protection of Cultural Property in the Event of Armed Conflict* (now known as the First Protocol), sought to prevent a repetition of the unprecedented destruction, plunder, and vandalism of cultural sites and objects during the Second World War. But its antecedents reach back to the eighteenth century, when an evolving customary law of war among European nations recognized the importance of protecting cultural sites from destruction and cultural objects from looting. Despite the excesses of state-sanctioned cultural plunder by Napoleon's armies, and indeed partly because of them, the notion that cultural heritage should be respected and immune from plunder achieved normative status among Western armies during the nineteenth century. In the Annex to the 1907 Hague *Convention IV Respecting the Laws and Customs of War on Land*, a revision of an 1899 convention, all pillage was outlawed and special provisions were included to spare cultural sites, including historic monuments, during sieges and bombardments. Both attackers and defenders had duties in this regard: the attackers were obliged to take "all necessary steps. . . as far as possible" to spare cultural sites, while the defenders were required to identify cultural sites with "distinctive and visible signs," give notice of their locations beforehand, and refrain from using them for military purposes (O'Keefe 2006: 22–34).

Building on these dual obligations – that of both attacker and defender – the 1954 Hague Convention attempts to strengthen protection of both movable and immovable cultural property (using the term employed in the convention) by promoting the safeguarding of, and respect for, cultural property (O'Keefe 2006: 92–201; Forrest 2010: 78–108). Safeguarding means that nations prepare in times of peace for the possible effects of war on cultural property in their countries. Respect means both refraining from use of cultural property for purposes that might expose it to damage or destruction during wartime and refraining from any act of hostility towards cultural property. These measures to protect cultural property, however, are liable to be waived for the sake of imperative military necessity. In addition, States Parties agree to prevent theft, pillage, misappropriation, or vandalism of cultural property as well as reprisals against the same and to cooperate with local authorities to protect cultural property during occupation of the territory of another states party. The convention also allows for the granting of "special protection" – the designation of refuges or shelters for certain movable or immovable cultural property.

One of the anachronistic features of the 1954 Hague Convention is the notion that cultural property may be designated with a "distinctive marking" – the now familiar "Blue Shield" emblem. Officials responsible for the protection of cultural sites and objects may also wear the emblem. The notion of marking cultural sites in wartime goes back to the nineteenth century, but in the modern age of remote, long-distance bombardment when even ground forces may not be in direct visible contact with targets, the effectiveness of such markings for protecting cultural sites is problematic. In addition, the changing nature of warfare itself – characterized in recent decades by insurgencies, guerilla operations, and terrorist actions, all of which employ asymmetric methods of conflict – has rendered the very concept of identifying one's important cultural sites to one's enemy problematic. Despite its often horrific violence, the nineteenth-century warfare among "civilized" nations was pursued by standing armies led by generals who often communicated with one another and shared a common interest in certain civilities, including the protection of churches, museums, and monuments. In recent conflicts, cultural sites have sometimes been deliberately targeted for ideological reasons, so that advance notification of their location may actually invite attack. Some belligerents have also deliberately used cultural sites for military purposes precisely because they are counting on their first-world foes to refrain from attacking such sites.

Recent conflicts in Iraq during the First Gulf War (1991) and in the Balkans during the 1990s highlighted several inadequacies in the protective regime envisioned by the 1954 convention and led to the adoption in 1999 of the *Second Protocol to the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict* (O'Keefe 2006: 236–301; Forrest 2010: 110–237). The Second Protocol attempts to restrict the circumstances when military necessity may override the protection of cultural property; emphasizes the principle of proportionality in military actions that may affect cultural property; provides for new system of "enhanced protection"; strengthens the protection of cultural property during occupation; and provides for criminal enforcement of violations. Despite these efforts, the problems evidenced in the Second Gulf War – including looting of the Iraq Museums and other institutions, the plunder of archaeological sites, and the use of cultural sites for military purposes (Elia 2008) – demonstrates that we are far from achieving success in this area (see also Renfrew and Farchakh-Bajjaly, this volume).

Illicit Traffic

Two cultural heritage conventions attempt to deal in tandem with the problem of the illicit movement of cultural heritage through theft, looting, illegal export, and illicit transfer. As early as 1960, archaeologically rich countries such as Mexico and Peru were petitioning UNESCO to develop an international agreement that might stem the flow of illicit cultural materials out of their countries and into developed, art-market nations like the United States and United Kingdom. The result, adopted in 1970, was the UNESCO *Convention on the Means of Prohibiting and*

Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (Prott and O'Keefe 1989: 726–801; O'Keefe 2000; Forrest 2010: 166–196). This celebrated and influential convention was an imperfect instrument, and, in 1984, UNESCO asked UNIDROIT, the International Institute for the Unification of Private Law, to develop another treaty to address some of the inconsistencies and omissions of the 1970 convention. In 1995, the UNIDROIT *Convention on Stolen or Illegally Exported Cultural Objects* was adopted and entered into force in 1998 (Prott 1997; Forrest 2010: 196–223).

The 1970 UNESCO Convention identified the illicit movement of cultural property as "one of the main causes of the impoverishment of the cultural heritage of the countries of origin" (Article 2). In early drafts, a relatively straightforward scheme of international cooperation in the area of export and import controls was envisioned. Exporting countries were required to introduce a certificate to accompany the legal export of cultural property and to prohibit the exportation of cultural property unless accompanied by a certificate. This provision survived in Article 6 of the convention, but its companion piece – a requirement that importing countries recognize the export certificates of States Parties and prohibit import of cultural property without them – was removed from the final text, largely by the efforts of the United States, eager to protect the free-trade practices of its thriving art trade, including dealers, private collectors, and museums (O'Keefe 2000: 57). In its place was substituted a highly restrictive set of rules that only required nations to take necessary measures, "consistent with national legislation," to prevent museums from acquiring illegally exported cultural property; in addition, States Parties were required to prevent the import of cultural property stolen from a museum or institution in another State Party if properly documented or inventoried (Article 7).

Another provision of the 1970 convention allows a State Party "whose cultural patrimony is in jeopardy from pillage of archaeological or ethnological materials" (Article 9) to request assistance from other states and to help control the export and import of specific materials if warranted. This highly restrictive approach to addressing the global problem of archaeological site looting ensured that a steady stream of plundered, undocumented archaeological material would continue to flow into the antiquities market, largely unimpeded by the 1970 convention. Thus, although the compromise text of 1970 was accepted because it was considered essential to have the support of at least one major art-importing nation (i.e., the United States, which ultimately ratified the convention in 1983), there is no doubt that the overall effectiveness of the 1970 regime was thereby seriously diminished. While some importing countries, such as Australia (O'Keefe 2000: 102–106), interpreted the 1970 convention in a broad sense – effectively agreeing to follow the export rules of other States Parties – most art-market states that have ratified the convention in recent years, including the United Kingdom, Switzerland, and Japan, have followed the narrow interpretation of the convention favored by the United States, by requiring States Parties to make formal requests for assistance, which may take the form of bilateral agreements that restrict the import of specific categories of cultural objects. Currently, the United States has 13 bilateral agreements made under Article 9 of the 1970 convention.

The 1995 UNIDROIT Convention is complementary to the 1970 UNESCO Convention and addresses several important issues that were not adequately covered in the earlier treaty, including the ability of private owners to seek the return of stolen or illegally exported cultural objects (the 1970 convention is a public-law treaty, requiring state-to-state relations); rules relating to protection of bona fide, third-party purchasers; and the appropriateness of payment of compensation to them. UNIDROIT's effort was complicated by the need to harmonize fundamental differences in the traditional practices of civil law systems and common law systems. Common Law jurisdictions generally do not allow thieves or third-party purchasers to obtain good title to stolen objects nor do they favor the payment of compensation to good-faith purchasers. In civil law systems, however, bona fide purchasers may obtain good title after a specified period of time or, if they must return a

stolen object to an original owner, may be entitled to compensation. The 1995 UNIDROIT Convention attempts to resolve this quandary through compromise. On the one hand, it enunciates the Common Law principle that "the possessor of a cultural object which has been stolen shall return it" (Article 3(1)); on the other hand, it also adopts the civil law notion that bona fide purchasers are entitled to reasonable compensation if they exercised "due diligence" in acquiring an object (Articles 4(1) and 6(1)). The convention also sets time limits within which claimants may seek the return of stolen cultural objects.

The UNIDROIT Convention distinguishes between two categories of cultural objects and creates different rules for their return. First are "stolen cultural objects," which include archaeological materials that have been illegally excavated or legally excavated but illegally retained, in accordance with the law of the state where the objects were found. Including the products of illegal excavations in the category of stolen cultural objects is significant and contrary to the views of free-market proponents, who generally distinguish between an inventoried object stolen from a museum and the products of clandestine excavations that are classified as merely "illegally exported." The second category of cultural objects in the convention is "illegally exported cultural objects," which must be returned to a requesting state if their removal significantly impairs the physical condition or context of the object; the integrity of a complex object; the preservation of information; or the traditional or ritual use of the object by a tribal or indigenous community.

Also significant is the convention's articulation of the elements of "due diligence" – the reasonable efforts made by the possessor of a stolen cultural object at the time of acquisition. Absent due diligence, the possessor is not entitled to reasonable compensation for the return of the object.

Considered together, the 1970 UNESCO and 1995 UNIDROIT conventions may seem to be exclusively concerned with efforts to ensure the return, restitution, and repatriation of illicitly removed cultural objects. Indeed, these are important issues in the two conventions, but one should not lose sight of their fundamental purpose: to prohibit and prevent (both verbs are present in the title of the 1970 convention) the behavior that results in the illicit movement of cultural objects. Their primary goal, therefore, is not to return illicitly removed cultural objects but to prevent their removal in the first place. Although the 1970 convention has serious flaws, it has dominated discussions about cultural heritage since its adoption and is a milestone in the evolution of museum acquisition policies. And the UNIDROIT Convention, for all the opposition it has engendered from pro-market forces, has forced collectors and dealers to address explicitly their behavior relating to due diligence and investigations of provenance.

World Heritage

The 1972 UNESCO *Convention Concerning the Protection of the World Cultural and Natural Heritage* aims to protect cultural and natural sites of global importance as the common heritage of humanity (Francioni 2008; Forrest 2010: 224–286). It creates a system to promote international cooperation to assist nations to identify, protect, and manage sites of "outstanding universal importance" in the face of increasing threats from decay as well as social and economic conditions. The World Heritage Convention enjoys the widest participation of all the cultural heritage conventions, with 188 States Parties as of November 2011 (World Heritage n.d.).

Central to the World Heritage Convention is the World Heritage List, an inventory of the world's most important cultural and natural sites, which enjoys broad support and recognition throughout the world. States Parties wishing to nominate sites for the list must demonstrate that they have taken effective measures to ensure their protection, conservation, and management. An intergovernmental Committee for the Protection of the World Cultural and Natural Heritage considers nominations and decides whether or not to inscribe nominated sites on the World Heritage List; it also acts on requests for international assistance, including financial assistance. Currently, there are 936 sites inscribed on the list, including 725 cultural, 183 natural, and

23 mixed located in 153 countries (World Heritage n.d.). The Committee also maintains a List of World Heritage in Danger, which consists of properties on the World Heritage List that are determined to be a serious risk of damage or destruction. Currently, there are 35 sites on the list in danger (World Heritage n.d.).

The World Heritage Convention is more than a commemorative list of globally significant sites. Its emphasis on heritage rather than property, on immovable sites rather than movable, and on its combination of cultural and natural heritage sites, including cultural landscapes, which highlight the close, often intangible interactions between humans and their environment, reflect an important evolution in thinking about heritage. Although rooted in a pragmatic reliance on national systems for identification, nomination, and protection, the World Heritage Convention promotes the need for international cooperation for heritage protection in the common interest of humanity.

Underwater Cultural Heritage

In 1985, a team of explorers led by Robert Ballard located the wreck of the RMS *Titanic* in international waters at a depth of more than 4,000 m. The discovery signaled the opening of the deep seas for shipwreck exploration, not only for scientific purposes but also for treasure hunting and commercial exploitation. Indeed, the *Titanic* itself soon became the focus of a controversial, multi-year commercial project. Concerned that underwater cultural heritage in international waters might become the target for the same types of destructive exploitation that had plagued shipwrecks and other submerged sites in the territorial seas in recent decades, in 1994, the private International Law Association developed a draft convention to protect underwater cultural heritage. In 1997, UNESCO decided to promote an underwater convention and, after 4 years of discussions among governmental experts, produced the *Convention on the Protection of the Underwater Cultural Heritage*, which was adopted in 2001 (O'Keefe 2002; Forrest 2010: 287–361).

The Underwater Convention creates a complex and cumbersome regime for the protection of underwater cultural heritage, focusing on the maritime zones beyond the territorial seas, especially the Exclusive Economic Zone (EEZ)/Continental Shelf (up to 200 nautical miles wide) and the "Area," that is, the seabed below the high seas beyond the continental shelf and coastal state jurisdiction. It seeks to balance multiple, often competing interests, including national security, sovereign interests in submerged state vessels and aircraft, and the interests of groups involved in salvage, treasure hunting, sport diving, archaeology, and recreation. The convention takes as its starting point the 1982 *United Nations Law of the Sea Convention* (UNCLOS), which dealt with submerged cultural resources only in a marginal and confusing manner. UNCLOS did, however, establish the principle that states have a duty to protect submerged cultural heritage, should cooperate in that effort, and that "all objects of an archaeological and historical nature found in the Area should be preserved or disposed of for the benefit of mankind as a whole. . ." (Article 149).

Instead of attempting to determine issues of ownership of underwater cultural heritage in international waters, the 2001 convention focuses on rules to ensure that underwater sites will be protected and that activities directed towards them will be conducted according to preservationist principles and archaeologically sound practice. Key principles include the goals of protection and preservation for the benefit of humanity international cooperation, in situ preservation as a first option, long-term preservation and curation of recovered heritage, prohibition of commercial exploitation, respect for human remains, and reasonable public access. The convention requires that activities directed towards underwater cultural heritage be consistent with a set of rules for archaeological best practice based largely on, but not identical to, a document developed by the International Council of Monuments and Sites as the Charter on the Protection and Management of Underwater Cultural Heritage.

The main protective regime envisioned by the 2001 Underwater Convention involves a series of rules for reporting submerged heritage and enforcement actions in two zones – the EEZ/Continental Shelf and the Area. In both

zones, States Parties that discover or intend to undertake activities involving underwater cultural heritage must report their findings or intentions. In the EEZ/Continental Shelf, the coastal state has certain rights to protect submerged sites as well as to authorize or prohibit actions directed towards underwater cultural heritage. In the Area, these responsibilities are more diffuse, and all interested States Parties may become involved in protective efforts in cooperation with a "Coordinating State." To protect sites from unauthorized activities, removals, and looting, States Parties are given a number of enforcement tools to prevent and deter illicit activities. They may prevent the entry into their territory, dealing in, and possession of underwater cultural heritage that has been illicitly recovered and/or illicitly exported. They may seize and dispose of underwater cultural heritage that was recovered in violation of the convention. States Parties may also prohibit the use of their territory, including ports and facilities, in support of any activities directed at underwater cultural heritage in contravention of the convention, and they may take measures to ensure that their nationals and flag vessels do not engage in activities in contravention of the convention.

These tools, in addition to provisions aimed at promoting international cooperation, information sharing, public awareness, and training in underwater archaeology, make the 2001 Underwater Convention a potentially significant tool for protecting underwater sites and diminishing the plague of looting and other unauthorized destruction. To be effective, however, the convention needs broader participation (there are currently 40 States Parties) from countries with active salvage economies and treasure-hunting enterprises, such as the United States and United Kingdom.

Intangible Cultural Heritage

UNESCO's 2003 *Convention for the Safeguarding of Intangible Cultural Heritage* marks a significant departure for international cultural heritage law and policy (Forrest 2010: 362–387). All earlier conventions dealt with tangible cultural heritage, whether movable or immovable, above ground or below the sea. The 2003 convention deals with a difficult and challenging concept of intangible cultural heritage, which it defines in such a way that it also includes some elements of material culture: "The 'intangible cultural heritage' means the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith-that communities, groups and, in some cases, individuals recognize as part of their cultural heritage" (Article 2(1)). The purpose of the convention is to safeguard the intangible cultural heritage; to ensure respect for it; to increase awareness of, and appreciate for, intangible cultural heritage at local, national, and international levels; and to provide for international cooperation and assistance.

The Intangible Cultural Heritage Convention is rooted in a growing awareness of the need to protect and promote cultural diversity and traditional practices and ways of knowing among the world's peoples, including individuals, indigenous peoples, and ethnic, religious, and linguistic minorities. Its structure follows the approach taken in the 1972 World Heritage Convention, namely, to encourage sovereign states to identify and nominate intangible cultural heritage present in its territories. As in the 1972 convention, an intergovernmental committee is established to register nominated examples of intangible cultural heritage in an inventory, called the Representative List of the Intangible Cultural Heritage of Humanity. Corresponding to the 1972 convention's List of World Heritage in Danger is the new convention's List of Intangible Cultural Heritage in Need of Urgent Safeguarding. The intergovernmental committee also handles requests for international cooperation and assistance and for funding.

Since 2008, a total of 213 "elements" of intangible cultural heritage have been inscribed on the Representative List. Examples include acupuncture of traditional Chinese medicine, the chant of the Sybil on Mallorca (Spain), the Kirkpinar Oil-Wrestling festival in Turkey, the gastronomic meal of the French, and traditional Azerbaijani carpet weaving in Azerbaijan. A total of 16 elements of listed intangible heritage are currently on the list in need of urgent safeguarding, including wooden movable-type printing in China; the Mongol epic tradition known as the Mongol

Tuuli; and the Sanke mon, a collective fishing rite among the Sanke people of Mali.

Conclusion

The international law of cultural heritage continues to evolve as it faces challenges of consistency, definition, and consensus. Threats against both tangible and intangible cultural heritage continue to diminish the common heritage of humanity. The six cultural heritage conventions described in this entry were developed over more than 50 years. They reflect a multitude of interests, concerns, and approaches that continue to change and evolve. Much of the criticism that has been leveled against the cultural heritage conventions has focused, with good reason, on their imperfect effectiveness. Armed conflict still destroys cultural sites; looting still rips ancient artifacts from their archaeological contexts; and the inexorable forces of development and construction continue to destroy cultural sites and disrupt living traditions and cultural practices. Despite these problems, however, the cultural heritage conventions remain the starting point for any discussion of cultural heritage preservation and policy at the international level. Although their implementation may be imperfect, they express normative standards relating to the value and importance of cultural heritage as the common legacy of humankind. Despite the many differences among the individual conventions, they all promote three consistent themes – that cultural heritage is important for peoples, nations, and the world; that cultural heritage is deserving of safeguarding and protection; and that international cooperation and efforts should be devoted to that purpose.

Cross-References

- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ UNESCO (1972) and Malta (1992) Conventions

References

Elia, R.J. 2008. Protecting cultural heritage in asymmetric conflicts: Lessons from Iraq. In *World heritage and sustainable development*, ed. R. Amoeda et al., vol. 1, 119–128. Barcelos: Green Lines Institute.

Forrest, C. 2010. *International law and the protection of cultural heritage*. London: Routledge.

Francioni, F., ed. 2008. *The 1972 World Heritage Convention: A commentary*. Oxford: Oxford University Press.

O'Keefe, P.J. 2000. *Commentary on the UNESCO 1970 Convention on Illicit Traffic*. Leicester: Institute of Art and Law.

O'Keefe, P.J. 2002. *Shipwrecked heritage: A commentary on the UNESCO Convention on Underwater Cultural Heritage*. Leicester: Institute of Art and Law.

O'Keefe, P.J. 2006. *The protection of cultural property in armed conflict*. Cambridge: Cambridge University Press.

Prott, L.V. 1997. *Commentary on the UNIDROIT Convention*. Leicester: Institute of Art and Law.

Prott, L.V., and P.J. O'Keefe. 1989. *Law and the cultural heritage. volume 3: Movement*. London: Butterworths.

Prott, L.V., and P.J. O'Keefe. 2010. *Cultural heritage conventions and other instruments: A compendium*. Leicester: Institute of Art and Law.

Unesco. n.d. Website of the cultural sector of UNESCO. Available at: www.unesco.org/new/en/culture. Accessed 12 Dec 2011.

World Heritage. n.d. Website of the UNESCO World Heritage Convention. Available at: http://whc.unesco.org/list. Accessed 12 Dec 2011.

International Council for Archaeozoology (ICAZ)

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Introduction

The International Council for Archaeozoology (ICAZ, http://www.alexandriaarchive.org/icaz/) is devoted to the study of human-animal relationships

over time using archaeological evidence. Archaeozoologists have contributed to studies of human impact on the environment on a national level. However, international comparisons between sites are indispensable in such projects. Research questions and methods need to be carefully coordinated. ICAZ is dedicated to promoting communication between archaeozoologists worldwide coordinating policies of recovery and analysis. International cooperation has been a key to understanding, e.g., past impacts of climate change or cultural diversity in ancient diets.

History, Growth, and Impact

Archaeozoology began in mid-nineteenth-century Europe. In 1851 Japetus Steenstrup and his team established the artificial nature of prehistoric shell middens in Denmark. Help by the paleontologist Ludwig Rütimeyer (Bartosiewicz 2001) was enlisted in quest of Celtic Helvetii at Swiss lacustrian settlements in the 1860s.

For a century archaeozoologists operated in relative isolation. The "Great Generation" emerging in the 1950s – predominantly in Central Europe – was natural scientists whose efforts were rarely integrated with archaeological inquiry traditionally concerned with historical interpretations. During the 1960s new New Archaeology in the English-speaking world and concern with environmental issues stimulated archaeozoological research within archaeology.

The first major meeting of archaeozoologists took place as Session IV, of the Third International Congress of Agricultural Museums in Budapest (1971). Seventy-five attended, most from European countries (Matolcsi 1973). They represented both sides of the Iron Curtain, a remarkable phenomenon after the failed 1968 "Prague Spring" in Czechoslovakia. However, thanks to political tolerance at the time, Hungary became equally accessible to archaeozoologists from Eastern Europe and those from the West. Crucially, many attending archaeozoologists already had personal contacts before. Some were separated by the Berlin Wall only after 1961. Sándor Bökönyi, a Hungarian organizer, had already built British and US contacts working in Yugoslavia and Iraq (Bartosiewicz and Choyke 2002). The informality of personal conduct and keen awareness of the need to crosscut political boundaries have become traditional strengths of ICAZ. It was decided that International Conferences should be held every 4 years alternating between Eastern and Western Europe. Meetings thus followed in the Netherlands, Poland, and Great Britain. Although the pattern was abandoned in 1986 by holding a meeting in France, political changes in Europe soon made the East-West distinction irrelevant. The 1990 conference in Washington DC was a breakthrough in ICAZ history: it was the first International Conference held in the New World, right after the political transformation of Europe. It served as a forum for scholars in North America and countries from the former Soviet Bloc who had previously been quite isolated.

Along with growth diversity has increased. Regional representation varied in the International Conference proceedings, the best proxy to the scholarly involvement with ICAZ. Figure 1 shows ICAZ activity in print. There is an increase in scholars from outside Europe, mostly North America (Amorosi et al. 1996). On the margins of the graph, welcome contingents from Africa, Asia, Australia/New Zealand, and Latin America began appearing already over a decade ago. Standardized publication data have not been available for recent conferences: they are too costly to be taken on board by a single publisher; output is spread among conference sessions. The high contribution of local participants in Fig. 1 has highlighted an important aspect of conferences: the publicity provided by hosting meetings. This benefit was foreseen by the founders when alternating East-West venues were planned.

Since then ICAZ has grown into a global organization. International Conferences should be held on a different continent every 4 years in an effort to guarantee access. Additional International Conferences held in the Americas included those in Canada (1998), Mexico (2006) and Argentina (2014). The 2018 meeting is planned in Turkey. The 2010 International Conference in Paris was devoted to promoting archaeozoology in Central and Eastern

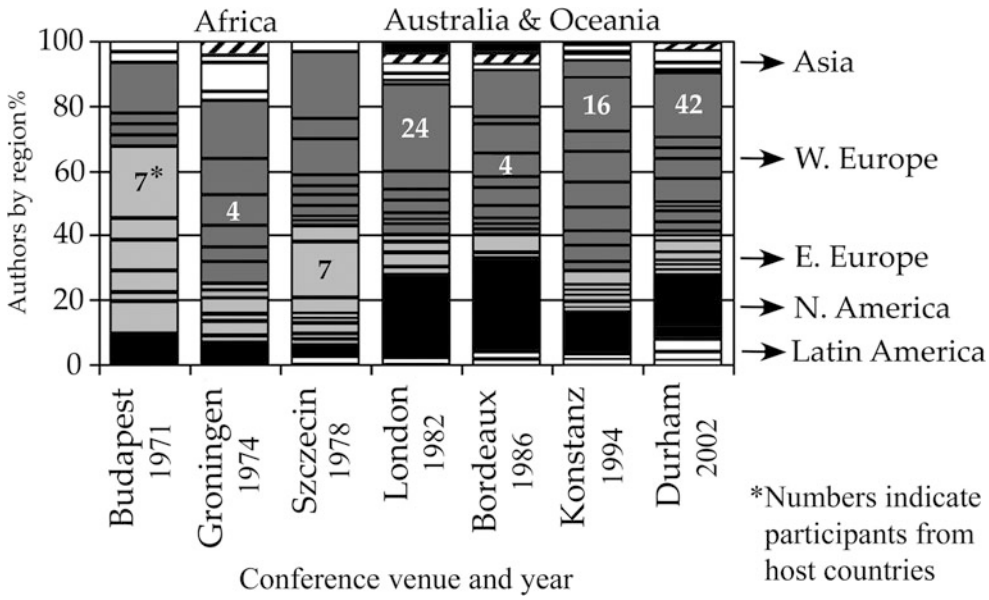

International Council for Archaeozoology (ICAZ), Fig. 1 Regional representation as reflected in International Conference proceedings. After 1990 Eastern Europe includes former Soviet Bloc countries except for East Germany

Europe. Not all archaeozoologists in large countries such as China, India, or Russia have had full access yet to ICAZ membership. The Paris conference was of special importance in including colleagues from areas outside the usual geographical range of ICAZ membership. It mustered 714 registered participants from 56 of the 61 countries represented in ICAZ, a spectacular increase since 1971 (Budapest, 75 participants, 18 countries).

As a qualitative consequence of growth, subtopics within archaeozoology began attracting attention and working groups specialized in ICAZ. They are loose, autonomous groups. Their meetings are organized every 2–3 years. In 2018 sixteen such groups were registered, some specializing in regions (e.g., SW Asia) and others by taxonomic groups (e.g., fish). In addition to evident diversification, the dynamic development of working groups is also evident as many functions are taken over from the overgrown, multi-session International Conferences.

Transforming ICAZ into a membership-based professional organization was initiated at the 1990 Washington DC meeting. By 2003 a dues-paying membership was created. Most of the income is being redistributed every 4 years to support conference participation for those most in need and other costs of communication. Organizing International Conferences with a global outreach has become a heroic task both financially and in terms of logistics. In addition to geographical affiliation, the age and employment status of potential participants have been consistently considered in funding (Vigne and Lefèvre 2010).

ICAZ is committed to its founding goal of fostering communication within the diverse archaeozoological community. Although Europe became politically united, other tensions create what is politely referred to as "visa issues." Access to conference venues is not equally guaranteed to everyone, and the wisdom of ICAZ founders would be needed to outwit political forces beyond the power of an academic organization. Solidarity and personal trust among members remain the fundamental assets in best handling such inevitable situations.

Cross-References

► Animal Domestication and Pastoralism: Socio-environmental Contexts

▶ Archaeology and the Emergence of Fields: Environmental
▶ Genetics of Early Plant Domestication: DNA and aDNA
▶ Hunting and Hunting Landscapes
▶ von den Driesch, Angela,
▶ Zooarchaeology

References

Amorosi, T., J. Woollett, S. Perdikaris, and T. McGovern. 1996. Regional zooarchaeology and global change: Problems and potentials. *World Archaeology* 28 (1): 126–157.

Bartosiewicz, L. 2001. Archaeozoology or zooarchaeology?: A problem from the last century. *Archaeologia Polona* 39: 75–86.

Bartosiewicz, L., and A.M. Choyke. 2002. Archaeozoology in Hungary. *Archaeofauna* 11: 117–129.

Matolcsi, J., ed. 1973. *Domestikationsforschung und Geschichte der Haustiere*. Budapest: Akadémiai Kiadó.

Vigne, J.D., and Ch. Lefèvre. 2010. ICAZ 2010 international conference hugely successful. *ICAZ Newsletter* 11 (2): 1–3.

International Council of Museums (ICOM)

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Basic Information

The International Council of Museums (ICOM; icom.museum), since its inception in 1946, is the world organization for museums and museum professionals, committing to the promotion and protection of natural and cultural heritage, the present and future, tangible and intangible. With over 30,000 members in 137 countries, ICOM is a network of museum professionals acting in a wide range of museum- and heritage-related disciplines (Fig. 1).

International Council of Museums (ICOM), Fig. 1 ICOM logo

Major Impact

Maintaining formal relations with UNESCO and a consultative status within the United Nations Economic and Social Council, ICOM takes part in the development and the implementation of international conventions that play a crucial role in the protection and the promotion of cultural heritage: the 1954 Hague Convention *for the Protection of Cultural Property in the Event of Armed Conflict* and its two Protocols, the 1970 Convention *on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property*, the 1972 Convention *Concerning the Protection of the World Cultural and Natural Heritage*, and the 2003 Convention *for the Safeguarding of Intangible Cultural Heritage*. ICOM has also initiated close partnerships with the UNESCO Memory of the World Program.

ICOM partners other organizations such as the World Intellectual Property Organization (WIPO), INTERPOL, and the World Customs Organization, in order to carry out its international public service missions. Together, ICOM and its partners strive particularly to make awareness-raising efforts highlighting the importance of protecting the cultural heritage of civilizations against illicit traffic, assist museums through alternative dispute

resolutions in the process of complex negotiations, and provide support and risk prevention tools for cultural institutions facing conflict situations or natural disasters.

In the field of relief response for heritage, ICOM is a founding member of the International Committee of Blue Shield (ICBS). This equivalent of the Red Cross for Heritage relates to the UNESCO Hague Convention (1954) to protect cultural goods during armed conflicts. In this regard, the International Committee of the Blue Shield (ICBS) works to protect world cultural heritage threatened by natural and man-made disasters.

ICOM's commitment to culture and knowledge promotion is reinforced by its 31 international committees dedicated to a wide range of museum specialities, who conduct advanced research in their respective fields for the benefit of the museum community. ICOM has therefore the ability to mobilize experts in cultural heritage worldwide responding to the challenges museums face around the globe.

A leading force in ethical matters, ICOM adopted its *ICOM Code of Ethics for Museums* in 1986, a reference tool that sets standards of excellence to which all members of the organization must adhere. The *ICOM Code of Ethics for Museums*, translated into 36 languages and revised in 2006, establishes values and principles shared by ICOM and the international museum community. These standards of self-regulation by museums include basic principles for museum governance, the acquisition and disposal of collections, and rules for professional conduct.

ICOM provides for its members various resources to foster their professional network and expertise: the UNESCO-ICOM Museum Information Centre, the *ICOM News* magazine, a monthly e-newsletter with information on events within the ICOM network, and ICOMMUNITY, an online collaborative platform for ICOM members to exchange and share information more easily.

Finally, ICOM organizes a wide range of events for all museum lovers and professionals. Since 1977, each year ICOM has organized the International Museum Day, an event held worldwide around the 18th of May to promote greater diversity and intercultural dialogue amongst the international museum community. Furthermore, academic events take place internationally as ICOM's committees hold annual conferences and symposiums revolving around themes relating to their expertise and specialities, with the gathering of high-ranking specialists. Finally, the ICOM General Conference is held triennially as an opportunity for the international museum community to come together and engage in professional discussion on the issues facing museum professionals today. Different countries host this conference: Seoul in 2004, Vienna in 2007, Shanghai in 2010, and Rio de Janeiro in 2013.

Cross-References

- ▶ Conservation in Museums
- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Ethics of Collecting Cultural Heritage
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law

References

ICOM. 2006. ICOM code of ethics for museums.

UNESCO. 1954. Convention for the Protection of Cultural Property in the Event of Armed Conflict with Regulations for the Execution of the Convention.

UNESCO. 1970. Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property.

UNESCO. 1972. Convention concerning the Protection of the World Cultural and Natural Heritage.
UNESCO. 2003. Convention for the Safeguarding of the Intangible Cultural Heritage.

Further Reading

Desvallées, F., and A. Mairesse, eds. 2010. *Key concepts of museology.* Paris: Armand Colin.

International Council of Museums (ICOM): Code of Ethics

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Introduction

The International Council of Museums (ICOM) (http://icom.museum/), created in Paris in 1946, is an international organization of museums and museum professionals whose mission is the conservation and transmission of natural and cultural heritage, present and future, material and immaterial. This mission demands the acceptance of the Ethical Code, for the museums and the professional members of the ICOM, which was adopted during the organization's 15th General Assembly in Buenos Aires, Argentina on November 4th, 1986. This code, which was last revised in 2006, establishes the common values and principles of the ICOM and of the global museum community in English, French, and Spanish.

The Code of Ethics of the ICOM is presented as a series of principles and rules which govern professional practices for the museums and their staff and thus established professional standards applicable to all members. These norms play a quasi-legal role in countries where legislation is lacking or unclear regarding professional practices to adopt. They can also serve as a basis for responding to local requirements or to other queries of museum staff.

The Code of Ethics of the ICOM (http://icom.museum/professional-standards/codeof-ethics/) consists of eight chapters which outline each principle and related articles.

Key Issues/Current Debates/Future Directions/Examples

1. *Museums preserve, interpret, and promote the natural and cultural inheritance of humanity*

Cultural property of which museums interpret and are responsible for, are not only significant elements for the definition of cultural identity, both nationally and internationally, but they also often provide essential evidence to many disciplines in the humanities or natural sciences, thereby representing an important contribution to knowledge.

To achieve this mission, the regulatory authorities, in their management, must have authorization documents clearly stating the legal status of the museum, its mission, duty, and non-profit character (1.1 to 1.2); premises that are secured against most risks, while providing an appropriate environment that is accessible to all; and housing the collections, staff, and visitors in compliance with all relevant health, safety, and security provisions (1.3 to 1.8).

Still under the regulatory authority, the funds coming from public or private sources or income-generating activities must comply with the norms of the museum and the public and be used for the realization and development of the institution's activities (1.9 to 1.10); and in compliance with museum policies and legal and regulatory procedures, the skills of all the staff and volunteers are used in the context of an ethical conduct of the highest rigor and a professional approach offering possibilities for continual training in order to maintain efficiency (1.11 to 1.18).

2. *Museums that maintain collections hold them in trust for the benefit of society and its development*

The museum is defined as an institution that acquires, conserves, researches, communicates,

and exhibits the tangible and intangible heritage of humanity and its environment.

Within the framework of acquisition, disposal, protection, and utilization of collections, the museum must adopt a charter under the direction of the regulatory body, prove their diligence in establishing the complete history of the object from its discovery or its creation, and ensure that the object possesses a valid title; that it was not illegally obtained in, or exported from, its country of origin or any intermediate country in which it might have been legally owned (2.1 à 2.3); and that its acquisition did not involve the unauthorized, unscientific, or intentional destruction or damage of monuments, archaeological or geological sites, or species and natural habitats (2.4).

The acquisition should be based on an ethic where the choice of values was not imposed but was freely chosen by the responsible authorities. Moreover, concerning the collection, research, and exhibition of collections composed of human remains or sacred objects, it is recommended to treat this sensitive material with respect and in accordance with the interests and beliefs of members of the community, ethnic, or religious groups (2.5, 3.7, and 4.3).

Similar provisions are realized for biological and geological specimens (2.6) and living organisms (2.7) whose acquisition and conservation must respect the relevant legislation associated with the protection of species, nature, and the environment. For living animals, the museum assumes total responsibility for their health and well-being and should prepare and implement a safety code approved by an expert in the veterinary field (2.25).

Nevertheless, it is possible that the institution acquire objects in exceptional circumstances without an attested provenance and outside the museum's stated policy. For these exceptional acquisitions, the regulatory authority can take into consideration the advice of professionals, without national or international bias, the specific interests of the object for its preservation, and the legality of the title of ownership (2.9 and 3.4). It can also authorize the museum to act as a repository for objects illegally collected from the territory in which its lawful responsibility has been established (2.11).

The removal, just like the acquisition, of an object is subject to legal conditions and obligations. The museum can definitively dispose of an object or specimen from its register and collection by donation, transfer, exchange, sale, repatriation, or destruction of infested and deteriorated objects. It is up to each institution under the authority of its governing body, and in conjunction with the director of the museum and curator of the collection, to decide the procedure to follow in similar cases, to ensure that the money or benefits obtained are employed for the benefit of the collection, and to prevent members of the museum staff as well as their families or close associates from purchasing the objects from the collection for which they are responsible (2.12 à 2.17), or making personal use of objects from the collection of the museum (2.26).

To ensure its service, the collections are entrusted to qualified personnel. The documentation should meet accepted professional standards: full identification and description of each item, its associations, origin, condition, treatment, and present location in the museum. The collected data, to be used for securing, preventative conservation, or restoration, should be kept in a secure environment and managed by documentation retrieval systems enabling access to the information by the museum personnel and other legitimate users who are likely to consult them in the context of the museum's development (2.18 à 2.20).

A strategy should aim at protecting collections from disasters (armed conflicts and other human-made or natural catastrophes), guaranteeing the confidentiality of information, and to prevent any risks relating to the conservation of objects in an inappropriate environment during storage, display, or transit. This strategy must be developed by the museum responsible for monitoring the condition of object to determine when an object may require professional restoration (2.21 to 2.24).

3. *Museums hold primary evidence for establishing and furthering knowledge*

As institutions of general interest, museums possess collections that are primary evidence dedicated to knowledge. In this regard, the collection and all associated information should be made accessible and document the complete history of the object since its discovery. Field collection and research undertaken by museum staff should be carried out in accordance with the scientific norms, national and international legislative obligations, as well as with respect and consideration for the views of local communities within the missions and goals of the museum (3.2 to 3.5). The nature of collections means that members of the museum profession can share their knowledge and experience with researchers and students in relevant fields. The investigations carried out in this context should promote the use of information relating to collections and prevent all activities that could lead to the loss of scientific data which would be useful to develop within the framework of a necessary cooperation with other institutions sharing the same interests and collecting practices (3.6 to 3.10).

4. *Museums provide opportunities for the appreciation, understanding, and promotion of the natural and cultural heritage*

The proliferation of exhibitions mainly intended for the public's enjoyment and to reach a wider audience should take into account the ethical aspects relating to the mission, beliefs, and discretions accorded to some objects. The museum should be aware of the demands for the removal of objects coinciding with the sensitivities of a community, ethnic, or religious group from whom the object originated, or simply objects of questionable origin or lacking provenance information, which can be perceived as an encouragement for the illicit trafficking of cultural goods (4.1 to 4.5). For its educative mission, the museum should only publish accurate information and give consideration to the academic disciplines, societies, or beliefs presented (4.6). Finally, the presentation of collections inviting the public to participate in knowledge and culture must respect the integrity of the original and signal replicas, reproductions, or copies as facsimiles (4.7).

5. *Museums hold resources that provide opportunities for other public services and benefits*

The museum has the ability, through its identification service or that of another museum, to carry out this activity without it being considered as work benefiting them. If the identification and authentication reveal that objects are suspected of having been illegally acquired, this should not be made public until the appropriate authorities have been notified (5.1).

The estimation of monetary value, when it is undertaken by a museum in order to insure its collections, should only be given in response to an official request by other museum authorities or other appropriate authorities. However, when the museum itself may be the beneficiary, appraisal of an object or specimen must be undertaken independently (5.2).

6. *Museums work in close collaboration with the communities from which their collections originate as well as those they serve*

The ICOM encourages museums to promote the sharing of knowledge, documents, and collection, to develop partnerships, and to engage in dialogue with museums and other cultural organizations from the countries that have lost a large part of their heritage with a view to return cultural property (6.1 and 6.2).

Claims for restitution, which are regularly made for cultural property, concern all specimens or objects that appear to have been exported or otherwise transferred in violation of the principles of international and national conventions, or bought or acquired from an occupied territory disregarding the laws governing the importation, exportation, and transfer of cultural or natural materials.

Museums must conduct activities in close cooperation with the communities from which their collections originate as well as the communities they serve. The respect for concerned communities should prevail over all other activities

(collecting, searching for funds) carried out by the museum aiming to use its collections (6.3 to 6.8).

7. *Museums operate in a legal manner*

Museums should define their role and act with regard to a concerted ethical conduct in accordance with local and national laws in their location (7.1); they must direct their policy according to international legislation which serves as the standard for the interpretation of the ICOM's Code of Conduct, namely, the principle conventions listed in article 7.2:

- UNESCO Convention for the Protection of Cultural Property in the Event of Armed Conflict (The Hague Convention, First Protocol, 1954, and Second Protocol, 1999)
- UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973)
- UN Convention on Biological Diversity (1992)
- UNIDROIT Convention on Stolen and Illegally Exported Cultural Objects (1995)
- UNESCO Convention on the protection of the Underwater Cultural Heritage (2001)
- UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (2003)

8. *Museums operate in a professional manner*

Professional conduct compliant with ethical standards should dictate that all members of the museum institution have a good understanding of relevant legislation to protect them from deviant behavior (8.1), to distance them from practices that are contrary to professional ethics (8.2), and to encourage them to conform to the terms of the Code of Ethics of the ICOM and to know all the other codes or policies concerning museum work (8.3). Members of the museum profession are scientifically and intellectually responsible for all activities that may lead to the loss of information. They also have other obligations, such as never participating to illicit traffic (8.5), or protecting all confidential information related to their activity or possessed by the institution concerning the collection or the security of locales (8.6 to 8.7). The exception to the obligation for confidentiality involves goods which are illegally acquired and which are the object of police or legal investigations (8.8). Private or professional activities, as well as work relations conducted internally and externally to the museum, cannot be separated from those of their institution and should enable professionals to carry out their services efficiently and to a high standard in consultation with colleagues within or outside the museum (8.9 to 8.11).

Members of the museum profession should take into account the conflicts of interest that may arise from the benefits that could be offered to them because of their function (8.12), the specialist activities undertaken by them outside the institution (8.13), their direct or indirect participation in dealing (buying or selling for profit) natural or cultural heritage (8.14), maintaining relationships with dealers leading to the acceptance of gifts and donations in whatever form (8.15), and collecting objects privately that could compete with their institution (8.16).

Finally, ICOM requests all members to not use the same acronym or logo of the organization to promote or endorse any for-profit operation or product (8.17) and encourages them, in all other conflicts of interest between a person and the museum, to keep the interests of the museum prevailing (8.18).

Conclusion

The code of ethics for museums does not have a legal value in a strict sense but it states the precepts of conduct that set a high moral value to which each member of the ICOM is committed. Within the organization, the Ethics Committee is responsible for ensuring compliance with the code, to consider all matters pertaining to professional ethics to museums, to ensure its execution, and to propose to the Executive Board any

changes or supplement to the code (ICOM n.d.). The committee is called upon by the Executive Council as well as by various national and international organizations to study the codes of ethics developed by other bodies of the organization (Internet Museum n.d.).

Cross-References

- ▶ Conservation in Museums
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Museums and the Public
- ▶ Heritage Theory
- ▶ Human Remains in Museums
- ▶ International Council of Museums (ICOM)
- ▶ Museum Security Network (MSN)
- ▶ Stakeholders and Community Participation

References

ICOM. n.d. The world museum community. Available at: http://icom.museum/

Internet Museum. n.d. Available at: http://archives.icom.museum/other-codes_eng

International Council on Monuments and Sites (ICOMOS) (Ethics)

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Basic Information

Committed to neutral and sustainable monitoring of archaeological sites, especially during periods of social crisis or instability, the International Council on Monuments and Sites (ICOMOS) is a nongovernmental, professional organization dedicated to the conservation and protection of historic monuments, sites, and places throughout the world. Its website is at www.icomos.org.

History

COMOS was founded in Warsaw in 1965 as part of the 13 resolutions adopted in 1964 by the Second Congress of Architects and Specialists of Historic Buildings, which aimed in part to form an ethically responsible and globally recognized principle for the treatment of historic monuments. The first resolution, the Venice Charter, created the International Charter for the Conservation and Restoration of Monuments and Sites. ICOMOS was established in order to carry out this resolution. The Venice Charter traced its doctrinal roots to the 1931 Athens Charter on historic buildings. The pioneering Athens Charter put forth a fundamental definition of international cultural heritage and acknowledged the importance of creating globally accepted policies that reflect the ethical treatment of internationally recognized cultural heritage sites.

Major Impact

Advisory Body to the World Heritage Committee

In 1972, UNESCO named ICOMOS one of three official advisory bodies to counsel the World Heritage Committee on candidates for inclusion in the World Heritage List. ICOMOS considers individual monuments, sites, and places for nomination. The fundamental quality for consideration, as outlined by the World Heritage Convention, is "outstanding universal value" (OUV) (Jokilehto 2008). ICOMOS evaluates three additional primary criteria: authenticity, management, and conservation.

The necessarily broad definition of cultural heritage embodies a dynamic range of approaches to the conservation and protection of monuments, sites, and places. Various charters and memoranda have continued to reshape the mission of ICOMOS in identifying potential candidates for the WHL. One of the most important documents in the development of the notion of cultural heritage is the Florence Charter, an addendum to the

Venice Charter. This 1982 doctrine was created in order to include living entities as candidates for World Heritage Sites, in this instance, the gardens in the historic center of Florence. A second document should also be mentioned. As part of the 2005 World Heritage Convention, the Vienna Memorandum clarified the potential candidacy of entire cities (or Historic Urban Landscapes) for inclusion in the WHL (Araoz 2008). Such reevaluations of conceptual criteria underscore the vigorous, collaborative objectives of ICOMOS in defining and protecting world heritage.

International Committee of the Blue Shield, Risk Management

ICOMOS maintains at least one principal function in addition to advising the WHC. ICOMOS is one of five nongovernmental organizations that comprise the International Committee of the Blue Shield, founded in 1996. The Blue Shield emblem, the cultural counterpart of the Red Cross, was first issued as a result of the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict. This particular function of the Blue Shield and, by extension, ICOMOS calls for the protection of historic monuments, sites, and places in areas of crisis. The committees advising the Blue Shield aim to stop the destruction of internationally recognized cultural heritage during periods of violent conflict. In 2011, Blue Shield emblems were issued for armed conflicts in Egypt, Libya, and Syria.

A second Blue Shield statement on Syria was issued in 2012. An extension of ICOMOS' role advising the International Committee of the Blue Shield is its commitment to risk management in crisis situations. From January 7 to 8, 2013, an ICOMOS International Scientific Committee, the International Scientific Committee on Risk Preparedness (ICORP), led an e-learning course for professionals in cultural heritage currently living in Syria. This reflected a collaborative effort with ICOMOS-ICORP, UNESCO, ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property), and the DGAM (Directorate-General of Antiquities and Museums of Syria). This particular endeavor sought to improve the multi-level of preparedness of Syrian cultural heritage experts in various aspects of risk management and emergency response, in moments of conflict, and in the aftermath.

Committees, Membership, and General Assemblies

ICOMOS is comprised of two main branches, the Executive Committee and Secretariat, which are based at the international headquarters in Paris and individual or institutional members of National Committees. A third component, the International Scientific Committees, was comprised of 26 committees in January 2013. At that time, membership count was listed as approximately 12,100 members worldwide. National Committees are active in 110 countries. Each National Committee, regardless of the number of members, is allocated a maximum quota of 18 votes at general assemblies. Each National Committee operates within its own rules of procedure, although these must adhere to the basic premises of ICOMOS. Eligibility for membership is contingent upon the applicant's professional involvement in a field concerning cultural heritage. This definition includes, inter alia, professionals working in various aspects of conservation (scientific, technical, and administrative), and it may also include those working in disciplines such as archaeology, ethnology, and town planning. Membership is contingent upon adhering to an Ethical Commitment Statement currently comprised of 15 articles, each of which requires the active personal and professional involvement of members in various aspects of cultural heritage preservation. This statement is intermittently reviewed by members in order to ensure that it reflects contemporary ethical and methodological concerns in cultural heritage. A significant element of ICOMOS' general mission is for its doctrine to evolve as new situations arise that require nonpartisan council. Therefore, membership is contingent upon individual commitment to promoting and engaging with each of the 15 articles

in current situations. Article 4, for example, requires that ICOMOS members stay apprised of "contemporary conservation philosophy, practice and techniques" and whenever applicable that members share and exchange such information (*Ethical Commitment Statement for ICOMOS Members* 2002).

ICOMOS operates via international general assemblies. By the end of 2011, there will have been 17 general assemblies, during which representatives from Executive and National Committees meet to vote on and evaluate doctrinal issues. Records of the general assemblies (starting in 1965) as well as ICOMOS executive and advisory committee meetings (starting in 2006) are published on the ICOMOS website (ICOMOS n.d.).

International Day for Monuments and Sites

In 1983, UNESCO approved the ICOMOS proposal to make April 18th the International Day for Monuments and Sites, in order to annually promote different aspects of cultural heritage. The theme successfully nominated by ICOMOS in 2011 was the "Cultural Heritage of Water," which reflects the expanding awareness and definition of cultural heritage (McIntyre-Tamwoy et al. 2011). Previous themes include Religious Heritage and Sacred Spaces (2008) and twentieth Century Heritage (2002).

Cross-References

- ▶ Blue Shield
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Araoz, G.F. 2002. Ethical commitment statement for ICOMOS members – (revision, November 2002, Madrid). Available at: http://www.international.icomos.org/publications/Ethics-eng.pdf. Accessed 19 Jan 2013

Araoz, G.F. 2008. World-Heritage historic urban landscapes: Defining and protecting authenticity. *Association for Preservation Technology International* 39 (2/3): 33–37.

ICOMOS. n.d. Available at: www.icomos.org/en/. Accessed 19 Jan 2013 (contains links for all doctrinal texts, Blue Shield statements and E-newsletters such as those mentioned in this text, as well as an Open Archive, an online repository specializing in professional texts concerning the preservation of cultural heritage).

Jokilehto, J. 2004. *International charters for conservation and restoration*, Monuments and Sites I. 2nd ed. Berlin: Hendrik Bässler Verlag.

Jokilehto, J., ed. 2008. *The World Heritage list. What is OUV?* Monuments and Sites XVI. Berlin: Hendrik Bässler Verlag.

Lemaire, R.M. 1972. ICOMOS: Its role in international preservation organizations. In *Preservation and conservation: Principles and practices*, 537–543. Washington, DC: The Preservation Press.

McIntyre-Tamwoy, S., et al. 2011. 18 April 2011 – International Day for Monuments and Sites. The cultural heritage of water. Available at: http://www.icomos.org/18thapril/2011/18April_2011_STamwoy_essay_EN_final_20110329.pdf. Accessed 16 Jan 2013.

International Council on Monuments and Sites (ICOMOS) (Museums)

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Basic Information

The Second International Congress of Architects and Specialists of Historic Buildings, meeting in Venice in 1964, adopted 13 resolutions, the first one being the Venice Charter and the second, put

forward by UNESCO, provided for the creation of the International Council on Monuments and Sites (ICOMOS). Its statutes set out the aims and activities of the organization, the composition of membership, its administrative structure, and its legal status. It is one of the three formal advisory bodies to the UNESCO World Heritage Committee and is a representative on the International Committee of the Blue Shield, the cultural equivalent of the Red Cross. ICOMOS is an association of professional experts that currently brings together over 12,000 members throughout the world, organized through National Committees. It is interdisciplinary and works for the conservation and protection of cultural heritage places. It is the only global nongovernment organization of this kind, which is dedicated to promoting the application of theory, methodology, and scientific techniques to the conservation of the architectural and archaeological heritage.

The General Assembly, which meets every 3 years, is the sovereign body of ICOMOS comprising all its members worldwide. It elects the President, the Vice-Presidents, the Secretary General, and the Treasurer General, who together make up the Bureau. It also elects the 12 members of the Executive Committee. The General Assembly determines the program and the budgetary orientations for the triennium to come and sees that the objectives of ICOMOS have been met. Parallel to the elections and the statutory proceedings, a major international symposium is held on a different theme each time.

The Advisory Committee comprises the Chairs of the National Committees and International Scientific Committees. It meets once a year and its function is to advise the Executive Committee by bringing forth suggestions and recommendations on program priorities and orientations. The Executive Committee is the managing body of ICOMOS. It has 12 members, in addition to the members of the Bureau and 5 co-opted members. Demonstrated professional qualities are a requirement for these members, who represent every major region of the globe. The Executive Committee prepares the program and budget and oversees their implementation; between sessions it is the Bureau that ensures the program is implemented. The International Secretariat, located in the headquarters in Paris, is managed by an operational team led by a director and coordinates the implementation of the program. It has three divisions: Administration, World Heritage, and Documentation (UNESCO-ICOMOS Documentation Centre).

Major Impact

ICOMOS has established 28 International Scientific Committees (ISCs) on various cultural heritage themes. Members consist of international renowned expert specialists in each subject and are designated by their own National Committee. The ISCs are ICOMOS technical bodies. They undertake research; develop conservation theory, guidelines, and charters and foster training for better heritage conservation; promote international exchange of scientific information; and carry out projects. They elaborate their own programs and publish an annual report subject to the approval of the Executive Committee. ICOMOS has adopted a number of charters, resolutions, declarations, and other technical studies all of which are available on the website: http://www.icomos.org

Cross-References

- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

Further Reading

International Council on Monuments and Sites (ICOMOS). n.d. Available at: http://www.icomos.org

International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

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Brief Definition of the Topic

ICOMOS is the International Council on Monuments and Sites. It is an international non-governmental organization of professionals concerned with the conservation of historic/archaeological monuments and sites around the world. Quoting from its website (http://www.icomos.org/en/about-icomos/mission-and-vision/mission-and-vision):

> ICOMOS works for the conservation and protection of cultural heritage places. It is the only global non-government organisation of this kind, which is dedicated to promoting the application of theory, methodology, and scientific techniques to the conservation of the architectural and archaeological heritage. Its work is based on the principles enshrined in the 1964 International Charter on the Conservation and Restoration of Monuments and Sites (the Venice Charter).
>
> ICOMOS is a network of experts that benefits from the interdisciplinary exchange of its members, among which are architects, historians, archaeologists, art historians, geographers, anthropologists, engineers and town planners.
>
> The members of ICOMOS contribute to improving the preservation of heritage, the standards and the techniques for each type of cultural heritage property: buildings, historic cities, cultural landscapes and archaeological sites.

ICOMOS refers to "cultural internationalism" in its discussion of its history, in other words, an international concern with the promotion and protection of the tangible cultural heritage. An early impetus toward achieving ICOMOS' aims began in the post-World War I climate that saw the creation of the League of Nations and that climaxed in the immediate post-World War II years following the devastation not just to millions of people but also to the built environment of Europe. The Athens Charter of 1933 had addressed the restoration of historic buildings. The United Nations was created in 1945. UNESCO was created in 1948. The First Congress of Architects and Specialists of Historic Buildings was held in Paris in 1957 and advocated for the protection of historic buildings and membership in the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM). The Second Congress of Architects and Specialists of Historic Buildings in Venice in 1964 produced the important Venice Charter and the birth of ICOMOS.

ICOMOS emphasizes the global coordination role of this organization, directed at establishing an international effort for the preservation and the appreciation of the world heritage of historic monuments. Specifically, the ICOMOS mission is to

- Bring together conservation specialists from all over the world and serve as a forum for professional dialogue and exchange
- Collect, evaluate, and disseminate information on conservation principles, techniques, and policies
- Cooperate with national and international authorities on the establishment of documentation centers specializing in conservation
- Work for the adoption and implementation of international conventions on the conservation and enhancement of architectural heritage
- Participate in the organization of training programs for conservation specialists on a worldwide scale
- Put expertise of highly qualified professionals and specialists at the service of the international community (http://www.icomos.org/index.php/en/about-icomos/mission-and-vision/icomos-mission).

The 1972 UNESCO World Heritage Convention specifically names ICOMOS as one of three formal advisory bodies to UNESCO's World Heritage Committee. (The other two are the World Conservation Union, IUCN, and the International Centre for the Study of the Preservation and Restoration of Cultural Property, ICCROM). ICOMOS's most

important task is to evaluate all nominations of cultural sites that are submitted by the States Parties (the countries that have ratified the World Heritage Convention) to the World Heritage Committee. Among ICOMOS' many scientific committees, ICAHM/International Committee on Archaeological Heritage Management now plays a crucial role in assisting those countries seeking advice on the nominations process, among its other functions. ICAHM is currently working on standards of professional performance (see http://www.icomos.org/icahm/orgchart/ICAHM_Function_OfficesandDuties.pdf) and recently launched a publication series called "Multidisciplinary Perspectives on Archaeological Heritage Management" with Springer Publishing. ICAHM is also concerned to communicate its activities to the general public in the hope of raising awareness about site management, the proper conduct of which furthers ICOMOS' overall goal of site preservation.

The other ICOMOS scientific committees are: Analysis and Restoration of Structures of Architectural Heritage; Documentation of Cultural Heritage; Conservation/Restoration of Heritage Objects in Monuments and Sites; Cultural Itineraries; Cultural Tourism; Earthen Architectural Heritage; Economics of Conservation; Fortifications and Military Heritage; Historic Gardens and Sites; Cultural Landscapes; Historic Towns and Villages; Intangible Cultural Heritage; Interpretation and Presentation; Legal, Administrative and Financial Issues; Pacific Islands; Polar Heritage; Risk Preparedness; Rock Art; Shared Built Heritage; Stained Glass; Stone; Theory and Philosophy of Conservation and Restoration; Training; twentieth Century Heritage; Underwater Cultural Heritage; Vernacular Architecture; Wall Paintings; and Wood. Obviously, not all of these ICOMOS scientific committees are concerned with the archaeological past.

Cross-References

- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage List: Criteria, Inscription, and Representation

Further Reading

ICAHM. n.d. Function, roles, and responsibilities statement. n.d. Available at: http://www.icomos.org/icahm/orgchart/ICAHM_Function_OfficesandDuties.pdf

ICOMOS. n.d. Introducing ICOMOS. Available at: http://www.icomos.org/en/about-icomos/mission-and-vision/mission-and-vision.

ICOMOS. n.d. ICOMOS' mission. Available at: http://www.icomos.org/index.php/en/about-icomos/mission-and-vision/icomos-mission.

International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)

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Introduction

Around the world local, regional, and international tourism has grown significantly in importance since the end of World War II. Tourism is now a major employer in rural and urban areas across the world. In many communities, it is now one of the largest sources of economic activity. The numerical growth of the middle class in many emerging economies coupled with the emergence of mass-market air travel means that a greater proportion of the global population is now able to enjoy leisure travel than ever before. Similarly, the spread of mass communication media, such as television and cinema, combined with improved education in most countries has stimulated a desire in many people to visit other places and to experience other cultures.

While the early years of postwar mass tourism often concentrated on outdoor leisure pursuits and relaxation, the last 30 years have witnessed a fragmentation and diversification of the tourism industry. Consumer, adventure, family, sport, cultural and eco-tourism are now recognized sectors of the industry and they, too, contain further

subsectors. If we understand culture in the way that anthropologists do – as the way of life and shared values of a particular community – then all tourism is cultural. Even a beachside holiday takes place in the context of a certain way of life and specific shared values. So the various forms of tourism rarely exclude a mixture of objectives on the part of travelers and visitors. Beach holiday makers may include in their holiday plans a visit to a historic site or museum. People who are primarily interested in experiencing the arts, heritage, or historically significant sites may also want to spend time in a resort or on the ski fields.

Tourism operators, too, usually cater to varying needs. There are many ways to experience any tourist site. When we talk, then, of cultural tourism, it is a category that differs from other types of tourism in its emphasis and prioritization of the cultural aspects of the visitor experience. Almost all travelers are cultural tourists in some sense or at some time.

Cultural tourism can, however, be an area of contention because many sites, objects, and practices of cultural significance were never intended to host large numbers of visitors. When poorly managed, tourism can cause irreparable damage to cultural places or artifacts. The desire to attract visitors must be balanced by the need to preserve artifacts, traditions, or sites for others. It is also important that visitors respect and seek to understand the cultures of other people. Conflicts between ideas of individual and group ownership of cultural artifacts, sites, and traditions also need to be taken into consideration. While cultural meaning and significance is created by groups of people, individual items or places may rightfully belong to individuals whose rights and interest may conflict with those of the wider community.

Cultural tourism is a growing sector, and demand for tourist experiences with a cultural focus is expected to continue growing (OECD 2009). This growth is in part a reflection of today's demand for cultural authenticity. Visitors to culturally significant sites want firsthand experience of significant artifacts and places (Schouten 2007). This desire, however, also creates challenges for custodians and managers of cultural and environmental heritage. Just as the sheer number of visitors to heritage and culturally significant sites may threaten some of them, so, too, the demand to experience "the real thing" poses challenges for their preservation, especially when the effects of age-related deterioration, exposure to environmental damage, and changing cultural understandings are taken into account. Once again, a careful balancing of the demands of visitors and of preservation is required (ICOMOS 1994). The Charter has at its heart the objective of balancing these different interests.

Definition

Cultural tourism is a term that refers to tourism that has as its primary focus the experience of artistic, historical, or ceremonial aspects of places, artifacts, or practices.

The International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999) was adopted by the International Council on Monuments and Sites (ICOMOS) at its twelfth General Assembly in Mexico in October 1999.

ICOMOS was called into being in 1964 in response to a proposal from the United Nations Educational, Scientific and Cultural Organization (UNESCO). It is an international, non-government, membership-based organization most of whose members are professionals in the heritage, architecture, archaeology, and historical sectors. ICOMOS advises UNESCO and national governments on matters of world, national, and local heritage, and it has adopted a range of charters, resolutions, and declarations concerning aspects of cultural and environmental heritage protection and management. It has various scientific committees including one for cultural tourism.

Key Issues/Current Debates/Future Directions/Examples

The International Cultural Tourism Charter (1999) consists of six principles, seven objectives,

and an introductory statement of its ethos. This opening section explains the thinking behind the document and provides examples of cultural and natural heritage. It also makes clear that the Charter takes a universalist position on culture and cultural heritage. This position asserts that cultures share certain universal values and that heritage "belongs to all people." It is, though, a position that reflects Western Enlightenment ideas about the universality of human experience and culture and is one that is not shared by some other intellectual traditions.

The Introduction to the Charter further makes it clear that we live in an increasingly globalized world. Globalization is often seen as a threat to local cultural traditions and in recent years a number of international initiatives have been implemented with the aim of protecting the diversity of cultures around the world (UNESCO 2005). The Charter Ethos argues that "people everywhere" are challenged to preserve cultural diversity and conserve, present, and interpret cultural heritage. The Charter, nevertheless, recognizes that at the practical level these tasks normally fall to local communities. One of the principal aims of the Charter is to provide guidance to the people of these communities.

A further objective is to encourage the tourism industry to "respect and enhance" the culture of host communities. In many respects, cultural tourism brings with it inherent conflict potential, particularly between the interests of visitors and tourism operators on the one hand, and local communities and cultural custodians on the other. The third of the Charter's objectives is to foster dialogue between "conservation interests and the tourism industry." One of the desired results of this dialogue is the development of management plans that sets goals and strategies for the "presentation and interpretation of heritage places and cultural activities," and this is encouraged in the fourth of the objectives.

The first of the principles contained in the Charter notes the importance of cultural tourism for cultural exchange and calls for the conservation of cultural heritage so as to provide visitors and host communities with firsthand experience of cultural sites. The four subsections of Principle 1 deal with the contemporary significance of natural and cultural heritage, the need for the explanation and interpretation of cultural and natural significance, the fostering of the awareness needed to ensure the survival of heritage and the diversity of cultural meanings attributed to some places.

Principle 2 addresses the potential for conflict between the competing demands made on heritage sites. Its first subsection deals with cultural heritage as a source of "cultural diversity and social development." It calls for policy measures in a range of fields to ensure the protection of cultural manifestations. Later subsections deal with questions of authenticity, conflict resolution, the use of local materials and traditions in conservation programs, the development of management plans, and the implementation of evaluation programs to assess the impact of tourism on sites of cultural significance.

In many cases, the concerns of host communities and visitors to places of cultural interest can be in conflict. For a long time visitors to Uluru in Central Australia thought a visit to this iconic site was best capped with a climb up the famous rock. Many people would still like to do so. But climbing on Uluru conflicts with the cultural importance of the site for the local community – as well as causing environmental damage – and, hence, visitors are discouraged from doing so. In other places, host communities require visitors to dress in a manner appropriate to the meaning of a site, to remove their shoes, to refrain from taking photographs, to maintain silence, and so on in efforts to ensure that tourism does not harm the cultural traditions and meanings of a site or to minimize physical damage. Balancing these requirements with the legitimate interests and desires of visitors is one of the key objectives of the Charter, and one that is embodied, in particular, in subsections 2.2 and 2.6.

The authenticity of the visitor's experience is a crucial element for most cultural tourists. Indeed, the search for cultural traditions and practices that are considered more "authentic" than their own is a key element of cultural tourism for many people, particularly in Western countries. But when considered more closely, authenticity becomes a

contentious concept. The materials used in many historically important buildings are prone to natural deterioration and may need to be replaced. The actual wood we see when we visit a centuries-old Asian temple today may actually be quite recent. Similarly, in many European cities, numerous historic buildings were reconstructed in the aftermath of World War II and while they may appear much older, they are not strictly "authentic" or particularly old. In recent years, this feature of cultural heritage conservation has taken on new dimensions in Berlin where there has been a lively debate about reconstructing the Baroque palace (Stadtschloss) after it was damaged during the war and its ruins removed in 1950. Few people would argue that the resulting urban wasteland should remain unused. But the idea of rebuilding from scratch a (pseudo) Baroque palace is in itself an interesting commentary on the contemporary thirst for "heritage" even if it is not genuinely authentic. Subsections 2.4 and 2.5 of the Charter call for the "retention of the authenticity of heritage places" (2.4) and for infrastructure developments at heritage sites to use local materials while respecting local traditions and styles in architecture.

The third of the six principles deals with the visitor's experience at places of cultural tourism. It contains four subsections each of which gives guidance on ways in which the visitor's experience can be enhanced. It is essential for the economic success of cultural tourism that visitors find a particular experience rewarding, authentic, and well managed. Visitors are usually discerning and well-informed people who will quickly turn elsewhere if their experience of a particular heritage site, practice, or artifact is artificial, disrespectful, or exploitative. They also have myriad needs that vary from person to person and they generally value experiences that offer visitors flexibility and individuality. Subsection 3.2, thus, calls for visitors to be able to pace their visit to a heritage site at their own discretion, while subsection 3.1 calls for visitors to be provided with "high-quality information" on the significance of a particular item of heritage.

The Charter stipulates the various elements of a cultural experience that visitors should be able to expect. They also have responsibilities, though. Successful cultural tourism is able to balance the desire of visitors to experience places, artifacts, and practices of cultural significance with the right of host communities and the interest of all parties in the preservation and conservation of natural and cultural heritage for posterity.

The rights of host communities who are involved in cultural tourism are the focus of principles 4 and 5. In particular, these principles call for the rights of communities to restrict access to sites, cultural practices, and artifacts to be respected. Cultural tourism has a strong universalist element. Western Enlightenment thinking holds that cultural traditions, sites, and practices should be universally and equally accessible to everyone. It rejects the idea of knowledge that can or should be restricted to certain people based on community membership, religious faith, or gender. But more recent ethical debate has led to a realization that Western thinking cannot reasonably be imposed on peoples and communities that do not share its tenets.

Subsection 4.1 deals with the rights of host communities and traditional owners to contribute to management plans, policies, and protocols concerning places of cultural tourism. Making host communities the primary beneficiaries of cultural tourism is at the heart of Principle 5. When well managed, the benefits of cultural tourism can be numerous and substantial. They extend beyond the purely economic and can include employment, educational, intercultural, and intergenerational dividends. Subsection 5.2 even advocates for gender equality in the distribution of benefits that accrue to local communities from cultural tourism. The reinvestment of a proportion of revenues earned from cultural tourism in the protection and conservation of places of significance is the central objective of subsection 5.3.

The interpretation of cultural heritage and its presentation to visitors is a critical element of successful cultural tourism. It may also be an area of debate and controversy. Sometimes the

cultural significance of a site, artifact, or practice may no longer be fully understood. In such cases, interpretation may be largely speculative and it may be difficult to separate fact from fiction and mythology. Recent research may even challenge or contradict long-cherished understandings and interpretations. In other cases, the same site or artifact can have different and even conflicting meanings to different communities. Former battlefields, for example, may represent the site of a famous and nationally important military victory for one community while arousing painful memories of defeat, loss of life, and national subjugation for another community. Sensitive, respectful, and balanced interpretation of such sites is vital if they are to contribute to the peaceful coexistence of communities and nations in our time. These examples all attest to the central role played in cultural tourism by cultural interpreters. Subsections 5.4 and 5.5 of the Charter deal with interpreters and call for them to be drawn from host communities so as to develop skills among community members and to promote interest among local communities in their cultural heritage and its preservation.

The sixth and final of the Charter's principles deals with the protection of natural and cultural heritage in the context of cultural tourism. It calls for controls on excessive visitor numbers at sites of cultural tourism and proposes that host communities encourage visitors to take a wider view of the region in which a particular attraction is located. The subsections also call for host communities to encourage appropriate behavior among visitors by ensuring that the information provided deals with the heritage of a place or community in a responsible fashion.

The International Cultural Tourism Charter is, by dint of its legal status as charter, not an enforceable legal instrument. It sets out principles of good practice but is, in essence, aspirational.

The Charter is narrow in its understanding of cultural tourism. Its primary focus is clearly on cultural and natural heritage sites. Cultural tourism involving intangible heritage, such as performances, ceremonies, and rituals, is not explicitly covered in the Charter. Nor does the Charter deal explicitly with movable cultural artifacts. These features reflect the Charter's own parentage as a document produced by the International Council on Monuments and Sites.

The Charter makes occasional reference to the protection and conservation of natural heritage, but does not make clear the difference between the two.

The Charter is available in English, French, Spanish, Greek, Mandarin, and Dutch and can be accessed via the ICOMOS website at http://www.international.icomos.org/charters.htm.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ UNESCO (1972) and Malta (1992) Conventions

References

ICOMOS. 1994. *The Nara document on authenticity*. Paris: ICOMOS.

OECD. 2009. *The impact of culture on tourism*. Paris: OECD.

Schouten, F. 2007. Cultural tourism: Between authenticity and globalization. In *Cultural tourism global and local perspectives*, ed. G. Richards, 25–38. Binghamton: The Haworth Press.

UNESCO. 2005. *Convention on the protection and promotion of the diversity of cultural expressions*. Paris: UNESCO.

Further Reading

Europa Nostra. 2006. *Malta declaration on 'cultural tourism: Its encouragement and control'*. The Hague: Europa Nostra.

Di Giovine, M.A. 2009. *The heritage-scape: UNESCO, world heritage, and tourism*. Lanham: Lexington Books.

International Council on Monuments and Sites. n.d. http://icomos.org/

World Tourism Organization. n.d. http://unwto.org/en

International Heritage Conservation Principles: Historical Overview

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Introduction

To keep and maintain what we value and to hand it down to future generations is an aspect intrinsic to human development and deeply rooted in all cultures worldwide. Modern times saw the development of the concepts of heritage and conservation, which, as an inseparable part of building and preserving the cultural identity of a group, today have been established as critical elements of national culture. International principles on preservation and conservation try to build a bridge for conservation efforts worldwide and aim to establish a common understanding on what to preserve and how, and more generally, on the meaning of heritage for society as a whole.

Definition

The term "International Principles of Conservation and Preservation" is mostly used to describe internationally recognized and collaboratively developed doctrines and standards relating to the protection, care, and treatment of heritage resources, both movable and immovable (cf. Jokilehto 2002).

Considering the cultural and natural heritage as irreplaceable and precious, the responsibility of all to safeguard the common heritage of mankind and transmit it to future generations "in the full richness of [its] authenticity" constitutes the principal doctrine of the international conservation movement (cf. ICOMOS 1964, *The Venice Charter*, Preamble). In guiding countries and their experts in the practical implementation of this doctrine, international principles of conservation and preservation have been developed over time, all of them basically identifying and defining:

1. The subject of conservation (what)
2. The meaning/content and aim of conservation (why/for whom, the relevance of context)
3. The rules/methods of conservation (how, scientific and technical aspects)

International conservation practice covers a broad range of tangible and intangible subjects, and in its laid down principles, categories such as historic monuments (ICOMOS 1964, *The Venice Charter*, Art. 1) or cultural and natural heritage (UNESCO 1972, *The World Heritage Convention*, Art. 1) are more closely defined. In this respect, conservation practice is restricted to the subjects of conservation identified and defined in the various international agreements. However, definitions keep on widening in their scope and there is international recognition that, principally, every place that is of value to people can be subject of conservation and preservation (Petzet 2005: 8).

The definition of aim and content of conservation is intrinsically connected to the theoretical discourse on "the true meaning" of conservation. This discourse underlies the entire history of the development of (international) conservation principles and, naturally, its arguments shaped their content and meaning over time. Traditionally, the restoration movement employed and propagated the approach that restoration was about bringing back the "ideal" or "true" state of an object or place, based on "objective" and scientific knowledge. Today, there is international consensus that the discipline of conservation/preservation/restoration in general aims to retain a place because it is culturally significant, this cultural significance needing to be defined anew for every place or object (De La Torre 2002: 3; *The Venice Charter*, Art. 1 and Art. 3; Australia ICOMOS 1999, *The Burra Charter*, Art. 2.2). Hence, at the heart of the modern conservation movement, featuring principal protagonists such as John Ruskin (1819–1900), William Morris (1834–1896), or Alois Riegl (1857–1905), lies the concept of

values and the recognition of the relativity of values (Jokilehto 2002: 18, 174–244). According to the *Burra Charter* (ICOMOS 1999, Art. 1.2), the concept of cultural significance can be defined in the following way:

> Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations.
>
> Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects.
>
> Places may have a range of values for different individuals or groups.

Beyond the doctrines on the subject, content, and aim of conservation, there are principles defining the approaches and methods for retaining a place in its full meaning. The fundamental principle is the concept of authenticity, according to which an object is to be conserved in its authentic "truthful" state, this state being defined within its cultural context and not according to certain objective standards (UNESCO 1994; cf., section "Key Issues/Current Debates"). In order to respect and conserve a place in its full authentic meaning, conservation interventions should change "as much as necessary but as little as possible," giving the principle of "constant care and maintenance" primacy over any other conservation method (*The Venice Charter*, Art. 4; *The Burra Charter*, Art. 1.5, 3.1). There is a variety of terms for the methods or principal measures of conservation, encompassing for instance preservation, maintenance, restoration, renovation, and reconstruction. These different conservation methods are most often formulated as "rules," indicating which method should be best employed, how and under which conditions. A set of definitions is given, for instance, in Art. 1.4–1.8 of *The Burra Charter*, and *The Venice Charter* lays down a multitude of principles or "rules," that is, "Wherever the traditional setting exists, it must be kept" (Art. 6).

Even though the principles in *The Venice Charter* are internationally recognized, conservation methods are understood and used differently in different parts of the world. However, all conservation practice is based on the general principles outlined above and hence grounded in a common understanding of conservation theory and practice as a discipline that aims to preserve what is of value to people (Clark 2010).

Sources of international conservation principles are documents developed and agreed upon within an international discourse and through international collaboration of countries and conservation experts worldwide. In establishing this collaboration, international key organizations for the conservation of the cultural and natural heritage are instrumental.

The International Council on Monuments and Sites (ICOMOS) as the international forum for professional dialogue is the platform on which most of the international charters and guidelines on heritage conservation and preservation are developed. The fundamental conservation guideline is the *International Charter for the Conservation and Restoration of Monuments and Sites* (*The Venice Charter*) from 1964, which was the basis for the so-called *Burra Charter* (*The Australia ICOMOS Charter for Places of Cultural Significance*, 1999), drafted by Australia ICOMOS and highly influential and recognized outside Australia. There are further charters developed by ICOMOS, covering a range of conservation subjects, for example, the *Charter for the Protection and Management of the Archaeological Heritage* (Lausanne 1990). Agreed upon and adopted by expert individuals, charters and the principles expressed by them are legally not binding, yet highly relevant in international heritage discourse. Each country should apply the international principles within the framework of its own culture and legislation.

A legally binding source of international conservation principles are multilateral treaties negotiated on an intergovernmental level. Usually initiated in the international framework of the United Nations Educational, Scientific and Cultural Organization (UNESCO) or, on a European level, in the framework of the Council of Europe, international treaties are agreed upon by the signatory states and put into force after ratification by a certain number of signatory states, as defined in detail in every treaty. The UNESCO *Convention Concerning the Protection of the World Cultural and Natural Heritage* (*The World Heritage Convention*, 1972) is the most well-known and

successful international treaty and the first installing a common protection system for culture and nature (UNESCO World Heritage Centre 2007). Since then, a wide range of international conventions have been drawn up, constituting an important source for international heritage conservation and its principles, including for instance the UNESCO *Convention on the Protection and Promotion of the Diversity of Cultural Expressions* (2005) or the *European Convention on the Protection of the Archaeological Heritage* (Valetta 1992).

Historical Background

Principles of preservation and conservation are nothing permanent, but in continuous development, and so are the associated practices and methods. They very much reflect the time of their conception. Most often, conservation principles evolve as a reaction to major transformations in the sociopolitical, cultural, or economical context of life. The historical perspective on international preservation principles shows that new principles seek to respond or to adapt to new needs. Central concerns or key issues in the field of heritage conservation continue to shift, while the terms that are at the core of preservation principles are regularly redefined.

While the general history of heritage conservation has its roots in antiquity, a development of international preservation principles began only in Modernity, by the end of the nineteenth century. In their combination of political issues, history, social sciences, law, philosophy, ethics, and others, preservation principles are a particularly complex matter. However, as they are by definition a form of international public law, a primary approach to their historical background is through the history of law.

As a matter of fact, international principles are essentially based on the preceding forms of national, communal and local laws for heritage conservation. The earliest documented legal acts of that kind are from Roman law (cf. Poulot 2001) and concern the local protection of moveable and immovable objects which were valued as monuments (cf. Choay 1996). A major advancement in the general development of preservation principles followed in the course of the fourteenth and fifteenth century with numerous edicts and laws passed in various Italian republics which, for the first time, explicitly stated public interest as a motivation for protecting cultural heritage assets. Still, these laws focused mainly on built or material heritage, second most important for the advance in international preservation principles were the consequences of the French Revolution and secularization throughout Europe. The idea of a common, public heritage generated a new form of collective consciousness: the nation (cf. Babelon and Chastel 1994). With an inherent notion of public responsibility for heritage, conservation became increasingly institutionalized, or, in other terms, nationalized: Cultural heritage had finally assumed a fundamental importance for preserving collective cultural identity. The foundation for this understanding of heritage as an expression of collective identity and associated conservation philosophy had been laid by the late eighteenth century's concept of historical time: the insight that any man-made object belongs to a certain time and place, that it cannot be repeated in another (Schmidt 2008), and that it therefore uniquely "represents" its context. By the end of the nineteenth century, heritage conservation had become an essential element in the building of nations and the legal organization of the nation-state (Jokilehto 2002). In this view, the first and foremost preservation principle of protecting national values also entered the first models of international public law, namely, the Hague Conventions of 1899 and 1907, which as laws of war included first paragraphs referring to the special treatment of foreign cultural property in armed conflict, acknowledging thus the essential importance of heritage property for peoples. After the Second World War, these early considerations were finalized in the *Hague Convention on the Protection of Cultural Property in the Event of Armed Conflict* (1954); a second protocol to this convention was added in 1999. Alongside the fundamental principle to protect cultural heritage assets from the danger of violent destruction or loss as in times of war, from the early twentieth

century onwards, the development of international principles for heritage conservation gained momentum. The *Athens Charter on the Restoration of Historic Monuments* (1931) was groundbreaking in this regard because it included a first call for establishing international organizations for restoration on operational and advisory levels. Consequently, in the 1950s and 1960s, a series of international bodies for cultural and natural heritage and for the development and implementation of international preservation standards and principles were founded: the UNESCO in 1946, followed by ICOM (International Council of Museums, 1947), the IUCN (International Union for the Conservation of Nature and Natural Resources, 1948), and ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property, 1956), as well as ICOMOS in 1965. The three last-named organizations operate as advisory bodies to the UNESCO. These inter- and nongovernmental institutions and associations deal with educational, legal, and technical issues of conservation from an international to a local level, contributing thereby to the worldwide dissemination and implementation of international preservation principles. With growing international attention for preservation, consequently also the importance of those international public bodies, along with a number of internationally operating private institutions, is growing.

A turning point in understanding cultural heritage as being of international public interest was the *Convention Concerning the Protection of World Cultural and Natural Heritage* (UNESCO 1972), which designated for the first time heritage as universal, concerning all nations alike, that is: humankind (UNESCO World Heritage Centre 2007). Through the *World Heritage Convention*, the concept of a universal, world heritage became codified and the "outstanding universal value" of the heritage protected under its schemes is acknowledged through its protection instrument on an international level, the World Heritage List (*The World Heritage Convention*, Art. 11.2).

Meanwhile, the steady evolution of the definition of heritage contributes to a significant enlargement of the subject of preservation principles. Limited in their origin to historic monuments, international preservation principles gradually were extended, first to other forms of material heritage, such as sites, while subsequent conventions included the protection of historic gardens (*The Florence Charter*, ICOMOS 1981), historic towns, and urban areas (*The Washington Charter*, ICOMOS 1987), as well as the *Protection and Management of Underwater Cultural Heritage* (UNESCO 1996), and of landscapes (*European Convention on Landscapes*, 2000). In accordance with the widened subject of interest, the reach of preservation principles was also enlarged: In addition to protection, international conventions increasingly relate to questions of management, most clearly so in the *International Cultural Tourism Charter* (ICOMOS 1999) *for Managing Tourism at Places of Heritage Significance*. In the year 2004 another crucial turn in understanding the notion of heritage and hence preservation principles became manifest with the UNESCO *Convention for the Safeguarding of Intangible Cultural Heritage* (2003). The *Nara Document on Authenticity* (UNESCO 1994) and in particular the Australia ICOMOS *Charter for the Conservation of Places of Cultural Significance* (*The Burra Charter*, 1999), testified to the primary recognition of the immaterial aspect of the concept of heritage, arguing that it merited equal protection to material heritage. From Europe, one of the latest international preservation principles is the *Council of Europe Framework Convention on the Value of Cultural Heritage for Society* (*The Faro Convention*, 2005). This convention regards the significance of heritage and for the first time provides an understanding of the heritage community, namely, the "people who value specific aspects of cultural heritage which they wish, within the framework of public action, to sustain and transmit to future generations." The constant heritage discourse and the regular revision of central international documents such as *The Burra Charter* and the *Operational Guidelines for the Implementation of the World Heritage Convention* (UNESCO, 2011) ensure an evolution of international conservation principles according to contemporary needs and concepts.

Key Issues/Current Debates

A key issue in international heritage conservation is the role and meaning of values (Avrami et al. 2000; De la Torre 2002; De la Torre et al. 2005; Clark 2006). Conserving what is culturally significant until recently meant expert-defined decisions on the identification and treatment of places worthy to be preserved. There was a focus on values identified and defined by experts, such as historic or scientific value and, in a traditional, Western view, on values attributed to the material fabric of places. Accordingly, the main focus of conservation principles was on technical and scientific rules relating to form, material fabric, and the prevention of change (Clark 2010: 90). With increasing recognition of conservation as a "complex social practice," there is now a democratization of conservation theory and practice: Value categories expand and their relative, ever-changing nature becomes more and more recognized, all of this challenging traditional conservation processes (Avrami et al. 2000: 3). Values being important for the public, such as social value attributed to places – first recognized by the principles of *The Burra Charter* – or intangible concepts of significance, most often employed in non-Western countries, inevitably lead to new perspectives on heritage and its conservation and management, often conflicting with traditional value sets.

Conservation faces the challenge to find approaches towards identifying and negotiating these conflicting sets of values and to integrate the often different objectives towards conservation and its results into holistic conservation processes. Nationally and internationally, the discourse on conservation and its principles is shifting from being focused on preserving places and their fabric to the management and use of heritage (Araoz 2009). How to use the past in the present, as part of sustainable community development and without compromising the tangible places, is one of the key issues of conservation in the twenty-first century and requires a better understanding of the nature of values and their role in conservation.

The prerequisite to perceiving cultural heritage assets as witnesses or historical evidence of the past is the notion of their authenticity, in a general sense their being true and real. Focusing on the documentary function of the monument, as in historical science, the first international preservation principles put the main emphasis on conserving the historic fabric. According to the *Venice Charter* (1964), authenticity was to be preserved by allowing no changes to its "original material," that is, the physical entirety and/or setting of the monument, unless required for its safeguarding, and only to be executed by restoration specialists. This interpretation of authenticity as a (physically) unaltered, historic status became dominant in the course of the following decades, not least because the *Operational Guidelines for the Implementation of the World Heritage Convention* saw authenticity/integrity as conditions for World Heritage nominations, to be evaluated according to the attribute's design, materials, workmanships, or setting. Only in the 1990s was this concept challenged when a revision of the World Heritage Convention criteria led to the Nara conference and the *Nara Document on Authenticity* (UNESCO 1994). This document defines the concept of authenticity as rooted in specific cultural contexts according to which it should be judged; hence, it shifts the focus from the historic, physical fabric to a more comprehensive understanding of the essence of cultural heritage assets. The current debate on "tolerance for change" in conservation practice – where conservative criticism (mis)interprets "tolerance" as a freeway to uncontrolled alteration and destruction, while the term actually implies acceptable variations on a given object, preserving its authenticity, that would hence have to be defined exactly in every single case – illustrates that the contest between these two main concepts continues.

International Perspectives

Naturally, the existence of international preservation principles and the essential international discourse on heritage conservation do not imply that heritage conservation is practiced in the same way

all over the world. First and foremost, there are evident differences in the key subjects of heritage protection according to regional realities and cultural contexts. For example, mountainous regions might be less concerned with underwater heritage or intangible heritage, a minor issue in countries with a traditionally strong focus on built heritage and material fabric. Second, it has been argued that the concept of heritage and its need for preservation is original only to Western thinking but has since then been globalized. Nevertheless, it can be acknowledged that it is through international discourse that international agreements in preservation standards and norms have been established which at present are influencing regional development in heritage preservation (cf. Vinson 2009). More important, it is international exchanges in the theory and practice of heritage preservation that, particularly in the wake of significant anniversaries, produces continuous critique and revision of international documents, hence also of their often limited context and possible imbalances. Finally, while the ongoing development of heritage definitions has brought to light the basically unlimited variety of heritage assets, an international understanding is gradually taking shape that realizes the value of heritage for the individual and for society to be an essential, universal part of human culture; hence, it is the responsibility to protect, and the right to participate in, cultural heritage that need to be universally, internationally promoted.

Future Directions

Sustainable development is the key phrase for all activities relating to the human environment, hence also for conservation of the cultural and natural heritage. Not yet explicitly mentioned in most of the international conventions and charters concerning heritage conservation, the interrelation of heritage and sustainable development is internationally acknowledged and can be defined the following way:

"The protection and conservation of the natural and cultural heritage are a significant contribution to sustainable development." (Para. 6 *Operational Guidelines for the Implementation of the World Heritage Convention;* cf. also: Preamble, Art. 9 and 10 of *The Faro Convention*)

How heritage can be used wisely in order to benefit the sustainable development of our society, be it in economic, social, or environmental terms, is the major challenge ahead for the conservation movement. One important issue in this context, dominating debate and research on heritage and environment, is global climate change and its effects on the material and immaterial heritage (ICOMOS 2008; Long and Smith 2010). Global climate change as defined in Article 1.2 of the *United Nations Framework Convention on Climate Change* (1992) endangers heritage on a global scale and in a variety of ways. According to ICOMOS, the "main climate change parameters affecting cultural heritage are temperature change, atmospheric moisture change, sea level rise, wind, desertification, pollution and biological infestation" (ICOMOS 2008: 194). The effects these parameters have on tangible heritage are starting to be recognized and investigated in detail, and international recommendations on adaptation to climate change developed, emphasizing the relevance of tools such as monitoring, research, preventive maintenance, and training and advocacy with regard to global climate change and risk preparedness (ICOMOS 2007). In fact, there is a focus on the preservation of material fabric and on technical, site-specific approaches to adapt to the threats climate change is posing to buildings and structures. Developing a more comprehensive understanding of climate change as a threat to culture and intangible heritage, in fact to livelihoods, as well as an understanding of "the power of culture" as a tool helping to adapt or even mitigate climate change, will be of growing importance in the future (Long and Smith 2010: 184).

With the growing weight of heritage preservation in international politics, another major issue on the rise is human rights in heritage conservation. Research in political analysis has highlighted the arguably critical potential of heritage as a practice of social oppression and exclusion (Smith 2006; Díaz-Andreu García 2007), and in this context the dominance of Western scholarship

in international heritage conservation has received overdue critique. While the UNESCO *Convention for the Safeguarding of Intangible Cultural Heritage* from 2004 is generally acknowledged as a first important measure to amend this imbalance, as it explicitly relates to the Universal Declaration of Human Rights (United Nations, 1948), the challenge remains of how to reconcile the concept of heritage, defining a collective cultural identity, with fundamental but individual rights. The *Fribourg Declaration on Cultural Rights* is breaking ground here by declaring cultural rights as intrinsic to human rights (*Fribourg Declaration on Cultural Rights*, 2007). Likewise, the *Faro Convention*, that is, the *Council of Europe Framework Convention on the Value of Cultural Heritage for Society* (Council of Europe 2005), is not only "recognizing the need to put people and human values at the center of an enlarged and cross-disciplined concept of cultural heritage" (*Faro Convention*, Preamble), but explicitly states that "rights relating to cultural heritage are inherent in the rights to participate in cultural life, as defined in the Universal Declaration of Human Rights" (*Faro Convention*, Art. 1). In this regard, the growing impetus of critical research on the political aspects of heritage preservation (Smith 2004; Fairclough et al. 2008; Tunbridge 2008) contributes to exploring the potential of heritage preservation principles to employ the fundamental power of cultural heritage for identity and community building, based on the principles of democracy, social justice, and equal rights. Recent studies on the international status quo of cultural rights indicate also their growing importance for international heritage principles (Shaheed 2010).

Cross-References

- ▶ Authenticity and the Manufacture of Heritage
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Cultural Heritage and the Public
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: Public Perceptions
- ▶ Stakeholders and Community Participation
- ▶ UNESCO (1972) and Malta (1992) Conventions
- ▶ World Heritage and Human Rights

References

Araoz, G. 2009. *Protecting heritage places under the new heritage paradigm & defining its tolerance for change: A leadership challenge for ICOMOS*. A message for the meeting "Conservation turn – return to conservation: challenges and chances in a changing world". ICOMOS ISC Theory and Philosophy of Conservation and Restoration, La Valetta, Malta, October 2009. Available at: http://www.fondazione-delbianco.org/seminari/progetti_prof/progview_PL.asp?start=1&idprog=283 (accessed 14 August 2012).

Australia ICOMOS. 1999. The Burra Charter: The Australia ICOMOS Charter for places of cultural significance.

Avrami, E., R. Mason, and M. de la Torre. 2000. *Values and heritage conservation*. Los Angeles: Getty Conservation Institute.

Babelon, J.-P., and A. Chastel. 1994. *La notion de patrimoine*. Paris: Liana Levi.

Choay, F. 1996. *L'Allégorie du patrimoine*. Nouvelle éd. revue et corrigée. Paris: Editions du Seuil.

Clark, K., ed. 2006. *Capturing the public value of heritage. The proceedings of the London Conference 25–26th January* 2006. London: English Heritage. Available at: http://www.helm.org.uk/upload/pdf/Public-Value.pdf (accessed 14 August 2012).

Clark, K. 2010. Values in cultural resource management. In *Heritage values in contemporary society*, ed. G. Smith, P. Messenger, and H. Soderland, 89–99. Walnut Creek: Left Coast Press.

Council of Europe. 1992. *European convention on the protection of the archaeological heritage (Revised)*. Valetta.

Council of Europe. 2005. *Council of Europe framework convention on the value of cultural heritage for society*. Faro.

De La Torre, M., ed. 2002. *Assessing the values of cultural heritage. Research report*. Los Angeles: The Getty Conservation Institute.

De La Torre, M., M. MacLean, R. Mason, and D. Myers. 2005. *Heritage values in site management: Four case studies*. Los Angeles: Getty Conservation Institute.

Díaz-Andreu García, M. 2007. *A world history of nineteenth-century archaeology. Nationalism, colonialism, and the past*. Oxford: Oxford University Press.

Fairclough, G., R. Harrison, J.H. Jameson Jr., and J. Schofield, eds. 2008. *The heritage reader*. London/New York: Routledge.

ICOMOS. 1964. The Venice Charter: International Charter for the conservation and restoration of monuments and sites.

ICOMOS. 1981. The Florence Charter: Historic gardens.

ICOMOS. 1987. Washington Charter: Charter for the conservation of historic towns and urban areas.
ICOMOS. 1990. Charter for the protection and management of the archaeological heritage (Lausanne).
ICOMOS. 1999. International cultural tourism charter.
ICOMOS. 2007. Recommendations from the ICOMOS scientific council symposium cultural heritage and Global Climate Change (GCC). ICOMOS Scientific Council. Pretoria. October 2007. Available at: http://www.icomos.org/en/what-we-do/focus/heritage-and-climate-change (accessed 16 August 2012)
ICOMOS. 2008. Heritage at risk. In *ICOMOS world report 2006/2007 on monuments and sites in danger*, 192–224. E. Altenburg: Reinhold-Verlag.
Jokilehto, J. 2002. *A history of architectural conservation*. Oxford: Butterworth-Heinemann.
Long, C., and A. Smith. 2010. Cultural heritage and the global environmental crisis. In *Heritage and globalisation*, ed. S. Labadi and C. Long, 173–191. London/New York: Routledge.
Petzet, M. 2005. Principles of conservation. In *Monuments and sites I. International charters for conservation and restoration*, ed. ICOMOS, 7–29. München.
Poulot, D. 2001. *Patrimoine et musées. L'institution de la culture*. Collection Carré histoire 54. Paris: Hachette.
Schmidt, L. 2008. *Architectural conservation – An introduction*, 17–22. Berlin/Bonn: Westkreuz.
Shaheed, F. 2010. Report of the independent expert in the field of cultural rights, Ms. Farida Shaheed, submitted pursuant to resolution 10/23 of the Human Rights Council, Geneva.
Smith, L. 2006. *Uses of heritage*. London: Routledge.
Tunbridge, J.E. 2008. Whose heritage to conserve? Cross-cultural reflections on political dominance and urban heritage conservation. In *The heritage reader*, ed. G. Fairclough, R. Harrison, J.H. Jameson Jr., and J. Schofield, 235–244. London/New York: Routledge.
UNESCO. 1972. Convention concerning the protection of the world cultural and natural heritage (the World Heritage Convention).
UNESCO. 1994. *Nara document on authenticity.* Tokyo.
UNESCO. 2001. Convention on the protection of underwater cultural heritage.
UNESCO. 2011. Operational guidelines for the implementation of the World Heritage Convention.
UNESCO World Heritage Centre. 2007. *World heritage – Challenges for the millennium*. Paris: UNESCO.
Vinson, I. 2009. ICCROM's contribution to the ethics of heritage. *Museum International* 61 (3): 90–97.

Further Reading

Anico, M., and E. Peralta, eds. 2008. *Heritage and identity. Engagement and demission in the contemporary world*. London: Routledge.
Francioni, F. 2008. *Au-déla des traités: l'emergence d'un nouveau droit coutumier pour la protection du patrimoine culturel*. EUI Working Paper LAW 2008/05. San Domenico di Fiesole: European University Institute Department of Law.
Groupe De Fribourg. 2007. *Fribourg declaration on cultural rights*. Geneva: Fribourg.
Hoffman, B.T., ed. 2006. *Art and cultural heritage: Law, policy and practice*. Cambridge: Cambridge University Press.
Jokilehto, J. 2011. *ICCROM and the conservation of cultural heritage. A history of the organization's first 50 years, 1959–2009*. ICCROM Conservation Studies 11. Rome: ICCROM.
Larsen, K.E., ed. 1995. *Nara Conference on authenticity in relation to the World Heritage Convention. Conference de Nara sur l'authenticité dans le cadre de la Convention du Patrimoine Mondial. Nara, Japan; 1–6 November 1994*. Tokyo: UNESCO World Heritage Centre/Agency for Cultural Affairs (Japan)/ICCROM/ICOMOS.
Smith, L. 2004. *Archaeological theory and the politics of cultural heritage*. London/New York: Routledge.

International Journal of Cultural Property

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Basic Information

The *International Journal of Cultural Property* is an interdisciplinary peer-reviewed journal focused on cultural property and heritage law and policy. It is currently published quarterly by Cambridge University Press and is available worldwide both in print and online. The website is http://journals.cambridge.org/action/displayJournal?jid=JCP, and the editorial office may be reached by email at culturalproperty@cambridge.org.

Major Impact

Founded in 1992 by John Henry Merryman of Stanford Law School as the journal of the International Cultural Property Society, the *IJCP* quickly established itself as the leading journal in the emerging field of art and antiquities law. Over the years, it has expanded its scope to include a full range of topics related to "cultural property" and heritage studies, though with its particular distinction being its continued emphasis

on those subjects' legal and policy dimensions (Bauer 2005). As a result, it enjoys wide readership and regularly features contributions from those in policy arena such as the United Nations Educational Scientific and Cultural Organization (UNESCO), the International Council on Monuments and Sites (ICOMOS), and the World Intellectual Property Organization (WIPO). As of 2010, the *IJCP* has published 17 annual volumes, with a hiatus during 2003 and 2004. Over that time, it had three editors in chief: Norman Palmer (1992–1995), Patty Gerstenblith (1996–2002), and Alexander Bauer (2005–present).

The *IJCP* has published several articles and special issues that have been widely recognized for their importance in the field of cultural heritage. Articles include Lyndel Prott and Patrick O'Keefe's (1991) "'Cultural Heritage' or 'Cultural Property'?," John Henry Merryman's (1994) "A Licit International Trade in Cultural Objects," John Boardman's (2000) "The Elgin Marbles: Matters of Fact and Opinion," and Michael F. Brown's (2005) "Heritage Trouble: Recent Work on the Protection of Intangible Cultural Property." Special issues and sections have included "Cultural Heritage of Indigenous Peoples," edited by Robert K. Paterson and Patrick O'Keefe (1999); "Museums and the Pacific," edited by Haidy Geismar (2008); "Decoding Implications of the Genographic Project for Archaeology and Cultural Heritage," edited by Julie Hollowell and George Nicholas (2009); and "Spoils of War v. Cultural Heritage: The Russian Cultural Property Law in Historical Context," edited by Patricia Kennedy Grimsted (2010).

Cross-References

- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ World Heritage Journals

References

Bauer, A.A. 2005. (Re)Introducing the "International Journal of Cultural Property". *International Journal of Cultural Property* 12: 6–10.

International Journal of Heritage Studies

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Brief Definition of the Topic

Founded in 1994, this is the leading referred interdisciplinary journal in international heritage studies. Published as 12 issues a year (as of 2019), by Routledge, the *International Journal of Heritage Studies* (IJHS) includes original research articles, review articles, short reports or discussion pieces, and book reviews. The remit of the journal is to encourage the development of heritage studies both as an area of academic enquiry and as an area of public policy and practice.

Heritage studies became a recognizable area of academic enquiry during the 1980s. The study of heritage was itself initiated by the surge of national and international policies and legal instruments that were enacted around the globe during the 1960s and 1970s in an attempt to conserve and protect the built environment, archaeological sites, artistic works, and significant material culture as heritage. Although heritage studies developed out of the professional practices concerned with heritage management and architectural and art conservation, heritage studies is not confined only to the development of technical issues and practice. IJHS is dedicated to the theorization of heritage as a cultural phenomenon and aims at fostering international and interdisciplinary debate about the nature and meaning of heritage with particular emphasis on how heritage links to memory, identity, and sense of place.

Thus, the remit of the journal is to publish articles contextualized within the growing field of heritage and museum studies which contribute to debate about the theorization of heritage as cultural, political, and/or social experiences as well as articles that critically address technical, professional, or policy issues (i.e., cultural heritage management). In fostering the development of heritage studies, the journal also supports the development and activities of the Association of Critical Heritage Studies, the inaugural conference for which was held in 2012 at the University of Gothenburg, Sweden.

Contributing authors come not only from the interdisciplinary area of heritage and museum studies but also from the disciplines of geography, history, tourism, sociology, anthropology, law, cultural studies, archaeology, architecture, politics, social psychology, memory studies, and interpretation and design.

The founding editor of the journal was the geographer Peter Howard (1994–2007), then at the University of Plymouth (UK), he was followed by Fiona McLean (2007–2008), then at Glasgow Caledonian University, and the journal has been edited since 2009 by Laurajane Smith (Australian National University). The current book review editors are Ross Wilson (University of Nottingham UK) and Michelle Stefano (Library of Congress, American Folklife Center). The editorial board is made up of academics and practitioners from a range of disciplinary and national contexts. The URL for the journal is https://www.tandfonline.com/toc/rjhs20/current.

Cross-References

- ▶ Heritage Museums and the Public
- ▶ Heritage Theory
- ▶ Heritage: History and Context

References

International Journal of Heritage Studies. Available at https://www.tandfonline.com/toc/rjhs20/current.

International Journal of Historical Archaeology

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Brief Definition of the Topic

The *International Journal of Historical Archaeology* is a professional, fully refereed quarterly published in March, June, September, and December. Charles E. Orser, Jr., developed the journal in 1996 in collaboration with Eliot Werner, who was then the anthropology/archaeology editor at Plenum (now Springer).

By the early 1990s, the practice of historical archaeology was expanding throughout the world, but much of the research results were known only to archaeologists working or living within the particular region of the research. In addition, a significant proportion of worldwide research in the field was being conducted as agency-sponsored projects, research that typically includes the preparation of manuscripts of limited distribution. The original plan of the journal was thus to extend the reach of historical archaeology by publishing articles by professional archaeologists throughout the world regardless of their location. The underlying belief was that a broader appreciation of important research taking place outside North America and Western Europe – locations already well served by professional journals – would enormously benefit the discipline by allowing archaeologists to widen the scope of their comparative knowledge.

The journal defines historical archaeology in two ways: (1) as a general method that employs materials from archaeological excavation and textual information in the study of the past and (2) as the use of this multidisciplinary method to examine specifically the post-1500 CE world. Most of the articles published as of this writing conform to the second meaning, but the *IJHA* accepts manuscripts focused on all issues pertinent to contemporary historical archaeology regardless of

temporal focus, provided the author uses textual materials (broadly defined) in some fashion.

Cross-References

- ▶ Archaeological Record
- ▶ Community Engagement in Archaeology
- ▶ Critical Historical Archaeology
- ▶ Critical Theory in Archaeology
- ▶ Global Archaeology
- ▶ Historical Archaeology
- ▶ Landscape Archaeology
- ▶ Material Culture and Education in Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Post-Medieval Archaeology
- ▶ Social Memory in Archaeological Theory

Further Reading

International Journal of Historical Archaeology. n.d. Available at: www.springer.com/social+sciences/archaeology+&+anthropology/journal/10761.

International Scientific Committee for Documentation of Cultural Heritage (CIPA)

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Basic Information

CIPA is ICOMOS's (International Council on Monuments and Sites) Scientific Committee for Documentation of Cultural Heritage (CIPA), established in 1968 in collaboration with ISPRS (International Society of Photogrammetry and Remote Sensing). Its web site is at http://cipa.icomos.org/ (Fig. 1).

International Scientific Committee for Documentation of Cultural Heritage (CIPA), Fig. 1 Logo of CIPA

Major Impact

CIPA's main purpose is the improvement of all methods for recording, documentation, and information systems of heritage places, specially through the synergic effects gained by the combination of methods; particularly, the special consideration of digital surveying with all its aspects is an important contribution to recording and perceptual monitoring of cultural heritage, to conservation and restoration of any valuable architectural or other cultural monument, object or site, and as a support to architectural, archaeological, and other art-historical research.

ISPRS and ICOMOS created CIPA because they both believed that a monument can be restored and protected only when it has been fully measured and documented and when its development has been documented again and again, i.e., monitored, with respect to its environment, and stored in proper heritage information and management systems.

CIPA holds an International Symposium every 2 years, either in conjunction with a major conference of the two parent organizations or as a special

CIPA event. Often, accompanying these Symposia are specialist workshops dealing with specific topics. The proceedings of the Symposia are also published, either as a journal or on CD-ROM, and some papers are available through the CIPA web site. CIPA also maintains a discussion list, where the experts associated with CIPA provide advice and information on problems and solutions. It also supports other heritage recording initiatives internationally.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Aerial Archaeology
- ▶ Buildings Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Management Technology and Training
- ▶ Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation
- ▶ Heritage Conservation Training
- ▶ Historic Building Conservation: Current Approaches
- ▶ Historic Site and Historic Building Preservation: Overview
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Surface Survey: Method and Strategies
- ▶ UNESCO World Heritage Convention (1972)

Further Reading

Carbonell, M. 1983. *Hans Foramitti et le développement de la photogrammétrie architecturale*. Paris: ICOMOS Publication.

Hanke, K. n.d. CIPA. Available at: http://en.wikipedia.org/wiki/CIPA_(organization) (accessed 15 August 2012).

Patias, P. 2004. *35 years of CIPA. XXth ISPRS Congress, Technical Commission II, July 12–23, 2004, Istanbul, Turkey, Volume XXXV Part 2*. Available at: http://www.isprs.org/proceedings/XXXV/congress/comm2/comm2.aspx (accessed 15 August 2012).

International Slavery Museum

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Introduction

The display galleries at the International Slavery Museum (ISM) opened on August 23, 2007. Not only was 2007 the bicentenary of the Abolition of the Slave Trade Act but also a day designated by UNESCO as Slavery Remembrance Day, the anniversary of an uprising of enslaved Africans on the island of Saint-Domingue (modern Haiti) in 1791. Each year, National Museums Liverpool commemorates Slavery Remembrance Day with a series of events culminating in a traditional libation on the world famous Liverpool waterfront. The day pays homage to the many lives lost as a result of transatlantic slavery; it remembers Liverpool's role as the main British slaving port and also celebrates the survival and development of African Diaspora cultures.

The main objectives of ISM are the following: (1) to inform and help visitors understand the history of transatlantic slavery and the wider issues of freedom and injustice; (2) to challenge preconceptions, prejudice, and ignorance; (3) to encourage visitors to regard transatlantic slavery and its consequences as a shared history with shared responsibility for addressing its legacy in the modern world; and (4) to interpret, in an open

and honest manner, Liverpool's role in the transatlantic slave trade and its impact on the economic and cultural growth of the city.

ISM has three permanent galleries: *Life in West Africa* looks at the area from which the majority of enslaved Africans were stolen and explores Africa's long and complex cultural history; *Enslavement and the Middle Passage* covers the economics of slavery, particularly focusing on the Liverpool merchants that were at the forefront of British involvement, plantation life, and slaving voyages; *Legacy* examines slavery as a modern phenomenon – global inequalities, cultural transformations, racism and discrimination, and the lives and achievements of members of the African Diaspora.

The museum aims to enhance the understanding of the past and how its legacies affect people's daily activities, opportunities, and aspirations. One of the ways in which ISM aims to achieve these goals is by being an active supporter and vehicle of social change, as well as a political campaigner in the field of human rights. Marstine (2006: 2) explains that "Museums are not neutral spaces that speak with one institutional, authoritative voice. Museums are about individuals making subjective choices."

Definition

Terminology can often be problematic when dealing with issues around slavery, such as the use of the word "trade" in transatlantic slave trade. Several commentators believe this excuses the process of enslavement and commoditizes the enslaved Africans. Recent scholarship has also seen a shift from using the name *slaves* to an adjective *enslaved* granting these people an identity, describing their place in society and not reducing them to that position.

Key Issues/Current Debates

African Diaspora Archaeology

ISM demonstrates the value of the archaeology of slavery within museums and how archaeology can speak on behalf of certain (at times forgotten) African Diaspora communities. The museum has participated in several slavery-related archaeological projects. The St. Kitts-Nevis Digital Archaeology Project investigated the lives of enslaved Africans through excavation and interpretation of the material remains they left behind. The project digitized and delivered web information for three eighteenth-century plantations and their "slave" villages: two located on Nevis and the other on St. Kitts. The result is a digital collection of fully searchable archaeological and historical data from multiple sites in the Caribbean that is accessible on the **ISM** website, one of several information portals (http://www.liverpoolmuseums.org.uk/ism/slavery/archaeology/).

The museum also collaborated with archaeologists and the St. Helenan authorities on loaning archaeological material and designing an associated exhibition relating to excavations undertaken in Rupert's Valley, St. Helena, as part of the cultural heritage mitigation for the island's forthcoming airport. The works were carried out by a team of professional archaeologists from the United Kingdom, supported by a number of St. Helenan and non-Saint volunteers. The location formed part of the burial grounds for Africans liberated from slaver ships by the Royal Navy's West Africa Squadron in the mid-nineteenth century. Much of the valley is occupied by these unmarked burial grounds, and the excavations only uncovered a very small proportion of the total number of burials that are known to exist. Prior to this project, no archaeological work had taken place on St. Helena, and so the team broke new ground in every respect. In all, over 300 bodies were excavated, in single graves and from multiple interments. Rupert's Valley contains one of the few graveyards of Africans rescued directly from the slave ships, hence the immense cultural and heritage significance of this remote valley (Pearson et al. 2011).

Museums have to be mindful of the words of Joseph (2011: vii) who notes how activist archaeologists are exploring "the meaningful connections between artefacts from the earth and living communities." One has to put this into context with regard to the archaeology of slavery and its

depiction in a museum. A key point to understand is the value of archaeological research and partnership work for ISM and museums in this field generally. Working with archaeologists whose research covers aspects of the archaeology of slavery aids collection development and object research and offers academic credence to the museum. It offers the opportunity to include material culture relating to sites and individuals which will broaden the understanding of a subject matter and to work with African Diaspora communities in countries where archaeological research is taking place (e.g., St. Kitts and Nevis and St. Helena).

The breadth of archaeological slavery-related material within a museum environment should demonstrate a broad degree of material culture not just from a European perspective, such as goods related to the economics of slavery or implements of enslavement such as physical restraints, whips, and shackles, objects more traditionally associated with slavery. These types of objects are almost overwhelmingly made in Europe, and although interesting and rare themselves, a museum of slavery should, in addition, display and research objects that were either made or owned by enslaved or free and emancipated Africans. Disciplines such as plantation archaeology and African American archaeological studies on lifeways can offer the public a greater awareness of the subject of the African Diaspora and indeed transatlantic slavery and its consequences through related objects (see Singleton 1999).

ISM has a Cultural Transformations section within the Legacy Gallery which shows examples of material culture and cultural traits which might have traveled with Diaspora groups from Africa to locations such as the United States, South America, and the Caribbean. Merriman (1999: 49) notes how there are two methodological approaches to carrying out research on African American lifeways. One recognizes the archaeological patterning of slave sites, using these as markers or signals, whereas the second focuses on "the search for objects with physical or behavioral links to Africa's west coast, has moved beyond the simple transfer of objects and ideas across the Atlantic to a more refined focus which integrates behavior with material culture." In essence, this approach demonstrates how the archaeological record can show that cultural traditions within new environments could be modified, using material at their disposal, rather than simply transferred from Africa.

However, it should be noted that Fennell (2011: 2) observes that there are a host of "theoretical constructs and interpretative frameworks employed in African diaspora archaeology projects and comparative studies in the historical archaeology of sites in Africa." The subject of slavery, both in a historic and modern setting, is expansive and diverse, and although the core of the International Slavery Museum is transatlantic slavery and its legacies, future developments will include facilities to carry out further research in areas currently not covered in great depth in the display galleries but which fall within the museum's remit. This might include slavery and enslavement within prehistory, the classical era, and the Islamic world, "the Gulag" in the former USSR, or the system of indentured labor.

Agency

Agency and ownership need to be carefully considered when designing galleries and planning collection strategies. These discussions were central to the development of one of the more disconcerting yet constructive juxtapositions displayed in the International Slavery Museum: the relationship between the Ku Klux Klan outfit and the Black Achievers Wall. As soon as one walks into the Legacy Gallery, it is difficult not to catch a glimpse of the Black Achievers Wall which has a central, prominent position. It sits close to the Ku Klux Klan outfit but is not dominated by it – achievement versus oppression. This juxtaposition lends itself to the words of Little (2010: 4) who observes, "Our experiences with our histories can leave us both heartened and dismayed, sometimes simultaneously."

In various community consultation sessions arranged prior to the opening of ISM in August 2007, a recurring theme was that the museum had to carefully balance the horror and often visceral presentation of transatlantic slavery with a backdrop of resistance and African and Black

achievement. The Black Achievers Wall shows Black achievement across the arts, sciences, and sporting world, constituting one of several attempts at challenging the visitor not to leave ISM associating African and Black history exclusively with transatlantic slavery or negative perceptions of history. The Black Achievers Wall is intended especially for those visitors of all ages, who know very little about the subject of transatlantic slavery or African history. It is an eclectic portal into African achievement which is often, although not solely, born out of oppression.

The visually emotive Ku Klux Klan exhibit challenges stereotypes, comic caricatures, and romanticized portrayals of the confederacy and the Ku Klux Klan in popular culture, such as *Gone with the Wind* (1939) and *Birth of a Nation* (1915). The fact that the ISM outfit was worn by a Ku Klux Klan member from Orange County in New York State also highlights the fact that this racist organization was nationwide in the United States and not restricted to the southern states.

Future Directions

Within an archaeological framework, there are a number of areas which the museum could develop further, for example, maritime slavery studies and the support of excavations for the next *Henrietta Marie* (see Cottman 1999) by collaborating with projects such as the Slave Wrecks Project (http://www.slavewrecksproject.org/).

There is also an opportunity to expand slavery-related studies and to focus on more African-centered aspects of the narrative such as life in West Africa and the cultural processes which existed prior to encounters between Europeans and Africans and research on contact sites outside of the coastal region, including defensive walls around settlements and shrines or abandoned settlements depopulated by slave raiding. It would also make sense to build on previous archaeological preservation work and research at slave forts such as Cape Coast Castle as well as on free slave settlements and indeed the archaeology of the suppression of slave raiding and trading post abolition – focusing on British-built hinterland forts (see MacEachern 2005: 457–548; Kankpeyeng 2009).

ISM is currently developing one of the world's first permanent collections on the subject of modern slavery, including bonded labor, early and forced marriage, forced labor, slavery by descent, trafficking, and child labor. The focus of this collection is individuals' experiences of being enslaved. The collection, focusing on associated objects, will be used as an interpretive tool to ignite discussion and dialogue about modern slavery and to support campaigns and raise awareness. Moreover, the museum also supports exhibition proposals from external organizations, which actively campaign against all forms of modern racism, discrimination, and slavery.

This new collection stands alongside several other collections. The Diaspora Collection focuses on social history material relating to the Black Diaspora, both historical and modern, from countries that have a link to transatlantic slavery, and in particular the Black presence in the United Kingdom. The curatorial team is particularly interested in Liverpool's social history, actively sourcing collections that reflect the experiences and identities of Liverpool's Black community, their relationship with the city, and the impact of social, political, and economic change on their lives.

The Legacy Collection covers two main areas. Racist memorabilia are a collection of manufactured items that depict racist imagery and racist stereotypes of people of African descent. This material is usually American or British in origin and is often referred to as "Americana" or "Black memorabilia" – not wholly appropriate titles. The Global Inequalities collection reflects the political, economic, and environmental issues associated with global inequalities and fair trade. The domination of world trade by Western markets is considered by many to be a form of economic imperialism, a legacy of the colonial era, and a source of present inequalities. The collection seeks to show these inequalities through case studies and objects from countries such as Haiti, Sierra Leone, Brazil, and Guyana.

It was a steep learning curve for the museum to create one of the few, if not the only, permanent modern slavery collections. The first accessioned

object within the strand was the artwork *Missing* (2007) in 2009 by the artist Rachel Wilberforce. It consists of a series of photographs depicting scenes of a slave trade which still thrives. Photographed in urban and suburban Britain, the images depict sex trafficking and prostitution and the interiors and exteriors of working or derelict flats, brothels, and so-called massage parlors (Wilberforce 2011).

Following this visually evocative work, in 2010 the museum acquired several slavery-related ankle bracelets from the collections of Anti-Slavery International. One of the bracelets was "worn" by a young girl in Niger who was subjected to a form of descent-based slavery. Descent-based slavery occurs in some countries where people are either born into or are descended from a group perceived by other groups as suited for slave labor. The bracelets represent the importance of the work of ISM in developing its collections in modern slavery and campaigning to fight it. The ISM curatorial team understood that it was important to display the ankle bracelets alongside the personal stories of the wearers, to challenge the visitor who believes slavery to be an issue of the past rather than the present. Indeed, there was discussion about referring to the objects as "bracelets" which tends to conjure up images of physical adornment for personal vanity reasons rather than a tool of enslavement. Ultimately, it was decided to use the title given by Anti-Slavery International but to recognize that this subject may need to be addressed at a later stage.

Added to this is the way we might begin to archaeologically frame, among other methodologies, the material culture of modern slavery, which will add a whole new ethical dimension to the archaeology of slavery. Even though enslavement, forced labor, and the quest for freedom are broad thematic classifications, there is the possibility for them to become tangible archaeological strands within a museum of slavery. Modern slavery has social and economic characteristics, which, although difficult, are not unachievable to trace within an archaeological framework.

The conceptual and critical approaches to modern slavery are wide-ranging with the ability to cover a broad spectrum of material culture from personal items of the enslaved individuals (keepsakes, belongings) to related landscapes, such as places of enforced work (brothels, factories) and domestic life in general.

Conclusion

Lowenthal (2003: 187) noted "the fact that the past is no longer present clouds knowledge of it with uncertainty." The statement has less validation when one includes objects of modern slavery. Their meaning is validated by personal interaction and experiences with them; they are most definitely not what Lowenthal calls "*beyond reach*." Not only is the collecting of modern slavery an innovative and challenging strand for the museum, but the related archaeology takes the archaeology of slavery to a new level and opens up new research possibilities that are only now beginning to take shape. Through the development of archaeological research and the displaying of archaeological material, the museum can increase visitors' understanding of the significant role archaeology has to play in slavery studies and museum development generally.

As the museum's modern slavery collection grows and as its partnerships with human rights organizations develop, ISM will have difficult decisions to make about how much and to what we expose the museum's visitors. Allison and Gwaltney (1991: 69) point out, "most visitors are collecting impressions and experiences that will 'make sense' later in conjunction with other experiences and activities in their lives." ISM recognizes the fundamental need for social issues to be challenged and addressed and can become a place where visitors and community members not only "make sense" but "get involved" with subjects and campaigns that ISM champions through its programming and collections.

Cross-References

- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage Museums and the Public
- ▶ Museums and Memory Experiences

References

Allison, D.K., and T. Gwaltney. 1991. How people use electronic interactives: Information age – People, information & technology. In *Hypermedia & interactivity in museums: Proceedings of an international conference*, ed. D. Bearman, 69. Pittsburgh: Archives & Museum Informatics.

Cottman, M.H. 1999. *The wreck of the Henrietta Marie: An African-American's spiritual journey to uncover a sunken slave ship's past*. New York: Harmony Books.

Fennell, C. 2011. Early African American: Archaeological studies of significance and diversity. *Journal of Archaeological Research* 19: 1–49.

Joseph, J.W. 2011. African potters, marks and meanings in the folks pottery of the Edgefield District, South Carolina. *Historical Archaeology* 45 (2): 134–155.

Kankpeyeng, B.W. 2009. The slave trade in northern Ghana: Landmarks, legacies and connections. *Slavery & Abolition* 30: 209–221.

Little, B.J. 2010. Introduction. *CRM: The Journal of Heritage Stewardship* 7 (2): 1–2.

MacEachern, S. 2005. Two thousand years of West African history. In *African archaeology*, ed. A. Brower Stahl, 457–458. Oxford: Blackwell.

Marstine, J. 2006. *New museum theory and practice*. Oxford: Blackwell.

Merriman, N. 1999. *Public archaeology*. London/New York: Routledge.

Pearson, A., B. Jeffs, A. Witkin, and H. Macquarrie. 2011. *Infernal traffic. Excavation of a liberated African graveyard in Rupert's Valley, St Helena*, CBA research report 169. York: Council for British Archaeology.

Singleton, T. 1999. *"I, too, am America": Archaeological studies of African-American life*. Charlottesville: The University Press of Virginia.

Wilberforce, R. 2011. Missing 2007/08. Available at: http://www.rachelwilberforce.com/works/missing. Accessed 3 Aug 2011.

International Standardization of Fieldwork Payments

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Introduction

Archaeologists, as employers, engage in a capitalistic system. It is the archaeologist's ethical obligation to negotiate this system responsibly, in a manner informed by anthropological and interdisciplinary perspectives. An international committee of archaeologists should establish a standard for fieldworker payment, in order to prevent social injustice and the exploitation of peripheral communities.

Definition

As archaeological research moves forward in a post-globalized age, the standardization of fieldworker payment has become a more pressing issue of social justice (Linde 2012). Modern communities do not exist in an economic vacuum; rather, they are participants in the global marketplace. Failing to pay locally sourced workers in economically marginalized countries, a standardized international rate perpetuates the structural inequalities inherent in a colonial capitalistic system. Archaeologists, having a unique perspective and understanding of these global systems of power, are fully responsible for the fair treatment of their laborers. The creation of an internationally accepted standard for fieldworker payment would prevent the economic exploitation of communities by replacing the current system in which wages may be arbitrarily established by the individual archaeologist.

Historical Background

Since the dawn of archaeological research, archaeologists have employed local laborers to assist in the excavation process. Historically, this was a purely practical and economic choice, largely due to the budget constraints under which archaeology is conducted. Hiring cheap, locally sourced labor saved Western archaeologists abroad both time and money. However, in recent years the employment of local fieldworkers has taken on the dual purpose of community engagement and public outreach. Commissioning local labor involves the community in the archaeological process and promotes the

reciprocal flow of information between the archaeologist and the public (Overholtzer 2015).

Key Issues/Current Debates

One argument against the international standardization of fieldworker payment posits that offering a pay rate deemed fit by Western standards will upset the delicate economic balance of peripheral communities. A sudden influx of wealth into a poor community may have serious impacts on the inhabitant's daily lives. However, by examining the issue on a more personal level, as a transaction between archaeologist and employee, the ethical course of action becomes evident. Paying a locally sourced laborer less than a Westerner for the same work is an injustice with deep roots in the colonial history of the world and of the discipline itself. Archaeology was originally done by those who were privileged in the global system of power. These early archaeologists often conducted research in countries impacted by colonial exploitation. Archaeologists today should challenge the methodologies of the disciplines colonial past. It is also important to note that even the most marginalized of peripheral communities does not exist in an economic vacuum, but actively participates in the global market. Communities are not in a state of peaceful homeostasis until a disruptive archaeologist comes along to offer profitable employment.

International Perspectives

Archaeologists in the USA are grappling with issues of fair payment (McGuire and Walker 1999). Archaeological unions, such as the United Archaeological Field Technicians and Unite Archaeology Ireland, have been formed by workers in the USA and Ireland. Members of these labor unions demand a living wage for their work. However, there are no international unions to demand a fair wage for all fieldworkers. Considering the complicated issue of fair payment within the USA, it is not surprising that little effort has been made toward regulating the wages offered to laborers hired abroad.

Future Directions

The allocation of fair payment should be addressed in the budgeting stages of every project in which local laborers will be employed. Providing a standard pay rate to all fieldworkers, regardless of nationality, would have a lasting impact on the discipline. The shift in resource allocation may mean scaling back ambitious projects abroad, but it is essential to the promotion of cross-cultural equality. The standard for payment should be established by an international committee of archaeologists. Archaeologists must make the fair treatment of locally sourced workers a top priority, rather than focusing solely on individual research goals. Archaeologists are stewards of cultural heritage, and it is this living population that gives archaeological research meaning and relevance.

Cross-References

- ▶ Activism and Archaeology
- ▶ American Anthropological Association (AAA) and Ethics
- ▶ Archaeological Fieldwork
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in Times of Economic Crisis

References

Linde, S.J.V.D. 2012. *Digging holes abroad. An ethnography of Dutch archaeological research projects abroad*. Leiden University Press: Leiden.

McGuire, R.H., and M. Walker. 1999. Class confrontations in archaeology. *Historical Archaeology 33* (1): 159–183.

Overholtzer, L. 2015. The field crew symposium a model for initial implementation of a collaborative archaeology project. *Advances in Archaeological Practice 3* (1): 50–62.

I

International Symposium on Archaeometry

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Basic Information

The International Symposium on Archaeometry (ISA) is a biennial meeting organized to promote the development and use of scientific techniques in order to extract archaeological and historical information from the cultural heritage and the paleoenvironment. It involves all natural sciences and all types of objects and materials related to human activity. ISA's website is at http://www.ims.demokritos.gr/ISA/.

The beginning of ISA can be retraced as early as the 1960s, when the applications of natural sciences in archaeology started to gain more and more importance. While, during the early years, the main focus of the meetings was on geophysical prospection methods of archaeological sites, now all topics in the field of archaeological sciences are covered. Such topics include characterization of inorganic and organic materials, objects and monuments for the identification of provenance and technology, absolute dating, paleoenvironment and paleoclimate investigations, biomaterials and bioarchaeology, prospection and field archaeology, etc. The meeting is usually organized as a 5-day conference presenting sessions on standard topics as well as special theme sessions on selected specific topics. Parallel sessions are avoided for the sake of the interdisciplinary character of the symposium and the need of all participants to be informed on the status of the research in all aspects of archaeological sciences. A very important aspect of the symposium is the poster sessions, which attract the largest number of papers and which generate ample discussion during the specially designed long poster sessions and during the breaks.

Two prizes are offered in every conference for the two best student posters, named *Martin Aitken* prizes after the founder and the first chairman of the symposium. Additional prizes for best student posters are also offered by the international Society of Archaeological Sciences (SAS), named *R. E. Taylor* prizes. More prizes are occasionally offered by different Societies.

The subjects covered by the symposium are generally grouped in the following topics which form the regular sessions in which both oral and poster papers are presented:

Technology and Provenance I (stone, plaster, and pigments).
Technology and Provenance II (ceramics, glazes, glass, and all vitreous materials).
Technology and Provenance III (metals and metallurgical ceramics).
Archaeochronometry (dating techniques, dating and interpretation strategies, cultural phase analysis, etc.)
Biomaterials and Bioarchaeology (DNA, human diet, health, mobility, demography, organic residues, zooarchaeology, archaeobotany, etc.)
Remote Sensing, Geophysical Prospection, and Field Archaeology (All kind of techniques applied to study archaeological sites from the surface, sampling, field walking strategies, site monitoring, in situ observations, etc.)
Occasionally *Integrated Site Studies*, designed for archaeologists reporting combined archaeological and scientific results and interpretation of excavation data, materials, and paleoenvironmental information are presented, either by invitation or by participants initiative.
Special theme sessions are also organized in every venue on subjects that reflect recent trends in the field of Archaeometry or related to particular interests in the region or country where the symposium takes place.
Special sub-sessions or combined sessions are frequently introduced and different emphasis may be given to one or more of the above sessions from venue to venue.

The submitted abstracts are reviewed by a board of international convenors to confirm that

they are within the scope of the conference and also to be assigned as oral or poster presentation according to the nature and extent of research, subject, and general interest. Papers that deal with weathering and deterioration of archaeological objects or monuments are welcome, provided they are relevant to one of the main themes of the symposium.

The symposium is usually attended by an international audience of several hundred scholars from diverse fields, such as physics, chemistry, materials science, geology, biology, conservation science, computer science, archaeology, anthropology, art history. Since the 1980s, the symposium is taking place in an alternating mode at locations in Europe and in the Americas organized by respective local organizing committees. This mode may change if there is a decision for a venue in a third continent.

In order to ensure the continuity and maintain the standards, the organization is managed by the Symposium *Standing Committee* composed of past meeting organizers. The first Chairman of the S.C. was Martin J. Aitken (1961–1986) of Oxford University who was succeeded by Michael S. Tite (1986–2004) also from Oxford University. Since 2004, the Standing Committee is chaired by Yannis Maniatis of National Centre for Scientific Research "Demokritos," Athens (Fig. 1).

Martin Aitken passed away on 13 June 2017 at the age of 95.

The official numbering of the symposium was introduced by I. Scollar, the organizer of the Bonn meeting in 1978. Since his area of expertise was magnetic surveying, he started the sequence with the London meeting on "Prospection in Archaeology by Geophysical Methods" in 1961. During the early years, the symposium was focused exclusively on archaeological prospection using geophysical methods. After the first meeting in London the symposium was organized in the following years at the Research Laboratory for Archaeology and the History of Art (RLAHA) at the University of Oxford. It was initially designed as a 1-day user meeting for archaeologists using proton gradiometers for prospection. In 1969 the scope of the symposium was extended to other subjects apart from archaeological prospection. The name was accordingly changed to "Symposium on Archaeometry and Archaeological Prospection." With a larger program, the symposium was expanded to a 2-day meeting in 1970 and to a 3- to 4-day meeting during the following years. In

International Symposium on Archaeometry, Fig. 1 *ISA, Leuven 29 May 2012*: Reception for the celebration of 50 years of ISA. From right: Patrick Degryse (Local Organizer), Martin J. Aitken (First Chairman of ISA), Michael S. Tite (Second Chairman of ISA), and Yannis Maniatis (Present Chairman of ISA)

1976, the symposium left RLAHA in Oxford, its constant place until then, and started its everlasting journey across the world. Its first stop in 1976 was at the University of Edinburgh which was the hosting institution. Since 1980, the official name of the meeting is *International Symposium on Archaeometry*. Usually, it is hosted in a kind of alternating mode either in Europe or in the Americas, and it comprises a 5-day program, including oral presentations and poster sessions. From 1984, the symposium is organized on a biennial base.

In May 2012, during the 39th meeting at Leuven, the Symposium celebrated its 50 years anniversary (Fig. 1).

For an account of all the places and meetings at which the Symposium was organized up to now, the Symposium was organized visit the official ISA's website at http://www.ims.demokritos.gr/ISA/.

Major Impact

ISA is a unique symposium as it provides the only international forum for all activities in Archaeological Sciences, both individually and integrated. In this conference, one can meet experts and learn of their research in dating, geophysical methods, field studies, palaeoenvironment, biomaterials, ceramics, glass, vitreous, metals, lithics, plasters, pigments, textiles, paper, and so on. New inventions of techniques and novel applications targeting specific archaeological problems are presented. The accumulated information on archaeological objects and materials is compiled and presented in a unified way in order to complete the history of mankind and fill in the gaps in the human history and culture.

Therefore, ISA with its unique character and the fact that is organized alternatively in Europe and the Americas has a global impact on Archaeological Sciences and consequently on archaeology. This impact will be further enhanced in the near future as it has been decided by the Standing Committee to include in future symposia special sessions on global issues relating to major changes and developments in human behavior on a universal level.

Cross-References

- ▶ Aitken, Martin
- ▶ Archaeometry: Definition
- ▶ Dating Techniques in Archaeological Science
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Field Method in Archaeology: Overview
- ▶ Geoarchaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ Pigment Analysis in Archaeology
- ▶ Prospection Methods in Archaeology
- ▶ Proton-Induced X-Ray Emission Spectroscopy (PIXE): Applications in Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ Scanning Electron Microscopy (SEM): Applications in Archaeology
- ▶ Society for Archaeological Sciences (SAS)
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Technological Studies in Archaeological Science
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology
- ▶ Zooarchaeology by Mass Spectrometry (ZooMS)

References

Aitken, M.J. 2012. The gestation of Archaeometry. Available at: http://www.ims.demokritos.gr/ISA/Aitken_talk2012.php.

Maniatis, Y. 2012. 50 years of ISA. Available at: http://www.ims.demokritos.gr/ISA/Maniatis_talk2012.php.

More information about the International Symposium on Archaeometry, past symposium programs, proceedings, abstracts, etc, can be found through the symposium's web page: http://www.ims.demokritos.gr/ISA/.

Tite, M.S. 2012. The 50 years anniversary of ISA. Available at: http://www.ims.demokritos.gr/ISA/Tite_talk2012.php.

Internet Use for Archaeological Education

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Introduction

Although there is some variety between archaeologists' definitions of Archaeology, most of them agree it is a science that studies material vestiges and that it aims to understand the humanity (see "▶ Archaeology: Definition"). However, archaeology is still completely unknown among a great part of general public. On the other side, some of the people who have ever heard about archeology at least once in their lives still relate it to dinosaurs or some fictional media that, even with no intention, distorts the public understanding related to real life archaeology. Journalistic media still confuses archaeology with paleontology and/or relate it to amateurs and sensationalistic studies of the past. Because of that, some archaeologists are always concerned about providing archaeological learning to the general public (see "▶ "Public" and Archaeology").

Actually, one of the scientific research goals is to transmit knowledge about produced data to other research studies and to the general public as well. Researchers all over the world diffuse this knowledge, most of the times, by scientific publication as articles and books. Unfortunately, a big part of these publications are not presented to the general public in an accessible language, presenting terms and concepts that most of the public never heard about, or discussing subjects in a very specific context. These publications are difficult for the general public, and most of the times people may lose interest in reading them. Another factor interfering on public interest is the absence of open access to some of these publications, which are usually restricted to academics. It is notable how difficult it is to encourage the public to consume these materials; therefore, researchers are always discussing ways of doing public archaeology (see ▶ "Cultural Heritage Outreach"). The main question after all is about what is the best way of providing archaeological knowledge to the public in the modern world.

Researchers interested in providing scientific knowledge for the general public have followed two main guidelines: using simple language and providing free access to scientific publications. Researchers are increasing their understanding over the importance of providing scientific knowledge, since science is made, at least partially, because of (or as a response to) a nonacademic public interest, as well as to solve problems affecting all the society.

Internet is being used now as a powerful tool for a worldwide diffusion of this scientific knowledge, as well as providing access to scientific publications. In other words, Internet is now being used for scientific education, and archaeology is part of it.

Definition

With the increase of Internet use around the world, information gained a potential for transmission never seen before, breaking social, economics, and mostly geographic barriers. People are using Internet not just with computers, but also with mobile phones, tablets, televisions, and some other modern devices. Internet is turning into the major source of information for a lot of people around the world and, in this sense, it is easy to think about how big is the potential for scientific education and learning using online methods. Following this trend, archaeological education through the Internet is also a possible reality.

Internet use for archaeological education, or **online archaeological education,** is basically a way to provide archaeological knowledge through the Internet, reaching any kind of people, academics or not. In this sense, the Internet use for archaeological education may be understood as a type of public archaeology, or even collaborative

archaeology (see ▶ "Service Learning and Public Archaeology" and ▶ "Public Education and Archaeology: Disciplining Through Education"). And because it uses digital methods online, it may even be understood as a kind of digital archaeology.

Historical Background

We do not have to go so far in the past to build a historical background about the Internet use for archaeological education, since archaeology and Internet are connected since late 1990s. Some of the most known online archaeological education projects ever done are still being carried out and may be considered pioneers in the subject. It is a relatively recent phenomenon, which has been done by very few people around the world, making us to believe that the online archeology education history is still in its beginning.

Most of the collaborators making use of the Internet for archaeological education are online magazines or websites contributors with some experience in archaeology, or even scientific journalists specialized in archaeology, heritage, and history subjects. The most known examples of Internet use for archaeological education are online magazines. Some of the most popular websites around the world used by general public for archaeological learning are *Nature* (n.d.), *National Geographic* (1996), and *Heritage Daily* (2011), for example. They are not just very popular magazines around the world, but they also have open access to archaeology sections with lots of articles in their websites. As the articles are written by experts, they provide a trustful basic knowledge about the subjects, also referring to the original publications and researchers that the articles relate to.

Another example of online archaeological education website is *Thought.co* (2017). It has contributors from a large diversity of academic areas, including archaeology. The Archaeology section includes a great number of articles. The major difference of the online magazines from *Thought.co* is that the magazines mostly present archaeology news, interviews, and reports about the subject, while *Thought.co* also presents articles aiming to educate people from the basics, with information from a variety of categories. The website informs about research studies presented all over the world, while also including articles aiming to educate people about what is archaeology, what to consider before choosing a fieldschool, why to preserve heritage and even articles about archaeology law, methods and techniques, and a dictionary. Just like in the case of the online magazines, *Thought.co* articles are written by experts and always refer to original academic publications. Because of the website proposal of educating people, it has a potential of being a primary source of archaeological content to the general public, as well as to archaeology students, since their articles refer to academic publications, being occasionally used as a primary source.

Many of the archaeology research institutes around the world also present news and/or education sections in their websites, mostly providing online education about the research studies carried out by themselves or even by other groups in their countries, sharing very important archaeology news. These institutional website articles are most of the times written by experts in archaeology, which includes archaeologists as well. The archaeology section of *Smithsonian Magazine* website (2005) is an example of that. The *Archaeology Magazine* (2008) website from the Archaeological Institute of America has an online version too, as well as a printed version, with original articles and brief reports about works published in other online magazines, including the links to the original academic articles. The site has a strategy of gathering in the same place articles published in different magazines, turning it into a tool that can be used as a primary source for archaeological content.

There are some websites carried out by experts and academics themselves, with no funding support and nonprofit objectives, aiming just to educate people about archaeological subject. These websites usually use free blogging server services to host their websites. In the last years, The *Archaeology News Network* (Georgopoulos 2010) is doing it, publishing and gathering articles from other international sources together in the same place. Following this path, we can also mention the Archaeological Legacy Institute that has a website entitled *The Archaeology* Channel

(1999) aiming to nurture and bring widespread attention to the human cultural heritage.

Finally, we have the most largely known educational system applied online: The courses. A great number of institutions are providing online courses on a variety of archaeological subjects, directed both to academic students and to the general public. An example of a nonprofit course designed for general public is the Massive Open Online Courses (MOOCs), created in 2008. According to the *MOOC List* website (2016, February 29), there were 18 different archaeology MOOCs produced since 2014 to July 2018.

These are just some worldwide relevant examples of what has been done until the middle of 2010s. Internet has been largely used in the last years as a tool for publishing and sharing scientific articles, books, and other types of research studies results. However, the Internet use for archeological education of the general public is not so largely used as seen for academic purposes. One of the reasons may be the fact that the Internet only started to be largely used by the general public in the last decades, mostly by younger people. On the other side, the older researchers who did not make use of the Internet for years or decades during academic life have few, or none, experience in the online methods and techniques. With the increase of the Internet use by archaeologists, and because Internet is popularly recognized as a powerful tool for disseminating information, it is expected that the online archaeological education projects will increase in number in a near future.

Key Issues/Current Debates

There are two main key issues when talking about the Internet use for archaeological education: how to provide knowledge and which knowledge should be provided. But before discussing these issues, an important thing about online education must be clear: basic computer and digital knowledge and experience are necessary.

Some specific digital techniques are very complex, even for people who use Internet every time. It must be clear that the Internet use for education projects requires at least one person with enough technical knowledge and experience in digital materials production. Obviously, there is a variety of online approaches that can be applied using easy techniques.

Today, the most efficient way of providing online open access to scientific information is developing and managing Internet websites and/or digital software. Because they are less complex to manage and develop most of the times, websites are the most widely online tool used for archaeological education.

How to Provide Online Archaeological Education

Academic Archaeological Education

Online regular academic archaeological education became common in the last years. Online courses (a.k.a.: e-learning, cyber schools, distance learning) are examples of how one can undertake online academic education, a new method of learning that is benefiting students from all over the world (see ▶ "Heritage and Higher Education"). Considering that people can get more motivated studying in their native language, courses applied in different language versions could be an advantage (Barak et al. 2016). Besides that, the inclusion of students with any problems avoiding them to participate in regular classroom courses is another advantage, such as students from places with the absence, or poor quality, of local archaeology education (Kotoua et al. 2015), parents that still need to take care of their kids, or even students with autism disorder (Satterfield et al. 2015).

Journalistic Media

One of the most efficient ways of reaching the general public is through journalistic media, since it is the main source for public information, having an abundant online content that includes archaeology news (see ▶ "Media and Archaeology"). Despite that, most of these media do not sufficiently inform about archaeological subjects from around the world. However, as was mentioned before, some of them have a journalistic team interested in scientific outreach, including professionals with experience in different science areas. These professionals, mostly the archaeology experts, are the best online diffusers of archaeological knowledge, since they have more

experience collecting scientific data from publications, or even from the researchers themselves, delivering them to the public using a simple language without modifying the original information. Any researcher having the intent of diffusing their discoveries, ideas, or opinions to the public is able to contact these professionals (see ▶ "Preserving Heritage: The Role of the Media").

Unfortunately, just a small number of the biggest and more famous journalistic media have a scientific outreach team. Researchers may still contact the smallest vehicles, like the local or regional ones, if they want to publish something, although it is not rare to see journalists contacting researchers in search of new material. Fearing the possibility of spreading mistaken information, some researchers may choose to publish their ideas in their own pages or institutional websites instead of contacting journalists with no experience in scientific outreach.

Archaeology Specialized Websites and Webpages

Online archaeological education websites appeared in the last years, contributing with very good quality materials, even though most of them are made by people with no journalistic experience. The reason for that is the archaeological experience of the administrators and contributors, mostly composed by professional archaeologists, students, or other people directly related to archaeology.

One advantage of having archaeologists as administrators of specialized websites is to escape from the traditional journalistic ways of sharing information. Some media are known as being sensationalists, aiming not to educate people, but to reach more public attention and profit. In these cases, archaeology subject materials may be full of irrelevant or biased information. Managing their own websites, archaeologists are free to communicate directly to the public with none or very few mistakes. On the other hand, no experience in dealing with the general public, or even with digital systems, can become a problem in producing something interesting enough to the public. In that case, learning with other people working with online archaeology education is a good way to solve this issue and find the best forms of attracting people's attention.

Another good thing of these websites is to allow the public to be in touch with the researchers through their email or comment sections, being able to ask questions or even sharing relevant ideas and knowledge.

The existence of some barriers as lack of funds or available time turns it difficult for some researchers to work with online education. Since free online servers are available to develop a website, money is not the biggest problem. Researchers cannot stop their jobs for a nonprofit work, unless it is possible to get some funding or organize a volunteer team to manage and contribute with the website. In this case, everyone can collaborate without taking too much time from their main activities. A second option would be using the scientific outreach team or educative channel from their institution websites, where they can count with experts to make a high quality outreach, costing less time and energy.

Online Social Networks

Academic social networks as Research Gate (2008) and Academia (2008) are used as a way of sharing academic publications and providing open access to previously published articles, which were available only in the traditional printed forms in libraries, institutional subscriptions, or reprint requests. Since these academic social networks do not reach the general public, it is necessary to adapt to the most popular social networks, sharing the information in ways these websites allow us to do.

Some worldwide popular social networks from early and mid-2010s are *Facebook*, *Twitter*, and *Instagram*, for example, where a variety of media can republish and advertise content through their social pages. As open access channels with a vast and global popularity, they are used as an important source of directed information. Social network pages directly related to the official archaeology websites may increase public interest, mostly because of the possibility to publish links of the original materials. It is also possible to produce original and exclusive materials in these social networks.

Audiovisual Production

One of the biggest worldwide phenomena from the last years is the open access to audiovisual content production. As a result of that, some of these audiovisual producers, including some archaeologists, are using Internet to provide scientific content. Internet allows us to reproduce audiovisual content that have been broadcasted by other media, since it follows the legal regulations for copyrights. Some contents were already produced to Internet as the primary reproducer as well.

The most famous kind of audiovisual production for scientific education is probably the documentary, since we see a variety of them on television for decades. Documentaries cannot only be produced for television transmission but for the Internet as well. In archaeology, audiovisual reports are also common, produced not just by journalistic media for the Internet but also by audiovisual production teams from research or funding institutions.

Another popular way of producing audiovisual material is through interviews with professionals of specific areas, being an excellent way of learning and also a trustful source for reference for everyone.

Within this decade, some untraditional methods of producing audiovisual materials appeared in the Internet. The vlogs, for example, are mostly independent productions where a person talks directly to the camera – the public – in a very informal and, sometimes, even humored manner. This kind of production is a good way of attracting the public, mostly young people, because it allows people to use a funny and irreverent way to reproduce information. Besides that, if the information is transmitted by professors, scientists, or experts, they are considered to be really trustful by the public.

Finally, one last kind of audiovisual production with increasing popularity is the online courses. Although they are not as interactive as the regular ones, it turned to be an excellent alternative for students who cannot attend the regular classes, helping to reach different people from all over the world. Obviously, online courses do not need to be restricted to audiovisual lessons and may also provide digital reading and other kinds of digital content as well.

The major advantage of online audiovisual productions, in comparison to other media, is that the public can access the content at any time and wherever they want. Independent or academic funded productions are mostly free to produce the materials in the way the producers think it is right, not concerning about the length limits for the production or other traditional journalistic restrictions or editions, providing complete relevant information without having to cut scenes.

What Archaeological Knowledge May/Should Be Provided

Here we present some examples of knowledge that may or should be provided by archaeologists, not just for other archaeologists and students, but for the general public as well.

Scientific Publications

It is not common for the general public to read scientific publications; however, they represent the entire academic work for students and researchers, being the main source of scientific knowledge. Besides their big importance for science, not everyone has open access to all of them. Because the open access issue is not solved yet, one of the things online archaeology education contributors may provide is a list of books, journals, and other scientific publications with open access. These lists could focus on regional or national publications, or on specific subjects, being used as a primary source for content.

Archaeological Research Studies Outreach

The research and its results outreach is, or should be, one of the biggest objectives of researchers, since they are not done for academic purposes only, but for the interest of the society as well. Because most of people are not able or interested in reading scientific publications, archaeologists should provide them in a different manner, using online open access means and simpler language. Illustrations, summary texts, maps, videos, and other things can all be used. The most important thing is always focusing on the importance of the research and results, as well as justifying the contributions of it to the world.

Basic Archaeology Knowledge Outreach

Providing information using a simple language is the best way to succeed in transmitting basic knowledge. Simple language can be used to produce articles aiming to educate people on the basic archaeological knowledge, like what archaeology is, what are its disciplines, what is an archaeological site or vestige, how archaeologists excavate and analyze things, as well as any other information archaeologists may consider relevant.

Fiction, Pseudoarchaeology and Amateur Archaeology

It is not rare for people to confuse archaeology with paleontology, or also to be fascinated about archaeology while believing in fictional, fake, or even amateur information. Sometimes, providing the basic knowledge about archaeology may not be enough. Articles that make people aware of what scientifically trustful information is and what is right and wrong in fiction may change people's point of view in a good way (see ▶ "Popular Culture and Archaeology").

Making Archaeologists-Public Contact

Internet can provide ways for archaeologists to talk directly to the public, and the public could also talk directly to archaeologists in the same way. With online contact, as through e-mails, comments sections on websites/pages, or even online chatting, people are able to learn more. The public would even be capable of helping contributors with future plans through comments, critics, and compliments.

A second advantage of the Internet is also the possibility of learning with the public about their regional or local archaeology knowledge. Sometimes people would love to share information about an archaeological site or artifact they found, but most of the times they do not know who they should talk to. Considering that in some cases archaeologists would be very interested in people's findings, the approximation between both would be a good approach.

Finally, helping people in a private way about their personal wishes of being a future archaeologist, advising about how to become an archaeologist in their countries, and also sharing some tips about universities or research subjects would encourage more people to enter in the field.

Archaeological Heritage, Ethics, and Law

The most important knowledge archaeologists should provide is about the importance of the archaeological heritage for science and societies (see ▶ "Heritage Values and Education" and ▶ "Heritage and Society"). An educated people would probably have more respect with heritage, with the desire to preserve it too (see ▶ "Cultural Heritage and the Public"). However, people would like to learn about ethics and laws of their country or region concerning archaeological heritage. Therefore, archaeologists may provide the basic knowledge about national or regional laws (see ▶ "Cultural Heritage Management: International Practice and Regional Applications" and ▶ "Legislation in Archaeology: Overview and Introduction"), as well as advices of what people could do to help preserve the heritage or in case they find archaeological sites and artifacts. Online contributors could also share a compiled material including all the legal documents of their country and region concerning the archaeological heritage.

Archaeological Museums, Artifacts, and Sites

Museums and archaeological sites are the places where public is able to have a direct contact with archaeological vestiges, considered as the primary means for public archaeological education. Internet can be a great ally in sharing information about the research studies carried out by museums, about expositions, archaeological sites open for tourist visits, as well as museums and sites locations. Contributors could also provide lists of archaeological museums and sites.

Sometimes just indicating where these museums and sites are located may not be enough, considering that many people could not be able to travel and visit them. In this sense, an increasing recent approach are the virtual museums, with photo galleries, maps, 3d images, and other digital technologies, as virtual reality, with a big potential for archaeological-related information diffusion (see ▶ "Cultural Heritage in the Digital Age").

The open access to virtual 3D reconstructions of sites and artifacts would probably increase the interest of people about archaeology.

Academic Archaeological Information

One of the most desired information by the public interested in archeology is related to the high education and professionalization process. Even though some people do not know exactly what archaeology is, they still want to be archaeologists in the future or, if not, they just want to learn about the subject in universities courses.

A simple and effective way of helping people find archaeological higher education is providing online information about archaeology undergraduation and (post)graduation courses, like lists of courses in different countries. Also, it is important that archaeologists and online education contributors give support to everyone interested in becoming an archaeologist, mostly the ones showing a lot of interest, which may prove to be great archaeology colleagues. Giving information about open courses is very important as well, once they may encourage people to search for higher education courses.

Events

Not just open courses may encourage people, but some events as well, like congresses, symposiums, workshops, lectures, etc. Online information about these events is important too, and they may be provided as calendars. Online contributors may elaborate these calendars focusing on regional events, or also about thematic events (e.g., Calendar of zooarchaeology or lithics events). Most of the events have, now, official websites or webpages that may be linked within the calendar.

Fieldschools and Internships

Calendars are very useful for organizing travels, and it is also the case for events, fieldschools, and universities internships. This is a major interest of people engaged in archaeology and related sciences, once they are looking for more learning and practical experience opportunities. Fieldwork coordinators and other archaeologists are usually looking for people to help them in their projects as volunteers. Providing information about fieldschools and internships can contribute with archaeological education and to encourage new archaeologists.

International Perspectives

With all that exposed, it is possible to notice that a great variety of information can be available in the Internet. We just mentioned some of the most common online sources of information about archaeology. Brazil is an example of country following these perspectives. Besides Brazilian people access international sources, they rather access their own sources, mostly because of the language. The most known sources we mentioned before are all in English and it gets difficult for non-English speakers to follow these sources. So it is interesting for archaeologists around the world to provide information in their native language as well. Thinking about that, Brazilian archaeologists started making use of Internet for archaeological education in a variety of ways during the middle 2010s.

For example, *Arqueologia e Pré-História* website (Moreno de Sousa 2013) aims to educate people by sharing articles about specific subjects and worldwide research studies in a simple language, as well as information about Brazilian museums, archaeological sites, events, open courses, higher education, heritage related law, fieldschools, etc. The website is having an increasing popularity (Fig. 1) through the help of the online social networks, sharing even more information with exclusive material. This popularity is resulting in a positive public return, with people providing information about archaeological findings and asking for advices about archaeological higher education. The website contributors are frequently being invited by schools and public agencies to provide lectures and courses for students and other local citizens.

The same is happening to *Arqueologia Egípcia* (Costa 2008), an Ancient Egypt specialized website that is becoming very popular in the

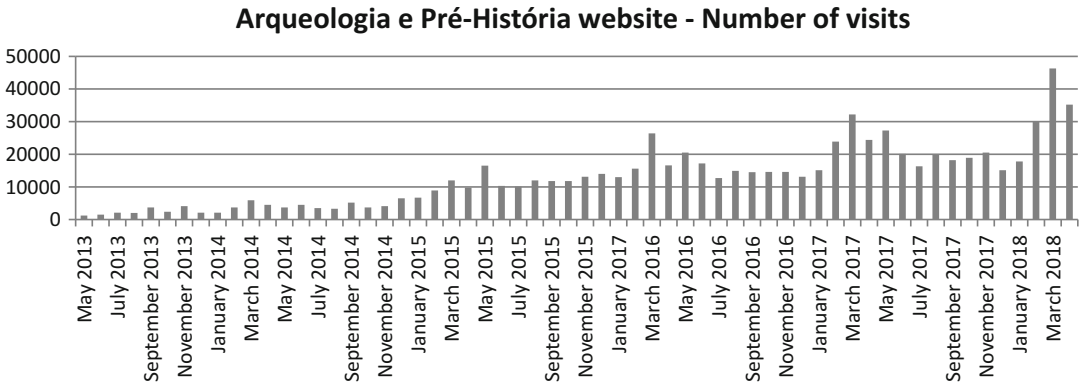

Internet Use for Archaeological Education, Fig. 1 Number of visits of *Arqueologia e Pré-História* website (Brazil). Statistics from May 2013 to April 2018

country, not just by the administrator efforts, but also as a result of the popularity of the subject. Besides Egyptian archaeology, the website also provides a big variety of archaeological knowledge, making people learn even more than they would expect. As a result of the contributor efforts, with very positive return until now, the administrator also offers lectures and publishes books. More recently, the author has also adopted the vlog type of scientific popularity (Costa 2013) and her videos reached more than 775,000 views until July 2018.

Another volunteer work in Brazilian online archaeological education is *Arqueologia em Ação* project (2013). The project aims to produce video interviews with archaeologists from everywhere in the world about their research studies or some specific archaeological subject they have experience in. The lack of funding and dependence on volunteers time results in a slow increase of the audiovisual material quality, although they have a very positive return from the public. School and university professors, for example, are using the project videos in their classes to teach about archaeology subjects. From May 2013 to Mid-2018, the videos reached more than 28,000 views.

These kinds of nonprofit projects for online archaeological education are becoming very popular among Brazilian archaeology companies as well. The *Contexto's Live* project (2015–2016), for example, was part of a company's public archaeology program, and it has the intention of transmitting online live lectures to the general public, while providing posterior open access to them.

In Brazil, as well is in other countries, archaeology companies must, legally, provide public free education for the locals within the cities they are carrying out archaeological projects. However, Online Archaeological Education is a very efficient approach not just for locals but for everyone with Internet access in any part of the world, as *Contexto's Live* has proved. By this approach people are able not just to learn about archaeology, but about the companies' projects and results as well.

Future Directions

It is important to notice that the higher is the volume and variety of online archaeological knowledge available to the public, the higher is the public interest in the subject. The more the public is getting interested, the more the public become aware of the cultural heritage importance and the more active is the public engagement. It is also important to notice that some people want to know about their local archaeological activities and learn about the importance of it for them. Once the public is aware of this, they tend to respect and collaborate with archaeologists.

That being said, it is not hard to assume how big and important can be the impact of Internet use for archaeological education on societies. So, for the near future, archaeologists should not just discuss how and what to provide as archaeological knowledge to the public, but also to ask why not to carry out online archaeology education projects? The digital world has arrived and archaeologists, besides looking at the past, must also look at their future directions on educating people. Archaeologists and online contributors must be aware that the modern technologies are making it able to innovate educational projects around the world. And soon new ways of online educating might appear and became popular as well.

Cross-References

- ▶ Archaeology: Definition
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Heritage Outreach
- ▶ Heritage and Society
- ▶ Heritage and Higher Education
- ▶ Heritage Values and Education
- ▶ Legislation in Archaeology: Overview and Introduction
- ▶ Media and Archaeology
- ▶ Popular Culture and Archaeology
- ▶ Preserving Heritage: The Role of the Media
- ▶ "Public" and Archaeology
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Service Learning and Public Archaeology

References

Academia.edu. 2008. Available at https://www.academia.edu/. Accessed 4 Aug 2018.

Archaeology Magazine. 2008. Available at http://www.archaeology.org/. Accessed 4 Aug 2018.

Arqueologia em Ação. 2013. Available at https://www.youtube.com/arqueologiaemacao. Accessed 4 Aug 2018.

Barak, M., A. Watted, and H. Haick. 2016. Motivation to learn in massive open online courses: Examining aspects of language and social engagement. *Computers and Education* 94: 49–60. https://doi.org/10.1016/j.compedu.2015.11.010.

Contexto's Live. 2015. Available at https://www.youtube.com/contextosarqueologia. Accessed 4 Aug 2018.

Costa, M.J.N. 2008. *Arqueologia Egípcia (website)*. Available at http://arqueologiaegipcia.com.br/. Accessed 4 Aug 2018.

Costa, M.J.N. 2013. *Arqueologia Egípcia (vlog)*. Available at https://www.youtube.com/user/arqueologiaegipcia. Accessed 4 Aug 2018.

Georgopoulos, I. 2010. *The Archaeology News Network*. Available at http://archaeologynewsnetwork.blogspot.com.br/. Accessed 4 Aug 2018.

Heritage Daily. 2011. *Archaeology*. Available at https://www.heritagedaily.com/category/archaeology-news. Accessed 4 Aug 2018.

Kotoua, S., M. Ilkan, and H. Kilic. 2015. The growing of online education in Sub Saharan Africa: Case study Ghana. *Procedia-Social and Behavorial Sciences* 191: 2406–2411. https://doi.org/10.1016/j.sbspro.2015.04.670.

MOOC List. 2016. Available at https://www.mooc-list.com/tags/archaeology?static=true. Accessed 4 Aug 2018.

Moreno de Sousa, J.C. 2013. *Arqueologia e Pré-História*. Available at http://arqueologiaeprehistoria.com/. Accessed 4 Aug 2018.

National Geographic. 1996. Available at http://www.nationalgeographic.com/. Accessed 4 Aug 2018.

Nature. n.d. Available at https://www.nature.com/subjects/archaeology?WT.ac=search_subjects_archaeology. Accessed 4 Aug 2018.

Research Gate. 2008. Available at https://www.researchgate.net/. Accessed 4 Aug 2018.

Satterfield, D., C. Lepage, and N. Ladjahasan. 2015. Preferences for online course delivery methods in higher education for students with autism spectrum disorders. *Procedia Manufacturing* 3: 3651–3656. https://doi.org/10.1016/j.promfg.2015.07.758.

Smithsonian Magazine. 2005. *Archaeology*. Available at https://www.smithsonianmag.com/history/archaeology/. Accessed 4 Aug 2018.

The Archaeology Channel. 1999. Available at http://archaeologychannel.org/. Accessed 4 Aug 2018.

Thought.co. 2017. *Archaeology*. Available at https://www.thoughtco.com/archaeology-4133504. Accessed 4 Aug 2018.

Further Reading

Bonacchi, Chiara, and G. Moshenska. 2015. Critical reflections on digital public archaeology. *Internet Archaeology* 40. https://doi.org/10.11141/ia.40.7.1.

Chowaniec, R. 2012. Archaeology on the Web. Educating children and youth though Internet portals. In *Archaeological heritage: Methods of education and*

I

popularization, ed. R. Chowaniec and W. Więckowski, 37–41. Oxford: Archaeopress.
Chowaniec, R. 2013. New technologies in the process of educating about the archaeological heritage. *EduAkcja. Magazyn edukacji elektronicznej* 1 (5): 32–42.
Ciejka, K. 2012. Using social media and new technologies in the popularization and promotion of archaeology. In *Archaeological heritage: Methods of education and popularization*, ed. R. Chowaniec and W. Więckowski, 53–57. Oxford: Archaeopress.
Davies, C., and R. Eynon. 2013. Studies of the Internet in learning and education: Broadening the disciplinary landscape of research. In *The Oxford handbook of Internet studies*, ed. H. Dutton. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199589074.013.0016.
Richardson, L.-J. 2014. Public archaeology in a digital age. PhD dissertation, University College London, London. 366 p.
Schreg, R. 2013. Archaeology, the public, and social media. Some new insights from Germany. *Journal of Community Archaeology and Heritage Blog*. Available at http://journalcah.blogspot.com/2013/07/archaeology-public-and-social-media.html. Accessed 4 Aug 2018.
Styliani, S., L. Fotis, K. Kostas, and P. Petros. 2009. Virtual museums, a survey and some issues for consideration. *Journal of Cultural Heritage* 10: 520–528. https://doi.org/10.1016/j.culher.2009.03.003.
Terras, M. 2012. The impact of social media on the dissemination of research. Results of an experiment. *Journal of Digital Humanities* 1 (3): 30–38.
Walker, D. 2014. Antisocial media in archaeology? *Archaeological Dialogues* 21: 217–325. https://doi.org/10.1017/S1380203814000221.

Internet, Archaeology of the

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Introduction

By the time you read this, it will be out of date – a fundamental issue when attempting to study the archaeology of the Internet. Readers of Ceruzzi's (1986) contribution to *Imagining Tomorrow* would have been amused by its account of the late 1940s, when experts seriously believed that there would never be more than ten computers in the United States. Yet Ceruzzi himself had no inkling of the World Wide Web (which we now often refer to as just "the Internet") that would emerge in embryo only three years later. William Gibson (2012) notes the error in his Sprawl novels of the 1980s which coined the term "cyberspace" – there is no mention in them of cellular phones. Similarly, the account of the archaeology of the Internet in Graves-Brown (2009) is also out of date.

The "Internet" is amorphous and ephemeral. If we considered it in ruination, as some future archaeologist might do, it would consist of a mass of cables, computers, satellites, manuals, and other artifacts, where any system would have to be inferred (Cubitt Forthcoming). Conversely, we could consider the archaeology of the "living" Internet, but even here we could not ignore the vast web or mesh of infrastructure that underpins it. For example, it has been estimated that Internet data centers consume 30 gigawatts of electricity per annum, roughly equivalent to the output of 30 nuclear power stations. Similarly, the physical devices involved, which are increasingly mobile in themselves (tablets and smart phones) incorporate a wide array of raw materials, such as rare earth metals, sapphires, or lithium, that are sourced from all parts of the world. Finally, given the obsolescence built into the technology, there are vast numbers of redundant computers and cell phones, many of which cannot be practically recycled and thus become waste (Slade 2007).

Historical Background

The Internet began with the ARPA or DARPANET, a small group of computers in military and academic sites in the USA (although its ancestors were the telegraph, telephone, and teleprinter). The Advanced Research Projects Agency, in turn, had its origins as the Eisenhower administration's reaction to the perceived threat posed by the launch of Sputnik 1 in 1957. As a parallel development, commercial computer networks soon began to appear, most notably CompuServe, founded in 1969. All of these systems depended in part on the modem, a device for dialing up an occasional inter-device connection on the telephone network, which had its origin in

teleprinter technologies of the 1920s. As these networks gradually spread across academic institutions and business, the next major step in Internet history was the rapid adoption of personal computers, marked by the appearance of the Apple Mac and IBM PC in the early 1980s. These in turn had their origins in work by Douglas Engelbart (the mouse) and Alan Kay (the GUI and local area networks; Kay 1977). Through the use of local area networks and the first dial-up connections, personal computers began to be used for communication and exchange of information through systems such as Usenet (1979) and FidoNet (1984) and other bulletin board systems that emerged in the mid to late 1980s. The first automatic modem, manufactured by Hayes, was marketed in 1982. What we now call the Internet is, effectively, the result of the gradual integration of separate government, academic, and commercial networks as each adopted the Internet protocols (TCP and IP). Thus, for example, the UK JANET was set up between British universities beginning in the 1970s, but only adopted IP in 1991.

Whilst these systems had users numbering in the tens or hundreds of thousands, it was the work of Tim Berners-Lee and Robert Cailliau, beginning in 1989, that turned the net into a global phenomenon (Reid 1997; Berners-Lee 1999). Initially intended as a document-sharing system for academic scientists, the HTML protocol was rapidly adopted for a wide variety of purposes, especially when Marc Andreessen and his colleagues at the National Center for Supercomputing Applications developed the Mosaic browser in 1993. Crucially, Andreessen incorporated the < IMG > tag into HTML, which enabled web pages to include pictures. It can be convincingly argued that from this point, pornography became one of the significant drivers behind the spread of Internet use, despite the attempts of the newly founded World Wide Web Consortium to prevent this (Berners-Lee 1999; Channel 5 2007). Other protocols for Internet data sharing lacked this graphical content. Gopher (developed by Mark P. McCahill), the only serious competitor for WWW, was hampered by the licensing requirements imposed by the University of Minnesota (Reid 1997).

Alternatives to the Internet/www *did* exist. The French Minitel system, launched by PTT in 1982, was based on simple video text terminals that were leased for free to telephone subscribers. The system provided an online phone book, mail order, and travel ticket purchasing and at its peak had over nine million subscribers. By the early 1990s, it had spawned the kind of online shopping and quasi-dot com start-ups that would only appear 10 years later on the web. Although adopted in a number of other countries, the system was only successful, outside of France, in Belgium, largely because other providers tried to charge too much for the service and/or the leasing of terminals. Only in 2012 was the Minitel service finally terminated.

The later 1990s witnessed the so-called browser wars and early attempts to commercialize the Internet, particularly following the development of SSL (Secure Sockets Layer) protocols in 1995, which enabled secure financial transactions across the Internet. For several years, Microsoft's Internet Explorer and Andreessen's Netscape attempted to dominate the web, and here it is worth noting that the business model adopted by Netscape, that of trying to build a web-based "platform" on top of the (Windows) operating system, failed at the time, but is rapidly coming to fruition (see discussion of cloud computing below). By 2001, early attempts to monetize the Internet ended in the so-called dot-com bubble, precipitated by excessive speculation and the failure of entrepreneurs to understand how the Internet could be used for business. In particular, it became apparent that the web itself, at the time, could not be a means of making money, but only as the platform upon which commerce could take place.

The subsequent decade has been marked by the emergence of several major strands of activity, in particular, online shopping, media downloads/streaming (music and film), advertising, and social networking, often dominated by those companies such as Amazon, Google, and eBay, which had survived the crash of the dot com bubble. At the same time, there have been claims for the emergence of a Web 2.0, typified by Creative Commons' activities such as

Wikipedia and, to a more limited extent, Facebook, YouTube, MySpace, Twitter, or SoundCloud (O'Reilly 2005). The growth of Internet usage, particularly in the late 1990s, had been marked by anarchic and often utopian approaches to the future of networked activity (e.g., Rheingold 1994). Whilst it is true that no entity, national or commercial, has succeeded in completely controlling Internet activity, it is certainly the case that there is a growing asymmetry between users and providers, symbolized by the fact that the dominant DSL protocol for broadband is asynchronous, i.e., that downloading and uploading are separate processes with increasingly asymmetric speeds (Kleiner & Wyrick 2006). Equally, it can be argued that users increasingly perform unpaid work in creating content that companies, such as social networking sites, exploit for profit.

Recent years have been dominated by the mobilization of the Internet, initially through laptops and PDAs, but increasingly through the use of smart phones that have Internet capabilities. Although the concept dates to the early 1970s, the first Internet-enabled phones appeared in the late 1990s, and the prevalence of such devices is probably marked by Apple's iPhone of 2007. In as much as the cell phone has largely bypassed landline-based systems in the developing countries of Africa, it seems likely that the same will become generally true of Internet usage. From an archaeological/material culture point of view, then, the Internet will have at least two ages: its wired and wireless eras, which would require quite different characterizations that might be termed, respectively, sedentary and nomadic. Here, whilst the utopians of the 1980s and 90s envisaged a virtual reality like Gibson's "consensual hallucination," the actuality is increasingly an interpenetration between the virtual and "real" in an augmented reality.

Key Issues

Software Archaeology

Although it might be thought that software programs or applications are analogous to documents, their dynamic characteristics imply a more artifact like quality (Graves-Brown 2009). Whilst they only exist as quantum states in millions of transistors, programs can print information on paper or launch nuclear missiles. The very iconography of graphical user interfaces implies an artifactuality; there are buttons and sliders and objects to be dragged or stretched. The soft Internet can be approached at several levels. We may, for example, examine the history and development of the actual code, as in the genealogy of the web browser, beginning with Berners-Lee and Cailliau's command-line browser, through Mosaic, Internet Explorer, Netscape, and Mozilla Firefox (all based on the same basic code) and other browsers such as Opera, Safari, and Google Chrome which have arisen more recently and (to some extent) independently (Graves-Brown 2009).

At another level, archaeologists can also study the various "artifacts" created on the Internet, particularly in the variety of virtual "worlds" and online games, such as Second Life or World of Warcraft (and increasingly in game environments associated with social media such as Facebook). Whilst the utopian vision of an immersive cyberspace has not entirely come to pass, virtual worlds are now used by millions of people and include objects that can be made, owned, and sold as if they were physical goods. As Harrison (2009; see also Guest 2007) has pointed out with respect to Second Life, such virtual artifacts can also come to have a history and be regarded as a form of virtual heritage. In a similar way, the role of virtual artifacts in the augmentation of reality can be studied.

What distinguishes virtual from physical artifacts is their so-called non-rivalrous nature. Every copy of an image or MP3 is identical and does not in any way detract from the "stock" of the original. This in turn leads to quite different concepts of ownership, typified by the concept of Creative Commons, since items can be freely shared by their creators at no cost to themselves. However, the concepts of copyright, license, and subscription are increasingly important areas of contestation as capitalism attempts to monetize the Internet.

Politics

The politics of the Internet revolve around access and ownership. There are still large segments of the populations of both developed and developing countries that are disenfranchised by a lack of access to the Internet. Similarly, governments are increasingly attempting to control access and traffic, as in the case of the so-called "Great Firewall of China" by which the PRC has attempted to filter its citizens' access to information. In extremis governments may simply seek to "turn off" the Internet and mobile phone networks. This is clearly becoming critical in the light of events surrounding the Arab Spring of 2011, where use of social media is said to have been crucial in mobilizing opposition to dictatorial governments. Elsewhere, so-called democratic governments have sought ways to control and or monitor Internet activity. These range from the V-chip incorporated into US televisions to filter content to the ECHELON interception system that has been implicated in both political and industrial espionage by western nations. At the end of 2012, the UK government was attempting to extend its powers to monitor Internet traffic, supposedly in order to counter terrorism. However, in contrast to this paranoia-inducing activity, it should be noted that contemporary methods of encryption (such as PGP, developed by Phil Zimmerman in 1991) are virtually impenetrable, even with the use of supercomputers.

The second aspect of the politics of the Internet that may be of interest to archaeologists concerns its exploitation by capital. At the macro level, this concerns the extremely free movement of capital facilitated by Internet communication, which through tax havens and other activities, has become implicated in the financial crisis that began in 2007–2008. At a more local level, as noted above, the ownership of virtual and physical property is increasingly crucial. At the physical level, this is characterized by attempts to control and monopolize copyrights and patents, as in the case of Google's purchase of Motorola and the numerous patent infringement suits surrounding smart phones in 2011–2012. At the virtual level, issues of ownership of content have arisen, typified by the (apparently apocryphal) controversy surrounding Bruce Willis' iPod (Willis 2012). Unlike physical books or audio recordings, the purchaser does not own the "thing," so much as a license to use it. The question then arises as to whether such items are property and whether Bruce Willis' children can inherit the content of his iPod.

At another level, the emergence of so-called cloud-based software/data storage brings us back to the Microsoft/Netscape conflict of the late 1990s. Thus, for example, the presentation application Prezi (unlike Microsoft PowerPoint) is not sold under license but as a subscription, based around the cloud sourcing of content. Unlike the earlier model, the user does not own, but must continually subscribe to the virtual artifact. Thus, in effect, cloud sourcing shifts the platform from the physical to the virtual, where a "new" method of monetizing usage can be deployed (as Netscape had originally attempted in the late 1990s). Here, it may be argued that the cloud model of networked computing is in fact a reversion to the earlier model of mainframe computers served by so-called thin terminals, i.e., devices that are little more than a keyboard/mouse and a screen.

Future Directions

The Internet can be studied by archaeologists at a number of levels. These include both its physical and virtual infrastructure and the virtual artifacts of all kinds created by and through this infrastructure. The nature of the Internet is always changing, at times in apparently cyclic patterns. Thus, the use of mobile devices and cloud computing may see a return to a model of information technology not dissimilar to that found in mainframe computers of the 1960s, 1970s, and 1980s. With the consolidation of data centers, it might not be too farfetched to foresee a time when there *are* only ten "computers" in the United States! These processes are driven by both global/national politics and the desire of capital extract profit from the Internet, countered by those who retain the utopian ideal of free "peer-to-peer" exchange of information.

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Cultural Heritage in the Digital Age
- ▶ Industrial Archaeology
- ▶ Intangible Cultural Heritage
- ▶ Modern Material Culture, Archaeology of
- ▶ Non-Places in Archaeology

References

Berners-Lee, T. 1999. *Weaving the web: The past, present and future of the World Wide Web by its inventor*. London: Orion Business.

Ceruzzi, P. 1986. The unforeseen revolution: Computers and expectations, 1935–1985. In *Imagining tomorrow. History, technology and the American future*, ed. J.-J. Corn, 188–201. London: MIT Press.

Cubitt, S. forthcoming. Global media and archaeologies of network technologies. In *The Oxford handbook of the archaeology of the contemporary world*, ed. P. Graves-Brown, R. Harrison, and A. Piccini. Oxford: Oxford University Press.

Channel 5. 2007. *How porn conquered the world*. TV documentary broadcast, Wednesday 26 Sep 2007, 11:05 pm – 12:05 am.

Graves-Brown, P. 2009. The library of Babel: Origins of the World Wide Web. In *Defining moments: Dramatic archaeologies of the twentieth-century (BAR S2005)*, ed. J. Schofield, 123–134. Oxford: Archaeopress.

Gibson, W. 2012. Talk for book expo, New York May 2010. In *Distrust that particular flavour. Encounters with a future that's already here.* London: Viking Penguin.

Guest, T. 2007. *Second lives: A journey through virtual worlds*. London: Hutchinson.

Harrison, R. 2009. Excavating second life: Cyber-archaeologies, heritage and virtual settlements. *Journal of Material Culture* 14 (1): 75–106.

Kay, A. 1977. Microelectronics and the personal computer. *Scientific American* 237 (3): 231–244.

Kleiner, D., and B. Wyrick. 2006. InfoEnclosure 2.0. *Mute* 4(2). Available at www.metamute.org Accessed 3 Sep 2013.

O'Reilly, T. 2005. What is Web 2.0: Design patterns and business models for the next generation of software. Available at. http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html?page=1 .

Reid, R. 1997. *Architects of the web. 1,000 days that built the future of business*. Chichester: Wiley.

Rheingold, H. 1994. *The virtual community: Finding connection in a computerised world*. New York: Secker and Warburg.

Slade, G. 2007. *Made to break. Technology and obsolescence in America*. Harvard: Harvard University Press.

Willis, A. 2012. Bruce Willis 'considering iTunes legal action' against Apple. *The Telegraph*. 9:55 AM BST 03 Sep 2012. Available at http://www.telegraph.co.uk/technology/apple/9516636/Bruce-Willis-considering-iTunes-legal-action-against-Apple.html Accessed 28 Dec 2012.

Internment and Prisoners of War in Historical Archaeology

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Introduction

The archaeology of prisoners of war, including both the sites of their incarceration and the artifacts they used and produced during confinement, has recently developed into a major element of historical archaeology, linked to the broader fields of conflict studies and confinement studies. While many prisoner of war camp sites retain no above-ground features, others still have some upstanding buildings. Only a few camps have thus far been excavated, but many artifacts that never entered the archaeological record are retained by private collectors and museums, often because of their craft qualities and evidence of human ingenuity in difficult circumstances. Another major source of information comes from the study of graffiti, often found on the walls of buildings in major camps, but also in other temporary prisons or buildings converted during wartime to hold prisoners of war.

Definition

Prisoners of war are military personnel or civilians who have been incarcerated without trial during a conflict between two nation states. Prior to the eighteenth century only small numbers of active military officers were captured and held to ransom, the other ranks being enslaved, massacred,

or allowed to flee. As armies and navies became larger, and the threats increased of captured forces returning to fight for the opposition following release, each nation tended to retain control of such prisoners until an exchange for its own captured forces (Mytum and Carr 2013a). However, from the Napoleonic wars onward such exchanges were less frequent, and so the concept of a military prisoner of war camp developed. In the Boer war at the end of the nineteenth century the British considered that civilians were a threat, and this was the first occasion when significant numbers of noncombatants were forcibly interned for the first time.

One of the important factors in the development of prisoner of war camps is the creation of xenophobic stereotypes of the "other" generated between nations at times of war. Whereas until the early nineteenth century officers of all sides could be expected to behave in an honorable way and not attempt escape from parole in the community, as mass media and more technologically advanced methods of warfare altered the attitudes to conflict it became necessary to isolate the captive aliens to prevent escape, sabotage, espionage, and unrest among the native population.

Prisoner of war camps should not be confused with concentration camps, where extermination of the inmates either by execution or forced labor was the purpose, or with any forms of detention during a civil war or totalitarian regime where individuals of the same nation were being held, though some sites are hard to place as either prisons or camps. For example, the sites of incarceration of the Mau Mau in Kenya, Republicans in Ireland, or Guantanamo Bay in Cuba would be seen as prisons for criminals by one side and camps for captured combatants on the other, and their assignment indicates the political relevance that this type of research entails (Myers and Moshenska 2011). These are all alid topics within confinement archaeology (Casella 2007) and can be grouped along with examination of asylums, workhouses, prisons, and other institutions designed to control marginalized groups in society. While prisoner of war archaeology may be placed within the field of conflict archaeology, because internment only took place because of war, in many respects the types of physical control and managerial structures, as well as inmate experiences, more often mirror those found in other institutions that facilitated confinement (Beisaw and Gibb 2009). The harshest prisoner of war camps were only marginally better than concentration camps, and the most tolerant, especially when for civilians, resembled relatively benign institutions albeit surrounded by barbed wire (Fig. 1). Some camps were created out of existing buildings, especially in the eighteenth century when castles and military establishments were converted, but from the Napoleonic period onward temporary sites were increasingly

Internment and Prisoners of War in Historical Archaeology, Fig. 1 Photograph of World War I civilian German internees at Douglas Camp, Isle of Man. (Photograph courtesy of Manx National Heritage)

popular. Early efforts at managing the prisoner of war numbers involved the use of hulks – old ships without their masts – but these were unhealthy and difficult to manage. The Napoleonic prisoner of war camp at Norman Cross, near Peterborough, England, sets a new standard of organization and control (Mytum and Hall 2013), subsequently copied or independently invented elsewhere. Most prisoner of war camps were constructed with limited life spans in mind, and while the majority have since been erased from the landscape, a surprising number of structures still stand, often being reused for agricultural or industrial purposes. The artifacts produced by prisoners with their large amounts of spare time survive in remarkable numbers as they were both sold outside the camps as a form of income generation or retained by prisoners as keepsakes on release.

Historical Background

Research into prisoners of war was initially an interest of historians, with the first studies in the early twentieth century (Abell 1914) in the UK and USA (Hesseltine 1930). Until the later twentieth century, archaeologists only noted prisoner of war phases as part of a site sequence, as at Portchester Castle (Cunliffe and Garratt 1995), but at this point those researching aspects of the American Civil War began to include the prisoner perspective alongside that revealed at battlefields and barracks. Significant programs commenced in the 1990s at Camp Ford, Texas (Thoms 2004), and Johnson's Island, Ohio (Bush 2000), with other fieldwork linked to public interpretation at the most infamous camp of Andersonville and at Fort Pulaski, both in Georgia (Jameson 2013). Research also began at about the same time on later prisoner of war camps, notably World War II Camp Hearne, Texas (Waters et al. 2004), and at the Japanese American camps including Manzanar (Burton et al. 1999). Parallel with the archaeological work, the artifacts made in the camps were studied from an anthropological perspective (Dusselier 2008). The impact of the Boer War has been researched from many different viewpoints, and this has included archaeological work on both African and Afrikaans internment (Dreyer 2001).

Archaeological research on prisoner of war sites and material in the UK and Europe only began in the twenty-first century, although it is now being actively pursued in many countries (Myers and Moshenska 2011; Mytum and Carr 2013b). One strand has been from academics and museum curators from a wide range of disciples interested in the creativity of prisoners (Carr and Mytum 2012) and the links between these products and others – Trench Art – made by soldiers during wartime (Saunders 2003). There has also been increasing interest from heritage managers who are now recognizing camps as valuable and significant archaeological sites. They are seen as important in terms of national and regional memory yet are fragile parts of the landscape because they were made for short-term use. Thus far, only a few prisoner of war camps are protected by any legislation, but there have even been excavations of such sites in advance of development (Early 2013). In Australia, there has been some survey to assist in the development of management strategies, but as yet no significant further research. Important camps survive, however, from both the First and Second World Wars, and in some cases museums hold important artifact collections associated with these sites and their inmates.

Key Issues/Current Debates

Many of the ethical and interpretive issues are similar to those within the wider field of conflict archaeology, but often prisoners of war were aliens in closer contact with home noncombatants than was normally the case in wartime, and this creates additional issues of memory, guilt, blame, and forgetting (Burström 2009). Often prisoner of war archaeology is part of a painful heritage that makes it both significant and dangerous.

Prisoner of war archaeology often reveals guilt, not only of the losers in war but also of victors whose treatment of those in their care was often inappropriate. The materiality of

Japanese American camps for interned civilians, and their study by academics and the US National Park Service, has given literally concrete evidence and reminders to reinforce the claims of survivors and their descendants (Burton et al. 1999; Dusselier 2008; Mytum and Carr 2013b). While responsibility for the forced labor camps for prisoners of many nationalities established across Europe by the Nazis can be separated from those alive today, there is a hidden legacy that research reveals. The work of these prisoners was often to the benefit of local residents, with improved infrastructure and profitable contracts for local firms. Archaeological survey and excavation can reveal injustices and oppressions buried beneath a generation or more of forgetting (Burström 2009). The complexities of the past are revealed, with the simplistic nationalistic narratives of allies and enemies, of stoical home front and heroic warriors, challenged and undermined. The extent to which this past is usefully unearthed, and what is then to be done with it, provides archaeologists in academia and in heritage management with dilemmas that are not always easy to resolve; this is evident in much current research (Myers and Moshenska 2011; Mytum and Carr 2013b).

The confinement in camps was primarily a physical, embodied experience, and under these extremes some of the cultural perceptions of the body, privacy, and self-worth are both revealed and challenged. How this was managed and coped with, again often using the material world of the camp and the impoverished range of objects within it, gives archaeologists great opportunities to study underlying attitudes that lie buried within more normal situations. The agency of those imprisoned can be compared and contrasted with that of the captors, and both had to formulate new structures of authority and management for these abnormal conditions. Moreover, most camps were single-sex institutions, and so many social structures, values, and behaviors had to be reworked in these partially domestic situations. Just as national identity was highlighted in war, so gender roles had to be renegotiated within the camps, a theme in a number of recent studies (Carr and Mytum 2012; Mytum and Carr 2013a).

Internment and Prisoners of War in Historical Archaeology, Fig. 2 Cigarette case made from a mess tin by a World War II Italian prisoner of war (Author's photograph)

Identity is a major theme linked to prisoner of war archaeology and other cultural studies in this interdisciplinary field (Carr and Mytum 2012). Internees were in that situation because of their own or other's perception of their identity as aliens within conflict. This is often then revealed in the material culture produced and used within the camps, as their occupants struggle to come to terms with their situation, and placement within what during wartime at least was an antagonistic milieu. Despite close observation and controls over access to resources, many acts of resistance can be identified from the most obvious such as escape tunnels, to more subtle indicators of national identity through use of symbols and language (Carr and Mytum 2012; Mytum and Carr 2013b). Many items of material culture survive as memory works from the camps and are in the possession of local museums or descendants of the internees (Fig. 2). Excavated evidence, however, or graffiti on structures still standing can also reveal the same processes.

International Perspectives

All archaeological studies have an element grounded in local situations, but as products of international conflict, prisoner of war archaeology always has an international dimension. However, what is drawn from the evidence of prisoners and their camps varies greatly with context. The issues

can be considered from an international perspective in terms of particular global conflicts – how civilian or military personnel were interned in many different countries, from the Boer War onward (Mytum and Carr 2013b). Some conflicts that were internal – such as the American Civil War – also reveal how the creation of the "other" was a product as well as a cause of war and could lead to a cycle of increasingly inhuman treatment of enemy captives (Hesseltine 1930). In contrast, for many conflicts there was considerable effort to make the camps meet international humanitarian standards, often because of the nation's fear of reprisals against its own capture held in the enemy's camps. The comparative study of site organization, management of security, hygiene, food, and clothing reveals remarkable similarity across both time and space. How far this was through learned experience and how far it was based on managerial deductions in independently assessed cases is still unclear.

Heritage bodies in all parts of the globe have been slow to recognize the cultural significance of prisoner of war camps from past conflicts, but this is now rapidly changing. While the USA has taken the lead in both researching, protecting, and presenting parts of this heritage (Burton et al. 1999; Jameson 2013), many state heritage organizations in Europe and Australasia are now identifying sites, creating policies, and implementing albeit often limited plans for protection and management.

Future Directions

The interdisciplinary nature of prisoner of war research is still in its infancy, and there is great potential for scholars, heritage managers, and field practitioners to work together on the wide range of sources that survive for this subject. Only recently have scholars working independently in their own disciplines realized that parallel and complementary research is taking place by others (Carr and Mytum 2012). Prisoner of war archaeology can provide an important contribution to this evolving interdisciplinary dialogue, not only because of the technical skills inherent to the discipline but also because of experience in working with descendant communities, communicating with the public, and awareness of the difficulties as well as opportunities that revealing the past can bring.

Interdisciplinary collaboration also brings prisoner of war archaeology to the fore in a range of topics where previously archaeologists may have been marginal. Camps, as tourist attractions or parts of a landscape to be preserved, lie within the spectrum of what is termed dark tourism, and a few are now preserved as visitor attractions (Fig. 3). The same site can have many different meanings and values to a range of visitors, from a place of personal or family suffering, to a symbol of victory over the enemy, to evidence of a past conflict with which the observer has no strong attachment. Archaeologists are only beginning to consider these issues, though some American

Internment and Prisoners of War in Historical Archaeology, Fig. 3 Eden Camp Modern History Museum, North Yorkshire, England, originally constructed to house World War II Italian, German, and East European prisoners of war (Author's photograph)

Civil War sites are the most advanced at the moment in this regard (Jameson 2013).

Fieldwork, and particularly excavation, has been limited to date, yet relatively restricted work on a variety of Japanese American camps in the USA (Mytum and Carr 2013b) reveals both the site-specific and wider comparative value of such investment. From trial work on the UK Napoleonic site of Norman Cross (Mytum and Hall 2013) to the extensive developer-led excavations at La Glacerie World War II camp in Normandy, France (Early 2013), it is evident that further excavation on UK and European sites would be highly rewarding. The combination of excavation data, surviving curated material culture, official and personal documents, and oral testimonies can create a rich source which is only just being appreciated and studied.

Cross-References

- ▶ Battlefield Archaeology
- ▶ Confinement and Detention in Political and Social Archaeology

References

Abell, F. 1914. *Prisoners of war in Britain 1756 to 1815. A record of their lives, their romance and their sufferings*. London: Oxford University Press.

Beisaw, A.M., and J.G. Gibb, eds. 2009. *The archaeology of institutional life*. Tuscaloosa: University of Alabama Press.

Burström, M. 2009. Selective remembrance: Memories of a Second World War refugee camp in Sweden. *Norwegian Archaeological Review* 42: 159–172.

Burton, J.F., M.M. Farrell, F.B. Lord, and R.W. Lord. 1999. *Confinement and ethnicity: An overview of World War II Japanese American relocation sites*, National park service publications in anthropology 74. Tucson: Western Archaeological and Conservation Center, National Park Service, US Department of the Interior.

Bush, D.R. 2000. Interpreting the latrines of the Johnson's Island civil war military prison. *Historical Archaeology* 34: 62–78.

Carr, G., and H. Mytum, eds. 2012. *Cultural heritage of prisoners of war: Creativity behind barbed wire*. New York: Routledge.

Casella, E.C. 2007. *The archaeology of institutional confinement*. Gainesville: University Press of Florida.

Cunliffe, B.W., and B. Garratt. 1995. *Excavations at Portchester Castle, volume 5: post-medieval 1609–1819*. London: Society of Antiquaries of London.

Dreyer, J. 2001. Archaeology and the Anglo-Boer war (1899–1902): A report on the discovery of the Black refugee camp and cemetery at Brandfort, Free State. *South African Journal of Ethnology* 24: 131–137.

Dusselier, J.E. 2008. *Artifacts of loss. Crafting survival in Japanese American concentration camps*. New Brunswick: Rutgers University Press.

Early, R. 2013. Excavating the World War II prisoner of war camp at La Glacerie, Cherbourg, Normandy. In *Prisoners of war: Archaeology, memory and heritage of 19th- and 20th-century mass internment*, ed. H. Mytum and G. Carr, 95–115. New York: Springer.

Hesseltine, W.B. 1930. *Civil war prisons: A study in war psychology*. Columbus: Ohio State University Press.

Jameson, J. 2013. Artifacts of internment: Archaeology and interpretation at two American civil war prisoner-of-war sites. In *Prisoners of war: Archaeology, memory and heritage of 19th- and 20th-century mass internment*, ed. H. Mytum and G. Carr, 23–40. New York: Springer.

Myers, A., and G. Moshenska, eds. 2011. *Archaeologies of internment*. New York: Springer.

Mytum, H., and G. Carr. 2013a. Prisoner of war archaeology. In *Prisoners of war: Archaeology, memory and heritage of 19th- and 20th-century mass internment*, ed. H. Mytum and G. Carr, 3–19. New York: Springer.

Mytum, H., and G. Carr, eds. 2013b. *Prisoners of war: Archaeology, memory and heritage of 19th- and 20th-century mass internment*. New York: Springer.

Mytum, H., and N. Hall. 2013. Norman Cross: Designing and operating an 18th-century British prisoner of war camp. In *Prisoners of war: Archaeology, memory and heritage of 19th- and 20th-century mass internment*, ed. H. Mytum and G. Carr, 75–91. New York: Springer.

Saunders, N.J. 2003. *Trench art: Materialities and memories of war*. Oxford: Berg.

Thoms, A. 2004. Sand blows desperately: Land-use history and site integrity at Camp Ford, a confederate POW camp in east Texas. *Historical Archaeology* 38: 72–92.

Waters, M.R., M. Long, W. Dicken, S. Sweitz, A.L. Presley, I. Buvit, M. Raisor, B. Mason, H. Standish, and N. Dannhaeuser. 2004. *Lone Star Stalag: German prisoners of war at Camp Hearne*. College Station: Texas A&M University Press.

Further Reading

Most of the key themes are addressed and the recent literature referenced in Myers and Moshenska (2011), Carr and Mytum (2012) and Mytum and Carr (2013), listed above.

Thomas, R.C. 2003. *Prisoner of war camps (1939–1948)*. London: English Heritage Available at: http://www.english-heritage.org.uk/publications/prisoner-of-war-camps/.

Interpretation (Including Historic Reenactments): Current Approaches

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Archaeologists don't usually enter the profession because they are anxious to work with living people. They have a passionate interest in the past, and its relevance to the public is a secondary concern for most. Interpreting what they have dug up is generally shared with colleagues through professional journal articles or conference presentations. However, most archaeologists realize that, since they are footing the bill, the public is entitled to know about what they have found out. So, once these interpretations have been made, how does the public find out about them? Traditionally, the public could find out from the horse's mouth by visiting archaeological digs and speaking to the archaeologists. However, opportunities for this type of interaction are limited, and the archaeologists often resent the intrusion into their digging time. The interaction in the field is usually better when archaeologists work with professionals who are trained to deal with the general public. However, few digs can afford full-time tour guides. However, technology has been employed to mediate the public experience with the archaeologist. Today the ways that the majority of the public typically learns about archaeological interpretations are through television programs, museum exhibits and living history reenactments, and social media.

Some archaeologists have embraced the site visitor as an opportunity to get their perspective heard. The field schools of the University of Massachusetts have opted for a somewhat unusual approach to archaeological interpretation to the public. They have employed critical theory to examine ideologies of the past that have resulted in social inequality in Annapolis (Potter 1994). They then attempt to show how our perceptions of the past influence our actions in the present. Their website (Archaeology in Annapolis n.d.) encourages feedback from the tours. The results suggest that the public was engaged when the relevance of the archaeology was made explicit.

Williamsburg is a more conventional public interpretation that is built on archaeology, literally. There, every historic building rests on an archaeological site. The discoveries of the archaeologist are witnessed by visitors and directly interpreted on the reconstructed site in the form of architecture, artifacts used at the structure, and the characters portraying the site's residents. It's a popular and effective way of communicating the past to the present, and one gets a sense of what eighteenth-century living was like (if they had OSHA standards and modern sanitation codes).

Down the road from Williamsburg is a site that combines elements of museum interpretation with living history and adds interactive web resources into the mix. The Jamestown Rediscovery project (Jamestown Rediscovery n.d.) boasts ongoing digs, an Archaearium (a museum specifically tied to the archaeology), and proximity to a more traditional museum and living history recreation of Jamestown and a Native American village. The elements all intermesh to provide the public with an immersive historical archaeological experience.

Across the pond, the Jorvik Viking Centre in York, England (Jorvik Viking Centre n.d.), presents a less sanitized version of the past by taking visitors through a recreated Viking settlement in a moving cart. The visitors see animatronic (and aromatic!) Vikings going about their business and experience the sounds and smells of their daily life. The Disneyesque ride ends with a tour through a gallery of artifacts recovered from the site. Throughout the visit, there are narratives explaining the connection between the archaeology and the interpretation. It's an immersive experience that is popular with the public, though some archaeologists are wary of the showmanship.

Not all archaeologists are onboard with living history interpretations of their work. Some feel this presents a skewed vision of the past based on the present and smacks of edutainment. Whatever the bias, the public clearly enjoys this type of interpretation. And if the purpose of the archaeological interpretation is to inform the public, they have to be listening first.

This leads us to, perhaps, the most controversial and most pervasive way of interpreting archaeological sites: television. Public television has been running archaeological documentaries for many years. But it was Britain that first really popularized archaeological interpretation for a general audience with their half-hour series Time Team. The premise for the show was that the Time Team cast would visit an ongoing archaeological project bringing an array of remote sensing and computer equipment. In 3 days they would have solved one of the questions that had been vexing the lead archaeologist before moving on to their next project (Hilts 2012). The show lasted an impressive 20 seasons and even had a spin-off in the USA with Time Team: America.

If not enthusiastically endorsing Time Team, archaeologists tolerated the popular excursion into their domain. Such was not the case with two later cable network programs, Spike's "American Diggers" and National Geographic Channel's (NGC) "Diggers." Both shows portrayed metal detectorists looking for artifacts and then presumably selling them. Both evoked protests from the professional archaeological community, but only the NGC responded. In a rare demonstration of cooperation, the NGC worked with archaeologists to remove the offensive aspects of the program and even hired an archaeologist to work with the detectorists on-screen. Again, the show was never fully embraced by archaeologists, but the protests stopped (Ewen 2014).

Like historic reenactments, televised archaeological programs and cinematic portrayals of archaeologists will always be viewed with caution by the profession. Walking the line between entertaining the public and educating them is a tightrope act. However, with archaeological interpretations of all kinds more available than ever through blogs, video clips, and social media, the archaeologist must promote their work publically or cede the field to the pseudoscientists.

Cross-References

- ▶ Activism and Archaeology
- ▶ Annapolis: Historical Archaeology
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Engagement in Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Heritage Values and Education
- ▶ Historic Jamestowne
- ▶ Jorvik Viking Centre
- ▶ Nationalism and Archaeology
- ▶ Privatization, Public-Private Partnerships, and Innovative Financing for Archaeology and Heritage
- ▶ Tourism and Archaeological Education

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References

Archaeology in Annapolis. n.d. Available at http://www.aia.umd.edu/index.html. Accessed 11 Dec 2017.

Ewen, Charles. 2014. President's corner. *Society for Historical Archaeology Newsletter* 47 (2): 2–3.

Hilts, Carly. 2012. Time Team: The rise and fall of a television phenomenon. Current Archaeology 7 December 2012. https://www.archaeology.co.uk/articles/features/time-team-the-rise-and-fall-of-a-television-phenomenon.htm

Jamestown Rediscovery. n.d. Available at https://historicjamestowne.org/. Accessed 11 Dec 2017.

Jorvik Viking Centre. n.d. Available at http://www.jorvik-viking-centre.co.uk/. Accessed 11 Dec 2017.

Potter, P.B. 1994. *Public archaeology in Annapolis: A critical approach in Maryland's Ancient City*. Washington, DC: Smithsonian Institution Press.

Interpretation in Archaeological Theory

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Introduction

The concept of interpretation in archaeology can be understood in many different ways. At one level, it is a general term used to describe the

construction of archaeological knowledge about the past from evidence surviving in the present; as such, many archaeologists use the term interchangeably with others, including explanation where no defined qualities are ascribed to either. However, the term "interpretation" also carries more specific connotations which distinguish it from explanation, premised on a different perception of what counts as knowledge. This distinction can be traced back to the nineteenth century and a separation in German scholarship made between the natural and human sciences as involving two different methods and types of knowledge. Archaeology has always occupied an uneasy position in this separation, and although on the whole its roots lie within the humanist tradition, archaeological interpretation rarely explicitly contrasted itself against explanation until the 1980s with the emergence of postprocessualism. This was largely as a reaction to the equally explicit development of the concept of explanation under New Archaeology and processualism in the 1960s and 1970s. As the battle between processualism and postprocessualism has faded out and more accommodating yet diverse theoretical positions have become the norm, it is questionable how far the distinction between explanation and interpretation remains a viable one.

Definition

The concept of interpretation, understood in its specific sense as a mode of knowledge production within the humanities, emerged under a philosophical stream called hermeneutics, which was initially a reflection about the interpretation of meaning in ancient texts. In traditional European scholarship, it was thus closely linked to three different concerns: philology, biblical exegesis, and the law (Bleicher 1980). In the nineteenth century, however, hermeneutics developed into a more general philosophical method in Germany, especially through the pivotal influence of Friedrich Schleiermacher. In Kantian fashion, Schleiermacher attempted to systematize hermeneutics by defining the possibility and limits of textual interpretation; at the basis of his approach was the importance of highlighting the reciprocal relationship between authorial intention and the wider linguistic context. That is, to understand a particular word or phrase in any given text, one needed to relate the author's ideas as expressed in that particular instance, with other parts of the text and even the language as a whole.

Although pivotal, Schleiermacher was only the prelude to the more important figure of Wilhelm Dilthey who used hermeneutics to provide a theoretical foundation to the humanities as a whole and in doing so underlined a distinction between the natural and human sciences. Dilthey took the Kantian model to its ultimate conclusion in his unrealized project of a *Critique of Historical Reason*, which replaced the transcendental (i.e., universal) categories of Kant's pure reason with the psychological and historical context of particular individuals. In short, human understanding and knowledge is always mediated by its particular personal and social context. At the core of Dilthey's philosophy lies the concept of interpretation (*verstehen*) as the methodology of the human sciences (*Geisteswissenschaften*). Dilthey characterized interpretation as a form of knowledge which emerges from a first-person perspective on the world – that is, the world as seen from a human being's point of view as they are immersed in the world. For Dilthey (and others before him like Giambattista Vico and Alexander von Humboldt), such a first-person perspective underlined the fact that we can understand other people because we are one of them. It gives us an insider perspective. He contrasted this with explanation (*erklären*) which adopted a third-person perspective, as exemplified in the natural sciences (*Naturwissenschaften*). Here, one understands trees or rocks in a different way; because we are not trees or rocks, we can only ever understand them from an external or outsider's point of view.

To illustrate this, consider a person standing by the side of the road hailing a taxi. One way to understand this situation is in terms of cause and effect between external objects – the raised arm, the directed gaze of the person, and the shape, color, and markings of the vehicle that stops. This would be an example of explanation. For Dilthey this was a very limiting way to understand

what is happening; in contrast, we can see this event from the point of view of the person by the roadside or sitting in the taxi. In this context, the raised arm needs to be understood not as a cause but as an intention (e.g., "Taxi, stop!") and the taxi stopping understood as the taxi driver reading that intention. The cause and effect approach only really offers us a *correlation* between two events – the raised arm and a vehicle of a certain type stopping; to fully understand that correlation, we need to grasp the intentions and meanings inscribed into these events, and this requires adopting an internal or first-person perspective on the event. This is what is also meant by empathetic understanding – not some kind of subjective or psychological projection of myself onto another, but simply to recognize the meaningfully constituted context of those events in the world which involve human beings.

Although Dilthey developed the concept of interpretation in this way in the nineteenth century, it was popularized by the sociologist Max Weber in the early twentieth century and used to promote an interpretive sociology which was to contest the French positivist sociology of Comte and Durkheim. The French sociological tradition, unlike the German, adopted a much less divided view on the relation between the natural and social sciences, seeing them more as sharing a similar methodology and philosophy. However, the German hermeneutic tradition, especially after Weber, impacted the way sociologists and anthropologists saw their disciplines, and by the middle of twentieth century, many scholars within the social sciences in the Anglophone tradition increasingly reflected on the special character of their methods and forms of knowledge. One of the earliest studies was Peter Winch's investigation into the nature of social science, linking Weber to Wittgenstein and which had a massive impact on subsequent social theory (Winch 1958). It provided the philosophical foundations to the interpretive turn in many of the social sciences such as anthropology represented in the work of Clifford Geertz from the 1970s and archaeology through Ian Hodder from the 1980s.

Concurrent with this interpretive turn was the emergence of a new wave of philosophical work in hermeneutics associated with writers like Emilio Betti, Karl-Otto Apel, Hans-Georg Gadamer, Jürgen Habermas, and Paul Ricoeur, many of whose ideas were taken up within the social sciences, including archaeology. Gadamer in particular is discussed further below, but the key development marked by his work among this group is the extension of interpretation away from being simply a methodology of the human sciences toward a way of defining human existence. If Dilthey expanded Schleiermacher's concept of interpretation from being about texts to defining a method for all human sciences, Gadamer took it one step further and generalized the concept as a definition of human understanding and, indeed, human being. In this, Gadamer was heavily influenced by (and was a student of) Heidegger; just as Dilthey's concept of *verstehen* had influenced Husserl (the founder of phenomenology), Heidegger's phenomenology later transformed this original concept into something much broader. It is thus important to note the close historical connections between the hermeneutic and phenomenological traditions, a connection which one also sees developed in archaeology through the work of Bjørnar Olsen, Christopher Tilley, and Julian Thomas. On that note, let us now turn to the more particular historical background of how the concept of interpretation has been used within archaeology.

Historical Background

Archaeologists rarely if ever explicitly referenced the hermeneutic tradition discussed in the last section – not until the advent of postprocessualism and the reaction to the logical positivist models of archaeological knowledge espoused by the New Archaeologists. However, this is not to say that archaeologists working in the early and mid-twentieth century did not share many of the same assumptions connected to this tradition; indeed the term interpretation was widely used and was probably the most common term for the process of archaeological reasoning. The Egyptologist Flinders Petrie, for example, explicitly paralleled archaeological interpretation with the

legal process, as did the historian and archaeologist R. G. Collingwood. Such perspectives on archaeological interpretation show a clear link with the humanist tradition and textual interpretation, especially in the case of Collingwood who developed his own particular brand of historical interpretation modeled on the hermeneutic concept of *verstehen*. However, archaeology always occupied an uneasy position within academic disciplines, straddling a widely held division between the natural and social sciences. Commonly perceived as a very young discipline (especially compared to history), its status remained ambiguous; at the same time, for some like Petrie, it was precisely because of this that archaeology could counter the increasing tendency toward what C. P. Snow was later to call the two cultures (Petrie 1904: viii).

There was, however, another dimension to this ambiguity. This was in the recognition that archaeology is not a completely unified discipline, but rather exhibited a major fracture between prehistoric and (proto-) historical archaeologies, the former lying closer to the natural sciences and the latter to the humanities. Historically this is well attested as the emergence of prehistoric archaeology in the mid-nineteenth century was closely aligned with natural scientists like geologists as against the humanist background of those working in classical and medieval archaeology. This schism was addressed in depth by the British archaeologist Christopher Hawkes in the mid-twentieth century (Hawkes 1954). Drawing a distinction between text-free and text-aided archaeology, he defined different modes of archaeological cognition or interpretation depending on whether textual sources existed alongside archaeological ones (parahistoric/telehistoric) or not (antehistoric). For Hawkes these represented very different types of interpretation, one historical and the other "processual," and he linked them to his famous ladder of inference. Ultimately of course, even though he was a prehistorian, Hawkes saw historical interpretation as the richer one because it dealt with what was more *human* in human societies.

Hawkes' views were widely shared by many of his contemporaries, especially in Europe, who, while recognizing the importance of natural sciences to archaeology, preferred to see their discipline as part of the humanities, not the natural sciences. Jacquetta Hawkes vociferously argued that the ultimate goal of archaeology was historical reconstruction and that while the natural sciences formed a part of archaeology, their role was largely methodological, not theoretical. Her views were stimulated as a response to the growing influence of New Archaeology within Britain and the opposite stance which it represented: the subsumption of historical interpretation to styles of explanation modeled on the natural sciences. In Britain, this shift is more abrupt, but in North America one can see the transformation taking place more gradually during the preceding decades. For example, archaeologists like John Bennett and Walter Taylor in the 1940s explicitly defined interpretation as the ascription of functional or historical meanings to archaeological data, which Taylor considered as a penultimate stage in the processing of archaeological data, prior to more generalizing steps such as the construction of chronologies, culture historical syntheses, or cross-cultural comparative generalization (Taylor 1983). Indeed, sometimes one can see the interpretative stage as an incipient version of middle range theory, pertaining to the understanding of the archaeological record in terms of the particular events which created it as opposed to more generalized syntheses. This is reinforced by Ascher's later discussion of analogy which aligns analogy with the interpretive stage of archaeological work, after data collection but prior to synthesis.

Thus, what for Hawkes and many archaeologists, both in Europe and North America, was the ultimate goal of archaeology – historical reconstruction – was for a growing number of North American archaeologists only a middle stage toward a grander goal of scientific explanation, conceived as cross-cultural generalization. This shift was however gradual, and as a result, the concept of interpretation became increasingly ambiguous in North America. Thus, while some authors used the term interpretation to cover *all* aspects of archaeological reasoning, from typologies to historical reconstruction, Willey and

Philips used the term processual interpretation as the particular *archaeological* form of scientific explanation (1958). In Britain, the leading exponent of New Archaeology David Clarke similarly used the term *interpretive theory* to refer to a natural science model of explanation which capped a whole series of lower-level theories relating to archaeological reasoning (Clarke 1973: 17). It is only with Binford and the New Archaeology in the 1960s that interpretation seems to almost disappear from North American archaeological vocabulary to be replaced by explanation, a shift that is very emphatic in Binford's seminal paper "Archaeology as Anthropology" (1962). This of course is linked to the adoption of logical positivism and the desire to model archaeological knowledge after philosophies of the natural sciences.

Britain, alongside Scandinavia, was somewhat exceptional in Europe in terms of its reception of the ideas of New Archaeology. While such theoretical changes from the other side of the Atlantic were noted, they were nowhere near as influential as in Britain, no doubt in part due to a shared linguistic and cultural heritage. As a consequence, archaeology and archaeological interpretation remained closely connected to history, most clearly exemplified in the German tradition which from the 1950s developed concepts and methods of source criticism and which still forms the dominant disciplinary matrix today. However, it was precisely because of the stronger reception of New Archaeology in Britain and the denigration of historical interpretation that when postprocessualism emerged in the 1980s, the concept of interpretation was not only revived but given extended and explicit discussion in a manner that it had never received before. This is especially striking in contrast to Germany, for example, where much greater theoretical emphasis focused on control of data quality through source criticism than interpretation per se, a legacy of the entanglement of Nazism and archaeological interpretation from the 1930s.

The earliest postprocessual writings which engaged with the concept of interpretation varied in the attention they gave to it. With Hodder, for example, usage was initially fairly vague, largely because he drew his main inspiration from the work of Collingwood and his method of empathetic understanding, which Hodder felt had been misunderstood (Hodder 1986: 94). For Hodder, Collingwood was simply underlining the importance of acknowledging the *meaning* content of events or material culture in the past. Although Hodder uses the term interpretation, it is by no means a frequent use – it does not even occur in the index to the first edition of his key theoretical text *Reading the Past* (1986), unlike the second and third editions. In contrast, Shanks and Tilley devoted a chapter on hermeneutics and interpretation in their *Re-Constructing Archaeology* (1987), where they affirm their role as an alternative to positivism and explanation. They argue that interpretation moves in a circular or spiral fashion in that archaeologists always bring certain assumptions or analogies from other contexts into their understanding of archaeological data, and it is through a dialectical interplay between data and preconceptions about that data that interpretation develops and moves forward (Shanks and Tilley 1987: 104–105). Drawing on the work of Gadamer, they emphasized the interpretive basis to human experience, anticipating later articulations by Olsen and Thomas (see below).

Apart from this brief but important discussion by Shanks and Tilley, the concept of interpretation within the early postprocessualism of the 1980s remained very much underdeveloped. As a response to this, the Norwegian archaeologist Bjørnar Olsen with Harald Johnsen published an important paper addressing the gap, specifically focusing on Hodder's contextual archaeology in relation to hermeneutics (Johnsen and Olsen 1992). They highlighted many of the parallels between Hodder's theory and hermeneutics, especially the emphasis on an "inner" understanding of material culture, but they also criticized what they saw as an outdated conception of meaning and pointed out inconsistencies and contradictions within Hodder's writings. In ending, they argued for the need to engage with more recent and theoretically sophisticated hermeneutic writings, singling out Gadamer as the key figure. They argued that archaeology needs to appreciate better the dialectical relation between past and present,

that our study of the past should act back on our perception of ourselves, and that modern hermeneutic philosophy can provide a stronger basis for understanding the production of archaeological knowledge. Their paper was published at one of those ironic moments, for after it had been written but before it was published, Hodder, as if anticipating this critique, published a paper in the same journal addressing exactly these concerns (Hodder 1991). In a postscript, Johnsen and Olsen acknowledge this, and while unable to comment at length, they do question Hodder's characterization of hermeneutics as a method as opposed to a philosophical theory about human existence. This is as aspect taken up later by Julian Thomas (see below).

Hodder's paper "Interpretive Archaeology and Its Role" engaged with the hermeneutic tradition in a more direct and explicit manner than his previous texts (Hodder 1991). In part this was driven by Hodder's need to distance himself and his brand of postprocessualism from the excesses of post-structuralist archaeology which many critics from within the processual core were lambasting as a descent into pure relativism, crippling archaeology from making any kind of authoritative statements about the past. For Hodder, the recent hermeneutic philosophy from Betti, Gadamer, Habermas, and Ricoeur provided a way to counter these criticisms, avoiding, as he saw it, the excesses of both positivism and post-structuralism. Archaeological data thus provided a *guarded objectivity* insofar as they represent a reality partially independent of our interpretation and can resist as much as agree with such interpretations. At the same time, our interpretation of such data is not guided by external methods of validation but needs to adhere to a principle of *internal* coherence between any particular part and the whole – which includes seeing archaeological remains as the product of human intentionality and agency. Additionally though, interpretation should also be *reflexive* and *critical* of the wider set of background assumptions and traditions within which archaeologists make their interpretations. These three facets of interpretive archaeology – objectivity, coherence, and reflexivity – combined to make a powerful alternative to the processual concept of explanation.

During the 1990s, Hodder's contextual archaeology thus morphed into an interpretive archaeology; indeed one might talk more generally of an *interpretive turn* within postprocessualism during the last decade of the twentieth century. Two volumes appeared making explicit reference to this development: one called *Interpreting Archaeology* (Hodder et al. 1995) and the other called *Interpretative Archaeology* (Tilley 1993). Shanks and Hodder suggested that the label interpretive archaeologies supersede postprocessual archaeology as a way of avoiding polarization in debate. The concept of interpretation was elaborated further in both volumes, in both similar and different ways. Ironically though, neither volume gave much explicit attention to hermeneutics but rather remained closer to a mix of post-structuralist and Marxist theory.

In the later volume, Shanks and Hodder defined interpretation as the understanding of meaning; this process of understanding, they emphasized, is a dialogue in which both sides (the archaeological record and the archaeologist) are active. As a process, it is also always ongoing; it never reaches a conclusion or closure. Indeed, even those statements which appear factual or uncontroversial are still interpretations; only the interpretive aspect has been black boxed. This in itself is necessary to enable interpretation to move forward, but at the same time such statements are potentially open to revision, like any other interpretation. In the earlier volume, however, Tilley took quite a different view. Tilley gave a broad definition of interpretation as an activity undertaken only in situations where we are unsure, where something is not immediately obvious. If one sees a figurine of a frog, one does not *interpret* it as a frog – it is just perceived directly as a frog. If the figurine exhibits an ambiguous form on the other hand, we might say it looks like a frog to me, and in that case, we are interpreting the object. For Tilley, this is why interpretation always remains open to change, lacking finality, and its "truth" remains dependent on agreement between people rather than on the evidence – in other words, the figurine is a frog if we *all* interpret it as a frog.

Tilley's volume occupies an important moment within postprocessual archaeology, subtly

marking the transition from post-structuralism to phenomenology as a guiding philosophy for its two leading contributors, Tilley himself and Julian Thomas. In many ways, it also marks the end of explicit discussion on interpretation within postprocessual archaeology; though short-lived, the series of papers and volumes mentioned here from the first half the 1990s effectively comprise most of what has been written on interpretation in archaeology in relation to the hermeneutic tradition. The fact that little has been written since is perhaps largely due to the fact that epistemic issues in archaeological theory in general have greatly diminished in importance, at least for those working out of the postprocessual tradition. Concerns have rather shifted more toward questions of ontology (Olsen 2010), reflected not only in the emergence of phenomenology from the mid-1990s within postprocessualism but also in the ontological twist given to the hermeneutic concept of interpretation, as alluded to by Johnsen and Olsen (1992) and later developed by Thomas (2004a; see below).

Key Issues/Current Debates

As suggested at the end of the last section, the concept of interpretation has more or less ceased to generate any new theoretical reflection since the mid-1990s, so there are no real current debates to speak of. Nonetheless, in this section, I will elaborate on two key issues which relate to the concept of interpretation and have engendered divided opinion: the hermeneutic circle and the double hermeneutic. The first has been more central to archaeological discussion, while the latter has only received very brief attention. In the first, I will explore the tension between those who view the circle as a method and those who see it in ontological terms, defining something central about human beings and understanding. In the second, I explore the assumption that would separate the human/social sciences from the natural sciences based on a conception of reality that is divided, between a human-centered, inner world of meaning and a material, outer world of objects.

The Hermeneutic Circle

The concept of the hermeneutic circle extends back to the origins of hermeneutic theory with Schleiermacher and Dilthey, who conceived it on the lines of a part-whole relation, chiefly in relation to textual interpretation. Parts can be anything from words to text sections, while wholes can be anything from sentences to a language. The circle describes the necessary working back and forth between the two so that an accurate understanding of meaning can be achieved. Thus, to understand an unusual word in an ancient text may require not only assessing it in the context of its sentence but also how the word is used in other sentences and how this usage might differ between different authors, literary traditions, and even time periods. It is an ever-widening circle but one that is also always a back and forth between part and whole. Expressed this way, it describes a method of interpretation, and it was this part-whole relation that Hodder adopted in his uptake of hermeneutics and which he illustrated so clearly in his interpretation of a Neolithic enclosure (Hodder 1999: 32–40). In this case study, he narrates how his interpretation of the excavation changed over seasons as it shifted back and forth between the evidence and his expectations based on prior knowledge of such sites. He describes this process not as a circle but a spiral, to emphasize that the interpretive process is always forward moving, not locked as in a closed loop, a point also made earlier by Shanks and Tilley (1987: 104). In a sense, this captures the same idea as the notion of a widening circle mentioned above. At the same time, however, in the process it is not only the interpretation of the site that has changed but also the general background knowledge about such sites and perhaps the Neolithic in general. This is why Hodder (and others) often also describes the process as a *dialectic*, because in moving back and forth between part and whole, *both* are transformed in the process.

However, one of the points made by Johnsen and Olsen in their review of hermeneutics and Hodder's version of it is that interpretation is not simply an epistemological concept about the method of knowledge acquisition, but it is an ontological concept defining something fundamental about human beings. This was taken

from Gadamer's philosophical hermeneutics which blended Heidegger's phenomenology with the hermeneutic tradition. For Gadamer, Heidegger marks a turning point in the theory of interpretation, transforming the hermeneutic circle from a methodological concept to a metaphysical or ontological one. In *Being and Time*, Heidegger described the process of interpretation in terms of the relation between fore-understanding and understanding, where fore-understanding represents our implicit way of seeing the world inherited from the particular historical tradition we were raised in. In one sense, Heidegger *temporalized* the hermeneutic circle – instead of being about the part-whole relation of words to texts, it became a past/future-present, temporal relation between fore-understanding/expectation and interpretation. Gadamer adopted this stance in his key work *Truth and Method*, using the term prejudice for this fore-understanding.

Julian Thomas developed this ontological view of the hermeneutic circle, citing Gadamer who characterizes humans as *interpreting beings* (Thomas 2004a: 24). For Thomas, interpretation is thus something we are always doing and it applies to all experience; thus in Tilley's example cited earlier, when we unhesitatingly see the figurine as a frog, this is just as much an interpretation as when we consciously decide it is a frog. All acts of experience are enframed within a pre-understanding – we always see things *as* something, there can be no raw, unprocessed or uninterpreted experience. Even if we are uncertain it is a frog, we at least see it *as* a figurine. For Thomas, this aspect of human existence, what Heidegger called the as-structure, contradicts Hodder's notion of even a partial or guarded objectivity. Quoting Gadamer, Thomas argues that interpretation is a circle we cannot escape; however, it is not necessarily a vicious circle. While implicit pre-understanding always informs any experience, any explicit act of interpretation can also alter that pre-understanding and thus alter our experience of the world. This is a basic issue of contention with the hermeneutic circle; some see it as a vicious circle, allowing no grounding in any stable or solid point; it is another version of the post-structuralist play of endless difference. However, the position taken by Gadamer and Thomas is that the circle actually *enables* understanding or interpretation in the first place.

The Double Hermeneutic

The concept of the double hermeneutic was coined by the sociologist Anthony Giddens as a way to characterize a particular consequence of interpretation in the social sciences as distinct from those in the natural sciences. The notion of a double hermeneutic captures the idea that while social scientists interpret a particular society, those interpretations can be taken up by the society being interpreted and thus constitute a second or doubled interpretation (Giddens 1984: 284). For example, a hypothetical tribal society will have its own interpretation of a certain ritual it performs, which constitute what might be called a first-order interpretation (e.g., sacrifice to the gods for a fertile harvest). The anthropologist studying them, however, will typically create a second-order interpretation to explain this ritual (e.g., releasing social tension); without this second-order description, it would hardly be anthropology. The same applies to any social science, including archaeology, where material culture patterning associated with a ritual incorporates aspects of how people in the past interpreted the ritual themselves. The doubling occurs however when these second-order interpretations are incorporated by the people being studied so that they become first-order interpretations. For example, early anthropological accounts of societies may be taken up by later descendents and integrated into their own sense of tribal identity.

Giddens' articulation of the double hermeneutic makes explicit the dialectical interplay between two frames of meaning – the sociologist and the people being studied, and how translation and interpretation from one to the other runs in both directions. When Giddens originally articulated this, it was contrasted with the natural sciences where, he argued, the object world does not answer back. This is highly debatable given recent perspectives within science and technology studies, but it is interesting that Shanks and

Tilley adopted and modified Giddens double hermeneutic into a fourfold hermeneutic – but in such a way that actually bears no resemblance to Giddens concept of it. For Shanks and Tilley, archaeology was involved in a quadruple act of interpretation, by which they effectively meant the overcoming of four levels of distanciation: from our own disciplinary matrix, from our own social context, to an alien cultural context, and to a past cultural context (Shanks and Tilley 1987: 107–108). This was a somewhat befuddled attempt to expand Giddens's original notion, and few have actually adopted it in archaeology (but see Leone, in Hodder et al. 1995); indeed a faithful reading of Giddens' original articulation would ironically have excluded archaeology from the double hermeneutic, aligning it with the natural sciences.

On the other hand, it raises a problem which Shanks and Tilley perhaps should have addressed, namely, the question of whether objects do answer back. There are two issues here; the first concerns the potential of any object of study to be transformed by the act of study itself. This is a common enough property of any science, from quantum physics to archaeology. The second, more equivocal issue concerns a separation of meaning (humans, society) from materiality (objects, nature) as two different orders of phenomena. This separation of course can be traced right back to Dilthey and Weber who argued for two forms of knowledge and science, one which looked at reality from an external, causal perspective (natural science/explanation) and the other which looked at reality from an internal, meaning perspective (social science/interpretation). The distinction also lay at the basis of Hodder's contextual archaeology and adoption of Collingwood's approach to interpretation as empathetic understanding. In assuming this separation, Giddens was inevitably led to argue that only when the object of study has the same ontological status as the scientist, i.e., social phenomena, is there any possibility of answering back. Yet if one avoids the separation of reality into two orders, then no distinction between a single and double hermeneutic is necessary. Any science exhibits the dialectical characteristics of the double hermeneutic, but more importantly, the very term is perhaps redundant insofar as the concept of hermeneutics presupposes the distinction of two realities – meaning and materiality.

Future Directions

What is the future of archaeological interpretation? For some, interpretation has come to carry a somewhat negative connotation, whereby it implies nothing is ever what it seems: meaning is always hidden, always beneath the surface, and always one step away. In Freudian terms, a pipe is never just a pipe. This hermeneutics of suspicion (Olsen 2006), of depth (Thomas 2004b: 154–157) is largely the product of a post-structuralist influence on the concept of interpretation, whereby all meaning becomes completely unhinged from the materiality of the world as it is experienced and is one reason why interpretation itself has now become suspect. But the concept as originally formulated does not necessarily need to imply such a connotation. On the other hand, arguably the word interpretation today is often used loosely and interchangeably with explanation, as it once was before the processual-postprocessual wars of the 1980s and 1990s. This suggests two not necessarily unrelated possibilities: either people are just bored of epistemic subtleties or that the basis for the distinction between explanation and interpretation is simply no longer plausible. Is there really a divide between the natural and social sciences in terms of their forms of knowledge or orders of reality? Instead of just two sciences, many now argue for a more heterogeneous disunity to the sciences, while conversely, others in emphasizing the performative quality of the natural sciences reveal a continuity between science and other forms of cultural production. This is most apparent in work that comes under the rubric of postphenomenology, specifically the work of Don Idhe (1999, 2009). In archaeology, this shift has manifested itself through the recent rise of interest in a concept of materiality that does not separate itself from meaning, but as this literature reveals, the dichotomies generated from the last century are hard to shake off.

It may be some time yet before we see a resolution to this issue, but either way, the concept of interpretation is unlikely to remain unchanged. The extent to which Hodder's original adoption of the distinction between an internal and external type of understanding remains a valid one is hard to maintain today. Indeed, Hodder's later articulation of interpretation tended to focus more on the process or operation of the part-whole relation than this internal-external distinction, which is why some have suggested a greater commonality between interpretive and explanatory archaeologies. In many ways then, the concept of interpretation, as described in this chapter, is perhaps already redundant; if it has a future, it may not be one that separates it from explanation at least.

Cross-References

- ▶ Hodder, Ian (Theory)
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory

References

Binford, L. 1962. Archaeology as anthropology. *American Antiquity* 28 (2): 217–225.

Bleicher, J. 1980. *Contemporary hermeneutics*. London: Routledge.

Clarke, D.L. 1973. Archaeology: The loss of innocence. *Antiquity* 47: 6–18.

Giddens, A. 1984. *The constitution of society*. Cambridge: Polity Press.

Hawkes, C. 1954. Archaeological theory and method: Some suggestions from the Old World. *American Anthropologist* 56 (2): 155–168.

Hodder, I. 1986. *Reading the past. Current approaches to interpretation in archaeology*. Cambridge: Cambridge University Press.

Hodder, I. 1991. Interpretive archaeology and its role. *American Antiquity* 56: 7–18.

Hodder, I. 1999. *The archaeological process*. Oxford: Blackwell Publishers.

Hodder, I., M. Shanks, A. Alexandri, V. Buchli, J. Carman, J. Last, and G. Lucas, eds. 1995. *Interpreting archaeology. Finding meaning in the past*. London: Routledge.

Idhe, D. 1999. *Expanding hermeneutics. Visualism in science*. Evanston: Northwestern University Press.

Idhe, D. 2009. Do things speak? Material hermeneutics. In *Postphenomenology and technoscience*, 63–80. Albany: SUNY Press.

Johnsen, H., and B. Olsen. 1992. Hermeneutics and archaeology: On the philosophy of contextual archaeology. *American Antiquity* 57 (3): 419–436.

Olsen, B. 2006. Archaeology, hermeneutics of suspicion and phenomenological trivialization. *Archaeological Dialogues* 13 (2): 144–150.

Olsen, B. 2010. *In defence of things. Archaeology and the ontology of objects*. Lanham: AltaMira Press.

Petrie, F. 1904. *Methods and aims in archaeology*. London: Macmillan.

Shanks, M., and C. Tilley. 1987. *Re-constructing archaeology*. Cambridge: Cambridge University Press.

Taylor, W. 1983. *A study of archaeology*. Carbondale: Southern Illinois University Press.

Thomas, J. 2004a. The great dark book: Archaeology, experience and interpretation. In *A companion to archaeology*, ed. J. Bintliff, 21–23. Oxford: Blackwell Publishing.

Thomas, J. 2004b. *Archaeology and modernity*. London: Routledge.

Tilley, C., ed. 1993. *Interpretative archaeology*. Oxford: Berg.

Willey, G., and P. Phillips. 1958. *Method and theory in American archaeology*. Chicago: University of Chicago Press.

Winch, P. 1958. *Theidea of a social science and its relation to philosophy*. London: Routledge & Kegan Paul.

Further Reading

Dilthey, W. 1976. *Selected writings*. Cambridge: Cambridge University Press.

Gadamer, H.G. 1975. *Truth and method*. London: Sheed & Ward.

Gadamer, H.G. 1977. *Philosophical hermeneutics*. Berkeley: University of California Press.

Ricoeur, P. 1981. *Hermeneutics and the human sciences*. Cambridge: Cambridge University Press.

Introdução à Arqueologia Brasileira [Introduction to Brazilian Archaeology]

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Basic Information

Introdução à Arqueologia Brasileira (Etnografia e História) (IAB-EH), by João Angyone Costa (Angyone Costa, Natal, 1888–1954), is

considered the first manual of Brazilian archaeology. The author argues that there was a need to systematize information related to archaeology, anthropology, and ethnology in Brazil, so that this information could be used as teaching material for the classes of the *Curso de Museus* offered by the *Museu Histórico Nacional* (Fig. 1).

IAB-EH underwent four editions that all sold remarkably well. The first one, with 348 illustrated pages, dates to 1934 and was published by the *Companhia Editora Nacional*, being part of the *Biblioteca Pedagógica Brasileira* collection. Due to it selling out quickly, the second edition was published only 4 years later, in 1938. Costa maintained the same format, only adding some comments, a subchapter on diet, an onomastic index, and a remissive index.

There are also two posthumous editions: 20 years after the second edition, and 4 years after the death of Angyone Costa, a third edition (1958) was published. The last edition contains a preface by his son, Dante Costa, to whom the first edition had been dedicated. Exhorting his father's qualities as a researcher, Dante emphasized the pioneering of this work, not only due to its dealing with archaeology but for placing the theme of the "Brazilian Indian" definitively in the science agenda. Finally, the fourth edition of 1980, composes volume 34 of the *Coleção Brasiliana* – a systematization of Brazilian studies published in partnership with the *Instituto* Nacional do Livro, of the former Ministério da Educação e Cultura.

The book manual is divided into four parts, which are *Part I: Elements for the study of Brazilian Archaeology*; *Part II: Archaeological Researches*; *Part III: Ethnographic and anthropologic elements necessary for the comprehension of Brazilian archaeology*; *Part IV: Morphology of the Tupi-guarani civilization, applicable, therefore, to other brazilic races*; and *Part V: Conclusions*. Altogether, the volume references 138 works by 106 authors, almost all of them written in Portuguese and published between 1844 and 1933. This reveals at the same time the range and the update of this work at the time. The annexed section provides notes on the 17 stamps that illustrate and inform about the distribution of indigenous people, ceramics, lithics, and rock engravings.

Angyone Costa was a secondary school teacher and a journalist and was a member of various scientific societies. He is also the author of *Civilização pré-colombiana no Brasil* (1935),

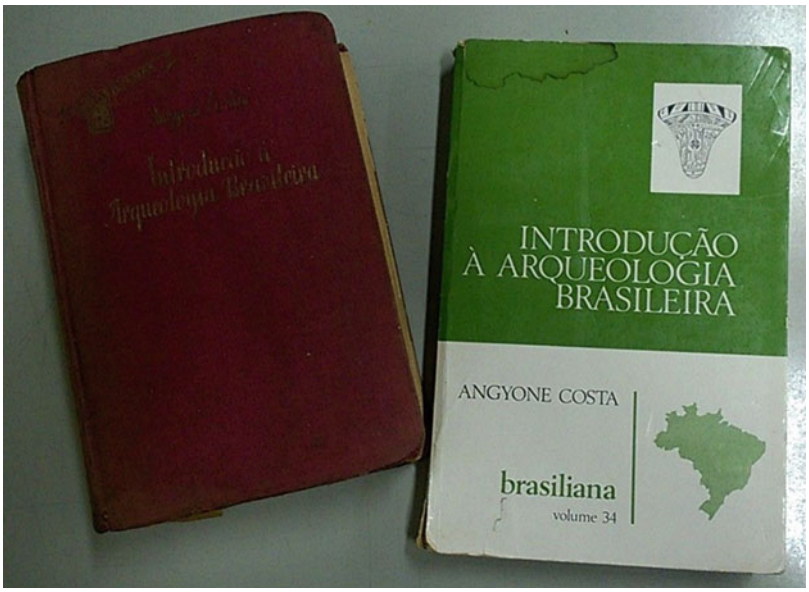

Introdução à Arqueologia Brasileira [Introduction to Brazilian Archaeology], Fig. 1 First edition (left) and fourth edition of *IAB-EH*

Arqueologia geral (1936), and *Migração e cultura indígena* (1939).

Major Impact

Although the author modestly declared the work being merely "an organization of indispensable elements for the study of Brazilian archaeology," *IAB-EH* does much more than present and compile studies on archaeology and ethnology. Its text resulted in the updating and reevaluation of a number of theories in vogue in the nineteenth century, among them are models of "savage" Indians versus "docile" Indians, which dominated the ethnographic accounts of naturalist travelers.

This helped to build the idea that archaeology was a discipline dedicated to the study of people that are "primitive," "uncivilized," or "in the stone age." The traits of civilization, through that perspective, were the use of clothes, the sophistication of artifacts, and the domestication of animals and plants. Indians were also qualified due to their physical characteristics such as color, hair, stature, and the shape of their noses.

The scientific authority which surrounds *IAB-EH*, used as a work of reference by many young students, resulted in Costa's perspectives being disseminated in a large number of scientific works in the twentieth century and, in a way, remains present until today. This can be seen in Costa's classification of research *sambaquis* (shell mounds) in the nineteenth century distinguishing three interpretative currents. Once the author had classified those three trends – stating that there were scientists who understood the shell mounds rather as a natural phenomenon, as archaeological sites, or a mix of those – a number of archaeologists repeated this judgment, even though it does not confirm itself factually.

For beyond the shell mound sites, caves, lithic stations, and stilt dwellings are also inserted into his data collection of archaeological sites. Other themes of the nineteenth century, however, were abandoned. This was the case of the mythic lost civilizations and the Viking and Phoenician inscriptions, which were themes that had inspired a number of studies in the prior century, but Costa considered these suspicious, due to a lack of scientific evidence. While other general books were published years or decades later, *IAB-EH* stands both as a great pioneer work on the theme of Brazilian archaeology and the disseminator of an idea about what Brazilian archaeology was at its very beginning.

Cross-References

- ▶ Brazil: Cultural Heritage Management Education
- ▶ Brazil: Historical Archaeology
- ▶ Ethics of Commercial Archaeology: Brazil
- ▶ South America: Lithic Industries
- ▶ South American Archaeology: Postcolonial Perspectives
- ▶ South American Rock Art
- ▶ Tupi-Guarani Archaeology in Brazil

References

Costa, Angyone. 1934. *Introdução à Arqueologia Brasileira*. São Paulo: Companhia Editora Nacional.

Costa, Angyone. 1980. *Introdução à Arqueologia Brasileira*. 4th ed. Brasília: Instituto Nacional do Livro.

Further Reading

Calazans, M.O. 2016. *Os sambaquis e a arqueologia no Brasil do século XIX*. Dissertação de Mestrado, Faculdade de Filosofia, Letras e Ciências Humanas, Universidade de São Paulo, São Paulo.

Meggers, B. 1985. Advances in Brazilian archeology, 1935–1985. *American Antiquity* 50 (2): 364–373.

Noelli, F.S. 1998. The Tupi: Explaining origin and expansions in terms of archaeology and of historical linguistics. *Antiquity* 72 (277): 648–663.

Prous, André. 1992. *Arqueologia brasileira*. Brasília: Editora UNB.

Robrahn-González, E.M. 1999/2000. Arqueologia em perspectiva: 150 anos de prática e reflexão no estudo de nosso passado. São Paulo, *Revista da USP*, ano 1, (44): 10–31. https://doi.org/10.11606/issn.2316-9036.v0i44p10-31

Iran: Heritage Preservation and Tourism

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Introduction and Historical Background

This entry seeks to provide empirical evidence concerning heritage preservation in the Islamic Republic of Iran. A brief description of the country's tourism industry is also presented as this relates to the cultural heritage.

Until 1935, Iran was historically referred to as Persia when Reza Shah Pahlavi formally announced to call the country by its *native* name, Iran. Under the leadership of Ayatollah Khomeini, the current Islamic Republic of Iran was founded in 1979. Iran has an impressive history and fascinating culture. The Iranians are very proud of their culture and history. It is important to note that Iran is not an Arab country. Iran comes from the word "Aryan" with its official language being Farsi, an Indo-European language. Although Iran is portrayed in the media as a society of purely Islamic fundamentalists, the country is also comprised of people practicing other religions making it, in reality, a multicultural national entity.

Iran's heritage is very represented on the UNESCO World Heritage List with 13 cultural sites. Clearly, Iran has an abundant wealth of cultural assets of the pre-Islamic and Islamic eras and thus great potential for tourism. Although tourism to Iran is restricted or difficult due to its political situation and strict Islamic practice, Iran nevertheless has recorded a significant increase in its inbound tourist arrivals. More than 1.6 million international visitors were generated in 2004.

Key Issues

Heritage Management, Policy, and Laws

The *Iran Cultural Heritage, Handicrafts, and Tourism Organization* (ICHHTO) is an organization in charge of the protection of Iranian monuments. Apart from that, the agency is also responsible for overseeing the country's heritage and tourism movement. All projects concerning the protection of monuments in Iran must be in accordance with the provisions of the law and must be approved by ICHHTO. However, I have not identified the specific law concerning this protection.

All nominated properties to the World Heritage List are protected under the Iranian legislation since 1932. Apparently, according to the current law, special protection provisions are in place for the property, the buffer zone and for a wider area called the "landscape zone." The High Technical Council of ICHHTO is responsible for the management of these protected monuments by allocating funding for major conservation works. Minor works and maintenance is ensured by a steering committee (Table 1).

It is complicated and difficult to distinguish the differences in functions and status between the ICHHTO, ICTHO, and ICHO. O'Gorman et al. (2007), in their article on central control and indigeneity of tourism in Iran, state that the growing links between tourism and the protection of

Iran: Heritage Preservation and Tourism, Table 1 Organizations responsible for the management of heritage and tourism in Iran

Iran Tourism and Touring Organization (ITTO)
Iran Cultural Heritage, Handicrafts, and Tourism Organization (ICHHTO)
Iranian Cultural Heritage Organization (ICHO)
Cultural Heritage and Tourism Organization (ICHTO)
Research Center for Conservation of Cultural Relics
Iran Heritage Foundation (IHF)
ICHO Anthropology Research Center
Technical Office for Preservation Projects of ICHO
Research Center of the Traditional Arts

Iran's national cultural heritage were reinforced in 2005 with the merger of *Iran Touring and Tourism Organization* (ITTO) and *Iran Cultural Heritage Organization* (ICHO) to form the *Iran Cultural Heritage and Tourism Organization* (ICHTO). It is interesting to note the way heritage and tourism is viewed based on the formation of these organizations. It appears that the country is aware of the significance of tourism and recognizes the importance of preserving heritage and cultural sites for that sector.

Another organization identified is the *Iranian Cultural Heritage Organization* (ICHO), which is also a governmental agency responsible for carrying out research, conservation, rehabilitation, presentation, and education concerning the cultural patrimony of Iran. It was mentioned earlier that this organization has been merged with ITTO to form the ICHTO. However, it is still very complicated to understand the heritage management of the country. Initially, the agency is responsible in formulating policy for cultural and heritage of Iran. It was also mentioned that the subdivision of ICHO, the *ICHO's Anthropological Research Center*, is made up of four research departments: social anthropology, ecological anthropology, ritual anthropology, and traditional arts. Their main responsibility is to carry out research in the various domains of Iran's intangible cultural heritage.

There is also another organization which, if not carefully read, may be mistaken as the earlier organization mentioned above, and it is unclear at this moment if both exist. *Iran's Cultural Heritage, Tourism and Handicrafts Organization* (ICTHO) is an agency responsible for the establishment and development of tourism in Iran. ICTHO is an educational and research institution overseeing a variety of museum complexes throughout Iran. Established in 1985, it is administered and funded by the government of Iran.

The *Iran Heritage Foundation* (IHF) is a nonpolitical UK-registered charity with the mission to promote and preserve the history, languages, and cultures of Iran. It can be assumed here that this may be a nongovernmental and nonprofit agency which is aimed at organizing diverse activities of cultural or scholarly merit which include academic research, publishing, and fellowships. IHF initiates a wide range of activities intended to facilitate the study of Iran's history and culture, both among academics and the wider community. Their main source of funding is the annual contribution pledged by trustees and patrons as well as fund-raising events. They encourage business and individual sponsorships but they accept no financial support from any government organizations or lobbying groups.

Iran Stolen Heritage

The *Iran Heritage* site (http://www.iran-heritage.org/index.htm) is a resource for anyone interested in preserving the heritage of Iran. The main goal of this site is to document stolen properties which have been transferred to locations and museums worldwide. These archaeological finds belong to Iran and its people. According to the UNESCO Convention of 1970, legal actions can be taken to return the stolen properties to Iran or Iranian museums anywhere in the world. The association listed three stolen Iran heritages worldwide on their website. The first one was found at the New York Metropolitan Museum of the United States. Another stolen heritage was reported in the Los Angeles County Museum of Art. According to the site, the museum paid $40 million to a private collector to purchase the stolen Iranian Heritage. The last reported stolen heritage was found at the Louvre Museum in Paris, France, and the British Museum, London, England – but no information was available on this. Another important purpose of this site is to raise the awareness of Iran's culture and natural resources.

World Heritage Sites

At present, there are 13 cultural sites of Iran listed on the World Heritage List. The table below provides the list of Iran's cultural properties listed in the World Heritage Sites. Out of those, one is listed as site in danger: Bam and its cultural landscape (Table 2).

Meidan Emam, Esfahan, was the first Iranian site inscribed on the UNESCO World Heritage List (in 1979). Known for its Royal Mosque, the site is an impressive testimony to the level of social and cultural life in Persia during the Safawid period (UNESCO). The center of the city was dominated by a vast Royal Square and so large that it was called "the image of the world."

Iran: Heritage Preservation and Tourism, Table 2 World Heritage Sites of the Islamic Republic of Iran

Sites	Nature of sites
Meidan Emam, Esfahan	Cultural, 1979
Persepolis	Cultural, 1979
Tchogha Zanbil	Cultural, 1979
Takht-e Soleyman	Cultural, 2003
Bam and its cultural landscape	Cultural, 2004
	Sites in Danger
Pasargadae	Cultural, 2004
Soltaniyeh	Cultural, 2005
Bisotun	Cultural, 2006
Armenian Monastic Ensembles of Iran	Cultural, 2008
Shushtar Historical Hydraulic System	Cultural, 2009
Sheikh Safi al-din Khānegāh and Shrine Ensemble in Ardabil	Cultural, 2010
Tabriz Historic Bazaar Complex	Cultural, 2010
The Persian Garden	Cultural, 2011

Source: UNESCO World Heritage List. Available at: http://whc.unesco.org/en/list

Persepolis was also inscribed in 1979. It was built on an immense half-artificial, half-natural terrace, where the "king of kings" created an impressive palace complex inspired by Mesopotamian models.

Another cultural property inscribed that same year is the *Tchogha Zanbil*, which is the ruins of the holy city of the Kingdom of Elam.

The archaeological site of *Takht-e Soleyman*, situated in a valley set in a volcanic mountain region, has an important symbolic significance and an outstanding ensemble of royal architecture situated in Azerbaijan province. Located about 750 km from the capital city of Tehran, the site is well known for heritage tourism among international visitors.

Pasargadae was the first dynastic capital of the Achaemenid Empire. Its palaces, gardens, and the mausoleum of Cyrus are outstanding testimonies of the Persian civilization. The property was inscribed in 2004 based on criteria I, II, III, and IV.

Soltaniyeh, situated in the northwest province of Zanjan, is another important achievement of the Persian Islamic architecture. The property has been described as "anticipating the Taj Mahal." It is believed that the site was occupied at least from the first millennium BCE.

Bisotun is located along the ancient trade route linking the Iranian high plateau with Mesopotamia. The site includes remains from prehistoric times to the Median, Achaemenid, Sassanian, and Ilkhanid periods. The principal monument is a bas-relief ordered by and featuring Darius I, the Great, when he ascended to the throne of the Persian Empire in 521 BCE.

The *Armenian Monastic Ensembles of Iran*, situated in the northwest of the country, consists of three monastic ensembles of the Armenian Christian faith: St Thaddeus and St Stepanos and the Chapel of Dzordzor. *Shushtar Historical Hydraulic System* was inscribed at the same time.

Sheikh Safi al-din Khānegāh and Shrine Ensemble in Ardabil incorporates a route to reach the shrine of the Sheikh, divided into seven segments and constituting a rare ensemble of elements of medieval Islamic architecture.

The *Tabriz Historic Bazaar Complex* is one of the most important commercial centers on the Silk Road. The complex has been one of the most important international places for commercial and cultural interchange. It was officially protected in 1975.

The Persian Garden includes nine gardens in nine provinces of Iran. As explained in the UNESCO website, "They exemplify the diversity of Persian garden designs that evolved and adapted to different climate conditions while retaining principles that have their roots in the times of Cyrus the Great, 6th century… [and] influenced the art of garden design as far as India and Spain."

Heritage in Danger: Bam and Its Cultural Landscape

Bam and its cultural landscape is the only property of Iran inscribed to the World Heritage List as heritage in danger. It is situated in a desert environment on the southern edge of the Iranian high plateau and was known for the production of silk and cotton garments. The site was submitted to UNESCO in 2004 after it was affected by the 6.2 magnitude earthquake in 2003, which destroyed most buildings of the city and killed more than 26,000 people. The Citadel was also seriously damaged. The government is still gathering efforts to revive this significant heritage property.

According to the official tourism website, this site receives substantial number of tourists every year. Being listed as heritage in danger does not mean the site will result in poor visitation. In fact, it would give more reasons for people to visit a site.

Properties on Tentative List

Iran has more than 50 sites submitted to UNESCO Tentative List! Most of these sites are cultural sites. In 1997, Iran submitted seven sites to UNESCO and is still awaiting approval into the premier list: Mosque Esfahan, Historic ensemble of Qasr-e Shirin, and Firuzabad Ensemble just to name a few. The government believes that the Tentative List will help them maintain sites of significance from further destruction and damage. In 2007, Iran submitted 40 cultural and natural sites to be listed as World Heritage Sites of UNESCO. Eleven more sites were submitted in 2008 making the total altogether 56 tentative sites.

Iran as a Tourism Destination

Tourism is undoubtedly an important industry for economic development of Iran. Before 1979, Iran was a well-known destination due to its impressive history and ancient civilization. Its attractive natural and historical sites are rated among the top ranked in the world (ITTO). The 2005 20-year Tourism Development Master Plan with the assistance of World Tourism Organization (WTO) is one effort indicating how serious the Iran government was on investing in tourism. UNESCO ranks Iran seventh in the world in terms of possessing historical monuments, museums, and other cultural attractions. This is a positive indication of how Iran can explore its tourism potential and attracts more international tourism. However, it has been a rather difficult process for tourism to flourish in Iran. Poor advertising, internal and international political instability creating an image of Iran as an unsafe country, and its negative public image in some parts of the world have hindered the growth of tourism. Perhaps a greater difficulty is that of getting an entry visa. At present, countries with no visa entry requirements are Bosnia-Herzegovina, Croatia, Japan, Turkey, and Saudi Arabia (ITTO).

In addition, the prohibition of alcohol and the strict Islamic women's dress code discourage tourism from the West. It is reported that tour operators in some countries are unwilling to promote Iran due to these circumstances. Yet many tourists from outside the Islamic world are undiscourage and Iran has somehow strategize its tourism campaigns to countries willing to accept these strict regulations.

Tourism will help enhance Iran's image internationally and, perhaps, change people's perceptions of its country.

In its further effort to promote tourism, Iran has established a *Special Economic Zone* and a *Free-Trade Industrial Zone*. These free zones are designed as an incentive for foreign investments. These zones provides facilities such as proper employment regulations, 15 years tax exemption, national and international banking facilities, no currency restrictions, abundance of energy sources, labor of all skill levels, no visa entry requirements, and tourist attractions (WTO 2002). The incentives provided in these zones have attracted many foreign investments.

Approximately 1.8% of national employment in Iran is generated in the tourism sector which is slated to increase to 10% in the next five years. In 2009, tourism attracted 2.3 million people to Iran. The tourists' arrival data or statistics are not available on Iran's leading tourism website. Countries such as Japan, Germany, and Turkey, that have good relations with Iran, are some of their main target markets. A study by Vafadari and Cooper (2007) on Japan and Iran's relationship in tourism reported that the Japanese with strong interest in heritage tourism constitute one of the most important tourism markets for Iran. Iran plans to have 20 million tourists annually by 2015. Cultural and heritage attractions constitute the focal point of Iran tourism promotion and marketing. According to their official tourism website, Iran Travel and Tourism Organization (online), 70% of Iran's tourists are from Europe. However, it was reported that tourists' arrivals in Iran faced a decline in 2008. Iran has been criticized as having a negative image internationally due to its political tension with the western governments. The country also has a reputation for supporting various elements of Islamic extremism.

Domestic tourism in Iran, however, has remained strong despite the decline in

international arrivals in 2008. Many domestic trips reported were among the religious visits or visiting family and friends (VFR).

Safeguarding Intangible Cultural Heritage and Developing Ecotourism

Although this encyclopedia is concerned with archaeology, when dealing with cultural heritage and world heritage the intangible must also be recognized. Moreover, ecotourism immediately implicates Iran's living cultural heritage.

One area considered for further expansion in the tourism sector in Iran is ecotourism. Iran has an established image of its heritage attractions and this has attracted many visitors with such interest. In expanding its tourism and exploring further potential in tourism, Iran has recently showed interest in investing in ecotourism. An initial project to realize this plan was to develop and preserve Masuleh, a village rich in tangible and intangible heritage. Masuleh is located in a scenic valley surrounded by snow-capped mountains in northeastern Iran. The village is a site of the UNESCO and the Iran Touring and Tourism Organization (ITTO) project in Iran. Notable for its traditional wooden buildings, clustered on the northern slopes of the valley, Masuleh is registered as national cultural and natural heritage in Iran. The project is aimed at encouraging community participation in the area's tourism development and helping to generate employment opportunities.

In its effort to safeguarding intangible heritage, the government of the Islamic Republic of Iran has passed several laws pertaining to aspects and the manner in which intangible heritage should be preserved. The following table provides the list of laws and acts about Iran's effort in protecting their intangible heritage (Table 3).

The Intangible Cultural Heritage list is composed of intangible heritage elements that concern communities and require urgent measures to keep them alive (UNESCO 2003). UNESCO defines intangible heritage as living traditions that are passed on from one generation to another. These include spoken traditions, festivals, performing arts, social ceremonies, and cultural knowledge. Inscriptions on the list help mobilize international cooperation and assistance for stakeholders to undertake appropriate safeguarding measures (Table 4).

Iran: Heritage Preservation and Tourism, Table 3 List of laws and acts about Iran's effort in protecting their intangible heritage

Act/laws
National laws and regulations giving rise to a number of organizations, ministries, or other governmental bodies
Iranian National Copyright Law of the year 1969, to support authors, composers, and artists
The Fourth Economic, Social, and Cultural Development Law, for the period 2005–2009
Establishment of the Iranian Cultural Heritage Organization Law, 1985
Constitution of the Iranian Cultural Heritage Organization Law, 1988

Iran: Heritage Preservation and Tourism, Table 4 Intangible Heritage of Iran listed during the 5th session of the Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage, Nairobi, Kenya

Intangible cultural heritage
The music of the Bakhshis of Khorasan
The Pahlevani and Zoorkhanei rituals
The ritual dramatic art of Ta'zīye
Traditional skills of carpet weaving in Fars
Traditional skills of carpet weaving in Kashan

Future Directions

Iran is a large country with numerous attractions that appeal to tourists particularly its rich heritage and cultural assets. Apart from its economic potential, tourism and cultural exchange will promote prosperity and understanding of other countries towards Iran. The 2005 Tourism Development Master Plan (WTO 2002) has in many ways helped justify Iran's tourism direction and attracted many stakeholders, foreign expertise and investors to boost up the country's tourism industry. Iran's potential in becoming a leading tourism destination is very strong considering the amount of heritage sites the country own and is maintaining.

The country receives great attention from UNESCO on preserving its heritage. Despite some of the major issues and challenges facing its tourism industry, Iran continues to receive tourists particularly interested with its cultural, history, and heritage endeavors. Iran is now gradually dealing with its challenges and limitations

facing its tourism industry. Issues such as the use of "hijab" among women tourists and prohibiting alcohol have invited much debate over the years. The government is also planning to extend its free-trade zones to the main land instead of just limiting it to the Iranian islands in order to distribute an equal share of its tourism economic benefits. The government has also taken measures to facilitate inbound tourism by easing visa issuance on arrival to many nationalities.

Historically, the war with Iraq impacted the country's tourism growth and a major decline in tourism arrivals was reported for Iran. Despite such turndown in tourism, Iran has instead focused its policy on selective markets with emphasis on its Islamic-Iranian civilization. Tourism policy was formulated with the aim to achieve Islamic unity among the Muslim nations through tourist exchanges. Although the policy was not aimed to attract tourists on a global scale, it was enough to boost tourism for Iran.

In recent years, the negative image of Iran imposed by international media has also played a major factor in the declining international tourism arrivals. The Middle East is often described as an unsafe place for tourists in general. In its effort to support tourism in the country and internationally, Iran's government has also given substantial responsibilities to the private sector in developing the industry particularly to preserve and restore historical monuments, cultural, and heritage products and tourism facilities, limiting its own role to tourism policy making and strategic planning (WTO 2002).

Apart from efforts in tourism, it is also important for Iran to enrich its management efforts of its heritage sites. This will require further research over the existing situation of Iran's heritage management and the impacts tourism may bring to the country's heritage sites.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Heritage Values, Communication of
- ▶ Iran: Islamic Archaeology

References

O'Gorman, K.D., T. Baum, and L.R. McLellan. 2007. Tourism in Iran: Central control and indigeneity. In *Tourism and indigenous peoples: Issues and implications*, ed. R. Butler and T. Hinch, 297–317. Oxford: Butterworth Heinemann.

Vafadarik, K.M., and M. Cooper. 2007. Japan-Iran tourism relations: Opportunities and limits of promoting Iran's culture and heritage in Japan. Unpublished PhD dissertation, Ritsumeikan Asia Pacific University.

World Tourism Organization (WTO). 2002. *Tourism after 11 September: Analysis, remedial actions and prospects*. Madrid: World Tourism Organization.

Further Reading

Alavi, J., and M. Yasin. 2000. Iran's tourism potential and market realities: An empirical approach to closing the gap. *Journal of Travel and Tourism Marketing* 9: 11–19.

Asia-Pacific Database On Intangible Cultural Heritage (ICH). n.d. Available at: http://www.accu.or.jp/ich/en/links/O_IRN1-more.html.

ICHHTO – Iran's Cultural Heritage, Handicrafts And Tourism Organization. n.d. Available at: http://www.ichhto.org/.

ICHO Headquarters, Teheran. n.d. Available at: http://www.iranmiras.ir.

Information about Iran and traveling to Iran. n.d. Available at: http://www.itto.org and http://www.chn.ir/Tourism/English/Index.asp.

Information about Iran's Foreign Investment Protection Law. n.d. Available at: http://www.irtp.com/howto/foreig/mb13.asp.

Iran Heritage. n.d. Available at: http://www.iran-heritage.org/articles/conspiracy.htm.

Iran Heritage Foundation. n.d. Available at: http://www.iranheritage.org/.

Iran heritage policy. n.d. http://www.iranculture.org/en/research/iranculpol.php.

Iran Tourism And Touring Organization (ITTO). n.d. Available at: http://www.itto.org.

Iran World Heritage List. n.d. Available at: http://www.unesco.org/culture/ich/doc/1extCOM-Comments/IRAN.pdf. Accessed Dec 2010.

Iran-Masuleh. 2004. Available at: http://portal.unesco.org/culture/en/ev.php URL_ID=2119&URL_DO=DO_TOPIC&URL_SECTION=201.html.

Irpedia. Available at: http://www.irpedia.com/iran/.

Locations of stolen heritage. n.d. Available at: http://www.iran-heritage.org/aboutus/locations.htm.

Sonmez, S. 1998. Tourism, terrorism risk and political instability. *Annals of Tourism Research* 25: 416–456.

World Bank Advisor: Iran's economic growth depends on expansion of private sector. 2004. Available at: www.payvand.com. Accessed 3 Mar 2005.

Iran: Islamic Archaeology

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Introduction

Islamic archaeology is a discipline characterized by an inaccurate and problematic definition. The chronological and geographical extent of Islamic history and the cultural, ethnic, and religious peculiarities of the territories ruled by Islamic authorities prevent the imposition of a conclusive definition – to the extent that this problem has become an object of research in itself. In the case of Islamic archaeology in Iran, additional issues relate to the nature of the birth and development of Islamic archaeology and the cultural peculiarities of the country, including its historical–political vicissitudes. For example, we must take into consideration the privileged role of the pre-Islamic past in shaping the national identity of Iran, as well as the historic influence of Westerners in the country.

Definition

Islamic archaeology in Iran involves the exploration of landscapes and excavation of archaeological sites as well as the study of monuments and artifacts that have been produced since the Islamic conquests. The Islamic expansion started in Iran in the seventh century and is conventionally accepted as having ended with the defeat of the Sasanian Empire in 641. Research into the Islamic period relates to elements and structures (such as mosques, madrasas, graveyards and funerary monuments, government buildings, monetization) that directly represent Islam as a religious and institutional entity or elements and structures (such as the water supply system, communications network, agricultural exploitation, production and commercialization of goods) that involve the socioeconomic organization of urban and rural territories, connected with either the Muslim majority or minor religious groups such as Christians, Zoroastrians, Jews, and minor Islamic sects such as the so-called Assassins.

Historical Background

An interest in the antiquities of Iran's Islamic period is demonstrated by the documentation of monuments and sites by occasional Western travellers since the seventeenth century, becoming more widespread in the late nineteenth century stimulated by the antiquarian appeal of the artifacts shown at Universal Exhibitions in Europe and America (mostly in Paris in 1867, 1878, and 1889). The antiquities market's growing demand for these artifacts led to excavations, generally authorized by the government, in search of objects of commercial value. Antiquarians themselves conducted such excavations. Among them were many Europeans, such as C. Vignier and G. Demotte, and Armenians such as the Kelekian and Kevorkian families. Excavations were also carried out illegally. These lucrative commercial activities had harmful effects on archaeological sites: Nishapur, Rayy, Sirjan, and Sava are among those damaged by such activities (Vernoit 2000). The commercial value of the artifacts also led to forgery, such as the case of some of Rayy's "Buyid" textiles.

The close relationship between antiquarians and art historians, together with the supremacy of history of art over archaeology in the academic context of the time, favored a historical–artistic approach to the study of artifacts of the Islamic period. This approach focused on decorative motifs, iconography, and the presence of inscriptions on decontextualized objects and legitimized the unscientific excavation of archaeological sites. In addition, this approach was contaminated by the ethnocentric and colonial tendencies of the cultural and political climate. The assumed superiority of Indo-Europeans over Arab Semites had long-term consequences in archaeology, for instance, in the preconceived attribution to Iran of stylistic and technical innovations in ceramic production.

The principal concern of the first archaeologists in Iran was to excavate the many important sites of the pre-Islamic period. Islamic strata encountered during excavations were usually ignored and often left unrecorded. Accordingly, it is not surprising that Islamic archaeology in Iran had difficulties in establishing itself as an autonomous discipline and that scientifically conducted archaeological excavations of Islamic sites started relatively late.

Between 1885 and 1931, when France had a monopoly over the awarding of concessions to excavate in Iran, the most excavated archaeological site was Susa, located in the southwest of the country. Archaeological surveys were carried out by the *Délégation archéologique française en Perse* (subsequently renamed *en Iran*, DAFI) since its foundation in 1897 and continued with few interruptions until 1979. The task of these surveys was to collect as many archaeological finds as possible. There was no interest in stratigraphy or context. Moreover, the search did not address the Islamic period. Nevertheless, the high number of Islamic ceramics found attracted the attention of experts, including G. Migeon, M. Pézard, and R. Koechlin.

Research on monuments conducted without excavation by scholars such as F. Sarre (1901–1910) and E. Diez (1918) provided a scientific basis for the development of Islamic archaeology in Iran at the beginning of the twentieth century. Particularly relevant is the publication of the monumental *A Survey of Persian Art from Prehistoric Times to the Present*, edited by A.U. Pope and P. Ackermann (1938–1939), which includes studies on architecture and artifacts of the Islamic period in Iran by authors including Godard, Herzfeld, Monneret de Villard, Schmidt, Schroeder, Siroux, Smith, and Wilber; the publication offers a complete overview of scientific research conducted in the region. The first specialized journals appeared in the same period, such as *Āthār-é Īrān* (Service Archéologique de l'Iran, 1936–1949, founded by Godard) and the *Archäologische Mitteilungen aus Iran* (Berlin, 1929–1937 and 1968–), publishing articles that contributed to the evolution of the discipline.

The Metropolitan Museum of New York started its first archaeological excavation of a site of the Islamic period in the 1930s, at Nishapur in Khorasan (conducted by J. Upton, W. Hauser and C.K. Wilkinson; see below). Other excavations that aimed to understand the pre-Islamic and succeeding phases were conducted by the Metropolitan Museum at Qasr-i Abu Nasr, close to Shiraz (from 1932); furthermore, E. Herzfeld started excavations at Istakhr, which were continued by E.F. Schmidt (1932–1937; see below) who was also working at Rayy (1932–1936). The archaeological results concerning these sites' Islamic levels have been published scarcely or not at all; their publication has been restarted recently but has not been completed for all sites (for Qasr-i Abu Nasr, see Whitcomb 1985; for Rayy, see Keall 1979; for the other sites see below).

The excavations at Nishapur investigated several *tepe*s, the most important of which are Tepe Madrasa, Sabz Pushan, "Vineyard" Tepe, and Qanat Tepe, uncovering houses, mosques (the *mihrab* always having a rectangular section), and *hammam*s. Almost all of these features have been dated between the ninth and twelfth centuries (Wilkinson 1987). The remains of architectural decoration are remarkable, particularly the mural paintings (these include ornamentations of animated vegetal motifs, imitations of marble panelling, and depiction of characters such as a knight and an attendant), the carved and painted stucco facing, and the baked-brick panels. Many houses had small *mihrab*s set into the walls and rooms set around a central courtyard, often with a colonnade. In subsequent phases, many of the rooms were divided. Water was supplied through canals. A mosque with a (later) minaret of octagonal section was brought to light at Tepe Madrasa, and various phases of this rectangular-planned mosque, with courtyard, were identified. Numismatic evidence indicates a *terminus post quem* of 785 for the earliest phase. An architectural complex composed of various profusely decorated rooms was also located at Tepe Madrasa. This was probably a palatial or governmental structure (despite the lack of a normally typical symmetrical framework). The finding of ceramic fragments

spanning the eighth to the fourteenth centuries in the remains of a pavilion with dome shows continuity in the use of the complex in this tepe after the Mongol invasion. At Qanat Tepe the excavations brought to light a mosque of at least the tenth century, with rectangular plan and two central pillars, a *hammam* with an octagonal *calidarium*, and remains of mural painting probably of Seljuk date.

Archaeological research on the city of Istakhr in the region of Fars has investigated the transition from the Sasanian period to that following the Islamic conquest of the seventh century. The results confirm that the city was prosperous during the ninth to tenth century and almost totally abandoned at the beginning of the eleventh century (Whitcomb 1979). During the seventh century, the urban center had been moved within the broad city walls that surrounded the Sasanian city. The new urban installation was characterized by the same orientation as the seventh-century congregational mosque. The hypostyle mosque had been built with spoliated stone material probably of the Achaemenid period and had columns with tauriform capitals and a painted *mihrab* decorated with stucco. The excavations also uncovered a row of bazar shops and three private houses, the houses having a narrow entrance with rectangular buttress and rooms over the central court, and a productive area with kilns. The interactions between the urban site and surrounding territory as well as agricultural exploitation and water supply in the region have been investigated by mean of surveys in the Marvdasht valley.

The systematic documentation of Iran's archaeological sites through aerial photography was undertaken by E.F. Schmidt and his wife M.H. Warden and published under his name only in 1940 (Schmidt 1940). This publication is still important and includes some Islamic sites.

Following a break due to World War II, renewed archaeological activities in Iran showed greater awareness of historical enquiry, applying excavation techniques to investigate the phases following the Islamic conquest and increasing the accuracy of their documentation. The 1960s and 1970s were a time of important excavations, bringing a considerable increase in knowledge about different Islamic periods in Iran, in particular that corresponding to Seljuk sovereignty. The most significant work saw renewed interest in Susa and Takht-e Sulayman, Siraf, the Friday Mosque of Isfahan, and Ghubayra (see below). In the same year, the publication of two major journals began: *Iran* (British Institute of Persian Studies, 1963–) and the *Cahiers de la Délégation Archéologique Française en Iran* (1971–).

Research in Susa recommenced in 1946 and was directed by R. Ghirshman until 1967. During this period, methods of excavation and recording were modified in order to consider the Islamic period. Archaeologists specializing in the Islamic period that undertook research under the direction of J. Perrot between 1967 and 1979 include M. Rosen-Ayalon, C. Hardy, M. Kervran, and A. Rougelle. The study and publication of the Islamic phases of some areas of the site and associated materials was commissioned (Hardy-Guilbert 2005). Continued use of the site is testified by the private and public buildings of the seventh century, in the three terraced *tepe*s called Apadana, Royal City, and City of the Craftsmen, according to the Achaemenid remains. The private houses became progressively bigger towards Apadana's *tepe* and are characterized by a central court that can have a colonnade or one or more *iwan* according to the socioeconomic status of the family; bathrooms and lavatories were connected to a sewage system. Motifs on stucco-decorated columns and in niches and apertures occurred in the grander buildings. The Friday Mosque, built in 639, had a court with columns around three sides and a prayer room without *mihrab*, which formed part of the significant enlargement that occurred around 700, to which also belonged the architectural decorations in carved stucco and baked brick with inscriptions in kufic. A minaret was also found during the excavations.

A large building was located close to the mosque, probably a *khangah* (monastery). It contained two structures at the sides of the entrance and a rectangular central court with access to the various rooms. A significant quantity of ceramics dated from the beginning of the eleventh century indicates that the building had been used as a dump since this time. The growth of the

city between the end of the ninth century and the beginning of the tenth century included the integration of the residential areas into the urban fabric following an orientation determined by the Achaemenid buildings. Susa was already equipped with a public *hammam* at this time. During the tenth century, the Apadana and the Royal City were abandoned, although the areas to the east and west continued to be inhabited until the thirteenth century. Much of the evidence was linked to the productive economy of the city, mostly related to ceramic and glass manufacturing and to sugar production from the tenth to the thirteenth century.

The German Archaeological Institute conducted excavations of the Ilkhanid site of Takht-e Sulayman in Azerbaijan from 1959 to 1978 (Naumann 1976). This included excavating the Ilkhanid palatine complex, which was built during the reign of Abaqa Khan (1265–1282), as indicated by finds of dated tiles, near a water basin on the site of a Sasanid Zoroastrian sanctuary. The remains of the Ilkhanid period, including the city walls (built over the Sasanid walls) and the palatine complex, are characterized by a north–south axis. The palace was built around the water basin. It had four *iwan*s with the throne hall located behind the northern *iwan*. The architectural decoration revealed stuccoes (including *muqarnas*), paintings, and, above all, tiles of various shapes, decorated with figurative motifs using techniques such as lustre and *lajvardina*. The tiles were combined according to complex geometrical schemes to produce high dadoes. The Ilkhanid court occupied the complex only periodically, regularly moving from place to place, using temporary campsites.

From 1966, the British Institute of Persian Studies undertook an excavation, among the most fruitful in terms of results and publications, of the port city of Siraf on the Persian Gulf, directed by Whitehouse until 1973 (see the reports published in *Iran* from 1968 to 1974; also Whitehouse 1980). The excavations revealed several areas with private houses, a bazar, small mosques, the congregational mosque, and the remains of city walls and highlighted the evolution of the urban structure over the period of the city's prosperity until the twelfth century. The most ancient phase of the Friday Mosque (dated to the early 9th c. according to numismatic evidence) took the form of a hypostyle prayer room, with a rectangular *mihrab*, and a courtyard with colonnade and a minaret. Various extensions, mostly concerning the prayer room, characterize the subsequent phases of the building's use, dated to the ninth or tenth century. The findings indicate the use of decorations in stucco, such as sawtooth crenellations decorated with vegetal motifs. Of great interest are the private houses, dated up to the eleventh century and generally provided with a central court onto which the rooms open; the richest houses, mainly in residential areas, have a quadrangular plan with buttress, the internal walls often covered in plaster and stuccoes. Wells and tanks guaranteed the water supply, and the houses were equipped with sewage systems. The excavated area also included a large public building the date of which seems to be prior to the mid-eleventh century. This building did not have a central court but probably had a second storey; however, its function is still unknown. Metallic production waste and the discovery of an area with kilns and structures for ceramic production provide a better understanding of the city's economy, while various finds of Chinese and Southeast Asian fragments of ceramics tell us something about its commercial role (Tampoe 1989; see also Priestman and Kennet 2002 for studies of ceramics from this and other sites in the region).

W. Kleiss conducted research in Iran from the 1960s with the aim of locating monuments (including bridges and dams); his various articles were published in *Archäologische Mitteilungen aus Iran*. The architectural documentation and research undertaken by R. Hillenbrand is of great relevance, the object of his investigation being the identification of regional styles of the Seljuk period (articles published in *Oriental Art* 1972 and *Iran* 1972, 1976, 1987). Also important was the finding of two important funeral towers in Kharraqan (dated to the end of the eleventh century) by D. Stronach and C. Young in northwestern Iran (1966). The various field surveys undertaken include W.M. Sumner's research in Fars, through which he created an archaeological

map that is still of fundamental importance for the Islamic period (*Tell-i Malyan and Chronology of the Kur River Basin*, 1972); the archaeological surveys conducted by A. Williamson in southeastern Iran, who also excavated small trenches (e.g., at Sirjan), aimed at the investigation of commercial and distribution routes for ceramics during Islamic periods (see Williamson 1987; Morgan and Leatherby 1987).

Excavations were conducted in Ghubayra, southeastern Iran, from 1971 to 1976 (Bivar 2000). Italian restorers from the *Istituto italiano per il Medio ed Estremo Oriente* (IsMEO, later IsIAO) were in charge of restorations, undertaking research at the same time, sometimes including the excavation of sondages, in order to conduct more accurate conservation. They worked mainly on religious monuments of the Seljuk period and various monuments of the Safavid and Qajar periods, mostly in Isfahan and the provinces of central Iran (among others, the mosque of Bersian, Ali Qapu's palace, Chehel Sotun's pavilion, and the door of the great bazar of Isfahan; see Zander 1980). The restoration of the Friday Mosque of Isfahan conducted by Galdieri (1973) from 1970 led to the identification of various pre-Seljuk phases, such as the Buyid and two Abbasid phases. These results indicated the need to proceed with detailed archaeological investigations, which were conducted by U. Scerrato from 1972 to 1978. Preliminary reports on what is considered to be the most representative monument of the architectonical and artistic evolution of Islamic Iran were published in the journal *East and West* (Scerrato 1973–1979). Research identified the various phases of construction but also found a Sasanid or proto-Islamic settlement and a more ancient mosque with an orientation different to that of the present. The earlier building can be dated to 772 based on historical sources. Excavations brought to light the *qibli* wall with a rectangular *mihrab*, both covered with decorated stuccoes, as well as some of the baked-brick columns that confirm the building's hypostyle structure. In the same area, one level down, a column covered in stucco with decorations in Sasanid style was found. It has a different orientation again but no evidence has been found of the nature of the building to which it belonged. The first mosque was destroyed in 842 and replaced with a wider building with a different orientation, comprising a hypostyle plan and central court with colonnade. All subsequent alterations had this building as their starting point: the addition of a row of baked-brick pillars resulted in a smaller court in the Buyid period (tenth century); two big pavilions with domes were built between 1088 and 1092 during the reign of the Seljuk sultan Malik Shah. Investigations revealed that the first pavilion, located in the north on the same axis as the mosque, was initially outside the building. At a later time, it was linked to it through hypostyle rooms. The second pavilion, located in the same area as the *mihrab*, was built after the demolition of the previous prayer room; this pavilion was also originally an independent structure. After these alterations, the four *iwan*s were added.

Important excavations conducted in the 1970s include finding the Ilkhanid astronomical observatory in Maragha, commissioned by Hülägü in 1258 at the request of the scholar Nasir al-Din Tusi (excavations 1972–1976; Vardjavand 1979); the excavations in Sultaniyya, the new capital founded by Ülgiaytü in 1307 (Gandjavi 1979); and excavations at Gurgan, on the Caspian Sea, where various buildings were found, including a mosque dated to the beginning of the thirteenth century, a Seljuk *hammam*, and kilns for the production of metal, glass, and mostly ceramics (Kiani 1984).

Key Issues/Current Debates

In recent decades archaeological work in Iran has been forestalled by social and political disruption. The Islamic revolution of 1979 called a halt to archaeological surveys conducted by foreigners in Iran, while the consequences of the Iran–Iraq war prevented the rise of Iranian archaeology for a long time. Both circumstances began to change in the 1990s with the appearance of Iranian teams (such as the excavations conducted by Moussavi in Nishapur, 1995–2005) and the first cooperative projects between foreigners and Iranian

archaeologists. Examples of such collaborations include documenting and archiving the finds from the archaeological survey conducted at the Friday Mosque of Isfahan in the 1970s (codirected by U. Scerrato in 2000 and by B. Genito from 2002 to 2010; Genito and Saeidi Anaraki 2011), the French excavations in Nishapur (codirected by M. Kervran, 2005–2006; Fouache et al. 2011), and the German excavations of the Friday Mosque of Golpayegan (codirector L. Korn; Korn in press).

Collaborative activities are strictly dependent on the variability of political and diplomatic relations between countries and as such can be limited. In terms of projects excavating sites of the Islamic period promoted by Iranian institutions, these are few and difficult to access (the few publications, in Persian, are spread among the various but not very widely disseminated Iranian archaeological journals). The excavations conducted in the Ismaili fortress of Alamut (directed by H. Chubak) revealed a reception room with a small *iwan* opening onto a room characterized by a central depression (maybe a pool? Chubak 2009). The excavations of the palatine complex of Sarvestan, east of Shiraz (conducted by A.R. Askari), are also relevant. This site is now attributed to the ninth century, rather than to the Sasanian period, according to the ceramics found (Askari Chāverdi 2009–2010; see also Bier 1986 with previous bibliography).

Up to the present day, the main focus of archaeological surveys in Iran has been urban areas, particularly religious buildings. The relatively low number of such archaeological sites that have been investigated means that our knowledge is restricted to the limited data collected and to analyses of the different regional contexts of the various sites. In addition to these sites, it is important to recognize others that are mostly pre-Islamic but have later phases that have not been examined in depth, as well as a number of relatively minor sites (Rugiadi 2005). Taken together, these represent an essential base for future research. Many religious monuments, especially those built since the Seljuk period, have been the focus of architectural-stylistic studies instead of archaeological excavations. However, the continuous and often drastic repairs conducted on most of the monuments, especially the religious ones, make research on these structures particularly difficult.

Archaeological surveys in rural areas and studies of the dynamics of landscape utilization at regional level, including the analysis of communications and exploitation of water resources, are still underdeveloped (Williamson 1987); some data can, however, be obtained from archaeological surveys focusing on evidence of the various pre-Islamic periods (such as Sumner 1972). One of the most stimulating topics connected with Islamic archaeology in Iran, for which further research is necessary, concerns the evolution that occurred in urban, architectural, historical, and artistic areas after the Islamic conquest.

Cross-References

- ▶ Aerial Archaeology
- ▶ Bam: Archaeological and Social Investigations After the Earthquake
- ▶ Ceramics, Southeast Asian and Chinese Trade
- ▶ Iran: Heritage Preservation and Tourism
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic Archaeology
- ▶ Islamic and Maritime Archaeologies
- ▶ Military Activity in Islamic Archaeology
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology
- ▶ Sasanian Empire, Archaeology of the
- ▶ Seleucid, Parthian Mesopotamia, and Iran, Archaeology of

References

Askari Chāverdi, A.-R. 2009–2010. Excavation at the so-called Sasanian castle at Sarvestān. *Majalle-ye Bastanshenasi va Tarikh* 23(2) (serial no. 46): 37–65 (in Farsi).

Bier, L. 1986. *Sarvistan. A study in early Iranian architecture*. University Park: Pennsylvania State University Press.

Bivar, A.D.H. 2000. *Excavations at Ghubayrā, Iran*. London: School of Oriental & African Studies.

Chubak, H. 2009. Alamut. *Miras-e Melli* 2 & 3: 120–125.

Diez, E. 1918. *Churasanische Baudenkmäler*. Berlin: D. Reimer.
Fouache, E., C. Cosandey, P. Wormser, M. Kervran, and R.A. Labbaf Khaniki. 2011. The river of Nishapur. *Studia Iranica* 40: 99–119.
Galdieri, E. 1973. *Isfahan: Masgid-i Gum'a, 2. Il periodo al-i Bùyide, The Al-i Bùyid period*. Rome: Istituto Italiano per l'Africa e l'Oriente.
Gandjavi, S. 1979. Prospection et fouille à Sultaniyeh. In *Akten des VII. Internationalen Kongress für Iranische Kunst und Archäologie (München 7–10. September 1976)*, 523–526. Berlin: D. Reimer.
Genito, B., and F. Saeidi Anaraki, eds. 2011. *ADAMJI Project. From the excavation (1972–1978) to the archive (2003–2010) in the Masjed-e Jom'e, Isfahan*. Tehran: Italian Embassy of Tehran.
Hardy-Guilbert, C. 2005. Susa. In *Enciclopedia archeologica*, *Volume Asia*. Roma: Istituto della Enciclopedia Italiana: s.v.
Keall, E.J. 1979. The topography and architecture of medieval Rayy. In *Akten des VII. Internationalen Kongress für Iranische Kunst und Archäologie (München 7–10. September 1976)*, 537–544. Berlin: D. Reimer.
Kiani, M.Y. 1984. *The Islamic city of Gurgan*. Berlin: D. Reimer.
Korn, L. in press. The great mosque of Golpayegan. Report on the first campaign, 1385/2007. *Archäologische Mitteilungen aus Iran und Turan*.
Morgan, P., and J. Leatherby. 1987. Excavated ceramics from Sêrjàn. In *Syria and Iran. Three studies in medieval ceramics*, ed. J. Allan and C. Roberts, 23–172. Oxford: Oxford University Press.
Naumann, R. 1976. *Takht-i Suleiman*. Munich: D. Reimer.
Pope, A.U., and P. Ackerman. 1938–1939. *A survey of Persian art from prehistoric times to the present*. London/New York: Oxford University Press.
Priestman, S., and D. Kennet. 2002. The Williamson Collection Project Sasanian and Islamic pottery from southern Iran. *Iran* 40: 265–267.
Rugiadi, M. 2005. Altopiano iranico. In *Enciclopedia Archeologica, Volume Asia*, 956–962. Roma: Istituto della Enciclopedia Italiana.
Sarre, F. 1901–1910. *Denkmäler persischer Baukunst*. Berlin: Wasmuth.
Scerrato, U. 1973–1979. IsMEO activities – Archaeological mission in Iran. Isfahan, Masgid-i Gum'a. *East and West* 23: 416–418; 24: 475–477; 25: 538–540; 26: 593–595; 27: 451–455; 28: 329.
Schmidt, E.F. 1940. *Flights over ancient cities of Iran*. Chicago: University of Chicago.
Stronach, D., and T.C. Young Jr. 1966. Three Seljuq tomb towers. *Iran* 4: 1–21.
Sumner, W.M. 1972. *Cultural development in the Kur River Basin, Iran: An archaeological analysis of settlement patterns*. Unpublished Ph.D. dissertation, University of Pennsylvania.
Tampoe, M. 1989. *Maritime trade between China and the West. An archaeological study of the ceramics from Siraf (Persian Gulf), 8th to 15th centuries A.D*, British Archaeological Reports International series. Vol. 555. Oxford: Archaeopress.
Vardjavand, P. 1979. La découverte archéologique du complexe scientifique de l'observatoire de Maraqé. In *Akten des VII. Internationalen Kongress für Iranische Kunst und Archäologie (München 7–10. September 1976)*, 527–536. Berlin: D. Reimer.
Vernoit, S., ed. 2000. *Discovering Islamic art: Scholars, collectors and collections, 1850–1950*. London: I.B. Tauris.
Whitcomb, D. 1979. The city of Istakhr and the Marvdasht plain. In *Akten des VII. Internationalen Kongress für Iranische Kunst und Archäologie (München, 7–10. September 1976)*, 363–370. Berlin: D. Reimer.
Whitcomb, D. 1985. *Before the roses and the nightingales. Excavations at Qasr-i Abu Nasr, Old Shiraz*. New York: Metropolitan Museum of Art.
Whitehouse, D. 1980. *Siraf III. The congregational mosque*. London: British Institute of Persian Studies.
Wilkinson, C.K. 1987. *Nishapur: Some early Islamic buildings and their decorations*. New York: Metropolitan Museum of Art.
Williamson, A. 1987. Regional distribution of mediaeval Persian pottery in the light of recent investigations. In *Syria and Iran. Three studies in medieval ceramics*, ed. J. Allan and C. Roberts, 11–22. Oxford: Oxford University Press.
Zander, G. 1980. Studi e restauri: consuntivo di quindici anni di collaborazione italo-iraniana (1964–1979). Questioni di metodo. In *Studi e restauri di architettura Italia – Iran*, 95–110. Roma: Istituto per l'Africa e l'Oriente.

Iraq: Archaeological Heritage

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Brief Definition of the Topic

The archaeological heritage of Iraq comprises antique remains, including sites, architectural features, and artifacts, for which excavations, surveys, and remote sensing are the main methods of discovery. Broadly speaking, archaeological heritage constitutes traces of past human existence, bearing witness to various forms of past social life. To date, more than 10,000 sites and monuments have been designated as part of the

archaeological heritage of Iraq, and many more sites exist that have not yet been excavated.

The archaeological heritage of Iraq includes sites in the modern Republic of Iraq, which comprises Mesopotamia proper, that is, the region between the rivers Euphrates and Tigris, where much archaeological research has concentrated in the past. In addition, sites in Western Iraq, bordering Syria, and in the autonomous region of Iraqi Kurdistan (Northern Iraq) are included among those that constitute the archaeological heritage of Iraq. This heritage attests to the earliest forms of sedentary life in the Late Neolithic period, dating from the 8th to 5th millennia BCE. Younger sites are subsumed under the period of "written history" or "recorded history," the beginnings of which are marked by the development of the earliest written languages, Sumerian and Akkadian, in the 4th and 3rd millennia BCE. The period of written history gave rise to the first cities and city states, while later archaeological materials date to the Assyrian and Babylonian Empires. In addition, the archaeological heritage of Iraq also includes material remains from the Achaemenid, Seleucid, Parthian, Roman, Christian, and Sassanid periods. Today it is moreover commonly understood that sites dating later than the Arab Islamic conquest are also part of the archaeological heritage of Iraq. This refers to the time period from the seventh century CE until Iraq fell under rule of the Ottoman Empire in the sixteenth century CE.

Of the archaeological sites in Iraq, UNESCO has inscribed three major sites into the World Heritage List: Samarra Archaeological City is officially a World Heritage site since 2007, Ashur/Qal'at Sherqat since 2003, and Hatra since 1985. Ashur and Samarra are also placed on the World Heritage List in Danger. Ten archaeological sites are found on the Iraqi Tentative List for World Heritage. These are the sites of Ur, Nimrud, Wasit, and Thilkifl; the ancient city of Nineveh; the fortress of Al-Ukhaidar; the sacred complex of Babylon; Erbil citadel; Wadi Al-Salam cemetery in Najaf; and Amedy city.

The fact that the archaeological heritage of Iraq includes endangered sites bespeaks the problem of the management and protection of the archaeological heritage of Iraq, which is seriously threatened by looting and illicit trafficking in antiquities due to high levels of violent conflict since the early 1990s (Brodie et al. 2006). While the Persian Gulf War (1990–1991) caused comparatively little damage to archaeological sites and monuments in Iraq, instances of illegal trade in antiquities were documented at the time. According to Iraqi authorities, some 4,000 archaeological objects disappeared following the war in the early 1990s. In 2003, in the context of the US-led war against Iraq (the Second Gulf War), events of large-scale looting and the destruction of archaeological sites but also of museums (such as the Baghdad Museum) and libraries (such as the Iraq National Library and Archive) occurred. An increase in the illicit trading of antiquities from Iraq on a global scale was also reported. During the war, sites of archaeological heritage often served as military bases for the coalition forces (Babylon, e.g., housed the US military base "Camp Alpha"), causing substantial damage.

Receiving much attention in Western media outlets, the public and the archaeological community bemoaned the destruction of a "universal cultural heritage" in the wake of the Iraq War and the loss of cultural objects signifying what has come to be understood as "the cradle of civilization." At the same time, this sparked a scholarly debate highly critical of arguments that placed the concepts of a universal heritage and of the cradle of civilization at the center of efforts to safeguard Iraq's archaeological heritage. In response, the expression of the cradle of civilization was deconstructed as a paternalistic and colonialist trope that suggests "that these countries of the Middle East have never surpassed their early glories and that the torch of civilization has since passed to Europe" (Meskell 2005: 140). The criticism of the notion of a world cultural heritage was directed against the use of universalizing language. It was argued that this language elevated Western legal-moral categories of ownership, access, and inheritance to global values, thus ignoring local or regional understandings of cultural heritage (Bahrani 1998).

Since the official end of the Iraq War on December 18, 2011, cultural institutions such as museums and libraries in Iraq have begun to rebuild, but the situation at archaeological sites often remains problematic. Even before the official end of the war, several heritage conservation initiatives were launched, some of them specifically designed to restore and conserve damaged archaeological sites in Iraq, such as the Iraq Cultural Heritage Conservation Initiative (a cooperation between the Getty Conservation Institute, the World Monuments Fund, the Iraq Ministry of Culture, and the Iraq State Board of Antiquities and Heritage). Some of these efforts focused on fighting the illicit trade in antiquities, successfully recovering around 5,000 missing Iraqi artifacts. In addition, Iraq established a national entity responsible specifically for the surveillance and protection of archaeological sites called the Force for the Protection of Sites (FPS), which operates under the umbrella of Iraq's Ministry of the Interior. While no national tourism strategy has yet been formulated, many of the efforts directed at the protection and restoration of Iraq's archaeological heritage also target the development of the country's cultural and tourism sector. As outlined in the "UNESCO Country Programming Document for the Republic of Iraq 2011–2014," the goal is to design strategies for the management of the archaeological heritage of Iraq that are sustainable and can benefit the local community.

Cross-References

- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage and Archaeology
- ▶ World Heritage Objectives and Outcomes

References

Bahrani, Z. 1998. Conjuring Mesopotamia: Imaginative geography and a world past. In *Archaeology under fire: Nationalism, politics and heritage in the Eastern Mediterranean and Middle East*, ed. L. Meskell, 159–174. London: Routledge.

Brodie, N., M. Kersel, C. Luke, and K.W. Tubb, eds. 2006. *Archaeology, cultural heritage, and the antiquities trade*. Gainesville: University Press of Florida.

Meskell, L. 2005. Sites of violence: Terrorism, tourism, and heritage in the archaeological present. In *Embedding ethics*, ed. L. Meskell and P. Pels, 123–146. New York: Berg.

Further Reading

Curtis, J. 2009. Relations between archaeologists and the military in the case of Iraq. *Papers from the Institute of Archaeology* 19: 2–8. https://doi.org/10.5334/pia.316.

Hamilakis, Y. 2003. Iraq, stewardship and 'the record': An ethical crisis for archaeology. *Public Archaeology* 2: 104–111. https://doi.org/10.1179/146551803793156637.

Ministry of Culture and Information of the Republic of Iraq, Iraq Directorate General of Antiquities. 1970. *Atlas of archaeological sites in Iraq*. Baghdad: al-Jumhuriya Press.

Pollock, S. 2005. Archaeology goes to war at the newsstand. In *Archaeologies of the Middle East: Critical perspectives*, ed. S. Pollock and R. Bernbeck, 78–96. Malden: Blackwell.

Pollock, S., and C. Lutz. 1994. Archaeology deployed for the Gulf War. *Critique of Anthropology* 14 (3): 263–284. https://doi.org/10.1177/0308275X9401400302.

Starzmann, M.T., S. Pollock, and R. Bernbeck, eds. 2008. Imperial inspections: Archaeology, war and violence. *Archaeologies* 4 (3): 353–522. https://doi.org/10.1007/s11759-008-9088-2.

Stone, P.G. 2009. Protecting cultural heritage in times of conflict: Lessons from Iraq. *Archaeologies* 5 (1): 32–38. https://doi.org/10.1007/s11759-008-9093-5.

Stone, P.G., ed. 2011. *Cultural heritage, ethics and the military*. Suffolk: Woodbridge.

Ireland: Archaeological Museums

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Brief Definition of the Topic

History

Prior to the Anglo-Irish Treaty of 1921, the whole island of Ireland was part of the United Kingdom with a single National Museum in Dublin which initially had collections of industrial and

decorative arts material, ethnographical material, and natural historical specimens. The National Museum was established by law in 1877 and was for a long time considered a branch of the South Kensington Museum in London (now the Victoria and Albert Museum) which ensured that a portion of acquisitions by the London museum were diverted to Dublin. It did not have a fully developed archaeological department until the transfer to it in 1891, under certain conditions, of the Museum of the Royal Irish Academy (founded 1785) with an archaeological collection of considerable size and value built up by the voluntary efforts of the academicians with the occasional support and intervention of government. The Academy's collection had been in formation almost since its foundation and it had managed to acquire many of the finds made in major drainage projects and railway building. Creating an enviable collection of organic materials, mostly bog finds and funerary pottery, and spectacular collections of prehistoric bronze weapons and utensils, gold ornaments and early-medieval personal ornaments, and religious objects, the Academy's collection was remarkable for its depth and comprehensiveness. In 1851, the Academy was granted the privilege in Ireland of administering the ancient crown right of Treasure Trove. In 1857, parts of a notable catalogue of the collection organized on Linnaean lines and written by William Wilde were published. The transfer of 1891 gave the new National Museum of Ireland a ready-made archaeological department with an internationally famous collection. In the 1920s, the importance of the archaeological collections to a sense of national identity was recognized, and the collection was given greater prominence in public display. Thereafter, all Directors of the National Museum to date have been archaeologists or closely associated with archaeology.

After independence of the greater part of the island in 1921, the National Museum continued to collect throughout Ireland. In 1930, the National Monuments Act regulated archaeological activity in the state and gave statutory responsibilities to the museum which continue in force with a significant strengthening in the 1990s to extend its rights to claim all archaeological objects found in the jurisdiction. The collections in the National Museum allow it to maintain object-rich exhibitions of Irish prehistory and history. In addition to Irish material, it has modest classical and Egyptian collections and superb early ethnographical collections especially from the Pacific and Africa, the latter not generally on display. In recent years development-led excavation has produced an enormous volume of archaeological material which will be housed principally in the National Museum.

Key Issues: Centralization

The new Irish state was highly centralized and continues in many respects to be so. The overwhelming majority of all archaeological finds are controlled by it. As a result, local professional museums were slow to develop, one in the 1940s and another in the 1970s but with increasing frequency in the 1980s and 1990s. However, with rare exceptions, these museums' archaeological displays contain only modest selections of artifacts lent by the National Museum. Museums with significant autonomous holdings include the Cork Public Museum and the Galway City Museum. The independent Hunt Museum, Limerick, has a noteworthy, originally private, collection of archaeological material. The Waterford Museum contains substantial amounts of material from the Viking and Medieval strata of the city which it holds and manages by arrangement with the National Museum and displays elegantly. The question of overcentralization in such a small country has never been properly addressed, and fundamental issues of access are raised by that centralization. In addition, the centralization of all archaeological material poses a challenge to the National Museum which may prove to be an unsustainable burden.

Current Challenges

Among the challenges facing the National Museum and other Irish museums is declining government support since the economic and fiscal crisis of 2009. Staff shortages and the threat of deferred maintenance jeopardize major programs of registration. Investment in a major new storage and study facility for archaeological finds and

collections will require continuing support. In addition the respective remits of the monuments service and the National Museum overlap in ways unintended by legislation, and clarity of roles and spheres of activity is urgently needed. The failure to realize the potential of the ethnographical collections is disappointing. However, despite the adverse economic circumstances, museum professionals are developing public services and maintaining a notable profile in archaeological research and publication.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Ethnic Identity and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Nationalism and Archaeology
- ▶ Uses of Heritage

Further Reading

Bourke, M. 2011. *The story of Irish museums 1790–2000: Culture, identity and education*. Cork: Cork University Press.

Mitchell, G.F. 1985. Antiquities. In *The Royal Irish Academy a bicentennial history 1785–1985*, ed. T.Ó. Raifeartaigh, 93–165. Dublin: RIA.

Wallace, P.F., and R.Ó. Floinn, eds. 2002. *Treasures of the National Museum: Irish antiquities*. Dublin: Gill.

Ireland: Managing Archaeology on Infrastructural Developments

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Introduction

Ireland has an incredibly rich archaeological heritage, with more than 150,000 known archaeological monuments recorded across the country. Infrastructural developments such as motorways, national roads, and light-rail have, however, revealed an equally rich heritage of previously unknown archaeological sites. This entry highlights the opportunity presented by infrastructural development for archaeological discovery.

Definition

Transport Infrastructure Ireland (TII) was created in August 2015 following the merger of the National Roads Authority (NRA) and the Railway Procurement Agency (RPA), which, respectively, had responsibility for national roads and light-rail (including trams and metro services). With regard to archaeology and heritage, TII seeks to manage and minimize the impact of its schemes on archaeology in the context of risk management, legislative and regulatory compliance, and ensuring that public trust and value is achieved.

Key Issues/Current Debates/Future Directions/Examples

Through the course of the 2000s, Ireland developed a collaborative and partnership approach to managing and minimizing the impact of major development on the archaeological resource; this is exemplified by the **codes of practice** which were introduced for national roads in 2000 and light-rail in 2007, along with codes for other areas involving large-scale developments such as the concrete industry in 2009. These codes created a framework based on a set agreed principles and actions between the two parties (namely, the Heritage Minister and the Developer).

An important consequence of the original codes for both the NRA and the RPA was the appointment of in-house Project Archaeologists to the project design teams. This allowed for archaeological issues to be managed and addressed throughout the development process from conception to completion. Another important aspect of the codes was the emphasis on completing archaeological works in advance of the main construction.

In 2017 a new Code of Practice (Fig. 1) for archaeology was published between the Minister for Arts, Heritage, Regional, Rural and Gaeltacht affairs and TII (Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, 2017). This amalgamated and updated the previously agreed NRA and RPA codes of practice. As with the other codes, it contains agreed principles and

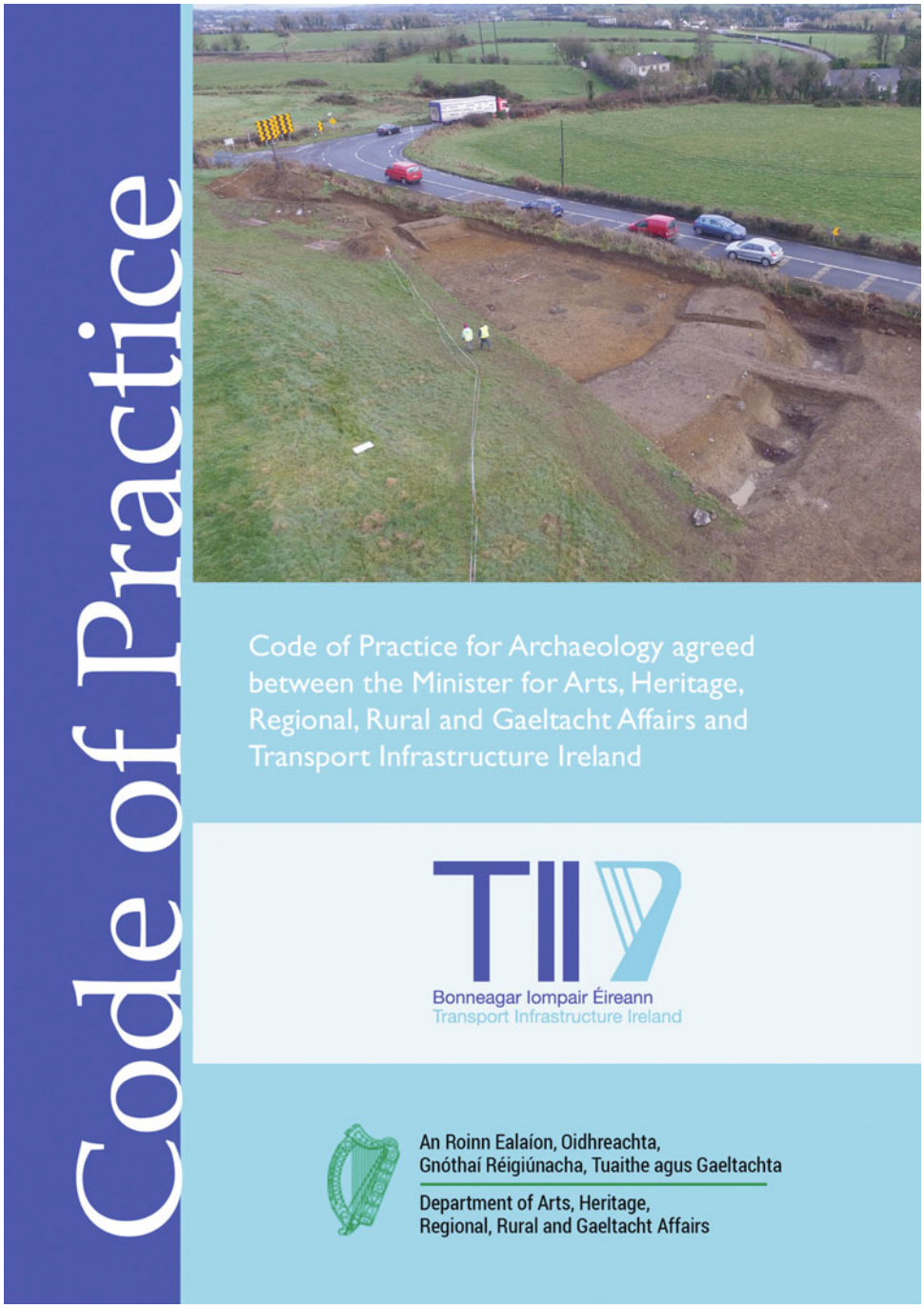

Ireland: Managing Archaeology on Infrastructural Developments, Fig. 1 Code of Practice for Archaeology agreed between the Minister and TII (Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, 2017)

actions for both parties. Significant revisions were as follows:

- The code applies to all TII-funded projects with an archaeological component, and, in addition to national road and light-rail projects, it also applies to motorway service areas, pavement and safety schemes, cycleways, and bridge rehabilitation schemes.
- An archaeological strategy is to be published, where advance works are not feasible (e.g., in urban contexts).
- There is an explicit commitment to publish and disseminate the archaeological results of TII projects.

The Royal Irish Academy's *Archaeology 2025: Strategic Pathways for Archaeology in Ireland* (2017, pp. 31) noted that codes of practice have "been welcomed across the sector as encouraging greater consistency" and goes on to highlight that their introduction has:

- "seen project archaeologists develop contracts for the engagement of archaeological consultants to carry out archaeological works in accordance with specifications and standards
- led to a streamlining of the development process, with significant improvement in the speed and efficiency of archaeological mitigation, resulting in time and cost savings
- led to the development of new standards and practices
- seen a significant increase in the level of archaeological reporting – e.g., on national roads 96% of all reports from 2001 to 2016 have been completed and submitted to the statutory authorities, and are publicly available
- led to significant publication, dissemination and engagement programs – e.g., TII has published more than 30 books to date."

TII has developed a comprehensive suite of guidelines for the assessment of archaeology. Furthermore, TII has commissioned empirical research into archaeo-geophysical surveying and palaeo-environmental sampling which directly informs practice and methodologies and is embedded in TII's suite of contract documents. These are available at www.tiipublications.ie.This website provides the necessary standards and guidelines for undertaking TII projects, and key archaeological milestones are set out in the TII Project Management Guidelines (http://www.tiipublications.ie/library/PE-PMG-02041-01.pdf, accessed 8th October 2017).

Figure 2 illustrates TII's standard approach to archaeological works. Firstly, a route is assessed

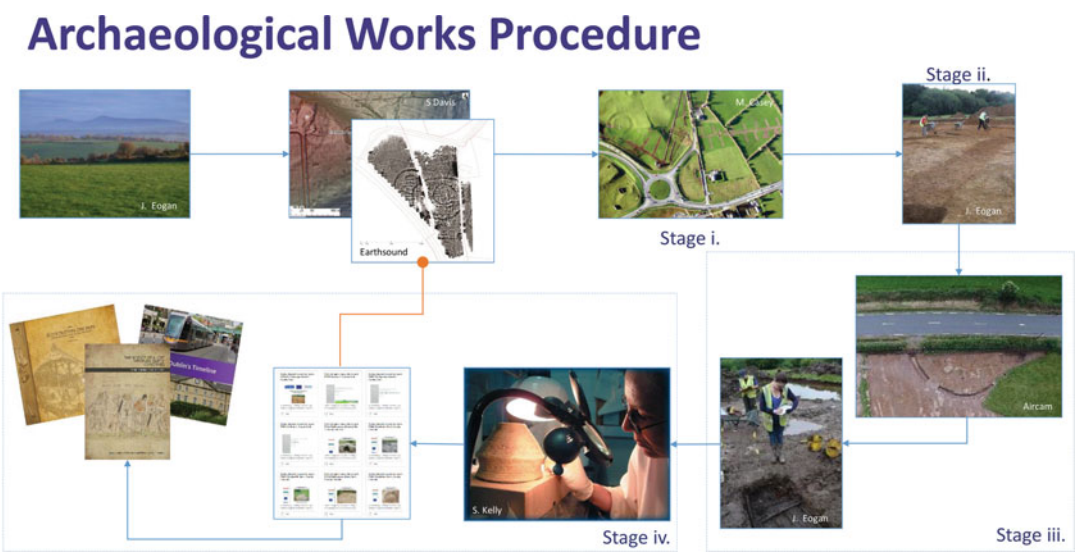

Ireland: Managing Archaeology on Infrastructural Developments, Fig. 2 TII approach to archaeological works

through archaeo-geophysical surveying or LiDAR during the preliminary design. Then archaeological teams are engaged to carry out comprehensive archaeological test excavations; typically 12.5% of the route is investigated across the route (stage I). Then at stage II, the nature, extent, and characteristics of the archaeological sites are exposed. These are fully excavated at stage III. At stage IV samples and artifacts are analyzed, the final report is produced, and the archaeological results are published and disseminated. In turn, these results will help inform future projects and schemes.

It has always been a cornerstone of TII policy to inform the public of the results of its archaeological works, and a multilayered approach is adopted to achieve this. This strategy is exemplified by TII's annual program of events to mark Ireland's Heritage Week, which coincides with the European annual Day of Heritage. Site tours, public lectures, pop-up exhibitions, and seminars are held throughout Ireland to showcase archaeological works taking place on TII schemes across the country. In 2017, more than 1,500 people participated in one or more of these events.

Perhaps the most significant dissemination initiative has been the establishment of the TII Digital Heritage Collections (Fig. 3) in partnership with the Discovery Programme and the Digital Repository of Ireland (DRI), which has seen the uploading of archaeological reports from TII (including NRA and RPA) projects into the DRI.

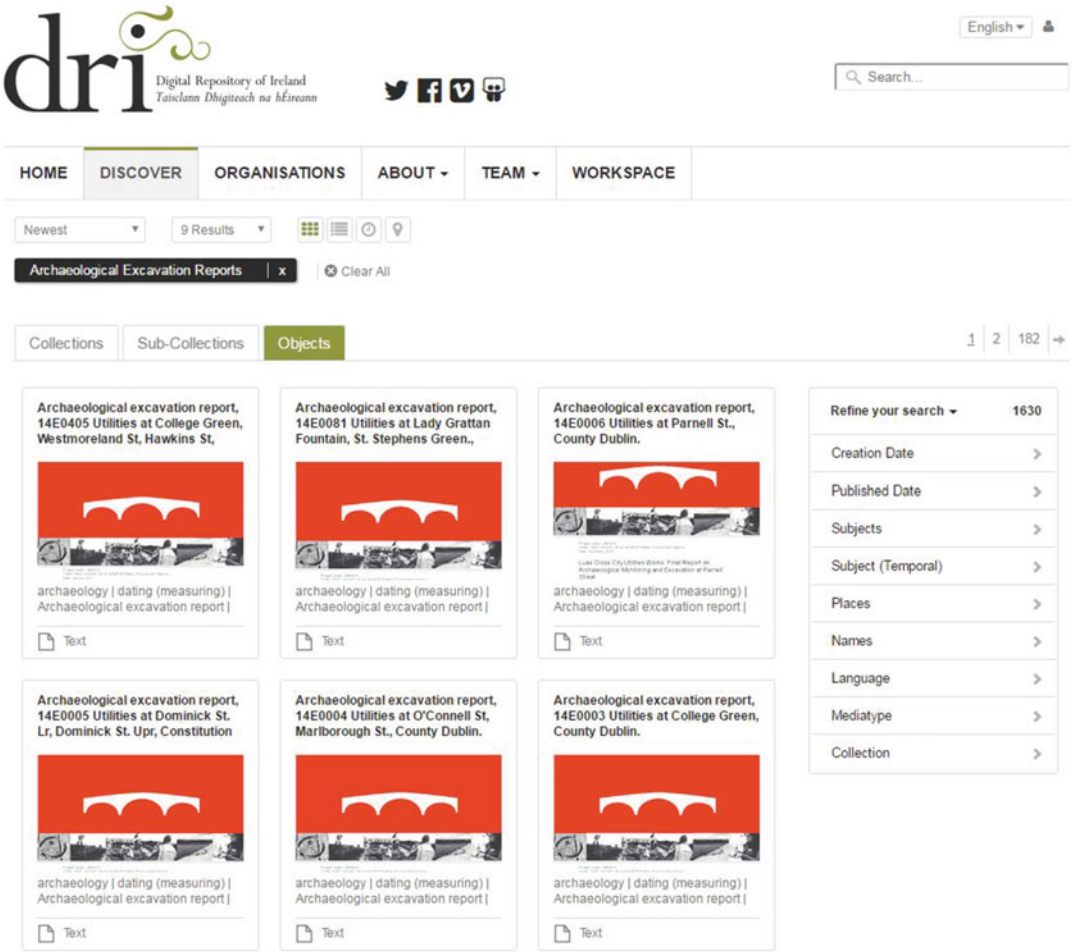

Ireland: Managing Archaeology on Infrastructural Developments, Fig. 3 TII Digital Heritage Collections

In addition to archaeological reports, short videos, audiobooks, and papers from the NRA seminar series are all securely stored and digitally preserved in the DRI and are also accessible from the Irish government's open data portal (https://data.gov.ie/) and the Heritage Council's web-based spatial data viewer (https://www.heritagemaps.ie/). In due course other digital outputs will be added to these collections, including laser scans, archaeo-geophysical reports, drone footage, etc. (Fig. 4).

TII is one of the most significant commissioners of archaeological work in Ireland and, given its national remit, is perhaps uniquely placed to contribute to the understanding of Ireland's past. Since the early 2000s, more than 2,500 archaeological sites have been excavated across the island. In the course of these works, many significant sites have been excavated and have been fully published (e.g., the recent volume *Meitheal* on Raystown, Co. Meath, describing an early medieval farming settlement and milling center, and the volume on the medieval village at Mullamast, Co. Kildare). TII's recent volume, *Stories of Ireland's Past*, presents a critical synthesis of archaeological discoveries made since the establishment of the NRA (Stanley et al. 2017).

One of the most important outcomes of TII's approach is that it unequivocally demonstrates the ubiquity of archaeological sites throughout the Irish landscape (Fig. 5). For academics and researchers, it requires them to fundamentally reassess their assumptions and models of past settlement and activity, while planners and developers need to assume that new archaeological sites will nearly always be discovered in the course of works and plan accordingly.

Ireland: Managing Archaeology on Infrastructural Developments, Fig. 4 TII archaeological monographs, Seaver (2016) and Bolger (2017)

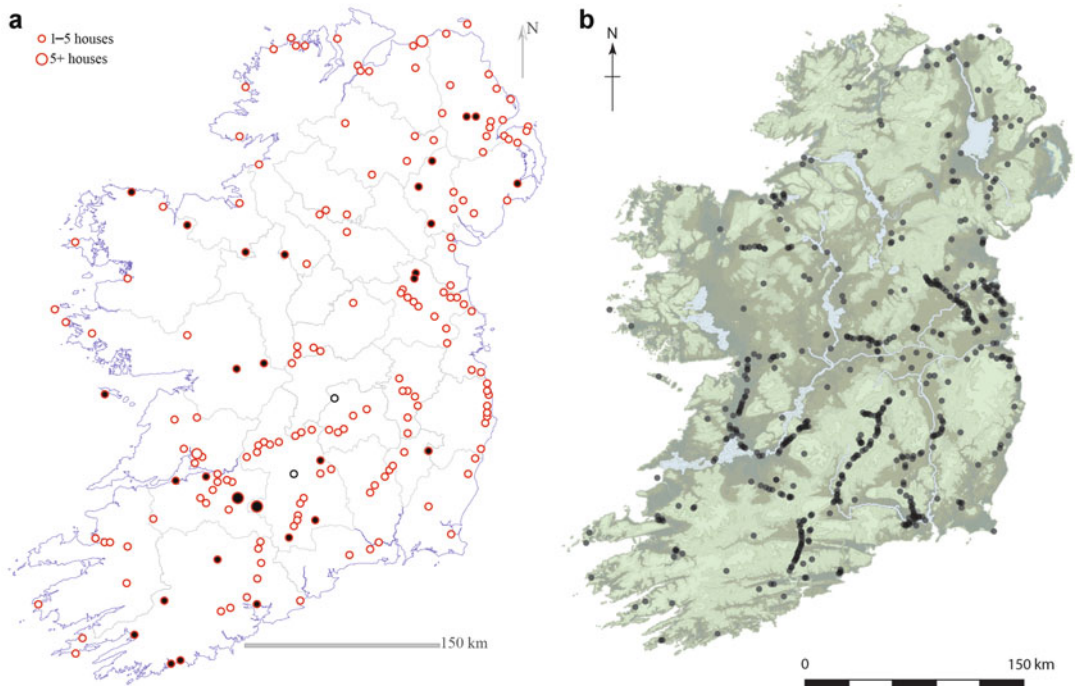

Ireland: Managing Archaeology on Infrastructural Developments, Fig. 5 Distribution maps of (**a**) Bronze Age houses and (**b**) new Iron Age sites

Cross-References

- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Management: Project Management
- ▶ Poland: Cultural Heritage Management
- ▶ Public Involvement in the Preservation and Conservation of Archaeology

References

Bolger, T, 2017. *Colonising a Royal Landscape, The history and archaeology of a medieval village at Mullamast*, County Kildare, TII Heritage 6. Dublin: Transport Infrastructure Ireland.

Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. 2017. *Code of practice for archaeology agreed between the minister for arts, heritage, regional, rural and gaeltacht affairs and transport infrastructure Ireland*. Dublin: DAHRRG.

Royal Irish Academy. 2017. *Archaeology 2025: Strategic pathways for archaeology in Ireland*. Dublin: RIA. (https://www.ria.ie/sites/default/files/archaeology.pdf. Accessed 7th October 2017).

Seaver, M., 2016. *Meitheal, The archaeology of lives, labours and beliefs at Raystown*, Co. Meath, TII Heritage 4. Dublin: Transport Infrastructure Ireland.

Stanley, M., R. Swan, and A. O'Sullivan. 2017. *Stories of Ireland's past, TII Heritage 5*. Dublin: Transport Infrastructure Ireland.

Irish Post-Medieval Archaeology Group (IPMAG)

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Basic Information

The Irish Post-Medieval Archaeology Group (IPMAG) was formed in 1999 and is a cross-border organization dedicated to fostering interest in the archaeology of Ireland from the period 1550 to the present. The stated aims of the group include undertaking initiatives that will help raise the profile of post-medieval archaeology

within (and beyond) Ireland; fostering greater contacts between those individuals engaged in researching the archaeology, history, and culture of post-1550 Ireland; and lobbying for increased academic attention to be paid to the post-medieval period in Irish universities. The group held its first conference in Belfast in February 2001, and annual conferences have followed each year, at venues throughout the island of Ireland. The group publishes an ad hoc newsletter, maintains a web site with a range of resources relating to historical archaeology in Ireland (http://www.science.ulster.ac.uk/crg/ipmag/), and has an active program of publishing its conferences as monographs. IPMAG has also been proactive in lobbying respective governments in relation to adequate protection for post-medieval sites, landscapes, and materials. Yearly field trips are also organized by the group to explore post-medieval sites and landscapes in Ireland, north and south. The membership is international in composition.

Major Impact

Prior to the establishment of IPMAG, there was little organized support for historical archaeology within Ireland, north and south. The contested nature of Ireland's early modern and modern history, in relation to the extension of British control over the island, had long dampened interest in the period as being worthy of archaeological attention. The establishment of the group therefore provided a forum for those interested in the period and legitimacy for the subject. Now, all of the major universities on the island teach some form of historical archaeology, and the number of postgraduates pursuing related research continues to increase each year. IPMAG has also played a central role in encouraging the broader reach of Irish historical archaeology through the publication of four major monographs *The Post-Medieval Archaeology ofIreland, 1550–1850* (2007); *Plantation Ireland* (2009, with the Group for the Study of Historic Irish Settlement); *Ireland and Britain inthe Atlantic World* (2009, with the Society for Post-Medieval Archaeology); and *Crossing Paths, Sharing Tracks*, *Future Directions in theArchaeological Study of Post-1550Britain and Ireland* (2009 with the Society for Post-Medieval Archaeology and the Association for Industrial Archaeology).

Cross-References

- ▶ Archaeology and Politics
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Historical Archaeology
- ▶ Horning, Audrey
- ▶ Industrial Heritage Association of Ireland (IHAI)
- ▶ Plantation Archaeology

References

Horning, A., and N. Brannon, eds. 2009. *Ireland and Britain inthe Atlantic world*. Dublin: Wordwell.

Horning, A., and M. Palmer. (ed.) 2009. *Crossing paths or sharingtracks? Future directions inthe archaeological study ofpost-1550 Britain and Ireland*, Society for Post-Medieval Archaeology Monograph series 4. Suffolk: Boydell and Brewer.

Horning, A., C. Donnelly, R. Ó Baoill, and P. Logue, eds. 2007. *The post-medieval archaeology of Ireland: 1550–1850*. Dublin: Wordwell.

Lyttleton, J., and C. Rynne, eds. 2009. *Plantation Ireland*. Dublin: Four Courts Press.

Iron Ironworks of West Africa

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Introduction

The study of ancient iron smelting in Africa has been, in recent decades, the center of interest of

many researchers in archaeology, history, anthropology, and so on. The stake and the interest of this study is the knowledge of the history of techniques in West Africa in which the approach of ancient metallurgy of iron is inscribed. At the very beginning of these investigations, the origins of technology were most often discussed. At the current state of research, the scientific debate is no longer at the level of the origins of this metallurgy especially as it has sparked publications that have finally confirmed the autochthony and the age of this industry in Africa, which probably did not know that a single center of origin and diffusion: 1000 BC in Niger, site of Termit; 800 BC in Nigeria, Jos region; 1000 BC in Central Republic of Africa; and 1200 BC near the Victoria Lakes (Bocoum 2002: 61; Robion-Brunner 2018b).

Scientific research carried out in recent decades on the ancient iron metallurgy has often emphasized technical, human, and sociocultural aspects. These revealed knowledge at the level of science, knowledge and know-how, technologies, myths, cosmogony, etc. which show a wealth and an undeniable material and intangible heritage.

The ancient metallurgy of iron, as practiced in Africa until the middle of the twentieth century, is a set of technical processes for obtaining iron from ore, by smelting of oxides. These processes are part of the operating chain. The latter consists of several stages that range from prospecting, the collection or extraction of iron ore, the preparation, and the smelting of iron ore in the furnaces to the transformation of the magnifying glass into finished products in the forge. This operating chain is rich in the technological specificities of each metallurgy, which leads to a diversity and an exceptional wealth of practices. However, contact with the West, colonization and the introduction of iron bars, and iron recovery in West African societies will lead to real changes in the production of iron, especially in the region. Forge, where technical and cultic practices continue today in our societies south of the Sahara.

In this approach we present the technical and cultural richness of this iron technology known largely thanks to the ethnographic investigations, to the vestiges and sites of this industry discovered all over West Africa, and to the adaptation of the techniques of the blacksmiths the demands of the modern world, which is driving a real technological change.

The Ancient Metallurgy of Iron in West Africa: A Wealth of Innovative Processes

Apart from archaeological research, much of the knowledge of the technical and sociocultural aspects of the operating chain of early iron production is known through ethnographic and experimental investigations. Indeed, these deliver results that complete the data of archaeology, thus allowing the understanding of the metallurgical activity, abandoned more than half a century ago.

Traditional iron metallurgy has several stages. At each of them, ritual and forbidden techniques are omnipresent and mark the inseparable character between material technical aspects and immaterial ritual aspects.

From the Mine to the Smelting of Iron Ore

All operations to obtain the bloom include prospecting, collecting where ore extraction, iron ore preparation, furnace construction and reduction of ore in furnaces.

Ore Prospecting or Prospecting

In Africa, prospecting methods are varied and very diverse depending on the time, space, and prospecting period. The operation of prospecting or finding the ore is most often the responsibility of the most experienced men with a ritual knowledge to complete the stage. During the prospection, divination practices often precede the operation. In particular, Gulmanceba metallurgists in Burkina Faso practiced geomancy to determine if the output would be successful by determining the directions to be taken for prospecting, the favorable moments, and the sacrifices to be made before the prospection campaign (Thiombiano-Ilboudo 2010: 249).

In addition, several indices based on very old knowledge can locate the iron ore. In fact, the knowledge of nature and the observation of certain plants are determining factors that make it possible to locate the iron ore during the

prospection. The presence of certain plants such as *wiliwiga* (*Guiera senegalensis*), *wędga* (*Saba senegalensis*), and *kubrsak* (*Cassia sieberiana*) reveals the existence of iron ore under certain formations of ferruginous cuirass (Kiénon-Kaboré 1998: 87). In the Moosé of central, northern, and northern central Burkina Faso, the observation of the smoke emanations released from the ground after the rain or in the evening after falling temperatures was a sign of the existence of the ore. The prospecting techniques are indeed diverse and denote the wealth of these metallurgies of iron in West Africa which are not exhaustive in this study.

Obtaining Iron Ore

The techniques of obtaining the ore are various, and most often it is about collection of surface, open excavations, trenches, and wells (of circular or rectangular form some of which with galleries). In Africa in general, extraction by circular or rectangular well is one of the most common extraction methods.

At this stage of the operating chain, rituals are still ubiquitous. Minors must abide by certain rules, such as not having sex the day before the operation or with the same women before the start of the extraction. The exploitation of iron is surrounded by a large number of rites and taboos, so as not to offend the living spirit of the iron on which depends the smooth running of operations (Kiénon-Kaboré 2003). Prohibitions related to the extraction of ore are a means to secure the production of iron by establishing a climate of peace and social harmony between blacksmiths to avoid any social tear that could be fatal to the duties assigned to them (Kienon-Kaboré 2017).

The work in mining operations is very difficult and therefore requires a large workforce. To extract iron ore, miners use several types of equipment such as picks with extremely rigid blades, daba, traditional flashlights to illuminate the interior of wells, baskets and ropes to raise the ore, etc. The work was done at the chain. The persons in charge of the extraction and the transport are generally men; however in some societies as among the Gulmanceba, the women took part in the works. The extraction periods were those of the dry season, between January and April, so as not to be hampered by rainwater. This period allowed the blacksmiths to take advantage of the season free of field work to make the material and not lose an annual campaign of culture, for those who were metalworkers and farmers. The search for the ore was a decisive step, but the preparation of the latter before its introduction into the furnace conditioned the success of the operation.

Ore Preparation

Regarding ore processing, metallurgists used several processes. These include crushing, sizing, washing, drying, and roasting. All these treatment techniques can be grouped into two types, namely, physical and thermal treatments. Physical treatments include sight sorting, crushing, sizing, and washing (Robion-Brunner 2008: 205). They make it possible to reject the iron-poor parts and to improve the behavior of the ore during the smelting process.

In the Moosé and Gulmanceba of Burkina Faso, and the metallurgists of Benin, the ore was either simply crushed and calibrated in small pieces the size of a chicken egg by experienced people, or it underwent other treatments that allowed to modify the nature of the ore to facilitate smelting (Kienon-Kaboré 2003: 102). On the other hand, at the Senufo of Koni, in the north of Côte d'Ivoire, at the extraction of the ore, they obtained a powder that had first to be moistened, shaped into small balls the size of an egg hen, which was then allowed to dry before loading into the furnace (Kiethéga 1996: 311). Some ores were washed to rid them of clay loam that could hinder the smelting of iron ore and reduced to powder and then to an egg-sized ball (Essomba 1983).

Heat treatments – roasting, for example – are the firing of an ore in an oxidizing atmosphere and at temperatures well below the melting point (800–900°). This operation allows dehydration (disappearance of water molecules), decarbonation (transformation of carbonates into oxides by release of CO_2), or desulfurization (release of sulfur contained in sulfides) of the ore (Robion-Brunner 2008: 205). It is noted that all these treatment techniques serve a specific purpose, facilitating smelting while achieving good yields.

Furnace Construction

Before the smelting, the furnace construction is of paramount importance. However, it is important to note that given the diversity of furnaces in West Africa, it would be imperative to take them all up with the stages of their construction. We will discuss the construction of a simple and well-known furnace type that encompasses the wealth of knowledge in the field. The furnace and accessory construction techniques are diverse and result from the multitude of techniques employed in African societies. There are furnaces with natural draft or forced draft or furnaces underground, semiunderground, open-pit, pit, etc. In this approach we present the example of the forced air draft furnace which also shows the technical richness of these metallurgists. Water, clay, and straw are the essential materials. The termite mound soil is also used for the construction of the furnace because of its better soil quality which, according to the metallurgists, withstands the high temperatures of smelting. The clay is kneaded with straw which is allowed to rest for several hours. Meanwhile, a bundle of millet stems made and cut to the size of the future furnace is attached in three places to have the frustoconical shape of the future furnace. Then, the metallurgist clears the ground and digs a circular pit (about 20 cm deep) to the shape of the base of the furnace (about 1 m in diameter), in the center of which it makes a hole. He arranges for the pit to have an inclined slope on the west side. After that, the bundle of millet stalk is transferred there and serves as a mold for the construction of the furnace. The kneaded clay is placed all around it and plastered with a corncob, fingers, and other suitable equipment. Three days later, the bundle of millet stalk is removed or burned inside the furnace that has taken shape. This last operation has a double advantage. The heat helps to harden the furnace, and the resulting ash, which remains in the crucible, allows the magnifying glass not to weld to the ground.

The construction of the furnace is followed immediately by the realization of the accessories. The manufacture of pots and secondary nozzles obeys the same principles as the furnace, with the difference that the latter two do not use the same molds. For pots of the blower, a terrine of about 30 cm in diameter is essential. The mold of the secondary nozzles is a cylindrical wood 1 m long and about 14 cm in diameter. The main nozzle has the shape of a funnel and serves as the junction point of the two secondary nozzles, at the opening of the furnace, where it fits first. It plays the role of air duct here; otherwise the air could disperse at the junction of the two secondary nozzles. A forked wood is used to keep the furnace tilted.

With the furnace construction completed, the blacksmith prepares for the smelting stage. The basic elements are the ore, the fuel, and the oxidizer (air) essential for the rest of the operation.

Combustible

A variety of fuel was used for the smelting of the ore, and each had specific qualities that acted on the good smelting of the ore. The most sought-after species were those with a high calorific value and also exhibited crush resistance in order to descend without crumbling or settling, a condition for the regularity of good combustion.

The choice of species is determined by the qualities specific to the species. Metallurgists have most often used green charcoal because it has a higher heating value than dry wood. In Burkina Faso, in the province of Bulkiemdé, metallurgists most often use *Khaya senegalensis*, *Guiera senegalensis*, *Detarium microcarpum*, *Burkea africana*, *Cassia sieberiana*, *Terminalia macroptera*, and *Butyrospermum parkii.*

Burkea africana, *Detarium microcarpum*, and *Terminalia macroptera* are much more commonly used in blacksmithing. One mentioned has the reputation of making the iron easy to handle the purification and gives a very good quality to the metal. *Khaya senegalensis*, *Guiera senegalensis*, *Burkea africana*, and *Cassia sieberiana* are used for both smelting and forging. In the majority of blacksmiths, *Cassia sieberiana*, the roots of *Guiera senegalensis*, and the *Khaya senegalensis* carbonized together facilitate the smelting of iron ore. The *Burkea africana*, considered as the best in forge and the furnace, is the

species most sought after by all blacksmiths of Bulkiemdé (Kiénon-Kaboré 2003).

The Smelting of Iron Ore

This stage also begins with sacrifices and rituals that differ from one society to another. The mode of loading depends on the blacksmith and the type of furnace. Sometimes ore and charcoal are alternately laden, as is the case in some Moosé, Gulmanceba, Bwa, and Dagara populations of Burkina Faso, Bassars of Togo, Niger, and Ivory Coast. Some metallurgists dispose of the charcoal in the middle of the furnace after making a crucible, and then the ore is put all around it.

The forced air draft furnace by the use of bellows works most often in the morning (5 am–18 pm). This type of operation allows metallurgists to have control over the intensity of the air. They may decide to stop, increase, or slow down the supply of air depending on the progress of the operation.

On the other hand, most natural air draft furnaces work at night. These are the case of the furnaces of Yatenga and some of Niger. The smelting takes place every night between 6 pm and 5 am; the smelting operation takes into account the wind conditions. Indeed, the absence or excess of air can affect the operation of the furnace by smothering or very rapid combustion of coal. This reason may have guided the blacksmiths to run the natural air draft furnaces at night, where the winds are moderated in some parts of Africa, to avoid malfunctioning.

The magnifying glass obtained after the smelting can be used directly in the forge for the manufacture of finished products or undergo purification at the smelting sites to facilitate refining at the forge.

The knowledge of the operational chain of the old iron metallurgy through ethnographic data shows the wealth of this traditional industry which includes geological, technical, mineral, chemical, meteorological, etc. They contain values of all kinds that disappear over time and the modernization of different African societies.

The work of the forge is also an important step which also includes technical and cultural knowledge and know-how.

Forging the Object

This phase is the transformation of the metal into a finite object. The blacksmith has a wide range of gestures and technical processes determined according to his raw material, his skills, his knowledge, the complexity of the object to be manufactured, and economic constraints (Robion-Brunner 2008: 216).

The Workshop of Forge

In the forge workshops, the magnifying glass obtained by the metallurgists was intended for the manufacture of tools for field work, weapons of war, and domestic, cultural, and religious objects. The workshop had a variable layout, workshop tools were diverse, and staff depended on the origin of blacksmith. The blacksmith's workshop at Bulkiemdé in Burkina Faso has a small forge of reduced size. It consists of a conical thatched roof shed. Circular in shape, it measures approximately 3 m in diameter and is composed of bellows, which are always two in number, with a fireplace and an anvil. Bellows are constructed in the same way as those of furnaces, with the only difference being that forges are small (Kiénon-Kaboré 2003). The same type of development is found in the Gulmanceba blacksmiths of Fada N'Gourma in eastern Burkina Faso where the roof is covered with a roof of millet stalks (Ilboudo-Thiombiano 1991). The spatial organization of the forge respects a certain number of prohibitions and mystical facts. The forge workshop can be family or community and most often located outside the family yard, in the center of the village.

Forging Equipment

The blacksmith uses specific tools for making finished products in the forge. These elements are most often common to African forges. The forge material is composite. We have iron anvils fixed on a tree trunk, chisels (for cutting), limes (for sharpening), pliers (to seize the red iron), hammers (for pinging), buckets, and cans. The anvil is the central element of the forge given its technical and cult role. It is a frustoconical mass of variable size, embedded in a tree trunk or inserted

directly on the ground. Some companies use a mass of stone. At the level of the blacksmiths of Bulkiemdé, when the blacksmith decides to stop his trade, it remains the only element of the forge implanted to serve for ritual ceremonies of care or protection. Aside from the anvil, master piece of the forge, there are other types of tools each having a specific function. The pincer is the most used among these secondary tools. It is used to introduce, remove the heated object from the fireplace, and soak the iron in water. The chisel often has two different dimensions (a smaller one to cut small pieces of iron and the largest to cut larger blocks) serves, using the pincers and the hammer, to cut the supports of objects to make up. The needle is used to drill holes in tools that require them. To polish the sharp parts of knives, blades, and lances, the blacksmith uses a kind of scraper.

The blacksmith uses fabrication techniques that start with hammering, dipping, welding, and other techniques of recoiling and chemical surface treatment for some delicate objects such as blades, lighters, knives, etc. (Kiénon-Kaboré 2003).

The Products of the Forge

With this forging material, the blacksmith manufactures tools, the majority of which consists of instruments for domestic use such as ladles and spatulas. The tooling for field work, such as the axe, the ermine, and the la, is the most requested and most made by the blacksmith. Apart from these indispensable items for farmers, the artisan blacksmith also manufactures small domestic materials such as large needles used to make holes on the damaged parts of the wooden gourds in order to repair them. The tools of decoration of the leather, the iron for spinning cotton, and the making of mats are also the fact of blacksmiths. Other objects such as rings, amulets, and bracelets that serve to protect themselves from diseases and evil spirits are also the work of blacksmiths. Artisans use techniques of making objects that denote technical know-how and wealth. Each object has its own approach specificity that highlights a certain subtlety.

The forge in African societies has extensive functions. It is used not only to make the necessary tools for society but also plays an important cultural and worship role.

The remains of all this inheritance are most often remnants of iron metallurgy and are composed of extraction wells, heaps of slag, furnaces of smelting, etc.

Sites of the Ancient Metallurgy of Iron: A Technological Diversity in West Africa

The witnesses to this technical heritage, which show the former importance of iron metallurgy in these societies in the south of the Sahara, are most often found in rural areas. The remains and sites at the level of urban areas are most often destroyed by rampant urbanization. A large part of the whole of this technical heritage is currently in ruins for natural and anthropogenic reasons. These are diversity of sites and archaeological remains reminiscent of a recent past very active in the production and marketing of iron metal. In this article, we have chosen to present only few examples of metallurgical sites in West Africa in order to show the technical and heritage wealth of this industry. Each country of this part of Africa has benefited from more or less extensive research that has revealed many iron production sites, but we will only present those in Benin, Burkina Faso, Côte d'Ivoire, Mali, and Togo. The research presented for each country mentioned above is not exhaustive.

Benin

Research on ancient iron metallurgy in this country has made it possible to chronologically date the beginning of iron metallurgy during the first millennium BC in the Mono region (Randsbord and Merkyte 2009). During the first millennium AD, the iron production is becoming more widespread. Iron is produced in the Atakora from the fifth century AD (Ndah 2009: 435), in the Dendi Region from the fifth century AD (Robion-Brunner 2018a), and in the northeast of Benin, in Boo country, from the twelfth century (Banni-Guénné 2012).

In the Atakora region, metallurgical sites of ancient iron have been identified in the Tanguiéta region, Boukombé, Koukouabirigou, Koutacoingou, and Tèkouantè, and in the Natitingou region, Perma,

Bouyagnidi, and south of Tayakou at the edge of the waterway called Ouankou. At Kèténkè, a site was located 10 km east of the village. It is composed of a large furnace of the Boonga type of central and northern Burkina Faso. It can reach a height of 3,75 m with a circumference of nearly 4, 30 m.

In northeastern Benin, research has highlighted several iron metallurgical sites (Banni-Guénné 2013). On the smelting sites of Ségbana, Kaiama, and Bensékou, Oumarou Banni Guene identifies two types of processes which he calls process Munga and Fufuna which are, respectively, the fact of sedentary and itinerant blacksmiths in the Borgou in Boo country. The Fufuna furnaces are smaller compared to those of the larger Munga process (Photo 1).

In the Dendi country, five smelting traditions divided into three groups have been distinguished: that of the reusable furnace with tapped slag (tradition 1), that of the non-reusable furnace with internal slag (tradition 2), and finally those of the reusable furnace with internal slag (traditions 3–5; Fig. 1; Robion-Brunner 2018a). The localization of iron traditions shows that the northwest is more diverse than the southeast. All the traditions are present around the village of Pekinga. This area seems to have welcomed blacksmiths belonging to diverse geographical origins. The craftsmen expressed their identity through their skills. We still do not know whether their settlement was contemporary, but what is certain is that Pekinga was a crossing zone. A series of 12 radiocarbon dates and oral traditions confirm that iron production started at least at the end of the first millennium AD and progressively decreased since the beginning of the twentieth century. Data are currently insufficient to assess the beginnings and fluctuations in iron production over this long period and to conclude whether the different traditions were contemporary or consecutive. Nevertheless, the variability of the metallurgical remains probably reflects significant modifications in population settlements. Moreover, some of these variations are very close to other West African remains. At least four traditions have the same spatial organization, the same type of furnace, and the same type of slag as those observed at Korsimoro by Serneels (Serneels et al. 2012, 2014) and near Niamey by Guillon (Guillon et al. 2016).

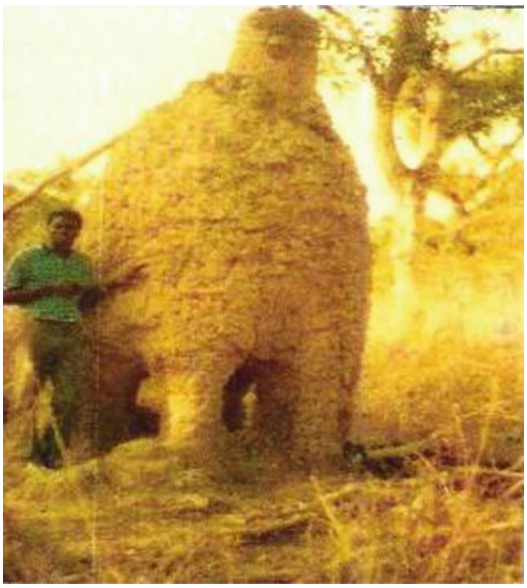

Iron Ironworks of West Africa, Photo 1 Furnace Munga. (Photo Banni-Guéné 2013)

More than 30 iron smelting sites have been located on the Abomey-Bohicon plateau and around the cities of Dogbo and Kétou (Fig. 2). Their activity began timidly during the first millennium BC and expanded from the second half of the first millennium AD east of Sodohomé. At its peak around the fifteenth century, it stopped abruptly at the beginning of the sixteenth century before the establishment of the kingdom of Dahomey. However, during this reign (1650–1900), iron objects were manufactured locally, but from iron imported either from neighboring regions or from European countries (Burton 1864). One of the possible reasons given for the end of iron production in the Mono is the arrival in the middle of the sixteenth century of an episode of drought in this region already subject to the effects of Dahomey Gap. This climatic factor in a dry subhumid environment makes biomass regeneration problematic and thus the availability of wood and therefore coal, an essential fuel for operating reduction furnaces and forging furnaces (Randsbord and Merkyte 2009). The study of

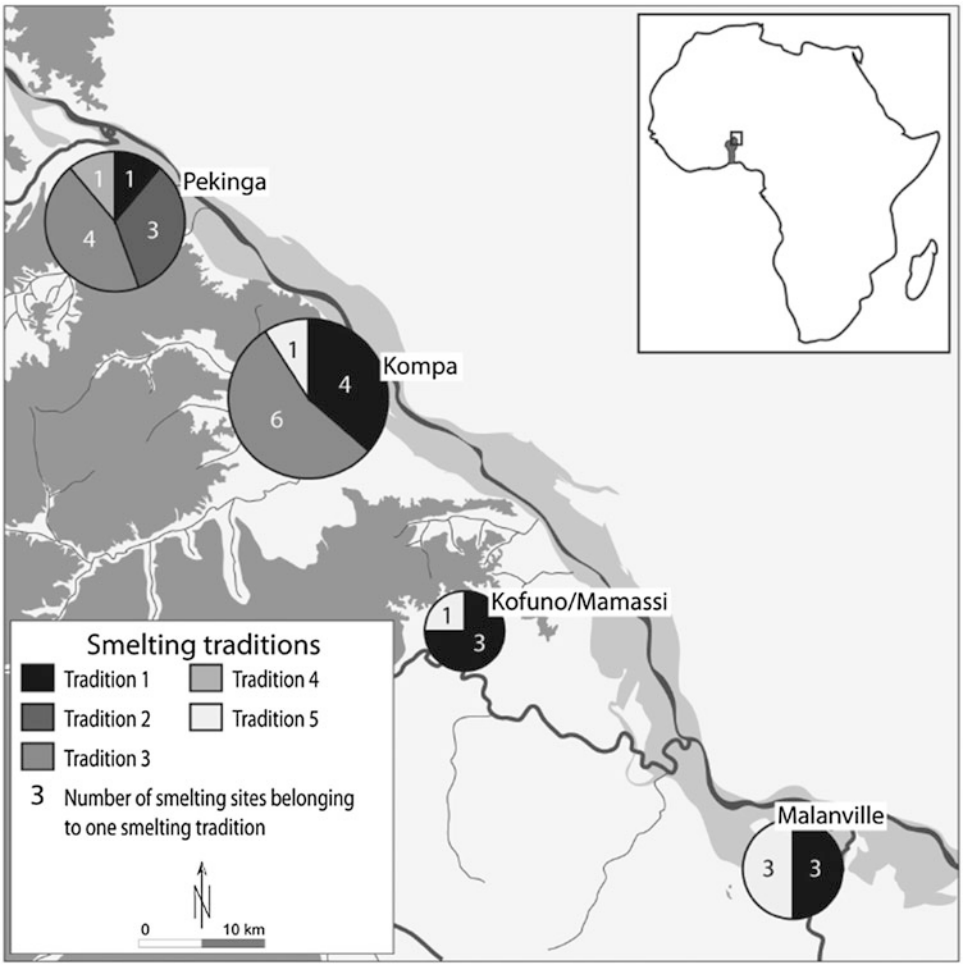

Iron Ironworks of West Africa, Fig. 1 Localization of the five smelting traditions in the Dendi country

archaeological remains and iron production volume showed the existence of three periods corresponding to different production levels and techniques (Randsborg and Merkyte 2009: Fig. 2):

1. Between the eleventh and twelfth centuries AD, iron was produced between Tado and Sodohomé in small bellows furnaces.
2. Between the thirteenth and fourteenth centuries, the furnaces operated with natural ventilation distributed in the tank by several small tuyères, the smelting workshops established outside the housing areas multiplied and occupied a wider region ranging from Cheito in the west to Kétou in the northeast and Pobé in the southeast, and their production met a wider regional demand, probably including long-distance trade.
3. Between the fifteenth and sixteenth centuries, the furnaces, still naturally ventilated, were now equipped with several large tuyères. Real pre-industrial districts are being set up, but refocused on the southwestern part of the area. Their production, in excess, is then turned toward an export extra-regional. Through topographical surveys and cubages, it is established that the latter have produced more than 60,000 tons of slag over six centuries (Randsborg and Merkyte 2009).

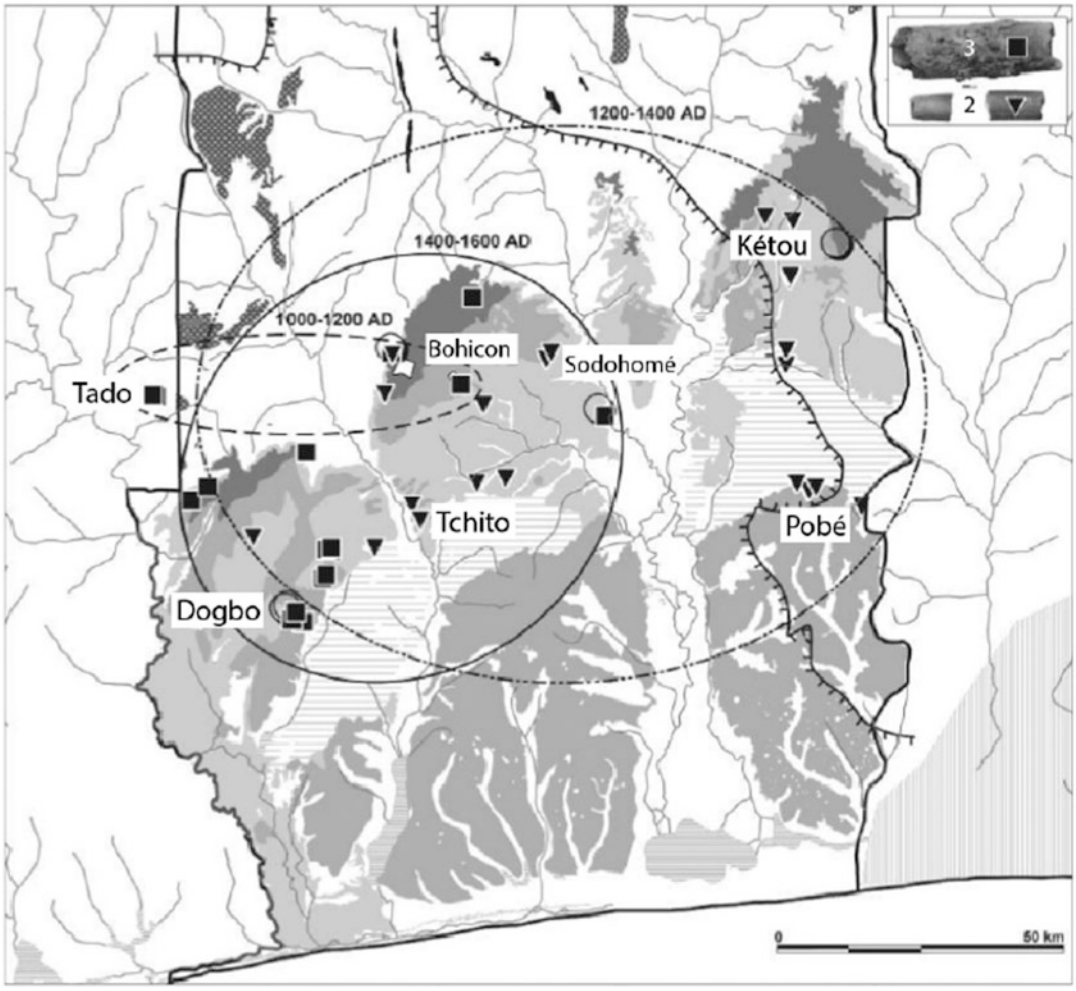

Iron Ironworks of West Africa, Fig. 2 The iron smelting sites of the Mono region with different chronological periods and different types of nozzles. (According to Randsborg 2009: 211)

As this estimate does not take into account all reduction workshops (calculations are based on data from 12 smelting sites out of the 30 identified), iron production was expected to be even higher, placing the Mono region on the list of the most important iron centers in West Africa.

The dimensions of the tuyères and their number are directly related to the morphology of the smelting structure. Sometimes markers of the ethnic origin of metallurgists, these elements often materialize population movements in a region. Crossed with ethnohistorical data, the analysis of archaeological remains makes it possible to trace the history of the iron industry and blacksmiths (Randsborg and Merkyte 2009). Thus, the large tuyère furnaces set up in the fifteenth century are associated with the arrival of Gbe-speaking peoples in the Mono. Gradually driving the Yoruba people to the East, who used to use small nozzles, these new populations bring a technique that seems more efficient, allowing the increase in iron production.

Burkina Faso

Burkina Faso, like other sub-Saharan African countries, has been a major iron-producing area over the past centuries. The importance of this industry is perceptible through the sites and

vestiges discovered throughout the territory. Some metallurgical sites have brought decisive data to the understanding of the history of ancient iron metallurgy in Burkina Faso. We can cite those of Ronguin, Tiwêga, Kindbo, Yamané, Korsimoro, Wolgteng-gooden, Tougaré, Beli in the Markoye region, etc.

Research in recent years has made it possible to advance a little more in the understanding of iron metallurgy in Burkina Faso. Among these investigations, those of Yamané-Nimpoui and Korsimoro have made it possible to renew the knowledge of ancient iron metallurgy in Burkina Faso.

The site of Yamané-Nimpoui is located 70 Km north of Ouagadougou. It houses numerous remnants of iron metallurgy composed of iron slag, nozzles, furnace walls, and well-preserved furnaces. The excavations made it possible to identify a first type of furnace which measures about 3, 5 m high and a second type whose bases are very eroded. One of the main characteristics of the first type of furnace is the presence of a cylindrical block in the center of the furnace during the smelting that works with a natural draft. The coal collected during the excavations made it possible to date one of the structures by 14c dating in the fourteenth century AD (Serneels et al. 2015: 4).

Another important site was identified and excavated at 70 km northeast of Ouagadougou. It is the metallurgical site of the iron of Korsimoro. In this region there are several technical traditions, the first identified of which present certain peculiarities (Serneels et al. 2011: 23–54). The first is the set of large, single-use slag furnaces. These are circular furnaces aligned on a straight line that worked with battery (Photo 2). The dates obtained are between the seventh and tenth centuries AD. The second type is characterized by large reusable, trapped slag furnaces that provide dates between the eleventh and thirteenth centuries AD. The furnaces are massive buildings scattered with natural draft of air. They have four openings, and the cylindrical and massive nozzles (diameter 12–15 Cm) are reused. Technical tradition 3 consists of large, reusable, cast slag furnaces dated between the fourteenth and sixteenth centuries with a single furnace placed in the center of an elliptical work area. The releases form a ring with a slag mound placed in the west. The nozzles are relatively small, 3–4 cm in internal diameter and 7–9 cm in outer diameter, and the slags found are blocks of cast slag. The furnace sometimes has five openings. As for technical tradition 4, it is represented by small, single-use, trapped slag

Iron Ironworks of West Africa, Photo 2 Technical tradition KRS1 (Photo Serneels et al. 2011)

Iron Ironworks of West Africa, Photo 3 Technical tradition KRS4 (Serneels et al. 2013)

Iron Ironworks of West Africa, Photo 4 Furnace tradition KAN1 in Siola (Serneels et al. 2013)

furnaces dating from the seventeenth century. The furnace bases are of very low diameter which contains a massive cylindrical slag. They are presented by battery of 10–50 units. The diameter varies between 15 and 25 cm, and the depth is 30–40 cm and reaches exceptionally 80 cm. The use of bellows is most likely for its operation (Photo 3).

The diversity of archaeological data and technical traditions on ancient iron metallurgy in Burkina Faso shows the dynamism of this industry over the past centuries. Burkina Faso, in view of these research results, constitutes an important center of production which the ethnographic data also confirms.

Ivory Coast

In Ivory Coast, the results of excavations in the Folon region of Kaniasso in the northwest of the country have provided important scientific knowledge on the production of ancient iron metallurgy. Metallurgical technical traditions are identified, and the first absolute chronology on this theme is obtained for the first time in Côte d'Ivoire. Different technical traditions are identified from the earliest investigations in the village of Siola, KAN 1 (eleventh to fifteenth centuries AD), KAN 2 (fifteenth to twelfth centuries AD), and KAN 3 (seventeenth to nineteenth centuries) (Serneel vincent et al. 2013).

The first technical tradition KAN 1 (eleventh to fifteenth centuries AD) located in area 2000 of

Iron Ironworks of West Africa, Photo 5 Furnace tradition KAN 1 in Doumbala (Serneels et al. 2015)

Siola and Doumbala-Kokoroni K-301 is the set of furnaces constructed of sunken slag nozzles. It is characterized by the presence of small elliptical or subcircular mounds consisting of small fragments of slag cast in cords. The nozzles associated with the KAN 1 tradition are cylindrical and small gauge. They are reused for the construction of the furnaces (Photos 4 and 5). The furnaces are built on pillars formed by blocks of irregularly shaped laterites above; a wall constructed using

Iron Ironworks of West Africa, Photo 6 Tradition KAN 2 in Siola (Serneels et al. 2013)

Iron Ironworks of West Africa, Photo 7 Furnace tradition KAN 2 in Doumbala (Serneels et al. 2015)

cylindrical sections of used nozzles is mounted. Initially, the furnaces are installed above a low elliptical depression in the bedrock. The furnaces probably work with a natural draft fed by nozzles, and the flow of slag through the door during the operation is the rule. In spite of everything, some internal slag also forms (Serneels et al. 2013).

The second technical tradition KAN 2 (fifteenth to seventeenth centuries AD), characterized by trapped slag furnaces, is composed of broken blocks of internal slag. This KAN 2 tradition has been identified at Siola 1200–1300 and Doumbala-Kokoroni K-201. The furnaces are subcircular constructions of 1.3 m in diameter. The material is a clay mixed with some gravel. These structures are reinforced by sections of used nozzles, arranged horizontally and which are then encompassed in the Earth mass (Photos 6 and 7). These pillars are 30 cm wide and 50 cm high. Then a clay wreath connects the pillars. The furnaces have been used repeatedly, and the air supply is probably based on a natural draft, with at least six large nozzles. The slag accumulated at the bottom of the furnace is evacuated after cooling the furnace.

The third technical tradition KAN 3 (seventeenth to nineteenth centuries AD), consisting of very large furnaces with trapped slag, is characterized by large annular clusters consisting of large blocks of internal slag surrounding a

Iron Ironworks of West Africa, Photo 8 Tradition KAN 3, site of Siola (Serneels et al. 2013)

structured work area. At the center is a very large furnace with an external diameter at the base of more than 2 m. The furnaces are very powerful constructions (Photo 8). They have a door and four or five doorways. They are built to serve a lot of times. The furnaces probably work with a natural draft. The remains of the KAN 3 tradition are impressive. In half of the cases, the accumulation of slag is 2.5 m high or higher.

A fourth tradition is highlighted in Siola in area 4000 and dated from the eleventh to the thirteenth century (Serneel Vincent et al. 2015: 93). In fact, surveys have made it possible to

update furnace bases after a depth of 50–80 cm. The furnaces are clearly distinguished from the structures belonging to the other technical traditions of the Kaniasso District. These are pits dug into the lateritic bedrock. They have an elliptical shape (Photo 9) and have a well-marked door, about 60 cm wide, placed at one end of the large axis of the ellipse. This area of Siola 4000 contains remnants of nozzles specific to their shape. These are large massive nozzles longer than 40 cm, weakly tapered with a subcircular to elliptical section. The peculiarity of these nozzles is the existence, in addition to the normal nozzle, of three perpendicular openings of rectangular or circular section according to the models (Photo 10). The activity was intense, with at least 200 furnaces in operation. However the complexity of the structures does not allow at this stage the work to clearly characterize this technical tradition.

Iron Ironworks of West Africa, Photo 9 Furnace tradition KAN 4, site Siola 4000 (Serneels et al. 2016)

Mali

In Mali, many vestiges testify to the production of iron. The study of those established on the Dogon plateau revealed the existence of different techniques present in a relatively small territory and operating at the same time. The work has resulted in dates extending from the sixth to the twentieth centuries AD (Robion-Brunner 2008: 237–347). In total, six (6) technical steel traditions have been clearly identified based on the spatial organization of production sites, furnace types, and associated waste assembly.

In the Fiko tradition, furnaces are often organized in drums of two, occupying a more or less circular work area. The slag is rejected on the periphery of the smelting area and forms a frustoconical cluster whose center has a crater with almost vertical walls and reinforced by slag walls.

There are double clusters due to the junction of two clusters. The furnaces are imposing structures of elliptical plan (2.5 × 1.5 m) with a basin-shaped lower part. At mid-height, the wall of the furnaces is pierced by a series of embrasures intended for the installation of massive nozzles. The vaulted superstructure is 2.5 m above the bottom. The majority of the slags are poured, but slabs in the form of slabs are encountered. The

Iron Ironworks of West Africa, Photo 10 Nozzle with lateral opening, Siola 4000 (Serneels et al. 2013)

beginning of production on the site of Fiko remains unknown, but it is clearly attested from the year 1100 AD and continues until around 1900 (Robion-Brunner 2008).

In the Ouin tradition, a single furnace occupies the center of a cluster of annular slags. The workshops consist of one or more rings. The furnaces have a circular section of one (1) m in diameter. They have a lower pit about 50 cm deep, a door, and 5–8 embrasures with a chimney up to 1.5 m above the traffic floor. On the side, a sandstone block staircase gives access to the upper opening. The slag is poured and the tuyères massive. The lower part of the chimney was built using lozenge-shaped raw bricks. These furnaces share similarities with furnaces from Yatenga (Burkina Faso) and attributed to Kibsi metallurgists, who were present before the conquest of the country by the Nakombsé in the fifteenth century AD (Kiéthéga 2009).

In the Ama tradition, site organization and furnaces have similarities to that of the Ouin tradition. The furnaces excavated at Amabalaginna are rather small (diameter 80 cm), of circular section, with a pit dug in the substrate, a door, and only five embrasures for the nozzles at the ground level of circulation and a slightly frustoconical chimney. The slag is shaped like a thick, curved plate. The solidified slag therefore has a central vacuum of the cooling mode. A large majority of nozzles is clogged with slag.

In the Tinntam tradition, the furnace construction technique is the cladding on the outside by a cladding of sandstone blocks surrounding a slag-bound construction using clay mixed with straw. On the inner walls a layer of nozzle fragments is applied, which is then covered by a thin clay film. The furnaces include a buried pit, a door, and nine narrow embrasures at the ground level of external circulation surmounted by a massive chimney high of about 2 m. The nozzles are thin and cylindrical and the slags are small cast fragments. They are frequently contiguous two by two. The spatial organization of the sites is not always the same. The other sites of the tradition are much more modest and are characterized by furnaces arranged randomly and each surrounded by a rejection of more or less annular slags.

The Aridinyi tradition is characterized by massive furnaces built of banco-bound slag. The lower part is a shallow bowl. And the globally frustoconical chimney rises about 2 m above it. The inner tank, wide at the base, closes in dome and is extended by a much narrower duct. A door and five embrasures are made at ground level of circulation. An external staircase provides access to the upper opening. These furnaces produce mainly internal slags in the form of roughly hemispherical large blocks up to 80 cm in diameter and 40 cm thick for a weight exceeding 100 kg. The nozzles are massive. The furnaces are arranged either randomly or in parallel rows. The spaces between the furnaces serve to reject the slag blocks. The accumulation of waste forms retaining walls. This is the case where on the large site of Aridinyi, the cluster of slag forms a single massive thick more than 2 m by 100 m long traveled by narrow streets lined with high slag walls connecting places occupied by furnaces.

The sites of the Enndé tradition are most often the juxtaposition of small, low mounds or even simple debris spreading. The excavation carried out by S. Perret uncovered a buried furnace base, with an access pit and a door as well as five embrasures for the nozzles at ground level of circulation. The construction is made of banco and slag. The diameter of the tank reaches about 1 m. The slag in these furnaces has irregular block shapes with flow structures and many traces of sediment adhering to the surfaces. These are bottom slag.

This research helps to understand the development of iron production in Dogon countries in the Bandiagara region.

Togo

In Togo, several researches have identified sites of ancient iron metallurgy in the regions of Bassar, Dapaong, and Tado, allowing some to situate this activity in a chronological context and to know the operative chain of this industry.

In the Bassar region, iron production began as early as the fifth century BC and ceased in the middle of the twentieth century AD. After a chronological hiatus, this activity took off at the end of the first millennium AD (De Barros 1986). The

workshops are established along two discontinuous mountain ranges rich in iron seams. The study of the volume of iron production taking into account the chronology makes it possible to divide the history of the Bassar iron industry into five periods (from Barros 1985, 1986, 2013):

1. Between the middle of the fifth century BC and the first century AD, iron was produced and transformed into an object around the Dekpassanware site.
2. Between the end of the first millennium AD and the middle of the fourteenth century, steel sites multiplied in the region, and their production was small and supplied local needs.
3. Between the middle of the fourteenth century and the end of the sixteenth century, steel activity increased and became important.
4. Between the seventeenth century and the beginning of the nineteenth century, it reached a surplus production turned toward extra-regional exports.
5. During the nineteenth century, it continued to expand, but some intersocietal relations disrupted trade and production; the latter ceased at the beginning of the twentieth century in the eastern part (Kabu/Bassar), while around the city of Bandjéli, it was not until the 1950s that local iron was permanently replaced by European imports.

Thanks to topographical surveys and cubages, production can be estimated at more than 200,000 tons of slag over the last six centuries (Robion-Brunner et al. in preparation). This estimate makes the Bassar district one of the most important iron centers in West Africa.

As elsewhere on this continent, the direct method of obtaining iron was used. Macroscopic analysis of the slags shows that external slags are in the majority in the Bassar region but that they are accompanied by other types of internal slag. In total, seven types of slags divided into five iron assemblies are characterized on the Bassar sites. This diversity of techniques corresponds to both different time periods and different geographical locations. Apart from an iron tradition present at all times and throughout the region, it seems that there was a technical change around the sixteenth century and that the processes differ on either side of the Katcha River. In the eastern sector, two technical traditions appeared at the beginning of the thirteenth century, and then a third one appeared in the middle of the fifteenth century in the northern part. In the western sector, the southern and northern parts are not contemporary. In the south, metallurgy seems to begin at the end of the thirteenth century and end at the beginning of the fifteenth century. Two techniques are used together but not on the same sites. In the northern part, the iron industry began in the sixteenth century. On these sites, two technical traditions are used in parallel, but not with the same intensity.

The surveys and excavations conducted at Tado by the team of Dr. Aguigah Dola have identified many metallurgical sites (Aguigah 2015). After analysis of the data, it has been established that it is a natural-run, semiunderground, flared-base furnace with a conical upper part.

This diversity of remnants and iron metallurgical sites is evidence of the importance of this industry at the technical, economic, military, and sociocultural level.

Ancient Metallurgy of Iron and Society

The History of techniques cannot, however, be done outside of society, culture and thoughts that constitute a whole with the technique strictly speaking. Indeed, the technique which is the peculiarity that man has to invent the tools and the processes to act on his environment in a sustainable and reproducible way is most often the reflection of culture, society, and thought, in a word of the Homo technicus in Its environment (Garçon et al. 2010: 11).

The Ancient Metallurgy of Iron in Society

The introduction of ancient iron metallurgy has profoundly affected African societies. Indeed, this industry has been at the base of the formation of strong, powerful, and structured states in Africa. Its role in the structuring of societies has been decisive in many socioeconomic and political upheavals. Its military and political consequences

have been an important lever in the establishment of many kingdoms and empires during the African Middle Ages. Indeed, during the time of the African Middle Ages, the control of the iron mines and the control of iron gave a certain economic and military power to the different kingdoms and empires which succeeded one another: the empire of Ghana (VIIe in XIe century), Mali (from the thirteenth to the fourteenth century), and Songhai (middle of the fifteenth to the sixteenth century). Their political, military, economic, and social history illustrates the importance and role of iron in the organization and structuring of these societies.

In addition, iron, tenacious, ductile, and malleable, which has improved weapons, will also play an important role in agricultural yields, as the increase in iron production has fueled trade.

Indeed, iron has been the basis of an important agricultural revolution and dynamic trade in West Africa. Metalworking allowed blacksmiths to make various tools used in agriculture. This unavoidable material in agriculture has therefore played an important role in agricultural production. The consequence is the multiplication and increase of agricultural resources. For the African continent, trans-Saharan trade has been an exchange network where iron played an important role after that of gold. Other commercial networks have existed and participated in this dynamic trade.

During the production of iron in furnaces and forging, man has developed over the years innovations of several kinds. The techniques developed have evolved over time but also in space. They improve, transform, and evolve to the rhythm of human thought and adapt to the context of the moment. What are the innovations in iron metallurgy?

Technical Changes and Societies

At the level of the operating chain, the technical changes are especially noticeable today at the level of the work at the forge. Experiments have also revealed the use of new equipment. In the same way the raw materials and the products have changed according to the context and the new needs of the society. Blacksmiths continue to use traditional technical gestures when necessary. Their role in society has also changed over time. At the level of the smelting of iron ore, for experimental reasons, the resumption of this activity for educational and research purposes allowed the use of new materials to facilitate the work, most often because of the absence of the iron ore old material that is difficult to reproduce, inappropriate, or low yielding. As an example, the 2005 experiments in Park W, part of Burkina Faso, for the construction of the bellows furnace, the nozzles connected to the blower jars, usually made of earth, have been replaced by modern iron pipes. However, of all these changes, changes in the forge are related to the current needs of companies in sub-Saharan Africa. These mutations are visible in many African societies. In this chapter, we discuss the case of mutations in Burkina Faso where important studies have been conducted.

Mutations Related to the Equipment or Operation of the Forge

As the techniques are evolving, many blacksmiths have released their creative genius to adapt traditional techniques to the reality of the moment, modernity, and the environmental context.

The workshop itself has changed. Forging workshops vary from one region to another but also according to blacksmiths and production techniques.

Zakaria Lingani writes that “the traditional workshop is a set of places in the house. It is a shed built outside the concession with a straw roof placed on some posts” (Lingani 1988: 66).

But, nowadays, it is not uncommon to see iron poles supporting the forge shop as found in Gourcy in north and west central Burkina Faso.

In the same way the sheet is introduced in the construction of the workshop like roof, which did not exist formerly. Also, the use of a plastic tarpaulin above the roof is an introduction to modernity in the workshop. All these innovations in the forging workshop are the fact of the popularization of iron material and the availability of these different raw materials, more accessible nowadays.

In terms of technical changes and innovations, the equipment of the forge workshop has also changed. In the device for manufacturing objects,

the use of an electric coil is used instead of traditional wind tunnels. This electric coil is a recovery equipment of old cars originally used to cool the engine of vehicles. It plays an important role in the energy production system and in the operation of production. This original duct system for the fireplace blower is used by Adama Traoré, a smelter in the village of Kolonkani-Ba (Burkina Faso). Many blacksmiths use this system.

The innovation also lies in the use of a battery in blacksmith shops for the operation of the forge (in Kolonkani-Ba, Sabou, and Ouagadougou). It is a battery, usually 12 volts, intended to supply the electrical circuit of cars. Similarly, solar panels are used to power the home. For example, the modernization of Adama Kindo forging has two wind tunnel systems, one manual and the other solar. The manual system is used in case of solar energy failure.

Also, the frames of mussels formerly made of earth are also made of wood precisely boards used in the process of production.

In Sabou, a town located 100 km west of Ouagadougou, many forges are semi-modern. The forge shop is characterized by a shed under which are found, as a working device, a fireplace built of clay bricks, a ventilation system materialized by a bicycle or motorcycle man, and a darned air brewer from a motorcycle chain cover.

The raw material is obtained from recovery equipment such as rims of motorcycles and vehicles, motorcycle coils, old cooking pots or old aluminum dishes, old empty cans of drinks cans, plates, and all other object containing aluminum.

Formerly intended to produce blades of hoes, arrows, and objects of adornment, the productions are today very varied. A diverse range of tools is manufactured in its semi-modern workshops. These include groundnut shellers, single plows, multipurpose plows such as plowers, seeders, plotters, weeders, and scrapers.

In order to participate in the Tougan agricultural and craft fair in 1989, the Souabo and Toungaré family produced iron from which they pulled a plow. Iron and plow were presented at the fair.

From the technical point of view, faced with the invasion of the industrial metal and the profusion of the artisan welders, the blacksmiths had to learn to adapt. The smelting gradually disappeared at the beginning of the twentieth century, and production has also changed. Some objects remain unavoidable and unequaled, among which tools for working wood and earth are still produced by craftsmen. Some blacksmiths have made a radical change in their production (Léonce 2009: 67).

Technical progress evolves in time and space, and man uses his creativity to evolve his techniques according to his environment. The mechanism created by Adama Traoré in the village of Kolonkani-Ba shows how modern elements can be used to lighten work and obtain better returns. It also denotes the inventive spirit and continual changes in techniques.

The Metallurgists-Smiths from Yesterday to Today

In the majority of blacksmith companies, the vision of iron in African societies has also marked the various roles played by the blacksmith, an important and unavoidable figure.

The place of the blacksmith in these societies is closely linked to the image of iron, its conception in these societies where the metallurgical industry is related to ritual aspects. Indeed, techniques and rites are complementary and inseparable. In Burkina Faso, in some blacksmith societies, apart from its technical contribution through the production of iron, the blacksmith is the very one who is at the center of cultural life. The blacksmith plays distinct roles according to the societies to which he belongs. Being a blacksmith is a vocation, one is often born blacksmith, one works iron, and one carries out also important missions in the company, like that to calm the conflicts. The blacksmith, a central figure in society, is at the beginning and end of life. He heals the body and the spirit, protects, and advises. The blacksmith is also asked for his mediating role in conflicts. The blacksmith within these companies becomes a key figure.

These roles have continued in the villages because the blacksmith is still feared and respected in the majority of societies.

In the past, the production of iron and the work at the forge were an activity most often exclusive according to the blacksmith companies. In fact,

iron metallurgy was the main activity, but not permanent, because trade or barter was able to cover the needs of the blacksmith. During the drought period, he was looking for his ore, reducing it to have a good reserve of magnifying glass. In the rainy season, during which the demand for finished products increases, he devotes himself to forging, trade, and/or trade. But with the gradual cessation of iron production and the introduction of salvage iron, metallurgists and blacksmiths intensified field work. Nowadays, blacksmiths are also farmers, and the work at the forge has become a complementary activity.

Their ancestors were metallurgists. They worked on natural draft or bellows furnaces. But the present generation did not participate in the different operations. They remain today blacksmiths, farmers, and healers.

Conclusion

The approach highlights the complexity and diversity of the old iron metallurgy in West Africa. The process of developing the metal from the search for ore to the transformation of the magnifying glass into finished products reveals a wealth and diversity of operations. The variety of furnace shapes, ore processing, smelting, and refining operations is a fundamental feature of iron metallurgy in West Africa. Thanks to the ethnographic approach, we know how the metallurgists produced the iron magnifier. The ethnographic aspects shed light on the archaeological data and show indeed a certain technical richness which includes knowledge, botanical, mineralogical, meteorological, and other related fields. The protection of these technical knowledge and archaeological sites related to iron metallurgy is more than an emergency. Archaeological remains that have been abandoned for some time may disappear without proper study or development. The protection of this technical heritage makes it possible to safeguard a wealth that contains technical, educational, moral, and symbolic values for West Africa. Research on the ancient metallurgy of iron must emphasize the technical, sociocultural approaches of each society and deepen local studies because the data of current investigations have shown technological and sociocultural wealth that differ from a society to another at reduced scales.

References

Aguigah, A. D. 2015**.** Les sites métallurgiques dans l'aire culturelle aja-tado**.** *NAC's Journal of African Cultures & Civilizations, n° 1*.

Banni-Guene, O.S. 2013. *La paléométallurgie au Borgou: Typologie des procédés de production et de transformation du fer chez les métallurgistes du Nord-Est du Benin*. Burkina-Faso: Université de Ouagadougou. Burkina-Faso, 415p.

Bocoum, H. 1995. La métallurgie du fer au Sénégal des origines au XXème siècle: Esquisses d'une évolution des techniques de réduction, In *Paléométallurgie du fer et cultures. Symposium international du comité pour la sidérurgie ancienne. Editions Vulcano*, 143–149.

Bocoum, H. 2002. *Aux origines de la métallurgie du fer en Afrique. Une ancienneté méconnue. Afrique de l'Ouest et Afrique centrale. Mémoire des peuples*. Paris: Edition Unesco, 240 p.

Burton, R.F. 1864 The Present State of Dahome. Transactions of the Ethnological Society London 3. 400ff.

De Barros, P.H. 1983. Les Bassars: Producteurs du fer à grande échelle dans la savane ouest africaine. *in actes du IX congrès panafricain de préhistoire Jos*, Nigeria, décembre.

De Barros, P. 1985. The Bassar: Large-scale iron producers of the West African savannah. Unpublished Ph.D. thesis, University of California, Los Angeles (USA).

De Barros, P. 1986. Bassar: A quantified, chronologically, controlled, regional approach to a traditional iron production centre in *West Africa*. *Africa* 56 (2): 148–174.

De Barros, P. 1988. Societal repercussions of the rise of large-scale traditional iron production: A West African example. *The African Archaeological Review* 6: 91–113.

De Barros, P. 2013. A comparison of early and later iron age societies in the Bassar region of Togo. In *The world of Iron*, ed. J. Humphris and T. Rehren, 10–20. London: Archetype Publications.

Essomba, J.M., 1983. Archéologie et recherches en métallurgie du fer et âge du fer ancien au Cameroun (nécessité d'une intervention des sciences de la nature). Archéologie Africaine et Science de la nature appliquée à l'Archéologie, 467–472. *1er symposium inter. Bordeaux 1983, A.C.C.T., C.N.R.S., C.R.I.A.A.* Paris, 551 p.

Fluzin, P., 2002. La chaîne opératoire en sidérurgie: matériaux archéologiques et procédés. Apport des études métallographiques. In *Hamady BOCOUM, Aux origines de la métallurgie du fer en Afrique. Une ancienneté méconnue. Afrique de l'Ouest et Afrique centrale.* Mémoire des peuples, 59–69. Paris, Edition Unesco.

Garçon, A.-F. et al. 2010. Introduction, pp. IX–XVIII. In *Techniques, Patrimoine, Territoires de l'Industrie: Quel enseignement ?* International Workshop, 227 p.

Guillon, R., C. Petit, J.-L. Rajot, A.A. Toure, O. Ide, and Z. Garba. 2016. Classification et chronologie de bas fourneau de réduction du fer à usage unique au sud-ouest du Niger. *Journal of African Archaeology* 14 (1): 55–82.

Jemkur, J. F. 2002. Les débuts de la métallurgie du fer en Afrique de l'ouest. In *Hamady BOCOUM, Aux origines de la métallurgie du fer en Afrique. Une ancienneté méconnue. Afrique de l'Ouest et Afrique centrale*. Mémoire des peuples, 22–33. Paris: Edition Unesco.

Kienon-Kabore, T.H. 1998. *La métallurgie ancienne du fer au Burkina Faso: Province du bulkiemdé. Approche ethnologique, historique, archéologique et métallographique*, Thèse de doctorat, Université de Paris I Panthéon – Sorbonne, Paris, 472 p.

Kienon-Kabore, T.H. 2003. *La métallurgie ancienne du fer au Burkina Faso: province du bulkiemdé, Approche ethnologique, historique archéologique et métallographique. Un apport à l'histoire des techniques en Afrique*. Abidjan: L'Harmattan, 318 p.

Léonce, KI 2009, *Les mutations du système technique du travail du fer du XVIIIè au XXè siècle : Cas du village de Twanré et de la ville de Bobo Dioulasso (Burkina-Faso)*. Mémoire de Master, Université de Paris 1 Panthéon-Sorbonne, 133 p.

Kienon-Kabore, H.T., Simpore L., Thiombiano-Ilboudo F.E. 2015. Etude de synthèse sur les connaissances relatives à la métallurgie ancienne du fer en Afrique, 91 p.

Kienon-kaboré T. H. 2017, Imagination and ancient techniques in Sub-Saharan Africa. European Journal of Research in Social Sciences (EJRSS), 5(5):42–53.

Kiethega J.-B., 1996. *La métallurgie lourde du fer au Burkina Faso*. Thèse de doctorat, Université de Paris I Panthéon – Sorbonne, Paris, 811 p.

Kiethega, J.-B. 2009. *la métallurgie lourde du fer au Burkina Faso, une technologie à l'époque précoloniale*. Editions Karthala, 500 p.

Lingani, Z. 1988. *La métallurgie du cuivre et des alliages cuivreux à Ouagadougou*, mémoire de maîtrise, Université de Ouagadougou, IN.S. HU.S, Département d'Histoire et Archéologie, p. 66.

N'Dah, D., 2009. *Sites archéologiques et peuplement de la région de l'Atakora (Nord-Ouest du Benin)*. Thèse de Doctorat unique, Université de Ouagadougou, 543 p.

Paris, F., A. Person, G. Quéchon, J.-F. Et, and Saliège. 1992. Les débuts de la métallurgie au Niger septentrional. Aïr, Azawagh, Ighazer, Termit. *Journal des Africanistes* 62 (2): 35–68.

Randsborg, K. (2009) *Benin archaeology: The Ancient Kingdoms*. Chicester, Wiley-Blackwell.

Randsborg, K., and I. Merkyte. 2009. *Benin archaeology: The ancient kingdoms*. Wiley-Blackwell: Chicester.

Robion-Brunner, C. 2008. *Vers une histoire de la production du fer sur le plateau de Bandiagara (pays dogon, Mali) durant les empires précoloniaux: Peuplement des forgerons et traditions sidérurgiques*, Thèse de doctorat, Genève, 424 p.

Robion-Brunner, C. 2018a. Blacksmiths and iron working in the North Dendi. In *Birnin Lafya: 2000 years in a Dendi village, Francfort, Journal of African Archaeology Monographs*, ed. A. Haour, 174–192.

Robion-Brunner, C. 2018b. L'Afrique des métaux. In *De l'Acacus au Zimbabwe, 20 000 avant notre ère –XVIIe siècle*, collection 'Mondes Anciens', ed. F.-X. Fauvelle, 518–543. Paris: Editions Belin.

Robion-Brunner, C., V. Serneels, and S. Perret. 2013. Variability in iron smelting practices: Assessment of technical, cultural and economic criteria to explain the metallurgical diversity in the Dogon area (Mali). In *The world of iron*, ed. J. Humphris and T. Rehren, 257–265. London: Archetype Publications.

Robion-Brunner, C., A. Haour, M.-P. Coustures, L. Champion, and D. Bèziat. 2015. Iron production in Northern Benin: Excavations at Kompa Moussékoubou. *Journal of African Archaeology* 13 (1): 39–57.

Robion-Brunner, C., M.-P. Coustures, S. Dugast, and K. B. Tcham. in preparation. Diversité technique de la sidérurgie bassar (13ème-20ème siècle). *Journal of African Archaeology.*

Serneels, V., T.H. Kienon-Kabore, L. Kote, K.S. Kouakou, M. Mauvilly, D. Ramseyer, and L. Simpore. 2011. Origine et développement de la métallurgie du fer au Burkina Faso et en Côte d'Ivoire. Premiers résultats sur le site sidérurgique de Siola (Sanmatenga, Burkina Faso). In *SLSA Jahresbericht, rapport annuel,* 23–54.

Serneels, V., T.H. Kienon-Kabore, L. Kote, K.S. Kouakou, M. Mauvilly, D. Ramseyer, and L. Simpore. 2012. Origine et développement de la métallurgie du fer au Burkina Faso et en Côte d'Ivoire. Premiers résultats sur le site sidérurgique de Siola (Kaniasso, Denguélé, Côte d'Ivoire). In *SLSA Jahresbericht, rapport annuel*, 113–143.

Serneels, V., T.H. Kienon-Kabore, L. Kote, K.S. Kouakou, M. Mauvilly, D. Ramseyer, and L. Simpore. 2013. Origine et développement de la métallurgie du fer au Burkina Faso et en Côte d'Ivoire. Premiers résultats sur le site sidérurgique de Siola (Kaniasso, Denguélé, Côte d'Ivoire). Journal de la fondation SuisseLiechtenstein pour les recherches archéologiques à l'étranger, SLSA, pp 113–143.

Serneels, V., T.H. Kienon-Kabore, L. Kote, K.S. Kouakou, M. Mauvilly, D. Ramseyer, and L. Simpore. 2014 Origine et développement de la métallurgie du fer au Burkina Faso et en Côte d'Ivoire. Seconde campagne dans la région de Kaniasso (Folon, Côte d'Ivoire) et autres recherches. Journal de la fondation Suisse-Liechtenstein pour les recherches archéologiques à l'étranger, SLSA, pp 23–60.

Serneels, V., B. Eichhorn, T.H. Kienon-Kabore, L. N'Zebo, D. Ramseyer, E.F. Thiombiano-Ilboudo, and A. Yeo. 2015. Origine et développement de la métallurgie du fer au Burkina Faso et en Côte d'Ivoire. Prospections et sondages dans la région de Yamane (Burkina Faso) et

en recherches à Siola 4000 (Côte d'Ivoire). *Journal de la fondation Suisse-Liechtenstein pour les recherches archéologiques à l'étranger, SLSA*, 67–101.

Serneels, V., T.H. Kienon-Kabore, L. Kote, K.S. Kouakou, M. Mauvilly, D. Ramseyer, and L. Simpore. 2016 Origine et développement de la métallurgie du fer au Burkina Faso et en Côte d'Ivoire. Prospections et sondages dans la région de Yamane (Burkina Faso) et recherches à Siola 4000 (Côte d'Ivoire). Journal de la fondation Suisse-Liechtenstein pour les recherches archéologiques à l'étranger, SLSA, pp 67–101.

Thiombiano F.É. 1991: *La production ancienne du fer dans le Gulmu: Cas de Namoungou (Province du Gourma-Burkina Faso)*. Mémoire de maîtrise, Université de Ouagadougou, INSHUS, 155 p.

Thiombiano, F.E. 2010. *Les vestiges de l'occupation humaine ancienne dans la province du gourma, Des origines a la pénétration coloniale (cas de kouare et de namoungou).* Thèse de doctorat, Université de Ouagadougou, Departement d'Histoire et Archéologie, Ouagadougou, 664 p.

Tylecote, R.F. 1975. Iron smelting at Taruga, Nigeria. *Journal of the Historical Metallurgy Society* 9 (2): 49–56.

Ironbridge Gorge Museum Trust (IGMT)

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Basic Information

The Ironbridge Gorge Museum Trust (IGMT) (http://www.ironbridge.org.uk/about_us/ironbridge_gorge_museum_trust/) is an educational charity founded in 1967 within the New Town of Telford, Shropshire, in the English West Midlands. The Trust is one of the largest independent museums in the UK, hosting over half a million visitors every year and generating over £20 million income for the region (IGMT n.d.). IGMT specializes in the preservation and interpretation of the remains of the earliest phases of the industrial revolution based on the presence of two monuments critical to the development of industrial-scale iron smelting and mass production of cast iron: the Darby Furnace, site of the first smelting of iron ore by coke in 1709, and the world's first cast iron bridge (1779; Cossons and Trinder 2002). The significance of these sites was recognized in 1986 when the Ironbridge Gorge was designated as a World Heritage Site.

Major Impact

From its earliest times, IGMT has been instrumental in preserving and conserving the industrial heritage of the Ironbridge Gorge and holds 36 historic properties, some of which are accessible to the public through the museums. Increasingly, there has been a realization that these monuments are located in a historic landscape that still remains largely in place and that the whole landscape is an area of deep significance that is still in need of detailed exploration, although earlier studies have been undertaken that have highlighted some of these significances (Alfrey and Clark 1993; Trinder 2005). Other key monuments in the care of the IGMT include the Darby Houses and Quaker Burial Ground, Coalport China works, Bedlam Furnace, Broseley Pipeworks, Jackfield Tile Works, and the Tar Tunnel. The museum trust also operates the Museum of the Gorge, based in a Victorian riverside warehouse, the Museum of Iron, and Enginuity, a science and technology museum, both based on the Coalbrookdale site within the former buildings of the Coalbrookdale Iron Company. IGMT's principal attraction is the site at Blists Hill which takes the existing historical elements of the site (a brick works, canal, incline plane, clay mine, and blast furnaces) and presents them as the core elements of a recreated Victorian town comprising shops, a pub, and a post office alongside historic buildings relocated from elsewhere in modern Telford, including a squatters cottage and a turnpike toll house designed by Thomas Telford. The town is populated by costumed interpreters who demonstrate the trades and industries of the period and engage with the public to explain the technologies and processes of the day. This has led to the development of a significant expertise in the creation of historic costumes which are in demand from other museums within the UK especially for use in interactive displays allowing children to "dress up" in historic costume or use modern costume based on historic examples to explain

how former garments operated (as with corsets made from modern materials to demonstrate the body-altering use of such garments).

In addition to the popular attractions presented by the IGMT, it holds nationally and internationally important research collections which have a designated status with the UK government through the Department of Culture, Media and Sport (DCMS). The most significant collections are the archives of the Darby family which are held alongside those of the Coalbrookdale Iron Company, which the Darby's founded, and the Elton Collection. This last comprises prints, drawings, paintings, books, ephemera, and artifacts relating to the industrial and transport revolutions and their social impact in Britain and abroad to a much more limited degree (Vanns 2003). Further research collections include books, prints, and papers relating to the Great Exhibition of 1851 and the life of Thomas Telford, the engineer. Other collections relate to the museums where they are located, as with the unique collection of tiles and plaster molds of decorative tile and ceramic building materials held in the original Craven Dunnill factory at Jackfield, the collection of Caughley and Coalport porcelain held at Coalport China Museum, and the decorative ironwork of the Coalbrookdale Iron Company held at the Museum of Iron. The Broseley Pipeworks hold the last surviving collection of clay smoking pipes and molds still in their original manufactory.

Cross-References

- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Historic Jamestowne
- ▶ United Kingdom: Archaeological Museums

References

Alfrey, J., and C. Clark. 1993. The landscape of industry. In *Patterns of change in the Ironbridge Gorge*. London: Routledge.

Cossons, N., and B.S. Trinder. 2002. *The Iron Bridge. Symbol of the industrial revolution*. 2nd ed. Chichester: Phillimore.

IGMT. n.d.. Available at: http://www.ironbridge.org.uk/about_us/ironbridge_gorge_museum_trust/facts_and_figures/. Accessed 5 Apr 12.

Trinder, B.S., ed. 2005. *'The most extraordinary district in the world' Ironbridge & Coalbrookdale. An anthology of visitors' impressions of Ironbridge, Coalbrookdale and the Shropshire Coalfield*. 3rd ed. Chichester: Phillimore.

Vanns, M.A. 2003. Witness to change. In *A record of the Industrial Revolution. The Elton collection at the Ironbridge Gorge Museum*. Surrey: Ian Allen Publishing.

Ironbridge Institute

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Basic Information

The Ironbridge Institute (now the Ironbridge International Institute for Cultural Heritage) (Coalbrookdale, Telford TF8 7DX; http://www.birmingham.ac.uk/schools/iaa/departments/ironbridge/index.aspx) is a postgraduate research and teaching institute founded in 1981 as an equal partnership between the Ironbridge Gorge Museum Trust (IGMT) and the University of Birmingham. It is based in museum buildings within the Coalbrookdale valley, Shropshire, UK, adjacent to the IGMT administrative buildings. Teaching and research initially focussed on industrial (i.e., historical) archaeology, building on the collections and activity of the IGMT in rescuing the relics and investigating the remains of the industrial revolution in Britain. Ironbridge staff and students under its first directors, Michael Stratton and Barrie Trinder, were instrumental in developing the methodological approaches to historical archaeology epitomized by thematic surveys of the automobile industry in Britain (Collins and Stratton 1993) and extensive survey's of key industrial structures such as the model farm complex at Leighton, Powys, in conjunction with the Royal Commission on the Ancient and Historical Monuments of Wales

(RCAHMW). Their early work in promoting The International Committee for the Conservation of the Industrial Heritage (TICCIH) following the founding congress of the organization at Ironbridge in 1973 led to the production of the first global survey of industrial heritage (Trinder 1993). Barrie Trinder in particular was also instrumental in demonstrating the value of oral history in the recording of the experiences of former workers in the many industries within the Gorge (Trinder and Cox 1980), a program that he pursued using local people who themselves went on to carry out extensive research into the past histories of the working communities of the area (Jones 2009). In this work, they were aided by the presence of the IGMT's active commercial archaeological unit, Ironbridge Archaeology, that was able to pursue the ongoing recording of the industrial archaeology of the buildings owned by the museum, within the immediate area of Telford and Shropshire and elsewhere in Britain.

Major Impact

From 1989, Heritage Management (equivalent to Cultural Resource Management) was added to the institute's portfolio, the first program of its kind in the UK. This has become the mainstay of the institute, and distance learning versions have been added since 2005. The industrial archaeology program has been replaced since 2006 by one in Historic Environment Conservation that offers practical training in built environment conservation within a framework of legislative and ethical practice. In all more than 1000 students have been trained at Ironbridge, and graduates are to be found all over the world. Research conferences on World Heritage (Ironbridge Gorge became a World Heritage Site in 1986) and on early industry have been published (White and Carman 2007; Belford et al. 2010), reflecting the continuing role of the institute in fostering high-level research in its areas of interest. World Heritage will become the driving force behind future developments as Ironbridge Institute seeks to develop its educational role in training and management of World Heritage Sites. The annual Ironbridge Lecture offers an opportunity to engage the academic community and the public with recent speakers including Sir Neil Cossons and Adam Hart-Davies.

Cross-References

- ▶ Association for Industrial Archaeology (AIA)
- ▶ Heritage and Higher Education
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values and Education
- ▶ Historic Building Conservation: Current Approaches
- ▶ Industrial Archaeology
- ▶ Industrial Heritage in Archaeology
- ▶ Marketing Heritage
- ▶ Oral Sources and Oral History
- ▶ UNESCO World Heritage Convention (1972)
- ▶ United Kingdom: Cultural Heritage Management Education
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Belford, P., M. Palmer, and R.H. White. (ed.) 2010. *Footprints of industry. Papers from the 300th anniversary conference at Coalbrookdale, 3–7 June 2009,* British Archaeological Reports British series 523. Oxford: Archaeopress.

Collins, P., and M. Stratton. 1993. *British car factories from 1896: A complete historical, geographical, architectural and technological survey.* London: Veloce Publishing.

Jones, K. 2009. Pitmen, poachers and preachers. In *Life and the poor law in the Madeley union of parishes 1700–1930*. Ludlow: Dog Rose Trust.

Trinder, B.S., ed. 1993. *Blackwell encyclopedia of industrial archaeology.* London: Wiley-Blackwell.

Trinder, B.S., and J.J. Cox. 1980. *Yeomen and colliers in Telford*. Chichester: Phillimore.

White, R.H., and J. Carman. (ed.) 2007. *World heritage: Global challenges, local solutions. Proceedings of a conference at Coalbrookdale, 4–7 May 2006, hosted by the Ironbridge Institute,* British Archaeological Reports International series 1698. Oxford: Archaeopress.

Iroquoian Archaeology

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Introduction

Iroquoian archaeology is primarily concerned with the material remains of societies that inhabited the Lower Great Lakes and St. Lawrence Valley regions of the Northeastern Woodlands of North America after approximately A.D. 1000. Iroquoian peoples shared a number of cultural traits, including settlements surrounded by palisades enclosing bark-covered longhouses; subsistence based on maize horticulture supported by hunting, fishing, and gathering; a social structure organized around matrilineal descent and clan membership; and political organization based on village councils, nations of affiliated villages, and regional confederacies. Although these societies experienced dramatic population loss and upheaval in the context of European contact and colonialism, many Iroquoian peoples continue to reside in the region today.

Iroquoians were shifting horticulturalists who relocated their village sites every 10–40 years due to depletion of the local environment or sociopolitical motivations. Settlements usually relocated a few kilometers away, often in the same drainage, although longer migrations also took place. The result is an uncommonly dense record of sequential village sites that permit the reconstruction and investigation of human behaviors at a generational scale.

From a global perspective, Iroquoian archaeology can shed light on many of the key themes in archaeological inquiry. This includes processes of ethnogenesis and cultural differentiation, the spread and adoption of domesticated plants, the development of settled village life, warfare, processes and outcomes of settlement aggregation, and the development of confederacies. During the era of European contact and colonization, Iroquoian peoples weathered epidemic diseases, displacement from their ancestral lands, hostility from European forces, and entry into the global political economy.

Definition

The term "Iroquoian" refers to both a language family and a cultural pattern. Iroquoian languages are indigenous to eastern North America and include Southern and Northern branches. The only known Southern Iroquoian languages are dialects of Cherokee historically spoken by populations in North Carolina, and now Oklahoma, following the forced relocation of those groups in 1838. Northern Iroquoian languages include dialects spoken by populations inhabiting, southern Ontario, the Finger Lakes region and Mohawk River valley of New York, the Susquehanna Valley, and the St. Lawrence River Valley at the time of sustained European contact in the late 1500s and early 1600s. Iroquoian archaeology is traditionally concerned with archaeological remains thought to represent the ancestors of or historical sites related to these Northern Iroquoian speakers.

At the time of sustained European contact in the early 1600s, Northern Iroquoian peoples consisted of a small number of political confederacies, together with other groups of allied communities, each of which inhabited discrete territories (Fig. 1). The Wendat (Huron) confederacy occupied the area between Lake Simcoe and Georgian Bay and comprised four nations: the Attignawantan, Atingeennonniahak, Arendarhonon, and Tahontaenrat. The Tionontaté (Petun) were allied with the Wendat and lived southwest of Georgian Bay, near the Blue Mountains. The combined population of the Wendat-Tionontaté prior to the spread of European epidemics in the 1630s was approximately 30,000 people occupying more than 20 villages (Warrick 2008). Prior to coalescing in their historic territories, ancestors of these groups also occupied multiple drainages flowing south to the north shore of Lake Ontario. The Attiwandaron (Neutral) lived in the Grand River valley and on the Niagara Peninsula, which separates Lakes Erie and Ontario.

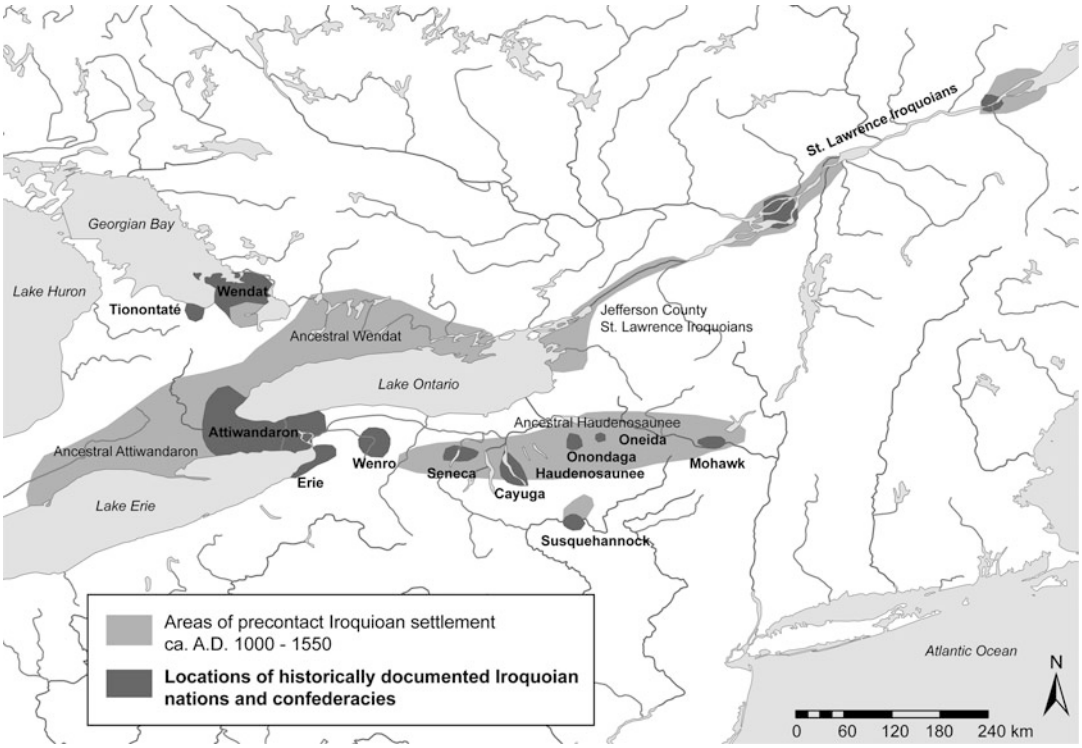

Iroquoian Archaeology, Fig. 1 Locations of Northern Iroquoian populations before and at the time of European contact

The Haudenosaunee (Iroquois) confederacy lived in separate nation-based territories spread across the Finger Lakes and Mohawk Valley regions of central New York State. They included (from west to east) the Seneca, Cayuga, Onondaga, Oneida, and Mohawk. The Haudenosaunee population was approximately 20,000 (Jones and DeWitte 2012). There is evidence for significant continuity in the occupation of the regions inhabited by these groups from the 1300s to the present day.

Not a great deal is known about the Wenro, who lived east of the Niagara Peninsula or the Erie, who lived south of Lake Erie. The material culture and mortuary assemblages of the Erie and Attiwandaron are similar, and both groups may have originated among populations in southwestern Ontario. The Susquehannock lived in a few large villages in the Susquehanna River Valley. As was the case for the Tionontaté and Erie, they may not have relocated into their historic configuration until late precontact or early contact eras. Iroquoian-speaking communities that populated the St. Lawrence Valley are referred to collectively as St. Lawrence Iroquoians although they were divided into distinct village clusters or "provinces" and do not seem to have shared a common political identity. By the time Champlain arrived in 1603, villages observed by Cartier in the 1530s had "disappeared." Archaeological and linguistic evidence suggests these populations amalgamated with other Iroquoian- and Algonquian-speaking neighbors.

Development of Iroquoian Societies

After approximately A.D. 1000, recognizably Iroquoian sites appear in the archaeological records of southern Ontario and central New York. These are typically small, palisaded villages less than a hectare in size with incipient longhouses that

essentially functioned as base camps for small groups practicing some agriculture. Between A.D. 1000 and 1300, maize only constituted a small portion of the diet for populations who remained committed to broad-based subsistence strategies. After ca. A.D. 1250–1300, the first longhouse villages emerged in the context of an increasing commitment to agriculture and year-round village life. This represents the "Neolithic transition" in the northeast. Distinctive patterning in material culture and burial practices suggests a certain amount of cooperation and integration between groups inhabiting subregional territories. Between A.D. 1300 and ≈1500, Iroquoian communities in New York and Ontario expanded long-distance interaction within each region, generating recognizable cultural patterns that presage the confederacies that would develop later (Birch 2015; Hart et al. 2016). Ancestral Wendat populations expanded north and east into territories that would become the contact-era footprint for the confederacy. Iroquoian settlements also appear in the St. Lawrence River Valley at this time, ca. A.D. 1350. In upper New York State, it is unclear if the earliest St. Lawrence Iroquoian settlements were the result of in situ development or movement of small groups north from the eastern Finger Lakes (Abel 2017). Further downstream, ceramic continuity from the preceding Middle Woodland suggests local in situ development (Gates St-Pierre 2009).

After ca. A.D. 1450–1500, there is evidence for increases in violent conflict throughout Iroquoia. Villages shift away from major drainages and into locations that are more defensive. By A.D. 1500, the archaeological record attests to widespread processes of coalescence. Within a generation or two, settlements become fewer in number, larger, and surrounded by multi-row palisades (Birch 2015). Some communities include more than 50 longhouses and populations close to 2000 individuals (Birch and Williamson 2013a). Ethnohistoric records suggest conflict involved raiding by small groups of men, and the archaeological record includes ample evidence for trophy-taking and prisoner sacrifice (Williamson 2007). It is unclear whether hostilities took place between adjacent communities or between groups farther afield. However, there is no evidence for the emergence of confederacies until the later sixteenth century, although alliances were certainly possible. Increased conflict likely contributed to shifts in regional settlement patterns: Ancestral Wendat settlements continued to relocate northward, culminating in the abandonment of the north shore of Lake Ontario by A.D. 1600. In upper New York State, sites clustered into what would become the territories of the Five Nations of the Haudenosaunee. The St. Lawrence Iroquoian populations inhabiting upper New York State and the eastern end of Lake Ontario dispersed, and the appearance of large quantities of distinctive SLI artifacts on sites associated with nascent nations of the eastern Haudenosaunee and Wendat suggests the integration of these populations (Engelbrecht 1995; Ramsden 2016). The outcomes of fifteenth- and sixteenth-century coalescence and conflict included the genesis of "tribal" nations (Birch 2015). Nations were composed of allied communities that shared common territories and acted in concert to achieve sociopolitical and economic objectives. In the late 1500s and early 1600s, certain of these nations allied into the historically documented confederacies.

Historical Background

Ethnohistoric texts written by Europeans who visited and colonized eastern North America in the sixteenth through eighteenth centuries, including the voluminous Jesuit Relations and accounts by Samuel de Champlain, Gabriel Sagard, and Joseph-François Lafitau, have profoundly impacted our understandings of Northern Iroquoian archaeology. While we must be cautious of projecting contact-era practices and behaviors into the past, these documents have provided a wealth of interpretive fodder for archaeologists. For some, the identification of sites associated with historical documents was important in guiding early excavations, including the search for European trade goods, early mission sites, and the routes and stopping places of European explorers.

While an antiquarian interest in "Indian relics" existed since the widespread European settlement

of the northeast, Iroquoian archaeology emerged as a formal field of inquiry in the mid-twentieth century, at a time when Americanist archaeology was concerned primarily with issues of taxonomy and chronology. In both Ontario and New York, culture-historical taxonomies were developed that ordered sites into broad cultural sequences. These were generally based on ceramic sequences and typological change. Although some culture-historical taxa have been retained as convenient shorthand within the region, most researchers prefer to focus on socially and spatially defined phenomena that relate to periods of cultural development or events that transformed the social, political, and economic fabric in meaningful ways.

The emergence of settlement archaeology as a discrete research focus in the mid-to-late twentieth century had a profound effect on Iroquoian archaeology. A series of influential studies and dissertations defined site relocation sequences and the emergence of "tribal" nations. In Canada, Bruce Trigger profoundly influenced the trajectory of Iroquoian studies. While known internationally as a theorist and historian of archaeology, Trigger was also the foremost ethnohistorian of the Wendat (Huron). From the 1970s until his death in 2006, Trigger and his students produced a generation of studies that focused on narratives of demographic, ecological, and cultural process that intersected at multiple temporal and spatial scales (Pearce et al. 2006). In New York, the essential focus on settlement archaeology has been the same. Bill Engelbrecht, Dean Snow, and their students provided a similar degree of coherence to research trajectories, including pioneering the use of geographic information systems (GIS) in the region where researchers explored issues related to settlement ecology and demography to great effect.

In Ontario, progressive cultural resource management legislation has resulted in the complete excavation of dozens of village sites. This rich corpus of settlement data have permitted the analysis of intra- and inter-site patterns regarding material culture and the built environments of individual settlements, site relocation sequences, and regional phenomena as well as comparisons between those units of analysis. The application of new conceptual frameworks (e.g., Creese 2012) and techniques, including geophysical prospection (e.g., Glencross et al. 2017), elemental analyses (e.g., Hawkins et al. 2016), isotopic analyses (Pfeiffer et al. 2017), and social network analysis (e.g., Hart et al. 2016), has led to greater theoretical and methodological plurality in Iroquoian studies in recent years.

Key Issues/Current Debates

Northern Iroquoians occupy a linguistic and cultural "island" in a "sea" of Algonquians. This position in the culture-historical map of eastern North America has led to a great deal of speculation on the origins of Iroquoian peoples. In the twentieth century, this debate involved two perspectives: One that favored the northward migration of Iroquoian-speaking farmers from the south and another that preferred an in situ development from earlier Middle Woodland populations. Early debates relied solely on ethnographic and archaeological evidence, while contemporary perspectives draw new insights from linguistics and molecular biology. While the debate over Iroquoian origins has not been resolved, contemporary researchers reject overly generalized theories, acknowledging the complexity of ethnogenesis and the variable trajectories of development for different subregional groups.

Recent studies have documented and theorized the adoption and spread of maize horticulture (Hart and Lovis 2013), including the relationships between maize and the emergence of settled village life. Isotopic studies of dietary contributions of maize, fish, and deer have revealed stability in the consumption of agricultural products but significant variability in sources of protein (Pfeiffer et al. 2016). Other work has revealed how weaning patterns relate to broader sociopolitical and historical trends (Pfeiffer et al. 2017) including the human outcomes of agricultural intensification and the effects of conflict and European contact.

The rich corpus of settlement data in Iroquoian archaeology has permitted new insights into

processes of settlement aggregation and concomitant developments in organizational complexity and diversity (Birch and Williamson 2013a). This includes aspects of community planning, the creation of public spaces, specialized production, waste management, and long-distance interaction (Birch and Williamson 2013b). Processes by which migrants and newcomers were integrated into preexisting village populations are also a fruitful area for research (Ramsden 2016). Organizational changes which came about as the result of coalescence and conflict may have been a factor which helped to both facilitate and motivate the reorganization of communities into nations and nations into confederacies during the sixteenth and early seventeenth centuries.

The so-called disappearance of Iroquoian populations inhabiting the St. Lawrence and relatedness of SLI to other groups has been the subject of perennial debate, although it is now clear that the relocation of these groups was typical of the flexible and adaptive settlement strategies practiced by Iroquoian peoples. Recent research has demonstrated that St. Lawrence Iroquoian populations inhabiting the upper portions of the valley served as brokers between groups in Ontario and New York (Hart et al. 2017) before many were incorporated in some fashion into those same populations (Engelbrecht 1995; Ramsden 2016). The relationship between St. Lawrence Iroquoians and the Huron-Wendat Nation is a topic of particular interest to modern descendants (Warrick and Lesage 2016).

Issues related to the timing and reception of European goods and direct European contact with various Indigenous populations has long been a subject of inquiry. While the study of trade goods has long been restricted to chronology building or reconstructing trade routes, contemporary perspectives also acknowledge the importance of processes of cultural entanglement, autonomy, and resistance to European influences (e.g., Jordan 2013). Elemental analyses (e.g., Hawkins et al. 2016; Michelaki et al. 2013; Pavlish et al. 2018) have also advanced understandings of the sources and distributional patterns of certain materials.

International Perspectives

Despite the fact that Northern Iroquoian societies of northeastern North America underwent many of the major transformations of interest to archaeologists and anthropologists, there has been little sustained interest in the field from outside North America.

Recently, increased collaboration between scholars in Canada and the United States has led to the development of new data sets and publications exploring processes and links that involve populations on both sides of the border. One notable example is the construction of a data set that includes coded ceramic collar decoration by John Hart and colleagues that includes 234 sites, each with a minimum of 25 distinct pots and a total of 70,463 coded collars. These data have provided the means of understanding differences in network topologies and relations between groups in Ontario, Quebec, and New York (e.g., Hart et al. 2016, 2017).

Interest in Iroquoian archaeology has come from scholars abroad engaging with structurally complementary social formations, such as longhouse societies in northern and eastern Europe or societies organized into confederacies. The large, aggregated village sites of the sixteenth and early seventeenth centuries are also excellent testing grounds for exploring processes associated with urbanization in nonurban contexts.

Future Directions

Future research trajectories in Iroquoian archaeology are poised to make major contributions to the field. Numerous researchers are currently engaged in utilizing the advances in radiocarbon dating to construct high-precision relative chronologies for numerous site relocation sequences. This work will reframe key cultural processes by aligning ceramic and absolute chronologies and permitting still-finer scale refinements of our understandings of, for example, coalescence, conflict, and the introduction of and resistance to European influences. Other ongoing research in the

archaeological sciences, including isotopic analyses and work on genetic variation, promises to yield new insights into Iroquoian history and society.

Over the last two decades, collaboration between Indigenous communities and archaeologists is becoming more common in Canada and the United States. The inclusion of First Nations communities in determining the nature and direction of research and in the production and dissemination of results is an important step toward reconciling differences between archaeologists, First Nations, and the colonial legacies in which our practices are enmeshed.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ North America During the European Contact Period
- ▶ Trigger, Bruce Graham

References

Abel, T. 2017. The Iroquoian Occupations of Northern New York. Retrieved 10/31/2018 from https://www.academia.edu/30484816/The_Iroquoian_Occupations_of_Northern_New_York.

Birch, J. 2015. Current research on the historical development of Northern Iroquoian societies. *Journal of Archaeological Research* 23: 263–323.

Birch, J., and R.F. Williamson. 2013a. *The mantle site: An archaeological history of an ancestral Wendat community*. Latham: AltaMira.

Birch, J., and R.F. Williamson. 2013b. Organizational complexity in ancestral wendat communities. In *From prehistoric villages to cities: Settlement aggregation and community transformation*, ed. J. Birch, 153–178. New York: Routledge.

Creese, J.L. 2012. The domestication of personhood: A view from the northern iroquoian longhouse. *Cambridge Archaeological Journal* 22 (3): 365–386.

Engelbrecht, W. 1995. The case of the disappearing iroquoians: Early contact period superpower politics. *Northeast Anthropology* 50: 35–59.

Gates St-Pierre, C. 2009. A critical review of the last decade of prehistoric archaeology in southern Quebec. In *Painting the past with a broad brush: Papers in honour of James Valliere Wright*, ed. D. Keenleyside and J.-L. Pilon, 103–142. Gatineau: Canadian Museum of Civilization.

Glencross, B., G. Warrick, E. Eastaugh, A. Hawkins, L. Hodgetts, and L. Lesage. 2017. Minimally invasive research strategies in Huron-Wendat archaeology: Working towards a sustainable archaeology. *Advances in Archaeological Practice* 5 (2): 147–158.

Hart, J.P., and W.A. Lovis. 2013. Reevaluating what we know about the histories of maize in northeastern North America: A review of current evidence. *Journal of Archaeological Research* 21: 175–216.

Hart, J.P., T. Shafie, J.A. Birch, S. Dermarkar, and R.F. Williamson. 2016. Nation building and social signaling in southern Ontario: A.D. 1350–1650. *PLoS One* 11 (5): e0156178.

Hart, J.P., J. Birch, and C. Gates-Pierre. 2017. Effects of population dispersal on regional signaling networks: An example from northern Iroquoia. *Science Advances* 3: e1700497.

Hawkins, et al. 2016. Laser ablation-inductively coupled plasma-mass spectrometry analysis of copper-based artifacts from southern Ontario and the chronology of the indirect contact period. *Journal of Archaeological Science Reports* 6: 332–341.

Jones, E.E., and S.N. DeWitte. 2012. Using spatial analysis to estimate depopulation for native American populations in northeastern North America, AD 1616–1645. *Journal of Anthropological Archaeology* 31: 83–92.

Jordan, K.A. 2013. Incorporation and colonization: Post-columbian Iroquois satellite communities and processes of indigenous autonomy. *American Anthropologist* 115 (1): 29–43.

Michelaki, K, R.G.V. Hancock, G. Warrick, and D. Knight. 2013. 17th century Huron Village Life: Insights from the Copper-based Metals of the Ball Site, Southern Ontario, Canada. *Journal of Archaeological Science* 40:1250–1259.

Pavlish, L.A., K. Michelaki, J.F. Moreau, R.M. Farquhar, W. Fox, L.M. Anselmi, C. Garrad, C. Walker, G. Warrick, D. Knight, and S. Aufreiter. 2018. Tracing the Distribution of Late 16th and Early 17th Century European Copper Artefacts in Southern Québec and Ontario, Canada. *Archaeometry* 60(3): 517–534.

Pearce, R., R. MacDonald, D. Smith, P. Timmins, and G. Warrick. 2006. Bruce Trigger's impact on Ontario Iroquoian studies. In *The archaeology of Bruce Trigger: Theoretical empiricism*, ed. R.F. Williamson and M.S. Bisson, 114–134. Montreal: McGill-Queen's University Press.

Pfeiffer, S., J.C. Sealy, R.F. Williamson, S. Needs-Howarth, and L. Lesage. 2016. Maize, Fish, and Deer: Investigating Dietary Staples Among Ancestral Huron-Wendat Villages, as Documented from Tooth Samples. *American Antiquity* 81(3): 515–532.

Pfeiffer, S., J.C. Sealy, R.F. Williamson, C. Forrest, and L. Lesage. 2017. Patterns of weaning among ancestral Huron-Wendat communities, determined from nitrogen isotopes. *American Antiquity* 82 (2): 244–261.

Ramsden, P. 2016. The use of style in resistance, politics and the negotiation of identity: St. Lawrence Iroquoians in a Huron-Wendat community. *Canadian Journal of Archaeology* 40: 1–22.

Warrick, G.A. 2008. *A population history of the Huron-Petun, A.D. 500–1650*. Cambridge, UK: Cambridge University Press.
Warrick, G.A., and L. Lesage. 2016. The Huron-Wendat and the St. Lawrence Iroquoians: New findings of a close relationship. *Ontario Archaeology* 96: 133–143.
Williamson, R.F. 2007. 'Ontinontsiskiaj ondaon' (the house of cut-off heads): The history and archaeology of northern Iroquoian trophy taking. In *The taking and displaying of human body parts as trophies*, ed. R.J. Chacon and D.H. Dye, 190–221. New York: Springer Books.

Further Readings

Birch, J. 2012. Coalescent communities: Settlement aggregation and social integration in Iroquoian Ontario. *American Antiquity* 77 (4): 646–670.
Bradley, J.W. 2005. *Evolution of the Onondaga Iroquois: Accommodating change 1500–1655*. Syracuse: University of Syracuse Press.
Engelbrecht, W. 2003. *Iroquoia: The development of a native world*. Syracuse: Syracuse University Press.
Jones, E.E., and J.L. Creese, eds. 2017. *Process and meaning in spatial archaeology: Investigations into pre-Columbian Iroquoian space and place*. Boulder: University of Colorado Press.
Loewen, B., and C. Chapdelaine, eds. 2016. *Contact in the 16th century: Networks among fishers, foragers, and farmers*. Ottawa/Gatineau: University of Ottawa Press and Canadian Museum of History.
Thwaites, R.G. (1896–1901) *The Jesuit relations and allied documents. 73 volumes*. Cleveland: The Burrows Brothers Company.
Timmins, P.G. 1997. *The Calvert site: An interpretive framework for the early Iroquoian village*. Gatineau: Canadian Museum of Civilization.
Tremblay, R. 2006. *The St. Lawrence Iroquoians: Corn people*. Montreal: Montreal Museum of Archaeology and History.
Trigger, B.G. 1976. *The children of Aataensic: A history of the Huron people to 1660, 2 volumes*. Montreal: McGill-Queen's University Press.

Isaacson, Ken

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Basic Biographical Information

Ken Issacson, Waanyi man, is Indigenous Australian archaeologist from the gulf region, north of Mt. Isa, Queensland, Australia.

Major Accomplishments

Ken Isaacson is an Indigenous Australian archaeologist with over 25 years of experience in the field. He traces his Aboriginal ancestry though his Waanyi mother and grandmother from the gulf region of Queensland, north of Mount Isa (Isaacson 2010). Throughout his career, Ken has reached both national and international standing within Indigenous studies and has remarkably done so without institutional support from a university or government body.

Ken was educated in Mount Isa, leaving school at age 14 to join the post office, first becoming a telegram officer and then a postman. He then worked a variety of jobs until finding himself in Tambo, Queensland, at the age of 18 where he visited his first Aboriginal art site (Blacks Palace). Ken found the heritage site which also contained Aboriginal burials in a bad state of repair, and it was this experience that set him on the path of becoming an archaeologist. Having left school early, Ken realized that taking the path of a traditional university student was not for him, but he was not deterred. With the encouragement of his mother and grandmother, he set out recording and photographing archaeological sites, working both at home in Queensland's gulf country and Australia wide. Ken is passionate about documenting and preserving cultural heritage so that it can be passed on to future generations and has devoted his life to this cause.

Ken initially learned about heritage sites from station workers (both Aboriginal and non-Aboriginal) who gained an intimate knowledge of the land while mustering cattle. In other instances he learned about archaeological sites and stories from Indigenous elders. Ken's cultural knowledge eventually came to the attention of archaeology departments in Australian universities, which led to him taking students to visit the sites he was managing (now over 1,500 rock art and burial sites). Through Ken's exchanges with the universities, he learned new techniques to use in his work while simultaneously teaching students about Aboriginal culture and heritage.

As his networks within the university system expanded, Ken has become involved in archaeological seminars presenting his papers "bushman

style." He has been a member of the World Archaeological Congress for 15 years, as well as having been involved with a number of other international conferences. Ken's work includes the presentation of a paper at the Fulbright-sponsored symposium "Indigenous Cultures in an Interconnected World" in Darwin, a trip to Borneo organized by the World Wildlife Fund to visit the Dyak people, as well as trips to visit rock art sites in South Africa and the United States.

Ken has drawn on his heritage (having an Indigenous mother and father of English and German heritage) to explore the relationship between archaeology and Indigenous peoples. This has led to a particular focus on ways for Indigenous people to become more involved in their own sites, while working together with non-Indigenous archaeologists (Isaacson 2010). In *Looking Forward—Looking Back: Shaping a Shared Future*, Ken argues that archaeological theory and practice should be grounded in the recognition of the rights of contemporary Indigenous peoples over their heritage. He challenges archaeologists to work with Indigenous youth and giving them "pride in their past, self-esteem in their present and some hope for the future" (Isaacson and Ford 2005: 242).

Ken's experiences have led him to a unique position from which to articulate the need for archaeologists and Indigenous peoples to work together. He argues that archaeologists making long-term commitments to Indigenous groups can foster trust and respect and create more than just a working relationship, but a personal relationship (Isaacson and Ford 2005: 340). Ken has identified that many Aboriginal communities have immediate needs beyond those of archaeological sites which could be addressed in joint projects with archaeologists. For example, he argues that archaeologists can assist Indigenous communities in lobbying government and mining companies for support in heritage matters and to assist communities in enterprises such as developing cultural tourism ventures. Ken notes that although archaeology cannot provide all the answers or solve all the problems, in long-term relationships with Indigenous groups, the archaeological profession can be shaped into one in which profound benefits are available to Indigenous people, helping Indigenous people and cultures survive.

Ken's published works include chapters in *Indigenous Archaeologies: Decolonising Theory and Practice* and *Being and Becoming Indigenous Archaeologists*. Ken has also been involved in cross-cultural awareness programs that simultaneously teach new mine employees about Indigenous culture while cultivating respect for it. Ken is currently on the board of Southern Gulf Catchments as Director for the Greater Mount Isa Indigenous sector where he works to identify Indigenous projects in need of funding, while continuing his work mentoring archaeology students.

Cross-References

- ▶ Indigenous Archaeologies
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Peoples, Working with and for

References

Isaacson, K. 2010. Archaeological reflections of a 68-year-old bushman. In *Becoming Indigenous archaeologists*, ed. G.P. Nicholas. Walnut Creek: Left Coast Press.

Isaacson, K., and S. Ford. 2005. Looking forward – Looking back: Shaping a shared future. In *Indigenous archaeologies: Decolonising theory and practice*, ed. C. Smith and M. Wobst. New York: Routledge.

Islamic and Crusader Archaeologies

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Introduction and Definition

The disciplines of Islamic and Crusader archaeology, despite sharing some common chronological

and geographic frameworks within what can generally be termed the *medieval archaeology of the Levant*, have largely taken separate paths since the advent of archaeology in the nineteenth century. "Islamic Archaeology" is a generalizing term that refers to the study of the material culture produced by and/or for Muslims (specifically on the *archaeology of Islam*, see Insoll 1999: 1–9), as well as of non-Muslims living under Islamic rule (perhaps better denominated the *archaeology of Islamic lands*, encompassing a large geographical body spreading from Spain and North Africa as far as the Far East). "Crusader Archaeology," however, is a term of a narrower scope, both in time and space. It is identified with the study of the cultural remains produced during the Crusades by the Crusaders, as well as with the associated Frankish settlement. This division of research has proven inefficient at times, especially as archaeological periodization might refer to historical periods in which both Islamic and Frankish rules overlapped. For example, how precise can the archaeologist be in defining whether an excavated context in Jerusalem dates to the Crusader or Ayyūbid periods, unless provided with precise finds such as inscriptions, coins, or imports, given that Jerusalem was in Crusader hands from 1099 to 1187 and then again from 1229 until 1244?

Historical Background

The division between the two disciplines is historical and has its roots in a colonialist and Eurocentric society. Crusader archaeology had already become a focus of interest to Westerners in the early nineteenth century, partly following the nationalist appropriation of the Crusades by countries such as France, Germany, and England (Ellenblum 2007: 18–31). In addition, concern towards the Christian community and its monuments in the Levant following the massacres in Lebanon and Syria in 1860 gave further impetus to this interest in Crusader heritage (Kennedy 1994: 2).

The first reason, nevertheless, seems to have been pivotal. One of the first architectural treatises to deal with the ancient Levant was Melchior de Vogüé's (1848–1910) *Les Églises de la Terre Sainte*, pinpointing the interests of French academics and the public at that time. But to demonstrate how difficult it is to disconnect Crusader and Islamic archaeology, de Vogüé's description of the Temple Mount in this very volume (Chap. 6, "Le Temple," de Vogüé 1860: 266-291; quote below is on p. 266) is the earliest modern account of the important Muslim buildings on the Ḥaram al-Sharīf of Jerusalem – al-Aqṣā and the Dome of the Rock – even if he justified their inclusion in his book on the mistaken premise that al-Aqṣā was a Justinianic church taken over by the Muslims and on the fact that the various buildings also served the Crusaders (Fig. 1):

> On ne s'étonnera pas de trouver dans un travail consacré aux édifices chrétiens de la Terre Sainte, la description de deux mosquées célèbres, Lieux-Saints de l'islamisme. L'un de ces monuments fut primitivement construit en l'honneur de la sainte Vierge [i.e. al-Aqṣā, which according to de Vogüé was erected by Justinian]; c'est une des plus anciennes et des plus belles églises de Jérusalem, usurpée par les disciples du Koran. L'autre, quoique d'origine musulmane [the Dome of the Rock], fut, pendant un siècle, consacré au culte catholique [*Templum Domini*]; il s'élève sur l'emplacement du "saint des saints"; son nom, porté avec éclat par un ordre fameux de chevalerie [Templars], est resté célèbre dans les annales du moyen âge chrétien. . .

It is also worth acknowledging that even in the more encompassing and balanced work of Charles Clermont-Ganneau (1846–1923), *Archaeological Researches in Palestine during the Years 1873–1874*, the first chapter of the first volume deals with an important subject in the field of Crusader Archaeology, being entitled "Introductory Remarks on the Distinctive and Specific Character of Crusading Masonry" (Clermont-Ganneau 1899: 1–47).

Another example of the nationalistic background for the first archaeological enterprises in the Levant is the German excavations at Tyre conducted by J.N. Sepp, B. Sepp, and H. Prutz in 1874. They were financed by Otto von Bismarck, the Imperial German chancellor at that time, and were motivated by the unfulfilled desire to find Barbarossa's tomb within what was

Islamic and Crusader Archaeologies, Fig. 1 The Temple Mount in Jerusalem during the mid-nineteenth century. (M. de Vogüe 1860: plate between 266 and 267, after photograph by A. Salzmann)

mistakenly believed to be the remains of Tyre's cathedral (Ellenblum 2007: 35–36).

But it was perhaps the magnitude of the Crusader castles encountered in Syria, Lebanon, Palestine, and Jordan that moved Western researchers most, as they best represented Western culture and power in the east. So while de Vogüé was busy studying Crusader churches, his friend and compatriot Emmanuel Guillaume Rey (1837–1916) dedicated his efforts to record to the best of his capacities the castles of the Latin Kingdom. His *Étude sur les monuments de l'architecture militaire des Croisés en Syrie et dans l'ile de Chypre* (1871) is the first scientific work on this topic from which later studies were launched (Fig. 2).

During the French Mandate in Syria and Lebanon (1921–1946), Crusader archaeology continued to flourish, "especially as the presence of Franks in the area in the twelfth and thirteenth century could give a sort of legitimacy to their presence in the twentieth" (Kennedy 1994: 5). Camille Enlart's (1862–1927) *Les Monuments des Croisés dans le royaume de Jerusalem: architecture religieuse et civile* (1925) resulted from an official commission, as did Paul Deschamps's *Les Châteaux des Croisés en Terre Sainte* (1934–1973).

For many decades thereafter, Crusader archaeology remained largely focused on castles and churches (the latter field in clear independence from Byzantine archaeology), as they best expressed the deeds of the great heroes of Europe. A more general approach to the Crusader remains in the Levant, including the study of rural and domestic life, developed much later, mainly in the 1970s and 1980s, under Israeli historians J. Prawer (1917–1990) and B.Z. Kedar (b. 1938). Archaeology only started reflecting this holistic approach from the 1980s onwards, best represented by fieldwork undertaken by D. Pringle of Cardiff University, R. Ellenblum of the Hebrew University of Jerusalem, and A. Boas of the Hebrew University and later the University of Haifa.

Islamic archaeology developed in an altogether different manner. It was not overtly driven by nationalistic or by religious sentiments (though S. Vernoit (1997) stresses how the excavations at Qalʿat Banū Ḥammad in Algeria and those in Madīnat al-Zahrāʾ in Spain served the colonialist motivations of France and Spain, respectively), but rather by the rising discipline of Oriental Studies in Europe and to a certain extent by Westerners' attraction to the "exotic" as nurtured by nineteenth-century Orientalism. Yet as argued by

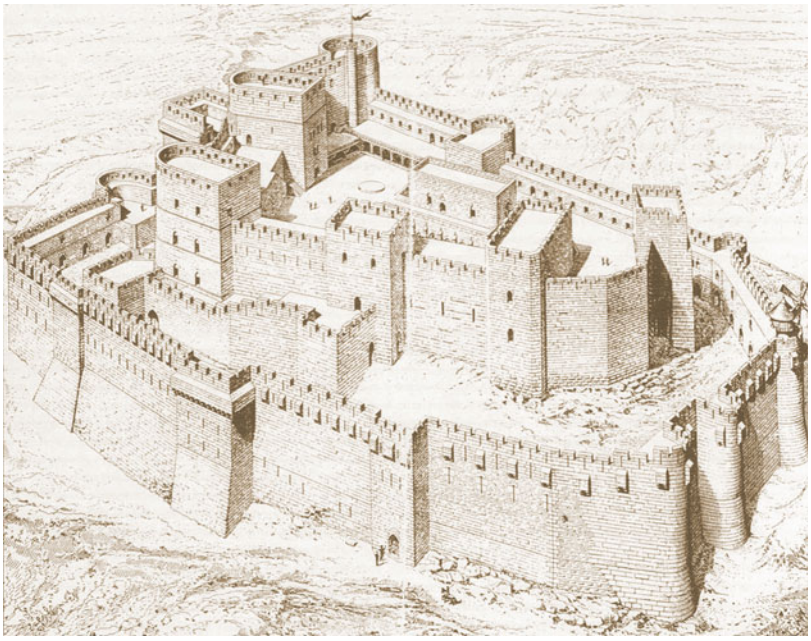

Islamic and Crusader Archaeologies, Fig. 2 Reconstruction of Krak des Chevaliers (After Rey 1871: Pl. VII)

M. Rosen-Ayalon (2006: 11), the development of the field was delayed even after the end of the colonial period:

> The various Muslim countries maintained a similar archaeological policy for several decades. There was a race to discover ancient civilizations: the Egypt of the Pharaohs, Hittite Turkey, Achaemenid Persia, as well as [Iraq's] Sumer, Akkad, Babylonia, and [Lebanon's] Phoenicia.

One of the most valuable contributions to the field of Islamic archaeology of the late nineteenth to early twentieth century was Max van Berchem's (1863–1921) *Corpus inscriptionum arabicarum*, the volumes of which contain inscriptions surveyed by the author during his trips to Egypt, Palestine, and Syria between 1887 and 1914. Beyond its contribution to the field of Arabic epigraphy, this corpus is a major pillar of Islamic archaeology, due to van Berchem's discussions of archaeological/architectural findings relating to various monuments and sites as well as associated historical sources.

Yet the event which for many years and to a great degree shaped the perception of Islamic archaeology was the publication of *Ḳuṣejr ʿAmra* by Alois Musil (1868–1944) in 1902 (Fig. 3). Its impact in Europe was of a totally different nature to that made by publications of Crusader castles. This well-preserved small Umayyad bathhouse, with figurative frescoes – some of them including seminude women and men – covering most of its standing surfaces, confused those who still believed in the "unlawfulness" of painting in Islamic art (see K.A.C. Creswell's "The Lawfulness of Painting in Islamic Art," 1946). *Quṣayr ʿAmra*'s frescoes ignited the romanticism regarding the first Islamic dynasty, in which the Umayyad aristocracy was seen as a class of irredeemable Bedouins, always drawn to the desert life – the *bādia* – and its pleasures. This discourse was best represented by the biblical scholar and orientalist J. Welhausen (1844–1918), in his *Das arabische Reich und sein Sturz* (1902), later translated into English (1927).

Not long after the publication of Musil's *Ḳuṣejr ʿAmra*, the first fieldwork at an Islamic city was carried out at Sāmarrāʾ on the Tigris.

Islamic and Crusader Archaeologies, Fig. 3 Quṣayr ʿAmra. (A. Musil, c. 1901. Library of Congress Prints and Photographs Division Washington, DC, call number LOT 11356-34)

Islamic and Crusader Archaeologies, Fig. 4 Excavation of Samarra (Iraq): view of the Great Mosque of al-Mutawakkil, 1911–1913. Panorama of 3 photographic prints, 8.7 × 29.2 cm (The Ernst Herzfeld papers, Freer Gallery of Art and Arthur M. Sackler Gallery Archives, Smithsonian Institution, Washington, DC: A.6 04.20.123)

This site was first visited by E. Hertzfeld in 1903, who published a series of studies on Sāmarrāʾ from 1907 to 1948 (Fig. 4). Capital of the ʿAbbāsids between 836 and 892, at over 58 km^2, this is the largest Islamic site known to date. It holds important examples of religious and secular early Islamic architecture, many of them embellished by stucco work fashioned in three main styles, a varied repertoire of unglazed and glazed pottery and other wares. Most of all, it is famous for the 53 m high spiral minaret of al-Mutawakkil's Mosque (849–851). The rich finds from Sāmarrāʾ further contributed to – and expanded – the romantic view of Islamic archaeology, which unlike the Crusader archaeology of churches and castles developed so as to emphasize the concepts of wealth and exotica. The excavations of the Umayyad palace at Madīnat al-Zahrāʾ next to Cordoba in Spain, which commenced in 1911 directed by the architect Ricardo Velázquez Bosco (*Medina Azzahra y Alamiriya*, 1912), only added to this romantic view.

Despite the above, one cannot claim that Islamic archaeology developed around an "archaeology of palaces," in the same way that Crusader archaeology developed both as an "archaeology of castles" and an "archaeology of

churches." In fact, the next exposure of an Umayyad palace – that at Khirbat al-Minya on the northwestern shore of the Sea of Galilee – was an archaeological misinterpretation by the German archaeologist A.E. Mader, who in 1932 started excavations at the site in the belief that it was a Roman fortress. Only in 1937, after a small mosque and a large hall had been exposed in the building's southern wing, was the site finally understood as having been originally built as an Umayyad castle (*qaṣr*, *pl. quṣūr*). At that time, the Umayyad palace at Khirbat al-Mafjar, north of Jericho, was already being uncovered (1934–1948). This monumental complex of palace-bath-mosque was rich in finds, including a small piece of marble containing an inscription referring to Hishām b. ʿAbd al-Malik (r. 724–743). This artifact provided archaeologist D.C. Baramki and later R. Hamilton with a clear chronological framework for the erection and use of the palace (today it is accepted that Hishām's nephew, al-Walīd II, was the actual patron of the palace while still heir to the throne). As in the case of Quṣayr ʿAmra and Sāmarrāʾ, Khirbat al-Mafjar's unique planning and rich decoration, including many figural sculptures and the famous lion-gazelle mosaic, gave rise to further romanticization of early Islamic life in the Levant (as indicated by the title of Hamilton's 1959 publication, Khirbat al-Mafjar: an Arabian Mansion in the Jordan Valley), supported by contemporary works on the Umayyads such as H. Lammens' *Études sur le siècle des Omeyyades* (1930).

The posthumous publication of J. Sauvaget's (1901–1950) *Châteaux Omeyyades de Syrie* in 1968, in which the author highlighted the economic background for the erection of the palaces and dismissed the previous romantic approach of scholars of the late nineteenth and first three decades of the twentieth century, was a landmark in Islamic Archaeology. It not only changed the paradigm by which Umayyad palaces had so far been investigated but also established new standards by which historical sites should be interpreted. The excavation at Qaṣr al-Ḥayr al-Sharqī east of Palmyra in Syria between 1964 and 1971 is a good example of a project which adopted Sauvaget's "agricultural model," even if not in its entirety (Grabar et al. 1978: 162–163).

Another important contribution by Sauvaget to Islamic Archaeology is his publication on Aleppo's urban development (1941). Following his archaeological survey of the city in 1935, under the auspices of the local Service des Antiquités, Sauvaget not only created a remarkable record of a medieval city (Fig. 5) but also laid the foundations for the much-discussed topic of the "Islamic City." To this field he also contributed his studies on Latakiya (1934) and Damascus (1949) in Syria.

Key Issues

The study of early Islamic settlements and urban development has been central for Islamic archaeologists. In addition to Sauvaget's and Herzfeld's contributions, others have created a field abounding with views and reviews on the subject: research on North African cities both by W. Marçais (in his famous "L'Islamisme et la vie urbaine" of 1928) and by G. Marçais ("La conception des villes dans l'Islam" from 1945), on Fusṭāṭ in Egypt by G. Scanlon ("Housing and Sanitation. Some aspects of medieval Islamic public service," 1970) and W.B. Kubiak (Fustat, Its Foundation and Early Urban Development, 1988), on Ayla in Jordan by D. Whitcomb ("The misr of Ayla: Settlement at ʿAqaba in the early Islamic period," 1994), on Sāmarrāʾ by A. Northedge (*The Historical Topography of Samarra*, 2005), as well as many other case studies of urban archaeological sites (see Whitcomb 2010 for a representative listing of urban sites). A. Hourani and S. Stern's *The Islamic City* (1970), H. Kennedy's "From Polis to Madina – Urban Change in Late Antique and Early Islamic Syria" (1985), J. Abu-Lughod's "Historic Myth, Islamic Essence, and Contemporary Relevance" (1987), P. Wheatley's *The Places Where Men Pray Together* (2001), and more recently S.K. Jayyusi et al.'s *The City in the Islamic World* (2008) as well as important summaries such as those by Walmsley (2007: 71–112) and Milwright (2010:

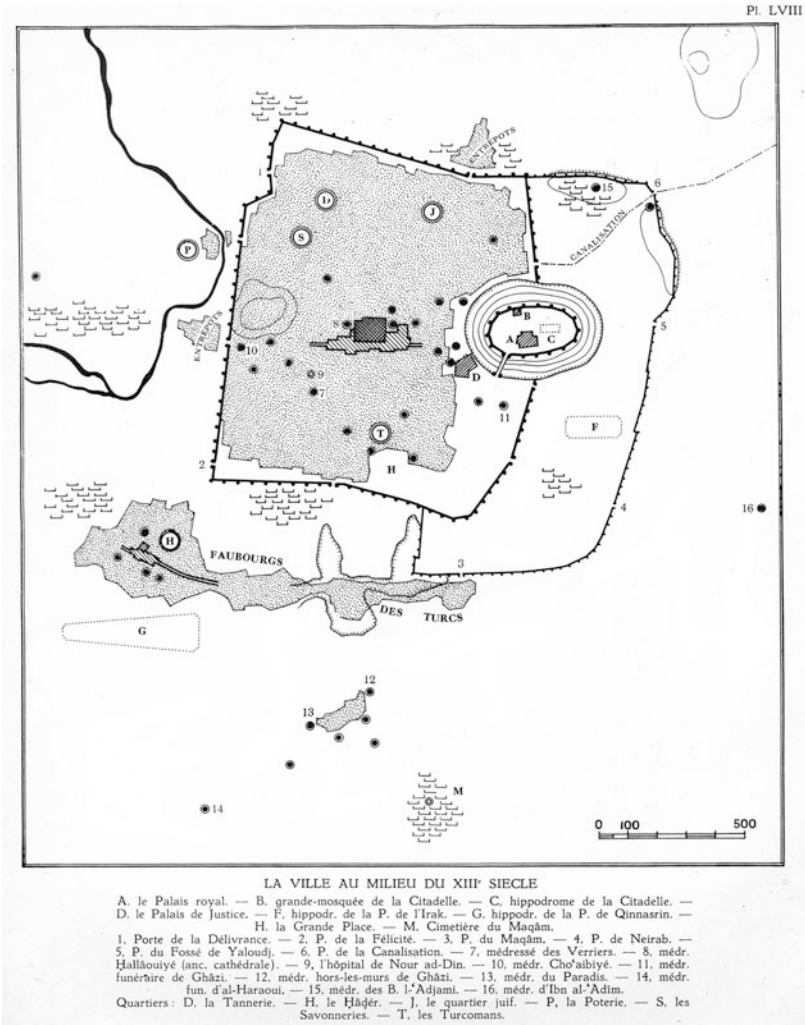

Islamic and Crusader Archaeologies,
Fig. 5 Reconstruction plan of the city of Aleppo during the thirteenth century (After Sauvaget 1941: Pl. 58)

75–96) are essential readings for those interested in this topic.

Research on Crusader cities, on the other hand, is of a different kind. As A. Boas writes in his *Crusader Archaeology* (Boas 1999: 12):

> There was no need for the Franks to establish new cities in the East. They occupied existing cities, expanding them … Within the cities they built new public and private buildings and converted others to suit their own needs.

One of Jerusalem's earliest excavations, undertaken by C. Wilson in the Muristan (south of the Church of the Holy Sepulchre) in 1867, exposed evidence for Crusader-era urban changes in Jerusalem, in this case the Hospitallers' quarter, while searching for remains of the Herodian Second Wall (Wilson & Warren 1871: 270–273). Since then much has been learned about Crusader Jerusalem (Boas 1999: 13–24) but even more about Akko in northern Israel, which was first studied by Rey in 1879 (*Étude sur la topographie de la ville d'Acre au XIIIe siècle*) and which has been intensively excavated since 1990, with Crusader levels being found under the remains of the Ottoman city (Boas 1999: 32–41).

Within the framework of the urban archaeology of both Islamic and Crusader periods, the study of churches and mosques, or of religious institutions in general, has been cardinal. As mentioned above, "church archaeology" has played a

central role in Crusader archaeology since its outset (e.g., the early excavations at Tyre), and those interested in the period can only benefit from D. Pringle's *The Churches of the Crusader Kingdom of Jerusalem* (4 vols. 1993–2009). Unfortunately there is nothing to parallel Pringle's work in "mosque archaeology," perhaps due to the much wider chronological and regional scope of the latter. Yet mosques have always been of central interest to archaeologists and historians of Islamic art, being discussed in all monographs on Islamic art and architecture including Creswell's *Early Muslim Architecture* (1932–1940), Ettinghausen and Grabar's *The Art and Architecture of Islam 650–1250* (1987; updated in 2001 with Jenkins-Madina), and R. Hillenbrand's *Islamic Architecture: Form, Function and Meaning* (1995). A few syntheses have developed this theme, most notably the monographs by D. Kuban (series on *Muslim Religious Architecture*, 1974, 1985), T. Insoll's chapter in his *The Archaeology of Islam* (Insoll 1999: 26–59), and J. Johns' article "The 'House of the Prophet' and the Concept of the Mosque" (1999). Important discussions on the development of the mosque have appeared since the 1980s, such as D. Whitehouse's report on Siraf's Congregational Mosque (*The Congregational Mosque and Other Mosques from the Ninth to the Twelfth Centuries*, 1980), D. Sack's monograph on the great mosque of Rusafa (1996), M. Rosen-Ayalon and R. Grafman's article on the proposed plan of Umayyad al-Aqṣā's ("The Two Great Syrian Umayyad Mosques: Jerusalem and Damascus," 1999), A. Walmsley and K. Damgaard's archaeological report and discussion on the mosque of Jarash (2009), and the current author's work on the congregational mosque of Tiberias (2009).

But while focusing on the main trends and differences in approach between Islamic and Crusader archaeology, one has also to be aware of the many converging points between the two, sometimes making it almost impossible to separate the disciplines. In light of Boas' words quoted above ("They occupied existing cities. . ."), it is futile to study a Crusader city without understanding its pre-Crusader phases, while to study Ayyūbid and Mamlūk architectural and urban programs without examining the monuments and archaeological vestiges left by the Franks is also ineffectual. The Crusader interventions at the Temple Mount in Jerusalem and more specifically at al-Aqṣā mosque which served as palace and later as headquarters for the Templars, for example, can only be analyzed (and even then not with ease) in light of the background of architectural development during the early Islamic period. The same can be said for the changes and additions that followed the Battle of Ḥiṭṭīn in 1187 and the reinstatement of the building as a mosque (Hawari 2007: 192–193). This is also true regarding the erection of churches and their post-Crusader use (see St. Anne's church in the northeastern section of the city, e.g., which was transformed into a madrasa by Ṣalāḥ al-Dīn; Pringle 2007: 142–155, Hawari 2007: 187–188), the erection of public establishments such as markets and their expansion during the Mamlūk period (e.g., the Cotton Merchants' Market), and the improvement of city defenses (the Mamlūk-Ottoman citadel of Jerusalem is basically an improvement of the Crusader fortifications; Boas 1999: 17–19, based on archaeological reports by C.N. Johns).

Yet the task of a trained archaeologist or historian of art is not always easy. The Romanesque style which developed during the twelfth century, as well as certain building techniques, survived into the Ayyūbid (1187–1260) and early Mamlūk periods (1260–1310s). Unless a building consists of a dated structure, with a clear religious identity and minor later changes (e.g., St. Anne's church), identifications might be contested for generations, as in the case of al-Aqṣā's gate which uses Crusader elements. Some will argue that the slender columns, the typical capitals, and the elaborate molded archivolt with chevron, cavetto, and cyma-recta moldings are in situ and thus evidence for a Crusader monumental gate. Others will argue that this is a typical case of spoliation. Yet the presence of two Ayyūbid inscriptions, one over the archivolt attesting to the erection of the portico's façade by al-Muʿaẓẓam ʿĪsā in 1217–1218 and the other on the central bay's dome attributing construction to the same ruler (d. 1227), leaves little doubt as to the date at

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which the earlier – Crusader – arrangement was replaced (Hawari 2007: 161–163).

Another converging point of the two disciplines is found in rural archaeology, where it is often difficult to discern the nature of a twelfth- to thirteenth-century settlement – Muslim, Christian, Frankish, or mixed – unless characterizing material finds allow such an identification. Typical ceramics of the period – such as slipped and glazed wares produced in Beirut or unglazed geometric painted handmade vessels – can be found all over the region (Avissar & Stern 2005: 88–90, 113–116). Other subjects, such as "Sugar Archaeology," are common to the Crusader, Ayyūbid, and Mamlūk periods and should thus be studied as a single unit. Sugar production, known in the Levant since the early Islamic period, was "industrialized" by the Franks during the twelfth century and persisted in the region up to the fourteenth century. The evidence at Khirbat Manot in northwest Israel, Ṭawāḥīn al-Sukkar in southern Jordan, and Kouklia in Cyprus is best preserved (Boas 1999: 81; Milwright 2010: 70-73), while excavations at Khirbat al-Minya on the northwestern shore of the Sea of Galilee have shown that the Franks took possession of the abandoned Umayyad palace (see above) and transformed it into an industrial plant, which seems to have persisted in use up to the Mamlūk period.

Future Directions

In conclusion, despite the different motifs and definitions which guided the first 100 years of Islamic and Crusader archaeology, in too many ways they join paths. The multiphased sites – urban or rural; military, religious, or secular – demand from archaeologists a broad knowledge of the material culture of the Middle Ages. Today the "archaeology of castles and churches" is much more encompassing, with interest in the communities which they served and the culture they nurtured. The same applies to the "archaeology of palaces and mosques," which has evolved to search for patterns of settlement, of land use, and of the Islamization of pre-Islamic lands.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic Archaeology
- ▶ Islamic Archaeology and Art History
- ▶ Islamic Industry, Archaeology of
- ▶ Medieval Archaeology
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ Orientalism: Islamic Archaeology and its Colonial Context
- ▶ Postcolonial Archaeologies
- ▶ Sugarcane: Origins and Development

References

Avissar, M., and E.J. Stern. 2005. *Pottery of the crusader of the crusader, Ayyubid and Mamluk periods in Israel*. Israel Antiquities Authority Reports 26. Jerusalem: Israel Antiquities Authority.

Boas, A.J. 1999. *Crusader archaeology: The material culture of the Latin East*. London/New York: Routledge.

Clermont-Ganneau, C. 1896(vol. 2)–1899 (vol. 1). *Archaeological researches in Palestine during the years 1873–1874*. London: Palestine Exploration Fund.

Creswell, K.A.C. 1932–1940. *Early Islamic architecture*. 2 vols. Oxford: Clarendon Press.

de Vogüé, M. 1860. *Les Églises de la Terre Sainte*. Paris: Librairie de Victor Didron.

Ellenblum, R. 2007. *Crusader castles and modern histories*. Cambridge: Cambridge University Press.

Grabar, O., R. Holod, J. Knustad, and W. Trousdale. 1978. *City in the desert: Qasr al-Hayr East*. Harvard Middle Eastern Monograph series 23-24. Cambridge: Harvard University Press.

Hawari, M.K. 2007. *Ayyubid Jerusalem (1187–1250): An architectural and archaeological study*. BAR International series 1628. Oxford: Archaeopress.

Insoll, T. 1999. *The archaeology of Islam*. Oxford: Blackwell Publishers.

Kennedy, H. 1994. *Crusader castles*. Cambridge: Cambridge University Press.

Milwright, M. 2010. *An introduction to Islamic archaeology*. Edinburgh: Edinburgh University Press.

Pringle, D. 1993/1998/2007/2009. *The churches of the crusader kingdom of Jerusalem: A corpus*, 4 vols. Cambridge: Cambridge University Press.
Rey, E.G. 1871. *Études sur les monuments de l'architecture militaire des Croisés en Syrie et dans l'ile de Chypre*. Paris: Imprimerie nationale.
Rosen-Ayalon, M. 2006. *Islamic art and archaeology of Palestine*. Walnut Creek: Left Coast Inc.
Sauvaget, J. 1941. *Alep: essai sur le développement d'une grande ville syrienne, des origines au milieu du XIX^e^siècle*, 2 vols. Paris: Librarie Orientaliste Paul Geuthner.
Vernoit, S. 1997. The rise of Islamic archaeology. *Muqarnas* 14: 1–10.
Walmsley, A. 2007. *Early Islamic Syria: an archaeological assessment*. London: Duckworth.
Whitcomb, D. 2010. Archaeology. In *Encyclopaedia of Islam three*, ed. G. Krämer, D. Matringe, J. Nawas, and E. Rowson. Brill Online. Available at http://referenceworks.brillonline.com/entries/encyclopaedia-of-islam-3/archaeology-COM_23305. Accessed 23 March 2013.
Wilson, C.W., and C. Warren. 1871. *The recovery of Jerusalem: A narrative of exploration and discovery in the city and the Holy Land*. London: Richard Bentley.

Islamic and Maritime Archaeologies

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Introduction

Islamic archaeology and maritime archaeology are two relatively recent subdisciplines to have emerged within archaeology, reflecting technological innovation and new theoretical trends and avenues of inquiry. The advent of SCUBA technology has, since the 1950s, facilitated investigation of submerged sites, leading to innovative techniques in underwater survey and excavation. Meanwhile, a growing interest in "non-European" archaeologies has contributed to an increasing appreciation of past Islamic societies as a legitimate object of investigation.

Definition

As with many adjectives applied to the word archaeology, "maritime" and "Islamic" are fluid shorthands that are ultimately inadequate to the task of defining rich and complex areas of investigation. Conceptually, maritime archaeology has broadened from a relatively narrow focus on shipwrecks (Muckelroy 1978: 3–10) to cover not only archaeology done underwater but also the archaeology of all maritime-related material culture. Equally, the term "Islamic" can be taken to mean the material remains of Islam as a religion (Insoll 1999: 1–15) or defined by cultural-historical criteria, thus incorporating societies over which a political élite professing Islam held sway (Milwright 2010: 1–11), or indeed minority Muslim communities living among non-Muslims.

Key Issues

Shipwrecks

Maritime archaeology's early encounter with Islamic remains was in the form of shipwrecks. In 1973, the Turkish sponge diver Mehmet Aşkin showed a wreck at Serçe Limanı on the Turkish Aegean coast to George Bass of the Institute of Nautical Archaeology (INA). Bass led excavations at the site from 1977 to 1979, revealing an early eleventh-century CE merchantman operating between Byzantium and the Fatimid Caliphate (Bass 2004). The vessel was the earliest known example of frame-first construction and had been rigged with two lateen sails. The cargo included around 3 t of glass cullet, acting as ballast, perhaps bound for the glassworks of Constantinople. Over 80 intact glass vessels were also excavated. Ceramics included 110 Byzantine amphorae, water jugs that are probably from Egypt, glazed wares, and Levantine cooking pots, alongside Fatimid coins and coin weights. The wreck exemplifies well the problems of definition: Although much of the cargo was from the Islamic realm, faunal remains show the crew ate pork, suggesting they were Christian. The wreck is thus suggestive of Christian-Muslim exchange in a period of Fatimid-Byzantine détente.

Islamic and Maritime Archaeologies, Fig. 1 Divers from the Institute of Nautical Archaeology excavate an Ottoman wreck at Yassıada, Turkey. (Image: Cemal Pulak, Institute of Nautical Archaeology)

Also in Turkey, Bass and his team discovered a sixteenth-century CE Ottoman vessel at Yassıada, partly overlying a fourth-century CE Roman wreck on which they were working (Fig. 1). Excavations in 1982–1983 revealed a largely empty hull containing a small amount of Ottoman sgraffito-glazed bowls elsewhere associated with military contexts, as well as cannonballs (Fig. 2). The vessel, originally around 20 m long, was interpreted as a naval supply craft. The lack of cargo, even ballast, gave rise to the theory that the vessel had become stuck on the adjacent reef before sinking, allowing the cargo to be salvaged (Pulak 2005).

Islamic and Maritime Archaeologies, Fig. 2 Glazed bowls from the Yassıada Ottoman wreck, Turkey. (Image: Cemal Pulak, Institute of Nautical Archaeology)

It was not until the 1990s that further ostensibly Islamic wrecks were investigated. Starting in 1994, archaeologists embarked on an underwater survey of the Tantura lagoon, in modern Israel, led by Shelley Waschsmann of INA and Yaakov Kahanov of the University of Haifa. Tantura was a rare sheltered lagoon of the ancient Palestinian coast, and work there has revealed seven vessels dating from the fifth to the ninth centuries CE. The earliest of the Islamic-era wrecks, Tantura F, dates from the early eighth century. This 15-m-long flat-bottomed cargo vessel was made frame-first with Anatolian timber. Finds included pottery, metal anchors, and organic materials (Barkai and Kahanov 2007). Another wreck, Tantura B, dates from the early ninth century CE. This flat-bottomed hull was again built frame-first and has been interpreted as a coaster, war galley, or even Nile rivercraft (Khalilieh 2005).

All three of these vessels share their frame-first construction method with a practice found throughout the Mediterranean during the early

medieval period. The tradition stands in contrast to the shell-first, and often sewn, traditions of the Islamic western Indian Ocean region, demonstrating that shipbuilding technologies do not necessarily reflect an Islamic/non-Islamic dichotomy.

Archaeological evidence for putatively Islamic vessels in the Indian Ocean is sparse. The only medieval wreck discovered in the region is of a ninth-century CE sewn "Arab" vessel, found by fishermen off the Indonesian island of Belitung (Flecker 2001). The wreck was salvaged under license from the Indonesian government by the German company Seabed Explorations, and a comprehensive archaeological record was not made. The cargo comprised Changsha pottery from the late Tang Dynasty (618–906 CE) and imperial-quality Chinese ceramics including Ding white-ware and Yue-ware from Zhejang. While none of this cargo is identifiably "Islamic," the sewn planking of the hull led to the vessel being identified variously as "Arab," "Persian," or perhaps "Indian" and so indicative of long-distance trade in prestige goods between the Islamic world and China.

The only Islamic-era shipwreck to have been archaeologically excavated in eastern waters with license from the state is the eighteenth-century CE Sadana Island wreck, an Ottoman vessel found off Egypt's Red Sea coast and excavated by INA under the direction of Cheryl Ward (Ward 2001) (Fig. 3). The 50-m-long hull contained an assemblage of Chinese Qing Dynasty ceramics designed for Islamic markets, as well as coffee, aromatic resin, spices, and tobacco-smoking paraphernalia belonging to the crew (Fig. 4). While historical accounts of Indian Ocean commerce in the period tend to focus on European trade with east Asia, the Sadana wreck is indicative of a more local trade, particularly in coffee, conducted within the Ottoman empire, albeit one with connections to China. Little data on the hull construction has been published, although the vessel is secured with iron fittings, and not sewn.

Islamic and Maritime Archaeologies, Fig. 3 Excavating the Ottoman-era Sadana Island shipwreck in the Egyptian Red Sea. (Image: Institute of Nautical Archaeology)

Islamic and Maritime Archaeologies, Fig. 4 Chinese Qing dynasty porcelain from the Sadana Island shipwreck in the Egyptian Red Sea. (Image: Institute of Nautical Archaeology)

Ships' Timbers

Apart from wrecks, timbers from Islamic-era ships have also been found reused in on-land contexts, giving further insights into past nautical technologies. Evidence of sewn ships' timbers has been discovered at al-Balīd in Oman, dating from the tenth to the fifteenth centuries CE, as well as at

Quseir in Egypt, from between the late twelfth and early fifteenth centuries CE (Blue 2006; Belfioretti and Vosmer 2010). Along with the evidence of the Belitung wreck, medieval historical descriptions such as that of the Andalusian pilgrim Ibn Jubayr, and ethnographic evidence from as late as the twentieth century CE, the sewing together of planks as part of a shell-first construction technique can be seen to constitute part of a distinct Indian Ocean shipbuilding practice lasting much of the Islamic era but also predating it: It is also mentioned in the first-century CE *Periplus Maris Erythraei*. Both the al-Balīd and Quseir timbers show the use of wooden dowels to edge-join the planks, with coconut coir rope then used to bind them. A similar technique is seen in twentieth-century vessels in the Yemeni Hadramaut and Oman as well as southern India.

Reconstructions

Archaeological and historical evidence has inspired two large-scale attempts to "reconstruct" sewn-planked medieval sailing craft, both in Oman. In 1980, a team led by Tim Severin completed the building of *Sohar*, a 24-m-long vessel that he and his crew sailed from Muscat in Oman to Canton in China (Severin 1982) (Fig. 5). More recently, from 2008 to 2010, Tom Vosmer directed the building of the *Jewel of Muscat*, a sewn reconstruction based on the Belitung wreck (Fig. 6). It sailed from Qantab in Oman to Singapore. These projects not only allowed an experimental appreciation of past technologies within the navigational landscapes in which they occurred but also provided a vehicle for Oman's self-representation as a maritime nation.

Islamic and Maritime Archaeologies, Fig. 5 Craftsmen in Sur, Oman, work in pairs to sew together the planks of Tim Severin's *Sohar* using coconut coir cordage. (Image: Severin Archive/Sindbad Voyage)

Ethnographic Research

While archaeological finds have so far yielded a relatively modest set of data on "Islamic" seafaring, ethnographic research into vessel types of the Islamic world has contributed a complementary strand of inquiry. The approach is used to understand contemporary boatbuilding practices in their own right and also to use this as a basis for the analogous interpretation of archaeological remains. It was not until the early nineteenth century CE that the Spanish spy Domingo Badia y Leblich, and later in the century the French Admiral Pâris, began to make detailed scale drawings of vessels from the region. Among English-language scholars, the term "dhow," once referring to a specific vessel type, was adopted to signify all larger "Islamic" craft of the region. Since the early twentieth century CE in particular, western scholars such as James Hornell (1942) have sought to establish a typology of regional "dhows." Color photographic books on regional craft appeared in the 1960s and 1970s, while scholarly works by Dionisius A. Agius (2008), Yacoub al-Hijji (1989), Erik Gilbert (2004), and Sheriff (2009), among others, have sought to

Islamic and Maritime Archaeologies, Fig. 6 The *Jewel of Muscat*, an Omani reconstruction of an ocean-going sailing vessel made from sewn timbers, based on the remains of the ninth-century Belitung wreck. (Photograph by Alessandro Ghidoni. © Ministry of Foreign Affairs Oman 2009)

Islamic and Maritime Archaeologies, Fig. 7 Close observation of a large fishing *hūrī* at Khor al-Ghureira, Yemen, during asurvey conducted in 2009 by the University of Exeter's MARES Project (John P. Cooper/MARES)

study social, economic, cultural, and linguistic dimensions of the vessels and their use, partly as a response to the rapid decline in the use of these vessels. More recent research has included the University of Southampton's Huri Project, led by Lucy Blue, recording the *hūrī* logboats of the western Indian Ocean; the University of Exeter's MARES Project, led by Agius, investigating the traditional craft of the southern Red Sea (Agius et al. 2010) (Fig. 7); as well as individual efforts by Norbert Weismann and Piotr Dziamski in the Gulf. All have sought to make a more detailed illustrated record of the remaining vessels of the region. Meanwhile Julian Whitewright (Forthcoming, 2012) has tracked the emergence of the lateen/settee rig in the Indian Ocean through iconography and text, demonstrating that this rig, today seen as quintessentially Arab, has a much older, pre-Islamic, provenance in the Mediterranean and is in fact a more recent introduction to eastern waters.

Port Archaeology

The emergence of Islam prompted an upsurge in international trade in the Indian Ocean region, and despite periodic conflicts with Christian powers, trade in Eastern luxury goods across the Mediterranean was, until the Portuguese discovery of the Cape route, also overseen by Islamic powers. The Indian Ocean became an Islamic *mare nostrum*, in which mariners harnessed the region's monsoon winds to pursue transoceanic trade. Within this

system, African ports supplied slaves and raw materials such as tortoiseshell and wood; Indian ports provided textiles, timber, and food; while Middle Eastern ports exported dates and manufactured goods such as ceramics, metalwork, and carpets.

Siraf, in modern Iran, was in the ninth century CE, the Persian Gulf's main entrepôt for luxury goods and ceramics made in China or the Abbasid heartlands. Excavations conducted between 1966 and 1973 by the British Institute of Persian Studies revealed that Siraf had existed already in the Sasanian period (Whitehouse 2009). By the early Islamic period, it served the inland trading center of Ardashīr Khurra. The elaborate carved teak architecture of its buildings speaks of the port's mercantile prosperity and overseas connections. Iraqi, Sirafi, and Chinese wares found on the Lamu archipelago in Kenya and Banhore in Pakistan may well have emanated from the port. A devastating earthquake in 976 or 978 CE, combined with a weakening of the local Buyid dynasty, led to decline: Visiting it in the early thirteenth century CE, the geographer Yaqut described it as a small and poor town.

In the Egyptian Red Sea, separate expeditions by the University of Chicago, led by Donald Whitcomb and Janet Johnson (1982), and the University of Southampton, led by David Peacock and Lucy Blue (2006), have shed light on the Ayyubid and Mamluk port of Quseir, which occupied the site of the long-defunct Roman port of Myos Hormos. Quseir was connected to the Nile by a pack-animal route through the Wadi Hammamat, this being the shortest connection between sea and river in Upper Egypt. The excellent Roman-era harbor was extensively silted by the medieval period, but a small embayment remained at the lagoon mouth. Quseir was involved in the trade in spices and textiles with India, in Chinese ceramics, and in more local networks within the Red Sea region (Fig. 8).

In 1985, soon after the Chicago excavations began at Quseir, archaeologists from the Middle East Cultural Centre in Japan led by Mutsuo Kawatoko began excavations at the site of the medieval and early modern port of al-Tur, on the Gulf-of-Suez coast of the Sinai peninsula. Al-Tur was an important harbor for both Christian and Muslim pilgrims, bound for Mount Sinai and Mecca, respectively. Its Islamic heyday was between 1379 CE, when the alternative *hajj* route via the southern port of 'Aydhab was abandoned, and the end of the fifteenth century, when the Portuguese discovered the cape route to the Indian Ocean. The medieval town has been extensively excavated: Finds reveal contact with China and Southeast Asia; Turkish and European ceramics, pilgrim flasks, and glassware; and Arabic documents from the fifteenth and sixteenth centuries.

Islamic and Maritime Archaeologies, Fig. 8 Indian resist-dyed fabric with elephant design from the medieval Islamic port of Quseir, Egypt. (Image: University of Southampton)

The medieval lake-island site of Tinnis in Lake Manzala, in Egypt's northeast Delta region, has been the subject of archaeological study by the Egyptian Antiquities Service since 1978 and by Alison Gascoigne of the Universities of Cambridge and Southampton since 2004. The site's island status has largely preserved it from modern urban encroachment. It comprises the remains of a largely brick, walled city, its maritime

infrastructure including the remains of at least one intramural canal harbor, and the water gate protecting it. Tinnis probably has a pre-Islamic foundation, but its heyday was Fatimid, where it was famed for its high-status textiles industry (Gascoigne Forthcoming). Its sheltered position within Lake Manzala and onward connection to the Damietta branch – avoiding the dangerous Damietta mouth – made it a navigationally attractive location. The city was eventually abandoned in the twelfth century following a series of Crusader attacks. Geophysical investigation of the site has identified the extent of the largest of the intramural harbors. Archaeological finds on the surface suggest onward connections with China, Persia, and the wider Mediterranean region.

Outside the Islamic heartlands, archaeological investigations by Mark Horton in 1980 at Shanga, an abandoned coastal trading settlement on the Lamu archipelago, Kenya, sought to address processes surrounding the appearance of Islam along the Swahili coasts (Horton 1996). The location of the archipelago placed it ideally at a terminus of transoceanic monsoon trade; local resources such as mangrove timber and water added to its attraction. The earliest evidence of settlement is from the eighth century CE, by the end of which a small number of inhabitants were Muslim and the first wooden mosque had been built. From pottery and glass evidence, they already had contact with the Gulf region. In the tenth century, a new style of building, using coral, was adopted and used in a new mosque. A further, larger, mosque was built from this material in the eleventh century CE, suggesting a majority Muslim population by this stage. By the late eleventh–early twelfth centuries CE, pottery included Indian and Chinese Longquan imports. By the late thirteenth century, trade connections appear to have realigned to South Arabia. The site appears to have been abandoned after a violent attack in the early fifteenth century CE.

Archaeological investigation into a more recent port settlement has been conducted by the University of Copenhagen at the site of al-Zubara in northwest Qatar. Al-Zubara was a large walled town of stone buildings which reached its zenith in the eighteenth–nineteenth centuries CE, when it was an important pearling center and processor of imported dates. Archaeological work to date has mapped the extensive remains of the urban area, which was abandoned in the twentieth century (Walmsley et al. 2010). Underwater survey work is being conducted offshore by the University of Birmingham.

In Oman, recent archaeology directed by Axelle Rougeulle of the Centre National des Recherches Scientifiques has focused on the site of Qalhat, a port city founded in the early twelfth century CE that became the second capital of the kingdom of Hormuz between the thirteenth and fifteenth centuries (Rougeulle 2010). Work so far has focused on the urban layout of the town and the identification of key structures. Excavations have revealed large proportions of Indian ceramic imports, Yemeni mustard ware, and, from the thirteenth to fourteenth centuries CE, Chinese imports.

Current Debates

Given its rich textual heritage, the Islamic world raises compelling issues regarding the relationship between archaeology, history, and art history. This is nowhere truer than within maritime studies. Few archaeologists still regard themselves as embarked on a purely "scientific" inquiry into past human existence. Nevertheless the discipline continues to shed an alternative light on past societies that is not constrained by the cognitive bounds and interests of the largely urban élites who authored the majority of written works surviving from the past. Arabic sources are, for example, surprisingly limited in their descriptions of past watercraft: The level of detail disclosed by even the few archaeological and ethnographic boat studies conducted so far is vastly greater than anything surviving in written sources.

At the same time, the nature of maritime studies is such that written accounts from the past – complemented by modern disciplines such as meteorology and oceanography – can provide valuable insights in areas where archaeological

methods are not so revealing. Historical accounts of maritime journeys, trade practices, and military campaigns can shed light, for example, on the seasonality of maritime life surrounding archaeological sites and landscapes, such as ports and maritime routes.

The relationship between maritime archaeology and art history is a complex one. Shipwrecks can, as with the example of the Belitung ship, be the very places where whole, pristine, and excellent examples of Islamic decorative art of the kind favored by art historians are preserved for centuries. But, as in the case of Belitung, it is also from such submerged locations that artifacts attracting aesthetic appreciation can be extracted and traded for profit. Nevertheless, submerged Islamic sites do offer the prospect of preserving a wider range of artifacts, given the often better preservation of organic materials in low-oxygen environments, than those attracting the attention of art historians. Thus, maritime archaeology has the potential to contribute its own perspective on long-distance contacts enjoyed by Muslim societies, on the ordinary lives of seafaring Muslims, and on the material culture of Muslims that art-historical inquiries do not.

Both maritime and Islamic archaeologists have in the past faced a struggle to win respect for their work as either methodologically rigorous or legitimate forms of archaeological inquiry and to shake off associations with emphatically non-archaeological practices such as treasure hunting. The non-archaeological recovery of items from underwater for profit has a long history worldwide. In some Islamic-world locations, colonial exploitation and postcolonial institutional weakness have increased the problems of non-archaeological extraction. Controversy over treasure hunting has already erupted: Seabed Explorations broke no Indonesian laws when it worked under license on the Belitung wreck. But the high-prestige ceramics it brought to the surface were subsequently sold to the Singapore government for $32 million, and no comprehensive archaeological record of the excavations was published: In 2011, the Smithsonian Institute shelved plans to hold an exhibition of finds from the wreck after vociferous objections to a show based on traded heritage.

Future Directions

For many maritime archaeologists working on the Islamic world, the key to overcoming problems of treasure hunting is institutional capacity building. A new Centre for Maritime Archaeology was established in 2009 at the University of Alexandria, Egypt; it is the first in an Arab country. Efforts are under way to establish capacity and extend education elsewhere in the Islamic world, particularly the Gulf.

Maritime archaeological inquiry in the Islamic world is often limited, and enabled, by the availability of resources and the disposition of funding bodies. Future investigation there is likely to be sporadic, with issues of political stability, international diplomacy, national priority, and funding likely to skew activity towards countries, such as those in the Gulf, with the resources, institutional capacity, and inclination to support archaeological work.

Any archaeological investigation of Islamic subjects cannot hope to remain outside contemporary politics. On a practical level, political and security issues impinge on the ability of maritime archaeologists to access sites for investigation. On a theoretical level, the often hegemonic ideologies of Orientalists, religious conservatives, and secular nationalists, constructing insular notions of the Islamic or national past, stand to be challenged by the findings of archaeology, not least that found underwater, as well as in ancient maritime trading settlements.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Bass, George Fletcher
- ▶ Experimental Maritime Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Islamic Archaeology
- ▶ Islamic Archaeology and Art History
- ▶ Orientalism: Islamic Archaeology and Its Colonial Context
- ▶ Red Sea: Maritime Archaeology
- ▶ Swahili Archaeology
- ▶ Underwater Archaeology

References

Agius, D.A. 2008. *Classic ships of Islam: From Mesopotamia to the Indian Ocean*. Leiden: Brill.

Agius, D.A., J.P. Cooper, C. Zazzaro, and J. Jansen Van Rensburg. 2010. The dhow's last redoubt? Vestiges of wooden boatbuilding traditions in Yemen. *Proceedings of the Seminar for Arabian Studies* 40: 71–84.

Al-Hijji, Y.Y. 1989. *The art of dhow building in Kuwait*. London: London Centre of Arab Studies.

Barkai, O., and Y. Kahanov. 2007. The Tantura F Shipwreck, Israel. *International Journal of Nautical Archaeology* 36 (1): 21–31.

Bass, G.F. 2004. *Serçe Limanı: an eleventh-century shipwreck, volume 1: The ship and its anchorage, crew, and passengers*. College Station: Texas A&M University Press.

Belfioretti, L., and T. Vosmer. 2010. Al-Balīd ship timbers: Preliminary overview and comparisons. *Proceedings of the Seminar for Arabian Studies* 40: 111–118.

Blue, L.K. 2006. Sewn boat timbers from the medieval Islamic port of Quseir al-Qadim on the Red Sea coast of Egypt. In *Connected by the sea: Proceedings of the tenth international symposium on boat and ship archaeology, Denmark 2003*, ed. L.K. Blue, F. Hocker, and A. Englert, 277–283. Oxford: Oxbow Books.

Flecker, M. 2001. A ninth-century AD Arab or Indian shipwreck in Indonesia: First evidence for direct trade with China. *World Archaeology* 32 (3): 335–354.

Gascoigne, A.L. forthcoming. *The island city of Tinnis: An archaeological study.* Cairo: Institut Français d'Archeologie Orientale.

Gilbert, E. 2004. *Dhows and the colonial economy of Zanzibar*. Oxford: James Currey.

Hornell, J. 1942. A tentative classification of Arab seacraft. *The Mariner's Mirror* 28 (1): 11–40.

Horton, M. 1996. *Shanga: The archaeology of a Muslim trading community on the coast of East Africa*. London: British Institute in Eastern Africa.

Insoll, T. 1999. *The archaeology of Islam*. Oxford: Blackwell.

Khalilieh, H.S. 2005. The enigma of Tantura B: Historical documentation and the lack of circumstantial documentary evidence. *International Journal of Nautical Archaeology* 34 (2): 314–321.

Milwright, M. 2010. *An introduction to Islamic archaeology*. Edinburgh: Edinburgh University Press.

Muckelroy, K. 1978. *Maritime archaeology*. Cambridge: Cambridge University Press.

Peacock, D., and L. Blue. 2006. *Myos-Hormos-Quseir al-Qadim, Roman and Islamic ports on the Red Sea; survey and ex 1999–2003*. Oxford: Oxbow.

Pulak, C. 2005. A rare Ottoman wreck: Yassıada, Turkey. In *Beneath the seven seas: Adventures with the Institute of Nautical Archaeology*, ed. G.F. Bass. London: Thames & Hudson.

Rougeulle, A. 2010. The Qalhāt project; new research at the medieval harbour site if Qalhāt, Oman. *Proceedings of the Seminar for Arabian Studies* 40: 303–320.

Severin, T. 1982. *The Sindbad voyage*. London: Hutchinson.

Sheriff, A. 2009. *Dhow cultures of the Indian Ocean; cosmopolitanism, commerce and Islam*. London: Hurst & Co.

Walmsley, A., H. Barnes, and P. Macumber. 2010. Al-Zubārah and its hinterland, north Qatar: Excavations and survey, spring 2009. *Proceedings of the Seminar for Arabian Studies* 40: 55–68.

Ward, C. 2001. The Sadana Island shipwreck: An eighteenth-century AD merchantman off the Red Sea coast of Egypt. *World Archaeology* 32 (3): 368–382.

Whitcomb, D., and J.H. Johnson, eds. 1982. 1982 season of excavations at Quseir al-Qadim. *American Research Centerin Egypt Newsletter* 120: 24–30.

Whitehouse, D. 2009. *Siraf: History, topography and environment*. Oxford: Oxbow Books.

Whitewright, J. 2012. Technological continuity and change: The lateen sail of the medieval Mediterranean. *al-Masaq* 24 (1): 1–19.

Whitewright, J. forthcoming. Sailing rigs of the western Indian Ocean during the first millennium AD. In *Maritime archaeology*, ed. S. Tripati. Goa: National Oceanographic Institute.

I

Islamic Archaeology

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Introduction

Islamic archaeology is concerned with the investigation of the material culture and historical record of Muslim peoples and societies. As an area of academic inquiry and as a practical part of heritage management, Islamic archaeology is growing as the role of Islam in the world increases both as a political force and in terms of its financial resources. There are a number of conceptual difficulties with the term "Islamic archaeology" which will be discussed below, but for the present it is used in broad inclusive fashion to encompass any archaeology where Islam is a significant factor in the history or heritage of the region or theme

under consideration. It will be clear that just as the Islamic world covers a large area and a significant proportion of the world's land surface, so the archaeology of Islam will incorporate considerable diversity in terms of ethnicities, beliefs, environments, languages, histories, politics, and economics. One of the problems or tensions within this area of inquiry is the reconciliation of such diversity and the question of the coherence of the subject as a whole.

Definition

As an academic field of inquiry, Islamic archaeology can be interpreted in many ways from an archaeology narrow focus on the religion of Islam to a much broader investigation of the material culture of societies where a significant proportion of the population was Muslim. In some cases the term may even be extended to non-Muslim societies where there was either a Muslim minority or significant interaction with the Muslim world. At this point it might be worth comparing Islamic archaeology to Christian or Hindu archaeology where the focus of research is firmly on the religious aspect of those societies, whereas other aspects of these societies (trade, economy, conflict) may be outside the remit of the study. Islamic archaeology is generally construed to have a wider remit partly because the religion of Islam is a structuring principle for all aspects of a society and individual's life. Thus, trade, politics, warfare, and social relations are all within the scope of Muslim religious life. Secondly from its inception in the nineteenth century, Islamic archaeology has not placed particular emphasis on Islam as a religion and has used the adjective "Islamic" as a general term to refer to cultures where Islam was the dominant religion.

The term "Islamic Archaeology" was first used in the late nineteenth century to refer to the investigation of archaeological sites where the material remains of predominantly Muslim settlements were excavated and objects retrieved for display in museums or private collections. Medieval Islamic remains were intimately linked with the present, and in the nineteenth and early twentieth centuries, there was often a tendency to see Muslim society as either static or in an inexorable decline. There was therefore little to be gained from an archaeological study of Muslim society as the trajectory of development was already known, and the only value that could be derived was from the excavation and retrieval of decorative objects. During the twentieth century the meaning of the term shifted away from the concept of object retrieval to the idea of archaeology as a means of understanding past societies. In many ways this change mirrors developments elsewhere in archaeology. However, because Islamic archaeology was overwhelmingly carried out by outsiders from Europe or America, the change from acquisition of objects to understanding of the development of societies was intimately linked to ideas of Orientalism as defined by the renowned Palestinian Egyptian scholar Edward Said (1978). While excavating objects and removing them to a distant location may be interpreted as a refined form of theft, the collection of information to construct narratives could be seen as part of a colonial/Orientalist attempt to appropriate the past history of peoples seen as somehow inferior. In this case archaeology was a method of control and according to Said an integral part of the colonial apparatus. Of course this does not apply exclusively to Islamic archaeology, and in the scheme of things, Islamic archaeology had a relatively minor role in relation to Egyptology, Assyriology, and Biblical Archaeology. It should also be noted that a crucial component of the archaeology of many of these pre-Islamic civilizations was a conscious effort to disassociate the glorious ancient civilizations from contemporary Muslim cultures.

Historical Background

Islamic archaeology may be divided into two distinct phases: (1) the late nineteenth and early twentieth century and (2) the second half of the twentieth century up to the present day. The first phase is characterized by European colonialism, a

preoccupation with major urban sites and a Middle Eastern focus. The second phase is characterized by differing national agendas, a shift toward regional survey and widening geographical focus beyond the boundaries of the Middle East.

1880–1945

Although Islamic remains had been found in Middle Eastern excavations of ancient sites during the early and mid-nineteenth century, they were not the objective of these projects and were generally either discarded or ignored. The specific targeting of Islamic-period sites and remains began in the latter part of the nineteenth century and was part of a growing interest in the development of art and architecture. The term "Islamic archaeology" did not occur until the 1890s when the concept of Islamic civilization was first adopted as a term to describe the culture and history of Muslim peoples. The philosophy behind the use of the term "Islamic" derived from the ideas of Auguste Comte and William Robertson who viewed religion from a comparative cultural and secular perspective rather than as a matter of faith and spirituality. The first use of this terminology in relation to material culture was the 1893 exhibition of Islamic antiquities in Paris which had the title "Exposition d'Art Musulman" (Exhibition of Islamic Art) rather than more usual terms of Persian or Arab art (Vernoit 1997). The new terminology was rapidly adopted, and the first excavations to be carried out as Islamic archaeology occurred in diverse locations such as Qal'a Bani Hammad in Algeria and Samarqand in the newly annexed Russian provinces of Central Asia. In both of these cases, the excavations were linked to colonial expansion and an attempt to create heritage and histories which would support European domination. Even the excavation of the Spanish Umayyad site of Madinat al-Zahra in 1910 has been linked to that country's colonial ambitions in Morocco which was made a joint French/Spanish protectorate in 1912. The same colonial interest is less evident in the German excavations at the ninth-century site of Samarra in Iraq during the years immediately preceding the First World War. As capital of the Abbasid state and the world's largest recognized archaeological site (45 km N-S), Samarra was a fitting setting for one of the first major scientific excavations of an Islamic site. Unfortunately the excavation and survey work was curtailed by the First World War; however, the results of this fieldwork are still being analyzed and continue to produce important new information (Northedge 2008). Samarra was particularly significant because it was regarded as the earliest expression of many features which were later considered to be characteristic of Islamic art including the three types of stucco decoration (carved, bevelled, and molded) and several distinct pottery types including cobalt blue-painted white ware and lusterware.

Following the collapse of the Ottoman Empire at the end of the First World War and the signing of the Sykes-Picot Agreement, large areas of the Middle East and North Africa came under European control pending eventual independence. During this period excavations at Islamic sites were seen as a way of connecting people with their own national histories and as a way of training local archaeologists. For example, the Iraqi archaeologist Fuad Safar excavated the early eighth-century Umayyad city of Wasit in southern Iraq between 1936 and 1942. In Palestine Dimitri Baramki working for the Department of Antiquities of Palestine excavated the eight-century Umayyad palace at Khirbat al-Mafjar between 1938 and 1942. The principal building at Khirbat al-Mafjar was a monumental bathhouse with magnificent mosaic decoration and sculptures (Hamilton 1959, 1988). The most surprising feature of the decoration was the presence of figural sculptures of semi-nude women which adorned the wall of the bathhouse. Although similar figures had been found as paintings in the bathhouse at Qusayr 'Amra in Jordan, the most unusual aspect of the Khirbat al-Mafjar figures is that they were three-dimensional statues – a form of artistic creation which was generally regarded as forbidden within Islam.

At this point it is worth mentioning the role of architectural survey within the growing field of Islamic archaeology (Fig. 1). For many centuries

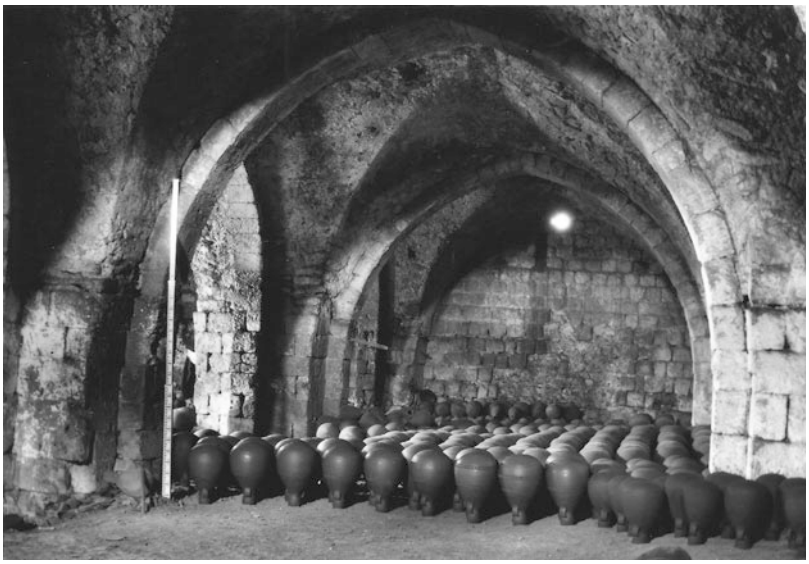

Islamic Archaeology, Fig. 1 Khan al-Idham in Ramla, Israel. This medieval khan or caravanserai was probably built in the fourteenth century and was later reused as a pottery factory. The photograph taken in the early twentieth century shows recently made jars being allowed to dry prior to firing

the architecture of the Islamic world had been admired and studied by Europeans, and it is known that there was considerable interchange of architectural ideas during the period of the Crusades. However, the recording and measurement of Muslim buildings as ancient monuments did not start until the late nineteenth century and was motivated by the same concerns which saw the excavation of Islamic sites. One of the earliest buildings to be documented was the early eighth-century Umayyad bathhouse at Qusayr ‘Amra discovered and recorded by the Czech anthropologist Alois Musil in 1908. The site is chiefly famous for its frescoes which include the earliest depiction of the night sky painted inside a dome. The architecture of the bathhouse in Qusayr ‘Amra is relatively modest when compared to the immense fortified palatial structure of Al-Ukhaidir first recorded by Gertrude Bell in 1909 and later published as monograph under the title *Palace and Mosque at Ukhaidir* (Bell 1914). As a British aristocrat and later administrator for the newly created state of Iraq, Gertrude Bell was firmly in the Orientalist tradition of archaeologists. However, the most famous historian of Islamic architecture and one of the most important figures in Islamic archaeology K.A.C. Creswell was not from such a privileged background and always remained slightly apart from the colonial establishment. Creswell started his work in the field by writing reports on Islamic architecture for the Palestine Mandatory Government in the years following the end of the First World War. He later developed as an independent scholar through a commission to write an account of Islamic architecture in Egypt and ultimately became Professor of Islamic Archaeology at the American University in Cairo (Grabar 1991). Creswell’s achievement was to establish a firm chronological base for the development of Islamic architecture and to pioneer a systematic empirical method of recording more akin to archaeology than art history (Creswell 1932, 1940, 1952, 1959).

It will be apparent that most of the interest and fieldwork in Islamic archaeology during the early twentieth century was concerned with the first three centuries of Muslim rule and that remains from the medieval period to later were seldom investigated. Jean Sauvaget was one of the first scholars to investigate medieval and later Islamic remains with his work on Damascus (1932) and Aleppo (1941). Sauvaget’s approach was markedly different from Creswell’s relying on historical documents, inscriptions, and a profound knowledge of local topography rather than meticulous measurements. Another scholar who made a major contribution to the archaeology of both the medieval and early Islamic periods was the Swiss

Orientalist Max van Berchem (1863–1921). Van Berchem's primary expertise was recording, translating, and analyzing Arabic inscriptions although he was careful to see them in context and often made a full study of the monument in which they occurred (see, e.g., Van Berchem 2001). Van Berchem's legacy continues both in his publications and in the Fondation Max van Berchem created in 1973.

1945–The Present

The Second World War marked a shift in the political makeup of the Middle East and North Africa which had a profound impact on archaeology. The European-dominated colonial and mandatory regimes were gradually replaced by independent though rarely democratic governments. The new governments were interested in developing their national identities, and archaeology was increasingly used to support these agendas. Although nationalist presentations of archaeology do not generally appear in academic accounts of excavations, the presentation of sites in popular literature and heritage may be used to re-enforce perceptions of national identity. For example, in Iraq Samarra was used by the Saddam regime to portray the glories of Iraqi civilization, while in Jordan the Umayyad desert castles were used to reenforce the nation's Arab identity. Despite these nationalist agendas foreign (European, American, and latterly Japanese) teams were still permitted to work in these countries; these projects had to be in collaboration with archaeologists from the countries concerned. Such regulations led to an increasing internationalization of Islamic archaeology with sharing of skills and resources.

One of the most important joint projects was the excavation of the Iranian coastal city of Siraf by the British Institute of Persian Studies and the Iranian Archaeological Service (Whitehouse 1970). The city which flourished between the mid-eighth and early twelfth century was important as a major city and one of the principal ports on the Arabian/Persian Gulf. Beyond its immediate findings in relation to the city and port, the Siraf project was important for Islamic archaeology as a whole. In the first place the large-scale excavations were important for the quantity of ceramic finds which overlapped with those of Samarra. Because Samarran pottery was encountered in many places, the Siraf finds were able to provide a corrective to the dating of many of these wares (Mason and Keal 1991). Secondly the Siraf project drew attention to the Indian Ocean trade of which it formed a central part with ceramics from the Gulf region found as far afield as Japan and South Africa.

The Indian Ocean connection is an aspect of Islamic archaeology that has seen increasing interest in the latter part of the twentieth century with excavations in places such as Pakistan (Banbhore), Sri Lanka (Mantai), and East Africa (Kilwa, Mantai, and Shanga). The geographical scope of Islamic archaeology was further increased from 1992 when the collapse of the Soviet Union opened much of Central Asia and the Caucasus to international teams. Although Soviet (and previously Imperial Russian) teams had been working on Islamic sites from the late nineteenth century, the results of this work were not well known internationally partly because of language problems and also for ideological reasons. Significant initiatives in this area include the International Merv Project focussing on the eastern capital of the Abbasid caliphate. In addition to the direct results of excavations, such projects also encourage and enable the translation and wider dissemination of information about the archaeology of the region. Other regions outside the traditional areas of research that have seen archaeological projects focussed on Islamic remains include West Africa (Timbuktu, Gao, and Tadmeka) (Insoll 2003), South East Asia (Lape 2005), and even Australia where evidence has been found of seventeenth-century Indonesian Muslim fishermen (Russell 2004).

In addition to an expansion in the geographical range of Islamic archaeology, there has also been an increase in the range of techniques used with an increasing emphasis on regional survey. One of the first regional survey projects which incorporated the Islamic period was Robert Adams' survey of the Diyala basin which used regional survey to investigate rural and urban settlement

patterns in the vicinity of Baghdad (Adams 1965). Regional surveys are by their nature multi-period and interdisciplinary and have been instrumental in setting Islamic sites within their wider environmental and chronological context. Regional survey has also led to a greater interest in rural sites throughout the Middle East and North Africa (see, e.g., De Meulemeester's 2005 article on granaries in Morocco and Iberia; Figs. 2 and 3). One of the largest rural excavations was the Khirbat

Islamic Archaeology, Fig. 2 Date-palm garden and fortified residence at Umm Salal Muhammad in Qatar. Date palms have a long association with Islamic culture and are often used to shelter other crops

Islamic Archaeology, Fig. 3 Twelfth- to thirteenth-century stone water-jar stand from Egypt or Syria. Water is extremely important in Islamic culture and was used as a decorative feature in gardens, mosques, and houses

Faris project in Jordan which took place between 1988 and 1994 (McQuitty and Falkner 1993). The excavation of this small village revealed more than 1,000 years of Islamic occupation, and the publication of this site will be a major contribution to our understanding of a typical rural village economy.

Current Debates

A number of theoretical concerns can be identified within Islamic archaeology which can be placed into three main categories: religious concerns, questions of scope, and the relationship with art history.

Religious concerns are focussed on the characterization of archaeology as "Islamic." While this question is discussed more fully in the entry on the Archaeology of the Islamic Religion, it is important to outline the main areas of contention which include (1) whether the excavation of Islamic sites should be restricted to Muslims; (2) whether Islamic archaeology should concern itself with the excavation of pre-Islamic remains pertinent to the origins of the religion; (3) in what circumstances and by whom a Muslim grave can be excavated; and (4) what role practitioners of Islamic archaeology should have in promoting intercultural understanding.

Practical problems include the definition of the scope of Islamic archaeology. While there is a general acceptance that remains from the early Islamic period in Saudi Arabia, Syria, or Jordan can be included within this field of inquiry, how far can this term be applied? For example, is it legitimate to use the term to describe excavation of an eighteenth-century Ottoman village in the Balkans? Similarly can the term "Islamic" be applied to industrial remains or the investigation of recent material culture? With increasing levels of globalization from the sixteenth century onward, different terms may be more appropriate to convey complex interactions between different societies and religions.

Islamic archaeology is unusual because art history had a formative influence on the development of the subject. Many of the first archaeological excavations of Islamic remains were organized to retrieve objects of aesthetic interest to collectors and museums. Because of this art history has continued to have considerable influence over the development of Islamic archaeology despite having very different aims and methodologies (Canby 2000). In some cases this has led to problems; thus, art-historical approaches have led to

Islamic Archaeology, Fig. 4 Fourteenth-century fritware ceramic cenotaph (grave marker) from Central Asia. In addition to vessels many objects in the Islamic world were made of ceramic material including mihrab niches, grave markers, and wall decoration

concentration of interest on glazed ceramics to the detriment of studies of coarse wares which have always made up the bulk of material on archaeological sites (Fig. 4). Similarly art historians have tended to focus on high-status buildings such as palaces, mosques, and mausolea, while ordinary housing and small village shrines have been barely noticed.

International Perspectives

By definition Islamic archaeology has an international perspective with the field of study encompassing much of Asia, Africa, and parts of Europe. Each country has its own approach to Islamic remains influenced by political, cultural, and religious factors. There are, for example, some European countries such as Spain and Portugal which were once major centers of Muslim civilization but are now overwhelmingly Christian or secular in outlook. For many years there was a negative attitude toward the Islamic history in these countries resulting both from colonial encounters and internal politics. However, recently there has been a willingness to accommodate and celebrate the Muslim heritage of both Spain (Borrás Gualís et al. 2000; De Meulemeester 2005) and Portugal (Torres and Macias 2001) seen in the publications of the organization *Museum With No Frontiers*. In other Christian countries, however, the situation is not so positive; thus, there has been very little attempt to investigate the Islamic archaeology of Malta despite a rich and deep Islamic heritage.

In Israel the situation is more complex partly because of the contested nature of the international borders, and also because even within Israel, there is a sizeable Muslim population. As a state Israel sees Jewish heritage and culture as predominant and has been reluctant to recognize any Palestinian (Christian or Muslim) culture as important. However, Israel also has a very positive approach to archaeology which has meant that there have been a number of excavations of important Muslim sites as well as numerous contract excavations of smaller sites (Petersen 2005). In Saudi Arabia the situation is reversed with a great deal of support for Islamic heritage and culture yet a lingering suspicion of archaeology.

Future Directions

Archaeology is becoming more important in Muslim countries partly as a way of developing tourism and partly because people may feel more interest in the development of their own culture and religion than in the distant past. It is, for example, notable that the Gulf states are now investing in archaeology as a way of reenforcing a sense of identity and heritage which is challenged by the rapid urbanization and development of these countries. It is likely that in the future these countries may well lead the way in supporting and developing Islamic archaeology not only in their own countries but further afield in Muslim countries with fewer resources.

The Balkan wars of the 1990s demonstrate how the presence of Muslims in Europe can still cause controversy. More recently controversies over the depiction of Islam by right-wing radicals have ignited debates about the integration of Islam into European society. While archaeology may generally be seen as remote from these debates, it can play a part in demonstrating the longevity of the relationship between Europe and Islam. Moreover, archaeology can shift the focus from violent interactions such as the Crusades to the more peaceful interactions such as trade and cultural exchange (see, e.g., Petersen 2008).

It is noticeable that during the twentieth century the majority of Islamic archaeology projects and excavations were focussed on the early Islamic (631–1000) and medieval (1000–1500) periods. However, recently there has been a growing interest in the post-medieval period influenced by the theories and concerns of historical archaeology. It is likely that this interest will develop particularly as it helps our understanding of the relationship of Islamic society with the rest of the world.

Cross-References

- ▶ Cyprus, Archaeology of
- ▶ Greater Syria: Islamic Archaeology
- ▶ Historical Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ India: Historical Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ North Africa: Historical Archaeology
- ▶ Ottoman Archaeology: Localizing the Imperial
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology

References

Adams, R. McC. 1965. *The land behind Baghdad*. Chicago/London: University of Chicago Press.

Bell, G.L. 1914. *Palace and mosque at Ukhaidir: A study in early Mohammadan architecture*. Oxford: Clarendon Press.

Borrás Gualís, G.M., P. Lavado Paradinas, R. López Guzáman, Ma P. Mogollón, A.M. Martínez Cano-Cortés, Ma T. Pérez, and Higuera. 2000. *Mudéjar art: Islamic aesthetics in Christian art*. Vienna: Museum with No Frontiers.

Canby, S. 2000. Islamic archaeology: By accident or design. In *Discovering Islamic art: Scholars, collectors and collections*, ed. S. Vernoit, 128–137. London/New York: I.B. Taurus.

Creswell, K.A.C. 1932. *Early Muslim architecture, Umayyads, early 'Abbasids and Tulunids, Part I: Umayyads, A.D. 622–750*. Oxford: Oxford University Press.

Creswell, K.A.C. 1940. *Early Muslim architecture, Umayyads, early 'Abbasids and Tulunids. Part 2: Early 'Abbasids, Umayyads of Cordova, Aghlabids, Tulunids, and Samanids, A.D. 751–905*. Oxford: Oxford University Press.

Creswell, K.A.C. 1952. *The Muslim architecture of Egypt I: Ikhshids and Fatimids, A.D. 939–1171*. Oxford: Oxford University Press.

Creswell, K.A.C. 1959. *The Muslim architecture of Egypt II: Ayyubids and early Bahrite Mamluks, A.D. 1171–1326*. Oxford: Oxford University Press.

De Meulemeester, J. 2005. Granaries and irrigation: Archaeological and ethnological investigations in the Iberian Peninsula and Morocco. *Antiquity* 79 (305): 609–615.

Grabar, O., ed. 1991. *K.A.C. Creswell and his legacy*. Muqarnas 8. Leiden: E.J. Brill.

Hamilton, R.W. 1959. *Khirbat al-Mafjar: An Arabian mansion in the Jordan Valley*. Oxford: Oxford University Press.

Hamilton, R.W. 1988. *Walid and his friends: An Umayyad tragedy*. Oxford: Oxford University Press.

Insoll, T. 2003. *The archaeology of Islam in Sub Saharan Africa*. Cambridge: Cambridge University Press.

Lape, P. 2005. Archaeological approaches to the study of Islam in Island Southeast Asia. *Antiquity* 79 (4): 829–836.

Mason, R., and J. Keal. 1991. The Abbasid glazed wares of Siraf and the Basra connection: Petrographic analysis. *Iran* 29: 51–66.

McQuitty, A., and R. Falkner. 1993. The Faris project: Preliminary report on the 1989, 1990 and 1991 seasons. *Levant* 25: 37–62.

Northedge, A. 2008. *Historical topography of Samarra*. Samarra Studies 1. London: British School of Archaeology in Iraq/Max Van Berchem Foundation.

Petersen, A.D. 2005. Islamic archaeology in Israel. *Antiquity* 79 (306): 858–863.

Petersen, A.D. 2008. The archaeology of Islam in Britain: Recognition and potential. *Antiquity* 82 (318): 1080–1092.

Russell, D. 2004. Aboriginal-Makassan interactions in the eighteenth and nineteenth centuries in northern Australia and contemporary sea rights claims. *Australian Aboriginal Studies* 1: 3–17.

Said, E. 1978. *Orientalism*. New York: Vintage Books.

Sauvaget, J. 1932. *Les monuments historiques de Damas*. Beirut: Imprimerie Catholique.

Sauvaget, J. 1941. *Alep. Essai sur le development d'une grande ville syrienn, des origine au milieu du XIXe siècle*. Paris: Paul Geuthner.

Torres, C., and S. Macias. 2001. *In the land of the enchanted Moorish maiden*. Vienna: Museum With No Frontiers.

Van Berchem, M. 2001. *Matériaux pour un corpus Inscriptionum Arabicarum Jérusalem*. Geneva: Max van Berchem Foundation.

Vernoit, S. 1997. The rise of Islamic archaeology. *Muqarnas* 14: 1–10.

Whitehouse, D. 1970. Siraf: A medieval port on the Persian Gulf. *World Archaeology* 2 (2): 141–158.

Further Reading

Insoll, T. 1999. *The archaeology of Islam*. Oxford: Blackwell.

Milwright, M. 2010. *An introduction to Islamic archaeology*. Edinburgh: Edinburgh University Press.

Petersen, A.D. 1998. *Dictionary of Islamic architecture*. London/New York: Routledge.

Petersen, A.D. 2005b. What is Islamic archaeology. *Antiquity* 79: 100–106.

Walmsley, A. 2007. *Early Islamic Syria: An archaeological appraisal*. London: Duckworth Publishers.

Whitcomb, D., ed. 2005. *Changing identity with the spread of Islam*. Oriental Institute Seminars 1. Chicago: University of Chicago Press.

Islamic Archaeology and Art History

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Introduction

The discipline of Islamic art history is connected inextricably with that of archaeology, for reasons of both history and philosophy. Each field of study examines the material culture of the Islamic world and utilizes many of the same sources, particularly in the premodern period.

The principal methodologies of the fields differ in their approaches to the objects, with archaeology – in principle – privileging all materials equally and being concerned primarily with the relationships between and among excavated objects, while art history has an overriding interest in the objects themselves.

Yet although art history is primarily concerned with form and content, it is certainly and deeply informed by context. The increasing emphasis in the discipline on visual culture has resulted in greater attention to, and emphasis on, the cultural milieux in which the objects were produced.

Key Issues

The nature of Islamic art history is connected intimately with the physical situations of available objects. The relative lack of grave goods in Islamic burials, combined with the deposition of "masterpieces" in numerous shrines and treasuries, provided a wealth of extant, unburied artifacts that in many cases became the original materials for Islamic art history in its infancy as a discipline. Some of the most celebrated examples of such objects include the Shroud of Saint Josse (Fig. 1) and the Pisa Griffin (Fig. 2), both of which have been in European hands since the medieval era and the subjects of myriad studies.

On the other hand, the widespread practice of the commercial excavation of Islamic sites, as well as academic investigations, provided a supply of material culture for museums and universities that formed the basis of numerous canonical collections. (Regrettably, this also included wide-scale looting of sites and trafficking in illicit antiquities – practices that are, shamefully, ongoing today).

Certainly the plethora of portable arts – ceramics, stucco, metalwork, etc. – found in archaeological contexts informed their increasing inclusion into the field of Islamic art history and even their "legitimization" as objects of serious study. A series of catalogues devoted to

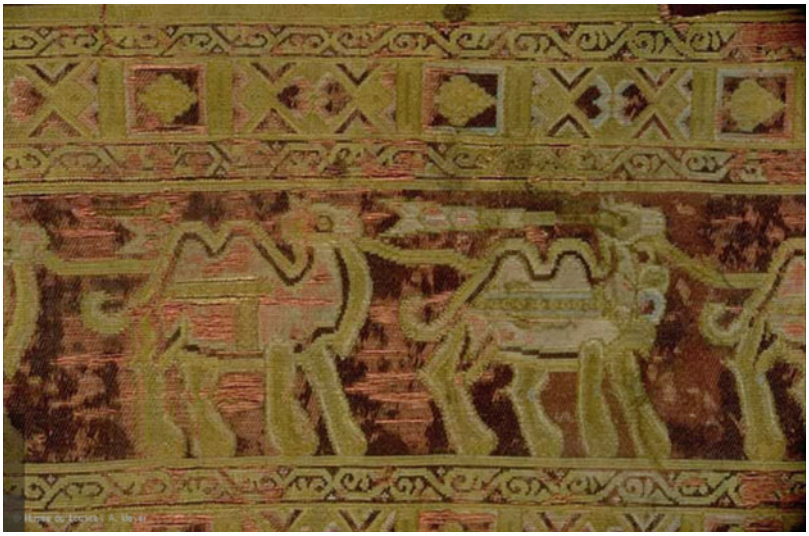

Islamic Archaeology and Art History, Fig. 1 Shroud of Saint Josse, pre-961 CE. (Musée du Louvre, OA:7502)

Islamic Archaeology and Art History, Fig. 2 Pisa Griffin, eleventh century CE, Pisa Cathedral Museum. (The Pisa Griffin Project)

Islamic Archaeology and Art History, Fig. 3 Nishapur Ware, tenth century CE. (Metropolitan Museum of Art, 40.170.23)

exhaustive collections – private or public – of specific media have been very commonly cited and useful reference works in the field (Ettinghausen 1962; Baer 1983; Grube 1994).

The practice of "collecting history" of the Islamic world reached a climax in the late nineteenth and early twentieth century, when a combination of factors – including a number of excavations of Islamic sites – provided a wealth of materials for the archaeologist and the art historian. In many ways the studies of this period were quite similar across the two disciplines, with scholars in both fields devoting more attention to the more aesthetically pleasing objects for purposes of initial collection as well as later study and display. One such example is the Metropolitan Museum of Art's excavations at Nishapur in the 1930s and 1940s, in which the oft-cited, and indisputably useful, tome on pottery nonetheless represents only a small portion of the ceramics at the site (Wilkinson 1973). The "best" of these were selected for initial collection, as well as later publication, study, and exhibition (Fig. 3).

Certainly pottery, perhaps more than any other medium, has benefitted from its common and widespread availability in archaeological settings as well as its treatment in art-historical studies. Forms and fabrics have long been included as part of standard descriptions of ceramics in art-historical texts, and collaborations between and among colleagues in art history and archaeology have resulted in intriguing new observations on both forms and functions (Golombek et al. 1996).

Additionally, examinations of standing as well as excavated architecture and its decoration contributed significantly to the formation of the field. Both Qusayr ʿAmra (Fig. 4), which was not excavated, and Khirbat al-Mafjar, which was (and continues to be), provide important information to the archaeologist as well as the art historian on Umayyad art and architecture, including patronage, audience, and memory. Both structures were initially examined via, and restricted to, a "sub-antique" designation, which has only been corrected with recent and careful scholarship (see Fowden 2004) – treatments that are at the

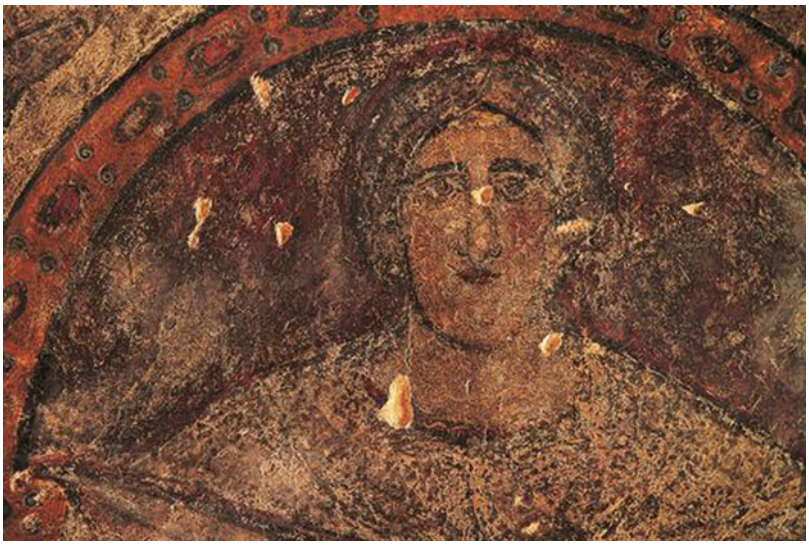

Islamic Archaeology and Art History, Fig. 4 Qusayr ʿAmra, eighth century CE, Jordan. (UNESCO World Heritage Centre)

forefront of reexaminations of the canon of Islamic art history.

This closely knitted history between Islamic archaeology and art history has resulted in a great privileging of the early centuries of Islamic art, as Grabar noted in his observations on the field: "The concentration of scholarly effort on the early centuries of Islam, with its concomitant emphasis on the Arab world, reflects in part the earlier concern of scholarship with unraveling and explaining the beginnings of Islamic culture and in part the influence of archaeology, a technique far more at ease with early monuments than with recent ones" (Grabar 1983: 7). Current emphasis is redressing this imbalance, with attempts to pay greater attention to later centuries and less-studied sites and their material culture (Vernoit 2000; Komaroff 2000).

Current Debates

Islamic art history has been concerned with the cultural setting surrounding and necessitating the production of visual culture for many years. In the 1950s the eminent Islamic art historian Richard Ettinghausen reminded his colleagues that: "We have to study the monument's function, or the object's use, the conditions of life, work and trade under which it was made, and all the associations that helped to create the work, whether they were derived from religious, magical, astrological, literary or folkloristic concepts" (Ettinghausen 1951).

This is perhaps too little known outside the field of art history, with frequent assumptions that there is an over-reliance on aesthetics and connoisseurship at the heart of the discipline. Yet visual culture certainly has a materiality to it, recognized in the study and practice of art history and with a meaning both in and across time. Therefore a shift to the examination of material culture in art history – with visual culture as one part of a greater cultural world – prioritizes the place of art, but definitively within its cultural setting.

Additionally, certain characteristics of Islamic society – including the collecting of calligraphy, the commissioning of fine buildings that are palpably different from mere shelters, or championing a series of objects made in precious substances or imitating those substances – are clearly art-historical aspects of material culture, at least in part, and therefore bear examining under that lens.

Future Directions

Both formalism and contextualism have significant roles to play in art history, and in the field of Islamic art history, this has great importance for

the role that museums, in particular, play in presenting and interpreting the material and visual cultural of the Islamic world to the public. The term "Islamic" can be problematic, encompassing as it does a wide range of explicitly secular works produced by and for a variety of peoples of disparate faiths (Grabar 1973). One very recent development is the decision by the Metropolitan Museum of Art to reject the designation of "Islamic Art" for its renovated galleries in favor of geographic designations.

In recent years a number of significant collections of Islamic art have been inaugurated or reorganized, reopening the questions surrounding the choices made in collecting and displaying Islamic art. These are even more charged in the current political climate, creating a greater role but also much greater responsibility, for the Islamic art historian.

Additionally, the expansion of Islamic art history to incorporate lesser-studied elements of the Islamic world – whether by media, temporality, or geographic location – has led, rather unsurprisingly, to a greater specialization among Islamic art historians. In the course of one or two generations of scholars, an "inclusive" expert on topics as wide-ranging as Nasrid ceramics to contemporary Turkish architecture has been steadily replaced, for reasons of the rapidly growing depth and breadth of the field, by scholars increasingly focused on a narrower range of media, times, and places.

It therefore seems logical that at some point in the near future, the overemphasis on the early centuries of Islam, and its heavy reliance on archaeology, may be lessened or even superseded. While unfortunate, it would also point to the great strength of the partnership between Islamic archaeology and art history that created the foundations for such exponential growth and development.

Cross-References

- ▶ Buildings Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic Archaeology
- ▶ Regional/Site Museums
- ▶ Spain and North Africa: Islamic Archaeology
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions

References

Baer, E. 1983. *Metalwork in medieval Islamic art*. Albany: State University of New York Press.

Ettinghausen, R. 1951. Islamic art and archeology. In *Near eastern culture and society*, ed. T. Cuyler Young, 17–47. Princeton: Princeton University Press.

Ettinghausen, R. 1962. *Arab painting*. Geneva: Skira Press.

Fowden, G. 2004. *Quṣayr ʿAmra: Art and the Umayyad elite in late antique Syria*. Berkeley: University of California Press.

Golombek, L., R.B. Mason, and G.A. Bailey. 1996. *Tamerlane's tableware: A new approach to the Chinoiserie ceramics of fifteenth- and sixteenth-century Iran*. Costa Mesa: Mazda Press.

Grabar, O. 1973. *The formation of Islamic art*. New Haven: Yale University Press.

Grabar, O. 1983. Reflections on the study of Islamic art. *Muqarnas* 1: 1–14.

Grube, E. 1994. *Cobalt and lustre: The first centuries of Islamic pottery*. London: Oxford University Press.

Komaroff, L. 2000. Exhibiting the middle east: Collections and perceptions of Islamic art. *Ars Orientalis* 30: 1–8.

Vernoit, S. 2000. *Discovering Islamic art: Scholars, collectors and collections, 1850–1950*. London: I.B. Taurus.

Wilkinson, C. 1973. *Nishapur: Pottery of the early Islamic period*. New York: Metropolitan Museum of Art.

Islamic Industry, Archaeology of

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Introduction

Industry in the medieval and post-medieval Islamic world was most commonly associated with urban environments, where it was predominantly organized and specialized in nature.

Production sites, in locations from Baŷŷāna, southeast Iberia (Acién Almansa et al. 1990); al-Basra, North Africa (Benco 1987; Benco et al. 2002; Robertshaw et al. 2010); Raqqa on the Euphrates (Henderson et al. 2004: 440–441) to Merv, Central Asia (Herrmann et al. 1997: 10–13), provide examples of industrial complexes. Such sites are key to our understanding of industry; however, the range of goods they produced, found on a greater number of consumption sites, also provide vital evidence of manufacturing. This entry will examine industrial production from the standpoint of artifacts, with evidence drawn from a range of contexts, predominantly medieval in date, in which those objects were made and used.

Definition

An industry is identified either by the presence of the site of manufacture, such as a kiln, or by a groups of artifacts, sometimes spread over a wide geographical area, that adhere to a particular morphology or technological style. Ceramics are the most intensively studied industrial product from most archaeological contexts and, along with metal and glass objects, represent the most common range of artifacts recovered during archaeological investigation. Both artifacts recovered from excavations and those held in museum collections as examples of Islamic art can shed light on key issues pertaining to industry. These include, for metal, the complexity and level of organization of production; for glass, the important technological change in production; and for ceramics, the vast range of types and the diffusion of styles. Exploration of these issues will allow consideration of how patterns of production and distribution of those artifacts can inform our understanding of industry. The focus of this discussion, owing to the length of this entry, will be Iberia, the Mediterranean, and the central Islamic lands.

Historical Background

Sināʿa, or the occupation of and production by artisans, was strictly governed by *hisba*, a set of moral codes often written in manuals, which were particularly associated with markets and enforced by an official known as a *muhtasib* (Milwright 2010: 143–144). *Hisba* documents provide key dated records of market conditions and the organization of industry. Both archaeological and historical evidence indicate, however, that the guidelines given in *hisba* documents were not always strictly adhered to. Excavation of urban settlements provides evidence that polluting industry was not always located away from centers of population, for example. During the early Islamic period, in the Syrian cities of Jarash and Baysan, ceramic kilns were located close to the urban center (Walmsley 2007: 117–119). Evolution in the organization of industry can be indicated by historical documents. By the fifteenth and sixteenth centuries CE, for example, court documents indicate that the role of the *muhtasib* was in decline, as many of its functions were supplanted by newly emerging guild structures that grouped and organized pre-existing craft associations (Hama 2008).

The Geniza documents provide arguably the best source of information on the organization of industry, albeit limited to the Mediterranean region. They indicate that the division of labor resulted in craftsmen specialized in industries ranging from the production of kohl sticks to house mats (Goitein 2003: 33–48). It was the textile industry, however, which represented the most significant production (Ashtor 1976: 95–97) but one which is rarely evidenced in the archaeological record, as such organic artifacts only survive in contexts where conditions permit their preservation. Even without the presence of textiles, production can sometimes be identified archaeologically, through tools such as loom weights, as at Baŷŷāna (Acién Almansa et al. 1990: 156). Important textile production centers such as Tinnīs, where fabrics embroidered with honorific titles referred to as *tirāz* were produced, provide examples of manufactories which served and were controlled by ruling authorities (Ashtor 1976: 150–152). Records from the Ottoman court, dating to the late fifteenth and sixteenth century CE, provide another example of impetus from the ruling classes which lead to industrial-scale production, here associated with products such as

Iznik pottery. Iznik products, in common with *tirāz* fabrics, were also consumed beyond courtly circles, as evidenced most strongly by their patterns of distribution (Atasoy and Raby 1989: 264–268; Barker 1995: 52–63).

Most recently, studies of an Arabic dictionary of crafts, written in Damascus between 1890 and 1905, have provided detailed textual accounts of a total of 437 artisanal activities, from pottery production to blacksmithing (Milwright 2011). Relating to the medieval period, treatises are amongst the documents that provide details of the processes of industrial production. For example, texts written by al-Kindī during the ninth century CE describe steel and iron manufacture, particularly in relation to swords (Allan 1979: 85–86), at centers including Merv (Herrmann et al. 1997: 12). For the early fourteenth century CE, a treatise by Abu al-Qasim of Kashan provides key information on the production of highly decorated pottery, such as lustre wares (see below). Here the recipe for ceramic "stonepaste" bodies is described as comprising ten parts quartz, one part crushed glass, and one part white clay (Watson 2004: 24–26). Texts on the objects themselves are another important source of evidence. For example artifacts such as inlaid brass objects, often in museum collections and classified as Islamic art, can provide evidence of the place and date of manufacture, sometimes in conjunction with a named patron or even artist (see Figs. 1 and 2). It is through such evidence that the diffusion of style and designs on inlaid brass objects has, in part, been defined. As a result, late twelfth-century CE Herat has been identified as the point of origin (within the Islamic world) of inlaying on brass before transmission to Mosul and then on to a number of centers, most notably Si'irt or Konya, Damascus, Cairo, and Fars (Ward 1993: 71–93).

On ceramics, inscriptions have allowed some of the best examples of lustre and polychrome *mina'i* pottery, produced in Kashan during the late twelfth and early thirteenth centuries CE, to be associated with a craftsman called Abu Zaid (Watson 2004: 55). However, it should be noted that a single name or signature may in fact refer to a workshop, or group of workshops, rather than an individual, as has been suggested for ceramics

Islamic Industry, Archaeology of, Fig. 1 Brass casket (O.2–1908), inlaid with gold and silver with a later copper and brass rim strip and iron clasp, 1366–1368 CE, probably made in Cairo. Given by the Rev. T. Hewitt, 1908.© The Fitzwilliam Museum, Cambridge

Islamic Industry, Archaeology of, Fig. 2 Detail of brass casket (O.2–1908) inlaid with the name of the patron, who was a secretary in the Mamluk government. Given by the Rev. T. Hewitt, 1908.© The Fitzwilliam Museum, Cambridge

(Milwright 1999: 507). The name or symbol of the patron can lead to association with a specific location. For example, an enamelled mosque lamp

from the collection at The Fitzwilliam Museum bears the name of its patron, the Mamluk Amir Shaykhu al-Nasīrī (Fig. 3). This object was almost certainly produced for his mosque complex in Cairo, which was completed between 1349 and 1356 CE (Fitzwilliam Museum 2005: 129). The following sections will consider predominantly archaeological artifacts recovered from known contexts but with reference to museum objects to explore key issues relating to their manufacture.

Islamic Industry, Archaeology of, Fig. 3 Enamelled mosque lamp (C.4–1949) made using clear glass with *blue*, *red*, *white*, and *black* enamel, c. 1335 CE, probably made in Cairo. Given by the National Art Collections Fund. © The Fitzwilliam Museum, Cambridge

Key Issues

Metalworking

The range of materials used, the complexity of their extraction, and the vast array of techniques employed to produce finished objects make metal artifacts one of the most complex object types produced on an industrial scale in the Islamic world. With the exception of copper, metals produced were predominantly alloys, made from more than one raw material.

Brass (an alloy of copper and zinc) was one of the most popular metals employed to produce utilitarian and decorative objects, using techniques from casting to sheet working (for the latter, see Ward 1993: 30–34). These objects reached their most spectacular form from the late twelfth to fifteenth century CE, when increasing numbers of brass objects were produced with inlaid designs using metals of contrasting color, such as silver and gold (Ward 1993: 71–121; for an example, see Figs. 1 and 2). Copper (with very low levels of alloying components such as zinc, lead, and tin) was also used to produce utilitarian objects, such as cooking pots and buckets, but these vessels may be under-represented in many archaeological assemblages, as when broken, they were probably recycled (Ponting 2008: 55). Similarly, only rare examples of precious metals survive probably because of their intrinsic and re-melting value, although rare finds from hoards including Nahavand and Harari provide evidence of Central Asian production from the late tenth to twelfth centuries CE (Allan 1982: 14–16). Ternary alloys with varying quantities of copper, zinc, lead, or tin were also used to produce largely utilitarian cast objects, while iron, sometimes alloyed with carbon to produce steel, was often used to make bladed objects from household scissors and knives to weaponry and armor (Allan 1979: 52, 66–82).

The raw materials to produce these metals were obtained through both open-cast and underground mining, which took place on an industrial scale, sometimes requiring ventilation shafts and drainage devices (Al-Hassan and Hill 1986: 235–244). Given that copper was a key ingredient in the production of the most commonly occurring metal objects (see above), it is perhaps not surprising that there is considerable evidence for the extraction of copper. For example, significant copper mines, smelting sites, and other industrial activities dating to the early Islamic period have

been identified in the Timna Valley, in the rural hinterland of Ayla, as evidenced by underground galleries measuring up to 3 km length and extensive slag deposits (Walmsley 2007: 119–120).

The transformation of mined ores into finished objects was a complex process, which often occurred at two or more locations, sometimes with considerable distance between the source of raw material and the workshop where the final product was manufactured. At Saltés, an island at the confluence of three rivers close to Huelva in the southern Iberian Peninsula, polymetallic minerals were processed into bars of metal, following transport from relatively distant sources in the Sierra Morena Mountains (Bazzana and Trauth 2008). Once processed at sites such as Marandet or Saltés, metals could be exported to workshops elsewhere, where they were fashioned into objects. At Merv, for example, a workshop dating to the ninth or tenth centuries CE produced steel in refractory crucibles by fusing non-local supplies of iron (Herrmann and Kurbansakhatov 1994: 70; see Fig. 4). The resulting steel was doubtless used to produce the weaponry for which the settlement was famed (Herrmann et al. 1997: 12). At Tiberias, a Fatimid-period metalwork shop similarly employed non-local resources. The presence of that workshop is witnessed most prominently by a significant hoard, which included a range of artifacts (from lamp stands to bowls), made in a variety of metal types (copper, brass, high-tin bronze, and ternary alloys), as well as 200 kg of scrap metal, predominantly copper, in the form of broken objects, lathe turnings, and folded packets (Ponting 2008). This metalwork shop probably carried out limited casting of base metals but clearly focused on the repair of brass and ternary alloy objects and the collection of scrap copper, possibly for recycling through re-melting at another location (Ponting 2008: 59–60). Although this pattern of production of metal objects can readily be identified, it should be noted that there is also evidence of variation. Al-Basra provides just one example of a site at which, during the ninth to twelfth centuries CE, a full range of metalworking, from smelting of raw materials to the production of finished objects, took place at a single location (Benco et al. 2002).

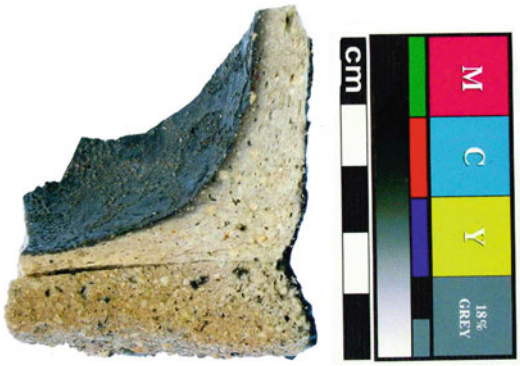

Islamic Industry, Archaeology of, Fig. 4 Crucible used to produce metals at Merv. (Published with kind permission of Ann Feuerbach)

As evidenced by the processes described here, the production of metal objects necessitated high levels of organization and considerable specialist expertise. Developing an understanding of those processes of production is relevant to other object types, in particular glass, which could also be produced in multiple stages and locations, as well as being re-melted following initial production or the breakage of objects.

Glass

Silica (often either quartz pebbles or coastal sands) along with a soda flux (either natron or plant ash) and lime (calcium oxide, present either in shell fragments or plant ash) can be combined, through heating, to form glass (for the methods and range of production, see Henderson 2013). As with other forms of material culture, decisions involved in the manufacture of glass objects, from the selection of different types of raw material to methods of decoration, form part of the *chaîne opératoire* of production reflecting not only industrial processes and availability of materials but also the society in which they are made. Soda-lime-silica glasses predominate in the medieval Islamic world, although lead could also be added, probably to make softer material that could

be cut or ground (Carboni and Whitehouse 2001: 28). Raw glass could then be blown or molded and decorated with a plethora of techniques from filling and scratching to enamelling and gilding (for discussion of working and decorating techniques, see Carboni and Whitehouse 2001).

The evolution in technology, which occurred between the ninth and eleventh centuries CE in the eastern Mediterranean, is the most important issue that has emerged recently in relation to industrial production of glass. During that time, the type of soda flux and as a result the source of silica used in glass production underwent a significant period of change and experimentation. Around the ninth century CE, the mineral natron, long used as a flux in glass production in the Levant and Egypt, began to be replaced with plant ash from halophytic plants that grow in coastal, salt marsh, or desert areas, using a recipe similar to that long employed in Central Asian glass production (Tite et al. 2006: 1284–1285). This change probably occurred due to political instability in the region of the Egyptian Delta, the most important source of natron (Shortland et al. 2006), combined with a massive increase in the demand for natron in general (Tite et al. 2006).

Experimentation in glass production during the early Islamic period is evidenced through scientific analyses of glass found at production sites, such as that located outside the city of Raqqa on the Euphrates (Henderson et al. 2004). Within that complex, a glassworking area, dating to the late eighth to ninth centuries CE and referred to as Tell Zujaj (Fig. 5), has yielded four different types of glass made with ash from different plant types combined with either quartz or sand from varying locations, as well as the addition of recycled natron glass (Henderson et al. 2004). During the early Islamic period, the difficulty of combining these new ingredients is evidenced at Bet She‘arim in the Levant, where failed attempts to produce glass are evidenced by a flawed slab (Walmsley 2007: 118). By the tenth or eleventh century CE, glassmakers had begun to overcome

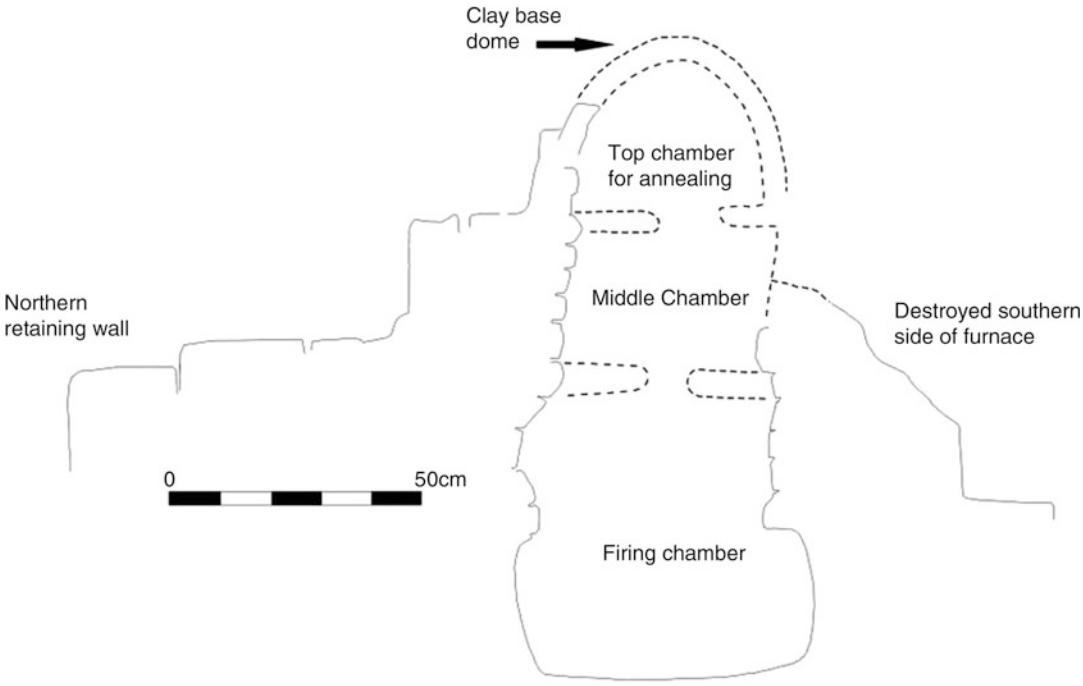

Islamic Industry, Archaeology of, Fig. 5 A north-south section through an eighth- to ninth-century beehive-shaped glass furnace found at Tell Zujaj, one of the three production sites excavated. (Published with kind permission of Julian Henderson)

the difficulties of making plant-ash glass, as witnessed at Tyre, where an industrial complex comprising four tank furnaces has been identified (Aldsworth et al. 2002).

Many centers in the central Islamic lands were capable of producing their own glass vessels (Walmsley 2007: 118; Carboni and Whitehouse 2001: 14–24). Nevertheless, the pattern of procurement of the raw materials to make those vessels was complex. From specialized production centers such as Tyre, glass chunks were exported to locations including Cairo (Aldsworth et al. 2002: 65). Yet Fustāt (Old Cairo) also manufactured glass from raw materials during the early years of its foundation (Carboni and Whitehouse 2001: 17). The picture is further complicated by evidence for recycling glass cullet from the Serçe Limanı wreck (Brill et al. 2009). In addition, although the fragility of finished glass objects must have made trade in raw glass easier, small objects such as bangles and beads were traded (Robertshaw et al. 2010: 375–376) and larger, highly decorated and presumably prestigious, items were also exchanged. Enamelled glass (see Fig. 3) provides an example of such a prestigious product, made at centers in Mamluk Egypt (notably Cairo) and Syria and distributed widely.

To summarize, owing to the relatively limited range of ingredients used in glass production, the process of manufacture was not as complex as metal, but it did undergo an important period of experimentation in the early Islamic period. As already noted in relation to metal and as discussed in the context of ceramics, the distribution of glass was similarly complex and highly organized, an issue that will be considered further below.

Ceramics

Ceramics are the most commonly encountered artifact produced in the Islamic world with an immense variety of forms and decoration. Clay, the common ingredient in the body, was largely locally sourced but could also be transported in a raw state (Milwright 1999: 507). Although clay always remained a key ingredient in ceramic bodies, by the eleventh century CE, potters adopted a new recipe for ceramic production, possibly to negate the less predictable qualities of material sourced from different locations (Tite et al. 2011). Referred to as "stonepaste," it contained only relatively small quantities of clay combined with quartz and glass (as described by Abu al-Qasim, see above). In contrast to predominantly locally sourced clays, recent analyses of glaze types have indicated that their lead content sometimes originated in regions distant to their production (Wolf et al. 2003).

The vast majority of ceramics in the Islamic world were thrown on a wheel. In the context of Iberia, during the late ninth and tenth centuries CE, the readoption of throwing on a fast wheel in association with the use of ceramic glazes is equated with the "Islamization" of the population (Gutiérrez Lloret 1992). Nevertheless, other types of production did occur, most notably during the twelfth and thirteenth centuries CE in Bilād al-Shām, where handmade geometrically painted ware (HMGPW) dominates ceramic assemblages from rural settlements. Contrastingly, wheel-thrown pottery was made and used at towns and cities, possibly indicating a social and economic divide between urban and rural populations during that period (Johns 1998). Such evidence of technical differentiation must be viewed in light of the economic and social context but can also be informed by ethnographic studies of the production of handmade pottery types (Milwright 2010: 154–156). The vast majority of Islamic pottery, with the exception of types such as HMGPW, was produced in updraft kilns, with a fire pit and chamber for pottery separated by a grill. Such kilns have been identified across the medieval Islamic world, with some of the most recently identified examples, dating to the late seventh to ninth centuries CE, present at the Merv Oasis (Herrmann et al. 1999: 13–15).

The great variety of ceramic types produced can be roughly divided into two categories: highly decorated vessels and coarser, utilitarian objects with little or no decoration other than perhaps a monochrome glaze. Highly decorated forms, both of ceramics and other artifact types, are often regarded as specialized products, made at a few centers and traded widely. As a result of its longevity of manufacture, lustre ware, characterized

by distinctive shiny and metal-like surface decoration, provides an ideal case study through which such patterns of production can be illustrated. Owing to the complexities of its manufacture, lustre ware was a specialized product, probably only made by a relatively small number of craftsmen through whom the technique may have been transmitted to a number of different centers over time (Watson 2004: 38–40). Recent analyses have unlocked the chemical process of lustre production, revealing that it is a nanocomposite metal glass layer, formed during a second firing as a result of a process of ionic exchange between copper or silver oxide paint and the surface glaze (Pradell et al. 2008). This complex production process was first employed in Basra, Iraq, where it was associated with the "Abbasid court," then transferring to Fatimid Cairo, where it was produced for the first time on stonepaste bodies (Tite et al. 2011). During the twelfth century CE, production of lustre ware moved once more, this time to Syria at sites including Tell Minis and Raqqa (Milwright 2010: 150). Further east, Kashan became the dominant production center making lustre and other highly decorated ceramics until the fourteenth century CE, with a cessation in the decades immediately following the Mongol conquest (Watson 2004: 56–57). Scientific analyses (largely ceramic petrology) support this transfer of technology (most recently see Tite et al. 2011).

A survey of ceramic material gathered from Iranian sites, dating to between the ninth and eleventh centuries CE, supports evidence of specialized and centralized production of lustre, while pointing to the more pervasive manufacture of slip-painted wares at multiple urban centers (Williamson 1987). Nevertheless, chemical analyses of lustre wares dating to the mid-twelfth to late thirteenth centuries CE from the Syrian site of Gritille do not support this hypothesis of centralized production, instead indicating that this pottery type may well have been manufactured at multiple, provincial centers in medieval Syria (Redford and Blackman 1997). This evidence concerning highly decorated pottery is, therefore, beginning to provide some clues that multiple production sites making similar wares might, at least in some cases, have been the reality. In contrast to highly decorated pottery, coarse, undecorated wares are often considered to have limited distribution except in the case of storage jars used to contain traded products. For example, amphora dating to the late eighth and early ninth centuries CE, and associated with the wine-making industries of Middle Egypt, was widely distributed in the eastern Mediterranean (Vogt et al. 2002). Furthermore, recent analysis of archaeological assemblages is beginning to indicate the diffusion of other undecorated wares; for example, cooking pots dating to the Almohad period made just outside Seville were distributed at a regional level, in this case to settlements as distant as Mértola on the River Guadiana and Écija on the River Genil (Bridgman 2007; see Fig. 6).

The picture that emerges of ceramic production is, therefore, as varied as the different types of this artifact category, with manufacture probably not following any one set pattern or model. It is no longer possible, therefore, to merely assume that decorated pottery was always a highly specialized and widely distributed product or that plain utilitarian vessels were only made for local consumption. Instead, a picture of pottery production that varied within regions, or even ceramic types, should be posited.

International Perspectives

Centers of Production and Consumption

At many urban centers, industrial complexes produced glass, metal, and pottery objects. Already discussed at Raqqa, glass was made in quantity (Henderson et al. 2004) but this was also accompanied by ceramic production (Milwright 2010: 148). At Merv, evidence for steel smelting and ceramic production has been identified (Herrmann et al. 1999: 13–15; Herrmann et al. 1997: 10–13), while al-Basra's industrial complex manufactured a range of goods including pottery (Benco 1987), glass (Robertshaw et al. 2010), and

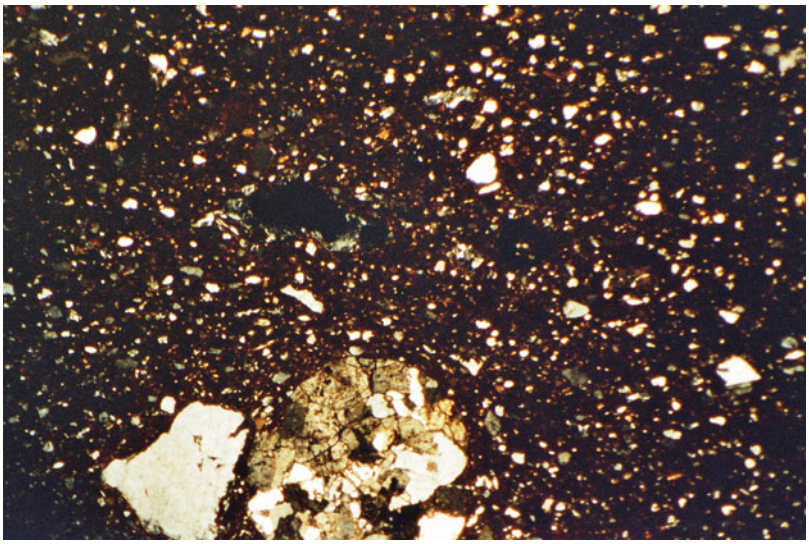

Islamic Industry, Archaeology of, Fig. 6 Seville Fabric VI, photomicrograph, identified at sites distant from the city, including Écija and Mértola

metal artifacts (Benco et al. 2002). Links with other industries are also evident at al-Basra, with bone waste from animal butchery (which probably took place nearby) used by metalworkers both as fuel for kilns and as tools for smoothing and burnishing finished metal products (Benco et al. 2002). At Baŷŷāna, the industrial complex incorporated ceramic and glass production, alongside textile manufacture (Acién Almansa et al. 1990). Even where industrial sites have not been identified, it seems most probable that most major urban settlements were capable of producing for their own basic needs, at least in relation to the three artifact categories discussed here. At Nishapur, ceramic kilns have been identified (Wilkinson 1974: xxxvii–xl) and although there is no direct evidence of metal (Allan 1982: 22–23) or glassworking (Kröger and Brill 1995), a large quantity of such objects were recovered from the site, indicating production of all these artifact categories.

If the urban centers discussed here were capable of producing the artifacts required by their populace, then what of the specialized production and trade of goods associated with the medieval and post-medieval Islamic World? Scientific analyses are central to developing understanding of what was doubtless a complex, and most likely differentiated, economic landscape. Analyses of ceramics are at the forefront of such studies, largely due to the range of scientific techniques (for a summary of techniques in relation to Islamic pottery, see Milwright 2010: 152–153), which have long facilitated understanding of their production and consumption. Unlike ceramics, analyses of glass and metalwork are complicated by the multiple stages of production; the possibility of exporting processed materials, such as glass chunks or metal ingots; and the potential for re-melting and mixing of ingredients. Nevertheless, groundbreaking work is increasingly allowing the diffusion of metal and glass objects to be reassessed or identified for the first time. For example, metal lampstands made in a style classified as Egyptian, recovered from Denia and Tiberias, have recently been subject to trace element and isotopic analysis leading to their re-attribution to Syrio-Palestine workshops such as Damascus (Ponting 2008: 58–9). Additionally, the cargo of glass cullet from the shipwreck site of Serçe Limanı, which provides clear evidence of the long-distance trade of this material, has recently been subject to chemical analyses leading to its attribution to a production center at Tyre or possibly Caeseria (Brill et al. 2009). Most recently, strontium isotope analysis of glass objects has

proven a particularly useful tool in assessing the origin of the plants used as an alkali flux (Henderson et al. 2009). Such work, when combined with chemical analyses, is now proven to facilitate identification of regional production signatures for both natron and plant-ash glasses (Leslie et al. 2006). Developments in the field of scientific analyses thus have the potential to broaden significantly our knowledge of the diffusion of manufactured goods on an international scale.

Future Directions

Archaeological research, incorporating excavation of industrial sites and analyses of manufactured goods, thus provides important and unparalleled clues to the levels of organization and specialization in Islamic industries. Artifacts themselves found in consumption contexts provide probably the most plentiful source of evidence on the complexity of industry, demonstrating the range of products produced, evolution and changes to industry, as well as on the diffusion and trade of objects. That evidence combined with studies of industrial complexes is central to the future directions of research on Islamic industry, which should further address the patterns of industry, identifying the extent to which many urban centers produced the goods they consumed, as well as their reliance on a limited number of large, specialized manufactories. Importantly, further investigation of this question will not only develop our understanding of artifacts found in archaeological contexts, and provide possible answers to wider questions of economy and society, but also help us better understand the many examples of Islamic art displayed in museum contexts for which the original provenance is often lost.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Islamic Archaeology and Art History
- ▶ Material Culture and Education in Archaeology

References

Acién Almansa, M., F. Castillo Galdeano, and R. Martínez Madrid. 1990. Excavación de un Barrio Artesanal De Baŷŷāna (Pechina, Almería). *Archéologie Islamique* 1: 17–68.

Aldsworth, F., G. Haggarty, S. Jennings, and D. Whitehouse. 2002. Medieval glassmaking at Tyre, Lebanon. *Journal of Glass Studies* 44: 49–66.

Al-Hassan, A.Y., and D.R. Hill. 1986. *Islamic technology: An illustrated history*. Cambridge: Cambridge University Press.

Allan, J.W. 1979. *Persian metal technology, 700–1300 A. D*. Oxford Oriental Monographs 2. Oxford: Ithaca Press.

Allan, J.W. 1982. *Nishapur metalwork of the early Islamic period*. New York: Metropolitan Museum of Art.

Ashtor, E. 1976. *A social and economic history of the Near East in the Middle Ages*. London: Collins.

Atasoy, N., and J. Raby. 1989. *Iznik: A pottery of Ottoman Turkey*. London: Alexandria Press.

Barker, P. 1995. *Islamic textiles*. London: British Museum Press.

Bazzana, A., and N. Trauth. 2008. Minéralurgie and Métallurgie á Saltés. In *Minas y metalurgia en al-Andalus y Magreb Occidental : explotación y poblamiento*. Collection De La Casa De Velázquez 102, ed. A. Canto García and P. Cressier, 209–243. Madrid: Casa de Velázquez.

Benco, N.L. 1987. *Organisation and technology of pottery production in early medieval Morocco*. Oxford: British Archaeological Reports.

Benco, N.L., A. Ettahiri, and M. Loyet. 2002. Worked bone tools: Linking metal artisans and animal processors in medieval Islamic Morocco. *Antiquity* 76: 447–457.

Bridgman, R. 2007. Re-examining Almohad economies in South-western al-Andalus through petrological analysis of archaeological ceramics. In *Revisiting Al-Andalus. Perspectives on the material culture of Islamic Iberia and beyond*. The Medieval and Modern Iberian World, ed. G.D. Anderson and M. Rosser-Owen, 143–165. Leiden/Boston: Brill.

Brill, R.H., B. Lledó, and S.D. Matthews. 2009. *Serçe Limanı, volume 2: The glass of an eleventh-century shipwreck*. Nautical Archaeology series 4. College Station: Texas A&M University Press.

Carboni, S., and D. Whitehouse, eds. 2001. *Glass of the sultans*. New York: Metropolitan Museum of Art.

Fitzwilliam Museum. 2005. *Treasures of the Fitzwilliam Museum*. London: Scala Publishers.

Goitein, S.D. 2003. The main industries of the Mediterranean area as reflected in the records of the Cairo Geniza. In *Manufacturing and labour as reflected in the records of the Cairo Geniza*, ed. M.G. Morony, 34–62. Hampshire: Ashgate Publishing.

Gutiérrez Lloret, S. 1992. Production and trade of local and regional pottery in early medieval Spain (7th–9th centuries): The experience of the South-East of the Iberian Peninsula. *Bolétin De Arqueología Medieval* 6: 9–22.

Hama, N. 2008. Guilds in recent historical scholarship. In *The city in the Islamic world. Handbook of oriental studies, Section 1: The Near and Middle East*, ed. S.K. Jayyusi, R. Holod, A. Petruccioli, and A. Raymond, 895–918. Leiden/Boston: Brill.

Henderson, J. 2013. *Ancient glass, an interdisciplinary approach*. Cambridge: Cambridge University Press.

Henderson, J., S.D. Mcloughlin, and D.S. Mcphail. 2004. Radical changes in Islamic glass technology: Evidence for conservatism and experimentation with new glass recipes from early and middle Islamic Raqqa, Syria. *Archaeometry* 46 (3): 439–468.

Henderson, J., J. Evans, and Y. Barkoudah. 2009. The roots of provenance: Glass, plants and isotopes in the Islamic Middle East. *Antiquity* 83: 414–429.

Herrmann, G., and K. Kurbansakhatov. 1994. The international Merv project preliminary report on the second season (1993). *Iran* 32: 53–75.

Herrmann, G., K. Kurbansakhatov, and St.J. Simpson. 1997. The international Merv project. Preliminary report on the fifth season (1996). *Iran* 35: 1–33.

Herrmann, G., K. Kurbansakhatov, and St.J. Simpson. 1999. The international Merv project preliminary report on the seventh season (1998). *Iran* 37: 1–24.

Johns, J. 1998. The rise of middle Islamic hand-made geometrically-painted ware in Bilād al-Shām (11th–13th centuries A.D.). In *Colloque International d'Archéologie Islamique*. Textes Arabes et Études Islamiques 36, ed. R.P. Gayraud, 65–93. Cairo: Institut Français d'Archéologie Orientale.

Kröger, J., and R.H. Brill. 1995. *Nīshāpūr glass of the early Islamic period*. New York: Metropolitan Museum of Art.

Leslie, K.A., I.C. Freeston, D. Lowry, and M. Thirlwall. 2006. The provenance and technology of Near Eastern glass: Oxygen isotopes by laser fluorination as a complement to strontium. *Archaeometry* 48 (2): 253–270.

Milwright, M. 1999. Pottery in the written sources of the Ayyubid-Mamluk period (c. 567–923/1171–1517). *Bulletin of the School of Oriental and African Studies* 62 (3): 504–518.

Milwright, M. 2010. *An introduction to Islamic archaeology*. Edinburgh: Edinburgh University Press.

Milwright, M. 2011. An Arabic description of the activities of antique dealers in late Ottoman Damascus. *Palestine Exploration Quarterly* 143 (1): 8–18.

Ponting, M.J. 2008. The scientific analysis and investigation of a selection of the copper-alloy metalwork from Tiberias. In *Tiberias: The house of the Bronzes*. Qedem 48, ed. Y. Hirschfeld and O. Gutfeld, 35–61. Jerusalem: Old City Press.

Pradell, T.J., J. Molera, A. Smith, and M. Tite. 2008. Early Islamic lustre from Egypt, Syria and Iran (10th to 13th century AD). *Journal of Archaeological Science* 35: 2649–2662.

Redford, S., and M.J. Blackman. 1997. Lustre and fritware production in medieval Syria. *Journal of Field Archaeology* 24 (2): 233–247.

Robertshaw, P., N. Benco, M. Wood, L. Dussubieux, E. Melchiorre, and A. Ettahiri. 2010. Chemical analysis of glass beads from medieval Al-Basra (Morocco). *Archaeometry* 52 (3): 355–379.

Shortland, A., L. Schachner, I. Freestone, and M. Tite. 2006. Natron as a flux in the early vitreous materials industry: Sources, beginnings and reasons for decline. *Journal of Archaeological Science* 33 (4): 521–530.

Tite, M.S., A. Shortland, Y. Maniatis, D. Kavoussanaki, and S.A. Harris. 2006. The composition of the soda-rich and mixed alkali plant ashes used in the production of glass. *Journal of Archaeological Science* 33 (9): 1284–1292.

Tite, M.S., S. Wolf, and R.B. Mason. 2011. The technological development of stonepaste ceramics from the Islamic Middle East. *Journal of Archaeological Science* 38 (3): 570–580.

Vogt, C., G. Bourgeois, M. Schvoerer, P. Gouin, M. Girard, and S. Thiébault. 2002. Notes on some of the Abbasid amphorae of Istabl ʿAntar-Fustat (Egypt). *Bulletin of the American Schools of Oriental Research* 326: 65–80.

Walmsley, A. 2007. *Early Islamic Syria: An archaeological assessment*. London: Duckworth.

Ward, R. 1993. *Islamic metalwork*. London: British Museum Press.

Watson, O. 2004. *Ceramics from Islamic lands*. London: Thames & Hudson.

Wilkinson, C.K. 1974. *Nishapur: Pottery of the early Islamic period*. New York: Metropolitan Museum of Art New York.

Williamson, A. 1987. Regional distribution of mediaeval Persian pottery in the light of recent investigations. In *Syria and Iran. Three studies in medieval ceramics*. Oxford Studies in Islamic Art IV, ed. J.W. Allan and C. Roberts, 11–22. Oxford: University of Oxford.

Wolf, S., S. Stos, R.B. Mason, and M.S. Tite. 2003. Lead isotope analyses of Islamic pottery glazes from Fustat, Egypt. *Archaeometry* 45 (3): 405–420.

Island Archaeology

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Introduction

The basic premise of island archaeology is to understand how humans used islands in the past. Island archaeology considers the geographical characteristics of insular spaces as a starting point for further analysis, often within a comparative and diachronic framework. In this context,

islands are considered to deserve specialist study, with three approaches featuring more prominently in the literature: (1) islands come in so many different shapes and forms that their comparison can shed light on several types of human/environmental adaptations; (2) they are like "laboratories," i.e., microcosms or simpler versions of the mainland; and (3) they have specific characteristics that set them aside from other geographical settings.

Not everybody agrees that islands are "special" or inherently "different" from mainland situations: coastal and island locations – for instance – share many features, proximity to the sea being the most obvious one. Nevertheless, islands, especially small ones, tend to amplify the effects of geographical and cultural variables, by virtue of being enclosed spaces, completely surrounded by water. Large islands may have more in common with the mainland than with smaller islands, but there are still important insights to be gained from their comparative study. Thus, while islands are not necessarily inherently different from the mainland, the effects of cultural and environmental processes are sometimes more evident on islands than on the mainland and can be more readily studied.

Definition

Island archaeology is the systematic and comparative study of island communities, their cultures, and environments. Islands can be studied both in their own right and as a key to understanding broader issues that may also be relevant to mainland settings. The effects of insularity can be assessed both in geographical and cultural terms, considering changing relations between nearby islands and the mainland, phases of relative isolation and connectivity, and different insular adaptations and cultural identities. Island archaeologists focus on issues including (but not limited to) seafaring, migration, colonization, settlement, abandonment, human-environmental adaptation, animal extinctions and introductions, resource exploitation, and cultural interaction. With respect to insular cultural identities, similarities and differences with nearby islands and mainland communities are equally revealing in terms of understanding shifting degrees of insularity and the extent of cultural interaction.

Historical and Theoretical Background

The development of island archaeology over the last 50 or so years reflects mainstream trends in archaeology, at times experimenting with new methods and theories. As a result, island archaeology has become an eclectic field at a global scale, while retaining a set of defining features. Although island environmental studies still feature prominently on the agenda, a noticeable trend in recent years is the shift towards a greater cultural focus. Key questions remain: in what way does insularity affect culture? And, conversely, do communities actively define their cultures and identity through insularity? Does it matter that it is on an island?

The following two papers provide useful historical and critical overviews of the development of the subject: (1) Matthew Spriggs (2008) wrote a chapter for a book entitled "Islands of Inquiry. Colonisation, seafaring and the archaeology of maritime landscapes" (edited by Geoffrey Clark, Foss Leach, and Sue O'Connor); (2) Cherry and Leppard (2014) wrote a review of island archaeology with a focus on the Mediterranean in "The Cambridge prehistory of the Bronze Age – Iron Age Mediterranean" (edited by Bernard A. Knapp and Peter Van Dommelen). Elements of this entry are also drawn from published and forthcoming work by the current author (Dawson 2014).

Following the "diffusionist" or "migrationist" paradigm prevalent in the 1950s–1960s, islands were originally considered as places vulnerable to outside influences or, alternatively, as backwaters, effectively isolated from mainstream change. As Spriggs (2008) points out, it was Margaret Mead (1957) who introduced the concept of "islands as laboratories" (whose origins can be traced back to early European travelers to the Pacific) to

mainstream academia in the 1950s. According to this principle, islands are ideal laboratories for studying ecosystems and societies, not because of their intrinsic isolation, but rather because "by studying clusters of islands, biologists view a simpler microcosm of the seemingly infinite complexity of continental and oceanic biogeography" (MacArthur and Wilson 1967: 3). A paper by Vayda and Rappaport on "Island Cultures" (1963) explained how this might work in practice, by spelling out some key principles: the so-called "founder" effect could explain why island communities diverge from their mainland parent populations (because of the limited size of the founder population), while the "rescue" effect explained why extinction is less likely to occur on islands that are within "commuting" distance of a replenishing source. These ideas were expressed mathematically in a seminal book entitled *The Theory of Island Biogeography*, by MacArthur and Wilson (1967). The authors formulated a theory, which stated that immigration and extinction on an island would reach equilibrium over time and that this process was affected by island size and distance to the mainland (or intervening stepping stone islands). Simberloff and Wilson (1969) subsequently devised an experiment to prove the theory and were able to demonstrate the effects of distance, in terms of relative and differential isolation, on island arthropod populations. Such "controlled conditions" (measureable in terms of size and distance) made islands similar to a natural laboratory.

In the 1970s, "processual" archaeologists began to adopt these ideas and engage with islands in their own right, emphasizing local developments and – inspired by the scientific rigor of island biogeography – searching for general and cross-cultural questions. Evans (1973) introduced the laboratory analogy to the Mediterranean islands. By this time, the radiocarbon revolution had revealed the fallacy of the diffusionist paradigm: for instance, in the Mediterranean, the megalithic cultures of Malta were shown to be much earlier than the Mycenaean remains that ought to have inspired them. Evans noted that the islands in the Mediterranean were not as remote as those in the Pacific, yet he considered the development of Malta's unique temples as the result of the island's cultural isolation during that particular period in prehistory. While he conceded that the Mediterranean was a highway rather than a barrier for contact, the idea of islands developing distinct cultures in isolation had a lasting legacy among Mediterranean archaeologists.

In 1981, Cherry wrote an article applying island biogeography in the Mediterranean using the area/distance parameters to explain differences in the rates of island colonization, an approach that for initial (Neolithic) settlement still holds relevance even in light of new data and discoveries some 20 years later (Dawson 2014). Island biogeography takes into consideration also cultural factors which may explain how communities overcome spatial limitations: distance (in terms of travel time) can effectively shrink through progress in boat technology (e.g., paddling vs. sailing), and even size and elevation have a relative rather than absolute effect on island settlement (such limitations can be overcome, e.g., through terracing or networks).

Cyprian Broodbank (2000) drew inspiration from the Pacific for his study of the Cycladic islands (Greece), where he adapted Terrell's (1977) "proximal point analysis" to predict patterns of connections between different islands and used it to develop his "islandscape" approach. This marked an important shift in island archaeology in the Mediterranean, which until then had been preoccupied with islands being isolated rather than being connected. Broodbank instead viewed insularity as "culturally constructed," "historically contingent," and "liable to change" (2000: 13).

Further developments were contained in a volume edited by Scott Fitzpatrick in 2004. Biological endemism can be explained by physical isolation (or the unlikelihood of plants and some animals to cross water bodies unaided); in contrast, water does not pose a barrier in the same way for humans. Since cultural isolation rarely occurred, the application of the "islands as laboratory" in archaeology is problematic and can

work only as long as we recognize that it is the archaeologists themselves who treat islands "*as if* they were isolated" (Terrell 1999: 241, in Fitzpatrick 2004: 5). The "idea" of a boundary sets islands aside from the mainland (Fitzpatrick 2004: 7) and emerges from the fact that they are well defined spaces: according to Terrell (1999: 240), they represent "living spaces surrounded by a considerable shift in habitat." Our ability to perceive of these spaces as distinct places is not limited to islands (it can also apply to other spaces surrounded by changes in habitat, such as enclosed valleys or oases); however, islands are more easily comparable, which makes them particularly attractive case studies.

In 2007, Paul Rainbird expressed his concerns regarding the legitimacy of an island archaeology approach arguing instead in favor of an archaeology of the sea, emphasizing similarities between island and coastal communities, as opposed to differences, thus ultimately focusing on connections rather than on isolation. His focus on the sea, however, treats island communities as consistently maritime in character, which is not always the case. In a volume entitled "Comparative island archaeologies," Conolly and Campbell (2008: iii) also argued that islands are not "privileged spaces to understand the past" while claiming that "islands are still good places to 'do' archaeology." Later on, they admit that islands "offer a *unique perspective* on human ecology because of their (usually) geographically circumscribed nature" (2008: 111, my emphasis). These statements, in apparent contradiction with each other, underline the evident paradox at the heart of island archaeology, which can be summed up as follows: "the separation of islands facilitated interaction" (Fitzpatrick 2004: 9). Assessing a community's relative isolation and connectivity and their effects over time, both in light of geographical categories and historically contingent factors, remains the real strength of a comparative island archaeological approach. Though tempting, it is hard to generalize about islands: island archaeology "implies comparison of insularity at different places and periods" (Renfrew 2004: 282).

Island archaeology has developed more readily in the Pacific and in the Mediterranean, with a few notable exceptions. Curet (2004: 187) lamented "the near absence of the Caribbean in the debate surrounding issues of island archaeology" while arguing that the archaeological record from the Caribbean islands "contradicted . . . the idea of islands as appropriate units of analysis," since communities on adjacent islands often had more in common than with people on opposite sides of the same island (Curet 2004: 191). In contrast, the editors of the recent *Oxford Handbook of the Caribbean Archaeology* stated in their introduction that the island provides a useful point of departure given that "at a general level of comparison, cultural differences in the Caribbean correspond to differences in the islands and their configurations" (Keegan et al. 2013: 3).

The comparison between geographical and cultural units is therefore one of the strengths of an island archaeological approach. Identities and cultures are not bounded in the same way as space: culture spills over the edges of geography. Anthropologists have noted that cultural groups are very rarely isolated, on the contrary they tend to develop from interaction (Eriksen 1993). Islands are not closed microcosms, but they provide fertile grounds for the comparative study of cultural interaction, which may result both in cultural similarities and differences, and contribute to the creation of distinctive island identities.

Island archaeology also has potentially a great contribution to make to island communities in the present. Such communities are braced against considerable challenges and – in extreme cases – threats to their natural and cultural heritage, mostly arising from the effects of climatic and environmental change. Numerous initiatives (such as the IHOPE Islands project) are developing policies to tackle these issues. Islands are often considered to illustrate how humans have impacted on the environment, whether positively and negatively, and to provide particularly good examples of both vulnerability and resilience. Islanders may act shortsightedly, wreaking an ecological catastrophe on themselves;

alternatively, they may be custodians of precious traditional knowledge that can be used to mitigate such threats. Easter Islanders are a case in point: they have been portrayed both as responsible for their own "eco-suicide" (Bahn and Flenley 1992) and as a "sustainable society" (Hunt and Lipo 2011). The unfortunate down-side of such polarized views is that they tend to turn islands into stereotypes: vulnerability and resilience are not absolute categories, rather their meaning has to be contextualized (Kelman 2018). Such discussions should take into account what islanders themselves have to say (Kelman 2018).

Island Archaeology in Practice

Archaeological survey has a long tradition in island archaeology and – especially when combined with excavation and palaeoenvironmental reconstructions – is arguably the most productive tool for island investigation as it allows comparative and diachronic study (see "Further Reading" for examples). Island survey is closely allied to spatial analysis, with Geographical Information Systems in particular being widely applied to survey data in order to study changing site distributions in time and space. GIS-based spatial analysis focuses not just on intra-island site relations but also at the inter-island scale, for example, using intervisibility analysis and modeling maritime travel. Underwater surveys encompass the seascape (submerged coastlines, structures, shipwrecks) and combined with terrestrial surveys can tell us about maritime contact (e.g., exotic materials, which might indicate long-distance exchange).

Network analysis is another natural ally of island archaeology since it captures connections at multiple scales (see "Further Reading" section). Islands or sites within them provide easily recognizable nodes, and evidence of contact can be used to connect them and create "edges" (or links) in order to reconstruct a network. Network analysis can be used – for example – to explain why islands lacking resources may support a sizeable population, to explain the success of a community as it benefits from the network and its potential decline if it relies excessively on the outside world for survival. Networks can be descriptive (presence/absence or frequencies of certain classes of material) and exploratory. Point Proximal Analysis (PPA) was one of the first applications of network analysis employed by archaeologists (and all it required was a pencil and ruler! John Terrell pers. comm. 2018). In PPA, each node is linked to its nearest three or four neighbors; these can either be sites that are geographically nearest or share the highest similarity with respect to certain archaeological features. Nodes may represent known sites or hypothetical locations and those with more connections are considered more central. PPA can also adopt a "fixed radius" model to simulate the creation of networks: here all the nodes that lie within a certain distance are connected. Terrell (1977) pioneered this in his study of the Solomon Islands and Broodbank (2000) to his study of interaction in the Bronze Age Cyclades, which simulated the range of travel of a canoe and sailing boat.

Islands offer useful case studies also for exploring qualitative aspects of space. A distinct feature of islands is their "sense of place," which arises from their being bounded by the sea, and is particularly evident on smaller islands, where the coastline is more conspicuous. Studies of present-day islanders suggest that such clear terrestrial boundaries foster a strong sense of community derived by geography: physical containment results in strong place identification. Archaeologists working on islands have begun to explore these insights through phenomenological fieldwork, employing methods that highlight specific qualities of insular spaces (e.g., stone quarrying on Easter Island, see section on "Further Reading").

Key Issues/Current Debates

Island archaeology is an interdisciplinary endeavor that combines environmental and

cultural approaches. It is about understanding degrees of isolation and connectivity: an island may be geographically remote/close, and culturally inward/outward looking, but there are no general rules and ultimately insularity is shaped both by geography and culture. Although cultural isolation is not a necessary consequence of physical containment, islands are broadly considered as more isolated in comparison to noninsular location. The sea is not a barrier for contact, but the effects of winds and currents on seafaring technology at different times cannot be ignored either: connectivity takes place *despite* the obvious challenges of insularity.

In the Pacific, for example, there is still little agreement on the relative weight of archaeological, biological, and linguistic data in substantiating both isolation and interaction (Cochrane and Hunt 2017). Theories on the colonization of this region differ between a phylogenetic approach (a common ancestral population split into separate groups that colonized separate islands or archipelagos and underwent cultural, linguistic, and biological evolution in relative isolation) and a reticulate approach (cultural similarities and differences cannot be explained by branching patterns of descent but by patterns of relatedness) (see discussion in Cochrane and Hunt 2017).

Another current debate surrounds the increasingly earlier evidence of island colonization emerging from the Pacific (recently reviewed by Bellwood in 2017) where hominin occupation currently goes back to at least a million years ago and modern human occupation to at least 50,000 years ago (see "Further Reading" for individual references). Homo floresiensis, popularly known as "the hobbit," made headlines when it was first discovered in 2003 on the island of Flores, as it was shown to be a new species, somehow capable of crossing water and colonizing new land. "Hobbit" fossils belonging to a number of individuals at the Liang Bua cave were arguably dated to between 95,000 and 17,000 years ago. Different locations in Flores have since yielded tools often associated with butchered animal remains: they were dated to about one million years BP (at a site called Wolo Sege) and 700,000 BP (at Mata Menge, where hominin remains were also found). If they represent hobbit's ancestors, the species' prolonged isolation could explain the dwarfism. Recent reports from the Philippines (at Kalinga cave) also place their earliest colonization date around 700,000 BP.

Evidence pertaining to our own species is usefully summarized in the recent *Oxford Handbook of Prehistoric Oceania* (O'Connor and Hiscock 2017): an open sea crossing was necessary to reach Sahul (a palaeolandmass comprising Australia, Tasmania, and New Guinea) from Sunda (an area now submerged along the edge of southernmost Eurasia). This happened over 50,000 years ago and required navigating across the vast region of Wallacea with its 17,000 islands. Remains at the Callao Cave (northern Luzon, Philippines) were directly dated to circa 67,000 BP: they may represent the descendants of the Kalinga cave occupants or a new wave of colonization. In Near Oceania, the earliest occupation in the Bismarck Archipelago to the northeast of New Guinea, and caves sites in East Timor, has been dated to ca. 43,000 years BP and in surrounding islands ca. 20,000 years ago.

This growing body of evidence has important repercussions for our understanding of subsequent migrations out of Africa and associated seafaring capacities – whether the sea posed a barrier or a passage for mobility, both for our species and earlier ones – and the purposefulness or accidentalness of such endeavors. The evidence of such early water crossings from Island South East Asia has given an impetus to research elsewhere, with archaeological fieldwork targeting areas that could represent likely landfalls and favorable ecological niches. The earliest evidence for island colonization in the Mediterranean at present comes from the Aegean (see "Further Reading" section). Recently discovered stone tools in Crete and Naxos have been dated to the Lower and Middle Palaeolithic (as early as c. 300,000 BP). This early dating has been challenged on a number of accounts: there are no actual anthropological remains and the sites are dated indirectly (either on typological grounds or based on the geological strata where the tools were embedded). Work on both islands is ongoing.

International Perspectives

While still relatively "young," island archaeology has already developed a strong international outlook. While the southern Pacific remains its natural "home," advances in the Mediterranean especially, followed by the northern Pacific and Caribbean, have been particularly significant in the last two decades. In contrast, archaeologists working on Africa's islands and in the Indian Ocean are yet to fully engage with these debates (see "Further Reading").

Island archaeology is also becoming more integrated into the broad field of island studies, which is likely to prove highly beneficial since new insights can be gained from the study of present-day island communities and the issues they face. Current debates can be relevant to our understanding of past communities; in return, the archaeological record anchors such issues to a long-term perspective (the journal Shima is a prime example of this potential).

Future Directions

Island archaeology is of growing interest and concern as islands are at the forefront of global environmental change. Islands are still relatively unexplored so that there is great potential for new discoveries and for their continued contribution to cognate fields of study, particularly landscape, environmental, and bioarchaeology (in particular, stable isotope and aDNA analysis with regards to processes of island colonisation). Islands' contribution to archaeological theory has already been outlined above and will continue to be a fertile testing ground in the future, as it encourages both categorical and relational thinking. Finally, island archaeology may be going through a revival of the "island laboratory" concept, as researchers reconsider the value of considering global issues through the lenses of insularity. As the systematic study of islands continues to shed light on human-environmental adaptation, it is becoming increasingly relevant to society. The study of islands communities, past and present, holds great potential for the future, in terms of understanding current societal concerns, environmental challenges, demographic movements, and the issues faced by small communities in a context of globalization.

Cross-References

- ▶ Greek Islands (Excluding Crete), Archaeology of
- ▶ Italy, Sicily, Malta, and the Lipari Islands: Prehistory
- ▶ Pacific Islands: Finding the Earliest Sites

References

Bellwood, P. 2017. *The first islanders. Prehistory and human migration in island Southeast Asia*. Oxford: Wiley.

Broodbank, C. 2000. *An island archaeology of the early cyclades*. Cambridge: Cambridge University Press.

Cherry, J. 1981. Pattern and process in the earliest colonization of the Mediterranean Islands. *Proceedings of the Prehistoric* 47: 41–68.

Cochrane, E.E., and T.L. Hunt. 2017. The archaeology of prehistoric Oceania. In *The Oxford handbook of prehistoric Oceania*, ed. E. Cochrane and T. Hunt, 1–29. New York: Oxford University Press.

Conolly, J., and M. Campbell. 2008. *Comparative island archaeologies*, BAR international series 1829. Oxford: Archaeopress.

Curet, L.A. 2004. Island archaeology and units of analysis in the study of ancient Caribbean societies. In *Voyages of discovery. The archaeology of islands*, ed. S.M. Fitzpatrick, 187–202. Westport/London: Praeger.

Dawson, H. 2014. *Mediterranean voyages. The archaeology of Island colonisation and abandonment*. Walnut Creek: Left Coast Press.

Evans, J.D. 1973. Islands as laboratories for the study of culture process. In *The explanation of culture change: Models in prehistory*, ed. A.C. Renfrew, 517–520. London: Duckworth.

Fitzpatrick, S.M. 2004. Synthesizing island archaeology. In *Voyages of discovery. The archaeology of islands*, ed. S.M. Fitzpatrick, 3–20. Westport/London: Praeger.

Keegan, W.F., C.L. Hofman, and R. Rodríguez Ramos. 2013. Introduction to the archaeology of the insular Caribbean. In *The Oxford handbook of Caribbean archaeology*, ed. W.F. Keegan, C.L. Hofman, and R. Rodríguez Ramos, 1–20. Oxford: Oxford University Press.

MacArthur, R.H., and E.O. Wilson. 1967. *The theory of Island biogeography*. Princeton: Princeton University Press.

I

Mead, M. 1957. Introduction to Polynesia as laboratory for the development of models in the study of cultural evolution. *Journal of the Polynesian Society* 66: 145.

O'Connor, S., and P. Hiscock. 2017. The peopling of Sahul and near Oceania. In *The Oxford handbook of prehistoric Oceania*, ed. E. Cochrane and T. Hunt, 26–47. Oxford: Oxford University Press.

Rainbird, P. 2007. *The archaeology of islands*. Cambridge: Cambridge University Press.

Renfrew, C. 2004. Islands out of time? Towards an analytical framework. In *Voyages of discovery. The archaeology of islands*, ed. S.M. Fitzpatrick, 275–229. Westport/London: Praeger.

Simberloff, D.S., and E.O. Wilson. 1969. Experimental zoogeography of islands: The colonization of empty islands. *Ecology* 50 (2): 278–296.

Spriggs, M. 2008. Are islands islands? Some thoughts on the history of chalk and cheese. In *Islands of inquiry. Colonisation, seafaring and the archaeology of maritime landscapes,* ed. G. Clark, F. Leach, and S. O'Connor, 211–226. ANU E Press, Australian National University Press, Canberra.

Terrell, J. 1977. *Human biogeography in the Solomon Islands*. Chicago: Field Museum of Natural History.

Terrell, J. 1999. Comment on Paul Rainbird, 'Islands out of time: Towards a critique of island archaeology'. *Journal of Mediterranean Archaeology* 12 (2): 240–245.

Vayda, A.P., and R.A. Rappaport. 1963. Island cultures. In *Man's place in the island ecosystem*, ed. F.R. Fosberg, 133–144. Honolulu: Bishop Museum.

Links

http://ihopenet.org/the-ihope-islands-project/
http://shimajournal.org/index.php
https://sciencedialogues.com/articles/biological/dynamic-network-analysis-6-what-is-a-network/

Further Reading

Bahn, P., and J. Flenley. 1992. *Easter island, Earth island*. London: Thames and Hudson.

Bevan, A., and J. Conolly. 2013. *Mediterranean Islands, fragile communities and persistent landscapes: Antikythera in long-term perspective*. Cambridge: Cambridge University Press.

Carter, T., D. Contreras, S. Doyle, D.D. Mihailović, T. Moutsiou, and N. Skarpelis. 2014. The Stélida Naxos archaeological project: New data on the middle Palaeolithic and Mesolithic Cyclades. *Antiquity Project Gallery* 88 (341). https://www.antiquity.ac.uk/projgall/carter341.

Cherry, J.F., and T.P. Leppard. 2014. A little history of mediterranean island prehistory. In *The Cambridge prehistory of the bronze and Iron age Mediterranean*, ed. A.B.. Knapp and P. van Dommelen, 10–24. Cambridge: Cambridge University Press.

Dewar, R.E. 1997. Does it matter that Madagascar is an Island? *Human Ecology* 25 (3): 481–489.

Eriksen, T.H. 1993. In which sense do cultural islands exist? *Social Anthropology* 1: 133–147.

Hamilton, S. 2016. Materialising island worlds: The case of prehistoric Rapa Nui (Easter Island). In *Rapa Nui – Easter Island: Cultural and historical perspectives*, ed. I. Conrich and H. Mückler, 129–148. Berlin: Frank & Timme.

Hay, P. 2006. A Phenomenology of Islands. *Island Studies Journal* 1 (1): 19–42.

Hunt, T., and C. Lipo. 2011. *The statues that walked. Unraveling the mystery of Easter Island*. New York: Free Press.

Ingicco, T., G.D. van den Bergh, C. Jago-on, J.-J. Bahain, M.G. Chacón, N. Amano, H. Forestier, C. King, K. Manalo, S. Nomade, A. Pereira, M.C. Reyes, A.-M. Sémah, Q. Shao, P. Voinchet, C. Falguères, P.C.H. Albers, M. Lising, G. Lyras, D. Yurnaldi, P. Rochette, A. Bautista, and J. de Vos Carter. 2018. Earliest known hominin activity in the Philippines by 709 thousand years ago. *Nature* 557: 233–237.

Irwin, G. 1983. Chieftainship, Kula and trade in Massim prehistory. In *The Kula: New perspectives on Massim exchange*, ed. J.W. Leach and E. Leach, 29–72. Cambridge: Cambridge University Press.

Kelman, I. 2018. Islands of vulnerability and resilience: Manufactured stereotypes? https://doi.org/10.1111/area.12457.

Knappett, C. 2011. *An archaeology of interaction. Network perspectives on material culture and society.* Oxford: Oxford University Press.

Leppard, T.P., and C. Runnels. 2017. Maritime hominin dispersals in the Pleistocene: Advancing the debate. *Antiquity* 91: 510–519.

Mijares, A.S., F. Détroit, P. Piper, R. Grün, P. Bellwood, M. Aubert, G. Champion, N. Cuevas, A. De Leon, and E. Dizon. 2010. New evidence for a 67,000-year-old human presence at Callao cave, Luzon, Philippines. *Journal of Human Evolution* 59 (1): 123–132.

Mitchell, P. 2004. Towards a comparative archaeology of Africa's islands. *Journal of African Archaeology* 2 (2): 229–250.

Seetah, K. 2010. "Our struggle". Mauritius: An exploration of colonial legacies on an 'island paradise'. *Shima* 4 (1): 99–112.

Simmons, A.H. 2014. *Stone age sailors. Paleolithic seafaring in the Mediterranean (with contributions by K. Di Benedetto)*. Walnut Creek: Left Coast Press.

Strasser, T.F., E. Panagopoulou, C.N. Runnels, P.M. Murray, N. Thompson, P. Karkanas, F.W. McCoy, and K.W. Wegmann. 2010. Stone age seafaring in the Mediterranean: Evidence from the Plakias region for lower Palaeolithic and Mesolithic habitation of Crete. *Hesperia* 79 (2): 145–190.

Strasser, T.F., C.N. Runnels, K.W. Wegmann, and N.C. Thompson. 2011. Dating Palaeolithic sites in southwestern Crete, Greece. *Journal of Quaternary Science* 26 (5): 553–560.

Island Nation Sites and Rising Sea Levels

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Introduction

Island nations around the world face major challenges to protect their heritage in the twenty-first century as sea levels rise, flooding low-lying coastlines and damaging or destroying significant cultural sites. Many countries surrounded by seas are affected by inundation with some low-lying Pacific islands with coasts only a few meters above sea level already damaged or partially abandoned. Traditional ways of life have changed as people try to protect their homes, lands, gardens, and cultural sites, or abandon them to move to higher ground. Rising sea levels have severely disrupted some island cultures but rejuvenated others as people forge stronger kinship links to cope with climate change.

Rising sea levels and storms, cyclones, tsunamis, and tidal surges have filled island bays, lagoons, rivers and eroded banks, beaches, deltas, headlands, and peninsulas along coast lines where many people live closer to the water, rarely more than 3–4 m above average sea levels (Henry and Jeffrey 2008: 13). Significant cultural sites have been washed away, waterlogged, damaged by salt, or submerged. These include landscapes, buildings, monuments, temples, graveyards, and middens. Iconic World Heritage cultural sites such the City of London and Timbuktu and natural places such as surf beaches, fishing and hunting grounds, tropical rainforests, and coral reefs are also threatened.

Definition

Vulnerable island nations include both large continental islands and archipelagos and small island and atoll states in Europe, Africa, Asia, the Middle East, and Oceania. Countries identified at the greatest risk of inundation have been identified using data from scientific studies based on United Nations predictions of sea level increases in the twenty-first century by the UN's fourth Intergovernmental Panel on Climate Change (Core Writing Team et al. 2007: 44–6) and confirmed after 5 years by the United Nations Framework Convention on Climate Change (UNFCCC 2005) at the Doha Climate Change Conference. The countries at risk include Australia; New Guinea; New Zealand; Britain; Bali, Indonesia; Cebu, Philippines; Chuuk; Eastern Island, Chile; Hainan, People's Republic of China; Hawaii, United States; Jejudo, South Korea; Loyalty Islands; the Maldives Islands; the Marshall Islands; Tuvalu; Tokelau; Kiribati; Phuket, Thailand; Prince Edward Island, Canada; Riau Islands Province and Western Province; and the Solomon Islands.

> Coasts have been modified and intensively developed in recent decades and thus made even more vulnerable to higher sea levels. Developing countries with their weaker economies and institutions face the gravest risks, but the low-lying coastal zones of developed countries could also be seriously affected. Given the present degree of protection, a sea-level rise of one metre would cause estimated land losses of 0.05% in Uruguay, 1% in Egypt, 6% in the Netherlands, 17.5% in Bangladesh, and up to about 80% for Atoll Majuro in the Marshall Islands (UNFCCC 2012).

Even a large continental island such as Australia faces a threat to its indigenous and historic sites caused by erosion from rising seas. Australian researchers have found that Aboriginal sites on the foreshores of Middle Harbour, in Sydney's heart, are among places that face devastation, with possibly a quarter of all sites likely to be damaged or destroyed by rising sea levels and wave wash (McIntyre-Tamwoy 2008: 7). As Henry and Jeffrey (2008: 13) point out:

> Surrounded as they are by vast expanses of ocean, it is clear that small island states are at the forefront of the vulnerability in relation to the potential adverse effects of climate change, including sea level rise in sea surface temperature and increased intensity and frequency of extreme weather events.

Key Issues/Current Debates/Future Directions/Examples

Natural Climate Change and Sea Level Rise in Prehistoric Times

Sea levels have risen and fallen periodically due to natural causes throughout the Earth's history, flooding and exposing coastlines and damaging heritage sites. The International Geosphere-Biosphere Programme (IGBP) has reported that new records from Israel, Tasmania, Alaska, and Greenland for the last centuries to millennia showed that sea levels responded to moderate climate changes during the Medieval Climate Anomaly (c. 950–1300 CE) and the Little Ice Age (c. 1450–1850 CE). The IGBP stated that:

> During the last interglacial (c. 125,000–114,000 years ago) – at a time when climate was a few degrees warmer and overall sea level several metres higher than today – new coral data from the Bahamas indicate that rates of sea-level rise were significantly faster than during the late Holocene (the past three millennia). This suggests that the ice sheets were less stable in conditions slightly warmer than today (IGBP 2011: 20).

The land bridges between Australia and New Guinea were submerged during the Holocene, cutting off close contact between Australian Aborigines and neighboring New Guinea tribal groups to the north and south, a separation that led to social changes as interaction across borders was reduced and cultural diffusion slowed (Mulvaney and Kamminga 1999: 261). The disruption to the flow of ideas, beliefs, genes, tools, and technologies led the separated Australian and New Guinean societies to develop strategies to preserve cultural contact. Long-distance trade journeys by canoe between Australia and New Guinea across the Torres Strait helped to maintain kinship ties, encourage trade, and reinvigorate cultural values. "Some parts of the [Australian] continental shelf were so low-lying and had such a low gradient that during periods of accelerated sea level rise the shoreline migrated inland at the phenomenal rate of one metre per day" (Mulvaney and Kamminga 1999: 273).

Contemporary Human Activity and Climate Change

In the past millennia, human activity including the development of intensive agriculture, establishment of cities, and the industrial revolution has been shown to contribute to climate change. Island nations have had to draw on their experiences of natural climate change during prehistory to deal with the outcomes of anthropogenic activity that have warmed the planet. Polar ice caps and land-based ice sheets have melted further and ocean water has expanded, raising sea levels still further. "The climate of our planet is changing. The climate has always been variable, but today there is a growing concern over climate change issues, perhaps because the magnitude of the change seems to be unprecedented but, more importantly, because there is strong evidence to suggest that humanity might be directly responsible for climate change," the United Nations Educational, Scientific and Cultural Organization (UNESCO 2007: 12) has found.

Forest clearing, burning fossil fuels, farming, and industrial development during the past millennia have allowed the release of more greenhouse gases including carbon dioxide and methane into the atmosphere, trapping heat on the planet's surface, melting ice caps, and warming oceans. The International Geosphere-Biosphere Programme has warned: "In addition to the large carbon sink, scientists now know that deforestation is responsible for emitting 2.9 billion tonnes of carbon per year – an exchange that had not been quantified in the past because of a lack of data. For comparison, total emissions from fossil fuels are currently above eight billion tonnes of carbon per year" (IGBP 2011: 21).

United Nations Concerned Deltas and Small Islands Vulnerable

The United Nations' Intergovernmental Panel on Climate Change (IPCC) has suggested that deltas and small island states are particularly vulnerable to sea level rise caused by both thermal expansion and ocean volume. The 2007 Fourth Assessment Report (AR4) by the IPCC indicated that during

the twenty-first century, sea levels are expected to rise another 18–59 cm (7.1–21 in) (Core writing team et al. 2007: 44–6). "Anthropogenic warming and sea level rise would continue for centuries due to the time scale associated with climate processes and feedbacks even if GHG [Greenhouse Gas Concentrations] were to be stabilized" (Core writing team et al. 2007: 44–6).

Sea level changes caused by human activities have been proven to result in environmental, humanitarian, or economic losses to small island states. The IPCC has forecast that thermal expansion will cause most of the increase in sea levels during the twenty-first century; however, other factors not directly related to climate change can also raise or lower sea levels. Subsidence, tectonic forces, submergence, and postglacial rebound too affect sea levels (Rowland 2008: 24).

ICOMOS Develops Strategy to Protect Cultural Heritage

The International Council on Monuments and Sites (ICOMOS) has developed a strategy to protect global heritage sites from the effects of climate change by giving priority to sites that can be saved and those which are considered unlikely to be salvageable, which can be documented or have archaeological salvage and research carried out. The ICOMOS Scientific Council Symposium on Cultural Heritage and Global Climate Change (2008: 1–3) described the issues as "managing static remains in a dynamic landscape" . . . climate change accelerates and magnifies the dynamism of the landscape."

The Scientific Council identified 13 areas where cultural heritage would be affected: polar heritage, earthen architectural heritage, stone, fortifications, structural stability, twentieth-century heritage, archaeological sites, vernacular, historic villages and cities, training, cultural tourism, intangible heritage, cultural landscapes, and heritage ensembles and interpretation. "All of these examples underline an important dimension of global climate change as it impacts cultural heritage, namely, that it is often about loss and destruction as much as preservation. In the cases where the loss of cultural heritage resources cannot be prevented or mitigated, its significance actually transforms itself from that of tangible to intangible heritage. Monuments or natural features documented before their destruction become cultural memories" (ICOMOS 2008: 4).

United Nations Cites World Heritage List Sites at Risk

The United Nations Educational, Scientific and Cultural Organization (UNESCO) report, Case Studies on Climate Change and World Heritage, has highlighted the dangers posed by rising sea levels and flooding to sites on the World Heritage List in Europe, Africa, and the Middle East and the need for international action to prevent further damage. The Director General of UNESCO, Koïchiro Matsuura, stated that the international community generally agreed that climate change would be one of the twenty-first century's major challenges and a coordinated approach to issues such as environmental preservation and sustainable development was needed (UNESCO 2007: 5).

UNESCO has warned that rising sea levels and flooding could devastate buildings and historic settlements and cities, citing the World Heritage places of the City of London and other European sites, Timbuktu and Mali in Africa, and, in the Middle, East Ouadi Qadisha and Lebanon's Forest of the City of God. These sites are vulnerable to the aftereffects of flooding such as a buildup of salt on buildings which damages decorations including paintings and frescoes, while rises and falls in ground level destabilizes buildings as changes weaken foundations and crack walls. Conservators and restorers face the complex task of dealing with the interactions between the natural, cultural, and social elements of conservation (UNESCO 2007: 52, 53).

Rising Sea Levels Threaten Traditional Island Cultures

Chuuk, in the Federated States of Micronesia, faces major challenges from rising sea levels that threaten to cover its many small outer coral atolls and islands, disrupting traditional ways of life as many

people live on the coast close to the ocean close to their land. Hezel observed that land and life were inextricably tied together for Melanesians who regard ownership as part of being fully human. "If land was life for traditional Melanesians, then loss of land was a form of death: in Chuuk, according to one author (Parker 1985) it was lamented with the cry "I am no longer alive" (Hezel 2001: 34–5).

In traditional island societies, land ownership and kinship systems are closely tied. Damage caused by climate change to significant natural and human-made places can have profound effects on cultures, leading to changes in social structures and customs, language, knowledge, traditions, and mythology. The loss of traditional lands for islanders has profound consequences for their societies with some people forced to try to protect cultural sites by building sea walls or even to abandon them and move to higher ground. Societies have adapted to the effects of weather and climate change to protect themselves from harm caused by such events as floods, storms, and droughts. However their ability to cope with the increasing impact of rising sea levels may be stretched beyond their ability to cope (Core writing team et al.: 2007 56).

Island governments have now recognized that to counter the effects of rising sea levels on Pacific islands, strategies need to be integrated with social and economic factors such as development and humanitarian issues to create effective regional responses rather than being driven by central administrations (IGBP 2011: 18). Some island states have to deal with a combination of such factors as large populations in coastal areas prone to hazards and a limited capacity to respond effectively to disasters. "Vulnerability and related assessments in the Pacific are now better aligned with the realities of the circumstances of small islands," according to the International Geosphere-Biosphere Programme (IGBP 2011: 18).

Paradoxically, loss of significant heritage sites submerged by rising seas may also spur renewal of island cultures. Traditional ties to land broken by dispossession can be strengthened by forging new social connections to survive change and by drawing upon historical knowledge.

> In terms of indigenous cosmologies too, there exists narrative knowledge of the dynamic nature of island formation in the past and local acceptance of the possibility of such environmental change – stories of islands disappearing into the sea, or either being either thrown down 'fished up' by various ancestral beings or culture heroes (Leasa 1961, in Henry and Jeffrey 2008: 13).

In traditional societies, a past strategy that helped to renew cultural ties during times of turbulent change was to strengthen kinships and exchange networks between low-lying coral atolls and neighboring high islands. ". . . Loss is also a productive notion, creative of heritage values celebrating social practices and tenure regimes, indigenous knowledge, economic and political institutions, exchange networks that become key tools for resilience and adaptation" (Henry and Jeffrey 2008: 17). Islands surrounded by seas have found ways to integrate their culture and changing maritime environment by conceiving of them as positive elements in social development. Rainbird (2004: 53) describes social flows as being linked to "heritage values of a cultural landscape constructed in terms of movement, so that rather than being a barrier, the sea is conceptualized as a 'way' or 'pathway' of connection."

Conclusion

In summary, the extent and effects of sea level rise on island states and nations are still being studied and the outcomes may not be known for many years. Damage or destruction of heritage by inundation has a significant effect on traditional cultures, which are closely tied to land ownership and linked through kinship systems. The experience of the loss of lands, homes, and important places from rising seas in the past is deeply embedded in the memories of traditional societies, and the lessons learned have developed their resilience, ability, and determination to survive. The ability of island societies to revitalize their traditional cultures during times of major change by celebrating indigenous social practices can also have a protective effect and help them to overcome the sense of loss and develop a new identity.

Cross-References

- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Disaster Response Planning: Earthquakes
- ▶ Disaster Response Planning: Fire
- ▶ Disaster Response Planning: Flood
- ▶ Disaster Response Planning: Tsunamis
- ▶ UNESCO World Heritage Convention (1972)

References

Case Studies on Climate Change and World Heritage. 2007. France, UNESCO world heritage centre. Available at http://whc.unesco.org/documents/publi_climatechange.pdf. Accessed 25 Nov 2012.

Core Writing Team. 2007. In *Contribution of working groups I, II and III to the fourth assessment report of the intergovernmental panel on climate change*, ed. R.-K. Pachauri and A. Reisinger. Geneva: IPCC. Available at http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html. Accessed 25 Nov 2012.

Henry, R., and W. Jeffrey. 2008. Waterworld: the heritage dimensions of 'climate change' in the Pacific. *Historic Environment* 21 (1).

Hezel, F.X., and M. J. Levin. 1996. New trends in Micronesian migration: FSM migration to Guam and the Marianas. Micronesian Counsellor 19.

ICOMOS. 2007. Recommendations from the Scientific Council Symposium Cultural Heritage and Global Climate Change (GCC). Pretoria. Available at http://www.icomos.org/en/what-we-do/focus/heritage-and-climate-change. Accessed 25 Nov 2012.

International Geosphere-Biosphere Programme (IGBP). 2011. *Annual report. IGBP Secretariat*. Stockholm: The Royal Swedish Academy of Sciences. Available at http://www.igbp.net/about.4.6285fa5a12be4b403968000417.html. Accessed 24 Nov 2012.

McIntyre-Tamwoy, S. 2008. The impact of global climate change and cultural heritage: Grasping the issues and defining the problem. *Historic Environment* 21 (1): 1–9.

Mulvaney, J., and J. Kamminga. 1999. *Prehistory of Australia*. Sydney: Allen & Unwin.

Rainbird, P. 2004. *The archaeology of Micronesia*. Cambridge: Cambridge University Press.

Rowland, M. 2008. Saving the past from the future. *Historic Environment* 21 (1): 2–9.

United Nations Framework Convention on Climate Change (UNFCCC). 2005. Sea levels, oceans and coastal areas. Available at unfccc.int/cop3/fccc/climate/fact11.htm. Accessed 10 Dec 2012.

Island Southeast Asia: Neolithic

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Introduction

Island South East Asia (ISEA) comprises the tropical islands lying in between Mainland Southeast Asia (MSEA) and Taiwan to the northwest and Australia and New Guinea to the southeast (Figure 1). The western islands lie on a shallow continental shelf, the Sunda Shelf, and were connected to MSEA during the Pleistocene. The eastern islands that have been separated from the mainland and from each other by deep marine troughs include the Philippines (east of Palawan), Sulawesi, northern Moluccas, and the Nusa Tenggara ("southeast") islands. Accordingly, colonization of eastern ISEA by anatomically modern humans (AMH), leading to the colonization of Australia and New Guinea by 50,000 years ago, would have required watercraft capable of transporting groups of people numerous enough to establish viable daughter colonies. By 5,000 years ago, on the eve of the Neolithic, all of the large islands and many of the small islands of ISEA were settled by foragers whose most consistent archaeological signature is flaked stone artifacts (Bellwood 2017).

The Holocene climate of ISEA is generally monsoonal, or permanently wet near the equator which is impacted by both the northern and southern hemisphere monsoons. Across most of ISEA, even in rain shadow localities, access to fresh water is adequate, apart from pockets (especially in Nusa Tenggara) that face a chronic danger of drought. The long coastlines of ISEA provide many of the inhabitants access to abundant marine, littoral, and mangrove resources, but terrestrial resources are unevenly distributed. For instance, floral diversity and the opportunity for

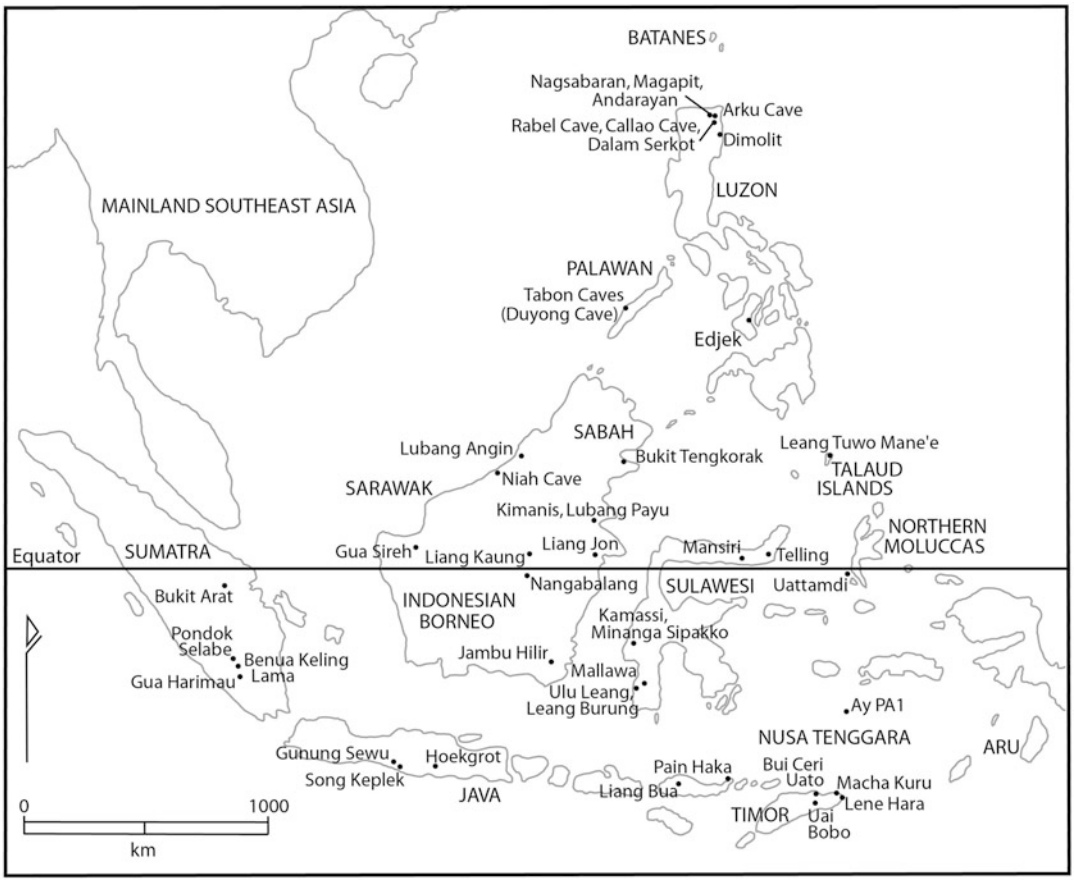

Island Southeast Asia: Neolithic, Fig. 1 Island South East Asia: Neolithic sites mentioned in the text

extraction of forest produce generally correlate with rainfall, while native mammalian diversity is highest on the largest islands on the Sunda Shelf and low across Nusa Tenggara.

The period of ethnographic contact began in the sixteenth century when competing European powers intervened in ISEA's maritime trade, notably the Moluccan spices. By this time, the great majority of ISEA's inhabitants spoke languages belonging to the Malayo-Polynesian branch of the Austronesian family, including the Philippine "Negritos" and many of the Moluccan/Nusa Tenggara inhabitants, whose dark skin and coiled hair distinguished them from most other ISEA inhabitants with their "Mongoloid" phenotype. Reliance on pottery and iron tools was firmly established across ISEA, associated with a variety of subsistence regimes that ranged from intensive wet-rice agriculture to swidden horticulture and specialized maritime and/or terrestrial foraging. Large kingdoms had evolved, with an economic base in wet-rice production and/or entrepôt trade, but small-scale societies were widespread, including small chiefdoms (with an agricultural basis) and egalitarian societies (often based on a foraging economy). The ISEA Neolithic, and the Early Metal Age that followed it, were a bridge between the stone-flaking foragers of the mid-Holocene and ISEA's kaleidoscope of ethnographically recorded societies (Bellwood 2017).

Definition

ISEA is defined here as the triangle of islands lying between the Philippines, Aru (southern

Moluccas), and Sumatra, excluding the Malay Peninsula. As explained by Spriggs (2011), the ISEA Neolithic is defined by the appearance of earthenware pottery. Thus defined, it broadly covers the period 4,000–2,000 BP ("before present"), but with an earlier onset in the northern Philippines (Bellwood and Dizon 2013) and a later onset in some remote locations such as the Lake Towuti region in Sulawesi (Bulbeck et al. 2016). Neolithic contexts also often include stone artifacts polished over much or all of their surface and sometimes reveal evidence of farming such as traces of rice in pottery and skeletal remains of domesticated animals (Bellwood 2017). Small bronze artifacts have been documented in a couple of sites prior to 2,000 BP (Lloyd-Smith et al. 2013; Fauzi et al. 2016), but the appearance of large ceremonial bronzes and iron metallurgy were Early Metal Age developments (Bellwood 2017).

Historical Background

Early archaeologists working in ISEA embraced the chronology of successive "ages" established by John Lubbock for Europe, and so recognized the Neolithic ("New Stone Age") on the basis of adzes and other tools of polished stone (Van Heekeren 1972). Some association of the ISEA Neolithic with the spread of people with Mongoloid physical features and an agricultural subsistence was also widely aired; an early statement of this proposition is provided by Van Heekeren (1972: 203). With the development of radiocarbon dating, chronological guesswork on the antiquity of the Neolithic was replaced by radiometric determinations in Malaysian Borneo, the Philippines, and East Timor during the 1950s and 1960s, and finally in Indonesia in the 1970s (Bellwood 1978). In the 1980s, as a greater number of sites were dated, archaeologists focused on the appearance of pottery rather than polished stone tools as the touchstone for recognizing the Neolithic in ISEA (Spriggs 1989).

From the 1960s into the 1980s, archaeologists dated the origins of the ISEA Neolithic to the sixth millennium BP, approximately the same age as the oldest dates known at the time for the Neolithic in Taiwan. Spriggs (1989) trimmed the initiation date in ISEA back to 5,000 BP by rejecting dates on freshwater shell in limestone regions and other dates from clearly insecure contexts, and so agreed with the emerging view that Austronesian speakers with a homeland in Taiwan introduced the Neolithic to ISEA. Subsequent rejection of dates from rockshelter contexts with a small number of pottery sherds, probably displaced downwards from the overlying Neolithic levels, led to an even more conservative estimate of 4,000 BP for the spread of the Neolithic across ISEA. There are a couple of anomalously early dates but these are arguably insecure: the c. 5,000 BP date on charcoal near a flexed burial associated with a polished stone adze and four polished shell adzes, interred into a preceramic shell midden at Duyong Cave in the Philippines; and the c. 4,500 and 4,300 BP dates from the lower pottery layers at Gua Sireh, Sarawak (discussed below). Excluding these dates, a 4,500–4,000 BP date on pottery food residue in the Batanes Islands would be the "exception that proves the rule," because the location of these islands between Taiwan and Luzon would have made them the ideal stepping stones for the movement of the Neolithic from Taiwan to ISEA (Bellwood 2017).

The archaeologist most responsible for developing a large empirical basis to address the ISEA Neolithic is Peter Bellwood. Working with counterparts in Indonesia, Malaysia, and the Philippines, Bellwood led a series of ambitious field projects in northern Sulawesi, Sabah (northeastern Borneo), the Moluccas, and the Batanes Islands between the 1970s and the 2000s. The Batanes project is especially noteworthy in (1) adopting a "landscape" approach that allowed the identification of a range of open-air Neolithic sites in addition to the more easily locatable rockshelters and shell middens, (2) targeting an area that appears to have been free of pre-Neolithic occupation, and (3) documenting the pristine material culture and settlement system of the Malayo-Polynesian speakers who subsequently dispersed across ISEA (Bellwood and Dizon 2013). Bellwood also supervised postgraduate students from Indonesia, Sarawak, the

Philippines, and Taiwan, whose projects have resulted in major contributions to our knowledge of the ISEA Neolithic. Of particular interest are the excavation by Hsia-chun Hung at Nagsabaran (Oxenham et al. 2016), one of a series of shell middens strung along the Cagayan River in northern Luzon, and the excavations by Anggraeni (2012) at Kamassi and Minanga Sipakko, two buried habitation sites on the Karama River in West Sulawesi.

Other prominent researchers whose investigations have touched on aspects of the ISEA Neolithic include Ian Glover (1976, 1986), who excavated East Timor sites in the 1960s and South Sulawesi sites in the 1970s, and Dominik Bonatz (2009), who has led investigations into the megaliths of highland Sumatra and their Neolithic precursor at Bukit Arat. Three particular projects are notable in the following respects: their recent revival of a research initiative that traces back to the mid-twentieth century, and their discovery of major information on the Neolithic within the context of an occupation sequence that extended back tens of thousands of years.

One of these projects involves cave sites at the eastern tip of East Timor, including Lene Hara which was first excavated by the Portuguese archaeologist Almeida in the 1950s. Discoveries germane to the Neolithic (O'Connor 2015) include direct dating (on bone) of a dog burial and translocated fauna (civet cat from the west, possum from the east) to around 3,000 BP, as well as conclusive documentation of terminal Pleistocene to mid-Holocene jewelry and fish hooks of shell, which have conventionally been interpreted as Neolithic introductions to ISEA. Importantly, in this context, it is now clear that polished shell adzes were manufactured in the central Philippines and the Moluccas (and Papua New Guinea) by the early middle Holocene, potentially supporting a mid-Holocene date for the Duyong flexed burial (Pawlik et al. 2015) but certainly earlier than the shell adze interred at the Neolithic cemetery of Pain Haka in Flores (Galipaud et al. 2016). The second project concerns the Niah Caves in Sarawak, which had been intensively excavated by Tom and Barbara Harrisson in the 1950s and 1960s. The multidisciplinary investigations led by Graeme Barker have allowed his team to securely date the site's main Neolithic cemetery and describe the mortuary customs and burial goods of the most bounteous Neolithic cemetery yet documented for ISEA (Lloyd-Smith et al. 2013). The third project is Michael Morwood's extension of R.P. Soejono's excavation of the Liang Bua cave, on Flores, discovered by the Dutch antiquarian Verhoeven in the 1960s. In the layers above the *Homo floresiensis* fossils for which the site is most famous, domesticated pig and translocated fauna (porcupines, civet cats and monkeys) are associated with pottery and a c. 3,600 BP date (Van den Bergh et al. 2009), while some of the AMH burials on which Soejono focused are now directly dated to the fourth millennium BP (Murti 2018).

Archaeologists based in research institutions in ISEA have also made major contributions to understanding the ISEA Neolithic. Robert Fox, who investigated the Tabon Caves and other cave complexes while working at the National Museum in Manila during the 1960s, strongly believed in developing local expertise. As a result, a succession of Filipino archaeologists, including Alfredo Evangelista, Wilfredo Ronquillo, Victor Paz, Armand Mijares, and Noel Amano, have made important contributions to understanding the Neolithic archaeology of the Philippines. Stephen Chia, who is based at Universiti Sains Malaysia in Penang, has taken a particular interest in Malaysia's Neolithic, which led him to re-excavate the Bukit Tengkorak rockshelter first excavated by Bellwood and Koon (1989). In Indonesia, Truman Simanjuntak and his colleague Bagyo Prasetyo have invigorated research into Indonesia's Neolithic, often working in collaboration with French nationals based in Jakarta. Open-air Neolithic sites that have been investigated include Minanga Sipakko and Mallawa in Sulawesi (Simanjuntak 2008), Benua Keling Lama in Sumatra (Guillaud et al. 2006), and Pain Haka (Galipaud et al. 2016), the only open-air Neolithic cemetery yet documented for ISEA. In addition, a faint signature of Neolithic occupation has been recorded for the Gunung Sewu cave

sites in East Java (Simanjuntak 2002) and Gua Harimau in Sumatra (Fauzi 2016).

Neolithic sites have now been professionally documented virtually across ISEA and in sufficient number to advance some generalizations. One such generalization is a distinction between sites with a material culture that signals a clear disjunction from the mid-Holocene forager material culture, and sites whose material culture indicates continuity (apart from the introduction of pottery).

As for the sites with a disjunctive material culture, the first group includes all of ISEA's open-air Neolithic sites. In addition to the examples covered above, these sites include Dimolit in Luzon (with its traces of a house floor), Edjek in the central Philippines (Bellwood 2017), Telling and Mansiri in North Sulawesi (Simanjuntak 2008; Azis et al. 2018), and Ay PA1 in the Bandas (Piper 2017). The second group includes the Neolithic cemeteries, whether substantial (Niah Caves, Liang Bua, and Pain Haka) or minor, such as Lubang Angin in Sarawak, which persisted as a burial cave into the Early Metal Phase (Datan and Bellwood 1991), and Arku Cave in Luzon (Bellwood 2017). The third group includes cave sites with little, if any, evidence of pre-Neolithic habitation, either because the Neolithic marked the colonization of the area, as was the case for the Batanes Islands (Bellwood and Dizon 2013) or because the cave was unsuitable for habitation prior to the Neolithic. Examples in the latter category include Bukit Tengkorak (Bellwood 2017), Uattamdi in the northern Moluccas (Bellwood et al. 1998), Pondok Selabe 1 in Sumatra (Simanjuntak et al. 2006), and possibly Hoekgroet in Java (Storm 1995) as well as Liang Kaung and Jambu Hilir in Indonesian Borneo (Plutniak et al. 2014). Neolithic industries based on flaking stone have been recorded at some of these sites, but their character is different from local, pre-Neolithic counterparts. Bukit Tengkorak is renowned for its agate microblades and awls and, most notably, chips of obsidian transported from the Admiralty Islands and New Britain located more than 3,000 km to the east. In addition, obsidian transported shorter distances overland dominates the flaked stone at Pondok Selabe 1, and also Bukit Arat (Bonatz 2009) as well as Kamassi and Minanga Sipakko (Angrraeni 2012).

The sites that show continuity of material culture include the most contentious for dating the ISEA Neolithic because pot shards may infiltrate deeper, older deposit and so produce a misleadingly early dating for when pottery was introduced. This is the accepted explanation for rejecting formerly entertained mid-Holocene dates for pottery at Leang Tuwo Mane'e in the Talaud Islands (Bellwood 2017), Ulu Leang 1 in South Sulawesi (Bulbeck 2004), Kimanis and Lubang Payu in Indonesian Borneo (Plutniak et al. 2014), and Uai Bobo and Bui Ceri Uato in East Timor (O'Connor 2015). Bellwood (2017) proposes a similar explanation for questioning the c. 4,500 BP date from Gua Sireh, but accepts this would not work for the c. 4,300 date on an identified rice grain in a pot shard, suggesting instead that the superseded protocols employed to generate that date may be at stake. Similarly, Spriggs (1989) queries the reliability of the Gakushuin Laboratory radiocarbon dates that collectively imply a mid- to late Holocene dating for the ceramic layers at Rabel Cave in Luzon. Certainly, when dealing with sites with pre-pottery habitation, archaeologists are now circumspect about dating the appearance of pottery before the fourth millennium BP, as for instance at Callao Cave and Dalan Serkot in Luzon (Mijares 2007), Agop Atas in Sabah (Bellwood 2017), Liang Jon in Indonesian Borneo (Plutniak et al. 2014), Leang Burung 1 in South Sulawesi (Bulbeck 2004), and Macha Kuru and Lene Hara in East Timor (O'Connor 2015). Particularly on the larger islands, continuity of occupation into the Neolithic is likely to reflect the sustained presence of the original foragers, who obtained Neolithic material culture and farm produce from their Malayo-Polynesian neighbors through trade (Bulbeck 2004; Mijares 2007).

Key Issues/Current Debates

The joint intrusion into ISEA of Malayo-Polynesian speakers and Neolithic material

culture invites the use of historical linguistics to reconstruct the Proto-Malayo-Polynesian vocabulary and thus infer the subsistence and technology of the Malayo-Polynesian immigrants. The reconstructed vocabulary is wide-ranging and includes, inter alia, rice, foxtail millet, taro, greater yam, breadfruit, banana, sago, sugarcane, coconut, pandanus, pottery, adzes, weaving, house, granary, outrigger canoe, sail, dog, domesticated pig, rooster, fishing and hunting equipment, monkey, squirrel, pangolin, dolphinfish, tuna, and bonito. It points to a mixed economy and skills in sailing, pottery production and, at least as far south as Luzon (based on corroboratory archaeological evidence), weaving (Bellwood 2017).

A capacity to grow crops may well have provided the Malayo-Polynesian immigrants with a demographic advantage over the resident foragers but firm archaeological evidence for Neolithic agriculture in ISEA is slim. The Neolithic shell mounds of Magapit, Nagsabaran, and Andarayan on the Cagayan River provide the strongest support with remains of rice dated to 3,000–4,000 BP at all of these sites along with banana phytoliths at Magapit (Hung 2017). Rice phytoliths have also been recovered from the Neolithic levels of Gua Sireh and Kamassi and some of the Neolithic pottery from Niah Cave is tempered with rice (Bellwood 2017).

Taro, presumably cultivated, and various possibly cultivated tubers and pulses have been identified from the Neolithic levels of Leang Burung 1 (Paz 2004). However, any Malayo-Polynesian association would have been at best indirect in view of the many important tree and root crops in ISEA, such as bananas, sago, sugarcane, and the greater yam, that were probably first domesticated in the New Guinea region and then introduced to ISEA. Historical linguistic evidence suggests that they were encountered by early Malayo-Polynesian speakers during their expansion southwards, and that small-scale agriculture was accordingly practiced in ISEA prior to the Neolithic (Donohue and Denham 2009; Blench 2012).

Evidence for domesticated animals in Neolithic ISEA is similarly complicated (Piper 2017). Two sources for domesticated *Sus scrofa* pigs have been identified: Taiwan as the homeland of the "Lanyu" pigs that were introduced into the Philippines, and MSEA as the source for the "Pacific clade" pigs that were transported through the islands of Indonesia into Oceania. Dogs too probably had dual origins, in Taiwan and MSEA, with the faint possibility of a pre-Neolithic dispersal of the lineage of dogs ancestral to Australia's dingoes. Chickens are difficult to assess because they are common in Neolithic contexts in MSEA and Oceania but as yet unidentified in the intervening islands, which does not however rule out a Philippine source for Oceania's chickens. Intriguingly, remains of the *Sus celebensis* "warty pig" of Sulawesi have been dated back to at least the Neolithic at Liang Bua, but this may reflect translocation of wild fauna rather than domestication of this species, similar to the Neolithic faunal translocations to East Timor. Certainly, south of the Batanes Islands (Bellwood and Dizon 2013), hunted rather than domesticated animals appear to dominate Neolithic faunal assemblages in ISEA, as for instance at Hoekgrot (Storm 1995), Liang Bua (Van den Bergh et al. 2009), and Kamassi and Minanga Sipakko, where a minor component of translocated deer and porcupines is also in evidence (Angrraeni 2012).

Osteometric evidence is mixed for discontinuity in ISEA between pre-Neolithic "Australoids," characterized by long, robust skulls, and large teeth, and Neolithic "Mongoloids" characterized by broad, gracile skulls, and small, differently proportioned teeth. A Neolithic burial from Nagsabaran reveals a long skull shape while its dental measurements (along with those of the Bunun of Taiwan) place it an intermediate position between Australoids and Mongoloids (Oxenham et al. 2016). A broad skull shape and small to moderate tooth size are documented for Java's Neolithic burials at Song Keplek and Hoekgrot, in contrast to pre-Neolithic Java skulls (Bulbeck 2015), although the Hoekgrot skull is robust for a female (Storm 1995). At Niah Cave, the Neolithic teeth are smaller and differently proportioned compared with the pre-Neolithic teeth, indicating population discontinuity (Bulbeck 2015). In contrast, at Gua

Harimau, there is less evidence from osteometric (or ancient DNA) analysis for pre-Neolithic/Neolithic discontinuity than there is for discontinuity between the pre-Neolithic-cum-Neolithic and the Early Metal Phase inhabitants (Matsumura et al. 2016, 2018).

In addition to the Taiwan–Philippines connection noted above, there is now considerable evidence for a separate introduction of the Neolithic from MSEA into western ISEA. MSEA as the identified source for the "Pacific clade" pigs and as a likely source for one of ISEA's two dog clades has been noted above. Further, study of early Neolithic pottery indicates two distinct traditions, with an apparent interface zone in central-eastern Borneo (Plutniak et al. 2014). One, clearly derived from Taiwan, is the red-slipped ware of the Philippines, Sabah, and Sulawesi, mostly plain but otherwise decorated predominantly with dentate stamping (Bellwood 2017; Azis et al. 2018). The second tradition, for which MSEA is the likely the precursor (Bellwood 2017), involved use of a paddle (often carved or cord-wrapped) to impart decorations, as documented for Bukit Arat (Bonatz 2009), Pondok Selabe 1 (Simanjuntak et al. 2006), Gua Harimau (Bellwood 2017), Gua Sireh (Datan and Bellwood 1991), Niah (Lloyd-Smith et al. 2013), and Nangabalang and Liang Kaung in central Borneo (Plutniak et al. 2014). Genetic studies on present-day ISEA populations clearly point to approximately contemporary population dispersals from MSEA into western ISEA, and from Taiwan into the Philippines and then across ISEA (Cox 2017). Analysis of the languages of western ISEA has also identified a widespread stratum related to the Austroasiatic languages of MSEA, including Dayak languages near Gua Sireh with its anomalously early Neolithic dating (Donohue and Denham 2009; Blench 2012). Thus, whether or not the spread of Malayo-Polynesian across eastern ISEA involved immigrant farmers supplanting the indigenous foragers, its spread across western ISEA appears to have more involved a language switch by communities that were already Neolithic. A likely motivation to cover both cases would be a founder ideology whereby ambitious individuals, intent on being glorified as an ancestor, ventured off to establish new communities (Blench 2012).

The time is past for grandstanding on whether the ISEA Neolithic was founded on the migration of farming communities or the maritime movement of useful technologies and resources, and whether its cultural matrix mainly reflects introduced concepts or the incorporation of pre-Neolithic knowhow. All of these were important, and speculation on their relative importance obfuscates an appreciation of their complementary but diverse roles in different situations. For instance, extended burials appeared in ISEA with the Neolithic but were interred cheek by jowl with the flexed and bundle burials also identified in pre-Neolithic contexts (Lloyd-Smith et al. 2013; Galipaud et al. 2016). Similarly, the successful adaptation of Neolithic communities to new environments would have relied on tapping into local foragers' knowledge on resource distribution and pathways through the forest, as expounded by Bulbeck (2004) for South Sulawesi.

International Perspectives

The ISEA Neolithic is of international interest for its late beginnings in comparison with the onset of the Neolithic in the surrounding tropics and subtropics of MSEA, Taiwan, and New Guinea. The evidence covered above indicates that ISEA was a recipient of crops from both Taiwan and New Guinea, and domesticated animals, pottery, and languages from both MSEA and Taiwan. These multiple sources are a reason why the culture history of the ISEA Neolithic has been so difficult to unravel. On the other hand, a passive role of ISEA in the development of its Neolithic is also disproved by the evidence at hand. Pre-Neolithic knowhow helped shape the ISEA Neolithic, and the number of mammal species translocated across ISEA, presumably to improve the returns from hunting, exceeded the number of introduced domestic animals. Also, as discussed by Bellwood (2017), Neolithic ISEA appears to have been the nursery for the Lapita culture that introduced the Neolithic into the islands in the east of New Guinea and gave rise to the Polynesians.

Future Directions

An understanding of the cultural history of the ISEA Neolithic will not be complete until attention is paid to Neolithic cultural innovations within the region that subsequently spread across ISEA. An example is the "Austronesian Painting Tradition," based on sketches (usually in black) on rock surfaces, which has its most concentrated expression in Sulawesi, southeastern ISEA, and Vanuatu (Hakim et al. 2018). Where charcoal can be identified as a component of the black pigment, the artwork is amenable to Carbon-14 dating, which would allow the source of the tradition to be identified and its dispersal routes to be traced. Another example is pottery motifs of confirmed Neolithic antiquity in ISEA which cannot be directly derived from MSEA or Taiwan, and whose similarities between pottery assemblages may illuminate spheres of contact within ISEA.

An emerging priority is anthropological investigation into the beliefs and social systems of ISEA Neolithic communities rather than a narrow focus on culture history. Galipaud et al. (2016) discuss the ideological implications of the Neolithic innovations at Niah and Pain Haka of burials in or associated with jars, and disarticulation of skulls from the postcranial skeleton, as also documented at Teouma in Vanuatu. However, as yet there has been little study of whether social stratification emerged during the Neolithic, a topic that would be amenable to investigation based on the rich mortuary assemblages and wide variety of burial practices now documented for ISEA cemeteries.

Cross-References

- ▶ Bananas: Origins and Development
- ▶ Farming-Language Dispersals (2): Worldwide Survey
- ▶ Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
- ▶ Niah Cave (The West Mouth)

References

Angrraeni. 2012. *The Austronesian migration hypothesis as seen from prehistoric settlements on the Karama River, Mamuju, West Sulawesi*. Unpublished PhD dissertation. Canberra: The Australian National University.

Azis, N., C. Reepmeyer, G. Clark, Sriwigati, and D.A. Tanudirjo. 2018. Mansiri in North Sulawesi: A new dentate-stamped pottery site in Island Southeast Asia. In *The archaeology of Sulawesi: Current research on the Pleistocene to the historic period*, ed. S. O'Connor, D. Bulbeck, and J. Meyer, 191–205. Terra Australis 48. Canberra: Australian National University E-Press.

Bellwood, P. 1978. *Man's conquest of the Pacific: The prehistory of Southeast Asia and Oceania*. London: Collins.

Bellwood, P. 2017. *First islanders: Prehistory and human migration in Island Southeast Asia*. Hoboken: Wiley.

Bellwood, P., and E. Dizon, eds. 2013. *4000 years of migration and cultural exchange: The archaeology of the Batanes Islands, northern Philippines*. Terra Australis 40. Canberra: Australian National University E-Press.

Bellwood, P., and P. Koon. 1989. Lapita colonists leave boats unburned! The question of Lapita links with Island Southeast Asia. *Antiquity* 63: 613–622.

Bellwood, P., N. Goenadi, G. Irwin, Agus W. Gunadi, and D. Tanudirjo. 1998. 35,000 years of prehistory in the northern Moluccas. In *Bird's Head approaches*, ed. G.-J. Bartstra, 233–275. Modern Quaternary Research in Southeast Asia 15. Rotterdam: A.A. Balkema.

Blench, R. 2012. Almost everything you believed about the Austronesians isn't true. In *Crossing borders: Selected papers from the 13th international conference of the European Association of Southeast Asian Archaeologists*, ed. M.L. Tjoa-Bonatz, A. Reinecke, and D. Bonatz, vol. 1, 121–142. Singapore: National University of Singapore Press.

Bonatz, D. 2009. The Neolithic in the highlands of Sumatra: Problems of definition. In *From distant tales: Archaeology and ethnohistory in the highlands of Sumatra*, ed. D. Bonatz, J. Miksic, J.D. Neidel, and M.L. Tjoa-Bonatz, 43–74. Newcastle upon Tyne: Cambridge Scholars Publishing.

Bulbeck, D. 2004. Divided in space, united in time: The Holocene prehistory of South Sulawesi. In *Quaternary research in Indonesia*, ed. S.G. Keates and J.M. Pasveer, 129–166. Modern Quaternary Research in Southeast Asia 18. Leiden: A.A. Balkema.

Bulbeck, D. 2015. Changes in human tooth-size and shape with the Neolithic transition in Indo-Malaysia. In *Taxonomic tapestries: The threads of evolutionary, behavioural and conservation research*, ed. A.M. Behie and M.F. Oxenham, 183–214. Canberra: ANU EPress.

Bulbeck, D., F.A. Aziz, S. O'Connor, A. Calo, J.N. Fenner, B. Marwick, J. Feathers, R. Wood, and D. Prastiningtyas. 2016. Mortuary caves and the dammar trade in the Towuti-Routa region, Sulawesi, in an Island Southeast Asian context. *Asian Perspectives* 55: 148–183.

Cox, M. 2017. The genetic history of human populations in Island Southeast Asia during the Late Pleistocene and Holocene. In *First islanders: Prehistory and human migration in Island Southeast Asia*, ed. P. Bellwood, 107–116. Hoboken: Wiley.

Datan, I., and P. Bellwood. 1991. Recent research at Gua Sireh (Serian) and Lubang Angin (Gunung Mulu National Park), Sarawak. *Bulletin of the Indo-Pacific Prehistory Association* 10: 368–405.

Donohue, M., and T. Denham. 2009. Farming and language in Island Southeast Asia: Reframing Austronesian history. *Current Anthropology* 51: 223–256.

Fauzi, M.R. 2016. The characterization of stone tool types and technology from Harimau Cave. In *Harimau Cave and the long journey of Oku civilization*, ed. T. Simanjuntak, 184–211. Yogyakarta: Gadjah Mada University Press.

Fauzi, M.R., A.A. Oktaviana, and Budiman. 2016. Traces of Paleometalik culture and its chronology in Harimau Cave. In *Harimau Cave and the long journey of Oku civilization*, ed. T. Simanjuntak, 247–263. Yogyakarta: Gadjah Mada University Press.

Galipaud, J.-C., R. Kinaston, S. Halcrow, A. Foster, N. Harris, T. Simanjuntak, J. Javelle, and H. Buckley. 2016. The Pain Haka burial ground on Flores: Indonesian evidence for a shared Neolithic belief system in Southeast Asia. *Antiquity* 90: 1505–1521.

Glover, I. 1976. Ulu Leang cave, Maros: A preliminary sequence for post-Pleistocene cultural development in South Sulawesi. *Archipel* 11: 113–154.

Glover, I. 1986. *Archaeology in Eastern Timor, 1966–67*. Terra Australis 11. Canberra: The Australian National University.

Guillaud, D., H. Forestier, A. Romsan, and B. Prasetyo. 2006. Bab 2 – daerah kaki gunung: Sebuah pendekatan arkeogeografis unutk mengetengahkan zaman protosejarah. In *Menyelusuri sungai, merunut waktu: Penelitian arkeologi di Sumatera Selatan*, ed. D. Guillaud, 35–47. Jakarta: Cet. 1 IRD-Enrique Indonesia.

Hakim, B., S. O'Connor, and D. Bulbeck. 2018. Black drawings at the cave site of Gua Pondoa, Southeast Sulawesi. In *The archaeology of Sulawesi: Current research on the Pleistocene to the historic period*, ed. S. O'Connor, D. Bulbeck, and J. Meyer, 79–92. Terra Australis 48. Canberra: Australian National University E-Press.

Hung, H.-c. 2017. Neolithic cultures in Southeast China, Taiwan, and Luzon. In *First islanders: Prehistory and human migration in Island Southeast Asia*, ed. P. Bellwood, 232–240. Hoboken: Wiley.

Lloyd-Smith, L., G. Barker, H. Barton, J. Cameron, F. Cole, P. Daly, C. Doherty, C. Hunt, J. Krigbaum, H. Lewis, J. Manser, V. Paz, P.J. Piper, R.J. Rabett, G. Rushworth, and K. Szabó. 2013. 'Neolithic' societies c. 4000–2000 years ago: Austronesian farmers? In *Rainforest foraging in Island Southeast Asia: The archaeology of the Niah Caves, Sarawak*, ed. G. Barker, vol. 1, 255–298. Cambridge: McDonal Institute for Archaeological Research.

Matsumura, H., T. Simanjuntak, A.A. Oktaviana, S. Noerwidi, D. Prastiningtyas, N.L. Cuong, M. Oxenham, A. Willis, R. Restu, M. Hana, and H.-C. Hung. 2016. Verifying Austronesian hypothesis from the skeletal human remains from Gua Harimau site in Sumatera. In *Austronesian diaspora: A new perspective*, ed. B. Prasetyo, T.S. Nastiti, and T. Simanjuntak, 495–510. Yogyakarta: Gadjah Mada University Press.

Matsumura, H., K.-I. Shinoda, T. Simanjuntak, A.A. Oktaviana, S. Noerwidi, H.A. Sofian, D. Prastiningtyas, N.L. Cuong, T. Kakuda, H. Kanzawa-Kiriyama, N. Adachi, H.-C. Hung, X. Fan, X. Wu, A. Willis, and M. Oxenham. 2018. Cranio-morphometric and aDNA corroboration of the Austronesian dispersal model in ancient Island Southeast Asia: Support from Gua Harimau site, Indonesia. *PLOS One*. https://doi.org/10.13711journal.pone.0198689.

Mijares, A.S.B. 2007. *Unearthing prehistory: The archaeology of northeastern Luzon, Philippine Islands*. BAR International Series 1613. Oxford: John and Erica Hedges Ltd.

Murti, D.B. 2018. Dental caries in prehistoric population of Liang Bua. In *Presentation at the 21st Congress of the Indo-Pacific Prehistory Association*, 23–28 Sept 2018. Hue.

O'Connor, S. 2015. Rethinking the Neolithic in Island Southeast Asia, with particular reference to the archaeology of Timor-Leste and Sulawesi. *Archipel* 90: 15–48.

Oxenham, M., A. Willis, H.-c. Hung, R. Page, and H. Matsamura. 2016. Dealing with death in late Neolithic to Metal Period Nagsabaran, the Philippines. In *The Routledge handbook of bioarchaeology in Southeast Asia and the Pacific Islands*, ed. M. Oxenham and H. Buckley, 311–338. London: Routledge.

Pawlik, A.E., P.J. Piper, R.E. Wood, K.K.A. Lim, M.G.P.G. Faylona, A.S.B. Mijares, and M. Porr. 2015. Shell tool technology in Island Southeast Asia: An early middle Holocene *Tridacna* adze from Ilin Island, Mindoro, Philippines. *Antiquity* 89: 292–308.

Paz, V. 2004. Of nuts, seeds and tubers: The archaeobotanical evidence from Leang Burung 1. In *Quaternary research in Indonesia*, ed. S.G. Keates and J.M. Pasveer, 191–219. Modern Quaternary Research in Southeast Asia 18. Leiden: A.A. Balkema.

I

Piper, P.J. 2017. The origins and arrival of the earliest domestic animals in Mainland and Island Southeast Asia: A developing story of complexity. In *New perspectives in Southeast Asian and Pacific prehistory*, ed. P.J. Piper, H. Matsumura, and D. Bulbeck, 251–273. Terra Australis 45. Canberra: Australian National University E-Press.

Plutniak, S., A.A. Oktaviana, B. Sugiyanto, J.-M. Chazine, and F.X. Ricaut. 2014. New ceramic data from East Kalimantan: The cord-marked and red-slipped sherds of Liang Abu's layer 2 and Kalimantan's pottery chronology. *Journal of Pacific Archaeology* 5: 90–99.

Simanjuntak, T., ed. 2002. *Gunung Sewu in prehistoric times*. Yogyakarta: Gadjah Mada University Press.

Simanjuntak, T. 2008. Austronesian in Sulawesi: Its origin, diaspora, and living tradition. In *Austronesian in Sulawesi*, ed. T. Simanjuntak, 215–251. Jakarta: Center for Prehistoric and Austronesian Studies.

Simanjuntak, T., H. Forestier, D. Driwantoro, Jatmiko, and D. Siregar. 2006. Bab 1 – daerah kaki gunung: Berbagai tahap zaman batu. In *Menyelusuri sungai, merunut waktu: Penelitian arkeologi di Sumatera Selatan*, ed. D. Guillaud, 21–33. Jakarta: Cet. 1 IRD-Enrique Indonesia.

Spriggs, M. 1989. The dating of the Island Southeast Asian Neolithic: An attempt at chronometric hygiene and linguistic correlation. *Antiquity* 63: 587–613.

Spriggs, M. 2011. Archaeology and the Austronesian expansion: Where are we now? *Antiquity* 85: 510–528.

Storm, P. 1995. The evolutionary significance of the Wajak skulls. *Scripta Geologica* 110: 1–247.

Van den Bergh, G.D., H.J.M. Meijer, D.A. Rokhus, M.J. Morwood, K. Szabó, L.W. van den Hoeke Ostende, T. Sutikna, E.P. Saptomo, P.J. Piper, and K.M. Dobney. 2009. The Liang Bua faunal remains: A 95 k. yr. sequence from Flores, East Indonesia. *Journal of Human Evolution* 57: 527–537.

Van Heekeren, H.R. 1972. *The Stone Age of Indonesia*. Revised edition. Verhandelingen van het Koninklijk Instituut voor Taal-, Land- en Volkenkunde 61. The Hague: Martinus Nijhoff.

Further Readings

Bellwood, P. 2011. Holocene population history in the Pacific region as a model for worldwide food producer dispersals. *Current Anthropology* 52 (S4): S363–S378.

Blench, R. 2010. Was there an Austroasiatic presence in Island Southeast Asia prior to the Austronesian expansion? *Bulletin of the Indo-Pacific Prehistory Association* 30: 133–144.

Brandão, A., K.K. Eng, T. Rito, B. Cavadas, D. Bulbeck, F. Gandini, M. Pala, M. Mormina, B. Hudson, J. White, T.-M. Ko, M. Saidin, Z. Zafarina, S. Oppenheimer, M.B. Richards, L. Pereira, and P. Soares. 2016. Quantifying the legacy of the Chinese Neolithic on the maternal genetic heritage of Taiwan and Island Southeast Asia. *Human Genetics* 135: 363–376.

Bulbeck, D. 2008. An integrated perspective on the Austronesian diaspora: The switch from cereal agriculture to maritime foraging in the colonisation of Island Southeast Asia. *Australian Archaeology* 67: 31–51.

Lloyd-Smith, L., J. Krigbaum, and B. Valentine. 2016. Social affiliation, settlement pattern histories and subsistence change in Neolithic Borneo. In *The Routledge handbook of bioarchaeology in Southeast Asia and the Pacific Islands*, ed. M. Oxenham and H. Buckley, 257–288. London: Routledge.

O'Connor, S. 2006. Unpacking the Island Southeast Asian Neolithic, and finding local complexity. In *Uncovering Southeast Asia's past: Selected papers from the 10th international conference of the European Association of Southeast Asian Archaeologists*, ed. E.A. Bacus, I.C. Glover, and V.C. Piggott, 74–87. Singapore: National University of Singapore Press.

Paz, V. 2005. Rock shelters, caves, and archaeobotany in Island Southeast Asia. *Asian Perspectives* 44: 107–118.

Sémah, A.-M., and F. Sémah. 2012. The rain forest in Java through the Quaternary and its relationship with humans (adaptation, exploitation and impact on the forest). *Quaternary International* 249: 120–128.

Solheim, W.G., II. 2006. *Archaeology and culture in Southeast Asia: Unraveling the Nusantao*. Diliman: The University of the Philippines Press.

Island Southeast Asia: Rock Art

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Introduction

Until the late 1990s, Indonesia and more generally Island Southeast Asia were rarely quoted as rock art locations in the general scholars' literature describing – or trying to explain – the development of art, from prehistoric to recent times. However, important rock art did exist and had in some places been surveyed, sketched, or mapped, by the end of the nineteenth century (Fig. 1). This is the case for instance in part of the northwestern coastline of West Papua, which presents kilometers of huge painted limestone cliffs. Also in Timor as much as in the small island of Kei Kecil, caves or cliffs with paintings had been observed for some time. Some miles toward the west, the island of Sulawesi contains also at least three places far away from each other with important and significant paintings.

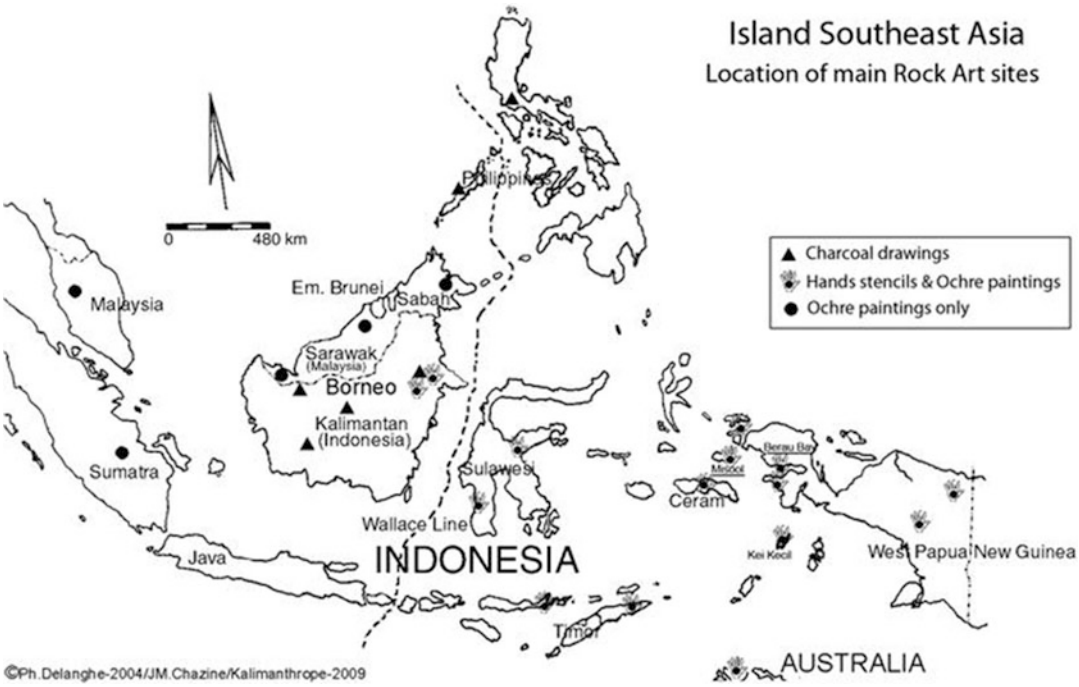

Island Southeast Asia: Rock Art, Fig. 1 Island Southeast Asia, location of main rock art. (@Ph. Delange - 2004/ J.M. Chazine/Kalimanthrope 2009)

A similar situation, although happening later, i.e., after WW II, is the great mouth of Niah Cave (in the northern Sarawak province of Malaysia), a gigantic and actually most important site for the archaeology of the region with a backyard gallery of paintings linked to funerary process (Solheim II 1983). Less important but as significant are the figures painted in a large gallery besides Gua Sireh Cave, also in southern Sarawak (Bellwood and Datan 1993). The latter were nevertheless considered as not very ancient, with an estimated age of up to 2,000 years old only.

All of these paintings, although more or less locally recognized, did not appear as important as those which had already been identified and displayed worldwide which are those by the Australian Aborigines.

And the others, mere charcoal sketches, which had been only quoted in South Kalimantan or discovered later in the south Philippines (Palawan island), appeared of too little importance to have great weight in the appreciation of rock art in Island Southeast Asia.

Definition

Apart from the simple aspect of paintings, their representations, styles, and contents, which would explain that relative disdain, the age corresponding to these paintings must be considered. Australian Aboriginal paintings associated with a community, which at the time were considered by the majority of the world as almost sole surviving from the prehistory, were attracting enough and could be nearly compared with the first attested prehistoric paintings from the main European Franco-Cantabric caves.

Historical Background

Knowledge of actual communities from Southeast Asia was far from well-known and their prehistory even less. Therefore, it is not surprising that their rock art is found difficult to elicit the slightest interest. Moreover, for Indonesia, the first specialists were convinced that in any case, it would have

been the Aboriginal influence, which would have spread from Papua through Timor and Sulawesi, being stopped by the Wallace Line separating the east from the west. At that time, no painting at all had been observed in Java, Sumatra, as much as in the Indonesian Borneo, i.e., the Kalimantan provinces nor continental Malaysia, Philippines, or Thailand. Therefore, Wallace Line could be considered also as a cultural frontier for a retroverse influence of a specific Aboriginal practice (Heekeren 1958).

Recently some geometric red paintings presenting seemingly ethnic designs have been observed in Harimau Cave, South Sumatra (Simantjutak 2011). Their scarcity does not change the general absence of "archaic" paintings in central and western Indonesia.

Although in 1988, a French team of cavers observed an unknown charcoal panel in Liang Kaung in the central Müller Range (Fig. 2), when trekking across Borneo from west to east, these charcoal drawings were similar in conception to the other charcoal designs found in the area.

Yet, the surprise was complete when in 1994, a Franco-Indonesian team, linked to the previous one, venturing into the deep karst of East Borneo discovered the very first paintings rather ancient if not completely "archaic." Of course, the question of the age of these supposed prehistoric paintings has been debated from the very beginning of their study and still occurs. Although dating processes have enhanced their possibilities and results, many cases are still resistant to direct dating by lack of organic stuff, forcing indirect estimations.

In the case of that really new and somehow puzzling discovery, it is the presence of hand stencils (also called "negative hands") which would attest of the antiquity of their authors. Almost everywhere in the world, stenciled hands are present, and as they appear from the very beginning in the oldest attested ornate caves or shelters (up to 30,000 year BP), they are considered as clues for a relative antiquity.

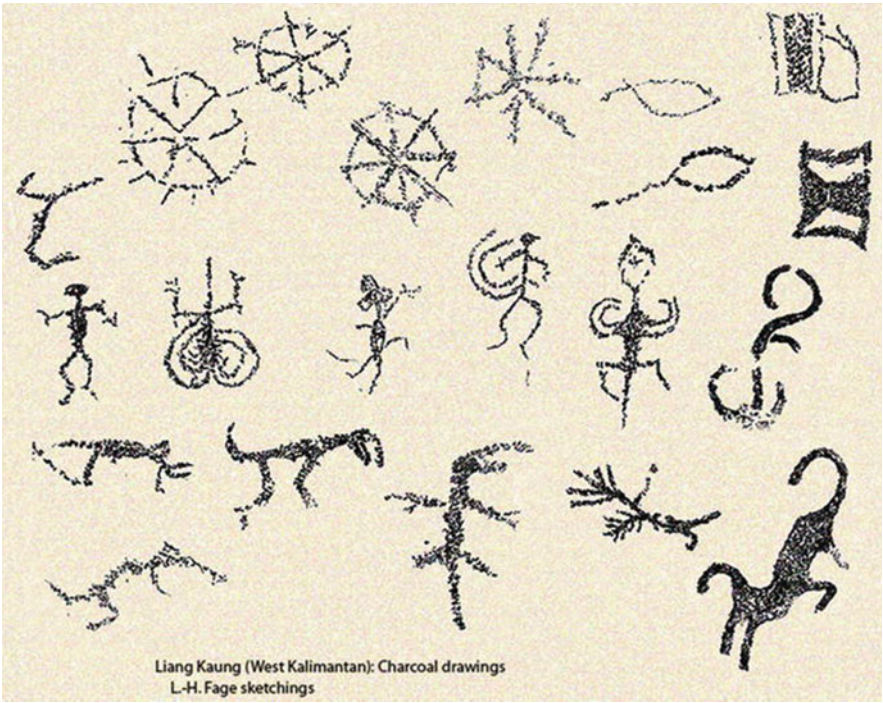

Island Southeast Asia: Rock Art, Fig. 2 Liang Kaung (west Kalimantan): charcoal drawings. L.H. Fage sketchings

In fact this assumption has to be nuanced because there are also clues of relatively recent if not contemporary examples of hand stenciling practices and not only in Australia. That kind of practice would then be more that one of a cultural stage or a particular cosmogonic relation with the world than a real proof of dated antiquity. Nevertheless both considerations may complete each other, and if they can be isolated from others, they may induce differences. This is the case for the East Kalimantan paintings, which until now are the only ones which present hand stencils all over the whole Borneo Island.

From that discovery and once assumed that a rock art did exist in that part of Borneo, further surveys completed these primary observations, and up to more than 30 ornate caves have been checked (Fage and Chazine 2010). Including geomorphologic observations, it was obvious that all the painted caves were in the highest levels of fossilized galleries, in the most remote and near-unreachable places, and far from the usual treks of remaining local hunters and bird nests' collectors. Moreover, no occupation remains could be found in these ornate caves. Archaeological evidence of final Pleistocene dwellings could be found (and as possibly excavated) only in the basements of cliffs or, more rarely, in the first level of galleries while a calcite veil covering hands stencils was nevertheless already dated over 10,000 years BP (Causse et al. 2003).

Thus, it became interesting and even necessary to check if comparisons, similarities, obvious differences, and contents would be worthwhile for a general overview of the rock art in the region. Communications and publications in different congresses in order to get subsidies for research enhanced a larger interest for Borneo's prehistory and more generally for Indonesian rock art.

Added to that is the fact that a particularly high number of stenciled hands have been checked (over 2,000 altogether with near 1,000 in 4 caves only) where they were sometimes applied on ceilings (Fig. 3), up to 8 and even 14 m. Another exceptional fact is that some of these negative hands are linked together and in many cases are also overpainted with different motifs (Fig. 4). Moreover, there are two cases where there are only and numerous stenciled hands (over 2 × 130 of them). This latter occurrence led thus to consider differently the practice of hand stenciling and tries to elaborate some practical explanation to that specific practice and materialization.

In fact, the possible deciphering of the hand stenciling principle, may make it possible to apply it to the different cases encountered in the area and more precisely to the Indonesian examples.

The case of the twin caves called Gua Masri I and II (from the guide's name) containing only hands and absolutely no other motifs would be the "Rosetta Stone" to express the function (at least in Borneo's cases) of hand stenciling. Considering that the author(s) did not need to "complete" the painted panels with other motifs, it may be deduced that this action would have been sufficient and would have completely answered their expectations. Apart from all the explanations, which have been proposed since the beginning

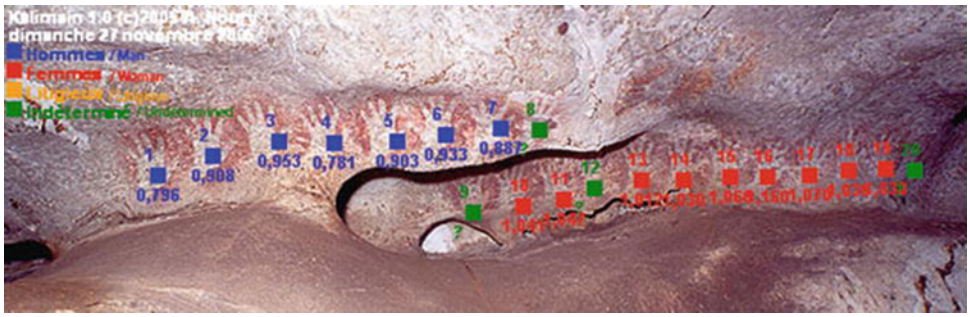

Island Southeast Asia: Rock Art, Fig. 3 Decipheration of male/female hands stencils from the Gua Ham's frieze, showing a strict sexual division of space, established in using Manning's ratio (Manning 2002)

of rock art studies in the early twentieth century and which are not convincing in Borneo's cases, there is at least one clue, which would fit with that context: the ethnographic observation of some of the healing process still practiced in many traditional cultures, with the applying of hands, the breathing of revitalizing energy, and the spitting of magico-therapeutic substances, is nothing but identical to the hands stenciling process on the caves walls.

Island Southeast Asia: Rock Art, Fig. 4 The Tree of Life (or Family?) representation using hands stencils in Gua Tewet' shelter. TEW017, Borneo 1999. (Photo: Luc-Henri Fage, Le Kalimanthrope)

As it has recently been proposed, a shamanic environment may have been in action in the ornating of prehistoric caves (Lewis-Williams 1993; Clottes 2004), thus healing process would have been active in the same and single way. Of course, considering the very difficult access to the Borneo's ornate caves, it would have been an indirect procedure, a simulacra or an allegoric way of mastering forces or powers, would they be from ancestors or Nature's spirits. Pushing the hypotheses further, it became possible, once knowing, then using what is called Manning's ratio, which is able to decipher men and women's hands from the length ratio between forefinger and ring finger to find also women's hands (Fig. 5) in the different panels of caves from different parts of the world (Chazine and Noury 2009). Throughout the world, healers are either men or women and this observation fits with the display of deciphered hands, which have been observed in the ornate caves up until now.

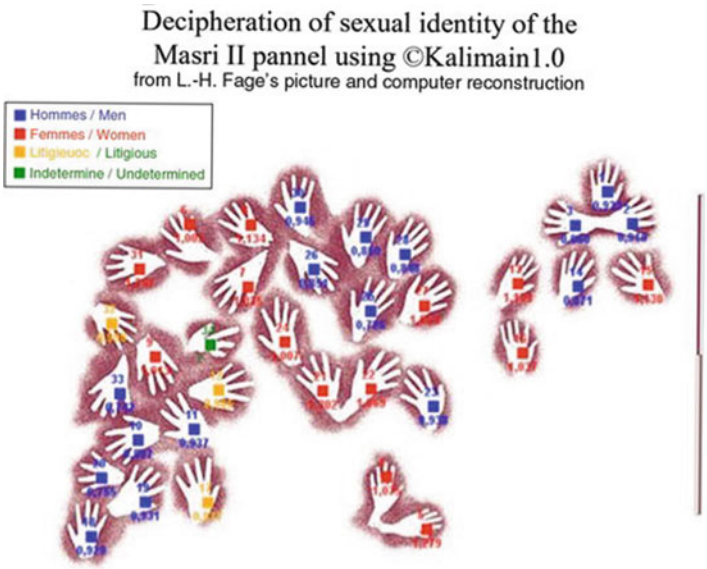

Island Southeast Asia: Rock Art, Fig. 5 Analysis of the sexual identity of artists who produced the Masri II panel, using @Kalimain1.0 from L.H. Fage's picture and computer reconstruction

And this is the case for Indonesian rock art where each site of minimal importance contains at least a couple of hand stencils.

These converging clues provide a kind of basic lecture grid. Once it is admitted that what is called rock art would have corresponded to some specific rituals practiced by still animist communities, for whom schematically, the whole of nature with its powers includes and also is related to all the human condition, one is able to prepare a more acute model to explain the different cases encountered.

Related to this latter point is the fact that stylistic expressions are present. In some cases, they are materially visible, like overimpressions, scrapings for new designs, or clear changes, and move toward more realistic and expressive figures. This is supposed to be linked to a very important and deep change, which occurred with the arrival of the Austronesian migration, 5,000 to 3,000 years BP, which spreads all over the Indo-Pacific area. Bringing new technologies, new beliefs, and thus new funerary practice, they also brought new aesthetic expressions (Bellwood 1997). It seems that in some cases, it drew a halt to rock art expressions, while in others, it provoked some significant changes and lasted, but slightly transformed, until the end of the pre-European periods.

When the two influences became intermixed, it is often difficult to separate the different periods, and sometimes it seems that the Austronesian has itself also adopted a pre-Austronesian core and adapted it to its needs.

This may be observed in the different sites holding rock art, which are to be found from eastern to central Indonesia, i.e., West Papua, Timor, Moluccas, Sulawesi, and Borneo.

West Papua: The northwestern shores of West Papua have been visited since the mid-sixteenth century for the traffic of the West Indies Company, and many navigators or visitors have been already able to see some paintings along the cliffs of its northern tip, i.e., mainly the McCluer Bay (now Berau Bay) and its surrounding capes, small archipelagoes, and tributaries of rivers. But in fact, it is not before the German Frobenius expedition in 1937–1938, and thanks to Röder's engagement in surveying it as completely as possible that the real riches of its rock art heritage could be appreciated (Röder 1959). Hundreds of sites containing altogether thousands of paintings or motifs have been surveyed and checked. As the publication of the final report had to be postponed until after WW II, not many could appreciate or evaluate the importance of his observations, and one must practically wait until a UNESCO project led to the launching of a book (Delanghe and Arifin 2004) presenting as many as possible pictures and descriptions of that impressive although sometimes strange core of rock art.

Although the first enquiries were made before WW II, with still traditionally living communities, not much ethnographic data could be gathered, giving thus the status of archaeological remains to these paintings and obliging hypothetic assumptions concerning their age, interpretations, functions, and authors.

Most of the paintings that appear inside pre-Holocene sea wave groove galleries were dug in the cliffs 3–8 m above the mean sea level (msl). Sometimes paintings have been executed as high as 30 m or so and thus are now unreachable. In whole, it is still difficult to relate them to actually living communities, which in some places do not even recognize them as theirs, themselves affirming their somehow foreign origin. This latter point relates to the spread of the Austronesian impact over the whole Insulinde has permitted to some researchers to develop hypothesis linking the paintings to an Austronesian original core (Ballard 1992), using between others convincing linguistic clues. The diversity of situations cannot be restricted to one single explanation and shows that conditions of development of the painting process associated with differentiating rituals happened also differently all along more or less pre- and protohistoric periods.

Although it is difficult to produce firm results for this mass of painted motifs (Delanghe and Arifin 2004: 59–225), some main directions of expressions may be outlined.

Key Issues/Current Debates

First, the most common rock art is comprised of hand stencils that are similar in their diverse representations (more or less with the arm or the fingers, i.e., so-called mutilated, corresponding also effectively to a vanishing Papuan tradition forcing widows to cut out one or more of their phalanx). More seldom are stenciled fishes, lizard, leaves, feet, and more or less recognizable artifacts like combs, boomerangs, sticks, masks, headdresses, crescents, or ornaments (supposed to be a moon representation).

Second, many fishes some of which are stenciled (the biggest local fishes like tuna, sharks, or barracuda) are represented with the particularity to be in vertical position, which is a quite unnatural and obviously a deliberate symbolic choice.

Then anthropomorphic figures, which depending of the site, bear different names that could correspond to a variety of ancestors, spirits, or deities. The most known and leader ancestor of most of the local communities is the Matutuo figure with a general shape of a lizard with a human face and sometimes a conic headdress. Near these representations are tattoo designs, which also have a strong correspondence with ancestors and kin groups.

Also present at almost every site are what is for modern observers, undeterminable/undetermined more or less complex circular, concentric, curvilinear, or even simple geometric figures. These probably correspond to symbolic representations and thus to possible ritual or ceremonial purposes.

At a distant and by side notice, it must be quoted that glyphs from Sosorra-weru designed by Röder (Delanghe and Arifin 2004: 74) have since disappeared. They would nevertheless correspond to some meta-logs of the long travel of Tanawa-Maui, quoted by Erathosten 200 C.E. (Fell 1975).

Now that Indonesian rock art has begun to demonstrate its importance, there is no year and no place where a new set of more or less ancient paintings or drawings would not be observed. For instance, 200 km away in the western vicinity of Berau Gulf area, southeast of Misool Island, a new complex of painted panels on karstic cliffs dropping straight into the sea were recently discovered and shortly first surveyed (Chazine 2011). It has since been largely completed and provided a larger set of figures (Oktaviana et al. 2018) and even possible underwater excavations (Shinatria and Yarista 2019).

Although similar motifs (mostly vertical large fish, stenciled hands and fish symbolic circular designs, or maze drawings) are present (Fig. 6), some motifs are unique. In particular, one large panel with a stenciled "Yoni" (another one was identified by Walsh in Carnarvon Gorge, Australia) with a negative hand besides identified as feminine, then five stenciled round mats or basketry sets (Fig. 7). But what was even more interesting is that it could be deduced that the locations of the painted panels on the cliffs had been exclusively selected for apparent geomorphological reasons. Practically paintings appear only on large cliffs in association with a large colored (from yellow to brown) strip coming out – or into – a more or less large cave, cavern, crevice, or dark hollow. Whatever the surrounding

Island Southeast Asia: Rock Art, Fig. 6 One of the numerous panels from Misool sunken karst (Raja Ampat-Indonesia) representing marine fauna

Island Southeast Asia: Rock Art, Fig. 7 Panel with a unique "Yoni" and some circular openwork basketwork stencils from Misool's karst (Raja Ampat-Indonesia)

state of the rock might be, there are – or not – paintings if these three parameters linked together are, or not, present. Therefore, the precise choice of these places seems established and would thus permit some interpretations. As suggested before, painting practices were probably a complementary part of the expressions of rituals and ceremonies, be they shamanic, initiatic, or healing procedures. Here, the analogy between the natural geologic aspects of the cliffs suggests associations with chthonian forces, feminine wombs, and thus fecundity or fertility longings. Moreover, this particular area is remote from the main island (more than 1 h dugout canoe), isolated, without possible settlement facilities. Further surveys have shown that if these combined parameters were present but disassociated there was no painting, indicating a very specific choice for the sites, which moreover cannot be seen one from the other.

International Perspectives

Using these interpretative clues for other rock art sites may provide some help in deciphering the original grounds for such a large variety in individual designs and common if not universal, expression of trends and leanings.

Figures and designs, which have been observed and studied in Timor, are basically similar to those from Berau Bay and its vicinity, but in many points they provide more complex figures, which following the local "sacred site" keepers' assertion should remain secret but would be somehow equivalent to the Matutuo principle: a complex figure of a supra-deity overwhelming the whole world. Significantly for dating assumptions, there are almost no negative hands, and many paintings present realistic moving human figures or in contrary very simple S shape or reduced to broad large lines. The presence of some boats surrounded by men carrying artifacts: tools or weapons, dance, or ceremonial sticks (?), and obvious narratives, which are clearly represented, would correspond to rather recent periods.

Future Directions

Thus, the dispersal and variety of paintings and representations provide a clear image of the complexity of human settlements over the time on the different islands of the archipelago. Although clues exist of a very ancient peopling (up to 30,000 BP) occupying the islands (O'Connor 2003; O'Connor et al. 2018), it is not definitely clear when or if the first settlers made paintings. What is sure is that many of other last Austronesian newcomers did practice – and still do – secret rituals associated with paintings. Contemporary ethnographic data could provide stimulating clues for understanding how rock art could have been linked to sociocultural practices in the past.

A past, which has been strongly enhanced since the datings of calcite layers enclosing hands paintings, first in 7 Maros Sulawesi's caves (Aubert et al. 2014, then in Marang River caves in East Kalimantan (Aubert et al. 2018), these latter dated from circa 13–15,000 to 40,000 years BP up to 52,000 years BP. A quasi revolution in the ISEA prehistory of Rock Art! First because it provides a completely changed glance upon not only the general prehistory of the whole Island SEA but secondly also a new space for research concerning Rock Art expressions, chronologies, genetics, and anthropological interpretations (Taçon et al. 2014). If definitely confirmed, and up to now, the East and North Kalimantan's Rock Art has suddenly emerged within the oldest figurative and aesthetic human expressions of the world! And Misool Island has become a determining target in the peopling process of ISEA. Therefore, the original haphazardous discoveries on rock art in Kalimantan, then in Misool, have provoked an unexpected and highly stimulating movement of research and discoveries, which is bearing large and dazzling prospects.

Cross-References

- ▶ Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
- ▶ Rock Art, Forms of

References

Aubert, Maxime, et al. 2014. Pleistocene cave art from Sulawesi, Indonesia. *Nature* 514: 223–227.

Aubert, Maxime, et al. 2018. Paleolithic cave art in Borneo. https://doi.org/10.1038/s41586-018-0679-9

Ballard, C. 1992. Painted rock art sites in western Melanesia: Locational evidence for an "Austronesian" tradition. In *State of the art: Regional rock art studies in Australia and Melanesia (occasional AURA publication 6)*, ed. J. Macdonald and I.P. Haskovec, 94–106. Melbourne: Australian Rock Art Research Association.

Bellwood, P. 1997. *Prehistory of the Indo-Malaysian archipelago*. Honolulu: University of Hawaii Press.

Bellwood, P., and I. Datan. 1993. Recent research at Gua Sireh and Lubang Angin. *Sarawak Museum Journal* 44: 93–111.

Causse, C., et al. 2003. Cross dating (Th/U-14C) of calcite covering prehistoric paintings in Borneo. *Quaternary Research* 60 (2003): 172–179.

Chazine, J.-M. 2011. New survey of painted panels off North West Papua: A precise identification of their location parameters and some insight into their function. XXIVth Valcamonica Symposium, July 6–9, 9p.

Chazine, J.-M., and A. Noury. 2009. Deciphering of rock art hands stencils with ©kalimain program using Manning's ratio, in Proceedings of the 14th International Congress Cultural Heritage and New Technologies held in Vienna, Austria November 2009: 43–52. Available at http://www.stadtarchaeologie.at/?page_id=1322

Clottes, J. 2004. Le chamanisme paléolithique: fondements d'une hypothèse. In *La spiritualité, actes du colloque de la commission 8 de l'UISPP, décembre 2003 (ERAUL 106)*, ed. M. Otte, 1–14. Liège: Université de Liège.

Delanghe, P., and K. Arifin. 2004. *Rock art in West Papua*. Paris: UNESCO.

Fage, L.H., and J.-M. Chazine. 2010. *Borneo: Memory of the Caves*. Fage G. edit. Le Kalimanthrope.

Fell, B. 1975. Maui on Eratosthenes: An additional fragment from Sosorra. *The Epigraphic Society Occasional Publications* 2: 1–3.

Heekeren, H.-R. 1958. *Rock paintings and other prehistoric discoveries near Maros (Southwest Celebes). Laporan Tahunan 1950*. Jakarta: Dinas Purbakala.

Lewis-Williams, J.D. 1993. *The mind in the cave: Consciousness and the origin of art*. London: Thames and Hudson.

Manning, J.T. 2002. *Digit ratio: A pointer to fertility, behaviour and health*. Rutgers: University press.

O'Connor, S. 2003. Nine new painted rock art sites from East Timor in the context of Western Pacific Region. *Asian Perspectives* 42: 96–129.

O'Connor, S., et al. 2018. *The archaeology of Sulawesi: Current research on the Pleistocene to the historic period*. Terra-Australis n°48: Canberra ANU Press.

Oktaviana, A.A., P. van Lape, and Marlon N.R. Ririmasse. 2018. Recent rock art research on East Seram, Maluku: A key site in the Rock Art of West Papua and Southeast Maluku. *Kapata Arkeologi* 14 (2): 135–144.

Priyatno, H.S., et al. 2014. *Penilitian Arkeologi Maritim Hunian Prasejarah dan Lukisan Cadas di Kepulauan Misool*. Jakarta: Pusat Penilitian Arkeologi Nasional.

Röder, J. 1959. *Felsbilder und Vorgeschichte des MacCluer-Golfes, West Neuguinea. Ergebnisse der Frobenius Expedition 1937–38 in die Molukken und nach Holländisch Neuguinea, Band IV*. Darmstadt: L.C. Wittich Verlag.

Solheim, W.G., II. 1983. Archaeological research in Sarawak, past and future. *Sarawak Museum Journal* 10: 35–56.

Further Reading

Ballard, C. 1988. Dudumahan: A rock art site on Kai Kecil, Southeast Moluccas. *Bulletin of the Indo-Pacific Prehistory Association* 8: 139–161.

Chazine, J.-M. 2007. Aesthetics and function: A composite role on Borneo rock art? In *Aesthetics and rock art symposium 3, XVII th UISPP Cong. Lisboa, sept. 2006 (British archaeological reports international series 1818)*, ed. J. Clegg and T. Heydt, 65–74. Oxford: Archaeopress.

Galis, K.W. 1964. Recent oudheidkundig nieuws uit westelijk Nieuw-Guinea. *Bijdragen tot de Taal-, Land- en Volkenkunde* 120: 245–274.

Glover, I.C. 1986. *Archaeology in eastern Timor, 1966–67 (Terra Australia 11)*. Canberra: Department of Prehistoric Research, School of Pacific Studies, Australian National University.

Koiman, S., and J. Hoogerbrugge. 1992. Art of Wakde-Yamna area, Humboldt Bay, and Lake Santani. In *Art of North New Guinea*, ed. S. Greub, 7–126. New York: Rizzoli.

Kosasih, E.A. 1991. Rock art in Indonesia. In *Rock art and prehistory: Papers presented to symposium G of the AURA congress, Darwin 1988 (monograph 10)*, ed. P. Bahn and A. Rosenfeld. Oxford: Oxbow Books.

Kusch, H. 1986. Rock art discoveries in Southeast Asia: A historical summary. *Bollettino del Centro Camuno di Studi Preistorici (BCSP)* 23: 99–108.

Prasetyo, B. 1997. Gambar cadas di Kalimantan Barat dan Kalimantan Timur: Indikasi sebaran di kawasan Indonesia Barat. *NW* 2: 44–51.

Sanders, R. 2001. Ancient navigators could have measured longitude! Available at: http://www.21stcenturysciencetech.com/articles/fall01/navigators/navigators.html.

Shinatria, A., and Yarista, A. 2019. Potential of submerged landscape archaeology in Indonesia. 28: 55–71. https://doi.org/10.24832/kpt.v28i1.505.

Shunaria, A., and S.Y. Ajeng. 2019. Potential of submerged landscape archaeology in Indonesia. *Kalpataru* 27(1): Mei 2018 (55–71).

Sidisunthorn, P., S. Gardner, and D. Smart. 2006. *Caves of northern Thailand*. Bangkok: River Books Co.

Simantjutak, H.T. 2011. Available at: http://ogan-community.blogspot.fr/2012/04/goa-harimau-part-1-gua-harimau.html

Souza, C., and W.G. Solheim II. 1976. New area of rock paintings in Irian Jaya, Indonesian New Guinea. In *Rock art of India*, ed. K.K. Chakravarty, 182–195. New Delhi: Arnold-Heinemann.

Sukkham, A., P.S.C. Tacon, and N.H. Tan. 2011. Rock art of Phrayanaga (Viking) Cave, southern Thailand: the illustration of ancient vessels. Available at: http://www.themua.org/collections/items/show/1214

Taçon, P.S.C., et al. 2014. The global implications of the early surviving rock art of greater Southeast Asia. *Antiquity* 88 (2014): 1050–1064.

Isotope Geochemistry in Archaeology

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Introduction

Isotope geochemistry is an important scientific technique that has made a significant contribution to archaeological research. Isotope techniques measure the relative abundance of a number of nuclides of the same (or derivative) element as a means of investigating a variety of natural processes. Both stable (H, O, C, N, Ca, Sr, Cu, Pb, S) and unstable (U, Th, K, Ar) isotope systems are analyzed as part of archaeological investigations.

Isotopes (often referred to as a nuclide in the singular) are variants of a particular element, which share the same number of protons but have varying numbers of neutrons. Isotopes are referred to as stable or unstable, depending on whether they undergo radioactive decay. Some nuclides are primordial, meaning they have existed since the beginning of the universe, while others are the product of the decay of other elements. Isotopes of the same element generally share the same chemical behavior.

Stable isotopes can be applied to studying a variety of processes with their applicability to specific problems depending on the mechanism by which one nuclide becomes naturally enriched or depleted. The basis of the application of some stable isotopes is that the variation in their atomic mass leads them to behave differently during processes such as evaporation, precipitation, freezing, photosynthesis, and incorporation into the body. Another approach is based on taking advantage of the varying abundance of some stable isotopes within different geological units to allow

proveniencing of various materials. This can only be achieved if the isotope ratios remain unchanged after incorporation into the sample.

Unstable isotopes are most commonly used as a geochronological tool for establishing the age of materials such as organics, calcium carbonates, and igneous rocks. Unstable nuclides that have either too many or too few neutrons spontaneously transform by beta decay, alpha decay, or spontaneous nuclear fission. The decay speed can be calibrated to time and is usually expressed as a "half-life." On the basis of a known decay rate and original abundance ratio, the comparison of the relative abundance of a stable nuclide to an unstable nuclide can provide an age estimation of the material studied. In the case of radiocarbon dating, the abundance of ^{14}C in the sample is compared to modern levels of ^{14}C.

Isotope analysis can be performed directly on archaeological materials or on geological materials to provide a context for archaeological sites. A particular advantage of using isotopic methods in archaeological investigations is that it provides quantifiable information that can be compared to the material culture record.

Definition

Isotope geochemistry is the measurement of the relative abundance of different species of the same element that have the same number of protons but varying numbers of neutrons. A wide range of elements and materials can be analyzed to provide insights into age, diet, mobility, climate, and provenience with important implications for archaeology.

Key Issues/Current Debates/Future Directions/Examples

A wide (and increasing) number of isotope systems can be applied to archaeological questions. This entry introduces each isotope system that has been applied in archaeological research and discusses the rationale for its use.

Hydrogen has two stable isotopes: ^{1}H and ^{2}H (often known as deuterium). Isotope results for this element are usually reported as δD that represents $^{2}H/^{1}H$ compared to the Vienna Standard Mean Ocean Water standard. This method, which is suitable to the analysis of collagen, has been used to determine paleoclimate (Leyden et al. 2006) and diet (Reynard and Hedges 2008) for archaeological samples. This technique works on the basis that hydrogen isotope ratios of precipitation vary according to climate and geography. Hydrogen in plant tissues, particularly from shallow-rooted plants, is generally sourced from leaf water derived from growing season precipitation. There is no fractionation of hydrogen during water uptake by terrestrial plants and the δD composition of herbivore tissue correlates to that of their diet, providing a time-averaged composition over their lifetime. δD values are fractionated with trophic level, with an increase of 30–50‰ from herbivores to omnivores and 10–20‰ from omnivores to herbivores, and are not influenced by other parameters, such as those which influence $\delta^{15}N$ (Reynard and Hedges 2008). As a result, this method can be used for sample provenience (using existing maps of δD), to examine changes in precipitation regime or to measure trophic level.

Oxygen has three stable isotopes: ^{16}O, ^{17}O, and ^{18}O. Results are commonly reported as $\delta^{18}O$ which reflects the ratio of ^{18}O to ^{16}O compared to a known isotope standard such as Standard Mean Ocean Water. Oxygen isotopes are fractionated by a variety of processes with the heavier ^{18}O being preferentially precipitated or frozen and the lighter ^{16}O being preferentially evaporated. Oxygen isotope analysis of tooth enamel can be focused on the oxygen atoms from either the phosphate or carbonate portion, although phosphate is traditionally favored as it is considered more resistant to post-burial diagenesis.

The oxygen isotope analysis of marine carbonates or ice cores allows the global ice volume to be estimated through time. This led the Quaternary to be divided into Marine Isotope Stages, which provide a broad framework for climate variation between glacial and interglacial periods. These changes are driven by Milankovitch cyclicity, in which the eccentricity, obliquity, and precession of the Earth's orbit vary on a regular timescale.

The Marine Isotope Stage changes have had a significant effect on plant, animal, and hominin biogeography. The oxygen isotope composition of mammal tooth and bone reflects the $\delta^{18}O$ of ingested water and macronutrients in food (Sponheimer and Lee-Thorp 1999). Ingested water has a composition similar to meteoric water, which is sensitive both to temperature and precipitation. The water in shallow-rooted plant stems and roots reflects meteoric water, although the value from leaves is enriched in ^{18}O. The effect of mammalian diet and physiology on isotope composition is poorly understood, although the relative proportion of oxygen derived from food or water may be significant. Overall, oxygen isotope analysis is a very commonly applied technique in archaeological research that has frequently been used as a proxy for climate or diet.

Carbon isotopes, reviewed by Lee-Thorp (2002), can be applied to archaeological biogenic minerals to determine the nature of vegetation included in diet. The method works on the basis that ^{13}C is strongly discriminated against during photosynthesis; however, the degree to which this occurs varies between different photosynthetic pathways. The C3, C4, and CAM photosynthetic pathways have distinctly different levels of ^{13}C, with C4 plants ranging between 9‰ and −16‰ and C3 plants ranging between −22‰ and −34‰. C4 plants are principally grasses which are predominant in areas with higher levels of solar radiation. The carbon isotope composition of biominerals such as bone, teeth, and shell will reflect the plant material in diet. Carbon isotopes have also been applied to determine the proveniencing of archaeological marble. Carbon isotope composition may also reflect the degree of marine resources within an individual's diet, as there is a significant difference in the isotopic composition of dissolved ocean bicarbonate and atmospheric carbon dioxide which is reflected in plant values (Richards and Trinkaus 2009).

Radiocarbon dating, a derivative of carbon isotope analysis, measures the amount of ^{14}C (which has a half-life of 5730 years) in a sample and compares this value to the level in modern systems. The dating technique, which is suitable for organic materials, is ubiquitous in archaeology due to its relatively low cost and accurate and precise results. More effective sample pretreatment methodologies and the use of accelerator mass spectrometry instruments has recently allowed a wider range of materials and smaller samples to be analyzed. The principal disadvantage of this method is that the amount of ^{14}C becomes too small for statistically robust analysis after ~40,000 years. Dates from radiocarbon are usually presented as "years before present" (BP) in which 1952 is taken to be present or as "calibrated years before present" (Cal BP). Calibrated years before present recognizes that the level of atmospheric ^{14}C has varied over time which is adjusted using a calibration curve constructed based on samples dated by other methods, such as dendrochronology or stratigraphy.

Nitrogen has two stable isotopes, ^{14}N and ^{15}N, the analysis of which in terms of archaeological studies is reviewed by Hedges and Reynard (2007). ^{15}N is progressively concentrated at higher trophic levels as shown by an increase in $\delta^{15}N$ values of 3–5‰ for each iteration. Nitrogen may also provide insights into weaning behavior (Schurr 1998). Bone and teeth are amenable to analysis for nitrogen isotope composition. There are however a number of complicating factors, including effects from temperature and aridity, which mean that nitrogen isotope results must be interpreted within geographic context.

Calcium isotopes, reviewed by Reynard et al. (2010), are utilized in archaeological investigations on the basis that they reflect some parameters of an individual's diet including trophic level and level of dairy consumption. Calcium isotope results are usually reported as $\delta^{44/42}Ca$ or $\delta^{44/40}C$. There appears to be a significant fractionation between diet and bone but little fractionation between diet and soft tissues.

The application of strontium isotopes as a provenience tool in archaeology is summarized by Bentley (2006). Strontium has four naturally occurring isotopes including ^{84}Sr, ^{86}Sr, ^{87}Sr, and ^{88}Sr of which the relative abundance of these isotopes is invariant and they are essentially stable on archaeological time scales. The analysis of the strontium isotope composition of archaeological

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materials can provide important information about the mobility of a range of mammals, including humans. The basis of this method is that, prior to any post-burial diagenesis, the Sr^{87}/Sr^{86} ratio of bone and teeth reflects the geological environment from which food and water were sourced while these biominerals were forming. Teeth are particularly amenable to tracing the geographic origins of humans as they mineralize during the first 12–13 years of life and do not subsequently change strontium composition after this time. Strontium isotope analysis can be used to determine if individuals are local or nonlocal by comparison to the isotopic composition in and around their burial location. In order to quantify the extent of faunal mobility, the strontium isotope composition of biominerals from fossil samples needs to be compared with a regional map of values obtained either from local faunal material or from analysis of the bioavailable component of strontium from plants, regolith, or bedrock. Knudson et al. (2010) recently introduced the use of $\delta^{88/86}Sr$ as a measurement of trophic level, on the basis that ^{86}Sr is preferentially incorporated into biological systems.

Copper isotopes have been infrequently utilized in archaeological research; however, potential exists for this method to be utilized as a tool for metal provenience studies (Gale et al. 1999). The stable isotopes ^{63}Cu and ^{65}Cu are usually measured relative to the copper isotope composition of the NIST SRM 976 standard and are reported as $\delta^{65}Cu$. Copper isotopes have not been widely utilized in the past because of the challenge of overcoming problems of incomplete ionization using traditional TIMS instruments, a short coming made redundant by the use of plasma source ionization and multi-collector instruments. Copper isotopes (in combination with iron isotopes) have been used in archaeological bone to discriminate between sexes, on the basis that male bone iron is depleted in ^{56}Fe and enriched in ^{65}Cu relative to female (Jaouen et al. 2012).

Lead isotopes, reviewed by Stos-Gale and Gale (2009) are used as a provenience tool in archaeological investigations. Four stable lead isotopes exist (^{204}Pb, ^{206}Pb, ^{207}Pb, ^{208}Pb) of which all except ^{204}Pb represent the ultimate product of element decay chains from uranium or thorium. The ratio of these isotopes varies between ore bodies and is not affected by anthropogenic processing, allowing them to be used to define the source of archaeological metals. Lead isotope ratios are most commonly reported as $^{206}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$, and $^{208}Pb/^{204}Pb$. Lead is present in a range of archaeological metals including silver, copper, bronze, and brass. Lead may also substitute for calcium in biominerals such as teeth, bone, and ivory with its composition reflecting the isotopic composition of the geological environment where these materials formed.

Sulfur isotopes, reviewed for archaeological applications by Richards et al. (2003), provide information about both the provenience of biominerals and the relative contribution of freshwater and marine materials to diet. There are four stable isotopes of sulfur (^{32}S, ^{33}S, ^{34}S, ^{36}S), and archaeological investigations usually report measurement of the two most abundant isotopes (^{32}S and ^{34}S) as $\delta^{34}S$ with reference to the meteorite standard Canyon Diablo Troilite. The $\delta^{34}S$ of bedrock locally, in combination with rivers and precipitation, controls this value in soil and water and hence plants and animals. The offset between sulfur source and isotopic composition in consumer is very small. There is a significant variation between $\delta^{34}S$ values of marine (+17‰ to +21‰) and terrestrial (−7‰ to +8‰) plants (Privat et al. 2007).

The uranium series technique (which utilizes the isotopes ^{234}U, ^{238}U, and ^{230}Th) is used to date both biological and geological calcium carbonate materials. This technique can provide minimum ages for samples up to an upper limit of ~500,000 years. The basis of this method is that carbonate materials are free from ^{230}Th when formed; however, it will accumulate over time due to the decay of uranium. As ^{230}Th is itself unstable, it will also decay until dating is no longer possible when these isotopes reach secular equilibrium. U-series dating has been widely applied to "closed system" samples such as corals and speleothems in which uranium is present at the time of formation and has also been used for "open system" biominerals such as bone or teeth which contain no premortem uranium. Open system samples are particularly prone to

postformation accumulation of ^{234}U, which is enriched compared to ^{238}U in surface waters and groundwaters. The use of laser ablation systems allows domains of different ages to be located with spatially resolved analysis in the same sample, which have been demonstrated to yield very heterogenous age results for open system samples (Grün et al. 2008). Uranium series can also be used to enhance the accuracy of electron spin resonance dating of tooth enamel by constraining the uranium uptake history of these samples. This approach can dramatically improve the age estimations of this method, particularly in samples with high uranium concentration (Grün et al. 1988).

The K-Ar/Ar-Ar technique is used to date igneous rocks, with a particularly focus on tuffs in archaeological investigations. Unstable ^{40}K, which decays with a half-life of 1.2×10^{10} years to form ^{40}Ar, is abundant in volcanic minerals and glasses. All argon is excluded from the samples by high temperatures associated with igneous processes, and so, all ^{40}Ar present in these minerals must derive from radioactive decay. This argon cannot escape from the crystals as long as the sample is not reheated. In K-Ar dating, the relative abundance of ^{40}K and ^{39}Ar is measured directly, and in Ar-Ar dating, neutron activation is used to form ^{39}Ar by neutron capture on ^{39}K. The extension of this method beyond the limits of radiocarbon and the presence of many tuffs have made this technique important for determining the chronology of the East African Rift region.

A range of instrumental approaches are utilized within the discipline of isotope geochemistry. Light elements such as H, O, C, and N are measured using gas source isotope ratio mass spectrometry. In this method, the material of interest is converted to a gas, ionized, and the relative abundance of the elements relative to a standard of known composition by using magnetic analyzer. Heavy elements such Ca, Sr, Cu, Pb, S, U, and Th are usually measured using thermal ionization mass spectrometry (TIMS) or multi-collector inductively coupled plasma mass spectrometry (MC-ICPMS). In TIMS analysis, samples are heated leading to ionization before being focused into beams by an electromagnet. The more recently developed technique of MC-ICPMS allows the measurement of a greater range of isotopes and has a significantly higher sample throughput compared to TIMS. Direct sampling methods such as laser ablation analysis and ion microprobe allow spatially resolved, minimally invasive, high-resolution sampling of a range of materials and has the added advantage of avoiding the need for chemical sample preparation facilitating high sample throughput.

In the future, isotope geochemistry is likely to be applied far more frequently in archaeology due to the greater availability of analytical instruments and the higher throughput of samples, made possible by MC-ICPMS and direct sampling. Additionally, isotope systems that have not been applied in archaeological research may yield interesting results in the future.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone: Chemical Analysis
- ▶ Chemical Survey of Archaeological Sites
- ▶ Dating Techniques in Archaeological Science
- ▶ Electron Spin Resonance (ESR) Dating in Archaeology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Molluscs (Isotopes): Analyses in Environmental Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ Zooarchaeology by Mass Spectrometry (ZooMS)

References

Bentley, R.A. 2006. Strontium isotopes from the earth to the archaeological skeleton: A review. *Journal of Archaeological Method and Theory* 13 (3): 135–187.

Gale, N.H., A.P. Woodhead, Z.A. Stos-Gale, A. Walder, and I. Bowen. 1999. Natural variations detected in the

isotopic composition of copper: Possible applications to archaeology and geochemistry. *International Journal of Mass Spectrometry* 184 (1): 1–9.

Grun, R., H.P. Schwarcz, and S. Zymela. 1987. Electron-spin-resonance dating of tooth enamel. *Canadian Journal of Earth Sciences* 24 (5): 1022–1037.

Grün, R., M. Aubert, R. Joannes-Boyau, and M.H. Moncel. 2008. High resolution analysis of uranium and thorium concentration as well as U-series isotope distributions in a Neanderthal tooth from Payre (Ardeche, France) using laser ablation ICP-MS. *Geochimica et Cosmochimica Acta* 72 (21): 5278–5290.

Hedges, R.E.M., and L.M. Reynard. 2007. Nitrogen isotopes and the trophic level of humans in archaeology. *Journal of Archaeological Science* 34 (8): 1240–1251.

Jaouen, K., V. Balter, E. Herrscher, A. Lamboux, P. Telouk, and F. Albarède. 2012. Fe and Cu stable isotopes in archeological human bones and their relationship to sex. *American Journal of Physical Anthropology* 148 (3): 334–340.

Knudson, K.J., H.M. Williams, J.E. Buikstra, P.D. Tomczak, G.W. Gordon, and A.D. Anbar. 2010. Introducing δ88/86Sr analysis in archaeology: A demonstration of the utility of strontium isotope fractionation in paleodietary studies. *Journal of Archaeological Science* 37: 2352–2364.

Lee-Thorp, J. 2002. Two decades of progress towards understanding fossilization processes and isotopic signals in calcified tissue minerals. *Archaeometry* 44 (3): 435–446.

Leyden, J.J., L.I. Wassenaar, K.A. Hobson, and E.G. Walker. 2006. Stable hydrogen isotopes of bison bone collagen as a proxy for Holocene climate on the Northern Great Plains. *Palaeogeography, Palaeoclimatology, Palaeoecology* 239 (1–2): 87–99.

Privat, K.L., T.C. O'Connell, and R.E.M. Hedges. 2007. The distinction between freshwater- and terrestrial-based diets: Methodological concerns and archaeological applications of sulphur stable isotope analysis. *Journal of Archaeological Science* 34 (8): 1197–1204.

Reynard, L.M., and R.E.M. Hedges. 2008. Stable hydrogen isotopes of bone collagen in palaeodietary and palaeoenvironmental reconstruction. *Journal of Archaeological Science* 35: 1934–1942.

Reynard, L.M., G.M. Henderson, and R.E.M. Hedges. 2010. Calcium isotope ratios in animal and human bone. *Geochimica et Cosmochimica Acta* 74 (13): 3735–3750.

Richards, M.P., and E. Trinkaus. 2009. Isotopic evidence for the diets of European Neanderthals and early modern humans. *Proceedings of the National Academy of Science* 106: 16034–16039.

Richards, M.P., B.T. Fuller, M. Sponheimer, T. Robinson, and L. Ayliffe. 2003. Sulphur isotopes in palaeodietary studies: A review and results from a controlled feeding experiment. *International Journal of Osteoarchaeology* 13 (1–2): 37–45.

Schurr, M.R. 1998. Using stable nitrogen-isotopes to study weaning behavior in past populations. *World Archaeology* 30 (2): 327–342.

Sponheimer, M., and J. Lee-Thorp. 1999. Oxygen isotopes in enamel carbonate and their ecological significance. *Journal of Archaeological Science* 26: 723–728.

Stos-Gale, Z.A., and N.H. Gale. 2009. Metal provenancing using isotopes and the Oxford archaeological lead isotope database (OXALID). *Archaeological and Anthropological Sciences* 1: 195–213.

Further Reading

Dickin, A.P. 2005. *Radiogenic isotope geology*. Cambridge: Cambridge University Press.

Pollard, M., C. Batt, B. Stern, and S.M.M. Young. 2007. *Analytical chemistry in archaeology*. Cambridge: Cambridge University Press.

Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches

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Introduction

The introduction of stable isotopes into archaeological research began in the 1970s and revolutionized the ways in which several key issues are studied, including early hominin diets, subsistence and spatial organization of forager societies, and individual life histories, among others (Makarewicz and Sealy 2015). Isotopic analysis of bones, teeth, and other organic tissues is a tool for the quantitative reconstruction of past human diets, providing an archaeological measure of subsistence that complements studies in zooarchaeology and archaeobotany.

Isotopic research is based on the premise that "you are what you eat," in other words, that the

isotopic composition of an organism's tissues is a function of the composition of its diet. Nevertheless, isotopic values do not have direct dietary meaning and need to be analyzed in an environmental context. The isotopic values for the vegetal and animal foods potentially available for forager populations in a given environment, known as the "isotopic ecology," provide the context for the interpretation of past foragers' diets.

Definition

The different chemical elements that constitute all organic tissues (e.g., carbon, nitrogen, oxygen) are defined by the number of protons in their nucleus, which varies among elements and is unique to each of them. For example, carbon has six protons, nitrogen seven, and oxygen eight. An isotope is a variety of a chemical element defined by the number of neutrons in its nucleus. For instance, carbon has three isotopes used in archaeology, ^{12}C, ^{13}C, and ^{14}C, possessing, respectively, six, seven, and eight neutrons in the nucleus (Fig. 1). These carbon isotopes have different atomic masses that condition whether isotopes are stable, like ^{12}C and ^{13}C, or radioactive, like ^{14}C. Stable isotopes do not change in abundance through time after an organism dies, whereas radioactive isotopes decay at a constant rate and are therefore useful as a radiometric dating tool.

Stable isotope values are a ratio between the heavier and the lighter isotope of each element ($^{13}C/^{12}C$, $^{15}N/^{14}N$). Since absolute abundances of these isotopes are very small, this ratio is standardized by comparison to international reference material (Vienna-Peedee Formation *Belemnitella americana* (V-PDB) for ^{13}C and atmospheric N_2 (AIR) for ^{15}N), producing δ values and then multiplied × 1000 (‰) as follows:

$$\delta(‰) = \left[\left(R_{sample}/R_{standard}\right) - 1\right] 1000$$

R is the ratio of the heavier to the lighter isotope.

Isotopic Fractionation

The process of incorporating and metabolizing nutrients involves chemical reactions in which nutrients are the dietary input or "substrate" of the reactions, an organism's tissue (e.g., bone) is the "product," and the excreta (urine, feces) are the output. Lighter isotopes of a given chemical element undergo reactions at faster rates than heavier isotopes, since bonds between the lighter isotopes are broken more easily than those between the heavy isotopes: for example, ^{12}C reacts faster than ^{13}C. In the case of animals, the

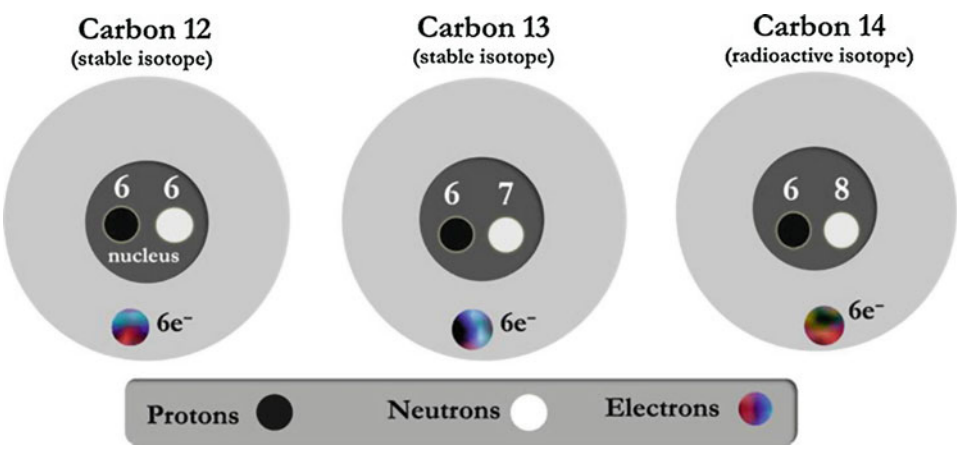

Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches, Fig. 1 Atoms of the three carbon isotopes used in archaeology

differences in reaction rates produce a concentration of molecules of the lighter isotopes in the excreta, resulting in impoverished $\delta^{13}C$ values, while the tissues that constitute a living organism are enriched in the heavier isotope. This effect is called "isotopic fractionation" and produces a systematic isotopic enrichment in every step along trophic chains. In the case of $\delta^{13}C$, fractionation is on the order of +1.5‰ and + 3‰ for $\delta^{15}N$, although there is interspecific variability (Schwarcz and Schoeninger 2011). Isotopic fractionation provides the basis for assessing paleodiets. Without it, all the organisms inhabiting a region would have the same isotopic abundances and thus provide no paleodietary information. This is actually the case with chemical elements with large atomic weight and small inter-isotope differences, characterized by negligible fractionation (e.g., $^{87}Sr/^{86}Sr$).

$\delta^{13}C$: A Marker of Photosynthetic Pathways

Photosynthesis allows plants to synthesize nutrients, including carbon, from sunlight and atmospheric carbon dioxide (CO_2). There are three alternative photosynthetic pathways (Ehleringer and Cerling 2001). The C_3 or Calvin-Benson pathway synthesizes CO_2 in the form of molecules with three-carbon atoms, with an average $\delta^{13}C$ value of −25‰, which ranges between −34‰ and −20‰. Diverse factors produce variation in these values, such as the existence of carbon reservoirs in closed forested environments, known as the "canopy effect." C_3 plants include most species from temperate and subarctic regions and high-altitude settings in general. The C_4 or Hatch-Slack pathway synthesizes atmospheric CO_2 as four-carbon molecules with an average $\delta^{13}C$ value of −12‰ and a range of −10‰ to −14‰. This pathway is characterized by a smaller isotopic fractionation and a more efficient use of nutrients, part of a physiological adaptation to arid and warm climates. C_4 species include maize, sugar cane, and tropical grasses. Finally, the crassulacean acid metabolism (CAM) pathway is characterized by the facultative capacity to alternate between the C_3 and C_4 mechanisms according to prevailing circumstances, producing an isotopic range that overlaps with that of both C_3 and C_4 plants. It includes a small number of taxa, such as succulents from desert environments.

Herbivores' $\delta^{13}C$ values are positively correlated with those of their diet, providing evidence of the plants consumed and, based upon this, paleoecological conditions. On the other hand, marine algae and plankton obtain their carbon from dissolved inorganic carbon, enriched by 7‰ with respect to atmospheric CO_2. Therefore, tissues of marine animals are enriched in comparison to those from terrestrial ecosystems.

$\delta^{13}C$ values can be obtained from two main components of bone: organic, or collagen, and inorganic, or apatite. Experimental work has demonstrated that the collagen isotopic signal reflects an average of the sources of protein consumed (e.g., meat), while the apatite signal reflects an average of the total diet (proteins, carbohydrates, and lipids). The integration of $\delta^{13}C$ values from collagen and apatite provides additional dietary information (Ambrose and Norr 1993).

$\delta^{15}N$: A Marker of Trophic Position

In terrestrial ecosystems, nitrogen is ultimately derived from soils. Soils from cool and moist areas, such as forests, tend to have low $\delta^{15}N$ values, whereas soils from warm and dry ecosystems, such as deserts, have high $\delta^{15}N$ values. These values are passed on to herbivores, plus ca. 3‰ due to isotopic fractionation. The stepwise increase in $\delta^{15}N$ values marks every step within a food web and thus provides important data on the trophic position of animals.

The $\delta^{15}N$ values of marine plants are about 4‰ higher than those of terrestrial ones. Additionally, marine food webs are usually longer than those from terrestrial ecosystems, providing more opportunities for isotopic fractionation and trophic enrichment. Globally, marine animals tend to have much higher values than terrestrial animals.

Foragers and Isotopic Studies

The definition of foraging societies is not free of ambiguity and discrepancy, given the inherent complexity of human organization of subsistence and divergent theoretical views. Nonetheless, it can be stated that foragers' subsistence relies to varying extents on gathering plants and hunting

Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches, Fig. 2 South American foragers: (**a**) Hoti family returning from a fishing and gathering trip (Venezuela); (**b**) Nukak man fishing with a bow and harpoon (Colombia). (Photographs courtesy of Gustavo G. Politis)

and fishing animals (Fig. 2). They do not control the reproductive cycle of the resources they consume to any great extent when compared to farming and herding societies. Generally, this is equivalent to the "hunter-gatherer" category (Kelly 2007; Politis 2007).

The combined use of $\delta^{15}N$ and $\delta^{13}C$ values provides a means to quantify the main food classes consumed by foragers in various local contexts around the world. Most importantly, it provides subsistence data on the scale of the individual, an analytical target that is usually hard to reach, providing access to issues such as subsistence variation by age and gender. In addition, subsistence can be studied at the population level as well. Stable isotopes have contributed to assessments of the dietary role of vegetal foods (C_3 or C_4), terrestrial animals occupying diverse trophic positions, marine animals including shellfish, fishes, and mammals, and freshwater resources. On this basis, it is possible to evaluate variation across time and space in behaviors along the foraging spectrum (Kelly 2007).

Historical Background

Vogel and van der Merwe (1977) conducted the first stable isotopes study in archaeology, presenting an assessment of carbon isotopes in collagen from human bones from the Woodland period in Eastern North America. Around the same time, DeNiro and Epstein (1978) presented an isotopic study of organisms fed controlled diets, lending definitive support to the assertion that the diet determines the isotopic composition of animal tissues. Tauber (1981) developed the first isotopic test case for the consumption of marine foods by foragers, focusing on the Danish Mesolithic and Greenland Eskimos. Following these pioneering studies, isotopic research began to gain wide acceptance and, since the end of the 1980s, has grown in scholarly scope, as well as in geographical extent. The series of *Advanced Seminars on Paleodiet* beginning in 1986 witnessed and encouraged much of the methodological and theoretical growth visible in the archaeological field today. Analysis of stable isotopes has become a routine worldwide.

Key Issues/Current Debates

Isotopic Ecology: Studying the Foragers' Menu

Isotope data from human remains must be interpreted in the context of the values of the potentially consumed foods, or the isotopic ecology. This is an integral part of the paleodietary study of forager societies, because the values of

human samples do not carry a precise dietary meaning per se. For example, a $\delta^{13}C_{collagen}$ value of −15‰ from a human sample indicates an enriched signal, which may suggest the consumption of a certain amount of protein from marine mammals, fluvial fishes, or some terrestrial herbivores, among other likely explanations. Interpretations must be adjusted by placing human values in the context of isotopic ecology. Usually, samples of archaeological origin are analyzed as well as modern samples, in order to widen the taxonomic range, in particular for plants. When modern samples are included as part of the context, it is fundamental to assess whether the organisms may have ingested foods that were not available in prehistoric times (e.g., agricultural forage, domestic animals). It is also necessary to correct the $\delta^{13}C$ values of modern samples for the so-called "Industrial" or Suess effect (ca. +1.5‰), which has altered global isotopic ratios by introducing carbon derived from fossil fuels, depleted in ^{13}C, to the atmosphere.

A first step for building an isotopic ecology is to define the foragers' potential menu on the basis of zooarchaeological and archaeobotanical evidences from the study area. This involves considering foods that might be unrecorded archaeologically, which is especially important for items with poor preservation potential (e.g., plant foods). Indeed, one of the merits of stable isotope research is that it permits inferences of past feeding behaviors that might otherwise be invisible.

The isotopic ecology must be local in terms of the archaeological problem at hand, since all vegetal and animal isotopic values vary with regional and local conditions – climate, nutrient availability, type of substrate, the existence of marine or terrestrial isotopic reservoirs, and physiological adaptations (Koch 2007). There is no "magic number" of samples providing a confident reconstruction of the isotopic ecology of a given region. The goal is to accurately characterize the isotopic variation of each of the main food resources available for foragers, since the use of inaccurate average and dispersion isotopic values for the foods eaten by humans will lead to wrong dietary interpretations. As a rule of thumb, the more complex the ecosystems where foragers make their living, the more extensive the isotopic ecology sampling should be.

A large-scale project directed by Andrzej W. Weber at the Lake Baikal region of Siberia, Russian Federation, provides an exemplary case of isotopic reconstruction of a complex ecological system intended to frame a regional study of forager populations inhabiting the area during the middle Holocene (Weber et al. 2011). Two main food webs are present in the region: (a) a *terrestrial food web* composed of C_3 plants consumed by herbivores (elk, red deer, hare), in turn consumed by carnivores (black bear, fox, dog), and (b) a *freshwater food web* of great complexity, as the Baikal is one of the largest freshwater ecosystems on Earth. The latter includes different groups of detrivorous and omnivorous fishes, fed on by seals (Fig. 3).

Plots (a) and (b) from Fig. 3 represent the terrestrial food web, and plots (c) and (d) depict the aquatic food webs from fluvial and lacustrine contexts. The $\delta^{15}N$ data show that most of the aquatic species are enriched with values above 10‰. On the other hand, most of the terrestrial species have $\delta^{15}N$ values below 10‰ with two exceptions: the herring gull, which includes fish in its diet, and the dog. As the authors suggest, "Since in most prehistoric societies, dogs are expected to feed mostly on human leftover food, dog stable isotope signatures are frequently accepted as a good measure of human diet at a group level…" (Weber et al. 2011: 542). The Baikal freshwater isotope ecology is extremely complex, in particular regarding $\delta^{13}C$ values. High variability in lake bathymetry, sunlight access, and availability of nutrients all produce a wide isotopic range (Fig. 3c) that stands in sharp contrast to the homogeneous C_3 terrestrial environment (Fig. 3a).

To summarize, the success of the Baikal isotope ecology project lies in having thoroughly characterized the isotopic ranges of the alternative food classes available for foragers from terrestrial and freshwater ecosystems. On this basis, the authors are able to discriminate two main types of diet, "Game-Fish" and "Game-Fish-Seal," each related to different ecosystems. This study

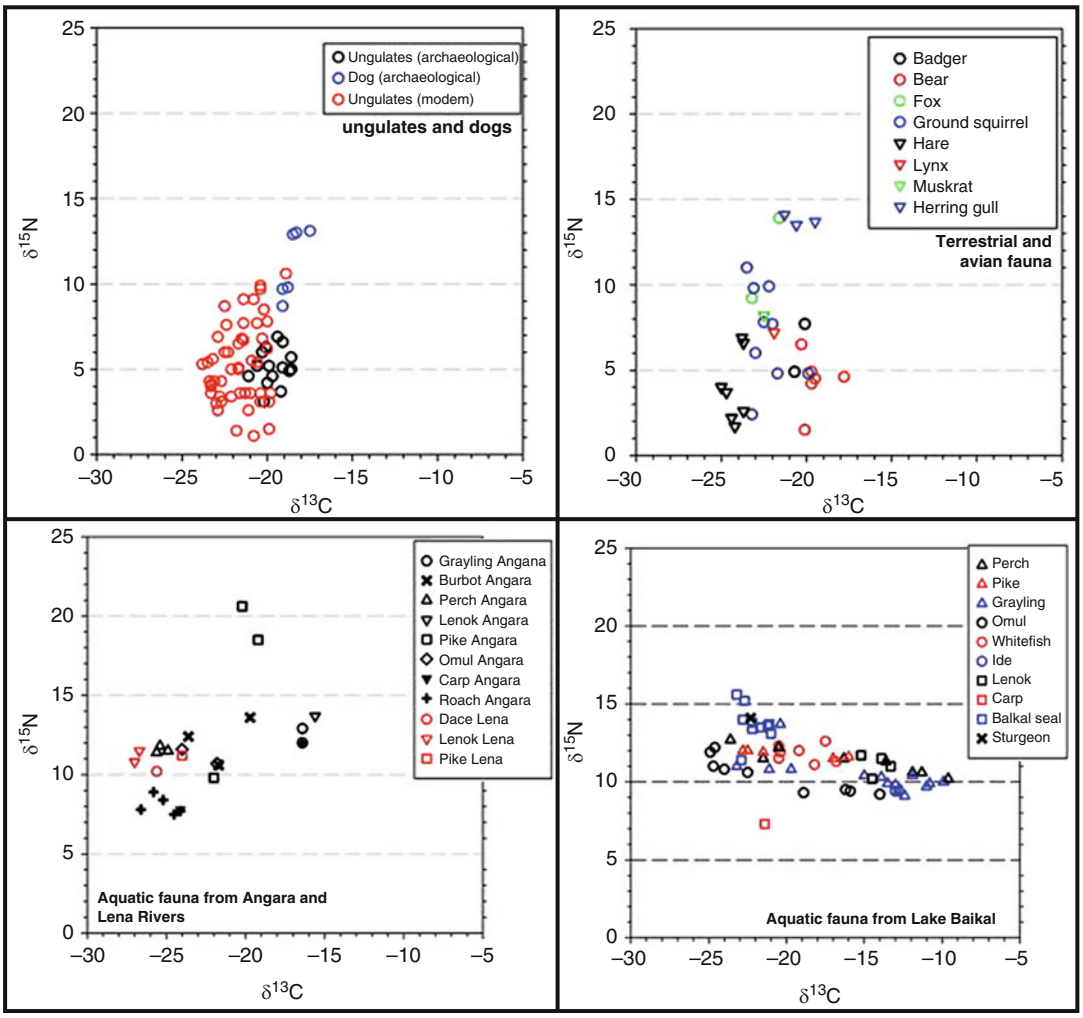

Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches, Fig. 3 Isotopic ecology of the Baikal region. (Source: Weber et al. 2011: Fig. 2. *Journal of Anthropological Archaeology* 30 (4). Reprinted with permission from Elsevier). Courtesy of Andrzej W. Weber

accentuates the need for archaeologists to determine the foraging menu via consideration of available food items; these provide the isotopic ecological context from which past forager diets can be reconstructed.

Isotopic Visibility of Feeding Behaviors: How Much Is Enough?

Isotopic results from human samples provide an *average* of the values of the foods consumed during a given period of time. Therefore, isotopes do not provide a record of rare feeding events. Beyond this, it is fair to ask how much of a given food must be eaten for it to be visible in the isotopic record. Currently, some of the main variables that determine the isotopic visibility of ancient feeding practices are known, while others remain unknown. The target of isotopic analyses is usually that of classes of foods grouped by similarities in their $\delta^{13}C$ and $\delta^{15}N$ isotopic ranges (e.g., C_3 or C_4 vegetal species, ungulates from open vs. forested environments, marine vs. terrestrial protein). This is a kind of taxon-free approach like that applied in paleontology, where the relevant variable is the niche that a species or population occupies. Correspondingly, the scale of analysis of isotopic

research does not usually reach the level of individual species, since different species occupying similar niches may present similar isotopic signals, as recorded for Baikal fish (Fig. 3d).

Figure 4 illustrates a simple dietary reconstruction with two isotope systems ($\delta^{13}C$ and $\delta^{15}N$ from collagen) where two classes of foods are present: proteins from marine and terrestrial mammals. It shows that three individuals consumed these two dietary sources in the following proportions: (A) 100% terrestrial protein, (B) 50% terrestrial and 50% marine protein, and (C) 100% marine protein. In a simple situation such as this, with only two classes of food or "isotopic end members" that are isotopically distinct, a linear mixing model can be used. Basically, the closer one sample falls to an end member, the larger the dietary importance of that end of the continuum (Schwarcz and Schoeninger 2011).

The $\delta^{13}C$ and $\delta^{15}N$ values of sample A represent consumed terrestrial protein, plus the isotopic fractionation affecting the relation between substrate and product (diet and bone collagen in this case). The same occurs with sample C, which points to a 100% marine-based diet. Finally, sample B falls halfway along the theoretical mixing line, as might be expected for a diet combining both sources of protein in equal proportions. If isotopic variation of the terrestrial and marine isotopic end members were small and the spacing between them large, as in Fig. 4, a relatively small proportion of either type of protein in the total diet (e.g., 15%) would be isotopically visible. As isotopic variation of the end members increases, the spacing between them decreases, and larger inputs of the minor protein source are necessary in order to be visible. Therefore, the answer to "How much is enough?" depends on the local isotope ecology, which provides the average and dispersion values for the isotopic end members.

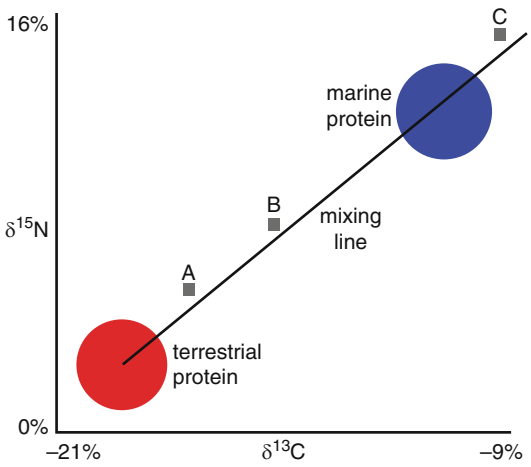

Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches, Fig. 4 Dietary reconstruction based on a "Linear Mixing Model" with two end members: terrestrial and marine protein

In real cases, usually there are more than two dietary sources present, increasing the complexity of the isotopic ecology and therefore of the study of forager paleodiets. The use of several isotopic tracers from organic and inorganic bone phases increases resolution. Recently, dietary mixing models have added powerful analytical tools to reconstruct foragers' subsistence.

Forager Diet, Mobility, and Settlement

In forager societies, subsistence is tied to mobility and geographical organization (Kelly 2007; Politis 2007). In this context, isotopically based dietary studies may offer spatial insights, in particular in cases that involved the consumption of foods with a spatially circumscribed availability and a distinct isotopic signature. This is the case with marine mammals and fishes, usually enriched in both $\delta^{13}C$ and $\delta^{15}N$ (Schwarcz and Schoeninger 2011). In some regions, this is also the case for fluvial or lake-dwelling mammals and fishes, enriched in $\delta^{15}N$ and usually depleted in $\delta^{13}C$, as shown in Baikal seals (Fig. 3d; Weber et al. 2011).

In a classic article, Sealy and van der Merwe (1986) tested a hypothesis that suggested a seasonal round between the coast and the hinterland for forager societies inhabiting the Cape of South Africa during the Late Holocene. This "seasonal model" of spatial organization – inspired by historic records – would produce a homogeneous isotopic signature mixing marine and terrestrial foods. Isotopic analyses of human samples from both ends of this alleged seasonal round showed at

least two different types of diet: people from coastal sites with marine-based diets and inland people who consumed negligible amounts of marine resources. This not only contradicted the expectations derived from the seasonal model but also suggested the existence of restricted ranges of mobility for foragers consuming marine foods. Similar patterns of isotopic coastal-inland differentiation have been recorded for regions of Australia, Peru, Argentinean Patagonia, and the Northwest Coast of North America. These cases highlight the attraction of productive coastal settings to foraging societies, leading to spatially restricted home ranges and high demographic densities. On the other hand, wide territories integrating the coast and the hinterland have been suggested for Mesolithic Denmark, among other cases. This information is well suited for the analysis of catchment areas via the application of patch choice models derived from foraging theory.

These and other case studies help place dietary information into a geographic context. Isotopic reconstructions of forager diets are currently being developed to integrate diverse aspects of cultural geography such as territorial organization, foraging ranges, and logistical spheres of mobility. This is enhanced by the use of other isotope systems described below.

Future Directions

Forager Geography and Life Histories: Strontium and Oxygen Isotopes

Following the lead of research on complex societies such as the Maya and Tiwanaku, studies of forager subsistence are progressively including isotopic markers of geographic residence (Bentley 2006; Price and Burton 2011). Strontium ($^{87}Sr/^{86}Sr$) and oxygen isotopes ($^{18}O/^{16}O$) are at the forefront of this methodological advance.

Stable isotope analyses can be performed on different organic tissues: bone, teeth, and soft tissues such as hair and nails. Bones are remodeled throughout life, whereas teeth, hair, and nails have incremental growth patterns and do not remodel once formed. The isotopic signal retrieved from each tissue reflects an average of the diet during the period of its formation. In the case of bones, the remodeling process is on the order of a decade and is active until the death of the individual, offering an isotopic signal that averages the diet during the last years of life. Teeth, on the other hand, form only during the first years of life, providing an evidence of diet during different stages of childhood. Hair and nails form rapidly and incrementally, providing dietary information on very brief periods of life, offering monthly dietary resolution (Schwarcz and Schoeninger 2011).

Strontium isotopes ($^{87}Sr/^{86}Sr$) have large atomic masses and differ little from each other. Therefore, rates of chemical reaction are very similar, and isotopic fractionation between substrate and product is negligible. In this case, all of the organisms in a given region present the same isotopic abundances determined by the chemical signatures in the local geology, which are passed on to soils, circulating water, plants, animals, and humans (Bentley 2006).

The use of $^{18}O/^{16}O$ ratios as markers of place of origin is based on two central facts: (a) Isotopic ratios in meteoric precipitations vary geographically according to altitude, humidity, temperature, and distance from the ocean; (b) isotopic ratios in human tissues depend on the water imbibed and, to a lesser extent, oxygen in air and food sources. Thus, oxygen values from human remains contain an averaged record of the places where a person lived during the period of time represented in the sampled tissue.

These isotope systems must be used in the context of different frames of reference: biologically available strontium in the case of $^{87}Sr/^{86}Sr$ and isotope values in water sources in the case of $\delta^{18}O$. The natural variation in isotopic abundances between different regions will determine the resolution that can be achieved in archaeological reconstructions (i.e., which regions have an isotopically distinct signature). Since these isotope systems are independent from each other and may offer complementary insights, their combined use is the best strategy.

Recent studies by Eerkens et al. (2014, 2016) for Central California illustrate the strength of this

approach to evaluate mobility and residence patterns in foragers. The authors analyzed isotope values in serial samples of third molars encompassing between 9 and 20 years of age, suggesting that in many cases there is large variability in the consumption of resources within short spans. This can be related to changes of residence, seasonality of resources, exchange, and scarcity periods, among others. In addition, by comparing different tissues they conclude that several individuals migrated at different stages of their lives and that an individual can be both "local" and "nonlocal" at different during along life. By revealing intra- and interindividual dietary and geographic differences, we have the capacity to assess forager social organization, subsistence, interpersonal violence, and life history traits (see next).

Dietary Mixing Models

Mixing models have recently been developed to convert a consumer isotopic values into quantitative estimates of the contribution of different resources, such as IsoSource, SIAR, and FRUITS (Phillips et al. 2014). These models have evolved by incorporating the uncertainties associated with the main sources of variability – isotopic enrichment, consumer, and sources – and considering a greater number of potential resources with different elementary concentrations. In the context of hunter-gatherer studies, dietary mixing models are just beginning to be applied (Newsome et al. 2004; Tsutaya et al. 2016). In a pioneering work, Newsome et al. (2004) implemented IsoSource to study the hunter-gatherer diet of the California coast during the early and middle Holocene, recording a decline in the importance of marine resources in the late period, particularly marine fish, accompanied by an increase in terrestrial resources.

In recent years, new mixing models have been developed utilizing a Bayesian statistical framework (Phillips et al. 2014), allowing incorporating prior information on the relative importance of different food classes and estimating the dietary contributions of a resource probabilistically. One of these models, within the framework of a Bayesian environment, is the Weaning Age Reconstruction with Nitrogen isotope analysis (WARN) of particular interest for studies of forager life history. Its purpose is to establish the ages of beginning and end of weaning in human populations (Tsutaya and Yoneda 2013). Breastfeeding and weaning are processes that involve a change in diet in the lives of individuals, being therefore recorded in isotope values. These processes are closely linked to the fertility, growth, mortality, and morbidity in forager populations. In a recent paper, Tsutaya et al. (2016) evaluated the role of ceramic technology and plant availability in the breastfeeding and weaning practices of a hunter-gatherer population of the late Jomon period in eastern Japan. Using WARN, these authors compared the timing for weaning in different populations of foragers (Fig. 5, Tsutaya et al. 2016). The authors observe large variation worldwide with foragers completing weaning between 1 and 4 years of age. This is a promising framework for the comparative analysis of key socio-ecological processes.

Overcoming Analytical Limitations: Compound–Specific Isotope Analyses

Isotopic analysis at the level of specific compounds of bone, including amino acids, fatty acids, and cholesterol, is a new technique that allows a high-resolution alternative to bulk tissue analysis of $\delta^{13}C$ and $\delta^{15}N$ (Evershed et al. 2007). Compound-specific studies provide a means to assess the dietary contribution of particular food classes, overcoming some limitations of forager paleodietary reconstruction, such as the $\delta^{13}C$ overlap of C_4 plants and marine resources and the ^{15}N enrichment prevalent in arid environments. Bone cholesterol in particular has been shown to reflect the whole diet, playing an analogous role to apatite and contributing to assess its preservation.

Since their introduction in archaeology 40 years ago, stable isotope analysis has provided a tool for the quantitative reconstruction of forager subsistence, thereby enlarging the range of topics addressed. Currently, the isotopic field has grown to include studies of isotopic ecology in complex ecosystems, forager diet, and geographical issues including foraging ranges, territories,

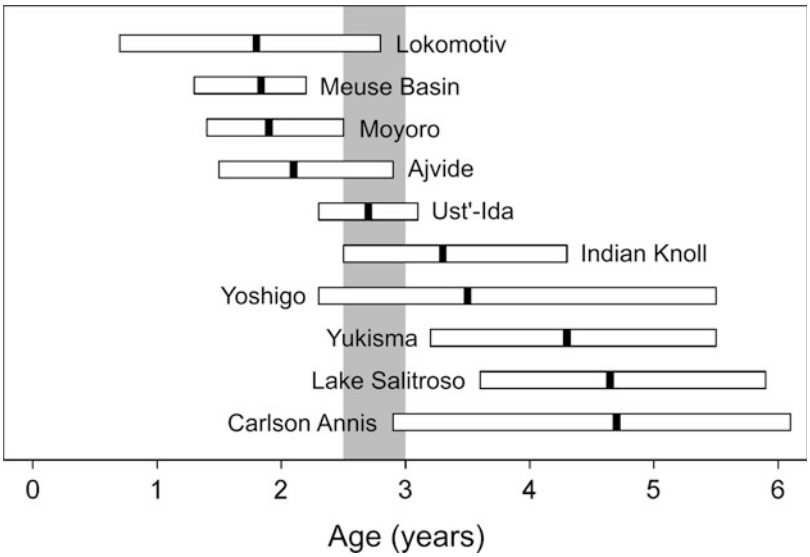

Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches, Fig. 5 Differences in end of weaning times among hunter-gatherers calculated using the WARN software. (Source: Tsutaya et al. 2016: Fig. 6. *Journal of Archaeological Science* 76. Reprinted with permission from Elsevier). Courtesy of Takumi Tsutaya

and migrations, with a potential resolution reaching the scale of individual life histories. The theoretical and methodological limits of the isotopic revolution in archaeology lie still far ahead.

Cross-References

- ▶ Bone Chemistry and Ancient Diet
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Radiocarbon Dating in Archaeology
- ▶ Zooarchaeology

References

Ambrose, S.H., and L. Norr. 1993. Relationship of carbon isotope ratios of whole diet and dietary protein to those of bone collagen and carbonate. In *Prehistoric human bone: Archaeology at the molecular level*, ed. J. Lambert and G. Grupe, 1–38. Berlin: Springer.

Bentley, R.A. 2006. Strontium isotopes from the earth to the archaeological skeleton: A review. *Journal of Archaeological Method and Theory* 13 (3): 135–187.

DeNiro, M.J., and S. Epstein. 1978. Influence of diet on the distribution of carbon isotopes in animals. *Geochimica et Cosmochimica Acta* 42: 495–506.

Eerkens, J.W., G.F. Barfod, G.A. Jorgenson, and C. Peske. 2014. Tracing the mobility of individuals using stable isotope signatures in biological tissues: "locals" and "non-locals" in an ancient case of violent death from Central California. *Journal of Archaeological Science* 41: 474–481.

Eerkens, J.W., K. Sullivan, and A.M. Greenwald. 2016. Stable isotope analysis of serial samples of third molars as insight into inter- and intra-individual variation in ancient diet. *Journal of Archaeological Science: Reports* 5: 656–663.

Ehleringer, J.E., and T.E. Cerling. 2001. Photosynthetic pathways and climate. In *Global biogeochemical cycles in the climate system*, ed. E.-D. Schulze, M. Heimann, S. Harrison, E. Holland, J. Lloyd, I.C. Prentice, and D.S. Schimel, 267–277. New York: Academic Press.

Evershed, R.P., I.D. Bull, L.T. Corr, Z.M. Crossman, B.E. Van Dongen, C.J. Evans, S. Jim, H.R. Mottram, A.J. Mukherjee, and R.D. Pancost. 2007. Compound-specific stable isotope analysis in ecology and paleoecology. In *Stable isotopes in ecology and environmental science*, ed. R. Michener and K. Lajtha, 2nd ed., 480–540. Boston: Blackwell Publishing.

Kelly, R.L. 2007. *The foraging spectrum. Diversity in hunter-gatherer lifeways*, rev. ed. New York: Percheron Press.

Koch, P.L. 2007. Isotopic study of the biology of modern and fossil vertebrates. In *Stable isotopes in ecology and environmental science*, ed. R. Michener and K. Lajtha, 2nd ed., 99–154. Boston: Blackwell Publishing.

Makarewicz, C.A., and J. Sealy. 2015. Dietary reconstruction, mobility, and the analysis of ancient skeletal tissues: Expanding the prospects of stable isotope research in archaeology. *Journal of Archaeological Science* 56: 146–158.

Newsome, S.D., D.L. Phillips, B.J. Cullenton, T.P. Guilderson, and P.L. Koch. 2004. Dietary reconstruction of an early to middle Holocene human population from the central California coast: Insights from

advanced stable isotope mixing models. *Journal of Archaeological Science* 31: 1101–1115.
Phillips, D.L., R. Inger, S. Bearhop, A.L. Jackson, J.W. Moore, A.C. Parnell, B. Semmens, and E.J. Ward. 2014. Best practices for use of stable isotope mixing models infood-web studies. *Canadian Journal of Zoology* 92: 823–835.
Politis, G.G. 2007. *Nukak. Ethnoarchaeology of an Amazonian people*. Walnut Creek: Left Coast Press.
Price, T.D., and J.H. Burton. 2011. *An introduction to archaeological chemistry*. New York: Springer.
Schwarcz, H.P., and M.J. Schoeninger. 2011. Stable isotopes of carbon and nitrogen as tracers for Paleo-Diet reconstruction. In *Handbook of environmental isotope geochemistry*, 725–742. New York: Springer.
Sealy, J.C., and N.J. van der Merwe. 1986. Isotope assessment of the seasonal-mobility hypothesis in the southwestern Cape, South Africa. *Current Anthropology* 27: 135–150.
Tauber, H. 1981. ^{13}C evidence for dietary habits of early man in Denmark. *Nature* 292: 332–333.
Tsutaya, T., and M. Yoneda. 2013. Quantitative reconstruction of weaning ages in archaeological human populations using bone collagen nitrogen isotope ratios and approximate Bayesian computation. *PLoS One* 8: e72327.
Tsutaya, T., A. Shimomi, S. Fujisawa, K. Katayama, and M. Yoneda. 2016. Isotopic evidence of breastfeeding and weaning practices in a hunter–gatherer population during the Late/Final Jomon period in eastern Japan. *Journal of Archaeological Science* 76: 70–80.
Vogel, J., and N.J. van der Merwe. 1977. Isotopic evidence for early maize cultivation in New York State. *American Antiquity* 42: 238–242.
Weber, A.W., D. White, V.I. Bazaliiskii, O.I. Goriunova, N.A. Savel'ev, and M.A. Katzenberg. 2011. Hunter–gatherer foraging ranges, migrations, and travel in the middle Holocene Baikal region of Siberia: Insights from carbon and nitrogen stable isotope signatures. *Journal of Anthropological Archaeology* 30 (4): 523–548.

Isotopic Studies of Husbandry Practices

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Introduction

Assessment of husbandry practices in ancient times has long been made from analogy with (sub) contemporary traditional herding systems. Although these are still extremely useful for encompassing the range of possibilities, analogy may today be replaced by direct evidence.

Probably from the early steps of domestication processes in the Near East, in the early Pre-Pottery Neolithic, and certainly from the time when the first domesticates were diffused and acclimatized outside of the area of domestication, pastoral communities have developed husbandry strategies involving great zootechnical skills to insure the survival of their stock and enhance the exploitation of subsistence products. In prehistoric times, with the exception of rare and sometimes ambiguous iconographical sources, the only direct evidence of husbandry practices is constituted by animal skeletal remains. In particular, valuable information may be retrieved from the isotopic composition of the elements that make up bones and teeth. In historical periods, many written and iconographical accounts may inform on herding practices. However, because such sources may not always reflect the actual management of husbandry and spatial variability on a local scale, direct investigation from bone remains is also commonly conducted on assemblages from antiquity and medieval times.

Definition

Husbandry practices are essentially related to animal diet and breeding. Management of domestic animals' diet may start from their very young age with control of weaning, and includes a range of possibilities, depending notably on the scale of the husbandry: from the choice and management of pasture areas, including seasonal to interannual mobility between pastures, to the supply with forage in periods of food shortage. In mixed farming systems, the fodder may be a by-product or a product of cultivated crops. Management of animal reproduction includes the choice of mates and control of the mating period and duration of lactation.

Most of these zootechnical parameters may be approached by isotopic studies of bone and teeth. Among elements, the most commonly targeted for this purpose are carbon (δ^{13}C), nitrogen (δ^{15}N), oxygen (δ^{18}O), and strontium (^{87}Sr/^{86}Sr), whose

isotopic compositions are primarily related to – and therefore inform on – environment (climate, geology, soil history, vegetation cover) and plant and animal physiology. The list may be enlarged in the future with other major or trace elements currently under consideration for possible applications in this field. Most of the time, these elements are extracted from bone and tooth collagen and bioapatite, less commonly from individual bone collagenous amino acids and fatty acids (Copley et al. 2004).

Under high and middle latitudes, husbandry and related tasks are strongly punctuated by the seasonal cycle, driving both availability of plant and water resources and animals' biological cycle. For this reason, an important place is henceforth given to reconstitutions of animals' isotopic history at the infra-annual scale. This is made possible by studies involving serial sampling in teeth. Still, studies involving bulk analysis of bone and teeth remain very informative in many instances.

Key Issues/Current Debates/Future Directions/Examples

Animal Diet

Proximity of the Herd to the Settlement: The Example of Pig Husbandry

Management of animal diet has consequences for the degree of commitment and organization of labor within pastoral communities and may indirectly inform on the scale of husbandry. The closeness of the flock to the settlement, as opposed to extensive husbandry, may be assessed through the position of domestic animals in the anthropic ecosystem, with trophic chains possibly including by-products from animal exploitation and/or land cultivation. This point is particularly relevant for pig husbandry. Domestic pig is characterized by a great plasticity in terms of feeding behavior. When herded extensively in woodland, domestic pigs would have a diet similar to that of their wild counterparts, mainly herbivorous. Proximity of pigs to the settlement and human activities may result in its scavenging on consumption refuses, including animal products, which would raise it to an omnivore to carnivore level in the trophic chain. The relative position of the pig in the trophic chain may be inferred from the analysis of bone collagen $\delta^{15}N$. The principle used is the stepwise enrichment in ^{15}N along the trophic chain. Crucially, given that $\delta^{15}N$ of plants, at the first level of the trophic chain, are primarily defined by local soil parameters (and physiology), pig $\delta^{15}N$ values rarely speak by themselves. They must be compared to $\delta^{15}N$ values measured in other animals of the same ecosystems, including unambiguous representatives of herbivores and carnivores (Ervynck et al. 2007).

Integrating Agricultural Resources into Animal Diet

In mixed farming systems, the interweaving of animal husbandry with plant cultivation may sometimes be detected from the analysis of bone collagen $\delta^{13}C$. This applies especially when the cultivated crop is a C_4 plant in a wild environment heavily dominated by C_3 plants, the difference in $\delta^{13}C$ between these two photosynthetic pathways being inherited by the consumers. This is the case, for example, in China, where millet, a C_4 cereal, was cultivated from the Early Neolithic. At Xipo, a Middle Neolithic site in the Yellow River basin, a substantial contribution of C_4 plants, most probably millet, was shown in the diet of domestic pigs, emphasizing the interdependence of husbandry and agriculture in these societies (Fig. 1a). A system where agricultural products are redistributed between animals and humans depending on fluctuations in agricultural yields and wild resources was described as a key to the stability of the subsistence strategy (Pechenkina et al. 2005). Another domestic crop representative of the C_4 photosynthetic pathway is maize. Its contribution to camelid pastoralism was demonstrated in the first millennium CE at the site of Conchopata in the Peruvian highlands (Finucane et al. 2006). From their bone collagen $\delta^{13}C$ values, camelids at the site could be separated into two groups (Fig. 1b) possibly corresponding to two different species: one group of camelids (llamas?) kept by the settlement and supplied with maize fodder and one group (alpacas?) fed pure C_3 diet, kept on highlands grasslands.

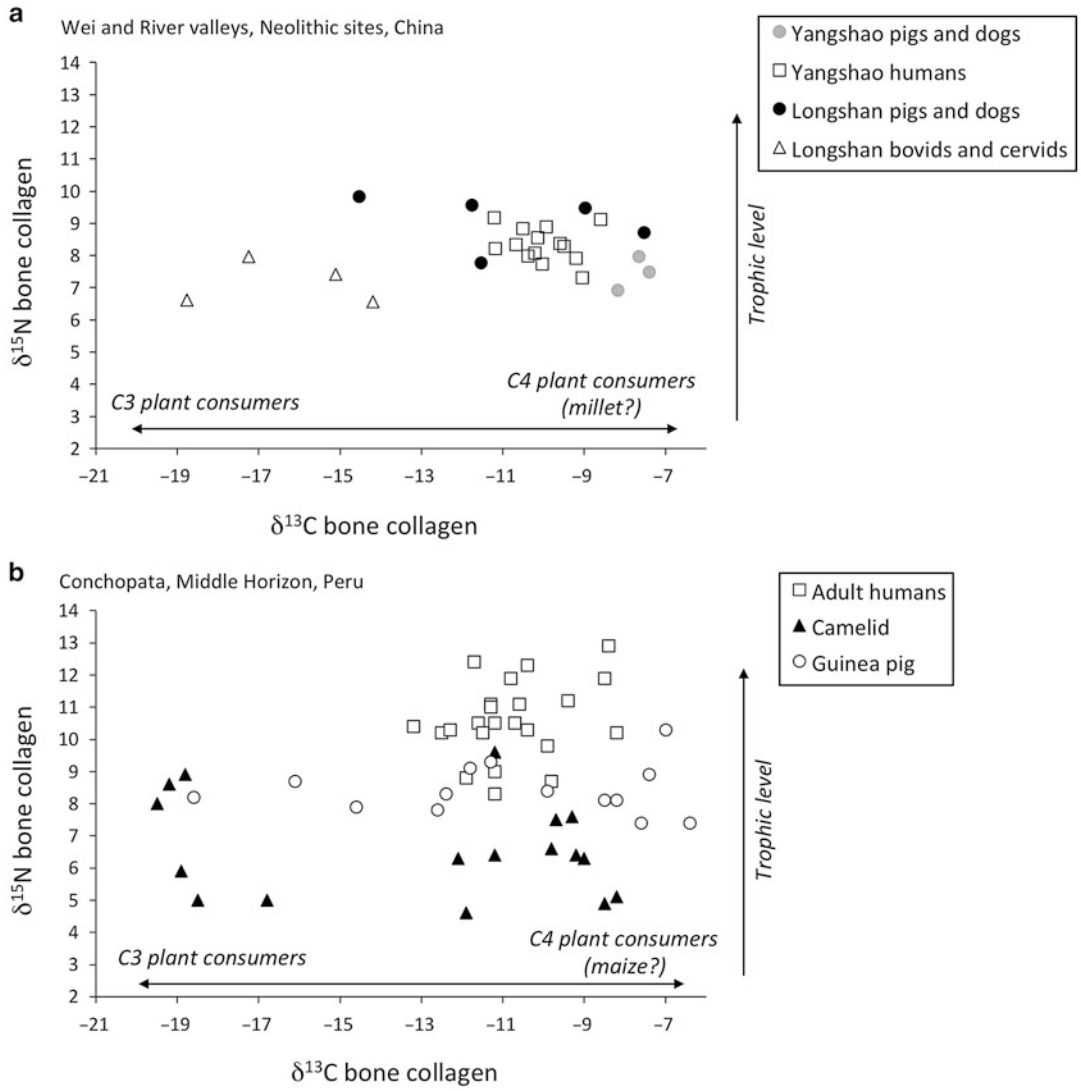

Isotopic Studies of Husbandry Practices, Fig. 1 Detection of the introduction of C_4 plants in the diet of domestic animals through analysis of stable carbon isotope composition ($\delta^{13}C$) of bone collagen. (**a**) Introduction of millet in the diet of domestic pigs in Neolithic China. (Data from Pechenkina et al. 2005); (**b**) introduction of maize in the diet of domestic camelids in Middle Horizon culture in Peru. (Data from Finucane et al. 2006)

Exploitation of Estuarine and Marine Resources

Coastal and marine ecosystems are characterized by isotopic values different than those measured in continental areas. This specificity was sometimes used to highlight the exploitation of estuarine and marine resources by herders for their stock. The exploitation of estuarine salt marshes to graze cattle and caprines is still a common practice in Northwestern Europe and is widely described by historical accounts from medieval times. In England, the antiquity of this practice was confirmed by an isotopic study using the principle that salt-marsh plants have significantly higher $\delta^{15}N$ ratios than other terrestrial plants. Comparing bone collagen $\delta^{15}N$ values of cattle and caprines from Bronze Age sites in the Southwestern coast of England, Britton et al. (2008) were able to show that they were significantly

higher than those measured in inland sites, reaffirming the hypothesis of salt-marshes exploitation previously suggested by other archaeological evidence, including cattle and sheep/goat footprints tracks and the presence of halophytic plant remains in herbivore coprolites found at the sites.

The use of marine resources – including fish, shells, and seaweed – to feed domestic cattle, caprines, horse, and pig is also a widespread practice, which can be detected through stable isotope analysis. Plants and animals from marine ecosystems tend to have higher $\delta^{13}C$ values than those measured in terrestrial C_3 plants-dominated ecosystems. Additionally, because food chains are extended in marine ecosystems, most marine animal resources have higher $\delta^{15}N$ values than those encountered in terrestrial animals. The introduction of marine fish in the diet of domestic animals can therefore be detected by a concomitant raise in bone collagen $\delta^{13}C$ and $\delta^{15}N$ values compared to what would be expected for a terrestrial diet. Guiry et al. (2012) conducted isotopic analyses on pig remains from seventeenth century fishing stations in Newfoundland and were able to highlight the presence of two clearly distinct groups of pigs with spectacular differences in both $\delta^{13}C$ and $\delta^{15}N$ values. The pigs with higher $\delta^{13}C$ and $\delta^{15}N$ values were most probably those raised locally with great access to marine-derived food, in contrast to their European counterparts raised on terrestrial diet.

The feeding on marine seaweed may in the same manner be reflected by $\delta^{13}C$ values higher than those measured in animals grazing on terrestrial C_3 pastures. The use of marine seaweed as fodder for cattle, sheep, and horse is a common practice in the Northwestern Atlantic area, attested from historical sources from Early Middle Ages on. In humid insular contexts, particularly, where terrestrial pastures are reduced in the winter while climatic conditions prevent the constitution of dry fodder, seaweed may be a valuable resource to complement the flocks over the bad season. Because this practice is often restricted seasonally, the greatest opportunity to detect it is by performing sequential sampling in tooth enamel. Concomitant analysis of enamel bioapatite $\delta^{13}C$ values, reflecting diet, and $\delta^{18}O$ values, reflecting climate, permits to access seasonal changes in diet and to highlight a potential contribution of seaweed resources in the winter (Fig. 2c). This principle was used to demonstrate a recurrent significant contribution of seaweed to the diet of sheep in the Neolithic site of Holm of Papa Westray (third millennium BCE) in the Orkney archipelago. The contribution occurred in the winter and in the form of fresh seaweed, so it could not be said whether sheep were intentionally fed this resource by the herders or if this resulted from the gathering by the animals of a fully accessible resource washed ashore by storms (Balasse et al. 2006).

Leaf Foddering

Compensating for restricted availability of grass during dry summers or snowy winters and/or over periods of stalling sometimes involves the use of tree leaves. The practice was widespread in Europe until recent history from Norway to the Mediterranean area. It is directly evidenced at middle Neolithic sites, where botanical remains including twigs and leaves have been retrieved in cattle and small stock dung deposits. Unfortunately, the retrieving of dung layers with good preservation of botanical remains is exceptional in archaeological contexts. Alternatively, the practice of leaf foddering can be investigated through the analysis of $\delta^{13}C$. Plants grown in closed forests are marked by the canopy effect resulting in a lowering of $\delta^{13}C$ values. Those are passed onto animals feeding on them (Fig. 2b). At the Middle Neolithic site of Bercy, France (fourth millennium BCE), previous archaeobotanical studies demonstrated the presence of a dense oak tree forest on the alluvial terraces nearby the site, exploited for firewood and partly cleared for agricultural purposes. Seasonal feeding on plants marked by the canopy effect was suggested by low $\delta^{13}C$ values in sheep and cattle tooth enamel, suggesting that the forest was also exploited for winter leaf foddering (Balasse et al. 2012).

Herd Mobility and Trade

In extensive pastoralism, the search for good quality pastures all year round involves compensating

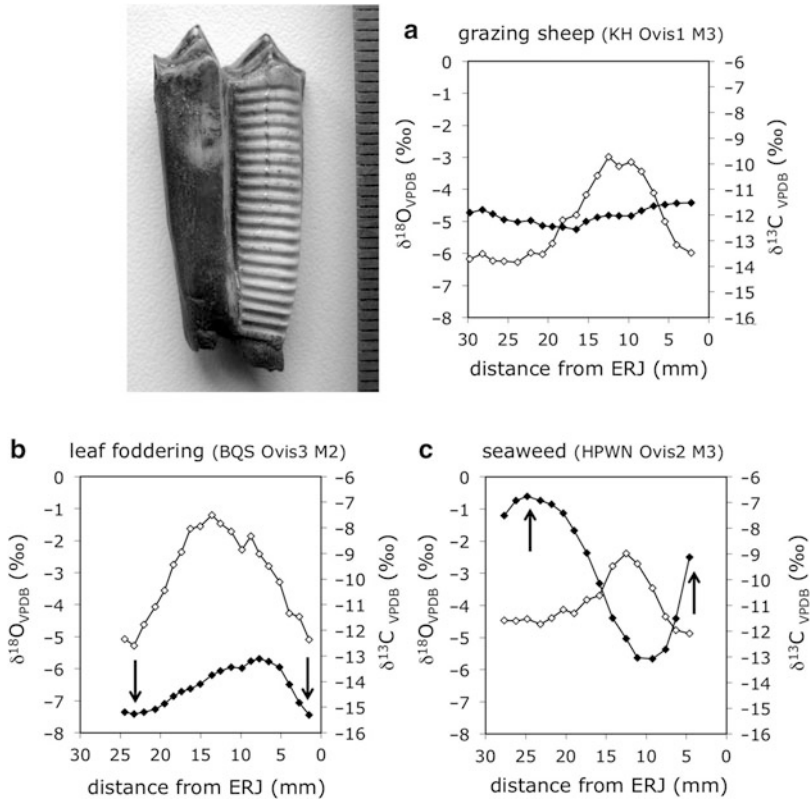

Isotopic Studies of Husbandry Practices, Fig. 2 Detection of seasonal changes in diet, through sequential sampling (here on a sheep second lower molar) and sequential analysis of stable carbon ($\delta^{13}C$, *black symbols*) and oxygen isotope compositions ($\delta^{18}O$, *open symbols*) of tooth enamel. (**a**) Expected values for a sheep grazing in terrestrial pastures. (Data from Balasse et al. 2006); (**b**) evidence for winter leaf foddering. (Data from Balasse et al. 2012); (**c**) evidence for winter seaweed consumption. (Data from Balasse et al. 2006)

for seasonal fluctuation in resource availability through altitudinal or longitudinal mobility. Altitudinal mobility sometimes implies a change in vegetation types and plant species available for graze. Particularly in subtropical regions, due to an altitudinal gradient in the relative proportion of C_3 and C_4 plants, with C_4 grasses dominating in low-altitude grasslands and C_3 grasses becoming more abundant to dominant in highlands pastures, altitudinal mobility may be reflected in $\delta^{13}C$ values mimicking changing proportions of C_3/C_4 plants in the diet throughout the year. However, when assessing mobility from changing proportions of C_3/C_4 plants in diet, one might also have to deal with two potentially interfering factors: plant selectivity by herbivores – especially as far as cattle are concerned – and seasonal changes in the proportion of C_3/C_4 plants at the local scale (Balasse et al. 2002; Balasse and Ambrose 2005).

Longitudinal mobility can be addressed through strontium isotopic analysis, the most commonly used tool to assess mobility and migration in the past (Bentley 2006). Sr isotopic signatures are mostly inherited from eroding geology through soils and waters into the food chain. The Sr isotopic signature from the geological material depends on the nature and age of bedrock and therefore varies on geographical scales with local parameters. In coastal areas, the local Sr isotope signature may be considerably influenced by the marine signal through sea spray. Other factors including a dust component may be taken into account. Mobility between areas with different geology and/or soil history and between coastal and inland areas may be reflected in changes in Sr isotope ratios. This principle has occasionally been applied to domestic animal assemblages with the aim of investigating mobility at the seasonal scale or mobility during the lifetime, potentially related to trade (Balasse et al. 2002; Bentley and Knipper 2005; Viner et al. 2010; Sjögren and Price 2012). The most

difficult prerequisite of this method is to evaluate accurately the range of variation of the local Sr isotope signature. It is recommended to define the local archaeological signature from archaeological teeth of animals with a restricted range of habitats (Bentley 2006).

Animal Reproduction: Seasonality and Season of Birth, Weaning, and Duration of Lactation

Domestication has lead to the attenuation or suppression of some of the physiological expressions of seasonality, including seasonality of the breeding cycle. However, the reproductive patterns of domesticated small ruminants are still strongly driven by the photoperiodic cycle, while the breeding cycle of other domesticates like cattle and pigs, when raised extensively, tends to be synchronized with the vegetation development cycle. The herder may directly influence this reproduction pattern, essentially through management of diet and mating, in order to extend or conversely to reduce the breeding period. Birth management strategies are mainly influenced by herd size, residential mobility, and, in more recent times, market timetable (Balasse et al. 2003). For all these reasons, although it is most likely that breeding in prehistoric herds was seasonally restricted, the duration of birth period and distribution of birth over this period (with a possible bimodality) need to be inferred from the archaeological record.

Assessment of birth distribution may be performed through the analysis of tooth enamel $\delta^{18}O$. The $\delta^{18}O$ value of tooth enamel is related to that of ingested water, mainly reflecting local surface water and precipitation. Seasonal variations in precipitation $\delta^{18}O$ are recorded in enamel during tooth mineralization and can be reconstructed through sequential analysis along the axis of tooth growth. Seasonality of birth may be investigated through a study of interindividual variability in the sequence of the seasonal cycle tracked in a given tooth. The assessment is performed by a comparison of the position in the tooth crown where the lowest and/or highest $\delta^{18}O$ values are measured (Fig. 3). This principle was applied, for example, on the Late Stone Age site of Kasteelberg in Southwestern Cape (South Africa), where it was used to highlight two lambing seasons for sheep, in agreement with descriptions by European observers of the Khoekhoe husbandry systems at the beginning of the eighteenth century. This result suggested either females lambing more than once a year or subdivision of the flock and births scheduled at different times of the year. Several implications could be drawn on the role of sheep in the subsistence economy, residential mobility strategy, and the use of sheep mortality profiles for interpretation of season of occupation of the site. Similar analytical protocols were developed in order to investigate birth seasonality in cattle (Towers et al. 2011; Balasse et al. 2012) and pig (Frémondeau et al. 2012).

The season of birth cannot be inferred from the pattern of intra-tooth variation in $\delta^{18}O$ values alone until the time resolution of the isotope signal in enamel bioapatite, influenced by the duration of enamel mineralization, is clearly established. Comparison of results must be made with modern reference sets (Fig. 3c, d).

In contexts where milk exploitation is attested, because lactation is initiated with the offspring's birth, seasonality of birth and duration of lactation influence directly the seasonal availability of milk. Duration of lactation may be approached indirectly through weaning age. The change of diet occurring during the weaning process is also a step down the trophic chain: the young mammal stops feeding on milk, a product elaborated by its mother. This change is recorded in tooth dentine. The $\delta^{15}N$ of dentine collagen reflects the trophic level at time of tooth formation. It is possible, by performing sequential sampling of dentine along the tooth, to observe the decrease in $\delta^{15}N$ of collagen at weaning time. Results from a study conducted on cattle teeth from the Middle Neolithic site of Bercy (France) suggested early weaning, possibly reflecting a shorter lactation for Neolithic cows, compared to modern improved breeds. This kind of result is a step toward a better estimation of the capacity of prehistoric dairy husbandry, which may help in the

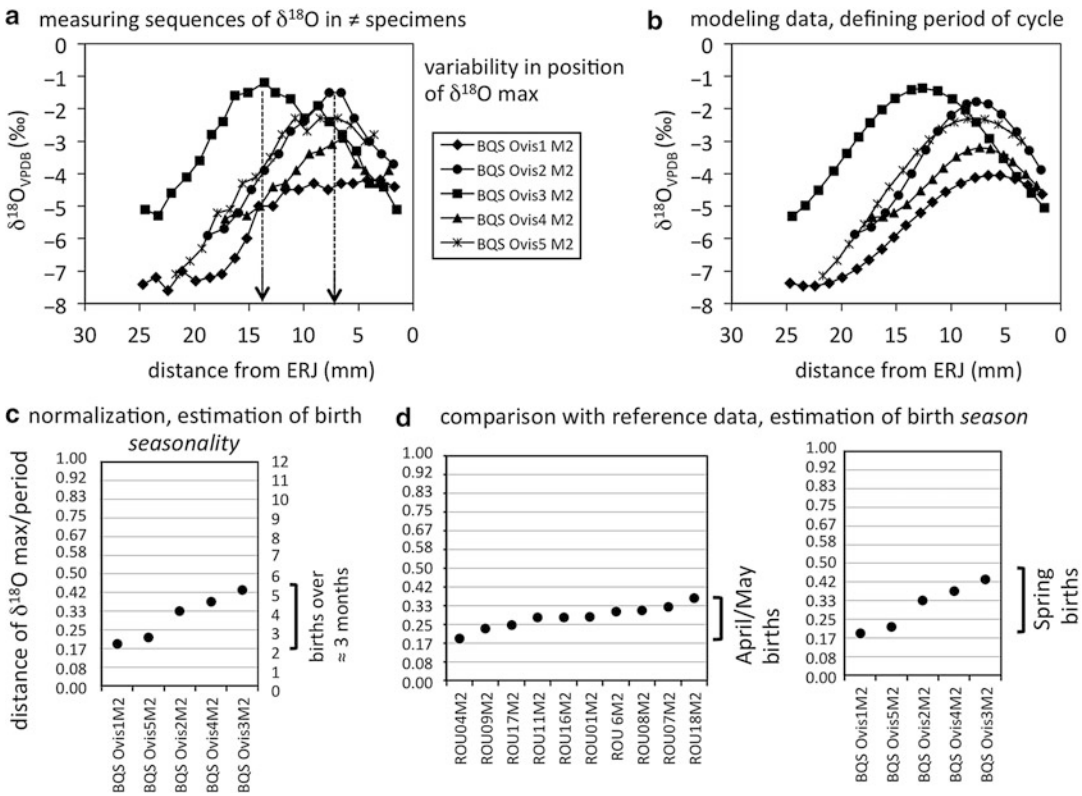

Isotopic Studies of Husbandry Practices, Fig. 3 Investigation of seasonality and season of birth in past herds, through analysis of tooth enamel stable oxygen isotope ratios ($\delta^{18}O$). (**a**) Birth spacing is reflected in interindividual variability in the position of the highest $\delta^{18}O$ values in the tooth crown (*ERJ* enamel-root junction). This variability may also reflect differences in tooth size and timing of growth. (**b**) Modeling of data permits estimation of the period of the cycle (1 year record) and normalization of the distance by this period, in order to eliminate the tooth size effect. (**c**) Normalized data is used to infer birth spacing (or birth seasonality). (**d**) Estimation of the season of birth implies comparison with modern reference sets obtained on animals with known birth season. (Data from Balasse et al. 2012)

future to evaluate the role of milk in subsistence economies (Balasse and Tresset 2002).

Future Directions

Isotopic studies of husbandry practices have naturally focused on the analysis of animal skeletons. Analysis of botanical remains might also prove very relevant to the subject. Recent stable isotope studies of charred remains of domestic crops have shown how the practice of manuring could be highlighted through the analysis of $\delta^{15}N$, opening a new window on the interweaving of animal husbandry and crop cultivation in mixed farming systems which may have existed from the Early Neolithic in Europe (Bogaard et al. 2007; Fraser et al. 2011).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Archaeometry: Definition
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone: Chemical Analysis
- ▶ Isotope Geochemistry in Archaeology
- ▶ Organic Residue Analysis in Archaeology
- ▶ Zooarchaeology

References

Balasse, M., and S.H. Ambrose. 2005. Mobilité altitudinale des pasteurs néolithiques dans la vallée du Rift (Kenya): Premiers indices de l'analyse du $\delta^{13}C$ de l'émail dentaire du cheptel domestique. *Anthropozoologica* 40: 147–166.

Balasse, M., and A. Tresset. 2002. Early weaning of Neolithic domestic cattle (Bercy, France) revealed by intra-tooth variation in nitrogen isotope ratios. *Journal of Archaeological Science* 29: 853–859.

Balasse, M., S.H. Ambrose, A.B.. Smith, and T.D. Price. 2002. The seasonal mobility model for prehistoric herders in the south-western Cape of South Africa assessed by isotopic analysis of sheep tooth enamel. *Journal of Archaeological Science* 29: 917–932.

Balasse, M., A.B.. Smith, S.H. Ambrose, and S.R. Leigh. 2003. Determining sheep birth seasonality by analysis of tooth enamel oxygen isotope ratios: The Late Stone Age site of Kasteelberg (South Africa). *Journal of Archaeological Science* 30: 205–215.

Balasse, M., A. Tresset, and S.H. Ambrose. 2006. First evidence for seaweed winter foddering in the Neolithic of Scotland. *Journal of Zoology* 270: 170–176.

Balasse, M., L. Boury, J. Ughetto-Monfrin, and A. Tresset. 2012. Stable isotope insights ($\delta^{18}O$, $\delta^{13}C$) into cattle and sheep husbandry at Bercy (Paris, France, IVth millennium BC): Birth seasonality and winter leaf foddering. *Environmental Archaeology* 17: 29–44.

Bentley, A.R. 2006. Strontium isotopes from the earth to the archaeological skeleton: A review. *Journal of Archaeological Method and Theory* 13: 135–187.

Bentley, R.A., and C. Knipper. 2005. Transhumance at the early Neolithic settlement at Vaihingen, Germany. *Antiquity* 79. Available at: http://antiquity.ac.uk/ProjGall/bentley/index.html.

Bogaard, A., T.H.E. Heaton, P. Poulton, and I. Merbach. 2007. The impact of manuring on nitrogen isotope ratios in cereals: Archaeological implications for reconstruction of diet and crop management practices. *Journal of Archaeological Science* 34: 335–343.

Britton, K., G. Müldner, and M. Bell. 2008. Stable isotope evidence for salt-marsh grazing in the Bronze Age Severn Estuary, UK: Implications for palaeodietary analysis at coastal sites. *Journal of Archaeological Science* 35: 2111–2118.

Copley, M.S., S. Jim, V. Jones, P. Rose, A. Clapham, D.N. Edwards, M. Horton, P. Rowley-Conwy, and R.P. Evershed. 2004. Short- and long term foraging and foddering strategies of domesticated animals from Qasr Ibrim, Egypt. *Journal of Archaeological Science* 31: 1273–1286.

Ervynck, A., A. Lentacker, G. Müldner, M. Richards, and K. Dobney. 2007. An investigation into the transition from forest dwelling pigs to farm animals in medieval Flanders, Belgium. In *Pigs and humans. 10,000 years of interaction*, ed. U. Albarella, K. Dobney, A. Ervynck, and P. Rowley-Conwy, 170–193. Oxford: Oxford University Press.

Finucane, B., P. Maita Agurto, and W.H. Isbell. 2006. Human and animal diet at Conchopata, Peru: Stable isotope evidence for maize agriculture and animal management practices during the Middle Horizon. *Journal of Archaeological Science* 33: 1766–1776.

Fraser, R.A., A. Bogaard, T. Heaton, M. Charles, G. Jones, B.T. Christensen, P. Halstead, I. Merbach, P.R. Poulton, D. Sparkes, and A.K. Styring. 2011. Manuring and stable nitrogen isotope ratios in cereals and pulses: Towards a new archaeobotanical approach to the inference of land use and dietary practices. *Journal of Archaeological Science* 38: 2790–2804.

Frémondeau, D., T. Cucchi, F. Casabianca, J. Ughetto-Monfrin, M.-P. Horard-Herbin, and M. Balasse. 2012. Pig seasonality of birth and diet, from tooth enamel stable isotope ratios ($\delta^{18}O$, $\delta^{13}C$): A modern reference set from wild and domestic populations from Corsica (France). *Journal of Archaeological Science* 39: 2023–2035.

Guiry, E.J., S. Noël, E. Tourigny, and V. Grimes. 2012. A stable isotope method for identifying transatlantic origin of pig (*Sus scrofa*) remains at French and English fishing stations in Newfoundland. *Journal of Archaeological Science* 39: 2012–2022.

Pechenkina, E.A., S.H. Ambrose, M. Xiaolin, and R.A. Benfer Jr. 2005. Reconstructing northern Chinese subsistence practices by isotopic analysis. *Journal of Archaeological Science* 32: 1176–1189.

Sjögren, K.-G., and T.D. Price. 2012. A complex Neolithic economy: Isotope evidence for the circulation of cattle and sheep in the TRB of western Sweden. *Journal of Archaeological Science*. https://doi.org/10.1016/j.jas.2012.08.001.

Towers, J., M. Jay, I. Mainland, O. Nehlich, and J. Montgomery. 2011. A calf for all seasons? The potential of stable isotope analysis to investigate prehistoric husbandry practices. *Journal of Archaeological Science* 38: 1858–1868.

Viner, S., J. Evans, U. Albarella, and M. Parker Pearson. 2010. Cattle mobility in prehistoric Britain: Strontium isotope analysis of cattle teeth from Durrington Walls (Wiltshire, Britain). *Journal of Archaeological Science* 37: 2812–2820.

Further Reading

Balasse, M., I. Mainland, and M.P. Richards. 2009. Stable isotope evidence for seasonal consumption of seaweed by modern and archaeological sheep in the Orkney archipelago (Scotland). *Environmental Archaeology* 14: 1–14.

Balasse, M., G. Obein, J. Ughetto-Monfrin, and I. Mainland. 2012. Investigating seasonality and season of birth in past herds: A reference set of sheep enamel stable oxygen isotope ratios. *Archaeometry* 54: 349–368.

Blaise, E., and M. Balasse. 2011. Seasonality and season of birth of modern and late Neolithic sheep from south-eastern France using tooth enamel $\delta^{18}O$ analysis. *Journal of Archaeological Science* 38: 3085–3093.

Henton, E., W. Meier-Augenstein, and H.F. Kemp. 2010. The use of oxygen isotopes in sheep molars to

I

investigate past herding practices at the Neolithic settlement of Catalhöyük, central Anatolia. *Archaeometry* 52: 429–449.
Lösch, S., G. Grupe, and J. Peters. 2006. Stable isotopes and dietary adaptations in humans and animals at Pre-Pottery Neolithic Nevalli Cori, Southeast Anatolia. *American Journal of Physical Anthropology* 131: 181–193.
Makarewicz, C., and N. Tuross. 2006. Foddering by Mongolian pastoralists is recorded in the stable carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) isotopes of caprine dentinal collagen. *Journal of Archaeological Science* 33: 862–870.

Israel: Museums

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Introduction

With over 230 museums, the State of Israel has the most museums per capita in the world. These range in size and sophistication from small house museums to those representing state-of-the-art contemporary museum design, such as the Yad Vashem Holocaust History Museum. Israel's diverse assortment of museums covers time periods spanning prehistory to the present day. Not all museums are concerned with archaeology, and many focus on topics as varied as clandestine immigration, computers, folklore, founding figures, grain, military history, sport, transport, and visual art.

Definition

Museums that contain archaeological exhibits are of four main types. Small museums found in *kibbutzim* mainly focus on aspects of local history and can include geological, botanical, and zoological exhibits along with archaeological material. Regional museums such as the Hula Valley Regional Museum in the Upper Galilee can be more comprehensive, specializing in a particular subject such as prehistoric settlement. Site museums are connected to outdoor archaeological sites such as Masada or urban excavations such as the Burnt House or the Davidson Excavation and Virtual Reconstruction Center in Jerusalem. Large public museums such as the Eretz Israel Museum in Tel Aviv often incorporate art and ethnographic displays along with archaeological material. It is the latter type of museum, housing prominent archaeological collections, which will be covered here in chronological order according to their date of establishment.

Key Issues/Current Debates/Future Directions/Examples

Archaeology plays a significant role in the foundation narrative of the State of Israel, linking contemporary Israelis to both the ancient Israelites and the Jewish nation in ancient Palestine (Petrovato 2006). Archaeological excavation of biblical sites has been described as a "veritable form of prayer" (Ben-Yehuda 2007), and archaeological collections within museums, particularly objects dating to the First and Second Temple periods – the Iron Age, Persian, Hellenistic, and Early Roman periods, considered the era of the original Jewish community in Israel – assume a religious aura when appearing to substantiate the biblical account. This functions, to an extent, to legitimize the repatriation of the Jewish diasporic community to its biblical homeland, encourages public support for the Israeli nationalist enterprise, and renders Palestinian (often referred to by the more generic term "Arab") culture less visible (Petrovato 2006). The museums of Israel are more than simply sites of nationalistic narrative, however, as they contain a vast range of artifacts of immense importance to the history of the Levant as well as the wider Eastern Mediterranean and beyond.

Rockefeller Museum, Jerusalem

Originally known as the Palestine Archaeological Museum, the Rockefeller Museum in East Jerusalem was established with the aid of a donation by

American philanthropist, John D. Rockefeller, Jr., on the initiative of archaeologist and director of the Oriental Institute in Chicago, Henry Breasted. Designed by British architect, Austen St. Barbe Harrison, in a style incorporating elements from Eastern and Western architecture, with sculpted reliefs by British artist Eric Gill and decorative tiles by the Armenian artist, David Ohanessian, the museum opened in 1938. The Rockefeller Museum was the first building constructed specifically as a national museum in Palestine in which material from excavations would be exhibited locally, rather than being exported to foreign museums. The museum houses a collection of antiquities from excavations conducted in Palestine during the period of the British mandate (1919–1948) (Ibrahim 2006). John Henry Iliffe, British archaeologist and first keeper of the museum, initially planned to include an ethnographic exhibit displaying local Palestinian culture but was overruled by Breasted and Rockefeller. In line with Rockefeller's original stipulation, the museum consequently focused solely upon archaeology, excluding historical, biological, and ethnographic exhibits (Baruch and Kudish-Vashdi n.d.). Arranged in chronological order, the exhibit displays material ranging in date from the prehistoric era to the beginning of the eighteenth century CE. The two main galleries contain finds from major excavations in Palestine conducted in the early twentieth century, while several smaller exhibition rooms are organized thematically, containing Egyptian material, decorative features and statuary from Hisham's Palace near Jericho, carved wooden elements from both the Al-Aqsa Mosque and the Church of the Holy Sepulchre, coins, jewelry, and examples from Talmudic period Jewish culture. Outdoors, within the arcades surrounding the pool, architectural elements, sculptures, and stone sarcophagi are displayed.

Eretz Israel Museum, Tel Aviv

Founded in 1958 as the Haaretz Museum, the Eretz Israel Museum is situated in northern Tel Aviv, next to the Philistine archaeological site of Tel Qasile. Organized in a series of pavilions spread over the site, the museum was initiated by Tel Aviv resident, Dr. Walter Moses, who bequeathed his archaeological collection and library to the Tel Aviv municipality with the proviso that it builds a museum in which to house it. Beginning with the inauguration of the glass pavilion in 1959, which houses vessels dating to between 1500 BCE and 1500 CE, subsequent pavilions would be built over the years. The Numismatic Pavilion was inaugurated in 1962 and chronicles the history of coinage and monetary systems. This was followed in 1963 by the Ethnography and Folklore Pavilion, focusing on the Jewish ritual year. The Ceramics Pavilion, installed in 1966, features ceramic objects dating to between the Chalcolithic and Classical periods from Israel, Cyprus, Egypt, and Greece, as well as material from Africa and Central America. In addition, the pavilion houses objects from Tel Qasile, one of the first archaeological sites excavated within the new State of Israel, as well as the important cult furnishings from the Yavneh favissa excavated in 2002. The Man and his Work Center, displaying objects related to agriculture, crafts, domestic work, and rustic decorative arts, was established in 1982. This was followed by the Nechushtan Pavilion in 1983, devoted to metalwork and containing material from the excavations at the copper mining site of Timna in the southern Negev, including the components of an Egyptian-Midianite temple. The Alexander Pavilion of Postal History and Philately, founded in 1998, focuses on the evolution of the mail service from the mid-nineteenth century CE to the establishment of the State of Israel in 1948. Finally, the Rothschild Center, inaugurated in 2006, documents the activities of Baron Edmond Benjamin James de Rothschild who was instrumental in financially supporting the development of Jewish settlements in Palestine between 1882 and 1934. The museum also includes a complex housing olive presses, one of which dates to the Iron Age II, while outdoor sites such as Mosaic Square display mosaics from a Samaritan prayer house discovered on site, as well as others from Beit Guvrin and Tiberius. In addition, the museum incorporates the excavated remains of Tel Qasile, dating to the twelfth century BCE, which include

the remains of temples and a street lined by workshops, storerooms, and houses.

Israel Museum, Jerusalem

Situated on the famous Museum Row in Givat Ram near the Knesset (Israeli parliament) buildings, the Israel Museum was founded in 1965 as a collection dedicated to archaeology, fine art, and Jewish art and life. It was initially established with the help of American funds from publishing sales of Cold War propaganda in Israel and a land grant from the Israel government. The Israel Museum is a nonprofit company whose shareholders consist of the Ministry of Education, the Hebrew University, the Municipality of Jerusalem, the Bezalel School of Art, the Friends of the Bezalel Museum, and the Jewish Agency (Weyl 1995). The archaeology wing of the museum was established in 1965 by the children of Canadian businessman and philanthropist, Samuel Bronfman, to commemorate his 70th birthday and was renewed in 2010 as part of the refurbishment and expansion of the entire museum (Snyder 2010). Displaying material mainly discovered within Israel, the museum's permanent collection of archaeology contains 6000 artifacts, spanning the periods from prehistory to the Ottoman period. The collection primarily consists of provenanced material deriving from controlled archaeological excavations, on loan from the Israel Antiquities Authority. A smaller proportion derives from donations by private collectors (Dayagi-Mendels 2010) as well as material confiscated from dealers and looters (Blum 2002). The museum is not without its share of controversy. In 1986 the museum bought the collection of military leader, politician, and notorious looter, Moshe Dayan, for US$1,000,000, incurring protests and criticism from the Israeli archaeological community as such objects technically did not belong to a private individual to sell (Kletter 2003). In 1988 the museum paid $550,000 for an ivory pomegranate thought, on the basis of its inscription, to come from the Solomon's Temple in Jerusalem but which was later discovered to be a Bronze Age object with a fake inscription (Watzman 2005).

The archaeological collection of the Israel Museum is displayed in seven separate galleries organized chronologically. The "Dawn of Civilisation" incorporates the Early Stone Age/Lower Paleolithic period, "The Land of Canaan" focuses on the Early Bronze Age, and "Israel and the Bible" features material ranging from the Early Iron Age, the Late Iron/First Temple/Destruction and Exile period, to the time of Persian rule. "Greeks, Romans and Jews" is devoted to the Hellenistic period, including Herod's reign and the Early Roman/Second Temple period and Revolt and Destruction, and "Under Roman Rule" covers the Late Roman period. "The Holy Land" includes the Byzantine period, and "Muslims and Crusaders" covers the Medieval and Late Islamic periods up to the end of Ottoman rule of Palestine in 1917. The museum also features galleries devoted to neighboring cultures such as Anatolia, Cyprus, Greece, Egypt, Italy, Lebanon, Mesopotamia, Persia, Southern Arabia, and Syria. Other galleries focus on the Islamic Near East, glass, coins, and early Hebrew writing (Dayagi-Mendels 2010). The grounds of the Israel Museum also incorporate the Shrine of the Book, a highly symbolic building housing the *Dead Sea Scrolls*, material from the Essene community at Khirbet Qumran, and other rare and unique biblical manuscripts such as the Aleppo Codex. Funded by the Gottesman family of New York and designed by architects Armand Bartos and Frederick Kiesler, the structure evokes the shape of the jars in which the scrolls were found, while a black basalt wall contrasts with the white dome of the shrine symbolizing the scroll of the *War of the Sons of Light Against the Sons of Darkness* (Weyl 1995).

Hecht Museum, Haifa

The Hecht Museum, situated at the University of Haifa, was established in 1984 and is based around the private archaeological collection of wealthy industrialist, Reuben Hecht, founder of the Dagon Silos and member of the University of Haifa's Board of Governors. A new wing of the museum, inaugurated in 1998, consists of artifacts donated by the Hecht family, objects on loan from the Israel Antiquities Authority, and material from archaeological excavations conducted by the University of Haifa. The museum's permanent

archaeological collection is designed to showcase material from the Israelite period and is divided into two sections: one laid out in chronological sequence covering the time span from the Chalcolithic to Byzantine periods and the other organized both chronologically and thematically. The thematic display includes material from Achziv (an archaeological site on the north coast of Israel), Jerusalem, Cyprus, Egypt, and Etruria. It incorporates an important collection of West Semitic seals, as well as weights, Jewish coins, oil lamps, games and toys, jewelry, and the biblical "seven species." Also included in the collection are examples of Phoenician material culture, an exhibit devoted to ancient crafts and industries and the Ma'agan Mikhael ancient ship. The museum also houses a collection of French impressionist painting and Jewish art from the mid-nineteenth to early twentieth centuries.

Bible Lands Museum, Jerusalem

Located on Museum Row, the Bible Lands Museum was established in 1992 and primarily consists of material from the private collection of its founder, Dr. Elie Borowski (Westenholz and Romano 2002). Intended to provide background for the *Bible*, the museum situates biblical Israel within its wider Near Eastern context, both regionally and chronologically. This is echoed in its floor plan in which the gallery dedicated to Israel is situated in the center of the building, while the other galleries encircle it. The museum contains 20 galleries arranged in chronological order and thematically titled, beginning with "From Hunter to Urban Dweller" focusing on the prehistoric era. This is followed by "The Coming of Civilisation" dedicated to southern Mesopotamia in the late fourth millennium and "Symbolic Communication" containing seals. "Literate Voices: The Beginning of Writing" focuses on cuneiform and hieroglyphic scripts, and "The Pre-Patriarchal World" concentrates on religious life and commerce in the ancient Near East of the third millennium. Next in the sequence are "The Sumerian Temple" and "Old Kingdom Egypt," followed by a gallery displaying Middle Bronze Age weapons. This precedes "The Age of the Patriarchs" outlining the religions of Mesopotamia, Syria, Canaan, and Egypt at the beginning of the second millennium and intended to provide a backdrop for Abraham, and this is followed by a gallery dedicated to the Exodus. Galleries displaying material culture of the Sea Peoples, Kassites, Arameans, and Assyrians flank the central gallery, "Israel Among the Nations," with the galleries assigned to the Persians, the Hellenistic period, Rome and Judea, Roman and Coptic Egypt, and Sassanian Mesopotamia completing the plan.

The Jay and Jeanie Schottenstein National Campus for the Archaeology of Israel, Jerusalem

The Schottenstein National Campus for the Archaeology of Israel is an ambitious project which is not yet open to the public. Situated on Museum Hill near the Israel and Bible Lands Museums, the national campus is a 350,000 ft^2 complex designed by Israeli architect, Moshe Safdie. Incorporating design components evocative of the landscape of archaeological excavations in Israel, the proposed building includes an enormous canopy referencing the ubiquitous black shade cloths used at Israeli excavations, and the floors are numbered from the top downward in the manner of stratigraphical levels. Intended to house the "Archaeological State Treasures" (antiquities excavated in Israel including the most comprehensive collection of the *Dead Sea Scrolls*), the National Archaeological Library, the National Archaeological Conservation and Restoration Laboratories, and the headquarters of the Israel Antiquities Authority (IAA), it will function as the national center for the storage, conservation, restoration, curation, and publication of archaeological material excavated in Israel. It is envisaged that the center will attract international researchers, provide public education, as well as function as a tourist attraction. To this end, it will house a 250-seat theater, an education center, exhibition galleries, and a rooftop exhibition garden. With an emphasis on accessibility, the building is designed so as most of its space will be visible, including the conservation and restoration laboratories and antiquities storerooms. The IAA scientific archives and the archaeological library

will also be open to the public. Financed primarily by private donations, the project also receives some assistance from the Israel Ministry of Finance (Schottenstein National Campus for the Archaeology of Israel n.d.; Pelletier 2017).

The Occupied Palestinian Territories

Gaza Museum of Archaeology

It is a museum established from the private antiquities collection of Gaza resident and construction company owner, Jawat Khoudary. Attached to a hotel and cultural center situated on the coast near the Shati refugee camp north of Gaza City, the museum opened in 2008. It houses 350 objects dating from the Bronze Age to 1967 and the ending of Egyptian administration of Gaza and is intended to showcase the history and multiculturalism of the Gaza Strip (Al-Mathaf 2008–2011).

Palestinian Museum

The Palestinian Museum is situated adjacent to the campus of Birzeit University north of Ramallah on the West Bank. Designed by Irish architects, Heneghan Peng, the museum is the flagship project of the Taawon (Welfare Association), an independent nonprofit organization which provides development and humanitarian assistance to Palestinians. The museum is situated on a 430,556 ft^2 plot and is being constructed in two phases, with Phase 1 completed in 2016. The building is set within extensive gardens that feature both native and adopted plants. The aim of the museum is to be the principal authoritative source of awareness and understanding regarding Palestinian history, culture, and contemporary life, and it aims to strengthen the bonds between Palestinians and those interested in their culture and history. Designed around thematic galleries, the museum focuses upon both past and present-day aspects of Palestinian culture, with a particular specialization on the modern period from 1750 CE to the present day. While based in Palestine, it is a transnational museum with links to international Palestinians centers through satellite exhibitions, its digital collection, and online platforms (The Palestinian Museum n.d.).

Cross-References

- ▶ Authenticity and the Manufacture of Heritage
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Museums and the Distortion of Archaeology for Political Purposes
- ▶ Nationalism and Archaeology
- ▶ Regional/Site Museums

References

Al-Mathaf. 2008–2011. Available at: http://www.almathaf.ps/museum/. Accessed 24 Aug 2017.

Baruch, Y., and R. Kudish-Vashdi. n.d.. *The Rockefeller museum*. Available at: http://www.antiquities.org.il/article_Item_eng.asp?sec_id=39&subj_id=156&Module_id=12. Accessed 24 Aug 2017.

Ben-Yehuda, N. 2007. Excavating Masada: The politics-archaeology connection at work. In *Selective remembrances: Archaeology in the construction, commemoration, and consecration of national pasts*, ed. P. Kohl, M. Kozelsky, and N. Ben-Yehuda, 247–276. Chicago: University of Chicago Press.

Blum, O. 2002. The illicit antiquities trade: An analysis of current antiquities looting in Israel. *Culture Without Context* 11: 20–23. Available at: http://s3-eu-west-2.amazonaws.com/wpmedia.outlandish.com/trafficking/2012/07/27133426/CWC-111.pdf. Accessed 24 Aug 2017.

Dayagi-Mendels, M. 2010. Introduction. In *Chronicles of the land: Archaeology in the Israel Museum Jerusalem*, ed. M. Dayagi-Mendels and S. Rozenberg, 7–9. Jerusalem: Israel Museum.

Ibrahim, F. 2006. *West meets east: The story of the Rockefeller museum*. Jerusalem: Israel Museum.

Kletter, R. 2003. A very general archaeologist – Moshe Dayan and Israeli archaeology. *The Journal of Hebrew Scriptures* 4: 2–42. Available at: http://www.jhsonline.org/Articles/article_27.pdf. Accessed 24 Aug 2017.

Pelletier, M. 2017. Site of conflict. *Apollo*: 34–36.

Petrovato, J. 2006. Producing national identity: Museums, memory and collective thought in Israel. *State of Nature* 3. Available at https://zcomm.org/znetarticle/producing-national-identity-museums-memory-and-collective-thought-in-israel-by-john-petrovato/. Accessed 24 Aug 2017.

Schottenstein National Campus for the Archaeology of Israel. n.d. Available at: http://www.archaeology.org.il/NCAIhome.html. Accessed 24 Aug 2017.

Snyder, J.S. 2010. Foreword. In *Chronicles of the land: Archaeology in the Israel Museum Jerusalem: 5*, ed. M. Dayagi-Mendels and S. Rozenberg. Jerusalem: Israel Museum.

The Palestinian Museum. n.d. http://www.palmuseum.org/ . Accessed 24 Aug 2017.
Watzman, H. 2005. Reality check. *Nature* 434: 13–15.
Westenholz, J., and J. Romano. 2002. *Bible lands museum: Guide to the collection*. Jerusalem: Bible Lands Museum.
Weyl, M. 1995. The creation of the Israel museum. In *The Israel museum*, ed. I. Lewitt, 8–21. London: Laurence King.

Further Reading

Abu El-Haj, N. 2001. *Facts on the ground: Archaeological practice and territorial self-fashioning in Israeli society.* Chicago: University of Chicago Press.
Baram, U. 2007. Appropriating the past: Heritage, tourism, and archaeology in Israel. In *Selective remembrances: Archaeology in the construction, commemoration, and consecration of national pasts*, ed. P.H. Kohl, M. Kozelsky, and N. Ben-Yehuda, 299–326. Chicago: University of Chicago Press.
Kletter, R. 2006. *Just past? The making of Israeli archaeology.* London: Equinox Publishing.
Masalha, N. 2013. *The Zionist bible: Biblical precedent, colonialism and the erasure of memory.* Durham: Acumen.

Israel: World Heritage Sites

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Introduction

Since accepting the UNESCO World Heritage convention in 1999, Israel inscribed nine sites to the World Heritage list (UNESCO 2006: 35). The sites inscribed in the World Heritage list, alongside the sites listed in the tentative list – which numbers 18 additional sites – represent diverse conceptions of national memory. It is possible to divide the sites into four categories: sites reflecting the Zionist modern Jewish heritage; sites reflecting the heritage of minority and non-Jewish groups within Israeli society; sites reflecting a universal heritage; and sites reflecting natural heritage. An examination of the various sites demonstrates a common denominator, one that depicts different aspects of the ongoing attempt to form a unified Israeli heritage.

Historical Background: An Attempt to Form a Unified Israeli Heritage

In the first decades after its foundation, Israeli society stood against internal and external threats: the country was in constant military conflict with the neighboring Arab countries and desperately attempted to cope with the overwhelming numbers of Jewish immigrants (tripling the size of the original prestate population) arriving at the country's doorstep – many of them penniless. Israel faced a dire need to coalesce the myriad groups of differing ethnic backgrounds into a united nation adhering to shared ideologies and objectives through the use of unifying symbols. In many cases, archaeological sites and artifacts served as such symbols, allowing the promotion of a new homogenized national ethos (Elon 1997: 37; Hallote and Joffe 2002: 86–87; Feige 2007: 281). However, this process of unification also excluded various minority and marginal groups within Israeli society, Jewish and non-Jewish, from taking an active role in the construction of the new shared identity.

In recent years, with the development of second and third generation children of the former immigrant groups and of the original Palestinian population, and following Israel's integration of international processes of globalization and social privatization, many minority groups demanded to reconstruct Israeli identity so as to encompass the diverse historical narratives of all segments of society. Moreover, in an ever more globalized society, the ideological need to prove a historic shared identity made way to the utilization of national heritage symbols as economic assets, better adapted to the growing market of global tourism (Bauman 2004; Baram 2007). An examination of the World Heritage list, which – according to its convention – calls for state parties to enlist sites that contribute to a universal heritage (UNESCO 1972), highlights the complex processes that characterize the development of Israeli heritage, maneuvering between the need to empower particular segments of society, the need to preserve a unified cohesive heritage, and the need to depict Israeli heritage as part of a universal one.

Sites Reflecting the Zionist Narrative

Masada: The site, located in the Judean Desert on the rugged cliffs overlooking the Dead Sea, was inscribed in 2001. It was first built as one of the many architectural enterprises that king Herod of Judea (73–4 B.C.E) planned and built. According to the Roman historian, Josephus Flavius, Masada was also the site where the last stand of the great Jewish revolt against the Roman Empire (74–76 C.E) was staged. The siege camp that was built by the Roman army in order to subdue the rebels constitutes the most complete Roman siege camp to have survived to contemporaneity. According to Flavius' report, when the Roman army broke into the stronghold, they found that all the Jewish rebels committed suicide so as to ensure they would die as free men. During the Byzantine period, the site served as a Christian monastery of a highly ascetic nature. It is one of the earliest known Christian monasteries (Netzer 1993). In Israel's formative years, the ethos of Masada served as the core for one of the Zionist movement's most significant symbols of the courage and selflessness needed to establish a national home for Jews, characteristics that were presented as contradictory to the passive and homeless exilic Jew (Zerubavel 1995).

When inscribed as a World Heritage site, Masada was noted not only for its important role in the construction of a national heritage in Israel's early years but also to its importance in the understanding of the Roman world, both through the examination of Herod's architectural feats and through the knowledge obtained regarding the Roman army through the examination of the siege camp. The site was inscribed to the World Heritage list according to criterions 3, 4, and 6 (UNESCO 2000).

The White City of Tel-Aviv: the Modern Movement: Inscribed in 2003, the site consists of the historic core of the city. Generally acknowledged as "the first modern Jewish city of the Zionist movement," Tel-Aviv is often described as one of the main symbols of the new Jewish Israeli culture. Accordingly, both the urban plan and the architectural influences that shaped the city testify to the important dialogue that developed between the Jewish architects who built it. Their dialogue allowed a merging between Modernist architectural styles into a distinct style reflecting the Zionist ideals predominant between the 1920s and 1940s. This had a great impact not only on Tel-Aviv's architectural plan but on other cities in Israel as well. To date, Tel-Aviv is acknowledged internationally as the city with the largest concentration of buildings built in one of the Modernist styles (Bauhaus) of the first half of the twentieth century CE. The decision to inscribe the city as a World Heritage site was based on criterions 2 and 4. It emphasizes the city's importance as a cultural center of the Zionist community while relating to Tel-Aviv's international importance as one of the only existing concentrations of Modernist architectural styles (UNESCO 2002).

The Biblical Tels: Megiddo, Hazor, Beer Sheva: Inscribed in 2005, the archaeological tels of Megiddo, Hazor, and Beer Sheva are considered as the most important in terms of their biblical heritage. Since the early days of Israel, these sites became an important part of the Zionist narrative representing a yearning for the Jewish return to the Land of Israel. The tels – having been resettled time and again due to their strategic locations – span a time period of at least 3000 years. Most important are the strata dated to the Bronze Age and the Iron Age – generally acknowledged as the time periods in which the biblical period occurred. While the strata dated to the Bronze Age are assumedly attributed to the Canaanite Period, the strata dated to the Iron Age are attributed to the biblical kingdom of Judea. In recent years, all three sites have been at the focus of a public and scientific debate regarding the reliability of the biblical stories. This debate has become especially fierce following the introduction of the "low chronology" theory – claiming that archaeological evidence does not support the claim that a united kingdom of Israel existed as described in the Bible (Finkelstein 1996).

As the three sites are connected to many biblical stories that serve as cultural pillars of all Monotheistic religions, they were inscribed as World Heritage sites not only due to their

importance in Jewish tradition but also due to the role they play in Monotheistic religions. In addition, they were also inscribed due to their stratigraphy which exemplifies the cultural continuity that existed between the Bronze Age and the Iron Age. The sites were inscribed according to criterions 2, 3, 4, and 6 (UNESCO 2003).

Necropolis of Beit She'arim: A Landmark of Jewish Revival: Inscribed in 2015, Beit She'arim was added to the World Heritage list due to the ancient Jewish graveyard dated to the second to fourth century CE located in its vicinity, shedding light on the development of Jewish culture following the failure of the second Jewish revolt against the Roman Empire in 135 CE.

Between 74 and 76 CE, the kingdom of Judah revolted against the Roman Empire in what is known as the Great Jewish Revolt. Following the failure of this revolt, the Temple of Jerusalem – the political and spiritual center of the kingdom of Judah – was destroyed. However, the Jewish population was able to recover, and in 135 CE, it launched a second failed revolt. In the aftermath of this revolt, Jews were banned from the city and the Jewish city of Jerusalem was destroyed and rebuilt as a Roman city named Aelia Capitolina. While a Jewish polity was never reestablished until modernity, a vibrant Jewish community was established in the Galilee – in the northern part of Israel today, transforming Judaism and shaping it as it is known today.

As testified through the ancient graveyard located at the site, following the debacle of the Jewish revolts, Beit She'arim developed into one of the important Jewish centers in the region. It was home to Rabbi Judah the Patriarch, the political and spiritual leader of the Jewish people after the failure of the second revolt, whose importance lies in the role he played promoting the changes Judaism underwent following the destruction of Jerusalem (Avigad and Mazar 1993–2008).

As can be attested by the ornamentations on the graves uncovered in Beit She'arim, which include, among others, human figures, and multi-language inscriptions, the graveyard in Beit She'arim also sheds light on the cultural influences the Greco-Roman world had on Jewish culture during this period, creating a unique multicultural atmosphere (Weiss 2010).

The site was inscribed according to criterions 2 and 3. Criterion 2 refers to the ability of the site to illuminate the methods through which Judaism was able to transform itself from a religion whose main rituals were based on pilgrimages to a physical site (Jerusalem) into a dispersed religion that created new rituals that were not dependent on a particular physical space. Criterion 3 refers to the contribution of the site to the understanding of the multicultural nature of this period (UNESCO 2014a).

Tentative Sites: Sites appearing in the tentative list that reflect the Zionist narrative are the ancient triple-arched gate at Dan; early synagogues in the Galilee, Degania, and Nahalal; Jerusalem (Mt. Zion); and Timna (UNESCO 2010: 10–60).

Sites Reflecting the Heritage of Minority Groups

The Old City of Acre: Inscribed in 2001, Acre was added to the World Heritage list due to the exquisite conservation of the city built by the Crusaders (1104–1291) and during the Ottoman Period (1517–1917). Although Acre has been inhabited for the last 4000 years, only during the Crusader period and the Ottoman period did the city serve as an economic and political center.

During the Crusaders period, the city was first captured by Baldwin I, king of the Crusaders kingdom of Jerusalem. The city quickly became an important port city connecting the kingdom of Jerusalem with the European commercial centers. In its heydays it was second in importance only to the capital Jerusalem. Following the debacle at Karnei Hittin, when the Crusaders were vanquished from the country by the Muslim armies of Saladin (1174–1193), Acre was destroyed only to be built again 4 years later as the capital of the second Crusaders kingdom following its recapture by King Richard I (Lionheart) (1189–1199). After the Mamluk conquest of the

land of Israel, Acre was again destroyed and abandoned until the Ottoman Empire conquered the region. During the eighteenth century, Acre became an important political and economic center and continued to serve as such until the British conquest of the region in 1917. In today's Israel, Acre became one the most important ethnically mixed – Muslim and Jewish – urban centers.

The site was inscribed to the World Heritage list according to criterions 2, 3, and 5. Its importance lies in the rare preservation of cities built during the Crusaders Period and the Ottoman Period, and the rare integration between the architectural styles of both periods. Moreover, the archaeological excavations conducted in the city demonstrate the use the Ottomans made of the remnants of the Crusaders city to build their own one (UNESCO 2001).

The Baha'i Holy Places in Haifa and the Western Galilee: The site was inscribed in 2008. The region of the Western Galilee, and especially the cities of Haifa and Acre, is the location of the most holy places for the Baha'i religion, which was founded in 1844. Most notable among them are the shrines of the two founders of the faith: the Shrine of the Bahá'u'lláh in Acre and the shrine of the Báb in Haifa. The site is divided into 11 distinct areas in Haifa, Acre, and the Western Galilee. Each area includes a varying number of sites. Due to the fact that the Baha'i religion is relatively new, it is possible to examine different stages in the religion's development. Thus the conservation of the site can be understood as important not only to the followers of the faith but to all of mankind. The site has been inscribed under criterions 3 and 6 (UNESCO 2008).

The Incense Route: Desert Cities in the Negev: The site was inscribed in 2005. It includes the northern segment of the Incense Route which connected between the Arabian Peninsula and the Mediterranean basin. It was used mainly for the transportation of frankincense and myrrh – aromatic resins which were processed into prestigious perfumes. The urban and economic growth that occurred during the Hellenistic and Roman Period, and peaked during the Byzantine Period, in Palestine, allowed for the growth of prosperous desert cities along the Incense Route. In the past, their construction was attributed to the Nabataeans, a nation of nomads whose center was in Petra. Their knowledge concerning methods of survival in the barren desert assumedly allowed them to monopolize the northern and most important segment of the Incense Route. In a relatively short period, they abandoned their nomadic lifestyle in favor of a sedentary one, quickly becoming an important political and military force (Negev 1979). During the first decades after Israel's foundation, and despite their possible representation of a past heritage of the native Bedouin population, these sites became an important model of the Zionist effort to resettle the barren desert, often describing the Nabatean culture as a continuation of a previous Judean civilization (Shiff 2017). Although contemporary research questions whether the Nabataeans had the political organization required for the control of a territory spanning between Damascus and the Sinai Peninsula (Elliott 1996; Fabian 2005), the four desert cities – Avdat, Mamshit, Shivta, and Haluza – along with other military fortresses along the Incense Route, have been inscribed as part of the World Heritage site according to criterions 3 and 5, emphasizing the opinion that these cities serve as a testimony to an extinct Nabataean civilization (UNESCO 2005).

Tentative Sites: Among the sites named in the tentative list reflecting the heritage of minority groups in Israel are several connected to the history of the Christian religion (the Journeys of Jesus and the Apostles; Sea of Galilee and its ancient sites) and others that are related to the Muslim and Crusader period (Hurvat Minnim, Arbel, White Mosque in Ramle, and the Crusaders Fortresses) (UNESCO 2010: 10–60). Finally, the addition of the site of Liftah in 2015 to Israel's tentative list is noteworthy. Liftah is a site promoted mainly due to the fact that it is the only remaining intact village that presents the architecture and planning of traditional Palestinian villages prior to the debacle of the Palestinian

culture in the 1948 war in which Israel was founded and the majority of the Palestinian population fled or was deported from the country (UNESCO 2015a).

Sites Reflecting a Universal Heritage

Site of Human Evolution at Mount Carmel: The Nahal Me'arot/Wadi el-Mughara Caves: The site was inscribed to Israel's World Heritage list in 2012. The site includes a number of caves located in the southeastern part of Mount Carmel in the northern region of Israel. The caves, which were inhabited for 500,000 years, are one of the most important prehistoric sites regarding human evolution in the Southern Levant. The inscription of the site was made according to criterions 3 and 5.

According to criterion 3, the importance of the site lies in its ability to examine the evolution of modern humans and their relations with Neanderthals. The Mount Carmel caves are one of the southernmost locations in which evidence for Neanderthal inhabitation has been found. Thus, the Mount Carmel caves have become a key site for the examination of the relations between both species and the chronostratigraphic framework of human evolution in general.

According to criterion 5, the elongated inhabitation of the site allows an intricate examination of the development of human culture and technology. Since the inhabitation of the site continued until the Natufian period, research of the site served to illuminate different aspects of the transition of humans from a hunter-gatherer society into a socially stratified sedentary culture as well (UNESCO 2011).

Caves of Maresha and Beit Guvrin in the Judean Lowlands as a Microcosm of the Land of the Caves

The site was inscribed into the World Heritage list in 2014. It is located in the Judea Lowlands and consists of a large complex of approximately 3500 underground chambers that were dug and hewn over a period of 2000 years for different purposes. The site was inscribed according to criterion 5.

This underground system was carved into the soft chalk strata existing in the region. At first, the area was utilized as a quarry. Later, underground chambers were dug into the soft chalk layers. They were used for different agricultural, industrial, and domestic purposes. Together, this underground system has created an underground city, situated under the ancient twin cities of Maresha and Beit Guvrin. The excavation of the site revealed the changes that have taken place in the uses of this system over different periods. Thus, it's importance lies in its ability to shed light on the cultural continuity in this region (UNESCO 2014b) .

Tentative List: Among the sites that have been added to the tentative list in this category, it is possible to mention sites that reflect the influence of the Roman Empire in shaping the region (Beit She'an/ Decapolis and Caesarea). Another site that is part of this category is the village of Ein Karem, located in the outskirts of Jerusalem. It is a village that has continuously existed for 3000 years, since the Iron Age (1000) BCE and until contemporaneity. Among the many cultures that inhabited this village, the nomination explicitly mentions the Palestinian inhabitation of the village until 1948 and the importance of the site in Christianity. According to Christian faith, it is believed that Ein Karem is the site where Mary, while pregnant with Jesus, met Elizabeth, while she was pregnant with John the Baptist. This belief was the cause for the establishment of a number of churches and monasteries in the village of Ein Karem (UNESCO 2015b).

Sites Reflecting Natural Heritage: Israel has not yet inscribed any natural heritage sites. Nonetheless two sites are listed in Israel's tentative list: the birds' migratory routes in the Hula Valley and the unique geological formations of the Makhteshim region (UNESCO 2010: 10–60). The lack of sites in this category is perhaps symbolic of the way Israel – a land rich in diverse

geographical and natural phenomena – is seen, both internally and by the international community, as one whose heritage is primarily dominated by ideological and historical characteristics.

Conclusions

The sites comprising the Israeli World Heritage list are an edifying test case to the continuing efforts of Israeli society to reconstruct its national memory and heritage according to changing ideologies and aspirations. While in Israel's formative years its national heritage was constructed through the use of sites that promoted a homogeneous memory, the World Heritage list serves as a testimony to an attempt of diversifying society's national heritage and to contend with the processes of globalization and privatization of the public sphere. However, the examination of the World Heritage sites and of the people comprising the Israeli World Heritage Committee can also alert to the many groups – such as Israeli Palestinians, but also different Jewish ethnicities – that still have no active role in the discourse regarding the changes that should conspire in Israel's heritage in the coming years. In this regard, it is especially relevant to note that to date, no site boasting a Palestinian heritage has been promoted by the Israeli World Heritage committee to be inscribed into the World Heritage list. Moreover, it was claimed by some that in several instances – such as the case of Acre – the inscription of the site as a World Heritage site was used to further eliminate the Palestinian characteristics and heritage (Davis 2013).

As Israeli society continues to develop, a continued examination of the changes in the sites comprising the Israeli World Heritage list may be most edifying as to the changes occurring in Israeli society.

References

Avigad, N., and B. Mazar. 1993–2008. Beth She'arim. In *The new encyclopedia of archaeological excavations in the holy land*, ed. N. Avigad and A. Lewinson-Gilboa, 236–248. Jerusalem: Israel Exploration Society & Carta.

Baram, U. 2007. Appropriating the past: Heritage, tourism and archaeology in Israel. In *Selective remembrances: Archaeology in the construction, commemoration and consecration of national pasts*, ed. P.L. Kohl, M. Kozelsky, and N. Ben-Yehuda, 299–325. Chicago: University of Chicago Press.

Bauman, J. 2004. Tourism, the ideology of design, and the nationalized past in Zippori/Sepphoris, an Israeli national park. In *Marketing heritage: Archaeology and the consumption of the past*, ed. Y. Rowan and U. Baram, 3–23. Walnut Creek: Altamira Press.

Davis, C.M. 2013. Conserving the "Ottoman(s)" at an Israeli world heritage site. *Archaeologies* 9 (2): 320–343.

Elliott, J.D.J.R. 1996. The Nabatean synthesis of Avraham Negev: A critical appraisal. In *Retrieving the past: Essays on archaeological research and methodology in honor of Gus Van Beek*, ed. J.D. Seger, 47–60. Winona Lake: Published for the Cobb Institute of Archaeology by Eisenbrauns.

Elon, A. 1997. Politics and archaeology. In *The archaeology of Israel: Constructing the past, interpreting the present*, ed. N.A. Silberman and D. Small, 34–47. Sheffield: Sheffield Academic Press.

Fabian, P.. 2005. Avdat during the establishment of Provincia Arabia: The Roman military camp and its position in the eastern defense system of the empire. Unpublished PhD dissertation, Ben Gurion University (Hebrew).

Feige, M. 2007. Recovering authenticity: West-Bank settlers and the second stage of national archaeology. In *Selective remembrances: Archaeology in the construction, commemoration and consecration of national pasts*, ed. P.L. Kohl, M. Kozelsky, and N. Ben-Yehuda, 277–298. Chicago: University of Chicago Press.

Finkelstein, I. 1996. The archaeology of the United Kingdom: An alternative view. *Levant* 28: 177–188.

Hallote, R.S., and A.H. Joffe. 2002. The politics of Israeli archaeology: Between 'nationalism' and 'science' in the age of the second republic. *Israel Studies* 7 (3): 84–116.

Negev, A. 1979. The Nabataeans in the Negev. In *The land of the Negev: Man and desert*, ed. A. Shmueli and Y. Grados, 226–279. Tel-Aviv: Ministry of Defense.

Netzer, E. 1993. Masada. In *The new encyclopedia of archaeological excavations in the Holyland*, ed. E. Stern, vol. 3, 973–985.

Shiff, C. 2017. Us and whom? Representations of indigenousness in the archaeological site of Avdat, Israel. In *Archaeologies of "us" and "them": Debating history, heritage and indigeneity*, ed. C. Hillerdall, A. Karlstrom, and C. Ojala, 80–96. London/New York: Routledge.

UNESCO. 1972. Convention concerning the protection of the world cultural and natural heritage. Available at: http://whc.unesco.org/archive/convention-en.pdf. Accessed 10 Jan 2012.

UNESCO. 2000. Masada: Proposed world heritage site by the State of Israel. Available at: http://meyda.education.gov.il/files/unesco/1042.pdf. Accessed 10 Jan 2012.
UNESCO. 2001. Nomination of the old city of Acre for the World Heritage list. Available at: http://meyda.education.gov.il/files/unesco/1042.pdf. Accessed 10 Jan 2012.
UNESCO. 2002. Nomination of the White City of Tel-Aviv for the World Heritage List. Available at: http://meyda.education.gov.il/files/unesco/1096.pdf. Accessed 10 Jan 2012.
UNESCO. 2003. The Biblical tels and water systems – Megiddo, Hazor, Beer Sheva: Proposed world heritage serial nomination by the State of Israel. Available at: http://meyda.education.gov.il/files/unesco/1108.pdf. Accessed 10 Jan 2012.
UNESCO. 2005. The incense and spice route and desert cities in the Negev. Available at: http://meyda.education.gov.il/files/unesco/1107rev.pdf. Accessed 10 Jan 2012.
UNESCO. 2006. Think tank reports: Israel world heritage committee. Available at: http://meyda.education.gov.il/files/Unesco/DochZivteyChashivaAnglit.pdf. Accessed 10 Jan 2012.
UNESCO. 2008. Baha'i Holy Places in Haifa and the Western Galilee: Nomination for Inscription on the World Heritage List. Available at: http://whc.unesco.org/uploads/nominations/1220rev.pdf. Accessed 10 Jan 2012.
UNESCO. 2010. The tentative list and world heritage sites of the State of Israel. Available at: http://cms.education.gov.il/NR/rdonlyres/5F24793D-E252-47E3-BEE7-32A57C13923D/132656/Tentative_list_7.pdf. Accessed 10 Jan 2012.
UNESCO. 2011. Sites of human evolution at Mount Carmel: The Nahal Me'arot/Wadi el-Mughara caves. Available at: http://whc.unesco.org/en/list/1393/documents/. Accessed 4 Sept 2017.
UNESCO. 2014a. The necropolis of Bet She'arim: A landmark of Jewish renewal. Available at: http://whc.unesco.org/en/list/1471. Accessed 4 Sept 2017.
UNESCO. 2014b. Caves of Maresha and Bet-Guvrin in the Judean Lowlands as a Microcosm of the Land of the Caves. Available at: http://whc.unesco.org/en/list/1370/documents/. Accessed 4 Sept 2017.
UNESCO. 2015a. Liftah (Mey Naftoa): traditional mountain village Available at: http://whc.unesco.org/en/tentativelists/6061/. Accessed 4 Sept 2017.
UNESCO. 2015b. Ein Karem: A village and its cultural landscape. Available at: http://whc.unesco.org/en/tentativelists/6062/. Accessed 4 Sept 2017.
Weiss, Z. 2010. Burial practices in Beth She'arim and the question of dating the patriarchal necropolis. In *'Follow the wise': Studies in Jewish history and culture in honor of Lee I. Levine*, ed. Z. Weiss and L.I. Levine, 207–234. Winona Lake: Eisenbrauns.
Zerubavel, Y. 1995. *Recovered roots: Collective memory and the making of Israeli national tradition*. Chicago: University of Chicago Press.

Italy, Sicily, Malta, and the Lipari Islands: Prehistory

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Introduction

The peninsula of Italy stretches from the Alpine mountain regions of the north to the emphatically Mediterranean maritime and mountainous regions of the south. In the presence of the Apennine mountain range, the full length of the peninsula added an important element of verticality that distinctively affected the response of prehistoric peoples. A further geographical variation was provided by the different sizes of the three island groups of Sicily, Malta, and the Lipari islands. Thus, Italy provides a good geographical cross-section against which to measure human response.

Definition

The choice of Italy as a separate geographical region is in many ways modernist. The unity of the Italian peninsula dates to the Roman Republic and the reestablishment of that unity to the Unification of 80 BP (where BP is the standard fixed point of 1950 in all radiocarbon chronologies appropriate for prehistory the subject of this essay). During prehistory, the peninsula is one of three major southern peninsulae in Europe that cut through a regional diversity, based on environmental variation in early prehistory and emerging political identities in later prehistory. To this we can add the islands of Sicily, Malta, and the Lipari islands which have similarly slipped in and out of the definition of what constitutes Italy.

Prehistory can be defined in Italy as starting some 800,000 years BP on the peninsula, but on the islands only in the late Upper Paleolithic (Sicily) or the Neolithic (Malta and the Lipari

islands). In many regions, prehistory effectively continues up to and into the period of the Roman empire, because writing about many peoples, and not only the Etruscans, took the form of an external "ethnography" by the Romans and Greeks. However, in conventional terms, most Italian archaeologists see prehistory ending with the Bronze Age, or at the very latest the first Iron Age, that is at about 2700 BP, reinforced and symbolized perhaps by the foundation of the famous pre-colonial settlement of Pithekoussai (Ischia) by the Greeks. For this reason, this contribution does not cover in any detail the last four millennia Before Present, since they are generally inserted within protohistory by Italian archaeologists.

The chronological definition of prehistory has traditionally been based on the phases of material culture employed elsewhere in Europe (with the addition of the term Epipaleolithic). These material culture schemes have only been gradually replaced by more absolute methods of dating, particularly in the fourth to second millennia BP where typological studies tethered in historical dates have been employed. For the fourth to second millennia BP, the gradual implementation of dendrochronology largely outside the immediate Italian area has gradually affected the traditional dates based on imports. In the Italian peninsula, the Lower Paleolithic marked by the employment of the earliest human tools can probably be dated to something in the order of 800,000 years BP. More complex industries, generally characterized as Mousterian, developed in Italy over the period 250,000–28,000 years BP. This is, in turn, followed by Upper Paleolithic blade-dominated industries and a major feature of the Italian peninsula, Epipaleolithic industries, that generally replace the designation Mesolithic in other parts of Europe.

Key Issues and Current Debates

Hunting and Gathering

There are two sources of evidence for the early occupation of the peninsula: skeletal remains and stone tools. The earliest hominid remains in the Italian peninsula have been dated to 900,000–800,000 years BP at Ceprano (Frosinone), at a similar date to finds in Spain. However, the earliest human pebble artifacts from Monte Poggiolo (Forli) have been somewhat controversially dated to as much as one million years BP. Many secure Acheulean hand axe sites follow in locations such as Venosa (Basilicata), Fontana Ranuccio (Lazio), Marina di Camerota (Campania), and Castel di Guido (Lazio). A particularly well-research site dating to 700,000 years BP is that of Isernia la Pineta (Molise) characterized by more varied stone assemblages (such as denticulates) and faunal remains of animals of varied size (elephant, rhinoceros, bison, deer, bear, and hippopotamus) on possible living surfaces. This site points to relatively systematic and organized hunting activities even at this early date.

The Mousterian industries are marked by some initial regionalization of styles, whose study has tended to dominate research to the detriment of the study of economic and other issues. Two stylistic provinces have been noted north and south of the modern city of Rome. To the north, there were industries rich in razors and to the south a so-called Pontine micro-industry employing pebbles as raw materials. These regional traditions appeared to have become more uniform over time, with the employment of more denticulates, grading into forms more typical of the Upper Paleolithic (burins, scrapers, etc.). In some Ligurian sites, there was the beginning of the evidence of raw material procurement from sources of as much as 50 km away, a tendency that became much more emphatic in the subsequent Upper Paleolithic. All this related strongly to increasing sizes of hunting territories and social communication.

Some evidence has emerged of structured activities for this period. At the Mousterian site of Grotta di Fumane (Verona), a spatial correlation has been shown between hearths and faunal remains, suggesting a systematic process of animal consumption. At Riparo di Molare, a possible hut associated with animal bones and stone tools has been located in one level and in another the deliberate placement of a bison head, which the excavators suggest related to ritual activity.

The arrival of anatomically modern humans probably occurred in the Italian peninsula at about the same time, 40,000 years BP, as in the rest of Europe. In other parts of Europe, the Chatelperronian industry appears to have been a stone tool industry which responded to the encounter between Neanderthal and these new populations. The Uluzzian industry of burins, razors, lunates, and scrapers may have taken that role in the Italian peninsula, although the precise chronology has not yet been established. The density of human occupation within the peninsula was nevertheless still very low, so low that it would have been subject to disruption by early Vesuvian volcanic activity at 36,000 years BP.

The full early Paleolithic or Aurignacian in Italy has been divided into three regional styles accompanied by increased population density and increased exchange of raw materials above 100 km from the source: one centered on the Veneto, a second "classic" type, and a third located more towards the south. Uncontroversial hut structures with hearths have been found in the Grotta di Fumane, and some possible art of the human form dating to as early as 36,000 BP has been also found in the same deposits. The subsequent Gravettian is best known from the site of Grotta Paglicci in the Gargano of southern Italy. The changed lithic styles were accompanied by poorly provenanced female figurines, from both the north and south of the peninsula, and a well-provenanced incision on stone of a wild goat from Grotta Paglicci. These changes in material culture were built on a diversification of economic activity, with regional specializations such as shellfish collecting (e.g., Riparo Mochi (Liguria) or bullrush processing (e.g., Bilancino near Florence).

From about 20,000 years BP, much of the Mediterranean, including Italy from the Veneto to Liguria, Lazio, and Puglia, was characterized by the Epigravettian, in two forms, one dominated by foliates (leaf-shaped tools) and another by *cran* (shouldered) points. This style of lithics continued right down to 10,000 years BP, characterized by geometrics, notably from the Grotta Romanelli of the Salento area. These late Upper Paleolithic lithic styles are contemporary with a considerable increase in formal burial, accompanied by shell headdresses, and multiple inhumation burials, most notably in the Liguria region, but also at Grotta Paglicci in Puglia. The same period in Italy was accompanied by a veritable explosion in portable art incised on bone and stone that extended throughout the peninsula, depicting both human and animal forms. Engraving on cave walls is best known in Sicily both from the Palermo area (Grotta dell'Addaura on Monte Pellegrino) and in the far west of the island in the Cala dei Genovesi caves. The same range of explanations have been advanced for these expansions of artistic expression as for the classic cases of continental Europe, but the main underlying reasons are probably the macro-context of increasing population densities (requiring statements of identity) and the micro-context of more personalized locales of rites of passage which, when taken together, had the effect of making creativity more visible and apparent, even if the biological capacity had been long standing.

Agriculture

The transition towards agriculture is traditionally preceded and sometimes paralleled by Mesolithic industries in much of Europe – although this terminology is largely replaced by the Epipaleolithic or Epigravettian in Italy, some of the same changes are visible in important sequences such as Grotta dell'Uzzo in Sicily. In this sequence, a broad spectrum of hunted and gathered resources including deer, wild boar, and shellfish but also open water fish have been identified. In the north, seasonal variations by altitude have been detected in the Adige valley, concentrating on various mammals and peri-lacustrine fish, eggs, and turtles in the winter months, while hunting upland deer and wild goat in the summer. All these changes were accompanied by much greater population densities drawing on a wider range of resources. These changes were accompanied by an increasing need to mark territorial identity that showed material form in the continued high frequency of burials in locations such as the Trento region, a high-altitude (2000 m.a.s.l) burial in the Veneto region at Mondeval de Sora, and Grotta dell'Uzzo (at least 10 burials).

The adoption of agriculture is generally equated with the appearance of pottery as a proxy for other developments. In broad terms, our understanding is based on radiocarbon measurements in the same context as early impressed pottery styles. Employing these data, the Adriatic and Ionian seas were the main arenas for interaction with the Eastern Mediterranean that led to earlier development in Sicily, southern Italy, and the Adriatic coast of the peninsula (late ninth millennium BP) than the northern Tyrrhenian coast, Sardinia, and Corsica (early eighth millennium BP) or northern central areas of the peninsula (later eighth millennium BP). The main concentrations of early agriculture were to be found in the coastal plains (assisted by lower sea levels), peri-lacustrine zones, and alluvial fans that had lighter workable soils and higher water tables. As agriculture developed in sophistication and diversification, more permanent occupation of upland areas became possible. There has been much debate over the process of take-up of agriculture ranging from externally derived innovation to local development. After a phase of emphasis of locally derived models based on sites such as Grotta dell'Uzzo in Sicily, the balance appears to be moving towards an emphasis on externally derived innovation. As radiocarbon dating develops in sophistication, evidence is emerging at a European level that the adoption of agriculture may have been more perilous than initially thought, accompanied by phases of boom and bust. This pattern may also have applied to the Italian peninsula.

The early Neolithic of the south of Italy is dated by radiocarbon dates to 8050–7750 calibrated BP on the basis of sites in central/southern Apulia (Torre Sabea, Pulo di Molfetta), Basilicata (Rendina and Trasano), and Calabria (Favella). There is also some evidence of penetration into the fertile plain of the Tavoliere (Masseria Candelaro and Coppa Nevigata) at this early date. Among the pottery, there is some distinction into coarse and fine forms, with a prominence of both footed and round-bottomed forms, of often ovoid or tronco-ovoid shape, frequently decorated with impressions of finger, nail, and shell (hence the term impressed pottery). The lithics are blade industries showing strong affinities with Mesolithic-type microlithic traditions. Crops include einkorn and barley. Ovicaprids appear to be dominant among the domestic animals, particularly at sites such as Torre Sabea in Apulia. At other sites like Favella, while there is a similar prominence of ovicaprids, there is a significant presence also of wild animals, species from wetlands and fish. The flint mine of Defensola demonstrates that resource procurement was increasingly organized on a more systematic basis. The internal organization of sites such as Torre Sabea and Rendina included enclosures for animals and hut structures for humans. In the ritual sphere, there is some evidence of intra-settlement burials and figurines.

The later phases of the early Neolithic of southern Italy (c. 7650–7350 BP) show a differentiation of styles perhaps suggestive of the emergence of regional identities, named, in traditional mode, after the main excavated sites (e.g., Lagnano, Masseria La Quercia, and Matera-Ostuni). These regional identities were accompanied by increased exchange activity (notably of Lipari obsidian), increased size, and boundedness of sites (e.g., Lagnano da Piede reaching 5 ha in size with five enclosure ditches). By contrast, burial practices remained relatively low key, at least in their material remains, taking the form of small numbers of inhumations in structures such as ditches and pits, although some limited collective burial has been found at Diga di Occhito (12 individuals).

The early Neolithic of central Italy follows that of southern Italy with a time lag of some half a millennium, commencing on the coast (c. 7550 BP) and then reaching the inner basins of the peninsula. In the later phases such as Catignano on the Adriatic coast, decorative styles became more regionally distinctive. Catignano itself remains one of the more extensively excavated sites over an area of some 200 m^2, revealing superimposed square huts of reasonable size (70–80 m^2). The site is also typical in the presence of a small number of burials in ditches. The Tyrrhenian side of the peninsula was characterized in this early period by impressed and linear pottery as well as by the less decorated

Sasso-Fiorano forms. Settlement organization is best known from the two interdisciplinary studies of Marmotta on Lake Bracciano and San Marco on an alluvial fan in the enclosed intermontane basin of Gubbio; both point to the importance of lacustrine and riverine resources in these early periods. At the same time, the two sites show the substantial presence of domesticated species but also that local communities drew on a wider range of both hunted and collected wild resources.

The early Neolithic of northern Italy was not substantially different from that of the center, although some of the coastal Ligurian sites of Arene Candide may have had an earlier presence of c. 7750 BP. Some regional styles such as that of Vho were distinctive, whereas others such as Fiorano shared elements with the central peninsula. One particularly well-preserved settlement is that of Lugo di Romagna, detected under 14 m of alluvium. Wattle and daub structures were uncovered belonging to a 70 m^2 rectangular structure, with flooring and hearth intact, as well as a dog's foot which may have been a foundation deposit. There is some evidence of expansion away from the primary lowland zones most suited to early agriculture. In the Alpine foothills, at altitudes of up to 800 m, open and rockshelter sites of the Gaban style have been discovered that combine cereal, legume, and sheep/goat with deer.

The Middle Neolithic of southern Italy is denoted by the very distinctive painted and plastic (handle) styles of Scaloria and Serra d'Alto that was followed in the later Neolithic by the Diana (indicated broadly by a red color and trumpet handles) into the later seventh millennium BP. The Tavoliere plain shows the trends towards larger and more densely distributed ditched enclosures. The occupied part of the largest Passo di Corvo enclosure was of at least 28 ha (although estimated to contain an upper limit of only 300 individuals). In addition, this central enclosure was surrounded by much more extensive ditched boundaries which must have required considerable manpower to construct. Rectangular household structures within had an area of about 30 m^2. These trends towards larger settlement areas were accompanied by the first deliberately constructed funerary structures. The most notable of these is that of Arnesano where a small tomb was cut from the bedrock to house a crouched inhumation accompanied by a rare figurine where identity was focused on a rudimentary head. These more formal funerary practices were broadly contemporary with the structured use of caves (painted walls and deliberate deposits), such as Porto Badisco, which were most probably employed for male (?) rites of passage.

The Middle Neolithic of central Italy (from c. 6450 BP) was characterized by the distinctive Ripoli style of pottery on the Adriatic coast, parts of Umbria, and Lazio accompanied also by the presence of arrowheads. The later Neolithic of central Italy, although present, appears to lack the definition or density of other regions. The Middle Neolithic of the north was marked by the distinctive Square Mouth Pottery style (Bocca Quadrata) that also brought a denser occupation of both higher-altitude and wet lacustrine areas (most notably Fimon-Molino Casarotto).

The islands surrounding the Italian peninsula generally followed similar trends during the Neolithic, and many of smaller islands (Malta, Lipari) were first occupied during this phase. Until about 5950 BP, the stylistic trends of Corsica, Sardinia, Sicily, Malta, and Lipari could be fairly closely linked into those already observed for the peninsula itself. The ditched villages of eastern Sicily had a different cultural name, Stentinello, but the populations of the plain of Catania exhibited a similar phenomenon of increasing density and boundedness to those already noted for the plain of the Tavoliere. However, Sardinia had already begun to exhibit trends towards a separate regional identity in the Bonu Ighinu and Ozieri styles, a development that was only noted emphatically elsewhere within Italy in the Copper Age. In these phases, distinctive figurative art and funerary culture began to emerge that indicated the construction of new identities taken to an even greater extreme by the island of Malta in the late sixth and early fifth millennium BP.

Emergent Identities

In the Chalcolithic, in spite of the name of the period – Copper Age – it is not so much the use of copper, which is almost invisible

archaeologically, but the prominence of funerary evidence over settlement evidence that is most pronounced. A series of local identities emerge, more distinctive and materially more visible in some locales, than in others.

In some islands, notably Malta and Sardinia, ritual complexes emerge. In Malta, this takes the form of large complementary monumental complexes for the living and the dead, reaching a climax in the early part of the fifth millennium BP before falling into a disuse apparently decided by the local populations themselves, possibly under some ecological stress, rather than a response to invasion from outside as some early models suggested. In Sardinia, the monumental complex of Monte d'Accoddi in the north of the island dating from about 5650 BP is the most conspicuous example, among a broader proliferation of largely funerary ritual. On the island of Sicily, there are regional styles, principally known from funerary evidence because of the emphasis of scholarly research, such as San Cono-Piano Notaro, Conzo, Piano Conte, Serraferlicchio, and Malpasso, but the fluorescent ritual complexes were not so prominent. Field survey when undertaken such as in the uplands around Troina has found the corresponding evidence for settlement, but this remains under-researched. At the transition between the Chalcolithic and the early Bronze Age, the presence of Bell Beakers added to the range of emergent identities.

On the peninsula itself, the traditional substantially funerary styles can be reinterpreted as nodes of identity focused on differentiated variations of performative action, which principally, but not exclusively, materialize in death rituals. In the south, there is the fundamentally funerary identity of Laterza. In the area around Paestum and more broadly the region of Campania, there is the funerary identity of Gaudo, distinguished by small collective tombs with leather-like skeuomorphic vessels and large daggers in flint and copper. In central Italy, there were the collective tombs of Rinaldone, containing copper daggers and thin-necked ceramic vessels. In the Brescia region of northern Italy, there were the collective tombs of Remedello, containing another codified ritual of inhumations with flint and copper daggers. This was not the only expression of identity in precisely defined locales. In the Trento region (e.g., at Arco), in the Aosta region, and in the Luni region of northern coastal Tuscany, there were concentrations of menhir figures depicting human identities, and in the Val Camonica and Valtellina regions, rock art that filled a similar role. In one unique case, we have a well-preserved survival of one individual, the iceman who moved in these worlds giving a detailed but not necessarily representative insight into the lifestyles of populations in the course of transition between the world of the Neolithic and that of the Metal Age. The arrival of more widely used metal brought an end to this type of display of identity and brought another that was based much more on economic fundamentals, accumulation, and corresponding deprivation, a form of expression of identity that took a good millennium or more to put in place.

New Economies

The development of the full Bronze Age in the course of the fourth millennium BP brought a new type of both portable wealth (bronze itself) and wealth tied to the land (the arboriculture of Mediterranean polyculture (grain, vine, and olive)). Both these features took off relatively slowly compared with the Eastern Mediterranean and more slowly in central Italy than in the south. The terramare of northern Italy did exhibit an intense development in the first half of fourth millennium BP, but at about 3150 BP, the population appears to have suffered a substantial decline. The greater storage of wealth may partly explain the more prominent materialization of nuraghi in the Bronze Age of Sardinia and the distinctive cultural phases of Sicily. A further factor was increased connectivity with the Eastern Mediterranean. Sardinia was clearly in regular contact with Cyprus at least by the recent Bronze Age as shown by the prominence of ox-hide ingots. In Sicily, the settlements of the Thapsos phase which succeeded the villages and cemeteries of Castelluccio were clearly in contact with the Mycenaean world. However, central Italy was substantially outside the range of these developments, and only in the Final Bronze Age did a

vibrant village life take off in a substantial way, with considerable mobilization of bronze technology. It was this momentum that continued into the periods of state formation that followed, resisting the colonization that affected southern Italy and the surrounding islands. Recent work has shown the fundamental importance of the Final Bronze in establishing the sociopolitical context that was receptive to entanglement with other parts of the Mediterranean in the early stages of the third millennium BP.

Future Directions

Overall Trends and Debates

The key issues and current debates that transcend these chronological stages center on the reconstruction of subsistence, the measurement of interaction, and the emergence of regionalism, first as a statement of identity and then as a projection of political hierarchy. Until the 1980s, much work on Italian prehistory was focused on the construction of local culture histories. In the current century, much work is emerging which is making major strides on all these issues. Our understanding of subsistence can now follow the transitions from hunting and gathering through the differential take-up of agriculture to the political orchestration of Mediterranean polyculture at the close of prehistory directed towards feasting on the one hand and the less recognized mobilization of infrastructural support of large urban populations on the other. In parallel, scholars can follow the increasing potential levels of interaction as the use of the sea around the peninsula (and the major rivers through the peninsula) moved from simple technologies that carried relatively small quantities of material while hugging the coast to large-scale transport of subsistence products often moving out of sight of land. During the course of these technological developments that included the incorporation of the production and use of bronze and iron, the massively increased infrastructural support led to the emergence of regional differences, specializations, identities, and ultimately political divergence. In the south of the peninsula and the major islands, interaction with Greek and Phoenician communities became a substantial part of the political dynamic. In the center and north of the peninsula, independent but entangled urbanisms emerged that rivaled the size and political power of those from the East. One of these, the Latin and then Roman, ultimately became master of much of Europe, by a more effectively implemented political trajectory that combined superior centralization, incorporation of subgroups, and physical force.

Cross-References

► Nuragic Culture and Architecture (Bronze Age to Iron Age)

I

Further Reading

Barker, G., and T. Rasmussen. 1998. *The Etruscans*. Oxford: Blackwell.

Cocchi Genick, D. 2009. *Preistoria*. Verona: QuiEdit.

Fugazzola Delpino, M.A., G. D'Eugenio, and A. Pessina. 1993. La Marmotta (Anguillara Sabazia, Roma): un abitato perilacustre di età neolitica. *Bullettino di Paletnologia italiana* 84 (1): 181–341.

Guidi, A. 2010. The archaeology of early state in Italy: new data and acquisitions. *Social Evolution and History. Studies in the Evolution of Human Societies (Moscow)* 9 (2): 12–27.

Guidi, A., M. Piperno, and M. Cremaschi, eds. 1992. *Italia preistorica*. Roma: Editori Laterza.

Hunt, C., C. Malone, J. Sevink, and S. Stoddart. 1990. Environment, soils and early agriculture in Apennine central Italy. *World Archaeology* 22 (1): 34–44.

Maggi, R., ed. 1997. *Arene Candide: a functional and environmental assessment of the Holocene sequence*. Rome: Il Calamo.

Malone, C.A.T. 2003. The Italian Neolithic: a synthesis of research. *Journal of World Prehistory* 17 (3): 235–312.

Mathers, C., and S. Stoddart, eds. 1994. *Development and decline in the Mediterranean Bronze Age*. Sheffield: John R. Collis Publication.

Mussi, M. 2001. *Earliest Italy. An overview of the Italian Paleolithic and Mesolithic*. New York: Kluwer Academic/Plenum Publishers.

Pacciarelli, M. 2009. Verso i centri protourbani. Situazioni a confronto da Etruria meridionale, Campania e Calabria. *Scienze dell'antichità* 371–416.

Radi, G. 2010. Les séquences de la céramique imprimée en Italie. In *Premières sociétés paysannes de la Méditerranée occidentale. Structures des productions céramiques. Toulouse, 11–12 mai 2007*, ed. C. Manen,

F. Convertini, D. Binder, and I. Sénépart, 133–147. Paris: Societe Prehistorique Francaise.
Spivey, N., and S. Stoddart. 1990. *Etruscan Italy.* London: Batsford.
Stoddart, S.K.F. 2006. The physical geography and environment of Republican Italy. In *Companion to the Roman Republic*, ed. N. Rosenstein and R. Morstein-Marx, 102–121. Oxford: Blackwell.
Stoddart, S., and C. Malone. 2009. Megaliths in Malta. In *Orme dei Giganti*, ed. S. Tusa, C. Buccellato, and L. Biondo Palermo, 59–70. Regione Siciliana – Assessorato dei beni culturali, ambientali e della pubblica istruzione – Dipartimento dei beni culturali e dell'educazione permanente.
Tusa, S. 1999. *La Sicilia nella preistoria*. Palermo: Sellerio.
Whitehouse, R. 1992. *Underground religion: cult and culture in prehistoric Italy.* London: Accordia Research Centre, University of London.

Italy: Medieval Archaeology

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An archaeological study of the Middle Ages appeared in Italy, as in other European countries, between the end of the nineteenth and the commencement of the twentieth centuries. Italy, which was reunited politically in 1861 after 1,300 years of division, was seeking its identity during the era of communes which had defeated Emperor Frederick I of Germany (Frederick Barbarossa). During the Fascist period (1922–1945), these still timid approaches disappeared from the scene due to the fact that they concerned a historical period considered in decline in comparison with the glories of the Roman Empire. However, Paleochristian Archaeology, with its focus on Late Antiquity, during which Christianity had begun, did not undergo any form of reappraisal. Following this interval, it was the historian of law, Gian Piero Bognetti, who in 1958 proposed a re-establishment of Medieval Archaeology. Between 1958 and 1963, he personally undertook excavations at Torcello (Venice) and Castelseprio (Varese), entrusting the work to a team (under the direction of Eleonora Tabaczynska and Stanislaw Tabaczynski) who hailed from the Institute of Material Culture in Warsaw. After Bognetti's death (in 1963), the excavations at Castelseprio continued through the efforts of a young team of people who had been assisting with the research.

During that time, Nino Lamboglia was pursuing his work on stratigraphy in Liguria, with research having commenced in the 1930s. In the meantime, between 1958 and 1962, Gaetano Panazza, director of the Civici Musei of Brescia, was excavating the Church of San Salvatore of Brescia, assisted by one of Lamboglia's students. It is therefore not surprising that in 1966, through the initiative of Michelangelo Cagiano de Azevedo, a scholar of Late Antiquity, the Catholic University of Milan established the first Italian Chair in Medieval Archaeology, followed by the establishment of a school of specialized studies which was extended to studies in Late Antiquity and the early Middle Ages. This historical period was a focus of interest in Lombardy, with work being undertaken by leading historians and archaeologists active at the time, and in particular the history of the Longobards, following the example of studies carried out by Gian Piero Bognetti and Gaetano Panazza, experts on the history of Milan and Brescia.

Subsequently, in the 1970s, this research environment saw the introduction of the innovative methods based on English urban archaeology, imported to Pavia, the ancient capital of the Longobards, through the efforts of Adriano Peroni, a pupil of Panazza's and director of the local museum. In fact in 1972, he entrusted to two young English archaeologists (Hugo Blake and Brian Ward-Perkins) firstly the excavation of the Torre Civica and subsequently an ambitious project in urban archaeology. Following on from these experiences in Pavia, and enriched by the technical contribution of Martin Carver who was invited to deliver courses to archaeological practitioners at Botticino (Brescia) from 1979

to 1982, the period of major urban excavations developed in various Italian cities at the commencement of the 1980s.

For their part, in 1973 the Tabaczinskis return to carry out new excavations in Italy (at Capaccio Vecchia, Salerno), as a result of which, a new group of medieval archaeologists is formed (Paolo Delogu, Paolo Peduto, Gabriella Matzke).

However, in 1971 a turning point in theoretical-methodological approaches is marked by the group in Genoa directed by Tiziano Mannoni, a student of Lamboglia's, with the publication of the "Notiziario di Archeologia Medievale" [Bulletin on Medieval Archaeology]. This group integrates the study of historical geography, promoted by Massimo Quaini, with the positivist tradition of Italian prehistorians (active in Liguria with Luigi Bernabò Brea) and the International Institute of Ligurian Studies of Nino Lamboglia, all of which combine with the neopositivist and neomarxist tendencies reproposed during the experiences of the student uprisings of 1968.

The encounter in 1973 at Scarperia (Florence) with the Tuscan group led by Riccardo Francovich sees the emergence of the journal *Archeologia Medievale* [Medieval Archaeology] which, in the editorial of the first issue (1974) written by Massimo Quaini, proposes an archaeology of the material culture of subaltern classes that is socially and politically engaged in the preservation of cultural heritage. Such a direction marked a departure from Classical Archaeology viewed through the lens of historical-artistic expression, and Christian Archaeology expressed through Catholic ideology linked to the Vatican. Further deepening this rift was the enthusiastic support shown in the stratigraphic discoveries being experimented in the 1970s by English archaeology. In this frame, two valued proponents were Andrea Carandini and Daniele Manacorda, both of whom, like Riccardo Francovich, were lecturing at the University of Siena. As archaeologists of classical training but with links to Anglo-Saxon experiences, they diffused these methods at the commencement of the 1980s: the former by means of a manual on stratigraphical excavation (Carandini 1981) and the latter with a translation in 1983 of *Principles of Archaeological Stratigraphy* by Edward Harris.

In the 1970s, very little was known in Italy about the material culture of the Middle Ages, such as settlements with wooden dwellings, as with fortifications, manufacture, and commerce. Therefore, the first objective of the various groups of archaeologists was to set up information categories for each strand of research. Early on, the reference points were above all the works of French scholars on the history of the *longue durée* developed around the *Annales*: from *The Mediterranean and the Mediterranean World in the Age of Philip II* by Fernand Braudel to the history of the town of Montaillou during the Inquisition by Emmanuel Le Roy Ladurie and the history of the landscape of the Sabine (in Lazio) during the early Middle Ages outlined by Pierre Toubert with documentation of the monastery at Farfa. During this time, archaeological research agendas, above all in Tuscany, were oscillating between scholars of medieval deserted villages and scholars of the second generation of castles (between the tenth and twelfth centuries).

In 1981, a conference held in Pavia ("Archeologia medievale: il prossimo decennio," *Archeologia Medievale*, X, 1983) ["Medieval Archaeology: the next decade," *Medieval Archaeology*, X, 1983] led to comparisons between medieval archaeologists working in Lombardy with those operating in Tuscany-Liguria. The conference marked a turning point in Italian medieval research. The moment was favorably inclined for the diffusion of new ideas since that year a dozen officials in medieval studies were taking up positions in government departments, while in the universities teaching in the discipline was beginning to spread. The major excavations in Brescia, Milan, and Verona not only triggered a debate on the methods and views of urban archaeology but also supplied work on the first archaeological projects based on the English model, endeavors that opened up a third professional pathway for archaeologists, besides those in universities and government departments. In research carried out on medieval landscapes, apart from excavations of dwellings,

surveys of wider territory were begun, during the course of which, aerial photographic interpretation and reconnaissance methods were systematically applied.

Following on from this were excavations of castles, both those of Late Antiquity such as Sant'Antonino of Perti in Liguria, Castelseprio and Monte Barro in Lombardy, and those of the second generation (from the tenth century onward) such as Rocca San Silvestro and Poggibonsi in Tuscany. Above all, Monte Barro signaled a shift, thanks to the systematic application of those scientific branches in archaeology that at the time were defined as paleobotany and zooarchaeology and through which reconstructed the environment and eating habits of the castle residents from the fifth to the sixth century (Brogiolo and Castelletti 1991).

In that same decade of the 1980s, Medieval Archaeology was also dedicated, through salvage rescue excavations, to the study of churches, thus extending stratigraphical methods, as well as the study of burials and the settlement context. Among the most significant were the excavations of Longobard monasteries, such as San Vincenzo al Volturno (founded by the Dukes of Benevento) and San Salvatore of Brescia (founded by King Desiderius and his wife Ansa). These studies were no longer limited by the "Paleochristian" period but were extended to the entire life span of the edifices. Similarly the necropolis were finally taken into consideration independently from the study of burial objects.

The flourishing of all these disciplinary specializations entailed the formation of specialist fields: geomorphologists and sedimentologists for the interpretation of stratified deposits and those studying techniques of production, various types of craft, and biological remains. During this period, the standard-bearers of these specializations were Tiziano Mannoni based in Genoa and Lanfredo Castelletti in Como.

Midway through that decade of significant development, emanating from a branch of urban archaeology, the building archaeology of architecture was finally developed in numerous centers (Genoa, Siena, Brescia, Venice, and finally Milan) through a collaboration with restoration architects. The official manifesto was created in 1987 at the Summer School of Pontignano near Siena (Francovich and Parenti 1988), and the following year the first handbook appeared (Brogiolo 1988).

In conclusion, the 1980s were a period of consolidation in the institutions and among professionals for the development of specializations and research methods in different disciplinary sectors with the intention of exploring the entirety of material culture in the Middle Ages.

The subsequent decade, which entailed discussion and rethinking on the basis of the knowledge acquired, opened in 1992 with a conference organized at Pontignano (Siena) by Riccardo Francovich with the collaboration of Ghislaine Noyé (Francovich and Noyé 1994). The title (*La storia dell'alto medioevo italiano alla luce dell'archeologia)* [The history of the Italian early Middle Ages through archaeology] synthesized the focus of research conducted to that point: constructing material sources that could communicate on equal terms with written sources but with a focus only on the early Middle Ages which, after the 1970s and above all thanks to the debate on cities of that period, had been cast in the spotlight.

Around the mid-1990s Medieval Archaeology was enriched by two new reference points: the "Società degli archeologi medievisti italiani" (SAMI) [the Society of Medieval Italian Archaeologists] (founded in 1993) and the journal "Archeologia dell'Architettura" [Archaeology of Architecture] (whose first issue appeared in 1996).

The role of SAMI emerged as an important one, more than for its institutional interventions, thanks to a few initiatives pursued over the time: the national conferences on medieval archaeology held triennially at various locations from 1997 onward; the Ottone d'Assia Prize (later also dedicated to Riccardo Francovich) awarded to a publication by an early career researcher, totaling 15 volumes printed from 2000 onward; the Riccardo Francovich Prize for the best park or archaeological museum with a medieval theme;

and the series "Metodi e Temi dell'Archeologia medievale" [Methods and Themes in Medieval Archaeology].

The need for a journal on "Archaeology of Architecture" arose, instead, from a prolonged debate with restoration architects with far-reaching interest even in Spain, where in 2002 a similar journal was established ("Arqueología de la Arquitectura"). The discussion continued in the first decade of the twenty-first century through comparison with structural engineers who adopted the methodologies of archaeology of architecture in the guidelines for interventions on historical buildings. More recently, following on from quantification work carried out by Janet DeLaine on the public architecture of the Roman era, even a group of classicists has finally adopted stratigraphical methods, and the journal, which has always existed without restrictions on specific chronologies, has also welcomed their contributions.

Between Archaeology and History: Some Themes in the Debate

The initial themes of the debate were set predominantly by historians in disciplines like medieval archaeology, which is concerned with a period that historiographical conventions identify from 476 (marking the end of the Western Roman Empire) and 1492 (the year of the discovery of America by Christopher Columbus). This is because they enjoyed a long tradition of study, and in the academy, up until the 1970s with few exceptions, courses on the Middle Ages were delivered by historians and art historians, and therefore the earliest medieval archaeologists had received that training. Furthermore, up until the first decade of the new millennium, the influence of Christian Archaeology remained entirely marginal, even though it had a long and uninterrupted tradition of scholarship.

After all, the new discipline had not yet developed a sufficient level of maturity to formulate its own research strategies, a maturity acquired through debate on certain themes. The first debate, in the second half of the 1980s, concerned the interpretation of initial data offered by urban archaeology in Brescia and Verona – two cities that had enjoyed success in the early Middle Ages and could therefore proffer a yardstick for urban studies of that period.

The Debate on the Transformation of the City

The debate on the evolution of the city in the early Middle Ages, which was widespread and the subject of presentations by leading archaeologists and European historians, had its origins in an article published by Cristina La Rocca in 1986 in *Archeologia Medievale*. Contrasting with my pessimistic interpretation based on data from studies of urban archaeology in Lombard cities, particularly Brescia, was an optimistic vision of the evolution of the ancient city on the basis of written sources from Verona in the ninth and tenth centuries. The discussion continued, then, in the second half of the 1990s, based on data that urban archaeology was gathering in many cities (a synthesis is available in Brogiolo and Gelichi 1998). In Rome, specifically, this is due to the excavations of the Balbi Crypt (conducted by Daniele Manacorda), of the forum of Nerva (conducted by Riccardo Santangeli Valenzani and Roberto Medeghini), and many salvage urban excavations, memorable among which is the recent one in Piazza Venezia which has highlighted an important artisan district. In Naples, the subject of numerous excavations, the most significant data is that obtained on the port, as well as an admirable synthesis by Paul Arthur. At Cividale and Ravenna, the former is the seat of a regional Longobard duchy and the latter a Byzantine exarchate. Apart from the transformation of the urban landscape, the debate has highlighted the economic, social, and cultural aspects of the so-called age of invasions/migrations, at the center of the project on the *Transformation of the Roman World* funded by the European Science Foundation.

The Debate on the Countryside

The debate on the transformation of the countryside in the early Middle Ages developed later,

during the 1990s of last century and the first decade of the current century, following numerous studies conducted in Tuscany and in northern Italy, which have given rise to two contrasting models.

In Tuscany, excavations carried out by Riccardo Francovich and later Marco Valenti below second-generation castles (constructed, as previously stated, from the tenth century onward) have uncovered phases of settlement from the early Middle Ages. Following the concept of a peasants' golden age proposed by Chris Wickham, these phases have been interpreted (Francovich and Hodges 2003) as an early concentration of the population on high ground, commencing at the end of the sixth century. Such a concentration would have been brought about by peasants who liberated themselves from the control of the aristocracy in the previous phase of the breakup of the Roman settlement, centered on villas.

On the contrary, in northern Italy, where most of the information was derived from castles constructed in the fifth to the sixth centuries and from villas that demonstrated meagre settlement phases, the interpretation suggested both a persistence of sparse settlement and the maintenance of strong hierarchical control over the land (Brogiolo and Chavarría Arnau 2005).

At the commencement of the 2000s, these divergent views were discussed at various conferences (among which Brogiolo et al. 2005; for a synthesis of the debate: Valenti in Gelichi 2014, 123–142) which proved fruitful in defining plans for future research. The notion of a period of breakup, no longer under hierarchical control, and defined as "chaotic," has moreover been superseded even in Tuscany when excavations began on villas and below second-generation castles, where evidence of hierarchization was brought to light, such as in Miranduolo, a village constructed on a mining area under public control since the seventh century.

The Longobards

In Italy, discussion on the effects of the Longobard invasion has been one of the most pursued topics by medieval archaeologists with opposing views. Interest in the Longobards – which has given rise to no less than four major exhibitions in the last quarter of a century – depends on the fact that in Italy, the Longobards bring to an end the unity of Italy which was still present during the Gothic period, when the peninsula was part of a political and economic power system that stretched from the Adriatic to Hispania. In fact, Italy found itself fragmented among territories reconquered by the Eastern Romans and the duchies of the kingdom, often autonomous when not fighting among themselves. There was a marked fragmentation in the ninth century, from the Arab conquest of Sicily, destined to last until 1861. It is therefore not unusual that the Longobard question has always been at the center of the historiographical debate from the time of Machiavelli and Guicciardini (at the beginning of the sixteenth century). Even today much attention is dedicated to it, at the cost of other themes and periods of Italian medieval history.

As in other countries, the debate has been particularly fiery in the 1990s of the last century and in the first decade of the present century. On the one hand, those commencing with the presupposition that burial objects do not provide proof of an identity maintain that there was an evolution predominantly within late Roman society. Others, placing major faith in what they attribute to sources, propose views that are diametrically opposed, based on a strong identification of the invaders which has been maintained for a long time as a result of the permanent conflict with the Eastern Roman Empire.

We have now entered a crucial phase of research, thanks to new and important excavations of necropoli with burial objects, among which is worth noting those at Ovada and Collegno in Piedmont, at Spilamberto in Modena, at Fara in Bergamo, and at Cividale in Friuli. This is, above all, thanks to DNA analysis and isotopes of skeletons which are confirming the traditional model that associated burial objects with weapons of the Longobard elite.

Of Christian Archaeology and Medieval Archaeology

Christian Archaeology has enjoyed a very long tradition since the time of quests for the relics of

martyrs. Until the 1970s it has, however, mainly adopted the specification of "Paleochristian" in order to observe the principal objective of studying the origins of Christianization through excavations and the study of places of worship with their rich decorative display. A point of division among historians of Christianity was interest in ecclesiastical structures, the liturgy, and the lives of saints. The introduction of officials in medieval studies in government departments, commencing in 1980, has largely broadened research themes on churches. However, common interests, such as training, curricula, journals, conferences, and referring institutions, have remained distinct.

Moreover, have been important research projects on churches carried out by medievalists and the publication of a handbook on the archaeology of churches (Chavarría Arnau 2009). A collaboration then developed around the Corpus Architecturae Europeae (CARE) (http://arcmed.lettere.unipd.it/CatMedievale/CARE_IT_HOME.html), an undertaking which is revealing itself as a prime opportunity to reinvigorate research. Thanks to the number of churches, continuity of their use, and the survival of architecture and handcrafted articles, a broad amount of information is in fact on offer, not only on the ecclesiastical network but also on the settlements, society, and ideology of the entire medieval period.

The First Decade of the Twenty-First Century: A Phase of Reformulating Medieval Archaeology

At the beginning of the twenty-first century, a phase of reformulating Italian Medieval Archaeology has taken place, influenced by multiple factors, not only as a result of comparison with scholars from other medieval studies disciplines but above all in relation to problems within the entire archaeological field.

In addition, a serious influence results from changes to legislation, particularly from the enactment of the *Codice dei Beni Culturali* [Cultural Heritage and Landscape Code] in 2004. This repressive Code has placed the entire Italian archaeological research world, not only medieval archaeology, at the mercy of bureaucrats from the Ministry of Heritage, Culture, and Tourism who, in fact, exercise full control not only over its protection but also in terms of archaeological research which in Italy is subject to approval in the case of excavations and authorization in the case of research and publication.

The loss of Italian archaeology's credibility is further worsened as a result of general crisis factors, also common in other countries, that are the consequence of our current historical era. Globalization is erasing national cultures and local identities, removing from archaeology the social function of constructing historical memory in which local communities can recognize themselves. A further outcome is the loss of value in cultural heritage in a society evermore flat and disinterested in its own roots, for which the only alternative now seems to be a turning of the past into a Disneyland-style spectacle.

Apart from this cultural regression, there is also the economic crisis which has struck more severely in Italy than elsewhere, rendering the survival of archaeologists more difficult. From a small group of a few dozen trained professionals in the 1970s, 30 years later the number had reached a peak, now downsized, of at least six to seven thousand people making a living from archaeology.

It is therefore in this context of an internal malaise of the whole archaeological sector, and the loss of values that were considered firmly in place, that Medieval Archaeology, the weak link in the entire chain, must measure itself. In a previous reflection (Brogiolo 2009), I maintained that in order to overcome the crisis, Italian medieval archaeology needed firstly to liberate itself from the guardianship of historians who, for 30 years, had proposed the research themes and the interpretive points. Other models, based on material data, needed to enter the research agendas of medieval archaeologists, for example, the reconstruction of environmental evolution, landscapes of production, bioarchaeology, and physical anthropology. For these, as with other themes, I also asserted how it was advisable to move away from the restricted chronological

constraints of the Middle Ages (as indeed the early Middle Ages) in order to tackle the *longue durée* and interdisciplinarity. This was the path of a "global archaeology," upheld by Tiziano Mannoni since the 1970s and which more recently had become the battle horse of Giulio Volpe in advocating for a reform of heritage protection. This involves a diachronic and interdisciplinary archaeology to be carried out using a complex approach in which historical landscapes represent the context from within which one can survey the systemic interrelationships between elements and spaces of production, settlement and the sacred. In this archaeology of complexity, the objective is to overcome both determinism and "idealistic" reconstructions, even more removed from reality.

An approach of this type is firstly dealt with at a local level, since it is based on a systemic gathering of all the information. The selection of local communities as a setting for the research highlights the social function and proposes a "political" role to an archaeology that, closed within itself, had never possessed it or had lost it along the way. The result, however, is not that of a local story: repeated across many areas, it allows more general syntheses and allows us to understand the biodiversity through which communities of the past were preserved for millennia. It therefore makes us cognizant of how much they have lost through the uncontrolled evolutionary process in which we have placed ourselves without knowing where this will land.

The conclusion was that only by signaling new themes would archaeology in general and medieval archaeology in particular be assured of a future. But for this objective the discipline had to reinvent itself in order to preserve the role of stimulus and action that it had occupied from the 1970s to the 1990s of the last century.

Moving on from these conclusions, while still maintaining the codirection of "Medieval Archaeology" and "Archaeology of Architecture" to which I have continued to remain committed, in 2010 I decided to found, with Alexandra Chavarría Arnau and the support of other Italian and foreign archaeologists, a new journal: *European Journal of Post-Classical Archaeologies*. The editorial of the first issue, which appeared in 2011, in line with critical reflections that had matured in the preceding years, underlined the objectives: diachrony, interdisciplinarity, internationalization, centrality of archaeological data and interpretation without the influence of other disciplines, and attention paid to new themes and discussions. In the subsequent issues, the following themes were explored: GIS and spatial analysis, bioarchaeology and the potential and limitations of isotopic analyses, marginal landscapes and economies, disaster and resilience, recycling and reuse in the Middle Ages, and rivers and waterways. Moreover, in the Dossier section, the following were discussed: Public Archaeology, Protection and Freedom of Research, Communication and Open Access in Archaeology, World Heritage and the Public, Anticommons in Cultural Heritage.

Challenges for the Future

In 2014, on the fortieth anniversary of the foundation of the journal *Archeologia Medieval*, a series of theoretical-methodological reflections on Italian medieval archaeology were published. What emerges is a picture that remains vital, evidenced by the large number of important projects in progress and in part already published and by the salience that research in southern Italy has achieved.

While it is impossible to cite them all, I would at least like to note the following: for central-northern Italy, the research in Venice, as a continuation of work carried out in Comacchio (Sauro Gelichi); in Piedmont and Lombardy (under the supervision of government departments); in Liguria (Philippe Pergola and the local bureau); and in Tuscany (Marco Valenti, Federico Cantini, Giovanna Bianchi) comprising a full excavation of the mining village of Miranduolo. And, among many projects under my direction, I will limit myself to noting the one on the landscapes of the Trentino (2008–2013) which, also bearing in mind successive developments, has so far resulted in a total of 14 published volumes.

Additionally, there are numerous and important other research projects in southern Italy, and I will limit myself to mentioning the systematic ones supervised by Giulio Volpe (with the large-scale excavations of San Giusto, Faragola, Canosa) and by Paul Arthur in Puglia; those of Federico Marazzi at San Vincenzo al Volturno and the churches in Campania; in Sardinia those of Marco Milanese at Geridu and of Giorgio Spanu at the ports; and the work by Rossana Martorelli in the byzantine quarter in the center of Cagliari.

Italian medieval archaeology therefore continues to express strong project designs, but there are at least four challenges, three of which are interconnected and relate to all of Italian archaeology.

The first challenge derives from the reform of the system of protection which, after more than a century of independence, has incorporated archaeology within the framework of a unique supervision that also includes landscapes, monuments, and historic and artistic cultural assets. This choice, steered by politics with different motivations, has, from the theoretical point of view, certainly been supported by the "global" approach in research. And with this outlook, all the archaeological disciplines constructed as silos should be measured.

The second challenge concerns the redesign of university education, modelled 20 years ago by the exclusive interest of lecturers who multiplied the degree courses, resulting in a flood of graduates with limited professional training, who are unemployed or carrying out other types of work.

The third challenge, on which the future of all archaeology depends, lies in the rediscovery of social meanings that will transform it from a constraint/obligation imposed by the State and valued by a small minority of citizens (no more than 5% on the basis of analyses that have been conducted) to being able to reconstruct a lost Italian historical memory. From this viewpoint, defined as "public archaeology" or "social archaeology," multiple lines of research are active. The most effective is, however, the one that constructs the agendas and realizes them in collaboration with local communities and is attentive to the themes of biodiversity and the sustainability of the past in relation to the present.

In this view, medieval archaeology, with respect to other disciplines, seems, at least potentially, more prepared: it is concerned with a period closer to us and is used to dialoguing with other sources and disciplines. However (and this is the fourth challenge), it must open itself up, in diachrony, to what comes before and after the Middle Ages, which means taking up the themes of the *longue durée* using interdisciplinary and diachronic methods. These themes flow outwardly from the environment to anthropic landscapes to architecture and technologies. And they are all found within the history of individual rural communities, from a territory's phase of conquest until today.

Moreover, in order to safeguard its identity and reason for being, medieval archaeology must continue to investigate themes dealing with economic trends, inventing new themes from among available material data in order to compare with written sources. By way of example, I can recall three: the history of cities from the eleventh century onward reconstructed via their urban evolution and the large number of elevated buildings still preserved (an example is Padua: Chavarría Arnau 2011); castles of the second generation and churches, between the Ottonian era and that of the Swabians, as an expression of the dynamics of regional power at the center of which, against the setting of the tortuous relationships between the Papacy and Empire, one is aware of the influence of ecclesiastical hierarchies and the high-ranking officials of the empire; and the strengthening, in the late Middle Ages, of regional markets whose rhythms are to be patiently reconstructed following road networks and river routes. From these and from many other themes, diverse narratives will emerge with respect to those that we can presently narrate utilizing only written sources.

Furthermore, in dealing with the end of the ancient world and the period of invasions, we must set our objective by placing Italian history in a European context, because in that scope political dualism operates (of the Papacy and the Empire). The end of the Middle Ages, besides

the discovery of the Americas, and the consequent shift of the economic and commercial center of gravity from the Mediterranean to the Atlantic, is signaled also by the crisis of these two powers. The Papacy will lose control of the Church of England and northern Europe; the Empire will be substituted by nation states.

Italian medieval archaeology, facing these themes that have been left too frequently to historians reliant on written sources, architecture, and the arts, should be tied to the modern era and from there to current problems, in a diachronic course that could make a very original and comprehensible contribution, even for those who are experiencing a further, even more profound, period of change.

Cross-References

► Medieval Archaeology
► Post-Medieval Archaeology (Europe)

Appendix. Handbooks and Summary Volumes

A history of Italian Medieval Archaeology has until now been tackled by some archaeologists who have been its protagonists; what is missing, therefore, is a detached historical reconstruction which will be the task of a future generation. Moreover, this is not a simple undertaking since there has been a simultaneous development in numerous centers that have not always been attentive to the dissemination of their work.

Since the end of the last century, attempts at a comprehensive history can be found in the handbooks of Sauro Gelichi (1997) and Andrea Augenti (2016). On the phase in the 1970s, one can read the testimonies of David Andrews, Hugo Blake, Gian Pietro Brogiolo, Richard Hodges, Sauro Gelichi, Guido Vannini, and Brian Ward Perkins in the dossier published in the journal *European Journal of Post-Classical Archaeologies* (1, 2011, 419-498). A reflection on the methods and views of the historical group that referred to Riccardo Francovich and Tiziano Mannoni can be found in "Quarant'anni di Archeologia Medievale in Italia" [Forty Years of Medieval Archaeology in Italy] (Gelichi 2014) and in number XLI of the journal *Archeologia Medievale* dedicated to Tiziano Mannoni.

Among the volumes on single themes, developed mostly on the basis of material data but also keeping in mind other sources, see those on the castles of the first generation in northern Italy (Brogiolo and Gelichi 1996); the city in the Italian early Middle Ages (Brogiolo 2011); monasteries of the early Middle Ages (Marazzi 2015); the countryside (Brogiolo and Chavarría Arnau 2005); and churches (Chavarría Arnau 2009).

The following contain syntheses on individual themes: the Summer School of Pontignano and the series "Ricerche di Archeologia Altomedievale e Medievale" [Archaeological Research of the Early Middle Ages and Middle Ages] (published by Insegna del Giglio, Florence); "Documenti di Archeologia" and "Progetti di Archeologia" (SAP, Mantua); the volumes of the "Centro interuniversitario per la storia e l'archeologia dell'altomedioevo" [Inter-university centre for history and archaeology of the early Middle Ages] (Brepols); the conferences held at the University of Foggia in southern Italy and the "Giornate Gregoriane" [Gregorian Days] in Agrigento (volumes I–X) (Edipuglia, Bari); and the conferences on the "età romano-barbarica" [Roman-barbaric age] of Cimitile (Naples) and "Archeologia Barbarica" [Barbaric Archaeology] in Milan (Giostra 2017).

Among the occasional conferences, which are useful for the discipline to grow, apart from those at Pavia in 1981 and Pontignano in 1992, it is worth remembering those held in Ravenna in 2004 on cities (Augenti 2006), in Trent on Longobard necropoli (Possenti 2014), and in Rome on manufacture (Molinari et al. 2016).

Triennial updates on research can be found in the proceedings of the eight "Congressi nazionali di Archeologia medievale" [National Conferences on Medieval Archaeology] (from 1997 to 2015),

promoted by the "Società degli archeologi medievisti italiani" [the Society of Medieval Italian Archaeologists].

References

Augenti, Andrea, ed. 2006. *Le città italiane tra la tarda Antichità e l'alto Medioevo, Atti convegno (Ravenna 2004)*. Florence: Insegna del Giglio.

Augenti, Andrea. 2016. *Archeologia dell'Italia medievale*. Bari: Laterza.

Brogiolo, Gian Pietro. 1988. *Archeologia dell'edilizia storica*. Como: New Press.

Brogiolo, Gian Pietro. 2009. Italian Medieval archaeology: recent developments and contemporary challenges. In: Gilchrist R, Reynolds A, editors. Society for Medieval Archaeology Monographs 30, 1957–2007. Leeds: Maney Publishing. pp. 155–171.

Brogiolo, Gian Pietro. 2011. *Le origini della città medievale, Post-Classical-Archaeologies Studies 1*. Mantua: SAP.

Brogiolo, Gian Pietro, and Lanfredo Castelletti, eds. 1991. *Archeologia a Monte Barro. I. Il grande edificio e le torri*. Lecco: Stefanoni.

Brogiolo, Gian Pietro, and Alexandra Chavarría Arnau. 2005. *Aristocrazie e campagne nell'Occidente da Costantino a Carlomagno*. Florence: Insegna del Giglio.

Brogiolo, Gian Pietro, and Sauro Gelichi. 1996. *Nuove ricerche sui castelli altomedievali in Italia settentrionale*. Florence: Insegna del Giglio.

Brogiolo, Gian Pietro, and Sauro Gelichi. 1998. *La città nell'alto medioevo italiano*. Bari: Laterza.

Brogiolo, Gian Pietro, Alexandra Chavarría Arnau, and Marco Valenti, eds. 2005. *Dopo la fine delle ville: evoluzione nelle campagne dal VI al IX secolo, 11 Seminario sul Tardoantico e l'Alto Medioevo, (Gavi 8-10 maggio 2004)*. Mantua: SAP.

Carandini, Andrea. 1981. *Storie della terra. Manuale di scavo archeologico*. Turin: Einaudi.

Chavarría Arnau, Alexandra. 2009. *Archeologia delle chiese. Dalle origini all'anno 1000*. Rome: Carocci. (new edition in 2018).

Chavarría Arnau, Alexandra, ed. 2011. *Padova: architetture medievali*. Mantua: SAP.

Francovich, Riccardo, and Noyé Ghislaine, eds. 1994. *La storia dell'alto medioevo italiano alla luce dell'archeologia*. Florence: Insegna del Giglio.

Francovich, Riccardo, and Richard Hodges. 2003. *Villa to village: The transformation of the Roman countryside in Italy, C.400-1000*. London: Duckworth.

Francovich, Riccardo, and Roberto Parenti, eds. 1988. *Archeologia e restauro dei monumenti. I° ciclo di lezioni sulla ricerca applicata in archeologia. (Pontignano 1987)*. Florence: Insegna del Giglio.

Gelichi, Sauro. 1997. *Introduzione all'archeologia medievale. Scavi e ricerche in Italia*. Rome: Carocci.

Gelichi, Sauro, ed. 2014. *Quarant'anni di Archeologia Medievale in Italia. La rivista, i temi, la teoria e i metodi, numero speciale di Archeologia Medievale*. Florence: Insegna del Giglio.

Giostra, Caterina, ed. 2017. *Archeologia dei Longobardi. Dati e metodi per nuovi percorsi di analisi, Archeologia Barbarica 1*. Mantua: SAP.

Marazzi, Federico. 2015. *Le città dei monaci. Storia degli spazi che avvicinano a Dio*. Milan: Jaca Book.

Molinari, Alessandra, Riccardo Santangeli Valenzani, and Lucrezia Spera. 2016. *L'archeologia della produzione a Roma (secoli V-XV). Atti del Convegno Internazionale di Studi, Rome, 27–29 marzo 2014*. Bari: Edipuglia.

Possenti, Elisa, ed. 2014. *Necropoli longobarde in Italia. Indirizzi della ricerca e nuovi dati, Atti del Convegno Internazionale, Trento, 26–28 settembre 2011*. Trent: Castello del Buonconsiglio.

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Jaffa and the Jaffa Cultural Heritage Project

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Introduction

Jaffa (Canaanite *Yapu*; Heb. *Yafo*; Gk. *Joppa*; Ar. *Yafa*) is situated south of the modern city of Tel Aviv on the coast of Israel between Caesarea Maritima and Gaza, about 60 km northwest of Jerusalem. The site consists of an ancient mound of approximately 3 ha (i.e., Tel Yafo) built on a kurkar sandstone ridge overlooking the Mediterranean Sea and during various periods also featured a sprawling lower city of as much as 6 ha. As an important site and port along the coast of the southern Levant, its occupation reflects nearly every major period from the Middle Bronze Age to the present, while the lower city experienced intermittent periods of substantial growth from the Hellenistic period onward.

The mound's stratigraphy became accessible following the abandonment of buildings in the center of the town during the British Mandate (1917–1947). The Ottoman period buildings on the upper part of the mound were destroyed or fell into ruins as a result of the British counter-insurgency in 1936 known as Operation Anchor (Fig. 1) (Gavish 2013). Consequently, the abandonment of structures on the mound of Tel Yafo permitted archaeological exploration, which began in 1948 under the auspices of the Israel Department of Antiquities and Museums and has continued to the present by various research institutions including the University of Leeds (1952), Tel Aviv University (1997, 1999), and the University of California, Los Angeles (UCLA), and Johannes-Gutenberg University in Mainz, under the auspices of the JCHP (since 2007) and in partnership with the Israel Antiquities Authority (IAA). Owing to antiquities legislation, salvage excavations have also been carried out since 1985 by the IAA (and more recently also by subcontracting Israeli universities) primarily along the mound's northern, eastern, and southern slopes in what is properly characterized as the lower city (e.g., Fantalkin 2005).

Taken together these excavations reveal a number of important discoveries connecting Jaffa's cultural heritage with that of the coastal plain, highlands to the east, and the Mediterranean basin as well as Europe. The earliest evidence for occupation at the site is dated to the late fourth millennium or the Early Bronze

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Jaffa and the Jaffa Cultural Heritage Project, Fig. 1 Aerial photograph of the Jaffa's old city illustrating the effects of Operation Anchor, 1936. Note that the shape of the destroyed area on the mound (Tel Yafo) resembles an anchor

I (ca. 3500 to 3000 BCE), which consists of ceramic remains. It is possible that some of these ceramics are also indicative of the transition from the late Chalcolithic (Gophna 2002). During the Middle Bronze Age (ca. 1900 to 1530 BCE), the site was inhabited by a population characterized as Amorite, who constructed the site's first defenses, an earthen rampart crowned by a mudbrick wall. Following the transition to the Late Bronze Age, the site was inhabited by an Egyptian garrison from ca. 1460 to 1125 BC (Late Bronze IB to III, see Burke et al. 2017a). Textual evidence from Egypt is now amplified by Egyptian New Kingdom material culture including both imported and local Egyptian ceramics, epigraphic finds such as inscribed architectural fragments and scarabs, as well as other *aegyptiaca* (Burke and Lords 2010). The evidence for the Iron Age in Jaffa is piecemeal both on the mound and in the lower city, owing a great deal to the extensive and disruptive building efforts of the Persian Period. Nevertheless, a robust collection of ceramics from the Iron I, including Philistine bichrome, and successive phases of the Iron II (ca. 980 to 539 BCE), suggest a maritime port commensurate with the role mentioned for Jaffa in the narrative concerning king Solomon in the Hebrew Bible, notably, as an entrepôt to inland polities such as Judah and those in Transjordan. In contrast to the Iron Age remains, the Persian Period (ca. 539 to 332 BCE) in Jaffa is the first period during which both the mound and lower town were intensively occupied with nearly every excavation area yielding architectural remains from this period. These remains suggest, as at contemporary ports to the north, such as Dor, and to the south, such as Ashkelon, that the port played an important commercial role during the Persian Period, notably from the mid-fifth century when the city fell under Sidonian control (Burke 2011b).

Of comparable grandeur and physical extent, the remains of Hellenistic Jaffa reveal a cosmopolitan city caught in the struggle between Hasmonean rulers waging an insurgency against Seleucid rule during the second century BCE as evidenced in destruction levels of this period (Notley 2011). The Early Roman period saw Jaffa's importance as a port eclipsed by Herod's construction of major port facilities at Caesarea Maritima on the coast to the north of Jaffa. Nonetheless, the city persisted and even maintained a Jewish identity, which may have emerged during the Hellenistic period, if not earlier. This is suggested by, among other things, the remains of a Jewish patrician's home, which was

identified on the basis of the remains of Judean stone drinking vessels. Ample evidence of Jaffa's continuous and robust habitation during the Late Roman and Byzantine periods is present throughout Jaffa (Foran 2011).

During the early Islamic period, the site was a fortified coastal site and functioned as the port for the regional capital of Ramla located to its east. Fragmentary architectural remains as well as ceramics have been recovered predominantly from the lower town to the east, but also attested on the mound. During the Crusader period, ample ceramic remains reveal the interconnections of the city with various regions within the Mediterranean including Cyprus and Italy (Boas 2011; Burke 2011d). Evidence of the Crusader fortifications of the city can be found on both the northern and southern sides (Peilstöcker 2006). Following the Crusader period, the city experienced a low point in terms of size and archaeological evidence during the Mamluk period (Burke 2011e), after which the Ottoman period witnessed a lengthy period of rebuilding and expansion of the town to the east as it served as the principal port to European interests in the Holy Land (Kark 2011; Mirkin 2017).

The repeated themes in the historical legacy of Jaffa, which impinge upon its archaeological heritage, include its role as principal port to the central coast of Israel through the early twentieth century CE and the role that this port played as a zone of cultural interaction between Mediterranean cultures and those of the southern Levant. Whether through the residue of ceramics and artifacts left by the various ethnic groups inhabiting Jaffa or the institutions of pilgrimage established in the city, Jaffa was regarded as home to a wide range of ethnic groups from Amorites and Canaanites, and enclaves of Egyptians, Greeks, Jews, Arabs, Crusaders, Italians, Germans, and Armenians. Such a legacy therefore warrants a cultural heritage program that is able both to support and to integrate such diverse lines of research by leveraging its resources in an efficient manner under a shared framework for research as, for example, originally outlined by the Jaffa Cultural Heritage Project.

Definition

The Jaffa Cultural Heritage Project (JCHP) was founded in 2007 by codirectors Aaron A. Burke and Martin Peilstöcker to address the renewal of archaeological research of Jaffa and the stewardship of its archaeological heritage. The project's founding institutions include UCLA and the IAA. Additional members include Johannes-Gutenberg Universität, Mainz and the Old Jaffa Development Corporation (OJDC). From the project's outset, its directors outlined a fourfold program (Burke and Peilstöcker 2011) to address the needs of research (Peilstöcker 2011), publication (Peilstöcker and Burke 2011), presentation, and conservation (Strul 2011) of Jaffa's cultural heritage (Fig. 2). The project builds upon earlier efforts, especially the extensive archaeological excavations carried out by Jacob Kaplan (Burke 2011) whose work as the municipal archaeologist of Tel Aviv-Jaffa led to the development of the first plan for Jaffa's preservation (Fig. 3) against efforts to construct new buildings on the mound (Ajami 2011). The project also sought to integrate findings from unpublished excavations by a range of academic institutions including the University of Leeds (Isserlin 1950) and Tel Aviv University (Herzog 2008; Sweeney 2003), both of which carried out excavations in the second half of the twentieth century on Tel Yafo.

Key Issues/Current Debates/Future Directions/Examples

The challenges inherent to a cultural heritage research program such as the one outlined by the JCHP have materialized as both successes and substantive, material impediments. An early success of the JCHP's integrated design is evident in the recognition of the importance of the excavations conducted by Jacob Kaplan between 1955 and 1974 (Burke 2011c). A number of studies have emanated from this work (Burke and Lords 2010; Keimer 2011; Burke and Mandell 2011; Tsuf 2011; Burke et al. 2017a) as well as the renewal of excavations by the JCHP on Tel Yafo from 2008 to 2014 (Burke and

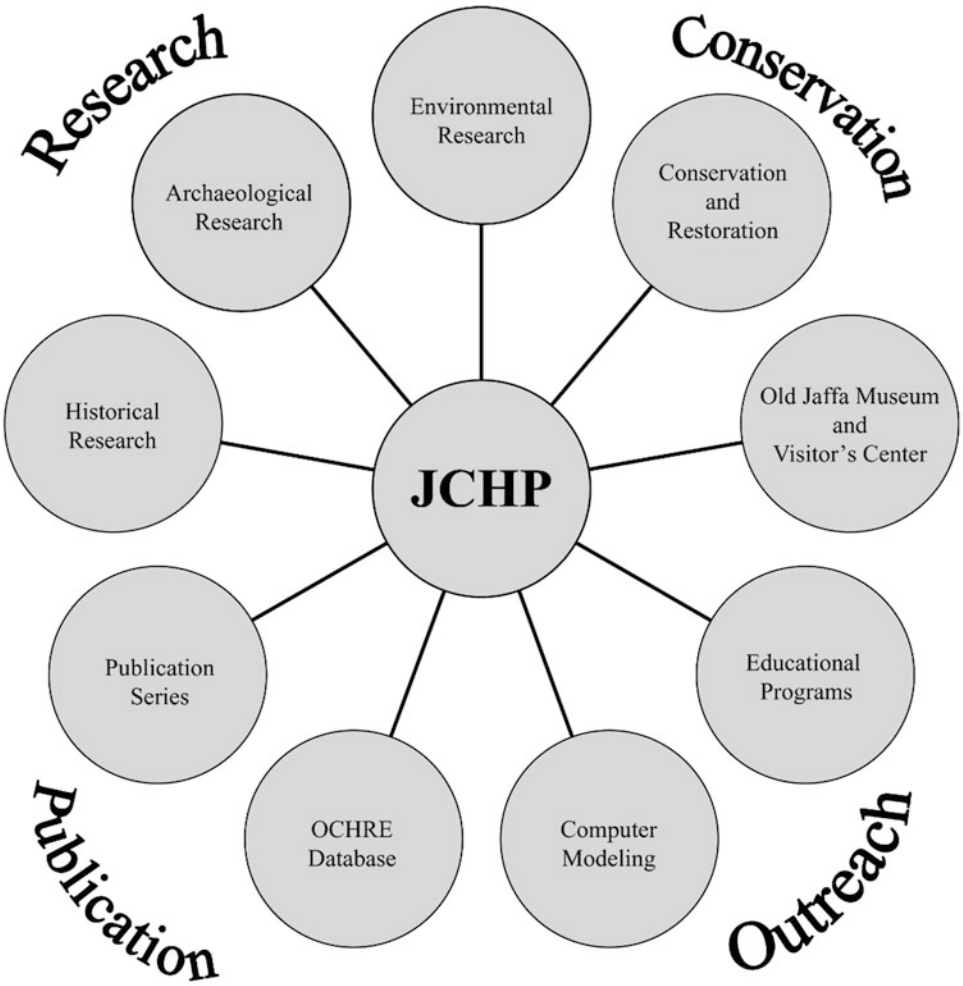

Jaffa and the Jaffa Cultural Heritage Project, Fig. 2 The JCHP's organizational framework

Peilstöcker 2017a). A central element of the effort is the project's integration of data via Geographic Information Systems (Pierce 2011), which permit not only the integration of plans from different excavations, but likewise data from a robust set of historical maps dating back to 1799 (Shacham 2011).

Data mining of European map and photo archives provides an indispensable source for understanding Jaffa's late Ottoman history (Shacham 2017), taken together with archaeological exploration in the lower town (Arbel and Rauchberger 2017; Aleksandrowicz and Giler 2017; Giler 2017). Such archaeology is elsewhere identified as Historical Archaeology, although it has, until late, not been practiced as such in Israel for remains dated from the sixteenth century CE on. Yet, now the remains in Jaffa's Qishle (Ottoman fortress), French Hospital, the Flea Market, and the Ganor Compound constitute some of the largest excavations of Ottoman remains in Israel.

As a testament the project's success in expanding the research methods employed in Jaffa, in 2014 the project initiated a survey of its premodern anchorages, as well as a geomorphological analysis of cores taken from the area of the lower city, under the direction of Shelley

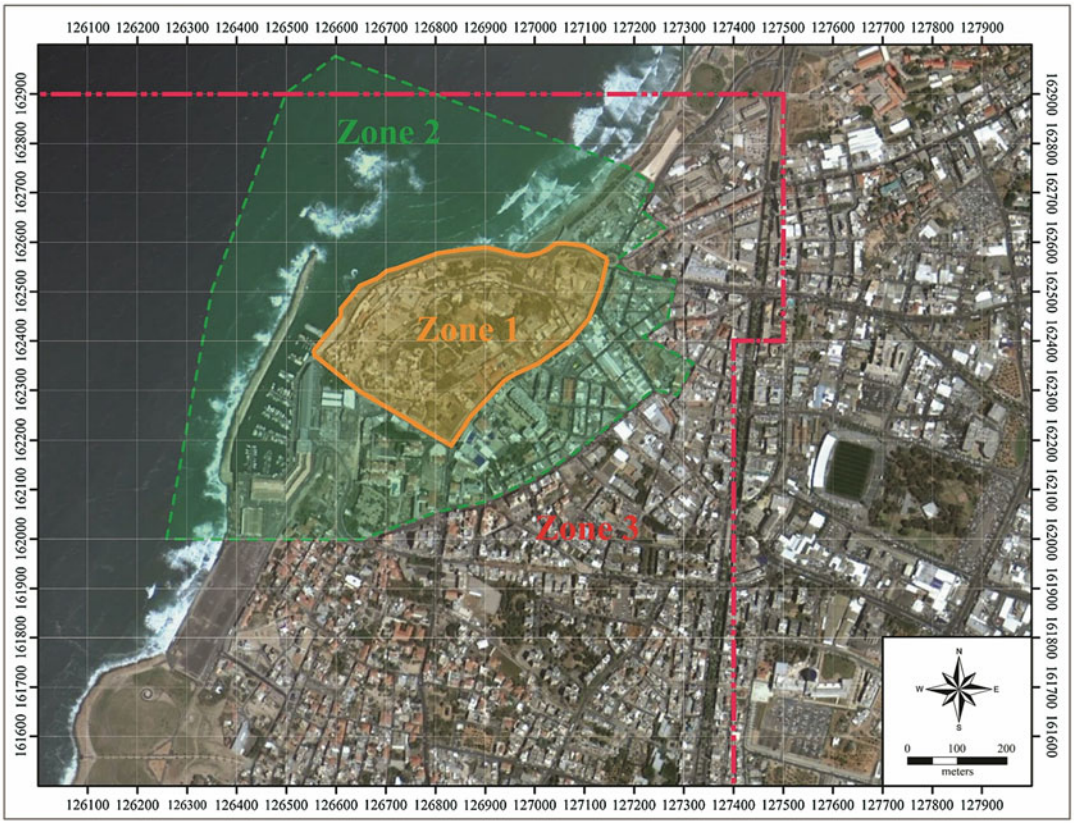

Jaffa and the Jaffa Cultural Heritage Project, Fig. 3 Legally defined archaeological zones of preservation of Jaffa's heritage. Zone 1: the mound; Zone 2: buffer zone around tell; Zone 3: area of lower city during Ottoman towns that falls outside Zones 1 and 2

Wachsmann (Wachsmann 2014, 2015). These were intended to assist in the identification of the site's original port that is thought to have existed to the east of the mound (Burke et al. 2017b). These results were successful in identifying a brackish environment that was likely connected to the sea, possibly an estuary. A maritime survey was also begun off the coast through examination of suspect targets identified during an earlier multibeam survey. This led to the identification of a World War I ship that was torpedoed to the north of Jaffa (Wachsmann et al. 2014).

While the JCHP serves as a model for one approach to planning of a long-term, heritage-focused research project intended to meet the needs of both research and conservation, a number of issues pose considerable challenges to the continued success of this and similar projects (Burke and Peilstöcker 2017). In the first place, operating within an urban environment is exponentially more expensive than conducting archaeological and cultural heritage work in nonurban areas. For example, the sheer cost of conservation of architectural remains has meant that such elements of the original plan remain to be realized at a future point when funding, whether municipal or private, can be identified for this purpose. Similarly, the conservation work that has been done was infrequently undertaken in collaboration with the Jaffa Cultural Heritage Project's efforts, and consequently did not incorporate the project's collective knowledge of Jaffa's historical or archaeological heritage.

Related to this concern is the reality that development efforts by organizations such as the OJDC continue to place the desire for immediate

touristic development ahead of thoughtful deliberation about the stewardship of Jaffa's cultural heritage, although this cannot be properly considered until sufficient archaeological research has been completed and more importantly synthesized, as toward publication. A conservation survey still remains to be undertaken of the lower city in order to determine its conservation needs, which would then be followed by the drafting of a conservation plan and the pursuit of legal means for its enforcement. This is, however, being gradually addressed by the IAA, although its allocation of resources are far below those necessary to pre-empt the impact of rapid urban development efforts in this part of Jaffa. With the assistance of the local development company and municipal agencies, greater public presentation of Jaffa's historical, architectural, and archaeological heritage, however, has improved signage throughout the city, in which the JCHP has played an important role. The primary limitations faced in Jaffa remain universal challenges to cultural heritage projects with more than expeditionary research interests: sustainable funding, and municipal support and coordination.

Despite the many decades of archaeological research in Jaffa that preceded the foundation of the JCHP and the project's efforts to analyze and publish earlier investigations, the project has experienced continuous pressure to consider touristic development of its excavation areas in advance of its own renewal of exploration of these areas. Consequently, such attitudes toward the JCHP have resulted in a considerable appropriation of its resources by agencies ostensibly coordinating their efforts with the project, which has limited still further the available funding for archaeological research, conservation, and presentation of the site. Nonetheless, within the first 5 years of its existence, the project established itself as the de facto arbiter of Jaffa's archaeological heritage and its decade of work has resulted in more than five completed and in-preparation publication volumes, exponentially increasing the availability and visibility of publications addressing the site's history and archaeology.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Heritage Outreach
- ▶ Experiencing Cultural Heritage
- ▶ Heritage Research and Visitor Planning
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage: History and Context
- ▶ Intangible Cultural Heritage
- ▶ Marketing Heritage
- ▶ Tangible Heritage in Archaeology

References

Ajami, Moshe. 2011. Cultural heritage management: The flea market and clock Tower Square excavations. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Aleksandrowicz, Or, and Samuel Giler. 2017. The new gate of Jaffa during the late ottoman period. In *The history and archaeology of Jaffa 2*, ed. A.A. Burke, K.S. Burke, and M. Peilstöcker. Los Angeles: Cotsen Institute of Archaeology.

Arbel, Yoav, and Lior Rauchberger. 2017. The Jerusalem gate of late ottoman Jaffa: An updated survey. In *The history and archaeology of Jaffa 2*, ed. A.A. Burke, K.S. Burke, and M. Peilstöcker. Los Angeles: Cotsen Institute of Archaeology.

Boas, Adrian J. 2011. Frankish Jaffa. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Burke, Aaron A. 2011a. The bibliography of Jacob Kaplan and Haya Ritter-Kaplan. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Burke, Aaron A. 2011b. Early Jaffa: From the bronze age to the Persian period. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Burke, Aaron A. 2011c. The Kaplan excavations publication initiative. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Burke, Katherine Strange. 2011d. Early Islamic and crusader pottery from Jaffa: A collection of whole and reconstructed vessels. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Burke, Katherine Strange. 2011e. Mamluk Jaffa: A Note. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Burke, Aaron A., and Krystal V. Lords. 2010. Egyptians in Jaffa: A portrait of Egyptian presence in Jaffa during the late bronze age. *Near Eastern Archaeology* 73 (1): 2–30.

Burke, Aaron A., and Alice R. Mandell. 2011. Egyptian "flowerpots" from Kaplan's area a excavations: Cultural and historical implications. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Burke, Aaron A., and Martin Peilstöcker. 2011. The Jaffa cultural heritage project: Objectives, organization, strategies, and implementation. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Burke, Aaron A., and Martin Peilstöcker. 2017a. Excavations of the Jaffa cultural heritage project, 2008–2014. In *The history and archaeology of Jaffa 2*, ed. A.A. Burke, K.S. Burke, and M. Peilstöcker. Los Angeles: Cotsen Institute of Archaeology.

Burke, Aaron A., and Martin Peilstöcker. 2017b. The Jaffa cultural heritage project, 2007–2016. In *The history and archaeology of Jaffa 2*, ed. A.A. Burke, K.S. Burke, and M. Peilstöcker. Los Angeles: Cotsen Institute of Archaeology.

Burke, Aaron A., Martin Peilstöcker, Amy Karoll, George A. Pierce, Krister Kowalski, Nadia Ben-Marzouk, Jacob Damm, Andrew Danielson, Heidi Dodgen Fessler, Brett Kaufman, Krystal V.L. Pierce, Felix Höflmayer, Brian N. Damiata, and Michael W. Dee. 2017a. Excavations of the new kingdom Egyptian fortress in Jaffa, 2011–2014: Traces of resistance to Egyptian rule in Canaan. *American Journal of Archaeology* 121 (1): 85–133.

Burke, Aaron A., Shelley Wachsmann, Simona Avnaim-Katav, Richard K. Dunn, Krister Kowalski, George A. Pierce, and Martin Peilstöcker. 2017b. Jaffa's ancient Inland Harbor: Historical, cartographic, and geomorphological data. In *The history and archaeology of Jaffa 2*, ed. A.A. Burke, K.S. Burke, and M. Peilstöcker. Los Angeles: Cotsen Institute of Archaeology.

Fantalkin, Alexander. 2005. A Group of Iron age Wineries from ancient Jaffa (Joppa). *Salvage Excavation Reports* 2: 3–26.

Foran, Debra. 2011. Byzantine and early Islamic Jaffa. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Gavish, Dov. 2013. "Operation Anker": die Zerstörung Jaffas 1936. In *Jaffa: Tor zum Heiligen Land*, ed. M. Peilstöcker, J. Schefzyk, and A.A. Burke. Mainz: Nünnerich-Asmus.

Giler, Samuel. 2017. The Anglican cemetery of Jaffa (from 1842). In *The history and archaeology of Jaffa 2*, ed. A.A. Burke, K.S. Burke, and M. Peilstöcker. Los Angeles: Cotsen Institute of Archaeology.

Gophna, Ram. 2002. Elusive anchorage points along the Israel littoral and the Egyptian–Canaanite maritime route during early bronze age I. In *Egypt and the Levant: Interrelations from the 4th through the early 3rd millennium B.C.E*, ed. E.C.M. van den Brink and T.E. Levy. London: Leicester University.

Herzog, Ze'ev. 2008. Jaffa. In *The new encyclopedia of archaeological excavations in the holy land*, ed. E. Stern. Jerusalem: Simon & Schuster.

Isserlin, Benedikt S.J. 1950. Some archaeological news from Israel. *Palestine Exploration Quarterly* 82: 92–101.

Kark, Ruth. 2011. Ottoman Jaffa: From ruin to Central City in Palestine. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Keimer, Kyle H. 2011. Area B: A test case for the publication of the Kaplans' excavations in Jaffa. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Mirkin, Daniel. 2017. The ottoman port of Jaffa: A port without a harbor. In *The history and archaeology of Jaffa 2*, ed. A.A. Burke, K.S. Burke, and M. Peilstöcker. Los Angeles: Cotsen Institute of Archaeology.

Notley, R. Steven. 2011. Greco-roman Jaffa and its historical background. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Peilstöcker, Martin. 2006. La ville franque de Jaffa à la lumière des fouilles récentes. *Bulletin Monumental* 164 (1): 99–104.

Peilstöcker, Martin. 2011. The history of archaeological research at Jaffa, 1948–2009. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Peilstöcker, Martin, and Aaron A. Burke, eds. 2011. *The History and Archaeology of Jaffa 1*. Edited by A. A. Burke and M. Peilstöcker, *The Jaffa Cultural Heritage Project 1*, Monumenta Archaeologica 26. Los Angeles: Cotsen Institute of Archaeology.

Pierce, George A. 2011. Archaeology of Jaffa and geographic information systems analysis. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Shacham, Tzvi. 2011. Jaffa in historical maps (1799–1948). In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Shacham, Tzvi. 2017. A panoramic view of late ottoman Jaffa from November 1860 by Louis Vignes. In *The history and archaeology of Jaffa 2*, ed. A.A. Burke, K.S. Burke, and M. Peilstöcker. Los Angeles: Cotsen Institute of Archaeology.

Strul, Lilah. 2011. Conservation projects in Jaffa. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Sweeney, Deborah. 2003. A lion-hunt scarab and other Egyptian objects from the late bronze fortress at Jaffa. *Tel Aviv* 30 (1): 54–65.

Tsuf, Orit. 2011. The Jewish Community at Roman Jaffa: The ceramic evidence. In *The history and archaeology of Jaffa 1*, ed. M. Peilstöcker and A.A. Burke. Los Angeles: Cotsen Institute of Archaeology.

Wachsmann, Shelley. 2014. The 2014 Ioppa Maritima project: The land survey. *INA Quarterly* 41 (3): 20–25.

Wachsmann, Shelley. 2015. 'Rafts by sea to Jaffa' (2 chronicles 2, 16): The 2014 Ioppa Maritima project. *Skyllis* 15 (1): 40–45.

Wachsmann, Shelley, Douglas Inglis, Megan Lickliter-Mundon, Veronica Morriss, and Holly Perdue. 2014. 2014 Ioppa Maritma project: The Deep-Sea survey. *INA Quarterly* 41 (4): 16–19.

Further Reading

For more information on IAA salvage excavations in Jaffa, see: http://www.hadashot-esi.org.il/default_eng.aspx.

More information on the JCHP can be found on the project's websites: http://jaffa.nelc.ucla.edu/.

Burke, Aaron A., Katherine S. Burke, and Martin Peilstöcker, eds. 2017. *The History and Archaeology of Jaffa 2*. Edited by Aaron A. Burke and Martin Peilstöcker, *The Jaffa Cultural Heritage Project 2*, Monumenta Archaeologica 41. Los Angeles: Cotsen Institute of Archaeology.

Herzog, Ze'ev. 2008. Jaffa. In *The new encyclopedia of archaeological excavations in the holy land*, ed. Ephraim Stern, 1791–1792. Jerusalem: Simon & Schuster.

Kaplan, Jacob, and Haya Ritter-Kaplan. 1993. Jaffa. In *The new encyclopedia of archaeological excavations in the holy land*, ed. Ephraim Stern, 655–659. Jerusalem: Israel Exploration Society.

Peilstöcker, Martin, and Aaron A. Burke, eds. *The History and Archaeology of Jaffa 1*. Edited by Aaron A. Burke and Martin Peilstöcker, *The Jaffa Cultural Heritage Project 1*, Monumenta Archaeologica 26. Los Angeles: Cotsen Institute of Archaeology, 2011.

Peilstöcker, Martin, Jürgen Schefzyk, and Aaron A. Burke, eds. 2013. *Jaffa: Tor zum Heiligen Land*. Mainz: Nünnerich-Asmus.

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Basic Biographical Information

John H. Jameson is retired after 25 years with the US National Park Service. He currently is a Heritage Consultant with the 12,000 Year History Park on Congaree Creek, Cayce, South Carolina, United States.

Major Accomplishments

John Jameson's 30-plus years of public service encompassed a broad range of projects in cultural heritage management, preservation, and interpretation in several regions of the United States and overseas. At NPS, John has led important initiatives in public interpretation, education, and outreach. Beginning in the 1990s, he managed the Center's Public Interpretation Initiative, a long-term outreach program, international in scope, that involved numerous government-sponsored symposia, training workshops, seminars, exhibits planning and development, website development, and publications on the topic of public education and interpretation of cultural heritage. A recognized national leader in public archaeology programs, he has been a key player in the organization and development of training courses for park rangers and cultural heritage specialists in the effective interpretation of archaeological and cultural heritage resources. As NPS curriculum coordinator and Interpretive Development Program (IDP) certifier, he evaluated professional interpretation and education programs in the National Park Service. In the

late 1990s, he organized and coordinated an interdisciplinary task group in developing the Archeology Interpretation Training Module (NPS IDP Module 440). He has extensive international experience, including invited critiques of heritage interpretation programs in the United Kingdom, Ireland, Australia, Canada, China, Poland, and Ukraine. In November 2005, he received the coveted Sequoia Award for significant, long-term contributions to interpretation, education, and partnerships in the US National Park Service. He has served as member and chair of numerous professional society committees and is frequently a keynote and plenary speaker at international conferences. From 2006 to 2015, he served as founding member and vice president of methodology and policy, International Committee on Interpretation and Presentation of Cultural Heritage Sites (ICIP), and ICOMOS.

Internationally, John has served (2006–2015) as vice president of the International Committee on Interpretation and Presentation (ICIP), promoting international dialogue and civic engagement. These efforts include the organization of symposia, seminars, and workshops on internationally relevant interpretation principles in Peru, Ireland, the United Kingdom, the United States, Ukraine, Jordan, Spain, Portugal, and Turkey. He continues to work with cultural heritage specialists and community members in recognizing the essential role of community involvement in explaining the relevancy and value of cultural heritage in everyday lives of people.

From 2008 to 2013, John served as advisor to the director of the Ancient City of Tauric Chersonese and its Chora World Heritage Site (aka National Preserve of Tauric Chersonesos) (https://whc.unesco.org/en/list/1411/) in Crimea, Ukraine, including coordinating a seminar at the site on archaeology and cultural heritage interpretation principles and tourism challenges.

Since January 2014, he has functioned as Staff Secretary and Heritage Consultant for the 12,000 Year History Park Working Group. During January to June 2014, as a consultant with River Alliance, he helped to establish the 12,000 Year History Park Working Group. During this time, he played a major role in the drafting of a Long-Range Interpretive Plan, the signing of an MOU among Core Partners (City of Cayce, the River Alliance, and the US National Park Service), and the adoption of a city archaeological ordinance. In 2015, John led efforts to develop a program of volunteer-led tours in conjunction with "Burning of Columbia" Civil War 150th Sesquicentennial Commemorations. Additional programs since 2015 have involved the development of interpretive theme modules on topics such as Civil War Human Interest Stories, Fort Congaree and the 18th Century Deerskin Trade, Native American Lifeways, and Nature in the Park. His latest projects include project manager of a National Park Service American Battlefield Protection Program grant to create a Preservation Plan for the 12,000 Year History Park's Civil War earthworks and as chief organizer of a city-sponsored seminar on the nature and historical significance of the "The Congarees" as an economic and military center of activity in eighteenth-century South Carolina.

John has edited and contributed to several seminal works on cultural heritage management and interpretation. He currently serves on the Editorial Board of the European Journal of Archaeology and as Assistant Editor of the Journal for Community Archaeology and Heritage. His publications include *Presenting Archaeology to the Public: Digging for Truths* (AltaMira,1997); *Ancient Muses: Archaeology and the Arts* (University of Alabama Press, 2003); *The Reconstructed Past: Reconstructions in the Public Interpretation of Archaeology and History* (AltaMira, 2004); *Unlocking the Past: Celebrating Historical Archaeology in North America* (UPF, 2005); *Past Meets Present: Archaeologists Partnering with Museum Curators, Teachers and Community Groups* (Springer, 2007); *Out of the Blue: Public Interpretation of Maritime Cultural Resources* (Springer, 2007); *The Heritage Reader* (Routledge, 2008); *Training and Practice for Modern Day Archaeologists* (Springer, 2013); and *Transforming Heritage Practice in the 21st Century: Contributions from Community Archaeology* (Springer, 2019).

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Outreach
- ▶ Ethics in Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Museums and the Public
- ▶ Heritage Research and Visitor Planning
- ▶ Heritage Tourism and the Marketplace
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ Multivocality and Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ "Public" and Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Site Visitation and Interpretation: Management
- ▶ Stakeholders and Community Participation

Japan: Cultural Heritage Management

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Introduction

"Cultural heritage" (*bunka isan*) is a relatively new term and concept in Japan. It became popular only after Japan's accession to UNESCO's Convention Concerning the Protection of the World Cultural and Natural Heritage in 1992. Prior to that, the term "cultural property" (*bunkazai*) was predominantly used in both official and everyday language. Today, the two terms are used almost interchangeably, and while "cultural heritage" is increasingly in use, especially in relation to World Heritage, "cultural property" is still prevalent and more familiar to most Japanese people.

It is important to note that cultural property in Japan is legally and officially defined. On the national level, the Law for the Protection of Cultural Properties (*Bunkazai Hogohô*) generally defines eight categories of cultural properties (see below). The designation of cultural properties of national importance is made with reference to this law. In addition, all prefectures and most municipalities have laws that build on the Law for the Protection of Cultural Properties, and according to them cultural properties of prefectural and municipal importance are defined and officially designated. Cultural properties are thus made *from above* by the government, be it national or local. This can be contrasted with cultural heritage, which, as many critics have convincingly argued (Lowenthal 1998; Howard 2003: Chap. 6; Graham and Howard 2008), is essentially made through people's identification with it and as such does not necessarily require legal and official designation.

That cultural property precedes cultural heritage both as a term and a concept can explain why "Cultural Heritage Management" in Japan is often understood as the management of legally defined cultural properties. In this sense, Cultural Heritage Management in Japan is strongly characterized by its legal and official nature.

Definition

Legal and Official Definition of Cultural Properties in Japan

Although in English-speaking countries "Cultural Heritage Management" – or CHM – is sometimes equated with the management of archaeological resources, the extent of cultural heritage is clearly far greater than that of archaeology. This is particularly the case in Japan, where intangible aspects of culture have long been considered and officially recognized as cultural properties. Considering this, it is useful to briefly summarize what is defined as cultural properties in Japan, before focusing on the management of archaeological resources.

The Law for the Protection of Cultural Properties regulates all aspects of the nation-level

management of cultural properties in Japan (Agency for Cultural Agency 2007, 2010). It generally defines eight categories of cultural properties: (1) tangible cultural properties, (2) intangible cultural properties, (3) folk cultural properties, (4) monuments, (5) cultural landscapes, (6) groups of traditional buildings, (7) buried cultural properties, and (8) conservation techniques for cultural properties (Clauses 2, 92, and 147). Archaeological resources are mostly concerned with "buried cultural properties (*maizô bunkazai*)", which in practice apply to archaeological materials buried in the ground. In addition, excavated archaeological objects that have significant value may be designated as "important cultural properties" or "national treasures" under the category of "tangible cultural properties", and excavated archaeological sites that have significant value may be designated as "historic sites" or "special historic sites" under the category of "monuments."

Key Issues

The Management of Buried Cultural Properties

There are approximately 460,000 registered archaeological sites (legally called as "areas containing buried cultural properties") in Japan. The Law for the Protection of Cultural Properties requires that those who propose an investigative excavation or development work on a known archaeological site notify the commissioner of the Agency for Cultural Affairs in advance. After receiving the notification, the commissioner can instruct the excavator/developer on necessary measures to take for the protection of the site. If the proposed development work is considered to inevitably destroy the site, "rescue excavation" is implemented to archaeologically record finds from it before destruction – this practice is called "preservation by record" (*kiroku hozon*). Objects retrieved from rescue excavation must be given to police unless their owner is identified. Judgment is then made as to whether they are officially recognized as cultural properties. If the objects are indeed recognized as cultural properties and if they still remain ownerless, they then become property of the prefecture in which they were discovered.

It is conventionally accepted that the costs of rescue excavation before construction of a private home for non-profit purposes are to be borne by the local and/or national government. When rescue excavation takes place prior to development work for any other purposes, its costs are to be paid by the "polluter," namely, the developer, be it a public or private body. These costs include the expenses for excavating the site, processing the finds, and publishing the excavation report. The Law for the Protection of Cultural Properties does not clearly stipulate the principle of "the polluter pays" (Tanaka 1984: 84); its clause 93–2 only states that when there is a "particular need" to protect the buried cultural properties that are going to be affected by development works, the commissioner of the Agency for Cultural Affairs can specify "necessary measures to be taken." It is generally accepted that these "measures" include asking the developer to pay the expenses of rescue excavations. However, there is no specific obligation for the developer to pay those expenses, as the "measures" constitute merely administrative direction. This issue, recurrently raised by developers, is one of the major problems in the Law for Protection of Cultural Properties.

In the fiscal year 2010, 35,467 proposals were made for construction works to be implemented in areas containing registered archaeological sites. These proposals resulted in 7,951 rescue excavations (Hayashi 2011: 50). Meanwhile, 428 research excavations were undertaken in the fiscal year 2009 (Hayashi 2011, Fig. 2). From these figures one can infer that approximately 95% of all archaeological excavations in Japan are carried out in the sector of rescue archaeology, where 5,963 archaeologists – officially referred to as "specialists in charge of buried cultural properties" (*maizo bunkazai tantou senmon shokuin*) – work today (Hayashi 2011: 47).

The nationwide management system for buried cultural properties developed rapidly from the mid-1960s onward (Agency for Cultural Affairs 2001: 263), reflecting the fast growth of the nation's economy and the concomitant increase of development work across the country. From the

1960s, archaeologists working at the boards of educations (*kyôiku înkai*) of local governments became in charge of rescue excavations. In 1965, there were only eight experienced field archaeologists employed in boards of education, but this number rose to 35 by 1968 (Tsuboi 1992: 3). As archaeologists were increasingly employed and positioned at local governments all over the country, a nationwide administrative system for managing buried cultural properties was gradually established, first at prefectural and then municipal levels, under the national government's supervision. Some local governments set up "semipublic" self-governing foundations specializing in archaeological investigation. This was driven by economic considerations – the foundations could ask the developers to pay for the costs of rescue excavations including the salaries of archaeologists, and thus the local governments could avoid the financial burden of hiring archaeologists as direct employees (Tanaka 1984: 83).

As Japan's economy continued to expand rapidly, the number of rescue excavations increased exponentially from the 1970s to the mid-1990s. The great majority of these excavations were funded by the developers, and the employment of archaeologists at local governments and semipublic archaeological foundations increased accordingly. Some prefectures, municipalities, and foundations established within themselves "centers for buried cultural properties", which took charge of excavation, analysis and storage of archaeological finds, and dissemination of archaeological knowledge and information in a systematic manner (Tsuboi 1992: 10; Agency for Cultural Affairs 2001: 272–273).

Thanks to the stable operation of the nationwide management system for buried cultural properties, the number of archaeological sites destroyed without being investigated and recorded before development work has decreased considerably. It is worth remembering, however, that the recorded sites have rarely been preserved after the termination of rescue excavation (Tsuboi 1992: 5). Archaeologists working in the sector of rescue archaeology hardly broach the subject of site preservation in situ, because of their entire, or at best partial, dependence on the developer to fund rescue excavations. Only archaeological sites of significant historical or scientific importance are physically preserved through the amendment of development plans or their designation as "historic sites" – the latter often requires purchase of the land by the national or local government (Tanaka 1984: 83; Tsuboi 1992: 5–8). Except for these rare cases, the majority of sites are preserved only "by record" and thus transformed into over 2,000 excavation reports annually (Agency for Cultural Affairs 2001: 284).

Archaeologists working at the boards of education and semipublic archaeological foundations are not only in charge of the implementation of rescue excavations but also the protection and restoration of archaeological sites in each prefecture or municipality, as well as the dissemination and publication of information gained from archaeological investigations for educational purposes. One of the popular educational activities that they organize is *gensetsu*, an abbreviation of *genchi setsumekai*, which literally means "explanation meeting on the site." *Gensetsu* aims to present the results of the excavation to the public at the site. *Gensetsu* was first held in 1956 at the excavation of Asuka Temple in Nara, and has been widespread throughout the country since the mid-1970s (Agency for Cultural Affairs 2001: 290). Today, *gensetsu*, usually held on weekends, are announced in newspapers and on television prior to the selected date and sometimes draw thousands of visitors (Okamura 2000: 62).

Current Debates

Current Challenges to the Management System for Buried Cultural Properties

The current management system for buried cultural properties is faced with two major challenges: the effect of the nation's long-term economic crisis and the pressure for the privatization of rescue archaeology (Okamura and Matsuda 2010: 104–106). In the second half of the 1990s, Japan began suffering from a long economic downturn, which led to the considerable reduction of development work all over the country. The decrease of development work itself

should probably be welcomed, as it implies fewer rescue excavations and, hence, less destruction of archaeological sites. However, the situation is far more complex in reality because the current system for buried cultural properties functions on the basis of certain supposed amounts of development work.

The amount of money spent for rescue excavations was 132 billion yen at its peak in 1997, and it diminished to 69 billion yen by 2010 (Hayashi 2011, Fig. 3). Effects of this can already be seen in the number of archaeologists employed at local governments and semipublic archaeological foundations: it hit its peak at 7,111 in the fiscal year 2000 and dropped to 5,963 in the fiscal year 2010 (Hayashi 2011, Fig. 1). The decrease of archaeologists working in the sector of rescue archaeology suggests that the management system for buried cultural properties in Japan has heavily relied on the nation's healthy economy. Hit strongly by the Great East Japan earthquake and tsunami in 2011, Japan's economy is likely to remain stagnant for another several years, if not longer. While it is still unclear how exactly this will affect the management system of buried cultural properties in the long term, it is likely that the emphasis that the system has placed on the protection and preservation of buried cultural properties will gradually move to their utilization, in particular so they can generate some income for local communities.

The pressure for the privatization of rescue archaeology poses another big challenge to the current management system for buried cultural properties. Private archaeological units have already been in operation for a few decades, particularly in the Kanto region, but most of them were small in size and led by professional archaeologists. In contrast, newly emergent private units are established at the initiative of, and within, construction companies, and today they are growing fast and increasingly demanding for the privatization of rescue archaeology. For these construction companies – private developers – rescue archaeology offers a new attractive business market, especially because they need to counteract the effect of the recent recession in the construction industry. Some fear that the marriage between private developers and private archaeological units might lead to the poorer quality of rescue excavations, while others are more optimistic. Currently, debates are going on as to how to ensure the quality of rescue excavations.

Cross-References

▶ Heritage: History and Context
▶ Japan: Cultural Heritage Management Education

References

Agency for Cultural Affairs. 2001. *Bunkazai hogohô gojyûnenshi [Fifty years of history of the law for the protection of cultural properties]*. Tokyo: Gyousei.

Agency for Cultural Affairs. 2007. *Cultural properties for future generations*. Tokyo: Agency for Cultural Affairs.

Agency for Cultural Affairs. 2010. Preservation and utilization of cultural properties, in Agency for Cultural Affairs (ed.) Administrations of cultural affairs in Japan: Fiscal 2010: 30-44. Tokyo: Agency for Cultural Affairs.

Graham, B., and P. Howard. 2008. Introduction: Heritage and identity. In *The Ashgate research companion to heritage and identity*, ed. B. Graham and P. Howard, 1–15. Aldershot: Ashgate.

Hayashi, M. 2011. Maizô Bunkazai Kankei Tôkei Shiryô no Kaisetsu to Bunseki: Heisei 22 Nendo Ban [Statistical data on buried cultural properties in 2010: Commentary and analysis]. *Gekkan Bunkazai* 573: 47–53.

Howard, P. 2003. *Heritage: Management, interpretation, identity*. London: Continuum.

Lowenthal, D. 1998. *The heritage crusade and the spoils of history*. Cambridge: Cambridge University Press.

Okamura, K. 2000. Conflict between preservation and development in Japan: The challenges for rescue archaeologists. In *Cultural resources management in contemporary society: Perspectives on managing and presenting the past*, ed. F.P. McManamon and A. Hatton, 55–65. London: Routledge.

Okamura, K., and A. Matsuda. 2010. Archaeological heritage management in Japan. In *Cultural heritage management: A global perspective*, ed. P.M. Messenger and G.S. Smith, 99–110. Gainesville: University of Florida.

Tanaka, M. 1984. Japan. In *Approaches to the archaeological heritage: A comparative study of world cultural resource management systems*, ed. H. Cleere, 82–88. Cambridge: Cambridge University Press.

Tsuboi, K. 1992. Issues in Japanese archaeology. *Acta Asiatica* 63: 1–19.

Japan: Cultural Heritage Management Education

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Introduction and Definition

In Japan, the term "cultural heritage" is becoming better known due, in part, to a rise in interest in World Heritage Sites among travel enthusiasts initiated by a popular TV program just after the Japanese government signed the Convention Concerning the Protection of the World Cultural and Natural Heritage in 1992. However, the term is not used to refer to domestic "heritage" sites, and has not yet taken the place of the traditional term, "cultural properties."

Cultural properties or heritage in Japan is managed by various organizations. Though museums have played a central role in its promotion, a number of educational activities are also conducted by archaeological units.

At present, Japan, a country inhabited by 128 million people, has over 440,000 registered archaeological sites. The number of rescue excavations in Japan increased exponentially from the 1970s to the mid-1990s, reflecting the rapid growth of the nation's economy over that period. Today, despite a recession, approximately 7,000 rescue excavations are carried out yearly across the country, and account for approximately 95% of all archaeological excavations in Japan. As of 2008, the total number of field archaeologists was 6,255 and all 47 of Japan's prefectural governments and over 65% of municipal governments (1,192 out of 1,834) have cultural properties sections. This high ratio of active units of field specialists clearly indicates the importance of maintaining CHM across Japan.

Key Issues

Preservation and Use of Cultural Properties

As the current CHM system in Japan was established at and developed by regional boards of education under the national government's supervision, archaeologists working at these public sectors are generally involved in a variety of educational activities; not solely archaeological, but sometimes architectural and other tasks related to heritage. All these activities are carried out under the title of bunka-zai no hozon to katsuyo (Preservation and use of cultural properties). This is an official policy and is also used as an administrative maxim for CHM in Japan. A good example of such activities in archaeology are the open days (genchisetsumeikai, or simply gensetsu: public site explanation), during which the results of the excavation are presented to the public at the site. Gensetsu, usually held on weekends, are announced in newspapers and on television prior to the selected date. Sometimes gensetsu draw thousands of visitors, not only archaeological enthusiasts but also local lay people. In addition to gensetsu, public lectures and symposia on archaeological subjects are frequently held, and interested people can read reports on recent archaeological discoveries or listen to professional archaeologists.

Some prefectures, municipalities, and foundations have even established "centers for buried cultural properties," which are in charge of the excavation, analysis, and storage of archaeological finds, and the dissemination of archaeological knowledge and information in a systematic manner.

Heritage Studies in School and Higher Education

As a part of elementary school curricula, students at the age of 12 are expected to go to museum to study local history and archaeological sites in order to appreciate cultural heritage. Local cultural heritage is sometimes used for off-school activities or as an integrated learning program for years 10–12. For instance, every year the Osaka Museum of History conducts an outreach program with elementary schools in Osaka City to excavate the Naniwa Palace site. This kind of hands-on activity is becoming popular in heritage education across the country. In junior and senior high school curricula, the subject most usually linked with cultural heritage is history.

In higher education, Nara University first set up its Department of Cultural Properties in 1979, which integrated studies on cultural heritage to train heritage managers and conservators, and to meet the then urgent demand of researchers for rescue excavation. Kyoto Tachibana University also set up a Department of Cultural Properties in 1997 which will be converted into the Department of Historical Heritage in 2012. The number of universities with departments or courses entitled "cultural properties" or "cultural heritage," including "World Heritage," has been increasing recently and now totals over 20.

A recent interest in archaeological qualification has remodeled educational programs at some universities. Issues surrounding qualifications had been discussed in the past, but development did not take place until late 2000 after the "Japan Association for Preservation of Cultural Properties," consisting of 76 private companies for excavation, air survey, analysis, conservation and others, initiated its own qualification examination in 2007. The National Agency for Cultural Affairs (Bunkacho) started investigating the need for excavation qualifications in 2008 and the Japanese Accreditation Board for Archaeological Researchers was founded in 2009. Presently, Waseda University and other eight universities are offering educational programs to enable students to become qualified as an "archaeological researcher" by the Board. More universities may join this movement in the future, as "qualification" generally attracts students.

Museum curatorial qualification can be gained at 344 universities (April, 2009) and this system will be intensified from 2012 to help further develop curatorial skills and knowledge. However museum positions are quite limited and, for example, in 2007 only 61 out of 10,427 qualification holders could were able to find a job in a museum.

As for professional training for heritage managers at local governments, every year the Nara National Research Institute for Cultural Properties offers a variety of courses to develop knowledge and skills for cultural heritage. For instance, in 2011, there are 14 courses covering a wide range of topics including research method for architectural features, stone artifacts handling, building conservation and restoration, scientific chronology, conservation science (metal and wooden objects), environmental research, survey mapping, recording and GIS, photography, site report, and site management.

Future Directions

Firstly, there are a small number of experts who specialize in heritage studies, management, and education in comparison to the demand for their teaching. Secondly, there is poor exchange of information between teachers, and heritage managers and archaeologists. Finally, since information on educational activities and curriculum for CHM is divided between a number of organizations such as local authorities, museums, and archaeological units among others, and has not been organized in a systematic manner, it is difficult to grasp the overall outline and to access the right information.

A national storehouse is need for the exchange of information about programs and curriculum development, and for education in archaeology.

Cross-References

► Japan: Cultural Heritage Management
► UNESCO (1972) and Malta (1992) Conventions

Further Reading

Okamura, K. 2011. From object-centered to people-focused: Exploring a gap between archaeologists and the public in contemporary Japan. In *New perspectives in global public archaeology*, ed. K. Okamura and A. Matsuda, 77–86. New York: Springer.

Okamura, K., and A. Matsuda. 2010. *Archaeological heritage management in Japan, cultural resource management: A global perspective*, 99–110. Gainesville: University Press of Florida.

Japan: Field Archaeology

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Brief Definition of the Topic

Principles

The basis for archaeological intervention in Japan is the *Law for the Protection of Cultural Properties* inaugurated in 1950 and updated regularly since. Archaeological resources underground are registered as "buried cultural properties (*Maizou Bunkazai*)." Since then every excavation has to be notified to the responsible government department, traditionally the Board of Education. Most archaeological fieldwork takes the form of *rescue excavation* (CRM) in advance of development rather than research projects. Universities do undertake excavations for academic purposes, but these are overwhelmingly exceeded by rescue work, both in number and budget. Academics are required to obtain permission to excavate from the local authority (who may not give it).

On the principle that it is better for buried cultural properties to be preserved underground than to be destroyed, the initiator of the development is required to pay for excavation of archaeological deposits in advance of their destruction. This principle was challenged in the courts in the late 1970s and the early 1980s, when private development companies sued for the losses caused by covering these costs. But the High Court of Tokyo found in favor of government and ruled that developers should cover the cost of excavation but with the condition that there should be the limit defined by an "appropriate level of investigation." Not all remains of the past are eligible for record: according to government advice dated 1998, only remains dating back to the Middle Ages and earlier are mandatorily subject to investigation, but those particularly significant to the local history are exceptionally treated.

Methods

Nondestructive field methods may be used at the evaluation stage, although rescue archaeology mostly uses *test pits* to determine and estimate the depth of cultural layers, as well as the anticipated structures and their likely date. This information also allows an estimation of the cost and duration of the intervention, which is then fed into the *project design*. The project design forms the basis for negotiation with the developers. Once fixed, archaeological contractors tender for the work, comprising the necessary equipment and the required labor force. Payment is usually calculated according to the volume of soil to be removed or the numbers of workdays required.

A mechanical excavator ("jumbo") is used to remove top layers and then digging switches to human labor using hoes and the other tools. Narrow trenches are first dug at the edges of

Japan: Field Archaeology, Fig. 1 Excavations in progress in Nara, 2012. Tools in use. (By courtesy of Nara National Research Institute for Cultural Properties)

the area to be excavated to reveal sections through the deposit. These trenches provide drainage, and their sections are used as a guide to the excavators, who peel back from them, layer by layer. Excavators use a versatile trowel hoe on a long handle, which can pick, cut, slice, and create a smooth surface (Fig. 1). The spoil is removed using electrically driven belt conveyors. When the surface of the layer is clean, those features showing in it are recorded by photography and drawing. Features and collected artifacts are located in three dimensions using a grid system connected to the national and world geodesic systems. A new departure is the recording of excavations using overhead photography from a helicopter or a crane supporting a cage. The photographs are used to generate measured drawings, which are then checked on site.

Once excavations are complete, all artifacts will be washed and marked with a serial number to identify date and location of discovery. Broken pieces are refitted, drawn, and photographed. This is often done by part-time workers. Comprehensive excavation reports are prepared containing all the information collected during the excavation. The public are invited to view the excavations' open days. This usually includes a safe route overlooking the excavated and a

Japan: Field Archaeology, Fig. 2 Excavations in progress: use of conveyor. (By courtesy of Nara National Research Institute for Cultural Properties)

few tents, one for reception and others for exhibiting artifacts (Fig. 2).

Archaeological work in advance of development is big business. A recent example of a large-scale urban project is the Second Keihan Highway project, which involved a national expressway and a bypass about 27 km in length. The section crossing Osaka was about 16.1 km and had 18 potential sites ("areas known to contain cultural properties"). Agreement for trial excavations was negotiated between the different agencies and authorization given to the contractor, in this case the Osaka Center for Cultural Heritage (OCCH), a nonprofit foundation partly invested by Osaka Prefectural Government. After completing trial excavations in 1996, the area in need of excavation was estimated as about 450,000 m^2. In 2000, the full-scale excavations started at Tsudajo site in Hirakata City, and all excavations were completed in January 2010.

Reflections

Privatized contract work needs appropriate surveillance, or it can simply become "the cheapest option." This must be avoided: to record sites properly requires the application of a certain standard, for example, by the issue of licenses, which has been under discussion for the past few years. A second concern is the usage of the new knowledge that is being generated. Many reports are not well researched nor accessible to the public. Some have been kept long in the archive without ever being consulted. We also need to rethink the role of archaeologists in the public sector. It is probably a good moment to discuss opening up field archaeology in Japan to wider involvement.

Cross-References

► Field Method in Archaeology: Overview
► Japan: Cultural Heritage Management

References

Naniwa. n.d. Available at: http://www.kkr.mlit.go.jp/naniwa/03/04.html

Japan: Indigenous Occupation

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Introduction

Ainu people and culture have been marginalized in the colonial politics of Japan. Their existence as an Indigenous people was denied over a long period, and many Japanese remain ignorant about this ethnic group (Weiner 1997). On the other hand, the Ainu people gathered much attention as direct descendants of the Indigenous inhabitants of the Japanese Archipelago, who were pushed off to the north by the agricultural ancestors of current Japanese since the Yayoi period. Early investigators proposed a Caucasian ancestry as the origin of Ainu, but this theory was rejected by later anthropological studies.

It has often been assumed that the Ainu people are direct descendants of the Jomon people, but the relationship between the Ainu and the Indigenous population of Japan is not so simple. Recent genetic analysis has confirmed that the Ainu people in Hokkaido and the native Okinawan people share similar characteristics in spite of their geographic distance (Japanese Archipelago Human Population Genetics Consortium 2012). This supports the hypothesis that the Ainu and Okinawan people descended from the Indigenous population of Jomon period, Japan, with little genetic influence from the immigrants who came to Japan from the continent in and after the Yayoi period.

Ainu place names remain in the northern part of Honshu, the main island of Japan, indicating that the Ainu-speaking people once lived there before retreating to Hokkaido. Archaeological evidence and historic documents of the Ainu are scarce before documents in the fifteenth century. However, the Ainu culture seems to have developed from the Satsumon Culture (seventh to thirteenth century CE) with an influence from the Okhotsk Culture (Sato et al. 2007).

Definition

The Ainu are an Indigenous people who inhabit the northern part of the Japanese Archipelago. Official estimates of the population are around 25,000 based on the 2006 census in Hokkaido, while the unofficial number is estimated at up to 200,000 (Poisson 2002). Ainu languages were spoken by Ainu people in Hokkaido as well as in the southern half of the island of Sakhalin and the Kuril (Chishima) Islands, but only the Hokkaido variant survives today.

Key Issues

The subsistence diet of the Ainu people was based on fishing, hunting, and gathering, as well as the cultivation of wheat, millet, buckwheat, and beans. They obtained rice and metal through trading with Japanese in the south. However, their relationships with the Japanese became increasingly fraught and resulted in a series of battles between the Ainu and the Japanese: the Battle of Kosyamain in 1457, the Battle of Syaksyain in 1669, and the Battle of Kunashiri-Menashi in 1789. The Ainu was defeated in each of these battles, and fell completely under the control of the Japanese after the Battle of Kunashiri-Menashi.

The traditional religion of the Ainu is animism, in which everything in nature is believed to have a *kamuy* (spirit or god) on the inside (Honda 1993). The bear is considered to be very special in the Ainu worldview. Ceremonies for sending back the spirits of bears is a well-known Ainu tradition called *Iomante*.

There is no particular reservation for the Ainu. Many Ainu people live in Nibutani, Biratori Town, Hokkado. The place name "Nibutani" is derived from the Ainu word "Niputai," meaning the wooded place. Dr. Neil Gordon Munro, a prominent researcher of the Ainu, opened a doctor's office in Nibutani in 1930 and had taken care of many patients for free until his death in 1942. Shigeru Kayano, who became the first Ainu member of the Diet in 1994, was from Nibutani.

Current Debates

The Ainu people have suffered under discriminatory policies and forced assimilation for more than a century since the Meiji restoration (1868) when the Japanese government included Ezo as part of Japan and changed the name to Hokkaido. At this time, the Ainu people were registered in the Japanese census and were compelled to use Japanese last names. Their language and cultural practices were prohibited. In 1875, Japan and Russia signed the Treaty of St. Petersburg based on the proposal that Russia should control Sakhalin and Japan would claim the Kuril Islands (Okada 2012). The Ainu people had to choose their citizenship, and some of them were forced to leave the homeland.

The Law for the promotion of Ainu Culture and the Dissemination and Advocacy of Knowledge in Respect to Ainu Traditions (Ainu bunka shinko-ho) was passed in 1997. Until this time, the government stated there were no ethnic minority groups in Japan. In 2008, the Japanese government finally recognized the Ainu as Indigenous people of Japan.

Because of such long-term political oppression, many Ainu people have tried to hide their ethnic backgrounds and/or to marry Japanese to lessen the chances of discrimination against their offspring. As a result, many Ainu are indistinguishable from their Japanese neighbors today and the Ainu language is moribund. The number of "pure" Ainu was recorded as 300 in 1966.

Today, however, there are a number of people who are interested in traditional Ainu culture and trying to revive Ainu culture and language. Oki Kanō is an Ainu Japanese musician who plays *tonkori*, an Ainu stringed instrument and performs traditional Ainu music and other styles of world music. There are some Ainu *kotan*, meaning Ainu village, in Hokkaido as tourist sites. The largest of such *kotan* is near the hot springs resort area at Akanko. Interactions between the Ainu and other Indigenous peoples in the world have also become much more frequent.

Cross-References

- ▶ Holographic Epistemology: Native Common Sense
- ▶ Periodization in Japanese Prehistoric Archaeology
- ▶ Torii, Ryūzō
- ▶ Tsuboi, Shogoro

References

Honda, K. 1993. *Ainu minzoku* [*Ainu people*]. Tokyo: Asahi Shimbun Publishing (in Japanese).

Japanese Arichipelago Human Population Genetics Consortium. 2012. The history of human populations in the Japanese archipelago inferred from genome-wide SNP data with a special reference to the Ainu and the Ryukyuan populations. *Journal of Human Genetics* 57: 787–795.

Okada, M.V. 2012. The plight of Ainu, indigenous people of Japan. *Journal of Indigenous Social Development* 1: 1–14.

Poisson, B. 2002. *The Ainu of Japan*. Minneapolis: Lerner Publications.

Sato, T., et al. 2007. Origins and genetic features of the Okhotsk people, revealed by ancient mitochondrial DNA analysis. *Journal of Human Genetics* 52: 618–627.

Weiner, M., ed. 1997. *Japan's minorities: The illusion of homogeneity*. London: Routledge.

Further Reading

Brett, L.W. 2001. *The conquest of Ainu lands: Ecology and culture in Japanese expansion 1590–1800*. Berkeley: University of California Press.

Honda, K. 2000. *Harukor: An Ainu woman's tale*. Berkeley: University of California Press.

Hudson, M.J. 1999. *Ruins of identity: Ethnogenesis in the Japanese Islands*. Honolulu: University of Hawaii Press.

Japan: World Heritage

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Introduction

Until 2010, Japan has 11 cultural heritage site inscribed on the World Heritage List. Considering that Japan accepted the World Heritage Convention since 1992, the process of identification, nomination, and inscription of World Heritage Site is quite speedy. A close examination of those sites allows the observation that each site can be seen as a case study presenting one or several issues that deserve an in-depth analysis. In the following discussions, I will elaborate these cases on the issues of cultural and spiritual values, tourism and impact of tourism, interpretation and political contestation, modernization, commercialization and authenticity, indigenous community, etc. A brief examination of the heritage laws and regulations of Japan follows, and finally a general discussion sums up this entry.

Examples

Buddhist Monuments in the Horyu-ji Area

Horyu-ji Area is located at Nara, the place where Japan claimed as the terminus of Silk Road. Since 206 BCE, Silk Road became an important trade route for traders, merchants, pilgrims, missionaries, nomads, and soldiers from Ancient China, crossing the Ancient India, Ancient Tibet, and Persia to Mediterranean countries for about 3,000 years. The extensive interconnected network gradually evolves to be a cultural communication channel that greatly accelerated transmission and convergence of different cultures. The World Heritage Site Buddhist Monuments in the Horyu-ji Area well manifested the application of new religion Buddhism and advanced wooden architecture construction technologies imported from China. However, with the purpose of de-emphasizing Japan culture as an affiliate of Chinese culture, the official website of Osaka and Nara stresses the cultural influence of Europe and North Africa and accentuate the distinctive style of Japanese architecture (Osaka and Nara 2010).

With the arrival of Buddhism, Nara flourished. Between 710 and 784, capital city of Japan – Heijokyo – became the center of Japanese cultural with numerous number of buildings, books, and assets settled in Nara and passed down to today. Nara has the largest number of buildings designated as National Treasures in Japan. Although

with abundance of cultural tourism resource, Nara is overshadowed by its more famous neighbor Kyoto. For time-pressed group travelers, Nara is often omitted on the itinerary.

Buddhist Monuments in the Horyu-ji Area are known as the world's oldest wooden building structures in the world; however, few tourists know that all the buildings have been rebuilt, reconstructed, or remodeled in historical times except the Hoki-ji temple. This issue raised the question of how to determine an authentic wooden building structure in terms of preserving the values authentic to its history.

Gusuku Sites and Related Properties of the Kingdom of Ryukyu

The site is located in Ryukyuan Okinawa, a chain of islands that are detached from the mainland Japan and present a considerably different culture formulated during Ryukyuan Dynasty (the twelfth to seventeenth century). Before being invaded in 1609, Ryukyu Kingdom was a tributary state of imperial China. In Ming and Qing Dynasties (the seventeenth to nineteenth century), the political power in Okinawa still paid tribute to the Chinese emperor (Baidu 2010). From the late nineteenth century, Ryukyu Okinawa became a target of territory dispute between China and Japan. During this historical period, China suffered from internal corruption and colonial occupation and was too weak to send soldiers to a remote island; instead it made diplomatic objections and asked former United States President Ulysses S. Grant to arbitrate. Grant stood behind Japan and allowed Japan to rule the islands in their favor. The superpowers paid no attention to indigenous islanders. From the beginning of the twentieth century, compulsory Japanese education was enforced on the Ryukyu children, whereby they were taught Japanese language, culture, and identity. The use of their native language was strictly forbidden. Military activity on the island, before and during World War II, had a devastating effect on Okinawan people and their cultural heritage. After World War II, under the San Francisco Peace Treaty, US military controlled over Okinawa from 1945 to the year 1973, when sovereignty was given back to Japan. China signed the Potsdam Declaration in 1945, which claims that Ryukyuan Okinawa should be given back to China, but with the eruption of inner war during 1945–1949, China never really puts it power on Ryukyuan Okinawa.

The territory dispute never ended. In 2010, Japan seized a Chinese fishing boat and once again intensified dispute that has lasted for several centuries (TVNZ 2010). There are also reports about the protesting activity of indigenous, showing their anger towards Japanese political sovereignty especially on the issue of allowing so many American soldiers to be stationed on the islands instead of the mainland, and call for the independence of their land (Baidu).

With all of the above observations of the historical problems associated with Ryukyuan Okinawa, it is interesting to look into Gusuku sites and related properties as embodied manifestation of Kingdom of Ryukyu (the twelfth to seventeenth century), which exists in a time period that is relatively independent of other political powers. The site presents a complex social structure of disappeared Ryukyu Kingdom in the form of ruins of castles, fortresses around the settlement, and the sacred tombs. Although these building structures present a mixture of many influential cultures, they still reserved their cultural uniqueness that can only be found in Ryukyuan Okinawa. None of the Japanese travel website, both official and nonofficial, mentions a word about the turbulent history of this particular site and erased the information about the damage of site caused by World War II and restoration in recent decades.

Another fascinating observation is that the most important castles in the site – Shuri Castle – was reconstructed in 1992. The reconstructed gigantic mansion is featured by colorful ceilings and pillars, while the other four castles inscribed are ruins with only brick walls and groundwork left by wars. The Shuri Castle looks quite isolated and awkward in a complex of ruined monuments and sites. It is apparent that Japanese government wanted to de-emphasize the history of Ryukyuan Okinawa, especially the memories associated with the World War II.

Himeji-jo

Himeji-jo is the early seventeenth-century Japanese castle comprising of 84 buildings with highly

developed defense system and protection device. Dating back to 1500s, the Himeji-jo is the biggest castle in all of Asia. With the wooden walls stocked with fireproof white plaster, unwelcomed visitors will be attached by firing guns and shooting arrows and also for pouring boiling water or oil (World Heritage Site Organization 2010).

Himeji-jo is an exemplar of an age of militarism, an important principal of expansionism. I consider that the expansionism – the desire to maintain a strong military capability – and aggressively invading other countries for the country's own national interest are the main reason for the eruption of WWII and should be mentioned and warned to the domestic and international visitors. From the online resources, there is no evidence of the availability of such information.

The site can be easily accessed by train or bus. From Tokyo, one Nozomi train per hour runs through to Himeji, and it takes about 3 h to get visitors to the site. For this reason, the site is extremely crowded in cherry blossom season when the grounds are full of blooms. Some popular travel-guiding websites suggest the international visitors to peak season to avoid the domestic visitors' flow.

Hiroshima Peace Memorial (Genbaku Dome)

The Atomic Bomb Dome is a skeletal-domed building in Hiroshima City which still stands to commemorate the dropping of the atomic bomb. The atomic bomb, dropped for the first time in history, exploded some 580 m above Hiroshima City. The only survival built structure – Genbaku Dome – was intentionally preserved immediately after bombing and eventually became famous symbol of the bombed city. ICOMOS site in danger 2006/2007 addressed the issues surrounding the proposed high-rise building near the dome, in the UNESCO world heritage buffer zone. The case triggers the thought about the integrity of heritage and the threat of modernity on the memory of ruthless war.

Take a closer look at the site, it can be easily recognized that the official guidebooks and the online site museum focus on historical fact and the suffering of Japanese people after war, with no comments about the role of Japan in World War II and any information about the miseries the countries invaded by Japan (The Outline of the Hiroshima Peace Memorial Museum 2010). By positioning Japan as a victim, both domestic and international tourists are misled by a one-sided picture of World War II and the dropping of atomic bomb in Hiroshima. This can potentially decrease the value of Hiroshima Peace Memorial as a place for people to look retrospectively at the war in the history and pray for peace in the future.

Historic Monuments of Ancient Kyoto (Kyoto, Uji, and Otsu Cities) and Historic Monuments of Ancient Nara

The two sites are both ancient capital cities in Japan and designated as the UNESCO World Heritage Site with similar reasons. However, as formerly discussed, Nara is shadowed by Kyoto and received less visitation.

Kyoto is nestled in the mountains of Western Honshu. Designed as a scaled replica of the Chinese Tang Dynasty capital Chang'an, the city became the seat of Japan's imperial court since 794 until Meiji Restoration of 1868, when the capital was moved to Tokyo (City of Kyoto and Kyoto Tourism Council 2010). With roughly 2,000 temples and shrines, including 20% of Japan's National Treasures and 14% of Important Cultural Properties, Kyoto receives over 30 million tourists annually (Kyoto City Local Government 2010). During its time at the center of Japanese power, cultural, and religion, Kyoto accumulated a large collection of palaces, temples, and shrines and was luckily escaped from the bombings of WWII. In modern times, the city is undergoing modernization with some of the older buildings replaced by modern architectures, such as the notorious Kyoto Station complex. The first time visitor to Kyoto would be surprised by the ultramodern glass and steel station and the urban environment all around. Tourism composed a large sector of Kyoto's economy, being constantly visited by school groups from across Japan and many foreign tourists around the world. In a regional brand survey, Kyoto is chosen as the second most attractive city in Japan.

Nara was the capital of Japan from 710 to 784. As formerly discussed, this period of time is

when Japanese national government first being consolidated and Buddhism reached a great prosperity. Nara is left with abundance of Buddhist temples, Shinto shrines, and the excavated remains of the great Imperial Palace, all of which serve as vivid examples of a broad picture of the profound political and social change in eighth-century Japan.

Both Kyoto and Nara are facing the problem of urbanization as a threat of preserving authentic ancient appearance of the cities. With UNESCO world heritage monuments isolated in ultra-modern urban environment, the harmony and integrity of sites of Nara are in threat.

Historic Villages of Shirakawa-go and Gokayama

The historic villages are located in a mountainous region that was cut off from the rest of the Japan mainland for a long time and developed their own housing construction technique. The architectural style unique in the villages is called gassho-zukuri, also known as prayer-hands construction. The thatched and steeply slanting roof resembling hands joined in prayer are exceptionally strong that can withstand the region's heavy snowfalls in the winter. The reason for inscription is attributed to the simple life spirit deeply embedded in the traditional village. The lose touch with nature together with traditional cultivation and silkworms rearing economic system manifests the ideal picture of arcadia.

The designated group of historic buildings is composed of 117 houses and seven other structures. In those buildings and structures, no one actually live there. However, tourists can find a family-operated inns within or nearby these villages to spend a night or two in traditional gassho frame house to experience the life of locals. It is worth to think about the meaning of emptied homes without any residents in these traditional villages. Without the ongoing repairing of homeowners, it is likely that the architecture structure will accelerate their degradation. More importantly, the memories associated with the domestic living and unique social relationships in these traditional villages will be lost.

Itsukushima Shinto Shrine

Itsukushima Shinto Shrine is located on an island in Seto Inland Sea. It has been regarded as a holy place since the sixth century. It was meant to protect people from sea disaster and wars. Painted in red, the shrine contrasts the surrounding mountains and sea environments and illustrates the Japanese concept of scenic beauty, which is a harmonious combination of the power of nature and human.

The most distinguished architecture structure of this shrine is the Torii and Shaden, the symbolizing gate to the shrine and shrine pavilion, both of which are located in the sea. When the seawater is at low tide, it is possible to walk out to the gate.

Like other most visited World Heritage Sites in Japan, the Shinto Shrine is extremely crowded in its peak season, which greatly disturbed the tranquility of its sacredness. How to keep a balance between high visitor density and the serenity of the site and its surrounding environment is a central management issue in Itsukushima Shinto Shrine.

Iwami Ginzan Silver Mine and Its Cultural Landscape

The site is a cluster of silver-bearing mine in the southwest of Honshu Island. The mine reached its peak production in the early seventeenth century of approximately 38 t of silver a year which was then a third of world production. UNESCO considers that the mine contributed to the overall economic development of Japan and Southeast Asia and prompted the mass production of silver and gold in Japan in the sixteenth to twentieth century. The mining area is now heavily wooded, because the silver production from the mine fell in the nineteenth century and eventually closed for low productivity.

The ICOMOS evaluation of the property report (2004) recorded some potential hazards that can have negative impact on the sites. For example, the rural communities are emptied due to low economic vitality. Losing population posed the issue of ongoing conservation of the towns and viability of community. The modern constructions of concrete wharfs and boat rams on the ports changed the authentic appearance of the heritage site.

Sacred Sites and Pilgrimage Routes in the Kii Mountain Range

The site is set in the dense of forests of the Kii Mountains overlooking the Pacific Ocean. The three nominated sacred temple and shrines together with the pilgrimage route linking the sites reflected the fusion of Shito, the ancient local tradition with Buddhism, and the imported religion from China and Korean peninsula. The surrounding environment has a variety of natural beauty, with abundance of streams, rivers, and waterfalls. The site is visited more by domestic tourists, especially the locals, for religious purposes and hiking. The site receives 15 million visitations annually. According to ICOMOS advisory body evaluation (2009), the development surrounding the site is sufficiently controlled by existing law. However, environmental change should be envisaged so that possible damage of typhoons, heavy rains, or landslide can be controlled.

Shrines and Temples of Nikko

Nikko is a small town located in the north of Tokyo and can be easily accessed by trains. A world heritage pass is available for a round-trip to Nikko, including both the transportation pass and the admission to shrines. Therefore, the World Heritage Site in Nikko is an attraction that received high visitation.

The temple at Nikko is famous for its architecture and decorations. Different from other temples and shrines in Japan, it is exceptionally gaudy and decorative, with a strong Chinese decorative style. In 1616, the dying Shogun Tokugawa made his final wish that he would like to be enshrined as a god in Nikko to guard the peace of the land forever.

As shrines and temples, the site received a large number of visitations for the purpose of religion. There is no information about if there is any collision between mass tourism and religious pilgrims. It could be an interesting nice site to investigate the issue.

Heritage Law and Regulations in Japan

Japan has a comprehensive network of legislation for protecting, preserving, and classifying its cultural patrimony. The Law for the Protection of Cultural Properties (1950) is the main legal framework. It protects all the building structures and the area around them. Any alteration to, or activities with adverse effects on the existing condition of, cultural properties designated under the Law for the Protection of Cultural Properties is only permitted with prior permission from the Commissioner of the Agency for Cultural Affairs. When the site is closed surrounded by natural settings, such as the case in Sacred Sites and Pilgrimage Routes in the Kii Mountain Range and Shrines and Temples of Nikko, the Law on Forests, the Law on Rivers, the Law on Sand Control, and the Law on Natural Parks apply. In addition to the national laws, each municipal has its directives in purpose of protecting the assigned areas. The law system is considered by ICOMOS as comprehensive protective measures, serving a carefully developed management plan.

The key cultural sites in Japan are designated as National Treasures or important cultural properties. The National Treasure system is designated by the Agency for Cultural Affairs (a subsidiary of the Ministry of Education, Culture, Sports, Science, and Technology). The national treasure can be buildings and structures or fine arts and crafts, showing outstanding workmanship, a high value for world cultural history, or exceptional value for scholarship. Approximately 20% of the National Treasures are structures such as castles, Buddhist temples, Shinto shrines, or residences). The Agency for Cultural Affairs provides advice on restoration, administration, and public display of the properties.

Discussion

Heritage produces national identity when it receives recognition from official practices. “The moment a place receives official recognition as a heritage site, its relationship with the landscape in which it exists and with the people who use it immediately changes – a place/object/practice ‘outside’ the everyday” (Harrison 2010: 11). When designated as a World Heritage Site, a place became an essential element of national representation, creating symbolic foundations upon which a sense of belonging is based. Therefore, visiting World Heritage Site by domestic tourists is a symbolic mechanism through which

national belonging can be constructed and communicated.

In the case of Gusuku sites and related properties of the Kingdom of Ryukyu, the inscription of this particular site located on the land that received intense territory dispute can be seen as an official declaration that Ryukyu tangible assets in the forms of ruins and monuments, together with the symbolic meanings and spiritual embodiment, are a part of Japanese history and culture. By de-emphasizing the turbulent history of Ryukyu Kingdom as an independent country, or a tributary state of imperial China or a military base for US military, Japan is declaring its control over the land in the past and in the future.

We have taken for granted that each country embodies its own distinctive culture and society so that the terms society and culture are routinely simply appended to the names of nation-states (Gupta and Ferguson 1997). However, national boundaries do not emerge by themselves, but are invented and imposed on a place. Domestic tourism visiting Gusuku sites, a World Heritage Site of Japan, would naturally get the impression that Ryukyu is always a part of Japanese and Ryukyu culture embedded in the site belongs to Japan cultural system. Cabeza (2006) pointed out that heritage is supposed to express the diversity of land and its people not just the heritage linked to the power groups. It is the responsibility of Japanese government to present a full picture of the history and cultural diversity in Gusuku.

Nuryanti (1996) stated that heritage is the carrier of historical values from the past, while tourism is a modern consciousness. The interaction between the two brought the results in a reinterpretation of heritage. In postmodern societies, tourism is conceptualized a series of production-related activities. The central challenge in linking heritage and tourism lies in reconstructing the past in the present through interpretation. Ename charter addressed the need to define the basic principles of interpretation and presentation as essential components of heritage conservation (Silberman 2009). It at the first time addressed the social, economic, and educational dimensions of heritage interpretation. It also defines the interpretation as a complex public exercise of historical reflection among many stakeholders. As such, it attempts to overt the largely one-way mode of communication from experts or professionals to the public at large, but promotes ongoing interpretive process that could and should be carried out by visitors, locals, associated community groups, as well as other stakeholders. In contested sites, as the Hiroshima Peace Memorial (Genbaku Dome), it is particularly important to integrate different interpretations and allows an ongoing discussion of history and future. Projecting Japan as a victim and avoiding the fact that it is also an invader is not only inappropriate but can create dangerous results in the future.

Cross-References

- ▶ Ethics of Commercial Archaeology: Japan
- ▶ Japan: Cultural Heritage Management Education
- ▶ Japan: Cultural Heritage Management
- ▶ Japanese Archaeological Museums

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References

Baidu. 2010. Ryukyu. Available at: http://baike.baidu.com/view/21491.htm. Accessed 3 Sept 2013.

Cabeza, A. 2006. Reflections on archeological heritage and indigenous people in Chile. In *Of the past, for the future. Integrating archaeology and conservation*, ed. N. Agnew and J. Bridgland. Los Angeles: Getty Conservation Institute.

City of Kyoto and Kyoto Tourism Council. 2010. Kyoto travel guide. Available at: http://www.kyoto.travel/. Accessed 3 Sept 2013.

Gupta, A., and J. Ferguson. 1997. Beyond "culture": Space, identity, and the politics of difference. In *Culture, power, place*, ed. A. Gupta and J. Ferguson, 33–51. Durham: Duke University Press.

Harrison, R. 2010. *Understanding the politics of heritage*. Manchester: Manchester University Press.

ICOMOS. 2004. Advisory body evaluation – sacred sites and pilgrimage routes in the Kii Mountain Range. Available at: http://whc.unesco.org/archive/advisory_body_evaluation/1142.pdf. Accessed 3 Sept 2013.

Kyoto City Local Government. 2010. Kyoto City Web. Available at: http://www.city.kyoto.jp/koho/eng/index.html. Accessed 3 Sept 2013.

Nuryanti, W. 1996. Heritage and postmodern tourism. *Annals of Tourism Research* 23: 249–260.

Osaka and Nara. 2010. Nara prefecture. Available at: http://www.pref.nara.jp/kanko/yukari/nara_e/index.html. Accessed 3 Sept 2013.

Silberman, N. 2009. Process not product: the ICOMOS Ename Charter (2008) and the practice of heritage stewardship. *CRM: The Journal of Heritage Stewardship* 6: 7–15.
The Outline of the Hiroshima Peace Memorial Museum. 2010. Available at: http://www.pcf.city.hiroshima.jp/outline/outlineTop_E.html. Accessed 3 Sept 2013.
TVNZ. 2010. Japan and China territory dispute intensified. Available at: http://tvnz.co.nz/world-news/china-japan-territorial-dispute-intensifies-3774875. Accessed 3 Sept 2013.
World Heritage Site Organization. 2010. Himeji-jo. Available at: http://www.worldheritagesite.org/sites/himejijo.html (no access date).

Further Reading

ICOMOS. 2006/2007. Site in danger Japan. Available at: http://www.international.icomos.org/risk/world_report/2006-2007/index.htm. Accessed 3 Sept 2013.
Kyoto's Temples and Shrines. 2010. Information on 26 temples and shrines. Available at: http://www.artofjpn.com/kyoto/index.html. Accessed 3 Sept 2013.
UNESCO. 2010a. ICOMOS evaluation of the property. Available at: http://whc.unesco.org/archive/advisory_body_evaluation/1246.pdf. Accessed 3 Sept 2013.
UNESCO. 2010b. Japan glossary. Available at: http://whc.unesco.org/en/statesparties/jp. Accessed 3 Sept 2013.
Yoneyama, L. 1999. *Hiroshima traces: time, space, and the dialectics of memory*. Berkeley: University of California Press.

Japanese Archaeological Museums

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Introduction and Definition

The definition of a museum by ICOM is "a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment" (ICOM 2012).

In Japan there are 5,775 museums covering such diverse fields as science and technology, art, general exhibitions, as well as zoos, aquariums, and botanical gardens. As of 2011, there are 3,327 historical museums in Japan. With only 1,746 municipalities, every city in Japan averages almost two historical museums within their borders (Ogata 2012a). These numbers show the Japanese people's enjoyment of historical exhibitions which provide an emotional connection to the past and to the land on which people lived.

Japanese historical museums display archaeological artifacts as part of their collections. Since 1970, many historical museums, including archaeological and site museums, have been constructed in line with the increase of archaeological excavations as a result of infrastructural development (Table 1). The current economic crisis has caused difficulties for the management and administration of many museums, including archaeological site museums in Japan.

This entry reviews the present situation of Japanese archaeological museums and their history and discusses the leading principal institutions of Japanese archaeological museums, distinctive archaeological site museums, and city museums with significant archaeological collections.

Historical Background

Before the adoption of the European and American concept of museums during the Meiji Restoration, the Imperial Court, shrines, and temples played a pivotal role in the preservation and administration of precious and religious items. However, these items were not open to the public, only being casually maintained for society.

Japanese Archaeological Museums, Table 1 Number of excavations and museums with years

Number/year	1970	1987	2005	2011
Number of excavations (year)	1,726 (1976)	7,007	8,741	7,934 (2010)
Number of historical museums	473	1,324	3,200	3,327

During the Edo period, members of societies such as Sekitei Kinouchi and Kenkado Kimura displayed collections of rocks of unusual shapes or colors including artificial ancient stone instruments, stone accessories, and archaeological remains (Okada 2012b).

In the last days of the Late Edo period, the Tokugawa shogunate and the Satsuma han (clan) sent delegations to the Paris and London International Expositions. They visited the British Museum and other important museums in Europe during the 1860s. The concept of "museums" returned to Japan with these delegations. However, instead of establishing permanent museums, the Meiji government opted for expositions for industrial development.

In 1870 the Meiji government established the "Department of Products" to oversee the exhibition of industrial products in Tokyo. The government, which was concerned about the preservation of cultural heritage, enacted *the Preservation of Antiquities Act* in 1871. In accordance with this law, many cultural properties, including archaeological remains, were brought into the custody of the department. Later, these archaeological remains were utilized as propaganda to promote the history of the Imperial family.

In 1871 the Department of Museums for the Vienna International Exposition was established. The government expected that the objects collected from around Japan for the Vienna International Exposition would become a useful founding collection for a future museum in Japan. Before being sent to Vienna, the articles were exhibited to the Japanese public at Yushima in 1872. The exhibition was an immense success. At that time the idea of founding a museum was part of a political strategy for the promotion of industry in order to catch up with the West. Thus, the first Japanese museum, based upon the principles of the British Museum in Japan, came about.

In 1875 the Department of Museums was divided between the Ministry of Home Affairs, responsible for promoting industrial development, and the Ministry of Education, Science and Culture, which oversaw school education. When the Ministry of Agriculture and Commerce was established in 1881, the jurisdiction changed once again, and the Department of Museums was transferred to the new ministry. In 1882 a museum simply called "the Museum" was opened in Ueno, which would eventually evolve into the Tokyo National Museum of today. In 1885, the Department of Museums was transferred to the jurisdiction of the Ministry of the Imperial Household to strengthen the protection of cultural properties and art, including archaeological remains, in order to support propaganda promoting the glorious history of Imperial family. The Museum was renamed the Imperial Museum in 1889. At same time, the Imperial Kyoto Museum and the Imperial Nara Museum were founded for same purpose as the Imperial Museum in Tokyo (Seki 2005).

In 1887 the Ministry of Education, Science and Culture also founded a museum in Ueno as the Educational Museum which is now the National Science Museum.

The enthronement of Emperor Showa in 1928 and the anniversary of the 2600th year of the accession of Emperor Jimmu accelerated the construction of museums throughout Japan, both public and private, such as the Museum of Kokugakuin University and the Yamato Japanese Historical Museum (the Museum, Archaeological Institute of Kashihara, Nara Prefecture later).

In 1951, after the World War II, the laws on museums were reformed and the Japanese Association of Museums joined ICOM in 1952. The construction of museums became popular to showcase economic growth (Okada 2012b).

With economic boom following the 1970s, many archaeological museums including site museums were constructed to house and display new discoveries found in large-scale excavations brought about by the nationwide development of infrastructure for transportation. The trend continued until the 1990s.

This boom in museum construction was also stimulated by the announcement by the Agency for Cultural Affairs of the "Project of Fudoki-no-Oka (historical park)" which designated vast areas for archaeological and historical monuments in 1966. Sixteen areas, such as Sakitama, Shimotsuke, Omi, Chikatsu Asuka, Kii, Usa, and Saitobaru, were incorporated as historical parks with archaeological museums. The Agency for

Cultural Affairs encouraged prefectures and municipalities to establish centers for archaeological excavation (Maizo-Bunkazai Center) to protect areas from the rapid increase in the number of excavations caused by development and infrastructure construction in the 1970s and 1980s. There are now more than 60 Maizo-Bunkazai Centers. Although they are not museums, most have exhibition rooms and showcase what archaeology is and how excavation is carried out.

Key Issues

Principal Institutions of Japanese Archaeological Museums

Museums are regulated by the Museum Law of 1951. Museums designated by that museum are facilities for social education. Archaeological museums are also regulated by the 1951 law. There are three types of museum: (1) registered museums, (2) facilities which comply with the appropriate standards, and (3) facilities which resemble these. Registered museums under the jurisdiction of the boards of education of local governments must have a curator and be open more than 150 days a year. Facilities compliant with the standards must be certified by the prefecture, have an associate curator, and be open more than 100 days a year. Facilities modeled on these are not regulated by the law.

The national museum system consists of four museums, the Tokyo, Kyoto, Nara, and Kyushu museums which possess massive archaeological collections. They are not subject to the Museum Law, as they are ranked as facilities for the conservation of cultural properties and so regulated by the Agency for Cultural Affairs (Hamada 2012).

The number of the registered museum is small, with other classes of museum making up the majority. Museums related to archaeological sites are classified as facilities of the third type. These are not regulated by the law. The construction of archaeological site museums is, in most cases, triggered by a new discovery of importance or by the development or the improvement of significant archaeological sites in historic parks. Since the aim of these projects is the development of tourism rather than education, the expense of construction relies on subsidies from the Ministry of Land, Infrastructure, Transport and Tourism together with the Ministry of Education, Culture, Sports, Science and Technology.

Archaeological museums, as well as general museums, have faced financial difficulties, because municipalities have largely adopted the Designated Manager System to reduce annual expenditures. This system has forced head curators to make exhibitions, to conform to popular tastes, and to reduce the number of curators.

With the inclusion of museology in university curricula, many universities have established museums or integrated museums to enable hands-on education in museology and management of museums. Kokugakuin University, Meiji University, Kyoto University, and Kansai University are well-known for their archaeological museums.

Distinctive Archaeological Museums

Museums Put the Word "Archaeology"

Few archaeological museums put the word "archaeology" in the museum's title and display only archaeological remains. These strictly archaeological museums include:

- Ichikawa City Archaeological Museum in Chiba
- Yamanashi Prefectural Museum of Archaeology in Yamanashi
- Hokuto City Archaeological Museum in Yamanashi
- Matsumoto City Archaeological Museum in Nagano
- Kyoto City Archaeological Museum in Kyoto
- Hyogo Prefectural Archaeological Museum in Hyogo
- Tatsuuma Archaeological Museum (private) in Hyogo
- The Museum, Archaeological Institute of Kashihara, Nara Prefecture
- Kurashiki Archaeological Museum (private) in Okayama
- Shimonoseki City Archaeological Museum in Yamaguchi

- The Archaeological Museum Matsuyama in Ehime
- Tokushima Archaeological Museum
- Saitobaru Archaeological Museum in Miyazaki
- Ibusuki Archaeological Museum in Kagoshima
- Kagoshima City Museum of Archaeology in Kagoshima

These museums mainly exhibit archaeological remains that show the historical sequence of events in the area in which they are located.

Among these, the Museum, Archaeological Institute of Kashihara, Nara Prefecture (Fig. 1), is the most distinctive, displaying objects from the Paleolithic to the Medieval period in Nara, an area which played a central role in Japanese political development from the Kofun period (third century CE) to the Nara period (eighth CE). This museum shows how Japan developed as a state and its connection to East Asian countries with archaeological remains excavated over all of Nara prefecture since 1938. This museum was established in 1939 and is the oldest archaeological museum in Japan. Impressive pieces in the collection include:

- Jomon Dogu (earthen figures), the important cultural property, from the Kashihara site (Late Jomon). "Jomon" needs an accent which I haven't got on my computer.
- The drawing on the pottery from the Shimizu Kaze site (Middle Yayoi).
- Prestige objects and gigantic cylinder "haniwa," an important cultural property, from the Mesuriyama mound tomb (Kofun).
- Gorgeous grave goods, a national treasure, including a set of harness, a crown, shoes, and swords from the Fujinoki tomb mound.
- Narrow strips of wood on which messages were written from the Asuka Palace site.
- A bronze epitaph of Ono Yasumaro who edited "Kojiki (Records of Ancient Matters)," an important cultural property.

Yamanashi Prefectural Museum of Archaeology is located in the Kai Fudoki-no-Oka historical park where the Kai-Choshizuka tomb mound and Maruyama tomb mound were constructed late in the fourth century with other small tomb mounds. This museum displays the history of Yamanashi prefecture from the Paleolithic to the Edo period, displaying the remains of the Ichinosawa site, an important cultural property, from the Middle Jomon period and the remains from the Kai-Choshizuka tomb mound and the Maruyama tomb mounds.

Hyogo Prefectural Archaeological Museum is located beside the Onaka site, Yayoi period. This museum also displays the history of Hyogo

Japanese Archaeological Museums, Fig. 1 The Museum, Archaeological Institute of Kashihara, Nara Prefecture

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prefecture from the Paleolithic to the Edo period. The integration of exhibits for children plays an important role at this museum.

Saitobaru Archaeological Museum in Miyazaki prefecture is located at Saitobaru Fudoki-no-Oka historical park, where more than 311 tomb mounds exist. This is an archaeological site museum featuring a cluster of Saitobaru mounds designated as a national special historical park and exhibits archaeological remains to introduce the history of Miyazaki prefecture from the Paleolithic to the Edo period. The main focus of this museum is to display archaeological remains related to trade between Miyazaki and East Asia.

Ibusuki Archaeological Museum in Kagoshima prefecture is a municipal museum which displays the history of the southern Kyushu "Hayato" area with archaeological remains and emphasizes the Hashimurekawa site which was buried as a consequence of volcanic eruptions of Mt. Kaimon in the Jomon period and the Yayoi period.

Tatsuuma Archaeological Museum is a private museum which was established by the Hakutaka sake brewer. The collection of *Dotaku*, a bell-shaped bronze vessel of the Yayoi period, is its centerpiece.

Museums for Specific Periods

There are large-scale archaeological museums which exhibit archaeological remains of specific periods, such as the Museum of Yayoi Culture in Osaka, the Osaka Prefecture Chikatsu Asuka Museum, and Kumamoto Prefectural Ancient Burial Mound Museum.

The Museum of Yayoi Culture in Osaka is the largest museum of its subject period in Japan showing the evolution of the Yayoi clan that constructed large tomb mounds in the transition to the Kofun period.

The Osaka Prefecture Chikatsu Asuka Museum (Fig. 2) in the Chikatsu Asuka Fudoki-no-Oka historical park centers on the Kofun period, displaying a diorama of how the largest tomb mound called Daisen tomb mound (or Nintokuryo-Kofun) was constructed.

Kumamoto Prefectural Ancient Burial Mound Museum concentrates on tomb mounds with decorative murals, drawn on the walls of their stone chambers around sixth century CE. This kind of

Japanese Archaeological Museums, Fig. 2 The Osaka Prefecture Chikatsu Asuka Museum

tomb was commonly constructed in northern Kyushu and provides visitors with a special impression of the tomb mounds.

Other Museums

As of 2011, there were 5,775 museums in Japan, of which 3,327 are historical in scope, and most of these display archaeological artifacts. While belonging to the third category and not regulated by the Museum Law, they are nonetheless important for the preservation of Japanese culture in the face of the modern construction which endangers the remains of our past.

There are 1,746 municipalities in all, with about 3,000 historical museums in Japan today. Among the many museums, mainly the displaying distinctive archaeological remains of their locality are the Hokkaido Museum of Northern Peoples, the Tohoku History Museum, the Osaka Museum of History, the Hiroshima Prefectural Museum of History, the Shimane Museum of Ancient Izumo, Kyushu Historical Museum, and the Okinawa Prefectural Museum. Every prefecture has founded museums to preserve their history and to display archaeological remains from all periods up to the Edo period to inform their visitors of the historical past.

The Hokkaido Museum of Northern Peoples is located in Abashiri, in northern Hokkaido, and preserves the Okhotsk culture which flourished around the seventh and eighth century. Discoveries from Moroyo shell midden are impressive and show the cultural exchange between this area and northern East Asia.

The Tohoku History Museum in Miyagi is located in a suburb of Sendai and displays archaeological remains from the ancient culture in the Tohoku region. This museum focuses on the system of ancient administration during the Nara period around the eighth century.

The Hiroshima Prefectural Museum of History focuses on the life of the people of the Setouchi area, with the archaeological remains of "Kusado Sengen," a medieval port town covered by a river. A life-size reconstruction of street life in "Kusado Sengen" recreates a summer evening during the Muromachi period and is popular with visitors.

Archaeological Site Museums

There are many archaeological museums which were constructed as guidance facilities to archaeological sites which are preserved in archaeological parks. Most site museums are constructed as atonement for destruction of the sites by development. Distinctive archaeological site museums include:

- Tokoro Iseki no Yakata (Tokoro Site Museum) in Hokkaido
- Sannai Maruyama site (Sannai Maruyama Exhibition Hall) in Aomori
- Goshono site in Iwate
- Tomizawa site (Chitei no Mori Museum) and the Historical Museum of Jomon Village Okumatsushima (Satohama shell midden) in Miyagi
- Iwajuku site in Gunma
- Shibayama tomb mound (Shibayama Kofun Haniwa Museum) in Chiba
- Otsuka-Saikachido site (Yokohama History Museum) in Kanagawa
- Shakado site (Shakado Museum of Jomon Culture) in Yamanashi
- Togariishi site and Hiraide site (Togariishi Museum of Jomon Archaeology) in Nagano
- Toro site (Shizuoka City Toro Museum) in Shizuoka
- Nishitani tomb site (Izumo Yayoinomori Museum) in Shimane
- Mawaki site in Ishikawa
- Saiku site (Saiku Historical Museum) in Mie
- Karako-Kagi Archaeological Museum and Heijo Palace site in Nara
- Myokenyama tomb mound (Onishi Fujiyama History Museum) in Ehime
- Hirabaru site and Mikumo sites (Itokoku History Museum) in Fukuoka
- Haranotsuji (Iki City Ikikoku Museum) in Nagasaki
- Oji site in Kagoshima

The Tokoro Iseki no Yakata no Mori Park (Tokoro Site Museum) is located in Kitami City in northern Hokkaido. At the Tokoro site, there are more than 10,000 archaeological features consisting of 2,500 pit houses, which date from

Japanese Archaeological Museums, Fig. 3 Shakado Museum of Jomon Culture

2,000 BCE to 1,000 CE. This is one of the largest pit house sites within a single autonomous area in the world. The park is divided into four parts: a site, a municipal museum which displays remains from all over this city area, a municipal research center with a repository open to the public, and the Tokyo University Tokoro Site Museum displaying remains from excavations conducted since 1957.

The Sannai Maruyama site was designated as a special national historical site in 2000 and is one of the largest archaeological parks in Japan. Excavations carried out since 1992 have brought uncovered dwellings, pillar-supported structures, graves, storage pits, clay mining pits, and road refuse disposal pits with large numbers of artifacts. There is an exhibition hall called "Jomon Jiyuukan," and numerous Jomon houses, storage pits, and six-pillared buildings are reconstructed in the park.

The Tomizawa (Chitei no Mori Museum) site is located in Sendai, Miyagi. This museum allows visitors directly to see excavated lithics and traces of bonfires in woodland from the Paleolithic period and feel the atmosphere of the forest of 20,000 years ago.

The Shakado Museum of Jomon Culture (Fig. 3) in the Shakado site is located in Fuefuki City, Yamanashi Prefecture. Most of the site was destroyed with construction of the Chuo Expressway, but the Shakado Museum of Jomon Culture was constructed to show the greatness of the site which flourished, about 5,000 years ago, in the Middle Jomon period. As this museum is located beside the Shakado service area, visitors can get to the museum with only a 3-min walk. The museum exhibits magnificent Jomon clay figures with over 1,116 pieces on display and beautiful Jomon pottery designated as important cultural property. The museum also has a wonderful view of the Southern Alps.

The Togariishi Museum of Jomon Archaeology is located beside the Togariishi site from the Middle Jomon period (3,000 BCE). The museum exhibits over 200 splendid archaeological artifacts. There are two outstanding clay figures, "the Jomon Venus," a national treasure, and "the Venus of Mask," an important cultural property,

Japanese Archaeological Museums, Fig. 4 Shizuoka City Toro Museum and the reproduction of the rice cultivation in the Yayoi rice paddy fields

exhibited as special-featured items. Outside the museum there are six pit dwellings excavated at the Yosukeone site and reconstructed to show the Jomon village landscape.

The Shizuoka City Toro Museum (Fig. 4) at the Toro site designated as a special national historical site is located in the center of Shizuoka City. The site and the museum are surrounded by modern houses due to urbanization. The Toro site was discovered in 1943 and was largely excavated from 1947 to 1950 and from 1999 to 2004. Through the excavations, a Yayoi-era village consisting of pit dwellings, elevated rice storehouses, and about 8 ha of rice fields with various water facilities was unearthed. Many pottery and wooden vessels, utensils, and farm implements were also discovered. The museum in Toro not only displays archaeological artifacts from the site but also features activities allowing visitors to get a real feel of what life at the site must have been like. Staff of the museum provide activities for visitors, such as cultivating rice fields, making a fire, weaving cloth, and making a pottery.

The Mawaki Jomon Museum (Fig. 5) is located in Noto Town in Ishikawa and introduces the Mawaki site. This site was a village from the Early to the Latest Jomon period (6,000–2,200 years ago). Remains including pottery, wooden objects such as oars, pillars as a totem pole and vessels, plant knitting and ropes, and animal bones from dolphins, fish, deer, and wild boars were found. Beside the settlement area, there was a wooden circle which consisted of huge pillars and graves. The museum in the Mawaki site displays artifacts to indicate a rich Jomon life. A wooden circle has been set up as a symbol to express a ceremonial connection to the Jomon people in the Mawaki site.

The Heijo Palace site designated as a special national historical site in Nara was the capital of Japan 1,300 years ago, from 710 to 784. In the early eighth century, Japan established very powerful centralized bureaucratic government by adapting the highly developed Chinese constitution. The ancient Heijo Palace was located in the northern center of the capital. It was surrounded by earthen walls. In the palace, there were an Imperial residence and the government administrative buildings. The Heijo capital was modeled after Chang'an, the capital city of the Chinese Tang dynasty. There are two museums at the palace site. One is an open air museum showing the royal buildings after the excavation. The other one shows the life of the palace. The remains of the palace and the surrounding area were designated as a UNESCO World Heritage Site in 1998.

The Myokenyama tomb mound, located on the top of a hill in Imabari City, Ehime Prefecture, was constructed in the late fourth century, when the Yamato clan was spreading their power over Japan. Its mound is a keyhole-shaped tomb mound covering two stone burial chambers with vertical access as the place for interments. A Chinese bronze mirror accompanied the dead.

Japanese Archaeological Museums, Fig. 5 Mawaki Jomon Museum

The Onishi Fujiyama History Museum was founded at the Myokenyama tomb mound and only displays remains from that tomb. Visitors can easily understand how the dead were disposed and view the burial chambers through glass windows on the top of the tomb mound.

City, University, and Other Museums with Significant Archaeological Collections

City Museums

City museums are noted for their large-scale exhibitions designed to attract the public. These museums have been able, with their substantial budgets, to collect important archaeological material. City museums with important archaeological collections include:

- Tokyo National Museum
- National Museum of Japanese History in Chiba
- Osaka Museum of History in Osaka
- Kobe City Museum in Hyogo
- Fukuoka City Museum in Fukuoka
- Kyushu National Museum in Fukuoka

The Tokyo National Museum (Fig. 6), as Japan's oldest museum, has an extensive and excellent collection built largely before the national expansion of museums from the 1960s. There are many designated "national treasures" and "important cultural properties" on display.

Jomon clay figures called "Dogu" of various types and periods show beautiful postures such as the Dogu from the Shimpukuji shell midden in Saitama and the Kamegaoka site in Aomori. Many bell-shaped bronze vessels of the Yayoi period called Dotaku are shown including a Dotaku with decorative animal and human motifs from Kagawa; these objects are famous for understanding agricultural ceremonies in the Yayoi period. A collection of bronze mirrors from the Kofun period aids people in understanding the formation of ancient Japanese political systems. Objects from Eta Funayama tomb mound such as a sword with a silver inlaid inscription are indispensable archaeological evidence for understanding East Asian history. From the Asuka period around the sixth century, ritual objects used in the consecration of the building site of a five-storied pagoda at Horyu-ji temple are important not only for religious studies but also as evidence of the technical art of the time. The Kobe City Museum in Hyogo possesses bronze objects from the Sakuragaoka site in Kobe. These bronze objects consist of 14 Dotaku with crossed-band and running water designs and seven bronze halberds. This collection is essential for study of the Yayoi society.

Japanese Archaeological Museums, Fig. 6 Tokyo National Museum

University Museums

University museums have a different role from the city museums but also preserve large and significant archaeological collections. The Hokkaido University Museum, the University of Tokyo Museum, Kyoto University Museum, the Meiji University Museum in Tokyo, the Kokugakuin University Museum in Tokyo, the Kansai University Museum in Osaka, and the Tenri University Sankokan Museum in Nara possess large collections for research and education.

The Hokkaido University Museum possesses archaeological objects from all over Hokkaido before the arrival of the Ainu and material of the Okhotsk culture.

The Tokyo University Museum possesses a fine collection of archaeological objects from all over the world, especially East Asia, West Asia, and South America where the university has sent research expeditions. This university's collections from the Jomon and Yayoi period are outstanding and demonstrate how archaeology developed as an academic field in Japan.

Kyoto University Museum (Fig. 7), the first university where archaeology was accredited as a subject in Japan, has a great collection of archaeological remains collected through many excellent excavations in West Japan, such as the Karako site in Nara; the Ikisan-Choshizuka tomb mound in Fukuoka; the Tsubai-Otsukayama tomb mound in Kyoto; the Shikinzaka tomb mound, the Kyozuka tomb mound, and the Minami-Tenpyozuka tomb mound in Osaka; and the Ishiyama tomb mound in Mie.

The Kansai University Museum possesses the collection of Mr. Hikoichi Motoyama, former president of the Mainichi Newspaper Company, from among others, the Koho site in Osaka, Jomon pottery from the Korekawa in Aomori, and a stone pillow for the dead, Early Kofun period, from the tomb attributed to Andonyama (Sujin Emperor) tomb mound.

The Tenri University Sankokan Museum in Nara possesses a large number of archaeological objects from Japan, China, Korea, West Asia, and South America. The most varied collection among them are the archaeological remains from the Furu site, which were connected to the ancient powerful clan "Mononobe" and are important in understanding ancient power structures.

Other Museums

There are many more museums affiliated with shrines and temples possessing archaeological remains as religious treasures. One of the most important archaeological collections is in the Munakata Taisha Shinpokan (Munakata Shinto Shrine) in Fukuoka. There are relics from the Okitsumiya shrine in Okinoshima Island on the Genkainada of the Japan Sea. The Okitsumiya

Japanese Archaeological Museums, Fig. 7 The Kyoto University Museum

shrine belongs to Munakata Taisha and was excavated in the 1960s.

Future Directions

Since the establishment of the Tokyo National Museum in 1882, many Japanese archaeological museums have been founded and have grown as historical museums. Land development and transportation infrastructure construction increased the number of excavations nationwide as new and magnificent archaeological artifacts were discovered. Many archaeological site museums have been constructed with tourism in mind. However, the economic crisis has placed museum managers and museums generally under stress. Museums have to think about how to survive this new economic climate while still serving their communities and missions.

Cross-References

- ▶ Ethics of Commercial Archaeology: Japan
- ▶ Japan: Cultural Heritage Management
- ▶ Japan: Cultural Heritage Management Education
- ▶ Japan: Field Archaeology
- ▶ Japan: World Heritage

References

Hamada, H. 2012. *New current toward museums and curators*. Tokyo: Ochanomizu-shobou (in Japanese).

ICOM. 2012. Museum definition. http://www.icom.museum/the-vision/museum-definition/. Accessed 11 Sept 2012.

Ogata, I. 2012a. Museum administration of the state and local government, in West Japan Division of the Conference of Museology Courses of the Japanese University (ed.) *Museology for new stage*, 66–67. Tokyo: Fuyou-shobou (in Japanese).

Ogata, I. 2012b. History of Japanese museum, in West Japan Division of the Conference of Museology Courses of the Japanese University (ed.) *Museology for new stage*, 35–41. Tokyo: Fuyou-shobou (in Japanese).

Seki, H. 2005. *Birth of a museum – Hisanari Machida and Tokyo Imperial Museum*. Tokyo: Iwanami-shoten (in Japanese).

Java Man

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Introduction

"Java Man" is the informal name given to Pleistocene *Homo erectus* inhabitants of Java. The

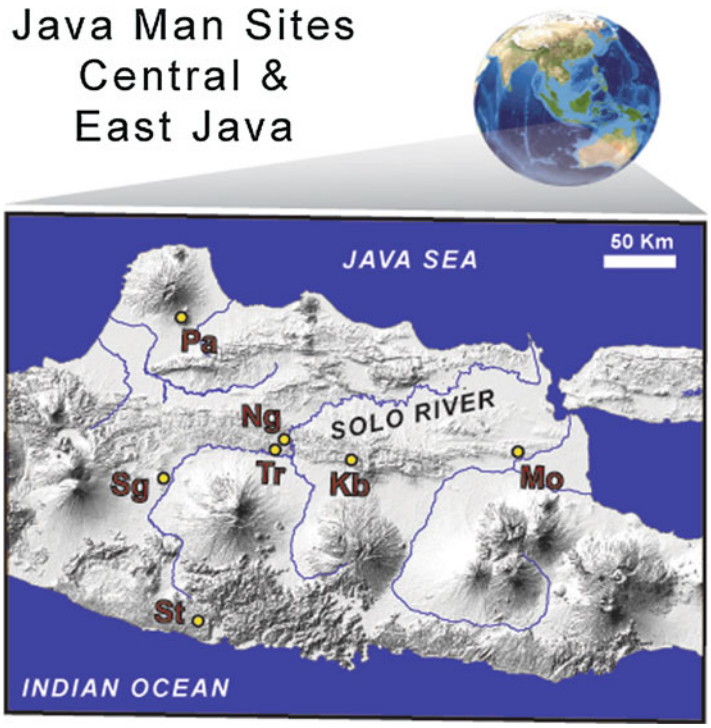

Java Man, Fig. 1 The Java Man (*Homo erectus*) fossil localities described in the text: Ngandong (Ng), Mojokerto (Mo), Sangiran Dome (Sg), and Trinil (Tr); Song Terus cave (St) has Paleolithic artifacts but no *Homo erectus* fossils. (After Huffman et al. 2012. © Frank Huffman, Univ. of Texas)

fossil discoveries on the island include the first for this extinct species, which is now known to have been widely distributed across the temperate and tropical zones of the Old World (see ▶ "*Homo erectus*"). Today, more than 100 skeletal specimens have been attributed to this species from localities in Central and East Java (Fig. 1; Indriati 2004). No other confirmed specimen of *Homo erectus* is known from elsewhere in Southeast Asia; however stone tools indicate the presence of early hominins on other islands in Southeast Asia suggesting a wider distribution of *Homo erectus* (see ▶ "Insular Southeast Asia in the Lower Paleolithic").

It is unclear how *Homo erectus* communicated: whether they "spoke" in any manner or used gestural communication. Nor do we know how meaningful a twenty-first-century person would find the facial expressions of Java Man. We also have not resolved how *Homo erectus* social groups were organized, how they divided labor among group individuals, or how exactly they subsisted. On the other hand, the physical attributes of Java Man are reasonably well established. The average *Homo erectus* stood about 1.7 m (5 feet, 6 inches) tall and had a lanky torso with long, well-muscled limbs and nimble hands. Java Man's brain was about three-quarters of the size of a modern human's brain (1000 cm^3 versus 1350 cm^3, respectively). *Homo erectus* individuals had flattened foreheads with prominent brow ridges (Fig. 2). The rear part of the skull (occipital bone) was curved sharply inward toward its base and had a massive ridge (transverse torus) where strong neck muscles attached. The lower jaw was nearly chinless. The face was massive, giving the head more of a forward projection (prognathism) than *Homo sapiens*. Java Man's teeth, on the whole, were only slightly larger than those of modern humans, and their incisors were "shovel-shaped" on the tongue side. Despite this human-like appearance, Java Man would have stood out in a crowd of our contemporaries.

Definition

"Java Man" refers to representatives of *Homo erectus* that inhabited Java, Indonesia, during the Pleistocene. In the early 1890s, the Trinil site

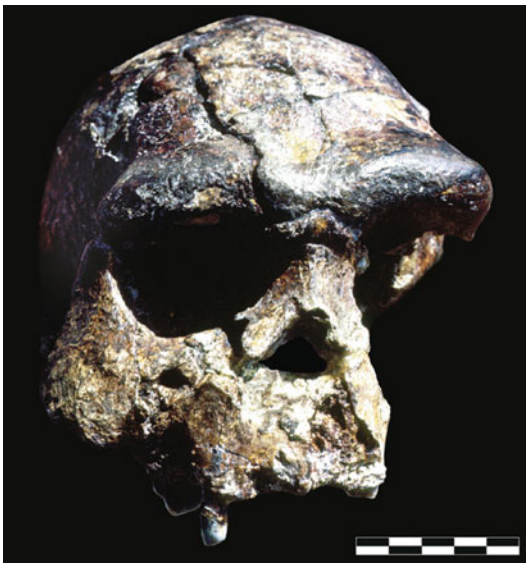

Java Man, Fig. 2 Sangiran 17, the most complete cranium of Java Man (*Homo erectus*). © Russell L. Ciochon, Univ. of Iowa

produced the holotype fossils of *Homo erectus* (the specimens that constitute the prime reference material used in defining *Homo erectus* taxonomically).

Key Issues/Current Debates/Future Directions/Examples

In the following paragraphs, we describe the best-known Java Man sites of eastern Java (Fig. 1) and use them to highlight the current scientific issues concerning *Homo erectus*.

Trinil

The Trinil discovery was the result of the only deliberate search for a fossil ape-human "missing link" in the nineteenth century. Eugène Dubois, a Dutch doctor who was strongly influenced on the subject of evolution by the German biologist Ernst Haeckel, hypothesized that fossils of the ape-human lineage could be found in Southeast Asia (see ▶ Dubois, Eugène). Dedicated to testing his hypothesis, Dubois joined the Dutch Army as a surgeon stationed in the Dutch East Indies (present-day Indonesia; Shipman 2001). In 1888,

Java Man, Fig. 3 Trinil I, the first cranium (skullcap) of Java Man discovered by Eugene Dubois. © Russell L. Ciochon, Univ. of Iowa

he began scouring limestone caves and outcrops of volcanic-rich sedimentary rocks known to have produced mammalian remains (de Vos 2010). Within 2 years, in October 1891, while digging in vertebrate-fossil-bearing sandstone exposed along the Solo River at Trinil (Tr on Fig. 1), his field crew discovered a large, fully fossilized, ape-like skullcap (Fig. 3). The following year, the field workers unearthed a humanlike adult thighbone (femur) about 12 m away from where the skullcap had been found and in the same meter-thick bonebed. Dubois asserted that the two specimens were from the same individual (although, surprisingly, debate continues on if the femur is the same species as the skullcap, Ruff et al. 2015; see also Joordens et al. 2014). Based on the two fossils, Dubois defined a new species, *Pithecanthropus erectus* (meaning "upright ape-man") – the very kind of creature he went to the East Indies to find. In the 1940s, *Pithecanthropus erectus* was subsumed into the human lineage as *Homo erectus*, after anatomical comparisons with other known hominin fossils made it clear that the Java finds were more human- than ape-like.

Excavation of the Trinil discovery bed (sometimes referred to as the Hauptknochenschicht or Trinil HK) ultimately produced thousands of strongly fossilized bone fragments of animals that had lived alongside *Homo erectus* in the local Pleistocene paleoenvironment. Most of the fossils represent extinct forms of cattle, water buffalo, deer, *Stegodon* (an elephant-like proboscidean), pig, rhinoceros, and tiger (de Vos 2010). Also present were denizens of large

lowland rivers and estuaries, such as crocodiles, turtles, and catfish (Joordens et al. 2009). The Trinil bonebed is often attributed to the late early Pleistocene (circa 900,000 years ago) on the basis of the correlation of its fauna with similar species at the Sangiran Dome (see below). Despite having contained multiple *Homo erectus* fossils and thousands of other large fossils, the Trinil discovery bed produced no stone tools. However, fossil freshwater mussel shells from Trinil show evidence of shellfish consumption, tool use, and even geometric engraving (Joordens et al. 2014). Minerals associated with the shells provided dates of 540,000–430,000 years ago using $^{40}Ar/^{39}Ar$ and luminescence dating methods.

Ngandong

In 1931–1933, the Geological Survey of the Netherlands Indies uncovered 12 cranial and two tibial (shinbone) fossils of *Homo erectus* along with more than 25,000 nonhuman fossils at Ngandong (Ng on Fig. 1). The fossils were unearthed across an excavation of about 4600 m^2 from gravelly sand (Huffman et al. 2010). This discovery bed is about a half-meter thick in a stratum near the base of flat-lying river-terrace deposits having a stratigraphic thickness of about 3 m (Fig. 4; Ciochon et al. 2009). The fossils were predominantly disarticulated and fragmented, with extinct cattle being the most common among 10 other mammals, turtle, and crocodile.

Ngandong is notable among global paleoanthropological sites because not only is it extraordinary to encounter the fossilized remains of so many hominin individuals in a single river-laid bonebed, but *Homo erectus* at this site appears to have been contemporaneous with anatomically more evolved *Homo* species from mainland Eurasia and Africa. Ngandong has been dated using paleontological and geological relationships, as well as radioisotopes. Paleontologically, the Ngandong nonhuman fossil assemblage includes more living taxa than was found at Trinil, indicating that Ngandong is the younger of the two accumulations, but the Ngandong assemblage also has extinct elements that do not occur in the modern fauna of Java or even in the youngest premodern assemblages (de Vos 2010). Geologically, the Ngandong deposit is flat lying, rather than being structurally tilted in the way that other *Homo erectus* formations in eastern Java normally are. On the other hand, the bonebed accumulated along the Solo River streambed before it entrenched to its present-day level, some 20 m below the site. Radioisotopic age estimates vary from 53,000–27,000 years (Swisher et al. 1996) to older than 70,000 years (Yokoyama et al. 2008) and younger than 500,000 years (Indriati et al. 2011). The 1931–1933 *Homo erectus* discovery bed was re-excavated in 2008 and 2010 in an effort to help clarify its age and explain how so many human individuals came to be embedded in the Solo River sands at this one locale (Ciochon et al. 2009). Flaked stone artifacts have been reported recently from a terrace deposit situated at the same elevation above the Solo River, 5 km south of Ngandong, and the artifact bed appears to date from ~102,000 to 130,000 years ago using red TL on the associated fluvial sediments (van den Bergh et al. 2014).

The bones of *Homo erectus* and the other animals were probably deposited during a flood on the Solo River that originated with rains falling on a stratovolcanic mountain >50 km away; the flooding followed a mass death of large mammals that had aggregated along the Solo River (Huffman et al. 2010). The Ngandong event was one episode in an apparently consistent million-year-long paleogeographic pattern: the well-watered river valleys of the stratovolcanoes sustained recurring or continuing habitation of *Homo erectus*, cattle, deer, *Stegodon*, and other large-bodied herbivores, while rapid volcaniclastic deposition, at times following eruption-related death, promoted quick burial and preservation of skeletal remains (Huffman et al. 2012).

Mojokerto

The Mojokerto site was discovered in 1936 approximately 125 km east of Ngandong and Trinil (Mo on Fig. 1). Unlike the previous finds, the Mojokerto site was a small excavation and produced just one, though considerably important, specimen attributable to *Homo erectus*. The

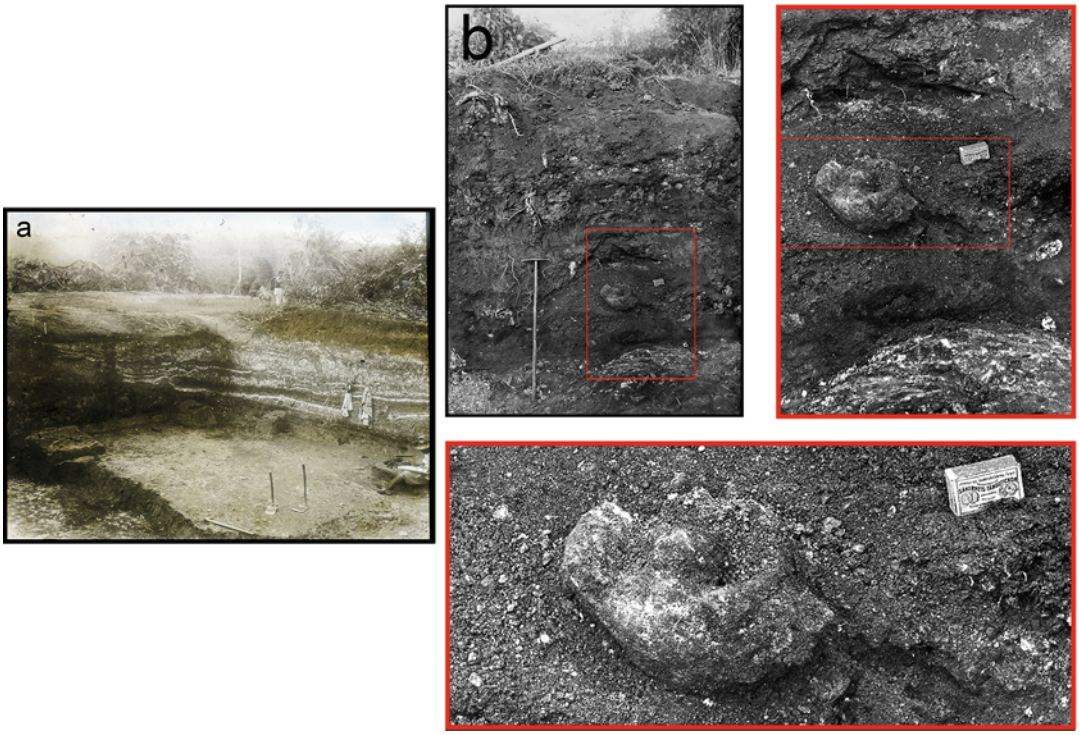

Java Man, Fig. 4 *Homo erectus* bonebed at Ngandong, 1931–1933. (**a**) The bonebed is exposed across an excavation platform with pedestals at its edge awaiting fossil collection. (**b**) A *Homo erectus* skullcap (calotte with basal margins; to the left of the matchbox) before geologist W.F.F. Oppenoorth removed it from the bonebed in March 1932. (After Huffman et al. 2010. © Joke Oppenoorth, The Netherlands)

fossil is the cranium of a juvenile, a rare occurrence in early hominin sites. Also, the Mojokerto child skull was embedded in conglomeratic sandstone deposited by a river flowing through a marine delta, making it the only seacoast geological context known for *Homo erectus* (Huffman et al. 2006). Finally, a probable early Pleistocene age places it among the earliest hominin specimens from Asia. Despite the potential value of establishing an exact absolute date for Mojokerto, radioisotopic and paleomagnetic investigations have so far not achieved this objective.

While the accurate dating of Mojokerto and many other Java *Homo erectus* finds remains a scientific challenge, recent research on the discovery sites improves our understanding of one characteristic of the *Homo erectus* presence in eastern Java. Andesitic sand and gravel largely make up the *Homo erectus* formations and form the matrix around the Ngandong, Mojokerto, and Trinil *Homo erectus* specimens (as it does for many finds from Sangiran Dome, described below). The paleogeographical implications, especially clear in the 125-km-long formational outcrop belt that connects Trinil to Mojokerto, are that the eastern Java sites record hundreds of thousands of years of human existence along large rivers flowing off of stratovolcanic peaks in a paleolandscape that was quite similar to eastern Java today (Huffman et al. 2006, 2010, 2012; the volcanic peaks form highest elevations in the Digital Terrain Model that is used as the base map in Fig. 1). The stratovolcanoes of the *Homo erectus* period, like those in modern Java, often generated perennial river discharge (continuous flow fed by the mountainous concentration of rainfall) as well as periodic eruptions of voluminous volcanic material; the runoff and sediment combined to produce volcanic-derived sedimentary pulses, including slurries and sandy-gravelly floods that ravaged the river valleys for many kilometers downstream (Huffman et al. 2012).

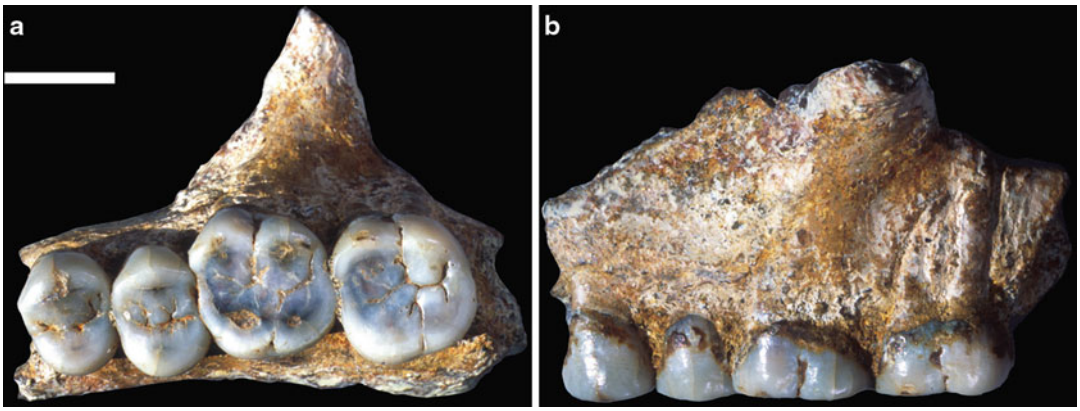

Java Man, Fig. 5 The Bapang maxilla from Sangiran, the earliest firmly dated fossil evidence of Java Man: A, Occlusal view; B, Lateral view (Zaim et al. 2011). © Russell L. Ciochon, Univ. of Iowa

Sangiran Dome

Vertebrate fossils have been collected since the mid-nineteenth century at the Sangiran Dome (Sg, Fig. 1), 65 km west of Trinil, but it was not until 1937 that G.H.R von Koenigswald, a paleontologist with the Geological Survey of the Netherland Indies, made the first of many *Homo erectus* finds there. Today, more than 80 specimens, or over 77% of all Indonesian fossil humans, derive from Sangiran Dome (Larick et al. 2001; Indriati 2004). Among the specimens is the most complete skull of Java Man known (Sangiran 17; Fig. 2). The word "Dome" in the name of the discovery area refers to the ovoid 4 by 8 km geological uplift (a structural dome) that exposes the fossiliferous beds. Many sites and stratigraphic discovery levels occur here, in contrast to the Ngandong, Mojokerto, and Trinil sites, where each discovery came from a single bed extending laterally less than a few hundred meters. Because the finds from Sangiran Dome are so important to the paleoanthropological record of Asia, UNESCO added the "Sangiran Early Man Site (Indonesia)" to the World Heritage List in 1996.

Sangiran Dome continues to yield both new *Homo erectus* finds and scientific insights into the evolutionary history the species. We highlight three examples. First, a 1.5 million-year-old *Homo erectus* upper jawbone (Fig. 5) from Sangiran Dome, when compared to *Homo erectus* material from China, Africa, and Georgia (central Asia), as well as with *Homo habilis* remains from Africa, seems to indicate that *Homo erectus* in East and Southeast Asia came from two separate populations. Evidently there was an early influx that reached Java and a later one that populated China (Zaim et al. 2011). Second, Sangiran Dome has been the site of a series of excavations in the last 40 years, and one of these (Ngebung) revealed several lithic artifacts and cut-marked bones along a Pleistocene ground surface (Semah and Semah 2006). This discovery is the best evidence yet of how Java Man used stone tools (Fig. 6). Equally, the finds serve to underscore how rare lithic artifacts and cut-marked bones are in *Homo erectus* beds of eastern Java, even in the prolific bonebeds excavated at Ngandong and Trinil. Third, because the geology of Sangiran Dome has been studied more intensely than other hominin-producing outcrop areas, it offers unique perspectives on the paleoenvironmental context of Java Man. The nature of the ancient soils and carbon isotope studies indicate that the earliest *Homo erectus* at Sangiran Dome encountered a low-relief lake-margin landscape dominated by moist grasslands with open woodlands in the driest landscape positions, while later in the Pleistocene, the hominin landscape had more riparian forests, local savanna, and open woodland (Bettis et al. 2009; Brasseur et al. 2015).

Several other sites in eastern Java help to show the extent of early hominin occupation in eastern Java. Hominin fossils were found with typical Pleistocene fauna at Patiyam, 90 km north of Sangiran Dome. Paleolithic artifacts (but no hominin fossils)

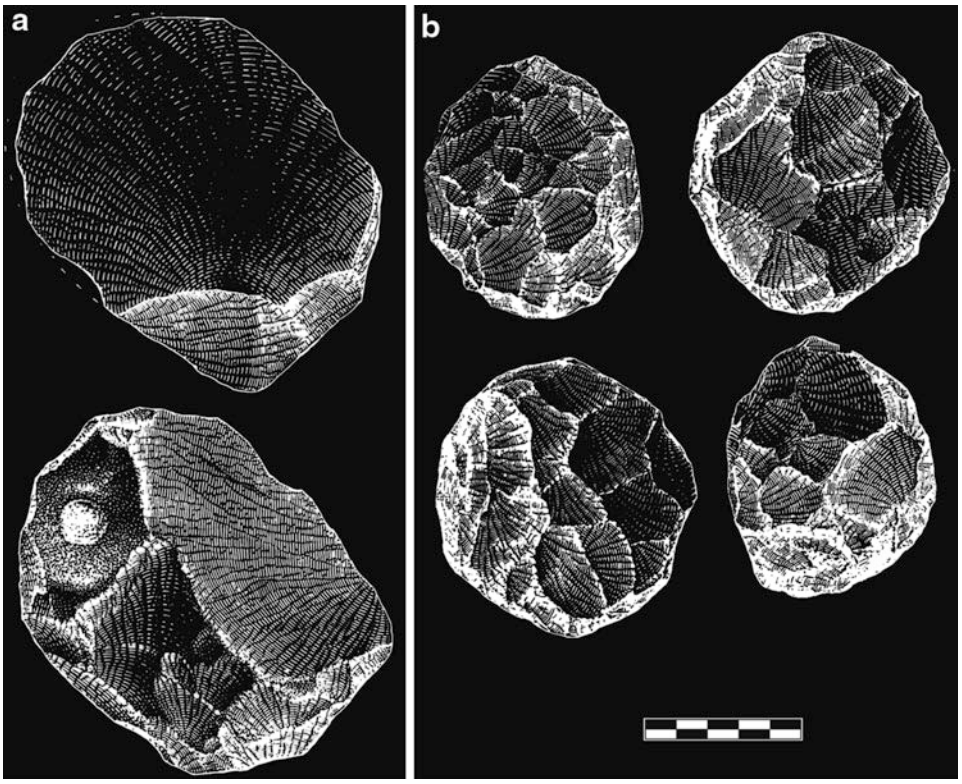

Java Man, Fig. 6 Stone artifacts from Ngebung, Sangiran: A, retouched flake; B, polyhedron tool. (Courtesy of © by Francois Semah, CNRS, France)

occur near Java's Indian Ocean coast in Song Terus cave, 75 km southeast of Sangiran Dome (St on Fig. 1; Semah and Semah 2006).

Summary

Both the origin and extinction of Java Man are subjects of continuing research. An East Asia source for Java Man was the leading scientific theory until the ascendency of African paleoanthropology during the 1960s. After that, the inferred origins and taxonomy of *Homo erectus* focused on Africa. Java Man represented a distant way point of an African-sourced dispersal. Interest now rests in a balance between African and Eurasian paleoanthropologic evidence. Particularly influential have been the discoveries of *Homo erectus georgicus* at Dmanisi, Republic of Georgia; Homo floresiensis, the "hobbit," of Flores Island, 1000 km east of Java; and the Denisovan populations of Northeast Asia (see *Dmanisi* in ▶ *Homo erectus*). *Homo erectus* or related ancestors inhabited western Asia more than 1.8 million years ago, as indicated by the fossils of this age at Dmanisi. *Homo erectus* likely reached Java by 1.6 million years ago upon evidence from the Sangiran Dome and possibly Mojokerto (Larick et al. 2001; Zaim et al. 2011). Even if Java Man emerged from an eastward-dispersing population of African origin, *Homo erectus* on the whole might have been most numerous in southern Eurasia with Java Man being one component of this widespread population. Whether Java Man was contemporaneous with *Homo sapiens*, as it dispersed out of Africa to Southeast Asia and Australia at around 40–60 thousand years ago, is not resolved. Firm dating of the Ngandong *Homo erectus* offers one opportunity to test this possibility.

Cross-References

▶ Dubois, Eugène
▶ *Homo erectus*
▶ Insular Southeast Asia in the Lower Paleolithic

References

Bettis, E.A., A.K. Milius, S.J. Carpentier, R. Larick, Y. Zaim, Y. Rizal, R.L. Ciochon, S.A. Tassier-Surine, D. Murray, Suminto, and S. Bronto. 2009. Way out of Africa: Early Pleistocene paleoenvironments inhabited by *Homo erectus* in Sangiran, Java. *Journal of Human Evolution* 56: 11–24.

Brasseur, B., F. Semah, A.-M. Semah, and T. Djubianto. 2015. Pedo-sedimentary dynamics of the Sangiran dome hominid bearing layers (Early to Middle Pleistocene, central Java, Indonesia): A palaeopedological approach for reconstructing '*Pithecanthropus*' (Javanese *Homo erectus*) palaeoenvironment. *Quaternary International* 376: 84–100.

Ciochon, R.L., F. Huffman, E.A. Bettis III, Y. Zaim, Y. Rizal, and Aswan. 2009. Rediscovery of the *Homo erectus* bed at Ngandong: Site formation of a late Pleistocene hominin site in Asia. *American Journal of Physical Anthropology* (Supplement 48): 110.

van den Bergh, G.D., K. Westaway, I. Kurniawan, M.J. Morwood, M. Moore, M. Storey, E. Setiabudi, and F. Aziz. 2014. A late Pleistocene flaking surface from the 20-m Solo River Terrace, Central Java, Indonesia. In *Conference program and abstracts of the 20th congress of the indo-Pacific prehistory association,* Siem Reap. p. 261.

Huffman, O.F., Y. Zaim, J. Kappelman, D. Ruez, J. de Vos, Y. Rizal, F. Aziz, and C. Hertler. 2006. Relocation of the 1936 Mojokerto skull discovery site near Perning, East Java. *Journal of Human Evolution* 50: 431–451.

Huffman, O.F., J. de Vos, A.W. Berhout, and F. Aziz. 2010. Provenience reassessment of 1931–1933 Ngandong *Homo erectus* (Java), confirmation of the bone-bed origin reported by the discoverers. *PaleoAnthropology* 2010: 1–60 http://www.paleoanthro.org/journal/content/PA20100001.pdf.

Huffman, O.F., B. Voight, J. de Vos, J.P. Johnson, A. Balzeau, and A.W. Berkhout. 2012. Volcanic mountains, river valleys and seacoasts – The paleoenvironment of *Homo erectus* in eastern Java (Indonesia), ed. C. Schlüchter, and J. Nietlispach, Special Issue. XVIII INQUA Congress, 21st–27th July, 2011, Bern. *Quaternary International* 279–280: 210.

Indriati, E. 2004. Indonesian fossil hominid discoveries from 1889 to 2003: Catalogue and problems. In *Proceedings of the 5th and 6th symposium on collection building and natural history studies in Asia and the Pacific Rim,* Tokyo, National Science Museum Monographs 24, 163–177.

Indriati, E., C.C. Swisher III, C. Lepre, R.L. Quinn, R.A. Suriyanto, A.T. Hascaryo, R. Grün, C.S. Feibel, B.L. Pobiner, M. Aubert, W. Lees, and S.C. Antón. 2011. The age of the 20 meter Solo River Terrace, Java, Indonesia and the survival of *Homo erectus* in Asia. *PLoS One* 6: e21562 http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjo1urnal.pone.0021562#references.

Joordens, C.A., F.P. Wesselingh, J. de Voss, H.B. Vonhof, and D. Kroon. 2009. Relevance of aquatic environments for hominins: A case study from Trinil (Java, Indonesia). *Journal of Human Evolution* 57: 656–671.

Joordens, J.C.A., F. D'errico, F.P. Wesslingh, S. Munro, J. de Vos, J. Wallinga, C. Ankjaergaard, T. Reimann, J.R. Wijbrans, K.F. Kuiper, H.J. Mucher, H. Coqueugniot, V. Prie, I. Joosten, B. van Os, A.S. Schulp, M. Panuel, V. van der Hass, W. Lustenhouwer, J.J.G. Reijmer, and W. Roebroeks. 2014. *Homo erectus* at Trinil on Java used shells for tool production and engraving. *Nature* 518: 228–231.

Larick, R., R.L. Ciochon, Y. Zaim, Suminto Sujijono, Y. Rizal, M. Reagan, and M. Heizler. 2001. Early Pleistocene $^{40}Ar/^{39}Ar$ ages for Bapang formation hominins, Central Jawa, Indonesia. *Proceedings of the National Academy of Sciences* 98: 4866–4871.

Ruff, C.B., L. Puymerail, R. Macchiarelli, J. Sipla, and R.L. Ciochon. 2015. Structure and composition of the Trinil femora: Functional and taxonomic implications. *Journal of Human Evolution* 80: 147–158.

Semah, F., and A.-M. Semah. 2006. Palaeolithic Settlements in the Southeast Asian Archipelagos: An Indonesian Perspective. In *Archaeology: Indonesian perspective: R.P. Soejono's Festschrift*, ed. T. Simanjuntak, M. Hisyam, B. Prasetyo, and T.S. Nastiti, 148–161. Jakarta: LIPI Press.

Shipman, P. 2001. *The man who found the missing link: Eugène Dubois and his lifelong quest to prove Darwin Right*. New York: Simon & Schuster.

Swisher, C.C., W.J. Rink, S.C. Antón, G.H. Curtis, and A. Suprijo Widiasmoro. 1996. Latest *Homo erectus* of Java: Potential contemporaneity with *Homo sapiens* in Southeast Asia. *Science* 274: 1870–1874.

de Vos, J. 2010. Chapter Twelve, Java. In *Evolution of Island mammals: Adaptation and extinction of placental mammals on Islands*, ed. A. van der Geer, G. Lyras, J. de Vos, and M. Dermitzakis, 172–189. West Sussex: Wiley-Blackwell.

Yokoyama, Y., C. Falguères, F. Sémah, T. Jacob, and R. Grün. 2008. Gamma-ray spectrometric dating of late *Homo erectus* skulls from Ngandong and Sambungmacan, Central Java, Indonesia. *Journal of Human Evolution* 55: 274–277.

Zaim, Y., R.L. Ciochon, J.M. Polanski, F.E. Grine, E.A. Bettis III, Y. Rizal, R.G. Franciscus, R.R. Larick, M. Heizler, K.L. Eaves, Aswan, and H.E. Marsh. 2011. New 1.5 million-year-old *Homo erectus* maxilla from Sangiran (Central Java, Indonesia). *Journal of Human Evolution* 61: 363–376.

Jenne-Jeno, Archaeology of

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Introduction

Jenne-jeno is an ancient city in the Middle Niger floodplain of the Niger River in present-day Mali. It was the first indigenous city recognized in Africa south of the Sahara, contradicting the long-held assumption that African cities were initially colonies of or in some way stimulated by Greco-Roman, Punic, or Egyptian urbanism north of the desert. It is the signature African site in one of many urban landscapes around the world that have pressed in new dimensions the debate about the degree to which centrally organized, hierarchical or horizontally organized, "distributed" cities deal better with resilience, sustainability, and demographic expansion (Anderson and Rathbone 2000; Crumley 1979). Jenne-jeno is one of scores of specialist-occupied settlements, separate but clustered together in an original city plan labeled the Jenne-jeno Urban Cluster. Notable also is the lack of evidence to date for kings, state apparatus, and indeed for a hierarchical power structure. Although other Middle Niger cities are coming to light that apparently predate this site's third-century foundation, Jenne-jeno serves for africanists as the type site for heterarchical (nonhierarchical) authority at an early city.

Definition

Early African city lacking expected evidence of kings and hierarchical power apparatus, all things once thought to be necessary to bind together the inhabitants.

Key Issues/Current Debates

Jenne-jeno rises seven meters high over Mali's Middle Niger floodplain (Fig. 1), a *tell* that would not be out of place in Mesopotamia. Jenne-jeno's descendant town, Jenne, lies three kilometers away; its present-day inhabitants walk about on nine meters of ancient city deposits. Within four kilometers are seventy tells in total, apparently all occupied contemporaneously with Jenne-jeno, and most abandoned at the same time, around AD 1400 (R. McIntosh 1998 & 2005). Many were founded simultaneously with Jenne-jeno in the third century B.C. In fact, in the 55,000 square kilometers of the seasonally inundated Middle Niger floodplain, there are many hundreds of similar mounds. In the roughly 170,000 square kilometers that were flooded yearly within the past four to five millennia (much now in the deepest Sahara), there are hundreds of tells more. Yet, as recently as the mid-1970s this was not recognized as an urban landscape.

During Colonial times, multiple archaeologists walked over the site (Mauny 1961), missing entirely its age and significance, because utterly lacking on the surface were palaces, temples, and other indicators of "civilization." As we shall see, Jenne-jeno is indeed a "city without citadels" – and that is its greatest importance to world prehistory. Later, in the late 1970s, archaeologists came armed with new theory and excavation and survey methodologies that allowed them first to recognize and then to plumb the evolution, not just of city Jenne-jeno, but of what we now call the "Jenne-jeno Urban Complex." As large and as heterogeneous as the principal site was, it was only a part of a 70-site cluster that, together, provided urban services and manufactures to a hinterland of many thousands of square kilometers – and ultimately to the sister-city of Timbuktu over four hundred kilometers downstream at the Saharan fringe.

From its foundation, Jenne-jeno served as the focus of long-distance trade networks that linked gold and forest goods producers far to the south with those who brought the semi-precious stone and salt of the Sahara (and eventually metal goods, beads, and books from North Africa). The growth of the town is a story of ever growing numbers of craftspersons adding value to the raw materials brought by traders and building a vast exchange covering large parts of the Middle Niger

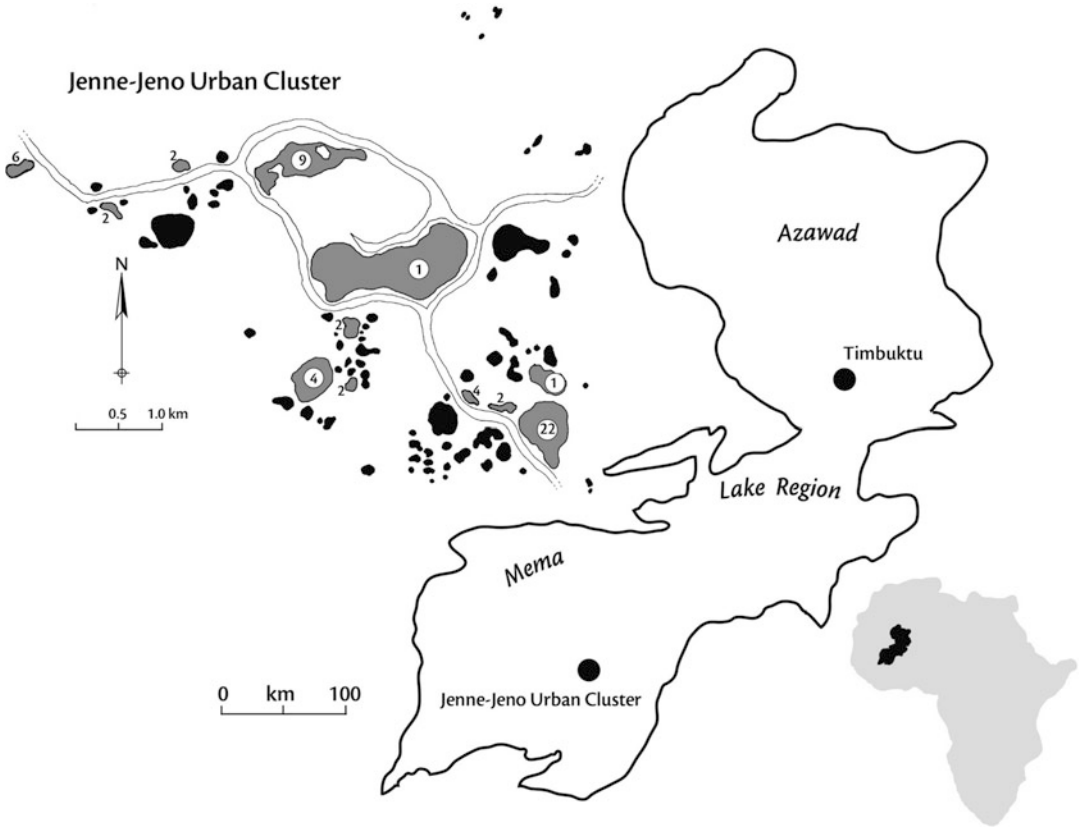

Jenne-Jeno, Archaeology of, Fig. 1 Location of Jenne-jeno and of the Jenne-jeno Urban Cluster in the Middle Niger of Mali, West Africa. Numbers associated with sites of the Clusters denote numbers of units excavated (e.g., 22 = Jenne-jeno)

and western Sahel. The relative homogeneity of the ceramic assemblages over this vast area attest to the commercial strength of the town (S. McIntosh 1995), a dominance that appears not to have been matched by any political hegemony.

Archaeologists once denoted a city by its citadel and palace, the associated residences of the elites, and the splendid temples in which kingship and its relation to the gods was celebrated (Yoffee 2005). Curiously, at Jenne-jeno no elite residences, no public architecture nor monuments, much less a king's palace have been located despite extensive excavation. What the site does provide in ample volume is evidence of multiple occupations, multiple manufacturing areas and multiple "identity groups" as indicated by a great diversity of contemporaneous burial practices. After some 35 years of controlled stratigraphic excavations at some 22 units spread over the 33 hectare area of the site, we have a plot of how that occupational and identity diversity burgeoned from the relatively simple (yet quite large at 20 hectare) community at its founding in the third century B.C. Note that sinking so many excavation units, some as large as 10 meters by 6 meters, into the 7 meter (and more) deep deposits is absolutely necessary when one is investigating the emergence and evolution of complex society, that is, complex mix and dynamics of interactions of multiple corporate groups (defined as self-identified groups that hold real or symbolic property in common).

Sinopoli et al. (2015) discuss the concept of the "distributed" cities, those in which power and authority appear to be arrayed quite differently that in the "classic" Mesopotamian urban seats of kings, militarized control agencies, and

hierarchical bureaucracies. The more horizontal distribution of decision making, however, raises its own set of questions about how these populations respond to crises (when a lag in response may have dire consequences), if there are "natural limits" to absolute population size or to the numbers of autonomous ethnic or corporate groups that can be integrated and, ultimately, can distributed power endure?

A complication to the archaeologist's tasks is the tight clustering of nearby settlements in a density that roughly decreases with distance from the principal site. What does clustering mean? One way to answer that question is to surface collect artifacts and surface features (burials, house foundations, etc.) from all the sites in order to ask the question: are there anomalous concentrations of certain artifacts or features, compared to the range and relative proportions at Jenne-jeno that reveal special activities concentrated at different locales? Take the case of iron smelting. This is a dirty, hot, and noisy activity, one that is today locally associated with the production of highly dangerous occult power. Not something one wants next door. Through the Jenne-jeno sequence, we see the migration of smelting from the focus site to multiple satellites. Adding to the tasks of sampling the activities at the main site, the urban archaeologist also must study the activities in each of the satellite sites. Already in the first season of surface collection in the Jenne-jeno Urban Complex, we detected a pattern of mutual exclusivity, or near-exclusivity, of activities at satellites.

A considerable degree of concentration of activities (especially, iron working, various styles of fishing, hunting aquatic mammals and snakes, weaving) continues to be the best explanation for the nonuniform, nonrandom distribution of surface and stratified artifacts in the Jenne-jeno Urban Complex. What does this clustering mean and what does this landscape say, potentially, about the distribution of power and authority within the larger community?

Some three and a half decades of research in the Jenne region allows us to say several things, with considerable confidence, about how this society was structured. First, clustering appears to have been a solution to the problem of how different specialist corporations might maintain and display their distinct identities, while at the same time having immediate access to other providers of needed goods and services and access to those to whom they themselves provide materials (Trigger 1972). One needs at the same time to answer the question: "Who monitors or controls the exchange of those manufactures and services?" An older theory of the nature of cities would have answered: "the king and his administration, backed up by force, of course (McIntosh 1999)." However, in the case of the Jenne-jeno Urban Cluster, we appear to have an exchange system that functioned organically through the relations of reciprocity forged among corporate groups. If corporate groups were defined unambiguously, and expectations and rules of reciprocity, including consequences if the rules were transgressed, the urban system would not have required a vertically hierarchical control structure – which in fact we do not see. Rather, corporate ownership of individual mounds by members of an occupationally defined/kin group is indicated by the archaeological data indicating near-exclusivity of occupational debris at each of the satellite sites.

Second, we have no hard evidence of a state-like, top-down, elite-driven political engine powering this kind of urbanism through time. We find no indications of kings, citadels, palaces, or indeed, any obvious elites. The political and economic organization of late first millennium B.C. and later urbanism in the Middle Niger seems heterarchical. That is, one identifies separate, if sometimes overlapping, domains of authority, all functioning in an interactive field, not a vertical hierarchy of kings and subjects and unidirectional flows of information.

Recent research reveals cities even earlier than Jenne-jeno and especially a "preurban" landscape in the northern reaches of the Middle Niger (Méma, Lakes Region and Timbuktu) (Park 2010; Togola 1996) and further north into the (Mauritanian and Malian Azawad) Sahara (MacDonald 2011) that was potentially several millennia in the making. This "preurban" landscape includes the creation of specialized sites

and activities in a regional economy (a self-organizing landscape in the language of complex systems (R. McIntosh 2005)). This landscape displayed great resilience in a challenging environment as the Sahara transformed from a well-watered savanna (with vast lakes) as late as the fourth millennium B.C. to its present condition by the late third or early second millennium.

References

Anderson, David M., and R. Rathbone. 2000. Urban Africa. Histories in the making. In *Africa's urban past*, ed. David M. Anderson and R. Rathbone, 1–17. Oxford: James Currey.

Crumley, Carole. 1979. Three locational models: An epistemological assessment of anthropology and archaeology. In *Advances in archaeological method and theory*, ed. Michael B. Schiffer, vol. 2, 141–173. New York: Academic Press.

Macdonald, Kevin C. 2011. Dhar Néma: From early agriculture to metallurgy in Southeastern Mauritania. *Azania* 46 (1): 49–69.

McIntosh, Roderick J. 1998. *The peoples of the Middle Niger*. Oxford: Blackwell.

McIntosh, Roderick J. 2005. *Ancient Middle Niger. Urbanism and the self-organizing landscape*. Cambridge: Cambridge University Press.

McIntosh, Susan Keech, ed. 1995. *Excavations at Jenne-jeno, Hambarketolo and Kaniana: The 1981 season*, University of California Monographs in Anthropology. Berkeley: University of California Press.

McIntosh, Susan Keech, ed. 1999. *Beyond chiefdoms. Pathways to complexity in Africa*. Cambridge: Cambridge University Press.

Mauny, Raymond. 1961. *Tableau Géographique de l'Ouest Africain au Moyen Age, d'Après les Sources Ecites, la Tradition, et l'Archéologie*, Mémoire de l'Institut Fondamental de l'Afrique Noire. Vol. 61. Dakar: I.F.A.N.

Park, Douglas P. 2010. Prehistoric timbuktu and its hinterland. *Antiquity* 84: 1–13.

Togola, Téréba. 1996. Iron age occupation in the Méma region. *African Archaeological Review* 13: 91–110.

Trigger, Bruce. 1972. Determinants of growth in pre-industrial societies. In *Man, settlement and urbanism*, ed. Peter Ucko, Ruth Tringham, and David Dimbleby, 575–599. London: Duckworth.

Yoffee, Norman. 2005. *Myths of the archaic state*. Cambridge: Cambridge University Press.

Sinopoli, Carl a M., Roderick J. McIntosh, Ian Morris, and Alex R. Knodell. 2015. The distribution of power: Hierarchy and its discontents. In *Cambridge history of the world*, A world of cities, ed. Norman Yoffee, vol. 3, 381–393. Cambridge: Cambridge University Press.

Jennings, Jesse D.

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Basic Biographical Information

Jesse D. Jennings was born in Oklahoma City July 7, 1909, and died at his home in Siletz, Oregon, on August 13, 1997. Married for some 60 years to Jane Chase Jennings, he left behind two sons, David and Herbert, and three grandchildren. The son of hard-scrabble dirt farmers, Jennings worked his way through Montezuma College in Hot Springs, New Mexico, graduating in 1929 and entering the University of Chicago graduate program the same year. There he supported himself by working on the campus grounds crew, as a hospital orderly, as a campus policeman, as an archaeological field worker, and ultimately as a holder of the Anthropology Department's coveted Ryerson Fellowship. After beginning with Robert Redfield and others in cultural anthropology, Jennings was drafted by department head Faye-Cooper Cole to serve in Chicago's archaeological field school, where he progressed rapidly into a supervisory role at sites in Illinois, the Southeastern USA, and beyond. This set him on the archaeological track that he followed the rest of his life (Jennings 1994). His Chicago Ph.D. dissertation, completed during WWII when he was serving as a Naval Officer in Newfoundland, was *The Site Kaminaljuyu and Its Contribution to Certain Problems of Mesoamerican Prehistory* (Jennings et al. 1946).

For some years after WW II, Jennings worked in the realm of archaeological stewardship for the US National Park Service in the American Southeast, Southwest, and Plains, during the early developmental phase of what we now call Cultural Resource Management (CRM) archaeology. In 1948, he joined the Department of Anthropology at the University of Utah, a position he held until his 1986 retirement at the rank of Distinguished Professor Emeritus. Jennings moved in

Jennings, Jesse D., Fig. 1 Jesse D. Jennings

his later years to the Oregon Coast, where he and his wife lived near their son Herb and his family and for many of these years taught a hugely popular spring seminar to worshipful graduate students of the University of Oregon Department of Anthropology (Fig. 1).

Major Accomplishments

Jennings distinguished himself early on, and throughout his highly active career, by a strong emphasis on strategically conceived and rigorously executed excavation, meticulously documented. His interpretive paradigm, applied over a long career to researches in the American Midwest and Southeast, Guatemala, the North American Plains, Southwest, Great Basin, and the Pacific Islands, was firmly based on ethnographic analogy and a direct historical approach that yielded him rich historical and ecological perspectives in all these settings.

Jennings' research at Danger Cave, a deep, dry grotto overlooking the final Pleistocene shoreline of Pluvial Lake Bonneville in far western Utah, was pathbreaking in its execution and dramatically rich in its conclusions and remains today his single greatest contribution to our understanding of North American prehistory (Jennings 1957). Making comparisons among the well-preserved material culture, flora, and fauna of Danger and other dry cave sites, and calling attention to many thoroughgoing congruencies between archaeological inventories and ethnographic accounts all across the region, Jennings described a Great Basin Desert Culture that was widespread, ancient, and stable in its fundamentals, maintaining the same basic adaptive patterns from about 10,000 years ago down to the nineteenth century.

The evidence and argument Jennings marshaled established a conception that will forever influence archaeologists' thinking about prehistoric hunter-gatherer cultural ecology in the American Desert West and similar situations elsewhere on the planet. Jennings' original presentation was broad and generalizing, but more closely focused applications of the same ecologically informed approaches are today also yielding important insights into more closely defined regional and local social economies across the same region.

Another major Jennings accomplishment was his focal role in creating the University of Utah Museum of Natural History, an effort that spanned in all more than 20 years. With the museum at last installed in the fine old campus library in 1973 and legislative funding assured for its continuance, he resigned as director, passing the job on to his longtime curator of exhibits. The museum has continued to flourish as a world-class research facility and contributor to public education, and as this is written, the University of Utah has just moved it into a new multimillion dollar building on its upper campus that magnificently expands and carries on Jennings' legacy.

In another aspect of his archaeological career, Jennings entered early into the writing and editing of synthetic archaeological volumes directed to peers and students (Jennings 1968, 1986). *Prehistoric Man in the New World* (1964), coedited with Edward Norbeck, and *Prehistory of North America* (1968), gave students and teachers two of the first textbook syntheses of the continent's archaeology, each continuing through three editions. In addition, *The Prehistory of Polynesia* (1978b) brought together under his

editorship synthetic essays by more than a dozen prominent students for a first-time summation of this vast area's long human history. His Glen Canyon (1966) and Prehistory of Utah and the Eastern Great Basin (1978a) brought together decades of work he conducted with generations of students.

Professional Awards and Honors

Editor of *American Antiquity* 1950–1954; Executive Board of the American Anthropological Association 1953–1956; Viking Medalist in Archaeology 1958; President, Society for American Archaeology 1959–1960; Vice-president and Section H Chairman, American Association for the Advancement of Science 1961, 1971. University of Utah Distinguished Professor 1974, Doctor of Science 1980. National Academy of Sciences 1977. Society for American Archaeology Distinguished Service Award, 1982. Distinguished Service Award, Society for Conservation Archaeology 1982. Plenary session speaker at the Society for American Archaeology 50th Anniversary Celebration, 1985. Jesse D. Jennings Prize for Excellence established by the Great Basin Anthropological Conference, 1990. A.V. Kidder Medal for Achievement in American Archaeology 1995.

Cross-References

► North American Plains: Geography and Culture

References

Jennings, J.D. 1957. *Danger cave*, Society for American archaeology memoir 14. Washington, DC: Society for American Archaeology (also published as University of Utah Anthropological Papers 27).

Jennings, J.D. 1966. *Glen canyon: A summary*, University of Utah anthropological papers 81. Salt Lake City: University of Utah Press.

Jennings, J.D. 1968. *Prehistory of North America*. New York: McGraw-Hill.

Jennings, J.D. 1978a. *Prehistory of Utah and the eastern Great Basin*, University of Utah anthropological papers 98. Salt Lake City: University of Utah Press.

Jennings, J.D., ed. 1978b. *The prehistory of Polynesia*. Cambridge: Harvard University Press.

Jennings, J.D. 1986. *Handbook of North American Indians, volume 11: Great Basin*. Washington, DC: Smithsonian Institution.

Jennings, J.D. 1994. *Accidental archaeologist*. Salt Lake City: University of Utah Press.

Jennings, J.D., and E. Norbeck, eds. 1964. *Prehistoric man in the new world*. Chicago: University of Chicago Press.

Jennings, J.D., A.V. Kidder, and E.M. Shook. 1946. *Excavations at Kaminal Juyu, Guatemala*, Carnegie institution of Washington publication 561. Washington, DC: The Carnegie Institution of Washington.

Jericho Archaeological Site

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Introduction

The transition between foraging and food-producing economies from the Levantine Late Natufian through to the Pottery Neolithic, at times envisioned by researchers as the period of *Neolithic Revolution,* is widely recognized as representing a crucial threshold in human prehistory. As seen with the excavations of Jericho, it is this period that we see profound changes in subsistence practices and economy, the emergence of the first villages, explosive population growth who settle down in these villages occupied on a year-round basis, and the reorganization of the processes and structures by which human social interactions occurred. This is most noticeable with the development of large community structures, such as the large Neolithic tower of Jericho excavated by K. Kenyon, and densely packed villages of rectangular mud brick residential buildings that came to characterize residential architecture since this point.

Definition

Tell el-Sultan, better known as the ancient site of Jericho, is situated in the Palestinian Autonomous

Authority, north of Wadi el-Mafjar on a moderately sloping plain formed by the Late Pleistocene Lisan Lake. Rising as a mound some 26–39 ft. (8–12 m) above the current landscape, the site of Jericho covers an area of at least 30,000 square yards (25,000 m^2) and is oval shaped, with its long axis oriented along a north-south line.

Key Issues/Current Debates/Future Directions/Examples

As a historical, biblical, and archaeological location, the settlement of Jericho provides insight into the appearance of the world's first villages in the Neolithic period, development of early Neolithic agriculture, the forager-farming transition of the Ancient Near East more generally, and the emergence of Bronze Age urbanism. Originally intrigued by the biblical tale of the walls of Jericho, many early archaeologists undertook biblically oriented excavations at Jericho. The earliest of these archaeologists was C. Warren, who excavated a series of deep, and remarkably unsafe, shafts into the mound in 1873. Following this, E. Sellin and C. Watzinger (1907–1908) opened up a series of trenches and were followed by the extensive excavations of J. Garstang (1930–1936). Focusing on the Early and Middle Bronze Age occupation, these researchers demonstrated that in the Bronze Age, Jericho was enclosed by a defensive wall system with a number of elongated rectangular towers. Jericho appears to have been continually occupied into the Middle Bronze Age, indicated by the extensive cemetery, with vertical shaft tombs and underground burial chambers. In the Middle Bronze Age, the town was expanded with the construction of glacis defensive fortifications. The elaborate burial offerings placed in some of the tombs of this period may reflect the emergence of local rulers. After destruction in the Late Bronze Age, Jericho no longer served as an urban center.

The early excavations at Jericho also revealed something totally unexpected: evidence for a Neolithic preagricultural village as well as preagricultural settlement of what we now know to be sedentary people living on wild plants and animals. Sellin and Watzinger and, later, Garstang uncovered remains of an earlier Neolithic settlement. Intrigued by these materials, Dame K. M. Kenyon undertook large-scale excavations of the prepottery Neolithic occupation at Jericho from 1952 to 1958 (Kenyon 1957, 1981). Kenyon's excavations demonstrated that Jericho was originally founded by sedentary foragers/collectors in the Natufian period (12,800–10,500 BP), living in large semi-subterranean oval stone structures, although it is unclear how extensive this occupation was. With the introduction of domesticated plants in the Pre-Pottery Neolithic A period (PPNA) (c. 11,700–10,500 cal. BP), Jericho mushroomed into a large regional agricultural community, covering an area of some 300 square yards (25,000 m^2). Villagers, like those of the nearby sites of Netiv Hagdud and Gilgal I, lived year-round in roofed, oval semi-subterranean dwellings and engaged in long-distance trading of Anatolian obsidian and shells from the Mediterranean and the Red Sea (Kuijt & Goring-Morris 2002). Living on domesticated and wild plant crops as well as hunting of wild game, adult individuals were buried in single graves, frequently with their cranium later removed to secondary locations.

Excavations at Jericho illustrated that this early Neolithic communities consisted of several hundred people, with systems of food storage and with sufficient labor to construct large community facilities. Kenyon's excavations of the PPNA layers at Jericho uncovered a spectacular large circular stone tower situated just inside of a 12-ft-high (3.6-m-high) perimeter wall (Fig. 1). Made of field stones, the tower was 28 ft. (8.5 m) in diameter, preserved to a height of 26.5 ft. (8 m), and had an internal staircase (Fig. 2). Kenyon argued that the tower and walls comprised an early defensive system. O. Bar-Yosef (1986) has questioned this view, arguing that the tower and perimeter wall served as a water diversion system to protect the PPNA occupants from winter floods. It is also possible that the western wall, which does not totally surround Jericho, facilitated the ponding of water so as to support agricultural and a waterfowl habitat. Elsewhere, Kuijt (1996) points out that at a later

Jericho Archaeological Site, Fig. 1 Pre-Pottery Neolithic A period tower of Jericho in trench I and squares FI and DI. Note the height of the tower, illustrated by excavators standing on top of and below the building, the square entrench to the staircase that goes to ground level, and the upper surface of the tower illustrate that the building was built in two periods and the outer surface was covered by mud. (From Kenyon 1981, Plate 5)

point, the tower was abandoned and the internal staircase was used for burials. It is puzzling to note, however, that even with the stairway being blocked off, the tower continued to have stood 5 or more meters above the ground surface and existed as a major building visible from some distance.

Over the last 20 years, research at several archaeological sites, such as Göbekli Tepe, Dhra', and WF 16, has illustrated that early villagers created corporate structures for food storage, community events, and perhaps seasonal feasts and mortuary ritual. There is active debate among researchers of how representative these structures were of life within Neolithic villages and how they would have been used as physical locations for human action. Excavation of Neolithic Jericho provides important insights into the question of the construction, use, and frequency of community buildings. For example, given that Kenyon opened up a surface area of less than 5% of the total surface area of Jericho, it is likely that the tower she identified and excavated was only one of many stone towers at Jericho. When she started excavations in 1952, the tower was invisible, and she had no idea what was below the ground surface. In light of the total surface area of the mound, it is entirely possible that there are four or more other Neolithic towers at Jericho.

Even if this is the only tower at Jericho, the construction of this building represents a major input of community labor that was far beyond the labor required to construct an individual home or the harvesting of plants. What this shows us, in brief, is that Jericho was not only a village of individual households who pooled labor for seasonal agricultural tasks: it was a village where household members cooperated in the construction of one or more large monumental buildings. This is all the more surprising when one realizes that these people were cultivating wild plants and hunting wild animals.

With the appearance of domesticated goat and sheep in the Pre-Pottery Neolithic B period (PPNB) (10,500–8700 cal. BP), significant changes occurred at Jericho and the rest of the Levant (Kuijt and Goring-Morris 2002). The village was expanded, with a greater number of residential buildings placed in relatively close proximity to each other and with the development of new ground and chipped stone technologies. The rectangular buildings were free standing and with fences, walls, and alleyways, would have created a complex village layout with single-story mud houses, courtyards, areas for stock, and homes for several hundred people. The PPNA tower and perimeter walls were abandoned, and PPNB villagers built rectangular (4 by 8 m) houses with painted red and white lime plaster floors (Kuijt 2000) (Fig. 3). Displaying continuity with earlier burial practices, PPNB villagers buried their dead in a wide range of locations within the settlement, and more specifically, in close proximity to their homes. Burial practices often included skull removal as part of an elaborate and highly complex system of defleshing and secondary interment of part of the

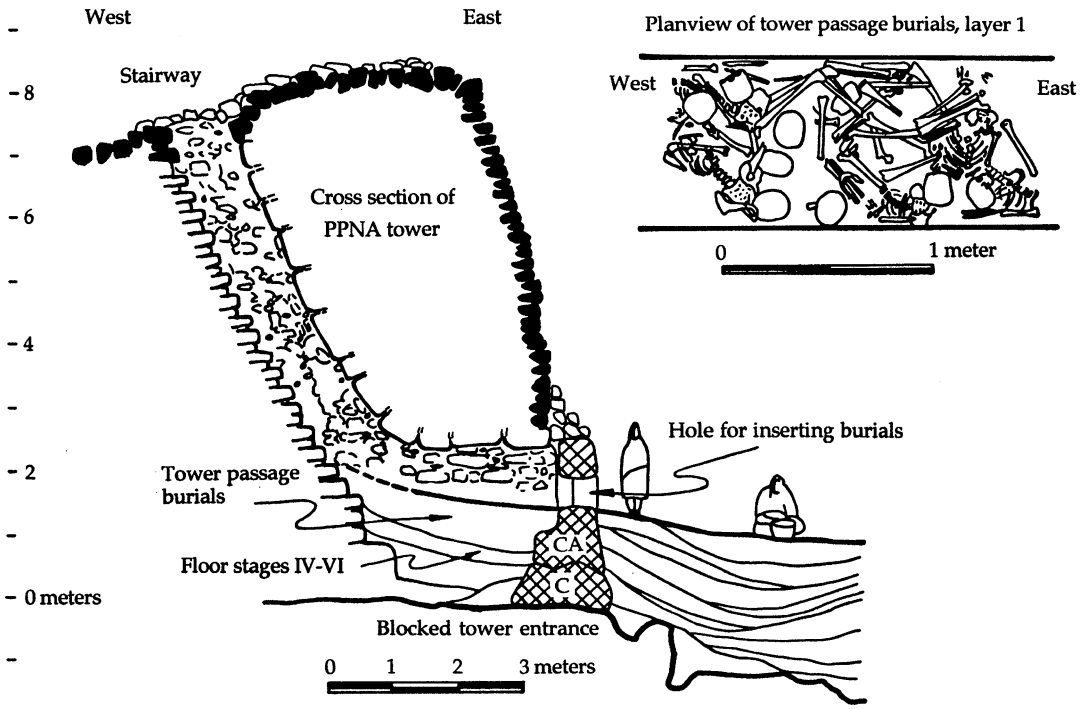

Jericho Archaeological Site, Fig. 2 Cross section of the Pre-Pottery Neolithic A period tower of Jericho. (From Kuijt 1996). Note how steep the stone stairway is and size of the tower

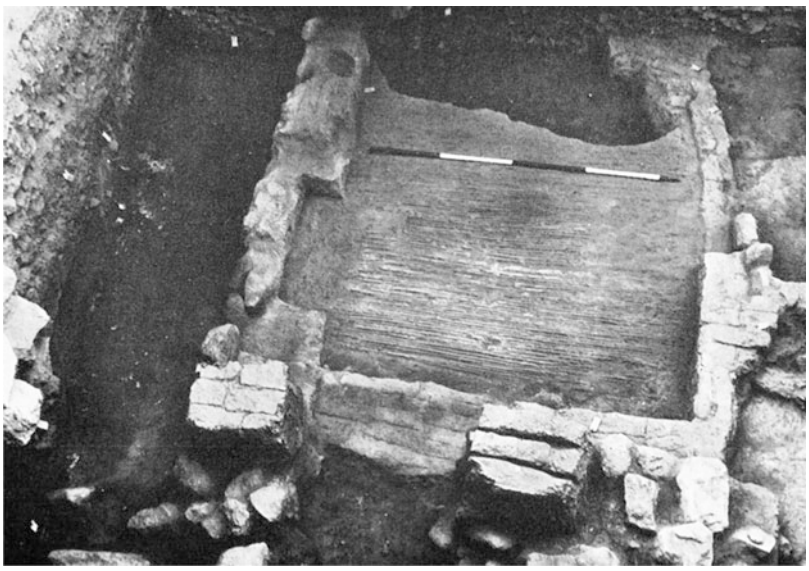

Jericho Archaeological Site, Fig. 3 Floor plan of partially preserved Pre-Pottery Neolithic B rectangular house of mud bricks of phase DI.xlii, showing reed foundation for plaster floor. The walls are made of hand-formed mud bricks that were stacked on top of each other to make an upright wall. (From Kenyon 1981, Plate 49b)

human body. Villagers often cached multiple human skulls beneath house floors and courtyard areas as well as individual skulls in a wider range of locations. Evidence of plastered human skulls, at times with inset saltwater shells for eyes and painted representations of hair and other facial features, clearly indicates the practice of a complex form of ancestor worship and the emergence of more complex social and ritual organizations. Villagers also developed new

ways of making chipped and ground stone tools, including the expanded use of pressure flaking to make new projectile point forms and the development of naviform core reduction to systematically create blanks for tools, and developed new ways of manufacturing grinding stones to facilitate the grinding of domesticated plants. Other important stone tool technologies involved the production of ground stone beads and other stone ornaments.

Kenyon's excavations of the Neolithic deposits clearly demonstrated that as one of the earliest and most important agricultural villages in the Jordan Valley, Jericho existed as a regional focus for the trade of exotic goods and agricultural products and possibly as a major location for ritual. As one of the, if not the most, extensively reported Neolithic sites in the southern Levant, our archaeological knowledge of Jericho serves as the foundation for understanding Neolithic cultural chronology, the emergence of agriculture, and the development of complex social organization in the Levantine Neolithic period.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Braidwood, Robert John
- ▶ Çatalhöyük Archaeological Site
- ▶ Çayönü: Agriculture and Domestication
- ▶ Göbekli Tepe: Agriculture and Domestication
- ▶ Households in the Ancient Near East, Archaeology of
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Plant Domestication and Cultivation in Archaeology

References

Bar-Yosef, O. 1986. The walls of Jericho: An alternative interpretation. *Current Anthropology* 27: 157–162.

Kenyon, K.M. 1957. *Digging up Jericho*. New York: Praeger.

Kenyon, K.M. 1981. *Excavations at Jericho, volume 3: The architecture and stratigraphy of the tell*. London: British School of Archaeology in Jerusalem.

Kuijt, I. 1996. Negotiating equality through ritual: A consideration of late Natufian and Pre-Pottery Neolithic A period mortuary practices. *Journal of Anthropological Archaeology* 15: 313–336.

Kuijt, I. 2000. People and space in early agricultural villages: Exploring daily lives, community size and architecture in the late Pre-Pottery Neolithic. *Journal of Anthropological Archaeology* 19: 75–102.

Kuijt, I., and N. Goring-Morris. 2002. Foraging, farming, and social complexity in the Pre-Pottery Neolithic of the southern Levant: A review and synthesis. *Journal of World Prehistory* 16: 361–440.

Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of

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Introduction and Definition

Jerusalem القدس ירושלים (UTM: 31°47′N 35°13′E) sits at the heart of the highlands that run down the center of Palestine, bounded by the Syro-African Rift in the east and the limestone foothills of the Shephelah and the coastal plain to the west. A Mediterranean climate characterizes the Judaean hills, with wet cool winters strongly contrasting with hot very dry summers. The limited rainfall is augmented in Jerusalem by the existence of the prolific Gihon spring, whose difficult topographical location has long influenced the layout of the city. Jerusalem is spread over several hilly spurs, with the Kidron Valley on the east and the Hinnom Valley on the west. The city is divided by the Tyropoeon Valley with Mount Moriah on its eastern side.

Jerusalem has a history of six millennia, one of the most ancient continually settled cities in the world. Jerusalem has been Judaism's holiest city and spiritual center since the Iron Age; it is the site of the crucifixion and resurrection of Jesus Christ and the destination of the night flight (*Miraj*) of Mohammed. Mount Moriah, Jerusalem's acropolis, has formed the locus for religious tradition and

worship from the time of the Canaanite tribe of Jebus, through its role as the Temple Mount upon which two Jewish temples were both built and destroyed, as the site of the Roman temple of Jupiter Capitolinus, and as the location of the Noble Sanctuary (*el-Haram es-Sharif*) that contains the Dome of the Rock and the el-Aqsa Mosque, the last of which is outside the temporal framework of this entry. In addition to its place in the Old Testament, Jerusalem is important to Christians for its central place in the life of Jesus, especially for the events of the last week of his life. As a result of these events Jerusalem became the site of some of the most important shrines of Christianity.

Key Issues/Current Debates

The Hellenistic and Early Roman Periods: Second Temple Jerusalem

After Alexander the Great conquered the Persian Empire in 333–332 BCE, Jerusalem fell under Seleucid and Ptolemaic control and cultural influence. Disputes concerning the influence and imposition of Hellenism culminated in rebellion. As a result of the Maccabean revolt Jerusalem became the capital of the independent Hasmonean Kingdom for some hundred years, till a dynastic dispute led to Roman intervention and Judaea becoming an autonomous Hasmonean province. After the Romans appointed Herod as a client king around 19 BCE, he proved to be a dominant ruler whose work in the city influences the urban form of Jerusalem even today. Herod renovated the Temple, constructed major additions to the surrounding complex, and built new streets and walls. After Herod's death in 4 BCE, Judaea came under direct Roman rule and was governed by Roman procurators and Herod's successors until the Jewish population rebelled in 66 BCE. The future emperor Titus, leading the tenth Roman Legion Fretensis, reconquered and destroyed much of Jerusalem, including the Temple in 70 CE, an event commemorated on the Arch of Titus in Rome.

In the mid-second century BCE, the Hasmoneans encircled the Temple Mount, the City of David, Mount Zion, and the western hill with defensive walls that incorporated earlier walls of the Iron Age. The line of the new wall, known as the "First Wall," reached the Hippicus Tower, at the site of the medieval citadel. Sections of this wall have been excavated at a number of sites. In the first century BCE the "Second Wall" was built to enclose a new neighborhood between the Gennath Gate and the Antonia fortress, but it excluded Golgotha, the future site of the crucifixion, which was outside the city walls. In the first century CE King Agrippa enclosed Bezetha, an extramural suburb north of the city, within the "Third Wall," including the Psephinus Tower. The latter wall was only completed shortly before the Great Revolt (Fig. 1).

Dominating the Temple Mount was the Antonia fortress, which Herod constructed over an earlier Hasmonean fortress known as the Baris. The Antonia was a tetrapyrgion, a heavy rectangular building with four corner towers. On the opposite western edge of the city was a citadel incorporated within the walls and comprising three massive towers known as Hyppicus, Phasael, and Mariamne. To the south of the citadel was Herod's magnificent palace, for which Josephus provides detailed description of its opulent decoration. Its retaining walls have been exposed.

On the western hill, known as the Upper City, an elite residential quarter for the temple priests was set. Excavated palatial mansions consist of multistoried courtyard houses decorated with mosaic pavements and walls covered with colorful frescoes in Pompeiian style. Ubiquitous ritual baths (*miqve*) essential for Jewish ritual purification were found in all of these structures. A further mansion has been exposed in the lower Tyropoeon Valley; it shows that aristocratic dwellings were common within the city walls.

The growth of Jerusalem was guaranteed by the supply of water to the city through two sinuous aqueducts. These brought water from sources located 20 km to the south to the Tower pool near the citadel and the many cisterns cut below the Temple Mount. Additional spring water continued to fill the Siloam pool in the south, while runoff was collected in a pool beside the Antonia fortress from the Bezetha stream and in the nearby Bethesda pool.

The Temple prior to King Herod seems to have been relatively small. Thereafter, royal

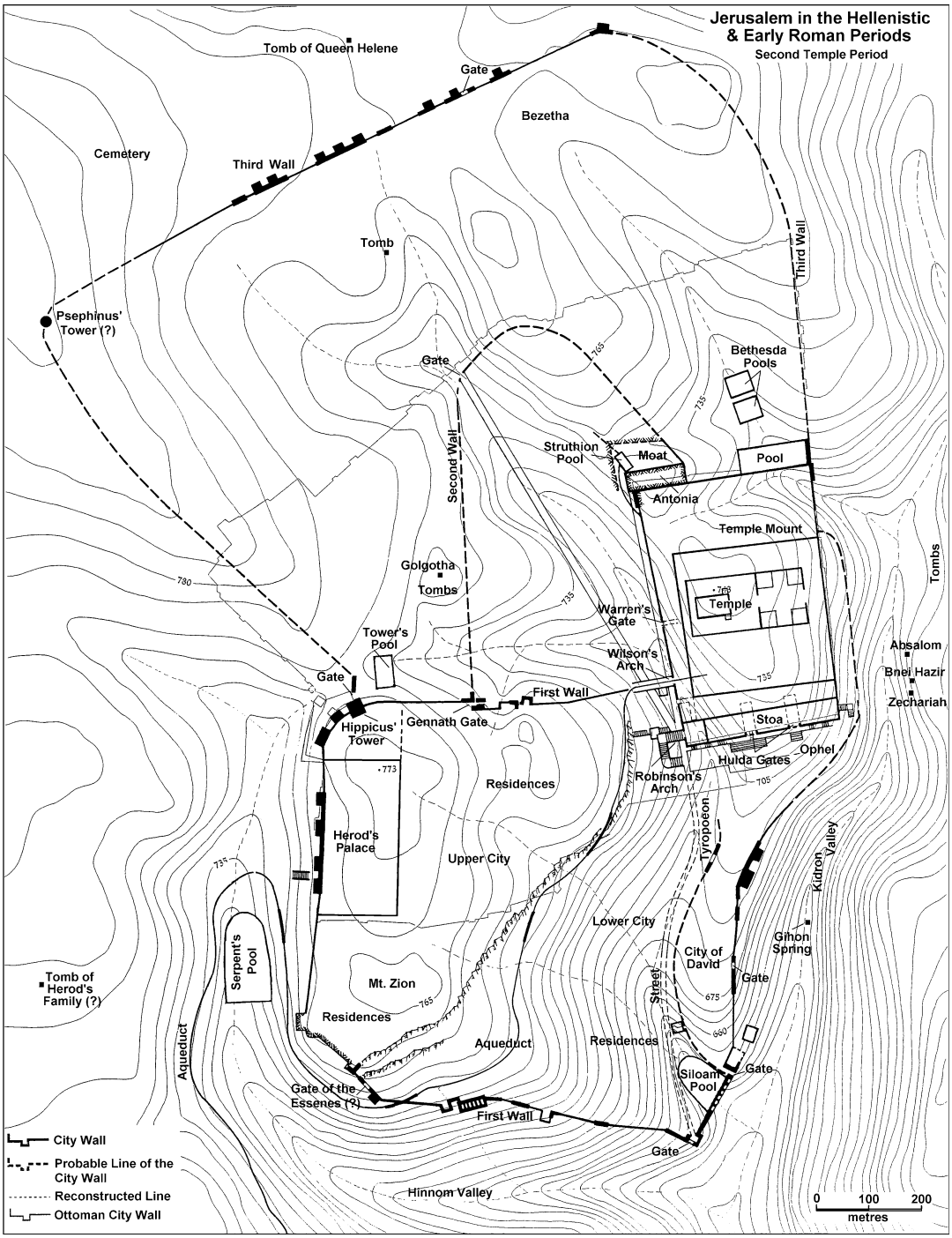

Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of, Fig. 1 Jerusalem in the Hellenistic to early Roman periods during the Roman period (third century BCE–70 CE)

sponsorship of a massive new temenos, a raised platform and a magnificent temple glorified Herod's name and dominated the urban structure of the city. Herod's builders greatly increased the area of the mount by building huge and splendid supporting walls around a rectangular area of

15 ha. At the center, on the rock of Mount Moriah, stood the Temple itself. Although no exposed remains survive, it is described by Josephus Flavius as a large tri-cameral structure of white marble fronted by an altar. On the southern edge of the Temple Mount a huge administrative Royal Stoa was added. Archaeological finds that survived the Roman destruction of 70 CE have been located, including inscriptions, architectural details, and the outer temenos walls.

Below the western retaining wall of the Temple Mount was the main thoroughfare of Jerusalem. The road led from the Siloam Pool in the south and extended beneath the stairs over Robinson's Arch, which rose up to the Royal Stoa, and under Wilson's Arch, which carried traffic along a viaduct from the Upper City. South of the Temple Mount was a massive staircase that led to the Huldah Gates, the main entrance to the compound. Numerous public ritual baths in the vicinity were utilized by pilgrims prior to their ascent to the mount, while shops along the roads would have provided sacrificial animals, change for the temple tithe, food, and other services.

An extensive necropolis surrounded the city on all sides, including typical family burial chambers with loculi and secondary internment in stone ossuaries. Monumental aristocratic tombs with pyramidal roofs, colonnaded porches, and classical decoration suited to the Jewish religious requirements prohibiting images were found in the Kidron and Hinnom Valleys and to the north of the city. The most famous tombs are those named for Absalom, Bnei Hazir, and Queen Helena of Adiabene.

Roman Jerusalem: Aelia Capitolina

After the sacking of the city in 70 CE Jerusalem came under direct Roman rule. Close to the second Jewish revolt of 135 CE the Roman emperor Hadrian renamed the city Aelia Capitolina, laying it out as a Roman colony. Jews were excluded from the city. Major works included the establishment of a new urban plan, the founding of a large Roman legionary camp, and the building of a pagan temple on the site of the former Jewish temple (Fig. 2).

Considering the abundance of archaeological data and written sources concerning other periods, the dearth of both for the Roman city is striking. This requires us to rely greatly on the information imparted by sources of the sixth to seventh centuries that still express the layout of the Hadrianic founding. These portray a classical city divided into seven quarters, covering some 100 ha and populated by a number of major structures. The expulsion of Jerusalem's Jewish residents left the city lightly populated, a situation only partially rectified by the encouragement of settlement by veterans and Hellenic groups living in *Provincia Palaestina*.

The present shape and even road layout of the extant Old City of Jerusalem is a survival of the plan originally set out in the Roman colony. It accords with accepted planning concepts common to contemporary cities of the Roman East. In general, the city can be split into two sections. The southern part, which corresponds to the present Armenian and Jewish Quarters, was, in the view of many, the site of the camp of the Tenth Roman Legion Fretensis. The northern part was used for Jerusalem's civic and municipal buildings.

Controversy concerns the defense of the city, especially whether or not Jerusalem was surrounded by a wall or whether it relied on remains of fortifications left after the destruction of the Second Temple period city. Excavations do not provide evidence of a reconstructed wall for Jerusalem until the beginning of the fourth century when a wall raised for Jerusalem's defenses was established on a line that mostly continues till the present on the north and east. By contrast, recent studies have proposed moving the initial northern limit of the city to the line of the northern "Third Wall," until the late third to early fourth centuries.

The road network of the city was based on straight Roman streets crossing at right angles. Their exact paths were dictated by the hilly topography and the overshadowing remains of the Temple Mount left unscathed by Titus. At the northern extreme was a monumental gate that now forms the base of the Damascus Gate, with a dedicatory column to its south. Two colonnaded cardines stretched from the gate to the south, and they were crossed at their center by a *decumanus*.

Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of, Fig. 2 Aelia Capitolina during the Roman period (early fourth century CE) (After: Tsafrir 1999a. Map in back cover)

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Sections of the western *cardo* have been uncovered east of the Holy Sepulchre, including columns of the arcade that flanked the street itself. The *cardo* was laid as far as the south-western hill, to the legionary camp, while the southern section of the *cardo* was only laid in the Byzantine period by Justinian, a conclusion challenged by those who give a Roman date for the entire street. Of the eastern *cardo* a large portion has been uncovered just south of the crossing with the *decumanus*.

The main streets would have led to four gates, of which only the northern has been excavated. The other gates stood in the general area of what are now known as the Jaffa, Lions, and Zion Gates.

The magnificent northern free standing triumphal arch of the Roman colony, possibly known as Porta Neapolitana, was built with the founding of the city. The remnants below the sixteenth century Damascus Gate have exposed a gate of three entrances flanked by two huge towers. Set over the entrances was the fragmentary inscription dedicated to the *decuriones* of the Colony Aelia Capitolina. Only with the construction of the northern city wall in the late third or early fourth centuries was this arch included in the city's defensive line. Similar triple triumphal arches were also built inside the city – near the forum (Ecce Homo), east of the Holy Sepulchre, and maybe even in the south of the city. Discovered north of the Damascus Gate on the road out of city were architectural elements of a possible further gate that may have been integrated into the northern wall on the line of the earlier "Third Wall."

A major development of the hydrological supply was the construction, or at least renovation, of the high level aqueduct. This aqueduct includes a 2.5 km section enclosed in a stone pipe siphon constructed by the Tenth Legion Fretensis. Furthermore, water collected from the Gihon spring entered the Siloam pool, which was now surrounded by colonnades on all sides.

After the taking of Jerusalem in 70 CE the Tenth Legion Fretensis was stationed in the city till its transfer by Diocletian at the end of the third century. According to a view held by most scholars the camp was located on the south-western hill, as indicated by the presence of many stamped tiles of the legion found in excavations in the area. The command of the legion was most probably garrisoned in the Herodian towers that were left standing by Titus.

The gateway to the legionary camp probably opened into the compound on the line of the present Christian Quarter Street, which probably bisected the camp through its center. However, the lack of permanent garrison structures, clear finds usually associated with legionary camps and obvious fortifications on the south-western hill have led some scholars to doubt the identification and to suggest alternative locations to the south of the Temple Mount.

The public amenities and civic structures of Jerusalem included two *fora* and a number of temples. The main *forum*, beside the corner of the western *cardo* and the *decumanus*, included a basilica and probably the Temple of Venus-Aphrodite or of Jupiter. The eastern forum was situated north of the Temple Mount. Its triumphal arch, known as the Ecce Homo, was placed on its western edge and spanned the eastern part of the *decumanus*.

A sculpted relief, associated by the excavators with the cult of Aesclepius-Serapis, was uncovered close to the Bethesda Pool. Furthermore, a temple dedicated to the Capitoline triad of Jupiter, Juno and Minerva together was possibly established on the Temple Mount, along with two statues of the emperor Hadrian. Some scholars prefer to identify this Capitolium with the temple located in the central forum, on the site that would later be occupied by the Holy Sepulchre.

Byzantine Jerusalem

In 326 CE Helena, the mother of Constantine identified the site of the burial of Christ under the Temple of Venus, instigating a renaissance for Jerusalem. At the instruction of Constantine the construction of a huge church began at the site.

Jerusalem would develop to become a major city of Christendom and, from 451 CE, the seat of an independent Patriarchate. Within the walls and in adjacent areas outside them a series of important Christian edifices and monastic establishments were built under the auspices of imperial sponsorship and private donation. Church building would continue throughout Byzantine rule, with a short hiatus between 361 to 363 CE when Julian the Apostate encouraged the rebuilding of the Temple by the Jews. The end of Byzantine rule was preceded by the brutal Persian incursion of 614 CE, though the reported damage does not seem to be mirrored in the archaeological evidence. The Umayyad occupation of 638 CE brought the city under Muslim rule. Even with the commissioning of the Dome of the Rock over Mt. Moriah and the al-Aqsa Mosque in the southern part of the Temple Mount, the city's Christian character would only slowly change over the coming two centuries (Fig. 3).

With the adoption of Christianity as the state religion the Capitoline triad ceased to be honored, a transformation commemorated by the use of the official name Aelia for the city until the mid-fourth century, at which point the name Jerusalem was once again typically used. In marked contrast to the previous era, the Byzantine period is served by a plethora of sources, especially by the writings of Church fathers and pilgrims' itineraries that provide detailed descriptions of the history and topography of the city.

Beside ecclesiastic construction there was also extensive municipal and civic expansion, opened by the rebuilding of the defensive wall probably during Constantine's reign. Residential quarters filled the intermural area of 120 ha, spilling beyond the wall to the north and west to include new monasteries and commercial structures. The influx of Christian pilgrims from many nations raised the population to around 50,000, speaking a variety of languages.

The Byzantine town plan, as represented on the Madaba mosaic map of the seventh century, preserves the layout of the Roman city. It shows Jerusalem to be surrounded by a wall, towers, and gates and to be dominated by the Roman St. Stephens (Damascus) Gate on the north, the two colonnaded cardines, the *decumanus*, and the new monuments that defined the city's Christian topography – the Church of the Holy Sepulchre, the Zion Church, and the Nea. The complete refortification of Jerusalem has been illuminated by numerous excavations around the circumference that included the renovation of earlier walls. Sections of the wall have been found in the Ophel, the Kidron Valley on the eastern slope of the City of David, around the Siloam pool, across the Tyropoeon Valley, on the western side of the city in the Armenian Garden and the Citadel, and then along the line of the northern wall of the Old City including the Damascus Gate. Wall sections associated with Empress Eudocia were also found along the southern slope of Mount Zion. The date of the fortification has been debated, with some dating it to the late third to early fourth century, and others proposing a date a century later.

The continuity of the urban structure of Jerusalem from the previous period has already been emphasized. With the abandonment of the legionary camp, the south-western hill was ready for development. The western *cardo* was extended as a magnificent colonnaded street to Mount Zion, probably as part of Justinian's plan to connect the Holy Sepulchre with his newly constructed Nea Church. The eastern *cardo* was also renovated, and its southern sections dating to this period continued down to the Siloam Pool. New routes more closely following the topography in a haphazard organic development rather than the conventions of Roman planning, which had previously been used, were created. During the sixth century, both public and private buildings began to encroach onto open spaces, including the *fora* and even onto the public pavements that flanked the cardines. This encroachment reached its zenith in the following periods.

Numerous private dwellings, many of them prestige residences, were uncovered in the City of David and on the slopes of the Tyropoeon Valley flanking the streets down to the Siloam

Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of, Fig. 3 Jerusalem during the Byzantine period (After: Tsafrir 1999b. Map in back cover)

Pool; in the Ophel, where large houses surrounding courtyards were accompanied by a substantial bathhouse west of Robinson's Arch; on the southwestern hill; and on Mount Zion. A characteristic difference between the Byzantine city and the Roman city was the deterioration of functional divisions, whereby public and private zonal separation disappeared. Homes, commercial buildings, civic monuments, and religious institutions could now be found side-by-side.

Byzantine Jerusalem was dominated by ecclesiastical institutions representing both the events of the life of Christ and the numerous national communities that found their home in the city. Both the earliest and the most important church in Jerusalem was the Church of the Holy Sepulchre, built in the early fourth century on the instruction of Constantine, at the site identified by Eusebius as the locus of the crucifixion, burial, and resurrection of Jesus Christ. The new structure, built in place of a temple in the main *forum*, was entered from the *cardo* through an atrium that integrated part of the entrance of the dismantled Roman basilica and temple. One then proceeded through a large basilical church or *martyrium* of four aisles and a wide central nave with a single apse facing westward toward the tomb, a *triportico* that included the rock of Golgotha, and a rotunda or *Anastasis* with three apses that enclosed Jesus' tomb in an aedicule at its center. Ancillary buildings, including a baptistery, monasteries, and other structures were certainly located beside the church.

Mount Zion was home to the Church of Holy Zion built in 340 CE, and repaired in the fifth century. The church was built on the site identified with the Last Supper, the gathering of Jesus with the Apostles, the dormition of the Virgin Mary, and other traditions. The church was located on the southern end of the road that had bisected the legionary camp and was used as a processional way between the Holy Sepulchre and Mt. Zion. The limited remains enable a reconstruction of a basilica with four aisles and a nave leading to one of three external apses.

Emperor Justinian's huge Nea Church of Mary Theotokus was dedicated in 543 CE on Mount Zion. This church was the second largest basilica in Jerusalem, occupying a topographically dominant position above huge terraced retaining walls that enclosed a massive underground reservoir. In the south of the city, a church consecrated in the fifth century, probably by the empress Eudocia, opened to the colonnaded Siloam pool dedicated to the miracles of Christ at the pool (John 9: 1–12).

Other churches of note within the walls were the trefoil Church of John the Baptist, the Church of Saint Mary of the Probatica, which was set above the dividing wall between the two pools previously associated with the Roman cult of Aesclepius-Serapis, and the church of Peter in Gallicantu on the southern slope of Mt. Zion.

We learn of the monasteries of Jerusalem both from the written sources and from the results of excavations. Jerusalem was home to many monastic foundations, many of them connected to national groups and to the many *conoebia* and *laura* that populated the Judaean desert.

The status of the Temple Mount during the Byzantine period is a matter of some controversy. Certainly its very physical presence was the dominant feature of Jerusalem's topography, both structurally and as an important focus of the urban plan. Some insist that the whole area was left undeveloped as a testimony to Christianity's triumph over Jewish ambitions to rebuild the temple, while others suggest limited construction on the Mount. Without excavation these proposals remain speculative.

The peaceful conditions and safety enjoyed under Byzantine rule created public confidence to establish rich monastic institutions, residential neighborhoods, commercial districts, and cemeteries outside the city walls. These were concentrated to the west, north, and east of Jerusalem, especially along the routes out of the gates, and at sites of pilgrimage. To the west of the city a bathhouse fed from water from the high aqueduct was located on a commercial street of shops on the road leading directly out from the Porta David (Jaffa Gate).

North of the Damascus gate a closely clustered group of monasteries was discovered around the basilical church dedicated by Eudocia to St. Stephen in 460 CE. Nearby further monasteries were established, including institutions associated with the Armenian church. Among the

many ecclesiastical institutions in the area of the Mount of Olives were those excavated at Gethsemane, those at the Tomb of the Virgin Mary, Viri Galilaei, Dominus Flevit, the circular Church of the Ascension built in the fourth century, and the Eleona Church built by Constantine.

The area surrounding the city, which had served as the necropolis of Jerusalem since earliest times, continued to be utilized for burial, at times though the reuse of burial caves cut in earlier periods. The cultural transition from the Roman to Christian period is not illuminated by clear markers, beyond the initial entry of Christian symbols that would later unambiguously denote the change into the Byzantine period. A number of burial types have been identified. These include cist burials, shafts leading to a sealed chamber, a stepped dromus before a burial chamber with arcosolia cut into the rock, elaborate catacombs, and rows of graves in the crypts of the monasteries.

Cross-References

- ▶ Architecture, Roman
- ▶ Israel: World Heritage Sites
- ▶ Post-Second Temple Judaism Archaeology
- ▶ Second Temple Judaism Archaeology
- ▶ Urban Planning, Roman
- ▶ Urbanism in the Ancient Near East

Further Reading

Avigad, N. 1980. *Discovering Jerusalem*. Nashville: Thomas Nelson.

Avni, G. 1997. The necropoleis of Jerusalem and Beth Govrin during the 4th – 7th centuries A.D. as a model for urban cemeteries in Palestine in the late Roman and Byzantine periods. Unpublished PhD dissertation, Hebrew University of Jerusalem. (Hebrew with English summary).

Bahat, D. 1990. *The illustrated atlas of Jerusalem*. Jerusalem: Carta.

Ben-Dov, M. 1982. *In the shadow of the Temple: The discovery of ancient Jerusalem*. New York: Harper & Row.

Bieberstein, K., and H. Bloedhorn. 1994. *Jerusalem: Grundzüge der Baugeschichte vom Chalkolithikum bis zur Frühzeit der osmanischen Herrschaft*. Beihefte zum Tübinger Atlas des Vorderen Orients: Reihe B, Nr. 100/1. Wiesbaden: Dr. Ludwig Reichert Verlag.

Corbo, V.C. 1981–2. *Il Santo Sepolcro di Gerusalemme: aspetti archeologici dalle origini al periodo crociato, Volumes 1–3*. Jerusalem: Franciscan Printing Press.

CoÜasnon, C.P. 1974. *The church of the Holy Sepulchre in Jerusalem*. British Academy. Schweich lectures, 1972. London: Oxford University Press.

Geva, H., N. Avigad, and M. Avi-Yonah. 1993. Jerusalem. In *The new encyclopedia of archaeological excavations in the Holy Land, volume 2*, ed. E. Stern, A. Lewinson-Gilboa, and J. Aviram, 717–785. Jerusalem: The Israel Exploration Society & Carta.

Geva, H., et al. 2008. Jerusalem. In *The new encyclopedia of archaeological excavations in the Holy Land, volume 5, Supplementary Volume*, ed. E. Stern et al., 1801–1837. Jerusalem: The Israel Exploration Society.

Graber, O., and B.Z. Kedar, eds. 2009. *Where heaven and earth meet: Jerusalem's sacred esplanade*. Jerusalem/Austin: Yad Ben-Zvi Press/University of Texas Press.

Kloner, A., and B. Zissu. 2007. *The necropolis of Jerusalem in the Second Temple period*. Interdisiplinary Studies in Ancient Culture and Religion, Vol. 8. Leuven: Peeters.

Küchler, M. 2007. *Jerusalem: Ein Handbuch und Studienreiseführer zur Heiligen Stadt*. Orte und Landschaften der Bibel IV, 2. Göttingen: Vandenhoeck & Ruprecht.

Mazar, A. 2002. A survey of the aqueducts to Jerusalem. In *The aqueducts of Israel*. Journal of Roman Archaeology, Supplementary series 46, ed. D. Amit, J. Patrich, and Y. Hirschfeld, 210–244. Portsmouth: JRA.

Mazar, B. 1975. *The mountain of the Lord*. New York: Doubleday.

Prag, K. 1989. *Jerusalem: Blue guide*. London: Black.

Rahmani, L.Y. 1994. *A catalogue of Jewish ossuaries in the collections of the State of Israel*. Jerusalem, Israel Antiquities Authority; The Israel Academy of Sciences and Humanities.

Reich, R. 2011. *Excavating the City of David: Where Jerusalem's history began*. Jerusalem: Israel Exploration Society.

Tsafrir, Y. 1999a. The topography and archaeology of Aelia Capitolina. In *The history of Jerusalem: The Roman and Byzantine periods (70-638 CE)*, ed. Y. Tsafrir and S. Safrai, 115–166. Jerusalem: Yad Ben-Zvi. (Hebrew).

Tsafrir, Y. 1999b. The topography and archaeology of Jerusalem in the Byzantine period. In *The history of Jerusalem: The Roman and Byzantine periods (70-638 CE)*, ed. Y. Tsafrir and S. Safrai, 281–351. Jerusalem: Yad Ben-Zvi. (Hebrew).

Vincent, H., and F.-M. Abel. 1914–1926. *Jérusalem: Recherches de topographie, d'archéologie et d'histoire: Jérusalem Nouvelle*. Paris: Victor Lecoffre.

Wightman, G.J. 1993. *The walls of Jerusalem: From the Canaanites to the Mamluks*. Mediterranean Archaeology Supplement 4. Sydney: Meditarch.

Wilkinson, J. 2002. *Jerusalem pilgrims before the crusades*. Warminster: Aris & Phillips.

Jewish People in Mexico and South America, Archaeology of

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Introduction

The study of Jewish communities that settled in the former Spanish colonies, particularly in New Spain, Mexico, has been insufficiently approached from an archeological perspective. This field has been the endeavor of historians who have researched the topic extensively, particularly in Mexico, Peru, and Argentina (e.g., Alberro 2013; Chuchiak 2012; Greenleaf 1995; Jiménez Rueda 1946; Hordes 1982; Krause 1987; Liebman 1963, 1964, 1967, 1971, 1973; Shaposchnik 2015; Silverblatt 2000; Toro 1993; Uchmany 1985, 1992; Wiznitzer 1962; Zárate Miguel 1986). In contrast to Spain where *juderías (*quarters inhabited by Jewish communities) have been excavated, in other regions of Latin America, especially in Mexico, there is a lack of awareness of the potential of these areas within major urban centers. This could be because Jewish individuals, who arrived from Spain and Portugal to New Spain and other Spanish colonies during the sixteenth and seventeenth century, were Sephardi Jews converted to Catholicism, they were new Christians, crypto-Jews, or secret Jews (Liebman 1967; Wiznitzer 1962). This meant that although they had converted publicly to Christianity, many practiced Judaism in secrecy. As a result of this, there is a lack of material culture that was used for the outward display of their religious practices during that period. Thus, there are no public sites where synagogues and *juderías* were located, except in Brazil. Examples drawn from archaeological excavations of medieval sites with Jewish occupation in the Iberian Peninsula may shed light on the kind of material culture that was used by Jewish communities in the New World. Also, the data drawn from historical sources on the Inquisition from the sixteenth to the seventeenth century have the potential to inform on this. While the identification of settlements from the sixteenth to the early-nineteenth centuries may be problematic, those pertaining to the late nineteenth and early twentieth centuries can be easily located. This is so because the communities that arrived as part of late migrations displayed their cultural and religious identities publicly, in contrast to earlier ones. Consequently, in Mexico City and former Spanish colonies, the sites of synagogues are known as well as the streets where the modern *juderías* are situated.

Definition

The archaeology of Jewish communities is a research field that encompasses the material remains of Spaniards and Portuguese with a Jewish background that migrated to the New World, particularly to Mexico and South America, during the sixteenth, seventeenth, and eighteenth centuries. These individuals were known as New Christians that practiced Judaism in secret, away from the eyes of the public and religious authorities. This field of study extends to Sephardi and Ashkenazi Jewish communities that settled in Mexico, Brazil, Peru, and Argentina during the late-nineteenth and twentieth centuries.

Key Issues/Current Debates/Future Directions/Examples

The arrival of Sephardi Jews to the New World Spanish colonies occurred after their expulsion from Spain and Portugal in 1492 and 1497, respectively. Some of them like Luis de Torres accompanied Columbus on his first voyage. Others like Hernando Alonso, a ship carpenter who was put on trial and burned at the stake

accused of practicing Judaism, collaborated with Cortés in the conquest of Mexico in 1521 (Jiménez Rueda 1946, 85; Liebman 1963). Luis de Carvajal, *El Conquistador*, defeated the English in a naval battle off the coast of New Spain in 1568. In 1579 he received a royal contract from King Philip II awarding him with the governorship of the New Kingdom of Nuevo León in the north of Mexico (Liebman 1967, 20, 26; Toro 1993, XXII–XXIII). Others that were accused of practicing Judaism, like Gonzalo Gomez, settled in Michoacán (Toro 1993), and still others, in mining regions like Pachuca, Taxco, and Zacatecas Mexico (see Jiménez Rueda 1946; Toro 1993) (Fig. 1). In 1522 and 1523, Charles V signed a document that forbade Jews, Moors, and New Christians and their descendants from traveling to the Indies. Those who were found residing in the Spanish colonies were to be sent back to Spain. If they did not comply with this edict, they were deported, and their properties were confiscated. The decree lasted until September 16, 1802. Despite these prohibitions, many Jews settled in New Spain decades later (Greenleaf 1992, 108–109; Jiménez Rueda 1946, 83–84; Liebman 1963, 96; Toro 1993; Uchmany 1985, 265). By 1590 a Sephardi Jewish community was well established in Mexico City. It is estimated that by the mid-seventeenth century of the total population of

Jewish People in Mexico and South America, Archaeology of, Fig. 1 Geographical locations mentioned in the text

20,000 in New Spain, 2000 to 3000 were Jews (Liebman 1963, 100).

The Material Culture of Ritual and Religion

Emphasis should be made on the study of objects related to religious practices. That is because the Jews that migrated to places like New Spain, Mexico, in the sixteenth and seventeenth centuries cherished Spanish language, customs, and Spain itself. They were probably strongly acculturated into Spanish culture (Liebman 1967). Therefore, the material culture they used in the colonial environment may not have been significantly different from that employed by Old Christians in daily life, namely tin-glazed tableware like majolica. Because Spanish and Portuguese Jews that settled in the New World continued to practice their religion, one important source for the identification of these cultural groups corresponds to ritual objects. This kind of material culture may find parallels to that found in Spain even when Judaism in New Spain was practiced in the private realm away from the eyes of the public. There was no public display of spaces where Jews gathered like synagogues and *juderías,* and these were concealed. But the existence of secret rituals and synagogues, at least in Mexico City, has come to be known through historiographical studies on Jews put on trial by the Inquisition (see Jiménez Rueda 1946; Toro 1993; Liebman 1967). Therefore, it is expected to find some material culture related to such practices. Among the sources that could enable the identification of this kind of material culture are the findings of distinctive objects associated with rituality in Spanish *juderías.* The examples drawn from the excavations at *juderías* in the Iberian Peninsula suggest the use of ritual objects that distinguished Judaic groups from others like Christians and Muslims. These correspond to glazed clay candleholders known as *hanukiya* (see Pujante Martínez and Gallardo Carrillo 2004) (Fig. 2a). In Mexico City, a variety of glazed clay candleholders have been recovered in archaeological excavations and a particular type finds some similarities with the *hanukiya* from Spain and requires further consideration. The body of these candleholders is open with curved walls. The base has a geometrical design in the shape of a six or an eight- point star (López Palacios 1998, 475) (Fig. 2b).

A similar situation occurred in Argentina, where Jews were legally forbidden from settling but in practice were tolerated and hidden mainly because they held significant roles within Spanish society, e.g., merchants, bakers, and shoemakers. Evidence of this presence was found at an eighteenth-century house in the city center of Buenos Aires where architectural restoration revealed a ceramic floor preserved under a later mosaic one. On the internal surface of one of the

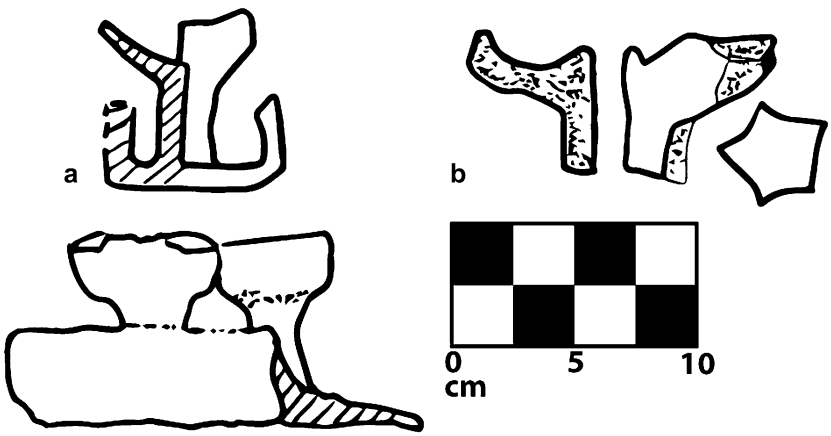

Jewish People in Mexico and South America, Archaeology of, Fig. 2 (**a**) Hanukiya found at the *judería* of León. (Re-drawn from Pujante Martínez and Gallardo Carrillo 2004). (**b**) Candleholder recovered at archaeological excavations in Mexico City. (Re-drawn from López Palacios 1998)

ceramic tiles an incised Star of David was identified (Shávelzon 2013).

Brazil constitutes a separate example from the Spanish colonies. After 1637, with the Dutch occupation of the northern portion of the Portuguese colony of Brazil, Jewish people in Recife were allowed to construct the first synagogue in America, the *Kahal Zur Israel*, which functioned until 1645. The synagogue was only known through documentary sources, but archaeological research at the site where it was presumably located was able to verify its existence. The most significant element that was found in the excavations was the *Mikvé*, a water pool for ritual baths (Albuquerque and Lucena 2003).

Another source of information concerning the material culture of Jewish communities in Mexico, and that is most useful for archaeological research, can be found in historic and historiographical sources (e.g., Alberro 2013; Greenleaf 1995; Jiménez Rueda 1946, 86–87; Toro 1993). These include Inquisitorial documents, trials, testimonies, testaments, and inventories. They provide unique insights into Jewish life and material culture during the Colonial period in Mexico, for example, avoiding pork, rabbit, hare, and fish without scales in their meals. The preference for particular meats like lamb and beef cut with a sharp knife in a specific fashion known as *Shechita*, *landrecilla*, or porging, and that had to be eaten whole, without breaking any bones, and the fondness for certain poultry; celebrating the candle feast, that is, Hanukah, where candles were burnt one after the other each day of the week; burying the dead covered in a shroud with a pillow under their heads and gold or a*ljófar* coins, that is with a symbolic value, in their mouths or under the body, among many other ritual practices (Jiménez Rueda 1946, 86–87, 93, 101; Toro 1993, 256; Liebman 1967, 45). It is worth considering these as they may have left a trace in the archaeological record.

Memorial Sites

The identification of places associated with Jewish occupation within the former Spanish colonies is essential to reconstruct a landscape of memorial sites. More often than not, these spaces are considered as pivotal within the Catholic landscape (Fig. 3). They are seldom thought of as commemorative places of other religious communities. However, these are sites where Jews were put on trial, incarcerated, tortured, and sometimes executed during the sixteenth and seventeenth centuries, particularly in Mexico an Peru (see below). These sites in Mexico City include the Colegio de Tlatelolco where Jews like Hernando de Alonso and Gonzalo de Morales were trialed and burned at the stake in 1528 (Greenleaf 1992, 108–110). Jewish writer and mystic Luis de Carvajal *El Mozo* also known as *El Alumbrado* was incarcerated also at Tlatelolco before dying by strangulation. His body was burned at the stake alongside eight other Jews (Liebman 1967, 32–33). Also, the Inquisition Palace, the plaza and former convent of Santo Domingo, the Cathedral, the Plaza Mayor, and the Plaza of the church of Saint Hipólito are symbolic (Fig. 3). The Inquisition Palace is probably one of the most emblematic buildings associated with a Jewish presence. There exists a vast corpus of information on the accusations made against Jews and on their imprisonment in the secret chambers, trials, and torments administered on behalf of the Inquisition. It was created in Mexico and in Peru by royal decree in 1569 (Medina 2010, 41). Before its legal foundation, many prisoners were put on trial and tortured in the *Palacio Arzobispal,* the palace of the archbishop of Mexico City. With the arrival of Moya de los Ríos to Mexico City in 1571, the Inquisition initiated its functions at the monastery of Santo Domingo. A few months later, it moved to the place where the actual building still stands and remained there until its suppression in 1819 by the court of Cadiz (Medina 2010). A revision on the Jews that were trialed by this institution can be found in Toro (1993), Liebman (1967), Greenleaf (1995), and Medina (2010).

The administration of sentences in New Spain was under the charge of the Inquisition during the *auto de fé.* This literally means "act of faith," a royal and public ceremony, during which the Inquisition tried and punished those that violated the Catholic faith. Depending on the sentence, the religious authorities handed over the prisoners to secular authorities to receive punishment. The auto

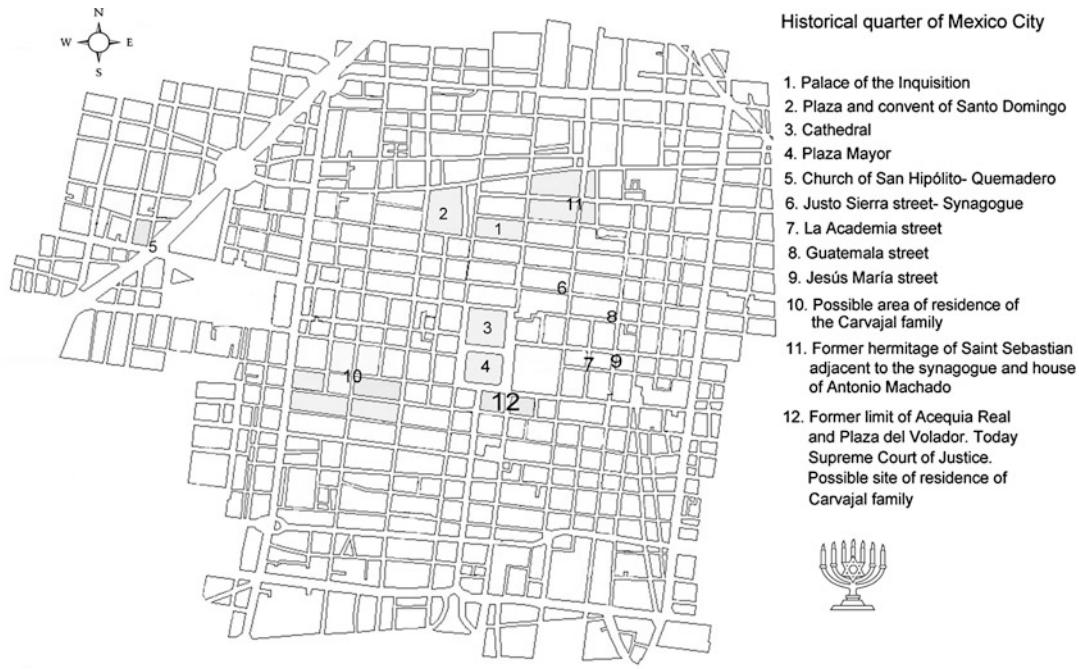

Jewish People in Mexico and South America, Archaeology of, Fig. 3 Landscape of memorial sites in Mexico City. Map of the old quarter of Mexico City with commemoration sites and residence areas mentioned in the text

was generally celebrated on a Sunday or on a particular feast that could bring together a large audience (Cañeque 1996, 322; Liebman 1973, 19). In the same fashion as the Peninsular *auto de fé*, this ceremony intended to "announce punishment across the world" and "extinguish heresy" (Ruíz de Zepeda Martínez 1659), and defend this religion and culture against heretics (Alberro 2013, 77–78). The great *autos* were sometimes celebrated at the Cathedral (Jiménez Rueda 1946 104–105), or more generally at the plaza mayor of Mexico City (Ruíz de Zepeda Martínez 1659) (Fig. 3). Smaller ones known as *autillos* were held within the private realm and inside the church of Santo Domingo or at the Inquisition Tribunal (Alberro 2013, 78; Cañeque 1996, 322; Liebman 1973, 19).

During the first stage, the penitents were covered with *Sambenitos,* a penitential garment, at the Inquisition Palace. From its main entrance, they solemnly marched through the streets of Mexico City towards the Cathedral, where their sentences were often read, and great *autos* were occasionally held (Jiménez Rueda 1946, 104–105), or to the plaza mayor of Mexico City. The convicted heretics made their abjurations and retractions and some were absolved and vindicated. The condemned ones walked a final procession with the effigies of others that were dead or absent and the bones of those that were taken by the secular authorities, postmortem, to the burning place or *quemadero* (Cañeque 1996, 321; Jiménez Rueda 1946, 104–105) at the market plaza of the church of Saint Hipólito (Fig. 3). At the *quemadero*, during the *auto* of 1649, for example, accused Jews suffered the garrote. Their dead bodies consumed by the flames, and the bones of the deceased ones, were turned to ashes (Jiménez Rueda 1946, 117).

In the *autos* that took place during the late sixteenth and seventeenth centuries in Mexico (e.g., 1590, 1596, 1601, 1603, and 1649), many Jews were put on trial. In 1601, of 123 tried persons, 39 were Jews. In the great *auto* of 1649, 14 relapsed Judaizers were put on trial and strangled with the garrote. One of them was burned alive at the stake (Wiznitzer 1962, 222–225).

During the great *auto* of 1659 in Mexico City, those condemned to die at the stake were mainly Blacks and mulattoes, the rest of them were whites accused of practicing Judaism. Among the 130 Jews that were relaxed to the secular authorities, 29 were burnt alive (Cañeque 1996, 332). As a consequence of punishment, many of their properties were confiscated and resulted in financial ruin. Others were imprisoned or forced to serve time at the galleys in ships. Still, others died at the garrote, and their bodies were burned afterward. The punishment for convicted Jews that had fled Mexico or had died before the *auto* was the trial or burning of their effigy and the exhumation and burning of their remains (Wiznitzer 1962, 222–225). The final resting place of these bodily remains is unknown, and further research on this specific topic is much needed. The few references made to Jewish burial sites are mentioned by Jiménez Rueda (1946, 123) concerning Juana de Enríquez; she was buried in 1646 in Jewish fashion at the Convent of El Carmen in San Angel, Mexico City, and was later disinterred by the Inquisition. For cases in Peru during the seventeenth century, see Silverblatt (2000) and Shaposchnik (2015), e.g., the trial of Rodrigo Váez Pererira who was accused of practicing Judaism in secret and died at the stake. For the case of bachelor Francisco Madlonado de Silva who was taken from Chile to the secret prisons of the Holy Inquisition in Lima and later died at the stake in 1639, see Günter Böhm (1984).

Memorial sites also comprise domestic spaces lived by Jewish families. Even when the identification of such places is difficult due to the scarcity of available archaeological data, some hints can be drawn from historiographical sources. An example of these is the house of de Almeida in Mexico City, who was a former inhabitant of a *judería* in Portugal and had traveled to New Spain in 1546. The Jewish community frequented his house during feasts (Jiménez Rueda 1946, 95) (Fig. 3). There are also a few references made to the house of the brothers of Luis de Carvajal, *el Mozo*. Around 1589, it was located adjacent to the Colegio de Niñas in Mexico City (Fig. 3). The Carvajal family had a second property in the portal of the *acequia* or water ditch next to the plaza, assuming that it refers to the former Plaza del Volador (Toro 1993, 257) (Fig. 3). Moreover, the house of Antonio Machado, an accused Judaizer, who was held amongst the Jewish community of New Spain as a great rabbi, was located next to the hermitage of Saint Sebastian in Mexico City (Fig. 3). His house was a sort of synagogue where Jews met secretly to pray, sing, and read the Bible (Jiménez Rueda 1946, 87). In Buenos Aires, the house of Tellechea in the city center (see above Shávelzon 2013) is a memorial site. Many other Jewish residences may have existed in the same area of Buenos Aires and may have functioned as familiar synagogues.

Other sites pertain to the late nineteenth and twentieth centuries. These are associated with a second significant Jewish migration that took place between the Mexican Independence in 1821 and the Revolution of 1910 and subsequently from 1910 until 1930 when a Jewish community was publicly established in Mexico City (Krause 1987, 31–33; Zárate Miguel 1986, 77). There were mainly bankers, physicians, soldiers, and merchants that traveled from Germany, Austria, England, France, Russia, Poland, Turkey, and Syria. Even though these immigrants are not the descendants of the Sephardi groups that arrived during the Colonial period, they can be considered as the founders of the contemporary Mexican Jewish community (Krause 1987, 31–33, 43). These groups at first established their synagogues and commercial depots in the historical quarter of Mexico City, and the former locations of these are still known today. An example of this is the synagogue Monte Sinai, located in the street of Justo Sierra and the second one in Jesús María. Around the synagogues, a *judería* grew with its kosher butcheries and bakeries in the modern streets of Guatemala, Justo Sierra, Loreto, and Academia (Fig. 3). In Peru, Jews from Central and Eastern Europe, Morocco, Turkey, and Siria immigrated during the late-nineteenth century. Many Sephardic Jews from North Africa and the Middle East arrived to the Peruvian Amazonia during the nineteenth century driven by the rubber market. They established at Iquitos and created a Jewish-mestizo culture. In the twentieth century, more Jews arrived to Peru from Russia, Poland,

and Romania, and also from Palestine and Egypt (Cadenas Erazo 2010), and have established synagogues and cemeteries especially in Lima.

Future Research

To approach the archaeological study of Jewish communities, an interdisciplinary approach is necessary. It can be achieved by combining the analysis of primary sources, cartographic ones, and excavated material culture, particularly the one associated with religious practices. Also, awareness of architectural features and religious insignia is required to identify domestic and ritual spaces related to Jewish religion. Other types of material culture that could be useful for this purpose correspond to zooarchaeological remains. Eating manners may provide a handy source for the identification of particular cultural and dietary practices and prohibitions, like the consumption of pork and certain meat-cuts. Thus, it is necessary to search for these elements in the archaeological samples. These could allow explore acculturation processes, patterns of consumption, and the strategies set forth by these cultural groups to display their identities in the private realm.

Cross-References

- ▶ Archival Research and Historical Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Historical Archaeology in Latin America

References

Alberro, S. 2013. *Inquisición y sociedad en México, 1571–1700*. Mexico: Fondo de Cultura Económica.

Albuquerque, M., and Veleda Lucena. 2003. Sinagoga Kahal Zur Israel retornando à vida do Recife. *Revista de Arqueología Americana* 22: 63–79.

Böhm, G. 1984. *Historia de los judíos en Chile, Vol. 1. Período Colonial. El Bachiller Francisco Maldonado de Silva, 1592–1639*. Santiago: Andrés Bello.

Cadenas Erazo, P. 2010. Semblanza judía. Historias de judíos en torno a la inmigración al Perú. *Revista Letras* 81 (116): 177–186.

Cañeque, A. 1996. Theater of power: Writing and representing the auto de fe in Colonial Mexico. *The Americas* 52 (3): 321–343.

Greenleaf, R.E. 1992. *Zumárraga y la Inquisición Mexicana, 1536–1543*. Mexico: Fondo de Cultura Económica.

Greenleaf, R.E. 1995. *La inquisición en Nueva España, siglo XVI*. Mexico: Fondo de Cultura Económica.

Hordes, S.M. 1982. The inquisition as economic and political agent: The campaign of the Mexican holy office against the crypto-Jews in the mid-seventeenth century. *The Americas* 39 (1): 23–38.

Jiménez Rueda, J. 1946. *Herejías y supersticiones en la Nueva España*. Mexico: Imprenta Universitaria.

Krause, C.A. 1987. *Los Judíos en México*. Mexico: Universidad Iberoamericana, Departamento de Historia.

Liebman, S.B. 1963. The Jews of Colonial Mexico. *The Hispanic American Historical Review* 43 (1): 95–108.

Liebman, S.B. 1964. *A guide to Jewish references in the Mexican Colonial Era 1521–1821*. Philadelphia: University of Pennsylvania Press.

Liebman, S.B. 1967. *The enlightened. The writings of Luis de Carvajal el Mozo*. Coral Gables: University of Miami Press.

Liebman, S.B. 1971. The great conspiracy in. *The Americas* 28 (2): 176–190.

Liebman, S.B. 1973. The great conspiracy in New Spain. *The Americas* 30 (1): 18–31.

López Palacios, J. A. 1998. Cronología de la loza de barníz plúmbeo. In *Primer Congreso Nacional de Arqueología Histórica*, Coord. E. Fernández Dávila, and S. Gómez-Serafín, 468–482. Mexico: Conaculta/Instituto Nacional de Antropología e Historia.

Medina, T. 2010. *Historia del Tribunal del Santo Oficio de la Inquisición en México*. México: Conaculta. Cien de México.

Pujante Martínez, A., and J. Gallardo Carrillo. 2004. Huellas del pueblo judío, a través de elementos cerámicos, en el castillo de Lorca. *Alberca* 2: 177–188.

Ruíz de Zepeda Martínez, R. 1659. *Auto General de la Fe, 19 de noviembre 1659*. Imprenta del Santo Oficio, por la viuda de Bernardo Calderón en la calle de San Agustín, México, licencia del 20 de diciembre de 1659. http://bdmx.mx/detalle_documento/?id_cod=73&codigo=149-159&carp=02. Last consulted 15 June 2006.

Shaposchnik, A.E. 2015. *The Lima inquisition: The plight of crypto-jews in seventeenth-century Peru*. Madison: The University of Wisconsin Press.

Shávelzon, D. 2013. Cuando la identidad es más fuerte: primeras evidencias materiales de la colectividad judía colonial en Buenos Aires. *Arqueología y Sociedad* 25: 1–12.

Silverblatt, I. 2000. New Christians and New World fears in seventeenth-century Peru. *Comparative Studies in Society and History* 42 (3): 524–546.

Toro, A. 1993. *Los judíos en Nueva España*. Mexico: Fondo de Cultura Económica.

Uchmany, E.A. 1985. De algunos cristianos nuevos en la conquista y colonización de la Nueva España. *Estudios de Historia Novohispana* III: 265–318.
Uchmany, E.A. 1992. *La vida entre el judaísmo y el cristianismo en la Nueva España*. México: Fondo de Cultura Económica.
Wiznitzer, A. 1962. Crypto-Jews in Mexico during the seventeenth century. *American Jewish Historical Quarterly* 51 (4): 223–231, 233–268, 322.
Zárate Miguel, G. 1986. *México y la diáspora judía. Colección Divulgación*. Mexico: Instituto Nacional de Antropología e Historia.

Further Readings

Chuchiak, J.F., IV. 2012. *The inquisition in New Spain, 1536–1820*, A documentary history. Baltimore: Johns Hopkins University Press.
Lewin, B. 1968. "Las confidencias" of two Crypto-Jews in the Holy Office Prison of Mexico. *Jewish Social Studies* 30 (1): 3–22.
Liebman, S.B. 1967. *The enlightened. The writings of Luis de Carvajal, el Mozo*. Florida: University of Miami Press.
Toro, A. 1977. *La familia Carvajal*. Mexico: Editorial Patria.
Warren, B.J., and P.S. Warren. 1991. *Gonzalo Gomez. Primer poblador español de Guayangareo (Morelia). Proceso inquisitorial*. Trans. A. S. Ochoa. Morelia: Fimax Publicistas.
Warshawsky, M.D. 2008. Inquisitorial prosecution of Tomás Treviño de Sobremonte, a crypto-Jew in colonial Mexico. *Colonial Latin American Review* 17 (1): 101–123.

Li Ji [Li Chi]

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Basic Biographical Information

Li Chi or Li Ji 李济 (1896–1979) was born in Hubei but grew up partly in Beijing. After finishing his undergraduate program at Tsinghua Academy, he went to the USA to pursue a master's degree in psychology and sociology at Clark University. In 1923, studying under E.A. Hooton, Alfred M. Tozzer, and Roland B. Dixon, he earned a doctorate in Anthropology from Harvard University. He then returned to China and taught at Nankai (1923–1924) and Tsinghua (1925–1928) universities. From 1925 to 1926, as the first Chinese excavator, he participated in the joint effort of Tsinghua Institute and the Freer Gallery of Art, Washington D.C., and excavated the Neolithic Yangshao 仰韶Culture site at Xi Yin 西阴, Shanxi 山西. In 1928, he directed the first archaeological section at the Institute of History and Philology, Academia Sinica. From 1928 to 1937, Li conducted 15 seasons of excavations at the Shang 商sites in Anyang 安阳and the Neolithic sites in Longshan 龙山, using modern and scientific archaeological approaches. He was forced to terminate his fieldwork in 1937 when the Sino-Japanese War broke out. In 1949, as the government of Chiang Kai-shek (ROC) exiled to Taiwan, he relocated with the Institute of History and Philology to Taipei and became the head of the Institute in 1955. He also founded and led the Department of Anthropology and Archaeology at the National Taiwan University. Subsequently, Li served as chairman of the Chinese Council for East Asian Studies, a subsidiary organization of the Harvard-Yenching Institute, and as board member of the National Science Council of the Republic of China. Throughout his career, Li trained the next generation of archaeologists, including K.C. Chang 张光直, Xia Nai夏鼐, and Guo Baojun 郭宝均. He advocated international collaborations, particularly those between the USA and the ROC. He paid numerous visits to the USA, Europe, and Australia to facilitate and promote scholarly exchanges.

Major Accomplishments

Li Chi was a key figure in shaping and advancing modern Chinese archaeology. His research on the Neolithic cultures adds a prehistoric extension to the studies of ancient Chinese civilization. Excavating and publishing the materials from the late Shang site in Anyang, Li marked a milestone in the understanding of the first dynasty with written records in ancient China. During his excavation, tombs in the hundreds, bronze vessels, skeletons, and oracle bones were uncovered and carefully documented. In addition, excavating Anyang, Li applied and demonstrated modern archaeological concepts and methods, leaving a lasting impact on Chinese archaeology. For example, he

emphasized the importance of the context in which the objects are found and of stratigraphy in establishing the chronology of the site.

Another major accomplishment of Li is that he designed a systematic classification of artifacts, departing from the methods used in Chinese antiquarianism that depends heavily on classical texts. Li classified the bronze vessels and pottery solely based on their formal features. Categories such as "flat-base" and "round-base" vessels, "tripods," and "ring-footed" vessels were established. Subcategories focusing on the detailed visual elements such as the decorative motifs were made for further distinctions.

Li Chi wrote extensively on Chinese archaeology, particularly on topics related to the Anyang materials. For example, Li published three lectures he gave in the USA in 1954–1955 in *The Beginnings of Chinese Civilization* (1957). In the book, he introduces the known prehistory as background to the emergence of the Shang civilization and examines the numerous cultural streams that may have contributed to the formation of the Shang culture. He also compares the Shang bronze vessels with artifacts from other cultures in the Near East and Asia, suggesting that certain similarities in the formal features indicate possible contacts. He provides chemical analyses and detailed account of the excavated objects from Anyang, particularly Xiaotun and Houjiazhuang, including the bronze vessels and dagger-axes [*ge* 戈]. Observing the formal characteristics of these objects, he defines the four cultural stages at Xiaotun.

Supplementing to his findings, in *Anyang* (1977a), Li chronicles and describes not only the archaeological but also the administrative activities relevant to his excavations. He summarizes and further interprets the published data of Anyang. He elaborates on the reasons as well as the historical circumstances under which he conducted these excavations. He also gives an account on the fieldworks of his colleagues, situating their scholarship in the broader development of modern Chinese archaeology.

With his training in the USA and field experiences in China, Li Chi successfully managed to integrate the academic approaches and research results from both sides. His writings, many of which in or translated into English, made the understanding of ancient China and the archaeological findings accessible to a broader group of audience, especially in the English-speaking world. His perspectives and analysis of the Shang culture also facilitate comparative studies in world archaeology.

Cross-References

► Chang, K.C.

References

Chang, K.C. 1980. Li Chi: 1896–1979. *Asian Perspectives* 23 (2): 317–321.

Chang, K.C., and Cho-yun Hsu. 1980. Li Chi (1896–1979). *Journal of Asian Studies* 40 (1): 217–219.

Li, Chi. 1957. *The beginnings of Chinese civilization: Three lectures illustrated with finds at Anyang*. Seattle: University of Washington Press.

Li, Chi. 1977a. *Anyang*. Seattle: University of Washington Press.

Li, Chi. 1977b. *Li Ji kaoguxue lunwenji vol. 1–2*李济考古学论文集*1-2*册. Taipei: lianjing chuban shiye gongsi.

Further Reading

Chang, K.C., and Li Guangmo, eds. 1990. *Li Ji kaoguxue lunwen xuanji* 李济考古学论文选集. Beijing: wenwu chubanshe.

Li, Chi. 1955a. Importance of the Anyang discoveries in prefacing known Chinese history with a new chapter. *Annals of Academia Sinica* 2: 91–102.

Li, Chi. 1955b. Studies of Hsiao-t'un pottery: Yin and pre-Yin. *Annals of Academia Sinica* 2: 103–117.

Li, Chi. 1957. Pottery and bronze of the Yin-Shang period. *BDAA* 9/10: 1–6.

Jiahu: Agriculture and Domestication

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Introduction

The Jiahu site is located in the Huai River Valley, Wuyang County, in Henan Province in North China. The site denotes the earliest development

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of the Peiligang culture in China, which is considered to be one of the worldwide centers of agricultural origins. The site was dated with conventional ^{14}C to between 9,000 and 7,800 cal BP (Henansheng 1999; Zhang et al. 1999).

Definition

Jiahu lies east of Mount Funiu in Henan Province. The Ni River currently runs south of the site; however, in ancient times, the Sha River ran to the north of the site (Li et al. 2003: 32). The site was initially excavated in 1962 and was excavated six times between 1983 and 1987 (Zhang et al. 1999). The most recent excavations were in 2001 (Zhang and Pan 2002). The site is 5.5 ha in size and includes several multiroomed houses (Henansheng 1999; see Liu 2004: 75 for an English summary). Three phases were identified at the site, phase one 7,000–6,600 cal BCE; phase two 6,600–6,200 cal BCE; and phase three 6,200–5,700 cal BCE (Henansheng 1999: 515). These dates were confirmed by TL and IRSL dating (Yang et al. 2005). These phases correspond to the early, early/middle, and middle Peiligang culture, respectively.

Key Issues/Current Debates/Future Directions/Examples

The significance of the Jiahu site is derived in part from the evidence of symbols or possible early writing (Li et al. 2003) and the early development of music including a crane-bone flute (Zhang et al. 1999, 2004). Stone tools and pottery appear to have been locally produced (Liu 2004: 78). Residues from pot sherds at the Jiahu site were found to contain an early type of alcohol made from rice and honey as well as other ingredients (McGovern et al. 2004).

Jiahu also has evidence for early pig domestication by 8,600 cal BP (Cucchi et al. 2011). Pig husbandry is thought to have occurred c. 8,000 BP in the Yellow River region, with suggestions of early domestication at Zengpiyan in Guangxi Province now discarded (Yuan 2006; Yuan and Flad 2002). New models of pig domestication support multiple independent centers of domestication (Cucchi et al. 2011: 11). Aside from Jiahu, early pig domestication sites such as Kuahuqiao, in Zhejiang Province, exhibit tooth crowding and tooth size reduction (Zhejiangsheng 2004: 252–269), and Xinglongwa in Jilin Province displays human-pig interactions in the form of pig burials in human graves (Yuan 2006). Based on second molar phenotypic traits, Cucchi et al. (2011) suggest that pigs at Jiahu display a shift towards domestication around 6,600 BCE. This concurs with stable isotope data from human bones; a shift towards increased animal protein consumption is evident from the first to second phase of occupation at Jiahu (Hu et al. 2006). The main plant components of the diet at Jiahu were C3 plants such as rice (Hu et al. 2006: 1328).

One of the most hotly debated issues stemming from the Jiahu site is the question of early rice cultivation (Liu et al. 2007). In the past debate has focused on whether this rice is domesticated or morphologically wild (Chen and Jiang 1997; Zhang and Wang 1998; Jiang and Liu 2006; Fuller et al. 2007; Liu et al. 2007). Claims for rice being in an early stage of domestication (Chen and Jiang 1997; Jiang and Liu 2006; Liu et al. 2007) are debated by Fuller et al. (2007), with debate related to the definition of early or later stage domestication. The rice at Jiahu is outside the modern geographical range for wild rice (Chen and Jiang 1997) although it is unclear whether it was outside the range for early Neolithic wild rice as well. This is especially difficult to determine given the climatic and environmental changes across the region over the past 9,000 years. Most recently, Zhijun Zhao, the paleoethnobotanist who examined the grains, has suggested the rice exhibited a large range of sizes indicating it was probably in the early stages of domestication (Zhao and Zhang 2009: 88, 93). The presence of large numbers of rice grains at the site at least indicates cultivation, if not domestication. Zhao and Zhang (2009: 93) also suggested that the numerous grains of soybean (*Glycine soja*) at the site were cultivated although they were morphologically wild.

The subsistence spectrum from Jiahu is similar to sites such as Hemudu and Kuahuqiao from

Zhejiang Province in South China, where rice was cultivated and a range of tubers and water plants were present in the waterlogged deposits (Liu et al. 2007). Other plant remains at Jiahu included acorns (*Quercus* sp.), water caltrop (*Trapa* sp.), lotus root (*Nelumbo nucifera*), walnut (*Juglans* sp.), and wild grapes (*Vitis* sp.) (Zhao and Zhang 2009).

Cross-References

- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication: Definition and Overview
- ▶ Peiligang: Agriculture and Domestication
- ▶ Pig: Domestication
- ▶ Plant Domestication and Cultivation in Archaeology

References

Chen, B., and Q. Jiang. 1997. Antiquity of the earliest cultivated rice in central China and its implications. *Economic Botany* 51 (3): 307–310.

Cucchi, T., A. Hulme-Beaman, J. Yuan, and K. Dobney. 2011. Early Neolithic pig domestication at Jiahu, Henan Province, China: Clues from molar shape analyses using geometric morphometric approaches. *Journal of Archaeological Science* 38: 11–22.

Fuller, D.Q., E. Harvey, and L. Qin. 2007. Presumed domestication? Evidence for wild rice cultivation and domestication in the fifth millennium BC of the Lower Yangtze region. *Antiquity* 81: 316–331.

Henanshengwenwukaoguyanjiusuobianzhu (Henan Provincial Cultural Relics and Archaeology Research Institute). 1999. *Wuyang Jiahu [The site of Jiahu in Wuyang County]*. Beijing: Science Press.

Hu, Y., S.H. Ambrose, and C. Wang. 2006. Stable isotopic analysis of human bones from the Jiahu site, Henan, China: Implications for the transition to agriculture. *Journal of Archaeological Science* 33: 1319–1330.

Jiang, L., and L. Liu. 2006. New evidence for the origins of sedentism and rice domestication in the Lower Yangzi River, China. *Antiquity* 80: 355–361.

Li, X., G. Harbottle, J. Zhang, and C. Wang. 2003. The earliest writing? Sign use in the seventh millennium BC at Jiahu, Henan Province, China. *Antiquity* 77 (295): 31–44.

Liu, L. 2004. *The Chinese Neolithic: Trajectories to early states*. Cambridge: Cambridge University Press.

Liu, L., G.-A. Lee, L. Jiang, and J. Zhang. 2007. Evidence for the early beginning (c. 9000 cal BP) of rice domestication in China: A response. *The Holocene* 17 (8): 1059–1068.

McGovern, P.E., J. Zhang, J. Tang, Z. Zhang, G.R. Hall, R.A. Moreau, and C. Wang. 2004. Fermented beverages of pre-and proto-historic China. *PNAS* 101 (51): 17593–17598.

Yang, X.-Y., A. Kadereit, G.A. Wagner, I. Wagner, and J. Zhang. 2005. TL and IRSL dating of Jiahu relics and sediments: Clue of 7th millennium BC civilization in central China. *Journal of Archaeological Science* 32 (7): 1045–1051.

Yuan, J. 2006. *Zhongguogudaijiazhu de qiyuan [The origin of the ancient Sus domestica in China]*. Xian: Sanqin Publishing House.

Yuan, J., and R. Flad. 2002. Pig domestication in ancient China. *Antiquity* 76: 724–732.

Zhang, J., and W. Pan. 2002. Henan Wuyang Jiahu yizhi 2001 nian chun fajue jianbao [Excavation report for the Spring 2001 excavation of Jiahu, in Wuyang County, Henan Province]. *Huaxia Kaogu* 2: 14–30.

Zhang, J., and X. Wang. 1998. Notes on the recent discovery of ancient cultivated rice at Jiahu, Henan Province: A new theory concerning the origin of *Oryza japonica* in China. *Antiquity* 72: 897–901.

Zhang, J., G. Harbottle, C. Wang, and Z. Kong. 1999. Oldest playable musical instruments found at Jiahu, early Neolithic site in China. *Nature* 401: 366–368.

Zhang, J.Z., X.H. Xiao, and Y.K. Lee. 2004. The earliest development of music: Analysis of the Jiahu bone flutes. *Antiquity* 78: 769–778.

Zhao, Z., and J. Zhang. 2009. Jiahuyizhi 2001 niandufuxuanjieguofenxibaogao [Report and analysis of results from 2001 flotation at Jiahu site]. *Kaogu (Archaeology)* 8: 84–94.

Zhejiangshengwenwukaoguyanjiusuo & Xiaoshan Bowuguan (Zhejiang Provincial Institute of Cultural Relics and Archaeology & Xiaoshan Museum). 2004. *Kuahuqiao [The site of Kuahuqiao]*. Beijing: Cultural Relics Publishing House.

Jijón y Caamaño, Jacinto

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Basic Biographical Information

Jacinto Jijon Y Caamaño was born on December 11, 1890, in Quito, Ecuador. He was the only child of Don Carlos Jijón, an important hacendado and

businessman, who died in 1908, when Jacinto was turning 18. He died on August 17, 1950, at the age of 60, and bequeathed part of his impressive library and museum to the Pontificía Universidad Católica del Ecuador, which is open to students and researchers. His house at the Circaciana in Quito now houses the Instituto Nacional del Patrimonio Cultural (National Institute of Cultural Heritage).

Major Accomplishments

During his childhood years, besides going to a private school in Quito, he was trained by the Salesian father and educator Jacinto Pankeri. After his father's death, he turned to father Federico González Suárez, archbishop of Quito, for mentorship. The archbishop had just published a monograph *Aborígenes de Imbabura y Carchi* (González Suárez 1910) and formed the Sociedad de Estudios Históricos Ecuatorianos y Americanos (SEEHA), with Jacinto as its youngest member. Inspired by his mentor's work, he began excavating on his own property, Hacienda Urcuqui and Hacienda Hospital, as well as on that of one of his friends, El Molino in El Quinche, along with father Pankeri who served as his field director and Juan León Mera as photographer and illustrator. Before leaving for La Paz as adjunct to the Ecuadorian Embassy in 1910, he excavated the Hacienda Ignaro. Upon his return from Bolivia in 1911, he resumed excavations at Urcuqui and extended his research to other areas of Imbabura.

At the age of 22, in the company of his friend Carlos Manuel Larrea and his mother, he moved to Europe. His first stop was the Congress of Americanist in London, and 3 months later they relocated to Paris, where under the auspices of Gonzalez Suárez, he interacted with Paul Rivet, who had served in Ecuador as physician for the French Geodesic Mission from 1901 to 1906. Rivet, then in charge of the Academy of Sciences of Paris, took Jacinto and Carlos Manuel under his wing, training them in physical anthropology and craniology and introducing them to French scientists. In 1914, they went to Spain and participated in a Geography congress in Sevilla, and in 1915 in Madrid, he published *Contribuciones al Conocimiento de los Aborígenes de la Provincia de Imbabura de la República del Ecuador* (Jijón y Caamaño 1912) and *El Tesoro del Itchimbía.*

In 1916, after his mother's funeral in Paris, he returned to Quito. His mentor, father Federíco González Suárez, died in 1917, and Jacinto succeeded the archbishop as president of the SEEHA. A year later, in 1918, the first *Boletín de la Sociedad de Estudios Históricos Americanos* appeared as a specialized journal in which Jijón himself published large parts of his works. That year, he published *Un cementerio Incásico en Quito y notas acerca de los Incas en el Ecuador* with Carlos Manuel Larrea (Jijón y Caamaño and Larrea 1918). A year later, he published *La Religion del Imperio de los Incas*, a then trendy topic inspired by the culture concept posited by Taylor (Vargas 1971) (Fig. 1).

Between 1918 and 1919, after writing a short essay on the artifacts from the coast (Jijón y Caamaño 1919), he devoted his interests to Chimborazo and Tungurahua provinces. In Riobamba, he excavated Macají, and San Sebastián de Guano, and the cemetery of Santa Elena near Ambato, and published *Puruhá*, *Contribución al*

Jijón y Caamaño, Jacinto, Fig. 1 Jacinto Jijón y Caamaño second form the left (National Library)

Conocimiento de los Aborígenes de la Provincia del Chimborazo (Jijón y Caamaño 1927). Here, he devoted his efforts to constructing a regional chronology, using Panzaleo culture as the main chronological marker. In Guano, he identified a widely dispersed assemblage, Tuncahuán, which included Carchi, Chimborazo, Cañar, Azuay, and even Manabí and Esmeraldas provinces. At this point he had already excavated in Manta and Cerro Jaboncillo, both in Manabí, returning in 1923 to define the Manteño culture associated with stone industry. His regional focus brought him into contract with Max Uhle, a renowned archaeologist who had excavated in Argentina, Perú, and Bolivia under the auspices of both the Museo Etnológico de Berlin and the University of Pennsylvania (Marcos 1988). Uhle's first task was to study the provinces of Cañar, Azuay, el Oro, and Loja, completing his task in the next 5 years, after which they went their separate ways. In 1920, SEEHA was recognized by Congress and transformed into the current Academia Nacional de Historia and its journal *Boletín de la Academia Nacional* (Jijón y Caamaño 1922). Jijón continued publishing his work in the bulletin and in 1923 began a publication series *Colección de Libros Raros*.

As a member of a rich family of hacendados, a leader in the textile industry, a fervent catholic, and president of the conservative party, he held strong conservative viewpoints until his death. He devoted time to publish two volumes of *Política Conservadora* in 1912 and 1934 (Jijón y Caamaño 1929; Jijón y Caamaño and Chávez 1981). His political activism was evident in his presidency of the Concejo de Quito in 1934 where he pushed for a conservative policy and the search for the Spanish heritage of Quiteños. He also contributed effort to publish the early cabildo papers found in the Quito Archive. In 1924, he bought arms in Colombia to lead a coup against President Gonzalo Cordova; however, his combative days ended after defeat in his first battle against the Ecuadorian army. He subsequently left Ecuador and established residency in Lima, where he met Uhle, Kroeber, and Tello and excavated Maranga, which was published in 1949 (Jijón y Caamaño 1949). He also published *Notas de Arqueología Cuzqueña* and began writing his monograph *Una Grán Maréa Cultural en el N-O de Sud América* (Salazar 1997).

Jijón y Caamaño, Jacinto, Fig. 2 Jacinto Jijón y Caamaño in his later years (National Library)

In 1933 he taught Ecuadorian Ethnography at the Universidad Central in Quito. During his stint as major of the City of Quito mayor of he produced in 1936, 1938 and 1949, three volumes on its Spanish history, and the first biography of the city's founder, Sebastian de Benalcazar (Jijón y Caamaño 1936, 1938) (Fig. 2).

During the 1940s, Jijón sought to synthetize the prehistory of Ecuador. In 1941 and 1943, four volumes entitled *El Ecuador Interandino y Occidental Antes de la Conquista Castellana* offered a comprehensive cultural history of Ecuador and introduced the study of philology and linguistics (Jijón y Caamaño 1943, 1945). In 1945 he wrote one of his masterpieces, *Antropología Prehispánica del Ecuador*, which was published post mortem by his wife and son in 1956 (Jijon y Caamaño 1997). One publication he never finished was *Las Culturas Andinas de Colombia*, which was also published posthumously in 1956. Also, in 1949 as one of the leading organizers of a colonial art exposition, he offered "Arte Quiteño, Breves Consideraciones Históricas."

References

González Suárez, Federico. 1910. *Los Aborígenes de Imbabura y del Carchi: Investigación arqueologicas sobre los antiguos pobladores de las provincias del Carchi y de Imbabura en la República del Ecuador. Láminas*. Colección otavalo en la historia, 51. Otavalo.

Jijon y Caamaño, Jacinto. 1912. *Contribución al conocimiento de los aborígenes de la Provincia de Imbabura en la República del Ecuador*. Madrid: Blass y Cía.

Jijon y Caamaño, Jacinto. 1919. Artefactos Prehistóricos del Guayas: Una Nota. *Boletín de la Sociedad Ecuatoriana de Estudios Historicos Americanos* II (5): 1–11.

Jijon y Caamaño, Jacinto. 1922. La Edad del Bronce en America del Sur. *Boletín de la Academia Nacional de Historia* 4 (9): 119–126.

Jijon y Caamaño, Jacinto. 1927. Puruhá:Contribución al conocimiento de los aborígenes de la provincia de Chimborazo. *Boletin de la Academia Nacional de Historia 6*, pp 12–26.

Jijon y Caamaño, Jacinto. 1929. *Política conservadora*... Tip. y enc.“ La Buena prensa del Chimborazo.”

Jijon y Caamaño, Jacinto. 1936. *Sebastián de Benalcázar*. Riobamba: Imprenta del Clero.

Jijon y Caamaño, Jacinto. 1938. *Sebastián de Benalcázar*. Vol. 2. Quito: Impr. del Clero.

Jijon y Caamaño, Jacinto. 1943. *El Ecuador interandino y occidental antes de la conquista castellana*. vol 1 y 2. Quito: Editorial Ecuatoriana.

Jijon y Caamaño, Jacinto. 1945. *El Ecuador interandino y occidental antes de la conquista castellana*. vol 4. Quito: Editorial Ecuatoriana.

Jijon y Caamaño, Jacinto. 1949. *Maranga: contribución al conocimiento de los aborígenes del Valle del Rimac, Perú*. Quito: La Prensa Católica.

Jijon y Caamaño, Jacinto. 1997. *Antropología Prehispánica del Ecuador*. 2nd ed. Quito: Museo Jacinto Jijón y Caamaño.

Jijon y Caamaño, Jacinto, and Ricardo Muñoz Chávez. 1981. *Política conservadora*. Quito: Banco Central del Ecuador.

Jijon y Caamaño, Jacinto, and Carlos M. Larrea. 1918. Un Cementerio Incasico en Quito y Notas Acerca de los Incas del Ecuador. *Revista de la Sociedad Juíridico-Literaria* XX: 159–260.

Vargas, María. 1971. *Jacinto Jijón y Caamaño*. Quito: Editoríal Santo Domingo.

Further Reading

Marcos, Jorge G. 1988. Max Uhle y la arqueología del Ecuador: precursor, investigador y profesor. *Indiana* 15: 197–216.

Salazar, Ernesto. 1997. Una Gran Marea Cultural, en el noreste de Sudamérica. Museo Jacinto Jijón y Caamaño, Pontificía Universidad Católica del Ecuador.

Johnson, Matthew (Historical Archaeology)

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Basic Biographical Information

Matthew Johnson, one of the leading theoreticians working in the archaeology of the late medieval and modern worlds, was born in Austin, Texas, in 1962 and has held joint US–UK citizenship since his birth. One of his formative archaeological experiences was the period which Johnson spent between September 1981 and June 1982 with the Norwich Survey, when he was involved with the post-excavation analysis and archive preparation of pottery and small finds from the late Anglo-Saxon to postmedieval periods from urban sites in Norwich, England. He would also spend an influential season working in Annapolis, Maryland, in 1985 as part of Mark Leone's Annapolis research program. Johnson's undergraduate and graduate degrees were all awarded by St. John's College, Cambridge University, between 1985 (BA) and 1990 (Ph.D.); his doctoral dissertation was on the subject *A Contextual Study of Traditional Houses in Western Suffolk, AD 1400–1700*.

Following his Ph.D., Johnson became Lecturer in Archaeology and Prehistory at the University of Sheffield (1988–1989) and was then appointed as a University of Wales Research Fellow in the Department of Archaeology at what was then still St Davids University College, Lampeter (1990–1991). In 1991, he was appointed Lecturer in Archaeology at the University of Durham, where he would remain until 2004, rising to the position of Professor of Archaeology before his departure. He was appointed Professor of Archaeology at the University of Southampton in 2004, becoming Head of Archaeology between 2005 and 2008; he was Deputy Head of School of Humanities (Research), between 2009 and the end of 2011. In January 2012, he took up a new

professorial post at Northwestern University in Evanston, Illinois. He has also held Visiting Fellowships at the University of California at Berkeley (1995); the South African Centre for Science Development (1997); the Centre for Medieval and Renaissance Studies, University of California at Los Angeles (1998); the Centre for Cultural and Environmental History, University of Massachusetts at Boston (1998); the University of Cambridge (2001–2002); Flinders University, Adelaide, Australia (2003–2004); Ruprecht-Karls-Universität, Heidelberg, Germany (2005); and the University of Pennsylvania (2008). He was elected a Fellow of the Society of Antiquaries of London in 2002 and was selected as a Guggenheim Fellow in 2019.

Major Accomplishments

Matthew Johnson is a one of the few historical (or postmedieval) archaeologists whose approaches to archaeological theory, particularly as regards the archaeology of capitalism, are widely known – and have been influential – outside of the subdiscipline of historical archaeology. Notwithstanding his dual British-American citizenship, and his current post in the United States, he is arguably the most important and influential theoretician working in the British postmedieval tradition. His books *The Archaeology of Capitalism* (Johnson 1996) and *Archaeological Theory: An Introduction* (Johnson 2019) form the centerpiece of his international reputation; the latter is on its third edition and has been translated into, among other languages, Spanish, Chinese, Serbian, and Korean. *The Archaeology of Capitalism* is a particularly important book for its study of the transition from feudalism to capitalism in Britain. While in some cases this builds on work by influential American historical archaeologists such as Mark Leone (e.g., 1995) and James Deetz (e.g., 1996), Johnson does so via a British-centered but internationally aware archaeological approach that roots the development of capitalism in the transformation of the British countryside in the late medieval period. This has helped to broaden both the geographical and disciplinary reach of archaeologies of capitalism internationally.

Alongside his theoretical work, Johnson has also made important and influential contributions to archaeological studies of British architecture and landscape of the period c. 1300–1800. Important works here include *Housing Culture: Traditional Architecture in an English Landscape* (Johnson 1993), *Behind the Castle Gate: From Medieval to Renaissance* (Johnson 2002 – nominated for the biennial Archaeological Book Prize), and *Ideas of Landscape* (Johnson 2006 – selected by Margaret Drabble as one of her books of the year). Among this work's influential strands has been what Johnson himself has – with full knowledge of the phrase's broader archaeological implications – termed a "loss of innocence" (Johnson 1997) in archaeological studies of British vernacular architecture through the consideration and integration of such topics as historical change, regional variation, and the application of theoretical approaches to buildings archaeology.

Johnson's most recent research projects build on both these theoretical and architectural/landscape strands. Castles have long been a particular focus of research, and from 2010 to 2014, he led an Anglo-American project studying Bodiam Castle in the south of England. This late medieval castle is one of the most iconic in England thanks to its evocative moated landscape. Johnson's research examined Bodiam not just in local, regional, global, and postcolonial contexts but also as a castle and landscape that formed part of a lived experience that encompasses such themes as social identity and political economy (Johnson 2017). In the field of theory, Johnson has recently turned his attention to the vernacular experience of archaeological theory or how archaeologists think while practicing archaeology at an everyday level. In order to provide this work a geographic focus, Johnson has been examining the practice of archaeology within the Wessex region of Southern England, which encompasses such iconic sites as Stonehenge, Maiden Castle, and Salisbury.

Johnson's trans-Atlantic background means that the archaeological community can continue

to look forward to thought-provoking work on the archaeology of the Atlantic world, both in terms of trans-Atlantic archaeological theory and the actual archaeology of trans-Atlantic colonial settlement (e.g., Johnson 2015). His current work traces material landscapes and identities from the English Middle Ages through to North American and Caribbean plantations and colonies, via feudal settlements in Scotland, Wales, and Ireland. His aim is to explore the landscapes, and material culture that people made and used, and how these interacted with the changing identities of the English and their neighbors over time; a book on this research is forthcoming.

Cross-References

- ▶ Annapolis: Historical Archaeology
- ▶ Buildings Archaeology
- ▶ Critical Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Historic Building Conservation: Current Approaches
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Post-Medieval Archaeology (Europe)

References

Deetz, J. 1996. *In small things forgotten: An archaeology of early American life*. New York: Anchor Books.

Johnson, M. 1993. *Housing culture: Traditional architecture in an English landscape*. London: University College London Press.

Johnson, M. 1996. *An archaeology of capitalism*. Oxford: Blackwell.

Johnson, M. 1997. Vernacular architecture: The loss of innocence. *Vernacular Architecture* 28: 13–19.

Johnson, M. 2002. *Behind the castle gate: From medieval to renaissance*. London: Routledge.

Johnson, M. 2006. *Ideas of landscape*. Oxford: Blackwell.

Johnson, M. 2015. The first fact: Discourses of culture in Anglophone archaeology. *Post-Classical Archaeologies* 5: 327–346.

Johnson, M., ed. 2017. *Lived experience in the later middle ages: Studies of Bodiam and other elite sites in South-East England*. St. Andrews: Highfield Press.

Johnson, M. 2019. *Archaeological theory: An introduction*. 3rd ed. Hoboken: Wiley Blackwell.

Leone, M. 1995. A historical archaeology of capitalism. *American Anthropologist* 97: 251–268.

Johnson, Matthew (Theory)

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Basic Biographical Information

Known for his contributions to archaeological theory, medieval archaeology, and the archaeology of landscape, Matthew Johnson is one of the leading historical archaeologists of his generation (Fig. 1). Born in 1962 in Texas, he grew up in Norwich, England, and enjoys a dual US and British citizenship. Johnson received his B.A. in 1985, his M.A. in 1989, and his Ph.D. in 1990 from St. John's College, Cambridge University, under the direction of Ian Hodder. Johnson served as a Lecturer in Archaeology and Prehistory at the University of Sheffield from 1988 to 1989. Johnson was a University of Wales Research Fellow in

Johnson, Matthew (Theory), Fig. 1 Matthew Johnson. (Courtesy of Matthew Johnson)

the Department of Archaeology at St. David's University College, Lampeter, from 1990 to 1991. Johnson was a Lecturer and then Professor in Archaeology at the University of Durham from 1991 to 1998. Johnson became Professor of Archaeology at the University of Southampton in 2004 and Head of Archaeology from 2005 to 2008 and was then Associate Dean of the Faculty of Humanities from 2009 to 2011. Johnson is currently Professor of Anthropology at Northwestern University.

Johnson completed his graduate studies at Cambridge just at the time that postprocessual archaeology came of age. Johnson was both an enthusiastic advocate of this new movement and a sharp critic. This is well demonstrated in his engagement with the popular concept of agency. Johnson observed that while postprocessual archaeology placed great emphasis on the role of the individual as an active social agent, there was little focus on the individual in practice (Johnson 1989). For example, in his review of Mark Leone's (1984) famous study of William Paca's garden, he pointed out that Leone failed to consider how the interpretations of those who visited the garden varied across class, gender, and ethnicity lines. Johnson also noted that the discussions of agency often neglected a consideration of structure, which was problematic since agency exists in a dialectical relationship with structure. Different sorts of social structures produce and are produced by different sorts of agency (Johnson 2000: 213). This insight caused him to propose the idea of a "historicity of agency," whereby models of agency are constructed appropriate to different epochs or periods.

Major Accomplishments

Johnson's early work used domestic houses and castles as a means of understanding the transition between feudalism and capitalism from the later Middle Ages to the beginnings of the Industrial Revolution. One of the most distinctive indexes of this transition is the "process of enclosure," the appropriation of common rights to an individual usually represented physically by hedges, fences, and walls demarking fields (Johnson 1991: 160). The process of enclosure, however, led to both intended and unintended consequences. It facilitated innovation and the rise of farming for profit. But it also let to the breakdown of community ties and the rise of class relations. In *Housing Culture* (Johnson 1993), he adopted the structuralist approach of Henry Glassie and James Deetz to argue that the structure and organization of domestic architecture relates not only to economic considerations but also to ideological ones as well. Indeed, he suggests that it is impossible to separate them out.

Johnson builds upon this research to contribute to an archaeology of capitalism, a field of growing interest in historical archaeology. Capitalism refers to a set of social relations linking landowners and patrons with workers and laborers. These social relations are classically unequal in the sense that laborers do not control the fruit of their labor, rather this is controlled by the landowners. Johnson (1996: 3) regards enclosure and commodification as emergent structures that unfolded in the late medieval period and achieved their full realization in industrial capitalism. They are not limited to a single domain, rather they cut across a range of spheres such as religious, agrarian, public, and domestic and are part of the genealogy of a disciplinary society.

More recently, Johnson has developed a sophisticated critique of landscape archaeology. In his book *Ideas of Landscape* (Johnson 2006), he observes that landscape archaeology especially as it is practiced in Britain is undertheorized. It is largely based on the work W. G. Hoskins (1955) and grounded in the ideas of English Romanticism. The Romantic tradition gives rise to an empirical approach based in field walking. Johnson argues that meaning does not just emerge from the landscape by itself. It is created and shaped as much by ourselves in the present, through our own habitual practices and ways of seeing, as it is by the activities of people in the past. His key insight is that we need to question the assumption that there is only one way of looking at and responding to landscape.

Johnson is well known for his general syntheses of archaeological theory. His book

Archaeological Theory: An Introduction (Johnson 1999) set out to demystify theory. As the screenwriter Richard Curtis might say, theory, actually, is all around. It underpins everything we do – from where we go to dig to what we choose to record – and to how we interpret what we find. Johnson writes with an engaging self-reflexive style to draw students into the complex debates about epistemological dilemmas, ethical stances, and political realities. Before they know it, they have become fluent in the language of archaeology and, equally importantly, are able to generalize this specialized form of knowing to other related domains.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Leone, Mark P.
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of

References

Johnson, M.H. 1989. Conceptions of agency in archaeological interpretation. *Journal of Anthropological Archaeology* 8 (2): 189–211.

Johnson, M.H. 1991. Enclosure and capitalism: The history of a process. In *Processual and postprocessual archaeologies: Multiple ways of knowing the past*, ed. R. Preucel, 159–167. Carbondale: Southern Illinois University.

Johnson, M.H. 1993. *Housing culture: Traditional architecture in an English landscape*. London: UCL Press.

Johnson, M.H. 1996. *An archaeology of capitalism*. Oxford: Blackwell.

Johnson, M.H. 1999. *Archaeological theory: An introduction*. Oxford: Blackwell.

Johnson, M.H. 2000. Self-made men and the staging of agency. In *Agency in archaeology*, ed. M.-A. Dobres and J. Robb, 213–231. London: Routledge.

Johnson, M.H. 2006. *Ideas of landscape*. Oxford: Blackwell.

Leone, M.P. 1984. Interpreting ideology in historical archaeology: Using the rules of perspective in the William Paca Garden in Annapolis, Maryland. In *Ideology, power, and prehistory*, ed. D. Miller and C. Tilley, 23–35. Cambridge: Cambridge University Press.

Further Reading

Johnson, M.H. 2002. *Behind the castle gate: From medieval to renaissance*. London: Routledge.

Johnson, M.H. 2005. On the particularism of English landscape archaeology. *International Journal of Historical Archaeology* 9 (2): 111–122.

Johnson, M.H. 2006. On the nature of theoretical archaeology and archaeological theory. *Archaeological Dialogues* 13 (2): 117–132.

Johnson, M.H. 2012. On the nature of empiricism in archaeology. *Journal of the Royal Anthropological Institute* 17 (4): 764–787.

Jokilehto, Jukka

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Basic Biographical Information

Jukka Jokilehto was born in 1938 in Helsinki, where he graduated from the Polytechnic in architecture and town planning in 1966. After a decade working in architectural practices in Finland, he took part in a number of courses on the conservation and restoration of historic structures around Europe, notably those on the restoration of monuments and sites at ICCROM (International Council for the Study of the Preservation and Restoration of Cultural Property) in Rome and on the conservation of historic structures at IoAAS (the Institute of Advanced Architectural Studies) at the University of York, where he was awarded the degree of Doctor of Philosophy (D.Phil.) in 1986.

Major Accomplishments

In 1972, Jukka Jokilehto joined the staff of ICCROM, becoming responsible in the following year for its program in architectural and urban conservation. Over the next two decades, he trained many hundreds of architects, planners, and conservators from every continent, with all of whom he has maintained close contact. Visits to

sites and monuments formed an essential component of these ICCROM courses, and as a result, Jukka became familiar with the concepts and practices for conservation and restoration across the whole gamut of human cultures. He remained with ICCROM until his retirement in 1998 after 6 years as Assistant Director-General. During his long years of service, he represented ICCROM at many meetings around the world, notably those of the UNESCO World Heritage Committee and those leading up to the 1999 Second Protocol of the 1954 UNESCO Convention for the Protection of Cultural Property in the Event of Armed Conflict (the Hague Convention). He is currently Special Advisor to the Director-General of ICCROM.

After his retirement from ICCROM, he also worked closely with ICOMOS (International Council on Monuments and Sites) as an advisor on World Heritage (2000–2006), as President of the International Training Committee, and as a member of the International Committee on the Theory and Philosophy of Conservation and Restoration. He is currently Professor at the University of Nova Gorica (Slovenia), jointly with the UniversitàIuav di Venezia. His wide consultancy portfolio is mainly directed toward the preparation of nominations to the UNESCO World Heritage List, management and urban conservation plans, and lecturing on the history and theory of conservation and on the management of the built heritage at universities around the world.

The last sentence of the Preface to the *Festschrift* published by ICCROM in 2008 admirably summarizes the esteem accorded to Jukka Jokilehto by colleagues and students alike over his long career: "May these essays give as much pleasure and inspiration to Jukka as he has given to so many others."

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Buildings, Archaeological Study of
- ▶ Conservation and Management of Archaeological Sites
- ▶ Heritage Conservation Training
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)

Further Reading

Jokilehto, J. 1999. *A history of architectural conservation*. Oxford: Butterworth-Heinemann.

Jokilehto, J., ed. 2008. *The world heritage list – What is OUV?* Monuments and Sites XIV. Paris: ICOMOS.

Jokilehto, J., and B. Feilden. 1993. *Management guidelines for world heritage sites*. Rome: ICCROM. [2nd edition 1998].

Jokilehto, J., H. Cleere, S. Denyer, and M. Petzet. 2005. *The world heritage list: filling the gaps –an action plan for the future*. Monuments and Sites XII. Paris: ICOMOS.

Price, N.S., and J. King, eds. 2009. *Conserving the authentic: Essays in honour of Jukka Jokilehto*. ICCROM Conservation Studies 10. Rome: ICCROM.

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Jones, Rhys Maengwyn

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Basic Biographical Information

Rhys Maengwyn Jones (1941–2001) (Fig. 1) was born in Wales on 26th February 1941. He died in Canberra, Australia, on 19th September; 2001. Jones received his primary and secondary education in Wales, where he grew up. He received a Master of Arts from Cambridge University, England, in 1966. After that he moved to Australia. In 1972 he was awarded a Ph.D. in archaeology from the University of Sydney. In 1969 Rhys Jones joined the Australian National University as a Research Fellow with the Research School of Pacific Studies. In 1993, he was awarded a personal Chair.

Rhys Jones was a prolific academic writer who published more than 200 articles and books. His research on Australia established him as a scholar

Jones, Rhys Maengwyn, Fig. 1 Rhys Jones. (Courtesy Betty Meehan)

of international standing. Universities in Europe, South East Asia, South America, Canada, North America, and the Pacific hosted his lectures on human evolution and archaeology. In 1995–1996, he held the prestigious Chair of Australian Studies, Harvard University, and in 2001 he became an Honorary Professor at the Scarab Research Centre at the University of Wales, Newport.

Along with colleagues such as Jack Golson, Betty Meehan, and Peter White, he played a key role in the professionalization of Australian archaeology in the 1960s and 1970s and in the establishment of the Australian Archaeological Association. He served on Faculty Boards and on advisory, research committees, and councils at the Australian National University and was an elected member of the Council of the Australian Institute of Aboriginal and Torres Strait Islander Studies. He was Vice-President of the Australian Academy of the Humanities from 1984 to 1987. His professional service to archaeology includes being a co-editor of *Mankind*, the Journal of the Anthropological Societies of Australia, from 1965 to 1972, and being President of the Australian Archaeological Society from 1977 to 1979. His contributions to Australian archaeology were recognized by the Australian government in 2003, when he was posthumously appointed an Officer of the Order of Australia, "for service to archaeology, particularly in the areas of research and teaching, and as a leader in matters relating to world heritage, conservation and indigenous social justice issues" (Smith 2003: 51).

Major Accomplishments

Rhys Jones was an outstanding archaeologist whose seminal works shaped critical research directions at a time when Australian archaeology was in its infancy. He was a member of a generation of intellectuals with European pedigrees who moved to Australia and established archaeology in this country in the late 1960s and early 1970s. Jones' research focus was on the antiquity of human occupation of the continent and the complex archaeological signature of human-environment relationships across the Pleistocene-Holocene transition. His influence extended far beyond his own research projects. He supervised successive generations of Australian students as they attempted to answer the most pressing questions of the times – the first colonization of the Australian continent, human evolution and land use, and the complexity of Indigenous settlements.

Rhys Jones' scholarly publications attest to his eclectic interests within archaeology. His interest in sociocultural evolution is evident in his doctoral study of the origins and evolution of Tasmanian Aboriginal people. This thesis is still considered a landmark study for its thoroughness, intellectual scope, and complexity of approach to archaeological theory and method.

Over a career spanning 40 years, Rhys Jones produced scholarship on the antiquity and

significance of some of the most important finds in Australian archaeology. His involvement in the recording, salvage, and research of the oldest recorded human burials in Australia at Lake Mungo led to seminal publications on the significance of these remains to theories of human evolution (Bowler et al. 1969). Although a trained scientist Jones understood and respected the local Indigenous community's reaction to the research into human remains at Lake Mungo, and in 1991 he was involved in the repatriation of these remains for reburial.

An important focus of Jones' research was the antiquity, land use, and settlement patterns of Aboriginal people in the Arnhem Land and Kakadu regions in northern Australia. In 1981 he directed a major interdisciplinary archaeological expedition to Kakadu National Park. Along with his life partner, Betty Meehan, he worked in remote Aboriginal communities in the Northern Territory in the 1980s. As a result of his experiences there, Jones was active in establishing a new frontier of knowledge in an Australian context: ethnographic approaches in Australian archaeology. Jones and Meehan's work inspired a spate of ethnographic studies among archaeologists in diverse geographic and environmental contexts in Australia.

Along with colleagues such as Jack Golson, Jim Allen, and John Mulvaney, Rhys Jones initiated research into the interrelationships between environment, ecology, and Indigenous peoples in the Australasian region. Jones' seminal paper, "Firestick Farming" (Jones 1969), broke down the perception of Aboriginal people as "unchanging people in an unchanging landscape" and is still cited extensively, while his paper "Why Did the Tasmanians Stop Eating Fish?" (1978) became a central resource in debate on the impact of cultural conservatism in Indigenous societies. In addition, Jones was a leader in advocating a scientific approach to Australian archaeology, expressly through the use of new scientific methods in dating rock art and investigation of the potential of paleoclimatic for the analysis of occupation deposits.

Rhys Jones' fieldwork with Aboriginal people in remote parts of northern Australia taught him much about Indigenous people's relationships to land. His standing with the Aboriginal people with whom he worked can be gauged by the Aboriginal Honours that were bestowed on him. He was invited to attend Kunapipi ceremonies in Arnhem Land in 1972 (twice) and 1986. Moreover, he was co-recipient of Rom ceremonial regalia in 1982. He was given the kinship designation (skin name) Wamut with the Galamagondidja Baparru clan of the Gidjingarli people, Arnhem Land, Northern Territory, Australia.

Rhys Jones accomplishments in Australian archaeology spanned all current and developing theories and methods in archaeological scholarship and related fields. He published independently and with colleagues on archaeological research in Europe, the Middle East, South East Asia, Oceania, and his native country of Wales. He was a prolific academic writer, publishing more than 200 articles and books, and spoke fluent Welsh and French. Over a forty-year period he attended, organized, and delivered seminars, debate sessions, public and university lectures, workshops, symposia, and conferences for which he produced more than 60 publications about human evolution and the colonization of the Australian continent.

Rhys Jones was a public intellectual whose views helped to shape the Australian public's appreciation of their past. He had a deep knowledge of Australia's Indigenous heritage and a rare ability to engender enthusiasm for this subject in both students and members of the general public. His career spanned 30 years in film, television, and radio documentaries, some of which he co-produced and appeared in, and in newspaper articles. Jones made major contributions to the quality of Australian society through enhancing a broad community understanding of Indigenous cultures. He gave frequent presentation on the cultural history of Tasmania and once gave a lecture aboard the *Icebird*, an ice-breaking ship travelling to Antarctica to resupply scientific personnel.

Much of Jones' research and public outreach was conducted in Tasmania. Jones' research on human evolution and occupation antiquity in Tasmania revolutionized popular perceptions of the sophistication and complexity of Tasmanian Aboriginal social organization and culture. The film that he co-wrote and appeared in, *The Last Tasmanian*, won first prize at the Adelaide Film Festival, the 1978 Logie for the best Australian documentary, and a silver medal at the Commonwealth Film Festival 1978, Cyprus. However, the film proved to be controversial as it was interpreted in the popular media as denying the existence and survival of Tasmanian Aboriginal people.

One of Rhys Jones' most significant accomplishments in this area was the World Heritage Listing of archaeological sites on the Franklin River (Kiernan et al. 1983). Jones' scientific research was fundamental to the nomination and subsequent listing of this area and his public engagement essential to lifting the public profile of the region. In 1981 he directed the discovery and archaeological excavations of the Kutikina Cave (formerly Fraser Cave), Franklin River, southwest Tasmania. His analysis of archaeological finds at Kutikina Cave in Tasmania established the antiquity of human occupation in Tasmania, contributing to the nomination of the nearby Franklin River to the World Heritage List. Working with colleague John Mulvaney, Rhys Jones played a critical role in the preservation of archaeological sites under threat by the damming of the Franklin River. Along with international colleagues Jones and Mulvaney took out a full-page newspaper advertisement affirming the significance of Kutikina Cave and the Franklin area as part of the world's cultural heritage.

Rhys Jones had an extraordinary intellect and capacity to reach out to diverse peoples. He was a natural linguist and could converse in Gu-jingarliya with the Anbarra people of Arnhem Land and in Tok Pisin with the people of Papua New Guinea. He was literate in Italian, Spanish, German, and Renaissance Latin. His scholarship established new directions in Australian archaeology.

Rhys Jones' outstanding contribution to Australian archaeology was honoured in the volume *Histories of Old Ages*: *Essays in Honour of Rhys Jones* (Anderson et al. 2001). The Australian Archaeological Association recognizes his enduring contribution each year in its award of the Rhys Jones Medal for academic excellence in Australian archaeology.

Cross-References

- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Golson, Jack
- ▶ Meehan, Betty
- ▶ Mulvaney, John

References

Anderson, A., et al., eds. 2001. *Histories of old ages: Essays in honour of Rhys Jones*. Canberra: Pandanus Books, Research School of Pacific and Asian Studies, Australian National University.

Bowler, J.M., R. Jones, H. Allen, and A.G. Thorne. 1969. Pleistocene human remains from Australia: A living site and human cremation from Lake Mungo, western New South Wales. *World Archaeology* 2: 39–60.

Jones, R. 1969. Fire-stick farming. *Australian Natural History* 16: 224–228.

Jones, R. 1978. Why did the Tasmanians stop eating fish? In *Explorations in ethno-archaeology*, ed. R.A. Gould, 11–48. Albuquerque: School of American Research and University of New Mexico Press.

Kiernan, K., R. Jones, and D. Ranson. 1983. New evidence from Fraser Cave for glacial age man in southwest Tasmania. *Nature* 301: 28–32.

Further Reading

Gould, R.A. 1968. Living archaeology: The Ngatatjara of Western Australia. *Southwestern Journal of Anthropology* 24: 101–122.

Gould, R.A. 1971. The archaeologist as ethnographer: A case from the Western Desert of Australia. *World Archaeology* 3: 143–177.

Jones, R., ed. 1985. *Archaeological research in Kakadu National Park*. Canberra: Australian National University.

Meehan, B., and R. Jones, eds. 1988. *Archaeology with ethnography: An Australian perspective*. Canberra: Australian National University.
Smith, C. 2003. Rhys Jones awarded the order of Australia. *Australian Archaeology* 56: 51.

Jorge, Vítor Oliveira

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Basic Biographical Information

Vítor Oliveira Jorge (Fig. 1) is a Portuguese archaeologist. Born in Lisbon in January 1948, he was awarded a degree in history (with a dissertation on Paleolithic archaeology) from the Faculty of Arts of the University of Lisbon in 1972. After being a lecturer at the University of Luanda (Angola), a territory where he had carried out several field research projects, he moved to the University of Porto, in the north of Portugal, where he taught from 1974 to 2011. His Ph.D. dissertation was awarded in 1982 on the basis of his analysis of passage graves (megalithic monuments) in the north of Portugal, in the fourth and fifth millennia BCE. The same theme was the object of his "aggregation" (public examination as a professor) in 1989. Vítor Jorge became a full professor of his faculty and university in 1990. He has been a member of the Department of Cultural Heritage Sciences and Techniques of the Faculty of Arts of the University of Porto since its creation in 2007. He was also a member of the research group of Centro de Estudos Arqueológicos das Universidades de Coimbra e Porto (CEAUCP/CAM) – an archaeological research unit that included archaeologists and heritage specialists from the universities of Porto and Coimbra and from the Mertola's Archaeological Camp – since its foundation and until 2014. Now (since January 2015) he is a researcher of the Instituto de História Contemporânea of the Universidade Nova de Lisboa.

In addition to being an archaeologist, Vitor Jorge is a poet, who has published around 20 books, and an essayist.

Jorge, Vítor Oliveira, Fig. 1 Vítor O. Jorge

Major Accomplishments

The archaeological career of Vítor Oliveira Jorge, who has kept active after his retirement in 2011 (both as a field archaeologist and as a researcher), has covered a range of themes. Until 1972, one of his interests was the Paleolithic archaeology of southern Portugal, namely, the Early and Middle Paleolithic, with a particular concern with the pebble tool industries. In 1973 and 1974, he conducted research on the archaeology of the southwest of Angola prior to Portuguese colonization, especially in the Huíla Plateau and in central Angola. From 1975 to 1994, he studied the Neolithic (megalithic) mounds of northern Portugal (namely, in the area from the border with Galicia to the river Douro to the south), with an emphasis on spatial and social archaeology, trying to focus on necropolis and their settings, rather than on isolated monuments, and showing the polymorphous character of these monuments.

From 1989 until the present, he has focused on Copper Age and Bronze Age hill sites (third to second millennia BCE) in the high Portuguese Douro basin (Vila Nova de Foz Côa region), as a continuation of his interest in prehistoric architectures and their relationships with the territories

where people settled. He is one of the directors of the excavation of the hill site of Castanheiro do Vento (1998–2018), an important Chalcolithic hill precinct located in the territory of the Foz Côa municipality. This research has changed the way archaeologists currently look at these kinds of sites, wrongly named "fortified settlements." Vítor Jorge contends that they probably were not the common places where people lived but ceremonial and symbolic devices connected with the constitution of local community identities and the emergence of elites.

In 1994 and 1995, when he was Dean of the Faculty of Arts of the University of Porto, Vítor Jorge took a public position in favor of the conservation of the rock art complex of the Côa valley in the northeast of Portugal (not far from the area he studied as a field archaeologist). In 1995 and 1996, he was the head of the Commission that prepared the installation of the Côa Valley Archaeological Park, and in 2001 the President of the Portuguese Republic granted him the Merit Insignia for his actions to protect Portuguese cultural heritage. After his retirement, in 2012, the Faculty of Arts of the University of Porto, where he has taught for 37 years, conferred him its Golden Medal, in a public ceremony where a book in his honor was presented.

Professor Vítor Jorge has organized and published the proceedings of many scientific meetings, namely, the I (Porto 1993) and III (Vila Real, in collaboration with the local university, the University of Trás-os-Montes e Alto Douro) Congresses of Iberian Archaeology (the proceedings of these congresses were published by SPAE and ADECAP, 8 volumes and 10 volumes, respectively). He is the head of two nonprofit scientific associations, the Sociedade Portuguesa de Antropologia e Etnologia (SPAE) and the Associação para o Desenvolvimento da Cooperação em Arqueologia Peninsular (ADECAP). From 1998 to 2011, this latter association published a journal in English, the *Journal of Iberian Archaeology*.

Lately, Professor Jorge has developed an interest in philosophical issues connected to his research themes in archaeology and cultural anthropology, namely, the relationships between culture and nature, humans and animals, objectivity and subjectivity, history and temporality, space and place, gender, and Lacanian psychoanalysis. These issues have driven him to study and to give short courses on the work of critical authors such as Giorgio Agamben and Slavoj Zizek. Since his youth, Vítor Jorge has struggled for a more intimate connection between archaeology (especially the so-called prehistoric archaeology) and the problems raised by contemporary critical thought, a connection that he thinks is crucial for the development of archaeology itself as a mature discipline.

Cross-References

► Archaeological Theory: Paradigm Shift

References

Actas do I Congresso de Arqueologia Peninsular. 1993–1995 (ed.). 8 vols. Porto: SPAE.

Actas do III Congresso de Arqueologia Peninsular. 2000 (ed.). 10 vols. Porto: ADECAP.

Jorge, V.O. 1987. *Projectar o passado. Ensaios sobre arqueologia e pré-história*. Lisboa: Ed. Presença.

Jorge, V.O. 1990. *Arqueologia em construção. Ensaios*. Lisboa: Ed. Presença.

Jorge, V.O. 2000. *Arqueologia, património e cultura*. 2nd ed. Lisboa: Instituto Piaget.

Jorge, V.O. 2003a. *Olhar o mundo como arqueólogo*. Coimbra: Ed. Quarteto.

Jorge, V.O. 2003b. *A irrequietude das pedras. Reflexões e experiências de um arqueólogo*. Porto: Ed. Afrontamento.

Jorge, V.O. 2005. *Vitrinas muito iluminadas. interpelações de um arqueólogo à realidade que o rodeia*. Porto: Campo das Letras.

Jorge, V.O. 2006a. *Fragmentos, memórias, incisões. Novos contributos para pensar a arqueologia como um domínio da cultura*. Lisboa: Ed. Colibri/IELT.

Jorge, V.O. 2006b. *Approaching prehistoric and protohistoric architectures of Europe from a dwelling perspective*. Porto: ADECAP.

Jorge, V.O. 2006c. In *Overcoming the modern invention of material culture*, ed. J. Thomas. Porto: ADECAP.

Jorge, V.O. & Thomas, J. (eds.) 2008. *Archaeology and the politics of vision in a post-modern context*. Newcastle: Cambridge Scholars Publishing.

Jorvik Viking Centre

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Basic Information

The Jorvik Viking Centre opened in York in 1984, following a 5-year excavation by the York Archaeological Trust. This "Viking Dig" (Hall 1984) had revealed that up to 9 m of archaeological deposits had built up in the Coppergate area of the city and that these moist organic-rich deposits contained the remains of wood, thatch, and many thousands of artifacts. The anaerobic nature of these deposits meant that textiles and leather were all well preserved. In total the dig recovered 250,000 pieces of pottery, 5 t of animal bone, and 40,000 other objects. The dig demonstrated that Jorvik had grown dramatically in the late ninth and tenth centuries, with new streets, a new arrangement of development plots, and new types of urban buildings. All of this was fuelled by craft production and trade. This discovery allowed the York Archaeological Trust to rewrite the history of town life in England, showing how this period was not an era of looting, or destruction, as many had thought, but one in which the foundations of medieval urban prosperity had been laid.

Major Impact

The Jorvik Viking Centre (http://www.jorvik-viking-centre.co.uk/) has welcomed over 17 million people through its doors since 1984 and today has about 400,000 visitors a year. The attraction contains a ride-based experience where visitors are carried around the replicated site of the Viking site on capsule cars that carry six people each. Visitors are able to see reproductions of the Viking houses where they stood over 1,000 years ago, see animatronics depicting the Viking inhabitants, and witness the sounds and smells of the time, including the world's famous Viking "man on the toilet." The ride is complemented by a series of gallery spaces which give visitors a variety of perspectives on Viking age life (Fig. 1).

Jorvik Viking Centre, Fig. 1 A capsule car at Jorvik

Cross-References

▶ Urban Archaeology
▶ Urban Heritage
▶ York Archaeological Trust

References

Hall, R.A. 1984. *The Viking dig: Excavations at York*. London: The Bodley Head Ltd.
The Jorvik Viking Centre. Available at: http://www.jorvik-viking-centre.co.uk/. Accessed 28 Oct 2012.

Joukowsky, Martha Sharp

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Basic Biographical Information

Martha Sharp Joukowsky is an archaeologist who has worked in numerous parts of the world, including Lebanon, Hong Kong, Turkey, Italy, Greece and, most extensively, Jordan. Her research encompasses studies of the domestication of plants and animals, the advent of Middle East urbanism and the varied cultural developments in Anatolia, Syro-Palestine, Iraq and Iran, from prehistory to the Roman periods. Her doctoral work (Ph.D. Paris I-Sorbonne 1982), published as *Prehistoric Aphrodisias* (1996b), engaged with the Neolithic through Bronze Age periods at the site of Aphrodisias in Turkey.

Joukowsky is a 1958 graduate of Pembroke College, the then coordinate women's college to Brown University. Until her retirement, she was Professor of Old World Archaeology and Art and of Anthropology at Brown, where she also serves as Trustee Emerita; she was recognized with the honorary degree of Doctor of Humane Letters by Brown in 1985. Joukowsky was elected President of the Archaeological Institute of America (AIA) in 1989, serving a 4-year term; the AIA's Distinguished Service Award bears her name and that of her husband, Artemis A.W. Joukowsky. The pair was presented with the AIA's Bandelier Award for Public Service to Archaeology in 2010.

In 2004, Brown University established the Joukowsky Institute for Archaeology and the Ancient World which is dedicated to promoting the investigation, understanding, and enjoyment of the archaeology and art of the ancient Mediterranean, Egypt, and Western Asia, through active fieldwork projects, graduate and undergraduate programs, and public outreach activities.

Major Accomplishments

Joukowsky directed a near 20-year long archaeological campaign at the Great Temple at Petra (southern Jordan), which has led to numerous detailed publications, student research projects and widely viewed documentaries and other public presentations. The excavation, sponsored by Brown University, revealed an impressive structure built, from the local "rose red" sandstone, on an artificial terrace along the city's main colonnaded street between the late first century BCE and the first century CE. The multi-level design of the 'temple' (its precise range of functions is sometimes debated) is especially noteworthy for its large porticoed courtyard, 120 columns (topped by elephant-headed capitals) and a small theatral area inserted into the structure's interior. The Brown University Great Temple team also explored a huge cistern, bath system and Residential Quarter. Almost completely buried at the project's inception, the complex today has been conserved and substantially restored, and is a major visual landmark in the Petra city center. Joukowsky also used the Great Temple as a laboratory for introducing a range of scientific techniques, many pioneering for their time in Jordan, including the use of

Ground Penetrating Radar (GPR) and 3D modeling and visualization studies. All Great Temple data are currently available through Open Context of the Alexandria Archive Institute.

Apart from her substantive publications deriving from fieldwork, Joukowsky is credited with writing one of the most influential handbooks in the field, *A Complete Manual of Field Archaeology: Tools and Techniques of Field Work for Archaeologists* (1980), which went through eight editions before going out of print. Among her several other books is *Breaking Ground: Pioneering Women Archaeologists* (2004), co-edited with Getzel Cohen, which examines the lives of several pioneer female archaeologists in the early days of the discipline. This project was also expanded into a web-based encyclopedia, *Breaking Ground: Women in Old World Archaeology*, co-edited with Barbara Lesko.

Cross-References

► Petra, Archaeology of

Further Reading

Cohen, G., and M.S. Joukowsky, eds. 2004. *Breaking ground: Pioneering women archaeologists*. Ann Arbor: University of Michigan Press.

Joukowsky, M.S. 1980. *A complete manual of field archaeology: Tools and techniques of field work for archaeologists*. Englewood Cliffs: Prentice-Hall.

Joukowsky, M.S. 1988. *The young archaeologist in the oldest port city in the world*. Beirut: Dar el-Machreq.

Joukowsky, M.S. 1996a. *Early Turkey: An introduction to the archaeology of Anatolia from prehistory through the Lydian period*. Dubuque: Kendall/Hunt Publishing.

Joukowsky, M.S. 1996b. *Prehistoric Aphrodisias: An account of the excavations and artifact studies*. Providence: Brown University, Center for Old World Archaeology and Art.

Joukowsky, M.S. 1998. *Petra Great Temple: Brown University excavations, 1993–1997*. Providence: Brown University Petra Exploration Fund.

Joukowsky, M.S. 2007. *Petra Great Temple, volume II: Archaeological contexts of the remains and excavations*. Providence: Brown University Petra Exploration Fund.

Journal of Archaeological Method and Theory

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The *Journal of Archaeological Method and Theory* (*JAMT*) is a quarterly publication of Springer Science+Business Media publishers (Springer). *JAMT* presents method- or theory-focused papers covering issues that are at the cutting edge of the discipline. The leading journal in its field, *JAMT*, also includes topical syntheses that critically assess and integrate research on specific subjects in archaeological method or theory, as well as examinations of the history of archaeology. The journal actively recruits "theme" issues where groups of authors address a particular theme often using regional case studies to illustrate method- or theory-related topics. Authors of *JAMT* articles include scholars from around the world, and each submission undergoes a rigorous peer-review process that insures articles published in the journal are of the highest possible quality. Articles that are accepted for publication are aimed at an international audience of archaeologists, students of archaeology, and practitioners of closely related disciplines. The journal's editorial board includes distinguished archaeologists with worldwide knowledge of the past (the Americas, Asia and the Pacific, Europe, and Africa) and expertise in an extensive range of methodological and theoretical issues.

The founding editor of the journal, Michael Brian Schiffer, noted in the introductory statement in the first volume (Schiffer 1994: 2) that the "journal will be a home for substantial syntheses" as well as "contributions to the history of archaeology, method-or theory-focused case studies, and significant explorations on the frontiers of method and theory." The journal's

genesis can be traced back to 1978 with *Advances in Archaeological Method and Theory*, a yearly edited volume published by Academic Press. The goal of that publication, which continued with Academic Press for 11 volumes and later with the University of Arizona Press for 5 volumes, was the presentation of topical syntheses usually solicited by the editor. The series filled an important need as theoretical papers during that time often had difficulty finding a publishing outlet. By the early 1990s, Schiffer decided to shift from yearly publications to a quarterly journal, its present format. Schiffer continued as editor until volume 6 in 1999, and James Skibo and Catherine Cameron became coeditors in 2000. Since the beginning of their tenure, they have alternated between senior and junior coeditor. Their editorship coincided with the transformation in academic journal publishing from a reliance on individual and institutional subscriptions of hard copies of the journal to a dominance of electronic publication and downloads of individual articles. With the guidance of Teresa Krause, (Senior Editor, Social Sciences), of Springer, journal readership expanded dramatically, and currently there are tens of thousands of downloads each year from all over the globe. Although the journal has always been international in scope, the number of international authors and reviewers has also increased.

The major accomplishment of *JAMT* since its inception has been to serve as an outlet for the latest innovations in the field of archaeology. Tracking *JAMT* articles over the years illuminates how archaeology has developed theoretically, ranging from efforts to build on commonly used theoretical approaches to dramatically divergent approaches that take archaeology in startlingly new directions. *JAMT* has also been the first to publish important methodological advances. Since our articles are aimed at a worldwide audience, the new methods proposed by our authors are generally those that could be (and have been) applied to the archaeology throughout the world. Traffic on the online version of the journal shows that in addition to downloads of the most recently published articles, many older articles are also frequently downloaded indicating that *JAMT* has published a number of "classic" articles in the field that continue to be cited even years after publication. Another accomplishment of the journal has been to highlight the work of younger scholars who often are at the forefront of theoretical and methodological developments in archaeology. Both the journal's founding editor, Michael Schiffer, and its current editors have made efforts to help young scholars develop their ideas into valuable, publishable papers. Finally, the *Journal of Archaeological Method and Theory* has developed an active and experienced editorial board whose members serve as both springboard and sounding board for the latest ideas published in *JAMT*.

In 2009, the journal began to be covered by the ISI Social Science Citation Index, significantly heightening its profile. *JAMT*'s impact factors are consistently among the highest among all archaeology journals. As a result of the increased size and international scope of our authors, reviewers, and audience, the journal has experienced a significant expansion of the number of papers it receives each year. Importantly, we are part of Springer's *Online First* system which allows our papers to be published online as soon as they have been accepted and copyedited. They are later placed into one of our quarterly issues, but until then our subscribers have access to the most current research available. In order to stay in close touch with the most current developments in our field, we periodically enlist new, energetic board members to help us to recruit the latest high-profile studies. *JAMT* promises to be a leading journal in archaeological method and theory well into the twenty-first century.

References

Schiffer, Michael Brian Schiffer. 1994. Introductory Statement. *Journal of Archaeological Method and Theory* 1(1):1–2.

Journal of Cultural Heritage Management and Sustainable Development

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Brief Definition of the Topic

JCHMSD was launched in 2011. Just the first issue has been published when these notes were under writing. In this case, more than investigating actual contents and distinguishing features as they appear from various volumes, the only thing to do is to look at the declared strategies by the editors.

The journal is calling firstly for papers on immovable cultural heritage, though also intangible heritage will be involved. In any case, a distinctive focus is the issue of sustainability, one of the more problematic elements in the field of heritage. The bridging between heritage discourse and sustainability is underlined as one of the distinguishing features of the journal.

Also, a variety of approaches are encouraged, from theory to practice. In any case, an emphasis on practices, on their improvement or the development of innovative practices can be pointed out (the call for paper refers to "positive contribution"). Needless to say, a strong interdisciplinary attitude is called for, and an international focus is at the base of the journal.

Each article is 2,000–5,000 words in length, which once again underlines the nature of the journal as addressed to an audience of practitioners, or in any case to experts and scholars that have substantive interests in the field, more than abstract theoretical concerns. In other words, it seems to look for kind of phenomenon-driven rather than theory-driven research.

Submitted articles are subject to double-blind review. The journal is published by Emerald.

Cross-References

▶ Sustainable Cultural Tourism Policies: Overview
▶ Sustainability and Cultural Heritage

Further Reading

Journal of Cultural Heritage Management and Sustainable Development. n.d. Available at: http://www.emeraldinsight.com/products/journals/journals.htm?id=jchmsd

Journal of Heritage Tourism

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J

Introduction

Tourism based on living traditions, built heritage resources, and intangible culture is one of the most pervasive forms of tourism. It involves many different resources, and people's motivations for visiting are manifold (McKercher and du Cros 2014; Timothy 2011). Many places depend almost entirely upon the cultural past for their tourism-based economies, resulting in many political, social, ecological, and fiscal implications (Timothy 2011, 2016). This condition has resulted in considerable academic interest in heritage tourism since the late 1980s. While cultural/heritage tourism specialists have published for many years in a wide array of social science journals, the *Journal of Heritage Tourism* (JHT) was established in 2006 to provide an international, peer-reviewed outlet for the dissemination of scholarly research specific to this subfield. JHT publishes full-length research articles, shorter pieces/research notes, and book reviews of tomes relevant to all aspects of culture and heritage. As a transdisciplinary journal, it provides a venue for the consolidation of theoretical and

empirical knowledge about cultural heritage and visitor use from a multitude of perspectives.

Definition

JHT was originally published by Channel View Publications in Bristol, England. The journal was sold to Taylor and Francis in 2008 and is now published by Routledge six times per year. Increased interest in the journal has seen it grow from two issues in the first volume to five issues in 2017 and now six issues per annum beginning in 2018. Information about the journal and submissions guidelines can be found at http://www.tandf.co.uk/journals/rjht. The journal has a broad scope and encourages creative social science research on all visitor- and resource-related topics pertaining to the human past and cultural present. The journal is edited by Professor Dallen J. Timothy of Arizona State University. The editorial board is comprised of scholars from a range of disciplines, all of whom are well-recognized researchers or up-and-coming scholars in the field. Board members represent social scientists, ICOMOS team members, and UNESCO officers from all over the world, known for their expertise in heritage management, conservation, and tourism. The journal is indexed in CAB Abstracts; Cambridge Scientific Abstracts; Current Abstracts; EBSCOhost; Emerging Sources Citation Index; Global Health; Leisure, Recreation and Tourism Abstracts; Leisure Tourism Database; OCLC – Environmental Sciences and Pollution Management; Reuters Web of Science; Scopus; and World Agricultural and Rural Sociology Abstracts. It currently has an unpublished impact factor of 0.99 and is expected to have a published Thomson Reuters impact factor in the near future.

Key Issues/Current Debates/Future Directions/Examples

Some of the most prominent themes appearing in the journal include personal and national identity, diasporas and migration, cultural landscapes, religious pilgrimages and sacred site management, interpretation, visitor management, economic impacts, policies, UNESCO "branding," authenticity, and nostalgia. The journal also publishes special theme issues once or twice per year. Since its foundation in 2006, theme issues have focused on managing World Heritage Sites, identity and representation in ethnic tourism, natural heritage and biodiversity, Chinese heritage cities, heritage cuisines, sport heritage, cultural tourism in the Caribbean, historic hotels, and heritage trails. Future theme issues are planned around the topics of regional identity, indigenous tourism, and innovation and technology.

Cross-References

- ► Heritage Tourism and the Marketplace
- ► Sustainable Cultural Tourism Policies: Overview
- ► Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

References

McKercher, Bob, and Hilary du Cros. 2014. *Cultural tourism*. 2nd ed. London: Routledge.

Timothy, Dallen J. 2011. *Cultural heritage and tourism: An introduction*. Bristol: Channel View Publications.

Timothy, Dallen J., ed. 2016. *Heritage cuisines: Traditions, identities and tourism*. London: Routledge.

Journal of Human Evolution

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Basic Information

The *Journal of Human Evolution*, known to all paleoanthropologists as JHE, is the leading

technical outlet for articles and news notes in human and nonhuman primate evolution, Paleolithic archaeology, and geochronological, taphonomic, and faunal studies related to those topics. It was founded in 1972 by Brunetto Chiarelli of the Anthropological Institute at the University of Florence, Italy. He produced 14 volumes through the end of 1985, with a wide view of "human evolution" including most of physical anthropology and some allied disciplines. A laxity of the reviewing process among other factors led Academic Press, which actually owned the journal (as does its successor Elsevier), to seek new editors.

Peter Andrews (London) and Eric Delson (New York) reorganized JHE, adding a new Board of Associate Editors with the express plan that they would coordinate review of all standard submissions (other than brief notes and book reviews), combining 3 external reviews with their own comments for final decision by an Editor. New manuscripts began to be received in December 1985, and after two issues of papers accepted by Chiarelli, the first issue under the new editorship appeared as volume 15, number 3, with a cover date of March 1986. Unfortunately, in part due to the unavailability of most manuscripts submitted to the previous editor, this issue actually was published near the end of 1986, and with no backlog of submitted papers to draw on, publication dates were delayed. This anachronistic situation persisted for several years, so that each article contained its month of publication (as well as dates of article submission and acceptance), through late 1988, when the September 1988 issue appeared that month. In the meantime, Chiarelli started a competing journal, *Human Evolution*, which never made much headway and appears to have ceased publication now.

JHE has continued to expand in popularity, eventually moving to 12 single-issue volumes per year, with 1647 pages in 2016. Numerous special issues have appeared, beginning with one in the December 1986 issue (published September 1987) drawn from contributions to a conference in honor of Desmond Clark (guest edited by J. W. K. Harris and John Yellen); others have covered such topics as primate systematics and evolution (from an early meeting of the Willi Hennig Society), primate locomotor evolution, several on behavioral ecology and/or paleontology of various primate groups, site-focused issues such as those on Atapuerca and the Turkish Miocene site of Paşalar, the *Homo floresiensis* material, "Paleoanthropology meets Primatology," Early-Middle Pleistocene paleoenvironments in the Levant, Excavations at Schóningen and most recently (September 2016) "Food materials testing and its relevance for primate biology."

The pattern of two Co-Editors has been retained since 1986, with a retiring Editor remaining "in harness" for a final year to complete production of articles (s)he has handled and then becoming Special Issues Editor. Following Andrews and Delson, 10 additional Editors have served an average of 6 years, with the two current (2017) Editors in their fourth and first year, respectively. Following the tradition set by Delson and Andrews, co-editors are often from the USA and elsewhere, generally the UK, but currently the editors are Spanish and USA, with the Special Issues Editor from the UK. The number of Associate Edtors (AEs) has risen from 26 to 41, in part due to the conscription of past Editors as permanent AEs; others are appointed for terms of 3 years and often reappointed once. There is a strong international flavor to the editorial board, with current AEs from the USA, UK, Australia, Belgium, Canada, France, Germany, and Spain. Gender diversity is also strong on the board, which, as in the field of paleoanthropology generally, is working to achieve parity. The journal is likely to soon introduce a double-blind review process, which has been demonstrated to reduce bias and increase equal opportunity by gender as well as ethnicity, nationality, and seniority.

Major Impact

The number of papers received has increased steadily, with 306 submitted and 104 published in 2016; for 2015 the numbers were 283 and 150. The rejection rate in 2016 was almost 60%, but JHE has a tradition of working with authors to assist revision so that many "rejected" articles are actually published after reworking. In 2016, the average time from submission to acceptance was

47 weeks, to a citable online publication about 14 months and another 5–6 weeks to print copy. The majority of articles concern Plio-Pleistocene hominins and archeology, but there is also strong representation from primate morphology, primate evolution, geology and related fields, and the behavior of living primates. About 42% of 2016 published articles have corresponding authors from North America and 34% from Europe. At 3.932 (for 2015), the journal has the second highest five-year impact factor of any journal in Anthropology, in the top third of all journals in the Evolutionary Biology group, and there were over 436,000 downloads of articles in 2016.

Cross-References

► Evolutionary Anthropology: Issues, News, and Reviews

Further Reading

Journal of Human Evolution. n.d. Available at: http://www.journals.elsevier.com/journal-of-human-evolution/.

Journal of Material Culture

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Brief Definition of the Topic

The *Journal of Material Culture* is a peer-reviewed publication that ranks highly in the field of cultural studies (2011 Journal Citation Reports 2012). Material Culture is a term used to describe the physical components in cultural studies. Objects made or modified through human behavior are considered an important source for archaeological interpretation. Knowledge gained from the study of artifacts and their social identity requires the application of theoretical models and sound methodologies. The *Journal of Material Culture* encourages an interdisciplinary approach to examine the associations between artifacts and social relations, "...irrespective of time or place" (Aims and Scope 2013). These relationships are considered important to the understanding of cultural construction and practice.

To go beyond established disciplinary limits, the *Journal of Material Culture* aims to "...promote and develop a general comparative and international perspective by publishing papers on theory and methodology, interpretive strategies and substantive studies of key themes and issues" (Aims and Scope 2013). Academic specializations include anthropology, archaeology, design studies, history, human geography, museology, and ethnography.

First published in 1996, the *Journal of Material Culture* is a quarterly production. The journal is supported by a global board of editors under the editorial management of Ludovic Coupaye and Adam Drazin, both from the University College of London, United Kingdom. The *Journal of Material Culture* is published by SAGE Publications as a printed and electronic work and is available by subscription or online at http://mcu.sagepub.com.

Cross-References

► Journal of Archaeological Method and Theory
► Material Culture and Education in Archaeology

References

2011 Journal Citation Reports. 2012. Journals ranked by impact: Cultural studies. In *Journal citation reports*, ed. Social Sciences. Thomson Reuters.

Aims and Scope. 2013. Available at: http://www.uk.sagepub.com/journalsProdDesc.nav?prodId=Journal200859&ct_p=title&crossRegion=antiPod#tabview=aimsAndScope (accessed 2 March 2013).

Journal of Social Archaeology

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Brief Definition of the Topic

The *Journal of Social Archaeology* (JSA) is a fully peer-reviewed international journal covered in the ISI Arts and Humanities Citation Index. The journal promotes interdisciplinary research focused on social approaches in archaeology, opening up new debates and areas of exploration. It engages with and contributes to theoretical developments from other related disciplines such as feminism, postcolonialism, social geography, literary theory, politics, anthropology, and cognitive studies. JSA is explicitly global in outlook with temporal parameters from prehistory to recent periods. As well as promoting innovative social interpretations of the past, it also encourages an exploration of contemporary politics and heritage issues.

The idea of journal devoted to social approaches in archaeology developed in 1998, and the first issue was published in 2001. The editorial panel includes high-profile archaeologists, as does the larger advisory board which also features leading figures in the humanities and social sciences. The constitution of the board reflected the journal's aims for global coverage and a full temporal scope from the deep past to the contemporary world, linking past and present, the local and the global.

JSA encourages papers from a variety of theoretical perspectives, being inclusive and innovative rather than policing the boundaries of a single academic position. At its inception, one particular aim was to break the divide that then separated American and European archaeology, and this was also reflected in the composition of the editorial panel as well as the scope of the papers and interviews solicited in the early issues. It was generally felt that archaeology had experienced a rather dull patch since the mid-1980s, and it would be particularly timely to challenge the current status quo, by being openly theoretical, interdisciplinary, and global, and blurring the boundaries between British and North American traditions. But it would also encourage theoretical and social approaches from other national and regional traditions: Latin America, Australasia, the Middle East, and South Asia.

Looking back a decade later in 2011, clearly archaeology is changing: our networks, collaborations, and the perceived centers of expertise have shifted considerably since the 1990s. Many of today's most exciting directions in archaeology are not necessarily generated in either Britain or the United States or by debates over what constitutes good science or good theory. Some of the most exciting work to come out of JSA has been conducted by Spanish, South African, Swedish, Colombian, Greek, and Australian archaeologists.

The journal has attempted to foster intradisciplinary exchange by bringing together widely separated discourses and traditions. Regional specializations are now subject to wider global dissemination. The journal aims to break down those arbitrary and hegemonic boundaries between North American, Classical, Near Eastern, Mesoamerican, European, and Australian archaeologies, for example. Typically these regions are never considered together. Egyptologists, Classical archaeologists, and Mesoamericanists each have their own narrow journals. JSA thus provides a forum in which archaeologists working on common issues in different areas can engage with each other over questions of theory. The central requirement of all published work is that a serious attempt is made to engage the social as not merely epiphenomenal but central to an understanding of past and present identities and meanings.

JSA represents a major effort to combine a host of theoretical orientations, diverse time periods, and geographical areas and bridge the divide between American and British archaeologies. Just as predicted in the first editorial for JSA in

2001, we have gone on to publish a suite of different contributors from Bangladesh, Iran, Zimbabwe, Australia, Turkey, Brazil, Palestine, and Cuba. Social topics published have included sociopolitics, identity, gender, postcolonialism, representation, landscape, mortuary studies, ritual, household studies, and material culture, among others.

The challenge for social archaeology is to be committed to understanding past societies in terms of their social contexts and lived experiences while, at the same time, to remain cognizant of how the knowledge of the past that we produce is used in the present. One avenue to accomplish this goal is to move from conceptualizing society as an object to thinking of society in terms of social relations that constitute the core of any analysis. Archaeologists can then examine how material culture is continuously implicated in webs of signification in the processes of creating meaning.

Reflecting on the first decade of JSA, it is striking to see the enormous diversity of articles published to date and the balance of exciting young scholars, many still students, combined with very established figures in the field. There has also been remarkable disciplinary scope in journal submissions that engage with linguistics, genetics, chemistry, art, philosophy, ethnography, and ethics. This is very much in keeping with our original editorial mission crafted in 2001 to situate archaeology within wider discourses across the humanities and the social and natural sciences.

We can now track the changing landscape of social archaeology. While the 1990s were so concerned with issues of identity, agency, and landscape, today there is a greater emphasis on heritage ethics, archaeological responsibilities, and multidisciplinary fieldwork. This is not to say that social archaeology has jettisoned its mainstream focus on spatiality, materiality, embodiment, biography, ritual, and difference. On the contrary, JSA has featured numerous articles devoted to architecture, memory, phenomenology, power, and practice that attest to the vibrancy of these topics and the new ways in which they are being explored. In the last decade single issue polemics have been replaced, in the main, by more complex and multistranded analyses. Rather than simply targeting ethnicity or gender, for example, recent archaeological work aims to embrace a wider set of social determinants in the lives of historically situated individuals by pursuing multiple lines of inquiry.

The journal remains committed to a very broad remit that includes our understandings of the deep past, contemporary archaeological practice, and engagements with the recent past.

Cross-References

► Social Archaeology

Further Reading

Journal of Social Archaeology. n.d. Available at: http://jsa.sagepub.com/

Joyce, Rosemary

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Basic Biographical Information

Rosemary Joyce (Fig. 1) is a prominent anthropological archaeologist widely known for her work on the archaeology of gender, sexuality, and embodiment, based on visual culture of pre-Columbian Central America. Born in Buffalo, New York, in 1956, she was the sixth of eight children of Thomas Joyce, a steelworker, and Joanne Poth Joyce, a homemaker. Joyce was educated at the Mount Saint Joseph Academy. She received her bachelor's degree in 1978 from Cornell University and her doctorate in anthropology from the University of Illinois at Urbana-Champaign in 1985 studying under David

Joyce, Rosemary, Fig. 1 Rosemary Joyce. (Photo by Russell Sheptak)

Grove. She is married to the ethnohistorian and archaeologist Russell Sheptak, with whom she has collaborated on many research projects.

Joyce was appointed Assistant Curator of pre-Columbian Archaeology at the Peabody Museum, Harvard University, in 1985, and made Assistant Director in 1986. Concurrently, she held the positions of Assistant and Associate Professor in the Department of Anthropology. In 1994, Joyce was hired as the Director of the Phoebe Hearst Museum of Anthropology (1994–1999) and as an Associate Professor of Anthropology at the University of California, Berkeley. She was promoted to Professor in 2001 and served as Chair of the Department (2006–2011). She was appointed the Richard and Rhonda Goldman Distinguished Professor in the Social Sciences in 2009 and made the Associate Dean for Social Science, Graduate Division in 2011.

Joyce is the recipient of many national fellowships and honors. She has held a Bunting Institute Fellowship at Radcliffe College, Harvard University (1992), University of California Humanities Research Institute Fellowship (1999), and a Center for Advanced Study in the Behavioral Sciences Fellowship at Stanford University (2001). She was selected as the Distinguished Lecturer by the Archaeology Division of the American Anthropological Association in 2003. She served as President Elect (2009–2011) and President (2011–2013) of the Archaeology Division. She was awarded a John Simon Guggenheim Memorial Foundation grant (2010) to study the history of Central American collections in European museums. Most recently, she was appointed by President Obama to the Cultural Property Advisory Committee of the US Department of State in 2011.

Major Accomplishments

A self-described field archaeologist who has carried out survey and excavations at sites spanning the full range of pre-Columbian and Colonial period occupation in Honduras since 1977, Joyce has made important contributions to practice-based theoretical approaches to interpreting the archaeological record. Her commitment to theoretical advancements that are solidly grounded in empiric data has resulted in a series of studies that not only advance understandings of issues of gender, embodiment, materiality, and agency but also contribute new ways of studying the material record.

In her book, *Cerro Palenque: Power and Identity on the Maya Periphery* (1991), she introduces the idea of an "archaeological ethnography," or "archaeography," to account for the dual project of archaeology – the observation of material remains in order to make inferences about the past and the construction of written accounts of the past based upon these observations. For her, archaeological ethnographies have the same epistemological status as interpretations as standard cultural ethnographies. Although they are dependent upon observations of material culture patterning rather than behavior, they share the goal of explicating culture defined as those meanings specific to a particular time and place.

Joyce was one of the first archaeologists to consider women and more broadly gender as legitimate topics in Mesoamerican archaeology. Her initial focus was on the contrast among three lines of evidence: the representation of women in Maya monumental art, the representation of gendered activities in small-scale representations such as figurines, and the presence or absence of women in the ethnohistoric documents (Joyce 1993, 1996). Her analyses led her to argue that although gender was a definite part of

differentiation within Mesoamerican societies, the kinds of difference created were not (or not only) hierarchical in some simple framework. Thus, men and women were often shown in complementary forms of action, and the kinds of action that gendered figures engaged in differed depending on social location (at home, in public) and in terms of social class. In a careful effort to distinguish between representation and actual practice, Joyce has contrasted and compared burial practices with artistic representations. In an important reanalysis of the burials from Tlatilco, a Central Mexican Formative period site famous for its rich burial offerings in a household context, Joyce (2001b) not only highlighted the care with which women were buried but used the distribution of burials to argue for continuity over time in kinship and social relations.

Drawing on the work of Judith Butler, Joyce (1998, 2001a) views gender and sex as socially constructed and shaped. This led her to a concern with embodiment, in which a real, corporeal body is nevertheless understood not as some natural entity but as something shaped, even sexed, by social and cultural views. Joyce (2005) has argued strongly that bodies are better understood as sites of lived experience than as appearances or images to be "read." She and Lynn Meskell have demonstrated the value of this approach, which emphasizes habitual actions and dispositions as much as image, ornamentation, or representation (Meskell and Joyce 2003). Her analysis of Playa de los Muertos figurines, produced in Honduras during the Formative period, exemplifies the value of her approach (Joyce 2003, 2008). Through a detailed examination of the depiction of gestures, hairstyles, size, and other factors, Joyce argued that the female body (these figurines are all of women) was a site of display and modification that reflected socially constructed identities that were both personal and social, tied not only to gender but to age as well.

Joyce is particularly interested in the semiotics of representation. In her book *The Languages of Archaeology: Dialogue, Narrative, and Writing* (Joyce 2002), she offers a critical study of the rhetorical practices archaeologist use to create representations of the past. Central to her study is a critical engagement with the dialogic model of the literary theorist Mikhail Bakhtin. This model emphasizes the concepts of heteroglossia and polyphony or multivocality as a means of textual interpretation. Joyce suggests that these concepts can be used to clarify questions of how and why multivocality is typically suppressed in the writing of archaeological narratives and why it matters that archaeologists attempt to recapture multivocality in the construction of archaeological knowledge. She suggests that thinking about the perspectives of multiple actors in the past as well as multiple audiences in the context of experimental writing offers a new opportunity to go beyond the constraints of disciplinary boundaries and standard notions of time-space relations.

As evidenced by her theoretical interests, Joyce is a committed anthropological archaeologist. She helped organize an American Anthropological Association panel that resulted in a special publication entitled *Archaeology is Anthropology* (Gillespie et al. 2003b). As she notes, in her concluding chapter (Gillespie et al. 2003a), it is possible to turn around the question of archaeology is anthropology or it is nothing, to ask "what kind of anthropology is archaeology." This shifts the issue away from tedious disciplinary debates to a concern for archaeological theory building and practice. She concludes that whether or not archaeology formally splits off from anthropology, it will remain anthropological because it is integrative and concerned with the big questions of who we are, where we came from, how we got here, and where we are going.

Joyce's research is characterized by the focus on people's engagement with the material world at multiple social scales, from that of the individual body, the household, the community, and the larger landscape which these groups inhabit. Her interest in these issues has allowed her to develop a far more nuanced picture of Mesoamerican social relations even as it has led her to propose ways of interpreting the past of interest to scholars across the discipline.

Cross-References

- ▶ Engendered Archaeologies
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Materiality in Archaeological Theory
- ▶ Meskell, Lynn
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Mesoamerica: Complex Society Development
- ▶ Semiotics in Archaeological Theory

References

Gillespie, S.D., R.A. Joyce, and D.L. Nichols. 2003a. Archaeology is anthropology. In *Archaeology is anthropology*. Archeological Papers of the American Anthropological Association 13, ed. S.D. Gillespie and D.L. Nichols, 156–169. Arlington: American Anthropological Association.

Gillespie, S.D., D.L. Nichols, and D.G. Anderson, eds. 2003b. *Archaeology is anthropology*. Archeological Papers of the American Anthropological Association 13. Arlington: American Anthropological Association.

Joyce, R.A. 1991. *Cerro Palenque*. Austin: University of Texas Press.

Joyce, R.A. 1993. Women's work: Images of production and reproduction in Prehispanic southern Central America. *Current Anthropology* 34 (3): 255–274.

Joyce, R.A. 1996. The construction of gender in classic Maya monuments. In *Gender in archaeology*, ed. R. Wright, 167–195. University of Pennsylvania Press.

Joyce, R.A. 1998. Performing the body in Prehispanic Central America. *RES: Anthropology and Aesthetics* 33: 147–165.

Joyce, R.A. 2001a. Burying the dead at Tlatilco: Social memory and social memories. In *Social memory, identity, and death: Anthropological perspectives on mortuary rituals*. Archaeological Papers of the American Anthropological Association 10, ed. M. Chesson, 12–26. Washington, DC: American Anthropological Association.

Joyce, R.A. 2001b. *Gender and power in Prehispanic Mesoamerica*. Austin: University of Texas Press.

Joyce, R.A. 2002. *The languages of archaeology*. Oxford: Blackwell.

Joyce, R.A. 2005. Archaeology of the body. *Annual Review of Anthropology* 34: 139–158.

Joyce, R.A. 2008. *Ancient bodies, ancient lives*. New York: Thames and Hudson.

Meskell, L.M., and R.A. Joyce. 2003. *Embodied lives*. London: Routledge.

Further Reading

Claassen, C., and R.J. Joyce, eds. 1997. *Women in prehistory: North American and Mesoamerica*. Philadelphia: University of Pennsylvania Press.

Joyce, R.A. 2000a. Girling the girl and boying the boy: The production of adulthood in ancient Mesoamerica. *World Archaeology* 31 (3): 473–483.

Joyce, R.A. 2000b. A Precolumbian gaze: Male sexuality among the ancient Maya. In *Archaeologies of sexuality*, ed. B. Voss and R. Schmidt, 263–283. London: Routledge Press.

Joyce, R.A. 2003. Working in museums as an archaeological anthropologist. In *Archaeology is anthropology*. Archeological Papers of the American Anthropological Association 13, ed. S.D. Gillespie, D.L. Nichols, and D.G. Anderson, 99–109. Arlington: American Anthropological Association.

Joyce, R.A. 2008. Critical histories of archaeological practice. In *Evaluating multiple narratives*, ed. J. Habu, J. Matsunaga, and C. Fawcett, 56–58. New York: Springer.

Joyce, R.A., and S.D. Gillespie, eds. 2000. *Beyond kinship*. Philadelphia: University of Pennsylvania.

Joyce, R.A., and J.A. Hendon. 2000. Heterarchy, history, and material reality. In *The archaeology of communities*, ed. M.-A. Canuto and J. Yaeger, 143–159. London: Routledge.

Joyce, R.A., and J. Lopiparo. 2005. Doing agency in archaeology. *Journal of Archaeological Method and Theory* 12: 365–374.

Joyce, R.A., C. Guyer, and M. Joyce. 2000. *Sister stories*. New York: New York University Press.

Perry, E.M., and R.A. Joyce. 2001. Providing a past for bodies that matter: Judith Butler's impact on the archaeology of gender. *International Journal of Sexuality and Gender Studies* 6 (1–2): 63–76.

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Kakadu National Park: Rock Art

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Introduction

Kakadu National Park, located in the top end of the Northern Territory of Australia, covers 19,804 km^2 of diverse tropical ecosystems. This vast area includes mangroves, mudflats and floodplains, major rivers, savanna woodlands, monsoon forests, sandstone escarpments, and rocky plateaus. Most importantly, Kakadu is an Aboriginal living cultural landscape. There are many different clan groups within Kakadu with each caring for their "country" and sharing in joint management of the park with the Commonwealth Government of Australia. Kakadu is universally acknowledged as one of the world's great rock art provinces. Internationally recognized through UNESCO World Heritage List for both its cultural and natural heritage, Kakadu has one of Australia's largest concentrations of rock art sites. Rock art played a vital role in Kakadu, achieving World Heritage status, with particular mention made of the antiquity, concentration, temporal span, and diversity of the art as well as its links to continuing cultural traditions (Fig. 1).

Key Issues

Characteristics

It is estimated that there are over 15,000 rock art sites of varying ages within Kakadu. While this is only a fraction of Australia's rock art, sites contained within Kakadu represent a highly significant and diverse suite within a protected national park. The rock art is overwhelmingly paintings; however, stencils also feature heavily. Less frequent are prints, engraved motifs including cupules, and beeswax figures pressed onto the rock surfaces. Paintings, stencils, and prints are made using natural ochers and white pipe clay sourced locally and traded across Kakadu and neighboring regions. In the late 1800s and early 1900s, Reckitt's Blue washing powder was occasionally used to depict traditional and new subject matter.

Chronology

Rock art dating is one of the biggest challenges in rock art research so few images have been directly dated. Consequently, we do not know how old much of the art is, but there is a range of evidence to suggest that the oldest surviving rock art,

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Kakadu National Park: Rock Art, Fig. 1 Most rock art in Kakadu adorns the surfaces of open-air rock-shelters rather than cave systems such as those in Spain or France

including paintings of large naturalistic animals, is over 15,000 years of age and possibly as much as 30,000 years. G. Chaloupka has argued some rock art could be even older and that Kakadu has "the world's longest continuing art tradition" (Chaloupka 1993: 15). Certainly, the rock art illustrates significant environmental, technological, and stylistic change over time, and a number of sequential styles have been identified in the art by studying the superimposition of individual paintings and comparing this across many hundreds of sites so far studied (see, e.g., Lewis 1983, 1988; Chaloupka 1984, 1993; Figs. 2 and 3). These studies have largely used the depiction of extinct animals and a wide variety of artifacts, clothing, and recent subject matter to mark the changes in style from the pre-estuarine, estuarine, freshwater, and historic periods (Figs. 4 and 5).

Research

The first record of rock art in (what is now known as) Kakadu was made by explorer Ludwig Leichhardt in 1845; however, it was not until the 1960s that rock art studies gained some momentum. The earliest work was undertaken by W. Arndt (1962) with his published interpretations of paintings at three sites. In the late 1960s, J. Jelinek (1978) carried out intensive recording of the Ubirr sites during the Czechoslovakian Expedition to Arnhem Land. These fleeting studies were then followed by more significant work in the late 1960s and 1970s, largely concentrating on artistic styles and establishing relative chronologies. E. Brandl (1968, 1973) was the first to systematically analyze the rock art of the region through an examination of changes in technology reflected within superimposed motifs.

The most widely recognized rock art recorder (and key advocate for the protection of rock art in Kakadu) was G. Chaloupka who, in 1984, produced a stylistic chronology of the Arnhem Land plateau rock art that incorporated four broad artistic periods: pre-estuarine, estuarine, freshwater, and contact (Chaloupka 1984, 1985). He defined the sequence by combining the evidence of superimpositions, differential weathering, defined

Kakadu National Park: Rock Art, Fig. 2 The changing environment of this region is reflected in the rock art of Kakadu

Kakadu National Park: Rock Art, Fig. 3 Stencils of material culture (such as this boomerang) can be found across Kakadu and help to fill gaps in our understanding of materials that do not survive in the archaeological record

Kakadu National Park: Rock Art, Fig. 4 Paintings of extinct animals such as the thylacine (Tasmanian tiger) provide important clues as to the age of rock art in Kakadu

Kakadu National Park: Rock Art, Fig. 5 One of the most common subjects in Kakadu rock art is fish and other animals depicted with internal organs showing (x-ray)

styles, and changes in the range of depicted animal species and their environmental contexts. This work both expanded upon and departed from Brandl's earlier work. Chaloupka believed the key to major stylistic changes was significant environmental change, particularly sea level fluctuations, experienced in the region during the late Pleistocene and early Holocene.

The late 1970s and 1980s saw a peak in the level of rock art and archaeological research occurring within Kakadu, associated both with mining exploration and the establishment of Kakadu as a national park and World Heritage site. This included research by D. Lewis (1977, 1983, 1988), P.S.C. Taçon (e.g., 1987, 1988, 1989a, b), J. Jelinek (1989), and R. Gunn (e.g., 1987). Throughout the 1980s, G. Chaloupka, R. Gunn, I. Haskovec, and H. Sullivan undertook a number of cultural surveys within the park which included community consultation (e.g., Chaloupka et al. 1985; Chaloupka and Kapirigi 1981; Gunn 1987; Sullivan and Haskovec 1986, 1987, 1988). These reports, as well as Taçon's Ph.D. thesis (1989b) and related publications, contain important ethnographic information relating to rock art and rare firsthand accounts from Aboriginal rock artists.

Collaborative rock art research continued in the early 1990s, particularly by Tacon (e.g., 1992, 1993 and with Chippendale and Taçon 1993, 1998; Taçon and Chippendale 2001, 2008; Taçon et al. 1996), Gunn (1992), and Chaloupka who in 1993 published "Journey in Time: the World's

Longest Continuing Art Tradition." This detailed publication provides a summary of his extensive research into the art sequence of Kakadu over the preceding decades. Since the mid-1990s, the level of rock art research occurring throughout Kakadu National Park has largely declined. Some Aboriginal people in Kakadu felt overrun by archaeologists and rock art researchers and desired to better control access to their country and to participate more equally in the documentation of sites for management (KCHS 2012).

As a result new collaborative research programs emerged in the early to mid-2000s including those run by the Jawoyn Association and Gundjeihmi Aboriginal Corporation. Parks Australia (Kakadu) cultural heritage staff also run a rock art management and conservation program and collaborate with rock art researchers as part of this program.

Continuing Artistic Traditions

For local Aboriginal people, rock art is just one part of a much wider and more complex cultural system that interweaves land, cultural law, other art traditions, ancestral beings, people, and other creatures. While we may try to ease our understanding by separating out the strands, in essence, one component of "culture" cannot be fully understood without the others. Some rock art imagery is intimately linked with ceremony, other designs to storytelling, and training in cultural law. Many sites simply relate to the everyday activities of past and present men, women, and children. The role that rock art plays in Aboriginal cultures is best described by local Aboriginal people, and information should only be shared in line with cultural protocols determined by different clan groups within Kakadu.

The rock art of Kakadu National Park is one of the world's great treasures, an immense source of pride for local Aboriginal groups and an irreplaceable resource for understanding Australia's past.

Cross-References

- ▶ Australian Paleoart
- ▶ First Australians: Origins
- ▶ Rock Art Sites: Management and Conservation
- ▶ Rock Art, Forms of

References

Arndt, W. 1962. The Nagorkun-Narlinji cult. *Oceania* 32 (4): 298–320.

Brandl, E.J. 1968. Aboriginal rock designs in beeswax and description of cave painting sites in western Arnhem Land. *Archaeology and Physical Anthropology in Oceania* 3 (1): 19–29.

Brandl, E.J. 1973. *Australian Aboriginal paintings in western and central Arnhem Land: Temporal sequences and elements of style in Cadell River and Deaf Adder Creek art*. Canberra: Australian Institute of Aboriginal Studies.

Chaloupka, G. 1984. *From palaeoart to casual paintings: The chronological sequence of Arnhem Land Plateau rock art*, Monograph series 1, 77–98. Darwin: Northern Territory Museum of Arts and Sciences.

Chaloupka, G. 1985. Chronological sequence of Arnhem Land plateau rock art. In *Archaeological research in the Kakadu National Park 1981–1984*, ed. R. Jones, 269–280. Canberra: Australian National Parks and Wildlife Service.

Chaloupka, G. 1993. *Journey in time: The world's longest continuing art tradition*. Chatswood: Reed.

Chaloupka, G., and N. Kapirigi. 1981. Cultural survey of Yamitj Gunerrd (Yamitj's country). Report for the Australian National Parks and Wildlife Service, Canberra.

Chaloupka, G., N. Kapirigi, B. Nayidji, and G. Namingum. 1985. Cultural survey of Balawurru, Deaf Adder Creek, Amarrkananga, Cannon Hill and the Northern Corridor – Parts A and B. Report for the Australian National Parks and Wildlife Service, Canberra.

Chippendale, C., and P.S.C. Taçon. 1993. Two old painted panels from Kakadu: Variation and sequence in Arnhem Land rock art. In *Time and space: dating and spatial considerations in rock art research*, Occasional AURA Publication 8, ed. J. Steinbring, A. Watchman, P. Faulstich, and P.S.C. Taçon, 32–56. Melbourne: Archaeological Publications.

Chippendale, C., and P.S.C. Taçon. 1998. The many ways of dating Arnhem Land rock-art, north Australia. In *The archaeology of rock-art*, ed. C. Chippindale and P.S.-C. Taçon, 90–111. Cambridge, UK: Cambridge University Press.

Gunn, R.G. 1987. Aboriginal rock art in the Gimbat Area, Kakadu National Park – an initial assessment. Report to the Aboriginal Sacred Sites Protection Authority, Darwin.

Gunn, R.G. 1992. Bulajang – a reappraisal of the archaeology of an Aboriginal religious cult. In *State of the art: Regional rock art studies in Australian and Melanesia*, Occasional AURA Publication 6, ed. J. McDonald and I. Haskovec, 174–194. Melbourne: Australian Rock Art Research Association.

K

Jelinek, J. 1978. Obiri – a rock gallery in Arnhem Land. *Anthropologie* 16 (1): 35–65.
Jelinek, J. 1989. *The great art of the early Australians: The study of the evolution and role of rock art in the society of Australian hunters and gatherers*. Brno: Anthropos Institute, Moravian Museum.
Kakadu Cultural Heritage Strategy (KCHS). 2012. Natural cultural programs unit, Kakadu National Park.
Lewis, D. 1977. More striped designs in Arnhem Land rock paintings. *Archaeology and Physical Anthropology in Oceania* 12 (2): 98–111.
Lewis, D. 1983. Art, archaeology and material culture in Arnhem Land. Unpublished BA Honours dissertation, Australian National University.
Lewis, D. 1988. *The rock paintings of Arnhem Land, Australia. Social, ecological and material culture change in the post-glacial period*, BAR International series. Oxford: Archaeopress.
Sullivan, H., and I. Haskovec. 1986. Najombolmi: the life and work of an Aboriginal artist, volume I. Report to the Australian National Parks and Wildlife Service, Canberra.
Sullivan, H., and I. Haskovec 1987. The 1986 Annual report for the archaeological section of the Kakadu National Park scientific services. Report to the Australian National Parks and Wildlife Service, Canberra.
Sullivan, H., and I. Haskovec 1988. The 1987 Annual report for the archaeological section of the Kakadu National Park scientific services. Report to the Australian National Parks and Wildlife Service, Canberra.
Taçon, P.S.C. 1987. Internal-external: A re-evaluation of the 'x-ray' concept in western Arnhem Land rock art. *Rock Art Research* 4 (1): 36–50.
Taçon, P.S.C. 1988. Identifying fish species in the recent rock paintings of western Arnhem Land. *Rock Art Research* 5 (1): 3–15.
Taçon, P.S.C. 1989a. Art and the essence of being: Symbolic and economic aspects of fish among the peoples of western Arnhem Land, Australia. In *Animals into art*, ed. H. Morphy, 236–250. London: Unwin Hyman.
Taçon, P.S.C. 1989b. From rainbow snakes to 'x-ray' fish: the nature of the recent rock painting tradition of western Arnhem Land, Australia, Volumes I and II. Unpublished PhD dissertation, Australian National University.
Taçon, P.S.C. 1992. Somewhere over the rainbow: An ethnographic and archaeological analysis of recent rock paintings of western Arnhem Land, Australia. In *State of the art: Regional rock art studies in Australian and Melanesia*, Occasional AURA publication 6, ed. J. McDonald and I. Haskovec, 202–215. Melbourne: Australian Rock Art Research Association.
Taçon, P.S.C. 1993. Regionalism in the recent rock art of western Arnhem Land, Northern Territory. *Archaeology in Oceania* 28 (3): 112–120.
Taçon, P.S.C., and C. Chippendale. 2001. Najombolmi's people: From rock painting to national icon. In *Histories of old ages: Essays in honour of Rhys Jones*, ed. A. Anderson, I. Lilley, and S. O'Connor, 301–310. Canberra: Pandanus Books.
Taçon, P.S.C., and C. Chippendale. 2008. Changing places: Ten thousand years of north Australian rock-art transformation. In *Time and change: Archaeological and anthropological perspectives on the long-term in hunter-gatherer societies*, ed. D. Papagianni, H. Maschner, and R. Layton, 73–94. Oxford: Oxbow.
Taçon, P.S.C., M. Wilson, and C. Chippindale. 1996. Birth of the rainbow serpent in Arnhem land rock art and oral history. *Archaeology in Oceania* 31 (3): 103–124.

Kanaseki, Hiroshi

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Basic Biographical Information

Hiroshi Kanaseki is a Japanese archaeologist and an Emeritus Professor of Tenri University (Fig. 1). He was born in Kyoto in 1927 as the second son of the famous anthropologist, Takeo Kanaseki. Takeo learned archaeological methodology at Kyoto University from Kosaku Hamada, who is regarded as the father of archaeology in Japan, while he worked as an Assistant Professor of the Department of Anatomy of the university. Takeo Kanaseki submitted a doctoral thesis on the anthropological study of Ryukyu people in East Asia, three years after Hiroshi was born, and then moved to Taipei to become a Professor of the former National Taiwan University. Hiroshi Kanaseki joined his father on the island in 1936. During his teenage years in Taiwan, Hiroshi often accompanied his father to help at archaeological excavations.

After returning to Japan in 1946, Hiroshi Kanaseki finished the science course in Matsue High School (in the old system of education, equal to the half stage of undergraduate studies in the present educational system) and then started studying archaeology at Kyoto University. The main material that he investigated at that time was Chinese bronze objects of the Warring States

Kanaseki, Hiroshi, Fig. 1 Hiroshi Kanaseki (*left*) with Claire Smith and Katsu Okamura at WAC Inter-Congress, Osaka, January, 2006. (© Hidetaka Bessho)

period. In 1953, he received his Bachelor of Arts from Kyoto University. In 1956, after several years of postgraduate study, he became an assistant specializing in drawing archaeological materials at the Nara National Research Institute of Cultural Properties. During his time at the Institute, Hiroshi Kanaseki joined in the excavations of cemeteries of the Yayoi period in Western or Southern Japan, including Doigahama and Hirota, where considerable data was collected on prehistoric mortuary practices. In addition, he excavated some of the oldest Buddhist temples, dating to sixth century CE, in and around Osaka, including Asuka-dera and Shiten'no-ji.

From 1959 Hiroshi Kanaseki worked as a member of the academic staff of Tenri University, and from 1965 onwards he started his expeditions of archaeological research in Israel. In that same year, he was asked to direct a large-scale excavation of a Yayoi village in Osaka, named Ikegami-Sone. Following his contribution to this excavation and continual advice of wisdom for the local government which succeeded to conduct the series of excavations there, Hiroshi Kanaseki asked to be the Director of the Osaka Yayoi Museum (1991–2012), which is built beside the traces of what is assumed to be large shrine of Ikegami-Sone site. In 1992, he founded the Department of Archaeology at Tenri University, which included study of the discipline of folklore. He retired the university in 1997.

Professor Kanaseki played a key role in the internationalization of Japanese archaeology through his support for the World Archaeological Congress' Inter-Congress of the topic of "Kyosei-no-koukogaku: Coexistence in the Past – Dialogues in the Present," which was held in Osaka in January, 2006. In 2013, his contribution to world archaeology, particularly to breaking down barriers between archaeology in Japan and in the outside world, was recognized when he received the Inaugural President's Award of the World Archaeological Congress.

Major Accomplishments

Professor Kanaseki became very experienced in excavation during his stay in Taiwan with his father. This attracted him so much as to lead him to the discipline of archaeology. Moreover, since his childhood, the wide range of acquaintance with leading scholars basically through his father's connections continued to help him to accumulate his immense knowledge on ancient human life. However, his considerably broad

knowledge of archaeology and its surrounding disciplines within the global scale emerged in the latter half of his career in archaeology. For example, while he worked as a Professor at Tenri University, he was involved with so-called Biblical archaeology in Israel, contributing to excavations at Tel Zeror and directing excavations at Ein Gev. This research seems to have made him consider the relationships between archaeological activities and the religious and political aspects of the modern world.

Professor Kanaseki's research has provided much insight into religious beliefs in the prehistoric and protohistoric periods in Japan, but his chief concern lies with the Yayoi period, the time when domestication was first introduced, from the early first millennium BCE to the third century CE. He has tried to increase the systematic understanding of Yayoi culture by paying more attention to the aspect of past beliefs, the subject of which has been almost untouched among most Japanese archaeologists because of the difficulty to approach this topic. Professor Kanaseki has researched a range of archaeological materials such as figurines, images drawn on objects, and grave goods and used a range of information sources from literature and folklore. One of the outstanding results of his investigation is his discussion of bird spirit worship, based on his analysis of wooden bird objects found at Ikegami-Sone. Professor Kanaseki argues that this belief was introduced in the Yayoi period along with agricultural practice and that it derived from the ancient Chinese civilization. He says that the essence of archaeology is not only to examine materials and analyze data but also to create something new that arises from the integration of past materials and the mind.

Professor Kanaseki's erudition and extensive knowledge together with his affectionate nature have allowed him, for a long time, to supervise various projects relating to ancient cultures, to organize many symposia and academic meetings, to edit a number of books, and to be invited to be the Director of a number of museums. The standing of his contributions to international archaeology is recognized in the Inaugural President's Award of the World Archaeological Congress.

Cross-References

▶ Periodization in Japanese Prehistoric Archaeology
▶ World Archaeological Congress (WAC)

Further Reading

Kanaseki, H. 1982. Kami wo maneku tori. [Bird serving as a guide for the God.]. In *Koko-gaku ronko*. [*A collection of papers on archaeology.*], ed. Publication Committee for Doctor Yukio Kobayashi's Seventieth Birthday Memorial Essays, 281–303. Tokyo: Heibon-sha. (in Japanese).

Kanaseki, H. 1985. Sekai no kokogaku to nihon no kokogaku [Archaeologies in the world and archaeology in Japan.]. In *Iwanami koza: Nihon kokogaku*. [*The Iwanami's academic courses: Japanese archaeology.*] *Volume* 1, ed. Y. Kondo et al., 301–43. Tokyo: Iwanami-Shoten. (in Japanese).

Kanaseki, H. 1986. Jujutsu to matsuri [Magic and ritual.]. In *Iwanami koza: Nihon kokogaku*. [*The Iwanami's academic courses: Japanese archaeology.*] *volume 4*, ed. Y. Kondo et al., 269–306. Tokyo: Iwanami-Shoten. (in Japanese).

Kanaseki, H. 1988. Seishin seikatsu [Spiritual life.]. In *Nihon kokogaku wo manabu: Shinpan*. [*Studying the Japanese archaeology: New edition*.] *volume 2*, ed. H. Otsuka, M. Tozawa, and M. Sahara, 292–309. Tokyo: Yuhikaku. (in Japanese).

Kanaseki, H. 1993. Kosho-bo shutsudo no gazo-mon ni tsuite. [On the pictorial motif on the grave goods found in Gao Zhuang Tomb.]. In *Ron'en koko-gaku*. [*A collection of papers on archaeology.*], ed. Publication Committee for Mr. Kiyotari Tsuboi's Seventieth Birthday Memorial Essays, 737–49. Tokyo: Tenzan-sha. (in Japanese).

Kanaseki, H. 1997. Saishu kogi roku: Ibutsu no kokogaku, iseki no kokogaku. [Final lecture: Archaeology of objects and archaeology of sites.] *Koji* [*Ancient matters*] 1: 54–65. (in Japanese).

Kanaseki, H. 2004. Yayoi no Shuzoku to Shukyo. [Mores and religion of Yayoi period.] Tokyo: Gakusei-sha. (in Japanese).

Kokubu, N., et al. 1968. Kanaseki Takeo hakushi nenpu [A chronological record of Dr. Takeo Kanaseki's career.]. In *Nihon minzoku to nanpou bunka*. [*The Japanese race and south cultures*.], ed. Publication Committee for Professor Takeo Kanaseki's Seventieth Birthday Memorial Essays, 959–65. Tokyo: Heibon-sha. (in Japanese).

Publication Committee for Professor Takeo Kanaseki's Seventieth Birthday Memorial Essays. 1997. Kanko ni atatte [Foreword.]. In *Shukyo to kokogaku*. [*Religion and archaeology.*], ed. Publication Committee for Professor Takeo Kanaseki's Seventieth Birthday Memorial Essays, 1–3. Tokyo: Bensei-sha (in Japanese).

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Basic Biographical Information

Sönmez Kantman was born in İstanbul in 1940. He died in 1999. He got his degree from Robert College, Istanbul. Afterward, he studied law in Switzerland and then continued his education in the Department of Protohistory and Near Eastern Archaeology at İstanbul University, Turkey.

Kantman was a Renaissance scholar with wide-ranging interests. Besides his scientific research, he was interested in art studies and literature. He wrote a play in French, named *Patira*, and he translated thirteenth century Japanese haikus into Turkish in preparation for a book called *Kokinşiu*.

He participated in excavations and survey studies early in his career, but in his later career concentrated his research efforts on the theory of practicing archaeology. His book *Analytic Archaeology* is a result of this research.

Major Accomplishments

Sönmez Kantman's name is on the verge of being forgotten. However, he should be remembered and honored for his remarkable study *Analytic Archaeology* which he coauthored with Ali Dinçol.

In the 1960s, around the world, the social sciences stream was strongly influenced by developments in new approaches and thinking systems. In the field of archaeology, new concepts such as archaeometry and processual archaeology were much discussed by academics. In Turkey, two young researchers Sönmez Kantman and Ali Dinçol who were in their early 20s undertook a study of both theoretical and practical methods in archaeology. This study emerged to contest the excavation-based archaeological tradition in Turkey. Kantman and Dinçol aimed to generate a discussion about the problems of practicing archaeology in Turkey and to offer a systematic approach to archaeological theory and method. Their interdisciplinary work was published under the title of *Essays on Analytic Archaeology*.

However, their work was ignored by the conservative structure of academy. After this, Sönmez Kantman gave up his career in archaeology and continued his career in a completely different field, while Ali Dinçol became a philologist.

However, their work had a significant impact on the next generation of archaeologists, suggesting avenues for research that are beyond the normal focus on excavations. While Sönmez Kantman and his work *Analytic Archaeology* did not find the response that they deserved at the time the work was published, this volume did open up a new area of discussion area and encouraged young researchers to generate new ideas that went beyond the traditional focus on excavations in Turkish archaeology.

Cross-References

► Excavation Methods in Archaeology
► Practice Theory in Archaeology
► Processualism in Archaeological Theory
► Surface Survey: Method and Strategies

Further Reading

Kantman, S. 1969a. Trakya ve Marmara Kiyi Bölgesi Paleolotik yerleşme yerleri arastirma plânlamasi. In *Analitik Arkeoloji, Anadolu Araştırmaları III*, 37–46. İstanbul: Özel Sayı.

Kantman, S. 1969b. Cilâli tas aletlerde mikroanalitik metodla fonksiyon tayini. In *Analitik Arkeoloji, Anadolu Araştırmalar, III*, 81–102. İstanbul: Özel Sayı.

Kantman, S. 1969c. Prehistorik arkeolojide kavramyapım. In *Analitik Arkeoloji, Anadolu Araştırmaları III*, 47–62. İstanbul: Özel Sayı.

Kantman, S. 1969d. Deneysel katkı. Gözlemcilik ve fonksiyonalizmin arkeolojik tıpbilimde önemi. In *Anadolu Araştırmaları III*, 63–80. İstanbul: Özel Sayı.

Kantman, S., and A. Dinçol. 1969. Arkeolojide yeni kavramlar ve metodolojik arastirma plânlamasi. In *Analitik Arkeoloji, Anadolu Araştırmaları III*, 15–36. İstanbul: Özel Sayı.

Karstic Landscapes: Geoarchaeology

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Introduction

Karstic landscapes are found over 12% of the Earth's terrain. Due to their physicochemical (e.g., high alkalinity) and physiographical (e.g., caves, dolines, poljes) characteristics, they preserve some of the most impressive evidence of human evolution and behavior as well as good continental paleoenvironmental records. It is perhaps due to these reasons that karstic landscapes have seen some of the earliest applications of geoarchaeology (e.g., at the Haua Fteah cave in McBurney 1967). In spite of recent attempts (e.g., Reeder 2011), a full overview on the geoarchaeology of karstic landscapes that goes beyond the study of caves is still missing in textbooks and review articles. The need for a more comprehensive definition and systematization is apparent from the rising number of dedicated conference papers and publications and the integration of geoarchaeology in research clusters and institutes focusing on the interdisciplinary study of karstic landscapes. The present contribution thus aims at drafting a broader definition of this potential branch of archaeological and paleoenvironmental research, stemming from scientific archaeology, environmental archaeology, and human ecology, in view of possible future developments.

Definition

The broad geographical distribution of karstic regions, together with the potential they show for archaeological preservation, means that they have provided much evidence to virtually all the current relevant questions in archaeology and human paleontology. In this sense, a definition of the geoarchaeology of karstic landscapes needs to be made in the broadest possible sense, especially concerning its resolution in terms of the scales of approach and methods implied. Thus, the geoarchaeology of karstic landscapes is no different from geoarchaeology as a whole, in that it contributes to issues related to both human-environment interaction and archaeological site formation and preservation, employing a hybrid multi-scalar methodological and theoretical framework with contributions from archaeology and the geosciences. However, geoarchaeological applications in karstic regions need to take into account the peculiarities of such landscapes in terms of their origin, distribution, taxonomy, and taphonomy.

Karstic regions offer the possibility for geoarchaeological applications in two main contexts, namely, subterranean and surface karst (Fig. 1). Cave deposits preserve long sequences of human occupation where micromorphology and microarchaeology find some of their most fruitful applications. As for paleoenvironmental reconstructions within caves, the isotopic study of speleothems currently offers some of the records with highest resolution. As for surface karst, superficial wetlands offer the best-preserved and more continuous sedimentological sequences with preserved proxies for paleoenvironmental reconstructions and for studying trajectories of long-term interaction between humans and this particular kind of landscape. While archaeological preservation is often poor in surface karst, the study of the distribution of surface archaeological evidence in connection with regional physiographical traits (through remote sensing, geomorphology, pedology) is key to understanding human occupation strategies and impact within these environments.

Origin and Distribution of Karstic Landscapes Worldwide

The solid geology of most of our planet (c. 70%) is made of highly soluble sedimentary

Karstic Landscapes: Geoarchaeology, Fig. 1 Examples of geoarchaeological contexts in surface and subterranean karstic landscapes. (**a**) Historical watermill hanging from the side of a karstic canyon in Istria (Croatia), note the stark contrast between the dryness of the watercourse (Photo was taken in summer) and watermarks on the artificial water channel. (**b**) Neolithic coastal site near Liznjan in Southern Istria (Croatia) being eroded away by Holocene sea-level rise. (**c**) Sampling speleothems at Cova Murada, Menorca. A megalithic Bronze Age wall used to close the entrance to the cave, where dozens of burials were excavated in the early twentieth century. (**d**) Cyrene (Libya, UNESCO World Heritage site since 1982), a Greek colony of Thera founded in 630 BCE, romanized in 74 BCE. The photographs show the damages of an earthquake on the bathing quarters of the city known as the *Aqua Augusta*. Classic writers attest two major earthquakes affecting Cyrene in CE 262 and in CE 365

calcareous rocks, such as limestone, dolomite, and aragonite, formed at the bottom of the sea during different geological periods (Ford and Williams 2007). Karstic landscapes are formed within these carbonate geological formations through meteoric dissolution, a process referred to as karstification. Across latitudes karstic regions give origin to contrasting landscapes (from barren ground to rain forest) in different climatic zones (from circumpolar to temperate and tropical).

The distribution of karstic regions, from Malaysia to Cuba and from Alaska to New Zealand (Fig. 2), makes them most

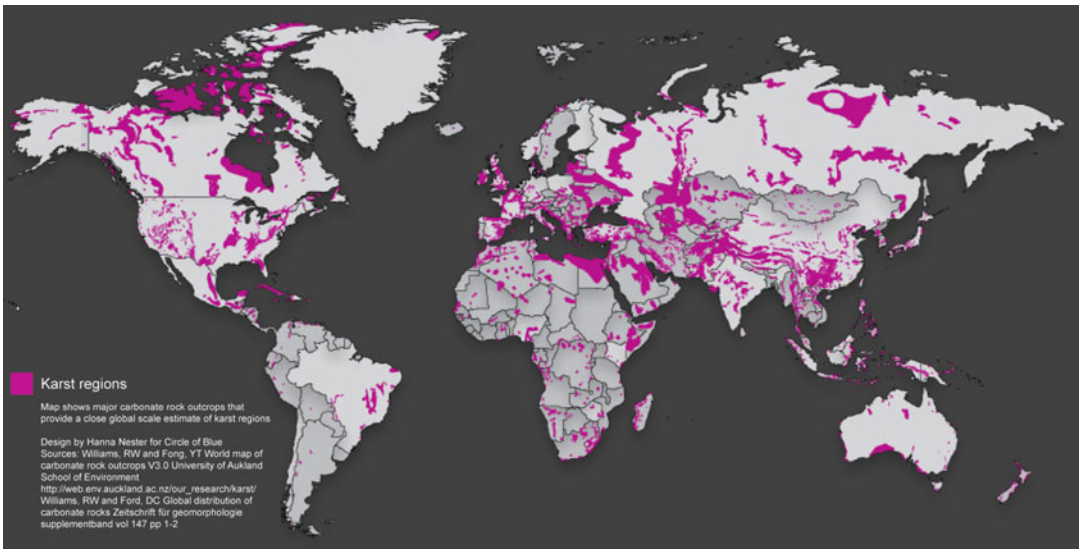

Karstic Landscapes: Geoarchaeology, Fig. 2 Karst regions of the world. Available at http://www.circleofblue.org/waternews/2010/world/chinas-karst-region-infographics/. Accessed 22 May 2012

interesting for archaeologists and human paleontologists. Karstic landscapes are often distributed along tectonically active regions (e.g., Alpine and Himalayan systems). In addition, karstic regions coincide with some of the main intercontinental corridors and bridges (e.g., Sinai, East Africa, Indonesia, Central America). As a result, karstic regions are ideal places for studying trends in human evolution and dispersal. Besides, they show some of the highest concentrations of human population, past and present (e.g., Egypt, Mesopotamia, North and Northwest India).

Taxonomy of Karstic Landscapes

Most karstic features and landscapes were first observed in SE Europe, and their geomorphological definition derives often from Slavic languages. Karst is the German modification of the Croatian word *krš* (rock). In common language, the word was originally employed to indicate the bare stony ground of the limestone regions of western Slovenia. The term karst has now become part of the geomorphological lexicon to define a "terrain with distinctive characteristics of relief and drainage, arising primarily from a higher degree of rock solubility in natural waters than is found elsewhere" (Jennings 1971: 1).

Karstic landscapes may be classified into two major groups, each generating a variety of landforms: surface and subterranean (Ford and Williams 2007). Surface landforms (exokarstic) include dissolution features such as poljes, karrens, dolines, sinkholes, cenotes, bridges, and towers. Due to the high permeability of carbonate rocks, surface karstic landscapes are characterized by low water retention and scarce surface waterways. In surface karstic landscapes, most water penetrates rapidly through sinkholes or diffusely through the permeable calcareous bedrock generating extensive subterranean drainage systems and a variety of subterranean landforms (endokarstic), mostly vadose and/or phreatic conduits of different scale, caverns, and caves.

Taphonomy of Karstic Landscapes

Despite being by definition more easily accessible, surface karstic landforms have received much less attention in archaeological and geoarchaeological research than subterranean ones. This is mainly due to the "aggressiveness" of the soils and sediments found on surface karstic landforms. The high alkalinity (low pH) of carbonate rocks and derived soils, combined with weathering, leads to the rapid dissolution of bone collagen and organic materials in surface

karstic landforms. Even phytoliths, among the most resistant plant fossil remains, suffer from higher dissolution rates in archaeological assemblages from surface karstic landforms, where lithic remains are often the only evidence preserved (Andel and Runnels 2005). However, in specific cases, past surface karstic landforms (e.g., paleosoils, limnic deposits, fluvial sequences) have been preserved within karstic depressions, buried under later alluvial, colluvial, and anthropic deposits, or in waterlogged conditions. In such cases, preservation of paleoenvironmental proxies in sedimentary sequences and anthropic features in archaeological contexts has been maintained (e.g., Siart et al. 2010; Palomo et al. 2011). Geoarchaeology can therefore be applied in exokarstic landscapes in both archaeological and non-archaeological contexts, providing an insight into human-environment interaction and past socio-ecological systems. Archaeological deposits provide evidence relative to the use of surface karstic environments for settlement and sustenance, while sedimentary sequences provide information relative to environmental change at the local, regional, and global scales (Balbo et al. 2006; Balbo 2009; Iriarte et al. 2011).

Subterranean karstic landforms have been a critical source of archaeological and geoarchaeological information worldwide (Rapp and Hill 1998; Goldberg and Macphail 2006). Caves and rock-shelters provide a protected environment and have been occupied throughout human history for different activities. Endokarstic landforms show much less diurnal and seasonal variation in terms of moisture and temperature than exokarstic ones. In addition, caves and rock-shelters favor burial, increasing the potential for preservation. In some exceptional cases, e.g., when cave entrances have been sealed rapidly after human occupation, materials as fragile as human hair have been found (e.g., Bronze Age deposits found at Cova d'es Càrritx, Menorca, in Wellman 1996). Although artifacts and fossil accumulations may be preserved, taphonomic histories of these types of deposits are often complicated. Site formation processes are eclectic due to the characteristics of the bedrock and the complicated depositional, erosional, and occupational processes involved. Both clastic and chemical depositions occur. Clastic deposits include debris produced by human and animal occupation, washes, fluvial, and aeolian deposits, as well as rockfalls. The most common chemical precipitates are calcite depositions such as flowstone or dripstone. While preserved from weathering, bone deposited in karstic caves is exposed to calcification, often resulting in poor collagen preservation. Exceptional situations exist where good DNA preservation has permitted a first sequencing of the Neanderthal genome (Green et al. 2010). As a result of such taphonomical advantages and limitations, cave stratigraphies constitute intriguing depositional systems. They have played an important role in archaeology, and they are still a critical source of chronostratigraphic and artifactual data. Again, in these contexts geoarchaeology may contribute in terms of understanding human-environment interaction based on a combination of evidence from archaeological deposits and specific sedimentary features such as stalagmites, providing high-resolution paleoenvironmental information through isotopic analysis (McDermott 2004).

Key Issues/Current Debates

Archaeology of Karstic Landscapes

Karstic landscapes worldwide are intertwined with major questions in archaeology and human paleontology including human origins and dispersal, human environmental behavior, and the emergence of early civilizations.

Human Origins, Evolution, and Dispersal

Karstic caves have provided key archaeological and paleontological evidence of hominin and modern human origins, evolution, and dispersal. Some of the most spectacular discoveries of hominin fossils were made in the past decades in the karstic landscapes of the South Cape province, South Africa, e.g., at Sterkfontein, Swartkrans, and Kromdraai (Martini and Kavalieris 1976; Dirks et al. 2010). Zhoukoudian cave in China gave one of the earliest examples of hominin presence in Asia 1 Ma (Goldberg et al. 2001). The karstic complex of Atapuerca offers

the most continuous fossil record of Europe with dates ranging from c. 1.5 Ma virtually to the present day (Carbonell et al. 2008). Blombos Cave in the South Cape province (South Africa) has provided some of the earliest fossils and artifacts attesting to the origin of anatomically and behaviorally modern humans (AMH) before 100 ka (Fisher et al. 2010; Henshilwood et al. 2011). The worldwide dispersal of AMH has been documented in karstic caves and landscapes in Israel (e.g., the disputed case of the Qafzeh in Niewoehner 2001), Borneo (Niah Cave in Barker et al. 2007), and SE Alaska, where karstic caves bear evidence of AMH migration into the American continent crossing the Laurentide Ice Sheet (Dixon et al. 2001). Karstic islands and wetlands have also offered evidence concerning the role of boats and seafaring for human dispersal and the spread of agriculture (Marangou 2003; Papageorgiou 2009). The demise of Neanderthals in Europe (e.g., Gibraltar in Finlayson et al. 2006) and their possible presence in Africa (e.g., Benzú in Ramos et al. 2008) have also been the subject of extensive archaeological research in karstic landscapes. More recently, findings from the Island of Flores, Indonesia, question the lone existence of AMH on Earth since the extinction of Neanderthal. Fossils of *Homo floresiensis* found in tropical karstic caves provide evidence of karstic landscapes supporting species other than our own as late at 15 ka (e.g., in Aiello 2010).

Human Environmental Behavior

A large proportion of rock paintings and carvings have been found in karstic caves. Similarly, numerous portable decorated objects have been found in karstic caves and in surface karstic landscapes. Such depictions of zoomorphic and human figures as well as plants offer evidence of the fauna and flora that characterized karstic environments before their extensive transformation through intensive hunting, domestication, and urbanization. Examples of rock art and portable art in karstic landscapes include Altamira (Valladas et al. 1992) and Fumane (Peresani et al. 2011) in Europe, as well as controversial sites such as Pedra Furada in Brazil (Santos et al. 2003).

Early agricultural and pastoral societies settled in karstic landscapes in regions as different as the Mediterranean and subtropical China. Within the semiarid strongly seasonal Mediterranean climate, karstic wetlands seem to have acted as major attractors for foraging and farming communities alike through glacial and interglacial cycles (Balbo 2009). Some of the major present-day European pastoral communities are still found in karstic landscapes in the Alps, the Pyrenees, and the Dinarides (Angelucci et al. 2009). On the other side of the world, in a completely different climatic setting, the humid steamy to subtropical conditions that characterize the South China karst have contributed to the formation of spectacular landscape features such as stone pinnacle forests, cone and tower karsts, huge sinkholes, natural bridges, and caves. It is within these settings that some of the earliest evidence of rice agriculture in Asia has been discovered within the framework of "The Early Rice Agriculture and Pottery Production Project."

Megalithism, Urban Contexts, and Early Civilizations

A significant portion of European megalithic archaeology is found in karstic landscapes. Stonehenge is but one of the best-known examples. Less-known examples, also from the British Isles, include the Burren uplands, a karstic landscape located on the midwestern coast of Ireland, and the karstic landscapes of Western Britain. Other cases of early megalithism in karstic landscapes come from Mediterranean Islands (Corsica, Sardinia, Malta, Cyprus, the Balearic Islands to cite but a few) (e.g., Cassar 2010; Feeser and O'Connell 2010). Karstic landscapes have provided the raw material to some of the most impressive early urban civilizations, for architecture and statuary work in Egypt (e.g., the Saqqara step pyramid), Europe (e.g., the Acropolis in Athens, the Minoan palace in Knossos), and Central and South America (e.g., buildings parts and decorations in Teotihuacan and Tikal) (e.g., Haviland 1970).

Geoarchaeology of Karstic Landscapes

Geoarchaeological applications in karstic landscapes contribute to some of the questions in

archaeology and human paleontology discussed above. Introduced along with a whole new array of field and laboratory archaeological methods in the 1950s, geoarchaeology has been formally defined in the 1970s as one of the latest developments within the archaeological sciences and environmental archaeology (Renfrew 1976). Mediterranean karstic landscapes have been a kind of testing ground for the discipline, with some of the earliest examples of geoarchaeological applications (e.g., Haua Fteah in McBurney 1967) (Fig. 3).

The geoarchaeological tradition in Mediterranean karstic regions has been continuous ever since (Barker and Bintliff 1999). Geoarchaeological applications are by definition multiscalar, based on methods spanning from spaceborne observations through remote sensing for physiographical characterization and archaeological site detection (e.g., Lasaponara and Masini 2011) to the sedimentological study of alluvial and colluvial sequences and cave fills for paleoenvironmental reconstructions (e.g., Brown 1997; Woodward and Goldberg 2001; Balbo et al. 2006; Iriarte et al. 2011; Marriner et al. 2012), site preservation assessment and formation processes of stratified archaeological deposits (e.g., Angelucci 2003; Araujo et al. 2008; Mallol et al. 2009; Iriarte et al. 2010), and the micromorphology of specific anthropic features (e.g., Wadley et al. 2011) as well as paleosoils and ancient field systems (e.g., Fuchs and Lang 2004; Sedov et al. 2008; Puy and Balbo 2013). More recently, coastal and submerged archaeology in karstic regions is opening new horizons for the application of geoarchaeology underwater, e.g., in the context of Central American and Caribbean archaeology (e.g., Faught and Donoghue 1997; Beeker et al. 2002).

Geoarchaeology of Subterranean Karst

Among the different geoarchaeological specialties, micromorphology has been widely applied in karstic caves (Goldberg and Berna 2010). Beside the assessment of site formation and taphonomical processes (Angelucci 2003; Araujo et al. 2008; Mallol et al. 2009; Iriarte et al. 2010), micromorphology (Stoops 2010) and microarchaeology (Weiner 2010) have been used to put under scrutiny some of the earliest evidence for the use of fire at Zhoukoudian cave 1 Ma (Weiner et al. 1998). On the other hand, based on the same methods, Berna et al. (2012) recently demonstrated cooking capabilities among hominins 1.2 Ma at Wonderwerk Cave, Northern Cape province, South Africa. On a similar note,

Karstic Landscapes: Geoarchaeology, Fig. 3 Resuming excavations at the Haua Fteah karstic cave in 2007 half a century after Charles McBurney made here some of the first systematic applications of geoarchaeology in the 1950s

microscopic techniques have been used in the karstic cave of Klisoura (Greece) to identify the earliest example of clay hearths 34 to 23 ka (Karkanas et al. 2004). One of the best-understood features in cave micromorphology in connection with animal domestication and husbandry is that of spherulites, carbonatic nodules found in ovicaprid dung that is found in great quantities in caves that have served for animal keeping (Canti 1997). Shahack-Gross (2011) has recently proposed an overview of microscopic features related to animal husbandry that find application in most Holocene anthropic karstic cave deposits.

Karstic rock-shelters and caves also provide archives of past environmental change that can be analyzed using methods integrated in the geoarchaeological approach (Woodward and Goldberg 2001). The isotopic study of speleothems provides key information on past environmental and climatic change (McDermott 2004). In Sicily, speleothems have provided highly resolved continental records of Holocene climate in connection with the spread of agriculture (Frisia et al. 2006). Frumkin et al. (2009) provide an example of how geochronology (Walker 2006) and isotopic analysis of speleothems were used to reconstruct long-term cave stratigraphy within the Qesem karst system in Israel.

Geoarchaeology of Surface Karst

Geoarchaeology allows the combination of physiographical characterization (through remote sensing and geomorphology) and archaeological survey in surface karstic landscapes. This hybrid approach is necessary to fully understand the significance of the archaeological and paleontological record preserved in caves within its broader environmental and socio-ecological context. Gaps in the often ill-preserved surface archaeological record can then be critically read in function of the preservation biases involved. Within karstic regions, this approach has revealed large numbers of open-air archaeological sites from the Pleistocene and Holocene periods (e.g., Runnels et al. 2004; Andel and Runnels 2005; Balbo 2009). In some instances and in spite of the generally poor taphonomical conditions, exceptional preservation has been maintained within archaeological sites found in surface karst landscapes. The Lower Paleolithic site of West Stow, found in a depression within the chalk karst region of West Anglia, provided evidence of the use of fire in Europe as early as 450 ka (Barendregt et al. 2005; Preece et al. 2006). Micromorphology and isotopic studies have been used in the region to reconstruct past climatic settings (Candy 2009).

A recent review by Coxon (2011) provides an insight into issues concerning the impact of agriculture on karst terrains and their management. Geoarchaeology has provided support to research on early agricultural adaptations and impact within the main foci of plant and animal domestication (e.g., the Levant) as well as in peripheral areas (Thomas 1990; Homburg and Sandor 2011). Using ground-penetrating radar (GPR), Munro-Stasiuk and Manahan (2010) and Gunn et al. (1995) studied ancient Maya field systems in the karst terrains of Northern Yucatan, Mexico. Geoarchaeological methods (mostly coring and geophysics) are among the main tools deployed in the "Early Rice Agriculture and Pottery Production Project" to study early rice agriculture in tropical karstic China. Apart from the definition of irrigation and terrace field systems, the geoarchaeological approach to the study of agricultural systems in karstic landscapes involves the reconstruction of the environmental settings prior to the introduction of the new agricultural order through the analysis of the underlying paleosols and nearby sedimentary sequences. Examples are found across the Holocene, from Neolithic agricultural soils in the Levant (Iriarte et al. 2011) to the complex irrigated terrace systems of Medieval Al-Andalus (Puy and Balbo 2013) and SE Asia, where clusters of terrace fields such as those of Ifugao (Philippines) have been inscribed in 2001 in the UNESCO list of world heritage in danger.

Within open karstic landscapes, karst depressions are perhaps the best archives for geoarchaeologists to find past environmental proxies preserved and propose reconstructions of human-environment interaction (Siart et al. 2010). Karstic wetlands function as refugia and transitional (buffer) zones and have acted as attractors for mobile hunter-fisher-gatherers, herders, and

settled agriculturalists (Coles 1984; Gams et al. 1993; Nicholas 1998).

In some instances karstic wetlands have given geoarchaeologists exhaustive continental paleoenvironmental sequences (e.g., Giraudi 2001; Lawson et al. 2004; Balbo et al. 2006), more complete and less biased by human action than those usually found in cave contexts. Likewise, wetlands have provided some of the best contexts for the application of geoarchaeology in waterlogged conditions within karstic regions. It is within the mixed karstic and volcanic landscape of the shore of the Sea of Galilee (Israel), the lowest freshwater lake of the world, that perfectly preserved remains of bedding were studied microscopically within the 23 ka fisher-hunter-gatherer camp of Ohalo II (212–213 m below mean sea level) in occasion of a rapid drop of the water level in the lake (Nadel et al. 2004). Velušćek (2004) provides an overview of lake-dwelling sites found in the karstic region of Slovenia. Another example, currently under investigation, is the Neolithic lake dwelling of La Draga (Spain), where micromorphology is employed in a multidisciplinary approach to clarify site formation and taphonomical processes and lakeshore sediment and pedological analyses are used to reconstruct past environmental change (Palomo et al. 2011).

Early Civilizations, Geohazards, and Submerged Geoarchaeology

Megaliths have been the focus of much archaeological research. Focus has been put on their value as ritual and astronomical centers for early agricultural societies. More recently, the involvement of geoarchaeologists in the study of their immediate environment has revealed salient aspects of the surrounding landscape, indispensable for a full understanding of these early building complexes (Pearson et al. 2008).

Geoarchaeology is becoming more and more integrated in the study of early civilizations, some of which are located in regions predominated by karstic landforms, as discussed above. Geoarchaeological applications within and around archaeological contexts in the tropical karst of Yukatán have focused on the impact Maya had on the local environment, their use of space within settlements, and their use of cenotes as sources of freshwater (Gilli et al. 2009; Hutson et al. 2009). In Egypt, sedimentology and geomorphology have been used to define paleoenvironmental and landscape dynamics (Ghilardi and Tristant 2012 and references therein). Within ancient urban contexts located in tectonically active karstic regions, geoarchaeology has been used to detect and date past geohazards, e.g., along the Dead Sea fault where earthquakes had devastating effects on the Late Byzantine communities of Syria (Marco 2008). The occurrence, impact, and media coverage of recent geohazards have inspired ever more geoarchaeologists to study the effects of such events as earthquakes, volcanic eruptions, and tsunamis (many of which happen to affect karstic regions) on past societies using sedimentology, micropaleontology, archaeology, and geochemistry (e.g., Reinhardt et al. 2006; Goodman-Tchernov et al. 2009). On a similar note, geoarchaeology has found significant applications in the understanding of the dynamics of site abandonment of karstic coastal areas due to submersion following sea-level rise in the Holocene (e.g., Florida in Faught and Donoghue 1997). Some of the karstic caves submerged following sea-level rise in the Pleistocene-Holocene transition have given remarkable rock art as well as important paleoenvironmental information, e.g., the Cosquer cave off the shore of Marseille (France) (Collina-Girard 2004).

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International Perspectives

The international presence and visibility of the geoarchaeology of karst landscapes in conferences and research institutes is briefly discussed in view of a possible more consistent future definition.

The Geoarchaeology of Karstic Landscapes at International Conferences

In general, geoarchaeology is gaining weight at international conferences on geosciences and archaeology. European Geosciences Union (EGU) Assembly in April 2011 had a full session dedicated to “Late Quaternary environments and

societies: progress in geoarchaeology." At the International Quaternary Association (INQUA) congress in July 2011, "Geoarchaeology: palaeoenvironments and human interaction" was the most extended session. Similarly, international conferences on archaeology have also seen a steep rise in geoarchaeological contributions in recent years. The Society for American Archaeology (SAA) conference in April 2012 dedicated a general session to "Geoarchaeology and Geophysics." In contrast, the European Archaeological Association (EAA) conference in August–September 2012 had no specific session dedicated to geoarchaeology.

Although several geoarchaeological case studies presented at international geosciences and archaeology conferences have been developed in karstic landscapes, a fully dedicated session has not yet been organized. Likewise, at specialist conferences and sessions dedicated to karstic landscapes, geoarchaeology plays only a little part, e.g., at the International Association of Sedimentologists (IAS) meeting in September 2012, where a full session on "Karst, cave sediments and speleothems" was devoted to karst formation, cave deposits, geochemistry, chronology, and climatic reconstruction. Similarly, although focusing on geoarchaeological applications in karst-dominated Mediterranean landscapes, the International Colloquium on Geoarchaeology in September 2011 did not have a session fully dedicated to geoarchaeological applications in karstic landscapes.

Dedicated Institutes and Research Clusters

Institutes dedicated to karst landscapes exist worldwide (Veni 2011). However, few of them explicitly include geoarchaeological research among their activities. Existing research clusters and institutions dedicated to karst landscapes are located in the hearth of emblematic karstic regions. The Department of Geography, Environment and Planning at the University of South Florida has a research cluster on "Karst and wetland environments," including a specific research line on the geoarchaeology of karst landscapes in Belize, Israel, Poland, and Spain. The Centro de Estudos em Geografia e Ordenamento do Território (CEGOT), Faculdade de Letras, Universidade de Coimbra (Portugal), includes a "Karst research group" focusing on cave deposits, paleoclimatic reconstructions, and cave and rock-shelter geoarchaeology in Portugal, Italy, and France. Outstanding international initiatives include the "Interdisciplinary Studies of Karstic Landscapes (INTERKRAS)," an EU-funded project within the "Long Life Learning Program (ERASMUS-IP)." INTERKRAS includes geoarchaeology among its approaches to training students to the integrated long-term study of karstic landscapes, viewed as a combination of natural and cultural heritage.

Future Directions

Major questions in archaeology and human paleontology involve the study of deposits found within karstic regions. The integration of methods from archaeology and the geosciences in geoarchaeology provides the tools for a multi-scalar approach to such issues as the construction of the domestic environment (e.g., control of fire, construction of floors, and beddings) and the transformation of the surrounding environment (e.g., construction of field and irrigation systems). Micromorphology and geomorphology provide an insight into formation and taphonomical processes. Sedimentology and pedology allows proposing paleoenvironmental, climatic, and land-use reconstructions.

In spite of recent attempts at drafting a synthesis of new directions in karst geoarchaeology (e.g., Reeder 2011), a comprehensive overview including karstic landscapes as a whole, i.e., subterranean and superficial karst systems, is still missing. Historically, the main focus of karstic geoarchaeology has been on caves and shelters. However, it is within exokarstic depositional environments that geoarchaeology is likely to bring a greater contribution to karstic landscape archaeology in the coming years. It is within superficial and submerged karstic deposits that most univocal evidence of human activity in karstic landscapes is likely to emerge in the near future, from poljes, dolines, incised river valleys,

to submerged coastlines. Geoarchaeology provides the necessary framework to maximize information found in these environments.

An increasing number of centers interested in archaeology and socio-ecological systems are applying geoarchaeological approaches in karstic landscapes. Although research tools are ever more refined, the promotion of a coherent teaching framework is still lacking. Innovative future teaching resources will benefit from an exhaustive review and systematization of information scattered online, in print, and in class. The outcome of such review could span from specific textbooks to conference sessions as well as university and online courses on the geoarchaeology of karstic landscapes. An international commission of experts focusing on the geoarchaeology of karstic landscapes, possibly clustering as a web community stemming from the present initiative, would bring great benefit to the definition of a discipline apt to solving major issues in archaeology.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Cultural Ecology in Archaeology
- ▶ Environmental Sampling in Mediterranean Archaeology
- ▶ Europe: Prehistoric Rock Art
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Human Evolution: Use of Fire
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Mediterranean Sea: Maritime Archaeology
- ▶ Niah Cave (The West Mouth)
- ▶ Niah Caves: Role in Human Evolution
- ▶ South American Rock Art
- ▶ Stratigraphy in Archaeology: A Brief History
- ▶ Taphonomy in Human Evolution

References

Aiello, L.C. 2010. Five years of *Homo floresiensis*. *American Journal of Physical Anthropology* 142 (2): 167–179. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20229502. Accessed 4 Mar 2012).

Andel, T.H.V., and C.N. Runnels. 2005. Karstic wetland dwellers of middle Palaeolithic epirus, Greece. *Journal of Field Archaeology* 30: 367–384.

Angelucci, D.E. 2003. Geoarchaeology and micromorphology of Abric de la Cativera (Catalonia, Spain). *Catena* 54: 573–601.

Angelucci, D.E., et al. 2009. Shepherds and karst: The use of caves and rock-shelters in the Mediterranean region during the Neolithic. *World Archaeology* 41 (2): 191–214.

Araujo, A.G.M., et al. 2008. Lapa das boleiras rockshelter: Sratigraphy and formation processes at a paleoamerican site in Central Brazil. *Journal of Archaeological Science* 35 (12): 3186–3202. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0305440308001635. Accessed 9 Mar 2012.

Balbo, A.L. 2009. *Human adaptation to Mediterranean wetlands. The geoarchaeology of Polje Čepić (Istria, Croatia) in the late Pleistocene and Holocene*. Saarbrücken: Verlag Doctor Müller.

Balbo, A.L., et al. 2006. Palaeoenvironmental and archaeological implications of a sediment core from Polje Čepić, Istria, Croatia. *Geologia Croatica* 59: 109–124.

Barendregt, W., et al. 2005. The earliest record of human activity in northern Europe. *Nature* 438: 1008–1012.

Barker, G., and J. Bintliff. 1999. 19. Geoarchaeology in Mediterranean landscape archaeology: Concluding comments. In *Environmental reconstruction in Mediterranean landscape archaeology*, The archaeology of Mediterranean landscapes, ed. G. Barker et al., 207–210. Oxford: Oxbow Books.

Barker, G., et al. 2007. The "human revolution" in lowland tropical Southeast Asia: The antiquity and behavior of anatomically modern humans at Niah Cave (Sarawak, Borneo). *Journal of Human Evolution* 52 (3): 243–261. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17161859. Accessed 5 Mar 2012.

Beeker, C.D., G.W. Conrad, and J.W. Foster. 2002. Taíno use of flooded caverns in the east national park region, Dominican Republic. *Journal of Caribbean Archaeology* 3: 1–26.

Berna, F., et al. 2012. PNAS Plus: Microstratigraphic evidence of in situ fire in the Acheulean strata of Wonderwerk Cave, Northern Cape province, South Africa. *Proceedings of the National Academy*

K

of Sciences.. Available athttp://www.pnas.org/cgi/doi/10.1073/pnas.1117620109. Accessed 3 Apr 2012.

Brown, A.G. 1997. *Alluvial geoarchaeology. Floodplain archaeology and environmental change*. Cambridge: Cambridge University Press.

Candy, I. 2009. Terrestrial and freshwater carbonates in Hoxnian interglacial deposits, UK: Micromorphology, stable isotopic composition and palaeoenvironmental significance. *Proceedings of the Geologists' Association* 120 (1): 49–57. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0016787809000030. Accessed 25 May 2012.

Canti, M.G. 1997. An investigation of microscopic calcareous spherulites from herbivore dungs. *Journal of Archaeological Science* 24: 219–231.

Carbonell, E., et al. 2008. The first hominin of Europe. *Nature* 452 (7186): 465–469. Available at: http://www.ncbi.nlm.nih.gov/pubmed/18368116. Accessed 29 Feb 2012.

Cassar, J. 2010. The use of limestone in a historic context – the experience of Malta. *Geological Society, London, Special Publications* 331 (1): 13–25. Available at: http://sp.lyellcollection.org/cgi/doi/10.1144/SP331.2. Accessed 29 May 2012.

Centro de estudos em geografia e ordenamento do território (CEGOT), Faculdade de letras Universidade de Coimbra. Available at: http://www.uc.pt/fluc/cegot. Accessed 25 May 2012.

Coles, J. 1984. *The archaeology of wetlands*. Edinburgh: Edinburgh University Press.

Collina-Girard, J. 2004. Prehistory and coastal karst area: Cosquer Cave and the "Calanques" of Marseille. *Speleogenesis and Evolution of Karst Aquifers* 2 (2): 1–13.

Coxon, C. 2011. Agriculture and karst. In *Karst management*, ed. P.E. Beynen. Dordrecht: Springer Netherlands. Available at: http://www.springerlink.com/index/10.1007/978-94-007-1207-2. Accessed 12 Apr 2012.

Department of Geography, Environment and Planning at the University of South Florida. Available at: http://gep.usf.edu/research/esp/. Accessed 25 May 2012.

Dirks, P.H.G.M., et al. 2010. Geological setting and age of *Australopithecus sediba* from southern Africa. *Science (New York, N.Y.)* 328 (5975): 205–208. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20378812. Accessed 18 Mar 2012.

Dixon, E.J., et al. 2001. Geoarchaeology of Southeast Alaska karst: A progress report. *Geoarchaeology An International Journal* 12 (6): 689–712.

Faught, M.K., and J.F. Donoghue. 1997. Marine inundated archaeological sites and paleofluvial systems: Examples from a karst-controlled continental shelf setting in Apalachee Bay, Northeastern Gulf of Mexico. *Geoarchaeology: An International Journal* 12 (5): 417–458.

Feeser, I., and M. O'Connell. 2010. Late Holocene land-use and vegetation dynamics in an upland karst region based on pollen and coprophilous fungal spore analyses: An example from the Burren, western Ireland. *Vegetation History and Archaeobotany* 19 (5–6): 409–426. Available at: http://www.springerlink.com/index/10.1007/s00334-009-0235-5. Accessed 1 Apr 2012.

Finlayson, C., et al. 2006. Late survival of Neanderthals at the southernmost extreme of Europe. *Nature* 443 (7113): 850–853. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16971951. Accessed 13 Mar 2012.

Fisher, E.C., et al. 2010. Middle and Late Pleistocene paleoscape modeling along the southern coast of South Africa. *Quaternary Science Reviews* 29: 1382–1398. Available at: http://linkinghub.elsevier.com/retrieve/pii/S027737911000017X. Accessed 15 Dec 2010.

Ford, D.C., and P. Williams. 2007. *Karst hydrogeology and geomorphology*. Chichester: Wiley.

Fossil hominid sites of Sterkfontein, Swartkrans, Kromdraai, and environs n.d. Available at: http://whc.unesco.org/en/list/915. Accessed 30 May 2012.

Frisia, S., et al. 2006. Holocene climate variability in Sicily from a discontinuous stalagmite record and the Mesolithic to Neolithic transition. *Quaternary Research* 66 (3): 388–400. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0033589406000706. Accessed 4 Aug 2010.

Frumkin, A., et al. 2009. Gravitational deformations and fillings of aging caves: The example of Qesem karst system, Israel. *Geomorphology* 106 (1–2): 154–164. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0169555X08004157. Accessed 16 Apr 2012.

Fuchs, M., and A. Lang. 2004. The history of Holocene soil erosion in the Phlious Basin, NE Peloponnese, Greece, based on optical dating. *The Holocene* 14 (3): 334. Available at: http://hol.sagepub.com/content/14/3/334.short. Accessed 3 Nov 2010.

Gams, I., et al. 1993. Environmental change and human impacts on the Mediterranean karsts of France, Italy and the Dinaric region. *Catena Supplement* 25: 59–98.

Ghilardi, M., and Y. Tristant. 2012. Geoarchaeology of Egypt and the Mediterranean: Reconstructing Holocene landscapes and human occupation history. *Quaternary International* 266: 1–3. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1040618212001711. Accessed 16 Apr 2012.

Gilli, A., et al. 2009. Geological and archaeological implications of strontium isotope analysis of exposed bedrock in the Chicxulub crater basin, northwestern Yucatan, Mexico. *Geology* 37 (8): 723–726. Available at: http://geology.gsapubs.org/cgi/content/abstract/37/8/723. Accessed 14 Mar 2012.

Giraudi, C. 2001. Nuovi dati sull'evoluzione tardo-pleistocenica ed olocenica di Campo Felice (L'Aquila - Abruzzo) [New data on the tardo-Pleistocene and Holocene evolution of Campo Felice (L'Aquila, Abruzzo)]. *Il Quaternario. Italian Journal of Quaternary Sciences* 14: 47–54.

Goldberg, P., and F. Berna. 2010. Micromorphology and context. *Quaternary International* 214 (1–2): 56–62. https://doi.org/10.1016/j.quaint.2009.10.023.

Goldberg, P., and R.I. Macphail. 2006. *Practical and theoretical geoarchaeology*. Malden: Blackwell Science.

Goldberg, P., et al. 2001. Site formation processes at Zhoukoudian, China. *Journal of Human Evolution* 41 (5): 483–530. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11681863. Accessed 21 Mar 2012.

Goodman-Tchernov, B.N., et al. 2009. Tsunami waves generated by the Santorini eruption reached Eastern Mediterranean shores. *Geology* 37 (10): 943–946. Available at: http://geology.geoscienceworld.org/content/37/10/943.full. Accessed 18 Mar 2012.

Green, R.E., et al. 2010. A draft sequence of the Neandertal genome. *Science (New York, N.Y.)* 328 (5979): 710–722. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20448178. Accessed 29 Feb 2012.

Gunn, J.D., W.J. Folan, and H.R. Robichaux. 1995. A landscape analysis of the Candelaria watershed in Mexico: Insights into paleoclimates affecting upland horticulture in the southern Yucatan peninsula semi-karst. *Geoarchaeology* 10 (1): 3–42. Available at: http://doi.wiley.com/10.1002/gea.3340100103. Accessed 24 May 2012.

Haviland, W.A. 1970. Tikal, Guatemala and Mesoamerican urbanism. *World Archaeology* 2 (2): 186–198. Available at: http://www.tandfonline.com/doi/abs/10.1080/00438243.1970.9979473. Accessed 29 May 2012.

Henshilwood, C.S., et al. 2011. A 100,000-year-old ochre-processing workshop at Blombos Cave, South Africa. *Science (New York, N.Y.)* 334 (6053): 219–222. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21998386. Accessed 14 Mar 2012.

Homburg, J.A., and J.A. Sandor. 2011. Anthropogenic effects on soil quality of ancient agricultural systems of the American Southwest. *Catena* 85 (2): 144–154. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0341816210001256. Accessed 15 Apr 2012.

Hutson, S.R., et al. 2009. Phosphate fractionation and spatial patterning in ancient ruins: A case study from Yucatan. *Catena* 78 (3): 260–269. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0341816209000356. Accessed 25 May 2012.

Ifugao (Philippines) terrace system in the UNESCO list of World heritage in danger. Available at: http://whc.unesco.org/en/list/722. Accessed 24 May 2012.

Interdisciplinary Studies of Karstic Landscapes (INTERKRAS). Available at: http://www.wix.com/predragnovakovic/vrgorac1. Accessed 25 May 2012.

Iriarte, E., et al. 2010. Geological risk assessment for cultural heritage conservation in karstic caves. *Journal of Cultural Heritage* 11: 250–258.

Iriarte, E., et al. 2011. Late Pleistocene and Holocene sedimentary record of the Bouqaia Basin (central Levant, Syria): A geoarchaeological approach. *Comptes Rendus Palevol* 10: 35–47. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1631068310001272. Accessed 13 Jan 2011.

Jennings, J.N. 1971. *Karst*. Cambridge, MA/London: The MIT Press.

Karkanas, P., et al. 2004. The earliest evidence for clay hearths: Aurignacian features in Klisoura Cave 1, southern Greece. *Antiquity* 78 (301): 513–525.

Karst regions of the world. n.d. Available at: http://www.circleofblue.org/waternews/2010/world/chinas-karst-region-infographics/. Accessed 22 May 2012.

La Draga Neolithic lake dwelling. n.d. Available at: http://www.banyolescultura.net/dragcat0.htm. Accessed on 25 May 2011.

Lasaponara, R., and N. Masini. 2011. Satellite remote sensing in archaeology: Past, present and future perspectives. *Journal of Archaeological Science* 38 (9): 1995–2002. Available at: http://linkinghub.elsevier.com/retrieve/pii/S030544031100032X. Accessed 11 July 2011.

Lawson, I., et al. 2004. The Lateglacial and Holocene environmental history of the Ioannina basin, north-west Greece. *Quaternary Science Reviews* 23 (14–15): 1599–1625. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0277379104000459. Accessed 7 May 2012.

Mallol, C., S.M. Mentzer, and P.J. Wrinn. 2009. A micromorphological and mineralogical study of site formation processes at the late Pleistocene site of Obi-Rakhmat, Uzbekistan. *Geoarchaeology* 24 (5): 548–575. Available at: http://doi.wiley.com/10.1002/gea.20280. Accessed 25 May 2012.

Marangou, C. 2003. Neolithic watercraft in Greece: Circumstantial evidence and serious guesses. In *Boats, ships and shipyards*, ed. C. Beltrame, 14–18. Oxford: Oxbow Books.

Marco, S. 2008. Recognition of earthquake-related damage in archaeological sites: Examples from the Dead Sea fault zone. *Tectonophysics* 453 (1–4): 148–156. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0040195108000607. Accessed 4 Aug 2010.

Marriner, N., T. Gambin, M. Djamali, C. Morhange, and M. Spiteri. 2012. Geoarchaeology of the Burmarrad ria and early Holocene human impacts in western Malta. *Palaeogeography, Palaeoclimatology, Palaeoecology* 339–341: 52–65.

Martini, J., and I. Kavalieris. 1976. The karst of the transvaal (South Africa). *International Journal of Speleology* 8: 229–251.

McBurney, C.B.M. 1967. *The Haua Fteah (Cyrenaica) and the Stone Age of the South-East Mediterranean*. New York: Cambridge University Press.

McDermott, F. 2004. Palaeo-climate reconstruction from stable isotope variations in speleothems: A review. *Quaternary Science Reviews* 23 (7–8): 901–918. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0277379104000198. Accessed 1 Mar 2012.

Munro-Stasiuk, M.J., and T.K. Manahan. 2010. Investigating ancient Maya agricultural adaptation through ground penetrating radar (GPR) analysis of a karst

K

terrain, Northern Yucatán, Mexico. *Acta Carsologica* 39 (1): 123–135.

Nadel, D., et al. 2004. Stone Age hut in Israel yields world's oldest evidence of bedding. *Proceedings of the National Academy of Sciences of the United States of America* 101 (17): 6821.

Nicholas, G.P. 1998. Wetlands and hunter-gatherers: A global perspective. *Current Anthropology* 39 (5): 720–731.

Niewoehner, W.A. 2001. Behavioral inferences from the Skhul/Qafzeh early modern human hand remains. *Proceedings of the National Academy of Sciences of the United States of America* 98 (6): 2979–2984. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=30592&tool=pmcentrez&rendertype=abstract.

Palomo, A., et al. 2011. Harvesting cereals and other plants in Neolithic Iberia: The assemblage from the lake settlement at La Draga. *Antiquity* 85: 759–771.

Papageorgiou, D. 2009. The marine environment and its influence on seafaring and maritime routes in the prehistoric Aegean. *European Journal of Archaeology* 11 (2–3): 199–222. Available at: http://eja.sagepub.com/cgi/doi/10.1177/1461957109106374. Accessed 12 Mar 2012.

Pearson, M.P., et al. 2008. The Stonehenge Riverside Project: Exploring the Neolithic landscape of Stonehenge. *Documenta Praehistorica* 7 (410): 153–166.

Peresani, M., et al. 2011. Late Neandertals and the intentional removal of feathers as evidenced from bird bone taphonomy at Fumane Cave 44 ky B.P., Italy. *Proceedings of the National Academy of Sciences of the United States of America* 108 (10): 3888–3893. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3054018&tool=pmcentrez&rendertype=abstract. Accessed 17 Apr 2012.

Preece, R., et al. 2006. Humans in the Hoxnian: Habitat, context and fire use at Beeches Pit, West Stow, Suffolk, UK. *Journal of Quaternary Science* 21 (5): 485–496. Available at: http://www3.interscience.wiley.com/journal/112664038/abstract. Accessed 17 Nov 2010.

Puy, A., and A.L. Balbo. 2013. The genesis of irrigated terraces in Al-Andalus. A geoarchaeological perspective on intensive agriculture in arid environments (Ricote, Murcia, Spain). *Journal of Arid Environments* 89: 45–56.

Ramos, J., D. Bernal, and S. Domínguez-Bella. 2008. The Benzu rockshelter: A Middle Palaeolithic site on the North African coast. *Quaternary Science*. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0277379108002047. Accessed 2 Nov 2010.

Rapp, G., and C.L. Hill. 1998. *Geoarchaeology: The earth-science approach to archaeological interpretation*. London: Yale University Press.

Reeder, P. 2011. Geoarchaeology and karst: a new perspective. In *Karst management*, ed. P.E. Beynen, 169–200. Dordrecht: Springer Netherlands. Available at: http://www.springerlink.com/index/10.1007/978-94-007-1207-2. Accessed 12 Apr 2012.

Reinhardt, E.G., et al. 2006. The tsunami of 13 December A.D. 115 and the destruction of Herod the Great's harbor at Caesarea Maritima, Israel. *Geology* 34 (12): 1061. Available at: http://geology.gsapubs.org/cgi/content/abstract/34/12/1061. Accessed 18 Mar 2012.

Renfrew, C. 1976. Archaeology and the earth sciences. In *Geoarchaeology. Earth science and the past*, ed. D.-A. Davidson and M.L. Shackley, 1–8. London: Gerald Duckworth and Co.

Runnels, C., et al. 2004. The Palaeolithic and Mesolithic of Albania: Survey and excavation at the site of Kryegjata B (Fier District). *Journal of Mediterranean Archaeology* (1): 3–29.

Santos, G., et al. 2003. A revised chronology of the lowest occupation layer of Pedra Furada Rock Shelter, Piauí, Brazil: The Pleistocene peopling of the Americas. *Quaternary Science Reviews* 22 (21–22): 2303–2310. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0277379103002051. Accessed 23 May 2012.

Sedov, S., et al. 2008. Micromorphology of a soil catena in Yucatán: Pedogenesis and geomorphological processes in a tropical karst landscape. In *New trends in soil micromorphology*, ed. S. Kapur, A.R. Mermut, and G. Stoops, 19–38. Berlin/Heidelberg: Springer.

Shahack-Gross, R. 2011. Herbivorous livestock dung: Formation, taphonomy, methods for identification, and archaeological significance. *Journal of Archaeological Science* 38 (2): 205–218. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0305440310003419. Accessed 28 Apr 2012.

Siart, C., et al. 2010. Karst depressions as geoarchaeological archives: The palaeoenvironmental reconstruction of Zominthos (Central Crete), based on geophysical prospection, sedimentological investigations and GIS. *Quaternary International* 216 (1–2): 75–92. https://doi.org/10.1016/j.quaint.2009.06.020.

Stoops, G. 2010. *Interpretation of micromorphological features of soils and regoliths*. Amsterdam: Elsevier.

The Archaeology of the Burren Uplands. n.d. Available at: http://mappingtheburren.com/burrenArchaeology.php. Accessed 23 May 2012.

The early rice agriculture and pottery production project. n.d. Available at: http://www.bu.edu/asianarc/field_projects/fp_yuchanyan1.html. Accessed 23 May 2012.

Thomas, K. 1990. Aspects of soils and early agriculture. *World Archaeology* 22 (1): 7–13. https://doi.org/10.1080/00438243.1990.9980124. Accessed 24 May 2012.

Valladas, H., et al. 1992. Direct radiocarbon dates for prehistoric paintings at the Altamira, El Castillo and Niaux caves. *Nature* 357 (6373): 68–70. Available at: http://www.nature.com/nature/journal/v357/n6373/pdf/357068a0.pdf. Accessed 21 May 2012.

Velušćek, A. 2004. Past and present lake-dwelling studies in Slovenia. In *Living on the lake in prehistoric Europe*, ed. F. Menotti, 69–82. London: Routledge.

Veni, G. 2011. National karst research institutes: Their roles in cave and karst management. In *Karst management*, ed. P.E. Beynen. Dordrecht: Springer Netherlands.

Available at: http://www.springerlink.com/index/10.1007/978-94-007-1207-2. Accessed 12 Apr 2012.
Wadley, L., et al. 2011. Middle Stone Age bedding construction and settlement patterns at Sibudu, South Africa. *Science (New York, N.Y.)* 334 (6061): 1388–1391. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22158814. Accessed 19 Apr 2012.
Walker, M. 2006. *Quaternary dating methods*. Chichester: Wiley. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1871101406001063.
Weiner, S. 2010. *Microarchaeology. Beyond the visible archaeological record*. Cambridge: Cambridge University Press.
Weiner, S., et al. 1998. Evidence for the use of fire at Zhoukoudian, China. *Science* 281: 251–253.
Wellman, H. 1996. The identification and treatment of a unique cache of organic artefacts from Menorca's Bronze Age. *Journal of Conservation and Museum Studies* 1: 1. Available at: http://www.jcms-journal.com/article/view/jcms.1961/1. Accessed 1 July 2011.
Woodward, J.C., and P. Goldberg. 2001. The sedimentary records in Mediterranean rockshelters and caves: Archives of environmental change. *Geoarchaeology* 16 (4): 327–354. Available at: http://doi.wiley.com/10.1002/gea.1007.abs.

Kaulicke, Peter

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Basic Biographical Information

Peter Kaulicke is a German archaeologist who has dedicated his entire career to the study of Andean pre-Hispanic populations and cultures. He was born in Buntenbock, near Hannover in 1946, and studied at the University of Bonn receiving his degree of Doctor of Philosophy in American Studies in 1980. Prior to completing his doctorate, he traveled to Peru in 1971 to begin his long-term research in and commitment to Andean archaeology. He first participated in field research projects organized by the *Instituto Riva-Agüero* of the Pontifical Catholic University of Peru (PUCP) in Lima. Subsequently, he joined research projects conducted by the Andean Rural History Seminar and the School of Archaeology of the National University of San Marcos. Under the auspices of these institutions, Dr. Kaulicke conducted excavations at the Uchkumachay Cave in Peruvian central highlands and at the site of Pandanche, a medium-sized platform mound located in the northern highlands.

After getting his degree, Dr. Kaulicke returned to Peru and founded in 1982 the Archaeology Program at the PUCP, where he later has become full-time professor, and dedicated himself to fostering this program and its students as well as pursuing his research interests.

Between 1987 and 1991, Dr. Kaulicke conducted research in the Piura Valley in the Peruvian northern coastal desert, studying the Mochica occupation of that region through excavations at Huaca Nima, Loma Macanche, and Loma Valverde sites. More recently, since 2011, he has conducted research in the Rio Grande Valley in the Peruvian south coast, addressing the characteristics of Paracas culture occupations of that region.

Dr. Kaulicke has also been the editor of the first 12 volumes of the *PUCP Archaeology Bulletin* and organized during a span of 10 years a series of international symposia on major themes and issues of significance to Andean archaeology at this university.

Major Accomplishments

Dr. Kaulicke's contribution to Andean archaeology can be addressed in three areas. First, as a researcher, his work became particularly important in clarifying chronological issues on Andean archaeology. Kaulicke contributed to establish cultural sequences of early hunter-gatherers (1981), early formative occupations (1975), and latter complex societies (2006). His long-standing concerns on chronology have resulted in comprehensive studies on the chronology of the Peruvian Formative Period (1994, 2010).

Dr. Kaulicke has also dedicated his studies to understand the relationships among ancestorship, burial practices, and Andean symbolic universes. His remarkable studies on death and memory

(2000) and water systems and ancestorship (2005) illustrate this line of research. Furthermore, he produced the most comprehensive analysis of the iconography of the famous Cerro Sechín site, offering a solid and refreshing interpretation on the meaning of more than 50 stone-carved images that decorate the exterior walls of the Cerro Sechín temple (1996).

The contributions of Dr. Kaulicke also include the reediting and diffusion of pioneers of Peruvian archaeology, particularly the work of Max Uhle, who conducted the first scientific research in Peru at the end of the nineteenth century. Kaulicke has been responsible for the translation and republishing of the important but poorly known contributions of German authors like Max Uhle but also of Hernan Trimborn, Jacobo von Tshudi, and Anke Wendt. A whole generation of Peruvian archaeologists has become benefited by this effort.

Finally, Dr. Kaulicke has been a leading figure in the growth of Peruvian scholarship, conducting for 10 years international symposia that brought to Lima the most prominent foreign and Peruvian archaeologists, historians, and anthropologists, to discuss recent finds and interpretations of nearly all the epochs of pre-Hispanic history. Edited proceedings of these symposia resulted in the first 12 volumes of the *PUCP Archaeology Bulletin* (*Boletín de Arqueología PUCP*) that, since then, has become a major reference on Andean archaeology.

Cross-References

► Uhle, Friedrich Max

References

Kaulicke, Peter. 1975. *Pandanche. Un caso del Formativo de los Andes de Cajamarca*, Seminario de Historia Rural Andina. Lima: UNMSM.

Kaulicke, Peter. 1981. Der Abri Uchkumachay und seine zeitliche Stellung innerhalb der lithischen Perioden Peru. *Beiträge zur Allgemeinen und Vergleichenden Archäologie* 3: 363–389 Münich.

Kaulicke, Peter. 1994. *Los Orígenes de la Civilización Andina. Arqueología del Perú. Vol. I. Historia General del Per,* ed. J. A. del Busto. Lima.

Kaulicke, Peter. 1996. Arte y Religión en Cerro Sechín. In *Arqueología de Cerro Sechín II (1995)*, ed. Salomón Lerner, Mercedes Cárdenas, and Peter Kaulicke, 185–222. Lima: Pontificia Universidad Católica del Perú.

Kaulicke, Peter. 2000. *Memoria y muerte en el Perú antiguo*. Lima: Pontificia Universidad Católica del Perú.

Kaulicke, Peter. 2006. The Vicus-Mochica relationship. In *Andean archaeology III: North and South*, ed. William H. Isbell and Helaine Silverman, 85–111. New York: Springer.

Kaulicke, Peter. 2010. *Las cronologías del Formativo. 50 años de investigaciones japonesas en perspectiva*. Lima: Pontificia Universidad Católica del Perú.

Kaulicke, P., T. Kusuda, R. Kondo, and J. Zapata. 2005. Agua, ancestros y arqueología del paisaje. *Boletín de Arqueología PUCP* 7: 27–56.

Keatley Creek and Bridge River: Complex Hunter-Gatherer Villages of the Middle Fraser Canyon

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Introduction

Complex hunter-gatherers depart from the traditional model of hunter-gatherers as small relatively egalitarian groups, engaged in frequent residential moves, employing little formal storage and consuming a very broad diet drawn from non-domesticated food sources (Lee 1968). In contrast, complex hunter-gatherers often live in large groups, are typically characterized by social status distinctions, move residences somewhat infrequently, rely upon storage, and typically specialize in select non-domesticated food sources (Sassaman 2004). Archaeologists have been interested in better understanding variation in the evolution and organization of these societies. The archaeological record of complex hunter-gatherers is widespread and includes such archaeological entities as the Middle Jomon culture of Japan, the northern European Mesolithic, the Natufian of the Near East, the Thule Eskimo

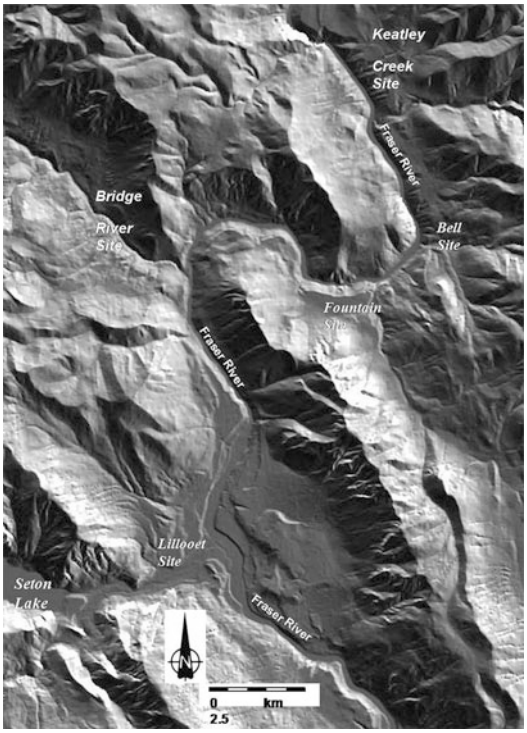

Keatley Creek and Bridge River: Complex Hunter-Gatherer Villages of the Middle Fraser Canyon, Fig. 1 Map of Middle Fraser Canyon showing approximate locations of Bridge River and Keatley Creek sites. (Map created by Guy Cross)

tradition of North America's Western Arctic, the Marpole phase of British Columbia's southern coast, and the Lillooet Phenomenon of Interior of British Columbia. The Lillooet Phenomenon is best represented by two important archaeological sites known as Keatley Creek and Bridge River (Fig. 1). These sites have become particularly important for their fine-grained data reflecting development of socioeconomic and political complexity in this region of North America (Prentiss and Kuijt 2012).

Definition

The Keatley Creek and Bridge River sites are housepit villages (Figs. 2 and 3) located in the vicinity of Lillooet, British Columbia, and densely occupied during the period of approximately 1,800 to 200 years ago (Prentiss and Kuijt 2012). Housepits are semi-subterranean dwellings with large wooden superstructures and earthen caps. Entrances to the dwellings could be on the side, or in larger structures, down a ladder made from a hollowed tree trunk, through a hole in the roof. Normally, one or more extended families resided in the houses, and the largest structures could hold 50 or more people. Keatley Creek and Bridge River are particularly large villages, containing, respectively, 115 and 80 housepits. At peak size each site may have been occupied by groups in excess of 600–800 persons (Hayden 1997; Prentiss et al. 2008).

Archaeological research at the Keatley Creek and Bridge River sites began during the late 1960s with Arnoud Stryd's Lillooet Archaeological Project. Stryd visited Keatley Creek and conducted limited test excavations at Bridge River. His primary focus, however, was a somewhat smaller village known as the Bell site. Excavations at Keatley Creek began in 1986 under direction of Brian Hayden, whose research at the site continues to the current period (Hayden 1997). Anna Prentiss excavated at Keatley Creek in 1999–2002 (Prentiss et al. 2007). She then conducted mapping, geophysical studies, and excavations at Bridge River from 2003 through 2012 (Prentiss et al. 2008, 2012).

Archaeological investigations at Keatley Creek and Bridge River have had a number of significant outcomes. All archaeological interpretations in the Middle Fraser Canyon have been enhanced by an excellent ethnographic and ethnoarchaeological record (Hayden 1992). Indeed, partnerships between archaeologists and indigenous groups have led to a range of creative studies and interesting conclusions about the recent and more remote past (Prentiss and Kuijt 2012).

The housepits of Keatley Creek and Bridge River have outstanding stratigraphic records and preservation of organic materials including wood and basketry in some contexts. It has been possible to chronicle many details of the life histories of particular households. The Bridge River site has proven particularly productive as many housepits feature stratified sequences of buried floors. Housepit 54, for example, included a sequence

Keatley Creek and Bridge River: Complex Hunter-Gatherer Villages of the Middle Fraser Canyon,
Fig. 2 Photograph of Keatley Creek site showing core area with greatest density of housepits

Keatley Creek and Bridge River: Complex Hunter-Gatherer Villages of the Middle Fraser Canyon,
Fig. 3 Photograph of Bridge River site showing a portion of the core area with highest density of housepits

of 13 distinct clay floors and seven roof deposits. These contexts provide the rare opportunity to examine household histories (Ames 2006) that sometimes span hundreds of years at a level of resolution rarely available to archaeologists working with complex hunter-gatherers (Prentiss et al. 2012).

The combination of fine stratigraphy, excellent preservation of materials, frequent house features, and abundant artifacts has permitted archaeologists to conduct fine-grained analysis of the evolution and organization of the complex societies that resided at these places. Brian Hayden's (1997) research emphasized intra- and inter-household variation in artifacts, food remains, and storage features as indicators of inter-household ranking at Keatley Creek. He sought to demonstrate that largest houses were able to accumulate more nonlocal goods such as shell jewelry and jade and soapstone tools, along with large quantities of high-quality food such as Chinook salmon. This permitted him to argue that during the time of peak occupation, social life was organized around a system of elite-dominated

manipulation of debt capital, manifested in elaborate feasts and potlatches similar to those of the nearby Northwest Coast groups. Prentiss and colleagues (Prentiss et al. 2012; Prentiss and Kuijt 2012) recognized markers of similar behavior at the Bridge River site as manifested in part by evidence for feasts featuring young dogs, salmon, and deer, along with differential accumulation of prestige goods such as copper jewelry and jade tools.

A final significant contribution of archaeological research in the Middle Fraser Canyon has been the recognition of a range of ritual behavior in housepits. Evidence for feasting is known from Keatley Creek and Bridge River. However, recent studies by Hayden and colleagues (Hayden and Adams 2004) have also revealed small houses on the periphery of the Keatley Creek village with evidence for a variety of ritual activities including the possible activities for special social groups and shamans. Research at these places is ongoing, and it remains to be seen whether they are related to the larger occupations in the core village. Regardless, they provide a window into an aspect of behavior among hunter-gatherers rarely available to most archaeologists.

Key Issues/Current Debates/Future Directions/Examples

There are several issues debated in Middle Fraser Canyon archaeology centered on chronology, socioeconomic change, political evolution, and village abandonment. Archaeologists differ over the founding of the large Middle Fraser villages (Prentiss and Kuijt 2012). Brian Hayden has argued for early dates in excess of 2,600 years ago, while Prentiss, drawing from more recent excavations and radiocarbon dating, argues for a start date of less than 1,800 years ago. Archaeologists also differ on interpretations of socioeconomic and political history. In brief, Brian Hayden (1997) contends that once present, the villages changed little in basic economy and political organization. In contrast, Prentiss and colleagues (Prentiss and Kuijt 2012) have presented new data suggesting that the Keatley Creek and Bridge River villages grew as much as 300% between 1,800 and 1,200 years ago. During that time, subsistence economies remained dominated by salmon, but the role of mammals gradually increased in importance, particularly after 1,200 years ago when salmon fishing apparently became less productive. Prentiss also argues that it was under the latter period that social status differences became obvious in the villages. Thus, drawing from Bridge River and Keatley Creek data and in contrast to Hayden, Prentiss contends that material wealth-based inequality was not obviously present in the early history of the villages. A final source of debate concerns the abandonment of the villages at around 1,000 years ago (Prentiss and Kuijt 2012). Brian Hayden and colleague June Ryder argue for an abrupt abandonment due to a massive landslide. This argument has been critiqued by Ian Kuijt who points out that there is no firmly dated evidence for such landslides. Prentiss and Kuijt (2012) contend that dense human populations and local depression in terrestrial food resources could be a more likely cause.

Future archaeological research in the Middle Fraser Canyon will seek to test alternative hypotheses offered by Hayden and Prentiss. In addition, archaeologists should explore a number of other critical issues. How were the Keatley Creek and Bridge River villages organized sociopolitically during their earliest occupations? How and why did life in these villages change over the following centuries? In particular, what were the conditions that favored the rise of archaeologically obvious socioeconomic and political competition? What was the role of this socially competitive process in the demographic decline and abandonment of the villages? Application of new research approaches will be essential to advancing knowledge of the ancient cultures of the Middle Fraser Canyon. Geophysical remote sensing techniques have been very productive for mapping subsurface features (Prentiss et al. 2008). Studies of paleo-DNA have been initiated and have shown promise, particularly in the identification of salmon species and recognition of domesticated dog

lineages. Finally, researchers will need to develop more advanced studies of organic residues on tools and in floor sediments in order to resolve questions regarding the roles of many plant foods, particularly geophytes (plants with edible roots).

Cross-References

- ▶ Complex Hunter-Gatherers
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of

References

Ames, K. 2006. Thinking about household archaeology on the Northwest Coast. In *Household archaeology on the Northwest Coast*, International Monographs in Prehistory Archaeological series, ed. E.A. Sobel, D.A.T. Gahr, and K.M. Ames, vol. 16, 16–36. Ann Arbor.

Hayden, B. 1997. *The pithouses of Keatley Creek*. Fort Worth: Harcourt Brace College Publishers.

Hayden, B., and R. Adams. 2004. Ritual structures in transegalitarian communities. In *Complex hunter-gatherers: Evolution and organization of prehistoric communities on the plateau of northwestern North America*, ed. W.C. Prentiss and I. Kuijt, 84–102. Salt Lake City: University of Utah Press.

Lee, R.B. 1968. What hunters do for a living, or, how to make out on scarce resources. In *Man the hunter*, ed. R.-B. Lee and I. Devore, 30–48. New York: Aldine.

Prentiss, A.M., and I. Kuijt. 2012. *People of the Middle Fraser Canyon: An archaeological history*. Vancouver: University of British Columbia Press.

Prentiss, A.M., N. Lyons, L.E. Harris, M.R.P. Burns, and T.M. Godin. 2007. The emergence of status inequality in intermediate scale societies: A demographic and socio-economic history of the Keatley Creek site, British Columbia. *Journal of Anthropological Archaeology* 26: 299–327.

Prentiss, A.M., G. Cross, T.A. Foor, D. Markle, M. Hogan, and D.S. Clarke. 2008. Evolution of a late prehistoric winter village on the interior plateau of British Columbia: Geophysical investigations, radiocarbon dating, and spatial analysis of the Bridge River site. *American Antiquity* 73: 59–82.

Prentiss, A.M., T.A. Foor, G. Cross, L.E. Harris, and M. Wanzenried. 2012. The cultural evolution of material wealth based inequality at Bridge River, British Columbia. *American Antiquity* 77: 542–564.

Sassaman, K.E. 2004. Complex hunter-gatherers in evolution and history: A North American perspective. *Journal of Archaeological Research* 12: 227–280.

Further Reading

Hayden, B., ed. 1992. *A complex culture of the British Columbia plateau*. Vancouver: University of British Columbia Press.

Prentiss, W.C., and I. Kuijt, eds. 2004. *Complex hunter-gatherers: Evolution and organization of prehistoric communities on the plateau of northwestern North America*. Salt Lake City: University of Utah Press.

Prentiss, W.C., J.C. Chatters, M. Lenert, D. Clarke, and R.C. O'Boyle. 2005. The archaeology of the plateau of northwestern North America during the late prehistoric period (3500–200 B.P.): Evolution of hunting and gathering societies. *Journal of World Prehistory* 19: 47–118.

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Basic Biographical Information

Bennie Carleton Keel is an American archaeologist and government official. He grew up in Panama City, in Florida and graduated from Bay County High School in 1952. He completed 1 year of college before enlisting in the US Army (1954–1957) and serving as a military policeman with the 11th Airborne Division at Fort Campbell, Kentucky. After military service, he completed undergraduate studies in anthropology and sociology at Florida State University where he received B.S. (1960) and M.S. (1965) degrees. He undertook graduate studies in anthropology and quaternary studies at Washington State University in Pullman where he received a Ph.D. (1972).

Early in his career, Bennie Keel worked on several government-sponsored archaeological projects including the Weiss Reservoir in Alabama, the Town Creek Indian Mound in North Carolina, and the Marmes Rockshelter in Washington. He was the archaeologist at the Research Laboratories of Anthropology at the University of North Carolina in Chapel Hill (1964–1967; 1969–1973), taught at St. Andrews Presbyterian College (1971) and Wright State

University (1973–1976), and worked on compliance projects in Ohio.

In 1976, Dr. Keel was hired by the National Park Service (NPS) to lead its Interagency Archeological Services Division in Atlanta, Georgia. In 1980, he was promoted to head the division's headquarters in Washington, DC, and serve as the Department of the Interior's Departmental Consulting Archeologist. In 1983, he was promoted to serve as Assistant Director for Archeology and continued as Departmental Consulting Archeologist. In 1990, he transferred to the NPS Southeast Archeological Center in Tallahassee, Florida, serving as Regional Archeologist (1990–2007) and Director (2007–2008) until his retirement.

Major Accomplishments

Bennie Keel's career in archaeology, spanning five decades, was coterminous with a period of significant change in American archaeology. During this time, many federal laws were passed, and presidential executive orders were issued calling on federal, state, and local governments and Indian tribes to preserve and protect the nation's archaeological resources. It was a time when the federal government was establishing its approach to managing these important resources. Bennie Keel was in a unique position to do groundbreaking work, and he had a profound influence on the direction the government took. He played a key role helping establish the framework for the federal archaeology program that exists today.

Dr. Keel brought a fresh approach to contract management in the southeastern United States in the 1970s. Most importantly, he instituted transparency in archaeological contracting. He insisted that contracts not only were academically justifiable, they also were fiscally responsible and in the public interest. He promoted the concept of treating large-scale federal undertakings as single archaeological districts to optimize and rationalize decision-making and insisted that major projects produce popular publications.

Dr. Keel oversaw development of regulations and guidelines of major impact nationally in the 1980s. The *Protection of Archaeological Resources: Uniform Regulations* (18 CFR 1312, 32 CFR 229, 36 CFR 296, 43 CFR 7) help federal land managers preserve and protect resources under their jurisdiction or control. The *Curation of Federally-Owned and Administered Archeological Collections* regulation (36 CFR 79) helps agencies care for their collections. The *Abandoned Shipwreck Act Guidelines* help government owners comprehensively manage shipwrecks. Dr. Keel also promoted development of the National Archeological Database and the NPS Cultural Sites Inventory, reported to Congress on federal archaeology (Keel et al. 1989), highlighted federal program accomplishments (Keel 1988), and encouraged peer review (Keel et al. 2007), archaeological resource protection (Keel 1991) and cultural conservation (Loomis 1983).

Dr. Keel developed a long-range plan (Keel et al. 1996) to help 64 southeastern NPS units identify their archaeological resources. He directed or coordinated projects at Cane River Creole National Historical Park (Keel 1999), Charles Pinckney National Historic Site, Fort Raleigh National Historic Site, Great Smoky Mountains National Park, and Timucuan Ecological and Historic Preserve. The Ravensford land exchange work (Keel 2007) at Great Smoky Mountains was the largest single Cherokee archaeology research project in North Carolina and set new standards for fieldwork.

Dr. Keel has received numerous awards for his contributions to the profession including the Department of the Interior Superior Service Award (1979), the Society of Professional Archeologists Distinguished Achievement Award (1993), the Southeastern Archaeological Conference Lifetime Achievement Award (2008), and the Society for American Archaeology's Lifetime Achievement Award (2012). A symposium recognizing his contributions to the development of North Carolina archaeology was held in 2008 (Davis 2010).

Early in his career, Bennie Keel gained renown for his pioneering research into Cherokee origins, and his book *Cherokee Archeology: A Study of the Appalachian Summit* (1976) remains the most

comprehensive analysis of late prehistoric archaeology in this area.

Cross-References

- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Management: Project Management
- ▶ United States: Cultural Heritage Management
- ▶ United States: Cultural Heritage Management Education

References

Davis, S. 2010. The contributions of Bennie Carlton Keel to the development of North Carolina archaeology. *Southeastern Archaeology* 29: 1–7.

Keel, B.C. 1976. *Cherokee archaeology: A study of the Appalachian summit*. Knoxville: University of Tennessee Press.

Keel, B.C., ed. 1988. *Proceedings of a symposium: Advances in southeastern archeology 1966–1986: Contributions of the Federal Archeological Program*. Special Publication 6. Southeastern Archaeological Conference.

Keel, B.C. 1991. The future of protecting the past. In *Protecting the past*, ed. G.S. Smith and J. Ehrenhard, 291–296. Boca Raton: CRC Press.

Keel, B.C. 1999. *A comprehensive subsurface investigation at Magnolia Plantation*. Tallahassee: Southeast Archeological Center, National Park Service.

Keel, B.C. 2007. *The Ravensford Tract archeological project*. Tallahassee: Southeast Archeological Center, National Park Service.

Keel, B.C., F.P. Mcmanamon, and G.S. Smith. 1989. *Federal archeology: The current program. Annual report to congress on the Federal Archeology Program FY1985 and FY1986*. Washington: United States Government Printing Office.

Keel, B.C., J.E. Cornelison Jr., and D.M. Brewer. 1996. *Regionwide archeological survey plan, southeast field area, National Park Service*. Tallahassee: Southeast Archeological Center, National Park Service.

Keel, B.C., B.J. Little, M. Graham, M. Carroll, and F.P. Mcmanamon. 2007. *Peer review of federal archeological projects and programs*. Technical Brief 21. Washington: Department of the Interior Departmental Consulting Archeologist, National Park Service Archeology Program.

Further Reading

Loomis, O.H. 1983. *Cultural conservation: The protection of cultural heritage in the United States*. Washington: American Folklife Center, Library of Congress.

Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues

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Introduction

The human skeletal remains now referred to as the "Kennewick Man" or the "Ancient One" were found in July 1996 in shallow water along the southern shore of Lake Wallula, a section of the Columbia River pooled behind McNary Dam in Kennewick, Washington. In February 2017, at an undisclosed location somewhere in the internal basin of the Columbia River, not far from the river, the remains were reburied by members of the tribes who had constantly sought such an outcome throughout the more than two decades since the discovery of the remains. This act concluded, if it did not resolve, arguments about how this set of ancient human remains should be treated. One can anticipate that cultural, legal, and scientific aspects of the case will continue to be debated and discussed in the future although the proximate question about how to treat the remains has been answered.

Discovery and the Start of the Case

The Kennewick skeletal remains were discovered by a pair of college students wading in the shallow water along the southern bank of Lake Wallula. From the end of July 1996, when the remains were first recognized until early September, whole and fragmentary human skeletal materials that eventually proved to be a single, nearly complete, and ancient human skeleton were gathered in shallow water from the bottom of Lake Wallula in Kennewick, Washington. The collection was made by James Chatters, a local professional archaeologist working for the county coroner. He recorded some

information about the remains and showed the remains to a few other individuals who inspected them briefly (Downey 2000:3–12; Nickens 1996, 1998). Based on these cursory inspections, many simple facts were unclear. For example, were these the remains of one or more than one individual, and what was the age of the remains? Were these the remains of a Euro-American settler or a "Native American"? If the latter, because they were found on land administered by the US Corps of Engineers (CoE), a federal agency, the Native American Graves Protection and Repatriation Act (NAGPRA) would apply to determine how the remains were treated. Radiocarbon testing of a piece of bone from the skeletal remains returned a very early date of about 8400 BP. When the date and other preliminary interpretations were announced at a press conference in August, the controversy regarding how the Kennewick remains should be treated became more pronounced and more widely known.

Over 350 separate, unarticulated human bones were gathered during several weeks by repeatedly wading in the water and picking up bones observed on the river bottom. We now know that the remains eroded into the lake from the river bank near the area where they were found. These remains were recovered from an extremely disturbed context; bones were collected, piece-by-piece, from beneath the shallow lake water with only general recording of their locations and spatial relationships (Nickens 1996, 1998; Chatters 2000: Fig. 3). The archaeological context, typically so informative concerning behavioral, chronological, and cultural interpretations, was lost almost completely after the remains eroded into the river bed. The skeletal remains were handed over to the CoE in early September 1996. Apart from brief notes made available in the fall of 1996, no further reporting about the initial collection activities and spatial distribution of the Kennewick remains at the discovery site was provided until 2000 (Chatters 2000). The CoE did not allow further study of the skeletal remains from that time until the government team studies that began in February 1999.

Despite the scanty information that was available at the time, individuals and organizations took steps to try and resolve the controversy that quickly developed concerning the proper treatment of the remains. Claims for repatriation were made by Indian tribes whose historical traditional territories overlapped the discovery site. Members of the scientific community called for full scientific study of the remains. In late September, local CoE officials began procedures to turn over the remains to the local tribes who claimed them. This attempt was challenged in federal court in October. In order to have time to address the legal complaint against the CoE, the court ordered the agency to halt its planned repatriation.

Reviewing the CoE activities during this period, the federal magistrate ruling on the case, John Jelderks, determined that the agency had not used adequate information to resolve the matter. In June 1997, he ordered the CoE to reconsider its decision-making and report to the court quarterly on its progress in resolving the matter.

Consultation with the Tribes and the Government Studies

At this point, the CoE and Department of the Army (DoA) turned to the Department of the Interior (DoI), which had expertise in both archaeology and the implementation of NAGPRA, for assistance. A series of discussions ensued involving officials from these departments and the Department of Justice (DoJ), which was representing the CoE in the case. In March 1998, the Secretary of the Interior agreed to assist the Secretary of the Army in resolving the issues related to the Kennewick Man human remains (Spiegel and Barry 1998). The Secretary agreed to have experts at the DoI assist in the case by:

1. Determining if the human remains found in the Columbia River near Kennewick, Washington, are "Native American" within the meaning of NAGPRA
2. Determining their appropriate disposition under the terms of the statute and its implementing regulations if these remains are found to be "Native American"

Within the DoI, the Departmental Consulting Archeologist (DCA) and National Park Service (NPS) were assigned to develop and carry out a program to resolve the issues at hand. Although one of the questions raised by the court was whether or not NAGPRA applied in this case, the NPS also undertook from its earliest involvement consultation with the Indian tribes that had come forward to claim the remains when they were found.

Most commentators and reporters described the legal controversy that developed and swirled around the Kennewick remains in rather superheated rhetoric pitting the interests of "science" against those of Native Americans. This characterization ignores the detailed, intensive, and wide-ranging historical and scientific investigation of the Kennewick remains undertaken by scientists and scholars as part of the government team's effort to determine the facts relevant to the questions in the case. Many news reports inaccurately suggested that scientific study of the Kennewick remains did not occur or that studies were hidden from the American public. In fact, this is quite untrue. A number of studies were conducted (McManamon 2013). These studies have been easily and publically accessible since shortly after their completion between 1998 and 2000, initially in a website maintained by the NPS Archeology Program, at (http://www.nps.gov/archeology/kennewick/). These reports and additional documents now also are available in tDAR (the Digital Archaeological Record) at (https://core.tdar.org/project/6325/the-archaeology-of-kennewick-man).

The government team responsible for trying to resolve the case successfully also organized and carried out a series of consultation meetings with representatives of the Indian tribes. These meetings, outlined in Table 1, were attempts to find common ground between the need to study the remains and the general opinion of tribal representatives that no studies were needed. The consultations also were justified on the grounds that if the Kennewick remains were found to be "Native American," consultation with possibly culturally affiliated Indian tribes would be required for compliance with NAGPRA. The combination of scientific studies and consultation with the tribal representatives reflects the balanced approach to resolving the case that characterized the overall approach of the government agencies involved.

As part of the consultation activities, the DCA, other DoI, NPS, and CoE representatives, as well as attorneys of the Department of Justice (DoJ), which was conducting the legal case, met with tribal representatives six times between 1998 and 2000 to ascertain the tribal perspectives on the case and to discuss the approach to the scientific studies, the rationale for such studies, and the results of the investigations (Table 1). The consultations all were held in the state of Washington at locations near where members of the tribes resided. The face-to-face meetings usually lasted for a day and gave officials of the agencies involved the opportunity to describe their plans

Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues, Table 1 Consultations with claimant Indian tribes and scientific examinations

Date	Topic	Location
Consultation meetings with tribal representatives		
May 1998	Proposed approach for DOI investigation	Walla Walla
July 1998	Draft multiphase DOI investigation plan	Walla Walla
July 1999	Plans for bone sampling and C14 testing	Walla Walla
October 1999	Plans for cultural affiliation investigation	Walla Walla
February 2000	Plans for bone sampling for DNA testing	Walla Walla
July 2000	Cultural affiliation investigation/interpretations	Spokane
Scientific physical examinations and studies		
February 1999	Examination, documentation, measurement	Burke Museum, Seattle
September 1999	Bone extraction for C14 tests – two samples/split	Burke Museum, Seattle
April 2000	Taphonomy investigation; microsampling bone for aDNA analysis	Burke Museum, Seattle

to resolve various aspects of the case and listen to the concerns of the tribes. Officials considered many suggestions of the tribal representatives to fashion the necessary studies in ways that were as inoffensive as possible for the tribal members yet without compromising the methods and techniques essential for conducting the necessary historical and scientific research. Tribal representatives frequently expressed their frustrations with the process and the agencies' positions, but at least the meetings provided a channel for communication.

Consultation with tribes was a major part of the DoI's involvement. NAGPRA requires consultation with tribes that have or may have a cultural affiliation with the human remains of objects covered by the law. Section 3 "Consultation with the Tribes and the Government Studies" of the statute directs that consultations should start soon after any discovery of remains on federal land and should address issues related to excavation, documentation, analysis, recording, and ultimate deposition of the remains or objects in question. The Kennewick case presented a situation, not uncommon when remains that may be subject to NAGPRA are found accidentally, in which facts and evidence are needed in order to make determinations of whether the law applies and, if so, what disposition is appropriate. In such cases both scientific and historical investigations frequently are necessary to establish facts about the remains and answer basic questions. The studies necessary must be developed and conducted in concert with consultations with representatives of the tribes who were potentially culturally affiliated with the remains, although, except for discoveries on tribal lands, the consent of tribe(s) is not a requirement.

To resolve some of the factual matters in the Kennewick case and answer the interpretive questions asked by the federal court, the DCA organized and conducted three physical scientific examinations of the Kennewick remains (Table 1), as well as several background research investigations that did not involve direct examination of the Kennewick remains. The historical and scientific background research, undertaken between 1998 and 2000, included anthropology, archaeology, biology, history, linguistics, and traditional oral histories. Twenty-one nationally and internationally recognized scientists and scholars conducted this variety of historical and scientific examinations, analyses, tests, and studies (Table 2; McManamon 2013). Throughout this period and afterward the Kennewick skeletal remains were cared for professionally and skillfully by collection managers of the CoE Mandatory Center of Expertise for the Curation and Management of Archaeological Collections, curators at the University of Washington's Burke Museum, and additional conservation experts (Cassman and Odegaard 2004).

The detailed scientific examination and recording of the Kennewick skeleton, conducted at the Burke Museum, University of Washington, in late February 1999, were designed to be non-intrusive, that is, no physical samples of the remains were removed (Larson 1998; McManamon 1998; Smith 1998). The skeleton was physically examined, measured, and recorded using current and standard scientific methods and techniques. Sediments adhering to the bones and trapped within bone cavities were examined, described, and analyzed for similarity with the soil sediments in the vicinity of the discovery of the skeletal remains. The stone projectile point embedded in the skeleton's pelvis was described and analyzed.

The physical anthropological examination by Powell and Rose (McManamon et al. 1999, see chapter by Powell and Rose) indicates that the Kennewick skeleton represents a male who died between 45 and 50 years of age. He was about 5′ 9″ tall and well-muscled indicating a life of rigorous physical activity. His teeth have extremely worn surfaces but no caries. Evidence of arthritis is minor, and his joints were in excellent shape for a man of his age and activity. Early in his life, probably when he was still a teenager, he was involved in an accident or conflict in which a projectile point became embedded in the right iliac blade of his pelvis. His bones indicate that he recovered completely from this wound without any infection or disability and lived for many years afterward. Powell and Rose present many other details about the skeletal remains and their interpretation of them in their report.

Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues, Table 2 DOI/NPS Kennewick man scientific investigations

Investigations and dates	Scientists and institutions[a]
1. NPS Research Design: Approach to Documentation, Analysis, Interpretation, and Disposition of Human Remains Inadvertently Discovered at Columbia Point, Kennewick, WA, November–December 1998	Dr. Francis P. McManamon; peer reviews by Dr. Bruce Smith, Smithsonian Institution, and Dr. Clark Larsen, University of North Carolina
2. Physical Examination of the Kennewick Remains, February 1999	Dr. John Fagan, Archaeological Investigations Northwest, Portland; Dr. Gary Huckleberry, Washington State University; Dr. Joseph Powell, University of New Mexico; Dr. Jerome Rose, University of Arkansas; and Dr. Julie Stein, University of Washington
3. C14 Dating of Kennewick Remains, September–November 1999	Dr. Douglas Donahue, University of Arizona, NSF Radiocarbon Lab; Mr. Darden Hood, Beta Analytical Laboratory; and Dr. R. E. Taylor, University of California, Riverside
4. Cultural Affiliation Report, November 1999–February 2000	Dr. Kenneth Ames, Portland State University; Dr. Daniel Boxberger, Eastern Washington University; Dr. Steven Hackenberger, Central Washington University; and Dr. Eugene Hunn, University of Washington
5. Physical Examination of Kennewick Remains; Analysis of organic content of bone samples; Sample Selection for ancient DNA analysis, April 2000	Dr. Clark Larsen, University of North Carolina; Dr. Joseph Powell, University of New Mexico; Dr. Phillip Walker, University of California, Santa Barbara; Dr. David Glenn Smith, University of California, Davis; and Dr. R. E. Taylor, University of California, Riverside
6. Tests of Bone Samples for Ancient DNA, June–September 2000	Dr. Frederica Kaestle, Yale University; Dr. Andrew Merriwether, University of Michigan; and Dr. David Glenn Smith, University of California, Davis
7. Potential for DNA Testing, December 1999	Dr. Connie Kolmon, University of Florida, and Dr. Noreen Tuross, Smithsonian Institution

Copies of reports of all of these investigations can be found in McManamon (2013) and accessed in tDAR (the Digital Archaeological Record)

[a]Individuals are listed with the professional affiliations they had when the investigations were conducted in 1999–2000. Dr. Phillip Walker is deceased

Like other ancient American skeletons, the Kennewick remains exhibit morphological features not found in modern populations. For all craniometric dimensions examined, Powell and Rose note that this is not unexpected given that the Kennewick remains date over 8000 years earlier than the modern samples used for most of the comparative analyses. The Kennewick cranial measurements are most similar to populations from the south Pacific, Polynesia, and the Ainu of northern Japan, a pattern observed for other crania with such very old dates from North and South America. This similarity does not mean that the Kennewick Man is an ancient Polynesian voyager who made his way up the Columbia River. Rather, the differences in cranial morphology observed probably reflect the complex events and different migrations of human populations into North America from 20,000 BP onward and the long ancient history of interaction among populations in the region since the original colonization of the continent (e.g., see Brace et al. 2001; Dillehay 2009; Schurr 2004).

Subsequent additional craniometrics analysis reported by Rasmussen et al. (2015, Supplemental Information No. 9) that was conducted along with the investigation of ancient DNA from the Kennewick Man skeleton concluded that the craniometrics features of the skeleton fall within the range of affinity patterns of individual Native Americans. Commenting on the 2015 craniometrics analysis, Meltzer (2015: 1489–1490 notes that "…early Native American crania seem to differ from those of modern Native

Americans. . .Craniometric variation is not solely a by-product of (separate) inheritance and history: mutation, isolation and drift, development and adaptation all converge to modify cranial form. . ..”

The February 1999 noninvasive examination included the removal, description, and analysis of soil sediments from the skeletal remains. Our original hope in using the sediments was that enough organic material from the original burial context of the remains could be obtained from the sediment adhering to the skeleton for a radiocarbon date to be made on it. However, during analysis it could not be determined with sufficient reliability that the sediments were not recently associated with the bones from the river or that they were not older sediments into which the Kennewick remains had been buried (McManamon et al. 1999, see Huckleberry and Stein chapter). Both possibilities created contextual problems that made radiocarbon dating of the sediment an unreliable proxy for the age of the skeletal remains.

The 1999 investigation of the Kennewick remains included a careful examination of the lithic object lodged in right pelvic bone. The object, which probably is a projectile point, was examined, documented, and analyzed in place. CT scans were essential to this part of the investigation. The descriptive information could not have been determined in any other nondestructive manner. They revealed that the object is at least 5.6 cm long and 2 cm wide at widest end, tapering to 3 mm wide at narrowest end. The object has two convex faces with a wide, rounded base and a narrow tapering tip. There is no evidence of notches or stem. The exposed portion of the object, around the middle, is 6–5.5 mm thick. Based upon comparative analysis with other specimens in collections at the Burke Museum and the Oregon State Museum, Fagan infers that the size, shape, and raw material give the object the appearance of a Cascade projectile point. However, these characteristics are not exclusive to Cascade points (McManamon et al. 1999, see Fagan chapter). The possibility that this object is a Cascade point is particularly interesting because archaeological site components containing such points are common throughout the Pacific Northwest. These site components often are associated with deposits of volcanic ash that originated during the eruption of Mt. Mazama approximately 7600 years ago.

The 1999 physical examination provided the basic description and detailed documentation of the remains that is required by the Archaeological Resources Protection Act (ARPA), NAGPRA, and other resource management and protection laws and regulations. The characteristics of the skeleton, the nature of the sediments embedded in and on the bones, and the attributes of the stone artifact in the pelvic bone all suggested an individual living a way of life consistent with an 8000-year date.

The information derived from the noninvasive studies, however, was not adequate to determine whether or not the remains fit the definition of “Native American” for purposes of NAGRPA, as understood by DoI officials at the time. Therefore, in order to make a reasonable decision about the age of the skeleton, which was considered at the time an essential aspect of making the “Native American” determination, DoI officials decided it was necessary to conduct additional tests, specifically radiocarbon dating of small samples of bone from the remains.

Following review and consideration of the results of the February examination, it was decided that two bone samples would be extracted from the Kennewick remains for radiocarbon dating. In September, bone samples were taken and sent to several radiocarbon dating labs to check and confirm the ancient date for the remains. Four C14 dates were obtained from these samples. The samples were processed and dated by Beta Analytical, Inc. (BA), of Miami, Florida; the Radiocarbon Laboratory of the University of California, Riverside (UC-R); and the NSF-Arizona AMS Facility of the University of Arizona. Two of the four new dates were in substantial conformance with the initial radiocarbon date of the portion of the metacarpal dated by UC-R in 1996. All the bone samples showed very low carbon content which slowed the processing of the samples and extended the time required to interpret the results. Taylor et al. (2001) describe this problem with

dating ancient bone samples and also note the variability of carbon preservation displayed by the Kennewick samples.

The BA date (Beta-133993) gave a conventional radiocarbon age of 8410 ± 40 BP. The equivalent calibrated radiocarbon age (using the two sigma, 95% probability) in years BP is cal BP 9510–9405 and cal BP 9345–9320. The bone sample used for this date was approximately half of the right metatarsal, one of the load-bearing bones of the foot. The UC-R lab processed and dated two of the Kennewick bone samples. Like the BA sample, both of these were very low in carbon content. Due to the low carbon content and the lack of clear collagen-like characteristics of the extracted carbon, the dates were reported as "the apparent C14 ages" for each sample. One of the samples was dated as 8130 ± 40 BP (UCR-3806/CAMS-60684), slightly different from the BA date but not inconsistent with it. These two samples, in fact, are from the same bone, the right first metatarsal. Both of these dates (Beta-133993 and UCR-3806/CAMS-60684) are consistent with the earlier C14 date (from the 1996 test) obtained from a portion of the fifth left metacarpal. The BA date, in fact, is almost identical to the first C14 date (McManamon 2000). The University of Arizona date (AA-34818) displayed very low carbon preservation, below the threshold for which the laboratory normally would report a date.

The C14 chronological information added to other information about the remains that supported the determination that the Kennewick skeletal remains should be considered "Native American" as defined by NAGPRA. All the dates obtained from the Kennewick Man samples predate 6000 BP and are clearly pre-Columbian. Two of the dates match closely the C14 date obtained in 1996 on another bone fragment believed to be from the skeleton. This chronological information, along with the results of the earlier documentation, examination, and analysis of the remains themselves, led the DoI to conclude that, for the purposes of NAGPRA, the Kennewick remains should be considered as "Native American," thus subject to the provisions and procedures of the law (McManamon 2000).

With this initial determination made, the government team next had to resolve the question of whether or not the Kennewick remains could be "culturally affiliated" with any of the Indian tribes who were claiming the skeleton as their ancestor. The DCA organized and coordinated the preparation of a series of scholarly reports by experts summarizing archaeological, biological, historical, linguistic, and traditional information that could be used for determining the cultural affiliation of the Kennewick remains (McManamon et al. 2000a). In April 2000, as part of the effort to determine the cultural affiliation of the Kennewick remains, an additional physical examination of the remains was conducted and samples taken to conduct tests for the detection of ancient DNA in the bones. Physical anthropologists Clark Larson, Joseph Powell, and Phillip Walker conducted macroscopic and microscopic examinations of the Kennewick skeleton to determine the suitability of specific skeletal elements for DNA analysis (McManamon et al. 2000b).

The 2000 taphonomic examination confirmed the conclusion of Powell and Rose, based on their 1999 examination that these are the remains of a single individual who was interred at the site, not one whose remains decomposed on the surface of the ground or who was incorporated into the deposit through a catastrophic flood event. This conclusion is supported by the completeness of the skeleton and the absence of any clear indications of carnivore scavenging of the remains.

During the April 2000 examination, microsamples were taken from the most suitable skeletal elements for analysis of the ancient DNA of the skeleton. The samples were analyzed by ancient DNA laboratories at the University of California – Davis, the University of Michigan, and Yale University. Each lab attempted to isolate and amplify ancient DNA from the skeleton; however, none of the tests were able to isolate and examine any ancient DNA (McManamon et al. 2000b).

In September 2000, Secretary of the Interior Bruce Babbitt recommended to the DoA Secretary Louis Caldera that the Kennewick remains could be culturally affiliated with the claimant tribes (Babbitt 2000). His decision was controversial within the DoI, where different interpretation

and procedure were advocated by some of the officials involved in the case. The decision was criticized in the wider world as well (e.g., The Economist 2000), although supported strongly by the American Indian community.

Subsequently, following a 2-year-long review by the district court, the DoI determination that the Kennewick remains were culturally affiliated with the claimant tribes was rejected in a decision released in August 2002 (Jelderks 2002). The judge commented that the scientific evidence presented by the DoI's investigations actually argued against the Secretary's determination and was not adequately taken into account in the reaching his conclusion. The district court also ruled that NAGPRA did not pertain to the Kennewick remains because the available evidence did not show a clear link between the remains and the claimant Indian tribes. The DoI and DoA accepted the first determination of the district court, i.e., that cultural affiliation between the remains and the tribes was not supported by a full consideration of the evidence. However, the government appealed the part of the district court ruling that NAGPRA did not apply to ancient human remains found within the jurisdiction of the Ninth Circuit Court of Appeals. Rather, the government argued that the archaeological, chronological, contextual, and taphonomic evidence developed by the government's scientific examinations and tests indicated that the remains should be considered "Native American" within the meaning of the term in NAGPRA.

The Kennewick Man case in federal court, which began in October 1996, reached its legal conclusion in February 2004, when a three-judge panel of the Ninth U.S. Circuit Court of Appeals issued an opinion supporting the earlier decision of the district court in Oregon (Gould 2004). The circuit court decision emphatically agreed with the district court opinion that in order for NAGPRA to apply to a set of Native American human remains, the remains must "...bear some relationship to a *presently existing* tribe, people, or culture to be considered Native American" (emphasis in original; Gould 2004: 1596). The circuit court, again in support of the district court, stated that the facts about the Kennewick Man skeleton could not reasonably be construed to provide such a link to any of the modern tribes or Indian groups who claim a relationship with the remains. The court went on to generalize from the specifics of the Kennewick case, noting that the scientific excavation, investigation, and study of ancient human remains that are unrelated to modern American Indians are neither a target of the law nor precluded by NAGRPA (Gould 2004: 1598).

The Ninth Circuit Court decision provided some detail about the kind of a relationship that might serve as a threshold for other situations. In other words, how much of a relationship and what kinds of relationships should exist for a set of remains to pass into the "Native American" category and thus be subject to NAGPRA? The opinion notes:

> ...though NAGPRA's two inquiries have some commonality in that both focus on the relationship between human remains and present-day Indians, the two inquiries differ significantly. The first inquiry [i.e., asking whether human remains are Native American] requires a general finding that [human] remains have a significant relationship to a presently existing 'tribe, people, or culture,' a relationship that goes beyond features common to all humanity. The second inquiry [i.e., asking which American Indians or Indian tribe bears the closest relationship to Native American remains] requires a more specific finding that [human] remains are most closely affiliated to specific lineal descendants or to a specific Indian tribe. (Gould 2004: 1599)

The circuit court reviewed the evidence collected and used by the government in the case, in particular, the conclusions that the Secretary of the Interior had drawn for the evidence. The court found that the Secretary's interpretation had inadequate factual support for the remains being either Native American or culturally affiliated with the claimant tribes (Gould 2004: 1603 ff.). The court noted that the Secretary overlooked evidence for a lack of connection or cultural continuity between the ancient remains and the modern tribes that his own experts had pointed out. The Secretary relied upon interpretations of tribal oral history accounts to reach his decision that the Kennewick remains were both Native American and culturally affiliated. The court found this evidence unpersuasive concluding that:

> . . .these accounts are just not specific enough or reliable enough or relevant enough to show a significant relationship of the Tribal Claimants with Kennewick Man. Because oral accounts have been inevitably changed in context of transmission, because the traditions include myths that cannot be considered as if factual histories, because the value of such accounts is limited by concerns of authenticity, reliability, and accurate, and because the record as a whole does not show where historical fact ends and mythic tale begins, we do not think that the oral traditions. . .were adequate to show the required significant relationship of the Kennewick Man's remains to the Tribal Claimants. (Gould 2004: 1607)

The court acknowledged the legitimacy of oral and traditional histories and evidence as one kind of information used to answer the inquiries that NAGPRA poses. However, in the Kennewick case, the court found this evidence irrelevant and misinterpreted by the DoI.

More Legal Developments, Additional Studies, and Final Treatment of the Kennewick Man Remains

Following the Ninth Circuit Court decision, in 2004 and 2005, legislation was proposed by the Senate to amend NAGPRA to ease the need to demonstrate in detail that Native American human remains or objects are related to a current, federally recognized tribe in order for the remains to be subject to the law and regulations. The NAGPRA Review Committee annual report for 2006 endorsed this approach. However, in the House of Representatives, a bill designed to focus the intent of NAGPRA on remains for which clear tribal affiliation could be determined was introduced in 2006. Neither of these legislative approaches to clarifying appropriate implementation of NAGPRA on this matter moved any further in Congress.

Following the conclusion of the federal legal case, the CoE worked with the plaintiffs, whose request to study the Kennewick remains was approved as part of the federal court decisions, to plan and undertake another physical study of the remains. Researchers associated with the plaintiffs in the federal case examined the Kennewick Man remains in July 2005 and February 2006. Nearly a decade later, the large (650-plus page) report about these examinations and subsequent analysis of the measurements and observations was published (Owsley and Jantz 2014). Shortly after this publication, Rasmussen, with a large number of coauthors, reported a successful extraction and subsequent analysis of ancient DNA from a bone sample from the Kennewick skeleton (Rasmussen et al. 2015; Meltzer 2015). The study results showed a:

> . . .stronger association of the Kennewick man with Native Americans than with any other continental group. We also observe that the autosomal DNA, mitochondrial DNA and Y-chromosome data all consistently show that Kennewick Man is directly related to contemporary Native Americans, and thus show genetic continuity within the Americas over at least 8 thousand years. Identifying which modern Native American groups are most closely related to the Kennewick Man is not possible at this time, since our comparative DNA database of modern peoples is limited, particularly for Native American groups in the United States. . .among the groups for which we have sufficient genomic data we find that the Colville, one of the Native American groups claiming Kennewick Man as ancestral, show close affinities to that individual or at least to the population to which he belonged. (Rasmussen et al. 2015: 458)

Perhaps this additional and independent piece of evidence would have persuaded the district and circuit courts that Kennewick Man was "Native American" for the purposes of NAGPRA, as the 1998–2000 DoI studies had inferred. However, the case was closed, and there may have been little interest in opening it again or starting a new case to see if this additional evidence would make a difference. In addition, having the remains determined to be Native American only meant that NAGPRA would apply to their treatment and disposition. Such a determination would not resolve automatically to which tribe or group of tribes the remains should be turned over. In most cases, a determination of "cultural affiliation," which requires that there be a "relation of shared group identify" between Native American human remains and a claimant Indian tribe, is required to justify the return of remains to a

tribe. In the Kennewick Man case, the district court, affirmed by the appeals court, had determined that the available evidence did not merit a determination of cultural affiliation between the Kennewick Man remains and the claimant tribes.

Following the publication of the Rasmussen et al.'s ancient DNA study and the wide publicity of the findings, the CoE funded a second ancient DNA study. The primary aim of the second study (Novembre et al. 2016) analysis was to provide an independent validation of the genetic evidence underlying the Rasmussen et al. study and its interpretations. The Novembre et al. study results concurred with the findings of the earlier study. The 2016 report notes that the sample tested is genetically closer to modern Native Americans than to any other population worldwide. Several distinct analyses that were part of the investigation support this conclusion. The authors note that their investigation spanned three non-overlapping subsets of the data and that each distinct result was consistent with Native American ancestry.

In 2016, the CoE Northwestern Division office, which retained legal responsibility for the care of the Kennewick remains, reviewed the evidence about the remains from the reports prepared by the DoI, as well as the ancient DNA evidence from the 2014 to 2016 studies. The Division Commander, Brigadier General Scott A. Spellmon, formally determined that for the purposes of compliance with NAGPRA, the Kennewick Man skeletal remains should be considered "Native American." The 14-page report (Spellmon 2016) describes the information and research results that support this determination.

Rather than rely upon a new case in the federal court system or amendments to NAGPRA to resolve these thorny matters, Senator Patty Murray of Washington and Representatives Newhouse, Heck, Kilmer, and Walden introduced in 2015 and 2016 legislation requiring that the CoE return the Kennewick remains to the claimant tribes. In December 2016, President Obama signed legislation requiring the return. On 17 February 2017, at the Burke Museum in Seattle, the remains were handed over to representative of the tribes (Inslee 2017). Early the next morning at a secret location near the Columbia River, Kennewick Man, the Ancient One, was reburied by tribal members.

Future and Ongoing Considerations

Opinions differ on the interpretation of evidence and the law in the complex and unusual case of the Kennewick Man. This case was surrounded with controversy from the very beginning. Numerous perspectives have been expressed on the various administrative, legal, and scientific aspects of the case as it worked its way through the federal court system and since. In addition to the analyses and interpretations about the skeletal remains, the Kennewick case generated discussion and written opinions regarding the study and treatment of human burials and remains from archaeological sites; the appropriate balance between humanistic, cultural, and scientific investigation; and the appropriate interpretations of ARPA and NAGPRA (e.g., Bruning 2006; Burke et al. 2008; Colwell 2017; Downey 2000; Owsley and Jantz 2001; Melzer 2015; Swedlund and Anderson 1999, 2003; Thomas 2000; Watkins 2003). These debates and discussions certainly will continue. No doubt the case of Kennewick Man/the Ancient One will be part of such future consideration. For the present, at least, the remains are reinterred and that aspect of the case has been determined.

References

Babbitt, B. 2000. Letter from Secretary of the Interior Bruce Babbitt to Secretary of the Army Louis Caldera regarding disposition of the Kennewick human remains. (tDAR id: 6357). https://doi.org/10.6067/XCV84T6J2R. https://core.tdar.org/document/6357/letter-from-secretary-of-the-interior-bruce-babbitt-to-secretary-of-the-army-louis-caldera-regarding-disposition-of-the-kennewick-human-remains. Accessed 20 Sept 2017.

Brace, C. Loring, A. Russell Nelson, Noriko Seguchi, Hiroaki Oe, Leslie Sering, Pan Qifeng, Yongyi Li, and Dashtseveg Tumen. 2001. Old world sources of the first new world human inhabitants: A comparative craniofacial view. *Proceedings of the National Academy of Sciences (PNAS)* 98 (17): 10017–10022.

K

Bruning, Susan B. 2006. Complex legal legacies: The native American graves protection and repatriation act, scientific study, and Kennewick Man. *American Antiquity* 71: 501–521.

Burke, Heather, Claire Smith, Dorothy Lippert, Joe Watkins, and Larry Zimmerman. 2008. *Kennewick Man: Perspectives on the ancient one*. Walnut Creek: Left Coast Press.

Cassman, Vicki, and Nancy Odegaard. 2004. Human remains and the conservator's role. *Studies in Conservation* 49 (4): 271–282. http://www.jstor.org/stable/25487703. Accessed 24 Oct 2011.

Chatters, James C. 2000. The recovery and first analysis of an early Holocene human skeleton from Kennewick, Washington. *American Antiquity* 65 (2): 291–316.

Colwell, C. 2017. How should the Ancient One's story end? *Denver Post* Guest Commentary. Saturday 14 May 2016. http://www.denverpost.com/2016/05/13/how-should-the-ancient-ones-story-end/. Accessed 20 Sept 2017.

Dillehay, Tom D. 2009. Probing deeper into first American studies. *Proceedings of the National Academy of Sciences (PNAS)* 106 (4): 971–978. https://doi.org/10.1073/pnas.0808424106.

Downey, Roger. 2000. *Riddle of the bones: Politics, science, race, and the story of Kennewick Man*. New York: Springer-Verlag.

The Economist. 2000. Kennewick Man: Boneheaded. *The Economist*, 28 September 2000. http://www.economist.com/node/382978. Accessed 23 Sept 2017.

Gould, Ronald M. 2004. *Opinion, Bonnichsen v. United States*, 4 February 2004, 1579. ff. No. 02–35994 D.C. No. CV-96-01481-JE. San Francisco: United States Court of Appeals, Ninth Circuit

Inslee, J. 2017. Kennewick Man brought home to his final resting place. *WA Governor's Office: News and Updates*. https://medium.com/wagovernor/kennewick-man-brought-home-to-his-final-resting-place-b3b6015d0066. Accessed 20 Sept 2017.

Jelderks, John. 2002. *Opinion and Order, Bonnichsen, et al. v. United States, et al.*, 30 August 2002, (D. Oregon, Civil No. 96-1481-JE). Portland: United States District Court, District of Oregon.

Larson, C.S. 1998. *Review: "Department of Interior Approach to Documentation, Analysis, Interpretation, and Disposition of Human Remains Inadvertently Discovered at Columbia Park, Kennewick, WA"*. (Draft Document of 20 October 1998). (tDAR id: 374890). https://doi.org/10.6067/XCV81R6PR2. https://core.tdar.org/document/374890/review-department-of-interior-approach-to-documentation-analysis-interpretation-and-disposition-of-human-remains-inadvertently-discovered-at-columbia-park-kennewick-wa-draft-document-of-20-october-1998. Accessed 20 Sept 2017.

McManamon, F.P. 1998. *Research design: Approach to documentation, analysis, interpretation, and disposition of human remains inadvertently discovered at Columbian Park, Kennewick, WA*. (tDAR id: 374889). https://doi.org/10.6067/XCV8X0669B. https://core.tdar.org/document/374889/research-design-approach-to-documentation-analysis-interpretation-and-disposition-of-human-remains-inadvertently-discovered-at-columbia-park-kennewick-wa. Accessed 20 Sept 2017.

McManamon, F.P. 2000. *Memorandum: Determination that the Kennewick skeletal remains are "Native American" for the purposes of the Native American Graves Protection and Repatriation Act (NAGPRA). Memorandum to Assistant Secretary, Fish and Wildlife and Parks, Department of the Interior, 13 January 2000*. (tDAR ID: 365165). https://doi.org/10.6067/XCV81Z435N. https://core.tdar.org/document/365165/memorandum-determination-that-the-kennewick-skeltal-remains-are-native-american-for-the-purposes-of-the-native-american-graves-protection-and-repatriation-act-nagpra. Accessed 23 Sept 2017.

McManamon, F.P. 2013. *The archaeology of Kennewick Man*. The Digital Archaeological Record (tDAR) Project ID 6325. https://doi.org/10.6067/XCV8W95BK9. http://core.tdar.org/project/6325. Accessed 2 Apr 2013.

McManamon, F.P., Powell, J.F., Rose, J.C., Huckleberry, G., Stein, J.K., and Fagan, J.L.. 1999. *Report on the non-destructive examination, description, and analysis of the human remains from Columbia Park, Kennewick, Washington*. (tDAR id: 365161). https://doi.org/10.6067/XCV8KK999C. https://core.tdar.org/document/365161/report-on-the-non-destructive-examination-description-and-analysis-of-the-human-remains-from-columbia-park-kennewick-washington-october-1999. Accessed 20 Sept 2017.

McManamon, Francis P., Jason Roberts, Brooke S. Blades, Kenneth Ames, Daniel L. Boxberger, Stacy Rasmus, Eugene S. Hunn, and Steven Hackenberger. 2000a. *Cultural affiliation report Kennewick Man: All chapters*. Washington, DC: National Park Service, Department of the Interior. (tDAR id: 376907). https://doi.org/10.6067/XCV8CC10CQ. https://core.tdar.org/document/376907/cultural-affiliation-report-kennewick-man-all-chapters. Accessed 20 Sept 2017.

McManamon, Francis P., Jason Roberts, Brooke Blades, David Smith, R. E. Taylor, Frederica Kaestle, D. Andrew Merriwether, Graciela Cabana, Ripan Malhi, Jason Eshleman, Philip Walker, Clark Larsen, and Joseph Powell. 2000b. *Report on the skeletal taphonomy, dating, and DNA testing results of the Kennewick human remains from Columbia Park, Kennewick, Washington*. Washington, DC: National Park Service, Department of the Interior. (tDAR id: 6749). https://doi.org/10.6067/XCV8GB22N0. https://core.tdar.org/document/6749/report-on-the-skeltal-taphonomy-dating-and-dna-testing-results-of-the-kennewick-human-remains-from-columbia-park-kennewick-washington-september-2000. Accessed 20 Sept 2017.

Meltzer, David J. 2015. Kennewick Man: Coming to closure. *Antiquity* 89 (348): 1485–1493. https://doi.org/10.15184/aqy.2015.160 https://www.cambridge.org/core/journals/antiquity/article/kennewick-man-coming-to-closure/791B8CDADE5B17CEDB4C0124EFAE7094. Accessed 20 Sept 2017.

Nickens, P.R. 1996. *Report on the discovery and recovery of human remains from Columbia Park Site, Kennewick, WA, July-September 1996*. https://core.tdar.org/document/391003/a-report-on-the-discovery-and-recovery-of-human-remains-from-columbia-park-site-kennewick-wa-july-september-1996. Accessed 24 Sept 2017.

Nickens, Paul R. 1998. Discovery of ancient remains at Kennewick site and subsequent events. In *Geologic, geoarcheologic, and historical investigation of the discovery site of ancient remains in Columbia Park, Kennewick, Washington*, Technical Report GL-98-13, ed. Wakeley, L., W.L. Murphy, J.B. Dunbar, A.G. Warner, F.L. Briuer, and P. R. Nickens, B1–B7. Vicksburg: Waterways Experiment Station, U.S. Army, Corps of Engineers. (tDAR ID: 374888). https://doi.org/10.6067/XCV8WW7FVT. https://core.tdar.org/document/374888. Accessed 7 Feb 2013.

Novembre, J., D. Witonsky, and A. Di Rienzo. 2016. *Technical report: Assessment of the genetic analyses of Rasmussen et al. (2015)*. Report prepared for the U.S. Army Corps of Engineers, St. Louis District (Contract #W912P9-16-P-0010). (tDAR id: 439879). https://doi.org/10.6067/XCV8RR21XN. https://core.tdar.org/document/439879/technical-report-assessment-of-the-genetic-analyses-of-rasmussen-et-al-2015. Accessed 11 Nov 2017.

Owsley, Douglas W., and Richard L. Jantz. 2001. Archaeological politics and public interest in Paleoamerican studies: Lessons from Gordon Creek Woman and Kennewick Man. *American Antiquity* 66: 565–575.

Owsley, Douglas W., and Richard L. Jantz, eds. 2014. *Kennewick Man: The scientific investigation of an ancient American skeleton*. College Station: Texas A&M University Press.

Rasmussen, Morten, Martin Sikora, Anders Albrechtsen, Thorfinn Sand Korneliussen, J. Vıctor Moreno-Mayar, G. David Poznik, Christoph P.E. Zollikofer, Marcia S. Ponce de Leon, Morten E. Allentoft, Ida Moltke, Hakon Jonsson, Cristina Valdiosera, Ripan S. Malhi, Ludovic Orlando, Carlos D. Bustamante, Thomas W. Stafford Jr., David J. Meltzer, Rasmus Nielsen, and Eske Willerslev. 2015. The ancestry and affiliations of Kennewick Man. *Nature* 523: 455–464. https://doi.org/10.1038/nature14625.

Schurr, Theodore G. 2004. The peopling of the new world: Perspectives from molecular anthropology. *Annual Review of Anthropology* 33: 551–583. https://doi.org/10.1146/annurev.anthro.33.070203.143932.

Smith, B.D. 1998. *Review and comment on the draft research design (20 October 1998): Approach to documentation, analysis, interpretation, and disposition of human remains inadvertently discovered at Columbia Park, Kennewick, WA*. (tDAR id: 374891). https://doi.org/10.6067/XCV80R9NPH. https://core.tdar.org/document/374891/review-and-comment-on-the-draft-research-design-20-october-1998-approach-to-documentation-analysis-interpretation-and-disposition-of-human-remains-inadvertently-discovered-at-columbia-park-kennewick-wa. Accessed 20 Sept 2017.

Spellmon, Scott A. 2016. *Native American determination for Kennewick Man*, Document on file. Portland: Northwestern Division, U.S. Army Corps of Engineers. (tDAR id: 439882). https://doi.org/10.6067/XCV8N0196Z. https://core.tdar.org/document/439882/native-american-determination-for-kennewick-man. Accessed 11 Nov 2017.

Spiegel, J.L., and D.J. Barry. 1998. An interagency agreement between DoA and DoI on the delegation of responsibilities for the Kennewick human remains [March 24, 1998]. (tDAR id: 365163). https://doi.org/10.6067/XCV8KS6QDV. https://core.tdar.org/document/365163/an-interagency-agreement-between-doa-and-doi-on-the-delegation-of-responsibilities-for-the-kennewick-human-remains-march-24-1998. Accessed 20 Sept 2017.

Swedlund, Alan, and Duane Anderson. 1999. Gordon Creek Woman meets Kennewick Man: New interpretations and protocols regarding the peopling of the Americas. *American Antiquity* 64: 569–576.

Swedlund, Alan, and Duane Anderson. 2003. Gordon Creek Woman meets spirit cave man: A response to comment by Owsley and Jantz. *American Antiquity* 68: 161–167.

Taylor, R.E., David Glenn Smith, and John R. Southon. 2001. The Kennewick skeleton: Chronological and biomolecular contexts. *Radiocarbon* 43: 965–976.

Thomas, David Hurst. 2000. *Skull wars: Kennewick Man, archaeology, and the battle for native American identity*. New York: Basic Books.

Watkins, Joe E. 2003. Beyond the margin: American Indians, First Nations, and archaeology in North America. *American Antiquity* 68: 273–285.

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Kent, Susan

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Basic Biographical Information

Thoroughly engaged in anthropology, ethnoarchaeology, and social activism, Susan Kent (1952–2003) was born on 26 June 1952 in Oakland, California, and passed away on 12 April 2003 while attending the annual Society for American Archaeology meeting in Milwaukee, Wisconsin. Educated at the University of Southern Colorado, Pueblo, Colorado (B.S. in Anthropology, 1973), and Washington State University

(M.A., 1975; Ph.D., 1980, both in Anthropology), she held visiting faculty appointments at the Universities of New Mexico, Iowa State, and Kentucky before joining the faculty at Old Dominion University, Norfolk, Virginia, in 1986. In 2000, Old Dominion honored Kent as Eminent Professor of Anthropology.

Major Accomplishments

From the outset of her career, Kent challenged herself, as well as her colleagues, to think across disciplinary boundaries and theoretical perspectives and to value the insights such intersections could produce. Indeed, she sought to communicate with and involve notably diverse groups – anthropologists and other social scientists, as well as architects, medical practitioners, people who set government policies, and multiple publics. For presenting her arguments, she set great store by the power of sound statistical analysis, necessarily grounded in carefully gathered evidence sets and critically assessed (1984). At the same time, she appreciated the importance of qualitative differences within and between cultures and the impact of social, political, and economic circumstances on both observer and observed. Kent had a pronounced positive impact in and beyond her field. An edited volume honoring her life and legacy offers a multivocal critical review of her diverse career-long contributions and continuing influence (Ashmore et al. 2006).

The research for which she is best known is ethnoarchaeology, the study of living peoples and their customs with special attention to the archaeologically observable material traces of these societies and cultures. Originally treated by most as a methodological tool to improve the reliability and richness of archaeological inference, ethnoarchaeology has become much broader as a field of intellectual and practical inquiry. In this scientific and interpretive blossoming, Kent was long a recognized leader.

Initially, her work focused on ethnoarchaeological study of spatial organization, especially in activity areas. Drawing from her research on domestic spatial arrangements in three present-day cultures of New Mexico (1984), she became a strong advocate for cross-cultural and interdisciplinary inquiries and for developing theory and methods for activity area studies (1987). These early books remain critical sources for ongoing research in ethnoarchaeology and spatial studies. By 1987, she was already conducting research in the Kalahari, among the Bajarwa ("bushmen," San), laying the interpersonal and scientific foundations for her enduring close involvement with people and cultures of southern Africa.

Kent viewed her studies of life among the Bajarwa in Botswana, Navajo, Hispanic, and Euro-American communities in the western United States, and with other peoples and cultures, as yielding insights for a broad range of significant social, medical, anthropological, and archaeological questions. These include, but are far from restricted to, the social meaning and implications of domestic spatial organization (1990); the causes and structure of sedentism and residential mobility (1989, 1996); the articulation of sedentism, diet, demography, and health (Stuart-Macadam and Kent 1992); the impetus and constraint to gender differentiation in distinct societies, especially in Africa (1998); and a wide array of topics on social justice (2002). Prominent among her enduring concerns were efforts to recognize and rectify inequalities in health, gender relations (1998), and relations between hunter-gatherer and farming societies, especially as these are now further encompassed in modern nation states (1989, 1996, 2002).

Working directly with hunter-gatherer and middle-range societies, Kent actively fomented debate on such critical issues as the autonomy and subordination of hunter-gatherers today and the diversity of customs within and between groups, now and in the past. Egalitarianism and sedentism are recurring themes in her published statements. The foregoing concerns are evident consistently in her numerous articles and book chapters and more especially in the volumes she edited, calling on colleagues with varying perspectives to engage cross-culturally the issues she posed (1989, 1996, 2002). Although not all her colleagues agreed with her every argument, Kent was undeniably a key contributor to the

research discourse and dedicated to bringing out the best models and inference from the collective research endeavor, especially for benefit of the people from whom scholars and policy makers learned.

As Rosen and colleagues note: "She staunchly believed in the equality of all peoples and in the dignity of individuals—most especially those who for decades informed her work and enriched her life.... [she contended that] anthropologists should lead the way in informing policy-makers about the plight of indigenous populations who might not be granted a voice of their own" (2006: 1). As archaeologist, ethnoarchaeologist, anthropologist, and activist, Susan Kent was an original thinker and prodigious researcher, beginning new high points in her productive career when her work came to an abrupt, unforeseen halt. Kent's final research project returned her to archaeological fieldwork about Middle-to-Late Stone Age activity areas and paleoenvironment in South Africa; a book manuscript on avoiding pitfalls of incautious statistical inference was under review; and the new book in progress at her death was a decade-long review of egalitarianism and sedentism in Botswana.

Cross-References

- ▶ Activism and Archaeology
- ▶ Archaeology and Anthropology
- ▶ Engendered Archaeologies
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Households and Domesticity: Historical Archaeology
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Southern and East African Middle Stone Age: Geography and Culture
- ▶ Spatial Analysis in Field Archaeology

References

Ashmore, W., M.-A. Dobres, S.M. Nelson, and A. Rosen, eds. 2006. *Integrating the diversity of twenty-first-century anthropology: The life and intellectual legacies of Susan Kent*, Archaeological Papers of the American Anthropological Association 16. Arlington (VA): American Anthropological Association.

Kent, S. 1984. *Analyzing activity areas: An ethnoarchaeological study of the use of space*. Albuquerque (NM): University of New Mexico Press.

Kent, S., ed. 1987. *Method and theory for activity area research: An ethnoarchaeological approach*. New York: Columbia University Press.

Kent, S., ed. 1989a. *Farmers as hunters: The implications of sedentism*. Cambridge: Cambridge University Press.

Kent, S., ed. 1990a. *Domestic architecture and the use of space: An interdisciplinary cross-cultural study*. Cambridge: Cambridge University Press.

Kent, S., ed. 1996. *Cultural diversity among twentieth-century foragers: An African perspective*. Cambridge: Cambridge University Press.

Kent, S., ed. 1998. *Gender in African archaeology*. Walnut Creek: AltaMira Press.

Kent, S., ed. 2002. *Ethnicity, hunter-gatherers, and the "other": Association or assimilation in Africa*. Washington, DC: Smithsonian Institution Press.

Stuart-Macadam, P., and S. Kent, eds. 1992. *Diet, demography, and disease: Changing perspectives on anemia*. New York: Aldine de Gruyter.

Further Reading

Kent, S. 1986. The influence of sedentism and aggregation on porotic hyperostosis and anemia: A case study. *Man* 21: 605–636.

Kent, S. 1989b. And justice for all: The development of political centralization among newly sedentary foragers. *American Anthropologist* 91: 703–712.

Kent, S. 1990b. Kalahari violence in perspective. *American Anthropologist* 92: 1015–1017.

Kent, S. 1991. Partitioning space: Cross-cultural factors influencing domestic spatial segmentation. *Environment and Behavior* 23: 438–473.

Kent, S. 1992. The current forager controversy: Real versus ideal views of hunter-gatherers. *Man* 27: 45–70.

Kent, S. 1995. Does sedentarization promote gender inequality? A case study from the Kalahari. *Journal of the Royal Anthropological Institute* 1: 513–536.

Kent, S. 1999a. The archaeological visibility of storage: Delineating storage from trash areas. *American Antiquity* 64: 79–94.

Kent, S. 1999b. Egalitarianism, equality, and equitable power. In *Manifesting power: Gender and the interpretation of power in archaeology*, ed. T.L. Sweely, 30–48. London: Routledge.

Kent, S., and D. Dunn. 1993. Etiology of hypoferremia in a recently sedentary Kalahari village. *American Journal of Tropical Medicine and Hygiene* 48: 554–567.

Kent, S., and R.B. Lee. 1992. A hematological study of Kung Kalahari foragers: An eighteen year comparison. In *Diet, demography, and disease: Changing views of anemia*, ed. P. Stuart-Macadam and S. Kent, 173–199. New York: Aldine de Gruyter.

Rosen, A., S.M. Nelson, M.-A. Dobres, and W. Ashmore. 2006. Introduction. Susan Kent: A life and a legacy. In *Integrating the diversity of twenty-first-century anthropology: The life and intellectual legacies of Susan Kent*, Archaeological Papers of the American Anthropological Association 16, ed. W. Ashmore, M.-A. Dobres, S.M. Nelson, and A. Rosen, 1–9. Arlington: American Anthropological Association (contains a complete bibliography of Susan Kent's writings).

Kewibu, Vincent

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Basic Biographical Information

Vincent was born on January 28, 1972, in Didiwa village in the Rabaraba District of Milne Bay Province, Papua New Guinea (PNG).

He is the second born son of John and Joyce Kewibu who are subsistence farmers. His paternal grandfather (Lawrence Irimoai) died during WWII while working as a carrier for the Australian forces primarily between Buna and Kokoda. He attended Korkoyabagira Community School before moving to Martyr's Memorial High School in Popondetta (Oro Province).

He finished his Grade 12 exams at Sogeri National High School in 1991 before entering undergraduate studies in Education at the University of Papua New Guinea (UPNG) in Port Moresby. After having completed his first year at UPNG, he switched across to archaeology and completed his B.A. in 1995. While studying at UPNG, he participated in research projects investigating trade and exchange at Woodlark Island with Simon Bickler and agriculture in the highlands of PNG at Kana with John Muke and Jack Golson. In 1997, he was awarded a scholarship to study archaeology at La Trobe University in Melbourne, Australia.

Major Accomplishments

During his candidature he participated in a number of research projects including the survey for European gold rush and contemporary Aboriginal archaeological sites at the Howqua Hills in Eastern Victoria with Susan Lawrence and Richard Cosgrove. He also participated in excavations at the Marki Alonia site in Cyprus run by David Frankel and Jenny Webb. He graduated from La Trobe University with a B.A. (Honors) in 1999. His Honors project focused on notions of trade and exchange as they apply to the archaeological predicates of the ethnographically recorded Hiri trade and exchange system that existed on the Papuan Coast of PNG.

Upon completion of his undergraduate studies, he returned to UPNG to take up a position as Tutor in Archaeology. During this time, he participated in survey and excavations in the Talasea region of West New Britain Province, PNG, run by Robin Torrence (Aust Mus), Peter White (U of Syd), and Jim Specht (Aust Mus). This project was broadly focused on prehistoric human adaptations to natural disasters.

In 2001, he was promoted to Lecturer in Archaeology at UPNG. At this time, his attention turned to cultural heritage management issues related to the dissemination of archaeological research into village-based rural communities. Between 2001 and 2003, he contributed to three separate workshops held across the New Guinea Islands region in Kavieng, Lorengau, and Buka coordinated by Glenn Summerhayes (Otago).

In 2004, he was awarded another scholarship, this time to attend the Australian National University (ANU) in Canberra. His research focus returned to issues of trade and exchange; however, this time, his case study was the Massim region of SE Papua (PNG). In particular, he focused on establishing an archaeological connection between the Trobriand Islands and mainland New Guinea by undertaking investigations on the D'Entrecasteaux Island Group, specifically, West Fergusson, Dobu, and SE Goodenough Islands.

Upon his return to UPNG in 2006, he has participated in various projects. These include investigations into the paleoenvironment of the

Port Moresby region with Simon Haberle (ANU). The Port Moresby Region Hilltop Survey Project based at UPNG, for example, seeks to investigate when and why populations appear to have used these apparently less hospitable locations. He also participated in the ongoing Caution Bay Project (a collaboration between Monash University and UPNG) that seeks to investigate notions of the Motuan expansion along the Papuan Coast and subsequent rise of the Hiri trade and exchange network.

Cross-References

- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ First Australians: Origins
- ▶ Mandui, Herman
- ▶ Mangi, Joseph Tumbe
- ▶ Oceania: Historical Archaeology
- ▶ Torrence, Robin
- ▶ White, J. Peter
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management

Further Reading

Kewibu, V. 2010. Archaeology and the perspective of the past in Papua New Guinea. In *Being and becoming Indigenous archaeologists*, ed. G. Nicholas, 156–166. Walnut Creek: Left Coast Press.

Khok Phanom Di, Archaeology of

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Introduction

Khok Phanom Di is a deeply stratified prehistoric mound located on the eastern margin of the Bangkok Plain in Thailand. Excavations in 1984–1985 (Higham and Thosarat 2004) in an area of 100 m ^{2} revealed a stratigraphic sequence 7 m-deep. The cultural buildup incorporated shell middens, occupation and industrial remains, and human inhumation graves. The radiocarbon determinations indicated that the site was occupied between approximately 2000 and 1500 cal. BCE (Fig. 1).

Definition

The second millennium BCE was a most significant period for Southeast Asian prehistory. In 2000 BCE, the area was occupied by hunter-gatherers whose ancestors had arrived from an African homeland at least 50,000 years ago. Over the ensuing five centuries, the indigenous hunter-gatherers interacted with intrusive groups of rice and millet farmers expanding south from the Yangtze and Yellow River valleys of China (Rispoli 2008; Zhang and Hung 2010). In the eleventh century, the now established farming communities entered the Bronze Age, and social changes took a dramatic turn (Higham et al. 2011).

Key Issues

Khok Phanom Di is a key site in illuminating what happened during the first half of this second millennium BCE. The unusual survival of organic remains, linked with the flotation to recover plant and microfauna, has led to the reconstruction of a detailed environmental history. The first occupants occupied an estuary when the sea rose significantly above its present level. The analyses of the plant remains, forams, ostracodes, and shellfish are unanimous in reconstructing a mangrove shore that persisted through the first three of seven mortuary phases (Fig. 2) that demarcate the site's cultural sequence (McKenzie 1991; Mason 1996; Thompson 1996). The tropical estuary is one of the richest habitats known in terms of bioproductivity, and during this period, the occupants of the site harvested the fish, crabs, and shellfish but showed no signs of cultivating plants or maintaining domestic animals. Although the initial occupation of Khok Phanom Di was by marine hunter-gatherers, the site almost at once

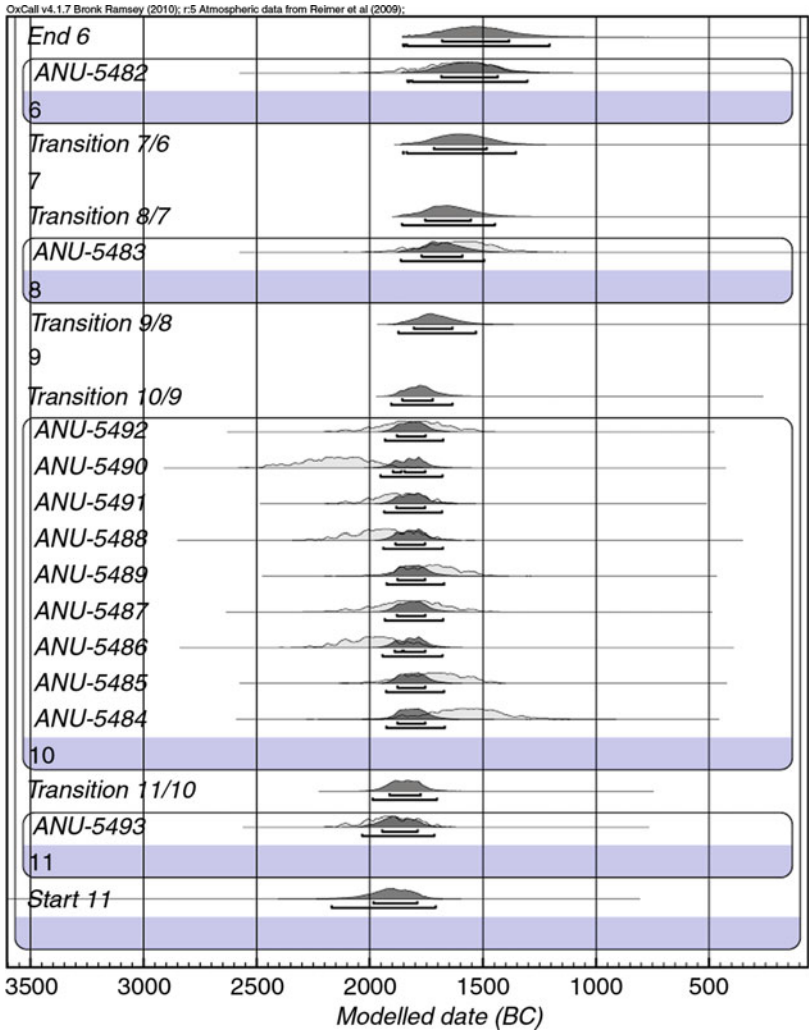

Khok Phanom Di, Archaeology of,
Fig. 1 The calibrated radiocarbon determinations and spans based on charcoal from Khok Phanom Di, following the application of an outlier model which specifies charcoal and gives an exponential tail to the data, saying effectively that it is more likely to be older than younger

attracted Neolithic farmers who brought with them their preferred pottery industry that involved complex incised and impressed designs, as well as finely polished stone adzes. The estuarine habitat, however, was not suited to rice cultivation, and although some fragments of rice were found in early contexts, it was the exotic imported pottery that were actually tempered with rice chaff. Thus, the initial farmers concentrated on hunting, gathering, and fishing at the expense of farming.

With mortuary phase 3B, there was a dramatic change in the environment, involving a sharp rise in freshwater indicators compatible with a decline in the sea level. At this juncture, we find that some women came to the site from a different habitat (Bentley et al. 2007), while rice harvesting knives and granite hoes were used. The remains of partially digested food found in the stomach area of a woman contained domestic rice chaff and freshwater fish scales and bones. This period, which probably dates to the eighteenth century BCE, clearly witnessed the establishment of rice cultivation, which persisted into mortuary phase 4. However, with mortuary phases 5–7, marine conditions returned, and no further harvesting knives or granite hoes were found.

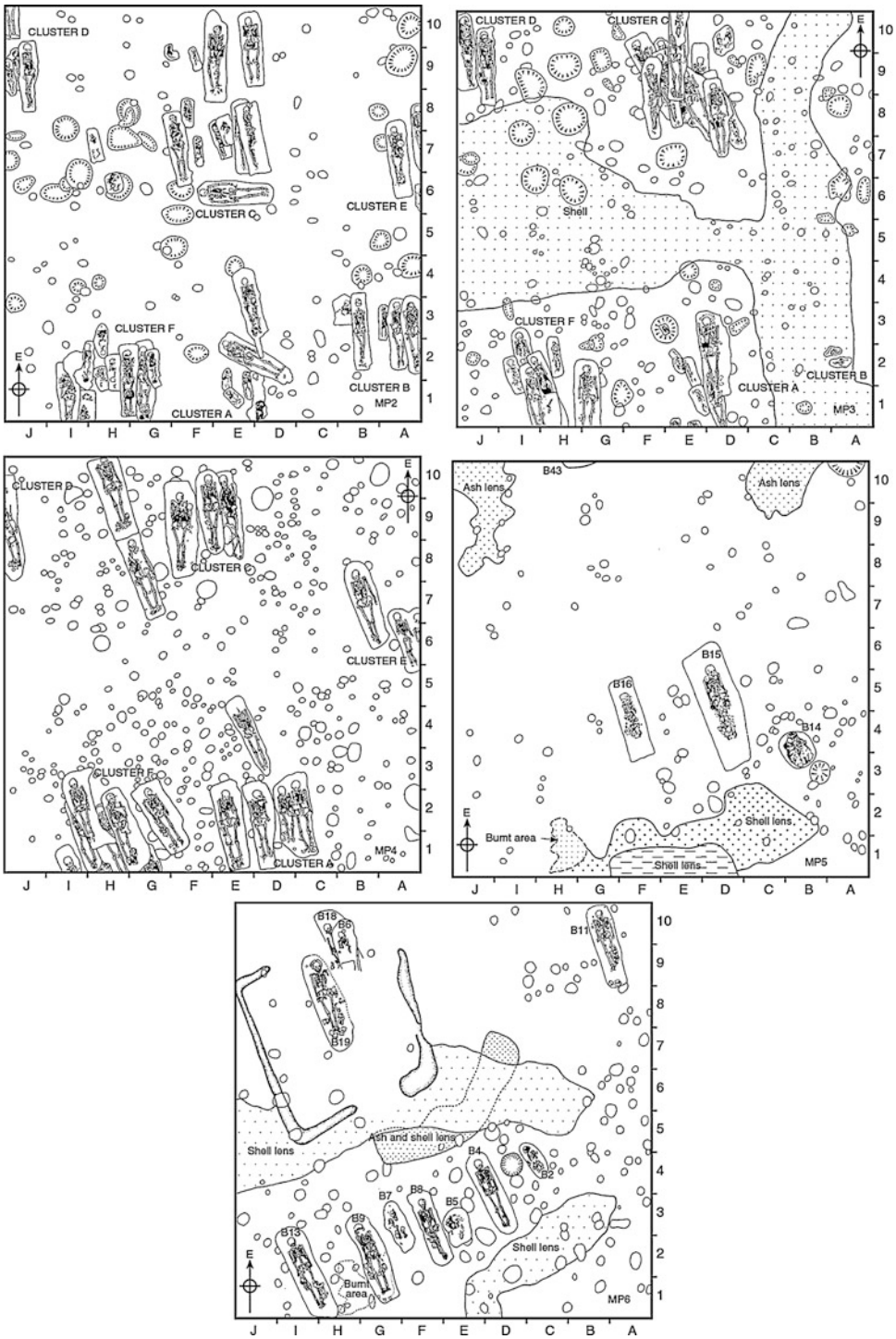

Khok Phanom Di, Archaeology of, Fig. 2 The layout of the mortuary phases 2–6 at Khok Phanom Di

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The rapid accumulation of cultural remains at the site, which included the deposition of thick shell middens, has resulted in a remarkable mortuary sequence in which the dead were interred over the ancestors. This has allowed the reconstruction of about 20 generations over a period of five centuries, leading in turn to a detailed exposure of social changes over time. The earliest occupants of Khok Phanom Di buried the dead in shallow graves, within their middens. A child was found interred in a fetal, crouched position, while two men and a woman were placed extended, on their backs with the head directed to the east, one accompanied by a handful of shell beads. Two of the adults and the child exhibited bone conditions that suggested that they suffered from a blood disorder that, while shielding the individual from malaria, caused anemia. This genetic disorder may well reflect many generations of survival in a malarial environment (Tayles 1999).

The second mortuary phase reveals a marked change in the treatment of the dead, for they were now interred in tight clusters, laid out on a checkerboard pattern, still with the head to the east. In some cases, mineralized wood under the skeleton suggested that they were placed on a bier, and to add to the increasingly complex rituals that attended funerals, bodies were sprinkled with red ocher and wrapped in a shroud of asbestos sheets. Mortuary offerings now included brilliantly polished and decorated pottery vessels. One man stood out for his lavish ornaments that included 39,000 shell beads. Cowrie shells were also found as mortuary offerings, as well as a rhinoceros tooth and bangles fashioned from fish vertebrae. The layout of the burial clusters was complemented by a thick shell midden that ran between them and even turned at right angles, as if it had accumulated against a structure of some sort. This, combined with the presence of the holes that would once have held the upright posts of a building, strongly suggests that there had once been mortuary buildings to contain the dead.

The study of the bones themselves reveals a very high proportion of newly born infants. The adults, many of which continued to exhibit symptoms of anemia, had well-developed bones with robust musculature, which Tayles (1999) has suggested might have been the result of such activities as paddling canoes, or kneading and converting clay into pottery vessels. All the skulls analyzed were closely related in form to other intrusive farmers, and beyond to the early rice cultivators of the Yangtze Valley.

The third mortuary phase continued in the established tradition of interment in tight groups lying over the ancestors, associated with finely made pottery vessels and shell jewelry. Half of all graves also continued to contain newly born infants. However, during the course of this phase, there were also a series of important changes seen in the adoption of rice cultivation. A few dog bones were also found, but no other domestic animals. The presence of the dog is significant, for it must have been brought into Southeast Asia from an exotic source, probably China.

During mortuary phase 4, the freshwater indicators continued, and there was a marked drop in infant mortality, but four of the five children encountered had suffered from severe anemia. Men were physically less robust than their predecessors, and they were increasingly distinguished from women when interred: men were found with large, fractured ornaments fashioned from turtle carapaces, whereas women were accompanied by the anvils and burnishing stones used to manufacture and decorate pottery vessels. But with the reversion to marine hunting and gathering during mortuary phase 5, there was a profound change in the rituals of death. In place of the traditional groups, we find a single grave far larger than was necessary to contain the body of the woman within it (Fig. 3). She had been interred in upper garments embellished with over 120,000 shell beads. There were shell discs on her chest, shell ear ornaments, and a shell bangle. Her body had been covered in red ocher and laid under a pyramid of clay cylinders destined to be converted into pottery vessels. Several completed vessels, each a masterpiece, were laid beside her, and by her right ankle, there was a potter's anvil and a shell containing two well-used burnishing stones. This staggering

Khok Phanom Di, Archaeology of, Fig. 3 Burial 15, of mortuary phase 5. This woman was interred with a remarkable amount of shell jewelry including over 120,000 shell beads

mortuary wealth was matched by that associated with an infant, not yet two years old at death, in an adjacent grave. Again, there were clay cylinders heaped over the body with thousands of shell beads, a shell bangle, fine pots, but also a miniature clay anvil placed beside the infant's right ankle. It is hard not to identify this woman as a master potter, particularly given the strong musculature of her wrists, and the infant as her daughter, a future potter who suffered a premature death. Her wealth might well have been due to her expertise in manufacturing vessels for exchange that brought to the site, exotic shell from a coralline environment.

Although the absolute amount of wealth fell back with the ensuing phase 6, rituals were still intense, for two women and a child were found buried within a raised mortuary chamber with clay wall foundations and floor. They wore thousands of shell beads and again, were accompanied by their clay anvils. In front of them, however, enclosed within a wooden building, was a row of graves containing men and women, as well as newly born probable twins, with much more modest offerings. A lively discussion could be generated from this information, as to whether this hunter-gatherer society was now divided into rich and poor social groups. However, after a handful of scattered burials representing mortuary phase 7, the sequence spanning perhaps as many as 20 generations came to an end.

Current Debates

The presence of the sophisticated ceramics and polished stone adzes indicate that the inhabitants of Khok Phanom Di were immigrant rice farmers who, on reaching a coastal habitat that was not conducive to cultivation, became hunter-gatherers (Bellwood and Oxenham 2008). Initially they encountered local hunter gatherers whose the material culture is a mirror image of that from an earlier coastal settlement of Nong Nor, located only 22 km to the south, and dated to the mid third millennium BCE. There are numerous similar Neolithic sites in Vietnam, and early farmers probably along the coast. It is most unlikely that this was the only migratory route south, other farmers probably following the course of the Mekong and Salween rivers.

Future Directions

No comparable site to Khok Phanom Di is known. Only a tiny fraction of the mound has been excavated. Future research should be directed to finding more settlements along the raised shoreline of the Gulf of Siam, while opening up by excavation more of Khok Phanom Di to identify its internal structure and layout.

Cross-References

▶ Complex Hunter-Gatherers
▶ Hunter-Gatherer Subsistence Variation and Intensification

References

Bellwood, P., and M. Oxenham. 2008. The expansions of farming societies and the role of the Neolithic demographic transition. In *The Neolithic demographic transition and its consequences*, ed. J.-P. Bocquet-Appel and O. Bar-Yosef, 13–34. New York/Berlin: Springer.

Bentley, A., N. Tayles, C.F.W. Higham, C. MacPherson, and T.C. Atkinson. 2007. Shifting gender relations at Khok Phanom Di, Thailand: isotopic evidence from the skeletons. *Current Anthropology* 48: 301–314.

Higham, C.F.W., T.F.G. Higham, K. Douka, R. Ciarla, A. Kijngam, and F. Rispoli. 2011. The origins of the Bronze Age of Southeast Asia. *Journal of World Prehistory* 24: 227–274.

Higham, C.F.W., and R. Thosarat, eds. 2004. *The excavation of Khok Phanom Di, Volume VII: Summary and conclusions*, Report of the Research Committee of the Society of Antiquaries of London. Vol. 72. London: The Society of Antiquaries of London.

Mason, G.M. 1996. The micromolluscs. In *The excavation of Khok Phanom Di, a prehistoric site in Central Thailand, Volume IV: Subsistence and environment: the botanical evidence. The biological remains (Part II)*, Report of the Research Committee of the Society of Antiquaries of London, ed. C.F.W. Higham and R. Thosarat, vol. LIII, 239–264. London: Society of Antiquaries of London.

McKenzie, K.G. 1991. The ostracodes and forams. In *The excavation of Khok Phanom Di, volume 2 (Part 1): The biological remains*, Research Report of the Society of Antiquaries of London, ed. C.F.W. Higham and R. Bannanurag, vol. XLVIII, 139–146. London: Society of Antiquaries of London.

Rispoli, F. 2008. The incised and impressed pottery style of mainland Southeast Asia: following the paths of Neolithization. *East & West* 57: 235–304.

Tayles, N.G. 1999. *The people*, Research Report of the Society of Antiquaries of London. Vol. LXI. London: Society of Antiquaries of London.

Thompson, G.B. 1996. The excavation of Khok Phanom Di. In *A prehistoric site in central Thailand, Volume IV (Part II): Subsistence and environment: the botanical evidence*, Report of the Research Committee of the Society of Antiquaries of London, vol. LIII. London: Society of Antiquaries of London.

Zhang, C., and H.C. Hung. 2010. The emergence of agriculture in southern China. *Antiquity* 84: 11–25.

Further Reading

Higham, C.F.W. 2014. *Early Southeast Asia: From the First Humans to the Civilization of Angkor*. Bangkok: River Books.

Higham, C.F.W., and R. Thosarat, eds. 1998. *The excavation of Nong Nor a prehistoric site in Central Thailand*, Otago University Studies in Prehistoric Anthropology. Vol. 18. Otago: University of Otago, Department of Anthropology.

Matsumura, H., and M. Oxenham. 2014. Demographic transitions and migration in prehistoric East/Southeast Asia through the lens of nonmetric dental traits. *American Journal of Physical Anthropology* 155: 45–65.

Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union

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Introduction

Kiik-Koba grotto and its finds, including Neanderthal remains, occupy a special place not only in the Crimean Paleolithic. Their significance for Paleolithic studies in East Europe and the former Soviet Union in general is impossible to exaggerate. Its excavations in the 1920s and subsequent publication had a significant influence on trends in Paleolithic archaeology in this part of the Old World for many years (see Bonch-Osmolowski 1940), due to the scientific rigor of Gleb A. Bonch-Osmolowski of then Leningrad. According to Gladilin, his scientific works "entered into the Golden Fund of Soviet and World-wide archaeological science and till now remain exemplary" (Gladilin 1985).

The grotto is situated on the right bank of the Zuya river 120 m above the river's modern water level, in a rocky massif of Jurassic limestone, within the northern spurs of Dolgorukovskaya

Yaila, part of the first ridge of the Crimean Mountains in Eastern Crimea, about 25 km east of Simferopol and 7 km south of Zuya. The grotto's niche (Fig. 1) is quite large: 11 m wide, 9 m deep, and 9 m high and faces southeast.

Key Issues/Current Debates/Future Directions/Examples

Discovery, Excavations, and Stratigraphy

The grotto was discovered by Bonch-Osmolowski in 1924 but known to local Tatars as "Kiikin-Kobasy" (Savage's Cave) or "Kiik-Koba" (Wild Cave). The latter name was chosen by Bonch-Osmolowski.

Excavations were carried out in 1924 and 1925, while 1926 was devoted to two trenches on the slope outside the drip line, where Paleolithic artifacts were rare or absent. During a test excavation (1.5 m^2, see Fig. 1 – sq. 2), two brownish-gray/almost black *hearth layers* (stratigraphic layers IV and VI or upper and lower archaeological layers, respectively) with flint artifacts and animal bones were identified within a sequence less than 1 m thick. The deposits were mainly clayey and loamy with a varying number of limestone *eboulis*. The *lowerhearth layer* was near bedrock, separated from it only by thin clayey layer VII. The dark color of *hearth layers* was due to multiple overlapping of hearths/fireplaces from different human occupation events and subsequent ablution and mixture during human activity into dark ashy depositional components. After the test sondage was dug, the site was spatially mapped using a 1×1 m^2 numerical grid system (Fig. 1) and several datum points were established for elevation measurements. Two Neanderthal burials were discovered in 1924. The 1925 excavations concentrated documentation of the stratigraphic and structural features of the two archaeological layers over as large an area as possible. In total an area of 60 m^2 was excavated. Limits of each arcaheological layer within the grotto were identified, enabling Bonch-Osmolowski to consider many aspects of human settlement. The excavations concluded with sample collection for later laboratory studies: charcoal and burnt bone fragments and a sediment column sequence (0.2 m wide and almost 1 m thick) from square 41. All lithics and animal bones, including the smallest items collected by dry sieving through 1-cm mesh screens, were transported to Leningrad. Many stratigraphic profiles and sedimentary features were drawn and photographed. Indeed, the Kiik-Koba excavation documentation is quite similar to modern standards, with description cards for nearly all excavated squares and recording of stratigraphic and planographic data. This information allowed Bonch-Osmolowski himself, many of his contemporaries, and later colleagues to propose various interpretations of different aspects of the site.

Archaeology and Chronology

Many archaeological and chronological interpretations of the archaeological layers at Kiik-Koba have been proposed over the more than 80 years since the site's first excavations.

Lower Layer

Bonch-Osmolowski (1940) considered the layer's assemblage, with almost 13,000 flints, (Fig. 2) as "an amorphous stage of Pre-Chelleen," finding that "the most similar . . . assemblages appear only far away in the West, in the lower layers . . . of La Ferrassie, La Micoque and Le Moustier," as well as the lower layer at Tabun Cave in Palestine and "numerous . . . horizons of alluvial find spots with Pre-Chelleen, Old Clactonian, 'Tayacien' and other atypical artifacts" having "the same absence of definite tool types, connected to a primitive variety of both the same massive primitive debitage and rough, denticulated edge retouch." With respect to dating, Bonch-Osmolowski first attributed the lower layer to the "Last Interglacial epoch" (1934) but then proposed a considerably older position in "an Interglacial period preceding the Maximum (Riss) Glacial time" (1940) or even the "beginning of Mindel-Riss" (1940).

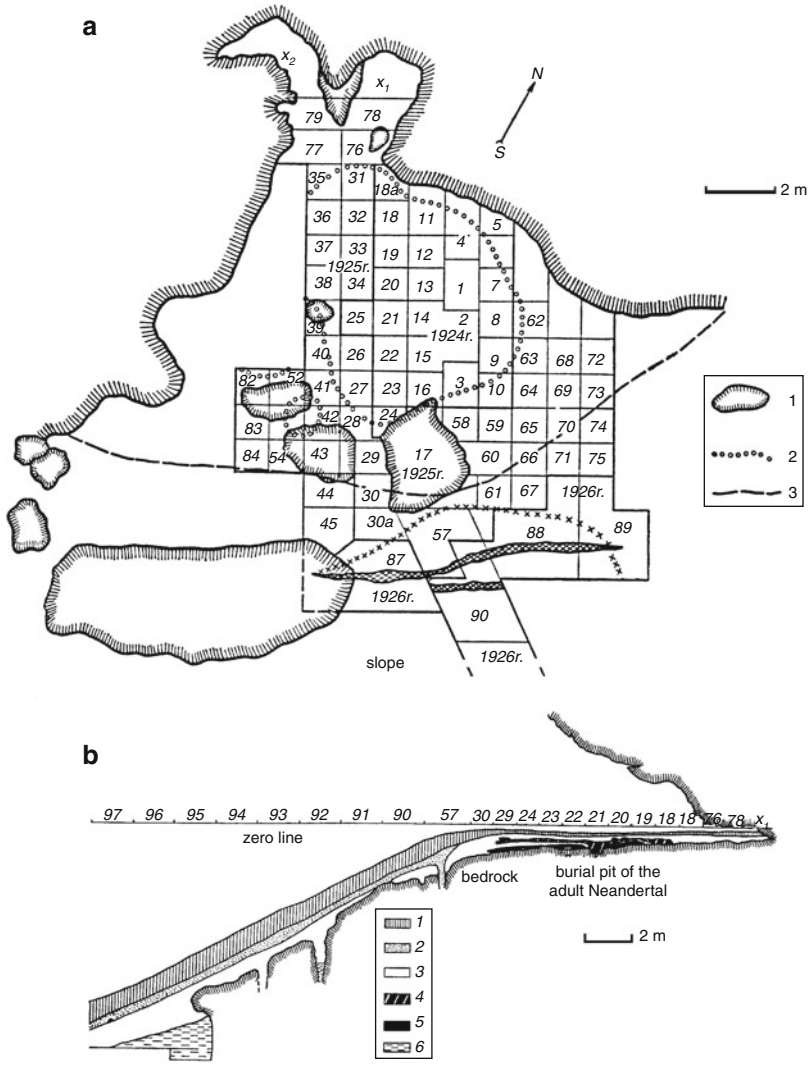

Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union, Fig. 1 Kiik-Koba grotto. Plan and stratigraphy. (**a**) Excavation plan. (Modified after Bonch-Osmolowski 1940: Fig. 10) *1* – limestone blocks in modern lithological layer I; *2* – limits of lithological layer II; *3* – the grotto's drip line. (**b**) The grotto's longitudinal stratigraphical profile from northwest to southeast through the grotto's central line. (Modified after Bonch-Osmolowski 1940: Fig. 11) *1* – Holocene lithological layer I; *2* – gray limestone loamy sand with some "Tardenoisian" finds; *3* – lithological layer III; *4* – lithological layer IV (upper hearth layer); *5* – lithological layer VI (lower hearth layer); *6* – clay lenses

At the start of the 1950s in Soviet archaeology, the layer was considered to be Late Acheulian–Early Mousterian.

Since the late 1960s, Gladilin viewed this assemblage as a sort of Tayacian-like Denticulated Micro-Mousterian (Gladilin 1966, 1976, 1985). Also, given the presence of only Upper Pleistocene animal species, the lower layer was attributed to the end of Riss/beginning of Riss-Würm or Riss-Würm/beginning of Würm in the mid-1960s. Gladilin (1976) later noted stadial period sediment and pollen for both lower and upper layers at Kiik-Koba and proposed two chronological phases for the lower layer – "either . . . Riss II or . . . an initial phase of Würm I." Since the early 1970s, the Denticulated Micro-Mousterian industrial attribution became widely accepted among Paleolithic archaeologists.

It was only in the early 2000s that another assemblage similar to the Kiik-Koba lower layer was found in the Crimea: Starosele, level 3 after the 1990s excavations (Demidenko 2003–2004). Starosele, level 3, is geochronologically attributed to the Lower Pleniglacial of the Last Glacial (MIS 4), c. 70,000 BP (Chabai 2004), which also appears comparable to the pollen data for the Kiik-Koba lower layer. Such comparisons between Kiik-Koba and Starosele have opened

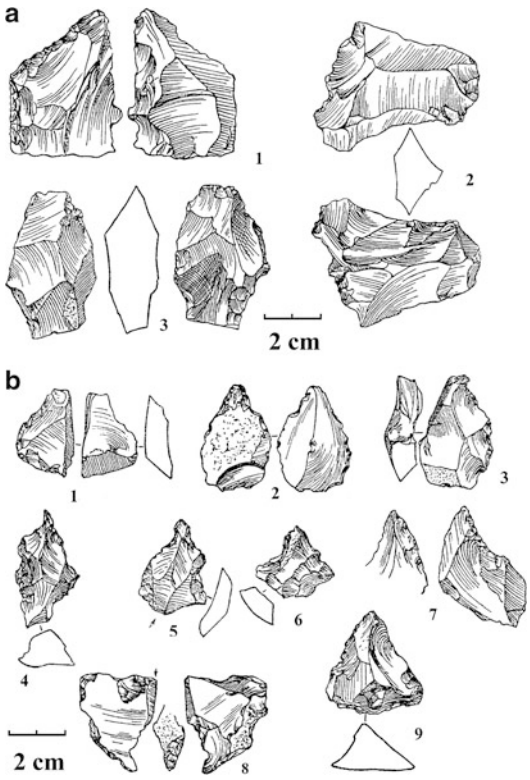

Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union, Fig. 2 Kiik-Koba, lower archaeological layer. Flint artifacts. (**a**) Cores – *1* – *2* – primitive parallel cores; *3* – discoidal core. (Modified after Bonch-Osmolowski 1940: Table I). (**b**) Tools – *1–2* – retouched pieces; *3*, *7*, *9* – denticulates with Clactonian notches; *4–6* – Tayacian points; *8* – burin + perforator. (Modified after Bonch-Osmolowski 1940: Tables I, VI – IX)

new doors for research on this Early Last Glacial Middle Paleolithic industry type in Crimea.

Upper Layer

Bonch-Osmolowski (1940) compared this assemblage, with c. 4,700 flints (Fig. 3), to the Micoquian from the eponymous French site and chronologically attributed it to the end of the Lower Paleolithic/beginning of Mousterian (Middle Paleolithic in modern terminology). He connected it to the "Late Micoquian, . . . very end of the Acheulian stage on its transition into Mousterian" (Bonch-Osmolowski 1934) or to the "end of the Acheulian or . . .to the transition from Acheulian to Mousterian" (Bonch-Osmolowski 1940). In his view, there was a group of similar Late Acheulian complexes in the Old World (e.g., La Micoque, upper layer in France, Okiennik and Nad Galonska in Poland, Koesten and Klausennische in Germany, Tabun Cave, layer E in Palestine) with "a combination of Mousterian unifacial tools and bifacial hand axes of Late Acheulian type" (Bonch-Osmolowski 1940). Similar complexes were also identified by him in the Crimea (Volchiy grotto, Chokurcha, Adzhi-Koba Cave, lower layer) and in the Northern Caucasus (Ilskaya). Initially, Bonch-Osmolowski attributed the upper layer "to the end of the Last Interglacial or to the beginning of the Last Glacial" (1934) but then considered it to be much older – to "a dividing line" between Mindel-Riss and Riss (1940).

In the 1950s, however, Soviet colleagues attributed the upper layer assemblage to the Mousterian and even to a sort of Mousterian with Acheulian Tradition.

Since the mid-1960s, based on lithological, faunal and pollen data, the geochronology of the Kiik-Koba, upper layer was discussed in terms of the Upper Pleistocene: either the beginning of Würm or end of Riss-Würm/beginning of Würm.

Gladilin first proposed a "Micro-Mousterian with Acheulian Tradition variant" attribution (Gladilin 1966) but concluded by arguing for the "Kiik-Koba culture of Mousterian period in Crimea" within the "Bifacial Micro-Mousterian variant" (Gladilin 1976, 1985). This was done on not only on the basis of clear differences between the "Bifacial Mousterian in the Russian Plain and Crimea with sites of Mousterian with Acheulian Tradition in France" but also a major culture paradigm shift in Soviet archaeology in the 1970s for understanding all Paleolithic periods (Gladilin 1976). Based on lithological data, Gladilin attributed the upper layer to a stadial period, which is "not older than the first half and not younger than the second half of Würm I," quite congruent with Bonch-Osmolowski's (1940) reconstruction of the prehistoric landscape around the site based on fauna species composition: "a dry grassy steppe with a rather harsh continental climate."

The existence of a "Kiik-Koba Mousterian culture" in Crimea was supported by Yu.G. Kolosov

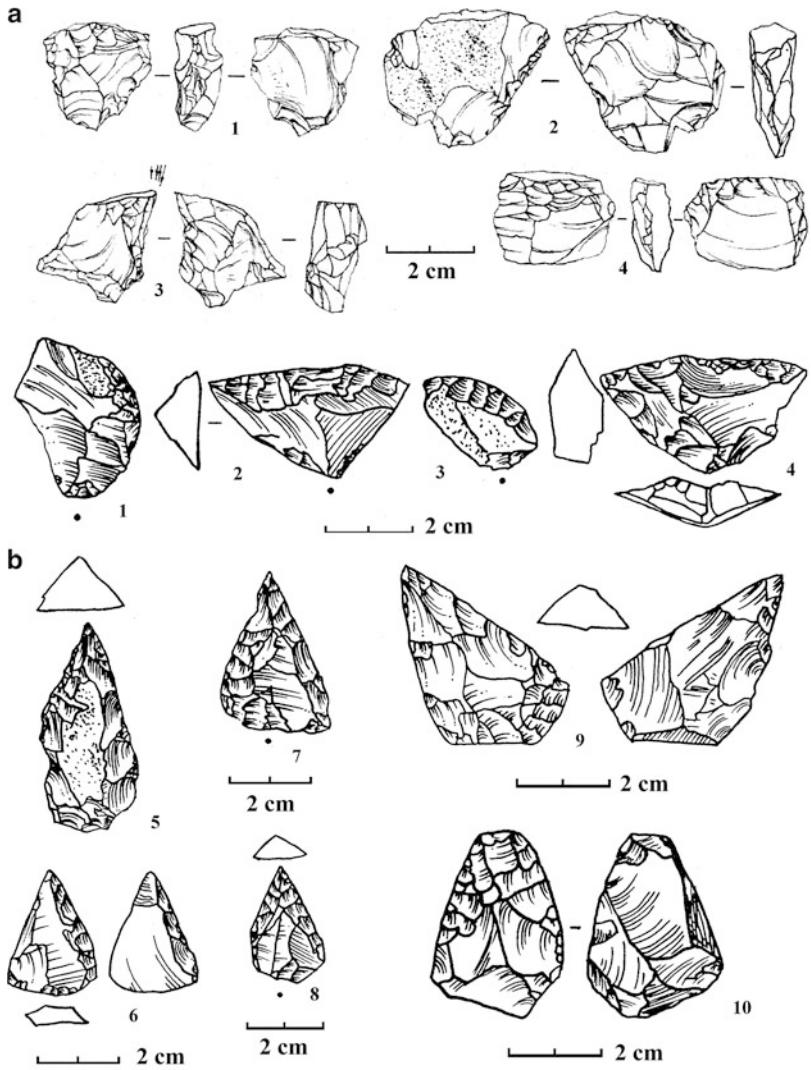

Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union, Fig. 3 Kiik-Koba, upper archaeological layer. Flint artifacts. (**a**) cores – *1* – discoidal core of triangular shape; *2* – orthogonal core of triangular shape; *3* – conventionally parallel transverse core of triangular shape/angle burin; *4* – conventionally parallel transverse core of rectangular shape. (After Demidenko et al. 2013). (**b**) Tools – *1* – simple convex sidescraper; *2* – transverse convex sidescraper; *3* – transverse convex oblique sidescraper; *4* – convergent sidescraper; *5–8* – unifacial points; *9* – bifacial point; *10* – bifacial sidescraper. (Modified after Bonch-Osmolowski 1940: Tables XI – XIV, XVI – XVII)

(see in Demidenko 2004; Demidenko et al. 2013) in the 1970s and 1980s, after his excavations at Prolom I in the 1970s and comparison of the Prolom I material with Bonch-Osmolowski's and Gladilin's data for the Kiik-Koba, upper layer assemblage. The Kiik-Koba upper layer was attributed by him to the "end of the Early Mousterian, in geological age close to the end of Early Würm I."

The cultural paradigm for the Kiik-Koba materials was developed by V.N. Stepanchuk in the 1990s and 2000s (see in Demidenko 2004; Demidenko et al. 2013). Using the paradigm's concept in which each tool was made intentionally, each Neanderthal tribe had its own industrial tradition, territory, hunting habits, etc.; he constructed the Kiik-Koba culture with a "distinct and syncretic tradition" of either a "para-Micoquian or Charentoid para-Micoquian" or an "atypical Charentian with features of a Micoquian influence" reflecting a "para-Micoquian Kiik-Koba industrial tradition" in the 1990s. Chronologically, the Kiik-Koba culture complexes were placed by him in the 1990s based on the following Last Glacial interstadial period intermittent sequence: Brörup (Kiik-Koba grotto, upper

layer) – Moershoofd (Prolom I grotto, lower layer) – Hengelo (Prolom I grotto, lower layer) – Denekamp (Buran-Kaya III grotto, level 7: 2), lasting from c. 100,000 BP to c. 30,000 BP, about 70,000 years for the Middle Paleolithic. In the 2000s, he radically changed the culture's chronology. After obtaining several new C14 dates for Kiik-Koba and Prolom I, the Kiik-Koba culture chronology became much shorter: the Stadial preceding the Denekamp interstadial and the Arcy interstadial (c. 35–28,000 BP), cultural characteristics remaining unchanged.

Since the mid-1990s a new approach for understanding Crimean Micoquian Tradition sites and find complexes, including Kiik-Koba, upper layer (Chabai et al. 2000; Chabai 2004; Demidenko 2004), was proposed. The Crimean Micoquian Tradition includes three traditionally defined industry types (Ak-Kaya, Kiik-Koba, Starosele). The industry types have the same primary flaking processes (a combination of radial, discoidal, multiplatform and parallel reductions without the Levallois method) and tool types, but tool type proportions differ by industry. Typological differences are connected to different human activities taking place at different sites, related to fauna processing and lithic reduction, as well as distances to high quality flint outcrops. As a result of the highest rates for human activities and the most distant location from flint outcrops, the Kiik-Koba lithic assemblages feature the highest indications of reduction with a medium amount of bifacial tools (c. 15%), an abundance of points among the unifacial (c. 40%) and bifacial (c. 50%) tools, a rather low frequency of simple sidescraper types (c. 20–30%) among unifacial tools, as well as mostly small (less than 5 cm long) bifacial and unifacial tools, which is why the industry was often attributed to the Micro-Mousterian.

Complex reanalyses of the 1920s Kiik-Koba, upper layer lithic assemblage and fauna were recently realized (Demidenko et al. 2013), clarifying the features of this industry type. A chronological position has been proposed in the stadial preceding the Arcy/Denekamp interstadial (Chabai et al. 2000; Chabai 2004; Demidenko 2004; Demidenko et al. 2013).

Kiik-Koba Grotto: Neanderthal Burials

The first burial of a child (Bonch-Osmolowski 1940) was found "in sq. 13, in 30 cm distance to the North from northern corner of another grave pit, which is from head of the adult human." The 5–8-month-old child "was lying in a so-called uterine position, at left side, almost at very bedrock. . . . The skeleton was positioned in a lower portion of VI layer being 15 cm thick at this place. Above, being unclearly separated from it, a so-called inter-hearth layer (Yu. D. –lithological layer V) is not present here, was distributed upper hearth layer, also c. 15 cm thick" (Fig. 4a). The child's "bone preservation is very bad." It was possible "to extract only part of skeleton bones, although most of them were in a defective condition" and "any skull and even teeth were absolutely missing." The grave pit was not traced during excavations. At the same time, the Pleistocene age was definitely established for the skeleton, taking into consideration "non disturbance of all lithological layers above the upper hearth layer and fossilization degree for the child bones." But because "in this place the inter-hearth layer was absent and the upper cultural layer was directly resting on the lower cultural layer, to define stratigraphically the belonging of the child skeleton to one or another layer was not possible." Thus, the layer to which the child burial belonged remained an open question for Bonch-Osmolowski. In the 1980s, Yu.A. Smirnov, using Bonch-Osmolowski's unpublished field notes, reconstructed the stratigraphy of sq. 13 and 14 in detail, showing that the child burial "was done during the existence of IV upper hearth layer and already after deposition of about half of its thickness" and that it was dug into the underlying lower archaeological layer – "in a clay, . . . in one of sub-levels of lithological layer VII" (Smirnov 1991). No indisputable grave goods were identified with the burial, although some unassociated lower layer flints were found when the grave was dug. The Neanderthal morphology for the child skeleton has established (Yakimov and Kharitonov 1979; Trinkaus 2008). As a result, Neanderthals appear to be the makers of the Kiik-Koba industry type of Crimean Micoquian Tradition.

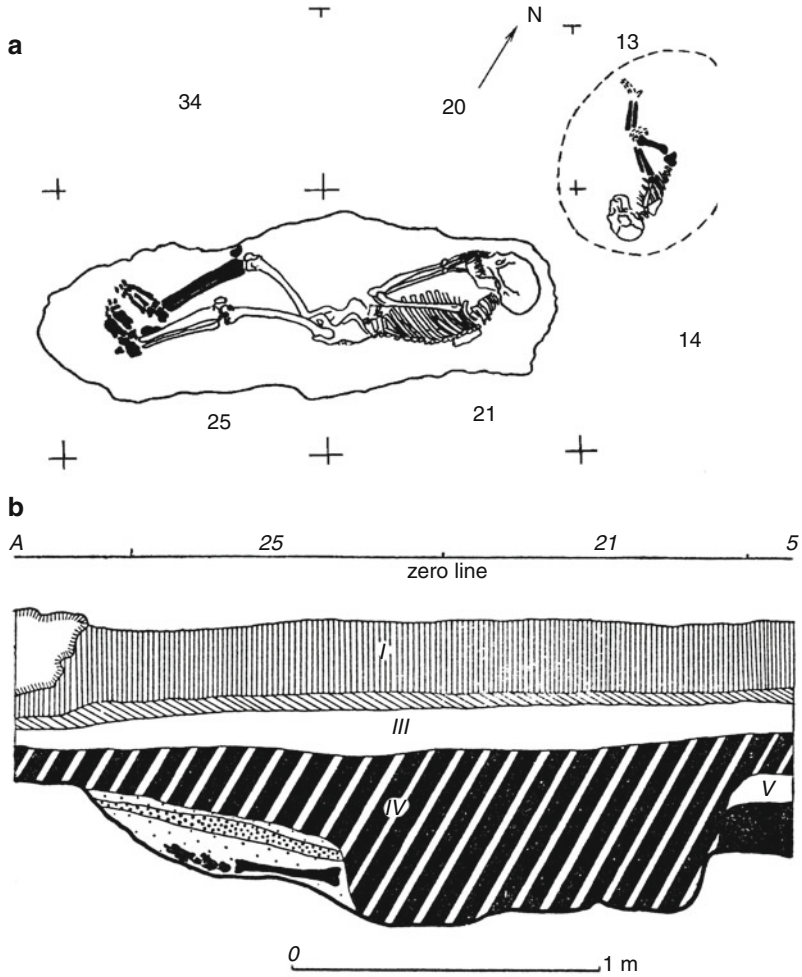

Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union, Fig. 4 Kiik-Koba. Neanderthal burials. (**a**) Human burial plans where *shaded* skeleton parts do indicate the ones found during the 1920s excavations. (Modified after Smirnov 1991: Fig. 57; Chabai 2004: Fig. V-4). (**b**) First host/economic pit in sq. 21 and 25 of upper archaeological layer that considerably destroyed the lower layer's adult human burial. (Modified after Bonch-Osmolowski 1940: Fig. 33b)

More well-known Kiik-Koba hominin remains were found in another burial, also Neanderthal, but an adult 40–45 years old (Yakimov and Kharitonov 1979). Unlike the child burial, the adult burial had clearer stratigraphic and spatial features (Bonch-Osmolowski 1940). Although the grave pit was damaged for c. two thirds of its area by a host/economic pit, it had clear ovoid configuration with northeastern–southwestern orientation and size: 2.10 m long, 0.80 m wide, and 0.45 m deep (Fig. 4a, b). The pit was not only stratigraphically related to lower archaeological layer but it was also "cut into the grotto's bedrock," where it was "partially deposited both in a solid limestone and clay pockets." Taking the bone leg position, the human body was placed into the grave "on the right side with slightly bended legs" and by its head to northwest (Fig. 4a). The main problem was the burial's stratigraphy relation to either upper or lower archaeological layer's human occupation. The difficulty was caused by the pit, destroyed much of the grave. Initially, Bonch-Osmolowski (1940) was sure that the burial was made by lower layer humans – "the seemingly clear covering by lower hearth layer of human bones in not disturbed grave pit's part, that has been authentically stated by photo pictures, alongside with common find characteristics, did not leave no doubts that the burial was realized by lower hearth layer people" (see Fig. 4b). But then in the same 1940 book, Bonch-Osmolowski changed

his opinion connecting the adult burial to upper layer humans. "Indeed, it very hardly agrees with a common conception on a historical development of Old Paleolithic Man in combination with such the primitive material culture and such the perfect burial type. The burial seems to be more appropriate for upper hearth layer humans." Moreover, in doing so, Bonch-Osmolowski (1941) also suggested that Kiik-Koba child burial also belongs to upper layer because of "general considerations on a simultaneous burial probability for mother and child" close one to another at Kiik-Koba grotto. All these Bonch-Osmolowski's contradictory notes and hypotheses were in details analyzed by V.N. Gladilin. He certainly concluded that the initial Bonch-Osmolowski's opinion was correct and the adult burial belongs to human occupation of lower layer (Gladilin 1979).

So, now it is almost universally accepted among the ex-USSR archaeologists that the adult burial is related to lower layer and the child burial is associated with upper archaeological layer at Kiik-Koba grotto. And again, all the 1970s and 1980s new analyses on the Kiik-Koba human burials were only possible thanks to the detailed published and unpublished Bonch-Osmolowski's field observations.

References

Bonch-Osmolowski, G.A. 1934. The results of the investigations in the Crimean Paleolithic. *The Proceedings of the Second International Congress of the Association for the Quaternary Investigations in Europe* 5: 114–83 (in Russian).

Bonch-Osmolowski, G.A. 1940. *Paleolithic of Crimea, Part 1: Grotto Kiik-Koba*. Moscow (in Russian).

Bonch-Osmolowski, G.A. 1941. *Paleolithic of Crimea, Part 2:The hand of the fossil man from Kiik-Koba Grotto*. Moscow (in Russian).

Chabai, V.P. 2004. *The Middle Paleolithic of Crimea: Stratigraphy, chronology, typological variability & Eastern European context*. Simferopol: Shlyakh (in Russian).

Chabai, V.P., Y.E. Demidenko & A.I. Yevtushenko. 2000. Paleolithic of the Crimea: methods of investigations andconceptual approaches. Simferopol, Kiev (in Russian).

Demidenko, Y.E. 2003–2004. Problems of epochal and industrial attribution for Kiik-Koba grotto, lower layer type complexes in the Crimea. *Stratum Plus* 1: 271–300 (in Russian).

Demidenko, Y.E., ed. 2004. *Buran-Kaya III rock-shelter, layer B – The etalonfind complex for Kiik-Kobatype industry of Crimean Micoquian tradition. Complex analysisof flint artifacts*. Kiev, Simferopol: Shlyakh (in Russian).

Demidenko, Y.E., J. Richter, and T. Uthmeier, eds. 2013. *Micoquian of Kiik-Koba grotto, lithological layer IV (Crimea): Complex re-analyses of 1920s excavation materials*. Köln: Institut für Ur- und Frühgeschichte der Universität zu Köln.

Gladilin, V.N. 1966. The distinct types of stone industries in the Mousterian of the Russian Plain and Crimea and their place in the early Paleolithic of the USSR. *Proceedings of the VIIth International Congress of Proto- and Prehistorians* 14–18. Moscow (in Russian).

Gladilin, V.N. 1976. *The problems of the early Paleolithic of eastern Europe*. Kiev: Naukova Dumka (in Russian).

Gladilin, V.N. 1979. On a cultural-chronological attribution of Neanderthal burials at Kiik-Koba grotto. In *The investigation of Paleolithicin the Crimea*, ed. Y.G. Kolosov, 67–76. Kiev: Naukova Dumka (in Russian).

Gladilin, V.N. 1985. The early Paleolithic. *Archeology of the Ukrainian SSR* 1: 12–53 (in Russian).

Smirnov, Y.A. 1991. *Mousterian burials in Eurasia*. Moscow: Nauka (in Russian).

Trinkaus, E. 2008. Kiik-Koba 2 and Neanderthal axillary border ontogeny. *The Anthropological Society of Nippon* 1–6.

Yakimov, V.P., and V.M. Kharitonov. 1979. Towards Crimean Neanderthals problem. In *The investigation of Paleolithicin the Crimea*, ed. Y.G. Kolosov, 56–66. Kiev: Naukova Dumka (in Russian).

K

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Basic Biographical Information

Nam C. Kim received a Ph.D. in Anthropology from the University of Illinois at Chicago, a M.A. in Political Science from New York University, and a B.A. in International Relations from the University of Pennsylvania. Prior to a career in anthropology, he worked in the private and non-profit sectors. He is an anthropological archaeologist in the Department of Anthropology at the University of Wisconsin-Madison.

Major Accomplishments

Much of Dr. Kim's work has been dedicated to ancient state formation, social complexity, and various factors for social change including warfare, trade, and various leadership strategies. He has performed fieldwork in Belgium (Neolithic village fortifications of the Linearbandkeramik culture), the southeastern USA (historic Native American Creek site), and Mesoamerica (postclassic and historic Mayan sites).

Most recently, his research has been geographically focused on East and Southeast Asia, specifically Vietnam, and he has been conducting investigations at the site of Co Loa in the Red River Delta of northern Vietnam. Kim was the first foreigner allowed to collaborate on excavations at the site, codirecting investigations with colleagues at the Vietnam Institute of Archaeology of the Vietnam Academy of Social Sciences. Nam Kim is an honorary member of the Vietnam Institute of Archaeology.

The Co Loa Middle Wall and Ditch Project (2007–2008) was the first full-scale, systematic investigation of the site's monumental system of earthen enclosures. The collaborative research at Co Loa is ongoing and aims to augment an overall understanding of the site's emergence as an early urban center and political capital for proto-Vietnamese civilization during the Iron Age. The research has been funded by various institutions and organizations, including The Henry Luce Foundation, the American Council of Learned Societies, the American Philosophical Society, the National Science Foundation, the George Franklin Dales Foundation, the University of Illinois at Chicago, and the University of Wisconsin-Madison.

The investigations at Co Loa have provided new data that Kim has presented at a variety of conferences and invited lectures in the USA and Asia, including the Society for American Archaeology, the Association for Asian Studies, the Indo-Pacific Prehistory Association, and the Archaeological Institute of America. Research findings have also been disseminated through journals such as *Antiquity*, *Journal of Archaeological Research*, and *Khao Co Hoc*. The research will also be featured in a book currently being written by Kim on the origins of the ancient state in Vietnam. Kim is also working with colleagues in Vietnam's Conservation Center for the Co Loa and Hanoi Citadels (also known as the Hanoi Ancient Wall-Co Loa Vestiges Preservation Center) in efforts related to cultural heritage management. Objectives include obtaining UNESCO World Heritage Site status for Co Loa, as well as the promotion of education, outreach, and global understanding regarding the site's history and cultural significance for Vietnam.

Cross-References

- ► Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
- ► Vietnam's Archaeological World Heritage Sites
- ► World Heritage List: Criteria, Inscription, and Representation
- ► World Heritage Objectives and Outcomes

Further Reading

Kim, N.C., and L. Keeley. 2008. Social violence and war. In *Encyclopedia of archaeology*, ed. D. Pearsall. San Diego: Elsevier Academic Press.

Kim, N.C., and C. Kusimba. 2008. Pathways to social complexity and state formation in the southern Zambezian region. *African Archaeological Review* 25: 131–152.

Kim, N.C., V.T. Lai, and H.H. Trinh. 2010. Co Loa: An investigation of Vietnam's ancient capital. *Antiquity* 84: 1011–1027.

Schweyer, A.-V. 2011. *Ancient Vietnam. History, art and archaeology*. Bangkok: River Books.

Kimberley Rock Art

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Introduction

This chapter summarizes the current state of rock art research in the Kimberley, Western Australia,

which is a globally significant corpus of tens of thousands of rock art, archaeological, ethnographic, and contemporary sites. We present a history of rock art research in the region, discuss linguistic and cultural diversity, across the Kimberley, and outline the development of rock art stylistic sequences and spatial analysis. A new generation of scientific dating of the art and associated excavations is also harmonized. Aboriginal ontologies and recorded ethnography associated with the rock art are highlighted. We also present land tenure land management under native title and affiliated ranger groups as heritage management challenges and opportunities.

Definition

The Kimberley is a biogeographical and cultural landscape covering 423,517 km^2 of northwest Australia. The landscape is marked by massive waterways and river systems, which once continued onto the now-submerged Sahul Shelf, meaning the Kimberley was almost twice its current size during the Last Glacial Maximum 26–19 thousand years ago. This large geographical area has been continuously occupied by people for over 50,000 years by multiple cultural and linguistic groups (Wood et al. 2016; Veth et al. 2019). The Kimberley is part of the non-Pama-Nyungan language bloc. These ancient and distinctive languages cover the Kimberley, Arnhem Land, a small area of the Gulf of Carpentaria and Cape York, and Tasmania (McConvell 1996). There are four major language groups across the Kimberley with between two and nine dialects (AIATSIS 2019):

1. Worrorran: Worara, Wunambal, Gamberre, Miwa, Kwini, Ngarinyin, and Worla
2. Jarragan: Yiiji, Kija, Kadjerrong, and Miriwoong
3. Bunaban: Bunaba, and Gooniyandi
4. Nyul Nyulan: Bardi, Yawaru, Jabirr, Nimanburu, Warwa, Nyikina, Ungumi, Umida, and Unggarangi

All Kimberley rock art was made by people ancestral to these groups. Kimberley rock art and iconography are well-known, particularly Gwion Gwion (formerly "Bradshaw") and Wanjina (also "Wandjina") "styles" or "traditions" that were produced and maintained by Aboriginal people. It is thus both creation and subsequent maintenance that are key to understanding this rock art. For example, Layton's (1992) synthesis opens with Love's image of the Wandjina Namarali (1930), which was repainted between January and March 1929 by Indamoia and Wallamurra and was later reproduced for use by Donny Woolagoodja in the 2000 Sydney Olympic Games Opening Ceremony (Fig. 1).

Throughout this entry, we use Wanjina and Gwion Gwion rock art traditions as leitmotifs that help us better understand the Kimberley's many other forms of rock art.

Historical Background

The Kimberley was never an isolated human landscape, with considerable trade, movement, and contact with the outside world for at least the last few hundred years. Prior to European invasion/colonization, Macassans from Island South East Asia visited the region to harvest *bêche-de mer* (trepang or sea cucumber) along the Kimberley coast for "at least two hundred years" (1803 encounter recorded: Crawford 2001:70, 3) and likely much longer. Crawford (2001) recorded 16 Macassan sites along the Kimberley coast and excavated a selection of these in the 1960s with Aboriginal Traditional Owners. New Macassan sites have just been identified and excavated in 2019 on Sir Graham Moore Island, north of Kalumburu (Paterson, personal communication)

European incursions that document rock art include George Grey in 1837–1838, Alexander Forrest in 1879, and Joseph Bradshaw in 1891. These travelers' inability to reconcile "complex" rock art with people they thought of as "primitive" generated an enduring and mendacious myth of non-Aboriginal authorship of the rock art. For example, Grey writes: "It is certain that they may have been very ancient, ... but, whatever may have been the age of these paintings, it is scarcely probable that they could have been executed by a self-taught savage. Their origin

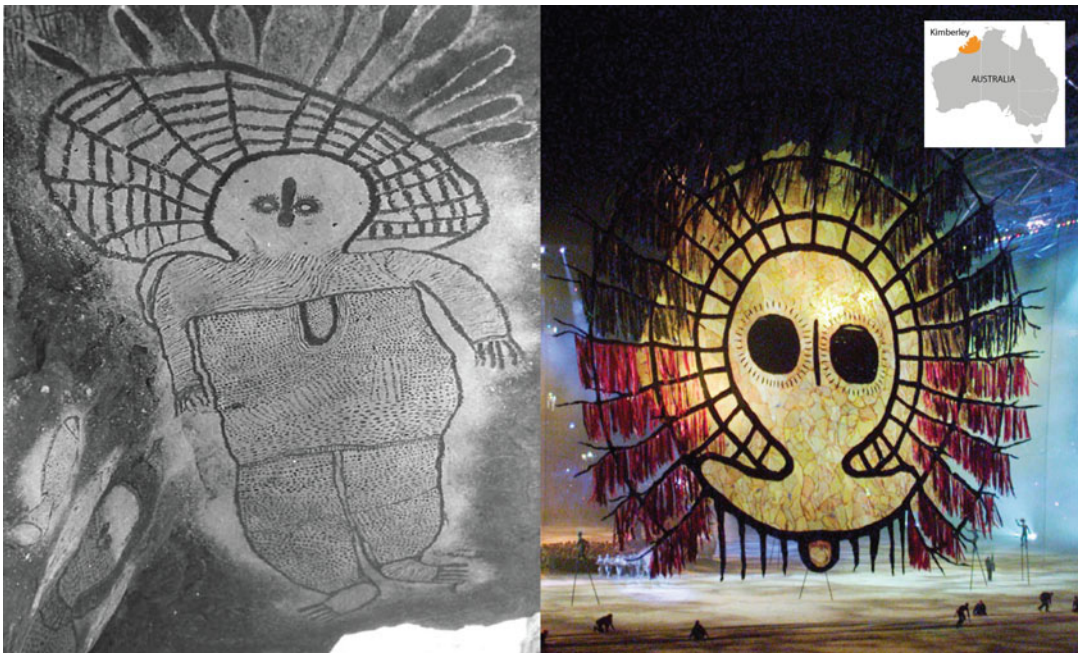

Kimberley Rock Art, Fig. 1 Namarali Wandjina: 1930 repainting (left: Love (1930), in Layton (1992)) and 2000 Olympic Games use (right: BBC Mundo, bbc.co.uk); with inset map showing the Kimberley's location

therefore I think must still be open to conjecture" (1841: 263). Later, Bradshaw continues this trope by stating "Indeed, looking at some of the groups [of Gwion paintings], one might almost think himself viewing the painted walls of an ancient Egyptian temple" (1892: 100). This pathology of British colonialism is entirely without factual basis and has been successfully challenged by both Aboriginal and non-Aboriginal scholars (e.g., Mangolomara et al. 2019; McNiven 2011).

This "dissociative archaeology" (McNiven 2011) occurred in tandem with dispossession of land for pastoralism from the 1880s as a result of Forrest's expedition. Aboriginal resistance and remoteness combined to make pastoralism largely unviable until the mid-twentieth century (Crawford 2001). Christian missions across the Kimberley, at Kunmunya, Munja, and Wotjalum in the West, and Kalumburu and Pago in the East (Crawford 2001) brought further disruption. However, Europeans also recorded valuable ethnography, including the creation and repainting of rock art from at least 1929 until today (cf. Layton 1992; Love 1930).

Key Issues and Current Debates

We identify four key issues in Kimberley rock art:

1. Time – Relative sequencing and association, as well as direct dating of rock art traditions
2. Space – Spatial distribution of rock art traditions and their relationship to current linguistic and cultural territories
3. Meaning – using both Aboriginal ontologies and archaeological/anthropological research
4. Heritage – management of rock art and related heritage now and into the future

Time: Relative Sequencing and Association

While Aboriginal people know rock art to be produced at both many and all times, "western" science prefers discrete dates and ranges. It has been proposed that Kimberley rock art dates to the Pleistocene, even as far back as initial colonization ~50,000 years ago (Veth et al. 2019). But in the absence of direct dating of rock art for most of the twentieth century, researchers relied on superimpositioning, the construction of "stylistic

sequences" and associating painted motifs with those found in excavations or known ethnographically. We explore these before presenting current and new direct dating evidence.

Two key stylistic chronologies were published almost simultaneously by David Welch (1993) and Grahame Walsh (1994). Welch classified and sequenced by technique, namely, cupules, engravings (petroglyphs), and paintings (pictographs), and by iconographic detail, such as, anthropomorphic body position (i.e., bent knee or straight parts) and attributes (e.g., tassels, material culture), without applying consistent variables between his five "periods" (Archaic, Tasseled, Bent Knee, Straight Parts, Wandjina, Contact: Fig. 2). Walsh's (1994) chronology included three Epochs (Archaic, Erudite, and Aborigine), each with two Periods, namely, "Pecked Cupule"; "Irregular Infill Animal Period"; "Bradshaw (Agnes Schulz of the 1938–1939 Frobenius Expedition first labeled Gwion Gwion as 'Bradshaws' in reference to Joseph Bradshaw publication on the same (1956: 45))"; "Clothes Peg"; "Clawed Hand"; and "Wanjina," some of which has further group subdivisions, each with subdivisions (Fig. 3).

Walsh's (1994) tripartite temporal led him to hypothesize discontinuity between Epochs, which at that point matched apparent site abandonments recorded archaeologically (e.g., O'Connor et al. 1999) – but which recent micromorphological research has challenged, suggesting continuous human occupation of the Kimberley (Travers and Ross 2016) albeit with fluctuating intensity. He linked the two most recent Periods – Clawed Hand and Wanjina – with living Aboriginal culture, but separate from the earlier "Erudite" styles.

In 1999, Walsh and Mike Morwood co-published the known occupation sequences from stratified rock-shelter excavations across the Kimberley – covering the last 42,000 years. This data was combined with observed changes in the art sequence, particularly the superimposition of spears, spear-throwers, and other armatures. For example, early "Tassel Bradshaw" (Gwion

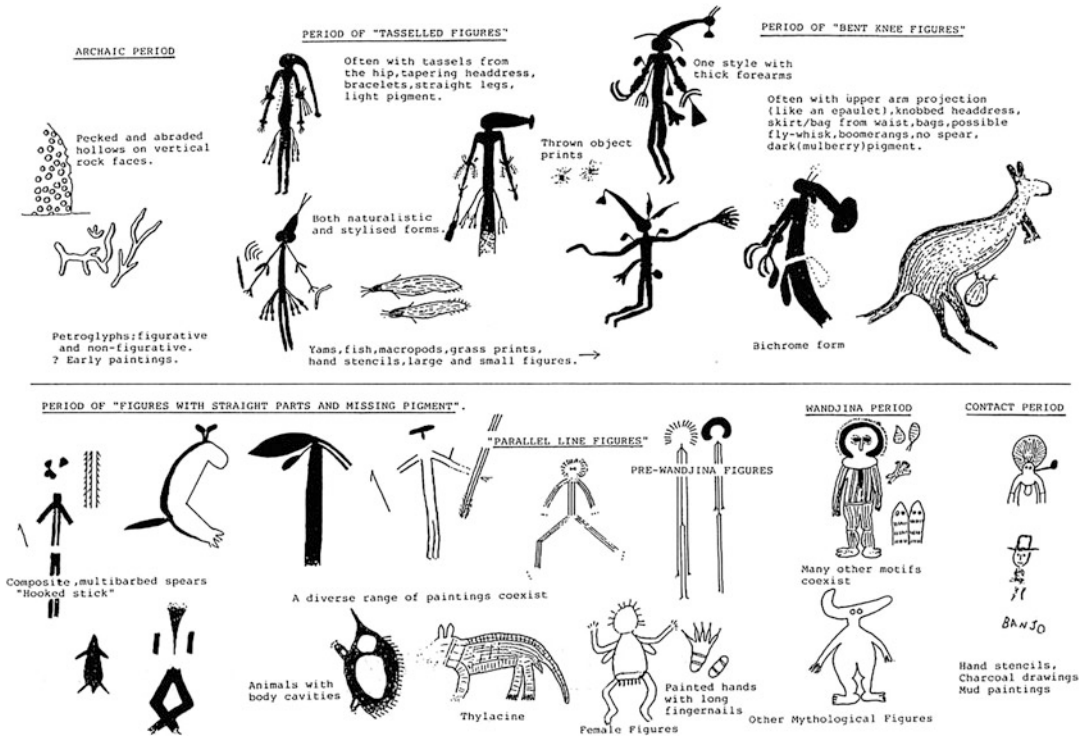

Kimberley Rock Art, Fig. 2 Welch (1993) stylistic sequence

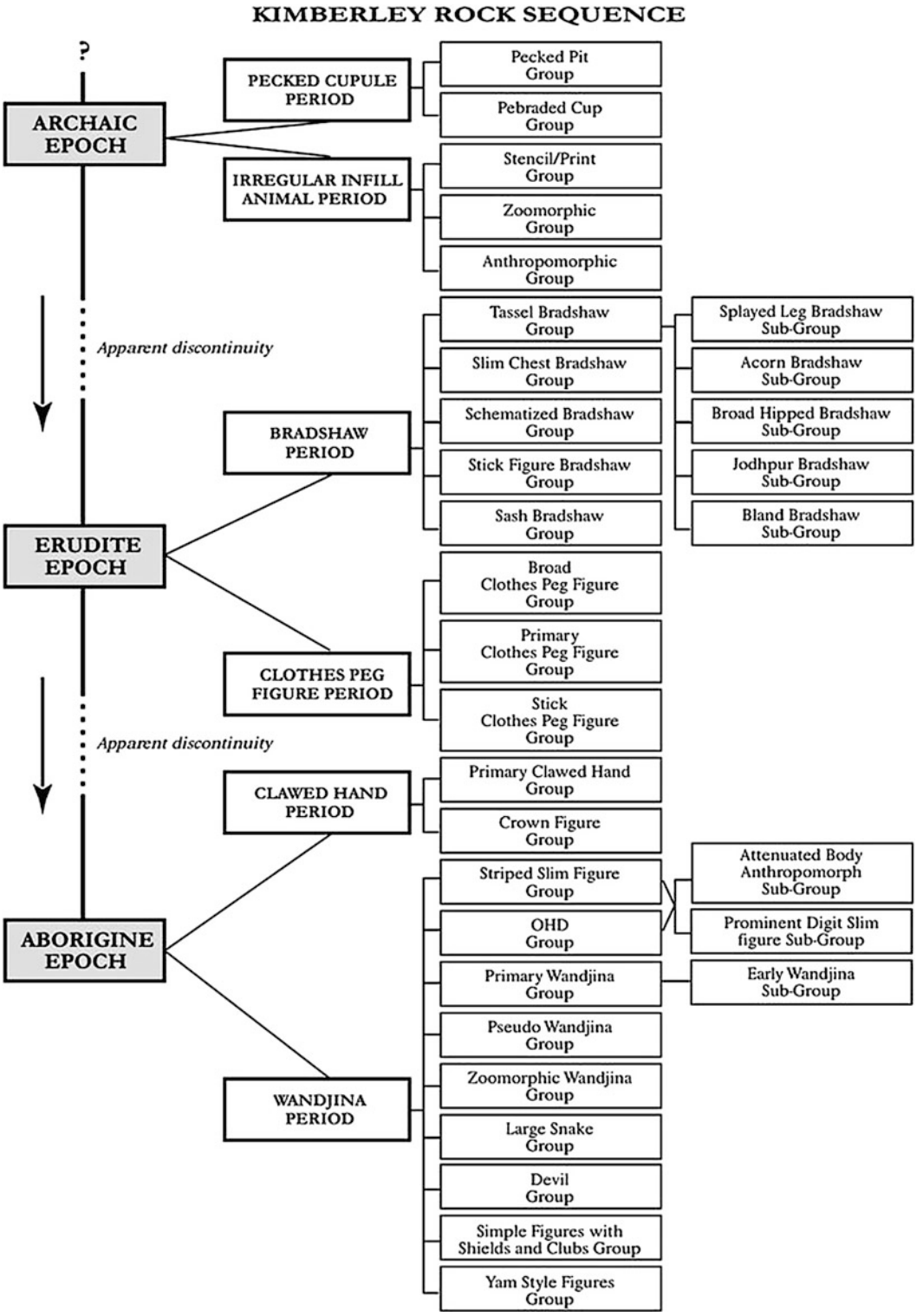

Kimberley Rock Art, Fig. 3 Walsh (1994) stylistic sequence

Gwion) has short spears depicted with an acute barb at one end, and multiple barbs at the other, with no spear-throwers depicted. In the later "Clothes Peg" (Static Polychrome) tradition, new types of spears are depicted, and spear-throwers are present. This builds on Lewis's (1988) key research across Arnhem Land and the Kimberley on style and material culture, confirming that there are patterned changes in technology across identified styles. At about the same time, excavation-centric research in the southern Kimberley produced the oldest known age for pigment applied to rock in the form of a hematite-covered limestone slab excavated at Carpenters Gap. This slab was found in layers dating to 42,700 BP (O'Connor and Fankhauser 2001).

Time: Scientific Dating

Fortunately, while direct dates are technically challenging due to paucity of dateable material within most pigments, (with the exception of charcoal used in, e.g., Wanjina eyes, as well as rare beeswax art (Morwood et al. 2010)), technology has advanced. Over two dozen published, direct dates are now available with dozens more soon to be published (Table 1). At least seven different techniques have been used to date material above or below painted motifs to determine maximum and minimum ages. These include conventional and AMS radiocarbon as well as OSL dating of mud-dauber wasp nests and AMS radiocarbon dating of beeswax. Uranium-thorium dating of mineral crusts and geomicrobiology are also being trialed, while cosmogenic dating of rock slabs is looking more broadly at when rock-shelters formed.

Table 1 provides a summary of dated Kimberley rock art from published sources. Wanjina and Gwion Gwion traditions have, once again, enjoyed particular attention with the former dated to between 5100 ± 240 BP and the present and the latter controversially dated to older than 17,500 ± 1800 (Roberts et al. 1997; Table 1; see Aubert 2012). Ross et al.'s (2016) multi-year research in the Northwest Kimberley used multiple dating techniques, with successful OSL and AMS radiocarbon on fossilized mud wasp nests, returning dates from the terminal Pleistocene into the Holocene. This program questioned the sequential, as opposed to overlapping, nature of styles in Kimberley rock art and highlighted the need for a larger dating program.

Current research is working to refine dates across all traditions, with upcoming publications for Gwion art, to understand the relationship of Gwion Gwion to the inferred older Irregular Infill Animal tradition. Recent presentations of primary data on AMS dates from bracketing mud wasp nests (Finch et al. 2019) suggest that at least some of the complex Gwion Gwion style art is of terminal Pleistocene age (c. 14–12 ka). Understanding temporal contexts helps us to make spatial sense of Kimberley rock art traditions.

Space: Distribution of Rock Art Traditions and People

When these different rock art traditions are mapped onto the extant Kimberley landscape today, interesting trends emerge. Figure 4 shows the spatial distributions of three key traditions: Gwion Gwion, Static Polychrome (Clothes Peg figure), and Wanjina. While there is significant overlap of all three traditions, Gwion Gwion motifs have the most restricted distribution – albeit with an eastern outlier in the Keep River region of the Northern Territory, where Static Polychrome figures are more dominant. Wanjinas have the most southern distribution and may connect to desert areas.

Veth et al. (2018) revised the temporal and spatial sequence, matching the six macro-styles (Pecked Cupule; Irregular Infill Animal, Gwion Gwion, Static Polychrome [Clothes Peg], Painted Hand, and Wanjina) with archaeological and environmental evidence across a 50,000 year chronology (Fig. 5). This work used 3750 rock art sites across the Kimberley – with the greatest concentration in the central and southwestern Kimberley as recorded by Walsh, and built upon by current research projects and housed in the Takarakka and *Kimberley Visions* project databases. This work also tracked the prevalence of plant motifs, often identifiable to species, across traditions (Veth et al. 2018). Plant motifs include grasses, trees, tubers, human-plant conflations, and plant-based material

Kimberley Rock Art, Table 1 Published Kimberley rock art dates

Style	Date (CalBP)	Method	Sample	Material	Description	Reference
Gwion Gwion	17,500 ± 1800	OSL	KERC5	Quartz grain	Adjacent to Gwion motif (KERC4)	Roberts et al. (1997)
Gwion Gwion	16,400 ± 1800	OSL	KERC4	Quartz grain	Directly over Gwion motif	Roberts et al. (1997)
Wanjina	5100 ± 240	OSL	LM-13	Quartz grain	Macropod	Ross et al. (2016)
Gwion Gwion	3880 ± 110	AMS	CB3	Mineral crust	"Cane Bradshaw"	Watchman et al. (1997)
Wanjina	3780 ± 60	AMS	OZC434	Beeswax	12 × 10 cm Wanjina head	Watchman et al. (1997)
Gwion Gwion (Mambi)	3280 ± 190	OSL	UP1A	Quartz grain	Cage shape over Gwion Gwion	Ross et al. (2016)
IIAP	3140 ± 350	AMS	CB3	Mineral crust	Zoomorph	Watchman et al. (1997)
Wanjina	1630 ± 110	OSL	CA-7	Quartz grain	Argula	Ross et al. (2016)
Unknown	1600 ± 100	OSL	CA-8	Quartz grain	Yam-like shape	Ross et al. (2016)
Gwion	1490 ± 50; 1490 ± 290; 1430 ± 180	Radiocarbon	KF1	Mineral crust	Tassel; minimum; minimum; maximum dates	Watchman et al. (1997)
Wanjina	1440 ± 120	Radiocarbon	OZC107	Beeswax	Stick figure below repainted Wanjina head	Watchman et al. (1997)
Wanjina	1420 ± 240	OSL	BRY-6	Quartz grain	Fish	Ross et al. (2016)
Warrarrajai (Static Polychrome) Gwion	1290 ± 30	AMS	LROIC-3	Charcoal	Anthropomorph	Ross et al. (2016)
Warrarrajai (Static Polychrome) Gwion	1285 ± 30	AMS	LROIC-2	Charcoal	Anthropomorph	Ross et al. (2016)
Wanjina	1240 ± 80	Radiocarbon	OZC118	Shell	Ochre stained baler shell from Wanjina site	Watchman et al. (1997)
Wanjina Period Argula	1230 ± 35	AMS	LR03S-01	Charcoal	Anthropomorph	Ross et al. (2016)
Wanjina	1210 ± 140	Radiocarbon	OZD081	Charcoal	Eye of large Wanjina	Watchman et al. (1997)
Wanjina	1200 ± 90	Radiocarbon	OZC115	Charcoal	Tail of Wanjina-style flying fox under Wanjina head	Watchman et al. (1997)

(continued)

Kimberley Rock Art, Table 1 (continued)

Style	Date (CalBP)	Method	Sample	Material	Description	Reference
Wanjina	1170 ± 60	Radiocarbon	OZC111	Beeswax	Argula under a "sea" Wanjina and rock cod	Watchman et al. (1997)
Wanjina	1160 ± 40	Radiocarbon	OZD076	Beeswax	Anthropomorph under Wanjina and macropod	Watchman et al. (1997)
Warrarrajai (Static Polychrome) Gwion	930 ± 50	OSL	JS-10	Quartz grain	Anthropomorph	Ross et al. (2016)
Wanjina	700 ± 40	OSL	BRY-3	Quartz grain	Anthropomorph	Ross et al. (2016)
Unknown	650 ± 120	OSL	JS-11	Quartz grain	Star-yam	Ross et al. (2016)
Wanjina	630 ± 125	Radiocarbon	OZC113	Beeswax	Anthropomorph under small Wanjina	Watchman et al. (1997)
Wanjina	610 ± 40	Radiocarbon	OZD075	Beeswax	90 x 138 line under Wanjina	Watchman et al. (1997)
Transitionary	530 ± 80	OSL	CA-9	Quartz grain	Between Mambi (Gwion Gwion) and Warrarrajai (Static Polychrome)	Ross et al. (2016)
Wanjina	338 ± 15	AMS	Wk-47,814	Charcoal	Top layer of charcoal Wanjina eye	David et al. 2019
Wanjina	300 ± 85	Radiocarbon	OZC549	Charcoal	Lowermost of 38 paint layers on Wungurr (Wanjina snake)	Watchman et al. (1997)
Wanjina	155 ± 30	AMS	BRY-3	Charcoal	Anthropomorph	Ross et al. (2016)
Wanjina	150 ± 10	OSL	DR2	Quartz grain	Red pigmented Wanjina (same figure for DR1 and DR6)	Roberts et al. (1997)
Wanjina	100 ± 10	OSL	DR1	Quartz grain	Red pigmented Wanjina (same figure for DR2 and DR6)	Roberts et al. (1997)
Wanjina	Modern	Radiocarbon	OZB020	Charcoal	Wanjina eye	Watchman et al. (1997)

culture such as digging sticks, dilly bags, hafted axes, spears, spear-throwers, and boomerangs. Plants are also represented directly via direct grass "prints." This work establishes the likelihood that the Kimberley houses some of the oldest depictions of plants in the world, with examples from both IIAP and Gwion traditions, which are thought to be Pleistocene in age, and continuing also into the most recent art traditions. This work moves us away from static understanding of past Aboriginal people as "hunter-gatherers" or "foragers" and explores human manipulation of plant resources over millennia in a complex people-plant relationship described as "eco-scaping" (Ouzman et al. 2017).

Interestingly, at both the center and on the edges of the Kimberley, a number of traditions have been identified that do not fit within existing style sequences. In addition, the southeastern Forrest River art styles (Kaberry 1936) share similarities to Keep River region and other desert fringe art styles. Indeed, the linkages of rock art

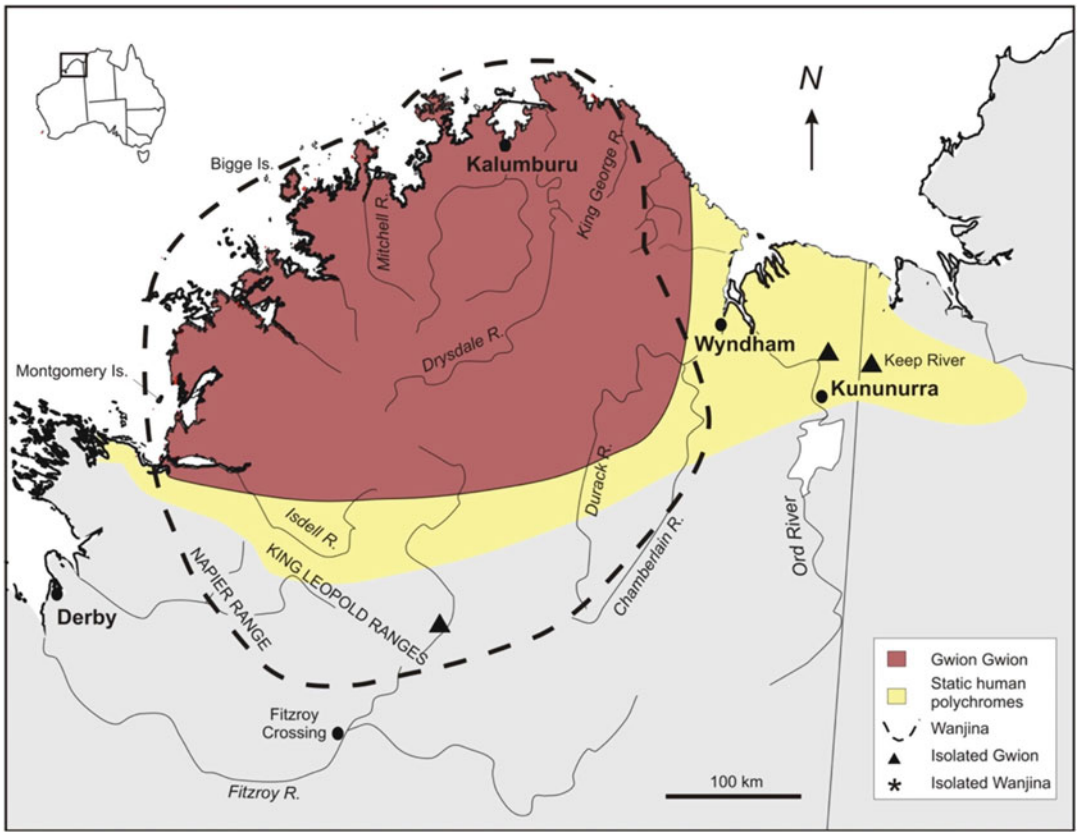

Kimberley Rock Art, Fig. 4 Key Kimberley rock art traditions' distributions. (Modified from Walsh 1994)

traditions with other areas may occasion us to rethink and redefine what we mean by the "Kimberley" – especially when realizing a great deal of what would have been human-occupied land is now underwater.

Here "contact" rock art provides instructive examples. While not as prolific as in Arnhem Land (May et al. 2010) or the Pilbara (Paterson and Wilson 2009), it includes "new" imagery such as boats (European and Macassan), cars, camels, horses, and European clothes (O'Connor and Arrow 2008; O'Connor et al. 2013; Ross and Travers 2013). There are also new production techniques for "old" imagery, such as scratching and use of charcoal to produce anthropomorphs with elaborate headdresses (O'Connor et al. 2013). Interpretation of contact art has focused on identification and antiquity of boats (Akerman 2015; Ross and Travers 2013) and the creation of art as an act of resistance during the contact period, mostly since the 1820s (O'Connor et al. 2013). However, not all boat imagery was created during the contact period (Akerman 2015; Ross and Travers 2013; Walsh 1994), as there are a series of canoes painted in Gwion Gwion scenes, suggesting great antiquity. This broad temporal and spatial sweep allows us to better understand possible meanings for these rock art traditions.

Meaning: Aboriginal Ontologies and Archaeological Research

This expanded understanding of the Kimberley, and utilization of multiple data sets – rock art, archaeology, ethnography, and paleoenvironment – productively disproves and displaces early interpretations of Kimberley rock art by outsiders as simplistic or even non-Aboriginal in origin. Indeed, a key development in Kimberley rock art

ROCK ART STYLE DISTRIBUTION	MAJOR IDENTIFYING ROCK ART ELEMENTS
1. PECKED CUPULE 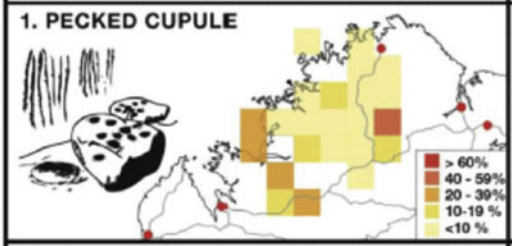	Sites have pebraded cupules, abraded grooves and in 25% of instances grinding hollows in association. Surface modification may indicate vegetable/animal and ochre processing. Positive print pigment grass seed stems and heads may be in association.
2. IRREGULAR INFILL ANIMAL 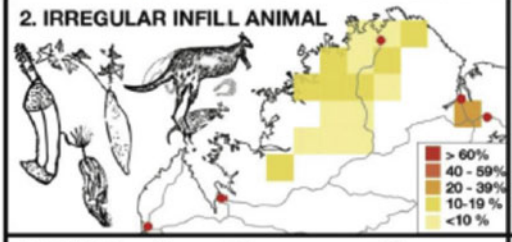	25% of sites depict yams and a variety of other flora with leaf, flower and root details. Grass imprints are depicted in 38% of sites containing plant motifs. Less common are prints of string and feathers. Aquatic species dominate, mostly fish and long-necked tortoise.This style also includes birds, echidnas, snakes flying possums, flying foxes, possums, and macropods. Extinct species present. Anthropomorphs are rare and include Mythological beings.
3. GWION 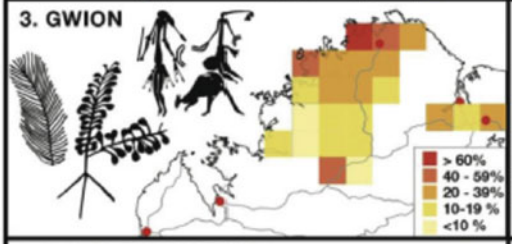	2% of sites have plant motifs. Highly decorated human figures are dominant. Early 'tassel' figures hold sticks, dillybags, palms and fern leaves. Figure style changes to 'sash', long plumes, pompom, feathers. Later figures hold multi-barbed spears, macropod hunting scenes and therianthropes are depicted. Stylised figures lose leg detail with some decorated with plant-like motifs.
4. STATIC POLYCHROME 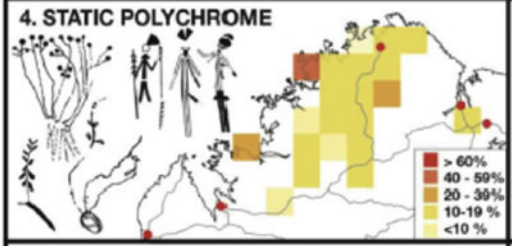	4% of sites have plant motifs, painted with very fine lines and most are botanicals. Human figures also dominate. Figures are polychrome with missing pigment. Headdress styles are very diverse with added features such as tussocks and tassels. Multi-barbed spears, spear throwers and conflict scenes are evident. Macropods most common fauna. Large watercraft are depicted.
5. PAINTED HAND 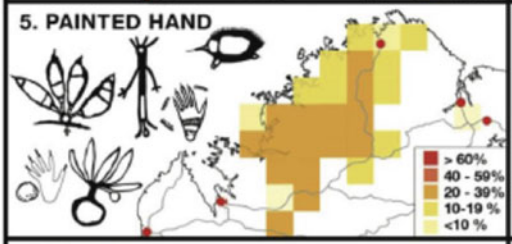	18% of sites have plant motifs, mainly yams, scenes of yams and people and anthropomorphised plants. Diverse range of paintings encompassed in this period. Early figures are painted with broad strokes and develop into decorative compartment body detail. Anthropomorphs depict gender, ritual practices and social aggregation. Macropods, crocodiles, lizards, birds, turtles,and echidnas are common. Motifs include concentric circles and decorated hands with distinct nails.
6. WANJINA 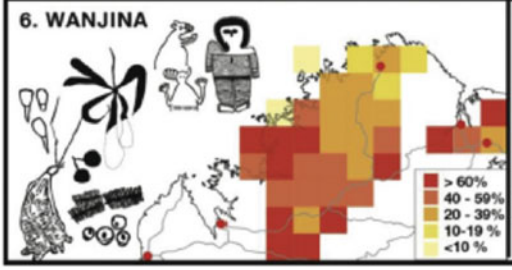	19% of sites have plant motifs. Early plant motifs are naturalistic while later art is more stylised and symbolic. Fruit is depicted as groupings of circles. Figures are (named) ancestral beings, controllers of the elements. When Wanjina art is repainted and cared for it brings rain and the regeneration of food and a range of other life processes. Dingo paintings enter the art, and the Thylacine is no longer depicted. Yam and animal themes replace older figurative art with the later re-appearance of argula 'devil' figures and ritual practice.

Kimberley Rock Art, Fig. 5 Revised stylistic chronology and plant motif distribution (Veth et al. 2018)

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research in the later twentieth century is the increasing coexistence of Aboriginal ontologies alongside archaeological research (Porr and Bell 2012).

For example, the Kimberley is in an instructive position with regard to the Wanjina – a broad cultural practice embodied in a rock art that is at least 5000 years old and which continues today (Akerman 2016). The late David Mowaljarlai characterized Wanjina thus:

> To us they are IMAGES. IMAGES with ENERGIES that keep us ALIVE. Those IMAGES were put down for us by our Creator, Wandin. So that would make us learn the story, to put new life into those IMAGES (1988: 690; see also Elkin 1930; Shulz 1956).

Wanjina cosmology is exceptionally rich: it weaves art, ochre, rain, and regeneration into a complex and integrated worldview. Wanjina country is traditionally within the Worora, Wunambal, and Ngarinyin language group, divided into patrilineal clan estates which were each responsible for Wanjina sites and their maintenance (Akerman 2016). Wanjinas are known as individuals named and associated with specific sites, events, and heroic actions. Wanjina is closely linked with Ungud, the serpent, but their relationship varies from the west to the east Kimberley. Recent excavation of Borologa rock-shelter on the Drysdale River in the northeastern Kimberley has revealed three Wanjina painting episodes over the last 2000 years, as evidenced through recovered ochre fragments and paint drops recorded in situ during meticulous excavation (David et al. 2019). This research highlights that stylistic and spatial variation through time is yet fully to be understood.

Such successive painting episodes intensify into the practice of retouching Wanjina images, which was recorded by Love, Elkin, and Crawford. Godden noted that on seeing a faded Wanjina at the site Wumbadengari, the senior Aboriginal men Mowaljarlai and Jagamurro would return to paint the site, once "*they had received proper permission from the old men and women*" (1982: 24). More controversially, David Mowaljarlai was involved in a government-funded repainting program in 1986 (Layton 1992; Mowaljarlai et al. 1988; Mowaljarlai and Peck 1987; Utemorrah and Vinnicombe 1992). Debate arose around this particular repainting program, an official complaint submitted by a non-Aboriginal pastoralist and labeled "defacement" by the Australian media (Bowdler 1988). These criticisms perpetuated a static view of Aboriginal culture, promoted rock art as a pristine relic, and removed agency of Aboriginal people and ownership of their living culture.

In the east Kimberley around Forrest River, a different kind of repainting was recorded by Kaberry (1938), with repainting on crocodile motifs recorded as an increase ritual for that animal. Additionally, Kaberry records women artists on this side of the Kimberley but highlights potential rich work in researching gendered aspects of rock art.

It is important also to understand "rock art" as not being restricted to a rock-shelter but transferring across media. For example, Wanjina is also associated with standing stones, which are understood to be transmogrified Wanjina called *djilgaiya* by the late Sam Woolagoodja (Layton 1992). Such transmogrification relates closely to Wanjina as living entities with close parallels to human life and form. Here, Adolphus Elkin's early but oft-overlooked research in the 1930s identified features in Wanjina art such as the headbands, hair, hair belts, and associated features such as lightning or cockatoo feathers (Fig. 6).

Material Culture and Dance

This focus on the human body and close relationship between rock art, the people and agents who made it, and performativity is continued further back in time with Gwion Gwion paintings. David Welch's intriguing observation that Gwion Gwion material culture and accouterments – despite their likely Pleistocene age – are strikingly similar visually to ethnographically recorded Kimberley material culture (2015: 219) merits further examination, for example, ethnographic photographs of Kimberley men dancing with *ngadari* headdresses and carrying spear-throwers and bunches of leaves and feathers remarkably similar to those shown in the rock art (Fig. 7). But rather than relying on

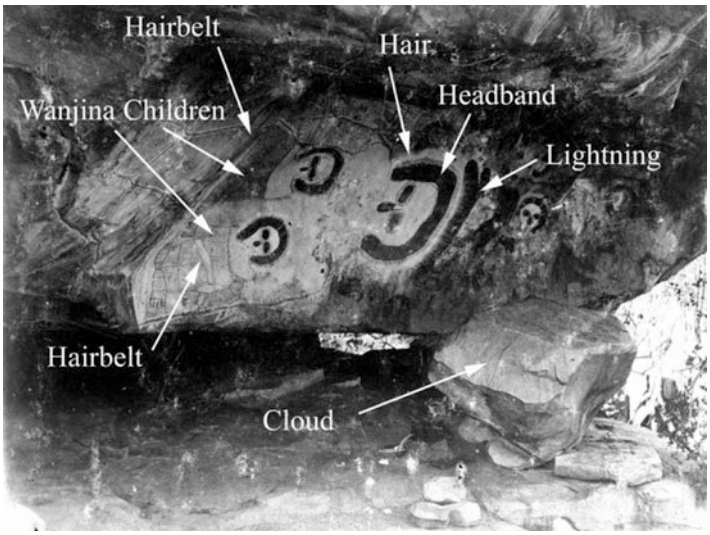

Kimberley Rock Art, Fig. 6 Wanjina at Beleguldo (Modum) (Elkin 1930)

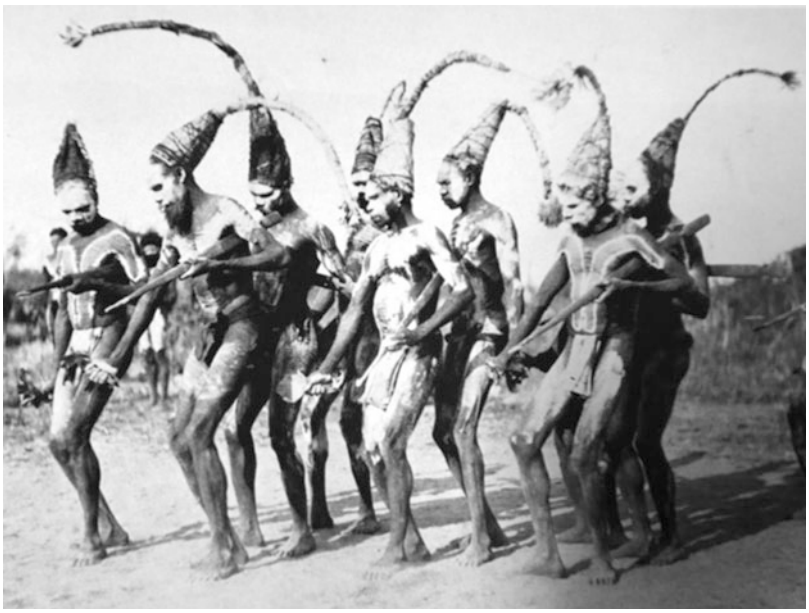

Kimberley Rock Art, Fig. 7 Kimberley men dancing with *ngadari* headdresses (Welch 2016)

direct ethnographic analogy as an analytical approach to explain the connection between these headdresses, accouterments, and the rock art, this deep time rock art repetition of motifs sees longer-term persistent behaviors of social reproduction. These persistent themes through varying traditions likely reflect long-term connections to country, cohesive group identities, and the cultural transmission of clan and linguistic affiliations. These social relations were dynamic as sea levels rose, climate fluctuated, and environmental landscapes shifted (Veth et al. in press).

Heritage: Managing Heritage and Change

We have used both ancient and modern Kimberley rock art to illustrate the rock art's enormous temporal, spatial, and ontological scope. But simply understanding this art is not enough – it has to be actively managed and made known to the world.

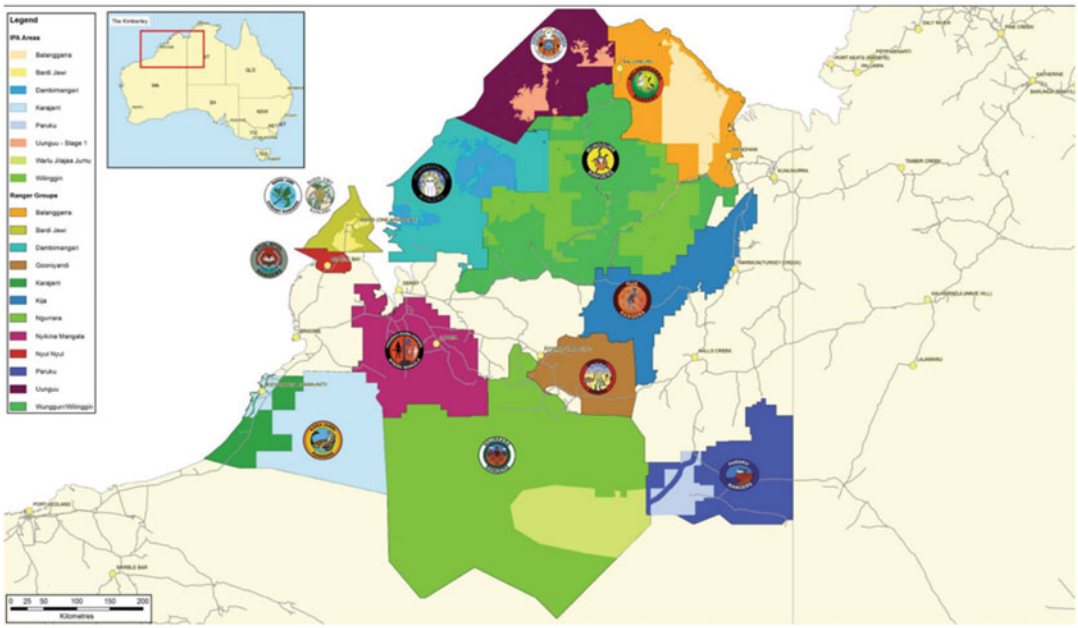

Kimberley Rock Art, Fig. 8 Kimberley Ranger Network (KLC 2017)

Following successful native title determinations since 1992, the Kimberley is today dominantly Aboriginal owned with over 84% of it and managed through large Indigenous Protected Areas (IPAs), Aboriginal Corporations, and affiliated Aboriginal ranger programs (Fig. 8). There are 70 full-time rangers in 13 ranger groups (Balanggarra, Bardi Jawi and Bardi Jawi Oorany, Dambimangari, Gooniyandi, Kara Jarri, Kija, Ngurrara, Yimardoo Warra [Nyikina Mangala], Nyul, Paruku, Uunguu, and Wunggurr rangers. There are also non-Aboriginal pastoral and tourism leases and government land. While the history of dispossession, relocation of people, the missions, and the current variety of tenures have all had an impact on Aboriginal access to traditional lands and cultural sites, there is an active program of reconnection to country in which rock art plays a key but as yet not fully realized role.

International Perspectives

The Kimberley presents one of the world's largest multi-style rock art bodies that stretches back at least 40,000 years and which remains connected to modern Aboriginal people today. This rock art coexists with rich archaeological, ethnographic, and paleoenvironmental data that has only been scientifically explored over the last few decades, promising new and ongoing research findings that will inform us of rock art's role in managing social and environmental change.

Future Directions

Future directions for Kimberley rock art research include the continued direct dating of rock art across traditions and regions. More work needs to be done contextualizing rock art and other symbolic markings and structures with subsurface archaeology. Especially exciting are nascent indications of how people and rock art connected across northern Australia and into Southeast Asia, which we now describe.

Rock art was most likely a key element in the colonizing repertoire of the First Australians, providing us with detail on the type and timing of their move into what was then the Sahul landmass. The visual and contextual similarities between Kimberley rock art and that recorded and dated

in Borneo, Sulawesi, Timor, and New Ireland, between 50 and 42 kya, provide evidence of people overcoming sea barriers with purposeful voyaging, having mixed terrestrial and marine economies and possibly sharing symbolic systems. Aubert et al. (2014) reported a 40,000 year old babirusa (deer-pig) rock painting from Sulawesi, which has stylistic similarities to the Irregular Infill Animal tradition of the Kimberley, including a thick outline, naturalistic representation of the faunal features, and irregular economic use of pigment infill. The same research team have presented the Datu Saman figures from Borneo (Aubert et al. 2018), dated to older than 13.6 years ago, and these anthropomorphs share some similarities to Kimberley Gwion Gwion as well as Arnhem Land's dynamic figures in being dark red, fine-line, dynamic, with elaborate headdresses and holding material culture. There is also a shift from naturalistic animal to human figures and material culture, as is also seen across northern Australia. These stylistic similarities suggest permeability across a potential trans-Wallacean culture bloc around 50,000 years ago, probably reflecting the region as a "hot spot" for island and continental dispersal. These shared styles suggest long-distance transmissions, between maritime and tropic-adapted peoples, and that at least some of these transmissions continue well after continental colonization on either side of the Last Glacial Maximum (Veth et al. in press) More fine-grained research, currently being developed, across northern Australia and Wallacea will further develop this model for (inter)tropical adaptations and cultures with their own strong "imprints" on country.

Moving to northern Australia per se, Darrell Lewis (1988) first suggested that the now submerged Bonaparte catchment culturally connected the Kimberley and Arnhem Land. He recognized that at the height of the Last Glacial Maximum (~19,000 years ago), the Pleistocene coastline would have been hundreds of kilometers north of its current iteration. Additionally, Gwion Gwion and Elegant Action figure traditions of the Kimberley show marked stylistic and material culture correspondences with Arnhem Land's dynamic tradition rock art, which is also thought to be Pleistocene (May et al. 2018). These similarities suggest an older, more unified cultural bloc that used rock art to signal a common identity, which then evolved over time into more specific place-based adaptations and signalings.

Conclusion

Kimberley rock art is best understood using multiple analytical lenses to account for the enormous variation in time, space, and cultural range. Kimberley rock art research provides an ideal model for twenty-first century science in that it is empirically rigorous, enmeshed in paleoclimatic and paleoenvironmental frameworks, and socially responsive, working with Aboriginal custodians and two-way learning. Research directions are negotiated within this milieu, along with multiple ontologies, needs, ethics, and aspirations.

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References

AIATSIS. 2019. AUSTLANG dataset. https://collection.aiatsis.gov.au/datasets/austlang/001.

Akerman, Kim. 2015. A review of the Indigenous watercraft of the Kimberley region, Western Australia. *The Great Circle* 37 (1): 82–111.

Akerman, Kim. 2016. *Wanjina: Notes on some iconic ancestral beings of the Northern Kimberley.* Carlise: Hesperian Press.

Aubert, Maxime. 2012. A review of rock art dating in the Kimberley, Western Australia. *Journal of Archaeological Science* 39 (3): 573–577.

Aubert, Maxime, Adam Brumm, Muhammad Ramli, Thomas Sutikna, E. Wahyu Saptomo, Budianto Hakim, Michael J. Morwood, Gerrit D. van den Bergh, Leslie Kinsley, and Anthony Dosseto. 2014. Pleistocene cave art from Sulawesi, Indonesia. *Nature* 514 (7521): 223.

Aubert, M., P. Setiawan, A.A. Oktaviana, A. Brumm, P.H. Sulistyarto, E.W. Saptomo, B. Istiawan, T.A. Ma'rifat, V.N. Wahyuono, F.T. Atmoko, and J.X. Zhao. 2018. Palaeolithic cave art in Borneo. *Nature* 564 (7735): 254.

Bowdler, Sandra. 1988. Repainting Australian rock art. *Antiquity* 62: 517–523.

Bradshaw, J. 1892. Notes on a recent trip to St. Regent's River. *Transactions and Proceedings of the Royal Geographical Society of Australia (Victoria Branch)* 9 (2): 90–103.

Crawford, Ian. 2001. *We won the victory: Aborigines and outsiders on the north-west coast of the Kimberley.* Fremantle: Fremantle Arts Center Press.

David, B., et al. 2019. Dating painting events through by-products of ochre processing: Borologa 1 Rockshelter, Kimberley, Australia. *Australian Archaeology* 85 (1): 57–94.

Finch, D., Gleadow, A., Hergt, J., Levchenko, V.A. and Fink, D., 2019. New developments in the radiocarbon dating of mud wasp nests. Quaternary Geochronology, 51: 140–154.

Grey, George. 1841. *Journals of two expeditions of discovery in North-west and Western Australia, during the years 1837, 38 and 39*. Adelaide: Libraries Board of South Australia.

Kaberry, P.M., 1936. Spirit-children and spirit-centres of the North Kimberley Division, West Australia. Oceania, 6 (4): 392–400.

Kimberley Land Council, 2017, KLC Cultural Enterprises Hub: Mid Year Report, September 2017.

Layton, Robert. 1992. *Australian rock art: A new synthesis*. Cambridge: Cambridge University Press.

Lewis, Darrell. 1988. *The rock paintings of Arnhem Land, Australia: Social ecological and material culture change in the post-glacial period*. Oxford: B.A.R.

Love, J.R.B. 1930. Rock paintings of the Worrora and their mythological interpretation. *Journal of the Royal Society of Western Australia* 16: 1–24.

Mangolomara, S., L. Karadada, J. Oobagooma, D. Woolagoodja, J. Karadada, and K. Doohan. 2019. *Nyara pari kala niragu: Gadawara ngyaran-gada: Inganinja gubadjoongana: We are coming to see you*. Fremantle: Fremantle Press.

May, S.K., P. Taçon, D. Wesley, and M. Travers. 2010. Painting history: Indigenous observations and depictions of the 'other' in northwestern Arnhem Land, Australia. *Australian Archaeology* 71 (1): 57–65.

May, S.K., I.G. Johnston, P.S.C. Taçon, I.D. Sanz, and J. Goldhahn. 2018. Early Australian anthropomorphs: Jabiluka's Dynamic Figure rock paintings. *Cambridge Archaeological Journal* 28 (1): 67–83.

McConvell, Patrick. 1996. Backtracking to Babel: the chronology of Pama-Nyungan expansion in Australia. *Archaeology in Oceania* 31 (3): 125–144.

McNiven, Ian J. 2011. The Bradshaw debate: lessons learned from critiquing colonialist interpretations of Gwion rock paintings of the Kimberley, Western Australia. *Australian Archaeology* 72 (1): 35–44.

Morwood, M.J., G.L. Walsh, and A.L. Watchman. 2010. AMS radiocarbon ages for beeswax and charcoal pigments in North Kimberley rock art. *Rock Art Research* 27 (1): 3–8.

Mowaljarlai, D., and C. Peck. 1987. Ngarinyin Cultural Continuity: A project to teach the young people our culture, including the repainting of Wandjina rock art sites. *Australian Aboriginal Studies* 2: 71–78.

Mowaljarlai, D., P. Vinnicombe, G.K. Ward, and C. Chippindale. 1988. Repainting of images on rock in Australia and the maintenance of Aboriginal culture. *Antiquity* 62 (237): 690–696.

O'Connor, S., and S. Arrow. 2008. Boat images in the rock art of northern Australia with particular reference to the Kimberley, Western Australia. In *Islands of Inquiry: Colonisation, seafaring and the archaeology of maritime landscapes*, ed. G. Clark, S. O'Connor, and B. Leach, 397–409. Canberra: ANU E-Press.

O'Connor, S., and B.L. Fankhauser. 2001. Art at 40,000BP? One step closer: An ochre covered rock from Carpenter's Gap Shelter 1, Kimberley Region, Western Australia. In *Histories of old ages: Essays in honour of Rhys Jones*, eds. A. Anderson, R. Jones, I. Lilley, and S. O'Connor, 287–300. Canberra: Pandanus Books.

O'Connor, S., J. Balme, J. Fyfe, J. Oscar, M. Oscar, J. Davis, H. Malo, R. Nuggett, and D. Surprise. 2013. Marking resistance? Change and continuity in the recent rock art of the southern Kimberley, Australia. *Antiquity* 87 (336): 539–554.

O'Connor, S., Veth, P. and Barham, A., 1999. Cultural versus natural explanations for lacunae in Aboriginal occupation deposits in northern Australia. Quaternary International, 59 (1): 61–70.

Ouzman, S., P. Veth, C. Myers, P. Heaney, and K. Kenneally. 2017. Plants before animals? Aboriginal rock art as evidence of ecoscaping in Australia's Kimberley. In *The Oxford Handbook of the archaeology and anthropology of rock art*, eds. B. David and I. McNiven. Oxford: Oxford University Press.

Paterson, A., and A. Wilson. 2009. Indigenous perceptions of contact at Inthanoona, northwest Western Australia. *Archaeology in Oceania* 44 (S1): 99–111.

Porr, M., and H.R. Bell. 2012. 'Rock-art', 'animism' and two-way thinking: Towards a complementary epistemology in the understanding of material culture and 'rock-art' of hunting and gathering people. *Journal of Archaeological Method and Theory* 19 (1): 161–205.

Roberts, R., Walsh, G., Murray, A., Olley, J., Jones, R., Morwood, M., Tuniz, C., Lawson, E., Macphail, M., Bowdery, D. and Naumann, I., 1997. Luminescence dating of rock art and past environments using mud-wasp nests in northern Australia. Nature, 387 (6634): 696.

Ross, J., and M. Travers. 2013. 'Ancient Mariners' in Northwest Kimberley rock art: An analysis of watercraft and crew depictions. *The Great Circle* 35 (2): 55–82.

Ross, J., K. Westaway, M. Travers, M. Morwood, and J. Hayward. 2016. Into the past: A step towards a robust Kimberley rock art chronology. *PLoS One* 11 (8): e0161726.

Shulz, Agnes S. 1956. North-West Australian rock paintings. *Memoirs of the National Museum of Victoria, Melbourne* 20: 54–64.

Travers, M., and J. Ross. 2016. Continuity and change in the anthropomorphic figures of Australia's northwest Kimberley. *Australian Archaeology* 82 (2): 148–167.

Utemorrah, D., and P. Vinnicombe. 1992. Northwestern Kimberley belief systems. In *Rock art and ethnography, proceedings of the ethnography symposium (H), Australian Rock Art Research Association Congress,*

Darwin 1988, Occasional AURA Publication, ed. M.-J. Morwood and D.R. Hobbs, vol. 5, 25–26. Melbourne: Archaeological Publications.

Veth, P., Myers, C., Heaney, P. and Ouzman, S., 2018. Plants before farming: The deep history of plant-use and representation in the rock art of Australia's Kimberley region. Quaternary International, 489: 26–45.

Veth, P., et al. 2019. Minjiwarra: Archaeological evidence of human occupation of Australia's northern Kimberley by 50,000 BP. *Australian Archaeology* 85 (2): 1–11.

Walsh, Grahame. 1994. *Bradshaws: Ancient rock paintings of North-West Australia*. Carouge-Geneva: Bradshaw Foundation.

Watchman, A.L., Walsh, G.L., Morwood, M.J. and Tuniz, C., 1997. AMS radiocarbon age estimates for early rock paintings in the Kimberley, NW Australia: preliminary results. Rock Art Research, 14: 18–25.

Welch, David. 1993. Stylistic change in the Kimberley rock art, Australia. In *Rock art studies: The post-stylistic era or where do we go from here?: Papers presented in Symposium A of the 2nd Aura Congress, Cairns 1992*, ed. M. Lorblanchet and P.G. Bahn, 99–113.

Welch, M., 2015. Aboriginal Paintings of Drysdale River National Park, Kimberley, Western Australia. David M. Welch.

Wood, R., Z. Jacobs, D. Vannieuwenhuyse, J. Balme, S. O'Connor, and R. Whitau. 2016. Towards an accurate and precise chronology for the colonization of Australia: The example of Riwi, Kimberley, Western Australia. *PLoS One* 11 (9): e0160123.

Further Reading

Bird, M., R.J. Beaman, S.A. Condie, A. Cooper, S. Ulm, and P. Veth. 2018. Palaeogeography and voyage modeling indicates early human colonization of Australia was likely from Timor-Roti. *Quaternary Science Reviews* 191: 431–439.

Capell, Arthur. 1939. Mythology in northern Kimberley, north-west Australia. *Oceania* 9 (4): 382–404.

Chalarimeri, Ambrose (2001) Man from the Sunrise Side. Magabala Books: Broome.

Cheinmora, Dolores. 2017. *Belaa plants and animals: Biocultural knowledge of the Kwini people of the far north Kimberley, Australia*, Balanggarra Aboriginal Corporation: Northern Territory Botanical Bulletin. Vol. 46. Batchelor: Batchelor Institute Press.

Clement, C., J. Gresham, J. Jeffrey, and H. McGlashan. 2012. *Kimberley history: People, exploration and development*. Perth: Kimberley Society. (Maybe ditch this one? And move to rec reading).

Crawford, Ian. 1968. *The art of the Wandjina: Aboriginal cave paintings in Kimberley, Western Australia*. Oxford: Oxford University Press.

Elkin, Adolphus P. 1930. Rock-paintings of north-west Australia. *Oceania* 1: 257.

Gunn, R., B. David, L.C. Douglas, J.-J. Delannoy, S. Harper, P. Heaney, S. Ouzman, and P. Veth. 2019. 'Kimberley Stout Figures': A proposed new motif type in Kimberley rock art, north-western Australia. *Australian Archaeology* 1–19.

Kenneally, K.F., M.R. Lewis, M. Donaldson, and C. Clement, eds. 1997. *Aboriginal rock art of the Kimberley*. Perth: The Kimberley Society.

Lewis, Darrell. 1997. Bradshaws: The view from Arnhem Land. *Australian Archaeology* 44 (1): 1–16.

Mowaljarlai, D., and J. Malnic. 1993. *Yorro Yorro, everything standing up alive: Spirit of the Kimberley*. Broome: Magabala Books.

Veth, P., S. Harper, K. Ditchfield, S. Ouzman, and Balanggarra Aboriginal Corporation. in press. The case for continuity in the Kimberley occupation and rock art. In *Companion to indigenous history*, ed. A. McGrath and L. Russell.

Welch, David. 2016. *From Bradshaw to Wandjina: Aboriginal paintings of the Kimberley region, Western Australia*, Australian Aboriginal culture series. Vol. 12. Coolalinga: David M. Welch.

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Basic Biographical Information

John Kinahan was born in Mutare, Zimbabwe, but is a resident and citizen of Namibia, where he and his wife, Jill Kinahan, have worked as archaeologists for more than 30 years. He studied archaeology at the University of Cape Town and completed his Ph.D. at the University of the Witwatersrand in 1989. Kinahan was employed as Curator of Archaeology at the National Museum of Namibia until 1996. He is currently Director of the Namib Desert Archaeological Survey, a long-term, field-based research project primarily funded through contract surveys for mining projects. He has published more than 70 articles, including peer-reviewed papers, chapters in books, edited volumes, and one book. His research interests are broad, ranging from post-Pleistocene hunter-gatherer archaeology to rock art interpretation, nomadic pastoral settlement and land use, as well as the history of archaeology

and the links between archaeology and related fields such as human and animal ecology.

Apart from his work in Namibia, John Kinahan has also carried out field surveys and excavations in Botswana, Mali, Angola, and Tanzania and completed a major survey and excavation project under contract to the Government of Ethiopia, in the Gilgel Gibe valley in the south of that country. In addition, he has served as a visiting lecturer at universities in Australia, Germany, the United Kingdom, Sweden, and South Africa. He is an Honorary Research Fellow of the Rock Art Research Institute in the School of Geography, Archaeology and Environmental Studies at the University of the Witwatersrand. He has presented his research at many regional and international conferences and has collaborated in a number of regional projects, serving as country coordinator in the Swedish Sida-SAREC-funded program of archaeological cooperation linking nine African countries with common research interests in the archaeology of human responses to environmental change.

Major Accomplishments

John Kinahan's early work in the Namib Desert formed the basis of a revised mid-Holocene to recent archaeological sequence which challenged the regional orthodoxy of successive ethnic migrations, by showing that local transformation in hunter-gatherer economies provided a better account of the evidence. He later extended this research into the archaeology of recent desert communities and established concrete links between the rock art and archaeological evidence for economic and social change and the archaeological basis for ancestral land ownership claims.

In his more recent involvement with contract archaeology, Kinahan has developed practical methods for the assessment of archaeological significance and vulnerability as an empirical basis for sensitivity mapping. He has developed GIS-based methods of rapid field survey using the varying desert landscape associations of archaeological sites. Kinahan pioneered rural community-based site management in Namibia, laying the basis for financially self-sustaining rock art tourism. Kinahan served as consulting archaeologist and principal author of the nomination dossier for Namibia's first listed World Heritage site, Ui-//aes or Twyfelfontein.

Cross-References

- ▶ Cultural Heritage Site Damage Assessment
- ▶ Rock Art Sites: Management and Conservation
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective

Further Reading

Kinahan, J. 1993. The rise and fall of nomadic pastoralism in the central Namib Desert. In *Food, metals and towns in the archaeology of Africa*, ed. B. Andah, A. Okpoko, T. Shaw, and P. Sinclair, 372–385. London: Routledge.

Kinahan, J. 1995. A new archaeological perspective on nomadic pastoralist expansion in south-western Africa. In *The growth of farming in Africa south of the Equator*, ed. J.E.G. Sutton, 211–225. Nairobi: British Institute in Eastern Africa.

Kinahan, J. 1996. The archaeology of social rank among eighteenth century nomadic pastoralists in southern Namibia. *African Archaeological Review* 13 (4): 225–245.

Kinahan, J. 1999. Towards an archaeology of mimesis and rainmaking in the rock art of Namibia. In *The archaeology and anthropology of landscape*, ed. P. Ucko and R. Layton, 336–357. London: Routledge.

Kinahan, J. 2000. Fifteenth century agropastoral responses to a disequilibrial ecosystem in eastern Botswana. In *Living on the margins: The archaeology of drylands*, ed. G. Barker and D. Gilbertson, 233–251. London: Routledge.

Kinahan, J. 2001. *Pastoral nomads of the Namib Desert: The people history forgot*. Windhoek: Namibia Archaeological Trust.

Kinahan, J. 2005. Late Quaternary human ecology of the Namib Desert. In *23° S: Archaeology and environmental history of the southern deserts*, ed. M. Smith and P. Hesse, 120–131. Canberra: National Museum of Australia.

Kinahan, J. 2011. From the beginning: The archaeological evidence. In *A history of Namibia, from the beginning to independence*, ed. M. Wallace, 15–44. London: David Hurst.

Kinahan, J., and J. Kinahan. 2006. Preliminary report on the late Holocene archaeology of the Awasib-Gorrassis Basin complex in the southern Namib Desert. *Studies in the African Past* 5: 1–14.

King, Thomas F.

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Basic Biographical Information

Thomas F. King was born October 20, 1942, in Atlanta, GA, to Theophilus T. (Ted) King and Helen Fulling King. He grew up in Petaluma, California, where he graduated from Petaluma High School. He became interested in archaeology at a young age. After serving in the United States Navy (1962–1964), he enrolled in San Francisco State University, where he received his undergraduate degree in Anthropology (1968). Majoring in Anthropology at the University of California, Riverside, he earned his doctorate in 1976. In addition to pursuing his Ph.D., between 1968 and 1975, Tom oversaw the UCLA Archaeological Survey and the UC–Riverside Archaeological Research Unit, and helped found the Society for California Archaeology. He conducted archaeological research in California's Sierra Nevada, the North Coast Range, the Mojave and Colorado Deserts, and along the Pacific coast, and took part in political activities, court cases, and administrative actions interpreting newly enacted and developing state and federal environmental and historic preservation laws. After Governor Ronald Reagan vetoed legislation to create a California Archaeological Survey, King moved to New York where he oversaw contract archaeological program for the New York Archaeological Council (King *pers. comm*. 2 May 2011).

He was recruited by the National Park Service's (NPS) Division of Interagency Archeological Service to develop regulations for the Archaeological and Historic Preservation Act (Public Law 93-291) in 1975. In 1977, he was detailed by the NPS to the Trust Territory of the Pacific Islands to establish historic preservation programs (King 2006). As Consultant in Archaeology and Historic Preservation to the High Commissioner, he was instrumental in building the historic preservation programs of the emerging island nations of Micronesia. Partly as a result of his experience in Micronesia, his horizon broadened from archaeological resources to include concerns with the protection of structures, rural landscapes, neighborhoods, the spiritual places of Indian tribes and Pacific Island groups, and places that are important for their association with the beliefs and ways of life of living communities, for which he and NPS anthropologist Patricia Parker coined the name "traditional cultural properties" (Parker and King 1990).

Returning to the states in 1979, he joined the Advisory Council on Historic Preservation's (ACHP) staff as Director of the Office of Cultural Resource Preservation, for the next 9 years. Although the National Historic Preservation Act (NHPA) had been in effect for more than a dozen years, Federal agencies were still grappling with provisions of the Act, especially the Section 106 review process overseen by the ACHP. King oversaw staff efforts to coordinate and provide guidance to federal agencies in implementing their Section 106 responsibilities.

After resigning from the ACHP in 1989, he became and continues to be engaged as a consultant to Federal, state and local agencies, Indian tribes, Pacific Island groups, and private clients providing guidance and training related to historic preservation. He has also authored, coauthored, and edited eight textbooks dealing with historic preservations issues, together with one trade book (*Amelia Earhart's Shoes*, King et al. 2004), and one work of fiction (*Thirteen Bones*, King 2009) based on his work as Senior Archaeologist with The International Group for Historic Aircraft Recovery (TIGHAR) is its research into the fate of aviation pioneers Amelia Earhart and Fred Noonan.

Major Accomplishments

Dr. King's major contributions consist of his books and articles (some critical of the bureaucracies and practitioners) that provide direction and guidance in the art of cultural resource management. See further readings for a selection of his work.

Cross-References

▶ Cultural Heritage Management: International Practice and Regional Applications

References

King, T.F. 2006. How Micronesia changed the U.S. historic preservation program, and the importance of keeping it from changing back. *Micronesian Journal of the Humanities and Social Sciences* 5: 1. Available at: http://marshall.csu.edu.au/MJHSS/

King, T.F. 2009. *Thirteen bones* (Novel). Dog-Ear Press.

King, T.F., R. Jacobson, K. Burns, and K. Spading. 2004. *Amelia Earhart's shoes*. 3rd ed. Walnut Creek: AltaMira Press.

Parker, P.L., and T.F. King. 1990. *Guidelines for evaluating and documenting traditional cultural properties*. National Register Bulletin 38. Washington, DC: National Register of Historic Places/National Park Service.

Further Reading

King, T.F. 1983. Professional responsibility in public archeology. *Annual Review of Anthropology* 12: 143–164.

King, T.F. 1989. *Preparing agreement documents*. Washington, DC: Advisory Council on Historic Preservation.

King, T.F. 2000. *Federal projects and historic places: The section 106 process*. Walnut Creek: AltaMira Press.

King, T.F. 2002. *Thinking about cultural resource management: Essays from the edge*. Walnut Creek: AltaMira Press.

King, T.F. 2003a. *Places that count: Traditional cultural properties in cultural resource management*. Walnut Creek: AltaMira Press.

King, T.F. 2003b. Considering the cultural importance of natural landscapes in NEPA review: The *Mushgigagamongsebe* example. *Environmental Practice* 5: 4.

King, T.F. 2005a. *Doing archaeology: A cultural resource management perspective*. Walnut Creek: Left Coast Press.

King, T.F. 2005b. What are traditional cultural properties? *The Applied Anthropologist* 25: 125–130.

King, T.F. 2006a. TIGHAR and the TBD in Jaluit: An example of the complexities to be considered in planning submerged historic aircraft recovery. *Micronesian Journal of the Humanities and Social Sciences* 5: 1. Available at: http://marshall.csu.edu.au/MJHSS/

King, T.F. 2006b. Cultural heritage preservation and the legal system with specific reference to landscapes. In *Chapter 13: Landscapes under pressure: Theory and practice of cultural heritage research and preservation*, ed. L.R. Lozny. New York: Springer.

King, T.F. 2007. *Saving places that matter: A citizens guide to the National Historic Preservation Act*. Walnut Creek: Left Coast Press.

King, T.F. 2008. *Cultural resource laws and practice: An introductory guide*. 3rd ed. Walnut Creek: AltaMira Press.

King, T.F. 2009a. *Our unprotected heritage: Whitewashing destruction of our natural and cultural environment*. Walnut Creek: Left Coast Press.

King, T.F. 2009b. Backing into disaster: Lessons in cultural resource management from the 'Graving Dock' at Port Angeles. *Journal of Northwest Anthropology* 4: 153–161.

King, T.F. 2010. A listless approach to resource management. *Heritage Management* 3: 97–100.

King, T.F., ed. 2011. *Companion to cultural resource management*. New York/London: Wiley-Blackwell.

King, T.F., and R. Gillespie. 1999. Archaeology in the search for Amelia Earhart. In *Lessons from the past: An introductory reader in archaeology*, ed. K.L. Felder. Mountain View: Mayview Press.

King, T.F., and P.L. Parker. 1984. *Piseken Nóómw Nóón Tonaachaw: Archeology in the Tonaachaw historic district, Moen Island, Truk*. Saipan: Southern Illinois University, Carbondale and Micronesian Archeological Survey.

King, T.F., and G. White. 2006. *The archaeological survey manual*. Walnut Creek: Left Coast Press.

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Basic Biographical Information

James Spedding Kirkman (OBE, FSA) was born in 1906. After graduating from Cambridge in 1928, he worked in various outposts of the British Empire including Borneo (as an administrative officer) and Ceylon (as a tea planter). His plans to work in Iraq were interrupted by World War II, during which he served as a rear gunner with the RAF. He became fluent in Arabic when posted to the Middle East during the war and afterward worked briefly at the Iraqi embassy in London, later joining the External Services of the BBC (Croome 1989; The Times 1989).

Between his stints in Ceylon and Iraq, Kirkman gained experience in archaeology by volunteering at the Castle Dove and later the Maiden Castle excavations (under Mortimer Wheeler) in the early 1930s. He also spent

3 years excavating in Palestine. This, along with his World War II posting, kindled an interest in Islamic culture (Croome 1989). He returned to archaeology in 1948 when, following an inquiry to Louis Leakey, he was appointed as the Warden of the Gedi National Park in Kenya. This marked the beginnings of an archaeological career in East Africa that spanned 24 years, first at the national parks and later at Kenya Museums (Anonymous 1990). He retired to Cambridge in 1972 where he continued to publish on the Indian Ocean World, edited the *International Journal of Nautical Archaeology*, and served as board member of the British Institute in Eastern Africa. He passed away in 1989 at the age of 82 (The Times 1989; Anonymous 1990).

Major Accomplishments

In a research context in which most scholarly attention was lavished on the Early Stone Age and human origins, Kirkman can be regarded as a pioneer of East African archaeology of the later periods, focusing on the Swahili towns of the Kenyan coast and later the Portuguese-built Fort Jesus. He is widely regarded as the first scholar to use the term "Historical Archaeology" in an African context, notably to refer to a study that drew on archaeological and oral traditional sources, alongside Arabic texts (Kirkman 1957). Kirkman spent 10 years excavating at Gedi, mapping the site and establishing a chronology based on finds such as imported ceramics (Kirkman 1954). In addition, he worked at a number of other Swahili sites including Kilepwa, Takwa, Mnarani, and Ungwana. His monographs contain detailed descriptions of the excavation layers and the finds, providing an invaluable resource for later researchers even though they have discounted many of his findings regarding the role of external influence on the Swahili coast. In 1958, Kirkman was appointed to oversee the archaeological investigation and historical conservation of Fort Jesus (a Portuguese fort) when it was declared a national monument. Thus, he oversaw its transformation from a colonial-era jail to a museum and monument. This is regarded as a seminal historical archaeological project on the East African coast. Kirkman worked at the site for 11 years, publishing *Fort Jesus: A Portuguese Fortress on the East African Coast* in 1974.

Today the fort is a popular attraction and a World Heritage Site. In addition to producing a number of detailed archaeological monographs, Kirkman also wrote an accessible book – *Men and Monuments on the East African Coast* (1964) – for members of the general public. While some of his findings and interpretations may be criticized today, and it has been shown that many of the levels, and indeed the history of Islam on the East African coast, date to an earlier time period than he had envisioned, undoubtedly James Kirkman laid the foundation upon which successive researchers such as Neville Chittick, Peter Garlake, Mark Horton (Anonymous 1990), and a new, younger generation of local scholars, including Chapurukha Kusimba, have built. His contribution to East African archaeology was recognized by the Festschrift *From Zinj to Zanzibar: Studies in History, Trade and Society on the Coast of East Africa* (Allen and Wilson 1982).

Cross-References

- ▶ East Africa: Historical Archaeology
- ▶ East Africa: Museums
- ▶ Leakey Family
- ▶ Society for Historical Archaeology (SHA) (Modern World Archaeology)
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

References

Allen, J. De V., and T.H. Wilson, eds. 1982. From Zinj to Zanzibar: studies in history, trade and society on the coast of East Africa. Papers presented in honour of Dr. James Kirkman. (Paideuma 28). Wiesbaden: Kommisionsverlag.

Anonymous. 1990. James Kirkman 1906-1989. *Azania* 25: 106–108.

Croome, A. 1989. Dr James Spedding Kirkman. *The International Journal of Nautical Archaeology and Underwater Exploration* 18: 189–190.
Kirkman, J.S. 1954. *The Arab city of Gedi: Excavations at the great mosque. Architecture and finds*. Oxford: Oxford University Press.
Kirkman, J.S. 1957. Historical archaeology in Kenya, 1948-1956. *The Antiquaries Journal* 37: 16–29.
Kirkman, J.S. 1964. *Men and monuments on the east African coast*. New York: Frederick A. Praeger.
Kirkman, J.S. 1974. *Fort Jesus: A Portuguese fortress on the East African coast*. Oxford: The Clarendon Press.
The Times. 1989. Dr. James Kirkman, Obituary, 3 May.

Further Reading

Kirkman, J.S. 1963. *Gedi: The palace*. The Hague: Mouton & Co..
Kirkman, J.S. 1966a. The Kenya littoral. *Current Anthropology* 7: 347–348.
Kirkman, J.S. 1966b. *Ungwana on the tana*. The Hague: Mouton & Co.
Wynne-Jones, S., and J. Fleisher. 2015. Fifty years in the archaeology of the eastern African coast: A methodological history. *Azania* 50 (4): 519–541.

Klejn, Leo

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Basic Biographical Information

Lev Samuilovich Klejn, known as Leo Klejn, is an internationally acclaimed Russian archaeologist. He was born in 1927 in Vitebsk, Belarus. Klejn studied philology at the Grodno Pedagogical Institute (1946–1947). He later moved to Leningrad State University where he studied archaeology under the supervision of Mikhail Artamonov and Russian philology and folklore under Vladimir Popp. Klejn remained inspired by semiotics, cognition and epistemological concerns, and Russian structuralism, which significantly contributed to the development of his intellectual profile. He graduated in archaeology in 1951. After working as a librarian and high school teacher and after postgraduate studies (1957–1960), he obtained a position of Assistant Professor of Archaeology in Leningrad State University in 1962. He defended his Ph.D. dissertation *The Origin of the Donets Catacomb Culture* in 1968. In 1976 he was promoted to the position of Associate Professor. In 1981, he was arrested by the KGB, expelled from the university, deprived of his academic grade and title, and sentenced to prison for alleged homosexuality. The sentence was overruled, but he remained without a position for 10 years. He spent this time taking classes at Leningrad State University. In 1994 he submitted a new dissertation and was awarded a second doctorate. In the same year, Klejn helped found the European University at St. Petersburg University, teaching there as a Full Professor until his retirement in 1997. He has been visiting professor at numerous universities, including Durham, Berlin, Vienna, Copenhagen, Tromso, and Washington.

Major Accomplishments

Leo Klejn's international prominence is largely due to his contributions to archaeological theory. His major interests comprised theory, epistemology, methodology, and typology. He conceptualizes the nature of archaeology as a mature discipline with a solid empirical basis independent from the disciplines of history and anthropology (Trigger 2006). His program of theoretical archaeology was long in the making. Their elements were presented in details in numerous publications. This innovative and original proposal has emerged in reference to critical assessment of the existing schools of archaeological thought in the second half of the twentieth century, including Marxism, historical materialism, processualism, and post-processualism (Klejn 1977).

Archaeology is arguably a source-studying discipline applying solid and explicit methodological and interpretive procedures. It has the form of an applied science akin to criminology. Theoretical archaeology, as defined by Klejn (2001), aims to define the algorithm of archaeological research and provide foundations for all facets of the discipline. It comprises three major groups of theories. The first group is called intra-archaeological and includes theories of interrelated issues dealing with archaeological material such as its processing,

interpretation, and extracting historical information from it. This also includes theories of classification and typology. The second group of theories is called meta-archaeological. These include philosophical, cognitive, scientific, and logical aspects of archaeology and its practice. They determine the subject matter of archaeology, its methodological nature, and the character of facts and theory. The third group is called para-archaeological and comprises theories originating from other disciplines like anthropology, sociology, linguistics, or geography. They make possible to conceptualize the laws of functioning the past communities and include such categories as culture, ethnos, society, migration, and historical process.

According to Klejn, the aim of archaeology is to restore historical process by applying a set of coherent, explicit, and well-defined methods and procedures. This makes it possible to decode information in material objects and overcome the break between the past and contemporary culture. The major element in this project comprises the archaeological sources. A wide range of sources, including artifacts, features, or structures, need to be conceptualized in the form of archaeological typologies. Hence, Klejn stressed a need of building typologies and captured a fundamental difference between classification and typology. A range of diverse sources is needed to write a comprehensive account about the past to facilitate a complete history. Klejn also developed the system of archaeological categories and notions used in archaeological process and the system of archaeological reasoning and explanation. The ultimate aim of Klejn's project is to generalize historical process and formulate historical laws by using different sources. However, the archaeologists' task to restore historical process is inevitably compromised by the incompleteness of archaeological sources.

In seeking the foundations for a bold and independent discipline of archaeology, it is necessary to grasp circumstances defining the conditions of its practice. In particular, its constitutive elements comprise the origin and significance of theory and the character of methodological frameworks including laws, models, analytical procedures, axioms, parallels, and analogies. Klejn reminds us that theory is not chosen freely but is developed within the general framework and takes into consideration the nature of archaeological sources. Similarly, the building of workable typology involves conceptualization of the foreknowledge.

Klejn (2013) is also interested in history of archaeology, and archaeological thought both in Russia and beyond. Soviet archaeology has been presented not as a monolithic entity but as composed of numerous schools and traditions, all embedded in Marxism. His other interests comprised works on the Neolithic, Bronze Age, Scythians, Sarmatians, Slavs, and Norsemen. Klejn worked extensively on the Bronze Age Donets Catacomb culture. He remains interested in ethnic issues including the origin of Indo-Europeans, especially Indo-Aryans, Greeks and Phrygians, and Slavs. He has also contributed to the debate of the origin of Russian state in the Middle Ages and the role of the Vikings in this process. Klejn was also an active member of numerous field projects in Russia, Ukraine, and Belarus including Bronze Age sites, Scytho-Sarmatian barrows, and early medieval towns. Klejn is also an acclaimed author of numerous philological works including studies of Homer and Homeric epic, especially Iliad. His interests in cultural anthropology comprised mainly folklore.

Klejn has published 18 monographs and more than 500 articles and has edited a few collections of articles. The most important of his theoretical works comprise *Archaeological Sources* (1978 – Russian), *Archaeological Typology* (1982 – English; 1991 – Russian), *Principles of Archaeology* (1991 – Russian), *Metaarchaeology* (2001 – English), *New Archaeology: Critical Analysis of the Theoretical Direction of Western Archaeology* (2009 – Russian), and *History of Archaeological Thought*, 2 vols (2011 – Russian). His newest book *Soviet Archaeology: Trends, Schools, and History* will be published in English in 2013. Klejn has also written *The World Turned Upside Down* (1993 – Russian), a personal account of his years in prison in the 1980s. A history of his life was presented in the book *It's Hard to Be Klejn: Autobiography in Monologues and Dialogues* (2010 – Russian). Three other major books: *A History of Anthropological Ideas* (Russian), *Time in Archaeology* (Russian), and *Culture and Evolution. Theoretical Studies* (Russian) are in preparation.

Cross-References

- ▶ Archaeological Record
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology and Anthropology
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Medieval Russia (Rus'), Archaeology of
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory

References

Klejn, L.S. 1977. A panorama of theoretical archaeology. *Current Anthropology* 18 (1): 1–42.

Klejn, L.S. 1982. *Archaeological typology*. BAR International series 153. Oxford: Archaeopress.

Klejn, L.S. 2001. Metaarchaeology. *Acta Archaeologica* 72 (1): 1–149.

Klejn, L.S. 2013. *Soviet archaeology: Trends, schools, history*. Oxford: Oxford University Press.

Trigger, B.G. 2006. *A history of archaeological thought*. 2nd ed. Cambridge: Cambridge University Press.

Further Reading

Immonen, V. 2003. The stratigraphy of a life. An archaeological dialogue with Leo Klejn. *Archaeological Dialogues* 10 (1): 57–75.

Kristiansen, K. 1993. Exploring the limits. An interview with Leo Klejn. *Journal of European Archaeology* 1: 184–194.

Taylor, T. 1993. Conversations with Leo Klejn. *Current Anthropology* 34 (5): 723–735.

Klithi Site: Excavating a Rockshelter in Northwest Greece

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Introduction

Klithi is a limestone rockshelter on the right bank of the River Voïdomatis in Northwest Greece (Fig. 1). Between 1983 and 1989, archaeological excavations here directed by Geoff Bailey brought to light a sequence of Upper Paleolithic deposits exhibiting remarkable uniformity in their artifact and faunal assemblages. Hunter/gatherer groups of the late glacial period had used ibex and chamois for food, leather, and bone artifacts. They had collected flint pebbles from the nearby river banks to manufacture an Epigravettian industry dominated by backed bladelets which were employed in hunting. Small endscrapers and other tools were employed in the working of hides and bone. Klithi is a low-diversity site and now features among other specialized ibex-sites that are typically found at high altitudes in or near the sort of rugged terrain that was the habitat of ibex herds.

Klithi Site: Excavating a Rockshelter in Northwest Greece, Fig. 1 Klithi rockshelter on the right bank of the River Voidomatis in Vikos Gorge. (Photo courtesy of Costas Zissis)

Key Issues

The *project design* combined on-site excavation aimed at producing data with high precision

chronological and spatial resolution, with off-site work intended to place Klithi within its local (NW Greece) and regional (SE Europe) geographical and cultural context. To this end, detailed archaeological survey and paleoenvironmental and paleogeographic research were conducted in parallel with excavation.

The excavation program sought detailed insights into patterns of change and variability in the excavated record, vertically across stratigraphic layers and horizontally in space. Prior to excavation, the shelter floor was cleared of the materials accumulated due to recent herding activity. It was then mapped on a 1 × 1 m grid with an alphanumeric designation and the major topographic features were projected on it (Fig. 2). Each grid was further subdivided into four quadrants, 50 × 50 cm each, and for the most part, these quadrants were excavated in 5 cm spits as the minimum provenance units to which all finds are referenced. Beyond this arbitrary three-dimensional coordinate system, all excavated finds were also stratigraphically referenced in terms of the geological and archaeological features into a two-tier system: *contexts* defined as the smallest units of stratigraphic provenance identified during excavation on the basis of lithology, texture, and color and *strata*, used (at Klithi) to denote groups of layers combined at post-excavation stage to represent a site-wide time unit. Small brushes and shovels were the main excavation tools (Fig. 3). Horizontal plans of the deposit featuring specimens larger than 5 cm were systematically drawn throughout. Excavated sediments were routinely dry-sieved and water-sieved (screened) in the river. Sorting, cataloguing, and study of artifacts and bones took place in the open air in the Vikos Gorge, on a river terrace under the plane trees, a magical spot indeed for archaeologists to set up their laboratory.

The *excavation strategy* evolved in the course of the project. First and foremost, a deep sounding was opened at the front of the shelter, reaching a depth of 2.8 m, to preview the stratigraphy and establish the total time span of occupation (1983). Excavation later continued across a horizontal area in order to examine the spatial distribution of finds and features (1984, 1985), following the principles of French "grands décapages" with detailed three-dimensional piece plotting of each

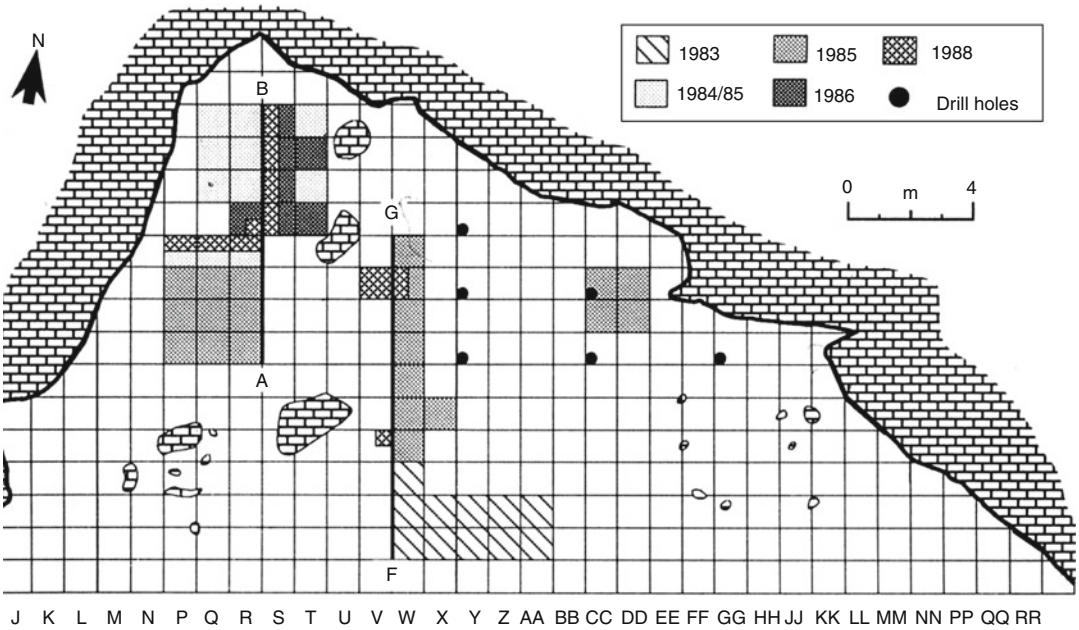

Klithi Site: Excavating a Rockshelter in Northwest Greece, Fig. 2 Klithi site plan, showing coverage by excavation year. (Reproduced by permission of the MacDonald Institute for Archaeological Research)

Klithi Site: Excavating a Rockshelter in Northwest Greece, Fig. 3 Excavating at Klithi with a small brush and a shovel. The excavator kneels on wooden plank and a foam cushion. The high density of artifacts is visible in the exposed surface. (Photo courtesy of Geoff Bailey)

specimen to its nearest centimeter. This procedure was eventually abandoned in view of the extremely high densities of archaeological material encountered – on average 26,424 lithic artifacts and 4,472 identified bones per cubic meter. Subsequent experiments with quadrants or mini-quads (25 × 25 cm) (1986) were applied but were still slow, and it was evident that better scientific design could only come from knowing the character of the total deposit in advance. Hollow steel tubes 1 m long and 60 mm diameter were used to sample the deposit in six boreholes drilled in various parts of the shelter floor, including both excavated and unexcavated areas (1986, 1988). The deposits were relatively loose and unconsolidated scree sediments, with relatively small clasts and high proportions of finer sediment. The maximum depth of scree deposits reached some 7 m in places, but the dense cultural material was confined to the upper 2 m. These 2 m of anthropogenic sediment corresponded to a mode of animal and lithic resource exploitation that remained stable for 3,500 years.

Refitting of lithic artifacts and quantitative analyses of spatial patterns were recruited to establish the spatial integrity of the deposits. Klithi, like other caves, contained a palimpsest of cultural material from overlapping occupations, a so-called time-averaged deposit, in which some redundant patterns of stable site structure were observed. A single major hearth area at the back of the shelter represented a complex stratigraphy of superimposed open hearths that was in use throughout the span of human presence on the site (Fig. 4). The repetitive use of the hearth area suggests a long-term familiarity of the Klithi inhabitants with the site and its physical features. One possible interpretation of this is that the rockshelter was in a remote part of the territory of a single group, which returned to the site periodically, relatively briefly, probably during late spring or early summer, and re-used the existing facilities.

Klithi Site: Excavating a Rockshelter in Northwest Greece, Fig. 4 The hearth area at Klithi with tags marking the superimposed layers corresponding to open hearths. The strings mark the site grid used for planning. (Photo courtesy of Geoff Bailey)

Future Directions

The expedition was completed in 1997 with the publication of an integrated two-volume report, which described the research questions, the methods adopted, the findings, and their interpretations step by step. Over the course of five field seasons, excavation at Klithi exposed 51.5 m^2, representing approx. 1/5 of the total floor area available to the Upper Paleolithic occupants. The remaining 4/5 now lie intact, awaiting the archaeologists of the future to return to Klithi with refined recovery methods and a new set of questions.

Cross-References

- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Karstic Landscapes: Geoarchaeology
- ▶ Spatial Analysis in Field Archaeology
- ▶ Switzerland: Upper Paleolithic Living Floor Investigations

Further Reading

Bailey, G., ed. 1997. *Klithi: Palaeolithic settlement and quaternary landscapes in Northwest Greece*. Cambridge: McDonald Institute for Archaeological Research.

Bailey, G., and N. Galanidou. 2009. Caves, palimpsests and dwellings places: Examples from Southeast Europe. *World Archaeology* 41 (2): 215–241.

Courbin, P. 1987. André Leroi-Gourhan et la technique des fouilles. *Bulletin de la Société Préhistorique Française* 84 (10–12): 328–334.

Kolb, Charles C.

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Basic Biographical Information

Charles C. Kolb, "Charlie," now a retired archaeologist, was a program officer for National Endowment for the Humanities (1991–2012) responsible for research and archival and library development projects. Charlie grew up in Erie, Pennsylvania, where he was born in 1940. After high school, he enrolled at The Pennsylvania State University and joined the Air Force ROTC program (1959–1962), preparing students to become officers while earning a college degree, which he obtained in 1962. These early studies trained him in navigation and aerial photo interpretation, chemistry, and history. After completing undergraduate studies, he submitted his dissertation, "Classic Teotihuacán Period Settlement Patterns in the Teotihuacán Valley, Mexico," and received a PhD from Penn State in 1979. William T. Sanders and Frederick R. Matson, who were members of his graduate committee, and by Louis B. Dupree, guided his professional career.

As lecturer at Bryn Mawr College and later as assistant professor at The Pennsylvania State University, he taught courses in ethnography and Old and New World Archaeology. Kolb conducted archaeological and ecological fieldwork in central Mexico, northern Afghanistan, Uganda, and the North American Great Lakes Basin. The latter included cultural resource management for the federal government in the Allegheny National Forest and southern shore of Lake Erie. From the perspective of a Mexican scholar, the 1960s and 1970s redefined the professional field of American archaeology, giving my esteemed colleague the unique opportunity to serve the discipline in the public, academic, and applied sectors for the benefit of our discipline. Kolb was director of research and grants at Mercyhurst University for 6 years and at NEH's State Programs in the early 1990s, where he monitored the programmatic and financial operations of 19 state humanities councils reviewing budgets, program, and compliance plans and bylaws. His academic experience and public service made him an ideal officer to analyze grant applications made to the Library and Archival Materials Program and National Heritage Preservation Program to preserve and increase the availability of resources (books, manuscripts, photographs, film, sound recordings, and material culture) that were vital for research, education, and public programming in the

humanities. Indeed, Dr. Charles Kolb facilitated for many scholars the opportunity to do laboratory analysis and carry field, library, museum, archival, and field research.

Major Accomplishments

The tragic events of 9/11/2001 led the United States to combat terrorism, to strengthen immigration policies, and to invade Afghanistan. During this time, Dr. Kolb was serving the Division of Preservation and Access at NEH, and his position as Humanities Administrator made him responsible of the Iraq Initiative and Afghanistan Initiative proposals. Later, he became a consultant at the National Museum of Afghanistan, partnering with The Oriental Institute Museum of the University of Chicago, identifying and cataloging materials from Middle Paleolithic through Historic eras, as part of a post conflict need assessment. In Afghanistan, Kolb conducted workshops on ceramics and American archaeological excavations drawing upon his fieldwork with Louis Dupree with the American Museum of Natural History Expeditions to Afghanistan I–II (1965–1966), and subsequent laboratory studies of the artifacts (including ceramics) recovered there (1965–1989) (Fig. 1).

Since 2012, he consulted with the US Immigration and Customs Enforcement to determine the provenance and authenticity of smuggled Bronze Age through Islamic period artifacts, including metals and ceramics, brought illegally into the United States from Central Asia, Afghanistan, and Pakistan (the Indus Valley-Balochistan) and seized by customs authorities. Since the early 1970s, Charlie has published widely on ceramics, notably about thin orange pottery from Teotihuacán. In 1973, he published an influential contribution for ceramicists interested in the study of thin orange pottery from Teotihuacan. His technological studies are among the few articles ever published about this ware beyond stylistic analysis, as are his analyses of Central Asian Kushano-Sasanian storage jars, Hellenistic wares, and painted pottery.

"Charles Kolb has become the most critical node of the network of ceramic specialists in archaeology" (Arnold 2014:1). Kolb's contributions to ceramic studies have been persistent and indefatigable, since he organized the first ceramic ecology symposium at the American Anthropological Association meetings in 1986, together with the late Louana Lackey† (Kolb and Lackey 1988), to honor the well-known ceramics scholar, Frederick R. Matson, who was retiring from Penn State. At that time, nobody would have envisioned that they were initiating a symposium series that would continue for 33 years and counting. Called "Ceramic Ecology: An International and Interdisciplinary Symposium," this long-running symposium, even with its oxymoronic title, materializes Matson's passion for pottery, and its environmental variables, and has attracted

Kolb, Charles C., Fig. 1 Afghanistan: excavation at an Upper Paleolithic site, Aq Kupruk III, Balk Province, Afghanistan, August 1965. (Photo courtesy of Nancy Hatch Dupree. Director, Afghanistan Center at Kabul University)

more than 200 scholars and students from at least 13 nations to discuss multiple theoretical and methodological approaches for analyzing ceramics. Up until now, the "Ceramic Ecology" symposium has not made it to Grand Ball rooms, attracting visible participants and large audiences, but none have been as persistent and influential as an organizer and node for a social network for the long-term advancement of knowledge among those interested in ceramics. Dr. Charles Kolb is known for giving young scholars that needed opportunity to present their studies, introducing them to a network of professionals engaged in ceramic studies.

Charles Kolb is a "world historian of ceramics studies." His ample vision of a holistic ceramic ecology and a staggeringly broad knowledge of bibliographic information and about who is doing what in ceramic studies comes from his amazing ability to synthesize a vast amount of information and remember individual contributions and their authors, including research by younger scholars (Fig. 2). His "ceramic chronicles" have appeared in the quarterly *Society for Archaeological Sciences Bulletin* since 1988.

I concur with Dean E. Arnold (2014) in that Charlie's limitless energy has been the source to produce critical and unprecedented contributions to knowledge about ceramics, and their role in anthropology and archaeology. The Ceramic Ecology symposium continues to celebrate the critical role of Charles C. Kolb in fostering an international and interdisciplinary climate of interaction at the annual meetings of the American Anthropological Association (López Varela 2014, 2017).

Kolb, Charles C., Fig. 2 Dr. Charles C. Kolb, the most critical node of the network of ceramic specialists in archaeology

Cross-References

- ▶ Ceramic Ecology
- ▶ Ceramics: Scientific Analysis
- ▶ Cultural Ecology in Archaeology
- ▶ Dupree, Louis B.
- ▶ Matson, Frederick R.
- ▶ Provenance Studies in Archaeology

K

References

Arnold, D.E. 2014. A professional and personal view of Charles K. Kolb. In *Social dynamics of ceramic analysis: New techniques and interpretations*, ed. S.L. López Varela, 1–3. Oxford: Archaeopress.

Kolb, C.C. 1973. The thin orange pottery of central Mexico. In *Miscellaneous papers in anthropology*, Occasional papers in anthropology, ed. W.T. Sanders, vol. 8, 309–377. University Park: The Pennsylvania State University, Department of Anthropology. [Also issued as a separate monograph].

Kolb, C.C. 1977. Technological investigations of Mesoamerican 'Thin Orange' ware. *Current Anthropology* 18 (3): 534–536.

Kolb, C.C. 1997. Analyses of archaeological ceramics from classic period Teotihuacán Mexico, AD 150–750. In *Materials issues in art and archaeology V*, Symposium proceedings, ed. P.B. Vandiver, J.R. Druzik, J.F. Merkel, and J. Stewart, vol. 462, 247–262. Pittsburgh: Materials Research Society.

Kolb, C.C. 2008. Petrographic analysis of Afghanistan ceramics: Neolithic through the Iron age. In *Materials issues in art and archaeology VIII*, Symposium proceedings, ed. P.B. Vandiver, F. Casadio, B. McCarthy, R.H. Tykot, and J.L. Ruvalcaba Sil, vol. 1047, 147–174. Pittsburgh: Materials Research Society.

Kolb, C.C., and L.M. Lackey. 1988. *A pot for all reasons: Ceramic ecology revisited: Papers dedicated to Frederick R. Matson*. Philadelphia: Temple University, A Special Publication of Ceramica de Cultura Maya.

Further Reading

Kolb, C.C., ed. 1988. *Ceramic ecology revisited 1987: The technology and socioeconomics of pottery*, BAR international series. Vol. S-436. Oxford: British Archaeological Reports.

Kolb, C.C., ed. 1989. *Ceramic ecology 1988: Current research on ceramic materials*, BAR international series. Vol. S-513. Oxford: British Archaeological Reports.

Lopez Varela, S.L., ed. 2014. *Social dynamics of ceramic analysis: New techniques and interpretations*. Oxford: Archaeopress.

Lopez Varela, S.L., ed. 2017. *Innovative approaches and explorations in ceramic studies*. Oxford: Archaeopress.

Matson, F.R., ed. 1965. *Ceramics and man*. Chicago: Aldine Publishing Company.

Kondo, Yoshiro

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Basic Biographical Information

Yoshiro Kondo left an enduring influence on Japanese archaeology through his Marxist-inspired approach to the study of the Yayoi (c. eighth/sixth century BCE to third century CE) and Kofun (meaning "mounded tomb") (c. third century to sixth century CE) periods of Japan. He was born in Tochigi prefecture in 1925. His academic career started as an Assistant Professor at Okayama University. He was promoted to full Professor in 1972 and continued to work at Okayama University until his retirement in 1990. He passed away in 2009.

Major Accomplishments

One of Yoshiro Kondo's major accomplishments in archaeology was the construction of a sophisticated model of social evolution as part of the emergence of the state in Japan. This model was based on his analysis of excavations of settlements, production sites (including salt- and iron-making sites), cemeteries, and mounded tombs of the Yayoi and Kofun periods. Some of Yoshiro Kondo's most important research draws upon, albeit tacitly, the Marxist concept of the "Asiatic mode of production" and builds on the Japanese Marxist tradition of his predecessors, such as Akira Misawa (pseudonym of Sei'ichi Wajima), who had been politically purged under the militaristic-imperialistic regime before and during World War II period (see, e.g., Watabe et al. 1936). Using a Marxist theoretical approach, Yoshiro Kondo put forward a model whereby the process of social stratification culminated in the establishment of an ancient state through which kin-based communities – clans and lineages – were transformed but, importantly, preserved (Kondo 1983). This model emphasized the importance of mediation through the communal leader to ease the intra- and intercommunal/kin-group tension that arose from ever-increasing conflicts of interest arising from the constant development of the forces of production. Kondo argued that the authority and power accorded to the leader, who conducted ancestral-agricultural-communal rituals, functioned to mediate and ease these tensions and to maintain communal collaboration in the face of increasing fragmentation due to the growing autonomy of communal segments. This led to a situation in which the leader and his/her immediate kin members came to "float" above other kin-based communities, with this situation normalized by the community as a whole through ritualistic mediation. Kondo's model resembles the famous "epigenetic model" of social evolution put forward by Friedman and Rowlands (1977) in its explanation of the formation and transformation of the "Asiatic state," in particular. However, Kondo's model provides a more nuanced and believable explanation of the prolonged preservation of kin-based communities in the process of social stratification.

In the early 1950s Yoshiro Kondo pioneered the mass involvement of the general public in archaeological practice and knowledge production in Japan. This can be characterized as an early attempt at public archaeology. While the aim of his excavations was to verify his stratification model, Yoshiro Kondo organized the excavation of the Tsukinowa tumulus so as to involve the general public in the process of archaeological knowledge production. The Tsukinowa tumulus is a round tumulus with a small rectangular terrace

attached to the main mound and dates from the early fifth century CE, situated in the Yanahara (presently Misaki) township of Okayama prefecture (Kyodo-kenkyu Tsukinowa kofun henshu-bu 1960; Kondo 1985). More than 10,000 volunteers were involved in the excavation that took place in 1953. These were mainly, but not entirely, from the Yanahara township and included schoolteachers; primary school, middle school, and high school students; university students; and Koreans in Japan. Through these excavations the entirety of the cobble-covered mound was revealed for the first time in the history of Japanese archaeology. Excavations were undertaken by the main mortuary facility situated on the top of the mound, comprised of two clay-packed dug--out log coffin burials and another clay-packed dug-out log coffin burial on the rectangular terrace. The objective of these excavations was clearly stated, thus to reveal the character of the power of the local despotic ruler and the mechanism of its development. However, they were also aimed at encouraging the general public to learn their local history, think about the origin of the emperor system, and reflect upon its ideological implications in contemporary politico-economic/social situation (Kyodo-kenkyu Tsukinowa kofun henshu-bu 1960). Together with the local people, Yoshiro Kondo organized seminars on this important history.

The Tsukinowa excavations had many characteristics which can be described as precursors to today's public archaeology. Evaluation of the achievements of this project should be undertaken in the light of the politically instigated (communist-leaning) mass-movement called *Kokumin-teki rekishi-gaku undo* (movement for the establishment of the history of the Japanese people), which rose as the post-World War II reformation movement was reaching its peak.

Deriving from the success of the Tsukinowa excavation, Kondo also founded *Kokogaku kenkyu-kai* (The Society of Archaeological Studies) in 1954. Its journal was originally called *Watashitachi no kokogaku* ("Our Archaeology") and featured reports and essays from amateur enthusiasts as well as professionals and academics. However, as the post-World War II reformation movement ceased, postwar economic difficulties were overcome and rapid economic development began. The movement for establishing a community-engaged history of the Japanese people ceased with disillusionment. The editorial policy for the journal *Watashitachi no kokogaku* changed towards the aim of transforming the journal into a professional academic journal, and its name was changed to *Kokogaku-kenkyu* ("The Quarterly of Archaeological Studies") in 1960. Though much transformed in its outlook, *Kokogaku kenkyu-kai* (The Society of Archaeological Studies) still retains its original spirit of promoting socially responsible archaeological practice.

Around this time, Kondo's research increasingly focussed on excavations which sought to identify the prototype of the Kofun keyhole tumulus in order to elaborate his model by revealing the process of transition from the Yayoi to the Kofun period. Through these excavations Kondo revealed that the Kofun keyhole tumulus emerged as a consequence of social hierarchization and its ideological-ritualistic mediation. These excavations no longer involved the general public.

During the 1980s, Yoshiro Kondo organized and led a major project that compiled a compendium of all the known keyhole tumuli across the archipelago and arranged them into the ten-phase relative chronology which is accepted today as a standard chronological framework of the Kofun period (Kondo 1991–2000). In 1983, Kondo published the seminal work *Zenpo-koen-fun no jidai* ("The Age of the Keyhole Tumulus"), which is one of the finest and most influential archaeological historiographies ever produced in Japan.

The trajectory of Yoshiro Kondo's research career reflects the transformation of post-World War II Japanese society and archaeology. His remarkable efforts in public archaeology in the 1950s were ahead of their time and gave way to a self-conscious professionalization of the discipline in the 1960s. Kondo's model of continuity in kin-based communities as part of the process of social stratification was the dominant research paradigm in the archaeological study of social stratification and state formation in Japan during the 1960s–1980s and remains highly influential today.

Cross-References

▶ Marx, Karl
▶ "Public" and Archaeology
▶ Public Archaeology, The Move Towards

References

Friedman, J., and M.J. Rowlands. 1977. Notes towards an epigenetic model of the evolution of 'civilisation'. In *The evolution of social systems*, ed. J. Friedman and M.J. Rowlands, 201–276. London: Duckworth.

Kondo, Y. 1983. *Zenpo-koen-fun no jidai [The age of the keyhole tumulus]*. Tokyo: Iwanami Shoten.

Kondo, Y. 1985. Tsukinowa kofun no seiritsu to seikaku [The background of the construction and the character of Tsukinowa tumulus]. In *Nihon-kokogaku kenkyu-josetsu [The treatise of the study of Japanese archaeology]*. Tokyo: Iwanami-shoten.

Kondo, Y., ed. 1991–2000. *Zenpo-koen-fun shusei [The compendium of the keyhole tumuli]*. Tokyo: Yamakawa-shuppan.

Kyodo-kenkyu Tsukinowa kofun henshu-bu, ed. 1960. Tsukinowa kofun: Okayama ken Kume gun Yanahara machi Yuka [Tsukinowa tumulus: Yuka, Yanahara town, Kume county, Okayama prefecture]. Tsukinowa Kofun kanko-kai.

Watabe, Y., J. Hayakawa, K. Izu, and A. Misawa. 1936. *Nihon rekishi kyotei, volume 1: Genshi- shakai no hokai made [The course in Japanese history, volume 1: To the collapse of ancient society]*. Tokyo: Hakuyosha.

Further Reading

The Japanese journal *Watashitachi no kokogaku*, issues published in the 1950s.

The Japanese journal *Kokogaku-kenkyu*, issues published in the early 1960s.

Kondoa Rock Paintings: Traditional Use

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Introduction

There are approximately 1,500 rock painting sites situated in the semiarid area of Kondoa District, located within the Dodoma Region in Central Tanzania. These sites are found primarily in granite and gneiss rockshelters. The majority of these sites have rock paintings, with only two exceptions having been reported: rock engraving sites to the west of Kondoa at Usandawe. Common painted motifs are animals, human, and various geometric designs. These rock painting sites do not only contain rock paintings but also have a rich archaeological record dating from the Middle Stone Age (MSA) right up to the Iron Age (Masao 1979; Kessy 2005). Some of the rockshelters, notably the *Mongomi wa* Kolo shelter and its surrounding environments, are also connected to living heritage. This site and its landscape have been used by local people, the Warangi and Waasi, for traditional ritual ceremonies (Leakey 1983; Chalcraft 2005; Bwasiri 2011).

Kondoa sites are National Monument under the Antiquities Act of Tanzania (1964 as amended 1979). In July 2006, UNESCO declared the rock paintings of Kondoa as a World Heritage Site under criteria iii and vi (see Antiquities Division 2004). This is an acknowledgement of its international significance, its authentic beauty, and its living heritage. This entry discusses and describes four types of researchers who have worked on the Kondoa rock paintings and provides a brief speculative discussion on age of the paintings. The management and cultural tradition of the sites are also discussed.

Key Issues/Current Debates/Future Directions/Examples

Group 1: Amateur Recorders

Amateur recorders have included colonial administrators and officials who discovered rock paintings in the course of their duties (Bagshawe 1923; Aitken 1948; Fozzard 1959). Reports from these amateur recorders were generally descriptive and discussed the location and content of the paintings. Some reports categorized rock paintings according to style and pigment color to establish typologies (Aitken 1948; Fozzard 1959). For example, Aitken (1948) found that red- and purple-colored figures were older than any others in all cases of superimposition. These two colors and associated naturalistic style which include

human, animal, and few geometric figures were linked to Stone Age people. A similar observation was made by Leakey (1936). Both Aitken and Leakey recognized that the white and black colors were relatively recent. They suggested the Bantu-language speakers or Pastoralists were the authors of the rock art in Kondoa but the specific group responsible for the rock paintings is unknown.

Group 2: Early Research

The earlier reports were improved and refined by subsequent studies undertaken by a number of professional archaeologists (Masao 1979; Leakey 1983; Anati 1986). Mary Leakey is the one who made Kondoa paintings known worldwide. She conducted a comprehensive survey and documented dozens of painting sites which had never been reported previously. A total of 186 rock painting sites were surveyed and recorded, 43 sites were traced, and over 1,600 figures were recorded. In her work, the book entitled *Africa's Vanishing Art* described the rock painting of Kondoa (see Leakey 1983: 1). From this later research, a system of categorizing the paintings according to style and pigment color was adopted. Scholars in this phase also considered subject matter, technique application, and social economic activities (Masao 1979). The color of the paintings provided the primary variable by which styles were divided. They identified phases of rock painting styles and analyzed the placement of these styles within the complex superposition sequences found in many of the larger Kondoa sites.

Masao (1979) produced four chronological cultural sequences that were based on color, subject matter, and technique of application. He defined the kinds of stylized representations into four distinct categories: "naturalistic, semi-naturalistic, silhouette, and abstract/geometric." Masao's naturalistic paintings were the oldest and belong to the indigenous people of the area (Fig. 1). These represent the work of ancestors of modern hunter-gatherers of Kondoa District conspicuously Hadza and Sandawe click speakers (Masao 1979). Leakey (1983) produced nine style bases from 186 sites, while Anati (1986) identified six styles which were thought to represent the chorological sequences and economic activities of the artists. This group of researchers similarly identified that the finger-painted black (Fig. 2) and white (Fig. 3) images are recent and can probably be attributed to Pastoralists or Bantu-language speakers, while red motifs are the oldest forms. While providing more empirical basis, these descriptions and formal classifications failed to provide a clear understanding of which ethnic group was responsible for which traditions within the Kondoa rock paintings sequence. This created a major problem for understanding the Kondoa rock paintings.

Kondoa Rock Paintings: Traditional Use, Fig. 1 Example of rock art created by indigenous people

Kondoa Rock Paintings: Traditional Use, Fig. 2 Example of rock art with finger-painted black images, attributed to pastoralist or Bantu-speaking people

Kondoa Rock Paintings: Traditional Use, Fig. 3 Example of rock art with finger-painted white images, attributed to pastoralist or Bantu-speaking people

Group 3: Ethnographic Approaches

A third group of researchers attempted to establish the meaning of the paintings by considering the relationship between the paintings and the ritual beliefs of the indigenous people. The idea of understanding rock paintings through ethnography had already been effectively used in southern Africa to study San rock art (Lewis-Williams 1986).

The use of ethnography to interpret rock paintings of Kondoa was initially used by Ten Raa. Ten Raa (1971) recognized three categories of rock paintings made by Sandawe, namely, casual, magic, and sacrificial rock paintings. Casual rock paintings are made without ritual association but painted on a particular occasion such as an unsuccessful hunt, when an accident occurred or where there was sickness in the family. Magic rock paintings were associated with hunting rituals and practices before a hunt. In their hunting rituals, the Sandawe performed rites of inductive magic with the hunter making an effigy of the animal he hoped to kill. Sacrificial rock painting involved sacrifices to clan spirits on hills in clan

property. The sacrifice was performed away from the residence, mostly at the foot of a large bolder or overhanging rock. Ten Raa linked some paintings to the specific Sandawe ritual of *simbò* (Ten Raa 1971).

Lewis-Williams (1986), using Ten Raa's writings describes *simbó* as a spirit control cult. According to Lewis-Williams, *simbó* is the ritual of being a lion. During *simbó* Lewis-Williams suggests that *simbó* dancers are believed to turn into lions rather than being possessed by spirits. *Simbó* dancers fight off evil spirits. Lewis-Williams, drawing from San trance dances, suggests that both *simbó* dancers and San medicine men attribute the ability to know things from afar to extra-earthly travel. Lewis-Williams' analysis suggests ways of studying hunter-gatherer paintings by considering specific features in the rock painting in relation to the Sandawe ritual *simbó*.

Like Lewis-Williams, Imogene Lim (1992) undertook research on Kondoa rock paintings in the Usandawe area. Lim attempted to interpret the rock paintings by combining both the physical environment and the social context of the site using "a site-oriented approach to rock art." This approach focused on the relationship between the rock paintings and sites, sites and the landscape, and the landscape and the community. Lim concentrated on understanding the Sandawe beliefs and how these beliefs were linked to the rock paintings. She recognized that most of the Sandawe sacrifices were held on the hill; therefore, she considered hills as important points in a symbolic landscape. From this observation, Lim suggested that the hill is the second object in the process of studying rock paintings, while the belief system is the first. According to Lim, the meaning and the potency of a place are produced through ritual activities (1992).

Lim also participated in a Sandawe traditional ceremony associated with the birth of twins, which is known as *iyari*. The ceremony is conducted in order to protect both the mother and her twins from lightning. Combining the painting analysis, oral traditions and *iyari* ceremony gave her confidence to link the ceremony practices to the production of some of the rock painting images in the Usandawe area (Lim 1992). The works of Ten Raa (1971), Lewis-Williams (1986), and Lim (1992) form the basis for understanding of the original meaning of the paintings through traditional ritual practices.

Age of the Paintings

While the issue of authorship and meaning is not yet resolved, the age of the paintings is also still a source of speculation. Using stylistic sequences, subject matter of the paintings, and history of the groups inhabited in Kondoa, Anati (1986: 24) suggested that the paintings might date as far back as 40,000 years ago. The Anati's date was not supported by any archaeological evidence and it was questioned by other researchers. Mabulla (2005: 20) suggested that the surviving paintings probably date to between 20,000 and 1,000 years ago. Other researchers place a maximum age of 10,000 years (Coulson and Campbell 2001), while Masao (1979: 55, 92) using archaeological deposits from Kandaga rock painting site and *Mongomi wa Kolo* sites suggested an age range of 3,500 years for early paintings and 200 years ago for recent paintings.

Although the age of paintings in Kondoa is still controversial, the oldest known date for African paintings was calculated from 15 radiocarbon dates, taken from occupation layer in Apollo 11 cave in southern Namibia. It dated back at least to 27,000 years (see Wendt 1976). Another early date, from Matopos in Zimbabwe, is from a flaked spall of the painted wall in the Cave of Bees which was incorporated in the archaeological deposit. Charcoal from the relevant layer was dated to about 10,500 BP (Thackeray 1983). The exact age of the paintings is unlikely to be resolved until direct dating of exposed parietal paintings is available.

Group 4

A fourth group of researchers (including myself) focus on management of rock painting sites and associated living heritage. The genesis of this approach commenced in 2000 when the Antiquities Department of Tanzania asked the World Heritage Site committee to inscribe the Kondoa rock paintings onto World Heritage List. Inscription onto the World Heritage List required the

implementation of various important management measures for Kondoa rock paintings. This started with a lengthy nomination process where expert heritage management consultants evaluated the paintings and associated living heritage (see Chalcraft 2005). The Chacraft findings showed some sites (particularly *Mongomi wa* Kolo) have living heritage associated with local people. The living heritage of sites needs protection in addition to rock paintings (Bwasiri 2011). The process involved seminars and meetings between the heritage authority and the local associated community. As part of the nomination process, the Department of Antiquities also constructed a new Kolo office in 2002, to accommodate the Antiquities staff and to provide a place for interpretative displays. The Kolo office now has four staff members (including the author) and two trained guides who are custodians of the Kondoa rock paintings' World Heritage Sites.

Traditional Use of Some Kondoa Rock Painting Sites

African archaeological sites including rock art in precolonial and the early colonial periods were managed by Africans without any written law. Many archaeological sites had traditional custodians who managed the sites through a series of taboos, rituals, and restrictions. The traditional custodian was chosen from the clan which used the site for their activities and rituals. Custodians decided who had the right to enter a site. Custodians usually fell under a traditional authority system made up of headmen and chiefs. All sections of this system had commitments and responsibilities for the protection and maintenance of cultural heritage. If a problem occurred, all levels would be held accountable and action would be taken. At Kondoa rock paintings particularly *Mongomi wa Kolo* site and surrounding sites Kolo BII and BIII, there was a complex system of traditional management made up of *mwenese* who is head of the land from the Warangi and *hapaloe* head of land from Waasi (Bwasiri 2011). Apart from traditional use of the sites, *Mongomi wa* Kolo and Kolo BII and BIII are also an interpretation focus for both school children and tourists.

The three rock painting sites have religious and spiritual associations with the local communities from nearby villages such as Waasi and Warangi (Bwasiri 2011). The Waasi is a Southern Cushitic group who arrived Kondoa perhaps 2,500 years ago (Bower 1973) before Warangi, while the Warangi is a large group of Bantu-language speaker who arrived in Kondoa about 600 years ago (Kessy 2005). Both groups interact and have cooperated and shared rituals such as rainmaking under their leadership *hapaloe* and *Mwenesi* (Fosbrooke 1958). The Waasi and Warangi continue to use *Mongomi wa* Kolo rock painting sites for traditional ritual. The diviners, healers, and rainmakers use the site and surrounding environment to conjure up visions and communicate with the spirits. Oral tradition from one of the traditional healers said that she visits the site five times a month with goats/sheep or chickens for curing sick people. She is *mwenese* who practices ceremonies at *Mongomi wa* Kolo (Fig. 4). Her clients come from Arusha, Dodoma, Kondoa town, and the neighboring villages (Bwasiri 2011).

Rainmakers from a nearby village also practice rituals at *Mongomi wa* Kolo three times a year. These rituals are scheduled at the start of the year (November/December when the first rains come), a second time to ask the spirit to bring good rains at the end of February, and a third, when the cereal crops have matured, to thank the spirit for giving a good harvest. The rain ceremony is controlled by the *hapaloe*. Along with diviners, healers, and rainmakers, individuals also come to *Mongomi wa Kolo* for divination. Oral traditions indicate that *Mongomi wa* Kolo is more powerful than other spiritual places in and around Kondoa (Bwasiri 2011). However, nowadays local people are restricted by Antiquities staff because some rituals (such as splashing water) deteriorate the paintings. Such rituals continue but are by necessity performed in secret. The current management system does not facilitate the living heritage, and local people connected with the art were excluded from management and decision-making about these sites (see Bwasiri 2011).

Kondoa Rock Paintings: Traditional Use, Fig. 4 Traditional healer who practices ceremonies at *Mongomi wa* Kolo

Conclusion

The Kondoa paintings are important because they retain unique cultural heritage resources both tangible and intangible. The indigenous people around the area continue to use the site for ritual practices of rainmaking and healing, and there is potential for educational and economic values for the local community and the country as whole. While the sites are recognized nationally and internationally, there remains the challenge to establish the painting chronology: authorship and meaning are still contested. The exclusion of living heritage and associated peoples into management and decision-making on the sites also is a challenge and this requires urgent resolution.

Cross-References

► Tanzania's History and Heritage

References

Aitken, W.G. 1948. Report on a certain sites of archaeological interest in Kondoa Irangi district. M/S, Kondoa district books. Microfilm, National Archives, Dar es Salaam, Tanzania.

Anati, E. 1986. *The mountain of God: Har Karkom*. New York: Rizzoli.

Bagshawe, F.J. 1923. Rock paintings Kengeju Bushmen, Tanganyika Territory. *Man* 23: 146–147.

Bower, J.R.F. 1973. Serenora: Excavations at a Stone Bowl site in Serengeti National Park, Tanzania. *Azania* 8: 71–104.

Bwasiri, E.J. 2011. The implications of the management of indigenous living heritage. The case study of *Mongomi wa* Kolo rock paintings world heritage sites, central Tanzania. *Southern Africa Archaeological Bulletin* 194: 129–135.

Chalcraft, J. 2005. Varimu Valale: Rock art as world heritage in a ritual landscape of central Tanzania. In *The qualities of time: Anthropological approaches*, ed. W. James and D. Mills, 35–54. Oxford: Berg.

Coulson, D., and A. Campbell. 2001. *African rock art*. New York: Abrams.

Division, Antiquities. 2004. *Nomination dossier: Kondoa rock art sites*. Antiquities Division: Dar es Salaam.

Fosbrooke, H.A. 1958. Blessing the year: A Wasi/Rangi ceremony. *Tanganyika and Records* 50: 21–29.

Fozzard, P.M.H. 1959. Some rock paintings in south and south-west Kondoa-Irangi district, Central Province. *Tanganyika Notes and Records* 52: 94–110.

Kessy, E.T. 2005. The relationship between the later Stone and Iron Age culture of central Tanzania. Unpublished PhD dissertation, Simon Fraser University.

Leakey, L.S.B. 1936. *Stone Age Africa*. Oxford: Oxford University Press.

Leakey, M. 1983. *Africa's vanishing art*. London: Hamish Hamilton.

Lewis-Williams, J.D. 1986. Beyond style and portrait: A comparison of Tanzania and southern African art. In *Contemporary studies on Khoisan*, ed. R. Vossen and K. Keuthman, vol. 2, 93–139. Hamburg: Helmut Buske Verlag.

Lim, I. 1992. A site oriented approach to rock art: A study from Usandawe, central Tanzania. Unpublished PhD dissertation, Brown University.
Mabulla, A.Z.P. 2005. The rock art of the Mara region, Tanzania. *Azania* 40: 19–41.
Masao, F.T. 1979. *The later Stone Age and the rock paintings of central Tanzania*. Wiesbaden: Franz Steiner Verlag.
Ten Raa, E. 1971. Dead art and living society: A study of rock paintings in social context. *Man* 8: 42–58.
Thackeray, A.I. 1983. Dating the rock art of southern Africa. *South African Archaeological Bulletin* 31: 5–11.
Wendet, W.T. 1976. 'Art mobilier' from the Apollo 11 cave, South West Africa: Africa's oldest dated works of art. *South African Archaeological Bulletin* 31: 5–11.

Further Reading

Cory, H. 1944. Sukuma twin ceremonies: Mabasa. *Tanganyika Notes and Records* 17: 34–43.
Wilson, M. 1954. Nyakyusa ritual and symbolism. *American Anthropologist* 56: 288–241.

Kono, Toshiyuki

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Basic Biographical Information

Toshiyuki Kono is professor of law at Kyushu University, Japan. He received his LL.B. and LL.M. from Kyoto University, Japan.

Major Accomplishments

Between 1997 and 1999, Toshiyuki held the position of secretary general of ICLAFI (ICOMOS International Scientific Committee on Legal, Administrative and Financial Issues) and, since 2010, has been vice president of Japan ICOMOS. Other positions include are vice president and titular member of the International Academy of Comparative Law, chairman of the Committee for Intellectual Property and Private International Law, and chairman of the Committee for Cultural Affairs of the UNESCO National Commission, Japan.

His main research fields are private international law, international civil litigation, and heritage law, including international enforcement of intellectual property right and litigation and economic analysis of conflict of laws. He also served as a member of an experts group to draft a Convention for Safeguarding Intangible Cultural Heritage, and of Japanese Delegation and Convention for the Protection and Promotion of the Diversity of Cultural Expression. He currently serves as a member of Intergovernmental Committee of the Intangible Heritage Convention to draft its Operational Directives.

Cross-References

► Intellectual Property Issues in Cultural Heritage (IpinCH) Project
► Japan: World Heritage
► Legislation in Archaeology: Overview and Introduction

Further Reading

Anderson, J. 2009. *Law, knowledge, culture: The production of indigenous knowledge in intellectual property law*. Cheltenham: Edward Elgar Press.
Kono, T. 2009. *Intangible cultural heritage and intellectual property: Communities, cultural diversity and sustainable development*. Antwerp: Intersentia.
Kono, T. 2010. *The impact of uniform laws on the protection of cultural heritage and the preservation of cultural heritage in the 21st century*. Leiden: Martinus Nijhoff.
Vrdoljak, A.F. 2009. Cultural heritage in human rights and humanitarian law. In *Human rights and international humanitarian law*, ed. O. Ben-Naftali, 250–302. Oxford: Oxford University Press.

Kosova: Archaeological Heritage

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Introduction

Since the prehistoric period until today, people in the present territory of the Republic of Kosova

have developed their cultural heritage. They left to their descendants abundant material sources on cultural values. Therefore, Kosova has a rich diversity of architectural heritage (cultural monuments, ensembles of buildings, architectural conservation areas), archaeological heritage (constructions, structures, and groups of buildings; monuments of various kinds and their contents, found on land or underwater; and cultural landscapes), and movable heritage (objects that are the expression or evidence of human creativity or of natural development, distinguished by values of historical, archaeological, artistic, scientific, or spiritual importance and interest).

"The Evidence of Cultural Heritage" is an important process in the protection of cultural heritage, especially intensively from 2001 until today. The evidence has been gathered by the central and regional institutions of the protection of cultural heritage of Kosova, assisted by international institutions. During the period 2001–2005, approximately 2,800 objects of cultural heritage were recorded. The greatest part of these was created during the Ottoman period (1455–1912). The others belong to the Illyrian-Dardanian, Roman, Paleochristian, Byzantine, and Serbian periods. Despite limited financial means in the Republic of Kosova, special attention is paid to prehistoric, antique, and medieval archaeology. Due to political circumstances, this heritage has been and still is instrumentalized. The inadequate treatment of archaeological localities after excavation, which normally should be associated with archaeological conservation, publication, maps, presentation, parks, and signage for localities, is worth emphasizing.

The cultural heritage of Kosova in general, as well as the archaeological one in particular, due to the daily politics, has been faced with the problem of compilation of the list for the protection of monuments of culture, which even nowadays has not been finalized, and as such currently, it is named "List of Cultural Heritage for Temporary Protection, 2016/2017," which includes 1534 assets of cultural heritage. 416 of them are identified as assets of immovable archaeological cultural heritage whereas 200 as assets of movable archaeological cultural heritage (Republic of Kosova, Ministry of Culture, Youth and Sport: 4866/2016). Along with this document, in 2016 another document named "List of Cultural Heritage in the Permanent Protection" was compiled, with only 23 archaeological assets. From them, nine assets belong to archaeological heritage: Ulpiana/Iustiniana Secunda, the Fortress of Prizren, Harilaq, Keçikollë, Korishë, Vushtrri, Veletin, the locality of Dërsnik to Klinë and the locality of Fusha e Madhe with Tumulus in Vitia/Vitina (Republic of Kosova, Ministry of Culture, Youth and Sport: 4889/2016–2). A great advance in this direction was made with the inclusion under the protection of UNESCO of "Medieval Monuments in Kosovo," such as the Deçan/Dečani Monastery (was included in 2004), the Pejë/Peć Patriarchate, the Monastery of Graçanica, and the Kisha e Zojës Prene/Bogorodica Ljeviška church of Prizren (were included in 2006) (Available at http://www.unesco-hist.org/en us/news/1051.html; http://whc.unesco.org/en/list/724; http://www.worldatlas.com/articles/unesco-world-heritage-sites-in-serbia-and-kosovo.html. accessed 5 April 2017).

Cultural heritage is among the first victims in any conflict. The war in Kosova is no exception. In the territory of Kosova during the war of 1998–1999, approximately 1,025 objects of cultural heritage were destroyed. Among them were two manufacturing complexes known as çarshia, mosques and tekkes, Orthodox and Catholic churches and monasteries, kullas as traditional Albanian stone tower houses, etc. (Herscher and Riedlmayer 2001: 3–25 & appendix of Building Identification; Drançolli 2017: 139–199; Hoxha 2012: 39–46). The long series of destructions of cultural heritage started symbolically with the opening of a water canal in 1995, which, passing through the archaeological localities of Ulpiana, had taken a part of the city's remains and also a part of an Early Christian monument of the fourth to sixth centuries (Karović and Mehmetaj 1996: 67–69). With the support of foreign embassies and international organizations, the abovementioned objects were subject of restoration and conservation. Also, in the following years, for the protection of cultural heritage, the application for Protection Zones and Special Protective Zones was ratified according to the law of Kosova's cultural heritage, law on spatial planning, and

also the plan of Martti Ahtisaar (Ahtisaari 2007: 37–42). The experience has confirmed difficulties in harmonizing all positions related to the establishment of zones and particularly in defining the mechanism for the management of the zones (Law No.02/L-8/2006; Law No. 04/L-174/2013).

Historical Background

The beginnings of the archaeology of Kosova are found in the studies of scholars and travelers of the nineteenth century. They showed interest and offered information regarding the archaeological monuments of Kosova. In this context, it should be emphasized that the archaeology of Kosova dates from the nineteenth century with the work of Sir Arthur Evans (1851–1941): his "Antiquarian Researches in Illyricum." Other prominent figures of the period were the Austro-Hungarian scholar Felix Philipp Kanitz (1829–1904), the Hungarian archaeologist Buday (1879–1937), Camillo Praschniker (1884–1949), Arnold Schober (1886–1959), Walter Jesse Fewkes (1850–1930), Anton Von Premerstein (1869–1935), and Alfred Von Domaszewski (1856–1927). The archaeologist Domenico Mustilli (1899–1966) wrote a brief monograph in the Italian language regarding the archaeology of Kosova. The first archaeological excavations in Kosova were carried out by Austro-Hungarian troops during World War I at Neprebisht, near Suharekë (1914–1915), and at Gradina of Pejë and its surrounding area (1917–1918). A series of archaeological excavations and surveys of this period in the region of Pejë and Mitrovicë made by the distinguished archaeologist of the time, Dr. Buday, are also known. Dr. Buday achieved to rectify some generalized conclusions of the British archaeologist, A. Evans, regarding the localities of the regions in question. Therefore, during the years 1917–1918, Dr. Buday wrote about ancient Pejë's ruins that they were situated in the vicinity of the city and were surrounded in an irregular quadrilateral form. He presented these findings in a sketch as well. In this context, he also wrote about the Municipium DD (Dardanorum) to Soçanica, Paleochristian Church in Studenica of Istog, etc. The Catholic priest Shtjefën Gjeçovi, a pioneer of the archaeology of Kosova, also carried out excavations in the Hasi region near Prizren until his murder in 1929 (Buday 1918: 77–83, 85–86, 99; Cecić 1984: 267; Elsie 2011: 30). Nevertheless, although some distinguished Yugoslav scholars, such as Nikola Vulić (1872–1945), Ćiro Truhelka (1865–1942), Grga Novak (1888–1978), and Milan Budimir (1891–1975), were engaged into the researching of Dardanian heritage in the period between the two world wars, archaeology in Kosova still lacked any professional institutions, and generally the level of its research remained very low (Vulić 1925: 63–76; Truhelka 1929: 65–85; Novak 1929: 72–89; Budimir 1937: 1–29).

It is important to emphasize the fact that the first publication dedicated to the archaeology of Kosova, titled "Archeologia del Kossovo" written by the Italian archaeologist Domenico Mustilli (1899–1966), was during the first part of World War II (Mustilli 1942: 93–111; Available at: http://www.treccani.it/enciclopedia/domenico-mustilli_(Dizionario-Biografico)/. accessed 11 June 2017). This unique study, for a long time, would remain the only study with direct content regarding the archaeology of Kosova, until 1998, when a two-volume publication on this issue was published.

In the first years after World War II, the archaeological work would mainly focus on the field archaeological probe, on the evaluation of the localities, and on the collection of the movable archaeological artifacts. With the founding of the Museum of Kosova (1949) and the Kosova Institute for the Protection of Cultural Monuments (1949), archaeological research was completed in a more adequate manner. At that time, almost one century after the consolidation of European archaeology as a discipline, the first steps of institutionalization of archaeology of Kosova were encountered. In such circumstances, in addition of the abovementioned institutions, the archaeological scientific activity was developed in the Albanological Institute (Prishtinë, 1953), Department of History of the Faculty of Philosophy (Prishtinë, 1962), etc. During this phase, an important role in the development of research in the field of archaeological heritage was played by the

scientific work of the archaeologist Dr. sc. Emil Čerškov (1929–1969), who would be distinguished for the foundation of the Archaeological Department in the Museum of Kosova (1950). It is worth mentioning that Čerškov also started and was the editor of the scientific journal of the Museum of Kosova, *Bulletin du Musée de Kosova et Metohie*. Čerškov, from the beginning of his arrival through the systematic archaeological excavations, laid the foundations in the best-known localities of Kosova, such as Tjerrtore/Predionica (Prishtinë, 1951, 1956, 1962), Novobërdë/Novo Brdo (1951), Ulpiana/Iustiniana Secunda (1953–1959), Municipium DD (Dardanorum) near Soçanica (1956, 1959–1965) which was also the topic of his doctoral thesis (Belgrade, 1965), etc (Novaković 2011: 435–440). Along with these excavations, the arrival of any other archaeologist in the new institutions of archeological heritage of Kosova would intensify new archaeological excavations in certain important Neolithic localities: Glladnicë/Gladnica (Graçanicë, 1956, 1959), Fafosi (Mitrovicë, 1955, 1961), Karagaç (Zvečan, 1955, 1960), Vallaç (1955/1957), Zhitkoc/Žitkovac (Zvečan, 1955, 1958, 1960), Runik/Rudnik (Skenderaj, 1966/68), and Reshtan (Suharekë, 1966/67) (MK/A 1951–1970: registries; Srejović 1997: 276, 314, 440–1, 848, 878–9, 1083–4).

A great political turning point in socialist Yugoslavia, in the 1970s, was accompanied with a progress and new opportunities in the foundation and advancement of national institutions in Kosova such as the University of Prishtina (1969), Academy of Sciences and Arts of Kosova (1975), and Institute of History (1977), followed by the foundation of other cultural and scientific institutions. These institutions have started also the cooperation with equivalent institutions in other republics of ex-Yugoslavia: Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Serbia, and Slovenia. In addition a significant cooperation with the Socialist Republic of Albania was marked. The abovementioned cooperation brought a number of publications and staff education and promotion in the field of cultural and archaeological heritage. In this context, particularly should be emphasized the joint archaeological excavations and research of scientific and professional teams of Kosova and Serbia in Kalaja of Prizren and in Bellacërkë near Rahovec, under the supervision of Dr. J. Kovačević; in prehistoric tumuli of Romaja, about 20 km in Northwest of Prizren (1971); in the locality "Boka," which is a Dardanian necropolis in the village Përçevë near Klinë in Gllarevë of Klinë an archaeological locality of the Middle Bronze Age and Early Iron Age, headed by K. Luci (1986); in tumulus of the Iron Age in Llashticë/Vlaštica, 10 km northeast of Gjilan, which was a project realized by the cooperation of relevant institutions of Kosova and Albania during 1980–1981 (MK/A 1980–1986: registries); in systematic archaeological excavation of Ulpiana from 1981 to 1987; scientific research in the project "Historical Atlas of Kosova in Middle Ages"(1975–76); and in some other projects of rescue excavations or of surveys (Ivić 1988: 15–16). From the abovementioned cooperations in the field of cultural heritage, a series of publications emerged, such as the results from the convention "Kuvendi I i Studimeve Ilire" held in Tirana on 15–20 September 1972 (Buda 1974: 5–8); the monograph "Kosova, dikur e sot/Kosova, nekad i danas" (Maletić 1973: 69–128); the monograph *The Albanians*, published in Ljubljana, where, among other issues, cultural-archaeological questions of the Antiquity and Middle Ages were included (Stanič 1984: 11–35); the publication of the first two volumes in Albanian language of *Encyclopedia of Yugoslavia*, with important information also regarding the development of cultural-archaeological heritage in Kosova, published in Zagreb in 1984 and 1987 (Cecić 1984: 188–209, 259–287 s.); *Prehistory of the Yugoslav Countries*, edited by the archaeologist A. Benac, published in Sarajevo, with important scientific findings also about Kosova from the Neolithic period until the Antiquity period (Benac 1979: 9–12); several-volume publication *Inscriptiones de la Mésie Supérieure*, edited by P. Petrović, F. Papazoglou, and B. Dragojević-Josifovska, which would enrich knowledge from the field of epigraphy in the Dardanian area through the Roman period.

The period 1989–1999, when the suprimation of autonomy of Kosova occurred, marked the regress and even the total interruption of development of archaeology and the cultural heritage in general. From June, 1999, when UN and other international institutions entered Kosova, the institutions for the protection of cultural heritage restarted their activities. At the same time, central institutions for the protection of monuments (Institute for the Protection of Monuments of Kosova and Museum of Kosova) were accompanied by the foundation of regional institutions such as the Institutes for the Protection of Monuments, which from 2012 began to be called Regional Centres for Cultural Heritage, based at Prishtinë, Prizren, Pejë, Mitrovicë, Gjakovë, and Gjilan. In this context, in Kosova, after 1999 was also founded a series of institutions of local/municipal level in the municipalities of Deçan, Dragash, Ferizaj, Graçanicë, Istog, Kaçanik, Mamuşa, Podujevë, Kamenicë, Leposaviq/Leposavić (there are also several parallel institutions), Novobërdë/Novo Brdo, Rahovec, Vushtrri, etc. In addition, in 2003, the Archaeological Institute of Kosova, with its first director Jahja Drançolli, was founded. Although in their beginnings, in the emergency phase, the UN and other international institutions that entered Kosova had their priority to reconstruct the country and increase the economic resources, the Museum of Kosova, headed by Kemal Luci, who achieved to sign a joint project with the Archaeological Institute of Tirana, headed by Muzafer Korkuti. This cooperation was implemented during the period 2000–2005, where it would include the region of the basin of Drini i Bardhë river, and was also carried out, which pervades Rrafshi i Dukagjinit and a part of the Northeastern Albania. The river has a length of 175 km and a basin surface of 4,956 km^2. The surveys were conducted during the years 2000–2005 in the region of Drini i Bardhë (Pejë, Deçan, Klinë, Rahovec, Prizren, Dragash, Suharekë, and Malishevë). The findings of the project in question resulted in the first volume of the *Archaeological Map of Kosova* (Bunguri et al. 2006: 27–127; Përzhita et al. 2006: 129–195), the edition which is considered the first of this kind in Kosova and as such served as an important scientific model for the edition of the second volume of the *Archaeological Map of Kosova* (2012), published by the Archaeological Institute of Kosova. This institute, which had gathered new staff educated in Zadar, Zagreb, Vienna, Tirana, and any other center of Germany and France, enacted series of new archaeological excavations in localities dated from different prehistorical and historical periods: Graboc i Ulët, Hisar, Çifllak, Polac, Kalaja of Prizren, Harilaq, Korishë, Rogovë, Vlashnje, Jahoc, Ticë, Lubozhdë, Nikadin, Sopotnicë, Dërsnik, Vushtrri, etc. In addition, the international project enacted in Ulpiana by the Archaeological Institute of Kosova and the German Archaeological Institute in Frankfurt/Römisch-Germanische Kommission des Deutschen Archäologischen Instituts, Frankfurt am Main (2006–2012), and later the inclusion in this project of the staff of the "Mimar Sinan Fine Arts University" (Istanbul), etc. should particularly be distinguished.

The importance of the professional and scientific staff of the aforementioned institutions and their partners such as Aleksandar Stipçeviq, Adem Bunguri, Bedia Rraci, Dragoslav Srejović, Draga and Milutin Garašanin, Elvis Shala, Emil Čerškov, Fatmir Pejë, Fejaz Drançolli, Gëzim Hoxha, Jovan Glišić, Kemajl Luci, Luan Përzhita, Milot Berisha, Muzafer Korkuti, Nikola Tasić, Skënder Anamali, Selim Islami, Slobodan Fidanovski, Tomor Kastrati, and above all Zef Mirdita, who gave their assistance in the prosperity of the archaeology of Kosova, should be emphasized as well. Besides special archaeological editions, the results of the abovementioned authors from the field of archaeology are published in the following journals of Kosova: *Glasnik Muzeja Kosova i Metohije*/*Buletini Muzeumit të Kosovë Metohis*/*Bulletin du Musée de Kosova et Metohie* (Glasnik Muzeja Kosova/Buletin i Muzeut të Kosovës/Bulletin du Musée de Kosova), *Kosova Archaeologica*/*Kosova Arkeologjike*, *Starine Kosova i Metohije*/*Antikitete të Kosovë-Metohis/Antiquités de Kosova et Metohija* (Starine Kosova/Antikitete të Kosovës/Antiquities of Kosova), *Gjurmime Albanologjike: Seria e Shkencave Historike, Recherches Albanologique*, *Buletin i Fakultetit Filozofik-*

Prishtinë/Buletin of Philosophic Faculty, etc. After the fall of Yugoslavia at the beginning of the 1990s, the tendency to politicize the science of history was obvious, including here the politicizing of the archaeological heritage. At the beginning of 1999, an exhibition was held in Belgrade, prepared by the Museum of Prishtina and the Serbian Academy of Sciences and the Arts. This exhibition served as a pretext for the 1,247 exhibits from Kosova to be held in the capital city of Serbia, which is still held through today with the intention never to be returned to Kosova. From the stolen exhibits, 677 were from the archaeological heritage. Despite the international negotiations between Prishtinë and Belgrade in Vienna, Brussels, etc., from all this heritage treasure, the only exhibition to be returned to its hometown was the Goddess in Throne in 2003 (Fig. 1). After the settlement of international administration in Kosova in June 1999, the Museum of Kosova has been virtually empty. In the absence of implementation of international laws and conventions referring the return of cultural heritage, the empty shelves of the Museum of Kosova after 1999 are being filled with new artifacts discovered in recent excavations.

Kosova: Archaeological Heritage, Fig. 1 Goddess on the throne. Tjerrtorja, Prishtina

The archaeological heritage both movable and immovable in the present territory of the Republic of Kosova dates from the Neolithic period onward. In this context, the archaeological heritage of the Neolithic, Eneolithic, Bronze and Iron Ages, Dardanian (Illyrian) and Roman Antiquity, Early and Late Middle Ages, and Ottoman periods is present. With the support of the archaeological excavations, so far certain archaeological centers as well as movable monuments of Kosova have become known. We must distinguish prehistoric habitats of Hisar and Reshtan near Suharekë, Vlashnje near Prizren, complex of Ulpiana near Graçanicë, Municipium DD (Dardanorum) at Soçanica near Leposaviq/Leposavić, Gradina of Pejë (hillfort of Pejë), Early Christian Mausoleum of Bajicë near Pejë, Roman Necropolis Vendenis near Podujevë, Fortress of Harilaq (by Procopius Aria, near Fushë Kosova), Fortress of Novobërdë/Novo Brdo, Fortress Pogragja near Gjilan, etc. Here we must also include the complexes of the Early Christian, Medieval Orthodox, and Catholic cult monuments and also mosques and tekkes.

Of great importance are also movable archaeological artifacts such as the Neolithic Goddess of "Tjerrtorja"/Predionica of Prishtinë, anthropomorphic figurine of Varosh near Ferizaj, Laterculi of Cercë near Istog, Dardanian woman of Baja e Kllokotit near Vitia (Fig. 2), epigraphic monument of Dea Dardaniae from Smira, etc. In addition, the Runner of Prizren (sixth century BCE), a bronze figure in a form of a running girl found in Prizren and from 1876 preserved in the British Museum (Available at: http://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?objectId=462926&partId=1, accessed 4 July 2017) should be mentioned also.

Key Issues/Current Debates/Future Directions/Examples

Prehistory

In the field of prehistory, a great number of important archaeological remains were discovered,

which date at least from the period of Early Neolithic. Research in the field of prehistoric archaeology in Kosova has been developed in three phases. The first phase is related to the work of the Albanian Renaissance on the recording, preservation, and collection of archaeological objects. This period coincides also with the interest of scholars and foreign travelers during the nineteenth century and the first half of the twentieth century. In this context, the contribution of American scholar, of Czech origin, Vladimir J. Fewkes (during the years 1931–1938), to the research of Starçevo culture, as a member of American team, and to the discovery of tumuli of the Dukagjini Plain (Fig. 3) (Fewkes 1933: 16–32, 33–54) should be mentioned. Their research was sponsored by the Harvard University, American School of Prehistoric Research, University of Pennsylvania, etc. The second phase complies with the foundation of two institutions of cultural heritage, the Museum of Kosova (1949) and the Kosova Institute for the Protection of Cultural Monuments (1949), and their professional and scientific activities during the period 1949–1999, accompanied sometimes also with elements of Historicism, Marxism, and Nationalism. The third phase includes the period

Kosova: Archaeological Heritage, Fig. 2 Marble bust of a Dardanian woman. Second–third c. CE. Baja of Kllokot, Vitia

Kosova: Archaeological Heritage, Fig. 3 Illyrian tumuli. Gjinoc near Suharekë

2000–2017, when the archaeological research was reactivated with the continuation of research by archaeologists of Kosova, mainly employed in the Museum of Kosova and the Archaeological Institute of Kosova, supported also by the respective international organizations. It is important to emphasize the engagement and scientific support from archaeologists of the Republic of Albania. During this period a series of new research has been conducted, as well as revision research, for the compilation of *Archaeological Map of Kosova* and, in specific cases, for the chronological definition of localities researched in the twentieth century such as the research project in multilayer locality in Hisari near Suharekë.

Early Neolithic/Middle Neolithic and Late Neolithic

6500–5500/5000–3500 BCE

In terms of relative chronology, Neolithic culture of Kosova is recognized through Early, Middle, and Late Neolithic. In Southeastern Europe, first Neolithic cultures are found in the complex with the painted ceramic culture. To date archaeological researches have discovered more than 20 important settlements and tens of other settlements which should be systematically researched through new scientific projects that would include the entire area of the Republic of Kosova. Neolithic culture in Kosova is represented by Protostarçevo and Starçevo culture group (circa 6000–5000 BCE), Vinça culture, which is considered a continuation of Starçevo culture not only in Kosova but farther as well. This culture appeared with its first phase called Vinça-Tordos of the early fifth millennium BCE and with the other phase called Vinça-Ploçnik of the early fourth millennium BCE, followed by Danilo culture of the period 4700–3900 BCE, as well as with the early phase of Bubanj-Hum culture (Maletić 1973: 69–96; Darvill 2002: 114, 404, 456; Boardman 1982: 87, 101, 104–5, 118–19, 125–27; Gimbutas 1974: 18–27). Archaeological excavations in Reshtan near Suharekë have discovered the obvious connections of this locality also with Middle Neolithic of Albania (Kolsch II and Dunavec cultures). In addition, Maliq II culture corresponds with findings of the first phase of settlement of Hisari near Suharekë, an archaeological locality which preserves elements of Late Vinça culture (Korkuti 2006: 2; Gashi 2010: 114–120; Boardman 1982: 204; Prendi 1976: 55–56). First important Neolithic cultures in Kosova were discovered in Runik/Rudnik near Skënderaj (a unique musical instrument was also discovered); Badoc/Badovac and Glladnicë near Graçanicë (a figurine which presented a female idol was discovered also); Bardhoshi and Barileva near Prishtinë; Tjerrtorja/Predionica in Prishtinë; Rakoshi near Istog and Gjonaj and Vlashnja near Prizren; Hisari and Reshtan near Suharekë; Lower Çupeva near Klinë; Kramovik and Sarosh near Rahovec; Fafosi near Mitrovicë; Karagaç, Valaç, and Zhitkoc/Žitkovac near Zvečan; Gënçar near Vitia; Partesh and Kllokot; Nerodime and Varoshi near Ferizaj (belongs the occasional discovery) (Fig. 4); Surkish near Podujevë; Ticë near Skënderaj (2004, 2012); etc. These archaeological settlements are situated in fields near the river valleys, respectively, in the basins of the rivers: Drini i Bardhë, Sitnicë, Ibër, Llap, Moravë e Binçës, Nerodime/Nerodimka, etc. On the other hand, Hisari is situated in river terrace, whereas Vlashnja in hilly terrain and Vallaç in rocky terrain. From the abovementioned localities were systematically excavated Runik/Rudnik (1966–1968,

Kosova: Archaeological Heritage, Fig. 4 Anthropomorphic figurine in Varosh. Municipality Museum, Ferizaj

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1984, 2004), Glladnicë (1956, 1959, 1961), Tjerrtorja/Predionica (1951, 1955–1956, and 1962), Vallaç (1955, 1957), Fafosi (1955–1961), Çupeva e Ulët (1968–1969), Hisari (1957, 1961–1962, 2003–2004, 2007), Zhitkoc/Žitkovac (1955, 1958, 1960), Karagaçi (1955–1960), Reshtan (1966–67, 2011), Bardhoshi (2002), and the multilayer settlement of Vlashnja (2002, 2006–2008). The abovementioned archaeological localities not only prove the development of life during the entire Neolithic period but based on the discovered archaeological findings, they can also prove their cultural relations with neighboring communities (MK/A 1951–1970, registries; IAK/A 2003–2009, reports and images; Bunguri 2009: 54–73; Korkuti 2006: 9–11).

The Late Neolithic culture/Vinça culture which is represented in Kosova with exceptional distinctive anthropomorphic figurines that are considered among the most beautiful examples of prehistoric plastic art in Europe should be distinguished. Affluent cultural life and a sentiment for artistic shaping are also reflected in the parts of architectural plastics ornamented with geometric motives or figural images. The appearance of new technology in pottery making clearly separates it from Starçevo culture. The abundance of anthropomorphic and zoomorphic forms related to cults (Magna Matter – mother goddess), biconical bowls; high-footed goblets, and prosopomorphic lids mirror the prosperity of social, economic, and religious Late Neolithic society. The main Vinça recorded sites of Kosova are Fafosi, Reshtan, Runik/Rudnik, Vallaç, Zhitkoc/Žitkovac, Tjerrtorja/Predionica, and Bardhoshi near Prishtinë where, in an occasional discovery in 2002, an evidence of much anthropomorphic terracotta of different sizes similar to the "Goddess in Throne" was recorded. To this group of sites belongs the occasional discovery of anthropomorphic figurines in Krushec near Obiliq (2012). Mentioned locations of the Vinça culture are typical for the realm of Kosova. As such, they are identified as "the variant of Kosova of the culture of Vinça." There is abundant and well-known evidence regarding this cultural group in Kosova (Përzhita et al. 2012: 195; Maletić 1973: 83; Gimbutas 1982: 61–64).

Chalcolithic/Eneolithic/Copper Age

Chalcolithic/Eneolithic/Copper Age (c. 3500–2200 BCE) is the archaeological period between the Neolithic period and the Bronze Age. There are areas that do not have a Chalcolithic period (Darvill 2002: 78, 134). Revolutionary transition from stone-processing technology to thermal technology of Copper Age (age of mineral melting and its processing to make weapons, dishes, working tools, copper, and gold ornaments) caused a series of changes in economic, cultural, and particularly religious life. In Kosova, several zones rich with mineral of copper and gold are known such as the zone of Kopaonik and the zone of valley of Ibri River. In Fafosi, which is a settlement of this area, the archaeological traces of copper processing are discovered also. Rich with copper mineral are also the neighboring territories of Kosova, such as Kratovo in Macedonia and the zone between the flow of Drini River and the region of Mati in Albania, territories which during the period in question belonged to almost one cultural-archaeological complex (Benac 1979: 33, 52, 92–94, 98–100).

The main sites of Copper Age, in Kosova, are Domoroc near Kamenicë; Upper Gadime/Gadime e Epërme near Lipjan (in archaeological studies, it is recorded as a discovery of 1973); Glladnicë II near Graçanicë; Hisar (IIa-c), Hisar i Kastërcit (one layer), and Nishor near Suharekë; Raskovë near Kastriot/Obiliq; and Zatriqi near Rahovec. The discovered archaeological treasure of these sites proves that the area of Kosova during the Eneolithic period was one ethnocultural entirety. Excavations accompanied with studies in important archaeological localities Gadime e Epërme I, Glladnicë II, Hisar IIa-c, and Vlashnje IV so far have discovered settlements which by the science of archaeology were evaluated that they belong to Eneolithic culture, of the type of cultural complex Sălcuţa-Krivodol-Bubanj (Benac 1979: 90–91, 419, 424, 437; Mirdita 1997: 170). Some scholars identify Maliq II a-b near Korça (in Southern Albania) with this cultural group. In addition to this cultural complex, in the area of Kosova, the cultural group Bubanj-Hum Ia and Ib, as well, and later Kostolac and Baden culture were present

(Bunguri 2009: 83–84; Drançolli 2006: 11–20; Darvill 2002: 35; Fidanovski et al. 1987: 4–5).

The Bronze Age

The prehistoric period of the Bronze Age is characterized by the usage of work tools, weapons, and ornaments of bronze. The beginning and the end of Bronze Age in different parts of the world have not occurred at the same time (Darvill 2002: 54–5). In Southeastern Europe, the Bronze Age started at the middle of the third millennium BCE and ended approximately in the eighth century BCE. The Bronze Age is closely identified with the process of ethnic differentiations. The beginnings of this period in the area of Kosova are known with the stabilization of conditions caused after the great migrations and moves of eastern nomad populations. In such conditions reappeared the elements of Bubanj-Hum III culture, which was a continuation of Bubanj-Hum II culture (Fokkens and Harding 2013: 54–55), which in the chronological aspect is identified with the Early Bronze Age, period which according to earlier burials can be connected with the process of ethnogenesis of Illyrians (Korkuti 2016: 177–182). This was exactly one of the reasons why the Yugoslav communist archaeology has almost not published at all the results that show the beginning of the Early Bronze Age in the area of Kosova (2300–1600 BCE).

The Early Bronze Age, not only in the area of Kosova but also in the area of Albania, Montenegro, most of Serbia, and Macedonia, was dominated by Glasinac culture, born in Glasinac (in the west of Sarajevo), Bosnia, and Herzegovina, where more than 1200 prehistoric graves called tumuli (gomila, gromila, mogila) were discovered. Considering the extension of this culture as far as the Mati River and from there as far as the tumuli of Barçi near Korça in Southern Albania, including also the entire area of Kosova, this cultural complex was named Glasinac-Mati culture (Mirdita 2015: 25, 57). In Kosova so far, tumuli of the Bronze Age were excavated and discovered in Bajicë of Pejë, Boka of Përçevë near Klinë, Lubozhdë near Istog, Fushë Rogovë near Gjakovë, Shirokë near Suharekë, and Volljakë near Klinë. In addition, during the preparation of the *Archaeological Map of Kosova*, other tumuli were evidenced also in Jashanicë near Klinë, Ponoshec near Gjakovë, Gjinoc near Suharekë, etc. The archaeological findings in Glasinac, in terms of the continuity of the development of this culture during the Bronze and Iron Ages, have found analogy with other findings as well, which belong to the area of ethnic Illyrian community (Bunguri 2016: 30–32; Luci 1998: 117–148; Gori 2012: 71–81). There were even cases when the tradition of Illyria (Dardanian) tumular burial has been restored. We should emphasize the tumulus in "Fusha e çerkezëve" which is situated 500 m on the northwest from the northern door of Ulpiana. In tumulus, the grave of the third century CE of one Dardanian noblewoman was discovered (Srejović 1981: 64).

Along with the burial in tumuli, the archaeological discoveries in the area of Kosova revealed also the flat graves in Gllarevë of the village Rixhevë near Klinë (1986, 1991/2) and in Ulpiana. In this context, it is of a crucial importance to emphasize that archaeological excavations in the locality Gllarevë revealed the Middle Bronze Age in this area. Among the rich ceramic findings and metal ornaments were also discovered bronze spears, daggers, and swords of the Bronze Age of Mycenaean import which characterize a social differentiation and the formation of aristocracy. To this period belongs also a bronze ax, casually discovered in the village Sina in Istog, which by typology finds analogy with Albanian-Dalmatian axes (Kilian 1976: 112).

Late Bronze Age: Bërnica e Poshtme cultural group (1350–950 BCE). It is one of the most characteristic periods in Kosova. This cultural group, as eponymous of Dardanian culture during the Late Middle Bronze Age and Late Bronze Age, has created an ethnocultural sustainable integrality in a wide area where Kosova, Western Macedonia, Southern Morava, Rashka, and Peshter are included as well. As such, this cultural group has become known through six necropolises revealed so far, and among them, with important results, those in Bërnica e Poshtme, Upper Gadime, and Grashtica could be

distinguished (Benac 1983: 773–778). Cremation was the dominant burial ritual, where the cremated remains of the deceased person were placed in urns and buried in graves. During the transitional period from the Late Bronze to Early Iron Age, tumuli and burial mounds were accompanied with grave goods and grave offerings that were typical features for the Illyrian population such as Dardanians, an Illyrian tribe, which lived in the present territory of the Republic of Kosova. In most cases, central graves were built from stone structure and surrounded in circle by other graves based on hierarchy of the persons that were buried in the same necropolis (Mirdita 2015: 24–25, 37–38).

The main settlements of the Bronze Age in Kosova (some of them were recently discovered) are considered: Gllarevë near Klinë; Upper Dobrevë near Fushë Kosovë; Karagaç and Vallaç near Zveçan; Lushta near Mitrovicë; Glladnicë near Graçanicë; Lower Bërnica, Teneshdoll near Prishtinë, Ticë near Skënderaj, and Upper Gadime near Lipjan; Korishë near Prizren; Budrigë near Gjilan; etc.

The Iron Age

The Iron Age (1200 BCE to fourth century BCE) is a particular period which is characterized by hillfort settlements and tumulus graves. Unlike the first phase of this period, the second phase, respectively, the early halshtat, (circa 800–500 BCE). See corrected version, together with the citation that should be added to the text: "Unlike the first phase of this period, the second phase, respectively, the Hallstatt culture period (circa 800–500 BCE) signals a general stability (Mirdita 2015: 37–38; Milisauskas 2011: 406–409). This period is characterized by the strengthening of the tribal aristocracy and the appearance of the ethnic name *Illyr* (*Illyrii proprie dicti*) in the Central Balkans (Papazoglu 1997: 97–98; Benac 1987: 799–802; Boardman 1982: 582–587; Gori 2012: 71–81). The ethnocultural stability of this zone, which is expressed in the material culture, was not destabilized by the penetration of the foreign ethnic elements. In the area of Kosova, this ethnic element appears in Shirokë and Dubiçak of Suharekë, and it is named "the group of Suharekë" (Mirdita 1997: 170–1). From this period, typical Dardanian gradinas are known, which in the chronological aspect were developed from previous prehistoric periods, and as such they continue to be distinguished in the following historical periods as well. In this context, in the area of Kosova, Northwest Macedonia, and South Serbia, during two first phases of the Early Iron Age were in use the stamped ceramics, decorated with dotted lines worked with fluting, cultural phenomenon this which is identified with Paleo-Balkan Dardanian population. Best-known localities of this period are Bellaçevci near Fushë Kosovë, Llashticë near Gjilan, Hisari and Shirokë near Suharekë, Vallaç near Zveçan and Vlashnje near Prizren, Upper Gadime near Lipjan, Veletin near Janjeva, etc. Other important localities of the Iron Age are also Cërnicë near Gjilan; Hereçi near Gjakovë, Hisari near Suharekë, Kulina/Teneshdoll near Prishtinë, and Polaci near Skënderaj; Samadrexha near Vushtrri and Strezoc near Kamenicë, etc. (Mirdita 2015: 21–51; Benac 1987: 686–689, 790–799; Boardman 1982: 593–598).

It should be emphasized that the archaeology scholar's attention was attracted by the necropolises with tumuli. They appeared frequently in the entire area of Kosova, respectively, in both the Plain of Kosova and Plain of Dukagjini, which were an integral part of Glasinac-Mati cultural complex. It is of a crucial importance to emphasize the discovery of tumuli of Llashticë near Gjilan, Plain of Kosova (Fig. 5), which shed light to an abundant material similar to the one discovered in the important tumuli of Romaja near Prizren, Plain of Dukagjini, as well as to other tumuli of the Plain of Dukagjini. As a conclusion, tumuli of Plain of Dukagjini and tumuli of Plain of Kosova belonged to the same Illyrian culture of Dardania (Korkuti 2006: 11–12; Krasniqi and Luci 2015: 140–145). Except the important tumuli of Llashticë and Romaja, the tumuli discovered in Baja of Pejë, Bitia e Poshtme/Donja Bitinja near Shtërpc/Štrpce, Dubiçak near

Kosova: Archaeological Heritage, Fig. 5 Illyrian tumuli. Llashticë near Gjilan

Suharekë, Moglicë near Gjakovë, Perçevë near Klinë, Podrime near Shtime, etc. are also known.

The locality of the necropolis type with tumuli that attracted attention of many home and foreign scholars is Baja of Pejë, which is located approximately 12 km on the northwest from Pejë, on the road leading to Mitrovicë. During the construction period of Hotel Onyx in 1974, a typical Illyrian military helmet was discovered there accidentally. This discovery leads to the discovery of two graves in one tumulus. This finding belongs to the group named "princely tombs," known as a part of Glasinac-Mati culture complex. In the tumulus were discovered among others: three typical Illyrian bronze helmets, swords and spears, silver bracelets with snake tops, rings, double needles, amber beads, two silver fibulae with an arched body, two silver fibulae in the form of an omega, a large silver belt plate, etc. (Fig. 6) (Korkuti 2006: 405, 11). The Illyrian grave in Baja of Pejë belongs to the sixth to fifth centuries BCE. In the first two phases, the culture with traditional decorative elements is encountered, which testifies the autochthonous ethnocultural continuity. In the third and the fourth phases of

Kosova: Archaeological Heritage, Fig. 6 Silver and bronze grave goods from Baja of Pejë. Museum of Kosova

the Iron Age (fifth to fourth centuries BCE) in Karagaç, Shirokë, Upper Gadime, and Cërnicë near Gjilan, besides the domestic production, the imitation of Hellenic production is clearly noticed. This phenomenon is testified almost in all of the Dardanian territory (Mirdita 1997: 171; Korkuti 2006: 11).

Antiquity-Roman Period

The rich tradition of archaeological heritage created during prehistoric periods was developed with an increased intensity also during the period of the Kingdom of Dardania ***(IV-I BCE). Romans conquered Dardania at the end of the first century BCE, whereas with the setting of political-social Roman administration, Dardania, during the period 86–272 CE, was included in Upper Moesian province (Moesia Superior).

Only during the reforms of Emperor Diocletian, in 297 CE, the province of Dardania was formed. Roman urbanization of the province was conducted by the development of settlements, which were certainly accompanied by construction of roads, evidenced by the milestones and old maps indicating their existence. The spiritual life of the population was represented mainly by monuments dedicated to the Roman pantheon. The present territory of the Republic of Kosova represented the nucleus of the Roman province of Dardania that included the southern part of Serbia, northeastern part of Albania, and northwestern part of the Republic of Macedonia. Urban life during the Roman period has been developed mainly within municipiums founded in the second century CE, such as Municipium of Ulpiana, Municipium DD (Dardanorum), and Municipium of Dërsnik. In addition to these political-social and economic-cultural centers, the centers called civitas peregrinorum and numerous stations (mutationes, mansions), founded through the important roads, were present as well. In this context, Roman beneficiary stations should also be mentioned, which were known as military centers for maintaining order and security of Roman citizens. They are encountered in several parts of Kosova, particularly in rich mining territories such as Ulpiana, Mitrovicë, Vushtrri, and Slatina at Municipium DD, near Loposavić. Others were set in geostrategic locations: Dobruzhdë near Prizren, Bajë near Malishevë, and Kaçanik (Schallmayer et al. 1990: 445–6, 458, 461, 463–4, 466–7). In Kosova, centers founded during the period second to fourth centuries in the regions with great natural wealth are also known. They were accompanied by a developed network of local roads which functioned for the conveyance of mining wealth and other natural products. All these changes did not influence much the change of ethnic structure, a fact which is also shown by numerous cultural-archaeological monuments, where, despite the presence of names with Romanized elements, the presence of Illyrian names is apparent (Mòcsy 1970: 199–250). Such names are encountered during the Early Christian period which is known in this area at least from the third century. The power of Christianity, as official religion in Dardania, was shown with the existence of a great number of monuments of Christian cult, particularly with the construction of basilicas.

Despite its rich archaeological heritage, the Illyrian Antiquity Period, unlike prehistoric periods and the Late Middle Ages Period, until recently, was not sufficiently tackled in scientific research projects. Early studies in lighting the epigraphic, topographic, anthroponomical, and numismatic material in Kosova of scholars N. Vulić (1931, 1941–48), E. Çershkov (1969, 1970), A. Mòcsy (1970), F. Papazoglu (1978), Z. Mirdita (2015), etc. present a good support for further research of this question. These researches are being completed with new researches, especially in some important centers, such as Ulpiana and Viciano in Uglar near Graçanicë; the ancient settlement of Pejë; Dërsnik near Klinë; Bajicë and Banja in Kllokot near Viti; Bajë near Malishevë; Bellacërkë, Binçë, Gushicë, and Vërban near Viti and Bob near Kaçanik; Cercë, Sine, and Vrellë near Istog; Çifflak near Rahovec; Gradina in Pejë and Jahoc near Gjakovë; Greme, Jezerc, Nerodime e Poshtme, Nikadin, and Surçin near Ferizaj; Mushtisht and Studençan near Suharekë; Paldenicë near Hani i Elezit and Pestovë near Vushtrri; Raushiq near

Pejë; Llanishtë and Sopotninë near Kaçanik; Strellc near Deçan; Statio in Poslishta and Zhur near Prizren; Statio Vendenis/Gllamnik near Podujevë; Klinë e Epërme; Murgë, Ticë, Turiçec, and Tushilë near Skenderaj, Velekincë near Gjilan; Vushtrri; Zllakuçan near Klinë; etc.

Municipium Ulpiana. Municipium of Ulpiana is situated near the Monastery of Graçanicë in the area of the municipality of Graçanicë, 7 km southeast of Prishtinë. It was raised to the rank Roman municipium at the time of Emperor Traianus (98–117 CE). It achieved the culmination of development during the period second to fourth centuries, when it got the status of the center with great economic, political, cultural, and religious influence. In the Late Antiquity, it became episcopal center. The relevant sources mention the first Christian martyrs of Dardania, Florus and Laurus, stonecutters from Ulpiana, who gave their lives as result of religious persecution in the second century CE. It was twice invaded by Goths. A catastrophic earthquake in 518 CE destroyed Ulpiana, which was witnessed and written in *Chronicon* by Comes Marcelinus. The Municipium of Ulpiana was completely rebuilt and renamed in Iustiniana Secunda in tribute and respect of Emperor Justinian I. It is very important to highlight that Emperor Justinian I was born in the province of Dardania, as claimed by the author Procopius Caesariensis.

The first data from the surveys of the terrain, accompanied also by the collection of epigraphic material of Ulpiana during the period between two world wars, but formerly as well, were offered by A. Premerstein, B. Saria, D. Karapandžić, Đ. Bošković, K. Jireček, M. Grbić, N. Vulić, etc. Apart from scientific achievements in the affirmation of archaeological findings, we also encounter the official information which reveals the systematic destructions of ruins from local population during the period of the Kingdom of Yugoslavia. For this reason, the Mayor of Prishtinë was requested to prevent the robbery and destruction of the treasure of cultural heritage (Petković 1929: 236).

The first systematic archaeological excavations in Ulpiana started in 1953. Archaeological excavations during 1953–2016 revealed eight archaeological layers, which in chronological aspect include the period from the Late Bronze Age until the seventh century CE. Only three of these layers belong to the Roman period (Cvetković-Tomašević 1990: 23–24). The city, together with a castrum, suburb, places of worship, and a graveyard, occupies a surface of approximately 120 hectares. The first archaeological excavations revealed four graves, known as "northern necropolis," which were recently conserved. Further archaeological excavations were mainly focused in northern part of the settlement, and the most significant discoveries are the construction of the basilica type, parts of Roman bath, parts of temple, parts of the road cardo with sewage, the Northern Gate, and ramparts of the city. Among the three buildings, the appearance of Northern Memory building with a huge marble sarcophagus is especially worth mentioning (Fig. 7).

During archaeological excavations, in the Northern Gate of Ulpiana, two horseshoe-shaped fortified towers (kullas) were identified, which were built above two kullas existing before. The Northern Gate was recently conserved. The city was encircled by the 3-m-thick ramparts. From the outside, the towers are of the semi-arc form, whereas inside the fortified walls, they are of the irregular rectangle form or of the horseshoe or base form. Much importance is devoted to the research of the Paleochristian church (basilica). It is possible that this object of cult is built above the graves of Florus and Laurus. It is worth mentioning that in the altar of the basilica, a grave was discovered, which is chronologically older than the basilica. In addition, older than the basilica is the white and dark gray mosaic discovered under the older layer of the floor of this cult monument. Parts of a mosaic are also encountered in the porch of the Memory building. Both of these mosaics are realized according to the "opus tessellatum" technique. As other monuments of the discovered complex of Ulpiana, Basilica as well was recently conserved. All of the abovementioned immovable monuments nowadays are part of the Archaeological Park of Ulpiana, project coordinator of which was the archaeologist M. Berisha.

When we mention Basilica, which had been discovered before, we should emphasize recent archaeological excavations, conducted in Ulpiana

Kosova: Archaeological Heritage, Fig. 7 Late Roman Period. Memoria, Ulpiana

by Turkish archaeologists headed by Prof. H. Cetinkaya, which revealed other immovable monuments. First, in 2012, a baptistery was discovered, whereas during the period 2013–2015, a two-phased church in a form of basilica was uncovered. The first church dated from the fourth century CE, and above its ruins (after the earthquake), another church at the beginning of the fifth century CE was built. The discovery of this two-phased church resulted also in the reveal of floor mosaics with different geometrical patterns such as triangles, crosses, swastikas, etc. A part of a mosaic, on the southern aisle of the church, presents two birds near two kraters. In addition, in the mosaics, the dedicatory inscriptions as well were apparent (Çetinkaya 2016: 372, 377; Darvill 2002: 216).

Aside from its architectural inventory and burial structures, many artifacts of archaeological movable heritage were discovered: Sculptures of Apollo, Iuppiter Ulpianensis (Melcid), Mercury, and Mercury with Pluto, head of the man, head of Eros, a female head, a male head/tragic mask of a statue, the fragmented statuary group of Venus with two Erotes, statue of a woman, a fragmentary relief of a nymph from Ulpiana, fragment of a Roman terra sigillata, (Mirdita 2007: 12, 36, 39, 109, 115, 127; Fidanovski 1990: 70–30; Fidanovski 1998: 236–246 (No. 597–602)), votive plaque bearing the representation of the Thracian hero, pieces of weapons, jewelry and others, the jewelry from the so-called Gothic grave or cruciform gold-plated fibulae, etc. (Mirdita 2007: 49–52; Fidanovski 1984: 38–9; Kovačević 1964: 187–192; Popović and Čerškov 1956: 319–26). The economic development enabled the rich cultural life in Ulpiana. Therefore, the discovery of the theatrical masks in this municipal center testifies about the development of the theater there. A certain form of romanization is expressed not only in its urbanism and infrastructure but also in its religious life. Apart from Ulpiana, but not so far, in the *Geography* of Ptolemy is also mentioned Arribantium (47° 30° and 42° 00′), one of the four biggest centers of Dardania, which not only it is unexplored, but it remains unknown up to today (Kozličić 2006: 21–36).

Municipium of Dërsnik. The ancient locality of Dërsnik (near Klinë) is situated in the valley between rivers Drini and Klinë. This archaeological locality, as such, was for the first time recorded by A. Evans (1885), when he conducted a survey on this area. He claims that on that area lies an important archaeological locality. Based on the favorable geographical position and numismatic findings, he considered that there must have existed a Roman locality of the rank of

municipium (Evans 1885: 67, 2006: 169). These views were followed by the Hungarian archaeologist, Dr. Buday, but with supplement based on an epigraphic monument, carried from Dërsnik in the Franciscan church of Zllakuçan, a village 10 km on the west of Dërsnik, which in that period (1917) was under the Bulgarian occupation (Buday 1918: 35–39, 89–91). A new approach toward this question was presented also by the scholars E. Çershkov, F. Papazoglu, and Z. Mirdita (Mirdita 2015: 169, 197, 200, 217, 256, 271, 282–4), who, based on the topographic survey and the existing epigraphic monuments, claimed the existence of the municipium of Dërsnik.

Systematic archaeological research in Dërsnik started in 2012 by the Archaeological Institute of Kosova and are still continuing. During this period, traces of some architectural monumental-luxury monuments were discovered, which, by value, make this locality particular not only in Kosova, but farther as well. Here the discovery of one residence of Imperial category should be distinguished. In addition, eastern parts of surrounding wall were discovered (3.70 m wide), built according to opus incertum and opus mixtum techniques, accompanied by the curve-shaped towers. Regarding the archaeological values, it is distinguished particularly the Early Christian basilica (26 × 14 m), with a polychrome mosaic on the floor, worked with opus tessellatum technique. This mosaic possesses interesting figures and covers a space of approximately 500 m^2. It should be emphasized that mosaics were preferred in all the Roman regions; most distinguished were those of North Africa, Sicily, and Antiochia, from the end of the third century and the first half of the fourth century, particularly the Early Christian ones in Aquileia (fourth to fifth centuries), an archaeological Roman center in the northeast of Italy (in Friuli-Venezia Giulia), where Early Christian art practiced the technique of mosaics to decorate the churches. In the territory of the province of Dardania, best-known mosaics were discovered in Ulpiana, Mediana, Vendenis, and Nerodime and also in Dërsnik, recently discovered, which possesses some fragments as well, which are analogous with those found in the Basilica of Aquileia (Fig. 8).

Except the immovable monuments, which were mentioned above, a series of movable archaeological monuments were discovered, such as two marble torso dedicated to Venera goddess and four marbles altars with secondary inscriptions and numerous architectural fragments.

The Byzantine Emperor and chronicler, Constantine Porphyrogennetos (905–959), in his work *De Administrando Imperio* (Moravcsik 1967: 32/156), mentioned a city named Destenik (Δεστινίκον), which many scholars consider

Kosova: Archaeological Heritage, Fig. 8 Mosaic of Dërsnik. Krasniqi 2014: 200–207

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that it refers to a center which existed in the nowadays village of Dërsnik, where recently the archaeological locality was discovered. However, in this phase of systematic research, where important scientific results were achieved, any epigraphic monument or any information from ancient authors to prove that how the archaeological locality of Dërsnik was called during the Roman period still has not been discovered. The lighting of this question would surely facilitate the further research regarding exact information on different aspects of life in this known center.

Municipium DD (Dardanorum). The first settlement of Romans in today's territory of the Republic of Kosova is dated from the end of the first and the beginning of the second century CE, a time when they are found predominantly in the rich-in-mine areas of Kosova. Important mining centers of this area in ancient times are Municipium DD (Dardanorum) and Ulpiana. These centers have been built along the settlements of the native people, whose remains have not been sufficiently investigated. Aforementioned centers were the imperial estates and as such have had their money on which was engraved *Metallum Ulpianum* and *Metallum Dardanica* (Metalli Dardanici). Metallum Ulpianum included the mines in Kishnica near Prishtinë, Janjeva, and Novobërda. The Metallum Dardanica (Metalli Dardanici) refers to the Municipium DD (Dardanorum) and other centers in Kopaonik and Rogozno, known for the great mining wealth, from the Eneolithic period until nowadays. In this context, during the period of Emperors Traianus and Hadrianus, coins were minted with the inscription *Dardanici*, on the reverse side (Mirdita 1997: 172; Bowman et al. 2008: 595, 598).

One of the most researched Roman cities is Municipium DD (Dardanorum), which is located in the vicinity of Soçanica/Sočanica (Vicus metalorum), which nowadays is a settlement in the municipality of Leposaviq/Leposavić, 25 km north from Mitrovicë. It obtained the status of municipium in the second century CE. At that time, the Roman population colonized these regions because of their rich mines of lead, zinc, and gold. At the end of the fourth century CE, the town was deserted. Archaeological systematic excavations were carried out in the temple dedicated to Antinous of the period of Hadrianus, Basilica Urbana (16,75x55m), parts of thermae, epigraphic monuments where the formulation Municipium DD was written (metalla municipii Dardanorum), necropolises, etc. Based on the researched material especially on the coins which were found in the Municipium DD of Soçanica, we consider that this archaeological locality existed during the period from the second century CE until the first half of the fifth century CE (Buday 1918: 99–102; Çershkov 1973: 81–187).

The Ancient settlement of Pejë and the construction of factories. On the occasion of the setting of foundations of the factory of accumulators in the proximity of Pejë in 1978, the remains of a big archaeological complex were found. In this complex called "horreum" were discovered four architectonic objects in the form of quadrilateral buildings. According to building characteristics, coins and other movable materials were discovered during rescue excavations (1978–1979); this complex dates from the period second to fourth centuries (IKMM/A 1977: Sl. List. SAPK br.19/77; Mirdita 1980: 187, T.1/3, 1981: 251, No. 235 [34]). The documentation of the excavation, which was preserved in the Kosova Institute for the Protection of Cultural Monuments, was stolen by the Serbian forces during the war of 1998–1999 (Fig. 9).

In 1917, almost attached with this locality, the Hungarian archaeologist, Dr. Buday, discovered the necropolis accompanied by a series of marble tombstones, which around the inscription field were decorated with images of grapevine, pine cone, and other local elements. These results were published by archaeologist N. Vulić and afterward by other scholars as well (Buday 1918: 8–25, 77–83; Vulić 1931: 112–116). Dr. Buday, while doing the survey in 1917, also encountered rich architectural material as well as the ruins of the fortress on the left side of the Bistrica River. After his survey in Pejë, Buday left an archaeological map of the region of Pejë, a sketch of the fortress of Pejë, some photos of the terrain, and some photos of the epigraphic monuments, which

Kosova: Archaeological Heritage, Fig. 9 The construction of the factory on the archaeological site in Pejë Photo by N. Belegu

were transcribed carefully by him (Buday 1918: 8–25, 77–83).

The Yugoslavian communist system did not show any interest for the protection of the archaeological heritage of Antiquity in the area of Pejë; this is shown by the construction of the depot of sugar factory in the 1960s of the twentieth century, situated about 200 m on the left of the locality described above (in the complex of the factory of accumulators). In the area where the depot was constructed had been discovered the foundations of an Early Christian Church, of the type of basilica, which was totally destroyed during the construction of this depot. In addition, the records regarding the found artifacts disappeared.

All this rich archaeological material, especially with the epigraphic monuments that were discovered in it, proves that the ancient settlement of Pejë ranks immediately after the complex of Ulpiana according to their importance. Based on these findings, in the abovementioned area, a search for the Siparunt of Ptolemy should be conducted (Çershkov 1973: 50).

Ancient station and settlement of Vendenis. The archaeological site Vendenis or nowadays the village of Gllamnik is situated on the left bank of river Llap, about 6 km in the southwest of the city of Podujevë. It is distinguished for an oppidum and a known station on the road Naissus-Lissus and has a surface of about 13–20 hectares. Vendenis is mentioned in the *Geography* of Ptolemy (second century) as well as in one map of the fourth century, known with a name Peutinger's tabula. Rich archaeological material was discovered, such as that found in the remains of Roman luxury villas. The peculiarity of these villas was the mosaics on the floor, the most important of which is the one with figurative presentation of Orpheus. In addition, in Vendenis, epigraphic monuments were discovered as well, and the necropolis of centuries 3–4 CE was researched for centuries. The discovery of one sarcophagus in 1968 and the other one in 2009, made of marble, which is currently preserved in the Museum of Kosova is of a crucial importance. A series of archaeological movable artifacts was discovered in the 1980s of the twentieth century and recently in 2014.

Geophysical researches conducted recently by German experts, after they had proved once more

the existence of a fortified settlement, also offered sustainable indications for the presence of structures, which could testify for the existence of an object in vicus on the south of fortified settlement. In this context, within a systematic research project of the Archaeological Institute of Kosova, headed by the archaeologist Elvis Shala, following the abovementioned findings of geophysical researches, a Gallo-Roman temple, unique for the area of Kosova (2–3 CE), was discovered. According to the epigraphic monuments discovered there (one monument was discovered in 1992, one in 2003, and three in 2017), this temple was dedicated to the goddess Dea Dardanica (Koha Ditore 2017: 21, 23).

Martyrium of the Bajicë. Unlike Kosova basin settlements where agriculture was secondary compared to the mining, in the settlements along the Drini i Bardhë basin, agriculture represents the primary branch of the economy. From these archaeological sites, the site in the village Bajicë near Pejë should be particularly mentioned. Its importance is well known since the work of Arthur Evans in 1885. This is a unique archaeological finding, almost the only one in the Balkans. On the basis of a large crypt, the funeral function of the building is testified which is assumed to represent Paleochristian martyrium or mausoleum (Jovanović 1967: 121–5). During the survey of this site in 2005, we found traces of immovable and movable archaeological objects of Late Antiquity (Drançolli et al. 2012: 41–45).

Medieval Period

Early Christian Cult Monument. Archaeological research regarding the Middle Ages period in Kosova does not possess a long tradition. However, the discovery of a considerable number of monuments and findings created the conditions that this cultural heritage attracts the attention of Middle Ages archaeologists and scholars from other fields. The first archaeological research in this field was amateurish. But from 1950 onward, the research of localities and monuments is a study object not only for professional archaeologists but also for architects, historians of art, and historians.

Research conducted so far offers mostly results for the Late Middle Ages period and the Ottoman period, whereas we have less information regarding the Early Middle Ages period. In general, tens of monuments of cult of the Middle Ages period such as the complex of Studenica Monastery were discovered, which was built on the ruins of the Early Christian basilica of Studenica village near Istog; the complex of Patriarchate of Pejë, also built on the ruins of a Paleochristian and Early Christian cult monument; the Monastery of Graçanica rebuilt on the foundations of an Early Christian basilica and with the constructive material carried from near Ulpiana (Fig. 10); the Monastery of Banjska near Mitrovicë; and the cathedral church Saint Prena/Ljeviška in Prizren; there are also reconstructions on the sites of the monuments of Byzantium cult. There are other Early Christian churches which recently were discovered within walls of fortresses (Drançolli 1998: 260, 2000: 145–152).

Fortresses of the Middle Ages. Archaeological researches in Kosova, besides the monuments of cult, paid special attention to the fortresses of the Middle Ages. The centuries of the Early Middle Ages, especially centuries 4–6, accompanied with great migrations from North and East, resulted in the construction of a series of fortresses along the primary and secondary roads, such as "Via Naissus-Lissus" and "Naissus-Scupi" (Perzhita and Hoxha 2003: 13–22). The study of fortified settlements and of their construction close to the road communication and close to the mines and known centers has a unique value not only for the recognition of urbanization but also for the recognition of the development of life in general. Archaeological researches, accompanied by a series of survey expeditions, so far have discovered a considerable number of fortifications raised from the Neolithic period and the Eneolithic period to continue until the Medieval period or any of them until nowadays. These fortifications, in the contemporary science, are recognized according to the toponyms, Gradina/Gradishte (castellum or stronghold), Kala/Hisar (castle), Kulla (tower), and according to the local

Kosova: Archaeological Heritage, Fig. 10 Roman tiles on the walls of Graçanica Monastery, illustration of ing. arch. S. Shoshi

toponyms which have the same meaning with fortification (Çukë, Gjytet, Sukë, etc.). As such, these objects were raised in natural protected positions, mainly mountain ones, and they preserve dominant positions over the surrounding area. The shape of the gradina depends mainly on the terrain on which it is built. Natural conditions like fertile soil, good pastures, drinking water, dense forests, forest animals, and fruits were the essential reasons for choosing a site for the construction of the gradina or fortress.

What mostly attracts the attention here is that the nowadays territory of the Republic of Kosova itself has a form of a natural geostrategic fortress. It is surrounded with walls, respectively, with high mountains from all sides (northwest, northeast, southeast, southwest), and as such it possesses access only through 17 gorges and forest passes. This favorable geostrategic position at the same time can be considered as a crucial factor in the determining of the topography of the fortresses in question, as well as the preservation of the historical continuity, issue which was best reflected by the material culture first discovered in fortifications and Neolithic and Eneolithic dwellings such as Bellaçevci, Harilaq (Fushë Kosovë/Kosovo Polje), Gadime e Epërme (Lipjan), Kasterci (Suharekë), Vallaç (Zveçan), Vlashnja (Prizren), Samadrexha (Vushtrri), and Zatriqi (Rahovec). As anywhere else in the Balkans, the nowadays territory of Kosova was dominated by the fortifications of the Bronze Age and the Iron Age, period when these fortifications were inhabited by the Illyrian tribes. From the long series of them, the following can be specified: Batushë, Cërmjan, Hereq (Gjakovë), Budrigë, Cernicë, Pidiq (Gjilan), Çukë e Godancit dhe Llapushnik (Drenas/Glogovac), Gexhë (Rahovec), Gotovushë (Shtërpc/Štrpce), and Llausha (Skenderaj). The fortifications accompanied with prehistoric dwellings, not rarely, being urbanized, have continued their life also as Roman and Medieval fortifications and dwellings, such as Cermjani (Gjakovë), Dubovci/Dubovac dhe Stroc/Strovce (Vushtrri), Gexhë dhe Zatriqi (Rahovec), and Harilaq (Fushë Kosovë), discovered in 2005; archaeo006Cogical researches, accompanied with the conservation of the site, are an ongoing process (Fig. 11) (See video at Reuters: Roman Castle found in Kosova. Available at: http://archaeology-in-europe.blogspot.com/2005_07_01_archive.html#112265100443716126, accessed 15 June 2017; Pejë et al. 2012: 15–40). There are also worth mentioning: Hisari and Hisari i Kastercit (Suharekë), Korisha and Vlashnja (Prizren), Llapushnik, Vërbovc, Gradina e Madhe and Gradinë e Vogël of Vuçak (Drenas), Llausha and Syrigana (Skenderaj), Pidiq (Gjilan), Siçeva and Teneshdoll (Prishtinë), Veletin (Lipjan), etc. It should be emphasized that a part of these archaeological fortifications were discovered after

Kosova: Archaeological Heritage, Fig. 11 Fortress of Harilaq, Fushe¨ Kosova view from the excavations

the year 2000 (MK/A 1951–1998: registries; IAK/A 2003–2009: reports and images; Archaeological Map of Kosova 2006, 2012).

Some other fortifications present the development phases from the period of the Early Middle Ages until the Ottoman period. In this context, archaeological research carried systematically in Brut near Prizren; Bellobradë and Radesh near Dragash; Çalia above Brezovica in Shtërpcë/Štrpce; Dollc and Ujëmir near Klinë; Durman near Rahovec; Gjyteti of Rashan near Mitrovicë; Kalaja of the city of Kaçanik; Hisari over the River Drini i Bardhë; Jabllanicë near Pejë; Kalaja of Muzhlak, Kalaja of Cuca near Prizren, and Kalaja of the city of Prizren; Keçikollë near Prishtinë; Novobërdë/Novo Brdo (Fig. 12); Pauni, Petriçi i Madh, and Petriçi i Vogël near Ferizaj; Pogragjë, Prilepc, and Prizrenc near Gjilan; Topanicë near Kamenicë, Tushilë near Skenderaj, Vraniq near Suharekë; Vushtrri; Zveçan; etc. These archaeological sites preserve values of crucial importance not only for the cultural heritage of Kosova but also for the cultural heritage of the region (MK/A 1951–1998: registries; IAK/A 2003–2009: reports and images; Korkuti 2006: 8; Zdravković 1975: 15–129). The majority of the abovementioned fortifications are encountered in the medieval written sources as well, particularly in the work titled *De Aedificis*, written by Procopius Caesariensis (c.500–c.565), a historian of the period of Justinian I (527–565), an Emperor who for the protection from the great invasions had reconstructed 61 and constructed 8 new fortifications (Dindorfii 1838: 280–282). Any of these fortifications possessed even Early Christian churches as well as necropolises raised above tumulus of the earlier historical periods. The physical communication of the fortifications was realized through the roads, visually, and also through the economic, social, and perhaps spiritual relations.

Medieval necropolises in Kosova. Until nowadays medieval necropolises in Kosova have not been researched with any particular project. As such, they were researched only within the study of the fortifications of Antique and Medieval centers and also within the study of the monuments of cult. In any of medieval necropolis, rescue excavations were made, after they had occasionally been discovered.

In addition, some necropolises such as those in Badoc near Graçanicë; Bllacë, Hisari settlement of Kasterci, and Shirokë near Suharekë; Çeçan near Vushtrri; Graçanicë/Graçanica; Gjonaj and Vërmicë near Prizren; Llashticë and Velekincë near Gjilan; Matiçan near Prishtinë; Përçevë near Klinë; Soçanicë/Sočanica; Bellacërkë and Fushë in Rogovë near Gjakovë; Kulina in the village Bajë near Zubin Potok (sunk in the artificial Lake of Gazivoda); "Grčko Groblje"/"Varrezat greke" in Rezala near Zubin Potok (sunk in artificial Lake of Gazivoda); Zaskok near Ferizaj; etc. were discovered. A considerable number of Paleochristian and Medieval necropolises were also discovered within the complexes of churches and monasteries. From the archaeological findings so far, we have information for approximately 20 necropolises from the Medieval period. It should be emphasized about half of the necropolises in question were also used in earlier historical periods, whereas the other half are

Kosova: Archaeological Heritage, Fig. 12 View of Novoberdo Fortress

considered as typical medieval necropolises. Necropolises with such features have been researched in the area of Ulpiana; respectively, in the western space near the Memory building were discovered skeletal burial. The discovery of earrings of the "S" type, accompanied also with the additional information, guides to the finding that these objects correspond to the medieval necropolises. In the cathedral church St. Nicholas of Novobërda was also discovered a center with the size of known European cities of that period. Abundant findings of silver and gold jewelry, Venetian glass, and a lot of decorative details in the clothes of patricians of the city lead to the conclusion that there were graves of the fourteenth to fifteenth centuries CE. Another necropolis with about 120 graves was discovered also in another Early Christian church in the village of Bellacërkë of Rahovec. Undoubtedly, the biggest necropolis discovered until now is considered to be the necropolis of Vërmicë, where 450 graves were excavated (MK/A 1975–1998: registries; Ivić 1988: 21–30; Marjanović-Vujović 1986: 204; Available at: http://www.mkrs-ks.org/repository/docs/Lista_e_TKMP.pdf accessed 5 July 2017).

During the first decade of the twenty-first century, the archaeological excavations in Medieval necropolises have achieved successful results, discovering necropolises of the ninth to eleventh centuries in Graboc i Ulët near Fushë Kosova in 2004 and 2007 (Fig. 13), Bajë near Malishevë in 2005 and 2007, Bllacë of Suharekë in 2011, etc. In this context, in the necropolis of Graboc i Ulët were excavated around 30 graves, and many artifacts were discovered, among which there were weapons, working tools, ornaments of bronze such as rings, bracelets, earrings, etc. The abovementioned graves mark an evidence for the determination of ethnogenesis of the population of Kosova for the period which these graves represent (Peja and Drançolli 2006:175–186; Përzhita et al. 2013: 74–79).

Ottoman cultural heritage. Kosova possesses a great number of objects from the Ottoman cultural heritage. Of great importance are the

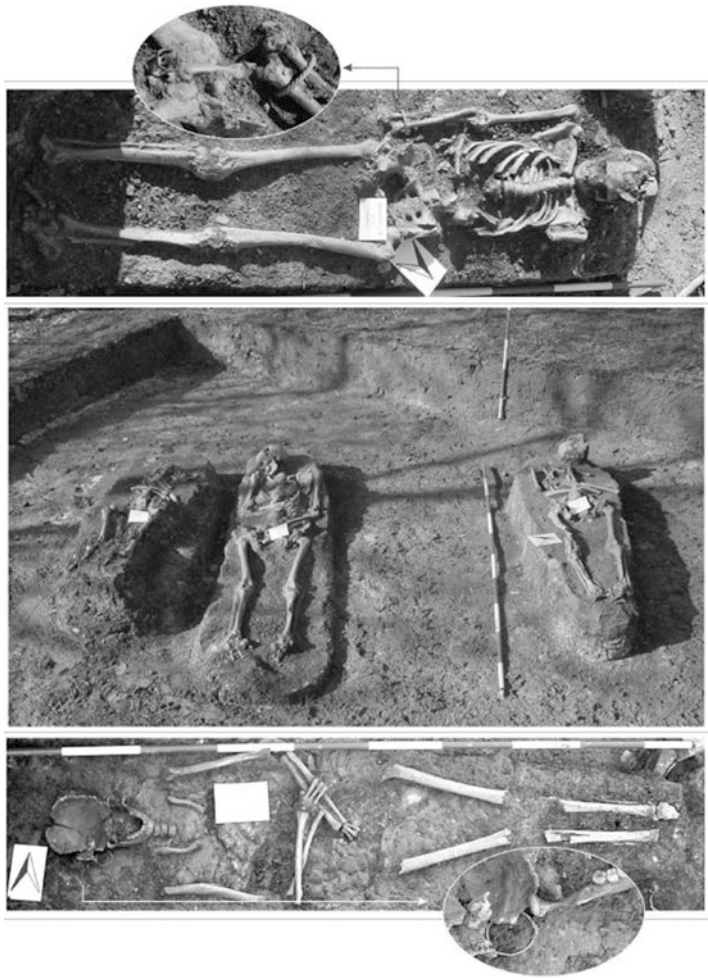

Kosova: Archaeological Heritage, Fig. 13 Necropolis of Graboc i Ulët, Fushë Kosovë: view from the excavations

mosques, such as the Mosque of Sultan Mehmed II – Fatih in Prishtinë (fifteenth century) – and the Mosque of Sinan Pasha in Prizren (seventeenth century). Besides the mosques, the hamams, cemeteries, teqes, and their architectural objects are present. This heritage, until 1999, was not an object of archaeological explorations but was treated only as a subject of the general cultural heritage (Aliu et al. 2005: 127–150).

Noninvasive Survey of Archaeological Sites

It is known that the cultural heritage of Kosova and of other states of ex-Yugoslavia has been a victim of destruction and plunder during the war and during the first years after the war, the consequences of which are present nowadays as well. These actions were very often accompanied with clandestine excavations followed by the artifacts trafficked abroad, a phenomenon which has preoccupied not only the relevant institutions of Kosova but also the institutions of the UNESCO as well. Considering that the archaeological localities in Kosova have been among the first victims of the war, the relevant institutions headed by the Ministry of Culture (Archaeological Institute of Kosova and the Museum of Kosova), during the years 2006–2007, have achieved to reach an agreement with relevant institutions of Germany (Romisch Germanische Kommission – DAI, etc.) for joint implementation of the research project of noninvasive archaeology field, respectively, of

Kosova: Archaeological Heritage, Fig. 14 Geophysical measurements in the Ulpiana Iustiniana Secunda area during 2008–2010 (Berisha, et al. 2013: 20)

archaeometry (which means geophysical methods, geochemical and magnetometric measurement). The aim of this research project among other things was the prevention of the unnecessary invasive excavations that cause further abuse with archaeological heritage. The non-invasive research project aims above all the research in archaeological locations from Neolithic and Roman period.

Implementation of this research project started from 2007 in Ulpiana-Iustiniana Secunda near Graçanicë/Graçanica, first with the training of anthropology, archaeology, and history students on interdisciplinary fields. Participating students were from Kosova, Germany, Albania, Croatia, Turkey, Poland, Slovenia, Greece, etc. Afterward, during the years 2008–2012, archaeometry research in Kosova has continued, based on the newest interdisciplinary methods on chronological definitions and the discovery of urban structure. Important results were achieved in the area of Roman municipium Ulpiana- Iustiniana Secunda and in its mining zones such as Veletin near Lipjan, Shashkoc, Hajkobillë, Marec, Mramor, Voguçincë, and the municipality of Prishtinë. During the abovementioned researches, a series of degrading traces, caused on heritage during some earlier incompetent researches and during some clandestine interventions, was pointed out. Besides the newest historical-archaeological information on Ulpiana area, the first geomagnetic and geophysical measurement sketches attract the attention as well, since in Kosova they were implemented for the first time (Gossmann and Körlin 2011: 128–129; Berisha et al. 2013: 82–88; Teichner 2015: 81–90). A special attention was dedicated to the archaeological site of the Roman period, Vendenis/Gllamnik nearby Podujevë, where there were surveyed nearly 11 hectares of territory, identifying important urban structures, which are being used successfully in archaeological excavations since 2014.

Another locality of Roman-Byzantium period named Poslishtë/Poslište (fourth to sixth centuries CE) was researched based on the geomagnetic prospection. This research was conducted in 2010 near Prizren, on the eve of the construction of a part of the Vërmicë-Prishtinë highway. Except the aforementioned sites, the geophysical measurements in the rich archaeological prehistoric sites, such as in Boka of Përçevë near Klinë, Runik/Rudnik near Skënderaj, Lubozhdë/Ljubožda near Istog, and Korishë near Prizren are of a great interest (Berisha et al. 2013: 65–92). These measurements offer a wide spectrum of information on the dynamics of developments of social-economic, cultural, and religious relations in the local and Balkan context during prehistoric and early historic periods. These relations have also indirectly reflected on the developments of modern cultural heritage (Fig. 14).

Despite the contribution of the surveys of non-invasive field in the most important archaeological sites, a tendency of using the old research methods is still evident.

Cross-References

- ▶ Central–Eastern Europe: Historical Archaeology
- ▶ Comparative Urbanism in Archaeology
- ▶ Cultural Heritage Management and Armed Conflict

References

Ahtisaari, M. 2007. Comprehensive proposal for the Kosovo status settlement. Annex V. Religious and cultural heritage. Available at: http://www.kuvendikosoves.org/common/docs/Comprehensive%20Proposal%20.pdf. Accessed 5 Apr 2017.

Aliu, V., F. Drançolli, N. Haliti, et al., eds. 2005. *Trashëgimia e evidentuar e Kosovës/Evidences monuments of Kosovo*. Prishtinë: Ministry of Culture, Youth and Sport.

Benac, A., ed. 1979. *Praistorija Jugoslavenskih zemalja*. Vol. I, II, III/. Sarajevo: Akademija Nauka i Umjetnosti Bosne i Hercegovine.

Benac, A., ed. 1983. *Praistorija Jugoslavenskih zemalja*. Vol. IV. Sarajevo: Akademija Nauka i Umjetnosti Bosne i Hercegovine.

Benac, A., ed. 1987. *Praistorija Jugoslavenskih zemalja*. Vol. V. Sarajevo: Akademija Nauka i Umjetnosti Bosne i Hercegovine.

Berisha, M., et al. 2013. Aerchäologisch-geophysikalische Prospektion im Kosovo: Erste Resultate einer bilateralen Forschungskooperation. Reports on fieldwork: Archaeological and geophysical surveys in Kosovo-first results of a bilateral research project. In *Archäologischer Anzeiger*, 2. Halbband, 2012, Deutsches Archäologisches Institut, Archaeological Institute of Kosova, 65–92.

Boardman, J., ed. 1982. *The Cambridge ancient history, III, part 1: The prehistory of the Balkans; the Middle East and the Eagean world, tenth to eighth centuries B. C*. Cambridge: Cambridge University Press.

Buday, Á. 1918. Régészeti kutatás Albaniában/Recherches archéologiques en Albanie. In *Dolgozatok az Erdélyi Nemzeti Múzeum Érem es régiségtárából szerkeszti*, tome IX. Kolozsvár: Pósta Béla, Stief Jenő és Társa Könyvnyomdai Műintézete, 1–72.

Bunguri, A. 2009. The new data on the Neolithic and Eneolithic civilisation of Kosovo. *Iliria* XXXIII: 51–106. Tiranë.

Bunguri, A. 2016. New research on the genesis of the Early Bronze Age culture in Albania and Kosovo. *Iliria* XXXIX: 25–74. Tirana.

Bunguri, A., K. Luci, and T. Kastrati. 2006. Qendra Prehistorike. In *Harta Arkeologjike e Kosovës/Archaeological Map of Kosova*, vol. I. Prishtinë: Akademia e Shkencave dhe e Arteve e Kosovës-Akademia e Shkencave e Shqipërisë.

Cecić, I., ed. 1984. Antika; Arkeologjia: In *Enciklopedia e Jugosllavisë*, 1 (A-Bib), 188–209, 259–287, etc. Zagreb: Jugoslavenski Leksikografski Zavod, "Miroslav Krleža".

Çershkov, E. 1973. *Romakët në Kosovë dhe Municipiumi D.D. te Soçanica*. Vol. 26. Prishtinë: Bashkësia e institucioneve shkencore të Kosovës, Studime.

Čerškov, E. 1969. Rimljani na Kosovu i Metohiji. Beograd: Arheološko Društvo Jugoslavije.

Čerškov, E. 1970. Municipim DD kod Sočanice. Priština-Beograd: Arheološko Društvo Jugoslavije.

Çetinkaya, H. 2016. Newly discovered early Christian mosaics from Ulpiana/Kosovo. In *Etudios sobre mosaicos antiguos y medievales*, ed. L.N. Jiménez, 372–377. Roma: "L' ERMA" di Bretschndeider.

Cultural Heritage Law. 2006. Law No.02/L-8.

Cvetković-Tomašević, G. 1990. Mosaïques découvertes à Ulpiana en 1982 et un groupe de mosaïques du IVe siècle. In *Recueil de Kosovo et Metohija*, Tome, 1. Belgrade: ASSA.

Dindorfii, G. 1838. *Procopius: Ex recensione*. Vol. III. Bonae: Impensis E. Weberi.

Drançolli, J. 1998. Kulturdenkmäler Kirchen und Kloster. In *Albanien: Zwischen Kreuz und Halbmond*. München: Pinguin.

Drançolli, J. 2000. Monuments of Catholic Cult in Kosovo during the Middle Ages. In *Christian among the*

Albanians, International symposium, November 16–19, 1999, 145–152. Tirana.
Drançolli, J., ed. 2006. *Kosova Archaeologica/Kosova Arkeologjike*. Prishtinë: Archaeological Institute of Kosova/Instituti Arkeologjik i Kosovës.
Drançolli, F. 2017. *Destroyed heritage in Kosova 1998/1999*. Prishtinë: Institute for Researching War Crimes in Kosovo.
Drançolli, J., L. Përzhita, A. Bunguri, et al. 2012. Harta Arkeologjike e Kosovës/Archaeological Map of Kosova. Vol. II. Prishtinë: Ministria e Kulturës, Rinisë dhe Sportit-Instituti Arkeologjik i Kosovës.
Elsie, R. 2011. *Historical dictionary of Kosovo*. 2nd ed. Toronto: Scarecrow Press.
Evans, A. 1885. *Antiquarian researches in Illyricum*. Parts III. and IV. Westminster: Printed by Nichols and Sons.
Evans, A. 2006. *Ancient Illyria. An archaeological exploration*. London: I. B. TAURIS/The Centre For Albanian Studies.
Fidanovski, S. 1984. Pregled rezultata disadašnjih istraživanja antičkog perioda u SAP Kosovu. *Buletin i Muzeut të Kosovës/Buletin du Musée de Kossovo* XIII–XIV: 35–43. Prishtinë.
Fidanovski, S. 1990. *Roman potery of Ulipana*. Belgrade: The University of Belgrade.
Fidanovski. 1998. Roman and Early Byzatine Period. In The archaeological treasures of Kosovo and Metohija from the Neolithic to the Early Middle ages: Catalogue. Belgrade: Gallery of the Serbian Academy of Sciences and Arts – Museum of Priština, 236–246 (No. 597–602).
Fokkens, H., and A. Harding, eds. 2013. *Handbook of European Bronze Age*. Oxford: Oxford University Press Available at: https://books.google.com/books?id=6ZQeAAAAQBAJ&pg=PA927&lpg=PA927&dq=Handbook+of+European+Bronze+Age.+Bubanj&source [. . .]. Accessed 27 June 2017.
Gashi, Sh. 2010. Die prähistorische Siedlung von Hisar/Prehistoric Settlement of Hisar. Historisch-Kulturwissenschaftliche Fakultät. Dissertation, University of Vienna. Available at: https://core.ac.uk/download/pdf/11593539.pdf. Accessed 23 Mar 2013.
Gori, M. 2012. Who are the Illyrians? The use and abuse of archaeology in the construction of national and transnational identities in the southwestern Balkans. *Archaeological Review from Cambridge* 27 (2): 71–81. Available at: https://www.researchgate.net/publication/316454364_Who_are_the_Illyrians_The_Use_and_Abuse_of_Archaeology_in_the_Construction_of_National_and_Trans-National_Identities_in_the_Southwestern_Balkans. Accessed 28 June 2017.
Gossmann, G., and G. Körlin. 2011. Roman non-ferrous and noble metal mining in Kosovo. In *International conference: Archaeometallurgy in Europe III*, ed. Andreas Hauptman et al. Bochum: Deutsches Bergbau-Museum. Available at: http://www.bergbaumuseum.de/index.php/de/forschung/publikationen-zum-download/item/gassmann2011-conference. Accessed 13 June 2017.
Herscher, A., A. Riedlmayer (auth.), and D. Viscuglia (tech. production). 2001. *The destruction of cultural heritage in Kosovo, 1998–1999: A post-war survey*. Cambridge, MA: Kosovo Cultural Heritage Project.
IAK/A: Instituti Arkeologjik i Kosovës/Arkivi (Archaeological Intitute of Kosova/ The Archive).
IKMM/A: Instituti i Kosovës për Mbrojtjen e Monumenteve/Arkivi (Kosova Institute for the Protection of Monuments/The Archive).
Jovanović, V. 1967. Banjica kod Peći u Metohiji kasnoantički funerarna građevina. In *Arheološki Pregled*, vol. 9. Beograd: Savez arheoloških društava Jugoslavije.
Karović, G., and H. Mehmetaj. 1996. Ulpijana, Gračanica, archaeological investigations. In *Glasnik Društva konzervatora Srbije*, 1995–20, 67–69. Belgrade.
Kilian, K. 1976. *Nordgrenze des ägäischen Kulturbereiches im mykenischer und nackmykenischer Zeit*, 112–129. Universität Frankfurt-am-Main/Jahresbericht des Instituts für Vorgeschichte, Frankfurt.
Korkuti, M. 2006. Preface. In *The archaeological map of Kosova*, vol. I, 1–13. Prishtina: Kosova Academy of Sciences and Arts/The Academy of Sciences of Albania.
Korkuti, M. 2016. *Etnogjeneza e Ilirëve*. Tiranë: Akademia e Shkencave e Shqipërisë.
Kozličić, M. 2006. *O ubikaciji Arribantuma i Vellanisa iz Ptol*, 3, 9, 3–4. Prishtinë: Kosova Archaeologica/Kosova Arkeologjike 1, 21–36.
Krasniqi, A. 2015. Monument. Vol. II. Prishtinë: Koha, ARS.
Law on Spatial Planning. 2013. Law No. 04/L-174.
Luci, K. 1998. The bronze age. In *The archaeological treasures of Kosovo and Metohija, from the Neolithic to the early middle ages*, 117–148. Belgrade: Gallery of the Serbian Academy of Sciences and Arts.
Maletić, M., ed. 1973. *Kosovo – Kosova*. Beograd: Kultura.
Mirdita, Z. 1980. Novitaes epigraphicae e Dardania collectae. In *Acta Archaeologica*, vol. 31, 186–201. Ljubljana: Institut of Archaeology at the Research Center of the SASA.
Mirdita, Z. 1997. Kosovo od prapovijesti do kasne antike. In Prilozi instituta za arheologiju u Zagrebu, vol. 11–12. Zagreb: Institut za arheologiju, 167–178.
Mirdita, Z. 2007. *Religija i Kultovi Dardanaca i Dardanije u Antici*. Zagreb: Hrvatski Institut za Povijest.
Mirdita, Z. 2015. *Dardanci i Dardanija u Antici*. Zagreb: Hrvatski Institut za Povijest.
Mòcsy, A. 1970. *Gesellschaft und Romanisation in der römischen Provinz Moesia Superior*. Budapest: Académia Kiadó.
MK/A: Muzeu i Kosovës/Arkivi (Museum of Kosova/The Archive)
Mustilli, D. 1942. Archeologia del Cossovo. 1941-XX. In *Estratto del volume "Le terre Albanesi redente"*, I – Cossovo, 93–111. Roma: Reale Accademia d' Italia. Centro Studi per l'Albania.
Novaković, P. 2011. Archaeology in the new countries of southeastern Europe: A historical perspective. In *Comparative archaeologies: A sociological view of the science of the past*, ed. R. Ludomir Lozny. New York: Springer.

K

Papazoglu, F. 1978. *The central Balkan tribe in pre-Roman times: Triballi, Autariatae, Dardanians, Scordisci and Moesians*. Amsterdam: Hakkert.

Papazoglu, F. 1992–1997. O zavisnom seljaštvu kod Ardijejaca i Dardanaca. In Godišnjak CBI, vol. 28. Sarajevo: ANUBiH, XXX, 97–104.

Peja, F., and J. Drançolli. 2006. Gërmime Arkeologjike në Graboc të Ulët, 2004. In *Kosova Archaeologica*, vol. 1. Prishtinë: Archaeological Institute of Kosova.

Perzhita, L., and G. Hoxha. 2003. *Late Antiquity castles in Western dardania*. Tirana: Akademia e Shkencave e Shqipërisë/Instituti i Historisë.

Perzhita, L., G. Hoxha, A. Bunguri, et al. 2006. *Harta Arkeologjike e Kosovës/Archaeological Map of Kosova*. Vol. I. Prishtinë: Akademia e Shkencave dhe e Arteve e Kosovës-Akademia e Shkencave e Shqipërisë.

Përzhita, L., et al. 2012. *Harta Arkeologjike e Komunës Obiliq*. Vol. II, 189–199. Prishtinë: Harta Arkeologjike e Kosovës.

Përzhita, L., et al. 2013. *The antiquity of Fushë Kosova*. Prishtinë: Fushë Kosova Municipality/Regional Centres for Cultural Heritage of Prishtina.

Petković, V. 1929. *Istorisko-Umetnički Muzej*. Beograd: Godišnjak SKA.

Popović, L., and E. Čerškov. 1956. Ulpiana. Prethodni izveštaj o arheološkim istraživanjima, 1954–1956 g. In *Glasnik Muzeja Kosova i Metohije*, 1. Prishtinë. Musées de la Province Autonome de Kosovo et Metohie.

Prendi, F. 1976. Neoliti dhe Eneoliti në Shqipëri/Le néolithique et l'énéolithique en Albanie. *Iliria* VI: 21–100. Tiranë.

Schallmayer, E., et al. 1990. *Der römische Weihebezirk von Osterburken: 1. Corpus der griechischen und lateinischen Beneficiarier-Inschriften des römischen Reiches*. Stuttgart: Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg.

Srejović, D. 1981. *Drevne Kulture na tlu Srbije i Antičko nasljeđe*. Vol. I, 44–53, 54–65. Belgrade: Istorija Srpskog Naroda.

Srejović, D. 1997. *Arheološki Leksikon*. Beograd: Savremena administracija.

Teichner, F. 2015. Ulpiana: Iustiniana secunda (Kosovo): Das urbane Zentrum des dardanischen Bergbaubezirks. In *Ephemeris Napocensis*, vol. XXV, 81–93. Bucureşti: Editura Academiei Române.

Vulić, N. 1925. Dardanci. In Glas, SKA, CXIV. Beograd: Srpska Kraljevska Akademija, 90.

Vulić, N. 1931. *Antički spomenici naše zemlje*. Beograd: Spomenik SKA, LXX, drugi razered, 55; Spomenik SAN, XCVIII, odeljenje društ. nauka, 77: 1941–48.

Zdravković, I. 1975. *Forteresses et chateaux Medievaux de Kosovo*. Beograd: Turistička štampa.

Further Reading

Berisha, M. 2015. Një vështrim historik i Dardanisë gjatë antikitetit të vonë. In *Kosova Arkeologjike*, vol. 2. Prishtinë: Archaeological Institute of Kosova

Bowman, K.A., et al. 2008. *The Cambridge ancient history*, volume XI, The high empire, A. D. 70–192, sec. ed. Cambridge: Cambridge University Press.

Buda, A., ed. 1974. *Kuvendi i studimeve Ilire I: Tiranë 15–20 shtator 1972*, vol. 1–2 (referate dhe kumtesa). Tiranë: Akademia e Shkencave e RPS të Shqipërisë (Instituti i Historisë, Instituti i Gjuhës dhe i Letërsisë, Instituti i Monumenteve të Kulturës).

Budimir, M. 1937. *O etničkom odnosu Dardanaca prema Ilirima*, 1–4. Ljubljana-Zagreb-Beograd: JIČ, God. III, knj. Sv.

Çavolli, R. 1997. *Gjeografia regjionale e Kosovës*. Prishtinë: Enti i Teksteve dhe i Mjeteve Mësimore i Kosovës.

Čerškov, E. 1958. Sur le problème des communications et de la situation des installations humaines dans la région de Kossovo et de Métohie a l'époque romaine. *Bulletin du Musée de Kosovo et Metohie* II: 65–86. Priština.

CHwB Kosovo Office., ed. 2011. Integrated conservation: Challenges opportunities and integration experiences of cultural and natural heritage into spatial and urban planning in Kosovo. Report series no. 245/2011.

Council of Europe – Kosovo PIL. 2004. Report on the architectural and archaeological survey: IRPP-SAAH 2 Culture 2000 - Integrated Rehabilitation Project Plan - Survey on Architectural and Archaeological Heritage in SEE - second EC/CoE Covenant 2004-2006. Strasbourg: Council of Europe Publishing. Accessed 20 august 2018 on http://www.jp.coe.int/cead/jp/default.asp?TransID=63&SA=1&SE=0#TopOfList.

Council of Europe Publishing ED. 2002. *European cultural heritage, Volume I: intergovernmental co-operation: Collected texts*. Strasbourg: Council of Europe Publishing.

Cvetković-Tomašević, G. 1983. Ulpiana, fouilles archéologiques au centre et dans la partie méridionale de la ville antique. In *Communications*, vol. XV, 67–94. Belgrade: Republički zavod za zaštitu spomenika kulture.

Dagron, G., ed. 1984. *Villes et peuplement dans l'Illyricum protobyzantin, in Actes du colloque de Rome, (12–14 mai 1982)*. Rome: Collection de l'École française de Rome.

Darvill, T. 2002. *The concise Oxford dictionary of archaeology*. Oxford/New York: Oxford University Press.

Dragašević, J. 1877. *Arheologijsko-geografijska istraživanja*. Vol. XLV. Beograd: Glasnik SUD.

Đurić, N.S. 1964. Tertres funéraires illyriens de Suva Reka. *Bulletin du Musée de Kossovo et Metohie* IX: 537–556. Pristina.

Đurić, V. 1989. *Dečani: et l'art Byzantin, au milieu de XVe siecle*, Colloques scientifiques. Vol. XLIX. Beograd: ASSA.

Dušanić, S. 1971. Novi Antinojev natpis i metalla Municipii Dardanorum. *Živa Antika* 21 (1): 241–261. Skopje.

Dzino, D. 2014. Constructing Illyrians: Prehistoric inhabitants of the Balkan Peninsula in early modern and modern perceptions. *Balkanistica* 27: 1–22. South East European Studies Association.

European Cultural Heritage. 2002. *Intergovernmental co-operation: Collected texts*. Vol. I. Strasbourg: Council of Europe Publishing.

Fewkes, V.J., and R.W. Ehrich. 1933a. Excavations at Starćevo, Yugoslavia, seasons 1931 and 1932. *Bulletin of the American School of Prehistoric Research* 9 (1933): 33–54.

Fewkes, V.J., and R.W. Ehrich. 1933b. Preliminary report on an archaeological reconnaissance in Yugoslavia: American expedition, season 1932. *Bulletin of the American School of Prehistoric Research* 9: 16–32.

Fidanovski, S., et al. 1987. *Hisar-Kosterce: Eneolitsko naselje, ranovizantijsko utvrđenje i srednjovekovna nekropolja*. Ljubljana: AP, 1986.

Fidanovski, S., et al. 1988. Nekropole Municipijuma DD u svetlu novih istraživanja. *Buletin i Muzeut të Kosovës* XV–XVI: 11–34. Prishtinë.

Francesco, De, ed. 2016. *In search of pre-classical antiquity: Rediscovering ancient peoples in Mediterranean Europe (19th and 20th c.)*, National Cultivation of Culture. Leiden/Boston: Brill.

Garašanin, M. 1979. *Rites d'Inhumation chez les Illyriens*, Conferences Scientifiques. Vol. VIII. Belgrade: ASSA. Classe des sciences historiques, No. 2.

Garašanin, M. 1988. *Les Illyriens et les Albanais*, Colloques Scientifiques, vol. XXXIX, 81–144, 173–199, 251–283. Belgrade: ASSA.

Gimbutas, M. 1974. *The gods and goddesses of old Europe, 7000 to 3500 BC: Myths, legends and cult images*, 18–27. London: Thomas and Hudson.

Gimbutas, M. 1982. *The goddesses and gods of old Europe, 6500–3500 BC. Myths and cult images*, 61–64. Berkeley: University of California Press.

Gori, M., and M. Ivanova, eds. 2017. *Balkan dialogues: Negotiating identity between prehistory and the present*. London/New York: Routledge.

Hoxha, G.J. 2012. In *The impact of conflict on cultural heritage in Kosovo*, ed. S. Lambert and C. Rockwell. Rome: ICCROM.

Ivanišević, V., and P. Špehar. 2006. Early Byzantine Finds from Čečan and Gornji Streoc (Kosovo). In *Starinare LV-2005*, 133–159. Belgrade: Institute of Archaeology.

Ivić, P., ed. 1988. *Recueil de la table ronde sur l'investigation scientifique du Kosovo*, Colloques Scientifiques. Vol. XLII, 1–71. Belgrade: ASSA.

Kanitz, F. 1892. *Römische Studien in Serbien*. Vienna.

Koha Ditore. 2017. *Gjurmëve të tempullit unik për hyjneshën dardane*. Prishtinë, 17 qershor.

Korać, V. 1965. *L'école de Pomorje dans l'architecture Serbe*, Monographies, tome CCCLXXXIV. Belgrade: ASSA.

Korkuti, M. 2016. *Etnogjeneza e ilirëve*. Tiranë: Akademia e Shkencave e Shqipërisë.

Kovačević, J. 1964. Mercenaires germains à Ulpiana c. 550. In *Actes du XIIe Congrés à international d'études byzantines, Ochride 10–16 septembre 1961*, vol. III. Belgrade.

Krasniqi, A. *Monument*. Vol. I/2014; Vol. II/2015. Prishtinë: Koha, ARS.

Marjanović-Vujović, G. 1986. *Les necropoles medievales en Serbie notes lors des fouilles archeologiques*. Starinar, Institut archéologique Beograd.

Merkle, M., and N. Oroshi. 2008. *Sieben Tage Kosova*. Dokumentarfilm: Mit Unterstützung durch Autokraft, German Wings und Peter Pohl.

Milisauskas S. eds. 2011. European prehistory: a survey, 2nd edition. New York: Springer, 406–409.

Mirdita, Z. 1981. *Antroponomia e Dardanisë në Kohën Romake*. Prishtinë: Rilindja.

Moravcsik, G.Y. 1967. *Constantine Porphyrogenetus, De Administrando Imperio*. Dumbarton Oaks: Center for Byzantine studies.

Novak, G. 1929. La nazionalità dei Dardani. *Arhiv ASJE* XV/1: 72–89. Belgrade.

Palavestra, A. 1995. Strongholds of power. The territorial aspect of the princely tombs of the early Iron age in the Central Balkans. *Balcanica* XXVI: 35–51. Belgrade.

Palavestra, A. 2011. In the service of conthinuity. Ethnoarchaeology in Serbia. *Etnoatropološki Problemi* 6/3: 579–594. Belgrade: University of Belgrade.

Papazoglou, F., ed. 1982. *Inscriptiones de la Mésie Supérieure*. Vol. VI. Beograd: Centre D'études Épigraphiques et Numismatiques.

Parović-Pešikan, M. 1990. Novi spomenik Jupitera Melana iz Ulpijane. *Arheološki Vestnik, Inštitut za arheologijo* 41: 607–616. Ljubljana.

Peja, F., et al. 2012. *The castle of Harilaq*. Prishtinë: Museum of Kosova.

Petrović, P., ed. 1979. *Inscriptiones de la Mésie Supérieure*. Vol. IV. Beograd: Centre D'études Épigraphiques et Numismatiques.

Petrović, V. 2007. Dardanie dans les Itineraires Romanes: Les villes et les agglomerations. Academie Serbe des Sciences et des Arts/Institut des Études balkaniques, Belgrade, ed. speciales, 99, 9–158.

Popović, L.J., and E. Čerškov. 1956. A preliminary report on archeologic researches from 1954 till 1956. *Bulletin du Musée de Kosovo et Metohie* I: 319–327. Priština.

Roman Castle Found in Kosovo. Video at Reuters. Available at: http://archaeology-in-europe.blogspot.com/2005_07_01_archive.html#112265100443716126. Accessed 1 June 2017.

Sahiti, F. 2016. Trashëgimia kulturore e Kosovës Lindore. Doctoral dissertation, Universiteti i Tiranës, Tiranë, 298.

Špehar, P. 2015. Remarks to Christianisation and realms in the Central Balkans in the light of archaeological finds (7th–11th c.). In *Castellum Pannonicum Pelsonense*, vol. 6. Budapest: VML Verlag Marie Leidorf GmbH.

Stanič, J., ed. 1984. *Albanci*, 11–35. Ljubljani: Cankarjeva Založba.

Stipčević, A. 1989. *Iliri, povijest, život, kultura*. Zagreb: Školska knjiga.

Tasić, N. 1998. *The archaeological treasures of Kosovo and Metohija from the Neolithic to the early middle ages, I-II*. Belgrade: Gallery of the Serbian Academy of Sciences and Arts – Museum of Priština.

Truhelka, Ć. 1929. *Arheološke beleške iz Južne Srbije (Archaeological notes from Southern Serbia)*. Vol. V, 59–85. Skoplje: Glasnik SND.

K

von Premerstein A., and N. Vulić. 1903. Antike Denkmäler in Serbien und Macedonien. *Jahreshefte des Österreichischen Archäologischen Institutes in Wien*, VI(1), 1–60.
Vulić, N., F. Ladek, and A. Premerstein. 1903. Ancient monuments in Serbia. *Spomenik SKA* 39: 43–88. Belgrade.

Kostenki: Geography and Culture

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Introduction

Kostenki is the name of a village on the Don River in the Russian Federation where more than twenty open-air Paleolithic sites are known. Several more sites are found at the village of *Borshchevo*, which is located about 5 km downstream from Kostenki. The sites are assigned to the Upper Paleolithic and yield skeletal remains of modern humans (*Homo sapiens*). Artifacts were found in association with the remains of extinct mammals at Kostenki in 1879 and were among the first discoveries of IceAge people in Eastern Europe. By the 1930s, the sites at Kostenki and Borshchevo had produced a rich record of middle and late Upper Paleolithic occupation, including large feature complexes with traces of suspected dwelling structures. The excavation and study of the occupation floors had a significant impact on theory and method in archaeology during the Soviet period. In the years following the Second World War, substantial evidence of early Upper Paleolithic occupation was discovered at Kostenki, adding another important dimension to these sites. The recent discovery that several sites contain occupations that underlie a 40,000-year-old volcanic ash provided evidence of the earliest known Upper Paleolithic remains in Eastern Europe. Field research continues today at Kostenki and Borshchevo, and the results continue to have an impact on world archaeology.

Definition

Kostenki is located on the Middle Don River near the city of Voronezh in the Russian Federation at 51° 40′ North and 39° 10′ East. The village lies on the west bank of the river and the eastern margin of the Central Russian Upland at an elevation of approximately 125 m above mean sea level. The village of Borshchevo is situated several kilometers southeast of Kostenki. The area is within the modern forest-steppe zone and experiences a continental climate with mean July and January temperatures of 19 °C and −8 °C, respectively. Precipitation averages 520 mm per year.

A total of 21 stratified Upper Paleolithic open-air sites have been investigated at Kostenki, and five or more sites have been discovered at Borshchevo. Although several sites are found in the main valley, most are situated at the mouths or in the upper courses of large side-valley ravines that are incised into the high west bank of the Don River. Springs are active today in the ravines, and primary carbonate deposits in the sites indicate that they were active during Upper Paleolithic times as well (Holliday et al. 2007: 217–219). The sites are found primarily on the first (10–15 m) and second (15–20 m) terrace levels (Lazukov 1982: 21–35).

Mammoth bones were known from Kostenki centuries ago and evidently account for the name of the village (*kost'* is the Russian word for bone), but archaeological remains were first discovered in 1879 (Klein 1969: 29). Major excavations began in the 1920s and 1930s, and these were focused primarily on middle and late Upper Paleolithic occupations (especially the large Eastern Gravettian component in Layer I at Kostenki 1 (Efimenko 1958)). Early Upper Paleolithic remains were investigated in the lower layers at Kostenki 1 and other localities prior to World War II (e.g., Kostenki 6), but most research on the early occupations was initiated

by A. N. Rogachev in the late 1940s (Rogachev 1957; Klein 1969: 231–232).

The high west bank of the Don Valley, which represents the eastern margin of the Central Russian Upland, is composed of Cretaceous marl (chalk) and sand (Lazukov 1982: 15–17). Upper Paleolithic sites are buried in fill deposits of the first and second terraces of the Don River. The terraces are found in both the main valley and in portions of the large side-valley ravines incised into the west bank of the valley. The terraces are composed of alluvium, which unconformably overlies the pre-Quaternary units, capped with a complex sequence of eolian, slope, and spring deposits (Lazukov 1982: 15–22; Holliday et al. 2007: 182–184).

The uppermost alluvium is interstratified with coarse slope deposits derived from the Cretaceous bedrock (Lazukov 1982: 21). Above these deposits lies a sequence of alternating thin lenses of silt, carbonate, chalk fragments, and organic-rich loam (Holliday et al. 2007: 184–186). At many localities, they are subdivided by the volcanic tephra horizon, which has been identified as the *Campanian Ignimbrite* (CI) Y5 tephra, derived from an eruption in southern Italy and dated to c. 40,000 cal BP (Pyle et al. 2006; Anikovich et al. 2007). Traditionally, the lenses below and above the tephra have been termed the *lower humic bed* and *upper humic bed*, respectively (Rogachev 1957; Klein 1969). The humic beds apparently represent a complex interplay of colluviation, spring deposition, and soil formation (Holliday et al. 2007). At some sites, more typical soil profiles developed, including a weakly developed soil (*Gmelin soil*) that formed during the early stages of the LGM (Last Glacial Maximum) and dates to c. 26,000–25,000 cal BP. Above the Gmelin soil lies loess-like loam of LGM age, which is capped with the modern chernozem (Lazukov 1982; Holliday et al. 2007: 219).

Key Issues/Current Debates/Future Directions/Examples

The earliest occupation levels at Kostenki and Borshchevo underlie the CI Y5 tephra and date to 42,000–41,000 cal BP or older (Anikovich et al. 2007; Hoffecker et al. 2008). There is continuing debate and discussion about the age and cultural affiliation of these occupation levels. In the early 1950s, P. I. Boriskovskii (1963) excavated a level below the tephra at Kostenki 17 (Layer II), which yielded burins, large retouched blades, end scrapers, and microblades. Other items included bone awls and point fragments and various ornaments. A similar assemblage was recovered from below the tephra level at Kostenki 12 (Layer II). These assemblages have traditionally been labeled as a local early Upper Paleolithic industry without clear links to others in Western or Eastern Europe (*Spitsyn culture*).

A somewhat different assemblage has been found below the CI tephra in the lowest level (Layer IVb) at Kostenki 14 containing bladelets, burins, end scrapers, and several bifaces; non-stone artifacts include antler mattocks, bone points, perforated shells, and a carved ivory piece that may represent the head and neck of a (unfinished) human figurine (Hoffecker et al. 2008).

Several strikingly different assemblages have been excavated from below the tephra at Kostenki 6, Kostenki 12 (Layer III), and other sites. These occupations contain end scrapers and Middle Paleolithic flake tool types, such as sidescrapers, small bifaces, and triangular points; non-stone tools, ornaments, and art are totally absent (Rogachev 1957; Praslov and Rogachev 1982; Anikovich et al. 2008). Traditionally, they have been assigned to an East European industry known as the *Strelets culture* (Anikovich et al. 2007: 236–240). An alternative view is that these assemblages, which are often associated with evidence for killing and butchering large mammals (primarily horse, mammoth, and reindeer), represent a functional subset of the other industry (i.e., kill-butchery tools and weapons) (Hoffecker et al. 2010).

Human skeletal remains in these layers are confined to a third molar from Kostenki 17, Layer II and the crown of a deciduous tooth from Kostenki 14, Layer IVb. Both are tentatively assigned to modern humans, which are widely assumed to have produced all of the artifacts

below the CI tephra at Kostenki and Borshchevo (Gerasimova et al. 2007).

Less controversy surrounds the classification of assemblages that lie above the CI tephra, but below loess-like loams deposited during the LGM, and date to the later phases of the early Upper Paleolithic. At Kostenki 1, Layer III contains an artifact assemblage widely classified as *Aurignacian* and comprising large blades with scalar retouch, carinate scrapers, backed bladelets, and other diagnostic items (Anikovich et al. 2007: 228–233; Anikovich et al. 2008). An older Aurignacian assemblage is associated with the tephra layer at Kostenki 14 (Sinitsyn 2003).

Another group of artifact assemblages dating to this interval contains a high proportion of end scrapers, as well as typical Middle Paleolithic forms (e.g., sidescrapers, points), and a varied assortment of bone artifacts. Among the bone artifacts are diagnostic "shovels" and the oldest known eyed needles. These assemblages are found in the upper portion of the upper humic bed at Kostenki 14 (Layer II) and the lower portion of the upper humic bed at Kostenki 15 (Praslov and Rogachev 1982); both are associated with evidence for the killing and butchering of a group of horses (*Equus latipes*) (Hoffecker et al. 2010). A similar assemblage is thought to be deposited with the Streletskaya assemblage in Layer I at Kostenki 12, and the assemblage in the lower part of the upper humic bed at Kostenki 14 (Layer III) is sometimes considered part of this group (Praslov and Rogachev 1982). These assemblages are assigned to the *Gorodtsov culture* (Rogachev 1957; Efimenko 1958), which is recognized at several other East European sites (e.g., Mira in the Dnepr Valley) but unknown in Western and Central Europe (Anikovich et al. 2007: 248–265).

Skeletal remains assigned to modern humans are associated with these assemblages at Kostenki 15, which yielded the partial skeleton of a child in a burial pit, and at Kostenki 12, Layer I (Gerasimova et al. 2007: 102–105). A complete modern human skeleton also was excavated from a burial pit in Layer III at Kostenki 14 (Rogachev 1957); although mid-Holocene dates on the human bone were reported several years ago, the most recent date is more than 30,000 cal BP and consistent with the stratigraphic context of the upper humic bed. Analysis of ancient DNA from this skeleton indicates that it belongs to mtDNA haplogroup U2 (Krause et al. 2010).

At Kostenki 11 (Layer V) and Kostenki 12 (Layer Ia), the lower upper humic bed contains assemblages with diagnostic triangular bifacial points, typical Middle Paleolithic artifact forms (points and sidescrapers), and also some end scrapers and burins; non-stone artifacts are absent. Similar artifacts are found in the upper portion of the upper humic bed at Kostenki 12 (Layer I). Traditionally, these assemblages have been assigned to a younger phase of the *Strelets culture* (Anikovich et al. 2007: 236–248; Anikovich et al. 2008); they also have been interpreted as functional variants related to large mammal kill-butchery (Hoffecker et al. 2010).

Yet another industry is represented in the upper portion of the upper humic bed at Kostenki 8 (Layer II). This assemblage is dominated by backed bladelets and points and is widely considered an early form of the *Gravettian technocomplex*, other sites of which are common above the upper humic bed and its stratigraphic equivalents in Eastern Europe (Anikovich et al. 2007: 233–236; Anikovich et al. 2008). Associated human remains at Kostenki 8 include skull fragments (Gerasimova et al. 2007: 90–91).

The archaeological remains for which Kostenki is most famous are those of the Eastern Gravettian (middle Upper Paleolithic) dating to the early phase of the LGM (~25,000 cal BP). They include, most notably, the large feature complexes at Kostenki 1, Layer I, and associated remains at the nearby localities of Kostenki 13 and 18 on the north side of the mouth of Pokrovskii Ravine (Efimenko 1958; Praslov and Rogachev 1982; Anikovich et al. 2008). The feature complexes comprise a linear arrangement of hearths surrounded by pits of varying size that contain large mammal bones and artifacts. Diagnostic artifacts include "Kostenki points," "Kostenki knives," and examples of "Venus figurines" carved in ivory and marl. The assemblages also contain burins, end scrapers, microblades,

and a variety of bone and ivory implements. As in Central Europe, there is evidence for Gravettian fired ceramic technology (Praslov and Rogachev 1982). The assemblages are similar to those of comparable age (and associated with similar feature complexes) at Avdeevo and Zaraisk, and sometimes placed in a local *Kostenki culture* within the broader Eastern Gravettian entity (Anikovich et al. 2008).

Faunal remains associated with the Eastern Gravettian occupations at Kostenki are dominated by mammoth and smaller fur-bearing mammals (wolf, fox, and hare). Many of the mammoth bones and tusks are weathered, and these may have been collected from natural occurrences for use in construction of dwellings and other structures or for raw material. Most of the fuel at these sites appears to have been bone (trees were either scarce or absent during this interval), and many of the remains of large mammals hunted by their occupants may have been consumed in the hearths. At least some of the pits may have been dug to the permafrost level during warmer months and used like Inuit "ice cellars" to keep the bone fresh and flammable.

There appears to be a hiatus in settlement at Kostenki during the cold peak of the LGM (roughly 23,000–22,000 cal BP). Later Upper Paleolithic occupations include examples of oval mammoth bone houses similar to those of comparable age in the Dnepr-Desna Basin (e.g., Mezhirich) at Kostenki 2, Kostenki 11 (Layer Ia), and probably Borshchevo 1 (on the first terrace level) (Praslov and Rogachev 1982). These occupation levels date to the interval following the LGM cold maximum, before the end of the Pleistocene (19,000–14,000 cal BP), as do the more widespread mammoth-bone houses in the Dnepr-Desna Basin, although several investigators believe that they are older (e.g., Lazukov 1982).

At Kostenki 11, the mammoth-bone structure has been left in situ on the excavated floor of Layer Ia; a portion of the exposed excavation is enclosed in a museum building at the south end of the village of Kostenki. The collapsed mammoth-bone structure measures 7–8 m in diameter and is composed primarily of mandibles, scapulae, pelves, and long bones. A minimum of 36 individual mammoths are represented. Around the former dwelling, to the north, west, and south, are large pits, filled chiefly with bone debris. At Kostenki 2, a bone-lined pit burial is associated with the mammoth-bone dwelling structure (Praslov and Rogachev 1982; Anikovich et al. 2008).

Cross-References

- ▶ Art, Paleolithic
- ▶ Bone Tools, Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Prehistoric Rock Art
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ Geoarchaeology
- ▶ *Homo sapiens*
- ▶ Human Remains in Museums
- ▶ Macphail, Richard I.
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Site Formation Processes
- ▶ Social Archaeology

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References

Anikovich, M.V., et al. 2007. Early Upper Paleolithic in eastern Europe and implications for the dispersal of modern humans. *Science* 315: 223–226.

Anikovich, M.V., et al. 2008. *Paleolit Kostenkovsko-Borshchevskogo raiona v kontekste verkhnego paleolita Evropy*. Saint Petersburg: Nestor-Istoriya.

Boriskovskii, P.I. 1963. Ocherki po Paleolitu Basseina Dona. *Materialy i Issledovaniya po Arkheologii SSSR* 121.

Efimenko, P.P. 1958. *Kostenki I*. Moscow: Nauka.

Gerasimova, M.M., et al. 2007. *Paleoliticheskii chelovek, ego material'naya kul'tura i prirodnaya sreda obitaniya*. St-Peterburg: Nestor-Istoriya.

Hoffecker, J.F., et al. 2008. From the Bay of Naples to the River Don: The Campanian Ignimbrite eruption and the Middle to Upper Paleolithic transition in Eastern Europe. *Journal of Human Evolution* 55: 858–870.

Hoffecker, J.F., et al. 2010. Evidence for kill-butchery events of early Upper Paleolithic age at Kostenki, Russia. *Journal of Archaeological Science* 37: 1073–1089.

Holliday, V.T., et al. 2007. Geoarchaeology of the Kostenki-Borshchevo sites, Don River, Russia. *Geoarchaeology* 22 (2): 183–230.
Klein, R.G. 1969. *Man and culture in the late Pleistocene: A case study*. San Francisco: Chandler.
Krause, J., et al. 2010. A complete mtDNA genome of an early modern human from Kostenki, Russia. *Current Biology* 20 (3): 231–236.
Lazukov, G.I. 1982. Kharakteristika chetvertichnykh otlozhenii raiona. In *Paleolit Kostenkovsko-Borshchevskogo raiona na Donu 1879–1979*, ed. N.-D. Praslov and A.N. Rogachev, 13–37. Leningrad: Nauka.
Praslov, N.D., and A.N. Rogachev, eds. 1982. *Paleolit Kostenkovsko-Borshchevskogo Raiona na Donu 1879–1979*. Leningrad: Nauka.
Pyle, D.M., et al. 2006. Wide dispersal and deposition of distal tephra during the Pleistocene 'Campanian Ignimbrite/Y5' eruption, Italy. *Quaternary Science Reviews* 25: 2713–2728.
Rogachev, A.N. 1957. Mnogosloinye stoyanki Kostenkovsko-Borshevskogo raiona na Donu i problema razvitiya kul'tury v epokhy verkhnego paleolita na Russkoi Ravnine. *Materialy i Issledovaniya po Arkheologii SSSR* 59: 9–134.
Sinitsyn, A.A. 2003. A Palaeolithic 'Pompeii' at Kostenki, Russia. *Antiquity* 77: 9–14.

Kow Swamp

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State of Knowledge and Current Debates

Kow Swamp is the name given to the largest Late Pleistocene cemetery thus far found in Australia. Site excavations led by Alan Thorne in the late 1960s and early 1970s revealed skeletal material belonging to more than 40 individuals with ages ranging from infant to adult. All but one were male. The morphological character of the material presented an important challenge to existing evolutionary theories of human settlement in Australia. Amid controversy, in 1991, the collection was repatriated to Aboriginal people and subsequently reinterred. This period in Australian archaeology heralded significant shifts in disciplinary ethics to include respectful acknowledgement of Indigenous perspectives and authority where human skeletal material are concerned.

Kow Swamp Material and Research Concerning Early Humans in Australia

As the largest group of Late Pleistocene fossils found in Australia, the Kow Swamp material substantially increased the body of evidence from which archaeologists and physical anthropologists could theorize about a range of complex issues such as the biological origins and transformations of human populations in Australia (Thorne 1971). As with other skeletal material found on the continent, the collection was generally poorly preserved, and only 12 of the best preserved and most complete individuals were recorded in detail. The collection generally was deemed morphologically "robust" but found to be relatively young with radiocarbon dating of shell, bone, and charcoal providing age estimates ranging between 9000 and 15,000 years ago (Thorne 1976). Analysis of the collection challenged any simple evolutionary framing of the origins and transformations of humans in Australia, whereby a robust population preceded but subsequently transformed to produce morphologically gracile humans. The robust morphology but relatively young age of the Kow Swamp material led to two possible explanations that Kow Swamp represented either the descendants of one (of multiple) colonizing populations or the descendants of a single colonizing population that subsequently diversified (Thorne 1971; Thorne and Macumber 1972). The proposition that multiple founding populations entered Australia was preferred at the time, but contemporary reinterpretation favors a single founding population entering Australia that later diversified to produce the considerable variation evident in the human skeletal record (see, e.g., Pardoe 2006). Both explanations are theoretically possible and research is ongoing (Curnoe 2011; Westaway and Groves 2009). While the Kow Swamp collection has been significant in debates relating to the peopling of the Australian continent, it also played an important role in shaping contemporary archaeological practice in Australia, in relation to Indigenous Australians.

Controversy Over the Repatriation of Kow Swamp Human Material

Indigenous opposition to the Kow Swamp excavations had been voiced since the early 1970s and a formal attempt made to halt excavations (which had by then ended) by the Aboriginal Legal Service issuing a writ to the authorizing institution, the then named National Museum of Victoria (Griffiths 1996). Subsequent removal of the Kow Swamp material from archaeological possession was made possible some time later by legislative changes in 1984 to the Victorian *Archaeological and Aboriginal Relics Preservation Act 1972* (Mulvaney 1991). These made display or possession of skeletal material illegal without permission from the Secretary of the Department of Planning and Environment. The Victorian Aboriginal Legal Service learned from Aboriginal employees of the National Museum of Victoria that one of the Kow Swamp crania was to be exhibited at the high-profile exhibition *Ancestors: Four Million Years of Humanity* at the American Museum of Natural History which ran from April 13 to September 9, 1984 (Tattersall et al. 1985). The Victorian Aboriginal Legal Service then applied under the act to have the material removed. Just days before it was due to be exhibited, the cranium was withdrawn and the entire collection held by the National Museum of Victoria until the eventual repatriation.

The Australian Archaeological Association (AAA) responded to the removal and the legislative changes that facilitated the event by forming a committee, chaired by Alan Thorne. They prepared their first ever position paper drawing on and closely following the reburial policies of similar societies in the USA and Canada including the Society for American Archaeology, the American Association of Physical Anthropologists, and the Canadian Association for Physical Anthropology (Meehan 1984). The AAA also wrote letters to both state and federal government ministers. These professed sympathy for Aboriginal views generally and "welcomed" their "first time" "interest" in "prehistoric sites." The AAA also fully supported the reburial of individuals who were *known* to living Aborigines. However, the paper remained opposed to the reburial or cremation of other skeletal materials highlighting the "scientific importance" of the Kow Swamp fossils to archaeology and related disciplines. The paper's proposed solutions for addressing tensions around the reburial issue included training Aboriginal people as archaeologists and museum curators, establishing "keeping places" (buildings made to securely house material under Aboriginal control such as that already planned for Lake Mungo), and initiating joint projects between Aboriginal people and archaeologists (Meehan to Walker, in Meehan 1984).

The AAA committee and individual archaeologists and physical anthropologists expressed great concern for the future study of skeletal material in the state of Victoria, and elsewhere (e.g., Brown in Meehan 1984). Victorian institutions held the largest share of prehistoric skeletal material found in Australia (Lewin 1984). At the time, it seemed that all skeletal material held by these could be subject to claim. The Victorian Aboriginal Legal Service making the claims clearly expressed their clients' preference that "everything must return home, to be reburied" (Lewin 1984: 393). In that same year, using the same legislation, the Victorian Aboriginal Legal Service had applied to have repatriated from the University of Melbourne's Anatomy Department, the Murray Black skeletal collection which consisted of some 800 individuals. Also in 1984, Tasmania, another Australian state, announced its intentions to return all publicly housed skeletal material to the Aboriginal people. It was expected that all would be cremated. At the time, the AAA committee expressed a deep concern that the potential removal and reburial of all Victorian and Tasmanian skeletal material would effectively end all scientific study of prehistoric human biology in Australia (Meehan 1984).

The AAA dedicated a special session of their annual conference to the issue in that same year. The Victorian Aboriginal Legal Service also sought to explore the issues by holding an Aboriginal Skeletal Remains Conference in Melbourne, and representatives from the AAA and Victorian Government attended. Specific responses from individual archaeologists at the time were varied but largely unsupportive of Aboriginal claims.

More extreme responses to the removals and eventual repatriations included claims that the actions were "criminal," "racist," and potentially heralded the "death" of the discipline (see, e.g., Lewin 1984; Meehan 1984; Mulvaney 1991). Interviewed for an article on the issue in *Science*, Thorne noted that "the speed of recent developments has taken the scientific community by surprise, and there is a great deal of uncertainty about what will happen now" (quoted in Lewin 1984: 393). Aboriginal views were largely absent from the public debate, and their feelings on the issues were often portrayed negatively in media reporting. Information regarding their views was largely based on speculation and gleaned from archaeologists directly involved in the repatriation claims (Bowdler 1992: 103). A full account of Aboriginal views on the Kow Swamp repatriation has never been published though it seems that Aboriginal requests for greater involvement in discussions involving the use and display of human remains by the museum led to internal disputes between Indigenous and non-Indigenous staff of that institution. These disputes contributed to the steadfast Aboriginal preference for reburial in that state (Turnbull 2010: 132).

While the Kow Swamp collection had been removed in 1984, its repatriation to Aboriginal people was difficult and lengthy. Negotiations extended over years until amended federal legislation was appealed to by Aboriginal legal representatives. This act, the *Aboriginal and Torres Strait Islander Heritage Protection Amendment Act 1987 (No. 39 of 1987)*, states that "the Aboriginal people of Victoria are the rightful owners of their heritage and should be given responsibility for its future control and management" and that "where Aboriginal remains discovered in Victoria are delivered to the Minister, he or she shall: (a) return the remains to a local Aboriginal community entitled to, and willing to accept, possession, custody or control of the remains in accordance with Aboriginal tradition" (see Mulvaney 1991). This legislation facilitated the eventual repatriation of the Kow Swamp collection to the Echuca Aboriginal Cooperative, the organization representing local Aboriginal interests.

By the time the Kow Swamp collection was repatriated in 1991, archaeological opinion had shifted, and calls for respectful acceptance of Aboriginal claims of ownership were appearing (e.g., Webb 1987; Bowdler 1992). The controversy surrounding the removal of the Kow Swamp material, combined with postprocessual critiques of the discipline in the 1980s, accelerated and intensified the political consciousness of archaeological practitioners in the creation and management of the past. Some though were famously hardened in their views. Australia's most senior archaeologist, Professor John Mulvaney, who became involved in the final years of negotiations, referred to the removal and reburial as "the most serious confrontation in Australian archaeology" (Mulvaney 2006: 428) and much later as his "career's most distressing episode." He was generally in favor of greater engagement with interested Aboriginal people and establishing "keeping places" for excavated material, but he remained opposed to reburying material and rejected the proposition that "the remote past can be 'owned' by a local clan" (Mulvaney 2006: 428); it belonged to all humanity. When the National Museum of Victoria repatriated the Kow Swamp collection in 1991, he resigned his (honorary) position at that institution in protest. Moreover, he exited the field of prehistory entirely feeling that his continued oppositional stance to reburial placed him in a "minority" position among his fellow archaeologists (Mulvaney 2006: 428).

Significantly, the removal and repatriation of the Kow Swamp material helped to prompt the development and adoption of a Code of Ethics by the Australian Archaeological Association (McBryde 1992). Based on the World Archaeological Congress' own code and with input from Australian Indigenous people, Association members discussed and adopted a code at their annual meeting in 1991. Designed to formalize "obligations" to Australian Indigenous peoples and guide appropriate conduct of archaeologists when their work concerns Indigenous heritage, it states that:

> Members agree to acknowledge the special importance of indigenous ancestral human remains, and sites containing and/or associated with such

> remains, to the indigenous people [and that] members shall not interfere with and/or remove human remains of indigenous peoples without the written consent of representatives authorised by the indigenous people who cultural heritage is the object of investigation. (Australian Archaeological Association 1991)

Kow Swamp Human Material and Disciplinary Identity: Loss and Renewal

The repatriation of the Kow Swamp human material was a significant event that made plain the differing worldviews of archaeologists and Indigenous peoples. It made abundantly clear that the discoveries and objects that archaeologists considered as belonging to "prehistory" was for Indigenous peoples connected to the contemporary domain and to personal and collective Indigenous identity. Debates over the Kow Swamp repatriation demonstrated the significance of these individuals to Aboriginal identity but also to the identity of *archaeology* as a discipline (Lahn 2007). Debates revealed the discipline as a contemporary practice, situated as much in the present as it is concerned with the past, thus able to be held up as a valid object of study itself.

Central to archaeological practice is the creation of knowledge concerning the past, built on analysis of objects accumulated by individuals and institutions. It follows that through this process some archaeological discoveries and objects are deemed more valuable than others (old over young, rare over commonplace) and certain highly valued forms, such as ancient human skeletal material, confer status and authority to the individuals and institutions that hold them. Such objects can take on an almost "inalienable" quality (Weiner 1992), too valuable to share with others even within the discipline. Instances where one individual engineers a "virtual monopoly over the fossil series" (Westaway et al. 2015: 250) have been noted. Withheld from circulation, such objects become "imbued with the intrinsic and ineffable identities of their owners" (Weiner 1992: 6).

Seen in these terms as high-status objects central to individual and disciplinary identity and authority, the "loss" to archaeology of the Kow Swamp material was important in signaling a (perhaps momentary) reshuffling of power. This entailed the creation of a space for those Aboriginal voices opposed to archaeological domination over the definition and use of heritage and increasing support for Indigenous perspectives from within the discipline itself. As a result, archaeology as a discipline has had to redefine its relationship to the objects upon which its livelihood depends. Such reshaping has entailed closer attention to the processes through which disciplinary knowledge is created.

Far from representing the "death" of archaeology in Australia, the repatriation of the Kow Swamp individuals helped provoke the opening of a space for different forms of archaeological endeavor involving Indigenous peoples including opportunities for collaborative research, and ongoing if uneven conversations about the conduct of the discipline that is respectful of the views of Indigenous peoples on whose country archaeologists work.

Cross-References

- ▶ Australia: Indigenous Cultural Property Return
- ▶ Australia: Repatriation Acts
- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Ethics and Human Remains
- ▶ Human Remains in Museums
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Peoples, Working with and for
- ▶ Langford, Rosalind
- ▶ Postcolonial Archaeologies

References

Australian Archaeological Association. 1991. Code of ethics. *Australian Archaeology* 39: 129.

Bowdler, A. 1992. Unquiet slumbers: The return of the Kow Swamp burials. *Antiquity* 66: 103–106.

Curnoe, D. 2011. A 150-year conundrum: Cranial robusticity and its bearing on the origin of Aboriginal Australians. *International Journal of Evolutionary Biology* 2011: 1–18.

Griffiths, T. 1996. *Hunters and collectors: The antiquarian imagination in Australia*. Cambridge, MA: Cambridge University Press. (especially Chapter 4).

Lahn, J. 2007. Finders keepers, losers weepers: A 'social history' of the Kow Swamp remains. In *Cultural heritage: Critical concepts in media and cultural studies. volume 1: History and concepts*, ed. L. Smith, 361–410. London: Routledge.

Lewin, R. 1984. Extinction threatens Australian anthropology. *Science* 225: 393–394.

McBryde, I. 1992. The past as symbol of identity. *Antiquity* 66: 261–266.

Meehan, B. 1984. Aboriginal skeletal remains. *Australian Archaeology* 19: 122–147.

Mulvaney, D.J. 1991. Past regained, future lost: The Kow Swamp pleistocene burials. *Antiquity* 65: 12–21.

Mulvaney, D.J. 2006. Reflections. *Antiquity* 80: 425–434.

Pardoe, C. 2006. Becoming Australian: Evolutionary processes and biological variation from ancient to modern times. *Before farming* 1: Article 4.

Tattersall, I., J.A. Van Couvering, and E. Delson. 1985. The 'Ancestors' project: An expurgated history. In *Ancestors: The hard evidence*, ed. E. Delson, 1–5. New York: Alan R. Liss.

Thorne, A.G. 1971. Mungo and Kow Swamp: Morphological variation in Pleistocene Australians. *Man* 8: 85–89.

Thorne, A.G. 1976. Morphological contrasts in Pleistocene Australians. In *The origin of the Australians*, Human biology series 6, Australian Institute of Aboriginal Studies, ed. R.L. Kirk and A.G. Thorne, 95–112. New Jersey: Humanities Press.

Thorne, A.G., and P.G. Macumber. 1972. Discoveries of late Pleistocene man at Kow Swamp, Australia. *Nature* 238: 316–319.

Turnbull, P. 2010. The Vermillion Accord and the significance of the history of the scientific procurement and use of indigenous Australian bodily remains. In *The long way home: The meaning and values of repatriation*, ed. P. Turnbull and M. Pickering, 117–134. Oxford: Bergham Books.

Webb, S. 1987. Reburying Australian skeletons. *Antiquity* 61: 292–298.

Weiner, A. 1992. *Inalienable possession: The paradox of keeping-while-giving*. Berkeley: University of California Press.

Westaway, M.C., and C.P. Groves. 2009. The mark of ancient Java is on none of them. *Archaeology in Oceania* 44 (2): 84–95.

Westaway, M.C., A. Durband, and D. Lambert. 2015. Human evolution in Sunda and Sahul and the continuing contributions of Professor Colin Groves. In *Taxonomic tapestries: The threads of evolutionary, behavioural and conservation research*, ed. A. Behie and M.F. Oxenham, 249–276. Canberra: ANU Press.

Further Readings

Angier, N. 1984. Burying bones of contention. *Time*, 10 September 1984, 49.

Cribb, J. 1990. Return of remains may bury past. *Weekend Australian*, 28–29 July 1990, 1, 10.

Davidson, I. 1991. Notes for a code of ethics for Australian archaeologists working with Aboriginal and Torres Strait Islander heritage. *Australian Archaeology* 32: 61–64.

Donlon, D. 1994. Aboriginal skeletal collections and research in physical anthropology: An historical perspective. *Australian Archaeology* 39: 73–82.

Faulkhead, S., and J. Berg. 2010. *Power and the passion: Our ancestors return home*. Melbourne: Koorie Heritage Trust.

Fforde, C. 2002. Collection, repatriation and identity. In *The dead and their possessions: Repatriation in principle, policy and practice*, ed. C. Fforde, J. Hubert, and P. Turnbull, 25–46. London: Routledge.

Hubert, J. 1992. Dry bones or living ancestors? Conflicting perceptions of life, death and the universe. *International Journal of Cultural Property* 1: 105–128.

Langford, R.F. 1983. Our heritage, your playground. *Australian Archaeology* 16: 1–6.

Layton, R. 1989. *Conflict in the archaeology of living traditions*. London: Unwin Hyman.

Mc Niven, I., and L. Russell. 2005. *Appropriated pasts: Archaeology and Indigenous people in settler colonies*. Lanham: AltaMira Press.

Mulvaney, D.J. 2011. *Digging up a past*. Sydney: University of New South Wales Press.

Smith, L. 2006. *The uses of heritage*. Abingdon: Routledge.

Smith, L., and E. Waterton. 2009. *Heritage, communities and archaeology*. London: Bloomsbury.

Stone, T., and M.L. Cupper. 2003. Late Glacial Maximum ages for robust humans at Kow Swamp, southern Australia. *Journal of Human Evolution* 45: 99–111.

Thorne, A.G. 1969. Preliminary comments on the Kow Swamp skeleton. *Australian Institute of Aboriginal Studies Newsletter* 2: 6–7.

Thorne, A.G. 1971. The racial affinities of the Australian aborigines. In *Aboriginal man and environment in Australia*, ed. D.J. Mulvaney and J. Golson, 316–325. Canberra: Australian National University Press.

Thorne, A.G. 1975. Kow Swamp and Lake Mungo: Towards an osteology of early man in Australia. Unpublished PhD dissertation, Australian National University.

Thorne, A.G. 1977. Separation or reconciliation? Biological clues to the development of Australian society. In *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia and Australia*, ed. J. Allen, J. Golson, and R. Jones, 187–203. London: Academic Press.

Westway, M.C., and C.P. Groves. 2009. The mark of ancient Java is on none of them. *Archaeology in Oceania* 44: 84–95.

Wright, R.V.S. 1975. Stone artefacts from Kow Swamp, with notes on their excavation and environmental context. *Archaeology and Physical Anthropology in Oceania* 10: 161–180.

Kristiansen, Kristian

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Basic Biographical Information

Kristian Kristiansen (Fig. 1) is the leading European Bronze Age archaeologist of his generation and has helped make Europe into a key anthropological case in the comparative study of complex societies. He received his Ph.D. from Aarhus University in 1975 and continued there as a postdoctoral research fellow until 1979. Then until 1994, he directed the Archaeological Monuments Division in the National Agency for Nature, Monuments and Sites in the Danish Ministry of the Environment. He became Professor of Archaeology at the University of Gothenburg in 1994 and served as Chair from 1994 to 2010. His lasting contributions to European prehistory and world archaeology include a major reconceptualization of Bronze Age Scandinavia and Europe, the internationalization of Bronze Age studies, the formulation of model field research projects that combine diverse scientific and humanist approaches, and a reconceptualization of heritage work within Europe.

Kristiansen, Kristian, Fig. 1 Kristian Kristiansen

Major Accomplishments

Kristiansen's work on Bronze Age Europe has been published in two foundational books published by Cambridge University Press: *Europe before History* (Kristiansen 1995) and *The Rise of Bronze Age Society* (Kristiansen and Larsson 2005). Developing various theoretical themes on materiality, he has focused on the social roles of cultural materials from swords to houses to rock art for materializing local institutions, establishing social identities, and making distant connections. Perhaps most original has been his concern with relationships in shaping the broadest connections across Europe and into Asia. Previously conceived simply in terms of migrations, acculturation, emulation, or trade, he has developed a highly sophisticated view of distant relationships as international travels and linkages built strategically to formulate broadscale networks of chiefs, warriors, priests, and craftsmen. His first formulation of these international relationships relied on an adaption of world systems theory to prehistory (Rowlands et al. 1987). He has replaced rather unsatisfying concepts of extensive "influences" with a robust model of human agency in a highly interactive and extensive social world. He has built his model with a comprehensive knowledge of the archaeology literature and museum collections and with a thorough understanding of the ethnographic literature. Bringing together an impressive array of scientific (ancient DNA, wool, and copper analyses) along with humanitarian approaches to identity, his career trajectory has received support from a European Research Council Advanced Grant for his capping project: "Travels, transmission, and transformation in temperature northern Europe during the 3rd and 2nd millennium BCE: The rise of Bronze Age societies."

As a modern academic chief, Kristiansen has built an impressive network of friends among the prehistorians across Europe and many anthropological archaeologists of Anglo-American academia. He initiated the formation of the European Association of Archaeologists with its successful *European Journal of Archaeology*. He helped

found the Humanities Centre at the University of Copenhagen, which became a locus for international visits to Denmark by many archaeologists and anthropologists. A who's who of theoretical archaeologists came as guests to his apartment in central Copenhagen, creating a nexus of extraordinary intellectual interchange. The result has been his frequent visits internationally to conferences and many chapters in classic edited books (Kristiansen 1982, 1984, 1987, 1991). From this network of scholars, he wove his own eclectic theory of society based on many intellectual threads often seen in opposition to each other. The result has been an original formulation that blends the best of processual and post-processual thought (Kristiansen and Rowlands 1998).

A major contribution by Kristiansen has been his organization of international and interdisciplinary projects that have systematically integrated a diversity of intellectually themes and field research strategies. Starting in 1990, he organized the *Thy Archaeological Project*, initially bringing together diverse theoretical ideas from Denmark (Kristiansen and Jens-Henrik Bech), England (Mike Rowlands and Nick Thorpe), and the United States (Earle and John Steinberg). Probably the most significant contribution of that project was a reconceptualization of field methods that united research strategies of American archaeologists, the long paleoenvironmental tradition of Danish researchers, and a commitment to integrate academic and rescue studies. Research involved developing methods for pollen sampling, settlement survey including phosphate sampling and plowsoil sampling, and household excavations with full screening and bone recovery and systematic soil sampling for macrofossil remains. Although each part of the research design had been used previously in Europe, the Thy project provided a uniquely integrated approach to long-term sociopolitical change from the Neolithic through the Bronze Age. The Thy Project then provided a model for a massive comparative, international study *The Emergence of European Communities: Household, Settlement and Territory in Later Prehistory* (3200–300 BCE), funded by the Swedish Riksbanken Jubieumsfond and the Marie Courie European Council Grant. This unprecedented comparative work included three new field projects in Tanum, Sweden, Százhalombatta, Hungary, and Monte Polizzo, Sicily, and involved primary researchers from 6 countries and 10 universities. Each project retained the same basic theoretical approaches and diverse field methods to provide comparable data. The result has been a long string of doctoral dissertation, publication, and a major overview book *Organizing Bronze Age Society* (Earle and Kristiansen 2010).

Kristiansen has sought many ways to bring academic research and rescue archaeology together. Although all too often operating separately, he has had the vision to try to integrate the common interests of the two endeavors, the funding of each reinforcing the goals of the other. His attempts have involved creative project design by the Danish Ministry, joint excavations in Denmark, funding of special work in Hungary, and the large-scale investigation of the World Heritage sites in Tanum. European graduate students have been encouraged by Kristiansen to use the rapidly expanding data from rescue investigations for doctoral dissertations and major articles. Kristian Kristiansen is remarkable for his energy, creativity, and vision. He has had the ability to bring diverse researchers together, energize and help fund their joint research, and use his personal charm to overcome frequent intellectual differences and personal conflicts. His non-doctrinaire theoretical approach is both creative and inclusive, creating a complex and realistic understanding of the human experience.

Cross-References

► Earle, Timothy
► World-Systems Analysis

References

Earle, T., and K. Kristiansen, eds. 2010. *Organizing Bronze Age societies: The Mediterranean, Central Europe, and Scandinavia compared*. Cambridge: Cambridge University Press.

Kristiansen, K. 1982. The formation of tribal systems in late European prehistory, 4000–500 BC. In *Theory and*

explanation in archaeology, ed. C. Renfrew, M. Rowlands, and B. Seagrave, 241–280. New York: Academic.
Kristiansen, K. 1984. Ideology and material culture: An archaeological perspective. In *Marxist perspectives in archaeology*, ed. M. Spriggs, 72–100. Cambridge: Cambridge University Press.
Kristiansen, K. 1987. From stone to bronze: The evolution of social complexity in northern Europe 2300–1200 BC. In *Specialization, exchange, and complex societies*, ed. E. Brumfiel and T. Earle, 30–51. Cambridge: Cambridge University Press.
Kristiansen, K. 1991. Chiefdoms, states, and systems of social evolution. In *Chiefdoms: Power, economy, and ideology*, ed. T. Earle, 16–43. Cambridge: Cambridge University Press.
Kristiansen, K. 1995. *Europe before history*. New Studies in Archaeology. Cambridge: Cambridge University Press.
Kristiansen, K., and T. Larsson. 2005. *The rise of Bronze Age society: Travels, transmissions and transformations*. Cambridge: Cambridge University Press.
Kristiansen, K., and M. Rowlands. 1998. *Social transformations in archaeology: Global and local perspectives*. London: Routledge.
Rowlands, M., M. Larsen, and K. Kristiansen, eds. 1987. *Center and periphery in the ancient world*. Cambridge: Cambridge University Press.

Further Reading

Rowlands, M., M. Larsen, and K. Kristiansen. 1998. *Europe before history*. Cambridge: Cambridge University Press.

Kryder-Reid, Elizabeth

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Basic Biographical Information

Elizabeth Kryder-Reid is a North American anthropological archaeologist known for her interdisciplinary work in landscape studies, museum studies, and issues related to cultural heritage. She earned a Ph.D. in anthropology from Brown University in 1991. From 1989 to 1991, Kryder-Reid served as instructor at the University of Maryland at College Park. From 1991 to 1996, she was a research associate at the Center for Advanced Study in the Visual Arts, National Gallery of Art, working on the Keywords in American Landscape Design project and then as lecturer at George Mason University. In 1998 she became assistant professor of Anthropology and Museum Studies at the Indiana University School of Liberal Arts at IUPUI (Indiana University-Purdue University Indianapolis) where she advanced to the rank of professor in 2015. She served as director of the IUPUI Museum Studies Program from 1998 to 2013 and since then as director of the Cultural Heritage Research Center, filling in as interim director of Museum Studies as needed.

Elizabeth Kryder-Reid

Major Accomplishments

Kryder-Reid is recognized for her commitment to public scholarship, that archaeologists and other heritage professionals must engage directly with their publics in generating and communicating heritage knowledge. In 2003, Kryder-Reid was instrumental in creating the Museum Studies Master of Arts program at IUPUI, which is now widely recognized as a leading program in the United States for promoting a civically engaged curriculum as a training path for cultural heritage professionals. To advance the principles and institutional capacity of public scholarship, the faculty members for the program were called Public

This entry supersedes the previous one written by Dr. Kryder-Reid.

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Scholars of Civic Engagement, and they partnered with area museums and heritage organizations. All of them – Public Scholars of Native American Representation; Collections and Community Curation; Curatorial Practices and Visual Art; African American History and Museums; and Museums and Learning – have direct links to issues of representation in museums, ethical treatment of cultural and intellectual property, and community collaboration. From 2000 to 2005, she served as Midwest regional representative to the Committee on Museum Professional Training of the American Alliance of Museums. In 2012, she received a Distinguished Service Award from the Association of Midwest Museums.

Kryder-Reid (1994, 1998) is also recognized for contributing to an interdisciplinary approach to landscape studies. Her landscape research began in the late 1980s working with Mark Leone, Barbara Little, Paul Shackel, and others to understand the relationships of political power, class, gender, the use of gardens, and other factors in the evolution of cultural landscapes in Annapolis, Maryland. Published in 2010, she was a major contributor to *Keywords in American Landscape Design*, a heavily illustrated dictionary of concepts and terms used in landscape architecture and garden planning from the seventeenth to mid-nineteenth centuries. In 2011, the volume received both the John Brinkerhoff Jackson Book Prize from the Foundation for Landscape Studies and the CBHL Annual Literature Award (Technical Category) from the Council of Botanical and Horticultural Libraries.

In the early 1990s, Kryder-Reid developed an intense interest in the 21 missions established by Franciscan order Catholic priests between San Diego and Sonoma, California, from 1769 to 1823 (Kryder-Reid 2007, 2010a). Her first research trip was in 1991 and was in some ways an extension of her 1984 undergraduate thesis on Chumash collections at Harvard University and the Smithsonian National Museum of Natural History, bolstered by a 1993 Huntington Library Research Fellowship. The California missions were part of an effort to colonize New Spain by evangelizing Native American Indians of the region and to introduce Spanish culture. In the process, they abused and oppressed the Native peoples. The missions that survived, as the oldest colonial structures in California, have become the state's most visited historic monuments and a commonly used symbol for the state in popular media. The missions are also a source of controversy in California's elementary school curriculum because harsh treatment of Native peoples in the missions has been neglected. Misleading representations of their cultures and their plight have fostered negative opinions about contemporary Native Americans in the state. Kryder-Reid's (2016) long-term study, *California Mission Landscapes: Race, Memory, and the Politics of Heritage*, explicates the construction of public memory about the missions in the nineteenth and twentieth centuries and documents the reinvention of the missions from colonial outposts that exploited and marginalized Indigenous people into nostalgia-laden heritage sites. Although she critiques this process, she also offers possible ways by which the missions could provide different, more truthful visitor experiences. Kryder-Reid has received several awards for her publications about the California missions. In 2012, for her essay about the landscape history of the Santa Barbara Mission (Kryder-Reid 2010b), she received the Society of Architectural Historians Landscape History Chapter Essay Prize. In 2017, the Foundation for Landscape Studies honored Kryder-Reid by awarding her *California Mission Landscapes* the John Brinkerhoff Jackson Prize; in 2018, the book received the Abbott Lowell Cummings Prize from the Vernacular Architecture Forum. Two additional awards followed in 2019. The Historical Society of Southern California awarded *California Mission Landscapes* the Norman Neuerburg Prize as the best book on California history emphasizing the nineteenth century or earlier, and the Society of Architectural Historians presented the Elisabeth Blair MacDougall Book Award.

Kryder-Reid's interests expanded to examine heritage sites in the Midwest United States in 2015, a project that had its origins as an intersection of her involvement in the Shaping Outcomes project's (www.shapingoutcomes.org) developed

in 2008 for the Institute of Museum and Library Services, which placed the focus on users or audience, and questions about the meanings of heritage within fields of power being interrogated by critical heritage studies. She and her colleagues explored heritage values with a focus on stakeholder-defined values and the role of government in the use and interpretation of two precontact archaeological sites with contested heritages (Kryder-Reid et al. 2017). Kryder-Reid describes most of her research as having a focus on "cultural heritage and how humans appropriate the tangible and intangible remnants of the past and mobilize them in the constitution of social relationships." Using archaeological, historical, and art historical approaches, she seeks to "explore the intersections of landscape and power and examine how the built environment and other forms of material culture are deployed in the contestation of social inequalities across boundaries such as gender, race, class, ethnicity, and religion." She values "collaborative research and seek[s] to produce public scholarship that is accessible, useful, and explores systems of power and social difference" (Kryder-Reid 2017).

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Heritage Landscapes
- ▶ Heritage Values, Communication of
- ▶ Heritage: Public Perceptions
- ▶ Historical Archaeology
- ▶ International Council of Museums (ICOM)
- ▶ Landscape Archaeology
- ▶ Mission Archaeology in North America

References

Kryder-Reid, E. 1994. 'With manly courage': Reading the construction of gender in a nineteenth-century religious community. In *'Those of little note': Gender, race, and class in historical archaeology*, ed. E.M. Scott, 97–114. Tucson: University of Arizona Press.

Kryder-Reid, E. 1998. The archaeology of vision in eighteenth-century Chesapeake Gardens. In *Annapolis pasts: Historical archaeology in Annapolis, Maryland*, ed. P.A. Shackel, P.R. Mullins, and M.S. Warner, 268–290. Knoxville: University of Tennessee Press.

Kryder-Reid, E. 2007. Sites of power and the power of sight: Vision in the California Mission landscapes. In *Sites unseen: Landscape and vision*, ed. D. Harris and D.M. Ruggles, 181–212. Pittsburgh: University of Pittsburgh Press.

Kryder-Reid, E. 2010a. Perennially new: Santa Barbara and the origins of the California Mission Garden. *Journal of the Society of Architectural Historians* 69: 378–405.

Kryder-Reid, E. 2010b. Writing the landscape: Text as representations of and sources for American landscape design history. In *Keywords in American landscape design*, ed. T. O'Malley. New Haven: Yale University Press. in cooperation with the Center for Advanced Study in the Visual Arts, National Gallery of Art, Washington, DC.

Kryder-Reid, E. 2016. *California mission landscapes: Race, memory, and the politics of heritage*. Minneapolis: University of Minnesota Press.

Kryder-Reid, E. 2017. Liz Kryder-Reid: Thinking critically about heritage. http://kryderreid.com/about/

Kryder-Reid, E., J.W. Foutz, E. Wood, and L.J. Zimmerman. 2017. 'I just don't ever use that word': Investigating stakeholders' understanding of heritage. *International Journal of Heritage Studies* 24 (7): 743–763. https://doi.org/10.1080/13527258.2017.1339110. (published online June 22, 2017; in print 2018).

Further Reading

Holzman, L., E. Wood, H. Cusack-McVeigh, Kryder-Reid, E., M. Labode, and L.J. Zimmerman. 2014. A random walk to public scholarship? Exploring our convergent paths, *Public: A Journal of Imagining America* 2(2). http://public.imaginingamerica.org/blog/article/a-random-walk-to-public-scholarship-exploring-our-convergent-paths/

Kryder-Reid, E. 1996. The construction of sanctity: Landscape and ritual in a religious community. In *Landscape archaeology: Reading and interpreting the American historical landscape*, ed. R. Yamin and K. Bescherer Metheny, 228–248. Knoxville: University of Tennessee Press.

Kryder-Reid, E. 2015. Crafting the past: Mission models and the curation of California heritage. *Heritage & Society* 8 (1): 60–83.

Kryder-Reid, E. 2019. Do the homeless have heritage? Archaeology and the pedagogy of discomfort. In *Pedagogy and practice in heritage studies*, ed. S.J. Bender and P.M. Messenger, 129–147. Gainesville: University of Florida Press.

Kryder-Reid, E., and D.F. Ruggles. 1994. Sight and site: Vision in the garden. Special theme issue of the *Journal of Garden History* 14(1):1–2.

Kryder-Reid, E., and L.J. Zimmerman. 2018. Of, by, and for which people?: Government and contested heritage in the American Midwest. In *Cultural contestation: Heritage, identity and the role of government*, ed. J. Rodenberg and P. Wagenaar, 239–262. London: Palgrave.

Kuk Swamp: Agriculture and Domestication

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Basic Site Overview

The multidisciplinary evidence for Kuk Swamp has established the island of New Guinea to be a place of early and independent agricultural development and plant domestication (Golson 1977; Golson and Hughes 1980; Denham et al. 2003). Kuk Swamp is located at 1560 m AMSL in present-day Western Highlands Province, Papua New Guinea. The site forms part of extensive wetlands on the floor of the Upper Wahgi valley, which is one of several, large inter-montane valleys that occur along the highland spine of the island (Figs. 1, 2, and 3).

In 1969, during initial drainage of the swamp to establish the Kuk Tea (subsequently agricultural) Research Station, which has now been abandoned, several wooden tools associated with much earlier cultivation of the swamp were dug up. From the early 1970s to the 1990s, Professor Jack Golson of the Australian National University supervised a series of archaeological excavations at Kuk – including my own in 1998 and 1999 – designed to investigate the antiquity of agriculture in the highlands of Papua New Guinea. Similar excavations have occurred at several other wetlands in the highlands from the mid-1960s, but the archaeological sequence at Kuk is the oldest, the most complete, and the best investigated.

Evidence of Early Agriculture

Late Pleistocene occupation is indicated by a c. 30,000-year-old hearth at Kuk and burning of the lower montane rainforest on the valley floor from at least 20,000 years ago. Although unclear, the pattern of periodic burning and opening up of the forest canopy are suggestive of a human contribution to the disturbance signal. Similar anthropic contributions to Late Pleistocene forest disturbance occur in other highland valleys on New Guinea.

There is clear evidence for wetland manipulation and exploitation of tuberous plants (including

Kuk Swamp: Agriculture and Domestication, Fig. 1 Location of Kuk Swamp on a map of Papua New Guinea (showing provincial boundaries)

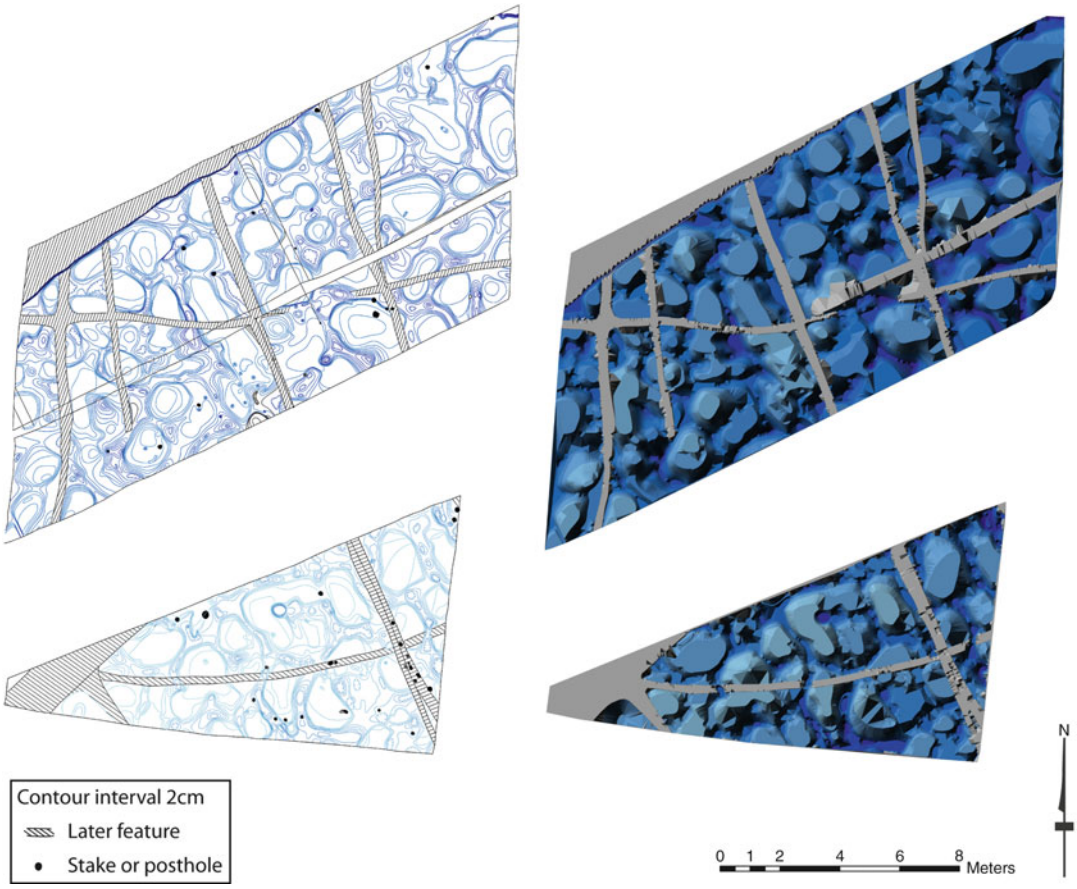

Kuk Swamp: Agriculture and Domestication, Fig. 2 Bases of former mounds used for cultivation dating to c. 7,000–6,400 cal BP at Kuk Swamp: (*left*) *contour lines* and (*right*) *shaded* (Denham and Haberle 2008)

a yam and an aroid) at Kuk around 10,000 cal BP. The multidisciplinary evidence is suggestive of vegetation clearance, digging, staking of plants, microtopographic manipulation, and plant exploitation during a short-lived dry period on the wetland margin. The significance of these finds is unclear, although they may indicate foraging activities as opposed to cultivation.

From c. 10,000–7,000 cal BP, there are sparse in situ archaeological remains of former plant exploitation at Kuk. However, palaeoecology and archaeobotany indicate continued human disturbance to the montane rainforest and exploitation of tuberous plants, as well as periodically high frequencies of banana phytoliths, which may indicate planting locally. These signals have been interpreted to represent shifting cultivation within the Kuk catchment (Denham and Haberle 2008).

At c. 7,000–6,400years ago, there is clear evidence for former cultivation at Kuk. The bases of former mounds used for planting are preserved, and these are inferred to have enabled the cultivation of plants with variable edaphic requirements. Different types of archaeobotanical evidence suggest multicropping including bananas (phytoliths) and potentially root crops (starch grain residues). At this time, the montane rainforest was effectively cleared in the Kuk vicinity; these grasslands were maintained by periodic burning and cultivation until the first Australian-based gold prospectors and colonial officer entered the valley in 1933.

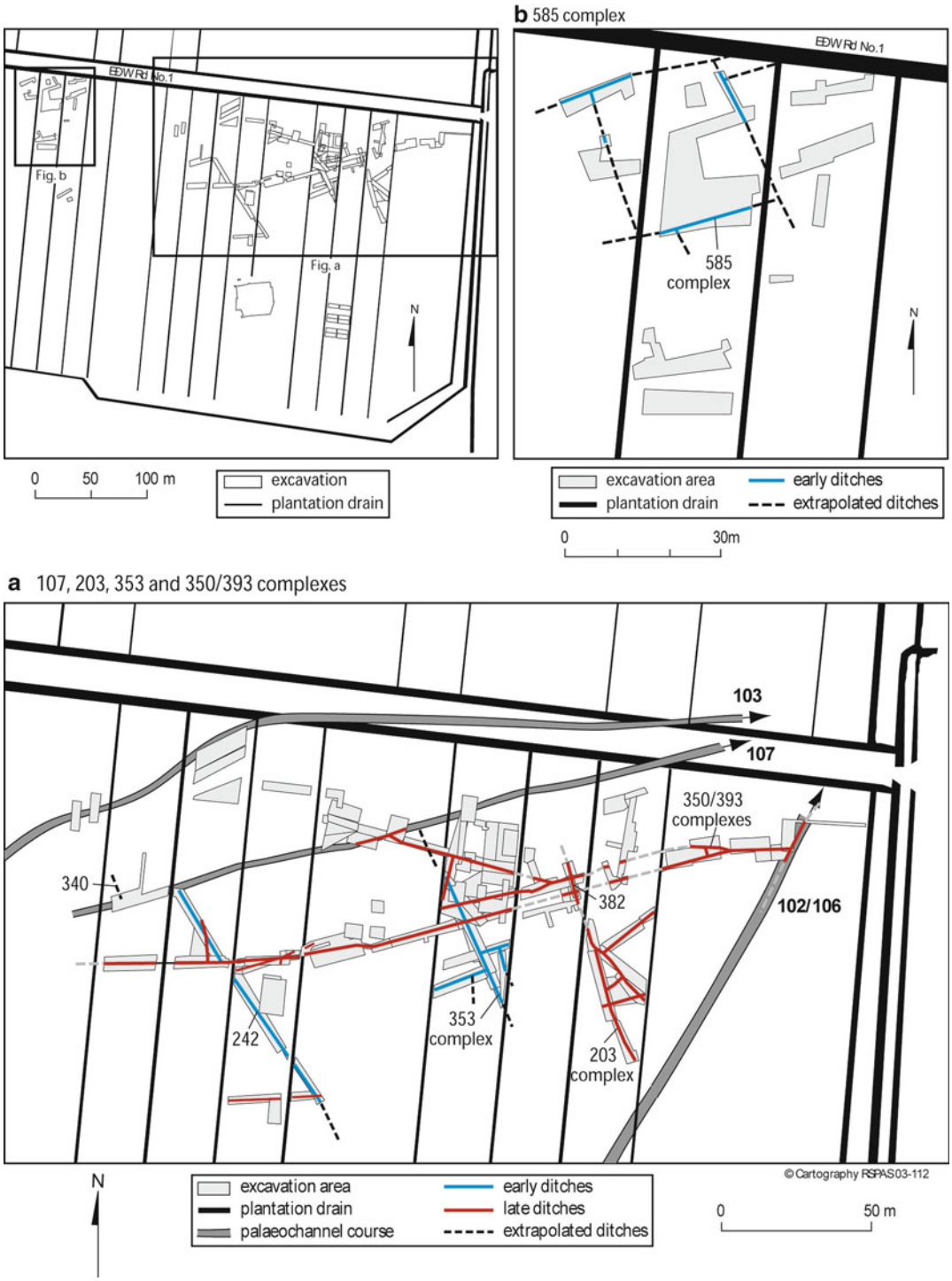

Kuk Swamp: Agriculture and Domestication, Fig. 3 Plan of the earliest ditch networks at Kuk Swamp: (*upper left*) southeast portion of Kuk Swamp showing excavation trenches and inset locations; (*upper right*) plan of "early" enclosure and (*lower*) plan of "early" and "late" networks. In this context, "early" ditches date to pre-4,350–3,980 cal BP, and "late" ditches to pre-2,730–2,360 cal BP (Denham et al. 2003)

From c. 4,500–4,000 cal BP up to the recent past, sequential ditch networks were dug to drain the wetland at Kuk for cultivation. Early ditch networks are of multiple forms, including rectilinear, although the characteristic rectangular or gridded pattern of gardens in the Upper Wahgi valley today originated perhaps less than 2,000 years ago. It is unclear whether periods of drainage and abandonment documented locally represent spatially variable cultivation of the wetland through time or represent broader-scale responses to climatic, environmental, or social stimuli. Various settlements dating to the last c. 1,000 years have also been mapped and excavated at Kuk.

Numerous wooden digging sticks and spades similar to those still being used in 1933 have been found in archaeological contexts at Kuk and other sites in the Upper Wahgi valley. Most are less than 2,500 years old. The oldest wooden agricultural implement is a c. 4,600–4,100-year-old wooden spade reported by Jack Golson and colleagues from an ancient ditch at the Tambul High Altitude Experimental Station in the Upper Kaugel valley.

The archaeological evidence at Kuk is old on a world scale and has established New Guinea as one of the few places in the world where agriculture arose from wild-plant gathering and land management practices (Denham 2011). In most other regions of the world, early agricultural development was based on the planting of seed for cereals, legumes, and other crops; for example, consider the planting of wheat and barley in Southwest Asia, rice in southeast China, and maize in Mexico. By contrast, early agriculture in New Guinea, like much practiced today, is based on the vegetative propagation of plant parts, whether a tuber, stem cutting, or sucker. Indeed, people living on New Guinea are considered to have used vegetative practices to domesticate several food crops, which are important across the world today for both subsistence and cash cropping, including bananas (*Musa* spp.), sugarcane (*Saccharum* spp.), some taro cultivars (*Colocasia esculenta*), and some yam species (*Dioscorea* spp.). Thus, the early farmers of New Guinea – whose activities are documented at Kuk – have given the world a major agricultural legacy.

As well as being the most intensively investigated archaeological site in Papua New Guinea, the traditional landholders – the Kawelka – are one of the most intensively studied Indigenous groups in the country. The Kawelka have been instrumental in the inscription of Kuk as Papua New Guinea's first World Heritage Site (Muke et al. 2007). Ongoing management and preservation of the site for future generations would not be possible without the willingness and support of local Kawelka tribesmen, provincial and national authorities, as well as the sustained efforts of a small group of dedicated professionals, both national and international.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Bananas: Origins and Development
- ▶ Niah Caves: Role in Human Evolution
- ▶ Nkang: Early Evidence for Banana Cultivation on the African Continent
- ▶ Sugarcane: Origins and Development
- ▶ Taro: Origins and Development
- ▶ Vegeculture: General Principles
- ▶ Yams: Origins and Development

References

Denham, T.P. 2011. Early agriculture and plant domestication in New Guinea and Island Southeast Asia. *Current Anthropology* 52: S379–S395.

Denham, T.P., and S.G. Haberle. 2008. Agricultural emergence and transformation in the Upper Wahgi valley during the Holocene: Theory, method and practice. *The Holocene* 18: 499–514.

Denham, T.P., S.G. Haberle, C. Lentfer, R. Fullagar, J. Field, M. Therin, N. Porch, and B. Winsborough. 2003. Origins of agriculture at Kuk Swamp in the highlands of New Guinea. *Science* 301: 189–193.

Golson, J. 1977. No room at the top: Agricultural intensification in the New Guinea highlands. In *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia*

K

and Australia, ed. J. Allen, J. Golson, and R. Jones, 601–638. London: Academic.
Golson, J., and P.J. Hughes. 1980. The appearance of plant and animal domestication in New Guinea. *Journal de la Société des Océanistes* 36: 294–303.
Muke, J., T.P. Denham, and V. Genorupa. 2007. Nominating and managing a World Heritage Site in the highlands of Papua New Guinea. *World Archaeology* 39: 324–338.

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Basic Biographical Information

Vicky Kynourgiopoulou received her Ph.D. (2004) in Architectural History and Urban Planning at the University of Edinburgh in Scotland. She holds an M.A. (1999) in Cultural Heritage Studies from University College London and B.A. (1998) in Archaeology from the University of Southampton, both in the U.K.

Major Accomplishments

Dr. Kynourgiopoulou is currently teaching archaeology and cultural heritage studies at Arcadia University, Center of Global Studies in Rome, affiliated with Roma Tre University, Italy. She is a consultant for European Union and UNESCO heritage projects. Her archaeological fieldwork has concentrated on North Africa and the Middle East where she specializes in sustainable tourism development and heritage preservation in underdeveloped and developing countries. She has published in the area of architectural history authenticity and cultural heritage management and conservation. Her current research focuses on the use of cultural patrimony for the creation of identities in times of crisis. Her main research areas are cities that were "crossroads" of civilizations like Rome, Athens, Istanbul, and Pella where she examines the integration, rejection, and/or transformation of identities and their cultural heritage in order to create homogenous urban centers. Her fieldwork also has concentrated on the sustainable development of archaeological sites that can contribute to the economic and social viability of different regions. She is currently researching transnational crime and the looting of antiquities in the Mediterranean in times of economic crisis. She was Editor in Chief of *Edinburgh Architecture Journal*, the research journal of the Department of Architecture at Edinburgh University, and Secretary General of the Society for the Protection of Ancient Buildings in Scotland and has created several undergraduate and graduate programs for US and European universities in Rome, Athens, and London.

Cross-References

► Cultural Heritage Management and Armed Conflict
► Sustainability and Cultural Heritage

Further Reading

Hitchens, C. 1997. *The Elgin Marbles. Should they be returned to Greece?* London: Verso.
Kynourgiopoulou, V. 2011. National identity interrupted: The mutilation of the Parthenon marbles and the Greek claim for repatriation. In *Contested cultural heritage: Religion, nationalism, erasure and exclusion in a global world*, ed. H. Silverman, 155–170. New York: Springer.
Loukaki, A. 2008. *Living ruins, value conflicts*. Aldershot: Ashgate.
Yalouri, E. 2001. *The Acropolis: Global fame, local claim*. Oxford: Berg.

Kyrenia Shipwreck Excavation

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Introduction

The wreck of the late fourth-century BC ship off the coast of Kyrenia, Cyprus, was found by Andreas Cariolou in 1965. The survey and excavation of the site was directed by Michael Katzev between 1967 and 1969. Katzev oversaw the research of the collection well until his death in 2001; his wife, Susan Katzev, has been leading those efforts since. The excavation of this site revealed a very well-preserved assemblage containing amphorae from Chios, Samos, and Rhodes, a collection of personal items suggesting the presence of a captain and a crew of three on board at the time of loss and the remains of approximately 60–70% of the original hull. As a unique, handmade object approximately 14 m long built over two millennia ago, this wooden hull is exceptional, and it and its replicas have become emblematic of seafaring in the Mediterranean Sea during the Hellenistic era.

The collection has been on display and in storage in the Crusader-era castle in Kyrenia, Cyprus, since 1970. Additions and improvements to the display began in 2015 and are still ongoing.

Definition

This is a collection of material from a ship of the late fourth-century BC likely lost in the early third-century BC, excavated in 1968 and 1969, and presently on display in the Crusader-era castle in Kyrenia/Girne, Cyprus.

Historical Background

Like the majority of wreck assemblages investigated and excavated in the seminal decades of maritime archaeology in the middle of the twentieth century, the site of this fourth-century BC ship lost off the northern coast of Cyprus was found by accident. Andreas Cariolou, a local councilman in the town of Kyrenia, Cyprus, and an amateur diver, found the site in the summer of 1965. At the time, Cariolou kept knowledge of the site a relative secret and reportedly told only a few individuals of the site's location, about a mile off the northern coast of the town.

In 1967, however, public knowledge of the site changed. In September of that year, Michael Katzev, a Ph.D. student at the University of Pennsylvania, under the supervision of George Bass, led the Cyprus Underwater Archaeological Search (CUAS), the first such large-scale maritime archaeological survey around the island's coastline. Katzev and his team, which included Susan Katzev, Jeremy Green, and E.T. Hall, spent the month surveying a number of locations including the coastlines of the Akamas peninsula and Paphos to the west, Cape Greco to the south, and the very eastern tip of the island, at Cape Saint Andreas (Katzev 1974). Katzev and his team learned of the site near Kyrenia near the end of their season, however, when an audience member at Katzev's lecture in Lefkosia on maritime archaeology arranged an introduction to Cariolou. Soon afterwards, the councilman brought the team to the site he had found 2 years earlier.

Visible on the seabed approximately 33 m deep and 450 m offshore were 75–80 well-preserved amphorae dating from the late fourth-century BC, including examples from Samos and Rhodes. During this initial survey, the team completed a preliminary probing of the seabed to determine the approximate size and extent of the assemblage and to prepare for the coming excavation (Katzev 1974). The excavation, directed by Katzev, occurred in the summers of 1968 and 1969, and many of the images and results from this effort have become emblematic of maritime archaeology in the Mediterranean. In addition to the recovery of over 400 amphorae from Chios, Samos, and Rhodes, the ship had a paid ballast of basalt grinding stones from the islands of Kos and/or Nisyros, whereas macrobotanical analysis revealed smaller shipments of almonds, figs, olives, and possibly grapes. Personal items include an inkwell, a game of knucklebones, a whetstone, and a lead "curse tablet" pierced with a copper spike, whereas a

collection of coarseware and bronze containers suggests the presence of a captain and three crew members (Katzev 2007). Preserved rigging elements include lead brailing rings, blocks, lines, and wooden reels. Exposed and excavated in the 1969 season, the hull is one of the best-preserved examples excavated from the seafloor of the Mediterranean.

Prompted by the importance of the collection and its growing international recognition (the site was featured in National Geographic in 1970 and would appear again in 1974, and be the subject of a documentary released in 1977), the government on Cyprus converted galleries in Kyrenia's Crusader-era castle for the storage, conservation, and eventual exhibition of the collection. Between 1970 and 1974, as research on the collection progressed, this growing exhibition was already the second-most popular tourist destination on the island of Cyprus (Katzev 1975). By 1975, with the completion of the hull fragments' conservation and reassembly by J. Richard Steffy and Robin Piercy, it was clear that the original vessel was approximately 14 m long, 4 m in beam, and slightly over 2 m from the bottom of the keel to the sheer strake at midships. They estimated the vessel's tonnage at approximately 25 tons. The hull was built with the mortise-and-tenon joinery common for the period but not in an idealized "shell-first" fashion erecting all the external planking prior to adding internal framing. Instead, it was assembled in alternating stages. Following the assembly of the keel, stem, and sternpost, the first nine strakes up to the main wale were affixed together with the mortise and tenon joinery, followed by the insertion of many – if not all – floor timbers affixed to the planking with nails. The upper wale and planks up to strake 13 were added next, and then a series of half frames and futtocks were nailed in place. No more material above this point is preserved, but, presumably, the futtocks supported other strakes and the sheer itself (Steffy 1985).

There are a variety of important points associated with the investigation and research of this collection. The excavation, for example, was the first to use a pair of handheld cameras to generate a series of three-dimensional images of an archaeological site under water, whereas the hull material – made of Aleppo pine and Turkey oak – was the oldest at the time to undergo a conservation treatment with polyethylene glycol (PEG). The excavation of this site likely prompted a variety of related research around the Cypriot coastline as well. The CUAS work at Cape Saint Andreas, for example, was the basis for Jeremy Green's later surveys in the same area between 1969 and 1973 (Green 1970, 1973). Nicholas Flemming investigated the geomorphology of the coastline at Salamis in 1973, followed by archaeological surveys off the coast of the same city by the Cambridge University Underwater Exploration Group in 1974 (Flemming 1974; Anonymous 1974). Similarly, Elisha Linder and Avner Raban came to Cyprus in 1971 to conduct their own harbor surveys at Salamis, Kyrenia, Lapithos, Marion Polis, and Nea Paphos, whereas George Bass, having left his position at the University of Pennsylvania, established the American Institute of Nautical Archaeology (now INA) on Cyprus (Raban 1995). The Institute's first surveys along the southern coastline of Turkey in 1973, a season that found the Byzantine-era sites at Bozburun and Serçe Limanı, were conducted from their headquarters on the island.

Equally important are the various recreations of the sunken ship itself, used either to guide the reassembly and study of the hull fragments or to test hypotheses about the original vessel's capabilities. Three such models were built while the team was still based in Kyrenia. The first was a 1:5 scale wooden model of the ship's general structure to assess both its order of assembly and its overall size and shape. This model, presently part of the display in the Crusader-era castle in Kyrenia, formed the basis for a second also at 1:5 scale but made of fiberglass, which was rigged with a sail and a pair of quarter rudders to gauge the original ship's sailing and handling capabilities. Although relatively crude, testing this model in Kyrenia's harbor proposed that the original vessel could sail at four to five knots and could sail closer to the wind than expected. The third recreation was at full scale but only of the central 2 m of the craft at

midships. This model, presently on display in Kyrenia as well, was vital for understanding the time and labor involved in fashioning the entire ship, which may have contained as many as 4000 mortise-and-tenon joints (Katzev 1981). This replica still illustrates the method of the vessel's assembly to museum visitors.

At least three full-scale sailing replicas have also been built, and the first, *Kyrenia II*, was a collaboration between the Institute of Nautical Archaeology and the Hellenic Institute of the Preservation of Nautical Tradition. Constructed in the Manolis Psaros shipyard between 1982 and 1985, this replica was an opportunity to apply much of what had been learned about the ship's construction through the reassembly of the original fragments and through the creation and testing of previous replicas. Although in some cases the past could not be replicated exactly (the Aleppo pine used centuries earlier was no longer available in Greece, and although the modern shipwrights started with hand tools, power tools were soon in use), the result was a replica highly faithful to the original (Katzev and Katzev 1989). Launched in 1985, this replica conducted a handful of short sea trials over the following year until, in September of 1986, *Kyrenia II* began a long voyage from Piraeus, Athens, to Paphos, Cyprus. Captained by Glafkos Cariolou, the son of Andreas Cariolou who found the site in 1965, the ship sailed approximately 600 nautical miles in 25 days and reached speeds up to 4.5 knots. The following year the replica returned to Athens over a 19-day trip but encountered storms with up to 50-knot wind gusts. Nevertheless, this too was an opportunity to assess the replica's capabilities and the potential capabilities of craft and sailing activities in antiquity; in storms on April 11 and 15, *Kyrenia II* reached speeds up to 12 knots (Katzev 1990).

Whereas the first replica tested the vessel's method of construction and its hydrodynamic capabilities, the third replica built in 2002, called *Kyrenia Liberty*, was used to test other theories. In the decades following Steffy's 1985 publication on the hull's construction, as well as the sailing of *Kyrenia II*, questions regarding the original ship's capacity continued to arise. In particular, reinterpretations of the preserved hull in Kyrenia castle proposed that the height of its cargo hold was greater than Steffy's previous estimates. To test this idea with *Kyrenia Liberty*, replicas of all the recovered cargo amphorae were loaded into *Liberty*'s hold – an opportunity to test how this process could proceed but, more importantly, if all could fit. Ultimately, all replicas of the cargo amphorae were loaded on the ship, but not all could fit neatly into the hold. Future recreations of the original vessel, as a result, will accommodate this new data.

Key Issues and Debates

There are few archaeological debates regarding the interpretation of the Kyrenia assemblage, yet there are a variety of potent political issues that surround the current and future work on the collection. During the site's excavation and the initial years of its study, the island of Cyprus was in the throes of a long-running internal conflict between elements of the Turkish and Greek-speaking communities on the island; portions of the latter, claiming unity with Greece, sought to minimize or eliminate the presence of the former. In 1963, this conflict brought United Nations forces to the island, hoping to stop the fighting and to mediate a solution. By 1974, however, those efforts had been only minimally successful. Indeed, in that year, military forces from Greece sympathetic to this unification movement attempted a coup against the government led by the Archbishop Makarios. Prompted by the presence of the Greek military, Turkish forces arrived on Cyprus as well, ostensibly to protect the members of the Turkish-speaking population. The Greek coup was a failure but, although the Greek forces departed the island, Turkish forces remained in place; they are still in place today in the northern 38% of Cyprus. In 1983, as a result of their ongoing international isolation, the Turkish-Cypriot population still on Cyprus created their own government called the Turkish Republic of Northern Cyprus, or the T.R.N.C. The T.R.N.C. is recognized as a sovereign state by the Republic of Turkey, but not by any other country. The United

Nations, for example, perceives this portion of the island as occupied territory due to the ongoing presence of the Turkish military. In contrast, the Republic of Cyprus government, based in the southern portion of the island and the present remnant of the pre-1974 administration, is still recognized by the international community as the legal authority on Cyprus.

These political events have impacted the ongoing investigation of the Kyrenia shipwreck collection. In 1974, for example, the intervention of military forces on Cyprus prompted the departure of Katzev and his research team. It was only through the intervention of the United States Embassy and the United Nations that Steffy and Piercy were able to finish their reassembly of the conserved hull material in 1975, and climate control was installed in the exhibition gallery a year later. More broadly, efforts to finish the study and publication of the material are entangled with, and complicated by, the ongoing legal ambiguity of the T.R.N.C. The Republic of Cyprus may have the internationally recognized authority to issue permission for the work today, but the T.R.N.C. presently controls access. To conduct and to publish ongoing research that is accepted within an international forum, present efforts require the support of both communities even if one community does not recognize the authority of the other over the collection. As an example of this political complexity, the first phase of the efforts to revitalize and update the storage and display of the collection required a 3-year effort that encompassed the political support of the United States Embassy, the High Commissioner of Australia, the European Commission, the United Nations Development Programme, UNESCO, and ICOMOS-ICUCH (Harpster 2015).

International Perspectives

Internationally, the Kyrenia shipwreck collection is recognized as the best research collection to study Hellenistic-era seafaring in the Aegean and eastern Mediterranean. The extant hull is one of the most well-preserved examples to be excavated from the bottom of the Mediterranean Sea, and, unlike other wreck assemblages from the same era, elements of the ship's rigging are preserved as well. The various replicas of the ship have not only modeled the vessel's potential hydrodynamic capabilities, but have also been used to test hypotheses about the ship's design. Historically, the results of the site's excavation in the late 1960s make it a seminal project in the formative years of maritime archaeology, whereas the associated work – the PEG treatment of the hull material, the reassembly of the fragments, and the replicas – have also established disciplinary standards. The ship too, regardless of any extrinsic political baggage, has become a symbol of the island of Cyprus. Images of the original and the replicas have been featured on Cypriot tourism posters and brochures, stamps, coins, and passports. Finally, the investigation not only demonstrated the potential archaeological richness of the waters around the island of Cyprus, it likely prompted much of the maritime archaeological research around Cyprus that is ongoing today.

Future Directions

Current work on the collection is following two parallel paths. One, under the direction of Susan Katzev, is the completion of the research and final publication of the collection. Despite the difficult surrounding politics, this work has been progressing since at least 2010. The second path is the gradual revitalization and updating of the storage and display of the collection within Kyrenia's Crusader-era castle. This effort also began in 2010, and the first phase was well underway in 2013 when the necessary political and monetary support was secured. Supported by a variety of international organizations, this bicommunal effort is one element of a new phase of Cypriot history incorporating increased cooperation between the communities to protect heritage that transcends the island's past divisions.

Cross-References

- ▶ Bass, George Fletcher
- ▶ Cyprus, Archaeology of
- ▶ Green, Jeremy N.
- ▶ Institute of Nautical Archaeology (INA)
- ▶ Steffy, J. Richard

References

Anonymous. 1974. *Cambridge Underwater Exploration Group*, Salamis Survey 1974. Cambridge University Library Archives.

Flemming, N. 1974. Report of preliminary underwater investigations at Salamis, Cyprus. Report of the Department of Antiquities Cyprus, pp. 163–173.

Green, J. 1970. *Cape Andreas expedition, 1969*. Oxford University Press.

Green, J. 1973. An underwater archaeological survey of Cape Andreas, Cyprus, 1969–70: A preliminary report. In *Marine archaeology*, ed. D. Blackman, 141–179. London: Archon Books.

Harpster, M. 2015. Protecting maritime heritage in disputed territory: The Kyrenia Shipwreck Collection Restoration Program. *Journal of Eastern Mediterranean Archaeology and Heritage Studies* 3: 156–165.

Katzev, M. 1974. Cyprus underwater archaeological search, 1967. National Geographic Society Research Reports, pp. 177–184.

Katzev, M. 1975. Conservation of the Kyrenia Ship, 1970–71. National Geographic Society Research Reports, pp. 331–340.

Katzev, M. 1981. The reconstruction of the Kyrenia ship, 1972–1975. National Geographic Society Research Reports 13, pp. 315–328.

Katzev, M. 1990. An analysis of the experimental voyages of Kyrenia II. In *TROPIS II*, ed. H. Tzalas, 245–256. Athens: Hellenic Institute for the Preservation of Nautical Tradition.

Katzev, S. 2007. The ancient ship of Kyrenia, Beneath Cyprus Seas. In *Great moments in Greek archaeology. Translated by David Hardy*, ed. P. Valvanis, C. Petrakos, and A. Delivorrias, 286–299. Los Angeles: J. Paul Getty Museum.

Katzev, M., and S. Katzev. 1989. 'Kyrenia II': Building a replica of an ancient Greek merchantman. In *H. Tzalas*, ed. I. TROPIS, 163–175. Athens: Hellenic Institute for the Preservation of Nautical Tradition.

Raban, A. 1995. The heritage of ancient harbour engineering in Cyprus, the Levant. In *Cyprus and the sea*, ed. V. Karageorghis and D. Michaelides, 139–188. Cyprus Ports Authority: Nicosia.

Steffy, J.R. 1985. The Kyrenia ship: An interim report on its Hull construction. *American Journal of Archaeology* 89: 71–101.

Kyrgyzstan: Cultural Heritage Management

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Introduction

The Kyrgyz Republic has a very rich and varied cultural heritage which has to be preserved for future generations. State management of cultural heritage is realized by the Kyrgyz Republic through the Ministry of Culture and Tourism, local government administrations, and local self-governments. To this effect, the Ministry operates a special department known as the Republican Inspectorate for Registration of Historical and Cultural Heritage. The National Academy of Sciences, research and educational institutions, and museums may conduct research at sites of historical and cultural heritage and may do expert evaluation of their scientific value. Public organizations and associations; enterprises of different ownership and membership, in cooperation with government agencies and academic institutions; and local authorities have to help in the protection and preservation of historical and cultural heritage, organize and take public control of protection of historical and cultural monuments, and carry out awareness-raising and outreach work among the population.

Historical Background

The concept of historical and cultural heritage in the Kyrgyz Republic started to be introduced from the eighteenth to nineteenth centuries in the limits archaeological science of the Russian Empire and later Soviet Union.

The history of investigation of archaeological monuments and their preservation, conservation, and documentation can be divided into the following stages:

Accumulation of fragmented information about antiquities (to the 1880s)
Starting of classification of archaeological monuments (to the 1930s)
Starting of conservation and restoration works (from the 1936s to the 1980s)

The first work on the preservation and restoration of archaeological monuments in the country were carried out within the framework of archaeological research. The Soviet era saw the restoration and conservation of such historical and architectural monuments such as the Ak-Beshim Buddhist temples (I, II), Burana Tower (medieval city of Balasagun), caravanserai Tash-Rabat, Uzgen complex, Buddhist temple of Krasnorechenskoe city, and gumbez (mausoleum) of Manas (Kolchenko 2005: 132–133). As a result, most of the restored objects have lost their historical authenticity, but at the same time, they were preserved for future generations and can be used as tourist attractions.

Key Issues

Legal Regulations

After the collapse of the Soviet Union, the Kyrgyz Republic inherited a strong legal basis for the preservation, conservation, restoration, and use of historical and cultural heritage. Since independence, the Law on Protection and Use of Historical and Cultural Heritage has been extended. This law was adopted by the Jogorku Kenesh (Parliament of KR) in June 29, 1999, with amendments and additions introduced in 2006 (Karymshakova 2010: 29). The law satisfies the fundamental requirements of the UNESCO convention concerning the Protection of World Cultural and Natural Heritage.

Article 3 of the law defines historical and cultural heritage as all historical and cultural monuments associated with historical events in the life of the people, the development of society and state, and material and spiritual works of art and having historical, scientific, artistic, or other values. Under Article 4 archaeological monuments are considered as a kind of historical and cultural heritage and viewed as historical and cultural sites, regardless of who owns them.

Since March of 2014, some new changes in the Law on Protection and Use of Historical and Cultural Heritage took into effect. One of the most serious changes was that the archaeological expertise became mandatory, which has been shown in the law (Article 23). As a result the Ministry as a responsible body for the protection of cultural heritage has more opportunities to monitor already discovered sites and at the same time to find new ones.

The System of Registration and Documentation

According to the state accounting and classification system, archaeological sites are divided into sites of local, national, and international significance. Lists of historical sites of local significance must be approved by local governments on the basis of their presentation by territorial bodies for the protection of sites, in coordination with the state body for the protection of sites. Lists of historical and cultural sites of national significance are established by the Kyrgyz government on the basis of reports from the state body for the protection of sites. Sites of international significance are represented by sites which already are sites of national significance and included on the list of sites under UNESCO protection. Lists of historical and cultural sites of international significance are made public by the authority for the protection of monuments according to international standards. On official recommendation following a competent scientific evaluation, a list of sites nominated for inclusion on the World Heritage List will be submitted by the Government of the Kyrgyz Republic to the World Heritage Committee and other international organizations.

There is also a category of newly identified sites, a list of sites that is constantly replenished through the discovery and recording of new historical and cultural heritage sites. Before making

the list, monuments in this category of sites also are still considered under Article 21 to be under state protection as objects of historical and cultural heritage. There is a separate list of monuments of historical and cultural heritage under threat.

Currently, the database of the Republican Inspectorate registers 583 monuments of national significance and 1,269 monuments of local significance. Among them are 335 archaeological monuments. This list was compiled and approved by the government in the form of resolution (the Resolution of Government of KR on August 20, 2002, No. 568). In reality, however, there are no archaeological monuments which are actually distinguished and protected by preservation measures. Most sites, even well-known ones included on the list of monuments of national significance, have been privatized and lie in economic and business zones (Kolchenko 2005: 142). Usually, this happened because most officials simply do not know about the historical and cultural significance of these places.

Government Programs

Since the 1990s, the Kyrgyz Ministry of Culture and Tourism declared several programs for the protection and preservation of historical and cultural heritage. In 2004 a plan "About Protection and Use of Historical and Cultural Heritage" was approved by the Ministry till 2010. One, concerning the "Culture of Kyrgyzstan," was prepared for the period from 2011 to 2013. The year of 2016 in Kyrgyzstan was declared as a year of history and culture. The special State Directorate on preparation and holding the Year of History and Culture was created. Among other activities archaeological works on mapping and documentation of one the biggest and unique rock art sites in Kyrgyzstan – Saimaly-Tash – were conducted. And of the outcomes of this project was a publication of book entitled *Archaeological Landscape of Saimaly-Tash*. This can be considered as a one of the first steps of the government to support archaeology. At the same time the Ministry actively is seeking potential partners and donors who are interested in collaborative archaeological projects in Kyrgyzstan.

UNESCO

The National Commission for UNESCO in the Kyrgyz Republic has a connection with the main office of UNESCO. The Commission prepares a list of monuments for UNESCO and monitors sites which are already under UNESCO protection. The museum complex "Sulaiman-Too" was the first monument in the Kyrgyz Republic to be entered onto the World Heritage List. In 2011, several projects in Osh oblast (one of the regions of the Kyrgyz Republic) were realized under the aegis of UNESCO. The main goal of these projects is to inform local administrations and state bodies about objects of historical and cultural heritage in their districts (Bostonbaeva 2001: 7).

Projects for Conservation and Restoration

Since independence from the Soviet Union, three projects on conservation of cultural heritage have been completed with funding from different international organizations. These are the Cholpon-Ata Rock Art complex, the Mausoleum of Shah-Fazil, and the complex of the cities of Krasnaya Rechka, Ak-Beshim, and Burana. The restoration and conservation works were realized by the Kyrgyz scientific, research, and project bureau *Kyrgyzrestavraziya* (nauchno-issledovatelskoe proektnoe byuro). The *Kyrgyzrestavraziya* is the entity under the Ministry of Culture and Tourism (Karymshakova 2010: 29–30). Unfortunately recent expert evaluations of these projects results, both local and international, have not been positive.

Problems

Despite progress since independence, many problems remain in the protection and preservation of Kyrgyz's historical and cultural heritage. Potential solutions to these problems depend on many factors. The first problem is a lack of funding, which affects the organization of research, monitoring sites, and other essential matters. Without support from the state, almost all financial problems related to the preservation of cultural heritage have been put onto the shoulders of experts. Their sources of funding include private universities, museums (mostly state historical

institutions), private organizations, and grants from international organizations. Recent financing or rather its absence means heritage management efforts fall short in current socioeconomic conditions; as such efforts have been traditionally relied on state financial support, which is now offered only on a residual basis.

Another problem is the training of specialists in the field of historical and cultural heritage. There is no clear government strategy for training young researchers and specialists. Poor financial support of science in general also strongly impacts upon this issue, as the nation's young people choose to study what from their point of view are more prospective specialties. As a result, the staff of the Republican Inspectorate for Registration of Historical and Cultural Heritage – the key state agency regulating the issues of conservation – consists of two persons. In the whole country, there are no more than ten archaeologists. And now because of archaeological expertise, all archaeologists are overloaded by survey works which can potentially influence on quality of works.

The most important problem is the lack of coordination among organizations concerned with the protection and management of cultural heritage (Amanbaeva 2010: 93).

Future Directions

Despite the availability of government programs designed to create effective mechanisms for management of cultural heritage, the painful process of gradual loss of cultural heritage continues. There is no agreed scheme of work that is based on legal regulations or traditions and that clearly identifies the competencies and responsibilities of each interested party, such as the Institute of History and Cultural Heritage, the *Kyrgyzrestavraziya* under of the Ministry of Culture and Tourism of KR, and the National Commission for UNESCO. These three organizations have to collaborate more effectively. Their collaboration must be based on clear regulation of the work so each body understands its role in the larger process.

The government cannot solve all these problems alone. Mechanisms to ensure the preservation of cultural heritage for future generations need radical reform, in a context in which cultural heritage management will at least partially have to justify itself economically. To achieve the change required, government bodies, heritage specialists, tourist agencies, and local people will have to be united in an effort to protect our common heritage.

When we get the big problems more under control, we will be better able to address the many more minor problems needing attention, such as updating cultural heritage lists, conducting of salvage excavations, illegal digging, urbanization, and lack of awareness of ordinary people and governmental bodies' officers, among many others.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Kyrgyzstan: Saving Archaeological Sites

References

Amanbaeva, B. 2010. Issledovanie i ohrana istoriko-kulturnogo nasledia v Kyrgyzskoi Respublike: sovremennoe sostoyanie, problem i vozmozhnye puti ih reshenii. *Sovechanie* regionalnyh spezialistov. *Kulturnoe nasledie Tsentralnoi Azii i vklad Yaponii*, 91–94. Tashkent: UNESCO.

Bostonbaeva, N. 2001. Taryhyi zhailaryna bolgon tashboor mamile. *Zaman Kyrgyzstan*. 27 May, 2011, p. 7.

Karymshakova, B. 2010. Gosudarstvennye i obshestvennye organizazii, zanimayucshiesya sohraneniem kulturnogo naslediya v Kyrgyzskoi Respublike. Sovechanie regionalnyh spezialistov. *Kulturnoe nasledie Tsentralnoi Azii i vklad Yaponii*, 29–32. Tashkent: UNESCO.

Kolchenko, V. 2005. Arheologicheskie pamyatniki Kyrgyzstana v svete Konvenzii ob ohrane vsemirnogo naslediya. In *Nasledie materialnoi i duhovnoi kultury Kyrgyzstana*, ed. A.Z. Japarov, 132–45. Bishkek: Ilim.

Further Readings

Gosudarstvennaya programma "Kultura Kyrgyzstana" v 2011-2013 gody. Available at: http://www.minculture.gov.kg. Accessed 9 Oct 2011.

Jansen, M., ed. 2008. *Preservation on Silk Road sites in the upper Chui valley. Navekat (Krasnaya Rechka), Suyab (Ak-Beshim) and Balasagyn (Burana). Final technical*. Aachen: Imankulov J.

Plan meropriyatii po vypolneniyu polozhenii Zakona Kyrgyzskoi Respubliki "Ob ohrane i ispolzovanii istoriko-kulturnogo naslediya". do 2010 goda ot 21 iyunya 2004 goda No. 455.

Polozhenie o gusudarstvennoi direktsii po podgotovke i provedeniyu Goda istorii I kultury ot 19 yanvarya 2016 goda No. 21. Tsentralizovannyi bank dannyh pravovoi informatsii Kyrgyzskoi Respubliki. Available at: http://cbd.minjust.gov.kg/act/view/ru-ru/99006. Accessed 18 Aug 2017.

Polozhenie ob uchete, ohrane, restavrazii i ispolzovanii ob'ektov istoriko-kulturnogo naslediyaot 20 avgusta 2002 goda. No. 455. TOKTOM. Informazionnyi tsentr. Zakonodatelstvo Kyrgyzskoi Respubliki. Available at: http://www.toktom.kg. Accessed 9 Oct 2011.

Zakon Kyrgyzskoi Respubliki "Ob ohrane i ispolzovanii istoriko-kulturnogonaslediya". ot 29 iyunya 1999 goda No. 91. TOKTOM. Informazionnyi tsentr. Zakonodatelstvo Kyrgyzskoi Respubliki. Available at: http://www.toktom.kg. Accessed 9 Oct 2011.

Kyrgyzstan: Saving Archaeological Sites

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Introduction

Archaeological sites play a significant role in the spiritual and intellectual development of any society. This is the case in Kyrgyzstan where there are great many historical and archaeological sites, representing periods from the Stone Age onwards, that contribute to the country's heritage. However, public perceptions of the past and objects from the past are often seen as "old things" with little connection to contemporary society. There are insufficient laws, organizations, and communication to help protect the country's cultural patrimony and as a result many sites have been destroyed and many more are in danger of being lost as a result of privatization of national lands, looting, and commercialization of the past. Although progress is being made with respect to public understanding and appreciation of the past, organizational infrastructure to help facilitate inventory, site monitoring, conservation, and certification have a long way to go.

Key Issues

The public perception of archaeological sites in Kyrgyzstan is a significant issue. The perception of archaeological sites as old things and museums as warehouses of old things prevails. In archaeological collections we can see metal objects made by skilled craftsmen 3,000 years ago which in many cases cannot be replicated by modern jewelry designers. We can see unique inscriptions on stone written by our ancestors from the Middle Ages that are compromised by commercialization that is more interested in financial value than the importance of these artifacts to our collective heritage. It is not unusual for archaeologists to be asked the monetary worth of a stone sculpture that may originate from an ancestor's tomb from 50 to 55 generations ago. This is compounded by the fact that when Kyrgyzstan was under a Soviet Republic, the past of the Kyrgyzstan people was overshadowed by other interests that glorified the Great Patriotic War. As a result, monuments to Lenin and sites such as Uzgen and Burana were the priority for the Society for the Protection of Monuments of History and Culture. Today this organization is no longer in existence, and as a result the accounting, preservation, and monitoring of monuments and sites are no longer carried out, and hundreds of monuments have been destroyed in Kyrgyzstan.

The fact that a number of medieval fortresses and mounds of nomadic people are in the hands of private owners makes the protection of sites difficult, even though current law requires archaeological research prior to any new construction or building. While the need to protect sites and the specifics of the law have been discussed in the mass media for the past two decades, there is still incomplete information regarding archaeological sites, for instance, those that have been destroyed at places such as hydropower stations, and a lack

of information on the existence of underwater archaeology. The picture is not all bleak. Under the influence of quasi-scientists, sites such as the Mausoleum at Manas Gumbez have been examined.

Since the late 1980s, when funding for archaeological sites was eliminated, some studies have been conducted but only in association with anniversary celebrations. However, state support of archaeological activity associated with these jubilee events was curtailed at a time when Kyrgyzstan was celebrating its 2,200th anniversary (in 2003). Nowadays, although the Ministry of Culture and Information has a small department, they are not able to work on the in situ conservation of monuments and their certification. That is why today in Kyrgyzstan we propose to employ best practices as utilized by other countries to organize a special permanent service of archaeological protection in Kyrgyzstan in an effort to save our heritage before it is too late. We propose that it be similar to the Ministry of Emergency. This Ministry of Emergency should consist of professional staff that would continue the monitoring of archaeological sites and objects begun in the mid-1980s. This would include carrying out work on the identification, certification, and registration of all archaeological sites within the country. Sites would receive full documentation, and their condition evaluated, and some sites given legal protection under a "site passport" scheme.

It must be recognized that even with the help of outside organizations such as UNESCO in conjunction with town leaders, archaeologists, regional administrators, agriculturalists, inspectors, administrators, school historians, and others, it may not be possible to save all the crumbling archaeological sites. But it is critical that we make an effort to establish strong working relationships to help identify and effectively manage archaeological sites and to convey the importance of our heritage to current and future generations. It is possible that if sites are taken care of by this generation, our heritage will help contribute to the spiritual and intellectual development of future generations. This is effectively taking place in other countries around the world, providing examples of how this can be done in Kyrgyzstan.

Based on current archaeological field experience in Kyrgyzstan, the protection of sites may well be assisted by individuals in local villages where commissioners and lovers of antiquities work together to protect the past, including the establishment of school museums. However, such museums often lack trained personnel and are often neglected or destroyed after the retirement of the organizer. Museums would be significantly enhanced by programs of study that provide education and training in how to preserve and respect sites in the region. The activities of such programs could also include specialized archaeological training and the production of manuals, handbooks, and books on local history. In particular, publications directed at young people are essential, to help establish cultural-historical values for contemporary times – such works should tell interesting stories of the nation's past to facilitate interest and help students understand the importance of preserving the sites of their ancestors. Alongside these measures, the creation of exhibitions, public lectures in the field, publication of scientific and popular literature, and albums of site types, especially in the Kyrgyz language for local residents, would contribute towards a public understanding of the importance of heritage. This would go a long way in protecting sites that are currently being destroyed and would build on interest among local school teachers and residents, witnessed by the authors during our archaeological research. Many enjoy the achievements of our ancestors together with archaeologists. In this regard we try to enhance the experience of our work with local people to preserve the historical heritage and raise awareness. The protection of sites from the ravages of time and vandalism is an urgent task in Kyrgyzstan today, and embedding an understanding of the importance of these sites is fundamental.

It is very important for us that we employ professional contacts, such as those established with Indiana University and personally with Professor K. Anne Pyburn since 2004, in the field of preservation and the establishment of local museums. Her experience in communicating the

need for archaeological observation to local communities and presenting heritage in a museum context has been especially significant for Kyrgyzstan.

Future Directions

Conclusion and Recommendations

Since the funding for archaeological sites was stopped in the late 1980s, many sites are under the threat of destruction. This has been compounded by the disbanding of the Society for the Protection of Monuments of History and Culture and the dismissal of regional inspectors and managers of heritage, resulting in a lack of monitoring and preservation of sites and artifacts. Adding to this situation is the fact that many sites and monuments are on private land and not available to archaeological inquiry. Consequently, valuable artifacts are sold within the context of an illicit archaeology, which of course is not archaeology at all.

Given the current circumstance for archaeology in Kyrgyzstan, there are number of areas of work that will improve the situation. The following is a proposed list of actions:

- Save the archaeological sites by means of creating a mobile, technically upgraded, archaeological service with legal authority.
- Regenerate the regional departments of historical, archaeological, and cultural services.
- Renew the passports of archaeological sites, giving them legal protection.
- Set aside reserved land (historical reservations) for objects of heritage.
- Use broadly and actively the punitive law against violators of legislation of the Kyrgyz Republic "On protection and use of historical and cultural heritage" with new additions.
- Formulate and define the article of criminal law in order to ban treasure hunting in the area of archaeological sites and the trade in archaeological and numismatic artifacts, for instance, in antique shops. Place a ban on the advertisement and promotion in the media of illegal treasure hunting. Introduce criminal liability for violation of this law.
- Include the problem of preservation of historical and cultural heritage in plans for urgent actions of the Council of National Security, Ministry of Interior, the Prosecutor's Office, Customs Service, and State Register of the Kyrgyz Republic.
- Increase the advocacy for the preservation of sites and monuments among students and public communities.

We believe that it is important to establish a fund or association which will contribute to the preservation and study of archaeological sites. This should effectively facilitate the following tasks:

- Support and assist public and professional groups in their efforts to save and protect archaeological sites in the territory of the Kyrgyz Republic.
- Implement the state orders for the preservation and study of archaeological sites.
- Provide assistance for archaeologists in registration of archaeological sites and legalize the archaeological passports of monuments of the Kyrgyz Republic.
- Fund and organize urgent archaeological research into monuments which are under threat of destruction and archaeological sites which are in dangerous or unstable zones.
- Investigate archaeological sites located in areas of construction, mining or industrial processing.
- Organize joint international archaeological expeditions to explore archaeological sites, which are under threat of destruction and disappearance.
- Help archaeologists, conservators, and local authorities in the preservation and study of material objects, including the production of written records and conservation where needed.
- Develop field studies of ethnographic collections for the sake of preservation of ethnoarchaeological materials, local creativity, and intangible heritage.

- Support and organize ethno-archaeological and interdisciplinary expeditions and research.
- Assist in the training of scientists in Kyrgyzstan in archaeology, ethnography, epigraphy, restoration, and conservation.
- Assist in the creation of community museums and school museums.
- Organize joint seminars and activities around archaeological sites with the participation of local experts and professionals from abroad.
- Facilitate access to archaeological sites which are in private territories.
- Promote the protection of the archaeological heritage of the Kyrgyz Republic and the proper protection of archaeological works.
- Prepare guidance documents and publications in the field of archaeological heritage in the areas of construction and design work.
- Support the educational, scientific, and educational activities in secondary schools and universities.
- Create albums, maps, and handbooks on archaeological sites in Kyrgyzstan.
- Publish the materials related to the archaeological heritage and the results of their research in the areas of building, design, and construction.
- Prepare an archaeological map of all of the regions, districts, and counties of the Kyrgyz Republic, with details of all known archaeological sites.
- Prepare special archaeological expositions and visual guides on local history for all schools of Kyrgyzstan.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Outreach
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Experiencing Cultural Heritage
- ▶ Heritage and Higher Education
- ▶ Heritage and Public Policy
- ▶ Heritage Areas
- ▶ Heritage Museums and the Public
- ▶ Heritage Research and Visitor Planning
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions
- ▶ Intangible Cultural Heritage
- ▶ Marketing Heritage
- ▶ Tangible Heritage in Archaeology
- ▶ UNESCO (1972) and Malta (1992) Conventions
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

Further Reading

Tabaldiev, K. 2012. *Ancient monuments of the Tien Shan*. Bishkek: University of Central Asia.

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La Draga: Environmental Archaeology

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Introduction

La Draga (Banyoles, Girona Province) is one of the most important sites of Iberian later prehistory. It is well known for being the only lakeshore settlement that has been identified so far in Spain. The site was discovered in 1990, and, from then until today, several archaeological excavations have taken place under the scientific supervision of the Museu Arqueològic Comarcal de Banyoles and the Museu d'Arqueologia de Catalunya. A second phase is now being undertaken with the additional collaboration of the Universitat Autònoma de Barcelona and the Consejo Superior de Investigaciones Científicas (Bosch et al. 2000, 2006a, 2011).

The settlement is located at the eastern side of Lake Banyoles, 170 m. a.s.l. (Fig. 1). Nowadays, the biggest part of it is in the dry land, but part of the site is underwater. It is thought that the original settlement was around 8000 m^2, but archaeological work has focused on a smaller area, of around 3000 m^2, where the site seems to have remained better preserved. La Draga is characterized by the exceptional preservation of wood and other plant remains, which together with the charred remains of fuel consumption makes this an exceptional site to see how the landscape was in time when the site was occupied. The studies of fauna and plant remains have been one of La Draga's most consistent contributions, thanks to the huge quantity of samples, as well as their variety (Antolin et al. 2014).

Three main areas have been excavated (Fig. 2): sector A, of approximately 284 m^2; sector B, of 126 m^2; and sector C, of 310 m^2. Sector A is on the eastern part, where the water table is around 70 cm below the archaeological layer, which means that waterlogged conditions have not prevailed until the present and the organic material of the archaeological layer has disappeared. Only the tips of the wooden posts, which still are in waterlogged conditions, have been recovered. Sectors B and C have maintained the waterlogged conditions ever since the Neolithic period. Recently a new area of 58 m^2 is being excavated, sector D.

As far as the chronology is concerned, the latest information comes from a batch AMS radiocarbon dates, which consistently place the two archaeological levels of La Draga in the Neolithic

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La Draga: Environmental Archaeology, Fig. 1 Location of the settlement of La Draga

Cardial culture. The initial phase can now be situated between 5324 and 5000 cal BCE and the second between 5210 and 4980 cal BCE (Tarrús 2009; Bosch et al. 2011).

Key Issues/Current Debates/Future Directions/Examples

The Landscape and Wood Resources

The pollen data, coming from the site itself and from the sediments of the lake, show that the forests in the surrounding area were composed of oaks (*Quercus* sp. deciduous), fir (*Abies* cf. *alba*), pines (*Pinus* spp.), evergreen oak (*Quercus* sp. evergreen), linden (*Tilia* sp.), maple (*Acer* sp.), juniper bushes (cf. *Juniperus*), and wild olive/Phillyrea type (*Olea/Phillyrea*)

La Draga: Environmental Archaeology, Fig. 2 Archaeological works and overview of the Archaeological Park of La Draga. (Photo: J. Casanova)

forming a mosaic of vegetation. These records highlight also the importance of riparian vegetation, represented by species such as hazel (*Corylus* cf. *avellana*), ash (*Fraxinus* sp.), elm (*Ulmus* sp.), alder (*Alnus* cf. *glutinosa*), poplar (*Populus* spp.), willow (*Salix* spp.), and elderberry (*Sambucus* sp.). The presence of bushes, between them shrub heath (cf. *Erica*) and boxwood (cf. *Buxus sempervirens*), is poorly represented in quantitative terms. Therefore, the environment of the settlement is dominated by forest formations that have provided a variety of resources to the settlement (Burjachs 2000).

Around ca. 7250 cal BP, coinciding with the first settlement phase of La Draga, a rapid fall of the pollen values of deciduous *Quercus* sp. is observed, and a stabilization of these values is found until ca. 6000 cal BP. Climate could not have been the main cause for the decrease of broadleaf deciduous forests, and the need of gathering raw material for the construction of dwellings played a major role in this change (Rivelles et al. 2014).

The study of charcoal and wood remains shows more precisely the composition of forests and how these were exploited by the inhabitants of La Draga. The study has allowed identifying a minimum of 22 taxa (14 among charcoal and 17 among the wood remains). All of them could have grown in the vicinity of the settlement. Among the species that are well represented are those gathered in riparian forests: laurel (*Laurus nobilis*), elm, ash, hazel, willow, alder, elderberry, poplar, clematis (*Clematis clematis*), and dogwood (*Cornus sanguinea*). Also well represented are sub-Mediterranean taxa: maple (*Acer* sp.), boxwood, oaks (deciduous), linden (*Tilia* sp.), *Prunus* sp., *Pomoideae*, pine (*Pinus nigra-sylvestris*), and yew (*Taxus baccata*). Their presence at the site confirms that oak forest, growing at low altitude, was predominant in the area. Finally we have also found typical Mediterranean vegetation with evergreen oak (*Quercus* sp. evergreen) and the strawberry tree (*Arbutus unedo*); however, these species are in the minority. Both taxa may form mixed forests in sunny and dry areas. The results obtained from the analysis of wood and charcoal suggest that, during the occupation of La Draga, the regime of temperatures and humidity has enabled the development of low-altitude deciduous forests (Piqué 2000; Bosch et al. 2006b).

The study of wood charcoals scattered in the archaeological level shows that main woods used as fuel were oak (deciduous), laurel, and boxwood. About 94% of the fragments analyzed correspond to these taxa. They represent the bulk of waste identified, and therefore, we believe they are indicators of preferential use by the community. The remaining taxa were used in a more minimal way.

Among the wood used for the manufacture of tools, certainly boxwood is the best represented taxon (Fig. 3), both in terms of the number of objects and categories of object. Forty-eight percent of items and up to ten different types of objects were manufactured with this wood. Oak was also used, but with less intensity, as it only represents about 12% of the objects. However, we

La Draga: Environmental Archaeology, Fig. 3 Tools made from organic materials: *left*, sickle haft (*Buxus sempervirens*); *right*, digging stick (*Buxus sempervirens*). (Photo: Project La Draga)

point out that most of the hundreds of poles used in construction of buildings were of oak.

Woods were used according to their properties, and many of the objects had been partially damaged by fire. The hardwoods of *Quercus* (deciduous and evergreen), *Arbutus unedo*, *Juniperus* sp., *Pomoideae*, *Cornus* sp., *Buxus sempervirens*, and *Acer* sp. have been used to manufacture a total of 15 categories of objects. They included handles of adzes of various sizes, angled sickles with collectors, twin-pointed digging sticks, and arrows, as well as cooking utensils (bowls, ladles, scoops, spatulas), items for furniture (hooks), building (wedges), and weaving (twin-pointed spindles, combs). The flexible softwoods were used in the manufacture of a lower number of object categories. These species were used for the production of basketry (*Corylus avellana*), string (*Tilia* sp., *Clematis* sp.), and bows (*Taxus baccata*).

Agriculture and Wild Foods

The agricultural production system of La Draga's inhabitants appears to have been quite complex and varied (Antolin 2016). Huge numbers of carbonized grains were recovered during the excavations, mostly associated both with combustion structures and burned-down grain stores (Buxó et al. 2000). All remains were in waterlogged conditions when recovered. Nevertheless, the largest part of the assemblage has survived in a charred state (Fig. 4). The vast majority of these grains are thought to belong to tetraploid naked wheat, based on the morphology of chaff remains (Buxó 2007; Antolin and Buxó 2011).

Fifty-seven taxa have been identified. Five of them belong to potentially cultivated cereals and two cultivated pulses. The cereal species are naked wheat (*Triticum aestivum/durum/turgidum*), which represents the 99% of all the grains and the main crop at the site, while all the other cereal species, such as barley and naked barley (*Hordeum vulgare* and *Hordeum vulgare* var. *nudum*), and hulled wheat as emmer (*Triticum dicoccum*) and einkorn (*Triticum monococcum*) types only make up 1% of the total. Chaff remains were relatively abundant. Of these, 30% are rachis fragments which coincide with the morphology of *Triticum durum/turgidum* type (tetraploid naked wheat). Only in very few structures, cereals other than naked wheat seem to be quantitatively significant. In the majority of these cases, the second better represented cereal is hulled barley, but there is one structure where naked barley yielded more than 1000 remains (E-52).

Pulses are represented by broad bean (*Vicia faba*) and peas (*Pisum sativum*), although in small numbers. In addition, poppy (*Papaver somniferum/setigerum*) is one more taxon that may possibly have been cultivated in La Draga. It is not entirely certain whether it was a weed among the crops or a plant specifically cultivated during the Neolithic on the Iberian Peninsula, as appears to be the case in the rest of the Mediterranean Basin.

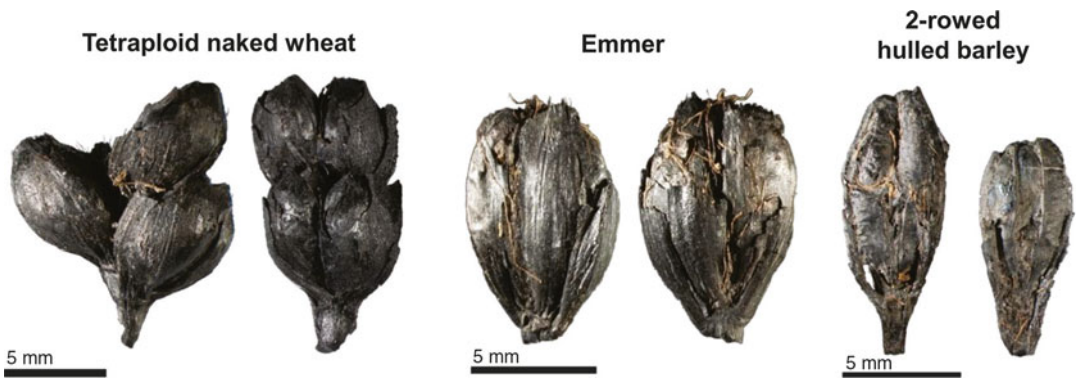

La Draga: Environmental Archaeology, Fig. 4 Carbonized cereals from the Neolithic site of La Draga: tetraploid naked wheat, emmer wheat, and two-rowed hulled barley. (Photo: F. Antolín)

Gathering of fruits and berries in the woods nearby is well documented at La Draga. There is a wealth of hazelnuts, acorns, pine nuts, blackberries, sloes, wild apples or pears, and wild grapevines. Among the wild fruits, cherry pits, some of which were perforated for use as pendants, have been found in abundance in recent excavations.

Charred remains of wild plants are very scarce and made up of several communities. Some of them are segetal and ruderal weeds, *Cerastium* sp., *Chenopodium album*, *Lolium* sp., *Papaver rhoeas/dubium*, *Polygonum lapathifolium*, *Polygonum* cf. *persicaria*, *Valerianella* cf. *dentata*, and *Verbena officinalis*; others are more related to aquatic/lakeshore vegetation, *Alisma plantago-aquatica*, *Alnus glutinosa*, *Cladium mariscus*, *Eupatorium cannabinum*, *Lycopus europaeus*, *Vitis vinifera* subsp. *sylvestris*, and *Potamogeton* sp.; a few examples may be related to deciduous woodland areas, such as a *Cornus sanguinea*, *Crataegus monogyna*, *Prunus avium*, *Quercus* sp., *Moehringia trinervia*, and *Tilia platyphyllos*, and woodland borders/ruderal areas such as *Prunus spinosa*, *Sambucus* cf. *ebulus*, *Rubus fruticosus* agg., and *Hypericum* cf. *perforatum*; and finally, some of the taxa may be found in more than one of these ecological groups: Brassicaceae, *Carex* sp., *Galium* sp., *Silene* sp., *Stachys* sp., *Ranunculus* sp., and *Rumex* sp. The presence of a few charred remains of *Galium* sp., *Lolium* sp., *Papaver somniferum/setigerum*, *Cladium mariscus*, and *Verbena officinalis* is the only evidence of clear weed plants.

Durum wheat would have been grown as a monocrop and harvested close to the ground. The most common harvesting technique for naked wheats in the Near East is reaping ears and straw together by cutting low on the straw. This type of harvesting technique is inferred for La Draga, according to the results of lithic artifact use-wear analysis (Palomo et al. 2011). Functional analysis of lithic artifacts provides a more complete understanding of cereal processing in La Draga. Around 25% of these artifacts seem to have been used on cereals, both for harvesting and for cutting straw close to the ground. Two types of blade insertion have been observed, parallel or oblique to the handle. Some of them have been used for cutting green stems of plants, which could be related to early harvesting of crops or other types of nonwoody plants (Palomo et al. 2011). Analysis has confirmed the position of the flint cutting teeth in the grooves of the wooden sickle handles. It has also highlighted the possibility that there may have been a second reaping of the cereal crops close to the ground to take advantage of the straw; this would account for the marks on the tools caused by hitting stones. The first harvesting would obviously have been to cut the spikes with the grain at the top of the plant. Straw then could be reused for other purposes such us construction material, fuel, fodder, or even basketry.

After this type of double reaping (spikes and straw), the selection of grains was carried out by hand beating without a thresher (perhaps by treading with animals), followed by winnowing and sieving. Once washed, the grain was stored in pottery vessels or baskets, which were probably placed in stone-floored granaries. Some of the grain would have been toasted in order to consume it directly, although most of it was used to make flour using small hand mills.

It is important, then, to consider consumption possibilities when only *Triticum durum/turgidum* type is identified in a site and seems to be its main crop such as in our case. Bulgur production could have taken place in La Draga, but the very few pre-charring fragments of caryopsis are not enough evidence for such a process. One possible good way to detect *frikke* production is the presence of significant quantities of non-charred grains with charred apical parts, which is a typical consequence of this practice. No such findings can be reported from La Draga, even though green stems are known to have been cut with lithic artifacts. Huge concentrations of charred grain around hearths of sector A have also raised the possibility that they represent grain roasting inside big pottery containers.

The grains of barley, emmer, and einkorn may not have been dehusked. Considering the low percentage that they represent in the assemblage and the presence of some pre-charring caryopses fragments belonging to these taxa, it is probable that they were accidentally harvested and

processed with naked wheat and survived the different processing stages.

Animal Exploitation

The faunal analysis addresses, in addition to the taxonomic determination, to approach other aspects such as the model of stockbreeding exploitation and the importance of hunting in the immediate environment of the lake or in more distant areas such as the forests or mountains that surround the site (Saña 2000, 2011). The faunal remains recovered and analyzed so far show the exploitation of at least different animal species, 46 wild and 5 domestic species.

The classification of faunal remains (N = 14,468) indicates that most are mammals followed by, in order of quantitative importance, the remains of mollusks (4.9%), birds (0.7%), chelonians (0.7%), and fish (0.09%). The exploitation of the animal biomass of aquatic environments and in particular the lake itself is a specific activity or sporadic. This feature is also evident if we consider the number of specimens of fish (eels, barbells, catfish, and roaches), turtles (*Emys orbicularis*), and freshwater mollusks acquired, with very few individuals represented for most species. The exploitation of the marine environment as a food source was not recurrent. Among the 14 species of marine mollusks documented, only rock mussel was potentially destined for consumption. A similar dynamic is documented for birds, with little more than two individuals representing each of the 14 species of birds identified. As well as the cormorant, we now have ducks (the common goldeneye and the ferruginous duck) and rails (coots or water hens), as well as cranes, woodcocks, wood pigeons, rock and red-legged partridges, quails, Passeriformes, and birds of prey, such as the osprey. Some of these animals, sometimes found quite whole, may have reached the site naturally, but in the majority of cases, their presence can be attributed to their having been hunted for their meat or feathers.

The role of hunting and obtaining of animal proteins was still of great importance in La Draga, despite the relative abundance provided in this area by domestic cattle (Fig. 5). In addition to the large mammals, such as aurochs or wild bulls, wild boar, red deer, roe deer, and wild goats, we have been able to determine the presence of rabbits and a wider range of small carnivores (fox, badger, marten, and wildcat), probably also appreciated for their skins. One is struck by evidence clearly showing that wild bulls existed in great numbers, alongside boars, rabbits, roe deer, and wild goats. These last two species tell us that what was the hinterland of La Draga, in the strict sense, began to expand considerably when hunting extended as far as the high mountains that marked the limits of the lacustrine basin.

La Draga: Environmental Archaeology, Fig. 5 Horns of domestic ox. (Photo: Project La Draga)

From hunting and gathering, cattle raising was extensively practiced for the different Neolithic occupations of La Draga. If we look at evidence concerning the domestic cattle of the period, there was a marked presence of the ox and the pig, alongside the traditional sheep and goats. These animals were exploited in two ways, to judge from the range of ages we have detected: they were kept in order to provide both meat and milk, including cream derivatives of the latter (butter, cheese).

There is also some slight but interesting evidence that dogs were kept, as was usual in other settlements of the Old Neolithic, both on the peninsular and Central Europe. The presence of the domestic dog is confirmed by the remains of two individuals, one of 3–6 months old and another more than 12 months old.

Stockbreeding was, above all, aimed at obtaining meat and milk, although there appears to be evidence that older oxen (Fig. 5) were used for agricultural tasks. From paleopathology bone, some oxen have made regular overwork, something that can be related to its use for different tasks (loading, wood transport, agricultural tasks, etc.). In these cases the repeated mechanical pressure on the hard parts of the skeleton of the animal can cause bone deformities. In La Draga it has been found that most of pathologies were found in the animal's foot, consisting in deformations and different degrees of bone spurs (Lladó et al. 2008).

The meat in all the domestic species (ox, pig, sheep, and goat) was obtained from young animals once they had reached their optimum usable body mass. The relative abundance at La Draga of the remains of animals only a few months old (calves, suckling pigs, lambs, and kid goats) or even newborns, perhaps due to the difficult conditions of the period, does not detract from the general pattern of slaughtering noted. Obviously, some males were reserved for the reproduction of each species, as well as adult females (cows, sheep, and nanny goats) for the provision of milk.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Environmental Sampling in Mediterranean Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Waterlogged Finds: Conservation
- ▶ Western Europe: Historical Archaeology

References

Antolin, F. 2016. *Local, intensive and diverse? Early farmers and plant economy in the North-East of the Iberian Peninsula (5500–2300 cal BC)*. Gröningen: Barkhuis Publishing.

Antolin, F., and R. Buxó. 2011. L'explotació de les plantes: contribució a la història de l'agricultura i de l'alimentació vegetal del neolític a Catalunya. In *El poblat lacustre del neolític antic de La Draga. Excavacions de 2000–2005*, Monografies del CASC 9, ed. A. Bosch, J. Chinchilla, and J. Tarrús, 147–174. Girona: Museu d'Arqueologia de Catalunya, Centre d'Arqueologia Subaquàtica de Catalunya.

Antolín, F., R. Buxó, S. Jacomet, V. Navarrete, and M. Saña. 2014. An integrated perspective on farming in the early Neolithic lakeshore site of La Draga (Banyoles, Spain). *Environmental Archaeology* 19 (3): 241–255.

Bosch, A., J. Chinchilla, and J. Tarrús, eds. 2000. *El poblat lacustre neolític de La Draga. Excavacions de 1990–1998*, Monografies del CASC 2. Girona: Museu d'Arqueologia de Catalunya, Centre d'Arqueologia Subaquàtica de Catalunya.

Bosch, A., J. Chinchilla, and J. Tarrús, eds. 2006a. *Els objectes de fusta del poblat neolític de La Draga. Excavacions de 1995–2005*, Monografies del CASC 6. Girona: Museu d'Arqueologia de Catalunya, Centre d'Arqueologia Subaquàtica de Catalunya.

Bosch, A., J. Chinchilla, J. Tarrús, and R. Piqué. 2006b. Els objectes de fusta i fibres vegetals. In *Els objectes de fusta del poblat neolític de la Draga. Excavacions de 1995–2005*, Monografies del CASC 6, ed. A. Bosch, J. Chinchilla, and J. Tarrús, 27–126. Girona: Museu d'Arqueologia de Catalunya, Centre d'Arqueologia Subaquàtica de Catalunya.

Bosch, A., J. Chinchilla, and J. Tarrús. 2011. *El poblat lacustre del neolític antic de La Draga. Excavacions de 2000–2005*, Monografies del CASC 9. Girona: Museu d'Arqueologia de Catalunya, Centre d'Arqueologia Subaquàtica de Catalunya.

Burjachs, F. 2000. El paisatge al neolític antic. In *El poblat lacustre neolític de La Draga. Excavacions de 1990–1998*, Monografies del CASC 2, ed. A. Bosch, J. Chinchilla, and J. Tarrús, 46–50. Girona: Museu d'Arqueologia de Catalunya, Centre d'Arqueologia Subaquàtica de Catalunya.

Buxó, R. 2007. Crop evolution: New evidence from the Neolithic of west Mediterranean Europe. In *The origins and spread of domestic plants in southwest Asia and Europe*, ed. S. Colledge and J. Conolly, 155–172. London: University College London Institute of Archaeology Publications.

Buxó, R., N. Rovira, and C. Saüch. 2000. Les restes vegetals de llavors i fruits. In *El poblat lacustre neolític de La Draga. Excavacions de 1990–1998*, Monografies del

CASC 2, ed. A. Bosch, J. Chinchilla, and J. Tarrús, 129–139. Girona: Museu d'Arqueologia de Catalunya, Centre d'Arqueologia Subaquàtica de Catalunya.
Llado, E., L.L. Gaitero, M. Pumarola, and M. Saña. 2008. Perforations in archaeological Neolithic cattle skulls: A new methodological approximation for their study and explanation. *Veterinarija ir Zootechnika* 43 (65): 58–61.
Palomo, A., J.F. Gibaja, R. Piqué, A. Bosch, J. Chinchilla, and J. Tarrús. 2011. Harvesting cereals and other plants in Neolithic Iberia: The assemblage from the lake settlement at La Draga. *Antiquity* 85: 759–771.
Piqué, R. 2000. La gestió dels recursos llenyosos a la Draga. In *El poblat lacustre neolític de La Draga. Excavacions de 1990–1998*, Monografies del CASC 2, ed. A. Bosch, J. Chinchilla, and J. Tarrús, 140–149. Girona: Museu d'Arqueologia de Catalunya, Centre d'Arqueologia Subaquàtica de Catalunya.
Revelles, J., F. Antolín, M. Berihuete, F. Burjachs, R. Buxó, L. Caruso, O. López, A. Palomo, R. Piqué, and X. Terradas. 2014. Landscape transformation and economic practices among the first farming societies in Lake Banyoles (Girona, Spain). *Environmental Archaeology* 19 (3): 298–310.
Saña, M. 2000. Els recursos animals. In *El poblat lacustre neolític de La Draga. Excavacions de 1990–1998*, Monografies del CASC 2, ed. A. Bosch, J. Chinchilla, and J. Tarrús, 150–168. Girona: Museu d'Arqueologia de Catalunya, Centre d'Arqueologia Subaquàtica de Catalunya.
Saña, M. 2011. La gestió dels recursos animals. In *El poblat lacustre del neolític antic de La Draga. Excavacions de 2000–2005*, Monografies del CASC 9, ed. A. Bosch, J. Chinchilla, and J. Tarrús, 177–212. Girona: Museu d'Arqueologia de Catalunya, Centre d'Arqueologia Subaquàtica de Catalunya.
Tarrús, J. 2009. La Draga (Banyoles, Catalonia), a lacustrine village of ancient Neolithic in Mediterranean Europe. *Catalan Historical Review* 1: 17–33.

Further Reading

Bosch, A., J. Chinchilla, and J. Tarrús. 1999. Neolithische Uferrandsiedlung La Draga. *Archäologie in Deutschland* 3: 54–57.

la Hausse de la Louvière, Philippe

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Basic Biographical Information

Philippe la Hausse de la Louvière received his B.S. in Natural Sciences, specializing in African fisheries ecology. He is General Manager of Les Moulins de la Concorde Ltd, an agro-industrial enterprise, and Director of other food-producing companies in Mauritius.

Major Accomplishments

He is founding President of the Mauritius National Heritage Trust and of ICOMOS Mauritius, President of Friends of the Environment, and former President of the Société de l'Histoire de l'Ile Maurice. He has also served in various positions with the Mauritius Museums Council, the National Environmental Advisory Council, and the Aapravasi Ghat Trust. Additionally, he was Member of ICOMOS Executive Committee (2006–2008), elected Member (2008–2011), and has served as Treasurer General since 2009. He is founding Vice-President of the ICOMOS International Scientific Committee on Fortifications and Military Heritage. His primary interests and projects involve heritage site restoration, archaeological programs, cultural tourism initiatives, and historic building restoration projects.

Cross-References

► Fortifications, Archaeology of
► International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
► International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
► International Council of Museums (ICOM)

Further Reading

Carman, J., and P. Carman. 2006. *Bloody meadows. Investigating landscapes of battle*. Gloucestershire: Sutton.
La Hausse De La Louvière, P. 1998. *Coastal fortifications: Proceedings of an International Conference on Coastal Fortifications held in Mauritius, 18th to 21st June 1996*. Heritage: Tamarin.
La Hausse De La Louvière, P. 2007. *Les Bâtisseurs de I'île Maurice: pierres et patrimoine de Port-Louis: une découverte historique au plein centre de Port-Louis*. Heritage: Tamarin.

La Riera Cave: Geography and Culture

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La Riera is a small cave in the karstic complex of La Llera ridge on the coastal plain of eastern Asturias, in Posada de Llanes, halfway between Santander and Oviedo (northern Spain). Other nearby Paleolithic and Mesolithic sites include Cueto de la Mina, Bricia, Coberizas, Tres Calabres, Balmori, Quintanal, Fonfria, Arnero, etc. The deposits in La Riera both overlap and complement the important culture-stratigraphic sequence in the adjacent rock-shelter of Cueto de la Mina, which spans some 18,000 years between the Gravettian and the Asturian. La Riera, Cueto de la Mina, and the other sites were discovered and excavated in the 1910s by the Conde de la Vega del Sella, whose palace is located nearby. His monographs on Cueto de la Mina, La Riera, and Balmori (Vega del Sella 1916, 1930), and Hugo Obermaier's observations thereon in *Fossil Man in Spain* (1924), provided information of extraordinary quality and value for the period. In 1917–1918, La Riera specifically yielded a series of layers pertaining to the Solutrean, Lower and Upper Magdalenian, Azilian, and Asturian. The site was heavily looted in subsequent years (and has again been recently, despite closure with iron bars). In 1969, as part of his doctoral research on the Asturian Mesolithic culture, Clark (1976) sampled the concreted shell midden (*conchero*) and excavated a small test pit in front of the cave. The site is strategically located in the center of the narrow coastal strip, 1.75 km south of the present shore (9.7 km from the Pleniglacial shore) and 1.5 km from the abrupt base of the Sierra de Cuera, a coastal hill range that rises to 1315 m above sea level to the north of the Picos de Europa (maximum elevations: 2500–2600 m). Facing south at only 30 m above sea level, the cave is sheltered by La Llera ridge from winds off the Atlantic. The resources of the coast, the coastal plain, and the steep, rocky slopes of the *sierra* were all easily accessible.

Between 1976 and 1979, Clark and L.G. Straus excavated remnant intact deposits in the interior of La Riera, uncovering the same sequence of periods as had the Conde (Fig. 1). The results of this research were fully published in a substantial interdisciplinary monograph (Straus and Clark 1986a). In an attempt to date the occupations independently of their "diagnostic" artifacts, they obtained 28 conventional radiocarbon assays. Several levels were dated by more than one assay. Despite several stratigraphic inconsistencies and a few dates that are patently too young, Solutrean levels 2–17 (defined by the presence of characteristic foliate and shouldered points) can be placed (in uncalibrated years) between ca. 20 and 17 ka BP, the Lower Magdalenian (levels 18–23) between ca. 17 and 15 ka BP, the Upper Magdalenian (levels 24–26, defined by a round-section antler harpoon) between ca. 13 and 11 ka BP, the Azilian (levels 27–28 with a flat-section harpoon) between ca. 11 and 9 ka BP, and the Asturian (with cobble picks found by Vega del Sella and Clark in the *conchero*) between ca. 9 and 6.5 ka BP. These ages were later basically confirmed by two series of reservoir-corrected dates obtained on mollusc shells by A. Craighead (1999) and by Soares et al. (2016), who also obtained an Oxford ultrafiltration-pretreated assay on an ibex molar that confirms a 20 uncal ka BP age for one of the earliest Solutrean levels. Thus the Solutrean in Cantabrian Spain began shortly before 20,000 radiocarbon years ago, as also shown by dates from Las Caldas in central Asturias and El Mirón in Eastern Cantabria. New AMS assays (commissioned by Straus) on ibex and red deer bone collagen (extracted by J.R. Jones) significantly increase the uncalibrated ages for La Riera levels 23 (15,120 ± 40 BP, UG-27526) and 24 (13,530 ± 35 BP, UG-27525), respectively, late Lower and early Upper Magdalenian. These new dates support Laville's (1986) interpretation of an erosional hiatus between levels 23 and 24.

The fundamental aims of the 1970s re-excavation of La Riera were to determine

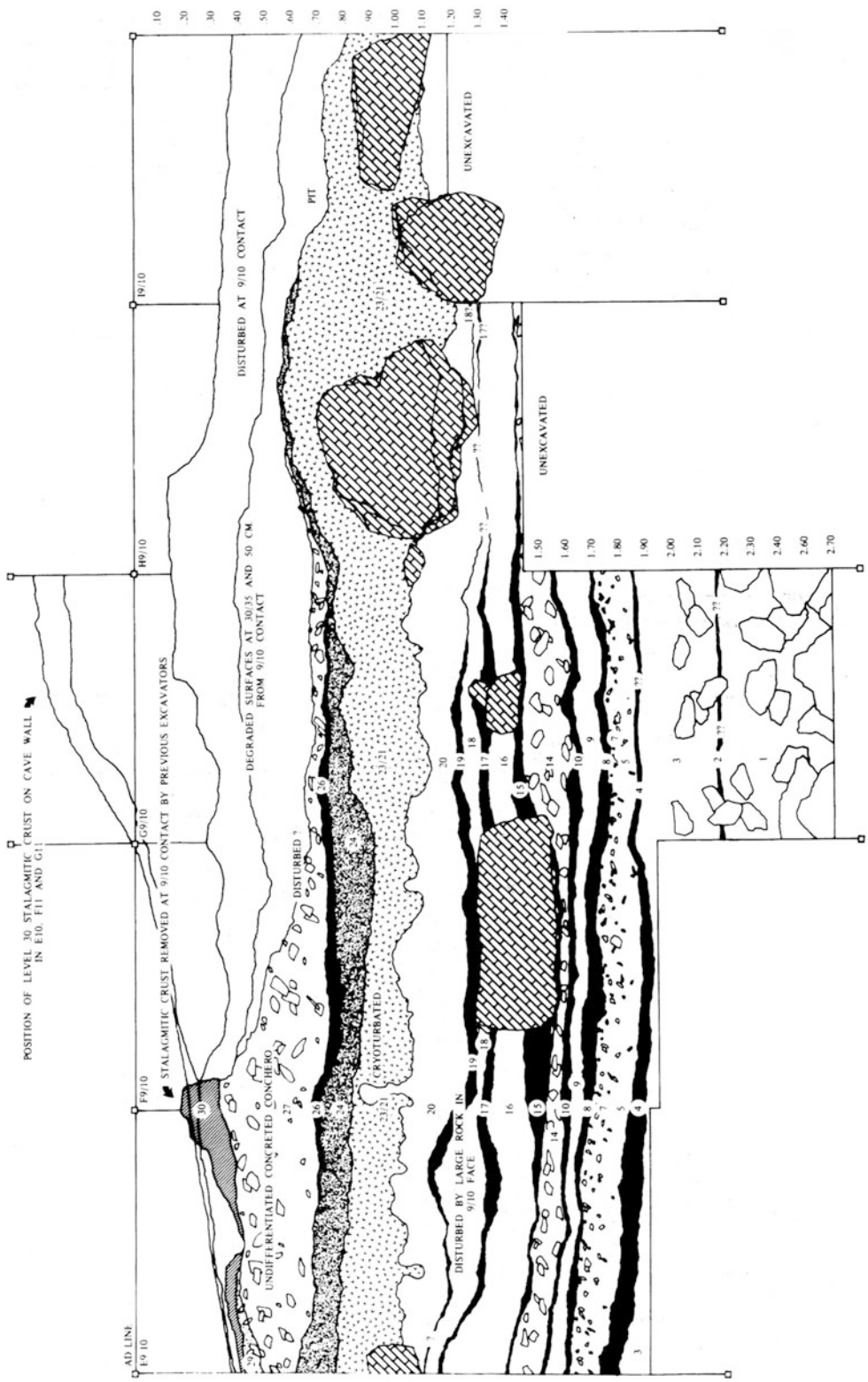

La Riera Cave: Geography and Culture, Fig. 1 Stratigraphic section (1976–1979 excavation) (Drawn by G.A. Clark and reproduced with permission from Anthropological Research Papers No.36)

whether/to what extent there were correlations between climatic and faunal changes throughout the sequence, whether/when there were changes in the human use of the cave through time, whether or not correlations could be found among faunal and artifact assemblages and site functions, and whether or not some kind of relationship existed between traditional, normative cultural designations (e.g., Solutrean, Magdalenian, Azilian, Asturian) and major adaptive shifts in the Cantabrian region. The key focus of the research was on the investigation of change through time both in the use of this cave and in the human exploitation of the surrounding environment as the latter was changing as a consequence of widespread last glacial changes in sea level, temperature, precipitation, and vegetation. Emphasis was placed on paleoenvironmental reconstruction and on radiocarbon-informed climatic correlations with better known regional sequences in SW France as monitored through sedimentology (Laville 1986), palynology (Leroi-Gourhan 1986), and micromammals (Altuna 1986).

While these higher-order questions were mostly addressed successfully, other findings had equal or perhaps even greater significance. Notably, it was shown that the classic diagnostic artifact types of the so-called "Upper" Solutrean were found at the bottom of the dated sequence of Solutrean levels and that there was a smooth transition in terms of *hunting technologies* (the most dynamic elements of Upper Paleolithic artifact assemblages) between the Solutrean and Lower Magdalenian, with a gradual substitution of Solutrean foliate and shouldered points by Magdalenian antler projectile points sometimes barbed/edged/tipped with backed bladelets (see Straus 1983). It was also demonstrated that there was a clear trend toward subsistence intensification through both situational specialization (in red deer or ibex hunting – including the increased killing of juvenile animals) *and* overall diversification to include more dangerous or elusive ungulate prey and smaller avian (Eastham 1986) and aquatic foods (fish (Menendez et al. 1986), shellfish, echinoderms, and crustaceans (Ortea 1986)), with the beginnings of a broad-spectrum adaptation well in advance of the Holocene Mesolithic. The exploitation of marine molluscs in significant amounts in certain Solutrean (Last Glacial Maximum) levels at La Riera, when the shore was a 2-h walk from the site, pushed back the known inception of the significant use of littoral resources in the Cantabrian region by several thousand years before the Lower Magdalenian (cf. Freeman 1973; Straus 1977). Indeed, size decreases in limpet shells beginning in the late Pleistocene could be attributed to human overexploitation of this resource, probably because of (seasonal?) food stress resulting from regional demographic pressure in this very confined strip of land between the ocean and the Picos de Europa. The oxygen isotope analyses of limpets by Deith and Shackleton (1986) represented another "first" for this region and indeed for Spain as a whole. Other studies that were pioneering in the Iberian context included reconstruction of lithic raw material procurement using petrographic analysis (Straus et al. 1986) and of lithic technology (including indicators of changing systematic reduction patterns) by application of a standardized typology of cores and *débitage* and multivariate analyses for inter-assemblage comparison (Straus and Clark 1986b; Clark et al. 1986).

Although La Riera yielded an impressive array of diagnostic lithic and osseous (Gonzalez Morales 1986) artifacts (notably projectile points), the research also revealed considerable general continuity in adaptation and a degree of inter-level alternation in "substrate" (often "archaic," flake-based) artifacts (e.g., sidescrapers, denticulates, notches), contrasting with more classic Upper Paleolithic types (backed bladelets, end scrapers, burins, perforators). These artifact-type characteristics responded to variations in lithic raw material availability (e.g., quartzites are common and locally sourced, while flints and radiolarites are relatively scarce and geographically restricted in the bedrock lithology of eastern Asturias). Fluctuations in the proportional representation of "substrate" tools are not related to classic culture-stratigraphic phases. In short, a significant part of the lithic component variability in the La

Riera sequence can be related to changes in lithic procurement patterns, artifact, and site functions, and not to traditional culture-stratigraphic constructs. This finding challenged some of the fundamental tenets of Upper Paleolithic and Mesolithic archeology in Cantabrian Spain, as the site monograph included explicit syntheses for the entire region (Clark and Straus 1986; Straus and Clark 1986c).

Although subsequent restudies of La Riera by numerous doctoral students (and others) have questioned (but not disproven) specific attributions of certain levels to the Solutrean, Lower Magdalenian, or Azilian culture constructs, challenged the human population pressure explanation for limpet size decrease (but see Guttierez Zugasti 2009 for region-wide support for this idea), or rejected certain radiocarbon dates, the original research has stood the test of time in terms of documenting subsistence intensification and changes in site use while (together with the late 1960s excavations of the Middle and Early Upper Paleolithic deposits in Cueva Morín in Cantabria (Gonzalez Echegaray and Freeman 1971, 1973)) helping to launch a new level of interdisciplinary, scientific prehistoric archeology in the classic Cantabrian region, in large part because of the extensive and explicit nature of the site monograph. La Riera has thus twice risen to the status of a reference site in the Cantabrian region, first in the early and then in the late twentieth century. More importantly, perhaps, the 1970s excavations in this relatively small cave were significant for the ideas proposed, tested, and debated, as new generations of prehistorians arise to propose their differing visions of the Upper Paleolithic and Mesolithic past as registered in La Riera's iconic deposits.

References

Altuna, J. 1986. The mammalian faunas from the prehistoric site of La Riera. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 237–274. Tempe: Arizona State University. 421–480.

Clark, G.A. 1976. *El Asturiense Cantábrico. (Bibliotheca Praehistorica Hispana 13)*. Madrid: CSIC.

Clark, G.A., and L.G. Straus. 1986. Synthesis and conclusions–Part I: Upper paleolithic and mesolithic hunter-gatherer subsistence in northern Spain. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 351–366. Tempe: Arizona State University.

Clark, G.A., D. Young, L.G. Straus, and R. Jewett. 1986. Multivariate analyses of La Riera industries and fauna. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 325–350. Tempe: Arizona State University.

Craighead, A. 1999. Climate change and patterns in the exploitation of economic resources (marine mollusca and ungulate fauna) in Cantabrian Spain at the endo of the Pleistocene, ca. 21–6.5 kyr BP. In *Zooarchaeology of the Pleistocene/Holocene boundary*, British archaeological reports international series 800, ed. J.C. Driver, 9–20. Oxford: Hadrian Books.

Deith, M., and N. Shackleton. 1986. Seasonal exploitation of marine molluscs: Oxygen isotope analysis of shell from La Riera Cave. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 299–314. Tempe: Arizona State University.

Eastham, A. 1986. The La Riera avifaunas. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 275–284. Tempe: Arizona State University.

Freeman, L.G. 1973. The significance of mammalian faunas from Paleolithic occupations in Cantabrian Spain. *American Antiquity* 38: 3–44.

Gonzalez Echegaray, J., and L.G. Freeman. 1971. *Cueva Morín: Excavaciones 1966–1968*. Santander: Patronato de las Cuevas Prehistóricas.

Gonzalez Echegaray, J., and L.G. Freeman. 1973. *Cueva Morín: Excavaciones 1969*. Santander: Patronato de las Cuevas Prehistóricas.

Gonzalez Morales, M.R. 1986. La Riera bone and antler artifact assemblages. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 209–218. Tempe: Arizona State University, 385–420.

Guttierez Zugasti, F.I. 2009. *La Explotación de Moluscos y Otros Recursos Litorales en la Región Cantábrica durante el Pleistoceno Final y el Holoceno Inicial*. Santander: Universidad de Cantabria.

Laville, H. 1986. Stratigraphy, sedimentology and chronology of the La Riera Cave deposits. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 25–56. Tempe: Arizona State University.

Leroi-Gourhan, A. 1986. The palynology of La Riera Cave. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 59–64. Tempe: Arizona State University.

Menendez, D.E., M. La Hoz, L.G. Straus, and G.A. Clark. 1986. The ichthyology of La Riera Cave. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 285–288. Tempe: Arizona State University.

Ortea, J. 1986. The malacology of La Riera Cave. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 289–298. Tempe: Arizona State University.

Obermaier, H. 1924. *Fossil Man in Spain*. New Haven: Yale University Press.

Soares, A. Monge, I. Gutierrez-Zugasti, M. Gonzalez-Morales, J. Matos Martins, D. Cuenca-Solana, and G. Bailey. 2016. Marine radiocarbon reservoir effect in late Pleistocene and early Holocene coastal waters off northern Iberia. *Radiocarbon* 58(4): 869–883. https://doi.org/10.1017/RDC.2016.71.

Straus, L.G. 1977. Of deer slayers and mountain men: Paleolithic faunal exploitation in Cantabrian Spain. In *For theory building in archaeology*, ed. L.R. Binford, 41–76. New York: Academic Press.

Straus, L.G. 1983. *El Solutrense Vasco-Cantábrico: Una Nueva Perspectiva*, Monografías del Centro de Investigación y Museo de Altamira 10. Madrid: Ministerio de Cultura.

Straus, L.G., and G.A. Clark, eds. 1986a. *La Riera Cave: Stone age hunter-gatherer adaptations in Northern Spain*, Anthropological research papers 36. Tempe: Arizona State University.

Straus, L.G., and G.A. Clark. 1986b. La Riera: Archaeological remains–level content and characteristics. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 75–188. Tempe: Arizona State University.

Straus, L.G., and G.A. Clark. 1986c. Synthesis and conclusions–Part II: The La Riera excavation, paleoenvironments and cultural sequence in perspective. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 367–384. Tempe: Arizona State University.

Straus, L.G., G.A. Clark, J. Ordaz, L. Suarez, and R. Esbert. 1986. Patterns of lithic raw material variation at La Riera. In *La Riera Cave*, ed. L.G. Straus and G.A. Clark, 189–208. Tempe: Arizona State University.

Vega del Sella, Conde De La. 1916. *Paleolítico de Cueto de la Mina (Memoria 13)*. Madrid: Comisión de Investigaciones Paleontológicas y Prehistóricas.

Vega del Sella, Conde De La 1930. *Las Cuevas de La Riera y Balmori (Asturias)* (Memoria 38). Comisión de Investigaciones Paleontológicas y Prehistóricas.

La Sena

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Introduction

The La Sena Mammoth Site is in southwest Nebraska, on the North side of the Medicine Creek Reservoir. Bureau of Reclamation archaeologists Bob Blasing and Brad Coutant discovered the site in 1987 during a routine shoreline survey (Holen 2008, 1). The La Sena site is situated in a high loess-capped terrace (Holen 2008, 1) approximately 200 ft from the former channel of Medicine Creek. The Medicine Creek Reservoir was constructed in the early 1950s and has since caused an estimated 30 m of cut bank to erode since its construction (Holen 2008, 1). Photo 1.1 below shows the La Sena site area post excavation in 2012 when reservoir water levels had dropped below the base of the berm. I carried out field work and collections studies at the La Sena site in 2011 and 2012. Much of the information contained here is based on my experiences at the La Sena site, and my study of the La Sena site publications and artifacts, for my 2015 dissertation (Steeves 2015) (Fig. 1).

La Sena, Fig. 1 La Sena site. (Photo credit Steeves)

La Sena, Table 1 La Sena excavations

Date	PI	Artifacts	Published
1987 Collection of eroded materials	Brad Coutant	Mammoth bone	US Bureau of Reclamation
	Bob Blasing	Lithic material	
1988 Collection of eroded materials. Coring 4 m north of bluff face, cut bank profiling	Steve Holen	Mammoth bone	
	David May	Lithic flakes	
1989 Excavation	Steve Holen	Spirally fractured mammoth bone	Plains Anth Conference 1989
	Bob Blasing		
	Dave May	Mammoth bone collagen	SAA 1990
	Jim Winfrey		
	Michael Fosha		
1990 Excavation interdisciplinary team	Steve Holen	Spirally fractured mammoth limb bones	
	Adrien Hannus		
	Dave May		
	Steve Bozarth		
	Cara Burres		
	Bob Blassing		
1991 Excavation	Steve Holen		
1993	Steve Holen	Spirally fractured mammoth bones	Quaternary Research 1993
	Dave May		
1994 Excavation	Steve Holen		
Salvage of eroding materials	Dan Watson		
UON, OSU			
1996 Excavation and collection, hair nets worn by all crew, and sterile excavation precautions taken	Steve Holen	Hair samples	Holen and Bonnichsen (1996)
	Robson Bonnichsen	Spirally fractured mammoth limb bones	
1997	Steve Holen	Spirally fractured mammoth limb bones	Holen and May
			Medicine Creek Conference 1997
1998	Steve Holen	Spirally fractured mammoth bones	

Compiled by Steeves from Holen (2008)

The La Sena deposition setting offers a glimpse of the past through spatial relationships among specimens (Holen 2008). The site deposition is discussed by Holen (2008) as unique in that the specimens are derived from non-fluvial sources (Burres-Jones 2008, 76). The La Sena site is found on a very weakly developed B horizon in the Peoria Loess that caps alluvial deposits of the Gilman Canyon Formation. The La Sena site has benefited from an interdisciplinary multiyear study directed by Dr. Steve Holen. Excavation at La Sena took place over 11 years, 1987–1998. The analysis of the La Sena site was supported by archaeological excavations and dating, geoarchaeological studies, micro faunal and paleoecological analyses, paleoenvironmental reconstruction based on opal phytolith analysis, and a study of fossil land snails as indicators of paleoclimate (Steeves 2015). The following Table 1 lists the excavations at the La Sena site from 1987 to 1998.

Definition

On a regional scale, there are numerous Pleistocene mammoth sites recorded within the Great Plains area. Pleistocene sites close to La Sena include but are not limited to those in Table 2 (Fig. 2).

La Sena, Table 2 Selection of La Sena Sites/ Great Plains not a complete list

Site	Dates rcybp	Artifacts	PI
Lovewell I, KS	18,250 ± 90	Spirally fractured mammoth bone	Holen (1996, 2007)
	20,430		
Lovewell II, KS	19,530	Spirally fractured mammoth bone patterned distribution of bone	Holen (1996, 2007)
	18,250		
Dutton site, CO	16,330 ± 320	Mammoth bone in situ below Clovis tool level, stone tools flakes, impact points, bone flaking	Stanford (1979)
	11,710 ± 150		
La Sena, NE	18,440 ± 145	Spirally fractured mammoth bone impact points, bone flakes	Holen (2008)
		Differential breakage	
		Patterned distribution of bone	
Shaffert, NE	16,500 ± 300	Mammoth bone, green fractured, impact points	Holen and May (2002)
Jensen, NE	14,830 ± 220	Mammoth bone impact points, bone flakes, differential breakage	Holen (1995)
	13,880 ± 90		
Selby, CO	16,630 ± 320	Mammoth bone	
		Horse, camel, bison, mammoth, impact points, bone flaking	Stanford (1979)
Hamburger site, NE	16,480 ± 60	Spirally fractured bone	Holen (2007)
		Impact notches	
		Differential breakage	
Lamb Springs, CO	11,735	Mammoth bone, impacted and flaked limb bone and stone artifacts	Stanford and Fisher (1992)
(5D*A*83)	26,000		
	15,000		
	21,850		
Dent Site, CO	11,200	Mammoth (12, mammoths), Clovis tools	Wormington (1957)
			Brunswig and Fisher (1993)

Compiled by Steeves

La Sena, Fig. 2 La Sena Regional Area, not a complete list or map of all regional sites (Steeves 2014). *1* La Sena: *2* Shaffert: *3* Jensen: *4* Hamburger; *5* Lovewell I Lovewell II: *6* Selby: *7* Dutton: *8* Lamb Springs: *9* Dent. Map Credit ((Steeves 2015)

The time of deposition of the mammoth remains at the La Sena site was approximately the same time as the maximum extension of the Last Glacial Maximum (LGM). During this time, the James Lobe extended just south of present-day Yankton, South Dakota (Wright et al. 1973, 160), or approximately 330 miles North of the La Sena site (Pierce 2008, 146). When the La Sena Mammoth

died, the environment would have included a cool grassland steep, river and creek areas would have supported a riverine deciduous forest and larger valleys spruce and pine forests (Holen 2008, 160).

The artifacts at the La Sena site include spirally fractured limb bones of an adult Columbian mammoth (*Mammuthus columbi*) (Holen 2006, 30). The disarticulated skeletal remains were scattered over an area of 20 × 10 m. The archaeologists found no stone tools in good contact with the bone, nor butchering marks on the bones (Holen 2006, 31). The spiral fracture of the limb bone indicated that the bones were broken relatively recently after the animal's death (Holen 2008 3) and the femur segments "exhibited impact points" (Holen 2008, 3) an indication that "humans were responsible for the bone breakage" (Holen 2008 3). The following Figs. 3 and 4 show in situ *Mammuthus* femoral segments found in undisturbed Pleistocene soils at the La Sena site during the 1989 excavation (Steeves 2015).

Dating and stratigraphic profiles were recorded throughout the 11 years of the excavation and survey of the La Sena site. The age of the mammoth bone bed level was established through radio carbon dating of the mammoth and of soil/sediment humates within, above and below the deposits to date depositional and erosional events (Holen 2006, 42).

In addition to general loess and alluvial stratigraphy at the La Sena site, the stratigraphy of the loess deposits on which the mammoth bone rest

La Sena, Fig. 3 Large femoral segments (Photo credit Steve Holen)

La Sena, Fig. 4 Lateral segment of femur (Photo credit Steve Holen)

La Sena, Table 3 La Sena humates dating profile

Depth below datum (m)	Depth below surface (m)	Excavation unit(s)	Lab. no.	Material dated	Delta ^{13}C ($^{0}/_{00}$)	Conventional ^{14}C age (year B.P.)
0.13–0.23	0.50–0.60	N5	Tx-7005	Humates	−15.5	2,440 ± 70
1.36–1.41	2.50–2.55	Z4 and Y4	Tx-8182a	Humates	−21.8	17,930 ± 180
1.36–1.41	2.50–2.55	Z4 and Y4	Tx-8182b	Humins	−22.6	18,280 ± 200
3.45–3.50	3.70–3.75	K1	Tx-7006	Humates	−25.7	18,860 ± 360
3.68–3.78	3.76–3.86	I4	Tx-6708	Humates	−21.4	16,730 ± 490
6.42–6.52	6.79–6.89	N1	Tx-6707	Humates	−21.8	20,870 ± 1280
8.18–8.28	8.55–8.65	N1	Tx-6709	Humates	−19.2	24,830 ± 1340
8.90–9.00	9.22–9.32	L1	Tx-7370	Humates	−18.6	27,640 ± 580

Compiled by Steeves from Holen (2008)

La Sena, Table 4 La Sena site soil formations

La Sena site land-forming events	
28,000–25,000	Loamy alluvium deposited on the flood plain of Medicine Creek
25,000–21,000	Fine-grained alluvium and loess accumulated
21,000	Deposition of Peorian loess begins in Medicine Creek valley
20,870–17,930	A little more than 5 m of Peorian loess accumulates
Up to 11,000	Deposition of Peorian loess at La Sena site continued
10,500–5000	Alluvium valley fill 2 accumulated in the Medicine Creek valley

Compiled by Steeves from Holen (2008)

> and in which they are buried was studied in detail. (Holen 2008, 43)

The La Sena site soil stratigraphy and radio carbon dating "may be used to reconstruct land-forming events at the site" (Holen 2008, 45) (Tables 3 and 4).

Archaeologists are often faced with the laborious task of defining faunal collections and having to decide whether collections of animal bones are the result of natural, carnivore, or human activity. In deciphering human accumulations of animal bones from mammalian accumulations of animal bones, archaeologists have considered numerous points regarding agents of bone breakage. Behrensymer (1991) argued that bone breakage in an assemblage "can reveal information regarding the relative time of breakage, number of episodes of modification and the agent responsible." Bone that is broken when it is green or slightly fresh exhibits spiral fractures "that follow the course of collagen fibers, sawtooth fractures or flaking" (Shipman 1981). Bone that is dry or weathered "tend to fracture perpendicular to the long axis of the bone and collagen fibers producing columnar step-fractures with rectangular edges" (Burres-Jones 2008, 79). Holen and Holen (2014) listed the following traits in Table 5 for human-induced bone breakage (Fig. 5).

Key Issues/Current Debates/Future Directions/Examples

Holen (2006, 39) argued that "the presence of spirally fractured mammoth limb bone, dynamic loading points, and bone flaking from in situ deposits at both La Sena and Lovewell mammoth sites, could be representative of human modification of mammoth bone." Proboscidean bone modified by humans as a resource for tools and/or marrow is known from the archaeological record of the middle Pleistocene of the Eastern Hemisphere in the area now known as Europe (Biddittu et al. 1979, 22) and Siberia (Morlan 2003). In North America, pre-13,200 cal BP communities also utilized proboscidean bone to manufacture bifacial tools, for shafts, projectile points, and shaft wrenches (Johnson 1985, 201). The procurement of bone for tool manufacture would require

La Sena, Table 5 Holen and Holen (2014). Human-induced bone breakage

Definitions of human-induced bone modifications	(Holen 2013,433)
Impact notches	Semicircular or arcuate indentations on the fracture edge or a long bone produced by percussion
Spiral fractures	Tensile failures along a helical path produced by breaking at oblique angles to the longitudinal axis of the bone
Bone flakes	Debitage produced by bone percussion that have features characteristic of lithic flakes produced by human agency
Flake scars	Patterned indentations on bone surfaces indicating flakes have been removed
Patterned distributions of bone	Human induced arrangements of skeletal elements
Preferential breakage	The intentional breakage of thick cortical limb bones while leaving lighter bones unbroken
Modified bone tools	Skeletal evidence with evidence of modification or use wear
Chipped stone tools	Manufactured lithic artifacts exhibiting multiple flake scars
Anvils or hammer stone	Cobbles associated with bone assemblages interpreted as precursors or anvils
Lithic flakes	Utilized or waste flakes

Compiled by Steeves (2013)

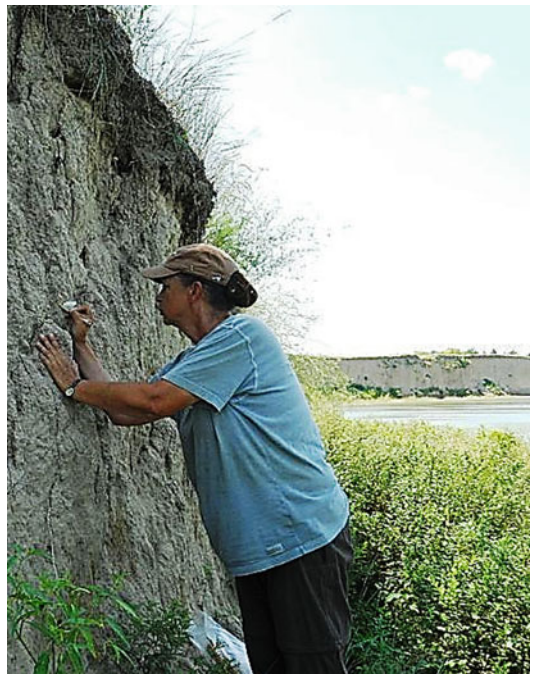

La Sena, Fig. 5 Paulette Steeves La Sena collection of fragmented bone extruding from adjacent cut bank area. (Photo Credit. Holen 2011)

the reduction of mammoth limb bone into large flakes or cores which would require striking them with a hammer stone (Holen 2006, 40). The taphonomic studies from La Sena were compared with "naturally induced fracture patterns on modern elephant bone" (Holen 2006, 40). Holen argues that both "carnivore gnawing and trampling can be eliminated as factors in mammoth limb bone fracturing and flaking at La Sena and Lovewell based on this evidence" (Holen 2006, 40). Numerous North American archaeologists have observed mammoth limb bone reduction and have argued that human action creates spirally fractured bone and resulting flaked bone (Johnson 1985; Morlan 1980).

Haynes and Krasinski (2010) stated that arguments for human breakage of proboscidean bone have not been "perfectly supported" (Haynes and Krasinski 2010, 181). They further argued that modified mammoth remains in the Americas "do not indicate a Pre-Clovis human presence" (Haynes and Krasinski 2010, 181). However, throughout the article, Haynes and Krasinski repeatedly refer to the implications for Pre-Clovis sites as their focus on rejecting humanly induced bone technologies. The author's offer no citation or reference to support some of their statements such as "crania 'may' be picked up by curious elephants and broken" (Haynes and Krasinski 2010, 185); "A single elephants foot placed upon a bone 'may' create one mark" (Haynes and Krasinski 2010, 181). The authors also suggest that in replicative experiments, impact notches and hammer stone marks should be visible. The authors state that the "fossils do not possess these marks" (Haynes and Krasinski

2010, 197), but they do not identify which fossils they are referring to. In critiquing the La Sena and Lovewell sites fossil mammoth bone collection, Haynes and Krasinski (2010, 181) state that the mammoth remains do not have visible marks from anvils or hammer stone, yet hammer stone and impact marks are recorded and photographed on mammoth limb bone from both sites (Steeves 2015).

There has not been an overall comparative analysis or an overall report on all mammoth bone breakage at mammoth fossil sites in the Americas; however, Haynes and Krasinski (2010) state that "most if not all the modifications on North American Pre-Clovis mammoth bones can be more parsimoniously attributed to non-human Taphonomic processes" (no citation given by authors). To back up this statement with scientific data would require an extensive study of all North American sites which contain fractured mammoth bone. However, as far as I know, such a study has not been published. Therefore, Haynes and Krasinski's argument failed to support their position (Steeves 2015).

There are numerous oral traditions relating to the Great Plains area which include discussion of megafauna and extinct species. The Pawnee in 1832 numbered between 10,000 and 20,000 people. Forty-two years later in 1874, their numbers had dropped to only 2,000 and after removal to Oklahoma in 1902 their numbers dropped to 500 (Mayor 2005, 169). In 1902, James R. Murie whose Pawnee name was Young Eagle began to collect stories for George Dorsey of the Field Museum of Chicago (Mayor 2005, 169). Young Eagle interviewed Young Bull (1835–1916), the last of the fossil bone doctors (Mayor 2005, 169).

> Dimly illuminated and suspended over the altar area was an old sacred bundle, about three feet long, wrapped in red ocher stained Buffalo hide. (Mayor 2005, 172)

The sacred bundle had been saved by a 5-year-old girl named Sadie, after a Pawnee hunting party of 350 people was attacked by a group of 1,000 Sioux. Sadie's father had lashed the bundle to her back as he sent her off; she was one of only a few Pawnee people who survived the attack that day (Mayor 2005, 172). The bundle was later donated by Sadie's descendants to the Pawnee Village Museum in Republican Kansas (Mayor 2005, 172). In 1855, Young Bull saw the large white carved bone on the altar, and the pictures that been carved in it (Mayor 2005, 173). The old medicine man told Young Bull the following story in 1855 (Mayor 2005, 172).

> Many years ago, when our people lived on the Republican River, we used to go hunting in the western part of what is now Kansas and Nebraska. Upon our journey, we stopped at a place where there was a big mound known as the Swimming Mound" That day one man climbed the hill and walked into the timber. "There he wandered until he became tired and lay down upon this high mound."
>
> He dreamed that a giant person was standing near him. "My son, I have come to you. Many of my people were drowned here at this place, and here our bones rest.... The people make light of our bones when they find them. I will now tell you that when you find some of their old bones they have curative powers. On the south side of the hill you will find a bone.... one of my thighs. Take it, wrap it up, and my spirit will be with that bone. I will be with you and will give you my great power". The Pawnee hunter awoke and went around the hill and found what looked like a long white rock sticking out of the cliff. He dug out the object and recognized it as the thighbone, of a giant turned to stone.
>
> "The man took the giant bone home with him and placed it in a buffalo robe and hung it up in his tipi." That winter he took the heavy fossil back to his village and placed it in his earth lodge. Over the following years, the giant reappeared in his dreams and taught him the rituals and songs about the stone bone. At last, the keeper of the fossil invited several other medicine men to learn the new healing ceremony. The bone was later wrapped in calico cloth inside a buffalo-calf hide and kept in the doctor's lodge. Only the initiates of the lodge knew that the large white stone was really a giant bone. Inscribed on the petrified femur were carvings of a woman and a man, a human skull, a bow and arrows, and stars and a moon. A sunburst design was carved around the joint. The original fossil finder became a great warrior and medicine man. He has the strength of a giant on the warpath; he could kill a buffalo with one arrow and carry all the meat home on his back. In his doctoring he "took dust from the bone" to make a tea that cured the sick. When small pox arrived on the Great Plains, recounted Young Bull, and the bone helped the Pawnees. Although the people never realized the true identity of the "wonderful stone" anyone who touched the giant bone

> did not fall sick, and those who took-sick and drank the fossil bone tea survived.
>
> As a little boy in about 1840 Young Bull heard from his grandmother about giant beings who had drowned long ago, "before we lived upon this earth." These "wonderful human beings" lived "where the swimming mound is in Kansas." There a great flood occurred, "so deep it killed these wonderful beings." She told Young Bull that the Pawnees found many giant bones "upon the sides of the hill of the swimming mound (Mayor 2005, 173–175).

We do not know for how long before Young Bull heard this story the Pawnee lived or hunted in the area close to the La Sena site. However, we do know from this story that the Pawnee were knowledgeable of megafauna fossils and histories of flooding in the area. The La Sena site is just a few miles north east of where the Pawnee camped during their last buffalo hunt. This is where the Sioux attacked them, a battle mentioned in oral traditions as the one from which Sadie fled on horseback with the sacred medicine bundle. The La Sena site along Medicine Creek is in an area of numerous sites which date into recent times, an area of power, at the closest point between two larger rivers, the Platte to the north and the Republican to the south (Steeves 2015).

Medicine Creek is fed from a spring approximately 50 miles to the northwest of the reservoir and drains south into the Republican River. Ancient landscapes are visible in stratigraphic profiles of eroded cut banks; the land was a little gentler with lower rises from the water's edge during the Pleistocene. Currently receding water levels expose the stumps of trees cut in the 1950s when the dam was built. Driving across the flat barren plains of Nebraska, it is hard to imagine that such a place exists, hidden over the slight crest of an upland terrace, in a shallow ravine just below the earth's surface. During the occupation of La Sena, this would most likely have been a very good place to live. The ravine was deep-enough to provide protection from the wind, fresh water was available from the creek, and abundant game and plant food could be harvested close to the site (Steeves 2015).

Spending time on the land at La Sena and creating a relationship with this place, offering tobacco and prayers to all my relations, brings a clarity of mind. I realize that this was a very good place for humans and for their four-legged relations. From the archaeological data and from oral traditions I am given the vision of a vibrant place where Mammoth and others lived well on the land. Oral traditions give an accounting of the numerous megafauna fossils, medicine bones that were found along Medicine Creek for many years prior to the invasion of Europeans. Archaeological records also provide an accounting of mammoths in this area over 18,000 years ago. The La Sena site is just one of many similar sites in the area, and thus one in a regional area of mammoth sites that date to the same time frames within a few thousand years. The area of southern Nebraska and central and northern Kansas and eastern Colorado have not yet given up all their archaeological secrets. There are most likely other sites to be found and the area would be a rich place for researchers to continue archaeological investigations of Pre-Clovis sites. Mammoths were abundant on the Great Plains during the Pleistocene, where grazing was lush and water sources plentiful. Where resources for sustenance and tools and daily necessities are found, there so do we often find humans. Arguments against earlier than 12,000 years before present archaeology sites have been the norm in American archaeology for over 80 years. However, the multi-year study at the La Sena site in southwestern Nebraska has produced a solid record of human interaction with mammoth bones and is dated to 18,440 ± 145 rcybp.

Cross-References

► North America (USA): Historical Archaeology
► Oral Tradition: Ancient Greece

References

Behrensmeyer, A.K. 1991. *Taphonomy: Releasing the data locked in the fossil record. Geobiology.* New York: Plenum Press. 9: 291–335.

Biddittu, I., P.F. Cassoli, F. Radicati di Brozolo, A.G. Segre, E. Segre Naldini, and I. Villa. 1979. Anagni, a K-Ar dated lower and middle Pleistocene

site, central Italy: Preliminary report. *Quaternaria. Storia Naturale e Culturale del Quaternario Roma* 21: 53–71.

Brunswig, R.H., Jr., and D.C. Fisher. 1993. Research on the Dent mammoth site. *Current Research in the Pleistocene* 10: 63–65.

Burres-Jones, Cara, L. 2008. Paleoecology and microtaphony of the La Sena Mammoth Site, a micro faunal analysis. In *The La Sena Mammoth Site, 25FT177. volume 1: History of investigations, paleoecology and stratigraphy. Medicine Creek Reservoir, Frontier County, Nebraska*, ed. Steve Holen. Denver Museum of Nature & Science Technical Report 2008–09. Denver.

Haynes, C.V., and Kathryn Krasinski. 2010. Taphonomic fieldwork in Southern Africa and its application in studies of the earliest peopling of North America. *Journal of Taphonomy* 8 (203): 181–202.

Holen, S. 1996. The Lovewell mammoth, A late Wisconsonian site in north-central Kansas. *Current Research on the Pleistocene* 13: 69–70.

Holen, S.R. 2006. Taphonomy of two last glacial maximum mammoth sites in the central Great Plains of North America: A preliminary report on La Sena and Lovewell. *Quaternary International* 142: 30–43.

Holen, S. 2007. *Excavations at the Hamburger Mammoth site, 25FT44, Medicine Creek Reservoir, Frontier County, Nebraska*. Denver, CO: Denver Museum of Nature and Science Technical Report 2007–07.

Holen, Steve. R. 2008. *The La Sena Mammoth site, 25FT177. volume 1: History of investigations, paleoecology and stratigraphy. Medicine Creek Reservoir, Frontier County, Nebraska.* Denver Museum of Nature & Science Technical Report: 2008–09.

Holen, S., and R. Bonnichsen. 1996. Excavations at the La Sena Mammoth Site: The Search for Late Pleistocene Hair. Iowa City: Plains Anthropological Conference.

Holen, S.R., and K. Holen. 2014. The mammoth steepe hypothesis: The Middle Wisconsin (oxygen isotope stage 3). *Peopling of North America*. Paleoamerican Odyssey, 429–444. College Station: Texas A&M University Press.

Holen, S.R., and D.W. May. 2002. The La Sena and Shaffert Mammoth Sites: history of investigations, 1987–1998. In *Medicine creek: Seventy years of archaeological research*, ed. D. Roper, 20–36. Tuscaloosa: The University of Alabama Press.

Johnson, E. 1985. Current developments in bone technology. *Advances in Archaeological Method and Theory* 8: 157–235.

Mayor, A. 2005. *Fossil legends of the first Americans*. Princeton: Princeton University Press.

Morlan, R.E. 1980. *Taphonomy and archaeology in the Upper Pleistocene of the northern Yukon Territory: A glimpse of the peopling of the New World*. Musée National de l'Homme. Collection Mercure. Commission Archéologique du Canada. Publications d'Archéologie. Dossier Ottawa, (94), 1–380.

Morlan, R.E. 2003. Current perspectives on the Pleistocene archaeology of eastern Beringa. *Quaternary Research* 60: 123–132.

Pierce, H.G. 2008. Climate implication of land snail's associated with a Late Wisconsonian fossil mammoth in south central Nebraska. In *The La Sena Mammoth site, 25FT177. volume 1: History of investigations, paleoecology and stratigraphy. Medicine Creek Reservoir, Frontier County, Nebraska.* Denver Museum of Nature & Science Technical Report 2008–09. Denver.

Shipman, P. 1981. Life history of a fossil and introduction to taphonomy and paleoecology.

Stanford, D. 1979. The Selby and Dutton Sites, Evidence for a possible Pre-Clovis occupation of the high Plains. In *Pre Llano cultures of the Americas, paradoxes and possibilities*, ed. R.I. Humphrey and D. Stanford. Washington, DC: Anthropological Society of Washington.

Stanford, D.J., and Fisher, J. W. 1992. Final report: Analysis of the Lamb Spring archaeological site. Smithsonian Institution Scholarly Studies Program. National Museum of National History, Washington, DC.

Steeves, P. 2012. *Photo of the La Sena site, post excavation*. Unpublished.

Steeves, P.F. 2015. *Decolonizing indigenous histories, Pleistocene archaeology sites of the Western Hemisphere*. Binghamton: State University of New York.

Wormington, H.M. 1957. *Ancient Man in North America*. Denver: Denver Museum of Natural History.

Wright, H.E., Jr. 1973. Tunnel valleys, glacial surges, and subglacial hydrology of the Superior Lobe, Minnesota. *Geological Society of America Memoir* 136: 251–276.

Wright, et al. 1973. James Lobe extension LGM (cited in) Holen, Steve. R. (2008). In *The La Sena Mammoth site, 25FT177. volume 1: History of investigations, paleoecology and stratigraphy. Medicine Creek Reservoir, Frontier County, Nebraska.* Denver Museum of Nature & Science Technical Report: 2008–09. Denver, CO.

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Labor Archaeology

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Introduction

The rise of industry transformed labor and impacted landscapes, gender roles, and living conditions. Today, in most of the Americas and across Europe, the evidence of these industrial signatures is found in the form of rusting factories, abandoned buildings, deserted mines, scarred landscapes, and decaying cities and towns.

These are all reminders of an economy that was once dominated by industrial capitalism for more than a century. While most of the factory production has moved to Asia, many communities in the Americas and in Europe debate about how to use and interpret these abandoned industrial properties. Archaeologists are involved in documenting the industrial past, and this work ranges from recording the engineering and technological feats to studying labor and working-class conditions.

Definition

Labor archaeology is about examining issues of power, resistance, and the affects of industrialization from the perspective of the laboring classes.

Historical Background

The archaeology of the industrial era has for a long time and continues to document and popularize the technological side of industrial archaeology. A major part of industrial archaeology has explained phenomena related to technological development, the economy of industry, and the industrial revolution. In many of these cases, labor is not mentioned, or it serves as a secondary thought when discussing industrial technology and landscapes at these sites (Shackel 2004).

The study of labor from an archaeological perspective has been influenced by the development of a "new" social history and the "'new' labor history" in the 1960s and 1970s, where the emphasis of study is the worker. Labor history was heightened with E. P. Thompson's (1966) groundbreaking work – *The Making of the English Working Class*. The new labor history – from the 1960s onward – focuses on the questions of class consciousness, providing a voice for the people who have been neglected, oppressed, and considered outcasts (Dubofsky 2000: 21). Thompson (1966) wrote that he wants to rescue the worker from the enormous condescension of prosperity. Included in this new labor history is the emphasis on the study of ethnicity, shop-floor history, the relationship between the work world and family life, and class as a cultural, rather than economic, construction (Brody 1979). Historical and anthropological perspectives on labor help to define issues related to the impact of changing technology on workers and their families.

Key Issues/Current Debates

Labor Archaeology: On the Domestic Front

One way to humanize working-class households is to examine workers' housing and examine how industry affected the daily lives of workers and their families. For instance, during the early industrial era, many companies provided housing for their workers. Industrialists dictated working conditions and processes and they controlled workers' behavior away from the factory by creating housing regulations. The archaeology at Lowell, Massachusetts, stands as an important study that shows how this paternalistic control operated. The early-nineteenth-century industrial town contained rows of similar-looking boardinghouses that stood close to the factory. All of the boardinghouse rooms were the same size, thereby creating an atmosphere of egalitarianism (Mrozowski et al. 1996). The control over behavior and the standardization of the built environment created individuals who were part of the larger industrial complex. The workers needed to conform to a standardized behavior in the factory as well as in the boardinghouse. While necessary for the operations of the factory system, they also became replaceable.

Not all industries operated in a fashion to create an environment that reinforced standardized behavior. For instance, at Harpers Ferry, a government-operated town that developed from the last decade of the eighteenth century, workers built their own houses and their families expressed their own personal identity within their individual homes. The domestic landscape of Harpers Ferry appeared haphazardly built, unlike the standardized boardinghouses found in the industrial Northeast. The archaeological record shows that armory workers occasionally practiced their craft at home until about 1841,

when the military took over control of the facility and made all workers abide by a standard factory discipline. After this date armory work was no longer performed in a domestic context and the federal government began to build standardized housing for its workers (Shackel 1996).

There is also an example whereby working-class families showed displeasure with the new work conditions on the domestic front. While many workers in the USA responded to industrialization by participating in a new consumer culture – a new status symbol – the armory workers' families at Harpers Ferry did not. A domestic assemblage dating to the military control of the armory contains material culture that was unfashionable for the time. It would be easy to use an economic model to say that with the industrialization of the factory, these workers lost considerable purchasing power. The households acquired out-of-date material culture as a type of silent protest. They acquired goods that were fashionable when artisans had control over their means of production (Shackel 1996: 129–43).

Community, Memory, and Politics and Power

There are costs as well as the benefits with the development of the new industrial revolution, and we should be cautious about not being too celebratory over industrial technological achievements (Hindle and Lubar 1988). Labor historian David Brody (1989: 7-18) brings to our attention that scholars studying labor need to look more closely at issues related to politics and power. It is clear that tensions between labor and capital continue to exist and these tensions play out in the everyday politics of commemoration of the working class. For instance, archaeologists, conservationists, and environmentalist are fighting to protect the memory of labor history at Blair Mountain, located in the southwestern portion of Virginia. The battle of Blair Mountain is the largest armed labor insurrection in US history. In 1921, approximately 10,000 coal miners participated in a battle against law enforcement officers and Baldwin-Felts Detectives, resulting in the intervention of the US military to suppress the uprising. The archaeology performed at the battle site located the areas of conflict on the landscape, and the information enabled archaeologists to list the place on the National Register of Historic Places. However, politicians who favor mountaintop removal successfully delisted the site from the National Register, and its delisting remains controversial. The Massey Energy Company is now planning to conduct mountaintop removal operations on Blair Mountain and destroy the archaeological signature that enabled the original listing on the National Register because of the event having national significance (Nida and Adkins 2011). It is clear that preservationists and the coal company are at odds on how to treat this landscape that is important to the labor movement. The removal of the battle field is an attempt to remove this episode of labor strife from the national public memory.

The archaeology in the Pullman community, on the south side of Chicago, is a story about how a community has embraced its working-class history and has been successful in promoting this history. Pullman was developed in the late nineteenth century to support workers and their families who were involved in the construction of rail cars on the south side of Chicago. It was dubbed "The World's Most Perfect Town" for 14 years straight, although this utopian image came to a crashing halt during the 1894 Pullman Strike. Wages were cut by Pullman during the economic depression, while he kept rents on the company-owned houses steady. The strike devastated the model community and the paternalistic relationship between Pullman and his worker deteriorated. After the Pullman Company closed in the 1950s, community activists and preservationists came together to save their community from urban renewal projects. Archaeology is helping to revive the community's working-class history, which is now found in visitor center films, tour presentations, docent training guides, and museum exhibits (Baxter and Bullen 2011).

The Hampden Community Archaeology Project is a public archaeology project in a former textile mill neighborhood in Baltimore, Maryland. Since the early 1990s, the area has been gentrifying thereby creating two distinct communities – the older, working class and a newer, upper middle class. The archaeology program created a

critical public dialog with local citizens, which created an awareness of the town's past and its relation to issues of labor, class consciousness, and community identity as the community deals with concerns about gentrification and the consequent dislocation of longtime residents (Gadsby and Chidester 2007).

Finding Workers' Resistance

The struggle for control over the work process occurs in many industries and workers continually fought to control the work process. Workers protested by work slowdowns, strikes, working on their own projects in the factory, and theft (Scott 1990; Bruno 1998: 5, 11–9). The imposition of rules, regulations, and industrial discipline often met various forms of resistance. At the John Russell Cutlery Company on the Green River near Greenfield, Massachusetts, archaeologists discovered a large quantity of inferior or imperfectly manufactured parts related to interchangeable manufacturing near the former cutting room and trip hammer shop. While it would be easy to conclude that these artifacts form a typical industrial waste pile, archaeologists looked at the larger context of nineteenth-century industrial labor relations and they concluded that this assemblage is a reflection of workers' displeasure with the new industrial work system. The higher than usual proportion of wasted materials is an indication that workers intentionally damaged goods because of their dissatisfaction with the work process (Nassaney and Abel 1993).

Another story of workers' sabotage is associated with the bottling works associated with the Harpers Ferry brewery. Archaeologists found more than 100 empty beer bottles stashed behind the wall lathing in the former bottling room and another 1,000 beer bottles in the basement of the bottling works' elevator shaft. The poor working conditions, long hours, and the higher speeding of machinery resulted in worker dissatisfaction. The archaeological evidence suggests that workers drank the owners' profits and concealed their subversive behavior by disposing the otherwise reuseable bottles in walls and dropped others down the elevator shaft. The brewery was also burned on 1897, 1906, and 1909, dates that coincide with labor unrest in the brewery industry (Shackel 2000: 104–13).

Striking is a significant form of resistance and the archaeology at the Ludlow Tent Colony Site in Colorado focuses on this form of resistance. The Colorado Coal strike ignited a yearlong cycle of violence and retribution beginning in 1913 and culminating when the militia charged the tent colony and set fire to the tents, killing 2 women and 11 children. The UMWA ran out of funds to support the workers and the strike was soon over. The workers received few concessions for their struggle. The archaeology examines the formation of temporary communities, protest labor movements, and government and military intervention. With the support of the United Mine Workers of America, the archaeology is raising the visibility of this bloody episode in labor relations and it is helping to make this incident part of the broader public memory (Walker 2003; Saitta 2007; Larkin and McGuire 2009).

In 2010 an archaeological survey was conducted at the site of a labor massacre in Lattimer, Pennsylvania. The massacre was the culmination of a monthlong strike by immigrant coal miners from eastern and southern Europe who sought better wages and safer working conditions. On September 10, 1897, a group of 400 miners marched to close all of the mines owned by the Pardee Company. On their way to Lattimer, a scuffle broke out between the sheriff and a few of the workers. The sheriff's posse then opened fire on the unarmed men. As the striking men ran from the scene, the posse continued to shoot them down. The majority of the 25 miners who died were killed by gunshot wounds to the back. This archaeology project began with a metal detector survey of the massacre site itself. Locating bullets and shell casings related to the massacre provides two things. First, the evidence furnishes information to a story that had various witness with different accounts, depending if they were sympathetic to the strikers or the sheriff. While the court transcripts are missing, the material evidence has brought attention again to the events of the massacre. Importantly, this archaeology is connecting the community to a painful past with the goal of creating some type of

reconciliation to heal the divides that have existed in the community for over a century (Shackel et al. 2011).

International Perspectives

The protection and commemoration of these industrial sites occur on the local, national, and international levels. For instance, UNESCO's World Heritage mission helps to protect significant cultural sites and encourage the nomination of sites and the development of management plans. The organization has been instrumental in recognizing important places related to work and industry throughout the world. Today there are over 800 World Heritage Sites and 33 are related to the heritage of industry. England has the more industrial-related sites listed as World Heritage Sites than any other country. The Derwent Valley, which includes 6 communities along a stretch of 15 miles, is known as the "cradle of the new factory system." UNESCO recognizes the area for the well-preserved factory buildings. It is also the place where the Arkwright water frame was first introduced. The machinery aided in the deskilling of the workforce. It allowed for the continuous spinning process and it could be operated by machine tenders rather than skilled operatives. The invention revolutionized the British economy and changed the conditions of labor. As a result, factory owners created housing for their workers and exerted a form of corporate paternalism. By the early to mid-nineteenth century, planned villages began to be constructed by the mill owners, like the UNESCO World Heritage Site – Saltaire, England. The village was developed in 1853 with mills and workers' housing built in a harmonious style of high architectural standards. Sir Titus Salt provided considerable recreation opportunities as well as a library, although he had strong paternalistic control over his workers. The town's urban plan survives intact (http://whc.unesco.org/sites/industrial.htm).

While European countries have the majority of UNESCO's industrial sites, they are also found in China, India, Bolivia, Brazil, and Mexico. None have been designated in North America. Many of these industrial sites are included on the UNESCO list because of engineering feats such as bridges, canals, irrigation systems, aqueducts, railways, mines, ironworks, and resource extraction. Many districts include the well-preserved domestic housing for workers such as the City of Potosi in Bolivia and the remarkably well-preserved example of the small-scale rural industrial settlements associated with pulp, paper, and board production at Verla Groundwood in Finland. Crespi d'Adda in Italy is an outstanding example of the nineteenth- and early-twentieth-century company towns built in Europe and North America by enlightened industrialists to meet the workers' needs. The city of Røros, Norway, is associated with the copper mining industry that developed in the seventeenth century and lasted until 1977. The city has about 80 wooden houses dating to the seventeenth century, most of them standing around courtyards, providing a medieval appearance in the town (http://whc.unesco.org/sites/industrial.htm).

While many of these sites mentioned above have been recognized as World Heritage Sites because of architecture and engineering feats, it is important to begin looking at places within the context of the new labor history. The inclusion of labor history at industrial sites can follow the development of other new radical traditions, such as the Civil Rights Movement, the feminist movement, and the American Indian Movement. The new labor history emphasizes workers and their families and it allows for the search for agency and resistance. Archaeologists working in industrial contexts can look at issues related to the impact of new innovations at the workplace and effects on the worker. The industrialization of the workplace not only affected work but also domestic lifestyles and health conditions. Studying workers and their families only humanizes the study of the industrial era, and it provides more in-depth understanding of laborers' work habits, their domestic life and interactions within the community, as well as their leisure activities. Labor archaeology is part of this tradition to humanize industrial labor and working-class life.

Future Directions

The study of industrial slavery is poorly documented in history as well as in archaeology. While there are documented cases of industrial slavery in the past, this phenomenon continues in many countries today, in developed as well as developing nations. Enslaving people to work in factories continues today, mainly because of the lack of labor laws and/or the enforcement of labor laws. There are about 27 million people in the world who are enslaved – in the sense that they are physically confined or restrained and forced to work. In the twenty-first century, slavery is far from over. In the United States, the Department of the State estimates that 20,000 people are illegally trafficked into the USA every year, and the total number of people enslaved in America is estimated at about 100,000 people, many who work in sweatshops. These workers are cut off from any support system and they live in fear of deportation (Shackel 2007). Perhaps an archaeology of industrial slavery can highlight this social injustice and make it part of the dialog to change working conditions among the working class.

Labor archaeology should examine the health conditions at industrial sites and towns. For instance, many mining sites endangered the health and life of workers. Work sites were often unstable, machinery often malfunctioned, pollution and harmful fumes contaminated the air, and workers often put in exhaustive work hours. Until about the mid-twentieth century, industrialists paid little attention to the impact that factories had on the surrounding environment until workers, scientists, and environmentalists brought these issues to the public's attention.

Archaeologists have demonstrated the effectiveness of using soil samples from the area in and around factories and dwellings to search for toxins to examine general health conditions. Privy samples at workplaces may reveal the presence of parasites and other toxins, indications of poor health and resistance to paternalism. Pollen and macrofloral samples may also supply some indication of the changing landscape and its relationship to changing ideals related to industrialization. The impact of industrial pollution has had a devastating impact on human populations and it is important that these issues are made part of the story of industry and labor (Shackel 2007).

Conclusion

There is a growing call by scholars to focus on issues related to labor. For instance, A. Bernard Knapp (1998: 2) wrote that it is important to recognize that technology in an industrial context must also take into consideration labor and understand how people could negotiate social, political, and economic relationships. Eleanor Casella and James Symonds (2005) also note that as archaeologists we should look at the larger implications of the industrial era and start thinking about people and how they worked and lived in industrial society.

Performing an archaeology that celebrates labor does not come easy. A labor archaeology will, most probably, unveil a history that has been buried all too long. Tensions exist between labor and capital regarding how to represent the past. However, community programs that focus on labor can also develop a form of reconciliation within and between communities. Initiatives to create an inclusive history are at times difficult, at best.

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Critical Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ Modern World: Historical Archaeology

References

Baxter, J.E., and A.H. Bullen. 2011. 'The world's most perfect town' reconsidered: Negotiating class, labour and heritage in the Pullman community of Chicago. In *Heritage, labour, and the working classes*, ed. L. Smith, P.A. Shackel, and G. Campbell, 249–265. London: Routledge.

Brody, D. 1979. The old labor history and the new. *Labor History* 20: 111–121.
Brody, D. 1989. Labor history, industrial relations, and the crisis of American labor. *Industrial and Labor Relations Review* 43: 5–18.
Bruno, R. 1998. Working, playing, and fighting for control: Steelworkers and shopfloor identity. *Labor Studies Journal* 23: 3–30.
Casella, E., and J. Symonds, eds. 2005. *Industrial archaeology: Future directions*. New York: Springer.
Dubofsky, M. 2000. *Hard work: The making of labor history*. Urbana: University of Illinois Press.
Gadsby, D.A., and R.C. Chidester. 2007. Hampden community archaeology project. *CRM: The Journal of Heritage Stewardship* 4: 57–59.
Hindle, B., and S. Lubar. 1988. *Engines of change: The American industrial revolution, 1790–1860*. Washington, DC: Smithsonian Institution Press.
Knapp, A.B.. 1998. Introduction. In *Social approaches to an industrial past: The archaeology and anthropology of mining*, ed. A.B.. Knapp, V.C. Pigott, and E.W. Herbert, 1–23. London: Routledge.
Larkin, K., and R.H. Mcguire, eds. 2009. *The archaeology of class war: The Colorado coalfield strike of 1913–1914*. Boulder: University Press of Colorado.
Mrozowski, S.A., G.H. Zeising, and M.C. Beaudry. 1996. *Living on the Boott: Historical archaeology at the Boott mills boarding houses, Lowell, Massachusetts*. Amherst: University of Massachusetts Press.
Nassaney, M.S., and M.R. Abel. 1993. The political and social contexts of cutlery production in the Connecticut valley. *Dialectical Anthropology* 18: 247–289.
Nida, B., and M.J. Adkins. 2011. The social and environmental upheaval of Blair Mountain: A working class struggle for unionization and historic preservation. In *Heritage, labour, and the working classes*, ed. L. Smith, P.A. Shackel, and G. Campbell, 52–68. London: Routledge.
Saitta, D.J. 2007. *The archaeology of collective action*. Gainesville: University Press of Florida.
Scott, J. 1990. *Hidden transcripts: Domination and the arts of resistance*. New Haven: Yale University Press.
Shackel, P.A. 1996. *Culture change and the new technology: An archaeology of the early American industrial era*. New York: Plenum Publishing.
Shackel, P.A. 2000. *Archaeology and created memory: Public history in a national park*. New York: Kluwer Academic/Plenum Publishing.
Shackel, P.A. 2004. Labor's heritage: Remembering the American industrial landscape. *Historical Archaeology* 38: 43–57.
Shackel, P.A. 2007. Civic engagement and social justice: Addressing race and labor issues. In *Archaeology as a tool of civic engagement*, ed. B.J. Little and P.A. Shackel, 243–262. Lanham: AltaMira Press.
Shackel, P.A., M. Roller, and K. Sullivan. 2011. Historical amnesia and the Lattimer massacre. SAA News*:* A Publication of the Society for Applied Anthropology. Available at: http://sfaanews.sfaa.net/2011/05/01/historical-amnesia-and-the-lattimer-massacre/#more-1207. Accessed 20 Nov 2011.
Thompson, E.P. 1966. *The making of the English working class*. New York: Vintage Books.
Walker, M. 2003. The Ludlow massacre: Class, warfare, and historical memory in southern Colorado. *Historical Archaeology* 37: 66–80.

Further Reading

Gordon, R.B., and P.M. Malone. 1994. *The texture of Industry: An archaeological view of industry in North America*. New York: Oxford University Press.
Gutman, H. 1976. *Work, culture, and society in industrializing America: Essays in American working class and social history*. New York: Alfred Knopf.
Little, B.J. 1994. People with history: An update on historical archaeology in the United States. *Journal of Archaeological Method and Theory* 1 (1): 5–40.
Mcguire, R.H., and R. Paynter, eds. 1991. *The archaeology of inequality*. Cambridge: Blackwell.
Montgomery, D. 1979. *Worker's control in America: Studies in the history of work, technology, and labor struggle*. New York: Cambridge University Press.
Shackel, P.A., and D.L. Larsen. 2000. Labor, racism, and the built environment in early industrial Harpers Ferry. In *Lines that divide: Historical archaeologies of race, class, and gender*, ed. J. Delle, R. Paynter, and S. Mrozowski, 22–39. Knoxville: University of Tennessee Press.
Silliman, S.W. 2006. Struggling with labor, working with identities. In *Historical archaeology*, ed. M. Hall and S.W. Silliman, 147–166. Malden: Blackwell Publishers.

L

Laboratory for Archaeological Chemistry (University of Wisconsin)

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Basic Information

The Laboratory for Archaeological Chemistry (LARCH) at the University of Wisconsin-Madison was established by Dr. T. Douglas Price (director of the laboratory until 2009) with a grant from the National Science Foundation in 1987. He was soon joined by Dr. James H. Burton as

associate director. Burton is the current director of the laboratory.

Major Impact

In the quarter century since its establishment, LARCH has played a significant role in advancing archaeological and archaeometric research, developing new techniques of investigation, and training both graduate and undergraduate students.

Much of the work done at LARCH has focused on the use of inductively coupled plasma (ICP) atomic emission spectroscopy, ICP-optical emission spectroscopy, and ICP-mass spectroscopy, but they also have worked collaboratively with other laboratories to explore other analytical modalities including neutron activation analysis (with the University of Wisconsin Nuclear Reactor Laboratory); X-ray diffraction (with the Bailey X-Ray Diffraction Lab at the University of Wisconsin); stable isotope ratios such as ^{13}C, ^{15}N, and ^{18}O (with the University of South Florida Archaeological Science Laboratory, the University of Arizona Environmental Isotope Laboratory, and the Department of Geology at the University of Illinois-Urbana-Champaign); and heavy element isotope ratios (with the Department of Geological Sciences, University of North Carolina-Chapel Hill, the Department of Geology at the University of Illinois-Urbana-Champaign, and the Institute of Geology at the University of Copenhagen) to name a few.

Early research at LARCH focused on paleodietary studies of human bone, examining relationships between alkaline earth elements and trophic level. Along with archaeological studies of human burial populations on several continents, LARCH staff conducted extensive studies of contemporary natural environments and food chains to better elucidate the relationships between environmental factors, soil-plant interactions, and diet on alkaline earth ratios and trophic level. In addition they also conducted extensive studies of diagenetic factors and their implications for bone chemistry and paleodietary reconstruction. Both of these later studies had significant implications for our understanding of paleodietary analysis and human bone chemistry. Compositional analysis of ceramics for the identification of compositionally similar groups of ceramics derived from the same production loci was another early project at LARCH.

In the early and mid-1990s, LARCH added isotopic studies to their repertoire. Their early efforts included the use of strontium isotope ratios in cortical bone and tooth enamel to study residential mobility. These studies spanned the globe and resulted in significant insights into past population movements, both in the distant past (e.g., European Bell Beaker, Teotihuacan) and the more recent past (e.g., Colonial Period Mexico). Studies of residential mobility continue to be an important focus of research at LARCH.

Many of the studies undertaken at LARCH were based on protocols developed or improved by LARCH staff. The previously mentioned ceramic compositional studies were based on a weak-acid extraction technique that was rapid, inexpensive, and very sensitive to producer-based variables that made it possible to identify actual production groups as opposed to geological sources of clays. LARCH also developed protocols for the characterization of anthropogenic chemical activity residues on house floors and exterior surfaces for the identification of patterns of organization of activities (this also used a weak-acid extraction technique).

The research done at LARCH over the years has generated a considerable scholarly output, much of it by collaborators with the laboratory as well as laboratory staff, in professional journals, conferences, edited volumes, books, theses, and dissertations. At least as important as the scholarly work done at the laboratory is its impact on the education of both graduate and undergraduate students. Several dozen graduate students at the University of Wisconsin have done all or part of their dissertation research at LARCH, and most of these have gone on to productive careers in academia (including the author of this article). Many more graduate students from other institutions have done key work for their dissertations at the laboratory through collaborative arrangements or grants issued by LARCH. Finally, an undergraduate course on "Archaeology in the

Laboratory" has served as a model for teaching archaeological science at many other institutions.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Bone Chemistry and Ancient Diet
- ▶ Ceramics: Scientific Analysis
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology

Further Reading

Burton, J.H., and A.W. Simon. 1993. Acid extraction as a simple and inexpensive method for compositional characterization of archaeological ceramics. *American Antiquity* 58: 45–59.

Burton, J.H., T.D. Price, and W.D. Middleton. 1999. Correlation of bone Ba/Ca and Sr/Ca due to biological purification of calcium. *Journal of Archaeological Science* 26: 609–616.

Douglas, T.D., J.H. Burton, and J.B. Stoltman. 2007. Place of origin of prehistoric inhabitants of Aztalan, Jefferson Co., Wisconsin. *American Antiquity* 72: 524–538.

Knudson, K.J., T.A. Tung, K.C. Nystrom, T.D. Price, and P.D. Fullagar. 2005. The origin of the Juch'uy-pampa Cave mummies: strontium isotope analysis of archaeological human remains from Bolivia. *Journal of Archaeological Science* 32: 903–913.

Price, T.D., and J.H. Burton. 2011. *An introduction to archaeological chemistry*. New York: Springer.

Richards, M.P., T.D. Price, and E. Koch. 2003. Mesolithic and Neolithic subsistence in Denmark: New stable isotope data. *Current Anthropology* 44: 288–295.

Lafone Quevedo, Samuel Alejandro

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Basic Biographical Information

Samuel Alejandro Lafone Quevedo, archaeologist, ethnographer, mining industrialist, educator, and linguist, was born in Montevideo, Uruguay, on February 28, 1835. His father, Samuel Fisher Lafone, was an English merchant and businessman, and his mother, Maria Pietro de Quevedo Alsina, was part of one of the richest families of the Buenos Aires elite. At age 13, he travelled to England to study. At St. John's College at the University of Cambridge, he graduated with the title of "Magister Artium." He returned from England to Montevideo in 1857. In 1859, he accompanied his father to the copper smelters he had in Santa Maria, a town north of the province of Catamarca in the Argentine Republic. A few years later, he assumed the management of his father's large-scale copper mines, where silver and gold were also obtained. Lafone Quevedo sold these establishments and bought in Andalgalá an immense carob forest where, in 1860, he launched Pilciao, a metal mill.

Major Accomplishments

Pilciao was a transit center for travelling scientists. Lafone Quevedo collaborated with Francisco P. Moreno, director of the La Plata Museum, and "is considered as one of the initiators of anthropological studies in Argentina in a series of works directly connected with the emergence of the discipline in the country and the process of formation of indigenous skulls collections, with 'the construction of the nation'" (Farro 2009: 63). Moreno visited Pilciao, and Lafone Quevedo assisted him in the provision of supplies, packaging, and transportation of the pieces and facilitated him his own network of relationships with the locals and even his laborers. Thus, he was appointed honorary curator of the antiquity collections from the Calchaquí Valleys in the La Plata Museum. He directed the expedition of the naturalist Adolf Methfessel, and between 1880 and 1893, he accompanied the anthropologist Herman F.C. ten Kate to study and document the indigenous remains of the region and collaborated with the inventories that they sent to the La Plata Museum. He published his first works in the form of letters in the newspaper *La Nación*, and in 1888 they were printed in book format with the title *Londres y Catamarca*. In 1890, he

published the expeditions of the scientists of the La Plata Museum and, in 1894, *Tesoro de Catamarqueñismos*, a dictionary with etymologies and ethnography of Aboriginal community's life built with the testimonies he had recorded. In 1881, Lafone Quevedo bought a metal disc that would change profoundly indigenous metallurgy history; in 1890, he published "Archaeological Notes about an object of indigenous art" in the Annals of the La Plata Museum about his investigation. The disc presents on its front face a "complex ornamentation that was achieved combining detailed lines in relief and sunken spaces. Indeed, the rich ornamental elements made it possible, afterwards, to attach the well-known La Aguada sociocultural entity to the object and to estimate that its antiquity went back to 600 or 700 years of the Christian era (González 2004: 18). The disc is in the La Plata Museum and a replica in the Shinkal Museum of Londres, Belén.

In Julio Argentino Roca's first presidency of the country (1880–1886) and due to the policies of the emerging nation state, the economy of the mill is destroyed, and the company closes definitively. Lafone Quevedo moves to Buenos Aires and is in charge of the chair of Ethnography at the University of Buenos Aires. In 1890, he was awarded the title "Honoris Causa" at the Philosophy and Letters Faculty. In 1906, he was appointed director of the La Plata Museum while he was dean of the Faculty of Natural Sciences of the La Plata University. He was also a member of the American History and Numismatic Board, the Buenos Aires Institute of Numismatics and Antiquities, the Historical-Geographical Institute of the Rio de la Plata (1854–1859), the Association of Friends of the Natural History of Plata (1854–1856), and the Paleontological Society.

He is appointed honorary officer of the Linguistics Section and writes "Instructions of the Museum of La Plata for collectors of indigenous vocabularies," and he is also in charge of the Journal and the Annals of the Museum. From 1893, Lafone Quevedo published articles on the cultural characteristics and languages of the different Argentine aboriginal groups in "the Bulletin of the Argentine Geographical Institute." In 1907, the "La Plata Museum's Library of Scientific Promotion" began its publications, under the direction of Félix Outes. volume 1 is dedicated precisely to the problem of classification in an anthropological museum, publishing translations of works such as "Methods and Purposes in Archaeology" and "The Successions of Prehistoric Remains" by WM Flinders Petrie and "Classification and Arrangement of Exhibitions of an anthropological museum" by William H. Holmes. Lafone Quevedo translates the last two. Before leaving Pilciao, Lafone Quevedo had ceded his archaeological collections under custody to the La Plata Museum, and he, who had lived with the inhabitants of the indigenous peoples of Catamarca, who had been part of their education, their histories, and their lives, found himself in the La Plata Museum, where indigenous life had been taken by assault, natives massacred by the "Desert Campaign," their bones exposed in showcases, and survivors enslaved as free labor in the Museum. Decapitated, dismembered, torn apart bodies were studied in the country or sent to museums abroad. This was the scenario where Lafone Quevedo witnessed there. The violence of the conquest of the so-called desert populated the symbolic environment of the museum and its exhibits. In the imaginary of General Roca's ruling elites, the "Indian menace" was on the scene, and the better place for them was in the display cases, or in the photographs of men and women that were circulating, in positions of forensic photographs, stripped of all humanity, the Argentine Republic had become a vast necropolis of lost races, in the words of F. Moreno.

Lafone Quevedo died in La Plata on July 18, 1920.

References

Cabrera, Pedro. 1943. *Apuntes sobre la vida íntima del sabio Samuel A. Lafone Quevedo*. Published by the author.

Dalla Corte, G. 2000. *Vida i mort d' una aventura al riu de La Plata Jaime Alsina i Verjés 1770–1836*. Barcelona: Publicacions de l'Abadia de Monserrat.

Farro, M. 2009. *La formación del Museo de La Plata. Coleccionistas, comerciantes, estudiosos y naturalistas viajeros a fines del siglo XIX*. Rosario: Prohistoria Ediciones.

González, L.R. 2004. *Bronces sin nombre, la metalurgia prehispánica en el noroeste argentino*. Buenos Aires: Ediciones Fundación CEPPA.
Lafone Quevedo, S.A. 1880–1902. *Diario personal*. Unpublished manuscript.
Lafone Quevedo, S.A. 1888. *Londres y Catamarca*. Buenos Aires: Imprenta y Librería de Mayo.

Lake Mungo, Archaeology of

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Introduction

Lake Mungo came to the attention of the international paleoanthropological community during the early 1970s following the widely publicized discovery of what were then the oldest, well-dated traces of human activity on the Australian continent, including the oldest-known ritual human burials (Bowler et al. 1970, 2003; Barbetti and Allen 1972; Bowler and Thorne 1976). However, these are only a few of the thousands of activity traces preserved in the 33 km-long transverse, crescentic dune (lunette) that bounds the eastern margin of Lake Mungo; and Lake Mungo is only one of 17 large and numerous smaller overflow lakes that together cover an area of approximately 2,400 km^2 on the southeast margin of the continent's arid core (Fig. 1). These lakes are now dry, but at times in the past when temperatures and evaporation were reduced, they were filled via a former channel of the Lachlan River, which flows westward from the Australian Alps. During the Pleistocene, the Lachlan periodically brought large volumes of water into this cascading lake system, filling the basins from north to south and creating vast expanses of freshwater in an otherwise xerophytic landscape (Fig. 2).

The Willandra Lakes are widely regarded as Australia's foremost Pleistocene archive, a potential treasure trove of information about the settlement of an initially unpeopled and unfamiliar landscape and about the strategies people developed in response to the dramatic changes in landscape and environment that were initiated within a few thousand years of their arrival. The perceived research potential of this area is based, in part, on the long time span of its record, which extends from ca. 45,000 years ago until the establishment of the pastoral frontier during the 1860s, and in part on the characteristics of the archaeological record itself. It is an unusual record, made up primarily of small, discrete clusters of debris that arguably represent single events, like the cooking of an emu egg (Fig. 3) or fashioning a few stone tools and lighting a fire to cook a small marsupial (Fig. 4). The vivid images these evoke of the distant past fire the public imagination, although they present archaeologists with all the interpretive conundrums inherent in studying "landscape palimpsests" (Bailey 2007). Those activity traces are preserved in sediments that record prevailing conditions in the adjacent lake, which, in turn, reflect the impact of regional and global climates, thus establishing a direct link between the record of past environmental change and the record of human activity.

The tools, burials, and fireplaces preserved in the Mungo lunette first came to the attention of the scientific community at the end of the 1960s through Jim Bowler's investigation into what the lake's depositional history could reveal about regional and global climate change (Bowler 1970). In 1968 he discovered what were then some of the world's earliest evidence for systematic exploitation of inland aquatic resources, as well as the cremated remains of Mungo Lady (Bowler et al. 1970) and, in 1974, the ochre-stained burial of Mungo Man (Bowler and Thorne 1976). Initial archaeological work focused on activity traces preserved in the vicinity of Mungo Lady (Bowler et al. 1970) (Fig. 2). The in situ and surface stone artifacts collected from the same sedimentary horizon were a springboard for presenting the first formal description of the types of stone tools made and used in Australia during the Pleistocene (Bowler et al. 1970). The studies made of the food remains recovered from hearths in Lower Mungo sediments at the southern end of Lake Mungo (Bowler et al. 1970), together with a dozen hearths and middens of

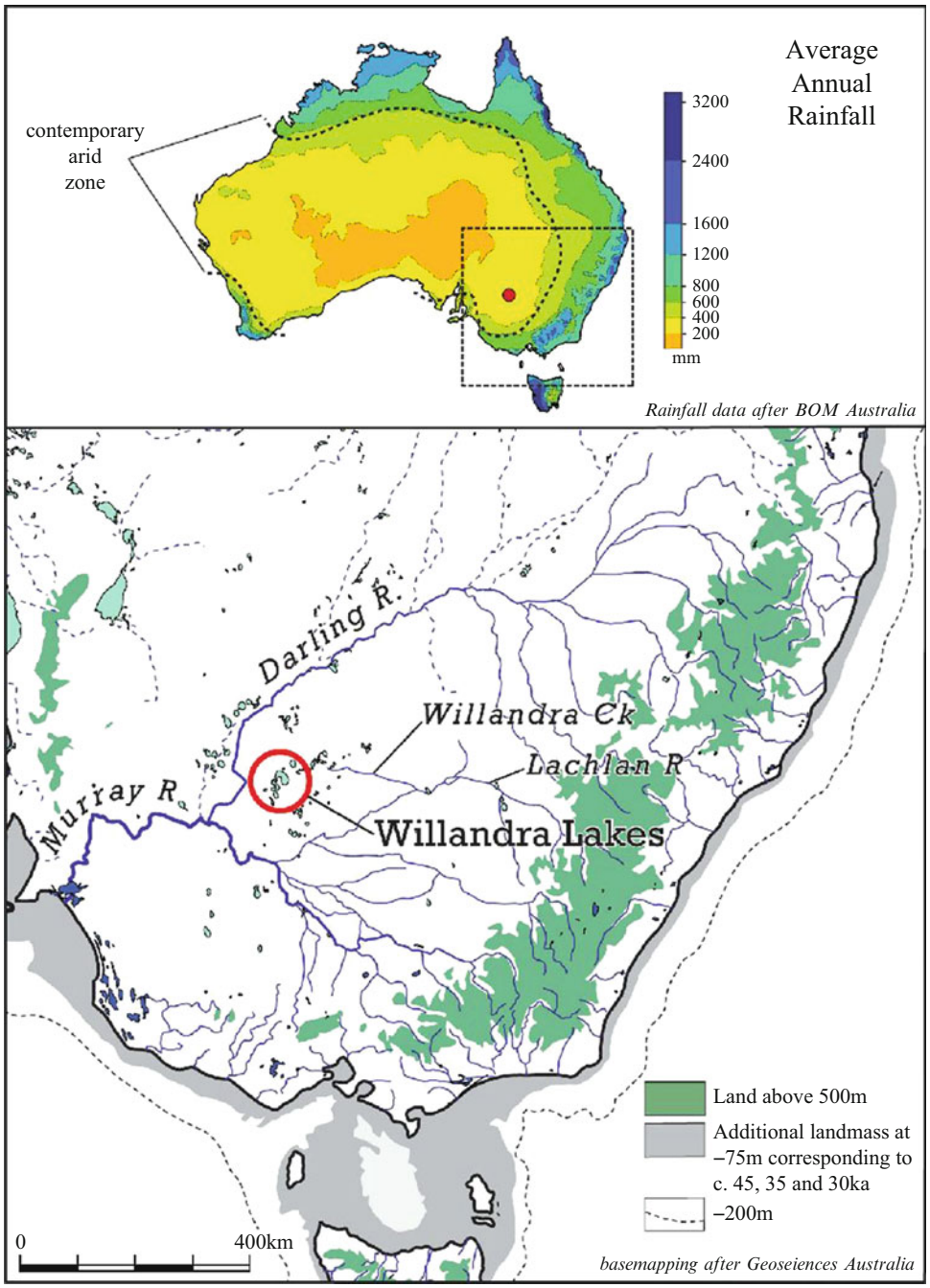

Lake Mungo, Archaeology of, Fig. 1 The Willandra Lakes lie on the southern margin of Australia's arid core, in the southwest corner of the Murray-Darling Basin, which drains more than a million square miles of country in the southeast of the continent. At times of reduced temperatures and evapotranspiration, water flowed westward from the southeast highlands and into these overflow lakes via a former channel of the Lachlan River, known as the Willandra Creek

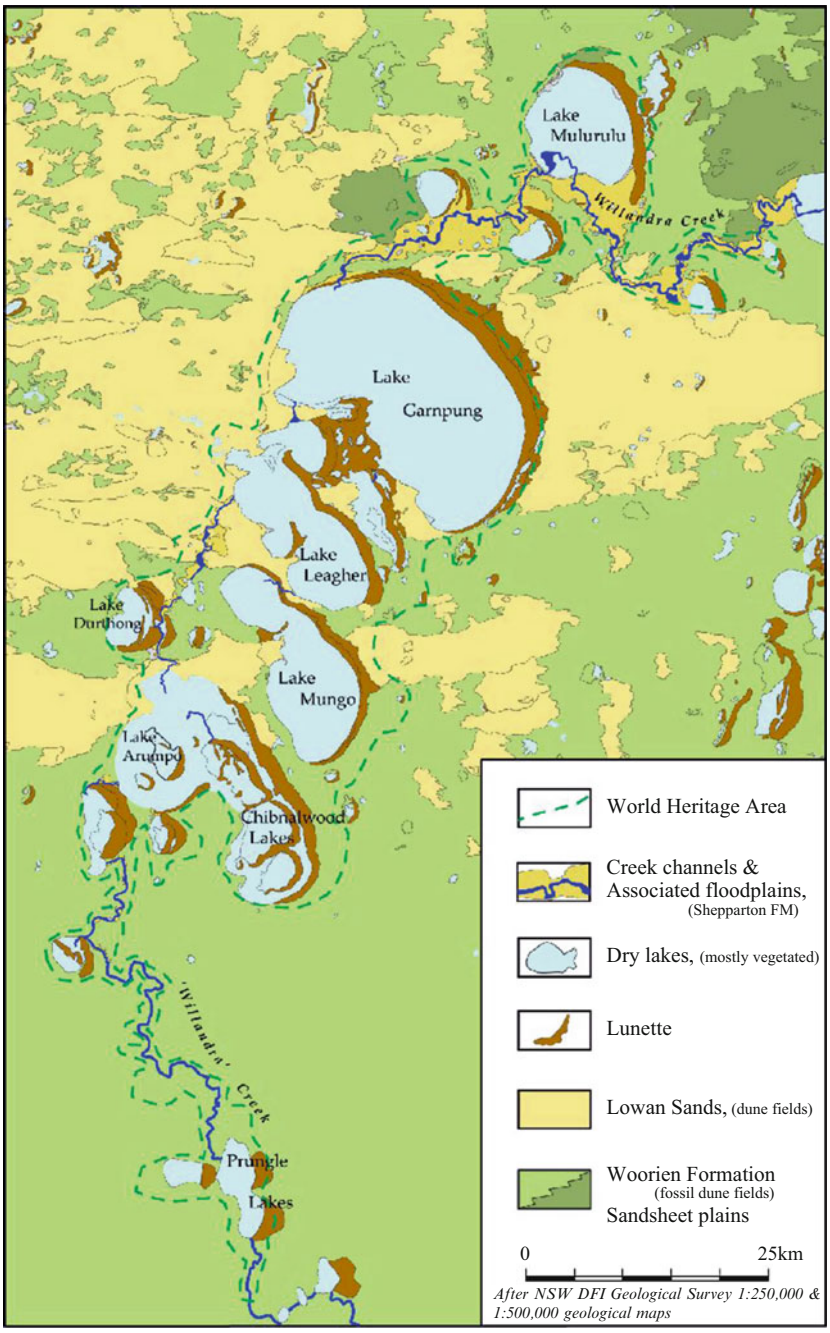

Lake Mungo, Archaeology of, Fig. 2 The Willandra Lakes are nestled within vast sand plains made up of east/west trending and irregular dunes fields that were initially formed about 400,000 years ago under dry, windy conditions. During periods of more effective precipitation, five major and at least a dozen smaller lake basins were filled via waters carried by the Willandra Creek; the exception to this was Lake Mungo, which filled via an overflow channel from Lake Leaghur. This map shows the names of the major lake basins, the location of the Willandra Creek, and the boundary of the Willandra Lakes Region World Heritage Area

L

Lake Mungo, Archaeology of, Fig. 3 A baked sediment hearth containing the burned bones of a bettong (rat kangaroo), a cobble of silcrete, and the scatter of stone artefacts struck from that cobble. The hearth is bracketed by OSL age estimates indicating that it was lit during the Last Glacial Maximum. The clean quartz sands in which it is embedded show that the lake was full at the time it was lit, resulting from a pulse of fresh water moving down the overflow system. (Photo: Rudy Frank, Mungo Archaeology Project)

varying age from all across the Willandra (Allen 1972), established the idea of long-term continuity in diet and foraging activities (Allen 1974, 1998), not just in the Willandra but across the continent's arid core (Allen and Holdaway 2009). It also contributed to the perception that settlement of the Willandra was more intense when the lakes were full of freshwater and that people shifted to the river systems when the lakes dried out (e.g., Allen and Holdaway 2009).

Lingering doubts about the origin and age of the surface artifacts, together with the desire to uncover intact living surfaces, subsequently led to the excavation of broad, deep trenches through undisturbed lunette sediments (Shawcross and Kaye 1980; Shawcross 1998). These excavations uncovered stone artifacts and hearths from undisturbed strata, and these remain among the oldest, well-dated archaeological traces in the Willandra (Bowler et al. 2003).

The initial flurry of research in the Willandra established its potential for generating a detailed record of past climate change on the sensitive, arid margin of the world's driest inhabited continent, as well as its potential for illuminating the long history of human settlement in the area. This potential underpinned the inscription of the Willandra Lakes on the world heritage register in 1981, the first such area to be nominated on the basis of both cultural and natural values (Mulvaney and Bowler 1981).

In the decades that followed, research in the Willandra focused primarily on stratigraphy, dating, and burials (Johnston and Clark 1998). As a result, present understanding of the changing pattern of people's lives in this area is limited, despite the dramatic changes in landscape and environment that have been documented (Bowler 1998; Bowler et al. 2012).

Depositional History and Paleoenvironments

Each lake in the overflow system has a unique history that is recorded in the lunette bounding its eastern margin, the sediments that accrued on its floor, and the desert dunes that built up downwind (Bowler 1976, 1998). The lunettes are particularly rich archives of past environmental change

because their formation was controlled primarily by the hydrologic conditions prevailing in the adjacent lake, and the lakes were extremely responsive to changes in effective precipitation in the catchment area. After the Lachlan shifted course and the lakes dried out, the lunettes responded to changes in local conditions, and extensive erosion of some has exposed their internal stratigraphy, opening a window into their past (Bowler 1998; Bowler et al. 2012; Fitzsimmons et al. 2014, 2015).

When the lakes were full, waves driven by the prevailing southwesterly winds washed sandy sediments to the lake edges to form quartz-rich sandy beaches that were backed by low, vegetated, transverse crescentic dunes, known as lunettes (Fig. 4a). During periods of low but fluctuating lake levels, salts precipitated from saline groundwater effloresced on the exposed lake floors, breaking up the sediments and forming sand-sized clay pellets. These were blown across the adjacent quartz dune to form pelletal clay lunettes (Fig. 4b; Bowler 1971, 1998). As a result, beach gravels and quartz sands record lake-full conditions, while pelletal clays indicate low lake levels and saline waters. Alternating horizons of pelletal clay and quartz-rich sand record fluctuations from low water levels and evaporative conditions to high lake levels, following influxes of freshwater from floodwaters that recharged the system. Soils formed when the landscape was stable, either as a result of regional drying or when there was a temporary cutoff in sediment supply following the refilling of a lake (Bowler 1998; Bowler et al. 2012). After the overflow system dried out, older lunette sediments were reworked as local conditions fluctuated from relatively more arid to relatively more moist.

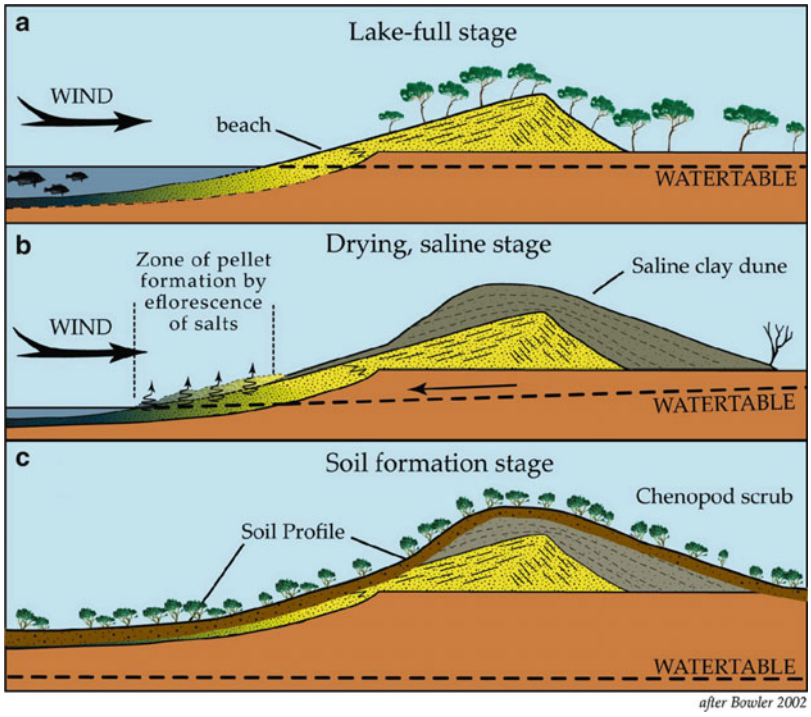

Lake Mungo, Archaeology of, Fig. 4 Lunettes built up around the eastern margins of the Willandra Lakes under the influence of the prevailing south-westerly winds. (**a**) When the lakes were full, sands were washed to the eastern shoreline and blown up into quartz-rich lunettes. (**b**) When lake levels were low, efflorescence of salts broke up the clays on the exposed lake floor creating pellets that were draped across the surrounding landscape to form low angle, clay lunettes. (**c**) Soils formed when the accumulation of sediment was interrupted. This happened when the lakes first refilled and there was no immediate sediment supply or when they were dry and the landscape was vegetated

Bowler (1998), Bowler et al. (2012) identified four stratigraphic units, the base of each defined by evidence for a major lake transgression and the top by a soil representing a period of landscape stability. Each of these is made up of lake margin, beach, and lunette deposits that represent three cycles of lake filling, fluctuating and drying over the past 55,000 years, as well as a much older (>120,000 years) and less well-defined lacustrine episode (Table 1). These units provide a framework for linking changes in lake hydrology to regional and global shifts in climate. However, they are variable in their expression along the length of the lunette, partly as a result of shifts in wind direction over time, which resulted in lateral variations in the volume of sediment accumulated, as well as by past erosion (Fitzsimmons et al. 2014; Fitzsimmons 2017).

Traces of past human activity were incorporated into the lunettes as they built up, including burials, hearths, food remains, and the debris from toolmaking and food preparation (e.g. Bowler et al. 1970; Stern 2015; Stern et al. 2013). The oldest well-documented archaeological traces lie in the upper levels of the Lower Mungo unit (i.e., from ca. 50 ka), but they are most abundant in sediments deposited immediately prior to, during, and immediately following the Last Glacial Maximum (Stern 2015). Current research is focusing on the small-scale depositional and erosional events that also left their mark on the lunette sequence because these provide the paleotopographic and paleoenvironmental context for each hearth, cluster of animal bones, or tools.

After the lakes dried out, traces of past human activity were incorporated into the reworked sands that built up on the crest and lee of the lunette and in the alluvial fans that built up at the toe of the lunette (Fitzsimmons et al. 2014). Hearths, chipped stone tools, and grinding stones are also found in sediments that accumulated around seasonal soaks on the lake floor. In the broader landscape, archaeological remains dating to the post-lake period are found in the banks of creeks and billabongs and around the margins of pans (Johnston and Clark 1998). These have the potential to extend the history of human settlement in the Willandra from 50,000 years ago until the establishment of the pastoral frontier during the 1860s.

The Human Burials

Lake Mungo is renowned as the site of the earliest "Australians," but it is salutary to remember that Indigenous Australians and scientists have quite different worldviews that influence their respective approaches to the study of burials. The "Dreaming," an interwoven tapestry of knowledge, beliefs, and rituals that includes explication of how the world came into being, shapes the worldviews of Indigenous Australians. However, it is not simply a story of origins: the Ancestral Beings who inhabit the Dreaming and carried out the deeds that created the country are now embedded within it, and each generation experiences the Dreaming anew through ritual and ceremony (Stanner 1953/1987). It is, therefore, a timeless concept that establishes the enduring presence of people in the country (Fig. 5).

In contrast, scientists employ a linear concept of time and trace the origin of the First Australians using data that describes variation in the morphological characteristics of skeletal remains and/or variation in the mtDNA or Y chromosomes of living populations. The Willandra figures prominently in these discussions because it preserves the largest known sample of Pleistocene burials on the continent: more than 130 burials have been documented in sediments that built up between circa 45,000 and 15,000 years ago (Webb 1989, 2006). The burials vary in form, completeness, state of preservation, and the precision with which they can be placed in time (Webb 1989, 2006; Bowler et al. 2003; Westaway and Groves 2009; Grün et al. 2010). The best dated are the burials of Mungo Lady (WLH 1) and Mungo Man (WLH 3); bracketing OSL dates place both in the time range between 38 and 42 ka (Bowler et al. 2003), which is consistent with OSL dates of 41 ± 4 ka on the sands filling the grave of Mungo Man (Olley et al. 2006).

Phylogenetic analysis of the morphological characteristics exhibited by 26 individuals from

Lake Mungo, Archaeology of, Table 1 Summary of the sedimentary characteristics of the stratigraphic units described by Bowler (1998) and the archaeological traces they contain (Bowler 1998; Allen and Holdaway 2009; Clark 1987; Stern et al. 2013, 2015)

Stratigraphic unit		Age in ka	Sediment characteristics	Palaeoenvironment	Archaeological traces
Fitzsimmons et al. (2014, 2015)	Bowler (1998)				
G		5.5–3.5		Lake dry, reworking of lunette sediments under locally more moist conditions	Termite & stone heat retainer hearths, chipped stone tools
F		<14 >8	Unconsolidated sands interspersed with some weakly developed, laterally discontinuous brown soils	Lake dry, reworking of lunette sediments under locally more arid conditions	Termite & carbonate heat-retainer hearths, clusters of tool-making debris, isolated in situ grindstones, manuports & shell tools
E	Zanci	~ 15	Brown soil on unconsolidated laminar sands, erosional surface	Final drying of lake	Heat retainer and baked sediments hearths, some associated with terrestrial and lacustrine resources, rare lenses of bivalves and/or fish bone, clusters of tool-making debris, isolated in situ grindstones, bone tools, ochre
		~19–15	Greyish yellow, unconsolidated laminar sands	Oscillating lake, but on a drying trend	
E	Arumpo	~ 21–20	Weak brown soil with secondary carbonates; erosional surface	Brief return of high water levels, erosion	Abundant archaeological traces include heat retainer and baked sediments hearths with terrestrial and lacustrine resources, clusters of burned faunal remains, clusters of stone tool-making debris, isolated in situ grindstones, shell tools, ochre
		~ 24–20	Greyish yellow laminar sands, dominant, some alternating sands and pelletal clays	Fluctuating lake levels	
D		*25–24*	Red sands and associated shoreline gravels	High lake stand, Lake Mungo joined to Lake Leaghur	Baked sediment hearths, some clusters of stone tool-making debris
C	Upper Mungo	<30	Thin sandy soil	Brief return to high water levels	Termite & carbonate retainer and baked sediment hearths, some containing terrestrial &/or lacustrine faunal remains, discrete scatters of burned bone or eggshell, clusters of debris from stone-tool making, isolated shell tools
		~40–30	Olive to greenish-grey pelletal clays and clayey sands	Fluctuating lake levels	
B	Lower Mungo	~ 40	Dark brown to dark grey with organics and secondary carbonates	Landscape stable and densely vegetated; onset of continental aridity	From ~ 45 ka: Termite & carbonate heat retainer and baked sediment hearths, some containing terrestrial and lacustrine faunal remains, clusters of stone tool-making debris 50 & 46 ka: a few stone tools
		~ 55–40	Beach gravels and well sorted clean quartz sands	Lake filled, sustained high lake levels	
A	Golgol	>140	Strong red calcareous soil with massive crystalline calcrete boulders	Stable, vegetated landscape	No archaeological traces
			Pelletal clays with prismatic jointing	Fluctuating lake	
			Quartz sands	High lake levels	

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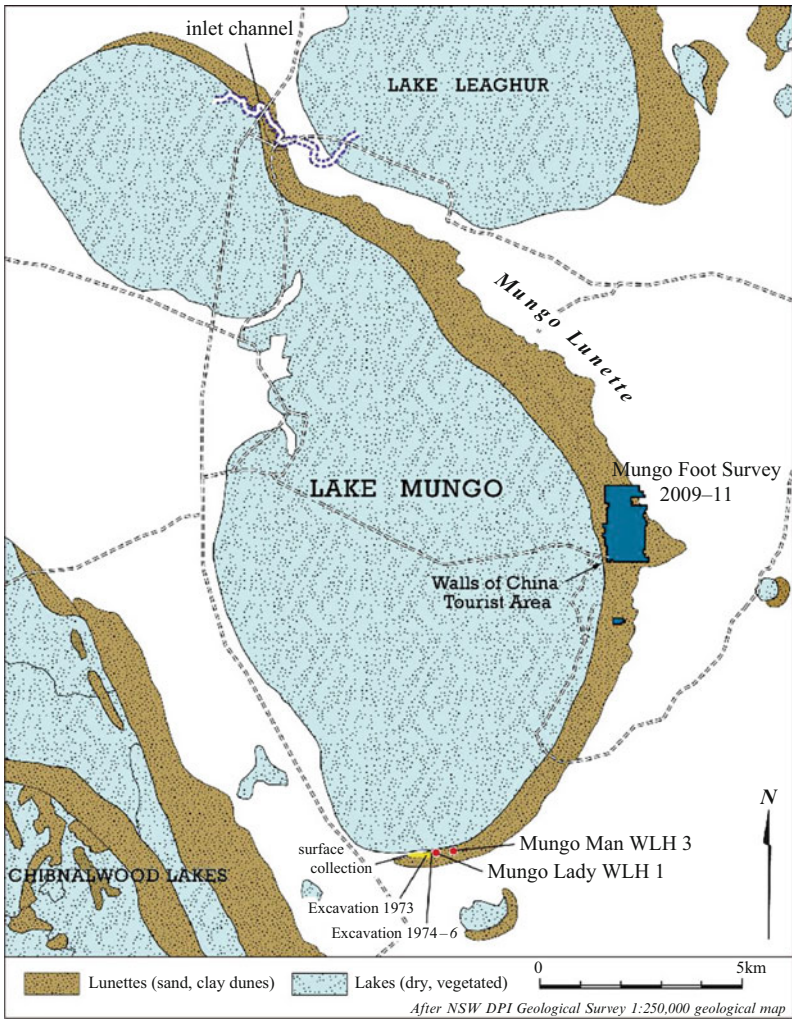

Lake Mungo, Archaeology of, Fig. 5 A map of Lake Mungo, showing the locations of Mungo Lady and Mungo Man; the trenches excavated by Mulvaney in 1973, by Shawcross in 1974–1976; the surface grid area that was collected repeatedly over the same time period; and the Barbetti "hearth site," and the "Walls of China" tourist site. It also shows the areas in which the first systematic surveys of archaeological traces preserved in the Mungo lunette were undertaken by the author between 2009 and 2011

the Willandra and 19 specimens of early modern humans from SW Asia and Africa suggests a close resemblance (Westaway and Groves 2009). This is consistent with mtDNA and Y chromosome data indicating that Sahul, the Pleistocene landmass made up of Australia, Tasmania, and New Guinea, was settled by descendants of the one of the founder groups of modern humans, early in their dispersal (Hudjashov et al. 2007; Riech et al. 2011). Recent mtDNA studies indicate settlement by a single population that dispersed rapidly along the north of the continent and then south along its eastern and western seaboards, between ~ 49 and 45 ka, followed by marked regional differentiation (Tobler et al. 2017). This is consistent with earlier studies suggesting a single founding population that subsequently diversified and remained relatively isolated, with any later migrations having limited impact on population genetics (McEvoy et al. 2010).

The documented burials provide insights into some of the ritual practices of the Willandra's Pleistocene inhabitants, although these insights are limited by the fragmentary nature of burials exposed through erosion. Tooth avulsion, a ritual usually associated with the attainment of specific age or social status, has been identified on some individuals (Webb 1989, 2006). Although individuals of all ages were cremated, internment in the ground was more common.

Footprints

Perhaps the most captivating traces of past human activity in the Willandra are the hundreds of footprints preserved on the surface of a hardpan that lies between modern, shifting sands in the low-lying country between Lake Garnpung and Lake Leaghur. Bracketing OSL dates show that the footprints were impressed into the muddy surface of a low-lying depression, some time between 21 and 19 kya (Webb et al. 2006).

More than 700 prints are preserved in a thin horizon of clay, and together Elders, researchers, and Pintubi trackers identified 23 individual track ways, including 12 that may have been left by a single group who crossed the muddy depression together. However, not all the prints result from a single afternoon's activities, and some are preserved on different bedding planes. They include the tracks of six men who ran across the muddy depression in the same direction, apparently in pursuit of prey as the surface also preserves a groove left by a spear that bounced across the ground when it was thrown underarm. Most of the trackways lie at right angles to those of the hunters and include the prints of a one-legged man who hopped across the mud with the aid of a pole, the imprints of blunted spears made when the men who carried them paused to rest, the prints of an adult who was accompanied by four children, as well as those of two women accompanied by a young child who circled away from the adults before rejoining them (Webb et al. 2006; Webb 2007).

Archaeological Traces

Until recently, only a few of the myriad of archaeological traces preserved in the Willandra had been documented in any detail, reflecting the difficulties of studying archaeological remains scattered through vast landforms with complex depositional and erosional histories but which are also part of an active landscape. Those landforms are made up of sediments representing successive paleolandscapes, and each paleolandscape is made up of interlocking, three-dimensional sedimentary bodies that represent a variety of paleo-topographic settings. Lateral variation in the timing, rate, and amount of sediment that accumulated along the lunette, and in the amount of sediment removed by subsequent erosion, means that the stratigraphic and paleo-topographic context of archaeological traces can only be established by mapping exposures and three-dimensional sedimentary relationships at a much finer scale than is the usual geological practice.

The scatters of archaeological debris strewn across the surfaces of the eroding Mungo lunette are the outcome of two processes that sometimes act in concert: the removal of encasing sediment to create lag deposits and the displacement of material down the rill and gully systems to create transported assemblages. The complex relationships that exist between stratigraphic boundaries, paleo-topography and modern topography, mean that these surface scatters don't always derive from the sedimentary envelope on which they lie and, in some settings, could be derived from any of the sediments that accumulated since the lakes last filled, ca. 55,000 years ago.

However, the record also includes thousands of archaeological features and isolated finds whose precise stratigraphic and paleo-topographic origin can be documented either because they are still partly embedded in sediment or because they lie in a discrete cluster on the surface indicating that they have been exposed only recently. The pace of ongoing erosion is such that most features weather, disperse, and disintegrate within 12–36 months of exposure.

These activity traces include a variety of cooking hearths, the debris from making chipped stone tools, clusters of burned food remains, grindstones, and shell and bone tools. Most of these arguably result from a single activity, like the preparation and cooking of a meal or the striking of a few tools from a core. These provide remarkable insights into individual meals and knapping episodes, but to build an understanding of the food-gathering strategies or technological systems that prevailed during particular time intervals, and correspondingly different paleoenvironmental conditions, archaeologists must aggregate the

activity traces found in the sediments making up the corresponding paleolandscape. Thus, the significance of this record lies not with one particularly spectacular or ancient occurrence but with the information that can be generated from thousands of activity traces with well-defined paleo-topographic and paleoenvironmental context.

History of Human Settlement

Systematic documentation of the archaeological traces preserved in the central Mungo lunette shows that they are not distributed homogeneously through the stratigraphic sequence (Table 1). Activity traces are far more abundant in sediments representing fluctuating lake levels than they are in sediments representing sustained lake-full conditions. This runs counter to the long-standing, popular perception that people were attracted to the Willandra lakes when they were full of freshwater and that they went there to catch fish and crayfish and to gather shellfish (e.g., Mulvaney and Kamminga 1999: 197). Instead, it appears that people were attracted to the shore of Lake Mungo in larger numbers and/or more often and/or for longer, when flood pulses frequently recharged the biological productivity of the overflow system and when standing water was less abundant on the surrounding plains (Stern et al. 2013; Stern 2015). After Lake Mungo dried out, activity traces did accumulate in sediments on the crest and lee of the lunette and in the alluvial fans at its base, but these are much less abundant and varied than when the lake contained water, suggesting a significant shift after ~ 15 ka in the way peopled moved around the landscape and the time spent in different places.

Fireplaces and Food Remains

Studies of faunal assemblages undertaken during the first phase of research in the Willandra suggested long-term continuity in diet, at least until the final drying of the lakes (Bowler et al. 1970; Allen 1972, 1974). This inference was based on the similarities noted between the food remains recovered from hearths and middens of widely scattered age and location and ethnohistoric records of the foods eaten by the Barkindji who lived along the Darling River (100 km to the west of Lake Mungo) during the late nineteenth century (Bowler et al. 1970; Allen 1972, 1974). The only significant shift in diet was thought to have taken place around 15,000 years ago, when seed processing was introduced to compensate for the loss of lake resources after the overflow system ceased to function as such (Allen 1974). The proposed long-term continuity in diet relied on ethnohistorical observations to flesh out the remote past, with limited consideration given to their applicability (Allen and Holdaway 2009). Such consideration is critical given that many of the recorded taxa have broad biogeographic distributions, the significant paleo-environmental changes that took place over the past 50,000 years, and the small number of hearths studied compared to the scale of the landscape and the time depth of its history. It is not surprising that this interpretation has been subject to critical reevaluation by its original proponent (Allen 1998; Allen and Holdaway 2009).

Long-term continuity in diet is unlikely, but given the time span of human settlement, the remains of hundreds of "individual meals" need to be studied in order to build a picture of how the "menu" has changed over time, including shifts in the relative importance of different prey species and the strategies employed to acquire and process those prey. Approximately 30% of the hearths documented during systematic surveys have associated food remains, and these remains suggest that much of the time dietary protein was being obtained from small mammals, eggs and reptiles, and sometimes from large macropods and birds.

The shell middens preserved in the lunettes bounding the Willandra Lakes are not common and are generally small (Johnston 1993) and, like the hearths lit primarily to cook fish (Stern 2015), are restricted to the onset of continental aridity (ca. 40 ka ± 2) and the Last Glacial Maximum (Bowler et al. 2012). Although this may seem

counterintuitive, when the lakes were full of freshwater, every creek and billabong on the open plains would also have held water, lifting a critical constraint on where and how far people could go to gather food and other resources and to meet up with other social groups. Nor is it counterintuitive if the amount of time and energy required to harvest shellfish is compared to the returns obtained (Allen and Holdaway 2009). Thus it could be argued that lake resources were fallback foods.

Recent research also reveals that seed grinding was introduced in the lead up to the Last Glacial Maximum, not after the final drying of the lakes. A study designed to establish whether grindstones exposed on the surface of the lunette preserve interpretable wear traces and/or residues shows that they were used primarily to grind seeds (Fullagar et al. 2015). Ongoing research aims to identify the seeds that were being harvested and to assess their significance in the overall diet.

Changing Technologies

Most of the chipped stone tools found on the Mungo lunette were fashioned from silcrete, numerous outcrops of which occur in the immediate region; most of the rest were made from quartzite, small outcrops of which are found 40 km to the west or 70 km to the north of Lake Mungo, and only a few were made from materials exotic to the region. The silcrete varies considerably in color and texture, even at a single source, but generally exhibits poor flaking quality compared to the quartzite. Changes in the relative abundance of silcrete and quartzite in an assemblage, combined with measures of how intensively each of these materials was worked, thus provide a basis for interpreting changes in assemblage characteristics in terms of shifts in relative mobility, which, in turn, reflect responses to changing paleoenvironmental circumstances (Stern et al. 2013).

For example, assemblages from the Arumpo unit (~24–21 ka) originating from alternating layers of clay and sand that reflect fluctuating lake levels contain relatively more quartzite artifacts, and the characteristics of both the silcrete and quartzite artifacts show little evidence for attempts to conserve the use-life of cores or tools; this suggests relatively higher levels of mobility. In contrast, the quartzite and silcrete artifacts originating from pelletal clays that reflect low lake levels are smaller and exhibit features indicative of attempts to extend the use-life of both cores and tools; this suggests relatively lower levels of mobility (Stern et al. 2013: 44–6).

Artifacts made from freshwater bivalves provide rare insights into a type of tool that may once have been in common use. Four shell tools, from sediments deposited between ~50 and 30 ka, were recovered from the surface of the lunette following unusually heavy rains. The shell tools described in the historical records from this region were unmodified or minimally modified valves used to scrape possum hides, scale fish, and prepare the twine used in net making. In contrast, the Pleistocene tools have deep notches incised into their working edges. Experimental studies suggest that they were used to work a soft-textured material and that individual tools were used in a scraping or slicing and/or cutting actions (Weston et al. 2017).

Long-Distance Movement of Material and Social Networks

Exotic materials that originated outside the Willandra Lakes region provide some measure of the extent of past social networks (e.g., Veth et al. 2011), although it should be noted that current data are limited. Two pieces of evidence suggest that social networks may have been quite extensive during the earliest phase of human settlement in the Willandra. One is the ochre that covered the body of Mungo Man, which is thought to have originated in the Barrier Range, some 250 km to the northwest (Bowler et al. 1970; Johnston and Clark 1998), although it should be noted that the source of this ochre has not yet been established through trace element analysis. The

other is the presence of *Turbo undulata* shells in Lower Mungo sands (personal observation). This is a marine species, commonly encountered on rock platforms along the southeast Australian coast, the nearest portion of which lies 400 km to the south.

Although the raw materials used to make the chipped stone tools and grinding stones found on the Mungo lunette had to be carried there, most could have been obtained from outcrops within 70 km of the Lake Mungo. A single edge-ground axe collected from the surface of the Mungo lunette during the 1970s was made from an amphibole hornfels that may have originated near Mt. Camel, >600 km to the southeast (Clark 1987). All the edge-ground axes recovered from dated contexts in southern Australia fall within the late Holocene (e.g., Mulvaney and Kamminga 1999: 221), so it has long been assumed that this one is of similar antiquity.

Current Work

Current interdisciplinary research in the Willandra is designed to identify the shifts in diet, food-gathering strategies, technologies, and social networks that took place over time and to investigate the relationship, if any, that these have to the dramatic changes in environment that have been documented for this climatically sensitive region. Electronic data recording systems solve many of the practical difficulties of studying scattered traces of past human activity dispersed through vast, stratigraphically complex and eroding landforms, which proved such a constraint to earlier research (Shawcross 1998). This work is being undertaken in close collaboration with members of the three traditional tribal groups of the Willandra Lakes Region World Heritage Area, the Barkindji/Paakantyi, Mutthi Mutthi, and Ngiyaampaa, who share the researchers' goal of enhancing the flow of information from this iconic Australian site.

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References

Allen, H., 1972. Where the crow flies backwards: Man and land in the Darling Basin. Unpublished PhD dissertation, Australian National University.

Allen, H. 1974. The Bagundji of the Darling Basin: Cereal gatherers in an uncertain environment. *World Archaeology* 5: 309–322.

Allen, H. 1998. Reinterpreting the 1969–1972 Willandra Lakes archaeological surveys. *Archaeology in Oceania* 33: 207–220.

Allen, H., and S. Holdaway. 2009. The archaeology of Mungo and the Willandra Lakes: Looking back, looking forward. *Archaeology in Oceania* 44: 96–106.

Bailey, G.N. 2007. Time perspectives, palimpsests and the archaeology of time. *Journal of Anthropological Archaeology* 26: 198–223.

Barbetti, M., and H. Allen. 1972. Prehistoric man at Lake Mungo, Australia, by 32,000 years BP. *Nature* 240: 46–48.

Bowler, J.M. 1970. Late quaternary environments: A study of lakes and associated sediments in South Eastern Australia. Unpublished PhD dissertation, Australian National University.

Bowler, J.M. 1971. Pleistocene salinities and climatic change: Evidence from lakes and lunettes in south-eastern Australia. In *Aboriginal man and environment in Australia*, ed. D.J. Mulvaney and J. Golson, 47–65. Canberra: Australian National University Press.

Bowler, J.M. 1976. Aridity in Australia: Age, origins and expression in aeolian landforms and sediments. *Earth Science Reviews* 12: 279–310.

Bowler, J.M. 1998. Willandra Lakes revisited: Environmental framework for human occupation. *Archaeology in Oceania* 33: 120–155.

Bowler, J.M., and A.G. Thorne. 1976. Human remains from Lake Mungo: Discovery and excavation of Lake Mungo III. In *The origin of the Australians*, ed. R.L. Kirk and A.G. Thorne, 127–138. Canberra: Australian Institute of Aboriginal Studies.

Bowler, J.M., R. Jones, H. Allen, and A.G. Thorne. 1970. Pleistocene human remains from Australia: A living site and human cremation from Lake Mungo, western New South Wales. *World Archaeology* 2: 39–60.

Bowler, J.M., H. Johnston, J.M. Olley, J.R. Prescott, R.G. Roberts, W. Shawcross, and N.A. Spooner. 2003. New ages for human occupation and climatic change at Lake Mungo, Australia. *Nature* 421: 837–840.

Bowler, J.M., R. Gillespie, H. Johnston, and K. Boljkovac. 2012. Wind v water: Glacial maximum records from the Willandra Lakes. In *Peopled landscapes: Archaeological and biographic approaches to landscapes, Terra Australis*, ed. S.G. Haberle and B. David, vol. 34, 271–296. Canberra: Australian National University.

Clark, P. 1987. Willandra Lakes world heritage area archaeological resource study. Report for the NSW department of environment and planning.

Fitzsimmons, K.E. 2017. Reconstructing palaeoenvironments on desert margins: New perspectives from Eurasian loess and Australian dry lake shorelines. *Quaternary Science Reviews* 171: 1–19.

Fitzsimmons, K., N. Stern, and C. Murray-Wallace. 2014. Depositional history and archaeology of the central Mungo lunette, Willandra Lakes, southeast Australia. *Journal of Archaeological Science* 41: 349–364.

Fitzsimmons, K., N. Stern, and C. Murray-Wallace. 2015. The Mungo mega-lake event, semi-arid Australia: Nonlinear descent into the last ice age, implications for human behavior. *PLoS One* 10 (6): *e0127008*.

Fullagar, R., E. Hayes, B. Stephenson, J. Field, C. Matheson, N. Stern, and K. Fitzsimmons. 2015. Evidence for Pleistocene seed grinding at Lake Mungo, southeastern Australia. *Archaeology in Oceania* 50: 3–18.

Grün, R., N. Spooner, J. Magee, A. Thorn, J. Simpson, G. Yan, and G. Mortimer. 2010. Stratigraphy and chronology of the WLH 50 human remains, Willandra Lakes World Heritage Area, Australia. *Journal of Human Evolution* 60 (5): 597–604.

Hudjashov, G., T. Kivisild, P.A. Underhill, P. Endicott, J.J. Sanchez, A.A. Lin, P. Shen, P. Oefner, C. Renfrew, R. Villems, and P. Forster. 2007. Revealing the prehistoric settlement of Australia by Y chromosome and mtDNA analysis. *Proceedings of the National Academy of Sciences* 104: 8726–8730.

Johnston, H. 1993. Pleistocene shell middens of the Willandra Lakes. In *Sahul in review: Pleistocene archaeology in Australia, New Guinea and Island Melanesia*, ed. M.A. Smith, M. Spriggs, and B. Fankhauser, 197–203. Canberra: Department of Prehistory, Research School of Pacific Studies. Australian National University.

Johnston, H., and P. Clark. 1998. Willandra Lakes archaeological investigations 1968-98. *Archaeology in Oceania* 33: 105–119.

Mcevoy, B.P., J.M. Lind, E.T. Wang, R.K. Moyzis, P.-M. Visscher, S.M. Van Holst Pellekaan, and A.N. Wilton. 2010. Whole-genome genetic diversity in a sample of Australians with deep Aboriginal ancestry. *American Journal of Human Genetics* 82: 297–305.

Mulvaney, D.J., and J.M. Bowler. 1981. Lake Mungo and the Willandra Lakes. In *The heritage of Australia: The illustrated register of the National Estate*, 180–183. Sydney: Macmillan.

Mulvaney, D.J., and J. Kamminga. 1999. *Prehistory of Australia*. Sydney: Allen and Unwin.

Olley, J.M., R.G. Roberts, H. Yoshida, and J.M. Bowler. 2006. Single-grain optical dating of grave-infill associated with human burials at Lake Mungo, Australia. *Quaternary Science Reviews* 25: 1469–2474.

Riech, D., N. Patterson, M. Kitchner, F. Delfin, M.R. Nandineni, I. Pugach, A.M.-S. Ko, Y.-C. Ko, T.A. Jinam, M.E. Phipps, N. Saitou, A. Wollstein, M. Kayser, S. Pääbo, and M. Stoneking. 2011. Denisova admixture and the first modern dispersals into Southeast Asia and Oceania. *The American Journal of Human Genetics* 89: 516–528.

Shawcross, W. 1998. Archaeological excavations at Mungo. *Archaeology in Oceania* 33: 183–200.

Shawcross, F.W., and M. Kaye. 1980. Australian archaeology: Implications of current interdisciplinary research. *Interdisciplinary Science Reviews* 5: 112–128.

Stanner, W.H. [1953] 1987. The dreaming. In *Traditional aboriginal religion: A reader,* ed. W.H. Edwards, 227–238. South Melbourne: Macmillan.

Stern, N. 2015. The archaeology of the Willandra: Its empirical structure and narrative potential. In *Long history, deep time*, ed. A. McGrath and M.A. Jebb, 221–240. Canberra: ANU Press.

Stern, N., J. Tumney, K. Fitzsimmons, and P. Kajewski. 2013. Strategies for investigating human responses to changes in landscape and climate at Lake Mungo in the Willandra Lakes, southeast Australia. In *Archaeology in environment and technology: Intersections and transformations*, ed. D. Frankel, J. Webb, and S. Lawrence, 31–50. London: Routledge.

Tobler, R., A. Rohrlach, J. Soubrier, P. Bover, B. Llamas, J. Tuke, N. Bean, A. Abdullah-Highfold, S. Agius, A. O'Donoghue, I. O'Loughlin, P. Sutton, F. Zilio, K. Walshe, A.N. Williams, C.S.M. Turney, M. Williams, S.M. Richards, R.J. Mitchell, E. Kowal, J.R. Stephen, L. Williams, W. Haak, and A. Cooper. 2017. Aboriginal mitogenomes reveal 50,000 years of regionalism in Australia. *Nature* 544: 180–184.

Veth, P., N. Stern, J. Mcdonald, J. Balme, and I. Davidson. 2011. The role of information exchange in the colonization of Sahul. In *Information and its role in hunter-gatherer bands*, ed. R. Whallon, W.A. Lovis, and R.K. Hitchcock, 203–349. Los Angeles: Cotsen Institute of Archaeology Press.

Webb, S.G. 1989. *The Willandra Lakes Hominids*. Canberra: The Australian National University.

Webb, S.G. 2006. *The first boat people*. Cambridge: University Press.

Webb, S. 2007. Further research of the Willandra Lakes fossil footprint site, southeastern Australia. *Journal of Human Evolution* 52: 711–715.

Webb, S., M.L. Cupper, and R. Robins. 2006. Pleistocene human footprints from the Willandra Lakes, southeastern Australia. *Journal of Human Evolution* 50: 405–413.

Westaway, M.C., and C.P. Groves. 2009. The mark of ancient Java is on none of them. *Archaeology in Oceania* 44: 84–95.

Weston, E., K. Szabó, and N. Stern. 2017. Pleistocene shell tools from the Lake Mungo Lunette, Australia: Identification and interpretation drawing on experimental archaeology. *Quaternary International* 427: 229–242.

Further Reading

Bowler, J.M. 2002. Lake Mungo: Window to Australia's past. CD-ROM, Melbourne. http://www.visitmungo.com.au/research. Accessed 25 Sept 2017.

Laming-Emperaire, Annette

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Basic Biographical Information

Annette Laming-Emperaire (1917–1977) was born in Russia in 1917. She grew up in France, where she lived all her life and developed a fruitful career at the *Centre National de la Recherche Scientifique* (CNRS), later becoming director of the *École Pratique des Hautes Études*, in Paris. She started her research career with rock art, becoming an influential member of the group of structuralist Paleolithic art scholars led by André Leroi-Gourhan. Her doctoral thesis (Laming-Emperaire 1962) was a major contribution towards the development of structuralism in rock art. Later, she became involved with South American prehistory, initially by following her husband, Joseph Emperaire, who was sent by Paul Rivet to the outskirts of the South American continent in the search of the early peopling of the New World. In South America Annette Laming-Emperaire soon found her own vein, and she became deeply involved with local research interests, working mostly in Chile and Brazil. She died in Brazil in 1977.

Major Accomplishments

Annette Laming-Emperaire was an eclectic investigator, full of curiosity about several domains of prehistoric archaeology. With a solid humanistic formation, her research interests were wide, from rock art to lithic analysis and her large fieldwork experience based on a very open mind towards interdisciplinarity, especially as regards Quaternary geology and cultural anthropology.

It is in the sphere of the beginnings of Brazilian archaeology, throughout the 1950s to the 1970s, that Mme. Emperaire (as she was fondly called by her Brazilian friends) became a decisive actor. At that time several academic scholars were starting to turn their attention to archaeology, but there was no academic research or schooling established in the country. Annette Laming-Emperaire became a regular visiting researcher, studying a broad range of material from ceramic Tupi-Guarani sites in the hinterland to *sambaquis* (shell mounds) on the coast, from rock art in hilly remote places to lithic analysis from Paleo-Indian sites at Minas Gerais. In doing this work, she was never alone but encouraged local disciples to learn, by practice, every different activity in which she was involved. Her teaching talents were matched by a strong leadership quality (she took part on the French *Résistance* during the Second World War) and the rigorous field methodology developed by French archaeologists around that time. Even more, she taught extensively at Brazilian universities and organized seminars on rock art and lithic analysis methods. In this sense, she was of paramount importance to a whole first generation of Brazilian archaeologists, leaving as heritage establishment of the basis for an academic archaeological tradition in Brazil that bears from her both a strong reliance on stratigraphic excavations and a meticulous structuralist analysis of artifacts and parietal representations.

Her insights towards the archaeological significance of her study subjects reveal the accuracy of her perspicacious mind. She was the first person to correlate rock art from different regions of the country, suggesting relationships that had not been suspected before but which were proven true by later studies. As regards coastal archaeology, she produced the first reflections on shell mound construction (on what we would call today "site formation processes"), describing accurately these as *sites à accumulation rapide*, or fast accumulating deposits, despite their very long chronology (Laming-Emperaire 1975; refer also to Gaspar's entry on coastal shell mounds in Brazil in this encyclopedia). One of her last works, about which she was really enthusiastic,

was an expedition to study a recently contacted Indian group, the Xetá, who lived in the backlands of Paraná and who still chipped stone implements. This study was published posthumously (Laming-Emperaire et al. 1978).

Her tragic death in an accident, in Curitiba (southern Brazil), left several disciples and friends who became prominent archaeologists in the next decades and prompted many mournful obituaries to be written by friends and colleagues, both in Brazil and in France (Leroi-Gourhan 1978; Pallestrini 1978; Lavallée 1978), from which this entry has drawn deeply. A bibliography of her publications can be found in the *Journal de la Société des Américanistes*, listed below.

Cross-References

- ▶ Leroi-Gourhan, André
- ▶ Prous, André
- ▶ Sambaquis Shell Mounds, Archaeology of
- ▶ South American Rock Art
- ▶ Structural Archaeology

References

Laming-Emperaire, A. 1962. *La signification de l'art rupestre paléolithique*. Paris: Picard.

Laming-Emperaire, A. 1975. Problèmes de préhistoire brésilienne. *Annales* 5: 1229–1259.

Laming-Emperaire, A., M.J. Menezes, and M.-D. Andreatta. 1978. O trabalho da pedra entre os Xetá, Serra dos Dourados, Estado do Paraná. In *Coletânea de estudos em homenagem a Annette Laming-Emperaire. Coleção Museu Paulista,* série Ensaios 2, 11–82. São Paulo.

Lavallée, D. 1978. Annette Laming-Emperaire (1917–1977). *Journal de la Société des Américanistes* 65: 224–226.

Leroi-Gourhan, A. 1978. Annette Laming-Emperaire. In *Coletânea de estudos em homenagem a Annette Laming-Emperaire. Coleção Museu Paulista,* série Ensaios 2, 7–8. São Paulo.

Pallestrini, L. 1978. In memoriam Annette Laming-Emperaire. *Revista do Museu Paulista,* nova série, XXV 5–9.

Publications d'Annette Laming-Emperaire (1917–1977) 1980. *Journal de la Société des Américanistes* 67: 23–28.

Lanciani, Rodolfo

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Basic Biographical Information

Rodolfo Amedeo Lanciani (Rome, 02.01.1845–21.05.1929) was one of the greatest figures of Italian archaeology of the late nineteenth and early twentieth centuries. His contributions are so significant that his teaching and his extraordinary scientific output still affect, both in method and in substance, the studies of the historical topography of Rome and Lazio.

After a technical degree, Lanciani's archaeological training took place in Rome and Ostia in the wake of the great scholars of the period (Giovanni Battista de Rossi, Pietro Ercole Visconti, Carlo Ludovico Visconti, Pietro Rosa, and John Henry Parker), who facilitated his early inclusion in the Archeologica Commissione Comunale di Roma of which Lanciani was Secretary from 1872 to 1890; the assumption in the Direzione Generale Antichità e Belle Arti (1876) is also due to the support of Giuseppe Fiorelli.

The presence of Lanciani in local and national archaeological institutions occurs in the years of the radical urban transformation of Rome itself; his long stay in the University (Professor of Ancient Topography at "La Sapienza" of Rome, 1878–1922) coincides with the modern disciplinary definition of archaeological teaching; his political action is exercised during the difficult period of World War I (Senator from 1911; City Councilor, Head of the Department of Antiquities and Fine Arts, vice-Mayor of Rome, 1914–1920).

Major Impact

Overall, the scientific, academic, institutional and political activities of Lanciani fall in the

crucial half-century between Roma Capitale (1871) and the affirmation of the Fascist regime (1922). This was the period of the greatest enhancement of the urban monuments of Rome under a nationalist perspective; and of the elaboration of legislation concerning the protection of Italy's historical-cultural heritage.

The double training, technical and philological, allowed Lanciani to deal with every aspect and period of history and archaeology of Rome and Lazio, with particular efforts in the reconstruction of the topography of ancient Rome and in the study of its millenary urban history, from the Archaic period to the Renaissance.

The bibliography of Lanciani includes over 630 titles (see Ashby 1928): manuals on Roman archaeology; reports of excavations and discoveries in urban and suburban areas; studies of individual monuments; topography of Rome, suburbs and Campagna Romana; studies on ancient literary and iconographic sources (with particular reference to the Severan marble plan or *Forma Urbis Romae*); epigraphy; sculpture; collections; museography; studies on the medieval and the renaissance history, topography and documents; biographies; reviews; articles of scientific dissemination.

In this multifaceted scientific production stand out the monumental *Forma Urbis Romae* (Milan 1893–1901) and the *Storia degli scavi di Roma e notizie intorno alle collezioni romane di antichità* (4 vols., Rome 1902–1913). Lanciani's voluminous output in English is also fortunate; he published 10 monographs between 1888 and 1925, on the archaeology and history of ancient, medieval and modern Rome, an extraordinary and innovative experiment in scientific communication addressed to the international cultivated audience.

Lanciani's unpublished archive is deposited in the Vatican Library (Cod. Vat Lat. 13,031–13,047 and 15,216–15,229) and the "Appunti Lanciani" in the Library of the Istituto Nazionale di Archeologia e Storia dell'Arte in Rome (for further documents: Palombi 2006, 2008, 2009).

Cross-References

▶ Ashby, Thomas
▶ Topography of Rome
▶ Urban Planning, Roman

References

Ashby, Th. 1928. Scrittori contemporanei di cose romane. Rodolfo Lanciani. *Archivio della Società Romana di Storia Patria* 51: 103–143.

Palombi, D. 2006. *Rodolfo Lanciani. L'archeologia a Roma tra Ottocento e Novecento*. Rome: L' "Erma" di Bretschneider.

Palombi, D. 2008. Archaeology and national identity in the works of Rodolfo Lanciani. Fragmenta. *Journal of the Royal Netherlands Institute in Rome* 2: 125–150.

Palombi, D. 2009. Rome 1911. L'Exposition archéologique du cinquantenaire de l'Unité italienne. *Anabases* 9: 71–100.

Further Reading

Barnabei, M., and F. Delpino, eds. 1991. *Le "Memorie di un Archeologo" di Felice Barnabei*. Rome: De Luca.

Buonocore, M., ed. 1997–2002. *Appunti di topografia romana nei Codici Lanciani della Biblioteca Apostolica Vaticana, vol. I-V.* Roma: Biblioteca Apostolica Vaticana.

Giuliano, A. 1992. Rodolfo Lanciani e la «Storia degli scavi di Roma». *Xenia Antiqua* 1: 155–160.

Sperandio, M., and M.T. Petrara. 1993. Rodolfo Lanciani e i Lanciani di Montecelio. *Atti e Memorie della Società Tiburtina di Storia Patria* 66: 165–177.

Landmarks Foundation: Protecting Sacred Sites Globally

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Basic Information

Landmarks Foundation is operated as a 501(c)(3) in New York, 1997–2011. It relocated from New York to Massachusetts, following death of its founder, Sam Green, in 2011. The website is at http://www.LandmarksFoundation.org.

Major Impact

Because we believe that religious intolerance causes so much grief in the world, Landmarks Foundation celebrates all religious beliefs, past and present. We believe that the tolerance of religious differences is fundamental to human existence, as all religions are an attempt at communication with the divine. The Landmarks Foundation identifies, protects, and preserves sacred sites and landscapes around the world which are tangible focal points for the beliefs, rituals, and religions that define human societies. Landmarks Foundation directs funding and technical expertise to local groups that cannot protect their sacred cultural heritage without assistance. Selection of specific projects is based on cultural significance and degree of jeopardy.

Identified and/or Protected and/or Restored and/or Preserved

- The Moai of Easter Island
- Santa Catarina Church, Sierra Madré, Mexico
- Temple at Patara, Turkey
- Ani, Turkey
- Sajama Lines, Bolivia
- Stone Spheres of Costa Rica
- Huichol Sacred Sites and Landscapes, Mexico
- Baneshwar Temple, Indore, India
- Kaleshwar Temple Complex, Indore, India
- Akhtamar Church, Lake Van, Eastern Turkey
- Gangteng Monastery, Bhutan
- Balyan Church, Istanbul, Turkey
- Slat al Qahal synagogue, Essaouira, Morocco

Cross-References

► Sacred Site Conservation and Preservation
► Sacred Sites in Indigenous Archaeology

Further Reading

Baynard, E. 2005. Restoring the reverend: Sam Green's mission to protect sacred sites. *Modern Painters*, February: 88–91.
Cannell, M. 1999. The curator of forgotten places. *Architecture* 88 (12): 121–123.
Glueck, G. 1968. 5-ton head from Easter Island on a pedestal. *New York Times*, 6 October 1968: D38.
Slonim, J. 1999. Site specific. *Madison Magazine*, November–December: 48–51.
Smith, A., and G. Forster. 1999. Spheres of influence. *Madison Magazine*, November–December: 52–59.

Landscape and Plants Use in Brazilian Shell Mounds

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State of Knowledge and Current Debates

Brazilian shell mounds, locally named *sambaquis*, were first recognized back in the nineteenth century. They remain to this day among the best studied sites in the country. Issues, such as diet/subsistence, environment/landscape, and, nowadays, ceremonial activities, have always been central to most research agendas. However, the importance of plant use and consumption remained, until recently, largely underestimated.

To a great extent, this is due to differential preservation, since animal remains tend to be overestimated compared to plant remains. Archaeological preservation of botanical remains is uncertain and depends on aleatory events and conditions that vary for each plant and plant organ. However, plants were extremely important for most past populations. They were certainly used in many ways in the daily life of *sambaqui* people, both in domestic and in ceremonial activities, for food, fuel, medicine, dyes, soap, tools, raw materials, construction, boats, and others.

Analyses of these remains pertain to archaeobotany. They were virtually inexistent in Brazil until the end of the 1990s, except for few plant macroremains identified at the request of archaeologists. The first studies, precisely in shell mounds, employed anthracology (e.g., Scheel-Ybert 2000, 2001) and soon were followed by microarchaeobotanical analyses (Wesolowski

2007; Boyadjian 2012). Studies on carporemains and underground organs, however, remain as yet rare and asystematic, for preservation of non-carbonized plant macroremains is particularly rare in *sambaquis* – exceptions include a few sites presenting waterlogged material in their lower layers.

Anthracology (i.e., charcoal analysis and identification based on wood anatomy criteria) provides both paleoenvironmental/landscape reconstitutions and paleoethnobotanical information on the use of plants. This discipline allows reliable reconstructions of local woody vegetation, since the confrontation with phytosociological data (vegetation structure) is rather direct, and carbonized macroremains are usually abundant in all archaeological sediments (Scheel-Ybert 2000). Charred macroremains of fruits, seeds, and tubers, frequently preserved along with wood charcoal remains, may inform about plant foods (Scheel-Ybert 2001, 2013). Microarchaeobotany (i.e., the study of phytoliths, starch grains, and other plant microremains found in archaeological context) is most useful for both subsistence and paleoethnobotanical information but can also contribute to paleoenvironment and landscape reconstitutions. These remains can be preserved in dental calculus, artifacts, and even sediments. The complementary information acquired from both approaches discloses important information on diet, plants use, landscape, and ultimately on these shell mound builders' way of life.

Landscape

Anthracological studies have already been performed for ten *sambaquis* from the Southeastern and Southern Brazilian coasts, providing landscape and paleoenvironmental information. Eight sites are situated in Rio de Janeiro State (Forte, Boca da Barra, Salinas Peroano, Meio, Ponta da Cabeça, Corondó, Pontinha, Beirada – Scheel-Ybert 2000; Scheel-Ybert and Dias 2007) and two in Santa Catarina State (Jabuticabeira-II, Encantada-III – Scheel-Ybert et al. 2009a; Bianchini et al. 2011) (Fig. 1). Their chronology ranges between 5270 ± 80 and 1430 ± 55 years BP (Table 1). Two sites present evidence of short occupations (Meio, Encantada-III), but most of them attest to long-standing sedentary settlements. The occupation periods vary from about 500 (Pontinha, Beirada) or 1000 (Ponta da Cabeça, Corondó, Jabuticabeira-II), to even more than 2000 (Boca da Barra, Salinas Peroano) or 3000 years (Forte).

Settlement pattern analyses demonstrated that *sambaquis* were always established in the vicinity of coastal lagoons, which were at the center of their builders' social life (DeBlasis et al. 2007). Anthracological results confirmed the close association of these sites to coastal lagoonal environments, indicating a very steady *restinga* environment, always neighboring other plant communities, such as humid coastal forests and sometimes mangroves (Fig. 2) (Scheel-Ybert 2000, 2001; Scheel-Ybert and Dias 2007; Scheel-Ybert et al. 2009a; Bianchini et al. 2011). *Restinga*, a typical Brazilian coastal vegetation, is a mosaic of plant associations with diverse physiognomies that occupies the sandy beach ridges. It varies from sparse open plant communities, such as herbaceous and shrub formations ("open *restinga*") to dense evergreen forest ("*restinga* forest"). Mangroves and saltwater marshes frequently occur at the land-sea interface, especially the edges of rivers and lagoons. Along the coast, inland low mountains and hills support the Atlantic Rain Forest.

As anthracological spectra reflect the local vegetation, one or another of these vegetation types prevails in each site, depending on its geographical location. Open *restinga* formations dominate in *sambaquis* Beirada and Pontinha, both situated between the sea and a coastal lagoon; their occupants were probably using mainly the vegetation closer to the ocean. Open *restinga* and *restinga* forest dominate in Forte, Ponta da Cabeça, and Jabuticabeira-II; the first two sites are presently near the sea; although the latter is situated farther inland, the sea level was higher in the period it was occupied – it is therefore probable that all of them were established in the *restinga* and had equal access to both open and forest formations. Anthracological spectra of Salinas Peroano, Boca da Barra, and Corondó, situated farther inland (Corondó) or upon coastal crystalline hills (the other two), present a significant contribution of *restinga* forest and Atlantic

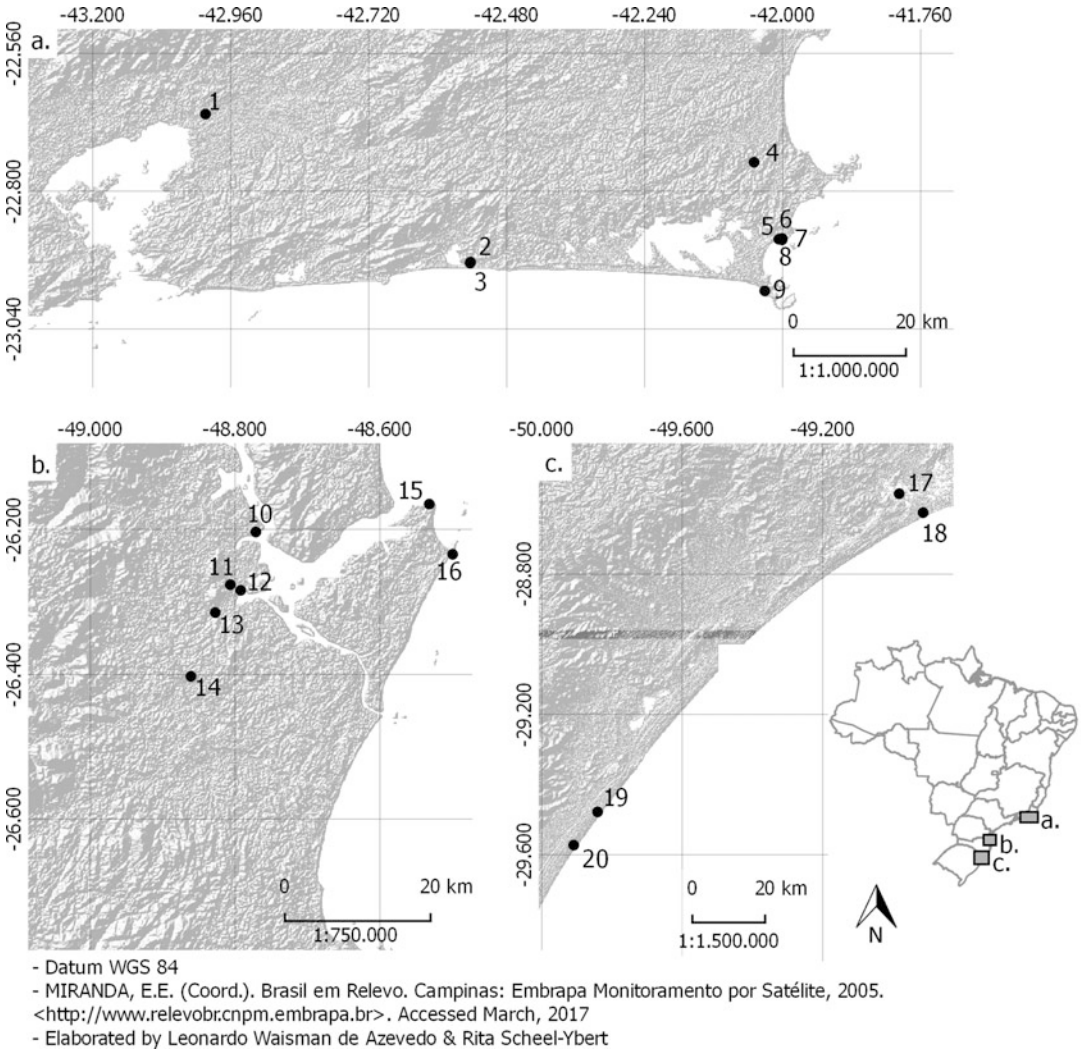

Landscape and Plants Use in Brazilian Shell Mounds, Fig. 1 Geographical location of studied sites. (**a**) South-eastern Rio de Janeiro State, showing the region of Guanabara Bay (to the left) and the "Lakes Region," dominated by the Araruama Lagoon (to the right): (**1**) Sernambetiba, (**2**) Pontinha, (**3**) Beirada, (**4**) Corondó, (**5**) Forte, (**6**) Salinas Peroano, (**7**) Meio, (**8**) Boca da Barra, (**9**) Ponta da Cabeça. (**b**) Northern Santa Catarina State, showing the region of Babitonga Bay: (**10**) Cubatão-I, (**11**) Espinheiros-II, (**12**) Rio Comprido, (**13**) Morro do Ouro, (**14**) Itacoara, (**15**) Forte Marechal Luz, (**16**) Enseada. (**c**) Southern Santa Catarina and Northern Rio Grande do Sul States: (**17**) Jabuticabeira-II, (**18**) Encantada-III, (**19**) Figueira-II, (**20**) Marambaia-I

forest taxa – corroborating their preference for gathering firewood near the sites and the presence of Atlantic forest inland and upon the hills. The few charcoal micro-fragments retrieved from *sambaquis* Meio and Encantada-III only allowed to demonstrate that a *restinga*-type vegetation existed near these sites during the occupation period. Mangrove elements appeared in Forte, Salinas Peroano, Boca da Barra, Ponta da Cabeça, Beirada, and Encantada-III. *Avicennia* and *Laguncularia*-dominated mangroves suggest they occurred mainly in the borders of salty or hypersaline lagoons, rather than along coastal rivers (Scheel-Ybert 2000; Scheel-Ybert and Dias 2007; Scheel-Ybert et al. 2009a; Bianchini et al. 2011; Bianchini and Scheel-Ybert 2012).

Landscape and Plants Use in Brazilian Shell Mounds, Table 1 Geographical location of studied sites, earlier and most recent radiocarbon dates for each site (and datings of layers or features mentioned in the text, when applicable), corresponding calibrated ages, and dated material (*RJ* Rio de Janeiro State, *SC* Santa Catarina State, *RS* Rio Grande do Sul State). Calibrations performed with OxCal 4.2, using the curves SHCal13: Southern Hemisphere (Hogg et al. 2013) for charcoal and seeds, Marine13-modelled ocean average (Reimer et al. 2013) for shells ($R = 220 \pm 20$ years, Estoe et al. 2002), and mixed marine 50:50% SHCal13/Marine13 for human bones

Site	Location	Level/feature	Conventional age	Calibrated age	Dated material
Forte	Cabo Frio, RJ	270–320 cm	5270 ± 80	6265–5755	Charcoal
		Level I	2240 ± 70	2276–1886	Shell
Meio		70 cm	5180 ± 80	5901–5575	Shell
		130–140 cm	4340 ± 70	5259–4585	Charcoal
Salinas Peroano		100–110 cm	4490 ± 40	5288–4878	Charcoal
		20–30 cm	1830 ± 45	1825–1592	Charcoal
Boca da Barra		90–100 cm	3760 ± 180	4574–3586	Charcoal
		20–30 cm	1430 ± 55	1399–1183	Charcoal
Corondó	São Pedro d'Aldeia, RJ	Layer IV	4260 ± 65	4953–4528	Charcoal
		Layer II	3010 ± 80	3360–2894	Charcoal
Ponta da Cabeça	Arraial do Cabo, RJ	160–170 cm	3270 ± 70	3635–3255	Charcoal
		70–80 cm	2080 ± 40	2143–1897	Charcoal
Beirada	Saquarema, RJ	Level IV	4520 ± 190	5446–4450	Shell
		Level I	3800 ± 190	4510–3500	Shell
Pontinha		Level IV	2270 ± 190	2742–1832	Charcoal
		Level II	1790 ± 40	1783–1545	Charcoal
Sernambetiba	Guapimirim, RJ	80–90 cm	1800 ± 40	1807–1571	Charcoal
		500 cm	1920 ± 70	2000–1616	Seed
Rio Comprido	Joinville, SC	(Ancient series)	> 4490	?	?
		(Recent series)	< 4170	?	?
Morro do Ouro		(Ancient series)	4030 ± 40	4509–4245	Collagen, human bone
Cubatão-I		Base	3110 ± 70	3446–3069	Charcoal
Espinheiros-II		Base	2970 ± 60	3119–2773	Shell
Enseada		?	1390 ± 40	1282–1097	Collagen, human bone
Forte Marechal Luz		?	1110 ± 100	1259–766	Charred seeds
		?	850 ± 100	925–564	Charcoal
Itacoara		?	550 ± 55	–	TL, pottery
Encantada-III	Jaguaruna, SC	30–40 cm	4320 ± 40	4971–4651	Charcoal
Jabuticabeira-II		L.5, T13, lev. 7	2890 ± 55	2993–2726	Shell
		L.1, T18	2880 ± 80	3059–2690	Shell
		L.1, T18, lev. 10	2280 ± 80	2427–2011	Charcoal
		L.1, burial 12	2170 ± 45	2111–1852	Shell
		L.3, T11, upper dark layer	1805 ± 65	1833–1536	Charcoal
Figueira-II	Arroio do Sal, RS	Base	3660 ± 40	4085–3830	?
Marambaia-I		Level 13/base	3050 ± 40	3350–3063	?

The only microarchaeobotanical study aiming landscape reconstruction in Brazilian shell mounds, performed in two sites from Southern Brazil dated at 3660 ± 40 and 3050 ± 40 years BP (Figueira-II, Marambaia-I – Pereira 2013), corroborates these findings. This analysis, relying

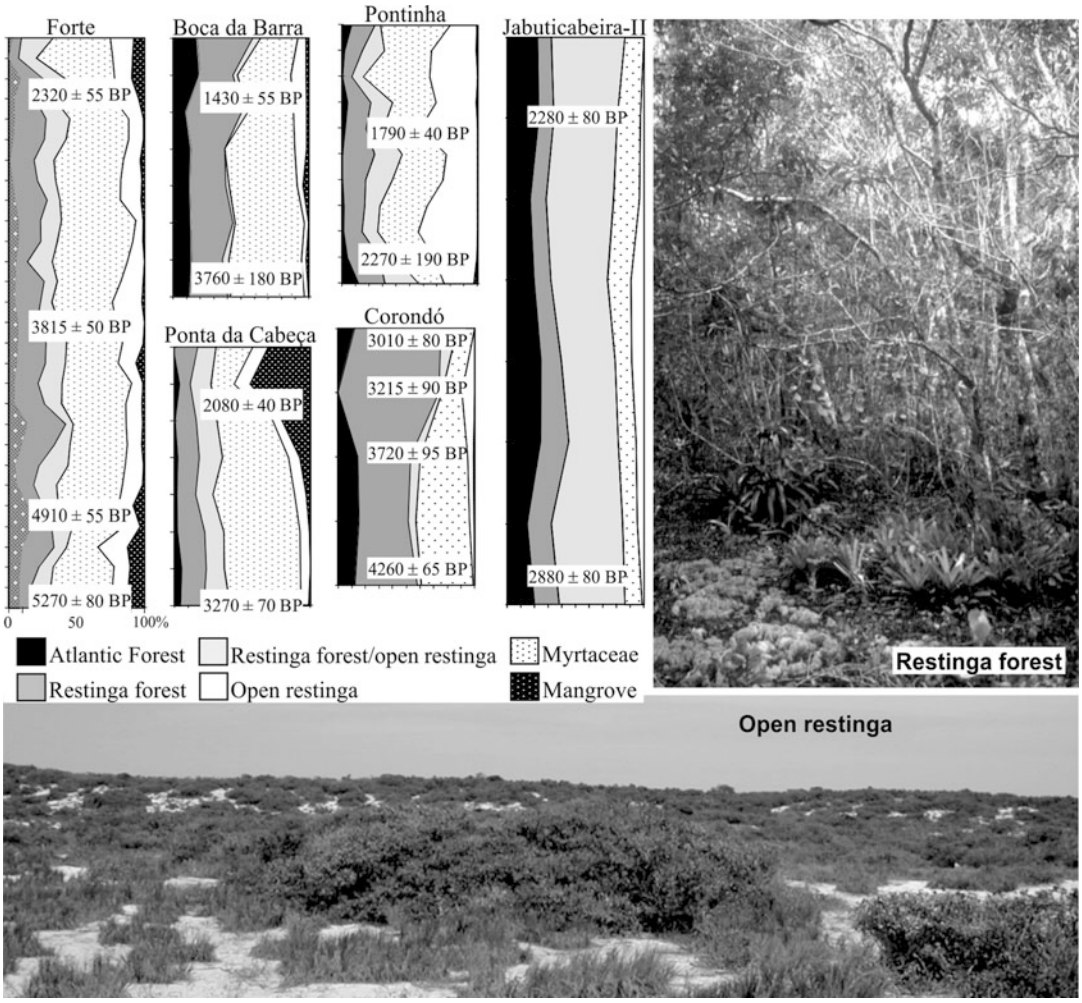

Landscape and Plants Use in Brazilian Shell Mounds, Fig. 2 Summary charcoal diagrams for *sambaquis* Forte, Boca da Barra, Ponta da Cabeça, Pontinha, Corondó, and Jabuticabeira-II. Aspects of the open scrubby *restinga* (below) and of the *restinga* forest (right) (diagrams Scheel-Ybert 2000; Scheel-Ybert and Dias 2007; Scheel-Ybert et al. 2009b; pictures Rita Scheel-Ybert)

especially on phytoliths and pollen grains, suggested that the sites were established upon soils in process of stabilization, where a humid coastal lacustrine environment rich in Poaceae and Cyperaceae plants gave place to *restinga*.

It is noteworthy that the charcoal assemblage of each anthracologically studied site did not change significantly over the several centuries of occupation, even if climatic oscillations were recorded, in the Southeastern coast, by variations in the mangrove vegetation. These variations corroborate other paleoenvironmental studies in the area, pointing to the alternation of two more humid phases and two episodes of increased dryness with increased lagoon salinity between 5270 ± 80 and 1430 ± 55 years BP (Scheel-Ybert 2000).

The apparent stability of the vegetation, however, was not associated to a stationary or immutable landscape. Multiple phytosociological, climatic, geomorphological, and anthropogenic processes must be taken into account here, and none of them are mutually contradictory: (1) the anthracological record shows that the mainland vegetation types

around the sites were practically the same during all the occupation periods; (2) the vegetation on the sea-land interface (mangrove), conversely, did vary; (3) small-scale climatic oscillations are recorded by these mangrove variations and corroborated by other paleoenvironmental studies; (4) significant sea-level variations, recorded by several studies, attestedly changed the coastal outline and the local lagoons conformation; and (5) (large) sedentary human groups dwelled along the coast for thousands of years.

Although it is expected that climatic changes produce vegetation change, this is not what happened regarding the coastal mainland vegetation, neither in the Southeastern nor in the Southern Brazilian coast. The *restinga* ecosystem being essentially an edaphic formation, that is to say, related to sandy soils and to the geomorphologic nature of sandy beach ridges, is highly resilient and therefore much less sensitive to climatic change (Scheel-Ybert 2000). On the other hand, Holocene sea-level variations are key to understand the coastal landscape during the *sambaquis* occupation. In the Southern-Southeastern coast, it is now well admitted that sea level, which was much lower during the Pleistocene, crossed the present level around 7000 years BP, reached its highest level (c. 2.5 m above the present) around 5500/5000 years BP, and then gradually fell to its present level (Angulo et al. 2006; Castro et al. 2014). When the sea level was higher, the coastline was much farther inland, and a large system of paleolagoons existed. During its retreat, these lagoons were gradually dried. Through a period of changing landscape including processes of partial isolation of water bodies by deposition of sandy barriers or drowning of preexisting dissection valleys, finally a new lagoonal system was established closer to the present sea line.

The coastal vegetation, however, remained the same throughout this process. Drying paleolagoons were gradually occupied by marsh herbaceous vegetation, adapted to humid brackish soils in process of stabilization. This was followed by the establishment of open *restinga* formations and later probably by different kinds of *restinga* physiognomies and by the *restinga* forest. This scenario is supported by both microarchaeobotanical and anthracological results, as presented above (Scheel-Ybert 2000; Pereira 2013).

It is important to keep in mind that all these processes were gradual and rather slow. Therefore, from the viewpoint of the people living there, the coastal landscape was dynamic, but still it was conservative. In other words, although this environment changed all the time, the landscape remained the same.

Another important point to consider is that quite large sedentary human groups (cf. Fish et al. 2013) have probably dwelled along the coast for thousands of years. These people constructed impressive mounds, lived in organized settlements, produced various artifacts, fished, hunted, made large fires, used plants to a variety of purposes, and maybe even managed or cultivated plant foods. They certainly interfered with the landscape and modified it in several ways. In spite of that, no anthropogenic degradation was perceived.

But that doesn't mean that the plant environment remained unaffected by human interference. There is little doubt that plants management was customary. Plant cultivation, possibly horticulture, might also have been practiced, as discussed later. Cultivation leads to the creation of anthropogenic environments, stimulating the introduction of foreign plants and management of native ones.

There seems to exist evidence of plants management in the Southeastern coast. For instance, for a sort of bully tree (*Sideroxylon obtusifolium*, a Sapotaceae), which charcoal was particularly frequent in the archaeological record. These trees and shrubs are quite common in the extant *restinga* vegetation, but they occur remarkably often in the site's vicinity and frequently over the mounds – to the point of being considered a "mound marker." Even if this is a fragile indication, the systematic association of these plants with archaeological sites might be an indication of their ancient use, representing the relict of past human activities. Their present utilities include edible fruits, several medicinal properties, and a good quality wood that is used in the present days to build specific boat parts (Scheel-Ybert 2001).

An interesting hypothesis, still untested, suggests that *sambaqui* people encouraged the dispersion of Myrtaceae plants, therefore contributing to the landscape construction (Bianchini 2008). One possible reason is that many Myrtaceae species produce edible fruits. A number of them, presently domesticated or semidomesticated, are important food items in tropical regions, such as several species of *Psidium*, *Eugenia*, *Myrciaria*, *Campomanesia*, *Syzygium*, and many others. The prominence of Myrtaceae remains in Southeastern and Southern shell mounds demonstrates that *sambaqui* builders largely used these plants both as firewood and as food. The strong contribution of Myrtaceae charcoal in all *sambaquis* anthracological records is striking. The presence of Myrtaceae seeds (as well as wood) associated with the funerary ritual in *sambaqui* Jabuticabeira-II, as it will be presented later, points to a high social value of these plants.

Although common in different communities of Brazilian vegetation, Myrtaceae are typical to *restinga* formations, particularly in Rio de Janeiro State (Araujo and Henriques 1984). The extant *restinga* flora typically presents high species diversity and a great number of individuals from this family, which frequently assumes a strong dominance in this vegetation physiognomy – could it be an evidence of landscape domestication?

Clement (1999) defines landscape domestication as a conscious process by which human manipulation results in changes in landscape ecology and in the demographics of its plant (and animal) populations, resulting in a landscape more productive and congenial for humans. Indeed, it is likely that *sambaqui* builders may have behaved as dispersal agents for these plants – transporting seeds along their paths, exchanging fruits from their "gardens," or in any way managing them, even if incipiently. These activities would tend to increase these plants importance in the environment (both in terms of species diversity as in number of individuals). If that is true, the high frequencies of Myrtaceae and the relative stability of the *restinga* environment would have persisted over such a long time not *in spite of* the human occupation but most likely *because of it* (Scheel-Ybert 2014).

It is nowadays largely accepted that human intervention has had significant consequences on the structuration of the present vegetation (e.g., Denevan 1992; Balée and Erickson 2006; Clement and Junqueira 2010). Human activity does not necessarily lead to degradation and extinction of species, due to the resilience of natural ecosystems. On the contrary, it may actually increase natural biodiversity by forest management, planting, encouraging the growth of an assemblage of useful plants in certain forest spots, and/or introducing new species (e.g., Balée 1994; Rival 1998; Politis 2001), or even, as it might have been the case in coastal Brazil, by modeling the landscape in a large scale and durably altering its structure through the deliberate or unintended encouragement of the prevalence of a whole group of plants.

Plants Use: Food

Currently, it is largely accepted that *sambaqui* builders were fisher-gatherers. For many Brazilian archaeologists, however, the notion of "mollusk gatherers" is still implicit in the second part of this expression. But studies on plants macro- and microremains have been demonstrating that plant consumption, even if secondary, certainly played a pivotal part in their diet and way of life.

Microarchaeobotanical studies in dental calculus have provided essential direct evidence of *sambaqui* people's diet. All studies up to now have been performed in Southern Brazilian sites (Fig. 1, Table 1). In 53 individuals from *sambaquis* Morro do Ouro (4030 ± 40 years BP), Forte Marechal Luz (1110 ± 100–850 ± 100 years BP), Enseada (1390 ± 40 years BP), and Itacoara (550 ± 55 years BP), Wesolowski (2007) identified a great diversity of phytoliths and starch grains, some of the latter modified (which points to cooking or processing). Sweet potatoes (*Ipomoea batatas*), Araceae (the taro family), and Poaceae (grasses) remains are present in all series; yams (*Dioscorea* spp.), palms (Arecaceae), and *Araucaria* pine nuts in most of them; and possibly Marantaceae (the arrowroot/leren family) and bromeliads in some. Possible maize remains were found in the more recent sites, Enseada and

Itacoara. Besides demonstrating that a large variety of plant foods was ingested by *sambaqui* people, this work also suggested that earth ovens were used for cooking and that contact with more inland plateau groups might have happened – the latter due to the presence of *Araucaria* pine nuts, which does not thrive on the coast.

Boyadjian (2012) found very similar results in the Jabuticabeira-II shell mound, which was continuously occupied from at least 2890 ± 55 to 1781 ± 65 years BP. The results from the 19 studied individuals attested a very diversified diet. Among the more than 30 starch grains and phytoliths morphotypes found and identified were sweet potatoes, yams, leren, Myrtaceae (possibly Surinam cherry), Araceae (taro family), palms, and maize. Damaged starches pointed to food processing. The presence of grass phytoliths might suggest the use of grass leaves in the fires. Microcharcoal remains were associated to the roasting of tubers in open hearths or earth ovens. The presence of lacustrine diatoms reasserted the use of lagoonal resources. The diversity of plant microremains and the evidence of consumption of both domesticated and wild plants allowed to suggest that the group lived in a system of mixed economy, where fishing and gathering were associated with horticulture (Boyadjian et al. 2016).

Macroremains analysis also attested the use of plant foods. Sambaquis Forte (5270 ± 80 to 2240 ± 70 years BP), Salinas Peroano (4490 ± 40 to 1830 ± 45 years BP), Boca da Barra (3760 ± 180 to 1430 ± 55 years BP), Ponta da Cabeça (3270 ± 70 to 2080 ± 40 years BP), Beirada (4520 ± 190 to 3800 ± 190 years BP), and Pontinha (2270 ± 190 to 1790 ± 40 years BP), in Southeastern Brazil (Fig. 1, Table 1), presented charred vestiges of edible plants within most of their archaeological levels, starting at the beginning of the occupation. Although never abundant, they are a significant part of the archaeological record, and their preservation attests that (1) they were widely used by these groups and (2) plant gathering greatly contributed to their diet (Scheel-Ybert 2001). Palm nuts, mostly from *Syagrus* sp., are largely the most abundant remain. Some yam (*Dioscorea* spp.) tubers were also identified, along with a Poaceae/Cyperaceae and other monocotyledonous tubers and several seeds that remain as yet unidentified.

Several charred plant food remains were found at a funerary area in *sambaqui* Jabuticabeira-II (2880 ± 80 years BP) (Fig. 1, Table 1). Among them, Bianchini and Scheel-Ybert (2012) identified *Cucurbita* (squash), Myrtaceae (the Surinam cherry family), and Annonaceae (the custard apple family) seeds, as well as palm nuts (*Syagrus* sp., *Butia* sp.).

Occasional uncharred plant remains identifications in different sites also point to the importance of a large diversity of edible plants for these groups. The waterlogged base of *sambaqui* Sernambetiba, dated at 1920 ± 70 years BP (Fig. 1, Table 1), preserved several fruit remains. Heredia and Beltrão (1980) reported identifications of Myrtaceae (cf. *Psidium*/guajava), Lecythidaceae (cf. *Lecythis pisonis*/monkey pot), and two palm species (*Acrocomia* sp. and another). Farias and Scheel-Ybert (2012) identified *Sacoglottis* sp. (axuá), a Chrysobalanaceae, and four palm genera (*Attalea* sp., *Bactris* spp., *Euterpe* sp., *Syagrus* sp.). In site Corondó (4260 ± 65 to 3010 ± 80 years BP/4865–4529 to 3346–2921 cal years BP) (Fig. 1, Table 1), Carvalho (1984) reported the findings of desiccated Myrtaceae (*Psidium* sp., *Eugenia* sp.) and palm (*Astrocaryum* sp., *Bactris* sp.) charred fruits/seeds.

Waterlogged palm remains are rare, having been reported only for *sambaquis* Sernambetiba (Heredia and Beltrão 1980) and Cubatão-I (Santos 2010). Charred palm nuts, however, are extremely frequent in *sambaquis*. Besides the findings cited above, they are recurringly mentioned by archaeologists and are common in most of the sites (e.g., Kneip 1994; Gaspar 1998; Lima 1999, 2000; Scheel-Ybert et al. 2009b).

Besides a large diversity of still unidentified micro- and macroremains, there are multiple indicatives of a number of wild and domesticated food plants (Fig. 3). Annonaceae (the custard apple family), Araceae (the taro family), Chrysobalanaceae (the coco-plum family), Humiriaceae (*Sacoglottis*/axuá), Lecythidaceae (cf. *Lecythis pisonis*/monkey pot), Myrtaceae

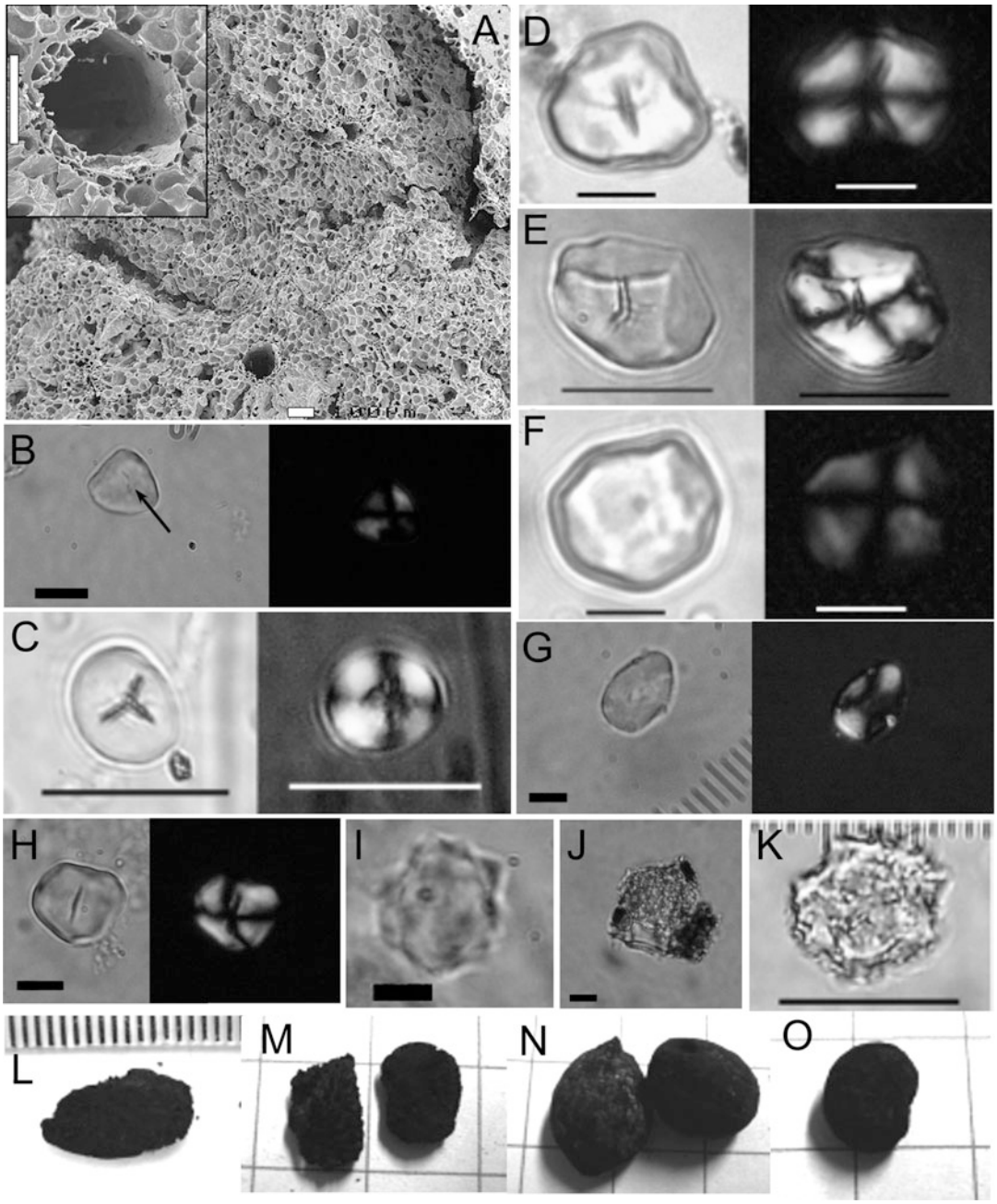

Landscape and Plants Use in Brazilian Shell Mounds, Fig. 3 Dietary macro- and microremains found in South-eastern and Southern Brazilian *sambaquis*: (**a**) *Dioscorea* tuber – Forte; (**b**) *Dioscorea* starch grain, Jabuticabeira-II; (**c**) *Zea mays*/maize, Enseada; (**d**) *Ipomoea batatas*/sweet potato starch grain, Forte Marechal Luz; (**e**) *Araucaria* pine nuts starch grain, Enseada; (**f**) Araceae (taro family) starch grain, Forte Marechal Luz; (**g**) *Eugenia*/Surinam cherry seed starch grain, Jabuticabeira-II; (**h**) Poaceae starch grain, Jabuticabeira-II; (**i**) Arecaceae/palm phytolith, Jabuticabeira-II; (**j**) *Calathea* rhizome phytolith, Jabuticabeira-II; (**k**) Marantaceae phytolith, Forte Marechal Luz; (**l**) Cucurbitaceae seed; (**m**) Annonaceae (cf. *Rollinia* sp.) seeds; (**n**) *Syagrus* sp. (Palmae) endocarp; (**o**) Myrtaceae seed. (**a**: Scheel-Ybert 2001; **b**, **g–j**, Boyadjian 2012; **c–f**, **k**, Wesolowski 2007; **l–o**, Bianchini and Scheel-Ybert 2012)

(mostly *Psidium*/guajava and *Eugenia*/Surinam cherry), and palms (*Acrocomia*, *Astrocaryum*, *Attalea*, *Bactris*, *Butia*, *Euterpe*, *Syagrus*) are probably wild plants. Convolvulaceae (*Ipomoea batatas*/sweet potato), Cucurbitaceae (*Cucurbita*/squash), Dioscoreaceae (*Dioscorea*/yam), and Marantaceae (*Calathea*/leren) may include domesticated species, while maize (Poaceae – *Zea mays*) is certainly domesticated. The diversity of plant foods associated to the finding of both domesticated and wild plants in the same contexts suggests the practice of both plant gathering and horticulture. Horticultural systems associate different wild and domesticated plants that are cultivated in the same space, in this case, probably, in house gardens.

Considering maize, it could be a part of this horticultural system, and as such, cultivated in a small scale, or its presence in the sites might be a result of exchanges with inland agriculturalist populations, along with *Araucaria* pine nuts.

The mere idea of cultivation among *sambaqui* builders, however, is most controversial. Low caries prevalence, traditionally found among these people, has always been related to low carbohydrates consumption and therefore to foraging (Mendonça de Souza 1995). However, some series from some sites present higher caries rates, compatible with horticulture (Wesolowski 2007). Besides, we must keep in mind that caries is a multifactorial infectious disease and that the association between caries prevalence and diet is indirect. Many factors may contribute to a lesser caries incidence even in the presence of cariogenic food, as amylaceous seeds and tubers, such as individual/population susceptibility, intense tooth wear (typical of these populations), and the presence of minerals in the diet, especially fluoride, which is known to be a caries inhibitor. Particularly, it is well accepted that a high reliance on aquatic resources, as it is the case for *sambaqui* builders, leads to a protection against caries (Wesolowski 2007; Scheel-Ybert et al. 2009b).

The accumulated evidence, however, is eloquent. Vestiges of wild and (possibly) domesticated plants have been evidenced in different sites, in different contexts, and from different proxies. The importance of a variety of tuberous species (yams, sweet potatoes, leren/arrowroot, some taro-related species, and several as yet unidentified tubers) is demonstrated since the earlier studied contexts (5270 ± 80 BP/6190–5760 cal years BP). Although most of the archaeobotanical evidence remains still unidentified, it is clear that fruits (such as guajava, Surinam cherry, and possibly other Myrtaceae, besides Annonaceae, Chrysobalanaceae, and Humiriaceae), seeds (cf. monkey pot), and other vegetables (such as squash) were also regularly consumed. Maize was certainly not a staple food for these people, but it might be cultivated and/or obtained through exchange to meet special usages.

Palm remains stand out as the most frequent and the most diverse plant item up to now. Palm nuts occur in *sambaquis* from all along the Brazilian coast since the earlier known occupations. Several species of at least seven genera were already identified. Palms are widely known for providing edible fruits and seeds, which are savory and rich in oils and carbohydrates, as well as nutritious buds (hearts of palm). They also provide useful fibers, leaves, and wood. Due to the multiplicity of important resources they offer, palms are high-value plants for most neotropical traditional populations and indigenous groups. There is no doubt they were extremely important for *sambaqui* people as well, being used both in domestic and ritual contexts.

Although a much greater investment in archaeobotanical studies is still needed, these ecofacts certainly are a significant part of the archaeological record. Their preservation attests that they were widely used by these populations and demonstrates that economic and subsistence spectra are much larger than formerly believed and that plant foods were making a substantial contribution to their diet.

Plants Use: Artifacts, Construction Material, and Others

Shell mound builders probably handcrafted a large variety of artifacts in wood, fibers, seeds, and other plant parts. However, very few remains have subsisted, due to preservation issues.

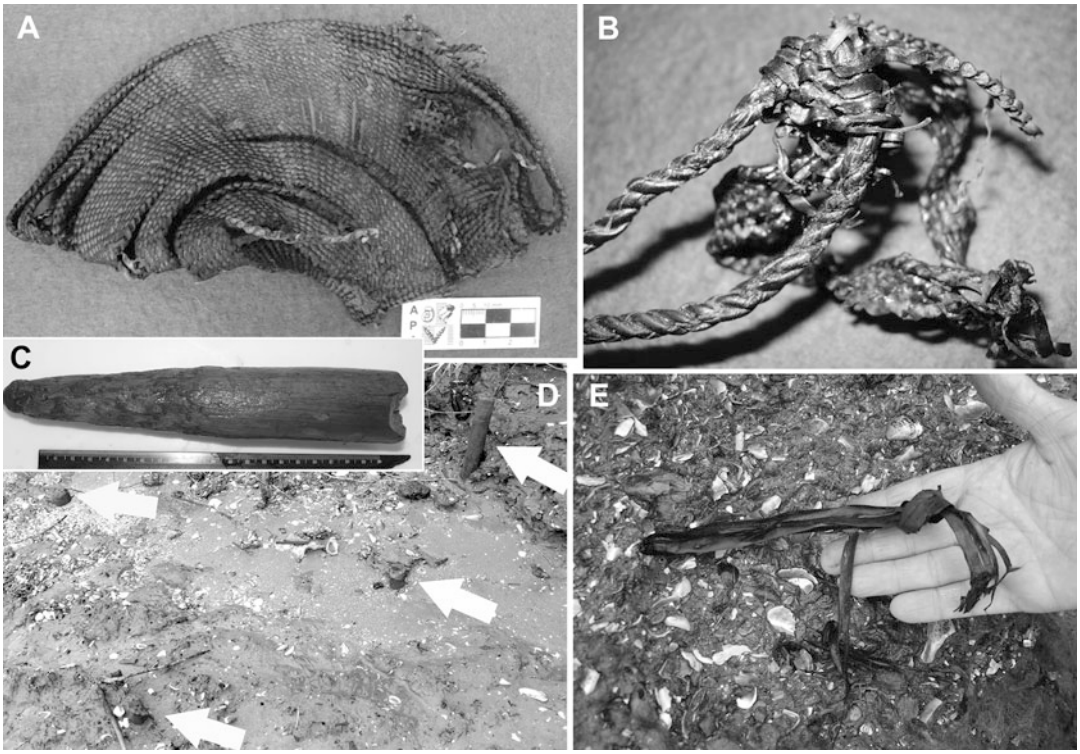

Landscape and Plants Use in Brazilian Shell Mounds, Fig. 4 Waterlogged artifacts from *sambaqui* Cubatão-I: (**a**) basketry, (**b**) rope with braided fibers, (**c**) wooden post, (**d**) wooden posts in situ (see arrows), (**e**) knotted fibers in situ (**a**–**c**, **e**: pictures courtesy of Museu Arqueológico de Sambaqui de Joinville; **d**, picture Rita Scheel-Ybert)

Archaeologists found waterlogged plant remains in the lower layers of *sambaqui* Cubatão-I (Southern Brazil), dated at 3480 ± 60 BP (Fig. 1, Table 1), which are permanently inundated by a river (Fig. 4). Wood posts and fibers, the latter frequently worked in basketry and ropes, compose an impressive collection. Santos (2010) describes fragments of baskets of different sizes, ropes twisted from long fibers, with or without knots, artifacts combining basketry and ropes, and many knotted fiber fragments, worked and twisted in different ways. Peixe et al. (2007) analyzed some of these fragments, all of them being identified as produced from adventitious roots of *Philodendron* (Araceae).

A great number of aligned posts remains were found in this site's base, some positioned perpendicularly and some parallel to the soil surface (Fig. 4c, d). They were interpreted as the remains of a platform projected to sustain the site over the mangrove muddy sediment upon which it was established. Melo et al. (2016) analyzed 30 of this site's posts and identified a large variety of wood types, including several mangrove species, some Fabaceae, besides species of Bignoniaceae, Lauraceae, Anacardiaceae, and Annonaceae. They interpreted the wood choice as based on the availability of woody plants in the surrounding environments (meaning there was not a particular wood selection) but also in the physical and mechanical wood properties. Most of the identified wood types are characterized by medium to high density, suggesting those woods were very resistant to decay and therefore well adapted to construction and structural frames.

The waterlogged base of *sambaqui* Espinheiros-II (Southern Brazil), dated at 2970 ± 60 BP (Fig. 1, Table 1), also revealed fibers, probably of grasses or palms, frequently tressed and twisted (Figuti and Klokler 1996).

The remains of a charred post associated with a funerary context dated at 2170 ± 45 years BP in

site Jabuticabeira-II were identified as a Lauraceae species – a plant from the cinnamon family (Bianchini et al. 2007). Another sample from this site, coming from a feature in another funerary area with several postholes, dated at 2880 ± 80 years BP, presented a particularly high frequency of Lauraceae charcoal pieces. It is possible, although not proven, that this charcoal also comes from carbonized posts. More studies are still necessary in order to investigate the possibility of wood selection. Yet, it is interesting that this particular wood was used, as these species are known for their resistance, durability, and essence contents and thus modernly considered high-quality woods.

On the other hand, an overrepresentation of *Condalia* sp. (a sort of snakewood, of the Rhamnaceae family), in several sites from Southeastern Brazil (Forte, Boca da Barra, Salinas Peroano, and Ponta da Cabeça), dated from 5270 ± 80 to 1430 ± 55 years BP, allowed to demonstrate a cultural selection of this species. A possible utilization of this taxon in rituals was proposed. However, economic uses for this species cannot be discarded, for its wood produces a blue pigment, besides being considered excellent firewood; the root bark of some species is used as soap or medicine, and the plants bears edible fruits. This plant is very rare in the present vegetation of the region, which might be a consequence of its overexploitation in the past (Scheel-Ybert 2000, 2014).

In addition to that, fruits of a Bombacaceae (cf. *Ceiba/Bombax*), which produces very useful fibers, were identified from the waterlogged base of *sambaqui* Sernambetiba (Heredia and Beltrão 1980).

Palms, as mentioned in the previous section, are extremely frequent in Brazilian shell mounds. Although almost all vestiges consist of fruits and seeds, some charred wood remains were also identified at Ponta da Cabeça (3270 ± 70–2080 ± 40 BP) and Corondó (4260 ± 65–3010 ± 80 BP) sites, in the Southeastern coast, and at Jabuticabeira-II (2880 ± 80 years BP) and Encantada-III (4320 ± 40 BP), in the Southern coast. As palm stems are usually poor or impractical firewood, it is conceivable that at least some of these remains could stand for artifacts, construction material, the debris of their handicraft, or else for special firewood. Indeed, palms are extremely useful plants that, besides food, provide fibers (for basketry and ropes), leaves (for artifacts and shelter covering), and wood (for artifacts and construction).

However, the preservation of artifacts produced from plant material is even more hazardous than food, at the same level that is the preservation of medicine, dyes, soaps, and so many plant uses. That is so because archaeological preservation depends both on the characteristics of the plant tissues that were used (hard parts tend to preserve much easier than fleshy parts) and on preservation conditions. Waterlogging and desiccation are rare, and carbonization depends on whether or not the plant material is directly exposed to fire, intentionally or accidentally, in the process of preparation, use, or discard. The unlikeliness of preservation of each one of the abovementioned items, therefore, is what makes their retrieval so significant, as they represent invaluable clues to the *sambaqui* builders' ways of life.

Even if these priceless clues are still scarce, they come to strengthen the views of *sambaqui* builders as skillful artisans, who produced elaborated artifacts from different materials such as rocks, bones, shells, and also plants. They also highlight the variety of complex choices that were made in different aspects of their daily life, regarding practical and economic issues but also ceremonial and symbolic matters.

Plants Use: Firewood

Fire was a central element in the life of *sambaqui* people. In domestic context, cooking, roasting, lighting, and other activities are central to daily life. In funerary spaces there are countless fireplaces, many of which were maintained for long periods to honor the dead.

Both in domestic and in ceremonial contexts, gathering of deadwood was the main source of firewood (e.g., Scheel-Ybert 2000). The high floristic diversity of all already studied charcoal assemblages points to nonselective wood

gathering. The prevalence of decay and xylophage stigmas, besides demonstrating the collection of necromass, is evidence of nonselective firewood supplying.

It is remarkable that the floristic diversity of anthracological assemblages from both possible domestic contexts (non-funerary constructive layers) as ritual features (funerary layers) is comparable and extremely high (e.g., Scheel-Ybert 2000; Bianchini et al. 2011). This suggests that charcoal remains were both associated with extended temporal activities and corresponded to wood collection in a relatively large area around the sites. Those are essential premises for reliable paleoecological interpretation based on archaeological charcoal. Besides, it supports the claims for sedentarism and long-term occupation of shell mound sites.

Notice that, although *sambaquis* are considered to be funerary and ceremonial sites, remains of domestic firewood may be retrieved from non-funerary constructive layers. These are believed to represent secondary deposits. Micromorphological (Villagran et al. 2010) and anthracological evidence (Scheel-Ybert 2014) suggest that domestic residues (essentially shells, fish bones, and dispersed charcoal) were accumulated in dumping areas or in domestic context aiming to become construction material and were latter employed as construction material to cover the funerary areas.

Numerous and frequently very large hearths occur in the funerary layers. Anthracological analysis of some of these features in *sambaqui* Jabuticabeira-II also demonstrated particularly high wood species diversity (Bianchini and Scheel-Ybert 2012). This result, while corroborating interpretations based on dispersed charcoal, points simultaneously to nonselective gathering and to long-lasting activities. Hearths presenting a high taxonomic diversity correspond to fires that were repeatedly lit at the same place or else that were maintained and continuously fed for a long time. This means Jabuticabeira-II funerary hearths represent long-lasting events, suggesting the mortuary rites of *sambaqui* people might persist at least for several days. It also implies a large investment of work and effort of this social group in collecting firewood and in fire maintenance.

These results suggest that the mortuary rites of sambaqui people might be very important long-duration events. They also highlight the importance of fire as a central element in sambaqui life, another connection between the living and the dead. By these means, besides being monumental buildings erected as landmarks, the mounds became even more visible by the continuously burning flames upon them.

Plants Use: Ritual

Sambaquis are thought to be funerary monuments and ceremonial spaces. The magnitude of the sites themselves, the complex constructive process, rich funerary offerings, and features that reflect an elaborated mortuary ritual point to the importance of passage rites in this society (Gaspar 2004; Klokler 2008). In these circumstances, we may expect considerable investments of time, effort, and resources. We may also expect the material integrating the funerary ritual to have been carefully selected, according to the ideological/symbolical universe of the group.

Sambaqui Jabuticabeira-II, presently one of the best excavated and understood sites in Brazil, is the first one for which the practice of funerary feastings was proposed. Klokler (2012) describes the mortuary ritual as follows: each funerary area would receive a few or several burials. The bodies were laid over the ground or in shallow graves. Hearths, always associated with the burials, were an integral part of the rites. Posts placed around the graves and hearths suggest fences or structures that protected the body until the area was covered. Eventually, funerary areas were covered with shell-rich sediments ("covering" or "constructive" layers), and a new funerary area was established above it or in another area of the site. During the rites, funerary offerings and ritual feastings occurred. Entire fishes (suggested by articulated fish bones) were placed inside the graves. Mammals and bird parts were also probably placed as offerings, although they might as well be consumed in the feastings. Food preparation and feasting were conducted nearby but probably not

over the funerary area itself, as suggested by shells integrity, pointing to little trampling. In these areas, fishes were roasted or smoked and ritually consumed. The residues were then transported and deposited over the funerary area. These residues suggest that fishes were the main food in those feastings and that more than one ton of fish meat might be available per feasting. The fish species used (mainly croakers and catfishes) were common in the paleolagoon and ordinarily used in domestic context as well, but mammals and bird remains appear exclusively in funerary context.

Meat was not the only food consumed in rituals, though. Archaeobotanical analyses in this site attested that plants were also an important part of mortuary rituals (Bianchini and Scheel-Ybert 2012). Analyses of a funerary area (i.e., ritually deposited material) and of constructive material from its covering layers (i.e., possible domestic deposited material) demonstrated that edible plant parts (fruits, seeds, and tubers) are strictly associated to funerary features. These food remains are prevalent in specific features of the mortuary layers, especially hearths. It is likely that fruits were placed as offerings or consumed as part of the funerary rituals or feasting ceremonies.

There is no evidence of these fruits being consumed in domestic contexts (as their remains do not appear in the covering layers), but it is quite probable that they were. Different ways of consumption in each context might result in a differential preservation of remains. During funerary rituals, where fire is an essential element, they might be regularly charred – and in consequence more probably preserved. Charring is likely to happen in this context either if plant parts represent an offering or if they are ritually consumed, as in both cases the whole fruit or its remains (seeds) might be set to the fire. In domestic contexts, however, fleshy fruits such as Myrtaceae and Annonaceae are consumed fresh and therefore have very little chance of entering in contact with fire, thus being uncommonly preserved as archaeological vestiges (Scheel-Ybert 2013).

It is not possible, at the present stage of knowledge, to ascertain if those plant foods were consumed in funerary feastings or if they were part of mortuary offerings or both. Actually, it is very hard to differentiate feastings from offerings. However, the evidence strengthens the hypothesis of ritually consumed food while demonstrating that not only animal food was used in these ceremonies but plant food as well.

Major Accomplishments and Future Directions

Archaeobotanical studies are still young in the country, and many questions subsist concerning plant-related issues in Brazilian shell mounds. However, although still fragmentary and incomplete, important results have already been achieved concerning subsistence, plant use, landscape reconstruction, and firewood use in domestic and ritualistic contexts, as summarized below.

Anthracological results converge in demonstrating that *sambaqui* people settled in the *restinga* ecosystem. Their firewood and plant catchment area included the open *restinga*, the *restinga* forest, and, less frequently, the Atlantic forest, as well as mangroves, when these existed. Holocene climatic and sea-level variations induced changes in the mangrove vegetation, in the lagoons conformation, and in the spatial distribution of *restinga* physiognomies, but the *restinga* vegetation types maintained floristic composition and general structure all along. We suggest that although this dynamic environment changed all the time, the landscape remained the same.

Landscape domestication is suggested. Horticulture and plant management probably increased the frequencies of certain species; the possibility of overexploitation of other species has also been raised. The long-term human interference on the landscape might have deliberately or unintendedly modeled the coastal vegetation in a large scale, leaving durable phytosociological alterations which extent is as yet impossible to ascertain.

The importance of plants to *sambaqui* people's subsistence is clearly demonstrated. The large variety of wild and domesticated plant foods suggests that *sambaqui* people lived in a system of

mixed economy, where fishing and gathering were associated with horticulture. At the same time, these plants played an important role in ritualistic activities, as they were offered in funerary rituals and/or consumed during mortuary feastings.

The exceptional preservation of a few botanical artifacts and some specially selected plant materials strengthens the views of *sambaqui* builders as skillful artisans, who produced elaborated artifacts not only from rocks, bones, and shells but also from plants. They also highlight the variety of complex choices that were made in different aspects of their daily life, regarding practical and economic issues but also ceremonial and symbolic matters.

It was demonstrated that opportunistic gathering of deadwood was the main source of firewood both in domestic and in ceremonial contexts. Mortuary rites integrated many activities of special care to the dead, each one of them using plants for different purposes. These rites, certainly very important events, persisted at least for several days and were accompanied by long-lasting fires that were continuously fed over a long time.

Those results corroborate the interpretations of these shell mounds adopted in more recent research in Brazilian archeology, that is to say, that of *sambaquis* as funerary structures, monumental landscape markers, and social congregation sites, built from a strong organized labor investment.

The sheer magnitude of these sites and its complex construction processes and funerary features reflect elaborated mortuary rituals. As spaces of ritualized offerings and feasts, these mounds represent a connection between the world of the living and the world of the dead. All these aspects attest of the central role of death in the cosmology of *sambaqui* groups while also attesting of the central role of plants in their life.

Plants have been essential for humankind at all times. Plants are food, heat, light, clothing, shelter, tool, medicine, material, protection, transport, and much more. Plants may be reference, landscape markers, house of spirits, vehicle to the spiritual world, or even people. Plants are vital for human survival. In spite of that, plants are frequently considered second-rate provisions, most especially in the case of non-agriculturalist populations. Their seemingly easy availability leads to undervalue and underestimation. Besides, their omnipresence in everyday life as in ceremonial events contrasts with their quasi-invisibility in the archaeological record. Retracing their importance is a task doomed to imperfection that demands retrieving small and fragmentary evidence. Nevertheless, it is worth the effort, for it helps provide a much more complete and faithful picture of past population's way of life.

It is therefore of the utmost importance that archaeobotanical studies be pursued and that field research aimed at maximizing the recovery of plant remains through flotation and careful microarchaeobotanical sampling be multiplied. The scenario perceived through the analyses already done in Brazilian shell mounds proves the effort worthy. The available data allowed good landscape reconstructions while pointing to a great diversity of plant uses and corroborating the importance of plants for *sambaqui* people. Yet, much remains to be done, and understanding of the use of plant resources by *sambaqui* builders is far from complete.

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Maize: Origins and Development
- ▶ Maritime Landscapes
- ▶ Paleoethnobotany
- ▶ People as Agents of Environmental Change
- ▶ Phytolith Studies in Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology

▶ Sambaquis Shell Mounds, Archaeology of
▶ Shell Middens and Coastal Archaeology in Southern South America
▶ Taphonomy of Plant Micro-remains in Environmental Archaeology
▶ Yams: Origins and Development

References

Angulo, R.J., G.C. Lessa, and M.C. Souza. 2006. A critical review of mid- to late-holocene sea-level fluctuations on the Eastern Brazilian coastline. *Quaternary Science Review* 25: 486–506.

Araujo, D.S.D., and R.P.B. Henriques. 1984. Análise florística das restingas do Estado do Rio de Janeiro. In *Restingas: Origem, Estrutura, Processos*, ed. L.D. de Lacerda, D.S.D. Araujo, R. Cerqueira, and B. Turcq, 159–194. Niterói: CEUFF.

Balée, W. 1994. *Footprints of the Forest. Ka'apor ethnobotany: The historical ecology of plant utilization by an Amazonian people*. New York: Columbia University Press.

Balée, W., and C.L. Erickson. 2006. *Time and complexity in historical ecology. Studies in the Neotropical lowlands*. New York: Columbia University Press.

Bianchini, G.F. 2008. Fogo e Paisagem: evidências de práticas rituais e construção do ambiente a partir da análise antracológica de um sambaqui no litoral sul de Santa Catarina. Unpublished Master's Dissertation. Rio de Janeiro: Museu Nacional, Federal University of Rio de Janeiro.

Bianchini, G., and R. Scheel-Ybert. 2012. Plants in a funerary context at the Jabuticabeira-II shellmound (Santa Catarina, Brazil) – feasting or ritual offerings? In *Wood and charcoal: Evidence for human and natural history*, ed. E. Badal, Y. Carrión, M. Macías, and M. Ntinou, 253–258. Valencia: Sagvntvm Extra.

Bianchini, G.F., R. Scheel-Ybert, and M.D. Gaspar. 2007. Estaca de Lauraceae em contexto funerário (Sítio Jaboticabeira-II, Santa Catarina, Brasil). *Revista do Museu de Arqueologia e Etnologia, São Paulo* 17: 223–229.

Bianchini, G.F., M.D. Gaspar, P. DeBlasis, and R. Scheel-Ybert. 2011. Processos de formação do sambaqui Jabuticabeira-II: interpretações através da análise estratigráfica de vestígios vegetais carbonizados. *Revista do Museu de Arqueologia e Etnologia, São Paulo* 21: 51–69.

Boyadjian, C.H.C. 2012. Identificação de microfósseis vegetais para a reconstrução de dieta sambaquieira. Unpublished. Ph.D. dissertation. São Paulo: Universidade de São Paulo.

Boyadjian, C.H.C., S. Eggers, and R. Scheel-Ybert. 2016. Evidence of plant foods obtained from the dental calculus of individuals from a Brazilian shell mound. In *Wild harvest: Plants in the hominin and pre-agrarian human worlds*, ed. K. Hardy and L.K. Martens, 215–240. Oxford: Oxbow books.

Carvalho, E.T. 1984. Estudo arqueológico do sítio Corondó. Missão de 1978. Boletim do Instituto de Arqueologia Brasileira, sér. Monografias, 2: 1–243.

Castro, J.W.A., K. Suguio, J.C.S. Seoane, A.M. Cunha, and F.F. Dias. 2014. Sea-level fluctuations and coastal evolution in the state of Rio de Janeiro, southeastern Brazil. *Anais da Academia Brasileira de Ciências* 86 (2): 671–683.

Clement, C.R. 1999. 1492 and the loss of Amazonian crop genetic resources. I. The relation between domestication and human population decline. *Economic Botany* 53 (2): 188–202.

Clement, C.R., and A. Junqueira. 2010. Between a pristine myth and an impoverished future. *Biotropica* 42 (5): 534–536.

DeBlasis, P., A. Kneip, R. Scheel-Ybert, P.C. Giannini, and M.D. Gaspar. 2007. Sambaquis e Paisagem: Dinâmica natural e arqueologia regional no litoral do Sul do Brasil. *Arqueología Suramericana* 3: 29–61.

Denevan, W. 1992. The pristine myth: The landscape of the Americas in 1492. *Annals of the Association of American Geography* 82 (3): 369–385.

Eastoe, C.J., S. Fish, P. Fish, M.D. Gaspar, and A. Long. 2002. Reservoir corrections for marine samples from the south Atlantic coast, Santa Catarina State, Brazil. *Radiocarbon* 44: 145–148.

Farias, S.Q. and R. Scheel-Ybert. 2012. Identificação de frutos e sementes do Sambaqui Sernambetiba (Guapimirim, RJ): dieta e modos de vida de sambaquieiros do Recôncavo da Guanabara. Unpublished report. Rio de Janeiro: CNPq/Museu Nacional, UFRJ.

Figuti, L., and D.M. Klokler. 1996. Resultados preliminares dos vestígios zooarqueológicos do sambaqui Espinheiros II (Joinville, SC). *Revista do Museu de Arqueologia e Etnologia, São Paulo* 6: 169–187.

Fish, P., S. Fish, P. DeBlasis, and M.D. Gaspar. 2013. Monumental shell mounds as persistent places in Southern coastal Brazil. In *The archaeology and historical ecology of small scale economies*, ed. V.D. Thompson and J.C. Waggoner, 120–140. Gainesville: University Press of Florida.

Gaspar, M.D. 1998. Considerations of the sambaquis of the Brazilian coast. *Antiquity* 72: 592–615.

Gaspar, M.D. 2004. Cultura: Comunicação, arte, oralidade na pré-história do Brasil. *Revista do Museu de Arqueologia e Etnologia, São Paulo* 14: 156–168.

Heredia, O.R., and M.C. Beltrão. 1980. Mariscadores e pescadores pré-históricos do litoral centro-sul brasileiro. *Pesquisas* 31: 101–119.

Hogg, A.G., Q. Hua, P.G. Blackwell, M. Niu, C.E. Buck, T. P. Guilderson, T.J. Heaton, J.G. Palmer, P.J. Reimer, R. W. Reimer, and C.S. Turney. 2013. SHCal13 Southern Hemisphere calibration, 0–50,000 years cal BP. *Radiocarbon* 55: 1889–1903.

Klokler, D.M. 2008. Food for body and soul: Mortuary ritual in shell mounds (Laguna – Brazil). Unpublished Ph.D. dissertation. Tucson: Arizona University.

Klokler, D.M. 2012. Consumo ritual, consumo no ritual: festins funerários e sambaquis. *Habitus* 10 (1): 83–104.
Kneip, L.M. 1994. Cultura material e subsistência das populações pré-históricas de Saquarema, RJ. *Documento de Trabalho, sér. Arqueologia* 2: 1–120.
Lima, T.A. 1999–2000. Em busca dos frutos do mar: Os pescadores-coletores do litoral centro-sul do Brasil. *Revista USP, São Paulo* 44: 270–327.
Melo, J.C.F., E.R. Silveira, and D.R. Bandeira. 2016. Arqueobotânica de um sambaqui sul-brasileiro: integrando indícios sobre o paleoambiente e o uso de recursos florestais. *Boletim do Museu Paraense Emílio Goeldi, ciências humanas* 11 (3): 727–744.
Mendonça de Souza, S.M.F. 1995. Estresse, doença e adaptabilidade: estudo comparativo de dois grupos pré-históricos. Unpublished Ph.D. dissertation. Rio de Janeiro: ENSP/FIOCRUZ.
Peixe, S.P., J.C.F. Melo, and D.R. Bandeira. 2007. Paleoetnobotânica dos macrorestos vegetais do tipo trançados de fibras encontrados no Sambaqui Cubatão I, Joinville – SC. *Revista do Museu de Arqueologia e Etnologia, São Paulo* 17: 211–222.
Pereira, G.L. 2013. Ocupação pré-histórica do litoral norte gaúcho: um olhar sobre o invisível. Unpublished M. Sc. dissertation. Porto Alegre: Pontifícia Universidade Católica do Rio Grande do Sul.
Politis, G. 2001. Foragers of the Amazon: The last survivors or the first to succeed? In *Unknown Amazon, culture in nature in ancient Brazil*, ed. C. McEwan, C. Barreto, and E.G. Neves, 26–49. London: British Museum Press.
Reimer, P.J., E. Bard, A. Bayliss, J.W. Beck, P.G. Blackwell, C.B. Ramsey, C.E. Buck, H. Cheng, R.L. Edwards, M. Friedrich, and P.M. Grootes. 2013. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. *Radiocarbon* 55: 1869–1887.
Rival, L. 1998. Domestication as a historical and symbolic process: Wild gardens and cultivated forests in the Ecuadorian Amazon. In *Advances in historical ecology*, ed. W. Balée, 232–250. New York: Columbia Univ. Press.
Santos, A.M.P. 2010. A conservação de material vegetal encharcado nos sambaquis de Joinville/SC. Unpublished M.Sc. dissertation. Joinville: Univille.
Scheel-Ybert, R. 2000. Vegetation stability in the Southeastern Brazilian coastal area from 5500–1400 yr BP deduced from charcoal analysis. *Review of Palaeobotany and Palynology* 110: 111–138.
Scheel-Ybert, R. 2001. Man and vegetation in the Southeastern Brazil during the Late Holocene. *Journal of Archaeological Science* 28: 471–480.
Scheel-Ybert, R. 2013. Preliminary data on nonwood plant remains at Sambaquis from the Southern and Southeastern Brazilian coast: Considerations on diet, ritual, and site particularities. *Cuadernos del Instituto Nacional de Antropología* 1: 60–72.
Scheel-Ybert, R. 2014. Landscape and use of plants by Southern and Southeastern Brazilian shell mound builders. In *The cultural dynamics of shell-matrix sites*, ed. M. Roksandic, S.M.F. Mendonça de Souza, S. Eggers, M. Burchell, and D. Klokler, 289–300. Albuquerque: University of New Mexico Press.
Scheel-Ybert, R., and O.F. Dias. 2007. Corondó: Palaeoenvironmental reconstruction and palaeoethnobotanical considerations in a probable locus of early plant cultivation (South-Eastern Brazil). *Environmental Archaeology* 12: 129–138.
Scheel-Ybert, R., G.F. Bianchini, and P. DeBlasis. 2009a. Registro de mangue em um sambaqui de pequeno porte do litoral sul de Santa Catarina, Brasil, a cerca de 4900 anos cal BP, e considerações sobre o processo de ocupação do sítio Encantada-III. *Revista do Museu de Arqueologia e Etnologia, São Paulo* 19: 103–118.
Scheel-Ybert, R., S. Eggers, V. Wesolowski, C.C. Petronilho, C.H.C. Boyadjian, M.D. Gaspar, M. Barbosa-Guimarães, M.C. Tenório, and P. DeBlasis. 2009b. Subsistence and lifeway of coastal brazilian moundbuilders. In *La Alimentación en la América precolombina y colonial: Una aproximación interdisciplinaria*, ed. A. Capparelli, A. Chevalier, and R. Piqué, 37–53. Barcelona: Treballs d'Etnoarqueologia 7.
Villagran, X.S., D.M. Klokler, P. Nishida, M.D. Gaspar, and P. DeBlasis. 2010. Lecturas estratigráficas: Arquitectura funerária y depositación de resíduos en el Sambaquí Jabuticabeira II. *Latin American Antiquity* 21: 195–227.
Wesolowski, V. 2007. *Cáries, desgaste, cálculos dentários e micro-resíduos da dieta entre grupos pré-históricos do litoral norte de Santa Catarina*. Unpublished Ph.D. dissertation. Rio de Janeiro: ENSP/FIOCRUZ.

Landscape Archaeology

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Introduction

An ever-present characteristic in any definition of landscape archaeology is that it refers to a varied and somewhat heterogeneous field of archaeological research. A number of approaches to the archaeological record may be included under this label, which in essence share one common interest: the analysis, through material culture, of the spatial dimension of human activity; in other

words, exploring how human communities have related to a geographic space through time in terms of how they appropriated this space and/or transformed its appearance through work and its significance through cultural practices.

There are two main reasons that explain why landscape archaeology is a wide-ranging concept today – firstly, the general changes in the theoretical foundations of the archaeological discourse that have occurred through time, especially since the middle of the twentieth century, and secondly, the different theoretical perspectives, both past and present, regarding the central concept of landscape that have been developed not only within the archaeological literature but in other fields such as geography or anthropology.

Definition

While running the risk of oversimplification, it can be said that the use of landscape in archaeology has been understood in three different ways, which sometimes have been complementary to each other and at other times mutually exclusive:

- As a context to better signify and understand the material record (for instance, by analyzing settlement patterns or off-site archaeology).
- As an objective, as something that archaeological research aims to positively reconstruct, by creating images of how ancient landscapes would have looked at any specific moment in the past (for instance, through environmental reconstruction).
- As a research object, considering that the landscapes we see today should themselves be considered as an archaeological record as a whole. Current landscapes would be the more obvious "artifacts" produced by human groups through time.

Historical Background

From a historiographical point of view, the origin of most of the concepts and proposals upon which landscape archaeology has been built are to be found in geography. Since the end of the nineteenth century, geographers such as Ratzel, Hettner, Slütter, or Vidal de la Blache began to stress the importance of analyzing the interaction between humans and their environments. Although from different (and even conflicting) backgrounds, they paved the way for the first schools of regional geography. It is true to say that at this stage, their direct influence on archaeology was by no means significant. However, they are important because two traditions that would have a major impact on archaeological interest in the landscape were developed after them: on the one hand, the incorporation of the proposals of Vidal de la Blanche into the theoretical framework of the French Annales School and, on the other, the development of the so-called cultural geography, in particular the remarkable work of Carl O. Sauer (Berkeley School) in the United States (Fig. 1).

The first, the Annales School, would have a major impact in the Mediterranean area, especially in France, where a significant and long-lasting archaeological tradition developed. This is a type of archaeology mainly focused on analyzing the formation of rural landscapes, identifying the forms of ancient agrarian landscapes and reconstructing of the social processes behind their formation. The study of ancient cadastres is among their most widespread manifestations. This archaeological tradition is based on the detailed reconnaissance and documentation of ancient structures currently visible in the landscape, with an intensive use of information sources such as aerial photography, whose popularization in archaeology is closely related to the development of this tradition. Quite often, this is complemented with the use of documentary sources, such as historical cadastres. A large amount of archaeological research has been carried out within this framework, making it possible to reconstruct the forms of ancient agrarian spaces, especially for historical periods such as Roman or Medieval times, for which complementary written sources are abundant.

In turn and rooted in cultural geography, the first proposals concerning the relevance of the

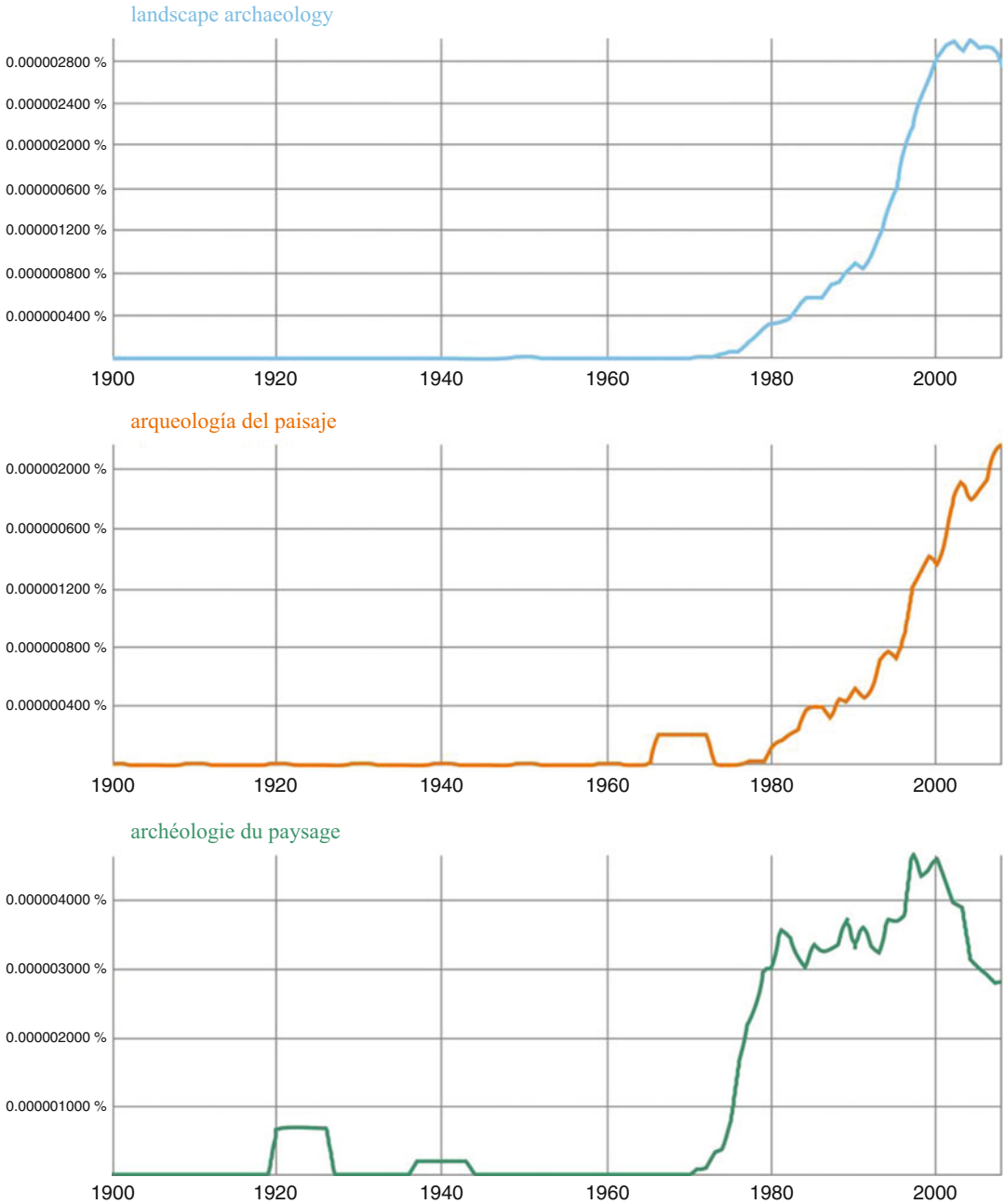

Landscape Archaeology, Fig. 1 Relative occurrence of the expression "landscape archaeology" in books published throughout the twentieth and start of the twenty-first centuries in English, Spanish, and French. (Data obtained from Google Ngram Viewer (accessed 2 September 2011)). Vertical scales are different in each case

spatial dimension for a comprehensive understanding of the archaeological record developed in British and American contexts. The book by Aston and Rowley (1974) is typically mentioned as the first to refer to the concept of landscape archaeology as something specific, different to the study of rural landscapes that had been carried out by geographers or historians (with the work of

W. Hoskins being especially influential in the British context).

From the 1960s and especially the 1970s, interest in the spatial dimension of the archaeological record flourished, in close contact with the development of the new archaeology and the environmental archaeology. This processual movement, with its strong emphasis on methodology, opened the door for the incorporation into archaeology of methods and techniques developed in other disciplines, notably Geography (such as locational analysis and site catchment analysis). Also, concepts such as space or the environment became central to archaeological research at that time. All of these innovations were aimed at analyzing the relationship between human groups and their environments in a widely adaptive, economic perspective.

From the 1990s onwards and in relation with the emergence of post-processual approaches, the concept of space, as used in previous years, was challenged for being deterministic, modern, and aculturally rational. As a result, it was argued that applying it straightforwardly to cultural contexts other than the contemporary Western world does not make any sense, which applies to most of the contexts in which archaeological research is interested. As an alternative, authors mainly from the British context argued for a reformulation of the concept of landscape: as opposed to an external environment, prior to humans, it is argued that it should be understood as a social and cultural construction, something shaped, handled, appropriated, and ordered in both material and conceptual terms. Despite a large number of publications on the subject, C. Tilley's A Phenomenology of Landscape is considered the landmark, where these ideas were developed in detail for the first time from an archaeological perspective. This is well in line with conceptual trends that emerged quite earlier in time in other fields of the social sciences, such as perception studies in Geography or Planning (for instance, Lynch 1960) that also challenged the positivist paradigm. The relationship between humans and the landscape was no longer described in terms of adaptation or exploitation but using different notions such as perception, experience, or engagement. And, in so doing, an opposition between the concepts of space and landscape was developed, with the former being something neutral, alien to human experience, and the latter something appropriated, experienced, and perceived (Fig. 2).

Those proposals achieved a degree of success during the 1990s and onwards, although they have also been widely accused of being too speculative

Landscape Archaeology, Fig. 2 *Cerritos de indios* in the Uruguayan region of Rocha. Landscape archaeology has been especially interested in the analysis of landscapes defined by different types of artificial features, such as funerary monuments. (Photography by Camila Gianotti. Reproduced with permission)

at times, negligent with data and evidence, or lacking a solid methodology. In any case, although they had a substantial impact in some areas, they had little influence in others, where alternate theoretical traditions held sway. This is the case of France, where the main trends in landscape archaeology remained aligned with tradition that was based on or inspired by the Annales School, which remains alive elsewhere (for instance, Bintliff et al. 2007). This is not the case in either Italy or Spain where, within quite varied and heterogeneous traditions, it is interesting to note the influence of historical materialism in the development of a socially oriented landscape archaeology, a tradition that has been also successful in Latin America.

Key Issues/Current Debates

A few issues can be highlighted in the current practice of landscape archaeology. The first concerns theoretical and conceptual questions. As mentioned above, the 1990s were arguably the period when landscape archaeology reached the zenith of its success and popularity. To a great extent, this was associated with the coexistence of a range of different approaches and, consequently, a boom in the number of publications. A good part of the academic literature (especially the most influential) gravitated around the possibilities for the development of a phenomenology-inspired approach to landscape. A major field for discussion has developed around the actual viability of these approaches. Among others, special mention should be made of Fleming's criticism (2006) due to its impact. This field of discussion is still alive and kicking today and affects the theoretical foundations of landscape archaeology and the very concept of landscape that is, or may be, behind it (for instance, a recent contribution is Barrett and Ko 2009).

In close connection with this, some approaches have been made to a significant question that post-processual archaeologies somehow left unattended: the development of original methodologies and fieldwork procedures, suited for the kind of theoretical proposals and research objectives that were being produced. Although no claims for maturity and solid advances have been made so far, it has constituted an interesting field of activity in recent years (for instance, Hamilton et al. 2006).

In a totally different direction, recent years have seen a boom in scientific approaches to environmental analysis, such as geoarchaeology. As an example, in the recent volume edited by B. David and J. Thomas (2008), 24 out of a total of 65 contributions are included in the section "Characterising Landscapes," broadly falling within this scope. To some extent, this has been boosted by some technological improvements: a significant increase in the availability of more numerous and refined tools, techniques, and analytical procedures to assist archaeological research and to extract information from the material and environmental record (for instance, Reindel and Wagner 2009). The possibility to gather much more information on a larger scale and at the same time with increasing levels of detail and accuracy pose challenging problems for data management and processing. But at the same time, this means that the possibilities of overcoming the limited analytical scale of the single site and carrying out comprehensive research at the landscape scale are multiplying (Fig. 3).

However, we have not just witnessed a leap forward in technological terms. It is also important to take into account the inclusion of archaeologists in long-range discussions, such as those concerning global change. The natural disposition of archaeology for analyzing change in the long term and its intimacy with the study of human impact on the environment have returned the analysis of environmental change to the forefront for some practitioners of a landscape-related archaeology (for instance, Redman et al. 2004). This has made it possible to incorporate archaeological perspectives into wider debates, where a vision of the landscape in socio-ecological terms prevails, and to complement it with more culturally balanced views (for instance, McAnny and Yoffee 2009) (Fig. 4).

The incorporation of archaeology into the environmental debate has had an additional

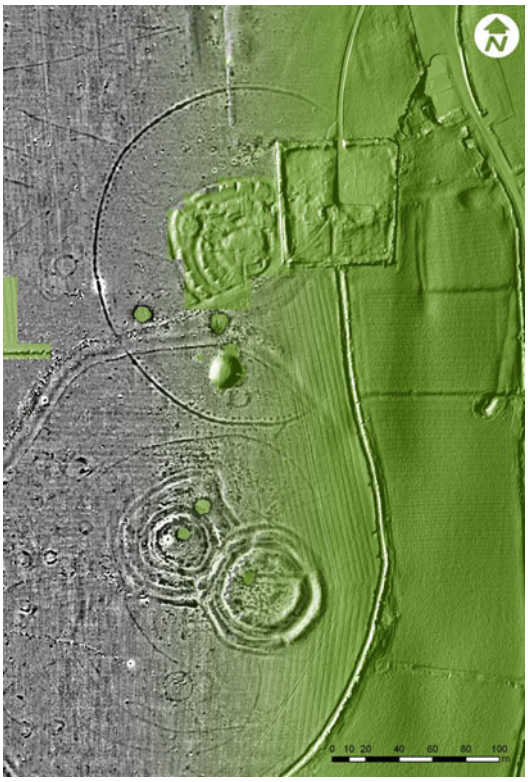

Landscape Archaeology, Fig. 3 The development of geo-spatial technologies is enabling the highly detailed documentation of large-scale landscapes like never before. Integration of geophysical survey and high-resolution Lidar of the Hill of Tara, Ireland. (© The Discovery Programme, 2011. Reproduced with permission (many thanks to Anthony Corns))

dimension in terms of practical applicability. In the last few decades, environmental management policies have increasingly taken into consideration human effects as something that is difficult to be limited in space and more complex than a simple question of physical impact. Archaeology, as long as it is involved with cultural resource management, has had an increasingly visible role within this field (for instance, Jones and Slinn 2006). More specifically, the use by landscape archaeology of some relevant concepts and categories has allowed it to have a visible influence in the development of dominant paradigms.

Beyond environmental management, this influence is visible in the major relevance recently acquired by the concept of cultural landscapes (although the concept itself was originally coined by Carl O. Sauer back in 1925). Two parallel roads have helped to spread the concept. On the one hand, UNESCO defined it as a key concept for the management and protection of the Cultural Heritage in the Operational Guidelines for the Implementation of the World Heritage Convention (1992). On the other hand, the approval by the Council of Europe of the European Landscape Convention (ELC) in 2000 laid the foundations for the incorporation of the landscape as a legal figure throughout Europe and beyond. The ELC uses a self-sufficient concept of landscape, without any additions: it is something holistic that integrates the natural and the cultural, the environmental, and the social. This is well in line with what landscape archaeology had been discussing and makes it possible to understand why it has become increasingly involved in the fields of practical characterization and management (Fig. 5).

Finally, the landscape, like any other central concept in archaeology, has been challenged from the series of theoretical positions that can broadly be defined as postcolonial. Once again, this is a field of discussion that is not only archaeological but has strong links with other disciplines, especially anthropology. Criticism has been levelled against most dimensions of archaeology as a Western-driven and Western-oriented form of knowledge and a discourse of power, which includes the concepts and practices of most of landscape archaeology. What is demanded is "to visualize the archaeological practice and landscape studies as an open arena in which different actors, interests and themes could be achieved and worked in a collaborative performance accounting also for the geopolitics of knowledge production" (Curtoni 2009: 15). A concept that comprehensively expresses and summarizes these visions is that of contested landscapes (Bender and Winer 2001). Debates within this arena affect Landscape Archaeology

Landscape Archaeology, Fig. 4 Pre-Hispanic irrigation channels in the extremely dry landscape of the Alto Loa region, in the margins of the Atacama Desert (Chile). Geoarchaeological approaches to landscape have gained new impetus in recent years, focusing on the analysis of environmental change and human impact

not only as a discipline for the study of the past but also, and remarkably, as a discourse related to the construction of Cultural Heritage in the present (for instance, Schofield 2009).

International Perspectives

Landscape, as a word, has been in and around archaeology for a long time. But not every use of landscape, as a word, implies the use of landscape, as a concept. For a landscape Archaeology to properly exist as a field of research and practice on its own, it should fulfil a series of basic conditions: to have a delimited object of study, a series of shared theoretical concepts, and its own (though not exclusive) set of well-defined methods and techniques. In the authors' opinion, what gives landscape archaeology its essence is neither the consideration of the archaeological record on a wide spatial scale nor adherence to a specific theoretical paradigm but the existence of an explicit, underlying concept of landscape. And this concept implies that landscape, in the words of David and Thomas, is not considered "simply a unit of analysis over and above the "site" [. . .] (but) an object of investigation in its own right" (2008: 27). Landscape, as an object of investigation, could be defined as the materialization of the social practices in spatial terms. Landscape archaeology would then be concerned with analyzing the processes of construction, function, signification, and valorization of that material medium through time. Boundaries with other disciplines dealing with the landscape can be sometimes diffused, but, in that respect, the specificity of landscape archaeology is the fact that it is archaeology, i.e., it is concerned with the material.

It is not by chance that the consolidation of a concept of landscape as a holistic category, integrating the environmental, the social, and the symbolic, as currently understood by many landscape archaeology practitioners, coincides with the consolidation of the landscape as a legal entity (and, consequently, a political entity). Landscape archaeology can aspire to play a relevant role in the politics of sustainability. This means that archaeological landscapes should also be considered as cultural resources, something that cannot only be studied but also managed and signified. In turn, archaeology can be enriched with the perspective provided by other disciplines that also

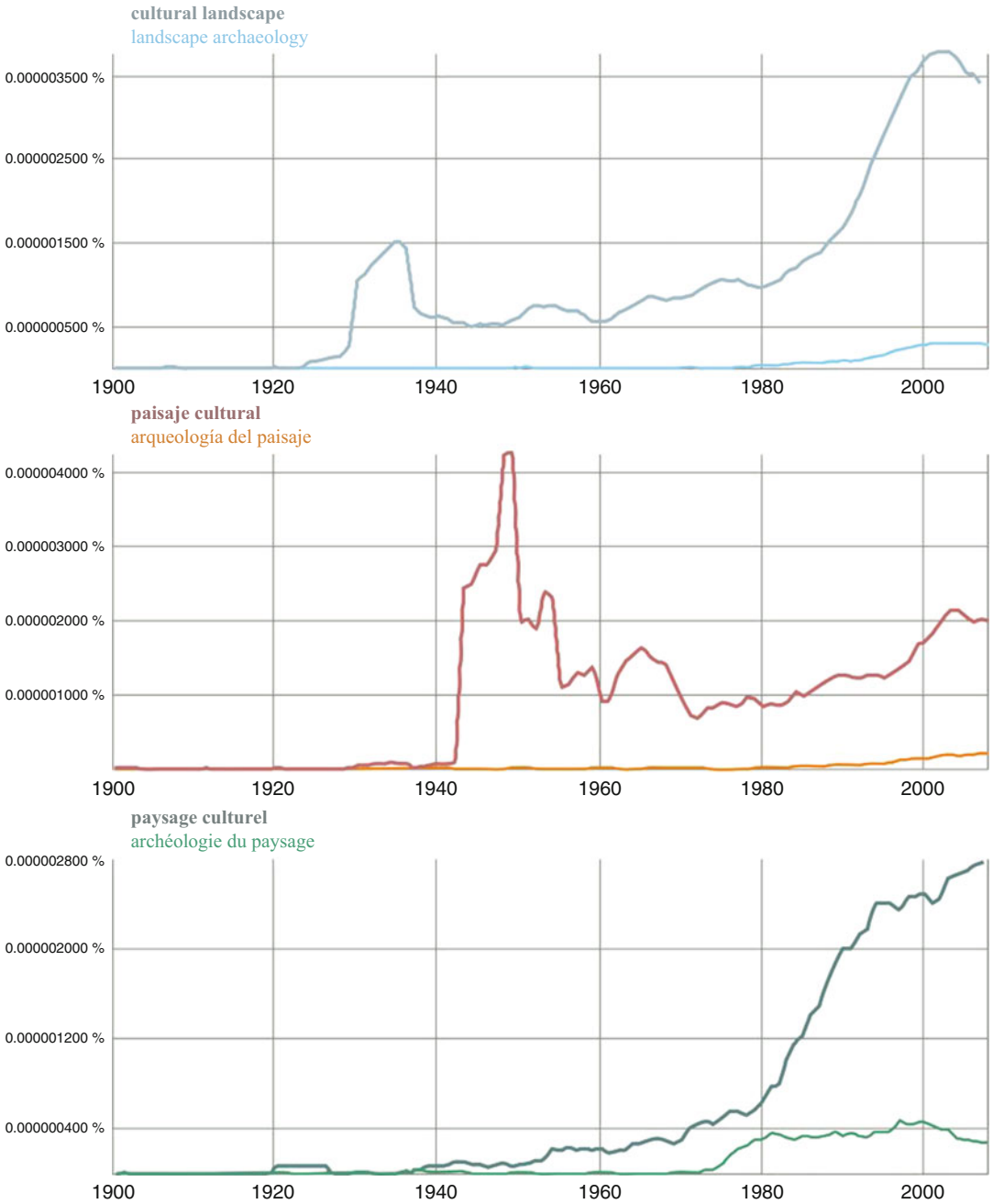

Landscape Archaeology, Fig. 5 Relative occurrence of the expressions "landscape archaeology" and "cultural landscape" in books published throughout the twentieth and early twenty-first centuries in English, Spanish, and French. (Data obtained from Google Ngram Viewer (accessed 2 September 2011)). Vertical scales are different in each case

deal with the landscape, such as geography, anthropology, or ethnography, making it possible to go beyond materiality to contribute towards a participative construction and management of landscapes as cultural heritage.

Future Directions

Although somewhat diminished after a period of significant activity some years ago, debates on the concept of landscape and the very idea of what landscape archaeology should be are sure to continue. In an overtly simplified way, we would say that on the one hand, although solid and alive, processual approaches towards the landscape have arguably shown themselves to be incapable of comprehensively accounting for the full dimensions of the construction of landscapes in the past. On the other hand, phenomenology-inspired proposals have developed a strong theoretical corpus, although they have failed to attract many followers due to being considered as an interesting proposal that is barely applicable to the archaeological record. To what extent both approaches remain incompatible and mutually exclusive, or can converge in novel ways, is something that deserves attention in the future.

At a slightly different level, the debate concerning the relationship between academic archaeology and alternate voices and actors will continue to affect the ways in which landscapes, their sense and meaning, should be constructed. How can archaeology deal with the current and flowing construction of meanings and values over past landscapes? Are "scholarly archaeology" and "popular claims over the past" compatible to any extent? Are differences and oppositions ethical, theoretical, or even ontological? A number of scholars have successfully argued about "the historically contingent nature of the Western concept of landscape and, in particular, its complicity with colonialism" (Lydon 2008: 654). If that is to be agreed, the only possible solution will be to account for ideas of landscape that overcome this "historical contingency" and make way for alternate visions and voices, agents, and interests. However, the question remains as to how and especially to what extent this is possible. Some of these challenges are quite similar to those faced by phenomenological or hermeneutics-oriented perspectives, as they imply going beyond

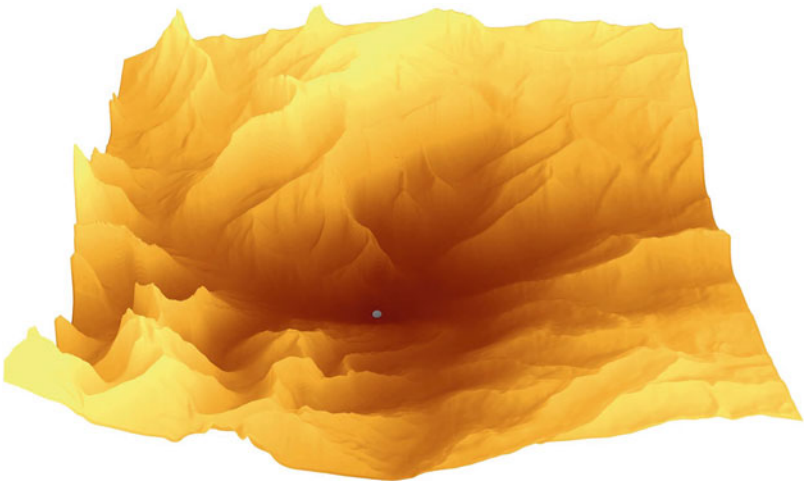

Landscape Archaeology, Fig. 6 Digital landscapes are not just a way of reproducing previously existing ways of working. They can provide a new framework of reference to approach and understand archaeological landscapes. The figure represents movement as a "2.5D" topography: valleys represent least-cost areas for movement towards the destination point pictured as the *gray dot* located at the "steam of the funnel," see Llobera et al. (2011)

traditional, processual views of the landscape, both at theoretical and practical level. But even beyond this, what would happen if we consider that the concept of "Western landscape" is itself a tautology? Will the concept of landscape be still valid to describe those multiple community contexts where there is no formal, conceptual separation between people, things, and the land?

Elsewhere, another direction points towards the relationship between landscape archaeology and geographic information science or, more extensively, the wider field of computing. The increasing incorporation of these fields within the archaeological agenda has led to a number of well-known and fruitful improvements, such as in the fields of mapping or prospecting. However, this can lead to a misleading impression:

> There is no denying that the use of information systems is allowing us to obtain new insights, but these remain far in between, marginal in scope, and seldom championed by archaeologists themselves. This is because the use of information systems is still reduced to a desirable technical skill that some archaeologists manage to "add-on" to their bag of tricks. There is little recognition that the intersection of information systems (computers primarily) and archaeology provides new paradigms and/or research venues. (Llobera 2011: 25)

So far, computers and information technologies have been conceived as external tools that can sometimes be applied to working processes in archaeology that are already well established. A possible direction for future developments lies in dealing with the implications of all of these in conceptual and theoretical terms, in exploring how the construction of digital landscapes is not only a way of reproducing the real world but also a new framework of reference for approaching and exploring it in different, novel ways (Fig. 6).

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Geoarchaeology
- ▶ Phenomenology in Archaeology
- ▶ Spatial Analysis in Field Archaeology
- ▶ Urban Landscapes: Environmental Archaeology

References

Aston, M., and T. Rowley. 1974. *Landscape archaeology: An introduction to fieldwork techniques on post-Roman landscapes*. Newton Abbot: David and Charles.

Barrett, J.C., and I. Ko. 2009. A phenomenology of landscape: A crisis in British landscape archaeology? *Journal of Social Archaeology* 9: 275–294.

Bender, B., and M. Winer, eds. 2001. *Contested landscapes: Movement, exile and place*. Oxford: Berg.

Bintliff, J., P. Howard, and A. Snodgrass, eds. 2007. *Testing the hinterland: The work of the Boeotia Survey (1989–1991) in the southern approaches to the city of Thespiai*. Cambridge: McDonald Institute for Archaeological Research.

Curtoni, R.P. 2009. Arqueología, paisaje y pensamiento decolonial. Reflexiones para una diversidad epistémica. In *Perspectivas actuales en arqueología Argentina*, ed. R. Barberena, K. Borrazzo, and L.A. Borrero, 15–31. Buenos Aires: CONICET-IMHICIHU.

David, B., and J. Thomas. 2008. Landscape archaeology: Introduction. In *Handbook of landscape archaeology*, ed. B. David and J. Thomas, 27–43. Walnut Creek: Left Coast Press.

Fleming, A. 2006. Post-processual landscape archaeology: A critique. *Cambridge Archaeological Journal* 16 (3): 267–280.

Hamilton, S., R. Whitehouse, K. Brown, P. Combes, E. Herring, and M.S. Thomas. 2006. Phenomenology in practice: Towards a methodology for a 'subjective' approach. *European Journal of Archaeology* 9: 31–71.

Jones, C., and P. Slinn. 2006. Cultural heritage and environmental impact assessment in the Planarch area of North West Europe. Final report. Maidstone: Planarch. Available at: http://www.planarch.org/downloads/library/action_3a_final_report_english.pdf

Llobera, M. 2011. Archaeological visualization: Towards an archaeological information science (AISc). *Journal of Archaeological Method and Theory* 18 (3): 193–223.

Llobera, M., P. Fábrega-Álvarez, and C. Parcero-Oubiña. 2011. Directed movement: GIS approach to accessibility. *Journal of Archaeological Science* 38 (4): 843–851.

Lydon, J. 2008. Contested landscapes – Rights to history, rights to place: Who controls archaeological places? In *Handbook of landscape archaeology*, ed. B. David and J. Thomas, 654–659. Walnut Creek: Left Coast Press.

Lynch, K. 1960. *The image of the city*. Cambridge: MIT Press.

McAnany, P.A., and N. Yoffee, eds. 2009. *Questioning collapse: Human resilience, ecological vulnerability, and the aftermath of empire*. Cambridge/New York: Cambridge University Press.

Redman, C.L., S.R. James, P.R. Fish, and J.D. Rogers. 2004. *The archaeology of global change: The impact of humans on their environment*. Washington, DC: Smithsonian Institution Press.

Reindel, M., and G.A. Wagner, eds. 2009. *New technologies for archaeology. Multidisciplinary investigations*

in Palpa and Nasca, Peru, Natural Science in Archaeology. Berlin: Springer.
Schofield, J. 2009. Being autocentric: Towards symmetry in heritage management practices. In *Valuing historic environments*, ed. L. Gibson and J. Pendelbury, 93–114. London: Ashgate.
Tilley, C. 1994. *A phenomenology of landscape*. Oxford: Berg.

Further Reading

Ashmore, W., and A.B.. Knapp, eds. 1999. *Archaeologies of landscape. Contemporary perspectives*. Oxford: Blackwell.
Attema, P., G.J. Burgers, E. van Joolen, M. van Leusen, and B. Mater, eds. 2002. *New developments in Italian landscape archaeology*, BAR International series 1091. Oxford: Archaeopress.
Barker, G. 1995. *A Mediterranean valley: Landscape archaeology and Annales history in the Biferno Valley.* London/New York: Leicester University Press.
Barrett, J.C. 1994. *Fragments from antiquity: Archaeology of social life in Britain, 2900–1200 BC*. Oxford: Blackwell.
Barrett, J.C., R. Bradley, and M. Green. 1991. *Landscape, monuments, and society: The prehistory of Cranborne Chase*. Cambridge: Cambridge University Press.
Bradley, R. 2000. *An archaeology of natural places*. London: Routledge.
Butzer, K.W. 1982. *Archaeology as human ecology.* Cambridge: Cambridge University Press.
Cambi, F., and N. Terrenato. 1994. *Introduzione all'archeologia dei paesaggi*. Roma: Caracci.
Chouquer, G. 2008. *Traité d'archéogéographie. La crise des récits géohistoriques*. Paris: Errance.
Criado Boado, F. 1999. *Del terreno al espacio: planteamientos y perspectivas para la arqueología del paisaje,* CAPA. Vol. 6. Santiago de Compostela: Laboratorio de Arqueoloxía e Formas Culturais. Available at: http://hdl.handle.net/10261/5698
Darvill, T., and M. Gojda, eds. 2001. *One land, many landscapes*, BAR International series 987. Oxford: Archaeopress.
David, B., and J. Thomas, eds. 2008. *Handbook of landscape archaeology.* Walnut Creek: Left Coast Press.
Fairclough, G., and S. Rippon, eds. 2002. *Europe's cultural landscape: Archaeologists and the management of change*. Bruxelles: EAC Secretariat.
Fleming, A. 1988. *The Dartmoor Reaves*. London: Batsford.
García Sanjuán, L. 2005. *Introducción al reconocimiento y análisis arqueológico del territorio*. Barcelona: Ariel.
Gillings, M., D. Mattingly, and J. van Dalen, eds. 2000. *Geographical information systems and landscape archaeology*, Mediterranean Landscape Archaeology. Vol. 3. Oxford: Oxbow.
Hicks, D., L. McAtackney, and G. Fairclough, eds. 2007. *Envisioning landscape: Situations and standpoints in archaeology and heritage*, One World Archaeology. Vol. 52. Walnut Creek: Left Coast Press.
Johnson, M. 2007. *Ideas of landscape*. Oxford: Blackwell.
Kirchner, H., ed. 2010. *Por una arqueología agraria. Perspectivas de investigación sobre espacios de cultivo en las sociedades medievales hispánicas*, BAR International series 2062. Oxford: Archaeopress.
Ingold, T. 1986. *The appropriation of nature. Essays on human ecology and social relations*. Manchester: Manchester University Press.
Muir, R. 1999. *Approaches to landscape*. London: Macmillan Press.
Orejas, A., D. Mattingly, and M. Clavel-Lévêque, eds. 2009. *From present to past through landscape*. Madrid: CSIC.
Smith, A.T. 2004. *The political landscape: Constellations of authority in early complex polities*. Berkeley: University of California.
Thurston, T.L. 2001. *Landscapes of power, landscapes of conflict: State formation in the South Scandinavian Iron Age*. New York: Kluwer Academic/Plenum Publishers.
Ucko, P.J., and R. Layton, eds. 1999. *The archaeology and anthropology of landscape: Shaping your landscape*. London/New York: Routledge.
Wilkinson, T.J. 2003. *Archaeological landscapes of the Near East*. Tucson: University of Arizona Press.

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Landscape Domestication and Archaeology

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Introduction

The term "domesticated landscape" was introduced by Douglas Yen (1989), and a decade later "landscape domestication" was defined as a process of human-mediated landscape transformation (Clement 1999), which fits comfortably into the increasingly popular conceptual framework of human or cultural niche construction (Laland and O'Brien 2010; Smith 2011). During the last decade or so the term "landscape domestication" has become increasingly visible in archaeology and historical ecology, in parallel with the increasing visibility of cultural niche construction. Some find this use of "domestication" to be

inappropriate, however, as domestication is often associated with Charles Darwin and his theory of evolution. A glance at a dictionary dispels confusion, as there are no mentions of evolution or selection or genetics in the definitions. The term comes from the Latin *domesticäre* to dwell in a house, to accustom (Harlan 1992). A house is a built environment and has been part of our experience since people started constructing their own shelters from the elements. The house in the countryside is surrounded by a garden, which also has a dump heap, both of which are intimately involved in the domestication of plants (Smith 2007). Hence, there is a strong relationship between landscape domestication and plant or animal domestication, as pointed out by (Rindos 1984), although he preferred the "developing agroecology" to landscape domestication. Cultural niche construction combines these domestications to explain how humans became so successful (Laland and O'Brien 2010; Smith 2011).

There is a relationship with evolution. Both domestication and evolution are processes. In evolution, natural selection is the primary agent, while in landscape domestication, culture is the primary agent, as it is in cultural niche construction (Laland and O'Brien 2010). As geographer Carl Sauer (1925) wrote, "The cultural landscape is fashioned from the natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape the result." Hence, "Human actions over time are manifested in landscapes that retain physical evidence of cultural practices, decisions, and ideas" (Crumley 1994: 9). These domesticated landscapes are part of the "ecological inheritance" of cultural niche construction (Laland and O'Brien 2010). It is now well accepted that forager societies consciously and unconsciously manage individual plants and plant populations in the landscape, as well as managing groups of animals and taming individuals (Harlan 1992; Terrell et al. 2003; Smith 2011; Harris 2012). These actions leave traces that can be read in the landscape, the physical evidence mentioned by Carole Crumley. As food production became more important during the Holocene in many parts of the world, the degree and tempo of landscape domestication increased, generating a strong positive feedback loop with human population expansion (Rindos 1984). These actions leave even more traces, which landscape and other archaeologists use to study the origins, development, and spread of food-producing societies (Zeder et al. 2006; Pearsall 2015; David and Thomas 2016), as well as all other manifestations of cultural niche construction (Laland and O'Brien 2010).

When local societies expanded, pristine nature contracted; when local societies contracted, nature returned, but landscapes maintained the imprint of previous human domesticatory actions, making them more attractive for the next local expansion. It follows that "Landscapes are the infrastructural legacies of past human action and contain cultural or social 'capital' to be exploited by succeeding human populations" (Erickson 2003: 456). These legacies are of two types: landscape legacies, which may not have been intentionally created, and landesque capital, which was intentionally created to leave capital for succeeding generations (Arroyo-Kalin 2016). As our species spread across the planet, we preferentially occupied the richest landscapes and then continually more marginal ones, domesticating and redomesticating landscapes to greater or lesser extent as time went on. It follows that landscape domestication has much to teach us about the human endeavor since the appearance of *Homo sapiens*.

Definition

Landscape domestication is a process in which human intervention in the landscape and manipulation of landscape components result in changes in landscape ecology and in the demographics of its plant and animal populations, resulting in a landscape more productive and congenial for humans (Clement 1999: 191–192). Human intervention is initially unconscious, mere presence being an intervention, but becomes increasingly conscious when humans remain in a landscape and start to manipulate its components (Rindos 1984). It is important to recognize that humans do not set out to domesticate their landscapes; rather, they concentrate on opening space for themselves,

for example, camps and settlements, and enhancing the spaces of their plants and animals, both native to the landscape and introduced from elsewhere (Rindos 1984; Terrell et al. 2003).

Since domestication is a process and the intensity of intervention and manipulation may vary considerably, there is a continuum of change from pristine to a city. It is worthwhile to identify some sections of the continuum for analytical convenience. See Clement (1999) for supporting references.

Pristine – a landscape in which humans have not intervened or manipulated plant or animal populations.

Promoted – a landscape in which desirable plant populations and individuals are encouraged through seed dispersal; minimal ecosystem clearance, for example, around campsites and along trails; and expansion of the edges between ecosystems, as ecotones tend to be more productive. Fire may be an important tool for these activities. Even though there may have been a low level of human manipulation, the biotic components of this landscape may remain modified long after humans have abandoned the area, for example, when humans introduce new species or expand populations of useful species. Promoted landscapes differ mostly in their biotic composition and may be difficult for archaeologists to identify without the aid of botanists and ecologists. It is in this category of landscape domestication that Rindos (1984: 154–158) hypothesized that the incidental domestication of plant populations begins.

Managed – a landscape in which the abundance and diversity of food and other useful plant populations is further encouraged through partial ecosystem clearance by burning, expansion of ecotones, transplanting of desirable individual plants or planting of individual seeds, addition of amendments to enhance plant growth, reduction of competition from non-useful plants, and management of water via irrigation. Again, the biotic components of this landscape may remain long after humans have abandoned the area. The difference between promoted and managed is one of degree, with more conscious application of some practices, while other practices may continue to be unconscious. Managed landscapes are becoming increasingly studied in the context of pre-domestication cultivation in Southwest Asia (Harris 2012) and forest management in the Neotropics (Peters 2000; Levis et al. 2018) and Southeast Asia (Michon 2005). It is in this category of landscape domestication that Rindos (1984: 158–164) hypothesized that the specialized domestication of plant populations begins. Although direct archaeological evidence of promoted and managed landscapes may be difficult to find (Peters 2000), phytolith, pollen, and macrobotanical remains may shed light on past foraging activities and are increasingly recognized as a major source of information about past landscape management strategies (Pearsall 2015). These assemblages may reflect the exploitation of wood as an energy source (Picornell Gelabert et al. 2011), and the use of palms and trees as food (Watling et al. 2017), thus providing good means to infer environmental management.

Cultivated – a manipulation that involves the complete transformation of the biotic landscape to favor the growth of one or a few selected food plants, both domesticated and not, and other useful plant and animal populations, through ecosystem clearance and burning, localized or extensive tillage, seedbed preparation, weeding, pruning, manuring, mulching, fencing, and irrigation in any combination. These dramatic manipulations create a landscape that has little relationship with the surrounding ecosystem, so that it may be called an artificial construct. The biotic components of this very artificial landscape do not survive long after human abandonment because the changes that favor the growth of the human selected populations also favor the growth of weeds and the invasion of other pioneer species; however, it takes a long time to return to a natural state. The abiotic transformations practiced in this landscape often survive for long periods, for example, earthworks for irrigation or planting, such as mounds and furrows. Other activities may also leave clear evidence for archaeologists, such as charcoal from the clearing and burning of the original ecosystem, soil modifications due to tillage, long-term management, including creation of anthropogenic soils

(Glaser and Birk 2012), and phytoliths from cultivated plants (Pearsall 2015).

Swidden/Fallow – this analytical construct is the combination of cultivation and management, in that order. The swidden is a cultivated landscape, which yields well for a few years but becomes progressively more difficult to weed and tend as soil fertility declines. Useful weeds and volunteer or transplanted shrubs and trees are managed at progressively lower intensities until a managed secondary forest results (the fallow) (Denevan and Padoch 1988). This is the most visible sequence of traditional landscape domestication in the tropics today. The managed fallow remains long after humans have abandoned it and is easily identified by the abundance of useful tree species. Archaeologists can also easily identify these domesticated landscapes, as charcoal and phytoliths of useful plants tend to be abundant.

Settlements – as in the cultivated landscape, this manipulation involves the elimination of a section of a preexisting ecosystem, followed by the construction of the settlement, be it a camp or a city. This landscape may be constructed from locally available materials, including wood, earth, and stone, and often involves considerable reworking of the local relief. It also includes gardens and dump heaps. This type of landscape has been intensively studied by archaeologists since the birth of the discipline, thus needing little explanation here.

Historical Background

The domestication of landscapes has attracted a wide range of scholars for a long time, although with widely varying terminology. Cultural landscapes have been studied since before Sauer's (1925) classic article on the morphology of landscapes. Harlan (1992), Denevan (2001, 2011), Terrell et al. (2003), and Harris (2012) provide good reviews. Both Jack Harlan and David Harris examine the topic as a component of the origins of food-producing systems, while William Denevan and John Terrell and colleagues argue that the process has been under way so long that it is difficult to identify pristine landscapes in any part of the world where humans have lived for any appreciable time, even the Neotropics where our species arrived only 20–15,000 yBP. Rindos (1984) would have agreed with Denevan and Terrell et al.

Key Issues/Current Debates

For many years, perhaps the most important debate has been the extent of landscape domestication in different biomes. Denevan's (2011) argument about the myth of the pristine has been questioned in Amazonia, for example, where some ecologists and archaeologists argue that preconquest human manipulation of Amazonian landscapes was variable across the biome, with negligible modification of interfluvial forests (Bush and Silman 2007), hence of the basin in general. The definitions provided above help explain why archaeologists have difficulty finding evidence of landscape domestication away from the settlements. However, when Clement et al. (2015) integrated archaeological evidence with evidence of plant domestications and dispersals, human population estimates, and language diversity and dispersals, a mosaic of different degrees of landscape domestication across the biome became clear. When Levis et al. (2017) integrated domesticated tree and palm richness and abundance in forests across the biome, the mosaic became even clearer. This integration of approaches allows more robust inferences, even for areas where there is, as yet, no archaeological evidence. For example, Levis et al. (2017) observed that the richness and abundance of domesticated trees and palms was greatest near known archaeological sites, but was often great along major and tributary rivers without known archaeological sites, strongly suggesting that when archaeologists look along those rivers they will find sites. In Amazonia, this debate is essentially over and the biome can be considered an anthrome, like most other biomes on the planet (Ellis and Ramankutty 2008). Now the focus is shifting to the degree and types of human transformations of landscape, since the great diversity of preconquest and current indigenous societies

and traditional communities had and have different impacts.

An ongoing debate is about the nature of progress in human history and, by extension, in analysis of domesticated landscapes. The sequence of categories of landscape domestication defined above has been read by many theorists as progress from social systems with simple food procurement strategies to more complex social systems with sophisticated food production systems, requiring more knowledge, more energy, larger populations to supply the energy, and producing more food to fuel population growth. The same is true of the sequence of plant population domestication (Rindos 1984; Clement 1999), as plants become continually more coevolved with their human mutualists. As Rindos (1984) was careful to point out, however, evolution and domestication are not about progress but about change for better adaptation to shifting environments, including landscapes that humans have domesticated to any degree, the cultural niches with both landscape legacies and landesque capital (Arroyo-Kalin 2016).

Modern food-producing societies, such as those that support academics, view the sequence of landscape domestication presented here and concomitant plant and animal population domestication as progress. Is this necessarily true of all human societies? Rival (2007) argues convincingly that this is not true, that some human societies prefer different lifestyles. Many of the examples of foragers cited by Harlan (1992) and Harris (2012) support Laura Rival's analysis. Members of modern food-producing societies look down upon members of societies that mainly promote or manage landscapes, while members of these landscape managing societies wonder why the food producers want to be slaves to their domesticated plants, animals, and landscapes. A closer look shows that both foraging and farming strategies are present in many – if not most – societies and that foraging activities are effective forms of niche construction, as complex and sophisticated as farming techniques (Terrell et al. 2003; Rowley-Conwy and Layton 2011). It thus appears obvious that a mosaic of landscapes with different degrees of domestication should be expected (Rindos 1984; Terrell et al. 2003). In fact, this is what is found on all continents with human societies (Ellis and Ramankutty 2008; Terrell and Hart 2008).

What does this mean for archaeology? It means that, since the boundaries between forager and farmer strategies are much more fluid than scholars have assumed in the past, archaeologists should not focus their investigations only on cultivated landscapes and settlements and the identification of the transition from forager to farming societies (Terrell and Hart 2008). Rather, they need to expend more effort to read the signatures of promoted and managed landscapes. A clue to find these signatures may be in settlements themselves. Since both forager and farming populations are likely to discard residues outside of their procurement and use areas (Schiffer 2016), centralized deposits, such as dump heaps, concentrate the remains of different forms of resource appropriation, including those from landscape promotion and management. These can be inferred by the combined analysis of archaeobotanical proxies with ethnoarchaeological and ethnobiological data, which are good tools to infer the cultural and ecological factors that generated the distribution of archaeological remains (Picornell Gelabert et al. 2011).

International Perspectives

Although the terminology varies, landscape domestication is being intensively studied on all habitable continents, although emphasis is placed on cultivated landscapes, since these came to support modern food-producing societies. Australia provides an emblematic contrasting case study, since Native Australians extensively domesticated their landscapes without domesticating plants or animals (Harlan 1992; Harris 2012), and provides the examples that justify distinguishing conceptually between landscape domestication and plant population domestication, even though native peoples do not recognize the distinction (Clement 1999). Harris (2012) provides an up-to-date introduction to this Australian literature.

The humid forests of Southeast Asia and near Oceania are also the subject of increasing investigation, parts of which are also analyzed by Harris (2012). In this region, two intertwined traditions exist: a tradition that developed efficient open-field food production systems and a tradition that developed complex forest food production systems. Michon (2005) provides an introduction to these two traditions, concentrating on the forest systems, rather than the open-field systems, which provides a welcome difference in focus. While the open-field systems came to dominate world food production (Harlan 1992; Harris 2012), numerous less-dominant societies throughout the world humid tropics developed more complex systems, similar to the intertwined systems of Borneo and adjacent areas of Southeast Asia and near Oceania. The large number of fruit trees and palms domesticated in Amazonia (Levis et al. 2017, 2018) suggests that something similar occurred there. Worldwide, there are an increasing number of studies examining tree crops and this trend will certainly continue.

This short entry is not the place to review the growing worldwide literature on landscape domestication, so the reader is directed to Harlan (1992), Denevan (2001, 2011), and Harris (2012), references therein, and Further Reading (below).

Future Directions

The study of landscape domestication by existing and prehistorical societies worldwide is expanding. It is clear that research in landscape archaeology requires an interdisciplinary approach (Knitter et al. 2017). Recent cases of the integration of multiscale and multidisciplinary datasets and GIS-based approaches are contributing to the understanding of landscapes as holistic entities (Knitter et al. 2017). Given the definitions presented here, it seems self-evident that archaeologists need to expand their collaborations even more than has been the case recently (e.g., Zeder et al. 2006). Landscape archaeologists recognize that human manipulation of the landscape does not cease at the edges of settled and cultivated landscapes (David and Thomas 2016), but continues through managed landscapes into promoted landscapes. Other archaeologists need to recognize this also. Since many of the legacies of promotion and management can be read in plant species composition, ecologists and ethnobiologists working under the framework of historical ecology provide valuable data for the interpretation of archaeobotanical and paleoecological records, which in turn inform the time depth of these legacies (Arroyo-Kalin 2016). With increased attention to subtler modifications, the extent of landscape domestication practiced by prehistoric societies will be clearer and may push back the beginning of the Anthropocene from 1750 CE to much earlier.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural and Social Earthworks in the Guianas
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeobotany
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Complex Hunter-Gatherers
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Harris, David Russell
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ Human Evolution: Use of Fire

- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Landscape Archaeology
- ▶ Maya Forest Garden
- ▶ Midden Cultivation
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Paleoethnobotany
- ▶ People as Agents of Environmental Change
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Southern Africa: Origins and Development of Agriculture

References

Arroyo-Kalin, Manuel. 2016. Landscaping, landscape legacies, and landesque capital in pre-Columbian Amazonia. In *The Oxford handbook of historical ecology and applied archaeology*, ed. Christian Isendahl, and Daryl Stump, 1–24. Oxford handbooks online. Oxford: Oxford University Press.

Bush, Mark B., and Miles R. Silman. 2007. Amazonian exploitation revisited: Ecological asymmetry and the policy pendulum. *Frontiers in Ecology and the Environment* 5 (9): 457–465. https://doi.org/10.1890/070018.

Clement, Charles R. 1999. 1492 and the loss of Amazonian crop genetic resources. I. The relation between domestication and human population decline. *Economic Botany* 53 (2): 188–202. https://doi.org/10.1007/BF02866498.

Clement, Charles R., William M. Denevan, Michael J. Heckenberger, André Braga Junqueira, Eduardo G. Neves, Wenceslau G. Teixeira, and William I. Woods. 2015. The domestication of Amazonia before European conquest. *Proceedings of the Royal Society B: Biological Sciences* 282 (1812): 20150813. https://doi.org/10.1098/rspb.2015.0813.

Crumley, Carole L. 1994. Historical ecology: a multidimensional ecological orientation. In *Historical ecology: Cultural knowledge and changing landscapes*, ed. Carole L. Crumley, 1–16. Santa Fe: School of American Research Press.

David, Bruno, and Julian Thomas. 2016. *Handbook of landscape archaeology*. Oxon: Routledge.

Denevan, William M. 2001. *Cultivated landscapes of native Amazonia and the Andes*, Oxford geographical and environmental studies. Oxford: Oxford University Press.

Denevan, William M. 2011. The "pristine myth" revisited. *Geographical Review* 101 (4): 576–591. https://doi.org/10.1111/j.1931-0846.2011.00118.x.

Denevan, William M., and Christine Padoch. 1988. Swidden-fallow agroforestry in the Peruvian Amazon. In *Advances in economic botany*. New York: New York Botanical Garden.

Ellis, Erle C., and Navin Ramankutty. 2008. Putting people in the map: Anthropogenic biomes of the world. *Frontiers in Ecology and the Environment* 6 (8): 439–447. https://doi.org/10.1890/070062.

Erickson, Clark L. 2003. Historical ecology and future explorations. In *Amazonian dark earths: Origin, properties, management*, ed. Johannes Lehmann, Dirce C. Kern, Bruno Glaser, and William I. Woods, 455–500. Dordrecht: Kluwer.

Glaser, Bruno, and Jago Jonathan Birk. 2012. State of the scientific knowledge on properties and genesis of Anthropogenic Dark Earths in Central Amazonia (terra preta de Índio). *Geochimica et Cosmochimica Acta* 82: 39–51. https://doi.org/10.1016/j.gca.2010.11.029.

Harlan, Jack R. 1992. *Crops & man*. 2nd ed. Madison: American Society of Agronomy/Crop Science Society of America.

Harris, David R. 2012. Evolution of agroecosystems: Biodiversity, origins, and differential development. In *Biodiversity in agriculture: Domestication, evolution, and sustainability*, ed. Paul Gepts, Thomas R. Famula, Robert L. Bettinger, Stephen B. Brush, Ardeshir B. Damania, Patrick E. McGuire, and Calvin O. Qualset, 21–56. Cambridge, UK: Cambridge University Press.

Knitter, Daniel, Wiebke Bebermeier, and Oliver Nakoinz. 2017. Bridging the gap – Integrated approaches in landscape archaeology. *eTopoi. Journal for Ancient Studies* 4: i–viii.

Laland, Kevin N., and Michael J. O'Brien. 2010. Niche construction theory and archaeology. *Journal of Archaeological Method and Theory* 17 (4): 303–322. https://doi.org/10.1007/s10816-010-9096-6.

Levis, Carolina, Flávia R.C. Costa, Frans Bongers, Marielos Peña-Claros, Charles R. Clement, André B. Junqueira, Eduardo G. Neves, et al. 2017. Persistent effects of pre-Columbian plant domestication on Amazonian forest composition. *Science* 355 (6328): 925–931. https://doi.org/10.1126/science.aal0157.

Levis, Carolina, Bernardo M. Flores, Priscila A. Moreira, Bruno G. Luize, Rubana P. Alves, Juliano Franco-Moraes, Juliana Lins, et al. 2018. How people domesticated Amazonian forests. *Frontiers in Ecology and Evolution* 5: 171. https://doi.org/10.3389/fevo.2017.00171.

Michon, Geneviève. 2005. *Domesticating forests: How farmers manage forest resources*. Bogor: Institut de Recherche pour le Développement (IRD)/Centre for International Forestry Research (CIFOR)/The World Agroforestry Centre (ICRAF).

Pearsall, Deborah M. 2015. *Paleoethnobotany: A handbook of procedures*. 3rd ed. Walnut Creek: Left Coast Press.

Peters, Charles M. 2000. Precolumbian silviculture and indigenous management of Neotropical forests. In *Imperfect balance: Landscape transformations in the*

Precolumbian Americas, The historical ecology series, ed. David L. Lentz, 203–224. New York: Columbia University Press.

Picornell Gelabert, Llorenç, Eleni Asouti, and Ethel Allué Martí. 2011. The ethnoarchaeology of firewood management in the Fang villages of Equatorial Guinea, Central Africa: Implications for the interpretation of wood fuel remains from archaeological sites. *Journal of Anthropological Archaeology* 30 (3): 375–384. https://doi.org/10.1016/j.jaa.2011.05.002.

Rindos, David. 1984. *The origins of agriculture: An evolutionary perspective*. San Diego: Academic Press.

Rival, Laura M. 2007. Domesticating the landscape, producing crops and reproducing society in Amazonia. In *Emergence and convergence: towards a new holistic anthropology?* ed. David Parkin and Stan Ulijaszek, 72–90. Oxford: Berghahm.

Rowley-Conwy, Peter, and Robert Layton. 2011. Foraging and farming as niche construction: Stable and unstable adaptations. *Philosophical Transactions of the Royal Society B Biological Sciences* 366 (1566): 849–862. https://doi.org/10.1098/rstb.2010.0307.

Sauer, Carl Ortwin. 1925. The morphology of landscape. *University of California Publications in Geography* 2 (2): 19–54.

Schiffer, Michael Brian. 2016. *Behavioral archaeology: Principles and practice*. London: Equinox Publishing.

Smith, Bruce D. 2007. Niche construction and the behavioral context of plant and animal domestication. *Evolutionary Anthropology: Issues, News, and Reviews* 16 (5): 188–199. https://doi.org/10.1002/evan.20135.

Smith, Bruce D. 2011. General patterns of niche construction and the management of 'wild' plant and animal resources by small-scale pre-industrial societies. *Philosophical Transactions of the Royal Society of London B, Biological Sciences* 366 (1566): 836–848. https://doi.org/10.1098/rstb.2010.0253.

Terrell, John Edward, and John P. Hart. 2008. Domesticated landscapes. In Handbook of landscape archaeology, ed. Bruno David and Julian Thomas, 328–332. Walnut Creek, CA: Left Coast Press.

Terrell, John Edward, John P. Hart, Sibel Barut, Nicoletta Cellinese, Antonio Curet, Chapurukha M. Tim Denham, Kyle Latinis Kusimba, Rahul Oka, and Joel Palka. 2003. Domesticated landscapes: The subsistence ecology of plant and animal domestication. *Journal of Archaeological Method and Theory* 10 (4): 323–368. https://doi.org/10.1023/B:JARM.0000005510.54214.57.

Watling, Jennifer, Jose Iriarte, Francis E. Mayle, Denise Schaan, Luiz C.R. Pessenda, Neil J. Loader, F. Alayne Street-Perrott, Ruth E. Dickau, Antonia Damasceno, and Alceu Ranzi. 2017. Impact of pre-Columbian "geoglyph" builders on Amazonian forests. *Proceedings of the National Academy of Sciences of the United States of America* 114 (8): 1868–1873. https://doi.org/10.1073/pnas.1614359114.

Yen, Douglas E. 1989. The domestication of environment. In *Foraging and farming: The evolution of plant exploitation*, ed. David R. Harris and Gordon C. Hillman, 55–78. London: Unwin Hyman Ltda.

Zeder, Melinda A., Daniel G. Bradley, Eve Emshwiller, and Bruce D. Smith. 2006. *Documenting domestication: New genetic and archaeological paradigms*. Berkeley: Univ of California Press.

Further Readings

Anderson, E. 1952/2005. *Plants, man and life*. Boston/Mineola: Little, Brown & Cia./Dover Publications.

Balée, W., ed. 1998. *Advances in historical ecology*, The historical ecology series. New York: Columbia University Press.

Balée, W., ed. 2009–10. Special issue "Long-term anthropic influences on the diversity of Amazonian landscapes and biota". *Diversity.* Available at: http://www.mdpi.com/journal/diversity/special_issues/amazonian.

Balée, W., and C.L. Erickson, eds. 2006. *Time and complexity in historical ecology: Studies in the neotropical lowlands*, The historical ecology series. New York: Columbia University Press.

Gammage, B. 2011. *The biggest estate on earth: How the aborigines made Australia*. Sidney: Allen & Unwin.

Harris, D.R., and G.C. Hillman, eds. 1989. *Foraging and farming: The evolution of plant exploitation*. London: Unwin Hyman.

Kennedy, J. and W. Clarke. 2004. *Cultivated landscapes of the Southwest Pacific* (Resource management in Asia-Pacific working paper 50). Canberra: Resource Management in Asia-Pacific Program, Australian National University.

Lentz, D.L., ed. 2000. *Imperfect balance: Landscape transformations in the Precolumbian Americas*, The historical ecology series. New York: Columbia University Press.

Mann, C.C. 2005. *1491: New revelations of the Americas before Columbus*. New York: Alfred A. Knopf.

Mason, S.L.R., and J.G. Hather, eds. 2002. *Hunter-gatherer archaeobotany: Perspectives from the northern temperate zone*. London: Institute of Archaeology, University College London.

Posey, D.A., and W. Balée, eds. 1989. *Resource management in Amazonia: Indigenous and folk strategies*, Advances in economic botany. Vol. 7. New York: The New York Botanical Garden.

Price, T.D., and A.B.. Gebauer, eds. 1995. *Last hunters, first farmers: New perspectives on the prehistoric transition to agriculture*, School of American Research Advanced seminar series. Santa Fe: School of American Research Press.

Sauer, C.O. 1952. *Agricultural origins and dispersals: The domestication of animals and foodstuffs*. New York: The American Geographical Society.

Tudge, C. 1996. *The time before history: 5 million years of human impact*. New York: Touchstone.

Landscape Iconoclasm

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Brief Definition of the Topic

The concepts of landscape and iconoclasm compose the term "landscape iconoclasm." "Landscape" varies from discipline to discipline, but it is widely regarded as the construction of cultural and natural aspects through time at different space scales and how people perceive them. Iconoclasm is, literally, the destruction or breaking of religious pictures for political and religious purposes, where pictures are icons that represent "the appearance of the immaterial image in a material medium" (Mitchell 2005: 85). Metaphorically speaking, iconoclasm refers to the destruction of ideas, beliefs, and traditions. For example, the removal of a monument that represents Francisco Franco and symbolizes fascism at the same time is a case of a literal and metaphorical iconoclasm. Contrary to vandalism, iconoclasm is a deliberate destruction, rather than a meaningless act.

Iconoclasm is associated with iconic pictures, not landscapes. However, certain communities consider their landscapes that bear culturally significant marks such as rock art, traditional stories, and natural features (trees, water holes) as cultural landscapes and sacred sites. These landscapes are meaningful because these marks provide meaning to a range of people attached to the place. As a result, sacred landscapes share some of the characteristics that some images possess in that they also arouse emotions, people use them in rituals, and they are part of a group's identity. Thus, the destruction of landscapes possessing sacred images or sites can be considered a genuine act of iconoclasm. The destruction of landscapes that are regarded by the local community as sacred can amount to a landscape iconoclasm because the landscape is not only the place where sacred pictures exist but also the images, beliefs, and traditions that together make up the landscape. The landscape not only exists because of the pictures – images engraved onto the landscape – and the ideas about them, as well as the traditions and stories that provide meaning to the place, but the pictures, images, ideas, traditions, and stories exist because they are embedded in the landscape. Attacking pictures or images is an iconoclasm; attacking a landscape that contains significant cultural markers in the form of pictures or images is a landscape iconoclasm. In the case of landscapes that do not bear images, the definition of landscape iconoclasm can be problematic. However, if the landscape is culturally significant for a social group because it is the place where the bodies of their ancestors are buried, or they are represented within the landscape (as natural features of the landscape), targeting the landscape amounts to a landscape iconoclasm. Due to its ritual, mythical, and social significance, the landscape, regardless if it possess iconic images or not, becomes itself an icon to the group associated with it. For example, the parliamentarian destruction of Royalist gardens after the 17th Civil War in the United Kingdom was motivated because the gardens were associated with the established power, not because they contained images. Destroying them amounted to destroy the royals.

One example of landscape iconoclasm is the destruction of Murujuga in Western Australia (the Burrup Peninsula) – the largest known archaeological site in the world. Comprising one million petroglyphs, Murujuga has been desecrated by the establishment of extractive industries since the 1960s, which have profoundly impacted the landscape as well as altered the preservation of traditional beliefs within site. The destruction, in this case, was the result of poor archaeological advice, the neglect of Indigenous rock art, and the mismanagement of cultural heritage (González Zarandona 2015). However, there are other instances such as the Huichol people in Central Mexico who have been witnessing the destruction

of their landscape as a result of extractive industries in the Wirikuta region and the petroglyphs in the Altai Mountains, Russia.

Any sacred landscape that is experimenting destruction of its natural and cultural features, whether as a result of military, political, or religious motives (Chapman and Gearey 2013; Walsham 2011) or economic motives due to the establishment of transnational extractive industries (Bednarik 2002; Mulvaney 2011; Plets 2016), is a landscape iconoclasm. Although many buildings and landmarks in rural or urban landscapes have been destroyed due to its religious or political significance, such as the Buddhas of Bamiyan in Afghanistan in 2001, landscape iconoclasm may only apply to the razing of entire landscapes, as opposed to a particular unique feature within the landscape.

Two important points raised by landscape iconoclasm are firstly how the destruction creates a limitation for local populations to access their landscape. Limited access to the place derives in the destruction not only of tangible heritage but also the intangible heritage associated with the area, as well as the natural features that bear cultural markers of significance. Secondly, in light of the high unemployment that exists in rural areas in countries like Australia, Russia, South Africa, Canada, and Mexico, the establishment of extractive industries in the landscape, where they operate freely, triggers the destruction. This situation is also problematic since the industries employ members of the local community in the extraction and management of the natural resources of which they are also entitled and, at the same time, in the destruction and mismanagement of the cultural heritage of which they are owners.

Regarding destruction of material culture also entails speaking about the intentions of the perpetrator. In the case of landscape iconoclasm, one should distinguish between the intentional destruction of the landscape that targets landscapes as part of the aim to destroy its material existence and the entire social structure of the group that is associated with the landscape and unintended landscape iconoclasm. The latter can be defined as the action that indirectly destroys landscapes by directly operating in the landscape as a result of practices such as the extraction of mineral resources. In both cases, the intention or the lack of it generates similar results; the difference lies in the intention to destroy not only the landscape but the social group associated with it.

Studying the destruction of landscapes through the lens of iconoclasm provides a more holistic view of landscape destruction, as opposed to a simplification of the act by proposing vandalism as the primary motive for the destruction. Iconoclasm, due to the religious and political implications that the term implies, provides a deeper analysis of the motives behind the destruction.

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Burrup Peninsula
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Dampier Archipelago Petroglyphs
- ▶ Heritage and Archaeology
- ▶ Heritage Landscapes
- ▶ Landscape archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Sacred Sites in Indigenous Archaeology

References

Bednarik, R. 2002. The survival of the Murujuga (Burrup) petroglyphs. *Rock Art Research* 19: 28–40.

Chapman, H., and B. Gearey. 2013. Iconoclasm in European prehistory? Breaking objects and landscapes. In *Striking images, iconoclasms past and present*, ed. S. Boldrick, L. Brubaker, and R. Clay. Burlington: Ashgate.

González Zarandona, J.A. 2015. Towards a theory of landscape iconoclasm. *Cambridge Archaeological Journal* 25: 461–475.

Mitchell, W.J.T. 2005. *What do pictures want? The lives and loves of images*. Chicago/London: The University of Chicago Press.
Mulvaney, K. 2011. Dampier archipelago: Decades of development and destruction. *Rock Art Research* 28: 17–25.
Plets, G.F.J. 2016. Heritage statecraft: When archaeological heritage meets neoliberalism in Gazprom's resource colonies, Russia. *Journal of Field Archaeology* 41: 368–383.
Walsham, A. 2011. *The Reformation of the landscape: Religion, identity and memory in early modern Britain and Ireland*. Oxford: Oxford University Press.

Landscape Mapping at West Heslerton

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Introduction

Archaeological research at West Heslerton, Yorkshire, England, began in 1978, following the chance discovery of Early Anglo-Saxon burials during sand quarrying (Powlesland et al. 1986). Subsequent excavations in advance of quarrying and plowing covered some 35 ha of the Vale of Pickering, exposing prehistoric, Roman and Anglo-Saxon settlements and cemeteries (Figs. 1 and 2). Revealing a portion of ancient landscape at such a large scale emphasized that the narrative of human occupation was expressed by a continuum of activity rather than by a number of dispersed sites of different ages. It also raised the question of the wider context of the excavated area and the nature of the landscape of which it formed a part. The Landscape Research Centre (LRC) was created to map the total archaeology of the Vale of Pickering, testing and developing methods of remote mapping and analysis. Now in action for more than the 30 years, the LRC has recorded over 1,000 ha of contiguous settlement in unprecedented detail.

Key Issues/Current Debates/Future Directions/Examples

The 1980 research design argued that a proactive campaign of archaeological survey was necessary both to provide a context for the excavations and to identify the scale, complexity, variability, and levels of preservation of the archaeological resource. The preliminary area to be examined was a transect 1-km wide and 10-km long laid at right angles across the varied terrain of the valley. Two packages of remote mapping methods were applied, the first from the air, the second on the ground.

Crop-marks are sensitive to conditions that vary with the seasons and from year to year, so that most discoveries in England are made by chance. To improve the viability of total coverage, LRC initiated a program of intensive and repeated aerial survey flying over the same fields again and again, and documenting crop-marks that were only visible from the air for a few days at a time. New technology in the form of airborne multispectral imaging offered the potential to record crop-marks in wavelengths beyond the visible parts of spectrum, particularly from infrared and thermal wavelengths. A research experiment funded by the Natural Environment Research Council (NERC) in 1994 provided an opportunity to test the viability of multispectral imaging for landscape scale crop-mark mapping, to test the potential for identifying crop-marks in nonvisible wavelengths in fields under permanent pasture and in fields that had no prior crop-mark record. The 1994 NERC flight combined conventional large format vertical color photography with digital imaging using the Deadelus 12 band multispectral scanner; by chance, the flight was undertaken at a perfect time when a very large number of crop-marks were visible (Fig. 3). The vertical photographs from this single survey included a large percentage of the features identified over many years of ad-hoc air photography. The scientific test to identify features using wavelengths beyond the visible part of the spectrum was confirmed, but the limited resolution of the

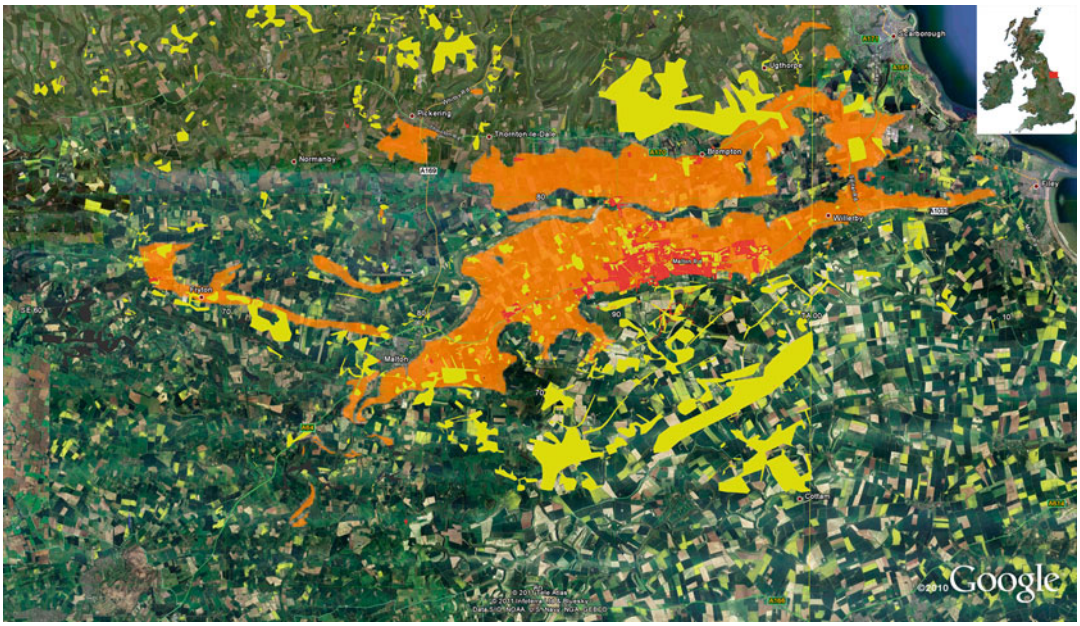

Landscape Mapping at West Heslerton, Fig. 1 The Vale of Pickering viewed in Google Earth with overlays showing the distribution of sands and gravels in *orange*, areas with crop-marks in *yellow* and areas covered by geophysical survey in *red*

Deadelus scanner generating images with a ground resolution of 2.0 m rather than the .08 m per pixel resolution of the photographs meant that the returns from the multispectral imaging were diminished (Powlesland et al. 1997).

Another NERC supported flight undertaken in 2005 collected LiDAR data. The LiDAR survey, despite its relatively low ground resolution of 2.0 m per pixel, provided an accurate surface model covering c. 80 km^2 around West Heslerton Village. It was quickly realized that the LiDAR surface model was imperfect in that it represented the current rather than ancient topography. The current landform has been radically altered by desiccation of the extensive peat deposits in the center of the Vale as a consequence of climate change, man-made drainage, and agricultural effects.

Attempts to identify buried archaeology using ground-based remote sensing in the early 1980s initially produced poor results, a consequence both of the available hardware and local conditions. With the support of English Heritage, a program of large scale and contiguous geophysical surveys designed to cover multiple adjacent fields was begun in 2001 and continued for nearly a decade; these completely transformed the picture of past activity in the area (Fig. 4). Survey was first targeted on an area of c. 350 h a between the villages of Sherburn and East Heslerton; work began using a single Geoscan FM16 fluxgate gradiometer, collecting data over thirty meter squares walked at 1-m intervals, recording points at .25-m intervals on a north-south axis with a field team of two. The sandy soils of the southern side of the Vale of Pickering both to the east and west of West Heslerton proved to be exceptionally responsive to geomagnetic prospection in particular. The initial 350 h a target area was sufficient to expose an extraordinary number of archaeological features but was insufficiently large to give an understanding of the underlying structure of the prehistoric and later landscape or develop a long-term management strategy.

In order to increase the rate of area coverage, a Bartington 601 dual gradiometer, with two probes set 1 m apart, was purchased; this significantly reduced the amount of walking required to cover each area. The limitations in single or dual probe survey employing manually established 30 m

Landscape Mapping at West Heslerton,
Fig. 2 Plan showing the excavated Anglian Settlement and associated cemetery at West Heslerton

grids were recognized at an early stage of the large area surveys; it was difficult to secure high quality and uniform results at a rate of more than 2 h a per day. By the mid-2000s, new instruments employing multiple probes mounted on carts were developed by English Heritage in the UK and a number of geophysicists in Europe. In 2007, we began to use a Foerster Kartograph which

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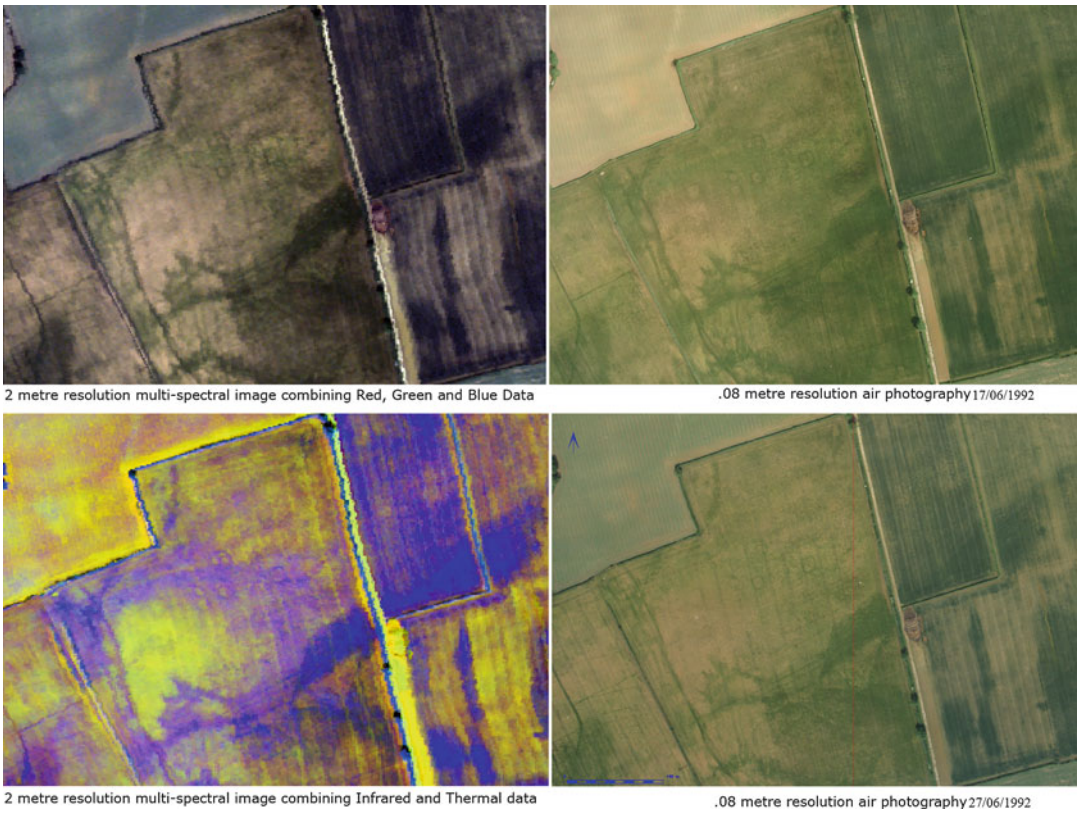

Landscape Mapping at West Heslerton, Fig. 3 *Four views* covering an area of crop-marks derived from multi-spectral and high resolution airborne imaging. Showing the limitations imposed by resolution and the difference in crop-marks only a few days apart

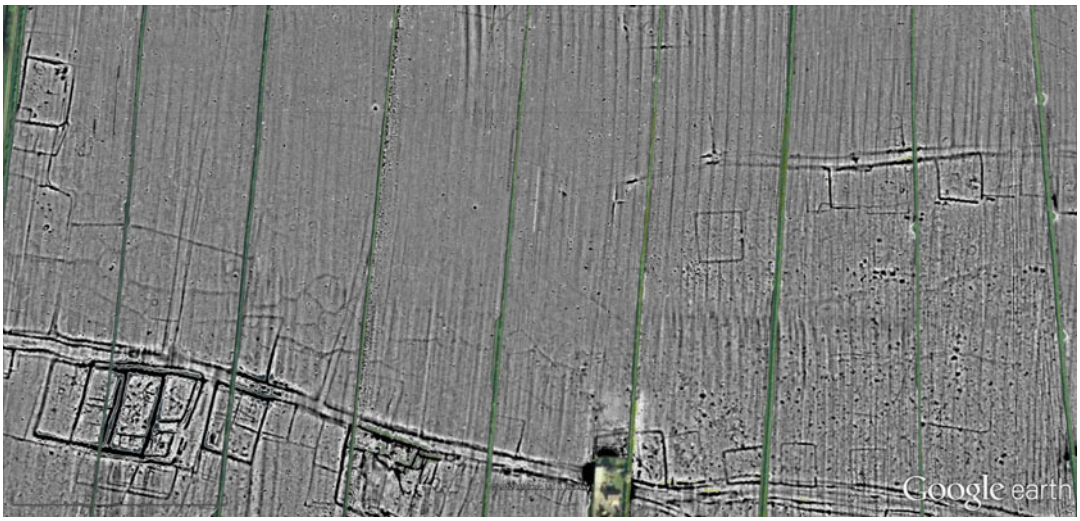

Landscape Mapping at West Heslerton, Fig. 4 A section of the LRC landscape scale geophysical survey covering a 1-km strip on the southern side of the Vale of Pickering revealing evidence of prehistoric, Roman and Anglo-Saxon domestic activity in addition to major trackways and probable cemeteries

carried four probes with a .5 m separation between them and collected magnetic values at .1 m intervals in the direction of travel; a Real Time Kinematic GPS mounted on the cart meant that each point collected was precisely positioned with an accuracy of less than 5 cm. The increased density of the collected data greatly improved the resolution of the mapped magnetic anomalies, revealing features that would not have been observed in lower resolution data, and made interpretation of the results more reliable. The use of the onboard GPS meant that there was no need to manually lay out a traditional survey grid and, by using a 2 m wide cart, larger areas could be covered in a day.

The integration of the geophysical and airborne remote sensing results within the LRC's geographic data management system employed the same approach as was applied in the excavations. Each identified feature is individually identified, documented in a database, and digitized as a filled polygon to produce an interactive map which can be viewed and interrogated at any scale. Conventional GIS software, while well suited to multiscalar data, rarely supports the sort of 3D imaging needed to appreciate the landscape setting of the evidence and, more significantly, the fourth dimension, time. This challenge was addressed using Google Earth as the platform for a digital atlas incorporating the results; this resolved the three primary issues – the delivery of the integrated results of the research using the Internet to nonspecialist and specialist audiences, the delivery of the interpreted data within an interactive 3D landscape, and the facility to scroll and animate the results through time. This represented a significant breakthrough in terms of the publication of a landscape dataset; the time depth of the data was addressed through the design of the underlying database, which indicates the active period for each identified feature (Powlesland 2012).

The detailed feature dataset now comprises over 30,000 features ranging from individual small pits to trackways running for many kilometers. This densely utilized landscape has challenged established models of population density and land use from the Neolithic to Medieval periods in England. It has also brought home the character of the archaeological resource as a continuous historic environment.

Cross-References

► Landscape Archaeology
► Medieval Archaeology

References

Powlesland, D. 2012. The Landscape Research Centre Digital Atlas of Archaeological Research in the Vale of Pickering. An online resource employing Google Earth to publish primary data and time linked interpretive overlays covering the LRC core remote sensing dataset. Available at: http://www.landscaperesearchcentre.org/atlas/LRC_Atlas.html.

Powlesland, D.J.C., A. Haughton, and J.H. Hanson. 1986. Excavations at Heslerton, North Yorkshire 1978–82. *Archaeological Journal* 143: 53–173.

Powlesland, D., J. Lyall, and D. Donoghue. 1997. Enhancing the record through remote sensing: The application and integration of multi-sensor, non-invasive remote sensing techniques for the enhancement of the Sites and Monuments Record, Heslerton Parish Project, N. Yorkshire, England. *Internet Archaeology* 2. Available at: http://intarch.ac.uk/journal/issue2/pld/index.html.

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Langebaek, Carl

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Basic Biographical Information

Carl Henrik Langebaek Rueda is a Colombian anthropologist. He was born in Bogotá in 1961, the son of a Danish father and a Colombian mother. He completed his undergraduate studies

in anthropology in 1985 at the Universidad de los Andes in Bogotá. Between 1985 and 1993 Langebaek concentrated on graduate studies in anthropology at the University of Pittsburgh, USA, obtaining his PhD in 1993. On this occasion, his PhD dissertation, formulated from archaeology, was based on a regional recognition in two valleys located to the east of Colombia, which made it possible to evaluate hypotheses related to the political control exercised by Indigenous elites (Langebaek 1995). It could be said that this research inaugurated the agenda of a scientific archaeology in Colombia at a time when the agendas of historical cultural archaeology predominated (Gnecco 1996).

Carl Langebaek, like many other Colombians born from European immigrants who had arrived in Colombia at the beginning and in the middle of the twentieth century, became impassioned by the social sciences and especially about anthropology since it was a discipline much appreciated in Europe by the end of the nineteenth century and beginning of the twentieth century (Arocha et al. 1984).

For most of his professional life, Langebaek has worked at the Universidad de los Andes where he has excelled as a professor, researcher, and administrator of several positions such as the Dean's office of the Faculty of Social Sciences and the Academic Vice-Chancellorship. Langebaek also has had important positions of trade union and professional representation such as at the now nonexistent Colombian Anthropological Society.

Major Accomplishments

Among Carl Langebaek's major achievements, we can mention his hypotheses about centralization models in the Colombian Andes, as well as the comparison of various pre-Hispanic *cacicazgos* (chieftain's territories) trajectories in Colombia and Venezuela (Langebaek 2004). In addition, Langebaek has made substantial contributions to the knowledge about Indigenous communities of Colombia in historical times, through the revision and study of colonial documents (Langebaek 1996). Unlike previous researchers, Langebaek has pointed out the need to build archaeological models that should be evaluated in the field through regional surveys and deduction from empirical indicators. In that sense, and together with other Colombian academics, he is one of those anthropologists who generated epistemological revolutions in scientific archaeology practice in South America.

As mentioned above, Langebaek is outstanding not only for his work at the University of the Andes but also in a national sphere. He is part of the National Accreditation Council of Colombia, an entity that is responsible for ensuring the quality of university education in Colombia. In addition, Carl Langebaek has made substantial contributions to the history of social sciences in Colombia, in the historiography of science in Colombia, especially archaeology, anthropology, and history (Langebaek 2003).

In 2009, Carl Langebaek won the Alejandro Ángel Escobar prize, the most important prize in Colombia for scientific publications, for his book *Heirs of the Past* (Langebaek 2008). This work synthesizes almost a decade of archival research. It demonstrates how early reflections on Indigenous peoples, made by intellectuals and travelers, Latin Americans, and Europeans, laid the foundations for the construction of a Colombian identity, at the same time that they generated the basic premises by which the project of the nation would generate mechanisms that exclude Indigenous peoples. A problem not yet solved in Colombia.

Without question, Langebaek's work is essential to understand the long-term trajectories at the north of South America, as well as the development of social sciences in Colombia, in particular, and Latin America, in general.

Cross-References

► Andes: Prehistoric Period
► Colonial Expansion and Nation-State Building: Influences on Archaeology

References

Arocha, Jaime, Nina de Friedemann, and Xochitl Herrera. 1984. *Un siglo de investigación social: antropología en Colombia*. Bogotá: Etno.

Gnecco, Cristóbal. 1996. Reconsideración de la complejidad social del suroccidente colombiano. In *Dos Lecturas Críticas*, ed. Cristóbal Gnecco and Carl Langebaek, 43–74. Bogotá: Banco Popular.

Langebaek, Carl. 1995. *Regional archaeology in the Muisca territory. A study of the Fúquene and Susa Valleys*. Pittsburgh/Bogotá: University of Pittsburgh and Universidad de los Andes.

Langebaek, Carl. 1996. *Noticias de caciques muy mayores: Origen y desarrollo de sociedades complejas en el nororiente de Colombia y norte de Venezuela*. Bogotá: Universidad de los Andes.

Langebaek, Carl. 2003. *Arqueología colombiana. Ciencia, pasado y exclusión*. Bogotá: Colciencias.

Langebaek, Carl. 2004. Secuencias y procesos. Estudio comparativo del desarrollo de jerarquías de asentamiento prehispánico en el Norte de Sur América. *Revista de Arqueología del Área Intermedia* 6: 199–248.

Langebaek, Carl. 2008. *Los herederos del pasado. Indígenas y pensamiento criollo en Colombia y Venezuela*. Bogotá: Universidad de los Andes.

Langford, Rosalind, Fig. 1 Rosalind Langford

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Langford, Rosalind

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Basic Biographical Information

Rosalind (or Ros) Langford (Fig. 1) was born Rosalind Atkinson on September 18, 1946, in Leeton, a Riverina town in New South Wales, spending her early years on the Flats in Mooroopna, Victoria. Her mother was a Yorta Yorta woman, born on Cummeragunja mission. Rosalind moved to Tasmania when she married in the early 1970s and has raised four children in the Tasmanian Aboriginal community. She died suddenly of a heart attack on August 8, 2012.

Major Accomplishments

Rosalind Langford was instrumental in starting the Aboriginal Information Service (AIS), the first Aboriginal organization in Tasmania, and was elected as its first State Secretary from 1972–1975. This was at a time when the state of Tasmania accepted Commonwealth money for Aborigines but denied their existence. From that base Ros worked to raise the profile of Aborigines in Tasmania. One of her earliest initiatives was to attend the first Aboriginal Legal Services conference in Canberra in 1973 and successfully put the case for a grant to operate a proper Aboriginal Legal Service in Tasmania. In 1977 the AIS became the Tasmanian Aboriginal Centre. Rosalind was elected its State Secretary several times over the next 20 years and most memorably in 1982 – the year of the Franklin River Campaign – during which simmering tensions between

Aborigines and archaeologists over the control of Aboriginal heritage came to a head.

With respect to the Australian archaeological community, Rosalind's major impact was an intervention contained in an address to the Australian Archaeological Association's 1982 Hobart Conference with the seminal work *Our Heritage – Your Playground* (Langford 1983). This presentation, delivered on behalf of the Tasmanian Aboriginal community, confronted archaeologists, who relied on an unquestioning acceptance of their scientific prerogative to freely dig up, remove, and pronounce on Aboriginal heritage, with the fact that this was the culture and heritage of a living people. The presentation strongly asserted that scientific professions were underpinned by the cultural values of white supremacist imperialism and maintained by the self-serving denial of the rights over heritage, and even the continuing existence, of indigenous people. Aborigines required archaeologists to take practical steps to acknowledge Aboriginal ownership and control of their past as a precondition for any future working relationship. In response, the AAA voted at its annual general meeting following the conference to acknowledge Aboriginal ownership of their heritage and to build consultation with Aborigines into all research funding projects.

Perhaps the most widely quoted passage is this:

> From our point of view, we say – you have come as invaders, you have tried to destroy our culture, you have built your fortunes upon the lands and bodies of our people, and now... want a share in picking out the bones of what you regard as a dead past. We say it is our past, our culture and heritage and forms part of our present life. As such it is ours to share on our terms. (Langford 1983: 2)

This entry of 1983 has been, and continues to be, widely cited by archaeologists and scholars in other areas such as general heritage studies (Creamer 1990: 137), indigenous heritage studies (Rigney 2006: 37), and law (Harris 1996: 32). It has influenced not only archaeologists and other white researchers but also Aboriginal people and not just in Tasmania (e.g., McNiven and Russell 2005: 188). Russell (2001: 50) refers to the entry as "an important milestone in Australian Aboriginal Studies."

Rosalind later worked as State Area Manager for the Aboriginal Development Commission and also chaired the Tasmanian Aboriginal Education Unit. She has lectured on Aboriginal Culture and Aboriginal Political issues at the University of Tasmania, in Adult Education and in schools throughout Tasmania.

Ros is also a celebrated artist, using symbols and motifs in a contemporary style and medium. In 2010 she graduated from the University of Tasmania with a Fine Arts Degree, with a double major in Print Making and Painting. The Tasmanian Museum and Art Gallery purchased one of her major pieces of work, a blanket screen printed with ochre depicting her Yorta Yorta heritage and her connection to Tasmanian Aboriginal people.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Archaeology and Politics
- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Australia's Archaeological Heritage
- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Peoples, Working with and for

References

Creamer, H. 1990. Aboriginal perceptions of the past: The implications for cultural resource management in Australia. In *The politics of the past*, ed. P.W. Gathercole and D. Lowenthal, 130–140. London: Unwyn Hyman.

Harris, M. 1996. Scientific and cultural vandalism. *Alternative Law Journal* 21: 28–32.

Langford, R.F. for the Tasmanian Aboriginal Community. 1983. Our heritage – Your playground. *Australian Archaeology* 16: 1–6.

McNiven, I., and L. Russell. 2005. *Appropriated pasts: Indigenous peoples and the colonial culture of archaeology*. Lanham: Alta Mira.

Rigney, L.-I. 2006. A first perspective of Indigenous Australian participation in science: Framing indigenous research towards Indigenous Australian intellectual sovereignty. In *Indigenous peoples' wisdom and power: Affirming our knowledge through narratives*, ed. J.E. Kunnie and N.I. Goduka, 31–38. Aldershot: Ashgate.

Russell, L. 2001. *Savage imaginings: Historical and contemporary constructions of Australian Aboriginalities*. Melbourne: Australian Scholarly Publishing.

Laos: Cultural Heritage Management

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Introduction

Cultural heritage management in Laos is largely concerned with the management of monumental archaeological sites, historical architecture, and more recent sites and objects related to the communist regime. Lao heritage management has its roots in the time when Laos was part of French Indochina and is characterized by its colonial legacy, with additions from Buddhism, communism, and a currently growing business of alternative tourism.

Definition

The definition of national heritage in the Lao PDR Law on National Heritage established in November 2005 says,

> National Heritage refers to items produced by mankind or formed by nature that have outstanding cultural, historical or natural value, thereby becoming precious assets and property of the Lao national community, some of which are adopted as regional and world heritage. National heritage consists of cultural, historical and natural heritage existing in the form of tangible objects, intangible items, moveable or immoveable property, and living or non-living organisms, reflecting the history of the Lao nation and the Lao people in each different era. National heritage includes items existing in the country and abroad. (Law on National Heritage 2005, article 2)

It is a standard modern definition of national heritage, which links objects and sites that are considered to be of outstanding value to the essence of the Lao people and the creation of the Lao People's Democratic Republic.

The cultural heritage of Laos is defined by law as both tangible and intangible. Some efforts have lately discussed and encouraged the preservation of intangible heritage, but apart from those discussions, it is mainly tangible historical sites and artifacts that are subject for cultural heritage management in Laos. Two sites are inscribed on the UNESCO World Heritage List: the former royal *town of Luang Prabang* (inscribed 1995) and the ancient temple complex of *Vat Phou and Associated Ancient Settlements within the Champasak Cultural Landscape* (inscribed 2001). These two sites attract a major part of the attention and resources for cultural heritage management in Laos, along with the Plain of Jars (Fig. 1) where

Laos: Cultural Heritage Management, Fig. 1 Plain of Jars visited by a group of ecotourists in November 2007

investigations are being done by UNESCO and Lao archaeologists in preparation for an application to have the site inscribed as world heritage.

There are other prehistoric sites that are also recognized as important national heritage. These include sites with ancient standing stones (Hintang) in two northern provinces and a very limited number of excavated sites that have no monuments above ground, like cave sites dated to the Paleolithic and all through the Stone Age, and the prehistoric ritual site Lao Pako (Källén 2004). Over the last decade, development works for infrastructure, dams, and mining have led to a series of development-led archaeology projects across the middle and southern part of the country, where new prehistoric and historic sites have been found and investigated.

The prehistoric archaeological heritage is, however, but a minor part of Laos' cultural heritage. The main focus and national attention is on the built historical heritage and particularly ancient temple structures and monuments connected to early forms of Hinduism and Buddhism and early political entities such as Dvaravati, Khmer, and the first Lao kingdom of Lane Xang. Colonial architecture from French Indochina is also considered part of the built historical heritage.

A third category of national heritage in Laos is the sites and artifacts from the early days of communism. These sites and artifacts often have a strong personal connection to communist heroes such as the leader of the revolution Kaysone Phomvihane and "The Red Prince" Souphanouvong. The heritage objects in this category are defined by their genealogical connections to heroism. They consist mainly of museum artifacts and war-related sites like the caves in Viengxay (Fig. 2) that worked as strategic center and shelter for the Pathet Lao leaders in the war against the US-supported Royal Lao Army, more widely known as the Vietnam War.

More recent objects such as textiles and weaving patterns, instruments such as the *khean*, and food such as sticky rice are also defined as cultural heritage by law.

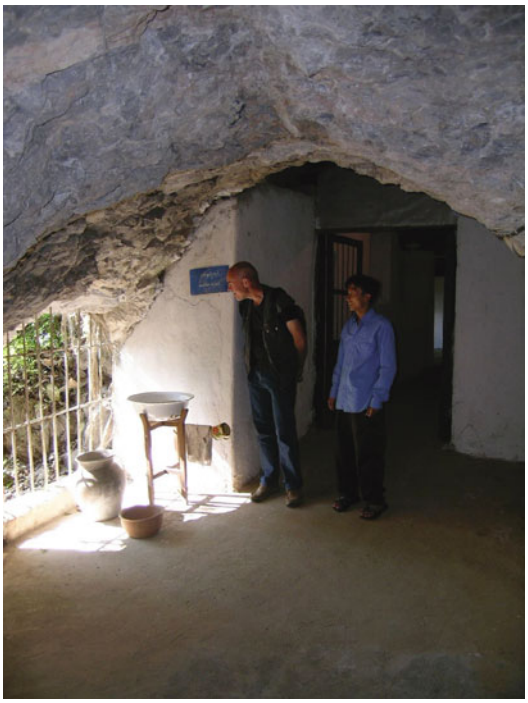

Laos: Cultural Heritage Management, Fig. 2 The caves in Viengxay, Hua Phan Province, where the Pathet Lao leaders took shelter and built the strategic center of the 1970s revolution, have recently been opened to visitors

Legislation

Since 2005, heritage sites and objects in Laos are protected by the Law on National Heritage. Compared with other areas of cultural politics in Laos, heritage has a remarkably clear definition and a strong protection by law. The first article says that the law "determines the principles, regulations and measures for the administration, use, protection, conservation, restoration, and rehabilitation of the national heritage, and also determines the rights and duties of the State, social organisations and individuals to preserve the value of the national cultural, historical and natural heritage, with the aims of educating citizens with a conscious love for their nation and fine national traditions that is deeply embedded in their hearts and of assuring the elements for prosper sustainability of the nation"(Law on National Heritage 2005, article 1). The outlines and contents of this law, consisting of 73 articles, have great similarities to

heritage legislation in most other countries. It defines cultural heritage sites in Laos and objects that originate from the Lao territory, as the property of the Lao people and nation, and decides that it is an obligation for the state, its citizens, and visitors to protect the Lao heritage, and it sets the rules for who do what when such sites and objects are moved or altered with. What sets it apart from legal documents for cultural heritage in Western democracies is the outspoken aims to use it for education of the citizens to "love their nation, to be unified and proud of historical efforts, to be creative, to bravely struggle, and to be united as one. . ." (Law on National Heritage 2005, article 40) that it forbids the creation of new monuments and religious places without permission from the Ministry of Information, Culture and Tourism (article 31) and the definition of Buddha figures as an extraordinary category of heritage object, surrounded by specific rules and regulations.

Government Offices for Cultural Heritage Management

The government office responsible for cultural heritage management is the Ministry of Information, Culture and Tourism (MICT) and there, in particular, the Department of National Heritage. Most of the official responsibilities regarding heritage protection, conservation, display, and knowledge production lie with the Department of National Heritage. It is a comparatively small office with only a few permanent members of staff. The registration of new heritage objects and the granting of all permits for research, excavation, analysis and display, and equally for artifact sales and exchanges is therefore in the hands of only a couple of individuals, which is unusual in a current global perspective. Other government offices such as the Ministry of Education and the Lao National Tourism Administration (LNTA) are occasionally involved in heritage-related issues, but the responsibilities for key operations lie with the MICT Department of National Heritage. The MICT also has provincial, regional, and local offices with the delegation to control the practical heritage work on a regional and local level.

Archives

There are no national archives for heritage management in Laos, nor is there any national database for heritage sites. Information about sites and heritage objects can only be found in publications and reports or by contact with the MICT Department of National Heritage.

Museums

There are a number of museums with national importance in Laos. The Lao National Museum in Vientiane has displays of objects and narratives of the national past, from dinosaurs to post-revolution times. It was established in 1980 as a Revolutionary Exhibit Hall, in the former premises of the French *Hôtel du commissariat*, and changed name to the Lao Revolutionary Museum in 1985. In the year 2000, its name was changed once again to the Lao National Museum, but the displays of heroic struggles against imperialists remain more or less intact on a large part of the first floor and half of the ground floor. The remaining half of the ground floor has displays of prehistoric and early historic archaeology, and in a smaller part of the first floor are displays of the customs and crafts of ethnic minorities. The National Museum also houses some smaller collections of excavated prehistoric and early historic material. In addition to the National Museum, there is in Vientiane a big memorial museum over the national hero Kaysone and a number of historically important temples, in particular Wat Ho Phra Keo and Wat Sisakhet (Fig. 3), that have displays and function partly as museums. In addition to these, there are several smaller museums and private showrooms for display of the Lao textile craft and tradition. On a regional level, the two World Heritage Sites in Vat Phu Champassak and Luang Prabang have several larger museums of local character. There are also smaller museums on a regional and local level with particular local displays of, for instance, a dinosaur fossil, an ancient temple site, or a cave used for shelter that was bombed during the war.

Conservation

Conservation has no particular unit in the national heritage administration. It is involved in most

Laos: Cultural Heritage Management, Fig. 3 Collection of Buddha figures in Wat Sisakhet in Vientiane

practical work on prehistoric and historic sites and buildings and is typically done by foreign experts hired by larger projects with international funding.

Training

There has until very recently not been any basic professional training in cultural heritage management available in Laos. The heritage management staff at the MICT and other heritage institutions therefore had their training by scholarships abroad. Among the older generation, many were trained in the Soviet Union or other Eastern European countries and a few in France, India, Japan, or Australia. In the younger generation, most have their training from Thailand or Vietnam. Only recently, the National University of Laos, Faculty of Architecture, has started an education program involving archaeology and heritage management.

Research

Research on cultural heritage in Laos is generally controlled by the MICT. It is often done practically by the Department of National Heritage staff, in larger projects with international funding and in cooperation with international experts. There is also the National Academy of Social Sciences, the Institute of Cultural Research, and the Urban Research Institute, which are separate research institutes in collaboration with the MICT.

International Actors

Although all heritage management is controlled by the MICT, international organizations and international cooperations in research or practical heritage projects are key to the field of cultural heritage management in Laos. The MICT has virtually no funding resources of its own and is entirely depending on foreign funding. Major international actors are UNESCO, the French École française d'Extrême-Orient, the Japanese MOFA, and the Asian Development Bank. There are also a number of smaller international research funds involved in heritage projects and international companies for development-led archaeology working with road and mining projects.

Historical Background

While the objects for cultural heritage management in Laos date from all between the Paleolithic and the twentieth century, the history of heritage management itself begins with the French incorporation of Laos in French Indochina in 1893. The three kingdoms that preceded French Indochina had complex administrations based on a system of *mandalas*. But the basic administrative structure of Laos as a centralized modern nation state was invented and implemented by the French in collaboration with Lao civil servants (Stuart-Fox 1997; Evans 2002). The definition of heritage as connected to national essence and a teleological historical narrative is characteristic for nineteenth-century European discourse. It was applied to Laos by the French and later adopted in

postcolonial nation building along with the general definition and administration of Laos as a modern centralized nation state. The concept of cultural heritage, such as it is defined today in Laos by law and official practice, is thus rooted in European discourse from the nineteenth and early twentieth century.

The first systematic documentation and research of Laos' cultural heritage was done by archaeologists from the French École française d'Extrême-Orient (EFEO) based in Hanoi, who made surveys and documented (mainly monumental) prehistoric and historic sites. Two of EFEOs most renowned archaeologists, Henri Parmentier and Madeleine Colani, both worked with and published extensively on the cultural heritage of Laos (Colani 1935; Parmentier 1954). Parmentier, who was a trained architect, represented the principal line of archaeological research at EFEO and was oriented toward art history and epigraphy, focusing on historic architecture, monuments, and art. Colani, who was a trained geologist, represented a minor branch of archaeology at EFEO with her interest in prehistoric archaeology and her orientation toward ethnography and craniology (Clémentin-Ojha and Manguin 2001). Both these branches of archaeological research are still present in the practice and narratives of cultural heritage management in Laos.

The first two decades of independence, after the dissolution of Indochina in 1954 and up until the revolution and victory of the communist Pathet Lao in 1975, were characterized by political instability and war. Heritage management was not a priority, but one of the key texts defining Lao history and heritage was produced during this time. Maha Sila Viravong's classic *History of Laos* (in English translation, Viravong 1964) is an interesting combination of a modern Western type of narrative focused on origin and racial essence, with a characteristic Lao narrative based on stories of mythical heroes and their connections to places, objects, and groups of people, often involving spiritual elements. Viravong's *History of Laos* is still found in school curricula and is without competition the most influential domestic source of history knowledge in postcolonial times.

In the years immediately after the revolution and victory of the Pathet Lao in 1975, a new category of cultural heritage was defined; very recent sites and objects related to communist heroes or the people's struggle against the imperialists. For almost two decades following the revolution, Laos diminished the contacts with the Western world and nurtured the relations with other communist and socialist states. During this time, the pre-communist heritage was of no official concern. The relevant history started at the revolution (Pholsena 2006).

Around the mid-1990s, there was a turn toward a softer communist politics, and Laos began to open up for political relations and visitors from the West. At about the same time, there was also a turn in the politics of heritage. In 1997 came an important presidential decree on the preservation of a national heritage, and a year earlier, one of the archaeologists at the Ministry of Information and Culture, which has recently been renamed Ministry of Information, Culture and Tourism produced a booklet with the title "The Prehistory of Laos" (Sayavongkhamdy 1996). Both used the basic definition of cultural heritage that had been introduced by the French administration but emphasized the ideals and objects of Buddhism and communism to create a unique definition of cultural heritage for the Lao PDR.

Key Issues/Current Debates

The open attitude to visitors in the first decade of the twenty-first century has resulted in a dramatic increase in tourism since the turn of the millennium. This increase has also had a big impact on the politics of heritage. If the main purpose of heritage as it is defined by law is to make the Lao people feel strongly and proudly for their nation, the most important practical purpose of cultural heritage in Laos today is to attract foreign visitors and generate income. As the country began to open up, it first attracted mainly

backpackers. The government in collaboration with foreign experts began to develop ecotourism and other forms of alternative tourism, in order to attract a clientele with more resources to spend and with more sensitive interests in the country's nature and culture. It has proven a very successful strategy, and Laos has been referred to as a model country for the development of alternative tourism (Harrison and Schipani 2007). The knowledge and sensitive consumption of heritage are a major concern for ecotourists, and the Lao National Tourism Administration is therefore a main actor in cultural heritage management in Laos today. The two World Heritage sites Luang Prabang and Vat Phu are key tourist magnets and appeal to ecotourists as well as backpackers. Monumental archaeological sites, temples, and historical architecture are generally marketed for ecotourists, while sites related to communism and war seem to attract more backpacker visitors. Non-Western tourists, mainly from Thailand, Vietnam, and China, are also a large and growing group of visitors, which the tourism industry in Laos are likely to adjust to in the near future.

The softer communist politics over the last couple of decades has also opened up an appreciation of cultural heritage with associations to the royal history of the country. Lao communism has always has a strong unusual connection with Buddhism. Buddhist buildings, objects, and traditions have therefore also kept a strong position as national heritage. Recently, there has also been a renewed interest in the royal past, with celebrations of kings' anniversaries and other important royal events. Along with this development, the buildings, objects, and stories of former kings and royal families have also gained status as important national heritage (Evans 2009).

International Perspectives

From an international perspective, cultural heritage management in Laos is interesting as an example of an unusual union between communism, a colonial legacy, Buddhism, and an increasingly important royal past.

The cultural heritage of Laos also provides an interesting example of the complex relations between materiality and spirituality in a Buddhist context. The different attitudes to materiality and spirituality, in Buddhism on the one side and common heritage management on the other, are part of the mundane reality for heritage management in Laos, but it can be fundamentally challenging for a strong international discourse of heritage preservation where the values of material authenticity and originality are often taken for granted (Karlström 2009).

Future Directions

The current tendency for the cultural heritage of Laos is to have it more involved as objects to be consumed by the growing tourism industry. Both in terms of tourism and other international relations that bring necessary funding to heritage management and all other sectors of society in Laos, less is now coming from the West and more from China, Vietnam, Japan, and other Asian states. If this tendency continues, it may well have profound consequences for the future cultural heritage management in Laos.

Cross-References

- ▶ Cambodia: Cultural Heritage Management
- ▶ China: Cultural Heritage Management
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage: History and Context
- ▶ Indo-Pacific Prehistory Association (IPPA)
- ▶ Intangible Cultural Heritage
- ▶ Local Populations and Global Heritage
- ▶ Marketing Heritage
- ▶ Tangible Heritage in Archaeology
- ▶ Thailand: Cultural Heritage Management

References

Clémentin-Ojha, C., and P.-Y. Manguin. 2001. *Un siècle pour l'Asie: L'École française d'Extrême-Orient, 1898–2000*. Paris: Les Editions du Pacifique, École Française d'Extrême-Orient.

Colani, M. 1935. *Mégalithes du Haut-Laos (Hua Pan, Tran Ninh)*, Publications de l'École Française d'Extrême-Orient. Vol. XXV & XXVI. Paris: EFEO.
Evans, G. 2002. *A short history of Laos: The land in-between*. Chiang-Mai: Silkworm Books.
Evans, G. 2009. *The last century of Lao royalty: A documentary history*. Chiang-Mai: Silkworm Books.
Harrison, D., and S. Schipani. 2007. Lao tourism and poverty alleviation: Community-based tourism and the private sector. In *Pro-poor tourism: Who benefits? Perspectives on tourism and poverty reduction*, ed. C.M. Hall, 84–120. Clevedon: Channel View Publications.
Källén, A. 2004. *And through flows the river. Archaeology and the pasts of Lao Pako*, Studies in Global Archaeology. Vol. 6. Uppsala: Uppsala University.
Karlström, A. 2009. *Preserving impermanence: The creation of heritage in Vientiane, Laos*, Studies in Global Archaeology. Vol. 13. Uppsala: Uppsala University.
Law on National Heritage. 2005. National Assembly, No 08/NA. 9 Nov 2005. English translation available at the UNESCO Bangkok web site: http://www.unescobkk.org/culture/resources/culture-asia-pacific-resources/conventions-charters-and-official-documents/national/. Accessed 15 Sept 2011.
Parmentier, H. 1954. *L'art du Laos*, Publications d'Ecole Française d'Extrême-Orient. Vol. XXXV. Paris-Hanoi: EFEO.
Pholsena, V. 2006. *Post-war Laos: The politics of culture, history and identity*. Singapore: ISEAS Publications.
Sayavongkhamdy, T. 1996. *Prehistory in Laos*. Unpublished booklet from the Ministry of Information and Culture. Vientiane: Department of Museums and Archaeology.
Stuart-Fox, M. 1997. *A history of Laos*. Cambridge: Cambridge University Press.
Viravong, M.S. 1964. *History of Laos*. Translated from the Laotian by the US Joint Publications Research Service. New York: Paragon Book Reprint Corp.

Further Reading

Goudineau, Y., and M. Lorrillard, eds. 2008. *Recherches nouvelles sur le Laos/New research on Laos*, Études thématiques. Vol. 18. Vientiane/Paris: École Française d'Extrême-Orient.

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador

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Introduction

At the end of the Pleistocene, the Las Vegas people developed an adaptation focused on a wide variety of marine, estuarine, and terrestrial resources in the Pacific littoral of today's Ecuador. While they may be classified as broad-spectrum foragers, hunters, and fishermen, they initiated an enduring pattern of plant cultivation, figured among the earliest cultivators in America, and participated in the domestication of useful plant species in the Neotropical region while progressively intensifying both fishing and horticulture. The Las Vegas adaptation has been reconstructed from a wide variety of evidence found in 32 archaeological sites in the western part of the Santa Elena Peninsula (SEP).

The chronological framework for interpreting Las Vegas evidence is based upon 30 radiocarbon dates (Stothert et al. 2003; Table 1). These form a coherent series, and agree well with independent stratigraphic interpretations. Deep preceramic midden in Site 80 permitted the identification of a little known Pre-Las Vegas occupation, as well as two Las Vegas phase dated to the Early Holocene period (EH) (Stothert 1985, 1988). All dates are stated in radiocarbon years before present (RCYBP), but some calibrated dates are included (Table 1). The use of calibrated dates has the effect

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Table 1 Radiocarbon dates for the study of Las Vegas history

Geological and cultural periods	Age in radiocarbon years before present (RCYBP)	Calibrated RC age (BP)
Late Las Vegas	8,000–6,600	9,000–7,300[a]
Early Las Vegas	10,000–8,000	11,000–9,000[a]
Pre-Las Vegas	10,840–10,510	13,820–10,850[a]
Clovis in North America	11,500–10,800	13,500–13,000
Monte Verde in Chile	12,500	13,800–14,800
Early Holocene (EH)	10,000–7,000	11,500–7,800
Terminal Pleistocene (TP)	12,000–10,000	13,900–11,500

[a]Two-sigma dendrocalibrated age ranges

L

of lengthening the period in which Vegas sites were occupied.

The earliest known inhabitants of the coast of Ecuador occupied the Las Vegas type site, known as Site 80 or CT M5 A3-80, located at 2°13′ S, 80°52′W on the SEP (Fig. 1). Scant evidence from the deepest levels of this site indicates that people visited Site 80 between 10,840 and 10,100 RCYBP; substantial archaeological remains from Site 80 and Site 67 (located 15 km further east) are evidence of more intense human occupation spanning the EH. Both sites are characterized by deep midden and human burials.

Today's Ecuador is a small country (270,000 km^2) characterized by a large number of compressed terrestrial zones with impressive variations in altitude and rainfall from region to region (Fig. 2). The tropical lowlands of the coastal zone include the environmentally diverse slopes of the Andes, a seasonally wet coastal plain dominated by the great Guayas river system, and the Pacific littoral which today is semiarid in the south but characterized by seasonally dry and very wet tropical forest in the north. This environmentally complex coastal region is 700-km long, and has a maximum width of only 200 km. Adequate rainfall and good soils predominate in most of this environmental mosaic, but the subhumid SEP has limited agricultural potential.

The Santa Elena region constitutes a tropical ecotone characterized by a mosaic microenvironment and impressive biological complexity and an

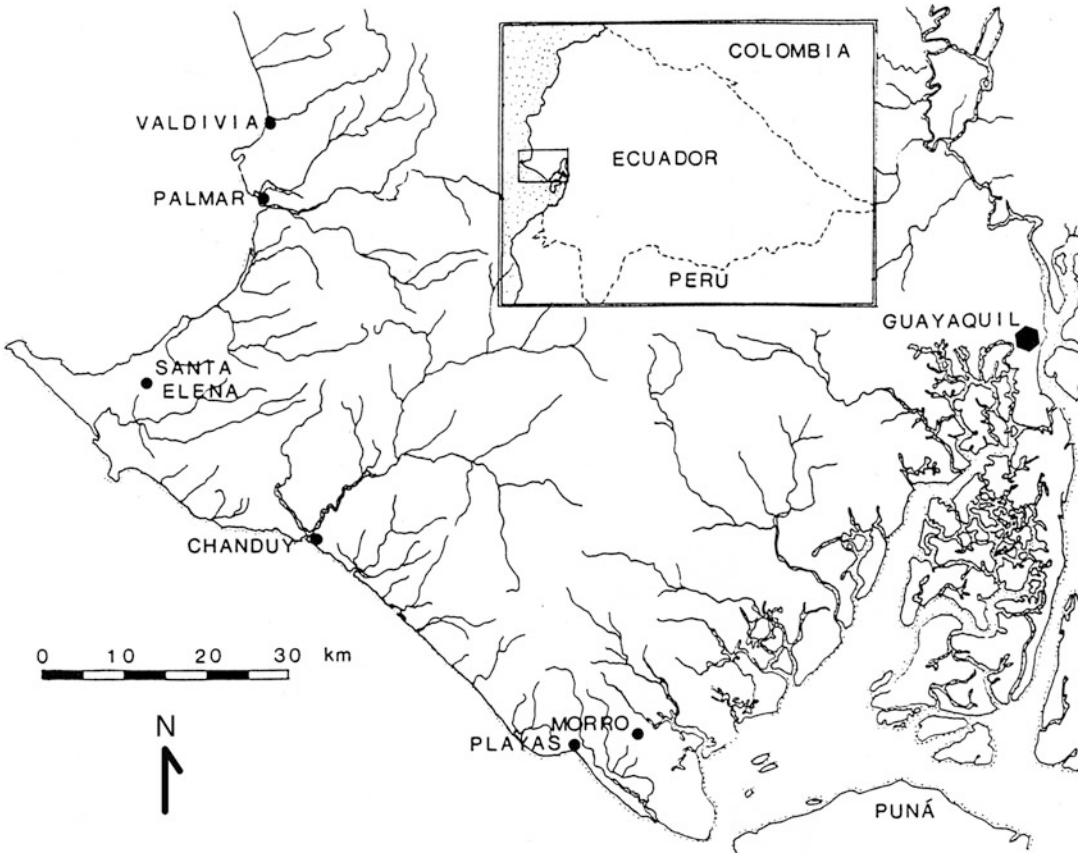

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 1 Location of several modern towns and seasonal rivers of the Province of Santa Elena, also showing the city of Guayaquil (*black hexagon*) on the mangrove estuary of the Guayas river system. Narrowly defined, the Santa Elena Peninsula (SEP) is the area west of a line between Palmar and Chanduy

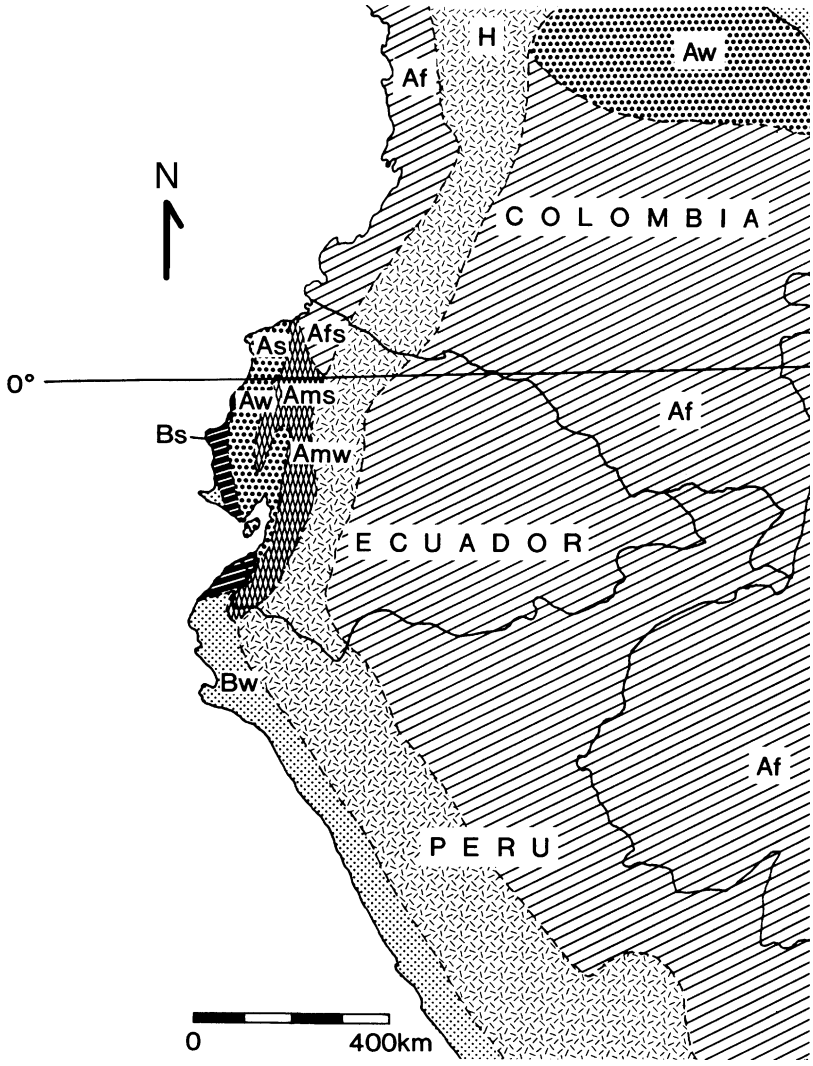

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 2 Northwestern South America showing the exceptional compression of distinct environmental zones in coastal Ecuador (Stothert 2011: 357, Fig. 15.2). *Af* tropical wet; *Afs* tropical wet with precipitation distributed seasonally; *As* tropical wet-and-dry; *Aw* tropical wet-and-dry with an emphatic dry season; *Ams* tropical wet with two yearly precipitation maxima; *Amw* tropical wet with a strong dry season; *Bs* semiarid; *Bw* arid or desert; *H* undifferentiated highlands. The western portion of the SEP is classified today as *Bw*

important interface with the sea. The shallow coastal waters of Ecuador are rich in pelagic fish, economic crustaceans, and mollusks. The terrestrial environment that was characterized by seasonally dry tropical forest in the nineteenth century is now an anthropogenic desert caused by recent deforestation. The main cause of aridity is the concentration of precipitation in one short season, followed by at least six dry months: This is the effect of the cold current along the southwest coast of Ecuador and the north coast of Peru (Stothert et al. 2003). It is likely that the SEP and northern coastal Peru were moister in the EH because of the more southerly position of the warm Equatorial Counter Current.

Las Vegas camps are known only from the western extreme of the SEP (Fig. 3) where people apparently occupied Site 80 repeatedly for as much as 5,000 calendar years. Most known Vegas sites are small campsites that facilitated the exploitation of a range of resources (Stothert 1988: 225–236). Although evidence is lacking, it seems probable that many Vegas sites are lost or submerged on the continental shelf, and that Las Vegas groups once settled throughout the tropical lowlands of Ecuador, and carried on social

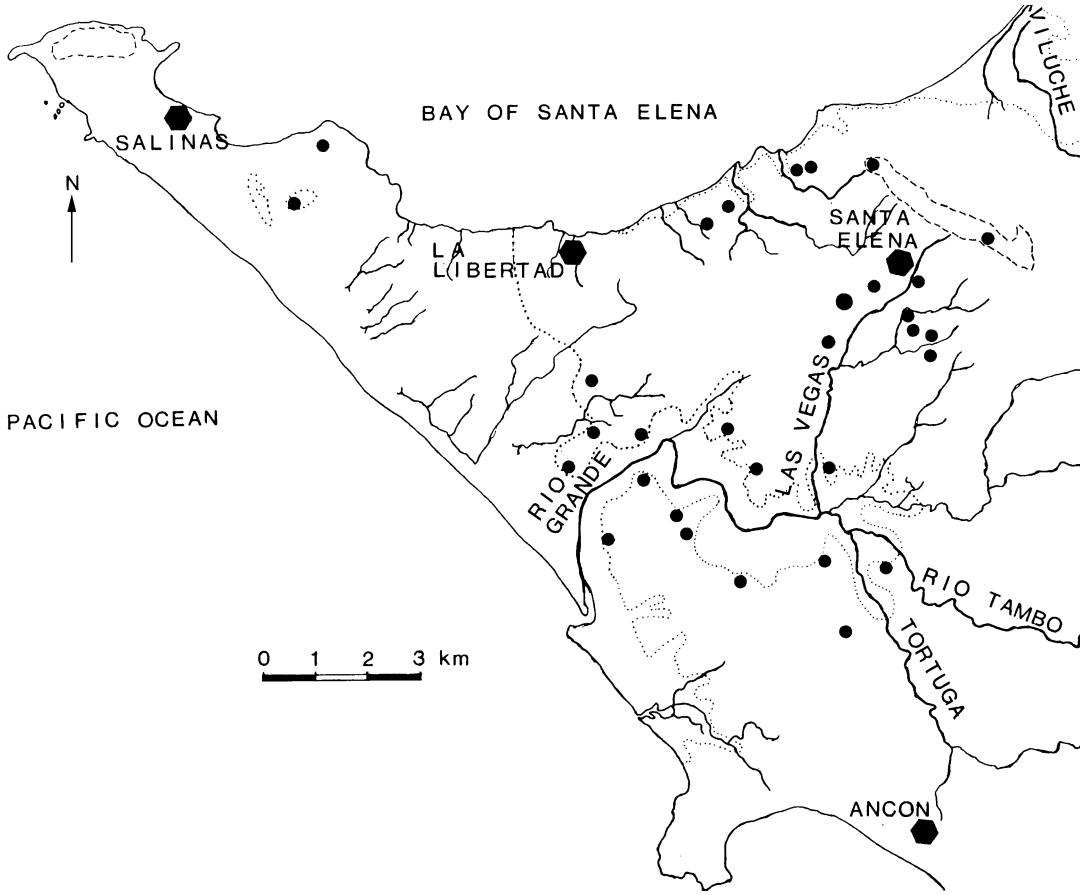

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 3 Map of the western portion of the SEP showing the distribution of Las Vegas preceramic sites; the modern drainage pattern; the modern 10 m contour line (*dotted line*); modern towns (*hexagons*); Las Vegas Site 80 (*large dot* near the town of Santa Elena); and 30 other Las Vegas campsites (*small dots*)

relations with other peoples in northwestern South America.

Definition

The western portion of the Santa Elena Peninsula (SEP) lies west of a line drawn from Chanduy to Palmar (Fig. 1), but the subhumid lands lying south of a line between Guayaquil and Santa Elena belong to the greater Peninsula of Santa Elena and El Morro.

The early preceramic people in America (sometimes called Paleoindians) were immigrants from the Old World, who, by the end of the Pleistocene, had occupied both North and South America, developing myriad regional cultural adaptations. In Ecuador, the term "preceramic" refers to the period and cultures dated before the beginning of the Valdivia phase, characterized by the use of ceramic pottery dated as early as 5,000 RCYB (c. 6,400 calendar years BP).

Phytoliths are the inorganic, silica structures that form inside some kinds of plant cells. When recovered from sediments, they provide evidence of plants that decayed in ancient times. These microfossils permit the identification of some wild and domesticated plants, and they may be dated directly by the AMS radiocarbon method or by their association with other datable archaeological materials.

Key Issues/Current Debates

Peopling America and Early Coastal Adaptation

By 10,000 RCYBP, groups of foragers with distinct adaptations and variable technologies occupied most of the South America (Dillehay 2000), but archaeologists have not recognized any clear or simple pattern of entry and dispersal through the heterogeneous environments of the TP. The evidence of early coastal adaptations in Peru and Ecuador supports the idea that all Pleistocene people were not big game hunters (e.g., Sandweiss et al. 1998; Sandweiss 2008; Dillehay 2011) and offers an alternative to the traditional view that the first Americans were Clovis hunters who walked across Beringia into America.

Coastal research has recently grown in importance, and it is now thought that Old World people, long adapted to both coastal environments and seafaring in East Asia, dispersed into America and down the Pacific coast of South America by boat before Clovis times (Erlandson 2002; Faught 2008; Davis 2011). Evidence from Chile's Monte Verde site (recognized as the earliest settlement in the New World) indicates that marine resources were important to the broadly adapted people of that site before 12,000 years ago (Dillehay 2000: 160–168; 221). Because no North American coastal sites predate Clovis, the issue of initial peopling of South America by hunters from the north continues to be debated. Las Vegas data inform recent research on the antiquity of human use of the world's coastal habitats and marine resources (Stothert 2011).

Climate and Paleoenvironmental Change

Any discussion of the Las Vegas adaptation depends upon an understanding of the effects of climatic and environmental change on terrestrial and marine resources. Independent paleoecological data have not been generated from any location on the SEP; nevertheless, ancient environmental conditions can be inferred from evidence recovered in archaeological midden and the growing evidence concerning paleoenvironments in South America (Fig. 4).

The late Pleistocene environments of tropical America were characterized by dry, cool climates and vegetation and faunal communities that differed substantially from those seen today (Piperno and Pearsall 1998: Chapter 2). Poorly dated Ice Age paleontological finds from the Santa Elena Peninsula and the north coast of Peru show Ice Age creatures who grazed, browsed, and paddled in environments characterized by open grasslands with gallery vegetation along the river courses, and rainfall apparently maintained a high water table, standing pools of water, and vegetation along drainage courses. Rainfall in Santa Elena and in northern Peru apparently was not sufficient to support forests between the rivers (Stothert et al. 2003).

Probably EH people in South America were challenged by "gradual and oscillating climatic amelioration" after which there were "greater seasonal extremes in temperature and moisture" that resulted in "substantial changes in the communities of plants and animals." As ecological conditions changed, edible resources would have been in a "constant state of spatial and temporal flux" (Stahl 1996: 11). Human responses to these challenges are of great interest to researchers today. Vegas midden deposits are too compressed to allow the documentation of climate processes and minor oscillations, but apparently, Vegas people adapted well to both long- and short-term environmental variations in the EH.

Marine Transgression

Conditions along the Santa Elena coast were very different in the past and varied through time due to postglacial changes in sea level involving marine transgression and regressions as well as dramatic local tectonic uplift that caused geomorphological and associated ecological alterations. There is little information about the timing and extent of these changes; however, the isobaths drawn in Fig. 5 reflect modern coastal topography and may also be employed to model ancient conditions. About 10,000 years ago, mean sea level was depressed circa 30 m below its modern position which would have exposed about 600 km^2 of land and lengthened the interface between the land and the sea. A diverse landscape of mangrove

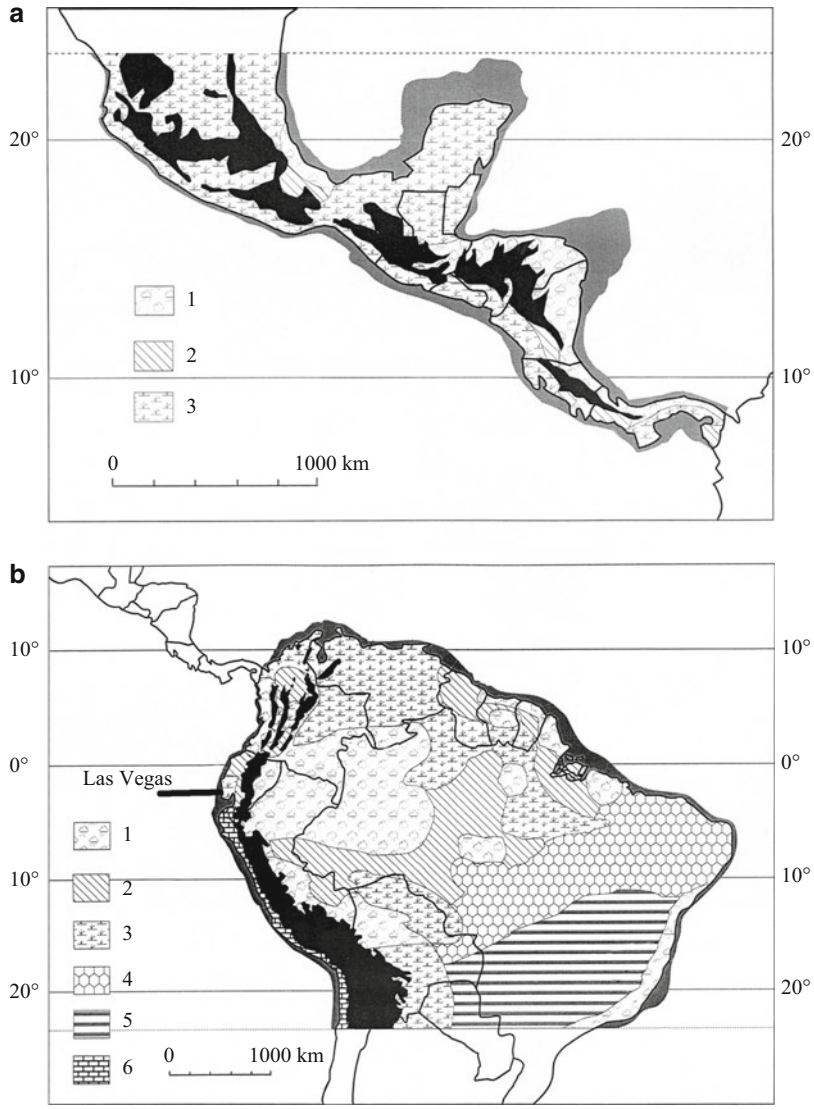

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 4 Reconstructed vegetation of lowland tropical Central America (**a**) and South America (**b**) between 20,000 and c. 10,500 RCYBP (Piperno 2006: Fig. 7.4). (1) Moist forest; (2) dry forest; (3) thorn woodland, low scrub, and savanna; (4) dry and open, few trees; (5) open forest and semi-evergreen forest; (6) desert/cactus scrub. The SEP may have had terrestrial vegetation classified as (3)

formations and estuarine zones may have existed at that time (Stothert et al. 2003; Table 2).

Several pulses of glacial melt water between 10,000 and 7,000 BP affected coasts in various ways, and the great amplitude of short-term sea level oscillations in the EH tapered off through time: As sea level fluctuated, Vegas people witnessed the creation and destruction of coastal habitats until stabilization c. 6,000 years ago (Bird 1993). At the beginning of the Late Las Vegas phase, around 8,000 BP (c. 8,600 cal. BP), Site 80 might have been located 12 km from the north shore of the peninsula, but people would have taken advantage of some 360 km^2 of land, as well as estuaries and mangrove formations, that are submerged today.

The most important implication of modeling the Early Holocene littoral is that the ancient configuration of coastal resources was constantly changing. Even without specifying which physiographic changes took place precisely when, plant and animal communities living along the coasts would have been affected by both sea level fluctuations and tectonic uplift. We may infer that

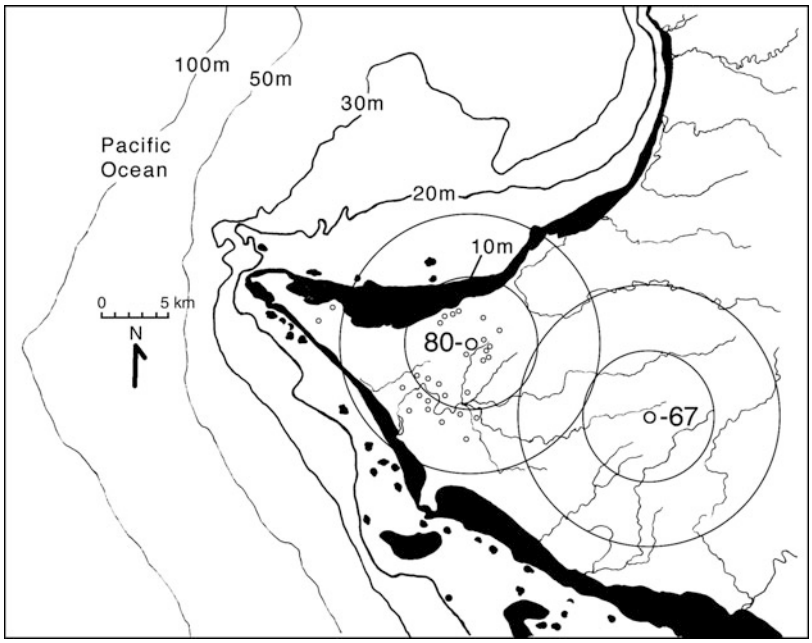

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 5 Changing coastline of the SEP as inferred from bathymetric readings of the modern sea floor. When sea level was depressed 30 m, the ancient coastline may have approximated the 30 m isobath, and the continental shelf between the contour line and the present coast may have been dry land. The area between the 10 m isobath and the present coastline is marked in *black* and models the terrestrial zone at 7,000 RCYBP. Small circles represent small Las Vegas sites, and Sites 80 and 67 are shown with their respective 10 km and 20 km catchment areas

these processes affected water table levels, river gradients, sedimentation rates, and settlement patterns in the terrestrial zone. These phenomena might have taxed the Las Vegas people by destroying traditional resources, but at the same time other resources were created, presenting opportunities to increase productivity by adjusting subsistence strategies. A deep-sea core from off the coast of Ecuador reflects conditions on the continent and provides evidence that mangrove vegetation reached its maximum development between 12,000 and 7,000 years ago (Heusser and Shackleton 1994: 223). In fact, mangrove clams (*Anadara tuberculosa*) that were well represented in Early Vegas assemblages declined in relative importance in Late Las Vegas assemblages (Stothert et al. 2003; Table 4). These numbers may track a long-term decline in the extent of mangrove formations on the peninsula, but the pattern probably reflects sociocultural change as well.

Paleoenvironmental Reconstruction

Fauna

Both floral and faunal remains have been used to reconstruct past environments and to chart long-term changes in the history of the Vegas culture. The bones and shells of animals that accumulated for over 3,000 years in Sites 80 and 67 were well preserved by alkaline soils (Fig. 6). In the early 1980s, the study of a small faunal sample identified 25 taxa of fish from offshore, in shore, estuarine, rocky, and beach habitats; three taxa of cosmopolitan amphibians; a few turtles, lizards, and snakes; parrot bones; a rare marine mammal; and an array of cosmopolitan mammals, including deer, fox (*Lycalopex* sp.), opossum, rabbit, weasel, peccary (rare), rats and mice, other rodents, anteater, squirrel, and a feline (Stothert et al. 2003; Table 5). New research, based on 100% of the excavated remains, has resulted in the recognition of more birds from wetland habitats.

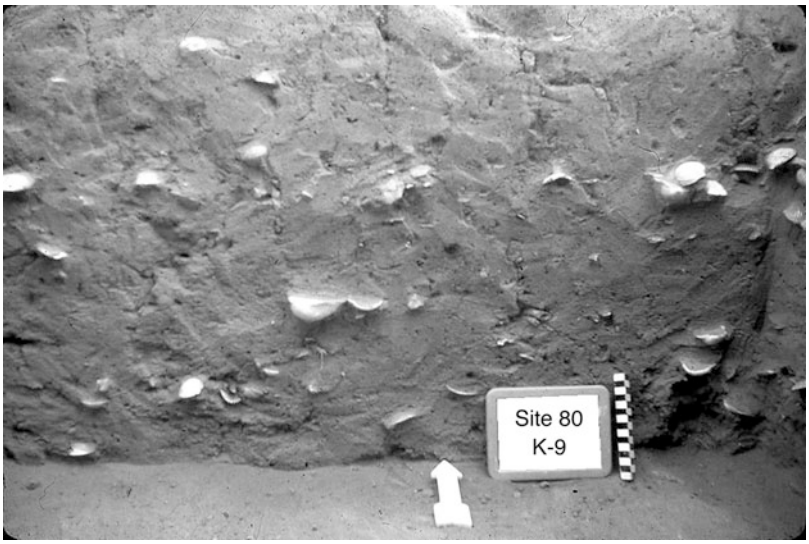

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 6 The excavated north wall of Quadrant K-9 in Site 80 shows the compressed Las Vegas midden that preserves faunal remains and plant microfossils deposited by Las Vegas foragers and cultivators in the Early Holocene

Evidence indicates that the same species of fish taken from near-shore waters in Vegas times are available today on the SEP, although shallow bays, shoals, lagoons, estuaries, and mangroves were distributed differently in the ancient environment. Apparently, the changes in Early Holocene ocean currents dramatically altered the distribution of marine faunal species further south in Peru, but did not affect the marine biotope of Santa Elena, although local mangroves were decimated in the twentieth century.

Analysis of small samples of vertebrate animals has led to the suggestion that Late Vegas people acquired half of their animal food from marine and estuarine environments, while the other half came from the land. Terrestrial vertebrate remains show that the western SEP was always subhumid and characterized by seasonally dry forest and savannas. Vegas people probably enjoyed somewhat moister conditions than today, with rainfall more evenly distributed throughout the year, but monkeys and other species characteristic of moist tropical forests are missing from Vegas faunal assemblages. By exploiting a wide variety of species, Vegas people enjoyed a constant supply of animal protein.

A comparison of faunal assemblages in Site 80 has shown a subtle evolution in exploitation patterns from Early to Late Vegas times (Stothert 1985: 620, 1988: 193–195): The earlier people concentrated on land animals, principally deer, while the later people apparently intensified their fishing activities.

Large mangrove clams dominate the molluscan remains from Site 80, but crabs and 19 other species of shellfish from a variety of inshore ecosystems are also present. Few species were acquired from deep waters. The surprising number of fresh water snails (*Pomacea* sp.) in the Early Vegas levels supports the notion that the ancient SEP received more rainfall and that Early Vegas people visited ponds of standing fresh water.

Based on a calculation of the minimum number of individuals (MNI) represented in samples of molluscan remains, it has been shown that the percentage of mangrove clams declined substantially in Late Las Vegas midden, and rock-living species were much more frequently sought in the Late Vegas period (Stothert et al. 2003; Table 4). While rocky points may have become more accessible in the Late Vegas period, mangrove habitats may have decreased in extent. This reduction might track an increased use of marine fish in the Late Las Vegas period. The increased emphasis on fish may have been encouraged by improved technologies that made fishing more efficient, or by a reduction in available meat from terrestrial sources, or the desire to produce surpluses of dried, salted, or smoked fish for social purposes.

Flora

Pollen and macro-plant remains were not preserved in Vegas soils, but the presence of microfossils, including starch grains and phytoliths, has revolutionized the interpretation of Vegas environments and cultural practices. Phytoliths from grasses and shrubs are evidence that the ancient environment was characterized by thorn scrub and wooded savanna vegetation in the Early Holocene (Piperno and Pearsall 1998: Chapter 2 and 183–199, Fig. 4.1a, b). Palm phytoliths, found commonly in archaeological soils in moist tropical habitats, do not appear in Vegas assemblages.

The study of microfossils at Site 80 shows a progressive development in the use of plants from Early to Late Vegas times (Piperno and Pearsall 1998: 183–199; Stothert et al. 2003; Piperno 2006). Early Vegas farmers cultivated bottle gourd (*Lagenaria siceraria*) as early as 9,000 BP, and phytoliths from this species continued in later archaeological levels. Bottle gourd, a plant always cultivated in America, may have been a source of seeds or fruits that can be used as containers, netfloats, or rattles. The diagnostic phytoliths from various kinds of squash seeds (*Cucurbita* sp.) are ubiquitous in the midden. Phytoliths from the seeds of *Calathea allouia* (a plant called leren) also appeared in a 9,000 BP context and became common in later levels: Today this plant is cultivated for its starchy root in northern South America and the Antilles. Edge-ground cobbles and small grinding stones may have been used to process this root food or a variety of seeds. *Zea mays* phytoliths that indicate a primitive form of corn were present in the latest midden level at Site 80 but do not represent a staple food. Maize seeds, originally from West Mexico, were widespread among preceramic peoples in Central America and northwestern South America by 7,000 years ago. A long dry season in Santa Elena would have favored the cultivation and storage of maize and other seeds crops. It is likely that Late Vegas people also cultivated beans, cotton, peanuts, and other tropical root crops because these were present in contemporary archaeological contexts in neighboring regions (Dillehay 2011; Piperno 2011a, b).

Cultivation and Domestication

The seasonally dry environments of Central and South America have drawn scientific attention because the wild ancestors of many plants that eventually were domesticated in America were found there, and because archaeological evidence indicates that people in today's Panama, Colombia, Ecuador, and Peru were cultivating and modifying the genetic makeup of plants by the beginning of the EH (Piperno 2006, 2011a). The idea that plants were cultivated and domesticated at the beginning of the EH is now widely accepted. Cultivation of genetically modified plants may be seen as a successful adjustment to fluctuating environmental conditions and shifting resource availability in a seasonally dry tropical zone. Cultivation was innovated in many localities, and not in just a few centers.

Vegas people probably harvested wild fruits and nuts from trees, and a variety of annual plants as well as roots and tubers, which famously store starch for the dry season. Foraging for wild resources, however, may not have been as energetically efficient as cultivation, especially as populations increased and mobility decreased. In Central and South America, as EH people began to cultivate plants, some responded positively resulting in more attractive, domesticated forms. Women might have been interested in reducing their mobility and increasing their per capita productivity by selecting certain improved species for cultivation, increasing the local availability of a valued resource.

Vegas people living in a seasonally dry ecotone were among the early cultivators of plants in northwestern South America: Phytoliths and starch grains from domesticated plants constitute evidence that the Las Vegas people began to manipulate economically important species between 9,000 and 10,000 BP. These data support the inference that both seed plants (squashes and bottle gourd) and a root crop (leren) were cultivated in alluvial soils on the SEP by 9,000 BP.

Measuring the squash phytoliths found in sediments at Site 80 has shown how the ancient seeds and fruits evolved through time (Piperno and Pearsall 1998: 194–195; Piperno and Stothert 2003). This pattern tracks the progressive

domestication of the squash plant, supporting the argument that cultivation was underway by 9,000 BP in Santa Elena, and providing evidence for independent domestication of squash species in lowland tropical South America during the earliest Holocene.

In modeling the origin of cultivation in the tropics, Piperno and Pearsall (1998: Chapters 1–4; Piperno 2006, 2011a) argue that broad-spectrum collecting developed as human groups found more energetically efficient adjustments to the changing resource patterns: because Pleistocene people operated in an ecosystem poor in starchy wild plants, they would have found it desirable to introduce more calories into their diet. Furthermore, in seasonally dry tropical forested biomes, plant cultivation is a more energetically efficient subsistence activity than wild plant collecting. Evidence from several regions supports the idea that plant cultivation was a low-cost subsistence strategy. Not surprisingly, horticulture developed in Central and South America before 9,000 BP, during a period when there was much more environmental instability than was experienced by people later in the Middle Holocene.

Reconstructing Intangible Culture

By Late Vegas times, animals from both aquatic and terrestrial environments were used as symbols in the Vegas ideological system (Stothert 1988: 133–170). Human burials at Site 80 were associated with offerings of teeth from the desert fox (*Lycalopex* sp., formerly *Dusicyon sechurae*). These canids may have been evoked as psychopomps. Also, shells of various species were used to construct a bed for the burial of an infant, and other mortuary offerings were manufactured from shell: These include ornaments of nacreous shells, dish-like artifacts that served to protect the joints of the dead, a container for ground red ochre, a conch trumpet, and two carefully perforated immature valves of *Malea ringens* that are functional whistles but might have been employed as containers for snuff. Shell is a useful raw material, but shells are often brilliant in color, and associated with spirituality, immortality, water, life, and fertility.

Marine and Terrestrial Resources

The Vegas case is important because it reveals a durable foraging adaptation of people focused on marine, estuarine, and terrestrial resources and who also participated in the domestication of useful plant species and progressively intensified both their efforts in fishing and horticulture for more than 3,000 years. The long-lived Vegas way of life was enabled by local conditions: Aquatic resources enabled sedentary life and underwrote experiments in plant cultivation, while the development of small-scale farming meant that people could maintain their residence by the sea and coastal wetlands and enjoy a balanced diet.

The study of the well-preserved (mineralized) skeletal remains of c. 200 individuals buried in Sites 80 and 67 between 8,250 and 6,600 BP proves that Late Las Vegas people were relatively long-lived and enjoyed very good health, with a low incidence of anemia and caries (Stothert 1988; Ubelaker and Newson 2002). This pattern of good health manifests a successful adaptation underwritten apparently by the mosaic of resources of the SEP, and sustained by the capacity of Vegas people to continuously adjust their foraging and farming practices.

Long- and short-term changes in the climate and biogeography of the Santa Elena Peninsula were factors that shaped the Las Vegas adaptation, and long-term demographic growth may have been another selective pressure. In order to model change successfully, paleoenvironmental studies of the peninsula are required, and only the discovery of more Early Las Vegas sites will generate information about demographic and socioeconomic change.

The Vegas case contributes a corpus of data to the study of the origin of horticulture in the Neotropics and supports the notion that cultivation originated as foragers, familiar with a wide variety of species within their complex tropical ecotone, experimented with cultivation. Their early experiments with horticulture and domestication were enabled by their access to predictable aquatic resources whose natural fluctuations were in part independent of the changing patterns of rainfall that affected the plant and animal communities of the terrestrial zone.

Late Las Vegas people, compared to their ancestors, consumed more fish, trapped fewer small animals, hunted large animals, and cultivated improved squash, root crops (like lerén and perhaps manioc), and eventually maize. Perhaps Late Vegas Period men hunted deer as before, but also parties of kinsmen developed ways of fishing together, improving the productivity of their lines and nets. Women may have gardened in the bottomland of seasonal rivers, an activity viewed as more productive than foraging in the bush. If Las Vegas women traditionally were responsible for collecting plants and small animals, then their growing specialization in cultivation may explain the decrease in the utilization of small animals in the Late Las Vegas phase.

Logistical collecting and relatively sedentary settlement may have been favored because of the economic benefits of exploiting both predictable terrestrial and marine/estuarine resources. During the long EH, the Las Vegas people became progressively more committed to feeding themselves with garden products while exploiting the rich aquatic resources of Santa Elena. Their farming and fishing strategies proved to be successful adjustments to a dynamic, complex tropical, coastal ecosystem. Late phase Vegas people undertook some social changes, including the development of elaborate communal burial activities. The mixed farming and fishing strategy of the Late Vegas people was well suited to the SEP: It can be seen as a preadaptation for the development of fully agricultural, village life in coastal Ecuador in the Valdivia ceramic period, and it continued to be the basis of life during the entire aboriginal period in what is now coastal Ecuador.

Social Complexity in the Late Las Vegas Period

Las Vegas men and women might have changed their behavior and reallocated their labor in order to optimize productivity and minimize risk in the dynamic environmental context of the EH, and their increasing efficiency in exploiting fish (harvested from a huge inshore biomass) and their ability to produce abundant plant food seasonally may have created the opportunity to grow the local community and undertake sociocultural change. Plants figure widely in human exchange activities, as do salt, and dried or smoked fish and shellfish. People may have invested labor in order to build alliances, engage in reciprocity with other people and with their ancestors, and undertake regional and extraregional exchange – activities that characterize more complex social life.

The founding of cemeteries in the deep midden at the two largest known Vegas sties indicates a greater degree of settlement stability and social complexity in the Late Vegas period. Funeral practices are evidence that people invested more time and effort in community social activities. One imagines that groups of families developed integrative mechanisms, such as complex mortuary rituals, that perhaps helped them to share food on a regular or irregular basis, and reminded them of the relationships that allowed the fielding of larger work groups and the defense of the resources of their territory. Ceremonial gatherings imply both the consumption of special foods and the giving of food as gifts. Growing food and producing quantities of fish in order to share is another way that people ensure themselves against resource fluctuation. Food sharing is a strategy for minimizing risk. The intensification of both fishing and farming may have underwritten the development of ceremonial activities, alliance building, and reciprocal exchange. Amerindians have a long history of maintaining robust patterns of interaction with near and distant neighbors.

International Perspectives

Research in the last 40 years has brought to light the existence of TP and EH archaeological sites in almost every country in South America, and key issues are now discussed across modern national boundaries. Innovative research tools developed by archaeologists, climatologists, botanists, zoologists, geneticists, and linguists are now employed throughout the tropics in order to better understand issues related to the development of culture in the New World.

Future Directions

Although most of the analyses of excavated evidence took place 30 years ago, research on phytoliths and starch from Vegas sediments, artifacts, and human teeth has proceeded continuously, and recent and proposed restudies of Vegas materials will yield improved interpretations.

New data are needed to facilitate the archaeological investigation of the initial peopling of coastal Ecuador, early horticulture, and the development of more complex social behavior. This will require the discovery of additional sites in all regions of Ecuador, but especially in the great Guayas River Basin and at points along the coast where the present shore is not too far removed from the ancient high tide line. Recently discovered preceramic sites in the Guayas Basin may result in expanding knowledge of the prehistory of Ecuador's coastal lowlands. Fortunately, the ongoing study of the domestication of native plants in the Neotropics will continue to generate invaluable evidence and interpretations.

Crucial is the long-term preservation of sites and excavated remains: This will require the commitment of individual archaeologists and governmental and private institutions in assuring that the archaeological record continues to be available for investigation. Recent restudies of curated remains illustrate the importance of applying current methods to answering today's research questions. Site 80 is now the campus of the regional museum in Santa Elena, where a portion of the ancient midden is protected for future scientific investigation.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Archaeobotany
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Phytolith Studies in Archaeology
- ▶ Squash: Origins and Development
- ▶ Submerged Prehistoric Landscapes
- ▶ Zooarchaeology

References

Bird, E.C.F. 1993. *Submerging coasts: The effects of a rising sea level on coastal environments*. Chichester: Wiley.

Davis, L.G. 2011. The North American paleocoastal concept reconsidered. In *Trekking the shore: Changing coastlines and the antiquity of coastal settlement, interdisciplinary contributions to archaeology*, ed. N.-F. Bicho, J.A. Haas, and L.G. Davis, 3–27. New York: Springer Science + Business Media.

Dillehay, T.D. 2000. *The settlement of the Americas: A new prehistory*. New York: Basic Books.

Dillehay, T.D. 2011. *From foraging to farming in the Andes*. Cambridge: Cambridge University Press.

Erlandson, J.M. 2002. Anatomically modern humans, maritime voyaging, and the Pleistocene colonization of the Americas. In *The first Americans: The Pleistocene colonization of the New World*. Memoirs of the California Academy of Sciences 27, ed. N.G. Jablonshki, 59–92. San Francisco: California Academy of Sciences.

Faught, M.K. 2008. Archaeological roots of human diversity in the New World: A compilation of accurate and precise radiocarbon ages from earliest sites. *American Antiquity* 73: 670–698.

Heusser, L.E., and N.J. Shackleton. 1994. Tropical climate variation on the Pacific slopes of the Ecuadorian Andes based on a 25,000-year pollen record from deep-sea sediment core tri 163-31B. *Quaternary Research* 42: 222–225.

Piperno, D.R. 2006. The origins of plant cultivation and domestication in the neotropics: A behavioral ecological perspective. In *Behavioral ecology and the transition to agriculture*, ed. D.J. Kennett and B. Winterhalder, 137–166. Berkeley: University of California Press.

Piperno, D.R. 2011a. The origins of plant cultivation and domestication in the New World tropics: Patterns, process, and new developments. *Current Anthropology* 52 (Suppl 4): S453–S470.

Piperno, D.R. 2011b. Northern Peruvian early and middle preceramic agriculture in Central and South American contexts. In *From foraging to farming in the*

Andes, ed. T.D. Dillehay, 275–284. Cambridge: Cambridge University Press.
Piperno, D.R., and D.M. Pearsall. 1998. *The origins of agriculture in the lowland neotropics*. San Diego: Academic.
Piperno, D.R., and K.E. Stothert. 2003. Phytolith evidence for early Holocene *Cucurbita* domestication in southwest Ecuador. *Science* 299: 1054–1057.
Sandweiss, D.H. 2008. Early fishing societies in western South America. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 145–156. New York: Springer.
Sandweiss, D.H., H. McInnis, R.L. Burger, A. Cano, B. Ojeda, R. Paredes, M.C. Sandweiss, and M.-D. Glasscock. 1998. Quebrada Jaguay: Early South American maritime adaptations. *Science* 281: 1830–1832.
Stahl, P.W. 1996. Holocene biodiversity: An archaeological perspective from the Americas. *Annual Review of Anthropology* 25: 105–126.
Stothert, K.E. 1985. The preceramic Las Vegas culture of coastal Ecuador. *American Antiquity* 50 (3): 613–637.
Stothert, K.E. 1988. *La prehistoria temprana de la Península de Santa Elena, Ecuador: la cultura Las Vegas*. Miscelánea Antropológica Ecuatoriana, Serie Monográfica 10. Guayaquil: Museos del Banco Central del Ecuador.
Stothert, K.E. 2011. Coastal resources and the early Holocene Las Vegas adaptation of Ecuador. In *Trekking the shore. Changing coastlines and the antiquity of coastal settlement*, ed. N.F. Bicho, J.A. Haas, and L.G. Davis, 355–382. New York: Springer.
Stothert, K.E., D.R. Piperno, and T.C. Andres. 2003. Terminal Pleistocene/early Holocene human adaptations in coastal Ecuador: the Las Vegas evidence. *Quaternary International* 109–111: 23–43.
Ubelaker, D.H., and L.A. Newson. 2002. Patterns of health and nutrition in prehistoric and historic Ecuador. In *The backbone of history: Health and nutrition in the western hemisphere*, ed. R.H. Steckel and J.C. Rose, 343–375. Cambridge: Cambridge University Press.

Further Reading

Jablonski, N.G., ed. 2002. *The First Americans: The Pleistocene colonization of the New World*. Memoirs of the California Academy of Sciences 27. San Francisco: California Academy of Sciences.
Lavallée, D. 2000. *The first South Americans. The peopling of a continent from the earliest evidence to high culture*. Salt Lake City: University of Utah Press.
Meltzer, D.J. 2009. *First peoples in a New World, colonizing Ice Age America*. Berkeley: University of California Press.
Morrow, J.E., and C. Gnecco. 2006. *Paleoindian archaeology. A hemispheric perspective*. Gainesville: University Press of Florida.

Late Antique Anatolia, Archaeology of

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Introduction

Together with Syria-Palestine, Anatolia, otherwise known as Asia Minor, in Late Antique and Early Byzantine times belonged to the more populated and dynamic regions of the Roman Empire. Both cities and countryside continued to prosper at least until the middle of the sixth century. There is much inconsistency in the use of the terms Late Antique and Early Byzantine. Here, the first period is considered to have started in 324, the year Constantinople was founded as the new Roman capital, and to have ended in 527, the beginning of the reign of Justinian. The Early Byzantine Empire ends in 640, when the internal structures of the Roman state were dramatically changed in response to the Arab conquests.

Definition

Anatolia is situated in the westernmost part of the Asian continent, roughly corresponding to the Asian territory of modern-day Turkey, between the Aegean and the Euphrates (Fig. 1).

The region was bordered by the Black Sea in the north, the Aegean Sea in the west, and the Mediterranean Sea in the south. Just as it had in previous centuries, the eastern border with the Persian Empire was constantly changing.

The richest provinces of the region were situated along the fertile Aegean and Mediterranean coasts and the great river valleys starting on the Anatolian plateau. Due to their easy access to water transport, these areas were well connected to the Mediterranean economy. They were also the most densely occupied by villages and cities,

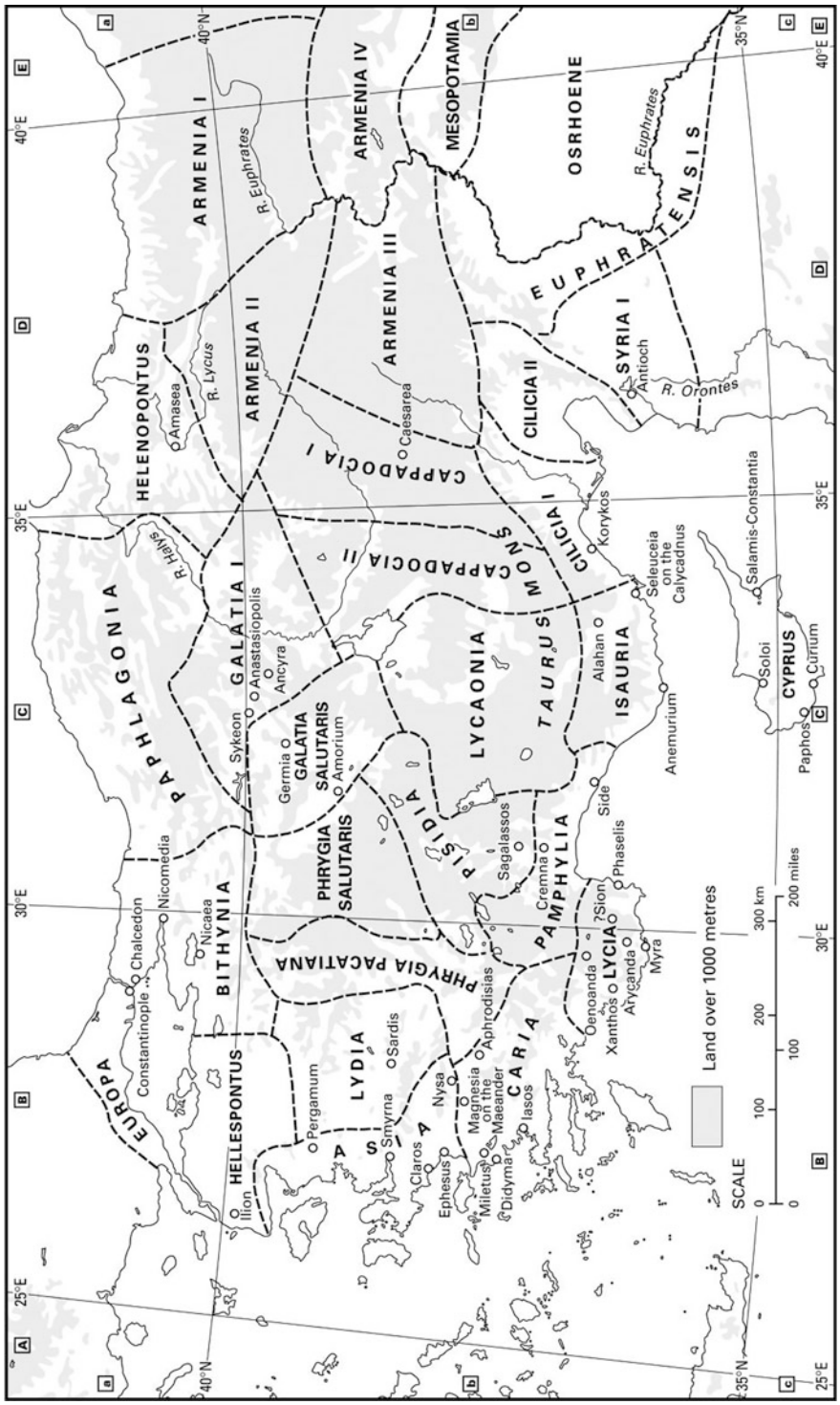

Late Antique Anatolia, Archaeology of, Fig. 1 Map of the provinces in Late Antique Anatolia (Roueché 2000: Map 14)

despite imperial efforts to foster greater administrative and fiscal efficiency by creating cities on the central plateau of Anatolia. The interior of the region was separated from the coastal strip by the Pontic mountains in the north and the Taurus mountains in the south, which begin on the Lycian coast and run all the way to the Euphrates. The nature of the inland plateau is harsh and rugged overall, rendering it fairly marginal to the Roman Empire. The Taurus Mountains also separated the provinces of Isauria and Cilicia from the rest of Anatolia. This was acknowledged in the past when these provinces were assigned to the diocese of Oriens. The remainder of Anatolia was divided into the diocese of Asia and the diocese of Pontica. Even in Late Antique and Early Byzantine times, various peoples populated Anatolia. Their internal differences and diverse historical and cultural backgrounds were acknowledged in the provincial division under the tetrarchy, which was still based on ancient tribal units and kingdoms (Roueché 2000: 572).

Historical Background

In 324, Constantine established his imperial capital at Constantinople. The city, which reached full development after Theodosius I took permanent residence there, counted a population of 300–400,000 in the fifth century, and around 500,000 by the time of Justinian. The concentration of people and power in this corner of Anatolia had far-reaching political, social, and economic consequences for the entire region.

The location of the city was strategically chosen at a crossroad of sea and land routes, and it was well protected from attacks over land by Greece and Thrace to the west and Syria, Armenia, and Anatolia to the east. Anatolia itself was well protected by natural borders. The most important threats came from the east, where the mountainous districts of Armenia and the Caucasian kingdoms formed a vital frontier region with the Sassanid Persian Empire (Fig. 2).

Not only were these regions densely populated and rich in natural resources; the Caspian Gates in the Transcaucasus provided a barrier against the incursions from the north. For instance, the Huns who harassed Anatolia between 395 and 398 invaded through Transcaucasia. Consequently, both Romans and Persians attempted to impose their authority on this broad frontier zone until the Arab conquest. Overall, the Persians dominated the eastern Caucasus and at times succeeded in extending their power as far as the Black Sea. Roman emperors frequently turned down requests for financial and military assistance in guarding the passes across the mountains, which resulted in more armed conflicts between the two Empires. The various local people – the most important group being the Armenians, the Iberians, and the Lazi – were in many respects culturally indebted and politically influenced by Iran, but their adoption of Christianity strengthened their loyalties to Rome. They frequently changed sides in this never-ending conflict (Greatrex and Lieu 2002).

The largest internal threat for Anatolia came from the province of Isauria, whose inhabitants were notorious for their raids on neighboring areas. They had already revolted in the 270 s, and their activities further escalated during the fifth century, when they were reported to have attacked settlements as far away as Cappadocia and Pamphylia. The region was only pacified under Anastasius in 498.

According to a law decreed in 534, the provinces of the Greek islands, of Caria and of Cyprus were made suppliers of the Balkan frontier, a ruling which suggests that the countryside of these provinces was still rich and prosperous. This may have changed when the Great Plague arrived in Anatolia in 541/2. It is generally assumed that the population of the Empire dropped drastically due to recurrent outbreaks of the disease (Little 2007).

Anatolia then took on a vital role in the final conflict with Persia, as it became the base of operations for Heraclius and his army from 610 onward. In 626, Constantinople was besieged by Persians, Avars, and Slavs. In a counteroffensive, Heraclius prompted the Persian nobility to overthrow their king in 628. However, the ongoing war had weakened both Empires, so much so that neither was able to resist by the time the Arabs

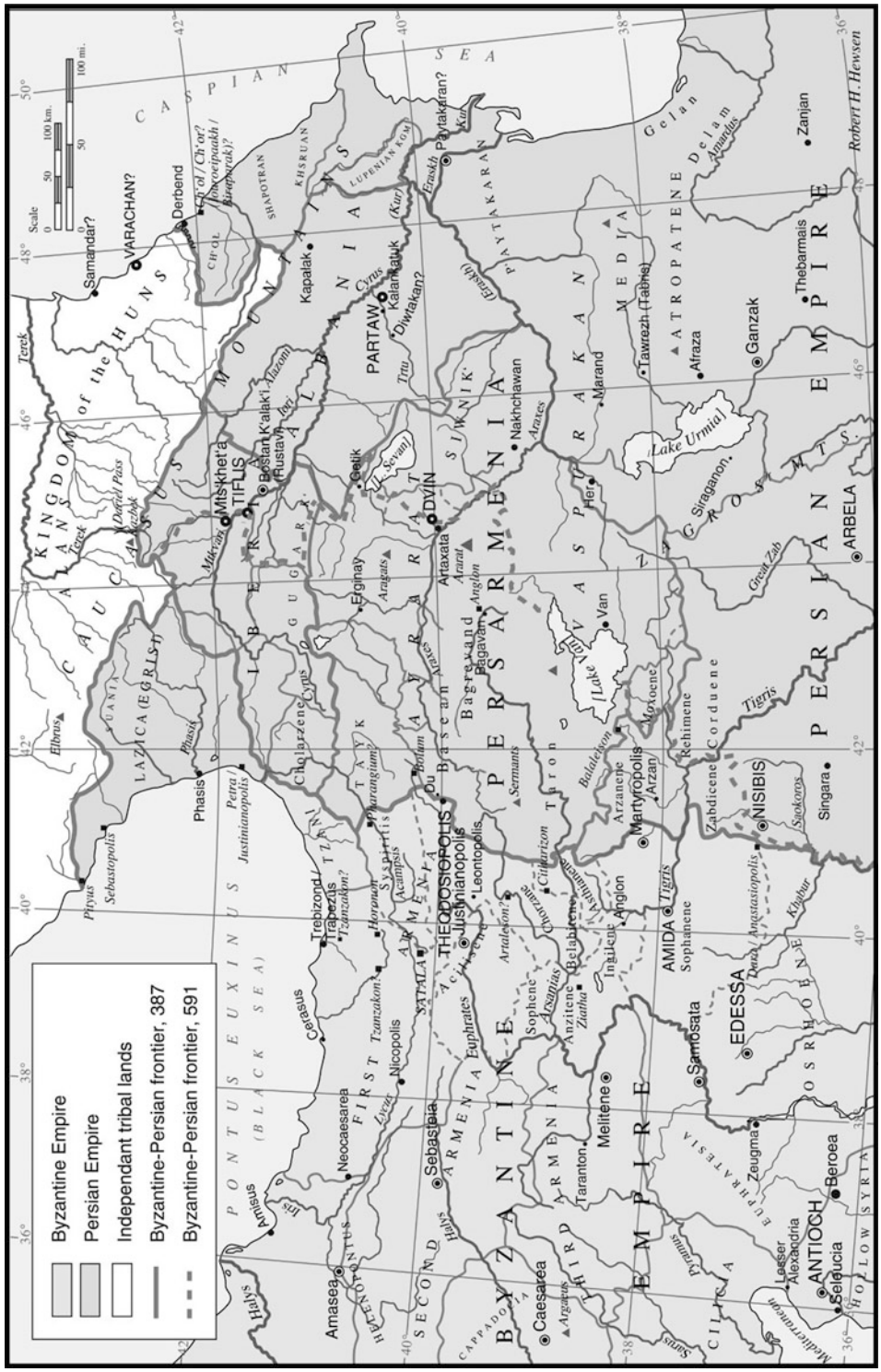

Late Antique Anatolia, Archaeology of, Fig. 2 Map of the Roman-Persian frontier in Armenia and surrounding regions (Greatrex and Lieu 2002: Map 3)

began their conquest in 634. By 641, the Roman Empire had shrunken to the Aegean, parts of the coasts of Greece, and Anatolia to the west of the Taurus mountains (Haldon 1990: 41–53). State control was weak, and small-scale brigandage and robbery had become frequent hazards.

As seen elsewhere in the Roman Empire, the Christianization of Anatolia happened quickly but inconsistently. Although civic temples were deserted and had begun to crumble from the fourth century onward, educated elites still held on to their pagan and mythological past. In certain localities, cults survived far into the sixth century, even longer in some cases. Aphrodosias especially, in Caria, had a strong pagan presence until the late fifth or early sixth century and was the location of a Neoplatonist school centered on Asklepiodotos of Alexandria. He and others like him traveled throughout the eastern Mediterranean studying and encouraging pagan religious practice. Likewise, though Christian shrines could be found in the countryside of regions such as Galatia, Cappadocia, Paphlagonia, Pontus, and Armenia Minor from the fourth century onward, John of Ephesus still claimed to have baptized 80,000 pagans in Asia, Caria, Lydia, and Phrygia in the 540 s (Mitchell 1995: 62, 68–9).

Key Issues/Current Debates

Archaeology of the City

Although our knowledge of the city in Anatolia is fairly advanced, there are still many uncertainties. First, Late Antique remains suffered severely from deficient excavation techniques and from the excavators' wish to expose the attractive classical city. Second, larger urban centers such as Ephesus or Aphrodisias have traditionally attracted much more attention than smaller towns. Moreover, the interior, the east, and the north have been far less explored than the Aegean and the Mediterranean coasts. On the whole, there is little evidence for urban activity in these regions after the early fourth century. Third, details about the civic government are more obscure than in previous centuries because the epigraphic record was largely reduced to verse inscriptions composed in honor of imperial officials, usually provincial governors (Mitchell 1995: 120–1, 336).

For the most part, Late Antique and Early Byzantine undertakings were of a more modest nature than their predecessors. This change was brought about by the profound restructuring of imperial and municipal institutions, which began under Diocletian, and the subsequent lack of money, at least in the smaller cities of the provinces. Building projects in provincial capitals still testify to the larger number of resources concentrated in the hands of the governor. Nevertheless, the reuse of architectural fragments also proliferated here from the fourth century onward. As the urban fabric of cities in Anatolia had already been saturated by the third century, building anew was less frequent than renovation and repair works. The money for these interventions came from municipal funds. Private benefactions had become rare and modest but were still commemorated with pride. Thus, when parts of the portico of Tiberius at Aphrodisias collapsed in the sixth century, the western side was reconstructed by one generous donor, while several others contributed to the restoration of the south side. Imperial funding remained limited to the capital and larger pilgrimage sites (Jacobs 2012: 482–535).

The level of activity in Late Antique and Early Byzantine times was, however, far from constant. After an initial quiet period, construction suddenly became more extensive after 350, first in provincial capitals and also in smaller cities around the 400 s. These decades were primarily characterized by widespread construction of civic fortifications, which often reused earlier Hellenistic wall stretches, even when the city had grown in the meantime (Fig. 3).

New major monuments – such as the Martyrium of St. Philip at Hierapolis and suburban quarters such as the Paktolos suburb at Sardis – were located outside the walls, suggesting that the climate was not too hostile.

The most elaborate achievement was the Theodosian defensive system of Constantinople, which enclosed a surface of 650 ha. Some of these walls show signs of later repairs. Another significant change taking place was the deconsecration

Late Antique Anatolia, Archaeology of, Fig. 3 The late antique city gate at Blaundos (Lydia)

of temples. In the following decades and centuries, most of them would be dismantled. However, temples on central locations had often already been converted into churches by the first half of the fifth century, as at Sagalassos or Aizanoi, or by the second half, as at Aphrodisias. The first newly built churches in this period were established in imposing positions that often held significant associations, such as the Church of St. John at Ephesus.

Despite the changed religious climate, cultural activities largely continued. Odeia, and especially theaters, remained major meeting places, in addition to providing a venue for mimes, pantomimes, and games, even into the sixth century. Traditional *thermae* were repaired, whereas smaller, asymmetrical baths proliferated. Constantinople possessed 153 of them by the early fifth century as well as 8 *thermae* complexes. Small baths were also built in Didyma, Priene, Ephesus, Samos, Perge, Side, and Anemurium. Stadia such as those of Aphrodisias and Perge came to house an amphitheater at one of their ends. Gymnasia went out of use, maybe as the result of an altered vision on agonistic culture, maybe because the maintenance of such large complexes was no longer possible. They were dismantled and encroached upon by either houses and workshops, similar to what happened to the gymnasia at Salamis-Constantia and Anemurium, or by churches, which was the case with at least two abandoned gymnasia at Ephesus.

In contrast, the city's colonnaded streets and agorae remained highly frequented areas. At the beginning of Late Antiquity, new imperial fora and other large and smaller plazas were still laid out at Constantinople. New agorae also appeared in the larger cities of the provinces, such as Pisidian Antioch and Aphrodisias (Fig. 4; Lavan 2006).

Even though some existing agorae went out of use and were encroached upon by houses and workshops (the most famous being the State Agora at Ephesus) or by churches (e.g., the Lower Agora at Xanthos and the agora at Phaselis and Iasos), most of them survived as political, social, and commercial centers into the sixth and sometimes even into the seventh century. Colonnaded streets were still built and renovated in both large and small cities (e.g., Constantinople, Ephesus, Aphrodisias, Sardis, Aizanoi) (Fig. 5).

With the exception of those at Aphrodisias, a city with a long-lasting local quarrying and stone carving tradition, both the colonnades and street pavements were now composed of varied spolia. The offices, shops, workshops, and restaurants housed behind the colonnades continued to draw a large number of visitors. Already by 400, their commercial function was extended even further when permanent structures with a commercial

Late Antique Anatolia, Archaeology of, Fig. 4 The fourth-century Tetrastoon at Aphrodisias (Caria)

Late Antique Anatolia, Archaeology of, Fig. 5 The late antique colonnaded street at Aizanoi (Phrygia)

and/or artisanal character encroached underneath their colonnades (Jacobs 2012: 625–37).

Finally, the fourth and also the first half of the fifth century saw the construction of large and lavishly decorated urban mansions in cities such as Ephesus, Sardis, Aphrodisias, Halikarnassos, Xanthos, Sagalassos, Paphos, Salamis, and so on (Uytterhoeven 2007: 82–5). They comprised both public areas with reception and dining halls as well as private areas with bedrooms, kitchens, and sometimes a bath complex. Some of them can be identified as official residences of provincial governors, bishops, or other officials. The elaborate town houses to the north of the Hippodrome at Constantinople could be identified as the palaces of Lausus and Antiochus, both *praepositus sacri cubiculi* of the early fifth century (Mundell Mango 2000: 950).

On the whole, the period after the mid-fifth to early sixth century was less eventful in the field of secular construction – though there are exceptions such as the city of Amorium that flourished under the reign of Zeno. Instead, this period saw the invasion of the city center by numerous churches, monasteries, *martyria*, and welfare establishments. Whereas many of the earliest churches resulted from conversions of temples and secular monuments, churches were now mostly constructed anew, following a simple basilical plan with three aisles preceded by a peristyle courtyard. The church exterior was kept simple and monotonous, though the interior was lavishly decorated with marble and mosaic floors, marble chancel and ambo plates, and wall paintings and wall mosaics. Only ecclesiastical foundations in Cilicia and Isauria possessed lavishly decorated exterior facades, as did those in other provinces of the Oriens diocese. Although the construction of lavish private houses apparently stopped after the mid-fifth century, the *episkopeia* that could be identified at Ephesus, Miletus, Side, and so on belong to the first half of the sixth century or later.

With the exception of the diocesian capital of Ephesus, the cities of Anatolia received little attention during the reign of Justinian. The emperor's activities were instead concentrated on Constantinople – where he constructed or rebuilt a senate house, a forum, a seaside promenade, a bath complex, a vast cistern, six hospices, and four palaces, as well as 33 churches including St. Sophia – and along the eastern frontier zone. In Pontos, Lazica, and Armenia, both Anastasius and Justinian established or refortified strongholds, such as Petra in Lazica, Theodosiopolis in western Armenia, and Martyropolis in highland Armenia, and further endowed these settlements with sizeable churches (Mitchell 2007: 339).

From the second half of the sixth century onward, the appearance of cities in Anatolia quickly deteriorated, and human actions became purely functionally motivated: statuary was thrown in limekilns, fountains were converted into water tanks, dilapidated colonnades were no longer reerected, and garbage dumps appeared in the center of the city. By the late sixth or early seventh century, even most churches showed few traces of continuing activity, save for the intramural necropoleis developing around them. These events, which would transform towns into rural villages, occurred several years, or even decades, before the Persian incursions. They had largely concluded before cities such as Ephesus, Sardis, Sagalassos, Aphrodisias, Phaselis, and Magnesia began constructing smaller fortification walls in the course of the seventh century. The positions of these *kastra* were primarily chosen for defensive reasons, with little or no respect for the earlier city (Jacobs 2012: 96).

The Countryside

Surveys of the countryside, which have been carried out since the 1950s, are starting to provide a more detailed picture of the settlement patterns in Anatolia. At the Marmara coast of Bithynia and in Cappadocia, large, often senatorial, landowners could be found. The church also acquired vast landholdings, and its landownership grew substantially in the sixth century, most notably in the development of monasteries on the outskirts of villages. Elsewhere, estates were mostly controlled by a city-based aristocracy. Only on the eastern Anatolian plateau (Pontos, Cappadocia) may there have been more isolated rural estate centers present (Morrison and Sodini 2002: 182). Rural life was therefore mainly confined to peasants, both landowning and dependent, who were living in villages or farmsteads.

Villages started to develop in the third century and flourished until the end of the sixth. The center of gravity was located along the coastal regions of southern Asia Minor, where cities and villages alike could profit from their position on the shipping routes from Alexandria, Syria, and Cyprus to the Aegean and Constantinople. Surveys in central Lycia as well as around Kyaneai near the coast show a Late Antique expansion in the number of villages, farms, and farmed terraces, probably dating to the fifth/sixth century. In Cilicia and Isauria, new villages developed from the fourth century onward. But also in inland regions, such as Pisidia and the Konya plain, new settlements were established and existing communities expanded. Byzantine Cyprus saw the widespread proliferation of Late Roman sites. Whereas

rural settlements again disappear from the map in the course of the seventh century, demographic expansion on Cyprus continued during the sixth and early seventh century.

Villages ranged in size from small hamlets to larger settlements that hardly differed from cities. Although a formal street plan was mostly lacking, they were commonly equipped with agricultural installations and storage buildings. Spacious village houses and bathhouses, and from the early fourth century onward also at least one church, often substantially built, testify to sizeable capital outlay by these small communities (Fig. 6; Morrison and Sodini 2002: 176–7; Chavarria and Lewit 2004: 18).

The money probably came from inside the local community, though powerful landowners and *kouratores* of imperial estates sometimes also functioned as patrons (Wickham 2005: 461).

Surprisingly, whereas inscriptions in the cities were disappearing, in inland Cilicia and Phrygia, they suddenly became more numerous from the fourth century and continued throughout most of the sixth. For instance, in the commercial entrepot of Corycus in Cilicia, nearly 600 individuals, including olive and wine merchants, shipowners, shipbuilders, sailmakers, and potters, organized into guilds, recorded their professional status on their sarcophagi (Mitchell 1995: 338). This wealthy settlement was provided with fortifications. In contrast to other regions in the East, within Anatolia, there is indeed more evidence of the existence of rural sites with towers and walls and small fortified villas (Sodini 1997: 479–82).

Novelties in the settlement pattern of Anatolia were the ecclesiastic foundations. Self-sufficient communities following the monastic rule of Basil the Great rose up in the city, and even more so in the countryside, with the greatest concentration in and around Constantinople. Even though the first, such as that of Dalmatios in Constantinople, were founded around 380, the largest growth was situated in the late fifth and sixth centuries. They were often endowed with luxurious liturgical fittings, including patens, chalices, lamps on stands,

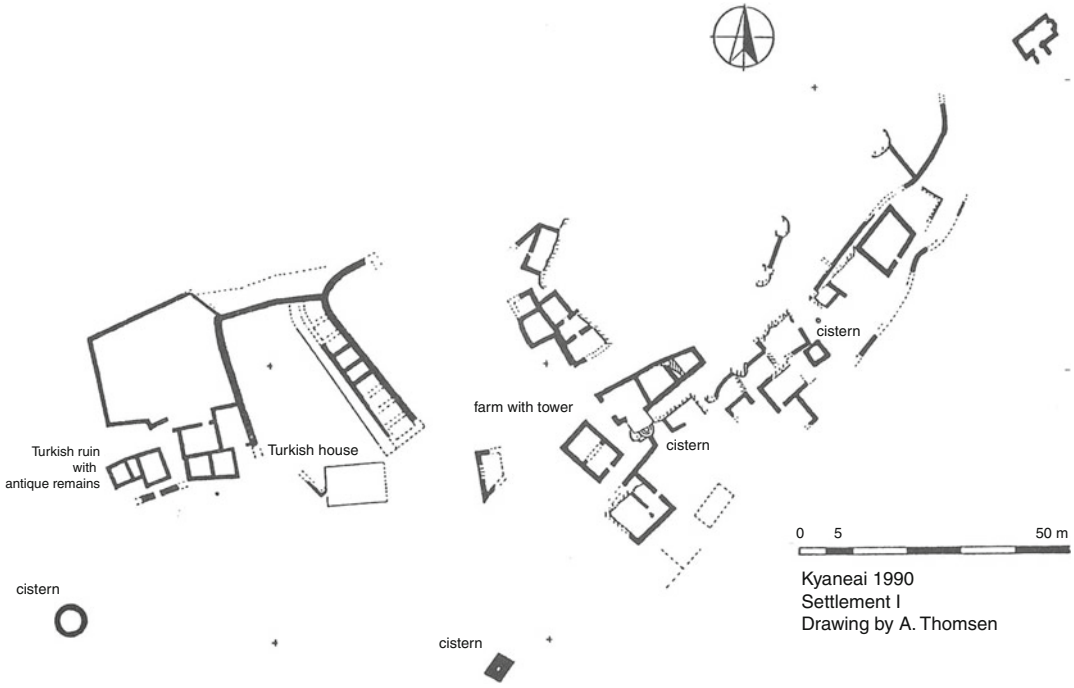

Late Antique Anatolia, Archaeology of, Fig. 6 Small settlement (Siedlung I) near Kyaneai (Lycia) (Thomson 1993: Fig. 19)

chandeliers, and other lighting devices. Christian communities, sometimes with their own fortification and water supply, also developed around church complexes established by rich landowners, such as the "Basileias" outside Caesareia. The same occurred around important pilgrimage centers, such as the Martyrium of St. Thecla at Meriamlik, that of St. Theodore at Euchaita, and also around the tomb of St. John on the Ayasoluk Hill at Ephesus (Mitchell 1995: 113–16), which were often endowed with imperial benefactions.

Production and Exchange

Mining of metals in Anatolia continued until the end of antiquity. Armenia and the Caucasus were rich in gold mines. Ore sources of silver can be found both in the Black Sea region and in the Taurus mountains. The first was probably transported to Constantinople; the second was likely to have been worked locally at Tarsus and Antioch. Manufacture took place both in private workshops and workshops controlled by the *comes sacrarum largitionum*. Objects produced were intended primarily for trade, both within and outside the Empire, with finds in northern Europe and Central Asia (Mundell Mango 2009). Copper continued to be quarried both in local and in industrial mines on Cyprus. Iron was extracted from the Taurus mountains near Caesareia, the location of an imperial arms factory. The largest of these establishments, which provided armor and weapons for the entire diocese, was located at Sardis. Finally, even if there were tin mines in Asia Minor, they probably did not have sufficient output to meet demands. The nearest alternative source was Britain.

The marble quarries of Proconnesos (Island of Marmara), Ezine in the Troad, and Dokimeion-Iscehisar, which were located in a favorable position for providing the new capital with building materials, came to dominate production and trade in the whole Mediterranean during the fifth and sixth centuries. Proconnesian gray-striped marble, which lay in imperial hands, became the main building stone for the construction projects in Constantinople. Half-finished columns, capitals, bases, and chancel screens were exported all over the Mediterranean, even reaching inland sites in the Negev desert. Part of the distribution can be connected to imperial building projects or gifts from emperors or higher officials, for example, to influential patrons such as Julianus Argentarius and Theoderic the Ostrogoth in the West. Furthermore, much was produced and sold in terms of commerce (Waelkens 1999: 560–1). Cities within Asia Minor – in particular Constantinople, Ephesus, and Aphrodisias – also remained centers of marble statuary production, especially of small-scale statuettes and of portrait statuary (Fig. 7).

In the mid-fourth-century *Expositio*, the province of Asia Minor is mentioned as a producer of grain, wine, and olive oil. It is assumed that most cities produced at least enough foodstuff to be self-sufficient. Only Cappadocia may have depended on grain imports from neighboring provinces (Decker 2009: 246–8). In contrast, Constantinople had become a consumer of such

Late Antique Anatolia, Archaeology of, Fig. 7 Head of Eutropius found in the Marble Street at Ephesos (Kunsthistorisches Museum Wien)

enormous magnitude that a system of provision based on that of Rome had to be created.

The origin of the products lay in Anatolia, at least partially. In Lycia, granaries and other storage facilities have been found in several coastal settlements (Foss 1994). Although the diocese of Oriens is especially known for its olive oil production, the evidence from Late Antique and Byzantine oil installations in southern Anatolia are sizeable enough to indicate surplus production. Presses were particularly numerous in Aperlae, a site with an extremely rugged and truncated hinterland whose survival depended on its place in sea trade. Scattered amphora evidence and textual fragments further suggest that local economies in Cyprus, Cilicia I–II, Isauria, and the Lycian coast heavily depended on oil production (Decker 2009: 163–4).

Transport of foodstuff occurred mostly in locally produced amphorae. The production of Late Roman 2 (LR2) amphorae is associated with, among others, the island of Chios in front of the west coast of Anatolia. Furthermore, in several locations along the west coast of Anatolia, amphorae of the Late Roman 3 (LR3) type were produced. They have been found in cities such as Ephesus, Pergamon, and Sardis, but also in *castella* along the limes. More important were the Late Roman 1 (LR1) amphorae, which were manufactured from the fourth to the seventh century. The smaller subvarieties initially were intended for wine, while larger types carried wine and oil and likely other regional products as well. It now seems that production started along the coast of Cilicia, with Cypriotic production sites appearing in the late fifth or sixth century (Pieri 2005). LR1 amphorae were exported to every coastal region of the Mediterranean, the Black Sea, the Danube, and the Euphrates frontier, and as far away as western Britain and Nubia. They also represent the most common amphora import in Constantinople, which once again suggests that the capital's (wine) supply derived from Cilicia and Cyprus rather than from Palestine and Egypt.

Within Late Antique Anatolia, two major international fine tableware groups were present which no doubt profited from the new dynamics created by the founding of Constantinople. In the area between Pergamon, Phokaia, and Pitane, Phocaean Red Slip Ware, also known as Late Roman C (LRC), was produced between the late fourth and the late seventh century. LRC was found throughout the Aegean and the Near East, but was also common on Crete and in Cyrenaica (Fig. 8).

In addition, from the mid-fourth century onward in south Asia Minor, Cyprus and the central Levant, Late Roman D (LRD), or Cypriot Red Slip Ware, became the most common fine ware. It may very well have developed on the back of LR1 amphorae. Both ceramics types are currently thought to have continued into the eighth century (Poblome and Fırat 2011).

There were also several smaller active tableware manufactories, operating on different scales, with a more restricted distribution pattern which as yet remains unknown. For instance, Sagalassos produced a fine ware with a regional distribution; Sardis, though only located some 100 km on a river inland from Phokaia, always had predominantly local wares, as had other inland sites such as Aphrodisias. Especially in the second half of the sixth century, such inland sites depended on regional wares, even though imports remained frequent at the coast.

The road network of Anatolia, used for short- and medium-distance trade, was well maintained until the sixth and even seventh century. Its spinal cord was the great road running across the region from Constantinople to Ankara and further to Syrian Antioch. However, the largest part of transport and trade took place overseas. The main ports on the west coasts included Smyrna, Miletos, and especially Ephesus. In the south, the Pamphylian ports Attaleia, Perge, and Side were essential. They were supplemented with numerous smaller ports. The capital itself was equipped with four harbors, the youngest of which was built under Theodosius I. Constantinople maintained contacts with all parts of the known world through a dense network of sea-lanes, which, as is testified by pottery, coins, shipwrecks, and hagiographical texts, remained dense up to the seventh century (Avramea 2002: 83–5).

Products derived from Anatolia were found all over the Mediterranean, and they even reached the Atlantic via the Strait of Gibraltar. LR1 and LR3

Late Antique Anatolia, Archaeology of, Fig. 8 The distribution of Phocaean Red Slip Ware in the Eastern Mediterranean, based on data assembled from published literature (© Rinse Willet, Philip Bes, ICRATES project)

amphorae as well as LRC have been found in Britain and Ireland, where their content was probably traded for tin and silver. African Red Slip Ware made in Africa Proconsularis and lamps from Byzacena testify that produce from the West was also imported, both to Constantinople and the rest of Anatolia. To the East, Anatolian products reached India by way of the Red Sea and Central Asia by land. Though the sea routes were partially in Byzantine hands, the land routes were dominated by the Sassanians. They imposed tolls of 25% on silk imports (from southern China), precious metals, gems, and spices coming into the Roman Empire. From the early fifth century onward, there were only three custom ports: Nisibis in Mesopotamia, Artaxata in Armenia – which was replaced by Dubios (Dwin) in the mid-sixth century – and Callinicum on the Euphrates. The long distance trade of luxury goods between the Roman Empire and Far East was supervised by imperial functionaries here, but elsewhere it was prohibited. Conversely, everyday goods freely crossed the frontier in both directions. The problem of heavy levies on silk was partially countered in 551, when the secret of silk production was brought to Constantinople by missionary monks (Morrison and Sodini 2002: 210–12; Mitchell 2007: 341–3).

Future Directions

Present-day archaeological research in Anatolia has moved beyond the exposure of monumental city centers. Reconstruction of everyday life has come to the forefront of attention, with research topics such as middle- and lower-class housing, artisanal manufacture, and everyday objects of use. In addition, attention has been extended to the suburbia and settlement patterns in the hinterland. Further exploration of the countryside still needs to clarify whether or not rural settlements in the fifth and sixth centuries grew at the expense of the cities, as it is clear that activity was dwindling at some urban sites during the sixth century. Likewise, the role of ecclesiastical foundations as new social and economic centers needs to be assessed in archaeological remains. Moreover, the country estates known through literary sources remain archaeologically unexplored.

Cross-References

► Hellenistic and Roman Anatolia, Archaeology of

References

Avramea, A. 2002. Land and sea communications, fourth-fifteenth centuries. In *The economic history of Byzantium: from the seventh through the fifteenth century*. Dumbarton Oaks Studies, Vol. 39, ed. A.E. Laiou, 57–90. Washington, DC: Dumbarton Oaks.

Chavarria, A., and T. Lewit. 2004. Archaeological research on the late antique countryside. A bibliographic essay. In *Recent research on the late antique countryside*. Late Antique Archaeology, Vol. 2, ed. W. Bowden, L. Lavan, and C. Machado, 3–51. Leiden/Boston: Brill.

Decker, M. 2009. Tilling the hatefulearth. In *Agricultural productionand trade in the late antique East*. Oxford Studies in Byzantium. Oxford: Oxford University Press.

Foss, C. 1994. The Lycian coast in the Byzantine age. *Dumbarton Oaks Papers* 48: 1–52.

Greatrex, G., and S.N.C. Lieu, eds. 2002. *The Roman eastern frontier and the Persian Wars. Part II AD 363–630. A narrative sourcebook*. London/New York: Routledge.

Haldon, J.F. 1990. *Byzantium in the seventh century. The transformation of a culture*. Cambridge: Cambridge University Press.

Jacobs, I. 2012. *Aesthetic maintenance of civic space. The 'classical' city from the 4th to the 7th c. AD*. Orientalia Lovaniensia Analecta, Vol. 193. Leuven: Peeters Publishers.

Lavan, L. 2006. Fora and agorai in Mediterranean cities during the 4th and 5th c. AD. In *Social and political life in late antiquity*. Late Antique Archaeology, Vol. 3, ed. W. Bowden, A. Gutteridge, and C. Machado, 195–249. Leiden-Boston: Brill Publishers.

Little, L.K., ed. 2007. *Plague and the end of antiquity. The pandemic of 541–750*. Cambridge: Cambridge University Press.

Mitchell, S. 1995. *Anatolia. Land, men and gods in Asia Minor, volume 2: The rise of the church*. Oxford: Clarendon Press.

Mitchell, S. 2007. *A history of the later Roman empire AD 284–641. The transformation of the ancient world*. Blackwell history of the ancient world. Malden/Oxford: Blackwell Publishing.

Morrison, C., and J.-P. Sodini. 2002. The sixth-century economy. In *The economic history of Byzantium: from the seventh through the fifteenth century*. Dumbarton Oaks Studies, Vol. 39, ed. A.E. Laiou, 171–220. Washington, DC: Dumbarton Oaks.

Mundell Mango, M. 2000. Building and architecture. In *Late antiquity: empire and successors, A.D. 425–600*. The Cambridge Ancient History XIV, ed. A. Cameron, B. Ward-Perkins, and M. Whitby, 918–981. Cambridge: Cambridge University Press.

Mundell Mango, M. 2009. Tracking Byzantine silver and copper metalware, 4th–12th centuries. In *Byzantine trade, 4th–12th centuries. The archaeology of local, regional and international exchange. Papers of the Thirty-eighth Spring Symposium of Byzantine Studies, St. John's College, University of Oxford, March 2004*. Society for the Promotion of Byzantine Studies, Vol. 14, ed. M. Mundell Mango, 221–236. Aldershot: Ashgate.

Pieri, D. 2005. *Le commerce du vin oriental à l'époque byzantine (Ve-VIIe siècle). Le témoignage des amphores en Gaule*. Bibliothèque Archéologique et Historique, Vol. 174. Beyrouth: Institut français du Proche-Orient.

Poblome, J., and N. Firat. 2011. Late Roman D. A matter of open(ing) or closed horizons? In *LRFWI. Late Roman fine wares: solving problems of typology and chronology, volume 1. A review of the evidence, debate and new contexts*. Roman and Late Antique Mediterranean Pottery 1; BAR International series, ed. M.A. Cau, P. Reynolds, and M. Bonifay, 49–55. Oxford: Archeopress.

Roueché, Ch. 2000. Asia Minor and Cyprus. In *Late antiquity: empire and successors, A.D. 425–600*. The Cambridge Ancient History XIV, ed. A. Cameron, B. Ward-Perkins, and M. Whitby, 570–587. Cambridge: Cambridge University Press.

Sodini, J.P. 1997. Habitat de l'Antiquité tardive (2). *Topoi Orient-Occident* 7: 435–577.

Thomson, A. 1993. Die ländlichen Siedlungen. In *Lykische Studien 1. Die Siedlungskammer von Kyaneai*. Asia

L

Minor Studien, Vol. 9, ed. F. Kolb, 39–51. Bonn: Dr. Rudolf Habelt.
Uytterhoeven, I. 2007. Housing in late antiquity: regional perspectives. In *Housing in late antiquity. From palaces to shops*. Late Antique Archaeology 3.2, ed. L. Lavan, L. Özgenel, and A. Sarantis, 65–93. Leiden/Boston: Brill.
Waelkens, M. 1999. Marble. In *Late antiquity. A guide to the postclassical world*. Harvard University Press Reference Library, ed. G.W. Bowersock, P. Brown, and O. Grabar, 559–562. Cambridge, MA: The Belknap Press.
Wickham, C. 2005. *Framing the early Middle Ages. Europe and the Mediterranean, 400–800*. Oxford: Oxford University Press.

Further Reading

Excavation and survey reports of all projects in Turkey since 2004 are available on-line: http://ekitap.kulturturizm.gov.tr/belge/1-63254/arkeoloji.html
http://www.une.edu.au/cat/ offers up-to-date information on archaeological projects currently operating in modern Turkey. With links to project-websites.

Late Antique Egypt, Archaeology of

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Introduction

The archaeological study of late antique Egypt is a relatively recent field of study. Excavations at key settlements such as Alexandria, Antinoopolis, Abu Mina, Berenike, Kellia, Naqlun, Sketis, Tebtunis, Thebes, Sinai, and the oases illustrate the diverse settlements available for analysis. The archaeology of late antique Egypt is significantly impacted by the introduction of both ecclesiastical monumental architecture and monastic settlements. The earliest presence of new architectural forms is evident in the fourth century with churches built in older Roman urban centers and then alongside newly designed monastic settlements. Ostraca and the papyrological corpus in Greek, Coptic, and eventually Arabic provide a rich body of evidence for reading alongside the diverse archaeological record. Methodological choices from the fields of late antique studies, landscape archaeology, and the archaeology of religion contribute to a wide array of interpretations for explaining Egypt's transition from the late Roman Empire to the Islamic caliphate.

Definition and Historical Background

Defining the historical limits for what constitutes late antique Egypt is difficult. The late antique period in the Mediterranean generally signals a transformation or adaption of the classical world to a world shaped by Christian and Islamic theology and the empires led by their respective emperors and caliphs. Late antique studies now have a 40-year history as an accepted field of study, which is, in its very nature, multidisciplinary and interregional. Although linked to the political changes of the Roman and its successor empires, the periodization of late antiquity is intentionally non-imperial and does not favor a particular religious society or culture. Instead, the name evokes a deliberate impression of continuity with the classical Mediterranean world with a focus upon regional variations from Gaul to Asia Minor, to Palestine, and to Egypt. Dates for late antiquity vary depending upon the region.

Egypt in the third century CE was an important province of the Roman Empire. As an agricultural boon for Rome, possession of Egypt afforded a stable food supply and revenue. Political events which usher in late antique Egypt are usually defined by two events tied to Diocletian in 284 CE: first, his division of the Roman Empire into two regions, which permanently secured Egypt's place in the eastern empire, and second, Diocletian's religious persecutions of Christians. The latter event was significant enough for the Egyptian Christians to begin using his accession date as the start of a new Christian calendar Anno Martyrum, Age of the Martyrs. Frequently inscriptions and dipinto in archaeological contexts include this dating.

The archaeological evidence of a third-century legionary shrine within the pharaonic Luxor

Temple shows the importance of Egypt's monumental architecture, especially under Diocletian. The ancient temple was enclosed by a Roman wall and formed the core of a legionary fortress. In 2009, the American Research Center in Egypt (ARCE) finished conservation of the Roman wall paintings, which show Roman senators before the imperial throne. This monument is a rare example of Diocletian's decorative program and illustrates the common practice of adapting existing architecture for new functions. The practice of adaptive reuse will be continued and expanded by monks and Christians in the building of new communities and churches.

The most significant change in the archaeological record of late antique Egypt is the introduction of Christianity with the building of churches, monasteries, and pilgrimage centers. As a social, cultural, and religious institution, Christian monasticism flourished and provided substantial archaeological evidence for new settlements and the expansion of Christianity into abandoned landscapes. The ascetic lifestyle motivated a new Christian demographic to seek unique locations for habitations, as monastics sought to build new urban settings dedicated to ascetic living. Frequently the settlements were located on the borders between arable lands and the sharply rising limestone cliffs that line the agricultural fields along the Nile. Monastics also adopted long deserted pharaonic temples, quarries, and tombs for convenient habitations. The building of churches in ancient pharaonic temples such as the Karnak Temple, Abydos, Luxor Temple, Medinet Habu, and Ramesseum highlights the importance of continued sacrality of older religious monuments. Additionally there is a dramatic increase in monastic settlements and the building of new monumental churches throughout the Nile Valley.

The end of late antique Egypt is frequently tied to the military conquest of the Delta, with the capture of Babylon (modern Cairo) and Alexandria in 641 CE. However, the shift to a fully Arabized territory is not evident until the mid-eighth century. As a result of the long transitional period, late antique Egypt spans to the eighth century. After this period, scholars speak of the post-conquest period. This designator seeks to moderate the presumption of immediate conversion or assimilation to Islam as the caliphates negotiated how to manage a predominately Christian territory.

The challenge in defining the period is evident in many of the published archaeological monographs over the last two centuries. Sites are interchangeably described as late Roman or early Byzantine and later as Coptic or Islamic. These labels frequently evoke different periods or interpretative assumptions about religious populations depending upon one's specialization. To identify artifacts as Coptic, for example, suggests the item is likely Christian, as the name is an etymological derivative of the Arabic and then earlier Greek name for indigenous Egyptians. For the Muslims, Copt or qibt was a convenient designator for Egyptians who were predominately Christian in the seventh century. Coptic also refers to the language that became dominant in the third and fourth centuries. The script is Greek, with the addition of several letters to represent Egyptian letters not found in Greek. For much of late antiquity, Greek and Coptic were used, and in the eighth century, Arabic became prominent.

Archaeology of Late Antique Egypt

The largest and most significant city of late antique Egypt is Alexandria. Located on the Mediterranean coast, equipped with two major harbors, and connected to the Nile via canals, Alexandria was the gem of the Mediterranean world. The Hellenistic city thrived under the Ptolemies and became a site for agricultural commerce, maritime trade, shipbuilding, and an intellectual center for medicine, philosophy, physics, and eventually Christian theology. Its rich heritage with a large Macedonian and Greek population, a large Jewish Diaspora, and a robust international trade with the Western empire and India (via the Red Sea ports) made Alexandria a cosmopolitan city. The architectural character of the city changed by the fourth century with many Christian churches built to rival the hundreds of temples as well as the museum, theater, Serapeum, amphitheater, Pharos lighthouse, and several instructional institutions. The city was the

central aim of Amr ibn al-As in 641 CE when he captured the city from the Byzantine forces for the Islamic caliph Umar.

The archaeological evidence of late antique Egypt is seen in select areas of the modern city, which continues to thrive as the second largest city in Egypt and is its largest maritime center. Since the 1960s, a Polish mission has excavated and conserved a Roman and Byzantine section of Alexandria at the site of Kom el-Dikka. The site includes a series of public and private buildings, which provide a valuable indication of late antique urban settlement. A series of public buildings, primarily in use from the fourth to seventh centuries, include a small theater, a multi-roomed bath complex large cisterns, and sixth-century lecture halls (auditoria). A collection of domestic residences, villas, private baths, and artisan workshops date to the period. The residential sections are understood to have shops on the first floor and then residences on the second storeys. Mosaics and wall paintings, showing Christian iconography, reflect late antique artistic preferences. Elsewhere in the city are several famous catacombs from the Greco-Roman period (Kom el-Shoqafa is one), but few have substantive evidence for late antique use. Salvage archaeology work at Gabbari has recovered Ptolemaic burials, which were reused in the fourth and fifth centuries by Christians. Extensive underwater excavation by the French Center for Alexandrian Studies has recovered primarily Ptolemaic material that was already submerged by the late antique period.

Equally significant is Abu Mina (about 45 km southwest of Alexandria), a vast Christian pilgrimage site in late antique Egypt whose building additions increasingly accommodated visitors. The earliest structure at Abu Mina is the fourth-century tomb of St. Menas, now covered by the Martyr Tomb Church. The central building for the city is the late fifth-century stone Great Basilica, which was built and remodeled twice. The Great Basilica is part of a martyr complex and abuts a later sixth-century tetraconch Martyr Tomb Church of St. Menas, a baptistery, and residences associated with the healing cult of the saint. Several pilgrimage flasks, or ampullae, from Abu Mina bear the image of St. Menas. The flasks are found throughout the Mediterranean world, reflecting the importance of the city for late antique Christian religious tourism. Evidence of the saint's popularity is found throughout Egypt and along the trade routes that conveniently provided transport to the shrine.

After leaving Alexandria, individuals and goods would travel south to the military installation of Babylon (modern Old Cairo). The Roman fort built on the Nile just south of ancient Heliopolis was equipped with quays for easy transfer of goods from the Red Sea and Mediterranean and facilitated the monitoring of movements through Egypt along the Nile and the canal that connected the Nile to the Red Sea. The architecture of the fort, still visible today by the Coptic Museum, in fact dates to the late third century. The fort was abandoned between the seventh and tenth centuries. The building of a new Muslim military camp surpassed Babylon. For the last 80 years, archaeologists have worked to excavate the extensive Muslim city of al-Fustat, founded in the late seventh century and abandoned by the eleventh century. Al-Fustat and Babylon would eventually become the core of Old Cairo.

Babylon directly linked the Nile to the Red Sea ports via canals and desert roads. The ports, in turn, provide evidence for the extensive Egyptian trade networks which connected the Roman Empire to the empires of the Indian Ocean and the East African coast. Berenike, Myos Hormos, and Clysma are the three most important harbor towns for the Roman and Byzantine periods. Strong prevailing north winds made the Suez site of Clysma less suitable for the seasonal transport of goods, which were more commonly found at the southern ports of Myos Hormos and Berenike. Once at port, the imports and exports then moved across the Eastern Desert along to the Nile and then down to Babylon's harbor (Old Cairo). The final leg of the journey led to Alexandria and then the Mediterranean. Demand for Indian goods in the Roman world explains why the port cities were so active during the third through sixth centuries.

Berenike, located on the Red Sea coast, is perhaps the most well-known of the ports from the Ptolemaic and Roman periods. The port

ceased to function by the mid-sixth century and had periods of minimal activity in the fourth century. The rich documentary evidence from middens, ceramics, and archaeobotanical remains testify to Berenike's active role in interregional trade via the Indian Ocean. Beads from East Java, mats from India, peppercorns in Indian-produced ceramics, and cotton textiles provide tangible clues to the multicultural nature of Berenike. Eleven different languages appear in the ostraca, papyri, and inscribed monuments recovered from the port including Tamil-Brahmi, Greek, pre-Islamic South Arabian, Latin, and Palmyrene.

The port served as a gateway between the seafaring community and the desert-road trade routes of Egypt. Artifacts recovered represent a wide range of goods imported from the Indian Ocean trading circles and items exported from the Roman and Byzantine Empire. Peppercorn is perhaps the most significant and largest quantity of Indian imports. Additional food goods from India and Southeast Asia appear in excavation layers including rice, coconuts, mung beans, and amla. By the fourth century, construction patterns included the use of coral, which is more commonly diagnostic of architecture in sites along the East African coast and in the Indian Ocean. Timber from the Mediterranean and India (teak, bamboo, Boswellia, cedar, and fir) indicates the wide realm of contacts for Berenike.

By the middle of the sixth century, residents of Berenike were more desert-road travelers. Their diet had shifted from a diverse selection of fish, pork, and beef to consist solely of sheep and goat. The material remains also reflect the diminishing importance of the port, which excavators attribute to a variety of factors including the silting up of the harbor, a plague in the mid-sixth century, and more efficient transport further north along the Red Sea coast, such as Clysma with its canal.

Myos Hormos is a port located north of Berenike and near the modern city of Quseir. The earliest evidence of settlement is Roman, although its occupation does not extend beyond the third century. The settlement shares many similarities with Berenike in being a multicultural port with several languages in use and the presence of teak from India. However, the site was substantially smaller than Berenike, and excavators believe that the more favorable winds to the south made Berenike preferable for docking than at Myos Hormos.

Clysma (known also as Cleopatris/Arsinoë and later Qolzoum) emerged as the most important port on the Red Sea by the end of the late antique period, supplanting Berenike and Myos Hormos. Its location near modern Suez reflects the importance of this pathway as a more efficient route from the Red Sea to the Mediterranean by way of a canal connected to Babylon. Clysma was first excavated in the 1930s and now a new project is using satellite images, topographical mapping, and sedimentological analysis to document the extant remains of the ancient port.

Several cities throughout the Nile Valley point to the stable economy of late antique Egypt. The site of Hermopolis Magna in Middle Egypt typifies the process of Christianization of a major urban city. The city reflects both Greek and Egyptian religious temple complexes, and by the mid-fifth century, Hermopolis Magna hosted one of the largest Christian basilicas in Egypt with a circular apse, tombs of bishops, and a baptistery. Late antique houses and middens are found throughout the site. Across the river from Hermopolis Magna is Antinoopolis, an ancient site rebuilt by Hadrian in the second century. The site was selected by Diocletian to be a district capital for the Thebaid and held garrison troops. Italian excavations, active since the 1960s, have identified several late antique burials and several churches. Some monastic residences were built in and around the city for apparently distinct female and male communities. Literary evidence highlights the city as an important center for the veneration of Sts. Claudius and Colluthus. A nearby southern suburb called Ansina contains a significant late antique community. Dating from the fifth to eighth century, the site contains impressive mud brick walls preserved to over 8 m, churches, chapels, a tower, and several residences. The site was recently surveyed and mapped by a British team to establish a record of this architectural rich and unexamined late antique city.

Further north along the Nile, the site of Oxyrhynchus, 180 km south of Cairo, is known

primarily for the late nineteenth-century recovery of the largest collection of Ptolemaic, Roman, and Byzantine papyri. The site was a prominent city in late antiquity with a bishopric and several monasteries. British and Italian excavations recovered parts of the city with the largest theater in Egypt, cemeteries, and several examples of late antique sculpture. Excavations are ongoing but are overshadowed by the still ongoing analysis of the vast and rich documentary corpus written in Greek, Latin, Coptic, Arabic, and Persian. The texts cover almost every spectrum of society such as private sales, loans, private letters, and religious texts both for Greco-Roman and Christian traditions, plays, and imperial correspondence.

Kharga and Dakhla are the two central oases of Egypt's Western Desert. Both show signs of importance in the late Roman period, although their importance as urban centers diminished in late antiquity. Bagawat cemetery is in the northern region of Kharga Oasis and provides several examples of Christian burials with painted tomb chapels with scenes from the Old and New Testament, lives of saints, and lives of Paul and Thecla. A monastic site at Deir Mustafa Kashef includes the modification of a rock-cut tomb, a church, areas for visitors, and monastic quarters. An Australian mission recently surveyed the site and excavations will begin soon.

To the west of Kharga is Dakhla Oasis. Several excavations since the 1980s by Australian, American, and Egyptian teams have recovered the urban and monastic settlements of this oasis. Signs of late antique occupation appear at Ain el-Gadida, Deir Abu Metta, the cemetery at El-Muzawwaka, Kellis, and Amheida. Kellis was a significant Roman city. Excavations testify to the presence of churches, a nymphaeum, a bath house, domestic quarter with multi-roomed houses, and cemeteries. Textual evidence on papyrus and wood and written in Greek, Coptic, and Syriac describe religious and private life within the city. Much of the evidence illuminates the Manichean community at Kellis. To the west is the late antique site of Amheida, currently under excavation by an American team. The discovery of a fourth century villa of Serenus preserves several wall paintings which provide evidence of secular iconography involving geometric and figural representations.

Monastic Settlements

While early monastic literature highlights the importance of physical isolation from non-monastic communities in the desert, the archaeological evidence points to several diverse locations for monasteries. Some communities elected to live along the edges of the Nile or in desert cliffs, which made the settlements quite visible and known to local communities. Some settlements were impressively purpose-built environments with their own unique architecture and site planning. More moderate settlements were made from modifications of quarries, ancient tombs, or natural caves nestled in the sharply rising cliffs which demarcate the Nile Valley. Other monks resided in areas that were far more difficult to reach or see; thereby their settlements reflected a greater desire to embrace a life of relative isolation. These settlements are often modifications of naturally forming caves in the wadis of the high desert or near trade routes. The documentary evidence from ostraca and papyri illustrates that the affinity for isolation espoused in the literary sources was not evident in daily living. The majority of monasteries in Egypt were agents of connectivity between local communities and elites in late antiquity.

The early twentieth century began with the unanticipated discoveries of two large monastic settlements which provided the basis for all initial studies into early monastic visual culture. The Monastery of Jeremias, for example, was built in the valley just south of the Step Pyramid at Saqqara. Excavated by the British Egypt Exploration Fund in the early twentieth century, the site provided a rich array of material evidence in stone of Coptic art which is now in the Coptic Museum in Cairo. The site was first occupied in the fifth or sixth century when monastics began a massive building campaign to construct three elaborate stone and mud brick churches, adjoining refectories, residences, chapels, a hospital, and a series of rooms for monks and pilgrims. At its height, the community supported communities for men and possibly women. Despite its close proximity to

pharaonic tombs and mortuary structures, the monks did not occupy the abandoned buildings of the Old Kingdom but chose to build their own spaces constructed from materials gleaned from the surrounding area (both stone and mud bricks). Many of the cells contain monastic paintings which show a range of Christian iconographic themes: monastic saints, angels holding holy bread, galaktotrophousa lactans (Virgin Mary nursing Jesus), Abraham's sacrifice of Isaac, and Christ in Majesty.

In Middle Egypt is the site of Bawit, which was excavated in the early twentieth century by the French Institute of Archaeology in Cairo. Excavations revealed a complex settlement known as the Monastery of Apa Apollo. The site produced an unprecedented amount of late antique material to compare with the monastery at Saqqara. Additionally, papyri and ostraca recovered from Bawit document a monastic community with economic ties to a variety of smaller monastic settlements and neighboring cities. Recent French excavations and geophysical prospection have explored the massive site further. Results of geophysical survey document a densely occupied 40-ha settlement. Limestone sculpture, monastic paintings, carved wood, bone artifacts, and archaeobotanical evidence all contribute to the reassessment of this important late antique monastery. The domestic spaces may have served as oratories or as commemorative chapels for particular individuals. Many contained monastic paintings with images of Christ in Majesty, Mary flanked by Apostles, saints, monks, and representations of flora and fauna. The communities of Bawit and Saqqara therefore provided the foundation for the field of early Byzantine art in Egypt until the development of the field of late antiquity in the 1970s.

Monks frequently redesigned and adapted quarries and tombs for habitation. Several sites throughout Egypt contain evidence of Christian occupation such as Sheikh Said, Der el Dik, Abydos, and Amarna in Middle Egypt; Abu Darag by the Red Sea; and Hagr Edfu in Upper Egypt. Ancient pharaonic tombs provided convenient, multi-roomed, spaces that could be easily modified for habitation. At Beni Hasan, Helwan, Wadi Sarga, Aswan, and the numerous tombs of the Theban area, monks often used a tomb as a foundation for a new settlement and then built out from the opening into the terraces with mud brick and timber additions. The occupants Christianized the residence with white plaster upon which they painted crosses, added multicolored Christian iconographic programs, and inscribed their Coptic prayers. Many sites contain ostraca in Coptic and late antique ceramic assemblages and, more rarely, monastic burials.

The most well-known example of the late antique adaptive reuse pattern is found in Thebes in the western hills. The Monastery of Epiphanius, a small sixth- and seventh-century residence, was excavated in the 1920s by the Metropolitan Museum of Art. The site typifies the extension of a monastery from a Middle Kingdom tomb onto the flat terrace of the surrounding cliffs, and excavations produced a collection of ostraca and papyri. Like many other modified tomb residences, the occupation does not usually span beyond a century of use. In addition to these examples of modest settlements, several sites included purpose-built structures specifically for monastic living. The sites were also large enough to be considered villages and rival the size of some smaller cities. The sites shared common features such as churches, domestic quarters, storage, wells, kitchens, areas of production, cemeteries, refectories, and housing for visitors.

Archaeological investigation into monastic sites resumed after a nearly 60-year hiatus with work at two of the most well-known monastic sites from Christian literature: Kellia and Scetis. The Apophthegmata Patrum, known as the Sayings of the Desert Fathers, recounts the deeds, sayings, and history of the first Egyptian monastics who were later used as inspirations for European monastic communities. Kellia, Scetis, and Nitria were often linked together in the didactic and hagiographic stories. While Nitria's exact location is still uncertain, Kellia and Scetis were definitively found in the deserts of the northwest Delta. Kellia, known as the Cells, consists of seventeen discrete areas or mounds of which five areas show a higher percentage of occupation than the others. Beginning in 1964, several decades of excavations by French, Swiss, and Egyptian

teams have documented the extensive settlements at Kellia with at least 1,500 buildings. None of the settlement was walled and no central church has been identified, although several structures clearly functioned as churches, chapels, martyrium, and oratories. The buildings consist of a range of forms from two-roomed private residences for a solitary monk to 50-roomed buildings which could house over a dozen monks. The earliest structures do not date before the fifth century and the latest occupation is in the eighth century.

Although Kellia was eventually abandoned, Scetis has had a continuous monastic presence since its first occupation in the fourth century. Excavations at and near the four contemporary monasteries (Deir Anba Maqar, Deir Anba Bishoi, Deir al-Suryan, and Deir el-Baramous) and in between these sites illustrate that settlements originally began as unwalled residences. The monastic communities dot a low-laying wadi valley marked by several large natron lakes. With similar residential designs to Kellia, Scetis had hundreds of multi-roomed buildings that were scattered throughout the desert and clustered together as if to form small villages. It was only later, after a decline in numbers, raids from desert inhabitants, and environmental factors, that these communities diminished and were enclosed by a single wall so that by the medieval period, probably in the tenth and eleventh centuries, the four remaining monasteries resembled fortresses. The height of monastic occupation seems to be between the seventh and tenth centuries. On the northern end of Wadi Natrun, a Dutch excavation at Deir el-Baramous points to a late fourth-century founding of a community with a church, monastic residences, and kitchen facilities for feeding residents and guests. It was later abandoned in the fourteenth century. At the opposite end of the natron lakes, Deir Anba Maqar is currently a walled monastery. However, recent survey work illustrates that it sits amidst a densely pocketed settlement with several buildings without defensive walls. Finally, a third site is the Monastery of John the Little (John Kolobos) which an American team is excavating and surveying. The map of the site shows over 80 residences with one being comparable in size to the existing Deir al-Suryan. Excavations include evidence of tenth- and eleventh-century monastic life with visually rich monastic paintings and dated painted inscriptions in the tenth century.

Late antique monastic settlements did not follow a standard site plan, but they do reflect a sensitivity to the environment and natural landscape in settlement design. In the Fayyum, for example, the monastic community at Naqlun is the best representative of a late antique settlement for this semi-oasis area. The settlement is 100 km south of Cairo and roughly 25 km west of the Nile. Under excavation by a Polish team since 1986, Naqlun is a settlement with two distinct components with rich archaeological material for monasticism. One region is the shale and limestone cliffs. Here the monastic community used the natural topography and geological features to construct 90 independent residences. Some residences were modest with four rooms extending from an open courtyard closed by a thin mud brick wall. Other residences included 18–19 rooms. Each seems to have enough space for housing two individuals. Habitation begins in the late fifth century, with new construction in the sixth century and after the seventh century. Occupation of the residences diminished after the post-conquest period, with only sparse evidence of Arabic inscriptions or pottery. The second area of the settlement, at the foot of the cliffs, dates to the end of the fifth and early sixth century. The plateau hosts a central church, several ecclesiastical buildings, a late antique cemetery, and a few remote residences. The burial shrouds from the cemetery indicate that the lay community used the cemetery, but not the monks. The documentary evidence from the residences indicates that the lay community visited the site regularly for medical and religious purposes.

A second settlement provides a unique example of variation. At the site of Esna, south of Thebes, a French excavation team discovered fifteen semisubterranean monastic dwellings in the 1960s. Esna is the only known example of a moderate-sized community that chose this style of building. The buildings are accessed by a staircase which leads down to a sunken open-air courtyard. Doorways were protected by short mud

brick walls, which likely functioned as sand barriers. A series of sleeping quarters, oratories, and kitchens extend from around this natural atrium. The oratories in particular show significant signs of religious activity with numerous inscribed and painted crosses, petitions, and Christian iconography. The site was relatively short-lived when compared with the great monastic centers at Kellia, Scetis, Saqqara, and Bawit. Based upon ceramic and epigraphic evidence, the excavators concluded the site was established early in the fifth century and later abandoned by the middle of the seventh century without any sign of destruction, either natural or man-made.

Just north of Esna is the ancient center of Thebes, home to the mortuary tombs and temples of the pharaohs. The late antique settlements in this region represent the density of monastic settlements and their close proximity to lay communities, such as the town of Djeme, which was built directly within the walled temple of Medinet Habu. Textual and artifactual evidence illustrate a successful town in the late antique and early Islamic periods. The community had a large church built directly into the colonnaded court of Ramesses III. French, German, American, and Polish excavations in the last decades are producing remarkable evidence for late antique Thebes. Hundreds of monks resided in the monasteries such as the Monastery of St. Phoibammon, Deir el-Roumi, Deir el-Medina, Deir el-Bachit, Deir el-Bahri, and Gurnet Marai. Surveys currently in the Valley of the Queens and in the wadis into the Western Desert by French archaeologists show that the occupation is far higher than once thought. Monks remodeled tombs, built on escarpments, and located themselves in a variety of remote and very visible locations. The sites include invaluable ostraca documenting monastic life, lease of cells, religious life, and economic activities with local communities. Monastic burials at Qurnet Marai, Deir el-Medina, and the Monastery of Epiphanius, for example, include men wrapped in linens and then clothed with leather aprons and leather hoods. Based upon ceramic, epigraphic, and artifactual evidence, the town of Djeme and many of the associated monastic communities were abandoned by 800 CE.

Finally, the most recent work at two monasteries in Atripe, modern Sohag, represents the importance of continued efforts to document and preserve late antique Egypt. The area was known in the fifth century as part of the large monastic White Monastery Federation led by a prolific author St. Shenoute. Over 3,000 pages of his writings to his community and to laity preserve the largest collection by a single author from late antiquity. Written in Coptic, Shenoute's writings touch on aspects of monastic living for men and women, how to host refugees, conflicts between monastic authority and urban elites, and religious life in the fifth century. Two central areas of his community still exist: the Monastery of St. Shenoute, known today as the White Monastery, and the Church of Saints Bishai and Bigol, known now as the Red Monastery.

Today the White Monastery includes the famous fifth-century church, which is one of the best preserved late antique Christian monuments and is still in use. Built of dressed limestone blocks, it includes a triconch apse and figural paintings. Its exterior bears similarities to ancient pharaonic temples. Several components of the site were excavated in the 1980s by an Egyptian team, but not published. An international team headed now by American directors has worked since 2005 to document the church and to record the surrounding archaeological remains of the monastic settlement which includes storerooms, a cistern, a refectory, public toilets, domestic quarters, kilns, and a cemetery. Recently the American team discovered a tomb chapel that they now identify as the tomb of St. Shenoute. The cliffs to the west show some indication of monastic occupation, but not substantial.

To the north is the Red Monastery, which is part of an ongoing American project to conserve and study the largest painted program from the late antique world. Over 80% of the existing church of the Red Monastery still preserves late antique paintings. Sculptural pieces also accentuate the uniqueness of this monument whose conservation by a team of Italian specialists demonstrates that Upper Egypt monastic sites had high-quality late antique art. A multidisciplinary publication of the paintings,

inscriptions, and the architectural history will significantly restructure conversations about late antique Egypt, how scholars regard monastic art, and the importance of the sites for understanding Christian iconography more broadly.

Cross-References

- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Papyrology in the Greco-Roman World

Further Reading

Alston, R. 2002. *The city in Roman and byzantine Egypt*. London: Routledge.

Atiya, A. 1991. *The Coptic encyclopedia*. New York: Macmillan.

Bagnall, R.S. 1993. *Egypt in late antiquity*. Princeton: Princeton University Press.

Bagnall, R.S. 2001. Archaeological work on Hellenistic and Roman Egypt, 1995–2000. *American Journal of Archaeology* 105: 227–243.

Bagnall, R.S., and D. Rathbone. 2004. *Egypt from Alexander to the early Christians: An archaeological and historical guide*. Los Angeles: Getty Publications.

Blue, L., and D. Peacock, eds. 2006. *Myos Hormos – Quseir al-Quadim: Roman and Islamic ports on the Red Sea*. Oxford: Oxbow Books.

Brooks Hedstrom, D.L. 2007. Divine architects: Designing the monastic dwelling place. In *Egypt in the Byzantine world, 300–700*, ed. R. Bagnall, 368–389. Cambridge: Cambridge University Press.

Cappozzo, M. 2007. *Il Cristianesimo nel Medio Egitto*. Todi: Tau Editrice.

Dijkstra, J.H.F. 2008. *Philae and the end of Ancient Egyptian religion. A regional study of religious transformation (298–642 CE)*. Leuven: Peeters.

Ghica, V., S. Marchand, and A. Marangou. 2008. Les ermitages d'Abu Darag revisité. *Bulletin de l'Institut Français d'Archéologie Orientale* 108: 115–163.

Grossmann, P. 2002. *Christliche Architektur in Ägypten*. Leiden: Brill.

Haas, C. 1997. *Alexandria in late antiquity: Topography and social conflict*. Baltimore: Johns Hopkins University Press.

Lavan, L., and W. Bowden, eds. 2003. *Theory and practice in late antique archaeology*. Leiden: Brill.

McKenzie, J. 2007. *The architecture of Alexandria and Egypt c. 300 BC to AD 700*. New Haven: Yale.

Sheehan, P. 2010. *Babylon of Egypt: The archaeology of old Cairo and the origins of the city*. Cairo: The American University of Cairo Press.

Sidebotham, S. 2011. *Berenike and the ancient maritime spice route*. Berkeley: University of California Press.

Sidebotham, S., et al. 2008. *The red land: The illustrated archaeology of Egypt's eastern desert*. Cairo: The American University of Cairo Press.

Török, L. 2005. *Transfigurations of Hellenism: Aspects of late antique art in Egypt AD 250–700*. Leiden: Brill.

Wipszycka, E. 2009. *Moines et communautés monastiques en Égypte (IVe-VIII siècles)*. Varsovie: Journal of Juristic Papyrology.

Latin America: Indigenous Peoples' Rights

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Introduction

The current indigenous population in Latin America has been estimated between 40 and 50 million, representing about 10% of the total population of the region, although these figures are not always reliable given the disparity of criteria used in each country to conduct indigenous censuses. This population includes bands of Amazonian hunter-gatherers, peasant societies, particularly in the Andes and Mesoamerica, and those who live in urban centers. Within the framework of an intense process of ethnic revitalization, 826 indigenous peoples have been counted, and it is estimated that there are another 200 who live in voluntary isolation. Some of them show remarkable demographic fragility and social and cultural vulnerability (Del Pópolo 2017).

Definitions

"Indigenous peoples" have been defined as indigenous communities, peoples, and nations which, having a historical continuity with the pre-invader and pre-colonial societies that took place in

their territories, are considered distinct from other sectors of the societies that now prevail in those territories or parts of them. They currently constitute non-dominant sectors of society and are determined to preserve, develop and transmit to their future generations their ancestral territories and their ethnic identity as the basis of their continuity as a people, in accordance with their own cultural patterns, their social institutions and their legal systems (Martínez Cobo 1986).

The cultural heritage of indigenous peoples is a holistic and intergenerational concept based on common material and spiritual values. It includes tangible and intangible manifestations of their ways of life, accomplishments, and creativity and should be considered an expression of their self-determination and their spiritual and physical relations with their lands, territories, and resources. It consists of all objects, sites, plants and animal species, customs and practices, expressions, beliefs, and knowledge, whose nature or use has been transmitted from generation to generation and which are considered to be characteristic of a particular town or its territory (see Opinion No. 8 (2015) of the Expert Mechanism – A/HRC/30/53).

In recent decades, indigenous peoples' rights have been widely recognized internationally. In this section particular reference will be made to cultural rights, especially the right to cultural heritage access, which has been recognized by international human rights standards and includes the right to participate in cultural life, the right to enjoy their own culture, and the right to self-determination in relation to their own cultural heritage.

The protection of indigenous peoples' cultural rights generates the challenge of contemplating the collective rights, connected to their own identity as peoples and to developing their culture (Pact of San José de Costa Rica). In this regard, the recognition made in the United Nations Declaration on the Rights of Indigenous Peoples deserves to be highlighted by establishing that they have the right to "maintain, control, protect and develop . . . their traditional knowledge . . . and the manifestations of their sciences, technologies and cultures . . ." and "maintain, control, protect and develop their intellectual property of . . . their traditional knowledge . . ." (Art. 31).

However, the protection of traditional knowledge at the international level undergoes a series of shortcomings linked to the lack of a clear and thorough definition, the determination of what traditional knowledge is to be protected and with what legal mechanisms.

Traditional knowledge is understood as all knowledge, creation, innovation, or cultural expression owned by indigenous or local communities and transmitted from generation to generation. Although there is no shared and accepted definition of "traditional knowledge" in the various international instruments, reference has been made to related concepts such as:

(a) The knowledge, innovations, and practices of indigenous and local communities incorporated into traditional lifestyles relevant for the conservation and sustainable use of biological diversity
(b) Relevant traditional knowledge of plant genetic resources for food and agriculture
(c) Cultural heritage, traditional knowledge, traditional cultural expressions, and manifestations of sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of fauna and flora properties, oral traditions, literatures, designs, traditional sports and games, and visual and performing arts (OMPI 2008)

Historical Background

During the second half of the nineteenth century and the beginning of the twentieth century, the new Latin American nations consolidated their dominion over their territories, given the need to have large land areas to be used in economic production, in accordance with the agro-export economic model that was imposed on the region (Halperín Donghi 1989: 309–312). Consequently, they implemented systematic political practices of land dispossession of territories that belonged to indigenous groups and even indigenous

extermination. The incorporated lands were, in some cases, usufruct of the State and sold freely, in others, divided into small units and granted to their owners, dissolving the community property system.

Indigenous communities ceased to be considered "indigenous towns" with a special legal system as they were during the Spanish colonial period, to become part of the national citizenship, although in some cases they did not enjoy full rights but instead were considered incapable of rights and, therefore, subjected to the tutelage of the State. In practice, these normative reforms deprived indigenous groups of their ethnic identity and their rights to ancestral property to community lands and far from improving their living conditions generated greater social, cultural, and economic exclusion. In some countries with a significant native population, the distinction between mestizos and Indians resulted in strong social and political differentiation, as well as discriminatory situations to the detriment of the latter.

Positivism and social Darwinism had during those times a marked influence on the Spanish-American intellectual elites and served as a justification for national policies. This racist ideology considered indigenous peoples an obstacle against progress and civilization (Politis 1995). The antiquity and richness of their past was denied, the absence of cultural continuity between contemporary and past indigenous people was assumed, and therefore pre-European history was appropriated by the State as well as their material culture (Macera 2000; Gnecco and Ayala Rocabado 2010).

During this period, several Latin American countries enacted their first archaeological heritage laws, establishing the public domain of the State over these goods, even if they were in private lands (e.g., Mexican Law of 1897, Argentine Law 9080 of 1913, Peruvian Law 6634 of 1929, Colombian Law 103 of 1931, etc.).

The emphasis on "national history" in schools and museums was used as a state policy to strengthen a national identity model based on the idea of a homogeneous culture or melting pot, denying any ethnic differentiation that could generate geographical fragmentation. In this sense it can be stated that in many Latin American countries, a real cultural genocide was carried out (Gnecco and Ayala Rocabado 2010).

As a result of all these policies, some descendants internalized the "stigma of being an Indian" and tried to deny their condition, others resisted the impossibility of obtaining fair treatment, which generated, in some cases, violent situations.

On the other hand, the study of the human remains and the material culture of the indigenous peoples became a matter of scientific interest, since they were considered relicts of past cultures and, consequently, they had to be collected before their disappearance, seen as inevitable. Natural history and ethnography museums were created for their custody and exhibition, following the model of European museums and the Smithsonian Institute of the USA.

In the first decades of the twentieth century, racist ideologies were overtaken by different movements that occurred alternately in different Latin American countries, such as *Indigenismo*, socialism, Hispanicism, and nationalism. The idea of race was gradually replaced by that of class or social group (Helg 1990: 38). Each of these movements exerted its influence on the heritage management policies of each country.

The *Indigenista* movement was promoted by intellectuals and had a significant boost in countries like Mexico and Peru, contributing to the construction of a national history that had its roots in the imperial pre-Hispanic past (i.e., Aztec, Inka). An important milestone of the indigenous movement was the celebration of the Pátzcuaro Conference in 1940 that gave rise to the creation of the Inter-American Indian Institute. However, Indigenist discourse had no major consequences in practice, in the sense that it failed to improve the living conditions of rural indigenous populations in those countries (Patterson 1995: 84).

On the contrary, countries such as Argentina, Chile, and Uruguay built a national history rooted in traditional Hispanic and Catholic history, denying all indigenous influence or other possible influence (such as that of Afro-descendants or that of Portuguese or Brazilians in Uruguay) (Politis 1992). In the case of Brazil, the policy

of denial of indigenous peoples remained unchanged until the late 1930s, when they began to receive greater attention from the State, some scholars and intellectuals (Endere et al. 2010).

However, all countries showed interest in controlling pre-Hispanic sites as part of the national heritage. The laws of national monuments were popular in all countries, as well as the creation of institutes for their research and/or management (National Institute of Anthropology and History of Mexico, 1939; the National Ethnological Institute of Colombia, 1941; the National Institute of the Tradition of Argentina, 1943; National Institute of Culture of Peru, 1971; etc.).

In the last decades of the twentieth century, especially after the restoration of democracy in the region, a social and political movement generated by a multiplicity of indigenous organizations of different levels was consolidated throughout Latin America. At first, their demands focused on historical claims, affirming their existence, as well as their pre-existence to National States. Then the claims focused on more specific issues, connected with the possession and ownership of the land and the improvement of livelihood and living conditions.

The emergence of indigenous peoples as new political actors, favored by an international context more attentive to their claims, has allowed them to change their relationship with the States, and, little by little, they were gaining recognition in the legal sphere. The claims and the new positive discrimination policies that were enacted at least in some countries were forging emerging identities. In this context, the new Indigenist discourse is more elaborate since it is the product of the formation of an elite of indigenous youngsters with academic training. This discourse was gradually putting more emphasis on ideological issues (Stavenhagen 2004).

The Current Debate

The recognition of the rights of indigenous peoples has been present in the political agenda of Latin America since the 1980s, although this was not always reflected on the supreme norms of the countries of the region.

Latin American constitutions can be divided into three groups, following Barié's analysis (2003: 87). The first group, composed of the constitutions of Belize, Chile, French Guiana, Suriname, and Uruguay, are characterized by making no reference to the native peoples, either because their legal traditions are essentially Anglo-Saxon or because they have not had substantial reforms in the last years. A second set of constitutions, formed by those of Costa Rica, El Salvador, Guyana, and Honduras, grants some specific protection to their ethnic minorities but "within an incomplete or poorly articulated legal framework." The third group includes the constitutions of Argentina, Bolivia, Brazil, Colombia, Ecuador, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, and Venezuela and makes an encompassing recognition of indigenous rights, as a result of reforms made since the middle of the 1980s.

In the case of Chile, the indigenous movement has strengthened in recent decades and has been gaining recognition in both political and academic fields. The result of this is the approval of the Indigenous Law 19,253 in 1993, and recently a draft constitutional reform bill was presented to the Congress in which the existence of indigenous peoples in their territory is recognized.

Uruguay has started a process of recognition of the current indigenous population through the approval of Law 18,589 which declares April 11 as "Day of the *Charrúa* Nation and Indigenous Identity." The Council of the *Charrúa* Nation was also formed, an indigenous organization of national character that fights for the vindication of their rights and the ratification of ILO Convention 169.

In Belize, Costa Rica, El Salvador, Guyana, French Guiana, Honduras, and Suriname, the indigenous population has poor visibility, and their groupings are relatively recent; the indigenous issue in general has been poorly studied and debated.

The rest of the Latin American countries have declared themselves as multicultural nationals, explicitly recognizing the pre-existence of

indigenous peoples and granting them a set of rights, including cultural rights (Harvey 2008).

The Present Situation

Most of the countries in the region, particularly those identified with the third group, have issued indigenous laws in which they grant legal recognition to indigenous communities or peoples and operationalize some rights recognized in the constitutions. However, these rules do not always include particular aspects of indigenous culture such as those connected with their cultural heritage. In general, archaeological heritage is still regulated by specific rules that do not usually mention indigenous peoples or do so vaguely, so their rights to participate in management are usually not effective in practice.

On the other hand, the native peoples are mainly focused in recovering their ancestral territories or gain ownership of the lands they occupy, the preservation of the environment in the areas where they live, and the improvement of their socioeconomic conditions, often pressing their governments to comply with the provisions of indigenous laws. Conflicts between indigenous organizations, government authorities of different levels, and mining and timber companies or responsible for tree-clearing or other productive activities are present throughout the region, and in some cases they have characteristics of high and growing potential for social conflict.

However, the situation of the indigenous population varies significantly in each country. While in some of them they constitute a minority with little political power, in countries like Peru, Bolivia, or Ecuador, they constitute the majority of the population and have occasionally gained political influence. However, the ethnic emergency process is strong throughout the region. In recent years, there has been a growing political participation, a strengthening of their own institutions, and the formation of new regional and international alliances for the fight of their rights (e.g., the caucus and the *Abya Yala* Indigenous Forum that influenced the definition of the 2030 Agenda for Sustainable Development) (CEPAL 2018; Del Pópolo 2017).

The voices of actors, previously invisible, who have begun to attract attention within their communities and in society in general, are added to theirs. This is the case of indigenous women, who perform significant functions within their communities, especially in the transmission of knowledge, as well as in cultural and ceremonial events.

In general, the interest of indigenous communities in cultural heritage issues is of the second order of priority for indigenous populations in the region. This interest has focused on the dispute over the control of the historical narrative exercised by archaeology and in some countries, on their ancestors' human remains; yet, their participation in the management of archaeological sites is still exceptional. There are records of some cases in which they have resisted archaeological excavations in places they consider sacred.

The claims for the restitution of human remains' that are kept in museums have been particularly significant in Argentina and Uruguay due to the social and political impact. There, the first restitution cases of the remains of indigenous chiefs who had a renowned historical trajectory were recorded (e.g., Chief Inakayal restituted in 1994 and Chief Mariano Rosas returned in 2001 in Argentina, and Chief Vaimaca Pirú given back to Uruguay by France in 2003). In addition, Argentina has a general repatriation law that recognizes the right of the communities of belonging to claim the repatriation of human remains found in museums and the requirement that any scientific undertaking that aims at indigenous cultural heritage be carried out with the prior consent of the affected community (Law 25.517, Art. 1 and 3) (Endere and Ayala 2012).

All in all, the divorce between political discourse and practice and the lack of coherence between indigenous laws and heritage norms have made indigenous participation in heritage management generally impracticable. Besides, the academic isolation of a large part of archaeologists and researchers in general and the lack of unity and coherence among the indigenous groups have prevented them from unifying their

discourse on the matter. Despite recent changes in the standards of professional ethics and periodic meetings to discuss the ethical implications of the work of archaeologists and bioanthropologists, they have put these countries' academic communities in motion to positions more open to dialogue and more willing to adapt their work methodologies to make them compatible with the respect of the rights of indigenous peoples to their cultural heritage.

International Perspective

In the second half of the twentieth century, when the decolonization process had already been consolidated in the world and the United Nations Universal Declaration of the Rights of Man (UN) was in force, there began a process of recognition of the rights of Indigenous peoples whose first milestone was the adoption by the International Labour Organization (ILO) of Convention 107 on Indigenous and Tribal Populations in 1957. Another important milestone was the publication of a study by the rapporteur José Martínez Cobo on discrimination against indigenous populations in 1986, while the presence of indigenous organizations in all international spheres where these issues were discussed was intensified (Barié 2003).

In international law, the issue of ethnic minorities has generally been addressed from the point of view of individual human rights (e.g., the Universal Declaration of Human Rights (1948), the International Covenant on Civil and Political Rights, the International Covenant on Economic, Social and Cultural Rights 1976, etc.). The most significant legal instruments regarding indigenous rights are the Convention for the Prevention and Punishment of the Crime of Genocide (1948), the International Convention on the Elimination of All Forms of Racial Discrimination (1965), Convention 169 (1989), the American Declaration on the Rights of Indigenous Peoples (1997), and the Declaration on the Rights of Indigenous Populations (2007).

Regarding human rights in Latin America, it is worth noticing the approval of the American Declaration of the Rights and Duties of Man (Bogotá, 1948) and the Protocol of San Salvador on Economic, Social and Cultural Rights in 1988, in addition to the American Convention on Human Rights, known as the San José de Costa Rica Pact of 1969, which constitutes the fundamental human rights charter of the American continent. In addition, many of the countries in the region signed the International Covenants on Civil and Political Rights and Economic, Social and Cultural Rights (Harvey 2008).

ILO Convention 169 had an unquestionable impact in the region because of its binding nature and because it advances on key issues such as the right "to participate in the formulation, implementation and evaluation of national and regional development plans and programs that can directly affect them" (Section 7, Sub. 1). It also establishes that the social, cultural, religious, and spiritual values and practices of these peoples must be respected (Section 5). At present, this agreement has been ratified by all Latin American countries with the exception of Belize, Panama, Uruguay, Guyana, French Guiana, El Salvador, and Suriname. Even those who have not ratified it have taken it into account when reforming their constitutions or sanctioning some specific rules.

The ethnic issue became important in the debates of the UN in the last two decades. The result was the Declaration on the Rights of People belonging to National or Ethnic, Religious and Linguistic Minorities approved in 1992 and the approval of the Declaration on the Rights of Indigenous Peoples in 2007.

It should be noted that the declarations approved by a resolution of the UN General Assembly can only have the character of recommendations and do not constitute binding norms. However, the dominant opinion in the doctrine affirms the obligatory nature of Human Rights Declarations indirectly, based on the fact that the rights recognized in them represent "general principles of the law of civilized nations" (one of the sources of international law recognized by the Statute of the International Court of Justice, Art. 38.1). The 2007 declaration has been repeatedly cited by the Inter-American Court of Human Rights as the basis for its decisions

(e.g., Pueblo Saramaka vs. Suriname case-CIDH judicial sentence 11/28/2007, Series CN ° 172), implicitly recognizing the principles of international law contained in it (Rodríguez-Piñero Royo 2010: 351).

The Declaration on the Rights of Indigenous Peoples of 2007 fully recognizes and guarantees the human rights of these peoples, placing them as political subjects at an international level and filling one of the great legal voids in international human rights law (Montes and Torres Cisneros 2010: 149).

In matters of indigenous cultural heritage, it recognizes the right to control its movable and immovable heritage; the right to the restoration of its cultural, intellectual, religious, and spiritual property (Art. 11); the right to repatriation of their human remains or ceremonial objects (Art. 12); and the right to protect their intellectual property over their cultural heritage, traditional knowledge, and traditional cultural expressions (Art. 31).

After a decade that this declaration was issued, the idea that it has generated a positive impact on the domestic legal system of the countries is recognized. It also highlights the importance of the jurisprudence of the Inter-American Court of Human Rights in the interpretation of the scope of the rights that it recognizes.

In 2016, the OAS approved the American Declaration on the Rights of Indigenous Peoples. It is the first instrument of this organization that deals with the protection of these peoples. There is a broad, complete, and exhaustive list of rights, including self-identification, self-determination and autonomy, as well as belonging to one or more indigenous peoples. Collective rights are incorporated as peoples, gender equality, and the right of indigenous peoples in voluntary isolation "to remain in that condition and to live freely and according to their cultures."

In addition, the right to "their cultural, tangible and intangible heritage, including the historical and ancestral, as well as the protection, preservation, maintenance and development of such cultural heritage for their collective continuity and that of their members, and to pass it on to future generations" (Art. XIII. 1) was recognized. It is stipulated that "States shall provide reparation through effective mechanisms, which may include restitution, established jointly with indigenous peoples, in respect of cultural, intellectual, religious and spiritual goods that they have been deprived without their free, prior and informed consent or in violation of their laws, traditions and customs" (Art. XIII. 2). The "right to preserve, protect and access their sacred sites is also considered, including their places of burial, to use and control their relics and sacred objects and to recover their human remains" (Art. XVI. 3). In 2017, a Plan of Action was approved whereby the member States are committed in creating institutional mechanisms to monitor the implementation of this declaration.

Future Addresses

Two main issues have been added to the traditional agenda connected with indigenous peoples at the international level: the need to eliminate ethnic, gender, and generational inequities in these peoples and the importance of including them in the elaboration and execution of strategies and projects that would be developed in the context of the 2030 Agenda for Sustainable Development (see A/HRC/RES/36/14, 2017). Within that framework, the need to build specific disaggregated indicators of sustainable development for indigenous peoples (CEPAL 2018), which should include aspects related to their cultural heritage, has been pointed out.

At the national level, although significant progress is recognized, inequalities continue to be deep, and there is concern about the gap in the implementation of these rights, the need to harmonize the regulatory systems to guarantee their exercise, and, in particular, the difficulties to implement consultation and free, prior, and informed consent (CEPAL 2014; Del Pópolo 2017).

A particularly critical issue is that of traditional knowledges, since their protection is not usually provided for in national legislation on intellectual property and patents, which only protects individual rights. At the international level, the

Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore is working on the development of a new regulation with the participation of indigenous peoples as observers. In some countries of the region, *Sui generis* standard projects are being discussed in order to fill this legal vacuum. Some examples can be mentioned: the Panama 20/2000 Law that creates a special regime for the protection of collective rights of intellectual property, traditional knowledge, and traditional expressions that are part of their indigenous cultural heritage and the Peruvian Law 27.811/2002 that establishes a protection regime of collective knowledge of indigenous peoples connected to biological resources. Likewise, the Andean Community (made up of Bolivia, Colombia, Ecuador, and Peru), through Decision 486, prevents the registration of trademarks or denominations that constitute the expression of the culture or practices of an indigenous community, without their expressed consent.

Cross-References

► United Nations Declaration on the Rights of Indigenous Peoples (2007)

References

Barié, C. 2003. *Pueblos indígenas y derechos constitucionales en América Latina: un panorama*. México D.F.: Instituto Indigenista Interamericano.

Comisión Económica Para América Latina y El Caribe (CEPAL). 2014. *Los pueblos indígenas en América Latina: avances en el último decenio y retos pendientes para la garantía de sus derechos*. Santiago de Chile: CEPAL.

Comisión Económica Para América Latina y El Caribe (CEPAL). 2018. *Acceso a la información, la participación y la justicia en asuntos ambientales en América Latina y el Caribe: hacia el logro de la Agenda 2030 para el Desarrollo Sostenible*. Santiago de Chile: CEPAL.

del Pópolo, F., ed. 2017. *Los pueblos indígenas en América (Abya Yala). Desafíos para la igualdad en la diversidad*. CEPAL: Santiago de Chile.

Endere, M., and P. Ayala. 2012. Normativa legal, recaudos éticos y práctica arqueológica. Un estudio comparativo de Argentina y Chile. *Revista CHUNGARA* 44 (1): 39–58.

Endere, M., P. Cali, and P. Funari. 2010. Arqueología y Comunidades Indígenas. Un Estudio Comparativo de la Legislación de Argentina y Brasil. In *Arqueología y pueblos indígenas en América Latina*, ed. C. Gnecco and P. Ayala Rocabado, 273–300. Bogotá: Universidad de los Andes y Banco de la República.

Gnecco, C., and P. Ayala Rocabado, eds. 2010. *Arqueología y pueblos indígenas en América Latina*. Bogotá: Universidad de los Andes y Banco de la República.

Halperín Donghi, T. 1989. *Historia contemporánea de América Latina*. México D.F.: Alianza.

Harvey, E. R. 2008. Instrumentos normativos internacionales y políticas culturales nacionales. Documento informativo presentado ante el Consejo Económico y Social. Documento ONU E/C.12/40/16 (9 de mayo de 2008). http://www2.ohchr.org/english/bodies/cescr/docs/discussion/EdwinRHarvey.pdf. Retrieved 14 Feb 2012.

Helg, A. 1990. Race in Argentina and Cuba 1880–1930. Theory, policies and popular reaction. In *The idea of race in Latin America, 1870–1940*, ed. R. Graham, 37–69. Austin: University of Texas Press.

Macera, P. 2000. Patrimonio cultural: Historia del debate. In *Patrimonio Cultural del Perú*, ed. L.G. Lumbreras, P. Macera, L. Millones Figueroa, and F. de Trazegnies Granda, vol. 1, 61–78. Lima: Fondo Editorial del Congreso del Perú.

Martínez Cobo, J.R. 1986. *Estudio del problema de la discriminación contra las poblaciones indígenas*, Conclusiones, propuestas y recomendaciones. Vol. V. Nueva York: Naciones Unidas (ECN.4/Sub.2/1986/7/Add.4).

Montes, A., and G. Torres Cisneros. 2010. La Declaración de las Naciones Unidas sobre los Derechos de los Pueblos Indígenas: base de la nueva relación entre los pueblos indígenas, los Estados y las sociedades. In *El desafío de la Declaración. Historia y futuro de la Declaración de la ONU sobre Pueblos Indígenas*, ed. C. Charters and R. Stavenhagen, 146–177. Copenhague: IWGIA.

OMPI. 2008. Comité Intergubernamental sobre Propiedad Intelectual y Recursos Genéticos, Conocimientos Tradicionales y Folclore. Proyecto de Análisis de Carencias en Materia de Protección de los Conocimientos Tradicionales. http://www.wipo.int/edocs/mdocs/tk/es/wipo_grtkf_ic_13/wipo_grtkf_ic_13_5_b_rev.pdf. Retrieved 30 Mar 2012.

Patterson, T. 1995. Archaeology, history, Indigenismo and the state in Peru and México. In *Making alternative histories. The practice of archaeology and history in non-Western settings*, ed. P. Schmidt and T. Patterson, 69–85. México D.F.: School of American Research.

Politis, G., ed. 1992. *Arqueología en América Latina Hoy*. Bogotá: Biblioteca Banco Popular.

Politis, G. 1995. The socio-politics of the development of archaeology in Hispanic South America. In *Theory in*

archaeology. A world perspective, ed. P. Ucko, 197–228. London/New York: Routledge.
Rodriguez-Piñero Royo, L. 2010. "Cuando proceda": vigilancia y aplicación de los derechos de los pueblos indígenas según la Declaración. In *El desafío de la Declaración. Historia y futuro de la Declaración de la ONU sobre Pueblos Indígenas*, ed. C. Charters and R. Stavenhagen, 336–365. Copenhague: IWGIA.
Stavenhagen, R. 2004. Derechos indígenas y derechos culturales de los pueblos indígenas. *Diálogos en la acción*, primera etapa, 169–189. México D.F.: Dirección General de Culturas Populares e Indígenas.

Suggested Reading

Oszlak, O. 1978. *Formación Histórica del Estado en América Latina: Elementos teórico-metodológicos para su estudio*. Buenos Aires: Centro de Estudios de Estado y Sociedad.
Politis, G., and J. Pérez Gollán. 2004. Latin American archaeology: From colonialism to globalization. In *Blackwell companion for social archaeology*, ed. L. Meskell and R. Preucel, 353–373. London: Blackwell Publishers.
Silverman, H., and D. Fairchild Ruggles, eds. 2007. *Cultural heritage and human rights*. New York: Springer.

Latin American Social Archaeology

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Introduction and Definition

Social archaeology is both a theoretical and methodological practice emerging directly from Marxism. In particular, this occurs by the founding contributions of Soviet archaeology, as envisaged by the Australian archaeologist Vere Gordon Childe (Gándara et al. 1986; Bate 1990). At the core, social archaeology is the construction of a method of archaeological process analysis that is significant and scientific in the manner it connects past and present. According to one of its founders, archaeologist Luis Lumbreras (1974), it was introduced in Peru in the 1950s by Emilio Choy to give the Andean process a coherent explanation. Its aim is to go beyond the explanations that are inferred by the ordering of archaeological materials, which lead to the development of productive forces to make comparisons between groups with similar characteristics and thus identify the levels of social hierarchy produced as a consequence of class struggle. In the mid-1970s, the adjective Latin American was added (Gándara et al. 1986), and subsequently Manuel Gándara in Mexico proposed to call it Ibero-American Social Archaeology (Gándara 1996), since it appeared primarily within Spanish social archaeological discourses. Key contributions have been made by archaeologists who have founded schools of thought developed in Marxism in Mexico, Venezuela, Peru, Cuba, and the Dominican Republic mainly where the state has been sympathetic to leftist ideas (Bate 1990, 1997). The idea of an archaeology that would serve as a liberation weapon lay in the possibility of discovering the historical roots of peoples and their character as exploited (Lumbreras 1974); the transience of institutions, states, social classes, and behavioral patterns; and the articulation of social archaeology with the other social sciences demonstrating historical processual unity in general terms and in their regional and local characteristics (Sanoja 1982; Vargas Arena 1986; Patterson 1988). The essential feature of their ideology lies in the application of a type of Marxism which holds some influences with Hegelian, Leninist, and Stalinist traditions of the former Soviet school, whose strength lies in the integration with dialectical materialism and neopositivism for explaining social phenomena.

Key Issues/Current Debates/Future Directions/Examples

Discussion

During the 1980s, two key meetings took place that allowed for the development of social archaeology: the Oaxtepec and Cusco meetings. During these meetings, significant issues were discussed related to the construction of analytic categories, methodological theory, the interpretation of historical materialism, and a history of archaeological contexts and production data (Lorenzo 1976; Gándara 1996).

At the second meeting of Oaxtepec, some agreements related with the following concepts were reached: mode of production, socioeconomic training, and modes of life and culture, for the definition of a concrete society. In efforts to create a conceptual unification, the need to develop the elements for a historical periodization for social formations was observed. This was called primitive with its variants: the hunter-gatherer and tribal. The former was developed through the work of Luis Felipe Bate (1990, 1996, 1998), and the latter related to tribal social developments was illustrated through the work of Iraida Vargas Arena (1986) and other researchers, such as Thomas Patterson, and it characterized equally complex social formations as the chiefdom and state societies (1998).

The contemporary context within which social archaeology was able to draw attention to archaeology's theoretical and methodological problems was the fall of the Soviet Union and the so-called real socialism. This became relevant to the discourse as Marxist ideas gave way to methodological theoretical positions relevant to discourses regarding other experiences and perception or interpretation of reality contrasted with the ambitious universal theoretical constructions of historical materialism (López Aguilar 1990).

The development of Latin American Social Archaeology was concurrently being represented within the American archaeological discourses through the work of Bruce Trigger (1992), Thomas Patterson (1988), and Randal McGuire (1992). In their discussions related to "culture" from a Marxist perspective, these scholars argued that the term "culture" should not be reduced to material production or symbolic systems; culture is more than ideology and political economy on the one hand and society on the other.

Despite efforts to unify criteria and categories of analysis, not all social archaeologists use the same categories in their explanations of the historical constructions of archaeological contexts they observe. Also important to keep in mind is the absence of a project in which the strength of the theoretical model may be tested against the relevance of the data. Social archaeology was also constructed contrasting methodological and theoretical positions as in the case of post-processual and processual archaeology, led by the American school (Trigger 1992). Its current production is scarce and scarcely spread in the Latin American context. Not all social archaeologists share the terms and arguments raised in the essential categories and laws of dialectics on the social construction of reality they observe. The ontological diversity is difficult and problematic if the aim is to have a unified methodological view.

Current Status

The social construction of reality has given way to another kind of discourse that goes beyond the borders of the nation state and the symbolic power of its founding myths. The arguments which are developed by schools of archaeology in Latin America vary substantially from country to country. There are still the state institutions that flourished and were consolidated in the middle of the last century which contribute to the need to protect such archaeological contexts. However, the fragmentation of academia, state, and civil society where public policies flow is still far from being organically integrated.

Although Marxist ideas are still part of some leftist discourses that are woven throughout the Latin American context, the need to draw more equitable public policies contrasts with a growth of urban, energetic, vial, mining infrastructure where interventions are needed to protect the cultural integrity of the social groups that may be affected by such growth. Much of the political strength of Marxists arguments has given way to environmental discourse and has even reviewed the concept of nature in that ideology (Bate 1996, 1998). The tension between neoliberal ideas, the weakening of the state as a provider of essential public services, and the decline of social values and social capital where Latin American nations' daily life runs continue to develop liberating creative and innovative elements, emerging from the tension inherent to the capitalist system. Several viable options that activate social cohesion have emerged, much like the Latin American Social

Archaeology attempted when trying to reconstruct the social history of a diverse and complex region.

Cross-References

- ▶ Archaeology and Politics
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Marx, Karl
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Power and Knowledge in Archaeology

References

Bate, L.F. 1990. Notas sobre el materialismo histórico en el proceso de investigación arqueológica. *Boletín de Antropología Americana* 19: 5–30.
Bate, L.F. 1996. Teoría de la cultura y arqueología. *Boletín de Antropología Americana* 27: 75–94.
Bate, L.F. 1997. *Arqueología y Materialismo histórico*. México: Edición de Cultura Popular.
Bate, L.F. 1998. *El proceso de investigación en arqueología*. Barcelona: Editorial Crítica, Grijalbo.
Gándara, M. 1996. El análisis de las posiciones teóricas: aplicaciones a la arqueología social. *Boletín de Antropología Americana* 27: 5–20.
Gándara, M., F. López Aguilar, and I. Rodríguez. 1986. Arqueología y marxismo en México. *Boletín de Antropología Americana* 11: 5–18.
López Aguilar, F. 1990. *Elementos para una construcción teórica en arqueología*, Colección Científica 191. México: INAH.
Lorenzo, J.L. (coord.) 1976. *Hacia una arqueología social. Reunión en Teotihuacán*, Octubre de 1975. México: INAH.
Lumbreras, L.G. 1974. *Arqueología como ciencia social*. Lima: Ediciones Hístar.
McGuire, R. 1992. *A Marxist archaeology*. Orlando: Academic.
Patterson, T.C. 1988. La creación de cultura en las formaciones sociales pre-estatales y no-estatales. *Boletín de Antropología Americana* 14: 53–62.
Sanoja, M. 1982. Modos de producción precapistalistas en Venezuela. *Boletín de Antropología Americana* 6: 5–16.
Trigger, B. 1992. *Historia del pensamiento arqueológico*. Barcelona: Editorial Crítica.
Vargas Arena, I. 1986. Teoría sobre el cacicazgo como modo de vida: el caso del Caribe. *Boletín de Antropología Americana* 20: 19–30.

Further Reading

Collingwood, R.G. 1993. *La idea de historia*. México: Fondo de Cultura Económica.
McGuire, R. 2008. *Archaeology as political action*. Berkeley: University of California Press.
Vázquez Leon, L. 1986. *El leviatán arqueológico. Antropología de una tradición científica en México*. Leiden: Research School CNWS Editorial Crítica.

Latium Vetus, Latium Adjectum

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Introduction

Literary sources suggest that Latins and Romans had close cultural ties from prehistoric times (Alföldi 1965: 102–4); their shared identity being recognized in the use of the same language and the adoption of distinctive religious rituals and of converging mythical genealogies. Romans and Latins believed that their common "nation" had indeed formed in Latium, the region of Tyrrhenian central Italy located just south of the Tiber river. The fact that Latium was also the first region to be incorporated by the Roman state in its early expansion certainly reinforced this idea. This connection easily explains why the archaeology of Latium occupies a prominent place in the history of Classical studies, as it represents a point of entry into two crucial aspects of the Roman past: Rome's origins and its first steps in the creation of a Mediterranean Empire.

Since the pioneering work of G. Pinza (who in 1905 was the first to propose a systematization of the prehistoric material of Latium), the study of Rome's origins became the domain of Prehistorians and Etruscologists, who were captivated by the image of a *Lazio primitivo* evoked by the ancient writers and so vividly reflected in the primeval aspect of many elements of the assemblage known in the literature as *cultura Laziale*, Latial culture. Classicists remained quite aloof

from the debate on Roman origins, embarking on extensive mapping projects of the surroundings of Rome whose main goal was to record with particular detail the marks of Roman conquest in the region (e.g., roads and aqueducts, rural elite residences). Famous examples include R. Lanciani's unpublished map of the Agro Romano (1894–1906) and his architectural surveys at Ostia, Portus, and Hadrian's Villa near Tibur; T. Ashby's classical topography of the Roman Campagna (published in the Papers of the British School at Rome in the period 1902–1910); and the Forma Italiae project, relaunched in 1923, with the campaigns of G. Lugli in and around Tarracina and Circeii. Combined with the standing evidence from the main urban centers of Latium (e.g., the excavations of Ostia, resumed in 1909), the systematic documentation of these remains provided a basis to reconstruct the development of monumental architecture in the region and decisively informed early typological studies of Roman construction techniques (see Lugli 1957, a work already completed in 1939).

In the 1950s and 1960s Prehistorians and Etruscologists continued to refine the chronological sequencing of materials dating to the Late Bronze Age, Early Iron Age, and Archaic Period. H. Müller-Karpe and R. Peroni devised a systematic periodization of the Roma-Colli Albani facies, thus encouraging the production of synthetic works on the Latial culture, such as those by P. Gierow (1964, 1966, this is a companion to Gjerstad's work on early Rome, with which it shares a largely discredited methodology) and G. Colonna (1974, 1988). New large-scale excavation projects were started in primate centers of Latium (e.g., Lavinium, Gabii, Praeneste), whose particular emphasis on temples and sanctuaries remained in line with the tradition of architectural history in Classical archaeology. Extensive surface surveys also received a new impetus, after the involvement of the Italian "Centro Nazionale delle Ricerche" (CNR) in the Forma Italiae project (14 volumes published beginning in 1965, featuring among others Tibur, Praeneste, and Ardea).

New research agendas took off in the 1970s, following a wave of important discoveries made in sporadic rescue excavations in the suburban sprawl of Rome, which revealed extensive Iron Age cemeteries and settlement evidence (e.g., Osteria dell'Osa, Castel di Decima, La Rustica). Prehistorians and Etruscologists quickly realized the potential of this material for reassessing the archaeology of early Rome and promoted major museum exhibits (such as that on the *Civiltà del Lazio Primitivo* of 1976, whose catalog contains preliminary reports on the excavations of the Italian state archaeological service and unfortunately remains the only reference for many of the sites) and seminars (notably that on the *Formazione della città nel Lazio*, held in 1977 and published in 1980). For their part, Classical archaeologists were primarily concerned with whether the new evidence could confirm the literary tradition on the origins of Rome (see the 1981 museum exhibit on *Enea nel Lazio*).

This broader interest in the archaeology of the region set in motion significant developments, most notably the official institution of a dedicated branch of the CNR (Comitato per l'Archeologia Laziale, established in 1978), which sponsored a new series of surface surveys (the *Latium Vetus* program directed by L. Quilici and S. Quilici Gigli), along with outreach initiatives such as annual meetings. The latter provided a new forum for presenting not only the activities of the state archaeological service but also the preliminary results of a growing number of Italian and foreign research projects carried out in Latium (12 issues published in the journal *Quaderni di Archeologia Etrusco-Italica*, covering the period 1978–1995). After a brief hiatus, this program was relaunched by the Soprintendenza of Lazio in 2003 as the "Lazio & Sabina" series. This updates regularly on the progress of research activities at sites ranging from Prehistory to Late Antiquity. Furthermore, detailed archaeological guides (e.g., Coarelli 1982) and major general works (particularly on the early phases: Colonna 1988; Bietti Sestieri 1992; Smith 1996; for the material culture of the mid-Republican period, *Roma Medio-repubblicana* 1973; for the late Republic, Coarelli 1987) offer widely accessible and helpful tools to contextualize current themes and approaches to the archaeology of the region.

Definition

Based on comparative linguistics, the ethnic name of the Latins (*Lătīni*) derives from the name of the region in which they were settled – *Lătium* (perhaps from *lātus*, wide, though a non-Indo--European root is also possible) and ethnic suffix -*ī nus* – and is documented in Etruscan inscriptions as early as the seventh century BCE. Historic analogy suggests that the Etruscans chose this collective noun to name those communities living in the coastal region south of the Tiber, who in turn eventually adopted it (Colonna 1988: 425). Latin and Greek authors of the early Imperial period, however, make a clear distinction between Old Latium (*Latium Antiquum* or *Vetus*) and Greater Latium (*Latium Adiectum* or *Novum*) (Pliny *HN* 3.39, 3.46, 3.56 and 3.59; Strabo 5.3), a territory inhabited by non-Latin-speaking peoples which was "added" to Old Latium by the Roman conquest.

In geographical terms, Latium Vetus corresponds to the lands bordered by the river Tiber to the north and beyond the river Anio (modern Aniene, a tributary of the Tiber) up to the hills of Sabinum, the Apenninic formations of the Monti Prenestini and Tiburtini to the northeast, the upper course of the river Trerus (modern Sacco) to the east, and the Monti Lepini and Monte Circeo to the southeast. The core of Vetus Latium is occupied by the Quaternary volcanic district of the Alban Hills. In historic times annual pan-Latin festivals (*feriae Latinae*) were held on the second-highest peak (Mons Albanus, modern Monte Cavo), where the sanctuary of Iuppiter Latiaris was located. To the south of the Alban Hills, the marshy area of the Ager Pomptinus extended down to the Monte Circeo.

Latium Adiectum comprised the adjoining region of the middle and lower Trerus valley (originally inhabited by the Hernici), the Liris (modern Garigliano) river valley (inhabited by the Volsci), and the stretch of coast south of Monte Circeo, framed by the Monti Aurunci (a chain named after the people who originally settled in this area, the Aurunci or Ausones), down to Suessa (a town located on the left banks of the Liris mouth), which marked the boundary with Campania.

By the mid-Republican period both Latium Vetus and Latium Adiectum were part of a densely urbanized region formally integrated in the Roman state. Long-lived towns, generally situated on defensible locations on sites of up to 20–30 ha and with relatively small territories, dotted the slopes of the main volcanic edifice of the Alban Hills, the Tuscolana-Artemisio caldera (Aricia, Labici, Lanuvium, Tusculum, Velitrae). Hilltop sites also characterized the limestone region at the foot of the Apennine chain: the area crossed by the Anio (both Praeneste and Tibur had an acropolis detached from the lower town), the valleys of the rivers Trerus (Artena; the Hernican sites of Anagnia, Ferentinum Aletrium, Verulae) and Liris (e.g., Arpinum, Frusino, Aquinum, Atina; Roman foundations such as Fregellae, Fabrateria, Sora, Interamna), the Monti Lepini (e.g., Cora, Signia, Norba, Setia, Privernum), while most of the towns founded or refounded by the Romans south of the Monti Aurunci lay on flat land (Formiae, Fundi, Minturnae, Suessa). Larger sites in the 30–80 ha range coalesced around secondary craters at the periphery of the caldera (Gabii), on volcanic spurs outcropping in the coastal plain of Latium Vetus (Rome, Fidenae, Crustumerium, Ardea, Lavinium, Antium), and at the margins of the Ager Pomptinus (Tarracina, Satricum). In the Roman period, land communication between the cities of this region was made possible by a network of public roads radiating from Rome, in most cases resulting from the regularization of preexisting routes (the via Appia, crossing in a straight line the marshes of the Ager Pomptinus and the coast south of Tarracina, being an obvious exception): among the most prominent are the via Salaria, serving the district north of the Anio; the via Tiburtina, Gabina/Praenestina, and Labicana, connecting Rome with main tier urban sites to the east; and the via Latina, climbing the Alban Hills up to Tusculum and then continuing in the Trerus-Liris basin to reach Capua in

Campania. A system of secondary roads that bypassed Rome is also attested, such as the so-called via Cavona, stretching on a southernly course from Tibur and Gabii to Antium.

Latium Vetus constituted a culturally unified region since the Final Bronze Age. Despite a remarkable continuity in settlement patterns from the previous period, the archaeological record of this period shows the sudden, widespread, and simultaneous adoption of a standardized and highly distinctive set of burial practices, materializing new forms of cultural and political identity. The formation of regional cultures in neighboring areas during the Late Bronze to Early Iron Age transition can be detected in the radical changes in the distribution and density of sites but was less connotated ideologically, as suggested by the higher variability in mortuary patterns (Pacciarelli 2000). In chronological terms, the formative phase of the Latial culture has been dated archaeologically to the tenth century BCE (Period I), although ^{14}C data suggest a slightly earlier absolute dating (end of the eleventh century – beginning of the tenth century BCE, according to the revised chronology: Nijboer et al. 1999–2000).

The typo-chronology of the Early Iron Age is commonly articulated in three periods; each period has two phases, in turn divided in two subphases (Colonna 1974; Bietti Sestieri 1992; Smith 1996): Periods IIA1-2 and IIB1-2 (900 to 830 BCE and 830 to 770 BCE, respectively; approximately tenth and ninth century BCE according to the revised chronology); Periods IIIA1-2 (770–750 BCE; according to the revised chronology, the Period IIIA1 begins c. 830 cal BCE) and IIIB1-2 (750–730/720 BCE); Periods IVA1-2 (730–720 to 630–620 BCE) and IVB1-2 (630–620 to 580 BCE), also referred to as the "Orientalizing" period (divided into an Early, Middle, and Late phase) by Etruscologists and Mediterranean archaeologists in general.

With the end of the Archaic period (late sixth century BCE), the archaeological phases of Latium are defined after the conventional periodization of Roman history.

Historical Background

Many of the towns in Latium had their own foundation myths, but in the Roman version they figured as offshoots (Rome being the last one) of Alba Longa, a town established on the slopes of *Mons Albanus* by Aeneas' son Ascanius (Iulus), the founder of a dynasty of kings that ruled Latium from the twelfth to eighth century BCE (sources in Alföldi 1965: 102–4). The image of an urban society capable of carrying out a colonization program already in the Late Bronze Age is clearly an anachronism, but the primacy assigned to the Alban Hills' district by historical sources is in fact mirrored in the archaeological record by the outstanding quality and quantity of finds from the area dating to Latial Period I, which remain unchallenged even after the wave of systematic research of the last few decades. These finds reveal small-village-based communities controlling territories of 4–5 km^2, whose military and religious leaders were afforded formal burial according to a funerary ritual characterized by a strong symbolism (mostly male cremations in hut-urns with miniaturized grave goods, including armor). There is a tendency to interpret these territorial entities as the archaeological correlates of those 30 Latin *populi* who took part in the sacrifices on *Mons Albanus*, known from a list given by Pliny (3.5.69; see Colonna 1988: 447–8). As to the form of political organization and social structure of the *populi*, a fundamental disagreement exists, whether these were weakly differentiated tribal societies (Bietti Sestieri), the precursors of gentilitial clans (Peroni), or chiefdoms integrated in a complex regional polity (review of the problem in Carandini 1997: 228–38).

During Latial Period II (particularly in Period IIB), there are increasing signs of settlement nucleation and differentiation, leading to a shift in importance from the Alban Hills to the coastal plain and showing that other Latin communities were undergoing the same process of urbanization that brought Rome into existence. Surface finds attest a clustering of small sites on the same

locations later occupied by the main Latin cities of the historic period (e.g., Gabii, Ardea, Lavinium, Satricum, Crustumerium). This phenomenon is accompanied by the emergence of extensive burial grounds featuring hundreds of graves (e.g., Rome-Esquiline; Gabii-Osteria dell'Osa). Spatial analysis at the Osteria dell'Osa cemetery suggests that burials were grouped according to kinship (i.e., lineages composed of extended families: Bietti Sestieri 1992) or other forms of social organizations (Smith 2007: 166 with further reference).

If the presence of permanent social stratification already in the first phase of the Early Iron Age remains a contested issue, later cultural developments are unambiguously characterized by the display of ascribed status and economic inequality in the funerary sphere. The Latial Period III (when according to the tradition Rome would have been founded) witnessed an intensification of contacts with Etruria (as suggested by the increase in the distribution of metal objects) and Campania (early imports of Greek pottery), particularly by the mid-eighth century BCE. The luxury assemblages documented in the richest burials of Castel di Decima and Praeneste have been correlated with the emergence of ruling aristocracies that secured access to wide exchange networks. In current reconstructions it is maintained that conspicuous consumption and competition among these elites fueled craft specialization and trade, creating the preconditions for the development of political complexity and eventually leading to the formation of the archaic city-states, a process concluded in Rome and elsewhere in the region by the late seventh century BCE at the latest (Cornell 2000).

It has been estimated that at least 20 city-states existed in Latium Vetus by the end of the sixth century BCE (list in Cornell 2000: 213). According to the ancient tradition, in the course of the Archaic period, these came under the hegemony of Rome (whether a formal alliance had been already stipulated at this time is a debated issue; see Smith 2007: 171). The excerpt of an inscription from Aricia cited by Cato (*Origines* fr. 58 P) and a text of Dionysius of Halicarnassus (5.61.2), however, attest an organized coalition of Latin cities (29, in the list given by Dionysius), which waged war against Rome at the beginning of the fifth century BCE. Their defeat resulted in the establishment of a military alliance on equal terms between the league and Rome, known in the sources as the *foedus Cassianum* (493 BCE), soon followed by the incorporation of the Hernici (486 BCE). This settlement marked the beginning of Roman expansion in Southern Latium, which continued throughout the fifth century BCE with joint military campaigns against the Volsci and the Aequi. In newly conquered territory or when lost cities were gained back, Romans and Latins founded colonies (*coloniae Latinae*) that possessed the same rights enjoyed by Latin cities as regards to intermarriage (*conubium*), stipulation of legally binding contracts (*commercium*), and mobility (*ius migrationis*) (Signia, Velitrae, Norba, Antium, Ardea, Labici, and perhaps Cora; Vitellia, perhaps to be identified with Artena, Circeii, Satricum, and Setia in the beginning of the fourth century BCE; on the *ius Latii* see Cornell 2000: 220).

Already in the early fourth century BCE, however, Rome began to absorb cities of Latium Vetus, transforming them into self-governing communities of Roman citizens (*municipia*). Tusculum was the first to be annexed in 381 BCE, followed by most of the Latin members of an anti-Roman alliance that included also Volsci, Aurunci, Sidicini, and Campani (who engaged Rome in the so-called "Latin War", 341–338 BCE). Some (Ardea, Circeii, Cora, Gabii, Norba, Praeneste, Setia, Signia, Tibur) retained formal independence but had to cede part of their territories, while their rights to conduct reciprocal dealings were severely curtailed. In Latium Adiectum the Romans imposed partial citizenship (*civitas sine suffragio*), which required all the burdens and obligations of full citizens but without political rights (Fundi, Formiae, Privernum). In addition, a new program of Latin colonization was launched, which involved strategic areas of Latium Adiectum (e.g., Fregellae, Interamna Lirenas, and Suessa, 313 BCE), the upper Anio (Carseoli, 298 BCE) and upper Liris (Sora, 303 BCE) valleys. It is important to note that since the majority of the colonies founded under this scheme was outside

Latium, the term *colonia Latina* ceased to have an ethnic connotation, referring only to the fact that such communities possessed political institutions modeled on those of the cities of Latium Vetus. Colonies of Roman citizens (*coloniae civium Romanorum*) were founded at Tarracina (329 BCE) and then at Minturnae (296 BCE), on the example of the garrison established a generation earlier at Ostia.

During the late Republican period, many of the Latin towns, while still functioning as *municipia*, suffered a decline and contraction, which was accelerated by the simultaneous growth of nearby Rome as a capital city. Possible causes of this phenomenon include the effects of the civil wars of the 80s BCE (e.g., destruction at Praeneste and Norba; Fregellae had already been razed to the ground as a consequence of a short-lived rebellion in 125 BCE, the inhabitants being relocated to Fabrateria Nova) and the progressive concentration of estates into the hands of a few landowners (an issue that has recently seen controversy; see Witcher 2005, arguing for a rising rural population in the *suburbium* of Rome during the early Imperial period). Monumental building projects funded by Roman aristocrats with local connections are still attested in the late second and early first century. BCE (most notably the sanctuaries at Praeneste, Tibur, Gabii, Cora, Lanuvium: Coarelli 1987; these represent a discrete phenomenon that can be explained in terms of the long history of peer-polity interaction in the region). By the early Imperial period, what were once flourishing urban centers survived only on a much smaller scale (e.g., Gabii) or were completely abandoned (e.g., the coastal sites of Ardea, Lavinium, Circeii), in spite of repeated attempts by the Roman emperors to revive them. A notable exception is Ostia, which continued to thrive as Rome's main harbor town.

Key Issues/Current Debates

A brief summary of current archaeological research on Latium will suffice to show the intrinsic interest of the development of this region as well as its contribution for understanding the cultural and historical trajectory of Rome during the first millennium BCE and beyond.

The process of urbanization and state formation in central Italy represents perhaps the key theme, especially after the recent wave of sensational discoveries in the early levels of Rome. Because Rome was part of it, the wider Latin context has been increasingly taken into account to explain the rise of urban society in the region. The consensus is that urban status was achieved by the late seventh century BCE. Parallels from Latium are now found for all the major innovations that characterized this transition in the built environment of Rome: earthen fortifications or proper walls (e.g., Ardea, Gabii, perhaps Praeneste), public road construction (e.g., Satricum; Crustumerium), and religious architecture (Gabii, Satricum, Lavinium). These features betray an increased level of settlement planning and coordination and the formation of a communal identity. As in the case of Rome, the combined evidence of surface survey, limited excavation, and funerary data from main tier sites in the region (e.g., Gabii; Lavinium) suggests that this shift was the result of a long process of settlement concentration on strategic sites, which in some cases were first inhabited during Middle Bronze Age. In the course of the Early Iron Age (Periods IIA and especially IIB, see Pacciarelli 2000: 120–8), occupation expanded on the wider geomorphological units (plateaus) to which these hilltops sites were connected (e.g., Ardea, Lavinium, Satricum; similar developments are attested at Ficulea, Fidenae, Crustumerium). With the exception of the Alban Hills area, small isolated sites were simultaneously abandoned. New evidence from Lavinium, however, points to the possibility that the entire area later enclosed by the fortification walls was already occupied by the last phase of the Final Bronze Age or the very beginning of the Iron Age, suggesting that the chronological gap between Etruscan and Latin urbanization processes may have been significantly shorter. Despite the smaller scale of the phenomenon in Latium, a reconsideration of old data from Etruscan sites such as Veii and Tarquinia (where occupation in the Final Bronze Age also seems to be limited to the acropolis) shows stronger

similarities in the formation of these sites (recent review of the problem in Fulminante and Stoddart 2010). The reconstruction of the internal organization of these settlements is in most cases based on surface evidence alone, which obviously limits the level of resolution. A generalized pattern has been observed, whereby separate clusters of ceramic material are sparsely distributed over the plateaus. This spatial configuration has been interpreted as a sign that the groups involved in the process of settlement nucleation occupied separate habitation compounds and only gradually merged into a continuous fabric. Different models have been recently proposed to identify the corresponding social organizations into which early urban communities were articulated as direct predecessors of the historical-period *curiae* or clan structures that tried to maintain their social and cultural identity (see discussion in Terrenato 2011).

The archaeology of Roman colonization represents another topic which recent fieldwork and research is focusing on, particularly in the field of architectural history. Latium Vetus and Latium Adiectum were the subject of two distinct waves of colonial foundations: according to the historical tradition, 15 colonies were founded in the period between the late sixth century and 382 BCE; additional Roman and Latin colonies were established after 338 BCE. Important monumental remains are preserved from these sites, providing ample evidence to study the formative phases of Roman urbanism and town-planning practice. The absence of a standardized pattern in the urban layouts of *ex-novo* early Latin colonies (e.g., Norba; cf. Ardea) suggests that these sites were not founded according to a predetermined model, but only progressively acquired specific urban features (city walls, orthogonal layout), and this because they participated in wider cultural developments that influenced the region as a whole, particularly from the early fourth century BCE. The lack of standardization in these early foundations has led some to believe that their establishment was not centrally driven by Rome, but rather represented private enterprises resulting from horizontal mobility at the elite level. The function of these colonies within the regional settlement system has also come under scrutiny, given the impressive continuity of occupation from the previous period that systematic surveys have documented in their territories (e.g., Attema and van Leusen 2004), although in this case it is virtually impossible to distinguish between Latin and specifically Roman pottery assemblages.

Extensive investigations have been conducted in several colonies of the Middle Republican period (Ostia; Minturnae; later stages of occupation at Norba; Fregellae). Large-scale urban surveys at these sites (particularly Norba and Fregellae) have revealed the presence of orthogonal city plans, with a clear spatial articulation of public and private spaces. Excavation has been focused particularly on temples as well as on the civic architecture in the monumental cores (data collected by Lackner 2008), while domestic architecture has received far less attention. According to a recent reassessment of the evidence from Latin colonies in central Italy (Sewell 2010), a model of Roman colonial urbanism can be reconstructed on the basis of specific details of the urban form (e.g., fortification techniques, elongated proportions of the city blocks, disposition of the Forum within the street grid, architecture of political assembly places). These show the influence of contemporary Greek town planning, which in some instances was adapted to accommodate preexisting Roman traditions and conceptualizations (most notable is the rejection of stoa architecture). Considering the generalized lack of third century BCE archaeological evidence other than religious architecture in many of the Middle Republican colonies, the site of Fregellae stands out for the quality and quantity of data on early house design (though poorly published), decoration styles, and technologies (particularly the diffusion of "cocciopesto" and other decorated cement floors), as well as on innovative building types (e.g., public baths) and associated construction techniques. While the assemblage attested at Fregellae is commonly taken to reflect a contemporary Roman cultural package, the possibility should be allowed that at least some of these features were independent developments, particularly because they consistently predate the earliest known examples from Rome. As the case of the Late Republican sanctuaries shows, political

interaction and competition between the urban communities of Latium may well have been responsible for the transmission of cultural models to Rome.

An intense scholarly debate concerns the historiographical problem of the origin of the villa, both as an architectural and as an economic template. The extensive surface surveys conducted in the context of the *Forma Italiae* and Latium Vetus projects show an increase in site density during the fourth and third century BCE, with a predominance of the "small-farm" and "farmstead" settlement types. This phenomenon is usually associated with the emergence of free peasantry in the *suburbium* of Rome. Alternative models have been proposed for the interpretation of this pattern, based on the fact that in some areas these farms coexisted with older, much larger, and richer rural residences (of the kind archaeologically attested at the Auditorium site in Rome), perhaps connected in a system of patron-client relationships (Terrenato 2007). Medium-sized estates involved in cash-crops production become visible only later in the second centuries BCE, but the buildings associated with these estates were still modest in size and architectural refinement. More importantly, it seems that in the *suburbium* of Rome, the large luxurious villas of the late second and first centuries BCE did not grow from direct precedents, but were generally planted *ex-novo*, suggesting that the old elite residences may have served as a model for the construction of a new landscape of power. The presence and involvement of elites in the social life of the Roman countryside in any case remained a constant throughout the history of the region, even after the formation of vast imperial estates (unsurprisingly, many of the imperially owned villas including Hadrian's famous one at Tibur were built atop Late Republican precursors).

Research on the Imperial period, however, is not confined to elite manifestations. Knowledge of lower-class urban structures such as the *insulae* (multistory apartment blocks) is made possible at Ostia by the extraordinary level of preservation of its architecture. Ostia and Portus also provide unparalleled material to study the life of port towns, including issues of identity (which can be compared and contrasted with the rich datasets from the extensive excavations of the cemeteries) and mobility of nonelite groups. Current work seeks to assess more specifically the degree to which these communities were connected with the broader social, economic, and cultural fabric of the Roman Mediterranean.

International Perspectives

The international research community is actively involved in the actual production of archaeological data in the region, thus shaping to a significant degree research agendas in all areas of the current debate. Non-Italian universities are usually granted excavation permits by Italian authorities with no particular limitations. Foreign cultural institutions based in Rome (including the Deutsche Archäologische Institut (*DAI*), the British School at Rome, the École Française de Rome, the American Academy in Rome, the Dutch Institute, the Nordic Institutes) sponsor many of these projects, facilitating the collaboration with Italian parties on a regular basis (e.g., the *Lazio & Sabina* series).

A noteworthy trend in the context of this fieldwork has seen the adoption of large-scale approaches for the study of pre-Roman and Roman urbanism, in both primate centers (e.g., the Spanish excavations at Tusculum, the American excavations at Gabii, the Dutch excavations at Satricum) and colonial towns (German initiatives at Minturnae and Fabrateria Nova). Noninvasive methodologies have also been applied and progressively refined, including geophysics (particularly magnetometry, with work conducted by the British School at Rome at Portus, Fregellae, and Interamna Lirenas) and artifact-based field methodologies (e.g., the Dutch field survey in southern Latium).

Future Directions

Archaeological activity in the core region around Rome still has a lot to offer in terms of richness of data and interpretive potential. The renewed interest on the early phases of central Italian urbanism has already determined a significant shift from

previous approaches based mainly on the interpretation of funerary evidence to research strategies that aim at the recovery of settlement data. A crucial problem that will have to be addressed in future excavations at primate sites is that of their internal organization during the early urban stages, so as to observe and date with much greater precision the alleged merging of hut clusters into a unified fabric. In addition, the fact that many of the Latin centers were relatively unaffected by the disturbances or destruction caused by concrete construction at sites that continued to be developed in the Imperial period should also increase the chance of recovering architecture of the Middle Republican period aside from temples and city walls, whose record at Rome and elsewhere in central Italy is not particularly rich.

Cross-References

- ▶ American Academy in Rome
- ▶ Architecture, Roman
- ▶ Ashby, Thomas
- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ École Française de Rome
- ▶ Economy, Roman
- ▶ Lanciani, Rodolfo
- ▶ Romanization
- ▶ Topography of Rome
- ▶ Urban Planning, Roman
- ▶ Villas and Farms in the Mediterranean World

References

Alföldi, A. 1965. *Early Rome and the Latins*. Ann Arbor: University of Michigan Press.

Attema, P.J., and M. van Leusen. 2004. The early Roman colonization of South Lazio: A survey of three landscapes. In *Centralization, early urbanization and colonization in first millennium B.C. Italy and Greece, volume 1: Italy*. Bulletin antieke beschaving, Supplement, Vol. 9, ed. P.J. Attema, 157–195. Leuven: Peteers.

Bietti Sestieri, A.M. 1992. *The Iron Age community of Osteria dell'Osa: a study of socio-political development in central Tyrrhenian Italy*. Cambridge: Cambridge University Press.

Carandini, A. 1997. *La nascita di Roma: Dei, lari, eroi, uomini all'alba di una civiltà*. Torino: Einaudi.

Coarelli, F. 1982. *Lazio*. Laterza: Rome.

Coarelli, F. 1987. *I santuari del Lazio in età repubblicana*. Rome: La Nuova Italia Scientifica.

Colonna, G. 1974. Preistoria e protostoria di Roma e del Lazio. In *Popoli e civiltà dell'Italia antica*, ed. B. D'Agostino, P.E. Arias, and G. Colonna, vol. 2, 272–346. Rome: Biblioteca di storia patria.

Colonna, G. 1988. I Latini e gli altri popoli nel Lazio. In *Italia: Omnium terrarum alumna*, ed. A.M. Chieco Bianchi et al., 409–528. Milan: Libri Scheiwiller.

Cornell, T. 2000. The city-states in Latium. In *A comparative study of thirty city-states cultures: an investigation conducted by the Copenhagen Polis Centre*, ed. M.H. Hansen, 209–228. Copenhagen: Reitzels.

Fulminante, F. and S. Stoddart. 2010. Formazione politica a confronto in Etruria e Latium vetus. Status quaestionis e nuove prospettive di ricerca. *Bollettino di archeologia on line 1: Volume speciale* F / F1 / 3, 11–22. Available at: http://151.12.58.75/archeologia/. Accessed 20 Sept 2011.

Gierow, P.G. 1964. *The Iron Age culture of Latium. volume 2, 1: Excavations and finds: the Alban Hills*. Lund: C. W. K. Gleerup.

Gierow, P.G. 1966. *The Iron Age culture of Latium, volume 1: Classification and analysis*. Lund: C. W. K. Gleerup.

Lackner, E.-M. 2008. *Republikanische Fora*. München: Biering & Brinkmann.

Lugli, G. 1957. *La tecnica edilizia romana con particolare riguardo a Roma e Lazio*. Rome: Bardi.

Nijboer, A.J., J. van der Plicht, and A.M. Bietti Sestieri. 1999–2000. A high chronology for the early Iron Age in central Italy. *Palaeohistoria* 41–42: 163–176.

Pacciarelli, M. 2000. *Dal villaggio alla città: la svolta protourbana del 1000 a.C. nell'Italia tirrenica*. Florence: All'Insegna del Giglio.

Roma medio-repubblicana. 1973. *Roma medio-repubblicana: aspetti culturali di Roma e del Lazio nei secoli IV e III a. C*. Rome: Assessorato antichità, belle arti e problemi della cultura.

Sewell, J. 2010. *The formation of Roman urbanism, 338–220 B.C.: between contemporary foreign influence and Roman tradition*. Journal of Roman Archaeology, Supplementary series 79. Portsmouth: Journal of Roman Archaeology.

Smith, C.J. 1996. *Early Rome and Latium: Economy and society c. 1000 to 500 BC*. Oxford: Clarendon Press.

Smith, C.J. 2007. Latium and the Latins: the hinterland of Rome. In *Ancient Italy: Regions without boundaries*, ed. G. Bradley, E. Isayev, and C. Riva, 161–178. Exeter: University of Exeter Press.

Terrenato, N. 2007. The clans and the peasants. Reflections on social structure and change in Hellenistic central Italy. In *Articulating local cultures. Power and identity under the expanding Roman Republic*. Journal of Roman Archaeology Supplemetary series 63, ed. P. van Dommelen and N. Terrenato, 13–22. Portsmouth: Journal of Roman Archaeology.

Terrenato, N. 2011. The versatile clans. Archaic Rome and the nature of early city-states in central Italy. In *State formation in Italy and Greece. Questioning the neo-evolutionist paradigm*, ed. D.C. Haggis and N. Terrenato, 231–244. Oxford: Oxbow.
Witcher, R. 2005. The extended metropolis. Urbs, suburbium and population. *Journal of Roman Archaeology* 18: 120–138.

Further Reading

Cornell, T.J. 1979–1980. Rome and Latium Vetus, 1974–79. *Archaeological Reports* 26: 71–89.
Cornell, T.J. 1985–1986. Rome and Latium Vetus, 1980–85. *Archaeological Reports* 32: 123–133.
Forma Italiae. n.d. Available at http://www.formitaliae.it/fi/progetto.html. Accessed 20 Sept 2011.
Frutaz, A.P. 1972. *Le carte del Lazio*. Rome: Istituto di Studi Romani.
Keay, S., M. Millett, L. Paroli, et al. *Portus. An archaeological survey of the port of imperial Rome*. Archaeological monographs of the British School at Rome 15. London: British School at Rome.
Pavolini, C. 2006. *Ostia*. Rome: Laterza.
Termeer, M.K. 2010. Early colonies in Latium (ca. 534 – 338 B.C.). A reconsideration of current images and the archaeological evidence 2010. *BABesch* 85: 43–58.

Lawyers' Committee for Cultural Heritage Preservation (LCCHP)

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Basic Information

The Lawyers' Committee for Cultural Heritage Preservation (LCCHP) is a not-for-profit organization that fosters the stewardship of the objects, places, and traditions that define us as societies, nations, civilizations, and even human beings. See http://www.culturalheritagelaw.org for more information.

Major Impact

The field of cultural heritage law (or cultural property law or cultural resources law) has grown considerably over the past decade, such that today it can properly be considered a "field" and not merely a practice area within some other field such as environmental law, art law, international law, copyright law, or federal Indian law. The number of attorneys working in the field has blossomed. In 2004, the Lawyers' Committee for Cultural Heritage Preservation ("LCCHP" or "Lawyers' Committee") was formed "to promote the preservation and protection of cultural heritage resources in the United States and internationally through education, research, outreach, and advocacy."

Although there are certainly other organizations promoting preservation and protection of cultural resources, the Lawyers' Committee is the first organization focused on legal education and advocacy to promote preservation both in the United States and internationally. The membership includes attorneys, law students, and interested members of the public. A member of the Board of Directors, however, must either have graduated from an accredited law school or must be a student currently attending law school. This gives the organization a unique perspective and the tools to influence cultural heritage preservation. Currently, 13 members serve on the Board of Directors and a part-time executive director manages the organization. The Board brings an array of expertise to the table: Many Board Members have backgrounds in either art or archaeology and work in academia, private practice, and government agencies. Their expertise ranges from domestic cultural heritage law, to the international illicit trade in antiquities, to the restitution of Holocaust art.

Education is central to the mission of the Lawyers' Committee. LCCHP actively works to inform the public about cultural heritage issues, raises the profile of cultural heritage law in our nation's law schools, and serves as a clearinghouse for employment and internship opportunities for law students and recent graduates. Each year, the organization sponsors a Student Writing Competition in Cultural Heritage Law for law students and works with the DePaul University College of Law to sponsor the successful National

Cultural Heritage Law Moot Court Competition. The organization also maintains a list of law school courses offered in the field nationally and a guide to internships and externships.

Since 2009, LCCHP has held an annual conference, open to both Committee members and the general public, and has periodically sponsored other public events. Topics for these events have included the following: cultural heritage, World War II, and the Pacific; the protection of underwater cultural heritage; international historic preservation in context with the National Historic Preservation Act; the US and the 1954 Hague Convention; free exercise, historic religious properties, and sacred sites; legal and ethical problems in art; foreign sovereign immunities; the trade in antiquities; and collecting Chinese art and antiquities.

As a legal organization, the Lawyers' Committee is also in an ideal position to be a successful advocate for the preservation of cultural heritage. That role is filled by the Committee's submission of comments on pending federal and state legislation that may impact cultural heritage and joinder with other preservationist organizations in the submission of amicus briefs in cases involving cultural heritage issues. For instance, the Lawyers' Committee partnered with a number of other organizations, including the US Committee of the Blue Shield and the Archaeological Institute of America, in providing testimony to the US Senate Foreign Relations Committee. The US Senate ultimately ratified the treaty in September 2008. LCCHP also comments on proposed bilateral agreements between the United States and other countries (including Italy, Cambodia, Cyprus, and Greece) to restrict the import of undocumented archaeological and ethnological materials.

Since its inception, the Lawyers' Committee has advocated for the protection of cultural heritage and has provided mechanisms for educating the public, archaeologists, and future attorneys. As the field of cultural resources law continues to grow and mature, LCCHP will be responsive in order to best assist in the preservation of global cultural heritage.

Cross-References

- ▶ Archaeological Institute of America (AIA)
- ▶ Blue Shield
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Gerstenblith, Patty
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ International Council of Museums (ICOM)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ Repatriation: Overview
- ▶ Society for American Archaeology (SAA)
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Society for Historical Archaeology (SHA) (Cultural Heritage Management)
- ▶ Society for Historical Archaeology (SHA) (Modern World Archaeology)

Further Reading

Lawyers' Committee for Cultural Heritage Preservation. n.d. Available at: http://www.culturalheritagelaw.org

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Basic Biographical Information

The Leakey family is the world's most prolific paleoanthropologist family. Three consecutive generations have conducted research in Africa studying human origins.

Louis Seymour Bazett Leakey was born on August 7, 1903, in Kabete, Kenya, and passed

away October 1, 1972. Louis' parents were British missionaries that lived among the Kikuyu tribe in Kenya of which he was an initiated member at an early age. At an early age, Louis showed an interest in stone arrowheads and tools. He studied at Cambridge University but took a leave of absence during which he undertook his first archaeological expedition which led to multiple fossil-hunting expeditions in East Africa. This was considered an unusual step as the widely accepted paradigm was that human ancestors derived from Asia. He had a son, Colin Leakey (a plant breeder who lives in London with his wife Susan and three daughters), with first wife Frida (divorced 1936). Louis later married Mary Nicol, an illustrator, in 1936. Besides his significant contributions to our understanding of human evolution, Louis influenced and mentored numerous researchers in many fields including Jane Goodall and Dian Fossey in primate behavior.

Mary Leakey was born on February 6, 1913, in London and had an early interest in art and archaeology. In 1930, she began auditing university courses in geology and archaeology. She established herself as a scientific illustrator and became knowledgeable on flint points. Mary first met Louis in 1933 and began illustration work for him. After his divorce from Frida in 1936, they married and had three sons: Jonathon (1940), Richard (1944), and Philip (1948).

Richard Erskine Frere Leakey was born on December 19, 1944. Richard participated in fieldwork at an early age and achieved independent success with his own discoveries. Serving as director of the National Museums of Kenya, Richard led an expedition to Koobi Fora in 1968 and expeditions to Lake Turkana between 1968 and 1989.

In 1989, Richard was appointed as head of Kenya Wildlife Service where he embarked upon combating rhino and elephant poaching. Unfortunately in 1993, Richard was involved in a plane crash resulting in bilateral below-knee amputations. In 1994, he left the Kenya Wildlife Service and served as secretary-general of Safina, a political party, and in 1997 was elected for a seat in the Kenya parliament. Richard's political career reached a pinnacle in 1999 when he was appointed the head of Kenya's Civil Service. He retired from political life in 2001 but continues the fight for political justice in Kenya. He is also involved in conservation projects.

Philip Leakey, born in 1949, was involved in Kenyan politics until 1992. He now runs a company, The Leakey Collection that sells Maasai crafts with wife Katy.

Meave Leakey (nee Epps) was born in London in 1942. Meave obtained joint honors in Zoology and Marine Zoology from the University of North Wales. Meave met the Leakey family the same year she commenced a Ph.D. in Zoology and took a position at the Tigoni Primate Research Center. She completed her Ph.D. in 1968. The following year, Richard Leakey invited her into the field at the Koobi Fora site. They married in 1970 and had two children, Louise and Samira. In 1989, Meave coordinated the National Museum's paleontological field research in the Turkana Basin. Meave's research interests also involve investigating how environments may have influenced hominin evolution.

Louise Leakey was born in 1972 and works alongside her mother Meave at the Turkana Basin Institute. She obtained her Ph.D. from London University, her dissertation focusing on climate change influences in fossil deposits between 3.5 and 1.5 million years ago. She is also a research assistant professor at the University of Stony Brook, Department of Anthropology, New York. Louise is heavily involved in the coordination of the Lake Turkana Basin and local programs aimed at education and health.

Major Accomplishments

The Leakey family centered their research in Tanzania, in particular Olduvai Gorge. It was not until 1948 that Louis made his first important discovery, a skull which he named *Proconsul africanus*, an ape like hominoid that lived over 14 million years ago. Louis attracted controversy at first; however, this and subsequent finds by the Leakey family supported early hominin finds of an earlier pioneer, Raymond Dart.

The Leakeys also uncovered a number of extinct animal fossils in the Olduvai Gorge. It was here that Mary made her first significant discovery, a fossil now known as *Australopithecus boisei* in 1959. In 1960, Leakey announced the discovery of a direct human ancestor, *Homo habilis*, otherwise known as the "handy man." Louise, Mary, and Richard have written a number of books relating to their life and work in Kenya.

Mary's next major achievement was the discovery of *Proconsul africanus* with Louis. She was also involved in the discovery of *Australopithecus boisei* (1959) and *Homo habilis* (1960). In 1979, she discovered footprints preserved at Laetoli. The footprints have been dated to about 3.6 million years old. The significance of this discovery was the proof that human ancestors were bipedal. Until her retirement in 1983, she continued to conduct fieldwork and make important hominid and animal fossil finds. She is also remembered for her meticulous and methodical approach to her work which laid the foundations for fieldwork today.

Jonathon Leakey born in 1940 left fieldwork to farm snakes but not before making his own *Homo habilis* discoveries in Olduvai.

Richard Leakey's success came in fossil hunting. He led expeditions in search of fossils, and in 1984, his team discovered a nearly complete skeleton of a young *Homo erectus* nicknamed Turkana Boy. The following year, he found a skull of *Australopithecus aethiopicus*. He has also written numerous books.

Meave Leaky attained success in her own right as coordinator of field research in the Turkana Basin. In 1994, her team uncovered a new hominid species, *Australopithecus anamensis*, possibly the ancestor to *Australopithecus afarensis*. The significance of this find was that there was evidence of bipedalism 4.2 million years ago. In 2000, Meave and her daughter Louise found fossils of both *Homo habilis* and *Homo erectus* dating 1.5 million years ago east of Lake Turkana leading to the suggestions that they coexisted for approximately 500,000 years signifying that evolution was more complex. Louise Leakey was credited with finding the skull and partial jaw of *Kenyanthropus platyops* and continues research in the Turkana Basin uncovering and exploring fossil deposits. She is also pioneering the use of 3D models as a way of exploring collections online.

The discovery of a new genus, *Kenyanthropus platyops*, by Meave and her team in 2001 revealed that this genus may also be a human ancestor.

Richard, Meave, and Louise continue to run the Turkana Basin Institute which is a private research facility that enables researchers to participate in research at Lake Turkana Basin.

Cross-References

- ▶ Australopithecines
- ▶ Dart, Raymond Arthur
- ▶ Fossil Records of Early African *Homo*
- ▶ *Homo erectus*
- ▶ *Homo habilis*

Further Reading

Bowman-Kruhm, M. 2005. *The Leakeys: A biography*. Westport: Greenwood Press.

Cole, S. 1975. *Leakey's luck*. London/Glascow: William Collins Sons & Co Ltd.

The Leakey Foundation. 2012. http://leakeyfoundation.org/. Accessed 30 Oct 2012.

Turkana Basin Institute. n.d. Leakey: A century of the family in East Africa. http://www.leakey.com/. Accessed 30 Oct 2012.

Leather, Archaeological: Conservation and Preservation

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Introduction

People's first efforts to collect and prepare animal hides to use for clothing and tools included their first efforts for preserving organic material culture. Vegetable materials, tannins from tree bark,

and even the brains of the slaughtered animal were effectively used to prepare hides for use. Leather artifacts excavated from land and dry cave sites and underwater excavations offer special challenges for conservation, based on complex environmentally driven chemical interactions and processes of biological and microbial deterioration. In the late 1980s, the addition of material science studies directed at the conservation of organic materials is contributing new insights and avenues for research in the field of leather artifact conservation. This entry discusses major concerns, issues, and avenues for research and advancement in scientific studies.

Definition

Many definitions describing the natures of conservation and preservation exist. For general discussion, we define processes of conservation as efforts undertaken to prevent the loss of artifacts using chemicals and other materials in an effort to prevent further loss or damage. Restoration is the more involved process of attempting to return deteriorated artifacts to a former state of physical completeness and stability. When chemical treatment strategies fail to stabilize an artifact, resulting in the loss of portions of an artifact, it may be desirable to restore the artifact by replacing missing portions to create a more complete artifact. Conservation involves minimally invasive processes designed to prevent the degradation and loss of an artifact. Preservation efforts often involve returning an artifact aesthetically to a previous state. Organizations such as the International Council of Museums, Committee for Conservation (ICOM-CC) offer extensive descriptions of ethical standards and practices for safeguarding the well-being of artifacts.

Key Issues/Current Debates/Future Directions/Examples

The physical nature of animal skins can be described as being composed of long protein fibers, known as collagen, and fiber bundles. Complex oils and fats that lubricate the fibers and prevent them from becoming rigid surround these fibers and bundles. Fats and oils, which are present in living skins, prevent fibers from shrinking and become fixed one to another. Processes of tanning are designed to chemically treat and lubricate skins and thus preventing fibers from sticking together, hardening, and shrinking.

Archaeological provenience affects the manner in which animal skins and leather artifacts become chemically compromised. Leather artifacts excavated from acidic soils often deteriorate differently than similar artifacts excavated from a marine environment. In extreme situations, leather components of a compound artifact (combining one or more differing components such as leather and a brass buckle) may be missing due to soil acidity or other biological contaminants in soils. Skin artifacts excavated in arid environments may be dry and desiccated, which renders the leather brittle and inflexible. Similar artifacts excavated from marine environments have diminished or depleted collagen and essential oils, causing the artifact to be fragile and structural compromise. The state of hides and leather artifacts is always dependent on a number of factors.

Red Rot and Brown Rot

Red rot readily occurs at pH values of 4.2–4.5. Sulfur dioxide, a common atmospheric pollutant, may convert to sulfuric acid and forms hydrogen peroxide. Hydrogen peroxide chemically reacts with tannins used to preserve the artifact, causing oxidation of proteins in the substrate of the leather. This chemical reaction may form ammonium sulfate and ammonium bisulfate. Red rot appears as powder deposits on the surface of the artifact. The presence of red rot indicates structural weakening of an artifact due to delamination.

Environmental Factors

Apart from sulfur dioxide (SO_2), other atmospheric pollutants including carbon monoxide (CO), ozone (O_3), lead (PB), nitrogen dioxide (NO_2), particulate matter (particle pollution), Methane (CH_4), Nitrogen Dioxide (NO_2), and Carbon Dioxide (CO) and Nitrogen Dioxide

(NO_2), other trace contaminants may be present. A general first step in the conservation of leather is to carefully rinse the artifact in baths of fresh water, to remove soluble salts and debris. If necessary, additional cleaning using a nonionic detergent (approximate 1% solution) or sodium hexametaphosphate may be necessary. In all cases, it is essential to rinse the artifact thoroughly in baths of fresh water after cleaning using detergents (Hamilton 1996: 33). Even dust and dirt are abrasive to already-compromised artifacts. Similar to the abrasive nature of dirt in carpets, so too these contaminants can undermine the integrity of leather artifacts.

Microbial and Bacterial Activity

The skin consists of several layers of tissues, each acting to protect the body from microbial, bacterial, and physical damage. The main layers are epidermis (outer layer of skin), dermis, and hypodermis (deep tissues). The epidermis is a thin layer that acts as a barrier to UV light and contains hair follicles and melanin, which determines skin color. Left untreated, leather excavated from marine sites may appear to have swelled with the outer surfaces of the artifact appearing spongy in texture due to water absorption (water logging).

The dermis is tucked away between the epidermis and hypodermis. It is the layer that holds all the blood vessels, most nerves, hair follicles, collagen, and sweat glands. Collagen and amino acids associated with hair follicles act to keep the skin flexible, and they are responsible for stopping advances of bacteria that are present within the epidermis. Current research at the Archaeological Conservation Research Laboratory at Texas A&M University has determined that amino acids associated with hair follicles are conducive to polymerization or chemical complexing when combined with some forms of chemical treatment. This complex reaction acts to strengthen chemical bonds between the fibers of leather and the bulking agents being used to stabilize the artifacts.

Means of Initial Treatment of Skins

Geographically, the process of preparing animal skins differs from area to area. Skins can be "tanned" using minerals, tannins from the bark of trees, vegetable matter, and even the brains of the animal from which the skin is recovered. Salt, various oils, alum, smoke tanning, and even working a hide with saliva and chewing can be effective in softening and preserving an animal skin. To create harder, more durable skins, however, it is beneficial to not lubricate the fibers of a skin and use slow-drying methods to deliberately harden or stiffen the leather. Known as raw hides, these untreated skins have unique properties. Cut into long strips or formed into specific shapes, these raw hides are less supple than tanned skins and are easily fashioned into harnesses, ropes, and strong lashings used to tools and fasteners. Each treatment method directly affects stiffness or flexibility and other physical characteristics of the skin being treated.

Treatment Strategies for Brittle and/or Desiccated Leather

Leather excavated from archaeological sites offers the conservator a range of challenges, depending on the long-term provenance from which the artifact is excavated. Waterlogged leather from any type of wet environment should remain in wet storage until the artifact can be examined, evaluated, and treated in a laboratory. After excavation, the physical integrity of wet leather is always structurally compromised. Microbial activities, resulting from bacterium, fungus, protozoan, and viruses, are major concerns when determining the state of waterlogged leather. Even with the aid of microscopic evaluation, it is a challenge to determine damage caused by microbial activities. The result however is mechanical deterioration of the matrix of the artifact caused by disintegration of the collagen forming individual fibers and fiber bundles. Dried and desiccated artifacts, such as bookbindings and velum manuscripts, may show signs of deterioration due to mold, fungi, and other biological processes that compromise the artifact.

For decades, one standard for the treatment of desiccated leather has been the Smithsonian glycerin treatment. Glycerin acts as a lubricant and when combined with water, and a small amount of formaldehyde or other biocides, creates an

effective treatment that lubricates and protects the leather. Immersing brittle or desiccated leather in the glycerin/biocide solution makes leather more pliable and restores flexibility to leather. Glycerin, however, is hygroscopic (moisture absorbing) which many believe attracts microbial and bacterial activity (Hamilton 1996: 33).

Glycerol Treatments

In the past, leather from archaeological excavations has been treated using a solution of 30% glycerol and 70% ethanol. Glycerol is a colorless liquid obtained by the saponification of fats and oils. From a conservation perspective, saponification is the name given to the chemical reaction that occurs when the remnants of tanning agents such as vegetable matter or fats (brain tanning) react with alkali-forming conditions.

Glycerol treatments act to introduce lubrication into the damaged matrix of an artifact, replacing collagen and other depleted oils. Delicate leather artifacts may be difficult to conserve when they are stored in alcohol. Their strength capability in water is not as great as leather being stored and treated in ethanol. Alcohol tends to make leather stiffer, thus allowing the conservator to retain the physical characteristics of an artifact during treatment. After immersion in a glycerol/ethanol or glycerol/water solution for a minimum of 2 weeks, the leather is immersed in three successive solvent baths to dry the leather (after Hamilton 1996: 33). While glycerol treatments are not widely used, they can be effective for softening stiff artifacts for short periods of time. Glycerol treatments have been replaced by other leather dressings that create longer lasting, aesthetically pleasing results that attract less dust and airborne pollutants.

Leather Dressing

One successful treatment for leather is known as the British Museum Leather Dressing (BML). Because of the potentially volatile nature of some of the ingredients in this dressing, the conservator should work in a well-ventilated environment. To make BML, 200 g of anhydrous lanolin, 30 ml cedar wood oil, 15 g of beeswax (optional) are warmed while continuously mixing. This mixture is then poured into either 350 ml diethyl ether or 330 ml of hexane. Ether and hexane are flammable liquids so caution is necessary. When cooled, the leather dressing can be rubbed into the surfaces of the leather. It may be necessary to immerse hardened leather in a mixture of 1 part BML to 3 parts Stoddard solvent (Hamilton 1996). Stoddard solvent is a flammable liquid that smells like kerosene (CAS No. 8052-41-3 – generally considered hazardous). With gentle polishing, beeswax seals the surfaces of the leather and adds shine to the artifact. British Museum Leather Dressing is best used post-treatment to protect the surfaces of conserved leather and to create an aesthetically soft shine to the conserved artifact.

Polyethylene Glycol (PEG) and Freeze-Drying Methods

Before treatment, waterlogged leather must be stored in fresh water. For long-term storage, the addition of a small percentage of alcohol or an antimicrobial additive such as Dowicide 1 (biodegradation of o-phenyl phenol) had proven effective. No thorough studies on the possible deleterious effects of antimicrobial additives have been conducted. Accordingly, many conservators do not use them. Regardless of how long artifacts have been stored in water, it is advisable to thoroughly rinse them in several baths of fresh water to ensure removal of soluble salts and debris from the artifact. Insoluble salts and calcareous materials can then be mechanically cleaned using soft wooden dowels or dental tools. Chemical spot treatment of stains is possible. The conservator must proceed cautiously to determine the nature of spots on the artifact and the cause for their appearance. Often, extensive chemical cleaning can cause discoloration and damage to leather. Often, it is advisable to monitor the artifact closely to determine if aggressive cleaning is necessary. After any type of spot treatments, the artifact must be rinsed in additional baths of fresh water. In all cases, it may be better to err on the side of caution and not treat minor staining.

In the 1960s, waterlogged leather was often treated with PEG at elevated temperatures between 80 °C and 85 °C. Also known as

Carbowax, water-soluble PEG was thought to easily penetrate into the damaged cell structure of leather. It was inexpensive and readily available, making it the material of choice for many conservators. More recently, PEG treatments for leather artifacts are carried out at room temperature. A standard treatment might be to immerse the artifact in a low-percentage PEG/water solution, followed by 10% increment additions of PEG and a final percentage of 30–40%. This simple process has proven to be an effective conservation procedure for softening brittle or stiff leather. In most cases, the artifact is left in the PEG/water solution for several days after the final percentage solution is attained, and with occasional inspection, the conservator will note changes in stiffness. After treatment, leather is removed from the PEG solution, surface cleaned using soft cloths, and then allowed to slowly air dry in a humidity controlled environment.

Many forms of PEG are available. PEG 400 and PEG 1450 are used for immersion treatments of leather, and experienced conservators might blend numerous specific molecular weights of the bulking agent to create specific results.

Less commonly used, spot treatments using topically applied aqueous solutions of PEG can be effective in treating small areas of an artifact that show signs of dryness or surface flaking. After consulting the conservation notes from initial conservation of an artifact to determine what molecular weight PEG or blend of molecular weight PEGs were used for initial treatment, it is possible to carefully apply a similar combination of molecular weights of PEG to a small area of the artifact using a Q-tip. Spot-treated areas of the leather will appear darker in coloration. This will dissipate over time. One concern that may need to be addressed is why a particular area of leather requires spot treatment. If bacterial activity is apparent, the addition of PEG as a spot treatment may be detrimental in attempting to stabilize the artifact. Water associated with the topical PEG application may encourage additional bacterial activity. Always try to determine the nature of changes in leather artifacts. Small indicators may indicate that more aggressive re-treatment is necessary. In situations where badly degraded leather artifacts are not stable or self-supporting in aqueous solution of PEG, alcohol is substituted for water.

Prior to freeze-drying PEG-treated leather, the artifact can be pretreated in a solution of 15–20% PEG 400. Freeze-drying, also known as lyophilization, has been a popular means of removing unbound water from the PEG-treated artifact. Because PEG is water miscible, the bulking agent contains water. Freezing PEG-treated artifacts in a vacuum environment forces water molecules to freeze and give off gas from the artifact. After as little as a few days, small artifacts will be relatively dry to touch, and the artifact can be removed from the vacuum freeze-dryer and allowed to stabilize in a controlled temperature and controlled humidity environment. To maintain stability, artifacts should be curated in an RH environment between 50% and 60% after freeze-drying.

Posttreatment, PEG-treated leather conserved using immersion methods is usually darker in coloration. The surfaces of these artifacts may feel damp to touch, and great care must be taken to store them in a controlled environment. With changes in humidity and temperature, it is not uncommon to see PEG migrate to the surfaces of the artifact, resulting in pooled materials that must be removed to maintain the aesthetics of the artifact. As PEG migrates to the surface of the artifact, the artifact may show signs of being unstable. Signs of instability may include a compressed look to the leather or stiffening. In the 1990s some conservators expressed concern that PEG is a carcinogenic chemical and deduced that respirators should be used in situations where long periods of exposure to the chemical are anticipated. The best citations for proper use of PEG are material data safety sheets (MSDS). Although PEG is generally thought to be safe, long-term exposure to PEG and elevated temperatures may cause irritation of skin and inhalation concerns for some individuals. PEG is noted as an irritant when in contact with skin and general inhalation.

In the early 1990, this author developed passivation polymers at Texas A&M University. Commonly referred to as silicone oil methods, these treatment strategies were initially met with

a lot of criticism from conservators because they were developed using polymer-based chemicals and well-established polymer chemistry. Many conservators observed that since the processes are not reversible, they should not be used for the treatment of artifacts. This is a valid concern. Many long-used conservation materials and methods however are also not reversible because they too are polymer-based chemicals (Smith and Hamilton 1998).

Silicone oil treatments rely on the removal of water from leather through the use of solvent baths. Solvent/water displacement is critical for these methods and materials to work. Like PEG mixtures, silicone oil mixtures are variable. Generally, to a volume of silicone oil sufficient to immerse the artifact, a 10% by volume addition of methyltrimethoxysilane (MTMS) is added and mixed thoroughly. Some conservators are noted to use as much as a 70% addition of MTMS to attain desired results.

Once leather is saturated with a solvent (acetone or alcohol), the artifact is rapidly immersed in the silicone oil/cross-linker solution and allowed to sit at room temperature until no off-gassing of solvent (bubbles) is noted. Dr. Helen Dewolf of the Conservation Research Laboratory, Texas A&M University, uses many different percentage mixtures of silicone oil and cross-linker, depending on the attributes she needs to impart on an artifact. Regardless of percentages used, when the leather is fully saturated with the polymer solution, it can be removed and allowed to drain off excess polymer solution. The next stage of this treatment is to expose the artifact to vapors of dibutyltindiacetate (DBTDA) tin-based catalyst. Depending on the size of the leather in treatment, vapor deposition using DBTDA may continue for 24 h or longer (Smith and Hamilton 1998). The last stage of silicone oil preservation is always exposing the treated artifact to fresh air. Atmospheric moisture acts to complete most polymeric reactions, and exposure to fresh air reduces lingering off-gassing odors.

Posttreatment, silicone oil-treated leather does not require specialized long-term storage, often called curation in conservation literature. Changes in temperature and humidity do not affect the stability of the leather. Additionally, atmospheric contaminants and changes in ultraviolet light emissions do not have deleterious effects on treated leather.

Conservation Dilemmas

Given the ever-advancing nature of conservation chemistry, many conservators have adopted a cautious approach to new innovations. Many conservators also elect to simply not conserve some artifacts they feel unqualified to handle. Artifacts in long-term storage may become a problem because even when stored properly, archaeological/waterlogged leather artifacts do deteriorate in a laboratory environment.

Yearly, many artifacts are lost because of a conservator's fear of committing to a conservation strategy and seeing that process through to completion. Many other artifacts are lost each year because of the lack of communication between conservators. In the twenty-first century, the cost of archaeological conservation is forcing conservators to prioritize which artifacts will and will not be conserved. In the past, artifacts were viewed as being equal in importance, especially for their information potential when viewing the corpus of information from a particular excavation. Accordingly, it was important to conserve everything. Alternative means of preserving information have become necessary, as funding is not readily available. Common artifacts such as scraps of leather and square iron nails may be photographed, sketched, and catalogued without undergoing full conservation. Laboratories such as the Wilder 3-Dimensional Imaging Laboratory make three-dimensionally scanned virtual images of artifact to augment assemblage records. Although in its infancy, this new form of photo documentation and rapid prototyping has proven to be an effective and cost-effective alternative to total conservation of an artifact.

Because polymerization is a natural process, conservators are rethinking the "old school" treatment strategies once thought to be reversible. Cross-linking between the materials used for bulking degraded leather and the matrix of the leather itself is a problem we scarcely understand.

Long-term storage of leather artifacts is a challenge, regardless of the methods and materials used for initial conservation. In general, conserved leather is usually stored in a dark, cool environment which may act to inhibit bacterial growth. While leather conserved with silicone oils is resilient to bacterial activity, it is best to curate these artifacts similar to artifacts conserved with other conventional methods.

Observations

With the exception of passivation polymer treatment methods, many conservation methods rely on the introduction of bulking agents as incremental additions in an aqueous solution. These methods are slow but effective. Over time, however, commonly used bulking agents attract atmospheric moisture and airborne contaminants from the museum environment.

The main set of governing principles for archaeological conservation has been the long-term well-being of artifacts. Conservators try to use conservation methods and materials that can be reversed when newer and better methods and materials are available.

During the late 1980s, material science studies and industrial chemistry laboratories expanded general knowledge of archaeological conservation chemistry. Focusing on archaeological chemistry, new scholars are expanding the discipline greatly. The practice of using polymers was once discouraged because conservators believed them to be unstable and unreliable. This is ironic since the mainstay of conservation strategies for archaeological leather is the use of polyethylene glycol (PEG) which, as its name indicates, is a polymer.

In spite of the many contributions archaeological conservators have made with the discipline of archaeology, artifact conservation is also reliant on artistry. As important as it is to understand archaeological chemistry, it is equally important to have knowledge of how material goods were originally made. The conservator must be a scientist, a historical archaeologist, an artist, and a scholar of historic literature.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Heritage Conservation Training
- ▶ International Council of Museums (ICOM)
- ▶ Mexico: Underwater Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

Hamilton, D.L. 1996. *Basic methods of conserving underwater archaeological material culture*. Washington, DC: U.S. Department of Defense, Legacy Resource Management Program.

Smith, C.W., and D.L. Hamilton. 1998. *Conservation of waterlogged leather using polymers*. Archaeological Preservation Research Laboratory (APRL) Report 4. Texas: Texas A&M University, College Station. Available at: http://nautarch.tamu.edu/class/anth605/605syl.htm

Further Reading

Cameron, E., J. Spriggs, and B. Wills. 2006. The conservation of archaeological leather. In *Conservation of leather and related materials*, ed. M. Kite and R. Thompson, 244–263. Jordon Hill/Oxford: Elsevier Lincare House.

Hamilton, D.L., and W. Smith. 2011. Archaeological conservation. In *Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 286–304. Oxford: Oxford University Press.

Klosowski, J.M., C.W. Smith, and D.L. Hamilton. 1998. A method of conserving waterlogged materials. United States Patent Office, patent 5,789,087, issued August 4.

Plenderleith, H., and A. Werner. 1971. *The conservation of antiquities and works of art*. 2nd ed. Oxford: Oxford University Press.

Smith, C.W. 1984. The re-treatment of two PEG-treated sabots. *Proceedings of the 7th ICOM – CC Working Group on Wet Organic Archaeological Materials Conference, Grenoble, France* 7: 155–159.

Smith, C.W. 2003. *Archaeological conservation using polymers*. College Station: Texas A&M University Press.

Waterer, J.W. 1972. *A guide to the conservation and restoration of objects made wholly or in part of leather*. New York City: Drake Publishers.

Legislation in Archaeology: Overview and Introduction

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State of Knowledge and Current Debates

Introduction

Every country in the world has some form of law relating to its cultural heritage. These range from the draconian (and sometimes relatively ineffective: Cleere 1984: 130) to the more loosely formulated and generally respected. In between lies the majority, more or less complex and more or less complied with. Some are "homegrown" and reflect particular local circumstances; others elsewhere are copied from neighboring or more distant places; others again have been adopted from past rulers but remain in place nonetheless. Law has been very important to the development of the idea of preserving material from the past (Carman 2012): laws have always proved a key means by which that preservation was effected. Laws also serve to legitimize the idea of that preservation.

This entry will look at the different kinds of laws that apply to the material heritage in different parts of the world and how they operate. In doing so, it is an exploration and celebration of difference rather than similarity. The common thread, however, lies in the adoption of law – of whatever kind and however written – as the key method of dealing with the cultural heritage. It has been the promulgation of laws to preserve old things – whatever the motivation driving it – that turns a mere private or sectional interest into something like heritage management as we know it. In the current state of heritage management, laws are even more crucial to the preservation of our heritage: without them, it can be cogently argued, there is no heritage (Cleere 1989: 10). At the same time, these laws need to be overseen and put into effect by appropriately empowered agents, whether of the state or independent. These agents too have their powers and duties defined by the laws that govern them and the material on which they act. Accordingly, even in so-called "non-statutory" systems of heritage management, law is the underlying mechanism and the ultimate repository of authority.

The sections of this entry will offer introductory outlines to some of the forms which laws in this area can take, how they are organized and to be interpreted, and the relations between laws at the national and international level. The opening section will examine some of the justifications for laws in this area, a truly global discourse. A section on interpretation of laws will expose the clear differences that exist between legal systems and which necessarily affect our understanding of them and any attempt at international comparison: these include the legal structures of federal versus unitary states, laws derived from traditions of Roman (and other) law, and those grounded in English "Common Law." An overview of international regulation – global in nature but subject to interpretation at the national level – follows. The laws of national territories will then come under scrutiny, representing different systems of laws: those assuming the state to be the proper owner of material versus those where private ownership is held to be the ideal, those favoring direct intervention and control versus more indirect and administrative mechanisms, and so on. Overall, the paradox of the ubiquity of laws to achieve the same ends that take a remarkably diverse set of forms will become clear. A final section will review the effect the promulgation of legislative control has had on the field in terms of the development of professional agendas and associations, both national and international, and the ways these too regulate the practice of heritage management.

This aspect of heritage management is very well documented. This is partly inevitable: laws are usually written documents and to ensure compliance must be made widely available to their intended audience. The literature of heritage management, therefore, abounds with summaries and commentaries at the national level (for the UK, see Carman 1996; Pugh-Smith and Samuels 1996; Hunter and Ralston 2007; for the USA, US Dept.

of the Interior 1989–90; for France, Rigambert 1996; for Austria, Hocke 1975; for German states, Dörge 1971; Eberl et al. 1975; for Switzerland, Hangartner 1981; for Mexico, King et al. 1980; etc.) and at the international and comparative level (Burnham 1974; Prott and O'Keefe 1984; Cleere 1984; Carman 2002: 68–76; and on underwater archaeology Dromgoole 1999).

The Role of Law

Despite the ubiquity of legislation as a foundational tool of heritage management practice, very little of the literature of the field concerns the purpose of such laws or, to put it another way, explains why we pass laws on this matter rather than tackling it in another way. McGimsey (1972), for instance, argues powerfully for legislation as a key component of a state preservation program but also argues against legislation alone since it would be an entirely "negative approach" (McGimsey 1972: 33, 46) lacking the necessary support from the wider public. Prott and O'Keefe (1984) go further: they argue that the dangers facing the archaeological resource are ever greater and that accordingly "some of them can only be controlled by governments" and therefore require legislation (Prott and O'Keefe 1984: 13). At the same time, they recognize the valuable role laws play in resolving key conflicts over material – especially issues of ownership and control – and the setting of policy aims, as well as the increasing requirements of national governments to comply with international treaties concerning the heritage (Prott and O'Keefe 1984: 14). None of these is, however, a reason for law *as such*: both McGimsey and Prott and O'Keefe offer programs of public education and the mustering of political support as alternatives (McGimsey 1972: 29–31; Prott and O'Keefe 1984: 145–15).

In so far as McGimsey does provide a reason for legislation, it must be as part of the requisite "administrative structure" (McGimsey 1972: 27) for such a program, which includes its establishment as a legally recognized authority with its own budget. Pickard (2001: 4–10), reviewing a sample of European states with a view to their response to new international agreements on cultural heritage, expands on this theme by presenting a number of areas where legislation has a valuable defining role:

- Of definition of the heritage, concerning the attributes and characteristics a heritage object should have or be deemed to possess
- Of identification of the heritage, especially the means available of inventory and recording, and the making of lists and schedules
- Of preservation and protection of the heritage, whether through systems of designation or by regulating development
- Of the philosophy of conservation in place, including attitudes to restoration and reconstruction
- Of appropriate sanctions against breaches of the law and the means – coercive or otherwise – to encourage compliance
- Of the integration of cultural preservation with other government policies and imperatives
- Of financial aspects
- Of the specific powers and duties of government and nongovernmental agencies in respect of the heritage
- Of educational and other aspects

From this functionalist perspective, the law in this area can be seen not so much as a mechanism of heritage management but as a facilitator for systems of heritage management to come into being: on its own, it seems, law does nothing but requires other agencies in order to put heritage management into effect. This is perhaps one reason law should so often emerge first in systems of heritage management: it provides the framework on which the other aspects of heritage management can hang. On the other hand, it would seem that other components of a heritage management system could exist independently of legislation to put them into place. The question "why law?" remains.

Although in general sympathetic to heritage management as a practice (and whatever they may choose to call it), others have taken a more critical view of the role of law in this field. A study of English law in this area (Carman 1996) concluded that its main purpose was to give value to archaeological remains. Though a continually

reductive process of selection of certain kinds of object from all the things in the world, subsequent categorization of those things into legal terms and allocation to particular agencies for a limited range of treatments, archaeological sites, and monuments would emerge with a new meaning and a new set of values placed upon them. In doing so, they became officially recognized as important and worthy of protection and preservation. This is a reversal of the usual understanding of the sequence, whereby things that are important are chosen to be preserved by law: here, it is the law that makes certain things important. A similar view was reached in respect of legislation to govern the heritage of indigenous populations in Australia and the USA (Smith 2004: 125–155). As Smith puts it, legislation "plays a key role in the management of Indigenous material culture, as... it establishes the need for management procedures and processes" (Smith 2004: 125). Such law therefore goes on to define who will manage indigenous culture and how those involved – archaeologists, indigenous people, and government agencies – will interact. This means law sets "the parameters of acceptable management practice....[and] the scope of policy debate, and influences the way in which debate is conducted between the three actors" (Smith 2004: 125). Overall, "legislation provides governments and bureaucracies with terms, concepts and guidelines against which competing claims to material culture may be assessed" (Smith 2004: 126) and ultimately "provides the conceptual frameworks that must govern debates within" heritage management which "institutionalize and regulate the discipline [of archaeology] as a technology of government" (Smith 2004: 154). Similarly, Fourmile (1996) has reviewed the role of Australian legislation in denying the indigenous population any access to or control over their cultural heritage. These readings of the place of legislation in heritage management locate it at the service of requirements external to the discipline itself and closer to those of government. In other words, rather than law serving the needs of archaeology, archaeology is made to serve the needs of government.

Interestingly, however, it is not just those who are critical (or indeed suspicious) of law who see it in this light. Breeze (1996) – writing on the definition given in Scotland to the British legislative category of "national monument" – is clear that the purpose is "to ensure that all people have access to [Scotland's built] heritage [of all periods] and are able to enjoy it, regardless of their own origins and background" (Breeze 1996: 102). He also acknowledges that "preserving monuments... is not entirely an end in itself" and cites government reasoning behind it (Breeze 1996: 102). Accordingly, the idea of a "national" archaeological resource based in law is seen here not as a limiting and exclusive concept but nevertheless one that remains at the service of government agendas. This same idea is reflected in Knudson's (1986) review of cultural resource management practice in the USA. As a result of success in "persuading the major policymakers... of the public significance of archaeological resources.... the implementation of such policies will not leave anyone... out of the process of public accountability for the treatment of those resources," and "this will be conducted within the context of multiple public objectives" (Knudson 1986: 399). The public referred to here is taken to be the Euro-American population of the USA, excluding its indigenous population whose cultural works are under discussion. Accordingly, even though it is acknowledged that conservation of cultural remains is a globally endorsed project, the target of conservation practice in the USA and what flows from it is directed at a particular audience, at least partly the result of "a lack of genetic continuity between the dominant political community in the United States and prehistoric Americans" (Knudson 1986: 396). Here, as elsewhere, law drives the heritage management process rather than providing support for it.

In most writing on heritage management, a legislative basis for preservation practice is taken for granted. The literature is therefore for the most part descriptive rather than critically discursive and does not ask why laws are in place in such profusion. One reason is simply historical: it is "the way it is done." Other reasons emerge from a

closer reading, however, whether from an overtly critical or a more sympathetic perspective: laws serve, as it turns out, not the needs of heritage management but rather the agencies – and in particular national governments – who promote them. This is not an issue of effectiveness, but may have an impact on the way heritage management is done in different contexts.

How to Approach, Read, and Interpret Laws

Laws are technical documents rather than discursive texts, which means they are not only written in a particular way but also designed to be read in a certain way (see, e.g., for the USA, Dickerson 1975; for the UK, Cross 1995; for Italy, Tarello 1980; for international comparisons, MacCormick and Summers 1991). Indeed, "reading" in its conventional everyday sense may not be quite the right word: they are usually designed to be used more like a technical manual than read as a linear narrative. Moreover, the particular manner in which such texts should be read varies from jurisdiction to jurisdiction so that an ability to operate in one legal system does not automatically imply an ability to so operate in a different one. The aim of this section is to outline some of the ways in which laws relevant to archaeology can vary from country to country across the globe.

As I have argued elsewhere (Carman 1996: 17; 2002: 102–103), to have a truly meaningful comparison between the practices of archaeological heritage management, it is necessary to take three factors into account:

- Differences between legal and regulatory systems
- Differences in the nature of the material record of the past between one territory and another
- Differences in the traditions and historical development of archaeology between one territory and the other

The first of these covers such things as the basic assumptions relating to the interests to be served by law, the degree of appropriate state control held to be applicable in an area, the weight to be given to private property laws, or the expected powers and duties of state and other agencies. All of these will differ between one territory and another, or one legal system (e.g., Common or Roman) and another. In the UK or USA, for instance, the usual style is to provide for legal protection without taking material directly into state ownership, but in other territories all archaeological remains and other heritage objects are held to be the property of the state. In the UK, the USA, and Australia, this reflects the ideological authority of private property upheld by a system of Common Law, as against the authority of the state more typical of systems deriving from the European continent. Here, the difference lies in expectations of what is right and proper and more fundamental social values. Where it is expected that heritage objects should belong to the state, the kind of system operated in the UK or USA makes no sense; in the UK or USA, the adoption of a system of generalized state ownership would be seen as an attack on private property. An attempt to assess the merits of one system against another therefore runs up against these fundamental differences in understanding of what laws can and should do and to whom legal authority should be given.

The second and third factors are linked. They concern the nature of the archaeological record and how it inevitably differs in different territories and the understanding given to the purpose and focus of archaeological research which will differ in one country from another, so that very different research traditions may exist, leading to a differential emphasis on types of material. In the UK, for instance, the treatment of different types of material is very often the same regardless of physical form or age. Prehistoric structures in the countryside can be treated in exactly the same way as medieval ruins in a city, and ancient monuments (a legal category that in England now includes some material from the twentieth century) can be placed upon a schedule, while standing buildings can be placed upon a list, both of which offer some form of legal protection. There are other territories, however, where differences in age make a substantial difference. Material from a preliterate past may be treated very differently from material emanating from historical times, or one period of history – or material representing

a particular way of life – may be more highly valued than another, making one subject to legal control and protection, while the other is abandoned to its fate. In the USA, for instance, buried remains of the indigenous population are subject to forms of federal legal control, while the remains of (sometimes contemporary) colonizing Europeans are excluded from this coverage. Such differences will make any direct comparison of UK and US laws rather meaningless, since they are grounded in very different historical circumstances, are driven by very different political and cultural imperatives, and concern significantly different categories of person. At root, therefore, UK and US legislation in this area do not concern the same types of material.

Any set of national laws will also need to be read in accordance with specific standards. These "rules of construction" are quite precise and are often themselves enshrined in law, ensuring that any law of the particular state will be interpreted in the same way as any other and thus guarantee consistency in application. These rules do not, however, cross territorial and jurisdictional boundaries. A brief introduction to some of the key differences that can exist is set out by Prott and O'Keefe (1984: 150–151) and another by Summers and Taruffo (1991: 501), but for specific advice on how to read laws in particular jurisdictions, more precise legal guidance needs to be sought. In particular, there are gross differences between the manner of interpreting laws between systems of legal Codes and the principles of Common Law. All start from the premise that laws are written and composed of words: the question arises as to how to understand the meaning and intent behind certain words and phrases.

Codification of Law: France

As conveniently summarized by Troper et al. (1991: 171), a distinguishing feature of French legal culture is that it is "one of written law. . .. to a large extent codified." The effect of codification is to offer a body of law that is complete and contains no contradictions or elisions: it therefore does not allow opportunities for avoidance or evasion, or for circumstances that are not covered by it. Accordingly, where the law is silent on an issue, it becomes the task of interpreters to fill that silence: either by simply not recognizing the omission or – more likely – by recognizing that the "gap" in legal coverage is a result of the legislator's inability to think of everything in advance and thus prevailing upon the interpreter to do so (Troper et al. 1991: 175–176). It is generally assumed that the legislators intend all laws to comply with the Constitution, and so laws will be interpreted to ensure this (Troper et al. 1991: 195), and that the administration works for the good of the common interest (Troper et al. 1991: 196) although laws restricting liberties are interpreted more strictly (Troper et al. 1991: 202).

Although as elsewhere in the world (see below) interpreters seek the "true" meaning of a law and the intention of the lawmaker, the materials they are allowed to draw upon are very wide rather than being constrained (as elsewhere) by tight legal rules (Troper et al. 1991: 184–189). These may include:

- The historical background to the law
- Documents used in drafting the law, including drafts and consultations
- Interpretations by users of the law, especially public officials
- The language of other, related, laws
- The language of laws amended by the one in question
- The history of legal terminology
- The effect particular interpretations would have in terms of the national Constitution or international treaty obligations
- Customary procedures and practices that would otherwise be affected

Interestingly, especially for comparison with the USA and UK (see below), interpretations by other courts are rarely drawn upon, although those of superior courts within the same hierarchy may be.

Overall, French law is seen as a unity that governs all those it rules. Interpreters of law – that is, the courts – are seen not at all to make law but simply to seek the lawmaker's intention. Accordingly, in filling "gaps" not covered by a specific legal phraseology, they are seen only to be

expressing the will and intent of the legislator rather than making new law or extending its coverage. All laws are interpreted in the light of the overarching Code of which they are a part: it follows that no French law "stands alone" but must be read as part of a coherent and cohesive system that effectively recognizes no differences of status or standing or of exception. As Summers and Taruffo (1991: 501) see it, in French law there are no genuine issues of interpretation, and only one meaning is ever possible, and it is this that interpreters must seek.

A Federal Common Law State: The USA

The French case is very different from that of the USA. While France is a single state, the USA is a federal one, divided into 50 jurisdictions governed by a federal Constitution. All laws of every state and federal law (a jurisdiction in itself) must ultimately comply with the Constitution: as in France, compliance will generally be assumed unless demonstrated otherwise (Summers 1991: 443–444). In the case where a state law is in conflict with a federal law, the federal law prevails, but a statute will prevail over administrative regulation and usually the Common Law which underpins all law (Summers 1991: 444–445). Whereas in French law gaps in legal coverage are acknowledged, in the USA such gaps are generally treated as if they are simple matters of textual interpretation (Summers 1991: 411–412): the issue is one of particular words and their meanings rather than attempts to meet the standards of an overarching Code.

The materials that a US court may draw upon in making interpretations are at once wider than that in other territories and more tightly regulated. Materials that must be taken into account include:

- The language of the text and any titles, subheadings, and other terms relating directly to it (compare with the UK, below)
- Dictionaries and grammars which set out the "ordinary" meanings of words under examination
- Any legal definitions of terms
- The text of other related statutes
- Any prior, repealed, or modified laws
- Any official history of the passage of the law
- Particular historical circumstances the law was intended to address, which may now have altered
- General legal principles
- Interpretations by similar or higher courts
- Interpretations by officials charged with administering the law (Summers 1991: 422–427)

In addition, interpreters are expected (but not required) to take into account interpretations by other (nonofficial) users of the law, by courts in other jurisdictions, and those of senior legal academics. There are also materials expressly forbidden from consideration, such as the testimony of legislators as to what they believed the law to be and nonofficial documentation relating to the history of the legislation.

By contrast especially with France, the US system is one that openly acknowledges the possibility of alternative readings of legal texts (Summers and Taruffo 1991: 501). It follows that US courts have more of a lawmaking role than their French counterparts. The prior interpretation by other courts has also a much more important role here than is evident in the French system, and the authority of officials over legal interpretation is much less evident. Similarly, no requirement exists to make the law fit part of a broader code despite the overarching commitment to constitutionality.

A Unitary Common Law State: The UK

The role of the courts in the UK is not to make law but, similar to their role in France, only to interpret it. Accordingly, it is not the place of the courts to fill gaps in coverage but to leave this to legislators (Bankowski and MacCormick 1991: 362). The law is not codified, and therefore, in large measure, each piece of legislation stands alone and separate from others except where connections are expressly drawn (Bankowski and MacCormick 1991: 363): the focus of interpretation is therefore very much upon the strict interpretation of particular words and phrases rather than seeking to contextualize the whole (Bankowski and MacCormick 1991:

382). Interpretation is therefore an essentially pragmatic process of seeking the "ordinary signification" of words (Bankowski and MacCormick 1991: 382–386) rather than being driven by broader principle, as in France, or constitutionality, as in the USA. Nevertheless, there are certain underlying presumptions that guide the interpretive process: that absurdity is not an intent of legislators; that laws are designed to operate fairly; that laws do not (unless specifically indicating otherwise) operate retrospectively; and that existing laws remain unaffected unless the law specifically indicates otherwise (Bankowski and MacCormick 1991: 391–392). In the UK system, statutes will prevail over all other kinds of law but increasingly need to comply with laws made elsewhere, in particular EU legislation and certain international treaties (Bankowski and MacCormick 1991: 375).

As in the USA, interpreters may draw on certain materials, may use others or are barred from using others: however, the range of materials differs from that elsewhere. The primary source is the specific substantive language of the law itself, excluding any subheadings, titles, or marginal commentary which is only present to guide users to relevant texts and not to determine its meaning (Cross 1995) but including any "Interpretation" section which sets out the precise meanings certain words and phrases may carry. Any previous interpretation by a similar or higher court must also be drawn upon, together with any relevant subsidiary legislation which may bring the law into force (Bankowski and MacCormick 1991: 375). They may (but are not required) to refer to other laws on the same topic, government guides on good practice, any previous legal history of the terms, current usages of officials, and scholarly writings (Bankowski and MacCormick 1991: 376–380). Material expressly barred from consideration includes any information on the history of the law and economic or sociological data on the effects of particular readings (Bankowski and MacCormick 1991: 380–382).

In general, UK law is seen as a body of separate regulations, some of which stand entirely alone, and others which are grouped together, and are interpreted accordingly. Although general principles and assumptions guide the process, the focus is very much upon the specifics of individual provisions rather than the creation of a unified whole. Only those materials directly relevant to the point at issue are taken into account: extrinsic factors are barred because the courts would then be involved in making policy, which is not their role. The assumption – as in France – is that there is a single meaning lying behind a particular provision and the function of interpretation is to find it.

Differences in Reading Laws

These three examples offer a taste – albeit a small one – of how different sets of laws represent different legal ideologies and are therefore to be read differently from one another. In particular, the clear differences between laws that operate as part of a codified system and those that stand alone need to be taken into account, as do the specific materials that can be drawn upon for interpretation and those that cannot and the extent to which underlying principles regarding the presence of "gaps," absurdity, and contradiction may be applied. Although Summers and Taruffo (1991) take France and the USA as exemplary of opposed legal systems, here I have used them merely as examples, placed alongside a third, to illustrate diversity. An area not mentioned here has been international law, which is the topic of the next section.

International Laws and Their Coverage

Technically those materials referred to by (especially but not exclusively) heritage practitioners as "international law" in the field of heritage are not in fact law: rather, for the most part, they are sets of agreements between nation states whereby those states agree to a common standard of treatment for certain classes of object, either generally or in defined sets of circumstances. They may be agreements that are designed to operate globally – such as those promulgated by the United Nations or UNESCO – or regionally, such as those relating to Europe or the Americas. These laws are important in the field because they are taken to represent the global principles to which all those concerned with the heritage

Legislation in Archaeology: Overview and Introduction, Table 1 Main international instruments relating to the cultural heritage

Date	Promoted by (international organization)	Title
1954	UNESCO (portal.unesco.org)	Convention for the Protection of Cultural Property in the Event of Armed Conflict (Hague Convention)
1970		Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Cultural Property (Paris Convention)
1972		Convention concerning the Protection of the World Cultural and Natural Heritage
2001		Convention on the Protection of the Underwater Cultural Heritage
2003		Convention for the Safeguarding of the Intangible Cultural Heritage
2005		Convention on the Protection and Promotion of the Diversity of Cultural Expressions
1971	RAMSAR (http://www.ramsar.org)	RAMSAR Convention on Wetlands
1995	UNIDROIT (http://www.unidroit.org)	Convention on Stolen or Illegally Exported Cultural Objects
1954	Council of Europe (http://www.coe.int)	European Cultural Convention
1969 (revised 1992)		European Convention on the Protection of the Archaeological Heritage
1985		European Convention on Offences Relating to Cultural Property
		Convention for the Protection of the Architectural Heritage of Europe
1976	Organization of American States (http://www.oas.org)	Convention on Protection of the Archaeological, Historical, and Artistic Heritage of the American Nations

subscribe. Increasingly they are also taken as the basis for the passage of law at the national level. The main international laws in force at present are set out in Table 1.

Since they are promulgated by organizations composed of individual nation states, these international agreements are binding only upon the states acceding to them: they cannot be enforced against individuals or agencies unless they have also been incorporated into national laws, although this does not lift the responsibility from national governments to put in place appropriate arrangements to ensure compliance below the level of government. They are to be read and interpreted in a distinctive manner which reflects in many ways their purpose as setters of norms and guidance. Each such document begins with a preamble which sets out the conditions under which it was brought into existence and the purpose it serves: its specific provisions must be read in the light of these opening statements as to function rather than as stand-alone imperatives. This contrasts with the way in which laws are read at the level of some nation states which are binding on individual citizens and state and non-state agencies.

In addition to Conventions, the membership of international bodies such as UNESCO and the Council of Europe may also adopt Resolutions, which have much less legal force than a Convention but nevertheless provide guidance as to norms and expectations. These too are not binding upon individual and state and non-state agencies unless their provisions are adopted into national law, but they may also provide the basis on which future Conventions are constructed. Other international organizations also contribute to international law in this area, in a more substantive manner. The European Union is concerned primarily with economic and political issues, leaving matters of culture to the broader membership of the Council of Europe, but recent changes in the

EU have allowed it to consider cultural matters, and these may become more significant as time moves on. However, as part of its economic remit, it brought forward in 1992 two legal instruments relating to the movement of cultural items into and out of the EU and between member states. The terms of the Directive on the Return of Cultural Objects Unlawfully Removed from the Territory of a Member State will need to be incorporated into national laws before it takes full effect, but this must be done to a set timetable; the Regulation on the export of cultural goods – which places limitations on the export of such items outside the EU – had immediate and direct effect on member states and their citizens.

Like all legislative arrangements, some international instruments purport to relate to all aspects of heritage, such as the UNESCO World Heritage Convention, the European Cultural Convention, and the OAS Convention. Others concern all matters relating to particular types of heritage object, such as the RAMSAR Convention on Wetlands, the European Conventions which separately treat the archaeological and architectural heritage, and the UNESCO Conventions on underwater and intangible heritages. Others attempt to address particular issues that affect cultural objects, such as the UNESCO Hague and Paris Conventions, the UNIDROIT Convention, and the European Union measures in relation to the movement of cultural objects. The Paris and UNIDROIT Conventions and the EU measures all relate in particular to the issue of the illicit acquisition, movement, and transfer of cultural objects from one state to another: whereas most international law seeks to provide guidance and to set standards, these measures endeavor to go further by regulating behavior. In this way they are acting much more like national laws.

Not all states choose to accede to all international laws in this field. In some cases it will be because they consider they lack the resources to meet the standards required by that law; in others – particularly developed states in the West – that they already have laws and mechanisms in place that meet or surpass those of the particular instrument. In some cases it may be felt that the particular instrument – although perhaps introduced by the state in question – is aimed at the practices of other states who do not meet the standard set. In others it will be because it challenges or threatens a particular national interest, such as an economic interest. Failures to accede inevitably weaken the effect of such laws since they cannot be enforced against states that have not done so. In turn this may affect the capacity of the instrument to act as a measure of minimum performance and an international standard. At the same time, such laws have been criticized for adopting a specifically Western approach to ideas of cultural heritage, constructed around notions of the built and monumental heritage, rather than heritages of practice and belief. Such criticisms have led to a refocusing especially by UNESCO on such ideas as the "intangible heritage" and "cultural diversity," reflected in instruments promulgated in the early part of this century. These represent new approaches to the cultural heritage which can be expected to have influence at the level of the nation state, although not all Western states have yet acceded to these new principles.

National Laws and Their Differences

Although references in the literature of the field to international measures are extensive and such laws are invariably treated in the literature of the field as significantly influential (e.g., Cleere 1989; Skeates 2000; Carman 2002; Smith 2004: 106), nevertheless attempts to assess their effect on law and practice at the key level of the nation state are limited. A project by the Council of Europe nevertheless attempted to do this for the European Conventions relating to the archaeological and architectural heritage, by a process of comparison of how different states put the requirements of the Conventions into effect (Pickard 2001). As would possibly be expected, the range of 13 countries from all parts of Europe – some well established, others newly emergent – provided evidence of a wide diversity of treatment, organization, and focus together with different levels of compliance with the Conventions. The project focused in particular on the following aspects of heritage management in each territory:

- Definition of the heritage, including systems of categorization and selection criteria
- Processes of identification and styles of inventories and recording
- Measures to protect, preserve, and prevent damage
- Conservation philosophy, including attitudes to reconstruction and refurbishment
- Sanctions for breach of regulations and coercive measures in place
- Integration of conservation with other planning and land-use regulation
- Financial provisions, including sources of funding, tax regimes, and economic development programs
- The role and structure of relevant agencies and organizations
- Provision for the education and training of staff

The discussion usefully highlights differences between individual countries but also indicates areas few or none have yet addressed, pointing to the future influence likely to be wielded by regional rather than purely national approaches (Pickard 2001: 4–10). Here, I wish to outline the areas where legislative provisions can take a different approach in different parts of the world. These areas are in particular:

- Ways of defining and specifying the object of such laws
- How different bodies of material are addressed in laws
- Issues of rights of ownership and control
- The kinds of sanctions which may be applied

Depending on the system of law in place, the approach taken in these areas will correlate quite closely.

Defining and Specifying Material

There are several ways in which the material covered by a law or a body of law may be described, set out by Prott and O'Keefe (1984: 184–187) as enumeration, categorization, and classification. *Enumeration* is a system of lists of the kinds of material to be covered: this is typical of US federal laws in this area (US Department of the Interior 1989–90) and has been to some extent adopted in the UK for the purpose of describing the kinds of objects that can be considered for the purposes of legal protection (Carman 1996: 120–124 and 187–192). The problem with this approach is that it leaves open the question of whether items not on the list but of a similar kind can be included: for example, if the list specifies "graves and burial sites," does this also cover aboveground disposal of the dead? *Categorization* is a looser approach whereby a broad description of types of material is provided, into which a range of particular objects may fall. The problem of this approach is that too narrow a definition may exclude objects of concern, while too broad a definition may include too much material. By contrast with both, *classification* is not concerned with the form of the object, but with actions taken towards it: in such a system, only those objects officially recognized and designated as such by a responsible authority can be granted protection. While convenient and transparent, the system has the flaw of only recognizing those objects that have been specifically designated, leaving others of similar nature to their fate. At the same time, it is worth noting that these different systems are by no means exclusive. It is possible to use them in combination, so that the list under an enumerative scheme may include categories, while a scheme of categorization may also enumerate particular types of object, and a classificatory scheme may operate in respect of items enumerated or categorized.

These differences represent contrasting approaches to the cultural heritage as a phenomenon as well as the structure of law. Where only designated material is covered by law, the emphasis is placed upon the relevant authority and its decisions; where material is enumerated, anything included is automatically covered, removing authority from agencies and placing it more generally; under schemes of categorization, a measure of interpretation is required, placing some but not all focus upon agencies. An enumerative scheme assumes a solid understanding of the kinds of materials and places constituting the heritage: by its nature, anything not listed is excluded. A scheme of categorization has a greater capacity for the inclusion of new types of material, especially if the categories are drawn not

on the basis of physical form or attributes (e.g., state of ruination or age) but on value ascriptions (e.g., "of architectural, archaeological, etc., interest or importance"). Paradoxically, the greatest flexibility may exist under a scheme of designation, so long as the capacity to designate is drawn widely: if it is limited by enumeration or categorization, then it is significantly less able to include new types of material.

Addressing Different Bodies of Material

The range of objects that can be classed as cultural resources is wide, ranging from individual moveable objects singly or in groups; to upstanding buildings in use, ruined buildings and structures, earthwork sites, buried features, scatters of material, and natural features used by humans; to entire landscapes, built and natural (Carman 2002: 30–57). Under systems of law, the ways of treating them may be as varied as the material itself. In some regimes, all cultural material of whatever kind is treated under the same body of law: while different objects may be treated in particular ways, the overall scheme is common to all classes of material. By contrast, others make a clear distinction between particular kinds of object, so they are not only treated differently but are also subject to different bodies of law. In those cases where a single, overarching national antiquities law covers all cultural objects, no distinction is drawn between individual bodies of material. Regardless of whether the object is a moveable object, a scatter of material, a ruin or a buried feature, an upstanding building, or a landscape, it will be subject to the same regime, effectively rendering them all a single class of object for legal purposes.

By contrast, other regimes make a clear distinction between particular kinds of object, so they are not only treated differently but are also subject to different bodies of law. Distinctions may be drawn on the basis of the physical properties or attributes of the material, so that moveable objects are differentiated from fixed monuments and sites, and the latter perhaps from upstanding buildings in use. While moveable objects are subject to laws concerning ownership and their placement in museums or other archives, fixed sites and monuments may be subject to official protection in the care of the state, while buildings in use are subject to controls on use and alteration. Alternatively, distinctions may be drawn on the basis of whose heritage the object represents: in states where an indigenous population may claim rights over its cultural material, such as the Americas or Australia, such material will be treated differently from the historic heritage of the incoming European population. Here, a distinction between prehistoric (i.e., pre-European contact) material and historic (colonial period) material is effectively drawn: but it is in fact not a distinction based upon age but upon putative cultural origin. European states – except those where an indigenous population dwells, such as in northern Scandinavia and Russia – and numbers of states in Africa and Asia (although not all), generally have no need of such a distinction, and material of all periods is capable of treatment under the same regime, although distinctions between different types of object may also be maintained.

Ownership Versus Control

As Prott and O'Keefe (1984: 189) point out, "it is not usually necessary to have ownership of [material] in order to regulate what may be done in relation to it." Nevertheless, as they go on to add (Prott and O'Keefe 1984: 191), a number of states across the globe do claim a right of ownership of certain classes of cultural material from the moment of discovery. While in most cases this right of ownership applies only to removable material – which will most likely find its way into a museum or archive – in some cases it applies also to the land on which they were found (Prott and O'Keefe 1984: 195). Alternatively, material and land may become subject to compulsory acquisition by the state unless certain conditions (such as the deposition of material in a suitable archive) are met. This "nationalization" of the cultural heritage has a number of advantages:

- It is a coherent and transparent process applied equally to all.
- It ensures full control by appropriate agencies over the fate of material.
- It associates such material with the entire community as represented by the nation state.
- It is simple.

However, it rides roughshod over private rights and may encourage finders to fail to report or record finds.

An alternative to state ownership is to provide for the regulation of the treatment of cultural material while allowing private ownership of that material. This may involve drawing distinctions between material on the basis of its type and circumstances of discovery so that some material is the property of the state, while other material of similar kind is not: this is the case, for instance, with the laws of Treasure Trove and Treasure in England (Carman 1996: 55–61; Bland 2004). Alternatively, the "cultural" component of the material may become controlled by state agencies, while the object itself remains the property of another: this is sometimes the case with upstanding monuments, where the land on which it stands and in which it is rooted remains the property of the landowner, but the monument passes into state control; in such cases, the landowner continues to have use of the land but is subject to limitations on treatment of the monument. A third way is to place controls on the use of land either to prevent damage to existing archaeology or such that the presence of archaeology is so far as possible taken into account before the discovery of cultural material: decisions regarding the fate of any such material will therefore have been taken before any work commences, and where significant material is to be encountered, work likely to damage it may be completely prevented. In cases such as these, laws and administrative arrangements to put them into force will be more complex and potentially more costly but if effective can develop a measure of public support for the project of cultural heritage protection, limiting the problems of avoidance.

Public and Private Agencies

The role of state agencies will differ whether the laws provide for state ownership or state controls on private ownership of cultural material. In the first case, all authority over cultural remains will lie with the state. In the second, state agencies will need to interact and compromise with others who retain an interest in the material.

By far the most common approach is that of central regulation by state control, in which heritage objects are deemed to be the property and thus the responsibility of the nation state and its agencies. Under such a system, only those accredited by the state – frequently its employees but also those granted specific licences – are entitled to conduct archaeological or conservation work. Accordingly, excavation by anyone else is commonly a criminal activity. In theory at least, all building and other work will cease when archaeological remains are encountered and state-employed archaeologists will move onto the site. In practice, however, limitations apply on this potentially draconian system. Small developments will be allowed to proceed unhindered, government-sponsored projects may also proceed without the interference of an archaeologist, and, in many countries where such systems apply, lack of resources will result in incomplete coverage. Nevertheless, the ideal of such a system is a very powerful idea and dominates much thinking in the heritage field. It is the ideal assumed to exist by most international agencies such as UNESCO, and very often those territories or areas not applying this approach can be thought to be deficient. Here, archaeology is a cost carried out of taxation levied on the entire community in whose service it is deemed to exist.

The alternative system, which applies mostly in Anglophone countries such as the UK, USA, and Australia, is that of a partially privatized archaeology. This is essentially a private enterprise system under a measure of regulation by state and state-empowered authorities. In general there will be no limitation on who may carry out archaeological work, although professional bodies will seek to encourage the employment of those accredited by them. Excavation itself will most often be carried out as a result of the need to mitigate the damage of archaeological remains by development projects. In the USA material of "scientific significance" may need to be retrieved or preserved; in the UK, the emphasis is theoretically upon preservation in situ but frequently results in rescue excavation and so-called preservation by record. Where development work reveals archaeological remains, the developer

will be responsible for employing archaeologists to carry out appropriate work, monitored by the local authority to ensure proper standards of recording. Here, archaeology is a cost levied on the developer, treating damage to the heritage as a form of pollution and applying the principle of "the polluter pays" for restitution. This is archaeology as enterprise, although never completely unregulated, and much of the discussion of such systems turns upon issues of regulation and control rather than freedom of action.

Sanctions and Penalties

There are two aspects to the issue of sanctions and penalties applied for breach of laws relating to the archaeological resource: to what kinds of offences they relate and the types of sanction applied. Depending on the kind of regime in place – a state-ownership regime or a "privatized" regime – particular attitudes as to the severity of breach and what types of breach are more serious will prevail, reflected in the sanctions applied both theoretically and in practice. The range of sanctions available runs the full scale of penalties for breach of any kind of law: from prison terms through fines where breach is considered a criminal matter to civil remedies such as damages and carrying the cost of restoration and repair and the confiscation of material. Such penalties may be combined so that a person in breach may have to carry out reparation and pay a fine or serve a prison term. As Pickard (2001: 329) points out, however, such powerful sanctions tend not to be applied: prosecutions may be rare and the penalties awarded relatively light.

Where archaeological material is held to be the property of the state, criminal sanctions are more likely to apply to those who claim it for themselves. It is frequently a breach of criminal law to export such material without the proper authority, and sometimes any private appropriation of such material will be considered a form of theft. In some territories, although private ownership is allowed, penalties apply for the non-reporting of finds (Prott and O'Keefe 1984: 209–210 and 215–216). An alternative is to reward finders for reporting: they may be allowed to retain the find without penalty, or receive payment for its delivery to a suitable repository. Where private ownership of material is the accepted norm, specific provisions may apply to particular classes of material – either on the basis of its attributes, such as its form or material, or on the basis of its context of discovery, such as its location when found, or the process by which it came to light. Accordingly, for the bulk of archaeological material, normal rules for the allocation of ownership will apply, but certain material may become the property of the state. In such cases a need to report may apply to all material or only that owned by the state: in the latter case, provision may nevertheless be made for the voluntary reporting of finds.

Penalties also accrue to those who may damage or destroy archaeological sites and monuments and historic buildings. In some cases, where these are owned by or in the care of the state, the penalties will be criminal, involving fine or prison. In other cases they will be civil, such as reparation or damages. Where arrangements are in place for the control of construction and development work, archaeological remains may be included among those factors to be considered. In such a case, where the likelihood of damage to archaeological remains is envisaged, the proposed work may be prevented altogether but is more likely to have controls placed upon it: for redesign to avoid affecting significant archaeological material, or for advance investigation of such material at the cost of the developer. Failure to comply may result in a fine or the imposition of further controls on development work. In similar vein, some Latin American states may apply sanctions to unsatisfactory excavators for poor quality archaeological work (Prott and O'Keefe 1984: 305): such penalties will involve the cancellation of licences to conduct work in the territory concerned.

Conclusion

It is likely that the kinds of differences between national laws outlined briefly here in some way correlate. Accordingly, where a single body of law applies to all cultural objects, they may also be subject to direct state ownership and control, allow for no non-state agency involvement, and apply at least theoretically strict criminal

sanctions. Where distinctions are made between types of object, different ownership regimes may exist side by side, there may be a measure of non-state involvement in archaeology, and sanctions may be relatively light and civil rather than criminal. To date, however, and despite the work of Prott and O'Keefe (1984) and others (e.g., heritagelaw.org), no substantial work of this nature has yet been completed, so these suggested likely correlations remain only as plausible assertions. Nevertheless, whether or not these types of correlations exist in reality, the crucial point is that differences between legal regimes are not mere matters of administrative convenience: in the same way as the differences of legal interpretation covered above, they represent fundamental differences of ideology in terms of what law is for, where authority resides, and the nature of the cultural heritage. In thus approaching national laws, it is necessary to be sensitive to the kinds of ideology represented and the attitudes towards and expectations of both law and heritage they carry.

The Professionalization of Archaeology

The application of legislation in the field of archaeology and its regulation under law is one of the factors that has encouraged the increasing professionalization of the field. The regulatory influence of official organizations allows them to produce standard-setting documentation which influence practice and require to be met if work is to be granted to those at whom they are aimed: a number of state agencies accordingly have adopted such a nonlegislative approach to controls on archaeological work. Parks Canada, for instance, publish as part of their website (http://parkscanada.pch.gc.ca/library/PC_Guiding_Principles/) their *Cultural Resource Management Policy* setting out the principles guiding their treatment of the historic places in their care. In the UK, English Heritage seek to guide the conduct of publicly funded archaeological work by encouraging a particular managerial approach (English Heritage 1991). English Heritage were also responsible for producing the nationally applicable guidelines for local authorities on the treatment of archaeological sites under threat from development projects (DoE 1990), and their application and effectiveness is monitored by them. The message of such products – whether international or national – is that of the particular expertise of the people responsible for them, which in turn further encourages the professionalization of the discipline as a whole.

In combination with laws and regulatory procedures, systems of self-supervision and oversight create a climate where archaeology operates inevitably as part of systems of governance. Although not widely discussed in these terms (but see Smith 2004: 58–80), the point is recognized by others with an interest in the material remains of the past. Especially in those jurisdictions governed by a tradition of Common Law and private property rather than state control and ownership, those who object to giving control over the past to a "closed" profession, and despite their own inclination towards individualism, organize themselves into groups who may then propagate their own codes of practice and standards of behavior, effectively "professionalizing" an anti-archaeologist stance. This is to some extent the situation in the UK in respect of amateur metal detectors and treasure hunters, many of whom work in association with archaeologists and others. The voluntary Portable Antiquities Scheme – whereby finds are reported and the information made publicly available (http://www.finds.org.uk; Bland 2004) – is given support by the code of practice of the National Council for Metal Detecting (http://www.ncmd.co.uk) among others.

Conclusion

The key points to note from this overview of law and regulation in archaeology are the variations in approaches to law in the field: these in turn represent not mere habit and local practice but real differences in ideology and approach. Where a system is based upon close control by central government, it represents a very different understanding of the purpose and role of archaeology in society from one where private ownership is upheld and regulations are looser and more flexible. These are differences that matter, especially in relation to study or work in an area new to one: ideas that are the norm in one territory do not

transfer simply to another. Such differences are reflected in how archaeologists are trained and qualified, the relations between archaeologists and the state, relations between archaeologists, between archaeologists and others interested in the past, and between archaeologists and the wider public.

Cross-References

- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Australia: Indigenous Cultural Property Return
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Charter for the Conservation of Historic Towns and Urban Areas (Washington 1987)
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ Conservation and Management of Archaeological Sites
- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)
- ▶ European Convention on the Protection of Archaeological Heritage (1992)
- ▶ Florence Charter on Historic Gardens (1982)
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
- ▶ International Journal of Cultural Property
- ▶ Latin America: Indigenous Peoples' Rights
- ▶ Legislation in Archaeology: Overview and Introduction
- ▶ Machu Picchu Artifacts: Repatriation
- ▶ Norms of Quito (1967)
- ▶ Parthenon (Elgin) Marbles: Case Study
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (1995)
- ▶ US Domestic Archaeological Heritage Law
- ▶ USA and Mexico (1970): Bilateral Treaties and Patrimonial Property Restitution
- ▶ Vermillion Accord on Human Remains (1989) (Legislation)

References

Bankowski, Z., and D.N. MacCormick. 1991. Statutory interpretation in the United Kingdom. In *Interpreting statutes: A comparative study*, ed. D.N. MacCormick and R.S. Summers, 359–406. Aldershot: Dartmouth Publishing.

Bland, R. 2004. The Treasure Act and the portable antiquities scheme: A case study in developing public archaeology. In *Public archaeology*, ed. N. Merriman, 272–291. London: Routledge.

Breeze, D. 1996. Archaeological nationalism as defined by law in Britain. In *Nationalism and archaeology*. Scottish Archaeological Forum, ed. J.A. Atkinson, I. Banks, and J. O'Sullivan, 95–103. Glasgow: Cruithne Press.

Burnham, B. 1974. *The protection of cultural property: Handbook of national legislations*. Paris: ICOM.

Carman, J. 1996. *Valuing ancient things: Archaeology and law in England*. London: Leicester University Press.

Carman, J. 2002. *Archaeology and heritage: An introduction*. London/New York: Continuum.

Carman, J. 2012. Towards an international comparative history of archaeological heritage management. In *The Oxford handbook of public archaeology*, ed. R. Skeates, C. McDavid, and J. Carman, 13–35. Oxford: Oxford University Press.

Cleere, H.F., ed. 1984. *Approaches to the archaeological heritage*. Cambridge: University Press.

Cleere, H.F. 1989. *Archaeological heritage management in the modern world*. One World Archaeology 9. London: Unwin Hyman.

Cross, R. 1995. *Statutory interpretation*. 3rd ed. London: Blackwell.

Department of the Environment. 1990. *Archaeology and planning: Planning policy guideline note No. 16*. London: Department of the Environment.

Dickerson, R. 1975. *The interpretation and application of statutes*. Boston: Little Brown.
Dörge, H. 1971. *Das Recht der Denkmalpflege in Baden-Württemberg*. Stuttgart: Kohlhammer.
Dromgoole, S., ed. 1999. *Legal protection of the underwater cultural heritage: National and international perspectives*. The Hague: Kluwer.
Eberl, W., W. Schidermair, and M. Petzet. 1975. *Bayerisches Denkmalschutzgesetz*. Munich: Deutscher Gemeindeverlag.
English Heritage. 1991. *Managing archaeological projects (MAP 2)*. London: English Heritage.
Fourmile, H. 1996. The law of the land: Whose law? Whose land? In *Issues in management archaeology*, ed. A. Clark and L. Smith, 45–50. St. Lucia: Tempus Publications, University of Queensland.
Hangartner, Y. 1981. *Rechtsfragen der Denkmalpflege*. St Gallen: Schweizerisches Institut für Verwaltungskurse der Hochschule St Gallen.
Hocke, M. 1975. *Denkmalschutz in Österreich*. Vienna: Jupiter-Verlag.
Hunter, J., and I. Ralston, eds. 2007. *Archaeological resource management in the UK: An introduction*. 2nd ed. Stroud: Sutton.
King, J.L., R.L. Gonzalez, and M. del Refugio Gonzalez. 1980. *Archaeologia y Derechoen México*. México: Universidad Nacional Autónoma de México.
Knudson, R. 1986. Contemporary cultural resource management. In *American archaeology past and future: A celebration of the Society for American Archaeology 1935–1985*, ed. D.J. Meltzer, D.D. Fowler, and J.A. Sabloff, 395–414. Washington, DC: Smithsonian Institution.
MacCormick, D.N., and R.S. Summers, eds. 1991. *Interpreting statutes: A comparative study*. Aldershot: Dartmouth Publishing.
McGimsey, C.R. 1972. *Public archaeology*. New York: Seminar Books.
Pickard, R., ed. 2001. *Policy and law in heritage conservation*. London/New York: Spon.
Prott, L.V., and P.J. O'Keefe. 1984. *Law and the cultural heritage, volume 1: Discovery and excavation*. Abingdon: Professional Books.
Pugh-Smith, J., and J. Samuels. 1996. *Archaeology in law*. London: Sweet & Maxwell.
Rigambert, C. 1996. *Le droit de l'archéologie francaise*. Paris: Picard.
Skeates, R. 2000. *Debating the archaeological heritage*. London: Duckworth.
Smith, L. 2004. *Archaeological theory and the politics of cultural heritage*. London: Routledge.
Summers, R.S. 1991. Statutory interpretation in the United States. In *Interpreting statutes: A comparative study*, ed. D.N. MacCormick and R.S. Summers, 407–460. Aldershot: Dartmouth Publishing.
Summers, R.S., and M. Taruffo. 1991. Interpretation and comparative analysis. In *Interpreting statutes: A comparative study*, ed. D.N. MacCormick and R.S. Summers, 461–510. Aldershot: Dartmouth Publishing.
Tarello, G. 1980. *L'interpretazione della legge*. Milan: Giuffry.
Troper, M., C. Grzegorczyk, and J.-L. Gardies. 1991. Statutory interpretation in France. In *Interpreting statutes: A comparative study*, ed. D.N. MacCormick and R.S. Summers, 171–212. Aldershot: Dartmouth Publishing.
U.S. Department of the Interior. 1989–90. *Federal historic preservation laws*. Edit. S.K. Blumenthal. Washington: US Department of the Interior.

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Basic Biographical Information

Daniel Lenihan grew up on the lower east side of New York City. He attended Guilford College in Greensboro, North Carolina, and graduated with a B.A. in Philosophy. His interest in Philosophy stemmed from a deep fascination for understanding human strategies for living, which had a profound impact on his future career choices.

After graduating, Lenihan taught fifth grade in the Virgin Islands. There, he was exposed to diving through a half-day course at a local dive shop. Dan dived with neighbor Alan Albright, who later became the South Carolina underwater archaeologist, and Alan's dive buddy, the Smithsonian's Mendel Peterson. After exposure to diving on cultural resources, in 1971 Dan enrolled at Florida State University for graduate school to study underwater archaeology but thought diving was more captivating than archaeology.

Lenihan spent his days at the University and his nights diving, often in sinkholes and caves, becoming a member of a group of expert cave divers in Florida, leading to his certification as one of the first instructors with the National Association for Cave Diving. In his coursework, Lenihan put more emphasis on studying

anthropology than archaeology because he felt more of an intellectual draw to it, seeing it as a form of applied philosophy. From this, Dan developed his foundational belief that archaeology is a tool to explore human strategies for living, but that if archaeology is not anthropology, it's not living up to its potential. Later, after some time with the NPS, he added to that belief that if archaeology is not historic preservation, it is not satisfying its obligations.

In 1972, as a Teaching Assistant in graduate school, Dan began his work for the National Park Service (NPS) in a temporary position as an underwater archaeologist under the direction of George Fischer. Dan's roles on his first field project, a shipwreck survey at Gulf Island National Seashore, were archaeologist and dive supervisor. He enforced a strict dive program believing that the transition to working underwater was more than just a safety issue, and professional research divers, including archaeologists, could not simply adapt to working underwater, but rather had to work towards doing it efficiently and effectively.

He completed his M.A. in Anthropology in 1973 and continued to work as a temporary NPS archaeologist. In 1974 he moved to New Mexico and began working for Calvin Cummings, lead archaeologist for the Southwest Region, doing terrestrial archaeology with states and the military. He also developed the underwater program for the Southwest Regional Office and became the Regional Dive Officer.

Major Accomplishments

In the mid-1970s, increased reservoir construction revealed uncertainties about what effects inundation had on cultural resources. Federal bureaucrats wanted a resolution and in 1975, because of its preservation ethic, the NPS received funding for the National Reservoir Inundation Study (NRIS). Despite Lenihan's reservations about taking on such a project, Cummings convinced him that this was the gateway to a permanent underwater archaeology program for the NPS. In 1976, Lenihan and crew began fieldwork conducted throughout the western United States to investigate the impacts from inundation. The study was one of the first in underwater archaeology to do a scientific research design based on strict archaeological theory and method. Though Processual Archaeology was beginning to be widely accepted and used, the discipline of underwater archaeology was nascent and most other practitioners had not yet adopted that framework.

At the conclusion of the NRIS (see Lenihan et al. 1981a, b), the assets of the project became the Submerged Cultural Resources Unit (SCRU), a national program of the NPS created to assist parks with underwater archaeological management. In addition, SCRU was the only team of underwater archaeologists in the federal government, and as a result, the team provided service for other agencies and nations as well.

In 1981, Dan suggested and helped organize the School of American Research Advanced Seminar on Shipwreck Anthropology, leading to a publication 2 years later. During the seminar, chaired by Richard Gould, professionals assessed the anthropological significance of shipwrecks and, in doing so, provided an introspective into the budding field of professional underwater archaeology. Dan insisted that solid concepts of research design, research strategy, and theory are critical to professional underwater research; however, he had not seen this framework used in the field and criticized colleagues for conducting projects without scientific methodology (Lenihan 1983: 48). His paper, still considered groundbreaking in the field today, concluded by providing a theoretical basis for the anthropological value of a shipwreck. Lenihan outlined hopes that archaeologists in 2030 would reflect on the development of the field in the late twentieth century, "wherein shipwreck studies where characterized by rich, interdisciplinary efforts conducted with the benefit of explicit research designs and a strong sensitivity for the fragile, nonrenewable nature of the resource" (Lenihan 1983: 64). Dan's critical understanding of an emerging field demonstrates why he did not have to wait 50 years for those three tenets to

become the framework upon which most professional underwater archaeologists today build their research.

Dan spent the following 20 years as Chief of SCRU. He worked on numerous projects all over the country and territories from the Aleutians to the Dry Tortugas, and from the Great Lakes to Kosrae, the Virgin Islands, and Guam. He led the efforts on creating an intricate 3D model of the USS *Arizona* and provided the US Government information it needed to allow divers to explore the no longer radioactive test sites at Bikini Atoll.

On the day of his retirement from Chief of the SRC, Dan was working at the USS *Arizona* Memorial and came back the following day as an employee. He left his position with the NPS in 2009 after 37 years of federal service, but continues to volunteer for the Submerged Resources Center.

Among his greatest contributions to the field are some of the critical theoretical and methodological doctrines with which professionals conduct underwater archaeology. The job of the archaeologist, according to Lenihan, is to assess evidence left behind using a purely scientific approach, to acquire, describe, and explain data in order to understand human strategies for living on the planet. Archaeology is a tool that can aid in achieving the desired outcome of evaluating human decision making, and doing so underwater is especially challenging. Ultimately, historic preservation is the outcome of archaeology and the obligation of any archaeologist is to save the past and pass it down to future generations. While this ideal forms the basis of the enabling legislation for the NPS, it also forms the foundation upon which Lenihan built his career.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Archaeology as Anthropology
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Underwater Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

Lenihan, D.J. 1983. Rethinking shipwreck archaeology: A history of ideas and considerations for new directions. In *Shipwreck anthropology*, ed. R.A. Gould, 37–64. Albuquerque: School of American Research, University of New Mexico Press.

Lenihan, D.J., T.L. Carrell, S. Fosberg, L. Murphy, S.L. Rayl, and J.A. Ware. 1981a. *The final report of the National Reservoir Inundation Study, volume 1: Summary*. Santa Fe: Southwest Cultural Resources Center, National Park Service, U.S. Department of the Interior.

Lenihan, D.J., T.L. Carrell, S. Fosberg, L. Murphy, S.L. Rayl, and J.A. Ware. 1981b. *The final report of the National Reservoir Inundation Study, volume 2: Technical reports*. Santa Fe: Southwest Cultural Resources Center, National Park Service, U.S. Department of the Interior.

Further Reading

Delgado, J.P., D.J. Lenihan, and L.E. Murphy. 1991. *The archeology of the atomic bomb: A submerged cultural resources assessment of the sunken fleet of Operation Crossroads at Bikini and Kwajalein Atoll lagoons*. Southwest Cultural Resources Center Professional Papers 37. Santa Fe: Submerged Cultural Resources Unit, National Park Service, U.S. Department of the Interior.

Lenihan, D.J., ed. 1974. *Underwater archaeology in the National Park Service: A model for the management of submerged cultural resources*. Santa Fe: National Park Service, U.S. Department of the Interior.

Lenihan, D.J., ed. 1987. *Submerged cultural resources study: Isle Royale National Park*. Southwest Cultural Resources Center Professional Papers 8. Santa Fe: Submerged Cultural Resources Unit, National Park Service, U.S. Department of the Interior.

Lenihan, D.J., ed. 1989. *Submerged cultural resources study: USS Arizona Memorial and Pearl Harbor National Historic Landmark*. Southwest Cultural Resources Center Professional Papers 23. Santa Fe: Submerged Cultural Resources Unit, National Park Service, U.S. Department of the Interior.

Lenihan, D.J., ed. 1994. *Shipwrecks of Isle Royale National Park: The archeological survey*. Duluth: Lake Superior Port Cities, Inc.

Lenihan, D.J. 2000. Of strawberries, women's thighs and Jim Delgado's paper. *Historical Archaeology* 34 (4): 22–23.

Lenihan, D.J. 2002. *Submerged: Adventures of America's most elite underwater archeology team*. New York: Newmarket Press.

Lenihan, D.J., and J.D. Brooks. 1998. *Underwater wonders of the National Parks*. Oakland: National Park Foundation/Compass American Guides, Fodor Travel Publications.

Lentil: Origins and Development

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Basic Species Information

Lentil is the common English name of the cultivated legume, *Lens culinaris* Medik. The genus, *Lens*, is in the plant family Fabaceae, in the subfamily Papilionoindeae, and in the tribe Vicieae. Lentil ranks fifth in the world's production of seed legumes, after soybean (*Glycine max* L.), pea (*Pisum sativum*), chickpea (*Cicer arietinum*), and cow pea (*Vigna unguiculata*). It is grown worldwide and the largest producing country is Canada, followed by India, Turkey, and the United States (http://faostat.fao.org). The global success of this crop is due largely to the high protein content of its seeds (25%) and therefore its use as a common meat substitute (Zohary 1995). In addition to being a companion to a starch-rich diet of cereal-based agriculture, legumes are a valuable resource in restoring nitrogen to the soil as they are able to fix atmospheric nitrogen and replenish soil fertility (Zohary et al. 2012).

Lens culinaris was domesticated in Southwest Asia and spread from this region during the "first wave" of crop dispersals beginning in the Early Pre-Pottery Neolithic. It spread with the "founder" crops, which include wheat, barley, flax, pea, bitter vetch, grass pea, and chickpea (Zohary et al. 2012). The wild progenitor of the cultivated species has been identified as *Lens culinaris* subsp. *orientalis*. While this progenitor is distributed through much of Southwest Asia and patchily through Central Asia, genetic variation and archaeobotany point towards a more restricted subzone of domestication in the Fertile Crescent (Fig. 1). The genus includes five other annual wild species restricted to the Mediterranean Basin, Southwest Asia, northern Afghanistan, and Central Asia (Cubero 1981; Zohary et al. 2012).

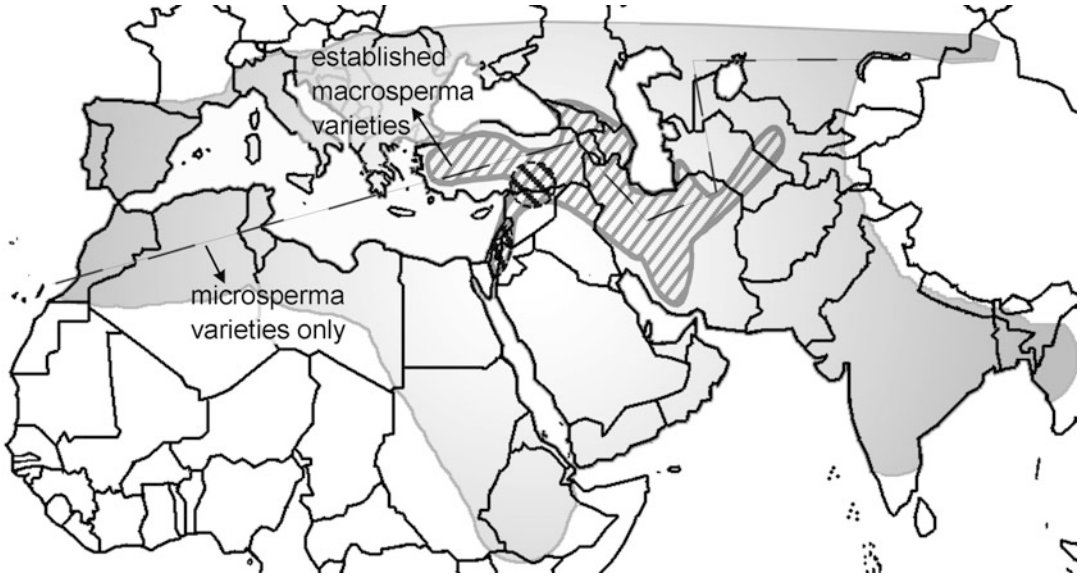

Lentil: Origins and Development, Fig. 1 Map illustrating the approximate maximal extent of traditional lentil cultivation, the range of the wild progenitor (gray diagonally hatched area), foci of earliest likely cultivation (two dark crosshatched areas), and the dividing line separating traditional *macrosperma* and *microsperma* landraces

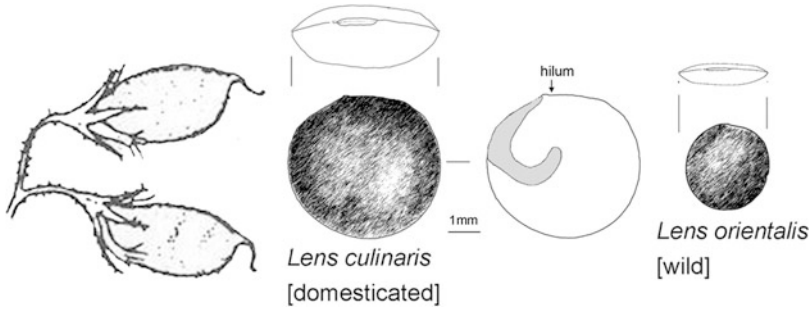

Lentil: Origins and Development, Fig. 2 Drawing of lentil pods and seeds, contrasting domesticated (*culinaris*) and wild (*orientalis*) seed sizes

Major Domestication Traits

The archaeobotanical evidence is most often in the form of charred seeds with only rarely the pods and pod fragments recovered. Lentil is the most commonly recovered pulse in archaeobotanical studies in the Near East which in part is due to its ability to survive carbonization better than fatter pulses. Seeds of lentil are identified based on morphology which is both flat and circular (Fig. 2). With domestication, seeds increase markedly in diameter (Fuller et al. 2012). The earliest archaeobotanical evidence for lentil comes from preagricultural sites located within the wild progenitor species' natural distribution including Epipalaeolithic Ohalo II (Kislev et al. 1992), Epipalaeolithic Abu Hureyra I, and Natufian Wadi Hammeh 27 (Fuller et al. 2012). Lentil cooccurs with cereals inferred to be under "pre-domestication cultivation" in the Pre-Pottery Neolithic A and Early Pre-Pottery Neolithic B in the southern and northern Levant (Fuller et al. 2011). In addition to evidence of the wild *L. culinaris* subsp. *orientalis*, there is evidence of the exploitation of wild *L. nigricans* from pre-farming sites in Greece, and this species may have been translocated as far west as Spain (Zohary et al. 2012; Fuller et al. 2012). By the Pre-Pottery Neolithic B phase, lentil is a common companion of cultivated wheat and barley with evidence of its spread to Cyprus. During the PPNB there is evidence for larger average diameters in comparison to Early Pre-Pottery Neolithic A specimens (Fuller et al. 2012). Lentils, along with wheat and barley, spread further westwards into Europe during the seventh and sixth millennia BCE, southwards to Egypt during the fifth millennia BCE, and eastwards to the Indian subcontinent, apparently via Afghanistan (Erskine et al. 2011), by 4000 BCE. Lentils were widespread in the Indus Valley and began to be grown in the monsoon zone of India between 2500 and 2000 BCE and are particularly common in the second millennium BCE (Fuller and Harvey 2006). Lentils had reached southern Arabia, both the Yemen and the United Arab Emirates, by c. 2500 BCE (Boivin and Fuller 2009).

Like all of the founder crops, *Lens* is self-pollinated, which was an advantage during the process of domestication because self-pollinated species are able to more easily fix desired genotypes by creating a barrier between cultivated and wild populations. As a result many interfertile landraces have evolved. The two main varieties are subsp. *microsperma* and subsp. *macrosperma*. The *microsperma* have small pods with small seeds, ranging in diameter from 3 to 6 mm. All of the early prehistoric archaeological specimens of domestic lentil are attributed to this variety (van Zeist 1982), as are all traditional landraces that spread to the south and east of the Fertile Crescent. The *macrosperma* varieties have larger pods and seeds, with a diameter ranging between 6 and 9 mm. This larger variety is considered the more established cultivar, and archaeobotanical evidence suggests this type developed in the first millennium BCE and is mainly restricted to Europe and North Africa (Cubero 1981; Zohary et al. 2012).

The primary traits of lentil that evolved under domestication include the retention of the seed in the pod as opposed to separation of the seeds upon maturation. The advantage to the farmer of the seed remaining on the pod is that the seeds must

then be harvested by the cultivator. Another trait that evolved under domestication is the loss of wild-type seed dormancy, which involves seed-coat thickness. In the wild the seed coats are thicker which enables the spread of seed germination over the course of several years by not allowing water to penetrate. The loss of this trait contributes to thinner seed coats which are more permeable to water and as a result all seeds germinate the same year they are sown, although this appears to be difficult to recognize in archaeological specimens (Zohary et al. 2012). Instead it is the increase in seed size, or the dispersal beyond its wild range, that testifies to domestication.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Barley: Origins and Development
- ▶ Chickpea: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Pigeon Pea: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Wheats: Origins and Development

References

Boivin, N., and D.Q. Fuller. 2009. Shell middens, ships and seeds: Exploring coastal subsistence, maritime trade and the dispersal of domesticates in and around the ancient Arabian Peninsula. *Journal of World Prehistory* 22: 113–180.

Cubero, J.L. 1981. Origin, taxonomy and domestication. In *Lentils*, ed. C. Webb and G. Hawtin, 15–38. London: Commonweath Agricultural Bureaux.

Erskine, W., A. Sarkar, and M. Ashraf. 2011. Reconstructing an ancient bottleneck of the movement of the Lentil (*Lens culinaris* ssp. *culinaris*) into South Asia: A working synthesis. *Genetic Resources and Crop Evolution* 58: 373–381.

Fuller, D.Q., and E.L. Harvey. 2006. The archaeobotany of Indian pulses: Identification, processing and evidence for cultivation. *Environmental Archaeology* 11 (2): 219–246.

Fuller, D.Q., G. Willcox, and R.G. Allaby. 2011. Cultivation and domestication had multiple origins: Arguments against the core area hypothesis for the origins of agriculture in the Near East. *World Archaeology* 43 (4): 628–652.

Fuller, D.Q., G. Willcox, and R.G. Allaby. 2012. Early agricultural pathways: Moving outside the 'core area' hypothesis' in Southwest Asia. *Journal of Experimental Botany* 63: 617–633.

Kislev, M.E., D. Nadel, and I. Carmi. 1992. Epipalaeolithic (19,000 BP) cereal and fruit diet at Ohalo II, Sea of Galilee, Israel. *Review of Palaeobotany and Palynology* 73: 161–166.

van Zeist, W. 1982. Archaeobotanical studies in the Levant 1. Neolithic sites in the Damascus basin: Aswad, Ghoraifé, Ramad. *Palaeohistoria* 24: 165–256.

Zohary, D. 1995. Lentil: *Lens culinaris*. In *Evolution of crop plants*, ed. J. Smartt and N.W. Simmonds, 2nd ed. Harlow: Longman Scietific & Technical.

Zohary, D., M. Hopf, and E. Wiess. 2012. *Domestication of plants in the Old World*. 4th ed. Oxford: Oxford University Press.

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Leone, Mark P.

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Basic Biographical Information

Mark P. Leone (Fig. 1) is an American historical archaeologist who has promoted the application of critical theory in historical archaeology. Leone was born in 1940 in Waltham, Massachusetts, historically a manufacturing town in the western suburbs of Boston. He studied history as an undergraduate at Tufts University, earning a Bachelor of Arts in 1963. Leone received his graduate training in anthropology at the University of Arizona in Tucson, earning a Master of Arts degree in 1966 and receiving his doctorate in 1968. He was an Assistant Professor at the Department of Anthropology at Princeton University (1968–1975). Leone joined the faculty at the University of Maryland, College Park, in 1976 and was

Leone, Mark P., Fig. 1 Mark Leone (Photo by Ben Skolnik)

promoted to Professor in 1990. He served as Chair of the Department of Anthropology (1993–2003) and Chair of the University Senate (2000–2001).

Leone has been extremely active in the profession and held numerous leadership positions. He served on the Governor's Consulting Committee on Historic Places in the State of Maryland (nomination panel for the National Register of Historic Places) (1978–1990). He was Secretary (1979) and then President (1980–1981) of the American Association of University Professors, College Park Chapter. He served on the Board of Managers, Anthropological Society of Washington, before becoming President (1984–1985). He was Chairman (1986–1988) of the Government Affairs Committee of the Society for American Archaeology. He served as Treasurer-Elect (1988), Acting Treasurer (1989), and Treasurer (1989–1992) of the Society for American Archaeology.

Leone directs a long-term research project called "Archaeology in Annapolis," which was founded in 1981 and continues at the time of this publication. Many of Leone's accomplishments have been made possible by this project and its partnerships. Leone provides an excellent synopsis of this project in the preface to *The Archaeology of Liberty in an American Capital* (2005), and the book synthesizes the major discoveries in Annapolis. His more recent *Critical Historical Archaeology* (2010) is very much an intellectual autobiography providing insight into his scholarly objectives and methodology through a series of excerpts from his earlier works.

Major Accomplishments

Leone was highly influenced by Lewis Binford and is counted among the generation that founded the New Archaeology. Although Stanley South is most frequently recognized for bringing processualism into historical archaeology, Leone was also very active in this program, and he carried forward the imperatives for archaeology that were established by Binford during this period. He is also closely associated with postprocessual archaeology, both as a contributor and as a critic. His historical archaeology provided a fertile ground for the introduction and working out of concepts of ideology and power.

One objective of the New Archaeology was to establish greater social relevance by doing research that was engaged rather than detached from public life. Historical archaeology was one outlet for that engagement, since it held out the possibility of understanding the origins of modern society. During the 1970s, Leone found himself critical of the way in which historical archaeology articulated with modern belief systems. Those connections were especially visible in the commemoration and the nationalization of historical sites, which was rarely critical or reflexive, but instead sustained the master narratives of American ideology, especially the idea of possessive individualism, which Leone adopted from Russell Handsman (Leone 1982; Handsman and Leone 1995 [1989]).

Leone found a theory of ideology and its reproduction in the structural Marxism of Louis

Althusser, as well as in the Frankfurt School philosophers, especially Jürgen Habermas and Georg Lukács. Marxist theory was virtually absent from the US academy following the McCarthy era and during the Cold War. Leone was exposed to Marxism by anthropologist Steve Barnett, who taught at Princeton University during Leone's appointment as Assistant Professor early in his career. Barnett was a student of David Schneider at the University of Chicago and authored *Ideology and Everyday Life* with colleague Martin Silverman (Barnett and Silverman 1979). Like Schneider, these scholars wanted to build an anthropology of American culture, and Leone's early focus on Mormonism contributed to this project (Leone 1979).

Leone began the Archaeology in Annapolis project in 1981, in partnership with Joseph Dent and Anne Yentsch. He also found an important partner in the Historic Annapolis Foundation, a preservation advocacy group that helped to connect Archaeology in Annapolis with excavation sites, exhibition space, and other resources. Leone's publications drew a number of graduate students to the project. Early research was directed at the ideological footings for merchant capitalism as expressed in the eighteenth-century formal landscapes and other material cultures. During the late 1980s, the emphasis of his research shifted to African American heritage in the City of Annapolis. The project was focused especially on the cultural and economic strategies of African Americans in different areas of Annapolis following emancipation and the traces of spiritual practices that derive from African tradition. In 2001 the project expanded into research sites on the Eastern Shore of the Chesapeake Bay in Maryland, including former plantations associated with Annapolis elites and communities established by African Americans following emancipation, and the association of these places with Frederick Douglass (Leone and Pruit 2015; Leone and Jenkins 2017).

Throughout his career, Leone has argued that interpretations of the past are a site for political and ideological struggle and that archaeologists can, but frequently do not, play a role in the outcome of these struggles. He has been influential in the development of landscape archaeology (Leone 1984; Leone et al. 2005), as well as approaches to the origins of capitalism (Leone 1988, 1995; Leone and Knauf 2015; Leone and Potter 1999), and the archaeology of African Americans, particularly the identification of spiritual practices with African associations (Leone and Fry 1999; Ruppel et al. 2003; Leone and Pruit 2015). He was also an early proponent of public interpretation at excavation sites, along with Parker B. Potter (1994; also Leone et al. 1987). Mark Leone was awarded the J.C. Harrington Medal in Historical Archaeology by the Society for Historical Archaeology (SHA) in 2016; the SHA's statement on the award, authored by Paul Mullins, provides a fond and detailed summary of Leone's career (Mullins 2016).

Cross-References

- ▶ Annapolis: Historical Archaeology
- ▶ Binford, Lewis R. (Theory)
- ▶ Critical Theory in Archaeology
- ▶ Historic St. Mary's City
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Marx, Karl
- ▶ Multicultural Archaeology
- ▶ Post-Processualism, Development of
- ▶ Processualism in Archaeological Theory
- ▶ Race in Archaeology
- ▶ Structural Archaeology

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References

Barnett, S., and M.G. Silverman. 1979. *Ideology and everyday life: Anthropology, Neomarxist thought, and the problem of ideology and the social whole*. Ann Arbor: University of Michigan Press.

Handsman, R.G., and M.P. Leone. 1995 (1989). Living history and critical archaeology in the reconstruction of the past. In *Critical traditions in contemporary archaeology*, ed. V. Pinsky and A. Wylie. Cambridge, UK: Cambridge University Press.

Leone, M.P. 1979. *Roots of modern mormonism*. Cambridge, MA: Harvard University Press.

Leone, M.P. 1982. Some opinions about recovering mind. *American Antiquity* 47: 742–760.

Leone, M.P. 1984. Interpreting ideology in historical archaeology: Using rules of perspective in the William Paca Garden in Annapolis, Maryland. In *Ideology,*

power and prehistory, ed. D. Miller and C. Tilley. Cambridge, UK: Cambridge University Press.
Leone, M. P 1988. The Georgian order as the order of merchant capitalism in Annapolis, Maryland, M. P. Leone, P.B. Potter Jr The recovery of meaning: Historical archaeology in the United States. Washington, DC: Smithsonian Institution Press.
Leone, M.P. 1995. A historical archaeology of capitalism. *American Anthropologist* 97: 251–268.
Leone, M.P. 2005. *The archaeology of liberty in an American capital: Excavations in Annapolis*. Berkeley: University of California Press.
Leone, M.P. 2010. *Critical historical archaeology*. Walnut Creek: Left Coast Press.
Leone, M.P., and G.-M. Fry. 1999. Conjuring in the big house kitchen: An interpretation of African American belief systems based on the uses of archaeology and folklore sources. *Journal of American Folklore* 112: 372–403.
Leone, M.P., and L.M. Jenkins, eds. 2017. *Atlantic crossings in the wake of Frederick Deouglass: Archaeology, literature, and spatial culture*. Leiden: Brill.
Leone, M.P., and J.E. Knauf, eds. 2015. *Historical archaeologies of capitalism*. 2nd ed. Cham: Springer.
Leone, M.P., and P.B. Potter Jr., eds. 1999. *Historical archaeologies of capitalism*. New York: Kluwer Academic/Plenum Publishers.
Leone, M.P., and E.F. Pruit. 2015. Archaeology of telling time: Plants and the Greenhouse at Wye House Plantation. In *Historical archaeologies of capitalism*, ed. M.-P. Leone and J.E. Knauf, 2nd ed. Cham: Springer.
Leone, M.P., P.B. Potter Jr., and P.A. Shackel. 1987. Toward a critical archaeology. *Current Anthropology* 28: 283–302.
Leone, M.P., J.M. Harmon, and J.L. Neuwirth. 2005. Perspective and surveillance in eighteenth-century Maryland gardens, including William Paca's Garden on Wye Island. *Historical Archaeology* 39: 138–158.
Mullins, P. 2016. J. C. Harrington medal in historical archaeology: Mark P. Leone. *Historical Archaeology* 50 (2): 1–8. Accessed at https://sha.org/wp-content/uploads/2016/10/LEONE-AWARD.pdf.
Potter, P.B., Jr. 1994. *Public archaeology in Annapolis: A critical approach to history in Maryland's ancient city*. Washington, DC: Smithsonian Institution Press.
Ruppel, T., J.L. Neuwirth, M.P. Leone, and G.-M. Fry. 2003. Hidden in view: African spiritual spaces in North American landscapes. *Antiquity* 77: 321–335.

Further Reading

Daglish, C. 2007. Archaeology and democracy: An interview with Mark Leone. *Archaeological Dialogues* 14 (1): 1–21.
Leone, M.P., and S.D. Hurry. 1998. Seeing: The power of town planning in the Chesapeake. *Historical Archaeology* 32: 34–62.
Leone, M.P., and P.B. Potter Jr., eds. 2003. *The recovery of meaning: Historical archaeology in the eastern United States*. Clinton Corners: Percheron Press (Reprinted with Prologue).

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Basic Biographical Information

American archaeologist Mark P. Leone (b. 1940) holds a B.A. in History (Tufts, 1963) and an M.A. and a Ph.D. in Anthropology (Arizona, 1966 & 1968). He worked at Princeton (Assistant Professor, Anthropology) before moving to the University of Maryland (Associate Professor then Professor, Anthropology; Chair of the Department of Anthropology; Chair of the College Park Senate) and has held positions and offices with the National Science Foundation Advisory Panel for Anthropology, the Governor's Consulting Committee on Historic Places in the State of Maryland, the American Association of University Professors, the Anthropological Society of Washington, the Society for American Archaeology, and the Council for Northeast Historical Archaeology.

Major Accomplishments

Leone's early work – on the prehistory of the southwestern United States – was within the New Archaeology tradition. However, during his time in Arizona, he began to follow an alternative path with a growing interest in questions of the contemporary role of archaeology. His move to Princeton brought with it an introduction to postmodern thought and, more importantly for him, Marxism and critical theory. In the latter, Leone found a means of theorizing the politics of archaeology – one which allowed him to build on rather than abandon his New Archaeology foundations. In parallel, a shift from prehistoric to historical archaeology allowed him to apply his craft to the study of the modern world, resulting in explorations of Mormon material culture, archaeological

analyses of capitalism, and reconsiderations of African-American history.

In much of his work, Leone has combined theory and practice, most notably through the Archaeology in Annapolis project which he has directed since 1981. His consistent concern has been to question the dominant discourses of modern history and to construct alternative narratives of the recent past. His aim has been to expose archaeology as a medium of power and to contribute to a more participatory and democratic understanding of the past by combining scientific hypothesis examination with a reflexive stance and political intent (issues he has discussed in a recent interview: see Dalglish 2007). Mark P. Leone's contribution to the theory and practice of archaeology is widely acknowledged and his well-cited works include his writings on the William Paca Garden (Leone 1984), critical archaeology (Leone et al. 1987) and capitalism (e.g., Leone and Potter 1999). A number of his key works have been collected and published as *Critical Historical Archaeology* (Leone 2010).

Cross-References

- ▶ Annapolis: Historical Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Critical Historical Archaeology
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Middle-Range Theory in Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ New Archaeology, Development of
- ▶ North America (USA): Historical Archaeology

References

Dalglish, C. 2007. Archaeology and democracy. An interview with Mark P. Leone. *Archaeological Dialogues* 14: 39–59.

Leone, M.P. 1984. Interpreting ideology in historical archaeology: Using the rules of perspective in the William Paca Garden in Annapolis, Maryland. In *Ideology, representation and power in prehistory*, ed. C. Tilley and D. Miller, 25–35. Cambridge: Cambridge University Press.

Leone, M.P. 2010. *Critical historical archaeology*. Walnut Creek: Left Coast Press.

Leone, M.P., and P.B. Potter, eds. 1999. *Historical archaeologies of capitalism*. New York: Kluwer Academic/Plenum Publishers.

Leone, M.P., P.B. Potter, and P.A. Shackel. 1987. Toward a critical archaeology. *Current Anthropology* 28 (3): 283–302.

Further Reading

A full CV and publication list for Mark P. Leone. http://www.anth.umd.edu/sites/anth.umd.edu/files/370/cv/Leone%20CV%202012.pdf

Lepenski Vir: Geography and Culture

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Introduction

Only a few sites/regions in Europe exhibit uninterrupted sequences of occupation across the Mesolithic-Neolithic transition. Moreover, it is rare that one can document rich details of various aspects of life that can shed light on the character of these fundamental changes in the mode of production with concomitant changes in other aspects of life. The Danube Gorges region in the north-central Balkans with a number of settlements found along the Danube and covering the whole duration of the Early Holocene (c. 9600–5500 BCE) offers both the continuous temporal framework for this key period of European prehistory and the richness of evidence for architecture, mortuary practices, ritual, art, and various aspects of daily life. Lepenski Vir is the key site of this sequence, and it epitomizes most of the important elements that characterize the Mesolithic-Neolithic Danube Gorges as a whole, along with the recognition of the site's special character in the period of Mesolithic-Neolithic transformations.

Definition

Lepenski Vir is a settlement found on the right bank of the River Danube in the area known as the Danube Gorges or the Iron Gates on the border between present-day Serbia and Romania. The site became well known in the late 1960s after the discovery of a large forager settlement with standardized trapezoidal building floors associated with sculpted sandstone boulders, which had richly ornamented surfaces. In a number of cases, the boulders were depicting human-fish hybrid beings. The site plays a crucial role in discussions about the nature of forager-farmer interactions at the time of the Neolithic spread in southeast Europe.

Key Issues/Current Debates/Future Directions/Examples

Southeast Europe is the key region for studying the spread of the Neolithic economy and way of life into Europe due to its proximity to areas of the eastern Mediterranean with the earliest well-established and long-lasting Neolithic, agricultural settlements in Eurasia. Models that see the migration or diffusion of farming populations from Anatolia into southeast Europe have persisted in archaeological and popular narratives even though more nuanced scenarios, which see more active role for indigenous forager populations in southeast Europe, have also been suggested (e.g., Tringham 2000; Borić 2002; Whittle et al. 2002). Understanding processes lumped under largely inadequate label of the "Neolithisation" of southeast Europe is still hampered by the lack of evidence for more substantial Mesolithic forager presence across the region as a whole. There are few areas where available evidence documents the presence of the latest phase of the Mesolithic prior to the arrival of the so-called Neolithic package. These processes of subsequent change included wholesale or piecemeal adoption of ceramics, domesticates, ground stone tools, and macro-blade technology to name the most prominent aspects of the archaeological record. One exception to the general rule of scarce Mesolithic presence is the area of the Danube Gorges (Fig. 1). In the course of the rescue excavation project made in the region on both the Serbian and Romanian banks of the river Danube in the 1960s and 1970s, more than 20 sites were found with Mesolithic and/or the earliest Neolithic levels (e.g., Srejović 1972; Radovanović 1996; Bonsall 2008; Borić 2011). Importantly, many of these sites disclosed details of more or less continuous forager occupation of the region since the end of the Last Glacial primarily found in caves and rockshelters, while open-air sites started being occupied after the end of the Younger Dryas, i.e., from around 9600 BCE. The archaeological evidence indicates that these forager communities might have been focused on fishing as the main subsistence base and that particular places in this landscape were utilized as places for specialized fishing in whirlpools.

The site of Lepenski Vir (Lepenski Whirlpool) was one such location found in the Upper or Gospodjin Vir (Lady's Whirlpool) Gorge of the Danube. The site was founded on a "terrace remnant" of the Danube consisting of finely laminated riverine sands in front of a strong whirlpool. Dragoslav Srejović conducted excavations at the site from 1965 to 1970 (Srejović 1972). The extraordinary features of Lepenski Vir brought the archaeological record of the site to the attention of archaeologists worldwide. However, in the decades following the excavation of the site, doubts raised about the precise dating and association of material culture, and Early Neolithic Starčevo pottery in particular, with the most dominant phase I-II, i.e., the phase of trapezoidal buildings (Fig. 2), limited the impact of this evidence on discussions about the nature of Mesolithic-Neolithic transformations in southeast Europe as a whole. The major stumbling block was the conviction of the excavator Srejović that Early Neolithic pottery and other typical Neolithic items of material culture (e.g., polished stone axes) were not associated with the occupation of trapezoidal buildings of phase I-II but intrusions from the overlying layer attributed to Early/Middle Neolithic phase III. In addition, at the time, a series of radiometric dates from Lepenski Vir that were made on charcoal, and available since the

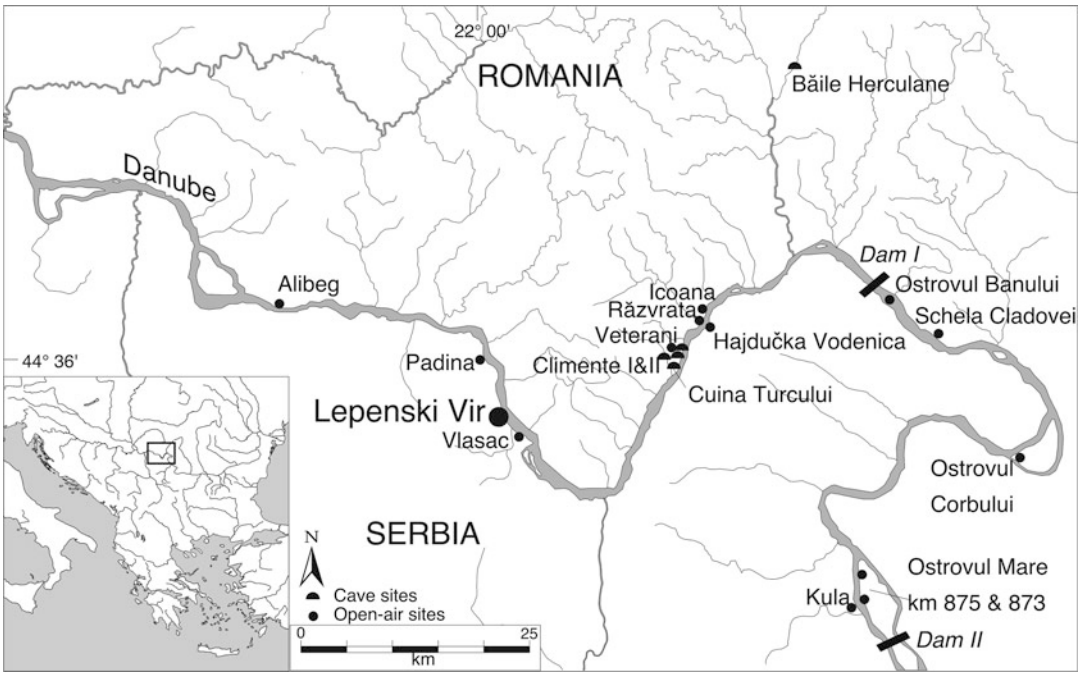

Lepenski Vir: Geography and Culture, Fig. 1 Map of the Danube Gorges with the location of Lepenski Vir and other Epipalaeolithic, Mesolithic, and Early Neolithic sites

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1970s, were often dismissed as problematic. The reinterpretation of the site's stratigraphy and dating in the late 1990s (Borić 1999, 2002) along with new AMS dates on both animal and human bones associated with the occupation and abandonment of trapezoidal buildings (e.g., Borić & Dimitrijević 2007; Bonsall 2008; Bonsall et al. 2008; Borić 2011) have allowed for a more realistic dating of material culture associations at this site. In addition, it has now clearly been shown that Early Neolithic Starčevo pottery was associated with trapezoidal buildings contrary to the view held by the excavator of the site (Borić 1999, 2011; Garašanin and Radovanović 2001).

Currently, Lepenski Vir is one of the best absolutely dated sites of the period in southeast Europe with over 90 radiometric measurements. These dates have helped to revise the original stratigraphic division of the site and suggested realistic spans for particular phases (cf. Borić and Dimitrijević 2007; Borić 2011). The earliest phase at Lepenski Vir is known as Proto-Lepenski Vir, and it is currently dated to the regional Early and Middle Mesolithic (from the end of the tenth millennium BCE to the last centuries of the eighth millennium BCE). Due to significant disturbance in the course of later occupation at the site, the remains of this long period of occupation are only sporadically found as partially preserved stone constructions, concentrations of artifacts, occasional burials with human remains, and possibly also the earliest forms of rectangular stone-lined hearths. Burials dated to this earliest Mesolithic phase at Lepenski Vir can be characterized as single inhumations, mainly placed in supine extended positions, sometimes with flexed legs. In the course of what can in chronological terms be distinguished as the Middle Mesolithic period (c. 8500–7300 BCE), a particular burial rite is documented at this and several contemporaneous sites in this region: seated burials with crossed legs. It also seems that rectangular stone-lined hearths, which might have been the central part of light dwelling constructions, can also be associated with Proto-Lepenski Vir phase. On the basis of the preserved material culture dated to

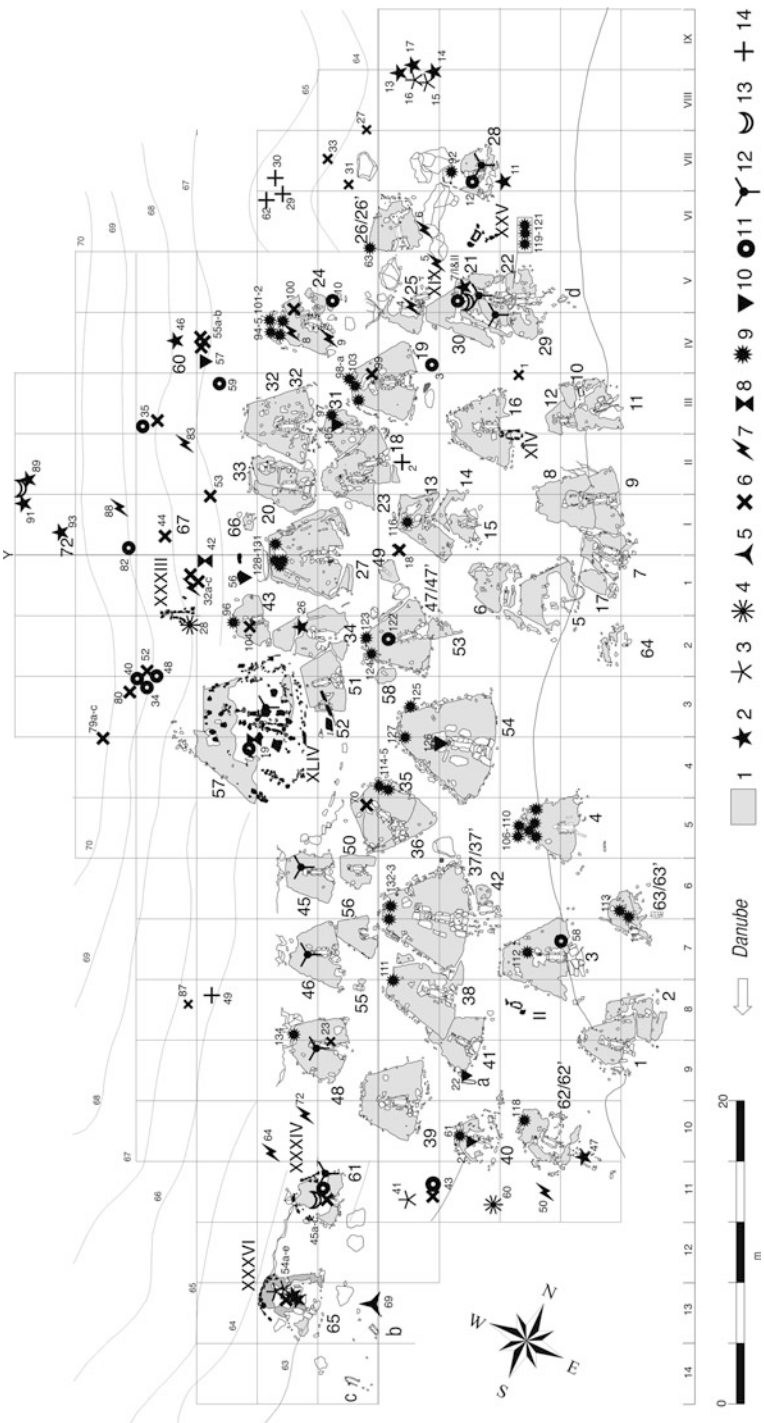

Lepenski Vir: Geography and Culture, Fig. 2 Plan of the excavated area of Lepenski Vir with trapezoidal buildings of phase I-II and burials from all phases represented as symbols. Key: *1* limestone floor, *2* extended skeleton placed on/dug through limestone floor or found outside buildings (parallel to the Danube – oriented downstream), *3* headless extended skeleton placed on/dug through floor and outside buildings (parallel to the Danube – oriented downstream), *4* extended skeleton, *5* seated skeleton with crossed legs, *6* disarticulated postcranial bones on/beneath floor and outside buildings, *7* contracted and flexed skeleton placed on floor or buried outside buildings, *8* headless contracted skeleton, *9* skeletons of neonates and children dug through floors (extended and contracted), *10* human mandible, *11* human skull, *12* red deer skull with antlers, *13* aurochs' skull with horn cores, *14* post-Neolithic burials

this period, there are no elements that can at the moment suggest a more fined-grained chronological resolution for this long duration of Proto-Lepenski Vir phase. Judging by the current distribution of radiometric dates and associated material culture, Lepenski Vir was not inhabited in the course of the regional Late Mesolithic (c. 7300–6200 BCE), i.e., for approximately a thousand years after the end of the Middle Mesolithic phase. On the other hand, the Late Mesolithic period in the Danube Gorges saw intense occupation at many other sites, including two sites neighboring Lepenski Vir: Vlasac, located 3 km downstream, and Padina, located 5 km upstream from Lepenski Vir.

A robust sample of radiometric dates indicates that Lepenski Vir was resettled again after 6200 BCE, in the course of the period that is in the stratigraphy of the site now referred to as phase I-II. This labeling differs from the one suggested by the excavator Srejović (1972) who assumed two separate phases: Lepenski Vir I with subphases a–e, characterized by trapezoidal plan buildings plastered with limestone floors, and Lepenski Vir II, characterized by assumed trapezoidal plan buildings made up of stone walls but without limestone floors. However, it has been shown that the two phases should be merged together since the stone walls of Srejović's phase II buildings overlap with the trapezoidal buildings of phase I, and hence, the limestone floors and the stone walls form part of the same buildings (Borić 2002, 2011). Hence, the label of this phase is I-II. I. Radovanović's (1996) more recent division of phase I as defined by Srejović into subphases 1–3 on the basis of stylistic differences, i.e., presence/absence of particular architectural elements, has also been called in question (Borić & Dimitrijević 2007). It also seems that phase I-II did not last longer than 200 years.

Phase I-II is the period during which the most intense building activity took place at the site with the construction of close to 70 semisubterranean buildings with trapezoidal bases furnished with limestone floors and with central rectangular stone-lined hearths (Fig. 3). The presence of such stone-lined hearths bespeaks of the regional cultural continuity with the previous Late Mesolithic period. Primarily in association with the hearths of trapezoidal buildings, on the floor level, there were over 90 sculpted and aniconic sandstone boulders (Fig. 4), some probably acting as mortars (Srejović 1972; Borić 2005). This large quantity of boulder "artworks" is unmatched for the region as a whole, and only at the sites of Padina, Hajdučka Vodenica, and Cuina Turcului were a few ornamented boulders also found. The reoccupation of Lepenski Vir at a particular historical moment and the outstanding features of this site not shared in character or scale with other contemporaneous sites in the Danube Gorges may suggest that this locale might have been of special interest to the autochthonous forager communities due to the site's particular position within the Danube Gorges' landscape. Namely, the site is situated directly across the Danube from the trapezoidal Treskavac Mountain, a prominent landscape feature in this part of the region. The importance of this landmark can be inferred on the basis of the shape of building floors, which mirrored the mountains trapezoidal shape.

It is also hardly a coincidence that this elaboration and building activity at Lepenski Vir in particular took place at the time when Early Neolithic farming communities became established across the northern areas of the Balkans (Whittle et al. 2002). It is likely that forager communities in the Danube Gorges were strongly emphasizing their cultural tradition as the consequence of increasing contacts with Early Neolithic groups while adopting a number of materialities (e.g., pottery, polished stone axes, new types of ornaments) coming from the expanding world of Neolithic farmers. Yet the adoption of the Neolithic traits at Lepenski Vir was piecemeal, and during phase I-II one finds no domestic animals associated with the occupation of trapezoidal buildings (Borić and Dimitrijević 2007). Moreover, burial rites changed little from the norm of Late Mesolithic burials found across the region and characterized by extended supine inhumations oriented parallel to the axis of the River Danube, with their heads most frequently pointing in the downstream direction of the river course. During phase I-II, burials were interred through limestone floors

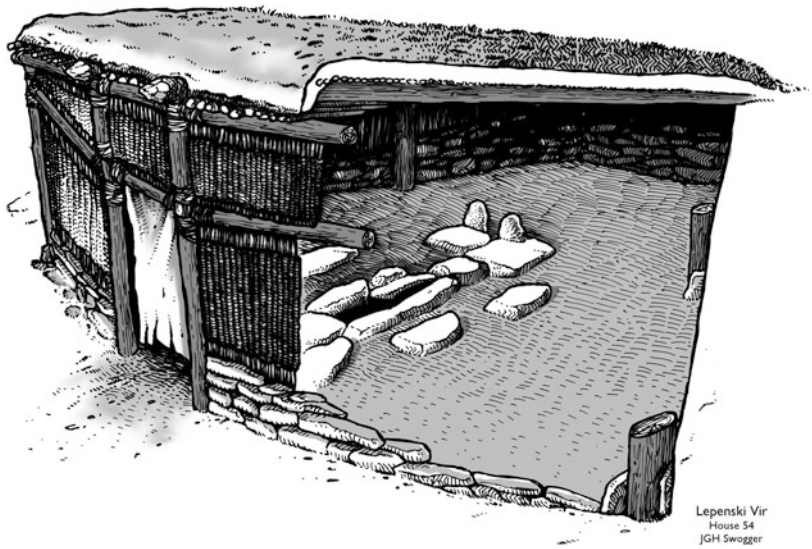

Lepenski Vir: Geography and Culture, Fig. 3 Reconstruction of building 54 from Lepenski Vir (Drawing: J.G. Swogger)

Lepenski Vir: Geography and Culture, Fig. 4 Boulders found in situ in building XLIV/57 at Lepenski Vir

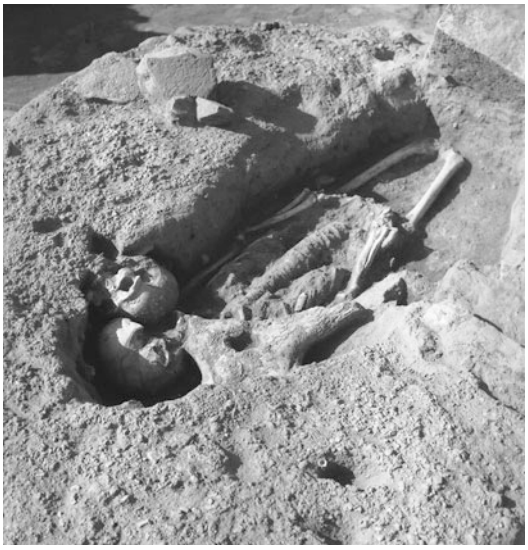

Lepenski Vir: Geography and Culture, Fig. 5 Limestone floor of trapezoidal building 21 at Lepenski Vir with extended supine burial 7/I interred through the building floor; this primary burial was associated with disarticulated human skull (no. 7/II) and an aurochs skull, while another red deer skull with antlers was found next to the deceased

(Fig. 5) or placed over the floor area of abandoned buildings. Another unique feature of Lepenski Vir in comparison to other contemporaneous sites is more than 40 neonates found buried beneath the rear, narrow areas of trapezoidal buildings (Borić and Stefanović 2004).

Neither revised stratigraphic evidence nor radiometric dates at present suggest a break in the occupation of Lepenski Vir between phases I-II and III (*contra* Srejović 1972). Yet, around or just after 6000/5950 BCE, there is a significant change in the pattern of occupation at the site. It seems that all or most of the trapezoidal buildings

at Lepenski Vir were abandoned by this time, with some evidence that certain buildings, the floors of which were in some cases already covered with a layer of soil, were used for the interment of burials. The burial practices also change. While there remains a possibility that a few extended burials can be dated to this phase, the dominant burial rite during phase III between 6000/5950 and 5500 BCE are crouched inhumations, placed on their right or left sides, and with variable orientations. There are over 20 such primary burials in evidence, with a number of secondary or disarticulated burials found across the site. In one case, two crouched burials (nos. 8 and 9) were placed symmetrically one facing the other with opposite orientations over the floor of a trapezoidal building (no. 24), likely some time after its abandonment and backfilling. The crouched burial position characterizes the typical Neolithic burial rite across the Balkans and beyond (e.g., Whittle et al. 2002). Moreover, recent results of strontium isotope analyses indicate that a significant number of the individuals placed in crouched positions were migrants, originating in several geologically differentiated areas outside the Danube Gorges (Borić and Price 2013). A new feature, typical of various other Early-Middle Neolithic sites across the northern Balkans at this time, found at Lepenski Vir during phase III are a number of mostly irregular pits of various dimensions found across the settlement. These pits were filled up with large quantities of ceramics, stone weights, and burned daub fragments coming from destroyed walls made in wattle and daub construction techniques, and other cultural material. There is no clear evidence of aboveground dwellings during phase III, and this is a recurrent bias with regard to many other Early-Middle Neolithic sites in the wider region. There is also evidence of several domed ovens attributed to this period and found across the site. Four ceramic hoards have been associated with this phase. Hoard 1 contained a necklace made from Spondylus, nephrite, and *Columbella rustica* beads, Hoard 2 contained stone axes, while Hoards 3 and 4 contained blanks of the so-called "Balkan" or yellow-white spotted flint. This particular raw material at this time became abundantly used across the Balkans, with frequent production of large macro blades with steep retouch. A large quantity of such specimens were also found at Lepenski Vir. The most likely origin of this raw material are outcrops in northern Bulgaria, several hundred kilometers away from the Danube Gorges, indicating the existence of long-distance exchange networks during this period. Of special interest are also several beads and other items from copper minerals found at Lepenski Vir, and which can be associated with both phases I-II and III. The most likely place of origin for these minerals is the nearby mining site of Rudna Glava, which continued to be used in later prehistoric periods for the extraction of copper minerals.

On the face of the current radiometric evidence and archaeological remains from Lepenski Vir, it seems that the site was abandoned before 5500 cal. BCE. Many other sites used more or less continuously throughout the Mesolithic and the Early Neolithic phases in the Danube Gorges were also abandoned around the same time. The abandonment of, by this time, old Mesolithic-Early Neolithic locales along the Danube in this region may relate to another important, region-wide culture change taking place around this time. This change brought to archaeological visibility long-lasting agricultural and stockbreeding communities in the central Balkans known in terms of culture history as the Vinča culture groups. Important changes in settlement pattern and material culture styles were taking place in the century following 5500 cal. BCE, marking the beginnings of the Late Neolithic period in the central Balkans. For these successful agricultural communities, an agriculturally marginal region such as the Danube Gorges and places suitable for large-scale fishing seems to have held little importance. The first post-Neolithic presence at Lepenski Vir is marked by an Early Copper Age burial associated with the Salcuța culture, dated to around 4300 cal. BCE (Bonsall et al. 2008). Sporadically, Lepenski Vir was also used in Roman and Medieval times, with several buried individuals associated with these respective periods now directly AMS dated (Bonsall et al. 2008).

Stable isotope data are now available for a number of burials from Lepenski Vir and other sites in the Danube Gorges, providing important information on dietary practices of Holocene foragers and early farmers in this region (Cook et al. 2002; Bonsall 2008). Furthermore, the combination of isotopic research and AMS dating has suggested that throughout the Mesolithic significant intake of river fish and migratory sturgeon species, which come from a different ecosystem than the atmosphere, deposited "old carbon" in humans and domestic dogs, with both species abundantly feeding on fish. Such physiological processes affect radiocarbon measurements made on the bones of these species. In such instances, when $\delta^{15}N$ values are elevated (over 13.0 ‰ and with many burials at Lepenski Vir and other forager sites in the region exhibiting values of 15.0 ‰ and over), a substantial intake of fish protein in the diet of measured individuals can be inferred. Such insights prompted researchers to devise a correction factor specific to this particular region that can be applied to the obtained radiometric measurements before calibration of dates (Cook et al. 2002). While fish-dominated diet seems to have remained constant throughout the Mesolithic period in the Danube Gorges, a number of burials from Lepenski Vir also show less elevated values (around or below 10.0 ‰). Such burials with lower $\delta^{15}N$ are also consistently dated to the phase of Mesolithic-Neolithic transformations, i.e., Lepenski Vir I-II, as well as to the Early/Middle Neolithic, i.e., phase III. Moreover, a number of these individuals were buried in crouched positions, suggesting a correlation between Neolithic-style mortuary practices and a diet less dominated by fish. Combined with recent insights from strontium isotope analyses, this evidence suggests that in the course of transformational phase I-II and in particular during phase III, a significant number of first-generation migrants from Neolithic communities were mixing with the locals at Lepenski Vir.

While research efforts in the past decade or so clarified many aspects of the existing evidence from the site of Lepenski Vir, there still remains an important task of providing systematic and detailed publications of various strands of data that would disclose in full the richness of this extraordinary site for the students of European prehistory. Moreover, forthcoming DNA research on the large collection of human remains from this and other sites in the Danube Gorges will provide a unique opportunity for better understanding of population dynamics at the crucial point in the transition from the Mesolithic to the Neolithic social milieus in this key area of prehistoric Europe.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Complex Hunter-Gatherers
- ▶ Demographic Transitions
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ European Mesolithic: Geography and Culture
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches

References

Bonsall, C. 2008. The Mesolithic of the Iron Gates. In *Mesolithic Europe*, ed. G.N. Bailey and P. Spikins, 238–279. Cambridge: Cambridge University Press.

Bonsall, C., I. Radovanović, M. Roksandić, G. Cook, T. Higham, and C. Pickard. 2008. Dating burial practices and architecture at Lepenski Vir. In *The Iron Gates in prehistory: New perspectives (BAR International series 1893)*, ed. C. Bonsall, V. Boroneanţ, and I. Radovanović, 175–204. Oxford: Archaeopress.

Borić, D. 1999. Places that created time in the Danube Gorges and beyond, c. 9000–5500 BC. *Documenta Praehistorica* 26: 41–70.

Borić, D. 2002. The Lepenski Vir Conundrum: Reinterpretation of the Mesolithic and Neolithic sequences in the Danube Gorges. *Antiquity* 76: 1026–1039.

Borić, D. 2005. Body metamorphosis and animality: Volatile bodies and boulder artworks from Lepenski Vir. *Cambridge Archaeological Journal* 15: 35–69.

Borić, D. 2011. Adaptations and transformations of the Danube Gorges Foragers (c. 13,000–5500 cal. BC): An overview. In *Beginnings – new research in the appearance of the Neolithic between northwest Anatolia and the Carpathian Basin*, ed. R. Krauß, 157–203. VML Verlag Marie Leidorf: Rahden.

Borić, D., and V. Dimitrijević. 2007. When did the 'Neolithic package' reach Lepenski Vir? Radiometric and faunal evidence. *Documenta Praehistorica* 34: 53–72.

Borić, D., and T.D. Price. 2013. Strontium isotopes document greater human mobility at the start of the Balkan Neolithic. *Proceedings of the National Academy of Sciences* 110 (9): 3298–3303.

Borić, D., and S. Stefanović. 2004. Birth and death: Infant burials from Vlasac and Lepenski Vir. *Antiquity* 78: 526–546.

Cook, G., C. Bonsall, R.E.M. Hedges, K. McSweeney, V. Boroneanţ, L. Bartosiewicz, and P.B. Pettitt. 2002. Problems of dating human bones from the Iron Gates. *Antiquity* 76: 77–85.

Garašanin, M., and I. Radovanović. 2001. A pot in house 54 at Lepenski Vir I. *Antiquity* 75: 118–125.

Radovanović, I. 1996. *The Iron Gates Mesolithic*. Ann Arbor: International Monographs in Prehistory.

Srejović, D. 1972. *Europe's first monumental sculpture: New discoveries at Lepenski Vir*. London: Thames & Hudson.

Tringham, R. 2000. Southeastern Europe in the transition to agriculture in Europe: Bridge, buffer or mosaic. In *Europe's first farmers*, ed. T.D. Price, 19–56. Cambridge: Cambridge University Press.

Whittle, A., L. Bartosiewicz, D. Borić, P. Pettitt, and M. Richards. 2002. In the beginning: New radiocarbon dates for the early Neolithic in northern Serbia and south-east Hungary. *Antaeus* 25: 63–117.

Further Reading

Antonović, D. 2006. *Stone tools from Lepenski Vir*. Beograd: Arheološki institut.

Bonsall, C., R. Lennon, K. McSweeney, C. Stewart, D. Harkness, V. Boroneanţ, L. Bartosiewicz, R. Payton, and J. Chapman. 1997. Mesolithic and early Neolithic in the Iron Gates: A palaeodietary perspective. *Journal of European Archaeology* 5: 50–92.

Borić, D. 2001. Mesolithic and early Neolithic hunters and fishers in the Danube Gorges: A faunal perspective. In *At the fringes of three worlds: From the mesolithic to the neolithic*, ed. R. Kertesz and J. Makkay, 101–124. Budapest: Archaeolingua.

Borić, D. 2003. 'Deep time' metaphor: Mnemonic and apotropaic practices at Lepenski Vir. *Journal of Social Archaeology* 3: 46–74.

Borić, D. 2006. New discoveries at the Mesolithic-early Neolithic site of Vlasac: Preliminary notes. *Mesolithic Miscellany* 18: 7–14.

Borić, D. 2007. Mesolithic-Neolithic interactions in the Danube Gorges. In *Mesolithic-Neolithic interactions in the Danube Basin*, ed. J.K. Kozłowski and M. Nowak, 31–45. Oxford: Archaeopress.

Borić, D. 2010. Happy forgetting? Remembering and dismembering dead bodies at Vlasac. In *Archaeology and memory*, ed. D. Borić, 48–67. Oxford: Oxbow Books.

Borić, D., and V. Dimitrijević. 2009. Apsolutne hronologija i stratigrafija Lepenskog Vira [Absolute chronology and stratigraphy of Lepenski Vir]. *The Star* 57 (2007): 9–55.

Borić, D., and P. Miracle. 2004. Mesolithic and Neolithic (dis)continuities in the Danube Gorges: New AMS dates from Padina and Hajdučka Vodenica (Serbia). *Oxford Journal of Archaeology* 23: 341–371.

Borić, D., C.A.I. French, and V. Dimitrijević. 2008. Vlasac revisited: Formation processes, stratigraphy and dating. *Documenta Praehistorica* 35: 293–320.

Borić, D., J. Raičević, and S. Stefanović. 2009. Mesolithic cremations as elements of secondary mortuary rites at Vlasac (Serbia). *Documenta Praehistorica* 36: 247–282.

Boroneanţ, V. 2001. *Paleolithique superieur et epipaleolithique dans la zone des Portes de Fer*. Bucureşti: Silex.

Chapman, J.C. 1993. Social power in the Iron Gates Mesolithic. In *Cultural transformations and interactions in eastern Europe*, ed. J. Chapman and P. Dolukhanov, 71–121. Aldershot: Avebury.

Jovanović, B. 1969. Chronological frames of the Iron Gate group of the early Neolithic period. *Archaeologica Iugoslavica* 10: 23–38.

Jovanović, B. 1987. Die Architektur und Keramik der Siedlung Padina B am Eisernen Tor, Jugoslawien. *Germania* 65: 1–16.

Jovanović, B. 2008. Micro-regions of the Lepenski Vir culture Padina in the Upper Gorge and Hajdučka Vodenica in the Lower Gorge of the Danube. *Documenta Praehistorica* 35: 289–324.

Radovanović, I., and B. Voytek. 1997. Hunters, fishers or farmers: Sedentism, subsistence and social complexity in the Djerdap Mesolithic. *Analecta Praehistorica Leidensia* 29: 19–31.

Roksandić, M. 2000. Between foragers and farmers in the Iron Gates Gorge: Physical anthropology perspective. Djerdap population in transition from Mesolithic to Neolithic. *Documenta Praehistorica* 27: 1–100.

Srejović, D., and Lj. Babović. 1983. *Umetnost Lepenskog Vira (Art of Lepenski Vir)*. Beograd: Jugoslavija.

Stefanović, S., and D. Borić. 2008. The newborn infant burials from Lepenski Vir: In pursuit of contextual meanings. In *The Iron Gates in prehistory: New perspectives (BAR International series 1893)*, ed. C. Bonsall, I. Radovanović, and V. Boroneanţ, 131–169. Oxford: Archaeopress.

Voytek, B., and R. Tringham. 1989. Rethinking the Mesolithic: The case of south-east Europe. In *The Mesolithic in Europe*, ed. C. Bonsall, 492–499. Edinburgh: John Donald Publishers.

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Basic Biographical Information

André Leroi-Gourhan was one of the greatest prehistorians of the twentieth century. He is well known for his significant contributions to

archaeological method and theory and to the study of rock art. Born in 1911 in Paris, Leroi-Gourhan was orphaned very early and grew up with his maternal grandparents, who took him on frequent visits to the Natural History Museum in Paris. These visits awoke in him a fascination with the natural sciences. This fascination, along with the influence of his grandfather who was a member of the Naturalists' Association, converted Leroi-Gourhan into an ardent nature lover who soon came into contact with a range of prehistorians.

At first, Leroi-Gourhan was not a motivated student, and he left study when he was 14 years old to be apprenticed to a merchant. He soon changed jobs and met some of the people who would most influence him in the future. His godmother played an important role in his development by giving him the gift of a book by Marcellin Boule, *Les hommes fossiles*, and by introducing him to Paul Boyer, the administrator of the School of Oriental Languages, who would offer Leroi-Gourhan a post as assistant secretary and library helper. These positions allowed Leroi-Gourhan to continue his studies, and he finished a diploma course at the Sorbonne in Russian in 1931 and in Chinese in 1933.

Leroi-Gourhan embraced the study of ethnology, while working for the France Institute of London in the ethnography department of the British Museum. Two of Leroi-Gourhan's works were completed during this period: *Bestiaire du bronze chinois* (1936a) and *La civilisation du Renne* (1936b). That same year, he married Arlette Boyer, the daughter of Paul Boyer. As a research professor of CNRS (Centre National de la Recherche Scientifique) and the Collège de France, Leroi-Gourhan began working on two of the works that would become points of reference for the world of prehistory: *L'homme et la matière* (1943) and *Milieu et techniques* (1945). During the Second World War, Leroi-Gourhan was commissioned to watch over the security of some of the art objects evacuated from the Louvre Museum and that he took part in different activities with the French Resistance, which earned him several honorary decorations.

In 1946, while deputy director of the Museum of Man (Musée de l'Homme), Leroi-Gourhan was named Professor of Colonial Ethnology at the University of Lyon. This position allowed him to develop the teachings in comparative technology that would form the future foundations of his research and teaching in prehistoric ethnology. At this time, he completed his doctoral thesis, directed by Marcel Mauss and entitled *Archéologie du Pacifique nord et documents pour l'art comparé de l'Eurasie Septentrionale* (1945). Later, he completed a second doctoral thesis *Les tracés d'équilibre mécanique du crâne des vertébrés terrestres et etude des restes humains fossiles provenant des grottes d'Arcy-sur-Cure* (1954). In 1956, Leroi-Gourhan was appointed to the Chair of General Ethnology and Prehistory at the University of the Sorbonne, and later, between 1969 and 1982, he was the Chair of Prehistory at the Collège de France.

Leroi-Gourhan received numerous awards and prizes for his contributions. In 1973 he was awarded the Gold Medal of the Centre National de la Recherche Scientifique in recognition of his outstanding contributions to archaeology, both nationally and internationally. In 1978 he received the Grande Prix of the national archaeology of the Ministry of Culture and in 1979 the Golden Medal of the Academy of Architecture, national prize of the Fissen fund, and the Legion of Honour. In 1980, he was elected in the Academy. Leroi-Gourhan died in 1986.

Major Accomplishments

Leroi-Gourhan's major accomplishments include a modernization of excavation methods in France, including the incorporation of multidisciplinary teams into archaeological investigation and the introduction of spatial studies, ethnographic concepts in Paleolithic studies, such as the *chaine operatoire* concept, and structural analysis in the study of prehistoric rock art.

Excavation Methods

Leroi-Gourhan was trained in a prehistoric archaeology that was more concerned with excavation to recover objects than in research for its own sake. However, possibly due to his

ethnographic training, he became aware that objects without their context only contributed part of the information. That is to say, they provided the relative chronologies without an understanding of the ways of life. For this reason he developed excavation methods which focused on the quality of documentation and the area excavation of sites, with the objective of enabling the reconstruction of all aspects of the population that had lived there thousands of years before.

This approach meant that all archaeological remains were recovered, no matter how small or fragmented, so they could later be studied by a group of specialists from diverse disciplines. An example of this excavation methodology was the Magdalenian site of Pincevent, where for over 20 years (from 1964), Leroi-Gourhan educated many prehistorians in his passion to reconstruct the past through a multidisciplinary spatial analysis, which would lay the foundations of prehistoric ethnology.

Paleo-Ethnology: Technique and Culture

Leroi-Gourhan's ethnographic education formed the basis for all his work and effort in studying prehistory. This is well exemplified in his most famous publications *L'homme et la matière* (1943), *Milieu et techniques* (1945), and *Le geste et la parole* (1964b). Within this ensemble of investigations, it is worth highlighting his adaptation of the ethnographic concept of the operative chain (*chaine opératoire*) to prehistory (Balfet 1991). This deals with a theoretical concept that attempts to understand archaeological occurrences, be they physical or artistic, in terms of the sequence of technical operations implied in all phases of their production. This concept, reformulated in the 1990s, has been the basis for the development of technological studies, both in rock art and in the analysis of lithic industries.

Prehistoric Art

Leroi-Gourhan transformed the study of prehistoric art. In particular, he is accepted as being the first scholar to introduce structuralism to the analysis of rock art. Using ethnographic comparisons, he treated prehistoric art as an expression of a religion, or magical aspects, during the Paleolithic. This approach is especially evident in his work *Les religions de la préhistoire* (1964a). However, his greatest contribution to this field was to propose a progressive evolution of diverse styles of Paleolithic art, from the simplest to the most complex, published in his work *Préhistoire de l'art occidental* (1965b).

During the twentieth century, methods for examining prehistoric art were completely reformed, thanks to Leroi-Gourhan's studies. His scrupulousness in the excavation process was translated to his analysis of painted walls, where the study of each figure in relation to its neighbors, and to the rest of the panel and the topography of the cavity, enabled him to develop the hypothesis that the panels were ordered in a relationship to the central figures and that in general a duality could be observed between man and woman in the images of bison and horses.

Leroi-Gourhan's proposal articulated the existence of four great stylist phases and became the model of reference in the field till the close of the twentieth century, when the direct dating of figures from diverse locations provoked a reconsideration of these hypotheses by some researchers, sparking off a widespread controversy that persists to this day (Alcolea and Balbin 2007).

Cross-References

- ▶ Europe: Prehistoric Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Lithic Technology, Paleolithic
- ▶ Structural Archaeology
- ▶ Style: Its Role in the Archaeology of Art

References

Alcolea, J., and R. Balbin. 2007. C14 et style. La chronologie de l'art pariétal à l'heure actuelle. *L'anthropologie* 111: 435–466.

Balfet, H., ed. 1991. *Observer l'action technique: des chaînes opératoires, pour quoi faire?* Paris: Editions du CNRS.

Leroi-Gourhan, A. 1936a. *Bestiaire du Bronze Chinois*. Paris: Les editions d'Art et d'Histoire.

Leroi-Gourhan, A. 1936b. *La civilisation du Renne*. Collection Géographie humaine. Paris: Gallimard.
Leroi-Gourhan, A. 1943. *L'homme et la matière. Évolution et techniques, I*. Paris: Albin Michel.
Leroi-Gourhan, A. 1945. *Milieu et techniques. Évolution et techniques, II*. Paris: Albin Michel.
Leroi-Gourhan, A. 1964a. *Les religions de la préhistoire*. Paris: PUF.
Leroi-Gourhan, A. 1964b. *Le geste et la parole, I: technique et langage*. Collection Sciences d'aujourd'hui. Paris: A. Michel.
Leroi-Gourhan, A. 1965a. *Le geste et la parole, II: la mémoire et les rythmes*. Collection Sciences d'aujourd'hui. Paris: A. Michel.
Leroi-Gourhan, A. 1965b. *Préhistoire de l'art occidental.* Collection L'art et les grandes civilisations. Paris: Mazenod.

Further Reading

Bromberger, C., J. Poirier, J.P. Olivier, C. Royer, A. Bruneton-Governatori, J. Barrau, J. Benoist, H. Balfet, C. Petonnet, J. Gutwirth, M. FontanÈs, J. Fribourg, P. Lemonnier, G. Ravis-Giordani, H. Raulin, C. France, and J.-D. Lajoux. 1986. Hommage à André Leroi-Gourhan. *Terrain* 7: 61–76.
Leroi-Gourhan, A., and M. Brézillon. 1966. L'habitation magdalénienne n° 1 de Pincevent prés de Monterau (Seine et Marne). *Gallia Préhistoire* IX, fasc. 2: 263–385.

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Basic Biographical Information

David Natanovich Lev (1905–1969) was the leading investigator of the Stone Age in Central Asia, and a professor at the University of Samarkand.

In 1931, he graduated from Leningrad State University with an archaeologist specialty. From 1931 to 1942, David Lev worked in the Department of Archaeology of the Museum of Anthropology and Ethnography at the Academy of Sciences of the USSR in Leningrad as a researcher and then as head of the department. During this period, he published two guides on the Department of Archaeology and collections stored there relating mainly to the old mining. D.N. Lev had dedicated his Ph.D. dissertation (thesis) to the history of ancient mining. He graduated in 1945. He was a close disciple of P.P. Efimenko, and participated in Efimenko's excavations at Kostenki. At the same time, fate brought Lev together with another major archaeologist – V.A. Gorodtsov. Circumstances were that in the 1930s, when V.A. Gorodtsov was still full of strength and energy and seeking to organize large archaeological expeditions, only two of his young scientific friends were true, selfless helpers: D.A. Krainov and D.N. Lev, together with Gorodtsov, excavated the Elizabethan settlement in the Kuban and the Ilsk Paleolithic site.

From 1944 to 1969, David Lev was the head of the Department of General History in the History Department at the University of Samarkand, where he led the preparation of extensive field research on the Paleolithic of Uzbekistan.

Major Accomplishments

David Lev's studies provided excellent results, especially those concerning the systematically excavated cave of Aman-Kutan near Samarkand and Samarkand late Paleolithic site. Aman-Kutan was widely known among archaeologists in the Soviet Union and abroad, and now, following Teshik-Tash and Obirakhmat, is one of the richest expressions of Mousterian cave settlements of Central Asia.

The excavations of Samarkand site, from 1958 to 1968, were very fruitful. Materials of late Paleolithic settlements are unique, because in the huge territory of Central Asia and Kazakhstan, they discovered for the first time the bones of an old man of the modern physical type of *Homo sapiens sapiens*. Samarkand revealed three cultural layers, separated by a sterile layer at a depth of 1.70–6 m from the ground surface. The deposits included stone products (over 800 items), fossil fauna, the remains of dwellings, ochre, and objects of art. The materials of the Samarkand site, published in a number of papers by D.N. Lev, certainly helped to resolve many important issues of the Stone Age, not only in Central Asia but also in Iran, Pakistan, India, and other countries.

The great discoveries of archaeological sites of Paleolithic Time were added with Mesolithic and

Neolithic complexes so-called Sazagan culture in Samarkand region. The Sazagan antiquities were opened by O.I. Ibragimov, and investigated by D.N. Lev from 1966. These artifacts enabled identification of some features of the Neolithic inhabitants, and the evolution and continuity of the Stone Age cultures of Zarafshan.

David Lev is best known as the researcher of Paleolithic Uzbekistan (Mousterian cave site Aman-Kutan, Samarkand Upper Paleolithic), but his archaeological work was comprehensive and included analysis of the monuments of different archaeological periods. Lev surveyed and registered additional monuments almost every time he visited the Zarafshan Valley. His scientific publications are not very widely known among researchers, despite their undoubted importance. Most of the results of his research remained in his diaries, manuscripts, and archives of the Department of Archaeology in the History Faculty of Samarkand State University. Among these is a general report on his work, submitted for the degree of Doctor of Sciences on the theme: "*Research on the Paleolithic of Uzbekistan*" (1966).

The style of David Natanovich's scientific activity was the use excellent language and an absence of repetition. The abundance of empirical data, which he owned, provided material that would have allowed Lev to write much more than the number of his printed works (about 50 titles). Nevertheless, his materials on Paleolithic sites of Uzbekistan received world recognition.

Teaching activities have an important place in the biography of David Lev. The lectures of Lev had great success. He channeled all the passion of his inquisitive nature into his lectures. He sought to give the students not only large knowledge, but convey to them the thirst for investigation and joy of archaeological inspiration. He wanted not only to give his listeners certain information, but also to share his passion for archaeological research with them.

D.N. Lev was a founder of the Scientific Laboratory for the historical and archaeological study of settlement Afrasiab at Samarkand State University.

David N. Lev combined a deep knowledge on the Stone Age, mining, ethnography, and museum studies with teaching activity (1941–1969) at Samarkand State University. Unfortunately, the scientific and organizational creativity of D.N. Lev is still not widely appreciated in archaeological literature, but this publication goes some way toward redressing this.

Cross-References

- ▶ Central Asia: Paleolithic
- ▶ Gorodtsov, Vasily A.
- ▶ *Homo sapiens*
- ▶ Kostenki: Geography and Culture
- ▶ Lithic Technology, Paleolithic
- ▶ Mousterian Industry Tradition
- ▶ Okladnikov, Alexey P.

References

Lev, D.N. 1934. *K istorii gornogo dela*. Lenengrad: Nauka.

Lev, D.N. 1935. Novye arkhailogicheskie pamyatniki Kamchatki. *Sovetskaya Etnografiya*: 4–5.

Lev, D.N. 1949. Novye peschernye stoyanki epokhi paleolita v Uzbekistane. *Sovetskaya Etnografiya* 1.

Lev, D.N. 1960. Stoyanka drevnego cheloveka. *Priroda* 8.

Lev, D.N. 1964. Poselenie drevnekamennogo veka v Samarkande Issledovaniya 1958–1960. Arhkeologiya Uzbekistana, Trudy SamGu, Samarkand.

Lev, D.N. 1966. Raskopki Samarkandskoy paleoliticheskoy stoyanki v 1963 godu. *IMKU, Istoria materialnoy kultury Uzbekistana*. 6. Instutut Arkheologii Akademii Nauk Uzbekistana, Tashkent.

Lev, D.N. 1968. Peschery epokhi paleolita bliz Samarkanda. *Priroda* 7.

Lev, D.N. 1969. Drevneishii sledy prebyvaniya cheloveka na territorii Samarkanda. In *Istoriya Samarkanda, volume 1*. Tashkent.

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Levallois Technology: Overview of Middle Paleolithic Technologies

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Introduction

The Middle Paleolithic (MP), generally speaking, is the period characterized by the emergence

and spread of Levallois technology and various flake tools, spanning circa 250,000–300,000 to 40,000–50,000 years ago. The Levallois technology of Middle Paleolithic was associated with at least three hominin populations: late *Homo heidelbergensis*, *Homo neanderthalensis*, and *Homo sapiens*. As the Middle Paleolithic were replaced by the Upper Paleolithic associated with behaviorally and anatomically modern humans who migrated out of Africa around 40,000–50,000 years ago, this reasoning engenders big questions such as the disappearance of the Neanderthals and their cultures, the dispersal of modern humans, and their cultural and physical interactions with archaic hominin groups. Such unsolved problems have drawn a great deal of attention among both the prehistorians and the public. Levallois technology seems to have its origins in the Lower Paleolithic Acheulian (Adler et al. 2014; Rolland 1995); however, its use became much more prevalent in the Middle Paleolithic. As one of the most sophisticated lithic technologies, research relating to the Levallois method has dominated the Middle Paleolithic literature including topics such as the cognitive ability and depth of planning of archaic hominins, economy of lithic technology, diffusion and interaction of technology, and social learning of lithic technology.

Definition

Levallois, named after a stone quarry in the northern Paris suburb of Levallois-Perret, is a sophisticated core reduction method for producing relatively standardized flake and blade blanks. In general, Levallois flaking involves careful preparation of the core in such a way as to predetermine the shape of the intended blanks, which distinguishes it from other flaking methods. The first attempt to identify unique Levallois artifacts dates to 1867 (Schlanger 1996), yet the first formal definition of Levallois flakes was made much later by Reboux (quoted by Schlanger 1996) as being "they were prepared and trimmed on the core before being separated." Subsequently, little by little, additional criteria for the definition of Levallois were added which emphasized the end products of classic Levallois types, including facetted striking platforms, the angle between the platform and interior surface, a stable longitudinal and cross section, etc. In the mid-twentieth century, François Bordes (1961a, b), a French prehistorian, formulated his now-famous definition of Levallois blanks with technological criteria and presented a framework of the main Levallois types (Fig. 1). For Bordes, Levallois consists of the manufacture of a "flake of a form predetermined by special preparation of the core before removal of the flake" (Bordes 1961a: 14). Although prevalent for more than three decades, many "Levallois" assemblages which do not fit Bordes' definition have been identified by many scholars. Faced with this disparity, pioneering work in the 1980s and early 1990s done by Marks (Marks and Volkman 1983), Boëda (1986, 1995), Van Peer (1992), and others emphasizing refitting and experimental studies initialized a new era for research on Levallois technology. Following the French approach called *chaîne opératoire*, researchers emphasized the reduction sequence consisting of a dynamic process from raw material procurement to the discard of exhausted stone artifacts, instead of a handful of pristine end products representing a narrow typological range of variability. Thus, it has become increasingly apparent by the early 1990s that the definition of Levallois technology should focus on the underlying manufacturing processes rather than on the end products themselves (Dibble and Bar-Yosef 1995).

The most detailed studies of European Middle Paleolithic industries are those carried out by Eric Boëda (1986, 1995). Boëda has identified what he refers to as a basic "Levallois concept" with a volumetric reconstruction representing the unifying element behind all flaking techniques to which the term Levallois can be properly applied. Six technical criteria were used for defining a Levallois core (Fig. 2; Boëda 1986, 1995):

1. Two asymmetrical convex secant surfaces form the core volume, and the intersection of these surfaces defines a plane.
2. The two core surfaces are hierarchically related: one produces defined and varied blanks that are predetermined, and the other

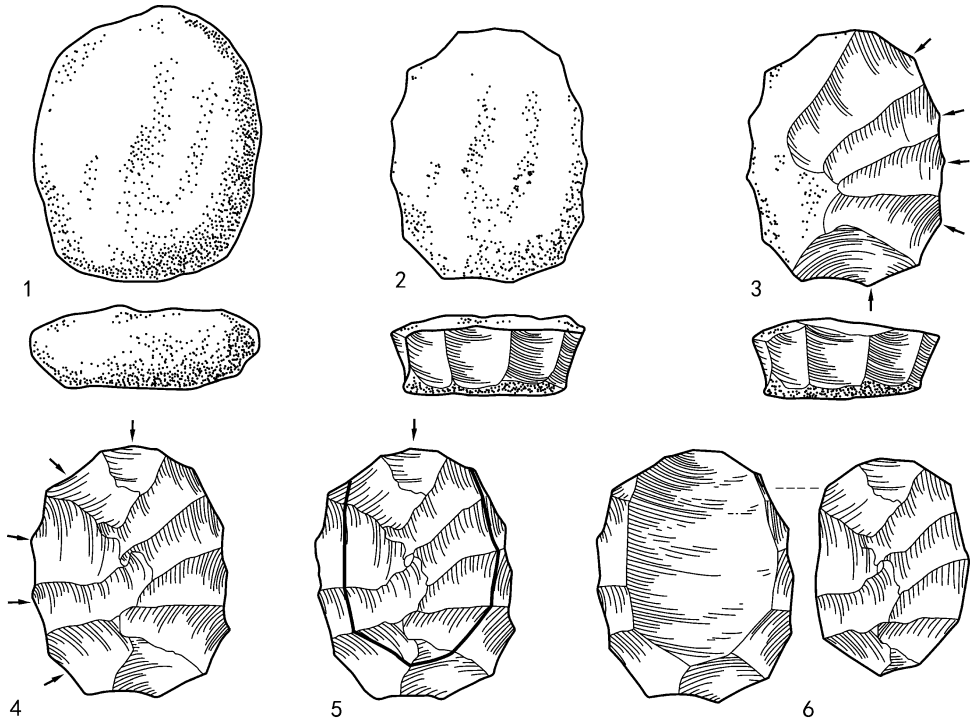

Levallois Technology: Overview of Middle Paleolithic Technologies, Fig. 1 Stages of production of a classic Levallois core, according to Bordes 1961b

serves as a surface for striking platforms. The role of the two surfaces cannot be reversed in a single production sequence.

3. The flaking surface is prepared for predetermined products consisting of maintenance of the lateral and distal convexities.
4. The fracture plane of the predetermined blanks is parallel to the plane of intersection of the two core surfaces.
5. The striking platform is maintained depending on the method chosen for the detachment of predetermined blanks but always exhibits one characteristic – the surface of striking platforms is always oriented in a position that is perpendicular to the flaking axis of the predetermined blanks.
6. Only one technique of flaking is used in the Levallois operational scheme: direct hard hammer percussion.

Two large clusters of Levallois methods have been observed in the Paleolithic record: a preferential method designed to produce a single major blank as the goal from one prepared surface and a recurrent method intended to produce several blanks from a single flaking surface without any re-preparation during the reduction (Boëda 1995). The shape of predetermined Levallois products varies and can be oval or rectangular in outline (what are generally referred to as Levallois flakes), elongate and narrow (Levallois blades), and triangular (Levallois points). However, Levallois reduction also produces many generalized flakes and certain technical spalls including débordant and dos limité flakes during the rejuvenation and maintenance of the core platforms and flaking faces.

Key Issues/Current Debates/Future Directions

Opinions concerning the roots of Levallois technology vary although, generally, scholars agree that it originated in the Acheulian technocomplex of the Lower Paleolithic. As a prepared-core

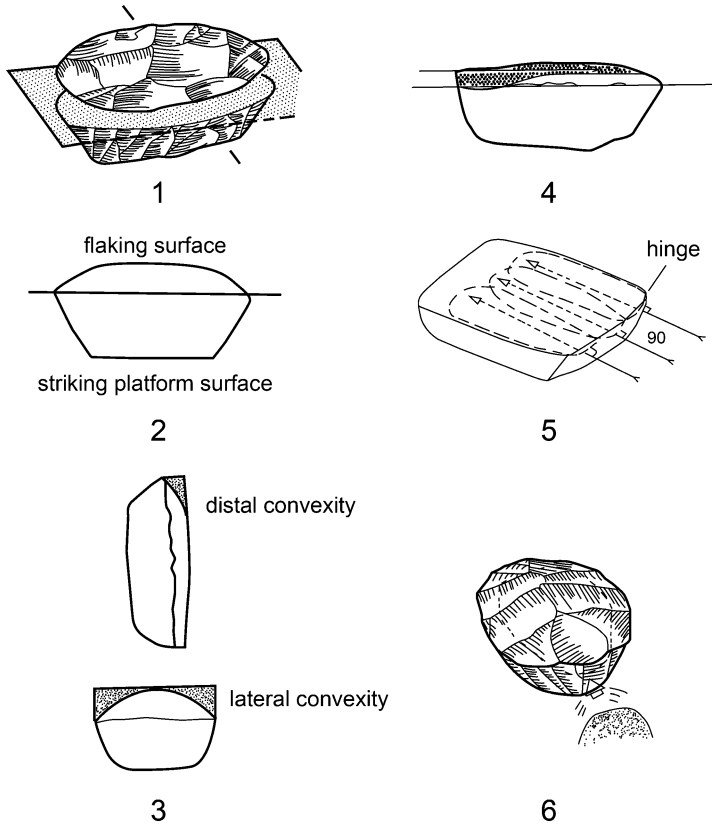

Levallois Technology: Overview of Middle Paleolithic Technologies, Fig. 2 Boëda's technological criteria for identifying the Levallois method (drawings modified after Boëda 1995)

technology, the Victoria West (also called "proto-Levallois") core technology in South Africa, dating to approximately 1 Ma, was considered by many to be the antecedent of Levallois technology (Riet Lowe 1945). More recent work has led many authors to emphasize in situ evolution from handaxe technology (Adler et al. 2014; Rolland 1995). However, the timing of the transition from Acheulian to early Levallois assemblages in different regions is not simultaneous. The picture of continuity in Africa combined with the discontinuity and apparent lack of any proto-Levallois stage in Europe lends support to Foley and Lahr's (1997) "Mode 3" hypothesis that advocates an exclusive African genesis for prepared-core technology. On the contrary, others have proposed a multiregional origin of Levallois technology in geographically dispersed regions (Adler et al. 2014; Rolland 1995). Discoveries of the early synchronic use of bifacial and Levallois technology in the Southern Caucasus (Adler et al. 2014), Northwestern Europe (White and Ashton 2003), and Southwest Asia (Debono and Goran-Inbar 2001) all tend to suggest that the transition from Acheulian to Levallois occurred independently in geographically dispersed, technologically precocious hominin populations with a shared technological ancestry (i.e., technological convergence).

The spatial distribution of Levallois technology during the Middle Paleolithic includes Africa, Europe, West and Central Asia, and the Indian subcontinent, and, of course, variations among Middle Paleolithic Levallois assemblages are present in different regions. The presence of this technology in a vast area which encompasses many geographically and environmentally variable regions raises many interesting research questions. For example, some authors have suggested that the Levallois technology signals the dispersal of specific hominin population (s) across the Eurasia toward the East

(Bar-Yosef and Belger-Cohen 2013; Foley and Lahr 1997). Instead of a population dispersal model, shared knowledge of knapping methods may have been the major component in such dispersals through cultural transmission (Lycett and Norton 2010; Lycett et al. 2016). Scholars have also considered economic explanations (e.g., Brantingham and Kuhn 2001; Lycett and Eren 2013). Brantingham and Kuhn (2001) presented a geometric model that permits controlled manipulation of a few key parameters defining Levallois core morphology, concluding that mechanical and economic constraints are the main factors underlying the broad geographic distribution and temporal persistence of Levallois reduction technologies.

A number of authors have considered possible cognitive implications of the Levallois technology. As one of the most sophisticated lithic technologies for producing predetermined blanks, the Levallois approach involves strategic planning of knapping procedures, including deliberate preparation of the core platforms and detachment surfaces. Many argue that both the products and the procedure of these Paleolithic knapping methods were clearly predetermined in terms of overall size and shape which implies a level of cognitive ability (Boëda 1995; Schlanger 1996). Wynn and Coolidge (2004) have used Levallois to support arguments that Neanderthals were capable to possess a long-term working memory. Others have even used this sophisticated lithic technology to advocate the linguistic capacity of extinct hominins (Lieberman 1984). However, a small number of researchers demonstrated that the Levallois products are not necessarily statistically more standardized than non-Levallois products; thus their manufacture could not be linked to the presence of linguistic rules, structure, or categories (Dibble 1989). Recent morphometric comparison of experimental preferential Levallois flakes and debitage flakes shows statistically significant standardization among Levallois flakes (Eren and Lycett 2012). Eren and Lycett's results (2012) support the hypothesis that the lengthy, multiphase, and hierarchically organized process of Levallois reduction was a deliberate, engineered strategy orientated toward specific goals. In turn, their results suggested that Levallois knapping relied on a cognitive capacity for long-term working memory and may also imply that the cognitive capacity of Neanderthals and modern humans was not as sharp as some scholars have previously suggested (Eren and Lycett 2012).

The Middle Paleolithic includes a great deal of industrial variability represented by several named technocomplexes throughout the Old World. Therefore, inter- and intra-site and regional Middle Paleolithic industrial variability is a crucial issue, although it has tended to be neglected by paleoanthropologists. In addition to the Mousterian technocomplex which is commonly associated with Levallois technology in Western Europe, many other Middle Paleolithic industries are present in the Old World, including the pre-Mousterian, the Micoquian, the Tayacian, and the Taubachian, among others, from Western, Central, and Eastern Europe, the Levantine Yabrudian, and the Middle Stone Age of Africa (Dibble and Mellars 1992). In addition to the major knapping method – Levallois – many other flaking technologies were present in the Middle Paleolithic, including discoidal, "salami slice" (Quina), and blade technology, etc. A more striking phenomenon of the Middle Paleolithic variability is that contemporaneous lithic assemblages in East and Southeast Asia differ greatly from those of Western Eurasia and Africa in that they lack prepared-core technologies in general. Archaeologists have argued for a distinctive and continuous technological evolution of the East Asian Paleolithic since the Early Pleistocene (Gao 2013), while others suggested a demographic model that relatively smaller effective population sizes inhibited the in situ evolution of Levallois technology in East and Southeast Asia (Lycett and Norton 2010). Many of these questions have not been completely resolved to date. Nevertheless, the implications of the similarities and differences among lithic technologies in the Middle Paleolithic across the Old World – and in Levallois technology in particular – will continue to attract attention from archaeologists in terms of human dispersal and technology adaptation.

References

Adler, D.S., K.N. Wilkinson, S. Blockley, D.F. Mark, R. Pinhasi, B.A. Schmidt-Magee, S. Nahapetyan, C. Mallol, F. Berna, P.J. Glauberman, Y. Raczynski-Henk, N. Wales, E. Frahm, O. Jöris, A. Macleod, V.C. Smith, V.L. Cullen, and B. Gasparian. 2014. Early Levallois technology and the Lower to Middle Paleolithic transition in the Southern Caucasus. *Science* 345: 1609–1613.

Bar-Yosef, O., and A. Belger-Cohen. 2013. Following Pleistocene road signs of human dispersals across Eurasia. *Quaternary International* 285: 30–43.

Boëda, E. 1986. *Approche technologique du concept Levallois et évaluation de son champ d'application*: *Étude de trois gisements saaliens et weichséliens de la France septentrionale*. Unpublished Doctoral Thesis, Université de Paris X.

Boëda, E. 1995. Levallois: A volumetric construction, methods, a technique. In *The definition and interpretation of Levallois technology*, ed. H.L. Dibble and O. Bar-Yosef, 41–68. Madison: Prehistory Press.

Bordes, F. 1961a. *Typologie du Paléolithique ancien et moyen*. Bordeaux: Delmas. [1988 edition, Paris: CNRS].

Bordes, F. 1961b. Mousterian cultures in France. *Science* 134: 803–810.

Brantingham, P.J., and S.L. Kuhn. 2001. Constraints on Levallois core technology: A mathematical model. *Journal of Archaeological Science* 28: 747–761.

Debono, H., and N. Goran-Inbar. 2001. Note on a link between Acheulean handaxes and the Levallois method. *Journal of the Israel Prehistoric Society* 31: 9–23.

Dibble, H.L. 1989. The implications of stone tool types for the presence of language during the Lower and Middle Palaeolithic. In *The human revolution: Behavioural and biological perspectives on the origins of modern humans*, ed. P. Mellars and C. Stringer, 415–432. Edinburgh: Edinburgh University Press.

Dibble, H., and O. Bar-Yosef, eds. 1995. *The definition and interpretation of Levallois technology*, Monographs in world archaeology, no. 23. Madison: Prehistory Press.

Dibble, H.L., and P.A. Mellars, eds. 1992. *The Middle Paleolithic: Adaptation, behavior, and variability*, University Museum monographs no. 72. Philadelphia: University of Pennsylvania Press.

Eren, M.I., and S.J. Lycett. 2012. Why Levallois? A morphometric comparison of experimental 'Preferential' Levallois flakes versus debitage flakes. *PLoS One* 7: e29273.

Foley, R., and M.M. Lahr. 1997. Mode 3 technologies and the evolution of Modern Humans. *Cambridge Archaeological Journal* 7: 3–36.

Gao, X. 2013. Paleolithic cultures in China: Uniqueness and divergence. *Current Anthropology* 54: S358–S370.

Lieberman, P. 1984. *The biology and evolution of language*. Cambridge, MA: Harvard University Press.

Lycett, S.J., and M.I. Eren. 2013. Levallois economics: An examination of 'waste' production in experimentally produced Levallois reduction sequences. *Journal of Archaeological Science* 40: 2384–2392.

Lycett, S.J., and C.J. Norton. 2010. A demographic model for Palaeolithic technological evolution: The case of East Asia and the Movius line. *Quaternary International* 211: 55–65.

Lycett, S.J., Noreen von cramon-taubadel, and M.I. Eren. 2016. Levallois: Potential implications for learning and cultural transmission capacities. *Lithic Technology* 41: 19–38.

Marks, A.E., and P.W. Volkman. 1983. Changing core reduction strategies: A technological shift from the Middle to the Upper Paleolithic in the southern Levant. In *The Mousterian legacy: Human biocultural change in the Upper Pleistocene*, British Archaeological Reports international series 164, ed. E. Trinkhaus, 13–33. Oxford: British Archaeological Reports.

Rolland, N. 1995. Levallois technique emergence: Single or multiple? A review of the Euro-Africa record. In *The definition and interpretation of Levallois technology*, ed. H.L. Dibble and O. Bar-Yosef, 333–359. Madison: Prehistory Press.

Schlanger, N. 1996. Understanding Levallois: Lithic technology and cognitive archaeology. *Cambridge Archaeological Journal* 6: 231–254.

Van Peer, P. 1992. *The Levallois reduction strategy*, Monographs in world archaeology, no.13. Madison: Prehistory Press.

Van Riet Lowe, C. 1945. The evolution of the Levallois technique in South Africa. *Man* 45: 49–59.

White, M., and N. Ashton. 2003. Lower Paleolithic core technology and the origins of the Levallois method in north-western Europe. *Current Anthropology* 44: 598–609.

Wynn, T., and F.L. Coolidge. 2004. The expert Neandertal mind. *Journal of Human Evolution* 46: 467–487.

Further Reading

Dibble, H., and O. Bar-Yosef, eds. 1995. *The definition and interpretation of Levallois technology*, Monographs in world archaeology, no. 23. Madison: Prehistory Press.

Mellars, Paul. 1995. *The Neanderthal legacy: An archaeological perspective from Western Europe*. Princeton: Princeton University Press.

Lévi-Strauss, Claude

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Basic Biographical Information

Claude Lévi-Strauss was born on November 8, 1908, in Brussels and raised in Paris where his

father worked as a painter. His upbringing in a secular Jewish family passionate for art gave him access to books, museums, flea markets, art galleries, and operas. During his years at the *lycée*, Lévi-Strauss became fascinated by geology, read Freud as soon as his books were translated in French, and was introduced by a family friend to the socialist movement and the works of Marx. In these three early intellectual interests, he found rational explanations for the seemingly illogical phenomena underlying the earth, the mind, and society. Lévi-Strauss passed the *agrégation* of philosophy in 1931 and became a high school teacher in Mont-de-Marsan. But his desire to apply philosophical knowledge and thirst for new discoveries pushed him toward a career as an ethnologist.

In 1934, he was offered a position as a sociology professor on a French university mission to Brazil. Before embarking on the 20-day boat trip from Marseilles, he read, what would become standards for his own research, Robert Lowie, Franz Boas, and Alfred Kroeber. At the end of his first academic year in São Paulo in 1935, Lévi-Strauss set out on a 4-month expedition to the Caduveo and Bororo tribes. Three years later, a longer expedition sponsored by the *Musée de l'Homme* allowed him to spend almost an entire year in the Mato Grosso with the Nambikwara, Munde, and Tupi-Kawahib tribes. He returned to Paris with his ethnographic material in March 1939 but was immediately sent to the front at the start of World War II. Lévi-Strauss managed to escape to southern France before the invasion of the German army. However, after the Statute on Jews was adopted in October 1940, he lost his French citizenship and any chance of finding a teaching job. In addition, his request for a visa to return to Brazil was denied.

Promised to a brilliant career in his own country, Lévi-Strauss found refuge in the United States. With the help of Alfred Métraux, Robert Lowie, and his aunt Aline Caro-Delvaille in New York, the New School for Social Research (recently opened by the Rockefeller Foundation) invited him to teach a course on South America. He would stay from 1941 to 1947 bringing with him the notes and diaries, photographs, and maps collected in Brazil used to finish a classic ethnographic report and formal analysis of his earlier expeditions' results (1948). He also spent much time in the New York Public Library collecting information on kinship systems. While in the United States, he met American anthropologists such as Boas, Kroeber, Linton, Benedict, and Mead and became the friend and colleague of other exiled intellectuals like the Russian linguist Roman Jakobson, whose structural linguistics offered Lévi-Strauss the general inspiration for the analysis of his ethnographic data.

Major Accomplishments

It was in conversation with Roman Jakobson that Claude Lévi-Strauss developed the theoretical model for which he is now best known: structuralism. Lévi-Strauss' structuralism studies human and social phenomena as diverse as kinship, mythology, and rituals to discover the underlying structures by which meaning is produced within a culture. As Jakobson did with languages, in order to go beyond the simple accumulation of facts, Lévi-Strauss examined kinship as a set of relations. Having adopted this model, he completed his thesis in February 1947 and defended it a few months later upon his return to France. The results of his labor would be published as *Les structures élémentaires de la parenté* (1949), which, if recognized by some as a reference work, was criticized, especially within French academia, as too ambitious. Lévi-Strauss' book did offer an encompassing methodology to scientifically examine family organization. Rather than focusing on the relationship between family members itself, he considered the logical structures underlying them. The methodological direction Lévi-Strauss embarked upon in the 1940s would lead, less than two decades later, to the publication of *Anthropologie structurale* (1958) – a collection of articles written in the 1950s investigating kinship, myths, magic, and art. Extending beyond the disciplinary boundaries of anthropology, this manifesto of structuralism would have a lasting influence in all fields within the social sciences and humanities during the second half of the twentieth century.

While considered by some as his least "scientific" work, *Tristes tropiques* (1955), a memoir of the anthropologist's travels combining personal recollections, ethnographic insights, and philosophical meditations, brought Lévi-Strauss the most public recognition. In this autobiographical account, he revealed a critique of western civilization and its associated destructive forces. In 1952, Lévi-Strauss was asked by the UNESCO to write *Race et histoire*. Here again, the author critically examined the supposed benefits of such taken-for-granted notions as social evolution, technological progress, and cultural diversity. The 1950s also marked a transition in Lévi-Strauss' teachings from kinship to mythology. He published the four-volume *Mythologiques*, which follows a single myth in all of its variations from South to North America. Again, rather than focusing on the content of the stories themselves, he examined the underlying structures and relations between their different elements starting with the opposition between raw and cooked (1964). In *La voie des masques* (1975), Lévi-Strauss adapted this structural framework to consider the stylistic differences among Native American masks made in the Pacific Northwest.

Among the many honors received during his lifetime, Lévi-Strauss was elected to the *Collège de France* in 1959 and entered the *Académie Française* in 1974. After retiring from the *Collège* on October 1, 1982 (50 years to the day after beginning his first job in Mont-de-Marsan), Lévi-Strauss remained active publishing *La potière jalouse* (1985), a critique of Freudian interpretations of myths, and *Histoire de lynx* (1991), deploring the human and environmental catastrophes brought on by western colonialism. He also spent time travelling and gave many interviews to journalists. In *De près et de loin*, a book based on a series of conversation between Didier Eribon and Lévi-Strauss, approaching his 80th birthday, the anthropologist reiterated the paradox behind some of his philosophical views – a pessimistic diagnosis of the destructive power of modern, western societies associated with an imperturbable faith in the totalizing power of science to understand cultural and natural phenomena. Claude Lévi-Strauss died in Paris on October 30, 2009, at the age of 101.

Cross-References

► Structural Archaeology

References

Lévi-Strauss, C. 1948. La vie familiale et sociale des Indiens Nambikwara. *Journal de la Société des Américanistes* 37: 1–132.
Lévi-Strauss, C. 1949. *Les structures élémentaires de la parenté*. Paris: PUF.
Lévi-Strauss, C. 1958. *Anthropologie structurale*. Paris: Plon.
Lévi-Strauss, C. 1964. *Mythologiques I. Le cru et le cuit*. Paris: Plon.
Lévi-Strauss, C. 1975. *La voie des masques*. Genève: Albert Skira.
Lévi-Strauss, C. 1985. *La potière jalouse*. Paris: Plon.
Lévi-Strauss, C. 1991. *Histoire de lynx*. Paris: Plon.

Further Readings

Bertholet, D. 2003. *Claude Lévi-Strauss*. Paris: Plon.
Keck, F. 2005. *Claude Lévi-Strauss, une introduction*. Paris: La Découverte.
Lévi-Strauss, C. 1955. *Tristes tropiques*. Paris: Plon.
Lévi-Strauss, C. 1994. *Saudades do Brasil*. Paris: Plon.
Lévi-Strauss, C., and D. Eribon. 1952. *Race et histoire*. Paris: UNESCO.
Lévi-Strauss, C., and D. Eribon. 1990. *De près et de loin*. Paris: Éditions Odile Jacob.

Lewis-Williams, James David

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Basic Biographical Information

David Lewis-Williams was born in 1934 in Cape Town, South Africa. He undertook his undergraduate studies at the University of Cape Town, graduating in 1956. He began teaching English and

Geography at Selborne College in 1958, moving to Kearsney College in 1963. In 1965, he completed an honors degree at the University of South Africa. While at Kearsney College, he was active in running the student archaeology club. It was with students from this club that Lewis-Williams began exploring the Drakensberg mountains for San rock art. It was also during this time that he met John Argyle, an anthropologist at the University of Natal (now, the University of KwaZulu-Natal). Argyle encouraged Lewis-Williams to pursue his interest in San rock art by writing a Ph.D thesis. The thesis was completed in 1978 at the University of Natal and was then published in 1981. Entitled *Believing and Seeing: Symbolic Meanings in Southern San Rock Paintings*, the published thesis has become one of the landmark works on the symbology of rock art and has been widely cited (Lewis-Williams 1981).

In 1978, Lewis-Williams was appointed to the Department of Anthropology at the University of the Witwatersrand. While teaching in the department, he was exposed to the structural Marxist thinking that pervaded the social sciences and humanities at the time and that was so influential in South Africa's intellectual, anti-Apartheid circles. In 1982, he published the first Marxist paper on rock art, breaking radically from the functionalist interpretations of earlier and contemporary scholars (Lewis-Williams 1982). In 1980, Lewis-Williams was offered a position in the Department of Archaeology at the University of the Witwatersrand, where he would receive laboratory space for working on the hand-traced copies of large rock art panels that were beginning to become a feature of rock art research at the time. From this position, he received a grant to undertake the research and documentation of San rock art in the Harrismith District on the Maloti Mountains. On the strength of this project, Lewis-Williams established the Rock Art Research Unit, with a small dedicated team, to work on recording and researching San rock art. Later the unit became a center, and after Lewis-Williams' retirement in 1999, it received the status of an institute. He was appointed as Professor of Cognitive Archaeology in the Department of Archaeology in 1987. At the end of 2012, he continues to be Professor Emeritus in the Rock Art Research Institute, where he is still actively researching and publishing.

Major Accomplishments

Following the success of *Believing and Seeing*, Lewis-Williams began an ambitious publishing schedule, regularly producing groundbreaking papers on the interpretation of San rock art. Influenced by the work of Victor Turner, the anthropologist, Lewis-Williams established the methodology by which San rock art could be interpreted by reading ethnography, most notably the now-famous 19 Bleek and Lloyd records. From the early 1980s, he added the use of literature on neuropsychology and altered states of consciousness as an additional tool for interpretation. Throughout the 1980s, a steady stream of publications saw the deciphering of previously enigmatic images in San rock art through the combination of ethnographic and neuropsychological evidence. Much of the art was shown to concern the San's ritual practices and religious beliefs about the spirit world. In particular, Lewis-Williams argued that the art was principally concerned with the practices of San shamans (known as owners of potency in their own languages), such as their healing and rainmaking activities. Moreover, Lewis-Williams, together with a colleague, Thomas Dowson, identified the use of natural rock features in the composition of some images; certain figures were observed to be composed in a manner that made them appear to be entering or exiting features such as steps and cracks in the rock surface (Lewis-Williams and Dowson 1990). Based on these observations, Lewis-Williams and Dowson argued that the rock surface acted as a veil between this world and the spirit realm. This observation became a significant one globally and sparked the recognition of the use of natural rock features in the composition of rock art images all over the world. By the mid-1990s, the rapid rate of publication by Lewis-Williams and his students had led to a significant body of interpretative material on San rock art in southern Africa. From this point

onward, while continuing work on the San rock art of southern Africa, Lewis-Williams shifted his focus to Europe, to both the Upper Paleolithic and the Neolithic periods.

The starting point for Lewis-Williams's work on both the Neolithic and the Upper Paleolithic was the research on altered states of consciousness that had influenced his interpretative work on San rock art. Lewis-Williams, again with Dowson, argued that at least, some of the imagery in the Upper Paleolithic caves, was generated in altered states of consciousness and thus suggested that the art was made within a shamanistic context (Lewis-Williams and Dowson 1988). In 1996, Lewis-Williams, together with Jean Clottes, published the first major book arguing that Upper Paleolithic rock art was shamanistic (Lewis-Williams and Clottes 1996). This was followed by a trilogy of books, expanding Lewis-Williams's ideas on the Upper Paleolithic (Lewis-Williams 2002) and the Neolithic (2005, together with David Pearce) and on the origins of art and religion (2010). Throughout his long career, Lewis-Williams's work has a number of related threads that span his writing on San rock art, the Neolithic, and the Upper Paleolithic. These are as follows:

1. His focus on deciphering meanings of ancient images and artefacts with methods that are more than "gaze and guess"
2. His emphasis on understanding the mind and, as far as possible, the brain and how it works in creating meaning
3. His efforts to always situate the understanding of how meanings are created by the mind/brain within a social context

His research has left an enduring mark on the scholarship of the Upper Paleolithic and Neolithic periods, and his research on San rock art has defined and shaped the field for decades to come.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Art, Paleolithic
- ▶ Europe: Prehistoric Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Leroi-Gourhan, André
- ▶ Mobiliary Art, Paleolithic
- ▶ Paleoart Studies: Scientific Methods
- ▶ Rock Art, Forms of

References

Lewis-Williams, J.D. 1981. *Believing and seeing: Symbolic meanings in southern San rock paintings*. London: Academic.

Lewis-Williams, J.D. 1982. The economic and social context of southern San rock art. *Current Anthropology* 23: 429–449.

Lewis-Williams, J.D. 2002. *The mind in the cave: Consciousness and the origins of art*. London: Thames & Hudson.

Lewis-Williams, J.D. 2005. *Inside the Neolithic mind: Consciousness, cosmos and the realm of the gods*. London: Thames & Hudson.

Lewis-Williams, J.D. 2010. *Conceiving God: The cognitive origin and evolution of religion*. London: Thames & Hudson.

Lewis-Williams, J.D., and J. Clottes. 1996. *Les chamanes de la préhistoire: transe et magie les grottes ornées*. Paris: Éditions du Seuil.

Lewis-Williams, J.D., and T.A. Dowson. 1988. The signs of all times: Entoptic phenomena in Upper Palaeolithic art. *Current Anthropology* 29: 201–245.

Lewis-Williams, J.D., and T.A. Dowson. 1990. Through the veil: San rock paintings and the rock face. *South African Archaeological Bulletin* 45: 5–16.

Lightfoot, Kent G.

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Basic Biographical Information

Dr. Kent G. Lightfoot (b. May 23, 1953) (Fig. 1) is a North American archaeologist whose research transformed the relationship between history and prehistory and who developed widely adopted practices for collaborative relationships between archaeologists and Native Americans. Kent

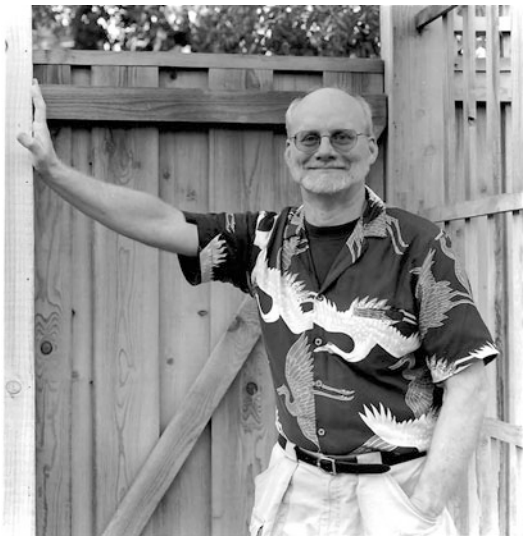

Lightfoot, Kent G., Fig. 1 Dr. Kent G. Lightfoot

Lightfoot was educated at Stanford University (B.A., Anthropology, 1975) and Arizona State University (M.A., Anthropology, 1977; Ph.D., Anthropology, 1981). He taught at Arizona State University (1981), Northern Illinois University (1982), and State University of New York at Stony Brook (1982–1987) before moving to the University of California, Berkeley (1987–present), where he is currently professor of Anthropology and curator of North American Archaeology at the Phoebe Hearst Museum of Anthropology. He is a fellow of the California Academy of Sciences; has received over a dozen teaching awards, including the 2007 American Anthropological Association Award for Excellence in Undergraduate Teaching; and was honored with the Society for Historical Archaeology 2007 James Deetz Book Award for *Indians, Missionaries, and Merchants* (Lightfoot 2005) and the 2010 Society for California Archaeology Martin A. Baumhoff Special Achievement Award for *California Indians and Their Environment* (Lightfoot and Parrish 2009). In addition to numerous academic publications, he is the founder and frequent contributor to a long-running essay series, titled Archaeology and Indians, in the magazine *News from Native California*.

Major Accomplishments

In North American historical archaeology, Lightfoot has been responsible for forging the study of culture contact in the archaeology of colonization, fundamentally transforming the perceived relationship between history and prehistory and developing practices for collaboration between archaeologists and indigenous communities. His landmark article, "Culture Contact Studies" (Lightfoot 1995), charged that the disciplinary division between prehistoric and historical archaeology created an ethnically segregated view of the North American past, in which Native American cultures are studied by prehistorians, and nonindigenous cultures, by historical archaeologists. As a result, present-day and historical Native American communities were used primarily as a source of analogy for prehistoric archaeology or were neglected altogether. Lightfoot critiqued the privileging of documentary evidence over archaeological evidence in the interpretation of colonial sites, as such documents rarely represented the Native American- and African-descendant laborers who were the majority of residents at most European colonial settlements in North America. Building on his prior research on cultural change in the US Southwest (Lightfoot 1984), Lightfoot argued that European colonial settlements must be studied within the long-term, comparative perspective afforded by the conjuncture of prehistoric and historic archaeology.

Lightfoot first implemented this approach through sustained research during the 1990s and 2000s at Colony Ross (also called Fort Ross) (Fig. 2), a Russian colonial settlement established on the Central California coast during 1812–1841. Russian colonial administrators conscripted Native Alaskan Alutiiq men to work as sea mammal hunters at Colony Ross and drew domestic and agricultural laborers from nearby villages of the Kashaya Pomo, the Native Californian tribe on whose ancestral land Colony Ross was founded.

Under Lightfoot's direction, research at Colony Ross followed several core principles that have now been widely adopted in the archaeology

Lightfoot, Kent G., Fig. 2 Dr. Kent G. Lightfoot during field research at Colony Ross, 1994

of colonization: (1) sustained collaboration with descendent communities, including adopting culturally appropriate research practices and field methods that minimize disturbance to archaeological deposits; (2) expanding the spatial framework of analysis from the central colonial compound to include labor encampments, task-specific sites, and regional networks of indigenous and colonial settlements; (3) integrating data from prehistoric and historic sites to facilitate long-term diachronic comparative analysis; (4) emphasizing multidirectional cultural exchange within the pluralistic demography of colonial settlements; and (5) concern with the long-term political and cultural consequences of colonization for present-day indigenous communities. Lightfoot's initial research at Colony Ross focused on the interethnic households formed by Native Alaskan men and Kashaya Pomo women under Russian supervision (Lightfoot et al. 1998). In contradiction to acculturative models of unidirectional cultural change, Lightfoot and his team found that despite intimate intercultural engagements, Russian, Alutiiq, and Kashaya residents of Colony Ross largely adopted only those cultural innovations that "fit" within their preexisting conceptions of what constituted proper behavior. Within the upheavals of colonization, there was great continuity between prehistoric and historic spatial patterns, material culture, and foodways. Subsequent studies at Colony Ross have investigated several Kashaya Pomo village sites, both near to and far from the colonial settlement, and task-specific colonial outposts such as ranches and boat docks.

In the book *Indians, Missionaries, and Merchants: The Legacy of Colonial Encounters on the California Frontiers* (Lightfoot 2005), Lightfoot expanded this research program to compare the long-term effects of Russian and Spanish colonization for Native Californian communities today. Using a methodology he terms holistic historical anthropology, Lightfoot drew on sources from ethnohistory, ethnography, native texts, and archaeology to compare multiple dimensions of colonization, including enculturation programs, resettlement programs, social mobility, labor practices, interethnic unions, demographic parameters, and temporal dimensions. He concluded that there were three basic processes of cultural change that unfolded in colonial-era California: indigenous political consolidation in the northern California regions affected by Russian colonization, massive Spanish-colonial resettlement programs in the central California missions, and modified relocation in the southern Spanish-colonial California missions. Significantly, Lightfoot determined that these differences in historical experience had far-reaching effects for Federal recognition of indigenous tribes in the present day, with those Indian descendants of the northern missions facing the most difficult task of proving political and cultural autonomy in the face of disruptive resettlements and ever-changing social and economic conditions.

Lightfoot's current research expands this diachronic, comparative methodology to archaeological studies of indigenous environmental management and historical ecology. With Kashaya Pomo elder Otis Parrish, Lightfoot coauthored the reference book *California Indians and Their Environment* (Lightfoot and Parrish 2009). Most recently, in collaboration with Mutsun Ohlone band member and environmental scientist Chuck Striplen, Lightfoot has directed a series of archaeological field research projects investigating indigenous environmental management practices on state-owned lands, in order to improve Native Californian access to traditional resources and to inform government land management strategies used by government agencies (e.g., Cuttrell et al. 2012).

Lightfoot has also made important advances to the prehistoric archaeology of the North American Pacific Coast, especially through synthetic analyses of existing research and new research on prehistoric mound-builders in Central California (e.g., Lightfoot 2011) (Fig. 3). His career is also marked by continual attention to methodological innovation, from pioneering statistical analysis of archaeological survey methods and site detection probabilities to more recent efforts to develop minimally invasive and culturally sensitive field methods (Lightfoot 2006).

Lightfoot, Kent G., Fig. 3 Dr. Kent G. Lightfoot with UC Berkeley student Ryan Posca during archaeological survey at Pinnacles National Monument, 2011

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Cultural Heritage Management and Native Americans
- ▶ Indigenous Archaeologies
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Mission Archaeology in North America
- ▶ North America (USA): Historical Archaeology
- ▶ People as Agents of Environmental Change

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References

Cuttrell, R., C. Striplen, M.G. Hylkema, and K.G. Lightfoot. 2012. A land of fire: Anthropogenic burning on the central coast of California. In *Contemporary issues in California archaeology*, ed. T.L. Jones and J.E. Perry. Walnut Creek: Left Coast Press.

Lightfoot, K.G. 1984. *Prehistoric political dynamics: A case study from the American Southwest*. DeKalb: Northern Illinois University Press.

Lightfoot, K.G. 1995. Culture contact studies: Redefining the relationship between prehistoric and historical archaeology. *American Antiquity* 60: 199–217.

Lightfoot, K.G. 2005. *Indians, missionaries, and merchants: The legacy of colonial encounters on the California frontiers*. Berkeley: University of California Press.

Lightfoot, K.G. 2006. Rethinking archaeological field methods. *News from Native California* 19: 21–24.

Lightfoot, K.G. 2011. Mounded landscapes of central California. In *Hunter-gatherer archaeology as historical process*, ed. K.E. Sassaman and D.H. Holly, 55–78. Tucson: University of Arizona Press.

Lightfoot, K.G., and O. Parrish. 2009. *California Indians and their environment: An introduction*. Berkeley: University of California Press.

Lightfoot, K.G., A. Martinez, and A.M. Schiff. 1998. Daily practice and material culture in pluralistic social settings: An archaeological study of culture change and persistence from Fort Ross, California. *American Antiquity* 63: 199–222.

Further Reading

Lightfoot, K.G. 1986. Regional surveys in the eastern United States: The strengths and weaknesses of implementing subsurface testing programs. *American Antiquity* 51: 484–504.

Lightfoot, K.G. 1993. Long-term developments in complex hunter-gatherer societies: Recent perspectives from the Pacific Coast of North America. *Journal of Archaeological Research* 1: 167–201.

Lightfoot, K.G. 1995. Frontiers and boundaries in archaeological perspective. *Annual Review of Anthropology* 24: 471–492.

Lightfoot, K.G. 1997. Cultural construction of coastal landscapes: A middle Holocene perspective from San Francisco Bay. In *Archaeology of the California coast during the middle Holocene*, ed. J.M. Erlandson and M.A. Glassow, 129–141. Los Angeles: Institute of Archaeology, UCLA.

Lightfoot, K.G. 2002. Late Holocene in the San Francisco Bay area: Temporal trends in the use and abandonment of shell mounds in the East Bay. In *Catalysts to complexity: Late Holocene societies of the California Coast*, ed. J. Erlandson and T. Jones, 263–281. Los Angeles: Institute of Archaeology, UCLA.

Lightfoot, K.G. 2005a. The archaeology of colonization: California in cross-cultural perspective. In *The archaeology of colonial encounters: Comparative perspectives*, ed. G. Stein, 207–235. Santa Fe: School of American Research Press.

Lightfoot, K.G. 2005b. Archaeology and Indians: Thawing an icy relationship. *News from Native California* 19: 37–39.

Lightfoot, K.G. 2008. Collaborative research programs: Implications for the practice of North American archaeology. In *Collaborating at the trowel's edge: Teaching and learning in indigenous archaeology*, ed. S.W. Silliman, 211–227. Tucson: University of Arizona Press.

Lightfoot, K.G., T. Wake, and A. Schiff. 1993. Native responses to the Russian mercantile colony of Ross, northern California. *Journal of Field Archaeology* 20: 159–175.

Upham, S., K.G. Lightfoot, and R. Jewett, eds. 1989. *The sociopolitical structure of prehistoric southwestern societies*. Boulder: Westview Press.

Lima, Tania Andrade

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Basic Biographical Information

Born in Rio de Janeiro, Brazil, Tania Andrade Lima graduated in Archaeology in 1979 at the Universidade Estácio de Sá (Rio de Janeiro, Brazil). In 1980, she received a specialization at the Universidade Federal do Rio de Janeiro, obtaining a doctorate degree in sciences (Archaeology) from the Universidade de São Paulo in 1991.

Currently, she is an Associate Professor at the Anthropology Department of the National Museum/Rio de Janeiro Federal University, and a researcher at the Brazilian National Council for the Scientific and Technological Development (CNPQ).

Major Accomplishments

Lima began her professional career in the 1980s as a pre-historian. Back then she was investigating a regional settlement system of fishermen/gatherers in the islands of Ribeira Bay, Angra dos Reis, for her Ph.D. research. It was precisely due to one of these shell-middens that she got interested in Historical Archaeology, and more specifically as a result of the presence of nineteenth-century remnants at their superficial deposits. At that time, Historical Archeology in Brazil was just giving its first steps by producing scarce and isolated researches.

Through observing and comparing the similarity of the material culture recovered from these investigations – usually considered apparently insignificant objects – Lima understood that she was standing before a phenomenon that configured a peculiarity in the Brazilian social formation: the rising of a bourgeoisie way of life yet during the slavery era that preceded the implantation of capitalism itself. The latter only took place with the consolidation of the republican regime and the industrializing process in the twentieth century.

Alongside the studies on prehistoric archaeology, Lima has devoted much of her attention to the study of the slow process of substituting the old mentalities for a progressively broader capitalist vision, focusing on the embryonic stage of capitalism in Brazil in the nineteenth century. Basically working with domestic units in both rural and urban environments, Lima has investigated the close relation between ordinary daily lives

and the major economic, politic, and social changes taking place through unconscious, daily, and anonymous behaviors. She has also analyzed the symbolic aspects of domestic material culture and the statement that nineteenth-century society of Rio de Janeiro was making about itself by means of used objects in table rituals, hygienic body practices, children's plays, and also through the iconography of gravestones (Lima 1994, 1996, 1999).

Another approach considered by Lima to the perspective of embryonic capitalism in Brazil is the Archaeology of Slavery. She did so by excavating a slave house in a coffee plantation at Paraíba Valley and later by analyzing low social prestige trades performed by urban slaves in one of the main downtown squares in Rio de Janeiro (Lima 2008). Most recently, in a research drawn specifically toward this goal, she found the remains of Valongo at the seaport zone, which was the exclusive slave wharf in the first half of nineteenth century. This was the harbor that received the greatest number of Africans destined for slavery in the Americas. Along with these remains, an exceptional collection of objects related to personal and magical-religious use was found. As an African Diaspora Memorial, the Valongo site has been transformed into a monument of reference to African-descendants communities in Brazil, and a new square has been specially considered to allow Valongo's presentation and its interaction with the public.

One of the most remarkable characteristics of Tania Lima's work is her astonishing capacity of using oral and written language to create a story that seduces the reader by transforming archaeology into much more than a simple interpretation of the past.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Engendering Historical Archaeology
- ▶ Social Identity in Historical Archaeology

References

Lima, T.A. 1994. De morcegos e caveiras a cruzes e livros: A representação da morte nos cemitérios cariocas do século XIX. *Anais do Museu Paulista, Nova Série, História eCultura Material* 2: 87–150.

Lima, T.A. 1996. Humores e odores: Ordem corporal e ordem social no Rio de Janeiro, século XIX. *História, Ciências, Saúde* 2: 46–98.

Lima, T.A. 1999. El huevo de la serpiente: Una arqueologia del capitalismo embrionário en el Rio de Janeiro del siglo XIX. In *Sed non Satiata – Teoría Social en laArqueología Latinoamericana Contemporánea*, ed. A. Zarankin and F.A. Acuto, 189–238. Buenos Aires: Ediciones Del Tridente.

Lima, T.A. 2008. Los zapateros descalzos: Arqueología de una humillación en Rio de Janeiro del siglo XIX. In *Sed non Satiata II, volume 2: Acercamientos socialesen la Arqueología Latinoamericana*, ed. F.A. Acuto and A. Zarankin, 135–157. Córdoba: Encuentro Grupo Editor.

Further Reading

Lima, T.A. 1995. Pratos e mais pratos: Louças domésticas, divisões culturais e limites sociais no Rio de Janeiro, século XIX. *Anais do Museu Paulista, Nova Série, História eCultura Material* 3: 129–191.

Linearbandkeramik Site Excavation

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Introduction and Definition

The Linearbandkeramik (Linear Pottery culture, LBK) is the earliest Neolithic culture so far defined in Central Europe. At its maximum extent, it reaches from western Hungary (where it emerges around 5500 cal BCE) to the Paris Basin, into Ukraine, and as far as the Northern European Plain. The LBK is characterized by a distinctive style of pottery (with linear bands) and monumental wooden longhouses flanked by pits. Enclosures and burial grounds also occasionally occur. In the earliest phase (until about 5250 cal BCE), material culture is more uniform,

but this gives way to increasing regionalization until the LBK is finally replaced by a series of successor cultures, a regionally varied process completed by about 4900 cal BCE.

Key Issues/Current Debates/Future Directions/Examples

Finding Sites

Most LBK sites are located on fertile *loess* soils, on the terraces of river valleys. Loess is a wind-borne glacial sediment deposited during the Ice Age which turned to fertile black earth. Subsequent decalcification and brunification have since degraded these soils, a process which began before the Neolithic and continued to at least the Iron Age. It has resulted in the top *A horizon* becoming much more lightly colored, and this has obscured the top sections of any Neolithic features and parts of their stratigraphy. Degraded black earth can also filter downward through cracks, so that the cuts of features are often indistinct and smudged.

After the Neolithic, but particularly after the Roman period, cultivation caused erosion in higher parts of slopes and the consequent deposit of colluvium in the river valleys. Where loess soils are still being plowed today, LBK sites are easy to locate from pottery on the surface, but generally at least half a meter of their deposit has been lost through plowing. Old ground surfaces and floor layers are thus not preserved, leaving only traces of cut features. Conversely, any sites in valley bottoms are now buried under colluvium. The bone is also not well preserved in many areas (Schalich 1988). One difficulty in digging a Bandkeramik site is hence to identify features which have virtually blended into the surrounding loess (and which may only become visible over time or in specific weather conditions).

Excavation

The destruction of a large part of the Aldenhoven Plateau in the German Rhineland in the course of opencast lignite mining in the 1970s and 1980s first provided an opportunity to study a whole LBK landscape and (alongside similar excavations in the Aisne valley, France (Ilett 2012), and at Bylany in Bohemia (Pavlů et al. 2017)) has fundamentally framed the way we approach these sites. An entire valley comprising nine LBK settlements and one burial ground was excavated under rescue conditions in a multidisciplinary project led by Jens Lüning, revealing hundreds of intercutting houses alongside pits and earthworks (Fig. 1).

The main challenge became to understand the chronological development and settlement structure of the sites. Sequencing was mainly achieved by pottery seriation and resulted in the definition of 14 chronological phases. On the basis of dated pits associated with house plans, it was shown that houses shifted within a circumscribed area of the settlement, termed a "yard" (Zimmermann et al. 2005; Zimmermann 2012). Contemporary houses were hence tens of meters apart from each other, while overlapping house plans were separated by several phases. The duration of each phase was estimated at around 25 years. In addition, on the basis of production waste, it emerged that the largest settlement in the valley, Langweiler 8, imported high-quality flint from the Netherlands, which was then passed on to other sites. Environmental analyses also indicated that the area was rapidly abandoned at the end of the LBK, when there was a distinct reforestation episode (Zimmermann et al. 2005).

Excavation method has usually employed the *spit*, where the deposit is lowered in an artificial horizontal slice c 10 cm thick (American *arbitrary layer*; here often called a *planum*, pl. *plana*). Pits may be *box-sectioned* (where the section is extended into subsoil), and all the material collected together and attributed to the feature. Otherwise a subterranean feature may be divided into *quadrants*, each excavated in artificial spits. Excavating alternate quadrants gives continuous orthogonal profiles through the feature fill (Fig. 2). Where layers are hard to distinguish visually or features are complex, the latter is the preferable method as it allows for both horizontal and vertical controls. These approaches have their rationale in the difficulty of defining edges, the need to supervise untrained helpers, and time constraints.

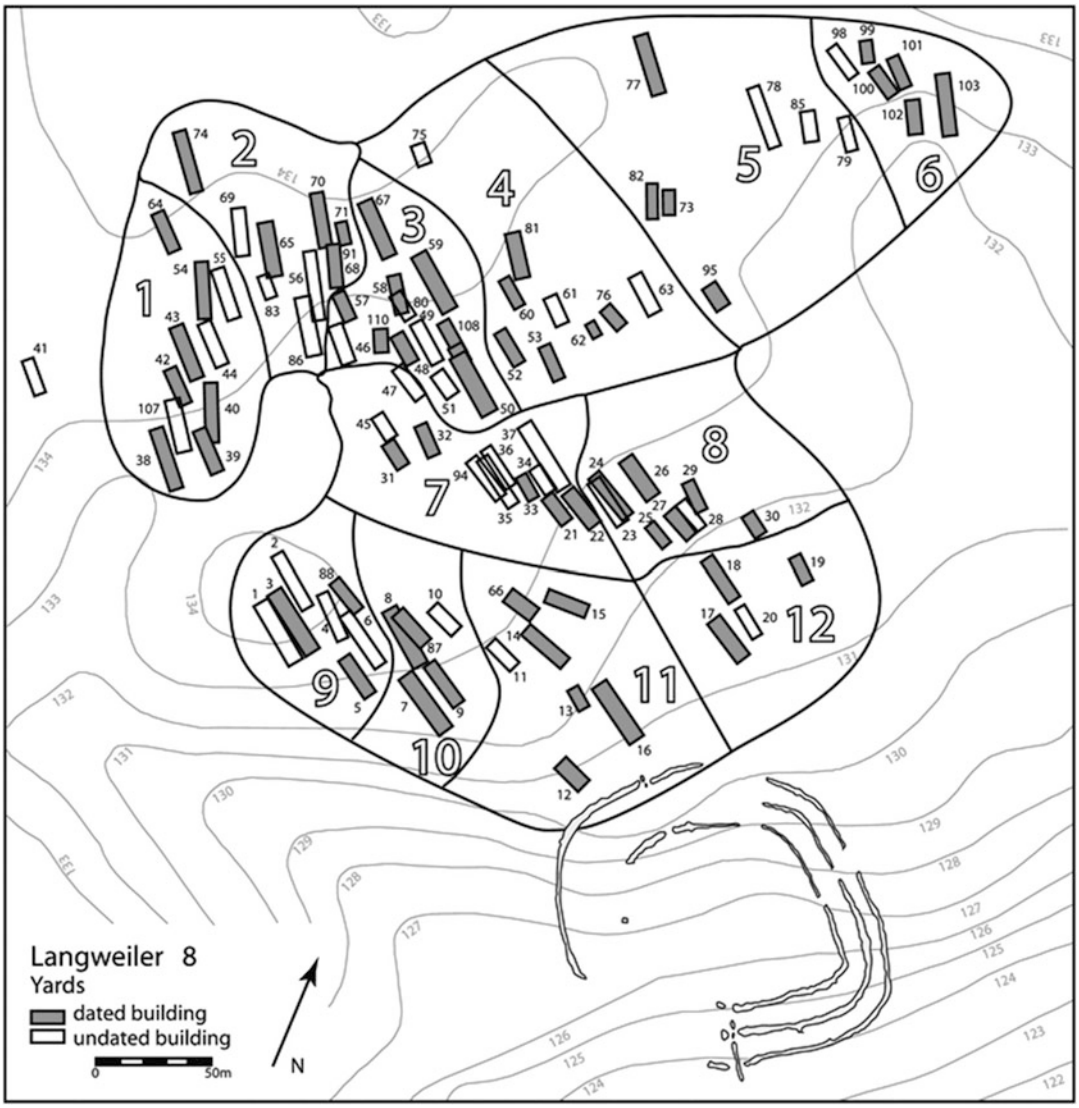

Linearbandkeramik Site Excavation, Fig. 1 Plan of the settlement of Langweiler 8. (After Stehli 1994: 87)

Future Developments

Although it is hard to overstress the range and quality of the previous work carried out under difficult conditions, newer projects have challenged many aspects of the original models. For example, at Vaihingen in southwest Germany, two pottery styles existed simultaneously and were associated with different yard clusters, termed "clans," and also defined by other material culture and economic preferences (Bogaard et al. 2011, 2016), and this spatial dimension may also be important in the Rhineland (e.g., Van de Velde 2007). Rather than self-sufficient households, there could have been factions within each LBK site, an aspect which can only be addressed by excavating large parts of a site and comparing artifact distributions in detail.

In recent years, large-scale rescue excavations have also taken place in other regions, for instance in Saxony, and numerous LBK settlements have been completely or largely exposed. This showed that sites can occasionally also

Linearbandkeramik Site Excavation, Fig. 2 Part of the Bandkeramik site of Wang (Lower Bavaria) under excavation, showing parts of a house and associated features. (Photo: Alasdair Whittle)

occur in landscape settings which diverge from the expected pattern, in this case away from streams and rivers. Instead, elaborate wooden wells were constructed to secure the water supply. These have been block lifted for excavation and have yielded a wealth of environmental and technological information, as well as in some cases evidence for ritual deposition at their base (Stäuble and Veit 2016; Elburg 2011).

Future method should focus on obtaining more stratigraphic information and on the elucidation of formation processes. Layers can be hard to recognize, and how pit fills formed remains elusive (Stäuble and Wolfram 2012). Was chronologically homogenous material deposited quickly, or are we dealing with mixed assemblages, perhaps in a secondary position? To answer these questions, material should at the very least be collected in artificial spits and investigated for refits, with additional methods such as micromorphology employed where possible. However, there is scope for stratigraphic excavation at some LBK sites, and this should be attempted where possible to better understand formation processes and sequence.

There is also much scope for further radiocarbon work. Many existing dates have been taken from the charcoal of long-lived species or from bulk samples. This is of doubtful value. As it is currently debated whether the "earliest" and subsequent phases of the LBK culture overlap, tighter dating frameworks are needed. The problem is even more acute for the beginning and ending of the LBK. Mesolithic groups could have coexisted with the LBK for varying durations, and it is unclear whether the transition to the post-LBK cultures was dramatic and rapid or a slow mosaic process with several generations of coexistence. Promising beginnings have been made in dating the ceramic sequences of some regions (Denaire et al. 2017), and it is to be hoped that future work can significantly enhance both the overall dating framework and the biographies of individual sites.

Finally, isotopic work is routinely identifying individuals who did not spend their childhood on loess soils. This indicates that the LBK settlement system may have included a substantial upland component (Turck et al. 2012). Identifying such non-loess settlement sites remains an important challenge for the future.

Cross-References

- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Excavation Methods in Archaeology
- ▶ Neustupný, Evžen
- ▶ Radiocarbon Dating in Archaeology
- ▶ Zvelebil, Marek

References

Bogaard, A., R. Krause, and H.-C. Strien. 2011. Towards a social geography of cultivation and plant use in an early farming community: Vaihingen an der Enz, south-west Germany. *Antiquity* 85: 395–416.

Bogaard, A., R.-M. Arbogast, R. Ebersbach, R.A. Fraser, C. Knipper, C. Krahn, M. Schäfer, A. Styring, and R. Krause. 2016. The Bandkeramik settlement of Vaihingen an der Enz, Kreis Ludwigsburg (Baden-Württemberg): An integrated perspective on land use, economy and diet. *Germania* 94: 1–60.

Denaire, A., P. Lefranc, J. Wahl, C. Bronk Ramsey, E. Dunbar, T. Goslar, A. Bayliss, N. Beavan, P. Bickle, and A. Whittle. 2017. The cultural project: Formal chronological modelling of the early and middle Neolithic sequence in lower Alsace. *Journal of Archaeological Method and Theory* 24: 1072–1149.

Elburg, R. 2011. Weihwasser oder Brauwasser? Einige Gedanken zur Funktion bandkeramischer Brunnen. *Archäologische Informationen* 34: 25–37.

Ilett, M. 2012. Linear pottery and Blicquy/Villeneuve-Saint-Germain settlement in the Aisne valley and its environs. An overview. In *Siedlungsstruktur und Kulturwandel in der Bandkeramik. Beiträge der internationalen Tagung "Neue Fragen zur Bandkeramik oder alles beim Alten?!"*, ed. R. Smolnik, 69–79. Leipzig: Landesamt für Archäologie Sachsen.

Pavlů, I., P. Květina, and R. Šumberova. 2017. Large-scale excavations to understand the past. In *European archaeology – Identities & migrations. Hommages à Jean-Paul Demoule*, ed. L. Manolakakis, N. Schlanger, and A. Coudart, 299–313. Leiden: Sidestone Press.

Schalich, J. 1988. Boden- und Landschaftsgeschichte. In *Der bandkeramische Siedlungsplatz Langweiler 8, Gemeinde Aldenhoven, Kreis Düren*, ed. U. Boelicke, D. von Brandt, J. Lüning, P. Stehli, and A. Zimmermann, 17–29. Köln: Rheinland-Verlag.

Stäuble, H., and U. Veit, eds. 2016. *Der bandkeramische Siedlungsplatz Eythra in Sachsen: Studien zur Chronologie und Siedlungsentwicklung. Leipziger Forschungen zur ur- und frühgeschichtlichen Archäologie 9*. Leipzig: Professur für Ur- und Frühgeschichte.

Stäuble, H., and S. Wolfram. 2012. Taphonomie heute: Reanimation erwünscht. Studien zur Bandkeramik. In *Taphonomische Forschungen (nicht nur) im Neolithikum*, ed. T. Link and D. Schimmelpfennig, 35–55. Kerpen-Loogh: Welt und Erde.

Stehli, P. 1994. Chronologie der Bandkeramik im Merzbachtal. In *Die Bandkeramik im Merzbachtal auf der Aldenhovener Platte, Rheinische Ausgrabungen Band 36*, ed. J. Lüning and P. Stehli, 79–191. Köln: Rheinland Verlag.

Turck, R., B. Kober, J. Kontny, F. Haack, and A. Zeeb-Lanz. 2012. "Widely travelled people" at Herxheim? Sr isotopes as indicators of mobility. In *Population dynamics in prehistory and early history. New approaches using stable isotopes and genetics*, ed. E. Kaiser, J. Burger, and W. Schier, 149–164. Berlin: De Gruyter.

Van de Velde, P. 2007. The Bandkeramik settlement. In *Excavations at Geleen-Janskamperveld 1990/1991. Analecta Praehistorica Leidensia vol. 39*, ed. P. van de Velde, 223–244. Leiden: Leiden University Press.

Zimmermann, A. 2012. Das Hofplatzmodell. Entwicklung, Probleme, Perspektiven. In *Siedlungsstruktur und Kulturwandel in der Bandkeramik. Beiträge der internationalen Tagung "Neue Fragen zur Bandkeramik oder alles beim Alten?!"*, ed. R. Smolnik, 11–19. Leipzig: Landesamt für Archäologie Sachsen.

Zimmermann, A., J. Meuers-Balke, and A. Kalis. 2005. Das Neolithikum im Rheinland. *Bonner Jahrbücher* 205: 1–63.

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Basic Biographical Information

Dr. Dorothy T. Lippert (2-18-1967–) is a Native American archaeologist from the United States currently working as a Case Officer in the Repatriation Department at the Smithsonian Institution's Natural History Museum. Of Choctaw Nation decent, Dr. Lippert graduated from Lee High School in San Antonio, Texas, and was chosen "Outstanding Teen" in 1985 in a program sponsored by the San Antonio Express-News. She received a Bachelor of Arts from Rice University and a Doctorate from the University of Texas at Austin, both in Anthropology. Dr. Lippert currently lives in Arlington, Virginia, United States.

Major Accomplishments

Dr. Lippert is known for her participation in the indigenous archaeologies movement by advocating for the repatriation of Native American remains and funerary items to their affiliated Native American communities. With other members of the Closet Chickens, an informal group of

Native American archaeologists, Dr. Lippert has critiqued anthropology's sordid past researching Native American communities and their cultural remains. She has been instrumental in providing alternative methods to working with Native American communities, methods that recognize that Native American remains and cultural remains should be treated with respect, dignity, and humanity. Dr. Lippert is the Indigenous Representative to the Executive of the World Archaeological Congress and is a past member of the Board of Directors for the Society for American Archaeology. In 2011, Dr. Lippert was appointed by President Barack Obama to serve on the Advisory Council on Historic Preservation (ACHP), an independent United States government entity which promotes the preservation of historic resources. Important academic papers include "Echoes from the Bones: The Importance of Maintaining a Voice to Speak for the Ancestors" (Lippert 2010), "The Rise of Indigenous Archaeology: How Repatriation has Transformed Archaeological Ethics and Practice" (Lippert 2008), and "Remembering Humanity: How to include Human Values in a Scientific Endeavor" (Lippert 2005).

Cross-References

- ▶ Closet Chickens
- ▶ Indigenous Archaeologies
- ▶ Repatriation: Overview

References

Lippert, D. 2005. Remembering humanity: How to include human values in a scientific endeavor. *International Journal of Cultural Property* 12 (2): 275–280.

Lippert, D. 2008. The rise of indigenous archaeology: How repatriation has transformed archaeological ethics and practice. In *Politics, practice and theory: Repatriation as a force of change in contemporary anthropology*, ed. T. Killion. Albuquerque: School of American Research Press.

Lippert, D. 2010. Echoes from the bones: The importance of maintaining a voice to speak for the ancestors. In *Being and becoming indigenous archaeologists*, ed. G. Nicholas. Lanham: AltaMira Press.

Lithic Technology, Paleolithic

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Introduction

Paleolithic stone tool technology extends over a period of close to 2.5 Ma and provides a unique dataset for the study of early hominin behavior. While it is safe to assume that technologies involving organic materials played a critical role in the adaptation and society of early humans, these materials rarely survive so archaeologists are forced to pull as much information as is possible from the study of lithic assemblages.

Historical Background

Archaeologists working in Eurasia tend to structure the Paleolithic into the Lower, Middle, and Upper Paleolithic, while Africanists use the terminology of Early, Middle, and Late Stone Age. There are a multitude of regional level subdivisions of these periods. Transitional industries – such as the Chatelperronian, which is found at the Middle to Upper Paleolithic transition in Western Europe, or the Fauresmith, which is associated with the transition from the Early to Middle Stone Age in Southern Africa – are often the focus of particular interest and debate. In an effort to cut across regional variation Grahame Clark defined five modes of stone tool production (Foley and Lahr 2003). Clark defined mode 1 as simple chopper and flake industries, mode 2 as the production of large flakes and shaped tools such as handaxes mode 3 as production of flakes from prepared cores, and mode 4 as blade production and a diversified tool assemblage. For mode 5, Clark emphasized the development of microlithic tools, which he associated with the Mesolithic.

Key Issues/Current Debates

In the current state of the discipline, Clark's modes of tool production can be reformulated as a series of major themes that are central to contemporary research on Paleolithic stone tool technology (for another approach, see Shea 2012). The first question looks at the earliest stone tools and questions the complexity of production methods. Ultimately, the goal is to understand the evolutionary context for the appearance of stone tool technology in the hominin lineage. The next question looks at the transition to shaped artifacts, principally hand axes and cleavers, in relation to the evolution and dispersal of *Homo erectus*. The third issue is the emergence of prepared core technologies. Archaeologists are questioning the relationship of prepared core technology with changes in hominin cognitive capacity and exploring the significance of variability within these industries. A final question revolves around the origins and development of projectile technology during the later stages of hominin evolution. Increasingly experimental studies are shedding light on the performance of stone projectile tips and developing criteria for identifying hunting techniques.

The Origins of Tool Use

Ethological and experimental research on tool use by primates and other animals provides important context for the study of the earliest stone tool industries (Schick et al. 1999). The oldest known stone tools are found in the Hadar region of Ethiopia and are securely dated between 2.3 and 2.4 Ma ago based on argon ages on volcanic tuff layers (Semaw 2000). At the Hadar, the stone tool technology seems to be extremely simple, and tool types are restricted to flakes and choppers. Choppers are cobbles with a series of flake removals, often alternating off two faces of the cobble, along one edge (Fig. 1). The evidence from the Hadar suggests that stone tool technology emerged gradually and that hominins were simply striking flakes off the edge of a cobble. However, evidence from the site of Lokalalei in Kenya presents a very different picture of early stone tool technology. At Lokalalei, which is dated to 2.3 Ma ago, it was possible to refit flakes onto the cores from which they were removed. This analysis showed that core reduction involved long sequences, reaching as many as 50 removals from a single core, and that the knappers organized flaking based on a spatial model of the core (Delagnes and Roche 2005). In Southern Africa, the earliest known stone tool industries date to around 2 Ma ago and are found at Sterkfontein and a number of other sites in the Cradle of Humankind as well as at Wonderwerk Cave (Kuman and Clarke 2000). Although there are a number of large choppers at Sterkfontein, many of the tools at this site and at Wonderwerk are very small (<3 cm.), raising further questions about early stone tool technology.

Lithic Technology, Paleolithic, Fig. 1 Oldowan chopper from the Nile Valley, Egypt. The *arrows* indicate the direction in which flakes were removed. This figure was prepared based on a 3D scan of the chopper using Meshlab software. (Copyright M. Chazan)

The Oldowan was first defined on the basis of the bed 1 industries found at Olduvai Gorge. Bed 1 is dated between 1.9 and 1.7 Ma ago and is thus over half a million years younger than the tools found at the Hadar. Opinions vary as to whether the Hadar and Lokalalei should be included within the Oldowan. In addition to cores and flakes, the Olduvai Gorge assemblages include polyhedrons and spheroids. It is not clear whether these are distinctive types of tools or simply forms of exhausted cores.

Shaped Artifacts

The earliest stone tool industries involve removals along a single edge to form a chopper or the kind of exploitation of the volume of a cobble found at

Lokalalei. Spheroids and polyhedrons are more extensively exploited, but there is little evidence that these are tools where the removals are deliberately organized to form the shape of a tool. The emergence of Acheulean technology marks the transition to the use of flaking to deliberately shape tools. The earliest Acheulean is found at the site of Kokiselei 4, Kenya, dated to 1.76 Ma ago (Lepre et al. 2011). The characteristic Acheulean stone tools are bifaces that are shaped by removals of both faces of a flat cobble or natural spall, or a large flake (Fig. 2). Handaxes are bifaces where the base is broader than the working tip, whereas cleavers have a wide working edge. Cleavers are mostly found in African Acheulean sites and are often made on very large flakes.

Following the pioneering work of Derek Roe, archaeologists have developed a wide range of methods to quantify the shape of handaxes. A major focus of research is to determine the degree to which variability in handaxe shape can be explained on the basis of characteristics of raw material. There is relatively little functional data on handaxes, and most archaeologists assume that these are multipurpose tools. There is limited evidence for use of handaxes in working wood (Dominguez-Rodrigo et al. 2001). One puzzling aspect of the Acheulean is that there are a number of sites at which bifaces are found in very large numbers, often estimated in the thousands.

The development of Acheulean technology is roughly contemporary with the first appearance of *Homo erectus*, but the significance of this association remains unclear. Surprisingly, the earliest hominin expansion into Europe found at sites such as Dmanisi, Georgia, and Atapuerca, Spain, is not accompanied by an Acheulean toolkit. The stone tool industries at these sites are very simple and are considered by some archaeologists to be pre-Oldowan. Bifaces are rarely found east of India, a geographical boundary known as the Movius Line. Recent discoveries of handaxes in the Bose Basin, China, dated to 800,000 years ago, limit the validity of the Movius Line (Yamei et al. 2000). In Europe, the earliest Acheulean industries date to 500,000 years ago.

Lithic Technology, Paleolithic, Fig. 2 Hand axe from the early Acheulean of Wonderwerk Cave, South Africa. This figure was prepared based on a 3D scan of the hand axe using Meshlab software. (Copyright M. Chazan)

There is a great deal of variation in Acheulean industries. At sites such as Gesher Benot Ya'akov in Israel, handaxes and cleavers are made on very large flakes struck from massive cores. While the earliest bifaces, such as those from Kokiselei 4, are quite crude, there is a trajectory overtime toward the development of more refined handaxes, many of which have a high degree of symmetry and display a high degree of technical skill. It appears that in some cases, a soft hammer was used for the final stages of shaping hand-axes. It is important to emphasize that simple flake-based industries persist alongside the Acheulean, for instance, in the Clactonian industries found in Britain.

Prepared Core Methods

Prepared core methods involve careful control over the morphology of the core with the goal of producing detached pieces of a desired morphology. It is difficult to pinpoint when flint knappers began to have control over the shape of detached pieces or flakes. There is already a hint of this capacity in the core reduction found on the early site of Lokalalei, but the degree of control in this assemblage is very limited. One of the earliest prepared core methods is the Victoria West method found on Earlier Stone Age sites in South Africa (McNabb 2001). This method involves shaping the surface of a large natural rock spall to prepare for the removal of a large flake that can be easily retouched to form a cleaver. Unfortunately, the precise age of the Victoria West method has not been determined, although it appears to be roughly 1 Ma old.

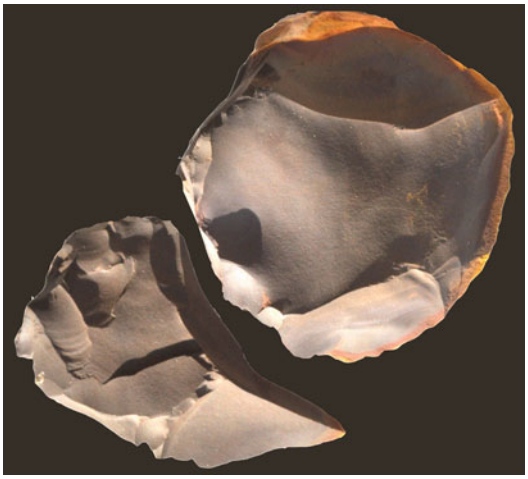

Lithic Technology, Paleolithic, Fig. 3 Experimental Levallois flake and core. (Copyright M. Chazan)

The Levallois method is among the most elaborate prepared core methods and has been the subject of intensive archaeological research (Fig. 3; Chazan 1997). This method is associated with Neanderthals in Europe and the Middle East and with modern humans in Africa and the Middle East (Qafzeh and Skhul Caves). Chronologically, these methods are characteristic of the Middle Paleolithic (Eurasia) and the Middle Stone Age (Africa). Typological definitions of the Levallois method focus on characteristic tortoise-shape cores and thin large flakes with a continuous cutting edge, often with a well-prepared platform. Technological definition of the Levallois method focuses on the conceptual model that underlies the use of the method. Five criteria are used in the technological definition of the Levallois method: (1) The core is constructing to consist of two surfaces that meet at a plain of intersection. (2) The surfaces are hierarchically related with one surface serving as a striking platform and the other as the surface for large flake removals. (3) The production face is organized so that the morphology of products is predetermined based on the management of lateral and distal convexities. (4) The removal of predetermined flakes is subparallel to the plane of intersection between the two faces. (5) The striking platform is organized so as to allow the removal of the predetermined flakes from the production surface.

The Levallois method allows the knapper a high degree of flexibility in determining the types of flakes produced. There is clear evidence for temporal and geographical patterning in the strategies adopted, which implies that flint knapping was a skill acquired through social learning. Among the types of flakes that can be produced using the Levallois method, depending on the choices made by the knapper in shaping the core, are triangular points, large ovate flakes, and elongated flakes.

In addition to the Levallois method, a number of other prepared core methods play a significant role in the Middle Paleolithic and Middle Stone Age archaeological record. These include the discoidal method in which the core is constructed with two surfaces but without a hierarchical relation between these surfaces, and the trifacial method where three surfaces are exploited. The use of prepared core methods implies a developed capacity for guiding technical action based on abstract concepts.

The analysis of Middle Paleolithic stone tool industries in Europe employs a highly developed typology based on the shape and location of retouched edges. Characteristic tool types are sidescrapers, notches, and denticulates. There is a significant debate over the significance of variability in retouch. François Bordes argued that the types found in an assemblage were characteristic of distinct cultural groups, while Lewis Binford held the position that the types of tools found on a site were the result of the activities that were carried out at that location. Harold Dibble has advanced the argument that variation in tool types reflects the intensity of tool use and resharpening.

Elongated flakes, defined as blades if their length is twice their width, play a particular role in Paleolithic archaeology as these types of tools become prevalent in the Upper Paleolithic. Blade production has now been identified on sites dating as early as 500,000 years ago in Africa (Wilkins and Chazan 2012) and slightly later at Qesem Cave in Israel. Blade production is also firmly established as one aspect of Neanderthal lithic technology (Bar-Yosef and Kuhn 2008). There

are aspects of Upper Paleolithic blade production that are distinctive. Jacques Pelegrin describes Upper Paleolithic blade production as the exploitation of a volume rather than exploitation of surfaces that is characteristic of the earlier production methods. In many Upper Paleolithic industries, crested blades are used to shape the core and initiate blade removal sequences. By the later stages of the Upper Paleolithic, blade production methods, often involving the use of a soft hammer, developed to the point where the knapper was able to remove a long sequence of very regular and narrow blades. Upper Paleolithic blade technology is also characterized by a shift toward retouched tools that include end scrapers and burins. Burins are tools that are shaped by removing a long spall of the margin. Burins have a strong working tip as well as robust edges useful for tasks such as shaping bone and wood.

Projectile Tips

It is not clear that stone tools were used for hunting during the early stages of the Lower Paleolithic. There have been suggestions that Oldowan spheroids might have been used as bolas or that Acheulean handaxes might have been used as a throwing weapon, but both of these proposals remain speculative. It is likely that wood spears were used for hunting before the development of stone armatures. The discovery of a series of spectacularly preserved wooden spears from the site of Schöningen, Germany (Thieme 1997), dated to 400,000 years ago provides a vivid illustration of hunting tools that did not involve stone armatures (although stone tools would have been necessary to shape the spears). One interesting question is what the exact advantage is of stone projectile points with one study showing evidence that stone tips have only a slightly increased ability to penetrate a target (Waguespack et al. 2009).

The criteria for identifying projectile points as opposed to pointed tools used for other tasks remain the subject of debate. There is very wide consensus that stone-tipped thrusting spears were used during the Middle Paleolithic and Europe and the Middle East and the Middle Stone Age of Africa. The discovery of a fragment of a Levallois point embedded in the vertebra of a wild ass at the Middle Paleolithic site of Umm El Tlel, Syria, and from Klasies River Mouth, South Africa, offers clear evidence that stone-tipped tools were in fact used for hunting. At Umm el Tlel, traces of bitumen hafting were also identified on Levallois flakes. There is emerging evidence that the use of stone-tipped spears likely dates back as far as 500,000 years ago.

Bladelets are small narrow flakes, usually smaller than 2 cm in length. Small blades and bladelets can be assembled to form a range of hafted composite tools (Fig. 4). The earliest strong evidence for the use of bladelets as elements of composite hunting tools comes from the Middle Stone Howiesons Poort industry of Southern Africa dated to c. 60,000 years ago (Lombard and Pargeter 2008). The Howiesons Poort bladelets were often retouched into crescents and might have served as barbs in composite points. The discovery of complex bone tools at the site of Katanda, Zaire, dated to c. 75,000 years ago provides the earliest evidence of a developed bone tool industry that includes barbed points. It is

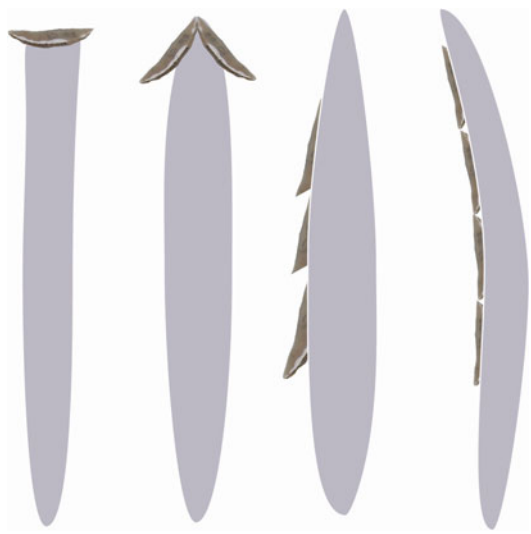

Lithic Technology, Paleolithic, Fig. 4 Examples of options for hafting microliths into a composite tool. From *left* to *right*: transversal arrowhead, pointed arrowhead, barbed point, and cutting tool. (Copyright M. Chazan)

interesting that these tools were likely used for capturing large lake fish.

The complex hunting tools found in the Middle Stone Age of Africa are not found in Europe until the Upper Paleolithic. The Aurignacian, the initial period of the Upper Paleolithic, is characterized by the presence of both bone points and standardized bladelets (Chazan 2010). Although the function of Aurignacian bladelets remains to be conclusively demonstrated, it is highly likely that they were barbs used on composite points. The Gravettian period sees innovation of a series of small point forms, and it is likely that the alt atl or spear-thrower is already in use in this period. The Solutrean is characterized by the use of fine pressure flaking both for small-shouldered points as well as large bifacial points. In the Magdalenian period, there is a return to bladelets, some of which are found embedded in bone points, and the repertoire of bone hunting tools becomes highly developed. The Epipaleolithic sees the development of highly developed microlithic industries. The bifacial projectile points that are characteristic of the archaeological record in the Americas are not found in Europe or Africa, although bifacial points are found in Siberia.

International Perspectives

The application of methods of analysis inspired by the concept of the *chaîne opératoire* developed by André Leroi-Gourhan has led French archaeologists to place an emphasis on understanding not only the form of tools but also the knowledge and skill involved in tool production and use (Tostevin 2011). At the same time, North American and European archaeologists have tended to emphasize quantitative methods, such as the scraper reduction model applied by Harold Dibble (1995) to the analysis of Middle Paleolithic scrapers. Quantitative research, often paired with the study of raw material sources, often takes place in a theoretical framework that considers stone tools as a component of the adaptations of mobile hunter-gatherers (Kelly 1988). At the same time, use-wear analysis and experimental replication are increasingly allowing archaeologists to determine the relationship between tool form and function (Odell 2001). Until quite recently, lithic analysis has been characterized by a polarization between researchers working from different research traditions. Thus, for example, there was significant debate of the relative value of low-power versus high-power microscopy for use-wear analysis. Similarly, debate between advocates of the *chaîne opératoire* and their American counterparts was often characterized by sharply discordant perspectives. However, the lines between research traditions are beginning to blur, and lithic analysts are coming to appreciate the value of adopting multiple perspectives in approaching Paleolithic stone tool technology.

Future Directions

Paleolithic lithic analysis is undergoing rapid development with the adoption of emerging digital imaging techniques that allow for the analysis of the three-dimensional morphology of tools and reduction sequences. Improved methods of trace element analysis using ICP-MS open new potential for sourcing raw materials used in tool manufacture, and developments in microscopy have the potential to renew the study of tool function. Methods of residue analysis are also bringing new opportunities for the study of tool use. A robust theoretical debate is sharpening perspectives on both the role of stone tools in hominin adaptation and the potential of stone tool analysis to provide insight into hominin cognitive evolution. Rigorous methods of fieldwork open up new potential for analysis of the spatial organization of lithic tool manufacture and use and allow lithic analysts to contribute to the study of social organization in the Paleolithic. However, as Glynn Isaac (1977) recognized, the challenge involved in "squeezing blood from stones" remains immense.

Cross-References

► Acheulean Industrial Complex
► Clark, John Grahame Douglas

▶ Europe: Paleolithic Art
▶ Handaxes and Biface Technology
▶ Mousterian Industry Tradition
▶ Oldowan Industrial Complex

References

Bar-Yosef, O., and S. Kuhn. 2008. The big deal about blades: Laminar technologies and human evolution. *American Anthropologist* 101: 322–338.

Chazan, M. 1997. Redefining Levallois. *Journal of Human Evolution* 33: 719–735.

Chazan, M. 2010. Technological perspectives on the Upper Paleolithic. *Evolutionary Anthropology* 41 (4): 57–65.

Delagnes, A., and H. Roche. 2005. Late Pliocene hominid knapping skills. *Journal of Human Evolution* 48: 435–472.

Dibble, H.L. 1995. Middle Paleolithic scraper reduction: Background, clarification, and review of the evidence to date. *Journal of Archaeological Method and Theory* 2: 299–368.

Dominguez-Rodrigo, M., et al. 2001. Woodworking activities by early humans: A plant residue analysis on Acheulian stone tools from Peninj (Tanzania). *Journal of Human Evolution* 40: 289–299.

Foley, R.A., and M.M. Lahr. 2003. On stony ground: Lithic technology, human evolution, and the emergence of culture. *Evolutionary Anthropology* 12: 109–122.

Isaac, G. 1977. Squeezing blood from stones. In *Stone tools as cultural markers: Change, evolution and complexity*, ed. R.V.S. Wright, 5–12. Canberra: Australian Institute of Aboriginal Studies.

Kelly, R. 1988. The three sides of a biface. *American Antiquity* 53: 717–734.

Kuman, K., and R.J. Clarke. 2000. Stratigraphy, artefact industries and hominid associations for Sterkfontein, Member 5. *Journal of Human Evolution* 38: 827–847.

Lepre, C.J., et al. 2011. An earlier origin for the Acheulian. *Nature* 477: 82–85.

Lombard, M., and J. Pargeter. 2008. Hunting with Howiesons Poort segments: pilot experimental study and the functional interpretation of archaeological tools. *Journal of Archaeological Science* 35: 2523–2531.

McNabb, J. 2001. The shape of things to come. A speculative essay on the role of the Victoria West phenomenon at Canteen Koppie during the South African earlier stone age. In *A very remote period indeed: papers on the Palaeolithic presented to Derek Roe*, ed. S. Miliken and J. Cook, 37–46. London: Oxbow Books.

Odell, G. 2001. Stone tool research at the end of the millennium: Classification, function, and behavior. *Journal of Archaeological Research* 9: 45–100.

Schick, K.D., et al. 1999. Continuing investigations into the stone tool-making and tool-using capabilities of a bonobo *Pan paniscus*. *Journal of Archaeological Science* 26: 821–832.

Semaw, S. 2000. The world's oldest stone artefacts from Gona, Ethiopia: Their implications for understanding stone technology and patterns of human evolution between 2·6–1·5 million years ago. *Journal of Archaeological Science* 27: 1197–1214.

Shea, J.J. 2012. Lithic modes A–I: A new framework for describing global-scale variation in stone tool technology illustrated with evidence from the East Mediterranean Levant. *Journal of Archaeological Method and Theory* 20: 1–36.

Thieme, H. 1997. Lower Palaeolithic hunting spears from Germany. *Nature* 385: 807–810.

Tostevin, G. 2011. Reduction sequence, chaîne opératoire, and other methods: The epistemologies of different approaches to lithic analysis. Introduction. *PaleoAnthropology* 2011: 293–296.

Waguespack, N.M., et al. 2009. Making a point: Wood- versus stone-tipped projectiles. *Antiquity* 83: 786–800.

Wilkins, J., and M. Chazan. 2012. Blade production 500 thousand years ago at Kathu Pan 1, South Africa: Support for a multiple origins hypothesis for early Middle Pleistocene blade technologies. *Journal of Archaeological Science* 39: 1883–1900.

Yamei, H., et al. 2000. Mid-Pleistocene Acheulean-like stone technology of the Bose basin, South China. *Science* 287: 1622–1626.

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Basic Biographical Information

Barbara J. Little graduated at Penn State University with a bachelor's degree in anthropology. She received a doctoral degree in anthropology from the State University of New York at Buffalo, in 1987, with a dissertation entitled *Ideology and Media: Historical Archaeology of Printing in Eighteenth-Century Annapolis, Maryland*. She has a long history of federal service as an archaeologist in the Archeology Program, National Parks Service and teaches anthropology at the University of Maryland, College Park. Her areas of interest are public archaeology and public history; historical archaeology; method and theory; feminist archaeology; and North America and other parts of the British colonial world.

Barbara J. Little has served in committees for the Society for American Archaeology, and since 2009 she has served as editor of *CRM: The Journal of Heritage Stewardship*. Recently she was recognized by the University of Massachusetts Amherst Center for Heritage and Society as a 2011 honoree.

Major Accomplishments

Since the late 1980s, Barbara J. Little has been a prolific scholar interested in the links between documentary records and material culture in the United States (e.g., Little 1988). Little considers that historical archaeology is action archaeology, since research may address contemporary groups "that have close ties to the earlier peoples under study to help set research agendas that will both illuminate the past and contribute to the aims" of modern communities (Little 2007a: 23). Recently, Little emphasized her continuous interest "in civic engagement, public outreach, and the public relevance of archaeology and all aspects of heritage" (Little n.d.).

In *Text-Aided Archaeology* (Little 1992), Little gathers in a single-volume contributions exemplifying the use of documents, oral history, and material culture to address substantive and methodological questions. The relationship between history and archaeology, and especially their combined potential to help advance understanding of the ties between everyday experiences and larger structures of social change (Little 2007b: 17), has been a common denominator of Little's contributions.

An outstanding contribution to the field of historical archaeology is the volume edited by Shackel and Little on the *Historical Archaeology of the Chesapeake* (1994), one of the first regions of the United States studied from a historical archaeology perspective. The volume is an example of the balance between historical information and archaeological remains within an investigation of the recent past. Foremost, Little's essay advocates for a feminist archaeology approach to the study of muted groups who resisted dominant ideology, expressing themselves through particular choices of material culture in the 1770s (Little 1994: 196).

Little's book *Historical Archaeology: Why the Past Matters* (2007a), conceived as an introductory volume for students with a Marxist theoretical perspective, has been praised as a relevant survey of historical archaeology; the volume presents insights concerning social relations, power, and inequality "and the many ways in which the modern world has been shaped by colonialism, capitalism, and globalization" (Rotman 2008), using American case studies to illustrate the points discussed in the book.

Cross-References

- ▶ Annapolis: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Critical Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Historical Archaeology
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ North America (USA): Historical Archaeology
- ▶ Oral Sources and Oral History
- ▶ Post-Processual Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Social Identity in Historical Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

References

Little, B.J. 1988. Craft and culture change in the eighteenth century Chesapeake. In *The recovery of meaning*, ed. M.P. Leone and P.B. Potter Jr., 263–292. Washington, DC: Smithsonian Institution Press.

Little, B.J., ed. 1992. *Text-aided archaeology*. Boca Raton: CRC Press.

Little, B.J. 1994. "She was. . .an example to her sex": Possibilities for a feminist historical archaeology. In *The historical archaeology of the Chesapeake*, ed. P.A.

Shackel and B. Little, 189–204. Washington, DC: Smithsonian Institution Press.
Little, B.J. 2007a. *Historical archaeology: Why the past matters*. Walnut Creek: Left Coast Press.
Little, B.J. 2007b. Topical convergence: Historical archaeologists and historians on common ground. *Historical Archaeology* 47: 10–20.
Little, B.J. n.d. Barbara Little. Available at: https://heritage-for-earthlings.wikispaces.com/Barbara+Little. Accessed 15 Sept 2012.
Rotman, D. 2008. Review of Historical archaeology: Why the past matters. *African Diaspora archaeology newsletter*. Dec 2008. Available at: http://www.diaspora.uiuc.edu/news1208/news1208-35.pdf. Accessed 15 Sept 2012.
Shackel, P.A., and B.J. Little. 1994. *The historical archaeology of the Chesapeake*. Washington, DC: Smithsonian Institution Press.

Further Reading

Leone, M.P., and B.J. Little. 1993. Artifacts as expressions of society and culture: Subversive genealogy and the value of history. In *History from things: Essays on material culture*, ed. S. Lubar and D.W. Kingery, 160–181. Washington, DC: Smithsonian Institution Press.
Little, B.J. 1990. Historical archaeology in Annapolis. *Maryland Archaeology* 26: 19–20.
Little, B.J. 1992a. Text-aided archaeology. In *Text-aided archaeology*, ed. B.J. Little, 1–6. Boca Raton: CRC Press.
Little, B.J. 1992b. Texts, images, material culture. In *Text-aided archaeology*, ed. B.J. Little, 219–223. Boca Raton: CRC Press.
Little, B.J. 1992b. Explicit and implicit meanings in material culture and print culture. *Historical Archaeology* 26 (3): 85–94.
Little, B.J. 1994. People with history: An update on historical archaeology in the United States. *Journal of Archaeological Method and Theory* 1: 5–40.
Little, B.J. 1997a. Archaeology, history and material culture: Grounding abstractions and other imponderables. *International Journal of Historical Archaeology* 1: 179–187.
Little, B.J. 1997b. Expressing ideology without a voice, or, obfuscation and the enlightenment. *International Journal of Historical Archaeology* 1: 225–241.
Little, B.J. 1998. Considering the context of historical archaeology for museum interpretation. *The Public Historian* 20: 111–117.
Little, B.J. 1999. From icons to ideology: A perspective on artifacts and historical archaeology in the United States. In *Old and new worlds; historical/post medieval archaeology papers from the societies' joint conferences at Williamsburg and London 1997 to mark thirty years of work and achievement*, ed. G. Egan and R.L. Michael, 208–213. Oxford: Oxbow Books.
Little, B.J. 2002a. Chesapeake region, USA. In *Encyclopedia of historical archaeology*, ed. C.E. Orser Jr., 97–98. New York: Routledge.
Little, B.J. 2002b. Domestic sites. In *Encyclopedia of historical archaeology*, ed. C.E. Orser Jr., 155–157. New York: Routledge.
Little, B.J. 2007. Historical archaeology in the United States. In *The encyclopedia of archaeology*, ed. D. Pearsall, 300–307. Oxford: Elsevier.
Little, B.J. 2009. Family resemblances: A brief overview of history, anthropology, and historical archaeology in the United States. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 363–381. New York: Springer.
Little, B.J. 2009a. Public archaeology in the United States. In *Heritage studies: Methods & approaches*, ed. M.L.S. Sørensen and J. Carman, 29–51. London: Routledge.
Little, B.J. 2011. Heritage, resilience, and peace. *Heritage and Society* 4: 187–198.
Little, B.J. 2012. Envisioning engaged and useful archaeologies. In *Contemporary relevance of archaeology*, ed. M. Rockman and J. Flatman, 277–289. New York: Springer.
Little, B.J., and N. Kassner. 2002. Archaeology in the alleys of Washington, DC. In *The archaeology of urban landscapes: Explorations in slumland*, ed. A. Mayne and T. Murray, 57–68. Cambridge: Cambridge University Press.
Little, B.J., and P. Shackel. 1996. Importance of historical archaeology in the United States. *World Archaeological Bulletin* 7: 97–107.
Little, B.J., and P. Shackel, eds. 2007. *Archaeology as a tool of civic engagement*. Lanham: AltaMira Press.

Litvak King, Jaime

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Basic Biographical Information

Jaime Litvak King (1933–2006) was born in Mexico City in the midst of a family of Eastern European immigrants. As an undergraduate, he studied economics at Mexico City College, and from 1958 to 1962, he attended to the National School of Anthropology and History (ENAH), obtaining his masters degree in 1963. Later, in 1970, he earned a Ph.D. in anthropology at the National Autonomous University (UNAM). His dissertation illustrates the use of statistical methods applied to the research of settlement patterning in pre-Columbian archaeology. Founding

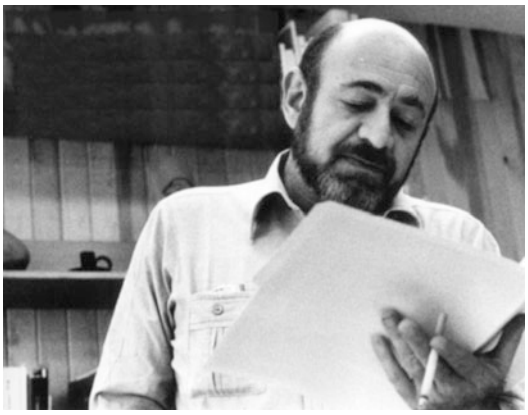

Litvak King, Jaime, Fig. 1 Jaime Litvak at his office, the early 1990s

the Institute of Anthropological Investigations at UNAM in 1973, he became as well its first director. Among the distinctions, he was honored in his lifetime with the Fray Bernardino de Sahagún Archaeology Prize awarded by the National Institute of Anthropology and History in 1971, the National University Award in 1996, and the Lifetime Achievement Award presented by the Society for American Archaeology in 2002. Two years later, in 2004, he was elected professor emeritus at UNAM (Fig. 1).

He was one of the first researchers in Mexico who incorporated quantitative methods, computer applications, and innovations in archaeological field methods. Through his life, he kept a continuous interest in pre-Columbian Mesoamerica. Yet, he was the first major Mexican archaeologist and maybe the only one who indeed recognized the importance of industrial archaeology and Mexican industrial heritage research, supporting both of them until the day of his death.

The first steps taken to support Mexican industrial heritage go back to the 1980s, when different individuals throughout the country started an effort in rescuing and reusing it. This latter was mostly expressed by turning industrial heritage sites into museums. In 1995, the Mexican Committee for the Conservation of the Industrial Heritage (CMCPI) was created, and in December 2006, the Mexican Section of The International Committee for the Conservation of the Industrial Heritage (TICCIH México) commenced as a result of the consideration that work to support industrial heritage needed to be reinforced.

In May of 1997, Litvak became a member of the CMCPI, offering his complete support, and this was a commitment that he kept until the day he passed away. He was the person in charge of publishing the CMCPI bulletins from 1997 to 1999, and in that same year, he included a section dedicated to the committee at the webpage of UNAM'S Institute of Anthropological Research. After 1999, Litvak became an academic consultant of CMCPI.

Major Accomplishments

In 1991, the Historical Archive and Mining Museum Civil Association (AHMM) proposed a research project for the rescuing and reusing of mining sites in Pachuca, Real del Monte, Mineral El Chico, and Mineral de La Reforma. This included mines and ore-processing plants dating from the eighteenth to the twentieth century. In 1998, industrial archaeology studies started, and from that moment on, Litvak became a teammate, actively collaborating with Iván Hernández Ibar who conducted the fieldwork. In 2000, the project was supported by a research grant on industrial archaeology issued by the Ignacio Zaragoza Research System–National Council for Science and Technology (CONACYT) with Litvak as the principal investigator.

Fieldwork was under the responsibility of Hernandez Ibar, and as a result of excavations, some steam boilers' ash boxes were uncovered. Further investigation in this area was prevented during the second field season since Litvak, who managed and supervised the research project, insisted that the materials found during the excavations required deeper examination. As a result of Litvak's academic contacts and generosity, Hernández Ibar was able to analyze the materials at the Physics Department of the National University (UNAM) under the guidance of Dr. José Luis Ruvalcaba Sil (Hernández Ibar and Ruvalcaba Sil 2010).

Under the supervision of Litvak, in 2002, Hernández Ibar became the first student of the

National School of Anthropology and History (ENAH) who graduated with a Bachelor's thesis on industrial archaeology. The following year, Yolanda Beltrán Aguirre wrote another thesis on the same subject. With this, Litvak not only demonstrated his interest and support for Mexican industrial archaeology (e.g., Litvak King and Rodríguez 2003) but above all his commitment with the education of a new generation: the generation of industrial archaeologists. These students were indeed fortunate. They were opening a new field of research, contributing to the development of industrial archaeology, in a country where pre-Columbian archaeology has long prevailed.

The invaluable support provided by Jaime Litvak King to the industrial heritage of Mexico encompasses two main fields: first by training young archaeologists and second by promoting and disseminating this subject. Through the website he created, access was provided to the CMCPI Industrial Archaeology Bulletins – a small-circulation journal – in which he shared industrial archaeology studies both in Mexico and worldwide.

Litvak was an outstanding person, one of the great characters in Mexican archaeology. He was a "teacher everywhere and at all times" who stressed creativity and scientific rigor in archaeology (Schmidt Schoenberg 2008: 161–2). He was a man committed with his country, its history, and its people. Despite the few years that Litvak actively participated in the industrial heritage world and an active promoter of industrial archaeology, his personality and massive imprint will always be present.

Cross-References

- ▶ Industrial Archaeology
- ▶ Industrial Heritage in Archaeology
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ Mexico: Historical Archaeology
- ▶ Museos de Real de Monte

References

Hernández Ibar, I., and J.L. Ruvalcaba Sil. 2010. Materiales arqueológicos de la Mina de Acosta en Real del Monte, Hidalgo: análisis PIXE de artefactos de hierro. In *Patrimonio industrial minero. Nuevasalternativas para una granhistoria*, ed. B. Oviedo Gámez, M. Iwadare Ijima, and M.A. Hernández Badillo, 119–130. México: Archivo Histórico y Museo de Minería, Asociación Civil, TICCIH.

Litvak King, J., and M.A. Rodríguez. 2003. Problemas y perspectivas de la arqueología industrial en México. In *La cultura industrial mexicana. Primer encuentro nacional dearqueología industrial*, ed. S. Niccolai and H. Morales, 45–56. México: BUAP-CMCPI.

Ruvalcaba Sil, J.L. 2010. Informe sobre análisis de artefactos de hierro procedentes de la Mina de Acosta en Real del Monte y del Museo de Minería en Pachuca, Hidalgo. In *Patrimonio industrial minero. Nuevasalternativas para una granhistoria*, ed. B. Oviedo Gámez, M. Iwadare Ijima, and M.A. Hernández Badillo, 131–139. México: Archivo Histórico y Museo de Minería, Asociación Civil, TICCIH.

Schmidt Schoenberg, P. 2008. Jaime Litvak King. 1933–2006. *American Anthropologist* 110: 160–162.

Living Communities: Local Communities in Site Management and Advocates for Site Preservation

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Introduction

Most archaeologically important sites are not static locations divorced from modern communities. Rather, as has been the case throughout history, local communities live in or around, and participate in activities at, these important locales. Though one of many stakeholders, local, living communities are often imperative for the long-term preservation of archaeological sites because their active use and interaction with these places make them good stewards of such cultural heritage. Tourism, and its economic development, however, has often resulted in the sidelining or

even outright relocation, of local communities, to the determinant of the communities as well as the archaeological sites themselves. More than ever, there is an urgent need to provide holistic strategies for the management of important archaeological sites that include the incorporation of local communities and that take into account the long-term socioeconomic impact of tourism on their daily lives.

In order to explore these important issues, this entry will present the specific case study of the UNESCO World Heritage site of Petra to illustrate how the past and the present can be better managed within cultural heritage schemes.

Definition

The Petra National Trust (PNT) is a non-governmental organization dedicated to the preservation of the archaeology, cultural heritage, and environment of the UNESCO World Heritage Site of Petra. To implement its goals, PNT conducts projects in the preservation of the archaeological, natural, and cultural heritage, as well as programs to raise awareness among the youth of Petra, the future agents of site preservation, on the uniqueness and fragility of this site. In executing its projects and programs, PNT contracts with local and international specialists; it engages both local and international volunteers and employs skilled labor from among the different local communities in its conservation efforts.

Ultimately, to safeguard the significance and integrity of the site for coming generations against damage to the environment, the deterioration of monuments and the inevitable impact on the quality of life of the local communities, PNT finds that community-based participation is imperative to long-term sustainable preservation in that the local communities' continued involvement offers an enormous opportunity to further local stewardship and empowerment. It is in recognition of the importance of community participation that the PNT has expanded its work in Petra and has, since 2010, introduced the Petra Junior Ranger Program to its program activities in education and outreach.

The Petra Junior Ranger Program is an engaging and interactive 6-day workshop for children and youth that aims to instill a sense of identity and pride in Petra's cultural and natural heritage and inspire a commitment to preserving and protecting Petra's outstanding universal values.

Key Issues/Current Debates/Future Directions/Examples

Petra, Site, and History

Located in southwestern Jordan (Fig. 1), Petra has been a place for human habitation for over 200,000 years. Today, the residents of the Petra area live in modern stone and concrete hillside villages as well as Bedouin encampments. About 13,000 years ago, an early seasonal village was established at Beidha, just north of Petra. The site was rebuilt and occupied year-round by a group of Neolithic farmers around 7000 BCE. In addition, the presence of mineral resources made the region important. Both bitumen and copper, one of the earliest metals to be manipulated by humans, have been mined and utilized since the earliest times.

Numerous cultures rose to prominence, beginning with the Edomites in the first millennium BCE. Edom gave rise to the nucleus of an Arab state, the Nabataean Kingdom, in the third century BCE. The Nabataeans made Petra the capital of their rich and powerful kingdom, filling it with spectacular buildings and carved facades and making water flow to every corner of the kingdom. In CE 106, Petra became part of the Roman province of Arabia. By the fifth century CE, Petra was the administrative center of the Byzantine province of Palaestina Tertia. During the seventh century, as a result of the Islamic takeover, trade routes were redirected and Petra declined in importance. In the twelfth century, the crusaders went across the rift valley from their capital, Jerusalem, to Petra. They later withdrew to the Mediterranean in 1189. It was not until 1812 that Petra was again visited, this time by the Swiss explorer Johann Ludwig Burckhardt. Travelers that followed suit give vivid description of its monuments and the conditions of the country during Ottoman rule. They describe the Huwaitat tribes and their roles in

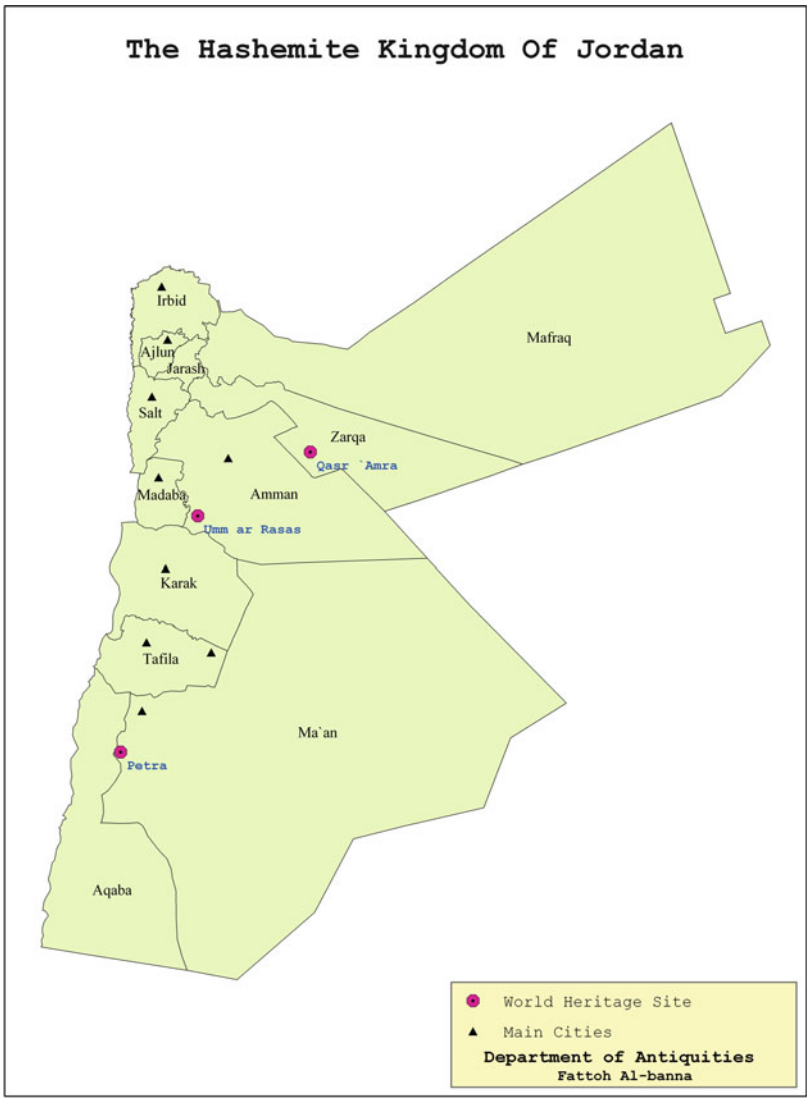

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 1 Map of Jordan

ensuring the security of caravans and the protection of the pilgrims. Under the Huwaitat, a Bedouin confederacy connected the tribes that now live in villages surrounding Petra: the Bdul, Layathneh, and Amarin tribes. Traditionally these tribes tended to their animals and undertook the seasonal planting of grains. Later with the arrival of tourism, in the twentieth century, they moved closer to the archaeological site and sustained a living by tilling the land, working on archaeological excavations, and guiding tourists.

Many still lived in caves in the vicinity of the monuments, the main inhabitants being the Bdul tribe. In 1985, Petra was inscribed on the list of World Heritage sites. Based on the recommendation of UNESCO, the government relocated the Bdul people in two stages: first in 1985 and then again in 1987 to an adjacent area outside the Park boundaries overseeing the archaeological sites and having a very high visual, social, and economic impact. The social dimension of this relocation was addressed at the time in as much as it affected the antiquities. There was no socioeconomic plan to provide the community with agricultural lands in order to maintain their livelihood prior to the relocation. The increasing numbers of

tourists, however, helped the Bdul in adapting to a more "settled" style of life. Furthermore, with the signature of the 1994 peace agreement with Israel, tourism figures spiked and, in parallel, triggered an increase in commercial activities improving the socioeconomic conditions of the communities, albeit, at the cost of preserving site significance and integrity.

Tourism in Jordan generates 12% of the GDP. This impact, however, is accompanied by unplanned development, neglect, institutional weakness, noninclusion of major stakeholders, and illicit trading of antiquities, all of which can irreparably impact the World Heritage site for present and future generations.

Local Communities as Stakeholders

For stakeholders in the local community to become stewards of preservation, it is important that a comprehensive evaluation be undertaken of the site, the local communities, development conditions, and constraints. Several studies have been done in the past at a time when the subject was less urgent. The focus however, was on one community, the Bdul tribe, neglecting the study of the other main villages surrounding Park. The number of visitors to Petra has doubled since; this increase in visitation provided a pretext for the local owners of concessions to expand tourism services to the point where it is now negatively impacting site integrity.

More than ever, there is now an urgent need to update and expand the study of the socioeconomic factors that constitute and lead to the understanding of the human relations and different needs and economic benefits to include all the six surrounding communities. Only then can a holistic strategy for the management of the Park be defined and developed to incorporate the local communities.

The government authorities in Jordan recognize the importance of integration of the local communities in the overall management of Petra and incorporated it in the laws of the successive Petra management authorities of 1995, 2005, and in the current authority established in 2009. In practice, however, participation of the local communities has been minimal and inconsistent. Then and now, decision-making in the absence of the communities is a prominent source of unease among the communities and the governing body. More recently this has been evidenced during the so-called Arab Spring uprisings with demands of better inclusion in the management and decision-making process.

Today in the Petra region, the communities surrounding the Park mainly focus on the socioeconomic value of Petra through tourism; this is demonstrated, for example, by the number of souvenir kiosks, tea tents, restaurants, etc., that are located intrusively on the main thoroughfare referred to as the "Main Spine" that tourists traverse to visit Petra. The government licenses these vending outlets in an attempt to satisfy what the local community perceives as their entitlement.

Child labor selling items including finds and colorful rocks at the high price of their schooling is widely manifested throughout the areas visited by tourists. A great number of the complaints that the government receives from tourists regard the harassment they encounter by children. To increase the carrying capacity, different types of transportation as in vehicles and animals, for example, camels, horses, and donkeys, are seen throughout the Archaeological Park. In addition, the Petra Archaeological Park is now considering providing buses to transport visitors out of the site using the Turkomania road notwithstanding the negative impact on the monuments and the vegetation among other impacts. The intended beneficiaries of this transportation system will be the local communities. The anticipated economic benefit, to be derived from the proposed transportation system, overrides the communities' interest in maintaining the site's legacy and its relevance to their cultural heritage and identity. Many do not realize that unless judiciously managed, tourism and the development of related facilities can negatively impact the significance and integrity of the property. This is partially explained by the discrepancy that exists between traditional tribal laws versus the modern laws that came into effect with the establishment of Jordan as an independent nation in 1946. According to the laws established after the independence, the government owns lands surrounding the Park as well as lands within the Park. In contrast, in the

perception of the tribal communities, there are Miri lands that fall under tribal or customary law. The restriction of development and commercial activities on lands perceived by the tribal communities as belonging to its traditional owners is not an easy regulation to impose in a tribal society, and doing so continues to present a challenge to this date.

The Petra region does not lack economic assets, but they have not been developed adequately to benefit all the local communities. On 25th of November 2005, at UNESCO's headquarters in Paris, a 16-member international jury proclaimed The Cultural Space of the *Bedu* in Petra and Wadi Rum a masterpiece of the oral and intangible heritage of humanity. This proclamation gives international recognition, visibility, and fame to one of the great nomadic cultures of the world, that of the *bedu*, in the specific natural and historical contexts of two outstanding areas in the south of Jordan. It carries a enormous potential for the concerned communities in terms of preservation of their heritage and improvement of their livelihoods.

In turn the social and economic benefits these resources provide can vest in the local communities a sense of purpose. Recent tourism trends indicate that visitors to the region seek to expand their experience beyond the Archaeological Park proper; local communities should be encouraged to take advantage of this interest in their intangible heritage. Hence, there is a growing need for facets of local heritage to be explored. This development can enable local communities to reap Petra's economic benefits. Moreover, fostering interest in heritage will simultaneously encourage the preservation and protection of heritage.

Junior Ranger Program

It is in recognition of the importance of community participation that the PNT introduced to its programs activities in education and outreach: the Petra Junior Ranger Program in 2010. It is an

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 2 Pledging the junior ranges oath at the graduation ceremony, Petra Junior Ranger Program

educational program based on the paradigm of explore, learn, and protect. In its mission to preserve and protect Petra, PNT is seeking to develop an educational and stimulating program for the youth of Petra. The program introduces the culture (peoples, traditions, and practices) and history of Petra in an entertaining and engaging way by employing a hands-on learning approach for youth, that is, learning by doing, exploring, and discovering. It will allow children to interact with the site, feel its importance and uniqueness, explore and discover its archaeology and natural features, and participate in different activities that will teach them about the site. PNT believes that this can be achieved by instilling a greater understanding and appreciation of Petra and by integrating the interests of the local community into Petra's preservation efforts. The Petra Junior Ranger Program is an effective method to involve and engage the youth of the local community in sustaining the values that set Petra apart as a world heritage site. PNT believes that the youth of today will become tomorrow's stewards of this heritage.

Throughout the workshop, participants learn about Petra, its significance, and why and how to preserve it. The program fosters critical thinking skills and civic engagement, essential building blocks for a healthy civil society. The workshops conclude with a ceremony in which participants recite the Junior Ranger pledge and graduate as Petra Junior Rangers (Fig. 2). The program targets children and youth from the six villages of the Petra region: Beidha, Um Seyhun, Wadi Musa, Taybeh, Rajef, and Dlagha. The program is divided by age group: 7–9, 10–12, and 13–15 year olds. Each workshop includes 20 participants and five teenage volunteers from the Petra region. From January 2011 to February 2012, PNT has implemented five workshops for the 7–9 year old age group and three workshops for the 10–12 year old age group.

The Junior Ranger curriculum focuses on the outstanding universal values (OUVs) that render Petra a UNESCO World Heritage Site. The program first addresses Petra's cultural value by introducing participants to the different peoples that contributed to their heritage. The type and depth of the activities expand with the age groups. For example, while the 7–9 age group studies four time periods: the Nabataean, Roman, Byzantine, and modern period, the 10–12 age group additionally studies the Neolithic period.

The activities focus on the different historic periods and their relation to modern times. Participants wear costumes to show the similarities between the attire then and now. In the classroom, participants dress up in Neolithic style costumes and use flint stones to make spark (Fig. 3).

Another classroom activity exposes participants to the round and square Neolithic houses; participants notice the similarities to modern houses, which help them to identify with this heritage. When participants visit the Neolithic site of Beidha, they do a bread-baking activity. First they see the oblong quern that Neolithic people used to grind wheat, and they compare it to rounded basalt querns that are still used today. Then they bake bread over fire, again in the way

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 3 Participants dressed up in Neolithic costumes

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 4 Neolithic round and rectangular houses in the Neolithic settlement in Beidha, Petra

that Neolithic people used to do it. This activity further encourages participants to connect with their heritage (Figs. 4, 5, and 6).

Following the Neolithic period, in addition to costumes, participants are introduced to the Nabataeans through their fine and delicate pottery; in the classroom participants learn to make and paint their own pottery. The "Decorating My Wall" activity based on the Nabataean wall painting in biclinium 849 in Siq al-Barid that was conserved recently by PNT encourages the appreciation of cultural and natural heritage, preservation practices, and creative expression (Figs. 7 and 8). On a field trip to Siq al-Barid, the participants have the opportunity to appreciate firsthand the content of the painting which includes endemic plants and animals as well as figures from Greco-Roman mythology. The instructor also draws the participants' attention to "vandalism" that has caused extensive damage to this unique example of wall paintings and connects this example to protection of heritage and the general concept of the need for preservation.

The workshop ends with a graduation event where parents, siblings, government and Park officials, local parliamentarians, and sponsors and members of the Board of the Petra National Trust attend. The work of the participants is exhibited on this occasion, and the junior rangers take the pledge, "I promise to appreciate, respect and preserve Petra. I promise to share with others what I have learned and to help protect the archaeological, natural, and cultural heritage of Petra."

PNT plans to further expand the Petra Junior Ranger Program to adapt the Petra Junior Ranger program to other archaeological sites in Jordan. PNT will also use the momentum from the Petra Junior Ranger Program to launch further youth and adult engagement initiatives to build a generation of aware, engaged, and active advocates for Petra.

Conclusion

In conclusion, a variety of factors threaten the world's rich and diverse cultural heritage. There emerges an exigent need to responsibly preserve this heritage for this and future generations. Moreover, cultural and natural assets can provide a path to development for local communities in Jordan. Whether from tourism or from investments in cultural heritage and related industries, there is ample potential to generate a broad scope of economic entrepreneurial activities that have the capacity to create wealth and cultivate pride and

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 5 Modern rectangular house in Wadi Musa, Petra

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 6 Participants building their own habitat

amelioration of level of comfort. In the case of Petra in Jordan, heritage manifests itself in everything from hospitality customs to traditional food serves to bolster tourists' experience in the region. Their heritage is what makes local communities more unique; expanded utilization of this heritage will bring socioeconomic benefits to Petra and other archaeological regions in Jordan. The challenge is galvanizing financial and other resources to invest in development of cultural heritage to bring benefits to the communities surrounding Petra and other heritage sites in Jordan.

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 7 Recreating the wall painting on the ceiling of Biclinium 849 in Siq al-Baird, Petra

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 8 Completing the wall painting on the ceiling of Biclinium 849 in Siq al-Baird, Petra

Cross-References

- ▶ Akrawi, Aysar
- ▶ Petra National Trust and the Challenge of Site Management at Petra

Further Reading

Akrawi, A. 2000. Petra, Jordan. In *Management planning for archaeological sites*, ed. J.M. Teutonico and G. Palumbo, 98–112. Los Angeles: The Getty Conservation Institute and Loyola Marymount University.

Atalay, S. 2010. 'We don't talk about Catalhoyuk, we live it': Sustainable archaeological practice through community-based participatory research. *World Archaeology* 42: 418–429.

Brighton, S. 2011. Applied archaeology and community collaboration: Uncovering the past and empowering the present. *Human Organization* 70: 344–354.

Carmen, J. 2011. Stories we tell: Myths at the heart of 'community archaeology'. *Archaeologies* 7: 490–501.

Chirikure, S., and G. Pwiti. 2008. Community involvement in archaeology and cultural heritage management: An assessment from case studies in southern Africa and elsewhere. *Current Anthropology* 49: 467–486.

Comer, D. 2012. *Tourism and archaeological heritage management at Petra: Driver to development of destruction*. New York: Springer.
Fox, W.A. 1999. Aboriginal peoples, archaeology and Parks Canada. *Plains Anthropologist* 44: 35.
Global Heritage Fund. 2009. Sustainable preservation, GHF's model for community development-based conservation. GHF white paper.
La Roche, C. 2011. Archaeology, the activist community, and the redistribution of power in New York City. *Archaeologies* 703: 619–634.

Local Communities and Archaeology: A Caribbean Perspective

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Introduction

Archaeology in the Caribbean has from its beginning in the early to mid-twentieth century been controlled by overseas universities and researchers. It is primarily academic-driven research that has and continues to produce excellent scholarship and impressive collections of cultural objects. It has also generated large amounts of information on the history and natural history of the islands. Management of data and collections is an ongoing challenge for many communities on the islands of the Caribbean.

Key Issues/Current Debates/Future Directions/Examples

Local Archaeology in the Caribbean Region

Despite more than a half century of research, only the islands of the Greater Antilles with large populations and universities have "local" archaeologists and departments of archaeology. The colonial French and Dutch Antilles also have resident archaeologists and departments of archaeology, but they are part of the European systems and the archaeologists are mostly from Europe. Regardless, academically focused archaeology is still at the forefront of research and excavations on those islands. In the independent islands of the former British colonies, archaeology is completely dominated by overseas academics from a large number of universities who visit annually for short periods of time. This discussion will refer specifically to the situation in the former British colonies of the Eastern Caribbean.

Most of the small islands have major economic issues, and archaeology and museum development have been and continue to be led by a few individuals who volunteer their time and resources for archaeology and heritage development. Sustainability is an issue although their efforts are well recognized by the development authorities and local governments on their various islands. Yet their efforts and projects including the safeguarding and management of their islands cultural relics and antiquities are grossly underfunded by their governments, if at all.

During the annual field seasons, archaeology field schools with new generations of archaeologists seeking to make their mark descend on the islands eager to recover the secrets and mysteries of the past. From their perspective they are providing a valuable service while gaining knowledge and recovering archaeological collections for study and publication. This is indeed admirable and welcome, but there is another side of the story. Many of the findings taken overseas for study and documentation are never returned to the islands. Most are lost in the basements and closets of universities as the students graduate and memories and promises fade. Ironically, the vast body of data and cutting-edge information is also lost within the halls of academia as papers, theses, dissertations, and presentations are produced and presented to fellow academics. Very little of this knowledge will ever trickle back to the islanders and into their history books. On the other hand, there are academics that have sufficient time, funds and students to be able to extract their required data, photos, and analysis on the islands, and then leave behind their excavated collections in the hands of the local museums and avocational

island archaeologists. To their credit they have done the right thing, except that most islands lack the resources and capacity to curate, manage, research, publish, and store the enormous collections that grow considerably every year. Throughout the islands there are collections that have been abandoned as their formerly well-labeled containers rot in the tropical heat. Plastic bags and bins dry and crumble, while insects and vermin, hurricanes, and vandalism contribute to the rapid destruction of cardboard, plastic, and wooden boxes and bins. Dedicated space for the storage of collections, primarily the bulk of non-diagnostic sherds, shells, soil samples, glass, and much more, is nonexistent. As the small nonprofit museums with untrained volunteers and staff struggle to cope with little-to-no resources, funding, or curation, the question will arise, "Why are we spending our limited resources on keeping this non-museum quality junk when we can't pay the utilities or improve the exhibits?" Before they can answer the question, its field season again and more archaeologists and their students descend on the islands.

So where does the academics' responsibility begin and end? Clearly the end of the field school museum day exhibition and meet-the-public day is not sufficient. Many academics try to build capacity by encouraging "locals" to come and dig alongside their students, but this too is an issue. While the academic has years of study, ethical responsibilities, and scholarship, the "local volunteer" will have only acquired the knowledge of how to find a site, where to dig, and what is of value. A little knowledge is indeed a dangerous thing, so this well-intended event could be the training camp for potential looters. Speaking from the perspective of a "local," it is strongly advised to use only committed museum staff, seriously interested older local students, and volunteers who are committed to heritage preservation.

The solutions to these issues begin with the academics. In the rush to find sites and lay claim to an island as one's research territory, the colonial mindset must be left behind. It is not "your site or artifacts or data." Before the excavations begin, one must start to develop capacity in the local communities and institutions that are responsible for the curation of the results of your work. While developing a research proposal, one must always include capacity building, training in curation and management of collections, and the values and ethical principles of archaeology. We must ensure that there are funds and space for sustainable long-term storage and that the organizations themselves are also sustainable and not solely dependent on a single individual for management or source of funds for survival.

Caribbean archaeology is growing in popularity, and recent projects on Antigua and Barbuda by CUNY have adapted this approach and developed close relationships with the museums (HERC 2011). A field station has been setup on Barbuda for a long-term commitment in research, museum development, storage, and training. They work in partnership with the museums on Antigua, and both organizations are benefiting from the new body of data, collections, and opportunities, an ideal case study in ethics and responsibilities.

Cross-References

- ▶ Caribbean Historical Archaeology
- ▶ Caribbean Maritime Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America

References

Human Ecodynamics Research Center (HERC). 2011. Available at https://herc.gc.cuny.edu/files/2011/10/BARC-HERC-info.pdf. Accessed 13 Nov 2012.

Further Reading

Atalay, S. 2012. *Community-based archeology: Research with, by, and for indigenous and local communities*. Berkeley: University of California Press.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2008. *Collaboration in archaeological practice: Engaging descendant communities*. Plymouth: AltaMira Press.

Jameson, J.H. 2007. In *Past meets present: Archaeologists partnering with museum curators, teachers, and community groups*, ed. S. Baucher. New York: Springer.

Local Discourses in Archaeology

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Introduction

Archaeologists generally accept that they cannot leave their work to be used only by others (e.g., Jeppson 1997; Little and Shackel 2007). Archaeologists also understand that there is a community outside of archaeology that has a practical interest in the outcomes of archaeological endeavors (e.g., La Roche and Blakey 1997; McDavid 1997, 2011; Leone et al. 2011). Many archaeologists support a responsibility to the public to meet their needs by explaining what they say about the sites and people being investigated (Edwards-Ingram 1997; Jeppson 1997). The difficulty, as an archaeologist, is developing a means to reach out to these communities effectively. It may not be an easy task to identify such communities and to draw the line between who is a part of it and who is not. Archaeologists engaging with stakeholders, which is how we define local discourses, consider these issues as they develop research designs for their projects.

Archaeology in Annapolis (AiA) has been working with the local communities in Annapolis and with communities outside of Annapolis since its inception in 1981. AiA was formed out of a partnership between the University of Maryland and several local community groups in Annapolis, including the Historic Annapolis Foundation, the Banneker-Douglass Museum, and the Kunta Kinte/Alex Haley Foundation. Through these partnerships, AiA has excavated over 40 archaeological sites in Annapolis and has provided a variety of ways to teach residents and visitors about the lost, hidden, missing, or misinterpreted cultures of groups that were and continue to be important in Annapolis. Teaching, our basic definition of discourse, has been done through public open sites, news media, and public displays of artifacts. Public media allow local communities to receive updated news of the discoveries being made through archaeology in the city. Public access to sites provides archaeologists the means to demonstrate what they are doing, how they are doing it, and how it leads to their ultimate conclusions. However, not every site can be opened up for the public to visit, and newspaper articles and TV newscasts are not continuous. Archaeologists interested in engaging communities have to find a way to reach their audiences and not only provide information but also start and sustain a two-way dialogue that can constitute a local discourse.

Definition

It would seem that any conversation that an archaeologist has about a site with a related community could constitute a local discourse. However, this is not the operational definition of local discourses. As we use it for AiA, local discourses are the conversations that archaeologists have with the stakeholders of a specific project to obtain information and give information about a particular site or project so that both the general public and the archaeologists end with more information. Local discourses, by our definition, also engage the stakeholders and local community in the project, so that the project is not just being done about a group, but for a group, with their interests and questions in mind as the research design is developed.

In the sociocultural anthropological contexts, local discourses have been defined as comparable to oral histories and have been used for the benefit of the anthropologist, as a way to gain more information about the subject under study (Agar 2005: 2). However, archaeologists typically do not see these discourses as solely for the benefit of the anthropologist.

Theoretically, our understanding of "discourse" is influenced by Jürgen Habermas (1981) and Michel Foucault (1969). Many of the problems archaeologists have had with local communities stem from a lack of communication, openness, trust, respect, and accountability, while many of the successes have come from an abundance of these (e.g., La Roche and Blakey 1997; McDavid 1997; Little and Shackel 2007). Habermas discusses the notion of the "ideal speech situation," that is, a situation in which all interested parties can come together to create and sustain a discussion, hear and be heard equally, participate in the discussion on equal footing, and weigh all of the options presented before being able to arrive at a general consensus (Habermas 1981). However, while striving to achieve Habermas' ideal speech situation, there are barriers which prevent archaeologists from achieving it, which in turn have ramifications for our understanding of local discourse. Central among these is archaeology's perceived authority to make statements of cultural fact (Jeppson 1997). Mostly located within academia, archaeologists use what Foucault introduced as the concept of knowledge/power, which asserts that there are hidden power relations embedded within any form of discourse in which one group possesses knowledge that it can use over another (Foucault 1969). Just as doctors have power over their patients and lawyers have power over their clients because they possess specialized knowledge and skills the other does not, archaeologists have power over the local communities in which they work. By ignoring this fact, power relations of the status quo are unwittingly maintained at the expense of the groups with whom archaeologists are supposed to be working. This is not to say that specialized knowledge is inherently bad. By recognizing the knowledge/power embedded within the practice of archaeology, archaeologists can take steps to change the way they relate to local communities and in doing so come closer to Habermas' ideal speech situation. Central to the attempts of archaeologists to work with local communities is a balancing act between trying to achieve Habermas' ideal speech situation and at the same time possessing Foucault's knowledge/power by acting as experts and authorities.

Key Issues/Current Debates/Future Directions/Examples

Engaging with the general public when doing archaeology presents several problems. The first is how to define a public. In some ways, it makes sense to define the audience as the people who live in the community surrounding the archaeological site being investigated. However, this can be problematic, especially when there is a descendant community with an interest in the site that is not local. In many cases, archaeologists end up having to deal with several different groups, who are not mutually exclusive, but who have different needs (McDavid 1997; Franklin and McKee 2004), and "archaeologists have historically oversimplified our notions of 'community'" (Brandon 2008: 149). For example, when working at Wye House, there is a known descendant community living in Unionville, Maryland. During the Civil War, 18 slaves were removed from the Wye House plantation by the Union Army and promised freedom in exchange for military service. After the end of the war, they returned to the area and settled on Quaker land approximately 3 miles away from Wye House and developed the town of Unionville. When Mrs. R. Carmichael Tilghman invited Archaeology in Annapolis to excavate at Wye House in 2004, researchers from AiA went to Unionville to start a dialogue with this descendant community. Mark Leone went to the main church in Unionville, St. Stephen's African Methodist Episcopal (AME), and started listening to the prominent members of this community about the excavations at Wye House that he was going to conduct through Archaeology in Annapolis. One member indicated that she wanted to know if there was "evidence of slave spirituality" and "what the Lloyds had done for freedom." These two questions, combined with the early interest of the Lloyd descendants, shaped significantly the research design that led to nine seasons of excavations at Wye House.

As direct descendants of the community being investigated through the archaeological investigations of AiA, this descendant community clearly has an interest in the work and is an audience. But should this audience be given a higher priority or be more included in the decision-making process than another local community? We decided they should be, and we made sure to consult with this community before excavations began at Wye House. This in some ways is less problematic than other descendant communities because the proximity of Unionville to Wye House allows it to be grouped within the "local" communities. However, we do encounter situations where the descendant community is not really a community, so much as a person, and that person lives on the other side of the country. In this case, the opinion of the descendant is solicited.

This was the case for one of the properties excavated in Annapolis, Maryland, where AiA members have worked directly with descendants of James Holliday to develop archaeological research designs. In the fall of 2009, a homeowner whose family had owned, and continues to own, the James Holliday House wanted to know more about her family than could be determined from historical records alone. James Holliday was a freed slave who was one of the first African-Americans to be employed at the US Naval Academy. He purchased a brick townhome just off of State Circle in downtown Annapolis in 1850. James Holliday and his descendants have owned the property ever since. This gracious homeowner agreed to let Archaeology in Annapolis excavate the yard and basement of the property for three summers, in exchange for any information the researchers could provide her about her family. The specific interests of the homeowner and the oral histories she has provided have significantly influenced the research design of this project. For example, the homeowner of this property is interested in the role her great-grandfather, James Holliday played at the US Naval Academy, and as a result, much of the research that has been done on this property has been focused on determining how the Holliday family's relationship with the Navy and Naval Academy influenced their standing within the Annapolitan African-American community. Three summers of archaeological investigation have led to the conclusion that the Holliday family was well established within the middle class and appears to conform, to some degree, to the previously established trends within the African-American community in Annapolis, in spite of their continued contact with these predominantly white institutions. Because this descendant homeowner does not live in Annapolis today, most of the information exchanged between the researchers and the homeowner has been done through phone calls and e-mails.

In their work at the African Burial Ground in New York City, La Roche and Blakey (1997) strove to create a project that both informed and was informed by the local community. Excavations began at the African Burial Ground in the summer of 1991 and continued into the summer of 1992 before a group of "influential and determined African-Americans, and others, combined to halt excavation, take moral responsibility, and seize intellectual power" (La Roche and Blakey 1997: 85). The burial ground is the largest and earliest example of such an African-American site in the United States and, as a result, is of great interest to both the academic community and to the descendant community. Local discourses surrounding this archaeological excavation were started largely as a reaction to the outraged local community, led by congressmen, senators, the New York City Landmarks Commission, journalists, artists, clergy members, and other concerned citizens. Their reactions and activism resulted in the project changing hands, from the US General Services Administration to a team of concerned academics, led by Michael Blakey at Howard University. According to La Roche and Blakey, the addition of the academics to this group of concerned citizens provided the "final necessary component" of intellectual power and technical expertise to the project (1997: 85).

La Roche and Blakey (1997) assert that understanding and sustaining local discourses require not only an understanding of the specific project at hand but also an understanding of the larger scholarly and public concerns related to the topic, especially the related long-standing political debates.

Most of the work of this project to establish and sustain conversation with the local community and interested stakeholders was done through the Office of Public Education and Interpretation (OPEI). OPEI opened in 1993 and was tasked with informing and educating the public about the ongoing progress of the African Burial Ground project, both on- and off-site (La Roche and Blakey 1997). In 2006, management of the OPEI was transferred to the National Park Service, which continues to interact with community members and volunteers through meetings, forums, the development of an interpretative center, and the dedication of a memorial (African Burial Ground 2007).

How does a project qualify as a local discourse? Is "local" anything that pertains to the site? For Annapolis, we determined that all descendants, regardless of their physical location, should be included in the target audience that is consulted in our outreach. What happens when different factions within the same community have competing interests? Do you, as the archaeologist, take a stand and advocate for a particular side?

In an effort to deal with the problem of a large, spread-out audience and community, archaeologists in Annapolis have moved toward working with an online blog. This is easily accessed, is easily updated by the archaeologists, and provides the opportunity to present research in an informal way that is more easily understood. It also allows people access to excavation sites that might otherwise be inaccessible due to size or privacy. For example, our excavations in the backyards of Annapolis households or the Wye House plantation are largely unavailable for the public. In order to open up a conversation about research, it is necessary for researchers to construct a space to share experiences and discoveries while allowing feedback from the community. A blog creates such a space in a digital environment and welcomes a discourse not only with the community that is local but also with a dispersed community with a shared interest in the findings and interpretations of Archaeology in Annapolis. This informal medium is the ideal space in which to demonstrate a reflexive, contextual, and interactive presentation of research because it shows people the ongoing process of inquiry and analysis in archaeology and permits commentary and questions from any reader. Kenneth Brown and Carol McDavid identified these attributes as the objectives for the Levi Jordan Plantation archaeological site, which was used to promote a collaborative project between archaeologists and the decedent community (McDavid 2004). In the development of a project website, McDavid brought the research on the Levi Jordan Plantation – a nineteenth-century site in Texas – into an environment of shared control with the African-American and European-American decedents. From the beginning stages of Web design, interaction with the community was an important factor, leading to workshops with descendants to determine how the public would engage with the features of the site. The final product included a discussion forum, feedback forms, and questionnaires, which allowed users of the site to contribute opinions, ask questions, and begin conversations (McDavid 2004: 46). One of the goals of the project was that every stakeholder – the community members, family members, and academics – had an equal and legitimate voice to add to the final website. Through a diversity of collaborators and the openness of the project, McDavid demonstrated a local discourse that leads to collaboration in "reciprocal, non-hierarchical, [and] mutually empowering ways" (41).

Due to the accessibility of the Internet, blogging has become a "spaceless" public sphere, where there exists a freedom of opinion, personal communication, and information exchange that brings users closer to Habermas' "ideal speech situation" (Dakroury and Birdsall 2008). Blogging in archaeology allows public access to the discussion of excavations and analyses without the constraints of uneven power relations, constructing a discourse where inclusion and the right to contribute knowledge within this online community are central.

The AiA Blog began in 2011 as an experiment in Web-based outreach and provided access to a community that stretches the definition of "local" and demonstrated a few of the positives and negatives of an online discourse. The main aim of the blog was to engage local communities connected

to our Annapolis and Wye House sites, but the global nature of the Internet meant that our project was open to any party with web access. By virtue of making our blog public, we expanded our audience to include local residents, descendants who have relocated, other archaeologists, and any other readers who have an interest in our archaeological work. The main problem, however, is gauging how effective the blog is in reaching our intended communities. The anonymity of the Internet allows readers to offer comments or ask questions without identifying who they are. Some commenters on the blog declare themselves to be local residents, while others make no mention of an affiliation. Additionally, it is difficult to assess the reach and readership of the blog simply from its comments, because a majority of visitors to blogs will read the content but not contribute to any discussion. It is both frustrating and gratifying to attempt a local discourse through an online medium.

In an attempt to create discourse through an online medium, Archaeology in Annapolis has used a number of different approaches, including online databases to allow the public to interact with archaeological sites from afar (Archaeology in Annapolis 2017). For Annapolis, Timothy Goddard created a tool in 2005 that allows the user to spatially search through historical data for the city by exploring an interactive Web GIS (geographic information systems) map. Another searchable database was created for Wye House in 2012. This database created by Beth Pruitt focused on search for individual names within the records of the enslaved at the plantation in the late eighteenth and early nineteenth centuries. The most recent project, Locating People in the Past, combines the methods of the first two, creating an interactive Web GIS (geographic information systems) resource that combines census data from before and after emancipation with contemporary maps in Talbot County, Maryland, to show where enslaved people lived, which is otherwise unavailable. This project was funded by the FIA-Deutsch Seed Grant Competition and developed in 2014 by a team of Archaeology in Annapolis graduate and undergraduate students. Our work at Wye House also attracted the interest of a local nonprofit creative studio, Assemble, who helped us produce professional video summaries of our work and make them available to the general public. Opening up our work in the manner of public blogs, searchable databases, and videos takes a great deal of the control of information out of the archaeologists' hands and places it into the view of an at-times faceless audience. Although using online mediums offers a number of benefits, archaeologists cannot assume that all communities will have equal access to the Internet. Being flexible and adapting to the situation of the community, in addition to using online approaches, allows archaeologists to create an entirely different sort of community, one that is not confined by physical location.

Historical archaeologists have sometimes been invested in working with communities to not only inform their own investigations but also to incorporate stakeholder concerns into the research design. The information gleaned from excavations can be of benefit to everyone. Through conversations with the public, archaeologists work toward an "ideal speech situation," in which the researcher and the public participate in a dialogue. An added difficulty in engaging with a local discourse comes from the oftentimes nebulous definition of the "local" community. Simply drawing a line around the residents with physical proximity to the research area can be problematic, and outlying members of the descendent community or other members of the general public may have a vested interest in the archaeological findings. One solution has been to take the discourse out of the realm of the physical and into the digital, where blogs can work toward allowing an informal record of archaeological work and a conversation between interested parties in a "spaceless" public sphere.

Cross-References

- ▶ Activism and Archaeology
- ▶ African Diaspora Archaeology
- ▶ Archaeological Stewardship
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America

▶ Community Archaeology
▶ Cultural Heritage and Communities
▶ Cultural Heritage and the Public
▶ Cultural Heritage Outreach
▶ Decolonization in Archaeological Theory
▶ Heritage and Archaeology
▶ Heritage and Society
▶ Heritage Values, Communication of
▶ Leone, Mark P. (Historical Archaeology)
▶ Local Communities and Archaeology: A Caribbean Perspective
▶ Media and Archaeology
▶ "Public" and Archaeology

References

African Burial Ground. 2007. Available at: http://www.africanburialground.gov/ABG_Main.htm. Accessed 27 Sept 2011.

Agar, M. 2005. Local discourse and global research: The role of local knowledge. *Language in Society* 34: 1–22.

Archaeology in Annapolis. 2017. Online projects. Available at http://aia.umd.edu/projects.html.

Brandon, J.C. 2008. Disparate diasporas and vindicationist archaeologies: Some comments on excavating America's metaphor. *Historical Archaeology* 42 (2): 147–152.

Dakroury, A., and W.F. Birdsall. 2008. Blogs and the right to communicate: towards creating a space-less public sphere? *2008 IEEE International Symposium on Technology and Society*, Fredericton, NB, 2008, pp. 1–8.

Edwards-Ingram, Y. 1997. Towards "true acts of inclusion": The "here" and the "out there" concepts in public archaeology. *Historical Archaeology* 31 (3): 27–35.

Foucault, M. 1969 (2002). The archaeology of knowledge. Trans. A.M. Sheridan Smith. London: Routledge.

Franklin, M., and L. McKee. 2004. African Diaspora Archaeologies: Present Insights and Expanding Discourses. *Historical Archaeology* 38 (1): 1–9.

Habermas, J. 1981. *The theory of communicative action, volume 1. Reason and the rationalization of society,* 273–337. Trans. T. McCarthy. Boston: Beacon Press.

Jeppson, P.L. 1997. "Leveling the playing field" in the contested territory of South African past: A "public" versus a "people's" form of historical archaeology outreach. *Historical Archaeology* 31 (3): 65–82.

La Roche, C.J., and M.L. Blakey. 1997. Seizing intellectual power: The dialogue at the New York African Burial Ground. *Historical Archaeology* 31 (3): 84–106.

Leone, M., J. Knauf, and A. Tang. 2011. Frederick Douglass and the archaeology of Wye House. *AnthroNotes: Museum of Natural History Publication for Educators* 32 (1): 15–18.

Little, B.J., and P.A. Shackel, eds. 2007. *Archaeology as a tool of civic engagement*. Lanham: AltaMira Press.

McDavid, C. 1997. Descendants, decisions, and power: The public interpretation of archaeology at the Levi Jordan plantation. *Historical Archaeology* 31 (3): 114–131.

McDavid, C. 2004. From "traditional" archaeology to public archaeology to community action: The Levi Jordan Plantation project. In *Places in mind: Public archaeology as applied anthropology*, ed. P.A. Shackel and E.J. Chambers, 35–56. New York: Routledge.

McDavid, C. 2011. From "public archaeologist" to "public intellectual": Seeking engagement opportunities outside traditional archaeological arenas. *Historical Archaeology* 45 (1): 24–32.

Further Readings

Blakey, M. 1998. The New York African Burial Ground project: An examination of enslaved lives, a construction of ancestral ties. *Transforming Anthropology* 7 (1): 53–58.

Gadsby, D.A., and R.C. Chidester. 2011. Heritage and "those people": Representing working-class interests through Hampden's archaeology. *Historical Archaeology* 45 (1): 101–113.

Jopling, H. 2008. Making a way out of no way: relations between Blacks and Whites in Annapolis, Maryland, from 1902 to 1952, volume I. Unpublished PhD dissertation, The City University of New York.

Little, B.J. 2002. *Public benefits of archaeology*. Gainesville: University Press of Florida.

Patten, M.D. 1997. Cheers of protest? The public, the post, and the parable of learning. *Historical Archaeology* 31 (3): 132–139.

Potter, P.B., Jr. 1992. Critical archaeology: In the ground and on the street. *Historical Archaeology* 26 (3): 117–129.

Praetzellis, M., and A. Praetzellis. 2011. Cultural resource management archaeology and heritage values. *Historical Archaeology* 45 (1): 86–100.

Shackel, P.A. 2011. Pursing heritage, engaging communities. *Historical Archaeology* 45 (1): 1–9.

Silverman, H. 2011. Epilogue: Perspectives on community archaeology. *Historical Archaeology* 45 (1): 152–166.

Local Populations and Global Heritage

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Introduction

Over the last 30 years, archaeologists and heritage managers have developed reflective, ethical

practices and methods to take into account the relationships "local" communities have with the archaeological sites that they live near and among and/or to which they lay spiritual, ethnic, or other cultural claim. In the late 1990s and early 2000s, during the height of postmodern critique, practitioners began designing projects that aimed to gain specific insights into how people use the material past to construct, perform, and maintain distinctive, "local" identities in an increasingly globalized world, the ways in which they contest, appropriate, and negotiate political and economic interests in relation to tourism and heritage management policies, as well as how they situate their pasts in relation to "world" history and human origins. As a result, the integration of "local" concerns, values, and beliefs became a routine part of heritage management practices, not only at United Nations Economic Scientific and Cultural Organization (UNESCO) World Heritage Sites (WHS) but also more widely at regional, local, and grassroots levels.

During the last 15 years in particular, projects relating to "communities," material remains, and the practices employed to produce, manage, and represent them have taken on new foci that embody global urgencies that overtly and *actively* engage with the networked and fractious geopolitical environments in which they are practiced. These can be outlined as four distinct but overlapping spheres of thinking and practice and include:

1. Projects that aim specifically to decolonize the fields of archaeology and heritage in a *meaningful* way by producing genuinely "co-created" and "co-authored" studies that give equal weight to communities and "professionals" in research design (Bollwerk et al. 2017).
2. Projects that examine how local communities, archaeologists, and heritage managers can help to understand and potentially assist in planning for sustainable futures, particularly in relation to defining the Anthropocene and gaining insight into how local communities can mitigate against climate change (Lane 2015).
3. Projects that explore the way in which "local/global" dynamics are implicated in social, economic, and cultural value creation (Jones 2017).
4. Finally, there is a recognition that archaeology and heritage practices can assist in contributing to understanding and resistance to the rise of conservative populism and ultranationalist discourses across the world, and a need for projects that examine how this might be possible (Gonzolez-Ruibal et al. 2018).

This entry summarizes the history of these developments and the current status they occupy in contemporary thinking around the local/global dynamics at heritage sites. It discusses and defines the approaches, techniques, and practices that have come to characterize critical archaeological and heritage discourses and the changing ways in which local communities relate to, produce, engage with, and use material remains, both in the global south and north.

Definition

Within archaeology and heritage management policies and practices, the relationship between the "global," that is, aspects of archaeological and historic remains that relate to their myriad values and significances in relation to human histories and origins, and the "local," that is, the *particular* assemblages of histories, traditions, and cultural practices in which those sites are entangled, is foregrounded as a particularly important and active dynamic in the ongoing lives of archaeological monuments. A number of trends emerged over the last three decades in theory, practice, and the development of heritage policy that are intended both to explore and "manage" this relationship. These have included participatory strategies that draw on the values, knowledge, and beliefs of "local" populations in *collaborative* ways that aim to enrich archaeological understanding and to empower and include social actors whose interests had previously been obscured or marginalized within the production,

management, and dissemination of archaeological knowledge. It has also included adopting frameworks that have "consultation" and, more recently, "co-creation/co-authorship" at their core. Often, participatory frameworks have been employed in order to *mediate* tensions that have the potential to arise when a site's meaning and worth are defined by those who lay social, cultural, historic, and economic claims to them, while archaeologists, historians, and other heritage "experts" are given the authority to define how they are used and presented in official, legitimized terms. UNESCO has been particularly active in employing such research and practices within its World Heritage Site management policy guidance, but these models are often used today in "grassroots," bottom-up ways. Furthermore, the relationships local communities have with archaeological sites and monuments are often used to gain insight into issues around cultural and environmental sustainability and defining the advent of the "Anthropocene."

Historical Background

Concern with the "global"/"local" dynamics of archaeological sites as defined above can be traced to the convergence of several strands of research that emerged across the humanities and social sciences in the 1980s and 1990s. Specifically, the impact of postmodern thought on archaeology led to the "postprocessual" movement during the 1980s, which led scholars to acknowledge and examine the subjective nature of archaeological interpretation (Trigger 2006). Appropriating approaches associated with a number of theorists and philosophers like Jacques Derrida, Michel Foucault, and Judith Butler, the assertions that characterized this paradigm included that archaeologists "read" the past in much the same way as texts (Hodder 1986) and that archaeological sites and objects are generally described and understood according to the subjective narrative experiences and identities of the discipline's practitioners. Such contentions evolved to include the interrogation of tendencies for archaeological remains to be presented to audiences as objective "facts" to be described and understood objectively by experts, as well as explorations of the traditionally unequal power relations that characterize interpretive encounters.

Postcolonial and feminist strands of postmodern thought also raised intellectual and practical challenges for archaeology and its practitioners throughout the late 1980s and 1990s. The World Archaeological Congress (WAC) was established during this era, becoming an important force for championing indigenous claims to the past, and questions also became common within archaeological discourse about the ways in which the construction of modernist metanarratives of human history had obscured and marginalized the voices of women and oppressed colonial societies whose pasts are the subject of archaeological scrutiny (Rowlands 1998).

Concurrently, scholars across the humanities and social sciences, particularly in Euro-American academic institutions, were becoming concerned with the increasing pace of "globalization" and its impacts on people's experience of identity and place (Appadurai 1986, 1996). Additionally, the collapse of Eastern European communism, the rise of neoliberal politics, and growing significance of international market economies and consumer capitalism also led scholars to become interested in changing cultural forms and the experience of everyday life in an increasingly mediated image and knowledge-saturated world. As a result, studies of people's experience of tourism and travel, how "local" identities are "performed" for visitors and maintained for cultural survival in communities, as well as the instrumental use of "culture" within development agendas all became commonplace in the academy.

Within these arenas of inquiry, a great deal of research focused on how, in particular, archaeological and historical "heritage" is used to construct politicized narratives of the past to serve nationalist agendas and political establishments in the present (see especially Handler 1988).

As a result, epistemological questions like "who owns the past?" "who decides what is preserved?" "who controls how the past is presented?" and "how do archaeological practices impact on those people who live near archaeological sites" became routinely raised in

archaeological dialogues, eventually leading to widespread integration of reflexive research and practices within governmental heritage policy and legislation across the world.

The involvement of "local" populations in cultural resource and "heritage" management practices, as increasingly recommended by UNESCO guidelines at WHS, generally involves the adoption of various strategies and research methodologies from the social sciences, to establish insights into the values, beliefs, and knowledge that they hold about particular sites and landscapes. This, it is generally argued by its proponents, enables collaborative research themes to develop and grow *out of* the issues deemed important by local communities (often termed "stakeholders" and "descendant communities"), with the specific intention of encouraging and nurturing more equitable participation in the management process than previous exclusionary heritage practices had allowed.

The language that characterizes such methodological approaches is purposefully inclusive and draws on active, "empowering" terms like "participation," "collaboration," and "action research." Although quantitative research is sometimes used to gain understandings of such values, it is generally forms of qualitative inquiry, including ethnographic approaches, experiential techniques, and qualitative interviewing, that have come to be the primary approaches used in this process (see Edgeworth 2006; Himilakis 2009), in order to gain nuanced views of people's knowledge and experience of archaeological sites.

The kinds of knowledge, values, and insights often identified as relevant to the heritage management process include historical traditions through which those sites are understood by local populations, like folkloric material, oral histories, and place names (Gazin-Schwartz and Holtorf 1999), as well as examining the role such traditions play in the construction of senses of place, authenticity, community itself, and ideas about the "rootedness" of identity to particular landscapes in the present (Jones 2004). Other spheres of knowledge with which such research tended to engage include how archaeological sites are represented within tourism media, the ways in which local economies and "sustainability" agendas are impacted by WHS management in both "developed" and "developing" nations (see Breen 2007 on WHS management in sub-Saharan Africa), as well as how the practices surrounding the sites themselves are appropriated and incorporated into "local" spheres of meaning and practice.

The knowledge gathered from such research exercises tends to be both *applied*, in that the results may be used within heritage management practices specifically to gain understanding of, and therefore better represent local interests within, the heritage management process, and *informing* archaeologists and heritage managers' understandings of how those people value heritage sites and the ways in which, for example, local identities, social structures, and views of the past are constructed in that process (see especially Breglia's account of traditions of inherited labor roles among Mayan communities at Chichen Itza WHS and Muke, Denaham, and Genuropa's 2005 investigation into the use of Kawelka traditional land tenure frameworks to denote conservation areas in order to better serve management of the Kuk WHS in Papua New Guinea).

Key Issues and Current Debates

While the socially liberal underpinnings of questions like "who owns the past?" "who is in charge of presenting it?" and similar questions regarding power relations in the construction of archaeological knowledge remain at the center of much critical heritage research, archaeologists have striven to engage directly with how those questions are relevant to twenty-first-century global problems and conditions, including the urgency of climate change, the rise of right-wing forms of populism that include ultranationalist and racist beliefs, and the necessity of the cooperative production of knowledge for the common good and future-oriented endeavors. What follow are short discussions around these strands of thinking and practice in local/global contexts.

Decolonization and Co-creation/Production

Archaeologists who work or have worked with local populations and social groups in the context of local heritage that has global significance have begun to reflect critically on the outcomes of engaging in "participatory" frameworks since they became regular practice in the early 2000s. While there is much to recommend in terms of success in more equitable representational of local interests, scholars are increasingly aware that reflexive research in this area must emphasize the decolonization of archaeological knowledge and embrace meaningful co-creation. As Breglia (2005) has pointed out, archaeological interpretation that is truly collaborative must not treat local concerns as secondary to more traditional forms of the presentation of archaeological data in research reports, monographs, and heritage policy agendas. This, she argues, needs to be reflected in the structure of research designs, as well as the representation of archaeological knowledge produced from such projects. Otherwise, true praxis cannot be achieved, and such efforts remain top-down endeavors and thus not central to the production of archaeological knowledge (Breglia 2005). Using reflexive ethnographic techniques and creative approaches to writing and integrating local knowledge to research design are possible solutions to such issues. If identity studies and reflexive methodologies emerging from the social sciences and humanities have taught us that cultures and landscapes are constantly in flux, who therefore decides which communities and interests are "local" in relation to heritage of global renown, what factors (geographic, historical) contribute to these "classifications," and which section of those societies' interests are foregrounded in heritage management processes? To reify the trope of "localness" simply reproduces the very exclusionary practices that the identity studies of the 1990s and 2000s sought to interrogate.

Incorporating lexicons and practices derived from cybernetic culture as well as gender and postcolonial activist research, archaeologists have taken on terminologies like "open access/open source," "commoning," as well as "decolonization" and "co-creation" to describe the integration of multiple authors and democratic modes of creating and disseminating archaeological knowledge.

Archaeological Heritage, Sustainability, and the Anthropocene

Recent work by Lane (2015) and Lafrenz Samuels et al. (2016) outlines the essential roles of archaeological knowledge in efforts to fight climate change, both to trace its genesis to specific, geographically significant human behaviors that have contributed to it and use that knowledge to inform contemporary and future-orienting planning strategies designed to mitigate it. Indeed, the definition of the Anthropocene – a human-made geological epoch – depends on the correlation of archaeological facts with historical narratives in order to build a picture of how we have constructed this situation through deep time. How can communities negotiate a willingness to become "sustainable" using the lessons of the past to inform the present?

As Edgeworth (2013) notes, working on conceptions of "scale" using archaeological evidence, too, is important in this regard, as moving between temporalities in tracing behaviors from deep time to the present requires a nuanced understanding of spatiotemporal contexts. How was the Anthropocene constructed through time and space in different places? How can archaeologists and geologists intertwine their respective disciplinary scales to achieve integrated understandings of climate change and its genesis within local populations and thus inform sustainable practices and strategies?

Value Production

A significant sphere of debate about the local/global heritage dynamic centers around definitions of "value" and "significance" as they relate to historic and archaeological remains (Jones 2017). Some argue the ways in which definitions of these concepts are ultimately rooted in the histories and practices of the capitalist nation state (Samuels 2008; see especially Holtorf 2009). Such values, they argue, have traditionally been dictated by economic significance, as defined by the World Bank and related to notions of private property, as well as according to

essentialist conceptions of culture as espoused by Western European ideas about citizenship and national identity. Such ideas continue to dictate how "heritage" is defined, produced, classified, and managed globally, despite recent attempts to integrate "local" values and to recognize the shifting center of identity that reflects the movement and immigration of people, knowledge, and practices associated with globalization. Any ethical treatment of heritage, then, must therefore center on dynamic processes of cultural change.

Another layer of the complexity of global heritage as it relates to local cultural practices overlaps significantly with critiques of the conception of "value" as discussed above and posits that the very concept of "global" heritage, especially as manifest in the UNESCO World Heritage List, privileges and legitimizes a modernist metanarrative of human heritage and its definitions. In an extensive critique of the concept of "World Heritage," Narkunas (2007) points out that the World Heritage agenda, as outlined by UNESCO, is underpinned by essentialist notions of culture that aspire to "normalize criteria" of culture in relation to the liberal democratic model of the nation state, which is underpinned by enlightenment ideas that aspire to objectivity and universal humanism. Such philosophical positions, especially in the context of defining what heritage is and how it should be managed and represented, "trump" the ways in which it may be defined and understood on smaller scales, preventing a truly ethical stance on providing equal weight to the knowledge and value systems of all concerned populations that have interests in heritage sites.

Heritage and Populism

Gonzalez et al. (2018) have recently argued that archaeologists and heritage specialists have a responsibility to counter right-wing populist movements with "facts" about the universality of humankind, despite the tendency of "community" and "public archaeology" discourses that give "equal" voice to those who lay claim to material remains. Although this position may in some ways run counter to the efforts outlined above, the authors pose the important question of how archaeologists and heritage specialist should engage those "communities" whose claims to the past relate to racist and ultranationalist agendas. What happens to the "subjective" nature of interpretation in these instances, in the context of post-truth populism, and how can we integrate ideas about "facts" and "universality" into analyses after three decades of emphasizing subjectivities?

Future Directions

The relationship between global heritage and local cultural dynamics continues to be an important, growing area of inquiry, with a particular view toward discussing it in relation to morality and socially liberal ethics: the ways in which the relationship of local knowledge and values to "global" heritage is crucial to engaging with, and intervening in, current crises of climate change, the rise of right-wing populism, and continuing global capitalism.

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Cross-References

- ▶ Community and Archaeology
- ▶ Community Archaeology
- ▶ Global Heritage Fund (GHF)
- ▶ Post-processual Archaeology
- ▶ Post-processualism, Development of
- ▶ Public Archaeology and Education: Present Relevance to the Past

References

Appadurai, A., ed. 1986. *The social life of things: Commodities in cultural perspective*. Cambridge, UK: Cambridge University Press.

Appadurai, A. 1996. *Modernity at large: Cultural dimensions in globalization*. St. Paul: University of Minnesota Press.

Bollwerk, E., R. Connolly, and C. McDavid. 2017. Co-creation and public archaeology. *Advances in Archaeological Practice* 3 (3): 178–187.

Breen, C. 2007. Advocacy, international development and world heritage sites in sub-Saharan Africa. *World Archaeology* 39: 355–370.

Breglia, L. 2005. Keeping world heritage in the family: A genealogy of Maya labour at Chichen Itza. *International Journal of Heritage Studies* 11: 385–398.

Edgeworth, M., ed. 2006. *Ethnographies of archaeological practice*. Walnut Creek: AltaMira Press.
Edgeworth, M. 2013. Scale (in the archaeology of the contemporary world). In *The Oxford handbook of the archaeology of the contemporary world*, ed. P. Graves-Brown, R. Harrison, and A. Piccini, 379–391. Oxford: OUP.
Gazin-Schwartz, A., and C. Holtorf, eds. 1999. *Archaeology and folklore*. London: Routledge.
Gonzolez-Ruibal, A., A. Gonzalez, and F. Criado-Boado. 2018. Against reactionary populism: Toward a new public archaeology. *Antiquity* 92 (362): 507–527.
Handler, R. 1988. *Nationalism and the politics of culture in Quebec*. Madison: University of Wisconsin Press.
Himilakis, Y. 2009. What is archaeological ethnography? *Public Archaeology* 8: 2–3.
Hodder, I. 1986. *Reading the past*. Cambridge, UK: Cambridge University Press.
Holtorf, C. 2009. A European perspective on indigenous and immigrant archaeologies. *World Archaeology* 41: 4.
Jones, S. 2004. *Early medieval sculpture and the production of meaning, value and place*. Edinburgh: Historic Scotland.
Jones, S. 2017. Wrestling with the social value of heritage: Problems, dilemmas and opportunities. *Journal of Community Archaeology and Heritage* 4 (1): 21–37.
Lafrenz Samuels, K., A. Markham, E. Osipova, and A. Caldas. 2016. *World heritage and tourism in a changing climate*. United Nations Environment Programme, Nairobi, Kenya and United Nations Educational, Scientific and Cultural Organization.
Lane, P. 2015. Archaeology in the age of the Anthropocene: A critical assessment of its scope and societal contributions. *Journal of Field Archaeology* 40 (5): 485–498.
Narkunas, J.P. 2007. Utilitarian humanism: Culture in the service of regulating 'we other humans'. *Theory and Event* 10: 3.
Rowlands, M. 1998. The archaeology of colonialism. In *Social transformations in archaeology: Global and local perspectives*, ed. K. Kristiansen and M. Rowlands, 327–333. New York: Routledge.
Samuels, K. 2008. Value and significance in archaeology. *Archaeological Dialogues* 18: 1.
Trigger, B. 2006. *A history of archaeological thought*. Cambridge, UK: Cambridge University Press.

Further Readings

McClanahan, A. 2007. The cult of community: Defining the 'Local' in archaeology and heritage discourse. In *Which Past, Whose Future?* BAR International Series 1633. Oxford: Archaeopress.
Muke, J., T. Denham, and V. Genorupa. 2007. Nominating and managing a world heritage site in the highlands of Papua New Guinea. *World Archaeology* 39: 324–338.
Smith, L., and E. Waterton. 2009. *Heritage, communities and archaeology*. London: Duckworth.
Waterton, E., and L. Smith. 2010. The recognition and misrecognition of community heritage. *International Journal of Heritage Studies* 1: 2.

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Basic Biographical Information

William (Bill) Logan completed a doctorate in 1981 in the field of urban geography with a thesis focused on the politics of housing, planning, and heritage conservation in inner Melbourne. He has long been on the faculty of Deakin University in Melbourne, Australia, where he has held numerous senior administrative positions including Dean as well as Research Director in the Faculty of Arts (1993–1998). He was awarded the Deakin University Researcher of the Year Award in 2002 and was made an Alfred Deakin Professor in 2004 for his contribution to the university's research profile. His research record includes numerous Australian Research Council and other grants.

Major Accomplishments

Dr. Logan has been involved in cultural heritage conservation since the early 1970s when he took part in the resident action movement in inner Melbourne. He has been engaged in teaching, research, and consulting on Australian and Asian heritage issues since then. He holds the UNESCO Chair of Heritage and Urbanism in the School of Humanities and Social Sciences.

Since 1986, Dr. Logan has been an International Expert for the UNESCO Division of Cultural Heritage in Paris, where his work has mainly been related to UNESCO's international campaigns to safeguard world cultural heritage sites in Pakistan, Sri Lanka, Bangladesh, Nepal, China, and Vietnam. He has also acted for the UNESCO World Heritage Centre at international meetings of experts in Vietnam, Indonesia, and Korea and has contributed to its "State of the World Heritage" Report (2005).

He is a member of Australia ICOMOS and was its president from 1999 to 2002. He has

represented ICOMOS at international meetings in Japan and Korea. He has been a consultant to AusAID, the Australian Heritage Commission and Department of the Environment and Heritage, and the Victorian Department of Infrastructure, and he is a member of AusHeritage (including Board Member, 1998–1999).

He is a member of the Heritage Council of Victoria and fellow of the Academy of Social Sciences in Australia. His involvement with international and national heritage bodies directly led to course innovations and research activities at Deakin University. Professor Logan introduced two courses in Vietnamese history and culture and instigated the development of an Asian Studies major. He led the establishment of the Cultural Heritage postgraduate program at Deakin in 2000. He is the immediately former Director of CHCAP/Cultural Heritage Centre for Asia and the Pacific, a research and training center that has UNESCO endorsement.

His research interests include World Heritage, heritage and human rights, heritage education and training, the heritage of war, heritage theory, and Asian heritage, especially of Vietnam. In addition to books, some of which appear below, Dr. Logan also has many articles in refereed and professional journals, as well as conference papers. His book, *Hanoi, Biography of a City* (2000), won the International Planning History Society Book Prize in 2002 and was republished in Vietnamese translation in Hanoi in 2010 as part of the city's millennial celebrations.

In addition to establishing heritage programs in several Victorian universities, he helped develop postgraduate heritage courses at Silpakorn University in Bangkok and the University of Santo Tomas in Manila. He has been member of the international advisory boards of the Academy of Irish Cultural Heritages at the University of Ulster, in the UK, and the Centre for Cultural Heritage Studies at the Chinese University of Hong Kong. He is a member of the editorial boards of Spatial Habitus, he is co-editor of the Routledge 'Key Issues in Cultural Heritage' book series and a series of monographs published by the University of Hawaii Press and the China Institute in America, NY; *International Journal of Heritage Studies*; and *Historic Environment*, the journal of Australia ICOMOS.

Professor Logan was an invited expert at the Consultative Meeting on Cultural Rights at the UN Human Rights Commission, Geneva, in February 2011 where he also addressed the Human Rights Council. He gave the keynote presentation at the 'Our Common Dignity: Towards Rights-Based World Heritage Management' seminar conducted by Norway ICOMOS, the Norwegian Centre for Human Rights and the Norwegian Helsinki Committee in March 2011 and in May 2012 he played a lead role in an interregional conference on 'Living with World Heritage' hosted by the Norwegian Ministry of Environment in Røros, also in Norway.

Cross-References

- ▶ Australia: Cultural Heritage Management Education
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Cultural Heritage and Communities
- ▶ Heritage and Higher Education
- ▶ Intangible Cultural Heritage
- ▶ UNESCO World Heritage Convention (1972)
- ▶ Urban Heritage
- ▶ World Heritage and Human Rights

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References

Logan, W.S. 2000. *Hanoi, biography of a city*. Sydney/Seattle: University of NSW Press/University of Washington Press.

Further Reading

Askew, M., W.S. Logan, and C. Long. 2007. *Vientiane: Transformations of a Lao landscape*. London: Routledge.

Di Giovine, M.A. 2009. *The heritage-scape: UNESCO, world heritage, and tourism*. Lanham: Lexington Books.

Harrison, R. 2013. *Heritage. Critical approaches*. London: Routledge.

Labadi, S., and C. Long, eds. 2010. *Heritage and globalisation*. Abingdon: Routledge.

Langfield, M., W. Logan, and M.N. Craith, eds. 2010. *Cultural diversity, heritage and human rights*. London: Routledge.

Leask, A., and A. Fyall. 2006. *Managing world heritage sites*. Amsterdam: BH/Elsevier.
Logan, W.S. 2002. *The disappearing "Asian" city: Protecting Asia's urban heritage in a globalizing world*. Oxford: Oxford University Press.
McKercher, B., and H. Du Cros, eds. 2002. *Cultural tourism: The partnership between tourism and cultural heritage management*. Binghamton: The Haworth Press, Inc.
Smith, L. 2006. *Uses of heritage*. New York: Routledge.
Smith, L., and N. Akagawa, eds. 2009. *Intangible heritage*. New York: Routledge.
Timothy, D.J., and S.W. Boyd. 2003. *Heritage tourism*. Harlow: Prentice-Hall.

Looting and Vandalism (Cultural Heritage Management)

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Introduction and Definition

The looting of archaeological sites is today one of the major threats to the world's cultural heritage, second only to the intensification of agriculture and to urban development. Looting in this context may be defined as the unrecorded destruction of archaeological sites in order to provide artifacts for sale on the illicit market for antiquities. What is shocking is that it derives, in some senses, from the recognition of the value of these tangible components of the cultural heritage. But instead of encouraging the careful preservation of their context of discovery, the price that such collectibles can command leads to clandestine excavation and the sale of "unprovenanced" antiquities. Their true value, of course, lies in what, when properly understood in their context of discovery and fully published by competent researchers, they can tell us about the shared past of humankind. Their commercial value is what they can command on the market, sold by unscrupulous middlemen and dealers to unquestioning private collectors. What is particularly shocking is that some of the great museums of the world continue, to this day, to accept gifts or even to purchase "unprovenanced" antiquities (Gill 2011) which derive, often via auction houses like Bonham's in London (see Bonhams 2006) or Sotheby's in New York (Watson 1997), from the illicit trade.

Key Issues/Current Debates/Future Directions/Examples

It should be acknowledged that the collection of antiquities by the scholars of the Renaissance was the starting point for the princely collections of Italy and beyond which gave birth to the first great museums of the world before the discipline of archaeology came of age in the nineteenth century. Until the techniques of stratigraphic excavation and professional publication were developed by pioneers such as General Pitt Rivers or Flinders Petrie, the antiquities themselves were the prize rather than the information which controlled excavation can provide. But by the time that the Archaeological Survey of India was established in 1861, the importance of cultural heritage management was widely realized. From then on, looting and archaeological research could be separated clearly. From then on, the great museums, and increasingly the universities, led expeditions which laid the foundations for world archaeology, albeit at that time in a colonialist or imperialist mode. It was not until after the Second World War that UNESCO (the United Nations Educational Scientific and Cultural Organization, established in 1945) passed its 1970 *Convention on the Means of Prohibiting and Preventing the Illicit Import Export and Transfer of Ownership of Cultural Property* (reprinted in Askerud and Clément 1997). This proved a turning point. For although it requires ratification by participating nations to have legal effect, the individual national enactments do usually have significant consequences, such as the United Kingdom's *Dealing in Cultural*

Objects (Offences) Act of 2003, which supports and extends the 1996 *Treasure Act* for England and Wales. The ratification of the 1970 UNESCO Convention by the United States of America and by Switzerland likewise brought important national legislation in each case (Gerstenblith 2003).

Despite these legal provisions, the looting of antiquities, which is illegal under most national legislations, continues unabated, and the looters are locally recognized by their own occupational names: *clandestini* in Italy, *archaiokapiloi* in Greece, and *huaqueros* in Peru. The problem is internationally recognized (O'Keefe 1997; Brodie et al. 2001; Brodie and Tubb 2002), but many national and regional governments find it difficult to control, and national agencies (for instance, the Red Army in China) are sometimes complicit. The reality is that illicit excavation – i.e., looting – is difficult to control in the field.

If the supply end is difficult to restrain, the consumption – by dealers, collectors, and museums – ought to be easier to regulate, at least when the looted antiquities turn up as "unprovenanced" items in auction houses and museums. In reality the world's museums have been slow in learning to undertake proper "due diligence" (Brodie and Renfrew 2005). The University Museum of Pennsylvania in Philadelphia in 1970 was one of the first (Renfrew 2000: 118), and the British Museum in 1998 was the first of the great museums explicitly to formulate the "1970 Rule": "Wherever possible the Trustees will only acquire those objects which have documentation to show that they were exported from their country of origin before 1970" (Renfrew 2000: 125). The merit of this formulation is that it places upon the vendor or donor to the museum the onus of proving the lawful excavation and export of the antiquity in question and thus excludes the acquisition (even by gift or bequest) of those dubious "unprovenanced" antiquities which have so often proved to be the product of looting (Brodie and Renfrew 2005). After the scandals in various museums in the United States, as noted below, a strong version of the "1970 Rule" in their new acquisition policy was approved and published by the Trustees of the J. Paul Getty Museum in Los Angeles in 2007. Significantly the 1970 Rule was also adopted by the Association of Art Museum Directors of the USA in 2007 and by the Metropolitan Museum of New York after the retirement of the Director, Philippe de Montebello, in 2008.

These important decisions in the USA might not have come about had it not been for the diligence and persistence of the Italian Carabinieri Art Squad in pursuing looted antiquities and their cooperation with the Swiss authorities in seizing in 1995 the contents at the free port in Geneva of the warehouse of the Italian dealer Giacomo Medici (Watson and Todeschini 2006). The looted antiquities and the documentation then recovered ultimately persuaded the Metropolitan Museum that the notorious Euphronios vase (an Attic red-figure crater painted and signed by the vase painter Euphronios), purchased in dubious circumstances in 1972, should be returned to Italy (Silver 2009). Although the return was at first strongly resisted by the Museum's Director, Philippe de Montebello, he was constrained to agree to the restitution in 2008. The Italian authorities also initiated the prosecution of the Curator of Antiquities at the Getty Museum, Marion True, a prosecution which was allowed to lapse with the return to Italy of a number of antiquities including a remarkable marble sculpture of griffins, now known to come from Ascoli in southern Italy and to date from the fourth century BCE (Bottoni and Setari 2009; Renfrew 2010).

The last two decades have brought many scandals to light involving scholars, collectors, and illicit antiquities, sometimes with the attempted suppression of the evidence. One notable example was the attempt by University College London in conjunction with the Norwegian collector, Martin Schøyen (2005), to suppress the report which it had itself commissioned into his loan of a major group of Aramaic incantation bowls, very

possibly looted from Iraq (Balter 2007). It may be that the spirit of the 1970 UNESCO Convention will yet prevail. But the prices of "unprovenanced" antiquities continue to rise on the open market. At present there is no doubt that the looting continues unabated.

Vandalism has a different motivation from the avarice which drives looting. In times of war, it is not uncommon for conflicting powers to seek to demoralize the enemy by laying waste to their cultural heritage. That has been true from biblical times, or indeed before, from the destruction of heathen images down to the "Baedeker" raids of the Second World War, named after the series of travelers' guidebooks to the artistic treasures of nations. Taking its name from the Vandals who, as legend has it, laid waste to Ancient Rome, it has its modern equivalent in religious as well as ethnic bigotry. The destruction of the bridge at Mostar in Croatia in 1993 (Renfrew and Bahn 2008: 550) was the work of Croatian nationalists in the ethnic conflicts which convulsed the former Yugoslavia. The demolition by dynamite of the great figure of the Buddha at Bamiyan in Afghanistan in 2001 was all the more shocking as the work of the Taliban (Renfrew and Bahn 2008: 547) who, as the effective government at that time, had overall responsibility for the protection of the nation's heritage.

These are among the most flagrant recent examples. It is sad that religious divisions continue to result in damage to the cultural heritage. Looting, however, for financial gain, results in more widespread damage in nearly every part of the world. Fortunately it is to some extent countered by modern tourism which increasingly focuses upon cultural history. Governments which previously neglected the cultural heritage now see the benefits of a program of protection and conservation which encourages the tourist industry. Yet some of the world's major museums, like the Miho Museum in Japan or the Metropolitan Museum of Art in New York, continue to exhibit unprovenanced antiquities which have become known since the year of the 1970 UNESCO Convention. As long as they continue to do so, the incentives for the looters will be obvious.

Cross-References

- ▶ UNESCO (1972) and Malta (1992) Conventions
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Balter, M. 2007. University suppresses report on provenance of Iraqi antiquities. *Science* 318: 554–555.

Bonhams. 2006. *The Sevso treasure, a private exhibition*. London: Bonhams.

Bottoni, A., and E. Setari, eds. 2009. *I marmi dipinti di Ascoli Satriano*. Rome: Ministero per I Beni e le Attività Culturali.

Brodie, N., and C. Renfrew. 2005. Looting and the world's archaeological heritage, the inadequate response. *Annual Review of Anthropology* 34: 343–361.

Brodie, N., and K.W. Tubb, eds. 2002. *Illicit antiquities, the theft of culture and the extinction of archaeology*. London: Routledge.

Brodie, N., J. Doole, and C. Renfrew, eds. 2001. *Trade in illicit antiquities: The destruction of the world's archaeological heritage*. Cambridge: McDonald Institute for Archaeological Research.

Gerstenblith, P. 2003. The Clain/Schultz doctrine: Another step against the trade in stolen antiquities. *Culture Without Context* 13: 5–8.

Gill, D. 2011. Due diligence and auction houses. www.davidgill.co.uk/looting/default/html.

O'Keefe, P. 1997. *Trade in antiquities. Reducing destruction and theft*. Paris: UNESCO.

Renfrew, C. 2000. *Loot, legitimacy and ownership*. London: Duckworth.

Renfrew, C. 2010. Combating the illicit antiquities trade: Progress and problems. In *International meeting on illicit traffic of cultural property*, ed. J. Papadopoulos and E. Proietti. Rome: Gangemi Editore.

Renfrew, C., and P. Bahn. 2008. *Archaeology, theory methods and practice*. 5th ed. London: Thames & Hudson.

Schøyen. 2005. An inquiry into the provenance of 654 incantation bowls delivered into the custody of UCL by or on the authority of Mr Martin Schøyen by D. Freeman, S. MacDonald and C. Renfrew. Inquiry established by the Provost of UCL on 14th February 2005. [Published by Wikileaks 2009: see 'Schøyen'. Available in the House of Lords Library, London].

Silver, V. 2009. *The lost chalice*. New York: Harper Collins.

Watson, P. 1997. *Sotheby's, the inside story*. NewYork: Random House.

Watson, P., and C. Todeschini. 2006. *The Medici conspiracy, the illicit journey of looted antiquities*. New York: Public Affairs.

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Basic Biographical Information

In 1996, the University of London awarded her doctoral degree in archaeology, based on her dissertation, discussing classification issues in the analysis of Maya pottery from northern Belize. She completed her undergraduate studies at the Escuela Nacional de Antropología e Historia in 1987 and obtained a Master of Arts in Archaeology at the Institute of Archaeology of the University College London, in 1989. The Alexander von Humboldt Foundation awarded her a postdoctoral grant at the University of Bonn in 1996, where she specialized in archaeological sciences, bringing together scientists from the Max Planck, the Freie Universität Berlin, and Leiden University to characterize Maya pottery from the site of K'axob in Belize (McAnany and López Varela 1999; López Varela et al. 2001; López Varela et al. 2002; López Varela 2004). Since 2013, Sandra L. López Varela is a professor at the Faculty of Philosophy and Literature of the Universidad Nacional Autónoma de Mexico.

Major Accomplishments

Her current research studies concentrate on the analysis of social development policies and institutional economics to combat poverty, an interest that developed from her ethnoarchaeological studies of griddle making at Cuentepec, in the State of Morelos (López Varela and Dore 2010; López Varela 2012a, 2014a). The transdisciplinary and international approach to her research has brought together scientists from apparently unrelated fields to archaeology and to contribute to modern social inquiry, a dialogue that awarded her the "Friedrich Wilhelm Bessel Award" from the Alexander von Humboldt Foundation in 2012 (Fig. 1), with the project "Sustaining Heritage in the Future Cities of Development: archaeological analysis of institutional solutions to poverty." Deriving from this innovative project (López Varela 2014c, 2014d), she has developed a mobile application, "Alternative Mexico," available on the iTunes and Android stores, financed by UNAM (López Varela 2015). The project aims to empower and promote local communities' definition of heritage in Mexico's City metropolitan area. Her international

López Varela, Sandra L., Fig. 1 Dr. López Varela, a Humboldt fellow and awardee, has long been at the forefront of promoting international cooperation and collaboration among scientists and scholars to promote the universe of knowledge for world understanding

recognition to advance our knowledge of the past was recognized with her holding the Archaeology Seat as an Executive Board Member at the American Anthropological Association (2011–2014). She has served as President/Vice president of the Society for Archaeological Sciences (2009–2011) and as Treasurer of the Sociedad Mexicana de Antropología (2015–2017). Since 2005, Dr. López Varela is a Registered Professional Archaeologist (RPA 15480) and a member of the Mexican Academy of Sciences, Arts, Technology, and Humanities since 2009.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Cultural Heritage Management and Poverty
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Heritage and Public Policy
- ▶ Heritage and Society
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Mesoamerica: Complex Society Development
- ▶ Technological Studies in Archaeological Science

References

López Varela, S.L. 2004. Ceramic History of K'axob, The Early Years. In *K'axob: Ritual, Work, and Family in an Ancient Maya Village*, ed. P.A. McAnany, 169–191. Los Angeles: Cotsen Institute of Archaeology at UCLA.

López Varela, S.L. 2012a. Arqueología de la Memoria: la producción del comal como un elemento mnemónico del combate a la pobreza. In *Culturas de la memoria: Teoría, historia y praxis simbólica*, ed. F. Schmidt-Welle. México, D.F.: Siglo XXI Editores.

López Varela, S.L. 2014a. *Social Dynamics of Ceramic Analysis: New Techniques and Interpretations, Papers in Honour of Charles C. Kolb*. BAR S2683. Oxford: Archaeopress.

López Varela, S.L. 2014b. Sustainable heritage in Mexico: Archaeological solutions for infrastructure planning and building. *Open Journal of Archaeometry* 2: 73–76.

López Varela, S.L. 2014c. Teaching Heritage Business and Marketing, a Solution for Heritage Preservation. *Advances in Archaeological Practice* 2(2):80–90.

López Varela, S.L. 2014d. Archaeometry teaching heritage business and marketing: A solution for heritage preservation. *Advances in Archaeological Practice: A Journal of the Society for American Archaeology* 2: 73–76.

López Varela, S.L. 2015. La experiencia del espacio histórico a partir de la World Wide Web: los ideales institucionales frente a la memoria social. In *World Wide Web y la formación de la subjetividad*, ed. A. Constante and R. Chaverry Soto, 69–88. México: Afinita Editorial, Universidad Nacional Autónoma de México.

López Varela, S.L., and C.D. Dore. 2010. Innovations in the chemical analysis of activity areas. *Journal of Archaeological Method and Theory*, 17(2).

López Varela, S.L., P.A. McAnany, and K.A. Berry. 2001. Ceramics technology at late classic K'axob, Belize. *Journal of Field Archaeology* 28 (1–2): 177–191.

López Varela, S., A. Van Gijn, and L. Jacobs. 2002. De-mystifying pottery production in the Maya lowlands: Detection of traces of use-wear on pottery sherds through microscopic analysis and experimental replication. *Journal of Archaeological Science* 29: 1133–1147.

McAnany, P.A., and S.L. López Varela. 1999. Recreating the Formative Maya Village of K'axob Chronology, Ceramic Complexes and Ancestors in Architectural Context. *Ancient Mesoamerica* 10: 147–168.

Loring, Stephen

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Basic Biographical Information

Stephen Loring was born on October 15, 1950, in Concord, Massachusetts (with his twin David), as the oldest of six children, to Victoria Harrington and Charles G. Loring. Growing up alongside the Concord and Assabet Rivers, he spent much of his spare time emulating the philosopher, naturalist, and antiquarian Henry David Thoreau, by exploring his natural surroundings, searching for artifacts, learning about lore and history in the town's library, and catching turtles and taming raccoons. Completing high school in 1968, he went for an undergraduate degree in anthropology at Goddard College in Plainfield, Vermont, graduating in 1973. That college allowed Loring to focus his interests on archaeology, with an internship at

Harvard's Peabody Museum of Archaeology and Ethnology, fieldwork in Guatemala and Arkansas, and independent research on older New England artifact collections, particularly from Vermont. Loring's 261-page senior thesis *An Appraisal of Vermont Archaeology* was the first synthesis of northern New England prehistory using neglected avocational, museum, and historical society collections.

Between 1971 and 1974, with summers with the Arkansas Archaeological Survey in the American Southeast and falls in the Cree country along James Bay in northern Quebec, Canada, Loring realized his true calling was the northern sub-Arctic and Arctic. He was drawn there by the opportunity to learn in an unbookish way about the life of northern hunters. He befriended a number of Cree families who introduced him to their style of living and their lands and the serious problems they were facing in the path of gigantic hydroelectric schemes. That interaction taught Loring much more directly, intensively, and sensitively about the people, past and present, than the learned tomes of anthropologists had done until then. If he were to work there as an archaeologist, he better articulate archaeology with the real-life problems of northern Native communities.

His experience in the Boreal forest and his interest in the Native history of the "Far Northeast" brought him to the attention of Bill Fitzhugh (Smithsonian Institution) who hired him in 1975 to join the archaeological and ethnohistorical survey of the Labrador coast he was directing. Infatuated by the knowledge, skills, and wisdom of many of the elders Loring got to know, he ended up focusing on pre- and post-contact Native history. Bill Fitzhugh encouraged Loring to go on for graduate training. As an erstwhile New England archaeologist, seeing no clear cultural or logical boundaries between New England and its Labradorian far Northeast, he entered graduate school in 1977 at the University of Massachusetts, with the New England archaeologist Prof. Dena Dincauze, obtaining his MA in 1981. While working on his doctoral dissertation, Loring also worked as administrator of the Arctic Studies Program at Middlebury College (1983/1984) and as instructor in the Anthropology Department of the University of South Carolina (1984–1990), interrupted by fieldwork in New England, Argentina, Labrador, and Alaska. He completed his doctoral thesis in 1992 (*Princes and Princesses of Ragged Fame: Innu (Naskapi) Archaeology and Ethnohistory in Labrador*), with Dincauze as chair.

In 1991, Loring was hired as museum anthropologist and Arctic archaeologist with the Arctic Studies Program of the Department of Anthropology at the Smithsonian's National Museum of Natural History in Washington, DC, a position he has occupied since then. At the Smithsonian, he helps curate the archaeological and ethnological collections from all across the North American Arctic. Throughout that region, he regularly carries out ethnohistoric, archaeological, and archival research and curates and consults about exhibits that deal with or touch upon it. He is the human interface between the ethnographic and archaeological collections of the Smithsonian and the descendants of the people whose artifacts and archives the Institution curates. Loring has covered this topical area with more than 70 presentations at professional meetings, the organization of a large number of professional symposia, about 70 publications, and numerous grants and contracts. He is very active in professional associations and in the various contexts in which professionals can assist the populations they publish about dealing with the serious problems they are facing today.

Since 1981, Loring has been married to Prof. Joan Gero (emerita, Department of Anthropology, American University, Washington, DC, 1944–2016). Before Joan Gero's untimely death in 2016, Loring and Gero were considered by many of their colleagues as a model to emulate for their commitment to exert a positive influence on the profession and its relations to its subjects and to do battle for progressive causes in the discipline. In recognition, the two of them were jointly honored in 2013 with the Lifetime Achievement Award of the World Archaeological Congress. Loring resides in Silver Springs, Maryland.

Major Accomplishments

Loring has translated more than 40 years of interacting with northern community members in general, and the Innu and Inuit communities of Labrador specifically, into a pioneering project that has become known as community archaeology. It is based on the realization of the horrific conditions that Arctic communities have to deal with on a daily basis, including the disintegration of traditional social structures; loss of, or alienation from, traditional knowledges; outside encroachment on their traditional land and resources; glaring health and educational iniquities; and destructive rates of alcoholism and suicide, among others. For the archaeologist (and other scientists), this requires first to learn from the community members about their problems and, then, to develop with them a praxis that helps to remediate these problems.

Loring has been trendsetting in helping northern communities to reconnect with their material patrimony and archival data curated at the Smithsonian Institution, to facilitate the repatriation of knowledge and materials to descendant communities (and the archival safeguarding of that patrimony), and to honor the custodians of traditional knowledge, by having them teach others with the help of this material patrimony (including the archaeologists). In the field, Loring has rethought archaeological field "schools" by sponsoring young community members to spend time on their traditional lands, to give them the opportunity to interact with their elders on their knowledge, to strengthen their connection to community history and environment, to give them positive educational experiences, and to encourage them to become self-propelled learners about their community and its place in nature and history. In Loring's community archaeology, it is the community benefit that drives what is done with the cultural patrimony, not the research interests of the (usually noncommunity) archaeologists. That long-time commitment to community archaeology, of course, also makes Loring a forerunner, model, and frequent contributor to indigenous archaeology worldwide. In addition, he has been an important spokesperson on the side of Native groups, in defense of their cultural patrimony, as, for example, in the Kennewick case.

Loring, Stephen, Fig. 1 Stephen Loring with an arm load of Murre eggs (previously dislodged by a gang of ravens) taken from beneath the rookery on Agattu in the western Aleutians, 1996. (Photograph: *Western Aleutian Archaeology and Paleoecology Project, Arctic Studies Center, Smithsonian Institution*)

Loring's expertise on the Native history of Northern Canada and the American Arctic is widely acknowledged. He controls northern technologies like few other non-Natives. In addition, Loring has contributed significantly to lithic technology, as, for example, in his publications on the Native history of lithic raw materials and how they relate to social and spiritual process. Finally, he has always remained an important contributor to New England archaeology, including to the archaeology of Concord, Massachusetts, where he spent his early years (Fig. 1). The references provide and select bibliography of his publications since 1997.

Cross-References

- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Cultural Heritage Management and Native Americans
- ▶ Descendant Communities in French Guiana: Amerindians

▶ Gero, Joan
▶ Indigenous Knowledge and Traditional Knowledge
▶ Indigenous Archaeologies
▶ Oral Sources and Oral History
▶ Repatriation Acts: Before NAGPRA
▶ Smithsonian Institution

References

Loring, S. 1997. On the trail to the Caribou House: Some reflections on Innu caribou hunters in Ntessinan (Labrador). In *Caribou and reindeer hunters of the Northern Hemisphere*, ed. L. Jackson and P. Thacker, 185–220. London: Avebury Press.

Loring, S. 1998. Stubborn independence: An essay on the Innu and archaeology. In *Bringing back the past: Historical perspectives on Canadian archaeology*, Mercury Series, Archaeological Survey of Canada, Paper 158, ed. P.J. Smith and D. Mitchell, 259–276. Hull: Canadian Museum of Civilization.

Loring, S. 2002a. Honoring our elders: A history of Eastern Arctic archaeology. In *Contributions to Circumpolar Anthropology, volume 2*, ed. W. Fitzhugh and D. Odess. Washington, DC: Arctic Studies Center, Smithsonian Institution.

Loring, S. 2002b. 'And they took away the stones from Ramah': Lithic raw material sourcing and eastern Arctic archaeology. In *Honoring our elders: A history of eastern Arctic archaeology*, Contributions to Circumpolar Anthropology, ed. W. Fitzhugh, S. Loring, and D. Odess, vol. 2, 163–185. Washington, DC: Arctic Studies Center, Smithsonian Institution. 2005.

Loring, S. 2005. *Anguti's amulet/Angutiup ânguanga (with L. Rosenmeier)*. Truro: Eastern Woodland Publishing, Millbrook First Nation. (awarded Public Communications Award, Canadian Archaeological Association; and Manning Award for Excellence (National Category), Historic Resources Association of Newfoundland-Labrador, St. John's, Newfoundland).

Loring, S. 2008. The wind blows everything off the ground: New provisions and new directions in archaeological research in the north. In *Opening archaeology: Repatriation's impact on contemporary research and practice*, ed. T. Killion, 181–194. Santa Fe: School for Advanced Research.

Loring, S. 2009. From tent to trading post and back again: Smithsonian anthropology in Nunavut, Nunavik, Nitassinan, and Nunatsiavut – The changing IPY agenda, 1882–2007. In *Smithsonian at the poles: Contributions to international polar science*, ed. I. Krupnik, M.A. Lang, and S.E. Miller, 115–128. Washington, DC: Smithsonian Institution Scholarly Press.

Loring, S. 2012. The archaeology of happiness. (with J. Gero). *Archaeologies* 8 (3): 376–402.

Loring, S. 2013a. The Inuvialuit Living History Project: Digital return as the foraging of relationships between institutions, people and data. *Museum Anthropology Review* 7 (1–2): 44–73. (co-authored with K. Hennessy, N. Lyons, C. Arnold, M. Joe, A. Elias and J. Pokiak).

Loring, S. 2013b. Caribou paths and stone hearths: Archaeological fieldwork at Kamestastin, Spring 2012. (co-authored with Chelsee Arbour and Anthony Jenkinson) Provincial Archaeology Office 2012 Archaeological review. Government of Newfoundland and Labrador Department of Tourism. *Culture and Recreation* 11: 7–23.

Loring, S. 2014. An appreciation of "something fiercely desirable". In *Mammals of Ungava and Labrador*, ed. Scott A. Heyes and Kristofer M. Helgen, xxv–xxvi. Washington, DC: Smithsonian Institution Press.

Loring, S. 2015. *Making "luck" by pleasing the Animal Masters: A northern perspective and reflection on portable material culture. (plenary address)*, The Archaeology of Portable Art Symposium. Canberra: The Australian National University.

Lubbock, John

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Basic Biographical Information

John Lubbock was a key figure in the establishment of archaeology as a science and a strong advocate of Spencerian progressivism during the Victorian era. Lubbock was born in 1834, the son of Sir John Lubbock, third baronet, a London banker. He grew up on the family country estate of High Elms near Downe in Kent, England. Serendipitously the estate was adjacent to the home of Charles Darwin. The great naturalist befriended the boy, guided him in studying insects and flora, and benefitted later by Lubbock's membership in a group of younger scientists within the Royal Society, the "X-Club," that proselytized evolution. Lubbock attended Eton to the age of 14. He then joined his father's bank and became a partner at the age of 22.

During the 1860s, Lubbock held a number of influential positions, including President of the

Ethnological Society (1864–1865), Vice-President of the Linnean Society (1865), and President of the International Association for Prehistoric Archaeology (1868). In the 1870s, he held the position of President of the Royal Anthropological Society (1871–1873), as well as the position of Vice-President of the Royal Society (1871). As economic historian Marc Flandreau describes in his 2016 book, Lubbock was simultaneously a leader in the Corporation of Foreign Bondholders, dealing with schemes to exploit resources in weak foreign nations. Lubbock's imprimatur as scientist authority on foreign peoples gave credibility to bonds issued for such schemes, resulting in strengthening British imperial power. Lubbock received honorary degrees from Oxford, Cambridge, Edinburgh, Dublin, and Würzburg in recognition of his scientific contributions.

Lubbock was active in politics, elected Member of Parliament in 1870 on his third attempt. As MP, he succeeded in his greatest claim to fame, the Bank Holidays Act of 1871, providing summer Monday holidays to give working people long weekends. A number of other legislative measures he initiated or espoused similarly benefitted the laboring class. Teaching science in schools was another of his campaigns, part of his enthusiasm for the idea that humans progress from savagery (ruled by superstition) to civilization enlightened by rational thinking freed from metaphysics. Darwin was his mentor in scientific work, especially entomology, but Herbert Spencer's mystical faith in progress is more evident in Lubbock's books than Darwin's doggedly empirical evolution.

Major Accomplishments

Lubbock's *Pre-historic Times* (1865) is a compendium of several articles he published in *Natural History Review* following trips to view archaeological sites including Swiss "lake dwellings," Danish "kitchen middens," and Boucher de Perthes' Somme gravels. The book was a publisher's effort to profit from the popularity of Daniel Wilson's sold-out *Prehistoric Man* (1862). Wilson, from Edinburgh, was the first to use the term "prehistory" in English, in 1851. He taught that prehistoric archaeology should follow a geology model relying on stratigraphy and comparison of artifacts with contemporary versions viewed alive; for this, he spent summers on Lake Superior canoeing with Ojibwe Indians to observe living hunter-fishers in forests similar to ancient Scotland's. Lubbock, disliking primitive conditions, did not travel outside Europe. Thus, his book relies heavily on secondary sources. In contrast to Wilson's systematic, firsthand survey of primarily American First Nations' architecture and artifacts, respectful of the accomplishments they embody, Lubbock's book begins with a chapter on masterfully crafted bronze weapons and then moves onto stone artifacts, tumuli, the Swiss and Danish Neolithic sites, "Antiquity of Man" (on which Charles Lyell accused him of plagiarism) and "North American Archaeology" (failing to cite passages lifted from Wilson), and finally "Modern Savages," for which he begs readers' understanding that the brutal ugliness depicted cannot be passed over. Two factors made *Pre-historic Times* very successful in England, going into seven editions through 1913. First, the book was promoted by Lubbock's many influential friends in London, whereas Wilson, from a poor Scottish family, lived in Toronto far from Britain's scientific circles. Second, Lubbock wrote with an optimism echoing the spirit of his own Victorian business class, moving into positions of power in industrializing imperial Britain.

Five years later, Lubbock published a sequel, *On the Origin of Civilisation* (1870), expanding upon the Savages section of the earlier book. Its political relevance jumps out in the first sentence: "The study of the lower races of men, apart from the direct importance which it possesses in an empire like ours . . . ." He explains in this opening chapter that vestiges of savage or (next higher) barbarian cultures survive in ritual or folk customs and are, by implication, worth winnowing out. But more important than administrative guidance in the empire or divesting civilization of now-senseless vestiges is the realization that his stage-ordered comparisons of primitives and

barbarians around the world clearly demonstrate that the human race is progressing, not degrading as some theologians held. He claimed that the reason that the lower races have not progressed like the White Man is biological and that adult savages remain remarkably like (civilized) children (p. 522). Understanding this, he says, "might have saved us many national misfortunes, from the loss of Captain Cook down to the Abyssinian war."

Lubbock was a gentleman of science, moneyed enough to travel comfortably in Europe and dine in exclusive clubs. Much more than that, he loved politics and energetically pushed for legislation and organizations that could ameliorate the condition of the British working class and London dwellers in particular (he was on the London County Council). His interest in archaeology culminated in sponsoring the 1882 Ancient Monuments Act, protecting them as national patrimony. A decade earlier he had purchased the huge henge monument Avebury, near Stonehenge, to preserve it from threatened destruction (a village sits in its middle). In 1900, the baronet was raised to the rank of Baron and chose the title Lord Avebury.

Lubbock's piquant eclecticism in his "archaeological" books (really treatises on Spencerian cultural evolution) met a very different mode of archaeology in the practice of Augustus Lane Fox, who took the surname Pitt Rivers upon inheriting a great-uncle's vast estate in the region that includes Stonehenge and Avebury. Pitt Rivers was an Army man meticulous in laying out grid excavations, keeping detailed notes, and logically constructing lines of progressive development in classes of artifacts culled from all over the world (preserved in the Oxford museum bearing his name). Lubbock, widowed, married Pitt Rivers' daughter in 1884. The father-in-law influenced the practice of field archaeology; the son-in-law helped preserve and popularize the archaeological record. Both men believed that archaeological remains illustrate the progress of mankind from bestial origins through an evolutionary force (Spencerian, not Darwinian) to the present pinnacle of educated Englishmen and likely to greater perfection in the future. Both used archaeology didactically, Pitt Rivers welcoming tourists and Lubbock writing books, in the cause of promulgating Spencerian progressivism. In the case of John Lubbock, first Baron Avebury, his indefatigable politicking for liberal social laws and welfare organizations created his real contributions, more significant than the haphazard archaeology in *Pre-historic Times* and the racist aggregation of travelers' stories in *Origin of Civilisation*.

Cross-References

► Heritage: History and Context
► Histories of the Archaeological Discipline: Issues to Consider

References

Lubbock, S.J. 1865. *Pre-historic times: As illustrated by ancient remains, and the manners and customs of modern savages*. London: Williams & Norgate.
Lubbock, S.J. 1870. *The origin of civilisation and the primitive condition of man: Mental and social condition of savages*. London: Longmans, Green.
Wilson, D. 1862. *Prehistoric man: Researches into the origin of civilization in the old and the new world*. London: Macmillan.

Further Reading

Barton, R. 1998. 'Huxley, Lubbock and half a dozen others': Professionals and gentlemen in the formation of the X Club, 1851–1864. *Isis* 89: 410–444.
Barton, R. 2004. Lubbock, Sir John (1834–1914), Lord Avebury. In *The dictionary of nineteenth-century British scientists*, ed. B. Lightman, 1272–1278. Bristol: Thoemmes.
Flandreau, M. 2016. *Anthropologists in the stock exchange: A financial history of Victorian science*. Chicago: University of Chicago Press.
Kehoe, A.B.. 1998. *The land of prehistory: A critical history of American archaeology.* New York: Routledge.
Murray, T. 2009. Illustrating 'savagery': Sir John Lubbock and Ernest Griset. *Antiquity* 83: 488–499.
Patton, M. 2007. *Science, politics and business in the work of Sir John Lubbock*. Aldershot: Ashgate.
Stocking, G.W., Jr. 1987. *Victorian anthropology.* New York: Free Press.
Trigger, B.G. 2006. *A history of archaeology thought*. 2nd ed. Cambridge: Cambridge University Press.

Lucy

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Introduction

Lucy is a famous fossil specimen of the extinct hominin species *Australopithecus afarensis* (Fig. 1) discovered in 1974 at Hadar, Ethiopia, by paleoanthropologist Donald C. Johanson. *A. afarensis* was a small-brained, large-jawed, bipedal hominin that has since been discovered at several other sites in Ethiopia, Kenya, Tanzania, and possibly Chad. The known time range of the species is c. 3.8–3.0 Ma. The discovery of Lucy changed perceptions about the timing and nature of the first appearance of traits that make us human.

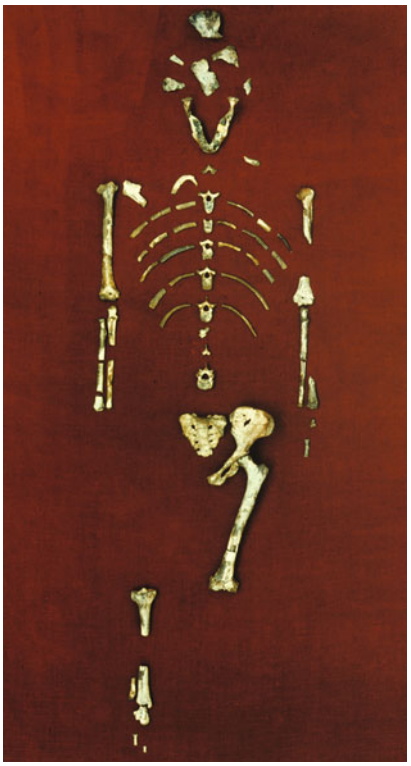

Lucy, Fig. 1 Lucy (A.L. 288-1 partial skeleton). (Image courtesy of the Institute of Human Origins, Arizona State University)

Definition

Lucy is the nickname given to a partial skeleton (A.L. [Afar Locality] 288-1) recovered from the Hadar Formation, central Afar, Ethiopia, and attributed to the species *Australopithecus afarensis*. The skeleton is roughly 40% complete and includes cranial fragments, the mandible, and a large proportion of the postcranial skeleton, including a complete sacrum, complete left pelvic bone, and complete left femur (Johanson et al. 1982a). Lucy is dated to 3.2 Ma ago based on single-crystal $^{40}Ar/^{39}Ar$ analysis (Walter 1994).

Lucy, Fig. 2 Donald C. Johanson excavating Lucy's pelvic bone. (Image courtesy of Donald C. Johanson/Institute of Human Origins, Arizona State University)

Key Issues/Current Debates/Future Directions/Examples

Donald Johanson and Tom Gray discovered Lucy in 1974 (Fig. 2) while surveying near the Kada Hadar tributary of the Awash River as part of the International Afar Research Expedition (IARE). The IARE was formed by Maurice Taieb, Donald Johanson, and Yves Coppens in 1973. Lucy was named after the Beatles' song, "Lucy in the Sky with Diamonds," which played in camp during celebrations the evening of the fossil's discovery (Johanson and Edey 1981). Lucy represents the

most complete of numerous *A. afarensis* individuals recovered from the Hadar Formation. The 1973 IARE field season had yielded hominin lower limb bones with a knee joint consistent with bipedal locomotion (A.L. 128-1).

The discovery of Lucy and other *A. afarensis* specimens recovered on this expedition formed the first significant sample of hominins more than 3 Ma old (Kimbel and Delezene 2009). In addition to confirming that bipedalism evolved in humans before major expansions in brain size (Johanson and Edey 1981), the Hadar discoveries are in part responsible for the recognition that the hominin divergence from extant great apes occurred relatively recently – in the early Pliocene or late Miocene, rather than the middle Miocene – and have provided important insights for understanding the origins of bipedalism, the uniquely human pattern of life history, and hominin dietary adaptations (Kimbel and Delezene 2009).

Lucy's discovery was so remarkable and highly publicized that she quickly became a household name and a key figure in raising awareness about human origins and evolution among the general public.

Lucy had a brain just slightly larger than that of a chimpanzee (less than ~500 c.c.) and was small in stature – standing just over a meter tall – with relatively longer arms than legs. In many respects, Lucy resembled extant great apes. However, unlike extant great apes, Lucy did not have an enlarged, apelike canine honing complex (when the upper canines are sharpened against the lower third premolar) and walked on two legs.

The morphology of the pelvis and lower limb bones reveals that Lucy walked bipedally in a striding gait. For example, the shape of the pelvis allows the hip muscles to control balance of the torso when standing on one leg (as we do when we walk). A prominent patellar lip on Lucy's distal femur keeps the patella (knee cap) from dislocating due to action of the thigh muscles on an inwardly angled femur, which is a unique feature of the human leg.

Paleoanthropologists know that Lucy is female, because of her small size compared to the nearly 400 specimens of *A. afarensis* now known from East Africa.

Lucy had relatively large, thickly enameled, low-cusped premolars and molars, and, generally, these dental features are associated with adaptations to consuming hard objects like seeds and nuts. The robusticity of *A. afarensis'* jaw is also consistent with a hard object diet. However, the frequency and morphology of pits and striations (i.e., dental microwear) on *A. afarensis* molars, including the mandibular molars of Lucy, are quite different from the pattern observed in extant primate hard-object feeders (Grine et al. 2006). These observations are true for *A. afarensis* specimens from different inferred paleohabitats and through time. It is possible that the morphological characteristics of *A. afarensis'* teeth and masticatory apparatus represent adaptations to "fallback foods" – resources of relatively low preference that are used seasonally when preferred foods are unavailable – rather than the preferred and main component of the diet (Grine et al. 2006).

The Hadar Formation is divided into four members, from bottom to top, the Basal, Sidi Hakoma, Denen Dora, and Kada Hadar (Johanson et al. 1982b). Lucy was discovered in the lower levels (KH-1 submember) of the Kada Hadar Member. The sediments Lucy was recovered from lie just above a volcanic tuff named the Kada Hadar Tuff (KHT), which was dated by crystal $^{40}Ar/^{39}Ar$ analysis to ~3.2 Ma (Walter 1994). Sediments near the top of the Kada Hadar Member date to ~3.0 Ma. Within the KH-1 submember, Lucy derives from sandy sediments known as the KH-1 sands that are up to 1 m thick in places and are situated between the KHT and a deposit known as Confetti Clay. The KH-1 sand represents a fluvial (i.e., stream or river) deposit, within a dynamic and cyclical fluvial and lacustrine (i.e., lake) depositional environment (Campisano and Feibel 2007).

Lucy's excellent preservation, which is rare in the early hominin fossil record, may be in part due to the high sedimentation rate at Hadar compared to other East African localities (Campisano and Feibel 2007). There is little evidence for carnivore damage, and the bones do not exhibit weathering prior to fossilization (Johanson et al. 1982b), suggesting that Lucy was deposited and buried

relatively quickly after death, most likely in fine sediments near a water source.

Hadar was a wetter place when Lucy inhabited it than the arid desert it is today. There was a large lake with an extensive system of meandering and braided rivers and streams, which would have supported a mosaic environment with woodlands, shrublands, and grasslands, and a diverse mammalian population including pigs, hippos, and antelopes. The environment was not static, however. Paleoenvironmental reconstructions based on paleontological indicators show that the Hadar habitat fluctuated between more open, arid, grassy conditions and more closed, wetter, wooded conditions (Reed 2008). The Kada Hadar Member from which Lucy was recovered yields the highest number of ungulates, suggestive of a more arid environment than earlier in the Pliocene. As a species, *A. afarensis* appears to have inhabited a variety of habitats, and persisted through periods of dramatic climate change, suggesting that the species was adaptively flexible and able to tolerate a wide range of ecological conditions (Reed 2008).

While there is consensus that Lucy did walk bipedally, there is debate about the relative importance of bipedalism and tree climbing within her locomotor repertoire (Ward 2002). Some of the apelike features of *A. afarensis*, such as relatively longer forelimbs than hindlimbs and longer curved phalanges, are generally interpreted in one of two ways. First, these traits may represent retained primitive features that did not play a significant functional role in locomotion and were retained as vestigial traits rather than being favored by selection. Alternatively, these traits may have played a significant functional role and were subject to stabilizing selection because they enhanced the tree climbing ability of *A. afarensis*.

In primates, the degree of dimorphism between males and females is related to intrasexual competition and social behavior. Generally, taxa with frequent and intense male-male competition show increased male body and maxillary canine size compared to females, and monogamous and polyandrous taxa show less difference between males and females. *A. afarensis* shows a high degree of body size dimorphism, consistent with intense male-male competition, but a low degree of canine size dimorphism, consistent with monogamy or polyandry (Plavcan and van Schaik 1997). There are no extant analogs among primates for this pattern of sexual dimorphism, making it difficult to establish the nature of *A. afarensis* social behavior and how it may have differed from earlier and later hominins.

Intentionally manufactured stone tools are not known in the archaeological record until 2.6 Ma, after the last known occurrence of *A. afarensis*. Generally, the origins of the first known stone tool industry – the Oldowan – are associated with *Homo habilis*. However, 3.4-Ma-old fossil animal bones from the site of Dikika, across the river from Hadar, appear to exhibit deliberate cutmarks (McPherron et al. 2010). This finding suggests that *A. afarensis* might have used unmodified stone tools with naturally sharp edges to process animal remains.

Lucy's partial skeleton is usually housed at the National Museum of Ethiopia in Addis Ababa. In 2007, the original specimen began touring across the United States as part of an exhibit called "Lucy's Legacy: The Hidden Treasures of Ethiopia." The tour is controversial because some paleoanthropologists were concerned about loss and damage, protesting the transport of the irreplaceable fossil (Gibbons 2006).

Cross-References

- ▶ African Stone Age
- ▶ Australopithecines
- ▶ Hominids, Earliest African
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ *Homo habilis*
- ▶ Human Evolution: Theory and Progress
- ▶ Oldowan Industrial Complex

References

Campisano, C.J., and C.S. Feibel. 2007. Connecting local environmental sequences to global climate patterns: Evidence from the hominin-bearing Hadar Formation, Ethiopia. *Journal of Human Evolution* 53: 515–527.

Gibbons, A. 2006. Lucy's tour abroad sparks protests. *Science* 314: 574–575.

Grine, F.E., P.S. Ungar, M.F. Teaford, and S. El-Zaatari. 2006. Molar microwear in *Praeanthropus afarensis*: Evidence for dietary stasis through time and under diverse paleoecological conditions. *Journal of Human Evolution* 51: 297–319.
Johanson, D.C., and M.A. Edey. 1981. *Lucy: The beginnings of humankind*. New York: Simon and Schuster.
Johanson, D.C., C.O. Lovejoy, W.H. Kimbel, T.D. White, S.C. Ward, M.E. Bush, B.M. Latimer, and Y. Coppens. 1982a. Morphology of the Pliocene partial hominid skeleton (A.L. 288-1) from the Hadar formation, Ethiopia. *American Journal of Physical Anthropology* 57: 403–451.
Johanson, D.C., M. Taieb, and Y. Coppens. 1982b. Pliocene hominids from the Hadar formation, Ethiopia (1973–1977): Stratigraphic, chronologic, and paleoenvironmental contexts, with notes on hominid morphology and systematics. *American Journal of Physical Anthropology* 57: 373–402.
Kimbel, W.H., and L.K. Delezene. 2009. "Lucy" redux: A review of research on *Australopithecus afarensis*. *American Journal of Physical Anthropology* 140: 2–48.
McPherron, S.P., Z. Alemseged, C.W. Marean, J.G. Wynn, D. Reed, D. Geraads, R. Bobe, and H.A. Bearat. 2010. Evidence for stone-tool-assisted consumption of animal tissues before 3.39 million years ago at Dikika, Ethiopia. *Nature* 466: 857–860.
Plavcan, J.M., and C.P. van Schaik. 1997. Interpreting hominid behavior on the basis of sexual dimorphism. *Journal of Human Evolution* 32: 345–374.
Reed, K.E. 2008. Paleoecological patterns at the Hadar hominin site, Afar Regional State, Ethiopia. *Journal of Human Evolution* 54: 743–768.
Walter, R.C. 1994. Age of Lucy and the first family: Single-crystal 40Ar/39Ar dating of the Denen Dora and lower Kada Hadar members of the Hadar Formation, Ethiopia. *Geology* 22: 6–10.
Ward, C.V. 2002. Interpreting the posture and locomotion of Australopithecus afarensis: Where do we stand? *American Journal of Physical Anthropology* 119: 185–215.

Lull, Vicente

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Basic Biographical Information

Vicente Lull (La Plata, Argentina, 1949) is Professor of Prehistory at the Autonomous University of Barcelona (Spain), where he teaches since 1980; he is also supervisor of the research group in Mediterranean Social Archaeoecology (ASOME). His academic training was at the University of Barcelona, where he submitted his PhD dissertation on the Bronze Age of *El Argar*. Joan Maluquer de Motes was the dissertation supervisor (1980). Since the 1970s, he has conducted a large number research projects on the Prehistory of southeastern Iberia and the Balearic Islands, in addition to making fundamental contributions in key fields of archaeological theory and method.

Major Accomplishments

Lull is a key figure in the theoretical and methodological renewal of archaeological research in Spain and one of the main advocators of historical materialism implementation in Western Mediterranean Late Prehistory research. His reference work on *El Argar* (Lull 1983), one of the most important archaeological entities of the European Early Bronze Age, is the most cited book on the Iberian Bronze Age. It marked a rupture with the historically and culturally dominant perspectives, characterized by an archival orientation in the study of the archaeological record and skepticism regarding the possibility of knowing prehistoric social organizations. He applied Marxist categories of historical analysis ("means of production", "relations of production", "surplus", "exploitation", among others) and statistical analysis and offered a proposal of socioeconomic and political organization that still marks out the research agenda.

Lull's break with traditional archaeology also kept distance to the late, yet enthusiastic, adoption of Anglo-Saxon processual approaches in Spain. The effort in the proposal of a methodology grounded on an explicit theoretical framework was translated, on the one hand, into an excavation and record system based on set theory (Gasull et al. 1984) and an original definition of archaeological objects and their expression dimensions (Lull 1988) and, on the other, in a social theory around the Marxist concept of "production of

social life" expressed empirically in social practices (Castro et al. 1996a, 2001).

The research on the society of El Argar also led to a critical alternative to the "archaeology of death" and its claim to evaluate levels of "sociopolitical complexity." This approach faced a dilemma when determining the *value* of the objects deposited as grave goods: either to impose our current value scale or to face a controversial quantification of the energy expenditure concept derived from the production and distribution costs of each object. Given these unsatisfactory solutions, he set out to investigate the social value of the objects in their specific social and historical background, according to a criterion that the most valuable objects would be the scarcest in the studied sample, but, at the same time, documented in the individual tombs with more grave goods (Lull and Estévez 1986). The results of the quantitative analysis led to characterize El Argar as a class society politically articulated as a state in the Marxist definition, that is, a political organization at the service of the exploiting class whose main objective is to maintain the privileges of such class through coercion practiced by specialists. The debate with traditional and procedural proposals was immediate and lasting, because two, often implicit dogmas, were questioned: (1) there were no states in Western Europe until, at least, the centuries before the Roman conquest, and (2) the political variability research of the so-called complex societies (chiefdoms, civilizations) must follow a comparative method, although, doing this, archaeology will be subordinated to anthropological and historiographic proposals and categories (Lull and Micó 2011). Instead, the investigation proposed addresses the challenge of empirically validating relational categories such as "surplus," "exploitation," "social class," and "coercive violence" and, if the data allow it, to identify a state organization even when elements traditionally considered diagnostic, such as writing, may be missing.

The Marxist hypothesis about the development of the state in the European Early Bronze Age was based on the analysis of funerary contexts, and, therefore, its testing required new research on other types of contexts and evidence (Lull and Risch 1995). This objective has strongly influenced the agenda of all research teams during the last decades. To get the necessary answers, Lull, together with R. Chapman, M. Picazo, and Mª E. Sanahuja, promoted the "Gatas Project (Almeria)" since 1985 around the investigation of the eponymous Argaric site (Castro et al. 1999). At present, the work continues in the "Bastida Project" framework, focused on the rich and outstanding findings in La Bastida, Tira del Lienzo, and La Almoloya (Murcia) (Lull et al. 2014; Delgado et al. 2016).

For Lull, research has always been synonymous of teamwork, but a team is not just an aggregate of individuals. Since the mid-1980s, it had a decisive role in the formation of a research team that, in addition to pursuing the aforementioned scientific objectives, gave rise to a demanding, critical, and collectivizing work and learning environment based on mutual support, thanks to which a group of archaeologists was formed who, over the years, have followed diverse paths. The individual competition and the search for the self-benefit prevailing today erode this kind of initiatives that, however, are the ideal means for the production of knowledge and its public dissemination.

This same group gave new impetus to research on the recent Prehistory of the Balearic Islands, initiated by Lull in 1975 with the first excavations at the monumental sites of Son Fornés and Son Ferragut (Mallorca), and later extended to Menorca, where they studied the amazing ritual and ceremonial contexts of the Es Càrritx and Es Mussol caves (Lull et al. 1999). This has resulted in the periodization and the social and economic model of the Balearic societies, from the insular colonization at the end of the third millennium cal BCE to the Roman conquest, which today dominates the state of the art. Son Fornés is also a reference in the dissemination and musealization of the archaeological legacy.

In addition, it is worth highlighting the pioneering contributions in the use of extensive series of radiocarbon dating to built social syntheses in recent Prehistory, both at European (González et al. 1992) and Iberian (Castro et al. 1996b) or Balearic scales (Lull et al. 1999).

In recent years, Lull has combined large-scale research in Iberian and Balearic sites, with the exploration of new paths of archaeological and social thought. In *Los objetos distinguidos* (*The Distinguished Objects)* (2007), he suggests a redefinition of the central categories of social thought ("work," "production," "society," "value," "property," "satisfaction vs. need," among others) and a materialist ontology, critical of Humanism, which places objects as *producers* of social life. This original consideration of objects has been known, although not recognized, by the latest reflections of the so-called symmetric archaeology or human-thing-entanglement. It is another example of a usual practice (colonial?) of the Anglo-Saxon academy: to take advantage of "new ideas and practical contributions" from different regions of the world and present them as their own, more or less simplified, through a handful of powerful transnational publishing companies.

References

Castro, P., R.W. Chapman, S. Gili, V. Lull, R. Micó, C. Rihuete-Herrada, R. Risch, and Mª.E. Sanahuja. 1996a. Teoría de las prácticas sociales. *Complutum* 6 (II): 35–48.

Castro, P., V. Lull, and R. Micó. 1996b. *Cronología de la prehistoria reciente de la península Ibérica y Baleares (c. 2800-900 cal ANE)*, British archaeological reports, International series 652. Oxford: Tempus reparatum.

Castro, P., R.W. Chapman, S. Gili, V. Lull, R. Micó, C. Rihuete-Herrada, R. Risch, and Mª.E. Sanahuja. 1999. Agricultural production and social change in the Bronze Age of Southeast Spain: The Gatas project. *Antiquity* 73: 846–856.

Castro, P., S. Gili, V. Lull, R. Micó, C. Rihuete-Herrada, R. Risch, and Mª.E. Sanahuja. 2001. Teoría de la producción de la vida social. Un análisis de los mecanismos de explotación en el sudeste peninsular. *Astigi Vetus* 1: 13–54.

Delgado, S., Lull, V., Martin, K., Micó, R., Rihuete-Herrada, C. and Risch, R. 2016. The Silversmith's Workshop of Tira del Lienzo (Totana, Murcia) in the Context of Iberian Bronze Age Metallurgy, *Archaeometry*, 58, 5: 779–795.

Gasull, P., Lull, V. and Sanahuja, Mª E. 1984, Son Fornés I: La fase talayótica. British *Archaeological Reports, International Series*, 209, Oxford.

González, P., V. Lull, and R. Risch. 1992. *Arqueología de Europa, 2250–1200 a.C. Una introducción a la Edad del Bronce*. Madrid: Síntesis.

Lull, V. 1983. *La "cultura" de El Argar. Un modelo para el estudio de las formaciones ecónomico-sociales prehistóricas*. Madrid: Akal.

Lull, V. 1988. Hacia una teoría de la representación en arqueología. *Revista de Occidente* 81: 62–76.

Lull, V., and J. Estévez. 1986. Propuesta metodológica para el estudio de las necrópolis argáricas. In *Homenaje a Luis Siret (1934–1984)*, 441–452. Sevilla: Junta de Andalucía.

Lull, V., and R. Micó. 2011. *Archaeology of the origin of the state. The theories*. Oxford: Oxford University Press.

Lull, V., and R. Risch. 1995. El Estado argárico. *Verdolay* 7: 97–109.

Lull, V., R. Micó, C. Rihuete-Herrada, and R. Risch. 1999. *Ideología y sociedad en la prehistoria de Menorca. La Cova des Càrritx y la Cova des Mussol*. Menorca: Consell Insular de Menorca.

Lull, V., R. Micó, C. Rihuete-Herrada, and R. Risch. 2014. La Bastida fortification system: New light and new questions on the Early Bronze Age societies in the Western Mediterranean. *Antiquity* 88: 395–410.

Further Reading

Chapman, R.W. 2003. *Archaeologies of complexity*. London: Routledge.

Lull, V. 2000. Argaric society: Death at home. *Antiquity* 74: 581–590.

Lull, V. 2007. *Los objetos distinguidos. La arqueologia como excusa*. Barcelona: Bellaterra.

Lull, V., Micó, R., Rihuete-Herrada, C. and Risch, R. 2005. Property relations in the Bronze Age of southwestern Europe: An archaeological analysis of infant burials from El Argar (Almeria, Spain). *Proceedings of the Prehistoric Society* 71: 247–268.

Lull, V., R. Micó, C. Rihuete-Herrada, and R. Risch. 2010. Metal and social relations of production in the 3rd and 2nd millenia BC in the southeast of the Iberian Peninsula. *Trabajos de Prehistoria* 67 (2): 323–347.

Lull, V., R. Micó, C. Rihuete-Herrada, and R. Risch. 2013a. Bronze Age Iberia. In *The Oxford handbook of the European Bronze Age*, ed. A. Harding and H. Fokkens, 594–616. Oxford: Oxford University Press.

Lull, V., R. Micó, C. Rihuete-Herrada, and R. Risch. 2013b. The Bronze Age in the Balearic Islands. In *The Oxford handbook of the European Bronze Age*, ed. H. Fokkens and A. Harding, 617–631. Oxford: Oxford University Press.

Lull, V., Micó, R., Rihuete-Herrada, C. Risch, R. and Escanilla, N. 2017. Halberdiers and combat systems in the Argaric. *Oxford Journal of Archaeology*, 36 (4): 375–394.

Lull, V., and M. Picazo. 1989. Arqueología de la muerte y estructura social. *Archivo Español de Arqueología* 62: 5–20.

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Basic Biographical Information

Lumbreras is one of the most influential Peruvian archaeologists of the second half of the twentieth century. He was born on the 29th of July in 1936 in the city of Huamanga, Ayacucho. Moving to Lima to complete his education, first in La Recoleta school, and later, in 1951, he continued his secondary education at Antonio Raimondi college. From the 4th year in secondary school, Lumbreras founded a study group with his classmates, dedicated to doing research and holding social gatherings and informative lectures on subjects of history and archaeology.

Lumbreras studied at the Universidad Nacional Mayor de San Marcos (UNMSM), obtaining his Bachelor of Arts and Humanities in 1959 and his Doctorate in Arts with special mention in Archaeology and Ethnology in 1960. At the time of his university training, he had Raúl Porras Barrenechea, Luis E. Valcárcel, Jorge C. Muelle, and José Matos Mar as professors. The visiting professors he had the opportunity to work with were John V. Murra, John Rowe, and Juan Comas.

In 1960 Lumbreras joined the faculty of the recently reopened Universidad Nacional de San Cristóbal de Huamanga in Ayacucho. There he met César Guardia Mayorga, with whom he systematically studied Marxism. This phase represents the greatest part of Lumbreras' political and philosophical training, in which he matures his thinking due to the immersion in the Ayacucho reality, not only in the university, but also in the field and in political work.

In 1966 Lumbreras returned to Lima to teach in different universities, among them the UNMSM. In this same year, he began excavations in Chavín de Huantar where he would excavate its most important archaeological context, the *Galería de las Ofrendas* (Gallery of Offerings). During these years, his Marxist thinking matured, as it can be seen in the text he devoted to his excavations in Chavín (Lumbreras 1993). At this time, he masterminded what would to be an important analytical category of his work and of the so-called Archaeology as a Social Science school, *unidad arqueológica socialmente significativa* (socially significant archaeological unity).

In 1960 he published the book *De las Artes, los Pueblos y las culturas del Antiguo Perú* (translated by Betty Meggers in 1974 as *Peoples and Cultures of Ancient Peru*) (Lumbreras 1969), a classic text in which the influence of positivism and culturalism of his academic training is still notable. However, he also laid out a chronological sequence contrary to that of John Rowe, suggesting more evolutionary stages based on social processes.

In 1970, Lumbreras organized the symposium *Formaciones autóctonas en América* (Native Formations in America) in the 40th International Congress of Americanists, in Lima, aiming to unite the leftist intellectuals of Latin America. Already consolidated in the UNMSM, his Marxist position became more notorious and influential. It materialized in one of his most popular books *De los orígenes del estado en el Perú* (On the Origins of the State in Peru) (Lumbreras 1972). In that book, it is clear that what moved him towards Andean prehistory was, in a Marxist style, class struggle.

Based on notes he made for an archaeology course he taught at the University of Concepción in Chile, he published his most popular theoretical book, *La Arqueología como Ciencia Social* (Archaeology as a Social Science) (Lumbreras 1974). This text would inspire José Luis Lorenzo to organize the *Reunión de Teotihuacán* (Meeting of Teotihuacán) in 1975, establishing common lines of action in the historic materialist perspective that the participants were developing in their own countries. From that meeting and from the one he organized in Paracas, Peru, he crafted his book *Arqueología de la América Andina* (Archaeology of Andean America) (Lumbreras 1981), where he laid out culture-historical areas for this part of the American, influential in Andean archaeology to this date.

In the 1970s, and under the auspice of Juan Velasco Alvarado's military government, Lumbreras worked in providing the archaeological cultural material the Peruvian state needed (Tantaleán 2005). One of the most important positions he held was that of director of the Peruvian National Archaeology Museum between 1973 and 1979.

During the 1980s, his career would encompass teaching and research. In those years, he wrote extensively for the journal *Gaceta Arqueología Andina*, refining his chronological and cultural sequence of 1974 (Lumbreras 2005). In 1989, he was named professor emeritus at the UNMSM. The following year, he toured Europe, giving classes in Spain – Universidad Complutense de Madrid (1991) and Universidad Autónoma de Barcelona (1991–1994) – and Germany (1995–1996) where he continued developing his Marxist approach, especially regarding the origins of the state (Lumbreras 2005: 192–229).

In 1996 he returned to South America. He spent four years in Brazil, teaching at the Universidade Estadual do Norte Fluminense, in Rio De Janeiro. Settled again in Peru in 1999, Lumbreras was appointed National Director of Culture, supporting Peruvian archaeology with regional projects, such as the symbolic *Qhapaq Ñan*, the purpose of which is to elevate the Inca road system to UNESCO's World Heritage List. Today, outside of government and university structures, Lumbreras continues to be active, publishing and lecturing in the Marxist approach that has provided him with a holistic and global perspective of the pre-Hispanic, historic, and contemporary Andean world.

Cross-References

- ▶ Andes: Prehistoric Period
- ▶ Latin American Social Archaeology
- ▶ Marx, Karl
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Social Archaeology

References

Lumbreras, L. 1969. *De los pueblos, las culturas y las artes en el antiguo Perú*. Lima: Moncloa-Campodónico.

Lumbreras, L. 1972. *De los orígenes del estado en el Perú*. Lima: Milla Batres.

Lumbreras, L. 1974. *La arqueología como ciencia social*. Lima: Histar.

Lumbreras, L. 1981. *Arqueología de la América Andina*. Lima: Milla Batres.

Lumbreras, L. 1993. *Chavín de Huántar. Excavaciones en la Galería delas Ofrendas*. Mainz: Verlag Phillip von Zabern.

Lumbreras, L. 2005. *Arqueología y sociedad*. Lima: MNAAHP/INDEA/IEP.

Tantaleán, H. 2005. *Arqueología de la formación del estado. El caso de la Cuenca Norte del Titicaca. Fondo Editorial del Pedagógico*. Lima: Avqi Ediciones.

Lydia, Archaeology of

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Introduction

Lydia is an ancient region in western Anatolia (modern Turkey) (Fig. 1) long famed for its wealth and legendary landscapes: the proverbially-rich King Croesus; the gold-bearing Pactolus stream, where King Midas of Phrygia was said to have washed off his golden touch; the wise Mt. Tmolus, who judged the musical contest between Pan and Apollo; and the Gygean lake, with its "everflowing" waters and neighboring burial mounds, among other noted features. The heyday of Lydian culture was the Archaic period (seventh-sixth centuries BCE), the era of the Mermnad kings and their expansion of Lydian domination through most of western Asia Minor. But even after the Lydian empire fell to the Persians ca. 545 BCE, Lydia remained a distinct cultural region within the Persian empire and later, in the Hellenistic period and in the Roman empire. The Lydian capital, Sardis, retained prominence as the seat of a Persian satrap, the site of an

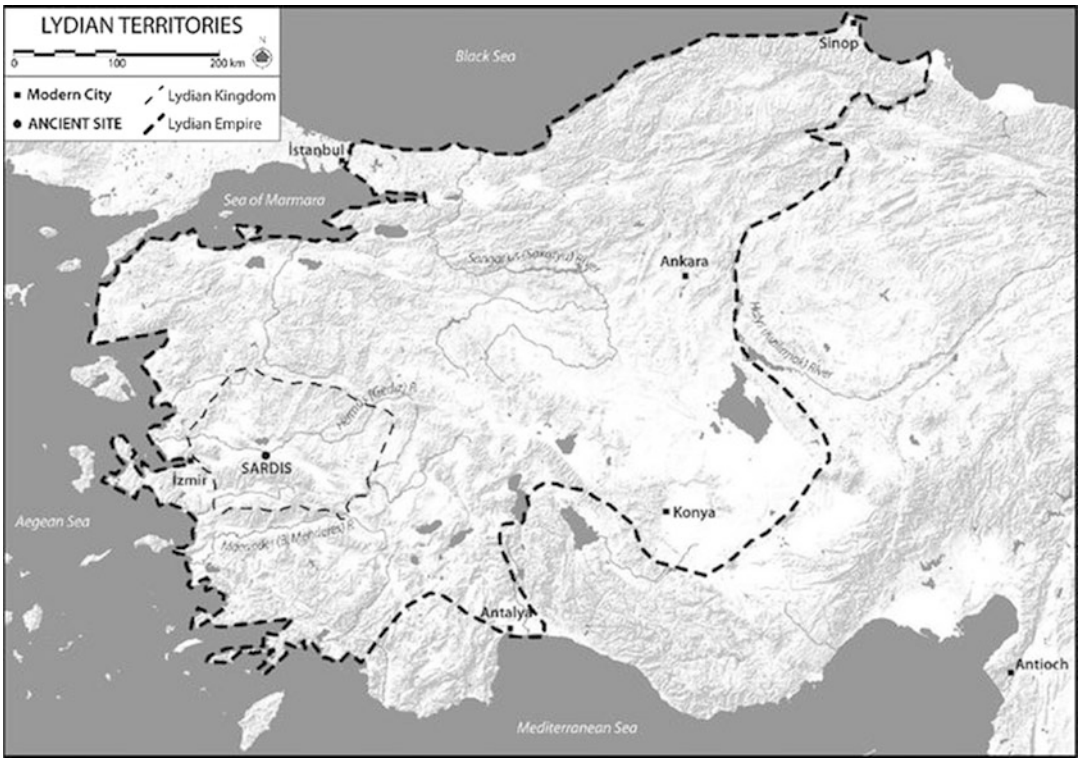

Lydia, Archaeology of, Fig. 1 Map of the Lydian Kingdom and Empire (C.H. Roosevelt)

important Hellenistic Temple of Artemis, monumental urban center in the Roman empire, and home to thriving Jewish and Christian communities in late antiquity.

Definition

The heart of Lydia lies in the fertile valleys of the Hermus (modern Gediz) and Cayster (now Küçük Menderes) Rivers and their tributaries, surrounded by foothills and higher mountain ranges (Fig. 2). The Hermus and Cayster descend gradually from the edges of the central Anatolian plateau westward toward the Aegean coast, which was colonized by Greeks by the time of the Iron Age. Lydia's western neighbors were thus Ionian and Aeolian Greeks, while its other borders were shared with other Anatolian populations: Mysians at northwest and north, Phrygians to the northeast and east, and Carians to the south. The kingdom of Lydia reached its greatest extent under King Croesus in the first half of the sixth century BCE. Croesus's father, Alyattes, had extended Lydian control towards both the west and the east, and Croesus succeeded in bringing the majority of western Anatolia under Lydian sway, all the way from the Aegean coast to the Halys River in Cappadocia. The Greek historian Herodotus tells the story of how Croesus's decision to push beyond the Halys into Median Persian territory led to the collapse of his vast empire.

The archaeology of Lydia encompasses the study of ancient sites in the region of historical Lydia both before and after the time of the Lydian empire, from earliest human occupation through the Roman era to the Ottoman period. It includes long-term excavation of the Lydian capital, Sardis, as well as recent excavation of a Bronze Age citadel, Kaymakçı; salvage excavations of looted burial mounds and other sites elsewhere in Lydia; and regional survey in central Lydia.

Historical Background

The discovery of ancient Lydia began with visits of European travelers to the standing remains of Roman-period buildings at Sardis, including the Temple of Artemis (Fig. 3), beginning as early as the fifteenth century. In the mid-nineteenth century, the conspicuous burial mounds of Bin Tepe, the royal cemetery of Sardis (Fig. 2), drew the interest of the Prussian consul at nearby Smyrna (now İzmir), Ludwig Spiegelthal. The first excavations in Lydia were carried out in 1853 by Spiegelthal at the largest of all the mounds in Bin Tepe, the Tumulus of Alyattes. The massive mound had been associated with the Lydian king Alyattes, father of Croesus, since at least the time of Herodotus (in the late fifth century BCE). Spiegelthal was able to locate the finely built marble chamber but it, like most other Lydian tombs found to date, had already been looted of its original grave offerings (Ratté 2011: 69–72). Further explorations of Lydian tumuli were undertaken in the 1870s by Auguste Choisy and George Dennis (better known for his work on Etruscan tombs). More comprehensive excavations commenced with Princeton's expedition at Sardis in the early twentieth century, under Howard Crosby Butler (1910–1914 and 1922). Work was halted by World War I and the Turkish War of Independence, but in keeping with excavation practices of the day the team uncovered the entire plan of the Temple of Artemis and excavated more than 1000 chamber tombs in the nearby "Necropolis" hillside in those six seasons (Butler 1922) (Fig. 3).

Starting in 1958, the Archaeological Exploration of Sardis, sponsored by Harvard and Cornell Universities, worked steadily to understand all eras of the city's long history, with particular emphasis on a bath-gymnasium complex and synagogue of the Roman period, the Lydian fortification wall, and a burned destruction level associated with the Persian conquest of Lydia ca. 545 BCE (Hanfmann and Mierse 1983; Cahill 2010: 74–105). Recent excavations have focused on Lydian terraces built on "natural spurs of the acropolis" and later structures built atop them, a Roman imperial cult sanctuary on a lower terrace, and a monumental arch that spanned the main avenue near the city gate (Cahill 2015).

Lydia, Archaeology of, Fig. 2 View of Hermus Valley and Bin Tepe from atop the Tumulus of Alyattes, showing smaller tumuli and the Acropolis and Necropolis hills of Sardis in the foothills of the Tmolus range (author photo)

Lydia, Archaeology of, Fig. 3 Sardis, Temple of Artemis and Necropolis hill. The Pactolus stream runs between. Depressions in the side of the Necropolis hill mark the locations of collapsed chamber tombs

Investigations of Lydian sites outside of Sardis have been more limited but are now a focus of current research. Until recently, archaeological investigations were undertaken mostly for salvage operations or on an ad hoc basis, as were occasional surface surveys. The Central Lydia Archaeology Survey (Boston University) in 2005 commenced systematic study of the areas surrounding the Gygean Lake through both intensive and extensive survey methods as well as excavation. The resultant identification and exploration of many new sites, including several fortified Middle to Late Bronze Age settlements, has significantly revised our understanding of early Lydia (Roosevelt in Cahill 2010: 37–73; Roosevelt and Luke 2017), and the project is using the latest digital technologies to pioneer new methods of archaeological investigation and recording (Roosevelt et al. 2015).

Key Issues/Current Debates

Early Lydia (Paleolithic – Bronze Age)

Human occupation began as early as the Middle Paleolithic period in the area that came to be known as Lydia, as evidenced by stone tools collected in surface survey in Bin Tepe and occasional finds elsewhere. The transition to settled farming communities in the Neolithic period may mark the advent of new people to this area (Roosevelt in Cahill 2010: 43–46). At least 12 Late Neolithic sites have been identified, but only one has so far been excavated (Ulucak, near İzmir). Settlements grew in size and number through the Chalcolithic and Early Bronze Ages. Five Early Bronze Age (EBA) sites have been excavated in Lydia, and more than 100 have been identified through surface survey. The finds suggest connections with other West Anatolian EBA cultures and include pithos burials as well as cist graves, pottery, stone vessels and figurines, weapons, and jewelry made of various metal types, including silver and gold as well as bronze (Hanfmann and Mierse 1983: 16–20; Roosevelt in Cahill 2010: 40–51). Middle Bronze Age (MBA) Lydia has come to light only in recent years, with survey of fortified citadels of this era around the Gygean Lake. From the number of identifiable sites in this period, it appears that the population of Lydia contracted in this period from the many smaller villages of the EBA into centralized, fortified settlements of the Middle and Late Bronze Ages. The largest of these citadels is the site of Kaymakçı, at the west end of the Gygean Lake (Fig. 4): with a fortified lower town and upper

Lydia, Archaeology of, Fig. 4 Kaymakçı: Three-dimensional rendering of Quickbird satellite image of the citadel. (© Central Lydia Archaeology Survey)

citadel, it is comparable to, yet much larger than, Troy VI. This site seems to have been an important regional center in the Middle and Late Bronze Ages (Roosevelt in Cahill 2010: 51–53; Roosevelt and Luke 2017: 136–137). By the Late Bronze Age, this part of central Lydia was known to Hittites as the Seha River Land, and the Cayster valley to the south was known as the land of Mira. These place names are mentioned in Hittite texts, and Hittite-style rock reliefs in these areas (one near Ephesos, in a mountain pass connecting Lydia to Ionia, and another near Manisa) provide physical evidence for Hittite cultural connections in this period (Roosevelt in Cahill 2010: 53–56; Roosevelt and Luke 2017). In addition to traces of Late Bronze Age (LBA) occupation of sites around the Gygean Lake, an LBA level has been discovered in a limited exposure at Sardis (Hanfmann and Mierse 1983: 20–24).

Early Iron Age and Archaic Lydia

When Lydian-speaking peoples settled in this region is a matter of debate that may perhaps be solved through future excavations. The area was known as Lydia by at least the seventh century BCE, when it was mentioned in the annals of the Assyrian king Assurbanipal. This was the time of the beginning of the Mermnad dynasty under its first king, Gyges, also mentioned by name in Assyrian texts. According to Greek historical sources, an earlier dynasty (the Heraclids) had ruled for 22 generations after the founding of Lydia by one Lydus, son of Atys. This would place the beginnings of Lydia as a cultural entity right at the transition from the Bronze to Iron Ages. Archaeological evidence for this transitional period is at this point severely limited, but initial results of the Central Lydia Archaeology Survey do suggest an interruption or change in settlement patterns around the turn of the first millennium BCE, with the abandonment of large fortified sites, the establishment of new sites, and the use of different clay sources for pottery production. But whether these changes indicate the arrival of new, Lydian-speaking peoples to the area is still uncertain, as there is some continuity in place names from the Bronze Age and the changes could just as easily be explained by internal social and political factors (Roosevelt in Cahill 2010: 56–60).

It was in the Iron Age that Sardis emerged as a new regional urban center. Iron Age and early Archaic levels have been exposed only in limited excavation sectors at Sardis but include monumental terrace walls and a thriving industrial/domestic quarter. In the area adjacent to the Pactolus stream, evidence shows that Lydians experimented with techniques of extracting pure gold from electrum, a natural alloy of gold and silver, and developed the world's earliest known gold-refinery by the late seventh century BCE (Ramage and Craddock 2000; Bruce 2015). An altar of Kybele decorated with lions stood in the middle of this area. The minting of coins of pure gold and silver soon followed and Croesus's lion-bull issues (Fig. 5, ca. 561–545 BCE) represent the first known bimetallic system of coinage.

The growth of the Lydian empire in the first half of the sixth century under Alyattes and Croesus is also linked with the monumentalization of Sardis, through the construction of finely built,

Lydia, Archaeology of, Fig. 5 Gold Croeseid stater from Sardis. The Metropolitan Museum of Art, Gift of The American Society for the Excavation of Sardis, 1926 (26.59.2). (© The Metropolitan Museum of Art)

ashlar terrace walls on the slopes of the acropolis and a massive fortification wall enclosing the city center at the foot of the acropolis. The high terraces probably supported royal palace structures, though many centuries of later use have obscured the picture (Ratté 2011: 9–11, 99–107; Cahill 2015). The city wall was composed of mudbrick courses (at least 10 m high) supported on a wide stone base or socle (as much as 20 m wide), in some places reinforced with an additional sloping mud glacis enclosed by stone arms (Fig. 6) (Cahill 2010: 77–81). The fortification seems to have undergone several phases of construction before its fiery destruction in the Persian sack of the city ca. 545, and the stone facings display a remarkable range of approaches to stone-cutting. The masonry of the recessed area around the city gate at the north, on what was probably the main east-west travel route, is particularly fine, with variously colored sandstone ashlars and a variety of masons' marks in the Lydian alphabet, conspicuous and still not fully understood (Ratté 2011: 9–12, 108–112).

Lydian houses have been discovered in several excavation sectors at Sardis, both inside and outside the city wall. They generally have mudbrick walls on stone foundations with clay floors, though a house excavated beneath the later (Hellenistic-Roman) theater had stone paving and a stone column (Cahill 2010: 86–90).

Lydia, Archaeology of, Fig. 6 View of the Lydian fortification wall at Sardis (N. D. Cahill)

Decorated architectural terracottas found in some areas probably adorned the wealthier houses, along the lines of a reconstruction made by the Harvard-Cornell team in the expedition compound (Fig. 7) (Ramage 1978). Within these Lydian houses, a wide range of domestic activities are attested: grinding grain and other foods, cooking, eating and drinking, spinning and weaving, cosmetics, gaming, and, in some cases, craft production (Cahill 2010: 90–99). Common pottery shapes include cups (skyphoi), pitchers (oinochoai), mixing bowls (kraters and lebetes), and amphoras, all associated with the mixing and serving of wine. Tall stemmed dishes were also popular, and a distinctive Lydian shape is a small round-bodied container with foot, known as a lydion and probably used for perfumed oil (Fig. 8). Types of decoration applied to these pottery shapes include monochrome grey and black-burnished wares, linear designs in black-on-red or "bichrome" styles, streaky glaze, and

Lydia, Archaeology of, Fig. 7 Reconstruction of a Lydian mudbrick house with architectural terracottas, Sardis Expedition compound (author photo)

Lydia, Archaeology of, Fig. 8 'Marbled Ware' lydion from Sardis, sixth century BCE. New York, The Metropolitan Museum of Art, Gift of The American Society for the Excavation of Sardis, 1926 (26.164.27). (© The Metropolitan Museum of Art)

distinctively Lydian "marbled ware" (Fig. 8). More elaborate decorative styles (such as the "Sardis Style" and the misnamed "Ephesian Ware"), with a lively combination of animal, floral, and geometric motifs, are comparable with East Greek Orientalizing vase-painting (Greenewalt in Cahill 2010: 106–124). Imports from eastern and mainland Greece are also found. These can be more firmly dated than local styles and are therefore crucial for establishing chronology. A series of dinner sets (cup, pitcher, dish, knife, and pot or jug) deposited in a sixth-century residential/commercial quarter outside the city walls may represent ritual dinners or religious offerings of some kind, since the pot or jug usually contained a complete puppy skeleton (Greenewalt 1978).

The destruction debris that covered many of these houses has been linked with the Persian sack of the city ca. 545 BCE by relative pottery chronology, since the latest securely datable pottery in the destruction level is dated ca. 550 (Greenewalt 1992; Cahill 2010: 339–361). Analysis of the human victims found in the debris confirms the martial nature of the conflagration, since two of the skeletons showed muscle development compatible with a soldier's life – the left arm had habitually carried something heavy (like a shield) while the right arm indicated repetitive movement as would result from throwing or thrusting weapons (Cahill 2010: 348–352). Both also had sustained violent wounds. The neck of one victim showed signs of having carried heavy weight on the head, and a helmet made of iron and bronze was found nearby. Weapons found among the debris include a wide variety of arrowheads,

slingstones, an iron saber, and an iron sickle of a type seen in some depictions of warriors from elsewhere in Anatolia.

Tombs and Burial Customs

Lydian graves ranged in form from simple cist graves to rock-cut chamber tombs, tumuli covering marble or limestone burial chambers or sarcophagi, and monumental built tombs (Roosevelt 2009: 135–183). Tumuli are found throughout Lydia and are one of the best indicators of settlement patterns, since so few occupation sites have been surveyed and excavated (Roosevelt 2006b). Rock-cut tombs are found only at Sardis and in a few other locations. Only the three largest tumuli at Bin Tepe (which means "Thousand Mounds" in Turkish, though the true number of mounds is closer to 130, see Fig. 2) probably belong to the Lydian era, before the Persian conquest. Dominating the valley on a low ridge adjacent to the Gygean Lake, these conspicuous monuments linked the Lydian kings to memories of the Bronze Age past (Luke and Roosevelt 2016). The smaller tumuli were probably built by Persian nobility and local elite in emulation of the earlier Lydian kings. The earliest datable chamber tombs at Sardis were used in the sixth century BCE, but the majority of them were used (or re-used) in the Persian era and later periods, and later re-use may have obliterated traces of earlier burials. No tombs of the Early Iron Age or seventh century have yet been identified in Lydia.

In both tumulus chambers and in rock-cut tombs, burials were often placed on bed-like platforms, cut from bedrock, or built of marble or limestone. The most elaborate examples are carved and painted to resemble wooden banquet couches of a type known in Greece as *klinai*. Along with the banqueting vessels that must have once completed many grave assemblages, to judge from looted finds, these couches may have served to identify the deceased as elite banqueters (Baughan 2013). Burials in terracotta and stone sarcophagi are nearly as common, however, and remains of wood and nails in some chamber tombs suggest that wooden coffins may have also been used, even in connection with rock-cut "couches." Grave goods include fine jewelry of metal, stone, and glass; sealstones and pendants; mirrors, combs, and cosmetic utensils; ceramic, stone, and metal vessels; utensils for serving and consuming food and drink (cups, pitchers, dishes, strainers, ladles, etc.); and containers for perfumed oils, further accoutrements of banqueting. These items may be seen as expressions of wealth and indications of a leisure-loving lifestyle (Baughan in Cahill 2010: 273–304).

Set before the entrances to some rock-cut tombs and the edges of some tumuli were carved stone stelai with sculpted relief and/or Lydian inscriptions. Some of the reliefs represent doors, which may symbolize the home, the door of the tomb, or the final passage (Roosevelt 2006a). Other reliefs represent the deceased in a characteristic activity, such as banqueting (Roosevelt 2009: 156–162). The inscriptions usually identify the owner(s) of the tomb and warn potential violators of divine retribution.

Late Lydia (Persian, Hellenistic, Roman, Byzantine, and Islamic Periods)

Under Persian rule, Sardis became the capital of a province (satrapy) of the Achaemenid Persian empire. Physical remains of this period are limited at Sardis, where Roman builders often dug as far as Lydian levels when laying their foundations, but finds from tombs at Sardis and throughout greater Lydia reveal a thriving and probably multiethnic elite population during the Persian era. Among the many grave goods recovered from looted tumuli (since very few burials in Lydia have been found undisturbed) are sealstones carved with Persian motifs in local styles, gold clothing appliqués thought to be of Persian type, and precious metal banqueting sets with some local and some Persian vessel shapes and decorative motifs (Dusinberre 2003; Miller 2007). The "Lydian Treasure," looted from tumuli in eastern Lydia in the 1960s and recovered from the Metropolitan Museum of Art in the 1990s, offers the most famous assortment of luxury goods from Persian-period Lydia (Özgen et al. 1996). Recent studies of this and related material have stressed, however, that even "Persian"-style objects may

have been produced in Lydia, highlighting the role of Lydian craftsmen in the creation of an "International" Achaemenid style (Miller 2007).

It was early in the Persian period, or the late sixth century BCE, that the first altar was built in the area that became a sanctuary of Artemis and home to Sardis's most well-known standing remains (Fig. 3). The monumental stone Temple of Artemis, in the Ionic order, was begun in the Late Classical/Hellenistic period (ca. 300 BCE) and was never finished. Construction resumed with a somewhat different plan in the Roman imperial era, when it served at least partly as a locus for imperial cult worship (Cahill and Greenewalt 2016). Lydian dedicatory inscriptions carved at the bottoms of some of the re-used columns attest to the continued importance of Lydian families and of the Lydian language more than two centuries after the collapse of the Lydian empire (Yegül in Cahill 2010: 362–388; Yegül 2014).

By the Roman period, Sardis held all the usual components of a city in the eastern part of the Roman empire: a theater and stadium, several temples, baths, a gymnasium with civic and commercial space, colonnaded avenues, and urban townhouses. Recent excavations have shed new light on the richly decorated imperial cult sanctuary that was built on a large terrace in the Julio-Claudian period (Cahill 2014). The massive triple arch revealed by recent work on the main colonnaded avenue next to the Bath-Gymnasium Complex is one of the largest known in the Roman world, with a central bay 13 m wide (Cahill 2015). The civic basilica in that complex was converted to a synagogue in the fourth or sixth century CE (Magness 2005), and several Christian churches were built at Sardis in the Byzantine era (Buchwald 2015), when the acropolis was fortified. A thirteenth-century Islamic village has been identified around the remains of one of the churches, and Sardis remained occupied as a series of villages through the Ottoman period, with some continuity to the modern era suggested in the shared name of modern villages in the vicinity, Sart (Crane 1987). Other important Roman and Byzantine sites in Lydia include Thyateira (modern Akhisar), Philadelphia (modern Alaşehir), and Magnesia ad Sipylum (modern Manisa), though none have been explored to the same degree as Sardis.

Current Issues

One of the biggest problems in the archaeology of Lydia, with its many conspicuous tumuli, is illicit digging by treasure-hunters. The destruction of archaeological context is permanent and irreparable, and the sale of looted artifacts on the black market is deplorable. Even when objects that end up in private collections or in museums can be reasonably associated with a Lydian provenance, their full context – for instance, location in a particular tomb, or association with other objects – can never be known. Cultural heritage management and community outreach are thus major concerns of current archaeological work in the region (Roosevelt and Luke 2006; Luke in Cahill 2010: 389–403). Other current issues include defining the borders of Lydia, investigating Lydian relationships with neighboring cultures (e.g., Gürtekin-Demir 2014), and understanding Lydian identities in Late Lydian periods (e.g., Rojas 2010).

The richness of current scholarship on ancient Lydia was demonstrated in May 2017 at a conference in Izmir, involving around 100 scholars from 19 different countries (Laflı et al. forthcoming). The papers at this conference presented new insights on a range of topics including: Lydian cities other than Sardis (such as Thyateira and Saittae) and on the borders of Lydia (such as Tripolis and Tabae); the geographical limits and ethno-linguistic identity of Lydia; Lydian contacts with neighboring regions (such as Caria and the Troad) as well as further afield (such as Illyria and the Caucasus); the prehistory of Lydia; the Achaemenid, Hellenistic, Roman, and Byzantine periods; urban development and monumental architecture; religion, epigraphy, and numismatics; and Lydia and Lydians in Greek and Latin literary traditions. The publication of these papers promises to make a monumental contribution to the study of ancient Lydia.

Cross-References

- ▶ Basilica in Classical Archaeology
- ▶ Baths and Bathing, Roman
- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Terracotta Architectural Sculpture in Classical Archaeology
- ▶ Urban Planning, Roman

References

Baughan, E.P. 2013. *Couched in death: Klinai and identity in Anatolia and beyond*. Madison: The University of Wisconsin Press.

Bruce, W. 2015. Industry, community, and the sacred: Life outside the city walls at Sardis. PhD disseration, University of Wisconsin.

Buchwald, H. 2015. *Churches E and EA at Sardis*, Sardis report 6. Cambridge, MA: Archaeological Exploration of Sardis.

Butler, H.C. 1922. *Sardis I: The excavations, 1910–1914*. Leiden: E.J. Brill.

Cahill, N.D., ed. 2010. *Lidyalılar ve Dünyaları/The Lydians and their world*. Istanbul: Yapı Kredi Yayınları. Available online at http://sardisexpedition.org/en/publications/latw.

Cahill, N. 2014. Sardis 2013. *Kazı Sonuçları Toplantısı* 36 (2): 413–430. Available in English at http://sardisexpedition.org/en/essays/kst-cahill-kst-2013.

Cahill, N. 2015. Sardis 2014. *Kazı Sonuçları Toplantısı* 37 (3): 147–164. Available in English at http://sardisexpedition.org/en/essays/kst-cahill-kst-2014.

Cahill, N., and C.H. Greenewalt Jr. 2016. The sanctuary of Artemis at Sardis: Preliminary report, 2002–2012. *American Journal of Archaeology* 120 (30): 473–509.

Crane, H. 1987. Some archaeological notes on Turkish Sardis. *Muqarnas* 4: 43–58.

Dusinberre, E.R.M. 2003. *Aspects of empire in Achaemenid Sardis*. New York: Cambridge University Press.

Greenewalt, C.H., Jr. 1978. *Ritual dinners in early historic Sardis*. Berkeley: University of California Press.

Greenewalt, C.H., Jr. 1992. When a mighty empire was destroyed: The common man at the fall of Sardis, ca. 546 B.C. *Proceedings of the American Philosophical Society* 136: 247–271.

Gürtekin-Demir, R.G. 2014. Phrygian aspects of Lydian painted pottery from Sardis. *American Journal of Archaeology* 118 (2): 223–239.

Hanfmann, G.M.A., and W.E. Mierse. 1983. *Sardis from prehistoric to roman times*. Cambridge, MA: Harvard University Press.

Laflı, E., G. Kan Şahin, and G. Labarre, eds. forthcoming. *Archaeology and history of Lydia from the early Lydian period to late antiquity (8th century B.C.-6th century A.D.)*. Colloquia Anatolica et Aegaea – Acta congressus communis omnium gentium Smyrnae IV. Besancon: Presses Universitaires de Franche-Comte.

Luke, C., and C.H. Roosevelt. 2016. Memory and meaning in Bin Tepe, the Lydian cemetery of the 'thousand mounds'. In *Tumulus as sema: Space, politics, culture and religion in the First Millennium BC*, ed. O. Henry and U. Kelp, 407–428. Berlin: De Gruyter.

Magness, J. 2005. The date of the Sardis synagogue in light of the numismatic evidence. *American Journal of Archaeology* 109: 443–475.

Miller, M.C. 2007. The poetics of emulation in the Achaemenid world: The figured bowls of the 'Lydian treasure'. *Ancient West and East* 6: 43–72.

Özgen, İ., J. Öztürk, M.J. Mellink, C.H. Greenewalt Jr., K. Akbıyıkoğlu, and L.M. Kaye. 1996. *Heritage recovered: The Lydian treasure*. Ankara: Republic of Turkey, Ministry of Culture, General Directorate of Monuments and Museums.

Ramage, A. 1978. *Lydian houses and architectural terracottas*. Cambridge, MA: Harvard University Press.

Ramage, A., and P. Craddock. 2000. *King Croesus' gold: Excavations at Sardis and the history of gold refining*. Cambridge, MA: Harvard University Art Museums.

Ratté, C. 2011. *Lydian architecture. Ashlar masonry structures at Sardis*. Cambridge, MA: Harvard University Press.

Rojas, F. 2010. Empire of memories: Anatolian material culture and the imagined past in Hellenistic and Roman Lydia. PhD disseration, University of California, Berkeley.

Roosevelt, C.H. 2006a. Symbolic door stelae and grave-side monuments in Western Anatolia. *American Journal of Archaeology* 110: 65–91.

Roosevelt, C.H. 2006b. Tumulus survey and museum research in Lydia, Western Turkey: Determining Lydian- and Persian-period settlement patterns. *Journal of Field Archaeology* 31 (1): 61–76.

Roosevelt, C.H. 2009. *The archaeology of Lydia, from Gyges to Alexander*. New York: Cambridge University Press.

Roosevelt, C.H., and C. Luke. 2006. Looting Lydia: The destruction of an archaeological landscape in western Turkey. In *Archaeology, cultural heritage, and the antiquities trade*, ed. N. Brodie, M.M. Kersel, C. Luke, and K.W. Tubb, 173–187. Gainesville: University Press of Florida.

Roosevelt, C.H., and C. Luke. 2017. The story of a forgotten kingdom? Survey archaeology and the historical geography of central Western Anatolia in the second millennium BC. *European Journal of Archaeology* 20 (10): 120–147.

Roosevelt, C.H., P. Cobb, E. Moss, B.R. Olson, and S. Ünlüsoy. 2015. Excavation is digitization: Advances in archaeological practice. *Journal of Field Archaeology* 40 (3): 325–346.

Yegül, F.K. 2014. A Victor's message: The talking column of the temple of Artemis at Sardis. *Journal of the Society of Architectural Historians* 73: 204–225.

Further Readings

A full bibliography on Sardis and Lydia, regularly updated, is available online at *The Archaeological Exploration of Sardis. Digital Resource Center*. http://sardisexpedition.org/en/publications.

Cahill, N.D., ed. 2008. *Love for Lydia: A Sardis anniversary volume presented to Crawford H. Greenewalt, Jr.* Cambridge, MA: Harvard University Press.

Dedeoğlu, H. 2003. *The Lydians and Sardis*. Istanbul: A Turizm Yayınları.

Foss, C. 1976. *Byzantine and Turkish Sardis*. Cambridge, MA: Harvard University Press.

Franklin, J.C. 2008. 'A Feast of Music.' The Greco-Lydian Musical Movement on the Assyrian Periphery. In *Anatolian interfaces: Hittites, Greeks, and their Neighbors. Proceedings of an international conference on cross-cultural interaction, Sept. 17–19, Emory University, Atlanta, Georgia,* eds. B.J. Collins, M.R. Bachvarova, and I. Rutherford, 193–203. Oxford: Oxbow Books.

Greenewalt, C.H., Jr., N.D. Cahill, P.T. Stinson, and F. Yegül. 2003. The City of Sardis. In *Approaches in graphic recording*. Cambridge, MA: Harvard University Press.

Hanfmann, G.M.A. 1972. *Letters from Sardis*. Cambridge, MA: Harvard University Press.

Rautman, M.L. 2011. Sardis in late antiquity. In *Archaeology and the cities of Asia minor in late antiquity*, Kelsey museum publication 6, ed. O. Dally and C. Ratté, 1–26. Ann Arbor: Kelsey Museum of Archaeology.

Rautman, M.L. 2015. A menorah plaque from the center of Sardis. *Journal of Roman Archaeology* 28: 431–438.

Yegül, F. 1986. *The bath-gymnasium complex at Sardis*. Cambridge, MA: Harvard University Press.

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Maastricht-Belvédère: Interpretation of a Technological Paleo-surface

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Introduction

Since hominins started producing stone artifacts approximately 2.6 Ma ago (Semaw et al. 2003), millions of kilos of lithic artifacts must have been discarded on the world's surfaces. Most of that output survived in reworked contexts, on surfaces, and in lag deposits, abraded by transport and reworked from one sedimentary matrix into another. However, some of that lithic material became encased in sediments soon after primary deposition and is recoverable in its (near) original spatial patterning. A good example is Maastricht-Belvédère in the Netherlands. At this commercially exploited quarry, a complex of primary context sites from the early Middle Paleolithic has been excavated from fine-grained fluvial sediments since the 1980s (Roebroeks 1988; De Loecker 2006). The local deposits contained fully temperate faunas and could probably be attributed to the late Middle Pleistocene (MIS 7, see below). The material evidence generally seems to reflect very mobile, episodic, and short-term Neanderthal occupations of parts of the river Maas (Meuse) valley, at least 250,000 years ago (e.g., Roebroeks 1988; Roebroeks et al. 1992; De Loecker 2006). Yet, some data suggest that considerable time, energy and skill was invested at certain localities, in order to execute specific technology or food related maintenance and production tasks (De Loecker and Roebroeks 2012).

Definition

What follows is a brief summary of the local Pleistocene archaeology, focusing on the high residential mobility character of Early Neanderthals (Binford 1980). Data from more recent Maastricht-Belvédère studies is concisely integrated to illustrate the complexity of the artifact distributions. It will be argued that we are not dealing here with a "hit-and-run" record only.

Key Issues/Current Debates/Future Directions/Examples

The Maastricht-Belvédère Setting

The former Maastricht-Belvédère loess and gravel pit is located on the left bank of the river Maas, approximately 1 km north-northwest of the Dutch town of Maastricht (50° 52′09.40″N,

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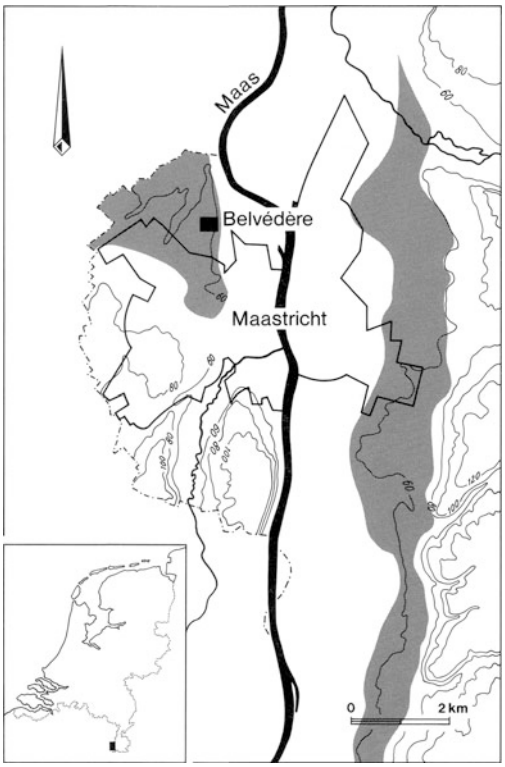

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Fig. 1 Location of the Maastricht-Belvédère quarry (The Netherlands). The shaded area shows the distribution of the Caberg Middle Terrace sediments. The Caberg plateau coincides with the western distribution of the Middle Terrace sediments of the local stratigraphy. (Figure after Roebroeks 1988: 1)

5°40′27.33″E, Fig. 1). Extensive fieldwork has focused on an interdisciplinary study of flint distributions, which occasionally were associated with faunal remains. Artifact scatters and patches (Isaac 1981) were generally preserved in primary archaeological context, in fine-grained sediments of the Middle Pleistocene River Maas. High rates of sedimentation created assemblages of a very limited time-depth (in Pleistocene terms) and enabled extensive refitting, spatial analyses, and interpretations beyond the site-level. By the end of 1990, excavations had uncovered a total of eight archaeological sites, together with a series of test pits (Tables 1 and 2). In total, a surface of 1,577 m^2 was excavated within an area of approximately six hectares of quarry (Roebroeks 1988; Roebroeks et al. 1992; De Loecker 2006).

The Middle Pleistocene river deposits yielded a full interglacial vertebrate fauna with 26 species (van Kolfschoten 1993) and a rich mollusc fauna containing more than 70 land as well as freshwater species (Meijer 1985). Both the terrace and loess stratigraphy and the mammal and mollusc biostratigraphical evidence indicate an age before the next-to-last glacial, i.e., prior to MIS 6 (van Kolfschoten et al. 1993). Thermoluminescence dating of heated flint artifacts yielded an age of 250 ± 20 ka (Huxtable 1993), and electron spin resonance dating of shells gave an age of 220 ± 40 ka, both corresponding to MIS 7 (van Kolfschoten et al. 1993). However, amino acid racemization dating of *Corbicula* shells from the interglacial deposits as well as biostratigraphically important elements of the mollusc fauna itself suggest an earlier, MIS 9 age for the Belvédère interglacial and its associated archaeology (Meijer and Cleveringa 2009).

Generally, the archaeological material from the main find bearing sediments, Unit IV, was recovered in the upper fine-grained part of a series of sediments deposited by a meandering river during MIS 7 (or possibly MIS 9). These fine-grained late Middle Pleistocene river deposits were subsequently covered by a thick sequence of Saalian and Weichselian silt loams (i.e., reworked and primary loesses).

Characterization of a "Veil of Stones"

The artifact distributions at Maastricht-Belvédère documented a number of well-preserved Early Neanderthal "on-site" activities which left a continuous artifact distribution on the paleo-surface (Roebroeks et al. 1992). Mainly because of the work of Isaac (Isaac 1981) at Koobi Fora (East fTurkana, Kenya), it became clear that the classical high-density lithic patches, coined as sites by archaeologists, are mostly present against a background of low-density scatters, covering isolated or small sets of artifacts. In an effort to explain the

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Table 1 Maastricht-Belvédère. Comparison (basic count and density per square meter) of the Unit IV primary context lithic assemblages. For details, the reader is referred to De Loecker (2006). (After De Loecker 2006: 236)

Site	Area dug (m^2)	Total number of artifacts	Density per square meter						
			Total number of artifacts	Chips <30 mm	Flaked artifacts ≥30 mm	Flakes	Blade-like flakes	Chunks	Burned artifacts
A	5	80[b]	16.0/6.8	9.4	6.4	6.0	0.2	0.2	0.2
B	20	6	0.3	–	0.3	0.25	0.05	–	–
C	264	3,067	11.61	10.11[c]	1.5[c]	1.48[c]	–[d]	0.071[d]	0.5[d]
D	–	11	–	–	–	–	–	–	–
F	42	1,177	28.0	24.28	3.69	3.19	0.14	0.35	0.35
G	50[a]	75	1.5/1.22	1.06/0.89	0.44/0.36	0.4/0.32	0.02/0.016	0.02/ 0.016	–
H	54	270	5.0	3.33	1.66	1.55	0.055	0.055	0.018
K	370	10,912	29.49	20.96	8.27	8.01	0.17	0.091	1.66
N	765	450	0.58	0.47	0.11	0.11	0.0013	–	0.0013
July 1990	7	15	2.14	1.14	1.0	1.0	–	–	–
L	–	8	–	–	–	–	–	–	–
M	–	44	–	–	–	–	–	–	–
O	–	10	–	–	–	–	–	–	–
Site N, level X	–	29	–	–	–	–	–	–	–
Section finds	–	67	–	–	–	–	–	–	–

Site	Area dug (m^2)	Total number of artifacts	Density per square meter					
			Cores	Core trimming elements sensu sticto	Tools	Tools sensu stricto	Long sharpening flakes	Transversal sharpening flakes
A	5	80[b]	0.2	0.4	0.4	0.2	–	0.2
B	20	6	–	–	–	–	–	–
C	264	3,067	0.015[c]	0.05[d]	0.087	0.018	–	–
D	–	11	–	–	–	–	–	–
F	42	1,177	0.047	0.12	0.19	0.071	–	–
G	50[a]	75	–	–	0.16/0.13	0.06/0.049	–	0.02/0.016
H	54	270	–	–	0.19	0.074	–	–

(continued)

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Table 1 (continued)

K	370	10,912	0.25	0.27	0.37	0.3	0.0027	0.0027
N	765	450	0.0013	0.0026	0.033	0.016	–	–
July 1990	7	15	–	–	0.14	0.14	–	–
L	–	8	–	–	–	–	–	–
M	–	44	–	–	–	–	–	–
O	–	10	–	–	–	–	–	–
Site N, level X	–	29	–	–	–	–	–	–
Section finds	–	67	–	–	–	–	–	–

[a]The excavated Site G area together with the test pit measures 61 m^2
[b]Within the excavated Site A area, only 34 artifacts were found
[c]Site C figures, after Roebroeks (1988; n = 3,067)
[d]Site C figures, after Schlanger's sample (Schlanger 1994; n = 1,438)

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Table 2 Maastricht-Belvédère. A comparison (basic count and ratios) of the Unit IV primary context lithic assemblages. For details, the reader is referred to De Loecker (2006). (After De Loecker 2006: 239)

Area		Number of artifacts					Ratio			
Site	Area dug (m^2)	All tools and fragments	Tools and fragments sensu stricto	Cores	Flakes and chips	Total	Tool: waste	Tool sensu stricto: waste	Core: waste	Core: tool
A	5	2	1	1	77	80[b]	1:39	1:78	1:77	1:2
B	20	–	–	–	6	6	–	–	–	–
C	264	23	5	4	3,040	3,067[c]	1:132	1:609	1:760	1:6
D	–	–	–	1	10	11	–	–	1:10	–
F	42	8	3	2	1.167	1,177	1:146	1:389	1:584	1:4
G	50[a]	8	3	–	67	75	1:8	1:22	–	–
H	54	10	4	–	260	270	1:26	1:65	–	–
K	370	137	111	91	10,684	10,912	1:79	1;97	1:117	1:2
N	765	26	12	1	423	450	1:16	1:35	1:423	1:26
July 1990	7	1	1	–	14	15	1:14	1:14	–	–
L	–	–	–	–	8	8	–	–	–	–
M	–	3	2	–	41	44	1:14	1:21	–	–
O	–	–	–	–	10	10	–	–	–	–
Site N, Level X	–	–	–	–	29	29	–	–	–	–
Section finds	–	4	3	1	62	67	1:16	1:21	1:62	1:4

[a]The excavated Site G area together with the test pit measures 61 m^2
[b]Within the excavated Site A area, only 34 artifacts were found
[c]Site C figures, after Roebroeks (1988; n = 3,067)

spatial distributions at Maastricht-Belvédère and to overcome the "solitary site" ocus, Isaac's (Isaac 1981) "scatters-between-the-patches" approach was used as a heuristical device. This resulted in the excavation of a "non-site," Site N. Here, 765 m^2 of the interglacial river deposits were meticulously excavated with the explicit aim of studying the character of the "background scatter" of flint artifacts and bones. The information from this low-density scatter was used to interpret the large-scale and continuous artifact distribution, both in low and high densities, referred to as a "veil of stones" by Roebroeks et al. (Roebroeks et al. 1992). A comprehensive lithic analysis showed that the main differences between the various sites, apart from differences in find densities, were to be found in fine-tuned typo−/technological variations (differences in percentages and ratios). At the same time, quantitative and qualitative refitting studies proved to be fundamental to study these subtle yet important differences (De Loecker 2006).

The individual "site-level" was transcended by integrating all the available data, recorded from the same fine-grained Unit IV sediments, into an "off-site" approach (Foley 1981; Isaac 1981). The archaeological relics are probably contemporaneous in Pleistocene terms, as they were discarded during a relatively short phase within the same warm-temperate interglacial period. Additionally, the find distributions were documented in a rather small area, which would suggest that they were formed under the "same" micro-environmental conditions, with no indications of significant changes in raw material availability. Precisely these research conditions inspired long-lasting field efforts and created the right setting for high-resolution analyses of a technological landscape.

Generally, two different kinds of find distributions can be distinguished within this spatial continuum. On the one hand, there are the "high-density patches" Sites C, F, H, and K. These are characterized by clusters of flint knapping debris, with high percentages of dorsal/ventral refits, realized during elaborate conjoining studies (Roebroeks 1988; De Loecker 2006). On the other end of the density scale are the low-density "off-site" distributions of Sites G and N. These predominantly consist of isolated and/or small groups of flakes and tools which yielded relatively few dorsal/ventral refits (Table 3) – a phenomenon that was present almost everywhere in the interglacial fluvial deposits. Tools are far more important in the scatters than in the patches. However, the prolific Site K stands out as relatively high numbers of sensu stricto tools (n = 111) were recorded here (Fig. 2). Eventually not one of these implements could be refitted into one of the extensive reduction sequences. Therefore, most of these tools (scrapers) may have arrived at the findspot as well-prepared finished (Levallois sensu stricto) products. The fact that they were produced on "nonlocal" finer grained flint points in the same direction. The high number of cores at Site K (n = 91), all produced on the spot, is also striking. That cores with considerable amounts of cortex were discarded in large quantities suggests that they were probably intended for local use only (De Loecker 2006).

At Site K, refitting resulted in the conjoining of 1,828 artifacts (16.8% of the total amount artifacts), i.e., 60.4 kg (61.7%) of the total weight of the flint assemblage (97.8 kg). These conjoinings, together with high percentages of cortex, indicate that several flint nodules entered the area without any (or hardly any) preparation, decortication, or testing (Fig. 3). Within the excavated area, the flint blocks were initially split into smaller units and decorticated. Intra-site spatial patterning shows that the individual parts or cores were subsequently transported to other zones within the excavated area. There further core-reduction and, finally, discard took place (De Loecker 2006). Although occasionally larger flakes were used as cores, natural flaws clearly played a major part in this initial "flaking" or splitting of the nodules. Together with some technological "flaking failures," this could indicate either an unselective choice of raw material or a lack of better quality raw material.

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Table 3 Maastricht-Belvédère. Comparison (refitted data) of the Unit IV primary context lithic assemblages. For details the reader is referred to De Loecker (2006). (After De Loecker 2006: 248)

Site	Number of refitted artifacts		Number of compositions	Number of connection lines	*Aufeinanderpassung* (production sequences)		*Aneinanderpassung* (breaks)		*Anpassung* (modifications)		*Einpassung* (inserts like heat damage)	
	n	%			n	%[a]	n	%[a]	n	%[a]	n	%[a]
A	20	25.0	9	11	9	81.8	2	18.1	–	–	–	–
B	2	33.3	1	1	1	100.0	–	–	–	–	–	–
C	659[b]	21.5[b]	?[c]	?[c]	?[c]	?[c]	?[c]	?[c]	?[c]	?[c]	–	–
D	5	45.5	2	3	1	100.0	–	–	–	–	–	–
F	153	13.0	45	105	81	77.1	24	22.9	–	–	–	–
G	25	33.3	10	15	7	46.7	8	53.3	–	–	–	–
H	40	14.8	14	27	16	59.3	10	37.0	1	3.7	–	–
K	1,828	16.8	321	1,582	1,221	77.2	245	15.5	55	3.5	61	3.9
N	73	16.2	25	49	11	22.4	38	77.6	–	–	–	–
July 1990	4	26.7	2	2	2	100.0	–	–	–	–	–	–
L	–	–	–	–	–	–	–	–	–	–	–	–
M	–	–	–	–	–	–	–	–	–	–	–	–
O	–	–	–	–	–	–	–	–	–	–	–	–
Site N, level X	–	–	–	–	–	–	–	–	–	–	–	–
Section finds	–	–	–	–	–	–	–	–	–	–	–	–

[a]The percentages are calculated from the total number of refits
[b]Site C figures after Roebroeks (1988; n = 3,067)
[c]No detailed data recorded (cf. Roebroeks 1988)

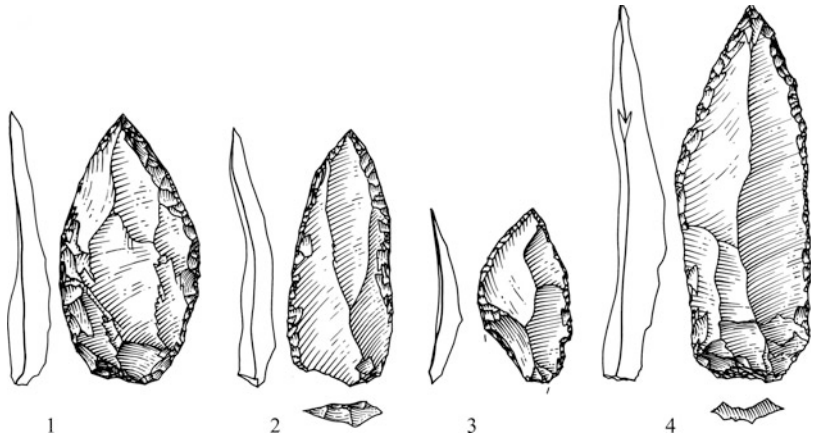

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Fig. 2 Maastricht-Belvédère Site K. Some of the tools sensu stricto (Mousterian points/convergent side scrapers) which could not be incorporated in one of the many refitted sequences from Site K. Scale 2:3. (Figure after De Loecker 2006: 507)

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Fig. 3 Maastricht-Belvédère Site K. Refitted composition shown from two sides (length = 253 mm, width = 330 mm, and thickness = 285 mm). The nodule weighs 9,286 kg (15.4% of the total weight of all conjoined Site K artifacts) and consists of 160 artifacts. It represents nine separately reduced parts or cores. (Figure after De Loecker 2006: 41)

Like Sites F and H, the Site K assemblage is generally characterized by large dimensions and "few" but large dorsal negatives on both cores and flakes, with limited attention for core preparation. Usually the negatives of flakes from an earlier stage in the reduction process are used as striking platform. The elaborate refitting study shows a strategy in which long "uninterrupted" sequences of flakes were produced by means of a "unifacial" and/or an interchanging bifacial disc(oidal) core approach (Boëda 1993). Cores were constantly turned and twisted to maintain good flaking angles. As a result, the assemblage can be described as reflecting a continuous, sometimes radial, removal of flakes. This makes it very difficult, or even impossible, to distinguish separate groups of flakes as "waste" or as "desired" products. Generally, it can be concluded that these "high-density patches" are mainly characterized by an ad hoc (expedient) technology.

A completely different kind of "high-density" find distribution was excavated at Site C (Roebroeks 1988). Here, several "smaller" artifact clusters were situated close to each other. The Site C flint assemblage is characterized by "smaller" dimensions and a well-prepared core approach, with several "classical" Levallois flakes and the products of a *débitage Levallois recurrent* (Boëda 1993), produced on finer grained Raw Material Units (RMUs). Refitting showed that

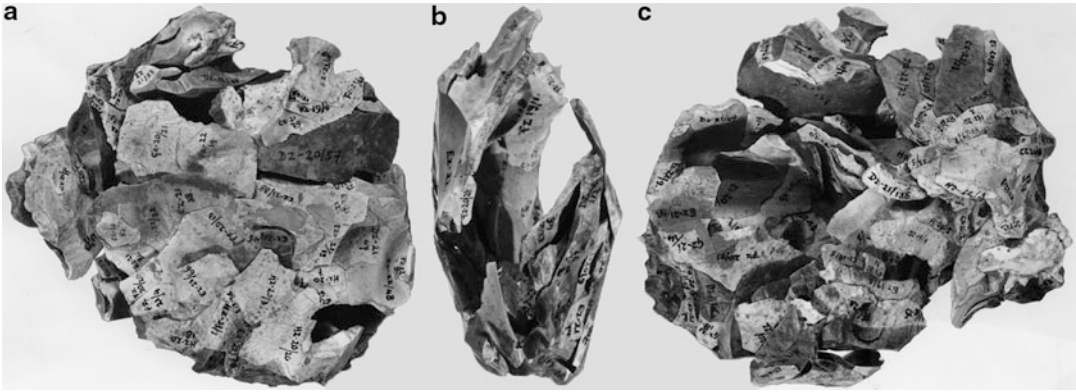

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Fig. 4 Maastricht-Belvédère Site C. Refitted composition shown from three sides (maximal dimension = 128 mm). The refitted composition consists of 162 elements and shows the flaking debris of a flat disc(oidal)-like core. The actual core was not recovered within the excavation boundaries, but must have been nearly exhausted. The initial flaking and decortication occurred previously outside of the excavated area. About 10% of the elements were burned. (Figure after Roebroeks 1988: 53)

several cores (and tools and flakes), in various stages of reduction, were introduced at the Site C location to be further worked on. Moreover, the excavated spatial configurations seem to represent flint-working events of which the products were transported from one area to another, where they were then abandoned (i.e., exhausted cores) and where a new reduction sequence of another RMU "started." Next, this new flaking sequence (or core) was transported to a "third" locus where its use-life again ended and where yet again a new one "started," etc. Subsequently, some prepared cores and flakes were transported away from the excavated area (Fig. 4). This is in clear contrast to Sites K, F, and H where most of the reduction sequences started and ended within the excavated area.

On the whole, the Sites C and K analyses indicate that at these "high-density patches," we are dealing with the remnants of two different, but related, technological strategies. On the one hand, a number of well-prepared (e.g., *Levallois recurrent*) cores, flakes, and tools, produced on finer grained flint, entered the excavated areas in already reduced forms or as "desired" products. This means that the initial flaking sequences were executed previously at other places in the landscape. Within the "site" boundaries they were, subsequently, further reduced, parts of the *chaines operatoires* or individual pieces were discarded on-the-spot, while reduced cores and produced flakes were transported to other locations (Roebroeks 1988; Roebroeks et al. 1992). On the other hand, a disc(oidal) core approach (Boëda 1993), with minimal attention for preparation, was used for the reduction of "locally procured," "coarser" grained, flint nodules. Most of the latter products were probably intended for ad hoc use only.

Between the large clusters of artifacts a diffuse artifact distribution was present all through the fluvial sediments at Maastricht-Belvédère. Segments of this low-density distribution have been excavated at Sites G and N (Roebroeks 1988; Roebroeks et al. 1992). No clear artifact concentrations were found. The mean artifact density was very low, ranging between 0.58 (Site N) and 1.22 (Site G) artifact/m^2 (Table 1). The highest percentages of tools were recorded at these scatters, with the tools recovered as stray finds and "worn out." Surprisingly a considerable number of larger and fragmented flakes (including *éclats debordants*,

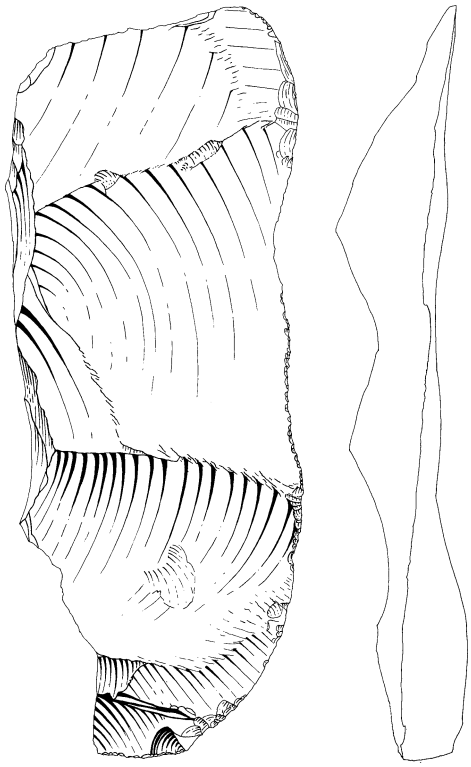

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Fig. 5 Maastricht-Belvédère Site G. Large flake with a sharp cutting edge and struck from the lateral side of a prepared core. This so-called *éclat débordant* is triangular in cross-section, shows a clear back (i.e., side of a core), and resembles a "backed knife." The implement could not be refitted to other excavated Site G lithic material. Scale 2:3. (Figure after Roebroeks 1988: 71)

Fig. 5) were recorded as well. These implements are considered to represent the discarded parts of transported "toolkits." Only very few refits could be established, which represent small parts of spatially fragmentized reduction/retouching sequences, while more than half of the Site G and N conjoinings consist of broken artifacts. At Site N, a few small refitted flakes testify to the passing of a core (Fig. 6), while resharpening flakes indicated that scraper-like objects were brought to, and subsequently removed from, the excavated areas (cf. Sites A and G, Fig. 7). One discarded "worn-out" double concave/convex scraper at Site N shows evidence of previous resharpening behavior, elsewhere in the paleolandscape (Fig. 8). Moreover, the flakes from these low-density scatters are larger than the ones from the rich sites. Apart from being voluminous, they have the highest mean number of scars and they show low cortex and flaw percentages. Their butts and dorsal surfaces are better or more often prepared, while the facetting indices are among the highest at Belvédère. The used raw materials show a large heterogeneity, which is also clear from the rather negative refitting results, i.e., dorsal/ventral refits. This seems to suggest that the "low-density" scatters reflect a series of non-related activities in the river valley landscape, separated in time and space, during various foraging trips.

All in all, compared to the "high-density" patches, these "low-density" scatters show distinct differences in the spatial patterning of the finds, in typology, technology, and in raw material composition (Tables 1, 2, and 3, see also De Loecker 2006). Together with the flint rich sites, the low-density scatters represent the traces of a very flexible and highly mobile use of stone tools in the Maas river valley, at least 250,000 years ago.

Time, Energy, and Skill Investment

Besides flint knapping, other (more time consuming) activities may have been performed at the excavated Maastricht-Belvédère locales. It is impossible to indicate the exact nature of these other site functions, because of a number of analytical limitations. For instance, only limited amount of (usually badly preserved) bone material was recovered. This could simply mean that at certain localities (e.g., Site K) faunal remains were never present, or it could be an outcome of decalcification of the site-matrix. Post-depositional processes were also responsible for the virtual absence of unambiguous use-wear traces. Some artifacts did display microscopic traces of use, but weathering prevented

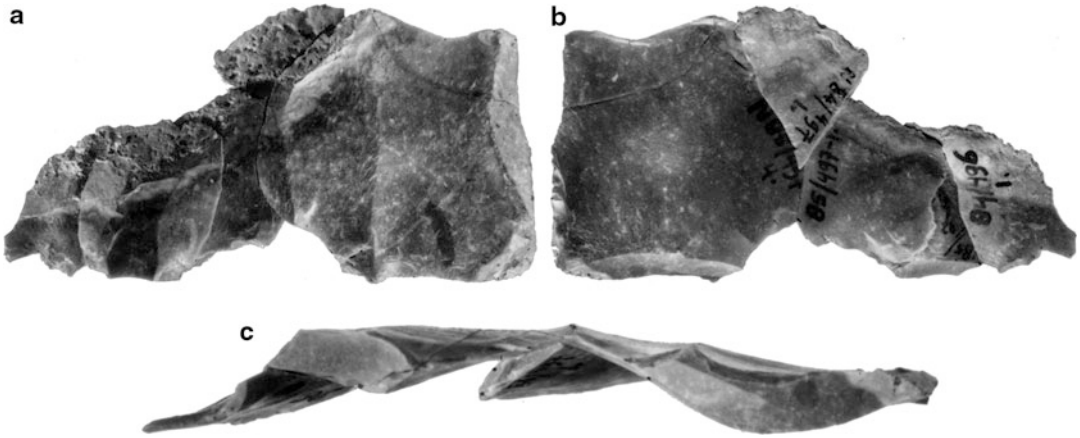

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Fig. 6 Maastricht-Belvédère Site N. A group of five refitted flakes (i.e., dorsal/ventral refits) indicating that a small knapping event (core-edge rejuvenation) was executed within the excavated area. Scale 2:3. (Figure after Roebroeks et al. 1992: 13)

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Fig. 7 Maastricht-Belvédère. Two "transverse sharpening flakes," which testify to the transient presence of scrapers. 1: Sites A. 2: Site G. Scale 2:1. (Figure after De Loecker 2006: 192, 208)

determination of the exact type of former use (van Gijn 1988). However, there is some data indicative of the character of certain activities, e.g., food (meat) acquisition for Site C and especially for Site G (Roebroeks 1988).

The Middle Paleolithic record indicates that Neanderthals were continuously transporting lithic equipment across the landscape. At Belvédère a broad assortment of morphological forms, usually made on "nonlocal" materials,

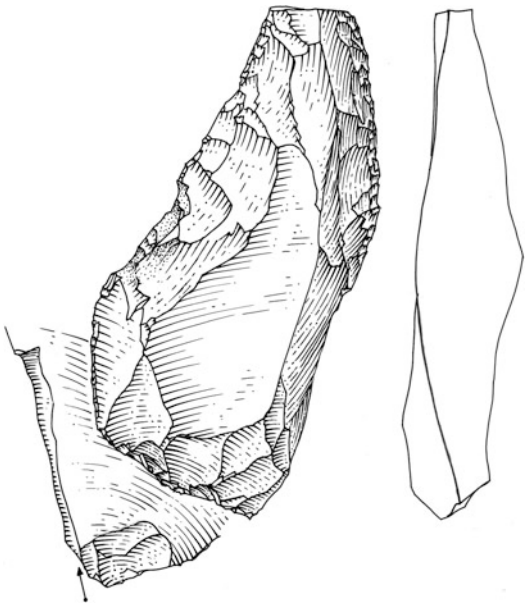

Maastricht-Belvédère: Interpretation of a Technological Paleo-surface, Fig. 8 Maastricht-Belvédère Site N. "Worn-out" double concave/convex scraper which shows evidence of previous resharpening behavior, performed outside the excavated area. At its proximal part a "long sharpening flake" was removed to rejuvenate the cutting edge. Scale 2:3. (Figure after Roebroeks et al. 1992: 8)

was part of the mobile toolkit, e.g., scrapers, (Levallois) flakes/cores (Roebroeks et al. 1992; De Loecker 2006). Understanding the initial choice and selection of raw materials for production of specific tools and cores and/or tasks is difficult. Contextual factors such as raw material quality, abundance, and accessibility, as well as thoughts about activities to be carried out in the future are among the determinants in raw material procurement and consumption processes. Each type of raw material required a separate evaluation, or better a different "conceptual scheme," to predict its suitability for specific activities.

As mentioned before, there are striking differences in raw material quality between locally produced items (more "coarse" grained flint with abundant natural imperfections and flaws) and transported Levallois (−like) objects (predominantly "fine" grained flint). Since the Levallois technique has a complicated *chaîne opératoire*, it can be stated that time and energy were invested in the procurement and selection of suitable raw materials. In general, the Pleistocene gravel beds of the river Maas (Unit III in the local sequence) contain pebbles of several different types of flint; in that sense all Maastricht-Belvédère flints are "local," as the gravels also contained the finer grained flint. At all Maastricht-Belvédère Unit IV sites fluvially abraded cortex was present. This indicates that raw materials (i.e., large flint cobbles at Site K) were probably collected from nearby river Maas deposits, reworked out of chalk cliffs some kilometers to the south of the locale (Roebroeks 1988). According to paleoenvironmental reconstructions (Meijer 1985; Duistermaat 1987), the Unit IV archaeological sites were located at c. 100–200 m distance from the main river stream. This means that no gravel beds (raw material sources) were present within a radius of at least 100–200 m around Site K. This possibly also means that after procurement, energy and time was invested in transporting the large and "heavy" nodules, at least 97.8 kg in total weight (De Loecker 2006), over a minimum distance of 100–200 m, to the Site K locus. The fact that these nodules entered the area without any (or hardly any) preparation, decortication, or testing implies a rather opportunistic behavior, parallel to, or complementary to, the well-planned activities, suggested by proper-prepared mobile (Levallois) items. At least it can be assumed that Site K was of such importance to early Neanderthal foragers, that a considerable amount of energy and time was invested in carrying large and heavy flint nodules to the activity area. Together with the transported toolkit, this shows a capacity to anticipate needs and suggests that sometimes longer periods of time were spent at a certain location.

In addition, specific find categories (i.e., studies of hematite finds [Roebroeks et al. 2012], and spatial interpretation of heated artifacts [Stapert

1990, 2007]), suggest that some of the activities performed at Maastricht-Belvédère may have gone beyond the limits of opportunistic "15-minute" flint knapping episodes or short butchering events (Hallos 2005). Especially at Sites C and K, vast quantities of heated artifacts co-occurred with dense clusters of debitage, tools, and sometimes cores. Physical hearth structures were not recorded. Several analytical studies (Stapert 1990, 2007) resulted in the identification of possible "phantom" hearths for Sites C and K. This could indicate that maintenance and production-related tasks may have been associated with (inferred) anthropogenic fires.

The Site C (and Site F) excavation also yielded some dots of reddish hematite. Roebroeks et al. (2012) concluded that the red ochre stains did not belong to the natural sedimentary environment, but had entered the matrix after formation, with the nonlocal material introduced to the sites by early Neanderthals. A number of performed experiments suggested that the fine hematite material was originally concentrated in a liquid solution and that blobs of this ochre-rich substance became embedded in the sediments during use of the liquid, spilled on the soil surface (Roebroeks et al. 2012). Strikingly however, the hematite was recovered at sites with evidence of fire and where subsistence- and maintenance-related tasks may have taken place. At the very least, the reported small hematite concentrates represent a very early case of red ochre use and manipulation, which minimally dates to MIS 7 (Roebroeks et al. 2012).

Conclusion

Large-scale excavations at the open-air sites of Maastricht-Belvédère and the subsequent typo-/technological, refitting, and spatial analyses allow detailed interpretations of late Middle Pleistocene Neanderthal behavior (Roebroeks 1988; De Loecker 2006). The sites are the outcome of episodic visits to a riverine landscape, where flint artifact discarding eventually resulted in a number of "high- and low-density" find distributions, with clear quantitative and qualitative variations. The early Neanderthals who created the archaeological record were definitely well-equipped foragers. At Sites C, G, K, and N, they entered the localities with finished tools, well-prepared initiated technological products (e.g., flakes and cores) as well as with raw materials (e.g., pieces of ochre), and, most importantly, the knowledge to put these items to good use in a wide range of environments. Stone artifacts probably played a major role in animal procurement and food processing. Beyond these subsistence-related activities, it can also be inferred that at the excavated locales, time was invested in the maintenance of technology. Moreover, the heated flint artifacts at the Sites C and K "high-density" patches could indicate the presence of former anthropogenic "phantom" hearths. At close range of these fires, a variety of tasks were executed, some of which may have involved the manipulation of red ochre (Roebroeks et al. 2012). Generally, these well-equipped late Middle Pleistocene foragers may have been attracted to the area by its diversity of natural resources, which included flint, fresh water, fuel for fires, and food supply. In addition, the spatial artifact distributions can be portrayed as fossils of their "foraging trails" in the landscape.

Each of the above mentioned "toolkit-elements" required special consideration, time investment, and a skilled control of raw materials. While equipped with tools produced elsewhere, these foragers also used locally available raw materials (collected at a minimum distance of about 100–200 m from Site K) to produce "situational gear" (De Loecker 2006). The "catchment area" of their technology, the know-how needed to produce fire, and in general terms their long-term survival in Pleistocene Europe are simple illustrations of a mobile adaptation which was based on a way of life which greatly surpassed the "15-minute cultures" (Hallos 2005), often envisaged for these hunter-gatherers. In that sense, we can picture these Early Neanderthals

as highly experienced "rock stars," who used their skills constantly during "daily" foraging tours.

Cross-References

- ▶ European Middle Paleolithic: Geography and Culture
- ▶ *Homo neanderthalensis*
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Mousterian Industry Tradition

References

Binford, L.R. 1980. Willow smoke and dogs' tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45: 4–20.

Boëda, E. 1993. Le débitage discoïde et le débitage Levallois récurrent centripète. *Bulletin de la Société Préhistorique Français* 90 (6): 392–404.

De Loecker, D. 2006. *Beyond the site. The Saalian archaeological record at Maastricht-Belvédère (the Netherlands)*. Leiden: University of Leiden.

De Loecker, D., and W. Roebroeks. 2012. Beyond '15-minutes': Revisiting the late Middle Pleistocene archaeological record of Maastricht-Belvédère (The Netherlands). *Analecta Praehistorica Leidensia* 43 (44): 349–367.

Duistermaat, H. 1987. Voorlopig resultaat van een malacologische analyse van een profiel uit Site G van de Belvédère. Unpublished typescript, Institute of Archaeology, University of Leiden.

Foley, R. 1981. Off-site archaeology: An alternative approach for the short-sited. In *Pattern of the past: Studies in honour of David Clarke*, ed. I. Hodder, G.L.I. Isaac, and N. Hammond, 157–183. Cambridge: Cambridge University Press.

Hallos, J. 2005. "15 minutes of fame": Exploring the temporal dimension of Middle Pleistocene lithic technology. *Journal of Human Evolution* 49: 155–179.

Huxtable, J. 1993. Further thermoluminiscence dates for burnt flints from Maastricht-Belvédère and a finalised thermoluminiscence age for unit IV Middle Palaeolithic sites. *Mededelingen Rijks Geologische Dienst* 47: 41–44.

Isaac, G.L.L. 1981. Stone age visiting cards; approaches to the study of early land use patterns. In *Pattern of the past: Studies in honour of David Clarke*, ed. I. Hodder, G.L. Isaac, and N. Hammond, 131–155. Cambridge: Cambridge University Press.

Meijer, T. 1985. The pre-Weichselian non-marine molluscan fauna from Maastricht-Belvédère (Southern Limburg, The Netherlands). *Mededelingen Rijks Geologische Dienst* 39 (1): 75–103.

Meijer, T., and P. Cleveringa. 2009. Aminostratigraphy of Middle and Late Pleistocene deposits in The Netherlands, with notes on published data from the southern part of the North Sea Basin. *Global and Planetary Change* 68: 326–345.

Roebroeks, W. 1988. *From find scatters to early Hominid behaviour. A study of Middle Paleolithic riverside settlements at Maastricht-Belvédère (The Netherlands)*, Analecta Praehistorica Leidensia 21. Leiden: Leiden University Press.

Roebroeks, W., D. De Loecker, P. Hennekens, and M. Van Ieperen. 1992. 'A veil of stones': On the interpretation of an early Middle Palaeolithic low density scatter at Maastricht-Belvédère (The Netherlands). *Analecta Praehistorica Leidensia* 25: 1–16.

Roebroeks, W., M.J. Sier, T.K. Nielsen, D. De Loecker, J.M. Parés, C.E.S. Arps, and H. Mücher. 2012. Use of red ochre by early Neandertals. *Proceedings of the National Academy of Sciences* 109 (6): 1889–1894.

Schlanger, N. 1994. Flintknapping at the Belvédère: Archaeological, technological and psychological investigations at the early Palaeolithic site of Maastricht-Belvédère (Limburg, The Netherlands), Unpublished Ph.D. dissertation, University of Cambridge.

Semaw, S., M.J. Rogers, J. Quade, P.R. Renne, R.F. Butler, M. Dominguez-Rodrigo, D. Stout, W.S. Hart, T. Pickering, and S.W. Simpson. 2003. 2.6-million-year-old stone tools and associated bones from OGS-6 and OGS-7, Gona, Afar, Ethiopia. *Journal of Human Evolution* 45 (2): 169–177.

Stapert, D. 1990. Middle Palaeolithic dwellings: Fact or fiction? Some applications of the ring and sector method. *Palaeohistoria* 32: 1–36.

Stapert, D. 2007. Youngsters knapping flint near the campfire: An alternative view of Site K at Maastricht-Belvédère (The Netherlands). *Archäologisches Korrespondenzblatt* 37: 19–35.

Van Gijn, A.L. 1988. Appendix I. A functional analysis of the Belvédère flints. In *From find scatters to early Hominid behaviour. A study of Middle Paleolithic riverside settlements at Maastricht-Belvédère (The Netherlands)*. Analecta Praehistorica Leidensia 21, ed. W. Roebroeks, 151–157. Leiden: Leiden University Press.

Van Kolfschoten, T. 1993. The mammal fauna from the interglacial deposits at Maastricht-Belvédère. *Mededelingen Rijks Geologische Dienst* 47: 51–60.

Van Kolfschoten, T., W. Roebroeks, and J. Vandenberghe. 1993. The Middle and late Pleistocene sedimentary and climate sequence at Maastricht-Belvédère: The type locality of the Belvédère interglacial. *Mededelingen Rijks Geologische Dienst* 47: 81–91.

Machu Picchu Artifacts: Repatriation

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Introduction

In 1911, a professor of South American history from Yale University drudged through the Andean jungle and rediscovered the ancient Incan ruins of Machu Picchu. Hiram Bingham had received permission from the government of Peru to return to Yale with 40,000 artifacts to study over an 18-month period. The artifacts were, for the most part, shards and fragments of pottery, jewelry, and human remains. While they were valuable for scientific research, only 350 of the artifacts were of museum quality.

The 18-month period for study came and went, and Yale did not return the objects to Peru. The issue became one of international importance, and in 1916, Bingham wrote to the National Geographic Society regarding the human remains. He explained, "Now they do not belong to us but to the Peruvian government, who allowed us to take them out of the country on condition that they be returned in 18 months. . . The whole matter has assumed a very large importance in the eyes of the Peruvians, who feel that we are trying to rob their country of its treasure" (Brice and Shoicet 2010).

Peru continued to demand repatriation of the objects, so Yale returned several boxes in 1921, presumably containing the fragments of human remains. However, Yale retained most of the objects, including the museum-quality pieces, which they housed at their Peabody Museum of Natural History. In the 1920s, Peru again requested the return of the remaining artifacts, but their requests were ignored.

For nearly 70 years, the issue lay dormant, until the year 2000, when Peru once again demanded the return of the remainder of the objects. Peru insisted that the loan agreement with Bingham applied not only to the human remains but also to the remainder of the 40,000 objects. Yale refused Peru's renewed request, claiming they had returned all lent objects, and the institution was the rightful owner of the objects remaining in their possession.

Peru would not relent, however, and the parties attempted to negotiate a settlement in 2007. They came to a contingent agreement that title to the objects would be granted to Peru, although many of the objects would remain at Yale for study and display. The following year, the agreement fell through, and Peru filed suit in a US federal court, demanding both return of all the objects and monetary compensation "far in excess of $75,000" for Yale's "wrongful retention" (Dibenedetto 2010).

Key Issues

From the beginning, the lawsuit faced two primary obstacles. First, in order for Peru to recover improperly removed objects, it would have to prove that its government was the legal owner of the objects when they were removed from the country. In a case involving the seizure by US Customs of 89 pre-Columbian artifacts from a private individual, the Central District Court of California found that Peru had only demonstrated national ownership of cultural property back to 1929, at the earliest (*Peru v. Johnson*, 720 F. Supp. 810 (C.D. Cal. 1989)). This means Peru's patrimony law (wherein the government lays claim to archaeological materials) would postdate Bingham's removal of the Machu Picchu objects from the country.

Another obstacle for Peru's lawsuit was that the statute of limitation or *laches* would have barred Peru's replevin action (a replevin action is a demand for return). Peru had made a formal demand for the return of the objects in the late 1920s and Yale refused. This refusal likely began the 3-year statute of limitations on replevin actions, yet Peru failed to file a claim for another 70 years.

While the case was being litigated, Peru mobilized a national effort to reclaim the artifacts. First, Peru publicly threatened Yale with criminal charges if the artifacts were not returned, although the basis of these criminal charges was neither stated nor apparent. Yale responded that while it respected "Peru's interest in archaeological material from Machu Picchu," Yale also owed "a duty to academic and cultural institutions everywhere to recognize their important contributions to the study and understanding of all the world's cultures" (Kennedy 2010). Peru's then-President Alan García Pérez then made a formal request for the intervention of US President Barack Obama, although no response was publicized.

Former President García mounted demonstrations in the cities of Lima and Cusco, where thousands of people marched to show unity and strengthen the country's demand for return of the artifacts. Peru solicited the support of Ecuadorian President Rafael Correa, who made a formal statement in support of Peru and said he would take this matter to the Union of South American Nations if necessary (Valencia 2010).

In the USA, nine runners in the New York marathon showed their support for Peru by wearing t-shirts demanding the return of the Machu Picchu artifacts. Former President García announced he had received a message of support from US Senator Christopher J. Dodd.

The public shaming had the intended result. In 2010, Yale sent representatives to Lima in an attempt to negotiate a new settlement concerning the artifacts. Peru and Yale reached an agreement in which Yale agreed to return the museum-quality objects in time for the 2011 centennial celebration of Machu Picchu's rediscovery. Yale agreed to return the remainder of the objects to the Universidad Nacional de San Antonio Abad del Cusco ("UNSAAC"), the closest university to Machu Picchu, where continuing research would be conducted and public exhibitions will be held (Orson 2012).

The new settlement agreement provided that Yale would be able to access the artifacts for research purposes and work jointly with Peruvian counterparts at the UNSAAC – Yale International Center for the Study of Machu Picchu and Inca Culture (Taylor 2011). Former President García also promised to ask for additional funding from parliament to construct appropriate facilities to house the artifacts. Peru further agreed to loan some artifacts to Yale to display at the Yale Peabody Museum of Natural History, although title to the objects would be transferred to Peru.

Through this initiative, Peru has demonstrated that it wishes to share center stage in the international movement to repatriate cultural property to artifact-rich nations. Countries such as Egypt, Italy, and Greece use political influence to reclaim extant cultural property, even when there are no legal grounds to mandate repatriation. When Peru's attempts to use legal means to reclaim the Machu Picchu artifacts failed, the country turned to the methods sometimes employed by other artifact-rich nations. Peru's apparent success with these methods demonstrates that the ethics-based repatriation movement is still a viable means for artifact-rich nations to reclaim archaeological property held in foreign nations.

Cross-References

- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation: Overview

References

Brice, A., and C.E. Shoicet. 2010. Peru's president: Yale agrees to return Incan artifacts, *CNN World* 20 April 2010. Available at http://articles.cnn.com/2010-11-20/world/peru.yale.artifacts_1_return-incan-artifacts-machu-picchu-artifacts-hiram-bingham?_s=PM:WORLD (accessed 2 February 2012).

Dibenedetto, E. 2010. Peru drops six charges in suit. *Yale Daily News*. Available at: http://www.yaledailynews.com/news/2010/mar/22/peru-drops-six-charges-in-suit/ (accessed 26 January 2012).
Kennedy, R. 2010. Peru seeks Obama's help in dispute with Yale. *New York Times*. Available at: http://artsbeat.blogs.nytimes.com/2010/11/03/peru-seeks-obamas-help-in-dispute-with-yale/ (accessed 26 January 2012).
Orson, D. 2012. Finders not keepers: Yale returns artifacts to Peru. *National Public Radio*. Available at: http://www.npr.org/2012/01/01/143653050/finders-not-keepers-yale-returns-artifacts-to-peru (accessed 26 January 2012).
Taylor, K. 2011. Yale and Peru sign accord on Machu Picchu artifacts. *The New York Times*. Available at: http://artsbeat.blogs.nytimes.com/2011/02/11/yale-and-peru-sign-accord-on-machu-picchu-artifacts/?scp=1&sq=yale/peru&st=cse (accessed 26 January 2012).
Valencia, A. 2010. Ecuador wants Yale to return artifacts to Peru. *Reuters*. Available at: http://www.reuters.com/article/2010/10/27/us-ecuador-peru-incas-idUSTRE69Q0BO20101027 (accessed 26 January 2012).

Further Reading

Alderman, K. 2010. Yale agrees to return Machu Picchu artifacts to Peru: Ethics-based repatriation (University of Wisconsin Legal Studies Research Paper 1147). *Cultural Heritage and Arts Review* Fall/Winter 2010.
Nutman, S. 2011. Returning to Machu Picchu. *Yale Daily News*. Available at: http://www.yaledailynews.com/news/2011/feb/14/returning-to-machu-picchu/ (accessed 26 January 2012).
Peruvians demonstrate in Lima and Cusco protesting Yale. 2010. *Living in Peru*. Available at: http://archive.livinginperu.com/news/13495 (accessed 26 January 2012).

Machu Picchu: Geography and Culture

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Introduction

Machu Picchu is an archaeological site known worldwide. Furthermore, it is the most emblematic site in the archaeology of Peru and in building national discourses. It has undergone a series of missions and "scientific" explorations since the late nineteenth century, such as Antonio Raimondi, Clements Markham, and Charles Wiener (Mould de Pease 2008a). Between 1868 and 1919, it was represented by the mapping done by these travelers. In 1874 it was recognized by the Peruvian government in official map drawn up by the German geologist Herman Göring (Mould de Pease 2008b; Gavazzi 2012: 42). In 1911, the American explorer Hiram Bingham claimed to have discovered this site as the "Lost City of the Incas." This would be the "scientific discovery" of Machu Picchu. Seventy years after this discovery, the site was declared by the Peruvian government as "National Protected Area by the State," and it was in 1983 when it was declared "World Cultural Heritage" by UNESCO. However, in 2011, this organization included it in its list of World Heritage in Danger.

Definition

The site of Machu Picchu amazes for the ability of its planners and builders, the Incas, to establish a monumental architecture within a natural environment so difficult. So, in this entry, the intimate relationship that Machu Picchu has between the geography inscribed in the nature of the area and the company of its designers, builders, and original users and their sacred status for this cultural group is going to be described.

Key Issues/Current Debates/Future Directions/Examples

Machu Picchu is located at coordinates 13° 9′ 47″ south latitude and 72° 32′ 44″ west longitude. Currently, it is part of the district of the same name, in the province of Urubamba, in the Department of Cuzco in Peru, about 2,430 m above the sea level. It is located about 80 km northwest of

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the regional capital and current ancient Inca capital, Cusco. Currently, the fastest way to get there is through land transport or train crossing the tracks that follow the natural path in the valley of Urubamba or *Sacred Valley* to the town of Aguas Calientes, renamed as Machu Picchu town. From this town, located in the valley, at kilometer 110 of the highway coming from Cusco, it is possible to ascend directly to the archaeological site. You can also reach the site on foot along the so-called long way which takes about 3 days. This trail starts at kilometer 88 of the highway in Qorihuayrachina located at the very bottom of Urubamba valley, but from there, you enter the mountainous area. This "long way" goes across the rugged Andes passing through a series of Inca settlements and sites reaching 4,250 m of altitude above sea level (Open Warmiwayñuska) where you have spectacular views of the mountains nearby like Salkantay, considered "apus" or tutelary gods of the ancient and modern inhabitants of the area. The Inca sites of Runkuracay, Sayacmarca, Phuyupatamarca, Wiñay Wayna, Intipata, and many more, apart from being ancient complex and agricultural terraces systems, complete the long route which ends at the site of Machu Picchu.

The site itself occupies mainly the top of the rocky outcrop known as Machu Picchu ("Young Mountain") and a natural backdrop to the north known as Huayna Picchu ("Old Mountain"), which also owns some buildings from the Inca period. Both hills are part of a large orographic formation known as Vilcabamba Batholith, composed of intrusive igneous rocks, particularly granite white to gray. The bases of both geological formations are on the left bank of the Urubamba River which almost entirely surrounds it describing a closed *meander* around *them*. *This area of the valley* was formerly known as Picchu Gorge and is on the eastern slopes of the Peruvian Andes since the waters of this river flow into the jungle. The ruins of Machu Picchu are located approximately at 400 m above the bottom of the valley. Biogeographically, they are in the Peruvian Yungas ecoregion, specifically in the area known as mountainous forests of the eastern slopes of the Andes of Peru.

The floor area of the site, or *llacta*, is about 5 ha (Gavazzi 2010: 241). The site can be divided into two sectors according to type, number of architectural structures, as well as a straight wall that separates them. Thus we have the southeast sector dominated by terraces and systems that would be the agricultural zone and the northwest known as residential or monumental (Canziani 2009: 459). In turn, the residential sector is spatially divided into two parts by a large square. In typically Incas settlements, this division represented the biases called *Hanan* (top, higher) and *Hurin* (below, lower), a division with economic-political connotations besides ideological ones. This residential sector has 200 architectural structures which seem to have housed a thousand inhabitants (Gasparini and Margolies 1977: 96). The buildings are made of granite blocks taken from a nearby quarry and are known as *kanchas*, the basic unit of Inca architecture, and which are composed of a series of rectangular structures surrounding a courtyard which allow direct access. Also, there are open spaces with no construction such as plazas. In addition, of the buildings made of stone that were roofed with plant material which comprises the core of the site, much of the work was invested in the construction of terraces on top of the hill and on its lower slopes which allowed to stabilize the large concentration of buildings and better drainage of rainfall, as well as they were used for agricultural crops.

The consensus among scholars is that the site was built and occupied only during the Inca period. Also, different authors (Rowe 1990; Burger and Salazar 2004) agree, based on ethnohistoric references, that the city was built during the time of Pachacutec government (c. 1450), one of the most enterprising rulers of the Inca Empire. It has even been suggested that this site would have located his mausoleum. Beyond this, it is clear that the site was built in the place for its natural conditions and landscape, a widespread practice in different places where the Incas built their

main buildings. Also, the distance from the capital of Cusco and its location in the natural route that goes to the high forest would provide a space away from the capital to the rest of the elite that was occupied and the development of specialized agriculture activities (e.g., growing corn (*Zea mays*) and coca (*Erytroxylum*) *coca*) and in a place that, like many of the Inca buildings in different ecological areas, established the employment of architecture in spectacular landscapes connected to land, sky and its stars, the sea, and other relevant elements in the scenery. The amount of ceremonial-based architecture is so high in comparison to domestic-like structures that the site may have mainly served for sacred and ceremonial activities.

The diversification in technology and structures, most of which unfinished, indicates that multi-technology skill builders, mainly from different areas of the Tahuantinsuyu, collaborated to the construction process. The unfinishing also shows that the site was abandoned at the time of the Spanish Conquest. These three elements – the ceremonial destination, techno- and typological diversification and the unfinished state – are coherent with the hypothesis that Pachacutec may have intended to reunite various religious and astronomical traditions in one site, to better integrate the expansion of the Tahuantinsuyu; his *panaca* (royal family) may have led the construction throughout time until the Spanish invasion.

As we saw, the site has a sacred character since the mausoleum of the Inca Pachacutec would have been built there, which would be located in the structure called the "Turret" (National Institute of Culture of Cusco 2005). In this mausoleum the Incas built three walls that serve to stabilize a granite block and are partly a natural ceiling of the cave, which would house the mummy of this ninth Inca, which would have been stolen during the colonial period and was held by the Spanish until it was lost. The site also includes the classic Incas carved stone buildings, a number of elements that articulate internally with nature and the surrounding geography. For example, the system of canals that run through the site allows the existence of freshwater spring collection whose purposes were pragmatic and ritual (Mays and Gorokhovich 2010: 188). Also, a number of natural caves were modified and used as part of their ritual spaces. Additionally, some sculptures were carved in the rocky outcrops, as the one representing a bird, in what has been called the *Temple of the Condor*, and highlight the relationship that their designers and builders wanted to convey with regard to the nature and the symbolism which, for them, the sculptures involved. Also, another rocky outcrop known as the Intihuatana sculpted or the construction of buildings like the same *Temple of the Sun* or *Turret* that is around a large rocky outcrop links the site directly with the observation of the movement of the sun in the sky. Finally, the big rock carved or *Sacred Rock*, which mimics the horizon formed by the mountain called Yanantin, makes clear the link between the Inca culture and geography.

Regarding protection, Machu Picchu was declared an intangible territory by the Peruvian state and therefore is protected by the National System of Protected Natural Areas (SINANPE) which, in turn, is part of the National Park System under control of Peru's National Institute of Natural Resources (INRENA). Therefore, the area where the site is has been designated as Historic Sanctuary of Machu Picchu. The Historic Sanctuary protects a number of biological species in danger of extinction and several Incas establishments, including Machu Picchu which is considered the main one. In the Americas, Machu Picchu and the Mayan site of Tikal in Guatemala are the only two sites considered by UNESCO as a World Heritage inscribed with double category of Natural and Cultural.

At present, we can recognize four main themes in current national and international debates about the place: (1) the history of the discovery of Machu Picchu archaeological site (Aguilar 2011; Vilela and De La Puente 2011); (2) the use of the site as a tourist destination and its subsequent

preservation and conservation (Martorell 2002; López Lenci 2005); (3) the use of Machu Picchu as part of the generation of a local identity, regional and/or national, and the "institutionalization of memory" (Flores Ochoa 2004; Jallade 2012); and (4) the relationship of indigenous communities and property and/or enjoyment of the site for tourism (Zan and Lusiani 2011; Aguilar and Tantaleán 2012).

A better way to route all these talking points, archaeological, anthropological, sociological, and historical in-depth research are necessary; fortunately these have already been generated in the last decade. Also, these discussions need to be grounded in a reflection on the way we are managing the archaeological site, which has a neoliberal orientation, also adopted by the Peruvian state.

Also, within the cultural policies of the Peruvian state and international organizations related to the archaeological and cultural heritage, the communities associated with the site must be recognized as active agents of this management and enjoyment. Consequently, the state institutions that protect and manage the site will need to establish better channels of dialogue with the communities. Furthermore, it is expected that in the coming years the communities near Machu Picchu strengthen their processes of interference and ownership of the site. Finally, as we have seen, it is important to recognize that the site was inscribed on the landscape within an Andean rationality that should seek to be maintained, as far as possible, for which we need the commitment and involvement of the various political and economic institutions, private companies, and social groups involved.

Cross-References

- ▶ Andes: Prehistoric Period
- ▶ Cultural Heritage Management and Native Americans
- ▶ Inca State and Empire Formation
- ▶ UNESCO (1972) and Malta (1992) Conventions

References

Aguilar, M. 2011. Entre diálogos y repatriaciones. Reparación colonial por la memoria y preservación de Machu Picchu. *Antípoda* 12: 211–234.

Aguilar, M., and H. Tantaleán. 2012. Estado, patrimonio cultural y comunidades indígenas: Machu Picchu y la historia de un diálogo asimétrico. In *Multivocalidad y activaciones patrimoniales en arqueología: Perspectivas desde Sudamérica*, ed. M. de Rivolta, M. Montenegro, and L. Menezes. Buenos Aires: Instituto Interdisciplinario Tilcara, Facultad de Filosofía y Letras, Universidad de Buenos Aires.

Burger, R., and L. Salazar. 2004. Lifestyles of the rich and famous: Luxury and daily life in the households of Machu Picchu's elite. In *Palaces of the ancient New World: Form, function, and meaning*, ed. S. Toby Evans and J. Pillsbury, 325–357. Washington, DC: Dumbarton Oaks Research Library and Collection.

Canziani, J. 2009. *Ciudad y territorio en los Andes. Contribuciones a la historia del urbanismo prehispánico*. Lima: Pontificia Universidad Católica del Perú.

Flores Ochoa, J. 2004. Contemporary significance of Machu Picchu. In *Machu Picchu: Unveiling the mystery of the Incas*, ed. R. Burger and L. Salazar, 109–123. New Haven: Yale University Press.

Gasparini, G., and L. Margolies. 1977. *Arquitectura Inka*. Caracas: Centro de Investigaciones Históricas y Estéticas, Facultad de Arquitectura y Urbanismo. Universidad Central de Venezuela.

Gavazzi, A. 2010. *Arquitectura Andina*. Lima: Apu Graph ediciones.

Gavazzi, A. 2012. Espacios sagrados: La herencia de los centros ceremoniales en la arquitectura Inca de Machu Picchu. In *Perú mágico II. Homenaje a Machu Picchu*, comp. M. Villavicencio, 41–59. Lima: Estruendomudo.

Instituto Nacional De Cultura Del Cusco. 2005. *Machupicchu, historia, sacralidad e identidad*. Lima: Impresión Konygraf.

Jallade, S. 2012. L'homogène et le pluriel. L'exemple de la multiculturalité au Pérou. *Droit et Cultures* 62 (2). (Spanish translation: La reinvención de las rutas incas: Representaciones y construcción de la memoria en el Perú (2001–2011)). Available at http://www.qhapaq-nan.org/rutas-incas-construccion-memoria.html

López Lenci, Y. 2005. La ciudad del Cusco hoy: ¿lugar sagrado y/o marca registrada de una cultura globalizada? Available at http://www.iai.spkberlin.de/

Martorell, A. 2002. Machu Picchu, patrimonio cultural y natural de la humanidad: Problemas y alternativas. *Ecosistemas* 2002(2). Available at http://www.um.es/gtiweb/adrico/medioambiente/machu%20picchu.htm

Mays, L., and Y. Gorokhovich. 2010. Water technology in the ancient American societies. In *Ancient water technologies*, ed. L. Mays, 171–200. New York: Springer.

Mould de Pease, M. 2008a. De la propiedad de Machu Picchu. *Lima CAP. Revista especializada en arquitectura, urbanismo, y territorio* 2 (7): 58–60.
Mould De Pease, M. 2008b. *Disco compacto: Mapas que muestran a Machu Picchu antes de las visitas de Hiram Bingham. 1868–1910*. Cuzco: Sociedad Pro Cultura, Clorinda Matto de Turner. Colección Franklin Pease G.Y. para la Historia Andina del Perú, BNP.
Rowe, J. 1990. Machu Picchu a la luz de documentos del siglo XVI. *Histórica* 14 (1): 139–154.
Vilela, S., and C. De La Puente. 2011. *El último secreto de Machu Picchu. Quién es dueño de la ciudadela de los Incas*. El Comercio: Lima.
Zan, L., and M. Lusiani. 2011. Managing change and master plans: Machu Picchu between conservation and exploitation. *Archaeologies: Journal of the World Archaeological Congress* 7 (2): 329–371.

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Basic Biographical Information

Neil William George Macintosh was born in Sydney, Australia, on December 27, 1906, and died on November 27, 1977 (Shutler 1992: 92). He attended Fort Street Boys' High School (1920–1925), a prestigious high school, where he gained honors in history and English and was awarded a scholarship to the Faculty of Medicine at the University of Sydney. A keen swimmer since high school, Macintosh was an honorary instructor and received a merit award from the Royal Life Saving Society. At the University of Sydney, he was awarded a "Varsity Blue" four times for outstanding sporting achievement in swimming (1927, 1928, 1929, and 1930). Taking a 2-year sabbatical from study, he spent this as an apprentice on a ship station in western New South Wales.

Macintosh completed a Bachelor of Medicine and Bachelor of Surgery in 1933. He served as registrar in the neurosurgical unit at Lewisham Hospital (1934–1935) and then became medical superintendent (1936–1937). During this period, his holidays were spent acting as ship's surgeon on two trips to Java. He finally returned to postgraduate studies while abroad and took courses in Edinburgh, London, and Budapest (1937–1939). Upon the outbreak of World War II, Macintosh was mobilized into the Royal Australian Naval Reserve where he saw active service at sea in the Indian and Pacific oceans as a surgeon lieutenant commander until he was invalided out from the Navy in 1943 (Elkin 1978a: 86).

In early 1944 Macintosh joined the war-depleted staff of the Department of Anatomy at the University of Sydney. Perhaps spurred by the universities' Professor of Anatomy, Joseph Lexden Shellshear, and anthropology professor, Adolphus Peter Elkin, Macintosh developed an interest in anthropology. Enrolling in a postgraduate Diploma of Anthropology at Sydney, he completed Anthropology I and II courses (1944–1945) with high distinctions (Elkin 1978a: 86). Not surprisingly, his diploma thesis *Critical Studies on the Antiquity of Man in Australia* (1950) was grounded in anatomy, his background of expertise, and reflected his burgeoning interest in physical anthropology. Additionally, elective courses, such as geology, introduced Macintosh to aspects of archaeology which reinforced his interest (Elkin 1978a: 86).

Macintosh remained with the University of Sydney Anatomy Department for the rest of his working life. Initially, he began work as a demonstrator (1944), followed by the position of lecturer (1945–1947) and senior lecturer (1948–1949). Following the conferral of his diploma, Macintosh was appointed as Reader (1950–1954). After a period as acting professor in the department, he was appointed to the Challis Chair of Anatomy (1955–1973). An enthusiastic and dynamic lecturer in the Anatomy Department (Stone 2000), Macintosh became affectionately known to his students and friends alike as "Mac" or "Black Mac," in reference to his constant smoking (C. Smith pers. comm.)

Upon retirement Macintosh was appointed emeritus professor and honorary associate of the

Department of Surgery. His endeavors in anthropology brought him various appointments throughout his lifetime. Elected president of the Anthropological Society of New South Wales in 1951, he went on to become a foundation member of the Australian Institute of Aboriginal Studies in 1961 and subsequently became chairman (1966–1974). Together with Professor Elkin, Macintosh launched the journal *Archaeology and Physical Anthropology in Oceania* (1963). Toward the end of his life, his global reputation grew. While in Czechoslovakia in 1970, he was awarded the Hrdliéka Memorial Medal, named in honor of Czech physical anthropologist Dr. Ales Hrdliéka (1869–1939), and the Anthropos Medal by the Moravian Museum in Brno (Stone 2000).

Macintosh died of cancer on November 27, 1977. His body was cremated. Elkin, his former supervisor, research collaborator, and friend of 33 years, delivered his crematorium address, concluding it with a quote adapted from Whitman (1860) *Of the Terrible Doubt of Appearances*:

I cannot answer the question of identity beyond the grave, but I am satisfied, he ahold of my hand has completely satisfied me. (Elkin 1978b: 133; After Whitman 1860: 353).

Macintosh did not gain professional qualifications in archaeology, a vocation that was largely the purview of museum staff and amateurs during his formative studies. Nevertheless, his work acted as an antecedent to the discipline in Australia. Ultimately, he was among the founders of modern Australian archaeology (Shutler 1992: 94).

Macintosh married twice, his first ending in divorce in 1945; he remarried in 1965. His bride, Ann Margaret Scot Skirving, had been the secretary in the Department of Anatomy from 1947 and was from a prominent family which included her grandfather, Sir Edmund Barton, the first prime minister of Australia (Stone 2000). Having no children, his widow carried his legacy on as a major benefactor to the Sydney Medical School. Her endowments made possible the refurbishment and modernization of the dissecting rooms, later renamed in honor as the Macintosh dissecting rooms. Additional donations made in 1994 to the University of Sydney facilitated in establishing the NWG Macintosh Centre for Quaternary Dating. Upon her death, the remainder of her estate, $5 million, was left as a legacy for the purposes of the NWG Macintosh Memorial Fund, a fund to support graduate and postgraduate student researchers in the Department of Anatomy and Histology, including the JL Shellshear Museum (Witton 2013).

Major Accomplishments

Though he primarily focused on physical anthropology, Macintosh's scholarly publications were diverse, tackling the breadth of archaeological problems that faced Australian prehistorians during the 1950s and 1960s. His contributions expanded understandings of the antiquity of the peopling of Australia, the diversity of Aboriginal people over time and space (Macintosh 1965), and the arrival, domestication, and role of the dingo in Aboriginal culture (Barker and Macintosh 1979).

Macintosh undertook fieldwork in 1949 and 1951 as a member of Professor Elkin's central Arnhem Land expeditions. He used these opportunities to study and address a wide range of issues. Taking stature and physiognomy measurements of various Arnhem Land people, his results challenged current theories of trihybridism proffered by Joseph B. Birdsell and Norman B. Tindale (Macintosh 1952). Along with Stanley Larnach, Macintosh further tested this theory in the 1960s using craniological research on Queensland skulls (Westaway and Hiscock 2005: 144).

Macintosh's research was not confined to physical anthropology. His excavations and rock art studies at Tangtangjal (*Tandandjal*) and Beswick Creek (*Doria Gudaluk*) caves made major contributions to the paucity of archaeological data and provided a wider understanding of the social, economic, and ritual values imbued in rock art. One of

his most cited articles is his 1977 article, "Beswick Creek Cave two decades later: a reappraisal," considered today as core reading within rock art studies. Macintosh's caution in this paper against ascribing meaning to motifs without relevant knowledge from local people is fundamental to Australian rock art research and inspires continued analysis (e.g., Smith et al. 2016).

References

Barker, B.C.W., and A. Macintosh. 1979. The dingo – A review. *Archaeology & Physical Anthropology Oceania* 14: 27–53.

Elkin, A.P. 1978a. N. W. G. Macintosh and his work. *Archaeology & Physical Anthropology Oceania* 13 (2/3): 85–142.

Elkin, A.P. 1978b. Crematorium address given by Professor A. P. Elkin, March 6, 1978. *The Anatomical Record* 192: 131–132.

Macintosh, N.W.G. 1951. Critical studies on the Antiquity of Man in Australia. Unpublished Diploma of Anthropology, University of Sydney.

Macintosh, N.W.G. 1952. Stature in some aboriginal tribes in South-West Arnhem Land. *Oceania* 22 (3): 208–215.

Macintosh, N.W.G. 1965. The physical aspect of man in Australia. In *Aboriginal man in Australia*, ed. R.M. Berndt and C.H. Berndt, 29–70. Sydney: Angus and Robertson.

Macintosh, N.W.G. 1977. Beswick Creek cave two decades later: A reappraisal. In *Form in indigenous art: Schematisation in the art of Aboriginal Australia and prehistoric Europe*, ed. P. Ucko, 191–197. Canberra: Australian Institute of Aboriginal Studies.

Shutler, R. 1992. N.W.G. Macintosh: Scientist, scholar, mentor and friend. *Archaeology in Oceania* 27: 91–94.

Smith, C., I. Domingo, and G. Jackson. 2016. Beswick Creek cave six decades later: Change and continuity in the rock art of Doria Gudaluk. *Antiquity* 90: 1613–1628.

Stone, J. 2000. Macintosh, Neil William George (1906–1977), Professor of Anatomy and Anthropology. In *Australian dictionary of biography*, ed. J. Ritchie, vol. 15, 228–230. Melbourne: Melbourne University Press.

Westaway, M., and P. Hiscock. 2005. The extinction of rigour: A comment on 'The extinction of the Australian Pygmies' by Keith Windschuttle and Tim Gillin. *Aboriginal History* 29: 142–148.

Whitman, W. 1860. Of the terrible doubt of appearances. In *Leaves of grass*, ed. W. Whitman, 352–353. Boston: Thayer and Eldridge.

Witton, V. 2013. The nurse who loved Dingoes. Available at: http://sydney.edu.au/alumni/sam/march2013/ann-macintosh.shtml. Accessed 3 Jan 2016.

Further Readings

Larnach, S.L., and N.W.G. Macintosh. 1970. *The craniology of the Aborigines of Queensland*, Oceania Monograph 15 Glebe. New South Wales: Australasian Medical Publishing Company.

Macintosh, N.W.G. 1951. Archaeology at Tandandjal Cave, South-west Arnhem Land. *Oceania* 21: 178–204.

Macintosh, N.W.G. 1952. Paintings in Beswick Creek Cave, Northern Territory. *Oceania* 22 (4): 256–274.

Murray, T. 1997. History of physical anthropology in Australia. In *The history of physical anthropology: An encyclopedia*, ed. F. Spencer, 133–138. New York: Garland Press.

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Basic Biographical Information

Richard Macphail first encountered soil science and soil micromorphology when studying Geography and Geology ("joint honors" 1973) at Swansea University, Wales. There, he received his first training under Mike Bridges (ex-Soil Survey of England and Wales), which led to him carrying out a soil survey of Brenig's ancient landscape, Denbighshire, Wales, for the Department of Ancient Monuments (which became English Heritage, and more recently "Historic England"). An MSc in Pedology and Soil Survey at Reading (1974) followed at one of the only two centers where soil micromorphology was taught in the UK. John Dalrymple (Reading) also acted as an advisor and examiner

for his PhD (CNAA, Kingston Polytechnic, 1979) entitled "Soil Variation on Selected Surrey Heaths." By this time, Macphail was in the Department of Environmental Archaeology, Institute of Archaeology, University of London as the "English Heritage" contract soil scientist for England, being mentored by Helen Keeley. In this role, he developed an integrated holistic approach to the study of archaeological soils and deposits.

During the 1980s his postdoctoral micromorphology training included:

- Regular visits for thin section checking and discussion with Peter Bullock and Chris Murphy (Soil Survey of England and Wales, Rothamsted)
- Many trips to the Institut National Agronomique, Paris-Grignon, France for thin section manufacturing and discussion (Nick Fedoroff and Marie-Agnès Courty)
- Collaborations with John C. C. Romans (Macaulay Institute, Aberdeen) and Paul Goldberg (then at Hebrew University, Jerusalem, Israel)

At the same time, Macphail was also guided by Herman Mücher (Amsterdam), Georges Stoops (Gent), and other Europeans and received a prepublication copy of the multi-author *Handbook for Soil Thin Section Description* (Bullock et al. 1985). This methodology was thus applied systematically to English archaeological sites along with standard soil science methods from Macphail's earliest days in the subject. Also during the 1980s Marie-Agnès Courty, Paul Goldberg, and Macphail worked together on the first textbook applying soil science and soil micromorphology to archaeology (Courty et al. 1989). A new version of this book by Macphail and Goldberg has just been published in October 2017 (*Applied Soils and Micromorphology in Archaeology*, CUP) and represents an update and summary of new methods and studies since the first volume was published 30 years ago.

Macphail has worked mainly in England and Europe, especially in Italy and France (Macphail et al. 1997), with a more recent focus on Scandinavia. There have also been forays into the Caribbean and Africa for the US Navy, collaborations with Paul Goldberg in North American and Gibraltar, and site studies in the Negev, Israel, Imjin Valley, Korea and Loess Plateau, China (Macphail and Crowther 2007), and most recently Belize (Macphail et al. 2017). Research topics include palaeoagriculture (cultivation and pastoralism), integrated microstratigraphic analysis employing soil micromorphology, microchemical, bulk soil, macrofossil and microfossil analyses, Dark Earth, occupation/floor deposits, inundation of archaeological sites, salt working, and experiments in geoarchaeology, which led to modelling evidence for settlement morphology reconstruction (Macphail et al. 2003); Macphail et al. 2016). In addition to regular employment of instrumental techniques (e.g., SEM/EDS), numerous interdisciplinary collaborations have been developed with chemists (John Crowther, Lampeter, University of Wales; Johan Linderholm, Umeå University, Sweden) and botanists (e.g., G. M. Cruise), (Macphail et al. 2007).

The first workshop in archaeological soil micromorphology was initiated in 1990, and since that time one to two international workshops have been held each year mainly in England and Europe, with Macphail in attendance as the ad hoc coordinator of these. From 2006 he has run intensive short courses in Archaeological Soil Micromorphology at the Institute of Archaeology, University College London, employing his wide reference collection and numerous case studies. This teaching employs fundamentals published in *Practical and Theoretical Geoarchaeology* (Goldberg and Macphail 2006).

Macphail was a *Professeur Invité* (Tours 2004) and visiting lecturer (Seoul National University 2010) and received the Geological Society of America's *Rip Rapp Award for Archaeological Geology* (2009). He is currently Senior Research Fellow at UCL, *Fellow of the Geological Society of America*, Associate Editor for *Geoarchaeology*, and with Paul Goldberg publishing reference studies (Macphail and Goldberg 2010).

Cross-References

► Geoarchaeology

References

Bullock, P., N. Fedoroff, A. Jongerius, G. Stoops, and T. Tursina. 1985. *Handbook for Soil Thin Section Description*. Wolverhampton: Waine Research Publications.

Courty, M.A., P. Goldberg, and R.I. Macphail. 1989. *Soils and micromorphology in archaeology*, Cambridge manuals in archaeology. 1st ed. Cambridge: Cambridge University Press.

Goldberg, P., and R.I. Macphail. 2006. *Practical and theoretical geoarchaeology*. Oxford: Blackwell Publishing.

Macphail, R.I., and J. Crowther. 2007. Soil micromorphology, chemistry and magnetic susceptibility studies at Huizui (Yiluo region, Henan Province, northern China), with special focus on a typical Yangshao floor sequence. *Bulletin of the Indo-Pacific Prehistory Association* 27: 93–113.

Macphail, R.I., and P. Goldberg. 2010. Archaeological materials. In *Interpretation of micromorphological features of soils and regoliths*, ed. G. Stoops, V. Marcelino, and F. Mees, 589–622. Amsterdam: Elsevier.

Macphail, R.I., and P. Goldberg. 2017. *Applied Soils and micromorphology in archaeology*. Cambridge: Cambridge University Press.

Macphail, R.I., M.A. Courty, J. Hather, and J. Wattez. 1997. The soil micromorphological evidence of domestic occupation and stabling activities. In *Arene candide: A functional and environmental assessment of the holocene sequence (Excavations Bernabò Brea-Cardini 1940–1950)*, ed. R. Maggi, 53–88. Roma: Memorie dell'Istituto Italiano di Paleontologia Umana.

Macphail, R.I., J. Crowther, T.G. Acott, M.G. Bell, and G.M. Cruise. 2003. The experimental earthwork at Wareham, Dorset after 33 years: Changes to the buried LFH and Ah horizon. *Journal of Archaeological Science* 30: 77–93.

Macphail, R.I., J. Crowther, and G.M. Cruise. 2007. Micromorphology and post-Roman town research: the examples of London and Magdeburg. In *Post-roman towns and trade in Europe, Byzantium and the Near-East. New methods of structural, comparative and scientific methods in archaeology*, ed. J. Henning, 303–317. Berlin: Walter de Gruyter & Co. KG.

Macphail, R.I., J. Bill, J. Crowther, C. Haită, J. Linderholm, D. Popovici, and C.L. Rødsrud. 2016. European ancient settlements – A guide to their composition and morphology based on soil micromorphology and associated geoarchaeological techniques; introducing the contrasting sites of Chalcolithic Borduşani-Popină, Borcea River, Romania and the Viking Age Heimdaljordet, Vestfold, Norway. *Quaternary International* https://doi.org/10.1016/j.quaint.2016.08.049.

Macphail, R.I., E. Graham, J. Crowther, and S. Turner. 2017. Marco Gonzalez, Ambergris Caye, Belize: A geoarchaeological record of ground raising associated with surface soil formation and the presence of a Dark Earth. *Journal of Archaeological Science* 77: 35–51.

Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology

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Introduction

Magnetic susceptibility is an easily measured property of soils and sediments with broad applicability in Environmental Archaeology. It is the first of a series of environmental magnetic techniques that can be applied to characterize magnetic minerals in natural and cultural environments. A strong connection exists between the goals of Environmental Magnetism and Environmental Archaeology. In both cases, magnetic measurements provide a means of exploring past environments and environmental change, including changes affecting and precipitated by humans.

Definition

Magnetic susceptibility is the ratio of the magnetization induced in a sample to the inducing (magnetizing) field, quantifying the degree to which a substance can be magnetized in a weak magnetic field similar to that of the Earth's field (i.e., 5–100 μT) (Banerjee 1981). It can be expressed either as a volume magnetic

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susceptibility (κ, dimensionless in SI units) or a mass magnetic susceptibility (χ, in SI units of m^3/kg) equal to the volume susceptibility divided by the bulk density of the sample.

Magnetic susceptibility depends on the concentration, composition (mineralogy), and size of magnetic grains in a sample. Grain size refers to the size-dependent magnetic domain state, ranging from thermally unstable ultrafine or superparamagnetic (SP) magnetic grains to stable single-domain (SD) and pseudo-single-domain (PSD) grains to large multidomain (MD) grains (Hunt et al. 1995).

Key Issues and Future Directions

Environmental Magnetism was formalized as an interdisciplinary science with the 1986 publication of a book of the same name by Roy Thompson and Frank Oldfield. This text not only summarized the behavior of magnetic minerals, their presence in environmental systems, and techniques for their measurement but, more importantly, also showcased the varied ways in which these magnetic techniques could be applied to answer diverse environmental questions. Subsequent updates of this burgeoning field have followed at just under 10-year intervals (Verosub and Roberts 1995; Evans and Heller 2003).

The wide applicability of environmental magnetic techniques stems from the pervasiveness of iron in the environment and the ease with which iron oxides are detectable in soils and sediments, even in small amounts (<1% or even 0.1%). As iron archives, soils and sediments record information on the transport and deposition of iron minerals and their transformations via chemical and biological processes. The techniques that are applied to extract this information are rapid and economical and applied to bulk non-oriented samples.

Of particular import for archaeological application is the notion of *Magnetic Enhancement*. Alterations in magnetic mineralogy within upper soil layers result in enhanced susceptibility values in surface as opposed to subsoil horizons. Magnetic enhancement occurs as a result of naturally occurring or human-generated fires or as part of pedogenesis (soil formation), both of which may convert weakly magnetic oxides and hydroxides to more strongly magnetic forms. Pedogenic enhancement occurs through a variety of processes, including low-temperature chemical reactions (i.e., inorganically) as well as organically via magnetotactic bacteria, iron-reducing bacteria, and bacterial-induced chemical reactions. Typically, it is magnetite or maghemite in the superparamagnetic to stable single-domain size range that is produced.

The magnetic enhancement process is environmentally sensitive (Maher 1986) and through pedogenesis linked to the five soil-forming factors (parent material, climate, topography, time, and living organisms) (Mullins 1977). Magnetic enhancement depends on the type of material in which the soils form, the time over which enhancement has been allowed to proceed, climatic variables such as precipitation and temperature, the landform in which the soil develops, and the plant and animal (including human) life on and in the soil. Humans directly influence magnetic enhancement in a number of ways. They alter properties such as soil temperature, soil chemistry, and soil porosity. They add organic matter, expose soils to high temperatures through firing, and incorporate fired or other high-susceptibility materials into the soil matrix. They influence the biomineralization of iron minerals (Bazylinski and Moskowitz 1997), for example, in creating conditions that encourage bacterial production of iron. To some degree, each of these environmental influences may be investigated via soil magnetic studies.

Magnetic enhancement is pervasive, occurring wherever soils develop, and conservative, with the enhanced signature retained unless soils are gleyed or iron minerals otherwise reduced. Enhanced susceptibilities of paleosols provide an avenue for the identification of buried archaeological sites. Vertical patterns in susceptibility provide clues regarding the dynamics of archaeological terrains, tracking natural and anthropogenic processes that redistribute soils

and sediments. For example, a ditch or pit excavated into a low-susceptibility subsoil filled with a magnetically enhanced topsoil produces a high-susceptibility feature.

Measurement of magnetic susceptibility is accomplished in either the field or the laboratory using a variety of dual- and single-coil instruments. These instruments allow measurement of various volumes (and depths) in a range of contexts (i.e., surface, including plow-zone surveys; surveys of excavation floors, walls, and other exposures; downhole applications; and measurements of whole- and split-cores and packed samples) (Dalan 2006). Field instruments yield volume susceptibilities while laboratory instruments can be used to normalize susceptibilities by mass and investigate the effects of packing and of water and other inclusions. As many susceptibility instruments investigate volumes similar in size to those analyzed for other physical and chemical properties, susceptibility data is easily integrated into geoarchaeological characterizations of soils and sediments.

Susceptibility measurements are a key component of a basic environmental magnetic reconnaissance. To understand how susceptibility contrasts relate to changes in magnetic concentration, composition, and grain size, however, additional magnetic measurements must be conducted. These expose samples to magnetic fields of varying strengths and directions over different frequencies, temperatures, and times. They are applied in sequence from least to most (magnetically) destructive. Discussions of techniques and protocol can be found in Banerjee (1981) and Maher (1986), as well as in the overviews of environmental magnetism mentioned above. It is this detailed magnetic characterization that is useful for interpreting past environmental conditions recorded by soil and sediment assemblages.

Applications of magnetic susceptibility and other environmental magnetic techniques are wide ranging. They include studies in fluvial, glacial, eolian, cave, lacustrine, coastal, and marine contexts. They have been used to investigate past climates and other environmental factors, to document land-use histories and landscape dynamics, and as prospection techniques. Unless otherwise noted, examples of these applications can be found in Thompson and Oldfield (1986) and Evans and Heller (2003).

Susceptibility studies have seen extensive use as part of environmental magnetic studies of global, regional, and local climate change. As a paleoclimatic proxy, they have allowed characterization of temperature, precipitation, and humidity variations in loess/paleosol sequences (e.g., in China and the Great Plains of the USA), caves, and marine sediments. Both short- and long-term climatic sequences have been produced, some of archaeological significance.

In addition to climate, other soil-forming factors have been successfully studied using environmental magnetic techniques. For example, susceptibility enhancement has been used as a proxy for the age of soils. Chronological ages have been estimated, and sites and earthen features, such as mounds, relatively dated. Akin to the use of ash layers as marker horizons, magnetic particulates, indicating the onset of industrial coal burning and steel production, have been used as time markers.

In investigations of landscape transformation, iron oxides serve as tracers of soil and sediment transport and deposition. They also provide evidence of landscape stability via magnetic enhancement and thus areas of increased potential for archaeological materials. These iron minerals are useful for studying both the formation of archaeological landscapes, sites, activity areas, and features and post-formation alterations. For example, susceptibility investigations of lake records, in concert with pollen studies, have been used to document archaeologically important events such as deforestation, burning, and the inception of agriculture. Land-based susceptibility studies have been applied to understand hill slope processes such as soil creep and wash. These processes alter topsoil depth and particle size distributions and thus patterns in the depth and character of magnetic enhancement (Dearing et al. 1985, 1986). Susceptibility studies can therefore be used to identify areas of stability, erosion, and deposition related to human activities or the integrity of the archaeological record and even to work backwards to

determine the pre-erosion form of archaeological features (Dalan 2006). Anthropogenic earthmoving activities such as borrowing, leveling, and reclamation can also be studied, even sourcing fill materials and providing mixing models (Dalan and Banerjee 1998).

As a prospection technique, magnetic susceptibility surveys depend on the fact that soils from archaeological sites often exhibit enhanced magnetic properties over surrounding "noncultural" or non-site soils (Mullins 1974). Such surveys have been used in defining sites, including buried sites, activity areas, and features (Clark 1996; Dalan 2008). Susceptibility surveys are often combined with other prospection methods such as magnetometry, ground-penetrating radar, resistivity, and electromagnetic conductivity. Types of features most frequently investigated are highly magnetic fired features, filled ditches or pits, and other earthen features comprised of contrastive soils. Susceptibility surveys have also been utilized to identify areas of intense occupation, industrial activity, and agriculturally managed or stockyard soils.

In considering *future directions* for magnetic susceptibility applications in Environmental Archaeology, the importance of anchoring susceptibility within a suite of magnetic measurements cannot be overemphasized. Research questions asked by Environmental Archaeologists are closely related to those asked by Environmental Magnetists and thus should make use of those techniques. Although the field of Environmental Magnetism has continued its rapid development, archaeological applications over the past decade have tended to focus on field applications of susceptibility. There is thus much potential for expanded use of the entire range of magnetic techniques to answer questions relating to past climates, dating, formation, and postdepositional processes central to understanding the relationship of humans to their environment.

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Prospection Methods in Archaeology

References

Banerjee, S.K. 1981. Experimental methods of rock magnetism and paelomagnetism. *Advances in Geophysics* 23: 25–99.

Bazylinski, D.A., and B.M. Moskowitz. 1997. Microbial biomineralization of magnetic iron minerals: Microbiology, magnetism and environmental significance. *Reviews in Mineralogy and Geochemistry* 35: 181–223.

Clark, A.J. 1996. *Seeing beneath the soil: Prospecting methods in archaeology*. London: B.T. Batsford.

Dalan, R.A. 2006. Magnetic susceptibility. In *Remote sensing in archaeology: An explicitly North American perspective*, ed. J. Johnson, 161–203. Tuscaloosa: The University of Alabama Press.

Dalan, R.A. 2008. A review of the role of magnetic susceptibility in archaeogeophysical studies in the United States: Recent developments and prospects. *Archaeological Prospection* 15: 1–31.

Dalan, R.A., and S.K. Banerjee. 1998. Solving archaeological problems using techniques of soil magnetism. *Geoarchaeology* 13: 3–36.

Dearing, J.A., B.A. Maher, and F. Oldfield. 1985. Geomorphological linkages between soils and sediments: The role of magnetic measurements. In *Geomorphology and soils*, ed. K.S. Richards, R.R. Arnett, and S. Ellis, 245–266. London: Allen and Unwin.

Dearing, J.A., R.I. Morton, T.W. Price, and I.D.L. Foster. 1986. Tracing movements of topsoil by magnetic measurements: Two case studies. *Physics of the Earth and Planetary Interiors* 42: 93–104.

Evans, M., and F. Heller. 2003. *Environmental magnetism: Principles and applications of environmagnetics*. New York: Academic Press.

Hunt, C.P., B.M. Moskowitz, and S.K. Banerjee. 1995. Magnetic properties of rocks and minerals. In *Rock physics and phase relations: A handbook of physical constants (AGU Reference Shelf 3)*, ed. T.J. Ahrens, 189–204. Washington (DC): American Geophysical Union.

Maher, B.A. 1986. Characterisation of soils by mineral magnetic measurements. *Physics of the Earth and Planetary Interiors* 42: 76–92.

Mullins, C.E. 1974. The magnetic properties of the soil and their application to archaeological prospecting. *Archaeo-Physika* 5: 143–347.

Mullins, C.E. 1977. Magnetic susceptibility of the soil and its significance in soil science – a review. *Journal of Soil Science* 28: 233–246.

Thompson, R., and F. Oldfield. 1986. *Environmental magnetism*. London: Allen and Unwin.

Verosub, K.L., and A.P. Roberts. 1995. Environmental magnetism: Past, present and future. *Journal of Geophysical Research* 100: 2175–2192.

Mainland Southeast Asia: Rock Art

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Introduction

Southeast Asia is not traditionally known as an area rich in rock art, but the region is in fact home to at least 450 rock art sites dating from the prehistoric through modern periods. This article summarizes the main styles, discoveries, and issues typifying Mainland Southeast Asian rock art.

Definition

The traditional scope of Mainland Southeast Asia includes the modern nation-states of Myanmar, Thailand, Laos, Vietnam, Cambodia, and Peninsular Malaysia. Some of this discussion will also include the Yunnan and Guangxi provinces of Southern China, which have deep archaeological links to Southeast Asia. Rock art is defined as anthropogenic markings on natural stone landscapes which are generally categorized as pictograms (paintings and drawings) or petroglyphs (carvings) but can encompass an array of application/inscription techniques. This categorization is atemporal and covers both ancient "prehistoric" art and more recent markings such as religious sculpture and inscriptions, which exist throughout the area in discussion.

Historical Background and Overview

Painted and engraved rock art was noted in Mainland Southeast Asia as early as the nineteenth century by European colonizers. However, colonial archaeological investigations were more focused on temple architecture, sculpture, and portable antiquities. As such, there was little interest in rock art research until the 1980s because academic consensus held that rock art was archaeologically rare, and therefore an unprofitable line of research in Southeast Asia.

Despite this, a series of prominent rock art discoveries in various parts of Thailand led to a sustained research program by the Thai Fine Arts Department, culminating in a series of books published in the late 1980s and early 1990s (e.g., Khemnak 1996; Srisuchat 1992). These works are mostly published in Thai but remain a useful visual reference.

Thailand's rock art is dominated by red rock paintings of humans, animals, and geometric and linear forms clustered in the north, northeast, center, and south of the country (Tan 2014:76). Most Thai rock art is presumed prehistoric based on the images depicted. Rock art sites containing Hindu-Buddhist and modern iconography are considered historic.

Peninsular Malaysia also saw a similar interest in rock art during the same period, leading to a number of discoveries in hinterland caves and rock shelters (e.g., Adi Haji Taha 1991). Unlike Thailand, most Malaysian rock art is black rock drawings linked to aboriginal populations (Orang Asli) or their ancestors. The most significant and only prehistoric rock art site in Peninsular Malaysia is Gua Tambun, a large cliff face with over 600 red and purple paintings, which appears to be unique in the peninsula (Fig. 1; see also Tan and Chia 2011).

In contrast, little rock art has been reported from the neighboring countries of Vietnam, Cambodia, Myanmar, and Laos. Vietnam's rock art is dominated by boulder carvings rather than paintings, and rock art appears to be concentrated in the north, though this may merely be an effect of sampling bias (Fig. 2).

Cambodian rock art has only been discovered in this millennium. The Kanam site in the Dangrek Mountains (Latinis et al. 2016), and a series of rock art sites around Phnom Kulen, contain red rock paintings of humans, abstract forms and animals. Engravings of Hindu and Buddhist iconography on open-air boulders and stone riverbeds are associated with the historic Angkorian period (Tan 2014:79).

Mainland Southeast Asia: Rock Art, Fig. 1 Gua Tambun in Perak, Malaysia, contains over 600 paintings

Mainland Southeast Asia: Rock Art, Fig. 2 Rock engravings of Sa Pa, in Lao Cai province, northern Vietnam

In Myanmar and Laos, rock art discoveries have been sporadic but promising. The Padalin Caves of Myanmar's western Shan State contain red rock paintings of stylized human hands (Fig. 3). More sites are known but most have not been published.

Similarly in Laos, multiple sites are known to the authorities but no detailed reports were

Mainland Southeast Asia: Rock Art, Fig. 3 The Padalin Cave in Shan State, Myanmar, is one of the country's most famous prehistoric sites and one that contains rock art

accessible at the time of this article. Petroglyphs, cupules, red rock paintings of humans and animals, handprints, and bas reliefs of Buddhist iconography have all been informally observed in the country (Tan 2014:80; Tan and Taçon 2014:80).

Southern China as a region is known as the home for numerous ethnic minorities that share a cultural origin with many populations in Mainland Southeast Asia. Clusters of rock art, mostly red rock paintings of humans, animals, and geometric forms, have been noted in the mountainous regions of Yunnan and Guangxi provinces which border Laos, Myanmar, and Vietnam. The Holocene and Neolithic assemblages from these areas are largely homogenous and widespread and indicate human occupation of the highlands beginning in the Pleistocene. Rock art at sites in Cangyuan (Yunnan) and Huashan (Guangxi) date between the Neolithic and Iron Ages (Bednarik and Li 1991; Shao et al. 2017).

The disparity of rock art research amongst the countries of Mainland Southeast Asia is important to note: Thailand is home to at least 200 known sites or about half of all the known sites in Mainland Southeast Asia. In cases such as Myanmar, Cambodia, Laos, and Vietnam, conflict and physical inaccessibility has hampered archaeological research. Several regional overviews and focused studies have now been published (see Scott 2012; Scott and Tan 2016; Tan 2014; Taçon and Tan 2012; Chen 2001; Srisuchat 1996; Kusch 1986), signaling increased interest in rock art throughout the region.

Key Issues/Current Debates

Increased regional stability and the opening of borders throughout Mainland Southeast Asia have directly led to the discovery of more rock art sites. The potential for future discoveries is high. In the past decade, interest in Southeast Asian rock art has increased exponentially, so much so that every major conference – the Indo-Pacific Prehistory Association Congress, the European Association of Southeast Asian Archaeologists conference, and the SEAMEO SPAFA International Conference on Southeast Asian Archaeology – has had papers and entire panels devoted to rock art. However, the majority of rock art research is still focused on describing newly

discovered sites or re-investigating previously-known sites. Some attempts have been made to describe and characterize regional styles, but these discrete packets are limited to discussions of sites within the same province, rather than comparative, pan-Southeast Asian investigations (see Surinlert et al. 2017 in press; Scott 2012; Heng 2011; Mokhtar Saidin and Taçon 2011; Charoenwongsa 1989; Khemnak et al. 1989).

No Mainland Southeast Asian rock art has been directly dated. However, 40 ka year-old rock art in Island Southeast Asia (Aubert et al. 2014) establishes the possibility of a similarly deep antiquity for the practice on the mainland. In light of this new evidence, there is a need to revise and refine the dates from Mainland Southeast Asia. Thai archaeological literature divides sites into rough prehistoric or historic periods. Red rock paintings and some Thai petroglyph sites are considered "prehistoric" and often estimated to be between 2,000 and 5,000 years old. This generalization is inferred from archaeological materials recovered from several sites, such as the Ban Rai rock shelter (Treerayapiwat 2005) and PRatu Pha (Winalayai 1999), northern Thailand, which have yielded dates of 7,000 BP and 3,000 BP, respectively. The Padalin Caves of Myanmar have yielded ochres and stone tools dated to 1,750 or 7,000–13,000 BP that are possibly associated with rock art manufacture (Aung Thaw 1971). Generally speaking, it has been observed that the older paintings across Southeast Asia include red paintings, particularly of large naturalistic animals and hand stencils (Taçon et al. 2014). Additional support for the antiquity of red rock paintings is the infrequent superimposition of black or white rock paintings on top of them – a phenomenon that has never been observed in reverse.

Historic-period rock art can be dated confidently and accurately using a variety of approaches. Hindu and Buddhist iconography, as well as written and carved inscriptions, can be stylistically associated with distinct historical epochs. Depictions of modern objects also allow for accurate age estimations. A number of caves and river beds in Thailand, Myanmar, Cambodia, and Laos have Buddhist or Hindu carvings in them, which reflect different religious values of different times. Tenth century Brahmanist carvings found on riverbeds in Phnom Kulen (Cambodia) and near Vat Phou (Laos) were meant to imbue the flowing waters with sacred fertility magic. Buddhist carvings are deeply connected with Buddhism, which is practiced widely in Mainland Southeast Asia and can be found throughout the region (Fig. 4). In Laos, the tenth century CE Tham Wang Sang near Vientiane features a Buddha carved into the rock. The oldest evidence for the Buddhist use of caves in Southeast Asia comes from Thailand between the sixth and eighth centuries CE, from inscriptions at Tham Narai in Saraburi Province and contemporary Mon-Dvaravati bas-reliefs in Tham Phothisat in the same province, and from the Khao Ngu range in Ratchaburi Province. Rock art in the form of writing and inscriptions are usually associated with the Hindu-Buddhist period, and the more modern examples are often dismissed as graffiti. The last category of historic rock art is identified through iconography, as they depict "modern" objects such as steamships and sailboats or land vehicles such as trains and buggies (eg, Tan and Walker-Vadillo 2015; Fig. 5).

Difficulties in conducting rock art research in Southeast Asia are tied to systematic issues such as a lack of training, personnel, and resources. Most archaeological work is done by government or university institutions and is written in local languages, which often have a low circulation and are not widely accessible. As such, terminologies and definitions are also inconsistent. Additionally, Southeast Asia is not represented in the International Federation of Rock Art Organisations. Despite these barriers, local archaeologists often take part in international collaborations. Since 2011, the Southeast Asian Ministers of Education Organization Regional Centre for Archaeology and Fine Arts (SEAMEO SPAFA) in Bangkok has held a series of training workshops on the research and management of rock art. The participants of these workshops comprise at least one member from each of the SEAMEO countries (all the members of ASEAN and East Timor), who come to Bangkok for lectures and field training. As a result, awareness in rock art methodologies

Mainland Southeast Asia: Rock Art, Fig. 4 Carvings of Vishnu and other deities on the river in Phnom Kulen, Siem Reap, Cambodia

Mainland Southeast Asia: Rock Art, Fig. 5 Painting of a steamship at the Pak Ou Caves in Luang Prabang, Laos, dated to the early twentieth century

and regional sites has increased and has contributed to the current interest in the field.

Most government-managed archaeology is linked to tourism development, which plays an important part in many Southeast Asian economies. Unlike temples, rock art sites are not income-generating and thus do not represent a substantial investment in tourism infrastructure.

Thailand is the notable exception, having promoted and made many rock art sites tourist-friendly destinations. A number of these sites are built around natural and historical parks, e.g., Phu Phra Bat in Udon Thani Province, Pha Taem National Park in Ubon Ratchatani Province, and Tham Phi Hua To in Krabi; while other rock art sites are also under the custody of Buddhist temples which tend to preserve and maintain them. Other sites in the region are generally open to visitors with little protection or provision of educational information. The lack of rock art training extends to the management of rock art sites, and with the opening up of sites to the public come other dangers and human causes of rock art deterioration.

Due to the reasons outlined above, most international overviews of world rock art pay little attention to Southeast Asia, although the recent dates from Indonesian Sulawesi (Aubert et al. 2014) have cast a spotlight on the larger region. Large tracts of Mainland Southeast Asia have yet to be surveyed for rock art. In this sense, Mainland Southeast Asia represents a genuine frontier for new discoveries.

Another unique aspect of Mainland Southeast Asia as a region is the division of rock art into prehistoric and historic art, which in turn reflects a dynamic interplay between people and the landscapes over time. There are a number of rock art sites displaying reuse, where prehistoric habitats transform into religious Hindu-Buddhist and animist shrines (Tan and Taçon 2014). In some cases, this reuse reflects a cultural continuity in the landscape or adaptations to new ideas and religious beliefs such as the syncretism between animist and Indic religions which arrived from the early centuries of the first millennium CE. This interplay between the later Indic religions and animist beliefs is best exemplified by "Buddha footprints." The historical Buddha, Siddhartha Gautama did not come to Southeast Asia, but the same local tradition that allows for the worship of spirits in natural features also recognizes depressions on rocks as the physical footprints of the Buddha which have been worshipped accordingly (Fig. 6). In sculpture, Buddha footprints do not appear in Southeast Asia until the second millennium CE, appearing first in Myanmar in the eleventh century, in Thailand during the Thirteenth and Fourteenth centuries, and then in Cambodia in the Sixteenth century (Brown 1990). It is likely that the "natural" Buddha footprints follow a similar chronology.

Mainland Southeast Asia: Rock Art, Fig. 6 Buddha footprints on Phu Phra Bat, Udon Thani province, Thailand

Future Directions

New sites continue to be discovered every year, and this trend shows no evidence of abating especially in the cases of Myanmar, Laos, and Cambodia, which are relatively unexplored. It is expected that rock art will continue to present a complementary line of evidence in Southeast Asian archaeology. Recent direct dating efforts in Island Southeast Asia and Southern China have suggested that rock art is often as old as presumed, and sometimes older. Direct dates for sites on the Mainland are expected to confirm this. There are, however, very few rock art specialists in Southeast Asia, and few opportunities

for specialist training in rock art research. It is also notable that more advanced chronometric dating is still beyond the reach of local archaeologists, who have to rely on the aid of foreign researchers.

In Mainland Southeast Asia, Thailand has the most number of reported sites due to its relative stability and prosperity, which allows public funds to go into archaeological research and has led to the documentation and publication of a number of sites. In contrast, the neighboring countries of Myanmar, Laos, and Cambodia only have a handful of sites that are known; some of them were recently discovered, while the existence of many has not been communicated to the larger academic or public community. Painted rock art is still rare in Vietnam. Yet the sheer number of sites known from Thailand possibly hints at how much more rock art has yet to be found in the region. It is interesting to note that we currently only have direct dates derived from Island Southeast Asia rather than Mainland Southeast Asia, but their considerable age suggests that the oldest rock art from the mainland would be of comparable age or older.

Despite our patchy knowledge of Southeast Asian rock art, we now have information from a large corpus of sites to make some generalizations, particularly of sites with red rock art. We now know that rock art, as a marking in the landscape on a natural stone canvas, exists throughout Southeast Asia and is found in every modern nation-state, making it far from rare and scarce in this region. Pictogram sites are by far the most numerous and widespread type of rock art found in Southeast Asia, while megaliths and petroglyph sites tend to be limited to specific regions. The number of sites found in Thailand and Indonesia, which are territories central to Mainland Southeast Asia and Island Southeast Asia, respectively, give us an idea of how many sites there may be in adjacent countries even as only a handful of sites are known in them.

For the reasons outlined earlier, rock art is still a new area of research in Southeast Asia and it is only recently that we have begun to integrate multisite analyses. The difficulty of investigating sites across many countries at the same time is exacerbated because of different operational requirements to do research in each country. Comparisons of sites within the region can be helpful in understanding human interactions with the landscape, particularly since such interactions occurred long before national borders were drawn and also since there is much commonality in the material culture of the region – for example, the Hoabinhian "culture" found prevalent through Southeast Asia, the introduction and spread of bronze and iron technology, and the localizations of Indic religions in the first millennium.

Besides research, other human actions will continue to threaten rock art. Rapid development and the extraction of raw materials in the mountainous regions of Myanmar, Laos, and Cambodia also have the potential to destroy sites before they are discovered. In Perak, Malaysia, limestone massifs are being mined for cement and lime; in Laos, dam projects have potential impact of several riverine rock art sites. In Cambodia, the construction of a dam project has the potential to destroy not only rock art sites but jar burials dispersed throughout the Dangrek mountain range. Irresponsible tourism and vandalism pose additional dangers to Southeast Asia and rock art. Thus, rock art research often provides the necessary and sometimes only baseline recordings of sites before they are destroyed.

Cross-References

► History and Current Debates of Archaeology in Mainland Southeast Asia

References

Aubert, M., A. Brumm, M. Ramli, T. Sutikna, E.W. Saptomo, B. Hakim, M.J. Morwood, G.D.V.D. Bergh, L. Kinsley, and A. Dosseto. 2014. Pleistocene cave art from Sulawesi, Indonesia. *Nature* 514: 223–227.

Bednarik, R.G., and F. Li. 1991. Rock art dating in China: Past and future. *The Artefact* 194: 25–33.

Charoenwongsa, P. 1989. *Sinlapa Tham Nai Isan [Rock art of Northeast Thailand]*. Bangkok: Fine Arts Department.

Chen, Z.F. 2001. Asia. In *Handbook of rock art research*, ed. D.S. Whitley, 760–785. Walnut Creek: Altamira Press.

Heng, T. 2011. Kulen mountain rock art: An initial assessment. *SPAFA Journal* 21: 29–34.

Khemnak, P. 1996. *Sinlapa Tham Samai Kon Prawattisat Nai Prathet Thai [Prehistoric cave art in Thailand]*. Bangkok: Fine Arts Department.

Khemnak, P., A. Srisuchat, P. Wongnoi, and P. Charoenwongsa. 1989. *Sinlapa Tham Sakon Nakhon [Rock art of Sakon Nakhon Province]*. Bangkok: Silpakorn University.

Kusch, H. 1986. Rock art discoveries in Southeast Asia: A historical summary. *Bolletino del Centro Camuno di Studi Preistorici* 23: 99–108.

Latinis, D. K., P. B. Griffin, and Sokha, T. 2016. The kanam rock painting site, Cambodia: Current Assessments. Archaeology Report Series [Online]. Available: https://www.iseas.edu.sg/images/pdf/archaeology_report_latinis_kanam_final.pdf [Accessed 15 October 2017].

Saidin, Mokhtar, and P.S.C. Taçon. 2011. The recent rock drawings of the Lenggong Valley, Perak, Malaysia. *Antiquity* 85: 459–475.

Scott, V.N. 2012. Interpretations of ritual in the rock-art of Kanchanaburi Province and Uthai Thani Province, Thailand. Unpublished MA dissertation, School of Oriental and African Studies, University of London, London.

Scott, V.N., and N.H. Tan. 2016. Recent rock art studies in Southeast Asia. In *Rock art studies: News of the world V*, ed. P. Bahn, N. Franklin, M. Strecker, and E. Devlet, 163–170. Oxford: Archaeopress.

Shao, Q.-F., E. Pons-Branchu, Q.-P. Zhu, W. Wang, H. Valladas, and M. Fontugne. 2017. High precision U/Th dating of the rock paintings at Mt. Huashan, Guangxi, Southern China. *Quaternary Research* 88: 1–17.

Srisuchat, A. 1992. *Rock art of the historic period in Thailand*. Bangkok: Fine Arts Department.

Srisuchat, A. 1996. Rock art news from South-East Asia. In *Rock art studies news of the world i*, ed. P.G. Bahn and A. Fossati, 141–144. Oxford: Oxbow Books.

Taçon, P.S.C., and N.H. Tan. 2012. Recent rock art research in Southeast Asia and southern China. In *Rock art news of the world 4*, ed. P. Bahn, N. Franklin, and M. Strecker, 207–214. Oxford: Oxbow.

Taçon, P.S.C., N.H. Tan, S. O'connor, J. Xueping, L. Gang, D. Curnoe, D. Bulbeck, Budianto Hakim, Iwan Sumantri, H. Than, I. Sokrithy, S. Chia, K. Khun-Neay, and S. Kong. 2014. The global implications of the early surviving rock art of greater Southeast Asia. *Antiquity* 88: 1050–1064.

Taha, Adi Haji. 1991. Recent archaeological discoveries in Peninsular Malaysia (1987 – 1990). *Journal of the Malaysian Branch of the Royal Asiatic Society* 64: 75–96.

Tan, N.H. 2014. Rock art research in Southeast Asia: A synthesis. *Arts* 3: 73–104.

Tan, N.H., and P.S.C. Taçon. 2014. Rock art and the sacred landscapes of Mainland Southeast Asia. In *Rock art and sacred landscapes*, ed. D. Gillette, W.B. Murray, M. Greer, and M.H. Hayward, 67–84. New York: Springer Science.

Further Reading

Aung Thaw, U. 1971. The "Neolithic" culture of the Padah-lin Caves. *Asian Perspectives* 14: 123–133.

Brown, R.L. 1990. God on Earth: The Walking Buddha in the Art of South and Southeast Asia. *Artibus Asiae* 50: 73–107.

Sidisunthorn, P., S. Gardner, and D. Smart. 2006. *Caves of Northern Thailand*. Bangkok: River Books.

Surinlert, J., P. Auetrakulvit, V. Zeitoun, C. Tiamtinkrit, and P. Khemnak. 2017. Comparison of rock painting sites in the Pratu Pha Valley, Lampang Province, Thailand. In *Advancing Southeast Asian Archaeology 2016*, ed. N.H. TAN. SEAMEO SPAFA: Bangkok In press.

Tan, N.H., and S. Chia. 2011. Current Research on the rock art at Gua Tambun, Perak, Malaysia. *Bulletin of the Indo-Pacific Prehistory Association* 31: 93–108.

Tan, N.H., and V. Walker-Vadillo. 2015. The curious case of the steamship on the Mekong. *Asian Perspectives* 54: 253–273.

Treerayapiwat, C. 2005. Patterns of habitation and burial activity in the Ban Rai Rock Shelter, Northwestern Thailand. *Asian Perspectives* 44: 231–245.

Winalayai, C. 1999. The study of Kai Phratu Pha rock painting site, Mae Mo district, Lampang province. Unpublished MA dissertation, Silpakorn University, Bangkok.

Maisières-Canal: An Open-Air Aurignacian Workshop

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State of Knowledge and Current Debates

Introduction

The Early Upper Paleolithic in Belgium is known primarily from cave sites located in the Meuse Basin, rarely from open-air sites. Until the discovery of the Aurignacian workshop at Maisières-Canal, Aurignacian occupations were known only in caves (Fig. 1), apart from isolated surface finds near Braine-le-Comte (Fourny and Van

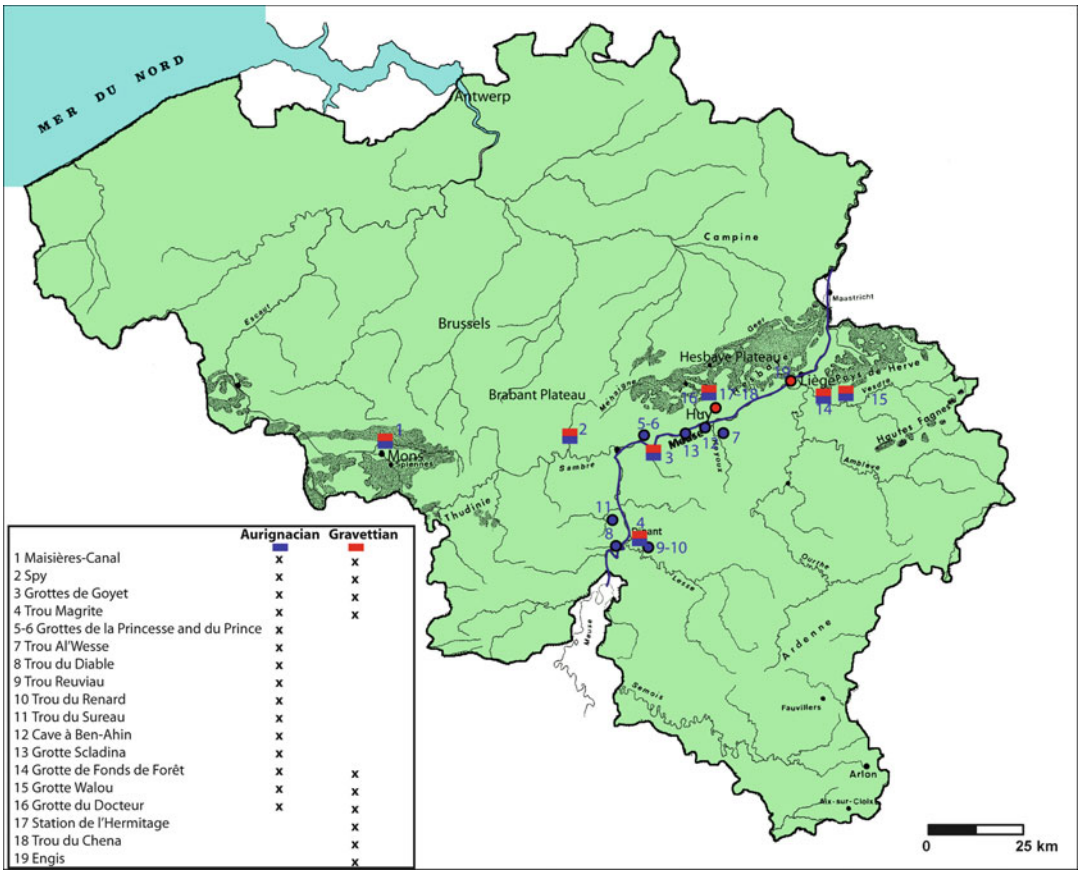

Maisières-Canal: An Open-Air Aurignacian Workshop, Fig. 1 Map showing the principal Aurignacian and Gravettian sites in Belgium

Assche 1992). The situation is similar for the Gravettian, with the addition of two in situ open-air sites (Fig. 1). Most Belgian Paleolithic sites were first excavated in the nineteenth century, and thus lack precise stratigraphic and chronological data, not to mention limitations in the lithic and faunal assemblages due to excavation bias.

In the last 25 years, excavations have been undertaken both in new caves (Grotte Walou: Dewez 2008; Pirson et al. 2011; Grotte Scladina: Otte 1992; Otte et al. 1998) and in those previously excavated (Trou Magrite: Otte and Straus 1995; Grottes de Goyet: Toussaint et al. 1999; Grotte du Docteur: Miller et al. 1998; Otte and Miller 2000). Such research yielded new data for the Paleolithic, including Aurignacian and Gravettian occupations, making it possible to establish a regional chronostratigraphic sequence, reconstruct Pleistocene palaeoenvironments, and to address different aspects of prehistoric hominid behavior.

However, such cave sites represent only a part of the range of human activities that took place across the landscape, being occupations of variable duration in the region of Middle Belgium that provided primary access to shelter, water, and fuel, as well as subsistence resources. Open-air sites, which could include short-term camps, hunting stands, kill or butchery sites, and lithic workshops, among others, complement cave sites and represent a broader range of activities. These are rare in Belgium and their discovery has been dependent on public works: Maisières-Canal was discovered in the 1960s as a result of the

modernization of the Canal du Centre, the Station de l'Hermitage at Huccorgne in the late nineteenth century when a railroad was cut through the deposits. Huccorgne was also more recently excavated in the 1970s by Destexhe and Haesaerts, and then in the early 1990s by Straus et al. (2000). Both sites are Gravettian; the only open-air Aurignacian site, the subject of this entry, was discovered by chance during re-excavation at Maisières-Canal.

Given the rarity of open-air sites in Belgium, new excavations were undertaken at Maisières-Canal in 2000–2002, with the initial aim of expanding the excavation in the "Atelier de Taille de la Berge Nord-Est" zone, which contained a small Gravettian assemblage. While little additional Gravettian material was found, the limits of the occupation were defined and the discovery of an intact Aurignacian level in one of the test trenches reoriented the aims of the project. These focused on the establishment of the chronostratigraphic context, clarification of the technological activities at an Aurignacian flint workshop, its role within the regional lithic economy, and the relationship between open-air and cave sites.

This entry presents a summary of the results obtained through geological and technological analyses, published in greater detail in the recent monograph (Miller et al. 2004).

Location and Description of the Site

The site of Maisières-Canal is located next to the Canal du Centre, near the limits between the villages of Maisières and Obourg in western Belgium (50° 28′55" N, 3° 58′37″ E). It includes two zones (Fig. 2a): the *Champ de Fouilles*, covering an area of 95 m^2, excavated in 1966–67 by J. de Heinzelin and P. Haesaerts for the Royal Belgian Institute of Natural Sciences (de Heinzelin 1971, 1973; Haesaerts 1973; Haesaerts and de Heinzelin 1979) and now beneath the canal, and the *Atelier de Taille de la Berge Nord-Est*, a small zone at the time covering 3 m^2 on the Northeast Bank of the canal, around 100 m from the Champ de Fouilles and excavated by P. Haesaerts. Both zones contained Gravettian occupations, the principal occupation in the Champ de Fouilles zone with a rich lithic and faunal assemblage, and a small workshop site in the Atelier de Taille zone. Recent fieldwork yielded the new Aurignacian workshop in the latter zone (Fig. 2b).

Research at Maisières-Canal by the Royal Belgian Institute of Natural Sciences for the first time provided comprehensive information concerning an Upper Paleolithic open-air site in Belgium, integrating data from the archaeology, stratigraphy, vertebrate paleontology, malacology, palynology, and radiometric dates. The Atelier de Taille was considerably altered by modernization of the existing canal. Landscaping on the Northeast Bank truncated the upper part of the Gravettian layer. A 4-m-wide drainage ditch cuts directly through the deposits. Archaeological material was found on both sides; part of the site was thus clearly lost.

Core sampling and test pits around the excavated zone indicate that the deposits are coherent with the stratigraphy of the site. However, the Gravettian occupation is restricted by chalk flow and the geological layer containing the Aurignacian occupation plunges abruptly to the southeast to a depth of 4 m below the surface and is sterile in three test pits.

Both occupations were situated at the top of a small hill overlooking the ancient Haine River. The Haine followed a wide synclinal depression oriented east–west. To the north, the depression is delimited by Cretaceous chalks in contact with the Hainaut Plateau (Haesaerts and de Heinzelin 1979: 9). Obourg flint would have been easily accessible and abundant in the chalks, at a maximum distance of 1 km and likely available in the eroded chalk flows directly at the site. Maisières-Canal was also ideally located for the exploitation of faunal and vegetal resources in the river valley and on the plateau as well as for obtaining good quality flint.

Stratigraphic Context

The 1966–1979 Stratigraphic Sequence

The exceptional character of the sedimentary sequence preserved at Maisières-Canal is linked in large part to the position of the site on the north edge of the alluvial plain of the Haine River,

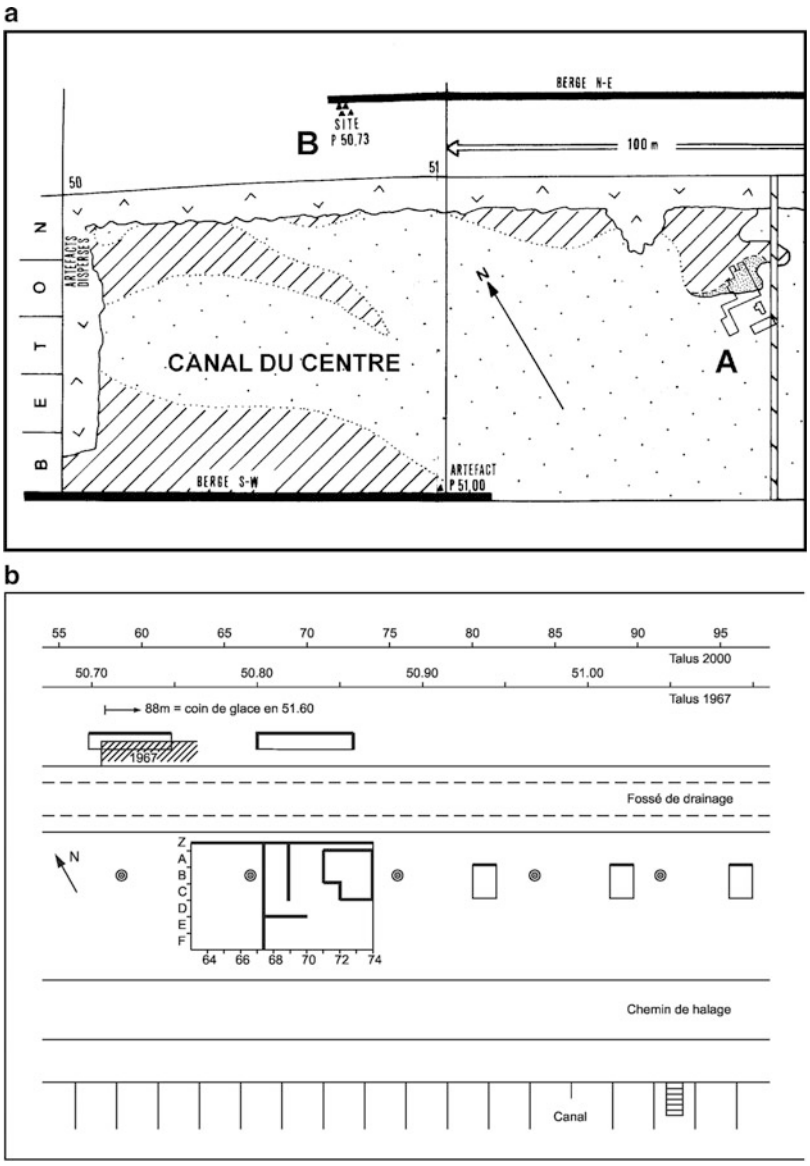

Maisières-Canal: An Open-Air Aurignacian Workshop, Fig. 2 (**a**) Maisières-Canal site plan showing the Champ de Fouilles and Atelier de Taille de la Berge Nord-Est (IRSNB excavations), (**b**) site plan for the Atelier de Taille (2000–2002 excavations)

upstream from the Nimy lock and near the mouth of the Wartons stream that drains the northern slope of the valley. In this context, earthworks for the canal enlargement provided access to deposits situated between 36 and 27.50 m ASL over a long distance, on the edge of and below the alluvial plain of the Haine.

The stratigraphy of the site was established on the basis of three groups of profiles located on the southwest bank between 33 and 27.50 m ASL, the Champ de Fouilles at the bottom of the new canal between 29 and 27.50 m ASL, and on the Northeast Bank between 36 and 33 m ASL. The southwest bank, near the center of the valley, exposed the fluviatile deposits of the Haine. These were also visible at the Champ de Fouilles where they came between a double generation of colluvial deposits at the base of the slope. Each colluvial deposit contained a humus-bearing horizon dated by the Groningen laboratory to 27,965 BP and

30,780 BP on sediment samples (Bastin 1971; Gilot 1971; de Heinzelin 1973). The Champ de Fouilles deposits are laterally attached to the lower part of the sequence on the Northeast Bank, overlain by a complex of loess, silty colluvial, and fluviatile deposits from the Wartons stream preserved over a length of several hundred meters between 35.50 and 32 m ASL, and capped by Lateglacial eolian sands.

The Gravettian Occupation

The Gravettian occupation was largely destroyed by canal earthworks, but remained intact at the Champ de Fouilles between 28.50 and 28 m ASL in the lower third of the second humus-bearing horizon (Unite MH). According to de Heinzelin (1973), the area of occupation likely extended the length of a silty promontory joining the valley floor with the northern slope. This appears to be supported by the discovery of the Gravettian workshop in September 1966, at 34 m ASL on the Northeast Bank. This was dated to around 28,000 uncal BP (Haesaerts and de Heinzelin 1979), recently confirmed by new dating of the Gravettian in the Champ de Fouilles zone (Jacobi et al. 2010).

The Middle Weichselian

The Gravettian occupation was situated near the Haine River, at the beginning of a subarctic climatic episode with grass cover dominated by cyperaceaes. Defined as the "Maisières oscillation," this episode is clearly distinct from the lower humus-bearing layer (Unit MD) dated to 30,780 BP, which is attributed to the Denekamp interstadial known from the Netherlands (Vogel and van der Hammen 1967).

The Maisières oscillation was followed by climatic deterioration evidenced at the Champ de Fouilles by periglacial fluviatile deposits (Units MM and MN) incorporating blocks of the underlying humus-bearing layer displaced under the pressure of ice. The ensemble is covered by a clay flow coming from the slope (Unit MO). This climatic deterioration that ends the Middle Pleniglacial is also demonstrated in the Northeast Bank sequence at the top of the silty layer (Unit NDC) containing the Gravettian workshop, where it is marked by tundra gley (Unite NEA) formed under permafrost, here again followed by a thixotropic clay flow (Unit NEB).

The Upper Pleniglacial

At the Champ de Fouilles and the Southeast Bank, a fluviatile aggradation with a strong silt component was deposited after the clay flows and raised the water level of the Haine above 30 m ASL; it is temporarily interrupted in the lower third by the formation of a thin humus-bearing soil (Unit MPD) attributed to the "Wartons oscillation." On the valley slopes, the beginning of the Upper Pleniglacial is also accompanied by the deposition of loessic silts (Unit NEC), followed by a homogeneous loess (Unit BED1). This is overlain by thick bedded loess (Unit NED2) that covers the slope between 35.50 and 32 m ASL and is linked on the southwest bank with a complex of obliquely stratified sands and silty sands associated with a network of braided channels that block the valley to 31 m ASL. After a brief stabilization marked by a cryoturbated peaty horizon, the fluviatile aggradation is followed in the valley above 32.50 m ASL.

At Maisières-Canal, the alluvial plain of the Haine remained stabilized at around 32.50 m ASL during the second half of the Upper Pleniglacial; several generations of channels were incised to 32 m ASL by the Haine and its affluent, the Wartons stream. On the northeast bank, these channels, blocked with sand and bordered by silty alluvium, migrated laterally and were progressively buried by silty-sand colluvia (Units NF to NK). During this period, the climatic context remained relatively cold and clearly humid with several episodes of cryoturbation and probably a temporary renewal of loess deposits in the upper part of Unit NH. Three minor climatic improvements took place, however, during this period, as indicated in the pollen diagrams by the expansion of pine, alder, and hazelnut (Bastin 1971), in Unit NF and at the base of Unit NG (possibly equivalent to Laugeries), then at the top of Unit NK (possibly equivalent to Lascaux).

The Lateglacial and the Holocene

At the end of the Upper Pleniglacial, probably around 16,000 BP, the water level of the Haine descended below 32 m ASL, immediately prior to a significant cold period indicated by a polygonal network of large ice wedges at the base of a double generation of covering sands (Units NUA to NUE), extending across most of the valley slope. These are separated by broken flints that indicate a deflation surface associated locally to a humus-bearing horizon of "Usselo" type, attributed to the Alleröd. The Maisières-Canal sequence ends with the development of valley peat between 9,000 and 4,700 BP, followed by clayey alluvium deposited after the Neolithic.

The Western Sector of the Northeast Bank (1966–1979)

It was the discovery by J. de Heinzelin in 1966 of the Gravettian workshop on the extension of the promontory connecting the Champ de Fouilles with the Northeast Bank that permitted the link with the loess stratigraphy preserved on the north slope of the valley. The loess was deposited at the top of clay flows mixed with glauconiferous Paleocene sands (Unit NSV). The loess deposits begin with a meter of loessic silt with chalk granules (Unit NBC), overlain by a heterogeneous sandy silt (Unit NCA) incorporating a bioturbated grayish-brown horizon with tiny oxidation stains (Unit NCB) in the upper part. The top is identified by a sine undulating layer of light gray clayey silt. The ensemble was attributed to a hydromorphic soil in relation with the stabilization of the water level of the Haine around 33 m ASL (Haesaerts 1974; Haesaerts and de Heinzelin 1979), during an interstadial episode characterized by a dominance of liguliflorae and a continuous curve for *Betula*, *Alnus*, and *Corylus* in the pollen diagrams.

The units above NCB include two heterogeneous silty-sand deposits (Units NDA and NDC) that evidence a renewal of eolian deposition, largely mixed by runoff, in a cooler and more steppic context marked by an expansion of grasses (Bastin 1971). These deposits are separated by fine lenses of light gray silt (Unit NDB) continuous with the top of NDA; these appear to be the vestiges of a tundra gley formed during a phase of extreme cold, subsequently elongated by solifluction (Haesaerts 1974; Haesaerts and de Heinzelin 1979).

The Gravettian workshop was discovered between squares P50.71 and P50.75 in the lower part of Unit NDC. The lithic artifacts are similar to those found in the Champ de Fouilles occupation and include primarily blades; these are interspersed with bone fragments, many of which are calcined. The area excavated in September 1967 was located at the edge of the workshop; the lithic material was likely displaced by runoff, as indicated by its distribution in elongated lenses following a slight downward slope to the north. The overlying chalk flow (Unit NEB) cuts into the workshop layer west of P50.70 and can be followed to 32 m ASL in P50.60.

Unit NEB extends from a thick deferrified horizon (Unit NEA) that developed at the top of the NDC silts beyond P50.75. This horizon has all the characteristics of a tundra gley with deep ice segregation structures and indicates a period of significant climatic deterioration accompanied by the stabilization of a permafrost landscape (Haesaerts and Van Vliet 1974; Haesaerts and Van Vliet-Lanoë 1981), the NEB chalk flow being likely associated with the phase of permafrost degradation. In the western sector of the Northeast Bank, the loess cover overlying the tundra gley includes three generations of eolian deposits. Sedimentation begins by a loessic silt with chalky granules (Unit NEC) preserved in the lower parts of the landscape, followed by a homogeneous loess (Unit NED1) which goes above 36 m ASL between P50.50 and P50.85, and finally, an obliquely bedded loess of "niveo-eolian" type, deposited on the valley slope after P50.80 where the deposits are cut by the fluviatile channels of Units NF to NK.

The Aurignacian Occupation

The Aurignacian assemblage was found in Unit NBD, which is a homogeneous gray-brown silt 25–30-cm thick, lacking chalk granules, presenting a well-developed porosity, with some small biogalleries. This silt directly underlies the sandy silt of Unit NCA in all three of the trenches excavated. The upper limit of NBD is clear and

slightly undulating, while the lower limit is irregular and characterized by a network of small biogalleries penetrating the top of underlying Unit NBC. NBC consists of a loessic silt with chalk granules and overlies the glauconiferous sands of Unit NSV in which the upper part contains a highly bioturbated horizon of browner sand (Unit SVH).

New data obtained for Maisières-Canal confirm the complexity of the Middle Pleniglacial sequence and permit the insertion of an Aurignacian component which, until now, was lacking in the loess record in Middle Belgium. In particular, recently obtained dates (Jacobi et al. 2010) clearly situated the Maisières oscillation at around 28,000 BP and confirm the validity of the 30,780 BP date obtained for the lower humus-bearing soil at the Champ de Fouilles, which would be younger than layer NBD containing the Aurignacian workshop on the Northeast Bank. In comparison with the new climatic and chronological sequence proposed by T. van der Hammen (1995) for the fluviatile deposits of the Middle Pleniglacial in the eastern part of the Netherlands, the humus-bearing soil MD of the Champ de Fouilles and the bioturbated horizon NCB of the Northeast Bank would be correlated with the Denekamp I interstadial dating between 30,000 and 30,500 BP. The Maisières oscillation, slightly more recent than the Denekamp II interstadial, would be situated between 28,500 and 29,000 BP, to which the humus-bearing silt MD and the sandy silts NDA are attributed. According to this schema, the Aurignacian workshop and Unit NBD would be attributed to the Huneborg II interstadial dating between 32,000 and 33,300 BP in the Netherlands sequence.

The stratigraphic data from the Northeast Bank is also of importance to place the Maisières-Canal sequence in the regional context of the Upper Pleistocene in Middle Belgium, using the Cuesta of Harmignes sequence on the southern slope of the Haine basin (Haesaerts 1974; Haesaerts and Van Vliet 1974). Here again, it is the comparable lithostratigraphic and climatic signatures that serve to make correlations between the two systems; these correlations are centered on the tundra gley NEA associated with climatic deterioration following the Gravettian occupation at Maisières-Canal and which constitutes a stratigraphic marker for the limit between the loess silts of the Middle Pleniglacial and the loess cover of the first half of the Upper Pleniglacial. The conjunction of the record at Maisières-Canal and the Cuesta of Harmignies permits the reconstruction of a pedosedimentological and climatic sequence covering the Upper Pleistocene and can be integrated with the stratigraphies at the sites of the Station de l'Hermitage and Remicourt west of Liège (Haesaerts et al. 1999), which serve as reference sequences for the Hesbaye loess.

In conclusion, the coexistence at Maisières-Canal of both Aurignacian and Gravettian workshops within a complex stratigraphic sequence well-situated chronologically constitutes an exceptional reference element for the loess sequence of northwest Europe where Early Upper Paleolithic open-air sites in stratigraphic context are extremely rare. For comparison, the Gravettian occupation of the Station de l'Hermitage at Huccorgne is more recent than that of Maisières, and is associated with the initial loess deposits of the Upper Pleniglacial, probably around 26,000 BP (Haesaerts 2000). The Aurignacian occupation at Maisières is comparable to Lommersum in the Rhine Valley southwest of Cologne (see Hahn 1977; Terberger and Street 2003).

Site Taphonomy

Taphonomic analysis was done to evaluate the integrity of the context of the Aurignacian assemblage. Six different sources of data were exploited: (1) unit slope, (2, 3) artifact orientation and inclination, (4) lithic raw material, (5, 6) vertical distribution of artifacts and spatial distribution of refits. Results complement stratigraphic analysis and demonstrate that the occupation is in situ, with minor displacement due to post-depositional cryoturbation. The slope of Unit NBD was evaluated on the basis of transversal and longitudinal profiles and the position of artifacts in the lower portion of the unit. The unit slopes slightly downward to the NNE and is nearly horizontal NNW-SSE, indicating that slope processes would have had little role in the

movement of artifacts. Artifact orientation was used as a proxy indicator of the direction of possible movement of artifacts. Similarly aligned artifacts would indicate a process of systematic displacement of artifacts, for example, along a streambed or slippage down a hill slope. Orientation was recorded for artifacts that were longer than wide (n = 283). Artifacts show a small tendency (39%) to be oriented NNE, along the slope of the unit, suggesting some lateral downhill displacement. Artifact inclination (horizontal, oblique, or vertical) along the longitudinal axis was measured for 871 artifacts. The majority are horizontal are slightly oblique (69%), but 31% are oblique or vertical, reflecting some displacement due to cryoturbation. Diversity and variability in lithic raw materials in an assemblage can serve as an indicator of possible mixture between strata or the presence of multiple occupations. At Maisières, the Aurignacian level is homogeneous, with a single type of flint represented with a similar patina for all artifacts. The flint is Obourg flint, found next to the site in the Cretaceous chalk formations and easily accessible in the eroding chalk flows. The flint is of good quality, black or brown, and translucent with few inclusions; patina is bluish-white and artifacts often became patinated only after being excavated. Artifacts edges and ridges are fresh, indicating little movement.

Several observations can be made:

1. The vast majority of artifacts are found in a dense circular concentration 5–10-cm thick in the lower part of Unit NBD, centered on squares 68–69 A-B, with a smaller adjacent concentration in squares 67–69 Z-A. The base of the concentration follows the unit slope, and is particularly clear in 68–69 A-B. These concentrations are considered to be in place.
2. A few artifacts are found above the main concentration, at the top of NBD and in the lower part of Unit NCA. No refits were possible between these artifacts and the main concentration; however, they are similar in raw material, morphology, and patination. Oblique or vertical, they appear to have been moved by post-depositional freeze-thaw action.
3. In squares 69 Z-A and occasionally in 67–68 A-B, some artifacts are found below the main concentration in the basal part of Unit NBD corresponding to the small initial horizon of the humus-bearing soil. Others are found 10–15 cm lower in Unit NBC. Refitting shows 13 series joining 43 artifacts from the main concentration and the base of NBD, including seven technological series, two tool modifications, and four breaks. Four tools are also part of the refits. These demonstrate the integrity of the assemblage within Unit NBD. No refits were possible between artifacts found in underlying NBC and the main concentration, although they again are morphologically similar.
4. A slightly different situation is observed in squares 70–73 A-C, which show a dispersed distribution of artifacts within NBD and a relatively high number of artifacts dispersed up to 25 cm lower in NBC. Among the artifacts dispersed upslope from the concentration (squares 69–72 C-D), 28 join with artifacts in the main concentration. It is suggested that the upslope dispersal is due to human activities taking place at the site rather than post-depositional disturbance.

The data demonstrate the integrity of the lithic assemblage of Unit NBD, which would appear to be the product of a single phase of activity. Such activity would have occurred during the initial formation phase of the humus-bearing horizon, in an interstadial episode associated with grass cover on the northern slope of the Haine valley. In this context, the distribution of lithic elements in the upper half of the horizon in squares 68–69 Z-B is likely the result of post-depositional freeze-thaw action, as is also indicated by the sub-vertical or oblique position of many artifacts. However, interpretation of the presence of artifacts in the underlying Unit NBC, some reaching 20 cm below the main concentration, remains problematic and could attest to a preceding activity phase.

Structure of the Aurignacian Lithic Assemblage

Table 1 summarizes the composition of the Aurignacian assemblage.

Maisières-Canal: An Open-Air Aurignacian Workshop, Table 1 Maisières-Canal, Trench 2, Aurignacian. Frequencies of types of reduction products (2000–2002 excavations)

Debitage products		n	%
Unclassified		81	2,82
Flakes < 1 cm	Trimming flakes	1,115	38,82
	Bifacial retouch flakes	3	0,10
	Thinning flakes	46	1,60
Debris	Debris <1 cm	362	12,60
	Angular debris >1 cm	15	0,52
	Chunks	3	0,10
Blades		486	16.94
Crested blades		18	0,63
Bladelets		49	1,71
Flakes	Flakes	568	19,78
	Laminar flakes	27	0,94
Tablets	Primary tablets	15	0,52
	Secondary tablets	5	0,17
Flanks		8	0,28
Burin spalls		71	2,47
	Total	**2,872**	**100,00**

Maisières-Canal: An Open-Air Aurignacian Workshop, Table 2 Aurignacian tool kit

Type	Sub-type	n
Burins		**11**
	Busked	5
	Dihedral	3
	Carinated	1
	Simple	1
	On break	1
Retouched artifacts		**8**
Denticulates		**6**
Notchs		**5**
Endscrapers		**4**
Truncations		**3**
Retouched bladelets	Dufour (Roc-de-Combe)	**1**
Composite tools		**6**
	Busked burin -sidescraper-notch	1
	Dihedral burin –notch	1
	Notch-retouched artifact	4
Total		**44**

The Aurignacian assemblage contains 44 formal tools (Table 2) as well as a slightly higher number of artifacts with slight retouch or traces of use ($n = 74$). Busked and carinated burins are included in the list, but are interpreted as bladelet cores rather than tools; 19 tools were able to be refitted, indicating that they were prepared and abandoned onsite.

Numbering 11, burins are the best represented category (25% of the toolkit). In addition, two other burins, one busked and one dihedral, are included in the category of composite tools. For the busked burins (Fig. 3), a notch on the left edge served to terminate transversal removals (Fig. 4: 9–18). The striking platform for these short removals is on the right edge, formed by the removal of a long burin spall parallel to the longitudinal axis of the burin (Fig. 4: 1–3). Busked burins were made on two partially cortical flakes and a partially cortical blade that were produced during the preparation of blade cores; long burin spalls were able to be refitted to each, indicating that they were prepared at the site. Another busked burin was made on a thick blade, onto which a long burin spall and a flake renewing the notch were refitted, suggesting that the artifact had undergone relatively significant reduction. Finally, a distal fragment of a busked burin, broken at the notch, and a proximal fragment of a longitudinal burin spall were refitted. Three dihedral burins are present, one on a blade retouched on both lateral edges, another on a tablet from a blade core, and a dihedral angle burin on an unretouched blade. Refitting of a longitudinal burin spall with transversal negatives to this last indicates that it had previously been a busked or carinated burin. It should be noted that this is the only piece where transversal removals were removed from the left side. A fourth is classified with the composite tools. The distal fragment of a carinated burin with a longitudinal burin spall refitted to the right edge shows the reduction of at least 1.2 cm of the burin by transversal removals. The left edge of the piece is slightly retouched, but lacks a clear

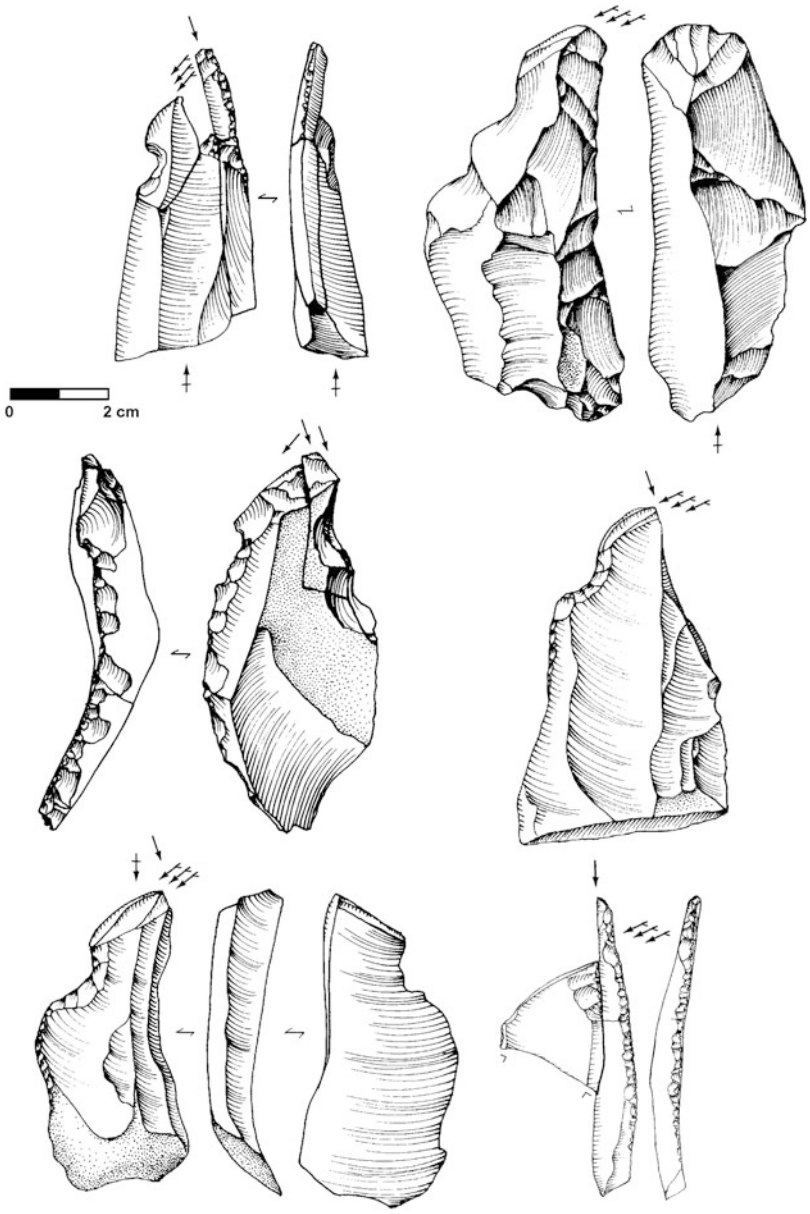

Maisières-Canal: An Open-Air Aurignacian Workshop,
Fig. 3 Maisières-Canal, Aurignacian, busked burins

notch; it is thus not classified with the busked burins. A simple burin on a blade refits to a burin spall, but was not used to produce short bladelets similar to those produced from the busked burins.

The total number of bladelets refitted to busked burins is 124. This may appear elevated, but certain refits demonstrate that the burins underwent significant reduction in length and would account for the high number of bladelets recovered as well as reflecting the focus on bladelet production at the site.

There is a single retouched bladelet, curved and twisted, asymmetric to the right, with very fine inverse retouch on the mesio-distal portion of the right edge (Fig. 4: 4). Retouch is limited, but regular and seems to have been intentional. Small chips on the distal end correspond, in contrast, to

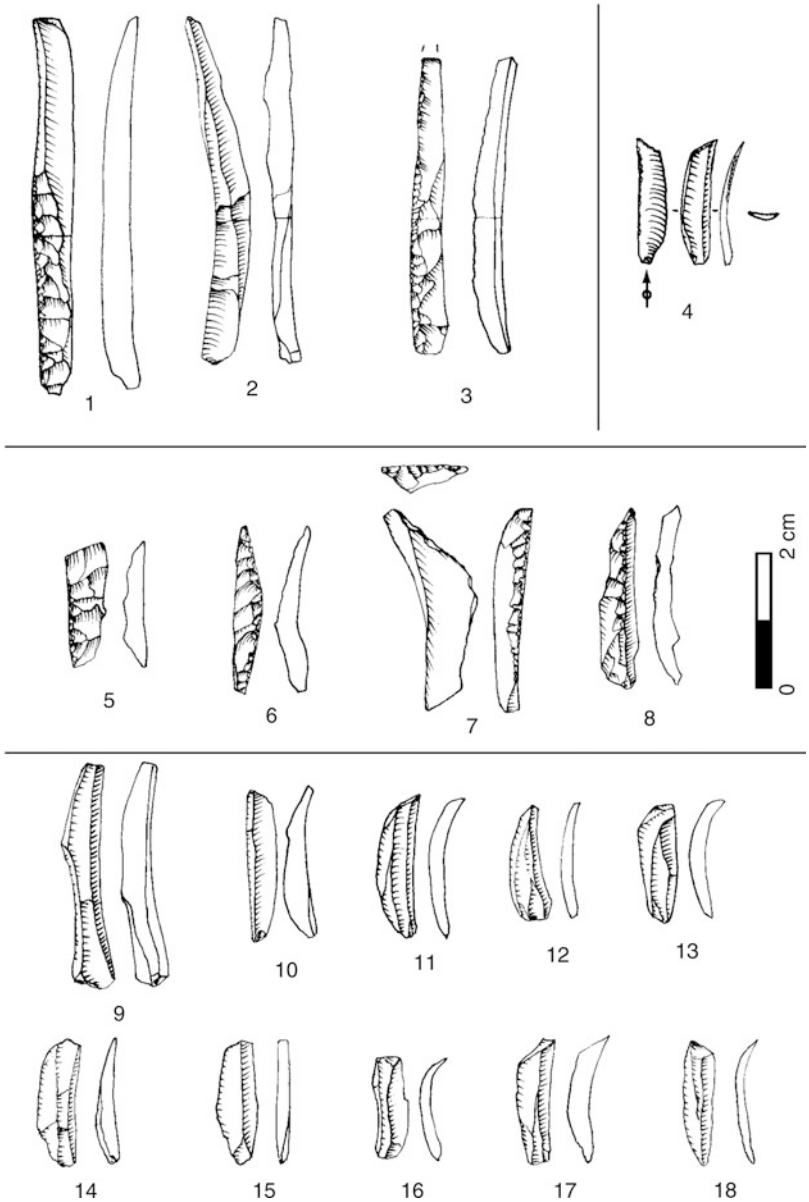

Maisières-Canal: An Open-Air Aurignacian Workshop,
Fig. 4 Maisières-Canal, Aurignacian, burin spalls and bladelets. (**1**–**3**) long burin spalls to prepare striking platform for short bladelets. (**4**) retouched bladelet (Dufour of Roc-de-Combe type). (**5**–**8**) retouched burin spalls. (**9**–**18**) bladelets

be accidental retouch resulting from bladelet reduction (Lucas 2000; Bordes and Lenoble 2002: 744; Chiotti 2003; Le Brun-Ricalens and Brou 2003). The piece is similar typologically to Dufour bladelets of Roc-de-Combe type, characterized by its small size (Demars and Laurent 1989: 102) and by its twisted aspect. The morphology and size suggest that it was removed as a "spall" from a carinated piece, such as the busked burins present on the site.

Artifact refitting shows the focus on bladelet production onsite, as well as the preparation of blade cores for export (Fig. 5). Different reduction phases are also demonstrated, including decortication, core preparation, blade/bladelet production, and the removal of crested blades.

Specialized Activity Zones

Two activity zones were identifiable on the basis of the spatial distribution of technological refits

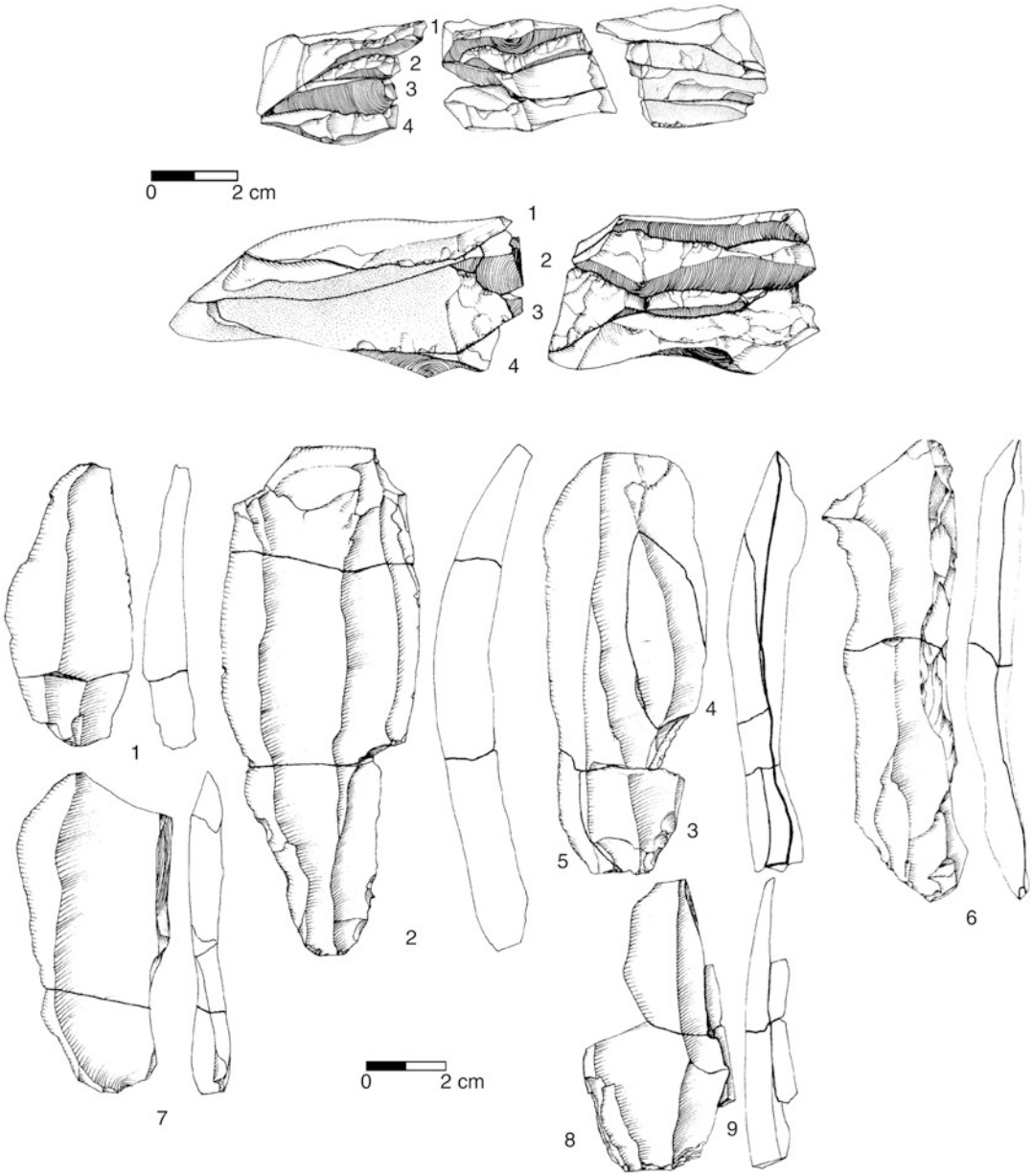

Maisières-Canal: An Open-Air Aurignacian Workshop, Fig. 5 Maisières-Canal, Aurignacian, top: two series of refitted core rejuvenation tablets from blade cores; bottom: refitted blades

and tool modifications (Fig. 6). The main concentration in squares 68–69 A-B is identified by the presence of technological refit series and unrefitted artifacts from all reduction phases: cortex removal, core preparation (series n° 2, 10, 11), preparation of crested blades (series n° 4, 74), removal of tablets during blade production (series n° 6, 8), and blade production (series n° 100). The vast majority of microdebris and small flakes are also found in squares 68A ($n = 725$) and 69A ($n = 407$) in comparison with squares 68B ($n = 42$) and 69B ($n = 92$); they are rare in the rest of the site. By contrast, bladelet production from burins is shown by refits of

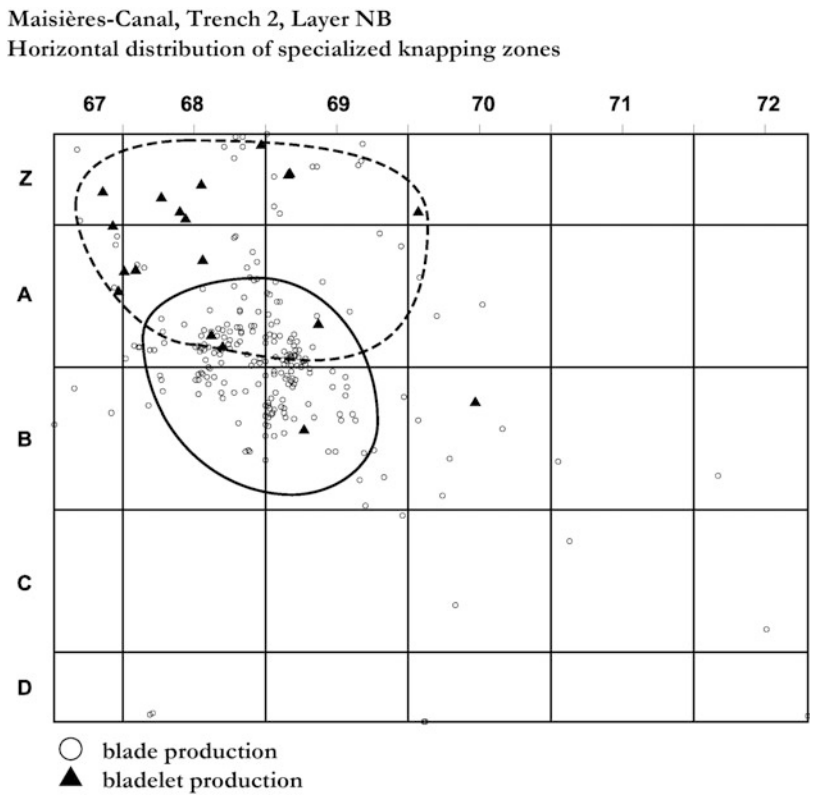

Maisières-Canal: An Open-Air Aurignacian Workshop,
Fig. 6 Maisières-Canal, Aurignacian, specialized knapping zones for blade and bladelet production

bladelets and burins, as well as numerous unrefitted bladelets, found concentrated slightly outside this zone, in squares 68–69 Z-A. All of the busked burins are found in squares 67Z, 69Z, and 68A, each refitted to a long burin spall creating the striking platform for bladelet production, while burins on break and dihedral burins are found in 68A-B and 69-70B. Technological activity associated with the busked burins thus took place in a 2 m^2 zone adjacent to the main reduction area. The second zone, then, would appear to have been specialized for bladelet production. Thus, even in a zone fairly restricted in area (around 7 m^2), two specialized activity zones can be distinguished, one focusing on the preparation of flint blade cores and blade production, the other associated with busked burins and bladelet production.

Interpretation

The structure of the Aurignacian lithic assemblage and its spatial distribution clearly demonstrate the function of the site as a flint workshop of short duration, for the preparation of blade cores and bladelets for export elsewhere. All of the reduction phases are represented. Tools, while rare and opportunistic, were produced on reduction by-products and not generally on intentional blanks (blades and bladelets). They were likely used for activities during the short-term occupation, reserving any blanks produced for export. The area of the site is small, around 25 m^2 excluding the part of the site destroyed by recent development along the canal.

There is no evidence of hearths or dwelling structures. Apart from the two adjacent knapping zones, there is no evidence for other activities that may have taken place during the occupation. Little fauna is preserved (e.g., a reindeer molar), certainly due to the open-air loess context, but this may also reflect a limited degree of hunting during the occupation.

The Aurignacian workshop thus contrasts in many ways to the Gravettian occupation, which contained hearths, abundant fauna, evidence of butchering activity, the presence of bone tools,

and a higher degree of flint reduction activity onsite.

The interpretation of the site is thus that it served as a short-term workshop, perhaps only for a few days, focused on bladelet production and the preparation of blade cores, with few "domestic" activities that would be associated with a longer-term camp. The lithic assemblage appears to have resulted from a single occupation, ultimately with the export of blade cores and blade/bladelet blanks and tools for use at other sites.

Cross-References

► Europe: Early Upper Paleolithic

References

Bastin, B. 1971. Recherches sur l'évolution du peuplement végétal en Belgique durant la glaciation du Würm. *Acta Geographica Lovaniensia* 9: 1–136.

Bordes, J.-G., and A. Lenoble. 2002. La "lamelle Caminade": Un nouvel outil lithique aurignacien? *Bulletin de la Société Préhistorique Française* 99 (4): 735–749.

Chiotti, L. 2003. Les productions lamellaires dans l'Aurignacien de l'Abri Pataud, Les-Eyzies-de-Tayac (Dordogne). *Gallia Préhistoire* 45: 113–156.

de Heinzelin, J. 1971. Le gisement Périgordien de Maisières-Canal (1966). *Bulletin de la Société royale belge d'Anthropologie et de Préhistoire* 82: 63–76.

de Heinzelin, J. 1973. *L'industrie du site paléolithique de Maisières-Canal*. Mémoires 171. Bruxelles: Institut Royal des Sciences Naturelles de Belgique.

Demars, P.-Y., and P. Laurent. 1989. *Types d'outils lithiques du Paléolithique supérieur en Europe*. Cahiers du Quaternaire 14. Paris: Editions du CNRS.

Dewez, M., ed. 2008. *Recherches à la grotte Walou à Trooz (Belgique)/Studies in Walou Cave in Trooz (Belgium). Second rapport de fouille/Second excavation report*. British Archaeological Reports International series S1789. Oxford: Archaeopress.

Fourny, M., and M. Van Assche. 1992. Sites aurignaciens en surface autour du Bois de la Houssière, Braine-le-Comte, Ecaussines d'Enghien, Henripont et Ronquières (Hainaut). *Notae Praehistoricae* 11: 29–31.

Gilot, E. 1971. Louvain natural radiocarbon measurements. *Radiocarbon* 13 (1): 45–51.

Haesaerts, P. 1973. Contribution à la stratigraphie des dépôts du Pléistocène supérieur du bassin de la Haine. Unpublished PhD dissertation, Vrije Universiteit Brussel.

Haesaerts, P. 1974. Séquence paléoclimatique du Pléistocène supérieur du bassin de la Haine (Belgique). *Annales de la Société Géologique de Belgique* 97: 105–137.

Haesaerts, P. 2000. Geology and chronostratigraphy. In *La station de l'Hermitage à Huccorgne. Un habitat à la frontière septentrionale du monde gravettien*. ERAUL 94, ed. L.G. Straus, M. Otte, and P. Haesaerts, 15–34. Liège: Université de Liège.

Haesaerts, P., and J. de Heinzelin. 1979. *Le site paléolithique de Maisières-Canal*. Dissertations Archaeologicae Gandenses 19. Brugge: De Tempel.

Haesaerts, P., and B. Van Vliet. 1974. Compte rendu de l'excursion du 25 mai 1974 consacrée à la stratigraphie des limons aux environs de Mons. *Annales de la Société Géologique de Belgique* 97: 547–560.

Haesaerts, P., and B. Van Vliet-Lanoë. 1981. Phénomènes périglaciaires et sols fossiles observés à Maisières-Canal, à Harmignies et à Rocourt. *Biuletyn Peryglacjalny* 28: 291–324.

Haesaerts, P., H. Mestdagh, and D. Bosquet. 1999. The sequence of Remicourt (Hesbaye, Belgium): New insights of the pedo- and chronostratigraphy of the Rocourt Soil. *Geologica Belgica* 2 (3–4): 5–27.

Hahn, J. 1977. *Aurignacien, das ältere Jungpaläolithicum in Mittel- und Osteuropa*. A (9). Köln: Fundamenta.

Jacobi, R., T.F.G. Higham, P. Haesaerts, I. Jadin, and L.S. Basell. 2010. Radiocarbon chronology for the early Gravettian of northern Europe: New AMS determinations for Maisières-Canal, Belgium. *Antiquity* 84: 26–40.

Le Brun-Ricalens, F., and L. Brou. 2003. Burins carénés-nucléus à lamelles: Identification d'une chaîne opératoire particulière à Thèmes (Yonne) et implications. *Bulletin de la Société Préhistorique Française* 100 (1): 67–83.

Lucas, G. 2000. Les industries lithiques du Flageolet I (Dordogne). Approche économique, technologique, fonctionnelle et analyse spatiale. Unpublished PhD dissertation, Université de Bordeaux I.

Miller, R., M. Otte, J. Haeck, F. Collin, and I. López Bayón. 1998. The Grotte du Docteur: Preliminary report for the 1998 excavations. *Notae Praehistoricae* 18: 65–75.

Miller, R., P. Haesaerts, and M. Otte, eds. 2004. *L'Atelier de taille aurignacien de Maisières-Canal, Belgique*. ERAUL 110. Liège: Université de Liège.

Otte, M., and R. Miller. 2000. La Grotte du Docteur à Moha. *Quatrième Journée d'Archéologie Liégeoise* 27: 45–55.

Otte, M., and L.G. Straus., dir. 1995. *Le Trou Magrite. Fouilles 1991–1992. Résurrection d'un site classique en Wallonie*. ERAUL 69. Liège: Université de Liège.

Terberger, T., and M. Street. 2003. New evidence for the chronology of the Aurignacian and the question of Pleniglacial settlement in western central Europe. In *The chronology of the Aurignacian and of the transitional technocomplexes. dating, stratigraphies, cultural implications. Proceedings of Symposium 6.1 of the XVth Congress of the U.I.S.P.P. Liège, Belgium September 2001*. Trabalhos de Arqueologia 33, ed.

F. D'Errico, and J. Zilhao, 213–21. Lisbon: Instituto Português de Arqueologia.
Toussaint, M., S. Pirson, I. López Bayón, A. Becker, Ph. Lacroix, and S. Lambermont. 1999. Bilan préliminaire de trois années de fouilles à l'Abris Supérieur de Goyet (Gesves, province de Namur). *Notae Praehistoricae* 19: 39–47.
van der Hammen, T. 1995. The Dinkel Valley revisited: Periglacial stratigraphy of the eastern Netherlands and global climatic change. *Mededelingen Rijks Geologische Dienst* 52: 343–355.
Vogel, J., and T. van der Hammen. 1967. The Denekamp and Paudorf interstadials. *Geologie en Mijnbouw* 46: 188–194.

Further Reading

Otte, M., ed. 1992. *Recherches aux grottes de Sclayn, volume 1: Le contexte*. ERAUL 27. Liège: Université de Liège.
Otte, M., and L.G. Straus, eds. 1992. *Le Trou Magrite: Fouilles 1991–1992: Résurrection d'un site classique en Wallonie. Resurrection of a classic site in Wallonia (1991–1992 excavations)*. ERAUL 69. Liège: Université de Liège.
Otte, M., M. Patou-Mathis, and D. Bonjean, eds. 1998. *Recherches aux grottes de Sclayn, volume 2: L'archéologie*. ERAUL 79. Liège: Université de Liége.
Pirson, S., C. Draily, and M. Toussaint. 2011. *La grotte Walou à Trooz (Belgique): fouilles de 1996 à 2004*, (3 volumes). Namur: Institut du Patrimoine, coll. Études et Documents.
Straus, L.G., M. Otte, and P. Haesaerts, eds. 2000. *La Station de l'Hermitage à Huccorgne: Un habitat à la frontière septentrionale du monde gravettian. The open-air Hermitage site at Huccorgne: An open-air site at the northern frontier of the Gravettian world*. ERAUL 94. Liège: Université de Liége.

Maiuri, Amedeo

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Basic Biographical Information

Amedeo Maiuri was born in Veroli on 7 January 1886 and died in Naples on 7 April 1963. Considered by many to be one of the greatest Italian archaeologists of the twentieth century, he is best known for his work at Pompeii and Herculaneum which he undertook for 37 years until his retirement in 1961.

Maiuri began his archaeological career in Crete in 1911 with archaeologist and epigrapher Federico Halbherr as a member of the Italian Archaeological Mission. At the age of 26, he entered the public service serving as director of the Museum of Naples. Shortly after the Italian occupation of Rhodes during World War I, he was sent to the island in 1914 to direct the Italian Archaeological Mission where he spent 10 years as director, saving archaeological sites and antiquities from plunder and founding the Archaeological Museum of Rhodes.

In 1924 Maiuri was appointed by Mussolini as director of antiquities in Campania to replace Vittorio Spinazzola, whose political views were not in line with the Fascists. At Pompeii Maiuri was one of the first to explore the pre-Roman settlement back to the Samnite period. He was the first to undertake stratigraphic excavations of the city and expose the entire circuit of the city's walls. Maiuri excavated and reconstructed some of Pompeii's most famous houses, such as The Villa of the Mysteries (1929–1930), House of the Surgeon (1929–1930), and House of the Menander (1930–1931). In 1927 Maiuri reopened excavations at Herculaneum which eventually became the showpiece of Campanian archaeology during the Fascist period. Work at both Pompeii and Herculaneum was halted in 1942 when fighting between the Italians and the Allies moved into Southern Italy. Pompeii was bombed by the Allies in August 1943, and many structures, such as the House of the Faun, House of the Moralist, and the Antiquarium, were destroyed.

During his long career, Maiuri also investigated Capri, Cuma, Baia, Misenum, and Pozzuoli and sites further south, such as Paestum, and Velia. From 1942 to 1962, he was professor of archaeology at the University of Naples.

Major Accomplishments

During Maiuri's time in Crete, he visited Sir Arthur Evans's excavation of the Palace of Knossos and observed what Evans called his

"reconstitutions" of the palace. This experience may have influenced Maiuri to reconstruct the buildings at Herculaneum and turn the site into an open-air museum. He did this by leaving some walls and floors of the houses half-built and open so visitors could understand, not only how they were originally constructed but how they were destroyed in the eruption. Maiuri also aimed to give visitors the feeling that they had "stepped back in time," by placing furniture and everyday objects of life, such as plates, saucepans, scales, lamps, and food in movie-set style tableaux; even skeletons and plaster casts of those killed in the eruption were showcased in buildings on site. Maiuri's reconstructions of life in a Roman town presented the nationalist ideology of *romanità* that promoted the continuity of Italian cultural superiority throughout the ages, from the Roman imperial period to the Fascist present.

Maiuri's dedication to archaeology led him to risk his life to save Pompeii and the Archaeological Museum in Naples from destruction during the Allied bombing. While cycling from Pompeii to Naples on 15 September 1943 to save the antiquities in the National Museum of Naples, Maiuri was shot in the leg: as a result, he used a walking cane for the rest of his life. After the war, Maiuri worked closely with the Allies to recover the Pompeii bronzes looted by the Germans.

Maiuri was a prolific writer. His prose style was greatly influenced by his personal hero Virgil and admired by his contemporaries for its "poetic" expression. Throughout his life he produced over 300 publications on his archaeological work in the Aegean and Southern Italy, particularly Campania and the Bay of Naples. Maiuri also published in the popular press, producing newspaper articles and popular guidebooks for Pompeii, Herculaneum, and many other sites which were translated into many languages. Maiuri considered communication with the public – in language that was interesting and accessible to the non-archaeologist – one of the most important responsibilities of his job.

Although Maiuri was willing to cooperate with the Fascists regarding archaeology, he did not agree with their racial policy. When Giulio Jacopi, director of the Italian excavations in the Dodecanese, asked Maiuri to give him a reference in 1946, Maiuri refused. It was well-known in the academic community that Jacopi had reported the whereabouts of Jewish Italian epigrapher Mario Segre to the authorities, resulting in the arrest of Segre, his wife, and child and their deaths in Auschwitz in l 944.

Maiuri, Amedeo, Fig. 1 Amedeo Maiuri at Pompeii

Amedeo Maiuri was an ardent Italian patriot with a passionate love for Roman history, archaeology, and Virgil. Although he promoted the ideology of *romanità* in his work and was rewarded by the Fascists with awards and promotions, unlike some of his contemporaries, he was not charged with any wrongdoing by the Allies. After the war Maiuri continued to have a long, productive, and highly respected career until his retirement in 1961 (Fig. 1).

Cross-Reference

► Pompeii

References

De Franciscis, A. 1990. *Amedeo Maiuri nel centenario della nascita*. Napoli: Bibliopolis.

M

Maggi, G. 1974. *L'archeologica magica di Maiuri*. Napoli: Loffredo.
Maiuri, A. 1958. *Vita d'Archeologo*. Napoli: Rusconi.

Further Reading

Berry, J. 2013. *The complete Pompeii*. London: Thames and Hudson.
Dobbins, J.J., and P.W. Foss. 2008. *The world of Pompeii*. London/New York: Routledge.
Laurence, R. 2007. *Roman Pompeii: Space and society*. New York: Routledge.
Wallace-Hadrill, A. 1994. *Houses and society in Pompeii and Herculaneum*. Princeton: Princeton University Press.
Wallace-Hadrill, A. 2011. *Herculaneum: Past and future*. London: Frances Lincoln.

Maize: Origins and Development

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Basic Species Information

Today, maize (*Zea mays* L.), which is also called "corn" or "sweet corn" in English-speaking countries, is one of the most important food crops cultivated globally. From initial, potential domestication in the Balsas River Valley of tropical southwestern Mexico around 9000–8600 years ago (Piperno et al. 2009), maize spread across much of Central and South America before 4000–3000 years ago (Iriarte 2007), to North America around 2000 years ago (see Fritz 2007), and has subsequently dispersed across the globe in the last 500 years or so.

Today, maize is grown by subsistence farmers across the globe as a source of starch or carbohydrate. Its widespread geographical adoption is due to its ability to adapt to a variety of climates, soils, and habitats. Although an important food crop, it is also grown for ethanol and corn syrup; the latter is a contributor to a vast array of processed foods.

The multidisciplinary history of maize domestication and dispersal is comparatively well-defined through archaeobotany (macrofossils and microfossils) and genetics (DNA and aDNA). Multidisciplinary research has enabled the processes of human selection and resultant morphogenetic transformation in the generation of maize to be tracked, as well as domestication traits that are not visible in the archaeobotanical record (Jaenicke-Després et al. 2003; Doebley et al. 2006; Zeder et al. 2006).

Major Domestication Traits

Genetic research has shown that maize is descended from a wild grass teosinte (*Zea mays* ssp. *parviglumis* or Balsas teosinte) that is native to the Balsas River Valley in tropical southwestern Mexico (Matsuoka et al. 2002). Domestication resulted in the transformation of multiple traits in teosinte to create maize. These include archetypical traits of the domestication syndrome in grasses, such as size of edible glume (much larger in maize) and nonshattering rachis (in maize), as well as other traits, such as apical dominance (replacement of multiple stalks with single stalk) and kernel case formation (enclosed casing around kernel in teosinte). Genes have been identified that control specific morphological changes, or domestication traits in maize, including *Teosinte branched 1* (*tb1*, apical dominance) and *Teosinte glume architecture 1* (*tga1*, kernel casing), as well as genes that control varietal differentiation based on kernel color, composition, and sweetness (Doebley et al. 2006; Zeder et al. 2006).

In 2001, Piperno and Flannery (2001) reported two archaeological cobs of maize dated to c. 6300–6000 cal BP from Guilà Naquitz Cave in the Oaxaca Valley of Mexico. These cobs exhibited all the major morphological characteristics of domesticated maize (Benz 2001), suggesting that domestication had already taken place. More recent archaeological research at Xihuatoxtla Shelter in the Central Balsas River Valley has identified starch grains and phytoliths of maize on stone artifacts and in associated sediments dating back to c. 9000–8600 cal BP

(Piperno et al. 2009; Ranere et al. 2009). These finds indicate that maize was domesticated early in Mexico, although the exact location and timing may vary with further investigations.

At present, there is a high level of agreement, or consilience, between genetic and archaeobotanical interpretations for the location of maize domestication in the seasonal tropical climates of the Balsas River Valley region of Mexico, rather than the semiarid highlands (see Hastorf 2009 and van Heerwaarden et al. 2011 for discussion and qualification). However, Zeder et al. (2006: 144) caution:

> . . . identifying the Balsas watershed as the place where maize was probably initially domesticated should be tempered with the realization that undiscovered or extinct populations might be yet closer to maize, and species distributions might have changed since the time of the domestication.

The degree of multidisciplinary consilience that exists for understanding maize domestication is unusual and shared by only a few other domesticated plants globally (Smith 2001). There is also relatively good multidisciplinary information for the dispersal of maize in the Americas and the subsequent generation of varieties (Smith 1998: 150–160).

Maize was widely cultivated in diverse climobiological regions across South America by approximately 4,000–3,000 years ago (Perry et al. 2006; reviewed in Iriarte 2007). It was also introduced to the southern United States but remained a relatively minor crop, until c. 1,000 years ago (Fritz 2007). The maize-bean-squash combination was a significant traditional diet in large parts the Americas at the time of European conquest and colonization. This nutritionally balanced diet extended from "Argentina to Ecuador, up through Central America and Mexico, and as far north as southern Ontario" (Smith 1998: 147). Maize was first introduced to Europe in the late fifteenth century, was cultivated for food in Mediterranean regions in the centuries that followed introduction, and has subsequently been dispersed to regions around the globe.

Where maize was the dominant staple in the Americas, it was traditionally processed using alkali (usually lime) – a process referred to as nixtamalization – to remove toxins and increase the availability of nutrients, including niacin (vitamin B3). Without this processing, people reliant on maize diets suffer deficiencies, such as pellagra (niacin deficiency). Pellagra periodically occurred in regions of Europe from the eighteenth century onwards where people were reliant on maize, especially during famines, because nixtamilization was not practiced.

Significantly, at some point during the domestication process, maize lost its ability to reproduce effectively. Without human intervention to remove the corn cob from its protective sheath of leaves, and thereby to remove kernels for storage and planting, unharvested cobs generally rot.

Furthermore, a vast amount of maize seed today, especially within commercial agriculture, is now genetically modified (GM). The narrow genetic diversity of cultivated GM maize has raised fears regarding the susceptibility of the crop to disease, with the potential for economic disruptions to processed food production, as well as the vulnerability of subsistence farmers to famine.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Beans: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Squash: Origins and Development

References

Doebley, J.F., B.S. Gaut, and B.D. Smith. 2006. The molecular genetics of crop domestication. *Cell* 127: 1309–1321.

Fritz, G.J. 2007. Keepers of Louisiana's levees: Early mound builders and forest managers. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T.P. Denham, J. Iriarte, and L. Vrydaghs, 189–209. Walnut Creek: Left Coast Press.

Hastorf, C.A. 2009. Rio Balsas most likely region for maize domestication. *Proceedings of the National Academy of Sciences (USA)* 106: 4957–4958.

Iriarte, J. 2007. New perspectives on plant domestication and the development of agriculture in the New World. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T.P. Denham, J. Iriarte, and L. Vrydaghs, 167–188. Walnut Creek: Left Coast Press.

Jaenicke-Després, V., E.S. Buckler, B.D. Smith, M.T.P. Gilbert, A. Cooper, J. Doebley, and S. Pääbo. 2003. Early allelic selection in maize as revealed by ancient DNA. *Science* 302: 1206–1208.

Matsuoka, Y., Y. Vigouroux, M.M. Goodman, J. Sanchez, E. Buckler, and J. Doebley. 2002. A single domestication for maize shown by multilocus microsatellite genotyping. *Proceedings of the National Academy of Sciences (USA)* 99: 6080–6084.

Perry, L., D.H. Sandweiss, D.R. Piperno, K. Rademaker, M.A. Malpass, A. Umire, and P. de la Vera. 2006. Early maize agriculture and interzonal interaction in southern Peru. *Nature* 440: 76–79.

Piperno, D.R., and K.V. Flannery. 2001. The earliest archaeological maize (*Zea mays* L.) from highland Mexico: New accelerator mass spectrometry dates and their implications. *Proceedings of the National Academy of Sciences (USA)* 98: 2101–2103.

Piperno, D.R., A.J. Ranere, I. Holst, J. Iriarte, and R. Dickau. 2009. Starch grain and phytolith evidence for early ninth millennium B.P. maize from the Central Balsas River Valley, Mexico. *Proceedings of the National Academy of Sciences (USA)* 106: 5019–5024.

Ranere, A., D.R. Piperno, I. Holst, R. Dickau, and J. Iriarte. 2009. The cultural and chronological context of early Holocene maize and squash domestication in the Central Balsas River Valley, Mexico. *Proceedings of the National Academy of Sciences (USA)* 106: 5014–5018.

Smith, B.D. 1998. *The emergence of agriculture*. New York: Scientific American Library.

Smith, B.D. 2001. Documenting plant domestication: The consilience of biological and archaeological approaches. *Proceedings of the National Academy of Sciences (USA)* 98: 1324–1326.

Van Heerwaarden, J., J. Doebley, W.H. Briggs, J.C. Glaubitz, M.M. Goodman, J. de Sanchez Gonzalez, and J. Ross-Ibarra. 2011. Genetic signals of origin, spread, and introgression in a large sample of maize landraces. *Proceedings of the National Academy of Sciences (USA)* 108: 1088–1092.

Zeder, M.A., E. Emshwiller, B.D. Smith, and D.G. Bradley. 2006. Documenting domestication: The intersection of genetics and archaeology. *Trends in Genetics* 22: 139–155.

Makowski, Krzysztof

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Basic Biographical Information

Krzysztof Makowski is a Polish archaeologist who settled in Peru in 1983. He was born on March 7, 1952, in the city of Warsaw, capital of Poland. In 1958, he began his studies in his hometown, first at the Elementary School #70. From 1965 he continued studying at the Experimental Humanistic Lyceum #XV by "Narcyza Zmichowska." Between 1969 and 1974, he completed his undergraduate and master's degrees in the Department of Mediterranean Archaeology of the Historical Sciences Faculty at the University of Warsaw, graduating summa cum laude. Between 1977 and 1978, he completed postgraduate studies in the seminars of Philippe Bruneau on the theory of archaeology and of Gilbert Charles Picard on Roman archaeology, both at the Institute of Art and History at the University of Paris IV (Sorbonne), supported by a French government scholarship (1977–1978). In 1982, he graduated with a PhD from the Institute of Archaeology and Prehistory of the Faculty of Historical Sciences, at the University of Warsaw, on the basis of a thesis on the eschatological beliefs in Syria and Egypt during the Roman period.

Major Accomplishments

Krzysztof Makowski began his academic career in Poland as executive secretary of the General

Bureau of the Polish Society of Classical Philology, FIEC (1972–1974). In 1974, he was teaching part-time at the University of Lodz and teaching assistant at the University of Warsaw, where he served as full-time teacher between 1975 and 1982, being named assistant professor in 1982. In 1982, he was invited by the academic authorities of the Pontifical Catholic University of Peru (PUCP) to participate in establishing the specialty of archaeology, where he served since 1983, first as assistant professor (1983–1986), then as associate professor (1986–1996), and finally as full professor (1996 onwards). He has also taught at the University of Lima and the Graduate School of the National University of San Marcos (UNMSM).

Furthermore, he held various administrative positions in the PUCP, the most important being the head of the Department of Humanities (2000–2005), coordinator of the masters and doctorate in archaeology in Andean Studies Program, who was co-founder (from 2005 onwards), and dean of the Faculty of Arts and Human Sciences (2005–2008 and 2008–2011). In addition, he served as director of the Center for Conservation and Restoration of Movable Goods "I.S.T. Yachaywasi" who was co-founder (1993–2003) and as scientific advisor of archaeological work in the Camisea Gas Pipeline Project, sections Coast, Highland, and Forest (2002–2004), and most recently he was advisor to the Ancon Cultural Board and Lima Art Museum (MALI).

As a graduate student and a young teacher, Makowski acquired wide experience in excavations at Neolithic sites as Olszanica in Poland (1972–1973), medieval sites as Draçy in Burgundy, France (1974), and Roman sites as Apamea on the Orontes in Syria (1977). He also studied collections of Roman funerary sculpture at the museum and necropolis of Palmyra, as well as the National Museum of Damascus, for the *Corpus Signorum Imperii Romani*, using a grant from the Syrian government (1978–1979). He has also been director of the Polish-Syrian mission in the Roman and Byzantine city of Bosra (1979–1981).

Thereafter, in Peru, Makowski was co-director of the Project "Alto Piura" PUCP-ORSTOM (along with Peter Kaulicke and Jean Guffroy), carrying out excavations at sites of the Early Intermediate and Intermediate Late periods, such as Cerro Vicus and Pampa Juarez (1987–1990). This work was complemented by the analysis of collections of Vicus and Mochica pottery of the Alto Piura in various museums in Peru, in collaboration with several young researchers, his students (Ivan Amaro and Juan Antonio Murro, among others) (Makowski 1994). Special mention should be made to his role, from 1991 to the present, as director of the Archaeological Project Field School PUCP "Tablada de Lurin" (Lurin Plateau), which since 1998 was renamed "Lomas de Lurin" (Lurin fog oases) and then in 2005 was renamed "Valle de Pachacamac" (Pachacamac Valley). Sixteen generations of PUCP archaeology's students were formed in fieldwork and lab in this project-school, first in the cemetery of Tablada of Lurin (1991–1998) (Makowski et al. 2012) and then at the Inka sites of Pueblo Viejo (since 1998) and Pachacamac (since 2006), resulting in dozens of pre- and postgraduate theses being researched under his direction within the framework of that project. In addition, he has also been co-director of the archaeological research project "Valle de Culebras" (Snakes Valley) (2002–2008) and advisor to the project "Castillo de Huarmey" (Huarmey Castle), led by Polish archaeologists Miłosz Giersz and Patrycja Prządka from 2010 to present (Makowski and Giersz 2016).

Krzysztof Makowski has published books and articles on iconography, pottery, funerary behavior, architecture, and Andean pre-Hispanic urbanism. These varied research interests have a common denominator: discussion of the original features of the development process of complex societies in the Central Andes from a comparative perspective. Special mention should be made of his work on Andean urbanism (e.g., Makowski 2008a). Makowski engaged in innovative methodological perspectives of using iconographic sources, which – in combination with fine funerary behavior analysis and

architectural decoration programs – made it possible to address issues related to the characteristics and political role of religious beliefs in pre-Hispanic Peru (e.g., Makowski et al. 2005). A third issue strongly represented in his writings is ethnic and political identities in prehistory, approached from perspectives as varying as archaeometry (technological style), the analysis of iconography and funeral behaviors (Makowski 1994, 2008b, 2010a, b).

Makowski is a member of the Society for American Archaeology and the Institute for Andean Research (Berkeley) and editorial boards of several journals as *Latin American Antiquity* (2008–2010). He has received several awards from the Peruvian, Polish, and Italian governments.

References

Makowski, K. 1994. (comp.) *Vicús*. Lima: Banco de Crédito del Perú.

Makowski, K. 2008a. Andean urbanism. In *Handbook of South American archaeology*, ed. H. Silverman and W. Isbell, 633–658. New York: Springer.

Makowski, K. 2008b. (comp.) *Señores de los reinos de la Luna*. Lima: Banco de Crédito del Perú.

Makowski, K 2010a. (comp.) *Señores de los imperios del Sol*. Lima: Banco de Crédito del Perú.

Makowski, K. 2010b. Religion, ethnic identity and power in the Moche world. In *New perspectives on Moche political organization*, ed. J. Quilter and L.J. Castillo, 280–306. Washington, DC: Dumbarton Oaks.

Makowski, K., and M. Giersz. 2016. *Nuevas perspectivas en la organización política Wari*. Andes (Boletín del Centro de Estudios Precolombinos de la Universidad de Varsovia) 9. Warsaw–Lima Centro de estudios precolombinos.

Makowski, K., M. Giersz, and P. Prządka. 2005. *El mundo sobrenatural Mochica*. Lima: Pontificia Universidad Católica del Perú – Universidad de Varsovia.

Makowski, K., P. Castro de la Mata, G. Escajadillo, M. Jimenez, and E. Tomasto. 2012. *Corpus antiquitatum americaniensium, Polonia-Perú: ajuares funerarios de los cementerios pre-hispánicos de Tablada de Lurín (Periodo Formativo Tardío, Lima Perú)*. Kraków: Academia Polaca de Ciencias y Letras – Pontificia Universidad Católica del Perú.

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Basic Biographical Information

Antonia Malan, Ph.D., was born in Britain in 1948 and initially qualified with a secretarial diploma from the Cambridgeshire College of Arts and Technology. After moving to South Africa, she enrolled for a B.A. degree at the University of Cape Town in 1976, returning to archaeology in 1986 when she graduated with a B.A. honors degree. She earned her Ph.D. under the supervision of Professor Martin Hall at the University of Cape Town (UCT) with a dissertation entitled *Households of the Cape, 1750 to 1850: Inventories and the Archaeological Record* (awarded in 1993). She has had a diverse career in Western Cape archaeology, including in contract archaeology, project management, and part-time lecturing and student supervision. She has served on a number of boards and committees including the Heritage Western Cape appeals committee (the heritage resources agency for the Western Cape Province, South Africa) and various trusts such as the "Cape Town Heritage Trust" and the "Tracing History Trust." She has thus made an invaluable contribution to the cultural resource management of Cape Town and the Western Cape. She currently serves on the councils of both Heritage Western Cape and the South African Heritage Resources Agency. In addition, Malan has served as the convenor of the Western Cape accreditation committee of the Association of Professional Heritage Practitioners, an organization that she helped to found (Malan, personal communication).

Major Accomplishments

Malan has made a substantial contribution to the development and growth of historical

archaeology in South Africa, particularly in the Western Cape, with her expertise in the study of probate inventories and the transition from Dutch to British rule at the Cape (Malan 1993). The study of probate inventories has led to further in-depth research on ceramic assemblages (Klose and Malan 2000), architecture (Malan 2005), gender (Malan 1993), and slavery (Malan and Worden 2011). She has also written on the politics of heritage management in the Western Cape (Malan 2007a). Malan has been involved with the Historical Archaeology Research Group (HARG) in the Archaeology Department at UCT for over 20 years and was active in the Research Unit for the Archaeology of Cape Town's (RESUNACT) excavations in District Six (Malan and Soudien 2002). In 2017 she co-authored the book *Grave Encounters: Archaeology of the Burial Grounds, Green Point, Cape Town* (Malan et al. 2017).

Stemming from her probate inventory research, Malan served as project manager of the Transcription of Estate Papers of the Cape of Good Hope (TEPC) Project, a joint initiative between the Department of Historical Studies at UCT, the History Department at the University of the Western Cape, and the South African and Dutch archives, which was funded by the Netherlands government. This project saw the transcription of selected papers from the Orphan Chamber (containing inventories of deceased estates between c. 1690 and 1834 and associated auction lists) and from a series of Court of Justice volumes. She is also a founding trustee of the Tracing History Trust, which was established in 2008 in order to continue the work of the TEPC Project (Tracing History Trust n.d.).

Malan is actively involved with the Vernacular Architecture Society of South Africa (VASSA). She has worked as a principal investigator and researcher for various VASSA recording projects in the Cedarberg and Karoo and edits the VASSA Journal. She has done much to further the ideal of interdisciplinarity in the study of South Africa's colonial past, particularly bridging the divide between archaeology, history, and architecture.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Hall, Martin (Historical Archaeology)
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Society for Historical Archaeology (SHA) (Modern World Archaeology)
- ▶ Southern Africa: Historical Archaeology

References

Klose, J., and A. Malan. 2000. The ceramic signature of the Cape in the nineteenth century with particular reference to the Tennant Street Site, Cape Town. *South African Archaeological Bulletin* 55: 49–59.

Malan, A. 1993. *Households of the Cape, 1750 to 1850: Inventories and the archaeological record*. Unpublished PhD dissertation, University of Cape Town.

Malan, A. 2005. Morgenhof: From langhuis to manoir. *VASSA Journal* 13: 15–30.

Malan, A. 2007. Contested sites: Negotiating new heritage practice in Cape Town. *Journal of Islamic Studies* 24/25 (2004/5): 17–54.

Malan, A., and C. Soudien. 2002. Managing heritage in District Six, Cape Town: Conflicts past and present. In *Matériel culture: The archaeology of twentieth century conflict*, ed. J. Schofield, W.G. Johnson, and C.M. Beck, 249–265. London: Routledge.

Malan, A., and N. Worden. 2011. Constructing and contesting histories of slavery at the Cape, South Africa. In *Slavery in Africa: Archaeology and memory*, Proceedings of the British Academy, ed. P.-J. Lane and K.C. McDonald, vol. 168, 393–419. Oxford: Oxford University Press.

Malan, A., D. Halkett, T. Hart, and L. Schietecatte. 2017. *Grave encounters: Archaeology of the burial grounds, Green Point, South Africa*. Cape Town: ACO-Associates.

Tracing history trust. n.d. Available at: http://tracinghistorytrust.co.za. Accessed 20 Nov 2017.

Further Reading

Jerardino, A., A. Malan, and D. Braun, eds. 2013. *The archaeology of the west coast of South Africa*. Oxford: Archaeopress.

Klose, J., and A. Malan. 1992. *Ceramics of the southwestern Cape, 1650 to 1850: A guide to the analysis and interpretation of ceramic assemblages excavated from archaeological sites*, HARG handbook. Vol. 1. Cape Town: Historical Archaeology Research Group, University of Cape Town.

Malan, A. 1997. The material world of family and household. In *Our gendered past: Archaeological studies of gender in southern Africa*, ed. L. Wadley, 273–301. Johannesburg: Witwatersrand University Press.
Malan, A. 2007. The form and layout of early Cape Town households, 1660–1740. *VASSA Journal* 18: 34–63.
Malan, A. 2008. Beneath the surface – behind the doors. Historical archaeology of households in mid-eighteenth century Cape Town. *Social Dynamics* 24: 88–118.
Malan, A. 2012. The cultural landscape. In *Cape Town – between east and west; social identities in a Dutch colonial town*, ed. N. Worden, 1–25. Cape Town: Jacana.
Malan, A., and L. Webley. 2010. West coast buildings: The architecture of a coastal frontier. *VASSA Journal* 23: 2–22.

Maldivian Archaeology

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Introduction

The Maldives are an archipelago located centrally in the northern Indian Ocean, southwest of Sri Lanka and India (see Fig. 1). The occupation history is layered, largely because the Maldives acted as a historical waypoint for seafarers traveling across the Indian Ocean (Maloney 2013; Mohamed 2005). Investigations into the material remains of past occupation were initiated in the mid-1800s, through a series of antiquarian investigations. Archaeology during the early 1900s tended to focus on establishing the nature of a pre-existing Buddhist occupation phase, with more recent investigations establishing the role of the islands within past globalizations (Litster 2016) and the export of cowry shell money (Haour et al. 2016, 2017; Mikkelsen 2000). This encyclopedia entry focuses on the archaeological research undertaken in the Maldives, concentrating on the historical development of the discipline in the region.

Definition

The archaeology of the Maldives concerns the islands situated on the middle portion of the Chagos-Laccadive Ridge in the Indian Ocean. This archipelago includes a double row of coral atolls from Seenu Atoll in the south to Haa Alifu Atoll in the north (Naseer and Hatcher 2004; Fig. 1). The Maldives are comprised of over 1200 low-lying individual mid- to late Holocene reef islands, with a total surface area of >4500 km^2 and c. 20 distinct atolls. The climate is monsoonal, with two distinct periods, including the southwest monsoon (wet season) from April to November, with the northeast monsoon prevailing from November to March (dry season) (Woodroffe 2005:127).

The population (locally known as *Divehi*, meaning "islander") have historically relied on maritime trade, owing to their depauperate resource base (Romero-Frías 1999). Most famously, the Maldives are known for the historical export of *Monetaria moneta* shells – or cowry shell money (Haour et al. 2016, 2017; Hogendorn and Johnson 1986). The contemporary population adheres to Islam, which was introduced in AD 1153. In 1836 Lieutenants Christopher and Young presented an argument for a pre-existing Buddhist phase based on two observations—the first involved the suggestions of a Sri Lankan Buddhist priest, who claimed there existed religious structures in the atolls. These did and do exist; however, many of these Buddhist structures were intentionally covered when Islam was introduced (Bell 1940; see Fig. 2). Secondly, a Bodhi tree (*Ficus religiosa*) was present in Malé – these trees are sacred and often found associated with Buddhist monasteries (Bell 1940: 140).

Historical Background

The early period of research in the Maldives was defined by antiquarianism, theft, and vandalism. Attention was focused on objects ("relics") recovered from the coral stone boxes ("reliquaries") found within stupas (Buddhist structures which are referred to as *haviththa* in the southern

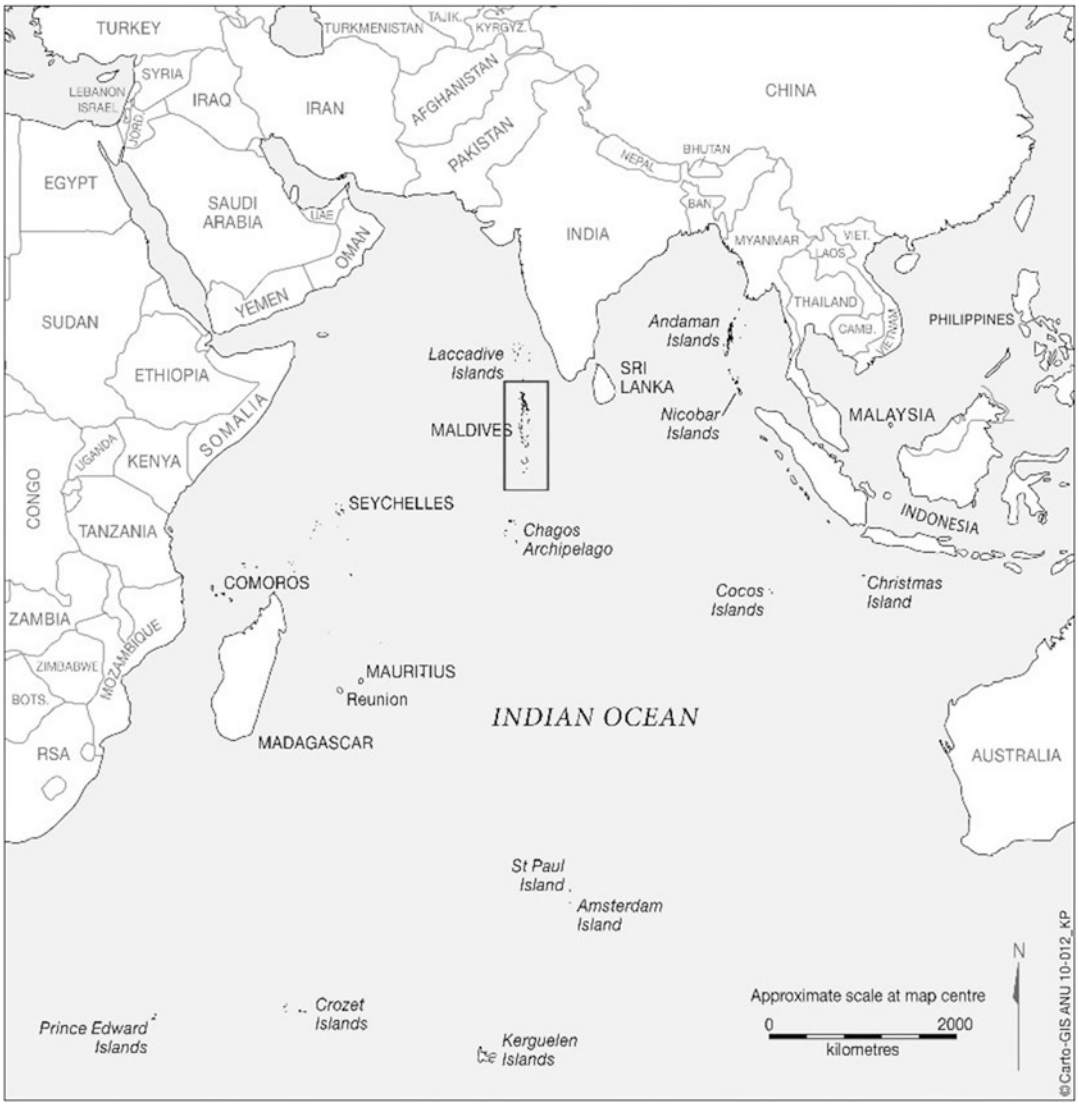

Maldivian Archaeology, Fig. 1 Location of the Maldives in the Central Indian Ocean. (Source: CartoGIS ANU, modified by Mirani Litster)

Maldives and *gafuuni* in the northern Maldives) and carved coral stone statues (e.g. Gippert 2015). The uncontrolled nature of the early excavations also resulted in a lack of contextual information, which is further problematized by incomplete or missing excavation records.

The first recorded excavations were conducted by *Divehi* in 1848 on Landhoo Island in Noonu Atoll. These investigations focused on an earth-covered *haviththa*, containing a reliquary holding copper and/or gold discs, which were subsequently "melted down or thrown into the sea" (Forbes 1987:282). Major historical studies during this phase included toponymic research and also the work of CW Rosset in 1886 (Rosset 1887) and Stanley Gardiner in 1900 (Gardiner 1904). Gardiner's extensive investigation of Buddhist monuments in the southern atolls was the first major contribution toward understanding the early phase of occupation in the Maldives, with

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Maldivian Archaeology, Fig. 2 A covered Buddhist site in the Central Maldives. (Source: Kon-Tiki Museum)

Bell (1940: 110) commenting that Gardiner's contribution "[built] better than he knew."

Harry Charles Purvis Bell (HCP Bell) visited the Maldives in 1879, 1920, and 1922, during which time he attempted to consolidate previous interpretations of the pre-Islamic phase of occupation. Bell's research resulted in two seminal compendia on the archipelago: *The Maldive Islands: Monograph on the History, Archaeology, and Epigraphy* (1940) and *The Maldive Islands: An Account of the Physical Features, History, Inhabitants, Productions, and Trade* (1882). The monograph on the history, archaeology, and epigraphy documented Bell's surveys of Buddhist sites in the south, including further investigations at Landhoo Island, a small Buddhist monastery site (*vihara*) in Seenu Atoll and the remains of a stupa on Fuvahmulah Island in Gnaviyani Atoll. Bell also investigated a stupa and a larger Buddhist monastery complex on Gan Island in Laamu Atoll (Forbes 1987:283). The latter investigation revealed a major center of Buddhism in the area, with Bell (1940) seeing parallels between the site and Buddhist structures in Sri Lanka.

During the 1940s–1950s, four Buddhist sites were investigated by local *Divehi.* The first excavation was undertaken in 1948 by Adam Nasir Maniku on Fuvahmulah Island in Gnaviyani Atoll; two investigations were conducted in 1958 by Muhammad Ismail Didi on Toddhoo and Kinbidu Islands. In 1959, a fourth investigation took place on Ariadhoo Island, also by Didi (Forbes 1987). Within the reliquary of the Toddhoo stupa, a Roman denarius was found, dating to approximately 90 BCE. This was photographed, but later "lost" in Malé (Forbes 1984: 53). Didi's 1959 excavation returned an apparent Hindu *siva linga* manufactured on coral stone – however, the object was not retained for further analysis, so this remains unconfirmed.

During 1962, construction works in the capital Malé resulted in the unintentional discovery of four coral stone heads carved to depict aggressive fanged expressions. The coral stone statues were

placed and stored in the National Museum in Malé; where they were subsequently destroyed by extremists in 2012 (Bajaj 2012; Proctor 2012). Two of the carved coral stones were described as Hindu objects – four-sided Hindu *siva linga* (Forbes 1987: 286). These discoveries influenced arguments for a pre-Islamic Hindu influence in the archipelago; however, scholars have subsequently argued that these are Buddhist guardian figures (Romero-Frías 1999).

A Danish social scientist and botanist, Nils Finn Munch-Petersen, conducted research in the southern Maldives first in 1974 and then in 1977–1981. From his surveys, Munch-Petersen put forward a "rather sketchy" portrayal of the Buddhist period, suggesting that taro cultivation might have been associated with this phase (Munch-Petersen 1982). Other research conducted in the 1970s included a study of trade wares by archaeologist Jon Carswell of the Ashmolean Museum. Carswell excavated in Malé, which returned a quantity of ceramics. Carswell contextualized their presence within the broader Indian Ocean context, especially the abundance of Chinese trade wares. These sherds are now housed at the Ashmolean Museum (Carswell 1975-1977: 144).

The 1980s saw an increasingly more controlled approach to excavation, although remained focused on investigations of early Buddhist period sites. Led by Thor Heyerdahl, the Kon-Tiki Museum, Maldivian government, and the University of Oslo conducted joint excavations from 1981 to 1984 (Skjølsvold 1991: 1). These investigations resulted in the first radiocarbon dates obtained from archaeological investigations in the Maldives. Marine shell samples were dated from Nilandhoo Foamathi (Faafu Atoll), and one bone sample was sent for radiocarbon analysis from Gamu Haviththa (Gan Island in Gaafu Dhaalu Atoll; see Fig. 3). A date from Nilandhoo Foamathi of 660–740 CE established a base chronology for the occupation of the islands; however, the samples from Gamu Haviththa contained

Maldivian Archaeology, Fig. 3 Investigating the Haviththa from Gaafu Dhaalu Atoll (Southeastern Clearance during 1983). (Source: Kon-Tiki Museum)

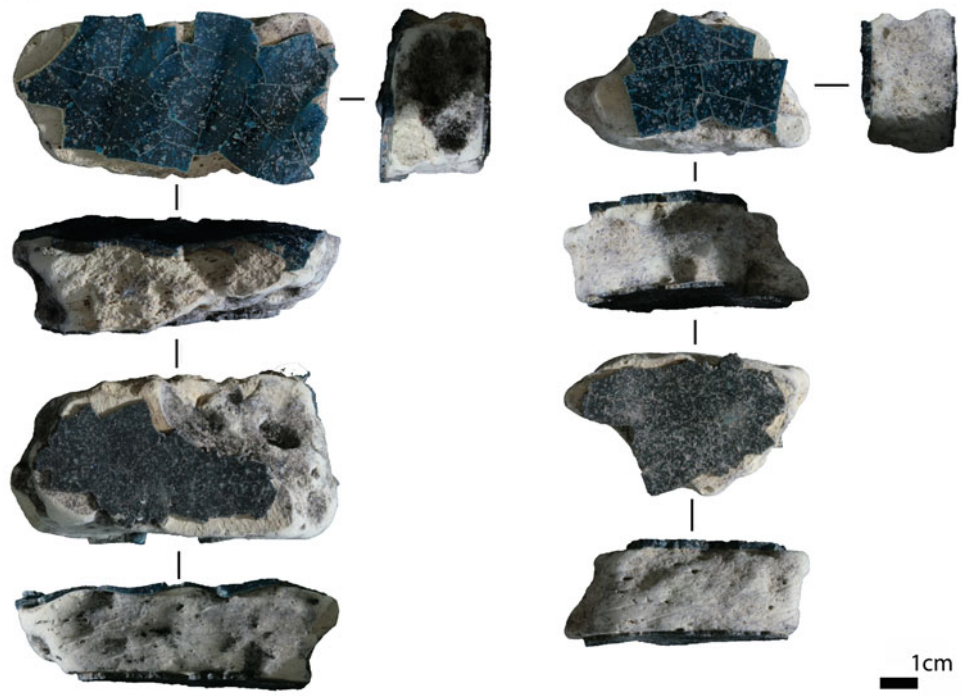

Maldivian Archaeology, Fig. 4 Sassanian Islamic Ware (Bodu Haviththa Surface). (Photo Credit: Michelle Langley. From Litster 2016: 143)

insubstantial bone collagen. Soon after, in 1986–1987 the South Asian Association for Regional Cooperation (SAARC) directed excavations in the Maldives, which did not return any radiocarbon dates and focused on the presence of ceramics.

The first major excavations were conducted during 1996–1998 by Professor Egil Mikkelsen from the University of Oslo (Mikkelsen 2000). Mikkelsen was also present for the previous investigations directed by Heyerdahl. During these excavations Mikkelsen obtained 20 dates from a monastery (*vihara*) known as Kuruhinna Tharaagandu (Kaashidhoo Island in Kaafu Atoll), which ranged between 40 BCE and 115 CE (T-13183) and 1260 and 1340 CE (T-13667) (see Litster 2016 for a discussion of chronologies).

More recent research conducted by Litster (2016) focused on the role of remote islands in past globalizations. This research was part of a larger Australian Research Council-funded project *Crossing the Green Sea* and involved a reassessment of the previously excavated materials by both Mikkelsen and Heyerdahl (e.g., Fig. 4). The University of East Anglia directed the Leverhulme Trust-funded *Cowrie Shells: An Early Global Commodity* from 2015 to 2018, which concentrated on aspects of cowry shell trade (Haour et al. 2016, 2017). Through this project, the first formally trained Maldivian archaeologist – Shiura Jaufar – will complete her PhD. Most recently, in 2018, a team directed by Dr Michael Feener, based at the Oxford Centre for Islamic Studies (Feener 2018), have begun to conduct a series of surveys throughout the Maldives in order to document cultural heritage locations to assist with conservation of tangible heritage in the archipelago.

Key Issues/Current Debates

A major discussion in Maldivian archaeology includes the source and timing of initial

colonization, with the most widely accepted model involving an early migration from South Asia – from Sri Lanka. Thor Heyerdahl's claims that sun "worshippers" from the Indus Valley had settled in the Maldives have been widely denounced. He based this argument on the discovery of the Roman Denarius discovered on Toddhoo (Heyerdahl 1987). The oldest charcoal dates have derived from the central atolls, on a piece of *Cocos nucifera* shell from the Nilandhoo Foamathi site dating to 249–393 cal. CE (95.4%) (Wk-30394) thus representing the terminus ante quem for occupation (Litster 2016).

The destruction of cultural heritage in the Maldives is an issue of major concern. In addition to a serious lack of conservation programs in the archipelago, there have been ongoing issues with the destruction of early period Buddhist sites and objects. This has become more obvious recently – on the day ex-President Mohamed Nasheed resigned in 2012, approximately seven men entered the National Museum in Malé and vandalized approximately 30 Buddhist statues. Naseema Mohammed, a prominent Maldivian historian, was quoted in the *New York Times* as saying that these actions contributed to a significant loss "[as] there was [already] very little left" prior to this, as many other Buddhist objects not in the museum had already been damaged or lost. Abdul Majeed Abdul Bari, ex-minister of Islamic affairs in the Maldives, was also quoted in the *New York Times*, "this is our heritage, and it has to be protected for future generations," and these Buddhist statues (as with all "ancient figures") were not constricted to the same regulations as other idols under current Maldivian law. The *New York Times* reports that there is no way that the "nation's archaeological legacy [can] be recouped" (Bajaj 2012).

International Perspectives

Since the 1980s, three major research groups outside of locally based Maldivian researchers have focused on varied aspects of the archaeology of the islands. These have been from Norway, Australia, and the United Kingdom. Norwegian research involved collaborations with the Maldivian government. This included the early work by Thor Heyerdahl (1983–1984) and Egil Mikkelsen's more extensive excavations in the 1990s. Both approaches adopted a culture history methodology, with a focus on understanding early colonization, contacts, and cultural transformations.

Australian research followed and included the Australian Research Council-funded project *Crossing the Green Sea*, directed by Atholl Anderson (Anderson et al. 2018). The research program followed a processual approach and aimed to find clear evidence of human occupation in Madagascar, the Seychelles, Chagos, and the Maldives, therefore renewing understandings of transoceanic movement across the Indian Ocean. Litster (2016) investigated the Maldivian component of this project and reassessed the earlier work of Heyerdahl (Skjølsvold 1991) and Mikkelsen (2000).

Research from the United Kingdom has included the University of East Anglia's Leverhulme-funded project *Cowrie Shells: An Early Global Commodity* (2015–2018). This was directed by Anne Haour and investigated cowry trade, with a focus on both the Maldives and West Africa. This project involved extensive archaeological and ethnographic investigations (Haour et al. 2016, 2017). Since 2018, Michael Feener, of the University of Oxford, has directed the Maldives Heritage Survey, which aims to record the tangible cultural heritage of the Maldives in danger, including Islamic and Buddhist structures and physical objects. The main methods include 3D terrestrial scanning, GIS, and digital photography (Feener 2018).

Future Directions

As previously outlined, the archaeological investigations from the 1980s onward have been essential in establishing baseline chronologies and piecing together an understanding of the early occupation of the islands. During this phase of research, archaeology focused on a direction of more controlled methods and on material culture not directly associated with religious monuments, including ceramics, beads, burials, and faunal

remains (Haour et al. 2016, 2017; Mikkelsen 2000); however, further investigations still need to be undertaken to refine and contribute to the occupation chronology of the islands – particularly in the northern- and southernmost atolls. Additionally, a regional ΔR needs to be established for the Maldives to support marine shell dating, as the current closest value derives from Southern India (Southon et al. 2002). This will not only better refine our understanding of cowry shell export but also the timing of occupation.

Furthermore, while antiquarian approaches have since been supplanted by archaeological investigations, theft and vandalism are still issues today, as exemplified by the destruction of a large number of Buddhist statues at the National Museum in Malé in 2012 (Bajaj 2012; Mohamed and Tholal 2010). The Maldives became a State Party to the World Heritage Convention on the 22nd of May 1986; however, no sites in the archipelago have been inscribed on the World Heritage List. One serial listing was entered onto the Tentative List in 2013, which was the "Coral Stone Mosques of Maldives" (UNESCO 2013). These were argued to represent a "unique example in the Indian Ocean of an outstanding form of fusion coral stone architecture" (UNESCO 2013); however, these mosques were never inscribed on the World Heritage List as a cultural property. Fortunately, this urgent need to rectify the lack of heritage conservation and recording has been noticed and is the focus of a recent survey program in the atolls (Feener 2018).

Cross-References

► Indian Ocean: Maritime Archaeology

References

Anderson, A., A. Camens, G. Clark, and S. Haberle. 2018. Investigating premodern colonization of the Indian Ocean: The remote Islands enigma. In *Connecting continents: Archaeology and history in the Indian Ocean world*, 30–68. Athens: Ohio University Press.

Bajaj, V. 2012. Vandalism at Maldives Museum Stirs Fears of Extremism. *The New York Times* (online: https://www.nytimes.com/2012/02/14/world/asia/political-turmoil-threatens-archaeological-treasures-in-maldives.html). Accessed: 30 June 2019.

Bell, H.C.P. 1882. *The Maldive Islands, an account of the physical features, climate, history, inhabitants, productions and trade*. Ceylon: F. Luker, Acting Government Printer.

Bell, H.C.P. 1940. *The Maldive Islands: Monograph on the history, archaeology and pigraphy*. Colombo: Ceylon Branch of the Royal Asiatic Society.

Carswell, J. 1975-1977. China and Islam in the Maldive Islands. *Transactions Oriental Ceramic Society* 41: 119–198.

Feener, M. 2018. *Maldives heritage survey*. Online: https://maldivesheritage.oxcis.ac.uk/. Accessed: 12 Mar 2019.

Forbes, A. 1984. A Roman Republican *Denarius* of c. 90 B.C., from the Maldive Islands, Indian Ocean. *Archipel* 28: 53–60.

Forbes, A. 1987. The pre-Islamic archaeology of the Maldive Islands. *Bulletin de l'Ecole française d'Extrême-Orient* 76: 281–288.

Gardiner, J. 1904. *The Fauna and Geography of the Maldive and Laccadive archipelagoes: Being the account of the work carried on and of the collections made by an expedition during the years 1899 and 1900*. Vol. I. Cambridge: Cambridge University Press.

Gippert, J. 2015. A glimpse into the Buddhist past of the Maldives II: Two Sanskrit inscriptions. *Vienna Journal of South Asian Studies* 48: 111–114.

Haour, A., A. Christie, and S. Jaufar. 2016. Tracking the cowrie shell: Excavations in the Maldives. *Nyame Akuma* 85: 69–77.

Haour, A., A. Christie, S. Jaufar, and D. Vigoureux. 2017. Back to Ibn Battuta's Island—Excavations in the Maldives. *Nyame Akuma* 88: 33–40.

Heyerdahl, T. 1987. *The Maldive mystery*. New York: Ballantine Books.

Hogendorn, J., and M. Johnson. 1986. *The shell money of the slave trade*. Cambridge: Cambridge University Press.

Litster, M. 2016. *Cowry shell money and monsoon trade: The Maldives in past globalizations*. Unpublished Ph. D. thesis. The Australian National University, Canberra.

Maloney, C. 2013. *People of the Maldive Islands*. Hyderabad: Orient Blackswan.

Mikkelsen, E. 2000. *Archaeological excavations of a monastery at Kaashidhoo*. Male: National Centre for Linguistic and Historical Research.

Mohamed, N. 2005. Note on the early history of the Maldives. *Archipel* 70: 7–14.

Mohamed, N., and M. Tholal. 2010. *National Museum of the Maldives*. Male: National Centre for Linguistic and Historical Research.

Munch-Petersen, N.F. 1982. *The Maldives: History, daily life and art-handicraft*. Bruxelles: Bulletin du

CEMOCI, Centre d'Études du Moyen Orient et de la Communauté Islamique.
Naseer, A., and B. Hatcher. 2004. Inventory of the Maldives' coral reefs using morphometrics generated from Landsat ETM+ imagery. *Coral Reefs* 23: 161–168.
Proctor, A. 2012. Shutting their eyes on history: Pre-Islamic heritage at the National Museum of the Maldives. *The Journal of the Asian Arts Society of Australia* 21 (2): 15–17.
Romero-Frías, X. 1999. *The Maldive Islanders: A study of the popular culture of an ancient Ocean kingdom*. Barcelona: Nova Ethnographica Indica.
Rosset, C.W. 1887. On the Maldive Islands, more especially treating of male Atoll. *The Journal of the Anthropological Institute of Great Britain and Ireland* 16: 164–174.
Skjølsvold, A. 1991. *Archaeological test-excavations on the Maldive Islands*. Oslo: Kon Tiki Museum.
Southon, J., M. Fontugne, B. Metivier, and W.-S. Yim Wyss. 2002. Marine reservoir corrections for the Indian Ocean and Southeast Asia. *Radiocarbon* 44 (1): 167–180.
UNESCO. 2013. *Coral Stone Mosques of Maldives*. https://whc.unesco.org/en/tentativelists/5812/. Accessed: 25 Mar 2019.
Woodroffe, C. 2005. Late Quaternary Sea-level highstands in the central and eastern Indian Ocean: A review. *Global and Planetary Change* 49: 121–138.

Further Reading

Yang, B. 2018. *Cowrie shells and cowrie money: A global history*. Oxon: Routledge.

Malta: Museums

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Introduction

The Museums of Malta attempt to preserve and communicate the historical narrative of this small Mediterranean nation. The history of Malta is complex and intertwined with the history of the region and its subsequent rulers. Heritage Malta attempts to communicate this unique message through Malta's numerous museums. Heritage Malta is the current supervisory body of the museum sector in Malta. Heritage Malta also is responsible for the interpretation and preservation of the World Heritage listed sites on the island; these include the City of Valletta, the Hal Saflieni Hypogeum, and the Megalithic Temples.

Definition

Malta's material culture history spans an impressive length of time and encompasses a number of historical narratives: from the ancient temple building culture of approximately 5000 BC, to the Roman Empire, to the crusader knights and a terrifying World War II story. These historical narratives are encapsulated in Heritage Malta's museum network.

Key Issues/Current Debates/Future Directions/Examples

Malta's tourist industry is a large consumer and patron of heritage culture. This leads to concerns regarding the conservation and interpretation of heritage sites. The age and fragility of many of the sites in Malta are impacted by tourism. For example, the impact of tourism needs to be strictly controlled to preserve the temple complex of Hal Saflieni Hypogeum, which is particularly fragile, and there is a limit of 15 people per day to gain access. This is being achieved by only allowing 15 people per day into the complex. Other issues and concerns regarding heritage sites in Malta include graffiti and the use of now outdated conservation techniques (Fig. 1).

Listing of Heritage Malta Museums

National Museum of Archaeology, Valletta

The National Museum of Archaeology is housed in the Auberge de Provence, a sixteenth-century Knights of St. John's Inn. This museum currently conserves and interprets artefacts from Malta's Neolithic period, from the Għar Dalam phase (5200 BC) to the Tarxien phase (2500 BC). This museum exhibits some of the earliest tools used

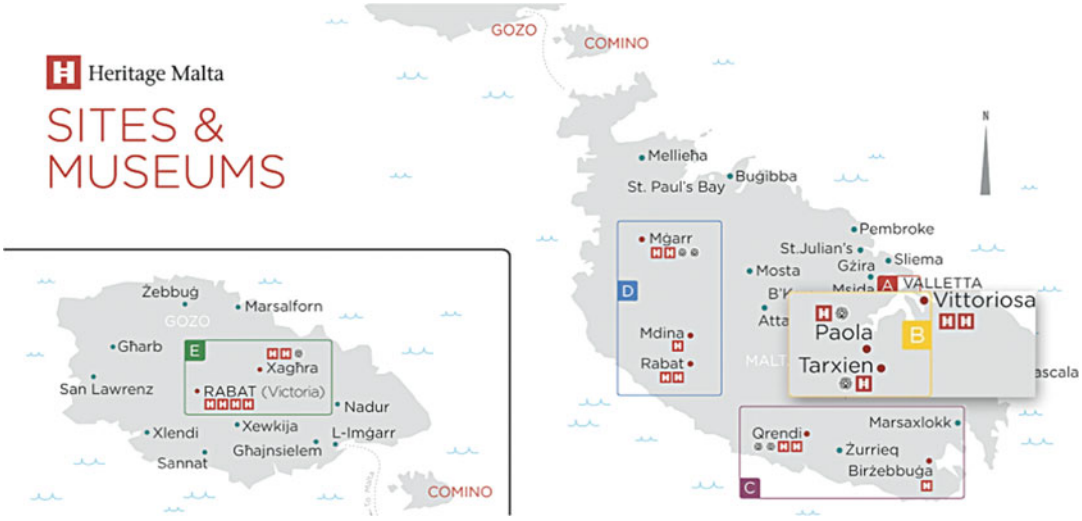

Malta: Museums, Fig. 1 Image from Heritage Malta

by past inhabitants. It also displays early artistic representations of animal life and human figures. Examples of these include the "Sleeping Lady" from the Hal Saflieni Hypogeum and large altars from the Tarxien Temples.

National Museum of Fine Arts, Valletta

The National Museum of Fine Arts is located in Valletta. This museum narrates and conserves the art of Malta from the late medieval period to the contemporary. Highlights from the collection include rare paintings, silverware, marble and bronze sculptures, and finely crafted furniture.

Folklore Museum, Citadel Gozo

This museum is located in a late medieval house on the island of Gozo. The museum displays and interprets a wide range of exhibits depicting the domestic, rural, and traditional agrarian economy of the Maltese Islands.

Malta Maritime Museum, Vittoriosa

This museum is located within the Old Naval bakery in Vittoriosa. It narrates the nation's maritime history within its Mediterranean context. A highlight of the museum's collection is its display of ship anchors that are interpreted to illustrate the evolution of seafaring in the region.

Inquisitor's Palace, Vittoriosa

The Inquisitor's Palace is located in Vittoriosa. The origins of the museum lie with Monsignor Pietro Dusina arriving in Malta in 1574 as the first general inquisitor and apostolic delegate of the Maltese Islands. Despite many renovations the Palace is a large building that is currently used to interpret the role of the religious inquisitors of the medieval period. Of particular note are the cells and original graffiti by prisoners.

National War Museum, Valletta

The National War Museum is located at Fort St Elmo, Valletta. This museum's collection is concentrated on the two World Wars (1914–1918 and 1939–1945) and Malta's strategic Mediterranean location and role in these conflicts. There is an emphasis on Maltese involvement in World War II and the incredibly difficult siege and massive bombing campaign on Malta that was led by Germany and Italy, which was later recognized by the presentation of the George Cross for heroism to the entire population of Malta.

Museum of Natural Science, Gozo

The Museum of Natural Science is located in Citadel of Victoria, Gozo. This museum extends

over two floors and interprets collections relating to the Island's marine life, geology, minerals, insects, ecosystems, and local habitats.

Palace Armoury, Valletta

The Palace Armoury is a collection of arms from the Knights of St. John who used the island of Malta as their strategic Mediterranean stronghold against the Ottoman Turks. The arms collection includes enough equipment to arm thousands of soldiers during the medieval and renaissance periods. Highlights of the collection include ornate decorated arms from France, Italy, Spain, Germany, and the Ottoman Empire.

Roman Domus, Mdina

The mosaic pavements in the Domvs Romana are located in Rabat. They were discovered in 1881 immediately outside Mdina in the remains of a rich and sumptuously decorated town house of the Roman period.

Cross-References

► World Heritage List: Criteria, Inscription, and Representation

References

Heritage Malta. n.d.. http://www.heritagemalta.org/museums/museums.html. Accessed 1 Oct 2012.

Hughes, Q. 1956. *The building of Malta 1530–1795*. London.

Maltain360: Discover the Maltese Island in 360. n.d.. http://www.maltain360.com/default.aspx#110005335. Accessed 1 Oct 2012.

Sammut, P. 2010. *The influence of the knights of the order of St. John on Malta*. Poland: Uncommon Culture; Think culture.

Tutchener, D. 2011. The Auberge de Provence Valetta: A history of the building, its tenants and its significance. *Anthrojournal*. http://anthrojournal.com/issue/october-2011/article/the-auberge-de-provence-valetta-a-history-of-the-building-its-tenants-and-its-significance. Accessed 22 Aug 2017.

UNESCO. n.d.. Malta. http://whc.unesco.org/en/statesparties/mt. Accessed 1 Oct 2012.

Further Readings

Schofield, J., and E. Morrissey. 2012. *Strait street: Malta's 'Red Light District' revealed*. Malta: Midsea Books.

Trump, D., and D. Cilia. 2002. *Malta: Prehistory and temples*. Malta: Midsea Books.

Manchester, Keith

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Basic Biographical Information

Keith Manchester was born in Leicestershire, England, on the 21 June 1938. Attending King Edward VII Grammar School in Melton Mowbray from 1946 to 1956, he gained his "A" levels which allowed him entry to study medicine at St Bartholomew's Hospital Medical College in London (1956–1962). He was awarded a B.Sc. Honors in Physiology (1959) and an M.B.B.S (Bachelor of Medicine and Surgery) in 1962. In 1963, he started work as a house surgeon in gynecology at St Bartholomew's Hospital and had later house jobs at the Whittington Hospital, London, and St Luke's Hospital in Bradford, West Yorkshire. These posts preceded his establishment as a General Practitioner at Laisterdyke Clinic in 1964, until his retirement in 1998. However, he remained a Locum General Medical Practitioner in Bradford for several years, and "rejoined" the palaeopathology community of Bradford University's Department of Archaeological Sciences.

Manchester had already established his interest in archaeology long ago as a schoolboy in Leicestershire, taking part in excavations with the local archaeological society. Keith married Ann, and they had four children, Sally, Giles, James, and Edward, with subsequent grandchildren. Behind every good man is a hardworking and supporting wife, and Keith Manchester is no exception. Ann has been a stalwart throughout their marriage, supporting his work and many extracurricular

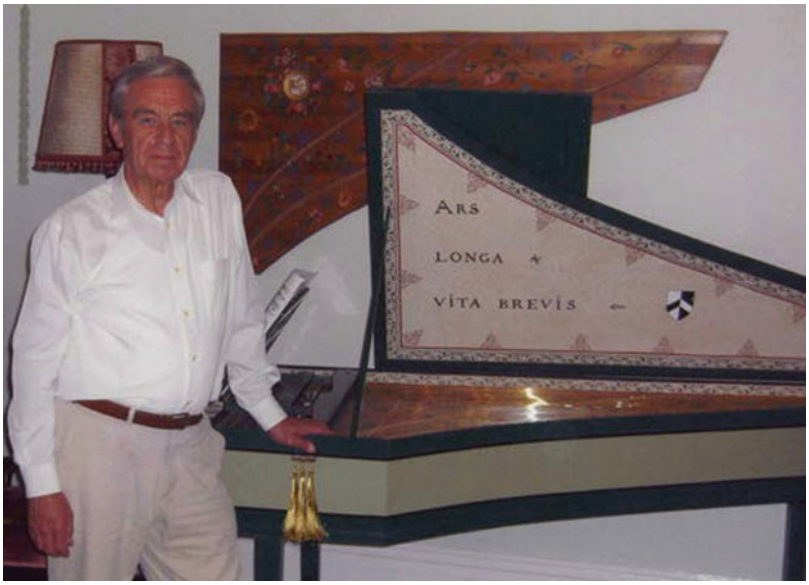

Manchester, Keith, Fig. 1 Keith Manchester showing his passion for music

activities, including fly fishing and making music (Fig. 1), but also palaeopathology.

Major Accomplishments

Although Keith has many skills and a wide knowledge of many subjects, his focus on palaeopathology has perhaps been the most longstanding, apart from medicine. In 1982, he embarked on a new career in palaeopathology at the University of Bradford, after having done some skeletal reports for West Yorkshire Archaeology Services and also published some papers. The teaching and research he did was as an Honorary Visiting Lecturer and Honorary Research Fellow, alongside continuing to work as a medical practitioner. In 1983 during the consolidating years of Palaeopathology at Bradford, Keith was joined by Charlotte Roberts, and they jointly conducted research in leprosy and tuberculosis, and in the years leading up to 1990, together formulated the academic curriculum for the subsequent M.Sc. course. The advantages of his involvement in teaching were his in-depth knowledge of the impact of disease on the skeleton and what signs and/or symptoms a person could have experienced (Fig. 2). In 1990, following much discussion with the University of Sheffield, the now famous joint Bradford/Sheffield M.Sc. Osteology, Palaeopathology, and Funerary Archaeology course was established and admitted its first students in the UK. This set the precedent for the future training of students in how to analyze and interpret skeletal remains from archaeological sites. This joint course which continued to run until 2000–2001 had many strengths, including for students the advantages of experiencing what two universities could offer, and it attracted more than 150 students over the years from North and South America, Greece, France, Spain, Switzerland, Iceland, Germany, Finland, Austria, Jordan, Australia, Japan, Malta, and, of course, the UK. The course "produced" many graduates with palaeopathological knowledge and skills who currently work in the field, which is a credit to Keith's initial efforts in establishing the course. Subsequently, for logistical reasons, the Joint Course separated and Bradford continued its M.Sc. course in Human Osteology and Palaeopathology independently. His other contribution, through his research collaborations with Don Ortner of the Smithsonian Institution starting in the 1980s, was the setting up of the "Short Courses in Palaeopathology," also at the University of Bradford. He and the author co-organized the first (of many) course in 1988. Keith's dedication and work effort to enhance the Department of Archaeological Sciences' research

Manchester, Keith, Fig. 2 Keith Manchester teaching in the 1980s

and teaching profile was rewarded by the award of a D.Sc. degree by the University in 1991. The Biological Anthropology Research Laboratory was also named the "Keith Manchester Laboratory" when the Biological Anthropology Research Center at Bradford was established. Keith's achievements in palaeopathology were recognized by the Swedish Society of Medical Sciences in 1987. He was elected Fellow of the Society of Antiquaries and the Royal Anthropological Institute (both London). He was one of the first palaeopathologists to be awarded a UK (government funded) research council grant (Science and Engineering Research Council), and one from the Wellcome Trust.

Keith joined the United States-based Paleopathology Association in 1978, and his research in palaeopathology continues to have an impact on the discipline, especially in the field of infectious disease. His first publications were in the 1980s, but one of his main achievements was developing diagnostic criteria for leprosy with the clinical leprologist Johs Andersen, although his base was the work of the Dane Vilhelm Møller-Christensen, another medical doctor with a research interest in palaeopathology (Andersen and Manchester 1986, 1988, 1992; Andersen et al. 1992, 1994). This included a visit to Ethiopia to get first-hand observations of people living with leprosy. In more recent times, he has returned to the diagnostic criteria and is currently working on skeletons at Bradford from the St James and St Mary Magdalene medieval leprosy hospital cemetery from Chichester, Sussex. His work on diagnostic criteria continues to be cited in the bioarchaeological literature. This research has also extended to looking at the reasons behind the fourteenth century CE European decline in leprosy, with a focus on tuberculosis (1984, 1991). The cross-immunity between leprosy and tuberculosis was suggested as the reason for the decline and the rise of tuberculosis, a hypothesis that continues to be an interest for other researchers, both clinically and palaeopathologically. His other major accomplishment was the publication of his *Archaeology of Disease* (1983), which has later appeared in new editions; it is a book that is globally used in teaching and research in palaeopathology.

In more recent years, Manchester has returned to the now Division of Archaeological, Geographic, and Environmental Sciences at the University of Bradford where he has been appointed Honorary Visiting Professor of Palaeopathology. Manchester lectures and assists in practical

classes for M.Sc. students and is part of a number of projects, including laser scanning photography of leprous bones from the Chichester medieval leprosy hospital skeletal collection. He continues to find leprosy intriguing and says, his "current research interests are in the pathogenesis of leprous bone change, particularly in relation to autonomic neuropathy, and the palaeopathological diagnostic criteria for leprosy, pathognomonic and indicative of the clinical sequelae of *M. leprae* infection in man" (Keith Manchester, *personal communication,* August 2017).

Cross-References

- ▶ Angel, John Lawrence
- ▶ Archaeology: Definition
- ▶ Bass III, William M.
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Demographic Transitions
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Ortner, Donald J.
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition

References

Andersen, J., and K. Manchester. 1986. Grooving of the proximal phalanx in leprosy: A palaeopathological and radiological study. *Journal of Archaeological Science* 14: 77–82.

Andersen, J., and K. Manchester. 1988. Dorsal tarsal exostoses in leprosy: A palaeopathological and radiological study. *Journal of Archaeological Science* 15: 51–56.

Andersen, J., and K. Manchester. 1992. The rhinomaxillary syndrome in leprosy: A clinical, radiological and palaeopathological study. *International Journal of Osteoarchaeology* 2: 121–129.

Andersen, J., K. Manchester, and R.S. Ali. 1992. Diaphyseal remodelling in leprosy: A radiological and palaeopathological study. *International Journal of Osteoarchaeology* 2: 211–219.

Andersen, J., K. Manchester, and C.A. Roberts. 1994. Septic bone changes in leprosy: A clinical, radiological and palaeopathological review. *International Journal of Osteoarchaeology* 4: 21–30.

Buikstra, J.E., and C.A. Roberts, eds. 2012. *A global history of paleopathology: Pioneers and prospects*, 56–59. New York: Oxford University Press.

Manchester, K. 1983. *The archaeology of disease*. Bradford: University of Bradford Press.

Manchester, K. 1984. Tuberculosis and leprosy in antiquity: An interpretation. *Medical History* 28: 222–230.

Manchester, K. 1991. Tuberculosis and leprosy: Evidence for interaction of disease. In *Human paleopathology: Current syntheses and future options*, ed. D. Ortner and A.C. Aufderheide, 23–35. Washington, DC: Smithsonian Institution Press.

Further Reading

Manchester, K. 1976. The human remains. In *An Anglo-Saxon cemetery at Baston, Lincolnshire*, ed. P. Mayes and M.J. Dean, 57–60. Lincoln: Society for Lincolnshire History and Archaeology.

Manchester, K. 1980a. Jugular vein occlusion in the Bronze Age. *Yorkshire Archaeological Journal* 52: 167–169.

Manchester, K. 1980b. Hydrocephalus in an Anglo-Saxon child. *Archaeologia Cantiana* 96: 77–82.

Manchester, K. 1983. Human remains. In *Sandal Castle excavation 1964–1973*, ed. P. Mayes and L.A.S. Butley, 337–339. Wakefield: Historical Publications.

Manchester, K. 1994. Rhinomaxillary lesions in syphilis: Differential diagnosis. In *L'origine de la syphilis en Europe: Avant ou après 1493?* ed. O. Dutour, G. Pálfi, J. Bérato, and J.-P. Brun, 79–80. Toulon: Centre Archéologique du Var, Éditions Errance.

Roberts, C.A., and K. Manchester. 1995. *The archaeology of disease*. 2nd ed. Stroud: Sutton Publishing Limited.

Roberts, C.A., and K. Manchester. 2005. *The archaeology of disease*. 3rd ed. Stroud: Sutton Publishing Limited.

Roberts, C.A., and K. Manchester. 2010. *The archaeology of disease*. Paperback ed. Stroud: History Press.

Mandui, Herman

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Basic Biographical Information

Mr. Mandui was born in 1969 in Southern Highlands, Papua New Guinea, of Manus (mother) and Sepik (father) heritage. He is a speaker of more than 15 local languages including Melanesian

Pidgin and Australian English. He was educated at the University of Papua New Guinea, completing in 1992 a B.A. in Physical Geography, Environmental Sciences, and Archaeology. After graduating, Mr. Mandui was a tutor in Cultural Ecology and Theoretical Archaeology at UPNG before joining the National Museum and Art Gallery of PNG as a Contract Archaeologist working under Dr. Pamela Swadling. Four years later, he was promoted as Principal Archaeologist and in 2008 Chief Government Archaeologist for the Independent State of Papua New Guinea. Mr. Mandui has been at the forefront of managing archaeological research in the independent state of Papua New Guinea. All applications for archaeological research in PNG are processed by the museum which is by law accountable for preserving the heritage of the nation.

Major Accomplishments

Mr. Mandui's major accomplishment is keeping archaeological research continuing in PNG despite difficult times including at one time the closure of the museum. Mr. Mandui is also an accomplished archaeologist working in many provinces of Papua New Guinea. He has authored a total of 39 publications in reports, journals, and chapters in academic publications to date. More recently he undertook and directed three research projects with Professor Summerhayes. The first focussed on the early colonization of PNG in the Ivane Valley. The second examined the beginnings of Austronesian settlement in the western Pacific by examining Lapita settlements on Emirau Island. The third project examined early settlement along the south Papuan Coast and involved archaeological excavations at the site of Oposisi. Publications from this research are seen below.

Cross-References

- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Taro: Origins and Development

Further Reading

Allen, J., G.R. Summerhayes, H. Mandui, and M. Leavesley. 2011. New data from Oposisi: Implications for the early Papuan pottery phase. *The Journal of Pacific Archaeology* 2: 69–81.

Mandui, H. 2006. What is the future of our past? Papua New Guineans and cultural heritage. In *Archaeology of Oceania: Australia and the Pacific Islands*, ed. I. Lilley, 379–382. Malden: Blackwell.

Muke, J., and H. Mandui. 2003. In the shadows of Kuk: Evidence for prehistoric agriculture at Kana, Wahgi Valley, Papua New Guinea. *Archaeology in Oceania* 38 (3): 177–185.

Shaw, B., H. Buckley, G. Summerhayes, D. Anson, S. Garling, F. Valentin, H. Mandui, C. Stirling, and M. Reid. 2010. Migration and mobility at the Late Lapita site of Reber-Rakival (SAC), Watom Island using isotope and trace element analysis: A new insight into Lapita interaction in the Bismarck Archipelago. *Journal of Archaeological Science* 37: 605–613.

Summerhayes, G.R., M. Leavesley, A. Fairbairn, H. Mandui, J. Field, A. Ford, and R. Fullagar. 2010a. Human adaptation and use of plants in highland New Guinea 49,000–44,000 years ago. *Science* 330: 78–81.

Summerhayes, G.R., L. Matisoo-Smith, H. Mandui, J. Allen, J. Specht, N. Hogg, and S. McPherson. 2010b. Tamuarawai (EQS): An early Lapita site on Emirau, New Ireland, PNG. *The Journal of Pacific Archaeology* 1: 62–75.

M

Mangi, Joseph Tumbe

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Basic Biographical Information

Joseph (Jo) Mangi (1961–) is from the Middle Wahgi Valley in the highlands of Papua New Guinea. Jo obtained his Bachelor of Arts from the University of Papua New Guinea (UPNG) in 1982. He continued his archaeological studies at the Australian National University for a Bachelor of Literature (B. Litt.) (Mangi 1984) and obtained a Master of Arts from UPNG in 1988.

After returning to Port Moresby, Jo became a temporary research fellow at the National

Research Institute (1991) and a lecturer in the Department of Anthropology and Sociology at UPNG (1992–1998). After leaving UPNG, Jo became a consultant for an array of development, poverty alleviation, sustainability, and welfare projects. From the mid-2000s, he has worked extensively in the commercial sector on cultural resource management and social mapping projects across Papua New Guinea. In 2006, he assisted John Muke in undertaking community consultations and drafting of the land-use management plan for the successful nomination of the Kuk Early Agricultural Site to the World Heritage List (inscribed in 2008).

Major Accomplishments

Jo's B. Litt studies involved the analysis of lithic material collected by Ole Christensen during his excavation of Manim 2 in the Wurup valley, Upper Wahgi Valley, Papua New Guinea (Christensen 1975). Manim 2 was the lowest and oldest (first occupied in the early Holocene) of a series of rockshelters excavated by Christensen along an altitudinal gradient in the Wurup Valley between 1972 and 1974. Unfortunately, Christensen died in an accident before completion of the analysis of the finds from his excavations, which were in part then taken up by Jo. This situation is reflected in the "10 Years BP" thesis subtitle, which is a reference to when the material was collected.

A major contribution of his thesis was the observation that direct comparisons of lithic studies for highland sites had been hindered by the different typologies used in the analysis of assemblages (Mangi 1984: 53–69). Up to that point, researchers had adopted several different classificatory schema: Bulmer's was an intuitive typology based on formal types (Bulmer 1977); White's was a modified version in which some formal types were retained, e.g., axe/adze, waisted blade, and pebble tool, and others were considered according to attribute analysis of altered edges (White 1972: 5–9, largely adopted by Mangi 1984); and Watson and Cole's was an attempt to produce a "scientific," nonintuitive approach (Watson and Cole 1977: 72–3). Jo considered Watson and Cole's classification to be "theoretical window-dressing" given that its "scientific" categories were subsequently articulated in terms of an intuitive typology (Mangi 1984: 68). He surmised that the different presuppositions inherent to each classificatory schema prevented ready cross-correlation and, as a result, only some general points of similarity and difference could be inferred.

In 1986, Jo attended the First World Archaeological Congress at the University of Southampton, England. He subsequently was a British Council-sponsored Visiting Fellow at that university from August to November 1987. This exposure undoubtedly fostered an interest in the political dimensions of archaeology within Papua New Guinea (Mangi 1994), something that underscored many of his subsequent activities.

Jo obtained a Master of Arts at UPNG on traditional Huli trade in the highland interior of Papua New Guinea (Mangi 1988a). He then enrolled for a Ph.D. in archaeology in the Prehistory Department at the Australian National University (discontinued in 1990). As part of his research, Jo surveyed and excavated sites in the Porgera Valley region of the highlands. One site, Purepa rockshelter, dated back to the beginning of the Holocene and was especially noteworthy for containing a waisted blade from a mid-Holocene context and an impressive array of marine shells that had evidently been traded inland, including *Trochus* shell armbands (Mangi 1988b).

Cross-References

► Kuk Swamp: Agriculture and Domestication
► Muke, John

References

Bulmer, S. 1977. Waisted blades and axes. In *Stone tools as cultural markers: Change, evolution and complexity*, ed. R.V.S. Wright, 40–59. Canberra: Australian Institute of Aboriginal Studies.

Christensen, O.A. 1975. Hunters and horticulturalists: A preliminary report of the 1972–4 excavations in the Manim Valley, Papua New Guinea. *Mankind* 10: 24–36.
Mangi, J. 1984. *Manim (2): 10 years BP: Prehistory of the rockshelter, western Highlands, Papua New Guinea*. Unpublished B.Litt. dissertation, Department of Prehistory and Anthropology, Australian National University, Canberra.
Mangi, J. 1988a. *Yole: A study of traditional Huli trade*. Unpublished M.A. dissertation, University of Papua New Guinea, Port Moresby.
Mangi, J. 1988b. *The gatherer hunter economy and horticultural development in the Porgera Valley from an archaeological perspective*. Unpublished manuscript, Prehistory Department, Research School of Pacific Studies, Australian National University, Canberra.
Mangi, J. 1994. The role of archaeology in nation building. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 217–227. New York: Routledge.
Watson, V.D., and J.D. Cole. 1977. *Prehistory of the Eastern Highlands of New Guinea*. Seattle: University of Washington Press.
White, J.P. 1972. *Ol Tumbuna: Archaeological excavations in the Eastern Central Highlands, Papua New Guinea*, Terra Australis. Vol. 2. Canberra: RSPAS, ANU.

Manioc: Origins and Development

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Basic Species Information

Manioc (*Manihot esculenta* Crantz) is a woody shrub that is cultivated primarily for its tuberous roots that contain large amounts of carbohydrate in the form of starch. The crop originates in South America but is now widely grown throughout the wet tropics and has become the sixth most globally important crop for food (Clement et al. 2010). It is also grown for fodder (e.g., for pigs in the highlands of New Guinea). Cassava is adaptable to marginal environments, has a flexible growth cycle, and has relatively high energy yields per unit area of land (Lebot 2009).

Manioc is ordinarily reproduced vegetatively under cultivation, namely, a stem cutting is planted to generate a new clone of the parent. Even though it is generally regarded as an asexually reproduced plant, it has not lost its ability for sexual reproduction, namely, many vegetatively propagated varieties still produce viable seed (Rival and McKey 2008). Clement et al. (2010: 78) have highlighted the importance of sexual reproduction to the evolution of manioc and the generation of cultivar diversity through a consideration of smallholder behavior today. Many smallholders let "volunteer" plants grow that are generated from seed and incidental incorporation into the seed bank of a plot. They then decide at harvesting if these plants are worth retaining and vegetatively propagating. Clement et al. (2010: 78) conclude: "Genetic analyses confirmed seedling incorporation by detecting high polymorphism in local varieties. . ., and by demonstrating that local varieties are polyclonal, with one predominant clone and a set of morphologically similar plants that are genetically different."

Major Domestication Traits

Cultivated manioc is grouped into "sweet" and "bitter" varieties. The two main groups of cultivars are differentiated based on lower or higher cyanogenic glucoside contents, respectively. Cyanogenic glucoside is hydrolyzed to the poisonous hydrocyanic or prussic acid upon harvesting, making unprocessed "bitter" manioc toxic to people. Consequently, bitter manioc requires leaching, mashing, and heat treatment prior to consumption to remove toxins, whereas sweet manioc only requires standard cooking and some varieties can be eaten raw. The distinction between "sweet" and "bitter" manioc masks continuous variation among cultivated varieties and wild species, suggesting that the two groups of cultivated varieties represent independent and different selective pressures exerted on a common ancestral plant with intermediate cyanogenic potential (Clement et al. 2010: 77).

Following Isendahl (2012), there are three sets of issues associated with the spatiotemporal dimensions of manioc domestication:

(a) The wild progenitor from which domesticated manioc is descended
(b) The locus and biome of domestication
(c) The area of initial cultivation

Various types of multidisciplinary evidence shed light on the history of these domesticatory relationships, including plant biology, phytogeography, plant genetics, plant microfossils (principally starch grain analysis; e.g., Perry 2005), and plant macrofossils (principally charred tuberous remains; e.g., Ugent et al. 1986).

Multiple regions have been proposed as the geographical center of manioc domestication (Vavilov 1951; Sauer 1952; Lathrap 1970; Piperno and Pearsall 1998). The morphology of manioc, with the binding of water in starch-rich tubers, has suggested adaptation of a perennial plant to periodically dry periods, characteristic of seasonal climates (in Isendahl 2012). Consequently, and drawing on multiple lines of evidence, several commentators have suggested that manioc originates in the transitional zone between savanna and the Amazonian tropical rainforest.

Genetic analyses have enabled the revision of this interpretation by defining the botanical origin more clearly. Previously manioc was thought to be a cultigen, namely, it was thought not to be descended from a wild conspecific ancestral population; it was thought to have originated from the introgression, or interspecific breeding, between different wild *Manihot* species (Clement et al. 2010; Isendahl 2012). Genetic analyses have now confirmed that manioc is descended from *Manihot esculenta* subspecies *flabellifolia* (Olsen and Schaal 2006), although some introgression may have occurred subsequent to initial domestication and contributed to the generation of the range of varieties. Following Isendahl (2012: 458) this genetic interpretation has enabled the locus of domestication to be better determined:

> Having identified a sole progenitor, it is also possible to suggest a probable geographical origin where the progenitor evolved and the agricultural origin of domesticated manioc. The biophysical habitat of wild populations of *Manihot esculenta* subspecies *flabellifolia* is in forest patches in the transition zone between the savanna scrub vegetation of the Brazilian Shield Plateau (i.e., the Cerrado) and the lowland rainforest of the Amazon Basin, where it grows as a clambering under-story shrub or low tree.

Although some authors suggest more restricted geographical regions, these may change in the light of new analyses and greater sampling coverage. On balance, the southwestern edge of the Amazon Basin is the most likely locus of manioc domestication.

The archaeobotanical record of early manioc domestication, which is used as a proxy for early manioc cultivation, has been greatly improved through the application of starch grain analysis (see Ugent et al. 1986; Piperno and Holst 1998; Piperno and Pearsall 1998; Isendahl 2012: Table 1). For example, Perry (2002) has shown that modern starch granules from manioc are larger than archaeological specimens and those derived from its purported wild ancestor. To summarize the diverse archaeobotanical findings, manioc may have been domesticated as early as 10,000–9,000 years ago in the South American lowlands, with subsequent widespread dispersal to several areas of cultivation by c. 6,500 years ago, including the Central Andes, Pacific Coast of South America, Central America, and Meso-America (e.g., Piperno and Holst 1998; Piperno and Pearsall 1998). Recent research is also demonstrating the importance of manioc cultivation on Dark Earths in Amazonia (e.g., Fraser and Clement 2008). At present, starch grain analysis is unable to differentiate clearly between "sweet" and "bitter" manioc.

Care needs to be taken in the interpretation of some claims for the importance of manioc in the past. Perry (2005) has demonstrated that the supposed "manioc" graters collected from archaeological contexts in the middle Orinoco valley of Venezuela were used to process a range of starchy and other foods. People evidently engaged in diverse plant food production and exploitation practices in the past, in doing so, they no doubt exploited wild and cultivated forms of manioc.

Ongoing multidisciplinary research on manioc is likely to further refine the phylogenetic relationships between wild *Manihot* species, including *Manihot esculenta* ssp. *flabellifolia*, and cultivated varieties of "sweet" and "bitter" manioc. As genetic interpretations improve, the locus for the origination – effectively the domestication – of manioc will also be refined based upon the present-day distributions of those wild species and cultivated varieties. However, care needs to be taken when using modern plant distributions as a guide to the distant past, given changing climates and biogeographies during the Holocene. At present, the pathways of manioc geodomestication have only been loosely anchored through archaeobotany. Much greater archaeological coverage across the vast lowland rain forests of the Neotropics is required to clarify the distributions of manioc and associated biomes in the past.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Vegeculture: General Principles

References

Clement, C.R., M. de Cristo-Araújo, G.C. d'Eeckenbrugge, A.A. Pereira, and D. Picanço-Rodridgues. 2010. Origins and domestication of Native American crops. *Diversity* 2: 72–106.

Fraser, J.A., and C.R. Clement. 2008. Dark Earths and manioc cultivation in Central Amazonia: a window on pre-Colombian agricultural systems? *Boletim do Museu Paraense Emîlio Goeldi Ciências Humanas, Belém* 3: 175–194.

Isendahl, C. 2012. The domestication and early spread of manioc (*Manihot esculenta* Crantz): A brief synthesis. *Latin American Antiquity* 22: 452–468.

Lathrap, D.W. 1970. *The Upper Amazon*. London: Thames and Hudson.

Lebot, V. 2009. *Tropical root and tuber crops: Cassava, sweet potato, yams and aroids.* Crop Production Science in Horticulture 17. Wallingford: CABI.

Olsen, K.M., and B.A. Schaal. 2006. DNA sequence data and inference on cassava's origin of domestication. In *Documenting domestication: New genetic and archaeological paradigms*, ed. M.A. Zeder, D.G. Bradley, E. Emshwiller, and B.D. Smith, 123–133. Berkeley: University of California Press.

Perry, L. 2002. Starch granule size and the domestication of manioc (*Manihot esculenta*) and sweet potato (*Ipomoea batatas*). *Economic Botany* 56: 335–349.

Perry, L. 2005. Reassessing the traditional interpretation of 'manioc' artifacts in the Orinoco Valley of Venezuela. *Latin American Antiquity* 16: 409–426.

Piperno, D.R., and I. Holst. 1998. The presence of starch grains on prehistoric stone tools from the humid neotropics: Indications of early tuber use and agriculture in Panama. *Journal of Archaeological Science* 25: 765–777.

Piperno, D.R., and D.M. Pearsall. 1998. *The origins of agriculture in the lowland neotropics*. San Diego: Academic Press.

Rival, L., and D. McKey. 2008. Domestication and diversity in manioc (*Manihot esculenta* Crantz ssp. *esculenta*, Euphorbiaceae). *Current Anthropology* 49: 1119–1128.

Sauer, C.O. 1952. *Agricultural origins and dispersals*. New York: American Geographical Society.

Ugent, D., S. Pozorski, and T. Pozorski. 1986. Archaeological manioc (*Manihot*) from coastal Peru. *Economic Botany* 40: 78–102.

Vavilov, N.I. 1951. Phytogeographic basis of plant breeding: The origin, variation, immunity and breeding of cultivated plants. *Chronica Botanica* 13: 1–366.

M

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Basic Biographical Information

Arif Müfid Mansel was born in Istanbul in 1905. He passed away in 1975. Arif Müfid Mansel graduated from Saint Benoit High School in 1925.

After this, he went to Germany to study Classical Archaeology at the University of Berlin. He attended lectures in Ancient History, Ancient Greek, and Latin as well as Archaeology from leading professors of the period such as Ferdinand Noack, Eduard Meyer, and Werner Jaeger. In 1930, after he received his Ph.D., which was based on his dissertation, titled *Stockwerkbau der Römer und der Griechen*/*Storied Roman and Greek*, Arif Müfid Mansel returned to Turkey. For 12 years, he worked as the assistant of Aziz Ongan at the Archaeology Museums of İstanbul and as a lecturer in the Ancient History Department of İstanbul University. Arif Müfid Mansel was promoted as Associate Professor in 1936, Professor in 1944, and finally became Professor Emeritus in 1958.

Major Accomplishments

Arif Müfid Mansel founded the Classical Archaeology Department at Istanbul University in 1946 and became the head director of the department. Until his death, he continued to chair the department and train numerous students and scientists. He mainly focused on ancient architecture especially the sarcophaguses, ancient history studies and museology. In addition, he was interested in bibliographic studies and he produced a major source of reference by compiling a comprehensive book that contains all the publications in Turkey until 1948.

Arif Müfid Mansel conducted excavations in 1933 at Balabanağa Masjid, in 1936–1940 at Thrace Tumuluses, 1938–1941/1948 in the Küçükçekmece region, in 1946–1947/1953–1957 at Perge, and in 1947–1967 at Side. He established the Archaeological Research Station of Antalya Region in 1954 and became the first director of this establishment. This initiated a tradition of an institutional style of research in regional studies and opened up new areas for researchers and students. He was a leader in the Turkish Historical Society; a member of the Supreme Council of Antiquities and Cultural Heritage Property (1954–1956 as head director); primary member of the Committee for the Protection of Ancient Monuments of Istanbul; and a member of the German Archaeological Institute, the Austrian Archaeological Institute, and Sofia Academy of Sciences. He was elected as the Vice President of the International Byzantine Examination Community and moderated the 10th International Congress of Classical Archaeology in 1973.

Cross-References

- ▶ Architecture, Roman
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Classical (Greek) Archaeology
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Tombs, Greek (Iron Age)

Further Reading

Mansel, A.M. 1932. *Stockwerkbau der Griechen und Römer*. Berlin: De Gruyter.

Mansel, A.M. 1934a. *Sarcophagus of a prince in İstanbul*. İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayınları.

Mansel, A.M. 1934b. *History and archaeology of Persia*. İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayınları.

Mansel, A.M. 1936. *Yalova guide*. İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayınları.

Mansel, A.M. 1938a. *Notes on history of Egypt and Aegean*. İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayınları.

Mansel, A.M. 1938b. *Culture and history of Thrace*. İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayınları.

Mansel, A.M. 1943. *Silifke guide*. İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayınları.

Mansel, A.M. 1945. *Outline of the history of the ancient East and the Aegean*. İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayınları.

Mansel, A.M. 1947. *History of Aegean and Greek*. Ankara: Türk Tarih Kurumu.

Mansel, A.M. 1948. *Bibliography for archeology, epigraphy and historical geography of Turkey*. Ankara: Türk Tarih Kurumu.

Mansel, A.M. 1949. *Excavation and researches in Perge*. Ankara: Türk Tarih Kurumu.

Mansel, A.M. 1963. *The ruins of side*. Berlin: de Gruyter.

Mansel, A.M. 1978. *Results between 1947–1966 excavations and researches in side*. Ankara: Türk Tarih Kurumu.

Manteño, Geography and Culture of

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State of Knowledge and Current Debates

Introduction

From the Río Chone in the north as far as the southern shore of the Santa Elena Peninsula, 200 km away, the central Ecuadorian littoral proper is bordered to the east by an interrupted chain of rugged hills that rise to 800 m above sea level, beyond which lie the hot, more humid coastal lowlands of the Guayas Basin. While the hill peaks support cloud forest, the lower slopes and plains stretching to the waters of the Pacific Ocean are dominated by variable tropical dry forest regimes and cactus scrub, with mangroves occupying the river estuaries. From 800 AD to the Spanish invasion in 1531, this mainland territory, along with Puná Island (50 km by 30 km) in the Gulf of Guayaquil, was held by diverse and complex chiefdom polities known collectively as the Manteños. The Manteño period saw major population increase; the growth of urban centers; innovation and increased scale in architecture, engineering, and technology; increased circulation of prestige items; the development of monumental sculpture; larger and more formalized ceremonial centers and sanctuaries; more elaborate burial practices; increased specialization; and marked social differentiation.

This essay focuses on the archaeological evidence for the better known late Manteños and its implications for understanding of their three main regional divisions: the Manteños of the north, in what is now the Province of Manabí, the more southerly Guancavilcas of the drier Province of the Peninsula of Santa Elena, and beyond them, the Punaés, who occupied Puná Island and controlled the Gulf of Guayaquil (Bushnell 1951; Stothert 2013). After a review of current knowledge and thinking concerning more generally shared aspects of Manteño culture, attention is paid first to Cerro Jaboncillo, the principal north Manteño ceremonial center, then to the design and architecture of the settlements, to the tombs and cemeteries, and to the sanctuaries. Concluding remarks reflect on the nature of Manteño political power.

General Aspects of Manteño Culture

Maize agriculture, supported by different types of water catchment and storage systems (Marcos 1995), was the main basis of Manteño existence. Manteño presence is thus most widely characterized, and in the first place identified, by an easily recognizable set of pottery vessels that include both large jars and broad flat griddle plates (*comales*) of unpolished brown or brick colored coarser fabrics and fine polished and pattern-burnished black wares whose jars and tall pedestal plates often carry realistic and distinctive modelled human and para-human faces (Bushnell 1951; Estrada 1957a, b; Mester 1990; Stothert 2006). These were used in the preparation and serving of maize, either as *chicha* (liquid beer) or as solid food such as *tortillas* (small maize cakes), essential ingredients both of normal household diet and communal feasts.

The black ware vessels decorated with faces are also statements of identity (Stothert 2006). First, they present the mutable nature of Manteño personhood as it moves back and forth between a human guise and one more animal (bat or other mammal). Second, the *chicha* jars were presentations of the full human form – head, body, and limbs may be depicted explicitly – and as such, they emphasize the essential relation between food and human ontology: we are what we consume. Finally, the faces are often adorned with ear spools, ear studs, lip studs, nose rings, and sometimes cheek scars, and there is emphasis on a prominent nose occasionally decorated not simply with a modelled clay nose ring but a real gold ornament. These last details, above all, proclaim shared Manteño being.

Coextensive and no less diagnostic are carefully made *manos* (hand grinding stones) and *metates* (the flat stones on which the maize was ground) with which the maize was turned into

flour, black polished solid mold-made pottery figurines, decorated spindle whorls, pottery whistles and stamps, small metal and shell ornaments, and metal tools such as tweezers, needles, and axes, along with axe-molds (Bushnell 1951; Currie 1995; Estrada 1957a, b). These portable artefacts, along with polished black ware vessels and carbonized maize remains, are frequently discovered in association with human burials, including secondary burials in large vessels often identical to cooking jars. They also represent some of the diversity of skilled artisanal practices that supported Manteño ritual and provided personal adornment. Thus spindle whorls, sometimes found in thousands, and copper needles reflect the widespread cultivation and use of cotton for thread and cloth, little of which has survived in the ground. Spindle whorls and stamps, moreover, carry tiny, intricate incised designs, figurative and geometric, which present an extra dimension to the study of Manteño iconography and symbolism.

But care must be taken in using such artefacts in reference to Manteño both as a chronological and as a geographical phenomenon. First, many of these objects were products of the latter half of the Manteño period and are then not representative of the development of the culture as a whole. Some idea of internal development indeed comes from early and late styles of shell bead and copper needle manufacture (Carter 2011; Hosler et al. 1990), early and late modelling techniques for portrait vessels, and changes in more general aspects of pottery manufacture (Mester 1990; Stothert 2006). There is also major change in architecture (see below). But so far the different lines of evidence have not been consolidated in a general temporal framework that covers Manteño territory as a whole; and it is still to be understood how early Manteño identity and practice were forged out of the traditions of the Bahía and Guangala chiefdoms that had previously occupied its mainland territories.

Next, while the limits of the core territories were probably well defined, by late Manteño there were outlier communities in north Manabí, up into Esmeraldas Province, and probably across the Gulf of Guayaquil from Puná Island into El Oro Province. Also, frontiers were porous, and there was, especially, continuous and intense inter-exchange with the Milagro-Quevedo neighbors of the Guayas Basin, who supplied much metalwork. And reference must also be made to the more distant Sicán and Chimú cultures of Northern Perú: Chimú pottery has been found in various Manteño offerings and burials, and both the Sicán and Chimú peoples, at least as much as the Incas, were consumers of *Spondylus* shell in large part originating in Manteño coastal waters (Carter 2011).

Third, while there was overall sharing of Manteño culture and identity, there were significant regional and more local differences in specific material traditions, economic practices, religious forms, and political structure. Thus, for example, the great late northern Manteño settlements, as well as many of smaller size, and ceremonial centers, such as Cerro Jaboncillo, are identifiable for an innovative stone architecture; and a small number of these sites were also the settings for unprecedented throne-like U-shaped stone seats, often supported by elaborately carved figures. With rare exception, such use of stone for seats and architecture is not found in the Guancavilca or Puná territories. Equally, elite shaft and chamber tombs are found across much of the southern landscape, including the great funerary center at Loma de Cangrejitos, but so far are mostly absent from records of the north, where there is instead a tradition of large bell-shaped tombs.

Meanwhile, the Pacific Ocean was nowhere more than 50 km from any settlement, and its limitless resources were the second foundation of Manteño life. The offshore islands of La Plata, Salango and, reputedly, the now barely visible rocks of Santa Clara south of Puná Island were important sanctuaries. Material dependence on the sea is especially evident at various sites on the Santa Elena Peninsula where fish bones and scales accumulated in massive quantities. This relationship is, however, more famously symbolized by the balsa raft and its crew of up to 20 that so impressed a Spanish reconnaissance expedition when encountered off the coast of Esmeraldas and by the *Spondylus* shell (*Spondylus princeps*) for

which the raft traders had journeyed north from their home port in the *Señorío* of Salangome, a chiefdom polity of the south coast of present-day Manabí.

Large sea-going balsa rafts seem to have been unique to the Manteño among contemporary societies. And on the basis of the Spanish reports, Jijón y Caamaño (1941) hypothesized a league of Manteño merchants engaged in long-distance maritime *Spondylus* trade. *Spondylus* exchange continues to dominate interest in things Manteño, especially in the area of Salangome (Currie 1995; Mester 1990). Moreover, *Spondylus* trade has been identified as one of the motors leading toward a hypothesized Manteño state (Marcos 1995, 2012). Balsa rafts may also have been involved in the transmission of copper technologies to west Mexico (Hosler et al. 1990), where stone diving equipment similar to that used in Manteño *Spondylus* collection is reported (Marcos 2005).

On the other hand, the wealth of stone structures of Manabí has been mostly ignored as a source of data relevant not only to settlement design and architecture, and from that to their symbolic and religious meanings, but also to wider topics such as social structure and political organization. One exception is an analysis of the architectural context of stone seats found at both the lowland settlement of Agua Blanca and the hilltop ceremonial center of Cerro Jaboncillo (McEwan 2003). However, though detailed primary studies of individual buildings and building groups are so far rare, renewed interest in Cerro Jaboncillo in particular is leading to the production of fresh information on this essential and defining aspect of northern Manteño culture.

Finally, ethnohistoric accounts, of the contact period and then of the first decades of Spanish colonial rule, provide descriptions, if at times questionable and ambiguous, of ritual practices, personal dress and appearance, lists of place names, and hints of political organization, as well as illuminating portraits of individual Manteño leaders who maintained the old ways even as their sons were adopting the new (Stothert 2013; Volland 1995). By the time of the Spanish conquest, however, the Incas were established in the Ecuadorian highlands with their northern capital at Tomebamba, modern Cuenca, and were pressing for the coast. Inca military invasion of the coast had apparently been successfully resisted, and the war of Inca succession had probably eased much of the pressure, but political alliances with local chiefs and religious state ritual, as evidenced especially by *Capac Hucha* burials on La Plata Island, suggest that Inca dominion had in part been enforced and accepted in Manteño territory (McEwan 2003; Stothert 2013). With the Spanish conquest, there was rapid and massive population loss, relocation of surviving communities, and significant cultural fragmentation. But what the Spanish reported was already in a state of change in part provoked by direct external pressures emanating from the south.

Cerro Jaboncillo

Long established as a sanctuary of regional importance, Cerro Jaboncillo was the principal sacred mountain of the northern Manteños (Fig. 1). Its vast ceremonial center was most likely built with the ambition of unifying communities of the north, and perhaps of elsewhere too, through elaborate extended ritual conducted at a shared site of mythic origin. Several other lesser separate peaks were also invested with ceremonial architecture, stone seats, and stone sculpture, including Cerro Agua Nueva, Jupa, Agua Clara, and Junín (Estrada 1962; Saville 1907, 1910) and probably Montecristi; and collectively they bound the region through their visible presence and the processions necessary to reach them. But Jaboncillo, sited close to the northern capital settlement, Manteño Jocay, now Manta, was the greatest.

A rugged, forested massif, approximately 14 km long and up to 6 km wide, rises from west to east as a series of lower peaks culminating first with Cerro de Hojas and soon after, at 641 m above sea level, with Cerro Jaboncillo itself. The summit commands extensive views in all directions, including out to sea. The design of the center was achieved through an architectural reconfiguration of a large part of the mountain: the core alone of albeit dispersed archaeological

Manteño, Geography and Culture of, Fig. 1 Cerro Jaboncillo seen from the east

remains occupies 3500 ha (Marcos et al. 2012; Saville 1907, 1910).

Artificial earth terraces were created first as foundations for dozens of building complexes of up to 30 houses each. This required significant manpower and organization in itself, as well as the clearing of large tracts of forest. Occasionally the terraces, though narrow, were up to 100 m long, 5 m high, and roughly faced with stone; and in some areas, they were built in tall ascending series. Effectively, they converted the mountain itself into a single, immense, multifaceted pyramid.

Construction terraces and building complexes were separated by ravines, cliffs, streams, and any other natural features that could not be surmounted or that might serve as suitable boundaries. Internally, complexes usually incorporated several construction terraces of different sizes. The complexes were sited on the peaks and upper ridge lines, steep middle slopes, and less inclined lower slopes down to more than 500 m below the main summit and were interconnected by constructed pathways that included, toward the summit, series of steps cut into the living rock. Houses and spaces around them were the settings for stone seats, three-dimensional sculptures, low-relief stelae, and short stone columns. While some of the sculpture was designed, like the stelae, to be fixed upright in the ground and the seats, though not fixed, were extremely heavy, the columns and much of the sculpture could have been easily moved into different arrangements according to need.

The stone seats (McEwan 2003; Saville 1907, 1910) were instruments central to newly reformulated processes of north Manteño power and made overt reference to its spiritual or mythical sources. Their shared U-shaped form argues for a general consistency of essential meaning, value, and function. Above all, they were designed to identify the seated personage as a holder and conduit of power. But there were notable variations in size and specific shape from site to site; there were differences, even within sites, in the iconography of the seat bases; and the seats seem to have been distributed in variable numbers in a variety of house sizes and types. The seats, in other words, even as they embedded in relatively

fixed and durable form a number of meanings, served in a multiplicity of ritualized social contexts related to the use and transmission of power.

House Design and Function on Cerro Jaboncillo

Houses were rectangular and set on their own earth platforms on top of the terraces. Complexes at the east end of the mountain suggest five basic types of structure, each distinguished by a combination of attributes readily visible today (Lunniss 2012). These include platform size, house size and shape, wall construction, house position with respect to the rest of the complex, and the nature of any associated structures. Future work will require modifications and additions, but meanwhile the classification can also be applied to houses reported for other areas of the mountain (Saville 1910; Veintimilla 2012). Thus the entire center seems to have been built according to a limited set of design possibilities. But each house has unique characteristics, and no two complexes were identical, this reflecting the availability of space, outlook, differences in complex function, and other factors. Given the uniformity of architectural style, however, and the overall coherence of the site, the time spent building was short. It will also have been late in the Manteño period.

Two classes of large structure are interpreted, respectively, as nonresidential ceremonial houses (Fig. 2) or temples and elite residential houses (Fig. 3). Both are found in central or dominant positions within their complexes, but the nonresidential structures tend to be more remote or difficult to access and were built with more care. Then there are medium-sized residential houses, small nonresidential houses, and another type of small, auxiliary structure. The latter two classes are each found in quite different dependent relationships with residential houses.

The temples and the residential houses have patios in front, some bordered by stone curbs. Occasionally, the house and its own platform, together with the patio, are set together on a larger platform. While house and patio constitute the basic functional unit, residential houses

Manteño, Geography and Culture of, Fig. 2 The remains of a large ceremonial house (13.75 m) at the east end of Cerro Jaboncillo, seen from its patio. Access is via a stone-edged ramp with two stone steps at the top of the 2-m-high platform

Manteño, Geography and Culture of, Fig. 3 View from the rear of a large residential house (15.30 m) that oversees the eastern approach to Cerro Jaboncillo

commonly share their patios with a small house placed on one or other side (Fig. 4). Central patios, however, or courtyards surrounded by houses on all sides, are not a feature of planning at this site. Instead, especially on the steeper slopes and ridges, complexes tend to be linear arrangements that follow the horizontal contour or run up and down the slope.

Ceremonial and residential houses have low walls along both sides and usually also the back end, but not at the front. Each wall consists of a main row of stones standing in a trench so as to create an approximately flat if discontinuous vertical surface along the inside. Immediately against the more irregular outside, a second row of smaller stones was set so as to support the main row. The inside surface was then plastered with the same clay as was used to make the floor. Some house interiors had permanent narrow benches along one or more of the walls. These consisted of a supporting structure of small stones set in a row 20 or 30 cm from the wall (or in two rows if the bench crossed the interior) and then a fill and covering of clay.

The walls stood up to a meter high for larger houses, less for the others. Occasionally there was a secondary doorway through a side or end wall. The roofs were supported by wooden posts set in rows along the inside of the houses. They would probably not have rested on the side walls but rather have been raised above them. The back end, as well as the front, would perhaps have been open or protected by a cloth curtain.

The ceremonial houses are mostly up to 20 m long, though given space they can reach 30, 40, or, on Cerro de Hojas, around 50 m. Set close to falling ground, they command magnificent views, usually to the east. They also sit on platforms 2–3 m tall, with impressive earth ramps leading to a pair of stone steps at the entrance: for this added elevation, the immediate foreground lies out of view, and a direct connection is established with the more distant landscape. Occasionally, they were built as an adjoining pair or set of three, all raised together on

Manteño, Geography and Culture of, Fig. 4 A medium-sized residential house (8.80 m) and a small house (2.80 m) on the west side of the patio, situated at the center of an 80-m-long construction terrace

a single enormous shared platform. Commonly also, at a short distance from the ramp, the patio in front of a ceremonial house was marked by a small rectangular arrangement of stones.

Elite residential houses may be as large as or larger than some more purely ceremonial structures and may also be fronted by stone arrangements similar to those found with ceremonial houses; but they have lower platforms and shorter ramps, and the stone arrangements are perhaps simpler. They are associated with medium-sized residential houses and with small houses and small auxiliary structures. With their different terraces and architectural components, elite residential complexes, which can extend up to a hectare or more, would have been occupied by large extended families, and their separate structures may be read as dispersed elements of a single large house. The main structure would have served for certain important ceremonial as well as residential purposes.

The medium-sized houses, while often associated with elite houses, are also found at the centers of their own complexes or sub-complexes (Lunniss 2012). They were then reduced versions of the elite houses and were occupied by families of lesser standing. The small houses, of less than 5 m length, had walls of vertically set stones made in the same general manner as those of the large and medium-sized houses. They are always associated with residences, at one side or other of the front patio, and probably had some ritual or ritual-related function. Structures of the fifth type are of a slightly larger rectangular form defined not so much by walls as by simple curbs of stones set on long edge around all four sides or just along two ends. They may be found singly or in aligned sets and are always associated with residential houses, though they do not share the front patios: in other words, they are different conceptually, as well as structurally and functionally, to what can be called houses.

Site Design and the Function of Cerro Jaboncillo

A primary processional way is indicated by a series of single, double, and triple ceremonial houses along a twisting route of 8 km that traverses the main west-east ridge, with lateral

routes ranging north and south from this central axis. The path culminates with the summit structures of Cerro Jaboncillo itself but then continues beyond and down the east slope of the mountain. Its central eastern terminal is a rather simple raised earth platform set on a high eminence overlooking the wide valleys to the northeast, though other ceremonial complexes lie to either side.

One such and rather small eastern complex is governed by a medium-sized house of trapezoidal design (Lunniss 2011). Sitting on a 14-m-high terrace, it looks southeast (c118º E). This is the general direction of sunrise at the December solstice, marker for the beginning of the rains on which the maize agriculture depended. The orientation is matched, and so emphasized, by a rectangular house, lacking earth platform, set directly below and on the same alignment, at the foot of the terrace. Meanwhile, 2 km away, on the summit of Cerro Jaboncillo, a pair of larger trapezoidal structures faced northwest (Saville 1910). The sharing of a ground plan so far not found elsewhere on the mountain points to a special joint and complementary purpose for these widely separated complexes. Since the small structure most likely was designed for observation of the December solstice sunrise, we can surmise then that the summit houses were probably oriented to the June solstice sunset. This would in turn not only confirm McEwan's (2003) prediction of solstice ritual on Cerro Jaboncillo but also suggest that the other house orientations may also have been selected for quite specific purposes of observation and visual linkage.

While ceremonial components dominate the site, there are also highly organized residential sectors. So far, however, no large quantities of household or other rubbish have been found. This fact and the formalized nature of the architectural design as a whole point to occupation that was temporary and highly ritualized, rather than permanent and quotidian. In other words, while there was likely to have been some permanent population of priests, assistants, and retainers, the residential complexes were probably used discontinuously by families or other social groups who came from their various home communities to participate in celebrations at different moments of the religious calendar.

Three further categories of structure include, first, what are identified as agricultural terraces (Estrada 1962; Lunniss 2011; Marcos et al. 2012). These, unlike those used to accommodate houses, are usually sited in descending linear series along valley bottoms, where they catch the water runoff. Fronted by earth walls, they are distinguished by a low but definite and broad elevation of the leading edge, perhaps designed to aid water retention. One major system was around 1 km long. For their location, they can also be rather wide, with dimensions of 50 by 50 m or more. Overall, however, the agricultural terraces occupy a very small area in comparison with those occupied by houses.

Next, hundreds of bell-shaped pits, with chambers 2–4 m wide and deep, accessed by short cylindrical shafts, are the most numerous of all structures (Lunniss 2011; Saville 1910; Marcos et al. 2012). Cut into the rock or earth, and varying in details of construction, they occur at all levels of the mountain occupied by stone-walled houses. Up to 50 or more are found in groups in their own separate sites on ridges or exposed slopes. When in more direct association with buildings, the groups are of smaller numbers and tend to be situated toward the lower ends of the complexes. So far, there is no direct evidence to explain function, though they have been interpreted alternatively as tombs and subterranean maize silos. Since the chambers were large and dry, however, with shafts sometimes stone-lined and capped by removable stone lids, it is clear that long-term storage, significant holding capacity, and easy, repeated access were all important aspects of use.

Finally, there are wells, some of them stone-lined and some still in use to this day, with shafts around 1.30 m wide and more than 3 m deep. Construction of wells and bell-shaped pits could involve identical techniques for strengthening the mouth with a stone collar (Lunniss 2011; Veintimilla 2012). Wells, however, are not only infrequent but perhaps the least common structures on the mountain.

Previous evaluations of Cerro Jaboncillo have suggested that it was both a capital city and a

center for maize agriculture, where the bell-shaped pits were designed to hold the surplus produced on the agricultural terraces (Estrada 1962; Marcos 2012). The importance of maize consumption is indeed indicated by ubiquitous *metates* and *manos*, including small, unfinished, and probably nonfunctional *manos* perhaps made for purely symbolic use, and by fragments of pottery vessels, both on the surface and in buried pits (Lunniss 2012; Saville 1910). But though there may have been maize cultivation around the mountain's lower reaches, as well as some opportunistic horticulture around the house complexes, the purpose-built agricultural terraces seem too limited in number and area to have made a significant volumetric contribution to the supplies needed. An alternative explanation is that these were designed for the production of special maize imbued with the sacred value of the mountain. Second, then, pits used for grain storage were probably mostly filled not with maize produced on the mountain but with maize brought in, perhaps as tribute, from elsewhere. The visitors would have been fed principally with this imported maize.

Meanwhile, the ceremonial activities carried out on the mountain were likely many and varied. The architectural complexes, the stone seats and sculptures, the wells, and the ways that link the complexes would all have been used for different specific rituals and ritualized purposes. And the summit complexes were doubtless the settings for some of the most sacred events. At the same time, the inter-connectedness and coherence of the center as a whole, and in particular the shared iconography, suggests that the complexes were all linked by a core set of myths and rituals.

First, the observation of the solstices from two widely separated locations points to a ritual calendar architecturally built onto and into the mountain. Second, maize was of central concern, and maize agriculture may have been symbolically directed from the mountain in accordance with that calendar. Third, the wells were probably part of ritual related to the mountain as a sacred water source. Fourth, and minimally, the seats allowed elite representatives of communities or other social groups to act as intermediaries with the beings of the spirit world (McEwan 2003). Fifth, the complex imagery of the stelae presented the principal figures of Manteño cosmogony as witnessed on the mountain. Of these, the main deity, with the head of a great feline and the body of a caiman or crocodile (Saville 1907, 1910), has been identified as an ancestral being linked with primordial time and earth power (McEwan 2003). The creature is also embodied in two massive stone heads at the base of the northern lateral route to the summit (Saville 1910). In short, the mountain as a whole was conceived of in relation to, and perhaps even configured as, this paramount being.

Among the wealth of seats, sculptures, and pottery figures collected by Saville over a hundred years ago, two stelae fragments in particular present direct images of the pomp and power of the ceremonies carried out there (Saville 1910). On one, a leader stands in a doorway, helmeted and dressed in a long quartered tunic. On the other, a yet more magnificent personage, attended by a retainer carrying a tall bannered staff in one hand and a smaller banner or shield in the other, wears massive feathered wings, while on his head rests an intricate crown. It is of special interest, then, that two crowns of beaten silver in the collections of the Museum of Anthropology and Contemporary Art, Guayaquil, present the great reptile of Cerro Jaboncillo (McEwan 2003), along with two silver pectorals (the second is in the National Museum, Quito) that carry similar imagery made with a similar metallurgical technique. These four pieces can be nothing other than sets of regalia for the high priest, or two high priests, of the main mountain cult. They also suggest that a significant aspect of political power was based on the authority of the spirit for whom the mountain was its house.

Manteño Settlement Design and Architecture

It is both convenient to use Cerro Jaboncillo as a standard of comparison for much late northern Manteño architecture and also likely that this was one of its original purposes. Not that Jaboncillo came first and was then imitated by houses with stone walls at other sites. Indeed, the specific forms and combinations of houses at Jaboncillo are not found replicated elsewhere.

Rather, its architecture incorporated, refined, and, from the perspective of Manteño aesthetics, consolidated certain ideas of what a house might represent and how, accordingly, it should be built. Stone walls, however, were a late though not universal addition to the Manteño architectural repertoire that enhanced the house in different material and symbolic ways yet to be fully recognized, though durability was surely an aspect of primary importance. Meanwhile, earlier houses also present a wide variety of ingenious designs and construction techniques, depending on locality and resources.

Early Manteño

Up in the north, by the mangrove estuary of the Río Portoviejo, Japoto is a mostly early Manteño site represented by 30 residential and ceremonial tolas or raised earth platforms in a core area of 29 ha and by a further 60 tolas around that (Bouchard 2010). The largest platforms are up to 80 m long, 20 m wide, and 5 m high. Some incorporate layers of volcanic ash. There is no stone architecture. One medium-sized house of 8 by 4 m was identified for its three rows of wooden roof supports, the main central row running parallel rows of smaller posts to either side. Of special interest is a ceremonial structure made with earth, *adobes* (bricks of mixed clay and organic matter), *adobes* of volcanic ash, daub of different types, bamboo (*Caña guadua*) poles, and bamboo panels (Guinea 2008). Its unique design centered on a raised roofed floor of 21 by 7 m, flanked on just the east side by a low stepped wall and bench and, on the outside, a sloping panel or talud. The west side was left open. Beneath, there were dedicatory offerings. Termination rituals saw the partial destruction of the platform, feasting and the burial of offerings, the burning, and, finally, the complete burial of the structure.

In south Manabí, the Los Frailes site has raised earth platforms surmounted by rectangular clay-walled structures, other simpler levelled house platforms, walk-in wells, and water catchment systems, or albarradas, spread over an area of 7.5 ha (Mester 1990). Four groups of earth platforms were set around a clean central space of about 2.5 ha. The platforms, up to 50 m long, have clay walls that retain soil fills: similar early Manteño earth platforms with adobe clay-walled structures have been recorded at Agua Blanca. In one main platform, however, a dried up well, 4 m wide and deep, accommodated a semi-subterranean circular house that went through five phases of construction and use. The house served as a specialized shell workshop for the making of small ornamental plaques of mother-of-pearl (*Pteria sterna*).

Manta and Cabo San Lorenzo

The port of Jocay, destroyed to make way for modern Manta, was the largest of all Manteño settlements and extended over several square kilometers of the shore and hinterland (Estrada 1962; Jijón y Caamaño [1952] 1997; Saville 1907). Great earth platforms, and houses up to around 60 m long, once rose in splendor above the surrounding low ground and its thick layers of broken pottery and other rubbish. While houses usually had walls with rows of upright stones as on Cerro Jaboncillo, designs were more varied and often more complex; and similar considerations apply to nearby Jaramijó. One structure supported by multiple revetments was accessed by two separate ramps at the east end. Wider walls had double stone rows containing rubble fill. There were also houses made of clay *adobe* blocks. Some houses had several interior divisions. Notably, one unusual structure of two rooms with stone-faced *adobe* walls contained Inca pottery. The main temple dominated the city from high ground overlooking the shore and ocean, though there were also other houses for a number of different god, spirit, and ancestor images.

Stone-walled houses and often elaborate bell-shaped storage pits are found across much of the area west of Cerro Jaboncillo to Cabo San Lorenzo. Stone architecture reaches the shore's edge at Liguiqui, where the walls consist of mortar-bonded courses of river and beach stones. The settlement of about 1.5 km^2 was dominated by a small central group of large houses set on a high bluff overlooking the ocean to one side and, on the other, lesser houses and small agricultural terraces on slopes rising from the river valley (Ortiz 2012).

The tombs of the head family of this well-delimited estate are indicated by rich grave offerings taken from the hill crest. Liguiqui is of special interest as the intertidal zone of its beach is occupied by a string of semicircular stone fish traps, still used to this day. Others are reported for bays to the east. Probably based on the design of traps made of perishable materials, they show that the new stone architecture was ultimately used for a wide range of purposes, from the summits of the mountains all the way down into the waters of the sea.

Salangome

The Señorío de Salangome was the first Manteño polity to be reported in the early sixteenth century, a few years before the Spanish conquest. While most famous for its balsa raft, its four principal settlements of Salangome, Cercapez, Tuzco, and Salango are also of interest for suggestions of an Andean model of quadripartite political organization perhaps shared by at least a few other settlement clusters of the northern Manteños (McEwan 2003). The sites of the Manteño towns are currently identified with modern Agua Blanca, Puerto López, Machalilla, and Salango.

Agua Blanca was a residential town with a ceremonial core, surrounded by farmsteads with agricultural terraces on the hill slopes (McEwan 2003). It controlled passage through the valley of the Río Buena Vista, which connected coastal settlements with the upper reaches of the Guayas Basin. Manteño occupation is found along 9 km of the lower valley, with a particularly dense 2 km^2 clustering of elaborate complexes opposite the modern village. Groups of stone-walled houses up to 40 in number, made with horizontal courses of rounded river stones, are set on modified terraces sometimes fronted by retaining walls of yellow clay adobes bonded with ashy mortar. The largest houses are of 50 m. Interior walls and floors were clay lined; but in addition some excavated houses had remnants of decorated clay friezes on front exteriors and on interior walls (Piana and Marotzke 1997). The center of the site is a modestly sized north-facing house set on a ramped 10 m prominence with dependent houses around the base of the platform, some in radial arrangement.

Site design within the ceremonial core suggests complex reference, direct and indirect, to the December solstice sunrise and the June solstice sunset. Lines of sight also link to other points of the surrounding horizon and beyond and bind the site internally. The central house is a special focus. Certain of the main complexes repeat a pattern whereby individual houses, or pairs of houses, are placed at right angles to each other on two sides of a shared patio. Inside many houses were elaborate large stone seats and seat fragments and stone columns similar to those found at the more northerly hill sanctuaries. One house contained a row of probably eight seats along one side, indicating that this was built as a formal meeting place or council chamber. Overall size, complex design, and the presence of the seats suggest that Agua Blanca was the paramount civic and ceremonial center for the region.

Manteño Puerto López was a dual settlement, reflecting an ancient socioeconomic division into farmers and fishermen. Overlooking the ocean from the 20 m marine terrace and bounded on either side by two river courses, the flat 20 ha upper settlement shares the building technique of Agua Blanca and also has large houses exceeding 50 m. There is no sign of such sophisticated planning as applied to Cerro Jaboncillo and Agua Blanca, and no seats, columns, or sculptures are recorded. A map of the site (Holm 1982), however, suggests division into several groups of 20–30 houses of various sizes, each arranged around an irregular plaza, with an overall shared preference of house alignment to north northeast.

For the second, smaller, lower settlement next to the sea at the south end of the bay, no stone houses are reported. Location alone suggests that here lived the fishermen and others who worked at the sea, as they do to this day. That the upper settlement was entirely directed to agriculture, however, seems unlikely. Artefacts recovered from middle Manteño contexts, including ornaments of mother-of-pearl shell (mainly *Pinctada mazatlanica*) and the tools necessary to make them, point to specialized craft production comparable to that at Los Frailes (Currie 1995). And while no ceremonial core is indicated, the large

elite residences would have been the setting for much political and ritual interaction.

Neither Los Frailes nor Salango have indications of stone structures. Salango, though a perhaps a smaller port than López, was important in part for the value of its island as a sanctuary. The mainland settlement centered on a core of about 6 ha at the sheltered south end of the bay but extended up the river valley and onto the surrounding hilltops. Opposite the island, a pair of artificial terraces ran more than 300 m along the base of the headland. Secondary urn and other human burials; dog burials; pottery ovens; kilns for converting *Spondylus* (*S. calcifer*) into lime; clay floors and postholes; the tools, products, and by-products of shell bead manufacture; and abundant other artefacts of shell, stone, bone, pottery, and metal, all point to intense mixed activity of different sorts (Norton et al. 1983), some perhaps related to the functioning of the island.

The Señorío de Salangome, however, was more than the simple union of four settlements implied by the chronicles. The main towns suggest enormous differences in design and function. In addition, many other sites are found by estuaries along the shoreline and through the valleys of the hinterland, and though most may not have had houses with stone walls, some did (Graber 2010). And at Casas Viejas, at the center of the floodplain close to the headwaters of the Río Ayampe, two parallel earth platforms of 80 m are as large as those of Japoto and greatly exceed any structures at Agua Blanca and Puerto López. This territory had a complex internal structure whose dynamics still await definition and explanation.

The Santa Elena Peninsula and Puná Island

The ethnohistoric evidence for Guancavilca territories and Puná Island suggests that the settlements were run by chiefs who each occupied a different position in a sequence of ascending authority (Stothert 2013; Volland 1995). Thus, for Puná Island a paramount leader stood above six lesser chiefs. But though populations could be large, there is little clear idea of settlement plan. The general if not complete absence of stone architecture is one factor in this. On Puná Island, paved ways and stone buildings are mentioned but not described (Estrada 1957a). However, excavation on the mainland at La Libertad and Mar Bravo (Bushnell 1951) have identified types, densities, and combinations of features very similar to those mentioned for Salango and also described for Japoto, suggesting that working and living habits were shared across the territories and governed by similar social conventions. In this context, close interdependency of humans and dogs is indicated not only by the widespread presence of carefully arranged dog burials but also by their frequent close proximity to and even direct association with the human dead.

Cemeteries, Tomb Architecture, and Burial Configuration

Manteño territory was inhabited by the dead as much as by the living. Tomb and burial configuration, burial location, and cemetery structure and location are highly diverse. Human body parts were also deployed in contexts other than dedicated burials. Chronicle accounts, for example, describe how the skins of sacrificed prisoners were cured with aromatic essence of the palo santo tree (*Bursera graveolens*) and then stuffed with ashes before being hung in temples. And Jijón y Caamaño ([1952] 1997) reports a large house at Manta with separate piles of different human bones.

There was then a background of continuing movement of human remains in various and variable states. Nevertheless, though much of their detail probably reflects highly localized tastes and accidents that will forever escape analysis, the tombs and cemeteries were important then and can be usefully read now, as differentially structured points of physical and spiritual connection between community and territory.

Commoner Burials

Secondary burials of single or multiple individuals in large pottery jars are reported through both mainland regions and Puná Island (Bushnell 1951; Delabarde 2015; Estrada 1957a, b, 1962; Graber and Jastremski 2009; Jijón y Caamaño [1952] 1997; Mester 1990; Norton et al. 1983; Saville 1910; Ubelaker 1981, 1988). All age groups are included. They are found within

settlements or in separate cemeteries, singly, in clusters, or in very large numbers. For abundance and ubiquity, as well as the general absence of grave goods beyond a few personal ornaments, they are interpretable as burials of commoners. While the urns usually contain defleshed bones, there may also or instead be cremated remains. Most urns were in simple pits, though at Salango one tomb with multiple urns had a lateral chamber accessed by a short vertical shaft at one end (Graber and Jastremski 2009). While jars used for holding defleshed bones are often identical to cooking and storage jars, comales were used at Salango as lids (Graber and Jastremski 2009; Norton et al. 1983). In the use of cooking jars and plates for the containment of the body, there is another apparent explicit correspondence between humans, in this case the treated corpse, and cooked maize.

At the Ayalán cemetery on the Santa Elena Peninsula (Ubelaker 1981), Manteño pottery goods were associated with burials in large Milagro-Quevedo funerary urns. Similarly, at Providencia in the upper Guayas Basin (Piana and Marotzke 1997), urns stacked Milagro-Quevedo fashion (Meggers 1966; Zevallos 1995) were also accompanied by Manteño vessels. These are interesting specific cases of cultural and social merger in the context of cemeteries either side of the geographic borders of Manteño territory. Meanwhile, at both Ayalán and Agua Blanca (Ubelaker 1981, 1988), urn burials included individuals with asymmetrical flattening of the head, suggesting a further instance of cultural practice linking communities across Manteño landscape.

Another form of secondary burial, often associated with urn burials, involved wrapping the bones in cloth before interment. These bundle burials are equally widespread, if less frequently reported (Bushnell 1951; Delabarde 2015; Piana and Marotzke 1997; Ubelaker 1988). Similar initial treatment of the cadaver, shared burial locations, and similarity of accompanying goods argue for similarity of social status of these dead with those of urn burials. A third treatment for commoners even more rarely recorded, but widely distributed, is found in simple primary burials with no, or minimal, surviving goods (Bushnell 1951, Delabarde 2015; Mester 1990; Piana and Marotzke 1997).

Non-commoner and Elite Burials

Some elaborately endowed Manteño burials were set in pits up to 2 m deep cut into two originally Bahía II period funerary platforms on the summit of Cerro Jaboncillo (Saville 1910), though pit shape and body position are not detailed. The few non-commoner burials described elsewhere for the northern Manteños are found in large bell-shaped pits. An early example came from close to the shell workshop at Los Frailes, where an adult male lying flexed on his side was accompanied by feasting residues, as well as the materials of his trade and bird bone flutes (Mester 1990).

A 4-m-deep middle phase pit at the upper settlement of Puerto López presented the most complex of tomb narratives reported for the Manteño culture as a whole, with six main moments of burial (Currie 2001). Collections of skulls and other bones were first set around the base, to be followed by incomplete and disarticulated remains, and then groups of partially cremated bones and un-cremated bones and skulls. The main burial was of a young female partially cremated on a pyre of *algarrobo* wood (*Prosopis* sp.), though the head had been removed. An adult female guardian lay near the mouth of the tomb and, just outside, an adult male. Close by, 15 dogs were buried in bell-shaped pits, one accompanied by small artefacts and broken pottery similar to those in the fills of the main tomb. At Agua Blanca, tombs up to 6 m deep are found both inside and outside houses of the ceremonial core (Piana and Marotzke 1997). Some had double burials, and guardian burials were an important feature as at Puerto López.

Meanwhile, several elite cemeteries are reported for the Guancavilca region. Overlooked by Cerro Chanduy, next to the estuary of the Río Chanduy, and surrounded by various habitation sites and smaller local cemeteries, Loma de Cangrejitos was the greatest and most complex of Guancavilca ceremonial centers (Marcos 1981; Zevallos 1995). Three extensive burial zones probably represent different phases of use. Close

by, on a modified natural mound, four large square platforms sat around a central plaza, each supporting a wooden structure. Also nearby was a fourth burial zone, Loma de Guasango Torcido, of late Guangala date. For its long history of use as an elite burial ground, this site, though there are significant differences, might be usefully compared with the summit of Cerro Jaboncillo.

The wooden structure of the largest platform consisted of four rows of six posts at regular spaces of less than 2 m. Given that architects were capable of spanning far larger intervals, this arrangement of 24 posts had some purpose other than supporting a roof, perhaps relating to re-creation of a mythical forest. By one post there was an offering of a Muscovy duck (*Cairina moschata*) accompanied by a lapis lazuli necklace. Similarly, in one area of the middle phase cemetery, a truly massive post, its base alone 4 m deep and 60 cm wide, was accompanied by offerings of bowls with carbonized maize to either side and a child, buried with head on a grinding stone, in front (Marcos 1995).

The three Guancavilca zones at Cangrejitos are characterized, respectively, by primary burials in rectangular pits, primary burials in shaft and chamber tombs, and cremation burials in shallow pits cut into an ever-rising mound of bone, ash, earth, and offerings. They present, then, very different approaches to the treatment of the dead and the configuration of the space in which the dead could be accommodated. Notably, the shaft tombs were associated with the massive tall post, which suggests much concern with the vertical axis. Grave goods also varied. In the rectangular tombs, there were *Spondylus* (*S. princeps*) containers for the lime used in coca consumption, metal money axes of probable Milagro-Quevedo manufacture, and tiny *Spondylus* (*S. princeps*) beads in conch (*Malea ringens*) containers, along with pottery bowls holding the stone tools and copper drill handles, used for making the beads. *Spondylus* bead manufacture, then, was here identified and elevated through ritualization, as a specialized craft. The cremation burials, meanwhile, despite all the consequent loss of body form and lack of clear definition of the grave, were accompanied by the most elaborate pottery vessels, including several iconic polished black ware jars and bottles.

Shaft tomb complexes, each with their own variations of tomb design and burial configuration, are then known for various high ridges of the Cordillera Chongón Colonche. On these hills, from which the rivers run south and west to feed the agricultural lands of the Santa Elena Peninsula, the cemeteries were placed as statements of community, family, or lineage rights. At Cerro Bellavista, of 76 tombs aligned north-south on an east-west ridge, 5 were excavated (Holm [1962] 2001; Zevallos 1995). Entrances were marked by pairs of standing stones. The chambers, unlike those of Cangrejitos, were rectangular rather than rounded but like them had doors of wooden stakes. The burials were secondary, in cloth bundles, and goods were few. On Cerro Paco, overlooking a tributary of the Río Daule and the Milagro-Quevedo territory of the lower Guayas Basin, the sole tomb recovered archaeologically contained four adults flexed on their left sides, with elaborate Manteño and Milagro-Quevedo pottery vessels (Estrada 1957a; Zevallos 1995). On Cerro de las Brujas, looking across the Estero Salado to Puná Island, one 9-m-deep tomb contained an elite adult family group (Zevallos 1995). The guardian attendant had a silver plaque in the mouth, and a group of five, probably wives, had shell bead necklaces and four silver earrings in each ear. The principal individual, however, had, folded over the stomach, a narrow skirt of thousands of tiny silver beads such as were described by the Spanish for the Punaés.

Finally, narrow rectangular tombs with adult individuals stacked alternatingly head to toe on top of each other are reported for El Manantial de Guangala (Zevallos 1995) and, in detail, for nearby San Marcos, in the valley of the Río Colonche (Stothert 2013; Stothert and Cruz 2001). Up to nine bodies could be placed in a single pit. Goods, including money axes and other Milagro-Quevedo metalwork, and bird-shaped *Spondylus* spear-thrower hooks, were generally similar to those at Loma de Cangrejitos. Two sets of artefacts, however, were not. First were small polished plaques of iron pyrites, set in copper-silver alloy mounts, worn around the wrist and used in order to

enhance spiritual vision. The importance of vision in ritual contexts is elsewhere suggested by large polished obsidian mirrors (Bushnell 1951; Saville 1910). Second were small wooden tubes carved out of *guasango* (*Loxopterygium huasango*) and used as hallucinogenic snuff inhalers. Central paraphernalia of local ritual practice, these tubes were in the form of mythic figures similar to those on monumental Guancavilca sculptures.

Puná Island has neither shaft and chamber nor bell-shaped tombs. At Pozo Amargo, however, a mixed cemetery included collective tombs of separate burials of different types (Piana and Marotzke 1997). One large multiple pit burial with nine individuals lain out in extended supine position had a central group of five, with one individual and a pair on one side and the principal on the other. This is notably similar in composition, though the goods were of different and of less extravagant order, to the shaft tomb burial of Cerro de las Brujas, on the other side of the straits that separate the island from the mainland. Together these two tombs support ethnohistoric claims not only of polygamy as elite marriage practice but also of simultaneous interment of the entire adult family group upon the death of the head.

Sanctuaries

Parallel with the elite cemeteries, and sometimes combined with them, shrines housing the spirits and the ancestors were maintained in all Manteño regions, anchoring communities to their lands through ties of mythic descent and proclaiming ownership over them. Spread right across 70 km of upland Guancavilca territory, hilltop sites including Cerro Los Santos, Cerro las Negritas, Cerro Camarona, Cerro El Azúcar, and Cerro Paco were guarded by at least 16 recorded stone ancestors, some of monumental size (up to 2.45 m) with their bases sunk into the ground and some at least shown to be seated on small stools, all evidently associated with regeneration and fertility (Álvarez and García 1995; Bushnell 1951; Estrada 1957b). At Cerro Los Santos, tall wooden posts were similarly carved, and the great column at Loma de Cangrejitos may also have been so configured. At Chongón de Colonche, there is a large stone monkey (Bushnell 1951).

The paramount supernatural, however, was the mythical caiman. While its largest sanctuary was at Cerro Jaboncillo, the Guancavilcas and Punaés also venerated this creature. And although the physical presentation, spatial context, and associated ritual were in each site different, the two mainland Manteño regions were centered on places of its worship, permitting speculation that political power in all three regions was closely related to the cult of this being.

Three carved wooden posts of *guasango* were placed at one side of a 40 m diameter floor on the top of Cerro Los Santos (Álvarez and García 1995; Bushnell 1951; Stothert and Cruz 2001; Zevallos 1995). This hill, not far from the tombs of Cerro Bellavista, lay at the heart of the watersheds of the rivers irrigating Guancavilca lands. While two collapsed smaller posts to either side were badly deteriorated, the still-standing 8.5 m central column carried up and around its shaft 32 male and female human ancestors. With them, toward the top, were two caimans, one ascending and larger (2.15 m) and the other descending and smaller (1.35 m). The relation of the caiman cult to human origins is further indicated by the copresence of three large stone ancestor sculptures and its ties with maize by seven massive grinding stones.

On Puná Island, by contrast, a caiman pair was carved across the top of a roughly circular, flattish 3-m-wide rock (Estrada 1957a). The larger animal lay straight across the rock and had a circular basin in its back, feeding a narrow duct which leads to the head. The smaller creature was curved, and perpendicular to the first, but also had a narrow channel cut into the head. Both animals, then, received offerings of blood or chicha. Clearly, at Cerro Los Santos and Puná Island, these were male-female pairs. It seems likely then that the two massive heads on Cerro Jaboncillo were also the two halves of a founder couple.

In parallel, there was a widespread cult of a water spirit. Various Manteño and Milagro-Quevedo artefacts of pottery and copper carry images of a heart-shaped face associated with more natural animals and birds of freshwater habitats (Meggers 1966). At a petroglyph site near

Manteño, Geography and Culture of, Fig. 5 Part of the petroglyph site at Pedro Pablo Gómez. One face and a humming bird beneath it are visible on the vertical rock to the right, with another larger face more indistinct below

Pedro Pablo Gómez, this same face was carved on multiple occasions on the sandstone rocks either side of a waterfall only meters from the source of the Río Ayampe, southern boundary of the territory of Salangome (Figs. 5 and 6). A large part of the rock had first been modified, making its vertical surfaces in particular more regular, giving the formation an overall appearance suggestive of the doorway to a house. Thus the water emerged from the underworld via a portal protected by its guardian spirit.

At Manta, one important sanctuary reputedly housed a large emerald. Inside other buildings, mythic beings took the form of monumental stone sculptures. Three images of a variable but indeterminate composite supernatural with a tall neck and crested head possibly present a marine counterpart to the terrestrial caiman of Cerro Jaboncillo (Saville 1907, 1910). Next, there is a set of ancestors (Figs. 7 and 8). Like the composite being, they are of thin blocks of marine conglomerate. The massive faces and bodies, the gestures, and the carving style are of a tradition quite different to that of the columnar Guancavilca figures. Three of those known show seated or perhaps standing figures, their elbows to the sides and hands forward holding the stomach. Another shows the upper bodies of two individuals locked face to face, one rising over the other, grasping each other's left shoulder with the right hand. A final work has a face similar to those of the others and a small libation pit on a shelf at the back of the head (Fig. 9). While this sculpture, seen from the front, might appear to present a seated human figure, the forward-sweeping profile suggests a different but enigmatic image and perhaps echoes that of another Manta sculpture identified tentatively as a monkey (Saville 1910).

Conclusion

Manteño lords and great chiefs were able, if needed, to mobilize effective armies and could count in normal times on skilled, inventive, and large work forces, as well as the support of subordinate leaders. But late north Manteño political power, embodied in massive stone seats and the

Manteño, Geography and Culture of, Fig. 6 A face (50 cm) carved on a loose boulder at the Pedro Pablo Gómez petroglyph site

Manteño, Geography and Culture of, Fig. 7 Side view of an ancestor figure (1.15 m) from Manta

stone-walled houses that were their formalized settings, attained a scale and a degree of institutionalization not apparent in the other two regions. And, with some oversimplification, we can identify Cerro Jaboncillo and Manta as twin poles of that power. For while one, rising high above sea and land, was the house of the creator caiman, god or spirit of the earth, the other, capital city with its own gods and ancestors, stood by and for the ocean.

This polarity is also suggested by the relation between the hilltop sanctuaries and elite cemeteries of the Guancavilca and their ceremonial center close to the shore at Loma de Cangrejitos. And we can follow the pattern down a descending scale: thus, within the territory of Salangome, Agua Blanca and Puerto López, and then Puerto López itself with its dual settlement, expressed identical ordering. Farming and fishing, the main socioeconomic division of Manteño life, emerging from its natural geography, were codified by its ritual forms.

Balsa raft trade and exchange up and down the coast ran perpendicular to this axis. We have still

Manteño, Geography and Culture of, Fig. 8 Head of an ancestor figure from Manta

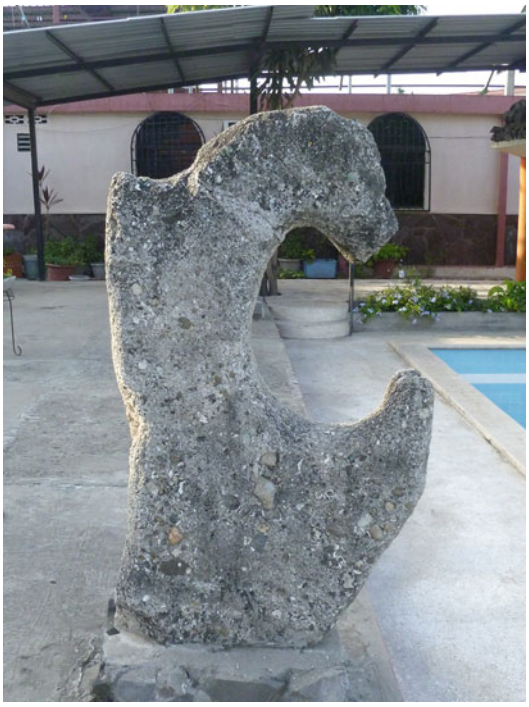

Manteño, Geography and Culture of, Fig. 9 Side view of an enigmatic sculpture (1.45 m) from Manta. A small libation pit sits in the shelf at the back of the head

to estimate properly its economic worth and political significance. Our awareness of it in the first place depends on the manuscript transmission of a single observation of a single craft. The cargo was valuable and the enterprise significant as an aspect of elite capacities and aspirations. And the rafts required specialized knowledge and skills, not least of ritual magic, for their construction, navigation, and success. But like contemporary traders among the Andean chiefdoms to the east, they operated outside normal structures and crossed normal boundaries.

Meanwhile the house, materially, socially, and symbolically, was the fundamental unit of Manteño society. Its importance is at times reflected by building dimensions as great as those of any other contemporary roofed structures on the continent. And Cerro Jaboncillo, ramifying downward from the summit into its multiple complexes, each centered on its own main house and then, via paths across the land first to the surrounding communities and then to those more distant, was a mighty, visible presentation of the primordial house from which all others sprang.

Nevertheless, the specific relations and processes of Manteño power still largely remain to be defined. Over the course of the centuries, there will have been constant adjustments to the mechanisms by which society was organized. And in spite of the sharing of essential aspects of culture and cosmology, the dynamics of political organization will have varied from one region to the other, each with their different territorial holdings, population sizes and densities, and social traditions. Multiple power structures also perhaps operated simultaneously. We should not then try to impose either an essential unitary model for Manteño as a whole or any too simple a scheme for each of the separate regions. On the other hand, Cerro Jaboncillo can be taken as strong evidence for ambition to achieve, through massive

ritual, a wider integration at least of the northern territory, perhaps even with an eye to the south as well. How successful that aim was is another question still to be answered.

Cross-References

► South American Geography and Chronology
► South American Rock Art

References

Álvarez Litben, R., and M. García Caputi. 1995. *El emblema territorial de los Manteño-Huancavilcas en las estribaciones de la Cordillera Chongón Colonche. Revista No. 1*. Guayaquil: Museo Municipal de Guayaquil.

Bouchard, J.-F. 2010. Japoto: Sitio manteño residencial de la costa central de Manabí. *Bulletin de l'Institut Français d'Études Andines* 39 (3): 479–501.

Bushnell, G.H.S. 1951. *The archaeology of the Santa Elena Peninsula in south-west Ecuador*, Occasional publication of the Cambridge University Museum of Archaeology and Ethnology No. 11. Cambridge: Cambridge University Press.

Carter, B. 2011. Spondylus in South American prehistory. In *Spondylus in prehistory: New data and approaches. Contributions to the archaeology of shell technologies*, British archaeological reports international series 2216, ed. F. Infantidis and M. Nikolaidou, 63–89. Oxford: Archaeopress.

Currie, E. 1995. Archaeology, ethnography and exchange along the Ecuadorian coast. *Antiquity* 69: 511–526.

Currie, E. 2001. Manteño ceremony and symbolism: Mortuary practices and ritual activities at López Viejo, Manabí, Ecuador. In *Mortuary practices and ritual associations: Shamanic elements in prehistoric funerary contexts in South America*, British archaeological reports international series 982, ed. J.E. Staller and E.J. Currie, 67–91. Oxford: Archaeopress.

Delabarde, T. 2015. From one burial to another: A sequence of funerary patterns from the Manteño Culture (Integration Period A.D. 800–1535) Site of Japotó, Manabí Province, Ecuador. In *Funerary practices and models in the ancient Andes: The return of the living dead*, ed. P. Eeckhout and L.S. Owens, 210–223. New York: Cambridge University Press.

Estrada, V.E. 1957a. *Los Huancavilcas: Últimas civilizaciones pre-históricas de la costa del Guayas*, Publicación del Museo Víctor Emilio Estrada No. 3. Guayaquil: Museo Víctor Emilio Estrada.

Estrada, V.E. 1957b. *Prehistoria de Manabí*, Publicación del Museo Víctor Emilio Estrada No. 4. Guayaquil: Museo Víctor Emilio Estrada.

Estrada, V.E. 1962. *Arqueología de Manabí Central*, Publicación del Museo Víctor Emilio Estrada No. 7. Guayaquil: Museo Víctor Emilio Estrada.

Graber, Y. 2010. Entre mar y tierra: desarrollo dual de las poblaciones prehispánicas del Manabí meridional, Ecuador. *Bulletin de l'Institut Français d'Études Andines* 39 (3): 603–621.

Graber, Y., and N. Jastremski. 2009. Étude d'une tombe collective de l'époque Manteño (Salango, Equateur) dans son contexte, culturel et funéraire, regional. *Antropo* 18: 9–25. www.didac.ehu.es/antropo.

Holm, O. 1982. La Vivienda Prehistórica. In *Arquitectura Vernácula en el Litoral*, ed. D. Nurnberg, J. Estrada Ycaza, and O. Holm, 245–282. Guayaquil: Archivo Histórico del Guayas and Banco Central del Ecuador.

Guinea, M. 2008. Primer avance acerca del hallazgo de una estructura singular en las excavaciones del sitio de Japotó, Ecuador. *Revista Española de Antropología Americana* 38 (1): 257–264.

Holm, O. [1962] 2001. Cámara Funeraria No. 5 "Bellavista" (Ecuador). In Lanzas Silbadoras y otras contribuciones de Olaf Holm al estudio del pasado del Ecuador, I, ed. K.E. Stothert, 320–340. Guayaquil: Museo Antropológico y de Arte Contemporáneo de Guayaquil, Banco Central del Ecuador.

Hosler, D., H. Lechtman, and O. Holm. 1990. *Axe-monies and their relatives*, Studies in Pre-Columbian art and archaeology 30. Washington, DC: Dumbarton Oaks.

Jijón y Caamaño, J. 1941. *El Ecuador Interandino y Occidental antes de la conquista castellana*. Quito: Editorial Ecuatoriana.

Jijón y Caamaño, J. [1952] 1997. *Antropología Prehispánica del Ecuador*. 2nd edn. Quito: Museo Jacinto y Caamaño.

Lunniss, R. 2011. La Ciudad de los Cerros Jaboncillo y de Hojas: Nuevos Aportes Científicos sobre la Cultura Manteña. Resultados de la Temporada de Investigación Marzo – Diciembre 2010 del Proyecto Arqueológico de la Corporación Ciudad Alfaro. Report prepared for Corporación Ciudad Alfaro: Montecristi.

Lunniss, R. 2012. Informe sobre las Estructuras A19, A18 y A20 de la Zona A, Sector "Camino del Puma" (Ladera Este). In *La sociedad prehispánica manteña en los Cerros Hojas-Jaboncillo*, Boletín Arqueológico No.1, ed. J.G. Marcos, C.I. Veintimilla Bustamante, O. Tobar, R. Lunniss, and M. Suárez Capello, 205–269. Montecristi: Corporación Ciudad Alfaro.

Marcos, J.G. 1981. Informe sobre el Área ceremonial del Complejo Manteño Huancavilca de la Loma de los Cangrejitos Valle de Chanduy, Ecuador (OGSECh4). *Revista Arqueológica* 1 (6): 54–63. Quito: Cromos S.A.

Marcos, J.G. 1995. El manejo del agua en el variado medio ambiente del área Septentrional Andina a partir del tercer milenio a.C. In *Cultura y medioambiente en el área andina septentrional*, ed. M. Guinea, J.-F. Bouchard, and J. Marcos, 129–164. Quito: Ediciones Abya Yala.

Marcos, J.G. 2005. *Los Pueblos Navegantes del Ecuador Prehispánico*. Quito: Ediciones Abya-Yala.

Marcos, J.G. 2012. La Investigación Arqueológica. In *La sociedad prehispánica manteña en los Cerros Hojas-Jaboncillo*, Boletín Arqueológico No.1, ed. J.G. Marcos, C.I. Veintimilla Bustamente, O. Tobar, R. Lunniss, and M. Suárez Capello, 27–47. Montecristi: Corporación Ciudad Alfaro.

Marcos, J.G., C.I. Veintimilla Bustamente, O. Tobar, R. Lunniss, and M. Suárez Capello. 2012. *La sociedad prehispánica manteña en los Cerros Hojas-Jaboncillo*, Boletín Arqueológico No.1. Montecristi: Corporación Ciudad Alfaro.

McEwan, C. 2003. *And the sun sits in his seat: Creating social order in Andean culture.* PhD dissertation, University of Illinois, Urbana-Champaign. Ann Arbor: University Microfilms International.

Meggers, B.J. 1966. *Ecuador*. London: Thames and Hudson.

Mester, A. M. 1990. *The pearl divers of Los Frailes: Archaeological and ethnohistorical explorations of the sumptuary goods trade and cosmology in the North and Central Andes*. PhD dissertation, University of Illinois, Urbana-Champaign. Ann Arbor: University Microfilms International.

Norton, P., R. Lunniss, and N. Nayling. 1983. Excavaciones en Salango, Provincia de Manabí. *Miscelánea Antropológica Ecuatoriana* 3: 9–72. Guayaquil: Museos del Banco Central del Ecuador.

Ortiz Aguilú, J.J. 2012. Informe de la prospección y reconocimiento arqueológico de las áreas de Liguiqui (Cantón Manta) y la Elvira (Cantón Portoviejo). Report prepared for Instituto Nacional de Patrimonio Cultural, Portoviejo.

Piana Bruno, L., and H. Marotzke. 1997. *Unidad Cultural en el Litoral Meridional Ecuatoriano*, 187–238. Guayaquil: Escuela Superior Politécnica del Litoral.

Saville, M. 1907. *The antiquities of Manabí, Ecuador. Preliminary report*. New York: Heye Foundation Contributions to South American Archaeology.

Saville, M. 1910. *The antiquities of Manabí, Ecuador. Final report*. New York: Heye Foundation Contributions to South American Archaeology.

Stothert, K.E. 2006. La cerámica de etiqueta de las *tolas* de Japoto (costa de Ecuador). *Bulletin de l'Institut Français d'Études Andines* 35 (3): 265–283.

Stothert, K.E. 2013. The peoples of the coast of Ecuador accommodate the Inca state. *Ñawpa Pacha* 33 (1): 71–102.

Stothert, K.E., and I. Cruz Cevallos. 2001. Making spiritual contact: Snuff tubes and other mortuary objects from coastal Ecuador. In *Mortuary practices and ritual associations: Shamanic elements in prehistoric funerary contexts in South America*, British archaeological reports international series 982, ed. J.E. Staller and E.J. Currie, 51–66. Oxford: Archaeopress.

Ubelaker, D.H. 1981. *The Ayalán cemetery: A late integration period burial site on the south coast of Ecuador.* Washington, DC: Smithsonian Institution.

Ubelaker, D.H. 1988. A preliminary report of analysis of human remains from Agua Blanca, a prehistoric late integration site from coastal Ecuador. *Journal of the Washington Academy of Sciences* 78 (1): 17–22.

Veintimilla Bustamante, C.I. 2012. El espacio y la prospección. Ruinas de una ciudad prehispánica de los antiguos manteños establecida en los cerros Hojas-Jaboncillo, Manabí central: análisis espacial y jerarquía social. In *La sociedad prehispánica manteña en los Cerros Hojas-Jaboncillo*, Boletín Arqueológico No.1, ed. J.G. Marcos, C.I. Veintimilla Bustamante, O. Tobar, R. Lunniss, and M. Suárez Capello, 51–157. Montecristi: Corporación Ciudad Alfaro.

Volland, M. 1995. Los Punaés. Una Jefatura del Periodo tardío de Integración. *Miscelánea Antropológica Ecuatoriana* 8: 15–27. Guayaquil: Museos del Banco Central del Ecuador.

Zevallos Menéndez, C. 1995. *Nuestras Raíces Guancavilcas*. Guayaquil: Casa de la Cultura Ecuatoriana, Núcleo del Guayas.

Further Reading

Benzoni, G. [1570]2000. *La Historia del Mondo Nuovo: Relatos de su viaje por el Ecuador. 1547–1550*. Trans. C. Radicati di Primeglio. 3rd edn. Guayaquil: Banco Central del Ecuador.

Bohórquez Gerardy, S.J. 2012. *Reconstrucción y Análisis del Proceso Constructivo y de Uso de una Estructura Doméstica Manteña en López Viejo, Costa Sur de Manabí, Ecuador*. In *Unpublished Licenciatura dissertation*. Escuela Superior Politécnica del: Litoral, Guayaquil.

Bouchard, J.-F., F. Fuentes, and T. López. 2006. Aldeas y pueblos prehispánicos en la costa de Manabí: Chirije y Japoto. *Bulletin de l'Institut Français d'Études Andines* 35 (3): 243–256.

Carter, B. 2008. *Technology, society and change: Shell artifact production among the Manteño (800–1532) of Coastal Ecuador.* Unpublished PhD dissertation, Washington University, St. Louis.

Cieza de León [1550] 2005. *Crónica del Perú: El Señorío de los Incas*. Edited by Franklyn Pease. Biblioteca Ayacucho.

Currie, E. 1995. *Prehistory of the Southern Manabí Coast, Ecuador*, British archaeological reports international series, 618. Oxford: Tempus Reparatum.

Delabarde, T. 2006. Una secuencia de patrones funerarios manteños en la provincia de Manabí: primeros resultados de la tola J7, sitio Japoto (Ecuador). *Bulletin de l'Institut Français d'Études Andines* 35 (3): 313–320.

Delgado Espinoza, F. 2009. *Proyecto Cerro Jaboncillo – Cerro de Hojas: Prospección y Excavación Arqueológicas*. Quito: Report prepared for Instituto Nacional de Patrimonio Cultural and Universidad San Francisco de Quito.

Disselhof, H.D. 1949. Grabungen und funde im Canton Sta. Elena (Ecuador). In *El México Antiguo*, vol. II, 343–410. Mexico: Sociedad Alemán Mexicanista.

Dorsey, G.A. 1901. *Archaeological investigations on the island of La* Plata, vol. 2, No. 5. Chicago: Field Museum of Natural History.

Estrada, V.E. 1954. *Ensayo Preliminar sobre Arqueología del Milagro*. Guayaquil: Editorial Cervantes.

Estrada, V.E. 1957. *Últimas Civilizaciones Prehistóricas de la Cuenca del Río Guayas*, Publicación del Museo Víctor Emilio Estrada No. 2. Guayaquil: Museo Víctor Emilio Estrada.

Funes Sánchez, M.A. 1970. Arte Precolombina Ecuatoriano: Las Fusaiolas o Torteras del Litoral. *Cuadernos de Historia y Arqueología* 37: 135–219. Guayaquil: Casa de la Cultura Ecuatoriana, Núcleo del Guayas.

Graber, Y. 2008. Aux origines du Señorío de Salangome: Occupation territoriale préshispanique de la côte sud de Manabí (Équateur). *Les Nouvelles de l'archéologie* 111–112: 59–64.

Guinea, M. 2004. Los Símbolos del Poder o el Poder de los Símbolos. In *Simbolismo y ritual en los Andes septentrionales*, ed. M. Guinea, 9–50. Quito: Abya Yala and Editorial Complutense.

Holm, O. 1982. Cultura Manteña-Huancavilca. In *Lanzas Silbadoras y otras contribuciones de Olaf Holm al estudio del pasado del Ecuador*, ed. K.E. Stothert, vol. I, 251–271. Guayaquil: Museo Antropológico y de Arte Contemporáneo de Guayaquil, Banco Central del Ecuador.

Holm, O. [1963] 2007a. Agujas de Cobre de Manabí, Ecuador. In *Lanzas Silbadoras y otras contribuciones de Olaf Holm al estudio del pasado del Ecuador*, vol. II, ed. K.E. Stothert, 34–42. Guayaquil: Museo Antropológico y de Arte Contemporáneo de Guayaquil, Banco Central del Ecuador.

Holm, O. [1995] 2007b. La metalistería precolombina del Ecuador. In *Lanzas Silbadoras y otras contribuciones de Olaf Holm al estudio del pasado del Ecuador*, vol. II, ed. K.E. Stothert, 21–33. Guayaquil: Museo Antropológico y de Arte Contemporáneo de Guayaquil, Banco Central del Ecuador.

Jijón y Caamaño, J. [1930] 1997.*Una Gran Marea Cultural en el Noroeste de Sudamérica*. 2nd edn. Quito: Museo Jacinto y Caamaño.

López, E. 2009. *Intervención e investigación arqueológica, y puesta en valor de los Solares 1 y 2 de la Manzana 17, Barrio 25 de Diciembre, La Libertad (OGSE-47), Provincia de Santa Elena*. Guayaquil: Report prepared for Instituto Nacional de Patrimonio Cultural.

López, E. 2013. *Evaluación de impacto patrimonial expost y estudio de liberación arqueológica en los Solares 18–19, Manzana 2 del Barrio 25 de Diciembre, Cantón la Libertad: Calle Guayaquil, entre Avenida 1 y 2 (Sitio OGSe-47)*. Guayaquil: Report prepared for Instituto Nacional de Patrimonio Cultural.

López, T. 2008. *Proyecto Arqueológico Cerros de Manabí: Fase 1 Cerro Jaboncillo*. Guayaquil: Report prepared for Instituto Nacional de Patrimonio Cultural.

Lunniss, R. 2007. Manteño. In *Ecuador: el Arte Secreto del Ecuador Precolombino*, ed. D. Klein and Iván Cruz Cevallos, 197–219. Quito: Casa del Alabado & 5 Continents.

Marcos, J.G. 1995. El Mullo y el Pututo: la Articulación de la Ideología y el Tráfico a Larga Distancia. In *Primer Encuentro de Investigadores de la Costa Ecuatoriana en Europa*, ed. A. Álvarez, S.G. Álvarez, C. Fauría, and J.G. Marcos, 97–142. Quito: Ediciones Abya-Yala.

Marcos, J.G. 2012. *La historia prehispánica de los pueblos Manteño Huancavilca del valle de Chanduy*. Quito: Universidad Internacional del Ecuador.

Marcos Pino, J.G., and M. Bazurco Osorio. 2006. Albarradas y camellones en la región costera del antiguo Ecuador. In *Agricultura Ancestral, Camellones y Albarradas: Contexto social, usos y retos del pasado y del presente*, ed. F. Valdez, 93–108. Quito: Ediciones Abya-Yala.

Marcos, J.G., and P. Norton. 1981. Interpretación sobre la Arqueología de la Isla de la Plata. *Miscelánea Antropológica Ecuatoriana* 1: 136–154. Guayaquil: Museos del Banco Central del Ecuador.

Martín Noriega, A. 2010. The domestic economy and its implications for social complexity: Spondylus craft production in coastal Ecuador. *Research in Economic Anthropology* 30: 111–155.

McEwan, C., and F. Delgado. 2008. Late pre-Hispanic polities of coastal Ecuador. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 505–526. New York: Springer.

McEwan, C., and M.I. Silva. 1992. ¿Qué fueron a hacer los Incas en la costa central del Ecuador? In *Proceedings of the 46th International Congress of Americanists*, British archaeological reports, international series 503, 163–185. Oxford: Archaeopress.

Murra, J.V. [1971] 1982. El Tráfico del *Mullu* en la Costa del Pacífico. In *Primer Simposio de Correlaciones Antropológicas Andino-Mesoamericanas. Julio 25–31, Salinas, Ecuador,* eds. J.G. Marcos, and P. Norton, 265–74. Guayaquil: Escuela Superior Politécnica del Litoral.

Norton, P. [1985] 1988. El Señorío de Salangome y la Liga de Mercaderes: El Cartel Spondylus-Balsa. In *La Balsa en la Historia de la Navegación Ecuatoriana*. 2nd edn, ed. J. Estrada, 255–274. Guayaquil: Instituto de Historia Marítima.

Paulsen, A. 1970. *A chronology of Guangala and Libertad Ceramics of the Santa Elena Peninsula in South Coastal Ecuador*. PhD dissertation, Columbia University, New York. Ann Arbor: University Microfilms International.

Sámano, J. de, and F. de Xérex. 1967. Relación (1527–1528). In Las relaciones primitivas de la conquista del Perú, ed. R. Porras Barrenechea. *Cuadernos de Historia del Perú* 2:63–68. Lima.

Sánchez, A., Y. Graber, S. Bohórquez, and F. Mejía. 2003. Proyecto Japoto 2002. Report prepared for Instituto Nacional de Patrimonio Cultural, Guayaquil.

Schávelzon, D. 1981. *Arqueología y arquitectura del Ecuador prehispánico*. Mexico: Universidad Nacional Autónoma de México.
Silva, M.I. 1984. *Pescadores y agricultores de la costa central del Ecuador: un modelo socio-económico de asentamientos precolombinos*. Unpublished MA dissertation, University of Illinois, Urbana Champaign.
Silva, M.I. 1985. Dual Division, Quadripartition and Hierarchical Organization among the Manteño Polities of Late Pre-Columbian Coastal Ecuador. Paper presented at the 45th International Congress of Americanists, Bogota, 1–7 July 1985.
Stothert, K.E. 2001. Manteño. In *Encyclopedia of prehistory. volume 5: Middle America*, ed. P.N. Peregrine and M. Ember, 303–327. New York: Kluwer Academic/Plenum Publishers.
Stothert, K.E. 2010. The Mar Bravo Manteño-Guancavilca Site, Santa Elena Peninsula, Ecuador. Available at http://www.karenstothert.org/mar-bravo.html. Accessed 8 June 2016.
Szaszdi, A. 1978. En torno a la balsa de Salango (Ecuador) que capturó Bartolomeo Ruiz. *Anuario de Estudios Americanos* 35: 453–554.
Topic, J.R. 2013. Exchange on the equatorial frontier: A comparison of Ecuador and Northern Peru. In *Merchants, markets, and exchange in the pre-Columbian world*, ed. K.G. Hirth and J. Pillsbury, 335–360. Washington, DC: Dumbarton Oaks Research Library and Collection.
Touchard, A. 2006. Una casa Manteña puede esconder otra: evaluación preliminar de la tola J6 de Japoto (provincia de Manabí, Ecuador). *Bulletin de l'Institut Français d'Études Andines* 35 (3): 285–298.
Wilbert, J. 1974. *The thread of life: Symbolism of miniature art from Ecuador*. Washington, DC: Dumbarton Oaks, Trustees for Harvard University.
Zevallos Menéndez, C. 2005. *Tecnología y Arte en la Metalurgia Prehispánica en el Ecuador*. Guayaquil: Mundo Gráfico.

Maps, Cartography, and Worldview in the Roman World

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Introduction

In the grave of a military officer, buried around 239 BCE, seven maps drawn in ink on thin pieces of wood were deposited; they represent a small region at a scale of c. 1:300.000 (Yee 1994: 37). Similarly, the grave of a ruler of 168 BCE preserved a map of a larger region, drawn to a scale of c. 1:180.000 and marking plains, mountains, rivers, roads, and places with standardized symbols and names, and another map with a detail of the same region, at a scale c. 1:100.000, marking forts and lines of defense (Bulling 1978; Hsu 1978, 1984). During their lifetimes, the officer and the ruler had both apparently had access to scale maps that were so important to them that they were buried together with their bodies. Literary evidence from the same period also refers to the use of maps. So a historical work from the second/first century BCE relates that in 227 BCE, the son of a ruler ordered a hit man to kill a neighboring dynast. To get close to the victim, the killer pretended to want to offer the dynast a map sent to him as a present by his master – and concealed a dagger in the map roll. The victim survived and founded his own dynasty. When his capital was attacked 20 years later, the soldiers were interested only in the administrative center with its archive and its maps – which ultimately contributed to the formation of a new dynasty that was to last until 9 CE (Watson 1961: 125; Brodersen 2003: 139).

The world to which these artifacts and stories belong is that of ancient China, not of the contemporary Roman World, for which comparable evidence is not transmitted. So, what do we know about Roman cartography as a special form of communicating geographic knowledge and worldview?

Definition

Cartography is a modern term created as a combination of Greek chartês, "chart," and graphein, "write" or "draw," and refers to the study of maps, i.e., two-dimensional representations, often to scale, of portions of the earth's surface.

Historical Background

There is precious little contemporary evidence for Greco-Roman maps. In the modern world,

original texts and graphics can be preserved, transmitted, and accessed for extended periods of time. Like other premodern worlds, however, ancient Rome had only a series of copies to work with, made over the centuries, usually on organic and therefore perishable material. While one could produce multiple copies of texts by copyist teams working from dictation, reproducing graphics was difficult and inevitably led to increasing distortion. Copies of copies of copies must generally have been very different from the vanished original, hence the scarcity of scholarly illustrations transmitted from the ancient world (cf. Stueckelberger 1994; for the Tabula Peutingeriana, see below). When modern atlases present "reconstructed" ancient maps of, for instance, Hecataeus, Herodotus, Eratosthenes, and Ptolemy, they combine data from ancient texts with modern knowledge about the shape of the earth's landmass (cf., e.g., Smith and Grove 1872; Bunbury 1883; Sieglin 1893; Miller 1898, but also Wittke et al. 2009: 4–5.). Such "reconstructions" introduce a host of modern concepts into the ancient data: north is on top, the shape of coastlines for which no ancient descriptions are available is the familiar modern one (e.g., Italy is presented in the shape of a "boot" – a modern idea unknown in the ancient world; cf. Bertrand 1989), and color coding familiar from modern maps is used to mark the continents and the sea.

Some even go beyond "reconstructions" and invent – that is, falsify – maps from the ancient world. Every decade or so, a new "discovery" of such a map is announced: In 1967, "the earliest Greek map to come down to us in any form and the first physical relief map known" (Johnston 1967) on Ionian coins of the fourth century BCE was published but later shown to be no such geographical representation (Dilke 1988: 92). The plan of the Roman settlement at Aguntum "found" in 1976 during excavations (Alzinger 1977) was soon exposed as a practical joke by the excavator's disgruntled students (Brein 1980). In 1987, "one of the few surviving geographical maps of the pre-Augustan period" (Dilke 1987: 207), a piece of sandstone shaped like Gaul – or rather modern-day France – supposedly found near a fort used by Julius Caesar and immediately published in the monumental History of Cartography, was eventually unmasked as a hoax (Brodersen 2003: 134). And "the oldest geographic map ever discovered in Europe" (Gomarasca 2009: 21) on a shard "found" in 2005 and allegedly presenting a "map" of the "heel" of Italy was soon shown to be a hoax intended to embarrass a prominent archaeologist (Yntema 2006). It is probably the desire of modern scholars to find tangible evidence for the existence of maps in the ancient world that has led to embarrassing credulity vis-à-vis such hoaxes and fakes.

Key Issues

To be sure, some Roman plans of small plots of land, drawn to scale, are preserved. Ancient building plans usually apply a very large scale (if not outright 1:1; cf. Haselberger 1994), and it was of course possible to measure existing structures and represent their topographical relationships on a plan. Several such large-scale plans of tombs along the Via Appia are preserved (Heisel 1993); the most spectacular plan of this kind is the so-called Forma Urbis Romae (a modern name), a plan of the center of Rome created around 200 CE, more than a thousand fragments of which survive (cf. the presentation, and bibliography, on http://formaurbis.stanford.edu and Trimble 2007). Apparently, many individual plans were combined to create an impressive display of the topography of the inner city of Rome.

For larger areas little knowledge was available, even to military personnel. Thus, the first century CE author Onasandros, in his book on the good general ("Strategikos" 11.2), states: "The lie of the land in the inhabited world differs widely in its various parts, and it is impossible to foresee in what sort of country a war will occur. Every man is well acquainted only with his own country but not with foreign countries."

Indeed, larger areas could only be surveyed in flat territory with few buildings and without high vegetation, where surveyors' instruments allowed for straight lines and right angles to be plotted on the land itself (Campbell 1996, 2000). Where land

was, as it were, created afresh by floods (as regularly in the Nile Delta), or acquired through colonization or conquest, it could thus be divided and ownership or taxation recorded. Records of such attributions were usually texts which assigned every plot of land (centuria) a unique identifier, by recording its distance from the decumanus and the cardo lines, which formed a rectangular cross at the center of the territory, but could be visualized – as a small bronze plaque from Lacimurga in Spain shows, published in 1990 (Sáez Fernández 1990: 207) – demonstrating that the concept of scale is irrelevant for this type of record (cf. Cuomo 2007: 109). At Arausio (Orange) in France, the local distribution of centuriae was displayed in several large inscriptions, which put the individual plots in their correct topographic position on a plan (not to scale), but also gave their individual locations in the form of texts (*CIL* XII 1244; cf. Piganiol 1962).

Even larger areas, i.e., space that could be traversed on sea or land by soldiers, traders, ambassadors, travellers, or pilgrims, were typically represented by lines following such routes, the periplous and the itinerarium being the regular method of representing these routes as text. Graphic forms of the periplous and the itinerary, on the other hand, are rare. The few extant examples belong to contexts where representation and display were envisaged. A list of stations on the land route from Gades (Cadiz) to Rome adorns four second-century CE silver goblets (*CIL* XI 3281–3284), and soldiers who had served on Hadrian's Wall in Britain presented a list of the names of stations along the wall above a graphic image of a crenellated wall (*AE* 1950, 56 [Amiens], *CIL* VII 1291 = *RIB* II 2, 2415.53 [Rudge], AE 2004, 857 [Staffordshire Moorlands]). Some stations along the Black Sea coast are depicted on a unique circular leather object – perhaps a ceremonial shield – dating to the third century CE and found in Dura Europos (Dura Parchment 9 = *AE* 1925, 123 = Codex Paris suppl. gr. 1354^2 V, cf. Cumont 1926: I 261; Arnaud 1989). While the authenticity, in whole or part, of the first-century CE "Artemidorus papyrus" (Gallazzi et al. 2008), which combines geographic texts, a diagrammatic and apparently unfinished map (it lacks toponyms), and images of animals and human body parts, is still being discussed (cf., e.g., Brodersen and Elsner 2009; Small 2010), the so-called *Tabula Peutingeriana*, an essentially diagrammatic representation, not to scale, of the topographical relationship of stations along routes in the later Roman Empire, combines a route diagram with toponyms and information on distances, as well as graphic elements. The preserved twelfth-century manuscript has been interpreted as a copy of a Roman map of similar appearance (pro: Salway 2005; Talbert 2010; contra: Albu 2005).

For the largest areas covered by maps, the continents of the oikoumenê, or even the entire globe, descriptive geography is of no immediate use; rather, this is the realm of philosophical speculation and reasoning. A scene in Aristophanes' Clouds (vv. 200 ff., originally produced in Athens in 423 BCE) refers to such a description "of the whole earth" in Socrates' school, and three academic philosophers' generations later (via Plato and Aristotle), Theophrastus' will is said to have referred to "tables on which the periodoi of the world are" (Diogenes Laertius 5.51). When the learned orator, politician, and scholar Marcus Tullius Cicero attempted to write his own geographical work, based on such philosophical geography, he exclaimed – "By Hercules, these things are difficult to explain!" (*Letter to Atticus* 2.6.1) – and abandoned the plan.

Current Debates

The current debates focus on the use of maps in the service of the state; newly conquered space was regularly presented in triumphal processions, not by way of maps, but by means of inscriptions listing the conquests or exhibits such as captives, animals, and treasures (Östenberg 2009). We seem to have no clear knowledge of a celebrated artifact often used to demonstrate the "power of images" in the pivotal time of the Roman emperor Augustus: the so-called map of Agrippa. In his influential

study of *The Power of Images in the Age of Augustus*, Paul Zanker writes:

> Those with time on their hands could also contemplate the map of the world which was commissioned by Agrippa and later transferred to the Porticus Vipsaniae. It was intended to give the Roman people an idea of "their" empire and heighten their awareness of being *princeps terrarum populus* (Livy, Praef.). We need only think of the impressive marble plan of the Imperium Romanum which Mussolini had placed on the ancient ruins along the Via dell Impero. (Zanker 1988: 143)

Agrippa, Augustus' right-hand man, is often credited with a "map of the world" displayed in the center of Rome. Unlike the five maps, Mussolini had engraved in 1936 on large marble plates to show the growth of the Roman Empire and the recent Italian conquest of Ethiopia (the latter map has since been removed); nothing remains of Agrippa's "map" (cf. Arnaud 2007/08). There is no evidence for its physical appearance, forcing scholars to speculate about its shape (cf. the survey of conflicting scholarly opinions by Brodersen in Dueck 2012: 108–109); the texts referring to the object do not even contradict the assumption that what Agrippa presented was merely an inscription offering some geographical detail (Brodersen 2003: 273). After all, Augustus' conquest of the Alps was celebrated by a great inscription in modern-day La Turbie (*CIL* V 7817; cf. Pliny, *HN* 3.136), as was the conquest of Lycia in 43 CE – not with a map but with a monumental inscription listing stations in the new province (Sahin and Adak 2007).

Future Directions

The last two decades have seen intensive international research on cartography, mapping, and worldview in the classical Roman period (cf. Talbert 2012, 2017). More needs to be done on the changes in the perception and the representation of space which late antiquity witnessed. Do late antique texts that suggest a change in the "worldview" suggest that maps begin to play a more tangible use? When the orator Eumenius, in a panegyric of 297 CE, combines his vision of a reemerging Roman Empire with that of a rebuilt school at Autun which will present a visual presentation of the Roman world (*XII Panegyrici Latini* 9 (4), 20), is this a continuation of previous thought or a new beginning? When Gaius Iulius Solinus, who probably wrote in the same age, adapts Pliny's geographical books for his *Collectanea rerum mirabilium* (collection of miraculous things), does he envisage a readership of his text which can visualize the world in a maplike fashion (Brodersen 2011)? Does a presumed "original" of the Tabula Peutingeriana date to late antiquity (Rathmann 2012; contra Talbert 2010; Rathmann 2016)? And, most importantly, is the late antique reorganization of the Roman Empire the consequence not only of new genres of geographical representation in maps but also a new Roman worldview – or did it generate such changes in perception and representation of space?

Cross-References

- ▶ Architecture, Roman
- ▶ Centuriation and Roman Land Surveying (Republic Through Empire)
- ▶ Epigraphy, Imperial Latin
- ▶ Epigraphy, Latin: Early Through Late Republican
- ▶ Infrastructure in the Roman World: Roads and Aqueducts
- ▶ Urban Planning, Roman

References

Albu, E. 2005. Imperial geography and the medieval Peutinger Map. *Imago Mundi* 57: 36–148.

Alzinger, W. 1977. Ein Stadtplanfund in Aguntum. *Antike Welt* 8 (2): 37–41.

Arnaud, P. 1989. Une deuxième lecture de bouclier de Doura-Europos. *CRAI* 1989: 373–389.

Arnaud, P. 2007/08. Texte et carte de Marcus Agrippa: historiographie et données textuelles. *Geographia Antiqua* 16–17: 73–126.

Bertrand, J.-M. 1989. De l'emploi des métaphores descriptives par les géographes de l'antiquité. *Dialogues d'histoire ancienne* 15 (1): 63–73.

M

Brein, F. 1980. Das Aguntiner Kuckucksei. *Romisches Osterreich* 8: 5–26.

Brodersen, K. 2003. *Terra Cognita: Studien zur romischen Raumerfassung*. 2nd ed. Hildesheim/New York: Georg Olms Verlag.

Brodersen, K. 2011. Mapping Pliny's world: The achievement of Solinus. *Bulletin of the Institute of Classical Studies (London)* 54 (1): 63–88.

Brodersen, K., and J. Elsner, eds. 2009. *Images and texts on the "Artemidorus Papyrus": Working papers on P. Artemid. (St John's College Oxford, 2008) (Historia Einzelschriften 124)*. Stuttgart: Franz Steiner Verlag.

Bulling, A.G. 1978. Ancient Chinese maps: Two maps discovered in a Han dynasty tomb from the second century B.C. *Expedition* 20 (2): 16–25.

Bunbury, E.H. 1883. *A history of ancient geography*, 2nd edn. New York.

Campbell, B. 1996. Shaping the rural environment: Surveyors in ancient Rome. *Journal of Roman Studies* 86: 74–99.

Campbell, B. 2000. *The works of the Roman land surveyors (Journal of Roman Studies Monograph 9)*. London: Society for the Promotion of Roman Studies. (repr. 2008).

Cumont, F. 1926. *Fouilles de Doura-Europos (1922–1923)*. Vol. I–II. Paris: P. Geuthner.

Cuomo, S. 2007. *Technology and culture in Greek and roman antiquity*. Cambridge: Cambridge University Press.

Dilke, O.A.W. 1987. Maps in the service of the state. In *The history of cartography, volume I: Cartography in prehistoric, ancient and medieval Europe and the Mediterranean*, ed. J.B. Harley and D. Woodward, 201–211. Chicago: University of Chicago Press.

Dilke, O.A.W. 1988. Table ronde on Graeco-Roman cartography (Paris 1987). *Journal of Roman Archaeology* 1: 89–94.

Dueck, D. 2012. *Geography in classical antiquity (key themes in ancient history)*. Cambridge: Cambridge University Press.

Gallazzi, C., et al., eds. 2008. *Il papiro di Artemidoro*. Vol. 1–2. Milan: Milano LED/Ed. Univ. di Lettere Economia Diritto.

Gomarasca, M.A. 2009. *Basics of geomatics*. Dordrecht: Springer.

Haselberger, L. 1994. Antike Bauzeichnung des Pantheon entdeckt. *Antike Welt* 25: 323–339.

Heisel, J.P. 1993. *Antike Bauzeichnungen*. Darmstadt: Wissenschaftliche Buchgesellschaft.

Hsu, M.-L. 1978. The Han maps and early Chinese cartography. *Annals of the Association of American Geographers* 68: 45–60.

Hsu, M.-L. 1984. Early Chinese cartography: Its mathematical and surveying backgrounds. In *Technical papers of the 44th meeting of the American congress on surveying and mapping (1984)*, 128–138. Washington, DC: The Congress.

Johnston, A.E.M. 1967. The earliest preserved Greek map. *Journal of Hellenic Studies* 87: 265–284.

Miller, K. 1898. *Mappaemundi VI: Rekonstruierte Karten*. Stuttgart: J. Roth.

Östenberg, I. 2009. *Staging the world. Spoils, captives and representations in the Roman triumphal procession*. Oxford: Oxford University Press.

Piganiol, A. 1962. *Les Documents cadastraux de la colonie romaine d'Orange*. Paris: Centre national de la recherche scientifique; renseignements et vente au Comité technique de la recherche archéologique en France.

Rathmann, M. 2012. The Tabula Peutingeriana in the mirror of ancient cartography. In *Vermessung der Oikumene – Mapping the Oecumene*, ed. K. Geus and M. Rathmann, 203–222. Berlin/New York: De Gruyter.

Rathmann, M. 2016. *Tabula Peutingeriana. Die einzige Weltkarte aus der Antike*. Darmstadt: Zabern.

Sáez Fernández, P. 1990. Estudio sobre una inscripción catastral colindante con Lacimurga. *Habis* 21: 205–227.

Sahin, S., and M. Adak. 2007. *Stadiasmus Patarensis (Gephyra Monogr. 1)*. Istanbul: Ege Yayınları.

Salway, B. 2005. The nature and genesis of the Peutinger map. *Imago Mundi* 57: 119–135.

Sieglin, W. 1893. *Atlas Antiquus*. Gotha: Perthes.

Small, Jocelyn Penny. 2010. Maps within texts: The Artemidorus Papyrus. *Quaderni di Storia* 71: 51–76.

Smith, W., and G. Grove. 1872. *An atlas of ancient geography biblical and classical*. London: John Murray.

Stueckelberger, A. 1994. *Bild und Wort: das illustrierte Fachbuch in der antiken Naturwissenschaft, Medizin und Technik*. Mainz: P. von Zabern.

Talbert, R.J.A. 2010. *Rome's world: The Peutinger map reconsidered*. Cambridge: Cambridge University Press. Available at: http://www.cambridge.org/us/talbert/.

Talbert, R.J.A. 2012. Maps. In *Oxford bibliographies online: classics*, ed. D. Clayman. Available at: http://www.oxfordbibliographies.com/.

Talbert, R.J.A. 2017. *Roman portable sundials. The empire in your hand*. New York: Oxford University Press.

Trimble, J. 2007. Visibility and viewing on the Severan marble plan. In *Severan culture*, ed. S. Swain, S. Harrison, and J. Elsner, 368–384. Cambridge: Cambridge University Press.

Watson, B. 1961. *Records of the grand historian of China: Translated from the 'Shih Chi' of Ssu–Ma Ch'ien, volume I*. New York/London: Columbia University Press.

Wittke, A.-M., et al. 2009. *Historical atlas of the ancient world (Brill's New Pauly Suppl. 3)*. Leiden: Brill.

Yee, C.D.K. 1994. Reinterpreting traditional Chinese geographical maps. In *The history of cartography, volume 2.2: Cartography in the traditional east and southeast Asian societies*, ed. J.B. Harley and D. Woodward, 35–70. Chicago/London: University of Chicago Press.

Yntema, D.G. 2006. Ontdekking 'oudste kaart' een grap? *Geschiedenis Magazine* 41: 5.

Zanker, P. 1988. *The power of images in the age of Augustus*. Ann Arbor: University of Michigan Press.

March, Ramiro

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Basic Biographical Information

Ramiro Javier March was born in La Plata, Argentina, in 1961. He graduated as an anthropological sciences teacher (1986) and then as a college graduate in anthropological sciences (1988) from the University of Buenos Aires (UBA). His career as a research fellow at the UBA was from 1985 to 1987, after which he was appointed to the National Council of Scientific and Technical Research (CONICET) of Argentina, from 1987 to 1989. Between 1985 and 1987, he was the representative of the young research fellows and contributed to the creation of the UBA Research Fellows' statutes. Between 1987 and 1990, he taught anthropology at the UBA.

In 1989, he joined the Archaeological Research Unit 275 Ethnologie Préhistorique of the French CNRS in Paris. He received his PhD in prehistory from the University of Paris 1, Pantheon-Sorbonne, in 1995. Since 1997, he has been a researcher at the CNRS in Unit 6566 CREAAH and a member of the Scientific Council of the "GIP-GIS Institut des Ameriques" of Rennes.

Between 2000 and 2014, Ramiro Javier March lectured on physical-chemical methods applied to the study of combustion structures, epistemology and archaeological theory, and the anthropology of hunter-gatherers at Rennes University 1 (UR1), France. From 2006, he lectured on the prehistory of South America, heritage, Indigenous studies and archaeology, anthropology, and alterity at Rennes University 2. Between 2008 and 2011, he was in charge of a seminar in the UBA on field work, archaeometry, and the study of hunter-gatherer societies. In 2012, he created the international and transdisciplinary PREFALC Master: South American Archaeology: Theory, Methodology and Practice (South American Societies, Modelling, Experimentation and Analytical Techniques) taught at UR1 (France) and at the National University of Trujillo (Peru) which is the first of its type both in France and in South America, and it is also the Master of Excellence for the Consejo National de Ciencia, Tecnología e Innovación Tecnología (CONCYTEC) in Peru. From 2008 to 2016, he designed and was responsible for the project that gave rise to the creation of the Latin American Archaeometry Laboratory – National Institute for Dating and Archaeometry (InDyA). This laboratory is unique for its theoretical and methodological approach, as well as for the characteristics of its analytical and experimental infrastructure in South America.

Major Accomplishments

Ramiro Javier March developed a transdisciplinary methodological approach to research into the history of fire through the study of combustion structures, by combining analytical techniques, experimental simulations, and modeling. His works laid the foundations for understanding the processes of formation and transformation of combustion structures in various cultural contexts from the Lower Paleolithic to state societies. His scientific contributions can be contrasted to the classic studies that applied descriptive methodologies to the elaboration of typologies (see March et al. 2012).

Ramiro March has been responsible and has participated in numerous research projects supported by National Geographic, CONICET, ECOS-SUD, FEDER programs, CNRS, and MAE (France & National Science Foundation) on a wide range of the social history of thermal energy control and its applications in the world. His research has contributed to the emergence of a specialization in archaeology devoted to that issue. He was responsible for and/or the organizer of two international colloquiums on this topic: in 1996, in Forli (Italy), "The study of human behaviour in relation to fire in Archaeology, new data and methods for understanding prehistoric fire structures" and in 2000, in Bourg-en-Bresse (France), "Le feu domestique et ses structures au Néolithique et aux Âges des Métaux."

Ramiro March is a pioneer in the application of organic chemistry to the study of sediments in archaeology, demonstrating the possibility of preserving lipids in hearths and creating mathematical simulations to study the use of fire. He developed an original method to determine the mode of operation and the minimum time of hearths use that allows the reconstitution of archaeological combustion structures in 3D (March et al. 1989, 2010; March and Ferreri 1989). These works have also been referenced in various areas of applied engineering (Muhieddine et al. 2011).

In Tierra del Fuego (Argentina), his work at Tunel-1 and Shumakush-X contributed to the study of the Beagle Channel annual cycle of hunter-gatherers and to the understanding of shell deposit formation and transformation processes. This allowed to differentiate the living spaces from the residues evacuation and deposition spaces and to refine the reading of their social organization and seasonal strategies (March 1999). In the Menez-Dregan sites of the European Lower Paleolithic, he contributed to the understanding of the first steps of the use of fire. In Middle Paleolithic contexts (Cova del Salt, Spain), he worked on the formation processes of the hearths and organic matter contained in sediments analyzing the social structuring of the space, and detecting also the first evidences of human fecal matter in anthropized sediments (El Salt).

In the final Upper Paleolithic Pincevent site (France), he generated tools to understand the functionality and social management of the space and the inhabitants' lifestyles, specifying the duration of their campsites and the strategy used within their annual cycle. These works contributed to the epistemological and methodological debates of Lewis Binford and Andre Leroi Gourhan in the 1970s concerning the interpretation of archaeological contexts and the possibilities of reconstructing the social behavior, as March combined both approaches in his study of fire (March and Lucquin 2007). His innovations in research of the stones of the Magdalenian sites of the valley of Paris established criteria to detect the emergence of different cooking techniques, such as "stone boiling" or direct cooking on hot stones.

In Natufian (Mallaha-Eynan) contexts, Ramiro March studied the formal changes of combustion structures related to sedentarization. This was a first critical study for the interpretation systems about the origin of organic matter in soils and hearths, using different models for the interpretation of lipids (March 2014). He highlighted the anthropic and natural formation processes of molecular associations and the molecular isotopic values interpreted as stable. He also has conducted studies on more recent periods including the Neolithic societies (Lillemer and Carnac sites) and the Bronze and Iron Age societies in Europe as well as the Moche (Huaca de La Luna) and Inka

March, Ramiro, Fig. 1 Dr. Ramiro March in 1988 doing controlled experiments with fireplaces at the site Túnel in Tierra del Fuego

(Pachacamac) societies in Peru. He has recently started working on the role of fire in the early settlement of the American continent in the Quebrada in Mani Chile (Fig. 1).

Cross-References

- ▶ Behavioral Archaeology
- ▶ Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)
- ▶ Binford, Lewis R. (Theory)
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ France: Field Method Origins
- ▶ Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology
- ▶ Human Evolution: Use of Fire
- ▶ Latin American Social Archaeology
- ▶ Leroi-Gourhan, André
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Middle-Range Theory in Archaeology
- ▶ Organic Residue Analysis in Archaeology
- ▶ Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Site Formation Processes
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology

References

March, R.J. 1999. Chimie organique appliquée à l'étude des structures de combustion du site de Túnel I. *Revue d'archéometrie* 23.

March, R.J.. 2014. Searching for the functions of fire structures in Eynan (Mallaha) and their formation processes: A geochemical approach. In *Natufian foragers in the Levant: Terminal Pleistocene social changes in Western Asia. International monographs in prehistory*, ed. Ofer Bar-Yosef and R. François, 227–292. Valla Archaeological Series 19. Ann Arbor. Chapter 17.

March, R.J., and J.C. Ferreri. 1989. Sobre el estudio de estructuras de combustión arquelógicas mediante replicaciones y modelos numéricos. In *Nature et Fonction des foyers préhistoriques*, ed. M. Olive and Y. Taborin, 59–69. Actes du colloque international de Nemours (1987), Nemours, Ed. APRAIF.

March, R.J., and A. Lucquin. 2007. Les activités réalisées en lien avec l'utilisation du feu et l'analyse des comportements dans l'espace: modalités fonctionnelles, modalités saisonnières. In *Actes XXVIIe Rencontres Internationales d'archéologie et d'histoire D'Antibes, Les Civilisations du renne de hier et d'aujourd'hui Antibes Juan-les-Pins 19–21 Octobre 2006*, ed. S. Beyries and V. Vatte, 421–438. CEPAM Ed.

March, R.J., A. Baldessari, and E.G. Gros. 1989. Determinación de compuestos orgánicos en estructuras de combustión arqueológicas. In *Nature et Fonction des foyers préhistoriques*, ed. M. Olive and Y. Taborin, 47–59. Actes du colloque international de Nemours (1987), Nemours, Ed. APRAIF.

March, R.J., M. Muhieddine, and E. Canot. 2010. Simulation 3D des structures de combustion préhistoriques. In *Actes du colloque Virtual Retrospect 2009 Session 1, Archéovision, Ed. Ausonius*, n 4, 29–39.

March, R., A. Lucquin, D. Joly, J.C. Ferreri, and M. Muhieddine. 2012. Processes of formation and alteration of archaeological fire structures: Views on complexity based on experimental approaches. *Journal of Archaeological Method and Theory* 47. https://doi.org/10.1007/s10816-012-9134-7.

Muhieddine, M., E. Canot, R. March, and R. Delannay. 2011. Coupling heat conduction and water−steam flow in a saturated porous medium. *International Journal for Numerical Methods in Engineering* 85 (11): 1390–1414.

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Marcos, Jorge G.

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Basic Biographical Information

Jorge G. Marcos was born in Guayaquil, Ecuador, on June 25, 1932, the elder of two children of banker Jorge Marcos Ycaza and Dolores Pino Ycaza. Archaeology had a presence from the very beginning within his family context, as his uncle Antonio Pino inherited a small collection of artifacts from Jorge's maternal grandfather, José Gabriel Pino who accompanied the great German

archaeologist Max Uhle while exploring Puná Island off Guayaquil. Doña Dolores, Jorge Marcos' mother, provided an ambiance for reading traditional literature that included themes on legends and indigenous traditions written by Gabriel Pino Roca her father.

In high school, Marcos was a history student of Francisco Huerta Rendón, one of the founding fathers of modern archaeology in Ecuador and one of the initial contributors to the archaeology of Manabí region. Rendón would encourage Jorge by identifying and discussing certain artifacts from his family's antiquities cabinet, such as spindle whorls as well as their cultural affiliations.

During his early years, Marcos took drawing and art classes with German fauvist and impressionist artist Hans Michaelson (1872–1954) in Guayaquil, who had escaped the Nazis and fled to Ecuador. Afterwards, in 1944, Marcos continued polishing his artistic skills in Quito with North American artist Lloyd William Wulff (1913–1965). His art education continued throughout his high school years as he was enrolled in courses at the prestigious Arts Students League in New York, an institution that could boast among its faculty members the likes of Georgia O'Keefe, George Bellows, and Jackson Pollock. These skills, which are notable, came to play a very significant role in Marcos' eventual contribution to his future analyses of the Valdivia ceramics' stylistic sequences, which today stand as a classic to be emulated (Marcos 1986, 1988; Marcos and Michzynski 1996).

Soon after his high school graduation in 1951, Jorge Marcos was sent to a Chauncey Hall school in Boston in order to go through college preparatory courses prior to his admittance to either the Massachusetts Institute of Technology (MIT) or Harvard, both to which he had been accepted. While in Boston, he made contact with an old friend of the family, Federico Stagg Caamaño, then a research fellow and assistant to the then very famous physical anthropologist Dr. Earnest Hooton at the Harvard Peabody Museum. Marcos met Hooton as well as another future luminary of American archaeology, Gordon Willey, both stimulating his longtime interest in archaeology.

Marcos eventually decided on Harvard, but in order to satisfy his family pressures, enrolled in English Literature rather than Anthropology. He did however keep close contact throughout with Hooton and Willey.

In 1955 he received his B.A. degree, returned to Guayaquil, and began working in the offices of "Plantaciones Ecuatorianas," the owner of several banana plantations in the area of Balao Chico, SE, of Guayaquil. Three years later, in 1958, he set up with a partner a company named "Alumar," a Venetian blind window factory. That same year, he married Eulalia Merino Valdivieso.

Marcos spent most of the next 12 years working in the private sector, until 1971, when he decided to go into a professional career in archaeology. He earned his Ph.D. in 1978 under the directorship of Donald W. Lathrap at the University of Illinois and returned to Ecuador to work for a while in the Museum of the Banco Central in Guayaquil. In 1980 he was invited by the chancellor of the Escuela Politécnica del Litoral (ESPOL), the foremost engineering and hard sciences university in Ecuador, to create a research and teaching program in archaeology.

During the next decade, Marcos carried out multiple research projects, while teaching and directing archaeology theses. In 1985 he married Dr. Silvia Alvarez-Litben, a social anthropologist from Mar del Plata, Argentina.

From 2010, Jorge Marcos was wearing two major hats, the first one as the director of the country's largest archaeological research project, the Cerro de Hojas-Jaboncillo Project in Manabí based in Ciudad Alfaro, Montecristi. This was a multidisciplinary investigation of an archaeological area of approximately 35 km^2 of hundreds of terraces, living structures, hydraulic terrain modifications, storage bins, and ceremonial structures on platforms that date to the Manteño period (c. 800–1500 CE) that could be the political and social center to what Marcos has proposed is the Manteño "incipient state." Marcos' second hat was as professor emeritus at ESPOL and director of the M.A. program in ethnoarchaeology and geoarchaeology of the neotropics at the same

institution. This is the only program of its kind in the country and the continent.

Jorge Marcos was awarded the Ecuadorian National Order of Merit in 2002, and in 2003, he received the National Prize of Culture Eugenio Espejo for scientific research, the country's highest honor. In 2005 he was inducted into the National Academy of History of Ecuador.

Major Accomplishments

Marcos' first archaeological field trip occurred in June of 1967 when he joined a group of friends who had been students in one of Carlos Zevallos Menendez's courses about archaeology that were then given at the Casa de la Cultura Ecuatoriana in Guayaquil. The plan was to survey the piedmont and lower slopes of the Chanduy Hill as well as different areas of the Chanduy Valley, roughly 90 km west-southwest from Guayaquil on the Ecuadorian coastal plain.

One of the sites discovered was "La Loma de los Cangrejitos" in the Chanduy Valley where they found an early eleventh-century CE Manteño cemetery, as well as what proved to be a sociopolitical center for the same period.

The professional association with archaeologist Carlos Zevallos Menéndez proved to be a very influential one for Marcos, which lasted until Zevallos' death in 1981. In 1969 work began with Zevallos Menéndez at a new archaeological site named "La Loma del Guasango Torcido" finding a Late Guangala cemetery (c. 750–800 CE). In 1970 Marcos attended the International Congress of Americanists held in Lima, where he presented the preliminary results of the work at Guasango Torcido. Marcos' participation would prove to be a life-changing experience for him.

The ensuing dialogue and discussions at the Lima Congress which included John V. Murra, Carlos Zevallos, Alberto Rex Gonzalez, and Donald W. Lathrap as well as Jorge Marcos touched on two major topics in Americanist archaeology: the nature of the Ecuadorian Formative and the character of Andean-Mesoamerican correlations. The strategic location of the Ecuadorian coast, from the perspective of these problems, and the provocative ideas brought to the table by the Ecuadorean delegation culminated in another macroregional meeting in Salinas, Ecuador, in July 1971. It was at Salinas that Carlos Zevallos presented his paper on the origins of maize agriculture in Ecuador, which he suggested took place during the initial Valdivia sequence. It was also at Salinas that Jorge Marcos accepted Donald Lathrap's invitation to join the Anthropology Department at the University of Illinois to pursue his Ph.D. degree (Marcos 2012: 9).

As was to be expected, at UI, Jorge Marcos came under the direct influence of Donald Lathrap, who was, to many of us, the world's leading authority on the archaeology of the American tropics. Lathrap's insistence on the simultaneous use of ethnohistorical, archaeological, ethnological, and ethnoarchaeological lines of evidence was pervasive in all his courses and was echoed by other true scholars at Illinois at the time such as Gary S. Vescelius, one of the foremost experts on Andean prehistory and mathematical applications to archaeological problems, such as chronology, modeling, typology, and planimetry. This is evident in the later work of Marcos who, besides archaeology, has produced results along all these lines all during his career. An exemplary manifestation of such interdisciplinary and multidisciplinary approach can be seen in his pioneering study of pre-Columbian hydraulic engineering in his *Las Albarradas en la Costa del Ecuador* (2004), in which he directed a complex team of specialists in the investigation of ancient water systems' management and construction. This work raised the level of modern archaeological work not only in Ecuador but in all of the Americas.

Marcos' analyses of the Valdivia sequence, stemming from his doctoral dissertation work at the Real Alto site, as well as from other related sites, clarified the many controversial issues dealing with chronology and stylistics. Marcos' superbly trained eye for design and composition, blended perfectly with Lathrap's inspired approach to ceramic analysis in which the idea

was to get to the ceramist's original concepts when constructing the vase, produced the best and currently unsurpassed description of the complete Valdivian sequence.

The work at Real Alto proved to be a forging ground for exemplary archaeological work, as Donald Lathrap encouraged other students to follow Jorge Marcos' (1978) lead and Deborah Pearsall (1979), James Zeidler (1984), and Emily Lundberg (1989), among others, all finished dissertations based on work at Real Alto itself or using approaches developed and applied there. This made Real Alto one of the best and most systematically studied sites in a tropical setting outside of Yucatan and catapulted Ecuadorean coastal Archaeology during the next two decades from being a bibliographic note to being the main table of discussion on critical topics such as the origins of maize cultivation in the tropics, antiquity of ceramics (early Valdivia), and the beginnings of urbanism in the Americas.

In 1978 Marcos returned to Guayaquil and directed the research directorate of the Anthropological Museum of the Banco Central in Guayaquil, where he was instrumental in museum planning and setting up research laboratories. Between 1979 and 1980, he joined forces with longtime friend Presley Norton and obtained a grant from Earthwatch Foundation to work in Isla de la Plata and Salango, two critical sites for the present-day understanding of the Manteño society and their role in long-distance trade between 800 and 1500 CE.

In 1980 Jorge Marcos and Gustavo Galindo, chancellor of ESPOL, created the "Center for Archaeological and Anthropological Studies" (CEEA) attached to the Escuela Superior Politécnica del Litoral (ESPOL) in Guayaquil. With it came the creation of the first Licenciatura degree specifically in archaeology on the continent. The Licenciatura in archaeology (more advanced than the B.A. degree common to Anglo-American universities) produced a generation of class-, field-, and lab-trained archaeologists that took on its shoulders the discipline in Ecuador until the 2000s.

Marcos entered formally into the field of heritage management with his very significant contribution in the organization of the New World Congress of Rescue Archaeology in 1981 in Quito, with financial backing from the OAS and the Banco Central del Ecuador. The papers in this conference reflected concerns that were being voiced in different circles and in many ways anticipated the critically important WAC 1 (World Archaeology Congress) held in Southampton 5 years later in 1986. By this time, the theme of the social responsibility of archaeologists was a very heated topic, and this congress provided a forum where the issues of development, heritage, colonialism, social identity, and archaeology were debated.

In 1983 Marcos was appointed deputy regional director for the National Institute of Cultural Heritage and, following an agreement signed with the ESPOL, implemented the management of the Center for Anthropology and Archaeology (at ESPOL) to form new generations of archaeologists and anthropologists.

In 1984 Jorge Marcos and Presley Norton joined Giancarlo Ligabue in organizing the Ecuadorian Archaeology Exhibit entitled "Treasures from the Land of Atahualpa" at the Palazzo Grassi in Venice for which Marcos wrote "A Brief History of Ancient Ecuador" as the exhibit catalogue.

In the spring of 1985, Jorge was an invited professor at the "Max Uhle" Volkswagen Foundation Chair at the University of Bonn. At the time, he also spent 2 months as guest of the German Archaeological Institute in Bonn, together with Alberto Rex Gonzalez from Argentina and Walter Alva Alava from the Bruning Museum, Chiclayo, Peru, who was then studying (with Michael Tellenbach) the site where the "Lord of Sipan" burial was later found by Alva.

In 1991 Drs. Marcos from ESPOL, Aurelio Álvarez Perez from Universidad Autónoma de Barcelona, and Giorgio Spinolo from the Universita degli studi di Milano were awarded a 3-year European Union Delegation XII Archaeological Research Grant, to study and date Valdivia ceramics from Ecuador. Marcos alternated between the Universidad Autónoma de Barcelona

and the Universidad Complutense de Madrid as an invited scholar until 1998.

That same year, he left for Washington to spend a year as a senior fellow at Dumbarton Oaks, Trustees for Harvard University. During that time, Marcos applied and was awarded a 3-year research grant by GEF-World Bank to study the ancient water detention ponds called "albarradas" in Ecuador (2000–2004).

In 2004 Marcos together with Gustavo Politis and Alfonso González Ruibal initiated collaboration for the creation of a master's program in ethnoarchaeology and geoarchaeology at ESPOL, in Guayaquil.

In 2008 he again presided, together with Dr. Silvia Alvarez Litben, the Second New World Conference on Rescue Archaeology in Guayaquil, where an in-depth discussion and analysis of social archaeology produced new contributions to the theoretical framework and its articulation with present-day social concerns in Archaeology in Ecuador. Between 2007 and 2009, he was Undersecretary of Heritage and Culture. In addition, he advised and occupied different positions in the upper levels of the governmental structure and was involved in policy decisions, as well as strategies for research and conservation programs.

In 2009 Marcos was asked to develop a major research project around the Picoazá area in Manabí Province in western Ecuador. The idea was to pursue the implications of Marshall Saville's turn of the twentieth-century discoveries in and around Cerro Jaboncillo and Cerro de Hojas, a 35 km^2 massif that has evidence of more than 1,200 pre-Columbian structures pertaining to the Manteño period. It is also the area which has produced the largest amount of U-shaped stone chairs. These artifacts, which are unique in the world, come from a Manteño context and imply a highly important social and political function to the whole region.

In February 2009, he moved to Manabí Province where he began to organize the archaeological project for Cerro de Jaboncillo-Hojas. In a bold, if characteristic, working hypothesis, Marcos proposed that the Jaboncillo-Hojas region was the seat of power for what he aptly called the Manteño incipient state.

A few months after finishing the theoretical and methodological framework for the Jaboncillo-Hojas Project, after many exhaustive efforts for funding, Marcos' proposal for the Master's program initiated in 2004 with Politis and Ruibal was approved and launched in July of 2010 at ESPOL under his directorship. Since at the time the Jaboncillo-Hojas Project was beginning to pick up serious speed, he then enlisted the collaboration of J.J. Ortiz-Aguilú (University of Puerto Rico-Mayaguez), former classmate at the University of Illinois and Lathrap student, specialist in tropical archaeology of the Caribbean region to assist in the academic and administrative obligations of the master's program.

During the summer of 2011, Marcos joined forces with Aleksander Popov from the Far Eastern Federal University (FEFU) and Andrei Tabarev from the Institute of Archaeology and Ethnography in Novosibirsk (both in Russia) with a proposal to re-examine several problems surrounding the early Valdivia cultural transformations. These had to do with the topic of transpacific connections and Valdivia culture, as well as the relationship between Valdivia and other early cultural manifestations in the archaeological record of the Ecuadorean coast (Marcos et al. 2017: 16–17). Although these problems had been examined previously, mostly by archaeologists from the Americas, the active participation of Russian and eastern scholars in these issues was a major positive factor together with the powerful abundance of comparative data that they could bring to the table.

By 2013 Marcos finished his role as Director of the extensive Jaboncillo-Hojas Project in Manabí province, in order to return to the helm of the Master's program started in 2010 at ESPOL as well as to rekindle the Licenciatura program in archaeology, which had been made inactive by the university since the early 1990s due to funding problems.

The Russian-Ecuadorean collaboration became a reality in two seasons of fieldwork at Real Alto, the early Vadivia site in Santa Elena

Peninsula excavated by Marcos, Lathrap, and others in the mid-1970s. Fieldwork and analysis, together with the training of both Russian and Ecuadorian graduate students, took place during 2014 and 2015. Both seasons resulted in a resounding success when new data were obtained which shed light on three major problems of the early Valdivia sequence: (a) the issue of transpacific connections, (b) the chronological distance between the Las Vegas preceramic culture and early Valdivia, and (c) the chronology of the San Pedro component and its relationship to the Early Vadivia sequence. On the issue of transpacific connections, the data obtained and compared by scholars from both sides of the Pacific Ocean concluded that no connection was warranted (Marcos et al. 2017: 16–17). The discovery of a Las Vegas component at Real Alto allowed for careful sampling for chronometric measurements showing that there does not seem to be a long time hiatus separating both components and that indeed they may even overlap somewhat. Also, the subsequent finding of San Pedro ceramics at Real Alto provided the opportunity to obtain very well contextualized samples which when dated, suggested that San Pedro and some Early Valdivia components apparently co-existed and overlapped on the Ecuadorean coast (Marcos et al.: ibid.).

Marcos' contributions range from the methodological, artifactual, and descriptive levels, such as the classification and contextualization of early Valdivia ceramics and its contemporaries, the mechanics, and implications of hydraulic engineering works, to the regional such as the Cangrejitos, Real Alto, and Jaboncillo-Hojas studies about the development of proto-urban regional centers in different time periods and the possible development of a proto or incipient state on the Ecuadorean coast in later prehispanic times, to the macroregional – such as the masterful data gathering and weaving of the ancient Spondylus shell trade network covering most of the Ecuadorean coast and eventually expanding in Manteño times from Acapulco to Cuzco.

Lathrap's lifelong interest in the role of maize in Valdivia economy has been continued by Marcos and, with Deborah Pearsall, Marcos, is to be credited with ushering modern paleobotanical studies into Ecuadorean archaeology. His study of clay pastes and mining sources with Aurelio Alvarez (Universidad Autónoma de Barcelona) opened the door for systematic study about the processes of ceramic manufacture, selection of raw materials, and exchange routes (Marcos et al. 1988). His measured, reflexive style of argumentation has provided a steady platform where thorny points of view and theoretical outlooks can be discussed productively. This is one reason why the congresses and meetings under his leadership have always produced constructive syntheses. This outcome is also causally related to his acute ability to bring together colleagues from different fields within archaeology as well as beyond in order to approach research problems from a wide spectrum of strategies and methodologies. This is very well evidenced in the Master's and Licenciatura's core curricula.

But Marcos' greatest contribution, the one that will stand the test of time, will be his unflinching efforts and the victories in his leadership towards the creation of the Licenciatura in archaeology at ESPOL (reactivated in 2016) and, most recently, the Master's program as well. These programs are a lifeline in the country for the creation of native professionals that hopefully will continue for years to come. The lines of investigation will proceed with, hopefully, the same scientific quality with which they were crafted initially under Donald Lathrap's inspiration and molded under Jorge Marcos' jovial character, surgically precise observations, artistic ability, and holistic approach.

Cross-References

- ▶ Archaeobotany
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Ceramics: Scientific Analysis
- ▶ Cultural Heritage Management Technology and Training
- ▶ Ethnoarchaeology
- ▶ Field Schools, Archaeological
- ▶ Geoarchaeology

▶ González, Alberto Rex
▶ Maize: Origins and Development
▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives

References

Marcos, J.G. 1978. The ceremonial precinct at Real Alto: Organization of time and space in Valdivia society. Unpublished PhD dissertation, University of Illinois, Urbana.

Marcos, J.G. 1986. Breve Prehistoria del Ecuador. In *Arqueología de la costa ecuatoriana: Nuevos enfoque*, Biblioteca Ecuatoriana de Arqueología, ed. J.G. Marcos, vol. 1, 25–50. Guayaquil: Escuela Superior Politécnica del Litoral.

Marcos, J.G. 1988. *Real Alto: La historia de un centro ceremonial Valdivia*, Biblioteca Ecuatoriana de Arqueología 4 y 5. Guayaquil: Escuela Superior Politécnica del Litoral/Corporación Editora Nacional.

Marcos, J.G. 2012. *La Historia Prehispánica de los Pueblos Manteño Huancavilca de Chanduy.* Quito: Universidad Internacional del Ecuador/Mengraf.

Marcos, J.G. 2015. *Un sitio Llamado Real Alto*. Quito: Universidad Internacional del Ecuador/Mengraf.

Marcos, J.G., and A. Michzynski. 1996. Good dates and bad dates in Ecuador; radiocarbon samples and archaeological excavation: A commentary based on the "Valdivia absolute chronology.". In *Proceedings of the third Latin American congress of the University of Varsovia, Varsovia and Biskupin-Wenecja. Andean archaeological mission of the Institute of Archaeology.* Warsaw: Warsaw University.

Marcos, J.G., A. Álvarez, and G. Bigazzi. 1988. El tráfico a distancia temprano entre la hoya de Quito y la península de Santa Elena: Las evidencias de Real Alto. Simposio ARQ-13. In *Intercambio y comercio en los Andes: La interacción tierras altas-tierras bajas desde una perspectiva arqueológica y etnohistórica*, ed. F. Cardenas-Arroyo, T. Bray, and C.K. Langebaek. Bogotá: Cuarenta y noveno Congreso Internacional de Americanistas.

Marcos, J.G., A. Popov, and A. Tabarev. 2017. Tres enigmas de la Cultura Valdivia. *Focus* Julio: 16–17.

Further Reading

Lundberg, E.R. 1989. Preceramic procurement patterns at Krum Bay, Virgin Islands. Unpublished PhD dissertation, University of Illinois, Urbana.

Marcos, J.G. 1987. Los campos elevados de la Cuenca del Guayas, Ecuador: El proyecto Peñon del Río. In *Pre-Hispanic agricultural fields in the Andean region*, BAR international series, ed. W. Denevan, K. Mathewson, and G. Knapp, vol. 359 (II), 217–224. Oxford: British Archaeological Reports.

Marcos, J.G. 1993. La arqueología como ciencia histórica y la problemática de la arqueología ecuatorial: Los agro-alfareros Valdivia de Real Alto, en el antiguo Ecuador, un modelo para la "revolución neolítica en el Nuevo Mundo". *Gaceta Arqueológica Andina* 7: 23.

Marcos, J.G. 1995. El mullo y el pututo: La articulación de la ideología y el tráfico a larga distancia en el formación del estado Huancavilca. In *Primer encuentro de investigadores de la costa ecuatoriana en Europa*, ed. A. Álvarez, S.G. Álvarez, C. Fauría, and J.G. Marcos, 97–142. Quito: Ediciones Abya-Yala.

Pearsall, D.M. 1979. The application of ethnobotanical techniques to the problem of subsistence in the Ecuadorian formative. Unpublished PhD dissertation, University of Illinois, Urbana.

Pérez Pimentel, R. 2013. Historiador y biógrafo del Ecuador. Available at: http://www.diccionariobiografico ecuador.com/. Accessed 20 Mar 2013.

Zeidler, J. 1984. Social space in Valdivia society: Community patterning and domestic structure at Real Alto, 3000–2000 B.C. Unpublished PhD dissertation, University of Illinois, Urbana.

Marcus, Joyce

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Basic Biographical Information

Joyce Marcus is a prominent anthropological archaeologist and epigrapher specializing in the archaeology of pre-Columbian Mesoamerican and Andean cultures. Born and raised in California, she enrolled at the University of California at Berkeley, graduating in 1969. At the encouragement of Robert Heizer, Marcus chose Harvard for graduate studies. When she arrived in 1969, Gordon Willey and a roster of notable Maya archaeologists were building up Maya archaeology at the Peabody Museum. Ian Graham asked her to accompany him to the Maya lowlands in 1970, where she aided him in recording hieroglyphic texts. While in northern Guatemala, Marcus excavated at El Mirador and became the first to recover Chicanel and Usulután pottery there, dating key structures to the Preclassic.

On her return to Harvard, she became close friends with Tatiana Proskouriakoff sharing almost nightly dinners. Since Proskouriakoff had achieved success by studying texts at Piedras Negras, she encouraged Marcus to pick one site's texts to examine in detail. Marcus, however, was more interested in examining multiple sites in a search for political hierarchies and inter-site interaction. She received her Ph.D. in 1974 writing on Maya emblem glyphs as a means of inferring the timing of the emergence of the Maya state. She joined the faculty of the University of Michigan in 1985. She is currently Robert L. Carneiro Distinguished University Professor of Social Evolution and Curator of Latin American Archaeology at the Museum of Anthropology of the University of Michigan. In 1997 she was elected as a member of the National Academy of Sciences.

In addition to her Mayan work, Joyce is well known for her work with her husband Kent Flannery at San José Mogote in Oaxaca (Flannery and Marcus 1983; Marcus and Flannery 1996). San José Mogote was the largest and most important settlement in the Valley of Oaxaca. It is considered to have evidence for the oldest permanent agriculture and probably was the first settlement in the area to use pottery. They demonstrated the processes of its growth and decline, from its humble beginnings as a cluster of family dwellings to a complex political center that ruled over a number of subsidiary settlements to becoming a tributary to the Monte Albán.

In the 1980s, Marcus decided to expand her knowledge of ancient states by investigating the Kingdom of Huarco in Peru's Cañete Valley. In collaboration with Peruvian ethnohistorian María Rostworowski, she excavated Cerro Azul, a coastal community whose elite families oversaw hundreds of fishermen. Marcus discovered that a specialized fishing community like Cerro Azul could afford to devote itself to fishing, fish drying, and fish storage because it was supplied with agricultural products from equally specialized inland farming communities. Such exchanges of products were facilitated by the ruler of Huarco until his kingdom was conquered by the Inka in CE 1470 (Marcus 2008a).

Major Accomplishments

Joyce Marcus is one of the pioneers in the investigation of ancient regional territorial organization in Mesoamerica. Beginning in the early 1970s, she applied central place theory to lowland Maya settlement patterns to identify primate centers and hierarchies of secondary and tertiary centers. This led to the first study to integrate archaeological settlement data with results from recent advances in the decipherment of ancient Maya texts, which had identified emblem glyphs that appeared to refer to specific sites in the Maya lowlands.

In her book *Emblem and State in the Classic Maya Lowlands* (1976b), Marcus focused on shifting political and military alliances and the evolution of hierarchies. She isolated three strategies the Maya used to incorporate dependencies: sending royal women from capitals to marry lords at subordinate centers, requiring lords at subordinate centers to attend inaugurations at the capital, and joint military raids in which subordinate lords fought alongside rulers from capitals. These themes, as well as the origins of writing, became the focus of her work in *Mesoamerican Writing Systems* (1992a). She argued that Mesoamerican writing emerged when iconographic symbols proved insufficient for recording proper nouns (names of leaders, captives, and place names), recording the date of an event, and labeling objects to claim ownership.

By integrating the spatial distribution of emblem glyphs with regional settlement patterns, Marcus was able to identify a series of political capitals, each located at the nexus of a hierarchy of subordinate sites. She also pointed out that these hierarchies were maintained by marriage, military, and political alliances. One consequence of this study was her identification of the emblem glyph for the site of Calakmul, which provided the key evidence that led to the realization that Calakmul was the capital of one of the dominant powers of the Maya Classic period.

Working in the Valley of Oaxaca, Marcus identified the glyphs for a series of subordinate centers inscribed at Monte Alban, the capital of the Zapotec state. Marcus (1976a, 1992a) was able to show that Zapotec writing, the earliest in Mexico, arose

in the context of endemic chiefly competition; other writing systems like those of the Maya and Mixtec were also used as tools in the competition for dynastic privileges and for political offices. Her work on Zapotec writing was the result of a 1972 visit to the Valley of Oaxaca, where she first examined Zapotec texts. In Oaxaca she went on to collaborate with Kent Flannery, investigating the replacement of egalitarian, politically autonomous village societies by multisite polities with hereditary rank. Their collaboration resulted in *Zapotec Civilization* (1996), which argued that the initial Zapotec state emerged when one chiefdom subjugated and incorporated its rivals.

As a result of both her Oaxaca and Maya lowland research, Marcus proposed that Mesoamerican civilizations were characterized by *political cycling*, recurring periods of consolidation under large expansionist states followed by breakdowns into numerous smaller states. For the Maya, this pattern was reflected in the development of three such cycles of consolidation, in the Late Preclassic, the Late Classic, and the Postclassic, which ended in a final period of fragmentation on the eve of the Spanish Conquest (Marcus 1992b, 1993, 2008b).

Marcus proposed a "Dynamic Model" in which expansionist states first incorporated weaker polities, only to have them learn statecraft, secede from their overlords, and form their own expansionist states. In other cases, subordinate polities formed alliances that gave them the power to secede and expand. Marcus (1973, 1976) found that during their apogee, some Maya capitals were surrounded by hexagonal "central place" lattices of secondary centers. Monte Albán in the Zapotec region was surrounded by similar central place lattices at the peak of its power. Such lattices broke down when subordinate centers seceded.

Marcus's work is also notable for including ideology within a systems framework for modeling ancient Zapotec society in the Valley of Oaxaca. By combining archaeological and ethnographic data, both Marcus and Kent Flannery have produced a balanced perspective on the role played by ideology in the development of Zapotec and other Mesoamerican societies. Based on patterns of gender-associated ritual activity detected from the archaeological record, Marcus (1998, 2001) identified the increasing centralization of power within the Valley of Oaxaca. Initially religious practice was family and community based. At this time women conducted ancestor veneration rituals within their households, while men conducted rituals in separate men's houses. But Marcus found that by c. 700–500 BCE, these earlier religious practices disappeared as ritual activities were taken over by elites. Religion became focused on state-sponsored temples thereafter, initiating a long process of consolidation of elite power by controlling labor, wealth, and ideology that culminated in the development of the state. In many ways, her approach anticipated the current interest in cognitive archaeology.

In an age when increasingly specialized and restricted perspectives have become the norm for scholars, Joyce Marcus has remained dedicated to a broad comparative view of the past. She holds that the best archaeology is informed by ethnography and ethnohistory and requires a search for widespread principles. These principles emerge only when a number of prehistoric cultures are compared and contrasted. Her focus has always been on human decision making, competition, and cooperation, rather than monolithic causes such as droughts and other environmental imperatives. Furthermore, she has widened this cross-cultural comparative perspective by conducting excavations in the Andean area of South America and utilizing case studies from Egypt and other Old World civilizations. As a result, throughout her career, Marcus has enlightened our understanding of pre-Columbian Mesoamerica with landmark publications based on comparative studies of ancient settlement patterns, social systems, trajectories of political development, and the origins and development of writing systems.

Cross-References

- ► Adaptation in Archaeology
- ► Cognitive Archaeology
- ► Engendered Archaeologies
- ► Flannery, Kent Vaughn

▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
▶ Willey, Gordon Randolph

References

Flannery, K.V., and J. Marcus, eds. 1983. *The cloud people: Divergent evolution of the Zapotec and Mixtec civilizations*. New York: Academic Press.
Marcus, J. 1973. Territorial organization of the lowland classic Maya. *Science* 180: 911–916.
Marcus, J. 1976a. The origins of Mesoamerican writing. *Annual Review of Anthropology* 5: 35–67.
Marcus, J. 1976b. *Emblem and state in the classic Maya lowlands: An epigraphic approach to territorial organization*. Washington, DC: Dumbarton Oaks.
Marcus, J. 1992a. *Mesoamerican writing systems: Propaganda, myth, and history in four ancient civilizations*. Princeton: Princeton University Press.
Marcus, J. 1992b. Dynamic cycles of Mesoamerican states. *National Geographic Research & Exploration* 8 (4): 392–411.
Marcus, J. 1993. Ancient Maya political organization. In *Lowland Maya civilization in the eighth century A.-D.*, ed. J.A. Sabloff and J.S. Henderson, 111–183. Washington, DC: Dumbarton Oaks.
Marcus, J. 1998. *Women's ritual in formative Oaxaca: Figurine-making, divination, death and the ancestors*. Museum of Anthropology Memoir 33. Ann Arbor: University of Michigan.
Marcus, J. 2001. Breaking the glass ceiling: The strategies of royal women in ancient states. In *Gender in pre-Hispanic America*, ed. C.F. Klein, 305–340. Washington, DC: Dumbarton Oaks.
Marcus, J. 2008a. *Excavations at Cerro Azul, Peru*. Los Angeles: UCLA Cotsen Institute of Archaeology.
Marcus, J. 2008b. *Monte Albán*. Mexico City: El Colegio de México, Fondo de Cultura Económica.
Marcus, J., and K. Flannery. 1996. *Zapotec civilization: How urban society evolved in Mexico's Oaxaca Valley*. New York: Thames and Hudson.

Further Reading

Feinman, G.M., and J. Marcus, eds. 1998. *Archaic states*. Santa Fe: School of American Research Press.
Flannery, K.V., and J. Marcus. 1994. *Early formative pottery in the Valley of Oaxaca*. Museum of Anthropology Memoirs 27. Ann Arbor: University of Michigan.
Flannery, K.V., and J. Marcus. 2005. *Excavations at San José Mogote 1: The household archaeology*. Museum of Anthropology Memoirs 40. Ann Arbor: University of Michigan.
Marcus, J. 2008. The archaeological evidence for social evolution. *Annual Review of Anthropology* 37: 251–266.
Marcus, J., and J.A. Sabloff, eds. 2008. *The ancient city*. Santa Fe: SAR Press.

Maritime Archaeological Organizations

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Introduction

There is a broad range of maritime archaeological organizations worldwide whose activities are directed towards recording and preserving underwater cultural heritage (UCH). Membership ranges from professional, to a mixture of professional and nonprofessional, to purely recreational. Depending on their role some organizations restrict their membership to qualified, professional practitioners, while others are inclusive of a range of qualifications and experience.

Definition

Maritime archaeological organizations in this context are distinct from statutory UCH management authorities, government agencies, and UCH consulting firms and can be generally categorized into the following types:

1. Advisory committees and councils set up to establish high-level communication and provide professional underwater archaeological (ethical and technical) advice, with international membership based on recognized qualifications and experience in UCH management. Examples include the International Council on Monuments and Sites (ICOMOS), International Council on Underwater Cultural Heritage (ICUCH), Society for Historical Archaeology (SHA), and Advisory Council on Underwater Archaeology (ACUA).
2. Not for profit professional or paraprofessional "avocational" groups, institutes, and non-government organizations (NGOs) made up of diverse community members (e.g., recreational and professional divers, conservators,

academics, students, professionals, general public) that conduct activities related to UCH sites. Their activities may include some or all of the following: research, conducting underwater archaeological surveys and excavations, experimental archaeology, conservation, displays and exhibitions, lobbying governments to introduce or amend protective UCH legislation, disseminating information and producing publications, providing training in underwater archaeological techniques, developing community and government networks, running conferences, and promoting the ethical and responsible management of UCH sites. Some examples of such organizations include the Nautical Archaeology Society (NAS), Australasian Institute for Maritime Archaeology (AIMA), Maritime Archaeology Association of New Zealand (MAANZ), Asian Research Institute for Underwater Archaeology (ARIUA), Arqueonáutica (Portugal), Groupe de Recherche en Archéologie Navale (France), Ships of Discovery (USA and Caribbean), Museum of Underwater Archaeology (MUA), and the Underwater Archaeology Society of British Columbia (Canada).

3. A third category is for groups or institutes whose titles may include the descriptors "maritime," "heritage," "archaeological," "historical," or "conservation" but whose activities are not undertaken in accordance with accepted international archaeological or heritage management practices. Their activities may include removing artifacts from UCH sites for personal collection, sale, or trade and may be local or international in scope.

The discipline of underwater/maritime archaeology owes much of its development to volunteer or "avocational" archaeologists – usually divers passionate about documenting and protecting underwater cultural heritage (UCH) sites. Many of the earlier established maritime archaeological organizations were set up in the 1960s–1970s to provide volunteer support for large-scale government-funded shipwreck/UCH excavations. There are numerous such maritime archaeological organizations worldwide, and a comprehensive list is beyond the scope of this entry.

Avocational archaeologists often have professional or technical skills in other areas that contribute enormously to the safe and professional running of underwater archaeological projects. From the Australian perspective, volunteer community participation in underwater archaeological work has long been recognized as essential to encourage public understanding and support for the protection and ethical management of underwater cultural heritage (UCH) sites.

Maritime archaeological organizations such as NAS, ACUA, and AIMA have an international membership and have led much professional and ethical research into underwater archaeological techniques for recording and excavation, the development of ethical codes of conduct to distinguish underwater archaeology from treasure hunting, and the dissemination of information via regular conferences and publications. In some countries such as Japan where there is no official government authority responsible for UCH, organizations such as ARIUA provide advice to local prefecture governments and community museums on issues of UCH management.

The ICOMOS ICUCH was established in 1991 specifically to provide advice on UCH sites to ICOMOS and UNESCO. Its mandate was to develop the UCH management guidelines published as the 1996 ICOMOS Charter, also known as the Sofia Charter. The Charter has in turn became the basis for the Annex to the *2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage*, recognized as world's best practice for the management of UCH sites.

Key Issues/Current Debates/Future Directions/Examples

Paralleling the growth and changes in the discipline of maritime archaeology, avocational groups have changed over time. Some groups were initially divers whose interest in shipwrecks was stimulated by finding and collecting artifacts from shipwrecks, prior to the enactment of protective legislation and modern understanding of the damage caused to sites by such activities. With the increase in knowledge and skills, many

organizations matured to become active proponents for the ethical management and protection of sites. The decline in major shipwreck excavations since the 1970s–1980s has meant that some of the established avocational groups have not seen the influx of new members that enthusiasm for such labor-intensive projects generates; however, the skills base in most groups is maintained by experienced individuals.

The popularity for NAS-based training and similar UCH training courses worldwide exhibits the demand for practical training in UCH skills and bodes well for the future of underwater archaeology and community involvement. The continuing development of diving technologies has seen deeper UCH sites being accessed by technical divers, though modern risk-based management usually means government agency and academic divers are not permitted to dive to such depths. This makes collaboration and communication between technical divers and practitioners important in order to document deep UCH sites. Some recently formed avocational groups are focused on documenting UCH sites only accessible with technical diving equipment, for example, Southern Ocean Research (SOR) in Australia.

One significant issue is that many organizations do not publicly subscribe to guidelines or have a Code of Ethics that members are required to adhere to. However, any group involved in UCH activities should explicitly state their stance on treasure hunting and the unethical or illegal salvage of UCH sites in their charter, constitution, or website. Increasingly, ethically minded avocational maritime archaeological organizations are publicly aligning themselves with the *2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage* as the accepted international standard by which to conduct underwater archaeological work.

Cross-References

- ▶ Australasian Institute for Maritime Archaeology Inc. (AIMA)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ Society for Historical Archaeology (SHA) (Cultural Heritage Management)

References

Charter on the Protection and Management of Underwater Cultural Heritage. 1996. Ratified by the 11th ICOMOS Assembly in Sofia, Bulgaria, October 1996. Available at: http://www.international.icomos.org/charters/underwater_e.htm. Accessed 13 Dec 2011.

The UNESCO Convention on the Protection of the Underwater Cultural Heritage. 2001. United Nations Educational Scientific and Cultural Organisation, Paris.

Further Reading

Advisory Council on Underwater Archaeology (ACUA). Ethics press kit. Available at: http://www.acuaonline.org/assets/2011/03/02/e313d3ce2e2ff7dc8f6c55b824ed4060.pdf. Accessed 13 Dec 2011.

Australasian Institute for Maritime Archaeology (AIMA). n.d. Code of Ethics. Available at: http://www.aima.iinet.net.au/home/ethics.pdf. Accessed 13 Dec 2011.

Scott Ireton, D. n.d. *A matter of ethics*. Available at: http://www.acuaonline.org/deep-thoughts/a-matter-of-ethics-by-della-scott-ireton/. Accessed 13 Dec 2011.

Maritime Contact Rock Art

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Introduction and Definition

Maritime contact rock art refers to depictions of maritime-related introduced subject matter in rock art most commonly linked to exploration, trade, and exchange during the last 500 years. In most

circumstances it relates to the depiction of ships by local populations but also includes depictions of any material culture related to these maritime activities.

Key Issues/Current Debates/Future Directions/Examples

Research

Maritime contact rock art has been documented in many places around the world including, but not limited to, Australia and the Pacific, Southeast Asia, Europe, Africa, and North America. Most studies have highlighted the technical aspects of the vessels and/or attempted to interpret the time period, type, identity, and historic context of the vessel depicted (see, e.g., Pritchard 1987; Mott 1990; Burningham 1994, 2000; Langdon & Van de Moortel 1997; Roberts 2004; O'Connor & Arrow 2008; Wesley et al. 2012), while others have placed their studies in a wider theoretical context such as cross-cultural interaction (e.g., Clarke 1994, 2000a, b; Chaloupka 1996; Clarke & Frederick 2006, 2008; Goldhahn 2012; Taçon et al. 2012). There has been considerable growth in the number of maritime contact rock art studies during the last decade, and this trend is expected to continue as the significance of this art form becomes more widely appreciated.

Case Study

Of all the countries with maritime contact rock art, Australia is thought to have the most examples, and in particular, the north of Australia is home to diverse and innumerable paintings related to this theme. In recent centuries Indigenous Australians came into contact with outsiders from a variety of countries and cultural backgrounds including Macassans, Dutch, English, French, and Spanish traders and explorers. Some of the most common recent rock art in Australia includes paintings and engravings of the watercraft visitors used to reach these shores. In many cases, this same watercraft quickly became an everyday part of indigenous life. Maritime contact rock art, therefore, provides a means to consider, in localized and national ways, these cross-cultural encounters.

One recently documented site in northern Australia, a site recently added to the Northern Territory Heritage Register and now nominated for National Heritage Listing, is known as Djulirri (Fig. 1). The site complex sits approximately 20 km from the coast in the Wellington Range sandstone massif which is surrounded by coastal plains and a number of small and larger rivers that feed out into the sea. At least 25 introduced types of watercraft (including praus) are painted at Djulirri, and they range in age from the seventeenth century to the 1960s (May et al. 2010; Taçon et al. 2010; Fig. 2). While some of these

Maritime Contact Rock Art, Fig. 1 Djulirri rock art complex, Wellington Range, Australia

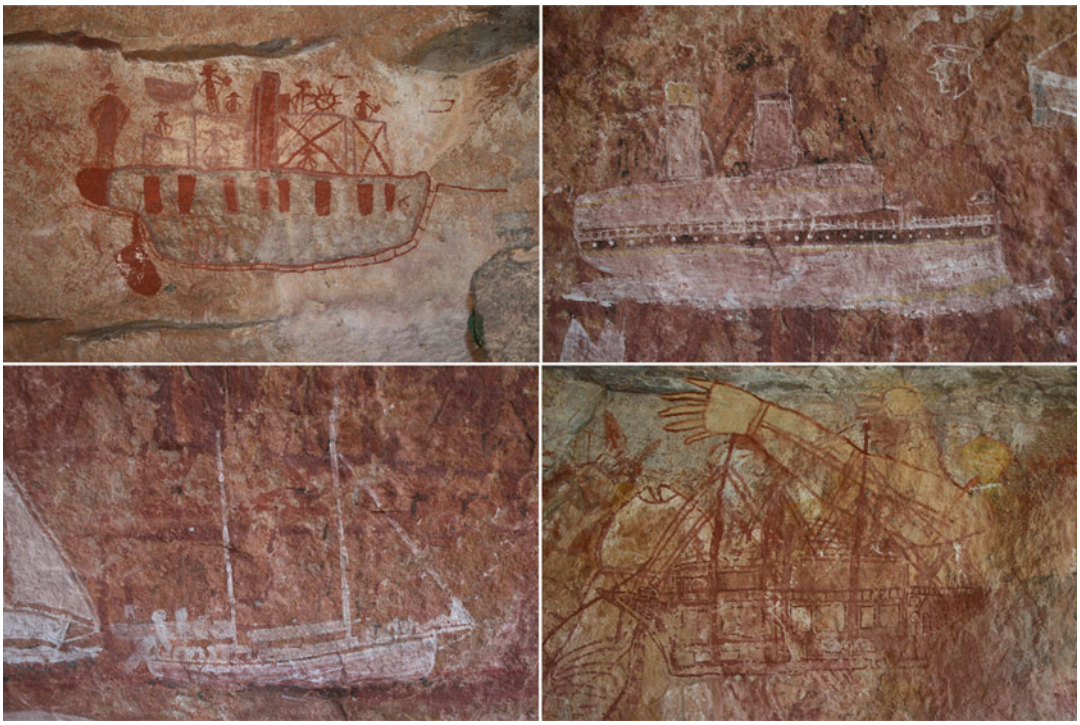

Maritime Contact Rock Art, Fig. 2 Maritime contact rock art from Djulirri, Wellington Range, Australia

vessels may have been seen by or visited or worked upon by local aboriginal people, other paintings may be a mixture of features from different ships sometimes with additions being made over time, perhaps by different artists. Some show less familiarity between artist and subject matter. Others still suggest that the artist may have only seen their subject matter in magazines, newspaper, books, or possibly as decoration on tobacco tins in the nineteenth century. One of the remarkable aspects of sites such as Djulirri is that the density and diversity of maritime contact rock art allow us to explore a range of detailed technical and theoretical archaeological questions.

Sites such as Djulirri tell us that watercraft have played a significant role in the lives of aboriginal people since at least the seventeenth century. Artists have depicted this subject matter as part of ongoing artistic systems of representation but in far higher numbers than other contact period art, such as guns, horses, and cattle (May et al. 2010, 2013; Taçon 2012). Maritime contact rock art tells stories of vessels well known across the northern coast of Australia and others that might only have been seen once. As well, they suggest artists were familiar with their subject matter but also not afraid to use "artistic license" and new techniques for painting. They indicate that watercraft became part of aboriginal storytelling traditions but were not stagnant, instead being updated and renewed with the coming of new watercraft into north Australian waters. While European artists aboard ships travelling the coast of Australia may have believed they were the observers, in fact aboriginal artists were returning the compliment tenfold.

Cross-References

► Australian Paleoart.
► Rock Art, Forms of.

References

Burningham, N. 1994. Aboriginal nautical art: a record of the Macassans and the pearling industry in the Northern Territory. *The Great Circle* 16: 139–151.

Burningham, N. 2000. Sublime but not ridiculous: Observations on the technical analysis of ships of first contact represented in various genre of art. *Bulletin of the Australian Institute of Maritime Archaeology* 24: 63–70.

Chaloupka, G. 1996. Praus in Marege: Makassan subjects in Aboriginal rock art of Arnhem Land, Northern Territory Australia. *L'Anthropologie* 34 (1–2): 131–142.

Clarke, A. 1994. Winds of change: an archaeology of contact in the Groote Eylandt archipelago, Northern Australia. Unpublished PhD dissertation. Australian National University, Canberra.

Clarke, A. 2000a. Time, tradition and transformations: The negotiation of cross-cultural engagements on Groote Eylandt, northern Australia. In *The archaeology of difference: Negotiating cross cultural engagements in Oceania*, ed. R. Torrence and A. Clarke, 1–31. London: Routledge.

Clarke, A. 2000b. The Moormans Trousers': Macassan and Aboriginal interactions and the changing fabric of indigenous social life. In *East of Wallace's Line: Studies of past and present maritime societies in the Indo-Pacific region*, Modern Quaternary Research in Southeast Asia, ed. S. O'Connor and P. Veth, vol. 16, 315–335. Rotterdam: A A. Balkema.

Clarke, A., and U. Frederick. 2006. Closing the distance: interpreting cross-cultural engagements through Indigenous rock art. In *Archaeology in Oceania, Australia and the Pacific Islands*, ed. I. Lilley, 116–133. Malden: Blackwell.

Clarke, A., and U. Frederick. 2008. The mark of marvellous ideas: Groote Eylandt rock art and the performance of cross-cultural ideas. In *Strangers on the shore: Early coastal contacts in Australia*, ed. P. Veth, P. Sutton, and M. Neale, 148–164. Canberra: National Museum of Australia.

Goldhahn, J. 2012. In the wake of a voyager: Feet, boats and death rituals in the North European Bronze Age. In *Image, memory and monumentality: Archaeological engagements with the material world*, Prehistoric Society's Research Paper, ed. A.M. Jones, J. Pollard, M.J. Allen, and J. Gardiner, vol. 5, 218–232. London: Prehistoric Society.

Langdon, M.K., and A. Van de Moortel. 1997. Newly discovered Greek boat engravings from Attica. In *Down the river to the sea: Proceedings of the Eighth International Symposium on Boat and Ship Archaeology*, ed. J. Litwin, 85–89. Gadansk: Polish Maritime Museum.

May, S.K., P.S.C. Taçon, D. Wesley, and M. Travers. 2010. Painting history: Indigenous observations and depictions of the 'other' in northwestern Arnhem Land, Australia. *Australian Archaeology* 71: 57–65.

May, S.K., P.S.C. Taçon, A. Paterson, and M. Travers. 2013. The world from Malarrak: Depictions of Southeast Asian and European subjects in rock art from the Wellington Range Australia. *Australian Aboriginal Studies* In press.

Mott, L.V. 1990. Medieval ship graffiti in the Palau Reial at Barcelona. *Mariner's Mirror* 76 (1): 13–21.

O'Connor, S. & S. Arrow. 2008. Boat images in the rock art of northern Australia with particular reference to the Kimberley, Western Australia, in G. Clark, F. Leach, S. O'Connor Islands of inquiry: Colonisation, seafaring and the archaeology of maritime landscapes. pp. 397–409. Canberra: ANU EPress.

Pritchard, V. 1987. Some English medieval ship graffiti. *Mariner's Mirror* 73: 318–320.

Roberts, D.A. 2004. Nautical themes in the Aboriginal rock paintings of Mount Borradaile, Western Arnhem Land. *The Great Circle* 26 (1): 19–50.

Taçon, P.S.C. 2012. On the rocks: Ships at Aboriginal rock-art sites. *Signals* 99: 22–29.

Taçon, P.S.C., S.K. May, S. Fallon, M. Travers, D. Wesley, and R. Lamilami. 2010. A minimum age for early depictions of Southeast Asian praus in the rock art of Arnhem Land Northern Territory. *Australian Archaeology* 71: 1–10.

Taçon, P.S.C., A. Paterson, J. Ross, and S.K. May. 2012. Picturing change and changing pictures: contact period rock art of Australia. In *A companion to rock art*, ed. J. McDonald and P. Veth, 420–436. Chichester: Blackwell Publishing Ltd.

Wesley, D., J.F. McKinnon, and J.T. Raupp. 2012. Sails set in stone: A technological analysis of non-indigenous watercraft rock art paintings in north western Arnhem Land. *Journal of Maritime Archaeology* 7: 245–269.

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Maritime Ephemera

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Introduction

Humans have throughout history found many uses for the coast and intertidal zone and its resources. Most people will think first of formal port structures, but there are many smaller and more unusual features to be found, depending on the local geomorphology and natural resources.

Key Issues/Current Debates/Future Directions/Examples

Core uses of the coast throughout the world include farming, fishing, and trade. Until the industrial revolution, transport by water was vastly cheaper than transport over land, and as much as possible was moved by water. There are places where every farm had its little jetty or quay for transporting people, animals, and other agricultural produce. Similarly most coastal communities had some places where boats could be anchored or beached, for the transport of people and goods. Coastal settlements were generally located where there was a good anchorage or landing-place, preferably sheltered from the prevailing winds.

Subsistence fishing was often done from the shore, with baited lines, or using fish-traps constructed of wood or stone in the intertidal zone, which funneled fish into nets or baskets, usually on a falling tide (Fig. 1). Fishing from small boats needed no built infrastructure. Commercial fishing usually did leave evidence in the form of piers, quays, net-stores, and ice-houses. But even subsistence fishing may leave remains, for example, evidence of areas where nets were spread out to dry. Among the less obvious evidence, cart-ruts across the foreshore have a story to tell, about gathering bait for fishing, or seaweed for manure. Associated with mankind's activities in coastal waters are navigational aids, ranging from simple poles or cairns through classical temples to the large lighthouses of the nineteenth century, capital-intensive structures usually built and maintained by national organizations or governments.

For much of humankind's history, transport of heavy goods overland was expensive, or even impossible, so some coastal areas will yield evidence of extractive industries, such as quarrying for stone, mining for coal, or felling and moving timber. Such products were either transported for sale in their raw form, or used to produce other saleable products. Coastal quarries provided stone for building, but in the case of limestone, to burn to produce lime (Fig. 2). Timber could be used for shipbuilding, or stacked and burned to make charcoal for processing iron ore, and coal, in cool climates, could be used to boil seawater to produce salt (Fig. 3). In warmer climates, salt was produced along suitable coasts by evaporation in shallow tanks, and this too leaves archaeological evidence.

At many coastal sites, there will be evidence of the exercise of political, social, or economic control, from prehistoric forts and medieval castles (Fig. 4) to structures built by regional or national authorities, such as customs houses and bonded warehouses. Major ports often had designated

Maritime Ephemera, Fig. 1 A large stone fish-trap in Airds Bay, Appin, Argyll, Scotland

Maritime Ephemera, Fig. 2 Remains of limeworking site on the island of Lismore, Argyll. On the right is the quarry face. Moving left, level with its floor are the tops of a pair of kilns. Further left and at a lower level are the manager's office, and stores for the coal used as fuel, and the finished lime. In the left of the picture is the pier to which coal was brought in and from which the finished lime was taken away in "lime smacks", vessels dedicated to this single, dangerous cargo

Maritime Ephemera, Fig. 3 Rock-cut basin in which seawater was held as the tide fell while debris settled out. The water was then pumped along the central channel to another holding tank on land from where it was distributed to the nine salt-pans at this late-eighteenth-century salt-production site near St Monans, Fife, Scotland

quarantine stations nearby, though these may not be easily identifiable archaeologically.

There should also be evidence for the building, maintenance and recycling of boats and ships, which was done as close to the water as was feasible. Traces may range from scatters of nails to large dry docks. Some boats were protected during their working life, in structures ranging from classical shipsheds through the Iron Age and later boathouses of Scandinavia to the submarine pens of World War Two. The coast itself has in places been altered by humans, with structures

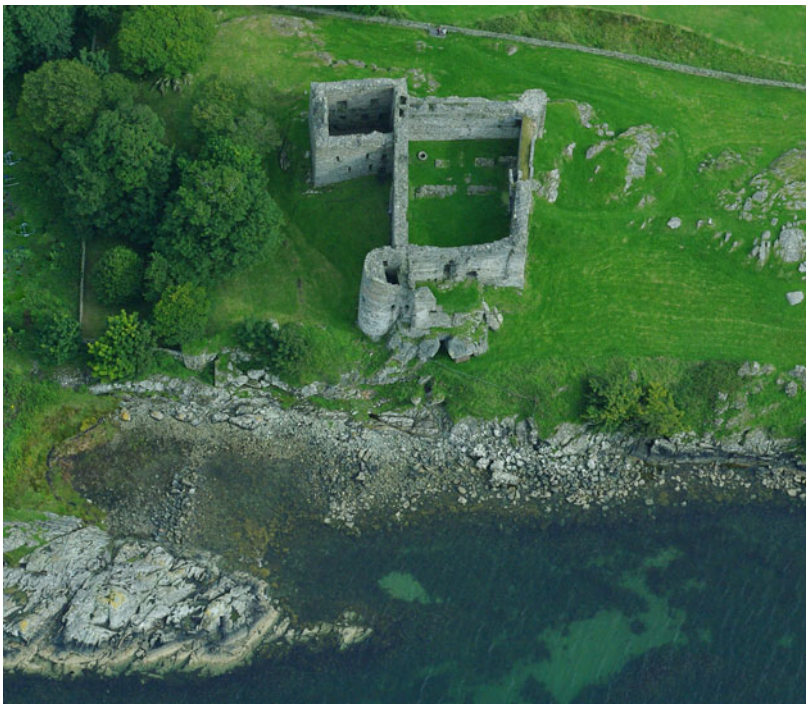

Maritime Ephemera, Fig. 4 Castle Sween, Knapdale, Argyll, one of the oldest stone castles in Scotland. Note its coastal location and shaltered landing-place

designed either to reclaim land or to prevent erosion. It has also been used for recreation, which may leave archaeological evidence such as bathing-houses, or swimming-pools cut from rocks or enclosing areas of the intertidal zone. Wildfowling may also leave evidence in the form of hides.

The coast is often a key area for defense during wartime, and many features survive, from prehistoric forts through medieval and later castles to Martello Towers and the pillboxes, gun emplacements, and other features from twentieth-century wars. Many such features may be clustered in strategically important areas, and there may be multiple reuse of key sites.

Shipwrecks can happen anywhere along coasts, and occasionally there may be evidence of survivors, in the form of temporary camps, where they either waited for rescue or built a smaller boat from the wreckage and set off again. Debris from wrecks can end up on shore, as can objects washed or thrown overboard from vessels at sea. The coast can also be used as somewhere to dispose of unwanted material from the land, from household ash to derelict cars.

There can be few stretches of coast where an experienced archaeologist could not find evidence for man's exploitation of the sea and its resources. And although much of the surviving evidence may be less than 300 years old, many of the uses identified could be expected to have applied in earlier periods, even though no direct evidence survives.

Future Directions

The coastal zone is now being seriously studied. There are Coastal Zone Assessments, consisting of rapid surveys of large stretches of coastline looking for any archaeological remains. Usually conducted by local or national heritage agencies, such projects have demonstrated that a surprising amount of evidence survives even in apparently unlikely areas (for example, Paddenberg and Hession 2008; Scottish reports available via http://www.scapetrust.org/html/czas.html).

There are also recent studies of specific areas, such as Strangford Lough in Northern Ireland (McErlean et al. 2002) where "fieldwalking" techniques were applied to the foreshore, leading to a

wide range of discoveries. The investigation of coastal sites is being carried out throughout the world (for example, Ford 2011), and is proving well suited to community involvement in discovery, monitoring, research, survey, and excavation (see, for example, http://www.shorewatch.co.uk; http://www.scapetrust.org/html/scharp.html). It is important to understand the many uses of the coastal zone, to counterbalance our modern bias toward road, rail, and air transport of people and goods, as well as understanding the role of coastal and maritime resources in past economies.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Industrial Archaeology
- ▶ Martin, Colin
- ▶ Post-Medieval Archaeology (Europe)

References

Ford, B., ed. 2011. *The archaeology of maritime landscapes: When the land meets the sea*. New York: Springer.

McErlean, T., R. McConkey, and W. Forsythe. 2002. *Strangford Lough: An archaeological survey of the maritime cultural landscape*. Belfast: Blackstaff Press.

Paddenberg, D., and B. Hession. 2008. Underwater archaeology on foot: A systematic rapid foreshore survey on the North Kent coast, England. *International Journal of Nautical Archaeology* 37 (1): 142–152.

Maritime Historic Site Management for the Public

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Introduction

Maritime historic site management generally revolves around issues regarding preservation and protection of heritage resources. Preservation initiatives at the local and state levels often are in the form of legislation such as ordinances, statutes, and laws that both govern the fate of heritage sites and objects and provide penalties for noncompliance, and in the form of public education programs. Protection strategies focus on threats from looting and commercial salvage and from inadvertent damage by visitors, trawling, dredging, development, and many other potential hazards. The purpose of management efforts is to ensure maritime resources, which are a tangible link to the past and survive for present and future generations. Effective strategies for explaining value and instilling appreciation of these sites to the public are key to successful management plans. In many cases, maritime resources technically "belong" to the public because they are located on state, federal, or other public lands. In all cases, cultural resources, maritime and otherwise, are part of the common heritage of our human condition. Archaeologists and cultural resources managers utilize many methods to protect and manage maritime resources for the public benefit and continue to adopt new technologies and innovative strategies to encourage the public to enjoy, preserve, and learn from maritime historic sites.

Public education and outreach are considered professional obligations for archaeologists, right along with ethical research and reporting of results. If archaeological research does not produce a better understanding of the past, or if the field loses its scientific credibility where the public is concerned, the value of archaeology will decrease in the eyes and minds of the public. Public education is proving to be one of the most powerful tools available to heritage resource managers. The purpose behind management of maritime historic sites for the public, especially through the establishment of underwater archaeological preserves, shipwreck parks, and maritime heritage trails, is to encourage the public to grasp the value of preservation instead of consumption of a nonrenewable resource through exposure to and education about shipwrecks and other maritime cultural resources. A vast majority of interpretive media created about in situ maritime sites is aimed toward this end. Although

archaeological sites, including shipwrecks, in many states and countries are protected under federal, state, and local law, this approach does not ensure the protection of shipwrecks (and other maritime cultural sites) from the effects of treasure hunters, souvenir seekers, construction companies, and well-meaning but uninformed divers. Educating the diving public seems to be the only viable alternative to legislation which, although based on good intentions, often proves ineffective and unenforceable.

Definition

Management of maritime historic sites for the public may be defined as methods and strategies used by archaeologists and cultural resource managers to encourage the public to visit, enjoy, value, learn from, and ultimately protect maritime heritage sites. These methods generally involve legislation, but also, and more importantly, interpretive strategies to promote educational and recreational visitation. Heritage tourism often is closely tied to public management of maritime cultural sites (as well as other types of cultural sites).

Many interpretive strategies incorporate both terrestrial and submerged maritime historic sites into one attraction that combines elements of several kinds of maritime activity, such as lighthouses, docks and wharves, harbors and ports, coastal fortifications and defenses, and maritime communities. Generally termed a trail and connected through thematic publications or markers, these attractions are ideal for illustrating the maritime cultural landscape of a region or locality. Isolated shipwrecks and groups of shipwrecks usually are interpreted for the diving public as a shipwreck park or underwater archaeological preserve, although trails of submerged attractions also have proven feasible. Ideal wrecks for this type of promotion are in relatively shallow, clear water and are near the shore. Certainly shipwrecks not in this type of environment are successfully promoted, but the most popular and visited tend to be easy to access and easy to dive. Many also are accessible to snorkelers, which increases the visitor base tremendously. Videos, websites, enhanced or virtual reality tours, and glass-bottom boats can enable nondivers to "visit" these sites as well.

Historical Background

Terrestrial archaeological sites have long benefited from management programs targeted to the public, ranging from elaborate reconstruction and living-history interpretations such as those practiced at Colonial Williamsburg in the USA and the Jorvik Viking Centre in the UK, to informal tours and "public days" now incorporated at many archaeological projects. Long-standing volunteer programs encouraging public participation also are mainstays of modern archaeology, providing not only free labor but also a way to educate and engage the public in active research. Only relatively recently, however, have archaeologists and resource managers begun to consider submerged sites appropriate for similar treatment. The growth of sport diving as a popular recreational pursuit increases the potential volunteer base for underwater projects, as well as the number of people interested in archaeology under water and in visiting underwater heritage sites. The proliferation of divers also leads to additional pressure through visitation on already limited and fragile shipwrecks and other submerged sites. Additionally, a pervasive attitude seems to exist among sport divers, fostered by the popular media, that anything under water can be taken by the person who finds it, regardless of existing laws protecting submerged cultural resources.

While the first "open-air" museum at a historic site was opened in 1891 at the town of Skansen near Stockholm, Sweden (Bennett 1995), public interpretation and access to in situ archaeological resources owe some developmental history to open-air and open-water ecological parks and preserves. These areas protect natural resources, including wildlife, plant life, and geological features, while granting and encouraging public access to the resource in a controlled and sustainable manner. Ecologists recognize that allowing public access to resources encourages visitors to learn about them which, in turn, promotes

appreciation and conservation (Andrews 1999). Environmental managers also pioneered directly involving the public, as trustees or stakeholders, in the management and conservation of natural resources (Griffith 2003). The concept of the outdoor historical museum spread to other nations, including the United States (Murtagh 1997), in the 1920s and 1930s, although limited to terrestrial historical sites which were considered appropriate candidates for nontraditional museums. The concept of submerged archaeological sites as underwater museums lagged far behind.

Promoting submerged cultural resources, particularly shipwrecks, as heritage tourism attractions is a relatively new method of maritime historic site management. Although plans for preserving and promoting submerged cultural resources through public education and interpretation were introduced as early as the late 1970s (Council of Europe 1978), nearly a decade passed before the establishment of the first underwater archaeological preserves. Programs to provide public access to interpreted shipwrecks and other historic maritime sites began to develop in the mid-1980s and continue to grow today. In recent years, conservation and preservation efforts by archaeologists were aided by developments in business and governmental arenas. Dive training agencies began to promote conservation of shipwrecks just as they promote conservation of natural resources such as manatees and coral reefs; the Professional Association of Diving Instructors' (PADI) Respect Our Wrecks initiative through its Project AWARE is one such program (PADI 2012). Additionally, passage of national legislation formalized preservation initiatives; for example, the USA's Abandoned Shipwreck Act of 1987 not only gives states title to shipwrecks in their waters but also mandates management of the shipwrecks for the public benefit, including public access. Internationally, the 2009 ratification of UNESCO's Convention on the Protection of the Underwater Cultural Heritage provides for international protection of maritime historic sites, including in situ preservation and prevention of commercial exploitation. The legally mandated requirement of public access to submerged and other maritime cultural sites is addressed by archaeologists in several ways. One of the most popular ways is through the establishment of shipwreck parks, underwater archaeological preserves, and maritime heritage trails.

Archaeological resources exhibited in situ take advantage of contextual integrity by encouraging visitors to understand relationships between the site and its environment, to feel a direct connection with the content of the "display," and to appreciate the knowledge available from a site preserved in context. Public education and outreach efforts often, and intentionally, lead to the public's desiring to visit the resource, resulting in heritage tourism becoming, and continuing to be, one of the fastest growing and most dynamic segments of the travel industry (Boniface and Fowler 1993; Jeffries 2001; Csapo 2012). Education and interpretation strategies often are designed to explain the knowledge value of the resource to the public and to describe the benefits of preservation. While visitation generally is encouraged, managers must strive to ensure zero or low impact to the resource in order to create a sustainable attraction and to preserve the resource for future research and enjoyment. Sustainable use of cultural resources is dependent upon educating the public about the nature of the sites, which often are fragile and susceptible to damage, whether unwitting or intentional. In the case of submerged sites, educational efforts focus on the diving public. Public education efforts generally include printed and electronic media as well as other types of interpretive literature and site markers (Fig. 1a, b). In promoting access to submerged sites, however, managers should be aware of the risks inherent in scuba diving and the nature of the environment surrounding their shipwrecks so that visitors are not led into dangerous situations.

Encouraging public access to archaeological sites is described as both incompatible with and contradictory to the goal of preserving a site intact (Hannahs 2003). Certainly the best-case scenario for preservation is for a site never to be discovered, but that is disingenuous and defeats the point of archaeology. Once a shipwreck is discovered, however, it cannot be "undiscovered" and the job of managing the site – taking into account relevant legislation, needs of the public, and needs of science – begins. Educating people who visit the site is the best method to ensure the site is treated with

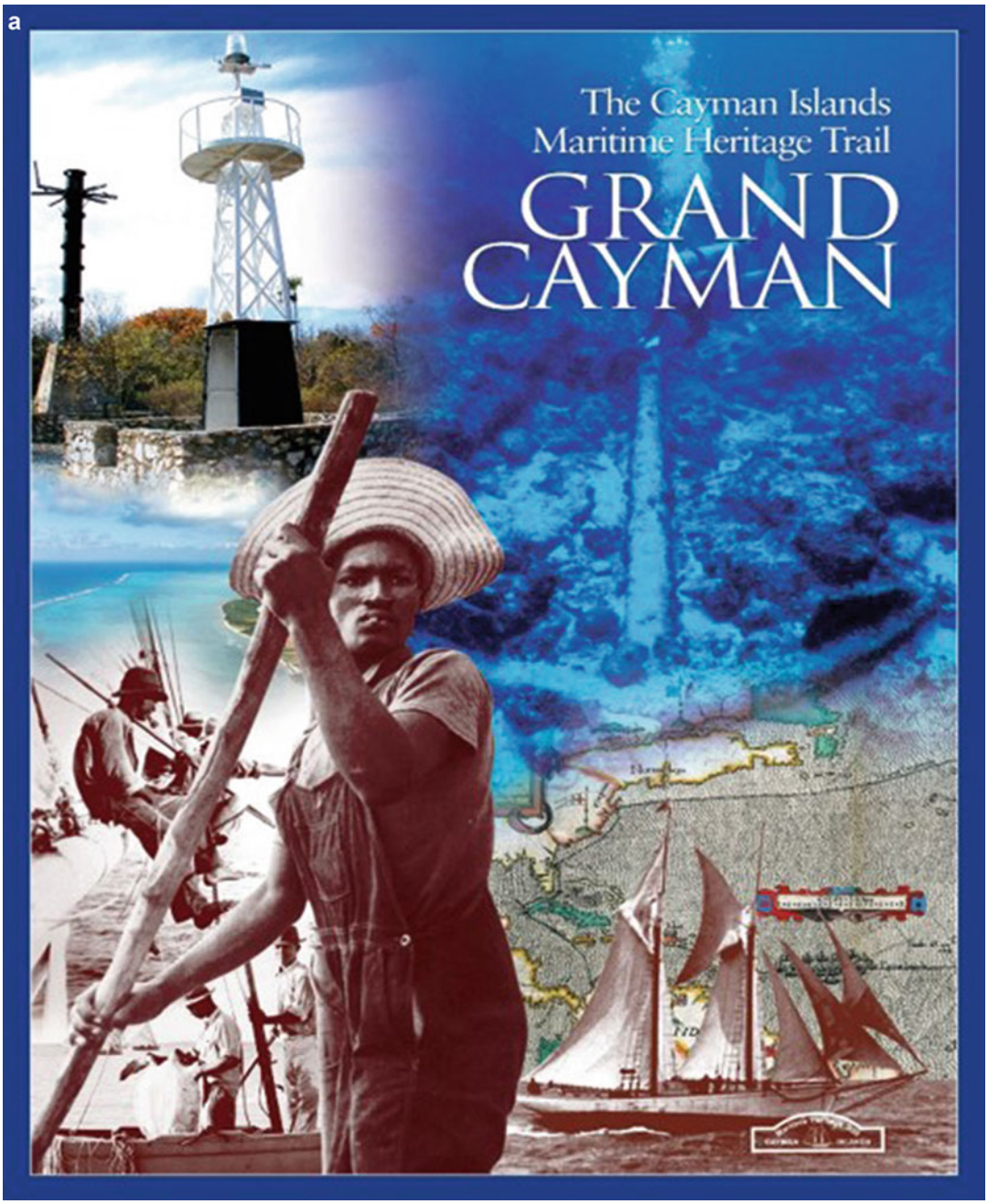

Maritime Historic Site Management for the Public, Fig. 1 (continued)

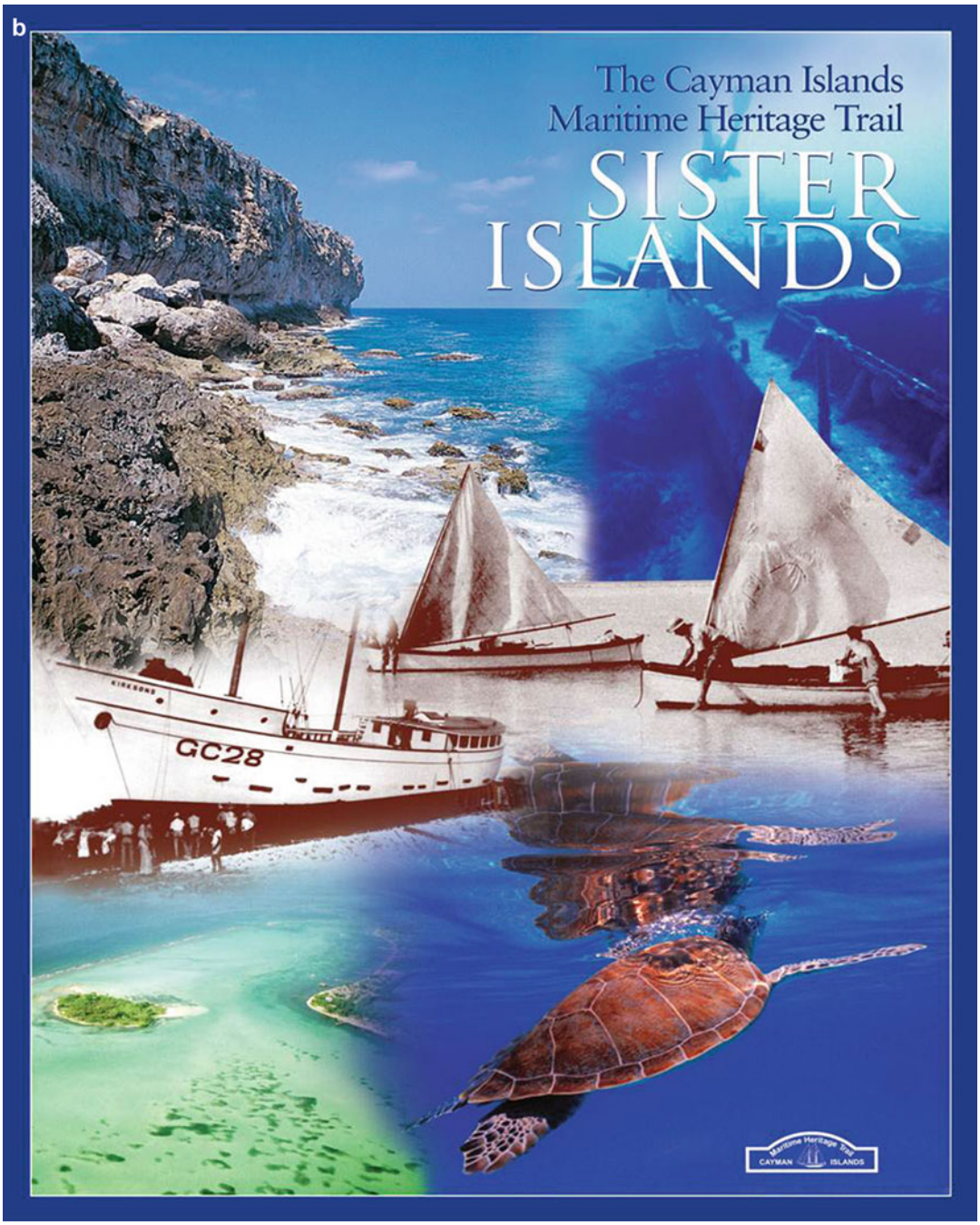

Maritime Historic Site Management for the Public, Fig. 1 (**a**) and (**b**) The Cayman Islands Maritime Heritage Trail poster/brochures are double-sided, featuring images on one side and information on the other. (Image courtesy Cayman Islands National Museum)

Maritime Historic Site Management for the Public, Fig. 2 Interpretation for Florida's Underwater Archaeological Preserves includes brochures that present site history, biology, and instructions for safe diving. (Image courtesy Florida Department of State, Bureau of Archaeological Research)

respect and care so it will last into the future. Managers of preserve, park, and trail programs around the world developed a variety of educational schemes to protect resources while encouraging public access. Interpretive methods include printed literature (Fig. 2), underwater markers (Fig. 3), signage (Fig. 4), Internet-based media (Fig. 5), and laminated guides for underwater touring (Fig. 6). Archaeologists and resource managers seem to agree that public interpretation of in situ maritime sites is an effective means of protecting sites while educating visitors about the need for preservation of nonrenewable cultural resources, although some issues remain to be solved.

Key Issues/Current Debates

Protecting Sites While Encouraging Public Access

One of the most pressing concerns facing archaeologists and cultural resource managers in the twenty-first century is how to protect cultural resources for meaningful research and future investigation while ensuring access to citizens who, in many cases, own the resource. Unlike natural resources which, given time and protection, can regenerate, cultural resources on land or under water are nonrenewable; once compromised, whether through controlled scientific excavation or vandalism, the cultural resource is forever affected. In order to preserve known heritage resources and to encourage the protection of newly discovered sites, archaeologists and resource managers must find ways of promoting the inherent value of submerged sites. Sport divers often find shipwrecks and, even more frequently, seek out known sites to visit. Unfortunately, many divers still view shipwrecks as repositories of treasure to be mined for personal gain and have a "finders-keepers" mentality for any object found under the water. Generations of television programs, movies, books, magazines, and other media reinforce this image, and the legal

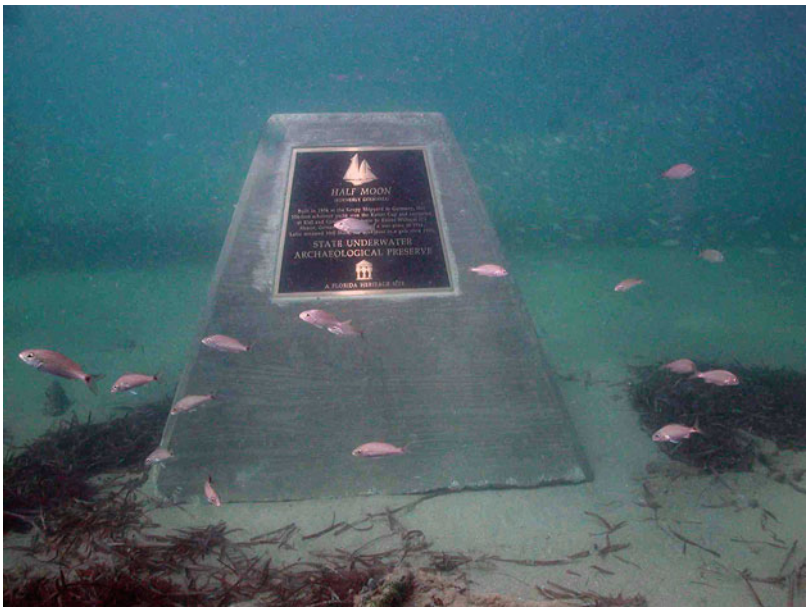

Maritime Historic Site Management for the Public, Fig. 3 Florida's Underwater Archaeological Preserves are marked underwater by bronze plaques set in cement monuments. (Image courtesy Florida Department of State, Bureau of Archaeological Research)

Maritime Historic Site Management for the Public, Fig. 4 Shore-based signage along Australia's coast marks the location of historic shipwrecks, providing information for divers, fishermen, and beachcombers. (Photo by author)

Maritime Historic Site Management for the Public, Fig. 5 Websites offer virtual tours of underwater sites, providing access to nondivers and encouraging visitation. (Image courtesy Florida Department of State, Bureau of Archaeological Research)

salvage of shipwrecks still permitted in some areas adds to the struggle faced by archaeologists. In the face of the failure of legislation alone to protect cultural resources (Prott and O'Keefe 1981; Flatman 2003), public education and outreach programs that encourage learning through responsible visitation appear to be the most effective tools available to managers.

Maritime parks, preserves, and trails all share two basic goals: (1) the in situ preservation of maritime resources and (2) the interpretation of these resources for public education and enjoyment. The ideal end result is for the public, having experienced the park, preserve, or trail, to gain an understanding of the importance of the resource as an irreplaceable element of our common history and of the need to protect it *and all others* for future generations. Toward this end, archaeologists and resource managers seek to create an experience that not only is exciting enough to capture visitors' time and attention, but is meaningful enough to inform the visitor as well.

Controlling/Monitoring Visitor Behavior

A visitor to an in situ archaeological site becomes an active participant rather than merely a passive spectator in the management of the site as a museum. Due to the increased level of interaction with the exhibit, and in the case of underwater and remote open-air museums the lack of on-site

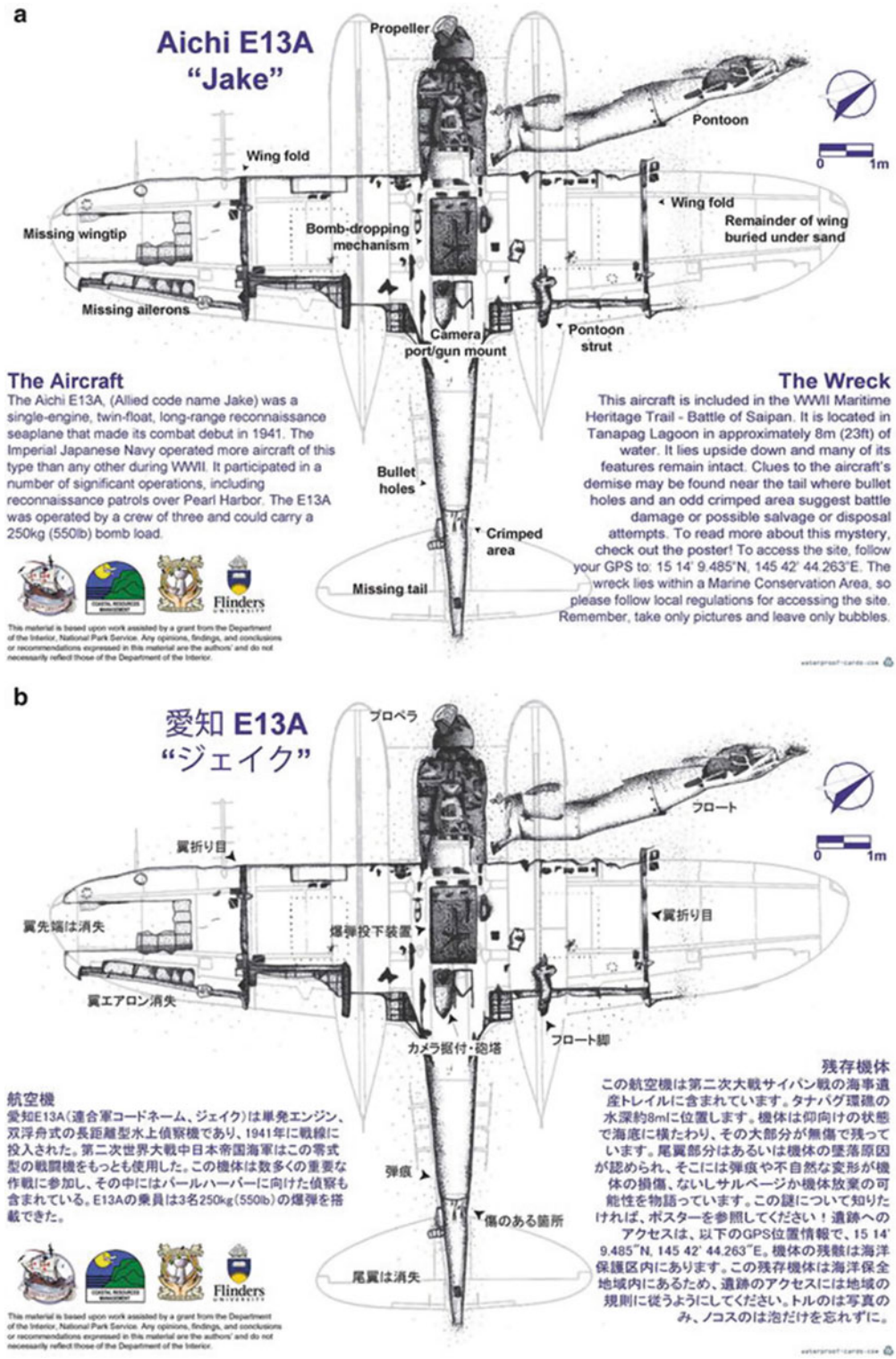

Maritime Historic Site Management for the Public, Fig. 6 The Battle of Saipan Maritime Heritage Trail features laminated underwater guides for visitors that are available in several languages. (Image courtesy Ships of Discovery)

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professional staff, the visitor is asked to fill the role of interpreter, curator, educator, and trustee and may even become part of the exhibit itself if viewed by others (Hetherington 1996:173). Visitors to in situ museums often are out of sight of managers and other visitors and simply are trusted to conduct themselves in a manner consistent with the preservation goals of the museum. The continued existence of the in situ museum depends on the visitor taking an active part in its preservation due to their belief, fostered by interpretation, that the site is valuable and should be left intact for future visitors.

Tracking visitation numbers and controlling visitor-related damage to sites (intentional and inadvertent) is a primary challenge that has not, to date, adequately been met. Some efforts at controlling visitors, and therefore potential impact, have been developed, with varying success. For example, access to the "*Land Tortoise* – A 1758 Floating Gun Battery" Preserve in Lake George, New York, is strictly controlled. Divers are required to obtain a permit for a specific date and time to visit the shipwreck, only eight divers are allowed at any one time, and the wreck is encircled by a barrier perimeter to prevent divers getting too close. The barrier, a chain mounted on stanchions, is intended to keep visitors from hanging onto and damaging the fragile wooden hull; the chain does not at all hinder viewing the wreck and serves the same purpose as a velvet rope at a historic house museum. The chain also serves as a guide line in the dark, cold water. Despite this measure, the shipwreck was damaged in 1995 by divers who attempted (unsuccessfully) to remove two cannon port lids and diver-caused impacts continue to be noted. While not preventing all divers getting too close to the wreck, the chain seems to be serving its purpose.

Similarly, two seventeenth-century shipwrecks in Scotland, designated as important historic wrecks under the Protection of Wrecks Act of 1973, originally were accessed by divers only through specially administered "visitor schemes." Visiting the shipwrecks, the probable *Swan* (also called the Duart Point Site) and HMS *Dartmouth*, required licenses from Historic Scotland, an agency of the Scottish parliament. Beginning in 1994, licenses were issued for divers participating in the Nautical Archaeological Society's (NAS) underwater archaeology training course to visit the wreck of *Swan* during field activities of St. Andrews University's Archaeological Diving Unit. In 1995, the license program was broadened to include any sport diver and the popular program was extended in 1997 to include the near-by wreck of *Dartmouth*. In 2013, the wrecksites' legal designation was changed to Marine Historic Protected Area, opening the sites to all divers without the need for a license. A local dive shop provides information about the history of the wrecks, the importance of maintaining proper buoyancy to avoid damaging fragile wooden remains, and the need for preservation. Guidelines and interpretive signs on the shipwrecks allow divers to explore major features; trail guides featuring site plans and identified features may be taken along as well. Although now visited by many more divers than in years past, the shipwrecks remain in good condition.

Use of the Resource

Because museums without walls do not have the socially, as well as physically, constructed boundaries of ownership associated with traditional museums, they often are contested spaces. In the case of shipwreck sites, for example, rights to use the resource are declared by groups as diverse as archaeologists, maritime historians, fishing enthusiasts, sport divers, marine biologists, and survivors and victims' families or their descendants. Often termed "stakeholders," each may have a legitimate claim that must be recognized by the manager of the site. In some cases, stakeholders include those whose intentions are not aligned with archaeological ethics or public benefit. For example, treasure hunters and commercial salvors are concerned with management plans developed for shipwrecks and may go to some length to ensure that their interests are represented. While the removal of archaeological materials from shipwreck sites for commercial sale is unethical archaeologically, in some areas commercial salvage is

lawfully permitted and salvage of historic wrecks will continue until the public demands that laws are changed. The ideal management plan is one that balances access and appropriate use with steps to preserve the resource, thereby balancing values of public access and preservation in the present and future.

Promotion of Maritime Historical Sites as Heritage Attractions

Heritage tourism is one of the fastest-growing segments of the tourism industry, ranking alongside other specialty tourist draws such as environmental and educational tourism (which heritage tourism often incorporates as well). In 1999, the World Tourism Organization reported that 37% of global tourism was cultural/heritage tourism and that this figure was expected to grow (Richards 2000:1). Visitation to historic submerged sites also is heritage tourism, bringing benefits of learning, appreciation, and economic incentives for preservation, as well as detriments of use-wear and potential for looting and vandalism.

Contemporary tourism is described as a "quest for the other" (Selwyn 1996; Burns 1999) as tourists seek new sights, locations, and experiences. People interested in heritage tourism must travel to areas featuring attractions of historical interest. Heritage and tourism are collaborative – heritage causes locations to become destinations and the trappings of tourism make the destinations economically feasible. The concept of "heritage" is dependent upon display and interpretation to give a dead site, location, culture, or economy a second life as an exhibit of itself (Kirshenblatt-Gimblett 1998:7, 151). Methods by which this is accomplished, including interpretational accuracy, entertainment factor, and sustainable management, are the determining factors for successful education, preservation, and visitation. By combining heritage, ecological, and educational tourism, shipwreck parks and underwater archeological preserves fill a tourism niche that no other attraction can match. Shipwrecks are out of the realm of most people's everyday experiences and, consequently, are seen as exotic or romantic or adventurous, thus fulfilling the need for difference and providing the value of difference for visitors. Archaeologists and resource managers can extrapolate from the value of difference to encourage visitors to think about other values of shipwrecks, such as their value to history, heritage, sense of place, local culture and character, social identity, and the economy.

The growth of heritage tourism and its attendant economic benefits encourages ever more communities to promote their pasts to lure tourists. In this climate, sites and exhibits must be authentic and high quality to attract visitors and to sustain their interest. Credibility can be maintained only if visitors are told explicitly what is real and what is re-created. Archaeology is vital to this effort. Poorly explained sites that do not provide the best possible experience for every visitor ultimately have a negative impact on every other historic site (Slick 2002:222). Archaeology can provide authenticity to objects and sites, not only by identifying age and cultural context, but also in the larger sense of providing a connection to "real things" of the past. This concept is crucial for interpreters who use authenticity to help shape the visitor's encounter (Lipe 2002:22).

Legal Issues and Liability Concerns

Legal issues and liability concerns are a subject of particular interest to managers of, especially, submerged cultural attractions. Interpreted terrestrial sites likely are subject to the same legal standards in terms of accessibility and liability that apply to other land-based attractions such as wilderness areas or nature trails, although this has not been tested in a court of law. Submerged interpreted sites, however, may pose a higher risk of liability. SCUBA diving carries an inherent risk that cannot be reduced to zero; by promoting shipwrecks as places to visit, managers encourage the public to engage in an inherently risky activity. Archaeologists for the state of Florida asked their legal counsel to consider this fact and to provide an opinion regarding liability if a diver were to be injured while visiting a state Underwater Archaeological Preserve. The State's Attorney determined that shipwrecks in Florida waters already are visited by divers and, by interpreting the sites, providing safe diving suggestions, and recommending minimum certification levels, the

state's Preserve program made visitation safer; therefore, the state did not assume any additional liability by encouraging visitation to the Underwater Archaeological Preserves. The state of Vermont's Attorney General's Office issued a similar opinion. Because the state allowed divers to visit its shipwrecks, it already assumed a degree of liability and, assuming conditions were no more hazardous than what normally is encountered in diving, additional liability was minimal.

Fortunately for submerged maritime historic site attraction programs around the world, no reported incidents of diving accidents are recorded to date, and no legal action has been brought against government-operated programs. If liability ever is tested in a court case, however, the resulting decision likely will have ramifications for all submerged cultural attractions.

Developing Effective Interpretation Methods

Because submerged maritime historic sites are located in an alien environment, the general public often disconnects their cultural value from the more easily accepted value of cultural sites on land. Shipwrecks are, literally, out of sight and out of mind and out of reach for a large segment of the public. Managers use interpretation strategies to connect the public, both diving and non-diving, to submerged and terrestrial maritime historic sites.

Various methods of interpretation and education are implemented in preserves, parks, and trails around the world. These methods may be divided into two major categories, those targeted to terrestrial audiences and those targeted to submerged audiences, although the two often, and intentionally, overlap. Interpretive materials range from visual attractions on-site to printed media for distribution and often also incorporate mass media such as television, magazine and newspaper articles, and the world-wide web. The most common interpretive strategy, for both submerged and terrestrial maritime sites, is the production of literature such as brochures and pamphlets describing the site; these may be printed for distribution or provided on websites to be read and downloaded if desired. Some types of interpretive materials are targeted directly at diving and snorkeling visitors who wish to tour the site with information in hand. The form of these materials must be modified in order to make them suitable for use under water. Signage and markers in various configurations also are applied to maritime sites above and below water.

From a museological aspect, interpretive methods seek to impart accurate information about the resource in an engaging and easily comprehensible manner that allows intellectual access to the past (Roberts 2004). The most effective interpretation for imparting information does not simply give facts but integrates the resource into the larger historical picture, provides a connection to the present, and describes what impact the resource had on local cultural identity and community history. This goal is not easy to meet in a small brochure, and many programs employ several forms of interpretive material to provide the whole picture or to enable the visitor to choose the form best suited to their particular desires.

International Perspectives

With the growth of sport diving in popularity and the advancement of technology to allow non-divers to explore underwater sites, more nations around the world are exploring methods for public access and interpretation of underwater archaeological sites. Some are explored below as examples of international perspectives in managing maritime historic sites for the public.

In 1987 the United States' federal Abandoned Shipwreck Act was passed granting title to historic shipwrecks to the states in whose waters they are imbedded. The Act charged states with management responsibility and recommended the creation of underwater parks at shipwreck sites to ensure public access. The first proposal for implementing state management plans based on the Act included suggested criteria for developing parks and preserves. Governmental agencies at the state and federal levels practice cultural resource management as mandated through legislation and often focus on preservation and management of resources specifically for public benefit rather than for strictly scientific research

purposes. States, territories, and commonwealths with active programs for management of maritime historic sites for the public include Florida, South Carolina, North Carolina, California, New York, Michigan, Vermont, Maryland, Wisconsin, Puerto Rico, and the Commonwealth of the Northern Marianna Islands. The National Park Service and the National Oceanic and Atmospheric Administration's National Marine Sanctuary Program also host public educational programs including shipwreck trails and maritime heritage attractions and are leaders in using new technologies, such as virtual and enhanced reality, to enable wider access to submerged heritage sites.

Australia's network of shipwreck trails is one of the largest efforts in public education and management of submerged cultural resources in the world. A major objective of the country's 1985 Australian Commonwealth Historic Shipwrecks Program is the identification and implementation of methods for promoting Australia's shipwrecks to the public. The creation of shipwreck trails is in response to the Program with efforts sponsored by individual states and administered through either local maritime museums or governmental resource management agencies. To date, however, a concerted effort has not been made to coordinate education and preservation efforts across the states. If such an effort were made, existing trails could be linked resulting in significant stretches of coastline being included in a trail.

Traditionally, public access to archaeological sites located in Canada's submerged environments was through museum displays and exhibits, often the best means of interpretation due to the fragile nature of the remains and to poor diving conditions at the wreck locations. In the early 1980s the province of Ontario created Fathom Five Provincial Park in Lake Huron to protect historic shipwrecks from looting through a program of resource inventory, documentation, and monitoring. In 1987, Fathom Five Park became Canada's first National Marine Park. Diving activities are monitored and limited accessibility restrictions are in place, including scheduling visits and requiring divers to register annually. Also in 1987, controlled public access to historic shipwrecks in Louisbourg Harbor, Nova Scotia, was permitted. Parks Canada archaeologists located, identified, and recorded many historic shipwrecks in the harbor; this information was used to develop informational material. Local dive shops permit diving visitors and agree to enforce diving regulations developed by Parks Canada. Additionally, some avocational underwater archaeology groups in Canada, with the support of the government, initiated programs to protect popular historic shipwreck dive sites. These groups, including Save Ontario's Shipwrecks (SOS) and Protect Ontario Wrecks (POW), work with governmental agencies to install mooring buoys, erect interpretive panels, and publish informative pamphlets.

The countries of the United Kingdom are progressing in granting public access to certain historic shipwrecks in UK waters. Shipwrecks designated as historically significant under the Protection of Wrecks Act of 1973 are protected by law and access is restricted to licensed divers. The relaxation of the requirement for a license at some wrecks and the development of underwater interpretive trails allow visitors to explore protected sites while ensuring preservation intended by legislation. Organizations such as the Maritime Archaeology Trust and the Nautical Archaeology Society provide training for divers interested in assisting with maritime archaeology projects as well as support and encourage the development of interpreted submerged attractions.

The island nations of the Caribbean Sea are among the world's top sport diving destinations, offering clear, warm water and a variety of colorful and interesting natural and cultural marine resources. Recognizing the need for protection of marine resources in order to sustain tourism, several islands enacted laws and regulations for the benefit of protecting natural resources such as fish species and coral reefs. Cultural resources, however, still are relatively unprotected and are rarely promoted, except as artificial reefs for marine life. A few islands, including Curaçao, the Dominican Republic, and the Cayman Islands, are in the vanguard of submerged cultural resource management including promoting public education and access through heritage trails, shipwreck parks, and museums in the sea.

Finland's first underwater park at a shipwreck site, sponsored by the National Board of Antiquities, opened in 2000 at the wreck of *Kronprins Gustav Adolf* near Helsinki. The park is interpreted on-site with mooring and marker buoys, a map, and a guideline around the wreck with information signs at major features. A webpage provides basic information and rules for visiting the park. Diving the underwater park does not require permission from the National Maritime Museum, as is necessary for diving any other Finnish shipwreck over one hundred years old.

Israel developed an Underwater Archaeological Park at the Roman harbor of Caesarea Maritima. Four dive trails interpreted as underwater tours include the harbor entrance, walls and breakwaters, docks, and the remains of ships and cargo. One of the areas is suitable for snorkelers, enabling those not certified to SCUBA dive to see part of the ancient port. On land, a visitor's center and near-by museum offer displays, artifact exhibits, real-time video, and documentaries.

In Saipan, part of the Commonwealth of the Northern Mariana Islands, planes, assault vehicles, and shipwrecks associated with the World War II Battle of Saipan are interpreted as an underwater maritime heritage trail. A website and printed brochures present the story of the 1944 battle and site maps can be printed for divers to take on a self-guided tour. These sites, located in clear, calm water with abundant sealife, are heavily visited by divers from all over the world. Enhancing this visitation through focused interpretation can help visitors to understand and appreciate conflict sites as a part of our shared heritage.

Future Directions

New ideas for promoting visitation to submerged resources constantly are tested. Glass-bottom boats allow children, the elderly, the physically challenged, and the nondiving public to experience shipwrecks in a way they otherwise could not and have proven popular and lucrative in areas where they are implemented. Moving threatened shipwreck remains to areas with better diving conditions is a practical solution, making the wrecks more accessible and saving them from total destruction. Underwater museums featuring shipwreck artifacts that are conserved and then returned to the marine environment enables the public to see items that otherwise may not be available for viewing. Some sites are enhanced with replica materials, either discrete artifacts such as cannons or entire replica ships. Tourist submarines, remotely operated cameras, and live web-cams may be feasible at some locations.

Shipwrecks considered to be especially historically significant traditionally are not promoted for public access. Citing potential problems with looting, vandalism, ignorant souvenir collection, and damage to carefully placed excavation grids, resource managers generally discourage the diving public from visiting shipwrecks in the midst of investigations. The managers of the wreck identified as *Queen Anne's Revenge*, the flagship of the pirate Blackbeard sunk off the coast of North Carolina in 1718, developed an innovative means for allowing the diving public to visit the shipwreck. The North Carolina Underwater Archaeology Branch, in partnership with the North Carolina Maritime Museum, created a program that balances public education and site preservation by allowing divers who complete a shipwreck awareness course to visit the shipwreck under the supervision of a guide who accompanies limited groups as they tour the site (Wilde-Ramsing and Hermley 2007).

Development of new technologies enabling the scientific excavation of shipwrecks in extremely deep water also brings the need for interpreting these sites for a public that likely never will visit them. Traditional presentation methods such as printed articles and books as well as television documentaries are useful and effective, but programs hosted on-line provide for interactive public participation. World-wide web-based pages, blogs, interactive site tours, web-cams, and photo galleries enable archaeologists to bring projects to the public in nearly real-time. Web 2.0 applications allow the public to engage and interact with archaeologists, ask questions, provide information, and become part of remote research.

Public involvement in stewardship of interpreted sites is becoming more relevant and,

in many cases, necessary. With relatively few archaeologists and resource managers available to monitor sites, engaging communities to care for the sites in their areas is a viable solution. Dive clubs can be trained in nondisturbance recording methods and encouraged to "adopt" a shipwreck, checking it routinely for damage, policing fishing debris and accumulated trash, and reporting any changes or disturbance. In this way, the public can engage in the production and preservation of knowledge, rather than just the consumption of knowledge.

The growth and proliferation of preserve, park, and trail programs around the world indicates this strategy of maritime historic site management fulfills requirements for both preservation and public access and encourages the visiting public to value submerged historic resources as tangible elements of the past to be maintained for the present and future. By turning resources into attractions, archaeologists and managers can guarantee access and can use the opportunity to educate visitors about the resource. Through intensive education and outreach efforts, visitors are made aware of the value of the resource to local and national heritage and of the need for preserving the resource for future generations to visit and enjoy. By illustrating the value of one shipwreck, managers enable the public to gain an understanding of the value of all.

Cross-References

- ▶ Activism and Archaeology
- ▶ Adult Education in Archaeology
- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Outreach
- ▶ Deep-Water Archaeology
- ▶ Heritage and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ Heritage: Public Perceptions
- ▶ Historic Site and Historic Building Preservation: Overview
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Privatization, Public-Private Partnerships, and Innovative Financing for Archaeology and Heritage
- ▶ Public Archaeology and Education: Present Relevance to the Past
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Site Stewardship Programs
- ▶ Site Visitation and Interpretation: Management
- ▶ Stewardship, Concept of
- ▶ Sustainability and Cultural Heritage
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ Underwater Sites in Archaeological Conservation and Preservation
- ▶ Uses of Heritage

References

Andrews, Richard N.L. 1999. *Managing the environment, managing ourselves: A history of American Environmental Policy*. New Haven: Yale University Press.

Bennett, Tony. 1995. *The birth of the museum: History, theory, politics*. London: Routledge.

Boniface, Priscilla, and Peter J. Fowler. 1993. *Heritage and tourism in the global village*. New York: Routledge.

Burns, Peter M. 1999. *An introduction to tourism and anthropology*. London: Routledge.

Council of Europe. 1978. *The underwater cultural heritage*. Report of the Committee on Culture and Education, Strasbourg, France.

Csapo, Janos. 2012. The role and importance of cultural tourism in modern tourism industry. In *Strategies for tourism industry: Micro and macro perspectives*, ed. Murat Kasimoglu, 201–232. Rijeka, Croatia: InTech.

Flatman, Joe. 2003. Cultural biographies, cognitive landscapes and dirty old bits of boat: 'Theory' in maritime archaeology. *The International Journal of Nautical Archaeology* 32 (2): 143–157.

Griffith, William B. 2003. Trusteeship: A practical option for realizing our obligations to future generations? In *Moral and political reasoning in environmental practice*, ed. Andrew Light and Avner de-Shalit, 131–153. Cambridge, MA: MIT Press.

Hannahs, Todd. 2003. Underwater parks versus preserves: Data or access. In *Submerged cultural resource management: preserving and interpreting our sunken maritime heritage*, Plenum series in Underwater archaeology, ed. James D. Spirek and Della A. Scott-Ireton, 5–16. New York: Kluwer Academic/Plenum (now Springer).

Hetherington, Kevin. 1996. The utopics of social ordering – Stonehenge as a museum without walls. In *Theorizing Museums*, ed. Sharon Macdonald and Gordon Fyfe, 153–176. Oxford: Blackwell.

Jeffries, David. 2001. *Government and tourism*. Oxford: Butterworth & Heinemann.

Kirshenblatt-Gimblett, Barbara. 1998. *Destination culture: tourism, museums, and heritage*. Berkeley: University of California Press.

Lipe, William D. 2002. Public benefits of archaeological research. In *Public benefits of archaeology*, ed. Barbara J. Little, 20–28. Gainesville: University Press of Florida.

Murtagh, William J. 1997. *Keeping time: The history and theory of preservation in America*. Revised edition. New York: John Wiley & Sons.

Professional Association of Diving Instructors (PADI). 2012. Respect our Wrecks PSA. Electronic video, www.youtube.com/watch?v=z02J4P4WWjo. Accessed 17 July 2017. Project AWARE, Rancho Santa Margarita.

Prott, Lyndel V., and Patrick J. O'Keefe. 1981. Law and the underwater heritage. In *Protection of the underwater heritage: Technical handbooks for museums and monuments*, vol. 4, 167–200. Paris: UNESCO.

Richards, Greg. 2000. Cultural tourism. In *Archaeological displays and the public: Museology and interpretation*, ed. Paulette M. McManus, 2nd ed., 1–11. London: Archetype.

Roberts, Lisa C. 2004. Changing practices of interpretation. In *Reinventing the museum: Historical and contemporary perspectives on the paradigm shift*, ed. Gail Anderson, 212–232. Walnut Creek: AltaMira.

Selwyn, Tom, ed. 1996. *The tourist image: Myths and myth making in tourism*. London: Wiley.

Slick, Katherine. 2002. Archaeology and the tourism train. In *Public benefits of archaeology*, ed. Barbara J. Little, 219–227. Gainesville: University Press of Florida.

Wilde-Ramsing, Mark U., and Lauren S. Hermley. 2007. Diver awareness program – *QAR* dive down. In *Out of the blue: Public interpretation of maritime cultural resources*, ed. John H. Jameson Jr. and Della A. Scott-Ireton, 127–144. New York: Springer.

Further Reading

Ham, Sam H. 2013. Interpretation: Making a difference on purpose. In *Fulcrum*. Colorado: Golden.

Hatton, Alf. 2012. *Cultural resource management in contemporary society: Perspectives on managing and presenting the past*. London: Routledge.

Jameson, John H., Jr., ed. 1997. *Presenting archaeology to the public: Digging for truths*. Walnut Creek: AltaMira.

Jameson, John H., Jr., and Della A. Scott-Ireton, eds. 2007. *Out of the blue: Public interpretation of maritime cultural resources*. New York: Springer.

Leshikar-Denton, Margaret E., and Della A. Scott-Ireton. 2014. Underwater archaeology. In *Encyclopedia of Caribbean archaeology*, ed. Basil Reid and R. Grant Gilmore III. Gainesville: University Press of Florida.

Little, Barbara J., ed. 2002. *Public benefits of archaeology*. Gainesville: University Press of Florida.

McManus, Paulette M., ed. 1996. *Archaeological displays and the public: Museology and interpretation*. University College London, London: Institute of Archaeology.

Merriman, Nick, ed. 2004. *Public archaeology*. London: Routledge.

Okamura, Katsuyuki, and Akira Matsuda, eds. 2011. *New perspectives in global public archaeology*. New York: Springer.

Satchell, Julie and Paola Palma (eds.). 2007. *Managing the marine cultural heritage: Defining, accessing and managing the resource*. Council for British Archaeology Research Report #153, York.

Scott-Ireton, Della A. (ed.). 2014. *Between the devil and the deep: Meeting challenges in the public interpretation of maritime cultural sites*. When the Land Meets the Sea: An ACUA and SHA Series, Annalies Corbin and J. W. Joseph, series editors. New York: Springer.

Spirek, James D., and Della A. Scott-Ireton, eds. 2003. *Submerged cultural resource management: Preserving and interpreting our sunken maritime heritage*, Plenum series in Underwater archaeology. New York: Kluwer Academic/Plenum (now Springer).

Tilden, Freeman. 2007. *Interpreting our heritage*. 4th ed. Chapel Hill: University of North Carolina Press.

Zimmerman, Larry J. 2003. Presenting the past. In *Archaeologist's toolkit #7*. Walnut Creek: AltaMira.

Websites

A selection of websites dedicated to maritime historic sites managed for the public (Accessed July 17, 2017):
www.museumsinthesea.com
http://info.flheritage.com/galleon-trail/
http://info.flheritage.com/maritime-trail/
http://www.floridapanhandledivetrail.com/
http://museum.wa.gov.au/research/departments/maritime-archaeology/shipwreck-trail-pamphlets
www.agfg.com.au/guide/tas/bass-strait-islands/bass-strait-islands/king-island/attractions-tourism/the-shipwreck-trail
http://www.lochalinedivecentre.co.uk/?page_id=1451
www.maritimetrails.org/
www.ohioshipwrecks.org/ShipwreckDetail.php?AR=3&Wreck=16
http://floridakeys.noaa.gov/shipwrecktrail/
http://www.dec.ny.gov/outdoor/5076.html
https://www.pc.gc.ca/en/amnc-nmca/on/fathomfive
http://www.nba.fi/en/cultural_environment/archaeological_heritage/underwater_cultural_heritage/underwater_park/kga
http://www.museum.ky/sites
http://www.caesarea-diving.com/en/page.asp?id=74
http://www.pacificmaritimeheritagetrail.com/

Maritime History

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Introduction

Maritime archaeologists examining a shipwreck can make notable insights to our understanding of the past. The investigators study the vessel's construction techniques, and the artifacts that have survived can offer a picture of the material culture that has been frozen in time. Clearly, much can be learned about that single vessel and its crew using maritime archaeological and historical techniques. Without consideration of the shipwreck's context, however, the archaeologists' insights are limited. What does a single ship say about the society that produced it? How representative was this vessel of the larger fleet of which it was a part? Why was this particular vessel sailing in the waters where it came to grief? Archaeologists must place a site or an object in relation to specific historical contexts (i.e., events/details of construction or use) as well as more general contexts (i.e., processes such as how the historical contexts of settlement/exploration/warfare invariably explain why a ship was going where it was going/wrecked where it did). Careful historical research is essential to establish the shipwreck's significance. Only by situating the wreck in context can maritime archaeology make valuable contributions to knowledge of the past. This is the intersection of maritime archaeology and maritime history in historical archaeology.

Key Issues/Current Debates/Future Directions/Examples

Some of the best works in maritime history incorporate this interdisciplinary approach. Colin Martin and Geoffrey Parker's *The Spanish Armada* (1988) is a case in point. In the collaboration of a maritime archaeologist and a historian, *The Spanish Armada* incorporates the findings of Martin's excavations of the Armada vessels that wrecked off the Scottish and Irish coasts with Parker's archival research in Spain and England to offer the most accurate interpretation of this famous sea battle. Earlier accounts posited that the Spanish had fired few broadsides in the pivotal action against the English fleet off Gravelines because they had run out of shot. Martin's archaeological evidence clearly demonstrated this was not the case because he found substantial amounts of shot in the wrecks he investigated. Using this evidence with records Parker examined concerning the ordnance carried by the Spanish and English ships, *The Spanish Armada* offers a new and more convincing account for the Armada's defeat. The Spanish fired their guns infrequently because of their outmoded tactics. The English won the battle because of their heavier firepower and better designed gun carriages. The combination of archaeological and historical evidence offers a more informed picture of the past.

This combination of historical and archaeological evidence offers a better depiction of more prosaic maritime activity as well. Archaeologists were familiar with the remains of a nineteenth-century ocean tug lying on the seabed near St. Augustine, Florida. Careful historical research, however, was necessary to identify the vessel. Kimberly Eslinger's investigation of the wreck revealed that the tug possessed an unusual steam engine. In addition, parts of .43-caliber Remington rolling block rifles and cases of rifle cartridges – munitions favored by Cuban revolutionaries – also lay near the wreck. Examination of the engine plans, combined with the date of the wreck and the presence of ordnance, revealed that this was no ordinary tug. Instead, it was the SS *Commodore*, a vessel used to run guns from New York to Cuban revolutionaries in 1897. Moreover, Eslinger's additional historical and literary detective work revealed that noted nineteenth-century American author and newspaper reporter Stephan Crane was a passenger on the *Commodore*. This shipwreck formed the basis for Crane's famous short story "The Open Boat."

Historical records can also be indispensible in determining the causes of a shipwreck. This is certainly true for the wreck of HMS *Santa Monica*, a British Revolutionary War frigate that sank in Hansen Bay off the Danish island of St. John (now the United States Virgin Islands) in April 1782. Kelly A. Gleason's archival research (Gleason 2006) discovered that the Admiralty sent the *Santa Monica* to the Caribbean to protect the British colony of Tortola from the actions of French, Spanish, and American warships and privateers. While sailing in consort with several other Royal Navy vessels, the *Santa Monica*, commanded by Captain John Linzee, struck hard on an unknown submerged rock. The frigate immediately took on water, and Linzee realized that he would have to run his ship aground to save his crew. Linzee skillfully grounded his vessel and saved every man on board. He then supervised salvage operations that recovered the rigging, sails, yards, anchors, guns, and many small stores. Linzee reported all of these events to his commanding officer, Admiral Sir George Rodney, on 29 April 1782. This letter and related documents thus explain why maritime archaeologists found few artifacts when a local diver discovered the wreck in 1970. The extensive records associated with the loss of HMS *Santa Monica* contained in the Admiralty Papers in the National Archives of Great Britain provide the keys to understanding why the frigate sank in the Virgin Islands. Moreover, those historical documents allow maritime archaeologists to understand why this British frigate was sailing off a Danish island in the Caribbean during the American Revolution.

These three examples, which could be multiplied many times over, clearly demonstrate the value of solid historical research for establishing context for maritime archaeology projects. The artifacts on the ocean floor can offer valuable evidence concerning past events that historians miss while reading dusty documents in archives and libraries. On the other hand, those documents are usually indispensible for determining historical context. Clearly, an interdisciplinary approach that combines maritime archaeology and maritime history in historical archaeology offers the best strategy for understanding the past.

Cross-References

- ► Caribbean Historical Archaeology
- ► Caribbean Maritime Archaeology
- ► Society of the Ship
- ► United Kingdom: Cultural Heritage Management Education
- ► United States: Cultural Heritage Management

References

Gleason, K.A. 2006. 'Compelled to run His Majesty's Ship ashore': A multidisciplinary approach to submerged cultural resource management at HMS *Santa Monica* shipwreck site. Unpublished Ph.D. dissertation, East Carolina University.

Martin, C., and G. Parker. 1988. *The Spanish Armada*. New York: Norton.

Further Reading

Eslinger, K.L. 2005. 'And all the men knew the colors of the sea': Historical and archaeological investigation of the SS *Commodore*, Ponce Inlet, Florida. Unpublished Master's dissertation, East Carolina University.

Maritime Iconography

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Introduction and Definition

Maritime iconography relates to four interconnected fields of study. These include the analysis and interpretation of:

- Maritime images and representations on a wide array of portable and semiportable materials, including the main groupings of stone-carving, graffiti (in stone, wood and plaster), models, manuscript illuminations and drawings, wood carving, tapestries, mosaics, stained and painted glass, coins, seals, tokens, murals, metalwork, paintings, and portable objects (see Farrell 1979) (Figs. 1, 2, 3, and 4).
- Maritime imagery and symbolism that acts as the inspiration for the design and iconography of non-portable materials, everything from individual signs on buildings and sculptures up to entire buildings, and even designed urban environments that use maritime motifs.
- The broader sociocultural uses of the symbolic value of maritime environments or technologies, such as the cultural enjoyment of real maritime environments like beaches and also representations of these environments through art or designed environments like themed bars or restaurants (see Crumlin-Pedersen and Munch Thye 1995).
- Symbolic imagery on or within vessels, e.g., eye motifs painted on the bows of boats, ships' figureheads, or hidden symbolic features such as coins placed in the mast step of vessels. The latter also includes symbolic activities associated to points in the "use life" of vessels (see Kaul 1998).

Maritime Iconography, Fig. 1 Cast of the c. 1199 CE seal of Dunwich, Suffolk. (Photo by Ian Friel, courtesy and copyright of Ian Friel, 2011)

Maritime iconography has been a nearly constant theme of the majority of societies, even those living significant distances inland, since prehistory. There are virtually no cultures or communities that have not in the past employed some form of maritime iconography, as witnessed by the copious quantities of maritime iconographic materials discovered over the years by historians, ethnographers, and archaeologists. This tendency continues in the modern world, where mass media and consumerism witness the regular use of maritime iconography and symbols in everything from the representation of political events in the media to the marketing of common items such as food, drink, and clothing. The modern world even has entire designed environments that utilize maritime iconography in their design and layout, places such as maritime-themed residential and social waterfront spaces in regenerated (often

Maritime Iconography, Fig. 2 Late fifteenth–/early sixteenth-century CE votive bench-end in the church of St Winnow, Cornwall. (Photo by Ian Friel, courtesy and copyright of Ian Friel, 2011)

Maritime Iconography, Fig. 3 Ship graffiti (probably from the sixteenth century CE onwards) on woodwork in the church of St Nicholas, Salthouse, Norfolk. (Photo by Ian Friel, courtesy and copyright of Ian Friel, 2011)

maritime) urban environments (see Atkinson et al. 2002).

Maritime iconography is the branch of art history and archaeology that studies the identification, description, and interpretation of the content of maritime images, be these "direct" maritime images (e.g., of watercraft and associated technologies and locations) or "indirect" maritime images (e.g., the use of common maritime components like rope designs, anchors, or ancillary features commonly associated with the marine zone like tattoos in secondary contexts like architecture and design). Maritime iconography draws widely from across history and art history, archaeology, anthropology, and ethnography in the collection and analysis of data, also in particular from related disciplines like philosophy, the history of science, and geography.

Maritime Iconography, Fig. 4 Ship graffiti on the wall of a medieval chapel at Kilchattan on the island of Luing in the Inner Hebrides. (Photo by Colin Martin, courtesy and copyright of Colin Martin, 2011)

Key Issues/Current Debates/Future Directions/Examples

The formal history of the study of maritime iconography dates back to the nineteenth and early twentieth centuries. It was a key concern of the Society for Nautical Research during the early years of that organization's life from 1911 onwards (see Murphy and Oddy 2011). Throughout the interwar period, considerable efforts were expended in the collection and cataloging of different examples of maritime iconography as a "source book" for ancient ship technology (see,

e.g., Moll 1929). Before the development of maritime archaeology as a formal academic discipline, such studies were often the only significant source for the study of ancient watercraft. After World War II, with the emergence of maritime archaeology and increasing discoveries of the remains of old ships, the importance of maritime iconography as a source declined and so in turn did its study, although it continues on as a niche market to this day and is popular among certain "avocational" groups such as ship modelers, with a particular focus on the arts of the "great age" of sail (e.g., the mid-fifteenth to mid-nineteenth centuries) (see Kemp and Ormond 1992).

For the Middle Ages in particular, maritime iconography remains an important source of analysis and also inspiration, providing details of aspects of medieval vessel technology such as sail types and patterns, hull decoration, and embellishment that archaeology rarely provides as well as providing evidence of ancillary facilities and equipment, also vessel handling techniques and crew behaviors (see Flatman 2009). The rise of post-processual archaeological approaches in the 1980s also witnessed the emergence of new areas of research into maritime iconography. On the one hand, influenced by studies of prehistoric art, especially rock and other forms of "landscape" art in Scandinavia, there was and continues a widespread reassessment of the relationship of the coastline and the marine zone to prehistoric communities, the symbolic place of the sea and ships in such communities (see Crumlin-Pedersen and Munch Thye 1995). There have been similar analyses of other distinctive marine areas, notably the Aegean (see Wedde 2000). On the other hand, influenced by postcolonial theory, there has been the consideration of the symbolic place of both ancient and modern vessels and also maritime archaeology in contemporary society, in particular the use of "ship symbolism" to project a sense of nationalism and "traditional" values (see Cederlund 1994). This was most overtly undertaken by the Conservative administration of the UK in 1982 during the Falklands/Malvinas War, when, with the support of the media, the recovery of the wreck of the Tudor warship *Mary Rose* functioned as a major form of nationalism symbolic ideology to encourage support for the war (see Wright 1991). Post-processual studies of contemporary society and the place of maritime imagery also occurred at this time – see, for example, Shanks and Tilley's (1994) – which considered maritime imagery and social identity on Scandinavian beer-can designs. The ultimate modern example of this phenomenon is the iconography and symbolic profile of the loss of the passenger liner *Titanic* in 1912, which is a near-universally recognized symbol of technological and social hubris, used in all sorts of contexts, including media, advertising, and the arts (see Biel 1997).

In the twenty-first century, the study of maritime iconography has effectively split into two academic groupings that have little cross-fertilization: traditional studies of the iconography of maritime technology allied to historical and art historical studies, and archaeologically led studies concerned with the higher-level symbolism of maritime art and communities. The latter in remain extremely popular, a particular field of study being the symbolic profile of "prehistoric" art, especially rock and other forms of "landscape" art at the coastline. Of late this has expanded to include specialist studies of particular communities, for example, surveys of the maritime elements of coastal Indigenous Australian rock art. There remains a need for national and international inventories of maritime iconographic materials in this respect, of which ongoing digitization programs of specific media offer considerable potential. Digital access to large quantities of disparate historic data for maritime iconography should allow future scholars to overcome the problems of access to meaningful quantities of source materials that have bedeviled previous scholars in this field.

An instructive example of the pros and cons of the study of maritime iconography comes from medieval-illuminated manuscripts. These are indicative of both the breadth of maritime iconographic themes used in societies and the problems of using much maritime iconography as source materials for ancient societies (see Flatman

2009). Medieval Europe was a society deeply influenced by maritime technology, and tens of thousands of illuminated manuscripts exist containing hundreds of thousands of different depictions of the maritime world, from crude and simple line drawings to detailed, multipage, full-color depictions. Virtually every aspect of the maritime world is depicted in these illuminations, including a startling array of maritime technology – including port and harbor installations, waterfronts, and shipbuilding facilities – coastal defenses, and ships and boats, also specific maritime activities such as sea battles, convoys, and trading activities. These illuminations deploy a complex and extensive symbolic language associated to medieval Christian philosophy, with most illuminations having multiple meanings dependent upon the level of education of the observer, from simple parables up to complex jokes within jokes. These illuminations also share common stylistic or other errors that observers need to be cautious of. Assessments must thus be careful to appreciate the cultural context of illustrations, such as the wider nature of medieval society, its background history, and its theological, intellectual, and artistic traditions, and as such illuminations are rarely reliable (although this does not mean they are not useful). Most aspects of medieval material culture were not considered sufficiently important to be recorded, particularly scenes of everyday life. Thus, when it was felt worth making a record, this was usually for economic reasons, because what was being described was a threat to the established social hierarchy, because those aspects depicted served as a positive or negative role model, or because those aspects depicted were amusing or motivational. Nor was it considered contradictory for the same author to describe a lifestyle as a positive ideal for human existence and simultaneously the negative model, especially in the case of the lives and material culture of the lower classes. Illuminations of ships in particular also tend to be more crowded together in art than in life, and there is also a tendency to exaggerate the height of vessels at the expense of their length. Within this, features that particularly attract the eye also tend to be reproduced on many occasions (e.g., the nails of clinker-built hulls and reef points across the whole of a sail, ratlines – see Villain-Gandossi 1994).

Irrespective of time or place, the majority of global maritime symbolism shares common symbolic themes. The reasons for this commonality and extent of maritime iconography are, as the maritime archaeologist Keith Muckelroy explained, easy to understand: because "in any pre-industrial society, from the upper Palaeolithic to the nineteenth century AD, a boat or (later) a ship was the largest and most complex machine produced" (Muckelroy 1978: 3). With the marine zone and in particular marine technology playing so central a part in the lives of so many people, it is inevitable that maritime iconography develops that reflects this central place of the marine zone in the lives of individuals and communities. Positive symbolic associations in maritime iconography far outweigh the negative ones in most cultures and tend to be of those of characteristics either associated with vessels themselves or gained as a consequence of the use of vessels for trade or war (e.g., power, success, and strength) and extend onto further levels through the conceptualization of strategies or values (i.e., loyalty, competence, and trust). In association – and mutually compatible with – manifestations of power, ships also function as symbols of status and membership, usually of elite groups. Most communities have vocal expressions of ship symbolism and general importance. Myths, epics, and tales (often expressed further in different media such as songs, images, with other/greater symbolic content) are common and often involve seminal points of cultural life history, such as creation myths. Reflecting this tendency at the small scale, ceremonies also usually exist surrounding vessels at key stages within their "use life," both for their own sake and those of their users. Whether to ensure a successful single event, or more widely for the benefit of society as a whole, such ceremonies can both help and be indicative *of* the physical reality of power and control – economic,

political, social, or otherwise – expressed by and through ships. Engenderization of ships – attesting to their familiarity and importance, personalization providing a step onto a different relational level – can be seen alongside this "social inclusion" of ships within society, and the appreciation of this is vital. Establishment of a "soul" both allows and requires such ceremonies at key stages of "life" usage, especially at creation, first use, and final destruction (to be equated with the steps in human existence), and can be taken a stage further by the establishment of personal relationships and/or ties for specific individuals – often in a specific role, like a captain or owner – in which characteristics unique to the specific craft are established (in some cases via unique events such as handling characteristics or bad or good omens at "strategic" use points). These are specific spiritual attributes equated with "its" own "personality," such as perceptions of one ship to be a "good"/"friendly" boat and another a "bad"/"malevolent" boat. Most societies similarly maintain levels of stylistic artwork upon boats. These never function as "art for arts sake": even modern company logos fulfill a purpose of identification and can often be for ephemeral concepts. Three variations exist [a] for the purposes of identification (which can then themselves take on a further symbolic dimension); [b] for the pacification of spiritual forces with impact – beneficial or malevolent – upon waterborne activities (like ensuring a safe voyage or passage); and [c] to project and identify attributes with which a society hopes/wishes to be identified with. Similarly, ships are rarely of purely functional form, with certain design styles or attributes for reasons beyond the rational-functional, often as a result of tradition (itself usually the result of long evolution in the face of the requirements vis-à-vis sea conditions, expected use, tools and building materials to hand, etc.). Such stylistic designs express concepts valid to the society itself and – often in highly altered interpretative frameworks very different to those conceived of by the "home" culture – to others who met through inter-voyage contact.

Cross-References

▶ Maritime Landscapes

References

Atkinson, D., S. Cooke, and D. Spooner. 2002. Tales from the riverbank: Place marketing and maritime heritages. *International Journal of Heritage Studies* 8 (1): 25–40.

Biel, S. 1997. *Down with the old canoe: A cultural history of the 'Titanic' disaster*. New York: W. W. Norton.

Cederlund, C.O. 1994. The regal ships and divine kingdom. *Current Swedish Archaeology* 2: 47–86.

Crumlin-Pedersen, O., and B. Munch Thye, eds. 1995. *The ship as symbol in prehistoric and medieval Scandinavia*. Copenhagen: Danish National Museum.

Farrell, A.W. 1979. The use of iconographic material in medieval ship archaeology. In *The archaeology of medieval ships and harbours in northern Europe*. British Archaeological Reports International series 66, ed. S. McGrail, 227–246. Oxford: Archaeopress.

Flatman, J. 2009. *Ships and shipping in medieval manuscripts*. London: British Library Press.

Kemp, J., and R. Ormond, eds. 1992. *The great age of sail: Maritime art and photography*. London: Phaidon.

Moll, F. 1929. *Das Schiff in der Bildenden Kunst*. Bonn: Kurt Schroeder.

Muckelroy, K. 1978. *Maritime archaeology*. Cambridge: Cambridge University Press.

Murphy, H., and D.J. Oddy. 2011. *The mirror of the seas: A centenary history of the Society for Nautical Research*. London: National Maritime Museum.

Shanks, M., and C. Tilley. 1994. Social values, social constraints and material culture: The design of contemporary beer cans. In *Re-constructing archaeology. Theory and practice*, ed. M. Shanks and C. Tilley, 172–236. London: Routledge.

Villain-Gandossi, C. 1994. Illustrations of ships. In *Cogs, caravels and galleons*, ed. R.W. Unger, 169–174. London: Conway.

Wedde, M. 2000. *Towards a hermeneutics of Aegean Bronze Age ship imagery*. St Petersburg: Bibliopolis.

Wright, P. 1991. Falling back together in the 1980s: The continuing voyage of the *Mary Rose*. In *On living in an old country: The national past in contemporary Britain*, 162–192. London: Verso.

Further Reading

Blake, J. 2009. *The sea chart: The illustrated history of nautical maps and navigational charts*. London: Conway.

Frere-Cook, G. 1966. *The decorative arts of the mariner*. London: Jupiter.
Hansen, H.J., and C.B. Hansen. 1998. *Ships' figureheads*. Atglen: Schiffer.
Kaul, F. 1998. *Ships on bronzes: A study in Bronze Age religion and iconography*. Studies in Archaeology & History 3. Copenhagen: National Museum.
Kobylinski, Z. 1995. Ships, society, symbols and archaeologists. In *The ship as symbol in prehistoric and medieval Scandinavia*, ed. O. Crumlin-Pedersen and B. Munch Thye, 9–19. Copenhagen: Danish National Museum.
Quilley, G. 2000. Missing the boat: The place of the maritime in the history of British visual culture. *Visual Culture in Britain* 1 (2): 79–92.
Unger, R.W. 1991. *The art of medieval technology: Images of Noah the shipbuilder*. New Brunswick: Rutgers University Press.
Unger, R.W. 2010. *Ships on maps: Pictures of power in renaissance Europe*. London: Palgrave Macmillan.

Maritime Landscapes

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Introduction and Definition

The term *landscape* applied to a maritime world does have a few distinct features which make it different to the application of it in a purely terrestrial context. In reality, of course, there is no clear-cut division between those two, since landscapes are always used and experienced by human beings and they move, albeit not always freely, between the two. Accordingly, in a way one could say that all landscapes are cultural or creations of culture. On the other hand, the natural or physical landscape and its potential resources have had such an overwhelming importance in the establishment of human history that it would be appropriate rather to acknowledge this fact by defining cultural landscape as a *physical landscape + cognitive landscape*. This dualism thus expresses an overall possibilistic strategy.

Key Issues and Current Debates

In the grand narrative history of archaeology, it could safely be argued that only the terrestrial variety of landscape, which largely corresponds to agrarian cultures, has been studied, in fact almost exclusively. It appears rather painful that a qualified reason for this focus seems simply to be that it contains highly visible remains, "pungent" monuments. In asserting the existence of the maritime variety of landscape, therefore, it has been part of a slightly provocative strategy to stress that all relevant remains are not always visible. Furthermore, apart from the comparatively meager remnants of human activity on land along the ancient shores, the landscape extends in a most striking way underwater, even though no such activity necessarily took place there in the past. Here, a far greater place in a study is thus of necessity taken by the immaterial remains, the place names, the landscape in the mind, and the mental landscape, as it is determined by movement on the water and by orientation and navigation on it to be able to reap the resources of it and exploit the network of cultural and social ways on it. Its time span is enormous, but even given the natural/physical changes, the signs of certain aspects of cultural continuity are not only self-evident, they are sometimes astonishing. This landscape has been used by human beings from at least the Mesolithic period onwards in fishing, hunting, and gathering cultures, and as a tremendous ever-present reserve, it is not only marginal – as is often stated – in agrarian cultures. This does not mean that maritime cultures are integrated; however, they are assumed to lead a separate and parallel existence to the mainstream. It would even be remarkable if terrestrial archaeology would not be influenced by such observations on its own ground.

The *maritime cultural landscape* is the term preferred by many, although not all. It is based on the cultures at the brink of the seas and oceans, its many-sided varieties, and in later times always including some agrarian or other terrestrial pursuits, including hunting inland (see Westerdahl

1992; Jasinski 1994; Parker 1999; Flatman 2003). The other designation, *seascape*, has gained ground during later years (see Cooney 2003). Originally the meaning of seascape is a painting of a ship in a tempest, often rather giving the impression of the helplessness of humans before the forces of nature. The tumultuous sea is often all-encompassing, and no sight of land can always be discerned. This is at its roots much more the physical than the cultural landscape. An instinctive reaction to the concept of the maritime cultural landscape could be to suspect the absence of cultural and social potential. But this term does express efficiently the contrast between the two main perspectives, sea and land, and places them on an equal footing. This could thus be a positive force in a certain stage of argumentation. The question is, however, whether the contrast is that antagonistic, if such a dualism might distort the proportions of qualified distinction. The maritime cultural landscape – i.e., the landscape of maritime culture with connotations as of above – is a painting of land as well as of water. To human beings in a boat, the contours of all kinds of land, islands, skerries, shallows, reefs, promontories, and indented coastlines are as important as the waters proper. Helplessness is here a very relative thing within a social and cultural web. Moreover, whatever you may call them, the aspects, facets, or even elements of any landscape are common to both worlds. The maritime cultural landscape "only" has a character distinctly its own. A few examples have been proposed by the present author: *economic landscapes* (e.g., in the maritime sense fishing, where the underwater shoals are depicted in the mind as well as the topography on land, the hunting of seals, the gathering of eggs and down); *resource landscapes* (for all kinds of wood and other materials, including rock for various kinds of tools, freshwater wells, but also for the neat layout of slipways for boatbuilding); *transport landscapes* (the network of routes and harbors, havens, which are all social constructs as well), with its attendant dramatic scenery of shipwreck, human tragedy, and plunder; *power landscapes* (landscapes of domination, of defense and aggression), but always with an element of *resistance and rebellion* (piracy, illegal trading); a strongly related *social landscape* (organization of land forms, regal rights of land and water); and *cognitive* (place names, mental maps) *and ritual landscapes* (as applied from a boat or at the liminal space of the shores, temples on headlands, fishing chapels, dimensions of taboo, and religious constraints). These elements or aspects are all intertwined, but each could for a temporary purpose of clarity be laid pure. They were certainly seen as clear "taskscapes" by the people of the past. These examples are clearly dangerously diachronic, but only for the purpose of showing continuities of a particular maritime kind. The route to such holistic interpretations of prehistory and early history must clearly go by way of experiences of continuities in the present or near-present. Oral tradition and unusual sources of the *Annales* kind are always important tools.

Scientific terms may not only be English, nor is English the only scientific language possible. Seascape as a term may work in English, since it was more or less created and accepted in that language, but appears rather strange in many other linguistic contexts. On the other hand, landscape is a concept easily translatable. It has its origin in Dutch or Low German where the *schap* or *scap* suffix means skill or ability. As Van de Noort points out (2011: 23) "the original meaning of the word 'landscape' was the perception of the ability to live in, on and off the land." Such a perception of human use is not difficult to project into the tremendous variety of cultures or languages. Nor need it undermine the analysis of power and the constraints of social forces.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Cognitive Archaeology
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Experimental Maritime Archaeology
- ▶ Landscape Archaeology
- ▶ Submerged Prehistoric Landscapes

References

Cooney, G., ed. 2003. Seascapes. *World Archaeology* 35 (3). London: Routledge.

Flatman, J. 2003. Cultural biographies, cognitive landscapes and dirty old bits of boat: 'Theory' in maritime archaeology. *International Journal of Nautical Archaeology* 32 (2): 143–157.

Jasinski, M.E. 1994. The maritime cultural landscape – An archaeological perspective. *Archaeologia Polski* 38 (1): 7–21.

Parker, A.J. 1999. A maritime cultural landscape: The Port of Bristol in the Middle Ages. *International Journal of Nautical Archaeology* 28: 323–342.

Van de Noort, R. 2011. *North Sea archaeologies: A maritime biography 10.000 BC-AD 1500*. Oxford: Oxford University Press.

Westerdahl, C. 1992. The maritime cultural landscape. *International Journal of Nautical Archaeology* 21: 5–14.

Further Reading

Ford, B., ed. 2001. *The archaeology of maritime landscapes*. New York: Springer.

McErlean, T., R. McConkey, and W. Forsythe. 2002. *Strangford Lough: An archaeological survey of the maritime cultural landscape*. Belfast: Blackstaff.

Westerdahl, C. 2005. Seal on land, elk at sea: Notes on and applications of the ritual landscape at the seaboard. *International Journal of Nautical Archaeology* 34 (1): 2–23.

Westerdahl, C. 2011. The maritime cultural landscape. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 733–762. Oxford: Oxford University Press.

Marketing Heritage

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Introduction: Defining Marketing Heritage

Increasingly over the years of the twenty-first century, the marketing of the past has represented, confronted, engaged, and facilitated archaeological research. Marketing is a means to locate target audiences, markets, for goods or services (Misiura 2006: 1). Heritage is the past in the present, a value added to an object, place, or activity. Archaeology is only one feature of the past but an increasingly important component of heritage. Marketing heritage refers to the paradoxical dynamics of archaeology's intersection with capitalist consumerism, particularly through heritage tourism.

Archaeologists during the last quarter of the twentieth century began to notice the increasing implications of tourism for archaeological sites. Visitations to place revealed by excavations electrify the imagination and encourage study, research, and preservation but the scale of visits and the transformation of visits into tourism affect the physicality of ancient places and change the meanings and vistas of the past landscape. Brian Fagan (1995) offered a vibrant example when he contrasted two visits to the Temple of Poseidon at Sounion, in 1979 versus 1990. South southeast of Athens, the earlier excursion allowed quiet reflection. Fagan laments the loss that comes with a packed parking lot, the cordoning off of the temple, and the crowd of tourists; those observations were prophetic: archaeological sites around the world are facing increasing concerns over the successful marketing of their significance. In 2004, Rowan and Baram (2004) organized a collection of studies to illuminate the implications of marketing the past. The trajectory for greater access and increasing number of visitors has progressed continually since then, creating challenges for the management and preservation of historic locations and changing the feel of places, the feel that Walter Benjamin (1936) called the aura. The shifts for archaeological sites, now tourist attractions, range from the rise of humidity levels inside great monuments and the implications of air pollution from travel buses to managing crowds and increasing the infrastructure around a site, such as gift shops and restaurants, that have led to restrictions at major heritage sites, such as at Stonehenge. The continual growth in tourism to Venice, Italy, has become a well-known example of a crisis of consumption of the past, with tourists themselves being the focus of the tourist gaze (Fig. 1). And the number of visitations is accelerating as tourism continues to grow globally, with efforts by national governments and

Marketing Heritage, Fig. 1 Tourists in Piazza San Marco

localities to showcase their heritage as an attraction for tourists. Recent scholarly publications, with titles such as *Heritage and Tourism: Place, Encounter, Engagement.* (Staiff et al. 2013) and *Tourism and Archaeology: Sustainable Meeting Grounds* (Walker and Carr 2013) as well as business textbooks (Misiura 2006), illustrate the approaches being considered for marketing heritage.

Uzi Baram and Yorke Rowan (2004: 5) state: "In employing the term 'marketing', the active construction of the past toward specific purposes is the goal" of investigating the use of archaeology for tourism and other means of using the past for economic development or financial gain. Cultural traditions and antiquities can become so entangled with the tourist industry that representation becomes marketing. Anthropology offers lessons and insights into this crisis of the representation, adding to the scholarly debate over heritage. Among the well-known examples of archaeology being presented for consumption are sites that have become famous for being famous, such as the Pyramids of Giza, the Great Wall of China, and Masada, and artifacts such as the Parthenon/Elgin Marbles on display at the British Museum. The scholarly critique of marketing heritage focuses on concern over the changing meanings of objects and places and offers caveats over the trajectory as the past is marketed for consumption.

Entangling Archaeology and Heritage

Heritage can be understood as the past in the present. One avenue to access the past is through archaeological research, and increasingly archaeological efforts into recovering and representing the past are entangled with heritage management and contests over the past. With heritage is increasingly engaged by communities in a globalized world of inequalities, those contests include social understanding of history as well as heritage an opportunity for economic development.

Especially since archaeology is labor intensive and costly, and there has been a decrease of available financial research resources for archaeological research, archaeologists in the era of neoliberal globalization have recognized tourism, a major approach for economic development, as an avenue for generating revenues for excavations and for preservation of sites. Across the globe, archaeology is intertwined with heritage and heritage tourism has positive potential for archaeological research and presentations, but turning the archaeological record into a commodity has scholarly and social implications.

Tourism is a means for large numbers of people to see the results of archaeological research, to experience past landscapes, and to learn about past lifeways. In today's experience economy (Pine and Gilmore 2011), heritage locales offer opportunities for tourists to be guided toward experiencing the past in a controlled manner that provides a source of funds for continuing excavations and conservation and for the innovative presentation of the past. Because of the desirability of experiencing in today's world, employment and development opportunities can arise with encouraging visitations to heritage attractions. Yet there are consequences to the visitations by large numbers of people to archaeological sites, otherwise a positive measure of tourist success. Physical harm to archaeological sites as well as popularizing and simplifying the presentations contain ethical concerns for archaeological professionals. And as anthropological studies of tourism point out, the implications for local communities are significant, disrupting social relations and increasing inequalities (e.g., Chambers 2010). With the rapid and continuing growth of tourism as a global economic development approach, the issues involved in marketing heritage have garnered increased apprehension over the assumptions of what entices audiences to heritage locales, particularly concerns over authenticity, accuracy, and the consumption of the past.

Heritage is a powerfully positive empowering focus for communities. The excavations at the African Burial Ground in New York City demonstrated those positive dynamics for archaeologists in the USA. As Cheryl LaRoche and Michael Blakey (1997: 100) note: "For many African Americans, [archaeology] is a conduit, an avenue leading to spiritual rebirth and renewal of our history. Our history is in the bones and in the artifacts excavated from the African Burial Ground. It is tangible, it is real, and it lives through the dead. . ." The organizing for the preservation of the site enriched the archaeology, its analysis and interpretations, and the commemoration of the burial ground. The commemoration provides continuing information for fresh audiences to engage the challenging, important history from the site. But heritage's opportunities are also its paradoxes, especially for archaeology and professional ethics for respecting the past. At the African Burial Ground National Monument, the details of the decreased are inscribed in the ground and stepped upon by visitors (Fig. 2).

Archaeology, through excavations, recovers material evidence of the past and becomes a means of producing heritage. Heritage is a broad category that includes personal inheritance, historical identity, and national ideals or generally be defined as the use of the past in the present. David Lowenthal (1998) in *The Heritage Crusade and the Spoils of History* described the global phenomenon of heritage overtaking history and laid out the claims and counterclaims made in the name of heritage. For Lowenthal history and heritage are quite different: "History explores and explains pasts grown ever more opaque over time; heritage clarifies pasts so as to infuse them with present purposes" (Lowenthal 1998: xi). Barbara Kirshenblatt-Gimblett (1998: 2) in *Destination* Culture asks a critical question for exhibiting heritage: "What does it mean to show?" Kirshenblatt-Gimblett (1998: 15) also explains heritage as adding value, producing something new. Archaeologists, across the globe, have experienced and studied this peculiar phenomenon, particularly as tourism incorporates heritage and the opportunities for larger audiences shift from the generalized public to targeting tourists.

Marketing Heritage, Fig. 2 Walking through the African Burial Ground National Memorial

Paradoxes and Complexities of Marketing Heritage for Archaeology

Lowenthal (1998) recognized the power of heritage for group identity. Central governments can use places and narratives to impress particular themes onto its subjects, citizens, and visitors. Heritage shapes our present identity and provides insight for our future. It includes a range of activities such as stewardship, preservation, research, education, and engagement. It can encourage sensitivity to the indigenous natural environment, to the impact of human activity on the natural environment, as well as to differing perspectives regarding objectives, ideas, places, and traditions. Helaine Silverman (2011: 5) points to a shift in the 1990s for the scholarly recognition that heritage is the contested past, a shift that came with an awareness that the past and its representations are political, with social implications. But heritage is not only nationalistic, its value can essentialist and monocultural but also cosmopolitan, heritage can be accurate in its details or entertaining. These strands and paradoxes constitute the significance of heritage for archaeology.

The representations and presentations for archaeological heritage correlate with globalization, the bundle of processes that include neoliberal economic policies. A useful divide in the goals for marketing heritage is financial capital over social capital. Since social capital can be used for nationalist purposes, the divide is not simple. Social capital's educational focus fits academic archaeology's goals better than the financial possibilities of presenting the past for tourists. The trajectory, under a neoliberal globalization, is "part of a trajectory on which more and more aspects of social life and localized resources become objects for consumption" (Baram and Rowan 2004: 6).

With the increasing monetary interest in heritage, Shashi Misiura (2006) offers a textbook for heritage marketing with chapters that offer insights, case studies, and issues for debate. In conceptualizing heritage as an exploitable resource within the neoliberal globalized world, the economic goal is to seek the broadest audience for financial gain with niche marketing, "segments that can be targeted effectively" (Misiura 2006: 79). Niche marketing creates different heritagescapes, reinforcing the assumed divides among groups of people. So rather than cosmopolitanism, one sees only what one wishes to see, and routes can come and go based on neoliberal

principles. A sterilization of the past, with nothing out of place, is a concern for the representation of the past where past landscapes are presented for enjoyment not education, using the techniques from Disney theme parks for historic sites. Alan Bryman (2004) coined the term Disneyfication to stress theming, consumption, merchandizing, and emotive service, a term used for historic sites as a negative value. Terms such as edutainment, combining education and entertainment, and historicidal indicate a shift from learning and edification to commodification and the loss of history.

The management of cultural resources needs to thread the needle among the competing definitions of the past. Heritage can be the past represented in the present, an inheritance for an individual or a group, an affirmation or collective memory of identity, a commodity and an exploitative resource for tourism, and a means to solidify group identity. The presentation can be informative, allowing visitors to know what to expect at a location but also overpromise what is available at a site. Troy Lovata (2011) offers a perplexing example at the Anasazi Cliff Dwellings of Manitou Springs to open up the intersection of tourism and archaeological sites. The cliff dwellings seem to be Ancestral Pueblo and are presented as such, except the architectural features were moved to distant location and reconstructed by 1907 in central Colorado as a tourist attraction. They are persistently popular not because of authenticity but because visitors can climb on them, unlike actual ruins. The attraction illustrates how production and interpretation of the past for heritage purposes can give way to consumerism. In Jaffa, Israel, visitors entering the historic sites see a diminutive statue of Napoleon (Fig. 3), whose 1799 invasion devastated the port-city, welcoming them. Such whimsy representations suggest how heritage can become tangled in competing histories, real and imagined. For archaeologists and managers of cultural resources being aware of such tourist effects, the ways in which the focus on drawing in tourists to a historic venue, an archaeological site, or a monument influences the presentation and representation of the past, its peoples and legacies, is an important set of

Marketing Heritage, Fig. 3 Napoleon in Jaffa

insights (Baram 2011). Self-reflection on the source, meaning, and implications of heritage has drawn tremendous attention by scholars over the last decade and is leading to a rapid increase in the number and types of studies.

To package tours, groupings of sites are organized by maps or trails. Even organizing directions to archaeological sites should raise concerns for cultural resource managers. Signage is not neutral; differential presentation of routes to sites is a tool of national governments to encourage or discourage visits to particular places. The signs pointing to heritage are not only on the side of roads. In Florida, the creation of trails to see specific types of histories (Black, Cuban, Jewish, Native American, Women, Spanish Colonial, World War II, and even the Florida Historic Golf Heritage Trail) are published as booklets and available online and are meant to raise awareness of cultural and historical resources (see http://www.flheritage.com/preservation/trails/index.cfm). They also create a series of mono-cultural heritage trails across the state. Monocultural heritage targets specific groups either to separate the past into distinct segments or to add

to diversity; cultural resource managers need to be aware of the balance. The locations do not speak for themselves. Kelli Ann Costa (2009) offers a reminder of the guides that illuminate heritage sites and trails yet, as Cota explains, often the heritage interpreters are not heard in assessment of heritage. Whether through people or brochures, signage or museum labels, heritage is the recognition that specific aspects of the past, no matter how recent or distant in time, are highlighted for the present. An accelerating number of studies employ ethnography to bring out the nuances of presentations at archaeological sites, with its implications for archaeological practice and the use of archaeological places.

Dividing up history into niche markets is only one of the dynamics of concern for heritage marketing. In Tampa, Florida, USA, there is an annual celebration of a pirate. The celebration has two parts in January, first a parade for children and the next week one for adults. The adult version has a pirate invasion of the port city of Tampa, with a pirate parade and street festival. The Gasparilla Pirate Festival is named for José Gaspar, whose legend has him born in the late eighteenth century and dying in 1821, just as Spain submits Florida to the USA. The historical record is clear that Gaspar is an invention, with André-Marcel d'Ans (1980) explaining the myth has two layers: the elitist version using a romantic figure to sweep away the history for the period, one with Cubans and Seminoles, and a popular version providing Tampa with an exciting story with sound and fury for popular enjoyment. The story leads to parades and merriment but not knowledge of what happened in history. Across the west coast of Florida, marketing pirate-themed annual events provides entertainment, objects for purchase, and encouragement of consumerism (Fig. 4).

Marketing Heritage, Fig. 4 Pirate statue in downtown Disney

Marketing Heritage, Fig. 5 Egyptian scarab replica purchased in Egypt

Souvenirs are an important part of the marketing of heritage, objects that can be purchased and brought home. The interest in seeing the material past can become a passion for antiquities, and the illegal antiquities trade is a major concern across the world but particularly in places where artifacts offer high rewards. The interest in capturing the past is increasing. Objects are made for tourists to purchase in omnipresent gift shops, significant locales for understanding the dynamics of heritage. Souvenirs can range from scholarly books and replicas of artifacts (Fig. 5) to kitsch like shot glasses and refrigerator magnets (Fig. 6). The images on such souvenirs are part of remembrances of archaeological sites.

Souvenirs are physical objects, whether handcrafted or mass-produced. Digital technologies have allowed the expansion of photography

Marketing Heritage, Fig. 6 Cahokia refrigerator magnet

and the dissemination of images across the world with social media. The opportunity to digitally capture and then replicate sites is a contemporary extension of what Walter Benjamin (1936) discussed for mechanical reproduction and the resulting copies are what Umberto Eco (1990) described as hyperreality. Digital technology has allowed professionals to document and reproduce virtually in ways that reality does not allow and, with 3-D printing, physically recreate artifacts and monuments. At Bamiyan, Afghanistan, holographs in the empty niches reproduce what had been there until the 2001 destruction. The 2015 destruction of the monuments at Palmyra, Syria, led some archaeologists to digitally reconstruct a scale model of the Temple of Baalshamin and receive critiques for the appropriation of cultural heritage. The technological possibilities have been outpacing ethics.

The implications of nominating a historic site for the UNESCO World Heritage List, which has growing exponentially, offer a global audience for a place deemed significant by a national government and approved by UNESCO; according to http://whc.unesco.org/en/about/: "World Heritage sites belong to all the peoples of the world, irrespective of the territory on which they are located. Listings offer an ethical challenge: when a place within the sovereign territory of a state, how does it belong to humanity? As the list grows in size, the competition for attention will grow stronger and more interesting. As Daugbjerg and Fibiger (2011: 141) state, building on the critique of heritage by Barbara Kirshenblatt-Gimblett for a collection on global heritage: "We share such a basic suspicion towards the effect of (world) heritage labeling and. . .set out to scrutinize cases of privileges of access, consumption and inheritance, as well as the appropriation and exploitation of what is understood as or claimed to be global heritage."

One of the central findings in tourism studies regarding sustainable tourism focuses on community control over decision-making and over the proceeds from visitations to locales. Patsy West (2008) documents the successes of the Seminole Tribe of Florida with tourism, where heritage tourism showcases cultural practices and facilitated the creation of the Ah-Tah-Thi-Ki Museum, whose name means a place to learn, a place to remember. The marketing of Seminole heritage meets Seminole goals because the Seminoles control the decision-making process and the resulting funds, enhancing opportunities for the future and being able to depend on tourism for resources to meet community goals.

Future Directions

Discussions of marketing heritage move along two separate avenues. For the scholarly

consideration, archaeologists and other heritage professionals will debate how to engage the marketing of the past and the implications of current dynamics that are dominated by representations for tourism. The issues and dynamics pose a question: Is archaeology up to explaining the politics of heritage in terms of both its empowering and commodifying processes? Can archaeologists theorize the concerns for heritage tourism and communicate them effectively with heritage managers? How do professionals navigate between financial, academic, and social interests in the presentation and representation of the past? The global trends do not determine how heritage is preserved and presented; while heritage is increasing marketed for tourism, actions and decisions on the local level are leading to unexpected outcomes; there are local and regional interests that need to be approached in their own context. For instance in Egypt, Joseph Hobbs (1989) offers a cautionary tale for the expansion of tourism at historical sites that focus on the present needs of tourists: Jebel Musa is a special place as Mount Sinai, a holy site for Judaism, Christianity, and Islam. The pilgrimage and religious significance is ancient and the tourist appeal is increasing. While the local residents would not climb to the top of the mountain, for some tourists access can be an important induction to visit. A development project to increase tourist access included a proposal for a cable car to the top of the mountain. Hobbs explains how the monks of St. Katherine Monastery used international pressure on the Egyptian government, providing an illustration of the interplay of the global and the local for preservation. The benefits of increasing commodification of the past are clear within a neoliberal economy, but the ethics of stewardship and collaborations with descendant communities are significant as counter-weights to the resources generated by archaeology's production of material heritage for consumption.

The collaboration with communities is a growing arena for scholarly discussion (Colwell 2016). Community-based research and continuing engagement to ensure support for decision-making regarding marketing and management of heritage locations and objects are challenges for professionals but a worthwhile avenue for ensuring academically accurate representations and socially meaningful opportunities for continuing research on the past for the place. As more professionals are trained through collaborative approaches, heritage as a field will be transformed in ways that are difficult to predict but seem productively possible.

The other avenue regarding the trajectory for marketing heritage situates heritage in the contemporary political economy. We might be at a transition to the end of capitalism and as new labor arrangements are being created, specifically the types associated with the sharing economy that avoid the market, local, descendant, or knowledgeable guides are being available for people to learn about places and their histories. Museums offer tours by descendants who ask for tips, with social media ranking the tour guides to provide tourists with information on options. The marketing of heritage in this emerging political economy will be a new challenge, different from the engagement and crises with neoliberal capitalism.

As archaeologists engage heritage in this new set of dynamics, working with communities offers new avenues for meaningful social use of heritage beyond neoliberal consumption. With the accelerating number of tourists seeking heritage sites, with new media possibilities for projecting heritage into new realms for those interested in the past, marketing heritage will continue to be a topic of study and analysis for archaeology around the world.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Economic Valuation of Heritage
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage: History and Context
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)

References

Andre-Marcel, d'A. 1980. The legend of Gasparilla: Myth and history on Florida's west coast. *Tampa Bay History* 2 (2): 5–29.

Baram, U. 2011. Archaeology in the public interest: Tourist effects and other paradoxes that come with heritage tourism. In *Ideologies in archaeology*, ed. R. Bernbeck and R. McGuire, 123–150. Tucson: University of Arizona Press.

Baram, U., and Y. Rowan. 2004. Archaeology after nationalism: Globalization and the consumption of the past. In *Marketing heritage: Archaeology and the consumption of the past*, ed. Y. Rowan and U. Baram, 3–23. Walnut Creek: AltaMira.

Benjamin, W. 1936. *The work of art in the age of mechanical reproduction*. https://www.marxists.org/reference/subject/philosophy/works/ge/benjamin.htm

Bryman, A. 2004. *The Disneyization of society*. Thousand Oaks: Sage.

Chambers, E. 2010. *Native tours: The anthropology of travel and tourism*. Boulder: Waveland Press.

Colwell, C. 2016. Collaborative archaeologies and descendant communities. *Annual Review of Anthropology* 45: 113–127.

Costa, K. 2009. *Coach fellas: Heritage and tourism in Ireland*. Walnut Creek: Left Coast Press.

Daugbjerg, M., and T. Fibiger. 2011. Introduction: Heritage gone global. Investigating the production and problematics of globalized pasts. *History and Anthropology* 22 (2): 135–147.

Eco, U. 1990. Travels in hyperreality. In *Travels in hyperreality*, ed. U. Eco, 3–58. New York: Harcourt Brace.

Fagan, B. 1995. A wanderer's lament. In *Snapshots of the sast*, ed. B. Fagan, 151–153. Walnut Creek: AltaMira.

Hobbs, J. 1989. *Mount Sinai*. Austin: University of Texas Press.

Kirshenblatt-Gimblett, B. 1998. *Destination sulture: Tourism, museums, and heritage*. Berkeley: University of California Press.

LaRoche, C., and M. Blakey. 1997. Seizing intellectual power: The dialogue at the New York African burial ground. *Historical Archaeology* 31 (3): 84–106.

Lovata, T. 2011. Archaeology as built for the tourists: The Anasazi cliff dwellings of Manitou Springs, Colorado. *International Journal of Historical Archaeology* 15 (2): 194–205.

Lowenthal, D. 1998. *The heritage crusade and the spoils of history*. Cambridge: Cambridge University Press.

Misiura, S. 2006. *Heritage marketing*. Burlington: Elsevier.

Pine, B., and J. Gilmore. 2011. *The experience economy: Work is theater & every business a stage*. Cambridge: Harvard Business Press.

Rowan, Y., and U. Baram, eds. 2004. *Marketing Heritage: Archaeology and the Consumption of the Past*. Walnut Creek: AltaMira.

Silverman, H. 2011. Contested cultural heritage: A selected historiography. In *Contested cultural heritage*, ed. H. Silverman, 1–49. New York: Springer.

Staiff, R., R. Bushnell, and S. Watson, eds. 2013. *Heritage and tourism: Place, encounter, engagement*. London: Routledge.

Walker, C., and N. Carr, eds. 2013. *Tourism and archaeology: Sustainable meeting grounds*. Walnut Creek: Left Coast Press.

West, P. 2008. *The enduring Seminoles: From alligator wrestling to casino gambling*. Gainesville: University Press of Florida.

Further Reading

Castaneda, Q. 1996. *In the museum of Maya culture: Touring Chichen Itza*. Minneapolis: University of Minnesota Press.

Duke, P. 2007. *The tourist gaze, the Cretans glance: Archaeology and tourism on a Greek island*. Walnut Creek: Left Coast Press.

Davis, R., and G. Marvin. 2004. *Venice, the tourist maze: A cultural critique of the world's most touristed city*. Berkeley: University of California Press.

Fairclough, G., ed. 2008. *The heritage reader*. New York: Routledge.

Feldman, J. 2016. *A Jewish guide in the Holy Land: How Christian pilgrims made me Israeli*. Bloomington: Indiana University Presss.

Kohl, P., M. Kozelsky, and N. Ben-Yehuda, eds. 2004. *Selective remembrances: Archaeology in the construction, commemoration, and consecration of national pasts*, 299–325. Chicago: University of Chicago Press.

Labadi, S., and C. Long. 2010. *Heritage and globalization*. New York: Routledge.

Logan, W., M. Craith, and U. Kockel. 2016. *A companion to heritage studies*. Malden: Wiley Blackwell.

Meskell, L. 2002. Negative heritage and past mastering in archaeology. *Anthropological Quarterly* 75 (3): 557–574.

Mortensen, L., and J. Hollowell, eds. 2009. *Ethnographies and archaeologies: Iterations of the past*. Gainesville: University Press of Florida.

Rowan, Y., and U. Baram, eds. 2004. *Marketing heritage: Archaeology and the consumption of the past*. Walnut Creek: AltaMira.

Samuels, K., and T. Rico, eds. 2015. *Heritage keywords: rhetoric and redescription in cultural heritage*. Boulder: University of Colorado Press.

Silverman, H., and D. Ruggles, eds. 2007. *Cultural heritage and human rights*. New York: Springer.

Smith, L. 2006. *Uses of heritage*. New York: Routledge.

Smith, L., and E. Waterton, eds. 2009. *Heritage, communities and archaeology*. London: Duckworth.

Smith, G., P. Messenger, and H. Soderland, eds. 2010. *Heritage values in contemporary society*. Walnut Creek: Left Coast Press.

Timothy, D., and S. Boyd. 2003. *Heritage tourism*. New York: Prentice Hall.

Waters, A. 2006. *Planning the past: Heritage tourism and post-colonial politics at Port Royal*. Landham: Lexington Books.

Martin, Colin

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Basic Biographical Information

Colin Martin's (b. 1939) (Fig. 1) brief early career as a flying instructor was curtailed by an eyesight defect, and he joined the army on a short service commission in 1958. Posted to Cyprus he learned to dive and became fascinated by the many submerged antiquities around its coasts. From 1961 he worked as a freelance writer and photographer based in Scotland, specializing in historical and archaeological topics and diving when he could. During the early 1960s, he participated in David Bellamy's "Operation Kelp" around Britain's coast and later accompanied Bellamy on a botanical expedition to NW Spain.

In 1968 he learned of the late Syd Wignall's planned expedition to SW Ireland to search for the Spanish Armada wreck *Santa María de la Rosa* and wrote asking if he could cover the story for a magazine. His then very amateur knowledge of archaeology, coupled with an ability to dive, was a rare combination in those days, and on his first night with the team in Dingle, he was offered the post of project archaeologist. The wreck was eventually found, and the story of the search and subsequent investigation is recounted in his popular book (Martin 1975).

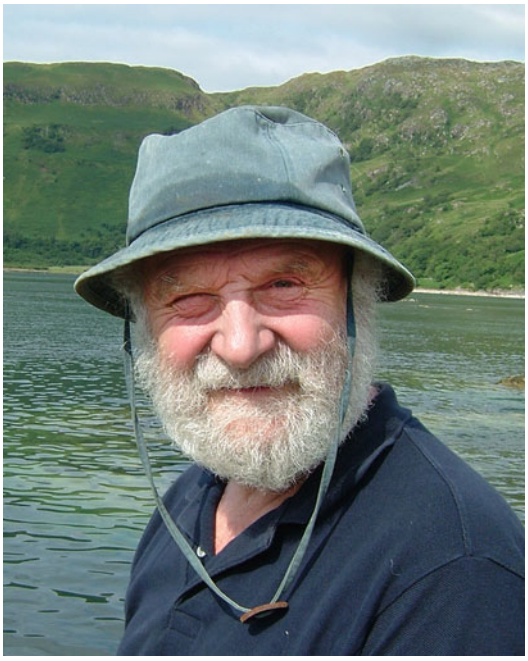

Martin, Colin, Fig. 1 Colin Martin

Major Accomplishments

In those pioneering days it was possible to get into professional maritime archaeology by such unconventional means, though it involved a steep learning curve. His burgeoning interest next led him in 1970 to Fair Isle, where another Armada ship, *El Gran Grifón*, had been wrecked. Her remains were discovered close inshore on the first day and for the rest of that season, and over a further summer in 1977, the site was extensively excavated, revealing much information about the ship's guns. By now Colin was questioning many historical interpretations concerning the Armada, especially relating to its armament, and was beginning to explore associated documentary sources, finding in the topic a marvelous opportunity to combine historical and archaeological evidence.

In 1971 the Armada wreck *La Trinidad Valencera* was discovered off the Donegal coast by the City of Derry Sub-Aqua Club, and Colin was invited to direct its investigation by the club in association with the BBC and the Ulster Museum. This continued over many seasons until 1985, when the site was finally closed. The recoveries included parts of the Armada's artillery train, including three matching siege cannons blazoned with Philip II's arms (Martin 1988). Great quantities of military equipment, including weaponry and items of clothing, were also found, as well as domestic and personal items belonging to the troops. Studied in conjunction with contemporary documentation in Spain, the finds provided unprecedented opportunities for fresh insights into the Armada, and this led to his Ph.D. thesis, *The Equipment and Fighting Potential of the*

Spanish Armada (University of St Andrews 1983). Later, in collaboration with the distinguished historian Professor Geoffrey Parker, Colin wrote a new analytical account of the campaign (Martin and Parker 1988). The recoveries from *La Trinidad Valencera* are now on display in the Tower Museum, Londonderry.

Through the good offices of Joan du Plat Taylor, who exercised a powerful if largely unsung influence on the early development of nautical archaeology in Britain, Colin was invited in 1973 to set up a research institute at St Andrews University, on the east coast of Scotland, with funding from the Leverhulme Trust. From this new base the *Trinidad Valencera* excavation was continued and fresh projects initiated. These included investigations of the wrecks of the Dutch East Indiaman *Adelaar*, lost on Barra in the Outer Hebrides in 1728 (Martin 2005), and the English warship *Dartmouth*, which sank in the Sound of Mull, Scotland, in 1690 (Martin 1978).

The Leverhulme grant included provision for the recruitment of new staff, and Tony Long – a colleague from *Santa María* days – joined as technician. He was followed by Keith Muckelroy and Paula Williams – young archaeology graduates from Cambridge and Bristol, respectively – who were boldly setting out on careers in a field still regarded as not entirely respectable for "proper" academics. Both were divers, and soon the St Andrews quartet was operating as a team each summer on the *Dartmouth*, *Gran Grifón*, and *Trinidad Valencera* projects. The interpersonal chemistry was stimulating, and during post-dive discussions in the pubs of Mull, Shetland, and Donegal, many ideas which have subsequently become enshrined in the discipline were thrashed out, usually amicably.

Keith moved on to research at Cambridge and then to a post at the National Maritime Museum before his untimely death in 1980. In 1976 Colin married Paula, and in 1985 a new graduate teaching and research program, the Scottish Institute of Maritime Studies, was established at St Andrews. For the next 15 years, it ran a popular diploma course and supervised master's and Ph.D. degrees. Colin retired in 2001 to concentrate on research and writing.

In 1992, seven years after he had ceased active diving with the close of the *Trinidad Valencera* project, Colin was persuaded to retrain for a commercial diving qualification so that he could direct the excavation of a small warship wreck off Duart Castle on Mull, which was threatened by erosion. With funding from Historic Scotland and the Arts and Humanities Research Board, and the support of the National Museums of Scotland, the work was completed in 2003 and is currently close to final publication.

Colin and Paula have remained research partners as well as nuptial ones, and for the past 10 years, they have jointly been engaged in a maritime landscape project among the western coasts and islands of Scotland. This brings together the archaeology of the shipwrecks they have investigated with the area's wider maritime past, conducted through surveys of coastal features such as early harbors and landing places, fish traps, industries, boathouses, recreational facilities, and defense. Some of this involves aerial survey in collaboration with the Royal Commission on the Ancient and Historical Monuments of Scotland, bringing Colin back to his early roots in aviation.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Industrial Archaeology
- ▶ Muckelroy, Keith (Underwater and Maritime Archaeology)
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Ship Archaeology
- ▶ Site Formation Processes

References

Martin, C. 1975. *Full Fathom Five: The wrecks of the Spanish Armada*. London: Chatto & Windus.

Martin, C. 1978. The *Dartmouth*, a British Frigate wrecked off Mull, 1690. 5. The ship. *International Journal of Nautical Archaeology* 7 (1): 29–58.

Martin, C. 1988. A sixteenth century siege train: The battery ordnance of the Spanish Armada. *International Journal of Nautical Archaeology* 17 (1): 57–73.
Martin, C. 2005. The *Adelaar*: A Dutch East Indiaman wrecked in 1728 off Barra, Outer Hebrides, Scotland. *International Journal of Nautical Archaeology* 34 (2): 179–210.
Martin, C., and G. Parker. 1988. *The Spanish Armada*. London: Hamish Hamilton.

Further Reading

Martin, C. 1997. Ships as integrated artefacts: The archaeological potential. In *Artefacts from wrecks*, ed. M. Redknap, 1–14. Oxford: Oxbow.
Martin, C. 2011. Stowed or mounted: The Spanish Armada of 1588 and the strategic logistics of guns at sea. In *Ships and guns*, ed. C. Beltrame and R.G. Ridella, 85–97. Oxford: Oxbow.

Marx, Karl

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Basic Biographical Information

Political radical, journalist, theorist Karl Heinrich Marx has probably been read by more people than any other social critic in the past 160 years, and his work still remains relevant for archaeologists and others today. Born 5 May 1818 in Trier, Westphalia, he died 13 March 1883 in London, England. From his student days at Berlin University in the late 1830s, Marx honed his understanding of anthropology (Patterson 2003, 2009; Anderson 2010). His appreciation – already apparent in The Ethnological and Philosophical Manuscripts of 1844 or The German Ideology – grew as he continually examined the historical antecedents of Western capitalism as well as the distortion and transformation of colonial societies on its margins (e.g., Marx 1844/1975, 1857–1858/1973, 1880–1882/1974, 1881/1983; Marx and Engels 1845–1846/1975).

Major Accomplishments

Marx insisted that human beings were simultaneously natural beings interacting with the worlds they inhabited and social individuals enmeshed in historically (developmentally) contingent ensembles of social relations. As natural beings, they distinguished themselves from animals once they began to produce their means of subsistence – a step that involved perceiving and engaging with the world around them, distinguishing themselves from that world through self-objectification (i.e., purposive activity) and action on the world of externalized objects they have created, and transforming their hands, eyes, and other organs into means of production as well as the objects they have forged into extensions of their bodies to mediate, regulate, and control the metabolism between nature and themselves. As social beings, their sociality is actualized in their relations with other individuals through participation in historically specific communities. Their consciousnesses, personalities, ambivalences, identities, and cultures are shaped by the sets of social relations into which they are born, help to actualize, and occasionally even transform during their lives. The two aspects of human beings – the natural and the social – exist in a dialectical relationship with each other and with the worlds they have created. Consequently, Marx's theory of history, contrary to atomistic (Cartesian) reductionism, is built on a notion of totality that includes both natural history and human history. In this view, the totality is a multileveled, historically and developmentally contingent and dialectically structured unity that exists in and through the diverse connections, interpenetrations, and contradictions that shape the interactions of the parts with one another as well as with the totality itself. It is structured by processes and relations that are not always apparent on the surface, the constituent parts are not identical with each other or with their relations to the whole, the parts do not exist prior to the totality but rather acquire their characteristic properties in the interactions that constitute the unity, the totality is in continual flux through the parts and levels may be changing at different rates, the transformations may destroy the conditions

that brought the totality into existence, and they may create possibilities for new structures that have not existed previously. For Marx, it was essential to understand the dialectical relation between history and social structure. In his view, the production of goods to satisfy needs and to reproduce life itself and the ensembles of social relations in which this industry occurred were "continually evolving out of the life-processes of definite individuals" living in particular circumstances (Marx and Engels 1845–1846/1976: 35).

It was necessary to grasp both the historical dimension (formation) of the social structure and, at the same time, to understand the structural determinations and contingencies of that historical movement – i.e., the interplay of structure and process, of necessity and accident. This is why he paid so much attention to the social structures of capitalism both in its core areas and beyond and to the underlying historical processes and relations that produced them (e.g., Marx 1863–1867/1977). It is why he recognized subtle variations in the development of capitalism from one country to another, resulting from the singularities of the conditions and relations that existed at particular times and places. Nevertheless, there were limits to this diversity, and the commonalities in ways capitalist societies organized production were manifest in their shared mode of production. Marx (e.g., 1857–1858/1973: 459–514) distinguished capitalist from precapitalist modes of production. Industrial capitalist societies were characterized by commodity production, private ownership of the means of production, a social division of labor between a class whose members owned the means of production and a class of propertyless workers who sold their labor power to produce and reproduce the conditions of their own existence, and the appropriation by the owners of the profit or surplus value created by the direct producers. In societies manifesting precapitalist modes of production, producers retained control over their means of production and subsistence, even though a portion of it might be siphoned off in the form of tribute, taxes, or rent. He proceeded to distinguish a number of precapitalist modes of production to designate different forms of cooperation and social structure: primitive communal, ancient, Asiatic, Slavonic, and feudal. These do not represent an evolutionary progression ultimately culminating in capitalist but rather different forms of property relations or alternative pathways out of historically specific forms of primitive communal society. Marx was repeatedly struck by the fact that communities manifesting precapitalist modes of production tended to reproduce existing social relations. By this, he did not mean that their cultures remained unchanged or that they were free of tensions, conflicts, or even contradictions. He viewed precapitalist communities as limited, local developments of humanity that possessed "an incomparably greater [natural] vitality than the Semitic, Greek, Roman, and a fortiori modern capitalist societies," and argued that "we should be thoroughly acquainted with all the historical twists and turns" of these formations (Marx 1881/1983: 106–107). He contrasted them with the dynamism of capitalist societies that were driven relentlessly toward universality, that constantly developed their productive forces to create new needs and commodities, that exploited both workers and nature, that destroyed local traditions as they reworked old ways of life, and that provoked opposition and resistance to their expansion.

Cross-References

- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Social Archaeology

References

Marx, K. 1844/1975. The economic and philosophical manuscripts of 1844. In *Collected works*, ed. K. Marx and F. Engels, vol. 3, 229–348. New York: International Publishers.

Marx, K. 1857–8/1973. *Grundrisse: Foundations to the critique of political economy*. New York: Vintage Books
Marx, K. 1863–7/1977. *Capital: A critique of political economy, volume 1*. New York: Vintage Books
Marx, K. 1880–2/1974. *The ethnological notebooks of Karl Marx*. Edited by L. Krader. Assen: Van Gorcum and Company.
Marx, K. 1881/1983. Marx-Zasulich correspondence: Letters and drafts. In *Late Marx and the Russian road: Marx and "the peripheries of capitalism"*, ed. T. Shanin, 97–129. New York: Monthly Review Press.
Marx, K., and F. Engels. 1845–6/1976. The German ideology. In *Collected works*, ed. K. Marx and F. Engels, vol. 5, 19–452. New York: International Publishers.
Patterson, T.C. 2009. *Karl Marx, anthropologist*. Oxford: Berg Publishers.

Further Reading

Anderson, K.B. 2010. *Marx at the margins: On nationalism, ethnicity, and non-western societies*. Chicago: The University of Chicago Press.
Patterson, T.C. 2003. *Marx's ghost: Conversations with archaeologists*. Oxford: Berg Publishers.
Patterson, T.C. 2009. *Karl Marx, anthropologist*. Oxford: Berg Publishers.

Marxism and Archaeology in the Soviet Union and China

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It is a cliché to say that the archaeology of the Soviet Union (1917–1991) and communist China (1949–) is marked by the Marxist paradigm. It should not, however, be expected that after ruling the two countries for so long, it would have generated a plethora of operational theories for archaeology. It is true that it laid out a broad spectrum of new research directions in the beginning, giving Soviet and Chinese archaeologies some vantage points; but due to the radical political environment in the two countries, it did not allow them to try out the right operational theories for these directions. Nor should it be assumed that sanctified as the paramount paradigm for all the sciences, it determined the development of archaeology in the two countries. While it did constitute the backbone of archaeological thoughts, the party line, expediently drawn up in response to volatile political circumstance but scrupulously clad in the Marxist mantle, actually delineated their developmental path. Nor should it be taken for granted that the archaeology of the two countries was identical with the Marxist archaeology; the ethnos paradigm, suppressed in the beginning, steered its development for several decades. As such, the development of the Soviet and Chinese archaeology was rather eventful and colorful. This entry will not present an encyclopedic survey of the Marxist archaeology in the two countries; the shortage of space allows the author to focus only on the most important aspects.

Soviet Union

Archaeology had an early beginning in Russia. The first documented excavation took place as early as 1679. At this nascent stage, the aim of fieldwork was primarily to seek ancient treasures, and the targets of excavation were solely kurgans. The rapid increase of excavation activities nevertheless nurtured the birth of professional archaeologists and their interest in theoretical thinking in the nineteenth century, the development of which was concurrent with that in West Europe. By the turn of the twentieth century, Russian archaeologists had begun to excavate camp sites and settlements so as to understand the economy, trade, technology, and cultures of ancient peoples (Miller 1956: 12–31). By the time of the October Revolution, a number of institutions had been founded in the two capital cities of Petrograd (changed to Leningrad in 1924 and to Saint Petersburg in 1991) and Moscow, including the Imperial Archaeological Commission, the Archaeological Societies, and archaeology programs in universities; a variety of schools, including Art History dealing with Classical Archaeology, Ethnos dealing with the origin of the Russian culture, and Paleoethnology dealing with the evolution of prehistoric cultures, had been active in the field (Dluzhnevskaya 2011).

The Bol'sheviks affected archaeology in the first decade (1917–1929) gradually, when they consolidated their power and tightened control of the science and education sectors. Although they started to install liberal "red professors" such as V. K. Nikol'sky in the leadership of academic institutions right after the revolution, and set out to cultivate new, Marxist, archaeologists to dig graves for the "old," "bourgeois" ones in 1925 (Platonova 2010: 205, 218), they left the pre-Revolutionary intellectuals largely untouched. In 1928–1932, however, the Bol'sheviks abolished the moderate policies and launched the radical "Cultural Revolution." The party functionaries and the young Marxist enthusiasts in the academic institutions were inflamed to expel the pre-revolutionary archaeologists, who had little chance to defend themselves, let alone to challenge the Marxist doctrines. Many were arrested, exiled, or killed (Miller 1956: 96–106). Even the renowned Ethnos scholar V. A. Gorodtsov (1860–1945), who won the recognition of V. K. Nikol'sky and worked with the Bol'shevik leadership on the preservation of sites since 1918, was removed from all of his posts (Platonova 2010: 200–213). The Paleoethnology school, which was distinguished with the application of a multidisciplinary approach, combining ethnography, archaeology, and natural sciences, to the study of prehistoric societies, suffered the most devastating blow, as the Bol'sheviks found no need for its service.

In the meantime, the Bol'sheviks restructured the academic institutions and research agendas. The State Academy of History of Material Culture (hereafter SAHMC) became the sole institution in archaeology; the Institute of Archaeology and Arts in Moscow was dismantled; the two ethnographic museums in Moscow were closed; archaeologists in the Ethnography Department of the Russian Museum were arrested; archaeology and ethnography were generally transferred from universities to the Historical-linguistic Institutes in Moscow and Leningrad (Platnonova 2010: 219). The SAHMC was also reorganized; on the model of Marxist socioeconomic formations, Departments of Pre-class, Slave-holding, and Feudal society were created. The slogan "From artefactology, from creeping empiricism, from culture-historical school, to sociological method, to Marxist-Leninist study of historical process," displayed in an exhibition in 1933, clearly captured the directives of the Bol'sheviks for researchers at the time (Dluzhnevskaya 2011: 111–112).

On the ruins of the "old," "bourgeois," archaeology arose two schools of "new," "Marxist" archaeology. One was the Sociology school, represented by A. V. Artsikhovsky (1902–2001) and the other students of V. A. Gorodtsov. In a paper "New methods in archaeology," they attacked the "old" schools for being superficial in their formal study of artifacts; in its stead, they called for the study of the Marxist socioeconomic formations (Gening 1982: 112–128). They sought to reconstruct the socioeconomic formations from the types of production tools (Klejn 2012: 240). The other was the so-called Stadiality School, represented by V. I. Ravdonikas (1894–1976), whose paper "The Archaeological Heritage" presented in 1929 signaled the Purge. Inspired by the Japhetic theory of N. Ya. Marr (1864–1934), this young fervent adherent erected a theory that the material culture of a local population is transformed stadially in keeping with the change of socioeconomic formation. Thus the Japhetic Cimmerians turned into the Scythians, who then became the Germanic Goths; the latter eventually turned into the Slavs (Klejn 2012: 255). It is notable that both schools, based on the Marxist principle that all social development is powered by internal contradiction between production force and relation of production in a society, denied external influence, the mechanisms of migration and diffusion.

In the early 1930s, the Marxist paradigm, and only this paradigm, was firmly implanted in the Soviet archaeology. Since then, archaeological data were employed to illustrate the Marxist socioeconomic formations. The lack of challenge from any other paradigm, however, spoiled the Marxist paradigm. Simplistic interpretation was widespread. Tools were taken to denote the productive force, and the productive force was taken to denote the relation of production and the socioeconomic formation (Gening 1982: 109). As an editorial of a major archaeological journal *Problems of History of the*

Pre-Capitalist Societies (Проблемы истории докапиталистических обществ) pointed out in 1934, the problems were "quotation in place of investigation, blatant ignorance of facts in place of laborious persistent study, general methodological consideration and historical analogy in place of analysis of concrete historical 'surrounding conditions' and historical 'lively activities'" (Gening 1982: 193). Although the problems were partially rectified after 1934, the want of operational theories that bridge the Marxist paradigm and the discipline continued to plague the Soviet archaeology.

After the Second World War, the "Stadiality theory" gradually fell out of favor, and after the crushing blow of the essay "Concerning Marxism in Linguistics" of Joseph Stalin (1878–1953) in 1950, it was rejected altogether (Klejn 2012: 34). The Ethnos paradigm was condemned as "chauvinism" in the early 1930s, when the Bol'sheviks were committed to international revolutions, but revived in the late 1930s, when the Bol'sheviks resorted to Russian nationalism to protect the Soviet Union in response to the threat of Nazism. In the postwar era, Ethnos became the paramount paradigm. The study of origin of Russian culture and the excavation at the medieval Russian town of Novgorod were particularly prestigious in the Soviet archaeology; among the researchers of this paradigm, A. V. Artsikhovsky and B. A. Rybakov (1908–2001) were outstanding figures (Klejn 2012: 246–248, 257–261).

In the high time when the Ethnos School was suppressed, A. V. Artsikhovsky, under the supervision of V. A. Gorodtsov, nevertheless wrote a dissertation titled "The Vyatich Kurgans" about the dispersal of the Old Russian tribes in 1929, but he used the typological method of Gorodtosv and mathematic method of correlation, and came under the attack of V. I. Ravdonikas. During these student years, he also studied Marxist sociology, and in 1929 he presented the paper "New Methods in Archaeology." But because of the conflict with Ravdonikas and the party ideologue S. N. Bykovsky, then director of the SAHMC, he lost any interest in theoretical thinking although he held on to the artefactological and sociological approaches to his work. In this same year, he was sent to excavate kurgans near the medieval Russian town Novgorod and in 1932 the town itself. The ideological hostility toward the Ethnos paradigm was lifted in the late 1930s, and his works on the history, crafts, and residents of the city and the birch-bark inscriptions, which he discovered in the 1950s, made him a leader of the Soviet archaeology (Klejn 2012: 237–251).

Another eminent figure in Soviet archaeology was Academician B. A. Rybakov (1908–2001), who directed the Institute of Archaeology (changed from the Institute of History of Material Culture in 1959; the Leningrad branch was changed back to the Institute of History of Material Culture in 1991) for over 30 years (1957–1988). During his student years, he was attracted by Gorodtsov to archaeology and to the Slavic and Russian antiquity. He adopted the methodology of A. V. Artsikhovsky, but his early career as a history teacher defined his future roles as both archaeologist and historian. After joining the Moscow branch of the Institute of History of Material Culture in 1937, he published the monograph *The Handicrafts of Ancient Rus*. Based on materials from 20,000 burial mounds and towns, he not only established the presence of Russian craft gilds but also demonstrated the high level of Russian culture before the Tartar invasion in the thirteenth century. Published in 1948, the book won him the Stalin Prize in the same year and the title of Academician in 1958. In the late 1940s, he began to trace the origin of the Rus to the sixth and seventh centuries. Although this idea was not supported by archaeological data, it fed into the nationalist pride of the time. He became the leader of the Slavic-Russian archaeology, the most prestigious branch of the Soviet archaeology (Klejn 2012: 257–274).

The Marxist paradigm continued to prevail, and juxtaposed with the Ethnos paradigm, it sought to define the socioeconomic formations of cultures and ethnic groups. The combination of the two paradigms is manifest not only in the works of Artsikhovsky and Rybakov but more so in those of S. I. Kiselev (1905–1962). Also a graduate student of Gorodtsov, Kiselev studied Marxism along with Artsikhovsky, and even published a paper paralleling the development of forms of settlement with the change of

socioeconomic formation. In the meantime, he studied the ancient societies of the Minusinsk Basin, an untouched region at the time, and in 1949 published his doctoral dissertation *The Ancient History of Southern Siberia*, which earned him the Stalin Prize. Following the norm of the 1930s, he avoided the use of archaeological culture and presented a new way of writing. He reduced the treatment of data to a minimum and placed it in the background, whereas he put the reconstruction of the history, economic achievements, and social changes of tribes and ethnic groups in the spotlight. As such, the monograph provided a handy model for archaeological research favored by the Soviet ideologues and other scholars. As "commissar of archaeology" Kiselev instructed every archaeologist on ideology and methodology, and as deputy but executive director, he steered the development of the Moscow branch of the Institute of History of Material Culture in the late 1940s and early 1950s (Klejn 2012: 317–321).

After the death of Joseph Stalin in 1953, the political atmosphere changed dramatically from the liberalization era of Nikita S. Khrushchev (1956–1964) to the conservative era of Leonid I. Brezhnev (1964–1982), and back to the liberalization era of Mikhail S. Gorbachev (1985–1991). In general, the ideological yoke on the Soviet scholarship was relaxed, but the Soviet regime continued to charge archaeologists with the tasks of exalting the superiority of the Marxist paradigm to Western theories and cultivating patriotism among the people (Klejn 2012: 35–44). The concept of the autochthonous development of cultures, which was derived from the Marxist concept of internal drive of social development, gradually lost its appeal, and migrationism crept back into the Soviet archaeology (Klejn 2012: 36–37).

A remarkable feat of the Soviet archaeology lies in the study of settlements of ancient societies. The Marxist doctrines on the subjects of production tools, social relations, economic activities, and spiritual life made it imperative to study them. The full-scale excavation of settlements of the Tripolye culture by T. S. Passek (1903–1968) was particularly lauded. Unlike earlier archaeologists, who only opened narrow trenches and small areas, he was able to expose large houses of 100–120 m^2 in their entireties with the new method. Most of the settlements, however, were only test excavated; only a few were extensively excavated. Excavation of cemeteries was more economical yet more productive in terms of interesting data, and thus more favorable to archaeologists. Fundamentally, it is essential for the materialist approach as cemeteries produced, apart from splendid objects, the most relevant information for the analysis of social differentiation (Zhang 2011: 1055).

Another field inspired by Marxism and well nurtured in the Soviet Union is ancient technology. Already in 1920, the Institute of Archaeological Technology was founded at the Russian Academy of History of Material Culture, the predecessor of the SAHMC, and endowed with five departments for the study of stone, ceramics and glass, painting techniques, metal, and organic materials (Dluzhnevskaya 2011: 107). After the restructuring of the SAHMC in the early 1930s, the institute (renamed Institute of Historical Technology in 1934) was assigned to reconstruct the development of production technology associated with the Marxist socioeconomic formations (Dluzhnevskaya 2011: 111–112). An outstanding figure in this regard was S. A. Semenov (1898–1978). Serving as Cheka investigator during his early career, he picked up archaeology in the 1930s. Drawing upon his forensic skills, he developed traceology, or the study of use marks, of lithic tools, using a microscope and performing experiments to analyze them, which was pioneering in the world. When he published the work *Prehistoric Technology* in 1957, it was translated and published in the US and UK. After this success, a school of traceologists was formed in his laboratory at the Leningrad branch of the Institute of Archaeology (Klejn 2012: 308–309).

China

The historical episodes of the Marxist archaeology in the Soviet Union recurred almost verbatim in China. Unlike in Russia, archaeology is an exogenous discipline that Japanese and Western explorers brought to China in the early twentieth

century. Archaeological research of the Paleoethnography type, which focused on human evolution, manifest in the search for early human fossils such as the Peking Man, and of the Ethnos type, which focused on the origin of Chinese culture, manifest in the discourses of the "western origin of Yangshao culture," the "autochthonous origin of Longshan culture," the origin of Zhou and Qin peoples, etc., were undertaken by both foreign and Chinese archaeologists (Chen 1997). Migrationism and diffusionism were common models used to explain cultural change (Chen 1997: 130–133); typology was introduced into China and innovatively adapted to Chinese data (Chen 1997: 314–329). In the protracted and devastating wars prior to 1949, the development of the discipline was rather constrained; only a small number of sites such as Chengziya (城子崖, Neolithic age), Yinxu (殷墟, Shang dynasty), and Doujitai (斗鸡台, Zhou dynasty) were excavated by a small number of professionals such as Liang Siyong (1904–1954), Wu Jinding (1901–1948), and Xia Nai (1910–1985).

After taking power in 1949, the Communists endeavored not only to control the science and education sectors of China but also to instill Marxism into them. Distinguished "red" scholars such as Guo Moruo (1892–1978) and Jian Bozan (1898–1968) were installed in the leadership of the Chinese Academy of Sciences and universities, and Marxist classics were inserted into the university curriculum to cultivate "Marxist" scholars. The Republican-era scholars, most of whom were liberal but born in landlord and capitalist families, were subjected to thought reform, trading their "bourgeois" ideology with Marxist teachings. After a few years of mild preparation, the party instigated the "red" scholars and the young Marxists to cleanse the "bourgeois" elements from all sciences. The Republican-era archaeologists, mostly trained in Western-style universities, were overwhelmed by a bewildering succession of treacherous and violent political campaigns, including the Anti-rightist Campaign (反右运动, 1957–1958), the Great Leap Forward (大跃进, 1958–1960), and the Great Cultural Revolution (文化大革命, 1966–1976), and either perished or were stranded on a thoroughly ideologized land (Anonymous 1958; Zhang 2013: 897). As a result, careful excavation of sites and formal study of artifacts were criticized, exogenous migration and diffusion denounced, and the extrapolation of Marxist history of socioeconomic formations elevated to be the priority, if not the only task of archaeological research (Zhang 2013: 896).

But how to build up a Marxist archaeology was an entirely new venture for Chinese archaeologists. Although some "red" historians such as Guo Moruo, Jian Bozan, Fan Wenlan (1893–1969), Hou Wailu (1903–1987), and Lü Zhenyu (1900–1980) had spontaneously experimented with Marxist theories in their studies of Chinese history, that did not help much (Zhang 2011: 1052). In this, however, Chinese archaeologists could learn from their Soviet colleagues, who had had 20 years of experience in applying Marxism to archaeological research. In fact, having decided to side with the Soviet Union, the Communists strenuously sought intellectual aid from the Soviet Union to modernize its science and education sectors. In the campaign of "Learning from the Soviet Advanced Experience (学习苏联先进经验)" in the 1950s, Chinese scholars were pressed to translate not only the Soviet version of *The Origin of the Family, Private Property and the State* of Friedrich Engels but also the *Dialectical and Historical Materialism* of Joseph Stalin to avail themselves of Marxist classics (Zhang 2011: 1052). Moreover, they carried out a variety of activities to learn how the Marxist theories were converted into research strategies.

For instance, they invited the "commissar" of the Soviet archaeology S. V. Kiselev (1905–1962) to demonstrate how Marxist historical materialism had been integrated into the Soviet archaeology and what the Soviet archaeology had achieved. In return, a few eminent Chinese archaeologists, including Xia Nai and Tong Zhuchen (1920–2011), conducted pilgrimage visits of the Soviet Union. Two selected young scholars, Wang Bohong (1923–1974) and Wang Zhongshu (1925–2015), were even dispatched in 1958 to observe a broad spectrum of the Soviet archaeology, from the Palaeolithic age to the early Russian and from university

programs to fieldwork methodology (Zhang 2011: 1049–1051). In addition, a number of Soviet publications, such as the aforementioned work of S. V. Kiselev (1950), and the *Soviet Archaeology* of A. L. Mongait (1963), and several course outlines, including "Archaeological Fieldwork Methods" of Moscow University, and "General Introduction to Archaeology" approved by the Culture Ministry, were translated to provide models for archaeology coursework. By 1958, the Chinese archaeologists were already able to write up a few, albeit somewhat immature, textbooks on Marxist archaeology of China, to rival those of the Soviet Union (Zhang 2011: 1053).

The Soviet model dramatically transformed Chinese archaeology. The discipline was defined not only as a study of history but also as a study of the Marxist socioeconomic formations (Zhang 2011: 1051). Lavish efforts were made to assign the Yangshao culture (4900–2900BC) to the "matriarchal society," Qijia (2200–1600BC) to the "patriarchal society," and the late Shang (1200–1046BC) to the "slave-holding society." Prolonged debates occurred around the question whether Western Zhou (1045–771BC) was a "slave-holding" or "feudal" society. The discourse culminated in the articles of Yu Weichao (Yu 1981, b), who re-examined the correlation between agricultural tools and social formations of the Shang and Zhou dynasties from the archaeological perspective, in the early 1980s, when the ideological grip on the science and education sectors had been loosened. Although these dynasties had entered the stage of the slave-holding society, they were merely at the early stage due to the lack of bronze tools. It was only in the Springs and Autumns period, when iron agricultural tools became more common, that the society reached the advanced stage of a slave-holding society. The transition to the "feudal society" took place much later, in the Western Jin (third century AD). Such a scenario, which was in conflict with the orthodox one of Guo Moruo who had held that the Warring States were a "feudal society," reaffirmed the earlier idea of the historian Shang Yue (1902–1982). As China began opening to the world, the Marxist paradigm receded from archaeology.

The predisposed subject of socioeconomic formations invariably urged archaeologists to allocate greater attention to the settlement and economy of ancient societies. As a result, they extensively excavated the Neolithic settlements of Banpo and Jiangzhai near Xi'an (Zhang 2011: 1055). In 1954, Banpo was excavated for a major construction project, but upon the inspiration of the Soviet archaeologist T. S. Passek, it was fully exposed, and a whole complex comprised of an occupation area, a pottery production area, and a cemetery was discovered. Being the first fully excavated settlement, it was taken to be the quintessential example of the Marxist Primitive Society; a museum was shortly built at the site for the purpose of educating the people. Studies on animal bones, carbonized wood, and grains, pollen, plant seeds, and insects were performed to investigate the environment of the society. The subjects of agriculture, craft production, technology, and spiritual life were also included in the excavation report (Zhang 2011: 1052).

In the turbulent years from the 1950s through the 1980s, the figure who steered the development of the Chinese archaeology was Xia Nai (1910–1985). He originally studied the Egyptian archaeology at University of London, but after returning to China in 1941, he began to work on the Chinese archaeology, and in 1948 he became a distinguished member of the Institute of History and Philosophy, Academia Sinica. On the eve of the rise of the Communist Party to power, many of his colleagues left to Taiwan, but he chose to stay in Mainland China. Upon the nomination by Guo Moruo, president of the newly reinstituted Academy of Sciences, Xia Nai became the deputy director (and later full director) of the Institute of Archaeology (Chang 1986). In keep with the party line, he diligently studied the Marxist theories and wrote a succession of articles condemning the bourgeois scholarship and the rightists, and exalting the Great Leap Forward and the Cultural Revolution. He also published a number of articles defining the mission of the Chinese archaeology and some key terms, including archaeological culture. But other than these writings, he refrained from any theoretical work; instead, he focused on

empirical research and practical matters, and managed to maintain a minimum standard of fieldwork and research in a time when "proletariat," "red and expert" scholars dominated the field and berated rigorous methodology as "bourgeois." In his last years when China was open to the world, he firmly objected to any international field project in China, a shrewd strategy possibly developed out of decades of hysteric xenophobia atmosphere.

As in the Soviet Union, the Marxist theories were dogmatized in China; new data were not used to test them but tailored to fit their expectations; schematic discussion of socioeconomic formations replaced detailed study of actual materials. Any theoretical reflection on the Marxist principles was not only unwelcomed but also precarious. Quotation of Marxist dogmas was required to safeguard one's career and sometimes deliberately employed to camouflage one's own scholarship. Xia Nai (1977), for instance, quoted passages from Engels' *Natural Dialectics* before proceeding to examine exhaustively archaeological discoveries that bear on the scientific achievements of ancient China; while the topic was in tandem with the party line, the meticulous discussion of the data was "bourgeois" in style. The subject of Marxist socioeconomic formations became banal and quietly gave way to the Ethnos (or regionalist) paradigm, which was resurrected to address the regional differences of cultures and the presence of multiple ethnic groups in China (Zhang 2013: 897–898). Since the late 1970s, as the party shifted its focus from an "internationalist outlook," i.e., liberating the world, to the recovery of the dilapidated country of its own, it has dominated Chinese archaeology until today, manifest in the perpetual search for the origins of the Chinese civilizations (Zou 1980; Su 1999; Xia-Shang-Zhou Duandai Gongcheng Zhuanjiazu 2000; Wang and Zhao 2012).

As in the Soviet Union, archaeologists in China paid particular attention to the study of ancient technologies. In 1956, ancient technologies, the "scientific heritage of the motherland," was listed as one of the four priority fields of scientific research in the 12-year (1956–1967) plan, upon which a separate department of history of science and technology was founded in the Academy of Sciences, and expanded to form the Institute of History of Natural Sciences in 1975. Drawing on the received historical sources, the small institution was able to publish a history of chemistry, a history of mathematics, and a history of geography by the mid-1960s (Xi 1997). The study of ancient porcelain had already been started by Zhou Ren (1892–1973), an eminent metallurgist and ceramicist from Cornell University, in the 1930s. He resumed the research in 1954, and upon the request of Xia Nai, he expanded his purview to include pottery of the Neolithic age and the Shang and Zhou dynasties (Zhou 1987). The study of ancient metallurgy, likewise initiated in the 1930s, was not reinstituted until 1974, when a research group was formed at the College of Steel and Iron Beijing (now University of Science and Technology Beijing) to study the history of metallurgy; before then eight professors of the college had combed through the received historical sources pertaining to ancient metallurgy, but these sources, of various credibility, turned out to be of limited value. The group thus turned to investigate ancient metal artifacts abundantly available in museums and archaeological institutes and subjected samples of them to modern compositional and metallographic analyses; in a few years, they were able to write a short book entitled *A Brief History of Chinese Metallurgy* (中国冶金简史) in 1978. Also in 1974, Ke Jun (1917–2017), a distinguished physical metallurgist, was invited to examine an iron-blade bronze axe of the Shang dynasty (1300BC) upon the request of Xia Nai. Being the earliest iron object in China, it had been acclaimed to be a human-made iron, which advanced the genesis of the iron metallurgy of China much earlier. But the testing, quite to the dismay of many scholars and a party ideologue in the Politburo, made it clear that it was made of siderite. It was a precarious situation, but Ke and Xia did not bend their result (Song 2011). Xia Nai (1977) himself constantly reviewed materials related to textile technology and astronomy.

Conclusion

The Marxist paradigm was first inculcated into archaeology in the Soviet Union in the 1930s, and Soviet Marxist archaeology was introduced into Communist China in the 1950s. In both countries, the Marxist paradigm thoroughly transformed archaeology, greatly broadening its horizon to include the subjects of social development, settlement, economy, and technology, and as a result giving the Soviet and Chinese archaeology some noteworthy vantage points. Given a liberal environment, it would have inspired plenty of operational theories in these directions. But militant Marxism, which provoked chronic class struggle in the two countries, and protracted ideological confrontation with the West, afforded Soviet and Chinese archaeologists little room to utilize the ever-increasing archaeological data to rectify the Marxist paradigm, develop middle-range theories to play out their potentials, and therefore sustain its relevance to archaeology: it negated itself. Except for the breakthroughs in the beginning, the Marxist paradigm failed to offer more inspiration to archaeology. It was the party line, drifting along with political circumstances but vigilantly enforced upon all the sciences, that shaped the path of archaeological development. As Leo S. Klejn (2012: 144) put it, Soviet archaeology "frequently was a very long way from Marxism; in many of its sectors it had no need of it; in some assertions it contradicted Marxism, or, at least, did not derive from Marxism"; the same can be said of the Chinese archaeology. As such, the archaeology in both countries may not qualify as "Marxist archaeology." It is no coincidence that in both countries what survived out of the difficult years and thrived thereafter was the Ethnos paradigm, which again followed the party line of patriotism.

References

Anonymous. 1958. Ba xin jiaogei renmin shi kexue dayuejin 把心交给人民使科学大跃进. *Kaogu Tongxun* 考古通讯 3 (1958): 1–3.

Chang, K.C. 1986. Xia Nai (1910–1985). *American Anthropologist* 88/2 (1986): 442–444.

Chen, Xingcan 陈星灿. 1997. *Zhongguo Shiqian Kaoguxueshi Yanjiu 1895–1949*中国史前考古学史研究1895–1949. Beijing: Sanlian Shudian.

Dluzhnevskaya, G. V. Длужневская, Г. В. 2011. *Arkheologicheskie issledovaniia v Tsentral'noi Azii i Sibiri v 1859–1959 godakh* Археологические исследования в Центральной Азии и Сибири в 1859–1959 годах. Sankt-Peterburg: ÈlekSis.

Gening, V. F. Генинг, В. Ф. 1982. *Ocherki po istorii Sovetskoi arkheologii* Очерки по истории Советской археологии. Kiev: Naukoss Dumka.

Klejn, Leo. 2012. *Soviet archaeology: Schools, trends, and history.* Trans from the Russian by Rosh Ireland and Kevin Windle. Oxford University Press.

Miller, Mikhail. 1956. *Archaeology in the U. S. S. R.* New York: Frederick A Praeger.

Platonova, N. I. Платонова, Н. И. 2010. *Istoriia arkheologicheskoi mysli v rossii: vtoraia polovina XIX-pervaia tret' XX veka* История археологической мысли в россии: вторая половина XIX-первая треть XX века. Cankt-Peterburg: Nestor-Istoriia.

Song, Lin 宋琳. 2011. Zhongguo yejinshi yanjiu de qianxingzhe (III)中国冶金史研究的前行者(三). *Beijing Keji Daxue Xuebao* 北京科技大学学报 28/2 (2011): 1–7.

Su, Bingqi 苏秉琦. 1999. *Zhongguo Wenming Qiyuan Xintan* 中国文明起源新探. Beijing: Sanlian.

Wang, Wei 王巍, and Hui Zhao赵辉. 2012. Guanyu Zhonghua wenming tanyuan gongcheng 关于中华文明探源工程. *China's Cultural Relics Weekly* 中国文物报, July 13, p. 5.

Xi, Zezong 席泽宗. 1997. Zhongguo Kexueyuan Ziran Kexueshi Yanjiusuo sishinian 中国科学院自然科学史研究所四十年. *Ziran Kexueshi Yanjiu* 自然科学史研究 16/2 (1997): 101–108.

Xia, Nai 夏鼐. 1977. Kaoguxue he kejishi: zuijin woguo youguan kejishi de kaogu xinfaxian 考古学和科技史: 最近我国有关科技史的考古新发现. *Kaogu* 考古 2 (1977): 81–91.

Xia-Shang-Zhou Duandai Gongcheng Zhuanjiazu 夏商周断代工程专家组. 2000. *Xia Shang Zhou Duandai Gongcheng 1996–2000 nian Jieduan Chengguo* 夏商周断代工程 1996–2000 年阶段成果. Beijing: Shijie Tushu.

Yu, Weichao 俞伟超. 1981a. Gushi fenqi wenti de kaoguxue guancha (part I) 古史分期问题的考古学观察(上). *Wenwu* 文物 5 (1981): 45–59.

———. 1981b. Gushi fenqi wenti de kaoguxue guancha (part II) 古史分期问题的考古学观察. *Wenwu* 文物 6 (1981): 28–40.

Zhang, Liangren. 2011. Soviet inspiration in Chinese archaeology. *Antiquity* 85 (2011): 1049–1059.

———. 2013. Chinese archaeological school. *Antiquity* 87 (2013): 896–904.

Zhou, Peide 周佩德. 1987. Zhou Ren zhuanlue 周仁传略. *Kexue* 科学 39/1 (1987): 58–64.

Zou, Heng 邹衡. 1980. *Xia-Shang-Zhou Kaoguxue Lunwenji* 夏商周考古学论文集. Beijing: Wenwu.

Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives

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Introduction

Marxist archaeological approaches are now considered important in the history of world archaeological thought (Hodder and Hutson 2003; Trigger 2006; Preucel and Meskell 2007). Such approaches have significantly impacted archaeological theories since their early exposition in the twentieth century. Marxist archaeologies have been employed in many different national contexts in Latin America and have particularly influenced the different levels and structural forms of archaeology in those countries. Additionally, though no less importantly, its practice in the contemporary world is significant, as it proposes an objective knowledge of the past – in the sense that it originated from the study of social materiality – but, at the same time, it differs from other theoretical tendencies by suggesting a critique of this world with the aim of creatively transforming it.

The entire development of Marxist archaeologies cannot be comprehensively covered in an entry of this length, and as such we recommend the following texts to the reader: McGuire (1992, 2008), Vargas and Sanoja (1999), Patterson (2003, 2007), Navarrete (2006), and Trigger (2006). Rather, in this entry, we will focus our attention on a set of Marxist archaeologies from Western Europe and the Americas. In particular, we will assess three traditions from these regions which have resulted from the direct inspiration of the writings of Karl Marx and Frederick Engels: Marxist archaeology in the United States of America, Marxist archaeology in Spain, and Latin American Social Archaeology.

Our aim is to present a succinct but meaningful panorama of the archaeological traditions closest to the classical Marxists and which have had implications for research about the past and for archaeology in theory and practice (also refer to Patterson 2003). Further, we argue that for many of the Marxist archaeologists discussed in this entry, the work of prehistorian Vere Gordon Childe has been of great importance, in particular his publications subsequent to 1936 (Trigger 1984; Politis 1999: 6).

There are also other important Marxist archaeologies, less well known in English and Spanish archaeological literature, such as the Marxist archaeological traditions developed in the USSR and China (Trigger 2006); however, there are problems in accessing such research due to language barriers. Interestingly, both perspectives may be viewed as dogmatic approaches due to the official policies of those countries. As such, even if this research was more accessible, we can assume that these projects would not have had a significant impact in Europe and America (although see the Cuban case in Dacal and Watters 2005). So, even though the labels we use turn out to be reductionist, as they do not encompass the different nuances of the Marxist theoretical position, they do assist us to see the main tendencies present in America and Western Europe, which remained interrelated due to the sharing of texts, ideas, and communal aspirations.

Key Issues/Current Debates

Marxist Archaeology in the United States of America

Archaeology in the USA is located within the anthropological tradition and as such is often located within anthropology departments at educational institutions. It can be argued that the development of Marxist archaeological approaches has been marginalized in the USA, and as a result, their development in the twentieth century was quite late. Indeed, rather than groups or schools of thought, the USA has seen such approaches practiced by isolated individuals (in many cases self-taught). Hakken and

Lessinger (1987: 4–5) indicate that the absence of Marxist development in North American anthropology is because "in the United States the interaction between an intolerant liberal politics and a deeply rooted anti- communism in great part prevented this from happening." For Maurice Bloch (1987), the late inclusion of Marxism into North American academic circles can also be explained by the enduring evolutionary thinking of Lewis H. Morgan. Morgan's emphasis on social change as being technologically driven was influential in non-Marxist neo-evolutionary thought in the USA after 1940s, particularly in the work of Leslie White and Julian Steward.

In this way, among the first groups of anthropologists to approach Marxism in the 1940s were members of the so-called Mundial Upheaval Society which included individuals such as Morton Fried, Elman Service, Eric Wolf, Robert Manners, Daniel McCall, Sidney Mintz, Stanley Diamond, Rufus Mathewson, and John V. Murra. Although many of these practitioners later abandoned Marxist approaches and moved to form part of the emerging New or Processual Archaeology, which from the 1960s would be the most important archaeological theory in the USA. Despite this move away from Marxism, one can still perceive in their writings the influence of Marxist thinking in their research.

Another early Marxist influence in the USA can be observed, for example, in the book *Outlines of Anthropology*, by Melville Jacobs and Bernhard Stern, published in 1947. However, this and other primary attempts to develop a Marxist archaeology in the USA would be radically cut short in 1950 by the commencement of the persecution of party members and communist sympathizers by the Committee of Anti-American Activities led by Senator John McCarthy. This persecution, in which many intellectuals with leftist ideas found themselves involved, forced some teachers to abandon their academic posts (McGuire 1992: 39).

With this intense repression, research and archaeological interpretations that were explicitly Marxist were removed from North American anthropological thought and isolated from the theoretical and methodological developments that were occurring principally in Europe. In this anti-Marxist environment, many archaeologists avoided quoting the writings of Marx or Engels; instead, they referenced the works of Lewis Morgan which, as we know, had already been taken account of by Engels at the time and now were found more acceptable. Interestingly, the 1950s was a decade when neo-evolutionism began to emerge in the hands of researchers like Leslie White and Julian Steward.

Despite this, in the 1960s, with the appearance of many different political movements, especially those critical of the Vietnam War, racism, and the formation of the feminist movement, there was a resurgence of Marxist thought. Anthropology was not far from these movements, and already by 1971, at the meetings of the New York American Anthropological Association, symposia with explicitly Marxist topics began to appear (Lewis 2009: 215). In the same way, in 1972, Dell Hymes published an anthology of texts, *Reinventing Anthropology*, in which many entries shared a critical spirit inspired by Marxism, as was also seen in the founding of the journal *Dialectical Anthropology*.

In this new atmosphere, which was more open and tolerant of Marxist discourse, some archaeologists were able to develop Marxist approaches. In spite of this, it also has to be mentioned that there existed archaeologists who used theories and concepts clearly derived from Marxism but who carried out their research without declaring the original source of their ideas (Spriggs 1984: 7). For example, Matthew Spriggs (1984: 2) discerned up to seven Marxist views of materialism used by some North American archaeologists.

All of the aforementioned history makes it clear that in this political scene, Marxist theoretical positions were undermined by the self-same State and interfered with its sustained development. In truth, what can be noted is that the few archaeologists following Marxist approaches had to do so in a form that was not organic and in many cases autodidactic.

An example could be the case of Thomas Patterson who, while conducting fieldwork in Peru in the beginning of the 1960s, met Peruvian

Marxist archaeologists. This contact, together with the understanding of the economic and political Peruvian milieux, and Marxist readings saw him develop a Marxist perspective (McGuire 1992: 74). Patterson is one of the most developed North American archaeologists in the historical materialist perspective as regards important themes in Central Andean archaeology, developing, above all, an explanation based on the dialectic between the social classes originating there. Likewise, in the last few years, he has taken it upon himself to spread the presence of Marxist thinking in global archaeology (Patterson 2003, 2009). One of Patterson's collaborators is Christine Gailey who, in turn, was a student of Stanley Diamond. Based on her research on the Tongan islands of Polynesia (Gailey 1987), she focused her research on the hidden exploitation of men over women and the ways such a "gender hierarchy" was a platform for the formation of the State.

Another researcher to be noted here is Randall McGuire, currently a lecturer at Binghamton University, the State University of New York, who primarily investigates pre-Hispanic societies in the southeast of the United States and Mexico. As a result of his research, McGuire has been exposed to Marxist theoretical developments in Latin America and in the Iberian Peninsula and, in fact, has maintained a dynamic interchange with archaeology research groups such as those of the Universitat Autònoma of Barcelona and students of Latin America. As well as his important synthesis of world Marxist archaeology (McGuire 1992), his 2008 book, *Archaeology as Political Action*, marks a milestone in North American Marxist archaeology, making clear the political commitment that should be involved in its praxis.

For his part, Phillip Kohl carried out archaeological research, especially in Asia, and developed his interpretations from a Marxist perspective (Kohl 1987). Also important are his critique of the "use and abuse" in archaeology of the "theory of the world system" of Immanuel Wallerstein and his critical analysis of the relationship between nationalism and archaeology (Kohl and Fawcett 1995).

Also deserving of mention is Glenn Perusek, who aligned himself with the "materialism of Marx" (Perusek 1994: 193) as a counterpart to the different materialisms existing in our time. Among these materialisms, we find the influential (in North America) structuralist Marxism and the diverse strands of neo-Marxism, which borrow only some Marxist elements. Perusek analyzed the so-called factional competition which has its Marxist correlation in class struggle as the engine of change in societies (for a broader treatment of this question, consult the edited anthology by Brumfiel and Fox [1994]).

As can be seen through these representative cases, Marxist archaeology still prevails in the USA, and the first generations of Marxist archaeologists of the 1960s and 1970s have now been joined by younger researchers who continue to develop and promote this perspective (McGuire 2008: 85), proposing different topics and places to research, always looking to Latin America and, above all, to Europe where Marxism began.

Marxist Archaeology in Spain

From 1960, as occurred in other Western European countries, Spain saw renovation and growth in the discipline of archaeology, although it was not until 1975 that historical materialism would be admitted into academia. This was the case because of Franco's dictatorship (1939–1975) during which time a traditional school of archaeology was maintained and "routine research rather than technological innovation, epistemological analysis and creative methodology" (Vázquez and Risch 1991: 25) was the order of the day.

It is also worth noting that the development of Marxist archaeological approaches in the 1980s was closer in Spain to the discipline of history (and hence archaeology was focused on prehistory) than to the social disciplines such as anthropology, whose frameworks and discussions had less influence on archaeology. On the other hand, Spain's close proximity to France facilitated the introduction of theory and methodology to the country, particularly within Paleolithic archaeology and fine-grained excavation techniques. Likewise, German archaeological research projects in Spain

also exerted an influence, principally methodological, on the training of many of its archaeologists; such an influence can be seen in large-scale excavations, the gathering of large collections of archaeological objects, detailed recording of sites and artifacts, the development of typologies, and quantitative analysis.

In this way, it was not until the beginning of the 1980s that new interpretations appeared in Spanish archaeology. These developed as a consequence of the changed political climate, given the left's return to power. Thus, in 1983, Vicente Lull published his doctoral thesis, defended in 1980, about the society of "El Argar" (2250–1500 BCE) in which a materialist historical perspective was used for the first time in an explicit way (Vázquez and Risch 1991: 32). As can be expected, such a publication was not free from the criticisms of the established academics, who were still very conservative.

In the same vein, an important space for the discussion of Marxist perspectives was opened in Barcelona's 1986 Congreso de Arqueología Teórica (Congress of Theoretical Archaeology) in which the majority of the papers centered on the use of Marxism in archaeology. During those years, the original Barcelona Marxist group was formally constituted, and its appearance in the academic arena at the Coloquio de Arqueología de Soria (1981) (Seminar of Sorian Archaeology) confirmed the materialist historical course that would be followed later. Equally, in the same decade, they carried out the first field investigations that had materialist theoretical frameworks, in which they included colleagues from other nationalities and theoretical positions, who would later take their theoretical substance from Marxism, as in the case of Robert Chapman (2003).

In this way, the Marxist archaeological group of Barcelona is a significant source of theoretical and methodological production for Marxist archaeology, as much in Spain as elsewhere. Its publications included many areas relating to prehistory and have been used as references in different academic spaces. In this sense, Vicente Lull, the lead investigator of this group, acknowledged from the first that dialectic has to exist between theory and material evidence, in this case that of archaeology.

In this way, Lull distanced himself from the many mechanistic Marxist discussions that had gone on previously. During the 1990s, with his team, he developed a series of theories and social explanations from archaeological investigations based on historical materialism. In almost all of these publications, one of the main objectives was to make clear that society comes about through praxis, distancing themselves completely from abstract and normative classifications that had become popular in mechanistic Marxist studies.

Lull and his associates went on to develop quite an active practice, holding conferences in different parts of Spain, Europe, and America as well as bringing to light the synthesis of theories about the origins of the State, written conjointly with Rafael Micó (Lull and Micó 2007) and a long essay by Lull (2007) on his method of viewing archaeological objects from a historical materialist perspective.

It should also be mentioned that at the same Pre-history Department at the Barcelona Universitat Autònoma was another Marxist group led by Jordi Estévez and Asumció Vila. This research group complemented the point of view of the Iberian Peninsula Pre-history Unit with a focus on studying pre-classist societies, specifically from the Paleolithic to ethnographic hunters and gatherers.

Furthermore, this group carried out archaeological investigations in America, particularly in Tierra del Fuego, closely allied with their Argentine colleagues (Estévez and Vila 1999). A similar collaboration with Peruvian colleagues was undertaken by the team led by Pedro Castro-Martínez, which focused their studies on the southern coast of Perú, carrying out various digs there, with results that were beginning to be published in America and Europe.

Finally, we also wish to mention that the Prehistory Department of Barcelona's Universitat Autònoma initiated and promoted a Marxist feminist approach, particularly by María Encarna Sanahuja (who has recently passed away) that has influenced other European and Latin

American Marxists as in the case of the Venezuelan Iraida Vargas.

Apart from the Barcelona group, another Marxist group arose in the Humanities Faculty of Jaén University, the principal representatives being Arturo Ruiz and Manuel Molinos. Important studies in this regard include those by Francisco Nocete (1988) about pre-Historic State formation in Guadalquivir and his scathing criticism of the sociopolitical leadership category; also the studies of Oswaldo Arteaga and his Seville team as well as José Ramos and associates in Cádiz deserve a mention here.

As a consequence of the structure of these Marxist archaeological groups in southern Spain, one of the seminal publications, the *Revista Atlántica-Mediterránea de Prehistoria y Arqueología Social* (RAMPAS) (the *Atlantic-Mediterranean Journal of Pre-historic and Social Archaeology*), has echoed their point of view and, of course, has an international following in which Latin American archaeologists have featured, given that the group from southern Spain has been quite influential theoretically in Latin American Social Archaeology, especially through the work of Luis Felipe Bate who obtained his doctorate from Seville University.

Latin American Social Archaeology (ASL)

After gaining independence at the beginning of the twentieth century, particularly from Spain, the majority of Latin American countries followed socioeconomic and sociopolitical processes which sought to generate identification with their precolonial, or criollo, legacy. Such identities originated in the colonial era and from the higher classes who, once political independence was achieved, eventually lead the new nations and re-created their history.

In this strengthening process, they tried to form national identities by seeking out their ancestors, which later gave rise to the nationalisms that were established through archaeological studies (Kohl and Fawcett 1995). However, scientific archaeology as such did not arise in these countries until the latter decades of the nineteenth century (Politis 1999: 198–199) although, paradoxically, they were initiated by foreign investigators, principally from Western Europe and the United States. With these researchers, cultural evolutionist theory was incorporated into the interpretation of pre-Hispanic societies. In addition, the influence of the USA became more noticeable at the start of the twentieth century, as its political power and economic interests grew.

In the years when diffusionism and cultural historicism were acquiring importance in the USA, countries such as Peru and Mexico were developing a social and political movement called "Indigenismo" (Indigenism) which was particularly influential in the 1920s. Indigenism, which began as a social vindication movement, later transformed into a type of nationalism that sought to strengthen the structure of the State by way of re-creating the pre-Hispanic past (Inca and Aztec, respectively) at the same time with the objective of rejecting colonialism, even though there were different expressions and interests in each country.

During the twentieth century, each Latin American country had a particular political trajectory, including a form that moved from leftist governments to elite US-patronized administrations to rightist military dictatorships.

In this way, owing to political situations in which power was taken by military dictatorships with nationalistic policies (e.g., in Peru at the end of the 1960s), leftist parties (e.g., in Mexico), communist governments, as in Cuba following their 1959 Revolution, or a mix of military dictatorship and left-wing parties (as in Venezuela), a Marxist archaeology was able to establish itself and develop.

In the case of Cuba, after its successful revolution, and with communist policy already installed, it was not long before Marxism was a fundamental part of archaeological interpretation. In this process, Cuban archaeologist Ernesto Tabío published his *Prehistoria de Cuba* (1966) (*Prehistory of Cuba*), a book through which Cuban archaeology was introduced to the soviet archaeological framework of analysis and through which many Latin American students assimilated this version of historical materialism (Navarrete 2006: 24). It is interesting to note here that before the Cuban Revolution, Ernesto Tabío had carried

out important archaeological investigations on the central coast of Peru.

The usual interpretations by archaeologists foreign to Latin American countries (and their local students and followers) were countered later, in 1974, with works such as *Arqueología como Ciencia Social* (*Archaeology as a Social Science*) by the Peruvian archaeologist Luis G. Lumbreras and *Antiguas Formaciones y Modos de Producción Venezolanos* (*Ancient Formations and Venezuelan Methods of Production*) by Mario Sanoja and Iraida Vargas.

As a consequence of these initial proposals, a series of meetings were held which invigorated the development of the so-called Arqueología Social Latinoamericana (Latin American Social Archaeology). The first of these, driven by Lumbreras, occurred at the symposium entitled "Formaciones aborígenes en América" (Aboriginal Formations in America) which was included in the XXXIX Congreso Internacional de Americanistas (39th International Congress of Americanists) celebrated in Lima in 1970. Later in Mexico, there was the Reunión de Teotihuacán (Meeting of Teotihuacán) in 1975, organized by José Luis Lorenzo. At each of these gatherings, they tried to establish general lines of action according to the perspective of historical materialism, which each of the participants went on to develop in their respective countries. After these early attempts, and dissatisfied with the previous work group, they formed the so-called Grupo de Oaxtepec (Oaxtepec Group) in 1983, among them Luis G. Lumbreras, Manuel Gándara, Mario Sanoja, Marcio Veloz, Iraida Vargas, and Felipe Bate.

For Perú, Luis Guillermo Lumbreras is the principal representative of this school of thought and has left us valuable insights into pre-Hispanic societies, which he endorsed through his empirical research in various zones of the Andes, for example, the Chavín de Huántar site (see the ► "Lumbreras, Luis Guillermo" entry in this encyclopedia). Although his works have not been free from criticism, it is undoubtedly his fieldwork, extensive bibliographic production, his panoramic view of social processes, and his political stance that have notably influenced archaeology in Peru and in other parts of the world.

In the 1980s, Lumbreras, together with other researchers, was part of the Instituto Andino de Estudios Arqueológicos (INDEA) (Andean Institute of Archaeological Studies) which provided a space for the practice and reflection of archaeology from the Marxism point of view. For various reasons, a solid group of Marxist archaeologists was never formed, which is made obvious by the few publications in this line. One explanation for this, in part, is that in the 1990s, during the government of Alberto Fujimori, intolerance and persecution of left-wing thought in general made it impossible to explain and practice a Marxist-inspired archaeology.

In the case of Mexico, following the foundations laid by José Luis Lorenzo and other intellectuals who emigrated from Spain due to Franco's dictatorship, the work of Luis Felipe Bate should be noted here. After his exile from Chile, as a consequence of the Pinochet dictatorship, Bate took it upon himself to form a nucleus of Marxist archaeologists with the Escuela Nacional de Antropología e Historia (ENAH) (National School of Anthropology and History) within which Manuel Gándara stands out, generating an important and meaningful production of archaeology which has impacted Latin America and Spain in particular (see Bate 1998). Likewise, thanks to the participation of Luis Felipe Bate and associates in the publication of *Boletín de Antropología Americana* (*Bulletin of American Anthropology*), an academic space was enabled for the diffusion and discussion of themes that were mostly related to Marxism.

In order not to overwhelm the reader with more individual cases, we simply wish to demonstrate that Latin American Social Archaeology still prevails, principally in such countries as Mexico, Venezuela, and Peru, although it has begun to form an autocratic viewpoint relative to its founders, though always keeping the same link between theory and praxis as its founders instituted (see Tantaleán and Aguilar 2012). Likewise, in Chile, there has been a resurgence of this type of archaeology, which had been persecuted and practically disappeared from academic and political circles during the military government of Augusto Pinochet (1973–1990).

After Pinochet's dictatorship, this kind of archaeology began to accept Marxism in both its theoretical and political implications. Studies in this line include those of Patricio Núñez, Mauricio Uribe, Francisco Gallardo, and new generations of young archaeologists such as Benjamín Ballester, Jairo Sepúlveda, Alex San Francisco, and Miguel Fuentes.

This resurgence of Marxist archaeology in Chile makes it clear that Marxism has always had an important political position in this country and that its left-wing intellectuals have been closely linked with the Peruvians, despite attempts to impose nationalisms and the political persecution of the left, particularly in the south.

Future Directions

Final Remarks

As we have been able to briefly outline, Marxist archaeology has had a presence in archaeological thought throughout the twentieth century, with significant influence in the first decade of the twenty-first century. Further, as we have demonstrated, the historical substratum, the academic training, and the academic and political context in which Marxist archaeologists practiced were dominated by other ways of doing archaeology, e.g., historical-cultural and neo-evolutionary approaches.

For this reason, despite taking on much of historical materialism, some Marxist archaeologists unconsciously reproduced assumptions and epistemologies they believed they had overcome. Furthermore, national contexts and, above all, official policies slowed down or halted their natural development. The intricate and diverse political and academic trajectories of the twentieth century can, at least in part, explain the often contradictory history of Marxism in archaeology.

While Marxist archaeological approaches are not dominant, they have influenced the world of archaeological thought. Marxist archaeology has also found ways to generate discussions and contributions which have transcended national borders and maintained a dynamic dialogue between colleagues. Thus, despite the fact that Marxist archaeologies are not always well received by the discipline, they have been well connected with other forms and approaches of practicing archaeology.

As Patterson (2003) would say, many archaeologists have had conversations with the "Ghost" of Marx. Archaeology has, therefore, been enriched by these often unacknowledged and unconscious conversations. We anticipate an ongoing development of Marxist archaeology, based on its fluent dialogues among archaeologists from diverse countries and regions of the world and with non-Marxist archaeologists as well. We also think that Marxist archaeologies need to keep some distance from dogmatisms and rhetorics that often limit their creativity, in order to develop objective and socially meaningful methodologies and historical data.

Cross-References

- ▶ Archaeology and Politics
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Childe, Vere Gordon (Theory)
- ▶ Lumbreras, Luis Guillermo
- ▶ Marx, Karl
- ▶ Patterson, Thomas Carl

M

References

Bate, L.F. 1998. *El proceso de investigación en arqueología*. Barcelona: Crítica.

Bloch, M. 1987. *Marxism and anthropology*. Oxford: Oxford University Press.

Brumfiel, E., and J. Fox, eds. 1994. *Factional competition and political development in the New World*. Cambridge: Cambridge University Press.

Chapman, R. 2003. *Archaeologies of complexity*. London: Routledge.

Dacal, R., and D. Watters. 2005. Three stages in the history of Cuban archaeology. In *Dialogues in Cuban archaeology*, ed. L. Curet, A. Shannon, L. Dawdy, and G. La Rosa, 29–40. Tuscaloosa: The University of Alabama Press.

Estévez, J., and A. Vila, coord. 1999. *Encuentros en los conchales fueguinos*. Bellaterra: UAB-C.S.I.C.

Gailey, C. 1987. *Kinship to kingship. Gender hierarchy and state formation in the Tongan Islands*. Austin: University of Texas Press.

Hakken, D., and H. Lessinger. 1987. *Perspectives in U.S. Marxist anthropology*. Boulder: Westview Press.

Hodder, I., and S. Hutson. 2003. *Reading the past. Current approaches to interpretation in archaeology*. 3rd ed. Cambridge: Cambridge University Press.

Kohl, P. 1987. The use and abuse of world systems theory: The case of the 'pristine' West Asian state. In *Advances in archaeological method and theory*, ed. M. Schiffer, 1–35. San Diego: Academic.

Kohl, P., and C. Fawcett, eds. 1995. *Nationalism, politics, and the practice of archaeology*. Cambridge: Cambridge University Press.

Lewis, H. 2009. The radical transformation of anthropology history seen through the annual meetings of the American Anthropological Association, 1955–2005. *Histories of Anthropology Annual* 5: 200–228.

Lull, V. 2007. *Los objetos distinguidos. La arqueología como excusa*. Barcelona: Bellaterra.

Lull, V., and R. Micó. 2007. *Arqueología del origen del estado. Las teorías*. Barcelona: Bellaterra.

McGuire, R. 1992. *A Marxist archaeology*. San Diego: Academic.

McGuire, R. 2008. Marxism. In *Handbook of archaeological theories*, ed. A. Bentley, H. Maschner, and C. Chippindale, 73–93. Lanham: Altamira Press.

Navarrette, R. 2006. *La arqueología social latinoamericana: Una meta, múltiples perspectivas*. Caracas: Coordinación de Extensión de la FaCES, Universidad Central de Venezuela.

Nocete, F. 1988. *El espacio de la coerción: la transición al Estado en las campiñas del Alto Guadalquivir (España), 3000–1500 a.C*. Oxford: British Archaeological Reports.

Patterson, T. 2003. *Marx's ghost. Conversations with archaeologists*. Oxford: Berg.

Patterson, T. 2007. Social archaeology and Marxist social thought. In *A companion of social archaeology*, ed. L. Meskell and R. Preucel, 66–81. Malden: Blackwell.

Patterson, T. 2009. *Karl Marx. Anthropologist*. Oxford: Berg.

Perusek, G. 1994. Factional competition and historical materialism. In *Factional competition and political development in the New World*, ed. E. Brumfiel and J. Fox, 191–198. Cambridge: Cambridge University Press.

Politis, G. 1999. Introduction. Latin American archaeology: An inside view. In *Archaeology in Latin America*, ed. G. Politis and B. Alberti, 1–13. London: Routledge.

Preucel, R., and L. Meskell. 2007. Knowledges. In *A companion of social archaeology*, ed. L. Meskell and R. Preucel, 3–22. Malden: Blackwell.

Spriggs, M., ed. 1984. *Marxist perspectives in archaeology*. Cambridge: Cambridge University Press.

Tantaleán, H., and M. Aguilar, eds. 2012. *La Arqueología social latinoamericana. De la teoría a la praxis*. Bogotá: CESO. Universidad de los Andes.

Trigger, B. 1984. Childe and Soviet archaeology. *Australian Archaeology* 18: 1–16.

Trigger, B. 2006. *A history of archaeological thought*. 2nd ed. Cambridge: Cambridge University Press.

Vargas, I., and M. Sanoja. 1999. Archaeology as a social science: Its expression in Latin America. In *Archaeology in Latin America*, ed. G. Politis and B. Alberti, 57–73. London: Routledge.

Vázquez, J., and R. Risch. 1991. Theory in Spanish archaeology since 1960. In *Archaeological theory in Europe. The last three decades*, ed. I. Hodder, 25–51. London: Routledge.

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Basic Biographical Information

Andrew R. Mason is a Principal and Registered Professional Consulting Archaeologist in Golder Associates' Vancouver, Canada, office. He holds an M.A. from the University of British Columbia.

Major Accomplishments

Mason's research interests include Northwest Coast archaeology, impact mitigation strategies, the role of finance in cultural heritage, and cultural heritage policy. He has over 20 years of experience, undertaking heritage assignments throughout North America, South America, and Asia. In addition to his consulting practice, he is also a Sessional Instructor at the University of British Columbia. He is an ICAHM Expert Member and Vice President for North America in ICAHM. He is also a member of the editorial board of ICAHM's publication series, "Multidisciplinary Perspectives in Archaeological Heritage Management." He was a board member of ICOMOS (Canada) from 2009 to 2012 and is currently Canada's International Voting Member for ICAHM.

Cross-References

- ▶ Canada: Cultural Heritage Management
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canada: World Heritage

Further Reading

Mason, A.R. 2005. Urban archaeological sites at risks. *ICOMOS Canada Momentum* 11 (1): 44–48.

Mason, A.R. 2012. International project financing and cultural heritage protection. *International Journal of Cultural Property* 19: 556–560.

Mason, A.R. 2013. Cultural resource management in the context of forestry in British Columbia: Existing conditions and new opportunities. In *Aboriginal peoples and forest lands in British Columbia and Canada*, ed. D.B. Tindall, R. Trosper, and P. Perreault, 161–179. Vancouver: UBC Press.

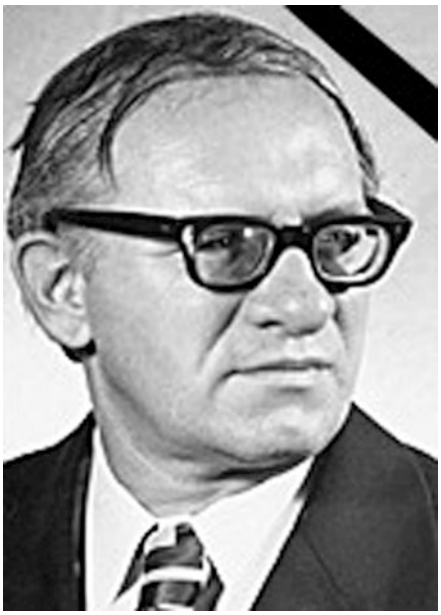

Masson, Vadim M., Fig. 1 Vadim Mikhailovich Masson

Masson, Vadim M.

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Basic Biographical Information

Vadim Mikhailovich Masson (1929–2010) (Fig. 1) was one of the most prominent archaeologists of Russia, a scientist with an international reputation, a pioneering researcher of ancient cultures of the South of Central Asia, and an important theorist who developed questions around the social and economic organization of proto-state (complex) societies.

Vadim Mikhailovich Masson was born on May 3, 1929, in Uzbekistan. He was the son of academic M.E. Masson. During 1945–1950, he studied in Department of History, Central Asian State University, in Tashkent. In 1959, he defended his Master's dissertation on the subject: *Dakhistan's Ancient Culture*. In 1963, he received a doctoral degree for his thesis *Ancient Past of Central Asia: From Beginning of Agriculture to campaign of Alexander the Great*.

From 1954, he worked in the Leningrad office of the Institute of Archaeology of the Academy of Sciences of the USSR (presently known as the Institute of History of Material Culture at RAS), before becoming the Director in 1982. In 1956, he began to teach in the Department of History of Leningrad State University.

From 1951 until 2002, Masson annually carried out archaeological expeditions in the territory of Turkmenistan on settlements such as Dzheytun, Kara-depe and Altyn-depe, archaic Dakhistan and the Geoksyur oasis.

Masson died on February 19, 2010, in St. Petersburg.

Major Accomplishments

Vadim Masson made a huge contribution to the discovery and study of the agricultural settlement of the fourth millennium BCE – the well-known Dzheytun. This monument gained worldwide recognition, thanks to its unique artifacts, which brightly narrate the lives of the first farmers and

cattle-farmers. V.M. Masson first identified and classified the so-called Dzheytun Culture as an essential phenomenon in the system of agricultural communities of the ancient world. Following V. Gordon Childe, Masson investigated the problem of the "Neolithic Revolution" based on new archaeological materials. He presented his findings in the monograph *Dzheytun's Settlement* (Masson 1971).

Archaeological excavations by V.M. Masson on the settled cultures of the Bronze Age in Central Asia enkindled a great interest in studying the genesis and development of early urban civilizations in this area of the ancient East. As shown in the research of V.M. Masson, in the third to second millenniums BCE between Shumer and India, several large urbanized habitats existed, where ancient civilizations were formed. The first of these was the South Turkmenian urban habitat of ancient-eastern civilization (Altyn-depe, Namazga-depe, Ulug-depe etc.). Early urban centers with monumental architecture were established in this area. The first general works dedicated to studying the pre-urban and early urban cultures near Kopetdag Plane (Namazga, Altyn-depe, Ulug-depe, Yaz-depe), were published in the 1950s and 1960s.

V.M. Masson regarded the South Turkmenian civilization as an early class (complex) society and Altyn-depe as "temple town" and urban center of this region. The detailed analysis of the rich collection of artifacts from this area led V.M. Masson to conclude that the complicated social and economical structure of the Altyn-depe society could also be viewed as a proto-state (complex) community.

V. M. Masson supervised around 50 scholars with scientific degrees for historical sciences. He is the author of more than 500 scientific works, including 32 books, which were published in Germany, Italy, Japan, Russia, Turkmenistan, UK, USA, and other countries.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Early Regional Centers: Evolution and Organization
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ Modern Material Culture, Archaeology of
- ▶ Social Archaeology
- ▶ Urbanism in the Ancient Near East

References

Masson, V.M. 1971. *Poselenie Djeitun: Problema stanovleniya proizvodyaschey ekonomiki [Dzheytun's settlement] (MIA 180)*. Leningrad: Nauka.

Further Reading

Masson, V.M. 1961. The first farmers in Turkmenia. *Antiquity* 139.

Masson, V.M. 1981a. Urban centers and early class society. In *The Bronze Age civilization of Central Asia*, ed. P.-L. Kohl. New York: Armonk.

Masson, V.M. 1981b. *Altyn-depe: Raskopki goroda bronzovogo veka v Yuzhnom Turkmenistane [Altyn-depe: Excavation of Bronze Age's town in South Turkmenistan]*. Leningrad: Nauka.

Masson, V.M. 1983. A new type of culture formation leading to food production economy and social progress. *Journal of Central Asia* 6 (1).

Masson, V.M. 1985. La dialectique des traditions et des innovations dans le dévelopement culturel de la Bactrian. In *L'archéologie de la Bactriane ancienne*. Paris: Editions du Centre national de la recherche scientifique.

Masson, V.M. 2006. *Kulturogenez drevney Tsentral'noi Azii (Cultural genesis of ancient Central Asia)*. Saint Petersburg: Saint Petersburg State University.

Masson, V.M., and V.I. Sarianidi. 1972. *Central Asia: Turkmenia before Achaemenides*. London.

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries

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This entry offers an overview of past and current approaches to the colonization of Nubia during the Egyptian New Kingdom (1550–1070 BC). In order to pursue this task, a general introduction to

the history of New Kingdom colonial Nubia is presented, as well as the main archaeological sites. After this, the entry discusses the material culture of various New Kingdom cemeteries and suggests that in order for us to move research on colonial Nubia forward, more attention has to be paid to the internal diversity that characterizes complex societies, among which New Kingdom Nubia was no exception.

Archaeologies of Colonialism and the Nubian Past

Throughout human history, different types of colonialism can be detected. Examples include annihilation and subjugation of indigenous populations by colonial forces, such as in the case of the Spanish colonization in the Americas (Todorov 1982); exploitation colonialism, in which a colonial center plunders and appropriates the resources of the colonized lands while local elites benefit from participating in the colonial enterprise, as in the case of Portuguese America (Fragoso et al. 2001); or settler colonialism, where expansion is followed by migration and the foundation of colonial towns, as in the case of the ancient Egyptian colonialism in Nubia during the New Kingdom (Morris 2018).[1]

Trying to construct an all-encompassing definition for colonialism is a difficult endeavor, especially as current archaeologies of colonialism, much influenced by postcolonial theory, are emphasizing bottom-up perspectives on colonization with special focus on specific realities. Thus, a generic definition proves itself useful for us to understand distinctive colonial situations. According to Gosden, colonialism "is not many things, but just one. Colonialism is a process by which things shape people, rather than the reverse. Colonialism exists where material culture moves people, both culturally and physically, leading them to expand geographically to accept new material forms and to set up power structures around a desire for material culture" (Gosden 2004: 153).

Such a definition works as basis for perspectives on culture contact which emphasize the historically situated uses of objects in colonial situations (Thomas 1991), or others which emphasize, mostly influenced by Homi Bhabha (1994), the potential of liminal spaces in colonial encounters to produce innovation (Stockhammer 2012). Other postcolonial approaches to the archaeology of colonialism emphasize the lived experience of colonialism, as an attempt to build bottom-up perspectives which give space to identity formation strategies, ethnicity, gender, etc. (Given 2004).

More recently, approaches focusing on consumption and material culture have flourished. Scholars are emphasizing the social role of material culture beyond representation, i.e., objects do not represent cultures that interact and produce innovation; instead, they are part of complex social phenomena such as consumption, local production, and distribution (Creese 2017; van Oeyen and Pitts 2017). The potential of objects "to become" in contexts of standardization is also playing an important role in today's discussions on colonization and globalization in archaeology (Cipolla 2017; Pitts 2019).

Ancient Nubia has been mostly left out of these debates until very recently, and perspectives on Nubian archaeology can be divided into a *colonial paradigm* and a *postcolonial paradigm* (see Trigger 1994). Traditional perspectives grounded upon the Egyptianization of Nubia can be included in the first, while more recent debates around cultural entanglements characterize the former.

During the New Kingdom (Tables 1 and 2), Nubia has been traditionally considered as an extension of ancient Egypt. In this period, the ancient Egyptians started an imperialist expansion towards the south, which later on became a full colonization enterprise (Fig. 1). For instance, it took Nubian archaeologists longer than Roman archaeologists (Webster 2001) to overcome acculturation approaches to imperialism and colonization (van Pelt 2013).

[1]In New Kingdom Nubia, migration is attested by textual sources and, more recently, confirmed by stable isotope analysis at cemetery of Tombos (Buzon and Simonetti 2013; Smith and Buzon 2017: 618–619).

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Table 1 Simplified chronology of Nubia. (Dates follow Welsby and Anderson eds. 2004)

Lower Nubia	Upper Nubia
A-Group c. 3700–2800 BC	Neolithic fourth millennium BC Pre-Kerma c. fourth millennium–2600 BC
C-Group 2300–1600 BC Egyptian Middle Kingdom and Second Intermediate Period 2200–1550 BC	Kerma Period 2500–1500 BC

Egyptian colonization (New Kingdom) 1550–1069 BC
Napatan Period ninth to fourth centuries BC
Meroitic Period fourth century BC to sixth century AD

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Table 2 Chronology of the Egyptian New Kingdom, and the reigns of pharaohs mentioned in the text. (After van Pelt 2013: 525 and Shaw ed. 2000: 484–485)

Egyptian New Kingdom		
18th Dynasty		1550–1295 BC
	Ahmose	1550–1525 BC
	Amenhotep I	1525–1504 BC
	Thutmose I	1504–1492 BC
	Thutmose III	1479–1425 BC
	Hatshepsut	1473–1458 BC
	Amenhotep III	1390–1352 BC
	Akhenaten	1352–1336 BC
	Tutankhamun	1336–1327 BC
19th Dynasty		
	Seti I	1294–1279 BC
	Merenptah	1213–1203 BC

Nubia offers us a fruitful context for investigating how foreign objects representing a colonial attempt at standardization worked as part of complex social phenomena (e.g., imports, local production, and consumption) that determined the extent to which cultural entanglements and the negotiation of identities took place through material culture. Beyond cultural mixture, the archaeology of colonialism in Nubia is also about "the complex webs of economic, political, social, and cultural linkages that can result, often inadvertently, from the consumption of alien material culture" (Dietler 2010: 53).

Theoretical and Methodological Issues

Postcolonial theory is still to make its way into Egyptology. For more the 100 years, Egyptological approaches to Nubia have revolved around the colonial idea of Egyptianization. Early scholars such as George Reisner conducted major excavations in Nubia and are responsible for a significant amount of our knowledge today. However, at the same time, a strong Egyptocentric perspective on ancient Nubia marks these early studies, alongside racist and evolutionist views of ancient Nubian populations, considered as essentially inferior, static, and unable to produce history by themselves (see Trigger 1994; Raue 2019).[2]

In the 1960s and 1970s, the concept of Egyptianization (e.g., acculturation) grounded most of the approaches to colonial Nubia. Local Nubian populations were considered as passive receptacles of Egyptian superior techniques, culture, and ultimately civilization. For instance, Bietak (1968: 113) had assumed that the C-Group populations of Lower Nubia offered no resistance to the adoption of Egyptian culture, based on a visible transition from burials following local traditions to "Egyptian" burial customs. In his words, once the C-Group met the ancient Egyptians, it "completely lost its substance and therefore offered no resistance to the monopolizing Egyptian New Kingdom culture" (Bietak 1987: 122). In general, scholars have considered that the local populations of Lower Nubia were rapidly Egyptianized, while others have suggested a gradual move towards "civilization". For instance, Säve-Söderbergh described the gradual change in building techniques and styles in C-Group settlements towards an "increasing occurrence of mud-bricks, square rooms, and defences imitating Egyptian fortifications" (Säve-Söderbergh 1989: 10).

[2]Such inappropriate views can be seen throughout Reisner's work, including the first volume of the *Archaeological Survey of Nubia* (1910) and his *Excavations at Kerma* (1923). Revisiting the work of early archaeologists in Nubia is vital for a better understanding of society and history in Sudan in Antiquity (Minor 2018).

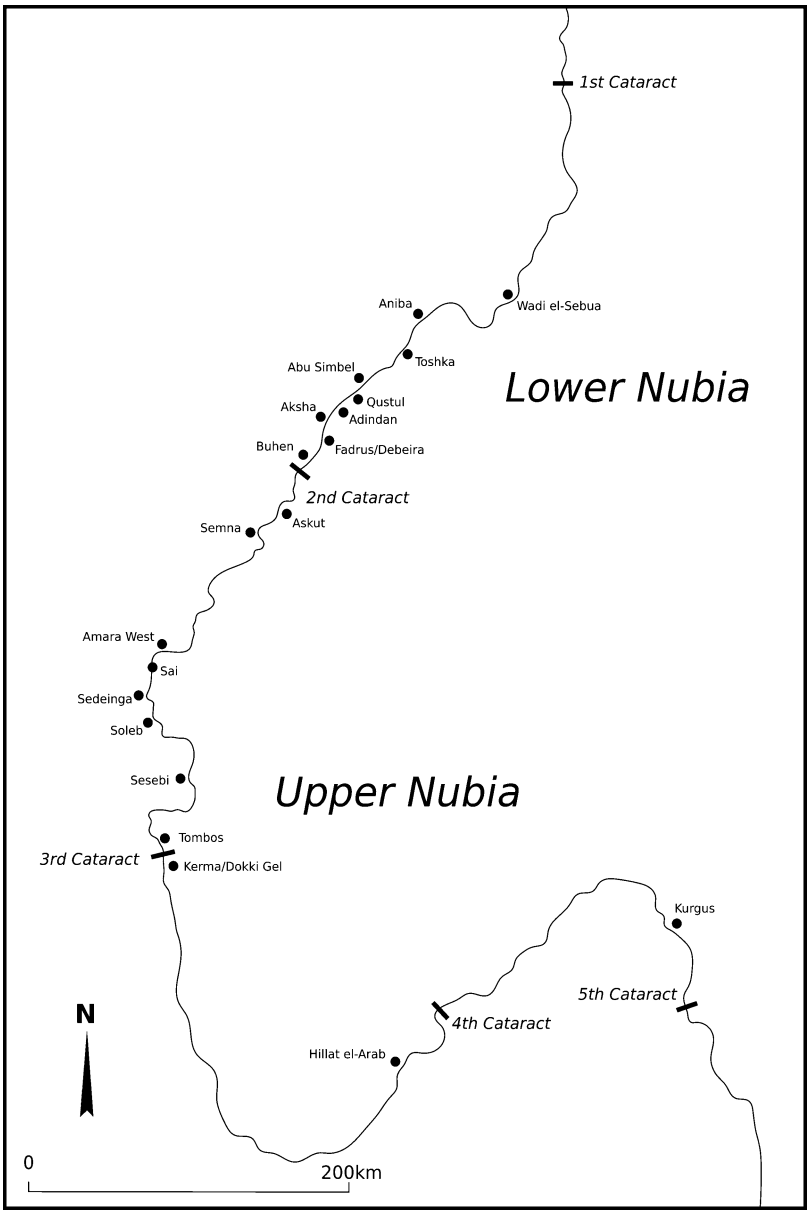

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Fig. 1 Map of New Kingdom Nubia showing the sites mentioned in the text. (Drawn by the author)

The Egyptianization perspective is mostly grounded on the accepted transposition of Egyptian administration and economic systems to Nubia and the overall substitution of local material culture for Egyptian-style objects at archaeological sites across Sudan during the Egyptian New Kingdom. In general, Nubian pottery types represent only c. 10% to 20% of the assemblages at New Kingdom settlement sites. This is the case at Askut, Sesebi, and Amara West (Smith 1995, 2003: 116; Rose 2012: 16, 2017: 472; Parkinson and Spencer 2017: 214). However, Nubian pottery types are less representative at Sai, comprising c. 5% of the assemblages (Budka 2017b: 123). At cemetery sites, the picture is not only marked by a predominance of Egyptian-style pottery (Nordström et al. 1991: 14) and grave goods, but also by an overall shift towards Egyptian burial customs; e.g., over 93% of the bodies at the cemetery of Fadrus were buried in an extended

position (see Säve-Söderbergh and Troy 1991). Tomb types also seem to follow Egyptian architectural standards (Vincentelli 2009: 3; van Pelt 2013: 524; Spence 2019: 547–556).

A few exceptions can be found within this intellectual context. Adams was a pioneer in discussing the Egyptian colonization of Nubia as a colonial enterprise and emphasizing the complexity of Nubian society (Adams 1977: 5–6), while Kemp was probably the first to propose a discussion of the character of such a colonial venture. Kemp questioned whether the term colonization should be applied to Nubia, ending up arguing for the validity of the concept, although Nubia in the New Kingdom should be considered a specific type of colonization, especially in comparison with other expansion movements in the Ancient World (Kemp 1978: 33–34). Säve-Söderbergh and Troy later discussed the loose application of the concepts "'colonization" and "imperialism" to New Kingdom Nubia, although still following an acculturation perspective in order to explain change (Säve-Söderbergh and Troy 1991: 11).

Later scholars continuously applied the concept of acculturation to ancient Nubia. However, new theoretical developments started to acknowledge the role of local resistance against the Egyptian expansion, for instance, in the topical permanence of certain Nubian features in burials at New Kingdom cemeteries in Lower and Upper Nubia (Smith 2003: 197). Such perspectives were an important step towards the recognition of Nubian agency in contexts of cultural contacts with Egypt, despite still making use of acculturation as an analytical tool.

More recently, following up from the critique to the concept of Romanization (Webster 2001) and influenced by postcolonial theory, scholars engaging with New Kingdom Nubia gradually started to reject the concept of Egyptianization (van Pelt 2013; Buzon et al 2016). Drawing from the work of Bhabha (1994) as criticized by Stockhammer (2012), van Pelt proposed an approach to New Kingdom Nubia centered in the concept of cultural entanglement. The concept emphasizes "the creative potential of 'liminal spaces' which are conceptualized as situations and spaces of intercultural encounter" (van Pelt 2013: 533). These encounters would result in material or relational entanglements, apprehended from modified objects and the display of cultural affinities, respectively. The cultural entanglement approach, similarly to Bhabha's hybridity, emphasizes indigenous agency and creativity in the (re) appropriation, adaptation, rejection, and transformation of colonial patterns, resulting in hybrid or entangled objects that are neither Egyptian nor Nubian.

Current work on Nubian archaeology based on the concept of entanglement is revealing a more complex set of interactions between the Egyptian administration, colonists, and local populations (Spencer et al. 2017: 13–14). Evidence for interactions include the topical presence of Nubian architecture in typically Egyptian settlement sites, e.g., Amara West (Spencer 2010; Spencer et al. 2017: 44); the local production of Egyptian-style pottery vessels using local techniques at Sesebi (Rose 2017: 471); and the combination of local and foreign burial practices; e.g., the female burials in Nubian-style deposited in Egyptian-style tombs at Tombos (Smith and Buzon 2017: 624), or the appearance of material innovations derived from the adoption of foreign objects in mortuary contexts, such as shabtis (see Freier 1993: 9–10; Näser 2017: 561; Smith and Buzon 2017: 621–622)

Entanglement also seeks to address colonial experiences, which produced blurred, relational identities in between the "foreign" and the "local" (Smith and Buzon 2017: 627). This is seen in the case of Hekanefer, Prince of Miam (Aniba) during the reign of Tutankhamun. Hekanefer appears in the tribute scene at the Theban tomb of Huy, Vice-Roy of Kush (de Davies and Gardiner 1926: 23, plates XXIII and XXVII). Within the tomb's decoration, Hekanefer is depicted as a Nubian courtier wearing an Egyptian linen robe, but also clear Nubian identity markers such as two ostrich feathers on his head, large white penannular earrings and bracelets, and a panther skin (Fig. 2). On the other hand, in his

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Fig. 2 Detail of the upper register of the tribute scene in the tomb of Huy at Thebes (TT40). Among the kneeling princes leading the procession is Hekanefer, identified by an inscription next to his body. Wikimedia Commons

own tomb at Toshka, Lower Nubia, Hekanefer is depicted fully as an Egyptian (Simpson 1963: 9, plate IV). Other Nubian princes, such as the brothers Djehutyhotep and Amenemhat, were depicted as Egyptians in their tombs excavated at Debeira (Thabit 1957: plate XVII; Säve-Söderbergh 1960: 31–32; Säve-Söderbergh and Troy 1991: 182–190). This movement across cultural boundaries has been interpreted as the creation of a mixed identity, which could trigger elements of both cultures strategically according to context (van Pelt 2013: 537; Török 2009: 269; cf. Smith 2015: 767).

According to van Pelt, cultural entanglement stimulates dynamic conceptualizations of Egyptian and Nubian cultures, instead of seeing them as monolithic entities (van Pelt 2013: 541; see Wendrich 2010). However, entanglement approaches have failed to acknowledge the internal diversity of Nubia, which includes different demands for things, local production and distribution of objects, and local relations of power, which result in different entanglements or lack thereof according to different social realities within Nubia. For instance, the entanglement approach has failed to address non-elite agency, which produces entanglements from a completely different social background to those elite individuals depicted in tomb paintings and reliefs, such as that of Hekanefer (Lemos 2018: 28).

Nubia in the New Kingdom

In the New Kingdom, the ancient Egyptians started a new project of expansion, occupation, and colonization in Nubia, which differed from their first attempts to establish dominion in the south in the Egyptian Middle Kingdom. In this period, the Egyptians built a series of fortresses in Lower Nubia, between the first cataract and Semna. These fortresses aimed mostly at establishing the Egyptian presence in the region and at creating defensive checkpoints against the Nubians from Kerma, but they also played an important role in long-distance trade (Török 2009: 86–87). The purely defensive role of fortresses has also been discussed, and scholars have stressed their role in an expansion policy undertaken in different periods (Spence 2004: 267; Vogel 2010; Knoblauch 2019: 370).

The ancient Egyptian imperial enterprise of the Middle Kingdom and New Kingdom share several characteristics, but as Morris highlights, in order to survive, empires have to be moving entities that constantly need to adapt strategies according to diversified realities (Morris 2018: 8). Morris approaches the New Kingdom colonialism in Nubia based on the idea of *conversions*, from previous realities into new ones (see also Williams 2018: 100). These conversions include soldiers becoming settlers and administrative

officials and Nubian elites becoming local rulers that answered to the pharaoh. But also the conversion "of Nubia's economy into a system that mirrored Egypt's own, and the conversion of its religious landscape into one dominated by Amun, divine kings, and other "Egyptian" gods but nonetheless increasingly placed under the stewardship of Nubians" (Morris 2018: 223).

After a gap during the decentralized Egyptian Second Intermediate Period, the pharaohs of the Egyptian New Kingdom turned their focus once more towards Nubia. The earlier fortresses seem to have been occupied without interruption through the Second Intermediate Period. Evidence from Buhen indicates an alignment between local independent ruling groups and the ruler of Kerma (stele Khartoum 18: Smith 1976: 41; Säve-Söderbergh 1949; see also Knoblauch 2012; Cooper 2018). With the advent of Egyptian colonial rule in New Kingdom Nubia, it is unclear what happened with the communities of expatriates living in the fortresses during the Egyptian Second Intermediate Period (Smith 1995: 137). Nevertheless, fortresses such as Aniba and Buhen were reorganized and expanded during the Egyptian New Kingdom. In this process, temples were erected, and magazines and residential areas developed (Emery et al. 1979: 15–16), as well as large cemeteries (Randall-Maciver and Woolley 1911; Steindorff 1937; Williams 1992).

At the beginning of the New Kingdom, the Egyptians had already expanded as far to the south as Sai Island. Discussion remains about which pharaoh founded the island's fortified settlement – either the first pharaoh of the Egyptian New Kingdom Ahmose (Davies 2004: 103), or his successor Amenhotep I (Gabolde 2012: 137; Budka and Doyen 2012: 170). Later pharaohs of the Egyptian 18th Dynasty sent military expeditions to Upper Nubia. The southernmost boundary at Kurgus had been already reached under Thutmose I, but was only finally established under Thutmose III (Davies 2017: 67–73).

Enumerating pharaonic military expeditions to Nubia does not explain the complex history of colonial Nubia, especially if we aim to open space for local viewpoints on history and the functioning of society. Most of the sources from which we can approach the Egyptian imperial expansion in the south consist of texts produced by the ancient Egyptians. These texts account only for the successes of military campaigns and never for the unsuccessful battles (Spencer et al. 2017: 19). However, the very ideological descriptions of the Nubians in Egyptian texts and iconography (Smith 2003; Anthony 2017) can also account for Nubia's resistance against imperial expansion and further colonization. In fact, tribute scenes such as the one at TT40, depicting Nubians bringing gold and other treasures from their country, could have been interpreted by Nubians as expression of their own power and their ability to provide Egypt with resources.

By the end of the Egyptian Eighteenth Dynasty, the character of the Egyptian expansion policies changed, from a more aggressive military expansion to a focus on territorial occupation (Morris 2018: 232–233). Before the major architectural interventions in Nubia, in the reign of Thutmose I, the city of Dokki Gel had been built, substituting Kerma, the former seat of the ruler of Kush. Later in the New Kingdom, Hatshepsut and Thutmose III intervened significantly in the architecture of the city (Bonnet 2019: 94–95). In the same period, Thutmose III enlarged the main temple of Sai (Gabolde 2012: 136–137; Azim and Carlotti 2012: 34; Vercoutter 1973; Minaut-Gout 2007).

In this period, the Egyptians started to build temple-towns across Upper Nubia. These sites were characterized by a surrounding thick wall (five meters thick, in the case of Sesebi), which bounded the settlement's space, rather than fulfilled any defensive role (Spence 2004: 268; a similar context was found at Sai: Adenstedt 2016: 25). Within the enclosure were located a stone temple, magazines, administrative areas, and housing areas (Kemp 1972). These temple-towns fulfilled a complex role in the administration of Nubia (Vieth 2018), but were mainly associated with the exploration and processing of resources, the most important of which was gold (Spence et al. 2011; Stevens and Garnett 2017: 303). Amenhotep III commissioned temples at Soleb and Sedeinga (Schiff Giorgini 1988–2002), while Akhenaten ordered the

construction of a temple-town at Sesebi (Blackman 1937; Fairman 1938), although activity prior to his reign has been recently detected at the site (Spence 2017). Other temple-towns were constructed later on in the Egyptian New Kingdom. An example is Amara West, built in the reign of Seti I (Spencer 2017).

Nevertheless, the socioeconomic role of temple-towns was not restricted to the exploration of Nubian resources, e.g., gold mining and processing; instead, it also included a series of other activities that aimed to keep these settlements working, while providing for both Egypt and local populations. The colonial towns of Nubia boosted local economic activities, most probably centered on the institution of the temple (Kemp 1978: 33). As urban centers, the Nubian temple-towns likely attracted people, and seem to have functioned as production centers, but also consumption foci (Morkot 1993: 92; see also Randall-Maciver and Woolley 1911: 131; cf. Steindorff 1937: 74–75). Morkot's model of the socioeconomic system in colonial Nubia opens little space for individuals to consume; rather, according to his view, consumption would be restricted to elites and pass through the monopoly of the temple. On the contrary, similarly to what happened at sites such as Amarna (Kemp and Stevens 2010), seals from urban contexts in colonial Nubia could have been used in private administrative practices (see Smith 2018: 310). Architecture at Amara West also serves as evidence for individual endeavors within the institution of the house/workshop, linked directly or indirectly to the local temple (see Spencer 2014). Consumption of certain goods, such as shabtis and heart scarabs, was indeed restricted to elite groups. The distribution of objects across various cemeteries in colonial Nubia reveals that certain types were restricted in number and confined to elite sites (see below 'Burial Communities in New Kingdom Nubia'). However, the products that resulted from consumption practices and allowed people to negotiate identities and entanglements to take place also appear in large non-elite cemeteries such as Fadrus (Säve-Söderbergh and Troy 1991), and in "simpler" interments in reused pyramid and shaft tombs throughout Nubia in the New Kingdom (Spence 2019: 541); e.g., the tombs at Soleb and Sai (Schiff Giorgini 1971: 296; Minault-Goult and Thill 2012: plate 71)[3].

Recent excavations are starting to offer us glimpses of the busy lives of the inhabitants of colonial towns in Nubia (Spencer et al. 2017: 37). This helps us to place burial goods back in their social context, which included phenomena such as importing, local production, and consumption of goods, which were later used to negotiate positions and power, as well as identities resulting from cultural entanglements. Activities detected at colonial towns include the management and distribution of imported goods (Smith 1976: 162–179, 180–189; Rose 2017: 471); the production of pottery (Budka 2017b: 152; Spencer 2017: 347; Rose 2017: 471); metalworking (Spencer 2017: 337; Emery et al. 1979: 94; Smith 2013: 283); and faience production (Budka 2017b: 166; Doherty 2013). Even when the evidence for production of objects at temple-towns is limited, glimpses from different sites, which include molds for production of small faience objects (Spencer et al. 2017: 37–38), alongside the products themselves, allows us, to some extent, to reconstruct a social context from which objects derive. In New Kingdom Nubia, the economic activities in colonial towns went from the institutional, administrative level to the private, individual realm.

[3]Due to extensive disturbance and plundering, and the fragmented character of the archaeological record of tombs at New Kingdom cemeteries in Nubia, it is difficult to establish any chronological divisions between primary and secondary uses of tombs (Näser 2017: 561–562). Later burials can only be identified on the grounds of comingled objects found inside tombs (e.g., Schiff Giorgini 1971: 369–383; Vincentelli 2009: 2). At the same time, it seems that the majority of secondary/later burials found in collective tombs date to the New Kingdom. This is exemplified by the collective burials at the cemetery of Fadrus (Säve-Söderbergh and Troy 1911), which was used only during the 18th Dynasty, and the New Kingdom cemetery at Soleb, where the latest pyramid tomb was erected sometime around the reign of Tutankhamun. Additionally, radiocarbon dates suggest that individuals were also buried inside New Kingdom tombs in the second half of the New Kingdom (Schiff Giorgini 1971: 98–101).

The material culture excavated at Nubian colonial cemeteries is the result of a colonial social context, which included interconnections with Egypt and local economic activities. Objects are not only evidence for cultural contacts and entanglements but also for a complex social context that included the consumption of imported or local goods, which determined whether entanglements would take place and, if so, how. In other words, cultural contacts and their results depended on local demands for things and internal social structures. Individuals would be more or less able to have access to objects depending on their position in society, proximity to local administration, etc. At the same time, material culture also created, reinforced, or contested social hierarchical relations and identities, a power which objects transferred to those individuals who were able to consume restricted objects, then becoming more able to negotiate identities and create entanglements. Objects such as heart scarabs were restricted to certain people, while others such as scarab seals were widespread through various cemeteries and types of tombs. Therefore, cultural entanglements were dependent on local social relations of production and consumption.

New Kingdom Cemeteries in Nubia

New Kingdom cemeteries in Nubia developed in association with urban sites, from large administrative centers such as Aniba (Steindorff 1937), Sai (Minault-Goult and Thill 2012; Budka 2017c), and Soleb (Schiff Giorgini 1971) to settlements with less extensive cemeteries such as Sesebi (Spence 2019: 549) and Amara West (Binder et al. 2011). However, not all cemeteries are associated with surviving settlements (e.g., Fadrus), although this might be due to the changing river and occasional floods (Säve-Söderbergh and Troy 1991: 212; cf. Johansson 2014: 65–66; Spence 2019: 5–6). These cemeteries house the tombs of individuals from all social strata. This is clear in the types of tombs and associated objects. These tombs included both Egyptian settlers and Nubians, who lived together in various temple-towns (Smith and Buzon 2017; Buzon et al. 2016).

Aniba, Sai, and Soleb were important administrative centers in the New Kingdom. The cemeteries associated with these sites include pyramid tombs and shaft tombs with two or more chambers. These tombs usually include a superstructure consisting of a mud-brick pyramid and/or courtyard, and are usually associated with elite individuals closely linked to the colonial administration (Müller 2013). Inscriptions found on tombs' architectural elements or on grave goods detail the relationships between individuals buried in the cemetery and the administration of the colony. A variety of titles appear on objects like shabtis (Fig. 3), including administrative and religious titles such as prophet, priest, goldsmith, mayor, overseer of the treasury, overseer of works, scribe, etc. The title Viceroy of Kush also appears on shabtis, but only two Viceroys of Kush are known to have been buried at Aniba – Seti and Messuy (Steindorff 1937: 21, 58, 84). Most of the Viceroys of Kush were buried in Egypt, at sites such as Thebes and Tell Basta (Habachi 1980: 630–639; Török: 171–177; Spence 2019: 546).

On the other hand, the mortuary landscape in New Kingdom Nubia was diverse. The cemetery of Fadrus, which is the largest cemetery excavated in Nubia, includes several types of tombs (Säve-Söderbergh and Troy 1991), totaling 725 units and 680 burials. Apart from the burials, 33 bone clusters were also registered (Table 3).

Burials at Fadrus encompass those usually attributed to individuals from non-elite and sub-elite groups (Lemos 2017: 124–125). The excavators identified eight different types of tombs at Fadrus (Säve-Söderbergh and Troy 1991: 214–220). More recently, Spence regrouped the burials at Fadrus into four types (Fig. 4):

1. Pit burials (the most common tomb type), not very deep, usually dug in the size of a body or a coffin
2. Pit with side niche
3. Pit with mud-brick chamber
4. Pit with end niche (a subtype are pit burials with double-end niches) (Spence 2019: 547)

Spence (2019: 557) notes that over 70% of the burials at Fadrus contained none or up to four

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Fig. 3 Two faience shabtis belonging to the Viceroy of Kush Messuy from Aniba Tomb S90 (Steindorff 1937: plate 44). Photo by the author. Courtesy of the Ägyptisches Museum Georg Steindorff, Leipzig

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Table 3 Units at Fadrus (Säve-Söderbergh and Troy 1991)

Unit type	Quantity
Surface construction	8
Pit	274
Side niche	127
False side niche (pit)	8
End niche	238
Double end niche	10
Corner niche	4
Chamber in pit	11
Triple chamber in pit	1
Chamber with ramp in pit	44
	Total: 725 units

ceramic vessels and few other objects. These are usually pit burials containing an individual body. There are also examples of collective burials, which might have played a specific role in the process of creating distinction (*sensu* Bourdieu 1984) in New Kingdom Nubia (Lemos 2018: 30). These tombs are usually more elaborate and contain a greater number of grave goods; e.g., Fadrus tomb 511, which was the largest tomb in the whole cemetery (Säve-Söderbergh and Troy 1991: 281–282). Collective tombs and tomb reuse were important phenomena in New Kingdom Nubia, and further research is needed to shed more light upon this aspect of colonial society (see Näser 2017; Lemos 2018; Spence 2019; Miniaci 2019).

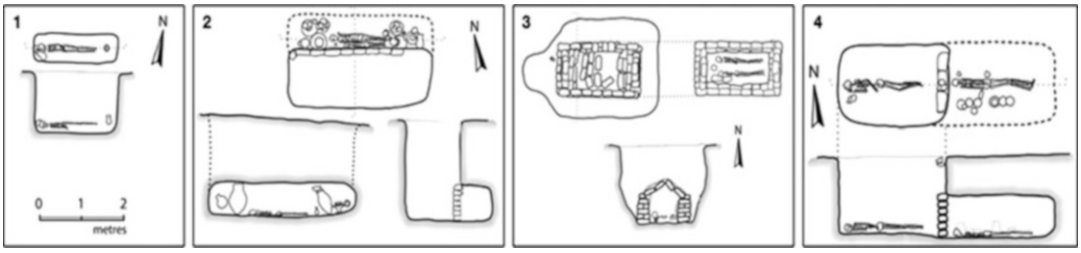

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Fig. 4 Burial types at Fadrus (Spence 2019: 547). (Courtesy of K. Spence)

The objects found in burials in New Kingdom Nubia are all Egyptian in style, with the exception of objects coming from elsewhere, such as Mycenaean stirrup jars found from Lower Nubia (e.g., Vercoutter 1962: 114) to Upper Nubia (e.g., Minault-Goult and Thill 2012: 381–382; Spence 2019: 561). The most common type of Egyptian-style objects found in New Kingdom graves in Nubia is pottery, especially wheel-made ceramics (e.g., Nordstöm et al. 1991: 14; Holthoer 1977; Minault-Goult and Thill 2012: 335–378; Helmbold-Doyé and Seiler 2019). Among other Egyptian-style objects are coffins and funerary masks, shabtis, heart scarabs, amulets/pendants and jewelry items, weaponry, tools, scarab-seals, toiletry items, and other personal objects.

Coffins are among the most widespread objects at New Kingdom Nubian cemeteries, appearing in all types of burials (Säve-Söderbergh and Troy 1991: 57–62). They are made of local types of wood and can be rectangular or anthropoid, the latter being more common. In Sudan, wood is usually poorly preserved, and in most cases, only fragments or traces of the presence of coffins are found. Exceptions are the coffins found at the tomb of Djehutyhotep in Debeira (Taylor 2017; Thabit 1957: 86; Säve-Söderbergh and Troy 1991: 53). These coffins are usually plastered and brightly painted (Spence 2019: 559). Their decoration includes typical New Kingdom Egyptian motifs, depicting various deities and protective signs, with regional variations (Taylor 2017: 542). Coffin decoration also has strong chronological implications. For instance, Aniba tomb S91 (Steindorff 1937: 199), Sai tomb 26 (Budka 2017c: 77), and Fadrus tomb 511 (Säve-Söderbergh and Troy 1991: 59–60) include coffins painted black with yellow decoration, typical of the late Egyptian 18th Dynasty. Soleb tomb 5 produced two stone sarcophagi, which are exceptions in the Nubian mortuary landscape (Schiff Giorgini 1971: 126). Pottery coffins have also been found at Aniba and Soleb (Steindorff 1937:72–73; Schiff Giorgini 1971: 256; Spence 2019: 559; Cotelle-Michel 2004). Mat coffins made of wooden sticks tied with vegetal ropes have also been found at Soleb (Schiff Giorgini 1971: 296). This type of burial container is usually associated with non-elite groups in New Kingdom Egypt, having been found at Saqqara (Raven 1991: plates 6, 8, 10) and in the largest non-elite burial ground at Amarna (Stevens 2017: 106).

Funerary masks are also found in several sites across Nubia, at sites such as Aniba, Buhen, and sites in the Debeira region, including Fadrus. They are usually plastered and brightly painted, in a similar way to coffins. According to Spence (2019: 559), they are more common in wealthier burials. The situation at Fadrus would support this interpretation, as they tend to come from mud-brick chamber single burials. However, at other sites in Debeira, such as site 400 (Fig. 5), they tend to appear in collective burials, which might suggest some sort of collective engagement, which would guarantee access to these objects to individuals aprioristically limited by social structure. It has been suggested that some examples from Fadrus lack technical sophistication, which would suggest that these objects were more accessible than previously thought (Säve-Söderbergh and Troy 1991: 68–69). However, interpretations of social complexity based on variables such as

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries,
Fig. 5 Funerary masks from Debeira Site 400. L: 400/18:2; R: 400/13:8 (Säve-Söderbergh and Troy 1991: plates IV and V). (Photos by the author, courtesy of the Gustavianum Museum, Uppsala)

technical sophistication usually share characteristics with top-down, colonial epistemologies.

The shabtis from New Kingdom Nubia comprise a corpus of 1264 objects (as catalogued by the author). They were found at several sites across Nubia. Shabtis come from shaft tombs, double end niches, pyramid shaft tombs, end niches, and a pit burial (only 1 example comes from a pit burial). These objects tend to concentrate at important administrative centers such as Aniba, Sai, and Soleb, having been found in larger reused tombs. However, shabtis also provide evidence for the circulation of objects internally within Nubia. As mentioned, the Viceroy of Kush Messuy, who was active in office during the reign of Merenptah, was buried at Aniba, but one shabti inscribed with his name (maybe a local copy made for someone else) was found at Wadi el-Sebua (Emery and Kirwan 1935: 104). At Fadrus, no shabtis have been found among the almost 700 burials (Säve-Söderbergh and Troy 1991: 213; Spence 2019: 560). These objects can be made of hard stones, wood, faience, and clay. The hard stones of which shabtis were made are not usually found in Sudan, which suggests that these objects were imported. In fact, after stylistic comparison, Minaut-Gout (2012) was able to retrace a group of black serpentine shabtis from Aniba, Sai, and Toshka back to its original workshop in Egypt. Stone and wooden shabtis tend to date from the 18th Dynasty and seem to be mostly imported. Faience shabtis tend to date from the 19th and 20th Dynasties, and seem to have been mostly produced locally. The same is true for clay shabtis.

Heart scarabs from New Kingdom Nubia comprise a corpus of 68 objects (as catalogued by the author). This number also includes composite pectorals with a heart scarab in the center and heart amulets, which would have fulfilled the same role. Heart scarabs have been found at Dakka, Sayala, Kuban, Aniba, Toshka, Debeira/Fadrus, Buhen, Sai, Soleb, and Tombos. These objects have been found predominantly in pyramid and shaft tombs, usually understood as elite tombs, even if tombs of this type are usually used collectively and reoccupied across time. Heart scarabs also appear in other types of tombs, such as end and double end niches; mud-brick chamber tombs; and simpler shaft tombs. This would indicate that non-elite groups also had limited access to these highly restricted objects. Examples would be the heart scarabs from Buhen, found in tombs H25 and H65 (Randall-MacIver and Woolley 1911: 149–150, 159), and the one found in tomb 511 at Fadrus (Säve-Söderbergh and Troy 1991: 144–145), which comprise contextual exceptions in New Kingdom Nubia.

Jewelry is common in all cemeteries and is widespread across different types of burials, including earrings, bracelets, rings, etc. Beads are usually found scattered, but strings have also been preserved, which allows us to reconstruct necklaces and bracelets (Spence 2019: 561). Materials include faience and hard stones such as carnelian. Jewelry (especially earrings and

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Fig. 6 Taweret pendants from Fadrus (Säve-Söderbergh and Troy 1991: 121). Photo by the author. Courtesy of the Gustavianum Museum, Uppsala

bracelets) could be also made of other materials such as ivory, which was a symbol of Nubian identity. For instance, ivory bracelets had been deposited in burials since the A-Group Period in Nubia (Williams 1989: 37–38). Ivory is among the materials brought by Nubians to Egypt in tribute scenes such as the one in TT40 or the tomb of vizier Rekhmire (TT100) (Davies 1943: 19, plate XIX). Likewise, the large white penannular earrings worn by Hekenefer in TT40 may be a depiction of ivory earrings (Smith 2015: 768, 770). Penannular earrings also seem to have originated in Nubia in the Kerma Period, then becoming more common in Egypt during the early New Kingdom (Markowitz and Doxley 2014: 96; Säve-Söderbergh and Troy 1991: 138). A total of 42 penannular earrings were found at Fadrus, although those were made of a material similar to bone (Säve-Söderbergh and Troy 1991: 137–138).[4] These objects were probably a non-elite version of the same earrings worn by Hekanefer in the tomb of Huy at Thebes. Pendants include a variety of motifs, from flowers to representations of gods and goddesses (Fig. 6). These objects are usually found around the neck/chest or near the hands. This pattern is also true for scarab seals, which at sites such as Soleb, could be mounted as rings, a common pattern in the 18th Dynasty (Wegner 2018: 243). Both jewelry and scarab seals may have been used in daily life contexts, as adornments/charms in the case of jewelry (e.g., at Askut: Smith 2003: 108–109), or in administrative activities. A decline in the number of scarabs in New Kingdom Nubia, when compared with the Middle Kingdom, could potentially be explained by their subsequent use in burials (cf. Smith 2018). Scarab seals include a variety of decorative patterns: names of kings, deities, and private individuals; administrative and religious titles; representations of gods, animals, and protective signs; and abstract patterns.

Weapons were also found in New Kingdom burials in Nubia. However, they do not represent a large part of overall burial assemblages, which is also the case with urban contexts (see Spencer et al. 2017: 26). For instance, at Fadrus, only 6 axes, 2 daggers, 1 "short sword," and 23 arrowheads were found. It has been suggested that weaponry in burials would represent status, especially axes (Säve-Söderbergh and Troy 1991: 171). Smith (2003: 106) has pointed to the fact that stone axes were a common funerary offering in various periods of Nubian history. For instance, a bronze axe was found associated with leather and textile fragments next to the neck of an infant in tomb 108 at Fadrus (Säve-Söderbergh and Troy 1991: 170). This is an example of how weapons could be offerings from the living to the deceased, especially in this case, as the axe would not be expected to have belonged to an infant.

Tools and other utensils also comprise a small portion of burial assemblages: while they appear at sites such as Aniba, Sai and Soleb, they do not seem to have played a major role because people at these sites possessed more restricted objects,

[4]These earrings were catalogued differently in the publications of various sites. For instance, at Qustul and Adindan, "horn" and "ivory" penannular earrings appear in the lists of objects from New Kingdom burials (Williams 1992: 103).

such as shabtis. The technical quality of such objects also changes depending on social context, e.g., simple versus elaborate rivets at Fadrus and Sai, respectively (Säve-Söderbergh and Troy 1991: plate 30; Minault-Goult and Thill 2012: plate 174). Tools and utensils are more frequently found in urban contexts, such as Askut and Sai (Smith 2003: 101; Budka 2017a: 436). Unlike weapons, which could be either an attempt to mark status or local identities, tools seem to have been an object category with broader meanings, and more accessible to a wider range of individuals. Objects in this category include awls, fishhooks, grindstones, etc. (Säve-Söderbergh and Troy 1991: 174).

Mirrors, kohl jars and applicators, razors, tweezers, hairpins, cosmetic boxes, and other toiletry/cosmetic items are also found at several sites. The most common object types are kohl jars, which appear in several types of tombs. Kohl jars are found in different shapes and materials, the most common of which, at Fadrus and Sai, being Egyptian alabaster (Säve-Söderbergh and Troy 1991: plates 34–37; Minault-Goult and Thill 2012: plates 172–173173). Other materials include faience (Schiff Giorgini 1971: 204) and hard stones (Säve-Söderbergh and Troy 1991: plates 34–37). Although highly standardized in terms of style, kohl jars could also work as basis for identity negotiations. For instance, kohl jars on a base (Säve-Söderbergh and Troy 1991: 154) appear only sporadically at Egyptian sites but have also been found at Pan-Grave sites in Nubia (Säve-Söderbergh 1989: plate 52, 8; Emery and Kirwan 1935: 540).

Even though objects such as coffins and other items made specifically for the burial are common in New Kingdom Nubia, other objects such as canopic jars are extremely rare, either because they were not valued in Nubia or because they were socially restricted. For instance, only two canopic jars were found at Sai (Minault-Goult and Thill 2012: plate 160). A set of canopic jars was also found in the tomb of Amenenhat, Prince of Tekhet (Debeira) (Säve-Söderbergh and Troy 1991: 76). No traces of mummification have been detected in New Kingdom Nubia (Spence 2019: 559), a situation that can be compared to non-elite contexts in Egypt, where individuals had access to objects such as canopic jars, but not to mummification (Lemos 2018: 29–30).

Buzon (2008: 173) has suggested that "some indications of mummification were present" at Tombos. These are mainly linen fragments and textile imprints on mud. Although the wrapping of the body, which would stabilize body members for its deposition in the grave, was part of the ritual at some sites (e.g., Soleb and Fadrus), it does not mean that the intention to preserve the body for the afterlife was present in New Kingdom Nubia. Another aspect of the ritual that is usually associated with mummification is the use of a black resinous material, poured onto mummies and coffins. Steindorff (1937: 200) noted that the shrouds involving two bodies found inside an intact chamber at Aniba tomb S91 were embedded in this black substance. A 20th Dynasty coffin fragment from Amara West tomb G321 was also found with a layer of black resin (Fulcher et al. Forthcoming). However, the preservation of the body for the afterlife was the *raison d'être* of mummification (see Taylor 2001), and no evidence for such a belief has been found in Sudan so far, nor actual mummified human remains have been excavated.

Burial Communities in New Kingdom Nubia

Within a context of an overall (but not complete) substitution of ceramic traditions and patterns of deposition of bodies in burials (Smith 2003: 114; Edwards 2004: 107; van Pelt 2013: 524; Weglarz 2017: 117), the above described object categories have been interpreted as expression of the acculturation or Egyptianization of Nubia during Egyptian colonization.

In fact, these objects, which range from daily life and personal items to objects produced especially for the burial, were found at various sites across Nubia. Their quantities vary, but their contexts of use are apparently very similar. However, standardization was not complete. An analysis of the distribution patterns of Egyptian and Egyptian-style objects in Nubian cemeteries

allows us to recognize a more complex social context, which relied upon specific social roles performed by objects as part of broader objecscapes (see Pitts 2019), as well as local and individual preferences and/or limitations in consumption of burial goods.

The social role of objects goes beyond representation and identities (Cipolla 2017; Creese 2017; van Oeyen and Pitts 2017). Foreign objects were not simply exported to Nubia. Contrarily, "mobile standardized objects in a wider connected milieu" reached "multiple communities rather than just a single locality" (Pitts 2019: 14). Locally and contextually, foreign objects performed roles which helped creating and reinforcing colonial social relations. In this way, communities consumed and used objects in varied fashions; their choices regarding which objects to include in their burial assemblages, or which sets of meanings to emphasize through material culture changed considerably. These choices, on the other hand, were influenced by a social context which limited the use of certain categories of objects, as the access to these objects would require power and the ability to cross the boundaries of social spaces by those individuals who desired these items. This context created various "burial communities" within New Kingdom Nubia, which consumed differently and produced different entanglements according to their possibilities and limitations to consume.

Näser (2017) recently applied the concept of "burial communities" to objects from the Aniba cemetery. The concept derives from Lave and Wenger's concept of "communities of practice" (Lave and Wenger 1991). It emphasizes collective or social learning practices that result in strategies. The recognition of different burial communities consists of a first step towards the awareness of the internal diversity that characterized cultural interactions in New Kingdom Nubia, contrarily to previous approaches based on cultural entanglement which considered Nubia as a homogenous cultural entity that regularly interacted with the Egyptian colonizers.

Broadly speaking, the same categories of objects appear at Aniba, Sai, Soleb, and Fadrus (Table 4). Other sites could have been included in the following discussion, but, on the one hand, Aniba, Sai, and Soleb can be considered as representing "elite" ideals and practices regarding death; on the other hand, Fadrus represents a "non-elite" burial ground. Therefore, the following discussion of the material culture of these sites takes into account possible distinctions between "elites" and "non-elites" (for discussion of terminology, see Lemos 2017: 124–125).

Amulets/pendants, coffins, earrings, kohl jars, masks, mirrors, necklaces/beads, rings, and scarabs are common to all cemeteries. Other objects are shared between most of the sites, such as toiletry equipment, jewelry, and weaponry. On the one hand, objects that are common at various cemeteries represent the broad social context of the colonization of Nubia, when Egyptian-style objects became widely available and their presence increased at cemeteries and settlements. On the other hand, the categories of objects present only at a few sites, or those objects which tend to concentrate at elite cemeteries (e.g., shabtis and heart scarabs), represent the internal social and cultural diversity within colonial Nubia.

Visually representing the distribution of objects at cemeteries is a helpful tool for us to understand the internal diversity of New Kingdom Nubia. In a context of apparent standardization, given by the widespread presence of Egyptian-style objects throughout the colony, some preferences can be identified at certain sites, as well as differences in the overall quantity of the categories of objects which appear at various sites.

At Aniba (Graph 1), shabtis are the most representative objects, comprising 1062 items and distributed across 51 tombs (more than 32% of the total number of tombs). In absolute numbers, shabtis represent the most popular category of object at Aniba. However, based on the number of tombs in which they were excavated, shabtis consist of the second most chosen object at the site. Scarabs are the most widespread objects, found in 68 tombs – a pattern which is also found elsewhere. Nonceramic vessels, pendants, and rings also represent popular choices at Aniba. Rings are very rare at other sites and might have a closer relationship with elite groups. Even though

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Table 4 Object types at Fadrus, Aniba, Sai, and Soleb

	Fadrus	Aniba	Sai	Soleb
Animal bones	X			X
Arrowheads	X	X		X
Awls	X			
Axes	X	X		
Baskets				X
Boxes	X	X		X
Bracelets	X	X		X
Canopic jars		X	X	X
Chisels				X
Coffins	X	X	X	X
Coffins (miniature)				X
Daggers	X	X		
Earrings	X	X	X	X
Faience fruits	X			
Fans				X
Figurines		X		
Finger protectors	X			
Fishhooks	X	X		X
Funerary cones				X
Furniture items		X		
Grindstones	X			
Hair curlers	X			
Hairpins	X	X		X
Hammerstones	X			X
Heart scarabs	X	X	X	X
Hes-jars	X			
Hoes		X		
Horseshoes	X			
Kohl	X			
Kohl applicators	X	X	X	
Kohl jars	X	X	X	X
Masks	X	X	X	X
Mirrors	X	X	X	X
Needles			X	X
Non-ceramic vessels	X	X	X	X
Ointment spoons	X	X		X
Ostraca		X		
Palettes	X		X	
Pectorals		X		
Pendants	X	X	X	X
Pestles				X
Plant remains				X
Polishing stones	X			X
Razors	X	X	X	
Rings	X	X	X	X
Rivets	X			X
Rods				X

(continued)

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Table 4 (continued)

	Fadrus	Aniba	Sai	Soleb
Sarcophagi				X
Scarabs	X	X	X	X
Sealings				X
Shabtis		X	X	X
Soul houses		X		
Spatulas		X	X	
Staffs	X			X
Statues		X		X
Tabernacle				X
Tweezers	X	X	X	
Wrappings	X	X		X

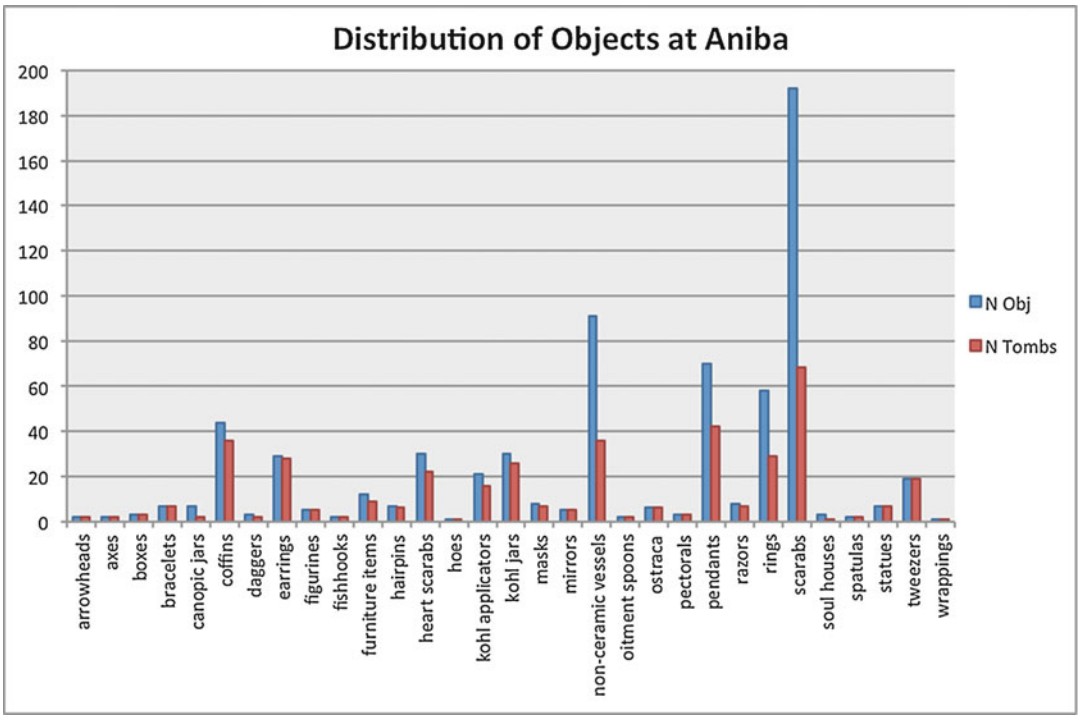

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Graph 1 Distribution of objects at Aniba[5]

the number and distribution of heart scarabs is low, if compared to other types of objects, their presence at the site is the highest when compared to Sai and Soleb. These objects were very restricted in New Kingdom Nubia, even among the elites.

At Sai (Graph 2), shabtis are also among the preferred types of objects. Pendants and scarabs were equally popular, distributed across 60% and 56% of the tombs, respectively, although the absolute number of pendants is higher. Earrings

[5]The distribution graph for Aniba does not include shabtis. The high number of shabtis at the site makes it difficult to visualize how the other categories behave. The numbers and distribution of shabtis are discussed in the text.

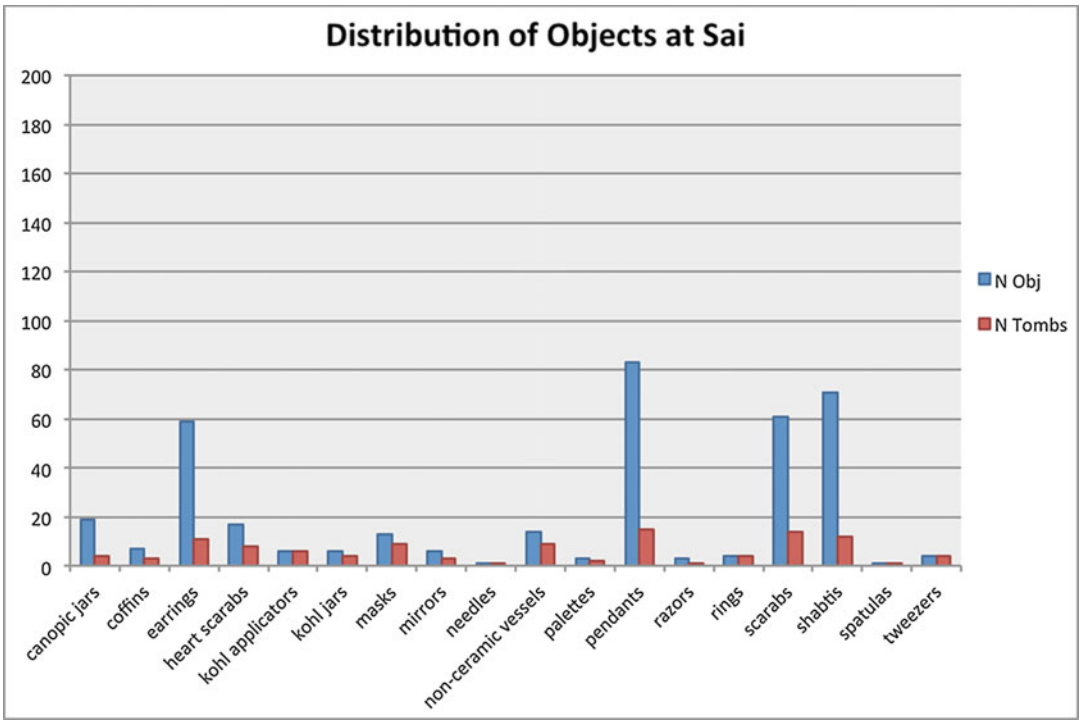

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Graph 2 Distribution of objects at Sai

represent another preferred object, a pattern which is not found at Aniba. This might indicate alternative ideals regarding the display of identities and power among elite groups buried at Aniba, Sai, and Soleb (Graph 3), where earrings were also common. Most of the earrings found at New Kingdom Nubian cemeteries are of penannular type and could be made of materials such as bone and ivory, which are considered Nubian identity markers. However, most of the earrings at Sai are made of carnelian and red jasper (Minault-Goult and Thill 2012: plate 121). Heart scarabs were also found at Sai, which suggests that the site housed elite individuals able to consume very restricted objects, most of which were imported. This would suggest that elite groups consuming restricted imported items desired to create affinities with the Egyptian culture, but, at Sai, a greater display of connections with Nubian traditions through penannular earrings was also permitted.

The distribution of objects at Soleb is highly similar to the pattern identified at Sai, but different in comparison with Aniba. Earrings represent the most popular objects, both in terms of absolute numbers and distribution across various tombs. At Soleb, 53% of the earrings were made of jasper, but 38% were made of shell (or another similar material such as bone). This would represent a clearer affinity with local Nubian cultures, which made extensive use of materials such as shell and bone to manufacture jewelry items. However, at the same time, high-quality shabtis and heart scarabs were also found at Soleb, similarly to Aniba and Sai. Pendants and scarabs equally comprise well-liked choices.

The distribution pattern at Fadrus differs considerably from Aniba, Sai, and Soleb (Graph 4). This might be attributed to differences between elites and non-elites. Fadrus houses the most varied set of objects among the four compared sites. The preferred types of objects also differ if

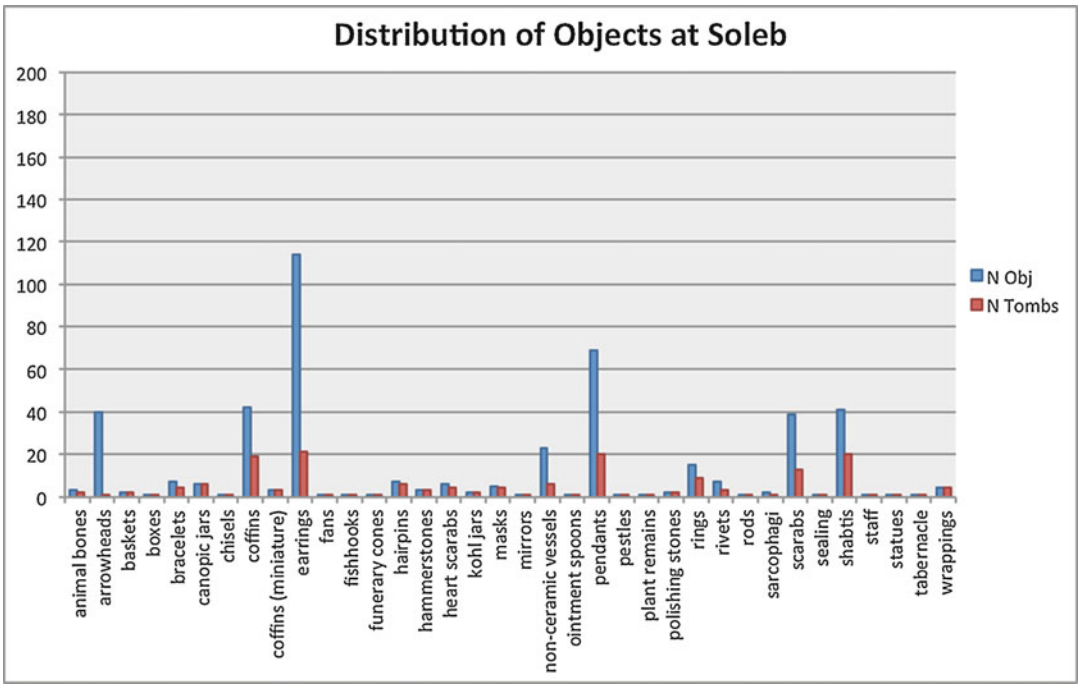

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Graph 3 Distribution of objects at Soleb

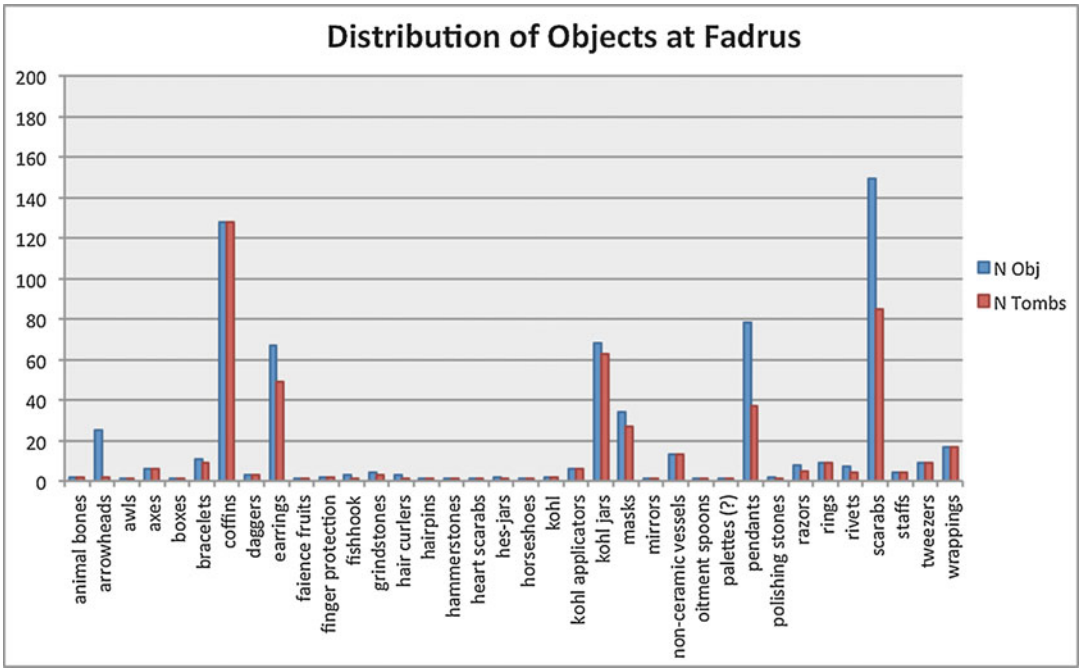

Material Culture and Colonization in Ancient Nubia: Evidence from the New Kingdom Cemeteries, Graph 4 Distribution of objects at Fadrus

compared to Aniba, Sai, and Soleb. No shabtis have been found at Fadrus, which relates to the fact that the site is a non-elite cemetery, while shabtis tend to be restricted to elite sites. However, as an exception, one heart scarab was found at the site. Scarabs and pendants are also very common types of objects, as well as earrings. The high percentage of kohl jars suggest that different ideals were circulating among the populations buried at Fadrus. In contrast, these objects were not found at Aniba, Sai, and Soleb at such high rates, which again might be related to differences between elites and non-elites. The high frequency of coffins at Fadrus is probably related to the fact that most of the burials were found intact, which is not the case at other sites.

As mentioned, standardization towards an Egyptian model is based on a variety of objects shared across cemeteries. However, tools such as grindstones, hammerstones, staffs, etc. tend to appear only at Fadrus, while shabtis and heart scarabs tend to appear at the larger administrative centers where elite officials resided. This would be a further indication of the social role of objects towards the creation of local hierarchies. While the non-elite population at Fadrus would have performed tasks for which a whole set of different tools were required, elite individuals at Aniba, Sai, and Soleb were able to possess more restricted funerary objects within their tombs, therefore being able to use entanglements in their favor.

Material culture meant different things for different communities. The distribution and frequency of objects at Aniba, Sai, Soleb, and Fadrus point towards the existence of local, distinctive ideals regarding object choices. This suggests that different ideals and cultural affinities were circulating and being negotiated within New Kingdom Nubia. The communities at Aniba, Sai, and Soleb shared characteristics such as the choice for shabtis and heart scarabs, objects which probably marked social differences. However, the communities at Sai and Soleb differed from the one at Aniba, as they opened more space for affinities with Nubian patterns to be created through penanular earrings. On the other hand, at Fadrus, people disposed of a more varied set of objects (mostly objects used in daily life activities such as scarab seals, which could become mortuary offerings), but their choices were more limited than the communities at Aniba, Sai, and Soleb. At these sites, individuals were able to consume restricted objects such as shabtis and heart scarabs, which were either imported or commissioned in a local workshop for a price, which was likely only affordable to certain individuals.

Different burial communities point to the existence of different ideals of death and dying, but also conceptions of society and culture. These different views were grounded on various preferences related to the practice of dying, as well as on diverse demands for goods, including objects especially manufactured for the tomb such as shabtis, and objects that *become* mortuary items such as jewelry. However, a diversity of conceptions and demands, which result in different types and degrees of entanglement, took place in a context where most of the available items looked Egyptian in style. Such diversity results from the fact that the global phenomenon represented by Egyptian-style material culture reached not only distinct regions within Nubia but also different social groups (Williams 2018: 106). Therefore, in a context of aprioristic standardization that grounded previous emphases on Egyptianization, the internal diversity of Nubia created a complex setting in which more than two cultural entities (e.g., "Egypt" and "Nubia") interacted and produced entanglements. Rather, the foreign ("Egypt") interacted with various versions of Nubia, which carried different social relationships of power, hierarchy, and probably different worldviews. This perspective goes beyond the long-emphasized distinction between Wawat and Kush (Lower and Upper Nubia), which is mainly based on how the ancient Egyptians politically divided their Nubian colony. Rather, the perception of various "Nubias" favors a variety of social and cultural groups and regions, with different beliefs and practices, which expressed their complex set of social relations through their local (re) creations of global/colonial material patterns flowing through the New Kingdom Egyptian empire.

Conclusion and Future Steps

The different distributions of objects and varied emphases given to grave goods are expression of specific burial communities, the existence of which suggests that colonial objects fulfilled local roles in New Kingdom Nubia, rather than representing acculturation and uniformity. This context of internal diversity suggests that entanglements were not as universally available in situations of cultural contact as previously thought. Situations of cultural contact include the consumption and use of Egyptian-style grave goods. The differences in the distribution of objects not only reflect regional preferences, but also restrictions and limitations in the consumption of certain objects; e.g., shabtis and heart scarabs, which were generally restricted in New Kingdom Nubia, and concentrate in elite cemeteries such as Aniba, Sai, and Soleb.

Future postcolonial research is needed in order to shed more light onto the internal diversity of Nubia, underlying the way entanglements took place. A postcolonial approach to colonial Nubia needs to emphasize more than indigenous agency and their role in negotiations of identity through material culture as a whole. Instead, in order for us to fully understand lived experiences in New Kingdom Nubia, future research needs to consider local complexity, social relationships of power, and material possibilities and limitations in the colony. Therefore, topics such as local production and distribution of goods (both imported and locally produced) need to be further investigated, as well as the specific social roles undertaken by objects in contexts of interaction.

Cross-References

- ▶ Archaeology and Colonialism
- ▶ Archaeology of Ancient Egypt
- ▶ Ceramic Production in the Middle Nile Valley, Sudan (8000 BC–1500 AD)
- ▶ Colonial Encounters, Archaeology of

References

Adams, William Y. 1977. *Nubia: Corridor to Africa*. Princeton: Princeton University Press.

Adenstedt, Ingrid. 2016. *Reconstructing Pharaonic architecture in Nubia: The case study of SAV1, Sai Island*. Vienna: Austrian Academy of Sciences Press.

Anthony, Flora. 2017. *Foreigners in ancient Egypt: Theban tomb paintins from the Early Eighteenth Dynasty*. London: Bloomsbury.

Azim, Michel, and Jean-François Carlotti. 2012. Le Temple A de l'île de Saï et ses abords. *Cahiers de Recherches de l'Institut de Papyrologie et d'Égyptologie de Lille* 29: 11–65.

Bhabha, Homi. 1994. *The location of culture*. London: Routledge.

Bietak, Manfred. 1968. *Studien zur Chronologie der Nubischen C-Grouppe. Ein Beitrag zur Frügeschichte Unternubiens zwischen 2200 und 1550 vor Chr*. Wien: Österreichische Akademie der Wissenschaften.

Bietak, Manfred. 1987. The C-Group and Pan-Grave culture. In *Nubian culture, past and present: Main papers presented at the Sixth International Conference For Nubian Studies in Uppsala, 11–16 August, 1986*, ed. T. Hägg, 113–128. Stockholm: Kungl. Vitterhets Historie och Antikvitets Akademie.

Binder, Michaela, Neal Spencer, and Marie Millet. 2011. Cemetery D at Amara West: The Ramesside period and its aftermath. *British Museum Studies in Ancient Egypt and Sudan* 16: 47–99.

Blackman, Aylward M. 1937. Preliminary report on the excavations at Sesebi, Northern Province, Anglo-Egyptian Sudan, 1936–37. *Journal of Egyptian Archaeology* 23: 145–151.

Bonnet, Charles. 2019. *The black kingdom of the Nile*. Cambridge, MA: Harvard University Press.

Bourdieu, Pierre. 1984 [1979]. *Distinction: A social critique of the judgment of taste*. Cambridge, MA: Harvard University Press.

Budka, Julia. 2017a. Life in the New Kingdom town of Sai Island: Some new perspectives. In *Nubia in the New Kingdom: Lived experience, pharaonic control and indigenous traditions*, ed. N. Spencer, A. Stevens, and M. Binder, 429–448. Leuven: Peeters.

Budka, Julia. 2017b. The pottery from SAV1 north. In *Across Borders I: The New Kingdom town of Sai Island, sector SAV1 north*, ed. J. Budka, 119–156. Vienna: Austrian Academy of Sciences Press.

Budka, Julia. 2017c. The 18th Dynasty on Sai Island: New data from excavations in the town area and cemetery SAC5. *Sudan & Nubia* 21: 71–81.

Budka, Julia, and Florence Doyen. 2012. Life in New Kingdom towns in Upper Nubia – New evidence from recent excavations on Sai Island. *Ägypten und Levante* 22 (23): 167–208.

Buzon, Michele. 2008. A bioarchaeological perspective on Egyptian colonialism in Nubia during the New Kingdom. *Journal of Egyptian Archaeology* 94: 165–181.

Buzon, Michele, and Antonio Simonetti. 2013. Strontium isotope ($^{87}Sr/^{86}Sr$) variability in the Nile Valley: Identifying residential mobility during ancient Egyptian and Nubian sociopolitical changes in the New Kingdom and Napatan periods. *American Journal of Physical Anthropology* 151: 1–9.

Buzon, Michele, Stuart Tyson Smith, and Antonio Simonetti. 2016. Entanglement and the formation of the ancient Nubian Napatan state. *American Anthropologist* 118: 284–300.

Cipolla, Craig. 2017. Postscript: Postcolonial archaeology in the age of things. In *Foreign objects: Rethinking indigenous consumption in American archaeology*, ed. C. Cipolla, 222–229. Tucson: University of Arizona Press.

Cooper, Julien. 2018. Kushites Expressing 'Egyptian' Kingship: Nubian Dynasties in Hieroglyphic Texts and a Phantom Kushite King. Ägypten und Levante 28: 143–167.

Cotelle-Michel, Laurence. 2004. *Les sarcophages en terre cuite en Égypte et en Nubie de l'époque Prédynastique à l'Époque Romaine*. Dijon: Éditions Faton.

Creese, John. 2017. Beyond representation: Indigenous economies of affect in the northeast woodlands. In *Foreign objects: Rethinking indigenous consumption in American archaeology*, ed. C. Cipolla, 59–79. Tucson: University of Arizona Press.

Davies, Norman de Garis. 1943. *The tomb of Rekh-mi-Rē' at Thebes*. New York: Metropolitan Museum of Art.

Davies, William Vivian. 2004. Statue of Amenhotep I. In *Sudan: Ancient treasures*, ed. D. Weslby and J. Anderson, 102–103. London: British Museum.

Davies, William Vivian. 2017. Nubia in the New Kingdom: The Egyptians at Kurgus. In *Nubia in the New Kingdom: Lived experience, pharaonic control and indigenous traditions*, ed. N. Spencer, A. Stevens, and M. Binder, 65–105. Leuven: Peeters.

Davies, Nina de Garis, and Alan Gardiner. 1926. *The tomb of Huy, viceroy of Nubia in the reign of Tutankhamun (no 40)*. London: Egypt Exploration Society.

Dietler, Michael. 2010. *Archaeologies of colonialism: consumption, entanglements and violence in ancient Mediterranean France*. Berkeley/Los Angeles: University of California Press.

Doherty, Sarah. 2013. *Amara West 2013: Faience production in the town?* https://britishmuseumamarawestblog.wordpress.com/2013/02/13/amara-west-2013-faience-production-in-the-town. Accessed 10 Feb 2019.

Edwards, David. 2004. *The Nubian past*. London: Routledge.

Emery, Walter, and Lawrence Kirwan. 1935. *The excavations and survey between Wadi el-Sebua and Adindan*. Cairo: Government Press.

Emery, Walter, Harry Smith, and Anne Millard. 1979. *The fortress of Buhen: The archaeological report*. London: Egypt Exploration Society.

Fairman, Herbert W. 1938. Preliminary report on the excavations at Sesebi (Sudla) and 'Amārah west, Anglo-Egyptian Sudan, 1937–8. *Journal of Egyptian Archaeology* 24 (2): 151–156.

Fragoso, João, Maria Fernanda Bicalho, and Maria de Fátima Gouvêa, eds. 2001. *O Antigo Regime nos Trópicos: A Dinâmica Imperial Portuguesa*. Rio de Janeiro: Civilização Brasileira.

Freier, Elke. 1993. Zu Einigen Leipziger Totenstatuetten. *Altorientalische Forschungen* 20: 3–19.

Fulcher, Kate, Rebecca Stacey and Neal Spencer. Forthcoming. *Bitumen from the dead sea in New Kingdom Nubia*.

Gabolde, Luc. 2012. Réexamen des jalons de la presence de la XVIIIe dynastie naissante à Saï. *Cahiers de Recherches de l'Institut de Papyrologie et d'Égyptologie de Lille* 29: 115–137.

Given, Michael. 2004. *The archaeology of the colonized*. London: Routledge.

Gosden, Chris. 2004. *Archaeology and colonialism: Cultural contact from 5000 BC to the present*. Cambridge: Cambridge University Press.

Habachi, Labib. 1980. Königssohn von Kusch. In *Lexikon der Ägyptologie III*, ed. W. Helck and W. Westendorf, 630–640. Wiesbaden: Harrassowitz.

Helmbold-Doyé, Jana and Anne Seiler. 2019. Die Keramik aus dem Friedhof S/SA von Aniba (Unternubien). Berlin: De Gruyter.

Holthoer, Rostislav. 1977. *New kingdom Pharaonic sites: The pottery*. Stockholm: Esselte Studium.

Johansson, Carolin. 2014. *Digital reconstruction of the archaeological landscape in the concession area of the Scandinavian Joint Expedition to Sudanese Nubia (1961–1964)*. Masters thesis, Uppsala University.

Kemp, Barry. 1972. Fortified towns in Nubia. In *Man, settlement and urbanism*, ed. P. Ucko, 657–680. London: Duckworth.

Kemp, Barry. 1978. Imperialism and empire in New Kingdom Egypt. In *Imperialism in the ancient world*, ed. P.-D.A. Gamsey and C.R. Whittaker, 7–57. Cambridge: Cambridge University Press.

Kemp, Barry, and Anna Stevens. 2010. *Busy lives at Amarna: Excavations in the Main City*. Vol. 2. London: Egypt Exploration Society.

Knoblauch, Christian. 2012. The ruler of Kush (Kerma) at Buhen during the Second Intermediate Period: A reinterpretation of Buhen Stela 691 and related objects. In *Egyptology in Australia and New Zealand 2009*, ed. C. Knoblauch and J.C. Gill, 85–96. Oxford: Archaeopress.

Knoblauch, Christian. 2019. Middle Kingdom fortresses. In *Handbook of ancient Nubia*, ed. D. Raue, 367–391. Berlin: De Gruyter.

Lave, Jean, and Etienne Wenger. 1991. *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Lemos, R. 2017. Material culture and social interactions in New Kingdom non-elite cemeteries. In *Current Research in Egyptology 2016: Proceedings of the seventeenth annual symposium*, ed. J. Chyla, J. Dębowska-

Ludwin, K. Rosińska-Balik, and C. Walsh, 121–135. Oxford: Oxbow.

Lemos, R. 2018. Materiality and cultural reproduction in non-elite cemeteries. In *Perspectives on materiality in ancient Egypt: Agency, cultural reproduction and change*, ed. É. Maynart, C. Velloza, and R. Lemos, 24–34. Oxford: Archaeopress.

Markowitz, Yvonne, and Denise Doxley. 2014. *Jewels of ancient Nubia*. Boston: Museum of Fine Arts.

Minault-Goult, Anne, and Florence Thill. 2012. *Saï II. Le cimitière des tombes hypogées du Nouvel Empire*. Cairo: Institut Français d'Archéologie Orientale.

Minaut-Gout, Anne. 2007. Les Installations du Début du Nouvel Empire à Saï: un État de la Question. *Cahiers de Recherches de l'Institut de Papyrologie et d'Égyptologie de Lille* 26: 275–293.

Minaut-Gout, Anne. 2012. La figurine funéraire Saï Inv. S964 (SNM 23424) et un groupe de quatre chaouabtis de la XVIIIe dynastie de même type. *Cahiers de Recherches de l'Institut de Papyrologie et d'Égyptologie de Lille* 29: 189–200.

Miniaci, Gianluca. 2019. Multiple burials in ancient societies: Theory and methods from Egyptian archaeology. *Cambridge Archaeological Journal* 29 (2): 287–307.

Minor, Elizabeth. 2018. Decolonizing Reisner: A case study of a classic Kerma female burial for reinterpreting early Nubian archaeological collections through digital archival resources. In *Nubian archaeology in the XXIst century*, ed. M. Honegger, 251–262. Leuven: Peeters.

Morkot, Robert. 1993. *Economic and cultural exchange between Kush and Egypt*. PhD dissertation. University College London.

Morris, Ellen. 2018. *Ancient Egyptian imperialism*. Oxford: Willey-Blackwell.

Müller, Ingebord. 2013. *Die Verwaltung Nubiens im Neuen Reich*. Wiesbaden: Harrassowitz Verlag.

Näser, Claudia. 2017. Structures and realities of the Egyptian presence in lower Nubia from the middle kingdom to the New Kingdom. In *Nubia in the New Kingdom: Lived experience, pharaonic control and indigenous traditions*, ed. N. Spencer, A. Stevens, and M. Binder, 557–574. Leuven: Peeters.

Nordström, Hans-Åke, Torgny Säve-Söderbergh, and Lana Troy. 1991. Handmade Middle Nubian pottery. In *New kingdom pharaonic sites: The finds and the sites*, ed. T. Säve-Söderbergh and L. Troy, 14–16. Partille: Paul Åstrom.

Parkinson, Richard, and Neal Spencer. 2017. The teaching of Amenemhat I at Amara West: Egyptian literary culture in Upper Nubia. In *Nubia in the New Kingdom: Lived experience, pharaonic control and indigenous traditions*, ed. N. Spencer, A. Stevens, and M. Binder, 213–223. Leuven: Peeters.

Pitts, Martin. 2019. *The Roman object revolution: Objectscapes and intra-cultural connectivity in Northwest Europe*. Amsterdam: Amsterdam University Press.

Randall-Maciver, David, and Leonard Woolley. 1911. *Buhen*. Philadelphia: University of Pennsylvania Museum.

Raue, Dietrich. 2019. Introduction: A rather young discipline. In *Handbook of ancient Nubia*, ed. D. Raue, 3–13. Berlin: De Gruyter.

Raven, Maarten. 1991. *The tomb of Iurudef: A Memphite official in the reign of Ramesses II*. London: Egypt Exploration Society.

Reisner, George. 1910. *The Archaeological Survey of Nubia. Report for 1907–1908*. Cairo: National Printing Deparment.

Reisner, George. 1923. *Excavations at Kerma*. Cambridge, MA: Peabody Museum.

Rose, Pamela. 2012. Early 18th Dynasty Nubian pottery from the site of Sesebi, Sudan. In *Nubian pottery from Egyptian cultural contexts of the Middle and Early New Kingdom*, ed. I. Fostner-Müller and P. Rose, 13–30. Vienna: Austrian Academy of Sciences Press.

Rose, Pamela. 2017. Sesebi: Ceramics, chronology and society. In *Nubia in the New Kingdom: Lived experience, pharaonic control and indigenous traditions*, ed. N. Spencer, A. Stevens, and M. Binder, 465–474. Leuven: Peeters.

Säve-Söderbergh, Torgny. 1949. A Buhen Stela from the Second Intermediate Period (Khartum no. 18). *Journal of Egyptian Archaeology* 35: 50–58.

Säve-Söderbergh, Torgny. 1960. The paintings in the tomb of Djehutyhotep at Debeira. *Kush* VIII: 25–44.

Säve-Söderbergh, Torgny. 1989. *Middle Nubian sites*. Partille: Paul Åström.

Säve-Söderbergh, Torgny, and Lana Troy. 1991. *New kingdom pharaonic sites: The finds and the sites*. Partille: Paul Åström.

Schiff Giorgini, Michela. 1971. *Soleb II. Les nécropoles*. Florence: Sansoni.

Schiff Giorgini, Michela. 1988–2002. *Soleb III–V. Le temple*. Caire: Institut Français d'Archéologie Orientale.

Shaw, Ian, ed. 2000. *The Oxford history of ancient Egypt*. Oxford: Oxford University Press.

Simpson, William Kelly. 1963. *Heka-Nefer and the dynastic material from Toshka and Armina*. New Haven: Peabody Museum of Natural History of Yale University.

Smith, Harry S. 1976. *The fortress of Buhen II. The inscriptions*. London: Egypt Exploration Society.

Smith, Stuart Tyson. 1995. *Askut in Nubia*. London: Kegan Paul International.

Smith, Stuart Tyson. 2003. *Wretched Kush: Ethnic identities and boundaries in Egypt's Nubian empire*. London: Routledge.

Smith, Stuart Tyson. 2013. The garrison and inhabitants: A view from Askut. In *The power of walls: Fortifications in ancient northeastern Africa*, ed. F. Jesse and C. Vogel, 269–291. Cologne: Heinrich-Barth Institut.

Smith, Stuart Tyson. 2015. Hekanefer and the Lower Nubian princes: Entanglement, double identity or topos and mimesis? In *Fuzzy boundaries: Festschrift für Antonio Loprieno*, ed. H. Amstutz, A. Dorn,

M. Müller, M. Ronsdorf, and S. Uljas, 767–779. Hamburg: Widmaier Verlag.

Smith, Stuart Tyson. 2018. Middle and New Kingdom sealing practice in Egypt and Nubia: A comparison. In *Seals and sealing in the ancient world*, ed. M. Ameri et al., 302–324. Cambridge: Cambridge University Press.

Smith, Stuart Tyson, and Michele Buzon. 2017. Colonial encounters at New Kingdom Tombos: Cultural entanglement and hybrid identity. In *Nubia in the New Kingdom: Lived experience, Pharaonic control and indigenous traditions*, ed. N. Spencer, A. Stevens, and M. Binder, 615–630. Leuven: Peeters.

Spence, Kate. 2004. Royal walling projects in the second millennium BC: Beyond an interpretation of defence. *Cambridge Archaeological Journal* 14 (2): 265–271.

Spence, Kate. 2017. Sesebi before Akhenaten. In *Nubia in the New Kingdom: Lived experience, pharaonic control and indigenous traditions*, ed. N. Spencer, A. Stevens, and M. Binder, 449–464. Leuven: Peeters.

Spence, Kate. 2019. New kingdom tombs in Lower and Upper Nubia. In *Handbook of ancient Nubia*, ed. D. Raue, 541–566. Berlin: De Gruyter.

Spence, Kate, et al. 2011. Sesebi 2011. *Sudan & Nubia* 15: 34–38.

Spencer, Neal. 2010. Nubian architecture in an Egyptian town? Building E12.11 at Amara West. *Sudan & Nubia* 14: 15–24.

Spencer, Neal. 2014. Creating and re-shaping Egypt in Kush: Responses at Amara West. *Journal of Ancient Egyptian Interconnections* 6 (1): 42–61.

Spencer, Neal. 2017. Building on new ground: The foundation of a colonial town at Amara West. In *Nubia in the New Kingdom: Lived experience, Pharaonic control and indigenous traditions*, ed. N. Spencer, A. Stevens, and M. Binder, 323–356. Leuven: Peeters.

Spencer, Neal, Anna Stevens, and Michaela Binder. 2017. Introduction: History and historiography of a colonial entanglement, and the shaping of new archaeologies for Nubia in the New Kingdom. In *Nubia in the New Kingdom: Lived experience, pharaonic control and indigenous traditions*, ed. N. Spencer, A. Stevens, and M. Binder, 1–61. Leuven: Peeters.

Steindorff, Georg. 1937. *Aniba II*. Glückstadt: J.J. Agustin.

Stevens, Anna. 2017. Death and the city: The cemeteries of Amarna in their urban context. *Cambridge Archaeological Journal* 28 (1): 103–126.

Stevens, Anna, and Anna Garnett. 2017. Surveying the pharaonic hinterland of Amara West. In *Nubia in the New Kingdom: Lived experience, pharaonic control and indigenous traditions*, ed. N. Spencer, A. Stevens, and M. Binder, 287–306. Leuven: Peeters.

Stockhammer, Philipp. 2012. Conceptualizing cultural hybridization in archaeology. In *Conceptualizing cultural hybridization: A transdisciplinary approach*, ed. P. Stockhammer, 43–58. New York: Springer.

Taylor, John. 2001. *Death and the afterlife in ancient Egypt*. London: British Museum Press.

Taylor, John. 2017. The coffins from Debeira: Regional interpretations of New Kingdom funerary iconography. In *Nubia in the New Kingdom: Lived experience, pharaonic control and indigenous traditions*, ed. N. Spencer, A. Stevens, and M. Binder, 537–556. Leuven: Peeters.

Thabit, Thabit Hassan. 1957. The tomb of Djehuty-Hetep (Tehuti Hetep), prince of Serra. *Kush* V: 81–86.

Thomas, Nicholas. 1991. *Entangled objects: Exchange, material culture, and colonialism in the Pacific*. Cambridge, MA: Harvard University Press.

Todorov, Tzevan. 1982. *La Conquête de l'Amérique*. Paris: Seuil.

Török, László. 2009. *Between two worlds: The frontier region between ancient Nubia and Egypt 3700 BC–500 AD*. Leiden: Brill.

Trigger, Bruce. 1994. Paradigms in Sudan archaeology. *International Journal of African Historical Studies* 27 (2): 323–345.

van Oeyen, Astrid, and Martin Pitts. 2017. What did objects do in the Roman world? Beyond representation. In *Materialising Roman histories*, ed. A. van Oyen and M. Pitts, 3–19. Oxford: Oxbow.

van Pelt, Paul. 2013. Revising Egypto-Nubian relations in New Kingdom lower Nubia: From Egyptianization to cultural entanglement. *Cambridge Archaeological Journal* 23 (3): 523–550.

Vercoutter, Jean. 1962. Preliminary report of the excavations at Aksha by the Franco-argentine archaeological expedition, 1961. *Kush* 10: 109–117.

Vercoutter, Jean. 1973. La XVIIe Dynastie à Saï et en Haute-Nubie. *Cahiers de Recherches de l'Institut de Papyrologie et d'Égyptologie de Lille* 1: 7–39.

Vieth, Jordis. 2018. Urbanism in Nubia and the New Kingdom temple towns. In *From microcosm to macrocosm. Individual households and cities in ancient Egypt and Nubia*, ed. J. Budka and J. Auenmüller, 227–238. Leiden: Sidestone Press.

Vincentelli, Irene. 2009. *Hillat el-Arab*. Oxford: Archaeopress.

Vogel, Carola. 2010. Master architects of ancient Nubia: Space-saving solutions in middle kingdom fortresses. In *Between the cataracts. Proceedings of the 11th Conference Of Nubian Studies*, ed. G. Włodzimierz and A. Łajtar, 421–430. Warsaw: University Press.

Webster, Jane. 2001. Creolizing the Roman provinces. *American Journal of Archaeology* 105 (2): 209–225.

Weglarz, Lindsey. 2017. *Continuity and change: a reevaluation of cultural identity and "Egyptianization" in lower Nubia during the New Kingdom*. PhD dissertation, University of Chicago.

Wegner, Joseph. 2018. The evolution of ancient Egyptian seals and sealing systems. In *Seals and sealing in the ancient world*, ed. M. Ameri et al., 229–257. Cambridge: Cambridge University Press.

Wendrich, Willeke. 2010. Epilogue: Eternal Egypt deconstructed. In *Egyptian archaeology*, ed. W. Wendrich, 274–278. Oxford: Willey-Blackwell.

Williams, Bruce. 1989. *Excavations between Abu Simbel and the Sudan frontier, parts 2, 3, and 4. Neolithic,*

A-Group, and post A-Group remains from cemeteries W, V, S, Q, T, and a cave east of cemetery K. Chicago: Oriental Institute.
Williams, Bruce. 1992. *Excavations between Abu Simbel and the Sudan frontier, part 6: New kingdom remains from cemeteries R, V, S, and W at Qustul and cemetery K at Adindan*. Chicago: Oriental Institute.
Williams, Bruce. 2018. Egyptians and Nubians in the early New Kingdom and the Kushite background. In *From microcosm to macrocosm. Individual households and cities in ancient Egypt and Nubia*, ed. J. Budka and J. Auenmüller, 99–102. Leiden: Sidestone Press.

Material Culture and Education in Archaeology

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State of Knowledge and Current Debates

Introduction

In the 1970s, while strongly influenced by a certain interpretation of oriental mysticism, the former Beatle George Harrison released the album Living in the Material World (1973). Imbued with the sounds of sitars, the songs were presented as musical alternatives to the Western way of life, particularly the US capitalist variety. Barely 10 years later, the theme of the material world returned to the music scene. Madonna's rendition lacked Harrison's orientalism (2003), declaring more complacently that "you know that we are living in a material world" (1985). To continue with our musical references, Pink Floyd's rock opera invoked a schoolboy choir against "dark sarcasm in the classroom" as, ultimately, they didn't "need no education."

The assertion that we live in a material world is no novelty to either the world of art or academia. Interpretations of the different sets of meanings resulting from these relations, however, are varied and can be construed from different perspectives. Among them we are concerned with how these sets of relations negotiate learning relations and the constitution of social subjects through materiality. The 1970s and 1980s marked a true conceptual turn in both archaeology and education. Our intention is to briefly outline a panorama of such a conceptual turn, as a guide to our present understanding of the partnership between these expressions of human activity.

Material culture is a constant presence in human life. We are born, grow up, and die interacting within diverse constellations of materiality, devised for different purposes: these are the structures, objects, and modifications which make up our leisure, work, and dwelling spaces among other countless possibilities. Material culture, being everything that is made or modified by human beings and that makes up humanity's day-to-day experiences, is therefore independent from time and even space.

One of the roles of this materiality is the transmission of knowledge, whether the result of a learning process – e.g., when making a tool – or by shaping the existing models of education as in the spatial layout of a classroom. We understand education as a learning process, a flux of knowledge in which the elders have a duty to cultivate the immature while guaranteeing their right to "shake up and question everything that is enshrined in the name of what is yet to come" (Brandão 2007).

Historic Panorama

If we now move away from the world of music and focus on the academic world, an example of a sharp analyst of the multiple meanings of material culture can be found in the British archaeologist Julian Thomas. Thomas proposes an understanding of the changes in the way material culture has been conceived as a key to the changing relations between people and the varied manifestations of materiality. Starting with the ideas of materiality of Aristotle, through to medieval scholastics and present-day philosophers, Thomas constructs an overview of the world of ideas and its effects and

relationships with the constructions of the material world (Thomas 2004, 202–250).

A second route of inquiry, still within the realm of philosophy but from a perspective which is closer to the history of science, is to reflect on the changing conceptions of material culture within the very field of archaeological science. This choice can be understood based on the authority exerted by archaeological discourses over analyses of material culture throughout the nineteenth and twentieth centuries. As part of a process of constituting and consolidating sciences, history was granted dominion over the analyses of written texts, anthropology dealt preferentially with certain specific cultures, and archaeology remained in charge of ordering, describing, and explaining what we call materiality. Therefore, the underlying question for this second route of inquiry would be how archaeology – perceived as the realm of material culture – understands its own object of study.

It must be highlighted, however, that the very basis of archaeological science allocated the materiality that archaeologists ought to study to past times. Therefore, the science that studied the human past was named archaeology (in Greek, "knowledge of the origins" or "account of things old" (Funari 2003, 10)). Although this definition was outlined throughout the nineteenth century, a significant proportion of scholars define their area as aiming to understand past human times through the analysis of material artifacts. In a recent edition of the book, *Archaeology: Theories, Methods, and Practice* (2008), British archaeologists Colin Renfrew and Paul Bahn present archaeology as:

> Archaeology is the 'past tense of cultural anthropology'. Whereas cultural anthropologists will often base their conclusions on the experience of actually living within contemporary communities, archaeologists study past humans and societies primarily through their material remains – the buildings, tools, and other artifacts that constitute what is known as the material culture left over from former societies. (Renfrew and Bahn 2008, 12)

Archaeology, as presented by Renfrew and Bahn, is constructed from the context of cultural anthropology. With its focus upon the past, the discipline turns material culture into a gateway into human history. Objects are subject to rescue and reconstruction and apt to reveal certain past events or mechanisms of past cultures. This perception of material culture as revealing is only plausible within a certain theoretical discourse about archaeology. Still, as we stated above, it is not the only way to understand materiality or even archaeological science.

Although material culture is enmeshed in human history, it was only in the nineteenth century that it was born as a concept within the studies of prehistory. The French geologist Boucher de Perthes was among the first to use the concept to analyze objects produced by humans during prehistory in his works *Antiquités celtiques et antédiluviennes* (1847) and *De l'homme antédiluvien* (1860). In his analyses, material culture enabled him to make assertions about a human past which had remained unrecorded in writing.

In over 150 years of existence, the term, which has become central to archaeological studies, has been given many different meanings. Archaeological practices of the cultural-historic strand, with their strong nationalist heritage, understood material culture as specific evidence of what humans built and therefore as artifacts. From such vestiges we can elucidate the way certain cultures work. Culture, in this view, is defined as the sum total of all ideas, activities, and materials that characterize the nature of a certain human group (Jones 1997, 17). It would therefore constitute a social legacy of certain shared traditions, institutions, and ways of life, among other elements (Childe 1974).

Within the cultural-historic theoretical universe, artifacts are configured as cultural indicators. Gordon Childe, the Australian archaeologist who laid the foundations of this theory, asserts that artifacts, through the knowledge they allow, are formative of cultures in an archaeological format. It is through the analysis of archaeological culture that one could understand, for example, how:

> (. . .) even in prehistoric times barbarian European societies behaved in a distinctively European way, very vaguely anticipating the contrast which over the past thousand years became flagrant, with African and Asian societies. (Childe 1974, 13)

Within an imperialist mind-set and context, Childe puts forth that artifact assemblages would bear the characteristics of the cultures where they are produced. Therefore, even prehistoric Europeans would have been "superior" to the prehistoric men of Africa and Asia, as they were, after all, already European. A direct correspondence is established between a presupposed cultural group and the sets of materiality produced by it.

Whereas the continuators of the cultural-historic traditions perceived archaeological cultures as bearing explicit and therefore incontrovertible truths, Childe warned his readers:

> The reader must understand the hypothetical character of most archaeological conclusions. We can only ask for him to accept the most likely and most generally admitted deductions although these are still only probable. It is to prevent boredom that question marks are omitted, which otherwise might as well accompany most assertions. (Childe 1974, 19)

Despite the warnings about the hypothetical character of material culture, artifacts were still understood as objective providers of "correct data" about certain cultures in several theoretical quarters.

Processual archaeology, as inaugurated by the work *Method and Theory in American Archaeology* (1958), by the archaeologists Gordon R. Willey and Philip Phillips, questioned the effectiveness of cultural-historic studies and proposed new analyses that would focus on understanding the uses of artifacts by human beings. According to Phillips and Willey, cultural-historic archaeology had delved into the artifact form and the development of grand timelines which afforded little information about the actual cultures which had produced the artifacts under scrutiny.

Influenced by theories of cultural evolution and in an open dialogue with cultural ecology, processual archaeologists opened new lines of inquiry into how certain cultures lived and used their artifacts. In this new view, archaeology became a science without boundaries. According to the French anthropologist and archaeologist André Leroi-Gourhan, material culture and the objectivity which it granted to archaeology allowed the discipline to surpass spatial and chronological boundaries and elaborate syntheses of the general and the particular in reconstructing the objects studied (Leroi-Gourhan 1945).

The access to certain cultures that was enabled by this specific way of recording, as well as its objectivity, began to be challenged, particularly from the 1980s onward, with the birth of post-processual archaeology and the strengthening of postmodernist theories.

The humanities in general and archaeology in particular sought to redefine the concept of culture and the objectivity of the researcher. In this new light, the idea of identifying cultures through archaeological artifacts as espoused by both the cultural-historic and the processual trend became a harder equation to solve.

The difficulties met when defining cultural boundaries among human groups would stem from the sheer impossibility of ascribing clear-cut identities to groups or even individual people. In this scope identity is understood as a series of fluid processes of constructs that answer such questions as "Who am I"? or "What groups do I belong to?" Archaeologies linked to post-processualism answer these questions in multiple ways which vary depending on individual and group engagements in time and space. According to the Jamaican-British researcher Stuart Hall, identity is configured as:

> (...) something formed overtime through unconscious processes and not something innate, existing in conscience at the time of birth. There is always something 'imagined' or fantasised about its unity. It is always incomplete, always 'in the process of', always 'in the making.' (Hall 2005, 38–39)

The unstability of identities is accompanied by the mutability of the various images of culture. If within certain theories it would be possible to work with fixed and predetermined cultural categories which condition identities in the post-processual and postmodern view, "culture" doesn't exist as a solid, homogenous, and single category. On the contrary, it is understood as a fluid process which always varies depending on the interlocutor's view. The latter may or may not share the ethnicities, that is, "practices and

cultural visions of a certain community of people which differentiate them from others" (Giddens 2005, 206).

It must be stressed that all the theoretical currents outlined here are subject to many nuances. Even within processualism there is no consensus about authors' autonomous existence in relation to certain power discourses (Zarankin and Senatore 2002). In this case material culture can take on different roles in mediating the relationships between discourses or between discourses and subjects (Shanks and Tilley 1982; Hodder 1999). In order to understand the role of material culture within these theoretical stances, one must use the teaching tool of highlighting the different intersection points between them as theoretical lines to form a general framework of the ways in which these theories read the world, in terms of both material and intangible culture. This allows us to use them as tools to think about learning processes. André Leroi-Gourhan, for example, fuses biology, genetics, anatomy, material culture, and social life in a beautiful narrative about the innate and the learned. On aesthetics he says:

> These levels, the physiological, technical, social and figurative will here represent the great clusters into which feelings are ordered. In man, references to aesthetic sensibility are rooted in the deepest visceral and muscular sensibility, in dermic sensibility in the senses of smell, taste, hearing and vision; thus, the intellectual image, symbolic reflection of the tissues of sensibility in their entirety. (Leroi-Gourhan 1971, 268)

To outline all aspects surrounding gesture in their organic and artificial paths is archaeology's basic proposal. Reflections on day-to-day social life, practices, and ideas cannot lose sight of the ways in which this knowledge is transmitted and how it expresses human relations.

Gordon Childe's Europeanizing identification of material culture seeks to highlight the tangent points between technical know-how, ethnic expression, and the symbolic feedback of social identity. Tracing the evolution line of European civilization also means a search for the didactic path through which symbols are transmitted as well as recognizing their impact on the day-to-day tangible past and present. What processes are involved in the constitution of the European? How can the right steps toward civilization be taught?

Andrés Zarankin elaborates on the central tenet that materiality, a product of human intention, not only responds to but also configures learning mechanisms in Western society (Zarankin 2001). Far from being built randomly, school space operates within a panoptic logic of control and arranging of ideas, repressing subversive qualities, and defining misbehavior. Walls erected by the state, behind often templelike facades, domesticate the minds of its pupils into sacred and unquestionable dogmas.

According to Andrea Lisset Pérez (2007, 228), education is of paramount importance to understand the socialization processes which reproduce and update different cultural traditions. Although overlooked by anthropology for an important part of its history, the works by Marcel Mauss and Émile Durkheim between the late nineteenth and early twentieth century operated "a fundamental epistemological rupture to understand the educational phenomenon" (Pérez 2007, 228).

In his work *Transmission of social cohesion: tradition, education* (1969), Marcel Mauss sees education as a traditional obligation to socialize new generations (Pérez 2007). Within this mechanism of transmission of cultural habit, corporality, sex, age, and social differentiation are combined into discrete learning phases. Still, new generations are not mere imitators of adults. The fact that their spaces are not clearly defined enables them to cross boundaries that adults no longer challenge. New generations observe the interconnections between practices and knowledge and may refuse to hand them down, bringing about a fresh novelty that may reformulate social processes. Their actions – e.g., games – are not mere reproductions, but creative constructions of the social world's meanings.

It is in this contest that new proposals mobilize contemporary archeologists to perceive themselves not only as interpreters of the materiality produced by past bodies and the past bodies produced by materiality but also their own present socialized body. While the scrutiny of the discourse outlined the biopolitics involved in the construction of truth, the real effects of these

strategies on everyday life were lost – the bodies and identities made by discourses became secondary. And by doing so, we ended up maintaining the old proposition of a single universal knowledge, "the discourse," whose intelligibility was the privilege of a few initiates: academic intellectuals. In the words of Danna Haraway, "Who wouldn't grow up warped? Gender, race, the world itself – all seem the effects of warp speeds in the play of signifiers in a cosmic force field" (Haraway 1988, 566–577).

Questioning the excesses of the discursive paradigm, the author seeks a return to objectivity that is not positivist but which is capable of taking a further step toward the creation of truths that allow us to live:

> Feminist objectivity is about limited location and situated knowledge, not about transcendence and splitting of subject and object. It allows us to become answerable for what we learn how to see. (Haraway 1988, 583)

Responsibility is a key word that has occupied international archaeology since the creation of the WAC in the 1980s. A self-awareness also came from social movements against the excesses of totalitarian, colonialist, and imperialist states (and their scientists) around the world. A feminist objectivity, for example, means accepting the limits of one's methods, questions, and self, allowing the emergence of questions and methods of others and their own different knowledges. We can only answer for our responsibilities. No science is done apart from scientists.

Central Questions

Material culture, as we have seen so far, has never failed to be a fundamental element in the development of social relations and identities. Its role in the learning processes of social habitus declares the undeniable alliance between education and archaeology. The question is exactly what such an alliance's powers could be. Both elements have been used to demolish human creativity and impose a massified and eliticized proposal for collective behavior. How should we practice archaeology and education to ensure that they are not "Just another brick in the wall?"

Future Directions

When addressing material culture, we are dealing with physical, materialized constructions. But that material world is still not detached from the intangible contexts which inform these constructions. These correlations – dynamic, fluid, and extremely delicate – can still be grasped when reflecting on the very concept of culture.

Criticisms of normative identities as put forth by civil movements after 1945 allowed for the elaboration of new theoretical proposals for the concept of culture, expressed both in the postwar historic-cultural archaeological trend and in the processualist and post-processualist scopes. As well as the changes in the field of archaeology, multiple perspectives on culture signaled the need to consider the immaterial as a realm worthy of attention from the political sphere.

In this new context, UNESCO's 2003 "Convention for the Safeguard of Intangible Heritage" was formulated with a view to guiding discussion within this new institutional field of research. This "recognizes a deep-seated interdependence between the intangible cultural heritage and the tangible cultural and natural heritage" (UNESCO 2003). For UNESCO, dealing with intangible heritage would be an important way of dealing with materiality itself and valuing human diversity (UNESCO 2005).

Analyzing perceptions about material culture in archaeology, we find it impossible to define material culture without considering its connections with the intangible world, especially if we lose sight of the political consequences of the theoretical models deployed to study materiality. Archaeology deals with material culture, but the basis of its objects of study, the concept of culture, refers to both the material and the spiritual world, so "there is no opposition between the two that can justify a study of 'things' alone (Funari 2003, 10)." Archaeologists' attention must be brought to this correlation between the material and immaterial, and they must also perceive the political consequences of our research.

Among the crisscrossing paths and meanders of new proposals, we believe that the relations between archaeology and education, considering both their material conditions and immaterial

impacts, delineate three paths that deserve our attention:

The first of these would be learning relations between professionals and civil society starting from the professionals' point of view. Regarding that relationship we find that it has been concerns about the preservation of material heritage that have attracted most attention. The effervescence devoted to legal issues and conservationist social engagement are still considered key aims in the eyes of professionals seeking to engage with the lay public.

What we call Public Archaeology today would have emerged from that moment of valuing historic national heritage (Funari and Carvalho 2009). Despite the great value of that struggle and its frequent successes in impeding the excessive penetration of capitalism into places of memory and shared cultural life, we cannot deprive ourselves of a critical awareness of our own interests and practices. Archaeology was, as we have seen, born in the context of both European imperialism and ethnic nationalism; its logic promoted both the ideology of the dominant class and the activities of colonial power (Trigger 1984; Funari and Carvalho 2009).

The varied modes of public coexistence outside archaeology often go beyond our expectations. Over the past 40 years, they have been bravely fighting colonial realities and the normatizations of capitalist society (Funari and Carvalho 2009). Therefore we can't imagine state-sponsored policies of management of this heritage as representing the social totality (Merriman 2004). As well as this, it is fundamental to reflect on the several ways in which learning occurs within these different groups. In this light we must stop considering gaps between our way of imagining the past and local ways of doing so as a deficit on their part that we should somehow compensate (Merriman 2004; Gomes 2006; Holtorf 2007). All societies have their own ways of knowledge and educational practices independent of the existence of schools (Pérez 2007), and it is just as important for cultural differences to be taught as it is for conflicts of interest to be negotiated. We therefore don't believe heritage education to be a way of becoming "culturally literate" (Horta et al. 1999; Bastos 2006), as we don't believe in the existence of cultural illiterates but in several cultural literacies.

This brings us to our second learning relationship between professionals and civil society from the standpoint of civil society. It is exactly at the point when we see ourselves as the teaching elders and devote ourselves to cultivating the immature that new paths come to shake off our most set in beliefs, the time when the educator becomes educated (Freire 1980).

Whether it be in classrooms, fieldwork, or TV broadcasts, extra-academic media that contribute to circulate our work offer us a point of view that lacks scientific parsimony (Taylor 2007) and which is therefore free of our prejudices and obstinacies. As part of the learning process about society, we must bid farewell to our scientific authority, pry open our Pandora's box (Latour 2000), and place our practice at the center of a discussion with those who are its public, consumers and appreciators.

From the 1970s, archaeologists influenced by Marxist or postmodernist theories began to question themselves about the social role of archaeology and especially the bases of the relationships between academics, their research, and society as a whole. The work Public Archaeology by US archaeologist Charles Robert McGimsey, professor of anthropology at the University of Louisiana, is considered a landmark on the route to establishing this new field of archaeology (Merriman 2004, 3). What later became known as Public Archaeology is therefore an area of archaeology which focuses on public interest in general and which developed in order to respond to that very need of dealing with dissonances and conflicts of interest (Merriman 2004, 2).

During the last Meeting of the Brazilian Archaeology Society, in Goiânia/GO, September 2016, Alfredo González-Ruibal presented some thought on archaeology's social and political responsibility in public conflict scenarios. The "public" we work with is a rough definition for anyone who is not an archaeologist; we should remember that there are many "others" outside our disciplinary milieu. On that account, González-Ruibal makes a crucial question: should we really

support everyone's claims? In 2016, Brazilian democracy was mined by a parliamentary coup that gave way to even more elitist and conservative politics, which also gave way to ultraright and pseudo-fascist movements. Ironically, they claim the right to openly speak against immigrants, native peoples, marooners, LGBTQ+, black, women, and laborers. And here the question above falls: should we support racist, sexist, elitist, fascist public claims?

We face still threats against diversity, democracy, and freedom, which must be faced conscious of our situated knowledge. This is the moment to reassemble the bodies disintegrated by postmodernity and carry on a critical and ethical archaeology. We must ask questions that take us toward the respect for diverse ways of living. And our stance is clear: no fascism!

Finally, the third learning relation can be seen internally within the very field of teaching archaeology in higher education. In Brazil the field's growing social importance can be seen particularly clear when we look at the 13 graduate courses that emerged over the past 10 years. But great powers bring great responsibilities, as we argued. In another paper (Ribeiro et al. 2017), we found that important themes such as gender and feminist studies are barely mentioned on the political and educational programs of said courses. The expansion of work markets and training in higher education places the difficult task that we have just outlined in the hands of the old guard, to cultivate unripe fruits while allowing oneself to be reformulated by their novelties and to hand down a discipline that will be ethical, socially responsible, self-critical, passionate about its practice, and conscious of its force. This is the only way we can provide a truly liberating education (Freire 1980).

Cross-References

- ▶ Activism and Archaeology
- ▶ Archaeological Resource Management: The Changing Role of the State
- ▶ Brazil: Cultural Heritage Management Education
- ▶ Community and Archaeology
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Native Americans
- ▶ Educational Tools and Techniques in Archaeology: Overview
- ▶ Ethics of Commercial Archaeology: Brazil
- ▶ Heritage and Public Policy
- ▶ Indigenous Archaeologies
- ▶ Intangible Cultural Heritage
- ▶ Materiality in Archaeological Theory
- ▶ Narrative and Storytelling for Archaeological Education
- ▶ Power and Knowledge in Archaeology
- ▶ "Public" and Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Social Movements and Archaeology
- ▶ Symmetrical Archaeology

References

Bastos, R.L. 2006. Arqueologia Pública no Brasil: novos tempos. In *Patrimônio: Atualizando o debate*, ed. V.-H. Mori, M.C. Souza, and R.L. Bastos. São Paulo: 9ª SR/IPHAN.

Brandão, C.R. 2007. *O que é educação?* São Paulo: Brasiliense.

Childe, V.G. 1974. *A pré-história da sociedade européia*. Lisboa: Europa-America.

Freire, P. 1980. *Educação como prática da liberdade*. Rio de Janeiro: Paz e Terra.

Funari, P.P.A. 2003. *Arqueologia*. São Paulo: Contexto.

Funari, P.P.A., and A.V. Carvalho. 2009. As possibilidades da Arqueologia Pública. *História e-História*. Available at: http://www.historiaehistoria.com.br/materia.cfm?tb=arqueologia&id=31

Giddens, A. 2005. *A sociologia*. Porto Alegre: Artmed.

Gomes, A.M. 2006. O processo de escolarização entre os Xakriabá: Explorando alternativas de análise na antropologia da educação. *Revista Brasileira de Educação* 11 (32): 316–327.

Hall, S. 2005. A identidade cultural na pós-modernidade. Rio de Janeiro: DP&A.

Haraway, Danna. 1988. Situated knowledges. The science question in feminism and the privilege of partial perspective. *Feminist Studies* 14 (3): 575–599. Available at: http://www.jstor.org/stable/3178066. Accessed in 5 Oct 2017.

Hodder, I. 1999. *Reading the past: Current approaches to interpretation in archaeology.* Cambridge, MA/Melbourne: Cambridge University Press.

Holtorf, C. 2007. *Archaeology is a brand!* Oxford: Archeopress.
Horta, M. d L.P., E. Grunberg, and A.Q. Monteiro. 1999. *Guia Básico de Educação Patrimonial*. Brasília: Instituto do Patrimônio Histórico e Artistico Nacional/Museu Imperial.
Jones, S. 1997. *The archaeology of ethnicity*. Londres: Routledge.
Latour, B. 2000. Introdução: abrindo a caixa de Pandora. In *Ciência como ação: como seguir cientístas e engenheiros sociedade afora*. Trans. I.C. Benedetti. São Paulo: Editora Unesp.
Leroi-Gourhan, A. 1945. Millieu et techniques. Paris: Albin Michel.
Leroi-Gourhan, A. 1971. *El gesto y la palabra*. Trans. F. Carrera D. Caracas: Ediciones de la Biblioteca de la Universidad Central de Venezuela.
Merriman, N. 2004. Introduction. Diversity and dissonance in public archaeology. In *Public archaeology*, ed. N. Merriman. London/New York: Routledge.
Pérez, A.L. 2007. Escola indígena: uma reflexão sobre seus fundamentos teóricos, ideológicos e políticos. *Perspectiva* 25 (1): 227–244. Available at: https://periodicos.ufsc.br/index.php/perspectiva/article/view/1636
Renfrew, C., and P. Bahn. 2008. *Archaeology: Theory, methods and practice*. Londres: Thames & Hudson.
Ribeiro, L., B. Silva, S. Schimdt, and L. Passos. 2017. A Saia justa da arqueologia brasileira: Mulheres e feminismos em apuro bibliográfico. *Revista de Estudos Feministas* 25 (3): 1093–1110. https://doi.org/10.1590/1806-9584.2017v25n3p1093
Shanks, M., and C. Tilley. 1982. *Re-constructing archaeology*. London/New York: Routledge.
Taylor, T. 2007. Screening biases: Archaeology, television, and the banal. In *Archaeology and the media*, ed. T. Clack and M. Brittain. Walnut Creek: Left Coast.
Thomas, J. 2004. *Archaeology and modernity*. London/New York: Routledge.
Trigger, Bruce. 1984. Alternative archaeologies: Nationalist, colonialist, imperialist. *Man* 19 (3): 355–370.
UNESCO. 2003. Convention for the safeguarding of the intangible cultural heritage. UNESCO: Paris. Available at: http://www.unesco.org/new/en/santiago/culture/intangible-heritage/convention-intangible-cultural-heritage/
UNESCO. 2005. *Convenção sobre a proteção e promoção da Diversidade das Expressões Culturais*. UNESCO: Paris. Available at: http://portal.unesco.org/en/ev.php-URL_ID=31038&URL_DO=DO_TOPIC&URL_SECTION=201.html
Zarankin, A. 2001. *Paredes que domesticam: Arqueologia da arquitetura escolar capitalista: o caso de Buenos Aires*. 255f. PhD Thesis (History Doctor) – Universidade Estadual de Campinas, Campinas.
Zarankin, A., and M.X. Senatore. (orgs.). 2002. *Arqueologia da sociedade moderna na América do Sul. Cultura material, discursos e práticas*. Buenos Aires: Ediciones del Tridente, Colección Científica.

Materiality in Archaeological Theory

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Introduction

Materiality is so enmeshed in our everyday existence that it has a kind of impenetrability. We are in touch with it so intimately that it vanishes. And yet of course it is always very much present. As I write, I sit on a Greek "kafeneio" chair, a simple wooden frame with crisscross rope that leaves its pattern on my legs, at least when I am wearing shorts. The wooden table is simple plywood on dexian. The table, the chair, the wooden floor, the computer, the ceiling fan, the dust, the coffee cups: together they are touched, seen, heard, smelled, and tasted, and somehow despite all these senses at work they go largely unnoticed. Writing brings them momentarily to the fore, though there are other ways too in which they can be made to appear. Many contemporary artists bring the artifacts of the everyday into presence by creating new kinds of encounter with them – from rendering them oversized, as in some of the work of Claes Oldenburg, or at miniature scale as in Slinkachu's almost invisible street scenes, or through redisplay (e.g., Jeff Koons). Sometimes, dramatic events can make the everyday appear to us in a very different light, as, for example, with the house interiors of New Orleans damaged by the floodwaters from Katrina (Wilford 2008). And these two can even come together when contemporary artists redirect their practice in the aftermath of such events, as with the "Floodwall" of Jana Napoli, or the photographic reportage of artist Robert Polidori (Fig. 1). These can help us briefly experience the elusive sense of materiality that is part of our everyday lives.

Arguably, it is the constant exposure to thousands of commodities in the twenty-first century West that forces a kind of drawing back from the overwhelming world of materiality. Or perhaps it

Materiality in Archaeological Theory, Fig. 1 "6539 Canal Street, New Orleans, September, 2005". (© Robert Polidori and courtesy the artist, and Edwynn Houk Gallery, New York)

is the fine-grained engineering of many products that makes our reliance on them so seamless: the thermostats for the silent control of heat in our houses, the ergonomic design of our cars, or the custom orthotics for our feet. But are either of these points valid – is the contemporary world really qualitatively different from the past? In fact, various authors suggest not: that this "condition" is actually part and parcel of being human. We may now sometimes feel choked by materials, but to be human has always been to be material or "artificial" (Taylor 2010). A fascinating set of stories can be traced back through early and later prehistory that document the "gradients" of change in materiality, between, for example, "instruments" and "containers" (Gamble 2007).

Yet despite the integral role of materiality in being and becoming human, the everyday world of stuff is endlessly overlooked both in our everyday lives, and to a surprising degree, perhaps consequently, in our archaeological practice and theory. Although archaeologists necessarily devote much of their attention to things – whether we call them artifacts, material culture, materials, or technologies – definitions of "materiality" have not been forthcoming. While it may seem at one level a term that we might take for granted, a flurry of recent research on materiality shows that it can actually lead in a number of different directions.

Definition

Let us try to think about what defines this phenomenon we call materiality. How is it different from or preferable to some of the other terms mentioned above, such as "artifacts," "materials," or "material culture?" Each of these terms can come across as static and categorical, whereas materiality has the advantage of being more relational. Artifacts imply that only things made by humans are relevant, a shortcoming that materials avoids; the latter could, after all, apply to metal ores, or pebbles on a beach. However, this is perhaps not sufficiently differentiated from the way in which a materials engineer might talk about materials. Material culture more obviously includes the cultural component that concerns the social scientist and humanist, though it does also risk portraying a polarized world of materials on the one hand and culture on the other, with the former acted upon by the latter. Materiality as a term does not make obvious this human component (sociomateriality could be a solution, but is unwieldy). Yet another term on offer is material world(s); this has the advantage of conveying the plural, ensemble quality of human-thing relations, but again it does not naturally include the human, and like "material culture" it too is static. Thus, none of the terms available quite gives us what we

need. Though not perfect, materiality may be the term that gets closest. It does have the distinctive advantage of conveying process, the ongoing dynamic of human-artifactual relations. And it does help to downplay the duality between mind and matter that is really one of the fundamental aims in materiality research (DeMarrais et al. 2004). Though this acts as a useful general guideline, there is an argument for being more specific, which entails considering the multidimensional nature of materiality. In this light, what we need is a concept that can cover four key areas: the dependent (material relations), codependent (social relations), independent (vital), and interdependent (plural) properties of things and objects (Knappett 2012). Admittedly, it is ambitious to try hanging all of these properties on the term "materiality" alone, but this is what it seems to require. One can understand both the reluctance (Miller 2005) and the insistence (Ingold 2007) to define materiality.

Historical Background

It is curious that only relatively recently has the urge to reconnect mind and matter, or the social and the artifactual, been felt. This move notwithstanding material culture is still often described as a reflection or an expression of social organization or cultural ideals. In archaeology, Tim Taylor has attributed this to the deep influence of Gordon Childe (Taylor 2009: 298). Much of the subsequent social archaeology has fallen into a similar Cartesian separation. Indeed, even some of the archaeological literature seemingly aimed at materiality uses terms such as "materialization," which reinforces the idea that something social exists prior to the artifactual, with the former "materialized" in the latter (DeMarrais 2004). Rather than ask here why we see a conjoining of mind and matter reappearing in materiality studies now, albeit unevenly, we should perhaps reflect on what has historically prevented its expression. What is interesting is that, according to Taylor, the sense of an inseparable connection between a community and its artifacts was widely held in the late nineteenth and early twentieth century, with the term "materiality" itself even used by E.B. Tylor as early as 1871 (Taylor 2009: 299). As Taylor also explains, the "sense of the intricate cultural nexus between artifacts and persons" (Taylor 2009: 299) was also tangled up with an essentialism that bound together cultural and racial identity, expressed in the work of Gustaf Kossina, for example, and subsequently subject to political manipulation and abuse in Nazi propaganda. This set of associations evidently led postwar to a disentangling of the cultural nexus to which Taylor refers, with a separation, or even polarization, of the social and the artifactual (actually already expressed in the prewar years by Childe). As an aside, we might note that a similar path was trodden in early twentieth century art history, with Alois Riegl's influential idea of "Kunstwollen" in its formalism promoting the idea of a "cultural nexus," but by the same token also potentially essentializing and hence open to abuse (Elsner 2006). Riegl's ideas generated much debate, with ripostes from Panofsky and Warburg among others (Elsner 2006), and arguably a similar kind of separation of the social and the material as that seen in archaeology.

Despite the postwar backlash against the idea of a tangled cultural nexus binding together a people and their culture, it is not as if the idea ever completely went away. It remained, for example, in the enduring legacy of the Pitt Rivers Museum in Oxford, which has maintained the same organizing principles as originally established when it was founded in 1884, with artifacts arranged according to function rather than geographical origin or period (see Fig. 2). Notable here is that the same E.B. Tylor as mentioned above was keeper of the University Museum of Natural History at Oxford in 1883, adjacent to which the Pitt Rivers was eventually located in 1887, and gave important collections to the Pitt Rivers (Larson et al. 2007). And recently, the Pitt Rivers has been an important stimulus for new work on materiality, not least as the base for Chris Gosden, and more recently for Dan Hicks, both of whom have made important contributions (Gosden 2004, 2005; Gosden et al. 2007; Hicks and Beaudry 2010). And this research base has contributed significantly to the resurgent interest

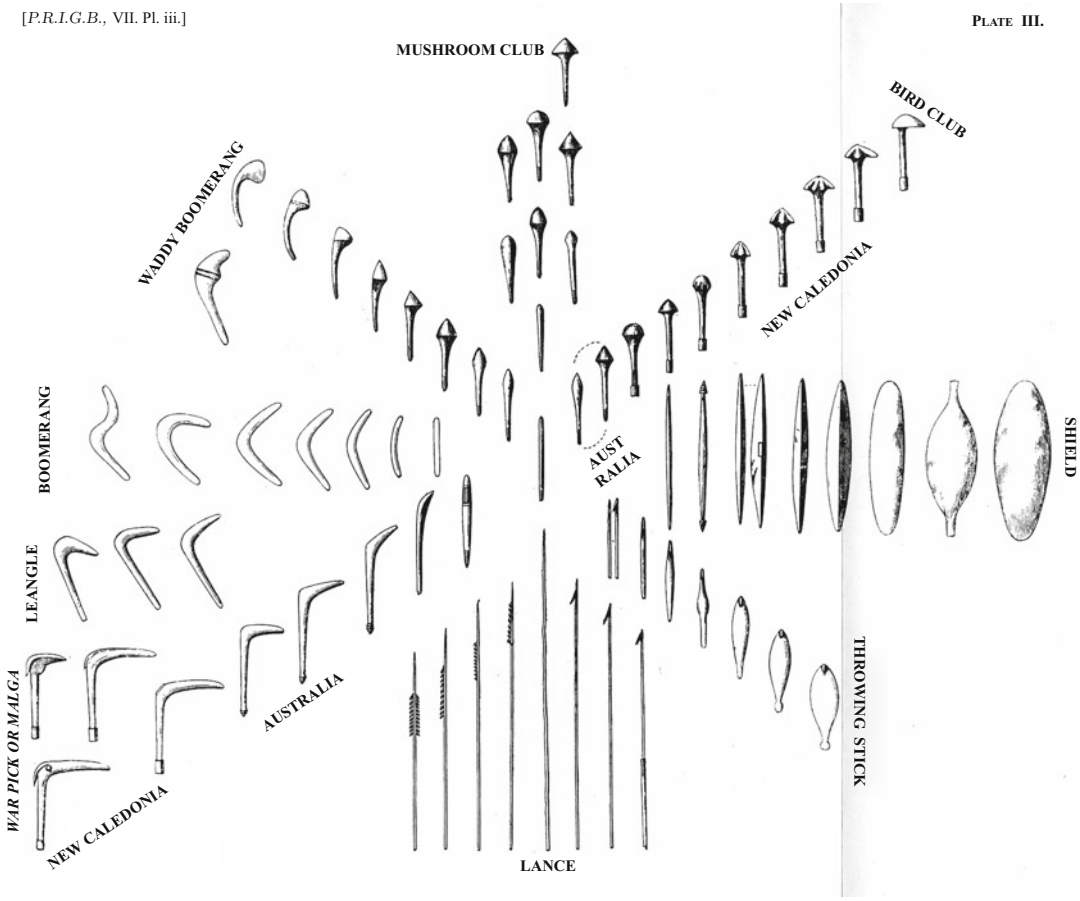

Materiality in Archaeological Theory, Fig. 2 An example of Pitt-Rivers's approach to artifact categorization. (Originally published in 1875; Pitt-Rivers 1906, Plate III.)

in materiality as a sociomaterial nexus, or what Hodder has recently dubbed the "entanglement" of things with each other and with their human interlocutors (Hodder 2011).

Key Issues/Current Debates

The museum is also a good "laboratory" for thinking about the ontology of artifacts, one of the key issues in materiality studies. If we think about how we engage with materiality in museums, the nature of display is such that we primarily encounter artifacts visually (with some exceptions). This has an objectifying effect whereby we stand back from the artifact as object and consider it consciously (Gosden 2004). This categorical experience of artifact-objects can occur in our daily lives as well, but we are perhaps more accustomed to encounter artifacts in a multisensory way that includes touch, smell, and sound (see opening paragraph). It is this multimodal experience that immerses us in the material world and makes it appear seamless with ourselves. Gosden (2004) talks about this distinction in terms of "objects," on the one hand, and "things," on the other. This distinction does seem to capture something of the shifting ontological status of materiality. It has not been much used in archaeology (though see Knappett 2010), seeing more currency in literary and cultural studies (e.g., Brown 2003). Indeed, it stems from philosophy and the work of Heidegger, whose object/thing distinction comes along with other

distinctions, such as "readiness to hand" and "presence at hand" (Heidegger 1971; Wheeler 2005). When something, such as a hammer, is ready to hand, it recedes from view and is smoothly incorporated into our action repertoires. However, when the hammer breaks, it enters a different mode and becomes present at hand, in which we observe the artifact as object, its categorical properties laid bare as we seek to understand them and return the hammer to use. The interaction between these different modes, if indeed they mark a valid distinction, is little understood and is a key issue for materiality studies.

Another way of viewing what is essentially the same issue is to take a different tack, from a starting point in psychology rather than philosophy. In particular, in the ecological psychology of J.J. Gibson, artifacts are viewed from the perspective of what they can afford an agent (human or indeed any other species) with a particular action repertoire (Gibson 1979). These "affordances" of an artifact are perceived directly by the agent, rather than filtered indirectly through cultural representations. Though a controversial idea in the psychology of perception, it has some common ground with Heidegger's concept of readiness to hand, which implies a kind of direct, seamless perception of an artifact's properties. Archaeologists have made some use of this Gibsonian idea of affordances, but have come up against the problem of how this kind of experience with materiality articulates with a more indirect encounter with the material world, via associations and cultural representations, of the kind envisaged within semiotic approaches to material culture. Again, the issue of the shifting ontologies of materiality arises and how artifacts seem to oscillate between being both objects and things. One solution proposed to the problem is the development of a "situated semiotics," based both on Gibsonian ecological psychology and the semiotics of C.S. Peirce, aimed at addressing both the directness of artifact affordances and the indirectness of artifact associations (Knappett 2005). The groundedness of Peircean semiotics has recently been recognized as an important tool in archaeology for the study of materiality (e.g., Preucel 2006; Crossland 2009) and will surely be an area of lively debate in the years to come.

The issue of the articulation of the direct and the indirect in the ontology of materiality raises another related issue, that of its scale. The notion of affordances is useful for understanding aspects of materiality at an immediate, proximate scale, but through iconic or symbolic associations materiality can occupy scales far beyond the proximate. This has relevance both spatially and temporally. Indeed, the critical role of materiality in allowing early human groups a "release from proximity" has been the focus of important recent work by Clive Gamble, who adopts a long-term perspective stretching from the Paleolithic through to the Early Neolithic (Gamble 2007). Gamble uses a distinction between instruments and containers to chart changing materialities, seeing not so much "revolutions" in material culture, but rather shifting gradients over time in how human groups exploit different material metaphors. The shift toward a more concerted use of containers in the Eurasian early Neolithic, both in the form of houses and ceramic vessels, is thus not seen as a revolution but as a strategic employment of a material metaphor that was already long present, the idea of the body itself as a container. The increasing expression of container metaphors in materials subsequently allowed new expressions of identity to unfold through the Neolithic. One can take this a step further and suggest that a clear idea of the human body as container may not in fact have preexisted the construction of houses and pots as containers, but may only have emerged as an effective bodily metaphor through these materialities (Knappett et al. 2010). If we trace this logic still further forward in time, into later prehistory, we see an explosion of socio-material differentiation in the Bronze Age, with an incredible range of artifacts, often operating together in assemblages (Knappett 2009). One of many possible examples is an assemblage from the "Temple Repositories" in the palace of Knossos, deposited c. 1650 BCE (Hatzaki 2009). This includes a wide range of materials – such as sea shells (both original and faience replicas) female figurines (also in faience), a stone cross, faience cups, and storage jars – that were probably part of

Materiality in Archaeological Theory, Fig. 3 Materiality as assemblage: some of the contents of the Temple Repositories, Knossos. (Courtesy of the Ashmolean Museum)

some cult equipment for use in or close to the palace's central court (see Fig. 3).

This growing differentiation in materialities over the long-term also has a spatial component. The release from proximity not only involves more and more different kinds of artifacts and technologies, but these tend to come from a broader range of more distant places too. If we return to the example of the Temple Repositories, we see faience technology of Egyptian derivation, and imported ceramic vessels from the Cyclades and probably the Dodecanese too. And this is not even an especially "connected" assemblage. Other assemblages we might have chosen from the Late Bronze Age involve more complex networks, particularly if we move further forward in time, to c.1300 BCE, when the complex networks of material circulation are quite astonishing, with "international" trade around the east Mediterranean exemplified in the remarkable cargo of the Ulu Burun shipwreck (Pulak 1998). These networks of materials and materialities can also be seen in the luxury items circulating as part of diplomatic and cultural exchange in the latter part of the Late Bronze Age, c.1400–1200 BCE (Feldman 2006).

Still, these patterns are not often theorized in terms of "materiality." Theoretical debates concerning the temporality and spatiality of materiality have still not been much worked through with detailed archaeological case studies. But a few notable exceptions apart (e.g., Meskell and Joyce 2003; Mills and Walker 2008), much of the debate remains theoretical at present. We might attribute this to the difficulty of talking about materiality in front of specific objects or assemblages – a point made by Elkins with reference to art history (Elkins 2008). Perhaps the issue, as indeed noted by Elkins, is one of methodology. How to go about studying materiality? Archaeology, however, is not short of methodologies, and there are some distinctive approaches already in existence that could be and indeed are being harnessed for a fuller understanding of materiality. As there are some interesting regional differences, though, in these methods, this we will turn to under the next heading.

International Perspectives

When archaeologists do get beyond theoretical considerations of materiality, the methodologies employed see some interesting variations internationally, principally between North America and Europe. In North America, the "behavioral archaeology" developed by Michael Schiffer and colleagues (e.g., recently, Skibo and Schiffer 2008; Hollenback and Schiffer 2010) has given rise to approaches to ancient materiality that examine people-thing interactions from production all the way through to discard. This has not had a lot of purchase in Europe (including the UK), where the *chaîne opératoire*, much used particularly by French lithic specialists, is more prevalent as a means for understanding production sequences alone (cf. Schlanger 1994; Conneller 2008). Instead, another tradition has picked up the consumption and discard end of artifact life histories, focused around issues of structured deposition and fragmentation (Chapman 2000). To understand processes of deposition in the past archaeologists have turned to the present, studying contemporary processes of abandonment (Gonzales-Ruibal 2008; Olsen 2010). In its experiential outlook this differs from the more rigorous attempts at replication in experimental archaeology's efforts to provide insights into past production choices. While the former may seem more post-processual and the latter processual, we should not make too much of such a distinction. For example, while Rathje's US rubbish project might seem processual in its experimental design, Rathje has recently collaborated with Shanks (Shanks et al. 2004); one might also point out the reference to Schiffer's methods in recent work on materiality by Hodder (Hodder 2011). Thus although there are some important differences in approaches to materiality on either side of the Atlantic, these should not be overstated. We should also note that European perspectives on materiality are not confined to the UK and France, with strands of thought established in Scandinavia (e.g., Olsen 2010, see above; also Fahlander 2008; Normark 2010), and emergent in Germany (e.g., Hahn 2005).

Future Directions

While archaeological approaches to materiality are already interdisciplinary, they could benefit still further from a wider range of dialogue. While archaeologists are aware of contemporary approaches in anthropology, sociology and geography, interesting lines of thought are also emerging in history, art history and other related disciplines. Tapping into approaches from many domains of inquiry is an essential direction for the future of materiality studies, as materiality itself has so many dimensions, with complex relations among materials, and between materials and people, and with properties such as vitality and plurality that are as yet poorly understood. Furthermore, archaeology is well placed, with its distinctive set of methodologies for studying people-thing relations, to contribute to the detailed study of materialities through diverse case studies from many periods and places. However, this methodological move has been slow in coming in materiality studies, perhaps, as Elkins states (see above), because of the difficulty of grasping materiality when faced with specific artifacts. This is arguably one of the most important directions for the future – the development of methodologies for the study of materiality that can match and complement the exciting theoretical moves that are currently underway.

Cross-References

► Behavioral Archaeology
► Material Culture and Education in Archaeology
► Rathje, William Laurens

References

Brown, B., ed. 2003. *Things*. Chicago: University of Chicago Press.
Chapman, J. 2000. *Fragmentation in archaeology: People, places and broken objects in the prehistory of South Eastern Europe*. London: Routledge.
Conneller, C. 2008. Lithic technology and the châine opératoire. In *Prehistoric Britain*, ed. J. Pollard, 160–176. Oxford: Blackwell.

Crossland, Z. 2009. Of clues and signs: The dead body and its evidential traces. *American Anthropologist* 111: 69–80.

Demarrais, E. 2004. The materialisation of culture. In *Rethinking materiality: The engagement of mind with the material world*, ed. E. DeMarrais, C. Gosden, and A.C. Renfrew, 11–22. Cambridge: McDonald Institute Monographs.

Demarrais, E., C. Gosden, and C. Renfrew. 2004. Introduction. In *Rethinking materiality: The engagement of mind with the material world*, ed. E. DeMarrais, C. Gosden, and C. Renfrew, 1–7. Cambridge: McDonald Institute Monographs.

Elkins, J. 2008. On some limits of materiality in art history. *31: Das Magazin des Instituts für Theorie* (Zurich) 12: 25–30.

Elsner, J. 2006. From empirical evidence to the big picture: Some reflections on Riegl's concept of Kunstwollen. *Critical Inquiry* 32 (4): 741–766.

Fahlander, F. 2008. Differences that matter: Materialities, material culture and social practice. In *Six essays on the materiality of society and culture*, ed. H. Glørstad and L. Hedeager, 127–154. Lindome: Bricoleur Press.

Feldman, M. 2006. *Diplomacy by design: Luxury arts and an "international style" in the ancient Near East, 1400–1200 BCE*. Chicago: University of Chicago Press.

Gamble, C. 2007. *Origins and revolutions: Human identity in earliest prehistory.* Cambridge: Cambridge University Press.

Gibson, J.J. 1979. *The ecological approach to visual perception*. Boston: Houghton Mifflin.

Gonzales-Ruibal, A. 2008. Time to destroy: An archaeology of supermodernity. *Current Anthropology* 49 (2): 247–279.

Gosden, C. 2004. Making and display: Our aesthetic appreciation of things and objects. In *Substance, memory, display: Archaeology and art*, ed. C. Renfrew, C. Gosden, and E. DeMarrais, 35–45. Cambridge: McDonald Institute Monographs.

Gosden, C. 2005. What do objects want? *Journal of Archaeological Method and Theory* 12 (3): 193–211.

Gosden, C., F. Larson, and A. Petch. 2007. *Knowing things. Exploring the collections of the Pitt Rivers Museum, 1884–1945*. Oxford: Oxford University Press.

Hahn, H.-P. 2005. *Materielle Kultur. Eine Einführung*. Berlin: Reimer.

Hatzaki, E. 2009. Structured deposition as ritual action at Knossos. In *Archaeologies of cult: Essays on ritual and cult in Crete in honor of Geraldine C. Gesell*, Hesperia supplement 42, ed. A.-L. D'Agata and A. van de Moortel, 19–30. Princeton: American School of Classical Studies.

Heidegger, M. 1971. The thing. In *Poetry, language, thought*. Trans. A. Hofstadter. New York: Harper.

Hodder, I. 2011. Human-thing entanglement: Towards an integrated archaeological perspective. *Journal of the Royal Anthropological Institute (N.S.)* 17: 154–177.

Hollenback, K., and M.B. Schiffer. 2010. Technology and material life. In *The Oxford handbook of material culture studies*, ed. D. Hicks and M. Beaudry, 313–332. Oxford: Oxford University Press.

Ingold, T. 2007. Materials against materiality. *Archaeological Dialogues* 14 (1): 1–16.

Knappett, C. 2005. *Thinking through material culture: An interdisciplinary perspective*. Philadelphia: University of Pennsylvania Press.

Knappett, C. 2009. Networks and the evolution of sociomaterial differentiation. *Proceedings of the British Academy* 158: 235–250.

Knappett, C. 2010. Communities of things and objects: A spatial perspective. In *The cognitive life of things: Recasting the boundaries of the mind*, ed. L. Malafouris and C. Renfrew, 81–89. Cambridge: McDonald Institute Monographs.

Knappett, C. 2012. Materiality. In *Archaeological theory today*, ed. I. Hodder, 2nd ed., 188–207. Cambridge: Polity Press.

Knappett, C., L. Malafouris, and P. Tomkins. 2010. Ceramics as containers. In *The Oxford handbook of material culture studies*, ed. D. Hicks and M. Beaudry, 588–612. Oxford: Oxford University Press.

Larson, F., A. Petch, and D. Zeitlyn. 2007. Social networks and the creation of the Pitt Rivers Museum. *Journal of Material Culture* 12 (3): 211–239.

Meskell, L., and R.A. Joyce. 2003. *Embodied lives: Figuring ancient Maya and Egyptian experience*. London: Routledge.

Miller, D. 2005. Materiality: An introduction. In *Materiality*, ed. D. Miller, 1–50. Durham: Duke University Press.

Mills, B.J., and W.H. Walker, eds. 2008. *Memory work: Archaeologies of material practices*. Santa Fe: SAR Press.

Normark, J. 2010. Involutions of materiality: Operationalizing a neo-materialist perspective through the causeways at Ichmul and Yo'okop. *Journal of Archaeological Method and Theory* 17: 132–173.

Olsen, B. 2010. *In defense of things: Archaeology and the ontology of objects*. Lanham: Alta Mira Press.

Pitt-Rivers, A. 1906. *The evolution of culture and other essays*. Oxford: Clarendon Press.

Preucel, R. 2006. *Archaeological semiotics*. Oxford: Blackwell.

Pulak, C. 1998. The Uluburun shipwreck: An overview. *International Journal of Nautical Archaeology* 27 (3): 188–224.

Schlanger, N. 1994. Mindful technology: Unleashing the chaîne opératoire for an archaeology of mind. In *The ancient mind: Elements of cognitive archaeology*, ed. C. Renfrew and E. Zubrow, 143–151. Cambridge: Cambridge University Press.

Shanks, M., D. Platt, and W.L. Rathje. 2004. The perfume of garbage: Modernity and the archaeological. *Modernism/Modernity* 11 (1): 61–83.

Skibo, J., and M.B. Schiffer. 2008. *People and things: A behavioral approach to material culture*. New York: Springer.

Taylor, T. 2009. Materiality. In *Handbook of archaeological theories*, ed. R.A. Bentley, H.D.G. Maschner, and C. Chippindale, 297–320. Lanham: Alta Mira Press.
Taylor, T. 2010. *The artificial ape: How technology changed the course of human evolution*. New York: Palgrave Macmillan.
Wheeler, M. 2005. *Reconstructing the cognitive world: The next step*. Cambridge, MA: MIT Press.
Wilford, J. 2008. Out of rubble: Natural disaster and the materiality of the house. *Environment and Planning D: Society and Space* 26: 647–662.

Further Reading

Hicks, D., and M. Beaudry, eds. 2010. *The Oxford handbook of material culture studies*. Oxford: Oxford University Press.
Tilley, C., W. Keane, S. Küchler, M. Rowlands, and P. Spyer, eds. 2006. *Handbook of material culture*. London: Sage.

Matobo Rock Art

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Introduction

Located in south western Zimbabwe (Matabeleland South), Matobo, UNESCO World Heritage Landscape has been known by different names including Matopos and Matopo Hills. However, Matobo is currently the official name for the landscape as stated on the UNESCO World Heritage List. Geologically, the area which constitutes the Matobo massif is a giant granite batholith extending more than 2000 km^2 (Fig. 1). Multiple rivers have cut it into a series of NNW-SSE-oriented parallel valleys separated by mostly granitic hills. These provide an extraordinary variety of ecosystems and extensive biodiversity. The cultural heritage comprises exceptional archaeological and living heritage sites. The hills are one of the main locations of rock art worldwide with more than 3000 sites (Mguni 2015). A long history of archaeological research since the 1920s has yielded evidence of peopling from the Earlier Stone Age to the early historical times (Walker 1994, 1995). Some sites have deep Pleistocene-Holocene chrono-cultural sequences that have become reference points in Zimbabwe Stone Age archaeology (Bambata, Pomongwe, and Nswatugi). According to the current data, foragers occupied the Matobo until about 300 AD when the farmers' settlements were established. In addition to the archaeological heritage, Matobo also has places of spiritual and ritual importance to today's local populations within the southern African Mwari religion. Although there is usually no direct claim to a link with the forager art, some of the sites with rock art are considered as sacred which have therefore been considered to be a part of a living heritage by the UNESCO. Although Matobo art has similarities with rock art from other parts of Zimbabwe and southern Africa, there are peculiarities that make it a significant area of research. This chapter focuses on foragers' rock art since little is known of the farmer art of the region so far.

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Definition

Due to the geomorphological and geological features of the hills, Matobo rock art is mostly found in shallow spheroidal rock shelters of various sizes, from the bottom valleys (Pomongwe) up to the summits (Bambata). Although there are rumors among the general populace about deep cave rock art, these have not been confirmed anywhere in Zimbabwe. Still imagery can also be located on boulders. Rock art sets vary from a handful of images to large assemblages of thousands. Much of the rock art is attributed to the foragers with only a few sites having farmer iconography. Herder art is yet to be identified in the area.

Forager Rock Art

Exclusively painted, the forager rock art comes in the form of the so-called fine-line paintings tradition. Parietal rock engravings are found in other parts of Zimbabwe (Hwange National Park, Bainbridge), mostly in regions with sandstone, a

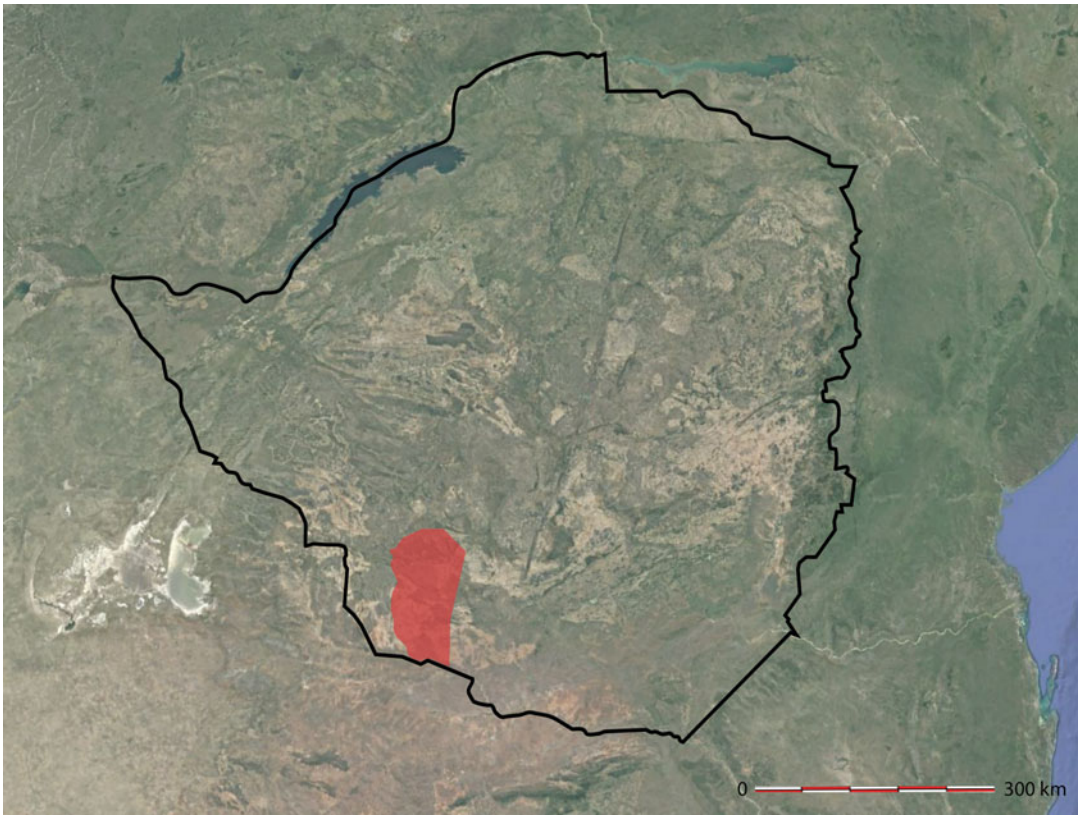

Matobo Rock Art, Fig. 1 Location map of Matobo (map Google Earth, modif. C. Bourdier)

softer rock to engrave. These paintings are among the best preserved and detailed in southern Africa, and made Matobo so renowned. These show a large range of colors: shades of red, pink, yellow, orange, brown, white, gray, and a few black (Fig. 2). Most were done in solid form with the whole image filled with color(s) while a few were outlined with their inside either left blank or filled out in stripes or other geometric patterns (Fig. 3). Matobo rock art is well known for a sizeable number of bichrome and polychrome paintings with the use of different colors to differentiate body parts on animal depictions, clothes and ornaments on human bodies (Fig. 4). At times, the colors are blended to produce shaded polychromes in a very realistic rendering of the animal coat, especially on antelopes depictions (Silozwane, Nswatugi and Nanke Caves – Fig. 4). Still monochromes prevail. Several instruments were used to paint, from the finger to brushes, and possible feathers, porcupine spikes, sharp bone tools, and/or vegetal stems for the finest lines (Walker 1996).

Rock paintings in Matobo hills depict a wide range of subjects, mostly figurative. Humans prevail together with animals, mainly large- and medium-size herbivores, with also a few felines, fishes, birds, and insects (Walker 1996). Antelopes (kudu, eland, tsessebe, bushbuck) and giraffes are the most commonly represented (Fig. 2). Wildebeests (Fig. 3), zebra, and elephants are much less numerous. The depiction of the animals often bears realistic features that make images identifiable to species level. Special attention was given to the rendering of the coat and sensorial organs (eye, ears, muzzle) often painted in bichromy or polychromy (Fig. 4). These images are very dynamic with lines of walking or running animals as the most common imagery (Figs. 2 and 3). Other scenes include grazing or resting animals. Juveniles are comparatively

Matobo Rock Art, Fig. 2 Painted section with monochrome, bichrome, and polychrome imagesat Nanke cave. (Photo by A. Nhamo)

Matobo Rock Art, Fig. 3 Solid figures of running humans and outlined depictions of wildebeests at White Rhino cave. (Photo C. Bourdier)

unusual. Human figures come in various forms and compositions (Figs. 3, 5, and 6). Depicted in complete, they show elongated bodies with small rounded heads; some have distorted features. Males are often identified by the depiction of penises which are often elongated, and sometimes infibulated (Fig. 5). Women are indicated by breasts and rounded bellies together with accentuated hips (Figs. 4 and 6). Gender is also reproduced through attributes: items of clothing and specific equipment such as bows, arrows, and quivers for men (Figs. 3 and 5); grinding stones for women. However, men and women indistinctively carry sticks, bags, and baskets. Images are dynamic with a large range of postures which actually individualize the subjects instead of the body traits. The most common composition is lines of walking or running men with the hunting equipment (Walker 1996). These "hunters" are usually associated with potential preys (antelopes, giraffes, elephants), at times with their weapons drawn in a shooting posture (Etopoteni: Walker 1996, p. 47). On some panels, they are depicted carrying the animals, presumably their kill (Mshelele Valley: Walker 1996, p. 48). Few

Matobo Rock Art, Fig. 4 Polychrome figure of a giraffe from Silozwane. (Photo C. Bourdier)

Matobo Rock Art, Fig. 5 Line of walking men at Bambata cave. (Photo C. Bourdier)

sites show women and female-related activities such as gathering using digging sticks or grinding (Ukhutula, Silozwane). Women can also be seating on their own clapping, most likely referencing to dancing scenes. In very few occasions are men and women executed together as a group, either in walking or camping scenes (Silozwane, Bambata; Fig. 6). Small characters in group scenes could be seen as the depiction of children (Fig. 6).

Matobo rock art also include few various non-real animal beings in the shape of animal-animal conflations (zoomorphics) (Walker 1996). The most iconic of these are the serpent-like conflations with animal heads (Gulubahwe, Buhwe; Fig. 7), in some cases specifically antelope heads. They are often closely associated with human figures, some shown to be crawling along their backs (Gulubahwe) or are intertwined with the serpentine figures (Buhwe). As elsewhere in Zimbabwe, the zoomorphic are an interesting part of Matobo rock art but are not commonly depicted. Except for animal-headed snakes, most

Matobo Rock Art, Fig. 6 Section of the back wall at Silozwane. (Photo C. Bourdier)

Matobo Rock Art, Fig. 7 The serpent zoomorphic from Gulubahwe. (Photo by A. Nhamo)

zoomorphics are found at a few specific sites. Although such figures have a common thread in terms of animal-animal conflations, their meaning seem to be expressed divergently at the individual site level. Human-animal conflations are also exceptionally found. The most common is the human-antelope hybridization, which associates human bodies with antelope head features, especially ears and sometimes horns (Wawa: Walker 1996, p. 51). These include impala and tsessebe (Walker 1996). On a few occasions, humans are also conflated with birds such as ostrich.

Plant depictions are another striking trait. Matobo assemblages mostly contain trees, very often in the shape of naked trunk and branches with a few if no leaves; many are not identifiable to species.

Another common motif in Matobo is the enigmatic depiction known as the formling (Fig. 2). Still in use today, this term was coined by the renowned ethnographer Leo Frobenius to refer to a particular form of images that he could not accurately describe otherwise. Found all over Zimbabwe, these motifs can be described as

"compartmentalized stacks of oval, oblong, or tubular cores" (Mguni 2015, p. 15) which are sometimes encircled. Depicted in monochrome, bichrome, and polychrome formats, some of the most detailed are found in the Matobo. They have puzzled many researchers since the beginning of the twentieth century: figurative motifs? Geometric signs? A diverse range of possible interpretations have been assumed. The most current given by Mguni (2006, 2015) states they are representations of termite mounds or *termitaria* (termite life circle), which are often found with trees growing on them. Mguni argues for a close connection between these formlings, plant, insects (especially flying termites), the fields of flecks, and other geometric depictions. All these are connected to this notion of the spiritual abode, which is considered as God's dwelling among some contemporary forager groups.

Farmer Rock Art

Despite a long history of rock art research, not much is known about the farmer rock art in Matobo beyond the sites location. It is commonly referred to as the "Late White tradition" (Cooke 1974), regarding the fact that most of the images are painted in white kaolin pigment which is significantly different from the ochres used in foragers' paintings. Some paintings were also made with red kaolin. The thick lines were finger-painted demonstrating another radical technical change. The Late White art in Zimbabwe share attributes such a color and texture with the farmer art known as the "White-spread eagled" tradition in South Central Africa (Eastern Zambia, Central Malawi, Central Western Mozambique – Smith 2005; Zubieta 2016). However, the Late White tradition depicts crude geometric motifs, animals, and humans rather than the iconic spread-eagled designs found in northwards. Nevertheless, contrary to the forager tradition, animals and humans are seen front view or from above, with very schematic geometric lines, no internal details, and lack any dynamism. The motifs are juxtaposed or superimposed with no apparent interaction.

Key Issues and Current Debates

Dating

Dating and chronological sequencing is one of the key outstanding issues pertaining to Matobo rock art, and more broadly to southern Africa (Swart 2004). Indeed the rock art of the whole region lacks chronological markers. According to the current data, southern Africa seems to be the cradle of graphic expression with geometric patterns engraved on pieces of ochre, stone, and eggshell from 100,000 BP (Henshilwood et al. 2009; Texier et al. 2013). Yet surprisingly, the oldest rock art with directdating at present is only between 5723 and 4420 cal. BP (Bonneau et al. 2017). The existence of a regional Pleistocene rock art is still at stake. Moreover, this question tackles another central issue in History of Art and Prehistory: the emergence of rock art in comparison to portable art, the seemingly discrepancy between the two, and the factors of this crucial cultural and social shift within the visual productions.

Although a number of chronometric dates have been established for the Matobo, they are still inadequate to provide a clear and convincing chronology of the rock art. Walker (1995, 1996) has obtained dates from associated material found together with painted spalls, pigments, and painting equipment in the archaeological layers at Pomongwe and Nswatugi. These include the oldest date of around 13,000–12,000 BP at Pomongwe, which makes Matobo one of the very few spots in Southern Africa with probable Pleistocene rock art. It is a minimum date as it indicates that rock paintings were already being done by this time for spalls to have peeled off and be incorporated in the stratigraphy of the rock shelter. Walker also recognized depictions of some ancient animals such as a zebra species (*equusgreyvi*) at Bambata, known to have gone into extinction some 9000 BP, which becomes an *ante quam* date for such images. Moreover, one often assumes that some Pleistocene rock art assemblages could have remained on walls in the deepest rock shelters thanks to the stability and low erosion rate of granite and a low exposure to sunlight and water weathering (Nhamo 2014).

Therefore, the actual date for the beginning of the practice of rock art is still outstanding. Dating of the subsequent development of the rock art is also vague and elusive. Relying on the archaeological sequences from the sites he excavated, Walker (1996) provided a provisional chronology, which puts much of foragers' art between 10,000 and 1500 BP when the foragers' populations would have had to leave the massif pushed away by the farmer community's first settlement.

Stylistic Sequencing

Stylistic sequencing has been at the center of controversy with long-running debates not just in Zimbabwe but also for southern Africa as a whole. The arguments surround the methodologies and even the heuristic usefulness of the stylistic approach in an interpretative perspective (Lewis-Williams 1990; Garlake 1995; Pearce 2010). Matobo rock art shows elements of variability in the techniques (shades, number, and associations of colors), and in the human and animal forms and compositions. The main sites appear as palimpsests with multiple superimposed layers of paint, which suggest changes over time, notably in the techniques, selection of motifs, and scenes. Such stylistic variations could attest to cultural dynamics as known in other fields of the foragers' material culture (lithics, hunting equipment). They could even yield evidence of changes of meaning when considering motifs and compositions (Pearce 2002).

In Zimbabwe, these were the mainstay of rock art studies from the 1940s through to 1960s and 1970s. The major reference for the stylistic sequence has been Cran Cooke (1963, 1974) who defined seven stylistic phases. Drawing on some of Cooke's conclusions, in Matobo Walker argued for a progressive technical improvement in time with first monochromes (Pleistocene), then bichromes (from 9000 BP), and latest polychromes (6000 BP). Mguni (2002, 2015) made similar implicit use of these sequences, as Peter Garlake (1995) and Ancila Nhamo (2014) did elsewhere in Zimbabwe. These traditional stylistic sequences have been heavily criticized for lack of objectivity and consistency in the choice of analytical attributes. Scholars have also pointed to the unsystematic methods used in establishing the sequences and the difficulties in replication when applied to several sites (Garlake 1995; Mguni 2002; Nhamo 2007). In South Africa, modern methodologies such as the Harris Matrix have been applied to the art as a way of refining these sequences. However, these works have also become embroidered in fierce debates over the applicability of the method (Swart 2006; Pearce 2010; Russell 2012). Nevertheless, modern researchers continue to use these "faulty" traditional sequences in Zimbabwe due to lack of updated chronostylistic studies.

Regional Variation of the Rock Art

Four provinces have been defined in Southern Africa foragers' rock art, one of which is the Zimbabwe-Limpopo with Matobo (Garlake 1995; Eastwood and Eastwood 2006). Several recent works have yielded evidence of a complex interplay of continuities and specificities in the techniques and motifs within the province (Walker 1996; Mguni 2015). For instance, Matobo bestiary shows some particularities with the importance given to giraffes, the higher frequency of elands than elsewhere in Zimbabwe, the depiction of the wildebeest, and the scarcity of elephants (Nhamo 2014). Plant depictions differ from other regions in Zimbabwe, notably the Mashonaland where tubers are the most common. In the technical field, the substantial use of color with polychromy is a major distinction as rock paintings are predominantly monochrome elsewhere (Garlake 1995; Walker 1996; Nhamo 2007, 2014). Walker (1996, p. 28) argued that the colors seem to give meaning to some images since there is some consistence in those used on certain images such as kudu, eland, and wildebeest. These differences with other parts of Zimbabwe and southern Africa have already been noted but little explanation has been proffered for the variability (Walker 1996). They may allude to local cultural facies and help recognizing and characterizing cultural dynamics within the past foragers' populations not only in time but also in space. They could also testify to local meanings of rock art production. Regarding the formlings for instance, although Mguni's interpretation is one of

the most convincing, he acknowledges that the basis of his arguments are not replicated on most sites since formlings are sometimes depicted on their own (2015, p. 124). The variation of some symbols use in different parts of Zimbabwe has to be investigated. Thus, understanding the regional variation of motifs remains an outstanding issue.

Interpretation

A last key issue regarding Matobo rock art with which most regional studies have dealt is interpretation, a seemingly never-ending endeavor in the discipline. Because of the existence of a bestiary with specific animals within the fauna, the absence of landscape elements, the non-representation of most daily activities, or the presence of nonreal beings, the vision of a decorative purpose or an "art for art's sake" (Cooke 1963, 1974) has been abandoned in the 1980s. Based on the exceptional informed ethnographic documentation from San populations of the nineteenth and twentieth centuries in South Africa, scholars agree to consider this iconography as the metaphoric expression of foragers' spirituality and religion with the depictions of magical potencies embodied in animals, beings from the spiritual world, mythical characters, together with the depiction of actual ritual activities (dancing scenes). Such as all regions with forager rock art in southern Africa, the predominant interpretation is Lewis-Williams' shamanism (Lewis-Williams and Dwoson 1989), i.e., the rock art would depict visions and experiences of shamans, and shamanistic rituals. Some have argued for a wider spiritual symbolism. Hunting, for example, has been interpreted under shamanism theory as symbolizing dying shamans (Lewis-Williams and Dowson 1989). However, Dowson (2007) later claimed that depiction of hunting represents the relationship between the hunter and the hunted where the hunter is procuring food while the hunted is providing sustenance. This engagement between the human and nonhuman leads to regeneration of life. The hunter respects the hunted for this role. The frequency of the hunting iconography shows that it was significant symbolism in the production and use of rock art in Matobo. It is likely to have permeated many aspects of culture beyond just spirituality. This has also been demonstrated by Mguni's (2006, 2015) re-visitation of the famous formling images. His extensive study of formling and their association with botanical imagery, mainly from Matobo, has brought out new insights into the symbolic meaning. For some, besides spirituality and ritual activities, rock art addresses a wider range of social symbolism including social identity negotiation, i.e., gender, groups, affiliations, and social networks identification (Garlake 1995; Nhamo 2013). Still none of these interpretative theories can explain all the motifs and compositions found in Matobo rock art so far. Many other features of the iconography still require further investigation such as conflated animal-human figures, gathering scenes, and camping scenes for instance.

Future Research Directions

The generalized social context of the art has been established through regional works on southern Africa such as those by Lewis-Williams and Dowson (1989). What is now necessary are specific localized studies to contextualize the environmental, economic, social, and political conditions that surrounded rock art production and reception to provide a better understanding of the meaning, social functions and uses (Dowson 1994). Indeed, with regard to the sociocultural dynamics in space and time attested in the techno-economic equipment, it appears essential to set the foragers' rock art back in a historical perspective (Mitchell 2005). It is both a necessity and a major scientific challenge that has drawn the interest of several researchers in recent years (Hampson 2015; Pearce 2002). Moreover, if one considers images as media of information within social relations (Wiessner 1984), rock art can augment the reconstruction of information exchanges, past social networks, and territorial structuring (broad vs. reduced; open vs. closed; socioeconomic risk minimization vs. competition), and their dynamics through time (McDonald and Veth 2012). It is, therefore, imperative to integrate rock art into broader researches on the past societies, notably in the exploration of identity and settlement

history of foragers' populations, and to tackle the complex relations between rock art production, socioeconomic systems, settlement patterns, and environment. How do environmental conditions and related socioeconomic structuring impact rock art? Conversely, how and to which extend can changes in style inform on foragers' socioeconomic organization? Since Walker (1995) has already made such attempts, Matobo is an ideal starting point for this kind of research in Zimbabwe.

To address the current key issues and to develop these new challenges in the future, there is now an absolute need for exhaustive and updated documentation according to the modern scientific standards. Although many works have been conducted in Matobo, the documentation is limited, partial, and irregular. A major aspect of rock art research should consist in the systematic survey recording tracing of the paintings. In addition, archeometric analysis should be carried out to characterize paintings recipes and pigments sourcing. This enhanced documentation should help refining the stylistic sequence through multi-criteria analyses of the assemblages including technological studies. As argued above, reviewing of stylistic sequences is not only relevant for chronology, but aides in addressing another key issue in Zimbabwe and southern African rock art studies, i.e., regional variation of rock art motifs. The studies on variation in Matobo and elsewhere should be hinged on a clear understanding of the patterning of the motifs across space and time to determine whether the differences are a result of localized factors or temporal changes. Priority should also be given to a search for relevant chronometric dating systems whenever possible to counter the inherent limitations of the relative methods. Indeed, dating rock art directly would contextualize and historicize the art by making it easier to chronological developments over time. However, chronometric dating techniques such as AMS are limited by the lack of organic pigments used in Matobo rock paintings (i.e., few black paintings). Thus, a refinement of the paintings stratigraphies through modern systematic analytical tools is still crucial.

Studies must now include an interdisciplinary approach, especially in relation to ground archaeology (Mitchell 2005; Meskell 2009). Indeed the other archaeological materials unearthed in the same sites are essential to inform on the chronocultural attributions of the rock art, and on the activities related to the production and reception of the paintings to provide knowledge of both the meaning and the social uses of rock art. This interdisciplinary dimension of rock art research must combine new excavation programs to provide updated stratigraphies and chronologies, and the re-examination of the archaeological series (artifacts and ecofacts) from previous excavations. For Matobo, this should be a central aspiration as some of the main rock art sites were excavated in the twentieth century, notably by N. Walker (1995). Walker collected all the painted spalls and painting equipment, but most of them have not been analyzed and remain unpublished.

References

Bonneau, A., R. Staff, T. Higham, F. Brock, D. Pearce, and P. Mitchell. 2017. Successfully dating rock art in southern Africa using improved sampling methods and new characterization and pretreatment protocols. *Radiocarbon* 59 (3): 659–677.

Cooke, C. 1963. The painting sequence in the rock art of southern Rhodesia. *South African Archaeological Bulletin* 18 (72): 172–175.

Cooke, C. 1974. *A guide to the rock art of Rhodesia*. Salisbury: Longman.

Dowson, T.A. 1994. Reading art, writing history: Rock art and social change in southern Africa. *World Archaeology* 25: 332–344.

Dowson, T.A. 2007. Debating Shamanism in Southern African rock art: Time to move on …. *The South African Archaeological Bulletin* 62 (185): 49–61.

Eastwood, E.B., and C. Eastwood. 2006. *Capturing the spoor rock art of Limpopo: An exploration of the rock art of Nothernmost South Africa*. Cape Town: David Philip.

Garlake, P. 1995. *The Hunter's vision*. London: British Museum Press.

Hampson, J. 2015. *Rock art and regional identity: A comparative perspective*. London: Routledge.

Henshilwood, C., F. D'errico, and I. Watts. 2009. Engraved ochres from the Middle Stone Age levels at Blombos Cave, South Africa. *Journal of Human Evolution* 57: 27–47.

Lewis-Williams, J.D. 1990. Documentation, analysis and interpretation: Dilemmas in rock art research. *South African Archaeological Bulletin* 45: 126–136.

Lewis-Williams, J.D., and T.A. Dowson. 1989. *Images of power, understanding Bushman Rock Art*. Johannesburg: Southern Book Publishers.

McDonald, J., and P. Veth. 2012. The social dynamics of aggregation and dispersal in the Western Desert. In *A companion to Rock Art*, 90–102. Hoboken: Blackwell.

Meskell, L. 2009. Contextualizing people of the Eland. In *The eland's people: New perspectives in the rock art of Maloti-Drakensberg Bushmen, Essays in memory of Patricia Vinnicombe*, ed. P. Mitchell and B. Smith, 29–31. Johannesburg: Witwatersrand University Press.

Mguni, S. 2002. *Continuity and change in San belief and ritual: Some aspects of the enigmatic 'formling' and tree motifs from Matopo Hill rock art, Zimbabwe*. Unpublished MA thesis, University of the Witwatersrand, Johannesburg.

Mguni, S. 2006. Iconography of termites' nests and termites: Symbolic nuances of formlings in Southern Africa San rock art. *Cambridge Archaeological Journal* 16 (1): 53–71.

Mguni, S. 2015. *Termites of the gods: San cosmology in Southern African rock art*. Johannesburg: Wits University.

Mitchell, P. 2005. Why hunter-gatherer archaeology matters: A personal perspective on renaissance and renewal in southern African Later Stone Age. *The South African Archaeological Bulletin* 60 (182): 64–71.

Nhamo, A. 2013. Of borrowed concepts and regional variations: A critique of rock art interpretative frameworks with specific reference to Zimbabwe. In *Zimbabwean archaeology in the post-independence era*, ed. M. Manyanga and S. Katsamudanga, 61–74. Harare: Sape Books.

Nhamo, A. 2014. *Characterizing hunter-gatherer rock art: An analysis of spatial variation of motifs in the prehistoric rock art of Zimbabwe*. PhD thesis, University of Zimbabwe, Harare. http://ir.uz.ac.zw/jspui/bitstream/10646/3401/1/Characterizing_hunter_gatherers.pdf

Pearce, D. 2002. Changing men, changing eland: sequences in the rock paintings of Maclear District, Eastern Cape, South Africa. *American Indian Rock Art* 28: 129–138.

Pearce, D.G. 2010. The Harris Matrix technique in the construction of relative chronologies of rock paintings in South Africa. *The South African Archaeological Bulletin* 65 (192): 148–153.

Russell, T. 2012. No one said it would be easy. Ordering San paintings using the Harris Matrix: Dangerously fallacious? A reply to David Pearce. *The South African Archaeological Bulletin* 67 (196): 267–272.

Smith, B.W. 2005. Rock art – Chewa (central Africa). In *The encyclopedia of religion and nature*, ed. B.R. Taylor, 1393–1394. London: Thoemmes Continuum.

Swart, J. 2004. Rock art sequences in Ukhahlamba-Drakensberg Park, South Africa. *Southern African Humanities* 16: 13–35.

Swart, J. 2006. Harassing the matrix: A reply to Pearce. *Southern African Humanities* 18 (2): 178–118.

Texier, P.-J., G. Porraz, J. Parkington, J.-P. Rigaud, C. Poggenpoel, and C. Tribolo. 2013. The context, form and significance of the MSA engraved ostrich eggshell collection from Diepkloof Rock Shelter, Western Cape, South Africa. *Journal of Archaeological Science* 40: 3412–3431.

Walker, N. 1994. Paintings and ceremonial activity in LSA of the Matopos, Zimbabwe. In *Contested Images: Variation in Southern African rock art research*, ed. J.-D. Lewis-Williams and T.A. Dowson, 119–130. Johannesburg: Witwatersrand University Press.

Walker, N. 1995. *Late Pleistocene and Holocene hunter-gatherers of the Matopos*, Studies in African archaeology. Vol. 10. Uppsala: Studies in AfricanArchaeology. ISBN 0284–5040.

Walker, N. 1996. *The painted hills*. Gweru: Mambo Press.

Wiessner, P. 1984. Reconsidering the behavioural basis for style: A case study among the Kalahari San. *Journal of Anthropological Archaeology* 3: 190–234.

Zubieta, L. 2016. Learning through practise: Chewˆ a women's roles and the use of rock art in passing on cultural knowledge. *Journal of Anthropological Archaeology* 43: 13–28.

Further Readings

Amstrong, A. 1931. Rhodesian archaeological expedition (1929). *The Journal of the Royal Anthropological Institute* 61: 239–276.

Burkitt, M. 1928. *South Africa's past in stone and paint*. Cambridge: Cambridge University Press.

Cooke, C. 1959. The rock art of Matebeleland. In *Prehistoric rock art of the federation of Rhodesia and Nyasaland*, ed. R. Summers, 3–111. Salisbury: National Publications Trust.

Cooke, C. 1964. Animals in southern Rhodesian rock art. *Arnoldia* 13: 1–22.

Cooke, C. 1971. The recording of rock art by Mrs E Goodall. *Occasional papers of the National Museums of Rhodesia* 1 (1A): 8–20.

Frobenius, L. 1931. *Madsimudsangara*. Berlin: Atlandis.

Garlake, P. 1987. *The painted caves*. Harare: Modus.

Goodall, E. 1957. Styles in rock paintings. In *The third pan African congress on prehistory, Livingstone 1955*, ed. J.-D. Clark, 295–299. London: Chatto and Windus. [assisted by Sonia Cole].

Hampson, J., W. Challis, G. Blundell, and C. DeRosner. 2002. The rock art of Bongani Mountain Lodge and environs, Mupumalanga province, South Africa: An introduction to the problems of southern African rock art regions. *The South African Archaeological Bulletin* 57 (175): 15–30.

Hubbard, P., and A.F. Mabrey. 2007. Birds and rock art in Zimbabwe. *Honeyguide: Journal of Birdlife Zimbabwe* 53 (1& 2): 13–24.

Hubbard, P. 2011. Fishes in the rock art of Zimbabwe. *The Fisherman Magazine* 22 (2): 33–35.

Jones, N. 1949. *The prehistory of Southern Rhodesia*. Cambridge: Cambridge University Press.
Lewis-Williams, D. 1983. *The imprint of Man: The rock art of Southern Africa*. Cambridge: Cambridge University Press.
Nhamo, A. 2007. *Out of the labyrinth: An enquiry into the significance of kudu in San rock art of Zimunya, Manyikaland, eastern Zimbabwe*. Harare: University of Zimbabwe Publications.
Pearce, D.G. 2009. An introduction to rock art of the Malilangwe Conservation Trust, south-eastern Zimbabwe. *Azania* 44 (3): 331–342.
Ranger, T. 1999. *Voices from the rocks nature, culture, and history in the Matopos Hills of Zimbabwe*. New York: Barnes & Noble.
Russell, T. 2000. The application of the Harris Matrix to San rock art at Main Caves North, KwaZuluNatal. *South African Archaeological Bulletin* 55: 60–70.
Walker, N. 1987. The dating of Zimbabwean rock art. *Rock Art Research* 4 (2): 137–148.

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Basic Bibliographic Information

Frederick Rognald Matson, Jr. (July 29, 1912, to March 27, 2007), a native of Chicago, Illinois, USA, was an influential archaeologist, university administrator, and pioneer in the scientific analysis of archaeological ceramics, glaze, and glass. He received a BS in ceramic engineering from the University of Illinois (1933) and was a graduate student in ceramic engineering at Carnegie Institute of Technology (1933–1934), before receiving a fellowship to attend the University of Michigan (1934–1936). Attaining an AM in anthropology at Michigan (1936), Matson enrolled in a newly developed graduate program in ceramic archaeology combining engineering and archaeology and was a Rackham Predoctoral Fellow (1938–1939), receiving his Ph.D. in ceramic archaeology at Michigan (1939) after defending his dissertation, *A Technological Study of the Unglazed Pottery and Figurines from Seleucia on the Tigris*. He served as field archaeologist on Michigan's expedition to Seleucia on the Tigris [Iraq] (1936–1937) and worked with Carl Guthe and James Griffin to develop the "Ceramic Repository for the Eastern United States" at Michigan (1937–1938), becoming assistant curator of ceramics in Michigan's Museum of Anthropology (1939–1942).

During World War II, Matson served as assistant ceramic engineer in the Optical Glass Section of the US National Bureau of Standards (1942–1944) and was appointed head of the Glass Section of the Armstrong Cork Company Research Laboratory, Lancaster, PA (1944–1948). He joined the Pennsylvania State University where he would spend the next three decades, initially in the College of Mineral Industries as professor of ceramics (1948–1953) and then as professor of archaeology, College of Liberal Arts (1953–1957), assistant to associate dean for research and director of the Social Science Research Institute in the College of Liberal Arts (1957–1966), and professor of archaeology in the newly established Department of Anthropology (1966–1978) (Kolb 2018), retiring as professor emeritus of ceramics and professor emeritus of archaeology in 1978 but continuing to work into his 90s (Kolb 1988a, 2018).

Major Accomplishments

Matson as a ceramic engineer, archeometrician, ceramic ethnoarchaeologist, and ethnographer combined these disciplines in his field and laboratory research and teaching. As an academic, he conducted annual summer fieldwork and research (1948–1975) on ceramics fabricated in contemporary pottery-making communities – what became ceramic ethnoarchaeology – in societies geographically spanning Spain to Afghanistan (1936–1975). In addition, he was the ceramic analyst archaeological expedition studying materials from Neolithic through the Late Islamic periods located from the

Charles C. Kolb has retired.

western Mediterranean through the Near East to Afghanistan. He also undertook ethnographic studies of modern pottery-making communities living on or near two dozen important prehistoric and Classical sites including Dura Europos, Jarmo, Persepolis, Tarsus, Pylos, Lerna, Porto Kheli, Franchthi Cave, and sites in Messina, Sphynos, and Athenian Agora. Matson particularly enjoyed working on the University of Chicago Oriental Institute projects directed by Robert Braidwood, and as early as 1953, he collected charcoal and bone specimens used for some of the earliest radiocarbon dates; in addition, he worked with Ralph Solecki at Shanidar Cave and village.

Initially, ceramic studies were confined to footnotes and often obscure descriptive catalogues in the appendices of site reports, but Matson, Anna Shepard, and a few other scholars demonstrated conclusively that the analyses of archaeological pottery could shed light on the people who made and used ceramic vessels and other clay objects. Hence, he was instrumental in bringing pottery out of appendices and into the mainstream narratives of archaeological reports and into full explanatory volumes devoted not only to form and function but also the holistic process from locating raw materials, fabrication, firing, distribution, and final disposition, reuse or discard.

Matson organized and convened the "Ceramics and Man" Wenner-Gren Conference in Burg Wartenstein, Austria, September 2–12, 1961. The international participants included a then "who's who" in ceramic studies: Robert Ehrich, Sigvald Linné, George Foster, Anna Shepard, Irving Rouse, James Griffin, H.W.M. Hodges, J.D. van der Waals, Walter Trachsler, Hélène Balfet, Zaky Iskander, Saul Weinberg, Frederick Matson, James Mellaart, Ruth Amiran, Louis Vanden Berghe, Wilhelm Solheim II, and Irving Rouse. The Matson-edited monograph, *Ceramics and Man*, containing 20 chapters, was published in 1965 and included his contribution "Ceramic Ecology: An Approach to the Study of the Early Cultures of the Near East" in which he stated that "unless ceramic studies lead to a better understanding of the cultural context in which ceramic materials were made and used, they form a sterile record of limited worth" (1965:205). The concept has been modified and expanded (Kolb 1989, 2001, 2011). Matson published nearly 60 articles and book chapters (Kolb 1988b); a sample of his major contributions appears in "Further Reading."

He was particularly proud of his students – mostly Penn State Mesoamericanists – who learned ceramic analysis, interpretation, and experimental archaeology in his laboratory, notably Prudence Rice (1987), Robert Johnston, Louana Lackey, Charles Kolb, Robert Santley, and James Sheehy. Early in his career, a new Penn State faculty member, Dean E. Arnold, was also influenced by Matson's ecological approach. Matson, as Dean for Research in the College of the Liberal Arts (1957–1966), was grantsman for nearly a dozen academic departments and oversaw the preparation and submission of grant proposals to funding agencies and the administration of awards. Archaeologists Louis Dupree and William Sanders and human biologist Paul Baker's multiple applications and subsequent awards reflected Fred's mentoring.

Matson was a founding member of the Society for American Archaeology (1932), gave the American Ceramic Society's Edward Orton, Jr. Memorial Lecturer "Ceramic Archaeology" (1953), and served as president of the Archaeological Institute of America (1975–1976) and received the AIA's Pomerance Award for Scientific Contributions to Archaeology (1981) as well as the Society for American Archaeology's Award for Excellence in Ceramic Studies (1995).

Fred's wife, Margaret Benson Hart Matson (1908–1995), joined the Penn State Sociology Department in 1953 rising to department chair and retiring in 1978 as professor emerita of sociology and social welfare. She served as president of the Pennsylvania Sociological Society (1958–1959) and then began a 20-year career with the US Commission on Higher Education, in the planning and implementation of study abroad program evaluations. Margaret and Fred were childless – their "children" were their students – but invested substantial energy and funds and donated ethnographic artifacts to create what became Penn State's Matson Museum of

Anthropology (Kolb 1988a). Fred was honored by two edited festschriften, one by Rice (1984) and another by Kolb and Lackey (1988); he is also honored by the yearly Ceramic Ecology Symposium held annually at the American Anthropological Association meetings (1986 to present).

Cross-References

- ▶ Archaeological Fieldwork
- ▶ Archaeological Institute of America (AIA)
- ▶ Archaeometry: Definition
- ▶ Ceramic Ecology
- ▶ Ceramics: Scientific Analysis
- ▶ Cultural Ecology in Archaeology
- ▶ Dating Techniques in Archaeological Science
- ▶ Dupree, Louis B.
- ▶ Experimental Maritime Archaeology
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ Society for American Archaeology (SAA)
- ▶ Society for Archaeological Sciences (SAS)

Frederick R Matson

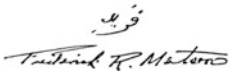

Courtesy of F. R. Matson

References

Kolb, C.C. 1988a. Frederick R. Matson: A personal and professional view. In *A pot for all reasons: Ceramic ecology revisited*, ed. C.C. Kolb and L.M. Lackey, 1–21. Philadelphia: Temple University Laboratory of Anthropology.

Kolb, C.C. 1988b. Selected bibliography: Frederick R. Matson. In *A pot for all reasons: Ceramic ecology revisited*, ed. C.C. Kolb and L.M. Lackey, 23–37. Philadelphia: Temple University Laboratory of Anthropology.

Kolb, C.C. 1989. Ceramic ecology in retrospect: A critical review of methodology and results. In *Ceramic ecology, 1988: Current research on ceramic materials*, BAR international series S513, ed. C.C. Kolb, 261–375. Oxford: British Archaeological Reports.

Kolb, C.C. 2001. Technological choices in ceramic production – Perspectives from ceramic ecology, archaeology and ethnoarchaeology. *Archaeometry* 43: 273–277.

Kolb, C.C. 2011. Chaîne opératoire and ceramics: Classification and typology, scientific analysis and archaeometry, experimental archaeology, and ceramic ethnoarchaeology. In *Archaeological ceramics: A review of current research*, BAR international series S2193, ed. S. Scarcella, 5–19. Oxford: Archaeopress.

Kolb, C.C. 2018. Maurice, Fred, Louie, Paul, Bill and friends: The beginnings of anthropology at Penn State. In *Teotihuacan valley symposium & land and water revisited project*, K. D. French (coord.). San Juan Teotihuacan, Mexico, PowerPoint, University Park: Department of Anthropology, Pennsylvania State University.

Kolb, C.C., and L. M. Lackey eds. 1988. *A pot for all reasons: Ceramic ecology revisited*. Philadelphia: Temple University Laboratory of Anthropology.

Matson, F.R., ed. 1965. *Ceramics and man*, Wenner-Gren Foundation for anthropology research, Viking fund publications in anthropology. Vol. 41. New York/London: Aldine/Methuen.

Penn State University Archives, Special Collection 608: *Frederick R. Matson papers* 1957–*1993*, Pennsylvania State University. 7 cubic feet.

Rice, P.M., ed. 1984. *Pots and potters: Current approaches in ceramic archaeology*, Institute of Archaeology monograph 24. Los Angeles: University of California at Los Angeles.

Rice, P.M., ed. 1987. *Pottery analysis: A sourcebook*. 2nd ed. Chicago: University of Chicago Press. 2015.

Further Readings

Matson, F.R. 1951. Ceramic technology as an aid to cultural interpretation – Techniques and problems. In *Essays on archaeological methods*, Anthropological papers 8, ed. J.B. Griffin, 102–116. Ann Arbor: University of Michigan.

Matson, F.R. 1960. The quantitative study of ceramic materials. In *The application of quantitative methods in archaeology*, Viking fund publications in anthropology 28, ed. R.F. Heizer and S.F. Cook, 34–51. Chicago: Quadrangle Books.

Matson, F.R. 1969. Some aspects of ceramic technology. In *Science in archaeology: A survey of progress and*

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research, ed. D. Brothwell and S. Higgs, 592–602. London/New York: Thames and Hudson/Praeger.
Matson, F.R. 1971. A study of temperatures used in firing ancient Mesopotamian pottery. In *Science and archaeology*, ed. R. Brill, 65–79. Cambridge, MA: MIT Press.
Matson, F.R. 1973. The potters of Chalkis. In *Classics and the classical tradition: Essays presented to Robert E. Dengler on the occasion of his eightieth birthday*, ed. E.N. Borza and R.W. Carruba, 117–142. University Park: Pennsylvania State University Press.
Matson, F.R. 1974. Archaeological ceramic study possibilities with a thermal gradient furnace. In *Archaeological chemistry*, Advances in chemistry 138, ed. C.W. Beck, 34–47. Washington, DC: American Chemical Society.
Matson, F.R. 1982. Archaeological ceramics and the physical sciences: Problem definition and results. In *Archaeological ceramics*, ed. J.S. Olin and A.D. Franklin, 19–28. Washington, DC: Smithsonian Institution Press.
Matson, F.R. 1984. *Ceramics and man* reconsidered with some thoughts for the future. In *The many dimensions of pottery: Ceramics in archaeology and anthropology, Cingula 78*, ed. S. van der Leeuw and A.C. Pritchard, 25–49. Amsterdam: Universiteit van Amsterdam.
Matson, F.R. 1995a. Science in archaeology: A review: Ceramic ecology. *American Journal of Archaeology* 99: 108–111.
Matson, F.R. 1995b. From potters' mouths. In *The aim of laboratory analyses of ceramics in archaeology*, Konferenser 34, ed. A. Lindahl and O. Stilborg, 13–22. Stockholm: Vitterhets Historie och Antikvitets Akademien.
Toll, N.P., and F.R. Matson. 1943. The green glazed pottery. In *The excavations at Dura-Europos, final report 4(1)*, ed. M.I. Rostovtzeff et al., 1–95. New Haven: Yale University Press.

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Basic Biographical Information

Galina Ivanovna Matveeva (1933–2008) (Fig. 1) was a Professor and Chair of Russian History at the Samara State University, candidate of historical sciences (scientific degree Ph.D.), founder of archaeological scientific school in Samara State University, President of the Samara Archaeological Society, and the author of more than 120 scientific works and manuals.

Matveeva, Galina I., Fig. 1 Galina Ivanovna Matveeva

Galina Matveeva was born on July 27, 1933, in the city Ashe, Chelyabinsk region, Russia, to the family of a history teacher. From 1951 to 1956, she was a student of the Historical-Philological Faculty of the Perm (Molotov) State University. Her scientific leader at that time was O.N. Bader – a great scientist, talented teacher, and agreeable person. In the university, Galina Matveeva learned the skills of fieldwork and gained fundamental theoretical knowledge of archaeology. The years 1956–1961 were the time of work in Troitsk, the city in Chelyabinsk region, as the director of a regional museum of folklore. During these years, Matveeva carried out extensive archaeological investigations, researching burial mounds, which have been destroyed since through construction, and deposited the excavated treasures into museum collections. From 1961 up to 1969, she worked in the Bashkir State University. This was a fruitful period for her, during

which she determined the main sphere of her intellectual interests – early medieval archaeology (though she was also interested in Neolithic and Bronze epochs). In 1970, she defended her doctoral thesis at the Archaeological Institute of the USSR Academy of Science.

Beginning in 1969, Matveeva's life was closely connected with the Samara (Kuibyshev at that time) State University, where she lectured on archaeology, history of primitive society, and ethnography. The Samara (Kuibyshev) region badly needed research from an archaeological point of view, and Matveeva began her archaeological exploration practically from the scratch. She started the investigation following V.V. Golstein's legacy and founded the Middle-Volga Region Archaeological Expedition in 1970, which still exists, focusing on different places in the region and in the country.

Major Accomplishments

G.I. Matveeva investigated many archaeological relics of the past, including the barrow of the Neolithic epoch near the village Sjeszheye (undertaken in cooperation with I.B. Vasiliev); Bronze period miners and metallurgists' settlement by Mikhailo-Ovsyanka; seventh and eighth ages CE tumuli with iron facings, connected with the early Bulgar tribes coming to Middle Volga from southern areas; Murom settlement, the southern outpost of the Volga Bulgaria of the tenth to thirteenth centuries and the only big town in the Samara region; and Suhorechye settling – a handicraft settlement of the Golden Horde. Matveeva's research resulted in the discovery of the "Novinkovskiy" cultural type.

Above all, Matveeva was interested in the medieval times. She constantly carried out research of the Imenkovs' culture and its monuments. She found the origins of these people in the upper Dnieper region, traditional places of settlement of the Slavs and the Balts. She determined their ethnicity as Slavic. In 1982, she investigated Lbische mound and identified the Lbische cultural type, dating third to fourth century CE. She formulated the hypothesis concerning the genetic relationship of the Imenkovs' culture and Slavonic people. This is a leading hypothesis in modern science, which is supported by most researchers who study the Slavonic culture.

G.I. Matveeva's last years were devoted to studying the relations of the Imenkov people with Turkish-speaking Bulgarian tribes and the historical fate of these people.

In Matveeva's scientific work, we clearly see her personality: meticulous, principled, brave, sensitive, intuitive, and knowledgeable. She was a nice teacher, and many well-known Samara archaeologists emerged from under her scientific guidance.

Galina Ivanovna published 120 scientific works. In the history of archaeology, she is one of the leading specialists in medieval history of the Volga region.

Cross-References

- ▶ Golmsten, Vera V.
- ▶ Institute for Archaeologists (IfA)
- ▶ Medieval Archaeology
- ▶ Medieval Pottery Research Group (MPRG)
- ▶ Medieval Russia (Rus'), Archaeology of
- ▶ Vasiliev, Igor B.

M

References

Matveeva, G.I. 1972. New savromat monuments in Bashkiria. *Soviet Archeology* 1.

Matveeva, G.I. 1980. *Archeological monuments of Iron Age on the territory of the Kuibyshev region: Tutorial*. Kuibyshev.

Matveeva, G.I. 1997. *Early Bulgarian barrows on the Samara Bend.* Samara.

Matveeva, G.I. 2000a. Monuments of settled tribes of the Volga region wooden zone (belogorskaya and gjrodetskaya cultures). In *History of the Samara region from early times to modernity. Early Iron Age and medieval times*. Moscow.

Matveeva, G.I. 2000b. Monuments of the Imenkovs' culture (V–VII cs. A.D.). In *History of the Samara region from early times to modernity. Early Iron Age and medieval times*. Moscow.

Matveeva, G.I. 2003. *Middle-Volga region in IV–VII centuries. The Imenkovs' culture*. Samara.

Matveeva, G.I. 2005. The question of the Bulgarians' settled way of life in the Volga region. In *Gorodetsk Readings II*.
Matveeva, G.I., and I.B. Vasiliev. 1979. Mound near the village Sjeszheye on the river. *Samara Soviet Archeology* 4.

Maya Forest Garden

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Defining the Maya Forest Garden

Today, as in the past, the Maya forest is known for its remarkable diversity and abundance of useful plants (Fig. 1). Far from the popularized notions of a pristine forest untouched by humans, the Maya forest is a co-creation of the human-environment relationship crossing time from the ancient Maya to the present. A product of millennia of resource management practices, the modern Maya forest is a domesticated landscape and serves as a veritable garden (cf. Anderson 2005), among the most biodiverse forests in the world and of a conservation concern (Mittermeier et al. 2000). Skilled Maya farmers, also known as master forest gardeners, whose heritage links to the ancient Maya landscape, use the forest as a garden and build utility in their agricultural landscape through the practice of the milpa-forest garden cycle.

Economic botanists say the Maya forest is a garden, filled with useful plants important to the Maya and to the rest of the world. This remarkable and abundant forest was featured on the historic global scene after the brutal conquest of the sixteenth century from whence its ecological treasures and harvesting techniques were exposed to the world. The garden's natural resources grew in demand affecting economies and cultures in subtle yet profound ways due to its novelty and quality, the Spanish grew a dependence on the native honey in the seventeenth century, the British used logwood as a base for dyes in the eighteenth century, European cabinet makers relied on mahogany in the nineteenth century, Wriggley's made a fortune in chicle gum of the Chicozapote, and ship rigging needed henequen fibers in the twentieth century, to name a few.

Traditional Maya forest gardens are a legacy of the ancient Maya and hailed as the most diverse in the world (Campbell 2007). Defining the forest garden is the essential step to understanding the Maya forest garden. Humans have interacted and shaped their environment over tens of thousands, even millions of years.

Originating in Africa and radiating out through Eurasia and ultimately into the Americas, the dynamic human engagement with the environment has left a mark. Using fire and stone tools, humans early on had great potential to modify their surroundings and influence the composition of the landscape. A forest garden represents an historical ecological setting that reflects the cumulative needs and values of the people who managed that setting, from house lots to habitats and landscapes. The Maya forest garden is an anthropogenic wooded landscape based on swidden, where human choice with cutting and burning is integral to the natural regeneration (Conklin 1954; see also Chazdon 2014). The consequent landscape reflects cycles of selection favoring daily human needs with annual crops opening gaps giving way to useful perennial woodland canopy. This legacy, however, is being practiced in ever fewer numbers as traditional ecological knowledge is eschewed for modern technology, and the encroachment of mechanical farming and urbanization having a distracting effect on the interest and opportunity of the local youth.

Comparative Land Cover and Land Use Change Signatures

How does the contemporary Maya forest reflect the ancient land use systems of the ancient Maya? Humans impacted landscapes worldwide. Today seen as pernicious, the influence of fire and cutting is evident in all the landscapes we see on earth

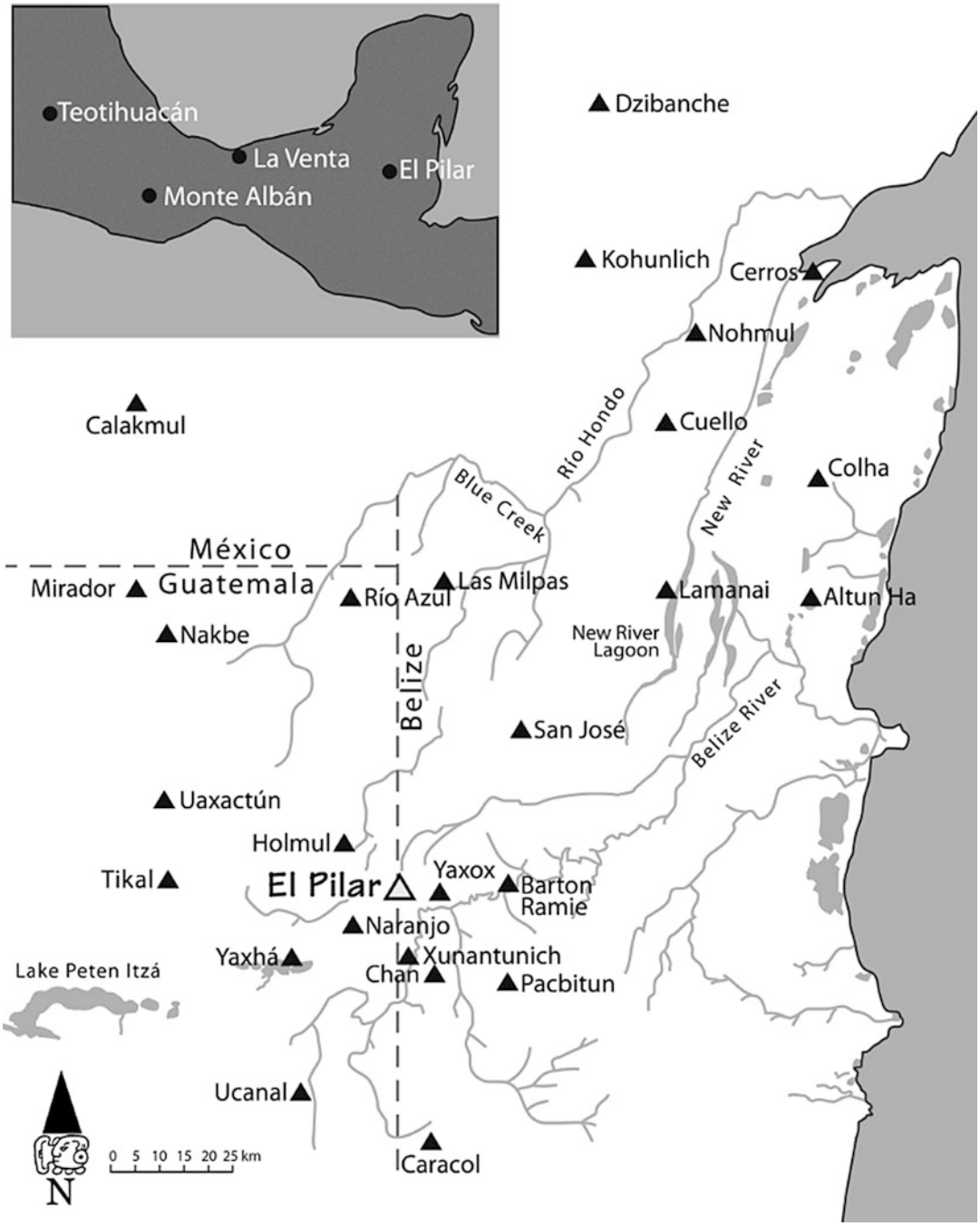

Maya Forest Garden, Fig. 1 Central Maya lowlands (MesoAmerican Research Center)

today. California is typified with rolling grasslands, but trees have been suppressed by grazing animals introduced by the Spanish that continues into the modern period. The history of the English countryside can be read by the shape and distribution of the trees to reflect invested tending and management. Rice economies of Asia use the bunds, the dykes that separate paddy fields, for

cultivations of crops — trees, and shrubs as well as forage for animals. These are the human land use and management strategies that change biodiversity and impact land cover; this is most dramatic in the tropics.

Biodiversity hotspots have been defined for the tropics around the world, and we can see that there is a relationship between the length of human occupation and the number of, for example, plants that are enumerated (Table 1). The longer the evidence of human presence in the environment, the fewer the overall number of plants. Selection across the millennia favoring the plants and landscapes preferred by humans shows an imprint and perhaps an indication of the tendency of humans to simplify their environment.

The world tropics are the most diverse of habitats and much has been made of the source of that diversity. Nevertheless, there is differentiation in the biodiversity between the Old World and the New World. Africa and South East Asia of the Old World have high numbers of plants, but Mesoamerica as well as the Amazon have been identified with greater diversity, making for the most biodiverse tropical forests. Interestingly, where the great Maya civilization arose and where numerous major cities have been recorded in prehistory, biodiversity is lower than in the Amazon where no major civilizational panoramas developed. Both the Maya forest and South East Asia have supported major preindustrial agrarian societies in prehistory, while Mesoamerica, with 24,000 plants, was occupied for at least 12,000 years and has double the number of plants of South East Asia that was occupied at least 5 times that amount of time. The Amazon, with the greatest number of plants, while settled the same amount of time as the Maya forest, has weathered soil systems restricting areas amenable to agriculture and thus did not experience the same human developmental impacts until the past century.

Maya Forest Garden, Table 1 Tropical biodiversity hotspots after (Mittermeier et al. 2000)

Region	Years of Occupation	Plant Diversity
West Africa	Millions	9,000
South-East Asia	Hundreds of thousands	12,000
Mesoamerica	Tens of thousands	24,000
Amazon	Tens of thousands	48,000

Mesoamerican and the Maya Forest

Mesoamerica, and the Maya forest in particular, have been characterized by plants that are useful to people, and the plants identified in the archaeological record of the Maya are comparable to the forest itself. Today, the 20 dominant plants (Ford 2008) are a prime example of how utility is built into the environment (Table 2) as a product of selection at the family, generation, century, and millennial levels. This utilitarian value of the forest today could only be achieved by centuries of choices by its human inhabitants. Studies show that, from the tallest trees to the smallest shrubs, the forest's qualities reflect uses that are still part of the language of the Maya forest practiced by the region's traditional farmers (Ross 2011). Yet, the majority of these plants are invisible in the paleoenvironmental record, as they are not wind pollinated.

Origins of the Maya Forest Garden

Over the course of 12,000 years of habitation in Mesoamerica, human populations expanded along the coast and overland from the Asian continent, bringing with them stone tool manufacture and fire management skills. Native American expertise lies in their competence and knowledge accumulated over time are fundamental to their adaptations and domestication of the landscapes they encountered. From the Arctic Circle to Tierra del Fuego as hunter-gatherers, dispersed across the continents in less than 2000 years. During the time that these early migrants established themselves in the Americas, they adjusted to the changing climatic conditions that ranged from the cold Ice Age to the warm Holocene Thermal Maximum (Ford and Nigh 2015). It was not until around 8000 years ago that the warm wet tropical forest conditions we are familiar with

Maya Forest Garden, Table 2 Dominant plants of the Maya forest

Scientific name	Common name	Pollinator	Uses
Alseis yucatanensis	Wild mamey	Moths	Food/fruit
Aspidosperma cruentum	Malerio	Insects	Construction
Attalea cohune[a]	Corozo	Insects	Food/construction
Brosimum alicastrum[a]	Ramon	Wind	Food/animal forage
Bursera simarouba[a]	Chaca	Bees	Medicine
Cryosophila stauracantha	Escoba	Beetles	Production
Licania platypus	Succotz	Moths	Food
Lonchocarpus castilloi	Manchich	Insects	Construction
Manilkara zapota[a]	Chicle	Bats	Food/construction
Piscidia piscipula	Jabin	Bees	Poison
Pouteria campechian	Zapotillo	Insects	Food
Pouteria reticulata	Zapote negro	Insects	Latex, animal food
Sabal morrisiana[a]	Escoba	Insects	Production
Simira salvadorensi[a]	Palo colorado	Moths	Construction
Spondias radlkoferi	Jocote	Insects	Food
Swietenia macrophylla	Mahogany	Insects	Construction
Tabebuia rosea	Macuelizo	Bees	Construction
Talisia oliviformi[a]	Kinep	Bees	Food
Vitex gaumeri	Yaxnik	Bats	Construction
Zuelania guidonia	Tamay	Bees	Medicine

[a]Dominant in home gardens

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dominated the lowlands of Mesoamerica, providing the context for the development of the Maya forest garden.

The rich tropical Maya forest landscape emerged as a cloak over a limestone foundation that continues to have an impact on water distribution, soil formations, plant habitat, and animal dispersal. While current annual rainfall averages 1000 to 2000 mm in the Central Maya Lowlands (Fig. 1), water remains unpredictable on the ground surface across most of the Maya forest due to porous and fractured bedrock. Instead of collecting in watersheds, the water is drawn into underground rivers and caves, opening as lakes in the south and cenotes in the north and moving as rivers in the south-east and south-west.

The woodlands we now know as the Maya forest were shaped by changes transpired in the context of human occupation, and the forest landscape was influenced by the interests of humans (Ford and Nigh 2015). Understanding the relationship between the ancient Maya settlements at the peak of the Classic Period (700–900 BCE) with the tropical woodland environment, demonstrates the association between forest qualities and Maya residential patterns. With preference for the hills and ridges of the uplands, the numbers of ancient domestic architecture were greatest in the well-drained undulating zones, areas preferred by the first farmers and where later civic centers emerged. These are the same zones that today are dominated by useful plants as well as those areas preferred by contemporary forest gardeners (Roys 1931). These rolling hills with friable but shallow and rocky soil are some of the most fertile of the tropical world, inappropriate for plow but ideal for hand cultivation, as the Maya have traditionally farmed and how they manage their own landscapes today. This is a critical point in understanding Maya land use and the integral scope of the Maya forest garden, past and present.

The Maya Milpa Cycle

Maya farmers, like subsistence farmers throughout the world, maintain a home garden (Caballero 1992) along with several secondary plots that leverage different land developments to hedge

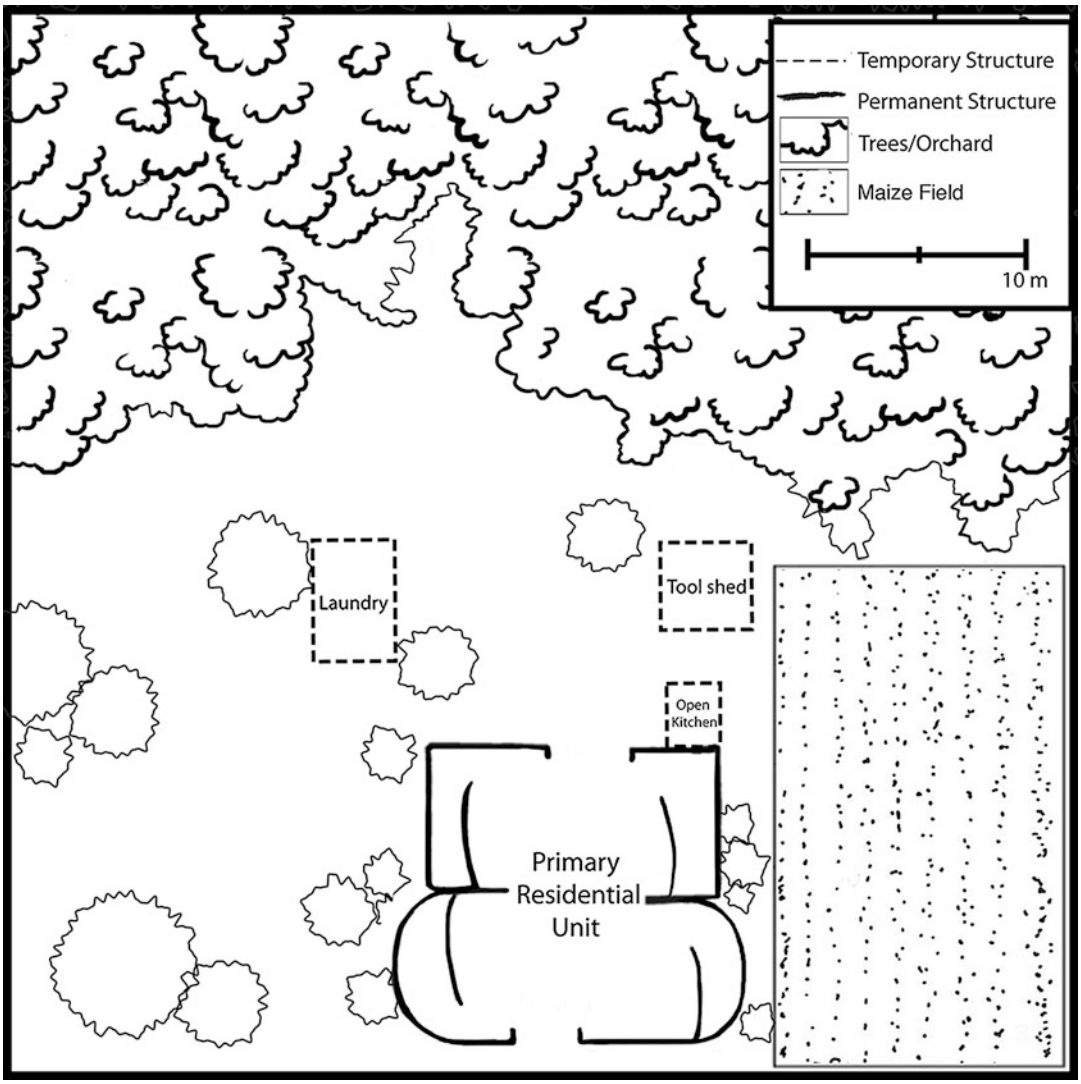

Maya Forest Garden, Fig. 2 Infield home garden of milpa and orchard plants (MesoAmerican Research Center)

the uncertainties of weather and crops. Known as the home infield, this base operates (Fig. 2) as the core that is coordinated with multiple secondary outfields, the cycles of open crops, secondary shrub and tree cover, and closed canopy forest gardens are enhanced over the development cycle that is a minimum of 20 years (Fig. 3). With annual variability in rainfall, as well as the seasonal cycle of precipitation, farmers today, and certainly in the past, favor established cropping in home infield plots for their intensive labor investment and dispersed outfield areas to improve the production challenges that vary with too much or too little rain. This system builds food sovereignty for the farmer and security for the family, supporting the redistribution of resources that are required by the local community.

This infield-outfield pattern of land use (Netting 1989) contributes to a complex landscape that sequences from forest to field and back to forest again with each family, generation, century, and millennial cycle (Table 3). Working within the natural regenerative system, swidden in general and the Maya agricultural cycle in particular, is

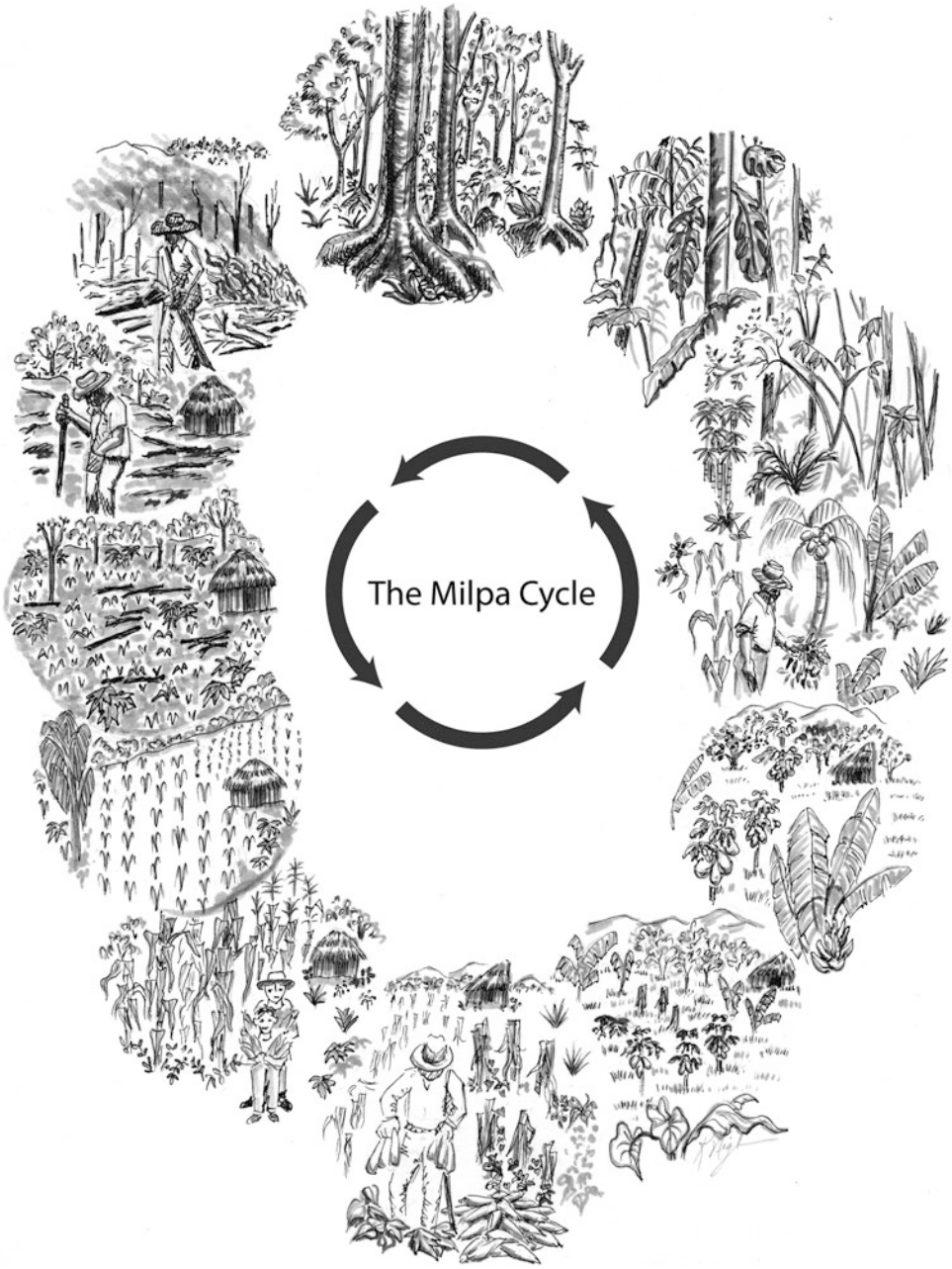

Maya Forest Garden, Fig. 3 The stages of the milpa cycle (Kippy Nigh)

integral to the Maya forest (see Conklin 1954). This is evident in the wind pollination syndromes that favor the open and succession phases and will be more evident in the paleoenvironmental record. Built on a basic 20-year field to forest cycle, the Maya Milpa forest garden cycle intervenes in the natural succession process (Chazdon 2014) to direct the production of the landscape to human ends. In forestry terms, the opening for crops is equal to the forest gap. But this is an intentional

Maya Forest Garden, Table 3 Dominant plants of the Maya milpa forest garden cycle[a]

Milpa cycle	Dominant plants (*Wind-pollinated spp. indicated in bold)*
Open multi-crop maize field ~ favoring sun: Phase 1 initialization (1–4 years)	Cultigens: ~99 spp. such as *Capsicum spp.* ***Chenopodium ambrosioides*** **L.**, *Cnidoscolus spp., Cucurbita spp.*, ***Lycopersicon esculentum*** **Mill.**, *Phaseolus spp., Xanthosoma yucatanense* Engl.**,** ***Zea mays*** **L.** Several other genera found in: Leguminosae. Noncultigens**:** ***Ambrosia spp.***, ***Cecropia sp.***, ***Mimosa sp.***, ***Trema sp.***, and several genera found in: **Amaranthaceae, Asteraceae, Cyperaceae, Euphorbiaceae, Melastomataceae, Poaceae, Urticaceae.**
Long-lived perennial reforestation ~ producing shade: Phase 2 renewal cycle (4–12 years)	*Acacia cornigera* L. Wild, *Ananas comosus* L. Merr., *Annona muricata* L., *Attalea cohune* C., ***Brosimum alicastrum*** **Sw**., *Bucida buceras* L., *Cucurbita pepo* L., ***Bursera simarouba*** **L.**, *Byrsonima crassifolia* L. Kunth, *Calophyllum brasiliense* Cambess, *Carica papaya* L., ***Cecropia peltata*** **L.**, *Ceiba pentandra* L., *Cnidoscolus chayamansa* McVaugh, *Enterolobium cyclocarpum* Jacq. Griseb.,*Guarea glabra* Vahl, *Guazuma ulmifolia* Lam., *Hamelia patens* Jacq., *Manihot esculenta* Crantz, *Manilkara zapota* L. van Royen, *Opuntia cochenillifera* L. P. Mill, *Pachyrhizus erosus* L., *Persea Americana* P. Mill, *Pimenta dioica* L. Merr., *Pouteria sapota* Jacq. Moore & Stearn, *Psidium guajava* L., ***Quercus oleoides*** **Schltdl. & Cham**., *Sabal morrisian* Bartlett, *Simira salvadorensis* Standl., *Talisia oliviformis* Radlk.
Closed canopy ~ favoring shade: Phase 3 culmination (>12 years)	*Alseis yucatanensis* Standley, *Aspidosperma cruentum* Woodson, *Attalea cohune* C. Mart, ***Brosimum alicastrum*** **Sw**, *Bursera simarouba* L.,*Cryosophila stauracantha* Heynh. R. Evans, *Licania platypus* Hemsley Fritsch, *Lonchocarpus castilloi* Standley, *Manilkara zapota* L. van Royen, *Piscidia piscipula* L. Sarg, *Pouteria campechiana* Kunth Baehni, *Pouteria reticulata* Engl., *Sabal morrisiana* Bartlett, *Simira salvadorensis* Standl, *Spondias mombin L., Swietenia macrophylla* King, *Talisia oliviformis* Radlk, *Vitex gaumeri* Greenman, *Zuelania guidonia* Britton & Millsp.

Note: Phase 1 is dominated by wind-pollinated taxa and Phase 3 is dominated by biotically pollinated taxa
[a]Only native taxa are included. Based on Campbell et al. 2006. Bolded taxa are wind-pollinated taxa

Maya Forest Garden, Fig. 4 Complex milpa outfield with tobacco, sugarcane, maize, banana, among other annuals (James Nations)

gap focused on the diverse cropped milpa field (Fig. 4).

Swidden, often referred to as shifting cultivation or slash and burn, has been misunderstood. Focused principally on the annual cultivated crops that use only one fifth of the system, the significance of the perennial component is ignored as abandoned. This is far from the case. Using

forestry terms of the sunlit gap, the succession fast growing perennials, and the shaded closed canopy forest, we can better understand the integral nature of the milpa forest garden system and how it is directed to resolve perennial requirements of foods, medicine, and products as well as construction, and other essential household needs. In practice, the cultivated gap is burned with regeneration in mind (Fig. 5). This "gap" is dominated by annuals but contains re-sprouting plants and protected trees to hasten the early succession devoted to building useful perennials (Fig. 6), representing significant investment in trees and shrubs over the cycles of field to forest (Fig. 7). As the crops give way to the perennial phases, the open gap transforms within 8 years, culminating from a plot that was once annual crops to a tiered landscape of understory palms and shrubs that flourish in the shade and trees of valuable fruit, spice, medicine, and construction that make up the structure of the landscape (Fig. 8). The ultimate look of the forest garden may easily be mistaken as wild to the

Maya Forest Garden, Fig. 5 A recently burned field with protected trees and cut shrubs for re-sprouting (Macduff Everton)

Maya Forest Garden, Fig. 6 Early gap succession where maize and banana dominate (Macduff Everton)

Maya Forest Garden, Fig. 7 Managed forest garden, the orchard (Macduff Everton)

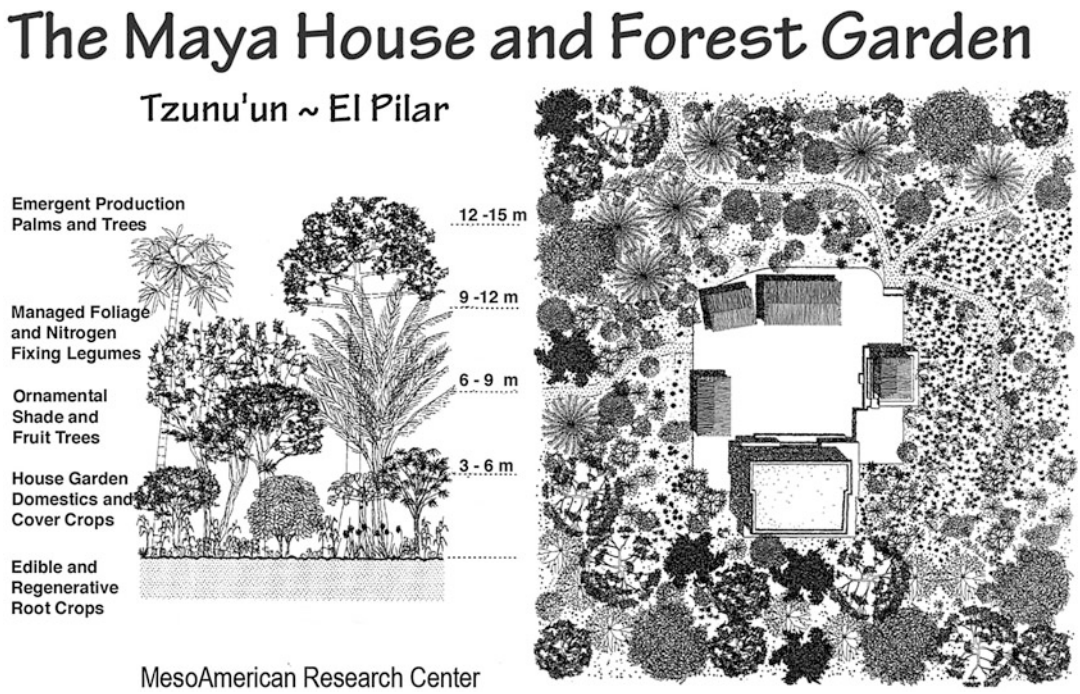

Maya Forest Garden, Fig. 8 The Maya forest garden of the Tzunu'un, El Pilar (MesoAmerican Research Center)

uninitiated but in fact is domesticated making the landscape today the *feral* Maya forest (Campbell et al. 2006).

Unlike the impeding compromise implied by Malthus over 200 years ago where he saw field or forest with no way to feed the growing populations, assuming that to produce more food, you needed to clear more forest, the Maya forest garden cycle shows the opposite. It provides food and land cover in an ever-changing cycle that conserves water, inhibits erosion, enhances utility, builds biodiversity, and feeds

people with investment in the biological capital of the landscape. To increase production, investments are in skill and labor, and as the fields are cycled into forests, there are opportunities to manipulate the grasses, forbs, shrubs, trees, palms, epiphytes, all plant species to the benefit of the people, leaving at any one time at least half the area as managed forest habitat for animals (Ford and Clarke 2016). This was the orchard of ancestors that Pakal, the acclaimed ruler of ancient Palenque, refers to on his sarcophagus (Schele and Mathews 1998). In fact, the Maya could not fight the exuberant growth of the forest; they devised an agricultural system that anticipated, selected, and managed that growth to co-create the Maya forest garden. Only with the introduction of the plow and the cow as European management traditions do we see the milpa forest garden cycle interrupted.

Impact of Spanish Colonialism and Imperial Perspectives

The observations of the Spanish at the time of the conquest and colonization are clear about Maya land use and land cover – forest and fields filled the landscape, edible foods lists were extensive, and home gardens were complex (Terán and Rasmussen 1995). The Spanish term *milpa* is derived from the Aztec *Milipan*, or cultivated place. A Milipan could be a field, an orchard, or anything in between. Unfortunately, the Spanish were interested in the product not the milpa cycle, and ultimately their concern was to alter the foreign agricultural system to look more like their own, without understanding how the abundant and diverse foods were cultivated.

The Viceroy Ordinance of 1552 in the Yucatan provides insight into the Spanish impact on the lives of the Maya and ultimately themselves:

> "... se prohibió la presencia de monte dentro espacios urbanos, que todos los pueblos se poblasen al modo de los españoles, [sin milpas en el pueblo] afín que estuviesen limpios, sin sementeras ni arboledas, y si algunas habían se quemasen" (Yam 2009 quoting from the 1552 ordinance issued by Tomás Lopez Medel)

> "... having forests in urban spaces is prohibited, all the towns will construct houses the way the Spaniards do [close to one another] ... [They should not sow any milpa within the town] so that all urban spaces be clean, without sown land or groves; and if there were any, they should be burnt." (Translation based on Roys 1952).

Disavowing the investments in the perennial components of the system, the position of the European ecological imperialist was to misjudge the forest garden (Crosby 1986). Seeing wild forest instead of directed succession towards the forest garden ignored areas without crops as abandoned or worse, fallow (unseeded plowed field).

The Maya forest garden is an intensive perennial system. These so-called abandoned fields are areas of significant investment to build the economic needs of a family, community, area, and region. These perennial "fields" are the source of products used for food, construction, medicine and as a habitat for animals that all contribute to the well-being of the inhabitants. In fact, for every four-year field, there needs to be at least 16 years of perennial management. Far from abandoned, these dynamic spaces represent intensive investments over time and across space, providing the source of the vital requirements of everyday life.

The Legacy of the Maya Forest Garden

Economic botany has brought attention to the important uses of the rich diversity of plants of the Maya forest based on local knowledge (Roys 1931), and applied research in agroforestry (Altieri 2004) has demonstrated the sophistication of the milpa forest garden cycle (Fig. 3). These connections allow us to interpret how the Maya milpa forest garden cycle supported the dense populations of the past and has the potential to contribute to its prosperity and conservation in the future (Schwartz and Corzo 2015).

The Maya civilization prospered in this tropical forested environment. The varied lines of evidence that has been used to argue the destruction of the forest can be interpreted now to show an alternative. Certainly, the Maya had an impact on the nature of the Maya forest, but the result

transformed into a landscape with abundant uses, constructed by the millennial long-term selection of families for the plants and habitats that sustained them. Understanding the qualities of the Maya milpa forest garden cycle clearly demonstrates how the forest became a garden. And this forest garden that underwrote the ancient Maya civilization holds promise for conserving the Maya forest today.

References

Altieri, Miguel A. 2004. Linking ecologists and traditional farmers in the search for sustainable agriculture. *Frontiers in Ecology and the Environment* 2 (1): 35–42.

Anderson, M.K. 2005. *Tending the wild: Native American knowledge and the management of California's natural resources*. Berkeley: University of California Press.

Caballero, J. 1992. Maya homegardens: Past, present and future. *Etnoecológica* 1 (1): 35–54.

Campbell, D.G. 2007. Don Berto's garden: Language, biodiversity, and a story of salvation. *Orion Magazine.* https://orionmagazine.org/article/don-bertos-garde/. Accessed 201#.

Campbell, D.G., A. Ford, et al. 2006. The feral forests of the eastern Petén. In *Time and complexity in the neotropical lowlands*, ed. C. Erickson and W. Baleé, 21–55. New York: Columbia University Press.

Chazdon, R. L. 2014. Second growth: The promise of tropical forest regeneration in an age of deforestation. Chicago University of Chicago Press.

Conklin, H.C. 1954. An ethnoecological approach to shifting agriculture. In *Transactions of the New York academy of sciences*, ed. R.W. Miner, vol. 17, 133–142. New York: The New York Academy of Sciences.

Crosby, A. W. 1986. Ecological imperialism: The biological expansion of Europe, 900-1900. Cambridge, MA, Cambridge University Press.

Ford, A. 2008. Dominant plants of the Maya forest and gardens of El Pilar: Implications for paleoenvironmental reconstructions. *Journal of Ethnobiology* 28 (2): 179–199.

Ford, A., and K.C. Clarke. 2016. Linking the past and present of the ancient Maya: Lowland use, population distribution, and density in the late classic. In *Handbook of historical ecology and applied archaeology*, ed. C. Isendahl and D. Stump. Oxford, UK: Oxford University Press.

Ford, A., and R. Nigh. 2015. *The Maya Forest garden: Eight millennia of sustainable cultivation of the tropical woodlands*. Walnut Creek: Left Coast Press.

Mittermeier, R.A., N. Myers, et al. 2000. *Hotspots: Earth's biologically richest and most endangered terrestrial ecoregions*. Mexico City: CEMEX.

Netting, R.M. 1989. Smallholders, householders, freeholders: Why the family farm works well worldwide. In *Household economy: Reconsidering the domestic mode of production*, ed. R.R. Wilk, 221–244. Boulder: Westview Press.

Ross, N.J. 2011. Modern tree species composition reflects ancient Maya "Forest gardens" in Northwest Belize. *Ecological Applications* 21 (1): 75–84.

Roys, R.L. 1931. *The ethno-botany of the Maya*. New Orleans: The Department of Middle American Research, Tulane University.

Roys, R.L. 1952. Conquest sites and subsequent destruction of Maya architecture in the interior of northern Yucatán. *Contributions to American Anthropology and History* 11: 129–182.

Schele, L., and P. Mathews. 1998. *The code of kings: The language of seven sacred Maya temples and tombs*. New York: Scribner.

Schwartz, N.B., and A.R.C. Márquez. 2015. Swidden counts: A Petén, Guatemala milpa system: Production, carrying capacity and sustainability in the southern Maya lowlands. *Journal of Anthropological Research* 71: 69–93.

Terán, S., and C.H. Rasmussen. 1995. Genetic diversity and agricultural strategy in 16th century and present-day yucatecan milpa agriculture. *Biodiversity and Conservation* 4 (4): 363–381.

Yam, I.O. 2009. Los montes yucatecos: la percepción de un espacio en las fuentes coloniales. In *Texto y Contexto: Perspectivas Intraculturales en el Análisis de la Literatura Maya Yucateca*, ed. A. Gunsenheimer, T. Okoshi Harada, and J.F. Chuchiak, 185–203. Bonn: Bonner Amerikanistische Studien, Universidad de Bonn.

Maya Geography and Culture: Ancient and Contemporary

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Introduction

The Maya area is "the broad expanse of territory occupied by the Maya in the centuries before the conquest... defined both by the distribution of ancient ruins of Maya Civilization and by the known distribution of peoples still speaking Mayan languages" (Sharer 1994: 19). Maya geography and culture is thus concerned with both the

archaeological past and the ethnographic present. An understanding of the geographic characteristic of this large and diverse territory as well as of the way in which people interacted and continue to interact with their environment is necessary because it informs many archaeological analyses of the ancient Maya.

Definition

Geography plays an important role in cultural production both past and present. The Maya area features great geographical and topographical diversity. Mountain ranges in the northern and southern highlands feature peaks as high as 4220 m (14,470 ft). The northern, central, and southern lowlands show a range of temperate to tropical climates. The southern lowlands have river basins, while in the northern lowlands water is found in underground streams called cenotes (a Spanish cognate of the Mayan word dzonot). Physical environment is much more than just a "backdrop" against which Maya civilization developed and continues to exist. Geographical concepts such as landscape, space, and place enable archaeologists to analyze the ways in which Maya (both ancient and contemporary) built meaningful relationships with their physical surroundings.

Key Issues/Current Debates/Future Directions/Examples

The Maya area covers about 324,000 km^2 (201,325 m^2), spanning from the lower Lempa River in El Salvador to the Isthmus of Tehuantepec in Mexico, encompassing the Yucatan Peninsula, the southern Mexican states of Chiapas and Tabasco, the countries of Guatemala, Belize, Western Honduras, and El Salvador. Sharer notes that these boundaries are diffuse, stating, "the ancient Maya were very much a part of a larger cultural area that has come to be called Mesoamerica" (1994: 19). This area features a variety of terrains, elevations, and weather patterns.

Archaeologists divide the ancient Maya archaeological geographic region by zones (Fig. 1), broadly categorizing them into the Pacific Coastal Plains (spanning from southern Chiapas, Mexico, Guatemala, to El Salvador); the highlands, those areas between 1000 and 2000 m above the sea level (spanning the Mexican states of Chiapas and Oaxaca, as well as Guatemala, Honduras, and northern El Salvador); and the lowlands, those areas between sea level and 1000 m (spanning the Yucatan Peninsula, the Mexican state of Veracruz, and Belize). These regions are inhabited by the contemporary Maya, whose population (an estimated 7,000,000 who speak approximately 29 Mayan languages) is present in all five countries.

The Pacific Coastal Plain, which stretches from southern Chiapas to El Salvador, is a fertile plain at the foothills of the volcanic highlands. Its rich volcanic soils are cut by several south trending rivers, the largest of which is El Salvador's Lempa River. The coastal area has a tropical climate, with annual temperatures between 25 °C and 35 °C (77–95 °F). The coastal plain has been a trading route for longer than any other area in the Maya area, the earliest of which may have been Olmec traders from the Gulf coastal region to the northwest (Sharer and Traxler 2006: 33). Many ancient Maya centers such as El Baúl, Chocola, Takalik Abaj, and Monte Alto are located in the Pacific Coastal Plain (Fig. 2).

Sharer and Traxler (2006) divide the highlands into southern and northern regions. Three continental plates converge in this region, making the southern highlands (located directly to the north of the Pacific Coastal Plain) a very geologically active region. Nevertheless, its rich soils and "springlike" weather continue to make the region attractive for settlement. Today, this area has the largest population density of the Maya area, and the settlements of Kaminaljuyu, El Portón, and Chalchuapa attest to the region's appeal in the past. In contrast, the northern highlands, characterized by Cenozoic limestone formations, are largely undisturbed by geological activity. The ancient Maya quarried the region's jadeite and serpentine deposits. Today, the Alta Verapaz preserve is a habitat of the quetzal bird, whose highly

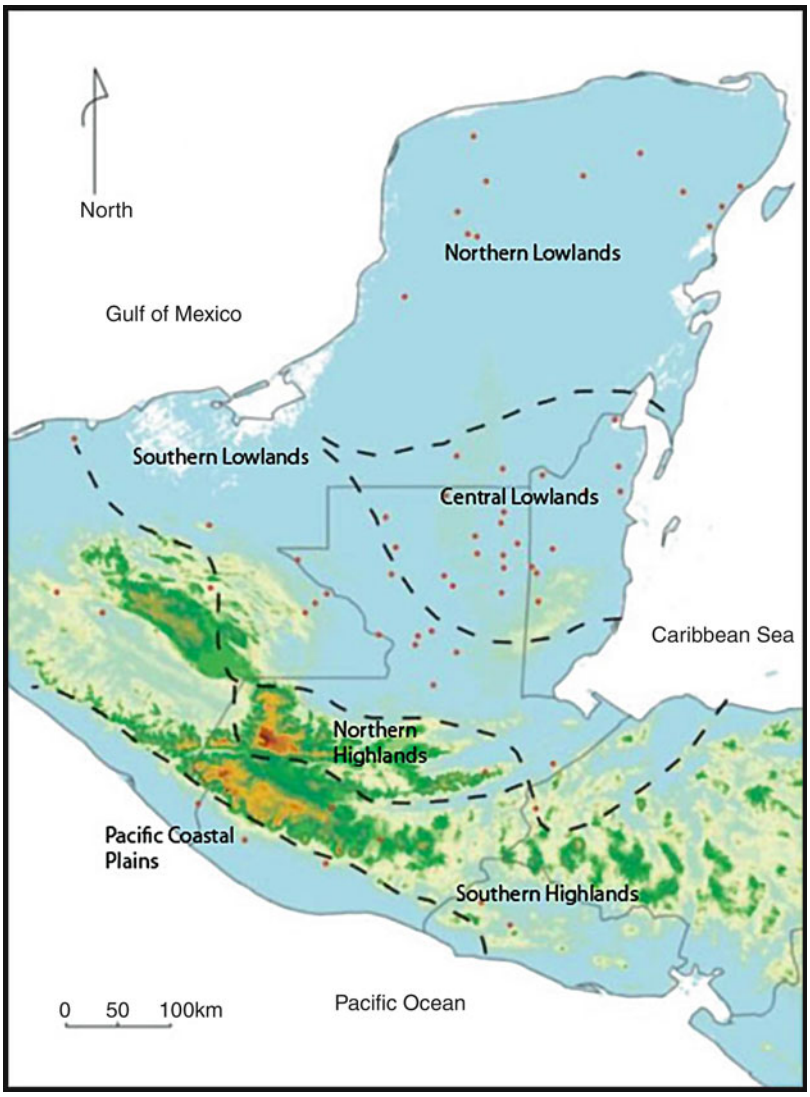

Maya Geography and Culture: Ancient and Contemporary, Fig. 1 Geographical zones of the Maya area

valued plumes adorned the headdresses of the ancient Maya ruling elite.

Archaeologists have traditionally divided the lowlands into northern and southern areas. Sharer and Traxler (2006) also define the Peten region as a central area, convincingly arguing that this region represents a gradual transition in climate from south to north. The southern lowlands gradually emerge from the northern highlands, from the Guatemalan departments of Huehuetenango, El Quiché, Alta Verapaz, and Izabal. The region is characterized by heavy rainfall, 2000–3000 mm (80–120 in) in a year, and temperatures similar to those of the Pacific Coastal Plain, ranging from 25 °C to 35 °C (77–95 °F) (Sharer and Traxler 2006: 45). The centers of Dos Pilas, Altar de Sacrificios, Bonampak, and Yaxchilan are located in this region. The central lowlands see diminishing rainfall (about 80 in or 2000 mm) and lower elevations (about 300 m) than the southern lowlands. The Peten region of Guatemala, where many important ancient Maya cities are located, is found in the central lowlands. Among the most important sites in this region are Tikal, Calakmul, Palenque, Piedras Negras, Caracol, and Uaxactun. The Maya city of Tayasal

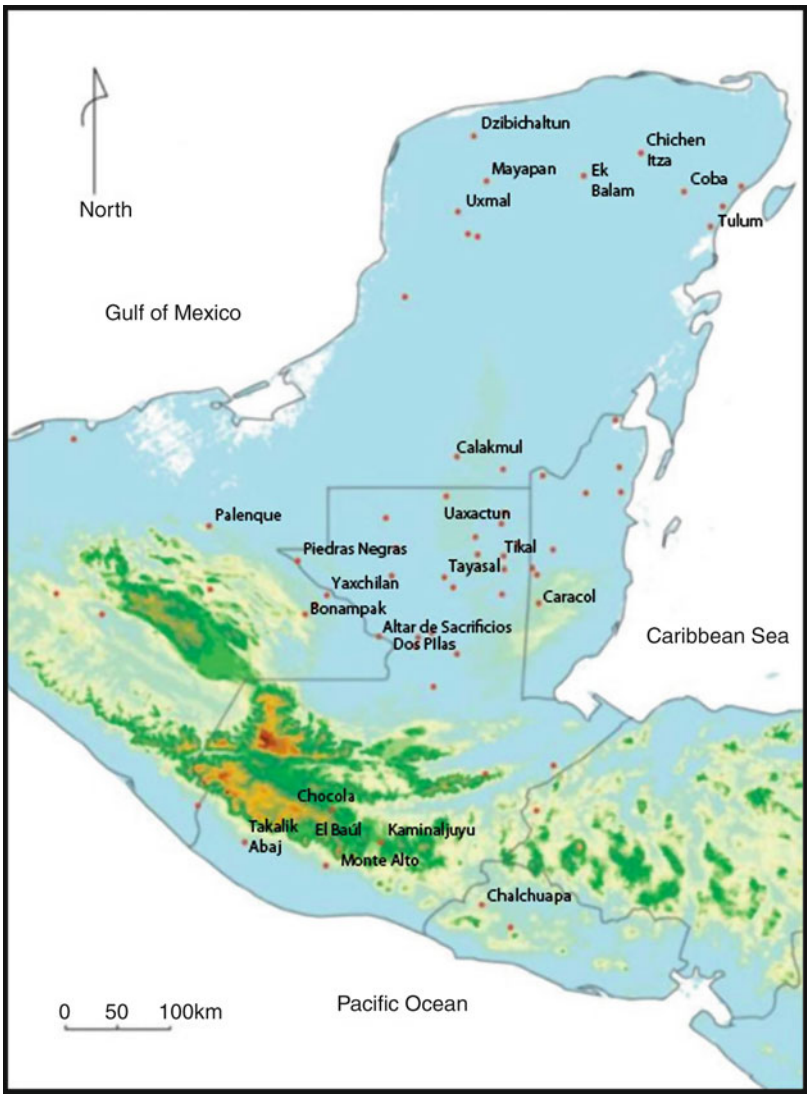

Maya Geography and Culture: Ancient and Contemporary, Fig. 2 Major ancient Maya cities

(which was not conquered until 1697) is also located in this region at Lake Peten Itza. Finally, the northern lowlands, corresponding to the northern half of the Yucatan Peninsula, is characterized by low bush and scrub forest, the terrain is low and flat, made up of porous limestone. There are no surface streams, but underground rivers and cenotes (sinkholes created when the limestone collapses and exposes the water beneath) make up a subterranean water table. Among the ancient Maya sites found in the Yucatan Peninsula are Uxmal, Chichen Itza, Ek Balam, Coba, Dzibilchaltun, Tulum, and Mayapan.

Knowledge of geography as a science and the concepts it contributes to the archaeology of the ancient Maya is necessary for understanding how archaeologists look at the ways the physical setting of Maya civilization relates to its material culture. Geography is a science concerned with the study of physical terrains and the people who inhabit them. It is characterized by two different approaches to its subject: the first is the positivist approach, which considers the qualitative and quantifiable aspects of physical space and human activity; the second is the humanistic approach, which applies concepts from critical and cultural

theory to analyze the actions of human beings and their effects on their surrounding environments. It is from the latter approach to geography that the concepts of landscape, space, and place emerged.

The concepts of landscape, place, and space are particularly useful in analyzing the role that geography plays in the production of culture. Generally, landscape is frequently used in archaeological writing (Anschuetz et al. 2001), and the concept is important in Maya archaeology (Ashmore and Knapp 1999). Rather than seeing geography and geographical features merely as the backdrop against which Maya civilization developed, archaeologists emphasize landscape as "an active and far more complex entity in relation to human lives" (Ashmore and Knapp 1999: 2). In other words, landscape refers to the ways in which human beings build (literally and metaphorically) meaningful relationships with their physical surroundings. As Anschuetz et al. state, "a landscape approach offers strategies and tools that... [construct] the past populated with ideational actors.. rather than 'faceless blobs'... that simply responded to whatever natural environmental vagaries befell them" (162).

Similarly, the concepts of space and place enable anthropologists and archaeologists to think about the social dimensions of location. According to Harry Sanabria (2007), space in this conception "is a construct with spatial (i.e., geographic) coordinates or boundaries with which a landscape is set apart from others based on assumed commonalities or differences" (20). In this sense, the "Maya region," the physical stretch of land encompassing five nations containing the physical remains of ancient Maya civilization, is such a spatial construct. In contrast, the concept of place bundles location, material form, and meaningfulness (Gieryn 2000). Geographically speaking, "place is a particular or lived space" (Agnew 2011: 318). In other words, all places are spaces, but not all spaces are places. The difference between a place and a space is that a place is inhabited and made meaningful by human beings. Within this framework, landscape is the concept used to create an archaeology of place.

These considerations of the role of geography in cultural production are relevant to the study of both ancient and contemporary Mayas. A recent example is the study of ethnoecology in contemporary Yucatan (northern lowlands). The field of ethnoecology considers the ways in which "nature is perceived by humans through a screen of beliefs and knowledge, and how humans, through their symbolic meanings and representations, use and/or manage landscapes and natural resources" (Barrera-Bassols and Toledo 2005: 11). Landscape, then, is constructed through a screen of beliefs and knowledge that informs the way in which Maya people use and manage their natural resources. Archaeologists have used these concepts productively in analyzing how the ancient Maya formed a meaningful relationship with their environment, transforming the space around them into a meaningful place. Using studies of how contemporary Maya people use, manage, and construct their landscapes, archaeologists have been able to construct models of sacred landscapes that have been useful in predicting the location of archaeological sites and in analyzing archaeological remains (Brady 1997; Ashmore and Knapp 1999; Dunning et al. 1999; Smith 2003; Brown 2004).

Researchers have found that Maya people possess more than a mechanistic understanding of their own landscape but construct their landscape through an elaborate linguistic and ritual system that informs the most important act of landscape-making, agricultural practice. Two studies of landscape among contemporary and ancient Mayas exemplify how these concepts are used in archaeological and anthropological research. The first is a study of contemporary Yucatec Maya ethnoecology by Narciso Barrera-Bassols and Victor Manuel Toledo (2005) that analyzes the "sacred ecology" (Faust 1998) of Yucatec Maya landscape management. The second is an influential study by archaeologist James Brady that used a contemporary model of sacred landscape that placed particular importance on caves to predict a pattern in locating architecture in relation to caves at

the Late Classic Maya site of Dos Pilas in the southern lowlands of Guatemala.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Agency in Archaeological Theory
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany
- ▶ Archaeology and Anthropology
- ▶ Cultural Ecology in Archaeology
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Mesoamerica: Complex Society Development
- ▶ Mesoamerica: Strengths and Weaknesses of the Current Classification
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Mundo Maya
- ▶ Volcanic Activity

References

Agnew, J. 2011. Space and place. In *The Sage handbook of geographical knowledge*, ed. J. Agnew and D.N. Livingstone, 316–329. Thousand Oaks: Sage.

Anschuetz, K.F., R.H. Wilshusen, and C. Scheick. 2001. An archaeology of landscapes: Perspectives and directions. *Journal of Archaeological Research* 9: 157–211.

Ashmore, W., and A.B.. Knapp, eds. 1999. *The archaeologies of landscape: contemporary perspectives*. London: Blackwell.

Barrera-Bassols, N., and V.M. Toledo. 2005. Ethnoecology of the Yucatec Maya: Symbolism, knowledge, and management of natural resources. *Journal of Latin American Geography* 4: 9–41.

Brady, J.E. 1997. Settlement configuration and cosmology: The role of caves at Dos Pilas. *American Anthropologist* 99: 608–618.

Brown, L.A. 2004. Dangerous places and wild spaces: Creating meaning with materials and space at contemporary Maya shrines on El Duende Mountain. *Journal of Archaeological Method and Theory* 11: 31–58.

Dunning, N., V. Scarborough, F. Valdez Jr., S. Luzzader-Beach, T. Beach, and J.G. Jones. 1999. Temple mountains, sacred lakes, and fertile fields: Ancient Maya landscapes in northwestern Belize. *Antiquity* 73: 650–660.

Gieryn, T. 2000. A space for place in sociology. *Annual Review of Sociology* 26: 463–496.

Sanabria, H. 2007. *The anthropology of Latin America and the Caribbean*. Boston: Pearson.

Sharer, R. 1994. *The ancient Maya*. 5th ed. Stanford: Stanford University Press.

Sharer, R., and L.P. Traxler. 2006. *The ancient Maya*. 6th ed. Stanford: Stanford University Press.

Smith, M.E. 2003. Can we read cosmology in ancient Maya city plans? Comment on Ashmore and Sabloff. *Latin American Antiquity* 14: 221–228.

Further Reading

Ashmore, W., and J. Sabloff. 2002. Spatial orders in Maya civic plans. *Latin American Antiquity* 13: 201–215.

Bassie-Sweet, K. 2008. *Maya sacred geography and the creator deities*. Vol. 257. Norman: University of Oklahoma Press.

Brady, J.E., and W. Ashmore. 1999. Mountains, caves, water: Ideational landscapes of the ancient Maya. In *Archaeologies of landscape: Contemporary perspectives*, ed. W. Ashmore and A.B.. Knapp, 124–145. London: Blackwell.

Chase, A. 1976. Topoxte and Tayasal: Ethnohistory in archaeology. *American Antiquity* 41: 154–167.

Chase, A. 1985. Postclassic Peten interaction spheres: The view from Tayasal. In *The Lowland Maya Postclassic*, ed. A. Chase and P. Rice, 184–205. Austin: University of Texas Press.

Chase, A.F., D.Z. Chase, and J.F. Weishampel. 2010. Lasers in the jungle. Airborne sensors reveal a vast Maya landscape. *Archaeology* 63: 27–29.

Demarest, A., K. Morgan, C. Wolley, and H. Escobedo. 2003. The political acquisition of sacred geography. The Murciélagos Complex at Dos Pilas. In *Maya palaces and elite residences. An interdisciplinary approach*, ed. J.J. Christie, 120–153. Austin: University of Texas Press.

Faust, B. 1998. *Mexican rural development and the Plumed Serpent*. Westport: Bergin & Garvey.

Jones, G. 1998. *The conquest of the last Maya kingdom*. Stanford: Stanford University Press.

Pulleston, D. 1978. Terracing, raised fields, and tree cropping in the Maya lowlands: A new perspective on the geography of power. In *Pre-Hispanic Maya agriculture*, ed. P.D. Harrison and B.L. Turner, 225–245. Albuquerque: University of New Mexico Press.

Vogt, E.Z. 1981. Some aspects of the sacred geography of highland Chiapas. In *Mesoamerican sites and worldviews*, ed. E. Benson, 119–143. Washington, DC: Dumbarton Oaks Research Library.

The Maya

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The conventional story of the magnificent Maya civilization ends after 2,000 years with environmental destruction and consequent disappearance of the people. This myth persists despite historical accounts to the contrary. Cortés, on his march to Lake Petén Itzá, describes the area as sufficiently populated to feed and house his retinue of more than 3,000 *Mexica*, gathered from Montezuma's troops, and Spanish conquistadors under arms. Moreover, thirty centuries of population development in the Maya lowlands – stretching from Preclassic to Terminal Classic and through Colonial and present times – represent long-lasting continuity.

The source of Maya wealth lay in their landscape and their profound understanding of how to use it. In fact, the Maya's subtle patterns of land use are embedded within the forest today. To understand the complex historical ecology of the Maya forest requires an examination of contemporary agroecology, traditional farming methods, and the paleoenvironmental record of the Late Classic Maya. Comparing Maya social developments with environmental chronologies reveals a discrepancy between the growth and sophistication of Classic Maya culture and the environmental destruction proposed for its demise. While most studies assume that the collapse of Maya civilization is related to human-caused deforestation, today the Maya forest is known for its remarkable diversity and abundance of useful plants. This suggests contemporary forests in the Maya lowlands are the products of successful land management over long, continuous periods of time. We would not expect such striking ecological conditions if the ancient Maya had radically altered their forested landscape to the point of environmental collapse, and we propose an alternative to this commonly accepted scenario that finds support from archaeological, ecological, and paleoecological data.

A Brief Introduction to the Maya World

The lowland Maya region (Fig. 1) was transformed by humans from the initial peopling of the New World. Human settlers influenced the landscape and ecology from the outset, managing and domesticating plants in a setting that changed from an arid, temperate zone to a humid, tropical environment from 10,000 to 8,000 years ago (Table 1). This environmental change initiated a period of several millennial, called the Archaic, in which human populations intensively interacted with plant communities through mobile horticultural subsistence strategies. Permanent Maya settlements emerged before 3,000 years ago, when communities began to increasingly rely on agriculture while essentially living within the forest. The first Maya villages mark the onset of the Middle Preclassic and were concentrated in areas with secure water reserves, as noted by Dennis Puleston and Olga Puleston (1971). As populations grew, farming settlements expanded to occupy virtually every locale with potential for hand cultivation. The Maya began building impressive monumental centers with public architecture across the lowlands at this time (summarized in Horn 2015: 34–54). Survey data from environs around Tikal, Lake Yaxhá, and the El Pilar area east of Tikal document the near-complete occupation of the well-drained uplands by 2,800 years ago – the same zones that were most densely occupied centuries later during the Late Classic. The growth of Maya farming communities around monumental centers continued to fill in the landscape through the following Late Preclassic period in most areas of the southern lowlands.

Settlement expansion continued between 2,000 and 1,000 years ago during the Classic period that witnessed the apogee of Maya civilization. Much has been made of the so-called Terminal Classic

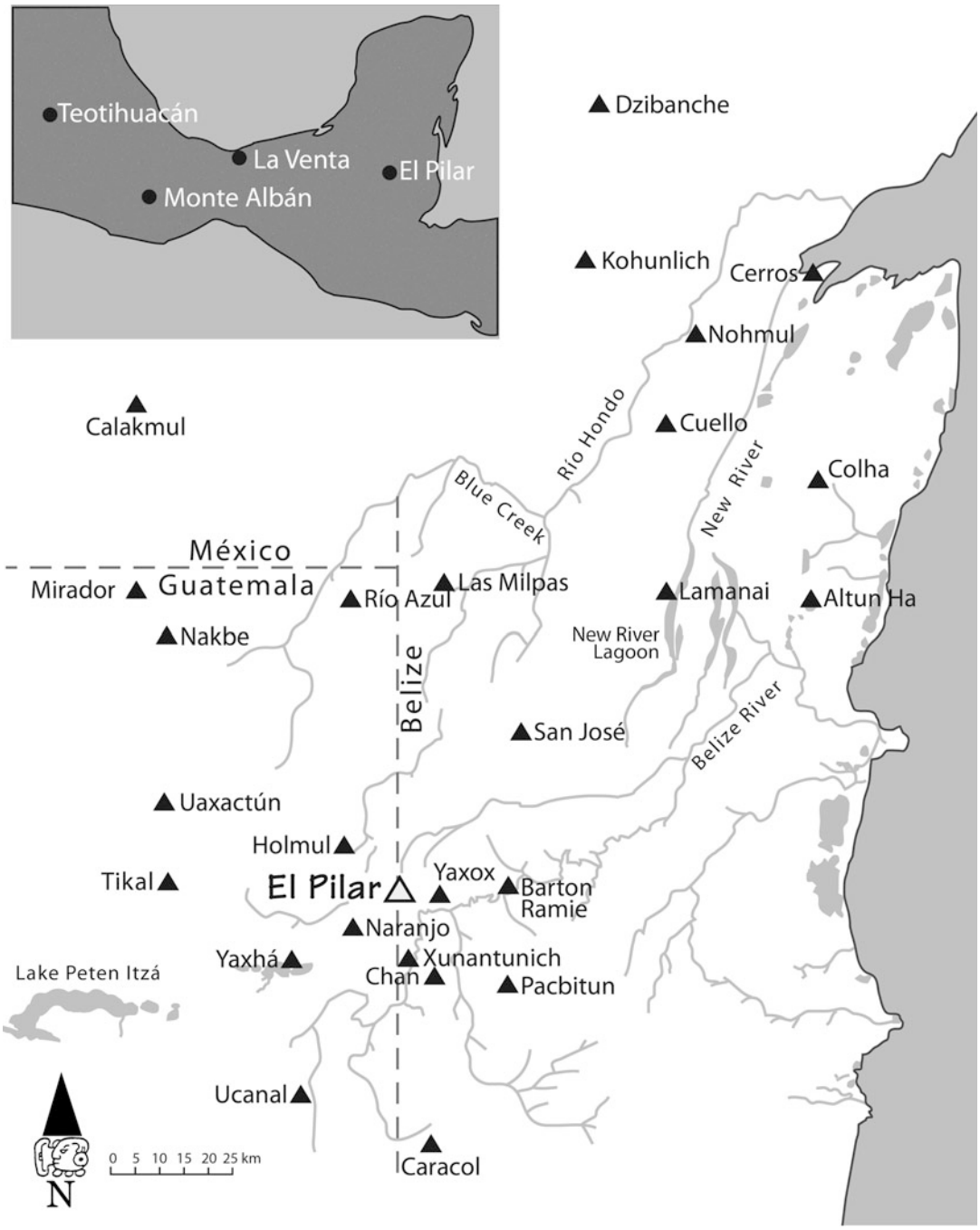

The Maya, Fig. 1 The central lowland Maya

collapse, a turbulent time when the institution of divine kingship, and Maya political systems more generally, underwent a major transformation. Political capitals in the southern area, which held varying degrees of hegemony over one another and engaged in a near-constant struggle for supremacy at the height of the Late Classic, gradually ceased to be maintained. Public

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The Maya, Table 1 Occupation chronology: 8,000 years in the Maya forest

Years before present	8,000–4,000	4,000–3,000	3,000–2,000	2,000–1,400	1,400–1,100	1,100–800	800–500	500–present
Human ecology	Hunting and gathering	Early settlement	Emergent Preclassic centers	Civic center expansion	Center and settlement growth	Civic center demise	Settlement refocus	Conquest depopulation
Land use	Mobile horticulture	Settled horticultural forest gardens	Settled forest gardens	Expanding milpa-forest gardens	Centralized milpa-forest gardens	Community milpa-forest gardens	Dispersed milpa-forest gardens	Disrupted milpa-forest gardens
Cultural period	Archaic	Formative Preclassic	Middle to Late Preclassic	Late Preclassic to Early Classic	Late Classic	Terminal Classic Postclassic	Late Postclassic	Colonial, national, global

infrastructure, such as the temples, palaces, and monuments that formed the focal points of Maya cities, was neglected and left to the elements. The idea of collapse, however, exaggerates the reality of this process and suggests a population crash where no such evidence exists (see Webster 2002). Dramatic "collapses" – better envisioned as the gradual abandonment of impressive urban centers – were a signature of Maya culture from Preclassic times and signal transformations of settlement patterns (Iannone 2014), as opposed to drastic reductions in population. Maya populations persisted on the landscape after the so-called Terminal Classic collapse, and significant numbers were still living around centers when the first Spanish conquistadors arrived several centuries later (Alexander 2006).

Hernán Cortés's fifth letter to Charles V, emperor and king of Spain, provides a unique glimpse of the pre-Hispanic Maya (Cortés 1985). Cortés (1985: 355–449) describes his epic *entrada* to the very heart of the southern lowlands at Lake Petén Itzá, some 70 kilometers from the abandoned Classic city of Tikal, in this letter of September 3, 1526. The lowlands that the Spaniards crossed, this "heavily settled region" (Jones 1998: 31; Diaz 1963), were already feeling the effects of the European invasion and dramatic demise of Aztec civilization. Cortés's party traversed Tabasco, Acalan, and Central Petén, where they encountered many large towns, often spaced less than a day's journey apart, separated by "dense forests," groves, and fields (Cortés 1985: 363–386). Even with local maps, as Cortés admits in his letter (e.g., Cortés 1985: 377), the Spanish spent many days lost among forests and bogged down in swamps. Terrified local guides often misled this foreign army as they traversed a region of waterways and well-trod footpaths. Cortés and his large retinue were, nevertheless, nearly always well-billeted and provisioned –willingly or not – by the Maya themselves (Jones 1998: 32–33).

Though the Maya inhabitants fled before him, Cortés was able to find enough food left behind in the well-ordered towns to provision his 3,000 Mexica warriors and almost 100 Spanish horsemen. On his more than 150-day journey from Coatzacoalcos to Tayasal/Nohpeten, the Itzá capital, through hostile territory using only walking trails, Cortés mentions having to sleep in the open air for approximately 17 nights (Cortés 1985: 360–386). The rest of the time Cortés and his army were comfortably housed and fed by the Maya in their own towns. Only between Tabasco and Acalan, in the Kejach territory near Calakmul that now comprises south-central Campeche, did Cortés have to spend several nights in what he called a "depopulated" area before finding a Maya settlement large enough to house his horde.

A careful reading of Cortés's description, Jones's overview (1998), general reflections, suggests that the Maya dwelt prosperously on the forested landscape of the southern Yucatan Peninsula during the early sixteenth century. The productivity of the forest was underscored more than a century later, when the Spaniard Ursua, with his 1697 conquest of the last independent Maya capital Nojpeten, sends a plea of support to Guatemala in which he detailed a list of foods that he and his men were "forced" to eat while traveling from Yucatan to central Petén. Ursua's list included zapote, macal, nance, and other foods found in traditional Maya forest gardens (Schwartz 1990: 54–55). It was a veritable cornucopia of forest resources, but the Spanish had culturally defined culinary standards and found these foods inedible (Terán and Rasmussen 2008: 134).

The agricultural innovation that allowed the Maya to succeed in their tropical ecosystem is known in Spanish as the *milpa*. Essentially in a 20-year cyclic system that opens fields to build forest gardens, this subsistence system sustained the ancient Maya and their landscape, building productivity into every stage of land use. After approximately 4 years, the open field naturally regenerates, managing fast-growing perennials that transform after some 8 years into useful closed canopy forests. The landscape matrix of the milpa-forest garden cycle provides food, builds soil fertility, manages water, maintains biodiversity, sustains animal habitat, and yields forest products and goods for daily life.

Understanding the Mesoamerican and Maya milpa-forest garden cycle as a basic component of the Maya is essential. As a complex polyculture system, it involves the rotation of annual crops with managed stages of perennial forest. The idea

of "abandonment" of fields to lie fallow after several years of annual crop cultivation is a misconception. As Wilken (1987) points out, the "high-performance milpa" is never abandoned even as they are reforested (cf. Terán and Rasmussen 2008). The milpa-forest garden cycle is crucial to the resource-management system that shaped the Maya forest to meet subsistence and tribute needs, develop their political economy, and promote local and long-distance trade.

The Maya Lowland Environment: A Platform for Development

The physical geography of the Maya region creates an environmental gradient, affecting both average annual temperature and rainfall, which is closely tied to elevation above sea level. This gradient extends from the cloud forests in the mountains of Chiapas and Guatemala to the south, around 15 degrees north latitude, through mountain ranges and ridges that gradually descend into the lowland limestone plain of the Yucatan Peninsula, around 21 degrees north. Average annual rainfall varies across the region from less than 500 mm in the northwest Yucatan Peninsula to 4,000 mm in the far south (Fig. 2).

Climate observers in the Maya region traditionally recognize two seasons, the wet and the dry, although local farmers provide a more nuanced view of the seasonal sequence. The rainy season begins in May or June as a warm, wet period associated with tropical air masses and powerful cyclonic storm systems, including hurricanes. A shift occurs in October or November toward cooler wet conditions, which are influenced by subtropical weather systems from North America and include the cold northeasterly winds called *nortes*. Cool, wet conditions persist until February or March, when the rains cease, and a 2- to 3-month dry season begins.

Forests cover a primarily limestone base across the Maya region, and forest composition varies with differences in local climate, water, and soil conditions. The permeable limestone bedrock creates unpredictable access to water, which rarely flows on the surface as rivers or permanent streams (Ford 1996; Iannone 2014; Lucero et al. 2014). Water is instead absorbed into the bedrock through fissures or flows through caves systems as underground streams. Two major river systems, the Belize/New River on the east and the Usumacinta/Candelaria on the west, and several smaller drainages flank the uplifted limestone shelf of the central lowlands. Lakes, lagoons, or cenotes – the water-filled sinkholes prevalent in northern Yucatan – form where the limestone bedrock dissolves to levels below the water table. Water also collects within closed depressions throughout the lowland region during the rainy season.

At least 40 percent of the lowland Maya region comprises wetlands. This is consistent with data from El Pilar, east of Tikal, where poor drainage and wetlands characterizes 38 percent of the area (Ford et al. 2009). Variations in karstic topography and water access generate the following four physiographic regions in the central Maya lowlands (Fig. 3), each containing a different basic ecosystem and capable of producing resources used by ancient and modern people:

- Well-drained ridges and uplands (high-to-low closed forest)
- Poorly drained lowlands (low, open forests and transitional wetlands)
- Perennial riverine wetlands (riparian, aquatic, and semiaquatic vegetation)
- Seasonal closed wetlands (low, open forest tolerant of hydric extremes)

The peopling of the New World altered the character of the environment by introducing anthropogenic landscape modifications at a time of global climate change. In only a few millennia, humans occupied the Americas from the Arctic Circle to Tierra del Fuego. Highly mobile forager groups, equipped with the ability to produce fire and stone tools, fanned out through myriad settings. By no later than 13,000 years ago, humans had spread into all habitable areas of Mesoamerica, including the Maya lowlands. These early occupants were the first to explore the topography of the area and identify sites of permanent water;

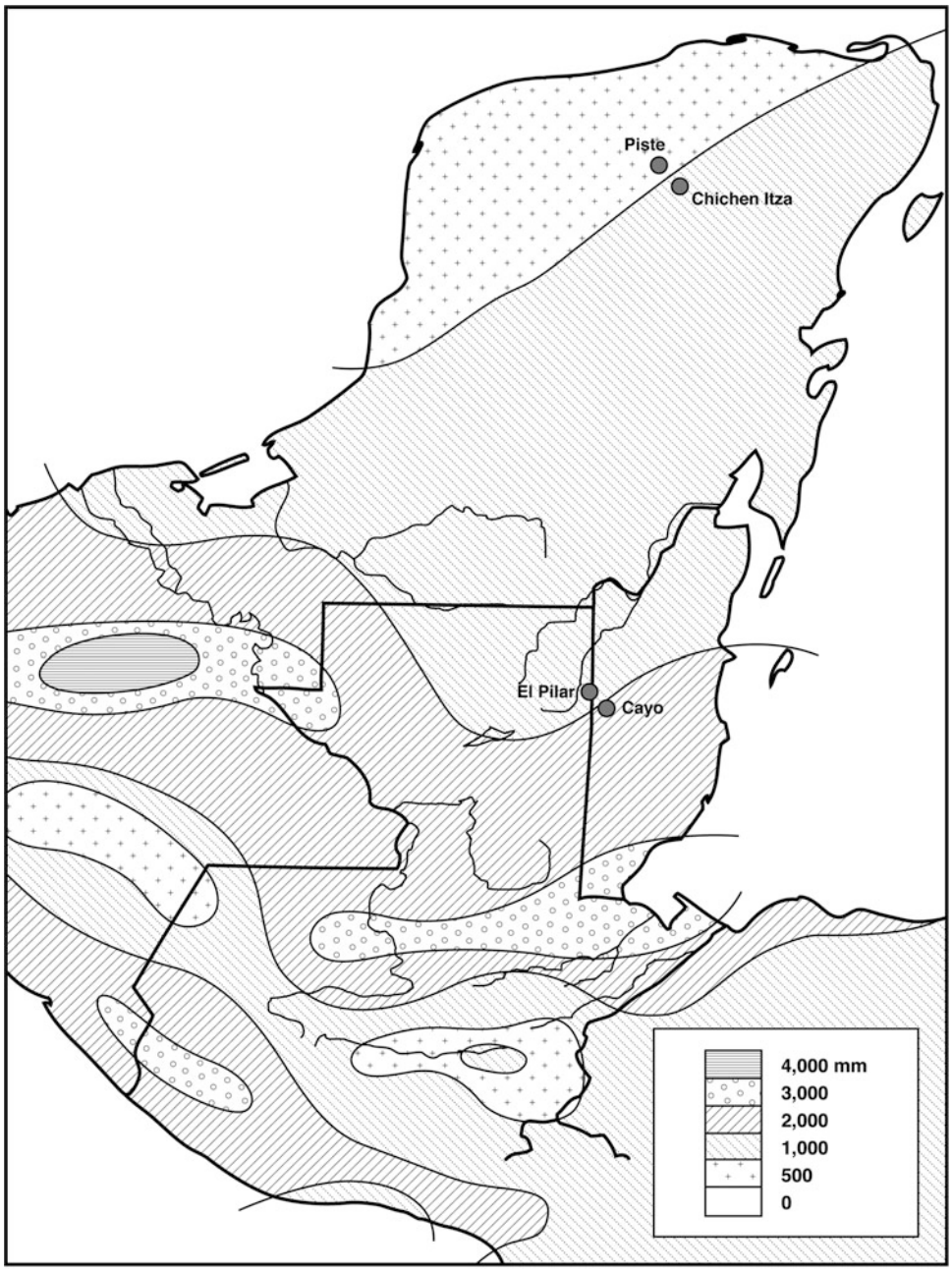

The Maya, Fig. 2 Rainfall across the Maya forest

this landscape knowledge was critical to survival at a time when the climate was cool and arid and temperate vegetation prevail. This understanding of the region and its resources provided a solid foundation for responses to future environmental changes.

As the climate warmed and precipitation increased, the dominant vegetation communities in the Maya lowlands began to change. This shift in the regional climatic regime corresponded to worldwide changes known as the Holocene Thermal Maximum around 8,000 years ago, and the

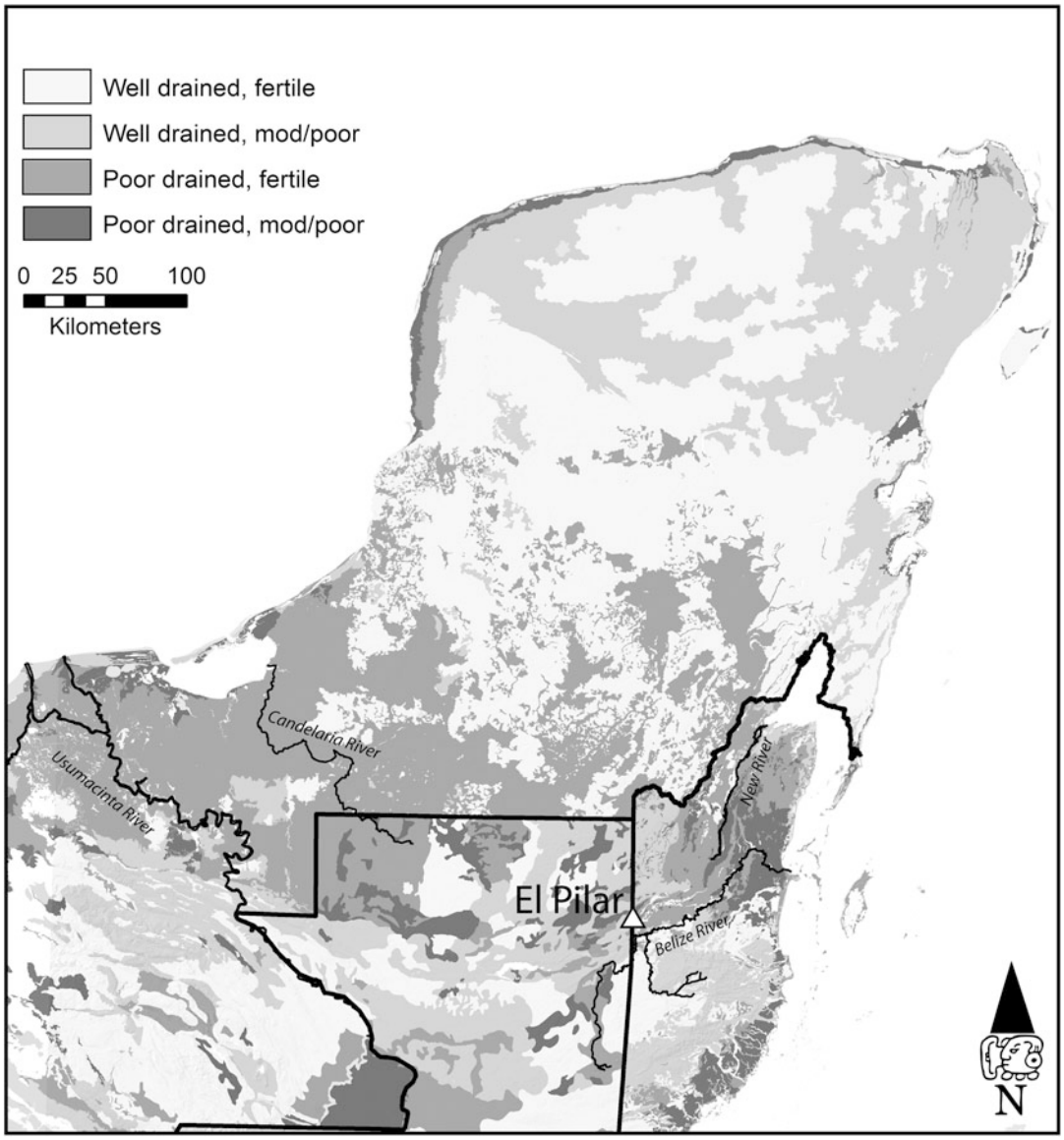

The Maya, Fig. 3 Physiographic regions of the central Maya lowlands

register of plants in the Maya tropical forest is clear. The temperate pine-oak-grass complex diminished in importance, and megathermal taxa, exemplified by *Brosimum*-type Moraceae trees, become evident in the pollen recovered from lake cores (Leyden 2002). The natural range of megathermal plants expanded from northern areas of South America along the eastern (Caribbean) side of Central America up to the Yucatan Peninsula. It is easy to imagine the spread of these plant species and the animals that would have accompanied them – frugivores that depended on the perennial availability of fruits in the warming tropical environment. Humans certainly moved along with these plants and animals, bringing with them additional resources needed for survival. The example of the genus *Theobroma* brings out this point. The genus is

represented by many species in the Amazon yet represented in the Maya forest by only one: *Theobroma cacao*, the natural source of chocolate.

A stable, warm, and wet environment prevailed in the Maya lowlands for approximately 4,000 years (Fig. 4). By this time, with basic knowledge of regional geography – the ridges, the undulating slopes, the wetlands, the lakes, and the few rivers – Archaic mobile horticulturalists were expanding their use of domesticated crops in the context of the forest. Throughout this long period of favorable stable climate conditions, seasonal hunting and gathering activities were governed by seasonal forest production. It was a time of incubation for the Mesoamerican culture that has endured to this day.

Familiarity with the lowland environment was key to building the historical ecological experience of Mesoamerica and the Maya cultures. Climate challenges evoked the development of traditional and local knowledge that continues to inform Mesoamerican agroecology. The paleoecological record of the region, derived from the Petén Lakes (Mueller et al. 2010) and the Cariaco basin sea cores (Haug et al. 2001), shows that precipitation became unstable and unpredictable around 4,000 years ago (see Fig. 4), marking a period of climatic chaos. This turbulent period created environmental stress that dramatically changed the landscape. Alternating wet and dry cycles introduced seasonal rhythms that influenced both flora and fauna. These cycles persist to this day, and they created the conditions that resulted in a new way of life for the Mesoamerican mobile horticulturalists that inhabited the Maya lowlands.

Ancient Maya farmers preferred the well-drained ridges and lower-upland slopes above annual flood lines for settlement (Fedick and Ford 1990; Ford et al. 2009). Today, these are the areas where moist, closed canopy forests develop to their fullest (Schulze and Whitacre 1999). Such forested, well-drained land is

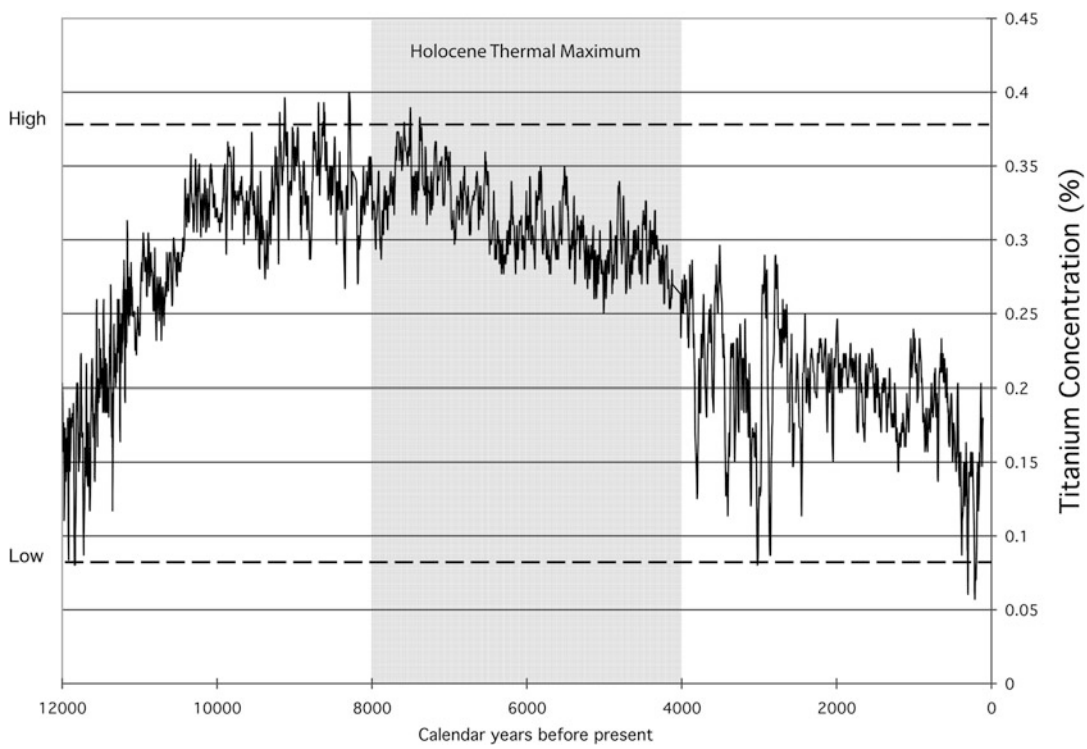

The Maya, Fig. 4 Circum-Caribbean precipitation highlighting the st*able* warm Holocene Thermal Maximum

unevenly distributed across the region, and the dispersed human settlement, characteristic of ancient Maya civilization, reflects the attraction of these preferred environmental zones (Bullard 1960; Culbert and Rice 1990). Ancient centers – and later Spanish relocation – were forced to work against these centrifugal settlement patterns that pulled farmers away from nucleated population hubs and into their milpas (Farriss 1992; Ford et al. 2009). Well-drained hills and slopes comprise less than one-sixth of the area of Northern Belize but nearly half of the Petén interior around the large Classic center Tikal (Fedick and Ford 1990), and these preferred lands are distributed, in varying proportions, to the west into Chiapas and north across the Yucatan Peninsula (Fig. 2). There is a direct relationship between the presence of well-drained ridges, high settlement density, and the location of elite cultural remains of Classic Maya kingdoms.

Historical Debate in the Maya Lowlands

Viewing Maya urbanism through a European historical lens can lead to major misunderstandings and mistaken perceptions. Indigenous peoples in the Americas possessed distinct skill sets that leveraged keen observations of their landscapes and measured environmental potentials against individual abilities. Basic knowledge and observation of the landscape, a fundamental appreciation of the limits of the natural world, and an ability to work *by hand* within those dimensions were fundamental to the growth and development of Maya communities and the forest they inhabited. The forested environment of the Maya lowlands provided a wealth of resources to people who understood how to use and manage their landscape.

The period of climatic chaos, beginning around 4,000 years ago, set the stage for major changes in subsistence, settlement, and social development that characterize the Preclassic in the Maya lowlands. Fundamental to these changes was the shift from scattered and mobile patterns of land use to permanent occupation of hand-cultivable, well-drained areas. As larger populations began to grow and settle in these preferred zones – the same areas where later centers inevitably emerged (Ford 1986: 115–116) – their use of milpa-forest gardens became more intensive. The locations of farming settlements were predicated upon the availability of land resources, and the major Maya centers arose among concentrations of farmers. Control of limited water sources may also have become increasingly political, particularly in the Preclassic, which would have drawn traditionally dispersed farming families into centers as populations grew and the climate became drier (Ford 1996; Lucero et al. 2014; see Haug et al. 2001). This would play a role particularly in the annual dry season.

The currently accepted view of the Maya collapse identifies the Preclassic as the beginning of a period of *escalating* environmental disturbance, which is thought to be linked to increasing population densities across the lowland Maya region (Turner and Sabloff 2012). According to this interpretation, large areas of the central lowlands *were essentially deforested*, with most available land given over to agricultural fields. The perceived result was ecological vulnerability caused by the degradation of the natural resources of the forest environment. This vision of the ancient Maya landscape, however, conflicts with evidence of long-lasting cultural continuity across the region – a continuous 30-century period of population growth and development from the Preclassic to present times.

There is no doubt that land use intensified with Maya growth and development. The steady increase in the number of residential sites through time reflects population growth, as does the proliferation of exuberant monumental civic centers. Scholars have traditionally imagined this landscape overrun by people and fields, where the expansion of settlements could *only* occur by displacing the forest. An alternative landscape for the Classic Maya does not propose settlement and forest as binary opposites, but views forest settlements as integral components of sustainable

human-environment relationships (Atran 1993; Voorhies 1982; see Conklin 1957). With population concentrated in rainforest cities, a form of decentralized urbanism emerged in the largely forested landscape of the Maya lowlands that resembled social developments in the prehistoric Amazon and Cambodia. This model of Maya settlement pattern and landscape ecology, while still debated, recognizes the importance of local solutions to the environmental constraints of the lowlands. The historical relationships between settlement patterns and environment resulted in the creation of the "high-performance milpa" system of food production (Wilken 1987), which is well known among local and traditional farmers and will be discussed in detail below.

Ancient Maya settlements and, by proxy, the farmers that made up the bulk of their population were located near useful forest and field resources. Emerging urban centers depended on these farmers to meet subsistence needs, and farming requirements were integrated into land-use strategies at the local and regional scales. Archaeologists for some time have recognized that the population was dispersed across the well-drained uplands (Bullard 1960), regardless of where the major monumental centers were located (Ford 1986). Social phenomena, such as trade, markets, and political relationships, may help explain these patterns, but their ultimate roots have received little attention from scholars. Recent investigations harnessing the power of geographic information systems (GIS) have statistically demonstrated the strong connections between settlement location and environment (Ford et al. 2009). We will explore these connections in detail to reveal the subtlety of Maya settlement patterns and how they are embedded within the forest environment.

Prehistoric Chronology that Is Native to the Place

Maya chronology represents a long, steady, and successful cultural development in the context of lowland tropical forests. The occupation of the Maya lowlands began with the expansion of hunters and gatherers into the Americas more than 13,000 years ago (González et al. 2008; Lohse 2010; Stinnesbeck et al. 2017). These first people inhabited an arid, cool landscape covering the karstic limestone platform that forms the Maya region. The topography of this area was essentially the same that we recognize today, with undulating ridges and hills interspersed among flatlands.

What began as a cooler, drier climatic regime changed about 8,000 years ago (Haug et al. 2001), when the region became a warm and wet environment with familiar tropical characteristics: evergreen and semi-deciduous, broadleaf-forested uplands, and seasonally or permanently inundated wetlands, with lakes in the south and cenotes in the north. The region was – and remains – subject to periodic Atlantic hurricanes and volcanic eruptions, and it also experiences annual and multiyear cycles of wet and dry periods.

8,000–4,000 Years Ago: Archaeological data from the Archaic period in the Maya lowlands is scant. There is, however, little doubt that people migrated north along the Caribbean littoral during the Holocene Thermal Maximum, at a time when mesic forests were spreading throughout the area. Several lines of evidence support this hypothesis, but none is more prominent than the distribution of plant species in the genus *Theobroma*. While over 100 of species of *Theobroma* have been documented by Kew Gardens, all members of this genus save one, the famous *Theobroma cacao*, are known exclusively from the Amazon. The presence of additional domesticated plants – particularly maize and manioc pollen from northern Belize, dating as early as 5,400 years ago (Pohl et al. 1996) – demonstrates that Archaic inhabitants were manipulating flora and moving closer to relying on food production. Maize, beans, squash, and chile supplemented hunting and gathering, and more intensive cultivation of maize becomes apparent in the pollen record around 4,000 years ago.

Little is known of the scattered and ephemeral Archaic settlements and the annual cycles of the people who lived in them. Diagnostic stone tools from stratified contexts in northeastern Belize (Rosenswig 2004), however, suggest a wide range of hunting and gathering activities were supplemented by incipient horticulture in the emergent tropical forests of the lowlands. Local populations became increasingly familiar with their environments at this time, and there is evidence of settlement continuity between Late Archaic mobile foragers and Middle Preclassic agricultural communities from a handful of sites in northeastern Belize (Lohse 2010). These settlement data suggest that food production was *not* a subsistence innovation introduced by agricultural colonists from outside the region, but an indigenous development that grew from a deep knowledge of the forest environment accumulated over thousands of years.

4,000–3,000 Years Ago: Widespread small but permanent settlements point to major changes throughout Mesoamerica. Very few settlements dating to this time have been discovered in the Maya lowlands, and inhabitants of region continued to practice Archaic lifeways successfully adapted to the forest environment. Outside the Maya lowlands, however, several Mesoamerican communities moved from reliance on mobile horticulture and founded sedentary agricultural villages. Populations increased following the shift to more permanent food production, and the monumental centers of complex societies appeared in highland central Mexico, Oaxaca, and along the Mexican Gulf Coast and Pacific coastal Guatemala within a few hundred years of the first permanent settlements (Horn 2015: 18–24).

Toward the end of this time, and certainly by 3,000 BP, permanent agricultural settlements dotted the forest of the Maya area (Fedick 1989; Ford 1986; Puleston and Puleston 1971). Small centers with public, ceremonial architecture – comparatively modest structures at first, but growing in scale and complexity through time – appeared in Belize, Guatemala, and across the Yucatan Peninsula of Mexico.

The establishment of settled villages and small centers was paralleled by two significant developments in early Maya communities: the production and consumption of pottery and the establishment of long-distance exchange networks that facilitated circulation of valuable commodities (Horn 2015: 26–28). Stylistic similarities among the earliest pottery complexes from the Maya lowlands, including symbolic images and design elements, suggest the widespread flow of information and possibly shared religious ideologies among the earliest settled communities. Valuable nonlocal materials, such as obsidian and basalt from the southern highlands of Guatemala, also appear at lowland centers roughly concurrent with their founding. The relationship between early long-distance exchange networks and the first farming villages in the Maya lowlands is poorly understood, and the establishment of these networks represents an additional break from Archaic lifeways focused exclusively on lowland resources for tool manufacture (Lohse 2010). This initial period of permanent settlement across the forested lowlands marks the beginning of Maya civilization.

3,000–2,000 Years Ago: This pivotal time frame, encompassing the Middle Preclassic and most of the Late Preclassic periods of ancient Maya chronology, witnessed the intensification of several trends across the Maya lowlands. Farming populations continued to increase and expand to encompass the most desirable farmland, such that virtually all upland hills and ridges in the area show evidence of settlement. Modest farming communities grew into large Preclassic monumental centers, and later cities, across the area. The development of impressive lowland centers, and the later rise of urbanism, paralleled the emergence of complex societies in surrounding regions of Mesoamerica (Horn 2015: 30–33)

Settlement pattern and artifact distribution studies indicate the formation of local settlement clusters, comprising multiple independent polities and characterized by intensive intra-cluster

interactions, across the Maya lowlands during the Middle Preclassic (Horn 2015: 36). Intensive interactions at the local scale produced similar patterns of architectural development, burial practices, craft production, and pottery styles within local clusters, while evidence of long-distance exchange clearly demonstrates connectivity among clusters. The formation of complex socioeconomic networks during the Middle Preclassic, and the ability of some individuals and communities to leverage advantageous positions within those networks, was an important engine driving the formation of complex societies in the Maya lowlands (Horn 2015: 662–679).

The development of complex societies across the Maya lowlands allowed some sites, such as El Mirador (Hansen 2005), Tikal (Coe 1990), and Lamanai (Pendergast 1981), among many others, to become major players in administrative hierarchies on both the local and regional levels. Hereditary leadership, most likely in the form of divine kingship, developed by at least Late Preclassic times and paralleled trends toward population aggregation at large centers. Although the ultimate fates of various Preclassic centers different dramatically, the overarching trajectory of Maya lowland communities bent toward increasing population and land-use management. Greater levels of political organization were required to meet demands of increasingly dense and urbanized communities, and the development of more complex organizational structures is evident in the growth of civic centers and the clustering of centers in primary production areas.

2,000–1,400 Years Ago: Classic Maya civilization is marked by the continued growth of settlements and centers from the Late Preclassic through the Early Classic, with concomitant increases social complexity. Settlements expanded to all well-drained areas, especially the prime upland agricultural areas that compose 25 to 49 percent of the region (Bullard 1960; Fedick and Ford 1990), reflecting the intensification of land use. Monuments carved with hieroglyphic texts refer to warfare, and settlements began to spread to the less-optimal transitional wetland areas (Fedick 1989; Fedick and Ford 1990; Ford et al. 2009; McAnany 1995). Specialized production of distinctive elite and general household products also appears to have developed out of earlier, more generalized traditions of manufacture at this time.

1,400–1,100 Years Ago: The Late Classic, the apex of Maya civilization, includes the growth of civic centers and the proliferation of residential settlements (Culbert and Rice 1990). Most centers reached their maximum extent at this time. Tikal, for example, covered approximately 150 hectares of its center with monumental architecture (50 percent of the size of medieval London c. AD 1300). Large, dense settlements occupied all the well-drained ridges; the same areas initially occupied during Middle Preclassic population expansion (cf. Robin 2012). Competition among powerful Maya states increased, and stela references to warfare were prevalent across the Maya region, especially in southern Petén.

The Late Classic was also a time of ceramic diversification, with the sudden appearance of volcanic ash-tempered pottery in the fine wares (Ford and Rose 1995) and decaying ash in clay deposits. Specializations in products clearly separate into attached and entrepreneurial part-time occupations, as evident in the El Pilar center and settlement areas. Elite attached specialists around El Pilar produced artifacts made from exotic obsidian, and marginal farming areas primarily made utilitarian products.

While settlement counts are straightforward and well reported (see Robin 2012), and numbers of buildings have been used to indicate population size (Culbert and Rice 1990), actual population estimates are a source of major discord and debate. For example, Chase and others (2011), based on interpretations from Caracol, estimate regional population densities at 1,000 persons per square kilometer; while modeling at El Pilar, produced an estimated density of approximately 140 persons per square kilometer, a little more than one-eighth the projection for Caracol. In the Maya context, reasoned estimates of 100–200 persons per square kilometer are considered

viable (Culbert and Rice 1990); these numbers have yet to be reconciled with land use. Given the annual farming regime that calls for the use of temporary farmsteads (Zetina and Faust 2011), as well as the generational landscape strategies, archaeologist must distinguish primary from secondary residences to understand population distributions and estimate population density in relationship to available resources (compare Ford and Nigh 2015 to Lentz et al. 2015).

1,100–800 Years Ago: The last stela erected at Tikal (Stela 11 dated to AD 869) marks the end of Classic Maya civilization in the core of the Maya region. Power shifted northward to centers in modern-day Yucatan, Quintana Roo, and Campeche, Mexico, and away from the uplifted limestone ridge lands of central Petén. The period known as the Terminal Classic, a decline of construction and maintenance lasting several centuries, is visible in the abandonment of monumental structures and has been linked to droughts. The current leading hypothesis suggests the Terminal Classic collapse reflects an environmental transformation and attributes the cause to overpopulation, which resulted in extensive deforestation and soil degradation (Turner and Sabloff 2012). The main evidence cited for environmental change and drought comes from paleoecological records derived from lake sediments, although the interpretation of these data is ambiguous (Ford and Nigh 2015). The notion that there would be a cataclysmic environmental change because of human mismanagement and overuse of forest resources (Lentz et al. 2015) does not square well with the long trajectory of sustained growth nor the adaptations encountered at the time of Spanish contact (Farriss 1992; Terán and Rasmussen 2008).

800–500 Years Ago: The demise of the major Classic centers, such as Tikal and El Pilar, has been interpreted as the abandonment of the lowland interior. We know that public infrastructure – temples, palaces, and plazas – was not maintained and gradually succumbed to the elements. The neglect of public works speaks directly to the failure of the intricate Late Classic political economy, however, and not to the disappearance of farmers from the landscape. The Classic Maya regents' power to collect tribute and fund public projects clearly broke down, but the collapse of elite institutions does not imply a collapse of farming populations. That assumption is based on the notion that overpopulation and agricultural expansion drove deforestation beyond environmentally sustainable levels (Turner and Sabloff 2012; Webster 2002), which supposes that food production and forest are incompatible. The incompatibility of forest and field has yet to be demonstrated, however, and is contradicted by Spanish records that indicate successful adaptations by forest-dwelling Maya populations observed by the Spanish conquistadors 500 years ago.

The area between the sites of Tikal and Yaxhá shows continuous, undiminished occupation through the Terminal Classic (Ford 1986: 64–65). The El Pilar area, where excavations focused on residential units around monumental centers and beyond (Ford et al. 2009), shows that at least half of these units were occupied after the Late Classic. Areas without major public architecture, despite the demise of the centers, continued to flourish into Postclassic times (Alexander 2006; Robin 2012). Some large sites, such as Lamanai in northern Belize (Pendergast 1981), show continuous occupation from the Middle Preclassic to Spanish contact. Elite culture and power changed significantly at Lamanai during Terminal Classic and Postclassic times, but several decades of excavation have produced no evidence of a population collapse.

The abandonment of the temples, palaces, and plazas did not happen overnight, but was a gradual process that took decades and even centuries to complete (Webster 2002: 260–326). Only in rare instances of rapid site abandonment, such as has been proposed for Aguateca and other sites in the strife-riven Petexbatun area of southern Petén, would these processes play out within the lifetime of any one individual. First, portions of buildings would be left unmaintained, then entire architectural complexes would fall to abandonment, and

finally, no resources would remain for any maintenance at the site scale. (This is not unlike Detroit, where today more than 50 major private buildings, including banks, offices, theaters, and hotels, as well as many public buildings, such as libraries, schools, and even the central railroad station, have been abandoned. Some have been demolished for gardens.) Maya farmers, however, could very well have continued to live in their forest gardens that had been developed and maintained by their ancestors over several millennia.

Construction and maintenance of monumental architecture was a major issue in both the public and private sectors. Public construction was likely based on corvée labor provided by people who were also responsible for maintaining their own private structures. As corvée resources for public buildings diminished, private constructions correspondingly simplified. The Classic Maya signatures on the landscape dwindled; there was no more investment in stone quarries, and the minimum of maintenance on monuments was coupled with increasingly plain domestic structures. Farmers, freed from the burden of maintaining monumental architecture, organized into smaller units and farmed in the traditional way that was encountered at the time of the conquest (Farriss 1992; Jones 1998).

The Paleoenvironmental and Pollen Records

Paleoenvironmental reconstructions for the Maya lowlands rely primarily on lake core sediments from the central Petén area of Guatemala. Vegetation changes for the Holocene are recorded in the pollen register of these cores (e.g., Leyden 2002), which are dominated by wind-borne pollen and associated with deposits that reveal the influx of sediment by turbid currents into the lakes (Mueller et al. 2010). These lake layers are believed to correspond to widespread erosion that formed sedimentary "Maya clay" after deposition. The record of past precipitation is based on the concentration and ratios of the minor element titanium (Ti) and iron (Fe) in marine and lake sediments. Titanium and iron concentration is used as a proxy for rainfall, specifically summer monsoonal rain that is reflected in the annual sediment varves of cores from the Cariaco Basin off the coast of Venezuela (Haug et al. 2001) and corroborated in samples from the Petén Lakes. The overall interpretation of the paleoecological record has concentrated on a few pollen signatures that can misrepresent the evident diversity (Fig. 5). It is interesting to note, however, that even within the limited lens of the pollen data currently available, the simple interpretation that the forest gives way to savanna ecosystems during the Classic period is not borne out by the data. Pollen data do show that Ramon, or *Brosimum* pollen types, decrease as a fraction of all pollen types during Classic times, but there is no corresponding rise in the grasses that would define an increase in savanna-type environments (Figs. 5 and 6). Lumping disturbance and grass taxa together masks the true diversity revealed in the pollen record. The data demonstrate considerable diversity in the category of forbs, the same annuals and perennials that would be dominant in the open-crop component of the milpa cycle (Ford and Nigh 2015: 41–77).

8,000–4,000 Years Ago: High precipitation characterizes the Holocene Thermal Maximum in the Maya area. Plant communities changed from temperate to tropical, and *Brosimum*-type Moraceae pollen, interpreted as representing mature forest cover, became dominant in the pollen record. Temperate taxa, including pine and oak, maintain a presence but in low proportions (Leyden 2002).

4,000–3,000 Years Ago: The end of the Holocene Thermal Maximum was marked by more than 1,000 years of rapidly fluctuating precipitation. Although there were chaotic extremes of high and low annual rainfall averages, the trend was toward drier conditions that persist to the present (Haug et al. 2001). Amid this variable rainfall, the diversity of fossil pollen increased with the addition of wind-pollinated forbs and

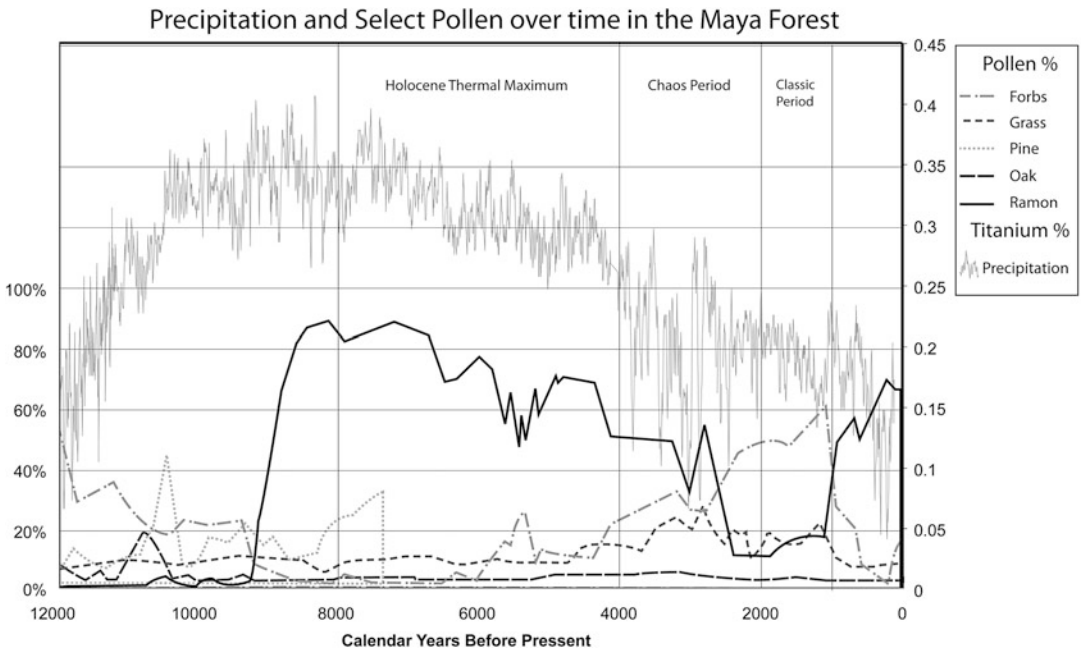

The Maya, Fig. 5 Precipitation and select pollen over time in the Maya forest

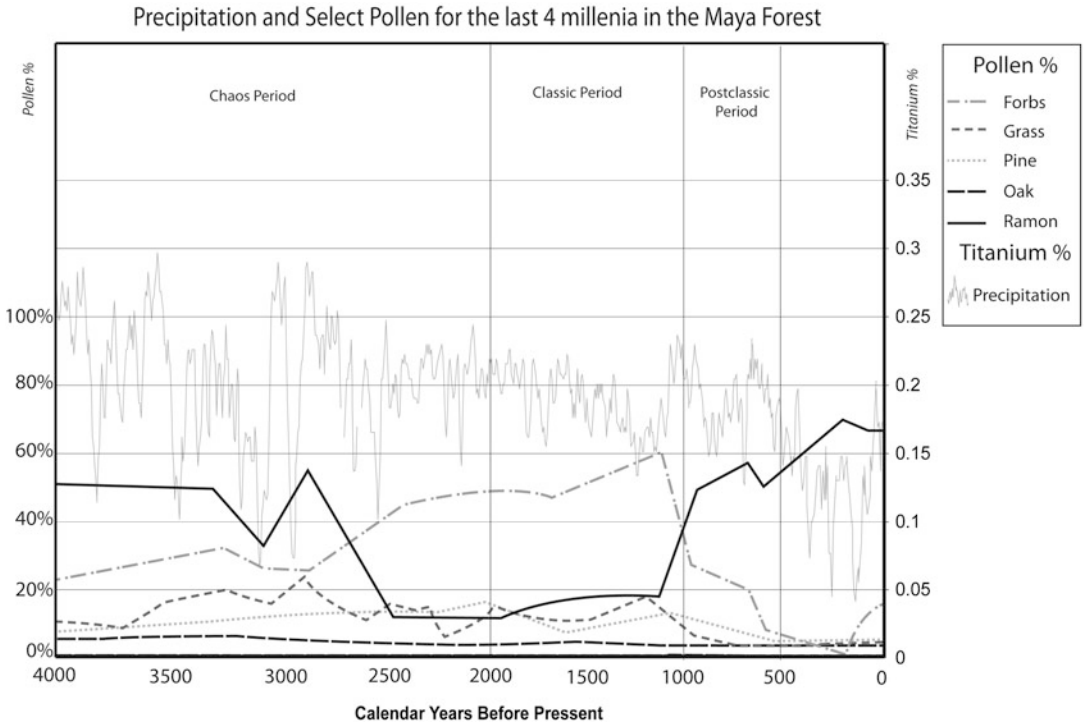

The Maya, Fig. 6 Precipitation and select pollen for the last four millenia in the Maya forest

grasses. This increase in forb and grass pollen occurred relative to wind-pollinated trees coincided with the initial appearance of Maya clay (Mueller et al. 2010), which was interpreted as the result of local soil erosion into lakes and swamps.

3,000–2,000 Years Ago: Precipitation remained chaotic at the start of this period, but by 2,000 BP, rainfall stabilized under somewhat drier conditions, which are suggested by a decrease in titanium concentrations in the Cariaco core. The composition and relative abundance of pollen taxa in sediments hint at even greater species diversity, with forbs becoming dominant elements in the forested landscape. At the same time, Maya clay rose to its highest levels (Mueller et al. 2010: 1226), which has been interpreted to reflect erosion from agricultural deforestation but could result from some other environmental change, such as drier conditions or internal shifts within the lakebed itself (Mueller et al. 2010).

2,000–1,400 Years Ago: Precipitation stabilized at rates lower than those noted for the Holocene Thermal Maximum. The pollen record comprises stable vegetation that continues to be dominated by forbs and grasses, with less than 20 percent originating from forest taxa (using the *Brosimum*-type Moraceae as the forest proxy, Leyden 2002). Maya clay formation also stabilized at moderate levels (Mueller et al. 2010). In all, it is noteworthy that the paleoenvironmental data suggest steady continuity for this period.

1,400–1,100 Years Ago: There were few changes in pollen and sediment inputs at this time (see also Ford and Nigh 2015: 77–96), yet new data on precipitation suggest more variability in rainfall. Interpretations during this stable period in Maya prehistory continue to emphasize deforestation yet suggest that this unsustainable process began at least two millennia earlier (Turner and Sabloff 2012). A careful reading of the data, however, indicates continuity in the paleoenvironmental indicators: forbs make up the majority of the wind-pollinated pollen, with grasses and *Brosimum*-type Moraceae each making up less than one-fifth of the record.

1,100–800 Years Ago: No dramatic climatic changes have been resolved for this critical period of Maya prehistory, despite the search for evidence of drought and other environmental impacts. Precipitation was stable, with some rise in levels of titanium suggesting increased rainfall (Haug et al. 2001). Maya clay is present, grasses are registered, and forbs dominate vegetation; all this is interpreted as the result of continued deforestation, yet the complex matrix of the milpa-forest garden could account well for these facts.

800–500 Years Ago: The centuries leading up to the Spanish conquest show major shifts in pollen indicators, with the rise of *Brosimum*-type Moraceae and a drop in forbs. There is continuity in the grasses. Rainfall, as interpreted from the Cariaco Basin and Petén Lake cores, increased at this time, presumably improving annual farming conditions, especially in the dryer north. Yet these data have been interpreted as the rebounding of tree cover in the *absence* of farmers, which has hardly been proven. While the *Brosimum*-type Moraceae pollen does increase in the record, this likely marks a simple change in the *Brosimum* habitat. *Brosimum* is a vanguard pioneer plant, which is evident in its marker of the expansion of the tropics 8,000 years ago. The new habitat for *Brosimum* was most likely the result of collapsing temples and palaces, which provide an ideal habitat for Ramon. Population abandonment is also inconsistent with Cortés's observations at the time of the conquest. The so-called Classic Maya collapse lasted centuries (Webster 2002), and although the major centers ceased to be maintained, farmers could have simply stayed in their forest gardens.

An overview of the Maya chronology exalts the cultural developments but levies a charge of poor environmental management for the same acclaimed culture. Mesoamerica and the Maya forest today are a biodiverse conservation hotspot. With more than 24,000 plants, it is the most biodiverse tropical forest in the

Northern Hemisphere (Table 2). Dominated by plants that are useful to people (Table 3), it is evident that the Maya forest is a garden, a quality that could only be achieved by millennia of selection by human inhabitants. This conclusion has been debated (Lentz et al. 2015, Turner and Sabloff 2012) but can be corroborated by studies that show, from the tallest trees down to the smallest shrubs and herbs, the forest's qualities reflect uses that are still commonly known to the region's traditional farming families (Ross 2011). An examination of the milpa-forest garden cycle sheds light on the landscape of the Maya forest in the past and present.

The Maya, Table 2 Biodiversity of four continents

Region	Plant diversity
West Africa	9,000
Southeast Asia	12,000
Mesoamerica	24,000
Amazon	48,000

The Maya Milpa-Forest Garden Cycle: Landscape Correspondence

The adaptation and resilience of the forest garden-milpa cycle provides insight into an alternative explanation of Maya cultural and paleoenvironmental chronology. The milpa is the core of the innovative Maya forest garden, a system that developed over eight millennia of dwelling in a tropical forest environment. The foundations for milpa agriculture were created in Archaic times, and the flexible qualities that characterize the milpa cycle were developed during conditions of climate change. The milpa evolved as a sustaining system that was imminently conducive to intensified production based on skill and increasing labor input (Ford et al. 2009; Ford and Nigh 2015: 97–124). Adapted to the extremes of deluge and drought that dominated the millennium from 4,000 to 3,000 years ago, the system thrived in the Classic period at a time of relative precipitation stability and Maya civilization flourished.

The Maya, Table 3 Dominant plants of the Maya forest

Scientific name	Common name	Pollinator	Uses
Alseis yucatanensis	Wild mamey	Moths	Food
Aspidosperma cruentum	Malerio	Insects	Construction
Attalea cohune [a]	Corozo	Insects	Food
Brosimum alicastrum[a]	Ramon	Wind	Food
Bursera simarouba[a]	Chaca	Bees	Medicine
Cryosophila stauracantha	Escoba	Beetles	Production
Licania platypus	Succotz	Moths	Food
Lonchocarpus castilloi	Manchich	Insects	Construction
Manilkara zapota[a]	Chicle	Bats	Food
Piscidia piscipula	Jabin	Bees	Poison
Pouteria campechian	Zapotillo	Insects	Food
Pouteria reticulata	Zapote negro	Insects	Food
Sabal morrisiana[a]	Escoba	Insects	Production
Simira salvadorensi[a]	Palo colorado	Moths	Construction
Spondias radlkoferi	Jocote	Insects	Food
Swietenia macrophylla	Mahogany	Insects	Construction
Tabebuia rosea	Macuelizo	Bees	Construction
Talisia oliviformis[a]	Kinep	Bees	Food
Vitex gaumeri	Yaxnik	Bats	Construction
Zuelania guidonia	Tamay	Bees	Medicine

[a]Dominant in home gardens

The annual agricultural round and the milpa-forest garden cycle intimately adjusted to the annual drought. Resilient under extreme conditions, the only drought extreme enough to wreak havoc on the Maya coincided with the Spanish conquest. Known as the Little Ice Age, the droughts were more extreme than at any other time in the Holocene (Fig. 6). These droughts combined with the impositions of the Spanish to undermine Maya life ways spread famine across the northern Maya area. Effective to this day, the Maya milpa-forest garden cycle prevails as an adaptive and resilient strategy, recognized as the most diverse domestic food production system in the world (Campbell 2007).

The consequence of this interrelationship between the forest and the Maya is an anthropogenic landscape (Atran 1993) that resulted from generations of environmental management and was responsive to critical human needs during the precipitation chaos that marked the millennium after 4,000 years ago. The principal tool of the Maya forest garden is the Mesoamerican agrarian system commonly known as the milpa (Wilken 1987). The milpa is widely misunderstood but forms the axis of resilient Maya natural resource management systems (Terán and Rasmussen 2008).

The active gardens found around Maya forest villagers' homes show the diversity of the milpa as a domestic food production system. Even today, after the great Columbian Exchange that followed the Spanish conquest and the development of the global economy, Maya home gardens contain a bewildering array of fruits, wood, spices, fodder, medicine, ornamentals, and more. This inspiring evidence of selection and enrichment is a fundamental part of the forest and the adaptations of the Maya people to their environment.

Cycling from closed forest canopy to an open milpa, from a field of annual crops to an orchard garden, and from an orchard garden back to the closed canopy, the traditional Maya forest garden-milpa cycle builds resilience into the system of land use. All phases of the cycle receive careful human attention, and varying the input of labor and forest-succession management can be used to intensify production of desired products at every stage of the cycle.

The agroforestry management of the milpa cycle is initiated in closed-canopy forest when a clearing is opened with cutting tools and fire, the same level of technology possessed by the first inhabitants of the Americas. The first years in the milpa cycle involve annual cropping of fields, which are visually dominated by maize but include many companion crops selected from over 100 cultigens (Ford and Nigh 2015: Appendix I; Nations and Nigh 1980; Terán and Rasmussen 2008). The milpa includes its own ecology that deters pests, enhances soil nutrients, and maintains soil moisture. The selection of trees and bushes for succession begins before the end of the annual crops phase, and it is this intensity that determines the rate and floral composition of later phases. The Maya shape the forest to their needs and create the forest garden through acts of enrichment, selection, and planting in later phases of succession.

Each phase of the forest garden-milpa management cycle varies according the preferences and needs of the farmers (Table 4). The primary goal of producing food and household products is important in the initial clearing and planting phase as well as in the succeeding phases. The long-term sustainability is increased with each round of investment by managing soil properties to increase fertility and selecting a diverse range of useful plants to become part of the home economy. There is only one hot burn per cycle at the initial clearing of the milpa. Subsequently, judicious use of fire increases biochar content and guarantees fertility throughout the cycle. Managed natural regeneration includes selection of desirable species, and the exclusion of undesired plants, which alter the floral composition to favor plants valued by Maya farmers for household needs. At any given time in traditional Maya farming communities, less than 25% of cultivable land will be in the open annual crop phase, while other areas, once dedicated to milpa, will be under forest cover in managed stages of succession, emphasizing the wide variety of products needed including food, construction, medicine, materials, and more.

The Maya, Table 4 Dominant plants of the milpa-forest garden cycle from the Maya forest[a]

Milpa cycle	Dominant plants (Wind-pollinated spp. indicated in bold)
Open multi-crop maize field ~ favoring sun Phase 1 initialization (1–4 years)	Cultigens: ~99 spp. such as *Capsicum* spp., ***Chenopodium ambrosioides* L.**, *Cnidoscolus* spp., *Cucurbita* spp., ***Lycopersicon esculentum* Mill.**, *Phaseolus* spp., *Xanthosoma yucatanense* Engl., ***Zea mays* L.** Several other genera found in Leguminosae Non-cultigens**:** ***Ambrosia* spp.**, ***Cecropia* sp.**, ***Mimosa* sp.**, ***Trema* sp.**, and several genera found in **Amaranthaceae, Asteraceae, Cyperaceae, Euphorbiaceae, Melastomataceae, Poaceae, Urticaceae**
Long-lived perennial reforestation ~ producing shade Phase 2 renewal cycle (4–12 years)	*Acacia cornigera* L. Wild, *Ananas comosus* L. Merr., *Annona muricata* L., *Attalea cohune* C., ***Brosimum alicastrum* Sw**., *Bucida buceras* L., *Cucurbita pepo* L., ***Bursera simaruba* L.**, *Byrsonima crassifolia* L. Kunth, *Calophyllum brasiliense* Cambess, *Carica papaya* L., ***Cecropia peltata* L.**, *Ceiba pentandra* L., *Cnidoscolus chayamansa* McVaugh, *Enterolobium cyclocarpum* Jacq. Griseb.,*Guarea glabra* Vahl, *Guazuma ulmifolia* Lam., *Hamelia patens* Jacq., *Manihot esculenta* Crantz, *Manilkara zapota* L. van Royen, *Opuntia cochenillifera* L. P. Mill, *Pachyrhizus erosus* L., *Persea Americana* P. Mill, *Pimenta dioica* L. Merr., *Pouteria sapota* Jacq. Moore & Stearn, *Psidium guajava* L., ***Quercus oleoides* Schltdl. & Cham**., *Sabal morrisian* Bartlett, *Simira salvadorensis* Standl., *Talisia oliviformis* Radlk.
Closed canopy ~ favoring shade Phase 3 culmination (>12 years)	*Alseis yucatanensis* Standley, *Aspidosperma cruentum* Woodson, *Attalea cohune* C. Mart, ***Brosimum alicastrum* Sw**, *Bursera simarouba* L.,*Cryosophila stauracantha* Heynh. R. Evans, *Licania platypus* Hemsley Fritsch, *Lonchocarpus castilloi* Standley, *Manilkara zapota* L. van Royen, *Piscidia piscipula* L. Sarg, *Pouteria campechiana* Kunth Baehni, *Pouteria reticulata* Engl., *Sabal morrisiana* Bartlett, *Simira salvadorensis* Standl, *Spondias mombin L.*, *Swietenia macrophylla* King, *Talisia oliviformis* Radlk, *Vitex gaumeri* Greenman, *Zuelania guidonia* Britton & Mill sp.

Note: Phase 1 is dominated by wind-pollinated taxa, and Phase 3 is dominated by biotically pollinated taxa
[a]Only native taxa are included. Based on Campbell et al. (2006). Bolded taxa are wind-pollinated taxa

The dynamic result of this agricultural cycle is a resilient system that builds a diversified mosaic landscape. Useful plants dominate the milpa and are encouraged to flourish in the successive forest stages managed by Maya farmers. This flexible and adaptive system coevolved with the development of the tropical forest in the Archaic, when the ancestral Maya became familiar with their landscape and the forest resources it could provide. The origins of this system lie in early adaptations to predictably warm and wet climate during the Holocene Thermal Maximum from 8,000 to 4,000 years ago. System resilience was creatively developed during the chaotic and unpredictable climates that characterized the Preclassic after 4,000 years ago. Evolved to mitigate both deluge and drought, the resulting system was an innovative adaptation that manages land cover, soil development, water and moisture, biodiversity, and forest products fundamental for livelihoods. The forest garden-milpa cycle is both flexible and sustainable and has served contemporary Maya farmers much as it did their ancestors for millennia. The prosperity of the Classic period speaks directly to the success of this system and the ingenuity of the culture that invented it.

The Fundamentals

The agricultural civilization of the Maya emerged naturally within the context of the Maya forest and the tropical lowland ecosystem of southern Mexico's Yucatan Peninsula, Petén of Guatemala, and Belize (cf. Conklin 1957). These forests were

once considered pristine, but as we know now, they constitute a highly structured and managed environment. Geographers and botanists now recognize that humans, over the course of millennia, have influenced the vegetation of the Maya forest through intervention in processes of ecological succession. Human impact on the forest today is largely expressed through European practices of cattle pasture and plowing, which together threaten the integrity and biodiversity of this important natural resource. In many respects, the population-deforestation relationship playing out in the Maya forest now is exactly what has been said to have happened a thousand years ago. But how can that be, if there were no sheep, cattle, or plows during the period in question?

Despite broad recognition of human impacts on the Maya forest by scholars, they disagree on the timing and nature of these impacts. Turner and Sabloff (2012), summarizing current interpretations of received wisdom, posit that lowland Maya interactions with the forest culminated in expanded clearing for agricultural fields and were so environmentally destructive that they caused the collapse of Classic Maya civilization in the ninth century. This interpretation is in line with Webster's (2002) conclusion that the Maya are reenacting the same story today. He implies that the milpa system is at the root of contemporary threats, but he refers to satellite imagery that clearly exposes the expansion of cattle pasturage, *not* milpa farming (Brook and Knudsen 2014). While most studies of the Maya assume that the collapse of the civilization was related to deforestation by people, the Maya forest today is known for its diversity and abundance of useful plants that remain as beneficial now as they were in the past.

Amid the expansion of "conventional" monoculture cropping based on European agricultural production founded on the plow, the traditional Maya farmers continue to practice hand cultivation based on local ecological knowledge. What is behind the historical ecological transformation of the Maya forest? How can the prehistory of the Maya people provide the background for understanding this transformation? Where are the lessons to be learned? How can we build on the inherent values of local knowledge for incorporation into our future adaptations? These questions clearly need to be considered if archaeology is to shed any light on the conservation challenges we face today.

References

Alexander, Rani T. 2006. Maya settlement shifts and Agrarian ecology in Yucatán. *Journal of Anthropological Research* 62: 23.

Atran, Scott. 1993. Itza Maya tropical agro-forestry. *Current Anthropology* 34 (5): 633–700.

Bullard, William R., Jr. 1960. Maya settlement pattern in Northeastern Petén, Guatemala. *American Antiquity* 25 (3): 355–372.

Chase, Arlen F., et al. 2011. Airborne LiDAR, archaeology, and the ancient Maya landscape at Caracol, Belize. *Journal of Archaeological Science* 38: 387–398.

Coe, William R. 1990. Tikal Report No. 14 Excavations in the Great Plaza, North Terrace and North Acropolis of Tikal V.1. Vol. 1: The University Museum.

Conklin, Harold. 1957. *Hanunóo agriculture: A report on an integral system of shifting cultivation in the Philippines*. Rome, Italy: FAO Food and Agriculture Organization of the United Nations.

Cortés, Hernán. 1985[1524]. *Cartas de Relación*. Madrid: Dastin, S.L.

Culbert, T. Patrick, and Don Stephan Rice. 1990. *Precolumbian population History in the Maya Lowlands*. Albuquerque, New Mexico: University of New Mexico Press.

Farriss, Nancy M. 1992. Maya society under colonial rule: The collective enterprise of survival. In *Princeton*. New Jersey: University of Princeton Press.

Fedick, Scott L. 1989. The economics of agricultural land use and settlement in the upper Belize river valley. In *Prehistoric Maya economies of Belize*, Research in Economic Anthropology, Supplement no. 4, ed. P.A. McAnany and B.L. Isaac, 215–254. Greenwich: JAI Press.

Fedick, Scott L., and Anabel Ford. 1990. The prehistoric agricultural landscape of the central Maya Lowlands: An examination of local variability in a regional context. *World Archaeology* 22: 18–33.

Ford, Anabel. 1986. *Population growth and social complexity: An examination of settlement and environment in the central Maya Lowlands*. Tempe, AZ: Arizona State University.

Ford, Anabel. 1996. Critical resource control and the rise of the classic period Maya. In *The managed mosaic:*

Ancient Maya agriculture and resource use, ed. S.L. Fedick, 297–303. Salt Lake City, Utah: University of Utah Press.

Ford, Anabel, and Ronald Nigh. 2015. *The Maya forest garden: Eight millennia of sustainable cultivation in the tropical woodlands*. Santa Rosa, CA: Left Coast Press.

Ford, Anabel, and William I. Rose. 1995. Volcanic ash in ancient Maya ceramics of the limestone Lowlands: Implications for prehistoric volcanic activity in the Guatemala highlands. *Journal of Volcanology and Geothermal Research* 66 (1–4): 149–162.

Ford, Anabel, Keith C. Clarke, and Gary Raines. 2009. Modeling settlement patterns of the late classic Maya with Bayesian methods and GIS. *Annals of the Association of American Geographers* 99 (3): 496–520.

Gutiérrez, Zetina, María de Guadalupe, and Betty Bernice Faust. 2011. De la Agroecología a la Arqueología Demográfica: ¿Cuántas Casas por Familia? *Estudios de Cultura Maya* 38: 97–120.

Hansen, Richard D. 2005. Perspective on Olmec-Maya interaction in the middle formative period. In *New perspectives on formative Mesoamerican cultures*, Vol. BAR International Series, ed. T.G. Powis, 51–72. Oxford, UK: Archaeopress.

Haug, Gerald H., et al. 2001. Southward migration of the intertropical convergence zone through the Holocene. *Science* 293 (5533): 1304–1308.

Horn III, Sherman W. 2015. The web of complexity: Socioeconomic networks in the middle preclassic Belize valley. Ph.D dissertation, Tulane University.

Iannone, G., ed. 2014. *The great Maya droughts in cultural context: Case studies in resilience and vulnerability.* Boulder: University Press of Colorado.

Jones, Grant D. 1998. *The conquest of the last Maya kingdom*. Stanford: University of Stanford Press.

Lentz, David L., Nicholas P. Dunning, and Vernon L. Scarborough, eds. 2015. *Tikal: Paleoecology of an ancient Maya city.* New York: Cambridge University Press.

Leyden, Barbara W. 2002. Pollen evidence for climatic variability and cultural disturbance in the Maya Lowlands. *Ancient Mesoamerica* 13 (1): 85–101.

Lohse, Jon C. 2010. Archaic origins of the lowland Maya. *Latin American Antiquity* 21 (3): 312–352.

Lucero, Lisa J., et al. 2014. Water and landscape: Ancient Maya settlement decisions. In *The resilience and vulnerability of ancient landscapes: Transforming Maya archaeology through IHOPE*, ed. A.F. Chase and V.L. Scarbororugh, 30–42. Hoboken, New Jersey: Wiley.

McAnany, Patricia Ann. 1995. *Living with the ancestors: Kinship and kingship in ancient Maya society.* Austin: University of Texas Press.

Mueller, Andreas D., et al. 2010. Late quaternary palaeoenvironment of northern Guatemala: Evidence from deep drill cores and seismic stratigraphy of Lake Pete´n Itza. *Sedimentology* 57: 1220–1245.

Nations, James D., and Ronald Nigh. 1980. The evolutionary potential of Lacandon Maya sustained-yield tropical forest agriculture. *Journal of Anthropological Research* 36 (1): 1–30.

Pendergast, David M. 1981 Lamanai, Belize: Summary of excavation results, 1974–1980. *Journal of Field Archaeology* 8 (1): 29–53.

Puleston, Dennis Edward, and Olga Stavrakis Puleston. 1971. An ecological approach to the origins of Maya civilization. *Archaeology* 24 (4): 330–337.

Robin, Cynthia, ed. 2012. *Chan: An ancient Maya farming community.* Gainesville: University Press of Florida.

Rosenswig, Robert M. 2004. The Late Archaic occupation of northern Belize: New archaeological. *Research Reports in Belizean Archaeology* 1: 267–277.

Ross, Nanci J., and Thiago F. Rangel. 2011. Ancient Maya agroforestry echoing through spatial relationships in the extant forest of NW Belize. *Biotropica* 43 (2): 141–148.

Schulze, Mark D., and David F. Whitacre. 1999. *A classification and ordination of the tree community of Tikal National Park, Petén, Guatemala*. Vol. 41. Gainsville: University of Florida.

Schwartz, Norman B. 1990. *Forest Society: A Social History of Petén, Guatemala*. Philadelphia: University of Pennsylvania Press.

Terán, Silvia, and Christian H. Rasmussen. 2008. *Jinetes del Cielo Maya: Dioses y Diosas de la Lluvia en Xocen*. Merida: Ediciones de la Universidad Autonoma de Yucatán.

Turner, I.I., Billie Lee, and Jeremy A. Sabloff. 2012. Classic period collapse of the central Maya Lowlands: Insights about human–environment relationships for sustainability. *Proceedings of the National Academy of Science* 109 (35): 13908–13914.

Voorhies, Barbara. 1982. An ecological model of the early Maya of the central Lowlands. In *Maya subsistence: Studies in memory of Dennis Edward Puleston*, Studies in archaeology, ed. K.V. Flannery, 65–95. New York: Academic Press.

Webster, David L. 2002. *The fall of the ancient Maya: Solving the mystery of the Maya collapse*. London: Thames & Hudson.

Wilken, Gene C. 1987. *Good farmers: Traditional agricultural resource management in México and central America*. Berkeley: University of California Press.

Further Readings

Aimers, James, and David Hodell. 2011. Societal collapse: Drought and the Maya. *Nature* 479: 44–45.

Balée, William. 2006. The research program of historical ecology. *Annual Review of Anthropology* 35: 75–98.

Binford, Michael W., Mark Brenner, Thomas J. Whitmore, Antonia Higuera-Gundy, E.S. Deevey, and Barbara Leyden. 1987. Ecosystems, paleoecology and human disturbance in subtropical and tropical America. *Quaternary Science Reviews* 6 (2): 115–128.

Bray, Francesca. 1994. Agriculture for developing nations. *Scientific American* 271 (1): 30–37.

Brumfiel, Elizabeth M., and Timothy K. Earle. 1987. Specialization, exchange, and complex societies: An introduction. In *Specialization, exchange, and complex societies*, ed. E. Brumfiel and T.K. Earle, 1–9. Cambridge: Cambridge University Press.

Campbell, David G., Anabel Ford, Karen Lowell, Jay Walker, Jeffrey K. Lake, Constanza Ocampo-Raeder, Andrew Townesmith, and Michael Balick. 2006. The feral forests of the eastern Petén. In *Time and complexity in the neotropical lowlands: Studies in historical ecology*, ed. W. Balée and C. Erickson, 21–55. New York: Columbia University Press.

Chase, Arlen F., and Vernon L. Scarborough. 2014. Resiliency, and IHOPE-Maya: Using the past to inform the present. In *The resilience and vulnerability of ancient landscapes: Transforming maya archaeology through IHOPE*, ed. A.F. Chase and V.L. Scarborough, 1–10. Hoboken: Wiley.

Clark, John E., and David Cheetham. 2002. Mesoamerica's tribal foundations. In *The archaeology of tribal societies*, ed. W.A. Parkinson, 278–339. Ann Arbor: Archaeological Series International Monographs in Prehistory.

Conklin, Harold. 1957. *Hanunóo agriculture: A report on an integral system of shifting cultivation in the Philippines*. Rome: FAO Food and Agriculture Organization of the United Nations.

Diaz, Bernal. 1963. *The conquest of New Spain*. Trans J. M. Cohen. Penguin classics. New York: Penguin Books.

Dunning, Nicholas, Timothy Beach, Sheryl Luzzadder-Beach, and John G. Jones. 2009. Creating stable landscape: Soil conservation and adaptation among the Maya. In *The archaeology of environmental change*, ed. C.T. Fisher, J.B. Hill, and G.M. Feinman, 85–105. Tucson: University of Arizona Press.

Fletcher, Roland. 2009. Low-density, agrarian-based uranism: A comparative view. *Insight* 2: 2–19.

Ford, Anabel. 1986. *Population Growth and Social Complexity: An Examination of Settlement and Environment in the Central Maya Lowlands*. Anthropological Research Papers No. 35 35. Arizona State University, Tempe, AZ.

Ford, Anabel. 1991. Problems with the evaluation of population from settlement data: Examination of ancient Maya residential patterns in the Tikal-Yaxhá intersite area. *Estudios de Cultura Maya* 18: 157–186.

Freidel, David A., and Linda Schele. 1988. Kingship in the late preclassic Maya Lowlands: The instruments and places of ritual power. *American Anthropologist* 90 (3): 547–567.

Gardens, Kew 2017 The International Plant Name Index, Genus = *Theobroma*. http://www.ipni.org/index.html, pp. The International Plant Names Index (IPNI) is a database of the names and associated basic bibliographical details of seed plants, ferns and lycophytes, vol. 2017. Kew Gardens, IPNI.

González González, Arturo H., Carmen Rojas Sandova, Alejandro Terrazas Mata, Martha Benavente Sanvicente, Wolfgang Stinnesbeck, O. Jeronimo Aviles, Magdalena de los Ríos, and Eugenio Acevez. 2008. The arrival of humans on the Yucatan Peninsula: Evidence from submerged caves in the state of Quintana Roo, Mexico. *Current Research in the Pleistocene* 25: 1–24.

Heckenberger, Michael J., J. Christian Russell, Carlos Fausto, Joshua R. Toney, Morgan J. Schmidt, Edithe Pereira, Bruna Franchetto, and Afukaka Kuikuro. 2008. Pre-Columbian urbanism, anthropogenic landscapes, and the future of the Amazon. *Science* 321 (5893): 1214–1217.

Iceland, Harry B. 1997. *The preceramic origins of the Maya: The results of the Colha preceramic*. Project in Northern Belize. Department of Anthropology, University of Texas at Austin, University Microfilms, Ann Arbor.

Iceland, Harry B. 2005. The preceramic to early middle formative transition in Northern Belize: Evidence for the ethnic identity of the preceramic inhabitants. In *New perspectives on formative mesoamerican cultures*, ed. T. G. Powis. BAR International Series, 1377 vols. Oxford, UK: Archaeopress.

IFord, Anabel, and Keith C. Clarke. 2015. Linking the past and present of the ancient Maya: Lowland land use, population distribution, and density in the late classic period. In *The Oxford handbook of historical ecology and applied archaeology*, ed. C. Isendahl and D. Stump, 28. Oxford: Oxford University Press.

Inomata, Takeshi, Daniela Triadan, Erick Ponciano, Estela Pinto, Richard E. Terry, and Markus Eberl. 2002. Domestic and political lives of classic Maya elites: The excavation of rapidly abandoned structures at Aguateca, Guatemala. *Latin American Antiquity* 13 (3): 305–330.

Jones, John G. 1994. Pollen evidence for early settlement and agriculture in Northern Belize. *Palynology* 18: 205–211.

Kellman, Martin, and Rosanne Tackaberry. 1997. *Tropical environments: The functioning and management of tropical ecosystems*. New York: Routledge.

Kennett, Douglas J., Sebastian F.M. Breitenbach, Valorie V. Aquino, Yemane Asmerom, Jaime Awe, James U.L. Baldini, Patrick Bartlein, Brendan J. Culleton, Claire Ebert, Christopher Jazwa, Martha J. Macri, Norbert Marwan, Victor Polyak, Keith M. Prufer, Harriet E. Ridley, Harald Sodemann, Bruce Winterhalder, and Gerald H. Haug. 2012. Development and disintegration of Maya political systems in response to Climate Change. *Science* 85. http://www.sciencemag.org/content/338/6108/6788.full.

Lambert, J.D.H., and J.T. Arnarson. 1982. Ramon and Maya ruins: An ecological not an economic relation. *Science* 216 (4543): 298–299.

Lohse, Jon C., Jaime Awe, Cameron Griffith, Robert M. Rosenswig, and Fred Valdez. 2006. Preceramic occupations in Belize: Updating the Paleoindian and archaic record. *Latin American Antiquity* 17 (2): 209–226.

Pendergast, David M. 1981. Stability through change: Lamanai, Belize, from the ninth to the seventeenth century. In *Late Lowland Maya civilization: Classic to postclassic*, ed. Jeremy A. Sabloff, E. Wyllys, and V. Andrews. Albuquerque: University of New Mexico Press.

Pohl, Mary D., Kevin O. Pope, John G. Jones, John S. Jacob, Dolores R. Piperno, Susan D. de France, David L. Lentz, John A. Gifford, Marie E. Danforth, and J. Kathryn Josserand. 1996. Early agriculture in the Maya Lowlands. *Latin American Antiquity* 7 (4): 355–372.

Puleston, Dennis Edward.1973. Ancient Maya settlement patterns and environment at Tikal, Guatemala: Implications for subsistence models. Ph.D. thesis, Department of Anthropology, University of Pennsylvania.

Rice, Don S. 1976. The historical ecology of lakes Yaxhá and Sacnab, El Petén, Guatemala. Ph.D. dissertation, Anthropology, Pennsylvania State University, University Park, State College.

Stinnesbeck, W., Julia Becker, Fabio Hering, Eberhard Frey, Arturo González González, Jens Fohlmeister, Sarah Stinnesbeck, Norbert Frank, Alejandro Terrazas Mata, Martha Elena Benavente, Jerónimo Avilés Olguín, Eugenio Aceves Núñez, Patrick Zell, and Michael Deininger. 2017. The earliest settlers of Mesoamerica date back to the late Pleistocene. *PLoS One* 12 (8): e0183345.

Tambiah, Stanley J. 1976. The galactic polity: The structure of traditional kingdoms in Southeast Asia. *Annals New York Academy of Sciences* 293: 69–97.

West, Robert C. 1964. Surface configuration and associated geology of Middle America. *Handbook of Middle American Indians* 1: 33–83.

White, D.A., and C.S. Hood. 2004. Vegetation patterns and environmental gradients in tropical dry forests of the Northern Yucatán Peninsula. *Journal of Vegetation Science* 15 (2): 151–160.

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Basic Biographical Information

Isabel McBryde is an Australian archaeologist. She was educated at the Presbyterian Lady's College, East Melbourne, and at Melbourne University, graduating with honors in 1957. In 1957, she was awarded a postgraduate scholarship, and in 1958 held a temporary lectureship at the University of New England. In 1959, she won the Jessie Webb Scholarship which enabled her to study at the British School in Athens after gaining a Diploma in Prehistoric Archaeology from Cambridge. In 1960, she graduated with an M.-A. Honors (I) in the School of Classical Studies, University of Melbourne.

From 1960 to 1973, Isabel was in turn the first Lecturer, Senior Lecturer, and Associate Professor in Charge of Prehistory, University of New England. She established courses in prehistory at all levels, and initiated and directed a groundbreaking program of regional research in archaeology and ethnohistory in northern New South Wales, with student field training. In 1967, she was awarded a Ph.D. by this University.

From 1974 to 1994, she was in turn Senior Lecturer, Reader, and Professor of Archaeology, at the Department of Archaeology and Anthropology, The Faculties, Australian National University, where she continued her extensive research, taught and mentored many students, and actively promoted links between Archaeologists and Indigenous people including the entry of Indigenous students into archaeology.

In 1994, Isabel retired from the university with the title of Professor Emerita and is a School Visitor in the History Program in the Research School of Social Sciences and a Visiting Fellow in the School of Archaeology and Anthropology at the Australian National University.

Throughout the course of her busy and fruitful academic career, Isabel has also been very active in a range of national and other seminal committees and boards and in doing so, she played a very significant role in the development of archaeology and cultural heritage management in Australia. Some of her most important roles included being a Member of the Prehistory Advisory Committee, Australian Institute of Aboriginal Studies, from 1964 to 1976, Member and sometimes Chair of Aboriginal Relics Advisory and then of the Interim Aboriginal Sites Advisory Committee (National Parks and Wildlife Service NSW) from 1970 to 1985, and Member, NSW Aboriginal Cultural Heritage Interim Committee (NSW NPWS and NSW State Land Council) 1993–1996, a member of Council of the Australian Academy of the Humanities from 1981 to 1983, a Commissioner of the Australian Heritage Commission from 1982 to 1988, in turn member of the Consultative Committee on the Plan of Management, of the Subcommittee on Research and of the Technical and Scientific Advisory Committee – Willandra Lakes Region World Heritage Area between 1984 and 1998, a member of the Advisory Committee to the Aboriginal Liaison Officer and Aboriginal Students Centre and then member, of the Australian National University's Consultative Committee on Aboriginal Education, 1987–1998, and member of the Board of Management of Uluru/Kata Tjuta National Park, 1996–2001.

Major Accomplishments

Isabel McBryde is a founder of the discipline of archaeology in Australia, and a significant proponent and practitioner of archaeology as multifaceted, and multidisciplinary with a contemporary social relevance. She has a deep commitment to the responsibilities which this brings. Her pioneering work has contributed immensely to Australian archaeology as we know it today (Macfarlane et al. 2005).

There was no precedent for her earliest research work in Australia. In contrast to many of her colleagues who limited their research to the excavation of promising sites, Isabel undertook a regional study of northern New South Wales which encompassed all types of site patterns and their distribution, ethnographic work, linguistics, geography, museum studies, and environmental zonation, followed by excavations informed by this detailed regional research. This rich, multifaceted regional work, its involvement of locals, and its fine-grained study of an astonishing range of evidence, all made it a model for Australian archaeological studies and gives us a seldom achieved picture of the Aboriginal presence in and cultural adaptation to the landscapes of northern New South Wales (McBryde 1974, 1978). Other spin-offs from this work include her meticulous and exemplary studies of early photographs of Aboriginal people, of first settler reminiscences, and of Australian Aboriginal ethnographic specimens from across the world located, provenanced, documented, and interpreted by her during her many international study tours (Macfarlane et al. 2005). Her early petrological work with R.A. Binns was also the first of its kind in Australia and a landmark publication (Binns and McBryde 1972). She is a national and international leader in studies of the social meaning and context of artifacts. A multifaceted approach to fieldwork also characterized her work with stone artifacts, quarries, and with trade and exchange networks. In this work, she traced and explained for the first time the dynamics and social determinants of these networks and in doing so gave story and meaning back to the Australian landscape (see, for instance, McBryde 1984, 1997, 2000).

Landscape has been of particular concern for Isabel – especially the landscape of hunter-gatherers which she has actively and influentially promoted nationally and internationally through her writing, her involvement in the cultural landscape of World Heritage Areas, and her guidance in landscape management generally.

Isabel has been an important agent in early work in cultural heritage conservation generally. Historic, natural, and Aboriginal heritage, all received her attention through the wide

range of committees and boards where she was an active participant and seminal contributor.

Isabel involved local Aboriginal people in her 1975 excavations at Lake Arumpo, now part of the Willandra Lakes Region World Heritage Area (Macfarlane et al. 2005). This was symptomatic of a key theme of her research and teaching, which emerged early – the rights of Aboriginal people to the custodianship of their heritage, including their right to a decisive voice in archaeological research in Australia (See, for example, McBryde 1985 and 1986). She has written about, lobbied for, and actively promoted this position, sometimes in difficult and contentious circumstances. She has been very influential in the rapprochement and cooperation between Aboriginal people and archaeologists which with some exceptions has come to characterize Australian archaeology. Her leadership at the Australian National University produced outstanding success in training young Aboriginal people as archaeologists (Macfarlane et al. 2005).

Isabel's contribution to archaeology and cultural heritage management has been nationally recognized. In 1990, she became an Officer of the Order of Australia and received a D. Litt. (*hon. causa*) from the University of New England in 1992. In 2003, she received a Centenary medal, and was awarded the Rhys Jones Medal – the Australian Archaeological Association's highest award. She has been awarded Honorary Life Memberships by the Australian Archaeological Association, Australia ICOMOS, and the Canberra Archaeological Society.

Cross-References

- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage Conservation Training
- ▶ Indigenous Archaeologies
- ▶ Indigenous Peoples, Working with and for
- ▶ Landscape Archaeology

References

Binns, R.A., and I. McBryde. 1972. *Petrological analysis of ground edge artefacts from northern New South Wales*. Canberra: Australian Institute of Aboriginal Studies.

Macfarlane, I., M. Mountain, and R. Patron. 2005. *Many exchanges: Archaeology, history, community and the work of Isabel McBryde*, Aboriginal history monograph. Vol. 11. Canberra: Aboriginal History Inc.

McBryde, I. 1974. *Aboriginal prehistory in New England*. Sydney: Sydney University Press.

McBryde, I., ed. 1978. *Records of times past: Ethnohistorical essays on the culture and ecology of the New England tribes*. Canberra: Australian Institute of Aboriginal Studies.

McBryde, I. 1984. Kulin greenstone quarries: The social contexts of production and distribution. *World Archaeology* 16 (3): 267–285.

McBryde, I., ed. 1985. *Who owns the past?* Melbourne: Oxford University Press (Reprint 1986).

McBryde, I. 1986. Australian's once and future archaeology. *Archaeology in Oceania* 21 (1): 13–28.

McBryde, I. 1997. The landscape is a series of stories. Grindstones, quarries and exchange in Aboriginal Australia: A Lake Eyre case study. In *Siliceous rocks and culture*, Monographs on art and archaeology, ed. A. Ramos-Millan and M.A. Bastillo, 587–607. University of Granada: Granada.

McBryde, I. 2000. "Barter ..... immediately commenced to the satisfaction of both parties". Cross-cultural exchange at Port Jackson, 1788–1828. In *The archaeology of difference: Negotiating cross-cultural engagements in Oceania*, ed. R. Torrence and A. Clarke, 238–277. London: Routledge.

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Basic Biographical Information

Fred McCarthy was a pioneering Australian archaeologist/anthropologist throughout the

twentieth century. He was born in 1906 in Petersham, Sydney. At the age of fourteen, McCarthy left schooling and took a position as a library clerk at the Australian Museum, Sydney. In 1930 McCarthy was transferred to the Department of Birds and Reptiles where he stayed for 18 months (Kahn 1993). In 1931 he produced his first research paper, "Lake Burrill and How Our Coastal Lakes Were Formed" (McCarthy 1931). In 1932 McCarthy was offered a position as Assistant Curator of Anthropology under W.W. Thorpe (Khan 1993). Thorpe died within months of taking the position and subsequently McCarthy took over curatorship of the entire anthropology collection. In 1933 McCarthy enrolled at Sydney University and undertook a Diploma of Anthropology under Professor A. P. Elkin. His first published excavation was on a rockshelter near Emu Plains in 1934. In 1935 his thesis, *The Material Culture of Eastern Australia. A Study of Factors Entering into Its Composition*, was accepted by Sydney University. Fred McCarthy and his future wife, Elsie Bramell, were the first university-trained anthropologists employed at the Australian Museum to manage the anthropology collections.

Between 1935 and 1936 McCarthy and C.C. Towel undertook excavation at Lapstone Creek in New South Wales. It was the first site in New South Wales in which culture periods were defined on the basis of stratigraphy (McCarthy 1948; Kahn 1993). Other fieldwork conducted throughout McCarthy's career covered areas such as the New South Wales east coast, western New South Wales, Arnhem Land in Northern Territory, Cape York in Queensland, and northwest Western Australia. Throughout these regions McCarthy undertook excavations, the recording of rock art, and ethnographic studies (Attenbrow 1998).

In 1938 McCarthy attended the Third Congress of Prehistorians of the Far East in Singapore with Norman Tindale and Dermot Casey (McBryde 1998). Here he presented a paper on observed relationships between Australian and Indonesian stone implements (McCarthy 1938a). This trip heralded a new era for McCarthy and on his return he began to press for the drafting of legislation to protect Aboriginal sites in New South Wales (McCarthy 1938b: 120–6). In 1946 McCarthy coauthored one of his best known works, *The Stone Implements of Australia*, with Bramell and Noone. In this volume they attempted the first systematic typological classification of Australian stone tools (McCarthy et al. 1946; Attenbrow 1998).

In 1948 McCarthy joined the Australian-American Scientific Expedition to Arnhem Land under the leadership of C. P. Mountford. Over 9 months McCarthy worked with Frank Setzler and Margaret McArthur conducting excavation and observing many aspects of Aboriginal life (Attenbrow 1998). McCarthy's work on food quest time factors was written with McArthur and remains a classic reference today (McCarthy and McArthur 1960). Throughout 1958 McCarthy studied rock art in north Western Australia and central-west New South Wales. In 1961 he also recorded totemic dances at Aurukun in north Queensland (Khan 1993).

In 1961 experts from many disciplines associated with Australian Aboriginal studies met at a research conference to discuss the founding of an institute for Aboriginal studies (Sheils 1963). McCarthy contributed through his knowledge of archaeology and material culture, and by the end of the meeting, an interim council had been appointed (Sheils 1963: 52–6, 171–94). By 1964 McCarthy was appointed as the Foundation Principal of the Australian Institute of Aboriginal Studies, now known as the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIAS Newsletter 1965: 1). He served as the principal of the institute until his retirement in 1971. McCarthy continued research into Aboriginal studies until his death in 1997.

Major Accomplishments

McCarthy's excavations at Lapstone (1935–1936) and Capertee (1958–1961) produced stratified stone artifact sequences that formed the basis for

his famous Eastern Regional Sequence (McCarthy 1948, 1964). This sequence consisted of three phases: Eloueran, Bondaian, and Capertian. Although regional variants were later found and Mulvaney promoted two pan-continental phases, McCarthy's tripartite sequence remains relevant today (Attenbrow 1998). In 1946 McCarthy, Bramell, and Noone published *The Stone Implements of Australia*, which was later revised and published as a book in 1976. This groundbreaking work attempted the first continent-wide typological classification of Australian stone artifacts.

McCarthy recorded many styles of rock art throughout Australia. His recordings of the Sydney-Hawkesbury sandstone region remain the only detailed documentation for many sites in this region and an invaluable source of information. Between 1958 and 1979 volumes of *Australian Aboriginal Rock Art* were published by the Australian Museum. It covered regional variants across Australia for engraved and pigmented sites and attempted to find a temporal sequence of styles (Attenbrow 1998). His final work *Artists of the Sandstone* contains ethnohistorical records of Aboriginal life in the Sydney area and is incredible for its wealth of knowledge and consistency.

McCarthy was pivotal in changing the focus of Australian Aboriginal exhibitions at the Australian Museum to encompass social, religious, and economic aspects of culture. He also established and maintained a catalogue of Australia wide sites with the Institute (AIATSIS). As early as 1938 he was drafting proposals to create legislation for protection of Australian Aboriginal sites.

In 1980 the Australian National University granted McCarthy an Honorary Doctorate of Sciences for his vast contribution to anthropological research in Australia. In 1990 he was made a fellow of the Australian Academy of the Humanities and in 1993 the Australian Museum devoted papers by contemporary researchers to commemorate his groundbreaking studies. That same year the Australian Archaeological Association conference in Darwin and its publications were dedicated to Fred McCarthy.

Fred McCarthy published more than 300 papers throughout his life and was pivotal to our contemporary understandings of Aboriginal studies. Over his career he paved the way for more ethical research and helped incorporate Aboriginal people into the decision-making processes around the recording and preserving of their culture.

Cross-References

- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Australian Paleoart
- ▶ Conservation and Management of Archaeological Sites
- ▶ Dampier Archipelago Petroglyphs
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Legislation in Archaeology: Overview and Introduction
- ▶ Rock Art, Forms of

References

AIAS Newsletter. 1965. *Australian Institute of Aboriginal Studies Newsletter* 2(1): 1.

Attenbrow, V. 1998. Frederick David McCarthy Obituary. *Australian Archaeology* 46: 40–42.

Khan, K. 1993. Frederick David McCarthy: An appreciation. In *F. D. McCarthy commemorative papers, ed.* J. Specht, Archaeology, anthropology, rock art. Records of the Australian Museum 17: 1–5.

McBryde, I. 1998. Frederick David McCarthy: 13 August 1905–18 November 1997. *Australian Aboriginal Studies* 1: 51.

McCarthy, F.D. 1931. Lake Burrill and how our coastal lakes were formed. *Australian Museum Magazine* 4 (7): 233–237.

McCarthy, F.D. 1934. A rock-shelter near Emu Plains: Result of excavation. *Man* 1 (10): 240–241.

McCarthy, F.D. 1935. Material culture of eastern Australia. *Man* 1 (11): 264–265.

McCarthy, F.D. 1938a. A comparison of the prehistory of Australia and that of Indo-China, the Malay Peninsula and the Netherlands East Indies. In *Proceedings of the Third Congress of Prehistorians of the Far East*, 30–50. Singapore: Australian Museum.

McCarthy, F.D. 1938b. Aboriginal relics and their preservation. *Man* 2 (5): 120–126.

McCarthy, F.D. 1948. The Lapstone Creek excavation: Two culture periods revealed in eastern New South Wales. *Records of the Australian Museum* 22 (1): 1–34.
McCarthy, F.D. 1964. The archaeology of the Capertee Valley, NSW. *Records of the Australian Museum* 26 (6): 197–246.
McCarthy, F.D., and M. McArthur. 1960. The food quest and the time factor in Aboriginal economic life. In *Records of the American-Australian scientific expedition to Arnhem Land 1948*, ed. C.P. Mountford, vol. 2, 145–194. Melbourne: Melbourne University Press.
McCarthy, F.D., E. Bramell, and H.V.V. Noone. 1946. The stone implements of Australia. *Australian Museum Memoir* 19.
Sheils, H. 1963. *Australian Aboriginal studies: A symposium of papers presented at the 1961 research conference*. Melbourne: Oxford University Press.

Further Reading

Mulvaney, D.J. 1980. Two remarkably parallel careers. *Australian Archaeology* 10: 99.

McDonald, Josephine J., Fig. 1 Jo McDonald at UWA event in 2012. (Photo: UWA Press)

McDonald, Josephine J.

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Basic Biographical Information

Jo McDonald (Fig. 1) was born on the 23 October 1960. She grew up in Cronulla and attended Burraneer Bay Primary School and Woolooware High School with her brother and sister. She undertook her undergraduate training in the Department of Prehistory and Anthropology at the University of Sydney. John Clegg was an early influence, and her honors research investigated whether species differentiation in kangaroo's feet could account for stylistic variability in engraved kangaroo tracks. This study was based at Sturt's Meadows, a semiarid Panaramitee style (Maynard 1979) engraving site in western New South Wales. She graduated with honors in 1982 – and embraced cultural heritage management for the next 5 years – working with many consultants in the Sydney region and forming the company Brayshaw McDonald Pty Ltd., with colleague Helen Brayshaw. She began a regional management study on Sydney Basin rock art for the National Parks and Wildlife Service, which after 3 years morphed into her Ph.D. research.

Her Ph.D. was completed at the Australian National University, where Andree Rosenfeld was her supervisor. The Sydney region's dual-media rock art (pictographs and petroglyphs) is one of the only in Australia where there are two contemporaneous art systems operating throughout the Holocene. After completing her Ph.D., McDonald continued to work in cultural heritage and for 15 years was the Managing Director of one of Australia's best-practice research-driven cultural heritage management consultancy companies – Jo McDonald Cultural Heritage Management (http://www.jo-mcdonaldchm.com.au/).

She has been involved in the development of the Australian Association of Consulting Archaeologists Inc. (AACAI), holding at various times the position of President, Membership Secretary, Secretary, and NEC member. She was made a Life Member of AACAI in 2010. She was President of the Australian Archaeological Association in 1997–1998.

After moving to Canberra in 2003 with her partner Peter Veth, she continued to manage this company while becoming more research active in rock art. McDonald was Principal Investigator with professors Howard Morphy and Peter Veth on the $1.2mill ARC Linkage Project – Canning Stock Route Project – Rock Art and Jukurrpa. JMcD CHM was an industry partner on this Linkage Project. This project, which grew from Aboriginal community concerns about the burgeoning tourist impacts along this 1,800 km transect through Western Australia's sandy deserts, provided significant research outcomes as well as baseline data for a Plan of Management and a governance structure for the Aboriginal communities located across the arid zone.

In 2011, Jo McDonald commenced an ARC Future Fellowship, with a project studying rock art's role in the settlement and occupation of the arid zone (comparing the Western Desert in Australia with the Great Basin, USA) (Fig. 2). In 2012, she became the inaugural (endowed) Rio Tinto Chair of Rock Art Studies at UWA. She is the Director of the Centre for Rock Art Research + Management (CRARM) at UWA.

She has three children from her marriage to Neil Hanson (Oliver, Jesse, and Zoe). Five of the seven children she and Peter have, have finished school in the last 7 years.

McDonald, Josephine J., Fig. 2 Jo McDonald recording rock art in the Carnarvon Ranges, Western Desert in 2012. (Photo: Stafford Smith)

Major Accomplishments

Over three decades of practice, Jo McDonald has bridged the gap between academia and public archaeology, as well as working towards a mainstreaming of rock art research in archaeological context. Significant contributions to Australian archaeological practice have been through CHM as well as rock art research. Over two decades, McDonald developed conservation and management strategies for the fast-disappearing indigenous cultural heritage resources of Sydney being continually impacted by urban development. She has excavated more than 80 open sites on the Cumberland Plain and rockshelters in the surrounding sandstone country and developed the theoretical and predictive basis for open-site archaeology with a focus on landscape sampling, lithic analysis, and the discovery of sites in an aggrading geomorphic landscape (where the archaeological evidence is invisible/buried in the topsoil). As a result, the industry standard for open-area excavation is now >100 sq. m per site and focussed on cultural landscapes and the retrieval of complete lithic assemblages (JMcD CHM 2005; White and McDonald 2010). Nowhere else in Australia has this extent of open-site archaeology been achieved with obvious research implications for urban/mining contexts around the country.

Major contributions have included:

- The development of appropriate best-practice standards in the sampling, excavation, and analysis of open sites.
- The excavation of the oldest Aboriginal site in the Sydney region – a 30,000-year-old open site in a sand body in Parramatta. More than

500 sq. m of this significant landscape have been salvaged prior to development.

- Working with the police on several forensic excavations (e.g., McDonald 1992). This work (with physical anthropologist, Dr Denise Donlon) resulted in the development of an archaeological unit within the Forensic Diploma which was taught by the NSW Police Department to its Crime Scene officers.
- The discovery, excavation, and collaborative analysis of the first Australian evidence for death by spearing of the *Narrabeen Man* – found beneath a bus shelter during installation of infrastructure (McDonald et al. 2007; JMcD CHM 2008).

Her Ph.D. research on the rock art of Sydney was contextualized by the archaeological excavations undertaken in a number of shelter art sites (McDonald 2008). This work demonstrated the contemporaneity of rock art production with other occupation evidence. Her Ph.D. research achieved some of the first radiocarbon direct dates on pigment rock art anywhere in the world (McDonald et al. 1990).

McDonald's contributions to rock art research have been theoretical and management oriented. Her Ph.D. was the first in the world to undertake a regional analysis of a dual-media rock art province and contextualize this using information exchange theory (Wobst 1977). As well as writing Plans of Management for specific rock art sites and developing a management basis for art sites in the Sydney region, she has pioneered the use of applied rock art research in several successful Native Title claims (De Rose Hill, Martu, and Birriliburu). Following her early dating work in Sydney, she has undertaken with colleagues an intensive program of pigment dating in the Western Desert, on the Canning Stock Route Project. She has also used rock art research to demonstrate the scientific significance of rock art across the Dampier Archipelago in support of National Heritage listing, achieved in 2007. This work, completed with Peter Veth, has more recently been supplemented by a study of this art province's Outstanding Universal Values for UNESCO World Heritage List nomination. She has also worked with the Department of Indigenous Affairs on developing a Heritage Inventory methodology to progress the documentation of the rock art across this art province (JMcD CHM 2008, 2009b).

She has recently co-edited a new international volume designed as a textbook for rock art scholars (McDonald and Veth 2012; and see McDonald 2013). She is currently working with colleagues to develop digital recording techniques, database development, and GPS-linked techniques to enable rock art research to be managed as digital heritage.

Cross-References

- ▶ Australian Association of Consulting Archaeologists Inc. (AACAI)
- ▶ Clegg, John K.
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Engendered Archaeologies
- ▶ Rosenfeld, Andrée

M

References

Jo McDonald Cultural Heritage Management Pty Ltd (JMcD CHM). 2005. *Salvage excavation of six sites along Caddies, Second Ponds, Smalls and Cattai Creeks in the Rouse Hill Development Area, NSW*. Australian Archaeological Consultancy Monograph series 1. St. Lucia: Australian Association of Consultancy Archaeologists.

Jo McDonald Cultural Heritage Management Pty Ltd (JMcD CHM). 2008. *Salvage excavation of human skeletal remains at Ocean and Octavia Streets, Narrabeen: Site #45-6-2747*. AACAI Consultancy Monograph series 2. St. Lucia: Australian Association of Consultancy Archaeologists.

Jo McDonald Cultural Heritage Management Pty Ltd (JMcD CHM). 2009a. *(McDonald). Archaeological survey of Deep Gorge on the Burrup Peninsula (Murujuga) Dampier Archipelago WA*. Perth: Report to Department of Indigenous Affairs.

Jo McDonald Cultural Heritage Management Pty Ltd (JMcD CHM). 2009b. *(McDonald). Heritage inventory methodology report Dampier Archipelago WA*. Perth: Report to Department of Indigenous Affairs.

McDonald, J.J. 1992. *The archaeology of the Angophora Reserve rockshelter: Helping the police with their enquiries*. Environmental Heritage Monograph series 1. Hurstville: NSW National Park and Wildlife Service.

McDonald, J.J. 2008. *Dreamtime superhighway: An analysis of Sydney Basin rock art and prehistoric information exchange*. Terra Australis 27. Canberra: ANU EPress.

McDonald, J.J. 2013. Rock art. In *Archaeology in practice: A student's guide to archaeological analyses*, ed. J. Balme and A. Patterson, 2nd ed., 59–96. Malden: Blackwell Publishing.

McDonald, J.J., and P.M. Veth. ed. 2012. *A companion to rock art.* Blackwell Companions to Anthropology series. Oxford/Malden: Blackwell Publishing.

McDonald, J.J., K.C. Officer, D. Donahue, T. Jull, J. Head, and B. Ford. 1990. Investigating ^{14}C AMS: Dating prehistoric rock art in the Sydney Basin, Australia. *Rock Art Research* 7 (2): 83–92.

McDonald, J.J., D. Donlon, J.H. Field, R.L.K. Fullagar, J. Brenner Coltrain, and P. Mitchell. 2007. The first archaeological evidence for death by spearing in Australia. *Antiquity* 81: 1–9.

White, B., and J. McDonald. 2010. Lithic artefact distribution in the Rouse Hill Development Area, Cumberland Plain, New South Wales. *Australian Archaeology* 70: 29–38.

Wobst, H.M. 1977. Stylistic behaviour and information exchange. In *For the director: Research essays in honour of J.E. Griffen*. Anthropological Papers 61, ed. C.E. Cleland, 317–342. Ann Arbor: Museum of Anthropology, University of Michigan.

Further Reading

Balme, J., I. Davidson, J. McDonald, N. Stern, and P. Veth. 2009. Symbolic behaviour and the peopling of the southern arc route to Australia. *Quaternary International* 202: 59–68.

McDonald, J.J. 2005. Archaic faces to headdresses: The changing role of the rock art across the arid zone. In *Desert peoples: Archaeological perspectives*, ed. P. Veth, P. Hiscock, and M. Smith, 116–141. Boston: Blackwell Studies in Global Archaeology.

McDonald, J.J., and P.M. Veth. 2008. Rock-art of the Western Desert and Pilbara: Pigment dates provide new perspectives on the role of art in the Australian arid zone. *Australian Aboriginal Studies* 1: 4–21.

McDonald, J.J., and P.M. Veth. 2009. Dampier Archipelago petroglyphs: Archaeology, scientific values and National Heritage Listing. *Archaeology in Oceania* 44: 49–69.

McDonald, J.J., and P.M. Veth. 2011. (McDonald and Veth). Report for Australian Heritage Council. Assessment of outstanding universal values; Dampier Archipelago, Western Australia. Department of Sustainability, Environment, Water, Population and Communities.

McGimsey III, Charles R.

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Basic Biographical Information

Charles R. McGimsey, III (1925–2015), known as Bob to all who know him, was one of the pioneering figures in the development of CRM in the United States. His numerous publications and lectures called attention for the need of archaeologists to engage the public for both financial support and the protection of archaeological resources. He was the driving force in the development and passage of state and national legislation for the management and protection of archaeological resources, including the establishment of the Arkansas Archaeological Survey. He led the effort to professionalize archaeologists in the United States with the creation of the Society of Professional Archaeologists, now the Register of Professional Archaeologists.

His early training in archaeology was interrupted by World War II. He finished his undergraduate degree at the University of New Mexico in 1949 and took his Ph.D. at Harvard University in 1958. His dissertation research focused on the Southwest, and he conducted extensive research in Panama during the 1950s and early 1960s. In 1957, he was hired as the assistant curator and assistant professor at the University of Arkansas. He was a founding member of the Arkansas Archaeological Society, a statewide amateur organization established in 1960. From 1960 to 1983, he was Director of the University of Arkansas Museum. He helped create the Department of Anthropology in 1969 and was the initial chair until 1972. In 1967, he was also named the Director of the Arkansas Archaeological Survey, a position he held until his retirement in 1990.

Major Accomplishments

Bob was responsible for two influential publications during the early development of CRM in the United States. One, *Stewards of the Past* (1970) cowritten with Hester A. Davis and Carl Chapman, grew out of concern for massive site destruction from agricultural practices in the Mississippi River Valley. This small pamphlet was an early manifesto for the preservation of the archaeological record and the engagement of the public. It called on everyone to be a steward of this nonrenewable resource. Thousands of copies were distributed free. In 1972, as an outgrowth of gathering information on state programs, the book *Public Archaeology* detailed his vision for the engagement of professional archaeologists with the general public. It was an inspiring call for archaeologists to engage the public to develop state laws, to nurture amateur archaeological societies, and to develop public programs.

His legacy in the legal arena began at the state level. In 1959, he drafted and successfully lobbied for legislation establishing a program for archaeological research in Arkansas based in the University Museum. In 1967, working with the Arkansas Archaeological Society, he expanded the 1959 law and created the Arkansas Archaeological Survey. Also in 1967, he was responsible for legislation making it illegal to damage and destroy archaeological sites on public lands in Arkansas and requiring state agencies and municipalities to cooperate with the Arkansas Archaeological Survey. In 1977, he helped draft the legislation establishing Arkansas's state historic preservation office.

At the national level, he was most associated with Public Law 93–291, the Archaeological and Historic Preservation Act of 1974. As President of the Society for American Archaeology, he wrote much of the law and spent endless hours lobbying Congress for its passage. The law is significant in that it authorizes federal agencies in the United States to spend project funds on site preservation. It complements Section 106 of the 1966 National Historic Preservation Act by requiring data recovery of properties that will be destroyed by federal projects.

In addition to his legislative efforts, while President-elect and President of SAA, Bob traveled extensively giving lectures and participating in meetings and symposia of various national organizations while arguing the value of public archaeology. Most importantly, he and Hester Davis organized the Airlie House Seminars in 1974 that gathered prominent academic, federal, and state archaeologists and Native Americans to discuss major issues in the developing CRM field. Separate seminars provided recommendations on professional qualifications, report standards, management, communication with the public, laws and regulations, and Native American issues (McGimsey and Davis 1977). The report was quite influential during a critical period of CRM development as it provided guidance to many individuals developing federal and state programs in response to national legislation. As an outgrowth of the Airlie House Seminars, McGimsey argued vehemently for standards to judge the professional capability of archaeologists. He was a founding member and advocate for the Society of Professional Archaeologists, now the Register of Professional Archaeologists, and was its President in 1984. Throughout his career, he wrote and commented extensively on CRM matters (McGimsey 2004).

The Arkansas Archaeological Survey was established by the Arkansas General Assembly in 1967. While McGimsey credited members of the Arkansas Archaeological Society for the legislative clout to affect passage, the design of the Arkansas Archaeological Survey was his alone. The Survey is an independent unit of the University of Arkansas System with 11 research stations associated with state universities and state archaeological parks with a central coordinating office. It follows his vision of public archaeology by working closely with amateurs and the general public in a program of archaeological research, preservation, and education. The Survey and the Society annually sponsor an archaeological training program for amateurs and the general public. The unique organization of the Survey has been a model for other state programs in the United States.

McGimsey III, Charles R., Fig. 1 Arkansas Archeological Survey

He received many awards honoring his career. The SAA awarded him the first Distinguished Service Award in 1975 and again in 1995 the Award for Excellence in CRM. In 1989, the Arkansas Archaeological Society named its highest award after him to honor those with distinctive records of archaeological site preservation. Charles R. McGimsey died on January 20, 2015 (Fig. 1).

Cross-References

► Davis, Hester

References

McGimsey, C.R., III. 2004. *CRM on CRM*, Arkansas Archeological Survey Research. Vol. 61. Fayetteville: Arkansas Archeological Society.

McGimsey, C.R., III, and H.A. Davis. 1977. *The management of archeological resources: The Airlie house report*, Special publication of the Society for American Archeology. Washington, DC: Society for American Archaeology.

McGimsey, C.R., III, H.A. Davis, and C. Chapman. 1970. *Stewards of the past*. Fayetteville: Arkansas Archeological Society.

Further Reading

McGimsey, C.R., III. 1972. *Public archeology*. New York: Seminar Press.

McGrail, Seán

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Basic Biographical Information

Born in 1928, Seán McGrail is currently Visiting Professor of Maritime Archaeology at the University of Southampton (1991 onwards). Prior to that time, he held positions at the University of Oxford (1986–1993) and the National Maritime Museum, Greenwich (1976–1986). He is one of the most distinguished British nautical archaeologists, with a long history of research and publication in the field dating back to the mid-1970s. He was instrumental to the development of maritime archaeology as a formal academic discipline, and many of his publications remain the key reference works for the subject. Prior to his career in archaeology, he served in the Royal Navy (1946–1968), including seeing active service during the Korean War, particularly as a pilot in the Navy Fleet Air Arm, before studying archaeology at the Universities of Bristol (1968–1971) and London (1972–1978).

Major Accomplishments

McGrail's major accomplishments focus on two distinct but related concerns: firstly, nautical archaeology, especially studies of ship technology, and secondly, maritime archaeology, especially the development of maritime archaeology as a formal academic discipline and teaching specialism (his 1984 work *Aspects of Maritime Archaeology and Ethnography* being particularly influential in this respect). In both concerns, he has played an active leadership role since the 1970s, including editing many of the key works on both subjects and playing a major role in related organizations, including notably the UK's Advisory Committee on Historic Wreck Sites (1974–1998) and the International Symposia on Boat and Ship Archaeology (ISBSA) that have been held periodically since 1976. McGrail was

also central to the establishment of key organizations in maritime archaeology, for example, the Centre for Maritime Archaeology at the University of Southampton, currently the lead academic institution for maritime archaeology in the UK.

McGrail's major publications reflect his focus on nautical archaeology, especially the analysis of ship technology through the rigorous application analytical rules leading to the understanding of shipbuilding traditions. Commencing with his (1978) *Logboats of England and Wales*, he has consistently led this field of study in the UK in particular and more generally internationally, especially in North West Europe. The seminal work in this field remains in McGrail's 1987 (reissued 1998) *Ancient Boats in North West Europe*, a theme that he expanded on in his majestic, encyclopedic (2001) *Boats of the World*. His work has included international fieldwork, in particular in South East Asia (see McGrail et al. 2002), but has primarily been focused on North West Europe, particularly on Romano-Celtic and Medieval vessel technologies, for example, his joint analysis (with Nigel Nayling) in 2004 of the Barland's Farm Romano-Celtic Boat. Other significant vessel assemblages that he has been involved in analyzing include the Late Bronze Age "raft" from Brigg, Lincolnshire; the Viking Age vessel finds from Wood Quay, Dublin; the mid-thirteenth century CE boat from Magor Pill, South Wales; and the mid-fifteenth century CE ship from Newport, South Wales. His work has also included the publication of popular books on this subject, notably his (1981) *The Ship*.

The influence of Seán McGrail can perhaps too easily be underestimated by those from outside the specialized subdiscipline of maritime archaeology. A self-effacing man, he has quietly and unostentatiously taught and mentored generations of maritime archaeologists working around the globe. His emphasis on rigorous analytical inquiry into boat and ship technologies helped make the UK a center of excellence in maritime archaeology in the 1980s when the nation was at risk from being eclipsed in this respect by other nations, including neighbors like Denmark and "distant cousins" like Australia. Internationally, there is a strong case to be made that our global understanding of ancient ship technology would be at least a decade behind the present-day without his contributions (see McGrail 1997 for a summary of his work).

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Crumlin-Pedersen, Ole
- ▶ Experimental Maritime Archaeology
- ▶ Maritime Archaeological Organizations
- ▶ Ship Archaeology

References

McGrail, S. 1978. *Logboats of England and Wales*. British Archaeological Reports British series 51. Oxford: Archaeopress.

McGrail, S. 1981. *The ship: Rafts, boats and ships from prehistoric times to the medieval era*. London: HMSO.

McGrail, S., ed. 1984. *Aspects of maritime archaeology and ethnography*. London: National Maritime Museum.

McGrail, S. 1987. (reissued 1998). *Ancient boats in north west Europe*. London: Longman.

McGrail, S. 1997. *Studies in maritime archaeology*. British Archaeological Reports British series 256. Oxford: Archaeopress.

McGrail, S. 2001. *Boats of the world*. Oxford: Oxford University Press.

McGrail, S., L. Blue, E. Kentley, and C. Palmer, eds. 2002. *Boats of South Asia*. London: Routledge.

Nayling, N., and S. McGrail, eds. 2004. *The Barland's Farm Romano-Celtic boat*. Council for British Archaeology Research Report 138. York: Council for British Archaeology.

Further Reading

McGrail, S., ed. 1977. *Sources and techniques in boat archaeology*. British Archaeological Reports International series S29. Oxford: Archaeopress.

McGrail, S. 1979. *The archaeology of medieval ships and harbours in northern Europe*. British Archaeological Reports International series 66. Oxford: Archaeopress.

McGrail, S. 1982. *Woodworking techniques before AD 1500*. British Archaeological Reports International series 129. Oxford: Archaeopress.

McGrail, S. 1990. *Maritime Celts, Frisians and Saxons*. Council for British Archaeology Research Report 71. London: Council for British Archaeology.

McGrail, S. 1993. *Medieval boat and ship timbers from Dublin*. Dublin: Royal Irish Academy.

McGrail, S., and E. Kentley, eds. 1985. *Sewn plank boats*. British Archaeological Reports International series 276. Oxford: Archaeopress.

Meadowcroft: Geography and Culture

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Introduction

Since the initial publication of the first radiocarbon sequence for Meadowcroft Rockshelter (Adovasio et al. 1975), this site has been among the most controversial localities advanced for early human occupancy of the New World. The reasons for Meadowcroft's persistently and initially contentious status are ultimately reducible to a single factor – Meadowcroft Rockshelter was the first archaeological locality to seriously challenge the then long-prevailing paradigm that the peopling of the New World was the singular accomplishment of the makers of Clovis fluted projectile points or their immediate precursors.

While Meadowcroft would not be the first site to actually break the Clovis-first barrier (that distinction is almost universally attributed to Monte Verde in Chile), it *did* set the stage for the collapse of that nearly sacrosanct chronological boundary. Additionally, unlike most of the 500 or so other claimants to pre-Clovis status, Meadowcroft Rockshelter was universally acknowledged even by its critics as "the most carefully excavated and extensively documented site in North America" (Custer 1996: 92) and as a "model for Paleo Indian studies" (Fagan 1990). Although, as many have pointed out, there is, as yet, no final report on Meadowcroft, there is a very extensive literature (Adovasio et al. 1975, 1977, 1978, 1979–1980a, 1979–1980b, 1984, 1985, 1988, 1990, 1998; Adovasio and Page 2002; Adovasio and Pedler 2013, 2016; Carlisle and Adovasio 1982; Carr and Adovasio 2002) and an extremely consistent, multiple assay radiocarbon chronology. In short, Meadowcroft Rockshelter does not exhibit the same acceptance-related difficulties as Pedra Furada, Pendejo Cave, Topper, or any of the other alleged early localities discussed and then summarily dismissed by an understandably skeptical North American archaeological community. As discussed further below, while debate still exists about the chronology of the earliest anthropogenic visitation/use of Meadowcroft, most former critics or ambivalent observers now conclude, to quote one of them, that "whatever the precise date of first occupation, Meadowcroft is one of the earliest well-documented sites in North America" (Fagan 1995: 80).

History of Research

Meadowcroft Rockshelter was discovered in 1955 by the late A. Miller, a local southwestern Pennsylvania landowner, amateur archaeologist, and historian whose family had owned the Meadowcroft property since the mid-1790s. Miller attempted to elicit professional interest in the site while, at the same time, protecting it from pot-hunting and vandalism. His efforts and those of friend and colleague, P. Jack (then of California State College in California, Pennsylvania), to secure professional assistance were unsuccessful until 1973 when the author initiated excavations in June of that year. Thereafter, extensive excavations were conducted from 1974 through 1978 and at widely separated times in the 1980s, 1990s, and most recently in 2011. The analyses of materials from the site are ongoing.

In early 2008, the site – by then named a National Historic Landmark and Commonwealth Treasure – became accessible to the public with the construction of an architectural elaborate enclosure and observation deck. The site is now owned and operated by the Senator John Heinz History Center in Pittsburgh, Pennsylvania, which also maintains a living museum of nineteenth-century rural life and a replicated sixteenth-century Native American village on the hilltop above the rock-shelter.

The excavation and attendant analyses at Meadowcroft Rockshelter were – and still are – the epicenter of a much larger project designed to study the entire contiguous Cross Creek drainage

both before, during, and after an aboriginal Native American presence.

From its inception, the Meadowcroft/Cross Creek Project was a multidisciplinary undertaking. Indeed, the overriding philosophy of the entire project necessitated a multidisciplinary perspective. Almost from the commencement of the project in 1973 and certainly by 1974, the central goal or theme of the operation was the systematic acquisition, analysis, and integration of any and all data bearing on the archaeology, history, paleoecology, geology, geomorphology, pedology, hydrology, climatology, and floral and faunal succession of the entire Cross Creek drainage. Moreover, this data gathering, analyses, and interpretation was to be executed with as great a degree of precision and employing the most sophisticated methodologies of which any of the project staff were cognizant. Additionally, and critically for the staff, this research was carried out virtually *without* temporal or fiscal constraints. In short, the project was designed to epitomize the so-called "state-of-the-art" data gathering and analytical methodologies and procedures.

As the foregoing suggests, the Meadowcroft/Cross Creek Project was essentially empirical in orientation and in some ways "old line" in philosophy. Meadowcroft Rockshelter and the Cross Creek drainage were never approached – whether in 1973 or the present – as vast laboratories in which to test explicit hypotheses or in which to seek logico-deductive covering laws or nomothetic truths about aboriginal behavior. Those who view archaeology as a vehicle or medium for the pursuit of such ends should not be denigrated for it, but theoretical considerations of this sort were not and a priori concern of the Meadowcroft project.

The implementation of the basic Meadowcroft/Cross Creek research strategy, simple though it was in theory, was, and remains, exceedingly complex in practice. Space precludes any detailed description of field methods, attendant analyses, or data management procedures, but these are available in Carlisle et al. (1982:16–30). Suffice to add because of the very extensive funding noted above, it has proven possible to implement the basic research strategy at a level of resolution rarely possible before and seldom encountered since.

Location and General Geology

Meadowcroft Rockshelter (36WH297) is a deeply stratified, multicomponent closed site (i.e., cave or rock-shelter) located 48 km southwest of Pittsburgh, Pennsylvania, and 4 km northwest of Avella in Washington County, Pennsylvania (Fig. 1). The site is situated on the north bank of Cross Creek, a small tributary of the Ohio River which lies some 12 km to the west. The exact location of the site is 40° 17′ 12″ North and 80° 29′ 0″ West (USGS Avella, Pennsylvania, 7.5′ Quadrangle).

Meadowcroft Rockshelter is oriented generally east-west with a southern exposure and stands some 15 m above Cross Creek and 260 m above sea level. The area protected by the extant overhang (i.e., the area within the modern dripline) is ca. 65 m^2, while the overhang, itself, is some 13 m above the modern surface of the site. When large roof blocks on the western (Old Roof Fall) and eastern (New Roof Fall) margins of the site were in place in the overhang, the habitable area was two to three times larger than at present. In addition to potable water potentially available from Cross Creek, springs are locally abundant in the immediate vicinity of the rock-shelter. The prevailing wind is west-east across the mouth of the shelter, which provides almost continuing ventilation and ready egress for smoke and insects. Finally, the "attractiveness" of the site is enhanced by the daily circuit of the sun, which warms the roof and walls of the rock-shelter and renders the local microenvironment more equable, especially during the colder months of fall and spring.

Geologically, Meadowcroft is located in what has been throughout the late Pleistocene an unglaciated portion of the Allegheny Plateau, west of the Valley and Ridge Province of the Appalachian Mountains and northwest of the Appalachian Basin. The surface rocks of this region are layered sedimentary rocks of Middle to Upper Pennsylvanian age (Casselman Formation), and the prominent lithologies are shale, quartz sandstone, limestone, and coal in

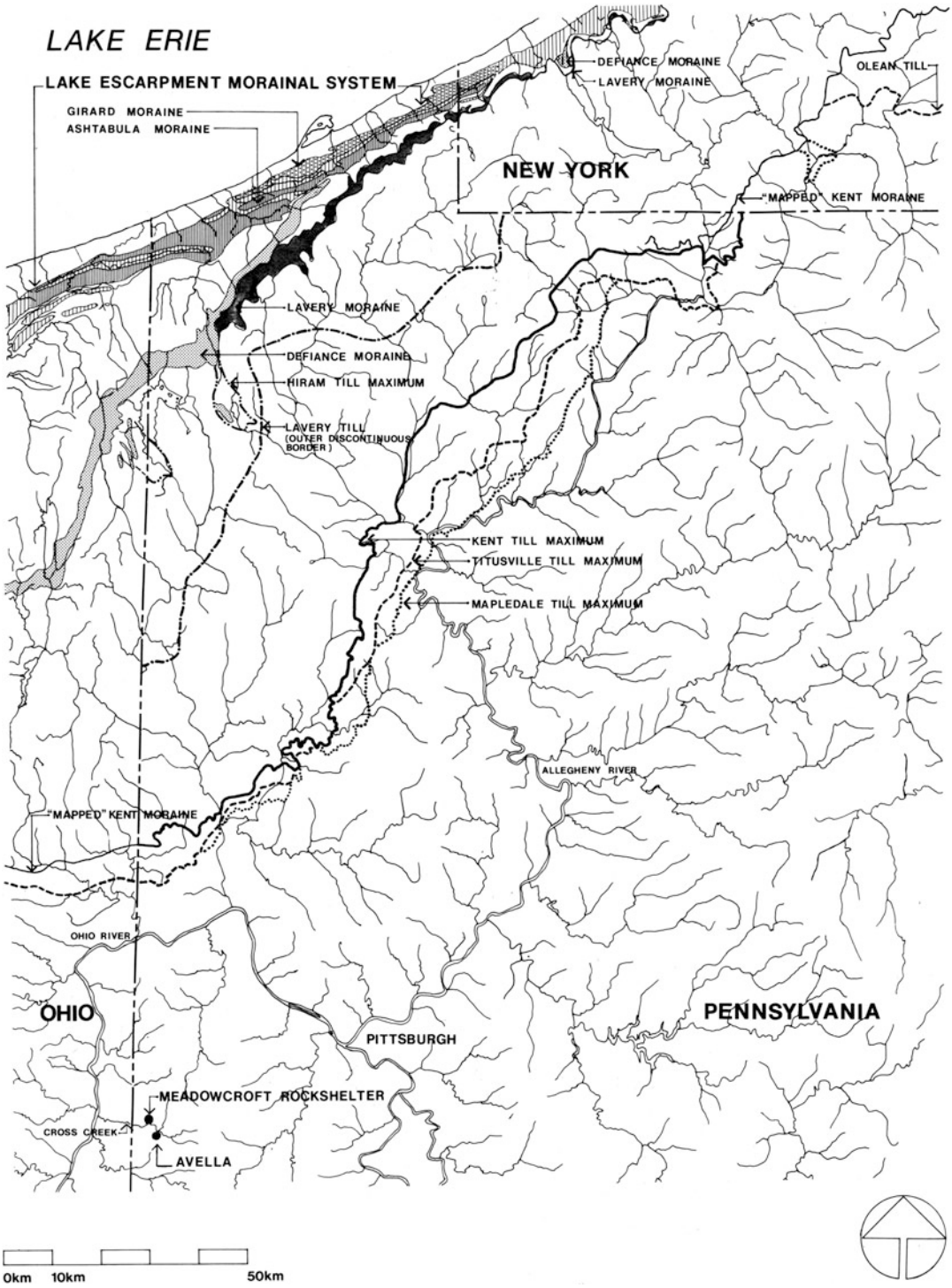

Meadowcroft: Geography and Culture, Fig. 1 General view of the Upper Ohio Valley and contiguous regions showing maximum southward extension of Wisconsinan glacial advance and the location of Meadowcroft Rockshelter

decreasing order of abundance. It is stressed that the nearest coal outcrop or seam is *not* expressed in or near the rock-shelter (Adovasio et al. 1992). Deformation of rock formations in the vicinity of Meadowcroft is very mild with a regional dip of 3–5° to the southwest.

Meadowcroft Rockshelter is formed beneath a cliff of Morgantown-Connellsville sandstone which is a thick fluvial or channel sandstone within the Casselman Formation of the Conemaugh Group of Pennsylvanian/Upper Carboniferous age. The cliff above the rock-shelter is 22 m thick, and the sandstone was deposited as two superimposed point bar or sand bar sequences within an ancient north-south flowing river. The rock within each point bar sequence changes from cross-bedded, coarse-grained sandstone to laminated fine-grained sandstone. The sandstone decreases in thickness along the Cross Creek valley both to the east and west with the maximum thickness evidenced at the rock-shelter.

The Morgan-Connellsville is technically an immature sandstone composed predominantly of quartz grains with minor amounts of mica, feldspar, and rock fragments. It is, taxonomically, subgraywacke to proto-quartzite in composition. A clay matrix is present between grains, and some zones within the cliff are cemented by calcium carbonate ($CaCo_3$). As discussed below, the mechanical breakdown or deterioration of the calcium carbonate bonds leads to grain-by-grain exfoliation or attrition of the roof and walls of the shelter and is one of the principal sources of material within the rock-shelter sediment pile.

The rock unit immediately underlying the Morgantown-Connellsville sandstone is the Birmingham Shale of the Conemaugh Group. This shale is a much-less resistant lithology, the erosion of which, via the downcutting of Cross Creek, produced the reentrant or rock-shelter which is Meadowcroft. The downcutting of Cross Creek began in the Sangamon Interglacial (ca. 125,000–75,000 BP) and continued through Early and Middle Wisconsinan times. Between ca. 31,000 and 21,000 RCYBP, a fine blue silty clay was deposited within the rock-shelter. This clay contains scattered sandstone blocks that spalled from the roof and walls of the shelter during downcutting and probably represents quiet water deposition from Cross Creek during early Middle Wisconsinan times. After Cross Creek resumed downcutting in the later Middle Wisconsinan, the rock-shelter was enlarged and never subjected to fluvial deposition again. After ca. 21,000 RCYBP, the rock-shelter would have been available for human occupancy/visitation had there been any populations in the area. The site, however, was not initially visited until considerably later. In any case, after ca. 21,000 RCYBP, the rock-shelter was "high and dry," far above even high water flood levels of Cross Creek.

Topographically, the region within which Meadowcroft Rockshelter is located is maturely dissected. More than 50% of the 14,164 ha Cross Creek watershed is in valley slope with upland and valley bottom in the minority. Maximum elevations in the Cross Creek drainage are generally above 396 m. At the divides on the east, elevations are above 426 m. Elevations at stream level are 310 m at Rea on the south fork of Cross Creek, 276 m at Avella, and 193 m normal pool level at the confluence with the Ohio River.

Within the Cross Creek watershed, the main stem of Cross Creek flows for some 37 km. The maximum north-south width of the watershed is ca. 15 km. The prevailing stream pattern is dendritic with numerous small creeks and runs supplying the main stem of Cross Creek. The steep gradient headwaters and tributaries of Cross Creek have their sources in the hills of central Washington County. Cross Creek and its three major tributaries (i.e., the north, middle, and south forks) have an average gradient of 0.4%. Most of the gradient is in the upper portions of the watershed where streams are small and of low volume. The drainage is northwestward to westward toward the West Virginia-Ohio border and the Ohio River.

Cross Creek exhibits a remarkably asymmetric drainage pattern with the northern tributaries significantly shorter than those on the south. Consequently, the drainage area to the south of Cross Creek is much larger than its counterpart to the north. This condition is probably the result of a

drainage pattern superimposed on the 3–5° regional dip noted above.

Because of the aforedescribed, dissected, and steep nature of the local terrain, the movement of human or animal populations from the Ohio River to the interior of Pennsylvania or in the opposite direction is, literally, funneled along drainages like Cross Creek. Suffice to note that any human populations moving along this natural artery who encountered Meadowcroft Rockshelter at the end of a long day of pedestrian and/or a combination of boat and foot travel would have potentially found the site to be an attractive, if temporary, habitat for a sojourn.

Stratigraphy and Dating

Sediment emplacement at Meadowcroft Rockshelter is the combined result of weathering and downslope (i.e., colluvial) movement of boulder-sized to clay-sized materials both from the directly contiguous upland surfaces and the Morgantown-Connellsville cliff.

Four distinct sources have supplied sediment to the Meadowcroft colluvial pile. As indicated above, a silty clay deposit just above the Birmingham shale probably represents quiet water deposition from Cross Creek during Middle Wisconsinan time when stream level was some 13 m (ca. 43 ft) above present levels. There is no recurrence of this sediment source later in the sequence underscoring the basic fact that *no* fluvial-emplaced fill accrued within the rock-shelter during the entire span of human occupation/visitation.

The second contributory sediment source is the release of rock fall from the Morgantown-Connellsville cliff. Sizes range from diminutive granules (<2 mm) up to very large boulders. Definite changes occurred in the amount of rock fall release through time with periods of stability punctuated by episodes of much more active rock release. Though the exact mechanism of rock fall detachment is not known, it appears that some combination of water movement, freeze/thaw, and, perhaps, root penetration along fractures in the sandstone are the critical processes.

The third sediment source is grain-by-grain attrition from the sandstone cliff. The sediments derived from this source consists of individual sand grains, predominantly quartz, with size ranges of 0.25–0.062 mm and small rock fragments with a size greater than 4 mm. This sediment source derives from the breakdown of calcium carbonate ($CaCo_3$) cement in the sandstone and provides a constant "rain" of sediment on the colluvial pile. The rate of attrition is clearly related to both precipitation and lower temperature, especially with extreme diurnal temperature change. During periods of increased rain and lower temperature with large daily fluctuations, the amount of sediment from this source increases. Attrition is the primary sediment source at the site, especially before the major roof spalling events.

The fourth sediment source at Meadowcroft Rockshelter consists of sheetwash from the contiguous uplands during rain storms. With the exception of the silty clay deposited at the base of the colluvial pile, sheetwash is the principal source of clay-sized materials at the site. Sheet wash becomes an important sediment source *only* after the major roof spalling episodes.

The relative importance of the major sediment sources clearly varies through time with one source, quiet water fluvial deposition, inoperative for the period of human/visitation use and the others differentially contributing throughout the occupational sequence.

The relative contributions of the three non-alluvial sediment sources are the principal factors via which the various Meadowcroft strata are distinguished. Within the site, there are 11 strata labeled with Roman numeral suffixes beginning with the earliest stratum (Stratum I) and proceeding to the latest Stratum XI. Stratum I is the culturally sterile basement of the site and is essentially synonymous with the Birmingham shale. The upper portions of this shale are heavily weathered and texturally friable, while the deeper portions become progressively indurated. The quiet water deposition of alluvial clay separates Stratum I from the remaining strata (II–XI).

The ten strata above Stratum I are individually variable in overall thickness, horizontal extent,

grain size(s), and geochemistry reflecting the differential operation of the various contributory sediment sources. All of these strata with the notable exceptions of VI and X are continuous across the site and many contain microstrata. The maximum thickness of the colluvial sediment pile at Meadowcroft Rockshelter is ca. 4+ m (13–15 ft).

The stratigraphic sequence at Meadowcroft Rockshelter is anchored by some 52 radiocarbon dates (Fig. 2) processed by four different laboratories. All but four dates are internally consistent and in absolute stratigraphic order, and those low-magnitude reversals occur in the Middle Archaic, Late Archaic, and Late Woodland periods. It should be stressed that not even the site's most persistent and strident critics have questioned the validity of the 39 dates that are younger than the assay of 12,800 ± 870 RCYBP. These samples include the "later" Paleoindian period as well as the entire Archaic, Woodland, Late Prehistoric, and Historic periods and are consistent with the ages of directly associated materials recovered from other sites. *Any* questions that have been posed, recently or in the past, have been directed solely at the remaining 13 dates, only 6 of which have undeniable and extensive artifact associations.

Suffice to note, most criticisms of the radiocarbon dates from Meadowcroft are focused on the lower culture-bearing strata or portions thereof (i.e., middle and lower Stratum IIa) and their attendant radiometric dates. Four decades of criticism revolving around these dates, especially those that are earlier than 11,500 RCYBP, have focused on the alleged particulate or non-particulate contamination of *only* the oldest samples. There is no evidence of any form of contamination of any of the older Meadowcroft Rockshelter samples, however, and there now appears to be an emerging consensus on the general antiquity of the site's deepest levels.

As noted by Adovasio and Pedler (2013:514), applying the most conservative interpretation of the available chronometric data, the most recent age for the presence of Paleoindian populations in this portion of the Ohio River basin is in the range of 12,000–10,600 RCYBP (13,870–12,660 cal BP). Radiometric dates on charcoal from a series of firepits identified in lower Stratum IIa range from 16,175 ± 975 RCYBP (20,476–18,110 cal BP) to 12,800 ± 870 RCYBP (16,565–14,085 cal BP). If the six deepest dates at Meadowcroft Rockshelter that are unequivocally associated with cultural material are averaged, then humans were definitely present at Meadowcroft between 14,555 and 13,955 RCYBP (17,500–16,750 cal BP). The oldest date from lower Stratum IIa, which was run on a carbonized, bilaterally cut fragment of bark-like material, is 19,600 ± 2400 RCYBP (26,212 cal BP). The configuration of the dated specimen is fully consistent with plaiting strips employed in later Meadowcroft basketry and *may* be a fragment of a basket wall. In any case, it is anthropogenically altered and suggests that the earliest Meadowcroft visitation may have occurred even earlier than 16,750 cal BP. It should be stressed, however, that this date and a second one (19,100 ± 810 RCYBP [21,000 cal BP]) on different material were both obtained from very small diluted samples, and both are non-AMS assays with obviously high standard deviations.

Summary of Cultural Features

Some 276 cultural features were identified at Meadowcroft Rockshelter. The most common features are firepits and charcoal lenses followed in decreasing order of abundance by extensive, accidentally or intentionally burned areas called fire floors; refuse/storage pits; concentrations of lithics, ceramics, and bone indicative of specialized activity areas; and roasting pits. Most of the firepits throughout the sequence are relatively simple constructions, unlined and unrimmed, and clearly represent single-use, short-term events (though some of the later Archaic and Woodland fire features are more elaborate). These later fire features sometimes reflect multiple-use episodes and are occasionally lined and rimmed. Collectively, the incidence of cultural features at Meadowcroft in conjunction with other proxies may constitute a coarse gauge of the intensity of site use through time, a topic addressed further below (see "Overview").

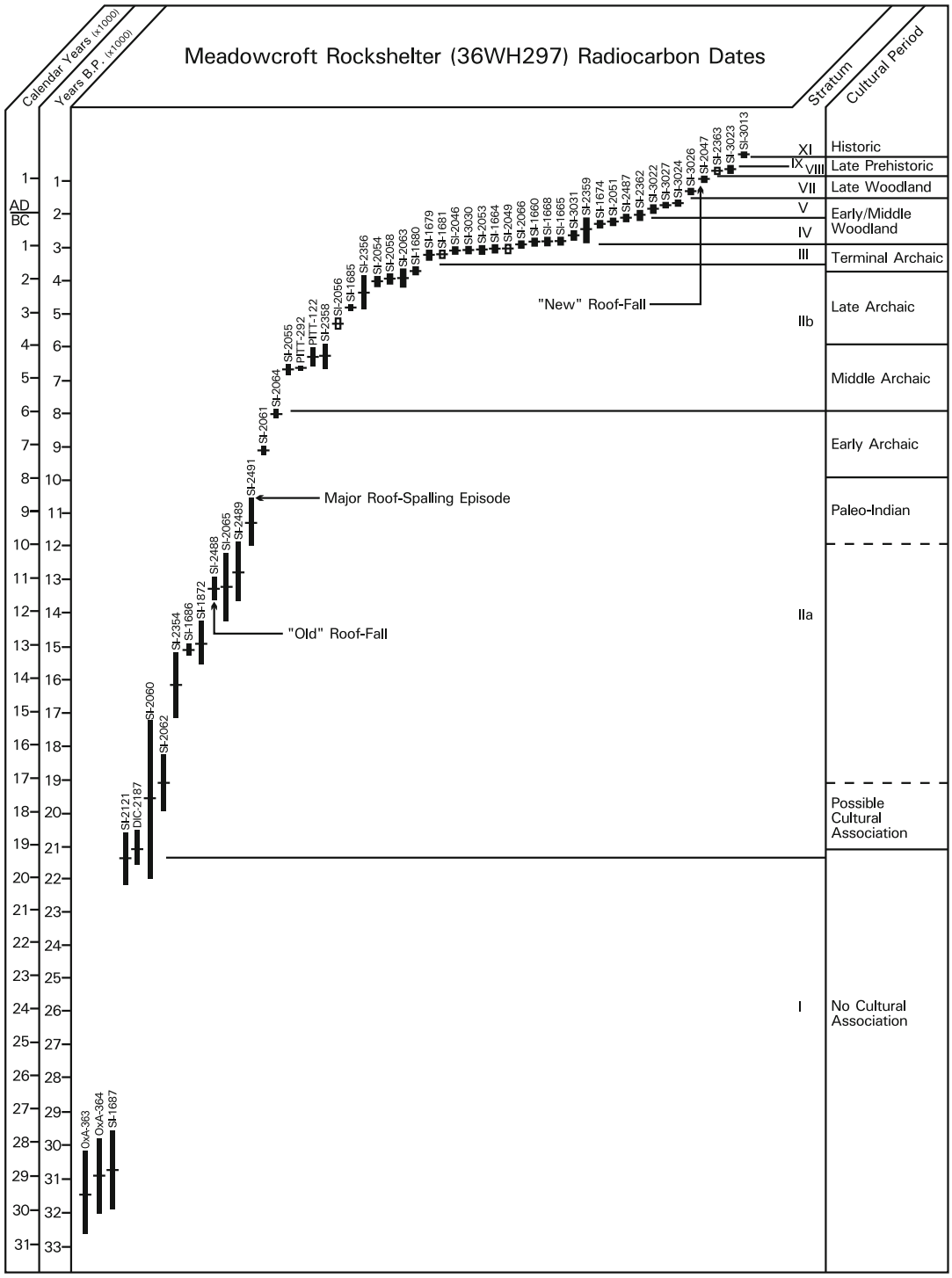

Meadowcroft: Geography and Culture, Fig. 2 Radiocarbon chronology from Meadowcroft Rockshelter (36WH297)

Artifacts

While the exact moment of the initial visitation/use of Meadowcroft Rockshelter remains problematic, the material culture suite of its first visitors and their immediate successors is far easier to characterize. The lithic artifact assemblage associated with the earliest Meadowcroft populations has been briefly described and illustrated in numerous publications (e.g., Adovasio et al. 1988; Adovasio and Pedler 2004; Fitzgibbons 1982) and was intensively analyzed by Boldurian (1985). Though somewhat compromised, or at least veiled, by the relatively small number of specimens (ca. 700), it is possible to characterize the lithic technology of the inhabitants of Meadowcroft Rockshelter and its contemporary sites/components (e.g., the Krajacic site and the Mungai Farm site complex) in the Cross Creek drainage.

The most common element in the early Meadowcroft Rockshelter lithic suite is debitage. As noted previously (e.g., Adovasio and Pedler 2004:147), the Meadowcroft lithic debitage sample clearly reflects secondary and tertiary core reduction from late-stage manufacture and especially the refurbishing of finished implements. The specimens of debitage strongly indicate that the earliest visitors to the rock-shelter brought with them an essentially curated lithic tool kit. Interestingly, the initial Meadowcroft visitors and their immediate descendants seemed to have exploited – or utilized through exchange – raw materials from a relatively far-flung series of quarries. These include Flint Ridge in Ohio, the Ondanga outcrops in New York, several Kanawha chert sources in West Virginia, the Pennsylvania Jasper quarries well to the east of Meadowcroft, and the local Monongahela chert outcrops in the Cross Creek drainage. This wide-ranging procurement pattern supports Custer's (1984) "serial quarry" exploitation scenario or, alternately, suggests that the regions earliest inhabitants were already part of a distant exchange network.

The flaked stone artifact suite from lower and middle Stratum IIa at Meadowcroft Rockshelter contains small prismatic blades or blade flakes (Fig. 3) that were detached from small, carefully prepared cores. Although complete cores were not recovered from Meadowcroft Rockshelter, the artifact assemblage from the nearby Krajacic site contains a great variety of the distinctive Meadowcroft-style blade or blade-flake implements and small, cylindrical polyhedral cores (Fig. 4). These cores and associated blade flakes (Fig. 5) were recovered from the Krajacic site after the initial study of the early Meadowcroft lithic assemblage was undertaken in 1975, and they precisely parallel the core reduction strategy posited for the Meadowcroft blades or blade flakes.

In 1976, a small lanceolate biface (subsequently named the Miller lanceolate after Albert Miller, the site's discoverer) was found in situ in the uppermost living floor of Stratum IIa at the site. This surface is bracketed by radiocarbon assays of 11,300 ± 700 RCYBP (13,350 cal BP) and 12,800 ± 870 RCYBP (15,250 cal BP), respectively. At the very least, this unfluted point is penecontemporaneous with the Clovis horizon, or, at most, it is as much as a millennium older (Fig. 6). As of this writing, the Miller point from Meadowcroft Rockshelter is the only specimen of its type recovered from a directly dated stratigraphic context. A second complete Miller was recovered from a surface context at the Mungai Farm site, and, as noted below, a probable fragmentary Miller was identified at the Krajacic site.

Because the Meadowcroft and Mungai Miller points were extensively resharpened in antiquity, it is extremely difficult to formulate even a provisional typological description. Adovasio et al. (1988) posited that the original Miller point(s) before resharpening were almost certainly longer, and further, that the angles of articulation between the lateral margins and the base suggested that the maximum width may have been achieved toward the distal or pointed end of the biface. One fragmentary artifact from the Krajacic site collection conforms almost exactly in most of its diagnostic attributes to the posited un-resharpened Miller "prototype" (Fig. 7). More recently, a complete, un-resharpened Miller point was collected from a surface context at the Mungai Farm site, confirming not only the proposed length of the posited prototype but also the preponderant width at its distal end (Fig. 8).

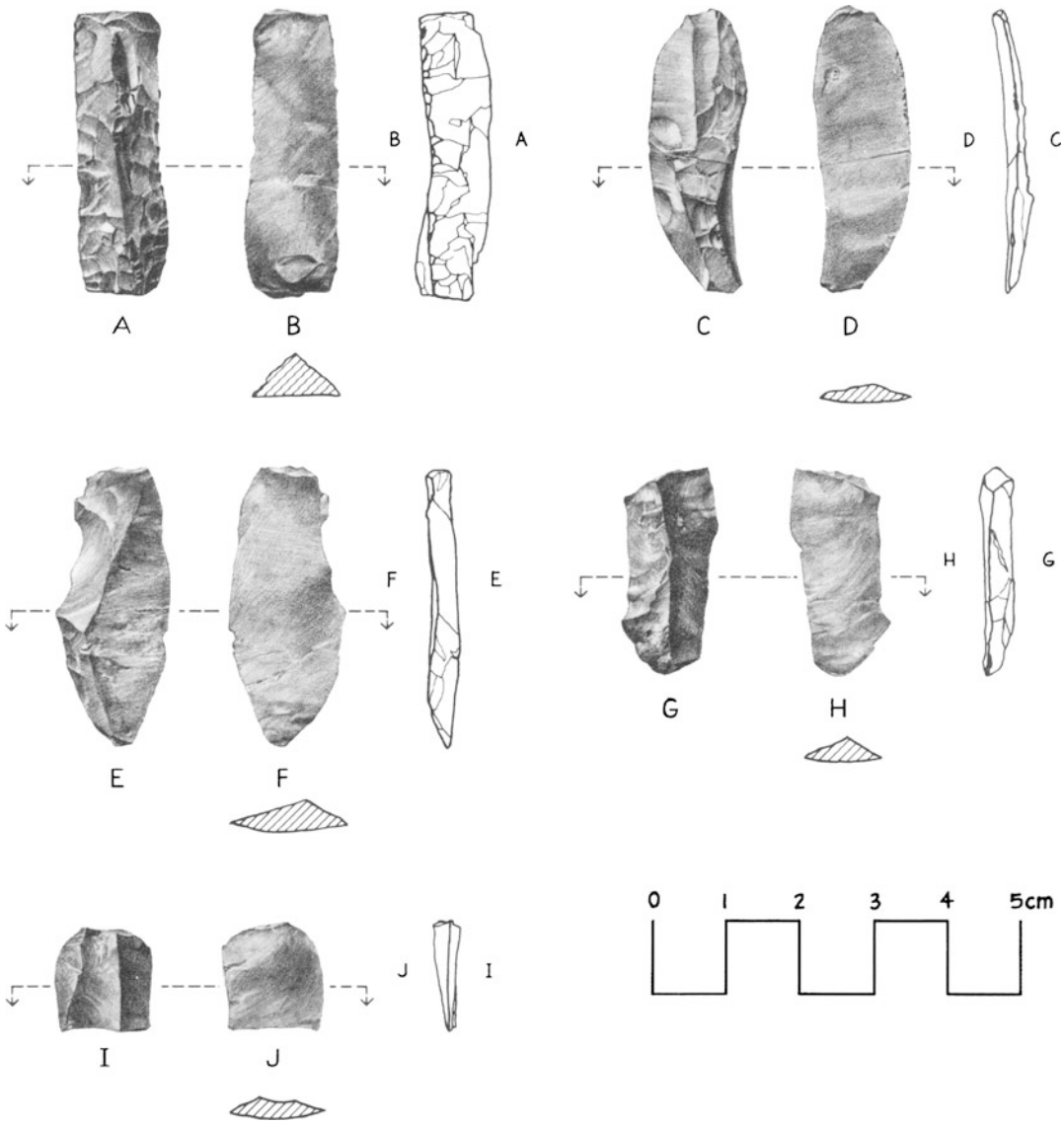

Meadowcroft: Geography and Culture, Fig. 3 Small prismatic blades from middle Stratum IIa at Meadowcroft Rockshelter (36WH297)

Taken in conjunction with the prismatic blades and prepared cores, these data very strongly suggest that the initial visitors to Meadowcroft Rockshelter brought with them a durable toolkit that was sophisticated, technologically standardized, and based on a small polyhedral core and blade technology of distinctly Eurasiatic flavor.

Despite the fact that conditions of preservation at Meadowcroft Rockshelter scarcely approximate the dry, closed sites of western North America, a few perishable artifacts were recovered from the site. These include artifacts of plant fiber, bone, and wood that are represented by simple plaited basketry, punch and awl fragments, and a bipoint, respectively. Not only do these rare items

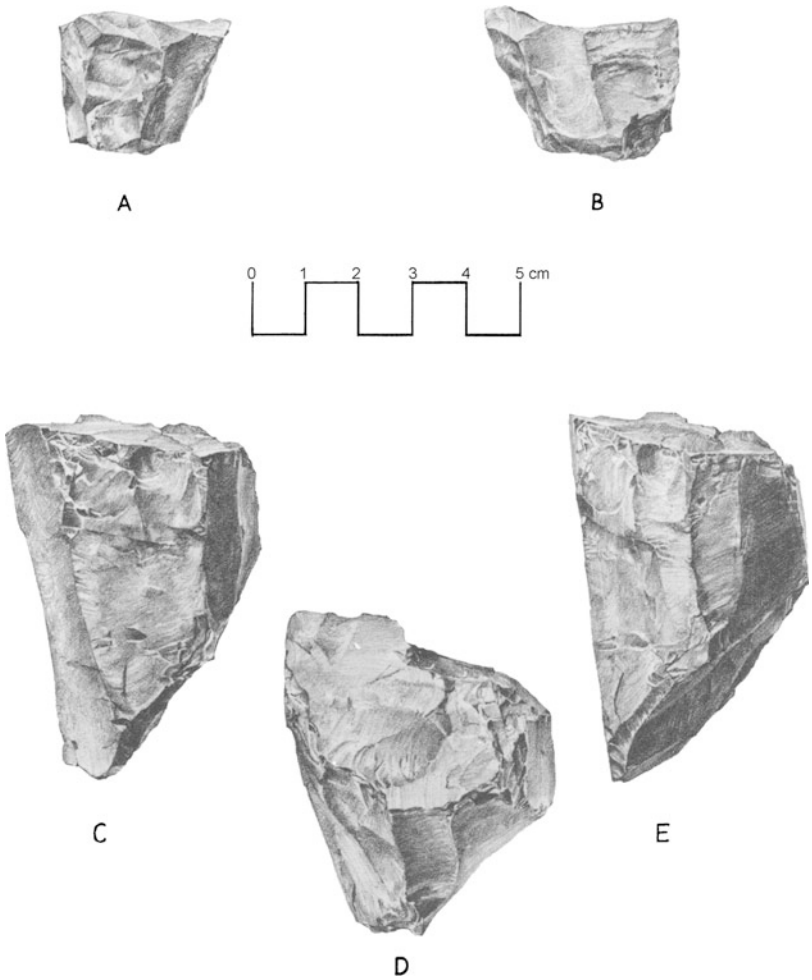

Meadowcroft: Geography and Culture, Fig. 4 Cylindrical polyhedral cores from the Krajacic site (36WH351), located in the Cross Creek drainage

provide a glimpse of non-durable technology of the earliest Meadowcroft populations, because of the anthropologically and archaeologically documented association of perishable technology with women (Adovasio et al. 2007), these *items* may inform about *some* of the activities of that gender at the site.

The later Archaic and Woodland artifacts from Meadowcroft are again dominated by lithic items, though scattered perishable artifacts do occur. The lithic tool kits are dominated by curated forms, especially projectile points and other utilitarian bifaces, while the associated debitage continues to reflect an emphasis on refurbishment and resharpening. The non-durable artifact inventory again contains plaited basketry and a variety of awls and other forms.

Significantly, Meadowcroft Rockshelter has produced the earliest dated ceramic artifacts for the Upper Ohio Valley. Feature 60, a deep and reused fire pit with its origin in Stratum IV and base in Stratum III, yielded a half-moon cord-marked vessel with an associated date of 2815 ± 85 RCYBP (3065–2845 cal BP). A second half-moon vessel from deeper in the same feature has an associated date of 3065 ± 80 RCYBP (3358–3156 cal BP). This ceramic type is restricted at Meadowcroft Rockshelter to Strata III and IV and constitutes the basal ceramic type for not only the Cross Creek drainage but the entire Upper Ohio Valley as well.

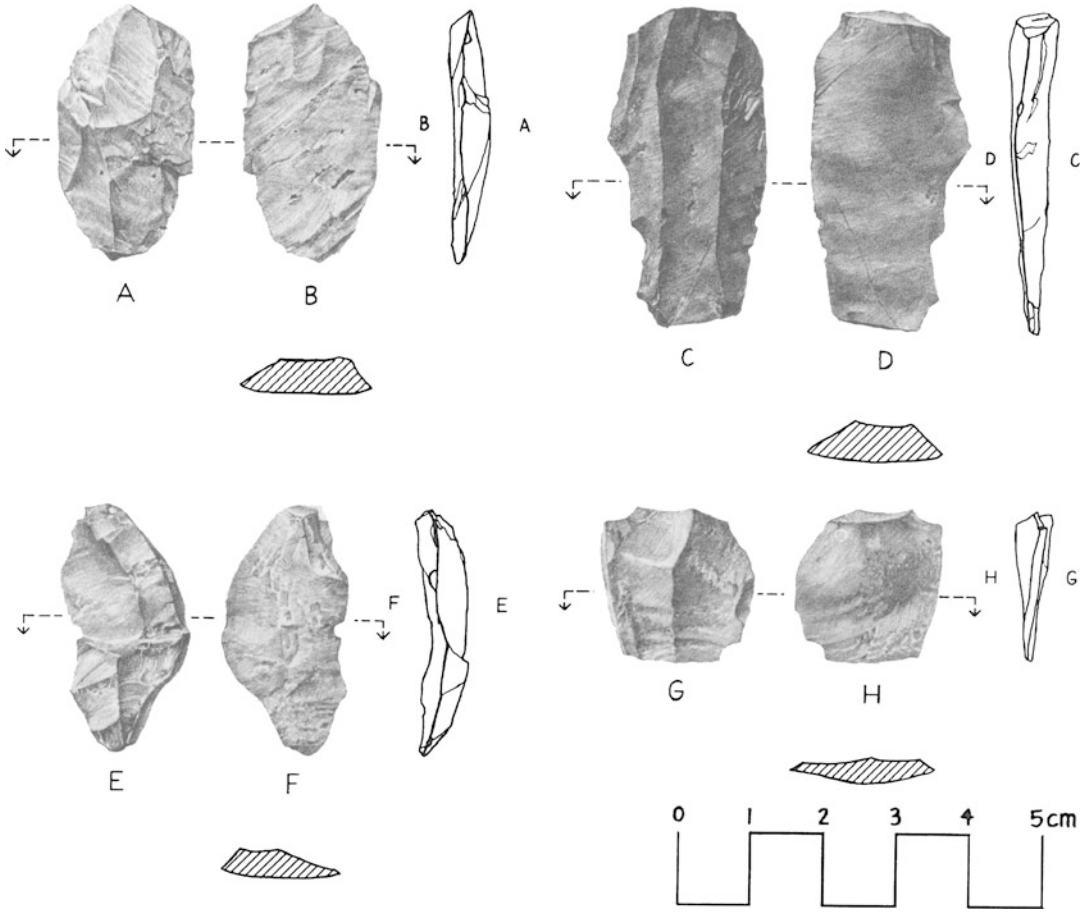

Meadowcroft: Geography and Culture, Fig. 5 Small prismatic blades from the Krajacic site (36WH351)

Faunal Remains

At total ca. 956,000 specimens, Meadowcroft Rockshelter yielded one of the largest collections of faunal and floral materials ever recovered from a single locus in eastern North America. Of these, some 115,166 (12%) were individually examined, identified, and catalogued by the late J. Guilday (Guilday et al. 1980). This sample includes all of the elements recovered during screening (dry and wet) as well as a representative sample of specimens recovered from flotation. It has been determined that the 115,166 individually scrutinized elements represent no fewer than 151 vertebrate taxa and 149 discreet species. The species total includes 66 avian species (44.3% of all represented species), 44 mammalian species (29.5%), 26 reptilian species (17.4%), 8 piscine species (5.3%), and 5 amphibian species (3.7%) (Guilday et al. 1980). The most common species at Meadowcroft Rockshelter are listed in Table 1. A complete listing of the vertebrate faunal remains is provided by stratum and excavation level in Guilday et al. (1980: Table 4).

The vast majority of the site's identified vertebrate faunal remains (ca. 93% of the sample) derive from disintegrated, digestive pellets regurgitated by raptors, primarily owls, which formerly roosted on the cliff face of the rock-shelter during the accumulation of its deposits (Adovasio et al. 1984:357).

As Table 1 indicates, the three most common species at the site are southern flying squirrel (*Glaucomys volans*), passenger pigeon (*Ectopistes*

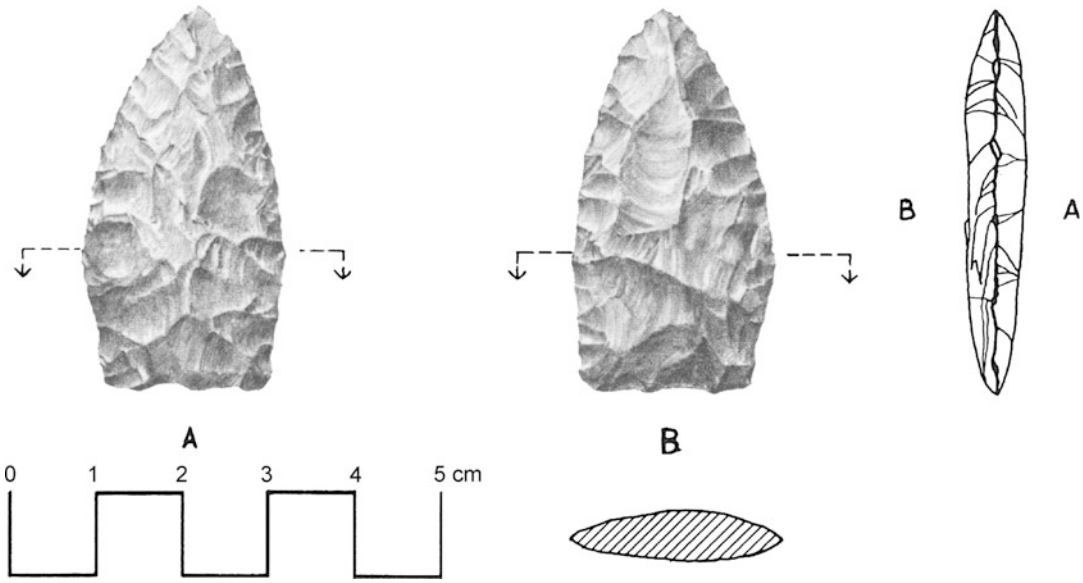

Meadowcroft: Geography and Culture, Fig. 6 Type specimen Miller Lanceolate point from Meadowcroft Rockshelter (36WH297)

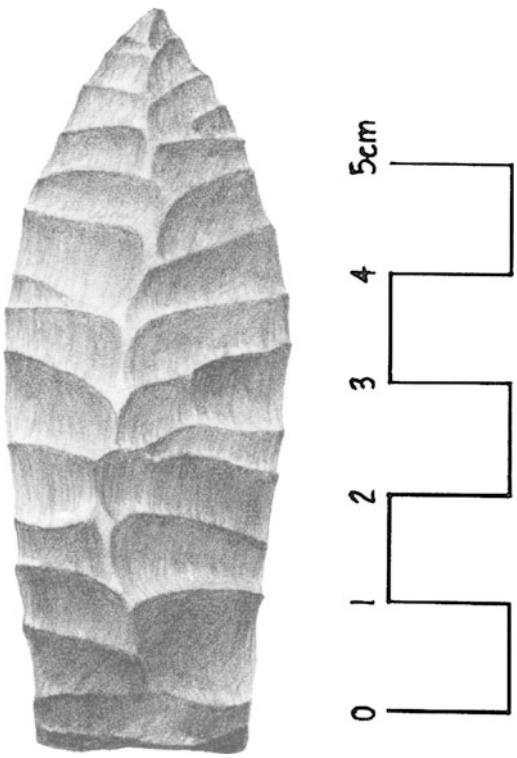

Meadowcroft: Geography and Culture, Fig. 7 Postulated "prototype" Miller Lanceolate projectile point

Meadowcroft: Geography and Culture, Fig. 8 Unresharpened Miller Lanceolate projectile point from the Mungai Farm site complex in the Cross Creek drainage

Meadowcroft: Geography and Culture, Table 1 Number of Identified Specimens (NISP) and minimum number of individuals (MNI) for taxa identified at Meadowcroft Rockshelter

			MNI	
Taxon	Common Name	NJSP	Total	% Site Total
Glau comys volans	southern flying squirrel	22,721	2,503	14.4
Ectopistes migratorius	passenger pigeon	7,050	810	9.2
Bufo sp.	toad	6,748	517	4.1
Peromyscus cf. *leucopus*	white-footed mouse	451	229	J.8
Tamias striatus	chipmunk	556	101	1.5
Blarina brevicauda	short-tailed shrew	264	88	1.5
Mele agris gallopavo	wild turkey	696	87	1.3
Mfrrotus pinetorum	woodland vole	154	75	1.0
Parascalops breweri	hairy-tailed mole	247	59	1.0
Bonasa umbellus	ruffed grouse	319	56	80.3
Total		39,206	4,525	80.3

SOURCE: Dirkmaat et al. (1993:Table 4)

migratorius), and toad (*Buffo* sp.) which collectively account for 68% of all recovered vertebrates. One of these species, flying squirrel, comprises 71% of all mammalian species, 94% of all squirrel species, and 44% of all identified vertebrate individuals recovered from Meadowcroft. The small size, nocturnal habits, conspicuous foraging strategy, and large population size of this rodent in mast forest settings such as that surrounding the rock-shelter made it the most common raptorial prey species in the Meadowcroft assemblage. Indeed, flying squirrel elements dominate the site's vertebrate faunal remains from the Archaic and Woodland strata to the extent that the relative number of other species (with the notable exceptions of passenger pigeon and toad) is so low as to register as only minor inter-stratal fluctuations.

Like the flying squirrel, the ubiquitousness of toad and passenger pigeon remains similarly reflects their large local population size and, hence, ready availability as raptor food. As discussed below, at least two of these species may have also figured in anthropogenic diets.

Although clearly dominated by microfaunal species introduced to the site principally by raptors, some 7% of the total identifiable faunal assemblage at Meadowcroft Rockshelter is attributable to feeding activities by the human occupants of the site. The dietary roles of these species are indicated by the presence of cut marks on specimens or by their excavated context within cultural features, activity areas, and living floors. Though not marked by any anthropogenic alterations, some of the flying squirrel and passenger pigeon remains *may* represent human collection and consumption – if the presence and use of mist nets and the subsequent processing of entrapped specimens without substantial disarticulation are presumed.

While there is no direct proof of the incorporation of flying squirrels or passenger pigeons in the human diet at Meadowcroft, there is positive evidence for the taking and processing of elk, deer, and turkey throughout the Archaic and Woodland periods.

Unfortunately, faunal preservation in the deepest and earliest levels at Meadowcroft Rockshelter is extremely poor. Only four vertebrate species, represented by diminutive fragments,

could be identified from stratigraphic contexts earlier than 11,300 RCYBP (ca. 13,100 cal BP). These include white-tailed deer, eastern chipmunk, southern flying squirrel, and passenger pigeon. Charred fragments of three other taxa are also present – toad, deer mouse, and colubrid snake – all of unknown specific ascription. While the possible dietary roles of deer mouse, chipmunk, flying squirrel, toads, and snakes are problematic, it may be assumed that white-tailed deer and, perhaps, passenger pigeons were "on the menu" of the earliest visitors at Meadowcroft. There are no extinct species represented.

From a paleoenvironmental perspective, it should be stressed that all the vertebrate faunal remains from later or upper Stratum IIa through Stratum XI suggest the presence of temperate Carolinian biota, typical of southwestern Pennsylvania, throughout the Holocene.

The scant vertebrate remains from the deeper or older levels of Stratum IIa likewise suggest but do not necessarily *demand* a temperate setting in the late Pleistocene. White-tailed deer, southern flinging squirrel, and passenger pigeon do, or did, range north rarely and marginally into Canadian zone situations and, also, have been recovered in dated late Pleistocene contexts with now extinct mammals. Their presence, albeit in very low numbers, in lower and middle Stratum IIa is, therefore, equivocal from a paleoenvironmental perspective.

Although not particularly common, mollusk remains are represented throughout the long Meadowcroft Rockshelter occupational sequence, though they are scarce in the very oldest deposits. All recovered mollusk specimens are locally present in the study area today, although several species have been extirpated from the segment of Cross Creek directly below the rock-shelter. A minimum of 35 terrestrial gastropod, 3 aquatic gastropods, and 11 naiad (freshwater mussel) species have been identified (Adovasio et al. 1984:358; Adovasio et al. 1985:88–100; Lord 1982:186–206).

The invertebrate faunal assemblage, like its vertebrate counterpart, indicates that the local microenvironment at Meadowcroft Rockshelter has been essentially stable for at least the past 11,300 years, before which time mollusks are poorly represented in the deposits. The extant data base also supports the presence of an essentially stable, humid, predominately oak-hickory woodland that was quite moist and shady but not particularly dense. Interestingly, despite the long-term pattern of stability, there are "moments" in the history of the site that appear to have been slightly drier and/or moister, cooler, and/or warmer. Of perhaps greater interest, while there is *no* evidence of the human consumption of terrestrial gastropods, there *are* clear indications of fresh water mussel collection, especially during the accumulation of Strata III through V, which subsume the Late Archaic, Transitional, and Early Woodland periods. Finally, there is a shift in terrestrial gastropod community composition which occurs with the appearance of early domesticates as the site (see "Floral Remains"). This change may signal some limited anthropogenic forest clearance to create more open garden plot areas.

Human Remains

Despite human visitation to Meadowcroft Rockshelter over literally thousands of years, human remains are very scarce at the site. In fact, there are no intentional burials of humans, and the few remains attributable to *Homo sapiens* are principally worn and discarded teeth (Sciulli 1982). Despite thousands of years of seasonal visits, it appears that either no one ever died during one of these generally very brief respites, or, if they did, their remains were transported elsewhere for interment. Of course, remains may have been interred in unexcavated portions of the site.

Several strata yielded non-dental human remains which, as noted previously, may have originated in burials elsewhere on the unexcavated portions of the site. Among these non-dental remains, potentially, the most informative derive from lower Stratum IIa. The specimens include the distal one-third of a middle hand phalanx with ca. one-half of the head missing. The specimen derives from an immature individual

and was directly associated with a date of 13,270 ± 340 RCYBP (16,711–15,532 cal BP). A second specimen from lower Stratum IIa is a highly weathered fragment of occipital bone from the lambdoidal suture area near asterion. This specimen was recovered in situ from a shallow firepit which produced a date of 13,240 ± 710 RCYBP (16,915–14,766 cal BP). Presently, these two human bones are among the oldest recovered from the New World. Unfortunately, these specimens are presently unavailable for additional research.

Floral Remains

Macrofloral remains comprise the most abundant class of ecofactual material recovered from Meadowcroft Rockshelter. Included in this ca. 1.4 million element collection is a fully processed, identified, and catalogued sample of ca. 30,000 items (2.14% of the total sample) ranging from moderately large sections of tree trunks and limbs (with and without bark), seeds, seed parts, fruits, and charcoal fragments to small quantities of pollen and spores. The remainder of this large floral assemblage was examined to ensure that the studied sample included adequate representation of all taxa and elements preserved on the site. The 30,000 identified specimens include all the plant remains extracted from 12 complete sediment columns excavated at the site. A fraction of the sediment from each stratum, microstratum, or excavated level within a stratum was processed via hydrogen peroxide (H_2O_2) flotation to deflocculate the sediment samples with minimal disturbance to the surfaces of charred floral elements.

Cushman (1981, 1982) summarized the floral inventory from Meadowcroft Rockshelter. Among the identified specimens of wood and charcoal as well as in the limited pollen sample are diversity of taxa within an attendant chronological range which, once again, present a picture of basic climatic stability, albeit, with intervals of low-level oscillations from ca. 11,300 RCYBP (13,100 cal BP) to the present. However, unlike the vertebrate and invertebrate faunal records from Meadowcroft Rockshelter, the macro- and microfloral assemblages suggest that temperate conditions extended into the late Pleistocene.

Two genera from the site's oldest plant-bearing sediments in lower and middle Stratum IIa are oak (*Quercus* sp.) and hickory (*Carya sp.*), which remain in evidence at the site to the present day. Similarly, pine (*Pinus* sp.) appears very early in the prehistoric record and persists to the present. Pine is particularly abundant from the latest Archaic until its decimation through logging in the very recent past.

Walnut (*Juglans* sp.), a very shade-tolerant species, persists from the initiation of human occupation to recent times in comparatively well-represented amounts. It is likely that walnut remained a dominant or co-dominant in the forest canopy during the entirety of its presence in the Meadowcroft area.

The only genera represented through time with greater frequency than walnut are oak and hemlock (*Tsuga* sp.), both of which are tolerant of a variety of light and moisture conditions. Oak is found in every time period at Meadowcroft and probably always was, as it is presently, a major component of the mixed conifer-hardwood forest in the immediate vicinity of the rock-shelter. The appearance of hemlock suggests the onset of possibly cooler/moister conditions, but the tolerance of this taxon for marginal conditions renders this interpretation conjectural.

Finally, hickory, elm (*Ulmus* sp.), ash (*Fraxinus* sp.), and beech (*Fagus* sp.) parallel each other in comparative representation through time. These species are all mesophytic and broadly tolerant of a variety of conditions. The greatest amount of beech recovered from Meadowcroft corresponds to the peak in hemlock, another moist habitat species.

Collectively, all the data presented above indicates fundamental environmental stability at Meadowcroft Rockshelter since well before the end of the Pleistocene. In this regard, it should be noted that although floral remains are scarce in the levels predating 11,300 RCYBP (13,100 cal BP), the mixed conifer-hardwood forest characteristic of later time periods may be extended back to the time of the site's earliest visitation(s).

Although this interpretation was initially challenged by the critics of the early Meadowcroft radiocarbon assays, it is now widely agreed that conditions to the south of the Wisconsin glacial front were far from uniform and that a mosaic of different environments existed well back into the Pleistocene.

Given Meadowcroft's unique physical and microenvironmental setting (cf. Adovasio et al. 1984: 365–366) as well as the fact that by the site's initial occupation, the ice front had retreated to nearly the present-day shoreline of Lake Erie, the late Pleistocene floral reconstruction advanced for the site is scarcely as anomalous as it once appeared.

In terms of diet, it appears that nuts, seeds, and fruits were subsistence elements of admittedly varying importance throughout the occupational sequence. Though walnut charcoal is absent, minor amounts of walnut and hickory nuts occur in the earliest occupational levels at the site. Walnut shells persist throughout the sequence, particularly in the more recent strata (VII–XI).

Fruits and seeds, other than nutshell, are also represented throughout the occupational sequence and notably include hackberry (*Celtis* sp.) in great abundance. While hackberry is absent from the Cross Creek drainage today (i.e., except as a lawn ornamental), prehistorically, it was apparently common and provided edible fruits with easily identifiable seeds from the late Pleistocene to recent times. While hackberry is also a dietary item for a variety of rodents and birds, its presence at Meadowcroft in storage, fire, and refuse pits is indicative of human emplacement and exploitation.

Cultigens from Meadowcroft Rockshelter include a small sample of maize (*Zea mays*) and squash (*Cucurbita* sp.) remains. Thirty-three specimens of corn (including 18 cobs) were recovered. The earliest corn specimens from the site (Stratum IV) is a small carbonized cob or what appears to be a 16-row popcorn with directly associated dates of 2325 ± 7 5 RCYBP (2222–2491 ca. BP) and 2290 ± 90 RCYBP (2183–2025 cal BP). The intermediate steps to longer and fewer rowed cobs are not directly evidenced at Meadowcroft, although most of the post-Stratum IV corn documents the local evolution of good-quality and high-yield maize varieties.

Cucurbit remains recovered from Meadowcroft Rockshelter include specimens from the top of Stratum III dated to 3065 ± 80 RCYBP (3358–3156 cal BP) and lower Stratum IV associated with dates of 2820 ± 75 RCYBP (3054–2856 cal BP) and 2815 ± 80 RCYBP (3057 2847 cal BP).

When the dates from the Meadowcroft cultigens were initially published, there was widespread skepticism about their accuracy and reliability; however, more recent research indicates the presence of squash in contiguous portions of the Northeast by ca. 5000 cal BP and corn by ca. 4000 cal BP.

As is addressed further below (see "Overview"), the introduction of nonlocal domesticates at Meadowcroft Rockshelter does not appear to have had major consequences either in the general trajectory of site use or the seasonality of visitation/occupation. However, as noted above, the introduction of cultigens *may* be synchronous with limited forest clearance near the site.

Overview

The basic interpretations of the timing and nature of the various sequent visitations/utilizations of Meadowcroft Rockshelter have not altered since 1982 (Carlisle and Adovasio 1982). Though still ongoing, the research at Meadowcroft since the initial excavations, attendant analyses, and publications in the 1970s and 1980s has only served to corroborate, expand, and occasionally modify earlier "conclusions" about the site. What has changed, indeed profoundly, since the original publication about Meadowcroft is the intellectual climate of the entire discourse about early humans in the New World, a topic beyond the scope of this contribution.

Chronology and Technology

The data presented above, as well as complimentary information published previously on the occupation of the Cross Creek drainage

(Adovasio et al. 1998), indicate that a much larger version of Meadowcroft Rockshelter and, by inference, a Cross Creek drainage not very dissimilar to today were initially visited or aboriginally occupied as early as 17,500–16,750 cal BP and, certainly, no later than 13,810–12,600 cal BP.

The flaked stone assemblage from the lower and middle portions of Stratum IIa at Meadowcroft as well as limited flaked stone materials from the Mungai Farm site complex, the lithic reduction station at the Krajacic site, and several other open localities in the Cross Creek drainage suggest that the earliest human populations who utilized the study area possessed a relatively sophisticated lithic technology. At a very early time, this technology included the production of diminutive blades or conical cores via indirect percussion as well as the manufacture of distinctive flake unifaces (or knives) and bifaces. Though dominated by utilized flakes, the earliest lithic industries in the drainage are by no means crude or technologically "backward" (see Adovasio et al. 1977: 87). Indeed, the reverse seems to be true.

Also included in the tool kits of the earliest Meadowcroft inhabitants are worked bone, modified wood, and basketry. Sties of this period are scarce, but it is clear that the entire length of the drainage was probably utilized (see "Spatial and Temporal Intensity of Rockshelter and Drainage Utilization," below). Further, it is apparent that in addition to a variety of exotic imported cherts, the earliest visitors to Cross Creek quickly began to exploit the local Monongahela chert resources.

Despite the ephemeral and obviously transitory nature of the earliest occupation of the drainage as it is reflected in lower Stratum IIa and the lower portion of middle Stratum IIa at Meadowcroft (as well as elsewhere, see below), it is clear that these early and presumable highly mobile groups of hunters and foragers represent the *chronological baseline* not only for the occupation of the Upper Ohio Valley but also for the lower reaches of the northeast and eastern North America.

Later Paleoindian utilization of both the Meadowcroft Rockshelter and the Cross Creek drainage is evidenced in the upper levels of middle Stratum IIa at Meadowcroft and at the Krajacic site and the Mungai Farm site complex. The occurrence of complete Clovis points from elsewhere in the drainage attests to the continuing use of the area in the so-called "classic" Paleoindian times. Despite the appearance of both Miller Lanceolate and Clovis points, the basic tool kit remained essentially unchanged. The perishable tool kit from the rock-shelter continued to include basketry, modified bone, and wood.

The latest Paleoindian occupation of the drainage is signaled by the recovery of a series of Plano-like points from the Mungai Farm site complex. Despite the absence of diagnostic materials, the presence of lithic debitage, ash, charcoal, incinerated bone, and limited plant material indicates that Meadowcroft continued to be used intermittently during this time. If the data from upper Stratum IIa at Meadowcroft is representative, the lithic tool kit continued to feature utilized flakes with limited numbers of bifaces, unifaces, modified bone, and wood. Basketry also persisted.

Occupation of both the rock-shelter and the Cross Creek drainage during the Early Archaic is evidenced by a series of diagnostic projectile points from a variety of open sites in the study area. Once again, it should be noted that Meadowcroft clearly was utilized during the Early Archaic despite the low number of flaked stone diagnostics. Two radiocarbon dates in the tenth and ninth millennia BP as well as extensive incinerated bone, limited lithic debitage, a variety of non-firepit cultural features, and abundant plant remains all indicate that the site was *not abandoned* at that time. Indeed, as noted by Adovasio et al. (1977: 88), the portions of the rock-shelter that have produced both terminal Paleoindian and Early Archaic materials are coextensive with the massive roof spalling event that separates Stratum IIA from Stratum IIb as well as a later series of less dramatic spalling episodes. It is strongly suggested that materials ascribable to the period ca. 10,950–8950 RCYBP are much more likely to be abundant east of the epicenter of the collapse rather than *in* or *on* the piles of spalls and roof blocks themselves. Again, if Meadowcroft is any reflection, Early Archaic tool kits included utilized flakes, limited numbers of bifaces and unifaces, as well as modified bone, wood, and

basketry. Significantly, the small blades with faceted and/or ground platforms so characteristic of the Paleoindian period at both the rock-shelter and elsewhere in the drainage disappear abruptly. The only "blades" recovered from any Archaic contexts are so dissimilar to the Paleoindian forms and so unstandardized as to suggest that most of them are "accidents." This is supported by the disappearance of conical cores as well.

The "beginning" of the early Middle Archaic utilization of Meadowcroft is marked by the appearance of Morrow Mountain-like and Kanawha Stemmed forms at the rock-shelter and the occurrence of Stanly and Kanawha points at both the Mungai Farm site complex and elsewhere in Cross Creek.

Utilization of Meadowcroft and the Cross Creek drainage throughout the duration of the Archaic is attested to by the recovery of a wide number of temporally diagnostic points. It is of some interest to note that there is greater typological diversity to the non-projectile point-flaked stone assemblages, at this time, both at Meadowcroft and at other Late Archaic or terminal Archaic sites. This is paralleled by increased diversity among all the perishable "assemblages" except basketry.

The onset of Early Woodland occupation at Meadowcroft and/or other localities in the drainage is marked by the persistence of several Late Archaic point types and by the appearance of Cresap Stemmed, Adena Ovate Base, and Robbins Stemmed point types. The Early Woodland at Meadowcroft is also evidenced by the early appearance of half-moon cord-marked ceramics and cultigens. The lithic and the perishable tool kits are more diversified typologically than previously, but the basically utilitarian character of the flaked stone assemblage persists as reflected in the high numbers of recovered utilized flakes. Diagnostic Middle Woodland points from Meadowcroft and from the study area in general indicate continued occupation during this period.

Late Woodland utilization of Meadowcroft is marked by various triangular points. In both the Middle and Late Woodland, the basic character of the non-projectile point flaked stone does not change appreciably. The Middle and Late Woodland levels at Meadowcroft, however, are somewhat depauperate in all classes of artifacts for reasons to be discussed below.

Spatial and Temporal Intensity of Rock-Shelter and Drainage Utilization

Many indices or proxies can be employed to gauge the spatial and temporal intensity of aboriginal utilization of Meadowcroft Rockshelter and the Cross Creek drainage. These include counts of sites/components per chronological period corrected for length of the period, numbers of temporally diagnostic artifacts per period (again corrected for length of period), as well as quantification (both with and without correction factors) of the artifactual and ecofactual data by stratigraphic level at Meadowcroft. Significantly, whatever measure or combination of measures is employed, it is clear that a slow but steady increase in the use of the drainage is evidenced from the onset of occupation in the Pleistocene through the end of the Middle Archaic. While there is apparently a dip or "regression" in the Middle Archaic, it is uncertain whether this is "real" or an artifact of sampling or identification.

Despite the fact that the entire drainage shows a scattered, almost ephemeral Paleoindian occupation generally at higher elevations (with the notable exception of Meadowcroft), and characterized by few if any real base camps, the Early Archaic materials are differentially distributed spatially with a concentration in the headwater areas of the drainage, particularly near the Mungai Farm site complex. Scant representation is found elsewhere at that time period, but the reasons for this are imperfectly understood at best.

The Late Archaic in the drainage, the period from ca. 5950–3050 RCYBP and especially the latter portion of that period, simultaneously witnessed a rise in numbers of sites and diagnostic projectile points as well as a dramatic increase in rock-shelter utilization; this underscores the appearance of genuine base camps. Extensive reduction of local lithic resources also characterizes this period with the appearance of flimsy "surface structures" at one of the two major lithic reduction localities, Cross Creek Village (36WH293). Additionally, the greatest range of

topographic settings was employed at this time for site placement. The magnitude of the change in intensity of drainage utilization during the Late Archaic and terminal Archaic (especially if the preceding Middle Archaic actually should prove to be poorly represented) is sufficiently striking that it suggests genuine population increase of a considerable magnitude.

Continued intensive utilization of the drainage is indicated during the Early Woodland, a time when Meadowcroft was still a base camp with other base camps located sporadically throughout the drainage. Thereafter, although there was a decline on rock-shelter utilization due to massive rock fall, the drainage continued to be heavily utilized in the Middle Woodland but, perhaps, in a different fashion than previously.

During the Late Archaic, a tendency developed to place sites on or near tributaries that provided access to adjacent drainages and which collectively are both much larger and ecologically richer than Cross Creek. This pattern intensified through the Early Woodland so that by the Middle Woodland, base camps for the aboriginal visitors to the Cross Creek drainage actually appear to be *outside* it in the "more attractive" contiguous drainages. A possible exception is the area near the Avella Mound (36WH415) which once may have had a Middle Woodland base camp of some size but which is now obliterated.

By the Late Woodland, base camps were absent from Cross Creek, and the number of known sites is low. Utilization of both the rock-shelter and the drainage persisted, however, and doubtlessly reflects an influx of hunting and foraging groups from permanent villages located outside the drainage.

It should be reiterated at this juncture that the horizontal or spatial distribution of occupational materials (and, hence, the loci of human utilization) at Meadowcroft Rockshelter has been determined by roof spalling events which dictate the amount of available dry, level floor space. The occupational record at the site consequently can deviate (as noted above) from that in the rest of the drainage due to site-specific geomorphic circumstances/constraints.

The general scarcity of late Paleoindian and Early Archaic materials at the site reflects very specifically the consequences of roof falls, while the apparent decrease in utilization of the rock-shelter after ca. 1665–1290 RCYBP likewise reflects the collapse of the huge New Roof Fall. Nonetheless, there are broad concurrences in the occupational history of Meadowcroft and in the adjacent Cross Creek drainage which can be taken to reflect the natural incidence and intensity of utilization of both settings.

Environment, Seasonality, Subsistence, and General Character of Site Utilization

Perhaps few subjects, exclusive of the lower and middle Stratum IIa radiocarbon dates, have engendered more discussion than the early environment of Cross Creek as interpreted at Meadowcroft Rockshelter. The absence of extinct Pleistocene big game animals and the presence of deciduous floral elements in very ancient levels have been extensively debated whenever the rock-shelter has been discussed.

In this regard, it can only be reiterated that all the extant ecofactual information, specifically including macrofloral, macrofloral, macrofaunal, and microfaunal remains as well as various categories of geological data suggest that from *at least* 11,250 or 10,950 RCYBP to the present, the environment of Cross Creek was essentially *modern* in aspect. This is not to suggest that there have been no changes over the past 11,000 years, as the data presented above indicate that cooler and/or moister as well as warmer and/or drier intervals *can* be detected in the environmental record. Specifically, the plant and invertebrate remains suggest some shift in forest species composition with indications of fluctuating temperatures before, during, and after the so-called Altithermal episode.

Conditions seem to have been considerably warmer and perhaps drier during the Middle Archaic and early Late Archaic (5950–3950 RCYBP) as well as immediately after the Middle Woodland. The magnitude of these changes is presently unknown, but, clearly, they should not be overstressed. Few if any readers have been concerned with or take exception to the

reconstruction of the latest Pleistocene or Holocene environmental history of the drainage. Rather, the focal point has been the lower and middle Stratum IIa deposits with their deciduous forest elements and lack of extinct Pleistocene fauna. As has been emphasized, these levels – especially outside the modern dripline – are very poor in terms of preservation; the material that is preserved is not large or numerous. What material is present, however, indicates both the presence within "striking distance" of the rock-shelter of both deciduous and coniferous trees with appropriate "modern" fauna. While this may seem unpalatable to some, it is not questioned by many others who realize the mosaic character of late Pleistocene environments in both the Midwest and Northeast. It is stressed, in this regard, that Cross Creek not only lies relatively far south of the Wisconsinan glacial front but occurs in a unique topographical setting which presently has many more frost-free days and generally higher mean annual temperatures than areas directly east or north of it. Specifically, modern weather records indicate that there are 40–50 more frost-free days in Cross Creek than on any of the higher elevations or contiguous drainages. Indeed, modern Cross Creek exhibits a temperate regime more appropriate to a more southerly setting than any other drainage in the area. If this is the case presently, it may well have been the case prehistorically. All the foregoing suggests that the environment which characterized the late Pleistocene in the portion of Cross Creek immediately adjacent to the rock-shelter was *not* radically different than at present.

The data recovered and analyzed from Meadowcroft to date argue that *throughout its history*, the site served as a temporary locus or station for hunting, collecting, and food-processing activities. The predominance of utilized flakes as well as projectile points which show multifunctional use coupled with limited numbers of bifaces and unifaces, the relative abundance of food bone, edible plant remains, and (at certain times) invertebrate resources plus perishable artifacts used in the acquisition, transport, or processing of these remains all support this conclusion. In marked contradistinction, the general absence of *extensive* evidence of the in situ manufacturing of lithic, ceramic, or shell artifacts militates against a "long-term or permanent occupation" interpretation of the site.

Significantly, while the intensity of site use changes through time – ranging from what may well represent very sporadic "day trips" in the Paleoindian, Early Archaic, and Middle Archaic periods to longer visits of perhaps several weeks or more in the Late Archaic through Early Woodland – the basic *function* of the site does not change appreciably even after the appearance of domesticated plants.

What is in evidence, however, are subtle changes in the apparent composition of groups using the rock-shelter. Despite the high incidence of projectile points and other flaked stone artifacts traditionally linked to hunting, the presence of basketry and the high incidence of modified bone (ethnohistorically associated with female activities) in the Late Archaic and Early Woodland levels at the site strongly suggest utilization by groups composed of both males and females at this time. Likewise, the relatively high incidence of Late Woodland ceramics and the low incidence of Late Woodland points imply a somewhat different pattern of collecting than is seen in the Paleoindian, Early Archaic, or Middle Archaic occupational horizons.

The primary subsistence modes of at least the various post-11,250 RCYBP Meadowcroft populations as directly reflected in the deposits include the hunting of deer and elk augmented by the taking of smaller game and perhaps bird egg collecting. The intensive collection of hackberries, nuts, and other fruits and seeds and the exploitation of riverine fauna, notably mussels, are also known from the archaeological record. While the data from the pre-11,250 RCYBP levels are (as noted above and elsewhere) rather limited, the extant information does at least suggest that the first visitors to the site also practiced a rather more diversified subsistence round than is normally associated with the Paleoindian period.

The hunting mode seems to have remained more-or-less constant throughout the post-middle Stratum IIa sequence, while the other subsistence modes mirror a number of potentially significant

changes. Hackberry exploitation sharply diminished in frequency after Stratum VII along with the collection of blackberry and blueberries. Conversely, the gathering of other nuts and seeds remained more-or-less constant. Similarly, exploitation of riverine resources, relatively insignificant before the Late Archaic, became markedly important immediately thereafter and remained so until the onset of Stratum VI (ca. 1665 RCYBP), when it virtually ceased. Doubtless, these changes reflect both climatically induced differential availability as well as specific food preferences. However, a full assessment of their significance is still underway. In recapitulation, the addition of cultigens toward the end of the long Meadowcroft sequence *does* appear to correlate with a diminution in the collection of certain wild plants although it does not seem to have changed the basic character of site use.

Examination of constituents of the dietary modes of the post-middle Stratum IIa Meadowcroft populations leads to the conclusion that the principal utilization of the site occurred during the fall of the year. While the hunting mode and, to a lesser extent, the riverine exploitation mode are seasonally independent, the nuts, berries, and seeds which constitute the "staples" of the collecting mode would have been most abundant in the fall, thus dictating the time of site occupation. If, as the floatation sample data suggest, egg collecting was pursued by some of the aboriginal visitors to the rock-shelter, then some limited spring utilization of the site is also indicated.

Data on the seasonality of the earlier occupations of the rock-shelter are so limited that they virtually preclude any cultural generalizations. However, if their apparently diversified subsistence strategy concentrated to any extent of plant resources, then the predominantly fall pattern of site utilization can be extended back into the late Pleistocene.

The data from all the other sites in the drainage except the Late Archaic seasonal camp of Cross Creek Village – which could not have been occupied in the spring because of flooding – are not conducive to reconstructing any seasonal patterns of aboriginal use. However, with the exception of a few localities, all of the open sites in the drainage appear to be short-term, limited activity loci presumable associated with one or another aspect of seasonally based hunting, collecting, and food processing.

Pending the ultimate completion of the data analyses from Meadowcroft Rockshelter and the 236 other sites in the Cross Creek drainage, it appears that it will be possible to link, at least, some of the aboriginal visitors to Meadowcroft with specific open sites and, hence, to "track" the movements of some aboriginal groups within the drainage. It is hoped that, by extrapolation, this will facilitate the generation of inferences on the seasonality of use of at least number of these open loci.

References

Adovasio, J.M., and J. Page. 2002. *The first Americans*. New York: Random House.

Adovasio, J.M., and D.R. Pedler. 2004. Pre-Clovis sites and their implications for human occupation before the last glacial maximum. In *Entering America: Northeast Asia and Beringia before the last glacial maximum*, ed. D.B. Madsen, 139–158. Salt Lake City: University of Utah Press.

Adovasio, J.M., and D.R. Pedler. 2013. The ones that still won't go away: More biased thoughts on the pre-Clovis peopling of the New World. In *Paleoamerican Odyssey*, ed. K.E. Graf, C.V. Ketron, and M.R. Waters, 511–520. Texas: Center for the Study of the First Americans, Department of Anthropology, Texas A&M University, College Station.

Adovasio, J.M., and D.R. Pedler. 2016. *Strangers in a new land*. Toronto: Firefly Books.

Adovasio, J.M., J.D. Gunn, J. Donahue, and R. Stuckenrath. 1975. Excavations at Meadowcroft Rockshelter 1973–1974: A progress report. *Pennsylvania Archaeologist* 45 (3): 1–30.

Adovasio, J.M., J.D. Gunn, J. Donahue, and R. Stuckenrath. 1977. Meadowcroft Rockshelter: Retrospect 1976. *Pennsylvania Archaeologist* 47 (2–3): 1–93.

Adovasio, J.M., J.D. Gunn, J. Donahue, and R. Stuckenrath. 1978. Meadowcroft Rockshelter 1977: An overview. *American Antiquity* 43 (4): 632–651.

Adovasio, J. M., J. D. Gunn, J. Donahue, and R. Stuckenrath. 1979–1980a. Meadowcroft Rockshelter—retrospect 1977 (part 1). *North American Archaeologist* 1(1):3–44.

Adovasio, J. M., J. D. Gunn, J. Donahue, and R. Stuckenrath. 1979–1980b. Meadowcroft

Rockshelter—retrospect 1977 (part 2). *North American Archaeologist* 1(2):99–137.

Adovasio, J.M., J. Donahue, R.C. Carlisle, K.A. Cushman, R. Stuckenrath, and P.W. Wiegman. 1984. Meadowcroft Rockshelter and the pleistocene/holocene transition in Southwestern Pennsylvania. In *Contributions in quaternary vertebrate paleontology: A volume in memorial to John E. Guilday*, Special Publication No. 8, ed. J.H. Genoways and M.R. Dawson, 347–369. Pittsburgh: Carnegie Museum of Natural History.

Adovasio, J.M., R.C. Carlisle, K.A. Cushman, J. Donahue, J.E. Guilday, W.C. Johnson, K. Lord, P.W. Parmalee, R. Stuckenrath, and P.W. Wiegman. 1985. Paleoenvironmental reconstruction at Meadowcroft Rockshelter, Washington county, Pennsylvania. In *Environments and extinctions: Man in late glacial North America*, Peopling of the Americas Edited Volume Series, ed. J.-I. Mead and D.J. Meltzer, 73–110. Orono: Center for the Study of Early Man.

Adovasio, J.M., A.T. Boldurian, and R.C. Carlisle. 1988. Who are those guys? Some biased thoughts on the initial peopling of the new world. In *Americans before Columbus: Ice age origins*, Ethnology Monographs No. 12, ed. R.C. Carlisle, 45–61. Pittsburgh: Department of Anthropology, University of Pittsburgh.

Adovasio, J.M., J. Donahue, and R. Stuckenrath. 1990. The Meadowcroft Rockshelter radiocarbon chronology 1975–1990. *American Antiquity* 55 (2): 348–354.

Adovasio, J.M., J. Donahue, and R. Stuckenrath. 1992. Never say never again: Some thoughts on could haves and might have been. *American Antiquity* 57 (2): 327–331.

Adovasio, J.M., R. Fryman, A.G. Quinn, D.C. Dirkmaat, and D.R. Pedler. 1998. The archaic west of the Allegheny mountains: A view from the cross creek drainage, Washington county, Pennsylvania. In *The archaic period in Pennsylvania*, ed. P.A. Raber, P.E. Miller, and S.M. Neusius, 1–28. Harrisburg: Commonwealth of Pennsylvania, Pennsylvania Historical and Museum Commission.

Adovasio, J.M., O. Soffer, and J. Page. 2007. *The invisible sex. Smithsonian books*. New York: Harper-Collins Publishers.

Boldurian, A. T. 1985. Variability in flintworking technology at the Krajacic site: Possible relationships to the pre-Clovis Paleo-Indian occupation of the cross creek drainage in Southwestern Pennsylvania. Ph.D. dissertation, Department of Anthropology, University of Pittsburgh, Pittsburgh.

Carlisle, R.C., and J.M. Adovasio, eds. 1982. *Meadowcroft: Collected papers on the archaeology of Meadowcroft Rockshelter and the cross creek drainage*. Pittsburgh: Department of Anthropology, University of Pittsburgh.

Carlisle, R.C., J.M. Adovasio, J. Donahue, P. Wiegman, and J.E. Guilday. 1982. An introduction to the Meadowcroft/cross creek archaeological project: 1973–1982. In *Meadowcroft: Collected papers on the archaeology of Meadowcroft Rockshelter and the cross creek drainage*, ed. R.C. Carlisle and J.M. Adovasio, 1–30. Pittsburgh: Department of Anthropology, University of Pittsburgh.

Carr, K., and J.M. Adovasio. 2002. Paleoindians in Pennsylvania. In *Ice age peoples of Pennsylvania*, ed. K. Carr and J.M. Adovasio. Harrisburg: Commonwealth of Pennsylvania, Pennsylvania Historical and Museum Commission.

Cushman (Volman), K.C. 1981. Paleoenvironmental implications of botanical data from MEADOWCROFT Rockshelter, Pennsylvania. Ph.D. dissertation, Texas A&M University, College Station.

Cushman (Volman), K.C. 1982. Floral remains from Meadowcroft Rockshelter, Washington county, Southwestern Pennsylvania. In *Meadowcroft: Collected papers on the archaeology of Meadowcroft Rockshelter and the cross creek drainage*, ed. R.C. Carlisle and J.M. Adovasio, 207–220. Pittsburgh: Department of Anthropology, University of Pittsburgh.

Custer, J.F. 1984. *Delaware prehistoric archaeology: An ecological approach*. Dover: University of Delaware Press.

Custer, J.F. 1996. *Prehistoric cultures of eastern Pennsylvania*. Harrisburg: Commonwealth of Pennsylvania, Pennsylvania Historical and Museum Commission.

Dirkmaat, D. C., J. M. Adovasio, and R. C. Carlisle. 1993. Taphonomic agents and paleoecological reconstructions at Meadowcroft Rockshelter (36WH297), Pennsylvania. In *Exploitación de Recursos Faunisticos en Sistemas Adaptativos Americanos*, ed. José Luis Lanata, 5–14. Arqueologia Contemporanea 4, 1993, Edicion Especial.

Fagan, B. M. 1990. Tracking the first Americans. archaeology November/December 1990:14–20.

Fagan, B.M. 1995. *Ancient North America: The archeology of a continent*. 2nd ed. London: Thames and Hudson.

Fitzgibbons, P.T. 1982. Lithic artifacts from Meadowcroft Rockshelter and the cross creek drainage. In *Meadowcroft: Collected papers on the archaeology of Meadowcroft Rockshelter and the cross creek drainage*, ed. R.C. Carlisle and J.M. Adovasio, 91–129. Pittsburgh: Department of Anthropology, University of Pittsburgh.

Guilday, J. E., P. W. Parrmalee, and R. Wilson. 1980. Vertebrate faunal remains from Meadowcroft Rockshelter (36WH297), Washington county, Pennsylvania. Ms. on file, Senator John Heinz History Center, Pittsburgh.

Lord, K. 1982. Invertebrate faunal remains from Meadowcroft Rockshelter, Washington County, Southwestern Pennsylvania. In *Meadowcroft: Collected papers on the archaeology of Meadowcroft Rockshelter and the cross creek drainage*, ed. R.C. Carlisle and J.M. Adovasio, 186–206. Pittsburgh: Department of Anthropology, University of Pittsburgh.

Sciulli, P.W. 1982. Human remains from Meadowcroft Rockshelter, Washington County, Southwestern Pennsylvania. In *Meadowcroft: Collected papers on the archaeology of Meadowcroft Rockshelter and the cross creek drainage*, ed. R.C. Carlisle and J.M. Adovasio, 175–185. Pittsburgh: Department of Anthropology, University of Pittsburgh.

Media and Archaeology

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Introduction and Definition

Whether an excavation stems from academic research or a legally mandated mitigation effort, the media has an insatiable appetite for archaeology. Indeed, human curiosity will always be piqued by stories about the mysterious past, and therefore archaeological discoveries will always be relevant. The propagation of human stories pieced together from artifacts, ruins/shipwrecks, and human remains lends itself perfectly to a foray of mediums that include printed formats (magazines and newspapers), radio, television (news programs and documentaries), and the Internet.

National and international media are interested in disseminating any archaeological search or discovery that may capture the interest of a larger audience; usually the stories are already familiar tales of the past, or the finds are significant enough to catch the attention of those unfamiliar with the history of the site. Although the topic of "archaeology and the media" can include various forms of electronic and published communication that influences mass audiences on anything related to archaeology, this entry will focus on the formats that archaeologists find most divisive and challenging to negotiate: published news media and television documentaries. While documentaries and local television news programs are made for television, they may be downloaded and viewed on portable electronic devices such as smartphones and laptops. Although daily newspapers and monthly magazines are distributed in print format, this time-sensitive form of media can also be accessed on the Internet where it can be lifted and posted in multiple web sites including listservs and blogs. The various locations and methods of sharing information today underscore the impact the mass media can have on a single archaeology site as well as the discipline in general.

Key Issues/Current Debates

The Debate

The job of documentarian and newspaper editor is to sell stories. Admittedly, humans are attracted to narratives involving a mystery, especially the ones with valuable antiquities and dead bodies. Those who publish archaeology articles and produce scientific documentaries recognize this interest, and naturally their stories include links to sex, drugs, human sacrifice, cannibalism, human remains, gold, taboo behavior, and anything religious. The media also recognize that their public is interested in popular people and events as well as archaeological excavations related to controversial projects and local history. Consequently, most archaeologists have experience sharing information on their work to news reporters. Since the data produced from archaeological excavations results in new information about our past, it is imperative that reporters accurately relay details about these discoveries. Failure to communicate the meaning behind material culture can result in erroneous information about the past that counteracts the archaeologists' efforts to contribute to, contradict, or confirm what was previously known about that particular event, place, and/or person(s). News reporters must become an expert on the subject they are covering at that moment. Their educational background and previous exposure to archaeology will significantly affect the quality and accuracy of their article. For example, science writers often cover science-based stories and are often successful at comprehending the value and meaning of an archaeological discovery. They possess the ability

to extract valuable information from an archaeologist to produce a comprehensive article with few, if any, misrepresentations or errors. Unfortunately, this quality of news coverage on archaeology is the exception rather than the rule.

Many archaeologists have experienced being misquoted and, perhaps worse, the significance of their discoveries overshadowed, often in favor of sensationalism. Although this unintentional or intentional misrepresentation of research can leave a site and the scholar relatively unscathed, occasionally there may be a significant impact to the project. Although many scientists face challenges with the media, Middle Eastern archaeologists are regularly pulled into the spotlight whenever one of their findings could be used to support or emasculate a group's political or religious agenda. An example is the alleged confirmation of Jesus of Nazareth and Mary Magdalene's tomb in Jerusalem by the *Discovery Channel*. After reviewing the evidence, or lack thereof, many of the biblical archaeologists remain skeptical that this ossuary could ever be substantiated as the tomb of Jesus (Gibson 2006: 118; Meyers 2006: 118). Despite the lack of scientific proof, the public is still left holding this mystery in their hands without a decision on the authenticity of the discovery.

As this example demonstrates, protesting the delivery of archaeology on television through avoidance may be futile and perhaps even a disservice to the discipline. Additionally, there are organizations that attempt to legitimize their treasure-seeking agenda by incorporating archaeological methods into their operations. Unfortunately, such organizations tout themselves as "commercial marine archaeologists," thereby creating confusion and reinforcing the erroneous message that archaeologists are treasure hunters in search of gold and objects of monetary value. Considering the impact treasure hunters have on the public may encourage some archaeologists to share their research on documentaries in an attempt to dilute bogus representations of archaeology.

On the other hand, significant repercussions can result from sharing new archaeological findings with the media. An example of an injustice to American archaeology research created by media coverage is the excavation of the Donner Party camp in California. This popular Western tale involved a wagon train becoming stranded in the mountains where some of the emigrants resorted to cannibalism to stay alive. When archaeologists publicly announced they found no human bone at one of the campsites, the news headlines insinuated the project archaeologists proved the Donner Party never cannibalized the dead (Dixon and Schablitsky 2011). In reality, the archaeologists simply did not recover human bone because they did not dig in the location of the bodies or the bone may have decomposed in the acidic soil. In the end, the news media ignored the newly discovered data on daily life in the camp and the reconstruction of a starvation diet in favor of dramatic and inaccurate headlines. This perpetuation of misinformation and insinuation of a "cannibalism debate" took an infamous historical event and created a controversy where there was none. When irresponsible and slapdash reporting on important events can twist and obscure the public's perception of the past, how can we, or should we, trust and share our findings with the media? Is there a reason we should even televise our research when the same network airs programs on treasure hunting our heritage? Herein lays the quandary and the debate.

Published Media

As discussed, sharing archaeological findings can be dangerous since a single interview can create a barrage of problems that did not previously exist. When a site is just discovered and exciting finds have not yet been publicly shared, reporters and even documentary producers can exhibit a voracious appetite for the "new" and "spectacular." Of course, media coverage is not limited to projects that involve significant finds; often stories are published on what the editor believes their audience will be interested in reading. Local archaeology stories, for example, often include cultural resource management (CRM) archaeology digs that can be attached to controversial construction projects.

Some scholars believe that in order to avoid any misrepresentation of scientific results, the safest response to the media is to simply not engage with them or rely on popular print to reveal one's preliminary findings and interpretations. Many of these scientists clutch tightly to the belief that trusting a non-archaeologist to share their results is not worth the risk of losing control of how their data is delivered to the masses. Unlike 20 years ago, a bad newspaper article does not end up lining a hamster cage. Instead, it lives on indefinitely in an electronic format posted on news sites, blogs, and commentaries. Furthermore, many academic scientists believe that sharing information on their findings within a popular medium prior to appearing in a peer-reviewed publication is popularization and regarded as irresponsible and an unethical delivery of scientific data (Gregory and Miller 1998: 108; Clack and Brittain 2007: 35). Instead, they believe that scholarly results should be restricted to academic publications and proceedings. The downside to this type of exclusivity is that it removes the public's ability to easily access archaeologically produced information about our past. This latter point is extremely important if the archaeological data is gathered with local, state, or federal government funding.

Of course, there are advantages to allowing an archaeological project to be publicly exposed in the mass media. In particular, large and complex archaeological projects take months, if not years to plan. The excavation of shipwrecks, large ruins, and multiyear projects requires a large and regular infusion of funding. Offering a high-profile archaeological site up as a sacrificial lamb to the media gods for the economic good of the project, however, should not be entered into lightly. Once preliminary data surfaces, the principal archaeologists should consider limiting regular and thorough coverage of their work by the media if the finds could be easily misinterpreted or are controversial in nature.

Some would also argue that coordination with the media is a necessary step when federal, state, and local agencies comply with Section 106 of the National Historic Preservation Act (Kuhn 2002: 206). Cultural resource management sections of agencies and private firms often find local news venues that facilitate their compliance with the law by reaching mass audiences, especially those populations who do not have the ability to access electronic information (e.g., email and Internet posts). When an archaeological excavation is finished, many community members may be interested in knowing what was found and learned from the dig. Indeed, a 30-second television announcement or a follow-up article in the newspaper is an efficient, inexpensive, and effective way to communicate what the archaeologists found and how the community's tax money was expended on the project. Recently, the Federal Emergency Management Agency agreed to fund the stabilization of a riverbank in a small town in southern Minnesota. The local news media effectively articulated the process of Section 106 of the National Historic Preservation Act (Lindberg 2011), allowing a 90-year-old citizen to recount that ". . . the archaeologists will conduct a second phase of work if the first phase results in information about the old ferry landing" (*pers. comm*. Carmel Miller 2011). Indeed, published media is extremely effective at notifying community members from various educational backgrounds and generations about what archaeologists are doing, what they find, and what new information they have learned about a site. The media can be a successful tool to share archaeological findings with those who pay for the science.

The Documentary

The creation of archaeology programs has been a favorite topic of television documentary filmmakers for over 50 years. One of the first televised excavations covered the work of paleoanthropologists Louis and Mary Leakey (*National Geographic*, Dr. Leakey and the Dawn of Man, 1966). Today, television documentaries primarily follow two formulas; however, these formats may overlap one another. The most common documentary captures a recent discovery, often incorporating the project archaeologists, and if possible, additional data not yet released. Exploring an already discovered shipwreck and new

excavations on popular sites also makes popular television documentaries.

Another common format uses a professional host who visits well-known archaeological sites in places such as the Near East, Mexico, and South America. These host-led shows are quite successful and include programs such as "The Naked Archaeologist," "Digging for the Truth," and "Solving History with Olly Steads." As a result of the reality television movement, history-related documentary series are personality driven, and a strong host is crucial for the show's success. An attractive persona, enthusiasm for solving a mystery, and the ability to naturally communicate on camera are what is necessary to lead these types of documentaries and not a degree in archaeology. In other words, the success of the program is dependent on the personality, rather than the subject matter.

In an attempt to emanate scientific credibility and meet funding requirements yet secure high viewer ratings, networks may pair a team of graduate-degreed archaeologists with a professional host. Over 20 years ago, Tim Taylor created a science reality program that allowed the television audience to peer over the shoulders of archaeologists as they recovered Roman pottery sherds and exposed stone walls in neighborhood backyards and local farm fields in the United Kingdom. The program brought three professional archaeologists together but used Tony Robinson, known for his role as Baldrick in the popular BBC television show *Blackadder*, to host the show. Tony is shown becoming extremely animated as he peers into the trenches to find out what the archaeologists have just discovered and then turns to the viewing audience to deliver the news. He is the audiences' interpreter and asks the questions likely on the minds of the audience. The show is energized by his enthusiasm, and a sense of urgency hangs over the team since they only have 3 days to answer their questions. Remote sensing techniques such as ground-penetrating radar and magnetometry, referred to as "geophys," lead the archaeologists to subsurface anomalies that could be buried walls or other culturally created features. Mechanical diggers quickly strip off the modern overburden, creating long trenches that allow the archaeologists to quickly find what they were searching for in that area. The sites are amazing and include Roman ruins, human burials, and even a World War II aircraft. The present and the past converge in the program when food and craft demonstrations are participated in by one of the archaeologists – what does a medieval feast smell and taste like? How do you fight with an ancient weapon? The Time Team format is a unique concept since it uses professional archaeologists who are uncovering their finds as the camera rolls, rather than after the discovery. Indeed, the program's formula can easily be transferred to any place in the world that holds undiscovered secrets and an enthusiastic team of archaeologists.

Fifteen years after Time Team aired in the United Kingdom, PBS determined the American audience was ready for their own science reality television show. Although much less popular than the British version, Time Team America went into production in 2008 and aired five episodes on PBS over a year later. The British Time Team program sent one of their directors to script the show and direct the camera crews on historic and prehistoric archaeology sites across the United States. The show included an amateur host and artist, a team of five professional archaeologists, and a pair of geophysicists. Instead of discovering and digging new archaeology sites like the original Time Team, the filming took place on already known and established excavation sites located on protected lands and managed by public or university archaeologists. Although the sites held mysteries such as the Lost Colony of Roanoke and a hero tale about an enslaved African American establishing a town in the heart of the Midwest, the series did not initially get funded for a second season. PBS did not believe that the discussion on dark soil post molds, finding 150-year-old ceramic sherds, and picking up broken Clovis bifaces were visually exciting enough to keep American audiences' attention. In addition, there seemed to be too many archaeology personalities on camera. Despite these concerns, PBS found the show format promising and was encouraged by the original British version's success. After a 4-year hiatus, PBS secured a National Science

Foundation grant, and Time Team America went into a second season of production in the summer of 2012 with a professional host and a smaller team of scientists.

Pitfalls and Advantages of Archaeology on Television

Although there are many successful documentaries that accurately and effectively communicate scientific discoveries to the public, the dissemination of information to the masses using television still has its critics and for good reasons. All television documentaries are born from a question. Is there evidence of cannibalism at the Donner Party site in California? Was King Tut murdered? Did archaeologists find Jesus' tomb? If the director can attempt to answer such questions by interviewing scientists, examining objects, and in some cases, performing experimentations on camera, then the topic has a potential for a documentary. Before the camera rolls, the vision of the executive director on how to navigate through the story has already failed in the eyes of many archaeologists. Admittedly, the audience will never be provided the credentials of the scientists and/or hosts of the show, the months and years of logistical planning and research will not be addressed, and even the reasons the archaeologists found their discovery significant may be glossed over in favor of a sensationalized aspect of the story. The networks' goal is not to share wonderful archaeology discoveries and teach the masses about the importance of archaeology. Instead, they entered the world of documentary filmmaking to tell a story that explores a mystery that most people will find interesting enough to learn about; archaeology just happens to be one of those topics people find fascinating, along with sharks, the Bible, and military history.

Archaeologists who oppose working with production companies are concerned with blurring the line between the legitimate scientist and the amateur as well as producing an archaeology-themed documentary solely for the sake of entertainment. It is the rare archaeologist who does not take offense at documentaries that focus on "chasing mummies," legitimizing treasure hunting, or producing a program on a controversial subject with little scientific data to support any hypothesis. The big networks, such as *History* and *Discovery*, fail to differentiate between a scientific and financial endeavor – unfortunately, so does the viewing audience. Hollywood reinforces the treasure hunting = archaeology stereotype through movies such as the Indiana Jones series and Tomb Raider – it is a symbiotic relationship. In the end, the discipline's goal to produce solid data about the past by using material culture and patterns is thwarted by the message that archaeologists only care about finding artifacts and, perhaps worse, context is nothing.

Archaeologists who want to create, or agree to participate in, a documentary about their site often do so realizing the benefit in it for them. Setting self-promotion aside, many scientists do see the economic advantage in exposing their site. If asked, networks may be willing to donate several thousand dollars to the project in exchange for permission to produce a documentary on one's research. This influx of funding may allow the principal investigator to complete necessary analyses or to hire a temporary research assistant. In particular, high-profile sites may greatly benefit from an exclusivity contract with the network that allows them to document the site and release information in popular mediums for thousands of dollars. In these longer and more extensive documentary productions, archaeologists benefit from a relationship with the director who is more likely to address the archaeologist's concerns. In still other instances, the high public profile of a site created by mass media coverage can encourage future support in the form of partnerships and additional funding.

Future Directions

Admittedly, media coverage can be detrimental to the field of archaeology as slapdash reporting confuses details, sensationalizes findings, and legitimizes individuals and groups who financially profit from archaeology. Once the scientific field understands and accepts that the media is not

capable of always recognizing the true significance of a discovery, archaeologists may be able to work toward identifying the part of their research that is newsworthy without losing control of the data. It is possible for scholars to use the media to teach the public *who* archaeologists are and *how* they learn about the past using broken things and patterns in the soil. All archaeologists should understand how to negotiate with the media but also simultaneously recognize when the director or reporter could deliver a dramatically construed story rather than a report steeped in scientific realities (Frank 2003: 453; Holtorf 2007: 105). Documentaries want to make their production believable and they try to get there by being as truthful as possible, but the truth is not always captured in documentaries or science reality television (Hampe 2007: 123–5). In fact, as reality television evolves, the public may be increasingly misled and fed misinformation on discoveries for the sake of entertainment. If archaeologists choose to work with the media to deliver a message, they need to exercise caution, anticipate specific questions, and prepare sound bites that the public can digest. Simplifying the message (rather than dumbing it down), although difficult for many, is imperative to reach audiences, as well as reporters, unfamiliar with scientific rigor and theory.

Archaeologists are truth seekers. Their ultimate goal is to literally get to the bottom of a story using all methods and sources available to them. In simple terms, after they gather the data, it is organized, analyzed, interpreted, and compared against other scholar's research. The end result is publication of the interpretations and findings in peer-reviewed publications and/or technical reports. Somewhere in the middle of this scientific process, an opportunity for the media to document and report on the discoveries from a historical site may become available to the archaeologist. A documentary film cannot, and a director would not choose to, capture a comprehensive production that communicates the methods and theories used to reach conclusions about the subject at hand. The mass media is limited and is not the place to launch new data or, in some cases, controversial or sensitive findings without it first appearing in scholarly publications. In the unfortunate event that misrepresentations occur in the media, peers and the public could always be directed to published articles and books for clarification.

In sum, the public's interest in human history will not wane with the passage of time and neither will the media's desire to write about and produce documentaries on archaeology. Perhaps the only thing to change will be the format that archaeological discoveries are disseminated to the masses. It is hoped that archaeologists can appreciate the limitations of the mass media but still find a way to successfully navigate within those boundaries to responsibly share their discoveries with the public.

Cross-References

- ► Film, Archaeology in
- ► Internet, Archaeology of the
- ► Television and Archaeology: Views from the UK and Beyond

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References

Clack, T., and M. Brittain. 2007. Introduction. In *Archaeology and the media*, ed. T. Clack and M. Brittain, 11–65. Walnut Creek: Left Coast Press.

Dixon, K., and J.M. Schablitsky. 2011. Concluding thoughts. In *An archaeology of desperation, exploring the Donner Party's Alder Creek Site*, ed. K. Dixon, J.M. Schablitsky, and S. Novak, 323–366. Norman: University of Oklahoma.

Frank, S. 2003. Reel reality: Science consultants in Hollywood. *Science as Culture* 12: 427–469.

Gibson, S. 2006. The Jesus tomb controversy: An overview. *Near Eastern Archaeology* 69: 118–124.

Gregory, J., and S. Miller. 1998. *Science in public. Communication, culture, and credibility.* New York and London: Plenum.

Hampe, B. 2007. *Making documentary films and videos, a practical guide to planning, filming, and editing documentaries*. 2nd ed. New York: Henry Holt and Company.

Holtorf, C. 2007. *Archaeology is a brand! The meaning of archaeology in contemporary popular culture*. Walnut Creek: Left Coast Press.

Kuhn, R.D. 2002. Archaeology under a microscope: CRM and the press. *American Antiquity* 67 (2): 195–212.

Lindberg, J. 2011. Archaeological survey targets old ferry site. *Faribault Daily News*, 26 Nov 2011. Available at http://www.faribault.com/content/archaeological-survey -targets -old -ferry -site

Meyers, E.M. 2006. The Jesus tomb controversy: An overview. *Near Eastern Archaeology* 69: 116–118.

Medieval Archaeology

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Brief Definition of the Topic

Medieval Archaeology is the annual journal of the Society for Medieval Archaeology, first appearing in 1957. It publishes original submissions of international significance, or national significance and of international interest, which further the study of the period from the fifth to the sixteenth century CE. While it maintains a special concern for the medieval archaeology of Britain and Ireland, it also provides a forum for the discussion of important finds and developments within this period from anywhere in the world, serving as a medium for coordinating the work of archaeologists and that of historians and scholars in any other discipline relevant to this field. The editorial committee strives to present the highest-quality research, work that not only reflects the breadth of the interdisciplinary period and geographical interests but also inspires and challenges in some way. Its international advisory board supports the editor in the delivery of an internationally respected, peer-reviewed journal.

As part of its 50-year celebrations in 2007, the Society made volumes 1–50 available free online (ADS n.d.), while through Ingenta/Maney Publishing volumes 44 onward are available electronically to its individual and institutional subscribers. In 2015 the journal was acquired from Maney Publishing by the Routledge Taylor and Francis group, and in 2016 the journal moved to two issues per year. All volumes from 1 to 62 are now available via Taylor and Francis online.

The contents (all color since 2011) comprise articles (with translated abstracts since 2007), notes, Medieval Britain and Ireland, and a substantial review section of primarily Europe-focused books. News now appears in the Society's biannual newsletter. Since 2007, the Society awards the Martyn Jope Award for the best novel interpretation, application of analytical method, or presentation of new findings. The Medieval Britain and Ireland section comprises a report and analysis of new finds from the Portable Antiquities Scheme and a section on highlighted projects or discoveries, accompanied by an index to all the medieval fieldwork for the year in question (since 2008 the Archaeology Data Service (ADS n.d.) makes the details of these archaeological projects available online).

Gerrard (2009) and Wilson (2009) discuss the evolving role and significance of the journal in the context of the development of the Society and attitudes toward the study of medieval archaeology. The Society and its journal have been instrumental and highly influential in this respect, the journal acting as the model for later European journals as the subject has expanded and matured. A constant for *Medieval Archaeology* is still the focus on international, multiband interdisciplinary perspectives, as well as substantive reviews. In 2017 to mark the 60-year celebrations of the Society, a retrospective virtual Anniversary Collection was published, with the free release of 20 past articles that represent the journals strength in interdisciplinary scholarship and its role in bringing new findings to press.

To date, the honorary editors have been Donald B. Harden (1957–1973), Richard Gem (1974–1978), D. A. Hinton (1979–1989), H. C. Mytum (1990–1997), John Hines (1998–2006), Sally M. Foster (2007–2012), Oliver Creighton (2013–2016), and Sarah Semple (2016–2018).

There is a separate Review and Medieval Britain and Ireland editor (Neil Christie since 2007).

Since 2009, *Medieval Archaeology* also has a deputy editor (Aleksandra McClain 2016–2018);

at times in the past, there was also an assistant editor.

Information on the journal and its contents can be found on the Society of Medieval Archaeology website https://www.medievalarchaeology.co.uk/ and via http://www.tandfonline.com/loi/ymed20.

References

ADS. n.d. Available at: http://archaeologydataservice.ac.uk/archives/view/med_arch/. Accessed 13 Feb 2018.

Gerrard, C. 2009. The Society for Medieval Archaeology: The early years (1956–1962). In *Reflections: 50 years of medieval archaeology, 1957–2007*, ed. R. Gilchrist and A. Reynolds, 23–45. Leeds: Maney Publishing.

Wilson, D.M. 2009. The foundation and early years of the Society for Medieval Archaeology. In *Reflections: 50 years of medieval archaeology, 1957–2007*, ed. R. Gilchrist and A. Reynolds, 11–21. Leeds: Maney Publishing.

Further Reading

Anniversary Issue. 2017. Available at: http://explore.tandfonline.com/content/ah/ymed-medieval-archaeology-vsi/. Accessed 13 Feb 2018.

Gerrard, C. 2003. *Medieval archaeology: Understanding traditions and contemporary approaches*, 175–176. London: Routledge.

Society for Medieval Archaeology. n.d. Available at: http://www.medievalarchaeology.org/. Accessed 13 Feb 2018.

Medieval Pottery Research Group (MPRG)

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Basic Information

The MPRG was founded in 1975. At a time when medieval archaeology was still emerging as a credible discipline, it became clear that pottery studies needed consistency of direction and approach. Since then, membership has grown to around 300 and includes people from the USA, Japan, and all over Europe, as well as many institutions. The group is run by a council that includes the president, vice-president, secretary, treasurer, and editors, as well as three overseas representatives.

Major Impact

The purpose of the group remains the communication of knowledge and understanding, the provision of expertise through a network of regional groups, the development of training and educational activities to a variety of audiences, and advocacy of our interests to regional and national bodies.

The first of those aims is achieved through the publication of the annual journal *Medieval Ceramics* which has now reached number 32. A twice-yearly newsletter provides a less formal means of communication, while the occasional paper series includes more subject-specific titles and was launched with the comprehensive *Guide to the Classification of Medieval Ceramic Forms* (1998). The group also holds an annual conference, based each time at a different location, usually within the UK but also including trips to Holland, Germany, and Italy.

The regional group network covers England, Wales, and Scotland. Group meetings are organized at local venues and are usually an opportunity to view newly discovered pottery assemblages and share views and current interpretations. Some groups have also held training events aimed at local amateur societies, and an overall aim is to develop those into a more organized program. Training has also been offered nationally, with funding support from English Heritage, in the form of 2-day workshops in a variety of subjects including characterizing pottery fabrics, European pottery imported into Britain, Staffordshire pottery, and manufacturing techniques.

The MPRG has recently published a *Research Framework for Ceramic Studies in Britain* (Irving 2011), which comprises a survey of current knowledge and the state of the discipline, together with recommendations for the direction of future

research. This will also be vital to future advocacy in funding applications and regional and national research programs. One key challenge is to encourage younger researchers to join and participate, as there has been a noticeable decline in the teaching of post-Roman material culture in academic institutions. The John Hurst Travel Fund, set up to honor one of the group's founding fathers, makes a small annual grant available to young researchers needing assistance with travel costs for studies abroad, and previous recipients have been helped with visits to Jordan and the Faroe Islands.

Information on all this and more can be found on the group's website at http://www.medievalpottery.org.uk/. New members are always welcome.

Cross-References

- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Medieval Archaeology
- ▶ Portuguese Redwares and Coarse Wares in Historical Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Society for Medieval Archaeology

References

Irving, A. 2011. *A research framework for post-Roman ceramic studies in Britain,* Medieval Pottery Research Group Occasional Paper series 6. London: Medieval Pottery Research Group. Available at: http://www.mprgframework.info/. Accessed 16 Oct 2012.

Medieval Pottery Research Group. 1998. *A guide to the classification of medieval ceramic forms*. London: Medieval Pottery Research Group.

Further Reading

Blinkhorn, P. 2012. The Ipswich Ware Project. In *Ceramics, trade and society in Middle Saxon England*. London: Medieval Pottery Research Group.

Cumberpatch, C., and P. Blinkhorn. 1997. *Not so much a pot, more a way of life*. Oxford: Oxbow.

Davey, W., and H. Walker. 2009. *The Harlow pottery industries,* Medieval Pottery Research Group Occasional Paper series 3. London: Medieval Pottery Research Group.

McCarthy, M.R., and C.M. Brooks. 1988. *Medieval pottery in Britain AD 900–1600*. Leicester: Leicester University Press.

Slowikowski, A. 2010. *Genius in a cracked pot – late medieval reduced wares: A regional synthesis,* Medieval Pottery Research Group Occasional Paper series 4. London: Medieval Pottery Research Group.

Medieval Russia (Rus'), Archaeology of

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Introduction

The Slavic colonization of Northwest Russia occurred in two waves coming from the territory of the western Slavs. The first, identified with the tribe known as the Krivichi and distinguished by their use of long barrows, took place in the sixth to seventh centuries. The second wave, identified with the Sloveni and their use of *sopki* (high, conical burial mounds), took place in the eighth to ninth centuries (Yanin 2007: 205).

Medieval Russia from the ninth to twelfth century is often referred to by the term Rus'. The origin of this name, and the populations and lands to which it refers, has been the subject of much debate that has affected both archaeologists and historians over many years. It is usually associated with Scandinavian settlers and tribal leaders, as the early chronicles describe Swedish Vikings coming from the Baltic area to settle and rule over a disparate group of Slavic tribes around the emerging town of Novgorod and its territory, which included the important hill fort known as Ryurik Gorodishche that controlled the waterways on the northern edge of Lake Ilmen. According to one possible theory, the name Rus', like the Finnish name for Sweden (*Ruotsi*),

might be derived from an Old Norse term for "the men who row" as rowing was the main method of navigating the rivers of Eastern Europe. The name Rus' would then have the same origin as the Finnish and Estonian names for Sweden, namely, *Ruotsi* and *Rootsi*, respectively.

Scandinavians are sometimes referred to in medieval Russian chronicles as Varangians, another name accepted as meaning Vikings with a Swedish origin. According to the *Primary Russian Chronicle* compiled in Kiev around CE 1113, the Rus' had relocated from the Baltic area to northeastern Russia, creating an early polity under the leadership of Ryurik. The descendants of Ryurik were the ruling dynasty of Rus' centered on Novgorod (from 862) and Kiev and the successor principalities of Chernigov, Vladimir-Suzdal, Galicia-Volhynia (after 1199), and eventually Moscow (which did not become a significant urban settlement and power base until the fourteenth century). Their dynasty is referred to as the Riurikid.

Historical Background

Primary Historical Sources

According to the earliest East Slavic record, known as the *Primary Russian Chronicle*, the Varangians were first expelled and then invited to rule over the feuding Slavic and Finno-Ugric tribes around Novgorod.

The part of the Chronicle that refers to this states that:

> The four tribes who had been forced to pay tribute to the Varangians (the Chuds, Slavs, Merians, and Krivichs) drove the Varangians back beyond the sea, refused to pay them further tribute, and set out to govern themselves. But there was no law amongst them, and tribe rose against tribe. Discord thus ensued among them, and they began to war one with another. They said to themselves, 'Let us seek a prince who may rule over us, and judge us according to custom.' Thus they went overseas to the Varangians, to the Rus'. These particular Varangians were known as Rus', just as some are called Swedes, and others Normans and Angles, and still others Gutes, for they were thus named. The Chuds, the Slavs, the Krivichs and the Veps then said to the Rus', 'Our land is great and rich, but there is no order in it. Come reign as princes, rule over us.' Three brothers, with their kinfolk, were selected. They brought with them all the Rus' and migrated (the *Primary Russian Chronicle* entry for either CE 859 or 862 depending on which version of the chronicle is used).

Development of the Subject

In the nineteenth century, the study of Russian medieval archaeology began with a period of antiquarianism, but by the late nineteenth century, the subject had become inextricably linked to nationalistic approaches that were becoming widespread across Europe. After World War I and the Bolshevik Revolution, this approach combined with a growing preoccupation with the ethnic origins of early medieval peoples, their settlements, and burial rites. Examples of this include the early fieldwork at Staraya Ladoga, where investigations, particularly of burial mounds, searched for evidence of Viking incomers to either support accounts from the chronicles or to demonstrate a Slavic national/ethnic tradition (often referred to as "the Normanist controversy") as views polarized about the extent and influence of Scandinavian migrants into Kievan Rus' in the ninth and tenth centuries. Under Stalin, nationalism was also used to legitimize political regimes using ethno-genetic studies.

The domination of ethnic origins and the role of typologies in supporting or countering various arguments about Vikings, Slavs, and indigenous tribes continued throughout much of the twentieth century. During the Soviet postwar period, this approach took on new significance, as it was seen as a relatively safe area of archaeological and historical research, whereas new approaches and the discussion of western ideas could place individuals into a position of conflict with the state with sometimes dire consequences. As recently as the 1980s, leading Soviet archaeologists found themselves in difficulties with the authorities due to their questioning of accepted Soviet interpretations of history. For instance, theoretical archaeologist Leo Klejn faced charges and a prison sentence partly for his questioning of the prevailing view of the Normanist question and for contradicting the orthodox Marxist theory of historical materialism. He was also persecuted for showing interest in Western ideas, such as the

New Archaeology, for publishing extensively in Western journals, and for having too many international contacts (Klejn 1991).

In the period of *perestroika* and the post-Soviet era (i.e., after 1991), Russian medieval archaeologists were able to contribute to academic debate within a wider, more open international forum. However, the economic crisis of the mid-1990s brought about its own problems of diminished resources in university departments and academic institutes, many of which had high numbers of staff but little money with which to pay them (Chernykh 1995).

Throughout all these twentieth-century upheavals, the Soviet and subsequently the Russian Academy of Sciences have supported archaeology in general and medieval archaeology in particular through the funding of fieldwork, research staff, and laboratories. The Institute of Archaeology in Moscow and the Institute for the History of Material Culture in St. Petersburg are the two main organizations for field archaeology throughout all of Russia. Both institutes have long pedigrees in high-quality archaeological work (the latter organization being established by Lenin himself). At the present time (2017), both institutes are run by medieval archaeologists (N.A. Makarov in Moscow and V.A. Lapshin in St. Petersburg).

University departments also play an important role in both national and regional archaeological research projects. For instance, the long-standing program of systematic excavations in Novgorod has been directed by the Department of Archaeology of Moscow State (Lomonosov) University every year since they were first begun by Professor Artemiy Artsikhovsky in 1932 with the exception of the war years in the 1940s. This connection has continued throughout the postwar and post-Soviet periods, first under the direction of Boris A. Kolchin, followed by Valentin L. Yanin and Alexander S. Khoroshev.

Key Issues/Current Debates

Key Sites

In keeping with the debate about the role and significance of Viking traders and settlers, the site of Staraya Ladoga, investigated since 1972 under the direction of A.N. Kirpichnikov, has been the subject of much interest to scholars of early medieval Europe. It was an important trading center (emporium) of the type well known throughout the Baltic and North Sea at this time, similar to Birka, Hedeby, and Ribe. According to dendrochronological evidence, the settlement of Ladoga emerged no later than CE 753 and quickly became an important trading place on the routes from the Baltic Sea along the River Volkhov, then via the Dnieper or Volga to the south or east. The generally well-preserved remains of timber buildings cover approximately 18 ha and represent continuous habitation from the mid-eighth century onward. It was a center for craft, administration, trade, and transportation, where Slavic, Finnish, Scandinavian, and other ethnic groups lived and traded. Much of the Arabic silver coinage that reached the shores of the Baltic Sea probably passed through it (Kirpichnikov 2004: 183).

Another site related to the question of Viking penetration into early medieval Russia is Gnezdovo, near Smolensk. This site has also been the subject of extensive investigation, producing a large range of artifacts, mostly from burials, that indicate extensive Viking connections. This has led archaeologists to address the formidable question of how extensive was the role of Scandinavians in the origins and development of the Kievan State. For an overview of Norse settlements in Eastern Europe between the eighth and tenth centuries, see Duczko 2004.

An important aspect of medieval archaeology in Russia has been the excavation of urban sites, the primary ones being Novgorod, Pskov, Suzdal, Vladimir, Rostov, and more recently Moscow. These investigations have had a tradition of focusing on the material culture, notably jewelry and other metalwork, and also on technological questions to do with the manufacture of iron and copper alloy objects. Another area of intensive study has been the organic remains of objects of wood and leather, particularly as many of the more extensively occupied towns, such as

Novgorod, have very deep anaerobic deposits where artifact preservation is exceptionally good. It was in this context that the first birch-bark documents were discovered at the Nerevsky excavations in Novgorod in 1951. Dating from the eleventh to fifteenth centuries, these documents now number over 1,000 from Novgorod alone, but with further examples found at other towns including Stara Russa, Pskov, Smolensk, Torzhok, Tver, Moscow, and Ryazan in Russia, Zvenigorod in Ukraine, and Vitebsk and Mstislavl in Belarus. These precious remains of largely domestic, sometimes mercantile, writing have been avidly studied by linguists and historians, as well as archaeologists, the leading experts being the historian V.L Yanin and the linguist A.A. Zalizniak.

Another aspect of medieval urban archaeology that has been much studied is town morphology: notably the layout of streets, properties, and open spaces. A great deal has been made of the so-called Republic of Novgorod dating from the twelfth to the fifteenth century where the *boyars* had a voice to equal, and occasionally veto, that of the Prince. They also elected their own mayor (*posadnik*). As a topographic feature, the outdoor space provided for the town *veche* (a popular assembly similar to the Norse *Thing*) should be recognizable archaeologically, and various ideas about its location have been put forward. In this way, medieval archaeology has been instrumental in the debate about notions of the state and statehood, as well as the organization of "democratic" or "republican" city life.

Recognizing and documenting the evidence for the Mongol invasions of the thirteenth century and their impact on urban places, such as Suzdal and Vladimir, is another recent theme, as is the investigation of the rise of Moscow in the fourteenth and fifteenth centuries. For example, recent work on rescue sites in Moscow, including the town's late medieval mint, has been carried out and recently published by the Institute of Archaeology (Krenke 2009).

It is worth noting that the Soviet era brought in some far-reaching and, for their day, innovative heritage protection laws in the 1960s. The most significant of these for medieval archaeology was "the protection of the cultural layer" first brought into effect in Novgorod and which ensured that archaeological deposits were either protected or excavated by approved archaeologists from the Academy of Sciences. However, changes to heritage protection in recent years have led to a more western approach to rescue archaeology as the involvement of private developers has brought about a more commercial approach to both urban and rural development. This has reduced the amount of research investigation but has increased the number of smaller investigations and extensive field surveys.

One of the positive outcomes of recent changes has been the emergence of landscape studies looking at rural settlement patterns through time, settlement shift, nucleation, and dispersal. A notable example of this approach has been the work of Nikolai Makarov, whose work in the Byeloozero region has been examining the evidence for the colonization of the northern region of medieval Russia as the principalities of Novgorod and Rostov-Suzdal vied for control of the rich fur-gathering lands that lay between Lake Byeloe and the White Sea. In particular, this survey work has been investigating the formation of a loose but stable settlement pattern in the eleventh to thirteenth centuries, which covered a vast area populated by Finno-Ugric groups who paid tribute in fur and other forest products to the dominant principalities, especially Novgorod. The importance of river systems and portages to the movement of goods and people has been well demonstrated in this research (Makarov 1997). Makarov has built upon these surveys carried out in the 1990s by intensive investigation around Lake Kubenskoye, recently producing three volumes of results that have used a multidisciplinary approach to address wider landscape and ecological themes (Makarov 2007, 2008, 2009). More recently, he and his team from the Institute of Archaeology in Moscow have turned their attention to the hinterland of Suzdal (Suzdalia) where they have been examining the social elite at rural sites in the area (Makarov 2013).

Turning to ecology, while the study of the animal economy of medieval Russia has lagged

behind that in the West, it has had some notable successes in recent years with studies of both domestic and wild species used to understand the role and type of settlements (e.g., settled agricultural communities versus fur-trapping stations). This work has also provided datable evidence for the decline in the population of certain hunted species such as beaver (Savinetsky and Krylovich 2009). Other zooarchaeological studies have included analyses of the contrast between animal assemblages found at urban and urban-hinterland sites in the Novgorod and Byeloozero regions (Maltby 2012; Brisbane et al. 2015).

Another ecological approach has been to develop models to provide a more detailed understanding of the changes in the composition of the medieval forest brought about by anthropogenic factors and the consequences this had for wildlife (Hamilton-Dyer et al. 2016).

The study of the arrival of Christianity in Russia in CE 989 and the impact of the Church on settlement and social stratification has also gone through various phases of development. In Soviet times, these topics were dealt with, as many topics were during this period, from a largely technological point of view. For instance, studies by archaeologist and architectural historian Pavel Rappoport (1913–1988) on the building of churches within medieval Russia concentrated on the investigation of how people went about constructing them, including topics such as brickmaking, lime firing, roofing, and decoration, as well as how churches were laid out and how much brickwork was required per day (see, e.g., his work on churches in Kievan Russia published in English in 1995) (Rappoport 1995).

More recent studies on the introduction of Christianity into Russia have focused on the material culture of the Church itself in terms of art history and artisan production. The importance of Christianity on settlement and churchyard location is increasingly being recognized as highly significant to settlement patterns of the eleventh to thirteenth centuries, for example, in regional surveys of the Byeloozero region and more recently of Suzdal Opolie (Suzdalia).

Future Directions

Building upon studies of landscape and settlement patterns, the work program established by the Institute of Archaeology, and supported by the Russian Academy of Sciences, has set the agenda for the foreseeable future for medieval archaeology in Russia. Topics include center/periphery relations, settlement patterns, shifting settlements within a landscape (Brisbane et al. 2012), as well as issues of social stratification and the rise of elites. The last of these raises interesting and much-debated questions of where the elites actually reside – in the town or the country – with some archaeologists now challenging the long-held view that towns such as Novgorod were where the *boyars* resided and had their power base. As mentioned above, undefended sites around Suzdal are now being mapped and studied with a view to testing this hypothesis (Makarov 2013).

Another example of one of the Institute's long-term projects that will help to bring new ideas forward is the work being undertaken in the region of Kaliningrad, where a German and Russian team of archaeologists have been undertaking joint surveys and excavations in an attempt to locate the Viking settlement of Wiskiauten (Ibsen and Frenzel 2010). In addition, A.N. Khokhlov is leading a team undertaking large, urban excavations within the city of Kaliningrad (formerly Königsberg), some of the first investigations to be carried out in the city since WWII. These projects are part of a wider initiative for a collaborative study of what was formerly East Prussia, supported by Polish, German, and Lithuanian organizations.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Klejn, Leo
- ▶ Russia: Management of Archaeological Heritage

References

Brisbane, M., N.A. Makarov, and E.N. Nosov, eds. 2012. *The archaeology of medieval Novgorod in context: Studies in centre/periphery relations*. Oxford: Oxbow Books.

Brisbane, M., Hambleton, E., Hamilton-Dyer, S., and M. Maltby. 2015. Reflections on the ecological setting and environmental impact of medieval settlement expansion in Northern Russia. In *Goroda i Veshi Svednevekovoi Rus'usArcheologia, Istoria, Kultura*, ed. P.G. Gaidukov. Papers presented to Nikolai Makarov on his 60th birthday, 36–44. Moscow: Drevnosti Severa.

Chernykh, E.N. 1995. Postscript: Russian archaeology after the collapse of the USSR – infrastructural crisis and the resurgence of old and new nationalisms. In *Nationalism, politics and the practice of archaeology*, ed. P. Kohl and C. Fawcett, 139–148. Cambridge: Cambridge University Press.

Duczko, W. 2004. *Viking Rus: Studies on the presence of Scandinavians in Eastern Europe*, The Northern World. Vol. 12. Leiden: Brill.

Hamilton-Dyer, S., M. Brisbane, and M. Maltby. 2016. Fish, feather, fur and forest: Exploitation of wild animals in medieval Novgorod and its territory. *Quaternary International*. https://doi.org/10.1016/j.quaint.2016.04.024.

Ibsen, T., and J. Frenzel. 2010. In search of the early medieval settlement of Wiskiauten/Mohovoe in the Kaliningrad region. *Lietuvos Archeologija T* 36: 47–58.

Kirpichnikov, A.N. 2004. A Viking period workshop in Staraya Ladoga excavated in 1997. *Fornvännen* 99: 183–196.

Klejn, L. S. 1991. *The savage society* (Russian title: *The world turned upside down*). Berlin: Aufbau. (German edition); St. Petersburg: Farn (Russian edition 1993).

Krenke, N.A., ed. 2009. *Archaeology of the Romanov Dvor: Early beginnings and history of the center of Moscow*. Moscow: Institute of Archaeology. (in Russian but with English summary).

Makarov, N.A. 1997. *Colonization of the northern periphery of medieval Russia AD 1000–1300*. Moscow: Scriptorium. (in Russian but with English summary).

Makarov, N.A., ed. 2007. *The archaeology of the rural areas of northern Rus 900–1300 AD, volume 1: Settlement and burial grounds*. Moscow: Nauka. (in Russian with extensive English summaries).

Makarov, N.A 2008. The archaeology of the rural areas of northern Rus 900–1300 AD, volume 2: Material culture and chronology. Moscow: Nauka (in Russian with extensive English summaries).

Makarov, N.A. 2009. *The archaeology of the rural areas of northern Rus 900–1300 AD, volume 3: Environment, society and cultural pattern*. Moscow: Nauka. (in Russian with extensive English summaries).

Makarov, N.A. 2013. Social elite at rural sites of the Suzdal region in north-eastern Rus'. In *Ruralia IX. Hierarchies in rural settlements*, ed. J. Klapste, 371–386. Prague: Brepols.

Maltby, M. 2012. From *Alces* to *Zander*: A summary of the zooarchaeological evidence from Novgorod, Ryurik Gorodishche and Minino. In *The archaeology of medieval Novgorod in context: Studies in centre/periphery relations*, ed. M.A. Brisbane, N.A. Makarov, and E.N. Nosov, 353–381. Oxford: Oxbow Books.

Rappoport, P.A. 1995. *Building the churches of Kievan Russia*. London: Ashgate.

Savinetsky, A., and O. Krylovich. 2009. Archaeozoological remains and changes in populations of utilized mammals. In *The archaeology of the rural areas of northern Rus 900–1300 AD*, ed. N.A. Makarov, vol. 3, 16–24 & 222–224. Moscow: Nauka.

Yanin, V.L. 2007. The origins of Novgorod. In *The origins of the Russian state*, ed. E.N. Nosov and A.E. Musin, 205–212. St. Petersburg: Russian Academy of Sciences.

Further Readings

Brisbane, M., ed. 1992. *The archaeology of Novgorod, Russia*. Lincoln: Society for Medieval Archaeology.

Brisbane, M., and D. Gaimster, eds. 2001. *Novgorod: The archaeology of a Russian medieval city and its hinterland*, British Museum Occasional Paper number 141. London: British Museum.

Fennell, J. 1983. *The crisis of medieval Russia 1200–1304*. London: Longman.

Franklin, S. 2002. *Writing, society, and culture in early Rus, c. 950–1300*. Cambridge: Cambridge University Press.

Franklin, S., and J. Shepard. 1996. *The emergence of Rus, 750–1200*. London/New York: Longman.

Martin, J. 1995. *Medieval Russia 980–1584*. Cambridge: Cambridge University Press.

Orton, C., ed. 2006. *The pottery from medieval Novgorod and its region*. Oxford: Oxbow Books.

Perrie, M., ed. 2006. *The Cambridge history of Russia, volume 1: From early Rus' to 1689*. Cambridge: Cambridge University Press.

Medieval Urbanism

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Introduction

The Middle Ages in Europe was a key period in the continent's urbanization. The proliferation of urban life, especially from 1000 CE to 1300 CE,

shaped the European landscape, physically, economically, and demographically, as population levels increased and a growing commercialization affected all aspects of culture and society. The creation of towns occurred simultaneously with the expansion of older-established urban centers to forge a new map of urban Europe by 1300. At the same time, the fortunes of some towns and cities grew, while others waned, and some disappeared altogether or became villages rather than places with urban functions. The explanations given for these changes in urban fortune range from the following: (1) the importance played by long-distance trade, encompassing both maritime networks and land routes; (2) the role played by aristocratic elites through tenancy and dynastic practices, involving both secular and ecclesiastical lords; and (3) the European-wide expansion and colonization of lands through cultivation and settlement, particularly in areas that were previously marginally occupied, such as uplands, woodlands, and marshlands.

Definition

"Medieval urbanism" is usually defined *functionally* based upon the presence of certain urban characteristics, such as settlements having a greater population size and density, a high proportion of economic activities based on consumption and production, and high levels of administrative status and provision. A further definition concerns *urban form*, for urban landscapes are characteristically more nucleated and physically dense than rural settlements, though where the boundary is drawn between "urban" and "rural" settlement hierarchies is largely dependent on locality, on geography, and on temporal context. An urban place in medieval Europe is more likely also to be distinguishable in terms of its *material culture*, in having a greater variety of imported or exotic ceramics and textiles, for example, while higher levels of consumption of towns and cities are evident in the abundant animal and plant remains usually found in medieval urban archaeological contexts.

Key Issues/Current Debates/Future Directions/Examples

Scholars have long studied medieval towns and cities in Europe, particularly in the field of urban and constitutional history, as well as historical and urban geography. The contribution of archaeology to understanding urban life in the Middle Ages began in earnest after the Second World War, particularly through the redevelopment of war-damaged historic cities. As a result of archaeological study, the documentary-based histories of medieval urbanism have been challenged and in some cases rewritten, for what material culture has shown is a much higher degree of urbanization in Europe in the post-Roman period (400–600 CE) than some historians had previously imagined (see Hodges 1982; Verhulst 1999). Rather than urbanism dying out in the "Dark Ages" in northern Europe, evidence for new trading places occupying coastal and riverine locations has shown not only that there were settlements that have characteristics expected of towns but that these places were linked, through long-distance trade, to urban centers in southern Europe, especially around the Mediterranean. By no means were these new places always defended with palisades or walls, though many urban defenses remained in place around the former Roman towns and cities.

After the fall of the Roman Empire, urban life continued in southern Europe, as evidenced by the continuity in urban form and fabric seen in some Italian cities (Ward Perkins 1988). While a break in urban occupation can be detected archaeologically in some former Roman urban centers in northern Europe, in other cases the evidence instead reveals urban development occurring on new sites, sometimes in locations situated close to former Roman cities, as in the case of Hamwic in southern England (Ottaway 1992). Continuity in urban life across Europe after 400 CE was thus differentiated geographically across the continent, but it would be wrong to see northern Europe being "un-urban" at this time, for the period of 400–600 CE was no "Dark Age" as some past historians have suggested, but rather a period of transformation, a shift from one "urban world" to another. Urbanization also continued to occur

both in the eastern part of the Empire, in what became the Byzantine Empire centered on Constantinople (present-day Istanbul), and in the former western parts, in sub-Roman Europe in Visigothic Spain and Lombardic Italy, for example.

As well as continuities in urban life in the early Middle Ages, there were of course changes, too, as the map of post-Roman urban Europe reflected shifting geopolitics and economic geographies. By 1000 CE the most important urban centers were invariably those with significant religious and ecclesiastical roles, such as the seats of bishops or archbishops, for example, York (England) and Tours (France), as well as those acting as centers of royal or imperial authority, such as seats of kings and emperors, for example, Prague (Czechia) and Aachen (Germany) (Nicholas 2003). The administrative functions of certain cities thus placed them at the center of networks of power, exercising command over large territories and so further serving the interests of those elites who ruled. It was also in this period of the Middle Ages, particularly from the 1100s onward, that Europe saw the most active phase of urbanization, as many new towns were established by aristocratic elites on their rural estates, and urban authorities sought to extend the built-up areas of already existing towns and cities (Lilley 2002). It was this period, in particular, that created the pattern of medieval towns and cities that survives in Europe today, an inherited urban network of huge cultural significance.

By the time of the Black Death in Europe, 1347–1351, the continent had attained its maximum extent and intensity of medieval urbanization. However, although the plague had a significant demographic impact across the continent – in the countryside as well as in the towns – contrary to popular belief, the plague did not completely kill off many towns, but rather initiated another period of urban transformation (Platt 1996). Indeed, with labor demands in the countryside diminished – especially in arable regions – rural-urban migration increased in the fourteenth century, and so the population of towns and cities was swelled by new arrivals, economic migrants, sometimes leading to anxiety among established urban elites (Dyer 2002). Urbanism in medieval Europe across 1,500 years is thus characterized by a complex pattern of continuity *and* change, but whether subjected to major political shifts, as with the fall of the Roman Empire, or demographic crises, as with the Black Death, urbanism in Europe was remarkably resilient throughout the Middle Ages (Ottaway 1992).

The general geographical and historical trends in European medieval urbanism have been fairly well established over recent decades, though one issue that continues to see less than adequate treatment is how medieval towns did grow. In part the reason this fundamental question is difficult to answer is because both documentary and archaeological records usually reveal rather little about who was involved in the creation and development of medieval towns and cities. Written sources from the period tend to reflect the roles and interests of social elites, such as bishops and kings, whose charters granting certain urban privileges have survived and are usually regarded by historians as primary evidence for the activities of certain key authorities in creating towns and in fostering urban development. Yet recent research has shown that the granting of a charter to a town often came quite late in its history, for archaeological traces of urban life can be detected long before a particular place became regarded, constitutionally, as a "borough," an enfranchised town.

One way of writing histories and archaeologies of medieval towns and cities is to study their form, their morphology. This involves looking at the characteristics of street layouts and lot patterns, using large-scale modern maps and plans of medieval towns and cities. Although very few medieval maps of towns survive, modern map-making techniques, when combined with archaeological and documentary study, can be used to map out phases of urbanization that had occurred during the Middle Ages. This is because each phase of urban development is identifiable through particular morphological characteristics, each distinctive in its shape and form and made visible by mapping. Such mapping reveals patterns of physical formation, as towns were extended and expanded over the centuries, during the High Middle Ages especially. The variety of these medieval urban forms is immense and is not

readily divided into particular morphological groups or categories. Indeed, the morphological evidence does not support at all the idea that there were "planned" towns with "regular" forms and "organic" towns with "irregular" forms. Instead, all medieval towns and cities had "composite forms," made up of distinct areas of streets and lots, so that towns such as Coventry (England) – long considered by some to reflect "organic" growth – can be seen to have plans that reflect phases of "planned development" (Lilley 2002) (Fig. 1).

The subject of medieval town planning has tended to focus on the founding of "new towns" or emphasizes the presence of "regularities" in urban form, such as geometrical patterns in a town's streets and street blocks (Schofield and Vince 2003). Planning, however, took many different forms, and even those examples considered to be "new towns," such as Ludlow (England), were not created in one single "planned" episode but rather were developed over longer time periods, resulting in a "composite plan" (like Coventry) (Lilley 2002) (Fig. 2). The subject of "planning" is critical in understanding how medieval towns grew – for it concerns who did what and how. In fact, there were a number of agents involved in shaping urban landscapes in the Middle Ages, from the landed aristocracies and civic elites on whose lands urban development took place to particular specialized individuals, such as surveyors and administrators, who had the necessary expertise to lay out new streets and lots for townspeople, while of course the occupants of towns and cities themselves also shaped urban landscapes, through the buildings they made and the property transactions they conducted. As a process, then, urbanization demands consideration of the roles played by urban agents and the agency that individuals and groups had in shaping the urban worlds around them.

Shaped by a myriad of agents, the resulting urban landscapes were of course ultimately a home to many. How distinguishable one locality in a town or city was compared to another is something that has increasingly interested urban archaeologists and historians, with some describing such differences in terms of the built environment and building types, others focusing more on trades and occupations, or ethnic and cultural identities, as distinguishable traits, while yet others point to different sonic and sensory landscapes. Of course, in the Middle Ages, as now, all of these factors contributed to a *sense of place* in an urban landscape, with some parts of a town seemingly more attractive and appealing to live and work in, while others were deemed more difficult and dangerous (see Goodson et al. 2010). Urban places thus had identities, while the places that townspeople occupied affected how they themselves were seen and perceived by others (Lilley 2002). Particular urban areas acquired reputations from the activities performed in them as well as being reinforced by the social and cultural identities of those who frequented or inhabited them. Areas situated close to trading places, such as quaysides and markets, were often locations where particular "deviant" practices occurred, such as prostitution. Such liminal spaces were places of transitory people – merchants, traders, and sailors – and invariably "edgy." Although attempts were made by urban authorities to expel – or marginalize – such activities, they nevertheless continued.

Cultural identities were thus forged through urban landscapes, of *being* in particular places. For most medieval towns and cities, distinct "neighborhoods" are difficult to define however, either archaeologically or historically. Urban spaces were fluid and the occupants of towns and cities likewise constantly shifting, adding to the *frisson* that characterizes urban life. There were urban communities, of course, fostered through guild associations for crafts or religious institutions, for example, but these were not localized socially except through particular structures such as guildhalls. Nevertheless, certain areas of medieval towns and cities were associated with particular kinds of economic or administrative activity, such as sites of trading, production, or ceremonial practices. Within these areas a multitude of activities would still take place, and housing would be a mixture of dwellings for rich and poor (Beattie et al. 2003). A complex pattern of households existed so even within one individual building different rooms might be lent to

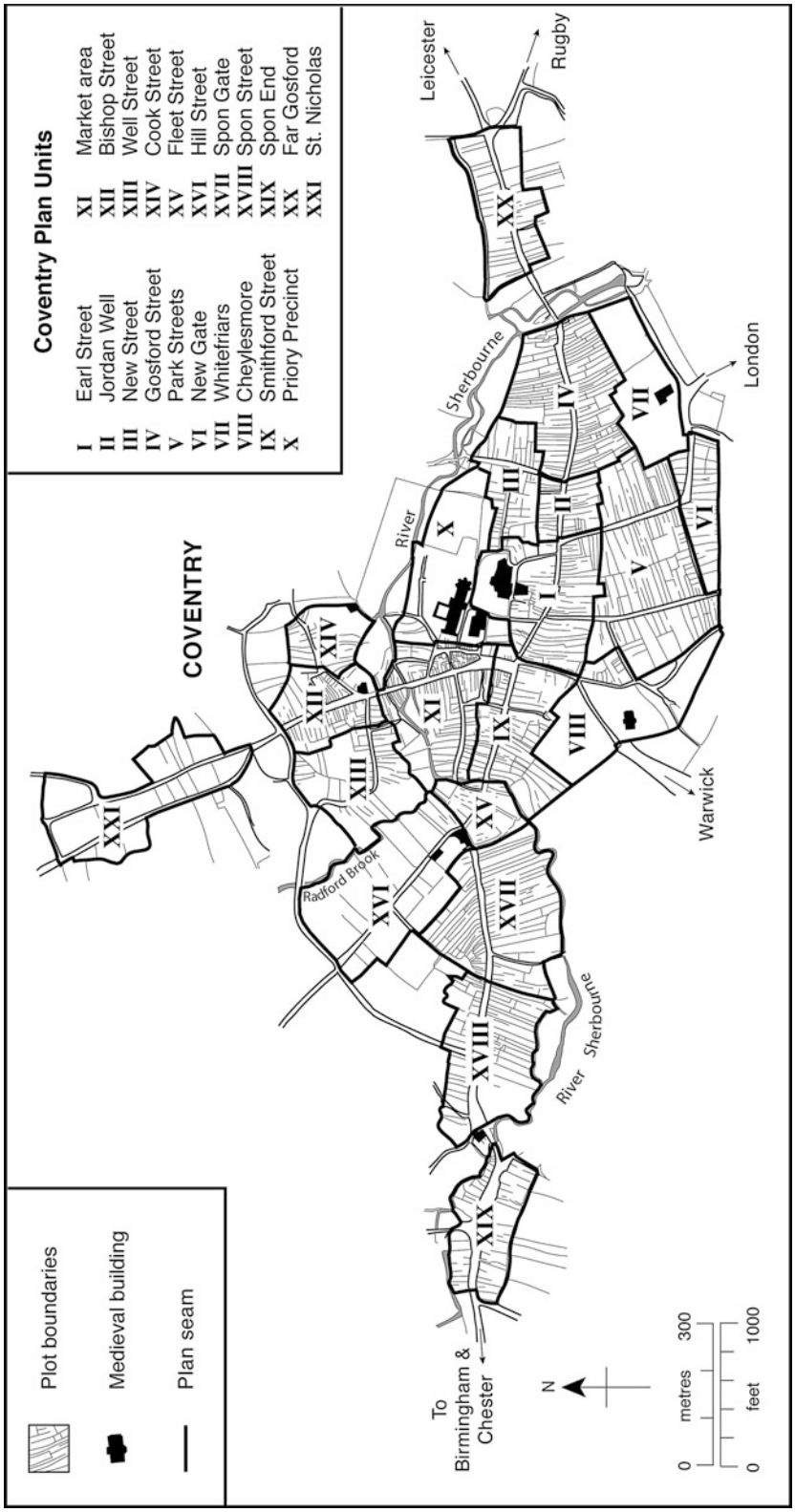

Medieval Urbanism, Fig. 1 The pattern of urban development of medieval Coventry (England) as mapped by Lilley (2002)

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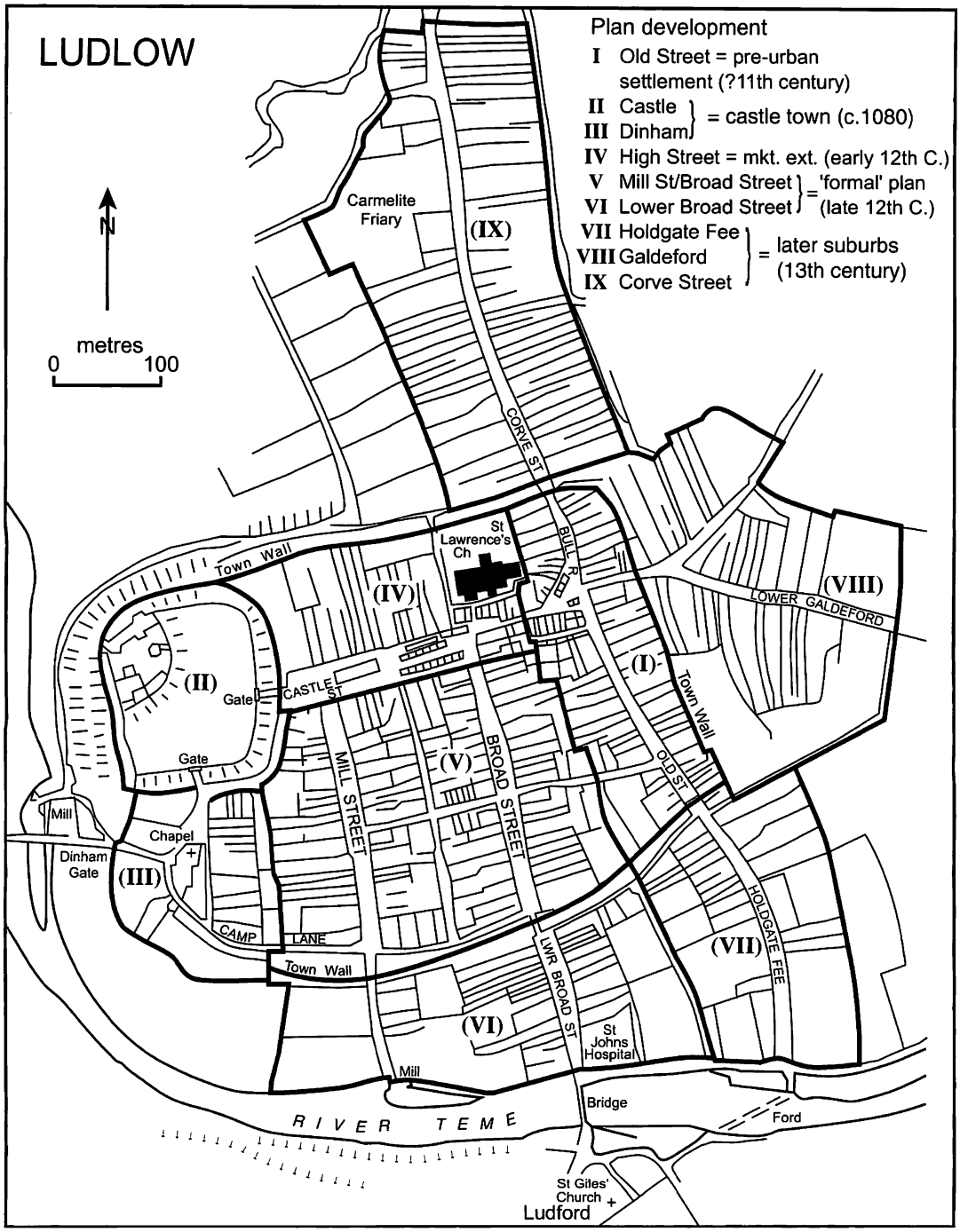

Medieval Urbanism, Fig. 2 The pattern of urban development of medieval Ludlow (England) as mapped by Lilley (2002)

journeymen as well as families. The buildings of a medieval "tenement" would generally occupy the street frontage, consisting of workshops and shops at ground level, with rooms for living in both above and behind (Schofield and Vince 2003). To suggest there were rich and poor neighborhoods in medieval towns is therefore an oversimplification. Instead, a sense of locality and community was formed through neighborhood ties and identities defined and mediated through rituals and ceremonies, worship in parish churches serving particular urban areas, for example, and annual activities such as feast days and processions (Hanawalt and Reyerson 1994; Boone and Stabel 2000).

Understanding the social and cultural dimensions of medieval urban life, "community," and "neighborhood" relations, for example, has gained much from recent cross-disciplinary studies of medieval towns and cities, combining different approaches. The blurring of boundaries (often drawn by past historians such as Henri Pirenne and Edith Ennen) between medieval urban and rural communities has similarly benefitted from multidisciplinary studies, for it has become clear, increasingly, that town and countryside in the Middle Ages were intimately connected (Giles and Dyer 2005). Indeed, one of the recent trends of exploring medieval urbanism is to think about towns and cities *spatially*, not only in terms of their geographical locations and interconnections through networks but more subtly through the close interrelationships between people and places (Classen 2009). For instance, the places of the urban poor, Jews, and women in medieval towns and cities have all been thoughtfully examined by archaeologists, historians, and geographers through evaluating various kinds of textual, artistic, and material evidence and revealing the multifaceted and multidimensional qualities of urban life in the Middle Ages (Goodson et al. 2010).

The recent "spatial turn" influencing humanities and social science research and broader intellectual currents such as post-colonialism and gender studies (Wallace 2004) have helped enrich a more empathetic and nuanced appreciation of medieval urbanism. Yet despite the current critical reevaluation of medieval urban life, through adopting new approaches and ideas, the medieval town and city are all too often still considered in isolation. In isolation, that is, from other times and places, in relation to a broader comparative context and a larger history of globalism, of Western, European encounter and expansion. Medieval Europe did not function in a vacuum and neither did its towns and cities (Platt 1979). Instead, its people and its urban centers were part of a wider world of networks and flows, of mobile bodies, ideas, artifacts, commodities, and cultures (see Lev 2002). There exists much scope therefore to look again at the material culture of medieval urbanism, and explore its global as well as local contexts, and establish what this might mean for global histories and archaeologies. The port city of Bristol, for example, in the late fifteenth century, was a key focal point of networks that stretched not only across and around the Mediterranean and Atlantic seaboard of Europe but crossing the Atlantic too, to Iceland and North America (Quinn 1974). Similarly, Portuguese towns and cities of the later Middle Ages functioned as part of an international maritime network that connected Europe with Africa and Asia and potentially even Australasia (Abulafia 2008).

One of the future challenges in the study of medieval urbanism, then, is not only to analyze what was happening within European towns and cities during the Middle Ages but also to look beyond Europe too, to the wider world. In so doing, exploring comparisons and connections between medieval towns and cities at a global scale, there is scope to rethink medieval urbanism and assure its continued place in global archaeology.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ British Isles: Medieval Archaeology
- ▶ Buildings Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Consumption, Archaeology of
- ▶ Fortifications, Archaeology of

▶ France: Medieval Archaeology
▶ Global Archaeology
▶ Italy: Medieval Archaeology
▶ Landscape Archaeology
▶ Medieval Archaeology
▶ Urban Archaeology
▶ Urban Heritage

References

Abulafia, D. 2008. *The discovery of mankind: Atlantic encounters in the age of Columbus*. New Haven: Yale University Press.
Beattie, C., A. Maslakovic, and S. Rees Jones, eds. 2003. *The medieval household in Christian Europe, c. 850–c.1550: Managing power, wealth and the body.* Turnhout: Brepols.
Boone, M., and P. Stabel, eds. 2000. *Shaping urban identity in late medieval Europe*. Leuven: Garant.
Classen, A., ed. 2009. *Urban space in the Middle Ages and the early Modern age*. Berlin: Walter de Gruyter.
Dyer, C. 2002. *Making a living in the Middle Ages: The people of Britain, 850–1520*. London/New Haven: Yale University Press.
Giles, K., and C. Dyer, eds. 2005. *Town and country in the Middle Ages. Contrasts, contacts and interconnections 1100–1500*. Leeds: Maney.
Goodson, C., A.E. Lester, and C. Symes, eds. 2010. *Cities, texts and social networks, 400–1500: Experiences and perceptions of medieval urban space*. Aldershot: Ashgate.
Hanawalt, B., and K. Reyerson, eds. 1994. *City and spectacle in medieval Europe*. Minneapolis: University of Minnesota Press.
Hodges, R. 1982. *Dark Age economics. The origins of towns and trade, AD600–1000*. London: Duckworth.
Lev, Y., ed. 2002. *Towns and material culture in the medieval Middle East*. Leiden: Brill.
Lilley, K.D. 2002. *Urban life in the Middle Ages 1000–1450*. London: Palgrave.
Nicholas, D. 2003. *Urban Europe, 1100–1700*. London: Palgrave.
Ottaway, P. 1992. *Archaeology in British towns. From the emperor Claudius to the black death*. London: Routledge.
Platt, C. 1979. *The atlas of medieval man*. New York: St. Martin's Press.
Platt, C. 1996. *King death. The black death and its aftermath*. London: UCL Press.
Quinn, D.B. 1974. *England and the discovery of America, 1481–1620*. New York: Knopf.
Schofield, P., and A. Vince. 2003. *Medieval towns*. 2nd ed. London: Continuum.
Verhulst, A. 1999. *The rise of cities in North-West Europe*. Cambridge: Cambridge University Press.
Wallace, D. 2004. *Premodern places: Calais to Surinam, Chaucer to Aphra Behn*. Oxford: Wiley.
Ward Perkins, B. 1988. The towns of northern Italy: Rebirth or renewal? In *The rebirth of towns in the West, AD700–1050*, Report 68, ed. R. Hodges and B. Hobley, 16–27. London: Council for British Archaeology Research.

Mediterranean Sea: Maritime Archaeology

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Introduction

The history and development of Maritime Archaeology as a scientific discipline is closely related to the Mediterranean Sea, which has been a witness to some of the oldest civilizations in the world. Along its shores flourishes the Ancient Egyptian, the Phoenician, the Greek, the Roman, the Byzantine, and the Islamic civilizations (Norwich 2007; Scarre and Fagan 2008). Accordingly, throughout the ages, maritime activities played a major role in the rise, development, and decline of such civilizations and societies. On the other hand, their maritime activities have left an array of material cultural evidence, which mainly takes the form of shipwrecks, harbors, and other waterfront installations.

Since the beginning of the twentieth century, the discovery of submerged archaeological sites in the Mediterranean triggered studies in maritime and underwater archaeology in different regions and countries, subsequently, the field of maritime archaeology in the Mediterranean witnessed substantial development on different levels including research, education, preservation, and public presentation.

Definition

It is quite essential, at first, to define Maritime Archaeology, which is the subdiscipline of

archaeology concerned with the study of maritime cultural heritage. It mainly includes the study of different types of watercrafts, as well as the study of coastal installations, whether these were found on land or underwater. Maritime Archaeology is not the same as underwater archaeology, which describes the study of the past through any submerged remains (Muckelroy 1978: 3–10). In other words, there are maritime archaeological sites which are not located underwater, such as ship burials, and there are submerged remains which are not of a maritime nature, such as jettisoned cargoes. However, it is evident that shipwrecks are the most common type of maritime archaeological sites; therefore, the development of maritime archaeology in the Mediterranean is often associated with the investigation and study of shipwrecks. On the other hand, maritime archaeology contributed significantly to the development of different studies such as ancient ship construction, ancient seafaring, and harbor archaeology. This entry will be looking at the development of maritime archaeological investigation which has been carried out along the shores and under the waters of the Mediterranean Sea.

Historical Background

Maritime Archaeology in the Mediterranean has gone through different phases of development which started as simple salvage operations and the recovery of submerged objects for their artistic, cultural, or monetary values. Sponge divers, in particular, have often encountered many ancient shipwrecks, and in most cases mounds of amphora and pieces of wood were of little or no interest to the sponge seekers. However, in 1900, sponge divers discovered near the Greek island of Antikythera the remains of an early first-century BC shipwreck at a depth of 55 m. The ship was carrying bronze and marble works of art, in addition to several pottery and glass items. The discovery of the shipwreck caught the attention of the Greek authorities who decided to salvage the ship's cargo for its artistic and historical value. The project was directed by the Greek antiquities authorities; however, the underwater work was exclusively carried out by helmet sponge divers (Throckmorton 1991: 16–20).

Another significant step in the development of maritime archaeology in the Mediterranean was the excavation of the Lake Nemi vessels in Italy. Since the fifteenth century, there have been several attempts to salvage the two large Early Roman vessels, submerged in Lake Nemi south of Rome. However, between 1928 and 1931, on the orders of the Italian dictator Benito Mussolini, the lake was drained using powerful pumps to expose the two immense and lavishly decorated vessels from the time of the Roman emperor Caligula. Nonetheless, the motive behind the project was political and nationalistic rather than archaeological (Blot 1996: 38–41).

The development of the Self-Contained Underwater Breathing Apparatus (SCUBA) in 1946 by Emile Gagnan and Jacques-Yves Cousteau (Joiner 2001: 1.3–1.4) represented a breakthrough in underwater exploration, which was reflected on the development of underwater archaeology. Between 1952 and 1957 Cousteau and his team of divers excavated a Roman shipwreck site at the foot of the rocky island of Grand Congloué, off Marseille. During the project numerous equipment and techniques were experimented and developed for underwater excavation; such techniques are now considered standard in many underwater archaeological projects. However, the Grand Congloué excavation witnessed some serious methodological problems, due to the limited involvement of archaeologists in the project, which resulted, at that time, in the misinterpretation of the site (Sibella 1997: 174–175). Another significant stage in the development of Maritime Archaeology in the Mediterranean was the excavation of the Albenga Roman shipwreck by the Italian archaeologist Nino Lamboglia, between 1961 and 1971. In addition to its archaeological importance as one of the largest Roman shipwrecks found in the Mediterranean, the Albenga shipwreck excavation was directed by an archaeologist, and a number of archaeologists contributed to the study of the excavated material. However, Lamboglia did not think that archaeologists should dive, so none of the archaeologists involved in the project dived on the site. Rather,

they remained on surface, managing the excavation remotely and interviewing the divers who collected the artifacts to try to establish their provenance (Carlson 2011: 382).

Perhaps a key turning point in the history of Maritime Archaeology in the Mediterranean took place in the 1960s. It was during that decade that the first scientific underwater excavations took place, and publications about the theory and practice of underwater archaeology started to appear (Dumas 1962; Frost 1963; Taylor 1965; Bass 1966; Throckmorton 1969).

In the 1960s, the excavation of the Late Bronze Age shipwreck off southern Turkey's Cape Gelidonya was the first underwater archaeological project to be carried out according to archaeological scientific standards. The site was originally discovered by Turkish sponge divers. However, it was excavated by a team of sport divers and amateur archaeologists led by the pioneer maritime archaeologist George Bass. The Cape Gelidonya shipwreck was the first one to be excavated entirely underwater and it proved that underwater archaeological sites could be excavated and studied as rigorously as terrestrial sites and according to the same archaeological standards (Bass 2005: 48–55). In the following years, Bass published his first book, which discussed several theoretical, methodological, and practical aspects of conducting archaeological work underwater (Bass 1966). In addition to the study of ancient shipwrecks, the study of harbors and submerged landscapes also started developing in the 1960s and 1970s (Flemming 1971). The work that Honor Frost did was probably the first in that respect in the Mediterranean. She was a pioneer female underwater archaeologist who had worked with Bass on the Cape Gelidonya shipwreck. She had a special interest in the study of anchors and harbors in the Eastern Mediterranean and had worked extensively in the Levantine coast. Her 1963 book was the first to discuss different aspects of harbor and port archaeology in that region (Frost 1963).

Perhaps, one of the most important publications which represented international recognition for the new field of underwater archaeology was *Underwater Archaeology: A Nascent Discipline* (UNESCO 1972). Not only it contained contributions from a number of archaeologists presenting different maritime and underwater sites, but also it discussed an array of archaeological, methodological, and technical aspects of maritime and underwater archaeology.

The foundation of the Institute of Nautical Archaeology (INA) in 1973 by George Bass and a number of his colleagues was a major step in maritime archaeological research in the Mediterranean. Since then, the INA has carried out numerous surveys and excavations in different Mediterranean countries. It also has contributed to training many archaeologists from those countries in aspects of underwater archaeology. The INA also contributed to the creation of one of the earliest museums of underwater archaeology, the Bodrum Museum of Underwater Archaeology in Turkey.

Few years following the UNESCO 1972 publication, one of the most important volumes on maritime archaeology was published (Muckelroy 1978). In addition to discussing different types of sites and the special qualities of underwater archaeology, the book presented, for the first time, a theoretical framework for the formation of underwater archaeological sites. Muckelroy's contribution has been the basis upon which numerous further studies and discussions were based. His volume is still considered a turning point in the development of maritime archaeology.

Key Issues/Current Debates

For the past 50 years, hundreds of sites were discovered and numerous surveys and excavations were carried out for different types of maritime and underwater archaeology sites all over the Mediterranean (Parker 1992). Accordingly, the field of maritime archaeology witnessed substantial development, particularly from a methodological and technological perspective (Green 2004). Advanced technology used for underwater archaeological investigation, such as underwater acoustics, and underwater imagery techniques became widespread and readily available for

researchers and institutions working in underwater archaeology. Moreover, during the past two decades the investigation and study of underwater archaeological sites in deep water using remote sensing techniques became quite common in several northern Mediterranean regions (Ballard et al. 2000; Wachsmann 2011). Despite its high cost, these projects proved the possibility of exploring underwater sites beyond diving limits, using non-intrusive methods, especially since the sites located in deep waters are often in a good preservation condition.

However, the large number of underwater archaeological excavations which took place in the Mediterranean during the past five decades yielded thousands of artifacts of different types, materials, and dates, which required extensive resources for conservation, storage, and display. Therefore, maritime museums and museums for underwater archaeology have been established in a number of Mediterranean countries, mainly to display material culture which has been excavated from underwater. It is worth mentioning, however, that there is a complete absence of maritime museums in most southern and eastern Mediterranean countries, which has negatively affected public awareness of maritime and underwater archaeology in that region.

Despite the existence of specialized conservation facilities and maritime museums in several Mediterranean countries, it became evident that underwater archaeology is significantly costly and time-consuming, not only for the excavation phase but also mainly for the conservation and management of the excavated material (Robinson 1998: 11).

Shipwreck excavations in the Mediterranean often come across submerged cargoes that include tens, hundreds, hundreds, and sometimes thousands of amphorae. Raising them and hence providing storage often represents a serious challenge for the museums. On the other hand, the conservation of organic material such as ship timbers could take many years to be accomplished, which requires considerable financial and material resources.

Therefore, during the past decade, there has been an evident change of concepts in underwater archaeology, from excavations and retrieving of artifacts to the management and in situ preservation of submerged archaeological sites. It was realized that excavations are not always the best ways for dealing with underwater archaeological sites and that there are other options which are more preferable in many cases. The UNESCO (2001) Convention on the Protection of the Underwater Cultural Heritage asserts that "the in situ preservation of underwater cultural heritage shall be considered as the first option before allowing or engaging in any activities directed at this heritage." Therefore, there has been an international trend towards the preservation of underwater archaeological sites where they are found and more focus in being put on underwater surveys and mapping of sites rather than full excavations. Accordingly, several northern Mediterranean countries are conducting large-scale surveys and mapping projects of their coasts in order to assess their maritime archaeological resources and develop methods for protecting and preserving them. On the other hand, different methods and techniques for the in situ preservation of underwater sites have been developed and tested in Mediterranean countries (Zmaić 2009). However, in situ preservation of underwater archaeological sites raised another issue concerning the presentation of those sites to the public. How can the sites be protected in situ and yet be available for public enjoyment and education? The options were either to bring the visitors physically to underwater sites or to bring these sites virtually to the visitors. The first option is represented by underwater archaeological parks and cultural dive trails which have been developed in some Mediterranean countries such as in Italy, Croatia, Greece, Turkey, and Israel. This mainly targets the diving community which forms the majority of the visiting public to these types of sites. On the other hand, the great development in information technology and digital imaging has enabled transmitting information about the underwater archaeological sites to the wide public through virtual reality images, 3D projections, and holographic displays; all can be utilized in museums to bring the underwater sites to the public (Manders 2008: 35–39).

Another aspect of maritime archaeology which has witnessed a significant development in the past years in Mediterranean countries is education and training. A number of Mediterranean countries have introduced studies in different aspects of maritime and underwater archaeology into their university curricula (UNESCO 2010). Also several countries, such as Turkey, Egypt, Croatia, Malta, and Spain, in collaboration with the UNESCO, have organized workshops and training programs in underwater archaeology and the conservation of underwater finds. This has significantly contributed to building capacity in that field.

Finally, in most Mediterranean countries, there are currently dedicated units within the national archaeology authorities specialized in underwater cultural heritage. Such units are normally responsible not only for conducting underwater archaeological projects within their respective countries, but also for overseeing and organizing work done by other archaeological missions or groups working within the countries' territorial waters.

International Perspectives

The development of maritime and underwater archaeology in Egypt has not differed significantly from other Mediterranean regions (Khalil and Mostafa 2002). However, one of the earlier discoveries in that field took place in the desert rather than underwater. In 1894, at least five boats from the Middle Egyptian Kingdom were found at Dashur south of Cairo (Haldane 2000: 83–102). The discovery of the Dashur boats could be considered the beginning of maritime archaeology in Egypt. It was followed by the discovery of several other boat and ship burials such as the Old Kingdom royal ships of Khufu in 1954 and the Early Dynastic boats of Abydos in 1991 (Haldane 2000: 39–43, 45–60).

Nevertheless, underwater archaeology in Egypt can be generally divided into two phases. The first phase started at the beginning of the twentieth century with the efforts of sport divers and amateur archaeologists, and it is mainly characterized by accidental discovery of underwater archaeological sites in the Alexandria region and hence the subsequent salvage operations which were carried out at those sites. The most important discoveries of that period were the pre-Hellenistic harbor of Pharos in 1912 and the submerged remains of the ancient lighthouse of Alexandria in the 1960s (Morcos 2000). The second phase of underwater archaeological research in Egypt started in the mid-1990s with two significant projects: the excavation of the submerged remains of the ancient Pharos lighthouse of Alexandria (La Riche 1996) and the excavation of submerged Ptolemaic royal quarters at the Eastern Harbor of Alexandria (Goddio et al. 1998). In addition to the archaeological value and significance of those two projects, they have shed light on the potentials of underwater archaeology in Egypt and opened the door to many projects that took place in the Alexandria region. However, it is worth mentioning that all the underwater archaeological research that took place in Alexandria has been concerned with submerged structures and landscape rather than shipwrecks. Nonetheless, a major drawback in underwater archaeology in the Egyptian Mediterranean waters is that it almost entirely focused on Alexandria, with very limited projects conducted elsewhere. Moreover, the Egyptian contribution to such projects was quite limited as the work was mainly carried out by foreign teams, yet the projects provided a great opportunity for training young Egyptian archaeologists on different aspects of underwater archaeology, which led to the establishment of the Department for Underwater Archaeology (DUA) in 1996 as part of the Egyptian Supreme Council of Antiquities (SCA), the authority responsible for overseeing all archaeological work in Egypt. The establishment of the DUA was a governmental recognition of the significance of underwater archaeological research in Egypt.

In addition to the archaeological projects that took place under Egyptian waters, a number of other important maritime sites were discovered and studied along the shores of Lake Mareotis

west of Alexandria. This included some of the most significant lake harbors and lacustrine waterfront structures in the Mediterranean (Blue 2010; Blue and Khalil 2011).

Nonetheless, a major problem in maritime archaeology in Egypt is related to its public presentation and appreciation. Despite its long and significant history, and the number of maritime archaeological sites that have been investigated, Egypt does not have a maritime museum, and the public presentation of maritime and underwater archaeology is insignificant, which has several shortcomings related to public awareness and knowledge of the Egyptian maritime cultural heritage. Nevertheless, Egypt has excelled in specialized education in Maritime Archaeology with the establishment of the Alexandria Centre for Maritime Archaeology and Underwater Cultural Heritage in 2009 as the first academic center in the Southern Mediterranean concerned with providing education and training at different levels in aspects of that field. The center targets students from Egypt, the Mediterranean, and the Arab Region; therefore, the education and training that the center provides would contribute to the development of maritime and underwater archaeology by creating generations of educated and trained maritime archaeologists.

Future Directions

It is evident that maritime and underwater archaeology in the Mediterranean has gone through different stages of conceptual, methodological, and technical development since the 1960s. Turning away from complete excavations of specific sites to surveying and mapping of large areas have been a distinctive feature of numerous projects that took place during the past decade. However, it is expected that the future will be characterized by multinational projects that are carried out between several countries and which emphasize on specific aspects related to maritime archaeology such as preservation, capacity building, and cultural tourism. Some EU-funded projects, which have already been initiated, were associated with underwater archaeology, such as the Project on Integrated Maritime Policy for the Mediterranean (IMP-MED), which is part of the European Neighbourhood and Partnership Instrument (ENPI), and also the EU (Tempus) Program, which funded the creation of the Alexandria Centre for Maritime Archaeology and Underwater Cultural Heritage in Egypt. On the other hand, the UNESCO secretariat of the Convention on the Protection of Underwater Cultural Heritage has been very active in collaborating with different Mediterranean countries, especially in disseminating the ideas and principles of preservation and public education. During the coming years, the EU will hopefully play an even greater role in funding projects related to site management, education, and training in maritime archaeology in the Mediterranean region. On the other hand, it is expected that more research projects will be carried out in deep and international waters. These are getting more and more accessible with the advances in remote sensing technology, particularly the use of the Autonomous Underwater Vehicles (AUV). Furthermore, in countries where maritime archaeology is still a nascent discipline, such as most Mediterranean Arab Countries, it is anticipated that such countries will put more emphases on the exploration and hence the preservation and public presentation of their cultural heritage. Also regional collaboration in education and training of maritime archaeologists has started and is expected to develop further in the future especially between countries witnessing recent political changes.

Cross-References

- ▶ Experimental Maritime Archaeology
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Port of Alexandria: Underwater Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

Ballard, R.D., A.M. McCann, D. Yoerger, L. Whitcomb, D. Mindell, H. Singh, B. Foley, J. Adams, D. Piechota, and C. Ciangrande. 2000. The discovery of ancient history in the deep sea using advanced deep submergence technology. *Deep-Sea Research* I (47): 1591–1620.

Bass, G. 1966. *Archaeology underwater*. London: Thames & Hudson.

Bass, G. 2005. Cargo from the Age of Bronze: Cape Gelidony, Turkey. In *Beneath the Seven Seas*, ed. G. Bass, 48–55. London: Thames and Hudson.

Blot, J.-Y. 1996. *Underwater archaeology: Exploring the world beneath the seas*. London: Thames a Hudson.

Blue, L., ed. 2010. *Lake Mareotis: Reconstructing the past*. British Archaeological Reports International series 2113. Oxford: Archaeopress.

Blue, L., and E. Khalil, eds. 2011. *A multidisciplinary approach to Alexandria's economic past: The Lake Mareotis Research Project*. British Archaeological Reports International series 2285. Oxford: Archaeopress.

Carlson, D. 2011. The seafarers and shipwrecks of ancient Greece and Rome. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D. Hamilton, 379–405. Oxford: Oxford University Press.

Dumas, F. 1962. *Deep-water archaeology*. London: Routledge/Kegan Paul.

Flemming, N.C. 1971. *Cities in the sea*. New York: Doubleday & Company.

Frost, H. 1963. *Under the Mediterranean*. London: Routledge/Kegan Paul.

Goddio, F., A. Bernand, E. Bernand, I. Darwish, Z. Kiss, and J. Yoyotte, eds. 1998. *Alexandria: The submerged royal quarters*. London: Periplus.

Green, J. 2004. *Maritime archaeology: A technical handbook*. San Diego: Elsevier Academic Press.

Haldane, C. 2000. *Sacred and secular: Ancient Egyptian ships and boats*. Dubuque: Kendall/Hunt Publishing Company.

Joiner, J.T. 2001. *NOAA diving manual*. Flagstaff: Best Publishing Company.

Khalil, E., and M. Mostafa. 2002. Underwater archaeology in Egypt. In *International handbook of underwater archaeology*. Plenum Series in Underwater Archaeology, ed. C. Ruppe and J. Barstad, 519–539. New York: Kluwer Academic.

Manders, M. 2008. In situ preservation: The preferred option. *Museum International* 240: 31–41. UNESCO.

Morcos, S. 2000. Early discoveries of submarine archaeological sites in Alexandria. In *Underwater archaeology and coastal management: Focus on Alexandria*, ed. M.-H. Mostafa, N. Grimal, and D. Nakashims, 33–45. Paris: UNESCO Publishing.

Muckelroy, K. 1978. *Maritime archaeology*. Cambridge: Cambridge University Press.

Norwich, J.J. 2007. *The Middle Sea: A history of the Mediterranean*. London: Vintage Books.

Parker, A.J. 1992. *Ancient shipwrecks of the Mediterranean and the Roman Provinces*. British Archaeological Reports International series 580. Oxford: Tempvs Reparatvm.

Robinson, W. 1998. *First aid for underwater finds*. London: Archetype Publications.

Scarre, C., and B.M. Fagan. 2008. *Ancient civilizations*. 3rd ed. New Jersey: Pearson Education.

Sibella, P. 1997. Grand Congloué. In *Encyclopaedia of underwater and maritime archaeology*, ed. J.P. Delgado, 174–175. London: The British Museum Press.

Taylor, J., ed. 1965. *Marine archaeology*. New York: Thomas Y. Crowell Company.

Throckmorton, P. 1969. *Shipwrecks and archaeology: The unharvested sea*. Boston: Atlantic Monthly Press.

Throckmorton, P. 1991. The road to Gelidonya. In *The sea remembers: Shipwrecks and archaeology*, ed. P. Throckmorton, 14–24. New York: Smithmark Publisher.

UNESCO. 1972. *Underwater archaeology: A nascent discipline*. Paris: UNESCO.

UNESCO. 2001. *Convention on the protection of the underwater cultural heritage*. Paris: UNESCO. Available at: http://unesdoc.unesco.org/images/0012/001260/126065e.pdf

UNESCO. 2010. *Courses in underwater archaeology at universities and other institutions*. Paris: UNESCO. Available at: http://unesdoc.unesco.org/images/0015/001514/151 452e.pdf

Wachsmann, S. 2011. Deep-submergence archaeology. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D. Hamilton, 202–231. Oxford: Oxford University Press.

Zmaić, V. 2009. The protection of Roman period shipwrecks in-situ: Underwater museums. In *Exploring underwater heritage in Croatia: A handbook*, ed. L. Beric and L. Miholjek, 20–21. Zadar: International Centre for Underwater Archaeology.

Further Reading

Bass, J. 2011. The development of maritime archaeology. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D. Hamilton, 3–22. Oxford: Oxford University Press.

Grenier, R., D. Nutley, and I. Cochran. 2006. *Underwater cultural heritage at risk: Managing natural and human impacts*. Paris: ICOMOS.

Hocker, F., and C. Ward. 2004. *The philosophy of shipbuilding*. College Station: Texas A&M University Press.

Jondet, G. 1912. Les ports antiques de Pharos. *Bulletin de la Société Archéologique d'Alexandrie* 14: 252–266.

Meehan, Betty

Sally Brockwell
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Basic Biographical Information

Betty Francis Meehan was born in Bourke, New South Wales, Australia, in 1933 and grew up there, the elder daughter of Francis Owen and Olive Jane Meehan. After completing high school in Bourke, she trained as a specialist infants teacher at Bathurst Teachers College and later taught in Sydney, Bourke, Darwin, and Canberra. In 1958, she travelled to Arnhem Land in northern Australia, accompanying her first husband, the late Lester Richard Hiatt, on fieldwork for his anthropology Ph.D. There she set up the first school for Aboriginal children at Maningrida. She went on to study at the University of Sydney and gained a Bachelor of Arts (Hons) and Master of Arts (Hons) in anthropology. In 1972, she enrolled in a Ph.D. in the Department of Prehistory and Anthropology at the Australian National University (ANU) in Canberra and returned to Arnhem Land for her fieldwork with her second husband, collaborator, and colleague, the late Rhys Maengwyn Jones. She graduated in 1975 (Fig. 1).

Betty's Ph.D. thesis became the basis for her iconic book *Shell Bed to Shell Midden* (Meehan 1982) for which she became internationally famous. The book describes the role of shellfish and a year in the life of the An-barra people of the Blyth River and has influenced generations of scholars from ethno-archaeologists to gastronomists. The fieldwork on which this book is based was done with the enthusiastic collaboration of Betty and Rhys' An-barra family – Frank Gurrmanamana and Nancy Bandeiyama (both now deceased) and their extended family.

Betty joined the Department of Prehistory in the Research School of Pacific Studies at the Australian National University as a Research Fellow in 1977. She continued her ethno-archaeological investigations in Arnhem Land and worked as an anthropologist with Athol Chase on the Upper Daly Land Claim in the

Meehan, Betty, Fig. 1 Betty Meehan collecting shellfish (*Marcia hiantina*) from shell beds off the beach near the An-barra home base Lalarr Gu-jirrapa where she and her husband Rhys Jones lived for seven months in 1973. (Photo taken by Rhys Jones, wet season, early 1973)

Northern Territory. In 1985, she joined the Division of Anthropology at the Australian Museum (AM) in Sydney where she carried out research on Aboriginal material culture in northeastern and central Arnhem Land and on the Daly River in the Northern Territory. This research was funded by the Australian Research Council, and detailed reports were lodged with that agency and the AM. From 1990 to 1991, she was Head of the Aboriginal Section in the Collections Management Division, National Museum of Australia in Canberra. In 1991, she joined the Australian Heritage Commission as Director of the Aboriginal and Torres Strait Islander Section where, as part of her responsibilities, she coordinated several National Indigenous Heritage Art Awards. After retirement, Betty has continued to work on her An-barra Archaeological Project in collaboration with Sally Brockwell of the ANU. A major monograph is planned for this research. Betty Ngurrabangurraba, daughter of Frank Gurrmanamana and Nancy Bandeiyama, is collaborating with Betty Meehan and Sally Brockwell in order to complete this work (e.g., Brockwell et al. 2005).

Major Accomplishments

Betty has been an inspirational influence in her dual professions of archaeologist and cultural anthropologist, as researcher, fieldworker, ethnographer, teacher, editor, collector, and curator. Her research has touched on many themes in Indigenous society: the role of women, diet and nutrition, art (including organizing numerous exhibitions), material culture, heritage studies, ecology, demography, and contemporary issues. She has published extensively on her research in Arnhem Land and elsewhere (e.g., Hiatt 1967–68; Meehan 1977, 1991; Meehan and Jones 1980, 2005; Hiatt et al. 2002). She is a life member of the Australian Archaeological Association for her outstanding contributions, a Fellow of the Australian Academy of Humanities, and a member of the Australian Institute of Aboriginal and Torres Strait Islander Studies.

Cross-References

► Ethnoarchaeology
► Jones, Rhys Maengwyn

References

Brockwell, S., B. Meehan, and B. Ngurrabangurraba. 2005. The An-barra archaeological project: A progress report. *Australian Aboriginal Studies* 1: 84–89.

Hiatt (Meehan), B. 1967–68. The food quest and economy of the Tasmanian Aborigines. *Oceania* 38 (2): 99–133; 38 (3): 190–219.

Hiatt, L.R., K. McKenzie, B. Ngurrabangurraba, B. Meehan, and R. Jones. 2002. *People of the rivermouth. The Joborr texts of Frank Gurrmanamana (with CD Rom)*. Canberra: National Museum of Australia and Aboriginal Studies Press.

Meehan, B. 1977. Man does not live by calories alone. The role of shellfish in a coastal cuisine. In *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia and Australia*, ed. F.J. Allen, J. Golson, and R. Jones, 493–531. London: Academic.

Meehan, B. 1982. *Shell bed to shell midden*. Canberra: Australian Institute of Aboriginal Studies.

Meehan, B. 1991. Wetland hunters: Some reflections. In *A northern heritage: Landscape, ecology and man in monsoonal lowlands in Australia*, ed. C.D. Haynes, M.G. Redpath, and M.A.J. Williams, 197–206. Rotterdam: A.A. Balkema.

Meehan, B., and R. Jones. 1980. The outstation movement and hints of a white backlash. In *Northern Australia: Options and implications*, ed. R. Jones, 131–157. Canberra: Research School of Pacific Studies, Australian National University.

Meehan, B., and R. Jones. 2005. Stone tool use in land with no stone. Ethnographic notes from the Gu-jinarliya. In *Many exchanges: Archaeology, history, community and the work of Isabel McBryde*, Aboriginal history monograph, ed. I. MacFarlane, M.-J. Mountain, and R. Paton, vol. 11, 147–169. Canberra: Aboriginal History Incorporated.

Megalithic Art: A Visual Repertoire for the Dead

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Introduction

By the mid-fifth millennium BCE, Neolithic communities along the Atlantic Seaboard of Europe began to witness the emergence of a pictographic language based on a common repertoire of abstract and figurative motifs. This distinct art form is arguably an extension of a much wider pan-European schematic art tradition which was mainly confined to communities involved in passage grave construction and use. The megalithic art tradition unified much of the Neolithic world along the coastal regions of the Mediterranean and the Atlantic coastal fringes of Europe, between the Iberian Peninsula and northern Scotland for a period of some 3,000 years and account for around 10–15% of all extant monuments. The art itself appears to have acted as a personal signature that was unique to each monument and its builders but drawn upon a limited set of symbols that included chevrons, concentric circles, cupules, spirals, and zig zag lines. The majority of this repertoire was engraved, although there is clear evidence that many sites were also painted. Recognized along the Mediterranean and Atlantic coastal fringes are around eight core areas; of these, four are islands. Each area appears to have had its own unique and distinct artistic autonomous repertoire, possible representing regional identity.

Definition

It is not entirely clear where and how megalithic art originated, although controversially it appears to form part of a much larger Schematic art tradition, itself having origins in the Late Meso-lithic/Early Neolithic of central and western Mediterranean Europe (Fig. 1). Schematic art, forming part of a post-Paleolithic rock art tradition is the term given to both engraved and painted rock art that dates between the fifth and first millennium BCE. Much of what is termed Schematic art is located within southern Europe, in particular, in cave and rock-shelter sites of the Iberian Peninsula. Apart from what is present on the wall so frock-shelters and caves, this artistic tradition also occurred as a portable assemblage, usually decoration on stone and ceramic items such as pendant sand pottery vessels. The height of this significant tradition appears to coincide with Europe's first metallurgists, Copper Age [Chalcolithic] cultures (3500–1700 BCE (dates vary across Europe)), and extends into the Bronze Age (2500–900 BCE (dates vary across Europe)) and probably the Early Iron Age (1200–600 BCE (dates vary across Europe)) as well. Arguably, one of its derivatives is megalithic art which comprises mainly abstract carved and sometimes painted motifs, exclusively associated with Neolithic burial–ritual monuments. It is usually closely associated with the passage grave tradition and decorated pottery (e.g., grooved ware which is common at many sites within Atlantic Europe) which incorporates variations of motifs that are found in megalithic art, such as horizontal bands, chevrons, and lozenges. There are instances though were certain megalithic art designs occur on other monument types such as Portal Dolmens.

In north western Europe, this artistic style has been extensively studied by Elizabeth Shee-Twohig (1981), as well as being the subject of a number of regional and individual site studies

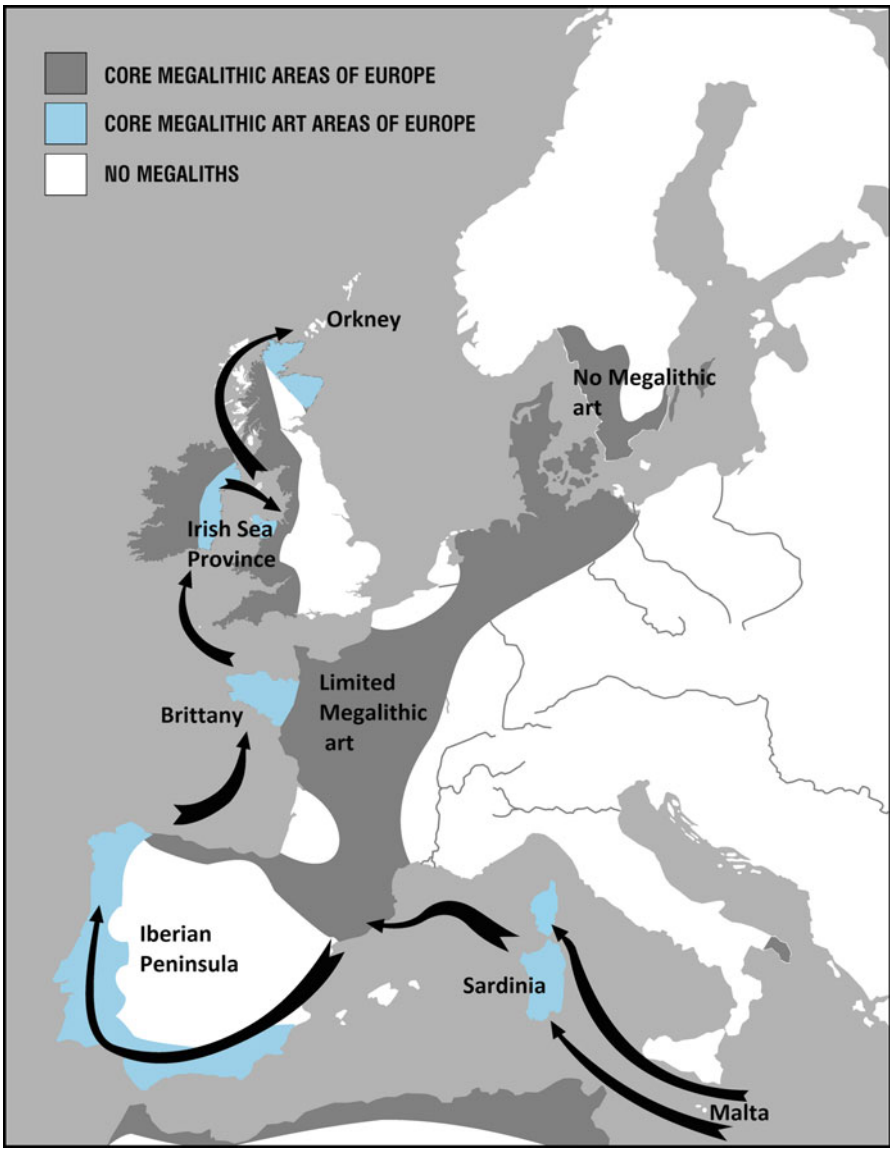

Megalithic Art: A Visual Repertoire for the Dead, Fig. 1 Map of Europe showing the likely chronological spread of megalithic art through the Neolithic world

(O'Kelly 1982; Eogan 1986; O'Sullivan 1986; Lynch 1991; Nash et al. 2005; Nash 2010). Elsewhere, megalithic art has been confused with open-air rock art which occurs later in the prehistoric sequence and usually located within upland areas, away from the burial monuments that usually occupy the coastal fringes of the western Mediterranean and Atlantic Europe (Cunliffe 2001).

Rudimentary studies during the early to mid-twentieth century by the Abbé Henri Breuil and O.G. S. Crawford promoted the idea that the art represented various parts of the human body, in particular the face, which had morphed through time, from Breuil's "stylized mortal" to Crawford's "eye goddess." Not surprisingly, many influences had originated from studies on Upper Paleolithic art by Breuil and German researcher Hugo Obermaier. During this period, Breuil considered that there was a direct link between megalithic art within the passage graves and open-air art,

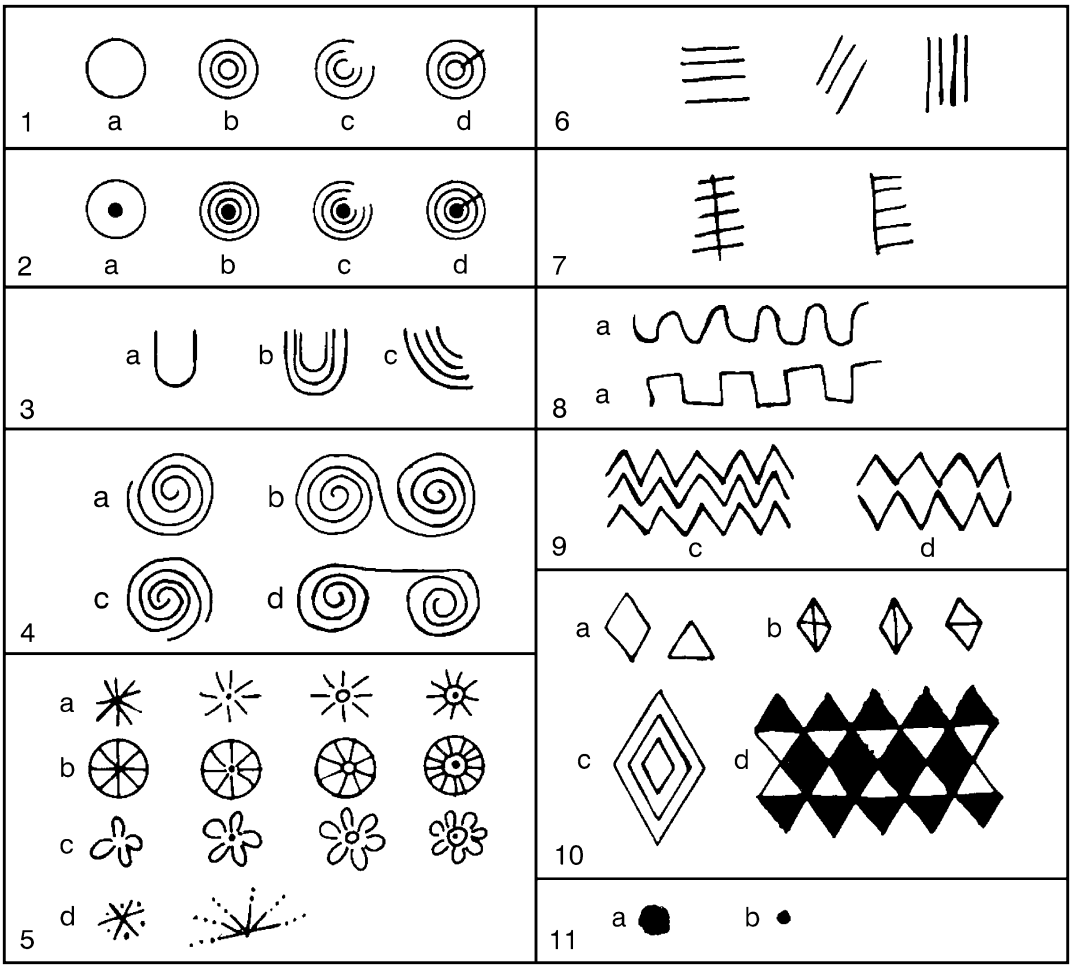

Megalithic Art: A Visual Repertoire for the Dead, Fig. 2 Shee-Twohig's motif classification (1981: 107, Fig. 11)

engraved on to rock out cropping. However, it is now considered that open-air rock art was being executed between 3000 and 1500 BCE, over 1,000 years later than the engraving found in passage graves (Bradley et al. 2001: 496).

Elizabeth Shee-Twohig's (1981) seminal work identified a clear repertoire of motifs that include 11 generic forms, ranging from chevrons, lozenges, and cup-and-rings to zig zags and simple cupules (Fig. 2). In addition to this abstract repertoire and depending on regionality, representative engravings are also present and include footprints, complete – or parts of – stylized anthropomorphic and zoomorphic representations with associated weaponry; however, these motifs may be later additions to an already well-established abstract tradition (Nash 2013). In southern Europe, one can postulate an association between megalithic art and statue stele (menhirs), where stylized anthropomorphic figures are pecked alongside multiple zoomorphic figures and weaponry onto hewn stone and boulders. Here, Bradley (2009: 93) has drawn a clear link between statue stele and burial–ritual monuments, which collectively would have formed part of a complex ritualized landscape.

Ritualized landscapes can take many forms; their intensity could have been based on where burial monuments were sited and their relationship with other nonburial structures such as

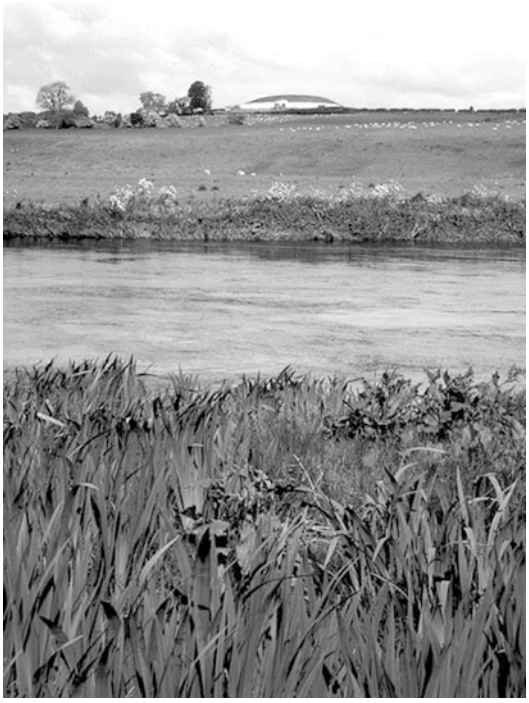

Megalithic Art: A Visual Repertoire for the Dead, Fig. 3 The epitome of being Neolithic–looking at New grange from south of the Boyne River. (Author)

standing stones (menhirs) and stone rows. There are a small number of passage graves where megalithic art is carved externally, either onto kerb stones or within the fac¸ade, for example, the three Boyne Valley passage grave complexes of New grange (Fig. 3), Knowth, and Dowth. Here, the art appears to act as a point of reference between space that is known and the fore boding of the long dark passage and the unknown spaces beyond. These public expressions of ritualized rock art production are, however, few in number. The carved art is generally strategically placed within the inner passage and chamber areas where visual access would have been restricted to possibly elites or religious actors within the community. With some monuments, the art faces into the mound or is carved onto the back wall of the ante chamber where its intentional positioning appears to be reserved for the incoming dead and for the ancestors (e.g., the passage graves of D'Er Grahand Gavrinis, Brittany). The carvings within the inner passage and chamber may have represented physical markers where by the art played a vital role in how the dead changed physically and metaphysically as they moved from one area of the monument to another. The position of such art would have also had an impact on those people allowed to accompany the dead to their resting place.

There are distinct differences in panel distribution, motif style, and association between various core areas; it would appear that certain symbols vary in significance according to where in the Neolithic world they appear, each dominant motif setting a trend. In Ireland, for example, two clear primary stylistic repertoires, including curvilinear and angular forms, are present in different monuments, such as the Late Neolithic Irish passage graves of Four knocks I, Knowth, and nearby New grange, County Meath (O'Kelly 1982; Eogan 1986). Spirals are common in the western Mediterranean, Ireland, and western mainland Britain but less so in Brittany. Similarly, radial motifs frequently occur in Brittany but are somewhat rarer elsewhere in Atlantic Europe. These potent signatures, the majority of which are incorporated into the monument's architecture, probably served as a reminder to both the living and the dead of their ancestral past, thereby enhancing a sense of ancestral belonging; the art being clearly associated with death. It is interesting to note that megalithic art does not occur outside the visual draw of these monuments; the majority of motifs are hidden, usually within the inner passage or the chamber areas of the monument. Megalithic art placed on curbing around the mound structure at New grange, Knowth, and Dowth in the Boyne Valley and Lough crew, County Meath, Ireland, may be interpreted as public symbols (O'Sullivan 1986, 1993). However, all three monuments stand within a defined ritual landscape – on a bow of the River Boyne – and as such, the art could only have been viewed from a point within this ritual area, probably by chosen individuals or the elite. From the south bank of Boyne, on lookers would have seen the monument but not its secret art (Fig. 3).

The Interplay Between Art and Architecture

Certain features of passage grave architecture appear to influence the siting of megalithic art, especially within the internal space of the monument. Rarely are these symbols visible from the entrance or fac¸ade; they remain hidden until access into the monument provides an intimate and discrete viewing. Such restricted visual access entails a number of architectural devices intended to heighten the secrecy surrounding the production and use of the engraved and painted art. Many passage graves, for example, possess door and sill stones positioned either side of the passage (e.g., Casa del Romeral, Malaga, Spain), and in some cases threshold stones are also used, arguably to define a point of separation between the world of the living and the realm of the dead. Deliberate kinks in the passage also served to restrict visual access and, in some cases, additionally controlled the amount of light penetrating the passage and illuminating the rear wall of the chamber at the summer equinox and winter solstice, undoubtedly significant annual events of immense symbolic importance.

During the early to mid-fourth millennium BCE, carving within burial monuments appears to have been taken up with vigor in Brittany. This tradition flourished for over a 1,000 years. Along with engraving, Neolithic communities appear to have been in creative competition with their neighbors, attested by the construction of large monumental structures that delineate entire landscapes rather than a specific locale. Le Grand Menhir Brisé once standing over 20 m high and weighing an estimated 280 t stood in full view as a focal point for the passage graves of Table des Marchands and D'Er Grah, both of which contain megalithic art. Several kilometers from this complex is the most elaborately decorated of all passage graves, the site of Gavrinis. Dating to c. 3500 BCE and now situated on an island, each of its passage and chamber uprights is mainly engraved with elaborate abstract imagery. Also present are representative polished stone-axe depictions, repeated and overlapping concentric circles, and curvilinear motifs (Fig. 4). Although this and other monuments elsewhere adhere to a convention in terms of architectural and landscape grammar, the artistic repertoire contains a set of designs and motifs that are regionally unique. These are individually and collectively dispersed around various hidden areas of the monument. Consistent with ideas of ritual concealment and secrecy, the panels may have been intentionally turned inward, facing the internal space of the monument, and thus would have only been perceptible to the spirits of the dead who would have occupied such spaces. Such a practice appears to be an Atlantic coastal tradition with clear in situ in-turned decorated kerbstones at sites such as Newgrange, Knowth, Dowth, and the now destroyed Calder stones monument in northwest England. However, this process appears to have originated around the Gulf of Morbihan at sites that include Gavrinis and nearby D'Er Grah. In the ceilings of both monuments are two broken sections of an enormous 10 m long menhir. Originally this structure would have stood proud within an earlier ritualized landscape. Engraved on one of its surfaces were two goats and a large

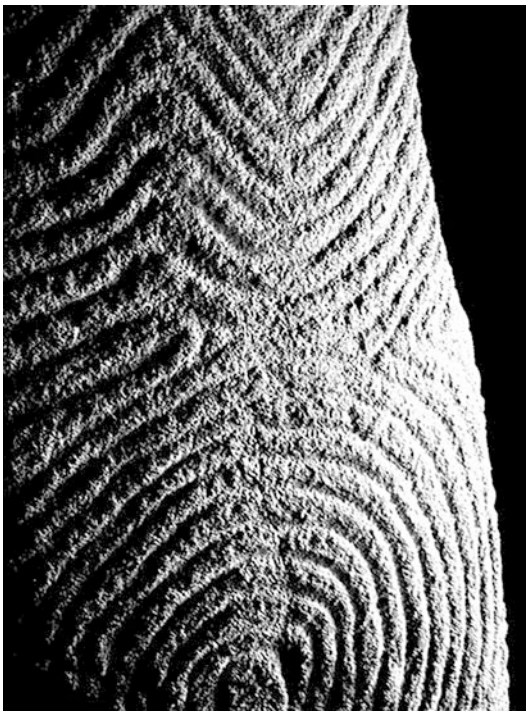

Megalithic Art: A Visual Repertoire for the Dead, Fig. 4 One of the highly decorated uprights within the passage of Gavrin is Brittany, France. (Author)

axe symbol. A section that included the axe symbol was incorporated into the passage grave of Table des Marchands (Le Roux 2006). The destruction of the menhir and its integration within the ceilings of the three passage graves may represent a deliberate act of incorporation, drawing the ritual power of an earlier monument into the body of its successor. Gavrinis and other Breton monuments presumably provided an impetus for the erection of truly monumental structures elsewhere in the Atlantic region of northwestern Europe, as attested by the examples of New grange, Knowth, and Dowth in the Boyne Valley, Ireland, Le Déhus and La Gran'mère du Chimquière in Guernsey, and La Hougue Bie in Jersey. However, the number of sites in Ireland and Britain incorporating megalithic art is relatively small and less elaborate in composition.

In most instances the carving on one upright stone rather than another appears to have been a deliberate and intentional act. Based on several well-preserved monuments, megalithic art was only read from the passage or chamber and is thus revelatory in its positioning. At Gavrinis, in the Gulf of Morbihan, 23 of the 29 uprights that construct the chamber and passage are highly decorated, though only some are visible from the entrance looking toward the chamber. However, despite the visibility of those uprights positioned closer to the entrance, the narrative of the other upright panels appears, from this viewpoint, as distorted and virtually impossible to read; the audience is forced to read each stone, probably sequentially (like the chapters in a book). Similarly, visual access is completely restricted at nearby Les Pierres Plates passage grave in Locmariaquer, where 13 decorated uprights occur 5 m beyond the entrance and beyond a kink of some 50° inside the chamber. The hidden art in this monument includes a stylized anthropomorphic "rib-cage" design (Thomas and Tilley 1993). It is argued that this and other abstract forms could not have been viewed by the uninitiated; that is, the majority of the community that would have congregated outside the monument, within the facade area. These people would been excluded from this most secretiveness of the engraved narrative. Instead, the art would have been exclusively read by special individuals who would have had direct contact between the community and the mortal remains of the dead and the spirits that would have inhabited the inner recesses of the monument.

The Potency of the Painted Motif

Although megalithic art is usually engraved, there are a number of sites in southern Europe, exhibiting irrefutable evidence of painting, either as a separate entity or as a combination of painting and engraving. The first discoveries of painted megalithic art were made during the turn of the twentieth century at Dolmen de Dombate (in Portugal) and Forno dos Mouros (in northwest Spain). At Pedra Cuberta, near La Coruña, the uprights in both the chamber and passage were decorated using black, red, and white pigmentation to create chevrons and multiple zig zag motifs (Rodríguez Casal 1990). More recently, field work at the Dolmen de Dombate shows that painted motifs covered most of the internal walls of the monument. It was deduced that both the red and black geometric forms had been painted over a prepared white-painted surface, thus creating a striking yet secretive visual impact upon those few who would have entered this realm of the dead. Red- and black-painted zig zags, at Coto dos Mouros and at Forno dos Mouros, confirm the wide geographic spread of this phenomenon through the northern and western coastal fringes of Portugal and Spain.

Painted motifs, using the artistic repertoire of the megalithic tradition, appear to be a southern European trait, although this trend may have been biased by taphonomic processes, as evidence from elsewhere may not have survived the archaeological record. However, painted motifs that can be relatively dated have been found on megalithic tombs in Malta, Sardinia, and the coastal regions of the Iberian Peninsula (Arosio et al. 2011). Charcoal fragments found within stratified deposits abutting the passage wall at Antelas Viseuin Portugal have revealed a radiocarbon determination of 4,655 $\pm$ 65 BP (Castro et al. 1957), while a further six megalithic sites have been dated in Galicia, north western Spain, using AMS radio-carbon and plasma-oxidation extraction techniques (Freddo

Megalithic Art: A Visual Repertoire for the Dead, Fig. 5 The painted spirals at Tomba Della Scacchiera, NW Sardinia. (Image: Antonello Porcu)

2007). Although the paintings on these monuments are now extremely faint, a number of characteristic geometric patterns can be recognized.

At the recently excavated rock-cut burial–ritual site of Tomba Della Scacchiera in the north-western highlands of Sardinia, a spectacular array of painted imagery was discovered (Arosio et al. 2011). The Tomba Della Scacchiera or Chequered Tomb, so named for a unique blue-and-white checker design across the ceiling, comprises a fac¸ade and an entrance leading to a rock-cut passage and a massive chamber with three side cells beyond. The walls were painted with characteristic curvilinear and rectilinear motifs which are also found elsewhere in Neolithic burial–ritual monuments in central and western Mediterranean and north-western Europe. Additional to the geometric motifs was a series of stylistic bull heads carved along the main wall of the chamber. This recurrent theme appears to have been an important symbol across the western Mediterranean and the Iberian Peninsula at this time. The most striking element of the surviving rock art here is a set of seven interconnecting, large, vibrant, red spirals–very similar in style, size, and composition to carved examples found within burial–ritual monuments in Ireland, Scotland, and Wales (Figs. 5 and 6).

Key Issues and Current Debates

So far, I have briefly identified the geographic distribution of megalithic art, from the Mediterranean to Orkney (see Fig. 1). I now wish to discuss, albeit briefly, past and current ideas on this unique assemblage; clearly these symbols represent some form of visual communication system and were associated with ritualized death and burial rites within stone chambered monuments (usually passage graves). During the latter part of the twentieth century, much of the megalithic rock art had been recorded using traditional classifications and methods usually employed with cataloguing portable artifacts, usually by enthusiastic amateurs (Bradley et al. 2001: 494). From these rudimentary studies, researchers began to link together certain core areas of Europe, suggesting

Megalithic Art: A Visual Repertoire for the Dead, Fig. 6 The recording of the engraved spiral at Llanbedr, North Wales, image taken in 2012. (Image: author)

geographic associations that were bound by a recognized artistic tradition and monument building (Nash 2012).

With the application of AMS chronometric-dating techniques of minute fragments of organic material, archaeologists can now safely establish a potential route-map through Western Europe for the construction and use of burial monuments and the use of an artistic repertoire. However, questions arise concerning the relationship between monument and rock art, moreover the meaning each may have conveyed. The transmission of ideas through a set of recognized symbols may have occurred during the initial wave of monument construction, suggesting a contemporarity between art and monument. In the case of the reuse of stone work within several of the Brittany passage graves, it appears that the megalithic art tradition was already in place and, therefore, these symbols represented different spatial and temporal zones; this hypothesis can be suggested for Bryn Celli Ddu, a passage grave in Anglesey in North Wales. Here, excavation in the early twentieth century revealed a highly decorated stone lying over a central pit that may have once been part of a henge monument (Fig. 7). Later use of the site, at around 3000 BCE, includes the construction of the passage grave which appears to have used the foot print of the former henge. Interestingly, none of the walls inside the passage and chamber areas of this monument are engraved with megalithic art.

The concept of passage grave monuments acquiring megalithic art sometime after construction suggests two or more waves of elaboration to existing monuments. Certain passage graves located within the Gulf of Morbihan and the Bryn Celli Ddu demonstrate that megalithic art (in one form or another) was already in place but engraved on other types of monument. Based partly on the concept of reuse/recycling, one could also suggest that certain stones were chosen and engraved prior to construction. Alternatively, established monuments with along ancestral past could have, as part of their development, been engraved. I say this because in Ireland, of the 225 or so passage graves standing, only around 15% possess mega-lithic art (Waddell 2005: 57); similar ratios exist elsewhere in Atlantic Europe. Clearly, Neolithic communities made a choice of whether to incorporate megalithic art or not; could this choice have been merely a trend or a veering away from the old religion to a nonconformist tradition?

Looking Beyond the Motif

Megalithic art became a recognized pre historic tradition during the early part of the twentieth century, and since then a number of dedicated researchers have attempted to provide meaning to this enigmatic set of symbols. The general consensus is that it is a derivative of a much wider Schematic art tradition which may have its origins in the Mesolithic. Elizabeth Shee Twohig was the first researcher to collate and synthesize most of the then known European Neolithic sites that possessed

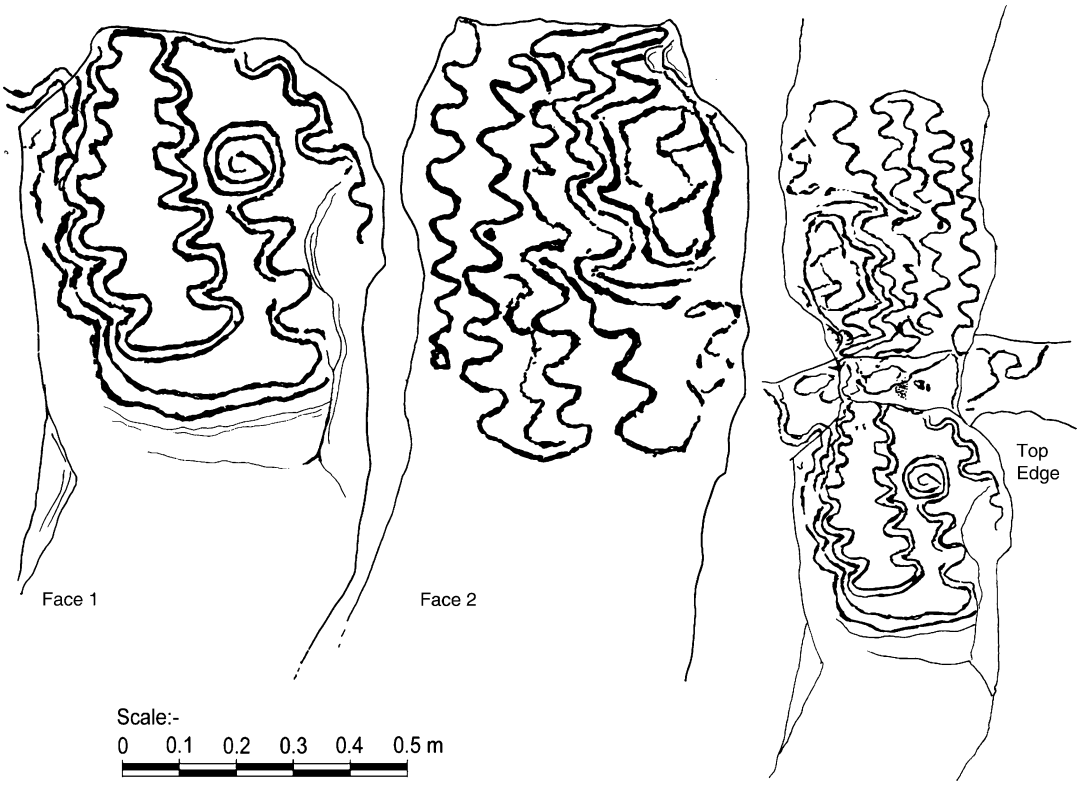

Megalithic Art: A Visual Repertoire for the Dead, Fig. 7 The Pattern Stone recovered from a central pit within a probable henge that originally stood under Bryn Celli Ddu, Anglesey, North Wales, British Isles. (After Lynch 1991) lines, wavy lines, and a spiral which he interpreted as mountains, the sea, and a celestial body – probably the sun or moon; the "scene" appeared to replicate the scape to the east of the monument (revealing a view of Snowdonia and the Menai Straits [a stretch of water between the North Wales main land and the island of Anglesey]) (Fig. 8)

megalithic art (1981). This monumental corpus of material has provided an essential starting point for research in later prehistoric rock art studies. During the next two decades, researchers such as Aubrey Burl, Richard Bradley, Paul Devereux, and Jeremy Dron field have gone some way to infuse meaning into what the various symbols might represent; for example, Bradley (2009) and Devereux (2009) introduced the reader to sensory components that are intangible and have not survived the archaeological record. In another ground breaking piece of research, Dronfield examined the significance of the passage component in Irish passage grave tombs (1996). He established that there was an association between the passage and engraved curvilinear motifs, in particular, concentric circles. He considered the idea that special people, such as shamans, would experience a tunnel experience which would be induced via altered states of consciousness as a means of accessing the supernatural world of the inner passage and chamber areas; the devices for this experience were the various curvilinear motifs that inhabited the tomb.

In a wider landscape sphere, megalithic motifs have been considered as landscape features (Nash 2012). Using the rock art from the passage grave of Barclodiad y Gawres in North Wales, Nash considered the design sequence on Stone 16, a large upright that appears to have delineated the space where the inner passage converges with the chamber. The panel design contained finely pecked multiple zig zag

Similarly, Kate Sharpe (2007) promoted the idea of a celestial body (represented by a complex

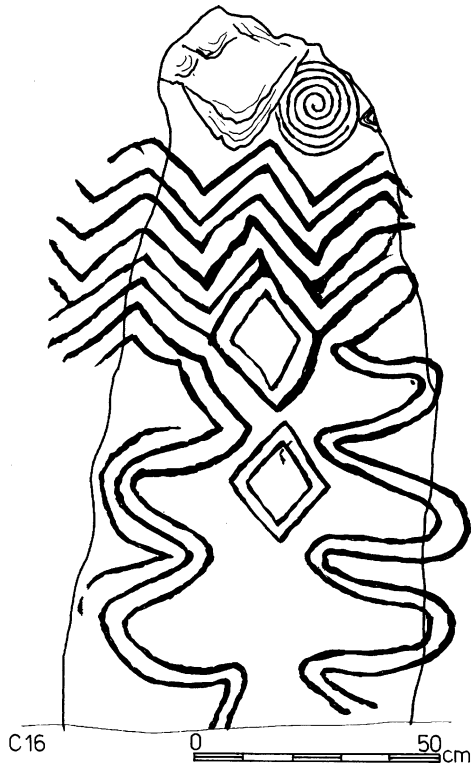

Megalithic Art: A Visual Repertoire for the Dead, Fig. 8 The design sequence on Stone 16 in Barclodiad y Gawres, Anglesey, North Wales, British Isles. (After Lynch 1991)

spiral motif) moving across the panel of Copt Howe, Langdale, in the uplands of Cumbria, northwest England to eventually set behind a series of lines that may represent the summit of a prominent peak within the Cumbria mountains (Fig. 9a–c).

In both examples, the spiral potentially represents a celestial body, but what of the concentric circle? Abreu (2012) has suggested that the concentric circle, one of the most common later prehistoric symbols within the Atlantic coastal fringe, is found exclusively near water on exposed rock out cropping (and occasionally on megalithic monuments), possibly representing the ripples that are created from dropping a stone into the water. This interesting and conceivable hypothesis is one of a number that require further systematic investigation.

Future Directions

Based on existing chronologies, survey coverage, and geographic scope, there is a probable association between monument, landscape, and megalithic rock art, what I have recently termed as *architecture, aspect, and art*, an intimate relationship between the rock art, the monument, and the landscape in which it stands (Nash 2013). Despite the large number of burial–ritual monuments in Western Europe, only a small number belonging to the passage grave tradition appear to be decorated. While there are differences in association, the evidence suggests that the repertoire of abstract motifs remains constant throughout the Mediterranean and Western European Neolithic core areas with certain motifs establishing distinct trends that create local and regional identity. However, in terms of universality, a recognized repertoire of motifs does extend along some 4,000 km of coastline; therefore, do they maintain the same grammar, meaning, and potency throughout this region of Europe?

It is conceivable that much of the artistic repertoire employed inside burial–ritual monuments during the Neolithic was later replicated on open-air panels, particularly those found in Galicia, northern Britain, and southern Scandinavia. This similar art form, also hidden in the upland landscapes of Western Europe, would have stood close to burial–ritual monuments such as barrows and round cairns that were constructed during the Bronze Age. Not surprisingly, this significant change in the location of (former) megalithic motifs occurs roughly in the same areas where megaliths were once active. However, the same question arises: does open-air rock art possess the same meaning as it did when originally engraved into a passage or chamber of a megalithic monument? If this were the case, the coastal fringes of the Mediterranean and Western Europe could boast a semiotic idiom that was in dynamic circulation for over 3,000 years and may have formed the foundations of a pictographic-based language, a visual communication system centered on death, burial, and ritual, as well as concealing ritual knowledge from nonelite members of the community.

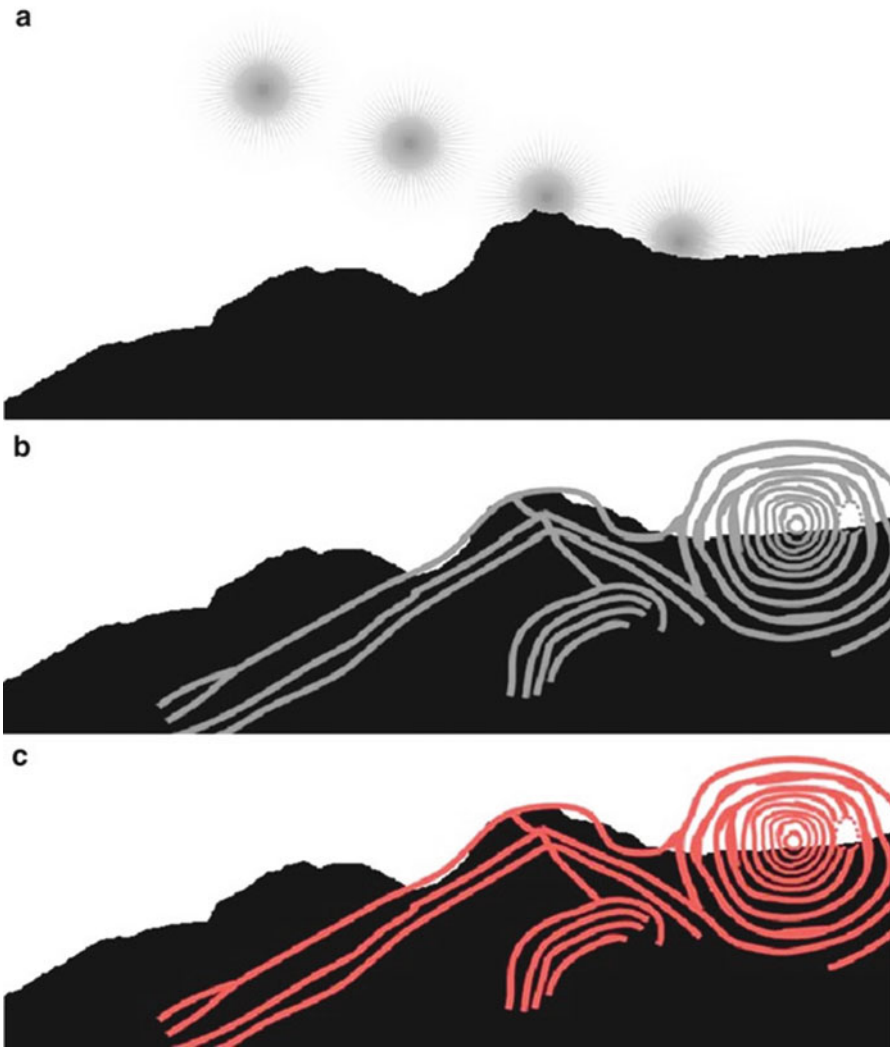

Megalithic Art: A Visual Repertoire for the Dead, Fig. 9 (**a**–**c**).The trajectory of the setting sun (?) and how it was characterized in the rock art from Copt Howe, Cumbria, Northern England, British Isles. (After Sharpe 2007)

Cross-References

► Palace of the Boyne (Brú na Bóinne)

References

Arosio, P., D. Meozzi, and G.H. Nash. 2011. Seeking, finding and hiding: Are cent Neolithic burial ritual rock-art discovery in northern Sardinia. *Time & Mind* 4 (1): 31–42.

Bradley, R. 2009. *Image and audience: Rethinking prehistoric art*. Oxford: Oxford University Press.

Bradley, R., C. Chippindale, and H. Helskog. 2001. Post-Palaeolithic Europe. In *Handbook of rock art research*, ed. D. Whitley, 482–529. Walnut Creek: Altamira Press.

Castro, A., O. da V. Ferreira, and A. Viana. 1957. O dolmen pintado de Antelas (Oliveira de Frades). *Comunicações dos Serviços Geológicos de Portugal* 11: 325–347.

De Abreu, M.E.P.S. 2012. *The rock art of Portugal: History, methods and traditions. Tese de 3 grau*. Vila Real: Universidade de Tras-os-Montes e Alto Douro.

Devereux, P. 2009. A ceiling painting in the Hal-Saflieni hypogeum as acoustically related imagery: A preliminary note. *Time & Mind* 2 (2): 225–232.

Dronfield, J. 1996. Entering alternative realities: Cognition, art and architecture in Irish passage-tombs. *Cambridge Archaeological Journal* 6 (1): 37–72.
Freddo, A.C. 2007. *Dólmenes de Galicia/Dólmens da Galícia*. Santiago de Compostela: Cátedra Bolívar da Universidade de Santiago de Compostela; Asociació n Galega de EStudios de Economia do Sector Público; Xunta de Galicia – Conselleríade Innovación e Industria – Dirección Xeralde Turismo. Apresentação de LúísCaramés Viéitez. Ediçãobilingüe espanhol-portuguiês.
Le Roux, C.-T. 2006. *Gavrinis et les mégalithes du golfe du Morbihan*. Paris: Éditions Jean-Paul Gisserot.
Lynch, F. 1991. *Prehistoric Anglesey: The archaeology of the island to the Roman conquest*. Llangefni: Anglesey Antiquarian Society.
Nash, G.H. 2010. Art in this world and art for the underworld: An appraisal of the later prehistoric menhir of Robin Hood's Stone, Allerton. *Journal of the Merseyside Archaeology Society* 13: 87–94.
Nash, G.H. 2012. Megalithic rock art of the Mediterranean and Atlantic sea board Europe. In *A companion to rock art*, ed. J. McDonald and P. Veth, 127–142. New York: Blackwell.
Nash, G.H. 2013. Aspect, architecture and art: The passage grave tradition of northwest Britain. *Time and Mind* 6 (2): 199–210.
Nash, G.H., C. Brook, A. George, D. Hudson, E. Mcqueen, C. Parker, A. Stanford, A. Smith, J. Swann, and L. Waite. 2005. Notes on newly discovered rock art on and around Neolithic burial chambers in Wales. *Archaeology in Wales* 45: 11–16.
O'Sullivan, M. 1986. Approaches to passage tomb art. *Journal of the Royal Society of Antiquaries of Ireland* 116 (68): 68–83.
Rodríguez Casal, A.A. 1990. *O Megalitismo. A primeira arquitectura monumental de Galícia*. Santiago de Compostela: Servicio de Publicacións e Intercambio Científico.
Sharpe, K.E. 2007. Rock-art and rough outs: Exploring the sacred and social dimensions of prehistoric carvings at Copt Howe, Cumbria. In *Metaphor as art: The prehistoric rock art of Britain*, ed. A. Mazel, G.H. Nash, and C. Waddington, 151–173. Oxford: Archaeopress.
Shee-Twohig, E. 1981. *Megalithic art of western Europe*. Oxford: Clarendon Press.
Thomas, J., and C. Tilley. 1993. The axe and the torso: Symbolic structures in the Neolithic of Brittany. In *Interpretive archaeology*, ed. C. Tilley, 225–324. Oxford: Berg.

Further Reading

Cunliffe, B. 2001. *Facing the ocean: The Atlantic and its peoples, 8,000 BC to AD 1500*. Oxford University Press: London.
Eogan, G. 1986. *Knowth and the passage-tombs of Ireland*. London: Thames and Hudson.
Le Roux, C.T. 1985. *Gavr'inis: Guides arechaeologiques de le France*. Paris: Ministere de la Culture.
O'Kelly, M.J. 1982. *Newgrange: Archaeology, art and legend*. London: Thames and Hudson.
O'Sullivan, M. 1993. *Megalithic art in Ireland*. Dublin: Town House.
Waddell, J. 2005. *The prehistoric archaeology of Ireland*. Wordwell Bray: Water ford.

Megaw, Vincent

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Basic Biographical Information

John Vincent Stanley Megaw (Fig. 1) was born in Stanmore, Middlesex, in 1934. One of his uncles, A.H.S. (Peter) Megaw, was a distinguished Byzantinist, the last Director of Antiquities of the former British Colony of Cyprus, and a Director of the British School at Athens. Another uncle, Basil, studied archaeology at Cambridge and was Director and Librarian of the Manx Museum on the Isle of Man. In 1940 young Vincent Megaw's archaeological education began after he was evacuated to his grandparents' Belfast home, which was filled with ancient curiosities largely collected by his uncles. This interest led him to join the London Institute of Archaeology as a Member at the cost of five shillings a year at the age of 16 years.

In 1953 Vincent Megaw enrolled in an Honors M.A. in Prehistoric Archaeology at Edinburgh University, with Fine Art as a second subject. It was here that Professor Stuart Piggott suggested that he study early Celtic Art, which was to become a primary focus of Megaw's teaching and research career. In 1958 Thames and Hudson recruited him as an in-house editor, and the young Megaw found himself correcting the English of archaeological luminaries such as Sir Mortimer Wheeler, Max Mallowan, and Grahame Clark.

The year 1961 was a watershed year in Vincent Megaw's life. This was the year that he married Ruth Miller, then the youngest Third Secretary in the UK Foreign Office, who became

Megaw, Vincent, Fig. 1 Vincent and Ruth Megaw in 2001 at Flinders University on the occasion of the publication of the second edition of their book *Celtic Art from Its Beginnings to the Book of Kells*. (Credit: Multimedia Unit, Flinders University)

Megaw, Vincent, Fig. 2 Vincent Megaw with his son Jonathan Megaw and cat, Passang. Eden Hills, South Australia. October 2019

his close collaborator and coauthor in his various projects. Together, the Megaws have published extensively on European Iron Age art (e.g., Megaw and Megaw 1989, 1990) and soon established an international reputation as experts in this area.

Also in 1961, Vincent Megaw was appointed as Lecturer in European Iron Age Archaeology at the University of Sydney, Australia. He enrolled in a part-time external Ph.D. on "The Human Form in La Tene Art" at Edinburgh University that he did not complete. Megaw (2012: 551) recalls that Stuart Piggott commented that this was the first time that one of his postgraduate students had not completed his thesis but published the book instead (Megaw 1970).

In 1972 Vincent Megaw was appointed to the Chair of Archaeology at Leicester University, following in the steps of Charles Thomas. At Leicester University, he established an Honors B.A. in Archaeological Studies, which he complemented with a textbook (Megaw and Simpson 1979). In 1982 Vincent Megaw returned to Australia when he was first appointed to Flinders University in South Australia as a Lecturer in Visual Arts with a remit to introduce courses in prehistoric and ethnographic art. At Flinders University, he devised a new Bachelor of Archaeology degree within a Department of Visual Arts and Archaeology. In 1996 he was appointed to a Personal Chair in Visual Arts and Archaeology.

Professor Megaw's keen interest in music has manifested in various ways during his career. One of his subsidiary interests is music archaeology, and his first publication in *Antiquity* was on bone flutes (Megaw 1961). Also, while at Flinders University, he convened a series of weekly concerts and managed the Flinders University Chamber Ensemble.

Professor Megaw's achievements include an M.A., D.Litt. (Edinburgh); Fellow, Australian Academy of the Humanities; Fellow, Society of Antiquaries of London; Honorary Fellow of the Society of Antiquaries of Scotland; Korresp. Mitglied d. Deutschen Archäologischen Instituts; and Member, Institute for Archaeologists (UK). In 2004 he became a Member of the Order of Australia for service to archaeology and art history as an educator, researcher, and writer, particularly in the areas of European Iron Age art, contemporary Indigenous Australian art, and music archaeology.

In 2000 Professor Megaw and Ruth Megaw were appointed as Honorary Research Fellows in the Department of Archaeology at Glasgow University. Vincent Megaw retired and was appointed Emeritus Professor at Flinders University in December 2002. He continues his research and writing.

Major Accomplishments

Vincent Megaw had several successes very early in his career. From 1956 to1963, he joined Charles Thomas' long-running excavations at Gwithian in Cornwall. In 1958, Megaw discovered evidence of cross-plowing using an ard plough in the Bronze Age levels of the site. Previously, this feature has been known only from Scandinavia and the Netherlands (Nowakowski et al. 2007).

While at Sydney University during the 1960s, Megaw conducted pioneering fieldwork on the Indigenous archaeology in the Sydney region. Colleagues at this time included Rhys Jones and Betty Meehan, who was one of his students for a time. Megaw's research was undertaken against the opposition of both J.R.B. Stewart, the Foundation Edwin Cuthbert Hall Professor of Near Eastern Archaeology, and his successor as Professor of Archaeology, the Classical archaeologist, Alexander Cambitoglou, who banned university time or money being spent on the archaeology of Australia. Megaw confronted this ban by excavating at weekends and during vacations (Megaw 2012). His work during this period included significant excavations on the shores of Botany Bay near the location of James Cook's landing in 1770 (Megaw 1969).

During the 1970s and 1980s, Vincent Megaw was one of a very few scholars who held that the Indigenous Arts of Australia should be understood as art, rather than as ethnographic objects (Megaw 1982). Intrigued by the art of the Western Desert in Central Australia, he collected early acrylic paintings made by these communities in the years before these paintings were accepted as art. On behalf of the Flinders University Art Museum, Megaw established a significant collection of Western Desert paintings. He also acted to promote the artists more widely. Supported by the Aboriginal Arts Board of the Australia Council, he initiated a series of short-term residencies for Indigenous artists. Later, he initiated an important traveling exhibition, *The Heritage of Namatjira*, on the work of watercolor artists from Central Australia. This was accompanied by a pioneering collection of essays (Hardy et al. 1992) that provided scholarly and cultural insights into this body of work.

The European facets of Megaw's research also flourished, and his firsthand experience in Europe continued as it has to the present. Between 1978 and 1981, Vincent returned to Austria and the Dürrnberg bei Hallein (the ancient salt-mining center south of Salzburg) as part of a Leicester rescue project in advance of the construction of an all-weather road from Hallein to Berchtesgaden, renowned as the former location of Hitler's summer villa. Vincent and Ruth Megaw's major survey of early Celtic art (Megaw and Megaw 1989, also forthcoming) was followed by a monograph on the Basse-Yutz find, now one of the major treasures of the British Museum (Megaw and Megaw 1990) as well as many later publications including reviews dealing with the ancient Celts – in whom he still believes

in spite of much controversy (Megaw 2007, 2010, 2013). Professor Megaw's fine scholarly skills are captured in Rudolf Echt's assessment:

Megaw… is at his best in tracing formal relationships between individual works, in recognizing formal dependences and influences (Echt 1999: 251, cited in Megaw 2012: 555).

In the early 1990s, Megaw's track record established a basis for several large grants from the Australian Research Council. This funding allowed him and Ruth Megaw to examine various facets of Celtic art in depth (Megaw and Megaw 1996, 1997) and to conduct excavations that shed new light on Dürrnberg's long mining history (Megaw 1990; Megaw et al. 2000).

In retirement, Megaw continued to be active, giving occasional lectures until well into his mid-80s (Fig. 3) and working on the completion of the magnum opus he conceived with Ruth Megaw, a supplement to the bible on the subject, Jacobstahl's (1944) *Early Celtic Art* (see Megaw and Megaw forthcoming).

The scholarly career of Professor John Vincent Stanley Megaw has spanned two continents and five decades. During this time he initiated significant academic programs at two universities, established a major collection of Australian Aboriginal art, and conducted internationally leading research. Most particularly, with his wife and colleague, Ruth Megaw, he has revolutionized understandings of Celtic art in Europe and made a major and early contribution to the recognition and scholarly analysis of Indigenous art in Australia. In 2012 he responded to the invitation of Martin Carver, then Editor of *Antiquity*, to write a personal survey of his life. It stands as a characteristically lively self-generated critique of the man and his work – so far. In 2013, Flinders University established the Ruth and Vincent Megaw Annual Lecture,

Megaw, Vincent, Fig. 3 Vincent Megaw teaching in Claire Smith's Archaeology of Art topic, Flinders University, South Australia. June 2019

in recognition of a lifetime of joint service to archaeology. Sadly, Ruth Megaw died in July, 2013. In 2014, a few days after his 80th birthday, he was presented with a *festschrift* honoring his work on Celtic art (Gosden et al. 2014).

Cross-References

- ▶ Europe: Paleolithic Art
- ▶ Jones, Rhys Maengwyn
- ▶ Meehan, Betty

References

Echt, R. 1999. *Das Fürstinnengrab von Reinheim. Studien zur Kulturgeschichte der Früh-La-Tène-Zeit (Saarbrücker Beiträge zur Altertumskunde 69)*. Bonn: Rudolf Habelt.

Gosden, C., S. Crawford, and K. Ulmschneider, eds. 2014. *Celtic art in Europe: Making connections*. Oxbow: Oxford Books.

Hardy, J., J.V.S. Megaw, and M.R. Megaw, eds. 1992. *The heritage of Namatjira: The watercolourists of Central Australia*. Port Melbourne: William Heinemann Australia.

Jacobstahl, P.F. 1944. *Early Celtic art*. Oxford: Oxford University Press.

Megaw, J.V.S. 1961. Penny whistles and prehistory. *Antiquity* 35: 6–13.

Megaw, J.V.S. 1969. Captain cook and bone barbs at Botany Bay. *Antiquity* 43: 213–216.

Megaw, J.V.S. 1970. *Art of the European Iron Age: A study of the elusive image*. Bath: Adams & Dart.

Megaw, J.V.S. 1982. Western Desert painting–artefact or art? *Art History* 5 (2): 205–218.

Megaw, J.V.S. 1990. The Anglo-Australian excavations on the Dürrnberg bei Hallein 1978–1981: Interim report. *Germania* 68 (2): 509–549.

Megaw, J.V.S. 2001. *Celtic art from its beginnings to the Book of Kells. Rev. and exp. edn*. London: Thames & Hudson.

Megaw, J.V.S. 2007. Imag(in)ing the Celts. *Antiquity* 81: 438–445.

Megaw, J.V.S. 2010. Bearing the truth about Celtic art: Kunst der Kelten in Bern. *Antiquity* 84: 250–255.

Megaw, J.V.S. 2012. The flying Dutchman reaches port. *Antiquity* 86: 546–557.

Megaw, J.V.S. 2013. A Celtic cornucopia. *Antiquity* 87: 280–284.

Megaw, R., and V. Megaw. 1989. *Celtic art from its beginnings to the Book of Kells*. London: Thames & Hudson. (2nd edn. 2001).

Megaw, R., and V. Megaw. 1990. The Basse-Yutz find: Masterpieces of Celtic art. In *The 1927 discovery in the British Museum (Reports of the Research Committee of the Society of Antiquaries of London 46)*. London: Society of Antiquaries.

Megaw, R., and V. Megaw. 1996. Ancient Celts and modern ethnicity. *Antiquity* 70: 175–181.

Megaw, R., and V. Megaw. 1997. Do the ancient Celts still live? An essay on identity and contextuality. *Studia Celtica* 31: 107–123.

Megaw, R., and V. Megaw. forthcoming. *Early Celtic art: A supplement*. Oxford: Oxford University Press.

Megaw, J.V.S., and D.D.A. Simpson, eds. 1979. *Introduction to British prehistory from the arrival of Homo sapiens to the Claudian invasion*. Leicester: Leicester University Press.

Megaw, J.V.S., G. Morgan, and T. Stollner. 2000. Ancient salt-mining in Austria. *Antiquity* 74: 17–18.

Nowakowski, J.A., H. Quinnell, J. Sturgess, C. Thomas, and C. Thorpe. 2007. Return to Gwithian: Shifting the sands of time. *Cornish Archaeology* 46: 13–76.

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Basic Biographical Information

Betty Jane Meggers (December 5, 1921 – July 2, 2012) was one of the most influential figures in the history of South American archaeology. She conducted research in the Amazon area, with her husband Clifford Evans, for almost half a century, starting as a graduate student in 1948.

Betty Meggers was born in Washington, DC, to Dr. William Frederick Meggers and Edith R. Meggers. Her father was an internationally recognized spectroscopist and an archaeology enthusiast. At the age of 16 Betty Meggers became a volunteer at the Smithsonian Institution and helped to reconstruct pots excavated from Pueblo Bonito, an Anasazi village in New Mexico.

In 1943, Betty Meggers graduated from the University of Pennsylvania with a Bachelor's degree. A year later she was awarded a Master's degree from the University of Michigan. At the University of Michigan, Meggers was introduced

to ceramics from the Marajo Island, at the mouth of the Amazon, and published her first scientific article on Marajo pottery in 1945. After obtaining her Master's Degree, she attended Columbia University to finish her Ph.D. At Columbia she was strongly influenced by anthropologist Julian Steward and his new "cultural ecology" approach, but also was enthusiastic about Leslie White's theories of socio-cultural evolution. She also met Clifford Evans at Columbia, a fellow graduate student. They married in 1946, and set off for fieldwork in Marajó about a year later.

During her lifetime Betty Meggers received many awards and honors in recognition of her long and consistent scientific contribution to knowledge of the South American past. She passed away in 2012, at the age of 90, after serving 68 years as research associate with the Department of Anthropology at the National Museum of Natural History, Smithsonian Institution.

Major Accomplishments

Betty Meggers' accomplishments encompass both research and training. Based at the Smithsonian Institution in Washington, she had an active role in the training of South-American archaeologists as well as the development of long-term archaeological research programs in countries such as Brazil, Guyana, Ecuador, Peru, Venezuela and Chile. Her theories about the origins and development of South American Indigenous cultures have dominated the field of Amazonian archaeology for decades and remain at the center of debates about the socio-cultural history of the region.

In 1948 Betty Meggers wrote one of the few pieces about archaeology published in the *Handbook of South American Indians* edited by Steward (Meggers 1948). Her article on the archaeology of the Amazon basin formed the basis for the theoretical argument developed in her much debated article on the "Environmental Limitation on the Development of Culture" published a few years later (Meggers 1954). Meggers believed that culturally complex societies could not have evolved in the Amazon due to supposed lack of protein and poverty of soils that had prevented intensive agriculture and population growth. Therefore, any sign of social complexity in the Amazon basin, as was implied by the elaborate Marajoara ceramics, had to be interpreted as immigrations of Andean or Caribbean groups, who were fatally doomed to degeneration and decay in a tropical environment. Her theories had a definite impact in characterizing South American tropical lowlands as a marginal area of social development, and reinforced the concept of cultural degeneration within the already biased colonialist Indigenous history of the region. These ideas have been questioned both by subsequent research at the mouth of the Amazon (Roosevelt 1991; Schaan 2012) and the more recent literature on the decolonization of archaeology in Brazil (Noelli and Ferreira 2007).

It is widely recognized that Betty Meggers' focus on cultural ecology and adaptation was highly innovative for her time. Moreover, throughout her career, her research and that of her associates produced enormous amounts of data on different kinds of resource distribution and variability in the Amazon, as well as data on the ecological history of the region, such as climatic changes during the Pleistocene-Holocene transition, the early human occupation of the region, and the evolution of forest environments.

In addition, Meggers is known for her controversial assertion of a trans-Pacific cultural connection between East Asia and South America long ago based on similarities of pottery fragments found in Japan and Ecuador. She contended that Japanese Middle Jomon pottery was similar to ceramics from the Valdivia site in Ecuador – both dating between 2000 and 3000 B.C. To support her argument Meggers stated that plants, pathogens, and parasites of Japanese origin are found among Andean populations.

Betty Meggers also made an important contribution in terms of methodology. In collaboration with Clifford Evans, she developed systematic procedures for both site surveying and ceramic analysis and seriation, the latter building on James A. Ford's typological approach, classifying ceramic complexes into phases, traditions and horizons. These were passed on to a great number

of South American scholars through courses, seminars and collaborative research programs. In Brazil, the PRONAPA (Programa Nacional de Pesquisas Arqueológicas, 1964–1970) coordinated by Meggers and Evans, had a profound impact on both the generation of data and the establishment of a chronological framework for the distribution of cultural archaeological traditions, phases and sub-phases, throughout the national territory.

Megger's legacy continues to be imparted through research associates in South America who carried her influence to new generations of archaeologists. Important figures here are Mario Simões, Eurico Miller and Ondemar Dias in Brazil, Emilio Estrada in Equador, José. M. Cruxent in Venezuela, Mario Sanoja and Iraide Vargas in Colombia.

Betty Meggers wrote nearly two hundred articles, book reviews, translations, and books. She published in many leading scientific journals including *American Anthropologist, American Antiquity, Americas, and National Geographic*. Results from her Ph.D. dissertation appeared in a seminal 1957 publication co-authored by Evans that remains a main reference in the archaeology of the mouth of the Amazon till this day (Meggers 1957). Her most cited books are *Amazonia: Man and Culture in a Counterfeit Paradise* (Meggers 1971) and *Prehistoric America: An Ecological Perspective* (Meggers 1972).

Cross-References

► Historical Ecology and Environmental Archaeology

References

Meggers, B.J. 1948. The archaeology of the Amazon Basin. In *Handbook of South American Indians, volume 3: The tropical forest tribes*, ed. J. Steward, 149–166. Washington (DC): Smithsonian Institution, Bureau of American Ethnology.

Meggers, B.J. 1954. Environmental limitation on the development of culture. *American Anthropologist* 56 (5): 801–824.

Meggers, B.J. 1957. *Archaeological investigation at the mouth of the Amazon,* Bureau of American Ethnology Bulletin 167. Washington (DC): Smithsonian Institution.

Meggers, B.J. 1971. *Amazonia: Man and culture in a counterfeit paradise*. Chicago: Aldine.

Meggers, B.J. 1972. *Prehistoric America: An ecological perspective*. Chicago: Aldine.

Noelli, F.S., and L.M. Ferreira. 2007. A persistência da teoria da degeneração indígena e do colonialismo nos fundamentos da arqueologia brasileira. *História, Ciências, Saúde–Manguinhos, Rio de Janeiro* 14 (4): 1239–1264.

Roosevelt, A.C. 1991. *Moundbuilders of the Amazon. Geophysical archaeology on Marajo Island, Brazil*. San Diego: Academic Press.

Schaan, D. 2012. *Sacred geographies of ancient Amazonia: Historical ecology of social complexity.* Walnut Creek: Left Coast Press.

Megiddo and the Megiddo Expedition

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The site of Megiddo (biblical Armageddon) has been under excavation, on and off, for more than a century. Four different groups have excavated at the mound to date, including a German-sponsored team led by Gottlieb Schumacher from 1903 to1905, Americans from the Oriental Institute of the University of Chicago from 1925 to1939, and Israelis under Yigael Yadin for several brief seasons in the 1960s and 1970s. The international Megiddo Expedition, led by Tel Aviv University, is the most recent of these four, beginning with an initial foray in 1992 and then launching officially in 1994. This brief entry will focus on this most recent expedition.

History of the Megiddo Expedition

Excavating every other year, in even-numbered summers, the Megiddo Expedition has been

ongoing for more than two decades so far. It is the longest-running archaeological project to take place at the site.

A triumvirate of co-directors led the project for the first decade (1994–2004): Israel Finkelstein (Tel Aviv University), David Ussishkin (Tel Aviv University), and Baruch Halpern (Pennsylvania State University). A variety of universities participated in an International Consortium, sending students and faculty each season; this was led by Penn State as senior member, in conjunction with Tel Aviv University.

Following the 2004 season, Baruch Halpern and Penn State formally left the project. George Washington University (GWU) replaced Penn State as the senior consortium member, and Eric H. Cline was appointed associate director (USA), while Finkelstein and Ussishkin continued as co-directors.

David Ussishkin retired from the project after the 2010 season. Cline was promoted to co-director and served in that capacity with Finkelstein for the 2012 and 2014 seasons, before retiring in turn; at that point, GWU remained a member of the Consortium but relinquished its position as senior member. Mario A.S. Martin and Matthew J. Adams served with Finkelstein as co-directors for the 2016 and 2018 seasons.

Primary Areas of Excavation

Area F (1994–1996): Located on the lower part of the mound, close to the current-day museum/gift shop/restaurant, Area F provided evidence for probable Middle Bronze (MB) fortifications, in the form of a glacis, as well as sparse remains from later periods, including the Late Bronze (LB) period and the Iron Age (IA). One notable find included a Neo-Assyrian faience vessel, found in a grave.

Area H (1994–2018): Positioned on the edge of the upper portion of the mound, in an area where the University of Chicago had uncovered two Neo-Assyrian palaces from the eighth century BCE, the initial squares opened up in 1994 and in 1996 had to be closed down when the Israel Antiquity Authority (IAA) forbade excavations to dig too close to the edge. Subsequently, a step-trench was begun on the slope next to Chicago's excavations that had previously revealed the LB palace and its famous ivories. Beginning in Neo-Assyrian levels, the excavations have now reached the period of the Middle Bronze Age, revealing several different destructions along the way, which yielded good material for radiocarbon dating.

Area J (1994–2012): Located in Chicago's Area BB and overlapping with part of Schumacher's Great Trench, Area J has primarily yielded remains from the Early Bronze (EB) period. These include a huge structure identified as a temple, located in the region of the iconic circular altar uncovered by Chicago. This may be the largest such temple yet found in the Levant dating to this period. Egyptian influence may be detected in some phases of the building, which also seems to have suffered damage from earthquakes at one or more times in its history.

Area K (1996–2018): Situated on the southeastern side of the upper mound, Area K follows a similar sequence to Area H, with excavations beginning in Neo-Assyrian layers and continuing down into Middle Bronze levels. The area seems to have housed domestic structures and possible workshops for much of its history, though a number of tombs and burials have been found as well. In addition, a wide mudbrick wall dating to the Middle Bronze Age was uncovered, which is likely to have formed part of the fortification of the mound during the second millennium BCE.

Area L (1998–2007): Located at the northern part of the mound, Area L is in a region where the Chicago excavators had previously found the remains of buildings that they identified as stables and where Yadin excavated portions of Palace 6000. Investigations in this area exposed and clarified the entire plan of Palace 6000, demonstrating conclusively that it did not date to the time of Solomon, as Yadin had suggested. Directly above, and reusing stones from the palace, a building containing what appear to be five tripartite rows of probable stables was fully revealed; again, this does not belong to the time of Solomon, as the Chicago excavators had believed, but is most likely from a time at least a century later.

Area M (2000–2006): In an area next to and including part of Schumacher's Great Trench, located in the middle of the uppermost part of the mound, Area M yielded large amounts of fallen mudbrick debris from various buildings located in the region of Schumacher's Mittelburg.

Area Q (2008–2016): On the southern edge of the upper mound, looking across to the current prison located at the crossroads of Megiddo Junction, Area Q is located in an area first investigated by the Chicago archaeologists in 1925 and 1926. It has yielded evidence of occupation primarily from the Iron Age, including a large pillared building and at least one destruction level. Remains of spent cartridge cases found in the uppermost levels tell the tale of a battle fought for control of the mound in 1948.

Area S (2014–2018): Situated just inside the Late Bronze Age gate, in the area where the Chicago excavators excavated down through the LB palace, Area S revealed remains from the Middle Bronze Age. These included possible evidence for a gate system that once stood in the area during this period.

Publications

In addition to numerous co-authored articles that have appeared in a variety of peer-reviewed scholarly journals, the Megiddo Expedition has published its preliminary results after every three seasons of excavation. Thus, *Megiddo III* (2000) covers the 1992–1996 seasons, *Megiddo IV* (2006) the 1998–2002 seasons, *Megiddo V* (2013) the 2004–2008 seasons, and *Megiddo VI* (forthcoming) the 2010–2014 seasons.

References

Finkelstein, I., and M. Martin. forthcoming. *Megiddo VI: The 2010–2014 seasons*. Tel Aviv University, Institute of Archaeology.

Finkelstein, I., D. Ussishkin, and B. Halpern. 2000. *Megiddo III: The 1992–1996 seasons*. Tel Aviv University, Institute of Archaeology.

Finkelstein, I., B. Ussishkin, and B. Halpern. 2006. *Megiddo IV: The 1998–2002 seasons*. Tel Aviv University, Institute of Archaeology.

Finkelstein, I., B. Ussishkin, and E.H. Cline. 2013. *Megiddo V: The 2004–2008 seasons*. Tel Aviv University, Institute of Archaeology.

Mellaart, James

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Basic Biographical Information

James "Jimmy" Mellaart was born on 14 November 1925 in London to Dutch parents with whom he returned to the Netherlands in 1930. It was in the Netherlands that he first developed a fascination for antiquity in school, particularly while working at the National Museum of Antiquities at Leiden during the Nazi occupation.

In 1947, Mellaart returned to London to study history and Egyptology at University College London. In his formative years around the time of his graduation in 1951, he took part in excavations in different parts of the Near East, including Jericho and Fikirtepe in Turkey, where he met his future wife Arlette. Soon after he graduated, he started working with the British Institute of Archaeology at Ankara (BIAA), where he was appointed as Assistant Director in 1959. Archaeologists at the BIAA, which was founded in 1948, were working in central Anatolia, exploring a part of the Near East that had previously received little archaeological attention. Mellaart took an active part in this pioneering work during numerous surveys on foot and through the excavation of sites he had identified.

He recognized the potential of the Late Chalcolithic/Bronze Age site of Beycesultan, and directed excavations at this site from 1954 to 1959 together with the experienced director of BIAA, Seton Lloyd. Soon, two more large-scale excavations followed at Neolithic/Early Chalcolithic Hacılar in the Lake Region from

1957 to 1960 and at Neolithic Çatalhöyük from 1961 to 1965.

In addition to his fieldwork in Turkey, Mellaart taught archaeology at Ankara and Istanbul. After he had to leave Turkey in 1965 (see below), he was appointed to a newly created lectureship in Anatolian archaeology at University College London where he taught from 1965 until his retirement in 1991.

James Mellaart died on 29 July 2012 in London.

Major Accomplishments

The work of James Mellaart and his colleagues at the BIAA placed Neolithic to Early Bronze Age central Anatolia on the radar of archaeologists. Prior to that, this area of research was somewhat underdeveloped compared to the significant processes and events known from the Levant and Mesopotamia. This view changed dramatically when the remarkable findings of Hacılar and Çatalhöyük became known to the archaeological community and the public (Redman 1972; Mellink 1973). Çatalhöyük was declared a UNESCO World Cultural Heritage in 2012 shortly before Mellaart's death.

Jimmy Mellaart is described by colleagues and student as talented, knowledgeable, spirited, inspiring, charming, and very able to present his data and thoughts in ways that fascinated archaeologists and the public alike. He had an independent mind and the instinct to find sites that would substantially enhance knowledge about Anatolian prehistory.

Mellaart's publications (e.g., 1965, 1967, 1970, 1975) are widely read. Many of his interpretations have been revoked as archaeological knowledge and fashions of thought progressed during the last decades (e.g., Farid 2008; Rosenstock 2010). These new publications not only show how far the knowledge about prehistoric central Anatolia has advanced since the 1960s, however, but also demonstrate once more the importance of Mellaart's pioneering excavations, and of his progressive interpretations that triggered scholarly discussions (e.g., Todd 1979).

During Mellaart's work as an archaeologist, there are mooted instances of imagination and facts becoming confused. Several reviewers of his early work (e.g., Whallon 1968; Redman 1972) criticized this as a general tendency in his excavation publications. A prominent example is the Dorak affair in 1965, during which Mellaart claimed to have inspected a rich collection of Bonze Age artifacts in 1958 at a young woman's house in Izmir, but neither the house, nor the woman, nor the artifacts were ever found. This inconsistent story made Turkish authorities suspect Mellaart of being involved in smuggling antiquities, together with the discovery that artifacts excavated in Hacılar and Çatalhöyük disappeared from depots and made their way to the antiquity market. In 1965, this culminated in Mellaart being banned from Turkey and from ever excavating there again; he was only permitted a very brief visit to the renewed excavations at Çatalhöyük in 2005.

Another controversy developed around accounts of wall paintings supposedly excavated at Çatalhöyük, published by Mellaart in the 1980s. The existence of these paintings was doubted by many since their style, content, and state of preservation were much more spectacular than that of the paintings published in the 1960s, and because no original photos or drawings of the paintings exist (Mellaart 1984, 1985, 1989, and later comments and replies to critics; reviewed among others by Lamberg-Karlovsky 1992; Mallett 1990, 1992).

While such accounts can be disconcerting for most of colleagues, such ambiguities do not diminish the fact that James Mellaart's "contribution to the unfolding of the Anatolian Neolithic and Chalcolithic periods was enormous and fundamental" (Watkins 2012).

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture

References

Farid, S. 2008. A review of the Mellaart level system and the introduction of a new phasing system at Çatalhöyük 2008. *Çatalhöyük Archive Report 2008*, 15–28. Available at: http://www.catalhoyuk.com/downloads/Archive_Report_2008.pdf. Accessed 28 May 2013.

Lamberg-Karlovsky, C. 1992. Constructing the past. *The Review of Archaeology* 13 (1): 37–40.

Mallett, M. 1990. A weaver's view of the ÇatalHüyük controversy. *Oriental Rug Review* 5(6): 32–39. Available at: http://www.marlamallett.com/ch.htm. Accessed 28 May 2013.

Mallett, M. 1992. The goddess from Anatolia: An updated view of the ÇatalHüyük controversy. *Oriental Rug Review* 8(2): 24–31. Available at: http://www.rugreview.com/132marl.htm. Accessed 28 May 2013.

Mellaart, J. 1965. *Earliest civilizations of the Near East*. London: Thames and Hudson.

Mellaart, J. 1967. *ÇatalHüyük: A Neolithic town in Anatolia*. London: Thames and Hudson.

Mellaart, J. 1970. *Excavations at Hacılar*. Edinburgh: University Press.

Mellaart, J. 1975. *The Neolithic of the Near East*. London: Thames and Hudson.

Mellaart, J. 1984. Some notes on the prehistory of Anatolian kilims. In *Early Turkish tapestries*, ed. B. Frauenknecht, 25–41. Nürnberg: Bertram Frauenknecht.

Mellaart, J. 1985. Some notes on the prehistory of Anatolian kilims. *Oriental Rug Review* 4 (10): 416–421.

Mellaart, J. 1989. *The goddess from Anatolia: ÇatalHüyük and Anatolian kilims*. Milan: John Eskenazi.

Mellink, M. 1973. Excavations at Hacılar by James Mellaart. *Journal of Near Eastern Studies* 32 (3): 331–333.

Redman, C. 1972. Excavations at Hacılar by James Mellaart. *American Anthropologist* 74 (4): 946–951.

Rosenstock, E. 2010. Die "Festung" von Hacılar I: ein Dekonstruktionsversuch. In *Panta Rhei: Studies on the chronology and cultural development of southeastern and central Europe in earlier prehistory presented to Juraj Pavuk on the occasion of his 75th birthday*, ed. J. Šutekova, P. Pavuk, P. Kalabkova, and B. Kovar, 21–35. Bratislava: Comenius University and Archaeological Centre.

Todd, I. 1979. The Neolithic of the Near East by James Mellaart. *Journal of Near Eastern Studies* 38 (3): 221–223.

Watkins, T. 2012. James Mellaart, 14 November 1925–29 July 2012. *Antiquity*. Available at: http://antiquity.ac.uk/tributes/mellaart.html. Accessed 28 May 2013.

Whallon, R. 1968. ÇatalHüyük: a Neolithic town in Anatolia by James Mellaart. *American Anthropologist* 70 (4): 813–814.

Further Reading

The Telegraph. James Mellaart, 3 Aug 2012. Available at: http://www.telegraph.co.uk/news/9450610/James-Mellaart.html. Accessed 28 May 2013.

Meroë

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Introduction

Meroë (Meroitic: Bedewe/Medewe) is located near modern Begarawiya (Northern Province, Sudan) at 16.54 N latitude and 33.44 E longitude, ca.120 km north of modern Khartoum. Meroë was one of the most significant administrative, religious, and artistic centers of the ancient kingdom of Kush between approximately the seventh century BCE and the fourth century CE, although these dates are far from certain. It seems that Meroë was a substantial town under Nubia's Napatan rulers (ca. 760–270 BCE) and rose in status to become the capital of the Meroitic Kingdom (ca. 270 BCE-350 CE). Although we have archaeological remains of considerable but uncertain time depth, the earliest-known inscriptional reference dates to the Napatan ruler Iriki-Amanote (ca. 431–405 BCE). The site may have been used as a residence for members of the royal family for some time, but Arkamani was the first known ruler to be buried there (Beg. S 6) (ca. 270–260 BCE). From this point onward, Meroë remained the royal burial ground until the end of the Meroitic State. Meroë is regarded as one of the oldest and most significant urban settlements in Africa outside of Egypt.

Definition

Meroë is situated on the east bank of the Nile, which provided the city with a major commercial and strategic route. This placement linked Nubia to Egypt and the Mediterranean, the Gezira (the region between the Blue and White Niles), to Axum (Ethiopia), and to the Red Sea. The environment surrounding Meroë has significant

rainfall and possessed substantial agricultural and grazing lands. Other natural resources include varieties of sandstone for constructing monumental structures, iron ore for the smelting industry, and clays for ceramic production.

Meroë city occupied a large area that was approximately 2.6 square km. The dominant component of the western portion is an enclosure known as the "Royal City." Based upon our current understanding of Meroë, the Royal City appears to be a walled precinct that is roughly rectangular in shape, measuring approximately 275 × 137 m. A labyrinth of mixed-usage buildings reside within these walls, many of which are monumental in size and ornamentation. Most of the buildings are composed of mud brick with exterior faces of baked brick and a few buildings built of stone. The buildings in the Royal City were repaired and rebuilt innumerable times, which creates a very complex tell formation of occupational history (Hinkel 2002). As a result, the original ground topography is difficult to interpret (Adams 1984 [1977]), and the phasing of the settlement is understood poorly. Large, square buildings, nearly identical in size, are located near the center of the walled enclosure and are believed to be palaces. Other buildings have been interpreted as storage magazines, audience chambers, and domestic quarters for the palace staff.

Since the advent of formal excavation, the buildings in the Royal City have been designated using the system M xxx. M stands for Meroë, while the numbers designate specific structures within the Royal City. The surrounding cemeteries use a different numbering system: Beg. N/S/W x. "Beg." stands for Begarawiya, the village near Meroë. The letters designate the cemetery – North, South, or West – and the numbers denote the specific tomb (Reisner 1923a, b; Dunham 1963).

Temple of Amun (M 260) adjoins the enclosure on the eastern side and is the dominant temple. Amun was an Egyptian god adopted and worshipped in a distinctive manner by Nubians. The Temple of Amun is the southern equivalent of the great temple of Amun at Jebel Barkal. The Temple of Amun is large (137 m long) and included a colonnaded court, columned halls, and a sanctuary on top of a platform. A processional route led from the Temple of Amun to a so-called Temple of the Sun (M 250) outside of the city. The Temple of the Sun was an enclosed area with a single-chambered cult building surrounded by a colonnade and standing on a platform (Hinkel 2001). Additional temples line a processional street through Meroë in this vicinity. There was also a small prostyle temple to Victory (M 292), in front of which was found the famous bronze head of Augustus, which the Meroites may have looted from Egypt in 23 BCE. The Royal Ontario Museum, directed by Krzysztof A. Grzymski, has re-excavated the temple precinct and provided new understandings about the temple area (1999–2009) (Grzymski 2003) (Fig. 1).

One of the most distinctive buildings of the site is the so-called Royal Bath, which is a Roman style nymphaeum complemented with Hellenistic style sculpture. The Humboldt University of Berlin continued excavations at the Royal Bath at Meroë from 1991. The German Archaeological

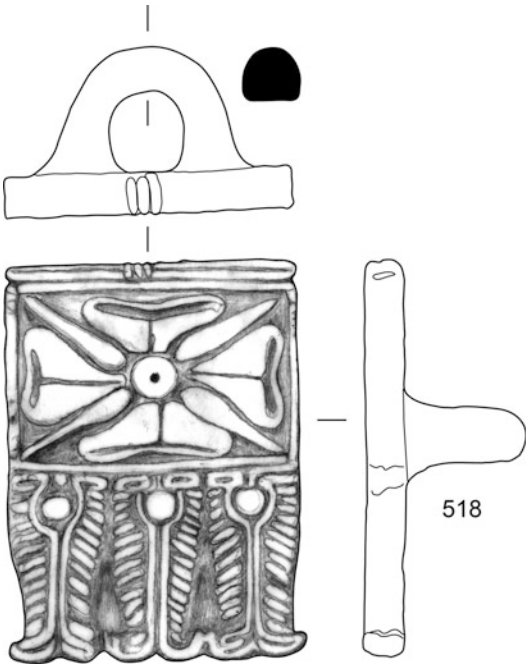

Meroë, Fig. 1 Faience object with suspension ring (INV 518); drawing by Sarah Lambert-Gates, Courtesy of the Meroe Archival Project

Institute (DAI) has been excavating this area from 1999–2000 to the present day. Simone Wolf and Hans-Ulrich Onasch direct this research. The current DAI project investigates the chronology and the building phases, the cultural influence from the Mediterranean, the hydrotechnical installations, and the function of the building complex in the context of the Royal Court and the City of Meroë (Wolf 2015). For the protection of the remains, a new shelter building, including a small exhibition to inform visitors, is intended.

Extensive, superimposed residential and industrial zones were located to the east and northeast of the Royal City. The houses are poorly understood as none of them were excavated in their entirety, and they were superimposed on top of one another (Shinnie and Bradley 1980). The Meroë Archival Project (MAP) team, directed by Anna Lucille Boozer, is re-examining the Shinnie material excavated from these structures. The ceramic assemblage includes a distinctive white-fabric ware made from locally sourced kaolin. Other ceramics include handmade black wares and a wheel-made brown ware, which seems to have been common to the domestic areas, as well as imported fabrics. Additional material comprises handmade figurines (predominately of quadrupeds), terra-cottas, weaving implements, weights and measures, jar seals, stamps, beads, lip/ear/nose plugs, metals, and numerous other objects relating to the social, economic, religious, and material life of ancient Meroë.

Slag heaps, thought to be from iron smelting, are located at the eastern edge of the city, marking the craft quarter. A UCL Qatar project, directed by Jane Humphris, is currently working in this area of the city. This project will expand over the coming years to include a number of additional iron production locations and to consider in more detail further pyrotechnologies. The multidisciplinary approach to ancient technologies, including mapping and modelling, dating, archaeobotany, geophysics, and geochemistry, alongside the exhaustive excavation sampling methodologies and laboratory analysis of archaeometallurgical and associated archaeological samples, will ensure a growing and holistic corpus of data is generated from this project. The results, spanning over 1000 years of technological history before, during, and after the Kingdom of Kush reached its zenith, will provide an understanding of the role and impact of technologies and technologists during this key period of time (Humphris 2014; Humphris and Rehren 2014). The UCL Qatar team is also collaborating with the MAP team to re-examine slag, crucibles, and iron objects that were recovered during the Shinnie excavations at Meroë.

Farther to the north and east are spacious burial grounds, including a field of pyramids belonging to the relatives of rulers (Fig. 2). Immediately to the east of the city are three discrete cemeteries, which provide an enormous source of information about this poorly understood empire. The northernmost of these cemeteries dates to ca. 100 BCE–200 CE. The other two cemeteries appear to have been active later. Most graves were marked with a mound of sand or gravel and appear to be those of the elite.

The pyramids of the kings and *kandakes* (ruling queens) are located still farther to the east and are arranged in a triangle. The western cemetery (among this triangle) included pyramid tombs of lesser royals. The northern and southern (among this triangle) include nearly all of the known rulers of Meroë after Arkamani. The pyramids were built of stone masonry, and the later phased ones were built of brick and rubble. These pyramids differed from the Egyptian pyramids; they were steeper, often had an attached chapel, and it seems that those belonging to the kings had a pylon (a double-towered gateway inherited from Egypt). Chapels had scenes and texts, which often repeated between the various tombs. A hoard of golden jewelry was supposedly found from these pyramids. This jewelry shows connections to Egypt and the Mediterranean (Priese 1992). There are other graves distributed among these pyramids in the south and the east cemeteries: mastabas (Arabic for "bench," describing the structure shape) and mounds. These graves appear to have been for queens, princes, and the elite.

Meroë had connections to the Roman Empire since Rome first occupied Egypt, although the

Meroë, Fig. 2 Pyramids of Meroë – Northern Cemetery; Ron Van Oers, photographer (CC-BY)

nature of these connections is contested (Yellin 2015b). It seems that Cornelius Gallus, the first prefect of Egypt, established the Egyptian border at the First Cataract in about 29 BCE. Subsequently, this border was pushed south by 70 miles to Hiera Sycaminos (Maharraqa) to include the Dodekaschoinos, a region of much-disputed control for this and the Ptolemaic era (Kirwan 1977). During the prefecture of Gaius Petronius (25–21 BCE), the Meroites attacked Syene, Elephantine, and Philae at the First Cataract. They were taking advantage of the transfer of troops from this area to Arabia Felix for Aelius Gallus' campaign there (Strabo XVII, 53–4). This attack is thought to be the one which resulted in Augustus' statue head being placed beneath the threshold of one of the temples at Meroë, which is often known as the Augustus Temple (M 292). During the first three centuries CE, the relationship between Rome and Meroë became peaceful. The movement of trade goods between Meroë and the Roman Empire (and particularly Roman Egypt) seems to suggest positive trade relationships ensued, as evinced by elite Roman Mediterranean goods found at Meroë, namely, lamps, glassware, beads, and adornment. Future work on material culture may provide more information on the nature of these exchanges.

Axum (along with some incursions by the Noba) has often been credited with destroying Meroe toward the middle of the fourth century CE (Kirwan 1977; Littmann 1938; Shinnie 1967). The archaeological evidence for Axumite destruction levels at Meroë is minimal (Bradley 1984).

Additional connections with other areas in Africa are certain, but further study of the material culture, archaeobotanicals, and faunal remains is required to identify specific locales with greater confidence.

Historical Background

Herodotus and other ancient writers mentioned Meroë, but little was known about it until the age of European exploration (Boozer 2017). The Scottish traveler James Bruce (1730–1794) first tentatively identified Meroë in 1772 on the basis of the Temple of Amun (M 260–280) (Bruce 1790). Bruce provided the first modern description of ancient Meroë:

> We saw here heaps of broken pedestals. . .pieces of obelisk, likewise, with hieroglyphs, almost totally obliterated. The Arabs told us these ruins were very extensive, and that many pieces of statues, of both men and animals, had been dug up there. . .It is impossible to avoid risking a guess that this is the ancient city of Meroë. (Bruce 1790)

Bruce does not mention the pyramids of Meroë, which have been the focal point of most antiquarian and modern-day interest at Meroë. Subsequent explorers, such as Frédéric Cailliaud (visited 1821), Linant de Bellefonds (visited 1821), and Karl Richard Lepsius (visited 1842–1845), included Meroë on their itineraries and described these pyramids (Cailliaud 1972 [1826–1827]; de Bellefonds 1958). Cailliaud, Linant, and Lepsius produced the first accurate drawings and measurements of the pyramids at Meroë. Lepsius was the first to archaeologically investigate a Meroitic pyramid (Lepsius 1849). These three missions provided the first scientific grounding for research upon Meroë.

Giuseppe Ferlini (lived 1800–1870) was one of the most notorious historical figures associated with Meroë because he hunted for treasure in the pyramids using destructive techniques (Priese 1992). Ferlini's quest was initially unsuccessful, but he eventually found jewelry in one (Beg. N. 6 of queen Amanisakheto). Ferlini hired four workers from neighboring villages and ordered them to dismantle the pyramid from the top down. Ferlini claimed that spectacular finds were located in chambers within the pyramid, along with some equipment used by the pyramid builders. According to a subsequent investigation by Hinkel, Ferlini likely opened the burial chamber within the pyramid and found the treasure there. Berlin acquired the majority of Ferlini's finds at the request of Lepsius (Priese 1992). Ferlini's discovery of treasure has drawn increased attention to the archaeology of Meroë by both archaeologists and looters. These looters appear to have been both Europeans and locals, as indicated by some of Lepsius' records (Lepsius 1852).

Sir Ernest Alfred Thompson Wallis Budge (lived 1857–1934), an English Egyptologist based at the British Museum, collected antiquities from Meroë for the British Museum. Troops furnished by Sir Reginal Wingate (lived 1861–1953), governor-general of Sudan (in office 1899–1916), made paths to and between the pyramids and sank shafts into the site. Little is known of the results of these explorations, although more might be learned from objects in the National Museum in Khartoum that may derive from this work and his personal papers preserved in the British Museum.

John Garstang (1910–1914), a professor of archaeology at the University of Liverpool (1907–1941), carried out the first formal excavations at Meroë. During Garstang's excavations (1910–1914), Meroë was positively identified by name. This identification was made in 1910 on the basis of the Amun Temple walls that he exposed and compared to descriptions of them by ancient writers. The mention of the city of *Mer* (?) in a hieroglyphic text of a stela of King Aspelta (late seventh–early sixth century BCE) found in fragments at Temple M 250 appeared to definitively corroborate this identification (Török 1997). This inscription fragment was not published by Garstang and was lost after the excavations were interrupted in 1914 (Török 1997). Garstang later attempted to connect the building periods of Meroë to known historical events. Garstang's work emphasized the importance of Egyptian and Hellenistic influences and imports upon Meroë. The First World War interrupted Garstang's fieldwork, and the results were not published in final form until László Török's multivolume publication in 1997.

George Reisner (1867–1942) was an American archaeologist who excavated Meroë's royal cemeteries located east of the city (1920–1923). Although Reisner did not publish his research

during his lifetime, his assistant, Dows Dunham (1890–1984), used his contextual descriptions to produce comprehensive reports (Dunham 1957, 1963). Subsequent scholars have used these reports to interpret the religious and mortuary practices of Meroë (e.g. Yellin 2012; 2015a).

The pyramids of Meroë were also subject to substantial restoration work by Friedrich W. Hinkel. This work has provided a new knowledge of the architecture of the pyramids and the method of their construction (Hinkel 1986, 2000).

The most sustained excavations in Meroë city were directed by Peter Lewis Shinnie (1915–2007) (Figs. 3 and 4). Shinnie excavated at Meroë (1965–1984, intermittent) as the director of a joint expedition of the Universities of Calgary and Khartoum (as the expedition was entitled in its final form) (Shinnie and Anderson 2004; Shinnie and Bradley 1980). Shinnie's excavations were the first to expose domestic houses, industrial areas, and components of the urban layout in addition to exploring the site's many temples.

The Meroë Archival Project (MAP), directed by Anna Lucille Boozer, re-examines the previously excavated material from Meroë. Among the objects examined thus far are decorative tiles, plaques, and medallions, which were probably inlayed in the floors and walls of the Temple of Amun as well as the smaller temples and shrines (Fig. 1). There are also numerous plaques and objects in the round provided with suspension rings, which were possibly hung from the ceiling, or from some kind of temple furniture. Some of these objects represent small shrines, feathers, and crowns. This analysis will hopefully shed light on diachronic change as well as the furnishings of Meroitic temples.

Key Issues/Current Debates

Due to the history of looting and nonscientific excavation at Meroë, many basic questions about the site remain unanswered. The contours of Meroë's occupational history remain uncertain despite more than a century of excavation. Current expeditions to Meroë are attempting to resolve outstanding questions relating to four main areas: iron production, the so-called Royal Baths, the Amun Temple, and the material culture.

UCL Qatar has documented and excavated the remains of extensive iron industries from key locations within the Meroitic landscape. They have demonstrated that the scale and the technological approach to iron working by Meroites situate it as a key industry. This research corroborates century-old suggestions about the significance of iron working at Meroë but is still in early

Meroë, Fig. 3 Peter Shinnie's excavation team at Meroe in 1975. The crew shown here is made up of students from the University of Calgary; Sam Gerszonowitz, photographer (CC-BY)

Meroë, Fig. 4 Peter Shinnie excavating in the 1970s; Janice Yellin, photographer (CC-BY)

stages of research. For example, the role of iron working in the rise, dominance, and collapse of the Kingdom of Kush is still unknown (Humphris and Rehren 2014).

The Royal Baths and the Temple of Amun have been explored for over a century. Like the site itself, these two loci remain poorly understood. The re-excavation of these two areas, by a German and a Sudanese team, respectively, promises to reveal more information about these structures as well as Meroë more generally. Excavations in the Royal Baths area have revealed water management systems, elaborate material culture, and potential garden features (Wolf 2015).

The material culture from Meroë was not published to modern standards or interpreted within their find spots. Ongoing re-examinations of this material inform interpretations of production, religion, and other social practices. For example, the many weaving implements found within domestic contexts inform interpretations of household production. Meanwhile, numerous fragments of faience tiles, objects in the round, and miniature shrines suggest complex religious practices unlike those in Egypt. Although it should be assumed that Meroites had their own approach to religion, there have been insufficient studies of how these approaches manifested themselves through portable material culture.

International Perspectives

British and European scholars have dominated current perspectives on Meroë. This Eurocentric interest has not been without issues; the excavations have not always been scientific; and all of them experienced significant time lags between excavation and final publication. These two problems have hindered more thorough archaeological interpretations of both the site and its material culture.

Sudanese archaeologists began to be included as research partners beginning with Shinnie's excavations; he trained a generation of Sudanese archaeologists at the site. Many of his former students are current faculty at the University of Khartoum, which maintains its permit for the site and conducts its own excavations at Meroë today.

Present-day international missions include Sudanese experts alongside international ones. Additional intertwining between international and local archaeologists is desirable for strengthening research outputs and community engagement.

The inscription of Meroë, as part of the Archaeological Sites of the Island of Meroë, as a UNESCO World Heritage Site in 2011 has brought renewed inter-national attention to this significant urban site. As with the inscription of any site (Meskell 2018: 118–142), significant social, political, and economic elements accompanied the inscription of Meroë. The local impact of inscription was enormous: long-standing villages surrounding and superimposed on top of ancient Meroë were, in some cases, forced to relocate away from the site in order to prepare it as a tourist destination (compare to Zambakari 2017). This disruption in the lives of local inhabitants was unwelcome, particularly since many of the inhabitants served as excavators on past missions at Meroë and felt a deep connection to the site and its archaeology.

Global connectivity, which crosscuts political, institutional, corporate, cultural, and economic lines, is also evident in the inscription of Meroë. At about the same time that Meroë was inscribed, Sudan experienced an enormous influx of infrastructure development funding from China and the Gulf states. Omar Hassan al-Bashir, the president of Sudan at the time, accepted Chinese funds and technical assistance to renovate the outdated railway system. The enhanced rail system runs alongside and crosscuts the site Meroë, overlaying the British rail system that preceded it (cf. Welsby 2011). There was hope that this updated rail system would help to transport tourists to the site, although some of the Chinese firms have since withdrawn from work in Sudan.

Gulf state funds, most notably from Qatar, provided critical support for Sudan when it lost its oil output in 2011 with the succession of South Sudan. Qatari funds supported the former president al-Bashir, the military, development, and also active archaeological research in the form of the Qatar and Sudan Archaeological Project (QASAP). Contemporaneous with the inscription of Meroë, several international expeditions acquired funding from the Qatar Fund and leading to the creation of QASAP. The formation of QASAP, as well as a working group on Meroë and its immediate environs, has created substantial new cohesion between the international and Sudanese projects working in the region. Additionally, QASAP funded the construction of a new visitor center for the Archaeological Sites of the Island of Meroë, which opened in 2019. Information panels at the visitor center describe the Royal City, iron working, and other aspects of the Meroitic economy in English and in Arabic.

Future Directions

There are numerous ongoing missions in the city, the cemeteries, and the surrounding landscape of Meroë. These ongoing projects include the aforementioned ones that examine metal production, previously excavated material culture and texts, the so-called Royal Baths and their environs, and the Temple of Amun. There are also additional projects that have just begun to publish their findings. For example, the Meroë Pyramids Graffiti Project (Qatar – Humboldt Universität zu Berlin) brings together international scholars, archival material, and new field research to document in detail the graffiti corpus on the pyramids that spans more than two millennia (Reidel et al. 2016). Conservation work at the pyramids of Meroë is ongoing (Qatar – NCAM – DAI Berlin). This work includes a re-examination and reopening of pyramids Beg. S. 503 and Beg. N. 9. The findings from this re-examination will be published fully. The surrounding landscape has also been subjected to further survey and examination. For example, the Meroë Quarries Graffiti Project (2105, UCL Qatar), led by Brigitte Cech, examines the sandstone quarries in the vicinity of Meroë, including the graffiti. The publications for this project are forthcoming.

Cross-References

► Shinnie, Peter L.

References

Adams, W.Y. 1984[1977]. *Nubia: Corridor to Africa*. Princeton: Princeton University Press.

Bradley, R.J. 1984. Meroitic Chronology *Meroitica* 7:195–211.

Bruce, J. 1790. An interesting narrative of the travels of James Bruce Esq. into Abyssinia, to discover the source of the Nile. Abridged from the original work. By Samuel Shaw, Esq. H.D. Symonds, London.

de Bellefonds, Linant, and Louis Maurice Adolphe. 1958. *Journal d'un voyage à Méroé dans les années 1821 et 1822*. Khartoum: Sudan Antiquities Service.

Cailliaud, F. 1972 [1826–1827]. Voyage à Méroé, au fleuve Blanc, au-delà de Fâzoql dans le midi du royaume de Sennâr, à Syouah et dans cinq autres oasis; fait dans les années 1819, 1820, 1821 et 1822, par m. Frédéric Cailliaud. [Paris] Par autorisation du roi, à l'Imprimerie royale, 1826–27. Westmead: Gregg International.

Dunham, D. 1957. *The Royal Cemeteries of Kush v. 4. Royal Tombs at Meroë and Barkal. Museum of Fine Arts*. Boston: Harvard University Press.

Dunham, D. 1963. *The Royal Cemetaries of Kush v. 5: The West and South cemeteries at Meroë. Museum of Fine Arts*. Boston: Harvard University Press.

Grzymski, K.A. 2003. Meroe Reports I. SSEA Publications XVII Mississauga.

Hinkel, F.W. 1986. Reconstruction work at the royal cemetary at Meroe. In *Nubische studien*, ed. M. Krause 99–108. Mainz am Rhein: P. Von Zabern

Hinkel, F.W. 2000. The royal pyramids of Meroe. *Architecture, Construction and Reconstruction of a Sacred Landscape Sudan & Nubia* 4: 11–26.

Hinkel, F.W. 2001. *Der Tempelkomplex Meroe 250. The archaeological map of the Sudan. Supplement I*. Berlin: Verlag Monumenta Sudanica.

Hinkel, F.W., and Siewertsen, U. 2002. *Die Royal City von Meroe und die repräsentative Profanarchitektur in Kusch. The Archaeological Map of the Sudan. Supplement I*. Berlin: Verlag Monumenta Sudanica.

Humphris, J. 2014. Post Meroitic iron production: Initial results and interpretations Sudan & Nubia 18.

Humphris, J. and T. Rehren. 2014. Iron production and the kingdom of Kush: An introduction to UCL Qatar's research in Sudan.

Kirwan, L.P. 1977. Rome beyond the Southern Egyptian frontier. *Proceedings of British Academy* 63: 13–31.

Lepsius, C.R. 1849. Denkmaeler aus Aegypten und Aethiopien nach den Zeichnungen der von Seiner Majestaet dem Koenige von Preussen Friedrich Wilhelm IV nach diesen Laendern gesendeten und in den Jahren 1842–1845 ausgefuehrten Wissenschaftlichen expedition, auf Befehl Seiner Majestaet hrsg. und erlaeutert von C.R. Lepsius. Berlin: Nicolaische buchhandlung.

Lepsius CR (1852) Briefe aus Aegypten, Aethiopien und der Halbinsel des Sinai, geschrieben in den Jahren 1842–1845, während der auf befehl sr. Majestät des Königs Friedrich Wilhelm IV von Preussen ausgeführten Wissenschaftlichen Expedition. W. Hertz, Berlin.

Littmann, E. 1938. Deutsche-Axum Expedition 11.

Meskell, L. 2018. *A future in ruins: UNESCO, world heritage, and the dream of peace*. Oxford: Oxford University Press.

Priese, K.-H. 1992. *The gold of Meroe*. New York: Mainz am Rhein.

Reisner, G.A. 1923a. The Meroitic kingdom of Ethiopia: A chronological outline. *The Journal of Egyptian Archaeology* 9 (1/2 (Apr.)): 34–77.

Reisner, G.A. 1923b. The pyramids of Meroe and the Candaces of Ethiopia. *Museum of Fine Arts Bulletin* 21 (124 (Apr.)): 11–27.

Riedel, A., M.S. Bashir, P. Wolf, M.B. Mohamed, and C. Kleinits. 2016. The Qatari Mission for the pyramids of Sudan – Archaeological investigation, conservation and site Management at Meroe 2015/2016. *Sudan & Nubia* 20: 62–74.

Shinnie, P.L. 1967. *Meroe: A civilization of the Sudan*. London: Thames and Hudson.

Shinnie, P.L., and J.R. Anderson. 2004. *The Capital of Kush 2, Meroë excavations 1973–1984*. Vol. Meroitica 20. Wiesbaden: Harrassowitz Verlag.

Shinnie, P.L., and R.J. Bradley. 1980. *The Capital of Kush 1: Meroe excavations 1965–1972*. Vol. 4. Berlin: Meroitica.

Török, L. 1997. *Meroe City, an ancient African capital. John Garstang's excavations in the Sudan*. London: Egypt Exploration Society.

Welsby, D.A. 2011. *Sudan's first railway: The Gordon relief expedition and the Dongola campaign*. London: Sudan Archaeological Research Society. Publication Number 19.

Wolf, S. 2015. The Royal Baths at Meroë: Recent investigations. In *The Kushite world: Proceedings of the 11th international conference for Meroitic studies, Vienna, 1–4 September 2008*, ed. M.H. Zach, 329–330. Vienna: Verein der Förderer der Sudanforschung c/o Department for African Studies.

Yellin, J.W. 2012. Nubian religion. In *Ancient Nubia: African kingdoms on the Nile*, ed. M.M. Fisher, P. Lacovara, S. Ikram, and S. D'Auria, 125–144. Cairo: American University in Cairo Press.

Yellin, J.W. 2015a. The family of Arkamani I in the southern cemetery at Meroe. In *The Kushite world: Proceedings of the 11th international conference for Meroitic studies, Vienna, 1–4 September 2008*, ed. M.-H. Zach, 601–612. Vienna: Verein der Förderer der Sudanforschung c/oDepartment of African Studies/ Citypress.

Zamakari, C. 2017. Land grab and institutional legacy of colonialism: The case of Sudan. *In Consilience: The Journal of Sustainable Development.* 18 (2): 193–204.

Further Reading

Boozer, A.L. 2017. A historiography of archaeological research at Meroë, Sudan. Ancient West & East 16:209–2e48.

Yellin, J.W. 2015b. Meroitic royal chronology: The conflict with Rome and its aftermath. *Journal of the Sudan Archaeological Research Society* 19: 2–15.

Mesa Verde

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Introduction

Mesa Verde is a national park located in Montezuma County, southwestern Colorado, USA. The park is famous for its numerous well-preserved cliff dwellings, mesa top pit houses, kivas, and multistoried structures. In the late 1880s, Virginia McClurg, a journalist who first visited the area in 1872, began to lobby federal representatives to create federal parks status for the Mesa Verde area (NPS website). No national park honoring an archaeology site or humanly constructed landscape had been considered in the United States. However, due to McClurg's fierce decades long lobbying, President Roosevelt signed the bill into law on June 29, 1906, and Mesa Verde National Park finally came into existence (NPS website). Mesa Verde was nominated to the US National Register of Historic Places in 1966 and was named a UNESCO World Heritage Site in 1978.

The park contains 4700 archaeological sites including 600 cliff dwellings. The cliff dwellings vary in size from one-room storage spaces to multifamily dwellings of more than 150 rooms. The park encompasses 52,000 acres of land with the highest elevations ranging from 6000 to 8572 ft (1000–2613 m) above sea level (NPS 201).

Region

Mesa Verde is Spanish for "green table." The park is in an area of the United States commonly referred to as the four corners where the borders of present-day southeast Utah, southwest Colorado, northwest New Mexico, and northeast Arizona meet. The four corners area contains many ancient Puebloan archaeological sites with pit houses, cliff dwellings, kivas, towers, and petroglyphs. Mesa Verde National Park has one impressive petroglyph panel known as "Petroglyph Point" that is accessible by a 2-mile trail (BLM 2012). Throughout the park there are well-marked automobile tour routes, viewing areas, and trails which lead to numerous pit houses, cliff dwellings, and kivas (Fig. 1).

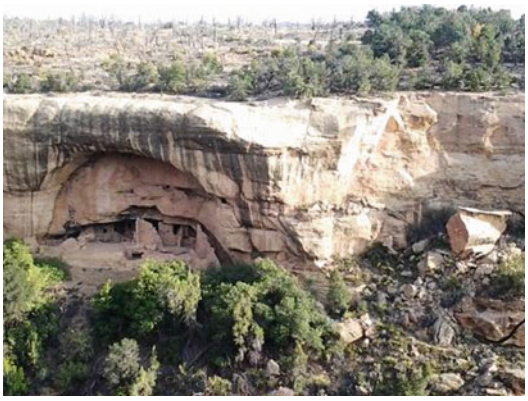

Mesa Verde, Fig. 1 Mesa Verde cliff dwelling. P.Steeves 2012

Pit Houses

Archaeologists believe that the area of Mesa Verde Park was first settled by ancient Puebloan people around AD 500 National Park Foundation (NPF 2017). The mesa tops offered productive agriculture areas where Puebloan people grew corn, squash beans, and other food crops. The earliest structures at Mesa Verde were pit houses which were located on the mesa tops. The pit houses were usually oblong or round and were semisubterranean with floors dug into the soil several below surface level. The roof of a pit house consisted of a wood frame covered with brush, grass, thin poles and capped with mud. The pit house was usually being divided into two rooms, the living space which had a fire pit located beneath a center hole in the roof that served as a chimney and an entry way (NPS 2012) and a smaller second room used for storage. Mesa Verde Park has constructed permanent

buildings over a few excavated pit houses which protect them from the environment and allow the public to view the interior of the structures (Fig. 2).

Kiva

Archaeologists commonly agree that ancient Puebloan kivas were used for religious purposes as they are today within modern Puebloan communities. Kivas held a prominent place in ancient Puebloan communities and are assumed to have been used mainly for ceremonies; however, they may have held different or diverse functions across time. Most kivas were constructed as underground structures, but there are also aboveground and tower kivas. The larger cliff dwellings at Mesa Verde have numerous kivas in each community area (Fig. 3).

Mesa Verde, Fig. 2 Pit House reconstruction at Step House Ruins, W.?V. Bailey 2007. http://commons.wikimedia.org/wiki/File:Pithouse_at_Step_House_Mesa_Verde_1.jpg

Cliff Dwellings

The cliff structures of Mesa Verde are believed to have been built and occupied sometime after 1100 AD, a time archaeologists have designated as Pueblo II. There are 600 cliff structures which have been recorded in Mesa Verde Park. Some of the cliff dwellings were large villages of multistoried apartment like structures, built in a step design with balconies and open areas. These village areas consisted of family dwellings, communal areas, kivas, storage rooms, and towers. Puebloan cliff structures at Mesa Verde were constructed of stone, adobe, mud, and other materials such as wood.

Visitors to the park have the option to walk through some of the cliff dwellings on a park ranger-guided hike. Chapin Mesa has many cultural sites including Balcony House, Sun Temple, Square Tower House, and Spruce Tree House which has 130 rooms including 8 kivas (Fig. 4).

Cedar Tree Tower. Cedar Tree Tower is one of several tower sites that are located on the mesa tops (Lamb 2001). On Wetherill Mesa, there are views of Step House which has one of the largest concentrations of petroglyphs found in the park, Mug House which has 94 rooms clustered around a large kiva, Long House which has 150 rooms and 21 kivas, Kodak House, Two Raven House, and the Badger House community area (Lamb 2001). The largest cliff dwelling in Mesa Verde Park is Cliff Palace with 150 rooms, 21 kivas, and 75 open areas (Fig. 5).

Ninety percent of Mesa Verde's cliff dwellings are smaller structures of less than ten rooms. The larger cliff dwellings include Cliff House with 150 rooms, Long House with 150 rooms, Spruce

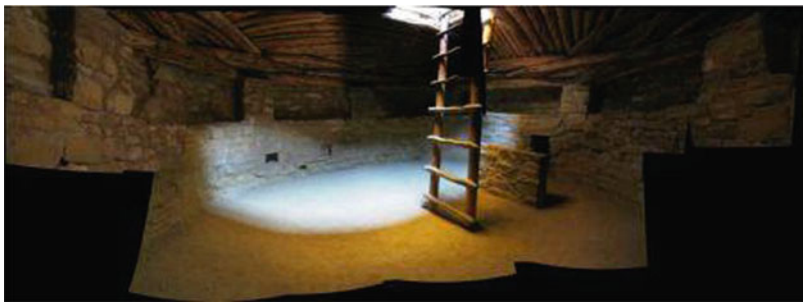

Mesa Verde, Fig. 3 Interior of Kiva of Mesa Verde, Wikimedia Commons 2012. http://en.wikipedia.org/wiki/File:Kiva.jpg

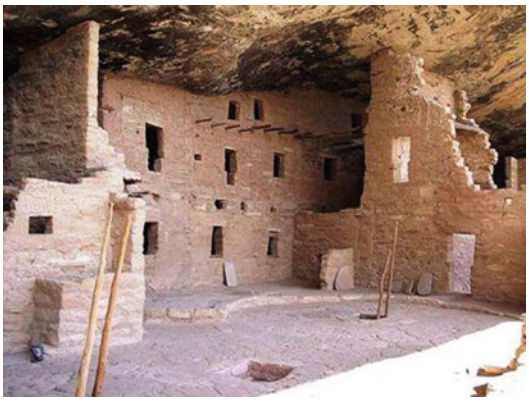

Mesa Verde, Fig. 4 Spruce Tree House, Sascha Bruck 2006. Creative Commons on Wikimedia. http://commons.wikimedia.org/wiki/File:Spruce_Tree_House_4.jpg

Mesa Verde, Fig. 5 Cliff Palace. P?Steeves,?2012

Tree House with 130 rooms, and Balcony House with 40 rooms (NPS 2012). The larger community areas are often discussed by archaeologists as villages.

The ancient Puebloan people were very successful farmers (BLM 2012); they constructed dams and water systems for agricultural and community use. Archaeologists believe that the Ancestral Puebloan occupation of Mesa Verde ended around AD 1300 possibly due to a severe drought.

Historically early settlers and archaeologists referred to the Puebloan peoples of Mesa Verde as the Anasazi Culture. However, no indigenous community or group ever called themselves by that name. Anasazi is a Navajo word: in Navajo [Anaasazi "anaa (enemy), sazi (ancestors)"] (Hewit Institute 2012). The identity of the cliff dwelling people as Anasazi, though formerly established in archaeological terminology and embedded in dominant discourses on the area, is offensive to modern Pueblo people who consider it an ethnic slur (BLM 2012). The descendants of the ancient Puebloan people who lived at Mesa Verde are recognized today as the Hopi, Zuni, Acoma, and Laguna.

Mesa Verde contained thousands of artifacts including Puebloan pottery which is very distinctive in style and decoration. Early explorers, unfortunately, looted the sites and took boxcar loads of pottery and artifacts to museums and private sales in Europe. After the area became a national park in 1906, the pottery and artifacts that remained were afforded protection. Mesa Verde Park today houses over three million artifacts including pottery, tools, baskets, and sandals (BLM 2012). The United States National Park Service has an active Archaeological Site Conservation Program (ASCP) at Mesa Verde which includes the collection of survey data on all sites in the park and assessments of over 200 of the park's 600 cliff dwellings. The park also has an active program to stabilize and protect sites from the damaging effects of natural elements such as wind and rain.

Mesa Verde is an extensive archaeological area; the main cliff dwelling and some pit houses can be visited in 1 day if you drive a car along the loop road tours. The park has a full-service hotel and restaurants, stores and laundry facilities, and camping area which is located at the entrance to the park.

References

Bureau of Land Management (BLM). 2012. http://www.blm.gov/co/st/en/fo/ahc/who_were_the_anasazi.html#who

Hewit Institute, University of Northern Colorado. 2012. http://hewit.unco.edu/DOHIST/puebloan/begin.htm

Lamb, Susan. 2001. *Mesa Verde life/earth/sky*. Mariposa: Sierra Press.

National Park Foundation. 2012. http://www.nationalparks.org/explore-parks/mesa-verde-national-park-0

National Park Foundation. 2017. https://www.nationalparktraveler.org/2008/06/park-history-would-there-have-been-mesa-verde-national-park-without-virginia-mcclurg
National Park Service (NPS). 2012. Website http://www.nps.gov/meve/planyourvisit/lodging.htm
National Parks Service. 2012. http://www.nps.gov/meve/forteachers/upload/ep_activity3_chronology.pdf

Meskell, Lynn

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Basic Biographical Information

Lynn Meskell (Fig. 1) is an Australian-born archaeologist who completed her Ph.D. at Cambridge University in 1997. Currently Professor of Anthropology at Stanford University, she was previously a faculty member at Columbia University (1999–2005) and a Postdoctoral Fellow at Oxford University (1997–1999). Meskell received her B.A. from the University of Sydney in 1994, having also studied Egyptology at Macquarie University. While an undergraduate, she assisted in archaeological fieldwork in New South Wales, Australia, in Micronesia, and in Cyprus and Greece. At Cambridge, Meskell participated in field projects in the Egyptian East Delta and took part in the Cambridge Theban Mission in Luxor. In her doctoral dissertation, Meskell analyzed data from the cemeteries of Deir el-Medina, a New Kingdom worker's village across the Nile from Luxor.

Meskell's postdoctoral field research involved a return to Egypt, where she codirected the South Saqqara Survey Project in 1998 and 1999. With her appointment as Assistant Professor at Columbia University in 1999, she became the field director of the Columbia University Excavations at Amheida, Egypt, in 2000. In 2001, Meskell obtained funding from the National Science Foundation to explore the potential of digital technologies for visualization of heritage sites, initially with her Egyptian project. She continued her work with digital technologies but switched her research site to South Africa in 2003. This marked a turning point that saw her shift her focus from Egyptian antiquity to the contemporary production of "heritage" in post-apartheid South Africa.

Meskell continues participation in field archaeology, as director of the Çatalhöyük Figurines Project. The project aims to overcome a history of representation of figurines from this important early Neolithic site that has focused on a small range of images that support particular interpretations related to fertility and mother goddesses, for

Meskell, Lynn, Fig. 1 Lynn Meskell

example, showing that animal figures are more common than previously understood (Meskell 2008).

On her graduation from the University of Sydney, Lynn Meskell was awarded the University Medal. Her postdoctoral appointment at Oxford was supported by the Harold Salvesen Research Fellowship. She began work in South Africa with funding as a Research Fellow by the South African National Research Foundation in 2002. In 2002, she was also a National Endowment for the Humanities Fellow at the School for American Research (now the School for Advanced Research) in Santa Fe. Meskell received the Andrew W. Mellon Foundation's New Directions Fellowship in 2004, supporting training in ethnography and African studies to prepare her for work in South Africa.

Major Accomplishments

Meskell is recognized for her contributions to feminist archaeology, archaeological ethics, and issues of heritage. In the 1990s, Meskell established herself as a critical voice in the archaeology of women, gender, and the body. Her 1996 article in the *Norwegian Archaeological Review* on what she termed the "somatization" of archaeology was a call to engage with broader social theory. Meskell (1996) wrote that archaeologists' emphasis on power, particularly the work of Michel Foucault, came at the expense of individuality and agency. She advocated viewing "embodied persons" as foci where biology, culture, and experience intersected. Her emphasis on the necessity to consider individuals carried through in later works, such as *Archaeologies of Social Life* (1999), where she used the cemeteries of Deir el-Medina to talk about personhood in ancient Egypt. The book explored the intersection of multiple dimensions of social difference, including age, sex, and class, in the lives of the buried individuals.

The publication of her edited book, *Archaeology Under Fire*, (Meskell 1998) initiated one of her most enduring emphases: exploration of the social and political contexts within which archaeology is carried out and through which archaeological knowledge circulates. In her contribution for a 2002 conference on ethics in anthropology sponsored by the Wenner-Gren Foundation for Anthropological Research (Meskell and Pels 2005), Meskell drew attention to the way contemporary residents were alienated from locations viewed as sites of heritage by the state and by archaeologists as well.

After the 2001 attacks on the World Trade Center in New York, Meskell (2002) published an influential article proposing a concept of "negative heritage": "a conflictual site that becomes the repository of negative memory in the collective imaginary" (Meskell 2002: 558). Juxtaposing analysis of the World Trade Center site and the Bamiyan Buddhas, destroyed by the Taliban government of Afghanistan, Meskell demonstrated the need for more critical debate that acknowledged the equivocal nature of material marking of pasts. In her most recent book, Meskell (2011) takes the central concept of this earlier article – "past mastering" – as a beginning for understanding post-apartheid heritage development in South Africa. Using ethnographic methods, Meskell traces how archaeology and wildlife intersected in the development of tourism for the new South Africa. She says that the project became "about why natural heritage and conservation has trumped the cultural past, why nature is seen as global and all embracing and non-racial" (Bailey 2011: 11).

Meskell is continuing research on heritage policy in the contemporary world, through an ethnography of UNESCO. She argues that archaeologists, despite working in and around World Heritage Sites, have very little understanding of how UNESCO operates (Bailey 2011: 8–9). By providing an ethnographic account of UNESCO (Meskell 2012), following on her ethnography of heritage in South Africa, Meskell is defining a new field for archaeological ethnography, going beyond the now common approach of conducting ethnography in communities local to archaeological sites and projects.

In a 2011 interview, asked to single out the work for which she would like to be remembered, after mentioning *Archaeology Under Fire*,

Meskell noted that she was proudest of her role as a founding editor for the *Journal of Social Archaeology* "because it promotes such good work by people from all over the world" (Bailey 2011: 12). The globalization of archaeology promises to be a lasting contribution of her work as both writer and editor.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Heritage and Society
- ▶ Heritage and Archaeology
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage: Public Perceptions
- ▶ Heritage Theory
- ▶ Journal of Social Archaeology
- ▶ Post-Processualism, Development of
- ▶ South Africa: Heritage Management

References

Bailey, D. 2011. Interview with Lynn Meskell. *Studii de Preistorie* 8: 7–13.

Meskell, L. 1996. The somatisation of archaeology: Discourses, institutions, corporeality. *Norwegian Archaeological Review* 29 (1): 1–16.

Meskell, L., ed. 1998. *Archaeology under fire: Nationalism, politics and heritage in the Eastern Mediterranean and Middle East*. London: Routledge.

Meskell, L. 1999. *Archaeologies of social life: Age, sex, class etcetera in ancient Egypt*. Oxford: Blackwell.

Meskell, L. 2002. Negative heritage and past mastering in archaeology. *Anthropological Quarterly* 75 (3): 557–554.

Meskell, L. 2008. The nature of the beast: Curating animals and ancestors at Çatalhöyük. *World Archaeology* 40 (3): 373–389.

Meskell, L. 2011. *The nature of heritage: The new South Africa*. Oxford: Blackwell.

Meskell, L. 2012. The rush to inscribe: Reflections on the 35th session of the World Heritage Committee, UNESCO, Paris, 2011. *Journal of Field Archaeology* 37 (2): 145–151.

Meskell, L., and P. Pels, eds. 2005. *Embedding ethics*. Oxford: Berg.

Further Reading

Meskell, L. 2002. *Private life in new kingdom Egypt*. Princeton: Princeton University Press.

Meskell, L. 2004. *Object worlds in ancient Egypt: Material biographies past and present*. Oxford: Berg.

Meskell, L., ed. 2005. *Archaeologies of materiality*. Malden: Blackwell.

Meskell, L., ed. 2009. *Cosmopolitan archaeologies*. Durham: Duke University Press.

Meskell, L., and R.A. Joyce. 2003. *Embodied lives: Figuring ancient Maya and Egyptian experience*. London: Routledge.

Meskell, L., and R. Preucel. 2006. *A companion to social archaeology*. Malden: Blackwell.

Mesoamerica in the Classical Period

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Introduction

Mesoamerica as a geocultural concept was defined by archaeologist Paul Kirchhoff in 1943 as a culture area in the Americas extending from central and west Mexico to Belize, Guatemala, El Salvador, Honduras, Nicaragua, and northern Costa Rica. The area is defined by a mosaic of cultural traits developed and shared by its indigenous cultures since ca. 7000 BCE, within which pre-Columbian societies flourished into the era of Spanish colonization and into the historic present. Archaeologists divide Mesoamerican civilizational development into three primary chronological periods: the Preclassic (PreClassic or Formative) period extending from ca. 1500 BCE to CE 300, the Classic period extending from approximately CE 150 to 950, and the Postclassic (PostClassic) period extending from ca. CE 950 to 1521. Some scholars employ designations of Terminal Classic for the period 800–900/1100 or

Charles C. Kolb has retired.

Epiclassic (Epi-Classic) for the era 800–1200 to indicate a transition between the Classic and Postclassic. All of these generalized dates differ from region to region and site to site. More precise chronologies of Classic period sites are detailed below when the authors are able to refine the generic dates with absolute or relative chronologies derived from radiocarbon analyses, dates on inscribed monuments, or ceramic studies.

Definition

Classic period Mesoamerica was an era of great social development and cultural interaction and commerce. It is characterized primarily by human adaptation to settled life, the creation of major cities located from arid highlands to tropical lowlands, as well as advancements in domesticated cultigens, amplification of sophisticated social structures, modification of both the landscape and natural ecology, as well as traditions of gardening in different environments, increased production of maize and other food resources, construction of sacred monumental architecture, and art, including ceramics, lithics, and murals.

There are voluminous published and online resources available on Mesoamerica in the Classical era: Carrasco et al. (2002), Evans (2013), Evans and Webster (2013), Nichols and Pool (2012), Sanders et al. (1979), Scarborough and Clark (2007), Sharer and Traxler (2006), and Williams and Maldonado (2016). For contextual background and useful but dated overviews, see Wauchope's (1964–1976) *Handbook of Middle American Indians* (16 vols.) and Weaver's (1993) classic textbook treatment.

Geography and Ecology

Ecological factors – the physical and biological environments, topography, altitude, hydraulic and mineral resources, native flora and fauna, cultigens, and human resources – played a significant role in the flowering of Mesoamerican cultures during the Classic period (Sanders et al. 1979). For purposes of presentation and discussion, Mesoamerica is divided into the following geographical units: Central Highlands, West Mexico, Gulf Coast Veracruz, Valley of Oaxaca, and Lowland Maya and Highland Maya. Some scholars further divide the Maya area into four principal geographic zones: (1) the Pacific coastal plain and piedmont which merge into (2) the northern highlands in contemporary Guatemala and Chiapas which merge into (3) the southern and central lowlands, or Petén, and further north into (4) the northern or Yucatán lowlands.

Major Classical Period Polities

Central Highlands

The Central Highlands during Mesoamerican Classic period (200–550) is characterized by city-states in the Basin of Mexico and adjacent regions and West Mexico (Carrasco et al. 2002; Cowgill 2015; Evans 2013; Kolb and Sanders 1996; Sanders et al. 1979; Scarborough and Clark 2007). Teotihuacan, a civic-ceremonial center located in a valley of the same name in the northeastern Basin of Mexico, was established ca. 100 BCE and with continuous construction through 450 grew to become the sixth largest city in the world. Teotihuacan's initial inhabitants had an Otomi ethnic origin but included multiethnic immigrants who came from areas influenced by Teotihuacan civilization, including Zapotec, Mixtec, and Maya peoples, as well as Nahuas and Totonacs. The city encompassed 24.5 km^2 and had at least 125,000 residents (with possibly as many as 200,000 inhabitants) at its apogee; the immediate rural area also included 134 other habitation sites (varying from farming hamlets to large nucleated towns) with an additional 40,000 persons. The city, center of a pan-Mesoamerican empire established through commerce and military conquest, was also supported by political, religious, and socioeconomic linkages to other centers located in the Gulf Coast, the Yucatan Peninsula, Valley of Oaxaca, and West Mexico. For centuries Teotihuacan was the dominant power in the Basin of Mexico, and the empire encompassed an area that reached north as far as the present-day US

Southwest, west to the Pacific coast, east to the Gulf of Mexico, and south as far as Honduras. Teotihuacán's influence in Mesoamerica was of three types: political-military, economic, and ideological-religious. Politically and militarily the city directly ruled most of the central highlands, including the densely populated Basin of Mexico, which saw the population increase dramatically due primarily to immigration from outlying areas that were encompassed within the polity.

Multi-ethnic Teotihuacan society had a well-defined social stratification, monumental architecture, temple pyramids, palaces, platforms, plazas, altars, terraces, more than 2200 multi-family residential complexes with patios and surrounding rooms, tombs for royalty, mortuary caches, and extensive craft specialization in stone working (obsidian), jewelry, pottery, and textiles. Major site features include the Pyramid of the Moon, Pyramid of the Sun, Ciudadela (Citadel), Temple of the Feathered Serpent, and Gran Conjunto (market) all situated along the city's main north-south axis the Avenue of the Dead. In addition to large-scale urban planning, Teotihuacan's unique architecture featuring the *talud-tablero* (inward-sloping surface or panel called the *talud*, with a panel or structure perpendicular to the ground sitting upon the slope called the *tablero*) was commonly used in platforms, temples, and pyramids in pre-Columbian Mesoamerica and became popular in the Early Classic Period of Teotihuacan. The *talud-tablero* is also found on buildings in Maya regional centers (Tikal, Kaminaljuyu, Copán, Becan, and Oxkintok) and Petén Basin sites influenced by Teotihuacan's commerce and conquest. Maya hieroglyphs on stelae for the year 378 document Teotihuacan's conquest of Tikal while year 426 designated the conquest of Copán and Quiriguá. Other Classic period traits are water-control technologies, a distinctive polychrome mural art, and the control of obsidian resources (hence, tool fabrication and distribution). Teotihuacan was also distinguished by its ceramic assemblage – both produced locally and imported – as well as fired clay artifacts including figurines and small incense burners made in local workshops and large elaborate censers made in workshops controlled by elite priests. Droughts and climate change beginning in 535–536 (supported by dendrochronology and ice core analysis) caused malnutrition. An internal uprising ca. 550 or later resulted in the sacking and burning of elite residences and defacing of major monuments along the Avenue of the Dead. Nearby centers such as Cholula, Xochicalco, and Cacaxtla competed to fill the power void left by Teotihuacan's decline.

Xochicalco in western Morelos was initially occupied in 200 BCE, but the Olmeca-Xicalanca (Maya traders from Campeche) founded a fortified city-state with a major urban center during Epiclassic (650–900). The site has step-pyramid temples, palaces, three ballcourts, sweat baths, circular altars, and an astronomical observatory and served as a commercial center with craft production emphasizing obsidian. It was later burned and destroyed and then abandoned and recolonized ca. 1200 by Nahua-speaking Tlahuica. Cacaxtla, located in Tlaxcala, prospered during the Epiclassic Classic (650–900) as the capital of a region inhabited by the Olmeca-Xicalanca. It is best known for colored murals painted in Maya style combing the symbolism of Teotihuacan with Maya, Mixtec, and Totonac influences.

Cholula in the Puebla-Tlaxcala Valley was occupied from the Early Formative period through Postclassic, serving as a Late Classic regional center (500–700). During this period, Cholula was a major center contemporaneous with Teotihuacan but avoided that city's fate of violent destruction at the end of the Classic period. Classic period Cholula had a maximum extent of 5 km^2 and estimated population of 15–20,000. The Great Pyramid of Cholula is the largest archaeological pyramid (temple) in the New World (400 $\times$ 400 m) built in an architectural style linked to Teotihuacan and El Tajin. Cholula reached its maximum size and population during the Postclassic period.

West Mexico

In West Mexico, the Bajío tradition, a regional culture identified in Guanajuato, Zacatecas,

Querétaro, Colima, Nayarit, Hidalgo, Mexico, Michoacán, and Guerrero has an Early Classic apogee (Williams and Maldonado 2016). Late Classic evidence is noted in Morelos, Tlaxcala, and Puebla, and an Epiclassic is reported in Morelos and Tlaxcala. The Bajío tradition is characterized by small city-states or kingdoms with architecture and ceramic works distinct from other Mesoamerican cultures. Trade networks, ballcourts, circular structures, sunken patios, and double temples are features of this tradition. In the Late Classic, the small city-states declined and collapsed as the result of the overexploitation of the surrounding deciduous rainforest and much of the region was abandoned by ca. 900 as the Postclassic Toltec city of Tula arose. West Mexico (Nayarit, Jalisco, and part of Colima) is also the region of a lesser-known Teuchitlan tradition which spans the Early-Middle Formative through Postclassic eras (300 BCE-CE 900) with an Early Classic 200–400 abruptly terminated by the end of the Classic by the ascent of the Postclassic Tarascan state. It was a ranked state society but politically fragmented. The major Teuchitlan site Los Guachimontones had multi-level circular step pyramids, rectangular plazas, ballcourts, shaft tombs, and obsidian workshops. One of the most important innovations in Mesoamerica during the Late Classic or Epi-Classic periods was copper metallurgy.

Lowland and Highland Maya

Independent Classic Maya centers developed in the Yucatecan Lowlands and Highlands during the Early Classic period (200–600) within the modern Mexican states of Yucatan, Campeche, and Quintana Roo and nations of Belize, Guatemala, and western Honduras. This era is considered the apogee of Maya civilization (Carrasco et al. 2002; Coe and Houston 2015; Houston and Inomata 2009; Sharer and Traxler 2006). These polities are characterized by small spatially and demographically independent centers in the form of city-states or kingdoms with dynastic rulerships, well-defined social stratification, civic-ceremonial centers, and monumental architecture (temple pyramids, palaces, platforms, plazas, altars, stelae, ballcourts, terraces, residential complexes – some with patios and surrounding rooms, tombs and sarcophagi for royalty, mortuary caches, mural painting, sacbes (causeways), water-control technologies, and craft specialization in stone working (flint, obsidian, and greenstone), jewelry, pottery (polychrome ceramics), and textiles. Notable unique features include distinctive writing and calendric systems, hieroglyphics, scholarly astronomical reckonings, dated monuments, and corbelled vault architecture. The troubled period of 650–900 that followed the break-up of the great Mesoamerican states such as Teotihuacan, Monte Albán, La Quemada, Palenque, and Tikal. This period, from ca. 650 to 900, is known as the Epiclassic period. The Late Classic period (650–900) is represented in sites within Yucatan, Chiapas, and Guatemala.

Major Early Classic Maya centers include Calakmul, Caracol, Chunchucmil, Copán, Palenque, Quiriguá, Tikal, Uaxactun, and Yaxha. Major Late Classic Maya centers were Aguateca, Cancuen, Cobá, Dos Pilas, La Blanca, Pusilhá, Toniná, Uxmal, Waka', Xultún, and Xunantunich.

Terminal Classic Maya area centers include the following: Puuc Region (Kabah, Labna, Sayil, and Uxmal) and Petén Basin (El Chal and Seibal).

Valley of Oaxaca

The Zapotec civic-ceremonial-citadel site of Monte Alban is located in the central section of the Valley of Oaxaca at an easily defended location where the northern Etla, eastern Tlacolula, and southern Zimatlán and Ocotlán valley branches converge. It was founded toward the end of the Middle Formative period (ca. 500 BCE), and by the Terminal Formative (ca.100 BCE–CE 200), Monte Alban had become the capital of the large-scale expansionist polity that dominated much of the Oaxaca highlands (Kolb 2011; Marcus and Flannery 1996; Sanders et al. 1979). Monte Alban had its apogee ca. 700–900; thereafter Early Postclassic Mitla (900–1400) and then Late Postclassic Zaachila (1400–1521) attained control (Coe and Houston 2015; Houston and Inomata 2009). The ancient capital was largely abandoned by 800–950. Monte Albán's Classic period is characterized by Oto-Manguean languages, an Early

Classic (200–500) expansion by colonization and conquest, and a Late Classic (500–750) which incorporated Teotihuacan deities (Feathered Serpent, Butterfly God, and Rain/Storm God) and the Nahuatl god of spring Xipe Totec. Other cultural features included dynastic rulership and social stratification; civic-ceremonial centers and monumental architecture with temple pyramids, palaces, platforms, plazas, altars, ballcourts, terraces, dams, canals, and residential complexes; 170+ tombs for royalty; mortuary caches; and craft specialization in stone working (flint, obsidian, and greenstone), jewelry, pottery, and textiles. The Great Plaza (ca. 300 × 300 m) has civic-ceremonial and elite-residential structures located around it or in its immediate vicinity, with 300+ carved stone monuments (*Danzantes*). Other unique features are a glyphic writing system, calendrical notation, and ancestor worship.

Gulf Coast Veracruz

Gulf Coast Classic culture is centered on northern and central areas of present-day Veracruz state and existed during the Early and Late Classic (100–1000 CE) exemplified by the site of El Tajin with its unique Pyramid of Niches and smaller regional centers at Cerro de las Mesas, Higueras, Nopiloa, Remojadas, and Zapotal (Coe and Houston 2015; Sharer and Traxler 2006). This culture is characterized by heightened militarism, human sacrifice, and the Mesoamerican ballgame (22 ballcourts at El Tajin). Other characteristics include elite hereditary rulership, social stratification, monumental architecture and sculpture, (temple pyramids, palaces, plazas, and altars), residential complexes, trade networks, and craft specialization in stone working and pottery (figurines).

Cross-References

- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Monte Albán (Zapotec): Geography and Culture
- ▶ Teotihuacan (La Ventilla): Field Method
- ▶ Tikal (Maya): Geography and Culture

References

Carrasco, D., L. Jones, and S. SESSIONS, eds. 2002. *Mesoamerica's classic heritage: from Teotihuacan to the Aztecs*. Boulder: University Press of Colorado.

Coe, M.D., and S.D. Houston. 2015. *The Maya*. 9th ed. London: Thames and Hudson.

Cowgill, G.L. 2015. *Ancient Teotihuacan: Early urbanism in central Mexico*. Cambridge/New York: Cambridge University Press.

Evans, S.T. 2013. *Ancient Mexico and central America: Archaeology and culture history*. 3rd ed. London: Thames and Hudson.

Evans, S.T., and D.L. Webster. 2013. *Archaeology of ancient Mexico and central America: An encyclopedia*. Hoboken: Taylor &Francis.

Houston, S.D., and T. Inomata. 2009. *The classic Maya*. Cambridge/New York: Cambridge University Press.

Kolb, C.C. 2011. Continued developments in the Oaxaca Valley and the early form of Monte Alban (8000 BCE-300 CE). In *World history encyclopedia: Era 3: Classical traditions,1000 BCE-300 CE*, ed. A.J. Andrea, W.E. Mierse, and K.M. McGeough, vol. 5, 66–69. Santa Barbara/London: ABC-CLIO.

Kolb, C.C. and W.T. Sanders. 1996. The surface survey: Classic period settlement patterns in the Teotihuacan Valley. In *The Teotihuacan Valley project final report,* ed. W.T Sanders, 3(3), Occasional Papers in Anthropology, 21: 484–653. University Park: Pennsylvania State University. [Synthesis of Kolb 1979, *Classic Teotihuacán period settlement patterns in the Teotihuacán Valley, Mexico*, 2 vols. Unpublished Ph.D. dissertation. University Park: Pennsylvania State University, xvii + 583 pp.].

Marcus, J., and K.V. Flannery. 1996. *Zapotec civilization: How urban society evolved in Mexico's Oaxaca Valley*. New York: Thames & Hudson.

Nichols, D.L., and C.A. Pool, eds. 2012. *The Oxford handbook of Mesoamerican archaeology*. Oxford/New York: Oxford University Press.

Sanders, W.T., J.R. Parsons, and R.S. Santley. 1979. *The basin of Mexico: Ecological processes in the evolution of a civilization*. New York: Academic.

Scarborough, V.L., and J.E. Clark. 2007. *The political economy of ancient Mesoamerica: Transformations during the formative and classic periods*. Albuquerque: University of New Mexico Press.

Sharer, R.J., and L.P. Traxler. 2006. *The ancient Maya*. 6th ed. Stanford: Stanford University Press.

Wauchope, R. 1964–1976. *Handbook of middle American Indians*, 16 vols. Austin: University of Texas Press.

Weaver, M.P. 1993. *The Aztecs, Maya, and their predecessors: Archaeology of Mesoamerica*. 3rd ed. San Diego: Academic.

Williams, E., and B. Maldonado. 2016. *Cultural dynamics and production activities in ancient western Mexico: Papers from a symposium held in the Center for Archaeological Research, El Colegio de Michoacán 18–19 September 2014*. Oxford: Archaeopress.

Mesoamerica in the Preclassic Period: Early, Middle, Late Formative

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State of Knowledge and Current Debates

Introduction

In 1943, Paul Kirchoff introduced the term Mesoamerica to identify a culture area that, at the start of the Spanish Conquest around 1519, was occupied by numerous indigenous societies who shared a suite of collective cultural and linguistic practices (Kirchoff 1943). His purpose was to provide a conceptual and spatial entity for anthropologists and archaeologists to organize the study of these societies. Initially, the boundaries of the area were based on linguistic and ethnographic information that existed at the time of European arrival. Since then, archaeological and anthropological research has added substantial new data that have modified the meaning and use of the term to more accurately represent and define the region. Today, Mesoamerica is recognized as a complex cultural concept whose spatial boundaries expanded and contracted as shared cultural practices ebbed and flowed across time and space (Clark 1997: 216).

Mesoamerica was a cultural hearth where numerous linguistic and ethnic groups emerged and evolved. These individual groups shared a suite of common traits and characteristics that included calendar systems and astronomical observations, a ballgame played with a rubber ball, ritual activities such as human sacrifice and self-immolation, ancestor veneration, deity worship, shamanism, and maize agriculture among others. Not every group practiced all of the cultural facets or to the same degree, but most participated to a level sufficient to be considered part of the culture area. Spatially, the boundaries of Mesoamerica were dynamic not constant or fixed. As processes of fission and fusion occurred among and between societies, the margins of Mesoamerica expanded and contracted. Thus, the boundaries of the Mesoamerican culture area were dependent upon the temporal period under consideration.

As a cultural continuum, Mesoamerica began to emerge during the transitional period between the late Archaic (c. 3500 BC) and the Early Preclassic period (c. 2000 BC). It was during this time that the move toward sedentary, agriculture-based societies allowed for the initial development of cultural traits and characteristics that would come to distinguish Mesoamerica. By the end of the Preclassic period (c. AD 150–250), social stratification, subsistence systems, worldviews, and other societal elements would be commonly practiced across many portions of an expanding Mesoamerica. This development would continue, unevenly, through to the Classic (c. AD 250–1000) and Postclassic periods (c. AD 1000–1519), when Mesoamerica would reach its greatest extent encompassing the north-central latitudes of Mexico to the south and southeast through Guatemala and Belize, portions of Honduras, El Salvador and Nicaragua, to the Gulf of Nicoya in Costa Rica (Gossen et al. 2007; Canto Aguilar and Castro Mendoza 2010) (Fig. 1).

The interregional consistency in the adoption and presentation of these sociopolitical and ideological elements is remarkable when one considers that Preclassic Mesoamerica was culturally, linguistically, and environmentally diverse (Clark et al. 2010: 4; Reilly 1995). These settlements occurred in detached, distant localities that formed "an archipelago of complexity," areas of higher social complexity that were interspersed

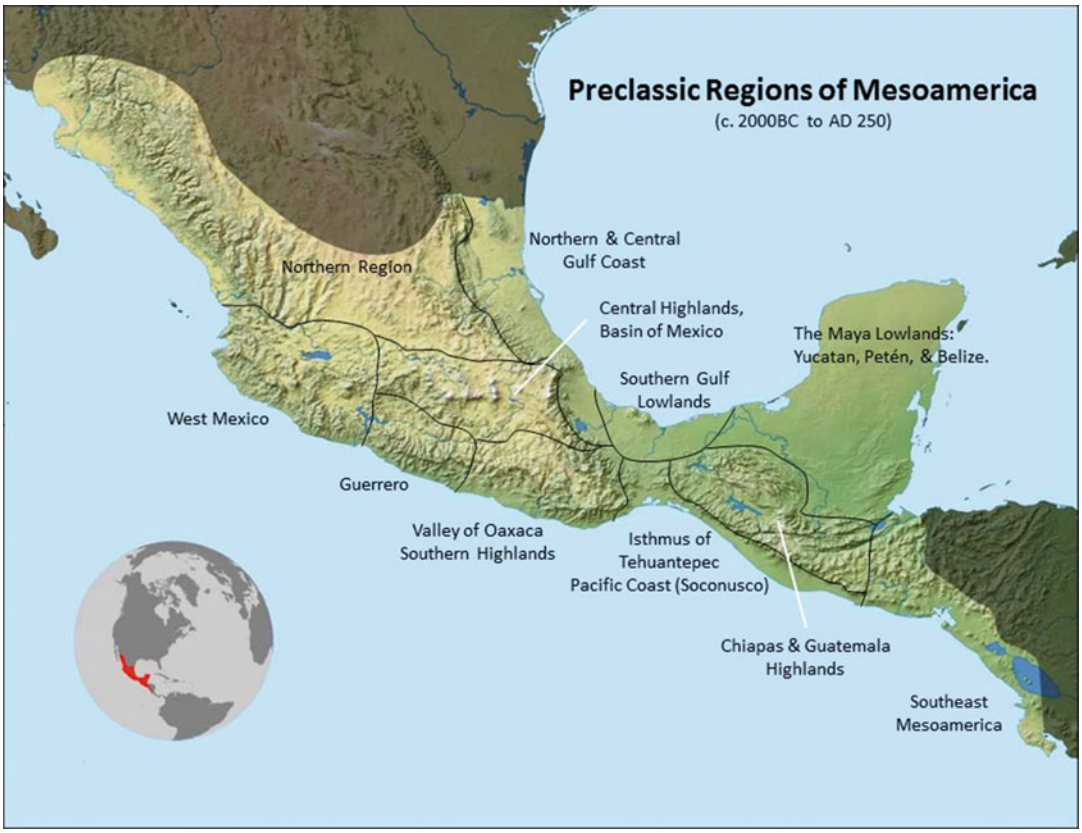

Mesoamerica in the Preclassic Period: Early, Middle, Late Formative, Fig. 1 Map of Mesoamerica with regions mentioned in text identified

across the landscape (Rosenswig 2010: 7). These locations were probably connected through elite interaction that took the form of long-distance exchange and acquisition networks for objects and goods (e.g., obsidian, jade, iron-ore, shell, and iconic ceramic vessels and figurines) that had been in place prior to the Early Preclassic period (Clark 1991; Flannery 1976). Over the period different, geographically oriented interaction spheres were established and maintained by numerous, rapidly emerging, socially complex polities.

A key question regarding the development of Mesoamerica involves how these various traits and characteristics emerged, evolved, and spread. Theorists portray the development of sociopolitical complexity as a process in which environmental, social, political, economic, ideological, and demographic variables acted independently or in combination to bring about change. Thus, Mesoamerica is best understood as a mosaic of individual pieces that, on the surface, may exhibit differences in adaptation and practice but are all bonded to an underlying framework by a socially consistent template. Interpretive difficulties have been a result of disparities in the extents and intensities of regional research programs. For example, the Maya have been rigorously investigated for more than a century and a half, but researches into the cultures of West Mexico are only recently gaining recognition (Beekman 2010; Pollard 1997; Williams 2004). The findings of West Mexican archaeological research are also changing perceptions of its role in the

development of Mesoamerica and its relationship to other regions.

One explanation for the adoption and distribution of cultural traits may be seen in the long-distance exchange and acquisition of goods and materials. The procurement of utilitarian items can be expected and is known to have occurred prior to the Preclassic period. The presence of non-local, non-utilitarian items (e.g., elite-related goods of jade, marine shell, amber, or iconic ceramics) during the Preclassic, however, raises questions as to their transport, significance, and purpose. Jade is an excellent example of a geographically diagnostic material that has been uncovered across Preclassic Mesoamerica. Note that Mesoamerican jade (jadeite) is a geological product and its only known source is the Motagua River Valley in Guatemala, but its pan-Mesoamerican presence extends from West Mexico (Beekman 2010; Mountjoy et al. 2004) to Costa Rica (Jones 1998). The distribution and pervasiveness of this material required complex long-distance interactions. Often, similar greenstones (e.g., serpentine, quartz, greenschist, chlorastrolite, or olivine) are often referred to as "social" jade more common and are found naturally across Mesoamerica.

By the Preclassic period, the content of the interregional networks had expanded beyond purely economic relationships to one that conveyed a suite of sociopolitical, technical, and ideological components as well. The items, technologies, and ideas that moved through these networks cross-cut a diversity of ethnic groups across an uneven physical landscape (Reilly 1995: 29). The materialization of some or all of these elements by a settlement's leadership could be used to support, facilitate, and validate their courses of civil action (see Helms 1979, 1993). Public displays of exotic objects, performance of highly ritualized ceremonies, and construction of architectural features were ways in which Preclassic leaders substantively demonstrated their acceptance of the principles borne within the interaction sphere and used them to advance their position within society (Reilly 1995; Smith and Masson 2000: 363). Participation enabled elite leaders to accumulate wealth and power by making exotic prestige items and valued commodities accessible to peers and constituents (Pool 2007: 290–293) and were used to construct and shape the social hierarchy (Hirth 1992). For these socioeconomic reasons, there was an increase in participation that intensified the demands for esoteric and exoteric demonstrations of power and privilege (Cheetham and Blomster 2010; Diehl and Coe 1995: 23; Grove 1993: 97–102; Grove 2007: 220).

Debate regarding the role of the Olmec of the Southern Gulf Coast lowlands during the Preclassic period has transpired for nearly a century (de Antropología 1942; Blomster et al. 2005; Diehl 2000, 2004; Flannery 1968; Graham 1989; Lowe 1998; Pina-Chan 1989; Pool 2007; Sharer and Grove 1989). The Olmec have been credited with a number of Mesoamerican "firsts" (e.g., the first established complex society, the first great Mesoamerican art style, the earliest monumental public works programs, the first city, and arguably the first state). Details of these unprecedented features have been argued. Nevertheless, there is little question that the ancient Gulf Coast Olmec played a key role in the development of Mesoamerica as a culture area (see Pool 2007; Cheetham and Blomster 2010; Clark and Pye 2000; Coe et al. 1995; Coe and Koontz 2013: 61; Diehl 2004).

The Olmec are an archaeological culture identifiable in the archaeological record by a shared array of concepts, values, and practices that established a communal worldview and imparted meaning to their cultural and physical surroundings. The Gulf Coast Olmec were not a homogeneous or uniform entity across space and time, however. Perceived similarities in style and symbolism led to an early, simplistic view of the Olmec as a static, monolithic entity; whereas recent investigations show that local elites and leaders of sociopolitical centers along the coast selectively employed various traits and characteristics to meet the demands of their constituency (Diehl 2004; Doering 2007; Pool 2007). In the latter stages of the Preclassic period, they may have even altered their form of government in order to extend the survival of their society (Wade 2017a).

Timeline of Mesoamerica

"In the late nineteenth century, there was really no idea at all of the sequence of development in pre-Spanish Mexico" (Coe and Koontz 2013: 39). We now know that prior to the establishment of Mesoamerica as a culture area, humans had occupied the region for millennia (Coe and Koontz 2013: 18–38). Although the date for initial occupation remains under debate, it is generally agreed that the age of Paleo-Indians or Early Hunters lasted until roughly 7000 BC, when small nomadic bands of hunter gathers roamed the territory. During the ensuing Archaic period (c. 7000–2000 BC), people began to domesticate food plants including maize, which would become the mainstay of the Mesoamerican diet. Mesoamerica as a social entity can arguably be said to have begun around 2000 BC, when more sedentary village life took hold, ceramics were introduced, and common cultural traits and characteristics began to emerge.

The chronology of Mesoamerica is divided into three primary segments: the Preclassic (c. 2000 BC–AD 250), Classic (c. AD 250–1000), and Postclassic (c. AD 1000–1519) periods. Unfortunately, these terms can be misleading and are not representative or consistent across the region. Early investigations of Mesoamerica were focused on prominent, visible architectural remains at sites like Teotihuacán, near Mexico City; Monte Albán, in Oaxaca, Mexico; Maya centers, such as Uxmal and Chichén Itzá in the northern Yucatan Peninsula; and Tikal and Copán in Central America (e.g., Caso 1932; Morley 1913, 1917; Thompson 1966). Because of the narrow scope of these initial explorations, broad generalizations regarding the timing and formational processes of the social development at these sites were articulated and applied to all of Mesoamerica. Subsequent research, however, has found that these terms were not appropriate for many other Mesoamerican cultures that had developed along different chronological and cultural trajectories.

The initial simplistic, and ultimately mistaken, belief was that a "golden age" or Classic period was Mesoamerica's cultural highpoint that included planned cities, architectural complexes, hieroglyphic writing systems, development of solar and ritual calendars, monumental artistic achievement, a pantheon of deities and ritualized religious practices, long-distance exchange systems, and advanced agricultural techniques. It was also thought that this cultural zenith had been preceded by a formative phase when naïve societies began to slowly emerge and develop, thus the term the Preclassic. Following the golden era, it was believed that Mesoamerica had experienced an interval of cultural decline called the Post Classic. Recent investigations have demonstrated, however, that most, if not all, of these presumed "Classic" features had actually occurred earlier, in the Preclassic, and that many societies continued or began a rise to prominence during the Postclassic. Therefore, Preclassic, Classic, and Postclassic are now used only as chronological markers, not as descriptive elements of a developmental sequence.

The focus here is on the Preclassic, a chronological designation that spans roughly from 2000 BC to AD 250. This period is also referred to as the Formative period, a 1960s term that was introduced to better express the changes in the material culture (Grove 2007: 213). These two terms are often used interchangeably, but it can be noted that the former is essentially used in reference to the Maya, whereas the latter is largely used as a descriptor for non-Maya regions of Mesoamerica. Nevertheless, there is no hard and fast rule on their use.

Subdividing the Preclassic period into shorter chronological segments varies according to several factors (e.g., radiocarbon (calibrated or uncalibrated) or astral/calendric dating). A generally acceptable partitioning is: Early (c. 2000–1000 BC), Middle (c. 1000–400 BC), and Late (c. 450 BC–AD 250). In turn, these timespans can be separated into more concise durations; for example, late Early Preclassic (c. 1250–1000 BC), early Middle Preclassic (c. 1000–750 BC), or middle Late Preclassic (c. 200 BC–AD 50). In this essay, the term Preclassic is used to describe the entire period from c. 2000 BC to AD 250, while Early, Middle, and Late Formative are used to identify the primary chronological subsegments. Please note, however, that these sequential divisions are arbitrary

chronological markers or guidelines that vary according to the researcher, the ancient society, or the geographic region.

Terminology aside, the Preclassic period was one of the most dynamic in Mesoamerican history. It was a transformative era that saw the emergence, establishment, and dissemination of unprecedented social, political, and economic practices along with ideological conventions and materializations that would serve as the framework upon which all subsequent Mesoamerican societies would be based. During the Preclassic, there were profound transitions that affected every aspect of society (Coe and Koontz 2013: 18–58). Nomadic, egalitarian bands and incipient agricultural societies that had existed for millennia, during the earlier Paleo-Indian and Archaic periods, began a rapid change toward a more sedentary lifestyle in socially ranked villages. The focus of subsistence systems was on full-time agriculture. Populations grew exponentially, and economic specialization and long-distance acquisition of goods and materials expanded. Either as a result of these changes or as a driving factor behind them, the appearance of hereditary inequality and the development of complex societies facilitated the large-scale socioeconomic conversions (see Clark and Blake 1994; Earle 1991; Redmond 1998).

Prelude to the Preclassic Period

The Preclassic period in Mesoamerica was part of a cultural continuum that had begun much earlier. It persisted through the Classic and Postclassic periods, and portions continue to endure today in many parts of Mexico and Central America (Chambers 1977; Gossen et al. 2007). To better understand the changes that influenced or impacted the social, economic, and political transformations that occurred during the Preclassic, consider what had transpired prior to this time. Although details about the Archaic period (c. 7000–2000 BC) in the area of what would become Mesoamerica remain murky, basic knowledge of ancient social structures and subsistence systems illustrate the contrasts in social organization and the conversion of lifeways that would take place in the Preclassic period (Clark and Cheetham 2002). During the Archaic to Preclassic period transition, there was a fundamental change from a seminomadic lifestyle of hunting, fishing, gathering, and incipient agriculture that were characteristic of the Archaic period, to sedentary villages primarily dedicated to full-time agriculture (Michaels and Voorhies 1999; Voorhies 2004). The clan or band-level social structure associated with the Paleo-Indian period gave way to the tribal structure in the Archaic period. By the Preclassic, ranked and stratified societies would become the norm.

These changes may, in part, be attributable to the fact that the beginning of the Archaic Period in Mesoamerica (c. 7000 BC) corresponded with major climatic and ecological deviations including the onset of the Holocene Climate Optimum (HCO), a significant warming period. Concomitant with the HCO was the disappearance of numerous species of large game animals (e.g., mammoth, mastodon, giant bison, ground sloth, camels, and horse) (Prescott et al. 2012). Rapid cultural and material adaptations to these new realities were required for human survival. Subsistence methods turned to the hunting of smaller game and a greater reliance was placed on marine and estuary resources (Lesure 2011; Rosenswig 2006; Voorhies 2004). The collection of specific plant foods increased along with the initial appearance of plant domestication. These modifications meant less travel that allowed more time to be spent in the more productive areas. The combination of these factors may have facilitated the transition to the fully sedentary lifestyle that became the norm in the Preclassic period.

The Early, Middle, and Late Formative periods each witnessed significant, discrete socioeconomic changes. Recent research suggests that major deviations, such as the move to sedentary village life, the appearance of stratified societies, and hereditary inequality did not occur universally or simultaneously across Mesoamerica (Elson 2012; Feinman 2001; González and Winter 2010; Lesure 2011; Niederberger 2000; Williams 2004; Zeitlin and Zeitlin 2000). The origins and expansion of cultural characteristics, technologies, and beliefs were spatially uneven and

temporally irregular. This information precludes the broad generalizations about pan-Mesoamerican occurrences that had previously been established and indicates that an examination of the Preclassic period could be facilitated by observing major changes and events from a synchronic, regionally focused approach.

The Early Preclassic Period (c. 2000–1000 BC)

During the Early Preclassic or Formative period, the characteristic traits that would come to distinguish Mesoamerica as a culture region were materialized. Patterns of social behavior emerged in small, agriculturally based, autonomous tribal villages that were widely scattered across the landscape: along the Pacific coast of Chiapas and Guatemala; the southern Gulf Coast lowlands of Veracruz and Tabasco; the central Mexican highlands including the Basin of Mexico, Morelos, and Puebla; the Valley of Oaxaca; and the highlands and coasts of West Mexico. Incipient ceramic technologies (e.g., slips, pastes, forms, and decorations) and interregional long-distance acquisition routes foreshadowed more complex political economies and developing social inequality. Egalitarian societies sporadically gave way to rank societies where the production, distribution, and consumption of goods and materials were controlled, to some extent, by emergent elite rulers (Clark 1991).

As population centers emerged and evolved during the Early Formative period, the presence of increasing social complexity was expressed in a variety of ways that included artistic and material articulations of wealth, authority, and ideological beliefs. Nevertheless, for all of the regional diversity of expression, there was an underlying uniformity in cultural features and attitudes (e.g., social structures, time keeping, shamanic beliefs and practices, and subsistence systems). The changes were sporadic, however. The timing and degree of change was largely related to the interaction spheres in which people participated. An example of this irregularity is illustrated through a basic regional comparison.

West of the Isthmus of Tehuantepec, small widely dispersed highland villages were primarily dependent upon maize agriculture. Their ceramics and architecture were modest and utilitarian, and social complexity was not readily apparent. To the east of the Isthmus, denser settlement patterns included larger villages with elite residences and ball courts. Ceramics were exceptionally well-made, highly decorated, and varied in form. Beside a utilitarian function, they served as elite vessels for rituals and feasting. The subsistence system included root crops, maize agriculture, and a significant use of wild and natural resources. The development of simple chiefdom societies led by shaman-chiefs is suggested by differential access to goods and resources.

The Soconusco Coast

The emergence of chiefdoms as a political entity represented a key shift in the type of sociopolitical organization seen in early Mesoamerica. Social ranking of individuals was determined by their perceived genealogical distance from the chief whether it be consanguinal (blood ties), affinal (marriage relations), or fictive (fabricated). In this type of social arrangement, the ruler and the community were united within a social network of mutual obligation that was reinforced through economic interdependence and factional commitments (Lesure 2011).

One of the earliest, well-documented appearances of chiefdoms in Mesoamerica took place among the Mokoya, a Mixe-Zoquean speaking culture, centered in the Mazatán region of Pacific coastal Chiapas, known as the Soconusco (Blake 1991, 2011; Clark and Pye 2006). Changes in the regional settlement patterns led to Paso de la Amada becoming the largest in a centralized cluster of villages that were some of the earliest in Mesoamerica. The emergence of social and economic disparities is demonstrated by variations in residences, burial practices, and the presence of exotic and crafted artifacts (Blake et al. 2006; Clark and Pye 2006; Lesure and Blake 2002). These objects were elite goods that signal the existence of a political economy directed by the chiefly elite, who exerted control over their access, production, and distribution.

The earliest ceramic traditions of the Mazatán region of Pacific coastal Chiapas, Mexico were arguably the benchmark of Early Formative

period artisanship (Lesure 1998). The Barra phase (c. 1800–1650 BC) witnessed the initial settlement across the area and the first regional appearance of pottery. Barra phase ceramic vessels were sophisticated in their production, design, and decoration (Clark and Gosser 1995). Additionally, two architectural features at Paso de la Amada demonstrate its development as an early chiefdom society (Clark and Pye 2006). The "Chief's House" (Mound 6) was a broad platform that supported a residence several times larger than the average in the village. The platform and its superstructure were rebuilt in the same location on at least six different occasions over a 200- to 300-year span. Recent interpretations suggest that the structure served both domestic as well as public purposes and was the center of the settlement's ceremonial zone (Blake 2011).

The second major architectural feature at the site was the presence of the earliest known ball court in Mesoamerica (Hill et al. 1998; Hill and Clark 2001). The rubber ballgame is a primary element in Mesoamerican tradition and its role in ancient, historical, and modern times is significant (see Scarborough and Wilcox 1991). The ballcourt, initially constructed and remodeled between 1400 and 1250 BC, was composed of two parallel mounds bordering a 77 m-long alleyway. The essential characteristics of this design would be generally adhered to in all later Mesoamerican ballcourt construction, indicating that by the Early Formative period a fundamental Mesoamerican architectural concept had already been articulated.

Another site, not far from Paso de la Amada, is Cantón Corralito that requires attention due to its distinctive long-distance association with the Olmec of the Southern Gulf Coast. Work by David Cheetham has shown that, during the later stages of the Early Formative period, Cantón Corralito was established as a colony of the Olmec capital of San Lorenzo, located 400 km to the northwest (Cheetham 2005, 2007, 2010). The site's initial occupation dates back to the Late Archaic period (c. 2500–2000 BC) and continued through Early Formative period (c. 1600–1000 BC). The site was destroyed near the end of this period by severe river flooding that inundated the site and buried it under meters of alluvium. The evidence-based interpretations of the activities and relationships of the site demonstrate an example of the influence of the Gulf Coast Olmec during the Early Formative period.

The Valley of Oaxaca

Developments that transpired in the Valley of Oaxaca provide another perspective on sociopolitical events of Early Formative Mesoamerica (Flannery 1976). Human occupation in the valley can be traced back at the Cueva Blanca rock shelter to least 10,000 BC, at Guilá Naquitz to c. 8900–6700 BC, and at Gheo-Shih to c. 5000–3000 BC. These sites may have foreshadowed the early Mesoamerican villages of the Preclassic period and provide evidence of occupational continuity in the region (Marcus and Flannery 2004). Unpredictable rainfall in the lofty valley (1,500 m elevation) led to unreliable wild food resources that encouraged highland foragers to adopt a more stable agricultural subsistence system (Flannery 1986). Domesticated maize, beans, and squash were present by the beginning of the Early Formative period in the permanent villages that dotted the sparse landscape. At San José Mogote and Tierras Largas, the presence of pottery from the Esperidión ceramic complex (c. 1900–1400 BC) is thought to be some of the oldest in Mesoamerica (Flannery and Marcus 1994). The simple vessels were utilitarian in nature and followed similar production methods as well as comparable form and function.

By the Tierras Largas phase (c. 1400–1150 BC), less than two dozen, small hamlets that consisted of small wattle and daub houses existed. The exception to this pattern was San José Mogote, which was about twice the average size in area and population (Flannery and Marcus 2005). During the San José phase (c. 1150–850 BC), the village was the center of a chiefdom and emerged as the ritual and economic hub of the valley. Within the developing social and political hierarchy, the elite controlled the procurement, production, and distribution of items crafted from local and distant materials (e.g., iron-ore, marine shell from the Pacific coast, and obsidian from central Mexico and Guatemala).

The presence of the earliest defensive palisade in Mexico, along with other evidence, suggests that the acquisition and maintenance of power and prestige in the valley required coercion or conflict with neighboring communities. This situation appears to be anomalous when considering other Early Formative period regions where allusion to warfare is, at best, questionable. Perhaps, due to the limited and restricted resources in the valley, the potential for conflict should not be unexpected, and the use of physical force would become a prominent part of the valley's subsequent history.

West Mexico

The beginning of the Early Formative period in West Mexico is considered a continuation of the preceding Archaic pattern. Hundreds of shell mounds were constructed along the coasts of Sinaloa and Nayarit and contained stone implements from an Archaic-style toolkit. Some of these mounds were immense, covering areas in excess of 3,000 m^2. Their size, shape, and construction have suggested that they were actually examples of monumental architecture as opposed to simply trash middens.

Many questions about West Mexico as culture region remain, and its perception has been obscured by a dearth of investigations. This situation is changing and recent research is beginning to fill-in the blanks (Beekman 2000, 2010; Williams et al. 2005). The region (i.e., the Mexican states of Nayarit, Jalisco, Colima, Michoacán, and the southern parts of Sinaloa, Zacatecas, Guanajuato, and Querétaro) followed an atypical cultural trajectory compared to other parts of Mesoamerica (Foster and Gorenstein 2000). Differences in cultural manifestations may be attributable to different linguistic traditions (Otomanguean, Purépecha, and southern Uto-Aztecan) (Beekman 2010). Additionally, variations can be partially ascribed to regional climatic and environmental conditions that required alternative ways of materializing similar Mesoamerican ideological beliefs.

By c. 1300 BC, shaft tombs at El Opeño, Michoacán were constructed and were significantly different from burial practices in eastern Mesoamerica (Beekman 2000). Their creators and their motivations remain obscure as tomb construction coincided with volcanic activity that covered the tomb sites and obscured the associated residential. Recent interpretations, however, have related tomb construction and content to shared pan-Mesoamerican themes related to the underworld and ancestor veneration. Evidence suggestive of auto-sacrifice has been uncovered, as have ceramic figurines of individuals wearing attire used in the rubber ballgame. These are notable indications of a broader Mesoamerican tradition that included West Mexico. Contemporaneous with El Opeño was the Capacha archaeological culture, in the state of Colima (Williams et al. 2005). Here, the earliest ceramic horizon for the Jalisco-Colima-Nayarit area were uncovered and included "stirrup-spout" vessels that suggest similarities with items found among the Tlatilco culture of the central Mexican highlands.

There was a comparatively late transition to agriculture, possibly as a result of an extended dry phase in West Mexico during the Archaic period. Ceramic traditions also appear later and have been associated with northwestern South America (e.g., the use of resist and red-on-brown decoration along with exotic bottle forms) (Anawalt 1998). West Mexican ceramic elements were also shared with sites like Tlatilco, in the Basin of Mexico, whose pottery exhibits ties to both the east and west Mesoamerica. West Mexico's participation in long-distance acquisition networks also demonstrates the two-way movement of materials and ideas. Jade (jadeite) from Guatemala's Motagua River Valley, iron pyrite mirrors suggestive of those from Oaxaca, and marine shell from the Atlantic Coast illustrate the scope of these socioeconomic systems. Obsidian exchange indicates the mutual nature of these transactions (e.g., green obsidian from Pachuca, Hidalgo, in central Mexico is present in West Mexico, and the jet black obsidian from the Ucareo source in Michoacán has been uncovered as far east as the Pacific Coast of Chiapas).

The Southern Gulf Coast Lowlands and the San Lorenzo Olmec

At the beginning of the Early Formative period (c. 2000–1800 BC), the southern Gulf Coast lowlands of Veracruz and Tabasco were subjected to climatic change, natural hazards, and landscape transformation (e.g., hurricanes, El Niños, La Niñas, annual inundations, and seismic and volcanic activity). It was also a region of exceedingly fertile and abundant flora and fauna. Village farming had extended northward across the Isthmus of Tehuantepec from the Soconusco Coast of Chiapas and was readily adopted in the Gulf lowlands. These two regions shared similar environmental and ecological similarities.

The Olmec of the Southern Veracruz lowlands were one of only a handful of "pristine" complex societies or civilizations that developed anywhere in the world without previous archetypes upon which to model their social structure (Diehl 2004: 11–12). Early Formative period San Lorenzo (c. 1500–900 BC), located on and around a plateau overlooking the Coatzacoalcos River in Veracruz, was the only one of these antecedent societies to emerge in a forested, tropical, lowland environment. The sui generis development of social complexity among the inhabitants of the Southern Gulf Lowlands constitutes a test subject for the study of social theory, both as a model and as a tool for evaluation (Coe and Koontz 2013: 61–72). The uniqueness of their appearance and environmental circumscription, plus the legacy of their cultural traits that were adopted by subsequent Mesoamerican societies, makes investigation of their social maturation critical to archaeological theorists.

Evidence of sedentary occupation along the lowlands included a sequence of the earliest regional ceramic horizons. The initial Ojochí phase pottery (c. 1500–1350 BC) bore similarities to materials from the Mazatán region along the Soconusco Coast. The Ojochí, along with Bajío and Chicharras phase ceramics (c. 1350–1150 BC), have been uncovered at sites along the San Juan and the Coatzacoalcos Rivers (i.e., El Marquesillo, Cuatotolapan Viejo, Estero Rabón-San Isidro, and San Lorenzo) (Coe and Diehl 1980; Doering 2007: 249–252). Although each of these sites would eventually become socioeconomic centers in their own right, it was San Lorenzo that would become the most important Early Formative period site in Mesoamerica.

The Olmec of the Southern Gulf Coast lowlands is an archaeological culture that emerged around 1500 BC, in the swampy lowlands of Veracruz, Mexico, along the northern edge of the Isthmus of Tehuantepec (Arnold 2009; Coe and Koontz 2013). These Olmec are credited with being the first established complex society in Mesoamerica, and it was at the site of San Lorenzo that they first demonstrated a suite of features and characteristics that would have a profound impact on contemporaneous and subsequent Mesoamerican peoples. The nature and extent of that impact has long been an issue of debate (de Antropología 1942; Blomster et al. 2005; Cheetham and Blomster 2010; Neff et al. 2006a, b; Sharer et al. 2006; Sharer and Grove 1989; Stoltman et al. 2005). Whatever one's position regarding the role of the San Lorenzo Olmec in the social development and ideological trajectory of Mesoamerica, their cultural, artistic, and monumental features that are demonstrated in the archaeological record are prodigious when compared to any other Early Formative period settlement.

Prior to around 1400 BC, San Lorenzo was a 20 hectare, egalitarian village located atop a 50 m high plateau adjacent to the Coatzacoalcos River in southeastern Veracruz. By 1100 BC, the village had evolved into, arguably, a state-level society and grown to at least 500 hectare (1,235 acres) with an estimated population of 10,000 and an additional 20,000–40,000 people living in the contiguous region (Clark 2004). The plateau had become a major urban center of political, economic, and religious power that headed a four-tiered settlement hierarchy. To demonstrate and support their claim to leadership, the elite controlled extensive interregional trade and acquisition networks, corps of highly skilled craftspeople, and a symbolic monumental art form that would become synonymous with their archaeological name (Benson and de la Fuente

1996; Cyphers 1997; de la Fuente 1992, 2000; Symonds 2000; Vega 2007). But for all its impressive and significant achievements, by the end of the Early Formative period, San Lorenzo would decline to relative insignificance.

Some 15 km southeast of San Lorenzo lies the site of El Manatí, an anaerobic spring used for the ritual deposition of offerings that included of wooden sculptures, rubber balls, jade celts, and other items, including infant burials (Ortíz and Rodríguez 2000; Rodríguez and Ortíz 1997). The offerings were deposited in three discrete phases: Manatí A (c. 1700–1500 BC); Manatí B (c. 1500–1400 BC); Manatí C (c. 1400–1200 BC), and each contained information regarding Olmec ritual practices during the Early Formative period (Ortíz and Rodríguez 1993). Several artifacts types are of particular note. Rubber balls used in the Mesoamerican ballgame were recovered from the Manatí A deposit making them the earliest examples known in Mesoamerica and were contemporaneous with the ballcourt uncovered in Paso de la Amada (see section "The Soconusco Coast" above). Numerous celts made of jade from the distant Motagua River Valley of Guatemala were also recovered from this initial deposit. The fact that these celts were exceedingly well made and extraordinarily highly polished suggests that the production and veneration of jade objects was a deeply rooted tradition that extends earlier in Mesoamerican history.

The Central Mexico Highlands

This region of Mesoamerica includes the modern Mexican states of Tlaxcala, Morelos, southern Hidalgo, central Puebla, and the Federal District (Mexico City). From a number of perspectives (e.g., geographic, geologic, and environmental), the region stands as a natural interface of the sociopolitical and economic traditions between east and west Mesoamerica. "People, goods, and ideas passed from one side to the other, and thus it holds many keys for our understanding of emerging social complexity in Mesoamerica . . .[and] the variation and dynamism of interregional interaction, including the formation of regional traditions, exchange systems, and foreign influence" are readily apparent (Plunket and Uruñuela 2012: 1).

The Central Highlands are also positioned to the north and south of Mexico's Neovolcanic Axis, which creates a geographic barrier to the opposing regions. At the same time, the broad deep valleys offer areas for the concentration of increasing populations in environmentally and ecologically productive zones. The presence of various natural resources were an attraction to external societies to the east and west, and thus facilitated long-distance interactions that enhanced the sociopolitical and economic development in the Highlands. Social inequality is evident, not only in the larger major center but also in the smaller villages and hamlets, where qualitative and quantitative differences in residential and burial goods mark the social structure (Carballo 2009; Uruñuela and Plunket 2002).

Generalized ceramic chronologies and reconstructions of the Preclassic period culture history in the Central Highlands were based on early twentieth century excavations at Tlatilco, Tlapacoya, and other sites in the Basin of Mexico (Gamio 1921; Vaillant 1930, 1931, 1935). More recent research, however, has revised many of the earlier assertions, finding sociopolitical differences to be more a factor of chronology as opposed to arrival of foreign elites (Niederberger-Betton 1987; Niederberger 1976; Tolstoy and Paradis 1970).

In Morelos, sedentary farming villages of 100–200 inhabitants were scattered across the Amatzinac Valley bottomlands during the Amate phase (c. 1500–1100 BC). During the Barranca phase (c. 1100–700 BC), the site of Chalcatzingo began to grow and emerge as a civic-ceremonial center that would reach its peak in the ensuing Middle Formative period (Grove 1987, 2008). The beginnings of landscape modification and architectural constructions at the site were coeval with its participation in what is referred to as the Tlatilco culture that developed between 1250 and 800 BC.

The Tlatilco culture has typically been closely associated with the Basin of Mexico and the sites such as Tlatilco, Tlapacoya, El Arbolillo, Zacatenco, Ticomán, and Cuicuilco and Coapexco, but recent research suggest its origins may actually be to the south, in the Morelos region

(Grove 2007). Ceramic connections with groups from West Mexico have also been observed (Williams 2004). During the period, stratified social structures corresponded to more elaborate settlement patterns and a substantial escalation in long-distance exchange that may account for a degree of the Gulf Coast Olmec art style present within the artifact assemblages.

The Maya Regions

During the Early Formative period, small, widely dispersed, densely populated villages participated in a mixed economy of hunting, gathering, and farming in the regions where the Maya civilization would later flourish. The inhabitants were perhaps Maya speakers, and they dotted the landscape of much of southeastern Mesoamerica. In the region, "The Early Preclassic begins in the Soconusco c. 1800 BC, and is marked by profound changes settlements patterns, subsistence, technology, and society" (Coe and Houston 2015: 49). Though the inhabitants of the Pacific Coasts, which included Chiapas, Guatemala, and El Salvador, were not Maya speakers, they would have substantial effects on the Maya peoples to the north, in the highlands and lowlands. It would not be until the opening centuries of the Middle Formative period that Mayas centers in the northern Petén region of Guatemala would begin to develop the sociopolitical foundations that would support and facilitate the eventual emergence of the Classic Maya (Inomata et al. 2013).

The Middle Formative Period (c. 1000–400 BC)

"The Middle Formative period. . .across Mesoamerica was qualitatively different from what preceded it" (Grove 2007: 220). Momentous socioeconomic, political, and ideological transitions that occurred during the Early Formative period laid the foundation upon which Mesoamerica would grow to become a distinct culture area. During the Middle Formative, the transition to settled life and expanding populations occurred throughout Mesoamerica. Although cultural regionalism increased with small villages coalescing into urban centers, an Olmec presence was still widely apparent. Monumental stone carvings, considered to be in the La Venta Olmec style, were erected at important trade centers and along communication routes. Ceramic industries intensified and new techniques were developed. The neckless jars (tecomates), common in the Early Formative Period, were replaced by a more durable pottery decorated with incised lines, frequently referred to as double-line break (see Tolstoy et al. 1977: 98).

Materials and ideas flowed in multiple directions between centers, and fundamental social, political, and economic transformations were accelerating across all of Mesoamerica; changes that would profoundly affect all future Mesoamerican societies. The scope and scale of interaction was amplified as populations increased rapidly and less desirable agricultural regions were settled out of necessity. Local chiefdoms proliferated along with complex sociopolitical alliances, exchange networks, and increased competition for natural resources and exotic products.

The Middle Formative period upsurge was led by a growing elite class that needed to communicate their status and affirm their right to rule. The new elites used their wealth and power to define their social identities through display of material possessions and public expressions of power. A rapid expansion in the demand for exotic goods and materials imposed changes to the structure and content of rapidly evolving interregional trade and exchange networks. Correspondences in the material demonstration of public identities suggest these leaders participated, to varying degrees, in an interaction sphere that carried a suite of shared economic, political, symbolic, and ideological concepts (Joyce and Grove 1999: 12). Results of this participation allowed the expression of status or corporate membership that differentiated individuals or factions from the rest of society while, at the same time, confirming the community's position within a pan-Mesoamerican system that was recognizable to distant peers.

The degree of similarity in the materialization and expression of power, wealth, and authority among emergent elite across Mesoamerica was remarkable, so much so that differences were a matter of scale and extent, not content. Because of this high level of correspondence, the collective manifestation of these expressions by the elite of a

community is referred to here as the Middle Formative Paradigm. Diagnostic elements of the paradigm included: designed architectural complexes (e.g., pyramids, plazas, special use structures, and ballcourts); water management systems; iconic ceramic vessels and figurines; high-status burials and ritual deposits; narrative bas-relief stone sculpture; and long-distance acquisition of exotic items, luxury goods, and resources (i.e., obsidian, jade, greenstone, marine shell, and iron ore). The Gulf Coast Olmec tradition was carried on at La Venta, in modern day western Tabasco. The Zapotec culture arose at Monte Alban in the Valley of Oaxaca, and multi-ethnic groups surged at Teotihuacan in the Valley of Mexico. The Maya civilization grew and proliferated across much of Guatemala, Belize, the Yucatán Peninsula and western Honduras. All these societies participated, to some degree, in the Middle Formative Paradigm.

Population growth was a major factor in numerous transformational processes and necessitated expanded agricultural activities that played a significant role in their development. Maize has been acknowledged as the primary agricultural product in Mesoamerica (Staller et al. 2009). Although there is evidence for the cultivation of maize as far back as 5000–7000 BC (e.g., pollen, plant remains, land clearing, and ground stone implements), direct evidence for its consumption as a dietary staple (i.e., stable isotope analysis of bone collagen, bone apatite, and tooth enamel) is not present until around 1000 BC (van der Warker 2006), precisely at the time of the population increase across Mesoamerica. Perhaps an underlying factor that propelled the demographic upsurge was the process of "nixtamalization," a maize preparation practice that has a number of significant benefits, possibly the greatest of which is the substantial increase in its nutritional value. Nixtamalized maize was so superior to the unprocessed type that without it some believe Mesoamerican civilization would have not progressed beyond the village level (Coe and Houston 2015: 49; Coe 1994).

Chiefdoms were the primary forms of social organization in Middle Formative period Mesoamerica; but they were relatively unstable, inclined to cycles of fragmentation, renewal, and expansion. The chiefly or elite ruling class was usually lineage-based, and an individual's role or social status within the chiefdom was generally determined by kinship. Middle Formative period chiefdom societies changed rapidly along with their power and prominence and can be better understood at a regional perspective.

The Pacific Coast

The southeastern terminus of Preclassic Mesoamerica was the Ahuachapán region of El Salvador where, during the Early Formative period, settlement consisted of modest farming villages. During the early Middle Formative period (c. 900–650 BC), Chalchuapa developed into a major trade colony, possibly as a result of interaction with the Southern Gulf Coast La Venta Olmec or groups from Morelos in the Central Mexico Highlands. At El Trapiche, a northern portion of the settlement, construction of a massive 20 m high platform took place, and at Las Victorias, the site grew into a leading political and religious center containing a massive boulder carved with multiple Olmec-style figures.

Approximately 700 km along the Pacific coast to the northwest, at the southern terminus of the Isthmus of Tehuantepec, was the site of Laguna Zope. Between 800 and 400 BC, Laguna Zope was a major trade center that specialized in the export of locally collected marine shell as well as acting as a redistribution point for materials originating in the Guatemala highlands (e.g., obsidian and jade). The inter-coastal waterway and riverine system along the Pacific coast between El Salvador and Oaxaca provided an almost unbroken stretch of flat water for the transport of goods and materials, a system that was actively maintained up to the beginning of the twentieth century. Adjoining this route were numerous sites that contain carved stone monuments that share common content and artistic canons associated with the major Southern Gulf Coast Olmec center of La Venta (Clark and Pye 2000).

Following the decline of sites in the Mazatán region of the Soconusco Coast, La Blanca, in westernmost coastal Guatemala (c. 900–600 BC) became one of Mesoamerica's largest Middle

Formative period sites and contained one of the earliest examples of the Mesoamerican temple pyramid and, at 25 m, the tallest on the Pacific Lowlands. La Blanca also exhibited one of the earliest examples of the quatrefoil shape, an iconographic feature that represented a portal to the underworld (Love and Guernsey 2007). Around 600 BC, the nearby site of Ujuxte would replace La Blanca as the dominant regional center. Several other sites along the Pacific coastal plains and adjoining piedmont (e.g., Izapa, Takalik Abaj, and Chocola) were developing population centers that would flourish in the Late Formative period (Love 2007).

Highland Guatemala

Small farming villages occupied many of the highland valleys of Guatemala during the Early Formative period. The appearance of Arevalo phase ceramics (c. 1200–1000 BC) at the settlement of Kaminaljuyú, located in present-day Guatemala City, was the first evidence of occupation that would last through the Late Classic (c. AD 900). During the Middle Formative period, Kaminaljuyú demonstrated considerable social complexity as it evolved into an administrative center thought to control the vast El Chayal obsidian source and the jade supply along the Motagua River Valley. The La Venta Olmecs were major importers of these commodities, and a trail of these materials follows a key riverine transport system between the Guatemalan highlands and the Gulf Coast that included such sites as La Libertad, Chiapa de Corzo, San Isidro, and others in Chiapas (Lowe 1981; Pye and Clark 2006).

During the Las Charcas to Providencia phases at Kaminaljuyú (c. 100–400 BC), population grew and all the elements of the Middle Formative Paradigm appeared. These factors indicate a centralization of authority by the settlement's elite leaders as they built the highland polity into a dominant socioeconomic capital. Sacrificial victims and captives become apparent on sculptures and burials indicate status differentiation. Similar events took place in the nearby Salama Valley, albeit to a lesser scale, as elites emerged and adhered to the Middle Formative period model.

Guerrero

The mountainous regions of Guerrero have produced evidence (e.g., carved greenstone objects, monumental stone sculpture, and cave paintings) that suggests a significant connection to the Southern Gulf Coast Olmec. Teopantecuanitlán, an important regional site that demonstrates this connection, was initially occupied around 1400 BC and reached its height in population and social complexity around c. 1000–800 BC (Martínez Donjuán 1996). Various lines of evidence demonstrate that the leaders were adherents to the Middle Formative Paradigm and participants in an interregional exchange network that included the Pacific coast, the Central Mexico highlands, Chalcatzingo in Morelos, the Southern Gulf Coast, and potentially the distant Maya lowlands. Acquisition of imported marine shell and obsidian from a variety of distant source provided materials for the production of luxury goods.

The presence of ceremonial architecture, water management systems, monumental stone sculpture, and Olmec-style ceramic wares demonstrated affinities with the Gulf Coast Olmec (Martínez Donjuán 2010; Reilly 2000). The corbelled arch or vault architectural feature is so closely associated with the Maya that it is called a Mayan arch. Yet, it was at Teopantecuanitlán that this architectural feature was first utilized in Mesoamerica and raises the question as to how and why this distinctive characteristic may have made its way to the Maya lowlands.

Paintings in the Juxtlahuaca Cave and Oxtotitlán rock shelter are two further examples of art and iconography that have been associated with the Olmec art style (Grove 1970). These sites are in remote canyons and not related to any major settlement; yet they are well developed in their execution, suggesting an established tradition. Mural painting is not common in the Middle Formative period, but the theme, content, and chronology have been associated with the Southern Gulf Coast and its symbolism and portraiture.

The Valley of Oaxaca

The settlement of San José Mogote, in the Valley of Oaxaca, was established in the Early Formative period (c. 1400 BC) and represents one of the

region's first permanent agricultural villages and among the first to use pottery (Flannery 1968). The site has been considered the originator of a number of significant sociocultural and political features (e.g., initial appearance of public architectural structures, earliest hieroglyphic writing, and institutionalized lineages). San José Mogote played a major, long-term role in the Valley of Oaxaca's sociopolitical development and was clearly the precursor to the Late Formative period civic-ceremonial center of Monte Albán.

Recent analyses have tempered some of the original claims about San José Mogote, however (Clark 2004; Pool 2007: 198–205; Rosenswig 2010). Nevertheless, near the end of the Middle Formative period, the Zapotec people were implementing artificially terraced hillsides and canal irrigation techniques. Evidence of increasing conflict, captive sacrifice, and defensive fortifications has been attributed to aggressive competition for limited resources of the valley. These factors may have been the reason for the rapid ascension of Monte Albán at the strategic, defensive hilltop location at the intersection of the three branches of the valley.

West Mexico

Information regarding West Mexico's socioeconomic and localized centralization of political control during the Middle Formative period has been derived primarily from evidence recovered from mortuary features. The shaft tomb tradition of this region that began around 1300 BC and continued into the Middle Formative period is thought to be lineage-related and contained sumptuous imported objects that demonstrated the status and wealth of the interred families. These practices expanded across the region as wealth and status appears to have been a result of membership in corporate social groups.

Based on the funerary objects, it is clear that West Mexico increased its participation in multiple long-distance interaction spheres. These systems not only involved contact with the most distant parts of Mesoamerica (e.g., jade from the Motagua Valley of Guatemala, Pacific and Atlantic Coast marine shell, Oaxaca iron pyrite mirrors, and central Mexican obsidian) but also interaction with northern Mexico and New Mexico was demonstrated by the presence of turquoise. At the same time, local materials and technologies were being circulated to other regions. Obsidian from Michoacán's Ucareo source is found in the Basin of Mexico, the Oaxaca Valley, and the Gulf Coast. A unique style of circular mounded architecture that originated in West Mexico is seen at distant regions such as Cuicuilco, in the Basin of Mexico, and Capacha and El Opeño ceramic types are found at the contemporaneous site of Tlatilco.

There are two factors that should be noted about West Mexico. First is that evidence of the Olmec art style in the region is visibly absent at this time. Second is that the region continued to display ancient associations with northwestern South America, specifically Ecuador (Callaghan 2003; Townsend 1998). The number and type of associations and the supporting evidence (e.g., archaeological, biological, technical, metallurgical, and ethnohistoric) suggest the possibility of recurrent contact be considered when evaluating the development and trajectory of West Mexican culture. Additionally, new archaeological evidence and lines of inquiry are expanding our knowledge of West Mexico (Williams et al. 2005).

The Southern Gulf Coast Lowlands and the La Venta Olmec

The final phase of the Olmec phenomenon occurred during the Middle Formative period with La Venta taking up the cultural mantle left by San Lorenzo's relatively rapid and not fully understood decline (Pool 2007). The capital of La Venta was located within a dynamic Tonalá riverine system in present-day Tabasco, and it was a leading example of complex society in Middle Formative period Mesoamerica (Diehl 1990, 2004). The city's elite imported goods and materials from across Mesoamerica and established the benchmarks for the materialization of the Middle Formative Paradigm (e.g., jade and greenstone objects, planned civic-ceremonial architecture and water management systems, monumental stone carving, and "massive offerings"). It disseminated ideological and artistic canons directly related to maize and possibly distributing

agricultural or technological techniques (Reilly 1995; Taube 2000).

Widely dispersed populations shifted into more nuclear centers across the alluvial lowlands of the Southern Gulf Coast, possibly in response to volcanic activity in the Tuxtla Mountains and regional climatic changes (Santley et al. 2000). Along the middle San Juan River, continuation of El Marquesillo's occupation was evident in its architectural and ceramic development (Doering 2007). El Viejón, on the Gulf Coast, may have operated as a commercial control station for La Venta and was the northernmost site with direct Olmec connections (Wilkerson 1981). Olmec-related jade and portable art items have been uncovered around the El Pital region of north-central Veracruz, and Middle Formative period communities around the Pánuco region expanded the northern boundaries of Mesoamerica along the Gulf Coast. Smaller, less-concentrated populations may account for the slower development of social complexity in the region. Tres Zapotes, east of the Papaloapan River, produced monumental stone sculpture and demonstrated a chiefdom-level society that would continue into the epi-Olmec period (Pool 2000, 2005).

The Central Mexico Highlands

During the Barranca phase at the site of Chalcatzingo, in Morelos (c. 1100–700 BC), the modest public architecture of the Early Formative period was replaced by a series of modified terraces that transformed the earlier village and added an elite house compound for the chiefly lineage (Guillén and Grove 1987; Grove 2008). A series of bas-relief narratives were carved on stone boulders and outcrops during the Cantera phase (c. 700–500 BC) and were directionally distributed with ideological representations to the south and depictions of political rulership placed in the elite residential area to the north. Although evidence suggests a small population, the presence of monumental architecture, exotic elite goods, and a large carved stone corpus, the settlement represents a major regional center with substantial connections to the Gulf Coast, Guerrero, and the Pacific Coast (Grove 1987).

In the Basin of Mexico, the development of political and ideological complexity has been seen as trailing behind those of southern Mexico. Settlement along the southern portions of the basin was limited to small villages occupied by members of the Tlatilco culture (e.g., El Arbolillo and Zacatenco) (Sanders et al. 1979). In the site of Tlatilco, evidence of Early Formative Olmec influence underwent a significant change around 1000 BC. Iconographic and stylistic modifications presented a more local type of expression that may represent modifications in ideological practices, perhaps as a result of the decline of San Lorenzo (Niederberger 2000). By c. 700 BC, Cuicuilco became a dominant center in the Valley of Mexico, where attributes of the Tlatilco culture were no longer evident (Gonzalez et al. 2000). Cuicuilco would prevail as the valley's major civic-ceremonial center, but Cuautlalpan and Chimalhuacan were also large settlements along the southern and eastern shores of Lake Texcoco. These autonomous centers shared the landscape until around 150 BC, when Teotihuacan would rise to become the largest urban center in Mesoamerica. The development of rank societies would spread sporadically across the valley and into the neighboring areas of Tlaxcala and Puebla.

The Maya Region

Occupied since at least c. 1400 BC, the Maya region, including the Yucatán Peninsula, had more or less followed the same socioeconomic and political trajectory as much of the rest of Mesoamerica. Small, dispersed agricultural villages of 100–200 inhabitants dotted the lowland landscape. That scenario began to change when exotic objects and elite luxury items were imported around 900–750 BC, at sites like Seibal and Altar de Sacrificios (Estrada-Belli 2011; Inomata et al. 2013). The increasing appearance of prestige goods suggests an expansion of extensive trade networks. The construction of canal and irrigation systems of increasing complexity and scale required substantial coordination of labor and management. At the site of Nakbe, in the Mirador Basin of the northern Guatemala Petén, production of monumental architecture began

c. 600–350 BC (Hansen 2005). Following earlier Southern Gulf Coast traditions, standing carved stone monuments (stelae) were placed atop platform structures c. 500–300 BC. An extensive network of raised, paved causeways (sacbeob) would be built to link emerging settlements within the basin, including El Mirador, El Tintal, and Wakna, that would, during the following Late Formative period, alter the political geography of the southeastern Mesoamerica (Aguilar et al. 2008).

During the Swasey phase (c. 1200–900 BC), at the site of Cuello in Belize, the establishment of maize agriculture and the introduction of ceramic technology were evident (Sharer and Traxler 2006). In the following Bladen phase (c. 900–650 BC), ceramic associations expanded to the lowlands around the Pasíon River basin, and obsidian and jade were imported from southern Guatemala. Elite wealth and ascribed status were demonstrated in residential contexts and child burials. Mayas from settlements in the southern Petén migrated north along the west coast of the Yucatán Peninsula setting up permanent settlements at Dzibilchaltún, Dzibilnocac, and Komchen. Later incursions by Maya from Belize and the eastern Petén moved northward along the eastern coast of the peninsula (Estrada-Belli 2011).

Southeast Mesoamerica

The eastern boundaries of Mesoamerica during the Preclassic period extended roughly from the Bay of Tela, on the Caribbean Coast of Honduras, south to the Gulf of Fonseca on El Salvador's Pacific Coast. In the Ulua River Valley of Honduras, the settlement at Puerto Escondido contained an exceptionally large mound structure possibly for civic functions (Joyce 2004). At Playa de los Muertos, child burials contained jade and other objects, while an adult burial at the site contained only unadorned skeletal remains, signs that demonstrate ascribed status. At both Honduran sites, artifacts included Olmec-related styles and motifs. Further to the south, Los Naranjos and Yarumela each were anchored by large 20 m high mound structures. Their location along a well-traveled communication route and the presence of marine shell, jade, nonlocal obsidian, exotic ceramics, and other luxury commodities suggest these settlements were trade outposts for the movement of Olmec-related materials.

The Late Formative Period (C. 300 BC–AD 250)

A number of significant socioeconomic and political episodes occurred across Mesoamerica during the Late Formative period. The cultural vacuum created by the demise of the Olmec at La Venta, and with it the Southern Gulf Coast Olmec civilization, was filled by a variety of emergent successors. Major cities, states, and culture groups arose in the Valley of Oaxaca, the Mirador Basin, the Guatemala Highlands, and at the urban colossus of Teotihuacán in the Valley of Mexico. Regional hegemony and local cultural integration became the new model for sociopolitical structures, and elite rulers put greater social distance between themselves and their constituents, and conflict became commonplace across Mesoamerica.

Generalized traits continued to permeate much of Mesoamerica. Shared characteristics involved similarities in ceramic horizons, the construction of temple-pyramids, and common burial practices. Widespread, intensive agricultural practices (e.g., terracing, irrigation, and raised-fields) were developed and implemented to provide the increased subsistence production needed to support rapidly growing populations. The ways in which Middle Formative period elite leaders distinguished themselves from their constituents (e.g., acquisition of exotic and luxury goods, conducting labor intensive public works projects, and commission monumental stone sculpture) were expanded.

Religious and ideological traditions were refined, reinforced, and facilitated through the use of emergent writing systems. Recent research into Mesoamerica epigraphy and iconography demonstrates that the Late Formative period was a pivotal time in the evolution of writing and calendric systems (Justeson and Kaufman 1993; Kaufman and Justeson 2009). Embedded on sculpted monuments were messages that "articulated political ideologies and complex cosmological themes, and formed a shared language of power that was employed by rulers in a Late

Preclassic communication sphere" (Guernsey 2006: 1). Early evidence of writing occurred in the Valley of Oaxaca, Chiapas, Guatemala, and Veracruz.

The Pacific Coast

The ethnic affiliations and political relationships along the Pacific Coast during the Late Formative period remain uncertain as numerous, diverse groups occupied the region. A series of sites: Izapa, in the west; El Ujuxte, Takalik Abaj, Chocola, and Kaminaljuyú, in the east had the unusual distinction of all being major centers, located within a 40–60 km distance from one another, that experienced their phases of florescence at the same time (Love 2007). Izapa is a large center near modern-day Tapachula, Chiapas, that contains multiple complexes of earthen mounds and platforms, but its notoriety stems from the large number of carved stone monuments that depict scenes of rulers, deities, and creation myths in an iconic language of power and authority (Guernsey 2006; Kapplemen 2001). The Izapan civilization has been heralded as a cultural intermediary between the earlier Olmec and later Maya and, although this hypothesis has some support, it is an oversimplification of the evidence (Rosenswig 2010).

The major Middle Formative period capital of La Blanca was replaced by El Ujuxte, a Mixe-Zoquean center with a three-tiered settlement hierarchy that may have withstood the regional Maya expansion (Love 2007). The site of Takalik Abaj, east of Izapa, on the Pacific Piedmont of Guatemala, contains one of the most eclectic assemblages of monumental stone sculpture in all of Mesoamerica, including examples of regional Pacific coast and piedmont styles as well as Southern Gulf Coast Olmec, Izapan, and early Maya styles. This diversity may be attributed to the settlement's location at the boundaries of multiple linguistic and cultural areas. Sculptural styles identified as Olmec or Olmecoid, Izapan, Pacific Coast, and Maya. Chocola, located just to the east of Takalik Abaj, shares some traits with its neighbor, such as cacao production and water management systems. Its cultural affiliations, however, appear more closely tied to the major settlement of Kaminaljuyú, on the western edge of present-day Guatemala City.

The Valley of Oaxaca

The establishment of Monte Albán, in a previously uninhabited area at the center of the valley, around 500 BC, represented a monumental transformation in the regional sociopolitical structure and settlement patterning (Marcus and Flannery 1996). Populations from various settlements across the valley were shifted to the site, which was defensively positioned on an elevated plateau 400 m above the valley floor (Spencer and Redmond 2001). Architectural complexes built on the leveled mountain top appear to have been constructed according to a master plan. They contained a formal ballcourt, plazas, patios, temple-pyramids, and a possible astronomical observatory, and in the Mesoamerican tradition, earlier structures were later built over. Cultural influences from southeastern Mexico were demonstrated in the form of ceramic traditions, and iconographic representations of vanquished captives (danzantes) and Zapotec place name glyphs were incorporated into the designs of structures and public areas. Issues of access to water and agricultural lands would have required new, more stringent methods for the control of labor and management of resources.

West Mexico

The Late Formative period in West Mexico is characterized by rapid population growth and attempts made to consolidate political power at regional centers (Beekman 2000). There was also expansion by farming groups into previously unoccupied areas including the Bajío region, north of the Lerma River Valley. This movement extended the northern boundaries of the Mesoamerican culture area. Associated with this expansion was the Chupícuaro culture, named after the southeastern Guanajuato site where high-quality ceramics were produced between 600 and 100 BC. Recently, shaft tombs were uncovered at Chupícuaro sites that contained objects similar to those found across the western highlands (e.g., solid and hollow human figurines, shell imported from the Pacific and Gulf Coasts). Although these

similarities demonstrate the long-term continuity of this cultural trait across much of West Mexico, differences in the richness of the tombs' contents and their proximity to public architecture imply social inequality (Beekman 2010).

The shaft tomb tradition of West Mexico has its antecedents in the Early Formative period and it continued to expand throughout the Preclassic period. The rise of the Teuchitlán tradition (c. 200 BC–AD 200) is considered an extension of the earlier shaft tomb tradition of West Mexico. Notable for its new architectural style of circular central plazas and conical step pyramids that were regulated by the elite. Larger sites, such as Los Guachimontones, became the model with fortified, defensive sites surrounding the major centers, suggesting political tensions.

The Southern Gulf Coast Lowlands

The Olmec phenomenon had come to an end by the Late Formative period, and significant changes occurred throughout the region. Tres Zapotes, which exhibited some remnants of the ancient Olmec society, underwent substantial transformation (Wade 2017b), a portion of which has been linked to the Izapan culture on the Pacific Coast of Chiapas. A primary example of this connection is Stela C, an Izapa-style mask that was carved into one side of the stone monument, while the other side contained one of the earliest Long Count dates of 31 BC. Such an early date has raised ideas that the Long Count calendric system, which had been considered a Maya innovation, was established in the Late Formative by epi-Olmec peoples outside the Maya region (Pool 2000).

Elsewhere, there was acceleration in development of cultural complexity that expanded along the Gulf Coast from the Tuxtla Mountains to the Panuco River area. Cerro de las Mesas was established as a regional center in the Mixtequilla area of the Papaloapan River basin, just to the west of what was the Olmec heartland, beginning around 600 BC. To the north, the Remojadas culture began its emergence. A major feature in the region was the appearance of an Epi-Olmec or Isthmian hieroglyphic script written in the Zoquean language that is still spoken in the region. The most renowned example is the La Mojarra Stela, a four-ton limestone slab that holds some 535 glyphs. A tentative decipherment of the text suggests an account of warfare, ritual performance, and celestial events that document a ruler's rise to power (Justeson and Kaufman 1993). This format would become the widely accepted method of propagandizing by rulers throughout Mesoamerica in the following Classic period.

The Central Mexico Highlands

Cuicuilco continued as one of the largest and most important settlements into the Late Formative period. Possibly the earliest stone pyramid on the Mexican plateau was constructed at the site. The circular structure is thought to be dedicated to the famed of Mesoamerican deity Quetzalcóatl. The site was abandoned around 300–400 AD, when a lava flow from the nearby Xitle Volcano (Gonzalez et al. 2000; Siebe 2000). The exodus from the site probably led to immigration to Teotihuacán at the north end of the Basin.

Midway through the Late Formative period (c. 200 BC), the site of Teotihuacan was established on a 2,000 m high plateau in the northeastern part of the Basin of Mexico, and by AD 200, it had become the largest (20 km^2), most populated (80,000–100,000 residents), and most dominant city in Mesoamerica (Carballo et al. 2007; Headrick 2007; Millon 1981). Within a few centuries, the influence of Teotihuacan would be felt across the majority of Mesoamerica. The early stages of its development are not well understood, but there is little question its leaders were intent on constructing more than a center of commerce. Monumental construction was initiated along a mile-long "Avenue of the Dead," immigration from distant locales ensued, burgeoning agricultural production and intensive utilization of natural resources took place, technological innovations emerged, and new religious institutions and sociopolitical organizations were established. Much of the city's power appears to have been derived from the ideological materialization of inspirational deities and cosmology. The center's supremacy was supported through

intensive production and export of goods and materials, and a consequent dissemination of its ideology.

Guerrero

Most of the activity in Guerrero during the Late Formative period occurred around the Balsas River drainage. Middle Formative period, Olmec-related sites at Teopantecuanitlán, Oxtotilán, Amuco, and Juxtlahuaca demonstrated the regions significance to earlier cultural development (Coe and Koontz 2013). During the Late Formative period, the region continued to act as a cultural interface that included the Mezcala and Chumbícuaro cultures and shaft tombs of the West Mexico tradition were found in Tepalcatepec Valley. Recently, at site of Cuetlajuchitlán (c. 600 BC–AD 200), a well-developed series of interrelated architectural complexes was uncovered (Manzanilla López et al. 2006). The urban design included civic-ceremonial structures, water supply systems, and sunken patios. Materials from across Mesoamerica were present at the site demonstrating it served as a major trading center that facilitated the movement of goods to and from the Central Mexican highlands to the Pacific Coast.

The Maya Region

Between 600 BC and AD 100, the Mirador Basin in the northern area of the Guatemalan Petén was the epicenter of the development of Maya social complexity with the concurrent emergence of sites like Nakbe, El Mirador, El Tintal, and Wakna (Clark and Hansen 2001; Aguilar et al. 2008). These sites were of a spatial magnitude that had never been seen previously anywhere in Mesoamerica and would not be seen again in the Maya region, even during the Maya "Golden Age" of the Classic period. Population in the basin exceeded 100,000 and the Danta Complex at El Mirador was the tallest pre-Columbian structure in the New World. Tikal and Calakmul were contemporaneous centers that would become major rivals after the settlements in the Mirador Basin declined at the end of the Late Formative period.

The widespread use of hieroglyphic writing across the area provided an exceptional dated record of Maya kings and their exploits. Along the Pacific coast and piedmont (e.g., Chalchuapa, El Baúl, Chocola, and Takalik Abaj) early Maya inscriptions and depictions of rulers are predecessors of the rich burials and records at Kaminaljuyú (Doering and Collins 2008; Houston et al. 2005; Inomata et al. 2014; Valdés and Wright 2004). El Portón in the Salama Valley is transformed by a series of earthen terraces and platforms related to religious and political activities, and a large stone stela with a partially preserved glyphic text was ancestral to later Classic Maya forms. At these and other sites, evidence for the proliferation of warfare is clear. The expansion of trade connections and the consequent development of Maya sociopolitical complexity to lowland Maya sites are also accompanied by conflict. Adding to the competition is the widespread influence of Central Mexico's Teotihuacan, evident at sites like Kaminaljuyú, Tikal, and Copán. In addition to those already mentioned, settlements across the lowlands of the Petén and Yucatán Peninsula (e.g., Cuello, Cerros, and Blackmon Eddy in Belize; Calakmul, Becán, Loltun, San Bartolo, Cival, Uaxactun, Pomona, Komchen, and Dzibilchaltun, and countless others) provide the foundation for the subsequent flourishing of the Classic period Maya (Coe and Houston 2015; Saturno et al. 2006; Sharer and Traxler 2006).

Summary

The move toward sedentism intensified throughout the Preclassic period in Mesoamerica. Beginning in the Early Preclassic (c. 2000–1000 BC), the emergence of village life and developing agricultural practices produced larger populations that resulted in institutionalized social inequality. Surpluses provided the engine for the further development of long-distance exchange networks, and art and architecture became the preferred method of demonstrating elite individual and group identity. The Olmec of the Southern Gulf Coast lowlands emerged during the Early Preclassic at San Lorenzo. Arguably the earliest civilization Mesoamerica, the Olmec established many of the ideological and sociopolitical principles that would be carried on by subsequent Mesoamerican societies. A few regional centers that were interspersed across the landscape would reach a higher level

social complexity, while the spread of ranked societies across the rest of Mesoamerica would occur unevenly.

In the Middle Preclassic period, capital centers expanded in size and population. Monumental art and architecture reached new highpoints, and control and authority over labor and trade became entrenched. The second Gulf Coast Olmec capital of La Venta established artistic canons for iconographic representations that were followed across Mesoamerica to varying degrees. As the Olmec declined during the Middle Preclassic, societies in the highlands and the Maya lowlands arose to fill the socioeconomic and political void. The transition period from the Middle to Late Preclassic witnessed distinct regional ethnic styles. Large and small regional settlements moved toward centralized plazas with surrounding architectural structures, which were conducive to a greater emphasis on markets replete with local and long-distance goods and materials.

The stage was set for the blossoming of regional cultural centers across the expanding landscape of Mesoamerica during the Classic period. Highly developed societies led the move toward more complex political, intellectual, and metropolitan development. Monumental architecture and artistic creativity would reach their height of excellence, and social infrastructure that had emerged and matured during the Preclassic period would become foundational to the rise of the independent city–states of the Maya, and the great center of Teotihuacan would dominate the Valley of Mexico. Throughout Mesoamerica, transitory as well as enduring alliances were created that were comprised of principal capitals and vassal states. Monte Alban controlled the Valley of Oaxaca, the complex society of the Teuchitlán tradition emerged to influence the regions of Nayarit and Jalisco in West Mexico. Veracruz saw multiple cultures arise, major centers on the Pacific Coast waned, and the still murky Mezcala culture was established in Guerrero. The solid foundation that has been established during the Preclassic period facilitated the development of Golden Age of Mesoamerica.

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Flannery, Kent Vaughn
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Ideology and Materiality in Archaeological Theory
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- ▶ Olmec: Geography and Culture
- ▶ Paleoindians
- ▶ Southwest United States and Northwestern Mexico: Geography and Culture
- ▶ Teotihuacan: Geography and Culture

References

Aguilar, Morales, Richard D. Hansen Carlos, Abel Morales López, and Wayne K. Howell. 2008. Nuevas perspectivas en los modelos de asentamiento Maya durante el Preclásico en las Tierras Bajas: Los sitios de Nakbe y El Mirador, Petén. In *XXI Simposio de Investigaciones Arqueológicas en Guatemala*, ed.J.P. Laporte, B. Arroyo, and H. Mejía, vol. 2007, 198–213. Museo Nacional de Arqueología y Etnología: Guatemala.

Anawalt, Patricia Rieff. 1998. They came to trade exquisite things: Ancient West Mexican-Ecuadorian contacts. In *Ancient West Mexico: Art and archaeology of the unknown past*, ed. R.F. Townsend, 233–250. Chicago: Thames and Hudson and The Art Institute of Chicago.

Arnold, Philip J., III. 2009. Settlement and subsistence among the early formative Gulf Olmec. *Journal of Anthropological Archaeology* 28: 397–411.

Beekman, Christopher S. 2000. The correspondence of regional patterns and local strategies in formative to classic period West Mexico. *Journal of Anthropological Archaeology* 19 (4): 385–412.

Beekman, Christopher S. 2010. Recent research in western Mexican archaeology. *Journal of Archaeological Research* 18 (1): 41–109.

Benson, Elizabeth P., and Beatriz de la Fuente, eds. 1996. *Olmec art of ancient Mexico*. Washington, DC: National Gallery of Art.

Blake, Michael. 1991. An emerging formative at Paso de la Amada, Chiapas, Mexico. In *The formation of complex society in Southeastern Mesoamerica*, ed. W.R. Fowler, 27–46. Boca Raton: CRC Press.

Blake, Michael. 2011. Building history in domestic and public space at Paso de la Amada: An examination of mounds 6 and 7. In *Early Mesoamerican social transformations: Archaic and formative lifeways in the Soconusco region*, ed. R.G. Lesure, 97–118. Berkeley: University of California Press.

Blake, Michael, Richard G. Lesure, Warren D. Hill, Luis Barba, and John E. Clark. 2006. The residence of power at Paso de la Amada, Mexico. In *Palaces and power in the Americas: From Peru to the Northwest coast*, ed. J.J. Christie and P.J. Sarro, 191–210. Austin: University of Texas Press.

Blomster, Jeffrey P., Hector Neff, and Michael D. Glascock. 2005. Olmec pottery production and export in ancient Mexico determined through elemental analysis. *Science* 307: 1068–1072.

Callaghan, R.T. 2003. Prehistoric trade between Ecuador and West Mexico: A computer simulation of coastal voyages. *Antiquity* 77: 796–804.

Canto Aguilar, G., and V.M. Castro Mendoza. 2010. Zazacatla in the framework of Olmec Mesoamerica. In *The place of stone monuments: Context, use, and meaning in Mesoamerica's Preclassic transition*, ed. J. Guernsey, J.E. Clark, and B. Arroyo, 77–96. Washington, DC: Dumbarton Oaks Research Library and Collection.

Carballo, David M. 2009. Household and status in formative central Mexico: Domestic structures, assemblages, and practices at La Laguna, Tlaxcala. *Latin American Antiquity* 20 (3): 473–501.

Carballo, David M., Jennifer Carballo, and Hector Neff. 2007. Formative and classic period obsidian procurement in central Mexico: A compositional study using laser ablation-inductively coupled plasma-mass spectrometry. *Latin American Antiquity* 18 (1): 27–43.

Caso, Alfonso. 1932. Monte Albán, richest archaeological find in the Americas. *National Geographic Magazine* LXII: 487–512.

Chambers, Erve. 1977. Modern Mesoamerica: The politics of identity. *American Anthropologist* 79 (1): 92–97.

Cheetham, David. 2005. *Recent investigation at Cantón Corralito: A possible Olmec enclave on the Pacific coast of Chiapas, Mexico*. Provo: Arizona State University and the New World Archaeological Foundation, Brigham Young University.

Cheetham, David. 2007. *Cantón Corralito: Objects from a possible Gulf Olmec colony*. Crystal River: Foundation for the Advancement of Mesoamerican Studies, Inc. (FAMSI). http://www.famsi.org/reports/05021/05021Cheetham01.pdf.

Cheetham, David. 2010. Americas' first colony: Olmec materiality and ethnicity at Canton Corralito, Chiapas, Mexico. Ph.D. dissertation, Anthropology, Arizona State University, Tempe.

Cheetham, David, and Jeffrey Blomster. 2010. Introduction to special section: Rethinking the Olmecs and early formative Mesoamerica. *Ancient Mesoamerica* 21 (1): 91–94.

Clark, John E. 1991. The beginnings of Mesoamerica: Apologia for the Soconusco early formative. In *The formation of complex society in southeastern Mesoamerica*, ed. W.R. Fowler Jr., 13–26. Boca Raton: CRC Press.

Clark, John E. 1997. The arts of government in early Mesoamerica. *Annual Review of Anthropology* 26: 211–234.

Clark, John E. 2004. Mesoamerica goes public: Early ceremonial centers, leaders, and communities. In *Mesoamerican archaeology: Theory and practice*, Blackwell studies in global archaeology, L. Meskell and R. A. Joyce, general editor, ed. J.A. Hendon and R.A. Joyce, 43–72. Malden: Blackwell.

Clark, J.E., and M. Blake. 1994. The power of prestige: Competitive generosity and the emergence of rank societies in lowland Mesoamerica. In *Factional competition and political development in the new world*, ed. E.M. Brumfiel and J.W. Fox, 17–30. Cambridge: Cambridge University Press.

Clark, J.E., and D. Cheetham. 2002. Mesoamerica's tribal foundations. In *The archaeology of tribal societies*, ed. W. Parkinson. Ann Arbor: University of Michigan.

Clark, John E., and Dennis Gosser. 1995. Reinventing Mesoamerica's first pottery. In *The emergence of pottery: Technology and innovation in ancient society*, ed. W. Barnett and J. Hoopes. Washington, DC: Smithsonian Books.

Clark, John E., and Richard D. Hansen. 2001. The architecture of early kingship and the origins of the Mesoamerican royal court. In *Royal courts of the ancient Maya*, Data and case studies, ed. T. Inomata and S. Houston, vol. 2, 1–45. Boulder: Westview Press.

Clark, John E., and Mary E. Pye, eds. 2000. *Olmec art and archaeology in Mesoamerica*. Washington, DC: National Gallery of Art.

Clark, John E., and Mary E. Pye. 2006. Los orígenes de privilegio en el Soconusco, 1650 AC: Dos décadas de investigación. In *XIX Simposio de Investigaciones Arqueológicas en Guatemala, 2005*, ed. J.P. Laporte, B. Arroyo, and H. Mejía, 10–22. Guatemala: Museo Nacional de Arqueología y Etnología. http://www.asociaciontikal.com/pdf/02_-_Clark_y_Pye.05_-_Digital.pdf.

Clark, John E., Julia Guernsey, and Barbara Arroyo. 2010. Stone monuments and preclassic civilization. In *The place of stone monuments: Context, use, and meaning in Mesoamerica's preclassic transition*, Dumbarton Oaks pre-Columbian symposia and Colloquia, J. Pillsbury, general editor, ed. J. Guernsey, J.E. Clark, and B. Arroyo, 1–26. Washington, DC: Dumbarton Oaks Research Library and Collection.

Coe, Sophie D. 1994. *America's first cuisines*. Austin: University of Texas Press.

Coe, Michael D., and Richard A. Diehl. 1980. *In the land of the Olmec: The archaeology of San Lorenzo Tenochtitlan 1*. Austin: University of Texas Press.

Coe, Michael D., and Steven Houston. 2015. *The Maya*. 9th ed. New York: Thames and Hudson.

Coe, Michael D., and Rex Koontz. 2013. *Mexico: From the Olmecs to the Aztecs (ancient people and places)*. 7th ed. New York: Thames and Hudson.

Coe, Michael D., R.A. Diehl, D.A. Freidel, P.T. Furst, F.K. Reilly, L. Schele, C.E. Tate, and K.A. Taube, eds. 1995. *The Olmec world: ritual and rulership*. Princeton: The Art Museum, Princeton University.

Cyphers, Ann, ed. 1997. *Poblacíon, Subsistencia y Medio Ambiente en San Lorenzo Tenochtitlan Universidad Nacional Autónoma de México*. Mexico City: Instituto de Investigaciones Antropológicas.

de Antropología, Sociedad Mexicana. 1942. *Mayas y olmecas: Segunda Reunión de mesa redonda sobre problemas antropológicos de México y Centro América*. Mexico City: Talleres de la Editorial Stylo.

de la Fuente, Beatriz. 1992. Order and nature in Olmec art. In *The ancient Americas: Art from sacred landscapes*, ed. R. Townsend, 122–133. Chicago: Art Institute of Chicago.

de la Fuente, Beatriz. 2000. Olmec sculpture: The first Mesoamerican art. In *Olmec art and archaeology in Mesoamerica*, ed. J.E. Clark and M.E. Pye, 252–263. Washington, DC: National Gallery of Art.

Diehl, Richard A. 1990. The Olmec at La Venta. In *Mexico: Splendors of thirty centuries*, ed. K. Howard, 51–71. New York: Metropolitan Museum of Art.

Diehl, Richard A. 2000. Olmec archaeology after regional perspectives: An assessment of recent research. In *Olmec art and archaeology in Mesoamerica*, ed. J.-E. Clark and M.E. Pye, 19–30. Washington, DC: National Gallery of Art.

Diehl, Richard A. 2004. *The Olmecs: America's first civilization*. New York: Thames and Hudson.

Diehl, Richard A., and Michael D. Coe. 1995. Olmec archaeology. In *The Olmec world: Ritual and rulership*, ed. M.D. Coe, 11–26. Princeton: The Art Museum, Princeton University.

Doering, T.F. 2007. An unexplored realm in the heartland of the southern Gulf Olmec: Investigations at El Marquesillo, Veracruz, Mexico. Ph.D. dissertation, Department of Anthropology, University of South Florida, Tampa. http://aist.usf.edu/Doering_dissertation.pdf.

Doering, T.F., and L.D. Collins. 2008. The Kaminaljuyú sculpture project: An expandable three-dimensional database, final report. Crystal River: Foundation for the Advancement of Mesoamerican Studies, Inc. (FAMSI). http://www.famsi.org/reports/07007/index.html.

Earle, T.K., ed. 1991. *Chiefdoms: Power, economy, and ideology*. Cambridge: Cambridge University Press.

Elson, Christina. 2012. Cultural evolution in the southern highlands of Mexico: From the emergence of social inequality and urban society to the decline of classic-period states. In *The Oxford handbook of Mesoamerican archaeology*, ed. D.L. Nichols and C.A. Pool, 230–244. New York: Oxford University Press.

Estrada-Belli, Francisco. 2011. *The first Maya civilization: Ritual and power before the classic period*. New York: Routledge.

Feinman, Gary M. 2001. Mesoamerican political complexity: The corporate-network dimension. In *From leaders to rulers*, ed. J. Haas, 151–175. New York: Kluwer Academic/Plenum Publishers.

Flannery, Kent V. 1968. The Olmec and the valley of Oaxaca: A model for inter-regional interaction in formative times. In *Dumbarton Oaks conference on the Olmec*, ed. E. Benson, 79–118. Washington, DC: Dumbarton Oaks Research Library and Collections.

Flannery, Kent V. 1976. *The early Mesoamerican village: Archaeological research strategy for an endangered species*. New York: Academic Press.

Flannery, K.V. 1986. *Guila Naquitz: Archaic foraging and early agriculture in Oaxaca, Mexico*. New York: Academic Press.

Flannery, Kent V., and Joyce Marcus. 1994. *Early formative pottery of the valley of Oaxaca, Mexico. Memoirs 27*. Ann Arbor: University of Michigan Museum of Anthropology.

Flannery, Kent V., and Joyce Marcus. 2005. *Excavations at San José Mogote 1: The household archaeology.* Ann Arbor: University of Michigan Museum of Anthropology.

Foster, Michael Stewart, and Shirley Gorenstein. 2000. *Greater Mesoamerica: The archaeology of West and Northwest Mexico*. Provo: University of Utah Press.

Gamio, M. 1921. *Album de colecciones Arqueologías*. Mexico City: Publicaciones de ls Escuels Internacional de Arqueología y Etnología Americanas.

González, Liliana Carla Reyes, and Marcus Winter. 2010. The early formative period in the southern Isthmus: Excavations at Barrio Tepalcate, Ixtepec, Oaxaca. *Ancient Mesoamerica* 21 (01): 151–163.

Gonzalez, Silvia, Alejandro Pastrana, Claus Siebe, and Geoff Duller. 2000. Timing of the prehistoric eruption of Xitle Volcano and the abandonment of Cuicuilco Pyramid, Southern Basin of Mexico. *Geological Society, London, Special Publications* 171: 205–224.

Gossen, Gary H., Janine Gasco, and Robert M. Carmack. 2007. *The legacy of Mesoamerica: History and culture of a native American civilization*, Exploring cultures. 2nd ed. Upper Saddle River: Pearson/Prentice Hall.

Graham, John A. 1989. Olmec diffusion: A sculptural view from Pacific Guatemala. In *Regional perspectives on the Olmec*, ed. R.J. Sharer and D.C. Grove, 227–246. Cambridge: Cambridge University Press.

Grove, David C. 1970. *The Olmec paintings of Oxtotitlan Cave, Guerrero, Mexico. Studies in pre-Columbian art and archaeology*, 6. Washington, DC: Dumbarton Oaks.

Grove, David C. 1987. *Ancient Chalcatzingo*. Austin: University of Texas Press.

Grove, David C. 1993. "Olmec" horizons in formative period Mesoamerica: Diffusion or social evolution? In *Latin American horizons*, ed. D.S. Rice, 83–112. Washington, DC: Dumbarton Oaks Research Library and Collection.

Grove, David C. 2007. Stirrup-spout bottles and carved stone monuments: The many faces of interregional interactions in formative period Morelos. In *Archaeology, art, and ethnogenesis in Mesoamerican prehistory papers in honor of Gareth W. Lowe*, Papers of the New World Archaeological Foundation no. 68, ed. L.S. Lowe and M.E. Pye. Provo: New World Archaeological Foundation, Brigham Young University.

Grove, David C. 2008. Chalcatzingo: A brief introduction. *PARI Journal* IX (1): 1–7. http://www.mesoweb.com/pari/journal/archive/PARI0901.pdf.

Guernsey, Julia. 2006. *Ritual and power in stone: The performance of rulership in Mesoamerican Izapan style art*. Austin: University of Texas Press.

Guillén, A.C., and D.C. Grove. 1987. Chronology and cultural phases at Chalcatzingo. In *Ancient Chalcatzingo*, ed. D.C. Grove, 56–62. Austin: University of Texas Press.

Hansen, Richard D. 2005. Perspectives on Olmec–Maya interaction in the middle formative period. In *New perspectives on formative Mesoamerican cultures*, ed. T. Powis, 51–72. Oxford: British Archaeological Reports.

Headrick, Annabeth. 2007. *The Teotihuacan trinity: The sociopolitical structure of an ancient Mesoamerican city*, William and Bettye Nowlin series. Austin: University of Texas Press.

Helms, M.W. 1979. *Ancient Panama: Chiefs in search of power*. Texas Pan American Series. Austin: University of Texas Press.

Helms, M.W. 1993. *Craft and the kingly ideal*. Austin: University of Texas Press.

Hill, W.D., and J.E. Clark. 2001. Sports, gambling, and government: America's first social compact? *American Anthropologist* 103: 331–345.

Hill, W.D., M. Blake, and J.E. Clark. 1998. Ball court design dates back 3,400 years. *Nature* 392: 878–879.

Hirth, Kenneth G. 1992. Interregional exchange as elite behavior: An evolutionary perspective. In *Mesoamerican elites: An archaeological assessment*, ed. D.-Z. Chase and A.F. Chase, 18–29. Norman: University of Oklahoma Press.

Houston, Stephan D., Zachary Nelson, Carlos Chiriboga, Carlos Alvarado, Héctor Escobedo, and Karl Taube. 2005. Nuevas Perspectivas sobre la Acrópolis de Kaminaljuyu, Guatemala. In *XVIII Simposio de Investigaciones Arqueológicas en Guatemala, 2004*, ed. J.P. Laporte, B. Arroyo, and H. Mejía, 505–510. Guatemala: Ministerio de Cultura y Deportes, IDAEH, Asociación Tikal, FAMSI.

Inomata, Takeshi, Daniela Triadan, Kazuo Aoyama, Victor Castillo, and Hitoshi Yonenobu. 2013. Early ceremonial constructions at Ceibal, Guatemala, and the origins of lowland Maya civilization. *Science* 340 (6131): 467–471.

Inomata, Takeshi, Raúl Ortiz, Bárbara Arroyo, and Eugenia J. Robinson. 2014. Chronological revision of preclassic Kaminaljuyú, Guatemala: Implications for social processes in the Southern Maya area. *Latin American Antiquity* 25 (4): 377–408.

Jones, Julie, ed. 1998. *Jade in ancient Costa Rica*. New York: The Metropolitan Museum of Art.

Joyce, R.A., and D.C. Grove. 1999. Asking new questions about the Mesoamerican Pre-Classic. In *Social patterns in Pre-Classic Mesoamerica*, ed. D.C. Grove and R.A. Joyce, 1–14. Washington, DC: Dumbarton Oaks Research Library and Collection.

Joyce, Rosemary A. 2004. Unintended consequences? Monumentality as a novel experience in formative Mesoamerica. *Journal of Archaeological Method and Theory* 11 (1): 5–29.

Justeson, John S., and Terrance Kaufman. 1993. A decipherment of epi-Olmec hieroglyphic writing. *Science* 259: 165–179.

Kapplemen, Julia Guernsey. 2001. Sacred geography at Izapa and the performance of rulership. In *Landscape and power in ancient Mesoamerica*, ed. R. Koontz, K. Reese-Taylor, and A. Headrick, 81–122. Boulder: Westview Press.

Kaufman, Terrence, and John Justeson. 2009. Historical linguistics and pre-Columbian Mesoamerica. *Ancient Mesoamerica* 20 (02): 221–231.

Kirchoff, P. 1943. Mesoamerica. *Acta Americana* 1: 92–107.

Lesure, Richard G. 1998. Vessel form and function in an early formative ceramic assemblage from coastal Mexico. *Journal of Field Archaeology* 25 (1): 19–36.

Lesure, Richard G. 2011. *Early Mesoamerican social transformations: Archaic and formative lifeways in the Soconusco region*. Berkeley: University of California Press.

Lesure, Richard G., and Michael Blake. 2002. Interpretive challenges in the study of early complexity: Economy, ritual, and architecture at Paso de la Amada, Mexico. *Journal of Anthropological Archaeology* 21 (1): 1–24.

López, Manzanilla, Talavera González Rúben, and Jorge Arturo. 2006. Cuetlajuchitlán. Sitio preurbano en la región Mezcala. *Arqueológia Mexicana* 14 (82): 47–51.

Love, Michael. 2007. Recent research in the southern highlands and Pacific coast of Mesoamerica. *Journal of Archaeological Research* 15 (4): 275–328.

Love, Michael, and Julia Guernsey. 2007. Monument 3 from La Blanca, Guatemala: a Middle preclassic earthen sculpture and its ritual associations. *Antiquity* 81 (314): 920–932.

Lowe, Gareth W. 1981. Olmec horizons defined in mound 20, San Isidro, Chiapas. In *The Olmec and their neighbors: Essays in memory of Matthew W. Stirling*, ed. E. Benson, 231–255. Washington, DC: Dumbarton Oaks.

Lowe, Gareth W. 1998. *Mesoamerica Olmeca: Diez Preguntas. Serie Arqueologia*. Mexico City: Consejo Nacional para la Cultura y las Artes/Instituto Nacional de Anthropologia e Historia.

Marcus, Joyce, and Kent V. Flannery. 1996. *Zapotec civilization: How urban society evolved in Mexico's Oaxaca valley*. New York: Thames and Hudson.

Marcus, Joyce, and Kent V. Flannery. 2004. The coevolution of ritual and society: New 14C dates from ancient Mexico. *Proceedings of the National Academy of Sciences of the United States of America* 101 (52): 18257–18261.

Martínez Donjuan, G. 1996. *Teopantecuanitlán. Arqueologia Mexicana*. Special Edition (Olmec), 64–67.

Martínez Donjuán, Guadalupe. 2010. The sculpture for Teopantecuanitlán, Guerrero, Mexico. In *The place of stone monuments: Context, use, and meaning in Mesoamerica's preclassic transition*, Dumbarton Oaks pre-Columbian symposia and Colloquia, J. Pillsbury, general editor, ed. J. Guernsey, J.E. Clark, and B. Arroyo, 55–76. Washington, DC: Dumbarton Oaks Research Library and Collection.

Michaels, G.H., and B. Voorhies. 1999. Late archaic period coastal collectors in Southern Mesoamerica: The Chantuto people revisited. In *Pacific Latin America in prehistory: The evolution of archaic and formative cultures*, ed. M. Blake, 39–54. Pullman: Washington State University Press.

Millon, Rene. 1981. Teotihuacan: City, state, and civilization. In *Supplement to the handbook of middle American Indians*, ed. J. Sabloff, vol. 1, 198–243. Austin: University of Texas Press.

Morley, Sylvanus G. 1913. Excavations at Quirgua, Guatemala. *National Geographic Magazine* 24: 339–361.

Morley, Sylvanus G. 1917. The rise and fall of the Maya civilization in the light of the monuments and the native chronicles. Proceedings of the second Pan American scientific congress, December 27, 1915–January 8, 1916, Section 1: Anthropology. Washington, DC.

Mountjoy, J.B., J. Luhr, S. Sorensen, and N. Mountjoy. 2004. Social and cultural implications of jadeite and iron pyrite jewelry recovered from the middle formative cemetery at El Pantano, Jalisco, Mexico. Paper presented at the 69th annual meeting of the Society for American Archaeology, Montreal.

Neff, Hector, Jeffrey Blomster, Michael D. Glascock, Ronald L. Bishop, M. James Blackman, Michael D. Coe, George L. Cowgill, Ann Cyphers, Richard A. Diehl, Stephen Houston, Arthur A. Joyce, Carl P. Lipo, and Marcus Winter. 2006a. Smokescreens in the provenance investigation of early formative Mesoamerican ceramics. *Latin American Antiquity* 17 (1): 104–118.

Neff, Hector, Jeffrey Blomster, Michael D. Glascock, Ronald L. Bishop, M. James Blackman, Michael D. Coe, George L. Cowgill, Richard A. Diehl, Stephen Houston, Arthur A. Joyce, Carl P. Lipo, Barbara L. Stark, and Marcus Winter. 2006b. Methodological issues in the provenance investigation of early formative Mesoamerican ceramics. *Latin American Antiquity* 17 (1): 54–76.

Niederberger, Christine. 1976. *Zohapilco: Cinco Milenios de Ocupacion Humana en un Sitio Lacustre de la Cuenca de Mexico. Coleccion Cientifica 30*. Mexico City: INAH.

Niederberger, C. 2000. Ranked societies, iconographic complexity, and economic wealth in the Basin of Mexico toward 1200 B.C. In *Olmec art and archaeology in Mesoamerica*, ed. J.E. Clark and M.E. Pye, 169–192. Washington, DC: National Gallery of Art.

Niederberger-Betton, Christine. 1987. *Paleopaysages et Archeologie Pre-Urbaine de Bassin de Mexico. Collection Etudes Mesoamericaines*. Mexico City: Centre D'Etudes Mexicaines et Centramericaines.

Ortíz, P., and M.C. Rodríguez. 1993. Olmec ritual behavior at El Manatí: A sacred space. In *Social patterns in Pre-Classic Mesoamerica*, ed. D.C. Grove and R.A. Joyce, 225–254. Washington, DC: Dumbarton Oaks Research Library and Collection.

Ortíz, Ponciano, and Maria Carmen Rodríguez. 2000. The sacred hill of El Manatí: A preliminary discussion of the site's ritual paraphernalia. In *Olmec Art and Archaeology in Mesoamerica*, ed. J.E. Clark and M.E. Pye, 75–93. Washington, DC: National Gallery of Art.

Pina-Chan, Roman. 1989. *The Olmec: Mother culture of Mesoamerica*. New York: Rizzoli.

Plunket, P. and G. Uruñuela (2012). "Where East Meets West: The Formative in Mexico's Central Highlands." Journal of Archaeological Research 20(1): 1–51.

Pollard, Helen Perlstein. 1997. Recent research in west Mexican archaeology. *Journal of Archaeological Research* 5 (4): 345–384.

Pool, Christopher A. 2000. From Olmec to epi-Olmec at Tres Zapotes, Veracruz, Mexico. In *Olmec art and archaeology in Mesoamerica*, Studies in the history of art, ed. J.E. Clark and M.E. Pye, vol. 58, 137–153. Washington, DC: National Gallery of Art.

Pool, Christopher A. 2005. Perspectives on variation in Olmec settlement and polity using Mississippian models. In *Gulf coast archaeology: The southeastern United States and Mexico*, ed. N. White, 223–244. Gainesville: University Press of Florida.

Pool, Christopher A. 2007. *Olmec archaeology and early Mesoamerica*. Cambridge World Archaeology, Cambridge University Press: New York.

Prescott, Graham W., David R. Williams, Andrew Balmford, Rhys E. Green, and Andrea Manica. 2012. Quantitative global analysis of the role of climate and people in explaining late quaternary megafaunal extinctions. *Proceedings of the National Academy of Sciences of the United States of America* 109 (12): 4527–4531.

Pye, Mary E., and John E. Clark. 2006. Los Olmecas son Mixe-Zoques: Contribuciones de Gareth W. Lowe a la arqueología del Formativo. In *XIX Simposio de Investigaciones Arqueológicas en Guatemala, 2005*, ed. J.P. Laporte, B. Arroyo, and H. Mejía,

70–82. Guatemala: Museo Nacional de Arqueología y Etnología.

Redman, C.L. 1999. *Human impact on ancient environments*. Tucson: University of Arizona Press.

Reilly, F. Kent, III. 1995. Art, ritual, and rulership in the Olmec world. In *The Olmec world: Ritual and rulership*, 27–46. Princeton: The Art Museum, Princeton University.

Reilly, F. Kent, III. 2000. Teopantecuanitlan (Guerrero, Mexico). In *Archaeology of ancient Mexico and central America*, ed. S. Evans and D.L. Webster, 722. New York: Taylor & Francis.

Rodríguez, Maria Carmen, and Ponciano Ortíz. 1997. Olmec ritual and sacred geography at Manatí. In *Olmec to Aztec: Settlement patterns in the ancient Gulf lowlands*, ed. B.L. Stark and P.J. Arnold. Tucson: University of Arizona Press.

Rosenswig, Robert M. 2006. Sedentism and food production in early complex societies of the Soconusco, Mexico. *World Archaeology* 38 (2): 330–355.

Rosenswig, Robert M. 2010. *The beginnings of Mesoamerican civilization: Inter-regional interaction and the Olmec*. New York: Cambridge University Press.

Sanders, William, Jeffrey Parsons, and Robert S. Santley. 1979. *The Basin of Mexico: Ecological processes in the evolution of a civilization*. New York: Academic Press.

Santley, Robert S., Stephen A. Nelson, Bently K. Reinhardt, Christopher A. Pool, and Philip J. Arnold III. 2000. When day turned to night: Volcanism and the archaeological record from the Tuxtla mountains, southern Veracruz, Mexico. In *Environmental disaster and the archaeology of human response*, Anthropological papers no. 7, ed. G. Bawden and R.M. Reycraft, 143–162. Albuquerque: Maxwell Museum of Anthropology.

Saturno, William A., David Stuart, and Boris Beltrán. 2006. Early Maya writing at San Bartolo, Guatemala. *Science* 311 (5765): 1281–1283.

Scarborough, V.L., F.V. Jr., and N. Dunning, ed. 2003. *Heterarchy, political economy, and the Ancient Maya*. Tucson: University of Arizona Press.

Sharer, Robert J., and David C. Grove, eds. 1989. *Regional perspectives on the Olmec*. Cambridge: Cambridge University Press.

Sharer, Robert J., and Loa P. Traxler. 2006. *The ancient Maya*. 6th ed. Stanford: Stanford University Press.

Sharer, Robert J., A.K. Balkansky, J.H. Burton, G.M. Feinman, K.V. Flannery, D.C. Grove, J. Marcus, R.G. Moyle, T.D. Price, E.M. Redmond, R.G. Reynolds, P.M. Rice, C.S. Spencer, J.B. Stoltman, and J. Yeager. 2006. On the logic of archaeological inference: Early formative pottery and the evolution of Mesoamerican societies. *Latin American Antiquity* 17 (1): 90–103.

Siebe, Claus. 2000. Age and archaeological implications of Xitle volcano, southwestern Basin of Mexico-City. *Journal of Volcanology and Geothermal Research* 104 (1): 45–64.

Smith, Michael E., and Marilyn A. Masson, eds. 2000. *The ancient civilizations of Mesoamerica: A reader*. Malden: Blackwell.

Spencer, Charles S., and Elsa M. Redmond. 2001. Multilevel selection and political evolution in the valley of Oaxaca, 500–100 B.C. *Journal of Anthropological Archaeology* 20 (2): 195–229.

Staller, J., R. Tykot, and B. Benz, ed. 2009. *Histories of maize in Mesoamerica: Multidisciplinary approaches*. Walnut Creek: Left Coast Press.

Stoltman, James B., Joyce Marcus, Kent V. Flannery, James H. Burton, and Robert G. Moyle. 2005. Petrographic evidence shows that pottery exchange between the Olmec and their neighbors was two-way. *Proceedings of the National Academy of Sciences of the United States of America* 102 (32): 11213–11218.

Symonds, Stacey. 2000. The ancient landscape at San Lorenzo Tenochtitlán, Veracruz, Mexico. In *Olmec art and archaeology in Mesoamerica*, ed. J.E. Clark and M.E. Pye, 55–74. Washington, DC: National Gallery of Art.

Taube, K.A. 2000. Lightning celts and corn fetishes: The formative Olmec and the development of maize symbolism in Mesoamerica and the American Southwest. In *Olmec art and archaeology in Mesoamerica*, J.E. Clark and M.E. Pye, ed. Washington, DC: National Gallery of Art.

Thompson, J.E.S. 1966. *The rise and fall of Maya civilization*. Norman: University of Oklahoma Press.

Tolstoy, Paul, and Louise I. Paradis. 1970. Early and middle preclassic culture in the Basin of Mexico. *Science* 167: 344–351.

Tolstoy, P., et al. 1977. Early sedentary communities of the Basin of Mexico. *Journal of Field Archaeology* 4: 91–106.

Townsend, R.F., ed. 1998. Ancient West Mexico: Art and archaeology of the unknown past. New York: Thames and Hudson.

Uruñuela, G., and P. Plunket. 2002. Lineages and ancestors: The formative mortuary assemblages of Tetimpa, Puebla. In *Domestic ritual in ancient Mesoamerica*, Monograph no. 46, ed. P. Plunket. Los Angeles: Cotsen Institute of Archaeology, University of California.

Vaillant, George C. 1930. *Excavations at Zacatenco. anthropological papers, no. 32, part 1*. New York: American Museum of Natural History.

Vaillant, George C. 1931. *Excavations at Ticoman, Mexico 32. Anthropological papers, vol. 32, part 2*. New York: American Museum of Natural History.

Vaillant, George C. 1935. *Excavations at El Arolillo, anthropological papers, no. 35, part 2*. New York: American Museum of Natural History.

Valdés, Juan Antonio, and Lori E. Wright. 2004. The early classic and its antecedents at Kaminaljuyú: A complex society with complex problems. In *Understanding early classic Copan*, ed. E.E. Bell, M.A. Canuto, and R.J. Sharer, 337–355. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Vega, Anthony A. 2007. *Early and middle formative: San Lorenzo, Veracruz, México*. Crystal River: Report Submitted to the Foundation for the Advancement of Mesoamerican Studies, Inc.. http://www.famsi.org/reports/00103/.

Voorhies, Barbara. 2004. *Coastal collectors in the Holocene: The Chantuto people of southwest Mexico*. Gainesville: University Press of Florida.

Wade, Lizzie. 2017a. Kings of cooperation. *Archaeology Magazine*. https://www.archaeology.org/issues/249-1703/features/5300-olmec-tres-zapotes-government%20249.

Wade, Lizzie. 2017b. Kings of cooperation. *Archaeology* 70 (2): 26–29.

van der Warker, Amber M. 2006. *Farming, hunting, and fishing in the Olmec world*. Austin: University of Texas Press.

Williams, Eduardo. 2004. Prehispanic west México: A Mesoamerican culture area. Foundation for the Advancement of Mesoamerican Studies, Inc. http://www.famsi.org/spanish/research/williams/.

Williams, Eduardo, Phil C. Weigan, Lorenza López Mestas, and David C. Grove, eds. 2005. *El antiguo occidente de México. Nuevas perspectivas sobre el pasado prehispánico*. Zamora: El Colegio de Michoacán.

Wilkerson, S.J.K. 1981. The Northern Olmec and pre-Olmec frontier on the Gulf Coast. In *The Olmec and their neighbors: Essays in memory of Matthew W. Stirling*, ed. E.P. Benson, 181–194. Washington, DC: Dumbarton Oaks.

Zeitlin, Robert N., and Judith Francis Zeitlin. 2000. The Paleoindian and Archaic cultures of Mesoamerica. In *The Cambridge history of the native peoples of the Americas*, Mesoamerica, part 1. 3 vols, ed. R.E.-W. Adams and M.J. MacLeod, vol. II, 45–121. Cambridge: Cambridge University Press.

Mesoamerica: Complex Society Development

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Introduction

Mesoamerica is primarily a cultural and linguistic concept useful to refer to groups of people who lived within a defined geographic region over a long period of time and who shared certain cultural and linguistic features and cultural practices, the most important of which are (1) a basic structuring economy, (2) beliefs about how the world works (cosmology) and practices related to those beliefs, and (3) material signs of stratification (Joyce 2004). The term refers geographically to the culture area that includes most of Mexico below the northern desert region and northern Central America minus the Caribbean lowlands of Honduras and Nicaragua to the east. Its geographic boundaries encompass the regions in which favorable climate and soils make maize agriculture feasible, and maize was in antiquity (and still is) the basis of the indigenous subsistence economy. Maize and other native cultigens such as squash, beans, and chili peppers were domesticated in Mesoamerica during the Archaic period, beginning about 5000 BCE (Acosta Ochoa 2017; Evans 2013: 88–89).

Definition

"Complex society" is defined here as social formations characterized by hereditary status-ranking differentiating elites and commoners, pervasive social inequality between these two broad social classes, and differential access to wealth and resources (both material and spiritual) (McGuire 1983; Fowler 1991). The phrase "development of complex society" is not necessarily limited to the earliest appearance or "pristine" cases of hereditary inequality, sometimes referred to "transegalitarian" societies because they are transitional from egalitarian to rank societies: political leadership surpasses the boundaries of kinship, acting further afield than the strictly local sphere and extending beyond the lifespan of the individual who exerts it, but neither institutionalized forms of power nor political centralization exists (Hayden 1995). Nevertheless, due to space limitations, this entry will focus on the earliest known archaeological evidence for the appearance of such societies.

Key Issues

By about 2000 BCE, the beginning of the Formative or Preclassic period, Mesoamerica was

inhabited by thousands of small, relatively homogeneous, egalitarian communities of full-time farmers, each consisting of perhaps 10–20 wattle-and-daub houses with thatched roofs and associated activity areas such as kitchens, midden deposits, and storage pits. Age, gender, and personal achievement constituted the dimensions of social differentiation. Agricultural tasks, craft production, and trading were organized at the household level. Some, but not necessarily all, ritual activities and interaction with outside groups may have been organized at the community level, but households and kin groups retained a high degree of autonomy. Leadership was based on achieved status, assumed by individuals with appropriate skills and personal qualities to specific activities and tasks.

Within a few centuries after 2000 BCE, a number of communities of considerable size and complexity – regional centers of economic, political, and religious power – appeared in various regions. At these centers, we see archaeological evidence for the emergence of complex society. These early hot spots of social complexity were considerably larger than most other contemporaneous settlements in their respective regions, and they possessed elite residential architecture ("chiefs' houses"), substantial ritual structures (elevated temple platforms), or both. Some featured public civic-ceremonial spaces such as plazas and ball courts.

The earliest development of political hierarchies in Mesoamerica, reflected in differences in mortuary furnishings, variation in residential form and construction, and tributary economies indicated by differential intrasite distributions of imported, exotic goods such as fine ceramics, mica and iron-ore mirrors, marine shells, obsidian, and greenstone, may be traced to this period. At this level of complexity, the household economy remains central in daily life, but institutional inequality fosters competition between hereditary elites who jockey for position and privilege. These individuals fulfill the roles of community political leaders and ritual specialists who reward cadre with gifts; manage communal labor; sponsor commensal activities; organize and direct interaction with other groups involving trade, tribute, and alliances; and organize and sponsor intergroup competition and violence.

Current Debates

Four decades ago, Kent V. Flannery (1976) influenced a generation of archaeologists to expect that such societal changes would result from gradual evolutionary trends resulting from the long-term effects of sedentary farming that developed in the Late Archaic period (3500–2000 BCE). The idea was that plant selection and improved diet led to population growth, fissioning of social units, and a general settling down in small, egalitarian villages throughout Mesoamerica. Some of these villages, because of differential access to critical resources, eventually became larger and more complex and developed new social institutions. They began to control more trade routes, engaged in increased social and economic exchange, and instituted formal political leadership. While very reasonable and well supported for its time, the gradualist village model of the origins of Mesoamerican social complexity did not anticipate the fact that some precocious centers with ranked society would begin their existence as full-blown, large villages with institutional inequality rather than small, egalitarian villages gradually moving in that direction.

Although many Mesoamerican regions have Initial Formative occupations dating to as early as 2000 BCE, none has the same archaeological evidence for early social complexity as the southeastern region. For more than 20 years, Mesoamericanists have suspected that the earliest development of complex society in the area may have occurred on the southeastern Pacific coastal plain and piedmont stretching from the Soconusco region of the Mexican state of Chiapas and down along the coast of the Central American republics of Guatemala, El Salvador, and Nicaragua (Fowler 1991). At the moment, the best data related to this issue come from the Mazatan zone of Soconusco where a detailed sequence and a number of early centers are known.

Examples

One such precocious center was the polity centered on Paso de la Amada, a large village site in the Mazatan zone of Soconusco, excavated by Michael Blake (1991) and John Clark (1991, 2004a, b). This ancient village, dating to 1650–1500 BCE (calibrated), appears to have been one of several regional centers of two-tiered settlement systems in the Mazatan zone. The core or ceremonial center of Paso de la Amada covered an area of approximately 40 ha, and the entire site covered 140 ha of dispersed construction (Clark 2004a: 54, 60), more than eight times the size of the next largest known center in the Mazatan zone (Rosenswig 2000: 427). Based on the criteria of size, the site could be considered a small town rather than a small village, but Clark and Blake do not make this claim.

The material culture of the Mazatan Early Formative centers features an array of symbolic goods that indicate social inequality such as ceramic figurines portraying obese males attired in ritual garb, wearing animal masks, and sporting round disks (iron-ore or mica mirrors?) on their chests or attached to a helmet or headdress, interpreted by Clark as depictions of shamanistic chiefs. At the El Vivero site, the osteological remains of a child, 11 years of age at death, were discovered. Grave goods interred with the child included a mirror fashioned of white mica mounted on a round sherd disk buried at the child's forehead region (possibly affixed to a helmet or headdress of perishable materials similar to those depicted in the figurines), clearly indicating ascribed social status. In addition, the child's body had been covered with red pigment, possibly another indication of high status.

Excavations of Mound 6 at Paso de la Amada revealed a sequence of at least nine superimposed platform construction levels of an aristocratic household (Clark 2004a: 56–57; Blake et al. 2006). The remains of these successive elite residences consisted of packed clay floors with postholes, concentrations of sherds and charcoal, bone fragments, trash pits, and occasional subfloor burials. The apsidal-shaped Structure 4 measured 10 by 22 m and was especially elaborate and well-constructed (Lesure and Blake 2002: Fig. 2). It is noteworthy that Mound 6 is the only one of several elite house platforms known in this large village that underwent sequential rebuilding; the others were abandoned in time. During the same period, three other elite residences at Paso de la Amada were built on smaller platforms (Mounds 4, 13, and 32), and approximately 40 small, non-elite residential mounds were built without platforms (Lesure 1997; Rosenswig 2000). These details and associated artifacts and features support the interpretation that Mound 6 was a chiefly residence which increased in relative wealth and status over the course of many generations, as inferred from superimposed building episodes. A symbolic transgenerational link with the past (social memory) is indicated by maintenance of the same shape and orientation of the house through successive rebuilding episodes. The architectural sequence of Mound 6 thus suggests a lineage of petty chiefs successfully consolidating power and passing their leadership to progeny in their household (Hill and Clark 2001: 332).

The rising fortunes of this household may have been connected with sporting and gaming activities. A monumental civic-ceremonial structure, Mound 7, located less than 200 m north of Mound 6 at Paso de la Amada, is regarded as the earliest known ball court and the largest construction known for its time in Mesoamerica (Evans 2013: 114). This is an earthen construction consisting of two parallel mounds with a central playing alley measuring 80 m long and 7 m wide. The flanking mounds are each 80 m long, 30 m wide, and 1.5 m high (Hill and Clark 2001: 333). Stratigraphic cross-dating indicates that construction of the ball court slightly predated the earliest of the sequential modifications of the Mound 6 houses, dated to about 1600 BCE (Blake et al. 1995). Hill and Clark (2001: 331) argue that location of the ball court in close proximity to an elite residence and its early date "constitute strong circumstantial evidence that its construction and/or use was important in and for the development of hereditary inequality and formal ascribed leadership." They highlight the close connection between sporting activity in the forging of community identity and the coalescence of leadership

roles around individual leaders. Drawing on Pierre Bourdieu's theory of practice, they argue that gaming activities and elite sponsorship of ball playing would have created an avenue for the accumulation of economic and social capital which would have contributed to the heritable power of an emerging chiefly lineage (Hill and Clark 2001: 341).

In their first formulation of a model of trans-egalitarianism at Paso de la Amada, Clark and Blake (1994) viewed the origins of hereditary village leadership as an accidental consequence of self-aggrandizing individuals pursuing advantage through feasting and competitive acts. They argued that the development of complex society in the Mazatan region was a long-term process involving "special historical and techno-environmental circumstances," the product of "self-interested competition among political actors vying for prestige or social esteem" (Clark and Blake 1994: 17). Hill and Clark (2001: 343) critique the aggrandizer model as overly materialist and political because it downplays the phenomenological component of cultural practices. In contrast, these are foregrounded in the practice-based interpretation of embodiment of ball game habitus related to community leadership based on manipulation and control of material and ideological resources, in turn fostering a sense of community identity (*communitas*), "largely an outgrowth of support for the village team and related activities" that crosscut lineage loyalties. Communitas implicated a titular community head and, combined with chronic disparities in social responsibilities and perquisites, created fertile ground for opportunistic elites to convert achieved leadership roles to heritable rulership.

Clark (2004a, b) argues that the large plazas and monumental buildings at Paso de la Amada were formally planned and laid out according to cosmological principles and using a measurement system of modular units that corresponded to numbers in later Mesoamerican calendar counts. The execution of such an ambitious scale of monumental construction would have required the mobilization of a significant collective labor project. Such a massive communal construction project would also have contributed to communitas through participation in inter-lineage activities, instilling a sense of shared ownership in the results of the project, and especially through a cosmologically charged statement of community identity that conferred founder status on the person or persons who organized and sponsored these activities (Clark 2004a: 61).

The last house of Mound 6 and the ball court of Mound 7 at Paso de la Amada fell into disuse at about 1350 BCE (calibrated), and the site itself was abandoned about a century later and never reoccupied (Clark 2004a: 54, 57).

Cross-References

▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative

References

Acosta Ochoa, G. 2017. Early agricultural modes of production in Mesoamerica: New insights from southern and central Mexico. In *Modes of production and archaeology*, ed. R.M. Rosenswig and J.J. Cunningham, 75–98. Gainesville: University of Florida Press.

Blake, M. 1991. An emerging early formative chiefdom at Paso de la Amada, Chiapas, Mexico. In *The formation of complex society in southeastern Mesoamerica*, ed. W.R. Fowler, 27–46. Boca Raton: CRC Press.

Blake, M., J.E. Clark, B. Voorhies, G. Michaels, M.W. Love, M.E. Pye, A.A. Demarest, and B. Arroyo. 1995. Radiocarbon chronology for the late archaic and formative periods on the Pacific Coast of southeastern Mesoamerica. *Ancient Mesoamerica* 6: 161–183.

Blake, M., R.G. Lesure, W.D. Hill, L. Barba, and J.E. Clark. 2006. The residence of power at Paso de la Amada, Mexico. In *Palaces and power in the Americas: From Peru to the northwest coast*, ed. J.-J. Christie and P.J. Sarro, 191–210. Austin: University of Texas Press.

Clark, J.E. 1991. The beginnings of Mesoamerica: Apologia for the Soconusco early formative. In *The formation of complex society in southeastern Mesoamerica*, ed. W.R. Fowler, 13–26. Boca Raton: CRC Press.

Clark, J.E. 2004a. Mesoamerica goes public: Early ceremonial centers, leaders, and communities. In *Mesoamerican archaeology: Theory and practice*, ed. J.A. Hendon and R.A. Joyce, 43–72. Malden: Blackwell.

Clark, J.E. 2004b. Surrounding the sacred: Geometry and design of early mound groups as meaning and function. In *Signs of power: The rise of cultural complexity in the southeast*, ed. J.L. Gibson and P.J. Carr, 162–213. Tuscaloosa: University of Alabama Press.

Clark, J.E., and M. Blake. 1994. The power of prestige: Competitive generosity and the emergence of rank societies in lowland Mesoamerica. In *Factional competition and political development in the New World*, ed. E. Brumfiel and J. Fox, 17–30. Cambridge, UK: Cambridge University Press.

Evans, S.T. 2013. *Ancient Mexico and central America: Archaeology and culture history*. 3rd ed. London: Thames & Hudson.

Flannery, K., ed. 1976. *The early Mesoamerican village*. New York: Academic.

Fowler, W.R. 1991. Approaches to the study of the formation of complex society in southeastern Mesoamerica. In *The formation of complex society in southeastern Mesoamerica*, ed. W.R. Fowler, 1–11. Boca Raton: CRC Press.

Hayden, B. 1995. Pathways to power: Principles for creating socioeconomic inequalities. In *Foundations of social inequality*, ed. T.D. Price and G.M. Feinman, 19–86. New York: Plenum Press.

Hill, W.D., and J.E. Clark. 2001. Sports, gambling, and government: America's first social compact? *American Anthropologist* 103: 331–345.

Joyce, R.A. 2004. Mesoamerica: A working model for archaeology. In *Mesoamerican archaeology: Theory and practice*, ed. J.A. Hendon and R.A. Joyce, 1–42. Malden: Blackwell.

Lesure, R.G. 1997. Early formative platforms at Paso de la Amada, Chiapas, Mexico. *Latin American Antiquity* 8: 217–235.

Lesure, R.G., and M. Blake. 2002. Interpretive challenges in the study of early complexity: Economy, ritual, and architecture at Paso de la Amada, Mexico. *Journal of Anthropological Archaeology* 21: 1–24.

McGuire, R.H. 1983. Breaking down cultural complexity: Inequality and heterogeneity. In *Advances in archaeological method and theory*, ed. M.B. Schiffer, vol. 6, 91–142. New York: Academic.

Rosenswig, R.M. 2000. Some political processes of rank societies. *Journal of Anthropological Archaeology* 19: 413–460.

Further Readings

Arroyo, B. 2004. Of salt and water: Ancient commoners on the Pacific coast of Guatemala. In *Ancient Maya commoners*, ed. J.C. Lohse and F. Valdez, 73–95. Austin: University of Texas Press.

Blomster, J.P. 2010. Complexity, interaction, and epistemology: Mixtecs, Zapotecs, and Olmecs in Early Formative Mesoamerica. *Ancient Mesoamerica* 21: 135–149.

Ceja Tenorio, J.F. 1985. *Paso de la Amada: An early preclassic site in the Soconusco, Chiapas, Mexico*, Papers of the New World Archaeological Foundation 49. Provo: New World Archaeological Foundation.

Cheetham, David. 2010. Cultural imperatives in clay: Early Olmec carved pottery from San Lorenzo and Cantón Corralito. *Ancient Mesoamerica* 21: 165–185.

Clark, J.E., and M.E. Pye. 2000. The Pacific coast and the Olmec question. In *Olmec art and archaeology in Mesoamerica*, ed. J.E. Clark and M.E. Pye, 217–252. New Haven: Yale University Press.

Lesure, R.G. 2014. Shared art styles and long-distance contact in early Mesoamerica. In *Mesoamerican archaeology: Theory and practice*, ed. J.A. Hendon and R.A. Joyce, 73–96. Malden: Blackwell.

Nichols, D.L. 2015. Intensive agriculture and early complex societies of the Basin of Mexico: The formative period. *Ancient Mesoamerica* 26: 407–421.

Rosenswig, R.M. 2010. *The beginnings of Mesoamerican civilization: Inter-regional interaction and the Olmec*. New York: Cambridge University Press.

Rosenswig, R.M. 2012. Agriculture and monumentality in the Soconusco Region of Chiapas, Mexico. In *Early new world monumentality*, ed. R.L. Burger and R.M. Rosenswig, 111–137. Gainesville: University Press of Florida.

Mesoamerica: Strengths and Weaknesses of the Current Classification

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Introduction

Mesoamerica is an analytical term that unifies several cultures of a particular region of the Americas. In this entry, a definition of Mesoamerica as an analytical term is presented in its historical context of development and use. A group of characteristic traits of several cultural traditions has historically been at the root of the term Mesoamerica, but the functionality of the term itself was meant to be as a heuristic device. Here, a commentary on its usefulness highlights both some advantages and disadvantages that resulted from grouping different historical trajectories into a single broad cultural realm. And, finally, while local academic disagreements renew debates on whether the term Mesoamerica has exhausted its

value, the strength of this term as a concept emerges best in cross-disciplinary and comparative contexts, providing a means of including Mesoamerican cultures in global discussions of complexity and world archaeology.

Definition

The term Mesoamerica is a concept that comprises the cultural phenomena of the indigenous world of Middle America. It is a framework of reference specifically devised to address cultural characteristics and boundaries, as opposed to geographical and political ones. Therefore, it is the cultural term that refers to a physical setting roughly encompassed between the river valleys of Sonora in northern Mexico and those of Honduras at the southern limits, comprising the modern nations of Mexico, Guatemala, Belize, Honduras, and El Salvador, with some of these only partially included. For example, the Maya archaeological site of Calakmul in the state of Campeche is politically in the nation of Mexico, geographically within North America, and culturally in Mesoamerica.

While the above example generates little scholarly issue, further north and south, the question of boundaries is at the heart of the sources of disagreement that have been problematic since the initial use of the term. Because the frame of reference is cultural, these boundaries cannot be drawn as hard and fixed lines; these are mobile and unstable cultural frontiers, and they vary with the frame of reference and with the temporal framework. Fluid frontiers represent cultural interaction spheres, so aspects of belonging and exclusion from what were traditionally defined as the "high civilizations" of Mesoamerica in contrast to the "lesser tribes" beyond it (Kirchhoff 1952: 19) have made for scientific, social, and political strife among scholars working in those areas. Most scholars who would refer to themselves as Mesoamericanists tend to work in the core, leaving the issue of boundaries somewhat unresolved.

Temporally, Mesoamerica in its inception referred to the arrangement of indigenous cultures and language groups of this area at the time of contact with Europeans in the sixteenth century. More generally today, the term is used for cultural developments comprising the long swath of time between early human migrations and settlement starting some 10,000 years ago and right up to contemporary embodiments of traditional cultural continuities, be they Postcolonial struggles with identity definition, immigration issues, or indigenous rights movements. As a simplified chronology, Mesoamerica can be divided into an Archaic period, running up to roughly 2000 BCE, a Preclassic period ending about 250 CE, a Classic period up until 900 CE, a Postclassic period ending with the fall of Aztec Tenochtitlan in 1521, and a Colonial and Postcolonial period between 1521 and the varying dates of national independence, with the Mexican Postcolonial period starting in 1821.

Within its physical setting, the concept of Mesoamerica includes several indigenous societies and the worldviews inspired by the relationship between people and their environments. Many diverse ecosystems are part of Mesoamerica's backdrop and can be grouped under three altitude-defined areas: *tierra fría* (high-altitude plateaus with volcanoes), *tierra caliente* (tropical rainforest lowlands), and *tierra templada* (the elevations in-between, with dry forest valleys). The diversity in ecosystems produced materials prized and traded throughout, between highlands and lowlands environments since early on, among which are jade, basalt, obsidian, salt, and perishable prestige items like feathers. Animals, especially those from the lowland tropics like jaguars, deer, monkeys, caimans, and several types of birds, including the turkey, also held symbolic importance in addition to providing sources of food and material for craftwork. Among the food items prevalent throughout Mesoamerica, the triad of early American domesticates – maize, beans, and squash – is a cornerstone of the intersecting cultural identities of Mesoamerican peoples, who might otherwise belong to different ethnicities and language groups. Among all foods, maize represents the most important staple, with consequent symbolic relevance in many cultures, such as the Maize

God of the Maya, but cacao also played an important role in long-distance trade out of the lowlands and, in addition to exemplifying a prestige product, may have functioned much like a form of currency.

For Mesoamerican people, environments themselves hold symbolic importance, especially those in connection with water and mountains. In particular, unique environments like the karstic limestone shelf of the Yucatan peninsula, which is studded with sinkholes, caverns, and underground streams, lend a supernatural quality to water scarcity. Caves and points of access to deeply buried water sources symbolize portals to the underworld and access to the realm of gods and godly resources. Caves are symbolically important throughout Mesoamerica and come to embody places of entry into and exit from other worlds – often the place of emergence of mythical human ancestors. Mountains (and volcanoes) are also locations of emergence: mythical Eden-like places enclosing precious life forces and goods. Ancient pyramid building practices create associations between artificial and natural mountains, constructing the appropriate places for the worship of gods, the burials of the elite, and the caching of offerings and sacrifices to deities.

Symbolism linked to concepts of space and directionality is of particular importance in many Mesoamerican societies and varies with each, but fundamental similarity in world view links spatial patterns from households to entire settlements and from commoner contexts to royal ones, with symbolic associations to an idealized cosmogram. The basic conception of the world is one of space divided into four quarters or directions in the form of a cross, with a center point acting as the most sacred direction, creating a quincunx patterning of space. This quadripartite scheme is reflected also in architectural layouts, as in the plan of radial pyramids, with a staircase on each of the four sides ascending to a central point at the top. Each direction in the cosmogram has cognate symbols, for example associated colors (among the Maya, red for east and the rising sun, white for north, black for west, yellow for south, and green – the color of precious jade – for the center). The directional symbolism of quadripartite structures also links space with time, as it traces the path of the sun from its rise in the east, passage through the zenith, setting in the west, and return through the underworld to its eastern point of emergence. With the cosmos divided into the upper layer of the heavens, the earthly surface, and the underworld below, the path of the sun also provides the mechanism connecting the layers of the cosmos and creates a parallel between quadripartite patterns and the notion of completion of cycles. The passage of time in ancient Mesoamerica was reckoned as cyclical (in particular, a 365-day solar cycle and a 260-day divinatory one), and this conception of time established links between cosmological, astrological, and agricultural cycles.

Despite these general definitions of Mesoamerica as a cultural concept in which shared beliefs between different traditions go back millennia and are evident in daily customs, Mesoamericans are not a single culture and have not traditionally viewed themselves as participating in a common identity. The term Mesoamerica dates to the 1940s and was devised as an analytical term, to allow for the classification of a group of cultures on the basis of shared traits.

Historical Background

Mesoamerica is a widely used term, but as an analytical concept, it is far from representing academic unity in the perception of its validity and continues to be a source of animated debate, especially in Mexico, where it developed and where it has been extensively adopted since its proposal in the 1940s. The classification of several societies straddling North and Central America into the cultural concept of Mesoamerica began with the 27th International Congress of Americanists held in Lima, Peru, in 1939, among members of the Comité Internacional para el Estudio de Distribuciones Culturales en América. It was followed by a formal definition of the term by German social anthropologist Paul Kirchhoff, who was working in Mexico and who published his proposal in Spanish in *Acta Americana* in 1943 and subsequently in an English translation

in 1952. The term was initially accepted and adopted without much controversy, mainly by archaeologists, ethnohistorians, and linguists, and less so by physical anthropologists, ethnologists, and sociocultural anthropologists, who to this day and especially in North America tend to make less use of this classification (scholars who call themselves Mesoamericanists tend to be archaeologists, not cultural anthropologists). Debate followed after decades, upon analysis of how the application of the term had morphed over time. Among the chief critical commentaries was that of Kirchhoff himself in the 1975 preface to the third edition of the original publication, in which he expressed disappointment in how his initial call for a productive use of the term had not been heeded with critical evaluation, and the concept was being adopted without serious consideration for its potential.

In the seminal 1943 paper in *Acta Americana*, Kirchhoff created the concept of Mesoamerica by grouping cultures on the basis of a series of shared cultural traits and practices, thereby establishing patterns of belonging and exclusion based on the presence or absence of those traits. The resulting groupings formed Mesoamerica as a cultural area, reflecting the anthropological scholarship of the time in its culture historical and classificatory tendencies, of which Kirchhoff's lifetime work is an evident example. While today the list of traits is the most commonly remembered aspect of Kirchhoff's method for the definition of Mesoamerica, his intentions stemmed from the recognition of a problem in defining the boundaries of culture areas. Kirchhoff objected to a geographic classification of indigenous groups into either North or South American, following biogeographical boundaries, and to the alternative division into Middle America, separating cultures from North and South American ones. He argued that geographical boundaries do not constitute cultural boundaries and that in some cases indigenous cultures of Mexico had less in common with neighboring ones to the north, with which they were grouped into the unit of North America, than they had with ones in South America, from which they were separated geographically and by extension culturally. In creating the term Mesoamerica, Kirchhoff meant it as an analytical term, or a theoretical construct, allowing for distinction from political and geographical boundaries, which remained purely descriptive. In this way, Mesoamerica did not exist as a reality reflected in tangible elements, but as an interpretive and analytical "problem" to address with investigations focused on explaining the presence or absence of elements and their historical trajectory. Despite Kirchhoff's intentions that Mesoamerica be more than just a framework for defining an area of investigation, that nevertheless became its most common usage and led to the development of critical objections to its validity in the first place.

Today, the temporal frame of reference of Mesoamerica is best envisioned in long and flexible spans of time because establishing chronological boundaries is equally as complex as defining cultural ones in geographical terms. In establishing his classification of cultures in the 1940s, Kirchhoff looked to the distribution of language groups "at the time of the conquest" (Kirchhoff 1952: 19), placing his original definition of Mesoamerica into a sixteenth-century context. Subsequently, as the term was adopted more by archaeologists than other anthropologists and historians, it most frequently came to refer to indigenous pre-Hispanic civilizations from much earlier times. Lately, new awareness recognizes that this traditional usage creates "terminological problems" in addressing the "mestizo, European, and even indigenous peoples who had little or nothing to do with the so-called Mesoamerican world but have resided in the region for centuries" (Carmack et al. 2007: 5–6). Contemporary definitions now acknowledge that Mesoamerica includes "not only the rich historical, social, and symbolic traditions of diverse aboriginal cultures (before and after European contact) but also the interweaving of these with European and African traditions from the Spanish conquest to the present" (Carrasco 2001: 212).

In tracing distributions of language groups, Kirchhoff classified Mesoamerican peoples into contact-period linguistic entities that approximated ethnic groups with shared histories and therefore brought out cultural boundaries. He

used language and history as forms of identity definition based on community and reinforced by differences with people beyond the group. In Kirchhoff's words, "this all demonstrates the condition of Mesoamerica as a region whose inhabitants, both the very early immigrants and those relatively recent, were bound by a common history that placed them as a group in front of other tribes of the continent, leaving their migratory movements confined, as a general rule, inside its geographical limits once they were within Mesoamerica's influence" (Kirchhoff 1952: 20). Aspects of a common history resulted in elements shared between or lacking from individual societies and allowed Kirchhoff to compile a list of over 40 elements exemplifying "Mesoamericanness." These shared traits can be grouped into categories that include elements of farming (like corn and cacao), personal adornment and clothing, architectural features (pyramids), writing and computation (such as hieroglyphs and positional numerals), calendar systems (ritual and solar years which combined form a 52-year "century"), components of ritual practices and sacrifice, and military aspects. Many of these categories had direct usefulness for archaeologists, regardless of whether the trait list was an efficient method of analysis. The broader strength of this proposition was the argument for a greater commonality, between cultures previously treated as discrete entities, of lifeways and worldview, of which stepped pyramids and ball courts are material manifestations and therefore subject of study for archaeology.

Among the first scholars who found the term useful and began applying it in their work is the Mexican scholar Pedro Armillas, who adopted aspects of Kirchhoff's Mesoamerica in a discussion of its cultural frontiers along rivers (1951). Armillas had developed a critical attitude toward Mexican archaeology during the early 1940s, targeting the shortcomings of traditional archaeological research design of the time, which focused on studying ceramic sequences in order to establish cultural chronologies. In the United States, Clyde Kluckhohn had published similar critical attacks on Mexican and Central American anthropology (1940), setting the stage for a reorganization of Middle American studies to include more theoretical goals, broader frameworks of analysis, and more generalizing formulations geared toward uncovering cultural universals. These new theoretical influences from Marxist ideologies also imparted tendencies toward cultural evolutionism to the establishment of Kirchhoff's concept of Mesoamerica.

Unfortunately, because Kirchhoff approached anthropology as a historical discipline, the application of Marxist and evolutionist notions of the time also meant that the reorganization of cultures around his trait list resulted in a developmental sequence in which Mesoamerican civilizations emerged as the "super area of higher farmers" (Kirchhoff 1952: 19). This attribution of low-to-high cultural levels to people along evolutionary lines is still one of the enduring weaknesses of the concept of Mesoamerica. Through it, Kirchhoff assigned to many of what he called "tribes" in the northern and southern reaches of Mesoamerica a low level of "culture" and designated the core areas of Mexico as the height of civilization. Further (as discussed below), evolutionary sequences led to the perception of a single developmental sequence, that in turn created the erroneous impression of a single uniform Mesoamerica in which cultures could be seen as derivative of one another – a practice that resulted in a largely diffusionist paradigm of Mesoamerican cultures.

Beyond the 1952 translation of Kirchhoff's definition of Mesoamerica, the term was used interchangeably with Middle America (the term then common among North American archaeologists) in Willey and Phillips's 1958 *Method and Theory in American Archaeology*, from which it became widespread beyond Mexico. The decades that followed saw developments in archaeology that were appropriate for a field of Mesoamerican studies, considerably more multidisciplinary and interregional than any in the preceding half century. Among the archaeological work that rested on the concept of Mesoamerica are regional projects, surveys, and settlement pattern studies; research in cultural ecology and human adaptations to the natural environment; long-distance trade and interaction; and the investigation of social evolution and culture change, urbanism,

and the development of civilizations and the state. Starting in the 1940s, systematic research began to expand into regions beyond the traditional focus on the Basin of Mexico, Oaxaca, and the Maya area, and all the way to the frontiers of Mesoamerica. The formulation of a concept for a Mesoamerica distinct from geographical and political classifications also resulted in evaluation of methodological approaches, in several synthetic works on archaeological aspects of the area and in archaeological publications placing culture areas within their larger Mesoamerican context, among which Marquina's (1951) *Arquitectura Prehispánica*, Piña Chan's (1960) *Mesoamérica*, Norguera's (1965) *La Cerámica Arqueológica de Mesoamerica*, Sanders and Price's (1968) *Mesoamerica: The Evolution of a Civilization*, and Flannery's (1976) *The Early Mesoamerican Village*.

Key Issues and Current Debates

One of the advantages of the term Mesoamerica, as well as what sparks much of the disagreement around the concept, is that it is full of ambiguity, deriving from the nature of the elements considered for its initial definition. Today's anthropological approaches cannot reduce culture to a formula for presence or absence of traits, but the method was typical of the classificatory period of culture history. Ambiguity also stemmed from the fact that the original concept was somewhat devoid of a discussion of its temporal dimensions, and the geographical distribution of the characteristic elements was not homogenous through space within each society. These compounded sources of ambiguity result in a cultural concept for Mesoamerica that identifies different ethnic groups, but the sum of these parts does not equal a single culture. Consequently, the developmental trajectory of Mesoamerica as a cultural tradition has multiple historical strands, at times interwoven in temporally and geographically heterogeneous ways.

Within the classification of New World societies into culture areas, the development of the notion of Mesoamerica is a contribution from Mexico to worldwide archaeology, and therefore, such a fundamental part of the discipline in that nation that for a long time analysis of its strengths and weaknesses has been beyond the realm of questioning. Recently, however, Mexican scholars in archaeology and related disciplines have attempted to systematize and coordinate the various voices of the debate on the continued appropriateness of the concept of Mesoamerica that have periodically questioned its validity since the death of Kirchhoff and even earlier. One such effort resulted in a symposium followed by a special issue edited by Ignacio Rodríguez García (2000) in the journal *Dimensión Antropológica* of the Mexican Instituto Nacional de Antropología e Historia. The aim of the journal is to address issues of national and international relevance to the theoretical and conceptual framework of anthropological research. Because of the deep tradition of Marxist approaches in Latin American anthropology, the issue dedicated to debating the concept of Mesoamerica is also a philosophical debate on the nature of knowledge, determinism, and the lack of theories of change in positivist science. What is clear to scholars in Mexico, more than to others who use the term Mesoamerica, is that it only has the appearance of a descriptive designation defining the extent of an area but that probing its theoretical implications is both an anthropological discussion and a debate on the intentions and legacy of Kirchhoff's contribution to Mexican and global anthropology. As López Aguilar asserts, "Mesoamérica se corrobora e intentifica con la tortilla, las navajas prismáticas, el juego de pelota, Tláloc, las sociedadedes complejas o *clasistas iniciales*, la mexicanidad, el nacionalismo, el México profundo o con cualquiera de los rasgos culturales *ad hoc* que propuso Kirchhoff y que se siguen manejando por los arqueólogos, con una carga teórica que no se ha reconocido hasta ahora" (2000: 107) (Translation by author: "Mesoamerica is corroborated by and identified with the tortilla, prismatic blades, the ballgame, [the rain god] Tláloc, complex societies or pristine states, mexicanism, nationalism, and deep Mexico or whichever of the ad hoc cultural traits proposed by Kirchhoff and that continue to be employed by archaeologists, with a theoretical load that has not

been recognized until now."). The critique warns that once accepted as a term reflecting a reality, all research results serve to reaffirm and reify Mesoamerica as a discrete entity: evidence is never used to confront the notion, explain its validity, argue against its usefulness, or question its very existence as a cultural certainty.

In broader terms, the use of the concept of Mesoamerica over nearly 70 years has developed its own historical trajectory in which its meaning has been ascribed changing values by different scholars and at different times. Some aspects of its history constitute weaknesses that are apparent in hindsight. For example, as Kirchhoff's and colleagues' ideas originated in an environment of Mexican nationalism that reinforced the concept of monumentalism, high culture, and the ideology of the state, the idea of Mesoamerica can be read as a teleological argument for the culmination of certain lifeways into a civilizing process defined by "higher farmers" to distinguish them from lesser farmers and hunter-gatherers. This approach neatly identified the core of Mesoamerica with the core of the Mexican nation, heir to the achievements of the civilizations of the Aztec, Toltec, and Teotihuacanos, and as such appealed to the government and to a state-supported vision of the Mexican past. The Mesoamerica that was intended to bridge fragmented research efforts into a cohesive whole and to represent all its societies as an interwoven cultural unit often resulted in the alienation of many groups whose cultural trajectories did not fall into the grand historical heritage envisioned by a national narrative.

The effects have often been practical, as in the favoring of a few cultural traditions over the whole, which resulted in direct intervention and government support to finance research projects and monumental site restoration for those endeavors that promoted the earliest origins and highest achievements of the grand civilizations of Mesoamerica. The perception of a grand sweep of historical evolution derives from Kirchhoff's original classification, though the effect may not have been in his intentions. One of the weaknesses of a typology of traits is that, once mapped onto a geographical distribution, it leads to a tendency, of which Kirchhoff himself was not free from, to explain the origin and spread of things through diffusion.

One such example is the role of the Olmec in the origins of civilization in Mesoamerica, a debate that has been ongoing since Frans Blom's and Oliver La Farge's 1920s survey of the Gulf Coast but that saw increased intensity after Kirchhoff's proposal of a Mesoamerican cultural unit and became an argument in favor of the Olmec as a "mother culture" with the 1942 Round Table of the newly founded Sociedad Mexicana de Antropología. The concept of Mesoamerica allowed for the impression of a single linear developmental trajectory, engendering a disposition to see one culture as derivative of another and ultimately all Mesoamerican cultures as derivative of a single one. With the dating of Olmec remains showing great antiquity, the Olmec became the case for the original civilization of ancient Mesoamerica, and the *cultura madre* debate continues unresolved today. In generalized terms, among the supporters of an Olmec origin of civilization, Diehl and Coe (1996) place the scholars and national institutes directors of great influence in Mexican archaeology, like Alfonso Caso, Miguel Covarrubias, and Ignacio Bernal, while researchers of other societies, like the Zapotec and the Maya, belong with the proponents of an alternative view in which Mesoamerican civilization is the combined result of many equal donor cultures. The debate is often driven by findings of newer and earlier examples of "traits" that occur first in any one society and therefore remains somewhat local, missing the opportunity for an analysis of the entire paradigm of "mother cultures" and whether this constitutes an appropriate model for the development of complex societies, in Mesoamerica or elsewhere.

Despite the above example of a less than fruitful consequence of the classification of cultural groups into a single Mesoamerica, the concept also has great power as an analytical tool for comparative approaches to Mesoamerican cultures, both within Mesoamerica and beyond it. A demonstrated strength of the concept of Mesoamerica is the example of its use in the analysis of Teotihuacan's interaction sphere, by scholars of

Teotihuacan as well as of several other Mesoamerican peoples. In addition to analysis of the legacy inherited by the Aztec and other Postclassic societies, in the study of Teotihuacan's spread of ideas and people into the Maya area in the early Classic period, a common broader view has allowed for very useful integration of separate culture histories into a much more complex pattern of reciprocal influences (see Carrasco et al. 2000; Braswell 2003). Much is still unclear about the nature of the interactions with the Maya, but a Mesoamerican lens is the appropriate approach to understanding Maya sites with particular traits not common to all sites and to understanding Maya and other ethnic barrios in Teotihuacan's urban core.

Beyond comparative approaches within Mesoamerica, the idea first proposed by Kirchhoff embodies the potential for strong multidisciplinary and cross-cultural discussions in a global context, which despite other weaknesses expressed here, imparts a validity and usefulness to the concept, whose possible theoretical contribution has yet to be fully explored from an international perspective.

International Perspectives and Future Directions

The inherent ambiguity in the concept of Mesoamerica has consequences for the role of the term in a global context. Whether debates center on ontological or theoretical discussions, Mesoamerica remains insufficiently solidly defined to be easily incorporated in worldwide visions. In simplistic terms, among scholars working in Mesoamerica, two camps can be identified: those who use the term widely but do not pose themselves the problem of querying its validity and those who are aware of its history and etymology but squabble over its contemporary limitations. Of the latter, scholars take issue with several of the shortcoming among which those discussed here and argue that its limitations are greater than its advantages, while others who support its validity often do so on the grounds of respect for Kirchhoff's historical contribution. Generally missing is a camp of supporters of the concept of Mesoamerica based on the renewed contemporary advantages it offers in a global context of cross-cultural archaeological inquiry.

While scholars who support the idea of Mesoamerica have seen uniformity, others in the world have sensed the heterogeneity of the concept of a Mesoamerican civilization defined differently for each time and place, making for ad hoc comparisons with the other early civilizations of the world: Egypt, Mesopotamia, the Indus Valley, China, southwestern Nigeria, and Peru. For example, if referring to a "Neolithic Revolution," we should look to the Tehuacan Valley of five millennia ago; if to the origins of complexity, then to the Maya, the Olmec, and the Zapotec of the early mid-first-millennium BCE; if to elaborate writing systems, to the Mixe-Zoque and the Maya before the first millennium CE; and if to urban societies, then to Teotihuacan in the first millennium BCE. However, as the deep history of long-distance trade in obsidian attests, these cultures did not exist over 4,000 years in isolation from each other and instead shared contact and exchanges of goods and information. Nevertheless, the above confusion as to exactly which society we refer to when speaking of a Mesoamerican civilization suggests that the concept of Mesoamerica could use fresh redefinition, perhaps acknowledging its historical roots but specifically formulated to be useful to a worldwide discussion of archaeological civilizations, so that Mesoamerican societies can be considered in a global context. An integrated approach to the study of complex societies that systematically includes Mesoamerican ones would advance a global history of comparable trajectories with the richness of local details.

Another great strength of the original classification lies in the fact that the concept is not defined by a chronological framework. While originally bound by contact period data, the term is inherently temporally flexible and today has come to encompass also Colonial and Postcolonial modern periods. In this realm, scholarship has demonstrated dynamic interaction of ideas between Europe and Mesoamerica that include Spanish, indigenous American, and African traditions (ethnographies and historical records, maps, ideas on religion, humanity, and

nature). As Carrasco, who supports the idea of a Mesoamerica not limited to pre-Hispanic times, reminds us, "the encounters and exchanges among various European cultural groups, diverse indigenous cultures, and African peoples did not represent a termination of indigenous cultural practices, but rather the formation and transculturation of new worlds for Europeans, native peoples, and *mestizos*, mulattos, and *castas*" (Carrasco 2001: 213). Today's scholars recognize that interactions in Mesoamerica in post-contact times have spurred developments in natural history, theology, and philosophy in Europe (during the Enlightenment), which subsequently informed models of biological, social, and political change (now described in such terms as evolution, syncretism, and revolution). These views, rather than treating Mesoamerica as part of a New World in opposition to an "old" one, argue for a New World that is the unprecedented outcome of two old worlds coming together – a perspective that is more consonant with global archaeological inquiry.

Kirchhoff's original proposal assumed that Mesoamerica was an identity concept shared by those people he had grouped under the term, when in reality it is a classificatory notion imposed from a typological perspective. Its value is analytical and cannot be confused with a retrofitted sense of identity for indigenous Mesoamerican groups. But, whether or not we can consider a common identity to be perceived as such, we may be able to observe it empirically in material traces, and such a practice has made the term Mesoamerica useful to archaeologists. Perhaps not in terms of the specific ethnic and linguistic groups, evolutionary stages, or shared traits, nevertheless Mesoamerica exists: as an area of shared cultural characteristics expressed in practices and ideological values resulting from diverse developmental trajectories in a context not devoid of contact and exchange.

Cross-References

- ▶ Global Archaeology
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mesoamerica: Complex Society Development
- ▶ Mexico's Heritage and Management
- ▶ Nationalism and Archaeology
- ▶ Olmec: Geography and Culture
- ▶ Teotihuacan: Geography and Culture

References

Armillas, P. 1951. Mesoamerican fortifications. *Antiquity* 25: 77–86.

Braswell, G.E., ed. 2003. *The Maya and Teotihuacan: Reinterpreting early classic interaction*. Austin: University of Texas Press.

Carmack, R.M., J. Gasco, and G.H. Gossen, eds. 2007. *The legacy of Mesoamerica: History and culture of a Native American civilization*. Englewood Cliffs: Prentice Hall.

Carrasco, D. 2001. Mesoamerica: An overview. In *The Oxford encyclopedia of Mesoamerican cultures: The civilizations of Mexico and Central America*, ed. D. Carrasco, 211–216. Oxford: Oxford University Press.

Carrasco, D., L. Jones, and S. Sessions, eds. 2000. *Mesoamerica's classic heritage: From Teotihuacan to the Aztecs*. Boulder: University Press of Colorado.

Diehl, R.A., and M.D. Coe. 1996. Olmec archaeology. In *The Olmec world: Ritual and rulership*, ed. M.D. Coe, 10–25. Princeton: Art Museum, Princeton University.

Flannery, K.V., ed. 1976. *The early Mesoamerican village*. New York: Academic.

Kirchhoff, P. 1943. Mesoamérica: sus límites geográficos, composición étnica y caracteres culturales. *Acta Americana* 1: 92–107.

Kirchhoff, P. 1952. Mesoamerica: Its geographic limits, ethnic composition and cultural characteristics. In *Heritage of conquest: The ethnology of Middle America*. Translation of 1943 original, ed. S. Tax, 17–39. Glancoe: The Free Press Publishers.

Kirchhoff, P. 1975. Mesoamérica. In *Enciclopedia de México, Volume VII*. Reprinted in *Dimensión Antropológica*, 19: 15–31.

Kluckhohn, C. 1940. The conceptual structure of Middle American studies. In *The Maya and their neighbors*, ed. C.L. Hay, R.L. Linton, S.K. Lothrop, H.L. Shapiro, and G.C. Vaillant, 41–51. New York: D. Appleton-Century Company.

López Aguilar, F. 2000. En la mirada del arqueólogo, una Mesoamérica Ciega (Entre Mesoamericanistas Te Veas). *Dimensión Antropológica* 19: 97–119.

Marquina, I. 1951. *Arquitectura Prehispánica*. Mexico City: InstitutoNacional de Antropología e Historia.

Norguera, E. 1965. *La cerámica arqueológica de Mesoamérica*. Mexico City: Universidad NacionalAutónoma de México.

Piña Chan, R. 1960. *Mesoamérica: Ensayo histórico cultural*. Mexico City: Instituto Nacional de Antropología e Historia.
Rodríguez García, I. 2000. Presentación. *Dimensión Antropológica* 19: 7–13.
Sanders, W.T., and B.J. Price. 1968. *Mesoamerica: The evolution of a civilization*. New York: Random House.
Willey, G.R., and P. Phillips. 1958. *Method and theory in American archaeology.* Chicago: University of Chicago Press.

Further Reading

Adams, R.E.W., and M.J. MacLeod, eds. 2000. *Mesoamerica. The Cambridge history of the Native peoples of the Americas*, Vol. 2, Part 2. Cambridge: Cambridge University Press.
Blanton, R.E., S.A. Kowalewski, G. Feinman, and L. Finsten. 1981. *Ancient Mesoamerica: A comparison of change in three regions*. New York: Cambridge University Press.
Brumfiel, E.M. 2009. Mesoamerica. In *The Oxford handbook of archaeology*, ed. B. Cunliffe et al., 611–646. Oxford: Oxford University Press.
Creamer, W. 1987. Mesoamerica as a concept: An archaeological view from Central America. *Latin American Research Review* 22: 35–62.
Flannery, K.V., and J. Marcus. 2000. Formative Mexican chiefdoms and the myth of the "mother culture". *Journal of Anthropological Archaeology* 19: 1–37.
Hendon, J.A., and R.A. Joyce. 2004. *Mesoamerican archaeology: Theory and practice*. Malden: Blackwell Publishers.
Jiménez Moreno, W. 1959. Síntesis de la historia pre-Tolteca de Mesoamérica. In *Esplendor del México Antiguo*, ed. C. Cook de Leonard, 1019–1108. Mexico City: Centro de InvestigacionesAntropológicas de México.
Kroeber, A.L. 1939. *Cultural and natural areas of Native North America*. Publications in American archaeology and ethnology 38. Berkeley: The University of California at Berkeley.
Litvak King, J. 1985. Mesoamerica: Events and processes, the last fifty years. *American Antiquity* 50: 374–382.
López Austin, A., and L. López Luján. 1996. *El Pasado Indígena*. Mexico City: Colegio de México, Fideicomiso Historia de las Américas, Fondo de Cultura Económica.
Taube, K. 1985. The classic Maya maize god: A reappraisal. In *Fifth Palenque round table 1983*, ed. M.G. Robertson, 171–181. San Francisco: Pre-Columbian Art Research Institute.
Wauchope, R., ed. 1964. *Handbook of Middle American Indians*. Austin: University of Texas Press.
Williams, E., M. García, P.C. Weigand, and M. Gándara, eds. 2011. *Mesoamérica: debates y perspectivas*. Zamora: El Colegio de Michoacán.
Wolf, E. 1959. *Sons of the shaking earth: The people of Mexico and Guatemala, their land, history and culture*. Chicago: University of Chicago Press.

Mesoamerica: Subsistence Strategies by Region

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Introduction

Establishing subsistence strategies for Mesoamerica appears quite simple; it would suffice to separate periods associated with hunter-gatherers from those in which agrarian societies appear. However, in practice, the situation is more complex. In addition to the fact that domestication represents a long process that cannot easily be considered to be completed, almost all societies at the time of the arrival of the Spanish continued to use hunting, fishing, and gathering as important parts of their obtaining nutrition.

Additionally, periods before the emergence of so-called complex societies have been little studied in comparison with ceramic periods. For this reason, available information regarding earlier subsistence strategies, such as those of the hunters of megafauna, gatherers from the coasts or the interior, and early agriculturalists, is scarce and fragmentary.

Finally, the differentiation carried out in this text regarding subsistence strategies is somewhat idealized in that it distinguishes three large groups: a. hunters of megafauna, b. coastal and broad-spectrum gatherers, and c. agrarian societies. This distinction is made simply to define the essential aspect that dominates each these subsistence strategies, without excluding other, secondary activities in obtaining food.

Definition

Subsistence

Subsistence implies all the strategies and material means that an individual or human group employs

for their survival and reproduction, whether biological or cultural. Thus, it is not synonymous with forms or levels of social integration, such as the terms "band," "tribe," "hierarchical societies," and "archaic state." Nevertheless, each form of social organization can be linked to specific subsistence strategies: For example, societies defined as "bands" (Service 1962) are characterized by a mode of subsistence based on hunting, fishing, and gathering, whereas in hierarchical or state societies, subsistence is generally based on agriculture.

Hunter-Gatherers

Hunter-gatherers are human groups whose subsistence is based on the hunting of wild animals and the collection of wild plants without their domestication and, with the exception of dogs, without domestic animals (Lee and Daly 1999: 3).

Big-Game Hunters

Extinct animals whose weight usually was over a half-ton are considered megafauna, although this term is generally employed to designate megaherbivores, such as the mammoth (*Mammuthus*), mastodon (*Mammut*), or giant sloth *Megatherium*, *Eremotherium*). Although the Paleo-Indian cultures of the end of the Pleistocene have generally been defined as hunters of megafauna, it is likely that Clovis hunters and other contemporary groups were only occasional hunters of this type.

Broad-Spectrum Foragers (Coastal and Continental)

These groups are oriented toward the collection of plants, mollusks, and smaller fauna and are usually associated with coastal and tropical zones of Mesoamerica, although they are not exclusively from these regions. Even if these groups are identifiable since the end of the Pleistocene, this way of life became widespread in the Mesoamerican zone, beginning with the Holocene.

Cultivation

This is the artificial human propagation of seeds, cuttings or roots, and/or care of plants, whether wild or domesticated.

Agriculture

In this cultural system, subsistence is based on domesticated plants. Agricultural production can be separated into two systems of agriculture: intensive and extensive. Extensive agriculture requires a relatively large area of land and is defined as following the cultivation of a parcel of land by a fallow period (which depends on the characteristics of the soil, but may be of up to seven years), during which the soil is allowed to reconstitute its nutrients.

Sedentarism

This process involves the permanent establishment of human settlement in contrast with nomadism, which involves the constant moving of camps to different territories due to causes such as herding, a reduction of the capacity of the environment, or the need for allochthonous resources. Although in the greater number of archaeological and ethnographic cases, sedentarism tends to be associated with agrarian societies, this association is not universal. In particular, sedentarism is a notably late process in Mesoamerica in comparison with the appearance of the first domesticated plants in this region.

Historical Background

The study of subsistence in Mesoamerica has been linked with the development of archaeology itself in Mexico and Central America. Most likely, the oldest discussions in this regard began with the debate at the end of the nineteenth century between Florentino Ameghino and Aleš Hrdlička. The former argued that modern humans had evolved in South America and subsequently migrated to the rest of the planet; in contrast, Hrdlička denied the idea that humans had originated in the Argentine pampas but also denied that they could have coexisted with the fauna of the Pleistocene. Later, the findings at Folsom, New Mexico, in 1908, would confirm not only coexistence between humans and Pleistocene fauna but also the possible hunting of such fauna.

During the first half of the twentieth century, many studies of Mesoamerican societies focused

on defining cultural sequences and the chronological position of the various regional cultures; therefore, the study of ceramics, sculpture, and architecture was central to defining regional styles. Although complex societies were the principal subject of this research, studies on subsistence systems prior to the development of ceramics were marginal. This condition held true until the discovery of the so-called Tepexpan Man in 1947, when the investigation of preceramic societies began in earnest, particularly in Mexico; various research projects on hunter-gatherer groups were carried out after the creation of the "Department of Prehistory of the INAH [the National Institute of Anthropology and History]." At this time, research also began on coastal gatherers, and research until the mid-twentieth century had a marked focus on cultural history.

In the second half of the twentieth century, ecological perspectives began to dominate archaeological investigations that were centered on defining agricultural systems, their productive potential, and their role in the development of complex societies (Sanders et al. 1979). Additionally, the first long-term studies examining the development of agriculture began, principally in the Tehuacán and Oaxaca valleys (MacNeish 1967; Flannery 1986). The last 3 decades have seen a marked change from research with an ecological and evolutionary focus to studies involving nonlinear dynamic models, as well as models where individuals are considered to be active agents in the models of change. Conversely, the application of new techniques for the recovery of evidence (both direct and indirect) for human subsistence (i.e., phytoliths, starch grains, pollen, chemical analyses, and stable isotopes, among others) has permitted the evaluation of traditional models of the origin of agriculture or the paleodiet and the generation of new research trends.

Key Issues/Current Debates

Early Peopling and Big-Game Hunting

Although it is clear now that the peopling of the American continent took place at the end of the Pleistocene through the Bering Strait, various opinions remain regarding whether this migration took place through the interior of the continent or along the coast, as well as the time at which this process occurred.

One group of researchers argues that this initial peopling must have taken place at the end of the last glaciation (Wisconsin) and suggests that it was not possible until the two large glacial blocs that covered North America (the Laurentide and Cordilleran) had melted between 11,000 and 12,000 BCE. This model (termed *Clovis-first*) suggests that the first settlers were hunters who used fluted points (Clovis) and entered through a hypothetical "ice-free corridor," a thin fringe of exposed land that existed between both glaciers and allowed passage through the area now occupied by Alberta (Fiedel 1996: 72).

The *Clovis-first* model assumes an accelerated "migratory wave" of groups hunting Pleistocene fauna that would go on to carry out a rapid peopling toward the south of the continent and would be responsible for the extinction of the megafauna. Unfortunately, this model presents several problems. Paleoecological studies have shown that this supposed corridor was either impossible or did not exist until very late in the Pleistocene, when the continent was already populated. The model also does not consider the large differences in the gradient of ecosystems located between North and South America, nor does it explain the presence of fully accepted pre-Clovis sites in the New World, such as Monte Verde in Chile.

In Mesoamerica, a large quantity of fluted points have been found, almost all of which are from the surface, from the Sierra Gorda de Querétaro to Honduras (Acosta 2012). These fluted points, which are found from southern Mexico and Central America, are not "typical" Clovis points but are characterized by reduced dimensions and concave edges such that they are more similar to the points of the late Paleo-Indian period of the USA. These points can be associated with points of the "fishtail" type, as in Chiapas or Belize, although the associated stone tools correspond to those typically associated with Clovis, such as "keeled" scrapers (*limaces*), burins, and

scrapers with lateral spurs; these tools indicate a type of subsistence that is highly dependent on hunting and uses specialized artifacts for removing flesh from prey and preparing skins. Only for Los Grifos, Chiapas, has a study reported on the remains of fauna from Clovis settlements, indicating medium-sized prey, such as white-tailed deer (*Odocoileus* sp.), peccary (*Tayassu* sp.), and Pleistocene horse (*Equus* sp.).

Only two Clovis sites in the Mesoamerican area have been dated: Los Grifos in Chiapas, Mexico and Los Tapiales in Guatemala. Unfortunately, the early dates for Los Tapiales (c. 10,500 BCE), Guatemala, do not appear to be clearly associated with the Clovis materials, and the site presents various dates from the early Holocene. The dates for Los Grifos (9,000–8,000 BCE) time the appearance of fluted points in Mesoamerica mainly at the beginning of the Holocene (Acosta 2012).

The association of megafauna with human activity has best been documented at the Valley of Mexico, although many of these sites do not contain diagnostic materials that could associate them with any particular Pleistocene technology. The megafauna (*Mammuthus columbi*) hunting sites associated with projectile points include those for mammoths at Santa Isabel Iztapan and three points associated with them (Lerma, Plainview, and Angostura) in combination with other artifacts linked to the processing of prey. Other sites, such as Atepehuacan, contain mammoth remains that are associated with obsidian flakes. These two sites are dated at the beginning of the Holocene, between 9,500 and 9,000 BCE (Aveleyra 1967).

Despite these datings, sites for megafauna hunting in the Valley of Mexico to date correspond to killing sites; however, base camps have not been located that would allow us to determine whether these great preys were important in the subsistence of these early settlers or these remains only reflect occasional hunting (and most likely scavenging) of the last megamammals that were in the process of extinction at the end of the last ice age.

Coastal Collectors and Broad-Spectrum Hunters

Human groups have exploited coastal resources since the end of the Pleistocene. Indeed, several authors believe that the peopling of the continent must have taken place along the Pacific coastline earlier than the peopling of the continental interior (Dixon 1999). The earliest evidence of coastal collecting groups appears along the entire Pacific coast from the California islands to Chile. These groups show a marked dependence on collecting marine mollusks; however, depending on the region, the hunting of birds, fish, and marine and terrestrial mammals can also be observed.

In the Mesoamerican region, the earliest evidence of coastal occupation comes from submerged caves in the Yucatan Peninsula, where human remains have been recovered that date between 7,000 and 10,000 BCE, although no other cultural materials were present (González et al. 2008). Most of the coastal sites of Mesoamerica correspond to the period known as Archaic (10,000–4,000 BCE) because sea levels stabilized after 7,000 BCE. Although there is a void in the research on the Pacific coast for periods prior to 7,000 BCE, coastal sites have been located (principally "shell middens") along the entire Pacific coast; in Sinaloa (El Calón, 1,800 BCE), Nayarit (Matanchén, 2,500–2,000 BCE), Guerrero (Puerto Marqués, 2,200 BCE), and Chiapas (Chantuto, 5,000–2,500 BCE) (Kenneth 2012).

In the continental interior, groups of broad-spectrum hunter-gatherers based on subsistence linked to the hunting of smaller fauna and the collection of wild plants can be observed from the Pleistocene-Holocene transition point, approximately 10,000–9,000 BCE. In zones such as the Sierra de Tamaulipas (Ocampo), Puebla (Tehuacán Valley), the Valley of Oaxaca (Guilá Naquitz), the Central Depression of Chiapas (Santa Marta cave), and the Honduras Plateau (El Gigante Cave), these groups show mixed subsistence based on the hunting of deer, rabbits, and peccary, the capture of animals such as turtles, and the collection of freshwater snails (Santa Marta).

Collection includes fruits from cacti in arid zones, pine nuts and acorns in forested regions, as well as fruits from tropical trees in more humid zones. One point worth emphasizing is the use of millstones since the Late Pleistocene in sites such as Guilá Naquitz, Oaxaca, and Santa Marta Rockshelter in Chiapas, which indicates a growing increase in the dependence on plants and their processing. Archaeobotanical remains indicate that these broad-spectrum subsistence groups are responsible for some of the earliest domestications in the Mesoamerican zone (Piperno and Smith 2012).

Domestication and Early Agriculture

Recent data indicate that the first domestications took place in groups that maintained a hunter-gatherer pattern of subsistence. It is probable that at least two species (the domestic dog and *Lagenaria* or bottle gourd) entered the continent, having already been domesticated, together with the first settlers at the end of the Pleistocene. The oldest domesticated plant found from the early Archaic Period (c. 10,000–8,000 BCE) is the pumpkin, located at the lower levels of Guilá Náquitz in the Valley of Oaxaca. These first domesticated plants do not appear to be related only to nutritional purposes but also to other aspects of subsistence, such as the transport of water (squash and the bottle gourd) or use as stimulant plants (*Theobroma*) and the production of fermented beverages (*Zea Mays*). In the Balsas river Basin, the region which is considered to have given rise to the ancestor of maize (*Zea parviglumys*), the remains of phytoliths of *Cucurbita argyosperma* (silver-seeded squash) have been located, and grains of corn starch, dated to 6,700 BCE, have been associated with stone mortars (Ranere et al. 2009). The earliest dates carried out directly from the remains of maize come from Guilá Naquitz and are dated to 4,200 BCE.

In the Paleoecological records of the tropical lowlands of Mesoamerica, a sudden increase in the appearance of maize pollen associated with a reduction in the amount of forest and an increase in weeds can be observed between 5,500 and 5,000 BCE. This finding has been interpreted as a change in agricultural techniques from an incipient agriculture or horticulture to a slash-and-burn agriculture, as can be observed in the Balsas river Basin (Ranere et al. 2009), the Pacific Coast (Kennett et al. 2010), and the Olmec zone of the Gulf of Mexico (Pope et al. 2001). In these regions, an accelerated change toward the transformation of tropical forest (including mangrove swamp) into agroecosystems can be observed, including plants originating from South America, such as manioc (*Manihot* sp.), at approximately 4,500 BCE. It is likely that this period corresponds with a true agricultural revolution in Mesoamerica, as demonstrated by the systematic modification of the environment into an agrarian landscape and the establishment of the system of milpa and its implications for the economic and religious structure of the communities. This agricultural revolution, beginning in the tropical lowlands, appears to have been adopted later in other regions, such as the Valley of Mexico and the Mayan Zone, where similar conditions can be observed after 4,000 BCE.

Sedentary Life and Agricultural Societies

The residence pattern of early hunter-gatherers (10,000–8,000 BP), including those of the early Archaic that exhibit evidence of domesticated plants, was one of high mobility and low demographic density. Cristine Niederberger (1979) has suggested two models for the mobility for incipient agricultural societies as follows: a) the "Tehuacán Model," applicable to the semiarid regions of Puebla, Tamaulipas, and Oaxaca, that exhibit a marked period of productivity associated with the rainy season; this model involved the aggregation of large communities (macrobands) dedicated to the extensive exploitation of cereals and other plants during the season of greatest fertility. In contrast, during the dry season, these groups would disperse into smaller groups (microbands) with the tasks of hunting and collecting in various ecological niches. Although

these groups show that certain early agricultural practices had developed by at least the sixth millennium BCE with plants such as maize, chile, avocado, and squash, a sedentary way of life was not observed for these groups until at least three millennia later. b) The model developed for Zohapilco and most likely other regions of higher annual productivity (such as the Pacific coast and other sites from the Mesoamerican lowlands) suggests that the societies of the sixth millennium BCE show territorial and sedentary occupation associated with the lacustrine environment (most likely linked to a period of climatic optimum and associated with a highly productive lake environment, where resources could be obtained during almost the entire year), exhibiting evidence of incipient agricultural experimentation with plants such as *Zea* (tesosinte), *Amaranthus*, and *Physalis* (tomato) for the period between 6,000 and 4,500 BCE. During the Zohapilco phase (3,500–2,200 BCE), however, a notable increase in the appearance of domesticated plants and stone artifacts associated with their processing (metates and manos) can be observed; thus, the model established by Niederberger indicates a marked period of sedentarism within a pre- and protoagricultural context. This model, however, is atypical for the rest of Mesoamerica because a fully established sedentary pattern does not appear to have been established until the period when ceramics appeared between 2,000 and 1,500 BCE.

Between 1,600 and 1,000 BCE throughout practically all of Mesoamerica, permanent communities developed based on extensive seasonal agriculture that was associated with fertile lands in lake zones, such as the Valley of Mexico and the Guatemala Petén, or on river banks in Oaxaca and the coast of the Gulf of México; these communities also developed in coastal zones rich in marine and terrestrial resources, as in Belize and El Soconusco in Mexico. Although continual reference has been made to these early villages as agrarian societies based on maize cultivation, stable isotope studies indicate that at least for El Soconusco, the diet of these first villages was not based on maize but on a mixed diet.

Complex Societies and Agricultural Intensification

Agricultural intensification with the accompanying increase of parcel productivity, whether through increased use of human labor or the introduction of more productive crops, is considered an improvement resulting from the use of applied technology or increased land quality through the incorporation of compost, moisture, or other means that involve increasing the total annual productivity (Scarborough 2012). Although it has generally been thought that demographic pressure was the cause of intensified production, with the data presently available, it is not possible to define whether the intensification observable in the Late Archaic (5,500–3,500 BCE) is the cause or the consequence of the demographic increase. This uncertainty is due to the scant nature of data on domestic contexts for this period. It is certain that one sees the accelerated diffusion of a mode of subsistence based on an extensive slash-and-burn agriculture beginning in 5,500 BCE, beyond simply the small-scale horticulture that is observed during the first half of the Archaic period (8,000–5,500 BCE).

The change from an extensive system of agriculture, such as slash-and-burn, to the various systems of intensive agriculture (including raised fields, drained fields, terraces, *camellones*, *chinampas*, and island beds) appears to be associated with demographic growth during the apogee of Mesoamerican cities and is documented at least since the Late Pre-Classic; however, this change is documented principally during the Classic and the Post-Classic. The implementation of aerial surveying in Mayan lowlands since the end of 1960 has allowed the identification of raised fields and canals on a large scale in the center of Veracruz, the Candelaria River in Campeche, and the north of Belize (Sluyter 1994). The increase in population of the larger political centers of the Post-Classic, such as those of the Aztec and Tarasco empires, required the systematic implementation of systems of intensification (*chinampas* for the Aztecs and lake-margin fields and extensive terracing for the Tarascan) and greater organization of work and the control of a large body of workers for carrying out hydraulic projects. In the Valley

of México *chinampas*, the Aztec state played an important role in developing dikes to separate saltwater from the lake. These hydraulic systems and agricultural techniques, such as the use of chinampa, amazed the Spanish conquistadores when they arrived.

International Perspectives

Although research on cultural ecology and systemic models has dominated studies on subsistence strategies for a long time, particularly with respect to the change from appropriative societies to food-producing societies, there has recently been a return to models based on the study of agency, phenomenology, and Marxist theory as alternatives that allow for recognizing the internal causality of such societies. However, studies remain lacking that would allow broadening the empirical data with which to support the various theoretical proposals.

In the case of hunter-gatherer groups, although theoretical proposals continue to be strongly deterministic in an ecological sense, mainly regarding models of the "optimal foraging" type in which hunters are viewed as inevitably destined to maximize energy resources and minimize risks (Bettinger 1991), there is a growing interest in evaluating the internal causality of these societies by assigning a more active role in historical processes, rather than simply viewing them as having a passive attitude (or, at most, reactive) where "if the medium changes, the society changes."

Regarding early agriculture and the origins of domestication, the demographic and climatic change models used for the Old World do not appear to be applicable to Mesoamerica, but consensus does not appear to exist in this respect. However, two models for the development of agriculture have been developed, with one being associated with lowlands and the other with highlands. To evaluate these models, research has been reinitiated over the last decade, allowing further empirical data to be obtained.

The author of this entry takes a social dialectical position against ecological determinism as a basis for explaining the principal changes in the modes of life of Mesoamerican societies, assuming that the principal force for change is the contradiction engendered within the communities and between the communities and their environment. The various means of resolving these contradictions are provided by specific subsistence strategies and the social and political organization of human groups that inhabited various ecosystems in Mesoamerica.

Future Directions

The study of pre-Hispanic subsistence in Mesoamerica has made great strides, beginning in the second half of the twentieth century, particularly regarding theoretical and methodological developments concerning its study. The clear trend toward the greater specialization of researchers has required collaboration in investigative networks and multidisciplinary projects, which has allowed the integration of various types of data in specialized publications, although a greater dissemination of these results to the non-specialized public remains lacking.

The development of new dating techniques that allow the dating of small samples has allowed us to register botanical materials directly and to obtain greater precision in the chronology of the initial peopling, domestication, and early agriculture. Furthermore, disciplines such as paleoethnobotany and geoarchaeology allow a better understanding of the geological and human processes linked to the creation of archaeological sites and their transformation, and an increasing number of studies use this type of focus.

Recent studies indicate greater antiquity for the processes of plant domestication in Mesoamerica, with certain dates indicating that the first domestications took place at least 10,000 years ago. The development of new techniques that allow the recovery of botanical micro-remains directly from soils, lithic artifacts, and dental calculus has allowed important data on ancient subsistence to be obtained, and new techniques are constantly being developed that permit the recovery of paleoethnobotanical information even in tropical zones in which botanical macro-remains are poorly preserved.

Regarding the first settlers of Mesoamerica, unfortunately, the trend continues to be a focus on the study of typology and the establishment of chronological sequences, which are sometimes unreliable because it remains common to date surface materials based on typology alone. Multidisciplinary studies are required to obtain greater knowledge regarding the subsistence of these first settlers and to obtain a larger number of reliable datings of the contexts.

Finally, the data on subsistence for the later periods of Mesoamerica, beginning from the appearance of the first ceramic villages, contrasts with data available for older periods linked to hunter-gatherers and incipient agriculturalists, which is scant and fragmentary. Thus, a new generation of researchers interested in the preceramic period is needed to increase our knowledge of this early period.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Central America: Historical Archaeology of Early Colonial Urbanism
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Geoarchaeology
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Mesoamerica's Archaic Period
- ▶ Mexico: Historical Archaeology
- ▶ Paleoindians
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Villas and Farms in the Mediterranean World
- ▶ Zooarchaeology

References

Acosta, G. 2012. Ice Age hunter-gatherers and colonization of Mesoamerica. In *Oxford handbook of Mesoamerican archaeology*, ed. D.L. Nichols and C.A. Pool, 129–140. New York: Oxford University Press.

Aveleyra, L. 1967. *Los cazadores primitivos de Mesoamérica*. México: Instituto de Investigaciones Históricas-UNAM.

Bettinger, R. 1991. *Hunter-gatherers: Archaeological and evolutionary theory*. New York: Springer.

Dixon, E.J. 1999. *Bones, boats and bison. Archaeology and the first colonization of western North America*. Albuquerque: University of New Mexico Press.

Fiedel, S.J. 1996. *Prehistoria de América*. Barcelona: Editorial Crítica.

Flannery, K.V. 1986. *Guilá Naquitz, archaic foraging and early agriculture in Oaxaca, México*. Orlando: Academic Press.

González, A., C. Rojas, A. Terrazas, M. Benavente, W. Stinnesbeck, J. Aviles, M. de los Ríos, and E. Acevez. 2008. The arrival of humans on the Yucatan Peninsula: evidence from submerged caves in the state of Quintana Roo, Mexico. *Current Research in the Pleistocene* 25: 1–24.

Kenneth, D. 2012. Archaic-period foragers and farmers in Mesoamerica. In *Oxford handbook of Mesoamerican archaeology*, ed. D.L. Nichols and Ch.A. Pool, 141–150. New York: Oxford University Press.

Kennett, D.J., D.R. Piperno, J.G. Jones, H. Neff, B. Voorhies, M.K. Walsh, and B.J. Culleton. 2010. Pre-Pottery farmers on the Pacific Coast of southern Mexico. *Journal of Archaeological Science* 37: 3401–3411.

Lee, R.B., and R.H. Daly. 1999. *The Cambridge encyclopedia of hunters and gatherers*. Cambridge: Cambridge University Press.

MacNeish, R.S. 1967. A summary of the subsistence. In *The prehistory of the Tehuacan Valley, volume 1: Environment and subsistence*, ed. D.S. Byers, 290–309. Austin: University of Texas Press.

Niederberger, Ch. 1979. Early sedentary economy in the Basin of Mexico. *Science* 203: 131–142.

Piperno, D., and B.D. Smith. 2012. The origins of food production in Mesoamerica. In *Oxford handbook of Mesoamerican archaeology*, ed. D.L. Nichols and Ch. A. Pool, 151–164. New York: Oxford University Press.

Pope, K.O., M.E.D. Pohl, J.G. Jones, D.L. Lentz, Ch. Von Nagy, F.J. Vega, and I.R. Quitmyer. 2001. Origin and environmental setting of ancient agriculture in the lowlands of Mesoamerica. *Science* 292: 1370–1373.

Ranere, A., D. Piperno, I. Holst, R. Dickau, and J. Iriarte. 2009. The cultural and chronological context of early Holocene maize and squash domestication in the Central Balsas River Valley, Mexico. *Proceedings of National Academy of Sciences* 106: 5014–5018.

Sanders, W.T., J.R. Parsons, and R.S. Santley. 1979. *The Basin of México: Ecological processes in the evolution of a civilization*. New York: Academic Press.

Scarborough, V.L. 2012. Agricultural land use and intensification. In *Oxford handbook of Mesoamerican archaeology*, ed. D.L. Nichols and C.A. Pool, 541–551. New York: Oxford University Press.
Service, E. R. 1962. *Primitive social organization*. New York: Random House.
Sluyter, A. 1994. Intensive wetland agriculture in Mesoamerica: space, time, and form. *Annals of the Association of American Geographers* 84: 557–584.

Further Reading

Siemens, A.H. 1983. Wetland agriculture in pre-Hispanic Mesoamerica. *Geographical Review* 73: 166–181.

Mesoamerica's Archaic Period

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Geographical and Cultural Overview Essays

Introduction

Willey and Phillips (2001 [1958]: 104–107) long ago struggled with a precise, inclusive definition of the New World's Archaic period. According to convention (today as when Willey and Phillips were writing), Mesoamerica's Archaic period begins when Holocene epoch warming reached modern conditions resulting in people exploiting a wider range of resources (~10,000 cal. BP), including plants that caused a wider range of stone tools to be used to process them. This period then ends once sedentary, ceramic-using, food producers are documented after ~4000 cal. BP. However, subsistence practices, residential mobility, and container technology are each continuous variables that do not necessarily co-occur, and so, their use to define the Archaic period does not necessarily allow for a clean cleavage from the earlier Paleo-Indian or subsequent Formative periods.

The Pleistocene-Holocene transition corresponds to the appearance of the earliest domesticated plant in Mesoamerica – the squash (Smith 1997). Therefore, 10,000 cal. BP provides a simple border to define the beginning of the Archaic period and what Smith (2001a: Fig. 7) terms the beginning of "low-level food production with domesticates." This date could be moved earlier as older cultigens are documented, but the beginning of the Holocene provides a convenient epochal transition point. The lifestyle of these early inhabitants of Mesoamerica was, however, little different than their pre-10,000 cal. BP ancestors that were not cultivating squash.

There is considerably more information for the end of the Archaic period. However, rather than creating a clear division from the following Formative period, the more detailed picture complicates matters. Researchers now argue that there is no clear distinction that occurred with the first sedentary, ceramic-using villagers in terms of either the foods consumed or their food processing tools (e.g., Blake 2006; Clark et al. 2007; Arnold 2009; Rosenswig 2012a, b, 2015; Killion 2013).

Adaptive variability is a significant factor when defining the end of Mesoamerica's Archaic period. The earliest ceramic-using villagers continued to have a nonagricultural adaptation during the fourth millennium BP (i.e., the Early Formative period). There is growing evidence that a significant increase in the reliance on domesticated foods occurred after 3000 cal. BP and that prior to this, it is more accurate to speak of horticulture (see Rosenswig 2006a: 347–348). Low-level food production (aka horticulture) characterizes the Early Formative period, and so, if we were to use intensive agriculture as the defining characteristic to end the Archaic period, then this change would only occur with the Middle Formative period beginning at 3000 cal. BP (Rosenswig et al. 2015). Many of the archaeologists who study Mesoamerica would not be comfortable with ending the Archaic period at 3000 cal. BP. For the purpose of this entry, I end the Archaic period with the first evidence of ceramic use at 4000 cal. BP (following Stark 1981 and others). However, ceramic use is first documented in the Maya zone of Mesoamerica only at the beginning of the third millennium BP, almost a 1000 years after they are recovered from most other regions (Clark and

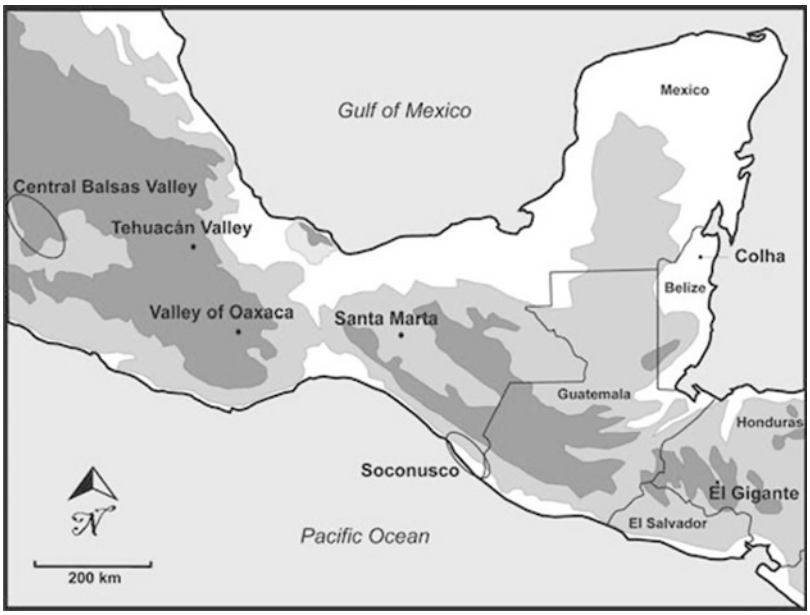

Mesoamerica's Archaic Period, Fig. 1 Map of Mesoamerica with regions and sites mentioned in the text

Cheetham 2002). This means that the Archaic and Formative "periods" can be said to have coexisted in Mesoamerica during the fourth millennium BP (Rosenswig 2010: 34–38, 2011). The term Archaic is therefore not strictly temporal and variability during the fourth millennium BP implies a mosaic of adaptations and technologies as one form of adaptation gave way to the other.

In this entry, I focus primarily on evidence of the Archaic period from the Tehuacán Valley, the Valley of Oaxaca, the Soconusco, and northern Belize (Fig. 1). These four regions provide the most completely documented archaeological evidence of Archaic period peoples in Mesoamerica. As the first two regions are in the arid highlands and the latter two in the tropical lowlands, these examples also provide geographical diversity. I end the entry with a brief discussion of the end of the Archaic period and some directions of future research in which to better understand (1) how the so-called 4.2 ka BP event (referred to here as the 4200 cal. BP Event) of global drying impacted Mesoamerica and (2) how a mix of sedentary and mobile subsistence strategies may have created a mosaic of different adaptations during the fourth millennium BP.

Highland Evidence

Tehuacán Valley

Work undertaken by MacNeish and colleagues in the Tehuacán Valley set the agenda for the study of the Archaic period in Mesoamerica (MacNeish 1964; Byers 1967; MacNeish et al. 1967; and see Flannery 2001). The Archaic-era phases defined in the Tehuacán Valley have been the source of intense scrutiny and controversy over the past decades. Reassessments have been fueled by direct dating of the plant remains that MacNeish used to reconstruct Archaic-period subsistence practices. In most cases, dating of domesticated plants indicate that they were more recent than originally claimed. The maize recovered from early levels at San Marcos and Coxcatlán caves was clearly domesticated (Benz and Iltis 1990) and initially dated by stratigraphic association to before 7000 cal. BP. However, direct dating of six cobs produced results dating to ~4700 cal. BP and more recent (Long et al. 1989) – the end of Late Archaic period. Equally importantly, when domesticated beans from Tehuacán were directly dated, they turned out to be from the beginning of the Late Formative period at 2300 cal. BP (Kaplan and Lynch 1999; and see Smith 2001b).

Smith (2005) has reassessed the earliest domesticates and stratigraphic integrity of Coxcatlán cave based on 71 dates (both traditional radiocarbon and AMS dating of botanical remains) and established the extent of stratigraphic mixing. He concludes that post-depositional disturbance was a problem in the west half of the cave (only 6 of 27 dates [22%] fall in the expected range) but the east half of the cave was more intact (where 30 of 43 dates [70%] fall in the expected range) (Smith 2005: 9443). Importantly, 25 of the 34 AMS dates (i.e., 74 %) obtained by directly dating domestic plant remains fell outside their expected range based on published phase association of the deposits from which they were found.

The Tehuacán remains are nevertheless repeatedly employed by those who want to study the origins of crops such as maize. For example, Benz and Long (2000) calculated evolutionary rates of maize based on the morphological characteristics of 26 cobs from San Marcos and Coxcatlán caves (and see Long and Fritz 2001; MacNeish 2001a). The Benz and Long (2000) study dates evolutionary change by stratigraphic association, and so, in his taphonomic assessment of the Coxcatlán cave stratigraphy, Smith (2005: 9443) concludes that such "time-sensitive analysis of rates of evolutionary change is rendered meaningless." The most desirable solution to the problem of relying on too little data from too few sites would be to excavate more Archaic-period sites so that stratigraphic mixing at a single site does not impact our understanding of this period so severely. Despite its faults, the Tehuacán project still provides a significant contribution to the surprisingly limited amount of basic archaeological data on the Archaic-period record of Mesoamerica.

Often forgotten from the race to document Mesoamerican's earliest domesticates is the broader cultural context provided by the archaeological record. In Tehuacán, the most dramatic increase in domesticated plant use occurred at 3000–2750 cal. BP, the beginning of the Middle Formative period at the end of the Ajalpan phase (MacNeish 1967: Fig. 186 with revised dating from MacNeish 2001b). Due to his reassessment of the Coxcatlán cave stratigraphy, and the direct dating of domesticated plants, Smith (2005) reports that: "domesticated plants represent ~45% of the food plants recovered from ceramic contexts and only 2% of the plant assemblage from preceramic cultural zones." The virtual absence of domesticated plants from Archaic-period deposits requires us to accept Farnsworth et al.'s (1985: 114) alternate hypothesis of their carbon and nitrogen isotope analysis: that during the Coxcatlán phase there was an increased consumption of wild grasses and the animals that ate them. Direct dating has consistently pushed the age of domesticates from the Tehuacán Valley to more recent times.

MacNeish's (1964) model of dry season microbands and rainy season macrobands painted a picture of progressive increase in sedentism due to reliance on domestic plants so that people spent more time living in larger communities and less time foraging in small groups for wild resources. While the details and stratigraphic integrity of MacNeish's excavations have been questioned (and therefore new dating makes the timing of these changes more recent), his model of the interplay between residential mobility, group size, resource scheduling, and reliance on domesticated plants remains useful for understanding changes occurring in this arid, highland environment during the Archaic period.

Valley of Oaxaca

Equally important as the Tehuacan project in defining the research agenda for the Mesoamerica's Archaic period was the research program undertaken by Kent Flannery and his colleagues in the Valley of Oaxaca (Flannery et al. 1981; Flannery 1986; Marcus and Flannery 1996: Chapters 4 and 5). Flannery's (1968, 1973, 1986: 19–28) influential model posited the Archaic period shift to seasonal scheduling was based on the unreliability of foods that provided the driving force that encouraged food production as a risk buffering strategy.

Early Archaic period populations are estimated at 75–150 people for the entire Valley of Oaxaca and documented only from a few microband sites (Marcus and Flannery 1996: 53). Excavated in 1966, the site of Guilá Naquitz was occupied

between 10,000 and 8500 cal. BP at least six times during the summer and fall months (Flannery 1986). Deer and rabbit were eaten, as were acorns, maguey, cactus leaves, and a variety of fruit. Unlike the Coxcatlán case, Smith's (1997) direct dating of botanical remains and taphonomic evaluation (Smith 2000: 20–27) document no more stratigraphic mixing of the Guilá Naquitz cave deposits than those originally reported by Flannery (1986: 65–95, 175–176).

Botanical remains from Guilá Naquitz have contributed to understanding the diet of Mesoamerica's inhabitants during the Archaic period. Piperno and Flannery (2001) report AMS dates from two maize cobs recovered from Guilá Naquitz that provide the earliest directly dated macrobotanical examples of this domesticate in Mesoamerica at 6300 cal. BP. Benz's (2001) description of these early (and tiny by modern standards) ears of corn is having two rows of cupules and non-disarticulating rachis that still make them dependent on human propagation. In addition to the early maize, there is also evidence of teosinte pollen at Guilá Naquitz, Gheo-Shih, and Cueva Blanca (Marcus and Flannery 1996: 67). Using nine assays, Smith (1997) reports directly dated squash remains from Guilá Naquitz to 10,000–8000 cal. BP. Morphological analysis of this squash reveals thicker rinds, larger peduncle diameter, and one with an orange color, which are all characteristics consistent with domestication. Wild bean species were consumed by the inhabitants of Guilá Naquitz, and while there is no evidence that they were domesticated (Kaplan 1986), there is circumstantial evidence to infer higher density of wild beans near the cave entrance was due to cultivation (Flannery 1986: 15). Along with the redating of beans from Tehuacán (Kaplan and Lynch 1999), it seems that wild beans may have been used to produce a complete protein, but that active control of this plant was not an early piece of the nutritional puzzle during the Archaic period (Smith 2001b). Squash, maize, and beans were each added independently to the Valley of Oaxaca diet and thus must have each been adopted for their own qualities and not as an agricultural package reflecting a new subsistence strategy. Further, together squash, maize, and wild beans never accounted for more than 4% of the plant remains deposited at Guilá Naquitz (Flannery 1986: 315).

Gheo-Shih was an open-air site not far from Guilá Naquitz that was occupied multiple times in the Middle Archaic period during the summer months (Marcus and Flannery 2004). The site is best known for two parallel lines of stones 7 m apart that could have functioned as a dance floor, a ball court or a road. The inhabitants of Gheo-Shih numbered 15–25 and ate only wild foods (Marcus and Flannery 1996: 59). Variability during the Early and Middle Archaic periods between the cave site of Guilá Naquitz and the open-air site of Gheo-Shih highlight the fact that during different times of the year and in different locations, different foods were being consumed. An important point when interpreting the ephemeral evidence from these sites is that before intensive agriculture and long-term storage, diet was not constant or stable. People could have seasonally exploited domesticates and still have foraged exclusively for wild resources during significant portions of the year.

Our only glimpse of the Late Archaic occupation in the Valley of Oaxaca comes from Level C at Cueva Blanca. Based on these data, Marcus and Flannery (1996: 61) propose that the inhabitants of the Valley of Oaxaca shifted from a foraging to a collecting strategy (sensu Binford 1980) at the end of the Late Archaic period. Cueva Blanca Level C is proposed to be the remains of an all-male deer hunting party who would have brought their kill back to a base camp on the valley floor.

Recent Evidence from the Chiapas Highlands, Honduras, and the Balsas Region of Guerrero

There are a number of other Archaic-age sites in Mesoamerica that warrant mention due to new evidence. The first is Santa Marta Cave in highland Chiapas that was originally tested by MacNeish and Paterson (1962) in his pursuit of dry caves with well-preserved early levels. Recent excavations by Guillermo Acosta Ochoa (2008; Acosta Ochoa and Pérez Martínez 2012) have not produced macrobotanical remains, but

microbotanical evidence documents economic species such as maize and cacao back to 8000 cal. BP.

Discoveries in the dry El Gigante rockshelter in southwestern Honduran highlands are well preserved, and Timothy Scheffler et al. (2012) documented an Archaic period occupation by 7000 cal. BP that includes storage pits. Excavations in the rockshelter have uncovered aceramic levels with faunal and botanical preservation. Recent botanical analysis from this rockshelter indicates human selection resulted in increased maize productivity between 4200–4000 cal. BP (Kennett et al. 2017). Ten maize cobs recovered from El Gigante were directly dated and indicate that at this time, a significant selection for increased yield as they all have 12–14 rows of kernels (Kennett et al. 2017), although they exhibited a great deal of morphological variability.

Evidence also comes from the Xihuatoxtla rockshelter from the Balsas region in Guerrero (Piperno et al. 2009; Ranere et al. 2009). A 1-m deep sequence of occupation was documented with lower levels dated to 8700 cal. BP. Fauna and macrobotanical remains are not preserved from this site, but ground and chipped stone tools are present, along with starch and phytolith evidence of maize and squash.

Lowland Evidence

Soconusco

The work of Barbra Voorhies (2004, 2015) and her colleagues provide the majority of what is known of the Archaic period occupation of the Soconusco region in southern Chiapas. These data are from excavations at six shell mounds that were made of marsh clams and periodically used, based on an absence of house floors or hearths as well as a low diversity of tools and faunal species.

The Archaic period in the Soconusco is defined by the Chantuto A (6000–5000 cal. BP) and Chantuto B (5000–1900 cal. BP) phases (Blake et al. 1995; Voorhies 2004). Chantuto A is known from the single shell mound site of Cerro de las Conchas which is located in a mangrove-estuary environment and produced a number of radiocarbon dates, but little information pertaining to subsistence activities is currently available. The Chantuto B phase is known from five estuary shell mound sites and the upland site of Vuelta Limón. The estuary sites are interpreted as seasonal resource procurement locales and Vuelta Limón as a base campsite (Voorhies 2004; Kennett et al. 2006).

The site of Tlacuachero is a Chantuto B period shell middens (Voorhies 2015). A large, prepared clay surface was encountered with post holes forming two oval structures, one measuring 4 × 8 m (Voorhies 1976: 38; Voorhies et al. 1991). This site was seasonally occupied to procure clams, fish, turtles, and other marine resources, and the tools recovered included milling stones and hammer stones. In addition, 57 obsidian flakes were found at the site and trace element analysis indicates that these Archaic-period peoples were obtaining obsidian from highland Guatemala (Nelson and Voorhies 1980). Two burials have been excavated from the Tlacuachero site, and one of them, an adult male, had extremely worn teeth (Voorhies 1976: 67). Isotopic analysis of these burials indicates a reliance on C4 plants, which includes maize, teosinte, and other grasses (Blake et al. 1992). However, Blake et al. (1995: 167) have suggested that these isotopic results may be due to high levels of consumption of marine resources, and one may actually date to the Classic period (Clark et al. 2007: 31). Phytoliths have been analyzed from the Tlacuachero midden, and a sediment core indicates that a similar mangrove environment prevailed during Chantuto times. Unfortunately, no identifiable pollen was recovered from the site nor was phytolith data pertinent to economic behavior (Micheals and Voorhies 1999: 48). Analysis from Vuelta Limón indicates that forest elements dominated the phytolith assemblage but indicators of disturbance, such as grasses, are also present.

Kennett et al. (2010) argue that "pre-pottery slash and burn farmers" were operating on the Pacific coast of Chiapas by almost 8000 years ago. This interpretation is based on pollen, phytoliths, and charcoal from two cores: one collected in the Acapetahua area around the Chantuto

mounds and the other 35 km northwest up the coast near the town of Pijijiapan. Core SOCO5–3 in the Acapetahua zone documents pollen evidence of maize and that "Zone 2 (525-475 cmbs [4200-3990 cal. BP]) is marked by a dramatic but temporary increase in red mangrove pollen" (Kennett et al. 2010: 3406). The Pijijiapan core's pollen included no maize from before the Common Era, but the charcoal record shows that "very high fire activity occur [ed] between ~4300 and 4200 cal. BP, 5200 cal. BP, and between 5800 and 5600 cal. BP" (Kennett et al. 2010: 3407). Kennett et al. (2010: 3407) argue that their environmental data is "consistent with burning of agricultural fields." While swidden agriculture is certainly one possible interpretation, another is natural lighting strikes causing forest fires in an increasingly dry environment. A third potential explanation is that foragers set fire to open fields to enrich the soil and/or drive out animals they were hunting (or both). The current paucity of data precludes saying much with certainty, and each of the three hypotheses is worth exploring.

Neff et al. (2006a, b) document similar timing of forest disturbance and a late fifth to early fourth millennium BP drying period based on the six cores from the coast of Guatemala. They interpret this as the "activities of Archaic-period populations practicing shifting horticulture" (Neff et al. 2006a: 288) and further "a pattern of extensive land use by horticultural people who exploited terrestrial fauna and wild plants but also modified the tropical forest ecosystem and incorporated domesticates" (Neff et al. 2006a: 291). Neff et al.'s (2006a) interpretation of horticultural and logistically organized collectors is consistent with how Voorhies and Kennett (Kennett and Voorhies 1996; Voorhies 2004; Kennett et al. 2006) have previously interpreted their archaeological data. That ancestral maize was being used in the Soconusco by 8000 cal. BP is clear. The possibility that fields were burnt by humans at this time seems a distinct possibility. However, lacking is any evidence to support the interpretation of intensive agriculture (swidden or otherwise) being practiced at this early date.

One striking correspondence is the major disturbance period documented by Kennett et al. (2010) between 4200 and 3900 cal. BP with the 4200 BP Event, a major environmental disturbances around the world (e.g., An et al. 2005; Booth et al. 2005; Perşoiu et al. 2019) that, among other things, is used to explain the fall of many Old World civilizations (Weiss et al. 1993; Weiss 2016). This "event" lasted for ~300 years and corresponds precisely to the dramatic disturbance documented in the pollen record of SOC05–3 in the vicinity of the Chantuto sites. Charcoal from increased burning between 4200 and 3900 cal. BP is documented by Kennett et al. (2010) along the Chiapas coast and Neff et al. (2006a, b) along the Guatemalan coast. Most telling is that Kennett et al. (2010: 3407) report that burning of grasses (and not trees) is documented in their charcoal record and that these remains are due to burning that occurred upstream on the coastal plain and that the charcoal was washed downstream into the estuary were their cores were located. Dry conditions were likely exacerbated by the activities of local human inhabitants of the Soconusco who burnt newly opening grasslands. Neff et al. (2006a: 288) argue that this "was a punctuated evolutionary event associated with population fragmentation caused by a reduction in available moisture shortly after 2000 cal. BC." I return to the implications of this Soconusco environmental data, and changes in maize morphology from El Gigante, in the discussion section below.

Northern Belize

Relatively more archaeological work has been undertaken by a greater number of people in Belize than in most other areas in Mesoamerica. However, this work has not produced a clearer or more robust record of the Archaic period. Lohse (2010) reviews the Archaic period evidence from Belize. Looking for a lowland location to compare with his Tehuacán work, MacNeish (1981, 1982) began the Belize Archaic Archaeological Reconnaissance project (BAAR) and recorded almost a hundred possible sites in the northern half of the country (Zeitlin 1984). The BAAR defined a continuous sequence of Archaic-period phases that

parallel those defined at Tehuacán; however, subsequent work has shown this sequence to be untenable (Lohse et al. 2006).

The best defined Late Archaic sequence in northern Belize (as well as anywhere in the Maya lowlands) comes from work carried out at the site of Colha and nearby Cobweb swamp (Hester et al. 1980, 1996; Hester 1994; Iceland and Hester 1996). Investigators divide the Late Archaic into an Early Preceramic (4500–3900 cal. BP) and a Late Preceramic period (3500–2900 cal. BP) based on the radiocarbon dates (Hester et al. 1996; Iceland 1997). Two formal, superimposed lithic production areas were documented at Colha – a lower surface (Zone C) of Archaic date was found with evidence of constricted uniface production (debris and refits) under another prepared surface (Zone B) with burin spall cores and other diagnostic Middle Formative lithic production debris (Hester 1994: 3; Hester et al. 1996: 47). At Colha, Operation 4046, Zones C and D both contained ". . . large amounts of patinated lithic material including constricted unifaces, biface and macro-blade fragments, and debitage, but no ceramics. . ." with associated dates that range between 4900 and 3000 cal. BP (Hester et al. 1996: 45).

Colha is located at the north end of an extremely high-quality chert-bearing zone that was extensively utilized from Archaic times up until Spanish contact. Numerous highly patinated flakes, large blades, projectile points, sandstone bowls, and constricted unifaces have been identified in a handful of sites in northern Belize, including Colha. Lowe points have been tentatively dated to 6500–5900 BP based on associated radiocarbon dates (Kelly 1993: 215), and this tool type is the primary archaeological characteristic of the Early Preceramic period (see Stemp and Awe 2013; Stemp et al. 2016). Constricted unifaces are associated with the Late Preceramic and have been identified as woodworking adzes (Gibson 1991), but could have also been used as digging tools, as suggested by experimental and microwear studies. Both activities are consistent with a horticultural adaptation.

Mary Pohl et al. (1996) undertook a paleoecological program of coring and excavations at a number of swamps in northern Belize and have run over 40 radiocarbon dates. They documented maize and manioc at Cob swamp by 5000 cal. BP. Yet tree pollen indicates that these cultigens were grown in high tropical forest with minor disturbance (Pohl et al. 1996: 363). However, John Jones' (1994) pollen analysis indicates that after 3500 cal. BP, forest disturbance became extensive with significant increases in maize and charcoal remains. The lithic assemblage from Pulltrouser Swamp is similar to that at Colha, with the diagnostic complex of unifacially worked macroflake tools (Pohl et al. 1996: 366) and dates that place a constricted uniface found there between 3300 and 3000 cal. BP (Bower 1994: 279).

Environmental data and corroborating lithic assemblages from northern Belize suggest that horticultural societies were using a specialized lithic technology to clear and plant crops for over a millennium and a half prior to the first use of ceramics in the region. Forest disturbance is also documented at this time in the Petén Lakes (Vaughan et al. 1985) and the Petexbatun (Johnston et al. 2001: 158–159) regions of lowland Guatemala. Environmental evidence suggests that humans were having an increasing impact on environments in the Maya lowlands by 4500 cal. BP. However, there is still little archaeological evidence from this time period pertaining to settlement patterns, social organization, or variation in economic activities.

After inadvertently encountering Archaic period occupation at multiple locales along the Freshwater Creek drainage in northern Belize (Rosenswig and Masson 2001), these deposits were tested at Progresso Lagoon (Rosenswig 2004; Rosenswig et al. 2014). At Caye Coco, approximately 150 sq. m of distinctive orange soils containing patinated, Archaic-period lithics were documented near two pit features and a single posthole. We also found two hammerstones. Excavations at the nearby Fred Smith site on the western shore of Progresso Lagoon, facing Caye Coco, produced many more heavily patinated tools from orange soils, including a variety of expedient and formal bifaces, unifacial tools made from macroflakes, and abundant utilized flakes. Radiocarbon assays of carbon in the orange soils at Caye Coco date to

the Middle Archaic period. Two dates reported by Zeitlin (1984) collected by the BAAR project in an orange soil stratum at Betz Landing, 500 m south of the Fred Smith site, are from the early fourth millennium BP (see Rosenswig et al. 2014: Table 1). From seven patinated tools recovered from five sites along the Freshwater Creek drainage, Pearsall documented starch grains of domesticated maize, chili peppers, squash, manioc, and wild beans (Rosenswig et al. 2014). Different lithic reduction patterns at island and shore sites provide a glimpse of regional land-use patterns; tools were broken and resharpened on islands where crops were planted, but they were made at camps on the shore (Rosenswig et al. 2014: 318). The Archaic-period occupation in the Freshwater Creek drainage seems to be extensive and a renewed campaign of fieldwork is planned.

Discussion

The fragmentary nature of data on the Archaic-age sites does not provide a representative picture of the range of peoples who lived at this time or the variety of their adaptations. Writing of the Oaxaca and Tehuacán records of food production, Buckler et al. (1998: 161) observed that: "While the best-reported and most extensive archaeological sites in Mexico occur in these semiarid regions, the ecological zone was unimportant in the domestication of most Mexican crops." More is known now than 20 years ago, but the progress has been slow going. This is undoubtedly due in part to the relatively low population density of Archaic period inhabitants of Mesoamerica as there were simply fewer people whose remains are left to encounter compared to their Formative and Classic period descendants. Equally as important though is the surprisingly small number of archaeologists who are interested in searching for and excavating sites from Mesoamerica's Archaic period.

I end this entry by briefly focusing on two observations. First, that the end of the global 4200 cal. BP Event corresponds to the beginning of the end of the Archaic period. Second, that during the course of the fourth millennium cal. BP, Mesoamerica was occupied by a mosaic of peoples following both "Archaic" and "Formative" adaptations. These are both empirical observations that have significant implications for how Mesoamerica's Archaic-period adaptation is understood.

The 4200 Cal. BP Event and Mesoamerica

Much discussion of drought in Mesoamerica has focused on the Classic period Maya collapse. A frequently cited synthesis of worldwide collapse published two decades ago discusses the Akkadian and Maya collapses, one after the other despite their separation by 3000 years (de Menocal 2001). More relevant would have been to compare the effects of a single drought period on different parts of the world and to peoples with different forms of sociopolitical organization. The 4200 BP Event appears to have played a part in the collapse of integrated, hierarchical societies in the Old World that depended on agriculture to sustain the political and administrative organization (Weiss 2016). But what about the effects of this global drying period on early horticultural peoples such as those in Mesoamerica?

No other Mesoamerican archaeologists I am aware of discusses the 4200 BP Event in print (but see Rosenswig 2006b, 2015). However, this global, centuries-long environmental disturbance caused dryer conditions ended precisely when ceramic containers were first adopted at 3900 cal. BP. Drought conditions before this time are clearly documented at eight different sites across the US Midwest using a variety of high-resolution environmental reconstructions (see Booth et al. 2005). For example, between 4200 and 4000 cal. BP, the pollen and charcoal analysis of South Rhody peatland in northern Michigan documents an increase in frequency and intensity of wildfires, a disturbance of forest vegetation, and a drop in the water table to its lowest point in the past 5000 years (Booth et al. 2005: 322). An abrupt, centuries-long period of deforestation also began at 4200 cal. BP in Italy (Drysdale et al. 2006), East Africa (Thompson et al. 2002), and China (An et al. 2005) to name but a few of the rapidly accumulating cases of this global event (see Walker et al. 2018).

Neff et al. (2006a) argue that a coordinated change in forest disturbance suggests an environmental cause for changes, whereas an uncoordinated series of disturbances is more consistent with human-induced environmental change such as early horticulture. Based solely on the six cores from the Guatemalan coast, their data was inconclusive (Neff et al. 2006a). However, combined with the cores from the Chiapas coast (Kennett et al. 2010), a clearer picture emerges of an environment with less forest cover and more fires in the grasslands of the Soconusco during precisely the same two to three centuries that the 4200 cal. BP Event is documented globally.

Add to this the timing of morphological changes to maize document in Honduras at the El Gigante rockshelter (Kennett et al. 2017) and evidence is emerging for a climate-induced subsistence change occurred in Mesoamerica at the end of the fourth millennium BP. Currently, the earliest two-row distichous maize cob is documented in the Oaxaca highlands and dates to 6300 cal. BP (Piperno and Flannery 2001). This Oaxacan example shares domesticated characteristics (e.g., rigid rachis, paired spikelets, perpendicular-oriented spikelets) with the earliest polystichous cobs from the Tehuacán valley that date to ~5000 cal. BP. Furthermore, genetic data indicate that genes controlling stems and inflorescence architecture from the Tehuacán samples resemble modern maize but genes controlling for ear shattering and starch biosynthesis were comparable to teosinte (Ramos-Madrigal et al. 2016; Vallebueno-Estrada et al. 2016). A small number of maize cobs from Tamaulipas in northern Mexico provide early evidence of increased cob size and row number occurred at ~4400 cal. BP (Smith 1997) and genetic work suggest starch productivity and protein storage allele frequency were similar to some modern varieties (Jaenicke-Després et al. 2003). As the ten 12–14-row maize cobs recovered from El Gigante date to between 4300–4000 cal. BP, this suggests significant selection for increased yield. This was also when drought-resistant maize varieties evolved and diffused in the southwest United States at ~4100 cal. BP (da Fonseca et al. 2015). Archaeological and genetic evidence thus both suggest that after initial domestication early maize did not change significantly for many millennia until approximately 4200 cal. BP when inhabitants of Mesoamerica were also readapting to an environment changed by the drought event.

It is possible to explain the contemporaneous collapse of multiple Old World civilizations as a domino effect and the result of trade and tribute networks falling apart. However, the global nature of the environmental disturbance makes even this interpretation unlikely (Weiss 2016; Walker et al. 2018). Whereas agriculturally dependent empires in the Eastern Mediterranean and the Middle East could no longer fund their political and military institutions, the end of the two to three century-long 4200 BP Event corresponds to the first adoption of ceramic containers and increased evidence of sedentary villages in the Soconusco, Oaxaca, and Tehuacán. Why would an increasingly wet environment result in decreased mobility? This is an empirical pattern in need of an explanation. In the Maya area, changes in container technology and residential mobility occurred nearly a millennium later. The reason why the Archaic period in the Maya area lasted so much longer than elsewhere in Mesoamerica, and the shift to a "Formative" adaptation did not follow the 4200 BP Event, is another pattern that begs for an explanation.

Fourth Millennium BP Adaptive Mosaic

The fourth millennium BP was a fascinating time in Mesoamerica as the Late Archaic transitioned to the Initial Formative period creating an adaptive mosaic across the region. The first ceramic-using villagers in Mesoamerica are documented at ~4000 cal. BP once the 4200 BP event ended. The earliest ceramic-using villagers appear to have been isolated local phenomena. The highland Purrón phase in Tehuacán (MacNeish 1964, 2001b) and the Epiridón phase in Oaxaca (Marcus and Flannery 1996) are known from very few sherds at single location spots, and much of the rest of the area was presumably still inhabited by foragers. In the Soconusco, sophisticated Barra phase ceramics (3900–3700 cal. BP) are known from a handful of sites on the coastal plain (Lowe 1975; Blake et al. 1995). Then,

during the course of the fourth millennium BP, ceramic-using villagers expanded into most regions of Mesoamerica (Clark and Cheetham 2002).

I have proposed that the fourth millennium cal. BP Mesoamerican consisted of an adaptive mosaic where ceramic-using villagers began as an anomaly whose numbers then progressively increased among the "Archaically-adapted" foragers who occupied most of the region (Rosenswig 2010: 13–46; 2011). Along with early villagers, less sedentary peoples were probably quite common in Mesoamerica at this time (Kennett et al. 2006: 104–105; Neff et al. 2006a: 308; Rosenswig 2006a, 2015; Arnold 2009; Blake and Neff 2011; Inomata et al. 2015). During the course of this millennium, sedentary, food-producing villagers went from being an anomaly to the most pervasive settlement/subsistence strategy across Mesoamerica. The implication of this proposal is that when studying early sedentary Mesoamerican peoples, it is worth considering the distinct possibility that other groups coexisted – especially those with greater residential mobility, less ceramic use, and/or subsisting on greater quantities of wild resources. Regional landscapes often form mosaics of adaptive strategies that are dynamically integrated and regulated by fluctuating environmental and social conditions (e.g., Stahl 2004).

The Archaic-Formative transition was not a temporally uniform occurrence in Mesoamerica. One of the better known, nonsedentary, adaptations that persisted throughout the Early Formative period was that of the inhabitants of northern Belize where ceramic use and village life were only adopted ~3000 cal. BP (e.g., Lohse 2010). One reason why the preceramic peoples in this area are known is that they lived near a source of high-quality chert which they used to make distinctive tools (e.g., Rosenswig et al. 2014). Other fourth millennium BP nonceramic-using peoples have likely gone undocumented in much of Mesoamerica – especially those who relied on more perishable forms of material culture. Philip Arnold (2009) also describes the variability of Early Formative adaptation on the Gulf Coast and argues that semi-sedentary peoples lived at La Joya, which was only a 2-day walk from the early Olmec capital of San Lorenzo. The transition was not as simple or as sudden as many assume.

I have proposed that the inhabitants of the Soconusco, the Gulf Coast, Grijalva Valley, Valley of Oaxaca, and Basin of Mexico and other islands of cultural complexity interacted with each other over long distances (Rosenswig 2010: 34–38, 2011). And further, that together these peoples formed an archipelago of cultural complexity. The cultural islands shared more with each other than with their more mobile neighbors who surrounded them (Rosenswig 2017). This interpretation is more consistent with the available evidence than one that posits a continuous distribution of people with a similar adaptive base and employing material culture graded from one set of stylistic standards to the next over vast areas of the early Mesoamerican landscape. Acknowledging the presence of peoples with less sedentary adaptations should impact the ways in which we model both local and interregional interaction in Mesoamerica during the fourth millennium BP. The persistence of nonsedentary peoples further emphasizes how stable and long-lasting Mesoamerica's Archaic period adaptation was.

Conclusion

Mesoamerica's Archaic period – defined by peoples without ceramic containers dependent on a mix of wild and domesticated foods – lasted for a longer time than that of all villages, states, empires, and industrial societies combined. As the inhabitants of Mesoamerica followed a stable Archaic adaptation for 6000–7000 years (10,000–3000/4000 cal. BP) of the Holocene, what needs to be explained is when and why change occurred at all and why such change was so slow and patchy. To understand the final millennium (i.e., 4000–3000 cal. BP), we need to assume that mobile foragers lived alongside newly emerging villages (see Rosenswig 2011) and explain why the inhabitants of certain regions – particularly the Maya area – maintained the long-lasting Archaic adaptation so persistently. Future research into the end of the Archaic

period will need to address what it was about environmental amelioration at 4000 cal. BP or 3900 cal. BP (after two or three centuries of drought) that would result in people reducing their level of residential mobility, settling in villages, and adopting ceramic containers.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Agriculture: Definition and Overview
- ▶ Flannery, Kent Vaughn
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Maize: Origins and Development
- ▶ Mesoamerica: Complex Society Development
- ▶ Mesoamerica: Subsistence Strategies by Region

References

Acosta Ochoa, G. 2008. *La cueva de Santa Marta y los cazadores-recolectores del Pleistoceno final – Holoceno temprano en las regiones tropicales de México*. Unpublished PhD dissertation, Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México.

Acosta Ochoa, G., and P. Pérez Martínez. 2012. El poblamiento de Chiapas a fines del Pleistoceno. In *Arqueología reciente de Chiapas: contribuciones del encentro celebrado en el 60 aniversario de la Fundación Arqueológica Nuevo Mundo*, Papers of the new world archaeological foundation, ed. L.S. Lowe and M.E. Pye, vol. 72, 21–29. Provo: Brigham Young University.

An, C.-B., L. Tang, L. Barton, and F.-H. Chen. 2005. Climate change and cultural response around 4000 cal yr B.P. in the western part of Chinese Loess Plateau. *Quaternary Research* 63: 347–352.

Arnold, P.J., III. 2009. Settlement and subsistence among the early formative Gulf Olmec. *Journal of Anthropological Archaeology* 28: 397–411.

Benz, B.F. 2001. Archaeological evidence of teosinte domestication from Guilá Naquitz, Oaxaca. *Proceedings of the National Academy of Science, USA* 98: 2104–2106.

Benz, B.F., and H.H. Iltis. 1990. Studies in archaeological maize I: The "wild maize" from San Marcos restudied. *American Antiquity* 55: 500–511.

Benz, B.F., and A. Long. 2000. Prehistoric maize evolution in the Tehuacan Valley. *Current Anthropology* 4: 459–465.

Binford, L.R. 1980. Willow smoke and dogs' tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45: 4–20.

Blake, M. 2006. Dating the initial spread of *Zea maize*. In *Histories of maize: Multidisciplinary approaches to the prehistory, linguistics, biogeography, domestication and evolution of maize*, ed. J.E. Staller, R.H. Tykot, and B.F. Benz, 55–72. Amsterdam/Boston: Elsevier.

Blake, M., and H. Neff. 2011. Evidence for the diversity of late archaic and early formative plant use in the Soconusco region of Mexico and Guatemala. In *Sociopolitical transformation in early Mesoamerica: Archaic to formative in the Soconusco region*, ed. R. Lesure, 47–66. Berkeley: University of California Press.

Blake, M., B.S. Chisholm, J.E. Clark, B. Voorhies, and M.W. Love. 1992. Prehistoric subsistence in the Soconusco region. *Current Anthropology* 33: 83–94.

Blake, M., J.E. Clark, B. Voorhies, G. Micheals, M.W. Love, M.E. Pye, A.A. Demarest, and B. Arroyo. 1995. Radiocarbon chronology for the late archaic and formative periods on the Pacific Coast of southeastern Mesoamerica. *Ancient Mesoamerica* 6: 161–183.

Booth, R.K., S.T. Jackson, S.L. Forman, J.E. Kutzbach, E.A. Bettis III, J. Kreig, and D.K. Wright. 2005. A severe centennial-scale drought in mid-continental North America 4200 years ago and apparent global linkages. *Holocene* 15: 321–328.

Bower, B. 1994. Maya beginnings extended back at Belize site. *Science News* 145: 279.

Buckler, E.S., D.M. Pearsall, and T.P. Holtsford. 1998. Climate, plant ecology and central Mexican archaic subsistence. *Current Anthropology* 39: 152–163.

Byers, D.S., ed. 1967. *The prehistory of the Tehuacán Valley, volume I: Environment and subsistence*. Austin: University of Texas.

Clark, J.E., and D. Cheetham. 2002. Mesoamerica's tribal foundations. In *The archaeology of tribal societies*, Archaeological series, ed. W. Parkinson, vol. 15, 278–339. Ann Arbor: International Monographs in Prehistory.

Clark, J.E., M.E. Pye, and D.C. Gosser. 2007. Thermolithics and corn dependency in Mesoamerica. In *Archaeology, art, and ethnogenesis in Mesoamerican prehistory: Papers in honor of Gareth W. Lowe*, Papers of the new world archaeological foundation, ed. L.S. Lowe and M.E. Pye, vol. 68, 23–42. Provo: Brigham Young University.

da Fonseca, R.R., et al. 2015. The origin and evolution of maize in the southwestern United States. *Nature Plants* 1: 14003.

de Menocal, P.B. 2001. Cultural responses to climate change during the late Holocene. *Science* 292: 667–673.

Drysdale, R., G. Zanchetta, J. Hellstrom, R. Maas, A. Fallick, M. Pickett, I. Cartwright, and L. Piccini. 2006. Late Holocene drought responsible for the collapse of Old World civilizations is recorded in an Italian cave flowstone. *Geology* 34: 101–104.

Farnsworth, P., J.E. Brady, M.J. DeNiro, and R.S. MacNeish. 1985. A re-evaluation of the isotopic and archaeological reconstructions of diet in the Tehuacan Valley. *American Antiquity* 50: 102–116.

Flannery, K.V. 1968. Archaeological systems theory and early Mesoamerica. In *Anthropological archaeology in the Americas*, ed. B. Meggars, 67–87. Washington, DC: Anthropological Society of Washington.

Flannery, K.V. 1973. The origins of agriculture. *Annual Review of Anthropology* 2: 271–310.

Flannery, K.V. 1986. *Guila Naquitz: Archaic foraging and early agriculture in Oaxaca, Mexico*. Orlando: Academic.

Flannery, K.V. 2001. "There were giants in those days", Richard Stockton MacNeish 1918–2001. *Ancient Mesoamerica* 12: 149–157.

Flannery, K.V., J. Marcus, and S.A. Kowalewski. 1981. The preceramic and formative of the Valley of Oaxaca. In *Archaeology*, Handbook of Middle American Indians supplement 1, ed. J. Sabloff, 48–93. Austin: University of Texas Press.

Gibson, E.C. 1991. A preliminary functional and contextual study of constricted Adzes from northern Belize. In *Maya stone tools: Selected papers from the Second Maya Lithic conference*, ed. T.R. Hester and H.J. Shafer, 229–237. Madison: Prehistory Press.

Hester, T.R. 1994. The archaeological investigations of the Colha Project, 1983 and 1984. In *Continuing archaeology at Colha, Belize*, ed. T.R. Hester, H.J. Shafer, and J.D. Eaton, 1–9. Austin: Texas Archaeological Research Laboratory, University of Texas at Austin.

Hester, T., H. Shafer, and T. Kelly. 1980. Lithics from a preceramic site in Belize. *Lithic Technology* 9: 9–10.

Hester, T.R., H.B. Iceland, D.B. Hudler, and H.J. Shafer. 1996. The Colha Preceramic project: Preliminary results from the 1993–1995 field seasons. *Mexicon* 18: 45–50.

Iceland, H.B. 1997. *The preceramic origins of the Maya: results of the Colha Preceramic Project in northern Belize*. Unpublished PhD dissertation, University of Texas.

Iceland, H.B., and T.R. Hester. 1996. The earliest Maya? Origins of sedentism and agriculture in the Maya lowlands. In *The prehistory of the Americas*, XIII International Congress of the Prehistoric and Protohistoric Sciences, vol. 17, 11–17. Forli.

Inomata, T., et al. 2015. Development of sedentary communities in the Maya lowlands: Coexisting mobile groups and public ceremonies at Ceibal, Guatemala. *Proceedings of the National Academy of Sciences, USA* 112: 4268–4273.

Jaenicke-Després, V., et al. 2003. Early allelic selection in maize as revealed by ancient DNA. *Science* 302: 1206–1208.

Johnston, K.J., A.J. Breckenridge, and B.C. Hansen. 2001. Paleoecological evidence of an early postclassic occupation in the southwestern Maya lowlands: Laguna Las Pozas, Guatemala. *Latin American Antiquity* 12: 149–166.

Jones, J.G. 1994. Pollen evidence for early settlement and agriculture in northern Belize. *Palynology* 18: 205–211.

Kaplan, L. 1986. Preceramic Phaseolus from Guilá Naquitz. In *In Guila Naquitz: Archaic foraging and early agriculture in Oaxaca Mexico*, ed. K.V. Flannery, 281–284. Orlando: Academic.

Kaplan, L., and T.F. Lynch. 1999. Phaseolus (Fabaceae) in archaeology: AMS radiocarbon dates and their significance for pre-Columbian agriculture. *Economic Botany* 53: 261–272.

Kelly, T.C. 1993. Preceramic projectile-point typology in Belize. *Ancient Mesoamerica* 4: 205–227.

Kennett, D.J., and B. Voorhies. 1996. Oxygen isotope analysis of archaeological shells to detect seasonal use of wetlands on the southern Pacific Coast of Mexico. *Journal of Archaeological Science* 23: 689–704.

Kennett, D.J., B. Voorhies, and D. Martorana. 2006. An evolutionary model for the origins of agriculture on the Pacific Coast of southern Mexico. In *Behavioral ecology and the transition to agriculture*, ed. D.J. Kennett and B. Winterhalder. Berkeley: University of California Press.

Kennett, D.J., D.R. Piperno, J.G. Jones, H. Neff, B. Voorhies, M.K. Walsh, and B.J. Culleton. 2010. Pre-pottery farmers on the Pacific coast of southern Mexico. *Journal of Archaeological Science* 37: 3401–3411.

Kennett, D.J., H.B. Thakar, A.M. VanDerwarker, D.L. Webster, B.J. Culleton, T.K. Harper, L. Kistler, T.E. Scheffler, and K. Hirth. 2017. High-precision chronology for Central American maize diversification from El Gigante rockshelter, Honduras. *Proceedings of the National Academy of Sciences, USA* 114: 9026–9031.

Killion, T.W. 2013. Nonagricultural cultivation and social complexity. *Current Anthropology* 54: 569–606.

Lohse, J. 2010. Archaic origins of the lowland Maya. *Latin American Antiquity* 21: 312–352.

Lohse, J., J. Awe, C. Griffith, R. Rosenswig, and F. Valdez Jr. 2006. Preceramic occupations in Belize: Updating the Paleoindian and archaic record. *Latin American Antiquity* 17: 209–226.

Long, A., and G.J. Fritz. 2001. Validity of AMS dates on maize from the Tehuacan Valley: A comment on MacNeish and Eubanks. *Latin American Antiquity* 12: 87–90.

Long, A., B. Benz, D. Donahue, A. Jull, and L. Toolin. 1989. First AMS dates on early maize from Tehuacan, Mexico. *Radiocarbon* 31: 1035–1040.

Lowe, G.W. 1975. *The early preclassic Barra phase of Altamira, Chiapas: a review with new data*, Papers of the new world archaeological foundation. Vol. 38. Provo: Brigham Young University.

MacNeish, R.S. 1964. Ancient Mesoamerican civilization – Long archeological sequence from Tehuacan Mexico may give new data about rise of this civilization. *Science* 143: 531–537.

MacNeish, R.S. 1967. A summary of subsistence. In *The prehistory of the Tehuacán Valley, volume I:*

Environment and subsistence, ed. D.S. Byers, 290–309. Austin: University of Texas.

MacNeish, R.S. 1981. *Second annual report of the Belize archaic archaeological reconnaissance*. Andover: Phillips Academy.

MacNeish, R.S. 1982. *Third annual report of the Belize archaic archaeological reconnaissance*. Andover: Phillips Academy.

MacNeish, R.S. 2001a. A response to Long's radiocarbon determinations that attempt to put acceptable chronology on the Fritz. *Latin American Antiquity* 12: 99–104.

MacNeish, R.S. 2001b. Tehuacán region. In *Archaeology of ancient Mexico and Central America: An encyclopedia*, ed. S.T. Evans and D.L. Webster, 705–710. New York: Garland Publishing.

MacNeish, R.S., and F.A. Paterson. 1962. *The Santa Marta rock shelter, Ocozocoautla, Chiapas, Mexico*, Papers of the new world archaeological foundation. Vol. 10. Provo: Brigham Young University.

MacNeish, R.S., A. Nelken-Turner, and I.W. Johnson. 1967. *The prehistory of the Tehuacan Valley, volume II: The nonceramic artifacts*. Austin: University of Texas Press.

Marcus, J., and K.V. Flannery. 1996. *Zapotec civilization: How urban society evolved in Mexico's Oaxaca Valley.* New York: Thames and Hudson.

Marcus, J., and K.V. Flannery. 2004. The coevolution of ritual and society: New 14C dates from ancient Mexico. *Proceedings of the National Academy of Sciences, USA* 101: 18257–18261.

Micheals, G.H., and B. Voorhies. 1999. Late archaic period coastal collectors in southern Mesoamerica: The Chantuto people revisited. In *Pacific Latin America in prehistory: The evolution of archaic and formative cultures*, ed. M. Blake, 39–54. Pullman: Washington State University Press.

Neff, H., D.M. Pearsall, J.G. Jones, B. Arroyo, S.K. Collins, and D.E. Freidel. 2006a. Early Maya adaptive patterns: Mid-late Holocene paleoenvironmental evidence from Pacific Guatemala. *Latin American Antiquity* 17: 287–315.

Neff, H., D.M. Pearsall, J.G. Jones, B. Arroyo de Pieters, and D.E. Freidel. 2006b. Climate change and population history in the Pacific lowlands of southern Mesoamerica. *Quaternary Research* 65: 390–400.

Nelson, F.W., and B. Voorhies. 1980. Trace element analysis of obsidian artifacts from three shell midden sites in the littoral zone, Chiapas, Mexico. *American Antiquity* 45: 540–550.

Perşoiu, A., M. Ionita, and H. Weiss. 2019. Atmospheric blocking induced by the strengthened Siberian high led to drying in West Asia during the 4.2 ka BP event – A hypothesis. *Climate of the Past* 15: 781–793.

Piperno, D.R., and K.V. Flannery. 2001. The earliest archaeological maize (*Zea mays* L.) from highland Mexico: New accelerator mass spectrometry dates and their implications. *Proceedings of the National Academy of Science, USA* 98: 2101–2103.

Piperno, D.R., A.J. Ranere, I. Holst, J. Iriarte, and R. Dickauc. 2009. Starch grain and phytolith evidence for early ninth millennium B.P. maize from the central Balsas River Valley, Mexico. *Proceedings of the National Academy of Science, USA* 106: 5019–5024.

Pohl, M.D., K.O. Pope, J.G. Jones, J.S. Jacob, D.R. Piperno, S.D. deFrance, D.L. Lentz, J.A. Gifford, M.E. Danforth, and J.K. Josserand. 1996. Early agriculture in the Maya lowlands. *Latin American Antiquity* 7: 355–372.

Ramos-Madrigal, J., et al. 2016. Genome sequence of a 5,310-year-old maize cob provides insights into the early stages of maize domestication. *Current Biology* 26: 3195–3201.

Ranere, A.J., D.R. Piperno, I. Holst, R. Dickau, and J. Iriate. 2009. The cultural and chronological context of early Holocene maize and squash domestication in the Central Balsas River Valley, Mexico. *Proceedings of the National Academy of Science, USA* 106: 5014–5018.

Rosenswig, R.M. 2004. New archaeological excavation data from the late archaic occupation of northern Belize. *Research Reports in Belizean Archaeology* 1: 267–277.

Rosenswig, R.M. 2006a. Sedentism and food production in early complex societies of the Soconusco, Mexico. *World Archaeology* 38: 329–354.

Rosenswig, R.M. 2006b. Northern Belize and the Soconusco: A comparison of the late archaic to formative transition. *Research Reports in Belizean Archaeology* 3: 59–71.

Rosenswig, R.M. 2010. *The beginnings of Mesoamerican civilization: Inter-regional interaction and the Olmec*. New York: Cambridge University Press.

Rosenswig, R.M. 2011. An early Mesoamerican archipelago of complexity. In *Sociopolitical transformation in early Mesoamerica: Archaic to formative in the Soconusco region*, ed. R. Lesure, 242–271. Berkeley: University of California Press.

Rosenswig, R.M. 2012a. Materialism, mode of production and a millennium of change in southern Mexico. *Journal of Archaeological Method and Theory* 19: 1–48.

Rosenswig, R.M. 2012b. The first 1000 years of ceramic use in the Soconusco: Evidence from the Cuauhtémoc site. In *La arqueología de Chiapas: 60° aniversario de la Fundación Arqueológica del Nuevo Mundo, volume 2: investigaciones recientes*, Papers of the new world archaeological foundation, ed. L. Lowe and M. Pye, vol. 72, 223–235. Provo: Brigham Young University.

Rosenswig, R.M. 2015. A mosaic of adaptation: The archaeological record for Mesoamerica's archaic period. *Journal of Archaeological Research* 23: 115–162.

Rosenswig, R.M. 2017. Olmec globalization: A Mesoamerican archipelago of complexity during the second millennium BCE. In *Handbook of globalization and archaeology*, ed. T. Hodos, 177–193. London: Routledge.

Rosenswig, R.M., and M.A. Masson. 2001. Seven new preceramic sites documented in northern Belize. *Mexicon* 23: 138–140.

Rosenswig, R.M., D.M. Pearsall, M.A. Masson, B.J. Culleton, and D.J. Kennett. 2014. Archaic period

settlement and subsistence in the Maya lowlands: New starch grain and lithic data from Freshwater Creek, Belize. *Journal of Archaeological Science* 41: 308–321.

Rosenswig, R.M., A.M. VanDerwarker, B.J. Culleton, and D.J. Kennett. 2015. Is it agriculture yet? Intensified maize-use at 1000 cal. BC in the Soconusco and Mesoamerica. *Journal of Anthropological Archaeology* 40: 89–108.

Scheffler, T.E., K.G. Hirth, and G. Hasemann. 2012. The El Gigante rockshelter: Preliminary observations on an Early to Late Holocene occupation in southern Honduras. *Latin American Antiquity* 23: 597–610.

Smith, B.D. 1997. The initial domestication of *Cucurbita pepo* in the Americas 10,000 years ago. *Science* 276: 932–934.

Smith, B.D. 2000. Guila Naquitz revisited: Agricultural origins in Oaxaca, Mexico. In *Cultural evolution: Contemporary viewpoint*, ed. G. Feinman and L. Manzanilla, 15–60. New York: Kluwer Academic/Plenum Publishers.

Smith, B.D. 2001a. Low-level food production. *Journal of Archaeological Research* 9: 1–43.

Smith, B.D. 2001b. Documenting plant domestication: The consilience of biological and archaeological approaches. *Proceedings of the National Academy of Sciences, USA* 98: 1324–1326.

Smith, B.D. 2005. Reassessing Coxcatlan Cave and the early history of domesticated plants in Mesoamerica. *Proceedings of the National Academy of Science, USA* 102: 9438–9445.

Stahl, A.B.. 2004. Political economic mosaics: Archaeology of the last two millennia in tropical sub-Saharan Africa. *Annual Review of Anthropology* 33: 145–172.

Stark, B.L. 1981. The rise of sedentary life. In *Supplement to the handbook of Middle American Indians, volume I: Archaeology*, ed. V. Bricker and J. Sabloff, 345–372. Austin: University of Texas Press.

Stemp, J.W., and J.J. Awe. 2013. Possible variation in late archaic period bifaces in Belize: New finds from the Cayo District of western Belize. *Lithic Technology* 38: 17–31.

Stemp, J.W., J.J. Awe, K. Prufer, and C. Helmke. 2016. Design and function of Lowe and Sawmill points from the Preceramic period of Belize. *Latin American Antiquity* 27: 279–299.

Thompson, L., et al. 2002. Kilimanjaro ice core records: Evidence of Holocene climate change in tropical Africa. *Science* 298: 589–593.

Vallebueno-Estrada, M., et al. 2016. The earliest maize from San Marcos Tehuacán is a partial domesticate with genomic evidence of inbreeding. *Proceedings of the National Academy of Science, USA* 113: 14151–14156.

Vaughan, H.H., E.S. Deevey, and S.E. Garrett-Jones. 1985. Pollen stratigraphy of two cores from the Petén lake district, with an appendix on two deep-water cores. In *Prehistoric Lowland Maya environment and subsistence economy*, ed. M. Pohl, 73–89. Cambridge: Harvard University Press.

Voorhies, B. 1976. *The Chantuto people: An archaic period society of the Chiapas Littoral, Mexico*, Papers of the new world archaeological foundation. Vol. 41. Provo: Brigham Young University.

Voorhies, B. 2004. *Coastal collectors in the Holocene: The Chantuto people of Southwest Mexico*. Gainesville: University Press of Florida.

Voorhies, B. 2015. *An Archaic Mexican shellmound and its entombed floors*. Los Angeles: UCLA Cotsen Institute of Archaeology Press.

Voorhies, B., G.H. Michaels, and G.M. Riser. 1991. Ancient shrimp fishery. *National Geographic Research and Exploration* 7: 2–35.

Walker, M., et al. 2018. Formal ratification of the subdivision of the Holocene series/epoch (Quaternary system/period): Two new global boundary Stratotype sections and points (GSSPs) and three new stages/subseries. *Episodes* 41: 213–223.

Weiss, H. 2016. Global megadrought, societal collapse and resilience at 4.2–3.9 ka BP across the Mediterranean and West Asia. *Past Global Change Magazine* 24: 62–63.

Weiss, H., M.A. Courty, W. Wetterstrom, F. Guichard, L. Senior, R. Meadow, and A. Curnow. 1993. The genesis and collapse of third millennium north Mesopotamian civilization. *Science* 261: 995–1004.

Willey, G.R., and P. Phillips. 2001 [1958]. *Method and theory in American archaeology*. Tuscaloosa: University of Alabama Press.

Zeitlin, R.N. 1984. A summary report on three seasons of field investigations into the archaic period prehistory of Lowland Belize. *American Anthropologist* 86: 358–368.

Metal Detecting in Archaeology

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Introduction

The association of metal detecting with relic hunters has almost made the metal detector synonymous with site looting and is perhaps one of the reasons metal detectors have been underutilized by professional archaeologists

(Connor and Scott 1998; Ferguson 2013). Metal detectors are inexpensive and effective remote sensing devices that should become part of the basic tool kit of archaeologists working at sites where metal artifacts are likely to be a part of the site assemblage. The primary difference between relic collecting and site looting and the use of metal detectors as legitimate archaeological tools is simply the manner of application. Metal detectors find metal objects just as a shovel tests or test units might be used to discover a site's content, depth, or boundary. In archaeological applications the metal detector inventory process, coupled with precise and accurate recording techniques, is a valid and useful field survey technique (Gregory and Rogerson 1984; Dobson 1995; Hesse 2000; Sutherland and Holst 2005; Banning et al. 2006; Boon 2013.

Key Issues/Current Debates/Future Directions/Examples

Today, the use of nondestructive and nonintrusive methods of archaeological investigation is ingrained in the discipline, and archaeologists have turned increasingly to methods of remote sensing for initial site investigation (Das et al. 2000; Espenshade and Severts 2016). The metal detector is a remote sensing archaeological tool, a handheld, near surface in-phase conductivity meter. All metal detectors have a similar basic configuration that includes a handle, search coil, cable, and a metal box that houses the battery and electronic circuit board (control housing and memory).

The control housing and metal detectors have four basic technologies in which metal detectors function:

1. *Continuous sine wave*: this is the traditional type of technology as used in most basic detectors. These detectors are commonly known as very-low-frequency (VLF) models. Continuous sine wave detectors create an electromagnetic field which is applied to the ground in a continuous wave.
2. *Broadband spectrum (BBS)*: this method transmits in 17 frequencies simultaneously instead of just 1 in a square wave form rather than a sine wave as with VLF machines. A further improvement on this technology is full band spectrum (FBS), which transmits in 28 frequencies simultaneously. FBS has the benefit of offering superior ground cancellation and accurate discrimination at depth and over a wide variety of targets. This makes multi-frequency detectors the most versatile detectors available today.
3. *V/flex technology*: this uses state-of-the-art digital and mixed-signal components to enhance standard single-frequency technology. The advantages of V/flex technology are that it gives dependable performance and improved immunity to outside factors. V/flex technology also allows the detector to operate in different frequencies dependent on the coil being used.
4. *Multi-period sensing (MPS)* or *pulse induction (PI)*: this is the exclusive and patented technology. MPS technology transmits a stream of alternating short and long pulses of magnetic field into the ground, causing objects to produce a changed magnetic field of their own. This means that you can locate metal targets at far greater depth than conventional (VLF) detectors, while small targets can still be found in difficult grounds. MPS technology also aids in the accuracy of ground balance which limits the number of "ghost" or false signals. A new form of PI was introduced in 2015, Zero Voltage Technology, that enables the user to detect at depths to 1–1.5 m below ground surface.

The two basic metal detector types routinely used in archaeological metal detecting are VLF (very low frequency) and PI (pulse induction, aka MPS, ZVT). The *VLF* concept is based on sending an electrical current into the ground to determine if materials that are conductive (also called inductance) or resistive to electrical current are present. VLF technology relies on the principle of phase shift, which is the difference in timing between the transmitter coil's frequency and the frequency of

the target object. The difference is a result of its conductivity (inductance) or its resistance to electricity. An object that conducts electricity easily (inductive) is slow to react to changes in the current. An object that does not conduct electricity easily (resistive) is quick to react to changes in the current. Essentially, this means that an object with high inductance is going to have a larger phase shift, because it takes longer to alter its magnetic field. An object with high resistance is going to have a smaller phase shift.

Phase shift provides VLF-based metal detectors with its discrimination capability. Since most metals vary in both inductance and resistance, a VLF metal detector examines the amount of phase shift, using a pair of electronic circuits called phase demodulators, and compares it with the average for a particular type of metal. The detector then provides an audible tone or visual indicator as to what range of metals the object is likely to be. Depths of 30–35 cm can be reached, but 20–30 cm is the normal depth range of VLF machines.

PI technology sends powerful, short bursts (pulses) of current through a coil of wire. Each pulse generates a brief magnetic field. When the pulse ends, the magnetic field reverses polarity and collapses very suddenly, resulting in a sharp electrical spike. This spike lasts a few microseconds (millionths of a second) and causes another current to run through the coil. This current is called the reflected pulse and is extremely short, lasting only about 30 μs. Another pulse is then sent and the process repeats. A PI-based metal detector sends about 100 pulses per second, ranging from several dozen pulses per second to over a thousand, depending on the model or brand.

A sampling circuit in the metal detector is set to monitor the length of the reflected pulse. By comparing it to the expected length, the circuit can determine if another magnetic field has caused the reflected pulse to take longer to decay. If the decay of the reflected pulse takes more than a few microseconds longer than normal, there is probably a metal object at that location. The sampling circuit sends the tiny, weak signals that it monitors to a device called an integrator. The integrator reads the signals from the sampling circuit, amplifying and converting them to direct current (DC). The direct current's voltage is connected to an audio circuit, where it is changed into a tone that the metal detector uses to indicate that a target object has been found.

PI metal detectors are poor at discrimination because the reflected pulse length of various metals is not easily separated. However, they are useful in many situations in which VLF-based metal detectors would have difficulty, such as in areas that have highly conductive material in the soil or general environment. PI systems detect metal much deeper in the ground than other systems, up to 1–1.5 m.

The control housing also contains either preset, manual, or automatic ground-balancing functions. Ground balancing reduces or eliminates natural background mineralization in the soil type or types at the work area. This function allows the detector to perform with more predictable results. *Manual ground balance* gives the operator the ability to alter the ground balance to suit the various and changing ground mineralization being detected. *Automatic ground balance* – automatic ground tracking – refers to the ability of the detector to track the changes in ground mineralization and automatically adjust the ground balance to suit. This ensures perfect ground balance and full detection depth and eliminates the need for the operator to stop and manually adjust the detector as the ground conditions change. *Preset ground balance* is preset to suit a particular soil type. This obviously makes the detector limited to where it is able to be used.

The control circuits have built-in operational frequencies established by the individual manufacture. Operational frequency is measured in kilohertz; the frequency is the number of times a signal is transmitted into the ground and received back, per second. The lower the frequency used by the detector, the deeper it can normally penetrate. At low frequencies, however, the sensitivity to small targets is sometimes reduced. The higher the frequency, the higher the sensitivity to small targets, but it may not penetrate as deeply. In general, gold detectors operate at higher frequencies (to find small nuggets), while coin and treasure detectors work at lower frequencies for deeper penetration (the exception to this is

MPS-type metal detectors that are sensitive and deep-seeking simultaneously).

A final function of a machine's control circuit is the *discrimination capability*. This function varies by quality of the machine and the manufacture. Discrimination is the ability of the detector to identify the type of metal object found and eliminates the unwanted metal types. There are four basic discrimination types:

Variable discrimination: this is the most basic of discrimination types. It works like a demarcation line in the conductivity level. The level can be set by the operator, and all metals with conductivity lower than where the level is set are eliminated, and all metals with a higher conductivity are accepted.

Notch filter discrimination: if all metals were arrayed in order of their conductivity, from least conductive to most conductive, notch filter discrimination segments that array into zones or "notches," and each notch or zone can then be accepted or deleted. The number and width of the notches offered on the model of detector will determine, to some degree, how selective the detector can be at eliminating unwanted from desired targets (e.g., can tabs from lead bullets or brass items).

Tone identification: some detectors will indicate the possible ID (identity) of a target, by changing the tone of the target signal. Generally, low conductive metals will give a lower tone, while highly conductive metals will give a higher pitched tone.

Identification meter: better quality detectors today offer a meter or LCD screen, which will identify the target using as either a graphic display or numeric display specific to the brand or model. Note: the accuracy of discrimination is dependent on the repeatability of an object having the same conductivity as other samples of the same object. Man-made objects will normally be consistent in their conductivity; however, naturally occurring conductive minerals like gold will often have variations in their purity and therefore their conductivity. Soil mineralization will also have an effect on discrimination.

The last major hardware feature is coil or antenna differences. Today, the control circuits are not advancing rapidly even among different manufacturers. The changes in technology to allow greater depth, metal discrimination, and recovery are in the coil technology. There are three aspects to coil differences that are important:

Size: the size of a coil can influence the depth or sensitivity of a detector. The larger the coil, the deeper it tends to detect but less sensitivity it has to tiny targets. The smaller the diameter, the more sensitive it becomes but with less depth. Smaller coils will also be lighter and easier to control and may be chosen for their ability to negotiate difficult terrain or undergrowth.

Shape: the most common shapes of coil are the conventional solid round or circular coils, elliptical-shaped coils, and open-web coils. The main reason for change to shape is to conform to a physical requirement, i.e., the elliptical coil can be pushed around brush or between rocks easier than round coils. Open-web coils help cut through water when wading or detecting underwater. These coils are also popular for their reduced weight. Conventional round coils are often the more stable and high-performing coil.

Configuration: the three most common types of coil windings are concentric, double D, and mono loop. The difference between these coil types is the pattern the wire is wound within the coil, and configuration is one of the most important elements in coil technology.

Concentric coils have an inner circle and an outer circle wire winding. Its search pattern is cone shaped and can be useful for accurately pinpointing the target. Concentric coils tend to be noisier in highly mineralized ground and require more detector sweep overlap for thorough ground coverage.

Double D wound coils are now the preferred coils for most detecting. They give a blade- or chisel-shaped signal that covers the ground more uniformly, and once an operator becomes accustomed to the signal, pinpointing is no hardship.

Double D coils are also preferred for their superior ground-balancing ability.

Mono loop coils are a special style of coil for the MPS technology detectors. These coils have one winding of wire around the circumference of the coil, and this winding is used to both transmit and receive. The signal pattern of the mono loop coil is cone shaped, requiring more overlapping, and in extremely heavily mineralized grounds, they can be more difficult to ground balance; however, they tend to provide slightly better depth than the double D coils.

Metal Detectors in the Field

Operation of a metal detector can generally be learned quickly and easily for most VLF machines. The exceptions are the VLF multi-frequency machines and the PI machines which take many hours of experience to use in an effective manner. As with any tool the more experienced and skilled the operator, the more efficient the work and the better the results. Since the skill of the operator is one of the most important variables, many successful projects have relied on experienced volunteer detector operators. The volunteers are frequently metal-detecting hobbyists who provide their own machines; thus the project benefits from both knowledgeable volunteers and cost savings.

A successful archaeological metal detector project will require careful planning and adaptation of the methods and techniques to the specific site context. When developing a metal detector survey strategy, operator experience, soil conductivity, and the purpose of the work must be considered. One method of survey consists of three sequential operations: metal detecting, artifact recovery, and provenience recording. During metal detecting, metal targets are located and marked. A recovery crew follows and carefully uncovers the objects, leaving them in place. The recording team then plots individual artifact locations, assigns field specimen numbers, and collects the specimens.

Detector operators should walk abreast, following transects across the area to be inspected. Coils should be held as close to and as level with the ground as possible to provide maximum vertical and horizontal coverage. Each operator can normally cover an area of roughly 1.5–2.0 m with each sweep, depending on the individual's height and technique. The transects can also be varied in width to meet the needs of different sampling approaches, ranging from a random sample to a stratified random sampling. The 1.5–2.0 m sweep with a 5.0 m interval between detector operators obtains approximately a 35% sample of a study area. If necessary, the metal detector operator can cover a site in a series of more closely spaced units in order to cover up to 100% of the site.

Transect orientation can be based on any reasonable parameter, such as grid orientation or cardinal direction, as long as a systematic approach is maintained to achieve the desired coverage. Parallel transects and radial transects worked from a central point are two other methods that have proven successful and effective in meeting different site sampling needs.

In dense concentrations of metallic debris, it may be necessary to recover the targets located and then re-sweep the area multiple times to recover all the artifacts. The signal from larger metal objects may obscure the signal from other smaller or less dense targets unless the larger targets are removed from the detector field. Metal shafts of surveyor's pinflags can also obscure nearby buried targets so that a dense field of surveyor's pinflags will affect the number of targets found. Pinflags with fiberglass shafts are available and can be used to eliminate the masking problem found with metal shaft surveyor's pinflags.

Conclusion

Metal detectors can aid in the recovery of archaeological information from almost any site containing metal. Without excavation, by simply detecting a site and flagging "targets," the archaeologist can easily examine the distribution and varying densities of metal artifacts within a site. This can aid in identifying intra-site spatial patterning and in establishing site boundaries. In shallow, unstratified historic sites, which are common in the western United States, the targets can

be excavated and a sample of temporally and functionally diagnostic material quickly and inexpensively obtained. This can also be done within a structure or where structural remains are present; the detector can be used to quickly obtain information on age and function.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Nondestructive Subsurface Mapping in Field Archaeology

References

Banning, E.B., A.L. Hawkins, and S.T. Stewart. 2006. Detection functions for archaeological survey. *American Antiquity* 71 (4): 723–742.

Boon, Robbert-Jan. 2013. Metal matters: A study towards the application of metal detection on excavations on Dutch sand soils, clay soils, and urban sites. Master thesis, University of Leiden, Faculty of Archaeology, Netherlands.

Connor, M., and D.D. Scott. 1998. Metal detector use in archaeology: An introduction. *Historical Archaeology* 32 (4): 76–85.

Das, Y. 2006. Effects of soil electromagnetic properties on metal detectors. *IEEE Transactions on Geoscience and Remote Sensing* 44 (6): 1444–1453.

Das, Y., J.D. Toews, K. Russell, and S. Lewis. 2000. *Results of in-air testing of metal detectors, defense research establishment technical report DRES TR 2000–185*. Alberta: Medicine Hat.

Dobison, C., and S. Denison. 1995. *Metal detecting and archaeology in England*. London: English Heritage and Council for British Archaeology. York: London and Walmgate.

Espenshade, C.T., and P. Severts. 2016. Better training = better battlefield interpretation: The AMDA and APP classes. In *Preserving fields of conflict: Papers from the 2014 fields of conflict conference and preservation workshop,* ed. S. D. Smith, 11–14. South Carolina: South Carolina Institute of Archaeology and Anthropology.

Ferguson, N. 2013. Biting the bullet: The role of hobbyist metal detecting within battlefield archaeology. *Internet Archaeology* 33. https://doi.org/10.11141/ia.33.3.

Gregory, T., and J.G. Rogerson. 1984. Metal-detection in archaeological excavation. *Antiquity* 58 (224): 179–184.

Hesse, A. 2000. De la detection des objects metalliques des Ages des Metaux. *Bulletin de la Societie Prehistorique Francaise* 97: 1–15.

Sutherland, T., and M. Holst. 2005. Battlefield archaeology – a guide to the archaeology of conflict British archaeological jobs Resource, pdf available from bajr.org.

Metallurgy

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State of Knowledge and Current Debates

Introduction

Metallurgy is a technology for transforming metallic ores to usable metals. It is generally described as a sequence of steps (mainly mining, ore processing, fuel preparation, smelting, purification, alloying, casting, and/or hammering) and components (raw materials, means of production, skills, knowledge) (Lechtman 1976; Shimada and Craig 2013; Serneels 2017). Many systematic investigations of ancient metallurgy have been carried out (textbooks and monographs dedicated to the subject are available for the interested readers in section Further Readings), so this entry aims to provide just a glimpse into this fascinating world of minerals, metals, and past societies.

Ores are rocks, minerals, or alluvial sediments that contain metals that are considered valuable and that can be mined and processed with the technologies available at a certain time (Killick 2014). Gold, and sometimes silver, copper, lead, mercury, and more rarely iron, can be found as native metals. However, metals are mainly combined with other elements, as oxides, carbonates,

or sulfide minerals. Before 1500 AD, seven metals were known and employed as pure metals or natural or intentional alloys: gold, silver (with gold or copper or both), copper (with arsenic, tin, lead, or zinc), tin, mercury, lead (with tin), and iron (with carbon or phosphorus) (Rehren and Pernicka 2008).

The history of the development of metallurgy around the world is still a matter of debate as recent research and discoveries offer new evidence of past activities, and diffusion and innovation are discussed based on such data. However, it is established that native copper was the first metal to be hammered and annealed to obtain metal artifacts. The earliest evidence dates from the late ninth millennium BC in Anatolia, while independent copper working was developed around 4500 BC in North America. First evidence of copper was found in Iran and Serbia and dates from around 5000 BC. Iberia has also been postulated as a third area of metallurgical invention in the Old World (Killick and Fenn 2012). Gold was used for the first time in Bulgaria (4000 BC) (Serneels 2017). Hammered and smelted copper evidences from circa 3000 BP have been identified in the Andes, another independent area of invention where archaeologists have identified different areas of innovation and development in Peru, Bolivia, and Northwest of Argentina (Scattolin et al. 2010). Much later, circa 650 CE, this copper-based technology (cold-worked and lost-wax cast) was introduced possibly by maritime routes from South America to western Mesoamerica (Hosler 1994). On the other hand, iron metallurgy was developed independently in Anatolia and China around 1800 and 800 BC, respectively (Tylecote 1992; Killick and Fenn 2012) (for more information about metallurgy inception and development, see Further readings).

The metallurgical "chaîne opératoire" (Hauptmann 2007) or sequence of operations starts with the ore extraction. The mining operations and the preparation/treatment of minerals strongly depend on the geological characteristics of the ore deposit and its location, such as type of mineralization, ore grade, host rock, local topography, and accessibility, and also on the technology, skills, labor supply, and organization available at a certain time and within a specific society, besides other social and symbolic factors (Salinas and Salazar 2008; Shimada and Craig 2013; Stöllner 2014, among others). Gold placer mining in alluvial deposits, for example, requires the separation of gold dust from the sand and gravel by mechanical means, while the extraction of ores from underground mines involves more complex mining technologies and operations (draining, ventilation, light, supporting, etc.). On the other hand, native metals can be hammered (e.g., gold nuggets) or melted and cast (e.g., tiny flakes that can be consolidated only by melting, Killick and Fenn 2012), sometimes after sorting and crushing operations (beneficiation), such as grinding, washing, and handpicking. In the case of oxides, the change from ore to metal is achieved by smelting. As Killick (2014) mentioned, this smelting process can be quite simple, in shallow crucibles or shallow pit furnaces filled with ore and charcoal. Conversion of sulfide ores, however, requires a more complex operation, including a previous step to remove the sulfur as gaseous sulfur dioxide (roasting) (Goldenberg et al. 1996). The aim of the smelting process is obtaining raw metal to be treated in a later phase when it will be purified, alloyed, cast, shaped, remelted, hammered, and/or decorated until the final product (metal object) is ready (Hauptmann 2007).

Each of these operations involves specific materials, tools, installations, intermediate and final products, and waste. Figure 1 summarizes the steps of the metallurgical chain and the material evidences of each activity. In the analysis of these operations, researchers understand that the specificities of the entire process are controlled by technical and physicochemical constraints and also by cultural factors and choices.

Archaeometallurgy

Archaeometallurgy can be defined as a subfield of archaeological science (see Martinon-Torres and Killick 2015) or archaeometry (see ► Archaeometry: Definition entry by Wells in this volume), dedicated to the study of metal and its production, use, and distribution, among other topics related to metallurgy in the past. Diverse research strategies, techniques, and concepts from

OPERATION	ARCHAEOLOGICAL EVIDENCE	
MINING: EXTRACTION	Galleries, trenches, pits, etc.	
	Tools	
	Ores	
PREPARATION AND BENEFICIATION	Grinding and crushing tools	
	Water systems	
	Beneficiation installations	
METALLURGY: ROASTING, SMELTING AND REFINING	Installations	Furnaces
		Hearths
	Fuels	Wood
		Charcoal
		Animal feces
	Fluxes	
	Tools	Crucibles
		Other technical ceramics (spoons)
		Handles
		Blow pipes/Tuyères
		Bellows
	Slag	Smelting slag
		Refining slag
		Forging slag
		Crucible slag
	Metals	
	Firing materials	
MANUFACTURE OF OBJECTS	Metals	Prills, waste, sheets
		Unfinished objects
		Finished objects
	Moulds	Open, bivalve, composite
		Bivalve
		Composite
		Lost wax
	Tools	Hammering
		Cutting, engraving, embossing
		Polishing

Metallurgy, Fig. 1 Operations involved in the metallurgical chain and the archaeological evidence required for, or resulting from, each of these activities (Modified from González 2004: 53)

natural sciences, chemistry, and engineering, along with ethnohistorical and experimental approaches, are employed to address the diverse archaeological evidence found in the field and the questions proposed in relation to this complex activity.

The importance of metals in ancient societies is beyond doubt, and scholars have been interested in its study from different perspectives. At the beginning of the sixteenth century, anonymous textbooks were published in Germany to teach practical notions of mining and metallurgy. They are known as Bergbüchlein and Probierbüchlein (Sánchez Gómez 1989). By the same period, Georg Agricola published the book titled *De Re Metallica* (1556); Vannocio Biringuccio, his *De la Pirotechnia* (1540); and Lazarus Erker, the *Treatise on ores and assaying* (1574). In the Andes, for example, a priest and miner called Álvaro Alonso Barba wrote the book *Arts of Metals* (1640). Although the original purpose of these works was a practical one (to teach mining and metallurgy operations), they became great sources for later studies on these past technologies. Centuries later, at the second half of the nineteenth century, John Percy wrote about traditional techniques in metal production (Hauptmann 2014), together with the appearances of other general works on the history and development of metallurgy (Rehren and Pernicka 2008). Eminent chemists, engineers, metallurgists, and physicists in this period and during the early twentieth century centered their attention on the study of metal objects, applying the innovative analytical methods developed at the time for detecting chemical composition and metallographic characteristics. Although these first approaches sometimes overemphasized the scientific techniques in detriment of a more holistic archaeological interpretation (González 2004; Rehren and Pernicka 2008), they were a huge improvement to help scholars to understand many aspects of ancient metallurgy.

Metals have been considered evidence to understand the origins and development of metallurgical practices (Tylecote 1992). They have also been interpreted as indicators of successive stages of evolution or unilineal progress and the rise of complex social hierarchies (González 2004), following into the trap of "assuming that the initial discovery of metals would have rapidly revolutionized production and thereby transformed society" (Killick and Fenn 2012: 561).

The study of metals offers also a window for analyzing mechanisms of trade, exchange, warfare, recycling, or substitution of metals (Rehren and Pernicka 2008), as the quest for metals has been one of the most important stimuli for exploration, long-distance trade, and conquest of new lands (Killick and Fenn 2012). More recently, metals have been addressed as significative products of complex social processes. In the words of Heather Lechtman (1976: 1), a pioneer researcher in Andean metallurgy, "metal objects are, after all, the products of complex technological systems, and by limiting our investigations solely to them we tend to ignore the fundamental stages that precede the fabrication of the object itself." Moreover, Lechtman stated that "it is not just the products of that industry that concern us, nor even primarily the techniques that it employed, but the nature and organization of the work force involved, the economic and political control of resources such as ores and fuel" and the articulation with other aspects of the technology and culture of the society which produced them. Therefore, a more holistic approach to metallurgy was necessary, including not only the analysis of finished products and associated manufacturing waste but also long-term interdisciplinary researches centered in the study of contexts of metal production and use, multi-site sampling and survey, archaeometrical analysis, laboratory and field experimental archaeology, ethnoarchaeology, and comparative study of artifact collections (Shimada and Craig 2013). Although interdisciplinarity continues to be challenging for any archaeological project dedicated to the study of metallurgy in the past, this kind of research design is currently much more common than it was previously, as it is shown in Roberts and Thornton's (2014) edited volume, *Archaeometallurgy in Global Perspective: Methods and synthesis* (see Further Readings).

Studying the Metallurgical Chain

Mining Activities

Mining requires specific knowledge related to mineral properties, chemical behavior, and techniques of extraction and beneficiation (Rehren and Pernicka 2008). Alonso Barba ([1640] 1939) fully described how, for example, Andean indigenous people searched and recognized minerals according to color and brightness. This kind of written sources available for historical periods provides data regarding mining techniques and also location of known and exploited mines in the past. In many cases, it is difficult to access to the mines and conclusively identify ancient labors (Fig. 2). Geological reports on mines before new labors begin offer key information about previous exploitations, especially when recent activities have erased (almost) all the evidence of possible ancient work. Published studies on ore deposits are useful for inferring possible provenance of ore samples (Killick 2014). When existing, diverse historical published and non-published documentation through which miners informed mine discoveries and requested permission to exploit them, mining authorities were designated, disputes about mine's owning or workers supply were solved, extraction process was described and ruled, etc., combined with the study of archaeological remains, enrich our understanding of labor system, agents involved, location of mines, and chronology of exploitation, among other issues. Iconographic documentation has shown the location and characteristics of the mines, galleries, pits and installations, tools, and work scenes.

Air photographs and satellite images are also very useful for identifying workings, installations, roads, and associated talus formations (Shimada 1994), as well as the analysis of toponymy. Interviews to local informants are very helpful in locating mines and establishing a relative chronological sequence of mining development in the area (Shimada 1994). Modern geological reports are usually focused on mines considered valuable or rich according to present-day economic profit standards, underrepresenting small-scale ore

Metallurgy, Fig. 2 Gallery (**a**) and vertical pit (**b**) with stairs and walls made of rocks found in Ajedrez, Jujuy, Argentina. They probably date from colonial times (around the eighteenth century)

deposits as the ones that were probably exploited during ancient times. Another problem is that the ore remaining at present day can be not representative of the ore mined in the past (Craddock 1995). The active participation of geologists or other specialists in mine survey and ore sample recollection is especially important at this stage of research design (Shimada 1994).

Combined to the regular archaeological survey methods, geophysical methods, such as seismic surveys and geoelectrical tomography, are employed in the detection and study of ore deposits. Speleological methods of measuring are applied for mapping and describing underground mines three-dimensionally (photogrammetry, laser scanning, traditional surveying with compass and graduated arc). Core drilling is employed for sounding tailings and mining depressions or shafts. Underground excavation requires special methodology due to the characteristics of the mine (horizontal or not, presence of filling layers and mining debris) (Stöllner 2014).

The spatial analysis of mining sites is essential to understand the organization of work and a miner's daily life: settlements, accesses and roads, areas for disposal of wasted rocks, crushing and selecting ores, water management systems, and other components of mining landscape are described and analyzed.

Researchers have tried to identify which ores were used by analyzing ore minerals recovered in archaeological sites and also by indirect means, studying chemical composition of metals and slag and the distribution of ore deposits in a regional scale (Killick 2014). Earth science methods, such as those from geochemistry, ore petrology, and igneous petrology, are applied with this aim. Optical and electron microscopy (see ▶ "Scanning Electron Microscopy (SEM): Applications in Archaeology", in this volume) are employed for identifying minerals, texture, and mineralogical parameters, useful to infer the mineral association in particular locations and the sequence of deposition of the minerals. A complement in this identification process is the use of chemical analysis of individual crystals by energy-dispersive X-ray spectroscopy (EDS), wavelength-dispersive X-ray spectroscopy by electron microprobe (EPMA-WDS) – better for quantitative analysis – and X-ray fluorescence (XRF) (see ▶ "X-Ray Fluorescence (XRF): Applications in Archaeology" in this volume). X-ray diffraction and Raman microscopy are also methods for identifying minerals in an ore sample (Rehren and Pernicka 2008; Killick 2014; see ▶ "X-Ray Diffraction (XRD): Applications in Archaeology" in this volume).

Artifact remains within workings can also give important information on the technology used to extract and crush the ore. The well-preserved body of a miner or Copper Man found in Chuquicamata, Chile, in 1899 (Bird 1979), with his entire equipment (lithic hammer heads, lithic and wooden shovel, wooden sticks, bag, baskets), currently displayed in the American Museum of Natural History in New York, is an extraordinary finding, but even more modest findings of tool equipment or identification of marks in mine's walls (diffuse bruising, long thin scratches, holes, burnt rocks) can give us important information about techniques of mineral extraction (use of stone or metal tools, fire setting, blasting) and chronology (as explained in detail by Craddock 1995: 10 Table 1.1; Shimada and Craig 2013). Ethnography and experimentation have great potential for interpreting functionality through the analysis of the form of tools and wear pattern as well as, for example, the traces left by fire setting (Téreygeol 2000; Timberlake and Craddock 2013; Heeb and Ottaway 2014). Radiocarbon dating has proven to be useful in dating ancient mining, when samples of charcoal from fire setting, fragments of wood, or pieces of torches are found in the mining areas (Hauptmann 2007).

Figueroa et al. (2013: 63–64) define the daily artifacts used by miners as "mining ergology," which can be divided in two categories: mining set (working and transport of materials) and personal items. In this analysis, the authors show the variability of activities related to mining that can be approached through this kind of evidence. Moreover, ritual aspects have been addressed, for example, from musical instruments and symbolically charged items found inside the galleries (Vaughn et al. 2013) or by evidence preparation and serving of food and drink for miners. Pottery

is usually found in mining sites and can be diagnostic for relative dating, especially when there are not radiocarbon-datable materials (Shimada and Craig 2013). Its study also offers us powerful data regarding the daily life of workers, circulation of people, technical knowledge and artifacts, and other important activities as the above referred commensalism rituals. When osteological remains are available, bioanthropological studies on ancient miners focused on stress markers and biomechanical and toxicological effects are another potential analysis for improving our understanding of mining activity (Figueroa et al. 2013).

The Study of Smelting Technology

As mentioned before, smelting is generally the next step after the extraction and beneficiation of mineral ores. It aims to separate metal from slag: the waste product that results from the gangue of the ore's host rock and from fluxes added to improve the smelting process (Hauptmann 2014). Smelting sites are located usually nearby the ore deposits to avoid transporting great quantities of gangue. However, sometimes other factors were also important in choosing the location, such as availability of fuel or wind and water supply (González 2004; Serneels 2017). Spatial organization and types (and quantity) of evidences of this activity will depend, like in mining, on cultural and technical constrains (scale of production, kind of mineral, etc.). In that sense, the study of patterns of distribution in smelting sites, metal (raw lumps and spills), discarded ore, slag, installations, and instruments is essential to have a better understanding of the metallurgical operational chain, the organization and logistics of production, and, of course, the society who produced and consumed the metals, its "traditions and taboos, and varying political and economic parameters" (Rehren et al. 2007: 216; Rehren and Pernicka 2008).

Furnaces have different designs, shapes, and sizes: they can be natural or forced draft, and they can be very simple like a shallow pit, smelting basins, or crucibles, or they have a more complex structure built with clay, stone, or both (see Craddock 1995 for a detailed description of furnaces types, blowpipes, and bellows). Fuel can be in contact with the ore as in the shaft furnace or separate in different chambers, as in the reverberatory furnaces employed in medieval England for melting bronze (Tylecote 1992; Craddock 1995) and in the colonial Andes and New Spain (present-day Mexico) for smelting and refining silver from the beginning of the seventeenth century and on (Alonso Barba [1640] 1939; Cohen et al. 2009; Angiorama and Becerra 2017; Téreygeol and Cruz 2012). Their characteristics can also vary according to their functionality (only for smelting or refining or for both purposes). The choice between each type of furnaces depends on fuel and labor availability and on cultural decisions (Rehren et al. 2007). Experimental archaeometallurgy has proven to be a powerful tool for recreating past smelting and refining techniques as well as the study of historical written sources (Figs. 3 and 4). Evidences of furnaces can be found in smelting sites, along with fragments of their walls or lining. Besides ore, almost present as waste, slag, refractory materials, tuyères (tube or pipe through which air is blown into a furnace or hearth), and remains of firing material are also usually found in these sites (Hauptmann 2007).

Slag is among the most common archaeological evidence of ancient smelting, even in sites where no other type of evidence of this process remains. Slag is waste products and has a very complex composition. It mainly consists of silicates and metal oxides of calcium, iron, magnesium, phosphorous, aluminum, etc. It also includes potential reusable material and sometimes, it is still rich in metal (Hauptmann 2007). Ancient slag also includes intermediate products that contain metal such as scrap metal, casting remains, and any metal-rich slag, among others (Hauptmann 2014). Through mineralogical and chemical analysis of slag, the smelted (or worked) metal and mineral ore can be identified, as well as the characteristics of the metallurgical process, the technological skill of metallurgists, scale of operation, and social and ritual behaviors (Cohen et al. 2009; Rehren and Pernicka 2008; Hauptmann 2014, Heeb and Ottaway 2014). The "human factors as recorded

Metallurgy, Fig. 3 (**a**) Reproduction of a Carolingian furnace for extractive metallurgy of lead and silver, found at Melle, France, dating from the ninth century. (**b**) Silver refining experiment following data obtained on Castel-Minier (the fourteenth century, French Pyrénées). Both experiments were carried out at the Experimental Archaeology Platform of the Arts of Fire, Melle, by the direction of Dr. Florian Téreygeol (Photograph courtesy of Florian Téreygeol)

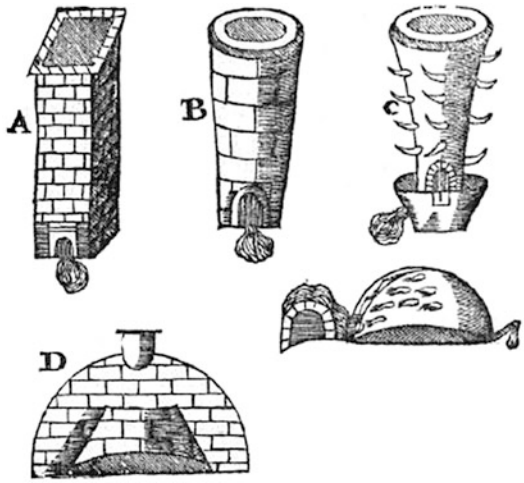

Metallurgy, Fig. 4 Drawings of furnaces employed in colonial Andes made by Alonso Barba 1939. (**a**) Spanish square furnace. (**b**) Spanish round furnace. (**c**) Indigenous furnace ("huayra"). (**d**) Refining indigenous furnace (tocochimbo), similar to the reverberatory furnace. Front and lateral view

in the slags include both short-term individual decisions affecting only single smelts, and accumulated developments affecting more fundamental parameters such as furnace design and choice of raw materials" (Rehren et al. 2007: 216). Moreover, according to Rehren and Pernicka (2008), the study of slag gives even a more complete representation of the ore and smelting conditions than metal samples, because as mentioned above, slag contains not only the gangue, mineral, and sometimes metal-bearing phases but also fluxes added, furnace wall material, fuel ash (in case ore and fuel are in direct contact), and soil sediments (sometimes especially prepared for acting as a container of the ore while smelting, as stated in historical records).

Slag can be waste products of the smelting process and also of metal melting, slag or metal remelting, refining, or metal casting (Hauptmann 2014). Each of these will have particular characteristics and can be classified as smelting, forging, and crucible slag. However, in some cases, slag analysis does not allow to identify variability in furnaces designs (Rehren et al. 2007; Angiorama and Becerra 2017). Slag identification starts in the field, describing types, amount and average size, color, texture, porosity, inclusions, weathering, etc. In the laboratory, several methods and techniques are applied for identifying chemical composition, mineralogical and metallurgical phase analysis, physical constants, age determinations, and lead isotope provenance (Bachmann 1980: 104–105; Hauptmann 2014). Slag sampling is a very important step in the research design, and it will depend on whether there is evidence of a single or multiple smelting episodes, on the distribution of the slag, etc. To obtain good results, registering the location of the sample and being consistent on where to sample are essential (Rehren et al. 2007). Analytical techniques require slag sample preparation. They can be mounted and polished or prepared as petrographic

thin sections (Hauptmann 2014). Optical microscope is used for identifying phases and their orientation and distribution. Metal or metal-bearing phases or inclusions, as well as some mineralogical phases like olivine, pyroxene, or spinel, are easily identified by the expert eye only with optical microscope. However, most of the times, given the complex composition of slags, scanning electron microscopy (SEM) and electron microprobe (EPMA) with energy-dispersive X-ray spectroscopy (EDS) and wavelength-dispersive X-ray spectroscopy (WDS) are employed for spot analysis, phase identification, and element concentration mapping (Hauptmann 2014) (Fig. 5).

Other techniques are also applied, such as X-ray diffraction (powdered sample) (XRD) or X-ray fluorescence spectroscopy (XRF) and inductively coupled plasma optical emission spectrometry (ICP-OES) for trace elements. Isotope analysis (see below) is also used to search for provenance of the ore. When present, wood or charcoal included in slag can be extracted to be dated by radiocarbon dating (Hauptmann 2014). Archaeomagnetic method and thermoluminescence are also potential techniques for dating burned features. To estimate the working temperature of the furnace, archaeometallurgists employ ternary or quaternary phase diagrams of the oxides present in slag (e.g., SiO_2+FeO+Al_2O_3 or CaO+SiO_2+FeO) (see Bachmann 1980; Hauptmann 2007; 2014).

Other important evidences of smelting operations are technical ceramics, namely, ceramics used in operations involving high temperatures, as containers of metallurgical processes (crucibles, furnaces, molds) or as intermediators for providing oxygen (tuyères). To be functional, technical ceramics need to have mechanical strength and withstand high temperatures (thermal refractory properties) and sudden temperature changes (thermal shock resistance), without collapsing or being altered. In that sense, their manufacture differs from domestic pottery, requiring other skills and materials, such as refractory clays or more numerous and different secondary inclusions or temper for improving thermal shock resistance (Martinón-Torres and Rehren 2014).

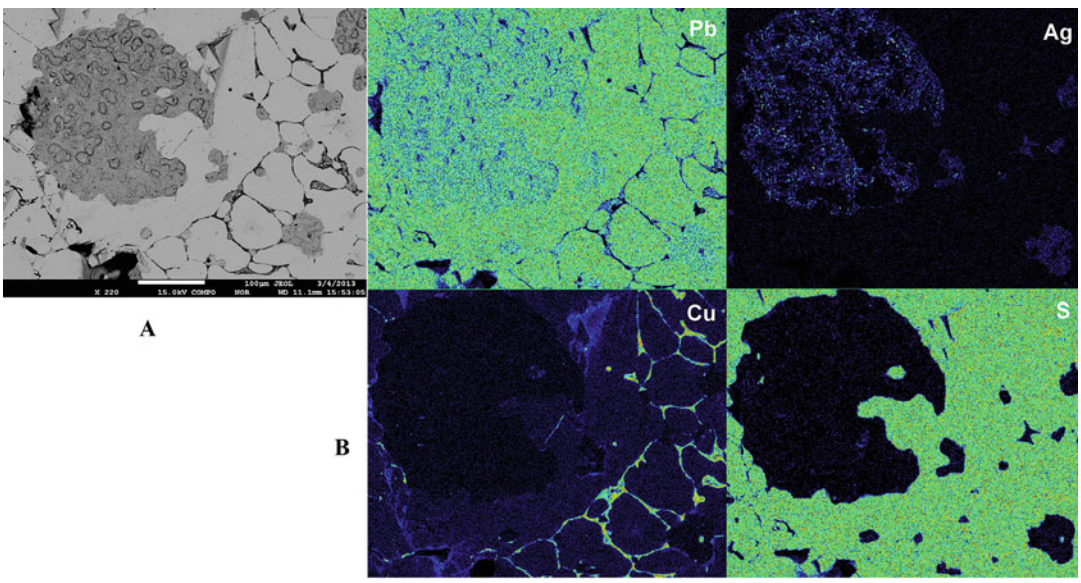

Metallurgy, Fig. 5 (**a**) SEM image of smelting slag of silver-rich lead ores from Fundiciones 2, Jujuy, Argentina. Prill of lead oxides with silver in a lead-sulfide matrix with copper sulfide phases. (**b**) Compositional map (230×) where concentrations of lead, silver, copper, and sulfur can be identified (scale from cold to warm colors indicates the increasing concentration of the element (blue, low concentration; red, high concentration). Analysis occurred at LAMARX, Facultad de Matemática, Astronomía y Física, Universidad Nacional de Córdoba, Argentina

The analysis of this kind of ceramics does not differ from the one applied in the study of archaeological pottery: macroscopic inspections and microscopical analysis of mounted and polished cross sections. Variations in the manufacture of these ceramics show different technological traditions, choices, raw material provisioning, etc. As in the case of ores and slag, the application of SEM-EDS and EPMA is very useful in the analysis of technical ceramics as well as XRD for mineralogical characterization and operating temperature estimation and ICP-OES, neutron activation analysis (NAA), and XRF for identification of chemical fingerprint and, therefore, of their possible geological source (Martinón-Torres and Rehren 2014). Technical ceramics can contain oxides related to contamination through use and metal residues, which can be analyzed as any other metal or slag sample, to obtain a better understanding of the metallurgical process involved. Molds and crucibles can also be intentionally covered by other products. For example, in the pre-Columbian Northwest of Argentina, many technical ceramics show a layer of white powder, identified as hydroxyapatite (calcium apatite with the formula $Ca_5(PO_4)_3(OH)$). It is supposed to facilitate unmolding the metal from the crucible or mold and to probably give structural stability to the walls (González 2004; Zagorodny et al. 2015) (Fig. 6). Their shapes and dimensions can show us what the metal objects looked like, key information when there is no remaining evidence of the final metallic products in the site.

Finally, the study of lake sediments, ice cores, or peat deposits for the identification of metals associated with smelting, such as lead, tin, bismuth, silver, antimony, or even copper, has proven to be a powerful tool for reconstructing chronology and intensity of metallurgical activity (e.g., Abbot and Wolfe 2003).

Metal Objects and Their Manufacture

When analyzing metal objects, as any other archaeological artifact, contextual information is basic. There is a variety of metal objects. Many of them are utilitarian artifacts like tools for fishing, sewing, mining, and working metals or other materials, used on a daily basis. Others played important roles in sacred, ritual, and/or political occasions, as accessories for decoration, power demonstration, or propitiatory ceremonies as rings, necklaces, bracelets, figurines (Figs. 7 and 8), or musical instruments (Fig. 9). For example, bells comprise 60% of the metal artifacts found in Western Mexico, and their acoustical properties may, according to Hosler (1994), have collaborated in the consolidation of emerging polities in Mesoamerican area. In this context, it is not a surprise that bells of copper and copper alloys from different areas (Costa Rica, Panama, West and Central Mexico) were deposited in the Sacred Cenote at Chichén

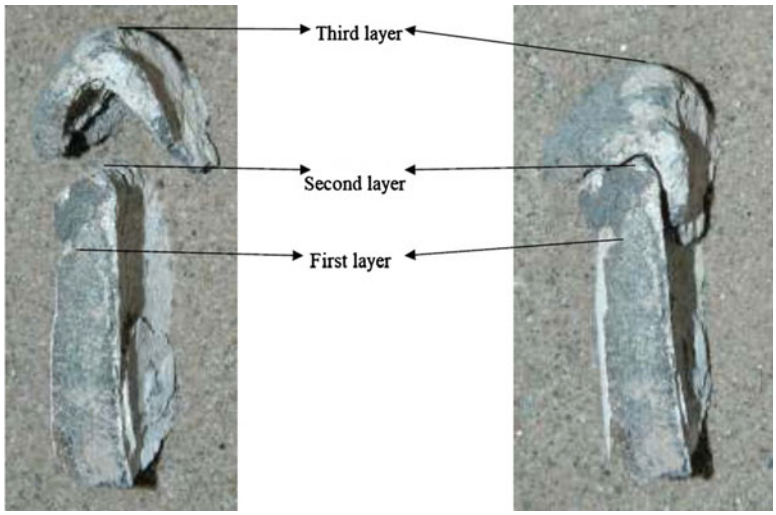

Metallurgy, Fig. 6 Fragment of a crucible that was reused at least three times and it was covered each time by a layer of white powder identified as hydroxyapatite. It was found in an archaeological site from Belen Valley, Catamarca, Argentina, and it dates from around the fifteenth to sixteenth century AD (Zagorodny et al. 2015)

Itzá since its primary occupation (750-1050 CE) (Cockrell et al. 2014). Metals have also been used (especially in the Old World) for military and defense purposes. Approaches to metals involve typological and stylistic studies as well as the identification of traces of use to identify functionality.

Metallurgy, Fig. 7 Anthropomorphic figurine from Inca times found in Puerta de Juella, Quebrada de Humahuaca, Jujuy, Argentina. It is made of an alloy made of gold and silver with little percentage of copper (2%) (Analysis courtesy of Mg. María Teresa Plaza). Source: object MLP-Ar-3777 from Muniz Barreto Collection, División Arqueología, Museo de La Plata, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, Argentina

Archaeometallurgical studies not only have paid attention to use and distribution of metals but also to manufacture processes. Producing a metal object "requires a fine understanding of the behavior of metals and alloys, over a range of temperatures from cold to fully liquid, combined with the artistic skill required to make both the functional and beautiful objects desired by patrons" (Rehren and Pernicka 2008: 234).

Metal objects were produced employing a wide range of manufacturing techniques, according to the desired characteristics for the final product, the artisan's skill, the available material, and the metal properties (González 2004). Artifacts can be made of one pure metal but also of natural or intentional alloys. The mixture of metals modifies and generally improves some of the properties of the material (hardness and elasticity, color, decrease of fusion temperature, etc.). They can be cold-hammered to shape, with or without heat treatments. This process is called annealing and consists of heating metal above recrystallization temperature, altering its physical properties to increase its ductility and reduce hardness. Then, the metal sheet can be manipulated, cut, embossed, bended, engraved, etc., to shape the object, give relief, and draw geometrical or figurative designs, among others. Two or more sheets can be fastened one to another by rivets or other devices but also by different types of welding and soldering. On the other hand, metals can be melted and poured into a mold that can be one-piece (open), bivalve (two halves joint together), or composite (three or more pieces) depending on the complexity of the object.

Metallurgy, Fig. 8 Chisel made of a copper-alloy found in Moreta, Puna of Jujuy, Jujuy, Argentina. Source: object MLP-D25-CMM-Nº(v)8191/(r)138 from Márquez Miranda Collection, División Arqueología, Museo de La Plata, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, Argentina

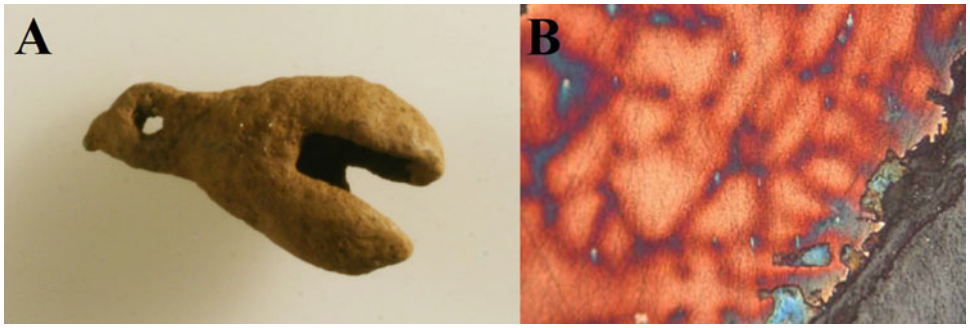

Metallurgy, Fig. 9 A copper bell (length = 2.9 cm) (**a**) made by lost-wax casting from the site of Tipu in Belize. It is associated with a context dating between the second half of the sixteenth century and the first half of the seventeenth century. A section of the bell was etched with ferric chloride ($FeCl_2$ with 20% HCl) (**b**) to reveal its as-cast, dendritic microstructure (red-orange areas). The metal inclusions (white spots) between dendrites emerged on cooling, as this metal was not absorbed into the dendritic areas. Field of view = 1 mm across (Images courtesy of Bryan Cockrell. Analysis occurred at UCL's Wolfson Archaeological Science Laboratories. As in Figs. 7 and 8, with profound respect to the indigenous communities who made and used this bell and others like it)

In many cases, artifacts need to be further hammered to obtain the final product. When the design of the object is even more complex, lost-wax technique is applied. The method can vary in details, especially if the final product will be solid or hollow. In general terms, a clay mold is created of a wax model, so the inner walls of the mold are the exact negative of that original model. When metal is poured into that mold, an artifact with numerous decorative details can be achieved.

Surface treatments are also used for decoration purposes. Colors and brightness have been very important properties for ancient societies. The use of certain metals and alloys could respond to the search of an object with a particular color. Moreover, metallurgical and electrochemical procedures for gilding and silvering objects were other mechanisms for obtaining the desired look. In that sense, for example, repeated sequences of hammering, annealing, and removing of surface copper oxide on copper-silver alloys produce an object with a silver-rich surface. Coatings obtained by systems of electrochemical deposition were also a solution for gilding. The process consists of the immersion of a copper sheet in a bath of aqueous solution of corrosive salts where gold is dissolved. A thin film of this metal will deposit on the copper surface. To bond the two metals permanently, heat must be applied so a solid-state diffusion of copper and gold is produced across their mutual interface (Lechtman 1984).

All these manufacture operations involve technical ceramics (furnaces, molds, crucibles, blowpipes, spoons), metal objects (chisels, hammers, handles), leather and bone implements, and stone tools. Some of them are very diagnostic of metallurgical activities, but others are also used for agricultural purposes, for example. In those cases, it is hard to distinguish functionality. Webb (2015), for example, has proposed a distinction of grinding and hammerstones dedicated to mining-metallurgical activities opposed to those dedicated to processing vegetables in Middle Bronze Age Cyprus, not only according to hardness of raw material and use-wear marks (as Craddock 1995) but also to greater number, size, and weight.

Several methods for identifying chemical composition of metal objects are employed in archaeometallurgy, most of them already mentioned in this entry: proton-induced X-ray emission or gamma emission (PIXE or PIGE), NAA, XRF, XRF with synchrotron radiation (SR), ICP-OES, ICP-MS (mass spectrometry), SEM-EDS, and EPMA-WDS. These analyses offer qualitative and quantitative data on the original composition and the current condition of metal objects (see entries in this volume). X-ray radiography and tomography are employed to reveal internal

structure of the object (Scott 2014). Selecting which method will be applied depends on many interactive factors: research aim, pre-existing dataset to compare and integrate, limits of detection, precision and accuracy of each method according to questions asked, conservation concerns (nondestructive, mild, or destructive analysis, access and transport of samples), and financial and time constraints (see Pollard and Bray 2014 for more information for selecting which analysis is more appropriate given what circumstances).

As mentioned above, two of the main research interests in archaeometallurgy have been reconstructing metallurgical production and identifying the geological origin of the metal used for manufacturing an object. Metallography has been applied since the beginning of the twentieth century to address questions regarding technologies of manufacturing and decoration. It consists of the application of microscopic techniques to identify composition, microstructural components, extent of corrosion penetration, method of fabrication (cast or work and anneal to shape), thermal history of the object, and authenticity. This analysis requires a small and polished section of the object, representative of the object or chosen to study a particular feature or area. During metallographic examination, diverse microstructure features are identified: range, size, and shape of the grains give information about fabrication operations; identification of different phases informs about ores and alloys used as well as cooling speed; heterogeneity in the sample, inclusion, porosity and corrosion products or distribution of layers, and the presence of coating, gilding, twin or slip lines, and dendrite pattern, among others, are indicators of manufacturing techniques (Scott 2014: 67, 70–71). The study of such indicators allows the reconstruction of the working history of the object, revealing the sequence of events (Rehren and Pernicka 2008) (Fig. 9). Binary and ternary phase diagrams (two or three metallic components) are employed by the archaeometallurgist together with metallography. They describe the different phases present in an alloy, taking into consideration both composition and temperature.

Regarding provenance studies (see entry ▶ Provenance Studies in Archaeology in this volume), the determination of the trace element pattern in metal objects was the first approach to the problem, understanding that this analysis could collaborate in identifying the nature of the ore (due to its similar pattern) and, therefore, its probable geographical origin. However, the abundance of those elements can be modified in the process from ore to object, through roasting, smelting, melting, alloying, etc. (Pernicka 2014). For example, it has been tested that some trace elements concentrate in the slag (and not in the metal) and that these concentrations vary according to temperature and redox conditions of the metallurgical process (Pollard and Bray 2014). Isotope analysis is another method to link metal artifacts with the metallic ores where they were extracted. Lead isotope studies are the most common, and it has been applied to lead, silver, copper, and copper-based alloys. The lead isotope ratios of a metal object reflect the geological sources of the lead, as isotopic compositions remain unchanged during the metallurgical process (Pernicka 2014). Lead isotope ratios of geological sources vary according to the age and geological history of each source, so given the lead isotope composition of a metallic object and the availability of lead isotopic data for geologic sources, researchers can match artifact with a metal ore source (Macfarlane and Lechtman 2016). One of the main problems faced by provenance studies (both lead isotope analysis and trace elements) is that recycling and mixing of metal objects would potentially erase the information from the provenance of each component. However, it has been discussed whether it is realistic to expect that in a certain region and period of time, the pool of metal available for mixing would come from different ore sources (Pernicka 2014).

Challenges for the Future and Final Words

As we intend to show in this entry, archaeometallurgy deals with a wide range of materialities and analytical methods, in order to have a more complete understanding of mineral extraction and metal production, use and distribution within a particular society in a specific period of time.

Interdisciplinary approaches are required to be able to combine the analysis of different types of data and evidences. Although current analytical methods are less invasive than in the past, most of the nondestructive techniques require smaller or polished samples for obtaining accurate results. Moreover, objects have to be moved from museums or research institutes to the laboratories where the necessary equipment is located. Portable devices are really useful in cases where transport is not possible, but many questions remain unanswered due to their limits of detection. Curatorial constraints toward conservation of the pieces are understandable as the archaeological record needs to be preserved for future generations. There is, however, some evidence that is more frequent and has little aesthetic value as slag or technical ceramics. In this case, as Martinón-Torres and Rehren (2014: 130) state, invasive analysis generates "a plethora of information not otherwise obtainable. This is not a destructive analysis – it is a constructive analysis of the first order". Another challenge archaeometallurgists face, as any other archaeologist or material scientist, is budget. The choice of analytical methods should be guided by the research question and aim, but in reality, the selection is mainly determined by the cost of the analysis and ease of access (Rehren and Pernicka 2008).

As noted by Thornton and Roberts (2014), the study of metallurgy at the present day is not focused, as in the past, on finding metallurgical origins but in analyzing technological transfer and circulation and its mechanisms, as well as the articulation of this technology with other technologies and the social context in which they are developed. The role-play of metal production in social complexity and elite dominance is also being discussed in each case and not pre-assumed as it was before.

Another challenge for archaeometallurgists has always been creating a real interdisciplinary team where geologists, geochemists, material scientists, and archaeologists can work together, sharing research questions and combining methods and perspectives. Last but not least, as in any other research field in archaeology, archaeometallurgists need to make their studies available to local populations, sharing knowledge and research questions and developing together new ethnoarchaeological and experimental studies on mining and metallurgical practices.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ Authentication and Conservation in Archaeological Science
- ▶ Dating Techniques in Archaeological Science
- ▶ Experimental Maritime Archaeology
- ▶ Museo de La Plata
- ▶ Provenance Studies in Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ Scanning Electron Microscopy (SEM): Applications in Archaeology
- ▶ Technological Studies in Archaeological Science
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Abbot, M., and A. Wolfe. 2003. Intensive pre-Incan metallurgy recorded by lake sediments from the Bolivian Andes. *Science* 301: 1893–1895.

Alonso Barba, A. [1640]1939. *Arte de los metales*. La Paz: Biblioteca Boliviana N°8. Imp. Artística.

Angiorama, C., and M.F. Becerra. 2017. Reverberatory furnaces in the Puna of Jujuy, Argentina, during colonial times (from the end of the 16th to the beginning of the 19th century AD). *Journal of Anthropological Archaeology* 48: 181–192.

Bachmann, H.G. 1980. Early copper smelting techniques in Sinai and in the Negev as deduced from slag investigations. In *Scientific studies in early mining and extractive metallurgy*, ed. P. Craddock, vol. 20, 103–134. London: British Museum Occasional Papers.

Bird, J. 1979. The "Copper Man": A prehistoric miner and his tools from northern Chile. In *Pre-Columbian metallurgy of South America*, ed. E.P. Benson, 105–132. Washington, DC: Dumbarton Oaks.

Cockrell, B., J.L. Ruvalcaba, and E. Ortiz Díaz. 2014. For whom the bells fall: Metals from the Cenote Sagrado, Chichén Itzá. *Archaeometry* 57 (6): 977–995.

Cohen, C., T. Rehren, and M. Van Buren. 2009. An archaeo-metallurgical study of the use of European furnaces in colonial Bolivia. *Archaeometallurgy in Europe* II: 529–540.

Craddock, P. 1995. *Early metal mining and production*. Washington, DC: Smithsonian Institution Press.

Figueroa, V., D. Salazar, H. Salinas, P. Núñez-Regueiro, and G. Manríquez. 2013. Ergología minera prehispánicas del Norte de Chile: una perspectiva arqueológica. *Chungara*. *Revista de Antropología Chilena* 45 (1): 61–81.

Goldenberg, G., J. Otto, and H. Steuer. (comp.) 1996. *Archäometallurgische Untersuchungen zum Metallhüttenwesen im Schwarzwald*. Germany: Jan Thorbecke Verlag Sigmaringen.

González, L. 2004. *Bronces sin nombre. La metalurgia prehispánica en el Noroeste Argentino*. Buenos Aires: Ediciones Fundación CEPPA.

Hauptmann, A. 2007. *The archaeometallurgy of Copper. Evidence from Faynan, Jordan*. Germany: Springer.

Hauptmann, A. 2014. The investigation of archaeometallurgical slag. In *Archaeometallurgy in global perspective. Methods and syntheses*, ed. B. Roberts and C.P. Thornton, 91–105. New York: Springer.

Heeb, J., and B. Ottaway. 2014. Experimental archaeometallurgy. In *Archaeometallurgy in global perspective. Methods and syntheses*, ed. B. Roberts and C.P. Thornton, 161–192. New York: Springer.

Hosler, D. 1994. *The sounds and colors of power: The sacred metallurgical technology of ancient west Mexico*. Cambridge, MA: MIT Press.

Killick, D. 2014. From ores to metals. In *Archaeometallurgy in global perspective. Methods and syntheses*, ed. B. Roberts and C.P. Thornton, 11–45. New York: Springer.

Killick, D., and T. Fenn. 2012. Archaeometallurgy: The study of preindustrial mining and metallurgy. *Annual Review of Anthropology* 41: 559–575.

Lechtman, H. 1976. A Metallurgical Site Survey in the Peruvian Andes. *Journal of Field Archaeology* 3 (1): 1–42.

Lechtman, H. 1984. Andean value systems and the development of prehistoric metallurgy. *Technology and Culture* 25 (1): 1–36.

Macfarlane, A., and H. Lechtman. 2016. Andean Ores, bronze artifacts, and lead isotopes: Constraints on metal sources in their geological context. *Journal of Archaeological Method and Theory* 23: 1–72.

Martinon-Torres, M., and D. Killick. 2015. Archaeological theories and archaeological sciences. In *The Oxford handbook of archaeological theory*, ed. A. Gardner, M. Lake, and U. Sommer. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199567942.013.004.

Martinón-Torres, M., and T. Rehren. 2014. Technical ceramics. In *Archaeometallurgy in global perspective. Methods and syntheses*, ed. B. Roberts and C.P. Thornton, 107–131. New York: Springer.

Pernicka, E. 2014. Provenance determination of archaeological metal objects. In *Archaeometallurgy in global perspective. Methods and syntheses*, ed. B. Roberts and C.P. Thornton, 239–268. New York: Springer.

Pollard, A.M., and P. Bray. 2014. Chemical and isotopic studies of ancient metals. In *Archaeometallurgy in global perspective. Methods and syntheses*, ed. B. Roberts and C.P. Thornton, 217–238. New York: Springer.

Rehren, T., and E. Pernicka. 2008. Coins, artefacts and isotopes – Archaeometallurgy and archaeometry. *Archaeometry* 50 (2): 232–248.

Rehren, T., M. Charlton, S. Chirikure, J. Humphris, A. Ige, and H. Veldhuijzen. 2007. Decisions set in slag: The human factor in African iron smelting. In *Metals and mines: Studies in archaeometallurgy*, ed. S. La Niece, D. Hook, and P. Craddock, 211–218. London: Archetype.

Salinas, H., and D. Salazar. 2008. Cadenas operativas y sistemas de explotación minera prehispánica. In *Puentes hacia el pasado. Reflexiones teóricas en Arqueología*, ed. D. Jackson, D. Salazar, and A. Troncoso, 73–91. Santiago de Chile: Serie Monográfica de la Sociedad Chilena de Arqueología N°1.

Sánchez Gómez, J. 1989. *De minería, metalúrgica y comercio de metales. La minería no férrica en el Reino de Castilla. 1450–1610*. Salamanca: Universidad de Salamanca.

Scattolin, M.C., M.F. Bugliani, L.I. Cortés, L. Pereyra Domingorena, and M. Calo. 2010. Una máscara de cobre de 3000 años. Estudios arqueometalúrgicos y comparaciones regionales. *Boletín del Museo Chileno de Arte Precolombino* 15 (1): 25–46.

Scott, D. 2014. Metallography and microstructure of metallic artifacts. In *Archaeometallurgy in global perspective. Methods and syntheses*, ed. B. Roberts and C.P. Thornton, 67–89. New York: Springer.

Serneels, V. 2017. Metals. In *Encyclopedia of geoarchaeology*, ed. A.S. Gilbert, 521–532. Dordrecht: Springer.

Shimada, I. 1994. Pre-hispanic metallurgy and mining in the Andes: Recent advances and future tasks. In *In quest of mineral wealth. Aboriginal and colonial mining and metallurgy in Spanish America*, ed. A. Craig and R. West, 37–73. Baton Rouge: Department of Geography and Anthropology, Louisiana State University.

Shimada, I., and A. Craig. 2013. The style, technology and organization of Sicán mining and metallurgy, Northern Peru: Insights from holistic study. *Chungara, Revista de Antropología Chilena* 45 (1): 3–31.

Stöllner, T. 2014. Methods of mining archaeology (Montanarchäeologie). In *Archaeometallurgy in global perspective. Methods and syntheses*, ed. B. Roberts and C.P. Thornton, 133–159. New York: Springer.

Téreygeol, F. 2000. L'abattage au feu: étude des variations de température et de la nature des roches lors d'une

attaque au feu. In *Arts du feu et productions artisanales*, ed. P. Pétrequin, P. Fluzin, J. Thiriot, and P. Benoit (dirs.). Antibes: Éditions APDCA.
Téreygeol, F., and P. Cruz. 2012. Die Silberberwerke von Potosi: Das wichtigste Technologiezentrum Südamerikas aus der Sicht der Autoren der Inka und der Spanier. *Der Anschnitt* 64 (H 2-3): 93–108.
Thornton, B., and C.P. Roberts. 2014. Introduction. In *Archaeometallurgy in global perspective. Methods and syntheses*, ed. B. Roberts and C.P. Thornton, 1–9. New York: Springer.
Timberlake, S., and B. Craddock. 2013. Prehistoric metal mining in Britain: the study of cobble stone mining tools based on artefact study, ethnography and experimentation. *Chungara, Revista de Antropología Chilena* 45 (1): 33–59.
Tylecote, R.F. 1992. *A history of metallurgy.* London: Maney for the Institute of Materials.
Vaughn, K., H. Val Gijseghem, V. Whalen, J. Eerkens, and M. Linares Grados. 2013. The organization of mining in Nasca during the Early Intermediate Period: recent evidence from Mina Primavera. In *Mining and quarrying in the Ancient Andes. Sociopolitical, economic and symbolic dimensions*, ed. N. Tripcevich and K. Vaughn, 157–182. New York: Springer.
Webb, J. 2015. Identifying stone tools used in mining, smelting, and casting in Middle Bronze Age Cyprus. *Journal of Field Archaeology* 40 (1): 22–36.
Zagorodny, N., C. Angiorama, M.F. Becerra, and M.J. Pérez Pieroni. 2015. Evidencias de Actividades Metalúrgicas en el sitio Campo de Carrizal (Belén, Catamarca). *Intersecciones en Antropología* 16: 439–450.

Further Readings

Bachmann, H.G. 1982. *The identification of slags from archaeological sites*. London: Institute of Archaeology.
Cauuet, B. (dir.) 2002. *L'or dans l'antiquité. De la mine à l'objet.* France: Aquitania.
González, L. 2004b. *Bronces sin nombre. La metalurgia prehispánica en el Noroeste Argentino*. Buenos Aires: Ediciones Fundación CEPPA.
Maddin, R. 1988. *The beginning of the use of metals and alloys*. Cambridge, MA: Massachusetts Institute of Technology.
Patterson, C. 1971. Native copper, silver and gold accessible to early metallurgists. *American Antiquity* 36 (3): 286–321.
Roberts, C.P., and B. Thornton, eds. 2014. *Archaeometallurgy in global perspective. Methods and syntheses*. New York: Springer.
Scott, D. 1992. *Metallography and microstructure of ancient and historic metals*. Singapore: The Getty Conservation Institute, The J. Paul Getty Museum in Association with Archetype Books.
Tylecote, R.F. 1992b. *A history of metallurgy.* London: Maney for the Institute of Materials.

Metals: Preservation and Conservation

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Introduction

The challenge of providing a summary of the most relevant literature that relates to metal conservation is based on exclusion rather than inclusion. Presently there is a resurgence of energy and vigor being found in this area of applied research. The largest collection of peer-reviewed papers comes from two triennial conferences of the International Council of Museums Committee for Conservation (ICOM-CC) and a meeting of the ICOM-CC Metals Working Group. The triennial conferences of ICOM-CC were held in Melbourne in 2014 and in Copenhagen in 2017 (ICOM-CC 2014, 2017), while the Metals Working Group held a meeting in New Delhi in 2016 at which more than 70 papers and posters were published (Metal 2016). Other principal sources included the publications of the International Institute for Conservation of Historic and Artistic Works (IIC) which publishes *Studies in Conservation* as well as the *Bulletin of the Australian Institute for the Conservation of Cultural Materials* (AICCM) and that of the *Journal of the American Institute for Conservation*. Summaries of the original papers are generally referred to by the year of the conference publication, while citations from journals are reported in standard formats. The original articles can be found by using Google Scholar. Many of the papers report on the results of practical conservation assessments, analyses, and treatments that relate to the typical problems faced by those caring for our metallic cultural heritage (Figs. 1, 2, 3, 4, 5, 6, and 7).

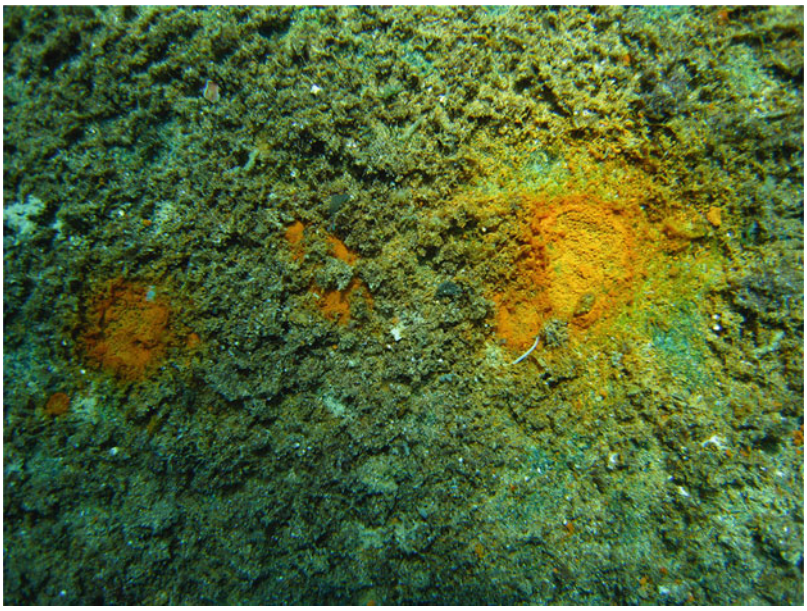

Metals: Preservation and Conservation, Fig. 1 Active iron corrosion from anchor damage on a WWII Chuuk shipwrecks

Metals: Preservation and Conservation, Fig. 2 Active iron corrosion on a bogey trolley on a WWII submarine slipway, Fremantle

Key Issues

Conservation of Iron

A key paper in the quest for new understanding on the nature of the interaction of iron with wood, bone, and other elements was recently reported (ICOM-CC 2014). The study of the binding between traditional Indian swords and their hilts discovered it was the traditional use of a paste made from boiled lac beetles and river sand that formed a very stable connection between the iron sword blade and the handle. The key element in

Metals: Preservation and Conservation, Fig. 3 Brass nail from the wreck of the *Rapid* (1811) with intergranular corrosion, width 1.13 mm

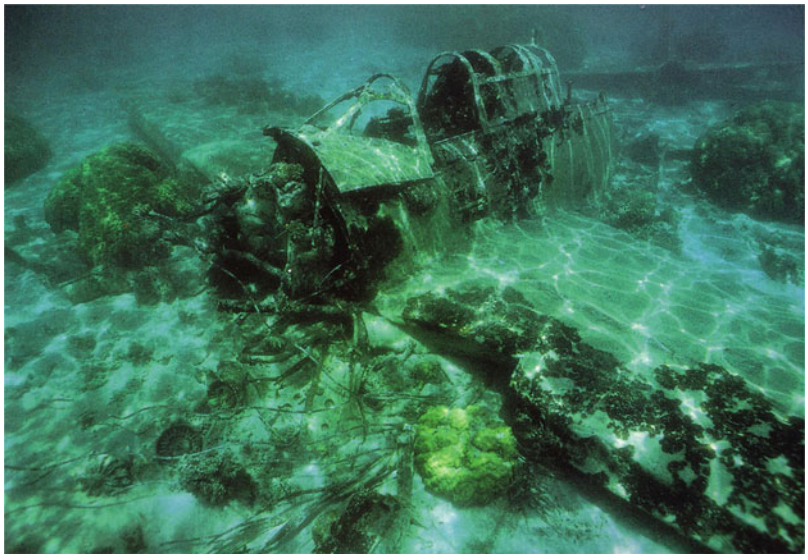

Metals: Preservation and Conservation, Fig. 4 In-situ corrosion measurements on the *Gosei Maru* (1944)

this work was the thoroughness of their study of traditional craftspeople throughout the subcontinent and then checking the oral histories against contemporary experimental practice. Conservation of grave goods containing a mixed collection of ferrous and nonferrous materials from the second to fourth century in Lithuania was well managed, and practical management advice is provided by the authors to assist archaeological conservators (Metal 2016).

The first definitive study on the subcritical treatment of French archaeological iron objects recovered from land-based and marine sites from the first century CE was reported at the Metal 2016 conference in New Delhi. The corrosion products were characterized with X-ray

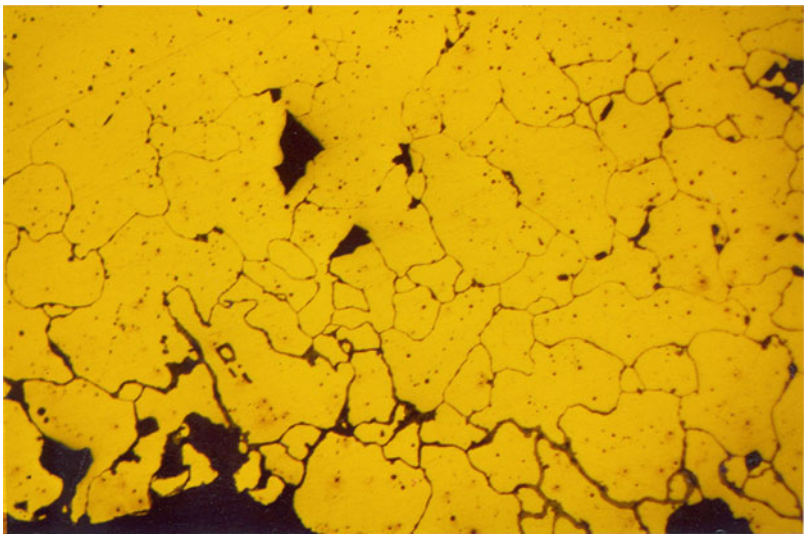

Metals: Preservation and Conservation, Fig. 5 *Judy* dive bomber (1944) in Chuuk Lagoon

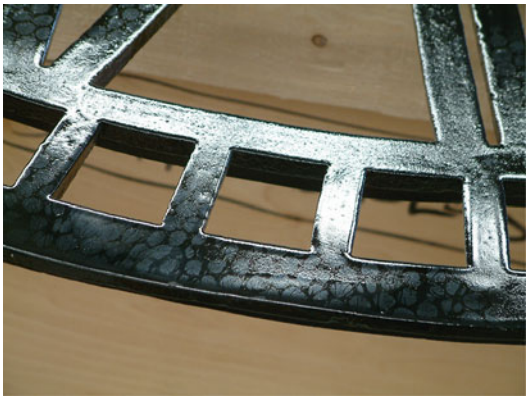

Metals: Preservation and Conservation, Fig. 6 PVC packing pox on a clock dial, The Bell Tower, Perth

Metals: Preservation and Conservation, Fig. 7 USS *Monitor* (1862) engine in caustic treatment tank, Eric Schindelholz inspection

diffraction and laser Raman, which confirmed the reactive nature of the iron (III) minerals within the matrixes. After equilibration for more than 30 h in the subcritical microenvironment, the troublesome phases had been converted into stable Fe_3O_4. The effectiveness of the methodology of sectioning the samples and providing a thorough physical examination of the materials is enough to convince the most doubting archaeologist that this "new method" has found a permanent home in the conservation repertoire (Metal 2016).

A significant breakthrough in both first aid and long-term management of archaeological iron and bronze objects takes the form of storage/treatment in Escal bags with the Mitsubishi oxygen scavenging RPS system. The work is based on a very testing environment in the collection stores of −8° to +38 °C over an annual cycle in Central

Anatolia, Turkey. The site has been worked for more than 25 years, and it dates to the early Bronze Age. The balance of the right amount of RPS material and desiccants is reviewed, and tests also confirmed that clips sealing the bags were as effective as heat sealing which increases the collection management flexibility. The combined system gave protection during excavation periods (up to 1 week) and during the break between annual excavation programs (Metal 2016).

Phosphoric iron has been misunderstood by conservators and archaeologists alike, but recent experimental archaeology has shown that despite the major impact of phosphorus impurities on microstructure of the cast iron alloys, they could be effectively worked and treated to make steel for swords. This new approach may stimulate a review of the finds of archaeological iron and lead to provenance studies of the ore bodies (Metal 2016).

Aerobic Corrosion Products and Decay Mechanisms

Scott and Eggert summarize patination of cast iron and steels in a compelling chapter in their book. Not unexpectedly, many of the combinations of chemicals used in the patination of iron objects are closely related to the reagents that are currently used to etch iron alloys and reveal, through differential oxidation rates, the phases that determine the properties of the alloys. The characterization of the physical, structural, and color properties of goethite, lepidocrocite, akaganéite β-FeOOH and schwertmannite $Fe_{16}O_{16}(OH)_y(SO_4)_z.nH_2O$, feroxyhyte δ-FeOOH, ferrihydrite $Fe_5O_6(OH)_3.3H_2O$, bernalite $Fe(OH)_3.nH_2O$, and hematite α-Fe_2O_3 are expertly summarized.

A major advance in understanding the distribution of iron chlorides in historical Roman nails has been developed through an X-ray tomography study which was combined with neutron diffraction work. Measurements were done before and after traditional treatment with alkaline sulfite solutions. One of the real challenges of dealing with significant archaeological iron objects is the inability to determine how effective a treatment has been without resorting to significant intervention, such as drilling samples for wet chemical analysis. This new approach shows great promise and will be a useful additional method that can be applied to significant cultural objects to ensure the effectiveness of treatment programs (ICOM-CC 2017).

Treatment of Iron-Organic Composites

Desalination of composite organic and iron archaeological artifacts still presents real challenges for material conservation. This is due to the fundamental incompatibility of chloride-infested iron, which wants a highly alkaline environment for stability, and the desire of organic materials to be in a near-neutral condition. Collaborative research in Switzerland and the USA showed that coatings of dodecane go a long way to protecting the organic remains during the prolonged immersion periods in alkaline solutions that are needed to stabilize the iron components (ICOM-CC 2017).

The role and significance of iron sulfides in the fate of formerly waterlogged wooden vessels such as the *Wasa* (1628) and the *Batavia* (1629) continue to expand, with most of the effort going into the characterization of the minerals. It is only when formation mechanisms are fully understood that there is hope that future resolution of the oxidative degradation, which follows successful stabilization of the waterlogged wood, can be effectively managed. The pyrophoric nature of the iron sulfide mackinawite explains why some freshly excavated cannon balls can corrode so rapidly that they begin to steam. A critical review of coating systems for reactive pyritic mineral specimens shows that storing them at a relative humidity below 40% is the best approach (Scott and Eggert 2009).

Treatment Options for Nonferrous Materials

The chemical stratigraphy of Renaissance bronzes revealed composite patinas consisting of primary layers reflecting dezincification and secondary layers of botryoidal copper sulfate structures using synchrotron- and neutron-aided techniques. These phases were topped with organic layers which explain the apparent mystery behind the

remarkable aesthetic beauty of the bronzes (ICOM-CC 2014). A synchrotron study of a 1697 Dutch pewter plate recovered in the nineteenth century revealed that the raw materials were English and that the complex patina of the de Vlamingh plate was due to significant amounts of copper impurities in the Cornish tin (ICOM-CC 2014).

A real headache for archaeological metal conservators is how to manage the impact of repetitive treatments on the same historical object. Collaborative research in Spain and Portugal has demonstrated, on model systems, that electrochemical reduction of silver and lead corrosion products can take place up to six times without loss of surface materials. Although limited to standard metal tokens, the news that potentiostatic reduction retains all the metal that had corroded and returns it to its metallic state is a very positive step forward in the long-term preservation of historic archaeological metal objects (ICOM-CC 2017).

A 4-year project involving the Getty Conservation Institute and French laboratories was focused on a series of extraordinarily fine second- to fourth-century silver archaeological objects. The research discovered historical evidence about the nature of the hoard which demonstrated the precise manufacturing techniques. The choice of tarnish removal was resolved by using ultrafine slurries of calcium carbonate with old organic coating residues being removed with a combination treatment of steam and alcohol. Details of the new transport and exhibition mounts are also reported which will ensure that the lessons learned regarding the Berthouville silver treasure are made available to the archaeological world at large (ICOM-CC 2017).

A major development for the proper interpretation of the milieu of corrosion products on archaeological bronzes has shown that it is the presence of human remains, providing a rich source of phosphate, that facilitates the formation of sampleite, $NaCaCu_5(PO_4)_4Cl.5H_2O$. In higher-sulfate soils, the hydroxy sulfate connellite $Cu_{19}Cl_4(SO_4)(OH)_{32}.3H_2O$ is a major copper mineral, and recent X-ray diffraction studies show that what was once believed to be paratacamite is in fact $(Cu,Zn)_2(OH)_3Cl$, i.e., a mixed copper-zinc hydroxychloride. The three isomeric forms of $Cu_2(OH)_3Cl$ are atacamite, paratacamite, and botallackite, and it has been determined that the old anarakite is now herbertsmithite $Cu_3Zn(OH)_6Cl_2$ (Scott 2017).

Detailed analysis of a late Bronze Age object by XRF and XRD showed that bronze disease is unequivocally related to the presence of nantokite (CuCl) in the subsurface pits. Scanning photoelectron microspectroscopy showed that there is selective corrosion on the Sn-rich phases with synergistic Sn and Cu attack triggered by a peculiar type of decuprification characterized by the formation of Sn(OH)Cl because of local HCl generation in the corrosion process (Bozzini et al. 2017).

Advances in Metal Conservation and Corrosion Inhibition Methodology

A breakthrough in the management of decay of archaeological bronzes involves the use of smart nanostructured coatings. The method involves separation of toxic corrosion inhibitors from the coating system. For example, benzotriazole is contained in halloysite nanocontainers in a hydroxypropyl cellulose matrix which is then applied to bronze objects. X-ray photoelectron spectroscopy was used to monitor the corrosive attack in 3 wt.% NaCl solutions. Results show that films can be efficiently used as a transparent bronze corrosion inhibitor coating. Some films exhibited a "self-healing" behavior, allowing a selective release of BTA during the corrosion process induced by chlorides, as well as a protection barrier effect due to the organic matrix (Metal 2016).

A very useful addition to the suite of tools for conservation of archaeological metals has been provided through a study of the variation of the voltage (corrosion potential) of metal objects sitting in treatment or storage solutions. Increasingly positive voltages show that the patina is interacting with the cleaning solutions to create a passive film that lowers corrosion rates. When the voltages become increasingly negative, it means

that the cuprite patina is being dissolved. This monitoring process allows an archaeologist conducting field stabilization to monitor the progress of a treatment or to know when to stop immersion in a treatment bath (Metal 2016). Conservators of composite archaeological items have been happy to engage with a new device, *the Pleco*, which is a free-sourced localized electrolysis piece of equipment that can be brought to objects in the collection and exhibition areas and the restoration work conducted in situ (Metal 2016).

An alternative to the hydrochloric acid-thiourea-based silver dip for removing tarnish from archaeological metals involves using sulfuric instead of hydrochloric acid with the critically important inclusion of xanthin gum. The gum appears to minimize the loss of finely attached precious metals since there was no mechanical buffing involved (Metal 2016).

Preventive Conservation

X-Ray Fluorescence Analysis of Metals

A guide as to how to optimize the reliability of portable XRF analysis of archaeological metals was developed through analyses of alloy coupons before and after artificially aging them. It is critically important to optimize the distance from the source to the artifact surface as many "weak" X-rays, such as tin, are attenuated by the air (ICOM-CC 2014). An exciting breakthrough for restorers of gilded artifacts involves the incorporation of small amounts of indium and palladium into gold leaf. The additive elements do not alter the properties of gold leaf but instantly allow discrimination of "new" and "old" gold through routine measurements using X-ray fluorescence (Metal 2016).

Responses to Traditional and Modern Coating Systems

The Getty Conservation Institute applied full forensic skills to the deconstruction of commercial *Incralac* and developed laboratory versions of the traditional commercial coating. This work was promoted by the increasingly severe regulations regarding emissions of volatile organic compounds and import restrictions. For archaeological conservators facing such challenges, the work provides new hope for both field and laboratory conservation of copper alloys (ICOM-CC 2017).

Prohibitive costs and customs regulations on imported conservation chemicals mean that important archaeological conservation can be extremely challenging; this is where the use of natural chemicals from fruit extracts provides ways of overcoming these issues. Indian conservators found that extracts from crushed fruit of the plant *Emblica officinalis* reacted with all the chloride-containing iron corrosion products associated with problematic archaeological iron objects. The extract converted reactive minerals into stable magnetite (Fe_3O_4) and left surfaces with a pleasing dark lustrous patina. If a matte finish is required, the treated objects can be coated with an appropriate matting agent (Metal 2016).

Conservation of Large Objects

Although not formally archaeological, the treatment of the massive Column of the Grande Armée, or "Vendôme Column," is pertinent to very large metal objects from a buried context. The 260-m-high frieze comprises 425 bas-relief panels cast from the bronze cannon captured during the Napoleonic campaign of 1805. The column was rebuilt in 1875 with no treatment for 130 years. The elemental composition of the different patinas was determined by X-ray fluorescence spectroscopy, X-ray diffraction, and cross-sectional metallography. The large variations in the lead and tin content brought about a dynamic visual range of colors on the patina that varied from greenish-white via blue-green to black. The metal was mechanically cleaned using urea formaldehyde powdered resin with some corundum media. Re-patination with a copper nitrate solution was necessary to restore the color of the patina (Metal 2016).

Experimental Archaeology

Characterization of four bronze shields dating to c.1300–800 BC from the British Museum collection and one experimental replica showed them to

have 9–14% tin in the bronzes with trace impurities. Cold working of some of the shields brought up to a 60% reduction in the as-cast thickness. The high microhardness values of the original shields and the survival of the replica shield in a combat test suggest that the Bronze Age shields could have been used in combat rather than being merely ceremonial. This data provides the opportunity for reinterpretation of historical archaeological analyses (Metal 2016).

Air Borne Pollution

In the last few years, the impact of particulate pollution on the corrosion of metals in heritage locations has diminished simply because of improvements in collection management of museum metallic objects. The impact of dust on metallic corrosion and how important the orientation of the surfaces can be, particularly inside a showcase, has been the subject of a recent expert research project (ICOM-CC 2014). Special care and attention to the early seventeenth-century ebony- and silver-decorated Walbaum Cabinet at the Kunstgewerbemuseum (Museum of Decorative Arts) in Berlin demonstrates the extraordinary care needed for rare and precious objects. To prevent the re-tarnishing by acetic acid off-gassing from the timber on more than 3400 individually cleaned and reassembled silver parts, the object was stabilized through the introduction of a custom-made air filtration system that prevents buildup of vapors (ICOM-CC 2014). Chinese workers from heavily polluted cities found that high levels of ozone in moderately humid conditions have a significant impact on the corrosion behavior of bronzes in museums. A surprising discovery is that bagging objects has turned out to be beneficial since bagged objects demonstrated greater RH stability than theory would suggest. It appears that, in storage, without temperature or humidity control, the benefits of bagging objects to reduce the risk of pollution and insects and to buffer against short-term fluctuations in RH may outweigh the risk of mold growth within the bag (ICOM-CC 2014).

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Atlantic Ocean: Maritime Archaeology
- ▶ Australia: Maritime Archaeology
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Caribbean Maritime Archaeology
- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation in Museums
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Experimental Maritime Archaeology
- ▶ Pacific Islands: World Heritage
- ▶ Underwater Sites in Archaeological Conservation and Preservation

References

Bozzini, B.A., M. Amati, M. Boniardi, V. Caramia, G. Giovannelli, L. Gregoratti, and M.K. Abyaneh. 2017. Novel insight into bronze disease gained by synchrotron-based photoelectron spectro-microscopy in support of electrochemical treatment strategies. *Studies in Conservation* 62 (8): 465–473.

ICOM-CC 2014. *17th Triennial Conference Preprints, Melbourne, 15–19 September 2014*, ed. J. Bridgland. Paris: International Council of Museums.

ICOM-CC 2017. *18th triennial conference preprints, Copenhagen, 4–8 September 2017*, ed. J. Bridgland. Paris: International Council of Museums.

Metal 2016, Proceedings of the interim meeting of the ICOM-CC metals working group, Sept 26–30, New Delhi, India, ed. R. Menon, C. Chemello, and A. Pandya, New Delhi, India.

Scott, D. 2017. New insights on the corrosion of ancient bronzes using X-ray powder diffraction: The importance of paratacamite, sampleite and connellite. *Studies in Conservation* 62 (7–8): 410–418.

Scott, D.A., and G. Eggert. 2009. *Iron and steel in art, corrosion, colourants conservation*. London: Archetype Books.

Further Reading

McCarthy, M. 2005. *Ships' fastenings, from sewn boat to steamship*, 1–229. College Station: Texas A&M University Press.

North, N.A., and Pearson, C., 1975, Alkaline sulphite reduction treatment of marine iron. *ICOM Committee for Conservation Preprints, 4th triennial meeting,* Venice 75/13/3, 1–14.
Selwyn, L., 2004 Metals and corrosion, A handbook for the conservation professional, Canadian Conservation Institute, Ottawa, 1–224.

Mexico: Historical Archaeology

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Introduction

Historical archaeology is a relatively new research field in Mexico. In the past, it was overshadowed by the archaeology of pre-Hispanic cultures, which served the State purpose of constructing a unified national identity. Today, the archaeology of the recent past is a well-recognized research strategy and considered necessary for the protection and investigation of the material remains dating to the Colonial and Republican periods. Initially, the archaeology of these periods was related to restoration projects and to rescue archaeology in urban centers. Over the years, however, the number of research projects with scientifically informed questions in both urban and rural areas has expanded, focusing on regional studies, settlement patterns, excavations at religious and secular sites, and the exploration of themes related to colonialism, identity, and consumerism, among others. Even though academic interest in the archaeological study of historical periods has increased over the past decade, there is much to be done as new research questions and topics arise which aim to contribute to a more complete narrative of Mexico's multicultural past and identity (Fig. 1).

Definition

The term historical archaeology in the New World and specifically in Mexico traditionally refers to the study of the material remains that pertain to the periods that follow the cultural contact between European and Native populations and the impact that the colonization processes had on both groups. The subject matter of historical archaeology in Mexico comprises the archaeological remains and documentary sources of Indigenous and European origin from the Colonial period (c.1519–1521 to 1820) and to the Republican era (1821 to the present) (Charlton and Fournier 2008).

Historical Background

Since its early development, archaeology in Mexico has been linked to the interests of the State. The research agenda and results derived from archaeological research have been used by the State to construct a national ideology through the National Institute of Anthropology and History (INAH) whose mission is to preserve, reproduce, and study this identity. Pre-Hispanic remains pertaining to an indigenous cultural heritage have been used by the State to reaffirm and glorify a native past, and thus, the periods predating the Spanish conquest have been traditionally considered the subject matter of archaeology. As a result, generally the limited funding destined for archaeological research has been granted mostly to projects that focus on pre-Hispanic sites, relegating the study of the postconquest era to local ethnohistorians and historians. This contrasts sharply with projects conducted by American archaeologists who may be funded with larger resources for the study of the remains pertaining to the Mexican Colonial and Republican periods (e.g., Charlton and Fournier 2008; Charlton et al. 2009).

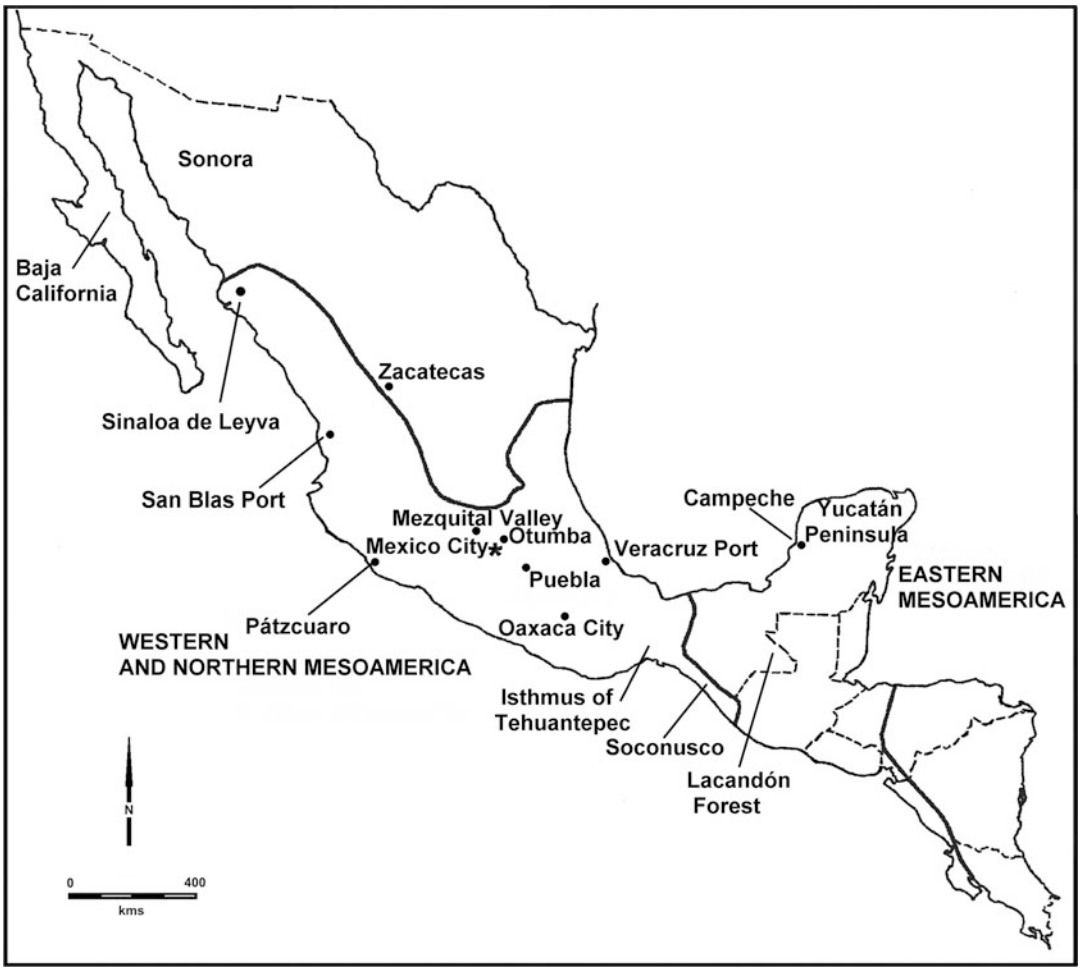

Mexico: Historical Archaeology, Fig. 1 Mexico with areas and important places mentioned in the text

However, the situation has been changing in recent times.

Historical archaeology is a relatively new research strategy in Mexico. The first approach to archaeological contexts from the colonial period dates to the 1930s, represented by studies of historic ceramics found in excavations in downtown Mexico City designed to understand technological and stylistic changes of post-conquest Aztec ceramics (e.g., Charlton and Fournier 2008). However, it was not until the early 1970s when the archaeology of historic sites acquired relevance in Mexico. This resulted from the discovery of the Aztec main temple (*Templo Mayor*) and from several public works projects in Mexico City, such as the construction of the subway, and from conservation projects in the Metropolitan cathedral and in the National Palace. The excavations in these sites uncovered material culture from historical periods that had been overlooked by archaeologists in previous decades and awoke the interest of some researchers to develop typologies of historic ceramics (e.g., Charlton et al. 2009) (Fig. 2).

Since 1972, Mexican legislation requires that archaeologists protect and conduct research of both pre-Hispanic and historic remains threatened by contemporary public works. This has promoted the interest of Mexican archaeologists to study them under a legal framework and the supervision of a government agency, the Instituto Nacional de Antropología Historia (INAH)

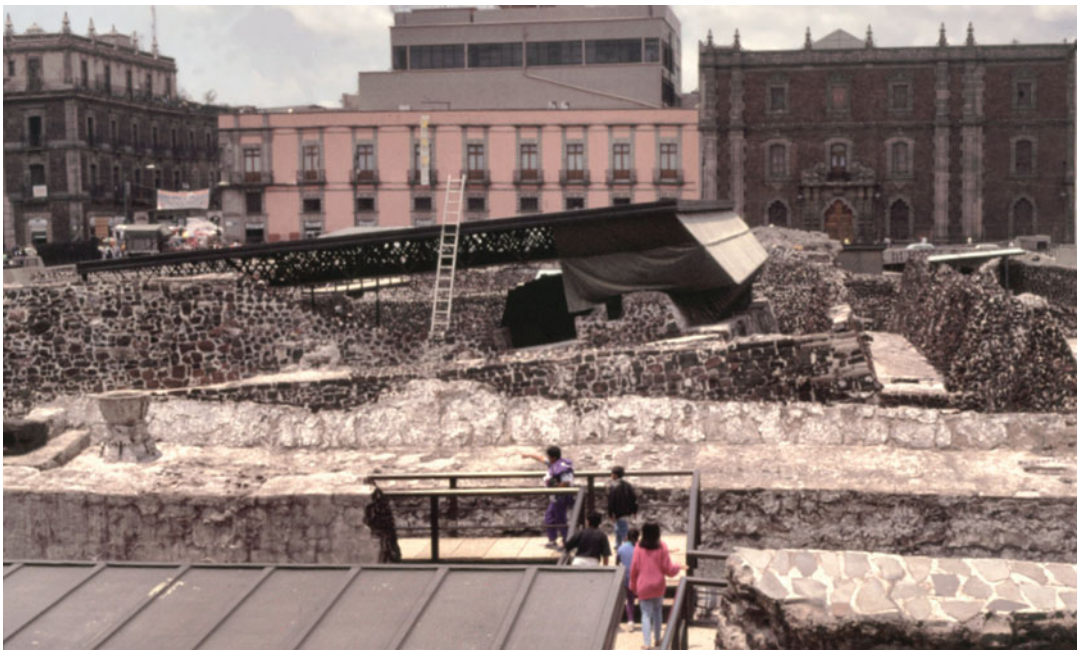

Mexico: Historical Archaeology, Fig. 2 Remnants of the Aztec Main Temple (*Templo Mayor*) in Mexico City

(Fournier and Charlton 2012). By the late 1970s, historical archaeology was a consolidated research strategy in Mexico, and trained archaeologists were put in charge of the excavations in buildings dating to the Colonial and Republican periods that were subject to restoration.

Through INAH's Office of Salvage Archaeology, historical archaeology has been linked to rescue and salvage excavations conducted in religious and secular buildings in Mexico City. An interesting case study is that of the convent of La Encarnación where the skeletal remains of nuns were discovered in graves (e.g., Charlton et al. 2009). Some important projects have been developed in areas outside the capital, for example, at the site of El Olimpo in the main square of Mérida, Yucatán, the city of Campeche, and in the Soconusco region in Chiapas, where a Dominican church was explored archaeologically prior to the construction of a dam (e.g., Charlton et al. 2009; Fournier and Velasquez in press). Also, the rescue excavations at the site of Santa Inés, located in the neighboring area of the Augustinian monastery of Zempoala, Hidalgo, revealed a late postclassic and early colonial indigenous town inhabited by the Otomí. The archaeological materials that were recovered at this site suggest that the life of the native inhabitants of this settlement continued after the conquest without major changes (Fournier and Charlton 2012). Moreover, the INAH Project for urban archaeology has excavated extensively the historic center of Mexico City. Even though the main purpose of this project is to uncover material remains from the Aztec occupation period, research on historic ceramics and zooarchaeological and botanical remains has also been conducted (e.g., Fournier and Velasquez in press) (Fig. 3).

Many historical archaeology projects have also developed from the need to preserve and restore monasteries, convents, hospitals, churches, and palaces in urban centers. These projects adapt the buildings to public or private use such as museums, universities, banks, government offices, or hotels and to promote tourism in Mexico City, Oaxaca, Puebla, and Cuernavaca, in the State of Morelos (e.g., Charlton et al. 2009; Fournier and Charlton 2012). These investigations have integrated archaeological, documentary, and ethnohistorical data in the study of

Mexico: Historical Archaeology, Fig. 3 Santa Inés site, Hidalgo. Excavation of early colonial houses and patios

material remains from the sixteenth to the twentieth centuries (Charlton and Fournier 2008). A good example of how archaeological research was conducted parallel to the agenda established by architectural restoration can be observed in the convent of San Jerónimo in Mexico City (e.g., Charlton et al. 2009). Here, the main objective of the project was the restoration of the architectural complex, but also archaeological remains were excavated and ceramics, glass, and human remains analyzed. Another example of how this research strategy was parallel to restoration projects is the monastery of Santo Domingo de Guzmán in Oaxaca (Fernández Dávila and Gómez Serafín 1998) (Fig. 4).

Mexico: Historical Archaeology, Fig. 4 Glazed earthenware bathtub excavated at one of the cells of the convent of San Jerónimo, Mexico City

Key Issues/Current Debates

Regional Studies

The most relevant regional studies of historical archaeology are those by Thomas H. Charlton in the Otumba area in the Basin of Mexico. They include intensive surface surveys, surface collections, and excavations along with ethnohistorical studies of the region. The project aimed at reconstructing aspects related to the cultural

Mexico: Historical Archaeology, Fig. 5 Ruins of a nineteenth century ranch in the Mezquital Valley, Hidalgo

contact between Indigenous and European populations, acculturation processes, demographic collapse, ecological change, and the development of rural settlements (e.g., Charlton et al. 2005). Another important regional study attempted to reconstruct the changes in settlement patterns, ceramic diversity, and consumption from the postconquest period to the twentieth century in the northwest of the States of Puebla and Tlaxcala and in southern Hidalgo (e.g., Fournier and Charlton 2012). Also in the Basin of Mexico in the case of rural Xaltocan, the work by Rodríguez-Alegría (2010) contributed to the understanding of how indigenous groups utilized Hispanic ceramics as symbols of social status. His research has enabled the comprehension of changes in labor patterns and demography by examining the production of obsidian tools during the postconquest period (Rodríguez-Alegría 2008).

In the Mezquital Valley, Hidalgo, research projects with an interdisciplinary approach, addressed the construction of Otomí indigenous identities and the emergence of resistance strategies to the Spanish conquest. These investigations considered the agave exploitation and the consequences of the introduction of ideological and economic systems, marked by Otomí family chapels and rural settlements, as well as the development of privately owned rural residential estates associated with animal husbandry and agricultural activities (*haciendas*) and ranches resulting in landscape transformations and the marginality of the indigenous population in this region (e.g., Mondragón et al. 1997; Fournier and Mondragón 2003) (Fig. 5).

Other examples of regional studies integrating surface surveys, excavations, and documentary evidence were conducted in the Isthmus of Tehuantepec, Oaxaca (Zeitlin 2005), the Soconusco region, Chiapas (Gasco 2005), and the Maya region (Alexander 2012). These investigations examined changes in social inequality, land tenure, landscape, settlement patterns, and ecology to address the transformations that occurred in indigenous communities during the colonial period. In the case of western Mexico, regional projects in the Pátzcuaro Basin, Michoacán, have approached the political, economic, and ecological impact of colonial rule and the conflict between Tarascan indigenous groups and Spanish settlers (Pollard 2005). In the port of San Blas, on the coast of Nayarit, a major trading post connecting the Pacific Coast of New Spain with the California missions, surface surveys have provided information on the daily lives of the inhabitants of this bay and aspects related to the trans-Pacific trade networks between Mexico and Asia (e.g., Fournier and Charlton 2012).

The study of Jesuit missions, particularly the Jesuit College of San Felipe and Santiago in Sinaloa de Leyva and towns in the neighboring region

Mexico: Historical Archaeology, Fig. 6 Excavations at the Jesuit church of Sinaloa de Leyva

of El Fuerte, Sinaloa, has contributed significantly to the archaeology of northwestern Mexico (e.g., Fournier and Charlton 2012). These research projects have provided information on the changes from pre-Columbian to historic indigenous and Hispanic ceramic traditions, and on the changes in subsistence strategies and settlement patterns during the colonial and Republican periods (Fig. 6).

Rural Settlements. Ranches and Haciendas

Studies with a regional scope and that have focused their interest on rural settlements like ranches and *haciendas* are part of a growing field in the archaeology of Mexico. Several projects have been developed in the Mezquital Valley, State of Hidalgo (Fournier and Mondragón 2003); in the *hacienda* of San Miguel Acocotla, Puebla (Newman 2010); and in the *hacienda* de Pánuco, Zacatecas, founded for smelting and refining silver (Fournier and Blackman 2010). The research undertaken in these areas relate to the construction of ethnic identities, the economic activities, and the life of workers, administrators, and owners at the *haciendas* (Fig. 7).

Other projects have concentrated in Yucatán. These investigations aim to understand the social and economic changes that occurred during the past 500 years related to settlement patterns, towns, and the exploitation of natural resources. The investigations combined documentary sources with settlement patterns and household archaeology. Major contributions to the archaeology of this region addressed the changes in the economic and political landscape during the Caste War (1847–1901) and the correspondence regarding place, identity, agrarian practice, and landscape since the Spanish conquest (Alexander 2012). Furthermore, in Hacienda Tabi, Sweitz (2012) examined the lives of the workers and explored the built environment to address power relations and changes in social status, production, and the organization of labor in the context of capitalism.

Colonialism, Production, and Consumerism

Studies that have dealt with the impact of Spanish colonialism have addressed changes in the production and consumption of material culture, namely, ceramics and other products like salt. These investigations have focused their attention on the changes in indigenous technologies, the introduction of European techniques, and the use given to local and imported ceramics by colonial society.

Artifacts such as Aztec tradition ceramic figurines from the Basin of Mexico have been studied, illustrating changes and continuities in styles and techniques as well as the appearance of European dress and facial features substituting pre-Columbian deities in the case of anthropomorphic figurines (Charlton et al. 2005). Research on the impact of colonialism on indigenous ceramic production and consumption is well exemplified by studies that have considered the red wares from Cuauhtitlán. The results of these studies suggest that ceramic traditions from the late postclassic period suffered only minor changes during Spanish rule and that this ware was popular among members of the Hispanic elite who used it for lavish display (e.g., Charlton and Fournier

Mexico: Historical Archaeology, Fig. 7 Ruins of the hacienda de Pánuco, Zacatecas

2011). Furthermore, the patterns of consumption of this ware have enabled the exploration of the relationship between these ceramic objects and the construction of power, social status, and ethnic identities. The changes that were introduced by the Spanish colonizers to indigenous ceramic technologies, vessel forms, and decorative styles in central Mexico have also been the subject of an extensive study by Hernández (2012). Other examples of this approach include studies of indigenous plain or painted wares from Oaxaca (Zeitlin 2005) and brown wares from northern Mexico (Brown et al. 2004) (Figs. 8 and 9).

The application of archaeometric techniques through neutron activation analysis of glazed wares has provided rich insights into the relationships between production, distribution, consumption, and technological change of Spanish colonial wares. Another important ongoing research deals with the identification of production centers of majolica, its commercialization in the Viceroyalty of New Spain, and aspects related to consumerism and the construction of identities. Potters in New Spain adapted European ceramic technologies to the new environment in order to manufacture objects in a style that emulated Spanish majolica and by the 1600s Chinese porcelain in order to satisfy local consumers (e.g., Fournier et al. 2009). The identification of production centers in Spain and Mexico have enabled the construction of the geographical distribution of majolica and aspects related to commercialization and consumption, indicating that the value attached to majolica by colonial elites as a symbol of social status and identity impacted the production of this ware (Fig. 10).

Mexico: Historical Archaeology, Fig. 8 Early colonial ceramic figurines from Mexico City

In addition to these studies, the work by Gasco (1992) explored cultural continuity in Ocelocalco, Chiapas. At this site, indigenous communities were active participants in the colonial economic system through the cacao trade. The control exercised by these groups over cacao production enabled them to consume large quantities of majolica and Chinese porcelain. Gasco's work has contested traditional views that have established a straightforward relationship between ethnic identity and material culture of a Hispanic tradition. Also, within the field of colonialism and consumerism, Palka (2005) examined the responses of Lacandón Maya in Chiapas to colonialism during the nineteenth century that resulted in culture change, transformations in settlement patterns, and consumption of local and imported material culture. Finally, Kepecs (2005) explores aspects related to the commercialization and consumption of salt, for example, and the impact of European incipient capitalism on Maya economy in the Peninsula of Yucatán.

Mexico: Historical Archaeology, Fig. 9 Early colonial redware tripod plate depicting an Aztec Warrior, found in excavations in Mexico City

Missions, Presidios, Reales, and Roads

Historical archaeology at missions (European religious foundations in indigenous settlements), *presidios* (forts that housed soldiers who protected the inhabitants from Indigenous assails), *reales* (mining centers), and roads is mainly concentrated in northern Mexico, including Chihuahua, Baja California, Sinaloa, Sonora, and Zacatecas. The research conducted at mission sites offers a valuable opportunity to explore the religious, economic, and social transformations in the lives of indigenous populations as a result of the Spanish conquest. Acculturation processes, the degree of interaction between native and Hispanic communities, the transformations in social organization, settlement patterns, subsistence and the introduction of agricultural practices, and the development of ceramic traditions are some of the major research topics conducted at mission sites (e.g., Brown et al. 2004; Fournier and Charlton 2012; Fournier and Velasquez in press).

Mexico: Historical Archaeology, Fig. 10 Seventeenth-century Kraak porcelain dish and Puebla Blue-on-White majolica dish emulating Chinese patterns

The missions and the *presidios* were connected with other regions of New Spain and with the *reales* in the north through major roads, like the Royal Road or *Camino Real de Tierra Adentro* and its branches, over which the silver extracted from the mines in the north was transported to Mexico City and the merchandises made in the Viceroyalty or imported from Europe and Asia were distributed, supplying avid consumers all over Mexico. The archaeological research at these sites has contributed significantly to the reconstruction of changes in the production and commercialization of products throughout the colonial period (e.g., Brown et al. 2004; Fournier and Velasquez in press).

The African Diaspora

There are few projects dedicated to the study of the African descendants in Mexico. This is due in part to the difficulty encountered in the identification of the material culture of groups with African ancestry in the archaeological record because of the interracial and cross-cultural processes among African, Indigenous, and Hispanic groups throughout the colonial period. Despite this, Fournier and Charlton (2008) have addressed how slaves and their offspring who served Spanish women, for example, were richly attired for public display and stood as symbols of social status in urban settings. Other investigations have focused on the analysis of the remains of Africans and mulattos contributing to the understanding of their lifestyles (e.g., Gallaga Murrieta 2009).

International Perspectives

Historical archaeology projects in Mexico have been confined largely to the study of sites located within the geographical boundaries of the country, although there have been exceptions to this, where Mexican and American archaeologists have collaborated to expand investigations into the United States. Researchers in Mexico seldom expand their area of interest to regions that were at one time under the political control or responsibility of New Spain, for example, Guatemala and Florida, respectively, and that were part of a complex network that connected individuals and products. These regions have an enormous potential for exploration of processes like the establishment of religious and secular institutions, commercial relationships, conflict, navigation, regionalism, and the construction of ethnic identities, among others.

Since the 1970s, processualist, materialist, structuralist, and, to a lesser extent, postmodernist frameworks, derived from American, English, and French traditions, have permeated the theoretical development of archaeology in Mexico. However, while these approaches are familiar to most archaeologists in the country, they are seldom applied to specific research questions or to the interpretation of the results. Moreover, as opposed to the United States and Europe where there are important theoretical contributions, in Mexico, there is an urgent need to protect the cultural heritage and to develop more theoretical and methodological chemes. A critical situation that has affected the dissemination of methodological developments and the results derived from research projects conducted by Mexican students and professional archaeologists is that their work is seldom published in languages other than Spanish, or presented at international symposia, and thus their international impact is limited.

Future Directions

In the future, historical archaeology in Mexico should develop investigations with specific research questions with an emphasis on studies with a regional scope in rural areas as most projects have concentrated in urban centers, mostly in Mexico City. The design of projects with specific research questions should provide better results that are often not attainable through salvage and rescue excavations, as the results of these are often limited to the production of descriptive field reports. The archaeological materials recovered at these excavations are processed but seldom subject to further analysis and interpretation. This is a crucial task for the development of the

discipline, since it is a fertile setting where contemporary theoretical and methodological approaches can be applied.

INAH's need to protect the cultural heritage and construct a common past, largely based on pre-Hispanic cultures, has relegated the study of the Colonial and Republican periods to historians and ethnohistorians. This constitutes a major hindrance for students and scholars who are interested in conducting archaeological research of the postconquest and modern periods. Therefore, it is necessary to emphasize the potential that this research strategy has for the study of the recent past. This could be attained through the dissemination of the results through a wider variety of local journals and finding new forums in which to present them to the public. While there are some optional modules on historical archaeology offered at the National School of Anthropology and History in Mexico City and at the University of the Americas, in Puebla, it is necessary to create compulsory theoretical and practical modules as part of undergraduate programs to train students in this research area.

Interdisciplinary approaches have been traditionally employed in the historical archaeology of Mexico, by integrating archaeological, ethnohistorical, historical, ethnographic, and zooarchaeological studies. Human osteology and bioarchaeology are usually applied to the analysis of human remains pertaining to historic periods to explore health conditions, life expectancy, nutritional aspects, and the effects of toxic agents on the populations under study (e.g., Fournier and Charlton 2012). However, these studies are usually conducted by physical anthropologists and done independent of archaeological studies and thus their scope is limited to understanding the social context. In recent years, the application of GIS and geophysical techniques have been applied often in rescue and salvage excavations and in the restoration of buildings. However, the main objective has been to recover as much data as possible without further archaeological interpretation of the results, thus limiting the potential that these techniques have. In the future, it will be necessary to apply them to well-defined research questions.

There are few investigations that have been conducted at industrial sites. To date, they include a paper mill in Mexico City, leather tanneries and bottled soda factories in Puebla (e.g., Fournier and Charlton 2012), surveys, excavations, and PIXE analyses of artifacts at the mining district of Real del Monte close to Pachuca, Hidalgo (e.g., Oviedo Gámez et al. 2010). This research has aimed at reconstructing the productive processes and studying in detail the artifacts associated with the end products. However, it is necessary to conduct more studies in this field that focus on aspects related to the life of workers and artisans as these provide insights into an important component of the past of Mexico that is seldom the subject of research projects.

As historical archaeology expands in Mexico and stands as a recognized research strategy, more Mexican students and scholars can become aware of the need to conduct archaeological research on the Colonial and Republican periods and can begin to realize that the study of the recent past is as important as that concerned with pre-Hispanic cultures. If this is acknowledged, then historical archaeology research projects could be incorporated into the institutional agenda. This would enable the reassessment of the national discourse that aims to construct a unified identity, based on the ancient indigenous past, and include a more culturally diverse one. Also a larger collaboration between Mexican scholars and scholars abroad should be aimed at developing projects with a wider regional scope. The potential that historical archaeology has for exploring topics that are relevant to local and international debates such as colonialism, racism, plantation archaeology, identity, gender, and conflict among others is yet to be explored.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Archival Research and Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Ceramics: The Ibero-American Shipping Container
- ▶ Charlton, Thomas H.

▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
▶ Fournier, Patricia
▶ Goggin, John M.
▶ Industrial Archaeology
▶ Mission Archaeology in North America
▶ Museos de Real de Monte
▶ New Spain: Forts and Transport Archaeology
▶ Oral Sources and Oral History
▶ Plantation Archaeology

References

Alexander, R.T. 2012. Landscape change in the Maya region, 1450–1910 AD. In *The Oxford handbook of Mesoamerican archaeology*, ed. D.L. Nichols and C.A. Pool, 933–947. New York: Oxford University Press.

Brown, R.B., P. Fournier, J.A. Peterson, D.A. Hill, and M. Willis. 2004. Settlement and ceramics in northern New Spain: A case study of brownware pottery and historical change. In *Surveying the archaeology of northwest Mexico*, ed. G. Newell and E. Gallaga. Provo: University of Utah Press.

Charlton, T.H., and P. Fournier. 2008. Geographic overviews, the Americas (central): Historical archaeology in Mexico. In *Encyclopedia of archaeology*, ed. D. Pearsall, vol. 1, 181–192. New York: Academic Press.

Charlton, T.H., and P. Fournier. 2011. Pots and plots. The multiple roles of early colonial red wares in the basin of Mexico (identity, resistance, negotiation, accommodation, aesthetic creativity, or just plain economics?). In *Enduring conquests. Rethinking the archaeology of resistance to Spanish colonialism in the Americas*, ed. M. Liebmann and M.S. Murphy, 127–148. New Mexico: School for Advanced Research.

Charlton, T.H., C.L. Otis Charlton, and P. Fournier. 2005. The basin of Mexico A.D. 1450–1620. Archaeological dimensions. In *The postclassic to Spanish-era transition in Mesoamerica. Archaeological perspectives*, ed. S. Kepecs and R.T. Alexander, 49–63. Albuquerque: University of New Mexico Press.

Charlton, T.H., P. Fournier, and C.L. Otis Charlton. 2009. Historical archaeology in central and northern Mesoamerica: Development and current status. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 409–428. New York: Springer.

Fernández Dávila, E., and S. Gómez Serafín. 1998. Metodología aplicada en el desarrollo del proyecto arqueológico del ex convento de Santo Domingo de Guzmán. In *Memoria del Primer congreso nacional de arqueología histórica*, ed. E. Fernández Dávila and S. Gómez Serafín, 107–120. México: Consejo Nacional para la Cultura y las Artes-Instituto Nacional de Antropología e Historia.

Fournier, P., and M.J. Blackman. 2010. Recorridos a lo largo del Camino de la Plata: el real de minas de Pánuco y la Hacienda del Buen Suceso, Zacatecas. In *Patrimonio, identidad y complejidad social*, ed. P. Fournier and F. López, 309–340. México: Escuela Nacional de Antropología e Historia.

Fournier, P., and T.H. Charlton. 2008. Negritos y pardos: hacia una arqueología histórica de la población de origen africano en la Nueva España. In *Perspectivas de la investigación arqueológica*, ed. F. López Aguilar, W. Wiesheu, and P. Fournier, vol. III, 201–234. México: Escuela Nacional de Antropología e Historia.

Fournier, P., and T.H. Charlton. 2012. Historical archaeology in central and western Mesoamerica. In *The Oxford handbook of Mesoamerican archaeology*, ed. D.-L. Nichols and C.A. Pool, 916–932. New York: Oxford University Press.

Fournier, P., and L. Mondragón. 2003. Haciendas, ranches and the Otomí way of life in the Mezquital Valley, Hidalgo, Mexico. *Ethnohistory* 50: 47–68.

Fournier, P. & V. Velasquez. In press. Historical archaeology in Mexico. In J. Symonds & L. Wilkie (ed.) *The Oxford handbook of historical archaeology*: 916–932. Oxford: Oxford University Press.

Fournier, P., M.J. Blackman, and R.L. Bishop. 2009. Empleo de análisis instrumentales de activación neutrónica (INAA) en el estudio del origen de la mayólica en México. *Arqueología* 42: 151–165.

Gallaga Murrieta, E., ed. 2009. *Dónde están? Investigaciones sobre Afromexicanos*. México: Universidad de Ciencias y Artes de Chiapas.

Gasco, J. 1992. Material culture and colonial Indian society in southern Mesoamerica: The view from Coastal Chiapas, Mexico. *Historical Archaeology* 26: 67–74.

Gasco, J. 2005. The consequences of Spanish colonial rule for the indigenous peoples of Chiapas, Mexico. In *The Postclassic to Spanish-era transition in Mesoamerica. Archaeological perspectives*, ed. S. Kepecs and R.T. Alexander, 77–96. Albuquerque: University of New Mexico Press.

Hernández, G. 2012. *Ceramics and the Spanish conquest*. Leiden: Brill.

Kepecs, S. 2005. Mayas, Spaniards and salt: World system shifts in sixteenth century Yucatán. In *The Postclassic to Spanish-era transition in Mesoamerica: Archaeological perspectives*, ed. S. Kepecs and R.T. Alexander, 117–137. Albuquerque: University of New Mexico Press.

Mondragón, L., P. Fournier, and N. Noguera. 1997. Arqueología histórica y etnoarqueología de la comunidad Alfarera Otomí de Santa María del Pino, México. In *Approaches to the historical archaeology of Mexico, central and south America*, ed. J. Gasco, G.Ch. Smith, and P. Fournier, 17–28. Los Angeles: The Institute of Archaeology, University of California.

Newman, E.T. 2010. Butchers and shamans: zooarchaeology at a central Mexican hacienda. *Historical Archaeology* 44: 33–50.

Oviedo Gámez, B., M. Iwadare Ijima, and M.A. Hernández Badillo, eds. 2010. *Patrimonio industrial minero. Nuevas alternativas para una gran historia*. México: Archivo Histórico y Museo de Minería Asociación Civil, TICCIH.

Palka, J.W. 2005. *Unconquered Lacandon Maya: Ethnohistory and archaeology of indigenous culture change*. Gainesville: University Press of Florida.

Pollard, H.P. 2005. From imperial core to colonial periphery: The Lake Patzcuaro Basin 1400–1800. In *The Postclassic to Spanish-era transition in Mesoamerica: Archaeological perspectives*, ed. S. Kepecs and R.T. Alexander, 65–76. Albuquerque: University of New Mexico Press.

Rodríguez-Alegría, E. 2008. Narratives of conquest, colonialism, and cutting-edge technology. *American Anthropologist* 110: 33–43.

Rodríguez-Alegría, E. 2010. Incumbents and challengers: indigenous politics and the adoption of Spanish material culture in colonial Xaltocan, Mexico. *Historical Archaeology* 44: 51–71.

Sweitz, S.R. 2012. *On the periphery of the periphery. Household archaeology at hacienda San Juan Bautista Tabí, Yucatán, Mexico*. New York: Springer.

Zeitlin, J.F. 2005. *Cultural politics in colonial Tehuantepec. Community and state among the Isthmus Zapotec, 1500–1750*. Stanford: Stanford University Press.

Further Reading

Alexander, R.T. 2004. *Yaxcabá and the caste war of Yucatán: An archaeological perspective*. Albuquerque: The University of New Mexico Press.

Alexander, R.T. 2012. Prohibido tocar este cenote: the archaeological basis for the titles of Ebtun. *International Journal of Historical Archaeology* 16: 1–24.

Allende Carrera, A. 2007. Curtiduría "La piel de tigre": arqueología en un sitio industrial de Puebla. *Dualidad* 7: 8–13.

Andrews, A.P., and F. Robles Castellanos. 2009. La Arqueología histórica del Noroeste de Yucatán. In *Arqueología colonial Latinoamericana. Modelos de Estudio*, British Archaeological Reports International series 1988, ed. J. García Targa and P. Fournier, 115–131. Oxford: Archaeopress.

Beristáin Bravo, F. 1996. *El Templo Dominico de Osumacinta, Chiapas*. México: Instituto Nacional de Antropología e Historia.

Bernal Felipe, N., and J.L. Castrejón Caballero. 2003. Condiciones de vida y salud de los pobladores de Santa María Texcalac, Tlaxcala en los siglos XVII y XVIII. *Estudios de Antropología Biológica* XI: 835–850.

Blackman, M.J., P. Fournier, and R.L. Bishop. 2006. Complejidad e interacción social en el México colonial: la producción, intercambio y consumo de cerámicas vidriadas y esmaltadas con base en análisis de activación neutrónica. *Cuicuilco* 36: 203–222.

Burgos Villanueva, F.R. 1995. *El Olimpo: un predio colonial en el lado poniente de la Plaza Mayor de Mérida, Yucatán y análisis cerámico comparativo*. México: Instituto Nacional de Antropología e Historia.

Carpenter Slavens, J.P., and G. Sánchez Miranda. 2007. Nuevos hallazgos arqueológicos en la región del valle del Río Fuerte, norte de Sinaloa. *Diario de Campo* 93: 18–29.

Charlton, T.H. 1996. Early colonial period ceramics: Decorated red ware and orange ware types of the rural Otumba Aztec ceramic complex. In *Arqueología Mesoamericana, homenaje a William T. Sanders*, ed. A.-G. Mastache, J.R. Parsons, R.S. Santley, and M.C. Serra Puche, 461–479. México: Instituto Nacional de Antropología e Historia-Arqueología Mexicana.

Charlton, T.H., and C.L. Otis Charlton. 1998. Continuidad y cambio después de la conquista. Hallazgos recientes en la ciudad-estado Azteca de Otumba, Estado de México. In *Memoria del primer congreso nacional de arqueología histórica*, ed. E. Fernández Dávila and S. Gómez Serafín, 458–467. México: Consejo Nacional para la Cultura y las Artes-Instituto Nacional de Antropología e Historia.

Charlton, T.H., P. Fournier, and C.L. Otis Charlton. 2007. La cerámica del periodo colonial temprano en la Cuenca de México: permanencia y cambio en la cultura material. In *La producción alfarera en el México antiguo V*, ed. B. Merino Carrión and A. García Cook, 429–496. México: Instituto Nacional de Antropología e Historia.

Córdova Tello, M. 1992. *El convento de San Miguel de Huejotzingo, Pue*. México: Instituto Nacional de Antropología e Historia.

Farrell, M., J. Martínez, and R. Schneider. 2001. El rescate de la ex Misión Jesuita de Nuestra Señora del Pilar y Santiago de Cocóspera, Sonora. Un trabajo interdisciplinario. *Arqueología Mexicana* 51: 64–69.

Fernández Dávila, E., and S. Gómez Serafín, eds. 1998. *Primer congreso nacional de arqueología histórica. Memoria*. México: Instituto Nacional de Antropología e Historia.

Fournier, P. 1990. *Evidencias arqueológicas de la importación de cerámica en México con base en los materiales del ex Convento de San Jerónimo*. México: Instituto Nacional de Antropología e Historia.

Fournier, P. 1997. Tendencias de consumo en México durante los periodos colonial e independiente. In *Approaches to the historical archaeology of Mexico, Central and South America*, ed. J. Gasco, G.Ch. Smith, and P. Fournier-García, 49–58. Los Angeles: The Institute of Archaeology, University of California.

Fournier, P. 2003. Historical archaeology in Mexico: A reappraisal. *The SAA Archaeological Record* 3 (18–9): 39.

Fournier, P., and J.J. Bracamontes. 2010. Matanchel, San Blas y el comercio transpacífico en Nueva Galicia:

perpectivas desde la arqueología histórica. In *Reflexiones en torno al bicentenario de las independencias Latinoamericanas*, ed. L. Chen and A. Saladino García, 333–350. Taipei: University of Tamkang.

Fournier, P., and F. Miranda. 1992. Historic sites archaeology in Mexico. *Historical Archaeology* 26 (1): 75–83.

Fournier, P. & W. Wiesheu. (ed.) In press. *Homenaje a Thomas H. Charlton. Enfoques en torno a la arqueología histórica Mesoamericana*. México: Instituto Nacional de Antropología e Historia.

Fournier, P., M.J. Blackman, and R.L. Bishop. 2007. Los alfareros purépecha de la Cuenca de Pátzcuaro: producción, intercambio y consumo de cerámica vidriada durante la época virreinal. In *Arqueología y complejidad social*, ed. P. Fournier, W. Wiesheu, and T.H. Charlton, 195–221. México: Escuela Nacional de Antropología e Historia.

Fournier, P., K. Castillo, R.L. Bishop, and M.J. Blackman. 2009. La Loza Blanca Novohispana: tecnohistoria de la Mayólica en México. In *Arqueología colonial Latinoamericana. Modelos de estudio*, British Archaeological Reports International series 1988, ed. J. García Targa and P. Fournier, 99–114. Oxford: Archaeo Press.

Gasco, J. 2006. Soconusco cacao farmers past and present. In *The origins of chocolate: Cacao in the Americas*, ed. C. McNeil, 322–337. Gainesville: University of Florida Press.

Hernández Pons, E., ed. 1997. *La antigua casa del Marqués del Apartado. Arqueología e historia*. México: Instituto Nacional de Antropología e Historia.

Juárez Cossio, D. 1989. *El convento de San Jerónimo. Un ejemplo de arqueología histórica*. México: Instituto Nacional de Antropología e Historia.

Kepecs, S., and R.T. Alexander, eds. 2005. *The Postclassic to Spanish-era transition in Mesoamerica. Archaeological perspectives*. Albuquerque: University of New Mexico Press.

Lind, M. 1979. *Postclassic and early colonial Mixtec houses in the Nochixtlan Valley.* Nashville: Vanderbilt University.

Lister, F.C., and R.H. Lister. 1982. *Sixteenth century Maiolica pottery in the Valley of Mexico*. Tucson: The University of Arizona Press.

López Camacho, L. (ed.) In press. *Las contribuciones arqueológicas en la formación de la historia colonial. Primer coloquio de arqueología histórica*. México: Instituto Nacional de Antropología e Historia.

López Cervantes, G. 1976. *Cerámica colonial en la Ciudad de México*. México: Instituto Nacional de Antropología e Historia.

López Cervantes, G. 1982. Informe preliminar sobre los materiales coloniales. In *El templo mayor: excavaciones y estudios*, ed. E. Matos Moctezuma, 255–282. México: Instituto Nacional de Antropología e Historia.

Mansilla, J., C.M. Pijoan, J.A. Pompa & D. Villegas. 1992. Los entierros primarios del templo de San Jerónimo, Ciudad de México (Temporada 1976). Estudios de los indicadores de las Agresiones Ambientales, in M.T. Jaen, J.L. Fernández & J.A. Pompa (ed.) Antropología física, anuario 1991: 121–129. México: Instituto Nacional de Antropología e Historia.

Martínez, J. 2006. La Misión de Nuestra Señora de los Dolores de Cosari. Arqueología e historia de un pueblo de Misión Supuestamente Destruido. In *Misiones del noroeste de México. Origen y destino*, ed. J.R. Félix Gastélum and R. Padilla Ramos, 15–35. México: Consejo Nacional para la Cultura y las Artes.

Matos Moctezuma, E., ed. 2003. *Excavaciones del programa de arqueología Urbana*. México: Instituto Nacional de Antropología e Historia.

Meyers, A.D. 2005. Material expressions of social inequality at a Porfirian sugar hacienda in Yucatán, Mexico. *Historical Archaeology* 39: 112–137.

Müller, F. 1981. *Estudio de la cerámica hispánica y moderna de Tlaxcala-Puebla*. México: Instituto Nacional de Antropología e Historia.

Medrano Enríquez, A.M. 2009. Arqueología en un lugar de enfrentamiento bélico entre indígenas y españoles durante la guerra del Mixtón (1541). In *Arqueología colonial Latinoamericana. Modelos de estudio*, British Archaeological Reports International series 1988, ed. J. García Targa and P. Fournier, 53–63. Oxford: Archaeopress.

Meza, A. 2003. Los Angelitos de San Nicolás Ayotla, Oaxaca. *Estudios de Antropología Biológica* XI: 549–560.

Moreno Cabrera, M.L., J. Cedeño, and L.F. Castro. 1997. Arqueología industrial en la Plaza Loreto, San Angel, Ciudad de México. In *Umbrales y veredas*, ed. R. Manzanilla, 197–213. México: Instituto Nacional de Antropología e Historia.

Noguera, E. 1934. Estudio de la cerámica encontrada donde estaba el Templo Mayor de México. *Anales del Museo Nacional de Arqueología Historia y Etnografía* 5: 267–282.

Otis Charlton, C.L. 1995. Las figurillas prehispánicas y coloniales de Tlatelolco. In *Presencias y encuentros Investigaciones arqueológicas de salvamento*, 157–175. México: Instituto Nacional de Antropología e Historia.

Otis Charlton, C.L. & T.H. Charlton. 2010 Figurines in the heart of the Aztec empire, in D. Gheorghiu & A. Cyphers (ed.) *Anthropomorphic and zoomorphic miniature figures in Eurasia, Africa and Meso-America. Morphology, materiality, technology, function and context* (British Archaeological Reports International series 2138): 151–158. Oxford: Archaeopress.

Palka, J.W. 2009. Historical archaeology of indigenous culture change in Mesoamerica. *Journal of Archaeological Research* 17: 297–346.

Pohl, J.M.D. 2012. The Spanish conquest and the archaeology of the colonial and the republican periods. In *The Oxford handbook of Mesoamerican archaeology*, ed. D.L. Nichols and C.A. Pool, 895–907. New York: Oxford University Press.

Reynoso Ramos, C. 2005. Basura industrial: Exploración arqueológica en la fabrica Latisnere, Puebla. Producción de bebidas de sabores, agua mineral y vino?. In *Memorias del II congreso nacional de patrimonio industrial*. Available at: http://www.granadacollection.org/Congreso_Nacional_Citlalli.pdf. Accessed 9 Nov 2011.

Ritter, E.W. 2006. Historic Indian contact at Laguna Guerrero Negro, Baja California. *Proceedings of the Society for California Archaeology* 19: 13–15.

Rodríguez-Alegría, E. 2005a. Consumption and the varied ideologies of domination in colonial Mexico City. In *The postclassic to Spanish-era transition in Mesoamerica. Archaeological perspectives*, ed. S. Kepecs and R.T. Alexander, 35–48. Albuquerque: University of New Mexico Press.

Rodríguez-Alegría, E. 2005b. Eating like an Indian. *Current Anthropology* 46: 551–573.

Rogers, R.C. 2011. New directions in Maya research: using history and anthropology to study the Maya site of Tíhoo, Mérida, Yucatán. *International Journal of the Humanities* 9: 347–362.

Salas Contreras, C. 2006. *Arqueología del ex convento de la encarnación. Edificio sede de la secretaría de educación pública*. México: Instituto Nacional de Antropología e Historia.

Santos Ramírez, V.J. 2004. Arqueología histórica del colegio de la compañía de Jesús de Sinaloa. In *Seminario sobre la religión en el noroeste novohispano*, ed. J. Gaxiola López and J.C. Zazueta Majares, 213–242. México: El Colegio de Sinaloa.

Suárez Aguilar, V., and H. Ojeda Mas. 1996. *Arqueología histórica en la ciudad de Campeche*. Campeche, México: Universidad Autónoma de Campeche.

Tiesler, V., P. Zabala, and A. Cucina, eds. 2010. *Natives, Europeans and Africans in colonial Campeche: History and archaeology*. Gainesville: University Press of Florida.

Velasquez, V. 2007. La arqueología de un rancho en Sonora. In *Arqueología y complejidad social*, ed. P. Fournier, W. Wiesheu, and T.H. Charlton, 267–287. México: Escuela Nacional de Antropología e Historia.

Velasquez, V. 2008. De rancheros, apaches y artefactos: la arqueología de un rancho del siglo XIX en el desierto de Sonora. *Boletín de Monumentos Históricos* 13: 76–94.

Velasquez, V. 2009. Lo que quedó del sueño de vapor. Arqueología de una utopía en Sinaloa, México. Estudio de caso. In J. García Targa & P. Fournier (ed.) *Arqueología colonial Latinoamericana. Modelos de estudio* (British Archaeological Reports International series 1988): 37–52. Oxford: Archaeo Press.

Van Buren, M. 2010. The archaeological study of Spanish colonialism in the Americas. *Journal of Archaeological Research* 18: 151–201.

Williams, J.S., and P. Fournier. 1996. Beyond national boundaries and regional perspectives: Contrasting approaches to Spanish colonial archaeology in the Americas. *World Archaeological Bulletin* 7: 65–75.

Mexico: Underwater Archaeology

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Introduction

Since its creation in February 1980, the underwater archaeology area at the Instituto Nacional de Antropología e Historia (INAH, National Institute of Anthropology and History) has undertaken assorted projects both in maritime and continental waters, with a multidisciplinary, interinstitutional, and international approach; promoted the training of archaeologists and other young specialists in disciplines related; received the support of national and international institutions and individuals; participated in national and international forums and councils, coordinating symposiums, colloquiums, and conferences within Mexico; dedicated special efforts to the dissemination through assorted means; and maintained its strong position regarding the defense of Mexico's underwater heritage.

INAH's Department of Underwater Archaeology was promoted to a Vice Directorate in 1995 and was headed by archaeologist Pilar Luna Erreguerena from February 1980 to April 2017, when Dr. Roberto E. Junco replaced her. Counting with the presence of colleagues mainly from the United States has been crucial in the development of Mexican underwater archaeology.

Definition

Mexican underwater archaeology has passed through three important stages: (1) 1980–1994, the creation of this area within INAH until the First Underwater Archaeology Diplomate took place; (2) 1995–1998, the area was promoted, and two main projects – the 1630–1631 New Spain's Feet Research Project and the Inventory

and Diagnosis of Submerged Cultural Resources in the Gulf of Mexico – began. The first sensing remote control equipment was designed and assembled with the assistance of colleagues from the USA National Park Service's Submerged Cultural Resource Unit; and (3) 1999 to the present, other important investigations began, among them, one through which significant results regarding the first groups which came from Beringia to America are being obtained and Mexico's presence in international councils increased, including its role in the elaboration and ratification of UNESCO 2001 Convention on Underwater Cultural Heritage.

Historical Background

Mexico's underwater archaeological patrimony was ignored and looted during many years (Luna Erreguerena 2014a: 4864). INAH's Subdirección de Arqueología Subacuática (SAS, Vice Directorate of Underwater Archaeology) has fulfilled a permanent campaign to make people aware of the existence and value of this legacy and a struggle against major threats coming from treasure hunters to minor looting coming mainly from groups or individuals who are related to marine and continental waters, like fishermen, managers, tourism agencies, and divers.

Key Issues/Current Debates

New and advanced technologies have been applied; more renowned specialists, national and foreign, have joined to Mexican teams to collaborate in main projects; and new attempts from treasure hunters have been defeated.

Main Projects

The 1630–1631 New Spain Fleet Research Project (1995 Onward)

This continues to be an ambitious project in search of *Nuestra Señora del Juncal*, one of the two flagships of this fleet which sailed from Cadiz in 1630 and lost several ships in October 1631 in the Gulf of Mexico due to strong winds known as *nortes*. Its cargo included a considerable amount of silver coins, fact that has attracted the attention of treasure hunters groups; however, INAH's Council of Archaeology and the underwater archaeology area have stopped all attempts to get an official permit to explore and explode this shipwreck (Fig. 1).

Nine field seasons took place between 1997 and 2012. The 2012 one marked a turning point: a team of experts from Mexico and the United States participated in the works and in the training in marine geophysical techniques applied to underwater archaeology; National Autonomous University of Mexico's (UNAM) oceanographic vessel *Justo Sierra* could be used; it was the longest field season ever fulfilled (45 days); Mexican Navy support was received through special fast boats which every week transported

Mexico: Underwater Archaeology, Fig. 1 Ceremonial wood serpent/thunder-shaped objects and cactus leaves and points, already conserved, recovered from the two lagoons in the crater of the Nevado de Toluca volcano. (Photo: Ricardo Castro, courtesy and copyright of INAH/CNCPC)

specialists and equipment to where the *Justo Sierra* was and then back to the port of Progreso, Yucatan; and 1157 magnetic anomalies and sonar targets were recorded, post-processed, and classified according to their importance, selecting 83 as priorities (Luna Erreguerena 2013; Junco Sánchez and Trejo 2016).

In June 2014, a Memorandum of Understanding was signed between Spain and Mexico to work together in this project, creating an example of international cooperation between two countries which in the past played the roles of the conqueror and the conquered one. Both are signatories of the UNESCO 2001 Convention on the Protection of Underwater Cultural Heritage, having participated as well in the experts meetings for its elaboration. Plans are on its way to fulfill a join field season in 2018 in order to verify the most important anomalies recorded in 2012 and to keep on surveying the selected areas in the Gulf of Mexico.

The Manila Galleon in Baja California (2000 Onward)

This project, promoted since 1999 by maritime historian Edward Von der Porten with the support of INAH's Center in Baja California, acquires more importance due to the fact that, in spite of the role the Manila galleons played connecting New Spain with Asia through Philippines during 250 years (1565–1815), they remain a kind of mystery for researchers who do not have enough historic material to work with, especially of those galleons from the sixteenth and seventeenth centuries (Junco 2017: 1). In 2000, INAH's Vice Directorate of Underwater Archaeology became co-director of this investigation.

Among the main recoveries in a beach in Guerrero Negro is the collection of more than 1500 fragments of Chinese porcelain, one of the most important ones in the world. Studies on this type of ceramic are few, so one of the objectives is to continue the research of this site in order to reach an understanding of these galleons, whose commercial and cultural exchange – which involved Mexico, Spain, Philippines, China, Japan, and other southeast Asian countries – influenced the New Spain society in so many and significant ways that you can even trace them today (Ibid). During the past few years, work with metal detectors has yielded several pieces of metal pertaining to cargo such as coins, locks and keys, parts of furniture fittings, as well as bolts and nails from the ship (Junco 2012).

Vice Directorate of Underwater Archaeology Special Programs Project (2003 Onward)

This project was born due to the need to structure different activities that were already taking place. Five special programs were created:

1. Legal and technical protection. Due to constant reports on archaeological material findings in marine and continental waters, priority is given to send researchers in order to verify the discovery, record it, and determine the next steps.
2. Capacitation. Permanent training is given by national and foreign experts to underwater archaeologists, specialists in other related disciplines, collaborators, students, divers, and fishermen. Experts from different countries have been invited to participate in sea campaigns and to give courses and lectures. Archaeologists and undergraduate students from other Latin American countries have also benefited from these experiences. SAS members impart periodical classes at the National School of Anthropology and History in Mexico City.
3. Dissemination. 37 years of Mexican underwater archaeology have been captured in books, books' chapters, articles, papers, lectures, mass media interviews, itinerant and permanent exhibitions, documentaries, and virtual visits of sites in national and international academic and public forums. Special publications, like comics and booklets with photos and animation, aimed to children and adolescents have been given away in schools of some of the regions where projects are taking place.
4. Conservation. Archaeologists work very closely with curators at INAH's specialized areas on this field, as well as with the Autonomous University of Campeche and the Autonomous University of Yucatan. Since the creation of the underwater archaeology area, curators began showing interest in learning how to treat cultural material recovered from aquatic means.

5. National and international collaboration. Individuals and/or institutions from Mexico, the United States, Canada, Spain, the Cayman Islands, and Argentina have shared their knowledge and experience with Mexican young researchers and students.

Underwater Archaeological Project at the Nevado de Toluca (2007, 2010, 2012)

This volcano, also known as Xinantécatl, is 80 km from Mexico City and 23 km from the city of Toluca. With a height of 4680 meters above sea level (masl), it is the fourth mountain in altitude in the country. Since the Postclassic period (900–1521 AD), it was a site of pre-Hispanic offering in the Sun and the Moon lagoons formed at its crater, both with a depth of 14 m at 4200 masl (Arce Saldaña 2009: 1).

Elements recovered in three field seasons (2007, 2010, and 2012) include ceremonial wood serpent/thunder-shaped objects – some of them more than one meter – spheres and cones made of copal (a pre-Hispanic incense), cactus leaves and points used for self-penitence, and fragments of baskets and textile. The collection of 75 pieces of copal is unique due to its excellent preservation because of the low temperature of the water, which during the works was between 7 and 8 degrees Celsius (Junco 2009: 24 and 27) (Fig. 2).

This volcano continues being a sacred place where religious processions occur. A group called "New Fire of the Sixth Sun in defense of the Mother Earth" accused archaeologists from INAH of "affecting the balance of the cosmos" when extracting the pre-Hispanic material, so for the second field season researchers requested shamans of each ethnic group living around the volcano to perform a ritual asking their deities permission to do the work; at the end, another ritual took place in order to thank the deities (Luna Erreguerena 2014b: 192).

Lithic material, little knives and arrows made of green obsidian, ceramic, jade, turquoise, and serpentine stones were recovered on land. According to expert Yoko Sugiura (2009: 39), ceramic corresponds to the late Postclassical

Mexico: Underwater Archaeology, Fig. 2 Panoramic view of the underwater chamber known as Hoyo Negro, using the technique "painting with light". (Photo: Roberto Chávez Arce, courtesy and copyright of INAH/SAS)

period (1250–1521 AD). More recent material recovered includes a kind of glazed ceramic, typical from the early colonial period, and a lead bullet from a musket.

It is believed that this volcano was a sort of a pre-Hispanic astronomical observatory which was used 1500 years ago to observe the stars and natural phenomenon. There is a place called "El Mirador" from where, still today, it is possible to see the sun rising exactly between the two Heilprin peaks, on May 16 and July 27 (Montero García 2009: 73).

Underwater Archaeology Project at Hoyo Negro, Tulum, Quintana Roo (2011 Onward)

This project is currently one of the most important ones due to the amazing information it has been providing on the first groups of people coming to America from Siberia through the Bering Strait. The site, discovered in 2007 by cave divers Alejandro Álvarez, Alberto Nava, and Franco Attolini while mapping the submerged Outland Cave of the Sac Actun system near Tulum, Southeastern Mexico, has been considered by specialists a "remarkable time capsule of the terminal Pleistocene climate and plant, animal, and human life of the Yucatan Peninsula" (Chatters et al. 2017: 119–120). They called it "black hole," as an analogy to the exterior space phenomenon. It is a chamber located in the middle of the Mayan jungle 600 m from the nearest entrance that would have been accessible before the cave flooded, around 10,000 years ago. It is 62 m in diameter and between 38 and 55 m below modern sea level (Fig. 3), where one human skeleton and numerous animal bones, some of them corresponding to megafauna, were detected (Luna Erreguerena 2011–2012: 6).

Different methods – radiocarbon, Uranium-Thorium, and Fourier transform infrared spectroscopy (FTIR) – have been used in order to date human and animal remains in laboratories of the United States, Mexico, and Denmark. The human skeleton, the most complete of the earliest yet found in America, belongs to a female who was between 15 and 17 years of age and lived during the late Pleistocene, between 13,000 and 12,000 years BP (Chatters et al. 2014). She was named Naia by Susan Bird, a member of the cave divers group – *Proyecto Espeleológico Tulum* (PET), to honor the Naiads, nymphs of classical mythology who protected fresh waters. Naia was considered among the most important discoveries of 2014 in the world (Archaeology 2015: 14–15; Tarlach 2014: 18–19).

Renowned national and foreign experts have worked together with a group of specialized cave divers trained to do archaeological recording, including three-dimensional models created through structure-from-motion photogrammetry (SfM), with the support of experts from Hydro-Technologies and the University of California in San Diego. Scientists, based on the images,

Mexico: Underwater Archaeology, Fig. 3 Part of Naia's skeleton being prepared for a tomography at the General Hospital of Specialties in the city of Campeche. (Photo: Félix Camacho Z., courtesy and copyright of INAH/SAS)

measurements done in situ, and a small number of samples, began identifying the specimens and making analyses and studies. The decision to extract some of these remains was taken after non-authorized divers altered and damaged the site and its context (Luna Erreguerena 2014c: 5).

Naia's skeleton was recovered in three field seasons, one in 2014 and two in 2016. It received conservation treatments in the Restoration Section at INAH's Center in the city of Campeche and then was brought to the National Museum of Anthropology's security vault in Mexico City. Studies by INAH together with DirectAMS (Washington), the Autonomous University of Yucatan, and the National Autonomous University of Mexico are underway, including bio-archaeological, dental anthropological, stable isotopic, radiographic, tomographic, and aDNA analyses (Fig. 4). Ancient DNA analyses confirmed Naia's Beringian origin, linking Paleoamericans and modern Native Americans (Chatters et al. 2017). Naia's estimated height is 152.6 ± 3.8 cm and her estimated potential weight, 50.36 kilos. She was, however, undernourished, had growth anomalies, and had already given birth at least once (Chatters et al. 2016).

Mexico: Underwater Archaeology, Fig. 4 Dr. James C. Chatters taking a photo of the new genus and species giant sloth found in Hoyo Negro. (Photo: Pilar Luna E., courtesy and copyright INAH/SAS)

Animal remains recorded on the floor and walls of Hoyo Negro, so far, belong to at least 27 individuals of which 11 species have been identified, five of them extinct: gomphothere (*Cuvieronius* cf. *tropicus*), sabertooth (*Smilodon* cf. *fatalis*), bear (*Arctotherium-Tremarctinae*), Shasta ground sloth (*Nothrotheriops shastensis*), and a ground sloth which resulted a new genus and species of late Pleistocene *Megalonychid—Nohochichak xibalbahkah* (McDonald et al. 2017: 1) (Fig. 5). The meaning of this Mayan name chosen by some of the researchers is "big claws dwelling in the underworld."(Note from author.) There is also an unidentified type of extinct South American canid. Extant specimens include puma, peccary, and white-nosed coati, as well as what appear to be bobcat and Baird's tapir (Chatters et al. 2014: 752). Numerous skeletons of catfish and bats are also present (Chatters et al. 2017: 122).

Other lines of investigation include geochemistry, paleohydrology, paleoclimatology, paleobotany, and micropaleontology.

Maritime Archaeology in the Port of Acapulco (2016 Onward)

In 2015, INAH's Vice Directorate of Underwater Archaeology received a report regarding the finding of archaeological material in a garbage pile next to the San Diego Fort's Historical Museum in Acapulco, in the state of Guerrero. This discovery derived in a project aimed mainly to reconstruct the history of that port activities from the sixteenth to the twentieth centuries and their effect on the local population. Archaeologists work on land and underwater, searching for evidence of such maritime activities. It is expected that this project will contribute to the Manila Galleon research from an archaeological perspective (Junco 2017: 1–2).

Land and Underwater Survey at the Media Luna Spring, San Luis Potosí, Central Mexico (1981–1982, 2016 Onward)

This was the first underwater archaeology project in continental waters back in the 1980s. In 2016, researchers revisited this pre-Hispanic offering place to make a land survey around the spring, a

Mexico: Underwater Archaeology, Fig. 5 Shipwreck from a nineteenth century steam ship recorded in the Alacranes Reef National Park in the Gulf of Mexico. (Photo: Helena Barba M., courtesy and copyright INAH/ SASAU3)

drone photogrammetry survey of the spring itself, and the area nearby in order to create a photomosaic and a 3D model. Information from local people led to the finding of a human skeleton completely submerged. Researchers obtained permission to have access to several private collections of artifacts extracted from this spring, recording around 400 pieces of ceramic and lithic, complete and fragmented (Postclassic period, 600–900 AD), which have been incorporated to INAH's national catalogue. In 2017, an underwater survey took place, identifying more archaeological deposits – human remains belonging to adults and children, ceramic figurines, and extinct fauna. The abovementioned skeleton was recorded in situ; another skeleton that had been recovered by the community and is exhibited in the Media Luna Natural Park Museum was also recorded and is currently under study (Hernández Bautista, I., email communication, September 6, 2017).

Inventories

Inventory and diagnosis of submerged cultural resources in the Gulf of Mexico (1997 onward). This is a parallel project to the 1630–1631 New Spain Fleet research. It began due to the fact that, while looking for the Juncal, 34 sites were located in the searching area of the Sound of Campeche, selected after an intense archival consultation in Mexico, Spain, and Cuba. Also in the Gulf of Mexico, other 174 sites have been located through other projects. Sites range between the sixteenth and the twentieth centuries (Barba Meinecke 2017).

Underwater archaeological atlas to record, study, and preserve cenotes in the Yucatan Peninsula (2000–2009), inundated and semi-inundated caves in the Yucatan Peninsula (2010), and other bodies of continental water in the Mexican Republic (2014 onward). The title of this project has changed according to new discoveries made in different aquatic bodies. As 2017, 91 sites have been located, dating from Pleistocene, pre-Hispanic (around 600 AD), and colonial times (Barba Meinecke 2017).

Integral project for the protection, conservation, research, and dissemination of the underwater cultural heritage of the Yucatan Peninsula (2008 onward). Hundreds of sites have been located in the coastal areas as well as in rivers, lagoons, estuaries, and terrain gained to the sea in the states of Campeche, Yucatan, and Quintana Roo. The ones located in marine waters of Campeche and Yucatan are included in the Gulf of Mexico inventory; those in the Mexican Caribbean are 58 so far. Chronology goes from the sixteenth to the twentieth centuries (Barba Meinecke 2017).

Inventory and diagnosis of the submerged archaeological and historic patrimony in the Reserve of the Bank Chinchorro Biosphere,

Quintana Roo (2006 onward). Located in the south coast of Quintana Roo, this bank is "one of the most important sanctuaries of the Mexican Caribbean." Part of the Mesoamerican Reef System, it is considered the second greatest barrier of the world, after the one in Australia. 69 sites, submerged and semi-submerged, dating from the sixteenth to the twentieth centuries, have been recorded. Almost all of them are distributed along the east barrier of the bank, witness of 500 years of navigation from Central and South America bound to Cuba, the United States, and Europe (Carrillo Márquez 2010: 65–67).

All sites of these inventories have been recorded, studied, and catalogued, incorporated in different GIS per region, and integrated into INAH's Sistema Único de Registro Público de Monumentos y Zonas Arqueológicos e Históricos (Single System for the Public Recording of Archaeological and Historical Monuments and Zones).

International Perspectives

It is a fact that underwater archaeology has gained visibility and respect as a serious discipline since Dr. George F. Bass's works in Turkey during the decade of 1960. It can be said that the same has happened in the case of Mexico where 37 years of work, besides a permanent struggle to defend its underwater cultural legacy from treasure hunters, some of which were infiltrated in high power spheres, have won a special place for this country in national and international arenas.

Mexico is part of the 2001 UNESCO Convention's Scientific and Technical Advisory Body (STAB) since its creation. Article 2.10 of this Convention establishes that "Responsible non-intrusive access to observe or document in situ underwater cultural heritage shall be encouraged to create public awareness, appreciation, and protection of the heritage except where such access is incompatible with its protection and management" (http://unesdoc.unesco.org/images/0012/001260/126065e.pdf). In 2016, Mexico presented two examples of Best Practices to be evaluated by the STAB: (1) Underwater Archaeological Museum in *Fuerte de San José el Alto* (Campeche) and (2) Underwater Cultural Heritage at the Nevado de Toluca (involving local communities with their own cultural heritage at the Nevado de Toluca).

(http://www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/underwater-cultural-heritage/best-practices-of-underwater-cultural-heritage/).

Both were approved in May 2017, during the sixth session of the Meeting of State Parties at UNESCO's headquarters in Paris (http://unesdoc.unesco.org/images/0024/002489/248974E.pdf).

Future Directions

Future directions enlisted in the first volume of the Global Archaeology Encyclopedia are still valid.

Regarding the 1630–1631 New Spain Fleet project, current plans to join efforts with Spain, through the Memorandum of Understanding signed in 2014, aimed to verify the main anomalies recorded in 2012 and to complete the survey of the preselected area with more possibilities of locating *Nuestra Señora del Juncal*, are expected to led to new discoveries in 2018.

Another project with a great potential is the one at Hoyo Negro, in Tulum, Quintana Roo. Future field seasons will focus on the recovery of fauna remains which, according to experts, may provide relevant information that, together with other lines of investigation, will keep on contributing to the understanding of the context of the site itself and the Yucatan Peninsula's ecosystem during the Late Pleistocene.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ Historical Archaeology

▶ Mexico: Historical Archaeology
▶ Muckelroy, Keith (Underwater and Maritime Archaeology)

References

Arce Saldaña, J. L. 2009. Historia eruptiva. In *Las Aguas Celestiales. Nevado de Toluca*, ed. P. Luna, A. Montero, and R. Junco (coords.), 1–6. INAH, Mexico.

Archaeology, Top-Ten Discoveries of 2014. January–February 2015, 24–25.

Barba Meinecke, H. 2017. A una década de arqueología subacuática en la Península de Yucatán. Paper presented at the Tercera Convención Mexicana de Hidrografía, Ciudad del Carmen, Campeche. To be published by Secretaría de Marina (SEMAR).

Carrillo Márquez, L.R. 2010. La riqueza natural y cultural de Banco Chinchorro. *Arqueología Mexicana* XVIII (105): 65–69.

Chatters, J.C., D.J. Kennett, Y. Asmerom, B.M. Kemp, V. Polyak, A. Nava Blank, P.A. Beddows, E. Reinhardt, J. Arroyo-Cabrales, D.A. Bolnick, R.S. Malhi, B.J. Culleton, P. Luna Erreguerena, D. Rissolo, S. Morell-hart, and T.W. Stafford Jr. 2014. Late Pleistocene Human Skeleton and mtDNA Link Paleoamericans and Modern Native Americans. *Science* 344: 750–754.

Chatters, J. C., V. Tiesler, A. Cucina, D. Arano, J. Chi Keb, and P. Luna Erreguerena. 2016. La Odontología de Naia: Reconstrucción de Condiciones de Vida y Afinidades Poblacionales de un Individuo del Pleistoceno Tardío. VIII Simposio Internacional El Hombre Temprano en América, November 17, Museo de Antropología, Xalapa, Veracruz, Mexico.

Chatters, C.J., D. Rissolo, J. Arroyo-Cabrales, T.W. Stafford Jr., B.M. Kemp, A. Álvarez, A. Nava Blank, P.A. Beddows, E. Reinhardt, S. Kovacs, S. Collins, S. Morell hart, R. Chávez arce, S. Bird, and P. Luna Erreguerena. 2017. Hoyo Negro: Tapping the paleoanthropological and paleoecological potential of a deeply submerged underground chamber on the Yucatan Peninsula, Mexico, Chapter 6. In *The archaeology of underwater caves*, ed. Peter B. Campbell, 119–297. Southampton, UK: Highfield Press.

Junco, R. 2009. Arqueología subacuática: descifrando los misterios del Nevado de Toluca. In *Las Aguas Celestiales: Nevado de Toluca*, ed. P. Luna, A. Montero, R. Junco (Coords.), 23–29. INAH, Mexico.

Junco, R. 2012. Memorias 2007–2012. Proyecto de Arqueología Subacuática Galeón de Manila, Baja California. Technical file, Vice Directorate of Underwater Archaeology. INAH.

Junco, R. 2017. Tarjeta de Proyecto. Galeón de Manila, Baja California. Technical file, Vice Directorate of Underwater Archaeology. INAH.

Junco Sánchez, R., and F. Trejo.2016. The 2012 field season of the 1630–1631 New Spain fleet archaeological project in the Gulf of Mexico. 49th SHA Conference on Historical and Underwater Archaeology. *Underwater Archaeology Proceedings*, ed. P.F. Johnston, 79–83.

Luna Erreguerena, P. 2011–2012. Proyecto Arqueológico Subacuático Hoyo Negro, Tulum, Quintana Roo. Informe 2011–2012. Technical file. SAS/INAH, 92 pages.

Luna Erreguerena, P. 2013. Informe Campaña de Prospección Geofísica a bordo del B/O Justo Sierra. 3 mayo-15 junio 2012, Sonda de Campeche. Technical file. SAS/INAH, 66 pages.

Luna Erreguerena, P. 2014a. Mexico: Underwater archaeology. In *Global archaeology encyclopedia*, vol. 1, 4864–4872. Springer, New York, USA.

Luna Erreguerena, P. 2014b. Challenges as stepping stones: Mexico's experience. In *Maritime heritage interpretation. Between the devil and the deep. Meeting challenges in the public interpretation of maritime cultural heritage*, ed. D.A. Scott-Ireton, 189–196. Springer.

Luna Erreguerena, P. 2014c. Proyecto Arqueológico Subacuático Hoyo Negro, Tulum, Quintana Roo. Informe de Actividades 2014. Technical file. SAS/INAH, 100 pages.

McDonald, H. G, J. C. Chatters, and T. J. Gaudin. 2017. A new genus of megalonychid ground sloth (Mammalia, Xenarthra) from the late Pleistocene of Quintana Roo, Mexico. *Journal of Vertebrate Paleontology.* https://doi.org/10.1080/02724634.2017.1307206. Published online: 08 Jun 2017. (14 pages).

Montero García, I. A. 2009. Arqueoastronomía. In *Las Aguas Celestiales. Nevado de Toluca*, ed. P. Luna, A. Montero and R. Junco (Coords.), 69–78. INAH, Mexico.

Sugiura, Y. 2009. Lo que nos cuenta la cerámica acerca de la singular importancia del Nevado de Toluca. In *Las Aguas Celestiales. Nevado de Toluca*, ed. P. Luna, A. Montero and R. Junco (Coords.), 38–41. INAH, Mexico.

Tarlach, G. 2014. Top 100 Stories of 2014. #7 Ancient Genome Sequences Settle First Americans Debate. *Discover Magazine*, Jan–Feb 2015: 18–19.

Further Reading

Collins, S.V., E.G. Reinhardt, D. Rissolo, J.C. Chatters, A. Nava blank, and P. Luna Erreguerena. 2015. Reconstructing water level in Hoyo Negro. Quintana Roo, Mexico, implications for early Paleoamerican and faunal access. *Quaternary Science Reviews* 124: 68–83.

Mainou, L. M. 2009. Bastones de mando y púas de Maguey. In *Las Aguas Celestiales: Nevado de Toluca,* ed. P. Luna, A. Montero, R. Junco (Coords.), 135–138. INAH, Mexico.

Trejo Rivera, F. 2008. El naufragio de *Nuestra Señora del Juncal*: una aproximación a la navegación trasatlántica en el siglo XVII. Cuaderno de Estudios Borjanos, vols.

L-LI Borja, Centro de Estudios Borjanos/Institución Fernando el Católico 2007–2008, 237–256.
Vigliani, S. and R. Junco (Coords.). 2013. *Bajo el volcán. Vida y ritualidad en torno al Nevado de Toluca*. INAH, Mexico.

Mexico's Heritage and Management

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Introduction

Mexico's heritage is here defined to approach the advantages and disadvantages of having a national preservation model. The pages that follow, critically, examine how the need to modernize the nation has historically and politically defined Mexico's concept of heritage. Mexico's desire for economic growth is pressuring the National Institute of Anthropology and History (Instituto Nacional de Antropología e Historia [INAH]), the stewards of Mexico's heritage, to adopt a private sector-based model. In the absence of a regulated process, the participation of the private industry has become a liability, not a preservation asset that could create a fertile employment field in heritage management, with a positive impact on Mexico's GDP (gross domestic product).

Lessons of public unrest are leading to the realization that after a century of infrastructure building and promotion of urban lifeways, Mexico's urban spaces have already created a sense of place attachment among its dwellers. Mexico's citizens demand the protection of novel heritage resources by taking their plea to the streets. Therefore, social unrest is forcing a revision of the legal frameworks defining Mexico's heritage. As will be discussed here, the model to successfully achieve a higher level of heritage protection at less cost to the government and the people of Mexico is already under configuration, amid national and international pressures.

Mexico's Definition of Heritage

Mexico defines her heritage as a patrimony comprised of three different types of properties (archaeological, artistic, and historic monuments). The National Institute of Anthropology and History is the steward of these properties, linked to the nation's history. The *Ley Federal sobre Monumentos y Zonas Arqueológicos, Artísticos e Históricos*, its regulatory framework, also known as 'Ley de 72', and still valid today, defines archaeological monuments, as the natural and built environment of those present before the arrival of the Spaniards in the 16th, including their created objects, and their human remains. Historic monuments include written documents and scientific collections, as well as, religious, military, and state architecture built between the sixteenth and nineteenth centuries. Beyond the twentieth century, heritage is defined in terms of immovable and movable modern properties, exhibiting relevant aesthetic values. The preservation process establishes the priority to protect archaeological properties over artistic and historic monuments.

Given the inalienable nature of Mexico's archaeological properties, their transfer of ownership or trading is prohibited, and sanctioned by Law. Historical and artistic properties may remain in private custody, with the ensuing responsibility to be preserved, always, under the supervision and permission of the institution. When the proprietor fails to preserve its property, INAH will carry out its preservation, and the costs absorbed by Mexico's Treasury Department. INAH is the trusted appointee to oversee the management and preservation of Mexico's heritage resources and absorbs the full costs of preservation through an assigned federal budget.

Historical Background

Mexico's definition of heritage is the result of a wide spread phenomenon in the nineteenth century of considering history as a crucial element with which to construct nations and national identity (Berger 2007). Creating national historical consciousness through monuments was very much within the spirit of the French Revolution.

In order to create such consciousness, Mexico debated which characteristics defined her national identity, as many other colonized nations did. After Mexico's Independence in 1810, the debate was divided between the conservative voices that defended Mexico's Spanish past and the liberal expressions that refused to accept that the Spanish colonial past should be part of her national identity (Berger 2007: 94). A "reconciling approach," sketched in *México a través de los siglos*, a publication by Vicente Riva Palacio, as noted by Berger (2007: 95), gave equal prominence to the nation's indigenous past and Spanish legacy, giving rise to the mestizo, her new ethnicity. The new and independent nation prohibited the extraction of Mexico's monuments, as early as 1827 (Schroeder Cordero 1983: 672). The National Museum of Mexico, founded in 1825, continues to display Mexico's past and her indigenous cultures in what it is now the Museo Nacional de Antropología.

The Mexican Revolution shaped the route for Mexico to become a modern nation in the twentieth century. Mexico had to transform the miserable living conditions of the *indios*, that after centuries of oppression under the Spanish Crown, had left them in a stage of physical, intellectual, moral, and economic underdevelopment, if the nation was to become a great country like Germany, France, or Japan, said Gamio (1916: 10). Given that "the Indian possesses a civilization of his own, which, however attractive and present the higher the degree of evolution, has lagged behind contemporary civilization" (Gamio 1916: 172). To remove these "incapacities" (Caso 1958: 52), and for the indigenous populations to contribute to Mexico's economic growth and development, their incorporation to Mexico's modern society was needed. In other words, modernizing the nation required the cultural homogenization of the country (Díaz-Polanco 1997). Few discourses of nationhood have been so contradictory, as the forging of the Mexican State, considering the indigenous life ways, their beliefs, and their illiteracy in Spanish, an impediment for economic growth as obstructions to economic growth, and at the same time, as symbols of her identity.

Despite the paradox, Mexico became one of the first countries to consider the protection of its heritage, as a fundamental responsibility of the federal government by the end of the nineteenth century. In modeling Mexico after France, a desire embodied in the architecture of downtown Mexico City, President Porfirio Díaz declared archaeological monuments as national properties in 1897, issuing in 1902, a formal law to protect them (Schroeder Cordero 1983: 672). In 1914, Mexico considered the preservation of historic and artistic monuments, including the beauty of her natural landscapes, in the *Ley sobre Conservación de Monumentos Históricos, Artísticos y Bellezas Naturales* (Rodríguez Morales 2011). Legislating over Mexico's monuments and natural landscapes led to the creation of an auditing institution, the *Inspección Nacional de Monumentos Artísticos e Históricos*, overseen by the secretariat of the Beaux Arts, the *Secretaría de Instrucción Pública y Bellas Artes* (Rodríguez Morales 2011: 206). In 1934, Abelardo L. Rodriguez, interim president of Mexico, enacted the *Ley sobre protección y conservación de monumentos arqueológicos e históricos, poblaciones típicas y lugares de belleza natural*, a law protecting archaeological and historical monuments, as well as traditional communities and sites of unique natural beauty, possibly inspired by the Athens Charter. (SEP 1934), possibly inspired by the Athens Charter, that even paid attention to traditional communities.

In 1939, President Lázaro Cárdenas the founding of the mandated the National Institute of Anthropology and History with the responsibility to protect the nation's patrimony and to help the federal government to promote their economic and social welfare programs. The preservation of Mexico's heritage has been bounded, for more than a century to economic growth. To create economic value from Mexico's heritage, President Cardenas considered the fostering of tourism as a viable economic activity for heritage preservation and poverty reduction, as with it comes the need to create services and goods, stimulating employment (López Varela 2014a). This "business model" determined archaeologists to be the only professionals to have the right qualifications to excavate the "ruins" of Mexico and to promote its rich history, qualifications acquired back then, at the Anthropology Department of the School of

Biological Sciences of the *Instituto Politécnico Nacional*, and since 1946, at the National School of Anthropology and History (Escuela Nacional de Antropología e Historia-ENAH). The "Escuela" is mostly responsible for educating students in archaeology, even though the discipline can be studied at public universities. During his presidential term, Miguel Alemán mandated the creation of the National Indigenous Institute (Instituto Nacional Indigenista [INI]) and the National Institute of Beaux Arts and Literature (Instituto Nacional de Bellas Artes y Literatura [INBAL]) to promote further assistance in the modernization of the nation and the management of heritage resources. The institutionalization of Mexico's heritage preservation included the foundation of the National Museum of Anthropology in 1940, by President Manuel Ávila Camacho. The Museum moved to its current premises in 1964.

The national heritage preservation model guides the practice and learning of archaeology and anthropology in Mexico. This model vests INAH to conduct most archaeological excavations, conservation and preservation activities, as well as, salvage work in Mexico. INAH oversees 120 museums, more than 100 thousand historic monuments built between the sixteenth and nineteenth centuries, and 29 thousand registered archaeological sites, of which, only 181 may be visited by the general public. INAH looks after Mexico's World Heritage sites (N: 34).

Debating Mexico's National Preservation Model

In 2015, the Mexican government created the Secretariat of Culture, disaggregating INAH's original federal mandate by creating the Dirección General de Sitios y Monumentos del Patrimonio Cultural (General Bureau of Cultural Heritage Sites and Monuments), and leaving under its jurisdiction the preservation and restoration of cultural heritage, the issuing of heritage preservation policy, all activities related to site management plans, and the responsibility of following international treaties regarding World Heritage sites (DOF 2016). This is not the first time that INAH has gone through a "federal reengineering." The creation of the National Council for the Arts and Culture (Consejo Nacional para la Cultura y las Artes-CONACULTA) in 1988, restrained the federal responsibility of the "Instituto" to preserve Mexico's heritage (Yañez Reyes 2006). In fact, when the government of Yucatan bought the main core center of Chichén Itza from the INAH in 2010, in the midst of a heated debate and indifference by UNESCO, the approved transfer of ownership, set up a different management system to oversee and control heritage resources in Mexico. Having a federal mandated process of heritage management and preservation, invested in a single institution, was one of the strongest assets to protect cultural heritage in Mexico. Although the heritage management process was far from being perfect, it set professional and legal standards for the stewardship of cultural heritage across the country.

Absorbing the full cost of heritage management by the federal government is one of the strongest flaws of having a national preservation model. First, federal budget expenditure among federal institutions is not balanced. Since other federal institutions require more money to support Mexico's sexennial development plan, INAH operates with a limited budget (Paredes Gudiño 2006). Nearly 60% of INAH's annual budget is destined to pay salaries (López Varela 2014a: 83), leaving a very short margin to fund substantial research and heritage related activities (Yañez Reyes 2006: 63) and to contract more personnel to research and protect the thousands of national properties under its custody. The national heritage business model has a low capacity of generating employment, as every job will take a toll on INAH's operational budget. Having a limited budget is detrimental to heritage preservation. Without taking into account, who is responsible for the tragic demolition with heavy machinery of the Chapel of Santo Cristo in the State of Tlaxcala, its destruction demonstrates INAH's limitations to fulfill its mandate in the absence of a budget to contract more personnel to oversee the protection of Mexico's heritage. Limited funding, additionally, has been a major impediment to protect heritage resources against infrastructure development (Carballal Staedtler and Moguel Cos 2007; García Bárcena 2007), one of the main strategies of economic growth.

Finding a solution to budget limitations has stretched the limits of the national heritage preservation model, by allowing the participation of the private sector, an experience that has proved quite unfortunate for the preservation of heritage resources (López Varela 2014a: 83–84). Partnering with a private industry, in the absence of a regulated contracting process of private companies, resulted in the severe damage of the equestrian bronze sculpture of King Charles IV of Spain, casted by Manuel Tolsá in 1802, during its restoration. The unfortunate damage of one of Mexico's downtown historic monuments, which took place without INAH's permission, reveals the uncoordinated and overlapping functions of local, federal, and private institutions to protect and promote Mexico's heritage, introduced by structural reforms, the creation of new secretariats, and private trusts. These actions have taken place without revising their legal frameworks against INAH's regulations.

In Mexico City, for example, INAH shares its federal mandate with Mexico's City Secretariat of Culture (Secretaría de Cultura del Distrito Federal), the authority for downtown's historic center (Autoridad del Centro Histórico), and Mexico's City Historical Center Foundation (Fundación del Centro Histórico de la Ciudad de México A.C.). After UNESCO declared downtown Mexico City a World Heritage Site in 1990, the local government and the private industry established a trust, the *Fideicomiso de la Ciudad de México*, to support the restoration and conservation of its buildings (López Varela 2014a: 84). Now a public entity, the "Fideicomiso," linked to a citizen council headed by business magnate Carlos Slim Helú, who also sponsored the creation of the Historical Center Foundation, contracted the private company that damaged Tolsa's monument.

Increasingly, INAH faces the consequences of infrastructure building. Mexico's citizens have taken to the streets their discontent against INAH's inability to protect their heritage against infrastructure building. Their concept of heritage distances itself from the national definition, as demonstrated by their discontent, during the construction of a COSTCO store on the grounds of the hotel *El Casino de la Selva*, located in Cuernavaca, in the State of Morelos (López Varela 2014b). Its demolition revealed the hidden existence of new forms of valued resources by Mexico's citizens. While building land-use plans for the State of Morelos (López Varela 2014b), the average citizen demanded the preservation of a football soccer court, a movie theater, a hotel, a modern avenue, a shopping mall, or a viewshed.

By promoting culture in UNESCO's terms, INAH contributes to one of the many strategies dictated by world institutions such as the World Bank and the International Monetary Fund, to demonstrate Mexico has reached the needed economic indexes to qualify as a developed, democratic, and sustainable economy. Mexico's need for competitiveness in the global economy has led the government to believe in UNESCO's (2008: 8) promise that, World Heritage sites are "big businesses" with turnovers of millions of dollars a year. Additionally, transnational companies, such as Coca-Cola, are driven forces configuring and marketing the identity of Mexico's national patrimony by supporting INAH's initiative of inscribing sites within UNESCO's World Heritage List. Therefore, Mexico has more World Heritage sites than any other country in the Americas. Unfortunately, heritage sites are not returning the expected revenue. Mexico's limited economic growth can explain the decreasing number of national visitors to archaeological sites between 2015 and 2016. When it comes to visiting archaeological sites and museums in states in which criminal activity is self-evident, there are hardly any visitors, as demonstrated by the available statistics issued by Mexico's Secretariat of Tourism.

Given that Mexico has not transcended beyond a monumental approach to define her heritage, absence from the national preservation model is a legal framework to protect indigenous lifeways and knowledge, against economic growth. The preservation of these fundamental traits of Mexico's national identity is not only threatened by its own model of economic growth, anthropology has been central in their fading away. In supporting Mexico's evident need to alleviate poverty levels and to become a modern nation, anthropologists promoted acculturating policies without coercion. With their support to evaluate those positive aspects of the indigenous lifeways that were to be preserved for the future (Caso

1958: 52), these policies disseminated modern ideas among the indigenous populations, including the use of the Spanish language. The strategy is at the center of the extinction of tongues and dialects in Mexico, and of those lifeways that the government wants so much to preserve as part of her identity.

The problem does not end here. Mexico's indigenous populations have been considered the face of poverty. It is assumed that indigenous populations live in rural areas with less than 2500 inhabitants. When this number is exceeded, they can no longer be the recipients of social development policies to alleviate poverty and promote welfare. Their perception of being indigenous, as a proxy for the allocation of resources, is not a strong solution. There are communities that do not understand the word indigenous, nor does it constitute part of their identity. At Cuentepec in the State of Morelos (López Varela 2010), the population stated they are Mexicans, because they speak *Mejicano* the local native tongue. The appropriation of the indigenous identity, however, is slowly permeating in the community through the introduction of development policies. The population understands they are indigenous because "they say we are," "we are poor and speak náhuatl," or "it is predetermined by the *indigenistas* that we are" (López Varela 2012, 2015).

Learning from Other Models of Heritage Management

Many countries around the world have developed a heritage industry to effectively preserve cultural heritage and to contribute to economic growth through the business of archaeology, mostly, as a response to the strategies of economic growth and development. The American Cultural Resources Association, a national trade association in the United Sates, sets standards to its 1300 firms private firms of all sizes. While advocating for the shared ideals of the industry, these private firms employ nearly 10,000 professionals, including archaeologists, historians, architects, and architectural historians. Together, they generate an annual revenue of almost 1 billion USD.

Mexico is one of the few countries left without a private heritage industry, even if the government believes in heritage as a proxy for economic growth and development, and INAH has given the first steps to assign the responsibility to protect Mexico's heritage to the private sector. Indeed, expanding the differentiation between responsibility and the activities of compliance leads to more effective ways of protecting heritage resources over the national model approach. The emergent partnership with the private sector alleviates the federal government to absorb the full costs of heritage management. Private entities have been permitted by INAH to conduct many of its activities, as demonstrated by the numerous projects funded by Roberto Hernández Ramírez, a well-known banker, serving as international member of the Federal Reserve Bank of New York. Still, the government has to find a way to shift the benefits of this emerging model beyond Mexico's wealthiest citizens and transnational companies and to create working opportunities for her professionals trained in the protection of heritage resources.

In the absence of a process to regulate the quality of the intervention of private companies and their responsibilities, Mexico's government and citizens will continue to pay the price for their mistakes. The damage to the equestrian sculpture by Tolsa is an interesting case in which the government and its citizens, through tax revenue, had to pay for the restoration, not the private company that caused its damage. Since the Organization for Economic Co-operation and Development recommended its members to measure the benefits and adversities of a proposed development project on the environment in 1972, Mexico adopted the recommended polluter pays principle (PPP), in which the developer is responsible for allocating the necessary funds to protect natural resources from development policies or actions by a federal institution or a private contractor. The PPP is the driver financing the CRM industry. Any action by a private or a government entity that has the potential to have an impact on the preservation of heritage resources needs to be measured and the costs of the preservation absorbed by the entity. The PPP does not rule heritage preservation in Mexico and it should.

Creating value from heritage, however, requires a structural change, breaking with past trends and theories, and the ways the Mexican government understands a business economy and projections. When cultural heritage is reduced to an aesthetic dimension for entertainment and not for increasing human capital through the knowledge of history (Montella 2015: 1), it is difficult to create economic value from heritage. The idea that Mexico could create economic value from its rich cultural history by offering it to the tourist industry is no longer a viable option. Mexico is facing high rates of violence and criminal activity. Therefore, cultural heritage is hardly a source of wealth and a magnet for tourism, failing to stimulate spending and to create jobs (López Varela 2014a).

Economic growth is forcing a revision of Mexico's heritage definition and management process and legal background. Moving away from an eighteenth-century approach to heritage and management might be the healthiest way to end the constant unrest and conflict during infrastructure planning and building. The people of Mexico must have a saying as to what is important to preserve, and their voices must not be subordinated to national and international institutions and expert knowledge deciding what their values and traditions must be. There is much to learn from the international experience of adopting a social approach to archaeology and the private heritage industry. In other countries, the applied sector is concerned with the preservation of heritage values in contemporary societies that include a wide range of properties, usually defined, without temporal limits, location restrictions, and scales of significance. Excluding the understanding that tomorrow's archaeological sites are being created today, that history is happening now, and that the material expressions of modern life are the cultural heritage of the nation's future is of great tragedy to the nation, as there are hardly any "material records" of her modern history under the national model approach.

Future Directions

Reaching high growth economic levels requires the Mexican government to follow policies and regulations established by major institutions around the world. Most of these institutions provide Mexico with significant loans to reduce poverty levels and to increase its GDP. Most loans now require the submitting of development plans and management instruments to protect the environment, by considering social, economic, political criteria. Most doing the job in Mexico have been trained in environmental or biological sciences, with hardly any experience in heritage compliance. Mexican archaeologists are not fully trained in compliance, as their skills concentrate on studying the past. The future professional in archaeology requires a different training profile that the current educational model is unable to accommodate and to contribute to these new specifications. In the absence of local expertise, international environmental companies are offering their services to companies investing in the energy sector in Mexico and are capturing the revenue.

Adding to the pressures of Mexico's desire for economic growth, the World Bank (WB) and the Inter-American Development Bank (IDB) have understood that social pressure could affect its performance and profit. The World Bank approved the new Environmental and Social Framework in 2016, reinforcing its commitment to sustainable development in ways Mexico is simply not prepared to meet. Considering indigenous peoples and cultural heritage as part of the "Framework," the World Bank wants to ensure its projects enhance opportunities for indigenous peoples, by stating in their safeguards their right to participate and benefit from development, in ways that do not threaten their unique cultural identities and wellbeing. The World Bank requires a people-focused approach to mitigate the adverse impacts of its projects. This is exactly the opposite of how Mexico's institutions have operated for more than a century.

The IDB states it will not support operations that, in its opinion, significantly convert or degrade critical natural habitats, or that damage critical cultural sites. Its safeguards introduce a definition of heritage based on four values, not entirely included in Mexico's legislations. When assessing the value of a cultural heritage site or object, the IDB (2015) requires "value to communities," as an attribute to be taken into consideration in developing a project. Even if the "Institute" was an active participant in the elaboration of the IBD

safeguards, the "Ley de 72" dismisses alternative views of what heritage means to society. Requesting a loan from the IDB or the World Bank will eventually force the Mexican government to face the limitations of its national preservation model. The Mexican government is under pressure to change its current approach to heritage and its disassociation from people's values. The Mexican government will soon understand that attachment to place is the basis of social identity, that community engagement will enhance sustainability, that heritage is not only constituted of old and pretty things, but involves feelings of association and human emotions, and that embracing this definition is the way to bring significant revenue to the Mexican economy.

Cross-References

- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Heritage and Society
- ▶ Heritage and Public Policy
- ▶ Heritage: History and Context
- ▶ Museo Nacional de Antropología, México
- ▶ Nationalism and Archaeology

References

Berger, Stefan. 2007. *Writing the nation, a global perspective*. New York: Palgrave Macmillan.

Carballal Staedtler, Margarita, and Maria Antonieta Moguel Cos. 2007. Salvage and rescue archaeology in Mexico. *The SAA Archaeological Record* 7 (5): 23–25.

Caso, Alfonso. 1958. *Indigenismo*. México: Instituto Nacional Indigenista.

Díaz-Polanco, Héctor. 1997. *Indigenous peoples in Latin America, the quest for self-determination*, Latin American perspectives series. Boulder: Westview Press.

DOF, Diario Oficial de la Federación. 2016. *Reglamento Interior de la Secretaría de Cultura*. http://dof.gob.mx/nota_detalle.php?codigo=5460041&fecha=08/11/2016. [25.11.2016].

Gamio, Manuel. 1916. *Forjando Patria*. México: Librería de Porrúa Hermanos.

García Bárcena, Joaquín. 2007. Law and the practice of archaeology in Mexico. *The SAA Archaeological Record* 7 (5): 14–15.

Inter-American Development Bank (IDB). 2015. Managing the Impacts of IDB Projects on Cultural Heritage. Inter-American Development Bank. https://publications.iadb.org/handle/11319/7319.

López Varela, Sandra L. 2010. Construcciones de la modernidad en torno al comal: etnoarqueología de políticas de desarrollo. In *La arqueología en Morelos. Dinámicas sociales sobre las construcciones de la cultura material*, ed. Sandra L. López Varela, 201–236. Historia de Morelos, tierra, gente, tiempos del sur. Cuernavaca: Congreso del Estado de Morelos-LI Legislatura, UAEM, Ayuntamiento de Cuernavaca, Instituto de Cultura de Morelos.

López Varela, Sandra L. 2012. Arqueología de la Memoria: la producción del comal como un elemento mnemónico del combate a la pobreza. In *Culturas de la memoria: Teoría, historia y praxis simbólica*, ed. Friedhelm Schmidt-Welle. México: Siglo XXI Editores.

López Varela, Sandra L. 2014a. Teaching heritage business and marketing, a solution for heritage preservation. *Advances in Archaeological Practice* 2 (2): 80–90.

López Varela, Sandra L. 2014b. Sustainable heritage in Mexico: Archaeological soutions for infrastructure planning and building. *Open Journal of Archaeometry* 2: 73–76.

López Varela, Sandra L. 2015. Hacia una epistemología de la identidad mexicana: implicaciones para el crecimiento económico y el manejo del patrimonio cultural. *Reflexiones Marginales* 25(2). http://reflexionesmarginales.com/3.0/hacia-una-epistemologia-de-la-identidad-mexicana-implicaciones-para-el-crecimiento-economico-y-el-manejo-del-patrimonio-cultural/.

Montella, Massimo. 2015. Cultural value. In *Cultural heritage and value creation, towards new pathways*, ed. Gaetano M. Golinelli, 1–51. Cham: Springer.

Paredes Gudiño, Blanca. 2006. The present situation of the archaeological patrimony in the southwest basin of Mexico. In *Paper presented at the 71st annual meeting of the Society for American Archaeology*. San Juan: Puerto Rico.

Rodríguez Morales, Leopoldo. 2011. Ley sobre conservación de monumentos históricos y artísticos y bellezas naturales, promulgada el 6 de abril de 1914. *Boletín de Monumentos Históricos Tercera Época* 21: 206–211.

Schroeder Cordero, Francisco Arturo. 1983. *Legislación protectora de los monumentos y zonas de monumentos en México. In Memoria del III Congreso de Historia del Derecho Mexicano*, ed. José Luis Soberanes Fernández. México: Universidad Nacional Autónoma de México.

SEP, (Secretaría de Educación Pública). 1934. LEY sobre protección y conservación de monumentos arqueológicos e históricos, poblaciones típicas y lugares de belleza natural. Diario Oficial de la Federación.

UNESCO. 2008. *Business planning for natural world heritage sites – a toolkit*. Paris: UNESCO. http://whc.unesco.org/en/businessplanningtoolkit/.

Yañez Reyes, Sergio. 2006. El Instituto Nacional de Antropología e Historia: antecedentes, trayectoria y cambios a partir de la creación del CONACULTA. *Cuicuilco* 13 (38): 47–72.

Microcomputerized Tomography (MicroCT) in Archaeology

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Introduction

A growing number of museums and other institutions involved in archaeological and paleontological research are acquiring or developing 3D imaging systems based on X-ray microcomputerized tomography (microCT) (Fig. 1). This X-ray technique evolved from conventional clinical CT scanning, with more than two orders of magnitude increase in space resolution and a great enhancement in image contrast. The past 20 years have witnessed advances in X-ray microCT as a result of advances in X-ray sources (microfocus tubes and synchrotron radiation), 2D detectors (charged-coupled devices, flat-panel detectors, and silicon microstrip sensors), and front-end microelectronics for data acquisition. Advances in computer processing speed and storage memory capacity have also been crucial for the progress of microCT.

MicroCT can reveal, with a resolution down to less than 1 μm, the inner microstructural features of fossil remains and artifacts in archaeological studies. Analyses can be applied to a variety of "hard" materials, such as fossil human teeth and bones; artifacts in metal, glass, ceramics, and stone; and "soft" materials, such as textiles, wood, and paper. Each kind of material requires a different analytical strategy. In particular, effects due to the high dose delivered to some materials of interest, such as the teeth and other precious ancient human remains, should be minimized as they could preclude further analyses. MicroCT scanners are available commercially, but some groups are developing dedicated systems, specifically designed for applications in archaeology, paleontology, and cultural heritage, with space resolutions from submicron, for small mm-size objects, to tens of microns for 10–20-cm-size objects. Portable systems for very large objects (e.g., archaeological objects that cannot be easily moved from the museum) have been designed or are being planned.

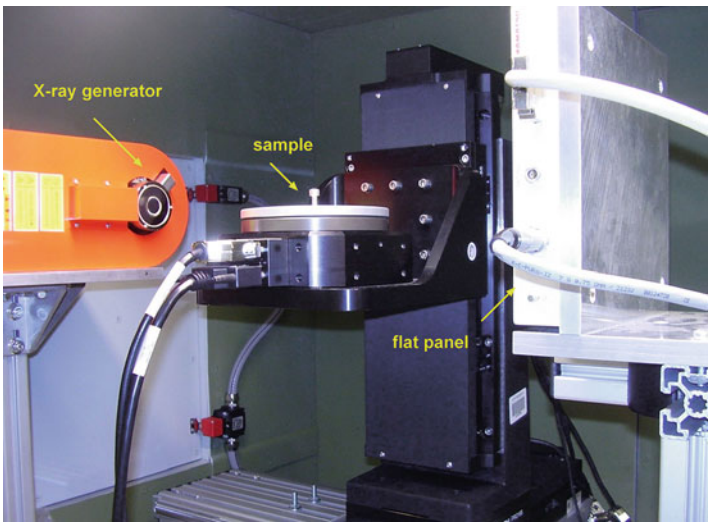

Microcomputerized Tomography (MicroCT) in Archaeology, Fig. 1 The microCT dedicated to cultural heritage and paleoanthropology at the "Abdus Salam" International Centre for Theoretical Physics in Trieste, Italy. The system is equipped with a microfocus X-ray tube (*left*) and a flat-panel sensor (*right*). High-precision horizontal and vertical stages allow fine movements and precise alignment of the sample (Tuniz et al. 2013)

Paleoanthropological specimens include human crania, teeth, and postcranial bones, with ages from the Miocene to the Holocene. Other analyses of archaeological interest involve Paleolithic flutes, ancient mommies, stone tools, and wooden statues.

Definition

Computerized axial tomography (CAT) was developed in 1972 by Godfrey Hounsfield and Allan Cormack, who received the Nobel Prize in Physiology and Medicine. CAT devices are based on the use of multiple radiographies taken from different angles around a single axis of rotation. In a conventional CAT, the X-ray source is rotated around the part of the body to be imaged, while the X-ray sensor is positioned on the opposite side. Each radiography thus obtained is based on the absorption or scattering of the primary beam by its interactions with the constituents of the object. The transmitted beam intensity follows an exponential law depending on the linear attenuation coefficient (related to the atomic number and density of the sample constituents) and the sample thickness. Hundreds of radiographies are stored in the memory of a computer and 3D images, including slices of internal parts of the body, are then reconstructed using mathematical algorithms. The most common technique is the "filtered back projection," based on mathematical methods developed in 1917 by the mathematician Johann Radon. Medical CAT systems, often using a spiral scan, have typical resolutions of 0.5–0.3 mm, which is insufficient in many applications of interest to archaeology, where structures on the microscale can be of high interest.

MicroCT was developed in the late 1980s (see, e.g., Feldkamp et al. 1989) using microfocus X-ray tubes, image intensifiers, and cone-beam reconstruction. In these systems, the X-ray source/detector system is kept fixed, while the sample is rotated at various angles. Thousands of digital radiographies are taken using an advanced detector that combines a scintillator and a CCD camera or a flat-panel detector. X-rays penetrate the sample and are detected by a scintillator, which converts them into visible light. Projection images are magnified by microscope optics and digitized to reconstruct 3D images. As for planar imaging, microCT can be performed either in absorption or phase-sensitive modality (in edge detection or in holography regime), depending on the sample-to-detector distance. Resolutions of a few microns (sometimes down to few tenths of micron) can be achieved with these systems, but there are limitations due to the polychromatic X-ray spectrum.

The use of third-generation synchrotron radiation sources offers particular advantages in microCT imaging. The use of monochromatic beams is important for limiting the "beam hardening" effect, often a serious limitation for conventional polychromatic X-ray sources in the analysis of archaeological samples, particularly fossil bones and teeth. This artifact is produced by the low-energy X-rays of the spectrum, which are more absorbed in the sample than the high-energy ones, producing images with brighter sample borders. This effect is stronger in highly mineralized fossils.

Moreover, the high spatial coherence of the X-rays allows the application of phase-contrast techniques. This method is important for imaging samples with structures made of materials with small differences in their attenuation coefficients, indistinguishable using absorption imaging. Fossilized materials have a very small absorption contrast and benefit from the analysis with phase-contrast techniques.

Three-dimensional imaging of specific elements can be obtained by combining microtomography with X-ray fluorescence induced by a scanning micron-size beam (micro-XRF). The development of these methodologies is based not only on the availability of third-generation X-ray facilities but also on recent advances in computer technology, both in terms of processing speed and memory availability, considering that images corresponding to many gigabytes of data can be collected in few minutes of irradiation time.

Transportable microCT systems are becoming available thanks to progress in compact X-ray detectors and electronics, allowing in situ nondestructive analysis of archaeological materials. They can be used in museums to study precious and non-movable objects (Morigi et al. 2010). MicroCT systems based on polychromatic microfocus X-ray tubes can be used for phase-contrast imaging (Wilkins et al. 1996).

Key Issues/Current Debates/Future Directions/Examples

MicroCT is opening a new era in paleoanthropology (Fig. 2), where hominin remains can be finally studied "nondestructively" (this point will be further discussed below) (Mazurier et al. 2006; Tafforeau et al. 2006, Macchiarelli et al. 2006). It is now possible to reconstruct virtually their skulls, extracting them from the rock matrix and correcting for possible plastic distortions. The resulting data are the base for modeling ontogenic processes and biomechanical properties on different skull elements, including the endocranium, maxilla, ear labyrinth, and hyoid bone. Quantitative studies of specific internal structures are possible with the use of advanced mathematical tools, including finite element analysis. Information of crucial interest for evolutionary studies includes quantitative analyses of the enamel and dentin. MicroCT has been also used to check collagen preservation in fossil bones, before the use of invasive methods such as those required for radiocarbon dating (Beck et al. 2012).

Microcomputerized Tomography (MicroCT) in Archaeology, Fig. 2 Juvenile Neanderthal mandible from Molare, with the *lower-left* second deciduous molar virtually extracted and the tooth tissues of this same element showed by transparency (Tuniz et al. 2012)

MicroCT has been proposed as the technique of choice for creating a depository of "virtual" stone tools that could be shared by scientific groups interested to study human behavior. Imaging capabilities based on microCT are introducing "virtual anthropology" as part of the general strategies for the preservation, management, and promotion of natural history collections. This will also offer novel pedagogical approaches for schools and the public (Balzeau et al. 2010).

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Examples of Special Analyses

A cave bear femur with two holes was found in 1995 in the Middle Paleolithic layers of the Cave Divje Babe I in Slovenia. The bone was interpreted as a Neanderthal flute, but some scholars firmly rejected this hypothesis, on the basis of taphonomic observations, suggesting a carnivore origin for the holes. MicroCT analyses (Fig. 3) show that originally there were four holes and that a thin bone layer was removed in correspondence of the holes, suggesting a possible human intervention for facilitating perforation. It was concluded that we couldn't yet rule out a Neanderthal manufacture (Tuniz et al. 2011).

Stone artifacts provide valuable insight into the evolution of human behavior and cognition. The use of CT scans to create 3D models of stone tools opens the broad access to information about lithic technology and typology and allows the critical assessment of the human or natural processes involved. The efficacy of microCT for visualizing

flint artifacts was tested using a single flake and a refitting group of flakes with a laboratory microscanner (Abel et al. 2011), showing all the advantages of the technique.

The characterization of prehistoric pottery fragments presents a quite complex task. In provenance studies, petrographic and chemical analyses of the ceramic materials are employed to investigate potential production areas in respect to the geological background. Moreover, also the production technology of the firing process, as well as the forming techniques used by the prehistoric potters, is of great interest. Ceramic fragments from the late Mesolithic to Neolithic site Hamburg-Boberg 15 (northern Germany) were analyzed by X-ray microCT, combining quantification and shape analysis of fabric components by means of computer-aided image processing (Kahl and Ramminger 2012). Recently, a new class of metal-imitating pottery has been described using SR microCT and an accurate use of data treatment algorithms (Agostino et al. 2016). Furthermore, the microCT method permits the characterization of the connectivity within the porous system, as well as the analysis of the orientation of the pore structures, which are indicative for vessel-forming techniques.

During burial in soil, archaeological glasses develop corrosion phenomena, which might be represented by a thin surface layer in the range of nanometers up to a few millimeters. Degradation may affect the fragment homogeneously, or it may be concentrated to spots and local cracks. Depending on the impact of different environmental situations (soil, humidity, pollutants, microorganisms), the corrosion process leads to significant changes in the chemical composition as well as to a change of the morphology of degraded areas and layers. Due to the high material contrast of phase-contrast X-ray microCT, a number of interesting phenomena have been visualized in the reconstructed tomograms. Defects inside the glass and the corrosion layers, including thin laminated substructures, have been resolved. For the characterization of treated samples after conservation, moreover, the penetration of a coating or a consolidant into the micro-cracks of the corrosion layer needs to be controlled in order to guarantee a suitable adherence between the polymer and the surface of the glass object. Since conventional microCT is not able to detect a low-absorbing material inside a high-absorbing material such as glass, phase-contrast microCT has been used for this application, and a thick organic polymer coating and a comparatively thin inorganic coating applied on a fairly corroded glass surface could be visualized (Gerlach et al. 2006).

Archaeological wood, and waterlogged archaeological wood in particular, is almost always characterized by a modification in the original properties and structure of the wood. Degradation agents can be of different origins (biological, chemical, physical), and they are able to produce a large variability in the degradation of individual pieces, requiring their characterization for a proper conservation. X-ray microCT is a powerful tool, which provides three-dimensional information on the morphological characteristics of materials.

Furthermore, by means of suitable algorithms, it is possible to reconstruct a volumetric map of X-ray linear attenuation coefficient. X-ray microCT has been applied to the characterization of archaeological wood (Fig. 4) for the investigation of anatomical structure of wood (i.e., determination of wooden specie) and the assessment of wood degradation through the measurement of residual density (Dreossi et al. 2010) (Fig. 3).

MicroCT analysis is defined as a "nondestructive" technique, as X-ray scanning does not produce visible structural damage to the tissue of the specimen. X-rays interact with the atomic electrons of the material, mainly via photoelectric and Compton scattering, with the release of energy in the tissue (called absorbed dose and measured in gray). These ionization effects become evident in case of submicron imaging of the teeth using powerful beams such as those produced by the European Synchrotron Radiation Facility (ESRF) in Grenoble (France), which can cause temporary darkening of the tooth surface. The ESRF scientists suggest to

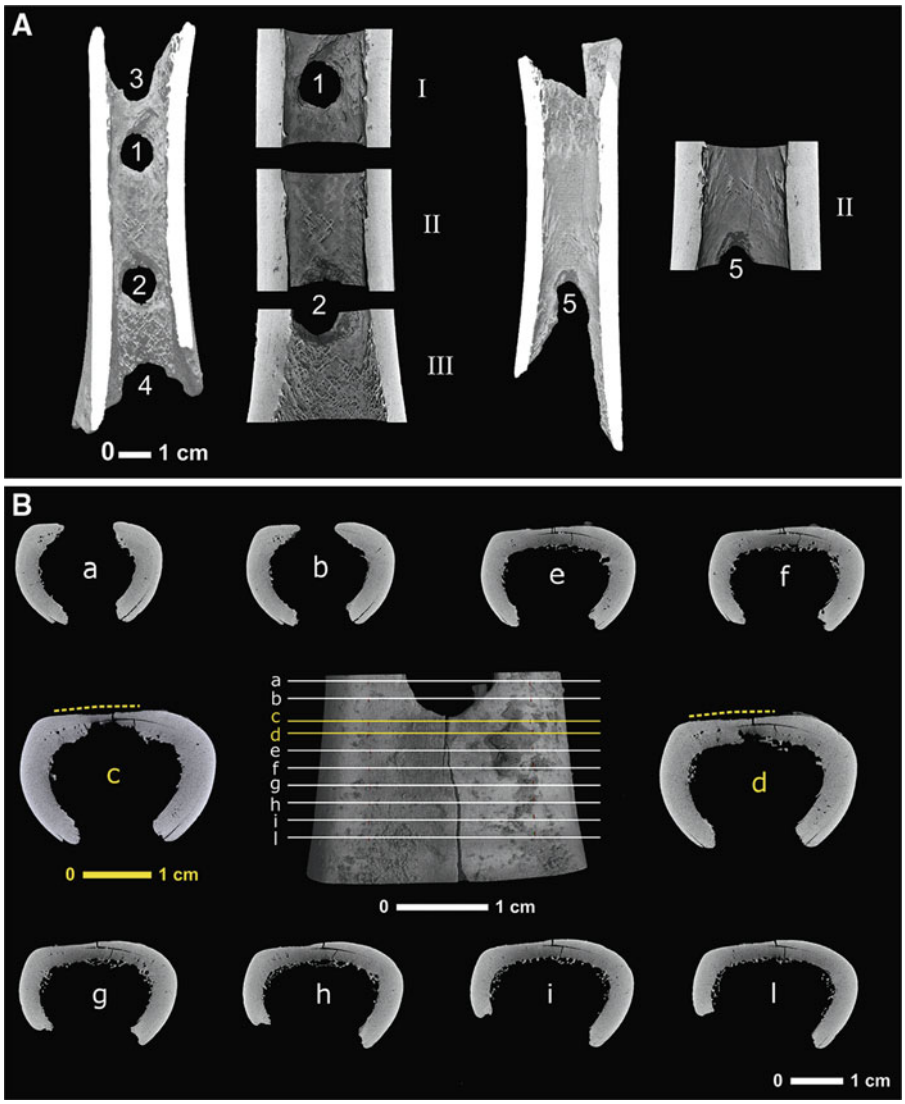

Microcomputerized Tomography (MicroCT) in Archaeology, Fig. 3 (**a**) Volume renderings of the "Neanderthal flute" (40-mm voxel size), showing the inner morphology for the holes. (**b**) Ten virtual transverse slices through Part III of the "flute" (Tuniz et al. 2011)

use UV light to restore the original color of the enamel (Tafforeau and Smith 2008). Further studies are in progress to understand the structural damage of the fossil teeth and bones by the ionization effects of X-rays, particularly for synchrotron radiation (Richards et al. 2012). In any case, possible damages, even if only at the microscopic level, are creating anxiety in museum curators. The progress in paleogenetic studies is increasing the value of paleontological collections stored in natural history museums, which should be preserved as much as possible in the original conditions and remain available for future generations of scientists.

A high dose is absorbed in the material during the relatively long scanning time (up to several

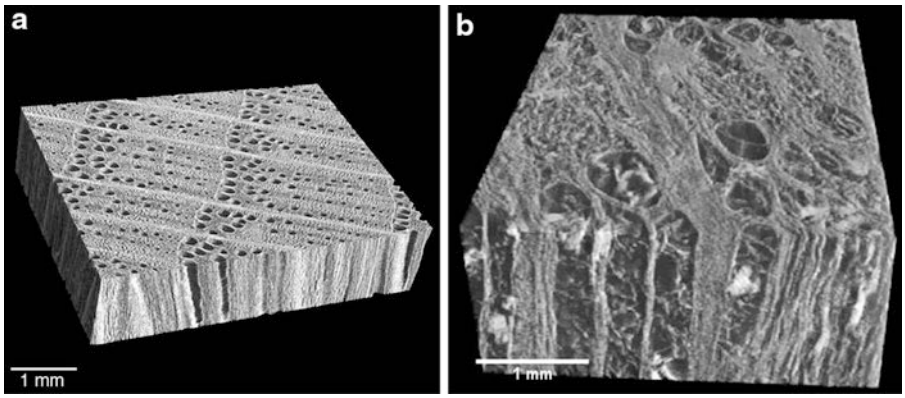

Microcomputerized Tomography (MicroCT) in Archaeology, Fig. 4 A three-dimensional rendering of recent (**a**) and archaeological (**b**) oak (Dreossi et al. 2010)

hours) needed for the analyses, orders of magnitude higher than with medical CT. For example, the microCT analysis of a tooth can correspond to doses of several hundreds' gray that could be of thousands' gray when synchrotron radiation is used. The irradiation effects on ancient DNA from Pleistocene bones have been investigated using known dose levels (Immel et al. 2016). The study concludes that conventional microCT does not produce effects that would impair future genetic analyses, while synchrotron microCT could degrade the DNA significantly. In this case, some protocols and rules should be followed.

No quantifiable increased DNA strand fragmentation has been shown in bird skins preserved in museum, more than 100 years old, after standard CT scanning. The effect of X-ray irradiation could not be separated from the variability of pre-CT DNA fragmentation in different samples, caused by different preservation conditions (Paredes et al. 2012).

In crystalline structures, such as apatite in the tooth enamel, X-ray-induced ionization causes electrons in the crystal's atoms to jump to higher-energy states, remaining captured in electron "traps." When this effect is strong, as in the case of microCT, it precludes electron spin resonance (ESR) dating, based on the measurement of trapped electrons related to natural radioactivity effects, one of the few dating techniques that can be used to date directly human fossils with ages beyond the radiocarbon limit (Grün et al. 2012). Similar effects should be taken into account for other materials, such as ceramics, that can be dated with thermoluminescence.

Cross-References

▶ Archaeometry: Definition
▶ Dating Techniques in Archaeological Science

References

Abel, R.L., S. Parfitt, N. Ashton, S.G. Lewis, B. Scott, and C. Stringer. 2011. Digital preservation and dissemination of ancient lithic technology with modern micro-CT. *Computer & Graphics* 35: 878–884.

Agostino, R.G., S. Donato, T. Caruso, E. Colavita, F. Zanini, A. D'Alessio, D. Pisarra, and A. Taliano Grasso. 2016. Microtomographic studies as a tool in the identification of a new ceramic class: The metal-imitating pottery as grave goods among Brettians and Lucanians. *Microchemical Journal* 126: 138–148.

Balzeau, A., I. Crevecoeur, H. Rougier, A. Froment, E. Gilisses, E. Grimaud-Hervé, P. Mennecier, and P. Semal. 2010. Applications of imaging

methodologies to paleoanthropology. Beneficial results relating to the preservation, management and development of collections. *Comptes Rendus Palevol* 9: 265–275.

Beck, L., J.-P. Cuif, L. Pichon, S. Vaubaillon, M. Dambricourt Malassé, and R.L. Abel. 2012. Checking collagen preservation in archaeological bone by non-destructive studies (micro-CT and IBA). *Nuclear Instruments and Methods in Physics Research* 273: 2003–2007.

Dreossi, D., S. Favretto, M. Fioravanti, L. Mancini, L. Rigon, N. Sodini, G. Tromba, and F. Zanini. 2010. Synchrotron radiation micro-tomography: A non-invasive tool for the characterization of archaeological wood. In *Wood science for conservation of cultural heritage*, ed. L. Uzielli, 34–39. Florence: Firenze University Press.

Feldkamp, L.A., S.A. Goldstein, A.M. Parfitt, G. Jesioil, and M. Kleerkoper. 1989. The direct examination of three-dimensional bone architecture in vitro by computed tomography. *Journal of Bone and Mineral Research* 4: 3–11.

Gerlach, S., H. Römich, E. Lopéz, F. Zanini, L. Mancini, and L. Rigon. 2006. Phase contrast microtomography for archaeological glasses. In *COST action G8: Non destructive testing and analysis of museum objects*, ed. A. Denker, A. Adriaens, M. Dowsett, and A. Giumlia-Mair, 147–151. Stuttgart: Fraunhofer IRB Verlag.

Grün, R., S. Athreya, R. Raj, and R. Patnaik. 2012. ESR response in tooth enamel to high-resolution CT scanning. *Archaeological and Anthropological Sciences* 4: 25–28.

Immel, A., A. Le Cabec, M. Bonazzi, A. Herbig, H. Temming, V.J. Schuenemann, K.I. Bos, F. Langbein, K. Harvati, A. Bridault, G. Pion, M.-A. Julie, O. Krotova, N.J. Conard, S.C. Münzel, D.-G. Drucker, B. Viola, J.-J. Hublin, P. Tafforeau, and J. Krause. 2016. Effect of X-ray irradiation on ancient DNA in sub-fossil bones – Guidelines for safe X-ray imaging. *Nature Scientific Reports* 6: 32969. https://doi.org/10.1038/srep32969.

Kahl, W.-A., and B. Ramminger. 2012. Non-destructive fabric analysis of prehistoric pottery using high-resolution X-ray microtomography: A pilot study on the late Mesolithic to Neolithic site Hamburg-Boberg. *Journal of Archaeological Science* 39: 2206–2219.

Macchiarelli, R., L. Bondioli, A. Debénath, A. Mazurier, J.F. Tournepiche, W. Birch, and M.C. Dean. 2006. How Neanderthal molar teeth grew. *Nature* 444: 748–751.

Mazurier, A., V. Volpato, and R. Maccharelli. 2006. Improved noninvasive microstructural analysis of fossil tissues by means of SR-microtomography. *Applied Physics A* 83: 229–233.

Morigi, M.P., F. Casali, M. Bettuzzi, R. Brancaccio, and V. D'Errico. 2010. Application of X-ray computed tomography to cultural heritage diagnostics. *Applied Physics A* 1000: 653–661.

Paredes, U.M., R. Prys-Jones, M. Adams, J. Groombridge, S. Kundu, P.-M. Agapow, and R.L. Abel. 2012. Micro-CT X rays do not fragment DNA in preserved bird skins. *Journal of Zoological Systematics and Evolutionary Research* 50: 247–250.

Richards, G.D., R.S. Jabbour, C.F. Horton, C.L. Ibarra, and A.A. MacDowell. 2012. Color changes in modern and fossil teeth induced by synchrotron microtomography. *American Journal of Physical Anthropology* 149: 172–180.

Tafforeau, P., and T.M. Smith. 2008. Non-destructive imaging of hominoid dental microstructure by phase contrast X-ray synchrotron microtomography. *Journal of Human Evolution* 54: 272–278.

Tafforeau, P., et al. 2006. Applications of X-ray synchrotron microtomography for non-destructive 3D studies of paleontological specimens. *Applied Physics* A83: 195–202.

Tuniz, C., F. Bernardini, I. Turk, L. Dimkaroski, L. Mancini, and D. Dreossi. 2011. Did Neanderthal play music? X-ray computed micro-tomography of the Divje Babe 'flute'. *Archaeometry* 54: 581–590.

Wilkins, S.W., T.E. Gureyev, D. Gao, A. Pogany, and A.W. Stevenson. 1996. Phase-contrast imaging using polychromatic hard x-rays. *Nature* 384: 335–338.

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Further Readings

Baruchel, J., J.-Y. Buffière, E. Maire, P. Merie, and G. Peix. 2000. *X-ray tomography in material science*. Paris: Hermes Science.

Devoti, R., F. Zontone, C. Tuniz, and F. Zanini. 1991. A synchrotron radiation microprobe for X-ray fluorescence and microtomography at ELETTRA. Focusing with bent crystals. *Nuclear Instruments and Methods in Physics Research B* 54: 424–428.

Mancini, L., G. Tromba, and F. Zanini. 2006. Structural microanalysis with synchrotron radiation: Archaeometric applications at Elettra. *Journal of Neutron Research* 14: 75–79.

Tafforeu, P., R. Boistel, et al. 2006. Applications of X-ray synchrotron microtomography for non-destructive 3D studies of paleontological samples. *Applied Physics A* 83: 195–202.

Tuniz, C., P. Bayle, F. Bernardini, L. Bondioli, A. Coppa, D. Dreossi, R. Macchiarelli, L. Mancini, A. Ronchitelli, and C. Zanolli. 2012. A new assessment of the Neanderthal child mandible from Molare, SW Italy, using X-ray microtomography. In Conference European Society for the study of human evolution. Bordeaux, 21–22 September 2012.

Tuniz, C., F. Bernardini, A. Cicuttin, M.L. Crespo, D. Dreossi, A. Gianoncelli, L. Mancini, A. Mendoza Cuevas, N. Sodini, G. Tromba, F. Zanini, and C. Zanolli. 2013. The ICTP-Elettra, 2012a, X-ray laboratory for cultural heritage and archaeology. *Nuclear Instruments and Methods in Physics Research A* 711: 106–110.

Willmott, P. 2011. *An introduction to synchrotron radiation*. Oxford: Wiley.

Midden Cultivation

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Introduction

Midden cultivation is an agricultural method which blurs the boundaries between horticulture and agriculture. The concept of midden cultivation was first suggested by Ritchie (1983), Macphail (1990), and Barber (2003), based on findings of flattened middens which (in some instances) overlay prehistoric plow marks. The practice of cultivating middens in situ was identified with greater certainty in the course of a geoarchaeological Ph.D. project (Guttmann 2001) which sought to analyze middens and associated buried land surfaces on multiphase sites in Orkney and Shetland, UK.

Definition

Midden cultivation is the cultivation of a midden or compost heap in situ, as opposed to the more usual practice of taking composted material from a midden and spreading it onto gardens or fields. The practice is identified by the following indicators:

1. Middens (rubbish heaps) which have been flattened and spread out, sometimes over large areas
2. The presence of ard marks (prehistoric plow marks) within or beneath the midden
3. Characteristics that link the soil within the plow marks with the overlying midden, e.g., where both deposits have a similar ash content, soil chemical signature, particle size, or inclusions such as charcoal, charred peat, or unburnt peat
4. The presence of unusually large charred cereal remains, indicating an exceptionally fertile soil

The more indicators are present, the more probable it is that midden cultivation was practiced.

Key Issues/Current Debates/Future Directions/Examples

Discovery

The concept of midden cultivation was formulated following the discovery of extensive areas of flattened midden material on the Neolithic site of Knap of Howar, Papa Westray, Orkney (Ritchie 1983). In the first phase of activity, around 3500 BCE, a midden up to 40 cm thick was deposited. In the second phase, structures were built on top of the midden and a distinct, upper midden deposit associated with the structures was then accumulated. Both the upper and lower midden deposits had level surfaces, and the excavator suggested that they might have been cultivated. The midden material was quite extensive, covering an area of c. 500 m^2 (Ritchie 1983). Links of Noltland, Westray, is another site with an extensive area of possibly cultivated Neolithic midden, measuring at least 210 by 70 m (Clarke et al. 1978). Cultivation of a midden in the Neolithic was also suggested by Macphail (1990) at Hazleton North, Gloucestershire, where small, shifting arable plots were recorded beneath a Neolithic long

cairn and one of the plots was placed on top of a midden heap.

Tofts Ness and Old Scatness

Midden cultivation was more firmly identified during the course of a geoarchaeological investigation of two multiphase sites in the Northern Isles of Scotland (Guttmann 2001, 2005; Guttmann et al. 2004). The evidence was derived from two multi-period sites: Tofts Ness, on the Isle of Sanday, Orkney, and Old Scatness, near the southern tip of Mainland, Shetland. The Tofts Ness site dates from the Neolithic to the Early Iron Age (Dockrill et al. 1994), and Old Scatness dates from the Bronze Age to the present, although it was not necessarily occupied continuously (Dockrill 1998). The two sites are in regions which (before stabilization of the dunes) were subject to major episodes of sand blow, and these sand deposits periodically buried and preserved successive agricultural soils together with the associated settlement evidence. At Tofts Ness, radiocarbon-dated Neolithic middens overlay a cultivated Neolithic soil, and at Old Scatness the earliest soil, dating from the Bronze Age to the Iron Age, was buried beneath Iron Age deposits. There were ard marks below both of these early soils (Guttmann et al. 2004).

The two sites were investigated in order to identify changes in agricultural methods over time (Guttmann et al. 2004). A range of geoarchaeological methods were employed in order to identify materials in the soils and middens, with the aim of identifying possible fertilizers used in the fields or accumulated in the middens. The methods included thin section micromorphology, phosphate analysis, soil magnetism (mass susceptibility, frequency-dependent susceptibility, anhysteretic remanent susceptibility, and isothermal remanent susceptibility), loss on ignition, and particle size analysis.

The results of the thin section analysis, phosphate analysis, and particle size distribution demonstrated that the arable soils were composed of exactly the same material as the midden heaps (Figs. 1 and 2). Unlike the soils of later phases, these were not simply soils with added compost but actually represent middens which were cultivated in situ (Guttmann et al. 2004; Guttmann 2005). The material which infilled the ard marks on both sites was clearly the same as that which overlay them, which demonstrates that the ard

Midden Cultivation, Fig. 1 Excavating the cultivated midden at Old Scatness, Shetland. Photo by Val Turner

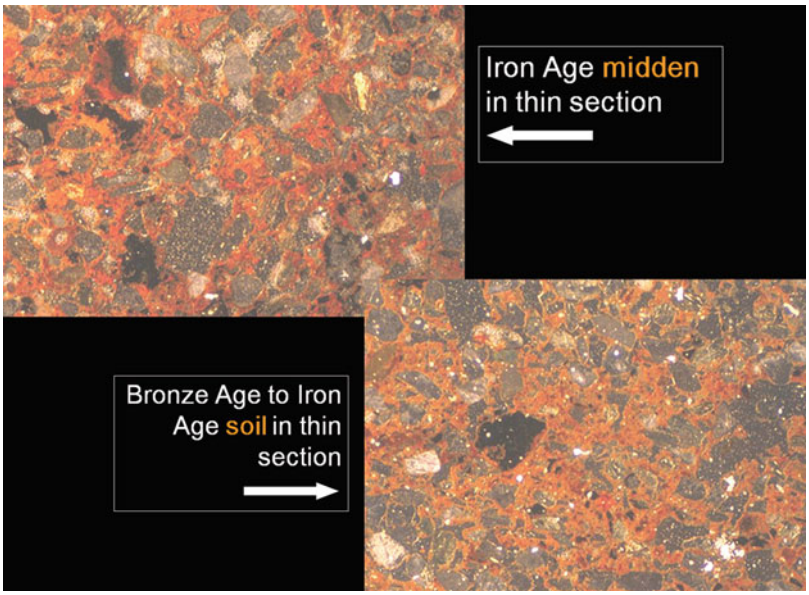

Midden Cultivation, Fig. 2 Iron Age soil and midden in thin section under oblique incident light. Old Scatness, Shetland

marks did not predate the layer above but were contemporary with it.

The evidence suggested that the arable plots were placed on top of the midden heaps, that is, the midden heaps were transformed into cultivated plots. The cultivated midden formed a small plot at Tofts Ness; the extent is unknown but the midden soil was not found in surrounding test pits, which suggests that the plot was no more than c. 10 or 20 m^2 (Guttmann et al. 2004). At Old Scatness the midden field may be more extensive; subsequent excavations on the opposite side of the Old Scatness settlement mound have produced more cultivated middens, probably of the same Bronze Age to Early Iron Age date.

Midden Heap Cultivation

Midden cultivation also may have occurred in the Western Isles of Scotland, where large amounts of midden material have been identified interleaved between the machair sands on several sites. Gilbertson et al. (1999) established that Bronze Age and Iron Age buried soils in the machair at Cill Donain, South Uist, contained large amounts of midden material and represent anthropogenic activity rather than periods of natural dune stabilization. It is possible that some of these deposits were cultivated middens rather than natural soils with added midden material. Midden material was also deposited over large areas on the Bronze Age/Iron Age sites of Baleshare, North Uist, and Hornish Point, South Uist (Barber 2003). Midden material was dumped onto the soil to create arable plots at Baleshare, but at Hornish Point the author suggests that the Iron Age midden deposits were probably cultivated in situ (Barber 2003).

The cultivation of the midden heaps at Tofts Ness and Old Scatness is indicative of a small-scale but intensive land management system. The enriched soils would have been an important resource, which suggests long-term occupation or repeated reoccupation of the sites. The extent of the practice is not yet clear; monumental middens in southern England, such as those found at Runnymede and Potterne, would seem to be potential sites for midden cultivation, but there is no clear evidence for this to date.

Neolithic Cultivation of Mesolithic Middens?

Recent work at Northton, Harris, in the Outer Hebrides, suggests that people in the Neolithic may have cultivated earlier middens as well as those of their own creation. The site at Northton was originally excavated in the 1960s and

comprises a series of midden deposits and structures; the pottery indicated a Neolithic to Beaker period chronology. The site was re-excavated in 2000, but despite the recovery of a Neolithic potsherd, a grain of barley and a sheep phalanx (all of which indicate a Neolithic date), hazelnut shells within the midden produced Mesolithic dates (7050–6650 cal BCE and 6450–6200 cal BCE) (Simpson et al. 2006).

A thin section analysis of the deposits at Northton indicated that the midden layers contained large quantities of added anthropogenic materials (Guttmann 2006). The cultural materials (mainly bone fragments and charcoal) occurred throughout the midden deposits, including in the basal layer and the glacial till below. This means that the midden did not seal an undisturbed buried soil, which suggests that the original soil must have either been removed (unlikely) or reworked (very probable). It was evident in thin section that the deposits were intensively reworked by earthworms, but it is also possible that the deposits were cultivated. This would explain why there was no distinct buried soil predating the midden, and it would explain the absence of soil-forming processes within the midden deposit, and it would also explain the presence of Neolithic material in a Mesolithic midden.

Northton is not the only Mesolithic site where later cultivation may have taken place. A Mesolithic midden located near Prestatyn, on the north coast of Wales, also appears to have been cultivated in the Neolithic (Guttmann 2005; Bell 2007). The midden comprised two layers, the lower dating to c. 4550–4230 cal BCE and the upper to c. 4250–3700 cal BCE. The lower, Mesolithic layer contained dense mussel shell, while the upper had much lower quantities of shell and appeared to have been reworked. Lines of shell extend out from the midden and appear to have been dragged by an implement. These lines are interpreted as possible ard marks.

The recovery of Neolithic material in Mesolithic middens is a common occurrence in Scotland and has previously been interpreted by some as evidence for the continuity of a marine-based economy into the Neolithic period (e.g., Armit and Finlayson 1992). Others argue that there was a radical change in diet in the Neolithic, indicated by a change in the isotopic signature of the human bone (Schulting and Richards 2002).

The evidence from Northton and Prestatyn suggests a possible way of reconciling this apparently conflicting evidence for continuity and change in the Neolithic economy. The attraction of the rich midden deposits may explain why Neolithic people chose to settle on sites that were previously occupied by Mesolithic peoples. If, as is suggested by Schulting and Richards (2002), the Neolithic diet was wholly or almost wholly terrestrial, it begs the question of why terrestrial farmers would reoccupy places which were presumably sited in order to exploit marine resources. If the Neolithic people were not using marine resources, what was the attraction of these sites? The obvious fertility of the middens may have been a key factor. The vegetation growing on the middens would have been distinctively richer than the vegetation produced by the surrounding soils, and this would have been readily apparent to the early farmers.

The extent of midden cultivation outside Scotland is unknown. In Scotland the post-Mesolithic middens are often easy to identify because they tend to contain large quantities of peat ash, which has a distinct yellow or orange color in the field. Under the microscope in thin section samples, the ash constituent is even more obvious, glowing bright orange under oblique incident light (Fig. 3) (Guttmann et al. 2004). In regions where

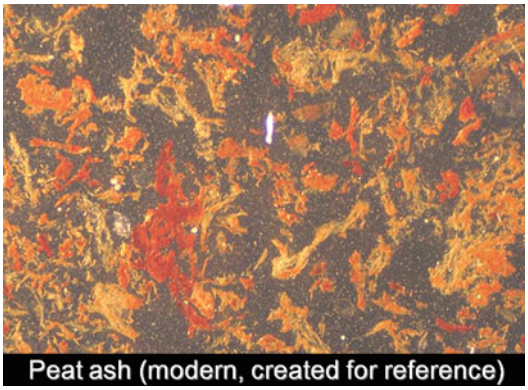

Midden Cultivation, Fig. 3 Peat ash in thin section under oblique incident light

middens are less distinct, it may be more difficult to distinguish cultivated midden from garden soils with large amounts of added fertilizer.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Geoarchaeology
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches

References

Armit, I., and B. Finlayson. 1992. Hunter-gatherers transformed: The transition to agriculture in northern and western Europe. *Antiquity* 66: 664–676.

Barber, J. 2003. *Bronze Age farms and Iron Age farm mounds of the Outer Hebrides* (SAIR 3). Available at: www.sair.org.uk.

Bell, M. 2007. Conclusions: The Mesolithic/Neolithic transition in the Prestatyn area. In *Prehistoric coastal communities: The Mesolithic in western Britain*, CBA research report, ed. M. Bell, vol. 149, 308–317. York: Council for British Archaeology.

Clarke, D.V., R. Hope, and C. Wickham-Jones. 1978. The links of Noltland. *Current Archaeology* 6 (2): 44–46.

Dockrill, S.J. 1998. Northern exposures: Phase 1 of the Old Scatness excavations 1995–8. In *Old Scatness Broch, Shetland: Retrospect and prospect*, ed. R.A. Nicholson and S.J. Dockrill, 59–80. Bradford: University of Bradford/Shetland Amenity Trust/North Atlantic Biocultural Organisation.

Dockrill, S.J., J.M. Bond, A. Milles, I. Simpson, and J. Ambers. 1994. Tofts Ness, Sanday, Orkney. An integrated study of a buried Orcadian landscape. In *Whither environmental archaeology?* ed. R. Luff and P. Rowley-Conwy, 115–132. Oxford: Oxbow Books.

Gilbertson, D.D., J.-L. Schwenninger, R.A. Kemp, and E.J. Rhodes. 1999. Sand-drift and soil formation along an exposed North Atlantic coastline: 14,000 years of diverse geomorphological, climatic and human impacts. *Journal of Archaeological Science* 26: 439–469.

Guttmann, E.B. 2001. Continuity and change in arable land management in the Northern Isles: Evidence from anthropogenic soils. Unpublished Ph.D. dissertation, University of Stirling.

Guttmann, E.B.A. 2005. Midden cultivation in prehistoric Britain: Arable crops in gardens. *World Archaeology* 37 (2): 224–239.

Guttmann, E.B.A. 2006. The soils. In *Excavations at Northton, Isle of Harris*, British archaeological reports, ed. D.D.A. Simpson, E. Murphy, and R. Gregory, vol. 408, 26–30. Oxford: Archaeopress.

Guttmann, E.B.A., S.J. Dockrill, and I.A. Simpson. 2004. Arable agriculture in prehistory: New evidence from soils in the Northern Isles. *Proceedings of the Society of Antiquaries of Scotland* 134: 53–64.

Macphail, R.I. 1990. The soils. In *Hazleton North, Gloucestershire, 1979–82: The excavation of a Neolithic long cairn of the Cotswold-Severn group*, Archaeological report, ed. A. Saville, vol. 13, 223–226. London: HBMCE.

Ritchie, A. 1983. Excavation of a Neolithic farmstead at Knap of Howar, Papa Westray, Orkney. *Proceedings of the Society of Antiquaries of Scotland* 113: 40–121.

Schulting, R.J., and M.P. Richards. 2002. The wet, the wild and the domesticated: The Mesolithic-Neolithic transition on the west coast of Scotland. *European Journal of Archaeology* 5 (2): 147–189.

Simpson, D.D.A., E.M. Murphy, and R.A. Gregory. 2006. *Excavation at Northton, Isle of Harris*, British archaeological reports. Vol. 408. Oxford: Archaeopress.

Middle East Archaeology: Sites, Texts, Symbols, and Politics

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Introduction

Though the story is most certainly apocryphal, the first recorded incident in which archaeology provided the symbolic ammunition for political ambitions occurred in 550 BCE. The leaders of the legendary warriors of Ancient Sparta sought to expand their tiny kingdom to include richer farmlands elsewhere in their region. The Spartans had long had their eyes on Arcadian Tegea but, after many attempts, had never been able to conquer it. The Oracle at Delphi prophesied that they would not win the lands of Tegea unless they were able to dig up the bones of Orestes. They were told that the bones rested in Tegean soil, and through a chance meeting with a local smith, a

Spartan warrior discovered that the skeleton of the ill-fated son of a Homeric hero could be found in a field not far from the city. The Spartans went to the described field, dug up the bones, and won the day (Hall 2007: 333). Texts, sites, and symbols of the past have been in play for the causes of politics ever since.

Definition

Archaeology is seldom considered as a part of military strategy or foreign policy, except to the extent that, in modern war zones, world heritage sites sometimes have greater protections than civilians. The past and representations of the past, however, are clearly part of those elusive elements, which include charismatic leadership, morale building, and the incitement of nationalist, ethnic, or religious fervor, that go into the making of successful wars, insurgencies, and revolutions both ancient and modern. This is unanticipated by scholars of the past unless they have been directly ordered or inspired to find evidence that will fuel the reigning ideology. It is more often the case that the political value attached to a site or object is a later development. Even in the case of decidedly nationalist archaeological endeavors, the most potent emotional and political connections are usually established long after the projects are finished.

Key Issues

Yigael Yadin's excavations of Masada in Israel or Manolis Andronikos' excavations of Vergina in Northern Greece are examples of this phenomenon. Yadin, of course, knew that Masada, representing the putatively suicidal last stand of Jews against Ancient Romans in 75 CE, was highly significant in Jewish history. He did not necessarily predict that it would become the favored spot for inducting soldiers into the Israeli Defense Forces for many years (Silberman 1994). Similarly, Andronikos may have seen Vergina, with its purported tombs of Philip of Macedon, Alexander the Great's father, as an important Greek heritage site, but he would be surprised to find that the famous symbol he unearthed on a sarcophagus there, the Star of Vergina, became a subject of great contention between the neighboring modern nations of Greece and the Republic of Macedonia (Cowan and Brown 2000).

The recognition that many sites and symbols of the past represent continuing struggles in the present has caused a deepening rift between archaeologists working in areas of enduring ethnic strife and those who work with well-funded governmental and academic institutions on recovering, preserving, and presenting sites in more stable countries. While the former tend to be more concerned with critique, the latter tend to focus on preservation, authenticity, and recognition of living descendant communities. This may be due to the fact that political instability creates uncertainty about the future of the sites and their material culture. The meaning of the past(s) that these scholars would like to relate to modern populations may, thus, be subject to over-politicization in the hands of one group and over-homogenization in the hands of the other.

The convoluted process by which a site or artifact becomes a powerful symbol for a political or social movement involves a number of factors over which archaeologists have little or no control as well as those over which they have great control. Nationalist and imperialist archaeologies may be the impetus for the excavations that produce these symbols – or their significance may simply grow organically as the society itself develops and grows more complex. What is universally true about the relationship between archaeology and politics, however, is that it is both materially and ideologically formed outside of the science of excavating and interpreting sites, particularly in the case of sacred space.

Examples

"A thing belongs to the one who remembers it the most obsessively," as Makiya has said about the Dome of the Rock in Jerusalem (Makiya 2001: 266). Creating obsessive memory is not the province of archaeologists but the close relationship

between living traditions and events far in the past in the Middle East means that archaeological endeavors there, particularly with respect to sacred sites, will have an unexpected immediacy and sometimes even notoriety. Jerusalem is the oft-cited example of a city that combines omnipresent antiquity with intense attachments. The deep-rooted feelings that people from so many different backgrounds have about the city are consistently reinforced by its ancient buildings. Jerusalem is also a place where the often carelessly used expression "world heritage" has a highly significant, and unusually divisive, meaning.

The collective memories of Jerusalem's inhabitants remain as contentious as they are cherished by both sides of the continuing struggle taking place there. Embedded in the collective memory of Jews in Israel is the view that Jerusalem represents an incomplete return to Zion – incomplete because the hill upon which one of Islam's holiest places now sits was the traditional site for the ancient destroyed Jewish Temple (Fig. 1). Embedded in the collective memory of Muslim Palestinians is the belief that Jerusalem establishes a vital connection between them and their co-religionists elsewhere in the Middle East (Scham 2004: 648). Christians from outside of the region find themselves in opposition to each other and sometimes to Christians living within the region, with fundamentalists supporting Jewish claims to Jerusalem while others the claims of Palestinians.

Sites of the past that have religious or nationalist significance for more than one ethnic or confessional group are the foci for hegemonic heritage struggles. These struggles are most often won by those who have control over the site with the memories of other groups effectively blotted out. Hegemonic heritage operates on the principle that if one narrative about the past of a particular place is true, then all others must be false – or worse, dangerous. The fact that permission to use certain sites is furnished to one group but denied to another is not based upon contested histories surrounding the site. More accurately, these sites become battlegrounds because of the necessity for one side to establish its claim and its narrative to the exclusion of all others.

Middle Eastern archaeological sites may also be the scenes of heritage suppression strategies that are designed to tacitly ignore everything that does not benefit the power interests of the present. There are many ways in which such benefits may be defined – but it is generally economic, religious, and political considerations that prevail. In Nasser's Egypt, for example, the country's

Middle East Archaeology: Sites, Texts, Symbols, and Politics, Fig. 1 View of the Old City of Jerusalem with the Dome of the Rock taken from West Jerusalem

rich history was denied and ignored because the Pharaonic past was an impediment to establishing a Pan-Arab identity. Building dams without regard to archaeological sites did not endear him as a leader to Western heritage professionals, but it also turned out that Egyptians themselves were more proud of this past than Nasser had estimated (Hassan 1998), and later leaders of Egypt were only too eager to show off the Pharaonic sites to distinguished visitors. Similarly, Saddam Hussein lavished attention and resources on the cities of the Babylonian Empire but those of the Assyrian Empire were largely left to crumble. He, no doubt, felt far less affinity for the Assyrians because their contentious Christian descendants had been a thorn in his side from the beginning of his regime (Abdi 2008). After Hussein was executed, the Assyrian Democratic Movement was one of the first groups to step forward to vie for power in the country.

Heritage repression may be a favored weapon of autocrats, but in recovering war zones, it becomes a means of survival. Beirut is a city where many decisions about archaeological sites are affected by an implicit agreement that history must be ignored as much as possible. The collective memories of the city's diverse residents have been in conflict for so many years that the best strategy that has been developed is one that involves separating the people from their contentious pasts. The country's multicultural story was laid bare by the destruction of Beirut's downtown during the civil war. Lebanese archaeologists, however, have to continually fight to preserve these remains as the city is being rebuilt as a glittering (and hopefully peaceful) modern example of the "New Middle East" (Lawler 2011).

Current Debates

Sites and symbols are the agents of collective memory, but its structure, at least in the Middle East, is defined by texts. Cuneiform tablets, papyri, scrolls, and inscriptions all have a uniquely privileged status beyond that of mere artifact (Scham 2009: 169). Modern scholars, of course, will not admit to using texts as archaeological source books. They are, nonetheless, an ever-present entity still waiting in the consciousness of many to be put into play in describing finds. This is especially true of the Bible which, despite its dubious historical value, has been used to define the past of Israel, Jordan, and Turkey, and, in part, Egypt and Mesopotamia for generations. Like the *Iliad* and the *Odyssey* in the early years of classical archaeological exploration, the Bible has inspired excavations throughout the region. Unlike the Homeric epics, the biblical text continues to be reinvented for the purposes of explaining the past. Barthes' observation that text is "... experienced only in an activity of production. The Text cannot stop..." (1977: 157) cogently describes the relationship between archaeology and the Bible.

Ignoring the text in that branch of Middle Eastern archaeology still known as biblical archaeology is not an option, as there are few who will be interested in pursuing an archaeology of the "holy land" denuded of its associations with the Bible. Scholars who have attempted to do this to any extent are dismissed by many of their colleagues as "minimalists." Although the term seems to imply a kind of austerely modern approach, even minimalists cannot eliminate any consideration of the Bible altogether in favor of a sites-and-artifacts-centered view. Minimalists and maximalists alike are both equally defined only by their textual approach, and neither group is willing to consider material culture as anything more than evidence that either confirms or contradicts the text.

Another structural use of text arises as a result of the distinction that those who have had the longest experience in working in very overtly politicized environments, biblical and Near Eastern archaeologists, have drawn between their fields and that of anthropological and social archaeologists. The "labels we choose to stick upon the corpse of history" (Hodder (citing Collingwood) 1993: 269) are not created in these archaeologies by material culture. The concept of

"reading" non-textual artifacts as text (Hodder and Hutson 2004) introduced into anthropological archaeology some decades ago is little understood or accepted in biblical and Near Eastern archaeology. The tendency to view text as the primary explicator of archaeological finds is noted by Abu El-Haj (2001) who describes Israeli archaeology as consistently conflating text, dogmatic belief, and practice.

Future Directions

Middle Eastern politics, if not Middle Eastern archaeology, began to veer away from the text, so to speak, in the spring of 2011. As the term text itself became a verb, its full power is being realized in the widespread use of information technology to mount challenges to the ruling powers of Tunisia, Egypt, Libya, Yemen, Bahrain, Syria, Jordan, and Lebanon. That the Arab World has been transformed by young people texting each other has become a modern news cliché. Bible, Q'uran, and historical manifesto notwithstanding, the power of the original is nothing compared to the blogged or tweeted interpretation of it.

What do these social media-stoked revolutions portend for the relationship between Middle East archaeology and politics in the future? It is difficult to assess the uses that new regimes might make of archaeological sites and artifacts. In contrast to the ubiquitous images of Hosni Mubarak as pharoah and Saddam Hussein as Nebuchadnezzar, the images used now are primarily those of Islam and the Islamic Past. This has become the case in Palestinian West Bank as well where a number of biblical sites, once revered by Muslims as well as Christians and Jews, have become symbols of negative heritage to be destroyed and looted as representations of the occupation of the territory by Israel (Yahya 2010).

For every report of site destruction emanating from the Middle East, there is a corresponding report that, even in the midst of armed rebellion, there is also continued veneration of the past. The so-called Treasure of Benghazi disappeared from a bank vault but the rebels who broke into Tripoli's National Museum bent on destruction only wrecked Qaddafi's old cars on display. Looters ran rampant in Egypt but the Supreme Council of Antiquities (SCA) has managed to restore security in most places despite the uncertainty of the country's future. A reported looting epidemic in Tunisia turned out to be an attempt perpetrated by the family and friends of the ousted dictator to make off with valuable artifacts as they left the country (Elkin 2012: 30).

Meanwhile, Israel has hoped to weather the changes being experienced by its neighbors simply by enduring and by continuing its efforts, dating from the end of the Six-Day War, to assert sovereignty over all of Jerusalem. The tremendous post-1967 onslaught of archaeological excavation, attesting to the Israeli government's concern about finding its own truth under the layers of largely Islamic and Ottoman remains in the city, continues in full force. The destruction of the historic Mamilla Cemetery close to the walls of the Old City, with remains of religious Muslims dating back to before the twelfth century AD, is by now almost complete and the construction work on the *Museum to Tolerance* that will take its place has begun.

Cross-References

- ▶ Activism and Archaeology
- ▶ Archaeology and Anthropology
- ▶ Archaeology and Politics
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Military Activity in Islamic Archaeology
- ▶ Nationalism and Archaeology

References

Abdi, K. 2008. From pan-Arabism to Saddam Hussein's cult of personality. *Journal of Social Archaeology* 8 (1): 3–36.

Abu El Haj, N. 2001. *Facts on the ground: Archaeological practice and territorial self-fashioning in Israeli society*. Chicago: University of Chicago Press.
Barthes, R. 1977. *Image-music-text*. New York: Hill and Wang.
Cowan, J., and K. Brown. 2000. Introduction: Macedonian reflections. In *Macedonia: The politics of identity and difference*, ed. J. Cowan, 1–27. London: Pluto Press.
Elkin, M. 2012. Arab Spring impacts archaeology: Libya/Tunisia/Egypt/Syria. *Archaeology Magazine* 65 (1): 24–31.
Hall, J. 2007. Politics and Greek myth. In *The Cambridge companion to Greek mythology*, ed. R. Woodard, 331–337. Cambridge: Cambridge University Press.
Hassan, F. 1998. Memorabilia: Archaeology materiality and identity in Egypt. In *Archaeology under fire: Nationalism, politics and heritage in the Eastern Mediterranean and Middle East*, ed. L. Meskell, 200–216. New York: Routledge.
Hodder, I. 1993. The narrative and rhetoric of material culture sequences. *World Archaeology* 25 (2): 268–282.
Hodder, I., and S. Hutson. 2004. *Reading the past: Current approaches to interpretation in archaeology*. Cambridge: Cambridge University Press.
Lawler, A. 2011. Rebuilding Beirut. *Archaeology* 64 (4): 24–29.
Makiya, K. 2001. *The rock: A tale of seventh century Jerusalem*. New York: Pantheon Books.
Scham, S. 2004. High place, symbolism and monumentality on Mount Moriah, Jerusalem. *Antiquity* 78 (301): 647–660.
Scham, S. 2009. Diplomacy and desired pasts. *Journal of Social Archaeology* 9 (2): 163–199.
Silberman, N. 1994. *A prophet from amongst you: The life of Yigael Yadin: Soldier, scholar, and mythmaker of modern Israel*. Reading: Addison Wesley.
Yahya, A. 2010. Heritage appropriation in the Holy Land. In *Controlling the past, owning the future: The political uses of archaeology in the Middle East and Southwest Asia*, ed. R. Boytner, L. Swartz Dodd, and B. Parker, 142–158. Tucson: University of Arizona Press.

Further Reading

Bernbeck, R., and S. Pollock, eds. 2005. *Archaeologies of the Middle East: Critical perspectives*. Oxford: Blackwell.
Boytner, R., L. Swartz Dodd, and B. Parker, eds. *Controlling the past, owning the future: The political uses of archaeology in the Middle East and Southwest Asia*. Tucson: University of Arizona Press.
Kohl, P., M. Kozelsky, and N. Ben-Yehuda, eds. 2007. *Selective remembrances: Archaeology in the construction, commemoration and consecration of national pasts*. Chicago: University of Chicago Press.

Middle East Middle to Upper Paleolithic Transitional Industries

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Introduction

As in Europe, the Middle to Upper Paleolithic transition is an intensely debated topic in Paleolithic archaeology and paleoanthropology of Western Asia. The Middle to Upper Paleolithic transition was an important period of biological and cultural changes in human evolution. The disappearing of Neanderthals and the expansion of anatomically modern humans in Europe and south Western Asia, as well as the emergence of Early Upper Paleolithic technologies, which signals significant changes between 45,000 and 30,000 years ago, are just some of the enigmatic aspects of this transitional period. It is not clear where the process of the changes initiated or whether it has been diffusion from a core area or local adaptation in different regions. Many researchers point to East Africa and Southwest Asia, in particular Levant, the region that the best documented records come from.

Thus, the Middle East is a key area that always has been the center of attention in the quest for the origin of the first wide speared cultural manifestation of anatomically modern humans. The present entry reviews the Middle to Upper Paleolithic transitional lithic industries as an important part of the material culture related to one of the most crucial stages of human evolution in the Middle East. In this entry, the Middle East is defined as a geographical area from Anatolia and southern part of Caucasus in the North, the Levant to the Iranian plateau in the center and the Arabian Peninsula in the South (Fig. 1).

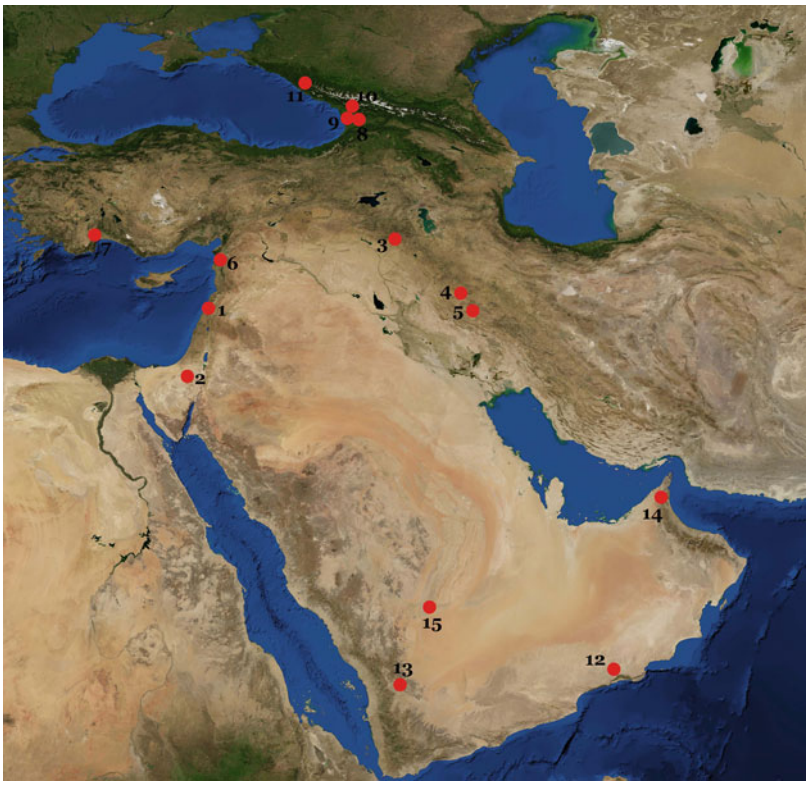

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 1 The locations of key sites mentioned in the text: *1* Ksar Akil, *2* Boker Tachtit, *3* Shanidar, *4* Warwasi, *5* Yafteh, *6* Üçağızlı, *7* Karain B, *8* Dzudzuana, *9* Ortvale Klde, *10* Bondi, *11* Mezmaiskaya, *12* Al-Hatab, *13* Shi'bat Dihya1, *14* Jebel Faya, *15* Faw Well. (Basemap courtesy of NASA's Visible Earth http://visibleearth.nasa.gov/)

Definition

During Oxygen Isotope Stage 3, several Middle to Upper Paleolithic transitional entities appear across Eurasia dating back to the interval of 50,000–30,000 BP. These variable entities or lithic industries are traditionally attributed to the end of Middle Paleolithic, the Initial and then Early Upper Paleolithic, with different names such as the Emiran, Bohunician, Szeletian and then early Ahmarian or Proto-Aurignacian.

The Initial Upper Paleolithic refers to industries that often encompass a combination of Levallois-Laminar technologies accompanying Upper Paleolithic retouch tools and sometimes Middle Paleolithic types and generally date to between 45,000 and 36,000 years BP. But the earliest appearances of true Upper Paleolithic characteristics manifest in Early Upper Paleolithic industries such as early Ahmarian or Proto-Aurignacian, with production of blade/bladelet from prismatic cores and emphasis on the soft hammer technique. Better-studied European evidence in particular suggests a relatively rapid and growing process of invention in different aspects of hunter-gatherers life during this time span. Apart from blade/bladelet-based technologies, long distance procurement of raw materials, specialized hunting, complex settlement patterns, bone industries, the common use of personal ornaments and ultimately certain types of art are documented in many archaeological sites. It is the beginning of the process through which anatomically modern humans dispersed widely, and is recorded in the variable industries reported from several regions in the Europe and Southwest Asia. Many of these lithic industries traditionally grouped under the title of Aurignacian techno-complexes and were considered as the marker of anatomically modern human migrations. The scarcity of human fossils from Initial or Early Upper Paleolithic contexts compels researchers to rely mainly on cultural remains and particularly lithic technology, which also seems to be a complex and difficult way to discuss the actual changes during the time of "Transition". The

transition sometimes refers to the technological continuity between Middle and Upper Paleolithic features, and sometimes indicates a probable mixture of Middle Paleolithic elements with Upper Paleolithic ones in other regions. Traditionally, the typo-technological continuities and discontinuities in lithic entities have been used to support the fundamental hypothesis of local evolution versus acculturation in Paleolithic literature.

Historical Background

The concept of Middle to Upper Paleolithic transition was founded in Europe, particularly Western Europe, the place where the Paleolithic archaeology has its formation roots as early as nineteenth century. In the Middle East, this Euro-centric research historically focused on the Levant and then Iran, in particular Zagros. Pioneering works of R. Neuville and D. A. E. Garrod before the mid twentieth century built a unilinear model for Upper Paleolithic of Levant; in the 1970s, it was replaced by a new hypothesis of parallel entities. In the new parallel Upper Paleolithic entities, the Ahmarian concept defined and added to the previously identified Levantine Aurignacian (Gilead 1981; Marks 1981). In the Zagros, the previous work of Garrod in Levant and Zagros inspired the work of other researchers, which lead to the birth of the Baradostian name for the industry found in Early Upper Paleolithic layers of Shanidar (Solecki 1958). Subsequent research in the Zagros tended to attribute of most of the discovered Upper Paleolithic industries to Baradostian, and reject the possibility of its evolution from underlying Mousterian. Based on the similarities observed in Warwasi assemblage, Baradostian renamed Zagros Aurignacian and opened for discussion the probability of its local origin in Zagros Mousterian (Olszewski and Dibble 1994). About a decade earlier in Levant, a crucial notion emerged that the evidence in the site of Boker Techtit indicates the development of the local late Mousterian into earliest Upper Paleolithic (Marks 1983). This earliest Upper Paleolithic was in fact Emiran, the first phase of the Upper Paleolithic unilinear model of Garrod and Neuville, which then recalled Initial Upper Paleolithic and was applied by many researchers to the same industry. Technological study of Yafteh cave lithic collections in Zagros revealed the resemblance of Baradostian early and late phases to the two-tradition model of Levant (Bordes and Shidrang, 2009). Ongoing excavations and research also point to some differences between early Ahmarian and early Baradostian that remain to be described in detail (Otte et al. 2011). Apart from these two key regions that historically received more broad attention, quite recently, increasing research in other parts of Middle East, such as Arabian Peninsula, Turkey or Caucasus, is providing us with interesting information. Some of the results of these researches will be briefly reviewed in the following section, in a region by region framework.

Key Issues and Current Debates

Levant

The important geographical location of Levant at the crossroads of Africa and Eurasia has led to centralization of Paleolithic research in this region, and consequently a better understanding of its Paleolithic cultures. This is particularly true for the crucial period of shift between Middle and Upper Paleolithic. As the result of decades of research, a relatively reliable sequence of cultural traditions has presented in Levant, which has become a comparative reference for neighboring areas.

The earliest Upper Paleolithic of Levant represents local modifications of lithic industries from Late Mousterian into the early Upper Paleolithic tradition of Early Ahmarian. Prior to Early Ahmarian, the best known MP-UP Levantine transitional lithic industry is called the Initial Upper Paleolithic, also known as the Emiran (Marks 1990).

The Initial Upper Paleolithic industries of Levant date back roughly to about 45,000–38,000 BP and present two main variants, one with characteristic index fossil of the Emireh point and the other with the chanfrein pieces. The

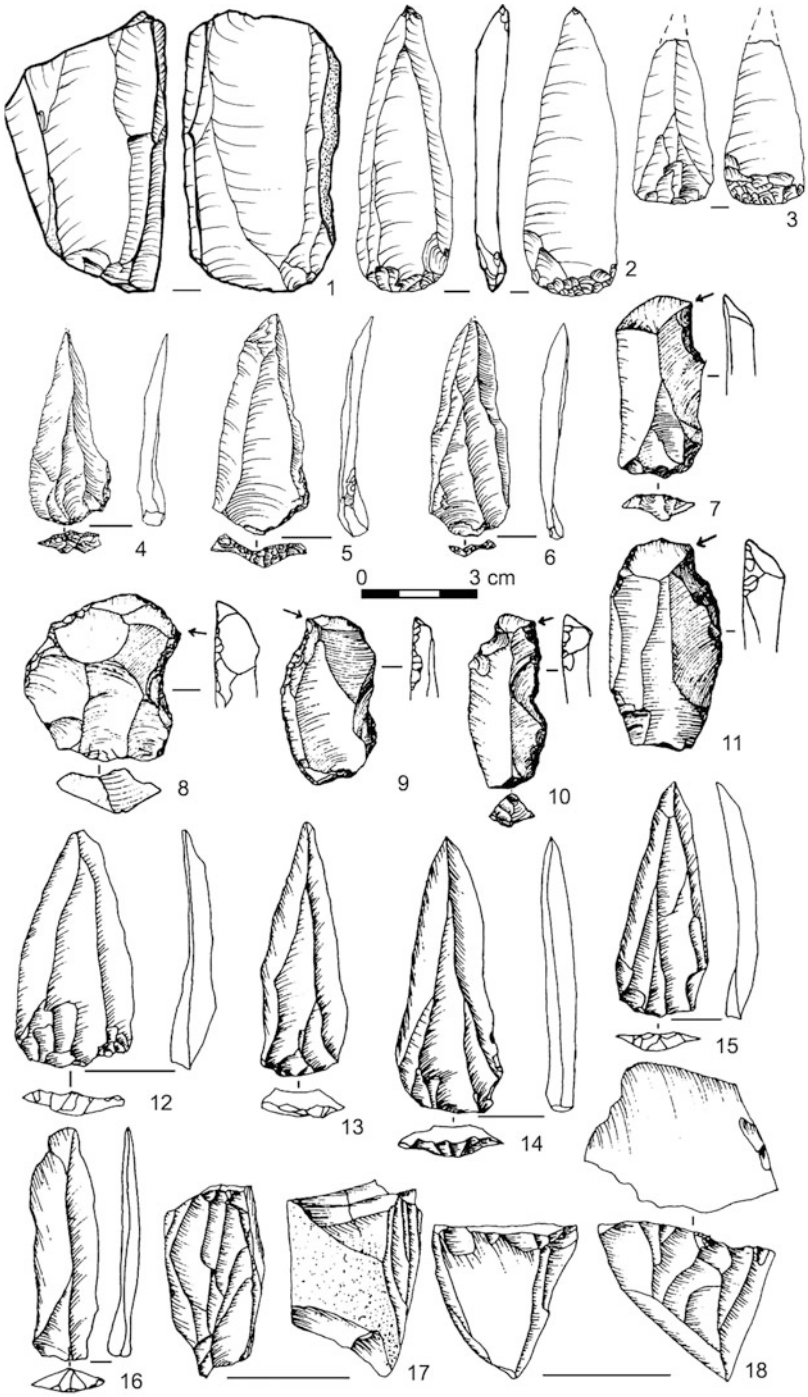

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 2 The characteristic elements of Initial Upper Paleolithic or Intermediate Middle to Upper Paleolithic industries: *1* Nubian Levallois core, *2–3* Emireh points, *4–6*, *12–16* Levallois-type points, *7–11* Chanfreins on faceted blanks, *17–18* Cores. (After Belfer-Cohen and Goring-Morris 2007*)*

technological characteristics of these industries usually include production of non-Levallois blades and Levallois-like points, hard hammer blade production and Upper Paleolithic retouched tools (Fig. 2). Ksar Akil in northern Levant and Boker Tachtit in southern Levant are the best relevant reference sites showing evidence of continuity for the intermediate phase between Middle

and Upper Paleolithic in Levant (Marks 1983; Ohnuma 1988).

The continuity between the Initial Upper Paleolithic and the Early Ahmarian has also been recognized in several sites including those mentioned before (Marks 2003). This continuity is expressed by some similar technological characteristics, exemplified by the continued use of faceting as part of core preparation. The Ahmarian is divided into Early (42,000–30,000 BP) and Late phase (30,000–23,000 BP) and is better known from open-air sites and semi-arid marginal zones. The Early Ahmarian is characterized by the production of blade and bladelet from several types of prismatic cores with the purpose of manufacturing blade/bladelet tools, particularly el-Was points. The other categories of tools, the cortical end scrapers and burins, seem to be also related to the same reduction sequence; their blank produced during the preparations and rejuvenations of blade/let cores (Goring Morris and Davidzon 2006).

The Levantine Aurignacian is another Upper Palaeolithic entity in Levant assigned to about 32,000–30,000 BP (Bar-Yosef and Pilbeam, 2000) and typo-technologically contains classical Aurignacian features. The European Aurignacian seems to present older dates (around 39,000–35,000 BP) and compared to its Levantine counterpart is a longer lived entity. Contrary to Early Ahmarian, which is technologically based on production of straight to curve blade/bladelet, in the Levantine Aurignacian, blades are the dominant blank for tools and there is a production of small twisted bladelets from carinated pieces, while flakes make up the major part of the debitage (Goring-Morris and Belfer-Cohen 2006).

Due to the late, short-lived and geographically limited appearance of the Levantine Aurignacian, it doesn't play an important role in the debate of the Middle to Upper Palaeolithic transition in Levant and is usually considered as a late intrusive culture.

Zagros

The majority of our knowledge for the Iranian Early Upper Paleolithic comes from the Zagros region. Last two decades saw an increasing interest in Upper Paleolithic of the Zagros region, in particular its early phase, which has a potential to answer some of the questions of Middle to Upper Paleolithic transition in Middle East. The resemblance of Baradostian lithic industries of Zagros with Aurignacian technocomplexes in Europe and Levant, and also the hypothesis that it evolved out of underlying Zagros Mousterian, engaged Baradostian as one of the potential candidates for ambiguous origin of Aurignacian. The current information comes from several cave and rockshelter sites, mostly in Iran (except Shanidar cave in Iraq), and more precisely in the intermontane valleys of Kermanshah and Khorramabad in the Western Zagros and a few sites in Fars province in the southern Zagros, which all yielded Baradostian industry. The definition of Baradostian and its affinities to Aurignacian has gradually formed and strengthened since its recognition in 1958 at the Shanidar Cave in the western foothills of the Zagros in Iraq (Solecki 1958). On the basis of similarities observed in Warwasi assemblages and Aurignacian technocomplex, the name "Zagros Aurignacian" suggested for Baradostian and two main chronological phases described for it (Olszewski and Dibble 1994). The earlier of these has been classified as the Early Zagros Aurignacian, and includes a combination of Upper and Middle Paleolithic tools, such as carinated endscrapers, burins, Font-Yves points, Dufour bladelets, sidescrapers, and truncated-faceted pieces. Most of the tools are on flake blanks and some are on blade and bladelet blanks. The debitage is dominated by flakes, but prismatic blade technology is also present. This assemblage has presented as an example of a transitional industry, which can indicate one sequence of development from a Middle Paleolithic into the Aurignacian. Later phase has classified as the Late Zagros Aurignacian and it is most typical for having the characteristic types of the Aurignacian. There is a considerable number of carinated burins and Dufour bladelets, carinated endscrapers as well as Arjeneh points. Tools are made about equally on blade, bladelet, and flake blanks. Technologically, this assemblage is dominated by bladelet debitage (Fig. 3).

The Late Zagros Aurignacian at Warwasi appears to share broad similarity to assemblages of central Europe and the beginning of the Levantine Aurignacian (Olszewski and Dibble 2006). In addition to Warwasi, recent researches of Yafteh Cave, which include restudy of the 1965 collections (Bordes and Shidrang 2009), and new field works (Otte et al. 2007, 2011) yielded a better-defined typo-technological characteristics and more importantly radiocarbon dates for Baradostian (Fig. 4). Based on recent re-studies of lithic material from 1965 excavation, the existence of two main typo-technological phases were described for the Yafteh sequence (Bordes and Shidrang 2009). The lower part of the deposit was associated with an assemblage mainly oriented toward the production of Arjeneh points and relatively large, straight or slightly curved Dufour bladelets. The bladelets or blanks of these tools were removed from prismatic cores or sometimes from narrow flake ridges. There are also a number of end-scrapers on blades, which sometimes have Aurignacian retouch on their lateral edges (Fig. 5). In the upper part of the sequence, carinated burins are dominant and small twisted bladelets were removed from them and subsequently transformed by inverse or alternate retouch into Dufour bladelets (Fig. 6). A series of radiocarbon dates which suggests the attribution of the materials to an age between 24,500 and 36,000 14 C BP. The more recent results indicate a single chronological signal of approximately 33,500 14 C BP for the major part of Yafteh sequence. Radiocarbon estimations

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 3 The 1960 excavation at Warwasi rockshelter. (Photo courtesy of F. Hole, after Biglari 2012)

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 4 General view of Yafteh cave. (Photo: S. Shidrang)

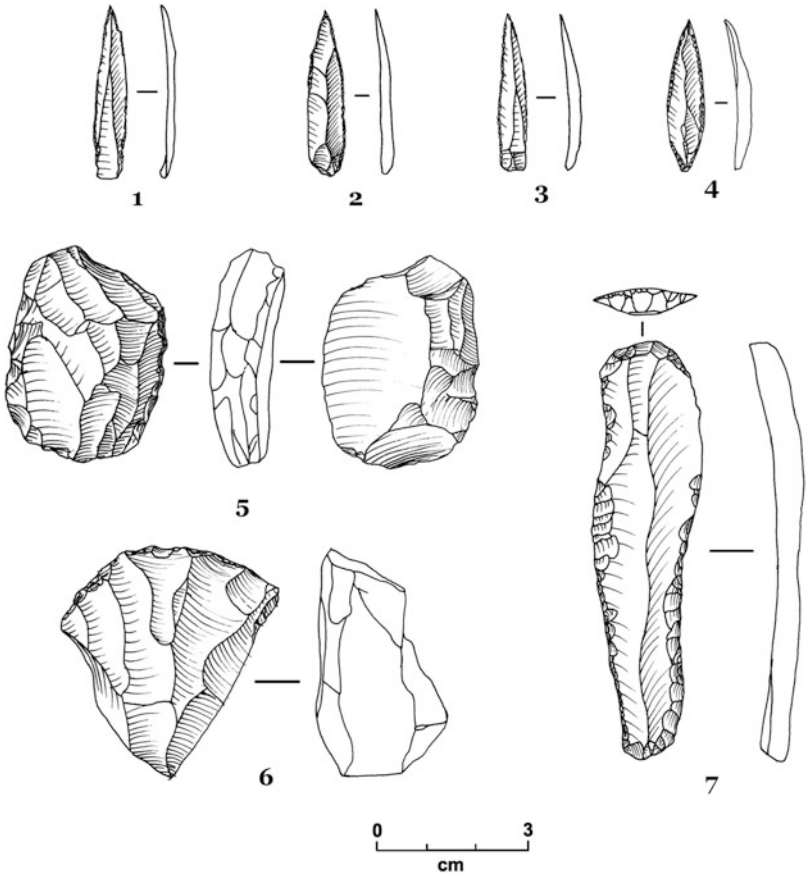

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 5 Some of the Early Baradostian characteristic artifacts from Yafteh Cave: *1–4* Arjeneh points, *5* Bidirectional bladelet core, *6* Prismatic bladelet core, *7* End-scraper on retouched blade. (Drawing: S.Shidrang)

from main occupation of Yafteh appear to pre-date the chronological range of considerable Levantine Aurignacian sequences and overlap some of the Early Ahmarian ones (Otte et al. 2011).

Anatolia

Despite its important key position, Anatolia is relatively less known in the debate of Middle to Upper Paleolithic transition, compared to Levant and other adjacent regions. The major part of our information for this period comes from two cave sites, Üçağızlı and Karain B located in Mediterranean Zone of modern Turkey. Üçağızlı Cave is located on the Mediterranean coast in the Hatay province of south-central Turkey. Radiocarbon dates indicate that the early Upper Paleolithic sequence of Üçağızlı corresponds to the temporal interval between 41,000 and 29,000 uncalibrated radiocarbon years BP. The earliest dates associated with the Initial Upper Paleolithic (IUP) industry, quite the same transitional industries identified in Levantine sites, correspond to about 35,000 and 41,400 radiocarbon years BP. The earliest true Upper Paleolithic entity, which was found on top of IUP layers, is the early Ahmarian known widely from Levant. The dates for Ahmarian layers at Üçağızlı Cave fall within an interval of 29,000–34,000 radiocarbon years BP (Kuhn et al. 2009). This interval corresponds with the earliest time range of early Ahmarian industries at open-air sites in the Sinai and Negev deserts of the southern Levant (Marks 1983; Bar-Yosef and Pilbeam 2000).

Apparently there is a noticeable degree of typological continuity throughout the Üçağızlı sequence. For instance, the endscrapers are the dominant retouched tool forms in all layers and pointed blades are most common in the upper layers and less abundant in the earlier part of the sequence. The technological attributes of

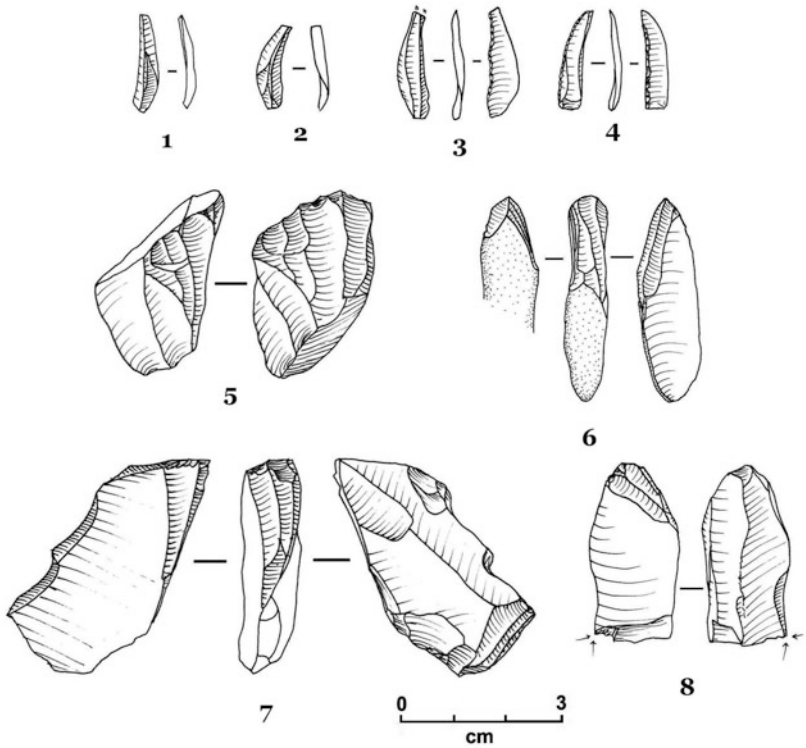

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 6 Some of the Late Baradostian characteristic artifacts from Yafteh Cave: *1–2* small twisted bladelets, *3–4* dufour bladelets (Roc-de- Combe subtype), *5* carinated core, *6–8* Carinated burin. (Drawing: S. Shidrang)

Levallois method and small numbers of chanfreins are common in IUP of Üçağızlı Cave. The Chanfreins are considered one of the types of fossils of the IUP or Transitional assemblages of northern Levant.

The Levallois blanks, particularly blades and elongated points, are common in IUP layers and their frequency decline over time. Changes in platform morphology and preparation indicate an abrupt shift from hard hammer percussion to soft hammer or indirect percussion at the end of IUP layers, which point out to the shift from IUP to Ahmarian (Kuhn et al. 2009).

The Üçağızlı Cave data supports the records from Ksar ‘Akil in showing gradual changes in lithic industries over time. The features that make IUP a transitional industry are the persistence of some Middle Paleolithic characteristics, such as application of Levallois method, hard-hammer technique and platform faceting, while the assemblage is Upper Paleolithic from typological point of view. The attributed Levallois features may imply that the Levantine IUP industries had their origins in the Middle Paleolithic in Levant or Middle Stone Age complexes in nearby regions.

The Üçağızlı sequence provides evidence for the evolution of IUP into the later Upper Paleolithic “early Ahmarian,” but since there is no evidence of Middle Paleolithic underlying the IUP layers of Üçağızlı, it cannot participate in the debate of Initial Upper Paleolithic origins in the region (Kuhn et al. 2009).

Apart from Üçağızlı, another cave called Karain B in Antalya has yielded a sequence encompassing Middle and Upper Paleolithic remains. The Early Upper Paleolithic in Karain B has been described as an Aurignacian-like industry with carinated and nosed end-scrapers associated with Dufour, Krems type retouched bladelets and carinated burins. Beside an irregular flake production, the retouch blades are present in moderate frequency, but a few prismatic bladelet cores were recovered. The available date for this industry is around 28,000 BP, which corresponds with the latest time range of early Ahmarian industry at Üçağızlı cave. The underlying Middle

Paleolithic artifacts display the typical characteristics of Mousterian industry, including Mousterian points, side scrapers, notches, etc., quite similar to those found in Zagros (Yalçınkaya and Otte 2000). Despite the proximity of these sites, their sequences are quite different and until the complete and equal publication of their studies, a valid comparison and interpretation would not be possible. Although these sites are described under the title of Anatolia and modern Turkey territory, they are in fact northern Levantine sites in Mediterranean zones. The situation in the mainland of Anatolia itself has remained quite an enigma for the time period of Middle to Upper Paleolithic Transition.

Caucasus

Caucasus (in this entry southern Caucasus) also presents notable insights concerning the expansion of attributed modern human cultures and the disappearance of Neanderthals ones that have useful implications for ongoing debates of Middle to Upper Paleolithic transition in Eurasia. The Middle to Upper Paleolithic pattern of cultural changes in southern Caucasus seems to be relatively abrupt in comparison to Levant. Reassessment of old excavations and new research in several sites in Georgia and Armenia, where the Middle Paleolithic lasted until 35,000 years ago, tend to demonstrate that the genuine Upper Paleolithic is without local precedent and can be intrusive to this region (Bar-Yosef et al. 2006). The main evidence for this claim on Caucasian Middle and Upper Paleolithic transitional industries come from two cave and rockshelter sites "Dzudzuana" and "Ortvale Klde" on the southwestern slopes of the Caucasus Mountains. The lithic assemblage from the earliest Upper Paleolithic at Ortvale Klde contains unidirectional blade cores, end scrapers on blades, rounded flake scrapers, burins on truncation, retouched bladelets, and backed bladelets. Beside lithic artifacts, several bone/antler points and decorated objects were discovered in Early Upper Paleolithic layers (Adler et al. 2006). Similar materials were never discovered in the underlying Late Middle Paleolithic layers, which were dominated by Levallois technology and a typical group of Middle Paleolithic scraper types (Adler et al. 2006).

In Dzudzuana Cave, the early Upper Paleolithic industry is characterized by the production of short blades and small bladelets from unidirectional blade/bladelet cores. Microliths are very common and there are typical burins and end scrapers on flakes and blades. The later Upper Paleolithic layer in Dzudzuana contains an industry dominated by the production of small blades and bladelets detached predominantly from carinated cores.

Apparently, there is no clear evidence at either site for interaction between Neanderthals and modern humans attributed cultures. In Ortvale Klde, the Late Middle Paleolithic sequence was overlain by a genuine early Upper Paleolithic occupation (Fig. 7). Interestingly, the lowermost Upper Paleolithic unit in Dzudzuana contains an industry similar to Upper Paleolithic layers of Ortvale Klde. At both sites, the Upper Paleolithic sequence begins at *about* 34–32 Ka BP. Similar industries were also recovered from both the northern and southern slopes of the Caucasus, for instance Mezmaiskaya Cave (Golovanova et al. 1999) dated to 35–34 Ka BP as Ortvale Klde (Adler et al. 2006) or Bondi Cave date to 31–24 ka 14 C BP (Tushabramishvili et al. 2012). To researchers, this homogeneity of Early Upper Paleolithic lithic industries across Caucasus suggests that the modern humans had more success in fast expansion across mountains in compare to Neanderthals, probably due to better communication abilities and improved equipment (Bar-Yosef et al. 2006). It is also believed that the Caucasus Mountains may have been a biogeographical and social barrier to the Neanderthals, since the Mousterian industries from the southwestern slopes are similar to the Zagros-Taurus types, while the Mousterian of the northwestern slopes of the Caucasus resembles the Eastern Micoquian.

Arabian Peninsula

The Arabian Peninsula is a geographical bridge between Africa and Eurasia, and its Pleistocene archaeological evidence is of significant interest in tracking the southern route of population expansion from Africa. Compared to Levant and

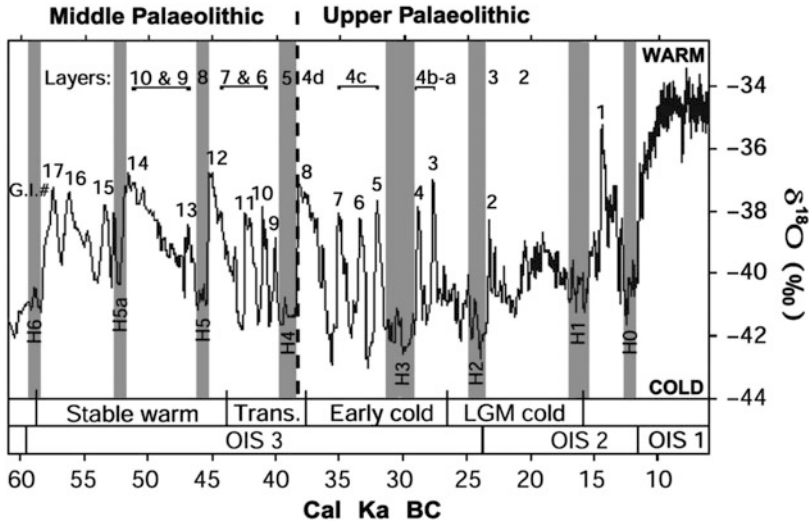

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 7 The Middle and Upper Paleolithic of Ortvale Klde and proposed correlation with Greenland Ice Cores. (After Adler et al. 2006)

other part of the Middle East, the study of Modern Human origins began relatively late in Arabian Peninsula. Given the scarcity of stratified sites and absolute dating, it is not yet possible to create a comprehensive idea of Middle to Upper Paleolithic Transition in Arabian Peninsula. However, recent research has found some archaeological affinities with North Africa and Southwest Asia, mainly based on Middle Paleolithic discoveries in coastal areas (Marks 2009; Rose et al. 2011; Delagnes et al. 2012). But the Upper Paleolithic of Arabia is less known and the current state of data has documented a long sequence of laminar technologies that date back to around MIS 4 through early MIS 1 (~75–8 ka).

Several sites, like Al-Hatab Rockshelter and Shi'bat Dihya1 inYemen, provide evidence for human occupation in southern Arabia during MIS 4 and MIS 2 (Delagnes et al. 2012). The site of Jebel Faya 1 with remains dated to MIS 5 and MIS 3 (Marks 2009) and Upper Paleolithic sites recorded in the Wadi Hadramaut are examples of Arabian Upper Paleolithic sites that were all found in marginal environments. Jebel Faya rockshelter in Sharjah Emirate is one of the a few stratified excavated Paleolithic sites that have yielded radiometric dates for Arabian Peninsula Paleolithic cultures (Marks 2009). The lithic materials are associated with three distinct archaeological layers of Jebel Faya spanning a major part of the Late Pleistocene. The preliminary results of radiometric dates indicate an age of at least 85 ka for its Middle Paleolithic assemblage (C), while later assemblages (A and B) fall in MIS 3 (Marks 2009). Typo-technologically, the lowest assemblage is characterized by small handaxes, bifacial foliates, hard hammer blades and centripetal cores, and the next upper assemblage (B) is characterized by the production of flakes from 90° cores and flat cores. There are a number of multiple platform cores as well as a few truncated faceted pieces and blade production in addition to some volumetric cores. Tools comprise sidescrapers, endscrapers, denticulates and simple retouched pieces. Later assemblage (A) is characterized by the production of small rectangular flakes from multiple platform cores. The purposeful blade production is very rare, although a few short, wide blades exist. Tools categories include burins, retouched pieces, and small number of endscrapers, sidescrapers and denticulates (Marks 2009). Apparently, the Jebel Faya 1 assemblages A and B show no obvious technological relations to any transitional industry in the Levant or Africa.

Apart from the site Faw Well, which based on its similarities to late Ahmarian of the Levant probably date back to late MIS 3, other contemporaneous sites throughout Arabia show no close affinities to either the Levant or East Africa. The

Faw Well, located east of the Asir Mountains in southern Saudi Arabia, seems to be the only convincing evidence for an Levantine Upper Paleolithic presence in Arabia (Marks 2009). The small collections from Faw Well typo-technologically resemble the later Ahmarian of the southern Levant, which date to about c. 24 and 20 ka.

At most of the sites, the blade technology is relatively different from contemporaneous Levantine sites and the absence of el Wad points and finely retouched blades and bladelets, makes it difficult to hypothesis any direct connections. While additional sites and absolute dates are vital to interpret these industries, currently the most accepted view is that they are parts of a long term, local developmental sequence of Arabian lithic industries. However, during early MIS 3, a period of increase in precipitation occurred in Arabia, which increased the possibility of demographic exchanges between Arabia and adjacent regions (Fig. 8). For instance, southern Arabian populations may have spread to the north during this time and disperse a Nubian-derived Levallois technique used in production of elongated points from bidirectional Levallois cores, one of the technological characteristics of the Middle-Upper Palaeolithic transition industries in the Levant (Rose et al. 2011).

International Perspectives

Middle East and its key location is particularly important in the studies based on the leading model of "out of Africa" or diffusion theory, which discuss the expansion of modern humans and their innovative Upper Paleolithic culture out of Africa into Eurasia, and ultimately replacing the earlier hominids. However, followers of an alternative model believe gradual local evolution from Middle Paleolithic to Upper Paleolithic played a more important role in Middle East and present some archaeological evidence in accordance with their model. But the development of research in the past two decades led to a more complex image, which attempts to adapt both local developments and interactions. The variety of the geographical and cultural contexts in which

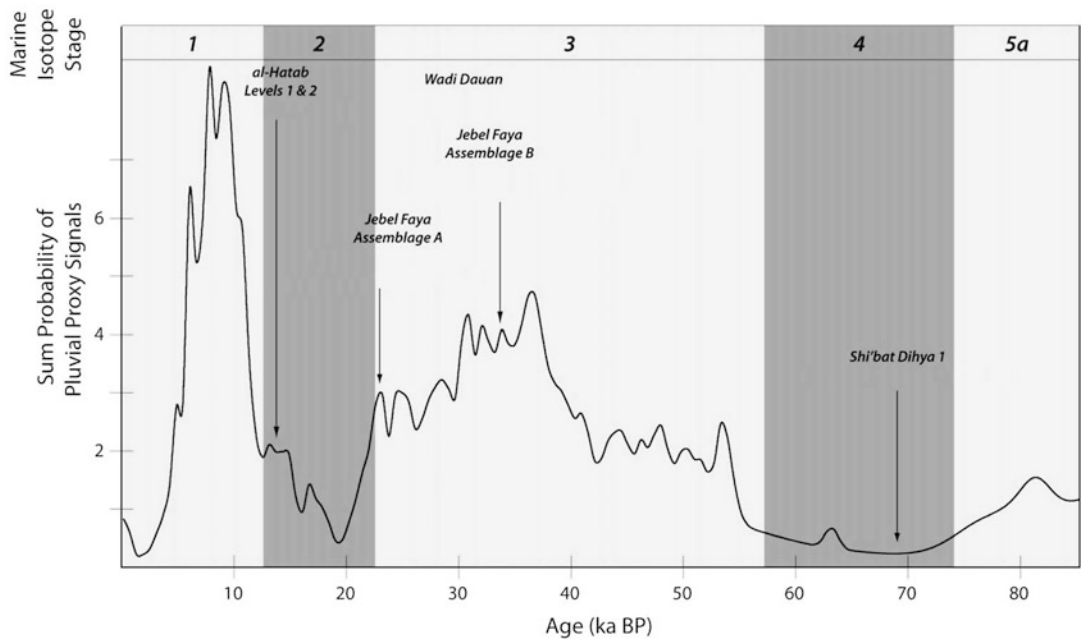

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 8 Arabian paleoenvironmental curve indicating summed probability curve of pluvial proxy signals from MIS 5a-MIS 1 and some of the dated Upper Pleistocene archaeological sites. (After Rose and Usik 2009)

the different traditions developed, and major and minor movement of hunter gatherer groups within the regions of Middle East and into or from neighboring areas like Europe, were certainly responsible for diversified evidence of MP-UP transition in this region. Unfortunately, the current state of data is not sufficient to reconstruct the processes leading to the appearance and development of the UP in each region of Middle East. This is particularly true for the Arabian Peninsula and the major part of Turkey. But within the Levant, the transition from Middle to Upper Paleolithic defines by the Initial Upper Paleolithic, which dates back to a time range between 49 k cal BP c. and 47.5 k cal BP (Belfer-Cohen and Goring-Morris 2013). The Initial Upper Paleolithic, which seems to have its roots in local Middle Paleolithic, developed into the Ahmarian tradition or the first true Upper Paleolithic tradition of the Levant that is similar to Proto- Aurignacian and partially early Baradostian of Zagros. In the Zagros, Middle Paleolithic typo-technological elements are present in the Early Zagros Aurignacian or early Baradostian of Warwasi, but on the basis of available data, possibility of continuity from Zagros Mousterian to the Zagros Aurignacian cannot be confirmed yet. However, there is no abrupt break between the Mousterian and Zagros Aurignacian of Warwasi rockshelter, which has kept Zagros as one of the potential candidates for origin of Aurignacian (Olszewski and Dibble 2006). Also based on the Yafteh cave in Zagros, which has yielded solely Baradostian layers, there are certain technological and chronological analogies between the lower Baradostian at Yafteh and the Early Ahmarian, and then the upper Baradostian and the Levantine Aurignacian; the nature of their connections still remains open to discussion (Otte et al. 2011).

Future Directions

As mentioned previously, the degree of our information about Middle to Upper Paleolithic transitional industries or events is not the same in all regions of Middle East. In order to reach a common level of information that enables us to compare and reconstruct a more complete image of human evolution history during this period, the following points are vital to be considered:

- Need for accurate information from well-stratified sites and systematic surveys in all involving regions.
- Generating new data via modern excavation methods and technologies to reach the maximum control over the recovery of materials and accurate documentation of their context as much as possible in all regions.
- Publication of detailed typo-technological characteristics of related industries extracted from in situ materials using efficient approaches, such as reconstruction of chain operation and refitting studies.
- Reliable chronological age determinations for each industry: the systematic dating of transitional sequences in different regions.
- Adopting multidisciplinary research approaches, such as microwear analysis, geoarchaeology, micromorphology and site formation studies, raw material sourcing, additional information from zooarchaeological and palynological analysis, etc., to maximize the extraction of archaeological information and reconstruction of changes in different aspects of hunter gatherers life.
- Refinement of traditional models by establishing new progressive and flexible models to understand the process of changes and developments as they really occurred.

Cross-References

- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ *Homo neanderthalensis*

▶ *Homo sapiens*
▶ Human Evolution: Theory and Progress
▶ Lithic Technology, Paleolithic
▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
▶ Out-of-Africa Origins
▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea
▶ West Asia: Paleolithic

References

Adler, D.S., G. Bar-Oz, A. Belfer-Cohen, and O. Bar-Yosef. 2006. Ahead of the game. Middle and Upper Palaeolithic behaviors in the southern Caucasus. *Current Anthropology* 47: 89–118.

Bar-Yosef, O. & D. Pilbeam. 2000. Appendix: Radiometric dates available at the time of publication. In O. Bar-Yosef & D. Pilbeam (ed.) *The geography of Neandertals and modern humans in Europe and the Greater Mediterranean* (Bulletin 8): 189–97. Cambridge, MA: Peabody Museum.

Bar-Yosef, O., A. Belfer-Cohen, and D.S. Adler. 2006. The implications of the Middle-Upper Paleolithic chronological boundary in the Caucasus to Eurasian prehistory. *L'Anthropologie* 44 (1): 49–60.

Belfer-Cohen, A., and A.N. Goring-Morris. 2007. From the beginning: Levantine Upper Palaeolithic cultural continuity. In *Rethinking the human revolution*, ed. P. Mellars, K. Boyle, O. Bar-Yosef, and C.B. Stringer, 199–206. Cambridge: MacDonald Institute of Archaeology.

Belfer-Cohen, A., and A.N. Goring-Morris. 2013. The earlier Upper Paleolithic: A view from the southern Levant. In *L'Aurignacien de la grotte Yafteh (fouilles 2005–08) et son contexte/The Aurignacian from Yafteh Cave (2005–08 excavations) and its context*, ERAUL 132, ed. M. Otte, S. Shidrang, and D. Flas, 127–136. Liège: Université de Liège.

Biglari, F. 2012. The development of the Paleolithic archaeology in Iran; a review. In *Eighty years of Iranian archaeology*, ed. Y. Hassanzadeh and S. Miri, 7–48. Tehran: Pazineh Publication, National Museum of Iran and Iranian Center for Archaeological Research.

Bordes, J.G., and S. Shidrang. 2009. La sequence baradostienne de Yafteh (Khorammabad, Lorestan, Iran). In *Le Paleolithique d'Iran*, ed. M. Otte, F. Biglari, and J. Jaubert, 85–100. Oxford: Archaeopress.

Delagnes, A., C. Tribolo, P. Bertran, M. Brenet, C. Remy, J. Laubert, L. Khalidi, N. Mercier, S. Nomade, S. Peigne, L. Sitzia, J.-F. Tourne-Piche, M. Al-Halibi, A. Al-Mosabi, and R. Macchiarelli. 2012. Inland human settlement in southern Arabia 55000 years ago. New evidence from the Wadi Surdud Middle Paleolithic site complex, western Yemen. *Journal of Human Evolution* 63 (3): 452–474.

Gilead, I. 1981. Upper Paleolithic tool assemblages from the Negev and Sinai. In *Préhistoire du Levant*, ed. J. Cauvin and P. Sanlaville, 331–352. Paris: CRNS.

Golovanova, L.V., J.F. Hoffecker, V.M. Kharitonov, and G.P. Romanova. 1999. Mezmaiskaya Cave: A Neandertal occupation in the northern Caucasus. *Current Anthropology* 40: 77–86.

Goring Morris, A.N., and A. Davidzon. 2006. Straight to the point: Upper Palaeolithic Ahmarian lithic technology in the Levant. *L'Anthropologie* 44: 93–111.

Goring-Morris, A.N., and A. Belfer-Cohen. 2006. A hard look at the 'Levantine Aurignacian': How real is the taxon? In *Towards a definition of the Aurignacia*, ed. O. Bar-Yosef and J. Zilhao, 297–314. Lisbon: American School of Prehistoric Research/Instituto Português de Arqueologia.

Kuhn, S., M. Stiner, E. Gülec, I. Ozer, H. Yilmaz, I. Baykara, A. Acikkol, P. Goldberg, K. Molina, E. Unay, and F. Suata-Alpaslan. 2009. The early Upper Paleolithic occupations at Üçağızlı Cave (Hatay, Turkey). *Journal of Human Evolution* 56: 87–113.

Marks, A.E. 1981. Upper Paleolithic tool assemblages from the Negev and Sinai. In *Préhistoire du Levant*, ed. J. Cauvin and P. Sanlaville, 369–374. Paris: CRNS.

Marks, A.E. 1983. The sites of Boqer Tachtit and Boqer: A brief introduction. In *Prehistory and paleoenvironments in the Central Negev, Israel, Volume III: the Avdat/Aqev Area, part 3*, ed. A.E. Marks, 15–37. Dallas: SMU Press.

Marks, A.E. 1990. The Middle and Upper Palaeolithic of the Near East and the Nile Valley: The problem of cultural transformations. In *The emergence of modern humans*, ed. P. Mellars, 56–80. Edinburgh: University of Edinburgh Press.

Marks, A.E. 2003. Reflections on Levantine Upper Palaeolithic studies: past and present. In *More than meets the eye: Studies on Upper Palaeolithic diversity in the Near East*, ed. A.N. Goring-Morris and A. Belfer-Cohen, 249–264. Oxford: Oxbow.

Marks, A.E. 2009. The Paleolithic of Arabia in an interregional context. In *The evolution of human populations in Arabia. Paleoenvironments, prehistory and genetics*, ed. M. Petraglia and J. Rose, 295–308. Dordrecht: Springer.

Ohnuma, K. 1988. Ksar 'Akil, Lebanon. *A technological study of the earlier Upper Palaeolithic levels of Ksar*

'Akil, Volume III. Levels XXV–XIV (BAR International series 426). Oxford: Archaeopress.

Olszewski, D.I., and H.L. Dibble. 1994. The Zagros Aurignacian. *Current Anthropology* 35: 68–75.

Olszewski, D.I., and H.L. Dibble. 2006. To be or not to be Aurignacian: The Zagros upper Paleolithic. In *Towards a definition of the Aurignacian*, Trabalhos de Arqueologia 45, ed. O. Bar-Yosef and J. Zilhao, 355–373. Lisbon: American School of Prehistoric Research/Instituto Português de Arqueologia.

Otte, M., F. Biglari, D. Flas, S. Shidrang, N. Zwyns, M. Mashkour, R. Naderi, A. Mohaseb, N. Hashemi, J. Darvish, and V. Radu. 2007. The Aurignacian in the Zagros region: new research at Yafteh Cave, Lorestan, Iran. *Antiquity* 81: 82–96.

Otte, M., S. Shidrang, N. Zwyns, and D. Flas. 2011. New radiocarbon dates for the Zagros Aurignacian from Yafteh Cave, Iran. *Journal of Human Evolution* 61: 340–346.

Rose, J., and V. Usik. 2009. The "Upper Paleolithic" of South Arabia. In *The evolution of human populations in Arabia. Paleoenvironments, prehistory and genetics*, ed. M. Petraglia and J. Rose, 169–185. Dordrecht: Springer.

Rose, J., V. Usik, A. Marks, Y. Hilbert, C. Galletti, A. Parton, J.M. Geiling, V. Cerny, M. Morley, and R. Roberts. 2011. The Nubian complex of Dhofar, Oman: An African Middle Stone Age industry in southern Arabia. *PLoS One* 6: e28239.

Solecki, R. S. 1958. *The Baradostian industry and the Upper Palaeolithic in the Near East*. PhD dissertation, Columbia University. Ann Arbor: University Microfilms International.

Yalçinkaya, I., and M. Otte. 2000. Débuts du Paléolithique supérieur à Karain (Turquie). *L'Anthropologie* 104 (1): 51–62.

Further Reading

Adler, D.S. 2002. *Late Middle Palaeolithic patterns of lithic reduction, mobility, and land use in the southern Caucasus*. Unpublished PhD dissertation, Harvard University.

Amirkhanov, H. 1994. Research on the Paleolithic and Neolithic of Hadhramaut and Mahra. *Arabian Archaeology and Epigraphy* 5: 217–228.

Azoury, I. 1986. Ksar Akil, Lebanon. *A technological and typological analysis of the transitional and early Upper Palaeolithic levels of Ksar Akil and Abu Halka* (BAR International series 289). Oxford: Archaeopress.

Bar-Yosef, O. 2000. The Middle and early Upper Paleolithic in Southwest Asia and neighboring regions, in O. Bar-Yosef & D. Pilbeam (ed.) *The geography of Neandertals and modern humans in Europe and the Greater Mediterranean* (Bulletin 8): 107–56. Cambridge, MA: Peabody Museum.

Bar-Yosef, O., M. Arnold, N. Mercier, A. Belfer-Cohen, P. Goldberg, R. Housley, H. Laville, L. Meignen, J.C. Vogel, and B. Vandermeersch. 1996. The dating of the Upper Palaeolithic layers in Kebara Cave, Mt. Carmel. *Journal of Archaeological Science* 23: 297–306.

Belfer-Cohen, A., and O. Bar-Yosef. 1981. The Aurignacian in Hayonim Cave. *Paléorient* 7: 19–42.

Belfer-Cohen, A., and A.N. Goring-Morris. 2003. Current issues in Levantine Upper Palaeolithic research. In *More than meets the eye: Studies on Upper Palaeolithic diversity in the Near East*, ed. A.N. Goring-Morris and A. Belfer-Cohen, 1–12. Oxford: Oxbow.

Blechschmidt, I., A. Matter, F. Preusser, and D. Rieke-Zapp. 2009. Monsoon triggered formation of Quaternary alluvial mega fans in the interior of Oman. *Geomorphology* 110: 128–137.

Crassard, R. 2009. The Middle Paleolithic of Arabia: the view from the Hadramawt region, Yemen. In *The evolution of human populations in Arabia: Paleoenvironments, prehistory and genetics*, ed. M. Petraglia and J. Rose, 151–168. Dordrecht: Springer.

Edens, C. 2001. A bladelet industry in southwestern Saudi Arabia. *Arabian Archaeology and Epigraphy* 12 (2): 137–142.

Marks, A.E. 1993. The early Upper Paleolithic: the view from the Levant. In *Before Lascaux: The complete record of the early Upper Paleolithic*, ed. H. Knecht, A. Pike-Tay, and R. White, 5–22. Boca Raton: CRC Press.

Phillips, J.L. 1994. The Upper Paleolithic chronology of the Levant and the Nile valley. In *Late Quaternary chronology and paleoclimates of the Eastern Mediterranean*, ed. O. Bar-Yosef and R. Kra, 69–176. Tucson: Radiocarbon.

Kuhn, S., M. Stiner, and E. Güleç. 1999. Initial Upper Paleolithic in south-central Turkey and its regional context: A preliminary report. *Antiquity* 73: 505–517.

Uerpmann, H-P., M. Uerpmann, J. Kutterer, M. Handel, SA. Jasim and A. Marks. 2007. The Stone Age sequence of Jebel Faya in the Emirate of Sharjah (UAE). Paper presented at the Seminar for Arabian Studies, London.

Yalçinkaya, I., M. Otte, O. Bar-Yosef, J. Kozlowski, J.M. Léotard, and H. Taskiran. 1993. The excavations at Karain Cave, south-western Turkey: An interim report. In *The Paleolithic prehistory of the Zagros-Taurus*, ed. D.I. Olszewski and H.L. Dibble, 100–106. Philadelphia: The University Museum, University of Pennsylvania.

Skinner, A.R., B.A.B.. Blackwell, S. Martin, A. Ortega, J.I.B. Blickstein, L.V. Golovanova, and V.B. Doronichev. 2005. ESR dating at Mezmaiskaya Cave, Russia. *Applied Radiation and Isotopes* 62: 219–224.

Tushabramishvili, N., D. Pleurdeau, M.H. Moncel, T. Agapishvili, A. Veku, M. Bukhaianidze, B. Maureille, A. Muskhelishvili, M. Mshvildadze, N. Kapanadze, and D. Lordkipanidze. 2012. Human remains from a new Upper Pleistocene sequence in Bondi Cave (western Georgia). *Journal of Human Evolution* 62 (1): 179–185.

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic

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State of Knowledge and Current Debates

Introduction

The Middle East, the Indian Subcontinent, and Central Asia are key regions in human evolution as they are the gateway between our African homeland and the rest of the world. Understanding the early prehistory of these regions is critical to understanding both hominin dispersal patterns and the divergent evolutionary trajectories of hominins in different parts of the Old World. Here, the Middle East is defined as that part of Asia from Anatolia, the Levant, and the Sinai in the west to the Iranian plateau in the east, and from the southern shores of the Black Sea, the Caspian Sea, and the Lesser Caucasus mountains in the north to Yemen in the south. The Indian Subcontinent is defined as stretching from the eastern edge of the Iranian plateau in the west to the Chittagong hills in the east, and from the High Himalayas in the north to Sri Lanka in the south. Central Asia is defined as extending from the Caspian Sea and the Ural River in the west to the Altai, Tien Shan, and Pamir Mountains in the east, and from the Kirghiz Steppe in the north to the Iranian Plateau and the Hindu Kush in the south (Fig. 1). This entry is organized chronologically to reflect the fact that this region of intercontinental crossroads cannot be understood in isolation but must be viewed in terms of dispersals out of and into the neighboring regions.

The First Asians: 2–1.6 Million Years Ago

The earliest claim for hominin occupation outside Africa comes from the site of Riwat in the Siwalik Hills of the Pakistani Punjab (Fig. 2). Here, a number of stone flakes and a core were found that were argued to have been produced by human agency by the presence of clear bulbs of

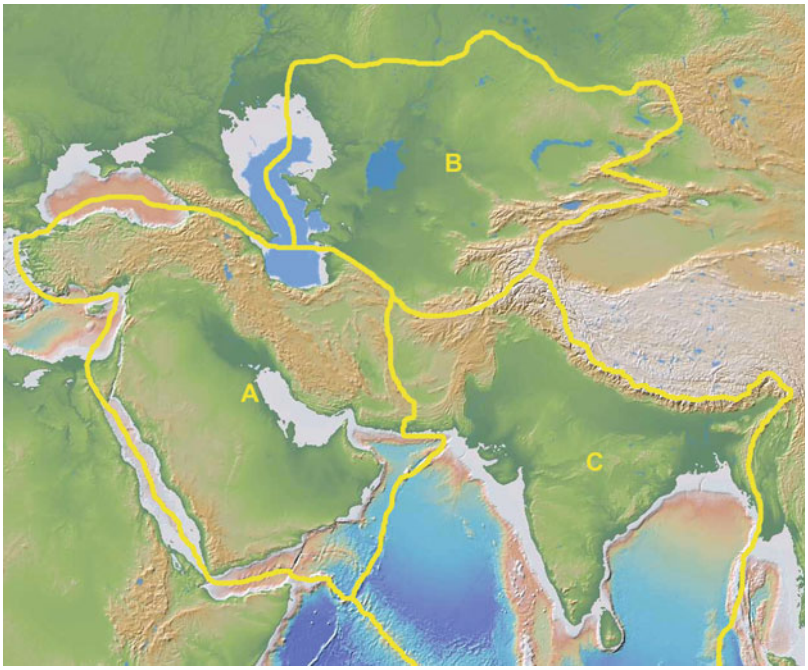

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic,
Fig. 1 Topographic map of the Middle East (**a**), Central Asia (**b**), and the Indian Subcontinent (**c**). (Adapted from GeoMapApp (http://www.geomapapp.org))

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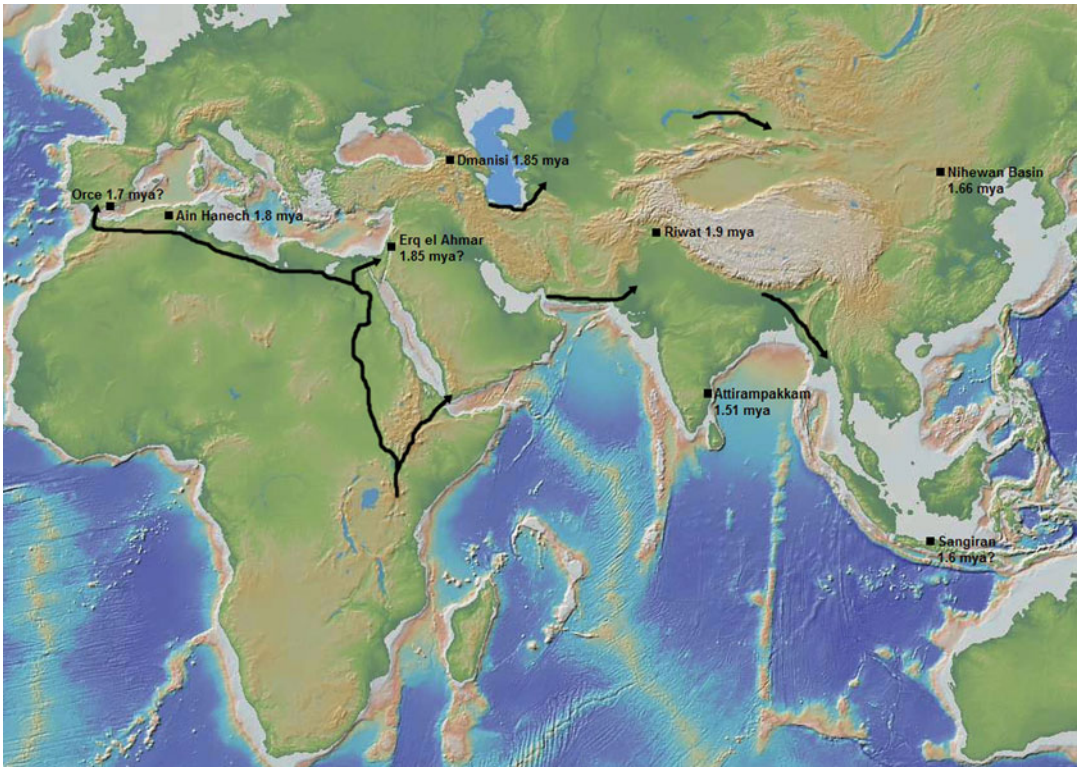

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic, Fig. 2 Hominin occupation sites outside of sub-Saharan Africa older than 1.5 million years and potential hominin dispersal routes

percussion and multidirectional negative scar patterns (Dennell et al. 1988). The absence of intermediary forms among the natural stone conglomerate in which they were found further implies the genuine cultural nature of these lithics. Paleomagnetism and fission-track dating indicate that the artifact-bearing horizon is at least 1.9 million years old (Dennell et al. 1988).

To reach the Indian Subcontinent from Africa overland, it is necessary to go through the Middle East (Fig. 2). An early archaeological site in the Jordan Valley, a rockshelter called Erq el-Ahmar, suggests hominins might first have left Africa via a northern route through the Sinai. Here, flaked pebbles were found in deposits preliminarily dated by paleomagnetism and potassium-argon ratios to 1.75–1.95 million years ago (Ron and Levi 2001), but further work is needed to corroborate both the age and authenticity of the artifacts.

The site of Shuwayhitiyah in northern Arabia has also been suggested to be at the vanguard of a northern out-of-Africa dispersal (Whalen et al. 1989). Although no ages have been obtained for this site, typological comparison of the artifacts links it to the developed Oldowan of east Africa, with high proportions of choppers, some polyhedrons and spheroids and some crude bifaces and small tools (Whalen et al. 1989). Similar undated Oldowan-like occurrences in southern Arabia have been used to argue for an early southern dispersal out of Africa across the Bab al Mandab straits (Whalen et al. 1989). Without dating however, these early archaeological sites in Arabia must remain tentative as simple stone tool types recur throughout human history.

The fossil record for the Middle East, Central Asia, and the Indian Subcontinent is extremely sparse, so determining which species are responsible for manufacturing the various facies of the Lower Paleolithic in these regions is a matter of some conjecture. For this early period, there are however some candidates whose remains were

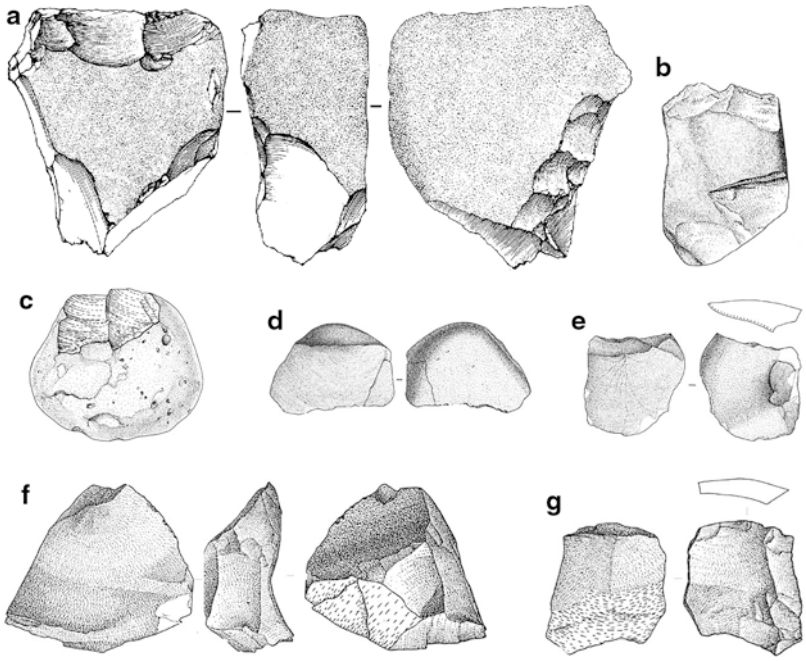

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic, Fig. 3 A selection of Oldowan artifacts from Dmanisi, (**a**) is a multiplatform core, (**b** and **c**) are unifacial cores, (**d**–**g**) are flakes. Drawings are not to scale. (After Mgeladze et al. 2010)

found at the site of Dmanisi on the northern slopes of the Lesser Caucasus (Fig. 2). Here, hominin fossils were recovered from a lakeside setting along with stone artifacts including unifacial, bifacial, multiplatform, and radial cores and small flakes (Mgeladze et al. 2010) (Fig. 3). Fauna at Dmanisi includes deer, giraffes, ostriches, gazelle, and rhinoceros (Gabunia et al. 2000), with cutmarks on a handful of bones indicating hominin butchery using stone tools. Paleomagnetism and argon-argon ratios indicate that the site was repeatedly used by hominins during the period 1.85–1.78 million years ago (Ferring et al. 2011). The earliest hominin remains at the site are of a robust mandible, while overlying this were several crania, gracile mandibles, and teeth. The variation in mandibular robusticity has led to the suggestion that the Dmanisi hominins were either markedly sexually dimorphic or that they represent two different species (Schwartz and Tattersall 2003). Phylogenetically, they appear to be a primitive form of *Homo erectus*, with small brain sizes and several affinities to *Homo habilis* (Rightmire et al. 2006). A subspecies designation of *Homo erectus georgicus* seems the simplest way to taxonomically situate these hominins on current evidence. Interestingly, it has been suggested that the Dmanisi hominins might be ancestral both to classic East Asian *Homo erectus erectus* and to the early African *Homo erectus ergaster* (Rightmire et al. 2006). The hominin finds from the island of Flores in Indonesia are interesting in this regard as they display many primitive features such as the wrist, curved clavicle, flared iliac blades, and relatively short legs, which indicates they are descended from a species more primitive than *Homo erectus erectus* (Brown 2012). It thus appears that hominins left Africa before the appearance of *Homo erectus* and that this species first arose in Asia and then migrated back into Africa.

The evidence for the earliest human occupation of Asia is sparse and doubtless the story will change with new discoveries in the coming years. At the time of writing, the most likely explanation for the evidence appears to be that an ancestor of *Homo erectus* left Africa just before 2 million years ago and that the exit route was a northern overland route through the Sinai (Fig. 2). Environmental reconstructions suggest that the eastern Sahara would have been savannah grassland and not desert at this time, so it would not

have presented a barrier to hominin range expansion (Dennell and Roebrooks 2005). Savannahs would also have extended continuously over much of Eurasia from the Middle East, through Central Asia and the western Indian Subcontinent, to northern China, in an area dubbed Savannahstan (Dennell and Roebroeks 2005). The abundance of medium to large mammals on the savannas would have presented hominins with a niche in which stone cutting tools could be used to butcher the carcasses of these mammals. The savannas may thus have acted as a dispersal corridor for early *Homo* (Dennell 2009). This hypothesis is consistent with the archaeological record for East Asia where the earliest site is a 1.66-million-year-old assemblage of simple stone tools from the Nihewan basin in northern China, an area which would have been savannah in the early Pleistocene (Zhu et al. 2004) (Fig. 2). On present evidence, the Dmanisi specimens are the most primitive forms of *Homo erectus* so it seems that Savannahstan may have been the source region both for East Asian *Homo erectus erectus* and African *Homo erectus ergaster*. The obligate terrestrial adaptations of *Homo erectus* may thus have evolved not on the African savannah but in the Savannahstan belt of Asia.

The Earlier Acheulean: 1.6–1 Million Years Ago

The Acheulean industry originates 1.76 million years ago in east Africa (Lepre et al. 2011) and is distinguished from the preceding Oldowan by the presence of large deliberately shaped bifacial cutting tools, often made on large flakes. The earliest Acheulean tools in Asia occur at the site of Attirampakkam in Tamil Nadu in South India (Pappu et al. 2011). The artifacts were buried in clays on the floodplain of the Kortallyar River and were dated by paleomagnetism and cosmogenic dating to 1.51 million years old. The artifacts are made mostly on large quartzite flakes and include the "type-fossil" artifacts of the Acheulean: hand axes (teardrop-shaped bifaces with a long cutting edge) and cleavers (bifaces with a broad unretouched bit as their tip). Attirampakkam also provides evidence for a long stratified Acheulean sequence, with the artifacts in the clay overlain by artifacts in ferruginous gravels, which are in turn overlain by artifacts in clayey silts which are transitional to the Middle Paleolithic (Pappu et al. 2011). This long sequence thus reflects the long term and possibly continuous occupation of India during the Acheulean.

Regional surveys of the Indian Acheulean, such as in the Raisen district in central India, the Kaladgi and Hunsgi-Baichbal basins in south-central India, and the Kortallyar basin in the southeast, have revealed a high density of Acheulean sites. A consistent pattern which emerges from all these surveys, and has also been documented in other parts of the world, is the association between Acheulean localities and freshwater sources. There also seems to have been a preference for semiarid environments (Pappu 1985), with very few sites known from the wetter more heavily forested parts of the country. In the Kaladgi basin, Acheulean sites are concentrated in the lower, dry, eastern parts of the Basin, as opposed to the subhumid upper reaches in the west (Pappu and Deo 1994). The niche of the Acheulean biface makers thus appears to have been tethered to the savannah biome.

A pattern evident at Acheulean sites in the Levant and India as well as elsewhere in the Acheulean world is that away from manufacturing localities, bifaces occur in high proportions and there are far fewer unretouched flakes than would be expected for the number of negative scars on the these bifaces (Goren-Inbar and Sharon 2006; Shipton 2011) (Fig. 4). This typological bias indicates that bifaces were preferentially curated and that hominins would often carry bifaces with them rather than produce and discard tools at the point of need.

Elsewhere in South India, an early Acheulean assemblage has been excavated at the site of Isampur Quarry on the edge of the Deccan Plateau in Karnataka. The Isampur Quarry artifacts are made from limestone slabs, and the site occurs on the edge of small paleochannel, the silts from which buried the artifacts (Petraglia et al. 1999). Electron spin resonance dating on a bovid tooth from this site produced an age of 1.27 million years old, although it could be as young as 730 thousand years (Petraglia 2011). Isampur

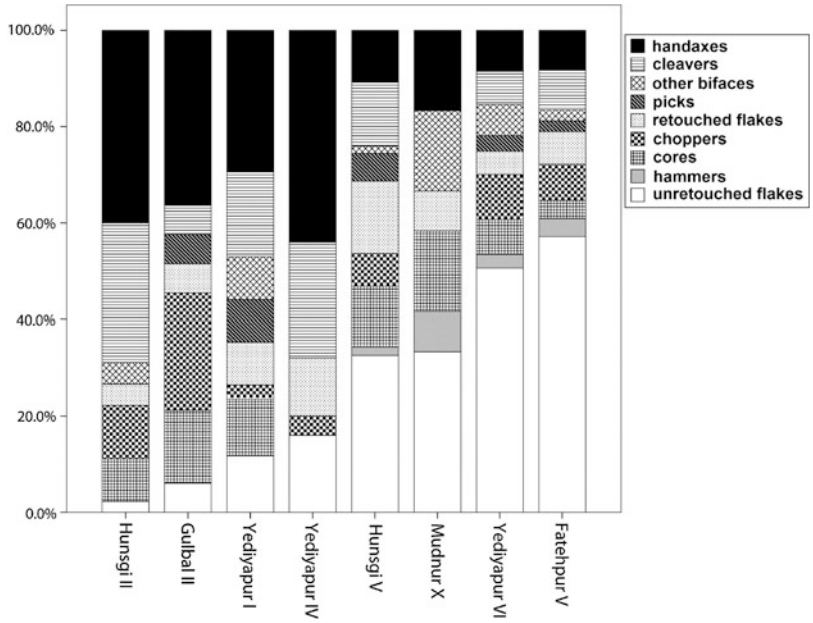

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic, Fig. 4 Assemblage composition by artifact type in the Hunsgi-Baichbal basin from excavated sites (Yediyapur IV, Hunsgi V, Mudnur X, Yediyapur VI) and surface collections (Hunsgi II, Gulball II, Yediyapur I and Fatehpur V)

Quarry is remarkable for a Lower Paleolithic site in two respects: the entire biface manufacturing sequence, from procurement of the raw material to the finished tool, occurs at a single site; and parts of the site are preserved with such spatial integrity that the artifacts are still in the positions that they were left by the ancient knappers (Petraglia et al. 1999). Analysis of the artifacts and experimental reproduction of implements have demonstrated that hominins produced hand axes by reducing slabs of medium thickness to leave the hand axe shape in plan (Fig. 5), while to make cleavers, they struck large flakes from thick slab cores (Shipton 2012). The consistency of this dual strategy for the production of hand axes and cleavers suggests the Acheulean industry was underpinned by robust mechanisms of social transmission, which may account for the unparalleled longevity of the industry. Giant cores weighing up to 65 kg were pried out of the bedrock (when they were even heavier) and propped up to allow for striking large flakes (Shipton 2012). Giant cores are present at numerous Acheulean sites where appropriate large clasts of stone are available (Sharon 2009). The ability to strike large flakes (over 10 cm in maximum dimension) from giant cores is one of the distinguishing features of the Acheulean over the Oldowan. Experimental evidence indicates that manipulating giant cores requires a lot of strength and is most easily achieved with two people working together (Shipton 2012). The appearance of the Acheulean may reflect new levels of individual strength among hominins as it broadly coincides with the emergence of the tall

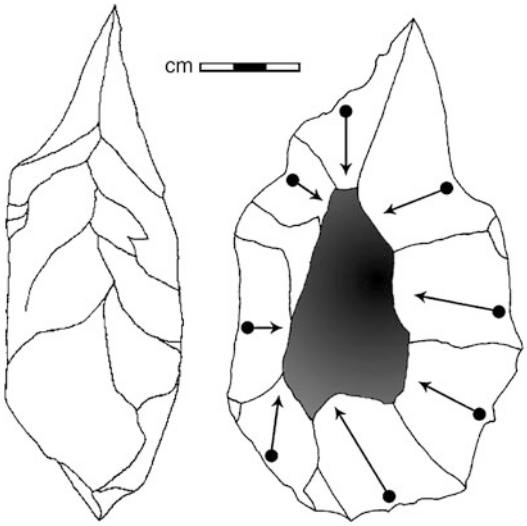

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic, Fig. 5 A hand axe made on a limestone slab from Isampur Quarry. The *shaded area* denotes cortex from the original bedding plane of the slab

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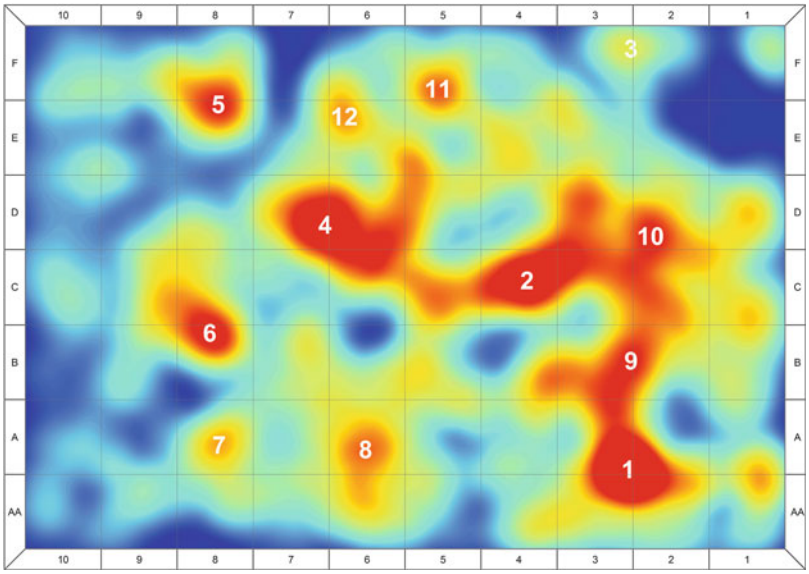

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic,
Fig. 6 Artifact density at Isampur Trench 1. *Red* = high density, *blue* = low density. Maximum number of artifacts = 186 per 1.33 m^2. Units are 1 m^2. Densities are based on artifacts mapped during excavations

Homo body plan. Spatial analysis of Isampur Quarry reveals distinct artifact clusters where different stages of reduction were being carried out (Shipton 2012) (Fig. 6). This suggests that hominins may have been working together with some producing large flake blanks, while others were retouching these into finished cleavers. The emergence of the Acheulean may reflect new levels of cooperation as it is approximately coeval with reduced levels of sexual dimorphism in hominins, indicating reduced male-male competition and long-term pair bonding between males and females (McHenry 1994).

The oldest Acheulean site in the Levant is 'Ubeidiya in the Jordan Valley. Faunal comparison, radiometric dates, and paleomagnetism put the 'Ubeidiya formation at around 1.4 million years old (Dennell 2009). Artifacts from 'Ubeidiya are mostly made on flint cobbles, although limestone and basalt are also used. The artifact types include bifaces, choppers, polyhedrons, and spheroids (Bar-Yosef and Goren-Inbar 1993). Layer K30 has the highest proportion of bifaces and also differs from the other paleoenvironments at the site in occurring in a stream channel context. The most common faunal remains from 'Ubediya are deer and horse with occasional examples of stone tool cut marks on both of these species (Gaudzinski 2004). Evron Quarry formed as a coastal site in the Levant dated by paleomagnetism and faunal correlation to c. 1.1 million years ago (Ron et al. 2003). Here, small artifacts were made on flint cobbles and pebbles from the nearby river.

The early Acheulean occurrences outside of Africa may represent a second dispersal event or the diffusion of an advantageous new technology. The fossils from the Middle East, Central Asia, or the Indian Subcontinent from this time period are too fragmentary to shed light on this question. The OH9 cranium from Olduvai Gorge in East Africa is dated to around 1.25 million years ago and is generally regarded as resembling East Asian *Homo erectus erectus* (Schwartz and Tattersal 2003). This suggests gene flow between Africa and Asia during the early Acheulean, so the distinction between dispersal and diffusion may be blurred during this period.

Homo erectus sensu lato first appears at about the same time as the Acheulean in East Africa, and fragmentary *H. erectus* remains were also found at 'Ubeidiya. This species is the first hominin to have a postcranial skeleton resembling our own with no arboreal adaptations, an elongate body and long legs (Bramble and Lieberman 2004). Several derived features of *Homo erectus*' postcranial morphology suggest adaptations for endurance running, including long legs relative

to body length, expanded articular surfaces in lower body joints, and expanded trunk stabilization muscle attachments (Bramble and Lieberman 2004). Endurance running, possibly as a hunting tactic, was thus an important component of the niche of *Homo erectus*. The Acheulean biface may have functioned as part of this niche because its long and durable bifacial edge, and its ergonomic design make it an ideal portable tool (Shipton 2011). This portability explains why at some Acheulean sites, particularly those next to rivers, we see very high proportions of bifaces: these artifacts were preferentially transported to repeatedly used locales where hominins could replace the water lost as sweat while running long distances (Shipton 2011).

The Middle Acheulean 1–0.6 Million Years Ago

The site of Gesher Benot Ya'aqov in the Jordan Valley is one of the most remarkable Paleolithic sites in the world, with its unusual levels of organic preservation yielding evidence for a wide variety of hominin behaviors that are either unknown or poorly documented elsewhere. The Acheulean occupation at the site lies just above the Brunhes-Matuyama boundary of 0.78 million years ago, with faunal comparison, uranium series, and electron spin resonance dating confirming that the site is at least 650 thousand years old (Goren-Inbar et al. 2000; Rink and Schwarz 2005). Gesher Benot Ya'aqov has yielded remains of several edible species of mammals including pig, cattle, deer, horse, gazelle and elephant, as well as plants such as the water chestnut, grapes, the prickly water lily, acorns, pistachios, olives, plums, and jujubes (Goren-Inbar et al. 2000). The site provides some of the earliest robust evidence for the hominin use of fire, with various other activities such as shellfish consumption, nutcracking, and flint knapping structured around hearths (Alperson-Afil et al. 2009). Some of the earliest known wooden artifacts come from Gesher Benot Ya'aqov, including a long branch under an elephant skull that has been interpreted as a lever which was used to turn the skull over and access the brains from the base (Goren-Inbar et al. 1994).

Unlike 'Ubeidiya and Evron Quarry where bifaces were generally made on flint cobbles, at Gesher Benot Ya'aqov, they were mostly made on large flakes of basalt and were then finished with marginal retouch (Saragusti and Goren-Inbar 2001) (Fig. 7). A variety of systematic prepared core techniques were used to produce these large flakes such as the Kombewa method, where large flake blanks were struck from the ventral surfaces of even larger flakes. One hypothesis is that Gesher Benot Ya'aqov is part of a wider large flake facies of the Acheulean, which is represented by pene-contemporaneous sites in Africa, southwestern Europe, the Caucasus, and India with bifaces made by marginally trimming large flakes struck from systematically prepared cores (Sharon 2009). The Gesher Benot Ya'aqov

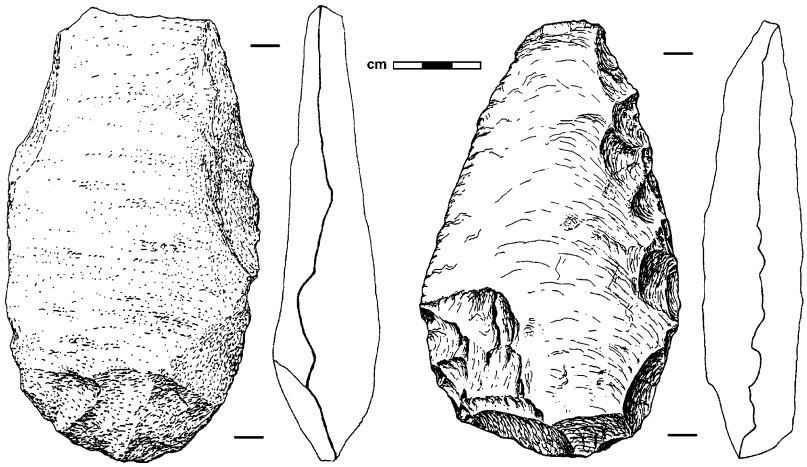

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic, Fig. 7 Ventral surfaces and profiles of two basalt bifaces from Gesher Benot Ya'aqov. (After Saragusti and Goren-Inbar 2001)

assemblage has been argued to represent a second wave of dispersal of Acheulean hominins from Africa with hippopotamus remains from the site also indicative of an African connection (Saragusti and Goren-Inbar 2001). A cladistic analysis of the shape and flake scars on hand axes from 10 sites suggests there is an out-of-Africa clade that includes sites from the Levant, the Indian Subcontinent, and Europe (Lycett 2009). DNA from Late Pleistocene hominin species shows a coalescence age of 804 thousand years ago between *Homo sapiens* in Africa and Neanderthals and Denisovans in Eurasia, suggesting a dispersal event sometime after this date (Green et al. 2010).

The extent to which prepared large flakes represent a genuine cultural marker versus the extent to which they are dictated by available raw material is unresolved. At Latamne in the Orontes Valley, Syria, elongate bifaces were produced on large cobbles of flint, around 0.8 million years ago based on the microfauna species they are associated with (Mein and Besancon 1993). The site of Bizat Ruhama on the southern Levantine coastal plain is placed by paleomagnetism and thermoluminescence at 780–920 thousand years old. Here, river pebbles of flint were exploited for the manufacture of small tools, though no bifaces were produced at this site, perhaps because the raw material clasts were too small.

Two Acheulean sites from central India with bifaces made on marginally trimmed large flakes have been preliminarily placed in the Early Pleistocene on the basis of paleomagnetism: Chirki and Morgaon (Gaillard et al. 2010). At both these sites, the Kombewa technique is in evidence providing a link to the technology of Gesher Benot Ya'aqov. However at the site of Singi Talav on the edge of the Thar Desert in northwestern India, tentatively dated to the Early Pleistocene, hand axes were made on slabs of schistose quartzite (Gaillard et al. 2010). The predominance of cleavers at Morgaon and their scarcity at Singi Talav perhaps reflects a functional environmental difference. If, as has been suggested, cleavers were wood-working tools (Movius 1944), then they would be more desirable in more forested landscapes. In general, the Indian Acheulean is characterized by higher proportions of cleavers than is the case for regions further west.

Several Acheulean sites have been discovered in Arabia; however, very few have been excavated. The two most notable site complexes are the Wadi Fatimah near the Red Sea coast and Dawadmi in central Arabia. Dating of calcareous nodules at both sites produced dates of 200 thousand years (Whalen et al. 1984, 1988), which must be regarded as minimum ages as the nodules would have formed post-depostionally (Petraglia et al. 2009). The 32 localities identified along the Wadi Fatimah occur close to smaller tributary wadis and outcrops of rocks such as basalt andesite and rhyolite which were used to manufacture the artifacts (Petraglia et al. 2009). The Wadi Fatimah is one of the largest drainages into the Red Sea, and hominins may have used this as a corridor to penetrate into the interior of Arabia. The Dawadami localities occur in the center of the Arabian Peninsula in close proximity to two huge but now extinct wadi systems: the Wadi al Batin and the Wadi as Sahba (Petraglia et al. 2009). Both these wadis flow from western Arabia to the Gulf and would have provided a resource-rich corridor for hominins. The Dawadmi localities occur along an andesite dyke that was exploited for the production of large flake blanks, from which hand axes and cleavers were made. Dawadmi is particularly extraordinary, as Acheulean sites are spread over c. 10 km along the dyke, providing evidence for the intensive and widespread use of the landscape by hominins (Petraglia et al. 2009).

The Lower Paleolithic of Iran and Afghanistan is particularly poorly known, but some potentially Middle Pleistocene choppers, side-scrapers, and denticulates have been found in southwestern Iran (Biglari and Shidrang 2006), while the site of Ganj Par on the south-western shore of the Caspian Sea has yielded Acheulean hand axes and cleavers (Biglari and Shidrang 2006).

The oldest site yet known in Central Asia is Kuldara in Tajikistan, dated on the basis of loess deposition correlations with China, to between 995 and 880 thousand years ago (Ranov and Dodonov 2003). The artifacts at the site are simple cores and flakes without retouch made on various types of pebble. Simple technology at the fringes

of the Acheulean occupation world is also seen in Europe and may represent the loss of the more complex Acheulean biface technology in small pioneer groups. The Middle Pleistocene sees Asia become colder and drier, with the Savannahstan belt turning into a marginal environment which has been termed Aridistan (Dennell 2009). The loess and paleosol sequence of the basin between the Pamir range in Tajikistan and the Hindu Kush in Afghanistan provides a clear picture of hominin occupation during the wet interglacials and abandonment during the dry glacials of the Middle Pleistocene (Ranov and Dodonov 2003). Central Asia was thus at the edge of the hominin occupied world during the Middle Pleistocene. The artifacts from this loess-paleosol sequence are all simple core and flake assemblages lacking bifaces. A consistent pattern is emerging in the Lower Paleolithic of central Asia whereby biface traditions are found in the low lying areas and simple core and flake assemblages occur in the more mountainous regions (Vishnyatsky 1999).

The Late Acheulean and Transition to the Middle Paleolithic 0.6–0.13 Million Years Ago

Quantitative comparisons of the Gesher Benot Ya'aqov bifaces with those from the younger Jordan Valley site of Ma'ayan Barukh and the older site of 'Ubeidiya demonstrate chronological trends of increasing symmetry and outline regularity (Saragusti et al. 1998, 2005). In the Hunsgi-Baichbal Valley in India, it has been shown that bifaces from the older sites of Isampur Quarry, Hunsgi V, and Hunsgi VI tend to be relatively thicker and more elongate than bifaces from the younger sites of Teggihalli II and Mudnur X (Shipton 2012). These trends may reflect increasing hominin knapping skill during the Acheulean as producing thin broad tools is the most challenging aspect of bifacial knapping. It is interesting in this regard that one of the limitations of the knappers at Isampur Quarry knappers was the tendency to over hit the bifaces causing end-shock breakages in 23% of cases. At another workshop site, Ziarat Pir Shaban in Sindh, assigned to the Late Acheulean albeit on typological grounds, this problem appears to have been much less acute with only a single end-shock break reported (Biaggi et al. 1996). In the Hunsgi-Baichbal Valley, bifaces from the younger sites also tend to be smaller with higher flake scar densities and have been transported further from their raw material source (Shipton 2012). Such trends may reflect an increasing use-life length for bifaces during the Acheulean and by inference increasing planning depth on the part of Acheulean hominins.

The Late Acheulean is characterized by an increasing regionalization of artifact styles. This is particularly marked in the Levant, where the terminal Acheulean is known as the Jabrudian industry. The Jabrudian is represented at several cave sites in the Levant including Tabun, Jabrud, Zuttiyeh, Qesem, and Bezez, as well as open-air sites such as El-Khowm. The Jabrudian retains the hand axe element of the Acheulean but also incorporates new tool types such as racloirs, convergent scrapers, backed knives, and edge-nibbled blades (Dennell 2009). Not only are there new distinctive tool types but also the hand axes from the Jabrudian are distinctive, tending to be small, with cortical butts and heavily worked tips (Fig. 8). Regionally distinct industries such as the Jabrudian suggest the emergence of distinct group identities at this transition. At several Jabrudian sites, there are examples of hand axes being used as a Levallois cores with a large preferential scar on one surface struck from a facetted platform on the butt (DeBono and Goren-Inbar 2001). It appears that the transformation of the hand axe in this way is one route by which hominins arrived at Levallois technology. The dating of the Jabrudian is complex and has undergone several re-evaluations, but a reasonable consensus would have the Jabrudian beginning around 350 thousand years ago and ending around 200 thousand years ago (Dennell 2009). Zuttiyeh has produced a partial hominin cranium dated to 300 thousand years which is most likely *Homo heidelbergensis* (Schwartz and Tattersall 2003). This association between *Homo heidelbergensis* and the Late Acheulean is well documented in Europe and Africa. Although there are no dated sites which can be attributed to the Late Acheulean in Arabia, there is nonetheless a consistent

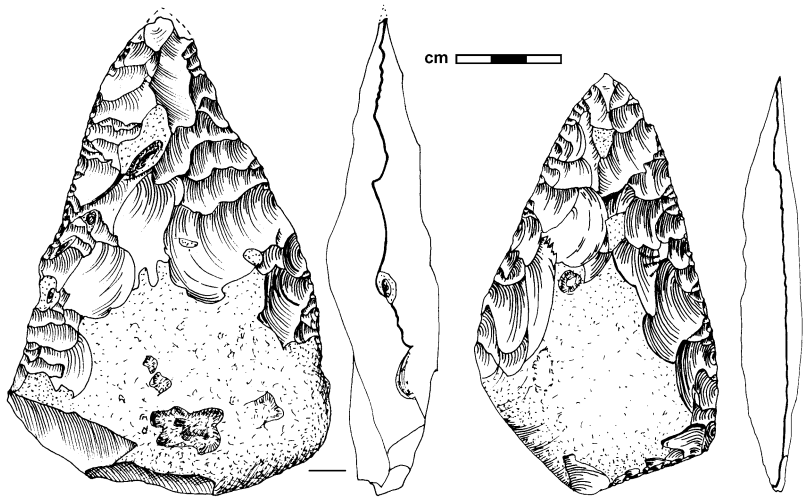

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic, Fig. 8 Jabrudian hand axe from the Azraq Oasis in Jordan. (After Copeland and Hours 1989)

pattern of assemblages with small thin hand axes associated with the use of the Levallois technique and the absence of other heavy duty tools such as polyhedrons, picks, and choppers (Petraglia et al. 2009).

In India, the Acheulean to Middle Paleolithic transition is documented at several sites including the 16R Dune in the Thar Desert, Bhimbetka and Patpara in central India, and Lakhmapur in the south. The transition appears to have been a gradual one in India with no apparent population replacement (James and Petraglia 2009). At all of these locations, the transitional assemblages are characterized by small bifaces, greater proportions of small flake tools in comparison to bifaces, and the use of the Levallois technique to produce those small tools (e.g., Haslam et al. 2011). The transitional assemblage from Patpara has been dated by optically stimulated luminescence to 131 thousand years ago (Haslam et al. 2011), while that from the 16R Dune is dated by thermoluminescence and uranium-thorium to 160–130 thousand years ago (Misra 1989). A hominin calvarium from Hathnora in the Narmada valley is dated by electron spin resonance to 165–80 thousand years old (Patnaik et al. 2009). A cladistic analysis of this specimen has assigned to it a sister clade of *H. sapiens* and Neanderthals, descended from *H. heidelbergensis* (Cameron et al. 2004). The exact taxonomic designation for this species is as yet undetermined and will have to await new fossil discoveries for it to be properly situated. Given the temporal and spatial proximity of the Hathnora find to the site of Patpara, it seems the population it represents was responsible for manufacturing the transitional industry there (Haslam et al. 2011).

The abandonment of bifaces and the shift toward small flake tools are commonly thought to be related to the origins of hafting technology. In terms of hominin cognition, the Middle Paleolithic is perhaps the culmination of the trends of increasing knapping skill and planning seen in the Acheulean with generic bifaces abandoned in favor of more task-specific small tools, made using the difficult to master Levallois technique. The transition appears to have had slightly different character in the two regions of western Asia where it is well documented: the Levant and India, and also appears to have occurred slightly later in the latter. We should therefore regard the transitions as being autochthonous processes, but given the similar end points, the possibility of interaction between the regions should not be ruled out. Genetics shows that the west Eurasian Neanderthals and east Eurasian Denisovans have a coalescence age of 640 thousand years ago (Reich et al. 2011), suggesting they had divergent histories from sometime after this date. This may be attributed to the cooler, more arid climate of the Middle Pleistocene which would have made parts of the Middle East and Central Asia uninhabitable

during glacial periods, thereby temporarily splitting Eurasian hominin populations.

In Kyrgyzstan, there is an enormous cave site called Sel'ungur where 7-m-deep excavations revealed five archaeological horizons separated by sterile deposits (Islamov 1990). A uranium-thorium date on a travertine capping the uppermost cultural layer produced a date of 126 thousand years (Vishnyatsky 1999). Although the assemblages are described as Acheulean, there are very few bifaces present. Sel'ugnur thus confirms the patterns of the Central Asian Lower Paleolithic that hominin occupation was intermittent and biface technology was scarce in the mountains. Interestingly, the site has also yielded 10 hominin teeth and a fragment of an infant's humerus which are classified as Neanderthal, a hominin ancestral to Neanderthals (Islamov 1990). Central Asia thus has affinities with hominin populations to the west in the Middle Pleistocene and may have been the route via which the *Homo heidelbergensis* population represented by the Dali cranium in China (Rightmire 2001) reached the Far East.

Acheulean sites of varying ages have been discovered on a river terrace sequence in the Gaziantep region of southern Anatolia (Minzoni-Deroche and Sanlaville 1988). In central Anatolia, surveys have revealed Acheulean sites around the obsidian source of Golludag. Excavations at one such site, Kalatepe Deresi 3, have yielded Acheulean biface technology based on the production of large flakes (Kuhn et al. 2009). The excavators draw comparisons with the Tabelbella-Tachengit method of large flake production known from North Africa. The bedrock at the base of the sequence is no older than 1.3 million years, while an overlying Middle Paleolithic layer has been dated to 160 thousand years ago. In southwestern Anatolia, the cave of Karain E has provided a 12-m Pleistocene sequence going back at least 400 thousand years (Otte et al. 1998). Five phases of Lower Paleolithic occupation have been identified in the lower part of the sequence, each separated by periods of abandonment. The artifacts are dominated by short thick flakes with side scrapers dominating the retouched pieces (Otte et al. 1998). Bifaces are notably absent, a pattern which extends up into southeastern Europe. Western Anatolia may represent another frontier for the Acheulean where Lower Paleolithic occupation is intermittent and small pioneer populations either lost Acheulean technology or chose to abandon it in the mountainous terrain. A similar pattern occurs in the Caucasus Mountains where Acheulean bifaces are relatively abundant in the Lesser Caucasus in the south but become scarce in the Great Caucasus in the north (Lyubin and Belyaeva 2006). A series of caves excavated in the Caucasus, Azych, Kudaro I and II, Cona, and Treugol'naya, show intermittent and ephemeral human occupation at high altitudes with cave bear dominating the fauna (Doronichev and Golovanova 2003). The caves were occupied between 620 and 195 thousand years ago, and hand axes are rare at these sites, except in the case of Cona where nearly half the artifacts are hand axes, but they appear to have been made on nonlocal material and carried some distance to the site.

Conclusion

The Lower Paleolithic is a long and enigmatic period in human history, and we have precious little evidence from these vast regions of western Asia. Nonetheless, several distinct patterns are discernible. The first thing to note is that the most primitive forms of *Homo erectus* are in fact Asian, suggesting that this species with its long legs and obligate terrestrialism may in fact have evolved on the Savannahstan belt of Asia rather than the smaller east African savannah. The niche of *H. erectus* relied heavily on endurance running and technologically assisted butchery, as revealed by cutmarked bone at early *H. erectus* sites like Dmanisi. It is tempting to link these two features and infer *H. erectus* pursued large animals. This niche appears to have culminated in an adaptive package of the long-limbed body of classic *H. erectus* and the long portable cutting edge provided by Acheulean bifaces. Bifaces were clearly highly curated items judging by their over-representation at many Acheulean sites, suggesting they may have been carried on the

long runs of *H. erectus*. Sites which were repeatedly used during the Acheulean resulting in the accumulation of bifaces are usually found close to sources of freshwater. This may reflect the need of *H. erectus* to replace the water lost through sweating after long runs. Evidence from Gesher Benot Ya'aqov indicates that c. 700 thousand years ago hominins were exploiting a variety of hunted and gathered plant and animal resources and consuming these at a repeatedly used location. Such behaviors may have far greater antiquity, and it is only due to the remarkable preservation conditions at Gesher Benot Ya'aqov that we have good evidence for them at that time.

The question of multiple dispersals within the Acheulean is as yet unresolved and will have to wait for the discovery of more fossil evidence and more cladistic analyses of Acheulean artifacts. There is considerable heterogeneity in the Lower Paleolithic record of the three regions described here. In the Indian Subcontinent and the Levant, there are numerous sites, and the dates span vast time periods suggesting continuous occupation. These regions were to some extent sheltered from the cooler and drier climate in the Middle Pleistocene which made other parts of western Asia less habitable. The relatively lower density of Acheulean sites in Arabia probably reflects the fact that this region was abandoned by hominins during drier climatic phases. A clear pattern which has emerged is that at the edge of the Acheulean world in the mountainous regions of western Anatolia, the Great Caucasus and eastern Central Asia occupation is intermittent, with probable abandonment during cold periods, and bifaces are either absent or rare. This behavioral pattern may reflect either the loss of complex technology due to the paucity of experts in small pioneer populations or an adaptation to mountainous environments where perhaps bifaces were less useful. The former explanation seems more likely given the presence of Acheulean bifaces in other mountainous regions such as central and eastern Anatolia, the Lesser Caucasus, and Nepal. The absence of Acheulean bifaces in the areas beyond these border regions, Eastern Europe, Siberia, and the Far East, indicates that once this technology was lost, it was not readopted when hominins moved into new low-lying areas. Comparisons of bifaces reveal important chronological trends in the long record of the Asian Acheulean, with bifaces becoming thinner over time, as well as on average smaller and with higher flake scar densities. During the Acheulean period, hominin brain size increases from c. 800 cc in *Homo erectus* to 1300 cc in *Homo heidelbergensis*, while body size remains largely the same. The chronological trends observed in Acheulean bifaces might be attributed to the evolving hominin brain with skill and planning capacity increasing during the Acheulean. The trend of increasing planning resulted in more smaller task-specific tools; these were produced using the multistage and highly skilled Levallois technique and were then often hafted, involving further stages of creating a binding agent and attaching the stone to a wooden shaft. The proliferation of such tools eventually led to the abandonment of Acheulean bifaces and the end of the Lower Paleolithic.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Archaic *Homo sapiens*
- ▶ Dmanisi Hominins and Archaeology
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
- ▶ *Homo heidelbergensis*
- ▶ Lithic Technology, Paleolithic
- ▶ Movius Line
- ▶ Oldowan Industrial Complex
- ▶ Out-of-Africa Origins
- ▶ South Asia: Paleolithic
- ▶ West and Central Asia: Early Homo Fossil Records
- ▶ West Asia: Paleolithic

References

Alperson-Afil, N., G. Sharon, M. Kislev, Y. Melamed, I. Zohar, S. Ashkenazi, R. Rabinovich, R. Biton, E. Werker, G. Hartman, C. Feibel, and N. Goren-Inbar. 2009. Spatial organisation of hominin activities at Gesher Benot Ya'aqov, Israel. *Science* 326: 1677–1680.

Bar-Yosef, O., and N. Goren-Inbar. 1993. *The Lithic assemblages of 'Ubeidiya, Jordan Valley*. Jerusalem: Hebrew University of Jerusalem.

Biaggi, P., M.M. Kazi, and F. Negrino. 1996. An Acheulian workshop at Ziarat Pir Shaban on the Rohri Hills (Sindh – Pakistan). *Southeast Asian Studies* 12: 49–62.

Biglari, F., and S. Shidrang. 2006. The Lower Palaeolithic occupation of Iran. *Near Eastern Archaeology* 69: 160–168.

Bramble, D.M., and D.E. Lieberman. 2004. Endurance running and the evolution of *Homo*. *Nature* 432: 345–352.

Brown, P. 2012. LB1 and LB6 *Homo floresiensis* are not modern human (*Homo sapiens*) cretins. *Journal of Human Evolution* 62: 201–224.

Cameron, D., R. Patnaik, and A. Sahni. 2004. The phylogenetic significance of the Middle Pleistocene Narmada cranium from central India. *International Journal of Osteoarchaeology* 14: 419–447.

Copeland, L., and F. Hours, eds. 1989. *The hammer on the rock: Studies in the early Palaeolithic of Azraq, Jordan*. Oxford: Archaeopress.

Debono, H., and N. Goren-Inbar. 2001. Note of a link between Acheulian handaxes and the Levallois method. *Journal of the Israel Prehistoric Society* 31: 9–23.

Dennell, R.W. 2009. *The Palaeolithic settlement of Asia*. Cambridge: Cambridge University Press.

Dennell, R.W., and W. Roebroeks. 2005. An Asian perspective on early human dispersal from Africa. *Nature* 438: 1099–1104.

Dennell, R.W., H.R. Rendell, and E. Hailwood. 1988. Early tool-making in Asia: Two-million-year-old artefacts in Pakistan. *Antiquity* 62: 98–106.

Doronichev, V., and L. Golovanova. 2003. Bifacial tools in the Lower and Middle Palaeolithic of the Caucasus and their contexts. In *Multiple approaches to the study of bifacial technologies*, ed. M. Sorressi and H. Dibble, 77–106. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Ferring, R., O. Oms, J. Agusti, F. Berna, M. Nioradze, T. Sheila, M. Tappen, A. Vekua, D. Zhvania, and D. Lordkipanidze. 2011. Earliest of human occupations at Dmanisi (Georgian Caucasus) dated to 1.85–1.78 Ma. *Proceedings of the National Academy of Sciences*. https://doi.org/10.1073/pnas.1106638108.

Gabunia, L., A. Vekua, and D. Lordkipanidze. 2000. The environmental contexts of early human occupation of Georgia (Transcaucasia). *Journal of Human Evolution* 38: 785–802.

Gaillard, C., S. Mishra, M. Singh, S. Deo, and R. Abbas. 2010. Lower and early Middle Pleistocene Acheulian in the Indian sub-continent. *Quaternary International* 223–224: 234–241.

Gaudzinski, S. 2004. Subsistence patterns of early Pleistocene hominids in the Levant – Taphonomic evidence from the 'Ubeidiya Formation (Israel). *Journal of Archaeological Science* 31: 65–75.

Goren-Inbar, N., and G. Sharon. 2006. Invisible handaxes and visible Acheulian biface technology at Gesher Benot Ya'aqov, Israel. In *Axe age: Acheulian toolmaking from quarry to discard*, ed. N. Goren-Inbar and G. Sharon, 111–136. London: Equinox.

Goren-Inbar, N., A. Listerm, E. Werker, and M. Chech. 1994. A butchered elephant skull and associated artifacts from the Acheulian site of Gesher Benot Ya'aqov, Israel. *Paléorient* 20: 99–112.

Goren-Inbar, N., C.S. Feibel, K.L. Verosub, Y. Melamed, M.E. Kislev, E. Tchernov, and I. Saragusti. 2000. Pleistocene milestones on the out-of-Africa corridor at Gesher Benot Ya'aqov, Israel. *Science* 289: 944–947.

Green, R.E., J. Krause, A.W. Briggs, T. Maricic, U. Stenzel, M. Kircher, N. Patterson, H. Li, W. Zhai, M.H.-Y. Fritz, N.F. Hansen, E.Y. Durand, A.-S. Malaspinas, J.D. Jensen, T. Marques-Bonet, C. Alkan, K. Prüfer, M. Meyer, H.A. Burbano, J.M. Good, R. Schultz, A. Aximu-Petri, A. Butthof, B. Höber, B. Höffner, M. Siegemund, A. Weihmann, C. Nusbaum, E.S. Lander, C. Russ, N. Novod, J. Affourtit, M. Egholm, C. Verna, P. Rudan, D. Brajkovic, Z. Kucan, I. Gušic, V.B. Doronichev, L.V. Golovanova, C. Lalueza-Fox, M. De La Rasilla, J. Fortea, A. Rosas, R.W. Schmitz, P.L.F. Johnson, E.E. Eichler, D. Falush, E. Birney, J.C. Mullikin, M. Slatkin, R. Nielsen, J. Kelso, M. Lachmann, D. Reich, and S. Pääbo. 2010. A draft sequence of the Neanderthal genome. *Science* 328: 710–722.

Haslam, M., R. Roberts, C. Shipton, J.N. Pal, J. Fenwick, P. Ditchfield, N. Boivin, A.K. Dubey, M.C. Gupta, and M. Petraglia. 2011. Late Acheulean hominins at the Marine Isotope Stage 6/5e transition in north-central India. *Quaternary Research* 75: 670–682.

Islamov, Y.I. 1990. Sel'oungour, un nouveau site du paleolithique inferieur en Asie central. *L'Anthropologie* 94: 675–688.

James, H., and M.D. Petraglia. 2009. The Lower to Middle Palaeolithic transition in South Asia and its implications for hominin cognition and dispersals. In *Sourcebook of Paleolithic transitions: Methods, theories and interpretations*, ed. M. Camps and P. Chauhan, 255–264. Dordrecht: Springer.

Kuhn, S., N. Balkan-Atli, and B. Dincer. 2009. 2008 excavations at Kaletepe Deresi 3. *Anatolia Antiqua* XVII: 291–299.

Lepre, C.J., H. Roche, D.V. Kent, S. Harmand, R.L. Quinn, J.-P. Brugal, P.-J. Texier, A. Lenoble, and C.S. Feibel. 2011. An earlier origin for the Acheulian. *Nature* 477: 82–85.

Lycett, S.J. 2009. Understanding ancient hominin dispersals using artefactual data: A phylogeographic analysis of Acheulean handaxes. *PLoS One* 4 (e7404): 1–6.

Lyubin, V.P., and E.V. Belyaeva. 2006. Cleavers and handaxes with transverse cutting edge in the Acheulian of the Caucasus. In *Axe age: Acheulian tool-making from quarry to discard*, ed. N. Goren-Inbar and G. Sharon, 347–364. London: Equinox.

McHenry, H.M. 1994. Behavioral ecological implications of early hominid body size. *Journal of Human Evolution* 27: 77–87.

Mein, P., and J. Besancon. 1993. Micro-mammiferes du Pleistocene moyen de Latamne (Syrie). In *Le Paleolithique de la Vallee moyenne de l'Oronte (Syrie)*, ed. P. Sanlaville, J. Besancon, L. Copeland, and S. Muhesen, 179–182. Oxford: Archaeopress.

Mgeladze, A., D. Lordkipanidze, M.-H. Moncel, J. Despriee, R. Chagelishvili, M. Nioradze, and G. Nioradze. 2010. Hominin occupations at the Dmanisi site, Georgia, Southern Caucasus: Raw materials and technical behaviours of Europe's first hominins. *Journal of Human Evolution* 60: 571–596.

Minzoni-Deroche, A., and P. Sanlaville. 1988. Le paleolithique inferieur de la region de Gaziantep. *Paléorient* 14: 87–98.

Misra, V.N. 1989. Human adaptations to the changing landscape of the Indian arid zone during the Quaternary period. In *Old problems and new perspectives*, ed. J.-M. Kenoyer, 3–20. Madison: Wisconsin Archaeological Reports.

Movius, H. 1944. Man and Pleistocene stratigraphy in southern and eastern Asia. *Papers Peabody Museum of American Archaeology and Ethnography* 19: 1–125.

Otte, M., I. Yalcinkaya, J. Kozlowski, O. Bar-Yosef, I. Lopez Bayon, and H. Taskiran. 1998. Long-term technical evolution and human remains in the Anatolian Palaeolithic. *Journal of Human Evolution* 34: 413–431.

Pappu, R.S. 1985. The geomorphic setting of Acheulian sites in peninsular India. In *Recent advances in Indo-Pacific prehistory*, ed. V.N. Misra and P. Bellwood, 9–12. Delhi: India Book House.

Pappu, R.S., and S.G. Deo. 1994. *Man-land relationship during Palaeolithic times in the Kaladgi Basin, Karnataka*. Pune: Deccan College.

Pappu, S., Y. Gunnell, K. Akhilesh, R. Braucher, M. Taieb, F. Demory, and N. Thouveny. 2011. Early Pleistocene presence of Acheulian hominins in South India. *Science* 331: 1596–1599.

Patnaik, R., P. Chauhan, M.R. Rao, B. Blackwell, A. Skinner, A. Sahni, M.S. Chauhan, and H. Khan. 2009. New geochronological, paleoclimatological, and archaeological data from the Narmada Valley hominin locality, central India. *Journal of Human Evolution* 56: 114–133.

Petraglia, M.D. 2011. Assessment and critique of chronometric ages associated with "early" Acheulean assemblages in the Indian subcontinent. In *Handaxes in the Imjin Basin: Diversity and variability in the East Asian Palaeolithic*, ed. S. Yi, 157–177. Seoul: SNU Press.

Petraglia, M.D., P. Laporta, and K. Paddayya. 1999. The first Acheulean quarry in India: Stone tool manufacture, biface morphology, and behaviours. *Journal of Anthropological Research* 55: 39–70.

Petraglia, M.D., N. Drake, and A. Alsharekh. 2009. Acheulean landscapes and large cutting tool assemblages in the Arabian peninsula. In *The evolution of human populations in Arabia: Paleoenvironments, prehistory and genetics*, ed. M.D. Petraglia and J.I. Rose, 103–116. Dordrecht: Springer.

Ranov, V.A., and A.E. Dodonov. 2003. Small instruments of the Lower Palaeolithic site Kuldara and their geoarchaeological meaning. In *Lower Palaeolithic small tools in Europe and Asia*, ed. J.M. Burdukiewicz and A. Ronen, 133–147. Oxford: Archaeopress.

Reich, D., N. Patterson, M. Kircher, F. Delfin, M.R. Nandineni, I. Pugach, A.M. Ko, Y. Ko, T.A. Jinam, M.E. Phipps, N. Saitou, A. Wollstein, M. Kayser, S. Pääbo, and M. Stoneking. 2011. Denisova admixture and the first modern human dispersals into Southeast Asia and Oceania. *American Journal of Human Genetics* 89: 516–528.

Rightmire, G.P. 2001. Comparison of Middle Pleistocene hominids from Africa and Asia. In *Human roots: Africa and Asia in the Middle Pleistocene*, ed. L. Barham and K. Robson-Brown, 123–133. Bristol: Westbury Press.

Rightmire, G.P., D. Lordkipanidze, and A. Vekua. 2006. Anatomical descriptions, comparative studies and evolutionary significance of the hominin skulls from Dmanisi, Republic of Georgia. *Journal of Human Evolution* 50: 115–141.

Rink, W.J., and H.P. Schwarz. 2005. ESR and Uranium series dating of teeth from the Lower Palaeolithic site of Gesher Benot Ya'aqov, Israel: Confirmation of palaeomagnetic age implications. *Geoarchaeology* 20: 57–66.

Ron, H., and S. Levi. 2001. When did hominids first leave Africa? New high-resolution paleomagnetic evidence from the Erk-El-Ahmar formation, Israel. *Geology* 29: 887–890.

Ron, H., N. Porat, A. Ronen, E. Tchernov, and L.K. Horwitz. 2003. Magnetostratigraphy of the Evron member – Implications for the age of the Middle Acheulean site of Evron Quarry. *Journal of Human Evolution* 44: 633–639.

Saragusti, I., and N. Goren-Inbar. 2001. The biface assemblage from Gesher Benot Ya'aqov, Israel: Illuminating patterns in "Out of Africa" dispersal. *Quaternary International* 75: 85–89.

Saragusti, I., I. Sharon, O. Katzenelson, and D. Avnir. 1998. Quantitative analysis of the Symmetry of Artefacts: Lower Paleolithic handaxes. *Journal of Archaeological Science* 25: 817–825.

Saragusti, I., K. Avshalom, I. Sharon, and U. Smilansky. 2005. Quantitative analysis of shape attributes based on contours and section profiles in artefact analysis. *Journal of Archaeological Science* 32: 841–853.

Schwartz, J.H., and I. Tattersall. 2003. *The human fossil record. volume 2: Craniodental morphology of genus Homo (Africa and Asia)*. New York: Wiley-Liss.

Sharon, G. 2009. Acheulian giant-core technology: A worldwide perspective. *Current Anthropology* 50: 335–367.

Shipton, C. 2011. Taphonomy and behaviour at the Acheulean site of Kariandusi. *African Archaeological Review* 28: 141–155.

Shipton, C. 2012. *A million years of hominin cognition and sociality: Acheulean bifaces in the Hunsgi-Baichbal Valley, India*. Oxford: Archaeopress.

Vishnyatsky, L.B. 1999. The Paleolithic of Central Asia. *Journal of World Prehistory* 13: 69–122.

Whalen, N.M., J. Siraj-Ali, and W. Davis. 1984. Excavation of Acheulean sites near Saffaqah, Saudi Arabia, 1403 AH 1983. *Atlal* 8: 9–24.

Whalen, N.M., J. Siraj-Ali, H.O. Sindi, D.W. Pease, and M.A. Badein. 1988. A complex of sites in the Jeddah-Wadi Fatimah area. *Atlal* 11: 77–85.

Whalen, N.M., W.P. Davis, and D.W. Pease. 1989. Early Pleistocene migrations into Saudi Arabia. *Atlal* 12: 59–75.

Zhu, R.X., R. Potts, F. Xie, K.A. Hoffman, C.L. Deng, C.D. Shi, Y.X. Pan, H.Q. Wang, G.H. Shi, and N.Q. Wu. 2004. New evidence on the earliest human presence at high northern latituds in northeast Asia. *Nature* 431: 559–562.

Further Reading

Agusti, J., and D. Lordkipanidze. 2011. How "African" was the early human dispersal out of Africa? *Quaternary Science Reviews* 30: 1338–1342.

Athreya, S. 2007. Was *Homo heidelbergensis* in South Asia? A test using the Narmada fossil from central India. In *The evolution and history of human populations in South Asia: Inter-disciplinary studies in archaeology, biological anthropology, linguistics and genetics*, ed. M.D. Petraglia and B. Allchin, 137–170. Dordrecht: Springer.

Goren-Inbar, N., G. Sharon, Y. Melamed, and M. Kislev. 2002. Nuts, nut-cracking, and pitted stones at Gesher Benot Ya'aqov, Israel. *Proceedings of the National Academy of Sciences* 99: 2455–2460.

Goren-Inbar, N., N. Alperson, M.E. Kislev, O. Simchoni, Y. Melamed, A. Ben-Nun, and E. Werker. 2004. Evidence of hominin control of fire at Gesher benot Ya'aqov, Israel. *Science* 304: 725–727.

Jacobson, J. 1985. Acheulian surface sites in central India. In *Recent advances in Indo-Pacific prehistory*, ed. V.-N. Misra and P. Bellwood, 49–57. Delhi: Oxford-IBH.

Madsen, B., and N. Goren-Inbar. 2004. Acheulian giant core technology and beyond: An archaeological and experimental case study. *Eurasian Prehistory* 2: 3–52.

Paddayya, K. 2007. The Acheulean of peninsular India with special reference to the Hunsgi and Baichbal Valleys of the lower Deccan. In *The evolution and history of human populations in South Asia: Inter-disciplinary studies in archaeology, biological anthropology, linguistics and genetics*, ed. M.D. Petraglia and B. Allchin, 97–120. Dordrecht: Springer.

Paddayya, K., and M.D. Petraglia. 1993. Formation processes of Acheulian localities in the Hunsgi and Baichbal Valleys, peninsular India. In *Formation processes in archaeological context*, ed. P. Goldberg, D.T. Nash, and M.D. Petraglia, 61–82. Madison: Prehistory Press.

Pappu, S. 1996. Reinvestigation of the prehistoric archaeological record in the Kortallyar Basin, Tamil Nadu. *Man and Environment* 21: 1–23.

Pappu, S., and K. Akhilesh. 2006. Preliminary observations on the Acheulian assemblages from Attirampakkam, Tamil Nadu. In *Axe Age: Acheulian toolmaking from quarry to discard*, ed. N. Goren-Inbar and G. Sharon, 155–180. London: Equinox.

Petraglia, M.D. 2003. The Lower Palaeolithic of the Arabian Peninsula: Occupations, adaptations and dispersals. *Journal of World Prehistory* 17: 141–179.

Petraglia, M.D., J. Schuldenrein, and R. Korisettar. 2003. Landscapes, activity, and the Acheulean to Middle Palaeolithic transition in the Kaladgi Basin, India. *Eurasian Prehistory* 1: 3–24.

Petraglia, M.D., C. Shipton, and K. Paddayya. 2005. Life and mind in the Acheulean: A case study from India. In *The hominid individual in context: Archaeological investigations of Lower and Middle Palaeolithic landscapes, locales and artefacts*, ed. C. Gamble and M. Porr, 197–219. Routledge: London.

Sharon, G. 2007. *Acheulian large flake industries: Technology, chronology, and significance*. Oxford: Archaeopress.

Shipton, C., M.D. Petraglia, and K. Paddayya. 2009. Stone tool experiments and reduction methods at the Acheulean site of Isampur Quarry, India. *Antiquity* 83: 769–785.

Wood, B. 2011. Did early *Homo* migrate "out of" or "in to" Africa? *Proceedings of the National Academy of Sciences*. https://doi.org/10.1073/pnas.1107724108.

Middle East, Historical Archaeology of

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Introduction

While not a traditional focus of research in the Middle East, historical archaeology has a growing presence in the region. Themes explored by colleagues interested in the post-1500 archaeological record encompass not just the topics of globalization and colonialism relevant to historical archaeology around the world but also topics specific to local cultural and historical postmedieval developments. The body of relevant work has grown to

the extent that both general overviews (Brooks and Young 2016) and detailed regional case studies deliberately designed to build Middle Eastern research agendas (Young 2019) are now available for the subject. Enough work has now taken place that the specific studies cited in this outline should be considered broadly representative rather than an attempt to be comprehensive. While the historical archaeology of the Middle East remains a subject of specialized interest, it also addresses themes of global relevance.

Definition

"Historical archaeology," in the New World sense of "the archaeology of the modern world," is a particularly problematic terms in the Middle East, where the history of literate cultures stretches back past 3000 BC in Egypt and Mesopotamia. The cognate European term "postmedieval archaeology" has also failed to gain traction. In much of the region, all archaeology postdating the founding of Islam in the seventh century is instead conceptualized as Islamic archaeology, with the post-1500 period broadly coinciding with the late Islamic period (Brooks and Young 2016: 22, 24). The term "Middle East" is also potentially problematic in global context since it presupposes a European definition of where a "middle" lies. The term is nonetheless so widely used to define a specific geographical region bounded by the Arabian Peninsula, Iran, Turkey, and Egypt that it would be counterproductive to seek an alternative (acknowledging that this excludes North African and Central Asian nations with strong historical and cultural links to the "core" Middle East). "BC" and "AD" are used throughout for dates. This is by far the most common local convention across the region as a whole when using the Western calendar in heritage contexts (with the exception of Israel), and "BCE" and "CE" use precisely the same core dating assumptions, albeit with different terminology.

The diversity of ethnic groups and religions historically represented in the region is often underestimated. Even allowing for the dominance of Islam across the Middle East as a whole, Christianity and Judaism have both had a strong historical presence in the region, as have demographically smaller but often historically significant still-extant religious groups such as Zoroastrians, Mandaeans, Yazidis, Samaritans, Druze, and Baha'is. And Islam is by no means a monolithic block, with the divisions between Sunni, Shia, and Ibadis crucial to an understanding of the Middle East's sociocultural and political development. Calling the subject of the present discussion, a "late Islamic historical archaeology of the Middle East" may be somewhat cumbersome, but it does allow for bridging the gap between the New World and Middle Eastern considerations of the topic while both stressing continuity with the regional past and acknowledging the transformations brought about during the increasingly globalized modern world.

Historical Background

Though there are important regional variations [see the relevant region-specific articles], historical archaeology has often focused on the impact of the postmedieval expansion of European territorial and economic colonialism, and the archaeological evidence for such topics as cultural contact, population movements, and enslavement. These themes are certainly relevant to a late Islamic historical archaeology of the Middle East. Direct European postmedieval colonial engagement with the region is temporally bounded by the Portuguese capture of Hormuz Island off the coast of Iran in 1507 and the end of the last British protectorates in the Persian Gulf in 1971. France, the Dutch East India Company, post-1870 Imperial Germany, and other European states and entities also had varying degrees of engagement with the Middle East across the post-1500 period.

However, a focus on European colonialism would risk obscuring important archaeological themes that are more specific to the post-1500 Middle East. Among these are local cultural continuity and the dominant role of the Ottoman and Persian empires across most of this period. The use of the term "Islamic archaeology" to

encompass the archaeology of the seventh century to the postmedieval period conceptually stresses continuity, even while its division into "early," "middle," and "late" acknowledges important shifts across time (see Milwright 2010 for an overview of Islamic archaeology). The multi-ethnic post-Timurid Persian (1501–1979) and Ottoman (c.1300–1923) empires together controlled most (though never quite all) of the post-medieval Middle East into the twentieth century, and a consideration of their impact is naturally key to an understanding of the archaeology of the region. It is also necessary to stress that these imperial states were economically and militarily superior to European states for the early part of this period. The Ottomans besieged Vienna as late as 1683, while Persia reached the peak of its power under Shah Abbas (1588–1629). It was only in the early eighteenth century that Europe definitively eclipsed the economic and military power of the Middle Eastern empires; as such, with the notable exception of sixteenth-century Portuguese forts, European colonial engagement with the region was primarily economic rather than territorial for much of this period. Only in the aftermath of the First World War would European states briefly assert territorial control over significant parts of the region. The sociopolitical context of the late Islamic historical archaeology of the Middle East is therefore quite distinct from New World historical archaeology.

Key Issues/Current Debates

While they only arose in the early fourteenth and early sixteenth centuries, respectively, the Ottoman and Safavid states were simply the latest in a long historical line of imperial states in the Middle East, and archaeology is dominated by research agendas focusing on earlier periods. This raises important questions about archaeological significance, whether decisions to ignore (or sometimes destroy) postmedieval and late Islamic archaeology are deliberate or stem from a simple lack of awareness and what constitutes "heritage" in a Middle Eastern context.

It is very difficult to make generalizations across such a complex region, but focusing initially on territories that once formed part of the Ottoman Empire, Dikkaya (2017) has convincingly argued that the lack of a developed Turkish archaeology of the Ottoman period (c.1300–1923) can be attributed to a deliberate ideological decision in the early years of the new republican government. Following the collapse of the Ottoman state at the end of the First World War, the Turkish republic lost most of the non-ethnic Turkish population to a variety of factors (including territorial losses for the Arabs, population exchanges for the Greeks, and genocide for the Armenians). The new republic therefore rejected an Ottoman Empire that was simultaneously predominantly Islamic in self-presentation and ethnically heterogeneous in practice as an appropriate ideological predecessor of the new secular and mono-ethnic state. Instead archaeology and heritage narrowly focused on much earlier periods, such as the Hittite Empire of Anatolia (c.1600–c.1200 BC), even though Turkish states only took control of the Anatolian plateau in the eleventh century AD. The majority of the historical archaeology of the Ottoman Empire has therefore taken place outside the borders of the modern Turkish republic.

In Israel, Uzi Baram has been particularly active in studying and promoting the archaeology of the Ottoman past both in national context (e.g., Baram 2007) and more broadly across the region (Baram and Carroll 2000). Studies have also taken place on the politically fraught events of 1948 and their aftermath, including from Palestinian perspectives that might not otherwise be a focus of archaeology in either Israel or Palestine (e.g., Nairouz 2008). However, in a situation mirroring the development of archaeological studies following the establishment of the Turkish republic just 25 years earlier, conscious decisions were made following the establishment of the State of Israel to ideologically root the new nation's archaeological past in the more distant past in order to stress the antiquity of Jewish settlement in the territory of the new nation. Studies in modern Palestine and Israel by external scholars have likewise often tended to focus on Biblical archaeology. The

motivations between external and internal scholars may not always align, but the outcome – likely bolstered by a broader public perception about how old a site should be to be the target of "proper" archaeology – has again been a focus on earlier periods rather than the four centuries of Ottoman rule in historical Palestine (Brooks and Young 2016: 26).

Iran and Egypt are very different nations, but historical archaeology faces significant – and not dissimilar – challenges in both countries. In what are recurring themes across the region, the extraordinary richness of the archaeological record, the ideological and iconographic prominence given to ancient civilizations (in this case Ancient Egypt and Achaemenid Persia, respectively), and a tourist market focus on these same civilizations all lead to an archaeological research focus on earlier periods. Given these factors, it is wholly understandable that financially strapped academic programs and hard-pressed local authorities focus archaeological resources on the latter. Nonetheless, work relevant to historical archaeology is still taking place. In Egypt, the Red Sea coast has been a particular focus of historical archaeology, with Le Quesne's work at the Ottoman and Napoleonic Quseir fort on the Egyptian Red Sea coast seeking to learn more about the origins and development of the fort and its role in the late Ottoman Red Sea world, among other objectives (Le Quesne 2007). Ward's work on the eighteenth-century Sadana Island shipwreck, undertaken in cooperation with the Egyptian Supreme Council of Antiquities, sought to place its cargo, particularly the 1000 nearly complete examples of Chinese Porcelain, within the context of international late Ottoman trade networks (Ward 2004). In Iran, Papoli-Yazdi's Bam Ethnoarchaeology Project, set up in the aftermath of the devastating 2003 Bam earthquake, explored the public and private lives of families and individuals via a synthesis of excavation, oral histories, and material culture analysis (Papoli-Yazdi 2010: 35–44). Young (2019) has also used building analysis, excavation, artifact analysis, and ethnographic interviews to study the nineteenth- and twentieth-century communities in Iran, comparing the latter with similar communities in Oman in order to develop research agendas specifically oriented toward developing historical archaeology across the Middle East.

Moving focus to the Arabian Peninsula, the countries of the latter are, in their current form, largely nineteenth- or even twentieth-century colonial or postcolonial foundations. Even Oman and Yemen, which can both claim roots in much earlier states (notwithstanding varying degrees of direct and indirect British colonial engagement), only achieved their current boundaries and political status in the period following the Second World War. In many of these countries, the majority of population groups were either nomadic Bedu or coastal pearl fishers well into the last century, and the twentieth-century discovery of petroleum and natural gas reserves wholly transformed the region's economy, societies, and geopolitical significance. These factors have led to extensive debates on what even constitutes heritage in Gulf countries and the extent to which heritage should be protected. In Saudi Arabia, these factors intertwine with the dominant Wahhabi interpretation of Islam. While Saudi authorities rightly note the need to improve the infrastructure for the millions of pilgrims to Mecca and Medina, particularly during the annual Haj, the impact has also been to destroy sites suffering from the taint of idolatry (as defined by Wahhabis). By some counts, 95% of the buildings dating to the Ottoman and earlier periods have been destroyed in the last 20 years (Page 2014: 324). This destruction encompasses both significant sites from the early Islamic period, such as the houses of the Prophet Mohammed and his first wife Khadija, as well as late Islamic sites such as the Ottoman-era Ajyad Fortress, the latter torn down (despite protests from the Turkish government) to make way for the Abraj Al Bait, the vast hotel and clock tower complex that now overlooks Mecca's Grand Mosque. Yet Saudi Arabia is also home to five cultural UNESCO World Heritage sites, two of which (At-Turaif District in ad-Dir'iyah and Historic Jeddah, the Gate to Makkah) are inscribed on the list for the importance of their late Islamic heritage. Heritage and archaeology are therefore not inherently incompatible with Saudi Arabia's national ideology; the

issue is the intersection of certain types of heritage and archaeology with a particular vision of Islam.

There has nonetheless been real growth in historical archaeology, including urban archaeology, on the Arabian Peninsula in the last decade. Pearl fishing, for example, was an important component of the international Persian Gulf economy for centuries (only declining with the development of cultured pearls in the opening decades of the twentieth century), has been the subject of extensive archaeological study across periods (Carter 2012), and has seen the development of two UNESCO world heritage sites focused on postmedieval pearling. The abandoned and ruined pearling town of Al Zubarah, occupied in the eighteenth and nineteenth centuries, is highly unusual in the Middle East for having gained UNESCO world heritage status specifically for its postmedieval archaeological significance. It has been the subject of extensive (if intermittent) archaeological work since the 1950s, with more recent work in the twenty-first century seeking to understand the significance of pearling in the development of modern Gulf economics and politics (e.g., Richter et al. 2011). In Bahrain, several nineteenth and twentieth-century sites in Muharraq City have been inscribed on the UNESCO list as "Pearling, Testimony of an Island Economy," though the site has been occupied for longer; the current fort on the site dates to the nineteenth century, but the earliest fort was a Portuguese structure built in the 1630s. While the Muharraq sites were not inscribed on the UNESCO list as archaeological sites, mitigation fieldwork has taken place prior to the development on more than one occasion in what is now the designated area, often with a strong focus on the nineteenth and early twentieth-century archaeological evidence (e.g., Carter et al. 2011). Among the artifacts recovered from the site were nineteenth- and early twentieth-century British and Dutch refined white-bodied earthenwares and Chinese porcelain, often collectively referred to as "late trade wares" in the Gulf region. These ceramics have been studied from sites in Bahrain, Qatar, and the United Arab Emirates in recent years, with analysis often seeking to link European and East Asian "trade ceramics" with broader European and Asian trade networks (Brooks and Young 2016: 29–30) and therefore providing a material means to link local late Islamic archaeology on such themes as pearl fishing with an international historical archaeology of trade and globalization.

International Perspectives

While still a nascent subdiscipline, the late Islamic historical archaeology of the Middle East has considerable international potential. This is not simply a matter of the inscribing of archaeological sites with important late Islamic components on the UNESCO World Heritage list. The archaeological record of the Middle East can also make an important contribution to an understanding of the globalized modern world. That the Middle East was integrated into the emerging global trade networks of the postmedieval world, as both an export and an import market, is amply demonstrated by archaeological studies of pearl fishing and European and Asian ceramics. The Middle Eastern material culture record can therefore make an important contribution to these standard themes within historical archaeology. At the same time, Islam is a world religion of global significance, and understanding the material record of the late Islamic period can play an important role in helping to understand the region's important role in modern geopolitics. But there are challenges in presenting this potentially important archaeological record to a broader international audience. The first comes in convincing historical archaeologists – traditionally dominated by North Atlantic scholars (though with increasingly important contributions from Europe, Latin America, Australasia, and South Africa) – to engage with a region outside of their traditional geographical spheres of interest. The second comes in convincing Middle Eastern archaeologists that historical archaeology should be proactively studied and can make a key contribution toward understanding regional heritage. Important strides have been made in addressing both challenges, but much also remains to be done.

Future Directions

For all the potential for a globally integrated late Islamic historical archaeology of the Middle East, there is considerable scope for expanding the awareness of a regional shared body of work, and its relevance to international historical archaeology. At present, historical archaeology in the region tends to be focused on individual countries, with occasional links between countries in specific subregions. Fraught geopolitics can also be a factor, with regional political tensions often hampering collaboration and cooperation. The sometimes difficult relationship between nationalist and religious ideologies and the inevitable impact this has on the conceptualization of heritage in modern Middle Eastern states will also remain a challenge. These factors give Young's work in Oman and Iran, as cited above, particular significance as it engages in transnational comparisons across the Persian Gulf and seeks to set out an internationally aware regional research framework for historical archaeology. Yet there is also a key need to "demonstrate the relevance of historical archaeology to local archaeologists, heritage professionals and communities, and the ways in which archaeology can support heritage developments" (Brooks and Young 2016: 29).

Future work will also likely pay attention to postmedieval diversity in the region. The extent of religious diversity within the Middle East, notwithstanding the dominant role of Islam, has already been noted in the "definitions" section of the present discussion. A similar observation could be made on ethnic diversity. While Arabs, Turks, and Persians have been politically and often culturally dominant in the Middle East, other groups such as (but by no means limited to) Armenians, Greeks, and Kurds have also played an important role in the postmedieval Middle East. There are also groups where the link between ethnicity and religion is highly important in defining cultural identity, as with the historical and modern Jewish communities of the region. Even within the dominant ethnic groups, there are important cultural subgroups that inform heritage interpretation, with the Bedu past forming an important part of identity formation and heritage conceptualization in modern Qatar (Exell and Rico 2013: 277). Economic and class diversity can also interface with these ethno-religious examples. Future historical archaeology research in the region will likely explicitly address this diversity within all its richness, explicitly acknowledging that modern states founded on particular forms of postmedieval nationalism are not necessarily representative of the region's past.

A regional sense of continuity through time has been a recurring theme in this discussion and will likely continue to form a key part of regional research agendas, and trade is likely to form a key theme. Trade through time has not been ignored by past work. For example, a 2002 conference at the British Museum on the archaeology of trade in the Red Sea looked at this topic holistically across periods, from Pharaonic Egypt through to the late Islamic Period, with contributions in the published proceedings looking at such late Islamic-period issues as Arab perceptions of the arrival of the Portuguese, commercial exchanges between the African and Arabian coasts in the sixteenth and seventeenth centuries, and goods from an eighteenth-century shipwreck (Lunde and Porter 2004). As historical archaeologists based in other parts of the world engage with the Middle East, seeking to merge local research agendas with international agendas drawing on themes of postmedieval globalization, the extent to which postmedieval Middle Eastern trade networks with East Africa, Europe, the Indian subcontinent, and East Asia were built on existing long-standing trade patterns which evolved to encompass European economic expansion will likely form a growing field of study and an important point of comparison and contrast with New World historical archaeologies.

Cross-References

- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Ceramics, Southeast Asian and Chinese Trade
- ▶ Egypt: Islamic Archaeology
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Global Archaeology

▶ Greater Syria: Islamic Archaeology
▶ Heritage and Archaeology
▶ Historical Archaeology
▶ Iran: Islamic Archaeology
▶ Islamic and Maritime Archaeologies
▶ Islamic Archaeology
▶ Islamic Industry, Archaeology of
▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
▶ Modern World: Historical Archaeology
▶ Orientalism: Islamic Archaeology and Its Colonial Context
▶ Ottoman Archaeology: Localizing the Imperial
▶ Post-medieval Archaeology

References

Baram, U. 2007. Filling a gap in the chronology: What archaeology is revealing about the Ottoman past in Israel. In *Reapproaching borders: New perspectives on the study of Israel-Palestine*, ed. S. Sufian and M. LeVine, 15–40. Lanham: Rowman and Littlefield.

Baram, U., and L. Carroll. 2000. *A historical archaeology of the Ottoman empire*. New York: Kluwer Academic/Plenum Publishers.

Brooks, A., and R. Young. 2016. Historical archaeology and heritage in the Middle East. *Historical Archaeology* 50 (4): 22–45.

Carter, R. 2012. *Sea of pearls: Seven thousand years of the industry that shaped the Gulf*. London: Arabian Publishing Ltd.

Carter, R., M. Morley, and C. Morse. 2011. Bu Maher Fort, Muharraq; report on excavations in 2010 for the Ministry of Culture and Information, Bahrain. Report prepared for Bahrain Ministry of Culture and Information, Manama.

Dikkaya, F. 2017. Archaeology without an Ottoman past: National archaeology and historical paradigms in Turkey. In *The country where my heart is; historical archaeologies of nationalism and national identity*, ed. A. Brooks and N. Mehler, 295–311. Gainesville: University Press of Florida.

Exell, K., and T. Rico. 2013. 'There is no heritage in Qatar': Orientalism, colonialism and other problematic histories. *World Archaeology* 45 (4): 670–685.

Le Quesne, C. 2007. *Quseir. An Ottoman and Napoleonic fortress on the Red Sea Coast of Egypt*. Cairo: The American University in Cairo Press.

Lunde, P., and A. Porter, eds. 2004. *Trade and travel in the Red Sea region; proceedings of Red Sea project I held in the British Museum October 2002*, British Archaeological Reports international series 1269. Oxford: Archaeopress.

Milwright, M. 2010. *An introduction to Islamic archaeology*. Edinburgh: Edinburgh University Press.

Nairouz, J. 2008. Ethnoarchaeological study of clearance in Palestine. In *Landscapes of clearance: Archaeological and anthropological perspectives*, ed. A. Smith and A. Gazin-Schwartz, 127–138. Walnut Creek: Left Coast Press.

Page, S. 2014. Mecca: The 'blessed heart' of Islam. In *Between cultural diversity and common heritage; legal and religious perspectives on the sacred places of the Mediterranean*, ed. S. Ferrari and A. Benzo, 319–330. Farnham: Ashgate Publishing.

Papoli-Yazdi, L. 2010. Public and private lives in Iran: An introduction to the archaeology of the 2003 bam earthquake. *Archaeologies: Journal of the World Archaeological Congress* 6 (1): 29–47.

Richter, T., P. Wordsworth, and A. Walmsley. 2011. Pearl fishers, townsfolk, Bedouin, and shaykhs: Economic and social relations in Islamic al-Zubārah. *Proceedings of the Seminar of Arabian Studies* 41: 317–332.

Ward, C. 2004. Luxury wares in the Red Sea: The Sadana Island shipwreck. In *Trade and travel in the Red Sea region; proceedings of Red Sea project I held in the British Museum October 2002*, British Archaeological Report international series 1269, ed. P. Lunde and A. Porter, 165–171. Oxford: Archaeopress.

Young, R. 2019. *Historical archaeology and heritage in the Middle East*. Boca Raton: CRC Press.

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Middle East: Epipaleolithic

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Introduction

The Epipalaeolithic period represents a time when everyone in the world was a hunter-gatherer. But, in the Middle East, these groups were the last of the hunter-gatherers because behavioral choices they made and subsistence strategies they undertook over the course of several millennia led to one of the key economic transitions in prehistory – the origins of food production (the origins of agriculture), including the domestication of cereal grasses and herd animals such as sheep and goats.

Definition

As a term, the Epipalaeolithic is used primarily in the Middle East to describe hunter-gatherer groups who lived in the interval from about 25,000 to 11,600 calendar years ago (Fig. 1). This temporal period represents the end of the Pleistocene epoch, which was characterized by a series of global cooling and drying events that resulted in glaciations and glacial retreats in northern latitudes. In the Levant (the region incorporating parts of modern Syria, Lebanon, Jordan, and Israel), behavioral decisions regarding subsistence strategies ultimately led to the origins of food production economies, while in the Zagros (the mountainous region incorporating parts of modern Iraq and Iran), economic strategies of hunter-gatherers may have led to the domestication of goats. The 14,000-year or so duration of the Epipalaeolithic in the Middle East is characterized by a variety of named "cultures" (discussed below), some of which were archaeologically contemporary, while others represent changes in material culture and behaviors over time.

One of the hallmark features of the Epipalaeolithic is the manufacture and use of very small stone tools called microliths; these usually are less than 3 cm long and 1 cm wide and can be as small as just 2–3 mm (Fig. 2). Epipalaeolithic microliths have backing retouch, which usually means small removals along one lateral edge that are steep or abrupt (90° when compared to the exterior and interior sides of the tool). Backing is a method to blunt an edge so that the tool can be inserted into a wooden or bone handle. Backing retouch thus distinguishes Epipalaeolithic microliths from those of the Upper Paleolithic period which have very light (fine) retouch. Microliths are essentially the prehistoric equivalent of interchangeable parts. That is, by creating composite tools which consist of a handle with many microliths inserted, for example, as barbs along an arrow shaft or as elements of

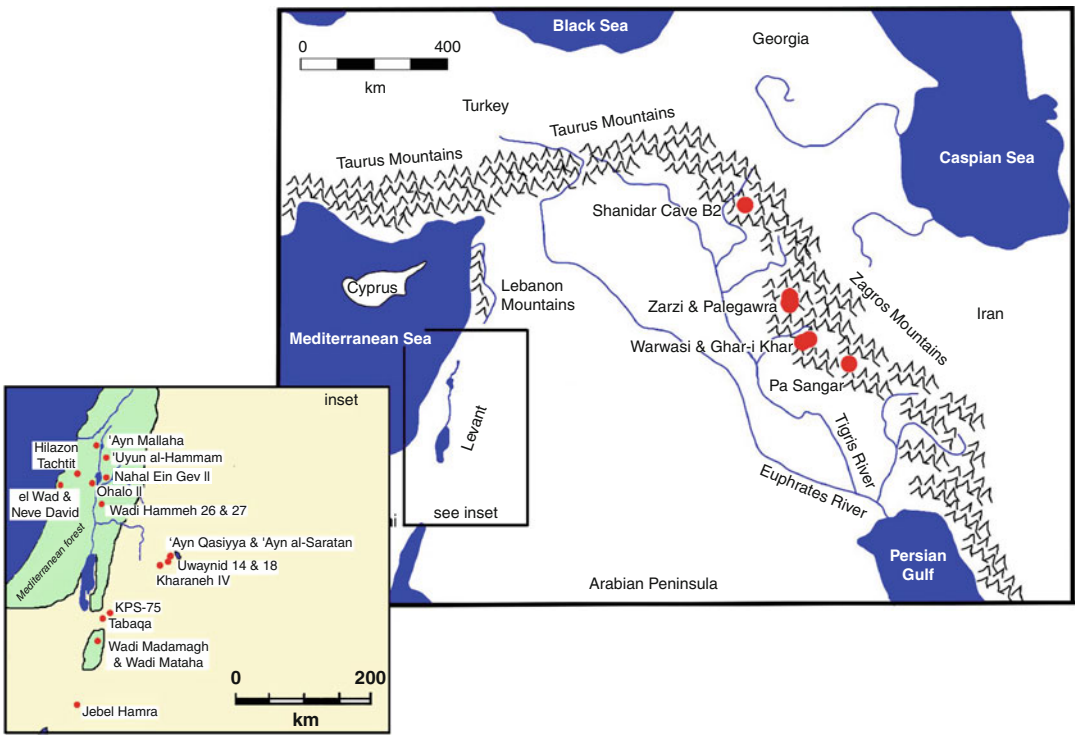

Middle East: Epipaleolithic, Fig. 1 Map showing Middle Eastern areas and Epipalaeolithic sites mentioned

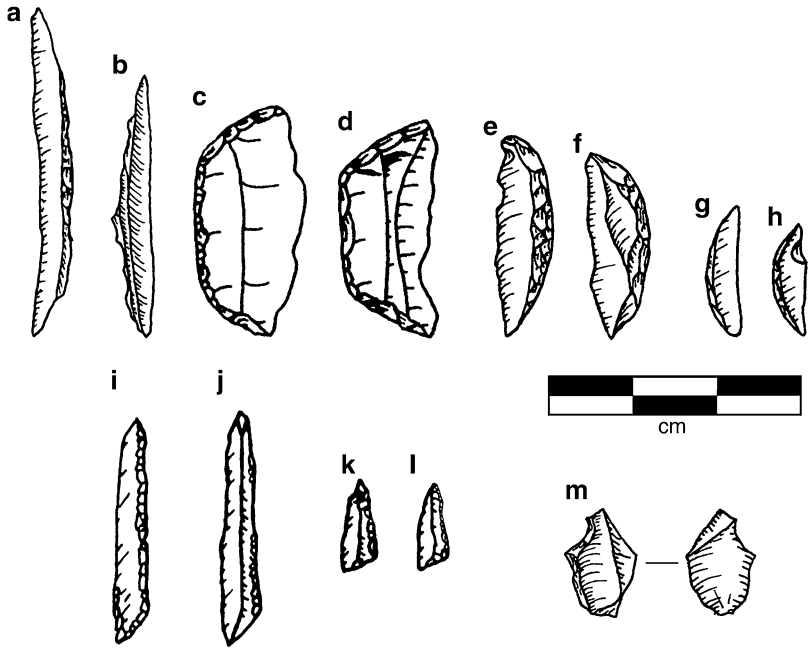

Middle East: Epipaleolithic, Fig. 2 Examples of Epipalaeolithic microliths and microburin. **a**, **b**: Early Epipalaeolithic nongeometric microliths; **c**, **d**: Middle Epipalaeolithic geometric microliths; **e**, **f**: Late Epipalaeolithic (Early Natufian) lunate microliths; **g**, **h**: Late Epipalaeolithic (Late/Final Natufian) lunate microliths; **i**, **j**: Zarzian elongated scalene triangles; **k**, **l**: Zarzian scalene triangles; **m**: both sides of a microburin. (**a**–**h**, **m**: drawn by Bradley M. Evans; **i**–**l**: drawn by Deborah I. Olszewski)

a knife blade, damage to any one piece can be easily repaired by removing the broken microlith and inserting a new one, rather than replacing the entire tool. In addition to a variety of other chipped stone tools, Epipalaeolithic groups also used ground stone to lesser or greater degrees. These grinding implements may have been for creating pigments in some cases but in others were undoubtedly for processing food resources such as wild cereals.

As hunter-gatherers, the majority of Middle Eastern Epipalaeolithic groups were quite mobile, moving frequently from one base camp to another. There are, however, several important exceptions, particularly during the Late Epipalaeolithic period (see below), when some parts of the Middle Eastern region were characterized by the development of small settlements where hunter-gatherers lived year-round or nearly so. These contexts and the types of cultural materials present in them have long intrigued archaeologists, especially with respect to how or if subsistence strategies undertaken by these Late Epipalaeolithic peoples may have contributed to the development of food production economies.

It should be noted that the Epipalaeolithic label also is occasionally used in other parts of the Old World, particularly for parts of Western Europe and North Africa. In the case of Western Europe, Epipalaeolithic is a marker for hunter-gatherer groups who were immediately after the Upper Paleolithic period as opposed to those of later periods. For example, the Azilian is Epipalaeolithic, while later hunter-gatherer groups such as the Sauveterrian and Tardenoisian are called Mesolithic. This distinction is in part a reflection of the large-scale habitat changes that occurred at the end of the Pleistocene "Ice Ages," when open grassland landscapes were gradually reforested as climate became warmer and wetter. Thus, the Western European Epipalaeolithic is associated with the very end of the Pleistocene and more open terrain, while Mesolithic groups lived in a heavily forested European landscape. For North Africa, the use of the term Epipalaeolithic reflects research traditions. Thus, the Iberomaurusian Epipalaeolithic groups (found in modern Morocco, Tunisia, and Libya) were named by French researchers who applied terminology familiar to them from European and Middle Eastern contexts. Other researchers prefer to use the term Later Stone Age for the Iberomaurusian and other similar groups, as this terminology, which represents the British research

tradition, is used throughout most of the African continent.

The Levantine Middle East

During the late Pleistocene, one of the important ecological distinctions was the primarily Mediterranean forest and open parkland habitats of the western Levant in contrast to the steppe and desert habitats of much of the eastern and southwestern Levant (see Fig. 1). Additionally, the eastern Levant was characterized by a series of Pleistocene lakes and marshes which provided favorable locales in an otherwise relatively cool and dry environment. The late Pleistocene also witnessed the Last Glacial Maximum (ca. 22,000–19,000 calendar years ago), a particularly cold and dry period during which Early Epipalaeolithic groups are found, followed by warmer and wetter conditions during the Middle Epipalaeolithic, which culminated in a climatic optimum during the early part of the Late Epipalaeolithic. This was followed by a brief return to much cooler and drier conditions during the Younger Dryas (ca. 12,600–11,600 calendar years ago), just prior to the beginning of the Holocene epoch, which is much wetter and warmer and which saw the advent of Neolithic societies.

Early Epipalaeolithic: Nebekian and Kebaran

The Early Epipalaeolithic occurs between about 25,000 and 19,000 calendar years ago. Two major complexes of hunter-gatherer groups have been identified; these are the Nebekian and the Kebaran (Table 1). For the most part, Kebaran hunter-gatherers were situated in the Mediterranean forest habitat of the western Levant, while Nebekian groups were found in the steppe/desert of the eastern Levant, although there are important exceptions to this pattern, particularly in the Azraq Basin region of Jordan. The stone artifact assemblages of the Nebekian and Kebaran are distinguished primarily on the basis of different forms of microliths and the fact that Nebekian groups use the microburin technique (making a notch in a bladelet [small blade] and snapping it at that place) to break bladelets into segments which can then be selected for backing into microlith tools. Most microliths of the Early Epipalaeolithic are very narrow (ca. 2 mm to 3 mm wide) nongeometric forms (see Fig. 2).

Examples of Kebaran sites include Ohalo II, Wadi Hammeh 26, and Kharaneh IV (Phase B); examples of Nebekian sites are Uwaynid 14 and 18, KPS-75 (Fig. 3), and Wadi Madamagh, while ‘Ayn Qasiyya has both Kebaran and Nebekian occupations (Nadel 2004; Olszewski 2008: 56–60; Richter 2011). Most Nebekian and Kebaran sites are small, representing high mobility, but there are exceptions. Of these, Ohalo II, situated on the shore of Lake Galilee, has extraordinary preservation of organic materials (plant remains) because of submersion by lake waters. Hunter-gatherers here constructed brush shelters; ate a wide variety of plant foods (including wild barley, acorns, and wild grass seeds), as well as fish and gazelle; and probably lived at Ohalo II year-round (Nadel 2004). In the Azraq Basin, quite large sites such as Kharaneh IV appear to represent aggregation locales where several hunter-gatherer groups came together at periodic

Middle East: Epipaleolithic, Table 1 Middle Eastern Epipalaeolithic archaeological cultures

Calendar years BP	Phase	Levant[a]		Zagros
15,000–11,600	Late Epipalaeolithic	Final Natufian Late Natufian Early Natufian	Harifian Late Ramonian	Zarzian
19,000–15,000	Middle Epipalaeolithic	 Geometric Kebaran	Early Ramonian Mushabian Hamran	Zarzian
25,000–19,000	Early Epipalaeolithic	Nizzanan Kebaran Nebekian	Qalkhan	Zarzian

[a]Sequential replacement not necessarily implied for columns in the Levant

Middle East: Epipaleolithic, Fig. 3 The Early Epipalaeolithic (Nebekian) rock-shelter of KPS-75 on the Kerak Plateau, Jordan. (Photo by Deborah I. Olszewski)

intervals for various social purposes, for example, perhaps to exchange mates or exotic materials such as sea shells from the Mediterranean and Red Seas (Richter et al. 2011).

Middle Epipalaeolithic: Geometric Kebaran

In the interval from about 19,000 to 15,000 calendar years ago, Levantine hunter-gatherer groups are classified as Geometric Kebaran (see Table 1). During this period, worldwide climate began to improve, with wetter and warmer conditions compared to the Early Epipalaeolithic. Like their predecessors, most Geometric Kebaran groups were highly mobile and continued to make microliths, which included trapezes and triangles; some groups used microburin technique, while others did not. The microliths of this period are considerably wider, ranging from 5 mm to 9 mm (see Fig. 2).

Examples of sites include Neve David, Jebel Hamra (Layers A and B), Kharaneh IV (Phase D), ‘Uyun al-Hammam, and Wadi Mataha (Goring-Morris and Belfer-Cohen 1998: 77–79; Olszewski 2008: 56–60; Maher et al. 2011). Sites such as Kharaneh IV (Fig. 4) continue to be aggregation locales, suggesting long-lived traditions of cultural knowledge about place. Several important social behaviors that presage developments in the Late Epipalaeolithic are apparent at some sites. ‘Uyun al-Hammam, for example, is the earliest cemetery known in the Middle East and contains eight burials with a total of 11 individuals. A variety of grave goods (such as bone and chipped and ground stone tools) are present, but what is especially interesting is the practice of removal of human skulls (which became very common in the later Neolithic period) and the burial of a red fox skull with one of the humans. This suggests strong ties between humans and animals and may be a ritual bond that helped lead to the later domestication of several animals such as dogs, sheep, goats, and cattle.

Late Epipalaeolithic: Natufian

The Natufian is the widely recognized complex of Levantine hunter-gatherers from about 15,000 to 11,600 calendar years ago. It is divided into several phases – early, late, and final – which represent in part quite different climatic conditions and behavioral adaptations. The late Pleistocene climatic optimum, a period of expansion of the Mediterranean forest ecology, characterizes the Early Natufian, while the Late and Final Natufian witness a return to much colder and drier contexts during the Younger Dryas, during which steppe and desert ecologies expanded at the expense of

Middle East: Epipaleolithic, Fig. 4 The Early and Middle Epipalaeolithic site of Kharaneh IV (within the fenced area), Azraq Basin, Jordan. (Photo by Deborah I. Olszewski)

the Mediterranean forest. Natufians used microburin technique to make microliths, with the most common geometric form being a lunate (half-moon-shaped backed piece) (see Fig. 2). Some Natufian groups were highly mobile, while others (especially during the Early Natufian) led a more settled life in small villages.

Among the many Natufian sites are ‘Ayn Mallaha, Wadi Hammeh 27, ‘Ayn al-Saratan, el-Wad, Tabaqa, Hilazon Tachtit, and Nahal Ein Gev II (Edwards 1991; Bar-Yosef 1998; Olszewski 2008: 60–62; Munro and Grosman 2010; Grosman et al. 2016). The small villages, such as ‘Ayn Mallaha and Wadi Hammeh 27, are mainly located in the Mediterranean forest region and consist of half-a-dozen or so circular stone foundation walls for dwellings. They also contain abundant evidence associated with a more settled lifestyle, such as numerous ground stone tools, art (figurines and engraved bone tools), and dense trash deposits. A number of sites have cemeteries or burials under house floors, including a young canid (possibly a dog) buried with an elderly woman at ‘Ayn Mallaha. Although many Natufian groups became much more mobile during the Late Natufian, there is evidence for elaborate rituals and people with special roles in society. At Hilazon Tachtit, for example, an elderly woman was buried with 50 tortoise shells, a golden eagle’s wing, a gazelle horn, a wild cattle tail, a leopard’s hip, and a human foot (among other things), and there is evidence for feasting rituals, perhaps in association with her burial (Grosman et al. 2008; Munro and Grosman 2010). Moreover, settlements with stone foundations for structures, such as Nahal Ein Gev II during the Late Natufian, indicate that not every Natufian group became highly mobile during the cool Younger Dryas period (Grosman et al. 2016).

The Zagros Middle East

Compared to the Levantine Middle East, the Epipalaeolithic of the Zagros region is much less well known, primarily due to historical events that have often constrained archaeological research, although recently Iranian archaeologists have been investigating sites of this period. Hunter-gatherer groups here, like their counterparts in the Levant, experienced the climatic fluctuations of the late Pleistocene, although their behavioral adaptations are less well documented and, consequently, less well understood.

Zarzian Epipalaeolithic

The main Epipalaeolithic group in the Zagros is the Zarzian, which was first described in the late 1920s. Radiocarbon dates are not available for the majority of the sites, although based on a few dates from two sites, the Zarzian likely predates about 12,000 calendar years ago (Turnbull and Reed 1974: 84). The chipped stone industry shows changes in microliths that over time parallel those of the Levant. That is, the earliest part of the Early Zarzian has many small, inversely retouched bladelets. This is followed by the appearance of scalene triangles and microburin technique and finally by lunates in combination with scalene triangles in the Late Zarzian (see Fig. 2) (Olszewski 1993). Many of the known sites are rock-shelters or caves and are small, probably short-term occupations that suggest highly mobile groups of people.

Examples of Zarzian sites include Warwasi, Palegawra, Shanidar Cave (Layer B2), Pa Sangar, Ghar-I Khar, and Zarzi (see Fig. 1). Unfortunately, there have been very few detailed studies of the cultural materials at Zarzian sites (Olszewski 2012). Exceptions include Warwasi and Palegawra. At Warwasi, the sequence of changes in microliths is well documented, but poor preservation of animal bone means that it is possible only to say that hunter-gatherers exploited onager, wild goat/sheep, and wild pig (Olszewski 1993). On the other hand, at Palegawra, while the chipped stone assemblage has not been studied in detail, the animal bone assemblage was described. It contains at least 27 onagers, 12 red deer, 10 wild sheep, 8 wild goats, 7 Persian gazelle, 3 wild boars, and 2 aurochs (extinct wild cattle) (Turnbull and Reed 1974).

Key Issues and Current Debates

The Epipalaeolithic in the Middle East has long been of interest in the context of factors and decisions leading to the eventual shift to food production economies, including animal domestication. Much of the debate on this has traditionally focused on the Natufian (Late Epipalaeolithic), not only because of the temporal proximity of these hunter-gatherers to the period in which agriculture became increasingly important but also because of the unusual archaeological signature of the Early Natufian with its small villages, abundant ground stone tools, numerous burials and associated grave goods, and sporadic plant food remains that included wild cereals (Bar-Yosef 1998; Olszewski 2010). These behaviors, in part, seem to foreshadow those of the subsequent Neolithic. However, recent archaeological research has shown that heavy investment in wild cereals occurred much earlier, at sites such as Ohalo II (Nadel 2004), which themselves appear to be year-round occupations, although with less substantially built dwellings than during the Natufian. Exactly why, after millennia of wild cereal use, people altered their strategies to the extent that cereals became domesticated after the Younger Dryas thus remains an open question that many archaeologists still research.

Similarly, the Early Natufian small villages, and aspects of social life common to them, were long thought to be the earliest such expressions in the Middle East of complex relationships between people (often seen in burial treatment) and between people and animals (Grosman et al. 2008). More recently, however, intriguing evidence for earlier examples of complex social relationships and perhaps ideology, such as the human-fox burial at ‘Uyun al-Hammam, and evidence of long distance exchange networks for sea shells from the Mediterranean and Red Seas document that these behaviors were a part of Epipalaeolithic lifeways long before the Natufian complex (Maher et al. 2011; Richter et al. 2011).

Finally, the Middle Eastern Epipalaeolithic is characterized by a large number of archaeological cultures, including but not limited to those discussed above (see Table 1). Some of the distinctions between these archaeologically named groups are due to changes over time in hunter-gatherer mobility and behavior and the resulting alterations in cultural materials that form the archaeological signature of each. Others may represent differences between adaptations to differing habitats (e.g., Mediterranean forest versus steppe/desert). Yet other distinctions between cultural assemblages may suggest social boundaries

between contemporary, yet geographically separated, hunter-gatherer groups. Continuing research on this fascinating period will undoubtedly yield additional materials allowing much finer nuancing and understanding of the last of the hunter-gatherers in the Middle East.

References

Bar-Yosef, O. 1998. The Natufian culture in the Levant: Threshold to the origins of agriculture. *Evolutionary Anthropology* 6: 159–177.

Edwards, P.C. 1991. Wadi Hammeh 27: An early Natufian site at Pella, Jordan. In *The Natufian culture in the Levant*, ed. O. Bar-Yosef and F. Valla, 123–148. Ann Arbor: International Monographs in Prehistory.

Goring-Morris, A.N., and A. Belfer-Cohen. 1998. The articulation of cultural processes and late quaternary environmental changes in Cisjordan. *Paléorient* 23: 71–93.

Grosman, L., N.D. Munro, and A. Belfer-Cohen. 2008. A 12,000-year-old shaman burial from the southern Levant (Israel). *Proceedings of the National Academy of Sciences USA* 105: 17665–17669.

Grosman, L., N.D. Munro, I. Abadi, E. Boaretto, D. Shaham, A. Belfer-Cohen, and O. Bar-Yosef. 2016. Nahal Ein Gev II, a late Natufian community at the Sea of Galilee. *PLoS One* 11: e0146647. https://doi.org/10.1371/journal.pone.0146647.

Maher, L.A., J.T. Stock, S. Finney, J.J.N. Heywood, P.T. Miracle, and E.B. Banning. 2011. A unique human-fox burial from a pre-Natufian cemetery in the Levant (Jordan). *PLoS One* 6: e15815. https://doi.org/10.1371/journal.pone.0015815.

Munro, N.D., and L. Grosman. 2010. Early evidence (ca. 12,000 B.P.) for feasting at a burial cave in Israel. *Proceedings of the National Academy of Sciences USA* 107: 15362–15366.

Nadel, D. 2004. Wild barley harvesting, fishing and year-round occupation at Ohalo II (19.5 ky, Jordan Valley, Israel). In *General session and posters. Section 6: The Upper Paleolithic*, ed. le Secrétariat du Congrès, 135–143. Oxford: Archaeopress.

Olszewski, D.I. 1993. The Zarzian occupation at Warwasi rockshelter. In *The Paleolithic prehistory of the Zagros-Taurus*, ed. D.I. Olszewski and H.L. Dibble, 206–236. Philadelphia: University of Pennsylvania Museum.

Olszewski, D.I. 2008. The Palaeolithic period, including the Epipalaeolithic. In *Jordan: An archaeological reader*, ed. R.B. Adams, 35–69. Oakville: Equinox.

Olszewski, D.I. 2010. On the margins: Early Natufian in the Wadi al-Hasa region, Jordan. *Eurasian Prehistory* 7: 85–97.

Olszewski, D.I. 2012. The Zarzian in the context of the Epipaleolithic Middle East. *International Journal of Humanities* 19 (3): 1–20.

Richter, T. 2011. Nebekian, Qalkhan and Kebaran: variability, classification and interaction. New insights from the Azraq Oasis. In *The state of stone terminologies, continuities and contexts in Near Eastern lithics*, ed. E. Healy, S. Campbell, and O. Maeda, 33–49. Berlin: *ex orient*.

Richter, T., A.N. Garrard, S. Allock, and L.A. Maher. 2011. Interaction before agriculture: Exchanging material and sharing knowledge in the final Pleistocene Levant. *Cambridge Archaeological Journal* 21: 95–114.

Turnbull, P.F., and C.A. Reed. 1974. The fauna from the terminal Pleistocene of Palegrawra Cave, a Zarzian occupation site in northeastern Iraq. *Fieldiana Anthropology* 63: 81–145.

Middle-Range Theory in Archaeology

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Introduction

Middle-range theory is an interpretive methodology influential in New Archaeology. The concept originates in the 1950s in the sociological theory of Robert K. Merton, where it is conceived as a scale of abstraction in the process of linking low-level empirical data to high-order theories about culture (Merton 1968). In archaeology, however, middle-range theory has developed a different, materialist objective, focusing on processes of site formation and the relationship between the material record and the conditions of its production (Raab and Goodyear 1984: 255–8; Tschauner 1996: 4).

By the mid-twentieth century, the traditional culture-historical archaeological approach had successfully developed sequences of artifacts and cultures and placed these within established chronological frameworks (Greene and Moore 2010). In the 1960s, rather than simply continuing to situate archaeological material within space and time, New Archaeology, also known as processual

archaeology, sought to examine its *function*, embracing a positivist materialist approach attempting to replace the implied assumptions and interpretive intuition characteristic of traditional approaches with scientifically testable interpretations of the past. Middle-range theory, as developed by Binford in the late 1970s, is the theoretical foundation upon which New Archaeology sought to achieve this scientific epistemology.

Definition

Introduced into archaeology by Lewis Binford in the late 1970s (Binford 1975, 1977, 1978, 1981, 1983; Binford and Sabloff 1982), middle-range theory recognizes the inferential nature of all archaeological interpretation and, by processes of rigorous observation of the relationship between the static archaeological record which exists in the present and the dynamic behavioral and physical conditions of the past which produced that record, attempts to establish generalizing analogies or covering laws by which hypotheses about the past may be independently tested. Middle-range theory seeks to bridge the gap between our interpretation of the past and the past itself, positing that the study of patterned behavior in the present can be formally linked with defined material signatures. On this basis, the dynamics of human behavior in the past can be reliably inferred from material traces in the archaeological record of the present, which are established as diagnostic.

Central to this approach is an analogy based on ethnoarchaeological observation. Confronted with the problem of understanding prehistoric hunter-gatherers from material traces in the archaeological record of the present, Binford undertook extensive ethnoarchaeological research on the Nunamiut Eskimos of Canada, modern-day hunter-gathers which he believed would exhibit the same adaptive behaviors of groups at similar stages of evolution in the past (Binford 1978). Binford's theory was that objective observation of the relationship between dynamic behaviors and physical conditions on the one hand and the static physical traces they produce in the present on the other could be used to establish universal generalizing analogies with which to test hypotheses about the dynamics of the past as reflected by their physical traces. Binford was seeking a "Rosetta stone" (Binford 1983: 24), a framework of inferences built upon a sound understanding of the dynamic behavioral and natural processes which form the material record and enable archaeologists to establish correlations between the material traces of the past and the behaviors which produced them (Trigger 2006: 33).

Middle-range theory is an actualistic approach based on observation of conditions as they *actually* exist in the present (Fagan and DeCorse 2005: 364). If a correlation can be drawn between aspects of behavior and material culture in the present, then the observation of such material culture in the archaeological record enables archaeologists to infer that the same behaviors were likewise present in the past (Trigger 1995: 2).

Proponents of middle-range theory employ a suite of methodological approaches to identify these causal relationships between the material and the behavioral, all of which are linked by their reliance on processes of analogy, which assumes that if objects share some similarities, they will likely share other attributes as well, allowing archaeologists to take what is known from one context (the present) to explain data from another context (the past) (Johnson 1999: 48; Fagan and DeCorse 2005: 360). Chief among these analogical approaches is ethnoarchaeology, where what is observed of living cultures in the present day is used to infer behaviors in the past. Experimental archaeology is also used to reproduce in the present conditions and processes of the past, such as replicating the manufacture and use wear of ancient stone tools to observe the processes of their production and use (Johnson 1999: 52; Fagan and DeCorse 2005: 373–5). Taphonomy, the study of how natural and cultural behaviors create the archaeological record, encompasses many of the objectives of these approaches (Johnson 1999: 57–8; Trigger 2006: 415).

Key Issues/Current Debates/Future Directions/Examples

Middle-range theory implies a neoevolutionary perspective assuming all societies past and present go through the same fundamental evolutionary stages, such that modern-day hunter-gatherers may be taken as equivalent to similar groups in the past and thus constitute a legitimate source from which to draw analogical inferences (Trigger 1986: 10; Johnson 1999: 52). Critics observe that such assumptions are uniformitarian, not only assuming a high degree of uniformity between societies but also between physical conditions past and present (Johnson 1999: 55; Trigger 2006: 416).

Like Binford, Ian Hodder also conducted ethnoarchaeological research during the 1970s and 1980s. Heavily influenced by structuralism, Hodder championed a hermeneutic contextual approach which has been influential in the development of post-processual archaeology and is often set in opposition to Binford's middle-range theory (Hodder and Hutson 2003). Hodder argues that rather than being purely functional and adaptive, material culture is meaningfully constituted, possessed of culturally specific symbolic meanings which lie beyond the reach of the kinds of cross-cultural laws advocated in middle-range theory (Hodder and Hutson 2003: 15). Thus, rather than seeking to establish independent universally applicable laws, Hodder emphasizes the internal relations within specific cultural contexts as the proper focus of archaeological interpretations of the past.

Recent reevaluation has found that post-processualist approaches do in fact assume certain generalizing principles and make use of analogy, leading to the conclusion that rather than exemplifying the contrast between processual and post-processual approaches, forms of middle-range theory are in fact common to both (Kosso 1991; Tschauner 1996).

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Behavioral Archaeology
- ▶ Binford, Lewis R. (Theory)
- ▶ Ethnoarchaeology
- ▶ New Archaeology, Development of
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of
- ▶ Taphonomy: Definition

References

Binford, L.R. 1975. Sampling, judgement, and the archaeological record. In *Sampling in archaeology*, ed. J.W. Mueller, 251–257. Tucson: University of Arizona Press.

Binford, L.R. 1977. *For theory building in archaeology*. New York: Academic.

Binford, L.R. 1978. *Nunamiut ethnoarchaeology*. New York: Academic.

Binford, L.R. 1981. *Bones: Ancient men and modern myths*. New York: Academic.

Binford, L.R. 1983. *In pursuit of the past: Decoding the archaeological record*. Berkeley: University of California Press.

Binford, L.R., and J.A. Sabloff. 1982. Paradigms, systematics, and archaeology. *Journal of Anthropological Research* 38: 137–153.

Fagan, B.M., and C.R. Decorse. 2005. *In the beginning: An introduction to archaeology*. 11th ed. Upper Saddle River: Pearson Prentice Hall.

Greene, K., and T. Moore. 2010. *Archaeology: An introduction*. 5th ed. London and New York: Routledge.

Hodder, I., and S. Hutson. 2003. *Reading the past: Current approaches to interpretation in archaeology*. 3rd ed. Cambridge: Cambridge University Press.

Johnson, M. 1999. *Archaeological theory: An introduction*. Oxford: Blackwell.

Kosso, P. 1991. Method in archaeology: Middle-range theory as hermeneutics. *American Antiquity* 56 (4): 621–627.

Merton, R.K. 1968. *Social theory and social structure*. 3rd ed. New York: Free Press.

Raab, L.M., and A.C. Goodyear. 1984. Middle-range theory in archaeology: A critical review of origins and applications. *American Antiquity* 49 (2): 255–268.

Trigger, B.G. 1986. Prospects for a world archaeology. *World Archaeology* 18 (1): 1–20.

Trigger, B.G. 1995. Expanding middle-range theory. *Antiquity* 69 (294): 449–458.

Trigger, B.G. 2006. *A history of archaeological thought*. 2nd ed. Cambridge: Cambridge University Press.

Tschauner, H. 1996. Middle-range theory, behavioral archaeology, and postempiricist philosophy of science in archaeology. *Journal of Archaeological Method and Theory* 3 (1): 1–30.

Migration in Historical Archaeology

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Introduction

History is defined by the movements of people. From global expansion in early prehistory to the frequent engagement of individuals in international occupation in the present, people migrate (sometimes not by choice) in response to social, political, and economic needs. These processes are a continuous, global phenomenon, with 2–3% of the world's population estimated to be in migration each year (Castles et al. 2014). These movements are occurring at different social and geographic scales, ranging spatially from local to international (Friedman 2007), temporally from temporary to permanent (Sabhlok 2019), and socially from acts of individual agency to forced migrations and slavery (Gill et al. 2011).

The processes that define migrations are often systematic, rooted in social and economic historical precedent. As a result, global developments within historical periods have had significant impact on how more recent migration processes take shape. For example, rapid technological developments in transportation and communication (de Haas 2010), the politicization of "hard" national borders (Diener and Hagen 2012), and a rise in labor-intensive industries (McNeill 1984, Castles 2002) all had influence on the durations, routes, and opportunities available to European migrants during the nineteenth century. At the same time, the processes underlying migration have had an extensive impact on global society, spurring development and social change within areas of industrialization, urbanization, agricultural production, transportation technology, community and family structures, gender roles, and sociopolitical ideologies (Kearney 1986; de Haas 2010).

As the contexts facilitating migration are often local, the processes involved can differ around the world based on these local factors. A historical migration from nineteenth-century Ireland to the United States (Miller 1980), for example, would be based in different underlying motivations, have different prospective opportunities, and take different routes (with different experiences) than a migration from China to the United States during the same period (Cloud and Galenson 1987). However, within similar historical spaces, these processes can be defined to create a general interpretive framework for understanding how migrations act as part of a broader global system. As such, this entry's discussion of migration will be rooted in the historical framework from nineteenth-century Western European migration to North America.

Historical archaeology is in a valuable position to make significant differences in the study of past migrations, as well as in our understanding of the processes and historical precedence underlying global migrations observed today. The strength of archaeology's *longue durée* perspective on human change and development enables us to contextualize the conditions that arise in the present and to recognize the implications of false narratives and misguided projections about the past on how societies engage socially and politically with these issues in the future. Alongside this, historical archaeology's use of documentary evidence together with material culture has enabled researchers to provide greater representation of marginalized migrant individuals and communities by being able to both challenge dominant narratives with material evidence on falsely represented aspects of the past, or to give voice to those wholly removed from the popular aspects of history.

While there are limitations in the ways archaeology can address migration through a material lens, such as the relatively intangible nature of direct movement resulting in a reliance of proxy data, and the complexity in projecting notions of ethnic and heritage identities onto the past, archaeology has a unique toolkit for engaging with aspects of migration in the past in a meaningful and directly socially relevant way.

Definition

Migration is a process of movement by individuals within and/or between geographic spaces for the purpose of resettlement. An individual may migrate intentionally for perceived betterment of social, economic, and/or environmental conditions, or migration could be politically, economically, or physically forced onto an individual or group (Castles 2006). These movements can be temporary or permanent, forced, or intentional and occur on local, regional, and international scales.

Migration processes are shaped by the contexts in which they occur. Simultaneously, these processes impact the social, political, and spatial makeup of those same contexts (see Anthony 1990; Skeldon 2004). For example, in nineteenth-century Ireland, significant emigration stemming from ecological and economic disaster in the form of potato blight (leading to island-wide famine) contributed to rapid depopulation in much of the country (O'Grada and O'Rourke 1997). However, the remittances returned by Irish emigrants often provided the necessary funds to improve homes and invest in communities, as well as passage to be afforded by other prospective migrants (Magee and Thompson 2006). It also introduced a significant network between communities sustained through social relationships now spanning the globe that both maintained and fostered subsequent migrations along these pathways for centuries following.

And so while emigration from Ireland was spurred by the ecological, economic, and political conditions occurring during that time, the processes of migration also contributed to reshaping those same social and ecological contexts.

Despite the local nature of these spaces from which migration occurs, similarities in social and historical contexts behind migrations often result in replications of particular frameworks for the processes involved (see Burmeister 2000; Lee 1966; or a very early attempt by Ravenstein 1885).

While tangible differences due to iterations in local responses to social conditions and pressures most certainly exist within these processes, defining a general framework for understanding the types of processes that may be involved in migration enables researchers to more easily identify where those variations exist and why.

The processes outlined below focus on patterns observed among migrants from nineteenth-century Western Europe. Between 1850 and 1913, more than 40 million people emigrated from Europe to North America and Oceania (Hatton and Williamson 1994). This period, often referred to as the era of "mass migration," was spurred primarily by economic opportunity (through labor mobility) and ecological and political hardship, although this greatly depended on the specific communities involved. Studies show comparable rates of those emigrating from urban and rural areas, suggesting significant shifts from rural to urban spaces within Europe prior to emigration abroad (following the relationship between proportion and distance outlined in number four below; see also Hvidt 1975). These migrations often reflected the framework of processes outlined below. However, it should be noted that this framework is not necessarily sequential, compulsory, nor wholly inclusive of local influences:

1. The migration process generally begins with an initial awareness of the destination (particularly for migrants seeking economic opportunity or relief; an exception would be forced migrations, such as slavery). This may be through communication with earlier migrants, by interacting with transient members of society (e.g., traveling salesman, shipping company representatives, seasonal laborers, etc. [Orser 2010]), or active recruitment by the receiving community (through distributed pamphlets or promotion of jobs within those places [Curti and Birr 1950]).
2. Migration is selective. Within nineteenth-century Western Europe, the majority of emigrants were young adult males, with "only 8 percent of the immigrants entering the United States between 1868 and 1910 [being] over 40 . . . [And] males accounted

for 64 percent of all immigrants to the United States between 1851 and 1910" (Hatton and Williamson 1994: 535). This was primarily due to young men often being the most fungible member of communities and being particularly attracted to labor market conditions. However, as reasons for migration vary depending on local circumstance, there remains variation in who is migrating within a community and why. For example, despite young males making up the majority of migrants from Europe overall, there was a much more proportionate emigration of males and females coming from nineteenth-century Ireland, due to harsh ecological and political conditions occurring within the island during that time. As a result, there was greater demographic variation represented among nineteenth-century Irish emigrants to North America, compared to many other European migrant groups (Kenny 2003). In general, young and elderly are seen as the least likely to emigrate, as are individuals who are infirm or handicapped (although Wiseman and Roseman 1979 provide a counter narrative to this point). Social and economic barriers such as gendered and familial expectations and financial cost also play a significant role in shaping migrant demographics.

3. Similarly, *who* migrates is determined largely by what motivated the migration. For example, natural disaster, war, and revolution will encourage a larger and more diverse proportion of the population to migrate over a short period of time, as with the estimated four to six million individuals displaced with the dissolution of the Ottoman Empire and onset of the First World War (McKeown 2004). These movements will often be less targeted than migrations prompted by personal agency due to the immediacy of external pressures. Economic migration, on the other hand, results in a more select group moving with relatively directed intent, as with the majority young males moving from Europe to North America during the nineteenth century (Hatton and Williamson 1994). Colonization of an area may also see diverse groups of individuals from similar origins, as with nineteenth-century British imperialism in Australia, New Zealand, Canada, and South Africa (Lawrence 2003), encouraged by the dominant government to move to specific, or series of specific, locations. Enslavement and forced relocation of peoples, however, marks a migration perpetrated by forces external to the migrant's immediate self. Thus, who is taken from a community is at the discretion of those in power. Perhaps the best-known example is the African slave trade, with close to 12 million persons being taken for slavery to the New World between 1500 and 1900 (Manning 1990). Different motivators may act concurrently upon the decision-making process, further shaping the way a migrant might engage with the migration process.
4. Volume of migration is proportional to distance. Most migration occurs on a local scale over relatively short distances, with the number of migrants diminishing as the distance increases (Ravenstein 1885; see also Friedman 2007: 558, who points out, "for every European who left Europe [from 1815–1914], nine moved within it"). This has to do with factors including fulfillment of migratory intent, diminishing degrees of local knowledge and/or that knowledge becoming more specific the further one travels from an embedded place, as well as social and economic costs increasing in proportion to distance traveled. The development of transportation technologies throughout the historic period, however, had a significant impact on the volumes, distances, and speed with which migration could take place, particularly throughout Europe. The development of steamships (Feys 2013) and expansion of railway lines (Kerr 1943) during the nineteenth century enabled European migrants to reduce the amount of time it took to immigrate to North America from weeks to days and enabled more reliable access to the American interior. It also allowed more rapid communication between communities, helping to ensure opportunities and maintain networks among these growing diasporas.

5. Migration is often a multistage process. Individuals may move shorter distances before deciding to emigrate internationally, or migrate several times in succession. This is commonly seen among temporary labor migrants, such as in Ireland, where 57,651 harvesters traveled to Britain in the summer of 1841 for agricultural labor (the first recorded year of temporary labor migration between the islands) (Kerr 1943). These laborers often traveled between different regions for work according to seasonal availability.
6. Migrants tended to favor social "centers" (densely populated urban areas) when seeking employment, socialization, and/or relief (see Guinnane 1997: 224). Urban spaces are often perceived to have greater social and economic opportunities compared to rural area. The subsequent concentration of migrants in urban spaces contributes to further development of that area due to larger labor pools, thus further promoting economic and social opportunities found within those spaces. In this sense, a cyclical relationship develops where migrations beget development begets migration (and so on).
7. Migrants often maintain connections with their departed communities. These social networks can manifest in the form of frequent communication (letters, calls, word-of-mouth, etc.), visits (during temporary returns), and remittances sent back (Esteves and Khoudour-Casteras 2011). Further developments in media technology throughout the twentieth century have made the perceived distances between communities and migrants shrink considerably (Dahan and Sheffer 2001). These networks often propagated a higher likelihood of continued migration within those communities, with new migrants tracing the same paths (or close approximates) as those who migrated before due to the process's "known" nature (Delaney 2005). Overtime, these become established "routes" within the community, who often rely on information and remittances sent by previous migrants to aid in their own process of migration. Thus, past migration influences future migration (Hatton and Williamson 1994). This systematic network of movement is often described as "chain migration," whereby community members utilize primary social relationships with previous migrants in order to facilitate their own migration (MacDonald and MacDonald 1964). However, critiques of this framing argue it implies sequential linear relationships between individuals, where in actuality "ties among individuals were most frequently multidimensional" (Samuel Baily quoted in Delaney 2005: 430; see also McCarthy 2003).
8. As a result of these networks (alongside social attitudes and perceived economic class toward many different migrant groups), migrants from similar backgrounds often become concentrated within particular regions or within specific neighborhoods of receiving communities. In 1850, for example, 78% of Irish in the United States lived in the North Atlantic region of America, compared to 40% of all Americans, "and by 1880, 1.2 million of 1.8 million Irish-born lived in those same states, or 67 percent" (Doyle 2006: 225). This concentration resulted in frequent maintenance of social and cultural expressions within these community spaces. In Pittsburgh, PA, for instance, Irish immigrants from the Gaelic-speaking West so dominated the neighborhood known as "Pittsburgh Point" throughout the mid-nineteenth century that, "even in the 1880s, Gaelic remained the spoken tongue of the Point. . .. So much so that men who had worked more than 12 years could hardly make themselves understood in English" (Walsh 1981).
9. Migration is often multi-directional. It is rarely marked by singular or unidirectional movements. Individuals, particularly seasonal or temporary migrants, often move back and forth between communities to determine/follow economic or social opportunity along community networks before coming to reside more permanently in a place (including back in the communities they initially left). This type of multi-directional migration could be intentional (i.e., temporary migration) or

unintentional (where the individual intended to remain but was forced to return for various abject circumstances) and includes an estimated "one quarter of the 16 million Europeans who arrived in the United States during the early decades of the [20th] century" (Gmelch 1983: 135). The rates of return migration are different between countries of origin, depending on local conditions, intent of migrants, and the demographics of those who initially migrated from these countries. For example, in 1908 (the first year the US government began keeping records on those departing) return migration rates to Europe were "nearly 70 percent for immigrants from the Balkans, 63 percent for Greeks, 58 percent for Italians, 34 percent for Austro-Hungarians, 22 percent for Germans, and 12 percent for British" (Friedman 2007: 558). Despite having one of the largest volumes of migrants per country entering the United States during this time, Irish return migration is estimated to "[involve] only 10 percent of the population during the nineteenth century" (McCarthy 2003: 316). A small part of these low returns can be explained through the relatively equal proportion of young adult males and females emigrating from Ireland during this time. Because emigration from other countries was disproportionately male during the nineteenth century, a common reason to coordinate return migration would have been in order to marry an individual from within their own ethnic and/or social community. However, because of the high rates of both male and female migration coming from Ireland, Irish immigrants did not have issue in finding spouses from their same communities, even within America, and thus did not need to return in order to fulfill these social desires. Thus, alongside continued economic hardship, political oppression, and perceived lack of opportunities in Ireland contributed to low rates or return.

As a result of these and other processes, it is evident that migrations can have significant effect on the social, political, and economic structure of those communities involved, as well on the systems and industries through which they move.

Historical Background

The relatively young nature of historical archaeology as a professionalized subfield (see Pykles 2008 for a brief history) means that the bulk of archaeological engagement with migration has occurred primarily within the context of prehistory (Hackenbeck 2008). While historical archaeological approaches to migration are informed by these earlier bodies of research, the field has made significant methodological and theoretical strides in investigating these processes within the context of the historical past.

While migration has been an ongoing interest in modern archaeology from its onset (Van Dommelen 2014), the subject was (and occasionally continues to be) used primarily as a causal factor of explaining material and cultural changes observed within the archaeological record, rather than a topic of study in its own right (Hackenbeck 2008). Early theoretical approaches to migration studies focused on the "push-pull" relationship between "sending" and "receiving" communities, explaining movement as the result of tension between rational actors weighing options between their current conditions and prospects of a future elsewhere (Delaney 2005; Anthony 1990; Passaris 1989; Brown 1960). This reflected studies of modern migration at the time (Piché 2013). The simplicity of "push-pull" modeling, whereby migrants are either "pushed" from a place due to adverse conditions or "pulled" to a place by economic opportunity, to explain these processes more-or-less succumbed overtime to the recognized complexity of the processes in which migrants engage. Changes in theoretical framing and subsequent methodological development within the field in the late twentieth century, influenced by debates between processual, post-processual, and World Systems Theory approaches to archaeological data and questions, influenced how migration processes were addressed by researchers. It spurred a shift away from viewing migration as a wholly chaotic

event and means-to-an-end (for both the researcher and the migrant), toward one of human processes guided by relatively predictable, albeit complex, factors, and behaviors (Anthony 1990; Burmeister 2000). As a result, contemporary views on migration perceive it as embedded in multidimensional (i.e., decisions to migrate are not singular and mono focused), multi-scalar (i.e., impacting households, communities, regions, and nations alike), multi-sited (i.e., involving both sending and receiving communities, as well as those *in-between*), and highly fluid (i.e., each aspect of the process subject to local conditions) spheres of social relation (Anthony 1990).

In historical archaeology in particular, the relationship between migration, urbanism, and industrial development is often seen as inseparable. The rapid industrial developments that characterized later historic periods (particularly in nineteenth-century Western Europe and North America) depended greatly on the cheap labor provided by a continual flow of new migrants. Informational and technological advances, in turn, had significant impacts on the pace and scope of movement accessible to migrants. For example, the invention and expansion of new systems of transportation, such as railways, steamships, and mass-produced automotives, enabled migrants to travel faster, further, and cheaper than previous methods. While the development of steamships, for example, likely did not influence the volume of individuals migrating (migrants would likely have crossed regardless of the form of vessel available), it did have an influence on the route migrants took (greater availability of steamship crossings), the conditions of travel (with development of closed berth aboard ships), and the frequency of those crossings (enabling migrants to travel back and forth with greater ease) (Keeling 2006; Page 1911). Information technology, such as methods of mass printing, made knowledge about target destinations more widely available (Cohn 2000; see also Brown et al. 1977; Golant 1971; Anderson 1983 provides a more theoretically oriented discussion on this point), as seen in the role of nineteenth-century Irish-American newspapers, such as the *Boston Pilot* and the New York *Nation*, in promoting unfiltered awareness and support for Irish independence among immigrants throughout the United States and creating a "wider, global network of communication among Irish people at home and abroad" (McMahon 2009). Coupled with the increased speed of dissemination through inventions such as the telegraph, telephone, and eventual development of the internet, means of relaying information and maintaining connection between communities was much more attainable to migrants than ever before (although, as noted by Anthony 1999: 896, "social organization, trade relationships, and transportation technology [such as capacity consideration among shipping lines] [continue to] constrain some of these processes").

Field Methodology

Historical archaeology uses documentary evidence alongside material remains to investigate aspects of the past: in this case, migration.

Using material data, i.e., physical objects that are often recovered through archaeological excavation, researchers can investigate patterns of processes that may manifest within migrant spaces due to the enactment of "habitual routines" (Lightfoot et al. 1998). Material objects and their patterns of distribution can reflect movement through contextual displacement, whereby certain objects or spatial layouts are viewed as "common" in one area, but "uncommon" in another. As migrants bring with them particular understandings of how to situate themselves in a space, these "routines of habit" often manifest in private spheres, such as domestic structures (Lightfoot et al. 1998), and are identified by differentiation from surrounding spatial practices. Additional ways archaeological data can provide insight into the lives of migrants is by investigating patterns of consumption and disposal within household sites (which can indicate socioeconomic status, food preferences and/or availability, frequency of object use, etc.), identifying or sourcing object origins, further engage with modes of long-distance transport (such as

Migration in Historical Archaeology, Fig. 1 A phenomenological study of ship life during a transatlantic crossing aboard the 1917 Dutch Tall Ship *Oosterschelde.* (Photos by author)

excavation of the slave ships *Henrietta Marie*, *Fredensborg*, and *Adelaïde* [Webster 2008]) (also see Fig. 1), as well as placing migration within the framework of settlement abandonment (as with understanding conditions for departure from the deserted village of Slievemore in Co. Mayo, Ireland [McDonald 1998]).

This use of material data is often complimented by historical documentary evidence. Documentary evidence utilized by historical archaeologists includes any historical data not found in the archaeological record. This often includes written sources, such as personal records, published accounts, correspondence, and historical databases or catalogues, but can also refer to oral histories, personal narratives, photographs, and maps, among others (see Table 1 for additional examples). These documentation types can help provide contexts and associate memories with objects recovered from the archaeological record, which aid in the construction of object itineraries and understanding the role of materiality in creating places with meaning (Joyce and Gillespie 2015), in this case, by migrants.

Documentary evidence can often provide specific personal information of individuals associated with an archaeological site or object, such as names, dates, and addresses. It can provide political context through passed legislation regarding attitudes toward migrants (such as the *1917 Immigration Act* [H.R. 10384; Pub.L. 301; 39 Stat. 874], which severely restricted the number of immigrants entering the United States and barred some individuals and ethnic groups altogether), provide images of objects in use or within primary contexts, and detail purchasing habits of specific families or individuals recorded in receipt ledgers at local shops (Wall 2014). Correspondence between migrants and distant families provides evidence for persisting community links that may not be otherwise materially apparent, as well as supply personal narratives of immigrant experiences.

Migration in Historical Archaeology, Table 1 List of documentary types archaeologists often use in conducting historical research

Source	Information type	Exemplar/citation use
Birth and death records	Place and dates of birth and death; names of relatives	Lewis and Gowland (2007)
Baptismal records	Place of baptism; relatives present; religious affiliations	Cannon and Cook (2015), Arnold (1990)
Marriage records	Place and date of marriage; used in reconstructing kin networks	Bittles and Smith (1994)
Diaries/journals	Personal experiences	Mayne and Lawrence (1999), Adamson (2015)
Letters and personal/professional correspondence	Narratives of experiences; routes traveled; opinions regarding place of settlement	Moreton (2016)
Wills	Relationships and list of relatives and descendants; personal wealth and holdings at end of life; types of objects seen as having value and respective distribution amongst a community	Mayne and Lawrence (1999)
Photographs	Clothing style and quality available to the individuals, and form of presentation; objects present in the images; indications of type of relationships between those portrayed	Januarius and Teghels (2009)
"Traditional" or oral knowledges	Local narratives of community interest/memory; local perspectives on relationships and community events	Fowles (2011), McDavid (2002), Anderson (2004)
Applications for assisted emigration/personal and professional sponsorship	Personal situation of prospective migrants; types of assistance sought and locations requested; what knowledges are available within the local community, and whom they are asking for aid	Mr. Tuke's Fund for Assisted Emigration 1882–1985
Club records	Social relationships; community responsibilities; consistency of participation	Nyhan (2015)
Shop ledgers	Types and rates of goods consumed in particular neighborhoods; names or residents purchasing; debts owed and credits extended	Stobart and Bailey (2018)
City directories	Personal and business addresses; local advertisements	De Cunzo (1987)
Federal and State census records	Place of birth of individual and parents; occupation; health condition; education level; personal addresses	Gray (2011)
Ship manifests	Passenger lists; ports of departure and entry; types of items imported into local markets	Wesley (1942), Davis (1989)
Historic maps	Residential and spatial distribution information of historic communities	Sanborn Fire Insurance Maps
City development records	Personal addresses; residential information; archived narratives	Somers et al. (1973)
Newspapers	Transport schedules; passage advertisements; published letters/correspondence	Harris et al. (1989)
Shop purchasing catalogues	Period reference for material objects/consumption	Sears, Roebuck and Co. Catalogue; Oswald (1960)

As such, documentary materials often provide information otherwise unobtainable in the archaeological record about those individuals who previously occupied an excavated space. This type of documentary evidence helps researchers correlate material findings with social realities, interject notions of personhood and agency into archaeological spaces through evidence of lived

experience, and/or challenge written narratives of social status, experience, and sociopolitical engagement of individuals or groups through evidence found in the material record (SpencerWood 1987).

Because of the ephemeral nature of migration processes and human movement, it is often difficult to detect directly in the archaeological record. Documentary evidence allows archaeologists to investigate the above processes through written narratives and community records detailing the experiences and movements of individuals engaged in the process. These documents are often used to contextualize material evidence recovered from identified spaces inhabited by migrants (e.g., specific households, boarding houses, processing centers, modes of transport, densely occupied neighborhoods, etc.) (see Fig. 2).

The importance of using archaeological methods to verify or challenge narratives provided by documentary sources is also evident in contexts where documentary records are sparse, absent, or skewed toward particular social perspective (Gray 2011). Material evidence for these processes enables researchers to engage with questions and populations "largely muted in the documentary record" (Skowronek, this volume), while gaining insight into intangible aspects of lived experiences through a critical application of whatever documentary evidence may be available.

Key Issues/Current Debates

As with any evolving research endeavor, there exist some methodological and theoretical issues with the way current archaeology approaches a study of migration. Several key issues are outlined here:

1. Perhaps one of the most prominent issues regarding the study of migration from a material lens is how evidence for movement manifests (or does not) in the archaeological record. Many early to mid-nineteenth century, researchers interpreted abrupt changes in

Migration in Historical Archaeology, Fig. 2 Line of boarding houses occupied primarily by Irish and German migrants during the nineteenth century along Green Street in Clinton, Massachusetts, still in use today. (Photo by author)

product consumption, presence, or design as indicative of individuals or groups of a different cultural origin interjected into an existing system/community (e.g., see Childe 1950). Later critiques of this direct correlative interpretation of material change argued for greater complexity and agency in the ways migrants and communities display culture, identity and/or ethnicity materially, and how it may (or may not) manifest in the archaeological record (Burmeister 2016).

The intangible nature of direct movement means that, as a product of the field, all archaeological investigation into the matter is dependent on proxy data to imply movement in some way (such as the aforementioned abnormal interjections of cultural indicators) or engages with some other aspect of a migration process other than the physical act of migrating itself. However, because migration is made up of many components beyond pure physical movement, there are avenues of working around this issue while remaining embedded in an archaeological lens. Many historical archaeologists try and focus on transitional spaces, such as boarding houses and other temporary residences, with which migrants often engage during the migration process (e.g., see Orser 2011; Davies et al. 2013), or by investigating particular neighborhoods comprised of historically concentrated migrant populations (see Yamin, this volume, for an overview of urban archaeology at Five Points neighborhood in New York City, comprised largely of Irish immigrants of the mid-nineteenth century). By investigating spaces of temporary residence, experiences of travel, and areas in which migrants are heavily concentrated (essentially, those definable spaces with which migrants frequently engage), we can work to document brief slices of these material and social realities and stitch them together to manifest pieces of a larger process of migration that is otherwise defined by intangible movements. However, regardless of diligence with which we approach these questions as a field, the majority of these processes are archaeologically inaccessible, being lost in action, over space, and within time.

2. A second key issue is to what degree can archaeologists confidently assert notions of identity and ethnicity onto past populations, particularly when ascribing a material "heritage" to a site of immigrant occupation (see "▶ Social Identity in Historical Archaeology," this volume, for a more in-depth consideration of this point).

The ways that many individuals understand heritage and social affiliation today is likely different from how it would have been perceived in the past. Contemporary perceptions of "selfhood" within the global West are heavily influenced by capitalistic and individualistic political and economic structures developed in Europe from the seventeenth century onward (Moran 2014). As contemporary identities are largely a product of compounded historical social and political construction, the elements comprising modern conceptions of identities, including heritage and ethnicity, were not necessarily an aspect of social and political life in periods of the past. An understanding of identities in the past would have been comprised of different sets of social and politically conscious modes of being in the world (Friedman 1992; see Insoll's *The Archaeology of Identities* (2007) for a thorough exploration of practical and theoretical engagement with identities in archaeology).

Furthermore, researchers are situated within the social, political, and economic contexts of modern society, and so address aspects of the past through that lens. This can lead to narratives about the past projecting an anachronistic understanding of identities and heritage onto the past, or simplifying the way identities were engaged within these historic spaces.

The role of archaeology in addressing complexities of engaging with identities in the past is particularly critical regarding national heritage laws, such as the *Native American Graves Protection and Repatriation Act* (NAGPRA 1990) in the United States. NAGPRA policy requires the demonstration

of "a relationship of shared group identity which can be reasonably traced historically or prehistorically between a present day Indian Tribe or Native Hawaiian organization and an identifiable earlier group" (NAGPRA Section 2(2); 25 USC 3001) when linking "ancient human remains and objects with the appropriate descent group" (Cameron and Ortman 2017: 8). As noted by Cameron and Ortman, this process "not only forces Native Americans to project their current identity into the past, it also brings archaeology full circle, back to the nineteenth-century goal of tracing the past migrations of contemporary groups."

3. A third issue is the way migration is often viewed as "exceptional" to social norms. The tendency for archaeological research interest to be heavily influenced by contemporary social and political debates (Härke 1998) means the perspective of a topic arising out of "abnormality" to what is expected to occur within society also translates into our social and theoretical framings of the topic. However, this framing of exceptionalism toward migration processes "obscur[es] the degree to which movement is a fundamental value for many people" (Fowles 2011, summarized in Cameron and Ortman 2017: 9). For many communities, now and in the past, degrees of migration were a critical part of how society functioned within a broader social and economic space. Nineteenth-century Ireland is often described as having a "culture of emigration" in which departure from the community by young adults was an expected part of family growth, economic strategy, and social dynamic (Miller 1980). Elsewhere, Fowles (2011) describes historic Pueblo relationships to the land as "in motion," with contemporary settlements and land claims being a byproduct of contending with western perceptions of ownership and property rights. A secondary focus of the field on migrations occurring during events of "mass migration" (periods in which significant portions of a population engage in transnational movement within a relatively short time frame (Hatton and Williamson 1994), such as observed throughout Europe during the nineteenth and early twentieth centuries) neglects more regular processes of seasonal and temporary migrations, as well as the role in economic and social development of more localized intranational migrations that make up the bulk of consistent human movement throughout the past (Friedman 2007). Migration processes are often more central to the function of a community and/or broader social system than is often considered when otherwise framed as a non-normative act of social disruption. By reframing how archaeologists think about these processes of movement and social and economic relation, we can more fully incorporate migrations into our understandings of social history and contemporary social being.

Future Directions

The questions directing archaeological inquiry have always been heavily influenced by contemporary social discourses and modern politics (Burmeister 2016; Díaz-Andreu 2001; Härke 1998).

Within archaeological studies of migration, the change in focus of migration as an explanatory factor for archaeologically observed cultural change into a topic of study in its own right during the early 1990s was contextualized by a surge of political interest and national debate concerning immigration law within the United States during that time (specifically surrounding the *Immigration Act of 1990* [Pub.L. 101-649, 104 Stat. 4978], which increased the total number of immigrants allowed to enter the United States per year, and provided family-based immigration schemes and diversity lottery programs for individuals from "low admittance" or underrepresented countries in the United States). As immigration remains at the forefront of contemporary political and social debate within America and throughout Europe, some archaeologists have turned toward using archaeological methods to engage explicitly with these immediate social issues through the materialist lens (most notably De León's (2015) investigation into the materiality of migrant camps along

the US/Mexico border, and Hamilakis' (2016) look at Greek detainment centers for undocumented migrants).

By pushing the field to engage with modern migrations directly, as these researchers have done, we are able to provide both a degree of depth to perspectives on contemporary movement, as well as inform our material understandings of the conditions impacting how these processes unfold, and the actions behind the creation of material and documentary records of migration. But perhaps more importantly, it allows us, as socially conscientious researchers, to engage through publically accessible mediums on a topic of unequivocal relevance to social concerns and shows the direct impact and influence archaeological research can have on contemporary social issues and debate.

On a broader scale, the value of a historical archaeological engagement with migration is that it allows an avenue through which marginalized populations (often those engaged in migration processes) can be engaged, and a means to challenge existing stereotypes by undermining perceived historical validity to those claims. Through the persistence of material evidence, archaeologists can open up distinctions of experience by different migrants that otherwise go lost in the past. "This is an *archaeology of care*," writes Hamilakis (2016), "which valorizes and activates small and seemingly insignificant material things, as well as the more imposing material edifices. It is *archaeology as witnessing*, which objectifies neither the migrants nor the material traces but foregrounds both as subjects and agents in the world" (Hamilakis 2016: 134).

The future direction needed by historical archaeologists in pursuing an archaeology of migration is to more strongly utilize the *longue durée* that archaeology affords within contemporary debates of modern migration (Kintigh et al. 2014). As Wurst and Mrozowski (2014) put it, we should "study history backwards," taking a known (or, at least, more informed) understanding of what arose from the past, such as contemporary social and political responses to migration, and investigate the past through the lens of that awareness. "Given that we know the outcome of choices made in the past," they write, "an archaeology of the future offers the potential to ask whether those choices were well reasoned or whether alternative trajectories would have produced a different future" (Wurst and Mrozowski 2014: 221). Historical archaeology is in a position to address these issues in the field and make a significant impact on contemporary migration debates by participating vocally in an informed manner. Although we exist in history, that does not mean history is only written in stone.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Archaeology and Politics
- ▶ Archival Research and Historical Archaeology
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Nationalism and Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Urban Archaeology in Twenty-First Century Perspective

References

Adamson, G. 2015. Private diaries as information sources in climate research. *WIREs Climate Change* 6: 599–611.

Anderson, B. 1983. *Imagined communities: Reflections on the origin and spread of nationalism*. Brooklyn: Verso.

Anderson, J. 2004. Talking whilst walking: A geographical archaeology of knowledge. *Area* 36 (3): 254–261.

Anthony, D.W. 1990. Migration in archaeology: The baby and the bathwater. *American Anthropologist* 92: 895–914.

Anthony, D.W. 1999. The bath refilled: Migration in archaeology again. *American Anthropologist* 94 (1): 174–176. New Series.

Arnold, J. 1990. An archaeological perspective on the historic settlement pattern on Santa Cruz Island. *Journal of California and Great Basin anthropology* 12 (1): 112–127.

Bittles, A.H., and B.T. Smith. 1994. Demographic and isonymy analysis. *Human Biology* 66 (1): 59–66.

Brown, L.B. 1960. English migrants to New Zealand: The decision to move. *Human Relations* 13 (2): 167–174.

Brown, L.A., E.J. Malecki, and S. Gustavus Philliber. 1977. Awareness space characteristics in a migration context. *Environment and Behavior* 9 (3): 335–348.

Burmeister, S. 2000. Archaeology and migration: Approaches to an archaeological proof of migration. *Current Anthropology* 41 (4): 539–567.

Burmeister, S. 2016. Archaeological research on migration as a multidisciplinary challenge. *Medieval Worlds* 4: 42–64.

Cameron, C.M., and S.G. Ortman. 2017. Movement and migration. In *The Oxford handbook of Southwest archaeology*, ed. B. Mills and S. Fowles, 715–728. Oxford: Oxford University Press.

Cannon, A., and K. Cook. 2015. Infant death and the archaeology of grief. *Cambridge Archaeological Journal* 25 (2): 399–416.

Castles, S. 2002. Migration and community formation under conditions of globalization. *IMR* 36 (4): 1143–1168.

Castles, S. 2006. Global perspectives on forced migration. *Asian and Pacific Migration Journal* 15 (1): 7–28.

Castles, S., H. De Haas, and M. Miller. 2014. *The age of migration: International movements in the modern world*. New York: The Guilford Press.

Childe, V.G. 1950. *Prehistoric migrations in Europe*. Oslo/Cambridge, MA: Aschehoug/Harvard University Press.

Cloud, P., and D.W. Galenson. 1987. Chinese immigration and contract labor in the late nineteenth century. *Explorations in Economic History* 24: 22–42.

Cohn, R. 2000. Nativism and the end of mass migration of the 1840s and 1850s. *The Journal of Economic History* 60 (2): 361–383.

Curti, M., and K. Birr. 1950. The immigrant and the American image in Europe, 1860–1914. *The Mississippi Valley Historical Review* 37 (2): 203–230.

Dahan, M., and G. Sheffer. 2001. Ethnic groups and distance shrinking communication technologies. *Nationalism and Ethnic Politics* 7 (1): 85–107.

Davies, P., P. Crook, and T. Murray. 2013. *An archaeology of institutional confinement: The Hyde Park Barracks, 1848–1886*. Sydney: Sydney University Press.

Davis, N. 1989. Cargo manifests and custom records from American China Trade Vessels Bound for the Port of Philadelphia 1790–1840. *Journal of East Asian Libraries* 86: 17–20.

De Cunzo, L.A. 1987. Adapting to factory and city: Illustrations from the industrialization and urbanization of Paterson, New Jersey. In *Consumer choice in historical archaeology*, ed. S.M. Spencer-Wood, 261–293. New York: Plenum.

De Haas, H. 2010. Migration and development: A theoretical perspective. *IMR* 44 (1): 227–264.

De León, J. 2015. *The land of open graves: Living and dying on the migrant trail*. Oakland: University of California Press.

Delaney, E. 2005. Transnationalism, networks and emigration from Post-War Ireland. *Immigrants & Minorities* 23 (2–3): 425–446.

Díaz-Andreu, M. 2001. Guest editor's introduction nationalism and archaeology. *Nations and Nationalism* 7 (4): 429–440.

Diener, A.C., and J. Hagen. 2012. *Borders: A very short introduction*. New York: Oxford University Press.

Doyle, D.N. 2006. The remaking of Irish-America, 1845–1880. In *Making the Irish American: History and the heritage of the Irish in the United States*, ed. J.J. Lee and M.R. Casey, 314–319. New York: New York University Press.

Esteves, R., and D. Khoudour-Castéras. 2011. Remittances, capital flows and financial development during the mass migration period, 1870–1913. *European Review of Economic History* 15 (3): 443–474.

Feys, T. 2013. *The battle for the migrants: The introduction of steam shipping on the North Atlantic and its impact on the European exodus*. St. John's: International Maritime Economic History Association.

Fowles, S. 2011. Movement and the unsettling of the Pueblos. In *Rethinking anthropological perspectives on migration*, ed. G. Cabana and J. Clark, 45–67. Gainesville: University Press of Florida.

Friedman, N. 1992. The past in the future: History and the politics of identity. *American Anthropologist* 94 (4): 837–859.

Friedman, M. 2007. Beyond 'voting with their feet': Toward a conceptual history of 'America' in European Migrant Sending Communities, 1860 to 1914. *Journal of Social History* 40 (3): 557–575.

Gill, N., J. Caletrío, and V. Mason. 2011. Introduction: Mobilities and forced migration. *Mobilities* 6 (3): 301–316.

Gmelch, G. 1983. Who returns and why: Return migration behavior in two North Atlantic societies. *Human Organization* 42 (1): 46–54.

Golant, S.M. 1971. Adjustment process in a system: A behavioral model of human movement. *Geographical Analysis* 3: 203–220.

Gray, D.R. 2011. Incorrigible vagabonds and suspicious spaces in nineteenth-century New Orleans. *Historical Archaeology* 45 (3): 55–73.

Guinnane, T. 1997. *The Vanishing Irish: Households, migration, and the rural economy in Ireland, 1850–1914*. Princeton: Princeton University Press.

Hackenbeck, S. 2008. Migration in archaeology: Are we nearly there yet? *Archaeological Review from Cambridge* 23 (2): 9–26.

Hamilakis, Y. 2016. Archaeologies of forced and undocumented migration. *Journal of Contemporary Archaeology* 3 (2): 121–139.

Härke, H. 1998. Archaeologists and migrations: A problem of attitude? *Current Anthropology* 39 (1): 19–46.

Harris, R.A.M., B.E. O'keeffe, and D.M. Jacobs. 1989. *The search for missing friends: Irish immigrant*

advertisements in the Boston PILOT. Boston: New England Historic Genealogical Society.

Hatton, T., and J. Williamson. 1994. *What drove the mass migrations from Europe in the late nineteenth century?* Historical paper No. 43. Cambridge, MA: National Bureau of Economic Research.

Hvidt, K. 1975. *Flight to America: The social background of 300,000 Danish emigrants*. New York: Academic.

Insoll, T., ed. 2007. *The archaeology of identities: A reader*. Abingdon: Routledge.

Januarius, J., and N. Teughels. 2009. History meets archaeology: The historical use of images. A survey. *Revue Belge de Philologie et d'Histoire* 87 (3–4): 667–683.

Joyce, R.A., and S.D. Gillespie. 2015. *Things in motion: Object itineraries in anthropological practice*. Santa Fe: School for Advanced Research.

Kearney, M. 1986. From the invisible hand to visible feet: Anthropological studies of migration and development. *Annual Review of Anthropology* 15: 331–361.

Keeling, D. 2006. The business of transatlantic migration between Europe and the USA, 1900–1914. *The Journal of Economic History* 66 (2): 476–480.

Kenny, K. 2003. Diaspora and comparison: The global Irish as a case study. *The Journal of American History* 90 (1): 134–162.

Kerr, B. 1943. Irish seasonal migration to Great Britain, 1800–38. *Irish Historical Studies* 3 (12): 365–380.

Kintigh, K., J.H. Altschul, M.C. Beaudry, R.D. Drennan, A.P. Kinzig, T.A. kohler, W.F. Limp, H.D.G. Maschner, W.K. Michener, T.R. Pauketat, P. Peregrine, J.A. Sabloff, T.J. Wilkinson, H.T. Wright, and M.A. Zeder. 2014. Grand challenges for archaeology. *American Antiquity* 79 (1): 5–24.

Lawrence, S. 2003. Exporting culture: Archaeology and the nineteenth-century British Empire. *Historical Archaeology* 37 (1): 20–33. Recent Work in Historical Archaeology in Australia and New Zealand.

Lee, E.S. 1966. A theory of migration. *Demography* 3 (1): 47–57.

Lewis, M., and R. Gowland. 2007. Brief and precarious lives: Infant mortality in contrasting sites from medieval and post-medieval England (AD 850–1859). *American Journal of Physical Anthropology* 134: 117–129.

Lightfoot, K.G., A. Martinez, and A.M. Schiff. 1998. Daily practice and material culture in pluralistic social settings: An archaeological study of culture change and persistence from Fort Ross, California. *American Antiquity* 63 (2): 199–222.

MacDonald, J.S., and L.D. MacDonald. 1964. Chain migration ethnic neighborhood formation and social networks. *The Milbank Memorial Fund Quarterly* 42 (1): 82–97.

Magee, G.B., and A.S. Thompson. 2006. The global and local: Explaining migrant remittance flows in the English-speaking world, 1880–1914. *The Journal of Economic History* 66 (1): 177–202.

Manning, P. 1990. The slave trade: The formal demography of a global system. *Social Science History* 14 (2): 255–279.

Mayne, A., and S. Lawrence. 1999. Ethnographies of place: A new urban research agenda. *Urban History* 26 (3): 325–348.

McCarthy, A. 2003. Personal letters and the organization of Irish migration to and from New Zealand, 1848–1925. *Irish Historical Studies* 33 (131): 297–319.

McDavid, C. 2002. Archaeologies that hurt; descendants that matter: A pragmatic approach to collaboration in the public interpretation of African-American archaeology. *World Archaeology* 34 (2): 303–314.

McDonald, T. 1998. The Deserted Village, Slievemore, Achill Island, County Mayo, Ireland. *International Journal of Historical Archaeology* 2 (2): 73–112.

McKeown, A. 2004. Global migration, 1846–1940. *Journal of World History* 15 (2): 155–189.

McMahon, C. 2009. Ireland and the Birth of the Irish-American Press, 1842–61. *American Periodicals: A Journal of History & Criticism* 19 (1): 5–20.

McNeill, W.H. 1984. Human migration in historical perspective. *Population and Development Review* 10 (1): 1–18.

Miller, K.A. 1980. Emigrants and exiles: Irish cultures and Irish emigration to North America, 1790–1922. *Irish Historical Studies* 22 (86): 97–125.

Moran, M. 2014. *Identity and capitalism*. London: Sage.

Moreton, E. 2016. Letters from America: Themes and methods in the study of Irish emigrant correspondence. In *The Edinburgh companion to nineteenth-century American letters and letter-writing*, ed. C.M. Bernier, J. Newman, and M. Pethers, 198–215. Edinburgh: Edinburgh University Press.

Nyhan, M. 2015. Oral histories: County societies in Irish New York. *American Journal of Irish Studies* 12: 159–169.

Ó Gráda, C., and K.H. O'Rourke. 1997. Migration as disaster relief: Lessons from the Great Irish Famine. *European Review of Economic History* 1 (1): 3–25.

Orser, C.E. 2010. Three 19th-century house sites in rural Ireland. *Post-Medieval Archaeology* 44 (1): 81–104.

Orser, C.E. 2011. Beneath the surface of tenement life: The Dialects of race and poverty during America's first gilded age. *Historical Archaeology* 45 (3): 151–165.

Oswald, A. 1960. The archaeology and economic history of English clay tobacco pipes. *Journal of the British Archaeological Association* 23 (1): 40–102.

Page, T.W. 1911. The transportation of immigrants and reception arrangements in the nineteenth century. *Journal of Political Economy* 19 (9): 732–749.

Passaris, C. 1989. Immigration and the evolution of economic theory. *International Migration* 27 (4): 525–542.

Piché, V. 2013. Contemporary migration theories as reflected in their founding texts. *Population-E* 68 (1): 141–164.

Pykles, B.C. 2008. A brief history of historical archaeology in the United States. *The SAA Archaeological Record* 8 (3): 32–34.

Ravenstein, E.G. 1885. The laws of migration. *Journal of the Royal Statistical Society* 48: 167–227.
Sabhlok, A. 2019. Seasonal migration and the working-class laboring body in India. In *Handbook on critical geographies of migration*, ed. K. Mitchelle, R. Jones, and J.L. Fluri. Cheltenham: Edward Elgar Publishing.
Skeldon, R. 2004. More than remittances: Other aspects of the relationship between migration and development. Paper presented at the *Third Coordination Meeting on International Migration*, New York.
Somers, D.A., T.J. Crimmins, and M.E. Reed. 1973. Surveying the records of a city: The history of Atlanta project. *The American Archivist* 36 (3): 353–359.
Spencerwoods, S.M., ed. 1987. *Consumer choice in historical archaeology.* New York: Plenum Press.
Stobart, J.S., and L. Bailey. 2018. Retail revolution and the village shop, c. 1660–1860. *The Economic History Review* 71 (2): 393–417.
The Native American Graves Protection and Repatriation Act (NAGPRA). 1990. Pub. L. 101–601, 25 U.S.C. 3001 et seq., 104 Stat.
Van Dommelen, P. 2014. Moving on: Archaeological perspectives on mobility and migration. *World Archaeology* 46 (4): 477–483.
Wall, B. 2014. Historical shifts in Native American subsistence strategies: An examination of store ledgers from Owens Valley. *Journal of California and Great Basin anthropology* 34 (2): 145–159.
Walsh, V.A. 1981. "A fanatic heart": The cause of Irish-American nationalism in Pittsburgh during the gilded age. *Journal of Social History* 15 (2): 187–204.
Webster, J. 2008. Slave ships and maritime archaeology: An overview. *International Journal of Historical Archaeology* 12: 6–19.
Wesley, C.H. 1942. Manifests of slave shipments along the waterways, 1808–1864. *The Journal of Negro History* 27 (2): 155–174.
Wiseman, R.F., and C.C. Roseman. 1979. A typology of elderly migration based on the decision making process. *Economic Geography* 55 (4): 324–337.
Wurst, L., and S.A. Mrozowski. 2014. Toward an archaeology of the future. *International Journal of Historical Archaeology* 18: 210–223.

Further Reading

Burmeister, S. 2000. Archaeology and migration: Approaches to an archaeological proof of migration. *Current Anthropology* 41 (4): 539–567.
Cabana, G., and J. Clark, eds. 2011. *Rethinking anthropological perspectives on migration*. Gainesville: University Press of Florida.
Castles, S., H. De Haas, and M. Miller. 2014. *The age of migration: International movements in the modern world*. New York: The Guilford Press.
McKeown, A. 2004. Global migration, 1846–1940. *Journal of World History* 15 (2): 155–189.
Papastergiadis, N. 2000. *The turbulence of migration. Globalization, deterritorialization and hybridity.* Cambridge, UK: Polity Press.

Military Activity in Islamic Archaeology

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Introduction

The archaeology of warfare is construed here in its widest sense. This approach is necessitated in part by the relative paucity of published archaeological work on the actual sites of battles in the Islamic world and palaeopathological studies of those killed in war. It is also very rare for armor, weapons, banners, and other related military equipment to be recovered from excavated contexts, although such items are sometimes encountered in Muslim religious buildings, palaces, and European cathedral treasuries (and many fine examples are today housed in museum collections). As a result the majority of the entry will deal with architecture and civil engineering, dimensions of warfare that might best be described as defensive rather than offensive in character. The archaeological evidence concentrates upon the regions of the Iberian Peninsula, North and East Africa, the Middle East, and Central Asia.

Definition

Problems are encountered in establishing the extent to which given monuments or artifacts were employed in warfare or other types of armed conflict. For instance, armor, banners, and weapons might perform ceremonial roles as gifts or symbols of official status and never see active use in battle. Shi'a communities commemorating of the martyrdom of Husayn, son of 'Ali ibn Abi Talib (d. 661) and grandson of the Prophet Muhammad (d. 632), at the battle of Karbala' in 681 often make use of steel banners (*'alam*) during parades and armor and weapons in the performance of traditional "passion plays" (*ta'ziya*)

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(Allan and Gilmour 2000: 125–210, 253–81). Turning to the built environment, it is also difficult to set out hard-and-fast rules for identifying what was constructed solely or principally for military purposes. Castles (Arabic: *hisn* or *qal'a*) obviously have important functions in times of warfare, but they might also be designed with other, less militaristic needs in mind: treasury, storehouse, prison, palace, administrative headquarters, and so on. Forts garrisoned with troops were built along the major routes taken by pilgrims performing the *hajj* to the holy cities of Mecca and Medina (Petersen in Kennedy 2006: 307–17). Other types of building (notably caravanserais) were partially fortified to defend travellers and merchants from brigandage, while elite residences were sometimes given features such as curtain walls, crenellations, and towers for more symbolic or ornamental purposes. Villages and small towns across the Islamic world were also often surrounded by walls for the protection of the inhabitants.

Historical Background

Islamic approaches to warfare and to the construction of military architecture were initially reliant upon the practices of Late Antiquity. The inhabitants of the Arabian Peninsula in the early seventh century would have been familiar with a form of square or rectangular fortified compound with a single entrance and four corner towers – good examples have been excavated at Qaryat al-Faw, Mlayha, and al-Dur – that has its origins in the Roman fort (*castrum* or *quadriburgium*). Adaptations of the Roman *castrum* also appear in eastern Syria and western Iraq in this period; in common with the Umayyad "desert castles" (also *qasr*, pl. *qusur*) of the eighth century, these Late Antique structures were employed principally for residential purposes, and the fortifications were only partially functional (Genequand in Kennedy 2006: 3–25; Milwright 2010: 34–41). Properly defensive architecture was a feature of the Late Antique Middle East and North Africa, however, and it was relatively common in this period for towns and cities to be surrounded by a curtain wall with side and corner towers and strongly constructed gates. In the territories of the Roman-Byzantine Empire, these walls were usually constructed in stone, while mud-brick and rammed earth (*pisé*) are more commonly encountered on Sasanian sites (such as Veh Ardashir, Ctesiphon, and the Erk Kala at Merv). Other types of fortifications existed, for instance, the system of walls and forts (known as "Alexander's Wall") constructed by the Sasanians to defend passes around the Caspian Sea.

During the lifetime of the Prophet Muhammad, the nascent Muslim community fought first against the inhabitants of Mecca who adhered to pagan beliefs and latterly in order to unify the tribes of Arabia under Islam. The scale of early conflicts such as the battle of Badr (624) is difficult to estimate; while they may have been little more than tribal skirmishes when compared to later events, they are important in establishing within Islamic culture the concept of holy war (*jihad*) and the virtuous status of the martyr (*shahid*) killed in warfare. The Prophet attempted to expand his influence north into Syria (culminating in defeat in 629 at the battle of Mu'ta in Jordan), but it was under his successors, the four "rightly guided" (*rashidun*) caliphs between 632 and 661 and the Umayyad dynasty (661–750), that the greatest territorial expansion was to occur. These extraordinary successes were achieved largely through battles fought successfully against the armies of the empires of Byzantium, Sasanian Iran, and the Tang dynasty of China. Smaller polities such as the Nubian Kingdom and the Visigothic rulers of the Iberian Peninsula were also defeated in this phase (Kennedy 2001: 1–58).

The most obvious physical manifestation of the Arab conquests was the establishment of garrison towns (*misr*, pl. *amsar*) that include Basra (c. 635) and Kufa (638) in Iraq, Ayla (c. 650) in Jordan, Fustat in Egypt (641–42), and Qayrawan (670) in Tunisia. No conclusive physical evidence for the layout and fortifications of these seventh-century settlements has yet come to light; only Ayla preserves its rectangular plan, round corner towers, and defensive gates, these probably dating from the early eighth century (Whitcomb in

Kennedy 2006: 61–74; Walmsley 2007: 94–5). The excavated governor's palace (*dar al-imara*) at Kufa may retain some of its seventh-century plan, including substantial walls and rectangular corner towers (replaced by round towers in a later construction phase) (Creswell 1989: 10–15). In the eighth century there is also evidence for the redevelopment of existing hilltop citadels as centers of regional government; those of Samarqand in Uzbekistan and 'Amman in Jordan have both been extensively excavated (Milwright 2010: 79–80). The militaristic aspect of Umayyad public and private art is exemplified by the so-called "standing caliph" coins (in gold, silver, and copper) that on the obverse carry the image of Caliph 'Abd al-Malik (r. 685–705) holding a sword and with a whip attached to his belt. This may be compared with stucco statues of sword-bearing caliphs from the palatial residences of Qasr al-Hayr al-Gharbi (720 s) and Khirbat al-Mafjar (740 s), both of which draw upon Sasanian royal prototypes (cf. the carved reliefs in the late Sasanian monument of Taq-i Bustan in Iran). Khirbat al-Mafjar, the bathhouse known as Qusayr 'Amra (after 711), and the Abbasid residence at Humayma also preserve diverse painted and sculpted images of soldiers and mounted archers (for illustrations of some examples, see Nicolle 1995–6: II, 24–48).

The Abbasid caliphate (749–1258) brought with it far-reaching changes to all aspects of Islamic culture. The capital of the empire was shifted from Damascus to the new city of Baghdad (constructed between 762 and 766). This circular city was extensively fortified using construction techniques employed in earlier Sasanian and Parthian cities. While nothing of eighth-century Baghdad survives, the probable form of its fortifications can be glimpsed in another Abbasid city, Rafiqa (now part of modern-day Raqqa), in northern Syria, erected between 771 and about 775 (Creswell 1989: 243–8; Daiber and Becker 2004: 3–18). Palaces too could be strongly fortified, as is demonstrated by the late eighth-century complex of Ukhaydir located in the Iraqi desert west of Kufa. This imposing structure is surrounded by a rubble and mortar curtain wall 17 m in height and well equipped with defensive towers and arrow loops (Creswell 1989: 249–58).

During the rule of the early Abbasid caliphs, there was an increasing professionalization of the army, most importantly involving the purchase of Turkish military slaves (referred to as *mamluk*s). Highly skilled as mounted archers, these Turkish troops were a potent military force. They were, however, expensive to maintain and apparently often the cause of civil unrest in urban areas. The remarkable city of Samarra (occupied by the caliphs between 836 and 892), located north of Baghdad on the Tigris river, was in part a solution to the latter problem. Stretching 35 km along the east bank of the river, a dominant feature of this urban development are the so-called cantonments, repeated compounds with central courtyards that are arranged in orderly grids within and around the major palaces. Attempts have been made to estimate the changing size of the caliphal army in the Samarran period based on the construction of these cantonments across the city (Kennedy 2001: 205–208; Kennet 2001).

The rigid grid plans of the Samarran cantonments can also be seen in the Syrian city of Rafiqa, itself designed to billet troops from Khurasan. The routes north of Rafiqa led into the contested border lands (pl. *thughur*) with the Byzantine Empire. Archaeological work in this region has revealed military towns of the eighth and ninth century such as Kharrab Sayyar and Madinat al-Far (Hisn Maslama) in Syria, and early Abbasid fortresses in southern Anatolia, including those of Haruniye and Karafrenk (Edwards 1987: 143–7, 155–6; Kennedy 2001: 190–2; Meyer and Haase in Kennedy 2006: 45–60). To the west of Rafiqa, there is an unfinished site known as Hiraqla that is believed to be a monument to commemorate Caliph Harun al-Rashid's (r. 786–809) conquest of the Byzantine city of Herakleia (Daiber and Becker 2004: 137–42).

This period also saw the emergence of a new architectural form with specifically military overtones, the *ribat*. These compounds were designed to be occupied by *murabitun*, men who for a period of years dedicated their life to the defense of the borders of Muslim polities. Hundreds of

*ribat*s were apparently constructed across the Islamic world though only a few survive. Most famous are the ninth-century *ribat*s of Sousse and Monastir in Tunisia constructed by the Aghlabid dynasty (800–909). Both adopt a square plan with corner towers that is rather reminiscent of the Roman *castrum* (Creswell 1989: 286–88; Djelloul 1999: 42–51). Excavations in Spain revealed another *ribat* at Guardamar del Segura south of Alicante composed of three rows of cells surrounded by defensive wall. This evidence may indicate that there never was a standardized plan for this military-religious institution and allows for the possibility that *ribat*s with different architectural plans will be identified archaeologically in other regions of the Islamic world (Harrison 2004: 220–6).

At the end of the ninth century, there was an increasing fragmentation of the Islamic world. The new polities of the period from the ninth to the eleventh century all invested energy in the formation of armies and the construction of defensive architecture. Palatial complexes also adopted strong fortified perimeter walls, and often the elite of the army was located in close proximity to the residence of the ruler. This is seen in the case of Madinat al-Zahra' in southern Spain, constructed during the reign of the Umayyad caliph 'Abd al-Rahman III (r. 912–61). Other partially fortified palaces have been excavated at Lashkari Bazar in Afghanistan and Kilwa in East Africa. Cities too were ringed by defensive walls; the eleventh- to thirteenth-century perimeter wall of Diyarbakr in southern Turkey runs a distance of 5 km and is constructed of ashlar masonry. Equally impressive are the walls of al-Qahira (Cairo). Established by the Fatimid caliphate (909–1171) following their conquest of Egypt in 969, this new city was initially surrounded by mud-brick walls punctuated by gateways, the most important of which were Bab al-Nasr, Bab al-Futuh, and Bab Zuwayla. Between 1087 and 1092 this circuit was replaced by stone walls and imposing fortified entrances. The new Bab al-Nasr is a particularly impressive defensive structure and also important for the carved representations of kite-shaped and round shields on its two flanking towers.

Fortified citadels became a prominent feature of the urban environment of the Middle East and Central Asia from the eleventh century onward. This development can be correlated with the increasing importance of Turkish mounted soldiers in the political life of these regions. Chief among these are the Saljuqs, a group originating in the steppe lands north of the Caspian and Aral seas who migrated south in the tenth century in order to work as mercenaries for dynasties such as the Ghaznavids (r. 977–1186). The Saljuqs ruled a major land empire in the Islamic East between 1040 and 1157 (the period of the "Great Saljuqs") and were vigorous patrons of religious and military architecture. An example of the latter is the citadel known as the Shahryar Ark constructed by Sultan Sanjar (r. 1118–57) in the northeastern part of the walled city of Sultan Kala at Merv. This great city was largely destroyed and abandoned as the result of the Mongol invasions of 1221–2 (a fate which also befell Balkh, Nishapur, and other eastern Islamic walled cities).

Citadels further west in Syria, Anatolia, and Egypt were commonly constructed in masonry and have proved more durable; the Kurdish Ayyubid dynasty (1171–1250 in Egypt and 1260 in Syria) was responsible for major citadels in Cairo and Aleppo and for the renovation of the one in Damascus. A common characteristic of these fortified centers of government is that they constituted an independent urban entity within the city; aside from the space given over to military functions, ministries, and palaces, these citadels contained many of the features – congregational mosque, bathhouses, domestic architecture, and industrial installations – also found in the city itself. Somewhat smaller fortified sites made opportunistic use of existing architecture, such as the citadel at Bosra which is built around a classical theatre.

Another major factor facilitating the evolution of defensive architecture and military technology was the changing balance of power between the Islamic world and Christian Europe, most notably the *Reconquista* in Spain (until 1492) and the establishment of the Frankish states in the Middle East following the First Crusade (1096–99). The castles and other military architecture associated

with the periods of conflict have been extensively studied (see below). The shifting of borders between Christian and Muslim polities resulted in complex phases of construction, destruction, and rebuilding. Evolving techniques of siegecraft also affected castle design, with Muslim and Christian designers learning from one another – a good example of this phenomenon is the box machicolation, which occurs at about the same time in Muslim and Frankish castles in the Middle East.

The capture of Acre by the forces of the Mamluk sultanate (1250–1517) in 1291 marked the end of the Crusader presence in the Middle East (though not the end of the Crusading movement). The Mamluks were a military slave elite who had replaced the Ayyubid sultanate. Like their predecessors they invested heavily in military architecture. Many castles were extensively rebuilt in the second half of the thirteenth century including Krak des Chevaliers (Qal'at al-Husn) in Syria and Karak and Shawbak in Jordan (Faucherre 2004). The Mamluks also recognized the importance of an effective communication infrastructure, and evidence of their postal system (*barid*) remains in the way stations and dovecots constructed along the main routes through the empire. The strongly militaristic aspect of Mamluk society is also evident in their material culture, and the personal emblems (often known as blazons) of Mamluk princes (*amir*s) are a feature of ceramics made in their capital (so-called barracks ware) and of textiles, metalwork, and glass excavated in Cairo and other urban sites of the sultanate. A cache of armor, weapons, and fragments of soldiers' clothing (sometimes with blazons embroidered upon them) from the Mamluk period was found during the archaeological investigation of the citadel in Damascus (Nicolle 2011).

Incendiary technologies such as "Greek fire" (*naft*) had already been employed in earlier centuries, but this aspect of Islamic warfare was transformed by the introduction of gunpowder. In the late fifteenth and early sixteenth centuries, the Mamluk sultanate made considerable, if not always effective, use of primitive handheld firearms (arquebuses) in war. The Ottoman sultanate (late thirteenth century–1924) also embraced cannon and handheld firearms in warfare, as did other so-called Gunpowder empires, the Safavids (1501–1722) of Iran and the Mughals (1526–1828) in India. Not only did these new weapons change the character of military engagements in the field, but they also necessitated adaptations to the design of defensive architecture (see below).

In archaeological terms some of the most interesting evidence from the fifteenth to the nineteenth centuries comes from the military encounters between Islamic and Christian polities. In preparation for the two Ottoman sieges of Constantinople (1396–1402/3 and 1453), the Ottoman sultans Bayezid I (r. 1389–1402) and Mehmed II (r. 1444–6, 1451–81) constructed the fortresses of Anadolu Hisarı and Rumeli Hisarı on the Asian and European sides of the Bosphorous. The Ottomans also extensively renovated existing fortifications as part of their ongoing struggle with the Venetian Republic for control of the Aegean and eastern Mediterranean. Impressive remains of fortresses and city walls may be found in Greek ports such as Nafplio, Nafpaktos (Lepanto), and Pylos. Elsewhere there is evidence for European military presence in Islamic regions, often involving the construction or extensive renovation of fortresses and walled settlements. Three associated with Portuguese colonial expansion are Qasr al-Saghir in Morocco, Qal'at Bahrain in the Persian Gulf, and Kilwa island off the East African coast (Redman 1986; Milwright 2010: 183–86).

The economic and military superiority of Europe is readily apparent in the history and archaeology of the Islamic world from the late eighteenth century. The Middle East and North Africa were drawn into larger conflicts (such as the Napoleonic War and World War I). Islamic regions also became the subject of the colonial ambitions of European states (most importantly France, Britain, and Russia). Recent archaeological work has recovered traces of some modern military campaigns. Notable examples are the excavation of Napoleonic trenches at 'Akko (Acre) in Israel and the survey conducted of sites in southern Jordan (Ma'an and Wadi Rutm) associated with the period of the Arab Revolt (1916–1918) (Saunders and Faulkner 2010). The

latter project is particularly significant for its focus upon the changes to the landscape caused by battles and by the creation of army camps in sparsely occupied regions. Excavation of an Islamic graveyard at the ancient site of Tell Hesi also revealed the presence of trenches dug during the war which led to the creation of Israel in 1948. These trenches were constructed prior to the battles of Hirbet Mahaz in 1948 and continued to be employed until 1959 for training purposes by the Israeli army (Toombs 1985: 6–14).

Key Issues/Current Debates

Much of the recent archaeological work on Islamic warfare has focused upon castles, city walls, and other defensive structures. While castles were obviously designed to withstand attack and could also be employed for billeting troops and as arsenals, they also performed many other nonmilitary functions. Furthermore, the main motivation for the construction of castles was not always the desire to defend borders in times of conflict; Ellenblum has demonstrated that the bulk of the Frankish castles of the Kingdom of Jerusalem was erected in phases of relative peace, and many of these structures were located at a considerable distance from the borders with the neighboring Muslim polities (Ellenblum 2007: 103–86). This leads one to question both the notion that lines of castles constituted a form of border defense and whether one should apply modern conceptions of national boundaries to the porous transitional zones that existed between medieval polities. These considerations are helpful in assessing the roles performed by castles in the Islamic world. It is apparent that fortified structures often functioned as centers of local government and as the principal markets for the surrounding rural communities. For instance, in the Mamluk period the castle and town of Karak was the capital of a district (*mamlaka*) with smaller fortified structures at Hisban, Shawbak, and elsewhere functioning as secondary centers of local government with their own staff of administrators and soldiers (Milwright 2008: 78–93). These networks facilitated the exploitation of resources from the surrounding area, protected the main roads, and provided a point of mediation between nomadic groups and the state. Broadly comparable patterns of castle building can be seen in southern Spain and in other parts of the Islamic world (Zozaya 1996).

During periods of prolonged warfare, areas of land, and the castles contained within them, would often change ownership several times (affecting such things as the size and composition of the administrative and military elite occupying castles). The excavation of important urban citadels such as Damascus and Aleppo has allowed researchers to reconstruct the fluctuations in the material culture of these sites through several dynasties and over periods of centuries (Berthier and Gonnella in Kennedy 2006: 155–75). Particularly important are cases where there are changes in the confessional affiliation of the occupants, such as during the Crusades in the Middle East, the *Reconquista* on the Iberian Peninsula, and the Ottoman conquest of Greece and the Balkans. Following the Portuguese conquest of Qasr al-Saghir, almost every aspect of the Islamic town was remodelled from the civic buildings to the domestic architecture and shops. Where the Muslim inhabitants had relied upon manufactured goods from the surrounding regions of North Africa and southern Spain, the Portuguese soldiers and merchant families of the fifteenth and early sixteenth centuries imported ceramics and other media from a wider area including northern Europe and China (Redman 1986).

Less pronounced shifts in the material culture were registered in the Islamic and Portuguese occupation levels at Qal‘at Bahrain in the Persian Gulf. More significant in this context was the transformation of the fort itself; the final construction phase, dating to the late sixteenth century, has massive walls and substantial galleries designed to accommodate cannon. The adaptation of fortifications to allow for the use of artillery (and to defend against it) has been studied on other sites including the Abdullah Khan Kala in Merv and the forts built by the Ottomans to guard the route of the *hajj* through southern Syria, Jordan, and northern Arabia (Brun 2005: 619–24; Petersen 2001). Similar issues are raised by a consideration of the

reflexive relationship between siege technology and military architecture in earlier periods of Islamic history. Recent studies of Frankish and Muslim castles of the Crusader period in the Middle East have revealed the evolution of both outer defenses and inner storage and domestic areas as the result of innovations in siege techniques (Michaudel in Kennedy 2006: 106–21; Ellenblum 2007: 189–286). Sometimes the renovation of damaged sections of a castle allowed for the creation of improved towers or curtain walls. The analysis of numerous construction phases of castles can be challenging, but considerable advances have been made in this field of study using techniques such as rectified digital photography (Tonghini and Montevecchi in Kennedy 2006: 201–24).

The evolution of Islamic weapons prior to the fifteenth century is hampered by the paucity of surviving examples (Nicolle 2011). In part, this must be connected with the Muslim prohibitions upon placing grave goods within burials (this being a significant source of excavated armor and weaponry in many early medieval cultures). Presumably, most military equipment in the Islamic world was recycled when it could no longer be repaired. Our major sources on Islamic weaponry and the techniques involved in making them are textual and visual. Particularly important in this respect is the treatise *On Swords and their Kinds* (*al-suyuf wa ajnasuha*) by the philosopher, al-Kindi (d. 870) (Allan and Gilmour 2000: 56–7). Illustrations of weaponry occur on numerous portable artifacts and manuscript paintings.

Archaeology has contributed to the study of Islamic weapons, however. Two swords were recovered from the excavations in Nishapur, both probably dating to the ninth century. The more complete example has a slightly curved steel single-edged blade (i.e., for slashing rather than stabbing) with bronze fittings and the remains of a decorative wooden scabbard. The closest correlates for the Nishapur sword exist to the north and west in the Altai mountains, the Caucasus, and Russia. During the eighth and ninth centuries, the form of sword encountered in Nishapur spread west into Europe, perhaps as the result of the Avar migrations (Allan 1982: 56–8, 108–109 nos. 208–209). The type of crucible steel employed in the manufacture of the Nishapur sword matches closely the steel ingots found in excavations of a ninth- or tenth-century workshop at Merv, about 250 km to the northeast. Merv had no local deposits of iron ore, and this material was imported. This major industry was probably focused upon the production of weapons and armor for the garrisons of the city (Allan and Gilmour 2000: 50–5). Other fragments of early swords have been excavated at sites such as al-Rabadha, an important town on the road from Medina to Kufa, and the eleventh-century shipwreck at Serçe Limanı on the southwestern coast of Anatolia (Nicolle 1995–96: II, 73–76).

International Perspectives

Warfare is an aspect of human activity that is highly sensitive to technological change, and for this reason the investigation of individual regions, sites, or artifacts always needs to maintain an international perspective. Archaeology provides a means to study manufacturing practices and the distribution of materials and weapons in different phases of Islamic history. Warfare is often also associated with economic concerns (the defense of trade routes, the opening of new markets, or the desire to obtain raw materials), and this means that the material culture excavated within fortified sites can reveal the changing extent and geographical scope of mercantile activity in different occupation phases. Traders and goods often passed across the borders of warring polities; for instance, excavations in Acre (‘Akko) have revealed the intensity of the trade in Islamic luxury goods to Europe during the thirteenth century (a fact borne out in contemporary written sources). A common concern in the design of fortified sites is the storage of food and water. The provision and storage of water through such features as aqueducts and cisterns has been studied by archaeologists working on sites as diverse as Ismaili castles in Iran, Ottoman towns in Greece, and Muslim fortresses in Spain; this body of evidence invites further comparative study within and beyond the Islamic world (Milwright 2010: 90–4).

Future Directions

With the partial exception of the study of Islamic castles and other aspects of military architecture, the archaeology of Islamic warfare is a relatively undeveloped field of study. The following comments are intended to identify areas of potential study that can build upon existing published scholarship. The rapid expansion of the Islamic state in the seventh and early eighth centuries is one of the most important events in the history of Eurasia, but archaeology has made little impact upon the debate about how and why the Arab armies of conquest were so successful. To what extent was it the weakness of the polities of the early seventh century and what weight should we give to the superiority of Arab military strategy or weaponry? Did the destructive plagues of the sixth and early seventh centuries critically weaken the societies of the Mediterranean and Middle East and thus facilitate the Islamic conquests? Further synthesis of existing archaeological data will refine our picture of the economic and political life of the Middle East and North Africa prior to the Arab conquests, while excavation of battle sites or early *amsar* like Basra or Kufa could help us form a better understanding of the characteristics of the armies of the first Islamic decades. Other periods of rapid territorial expansion such as the establishment of the "Great Seljuq" sultanate, the Mongol conquests of the thirteenth century, and the campaigns of Timur between c. 1370 and 1405 would also benefit from archaeological perspectives.

In general archaeology has provided relatively little information on the human aspects of Islamic warfare, encompassing both the lives of soldiers and of civilians affected by periods of conflict. Battlefield archaeology might well provide insights into this issue. The examination of Crusader-period skeletal remains has provided intriguing data upon weapon injuries (Mitchell et al. 2006). The imposition of large numbers of foreign troops upon a given area must have left an impact upon the environment, as well as affecting the sociocultural and economic lives of the native inhabitants. The *amsar* of the seventh and eighth centuries, the Abbasid cities of Rafiqa and Samarra, and the urban citadels of the eleventh to fifteenth centuries all provide opportunities to explore these issues. The settlement of soldiers and Turkish officials within the countryside of conquered areas has been addressed in survey work in the Pylos region of the Peloponnese (and similar issues have been productively explored in relation to Frankish settlement of the Crusader Kingdom of Jerusalem), but much more work is required (Zarinebaf et al. 2005). This also opens the possibility of comparative analyses with archaeological research in non-Islamic lands, an important recent example being the study of the impact of changes to settlement practices and animal-breeding practices during the Baltic Crusades (Brown and Pluskowski 2011). Lastly, there is an urgent need to improve our understanding of naval warfare during the Islamic period. No major study exists of an Islamic military craft or of a major engagement involving an Islamic navy.

Cross-References

- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Battlefield Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Historical Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Islamic and Crusader Archaeologies
- ▶ Islamic and Maritime Archaeologies
- ▶ Medieval Archaeology
- ▶ North Africa: Historical Archaeology
- ▶ Sasanian Empire, Archaeology of the
- ▶ Spain and North Africa: Islamic Archaeology
- ▶ Swahili Archaeology
- ▶ Underwater Archaeology

References

Allan, J. 1982. *Nishapur: Metalwork of the early Islamic period*. New York: Metropolitan Museum of Art.

Allan, J., and B. Gilmour. 2000. *Persian steel: The Tanavoli collection*, Oxford studies in Islamic art. Vol. 15. Oxford/New York: Oxford University Press.

Brown, A., and A. Pluskowski. 2011. Detecting the environmental impact of the Baltic Crusades on a late-

Medieval (13th–15th century) frontier landscape: Palynological analysis from Malbork castle and hinterland, northern Poland. *Journal of Archaeological Science* 38 (8): 1957–1966.

Brun, P. 2005. From arrows to bullets: The fortifications of Abdullah Khan Kala (Merv, Turkmenistan). *Antiquity* 79: 616–624.

Creswell, K. 1989. *A short account of early Muslim architecture*. Aldershot: Scholar Press.

Daiber, V., and A. Becker. 2004. *Raqqa III: Baudenkmäler und Paläste I*. Philipp Von Zabern: Mainz am Rhein.

Djelloul, N. 1999. *Les fortifications en Tunisie*. Tunis: Ministère de la Culture.

Edwards, R. 1987. *The fortifications of Cilician Armenia*, Dumbarton Oaks studies. Vol. 23. Washington, DC: Dumbarton Oaks Research Library and Collection.

Ellenblum, R. 2007. *Crusader castles, modern histories*. Cambridge/New York: Cambridge University Press.

Faucherre, N. 2004. La Forteresse de Shawbak (Crac de Montréal), une des premières forteresses franques sous son corset mamelouk. In *La Fortification au temps des Croisades*, ed. N. Faucherre, J. Mesqui, and N. Prouteau, 43–66. Rennes: Presses Universitaires de Rennes.

Harrison, P. 2004. *Castles of God: Fortified religious buildings of the world*. Woodbridge: The Boydell Press.

Kennedy, H. 2001. *The armies of the caliphs: Military and society in the early Islamic state*, Warfare and history. London/New York: Routledge.

Kennedy, H., ed. 2006. *Muslim military architecture in Greater Syria. From the coming of Islam to the Ottoman period*, History of warfare. Vol. 35. Leiden/Boston: Brill.

Kennet, D. 2001. The form of the military cantonments at Samarra. The organisation of the Abbasid army. In *A medieval city reconsidered: An interdisciplinary approach to Samarra*, Oxford studies in Islamic art, ed. C. Robinson, vol. 14, 157–182. Oxford: Oxford University Press.

Milwright, M. 2008. *The Fortress of the Raven: Karak in the Middle Islamic period (1100–1650)*, Islamic civilization, studies and texts. Vol. 72. Leiden/Boston: Brill.

Milwright, M. 2010. *An introduction to Islamic archaeology*, Edinburgh New Islamic survey series. Edinburgh: Edinburgh University Press.

Mitchell, P., Y. Nagar, and R. Ellenblum. 2006. Weapon injuries in the 12th century crusader garrison of Vadum Iacob castle, Galilee. *International Journal of Osteoarchaeology* 16 (2): 145–155.

Nicolle, D. 1995–1996. *Medieval warfare sourcebook*. London: Arms and Armour Press.

Nicolle, D. 2011. *Late Mamluk military equipment*, Travaux et études de la Mission Archéologique Syro-Français, Citadelle de Damas. Vol. 3. Damascus: Presses de l'Ifpo.

Petersen, A. 2001. Ottoman Hajj forts. In *The archaeology of Jordan*, ed. B. MacDonald, R. Adams, and P. Bienkowski, 685–691. Sheffield: Sheffield Academic Press.

Redman, C. 1986. *Qsar es-Saghir: An archaeological view of medieval life*. Orlando: Academic.

Saunders, N., and N. Faulkner. 2010. Fire on the desert: Conflict archaeology and the Great Arab Revolt in Jordan, 1916–18. *Antiquity* 84 (324): 514–527.

Toombs, L. 1985. *Tell el Hesi: Modern military trenching and Muslim cemetery in Field 1, Strata I–II*. Waterloo: Wilfrid Laurier University Press.

Walmsley, A. 2007. *Early Islamic Syria: An archaeological assessment*. London: Duckworth.

Zarinebaf, F., J. Bennet, and J. Davis. 2005. *A historical and economic geography of Ottoman Greece: The southwestern Morea in the 18th century*, Hesperia supplement. Vol. 34. Princeton: American School of Classical Studies at Athens.

Zozaya, J. 1996. *Fortification building in al-Andalus, in Spanien und der Orient im frühen und hohen Mittelalter. Kolloquium Berlin, 1991*, Madrider Beiträge. Vol. 24, 55–74. Madrid: Deutsches Archäologisches Institut Madrid.

Further Reading

Elgood, R. 1979. *Islamic arms and armour*. London: Scolar Press.

Kennedy, H. 1994. *Crusader castles*. Cambridge/New York: Cambridge University Press.

Nicolle, D. 2002. *Warriors and their weapons around the time of the Crusades*, Variorum collected studies series. Aldershot: Ashgate.

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Military Personnel Training in Archaeology

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Introduction and Definition

Devastation in conflict and disaster areas often extends to archaeological sites. For military personnel to respond appropriately in situations where cultural property requires protection, three

Note: This article is written in the author's personal capacity and does not reflect the policies of the US Government, the US Department of Defense, or the US Army.

components are necessary: an educated force, legal requirements for the property to be protected, and accurate maps, documentation, and information. The most comprehensive international legal instrument governing cultural property protection is the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954 Hague) and its two protocols. Over 120 nations around the world are state parties to the 1954 original agreement, meaning that, in theory, these governments have committed their militaries to the principles and practices of cultural property protection. In addition, many nations have established national register lists and heritage protection laws that offer a beginning point for understanding which properties and collections require rescue or protection. For military personnel to be effective in the protection of archaeological sites, this treaty requires education for them along with a requirement to establish a force of specially trained military personnel who are competent to respond to situations involving risks to and rescue and/or recovery of cultural property.

It is important to remember that the 1954 Hague Convention emerged in response to Nazi theft and looting of cultural property from across Europe. The convention offers an inclusive definition for cultural property with archaeological remains being one component of a comprehensive list of property types. As a result, most military education programs approach education related to protection of archaeological remains as part of a more comprehensive whole. Discussion of educating the military to protect archaeology is essentially a discussion of protection of cultural property writ large.

Background: Domestic Archaeological Protection on Military Land

For departments and ministries of defense in the United States, the UK, and some European countries, responsibility for the protection of cultural property including archaeological sites falls under either environmental or civil affairs programs or both. In the United States and in the UK, there are robust domestic stewardship programs for archaeological sites and historic structures. The US Department of Defense employs hundreds of archaeologists and may, in fact, fund more archaeological survey, site evaluation, and stewardship than any other agency on the planet. Each military installation with thousands, and in some cases millions, of acres supports an archaeological program that inventories archaeological sites and provides compliance archaeology for construction projects and training events that will result in ground disturbance. These archaeologists are hired to support the military training mission and as a result have an opportunity and a responsibility to educate the personnel who are training on the lands they protect.

In addition, in the United States, compliance with the US Native American Graves Protection and Repatriation Act (NAGPRA), a series of Presidential Executive Orders, and US Department of Defense (DoD) policy requires installation archaeologists to work as advocates for indigenous people whose ancestors lived and were buried on defense landholdings. The military archaeologists establish consultation partnerships and diplomatic relationships between leaders of federally recognized tribes and military command groups ensuring indigenous access to sacred places and protection of buried remains. In addition to educating military commanders, installation archaeologists also provide introductions to archaeology found on the training lands for military personnel with a goal of reinforcing appreciation, respect, and site protection rules. In the UK, military archaeologists work closely with English Heritage, caring for scheduled monuments on military land. Salisbury Defense Estate is probably the most archaeologically intact landscape remaining in the UK, and their installation archaeologists work daily with the military trainers to insure that soldiers are informed and that training events will not adversely affect archaeological features.

Currently, in the United States, the UK, and Austria, a small group of archaeologists who work with the military are proactively developing programs that shift the approach to archaeology stewardship on military land to one where training

lands are viewed as host nations and the protected cultural sites are sacred. This realistic approach not only vastly improves compliance with site protection protocols but also offers military personnel valuable experience to develop the skills they require to be able to identify and respect ancient places and sacred features in cross-cultural landscape settings. This approach was recently codified as a recommendation in the new US Army Guidance for Cultural Resources Management (US Army 2016).

Historical Context and "Monuments Men"

There are currently two complementary approaches being implemented to establish cultural property protection capabilities within the US military. One is to educate military personnel to the point where all types of cultural property, including archaeological sites, are taken into consideration during the course of every phase of a military operation. The other is to insure that the force includes specially educated personnel who can deploy to offer expertise in situations where cultural property is at risk and requires special attention. During World War II, the United States and the UK assigned military personnel with qualifications as archaeologists, art historians, and related fields to serve as monument officers in their "MFAA," Monuments, Fine Arts, and Archives program (Nicholas 1994). The elements of success in the MFAA program offer significant lessons learned which can be applied directly to efforts to restore cultural property protection capabilities to the deploying forces of today (Rush 2012). In the United States, preservation of the cultural heritage of Europe was recognized as a priority, and a commission recommended establishment of this force to President Roosevelt. Archives of World War II include military orders signed by Generals Eisenhower and Alexander, reiterating the importance of protecting cultural property whenever possible. Eisenhower is often quoted with respect to heritage, as he issued the following order on 29 December 1943. "To: All Commanders, Today we are fighting in a country which has contributed a great deal to our cultural inheritance, a country rich in monuments which by their creation helped and now in their old age illustrate the growth of the civilization which is ours. We are bound to respect those monuments so far as war allows." Even though US Army and Marine Corps Civil Affairs (CA) and in Europe Civil Military Cooperation (CIMIC) programs still exist, their cultural property component has been small. One exception was the deployment of Major (now retired) Cori Wegener to the National Museum of Iraq after the looting in 2003.

Archaeology and the Military Since 2003

The United States and the UK

As recent conflicts have painfully illustrated, the United States, UK, and other coalition partners have deployed forces that lacked the necessary education and information required for accurate identification of and appropriate response to the cultural property they were going to encounter. To make matters worse, these deployments were into regions of great archaeological sensitivity like ancient Mesopotamia and the silk road of Afghanistan. It quickly became clear that the World War II military cultural property protection capability had been lost.

In 2004, global media attention focused on damage at Babylon by occupation of US Marines and Polish forces (MSNBC 2004). In response, a core group of military archaeologists, academics, and heritage professionals from a series of western nations have been working to re-establish cultural property protection as an institutional element of responsible military training and operations. The Archaeological Institute of America (AIA) was among the first to respond to the challenge by initiating a Soldier Lecture Program under the direction of then President of AIA, Professor Brian Rose. This program was a volunteer effort where academic archaeologists and museum professionals traveled to military installations and offered information to soldiers and marines prior to their departure for Iraq or Afghanistan (Rose 2007).

It should be noted that there is a community of archaeologists who made an ethical choice not to

participate in any form of military partnership whatsoever (Hamilakis 2003; Stone 2011). The controversy surrounding the US invasion of Iraq in 2003 certainly contributed to the understandable concern among archaeologists about what would be an appropriate role to play in terms of educating military personnel who would be deployed to and operating in the immediate vicinity of ancient Mesopotamian archaeological sites. However, as the nature of armed conflict has changed in the second decade of the twenty-first century, bringing with it deliberate destruction of archaeological properties by armed adversaries, members of the academic community have increasingly come forward to contribute expertise. Over the past 10 years or more, archaeologists have been supporting military operations in a wide range of capacities: as academic experts offering data and "reach back" expertise, as educators assisting with pre-deployment training and military education, and as consultants for preparation of military policy, doctrine, and best practices with regard to archaeological resources. The shared goal of these efforts is the protection of archaeological sites and collections in any situation where military personnel might possibly be involved.

The Soldier Lecture Program evolved into a curriculum designed for all US Army Reserve Officer Training Cadets (ROTC) that introduces the principles of cultural property protection as part of cultural awareness training with an emphasis on archaeological sites. This program has the potential to engage interested academic archaeologists who could serve as volunteer instructors. The current challenge is reaching out to military science and academic archaeology programs on US college campuses and convincing them to partner for delivery of the required cultural property component of the cadet curriculum. The US Army ROTC Cadet Command also established a Cultural Property Internship Program at Fort Drum, NY. During the course of a month, the participating cadets learn about the Army Environmental Program, participate in archaeological survey, are introduced to Native American consultation partners, and complete a project that contributes to the US Defense inventory of cultural property training and resource material.

Some installation archaeologists in the United States and the UK, with support from academic archaeologists, began to add training for deploying personnel to their domestic archaeological survey, stewardship, and cultural resource management responsibilities. Their accomplishments include development and distribution of over 150,000 decks of archaeological awareness playing cards to deploying personnel; establishment of heritage reference websites for Iraq, Afghanistan, and Egypt (http://www.cemml.colostate.edu/cultural/cptraining.html); establishment of the Military Cultural Heritage Advisory Group or the MILCHAG; establishment of heritage protection guidelines for Central Command contingency operations in a regulatory format (CENTCOM 200–2, 2008); on-site training at Saqqara Egypt for participants in the Bright Star War Games in 2009; the addition of cultural property to military engagements in Jordan and the Arabian Gulf; initiation of CPP Subject Matter Expert Engagements in US Southern Command; development of cultural property protection scenarios for field training; development of replica archaeological sites for US Army field training; guidelines for identifying archaeological sites using defense imagery; development and delivery of archaeology and heritage awareness presentations to deploying personnel including specialized curriculum for military engineers; and funding of archaeological research related to improved understanding of ancient water systems as found throughout the Middle East, South Asia, and semiarid regions of Africa. UK colleagues, in cooperation with the British Museum, have even developed field-training aides that include mobile replica museums that can be used for military training in looting scenarios.

The Smithsonian and the University of Pennsylvania Museum Cultural Heritage Center have also become proactive partners in education of military personnel and support of research that provides a better understanding of the increasingly strategic role archaeological sites are playing in the modern battlefield. The University of Pennsylvania Museum Cultural Heritage

Center and the Smithsonian joined with other research institutions to create the Conflict Culture Research Network, a consortium designed to provide a research platform for developing a far more sophisticated understanding of how and why adversaries target archaeological sites and cultural property during the course of genocidal conflict. In addition, the Smithsonian has reached out to both US Army and US Marine Corps Civil Affairs units, offering them not just an introduction to cultural property protection but also behind-the-scenes visits for military personnel to collections at the Smithsonian and the Metropolitan Museum of Art on the east coast and the Getty on the west.

Current efforts and resources available for soldier education include presentations and workshop guidance on how CPP can contribute to mission success; how to identify cultural property on the battlefield; how to create a cultural property inventory; legal requirements for CPP both United States and global; an inventory of materials that could be installed to protect archaeological sites forward like temporary fencing and geotextiles; case studies of successes and failures in cultural property protection in the military operation context; how to handle antiquities in the case of seizure for military and customs personnel; how to inventory and document antiquities, structures, and works of art at risk; how to survey a landform for archaeology prior to a military construction project or military base expansion; CPP considerations during the course of disaster response; how to create and implement a CPP inject during the course of a military exercise; and guidance for military personnel on how to work productively with nongovernmental organizations. These resources are available for use by any archaeologist who is interested in working with military personnel.

The epitome of professional military education in the United States is the war college system where active duty officers can obtain advanced degrees in a range of civilian subjects in addition to gaining specialized education pertaining to military issues. For the first time, two of the war colleges, Air University and Naval War College, are offering graduate-level courses in cultural property protection taught by qualified archaeologists, anthropologists, and military officers. Air University is even encouraging its graduate students to take on CPP challenges as thesis topics.

Austria

The Austrian military is a world leader in cultural property protection education. The Austrian Society for the Protection of Cultural Property, whose members are military personnel, has served as an advocate for CPP since the 1980s. As a result, the Austrian Ministry of Defense has defined a military occupational specialty of Cultural Property Protection Officer. These officers, who have an academic background in history, archaeology, and/or the arts in addition to their military training and capability, interact directly with military planners and responders in peacekeeping operations.

The Austrians have established the first ever master's degree program specifically focused on cultural property protection at Donau University, Krems. The Krems program, directed by an academic archaeologist who is also a military officer, is designed to not only offer a formal MA in a traditional degree program format, but it also enriches the courses with intensive "hands-on" workshops so that the students can learn practical cultural property protection skills. Interested military personnel can participate in any workshop they would find useful without having to take the entire degree program. For example, one of the Krems Summer University workshops is on how to evacuate an archaeological collection. For 1 week, degree students along with workshop participants meet in Krems for formal presentations combined with the actual evacuation of a collection from field storage to a museum. The workshop includes critical skills like object documentation, object handling and packing, and coordination with local "host nation" rescue personnel like fire brigade members. Other workshop subjects include how to identify and map cultural property on the battlefield. The Austrians are also one of the global pioneers in using actual archaeological remains located on military training lands to support CPP scenarios in military exercises. On behalf of UNESCO, the Austrians have also

offered cultural property training courses for defense professionals from all over the world.

The Italian Model

The Italians lead the world in effective military deployment capability for CPP with a militarized police force whose officers specialize in protection of archaeological sites and objects in addition to other forms of protection for art and cultural material (Rush and Benedettini 2015). Called the Carabinieri Tutela Patrimonio Culturale, or the Carabinieri Command for the Protection of Cultural Property, these policemen have established an international database for missing archaeological objects and works of art, investigate and attempt to prevent incidents of looting at archaeological sites, and have recovered thousands of objects and works of art from all over the world amounting to hundreds of millions of euros in value. Carabinieri officers deployed to Iraq in 2003 as peacekeepers where they helped Iraqi heritage professionals capture and prosecute looters of archaeological sites; recovered objects stolen from the National Museum of Iraq; established a database of additional stolen objects; did aerial surveillance of archaeological sites in Nasiriyah and Dhi Qar Provinces, enabling them to provide Iraqi provincial inspectors with detailed site map coordinates and perimeters; and reopened the provincial museum at Nasiriyah (Carabinieri 2008). The Carabinieri TPC, in cooperation with the University of Turin, even opened a virtual Museum of Iraq (http://www.virtualmuseumiraq.cnr.it/prehome.htm).

Of special importance is the Carabinieri's global approach to site guard and training programs for international policing. These programs are designed to assist police forces and military organizations around the world, emerging as effective partners for the protection of art and archaeology. More specifically, they work to establish proficiency in protection of archaeological sites, to provide a template for establishing partnerships between police and ecclesiastical agencies for protection of sacred property, and to increase prosecutorial capability for convicting looters and traffickers in stolen art and antiquities on a nation-by-nation basis. The Carabinieri demonstrated their skills in Iraq when they assisted in re-establishment of the Iraq site guard program in the early 2000s. They made the case for the core elements required to protect an archaeological site: support from the local community, viable transportation like trucks and fuel, reliable communications like radios, the ability to carry a weapon when necessary, salaries for the guards, and uniforms in order to communicate the official and respected nature of the work (Rush and Benedettini 2015). It is interesting to note that as of 2017, the Carabinieri are playing a key role in reeducation and capacity building for Iraqi police forces, including those officers who are responsible for protecting cultural property (Parrulli 2017). The Carabinieri's proactive approach to international training and assistance has been extremely productive. At a recent meeting between representatives from US Southern Command, the Honduran military, the Roman Catholic Church, and Honduran cultural organizations, the Hondurans described significant progress in protection of churches as a direct result of Carabinieri courses offered in Central America.

Academic Approaches to the Subject of the Military and CPP

A series of research programs, dissertations, and books on the subject of protection of archaeological sites in conflict zones are emerging including projects at the University of Newcastle UK, the University of Amsterdam, Colorado State University, the University of Kansas in partnership with the US Command and General Staff College, University College Dublin, Indiana University of Pennsylvania, and Deakin University, Melbourne, Australia. The right to one's heritage is now recognized as an international human right, so protection of archaeological sites and heritage is now a component of legal discussions and included in law school programs and courses at DePaul University, Tulane; the University of Sienna, Villanova; and the International Institute of Humanitarian Law, San Remo, Italy. The Institute has recently partnered with the University of Turin to also offer a master's degree in CPP,

although given the nature of the partnership, it will probably be more focused on the legal aspects of the issue as opposed to the more practical approaches offered at Krems. Many of these programs are also making an effort to reach out to military personnel to encourage them to enroll.

One of the most fascinating and exciting accomplishments in the world of academic archaeology and the military has been the creation of Operation Nightingale in the UK (British Archaeology 2012). This program has achieved outstanding success by using participation in archaeological excavations as a form of therapy for wounded personnel. Operation Nightingale now has an established track record for genuinely assisting with emotional recovery while offering soldiers the opportunity to gain confidence working side by side with civilians. Participants also graduate from the program with the skills required to work on future archaeological projects, and some soldiers even gain more specialized marketable skills like surveying and scientific illustration as they prepare to return to the civilian world. Several participants in Operation Nightingale have gone onto university to study archaeology, and many are now serving on the compliance archaeology field crews on the UK Defense Estates. There are nascent attempts to duplicate Nightingale in the United States with a recent excavation at Fort Ligonier, PA.

An additional international program that deserves recognition is the Museo-bus of Senegal. The curator of the military museum in Dakar has created a traveling opportunity for the education of African military forces on the protection of cultural property. By using a mobile educational platform, the Senegalese military can reach out to counterparts across West Africa in order to increase awareness of the importance of protecting archaeology and heritage sites especially during the course of peacekeeping operations (Diatta 2012). Officer Ismaila Diatta contributed his example as part of an International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) program called "First Aid for Culture in Crisis Areas." Begun in 2011, this program is designed for all who care about saving heritage and welcomes all interested students and professionals including members of the military. The program has expanded beyond ICCROM's home in Rome, and the 2016 course was hosted by the Smithsonian Institution.

Archaeology and the Military Today

It is important to note that current initiatives in military training and education for cultural property protection are mainly focused on the need to educate the entire force for effective protection of archaeological sites during all phases of a military operation. In order to convince military leaders of the importance of protecting archaeological sites and other forms of cultural property, they need a sophisticated understanding of how the ability to recognize and respond to cultural property on the battlefield will contribute to mission success. This type of comprehension means that all military personnel should have at least an introductory level of awareness concerning the heritage of any nation where they may be operating. Once an appreciation for the importance of cultural property including archaeological sites has been institutionalized across the force, it should then encourage the development and use of specialized monument officers, hopefully bringing back a form of the MFAA as known in World War II (Rush 2012).

Archaeology, Cultural Property, and Phases of Military Operations

Mapping and "No Strike Lists"

The earliest phases of a military operation, of course, involve planning. During the planning phase, mapping and identification of archaeological sites is critical. Military personnel cannot avoid or protect features in the landscape that are unknown to them. One of the most important roles an archaeologist can play in protection of archaeological sites in conflict zones is provision of information to the Ministry or Department of Defense that includes location, nature, and size of archaeological sites that are at risk. In the United States, the US Defense Intelligence

Agency (DIA) handles this information, and currently academic archaeologists working with the US Committee of the Blue Shield (USCBS) are providing data sets related to archaeological sites and collections they would like to see protected by US personnel. USCBS has an agreement with the Digital Archaeological Record (tDAR), a not-for-profit organization based at Arizona State University designed to archive archaeological data. tDAR protects and archives these restricted data sets which USCBS shares only with DIA . Once DIA has incorporated these data into the Modernized Intelligence Data Base or MIDB, the archaeological information is added to the nonlethal targeting or "no strike" lists that are issued prior to any form of military action. It is very important to note that any archaeologist who contributes sensitive site information will always retain control over with whom that information may be shared whether it is residing at tDAR, DIA, or both. Very recently, DIA established a system whereby a nonclassified version of MIDB archaeological data can be shared back with selected archaeologists for update and/or quality assurance. DIA has also begun to incorporate discussion of the importance of cultural property protection into its military education activities (Varley 2017).

Kinetic Operations

The military, generally, is operating at the very local level, and sacred and valued features in small villages and settlements are rarely noted on the kinds of inventories that would be used during the planning process or that would be included on military maps. As a result, it is important to work with soldiers on the ability to recognize indications that they are in the vicinity of or on an archaeological site in addition to the kinds of clues that people use to indicate a sacred feature. The presence of offerings, symbols of prayers, sometimes even natural features that stand out in a foreign landscape are all critical for the ability to identify and respect the cultural property of others.

During what is called the kinetic or most violent phases of conflict, the military has to be prepared for situations where adversaries use cultural property for strategic and tactical advantage. In Iraq, Saddam Hussein deliberately placed military bases in the immediate vicinity of ancient Mesopotamian cities like Ur with the hope that western forces would hesitate to attack out of concern for potential collateral damage. The challenge in cases like these is to insure that an incoming force is prepared to minimize the impact of their presence once they assume responsibility. Training for military engineers includes opportunities for them to learn site assessment and implementation of environmental baseline protocols prior to occupying, establishing, and/or expanding a base in the immediate vicinity of an important archaeological property.

Adversaries may also use cultural property like headstones or archaeological ruins as firing points or places of worship as locations for sequestering large quantities of weapons or explosives. Military forces need to be prepared for these eventualities, and the training includes the skills required for what is called proportionate response. For example, well-trained military personnel will attempt to minimize return fire when being fired upon from a cemetery or archaeological ruins in order to do as little damage as possible. This type of training also includes a thorough introduction to the legal requirements for cultural property protection in situations like these. In the United States, a decision to attack a historic or sacred structure or feature that is being used for military purposes has to be made at the highest levels.

Stabilization and Post Conflict

The final phases of military operations are designed with the hope of restoring social order within the conflict zone. If material heritage within the landscape of a crisis zone has survived, there is increased hope that the community may recover as a corporate entity.

Blue Shield Committees

During the conflict in the Balkans, it became clear that 1954 Hague and its First Protocol, as designed and written, were insufficient to address destruction of cultural property as related to

genocidal and ethnic conflicts of the late twentieth century. As a result, they were supplemented with a second protocol drafted in 1999. In addition, in 1996, representatives of four nongovernmental organizations representing people active in the fields of archives, libraries, monuments and sites, and museums formed the International Committee of the Blue Shield (ICBS). Later the Coordinating Council of Audiovisual Archives Associations signed on as well. In 1999, the Second Protocol established the Intergovernmental Committee for the Protection of Cultural Property in the Event of Armed Conflict and articulated an official role for the ICBS as an advisory group to the Committee. The ICBS adopted a charter in 2000, and one of its key functions was to encourage establishment of national committees of the Blue Shield. Since that time, 26 countries have established committees, while another 22 countries have committees under construction (USCBS 2017). National committees of the Blue Shield are the organizations designated by the Second Protocol to assist and support military efforts to implement meaningful cultural property protection programs. It should also be mentioned that 1954 Hague establishes the Blue Shield as the recognized international symbol designating protected cultural property. The symbol is intended to be used the same way red crosses and red crescents are used to designate protected medical facilities.

The United States

As mentioned above, USCBS is playing a very active role in providing cultural property inventory information to US DIA. In addition, USCBS successfully advocated for US Senate ratification of 1954 Hague and currently encourages increased defense implementation of convention responsibilities at the legislative level. USCBS partners with other organizations whenever possible to assist with military training and development of educational materials.

The United Kingdom

The UK Committee of the Blue Shield has recently made remarkable progress. As advocates for CPP, this committee encouraged not only ratification of 1954 Hague and its two protocols by the UK Parliament but also insured passage of enabling legislation for establishment and implementation of a meaningful military CPP program. As a result, the UK is in the process of establishing a force of reserve officers who will serve as modern monument officers. The UK committee is also continuing to cooperate on collection and sharing of cultural property inventory information.

Norway

The Norwegian Blue Shield Committee was formed in 2000. This committee has worked to protect cultural property in conflict zones like Iraq, Afghanistan, and the West Bank while also strengthening their domestic program for development of an emergency plan for protecting cultural heritage in the event of a disaster. In addition, the Norwegian committee developed a deck of bilingual English and Norwegian archaeological awareness playing cards for military personnel based on the examples of the US decks. The President of the Norwegian Committee of the Blue Shield serves as a key board member of the new International Blue Shield organization that emerged out of the Associated National Committees of the Blue Shield (Mickleby 2015).

Switzerland

Given its neutrality, Switzerland focuses on civil defense in terms of its approach to military capability. Within this context, the Swiss have established a strong committee of the Blue Shield and associated program. Swiss Civil Defense utilizes civilian subject matter experts by providing them an opportunity to serve in their professional capacities as military experts. As a result, the Swiss are able to benefit from preservation expertise as they implement cultural property protection in the military context. In 1966, the Swiss passed the Federal Protection of Cultural Property Act and, nearly 20 years later in 1984, an enacting decree. They produced their first "Inventory of Cultural Property of National and Regional Importance" in 1988 and revised it in 1995. In 2009, they added an inventory of all museum collections to their system. Their protection system is applied at all levels of government, federal,

canton, municipal, and at the very local level, and emphasizes interagency and interdisciplinary partnerships (Zellmeyer 2010; Federal Office of Civil Protection 2017).

In terms of military participation, cultural property protection training is mandatory for all Swiss military personnel. The Swiss offer a 5-day course three times a year, and they have specialized officers and a CPP manual. Given the focus on civil defense, the Swiss are beginning to shift their military focus from potential deployment and conflict to effective disaster response. In 2012, the Basel library used its disaster plan to assist in developing a "Guidelines for the Preparation of a Disaster Plan." In addition, the Swiss Committee of the Blue Shield has established a quarterly publication that offers excellent advice on protecting and preserving cultural property (Swiss Committee of the Blue Shield). This publication, with articles and abstracts in four languages, English, Italian, French, and German, focuses on a different aspect of cultural aspect of CPP in each issue. Examples of topics include Documentation of Cultural Property, Protection of Archaeological Sites, Protection of Natural History Objects, Response to Natural Disasters, and Protection of Cultural Property during Conflict.

NATO CPP Project

NATO forces demonstrated the effectiveness of using archaeological site data to influence targeting decisions during Operation Unified Protector in Libya in 2011. Using information contributed by archaeologists from the United States and the UK, NATO planners were able to incorporate the locations of key archaeological sites along the Mediterranean coast into the battle plans. Even though Gaddafi had placed military targets like radar installations on archaeological sites and ancient structures, damage was minimized because the aircraft crews knew the areas to avoid. An international Blue Shield mission to Libya confirmed site integrity upon conclusion of the conflict, and these results were reported at a conference at the American Academy in Rome in November of 2011 (D'Emilio 2011). The resulting positive global media coverage encouraged the US DIA to increase its commitment to protection of cultural property and eventually led to funding for the NATO Science for Peace and Security, "Cultural Property Protection Policy, Doctrine, and Best Practices Project."

In essence, all 24 NATO nations voted to support a series of advanced research workshops designed to develop policy, doctrine, and best practices for effective implementation of a cultural property protection program for the Alliance. Workshop participants, led by a co-director from Denmark, included staff from NATO headquarters as well as high-ranking officers from the Supreme Headquarters Allied Powers Europe (SHAPE), academic archaeologists, and military personnel representing more than ten countries. Discussions included mapping, military education, and development of policy, doctrinal, and guidance documents. Project outcomes include establishment of a cultural property geo-spatial data layer for future NATO operational maps, a cultural property protection handbook for military personnel, and recommendations for future NATO policy development, possibly in the form of a Standardized NATO Agreement or STANAG. The final project report will be publicly released and the handbook available for digital distribution to military personnel in the fall of 2017. During the course of the NATO project, two retired US Navy Commanders presented a prototype of a cultural property protection video game that could be used for military training. UNESCO is looking for a country sponsor to support development of the game for global distribution.

Creation of the cultural property geo-spatial data layer at NATO is especially important because it sets a new standard for the field of military "human terrain" mapping. When the discipline of human terrain mapping for military applications emerged in the early 2000s, geographers agreed on features they viewed as essential for meaningful mapping models like ethnicity and language distribution. Inexplicably, they never included a cultural property or monuments geo-spatial data layer (WWHGWG 2016; NATO GIS Workshop 2016). As a result, military

requirements for "human terrain" maps were missing those critical data points. The closest category available for mapping an archaeological site was "land use." As a result, for an entire decade, military maps prepared for US personnel were missing critical cultural property information including locations of some of the most important archaeological sites in the world. When we combine NATO's new mapping initiative with the work of Blue Shield Committees who are supplying archaeological information to Defense Intelligence, there is reason to be more optimistic about the planners of future military operations having much more critical information concerning sensitive sites and cultural property in their areas of responsibility.

The NATO Center of Excellence for Stability Policing (COESPU) located in Vicenza, Italy, has shown a special interest in supporting international efforts for archaeological site and heritage protection. Stability police are responsible for local policing capacity building, and the international police recognize that in many areas in the immediate aftermath of conflict or disaster, protection of archaeological sites, museums, and other locations related to heritage can result in more rapid return to social order and cohesion within a community. As a result, military personnel dedicated to stability policing have included CPP as part of their core competence and have developed programs for educating host nation police on not just the importance of protecting archaeological sites but also methods for doing so.

UNESCO

When various extremist organizations began to destroy archaeological sites and museums in very public ways, the United Nations Educational, Scientific and Cultural Organization (UNESCO) became increasingly interested in working with military organizations under the rubric of International Laws of Armed Conflict (LOAC). In 2015, they established the first ever UNESCO Chair in Cultural Property Protection and Peace at Newcastle University, UK. They have a goal of developing CPP training and educational materials that can be distributed worldwide, and they published the Protection of Cultural Property Military Manual (O'Keefe et al. 2016) which can be downloaded at http://unesdoc.unesco.org/images/0024/002466/246633E.pdf. This manual covers legal obligations for responsible military organizations to protect cultural property during the course of armed conflict.

When Islamic extremists began attacking Sufi Tombs, sacred sites, and libraries in northern Mali and Timbuktu, UN resolution 2100 established the peacekeeping force MINUSMA, designed to restore social order. Resolution 2100 specified that the force was "to assist the transitional authorities of Mali, as necessary and feasible, in protecting from attack the cultural and historical sites in Mali, in collaboration with UNESCO." This resolution marked the first time in modern history where protection of cultural property was specified in the military mission. The MINUSMA forces discovered that the increased patrols and demonstration of concern and protection for the tombs, mosques, libraries, and archaeological sites resulted in improved acceptance of the foreign peacekeepers by the Malian people (UNESCO 2014). With support from UNESCO, the Malian Ministry of Culture created the Passport pour le Patrimoine, a graphic training aide for military personnel that provided maps of Timbuktu, Gao, and Kidal with photographs and locations of the most important cultural sites. The enthusiastic reception and use of this document inspired the Conflict Culture consortium with support from the US State Department to duplicate the concept by preparing similar guides for Mosul and Raqqa. These guides are trilingual in English, Arabic, and Kurdish for use by US, Iraq, and Peshmerga forces.

UNESCO has also established UNITE4Heritage, www.unite4heritage.org/en/unite4heritage-celebrating-safeguarding-cultural-heritage, a global movement that "calls on everyone to celebrate the places, objects and cultural traditions that make the world such a rich and vibrant place." One of the most exciting initiatives taking place under the aegis of UNITE4Heritage is the Italian "Blue Helmets for Culture" program. This project with the support of the University of

Turin and La Venaria Reale Consortium has created and trained a deploying force of approximately 60 people of Carabinieri and Italian military partnered with heritage professionals. The Carabinieri TPC regional office in Turin was also a key participant, especially in the training portion. This force is available to go anywhere in the world when called upon at the behest of the UN and/or a country that has asked for assistance.

UNESCO has also become interested in the challenge of military training and education. UNESCO has funded development of training materials for military personnel and is beginning to experiment with implementation by offering workshops for peacekeeping forces. The first such course was successfully completed at the Regional Peacekeeping Training Center in Harare, Zimbabwe, in September of 2017.

Into the Future

Injects

In addition to providing information and lectures, archaeology partners have assisted in development of a range of methods for educating military personnel about cultural property. There are slide presentations, case studies for formal use in the classroom, and scenarios where soldiers can practice identification and appropriate response to archaeological sites and cultural property in the field. One of the most effective ways to train military personnel is to offer them opportunities to actually practice CPP skills during the course of military field exercises. When a special challenge is introduced into an exercise in order to add realism to the training experience, it is called an "inject." As awareness of the importance of cultural property increases, we are beginning to see inclusion of cultural property injects into actual military exercises. In the summer of 2015, NATO added two cultural property injects into exercises taking place in Northern Europe. One of the challenges offered a situation where a historic castle was occupied by adversaries and friendly forces needed to secure it with a minimum of damage. A second challenge resulted from a fictitious situation where a large convoy of heavy military vehicles was traveling too close to a very old church and the vibration was threatening to break the stained glass windows. The operation planners had to figure out a new route in order to solve the problem.

The US Army recently added a cultural property inject to a major division exercise. In this case, Fort Drum used a combination of actual archaeological sites and replica ruins to challenge the brigade commander with two requests from the local population. The first request asked the commander to report on the condition of the archaeological sites that were located in territory recently retaken from the adversaries. The second was a request for recovery of artifacts stolen by insurgents who had destroyed the local museum. Injects of this nature benefit the military in a number of ways. First, it increases awareness of the importance of cultural property for a force preparing to deploy. Second, an unexpected challenge encourages different elements of the force to work together in creative ways to solve the types of problems they are going to encounter in crisis areas. When confronted with the challenge of stolen artifacts, military police, civil military personnel, intelligence officers, and military legal advisors all worked together to develop a recovery plan that involved the entire force who were instructed to identify high-value enemy targets who may have been carrying the stolen objects. Ultimately, recovery of cultural property also offers the military a powerful strategic communication advantage.

Conclusion

As we think about the changes since archaeologists began to think about protection of archaeological sites in the context of conflict in the early 2000s, there is now cause for optimism. We see programs emerging not just among forces of the major powers but also in many nations all across the globe. We see the results of academic and

military partnerships in a host of creative approaches to working together. In summary, a military force that is able to demonstrate respect for local populations, heritage, and values immediately distinguishes itself from destructive, genocidal, and extremist adversaries, an important accomplishment indeed.

References

1954 Hague convention for the protection of cultural property in the event of armed conflict. Available at: http://portal.unesco.org/en/ev.php-URL_ID=13637&URL_DO=DO_TOPIC&URL_SECTION=201.html. Accessed 29 July 2017.

British Archaeology. 2012. Archaeology as rehabilitation. Available at: http://www.britarch.ac.uk/ba/ba122/feat5.shtml. Accessed 27 June 2012.

Carabinieri Unit for the Protection and Safeguarding of Italian Cultural Heritage. 2008. Italian Carabinieri and the Protection of Iraq's Cultural Heritage. In *Antiquities under Siege*, ed. L. Rothfield, 135–140. Plymouth: AltaMira Press.

D'Emilio, F. 2011. Expert: NATO raids spared Libyan antiquities. *Associated Press*, November 4, 2011.

Diatta, I. 2012. Proposal for a training course for military personnel on cultural heritage awareness. In *Protecting cultural heritage in times of conflict*, ed. Simon Lambert and Cynthia Rockwell, ICCROM publication, 102–106.

Hamilakis, Y. 2003. Iraq, stewardship and 'the record': An ethical crisis for archaeology. *Public Archaeology* 3 (2): 104–111.

Kila, J. 2012. *Heritage under siege; military implementation of cultural property protection following the 1954 Hague Convention*. Leiden: Brill.

Mclaughlin, K. 2016. US Army; Cultural esources management guidance, Office of the Deputy Federal Preservation Officer, Army.

Mickleby, A. 2015. Personal communication, Meeting of the International Blue Shield, Newcastle.

Ministere de la Cuture, Mali. 2015. Passeporte pour le Patrimoine, Biens Culturels a Preserver.

MSNBC. 2004. US reportedly damaged ancient Babylon. *MSNBC*, October 4, 2004.

NATO GIS Workshop. 2016. NATO SPS CPP Project, Advanced Research Workshop held at NYU, August 2016, Human terrain mapping discussion.

Nicholas, Lynn H. 1994. *The Rape of Europa*. New York: Alfred A. Knopf, Inc.

O'Keefe, R., C. Peron, T. Musayev, and G. Ferrari. 2016. *Protection of cultural property military manual*. Paris: UNESCO.

Office of Federal Protection. 2017 Switzerland. Accessed at: http://www.babs.admin.ch/en/home.html. October 5.

Parrulli, F. 2017. Personal communication with the author in Rome, March.

Rose, B. 2007. Talking to the troops about the archaeology of Iraq and Afghanistan. In *The acquisition and exhibition of classical antiquities*, ed. R.F. Rhodes, 139–154. Notre Dame: Notre Dame University Press.

Rush, L. 2010. *Archaeology, cultural property and the military*, Newcastle heritage matters series 2. Suffolk: Boydell & Brewer.

Rush, L. 2012. Cultural property protection as a force multiplier in stability operations; World War II Monuments Officers lessons learned. *Military Review*, March–April 2012, 36–43.

Rush, L., and L. Benedettini. 2015. *The Carabinieri command for the protection of cultural property; saving the World's Heritage*. Suffolk: Boydell & Brewer.

Stone, P. 2011. *Archaeology, ethics, and the military*, Newcastle heritage matters series. Suffolk: Boydell & Brewer.

UNESCO. 2014. UNESCO presentation to the Danish Mission to the UN, CPP Meeting, NYC, April.

United States Central Command. 2008. *Environmental Considerations for Contingency Operations, Regulation 200–2*. Tampa: US Department of Defense.

Varley, T. 2017. Presentation to the AIA Annual Meeting, Toronto, Ontario, CA.

World Wide Human Geography Working Group (WWHGWG). 2016. Webinar on the mapping of cultural heritage.

Zellmeyer, S. 2010. The role of the Swiss armed forces in the protection of cultural property. In *Archaeology cultural property and the military*, Newcastle heritage matters Series, ed. L. Rush. Suffolk: Boydeell & Brewer.

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Miller, Margaret C.

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Basic Biographical Information

Margaret C. Miller (Fig. 1) is a prolific classicist and interpreter of the visual/material record of archaic and classical Greece. Her dynamic

Miller, Margaret C., Fig. 1 Margaret C. Miller

approach to Greek cultural perspectives on the Achaemenid Persian empire is an especially important feature of her work. Miller was born in Liverpool but soon emigrated to Canada, where she was raised and educated through the B.A. degree (Honours Classics) at the University of British Columbia. Following a second degree at Oxford and a year-long fellowship at the American School of Classical Studies at Athens, she earned her Ph.D. at Harvard University under Emily Vermeule in 1985. She has participated in archaeological projects in Greece (Mytilene and Corinth), Turkey (Sardis), Egypt (Naukratis), and England (Wroxeter). Since 2012, she is codirecting a collaborative field project at Zagora (Andros).

A distinguishing feature of Miller's professional contributions to date lies with her skills as an administrator as well as a scholar and subtle thinker. She taught at the University of Toronto, Department of Fine Arts, from 1989 to 2005, serving as Chair from 1996 to 2000. She has been on the faculty of the University of Sydney, Department of Archaeology, since 2005 as Arthur and Renee George Professor of Classical Archaeology (Head of Department for part of that time). She has consistently participated on many archaeological committees, most recently adding to her dossier of such activities the Headship of the Australian National Committee of the *Corpus Vasorum Antiquorum* and Membership on the Executive Committee of the Australian Archaeological Institute of Athens.

Major Accomplishments

Miller's first book, *Athens and Persia in the Fifth Century B.C.: A Study in Cultural Receptivity* (1997/2004), established her as a brilliant mind solidly informed by rigorous training in Greek literary and material culture and attunement to issues of intercultural arenas of social contact and exchange between Greece and the Achaemenid Persian empire. Key to the importance of *Athens and Persia* – what has made it a true classic in the field – is the nuanced approach Miller takes to notions of influence as a fluid system rather than a one-way exertion of cultural authority. This book was awarded *Le pris Roman and Tania Ghirshman* from the Académie des Inscriptions et Belles Lettres, Paris, in 2001. Supporting its overarching intellectual mandates are a series of impressive articles on specific topics relating to Greek-Persian cultural entanglements discernible through the visual/material record from pottery and luxury paraphernalia, to costume and sartorial accouterments, to cultural performance (e.g., among others, Miller 1989, 1992, 1993, 2010a, 2011a). Other major articles and chapters pursue a range of topics primarily working across similar platforms of evidence but focusing principally on Greek perspectives (e.g., 1999, 2008, 2010b, 2011b). Another side of Miller's scholarship, particularly in collaboration with Eric Csapo, explores Greek drama and ritual and theories of art- and myth-making as social practice (e.g., 2007).

Professor Miller has won numerous postdoctoral research grants and fellowships: five from the Social Sciences and Humanities Research Council (Canada), two from the National Endowment for the Humanities (USA), one from Harvard's Center for Hellenic Studies (Washington DC), and one from the Australian

Research Council. Two book projects forthcoming involve studies of Persians in the Greek imagination and iconographies of orientalization in Greek myth as represented in Attic art.

Cross-References

- ▶ Ceramics, Ancient Greek
- ▶ Classical (Greek) Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Multicultural Archaeology
- ▶ Semiotics in Archaeological Theory
- ▶ Social Identity in Historical Archaeology
- ▶ Style: Its Role in the Archaeology of Art

References

Miller, M.C. 1989. The *ependytes* in classical Athens. *Hesperia* 58: 313–329.

Miller, M.C. 1992. The parasol: An oriental status-symbol in late archaic and classical Athens. *Journal of Hellenic Studies* 112: 91–105.

Miller, M.C. 1993. Adoption and adaptation of Athenian metalware forms in Attic black-gloss ware of the fifth century. *Archaeologische Mitteilungen aus Iran* 26: 109–146.

Miller, M.C. 1997/2004. *Athens and Persia in the fifth century B.C.: A study on cultural receptivity*. Cambridge: Cambridge University Press.

Miller, M.C. 1999. Re-examining transvestitism in archaic and classical Athens: The Zewadski stamnos. *American Journal of Archaeology* 103: 223–253.

Miller, M.C. 2006/2007 [2008]. Persians in the Greek imagination. Mediterranean Archaeology 19/20: 109–123.

Miller, M.C. 2010a. Luxury toreutic in the western satrapies: Court-inspired gift-exchange diffusion. In *Der Achämenidhof/The Achaemenid court*, ed. B. Jacobs and R. Rollinger, 853–897. Wiesbaden: Harrassowitz.

Miller, M.C. 2010b. I am Eurymedon: Tensions and ambiguities in Athenian war imagery. In *War, democracy and culture in classical Athens*, ed. D.M. Pritchard, 304–338. Cambridge: Cambridge University Press.

Miller, M.C. 2011a. 'Manners makyth man': Diacritical drinking in Achaemenid Anatolia. In *Cultural identity in the ancient Mediterranean*, ed. E. Gruen, 97–134. Los Angeles: J. Paul Getty Trust.

Miller, M.C. 2011b. Imaging Persians in classical Athens. In *Herodot und das persische Weltreich/Herodotus and the Persian empire*, ed. R. Rollinger et al., 123–157. Wiesbaden: Harrassowitz.

Miller, M.C., and E. Csapo. 2007. *From ritual to drama: The prehistory of theatre in ancient Greece and elsewhere*. Cambridge: Cambridge University Press.

Millets: Origins and Development

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Basic Species Information

Millet is an imprecise English term applied to a large number of smaller-grained, largely tropical cereals that are often distantly related. Millets tend to be small-seeded cereals, i.e., distinct from wheat, barley, oats, rice, and maize. Sorghum is sometimes included with millets (in Indian English it is the "great millet"). Taxonomically speaking "millet-grasses" refers to grasses in the Panicoid subfamily and the Paniceae tribe, but not all traditional millet crops are in this group. Finger millet (*Eleusine coracana*) and tef (*Eragrostis tef*) are in the Chloridoid subfamily. Although a few millet species have been cultivated in Europe, they are generally less important economically and culturally, leading to poor linguistic differentiation in European languages, e.g., French *millet*, German *hirse*, and Spanish *mijo*.

Millets have received far less research than the "big" cereals (rice, wheat, and barley). Indeed statistics on millet production are very poor, as they are grouped as "minor cereals" in most national and FAO statistics. This is, at least in part, the product of a historical European bias against millets, especially among the former colonial powers of Northern and Western Europe, where millet cultivation is negligible. These cereals were undervalued and under-researched in the colonial period which set an unfortunate

precedent for modern governmental and non-governmental agricultural organizations. There are several "lost" or disappearing millets, cultivated in very localized areas or documented archaeologically only. This includes the recently "rediscovered" *Spodiopogon formosanum* of Taiwan (Takei 2008), the now relict browntop millet of South India (*Brachiaria ramosa*) (Fuller 2006), the local domesticate "raishan" (*Digitaria cruciata*) of the Khasi Hills in northeast India (Singh and Arora 1972), the black fonio (*Brachiaria deflexa*) and iburu (*Digitaria iburu*) of West Africa (Harlan 1992), the Sonoran millet of the American Southwest (*Panicum sonorum*), and the no longer cultivated crabgrass millet of Southeastern Europe (*Digitaria sanguinalis*) referred to in historical sources ranging from late Roman times to the nineteenth century (De Wet 2000).

Major Domestication Traits

There are at least 18 domesticated and cultivated species of millet, listed below in Table 1, together with a few other "minor cereals." These have been domesticated on almost every continent that had prehistoric agriculture, with the possible exception of Europe (De Wet 2000; Weber and Fuller 2008). Even in the case of the obvious exception of Australia, several wild millet grasses are reported to have been regularly gathered as a carbohydrate source of some Australian Aboriginal groups (Harris 1984). Similarly wild seed gathering in Africa often targets wild millets (Harlan 1992). In many cases, closely related species, in the same genus, have been domesticated independently on different continents, such as *Panicum* domestications in North America, India, and China; *Digitaria* and *Brachiaria* domestications in Africa and South Asia; *Setaria* domestications in China, India, and Mesoamerica; or *Echinochloa* domestications in South Asia and Japan. Thus, millets illustrate the parallel evolution of domesticates and cultivation systems from similar wild materials. Millets contributed to the earliest agriculture in several parts of Eurasia, including northern China, where millet cultivation developed well before rice was introduced (Zhao 2011), Korea, parts of Japan, and various parts of India (Fuller 2006). There may also be an early millet center in Western/Central Asia (the Caspian/Ukraine region) to account for Neolithic *Panicum* dispersal into Europe. In Africa numerous millets were domesticated in various parts of the Savannah zone, in the West African Sahel, and in the Ethiopian highlands.

Millets represent a diverse group of versatile cereals that have long been a part of many agricultural ecologies in Eurasia and Africa, but especially in more arid and tropical regions. Millets are generally well adapted to low-rainfall regimes, short growing seasons, and poor soils (Bhag et al. 2010). They are therefore often the most reliable cereals in many marginal environments. Most millets are reported to be drought tolerant, although a few such as finger millet (*Eleusine coracana*) are usually grown in somewhat wetter conditions and on good soils in order to produce high yields. At the more extreme end of drought tolerance are *Panicum miliaceum* in Eurasia and *Pennisetum glaucum* in the hot and dry parts of Africa and India, both of which may grow with 300 mm of rainfall or less and mature rapidly (within 3 months).

Millets present a challenge archaeobotanically as the grains of several species are somewhat similar and may be especially difficult to differentiate in carbonized material in which the husk is absent. This has led to a discussion of the misidentification problem, with one millet species being reported as another (e.g., Hilu et al. 1979; Fuller 2006). There has also been recent recognition of unfilled (immature) grains that may be common at archaeological sites and may have sometimes been mistakenly grouped with other taxa (Song et al. 2013).

Those millets with better archaeological records are treated in separate entries in this encyclopedia, including browntop millet (*Brachiaria ramosa*), broomcorn millet (*Panicum miliaceum*), finger millet (*Eleusine coracana*), foxtail millet (*Setaria italica*), little millet (*Panicum sumatrense*),

Millets: Origins and Development, Table 1 Millets: taxonomy, common names, and regions of origin

Species	Common name	Region of origin and cultivation
Brachiaria ramosa (L.) Stapf. (syn. *Urochloa ramosa* (L.) R. D. Webster)	Browntop millet, pedda-sama	South India
Brachiaria deflexa (Schumach) C. E. Hubbard var. *sativa* Porteres	Guinea millet, animal fonio	Fouta Djallon highlands, Guinea, W. Africa
Bromus mango E. Desv.	Mango	Andes (Peru). Not taxonomically a millet but a now extinct minor cereal cultivar
Digitaria cruciata (Ness) A. Camus var. *esculenta* Bor	Raishan	Khasi Hills, Assam; Hill tribes of Vietnam
Digitaria exilis (Kippist) Stapf.	Fonio, acha, fundi	West Africa
Digitaria iburua Stapf.	Black fonio, iburu, hungry rice	West Africa
Digitaria sanguinalis (L.) Scop.	Harry crabgrass	Eurasian origin; cultivated in Kashmir, formerly in Europe
Echinochloa colona (L.) Link ssp. *frumentacea* (Link) De Wet, Prasada Rao, Mengesha and Brink (= *E. frumentacea* Link).	Sawa millet	Peninsular India(?), also cultivated in the Himalayas
Echinochloa crus-galli (L.) P. Beauv. subsp. *utilis* (Ohwi & Yabuno) T. Koyama (syn. *E. esculenta* (A. Braun) H. Scholz)	Barnyard millet	Japan
Eleusine coracana (L.) Gaertn.	Finger millet, ragi	East African highlands
Eragrostis tef (Zucc.) Trotter	Teff	Ethiopian highlands
Panicum miliaceum L. ssp. *miliaceum*	Proso millet	China and SE Europe(?)/Caucasus; cultivated throughout South Asia
Panicum sonorum Beal (=*P.hirticaule* J. Presl. var. *millaceum* (Vasey) Beetle)	Sauwi millet, Sonoran millet	American Southwest
Panicum sumatrense Roth. ex Roem. & Schult. Subsp. *sumatrense* (syn. *P. miliare* auct. pl.)	Little millet, samai	India, especially peninsula
Paspalum scrobiculatum L.	Kodo millet	India, especially peninsula, and the Himalayas
Pennisetum glaucum (L.) R. Br (= *P. americium* (L) Leeke)	Pearl millet	West African Savannah, cultivated through India
Setaria italica (L.) P. Beauv ssp. *italica*	Foxtail millet	China and SE Europe(?)/Caucasus, cultivated throughout South Asia and in parts of Southeast Asia
Setaria palmifolia (J. Koenig) Stapf	Highland pitpit	Papua New Guinea; cultivated as a green vegetable
Setaria macrostachya Humboldt, Bonpland & Kunth	*Ne-kuuk-suuk* (Mayan)	Mesoamerica, cultivated(?) before rise in importance of maize
Setaria parviflora (Poir.) Kerguélen	Knot-root foxtail	Mesoamerica
Setaria pumila (Poir.) Roem & Schult. (syn. *S. glauca* auct. pl.) (Domesticated population reported)	Yellow foxtail millet, korali	India
Setaria sphacelata (Schumach.) Stapf & C. E. Hubb.	African bristle grass	Sudan: "lost millet" of Nubia
S. verticillata (L.) P. Beauv. (Domesticated populations?)	Bristley foxtail millet	South India
Sorghum bicolor (L.) Moench ssp. *bicolor*	Sorghum, jowar	African Savannahs, cultivated throughout South Asia
Spodiopogon formosanus Rendle	Taiwan hill millet	Cultivated in uplands of Taiwan for Formosan-speaking groups

kodo millet (*Paspalum scrobiculatum*), pearl millet (*Pennisetum glaucum*), and sorghum (*Sorghum bicolor*).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Brown Top Millet: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Finger Millet: Origins and Development
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Bhag, Mal, S. Padulosi, and S. Bala Ravi, eds. 2010. *Minor millets in South Asia: Learnings from IFAD-NUS project in India and Nepal*. Rome: Bioversity International, Maccarese and Chennai: The M.S. Swaminathan Research Foundation.

De Wet, J.M.J. 2000. Millets. In *The Cambridge world history of food*, ed. K.F. Kiple and K.C. Ornelas, 112–121. Cambridge: Cambridge University Press.

Fuller, D.Q. 2006. Agricultural origins and frontiers in South Asia: A working synthesis. *Journal of World Prehistory* 20: 1–86.

Harlan, J.R. 1992. Indigenous African agriculture. In *The origins of agriculture*, ed. C.W. Cowan and P.J. Watson, 59–70. Washington, DC: Smithsonian Institution Press.

Harris, D.R. 1984. Ethnohistorical evidence for the exploitation of grasses and forbes: its scope and archaeological implications. In *Plants and ancient man. Studies in paleoethnobotany*, ed. W. van Zeiat and W.A. Casparie, 63–69. Rotterdam: A. A. Balkema.

Hilu, K.W., J.M.J. De Wet, and J.R. Harlan. 1979. Archaeobotanical studies of Eleusine coracana. *Economic Botany* 306: 199–208.

Singh, H.B., and R.K. Arora. 1972. Raishan (Digitaria sp.) – A minor millet of the Khasi Hills, India. *Economic Botany* 26: 376–390.

Song, J., Z. Zhao, and D.Q. Fuller. 2013. The archaeobotanical significance of immature millet grains: An experimental case study of Chinese millet crop processing. *Vegetation History and Archaeobotany* 22 (2): 141–152.

Takei, E. 2008. Historical review of *Spodiopogon formosanus* Rendle, a minor grain crop in Taiwan. *Bulletin of the Cultural and Natural Sciences in Osaka Gakuin University* 57: 43–66. (in Japanese, with English abstract).

Weber, S.A., and D.Q. Fuller. 2008. Millets and their role in early agriculture. *Pragdhara* 18: 69–90.

Zhao, Z. 2011. New archaeobotanic data for the study of the origins of agriculture in China. *Current Anthropology* 52 (S4): S295–S306.

Hayashi Minao

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Basic Biographical Information

Hayashi Minao was born on 5 May 1925 in Fujisawa city, near Kamakura, Kanagawa Prefecture, Japan. His father, Tatsuo Hayashi, was a famous critic, and he nurtured his interests in humanities under his father's influence. He became interested in pre- and protohistoric Chinese artifacts and motifs under the tutorage of Sueji Umehara, Professor at the Department of Archaeology, Faculty of Literature, in Kyoto University. He obtained his BA degree in 1950 and Ph.D. in 1975, both from Kyoto University. After working as an editor at Heibonsha Ltd. for a short while, in 1957 he accepted the position of a research assistant (1957–1968) at Kyoto University Research Centre for the Cultural Sciences. He was promoted to associate professor in 1968 and professor in 1975. After retiring from Kyoto University in 1989, he was decorated with the Japanese Third Order of Merit in 1995 and became a member of the Japan Academy in 2004. He passed away on 1 January 2006.

Major Accomplishments

Hayashi conferred that he was fond of G. W. F. Hegel's writings in his youth. In his

writings Hayashi tried to approach to the essential character of Chinese artifacts and the Chinese culture itself. This can be explained by his inclination to Hegel's idea of the essential nature of human subjectivity and its evolution.

In his first article, entitled "Ryu ni tsuite (A study of the dragon motif)" (1952), Hayashi tried to trace the original meaning of the dragon motif back to the Chinese classical literature by investigating the chronological sequence of the dragon motif in the material culture.

From his first article, Hayashi continued investigating the ideological and religious implications and roots of Chinese artifacts until the end of his life. He tried to reconstruct the symbolic and religious meanings of artifacts and their evolution by studying the sequential transformation of various representative motifs on carved stelae, bronze vessels, jade artifacts, lacquerware, silk textile, and so on, dating between the Neolithic and the Han dynasties (e.g., 1976, 1989b). Hayashi single-handedly constructed the typo-chronological system of the bronze vessels between Yin-Zhou and Warring States periods (1984, 1986, 1989a), the chariots and armors of the Yin-Zhou period (1972), and the jade artifacts of the Neolithic through Han dynasty periods (1991, 1999) by compiling respective compendia of photographs and drawings of artifacts, some unearthed in scientific excavations and others housed in museums across the world as collected items. Those monumental works remain today as most authoritative references of the respective items and are used for the dating of newly excavated items.

Hayashi also innovatively used Chinese classical literature such as *Mountains and Seas* (山海経), *Er-ya* (爾雅), and *Shuowen Jiezi* (説文解字) in his reconstructions of the name, function, and meaning of artifacts and motifs.

Hayashi's goal was always to understand the essential character of the Chinese culture, and he reached the conclusion that it was the sense of awe in relation to various natural phenomena, formalized in the system of symbolic concepts, that formed the foundation of a unique animistic belief system, constituting the basic undercurrent of the Chinese culture. His method was culture-historical, but his approach and objectives, in that sense, were social anthropological (Fig. 1).

Hayashi Minao, Fig. 1 Hayashi Minao after the lecture at the Japan Academy, 2005

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Cross-References

- ▶ Archaeology: The World at 1800–1850
- ▶ Art Studies: Normative Approaches
- ▶ Chang, Kwang-chih

References

Hayashi, M. 1952. Ryu ni tsuite (A study of the dragon motif). *Shirin* 35(3): 261–279.

Hayashi, M. 1972. *Chugoku Inshu jidai no buki (Arms of Yin-Zhou period in China)*. Kyoto University Research Centre for the Cultural Sciences (1999 reprinted, Hoyu Shoten).

Hayashi, M. 1976. *Kandai no bunbutsu (Relics in Han dynasty)*. Kyoto University Research Centre for the Cultural Sciences (1998 reprinted, Hoyu Shoten).

Hayashi, M. 1984. *Inshu jidai seidoki no kenkyu (Conspectus of Yin and Zhou bronzes*, vol. I. Yoshikawa kobunkan (2017 trans. Hirose, Y., and Kondo, K. in Chinese, Shanghai Guji).

Hayashi, M. 1986. *Inshu jidai seidoki monyou no kenkyu (Studies on Yin and Zhou bronze decoration: A Conspectus of Yin and Zhou bronze vessels)*, vol. II. Tokyo: Yoshikawa kobunkan.

Hayashi, M. 1989a. *Inshu jidai seidoki monyou no kenkyu (Studies on the spring and autumn period bronzes: A conspectus of Yin and Zhou bronze vessels*, vol. III. Tokyo: Yoshikawa kobunkan.
Hayashi, M. 1989b. *Kandai no kamigami (Gods of Han dynasty)*. Kyoto: Rinsen shoten.
Hayashi, M. 1991. *Chugoku kogyoku no kenkyu (Studies of ancient Chinese jades)*. Tokyo: Yoshikawa kobunkan (1995 trans. Yang, M., Taiwan Art book).
Hayashi, M .1999. *Chugoku kogyokuki sosetsu (Surveys on ancient Chinese jades)*. Tokyo: Yoshikawa kobunkan

Mineralization of Macrobotanical Remains

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Introduction

Limited research has been conducted on the factors influencing the process of mineralization of macrobotanical remains on archaeological sites. A few studies have focused on mineralization from archaeological contexts, including the common process of calcium carbonate ($CaCO_3$) replacement in arthropods, such as woodlice, millipedes, and centipedes (Girling 1979: 309; McCobb et al. 2001) and a few studies on seeds (Ciaraldi 2001, 2007; Green 1979; Kenward and Hall 2000; Marshall et al. 2008).

Definition

Mineralization is a naturally occurring complex process in which phosphate and mineral deposits replace minerals from decaying organic matter. Phosphatization, the releasing of phosphate ions, from a variety of sources including faunal remains, food residues, and excrement, is thought to be caused by microbial decay and the movement of the dissolved ions facilitated by fluctuating water levels within the archaeological deposit (McCobb et al. 2001; Marshall et al. 2008: 860; Robinson et al. 2006: 214). Within an archaeological setting, possible sources of phosphate and calcium include human fecal material from specific archaeological deposits such as middens, latrines, and cesspits (a kind of soakaway: liquid material seeped into the ground while solid material remains in the pit (Jansen 2000: 37–9, 2002: 27)), mammal bones, fish bones and scales, and plant material (Carruthers 2000 cited in Ciaraldi 2001: 66). Archaeologically, without sewage, the occurrence of mineralization is extremely low.

The process of phosphate mineralization requires a liquid medium to be able to fully engulf an item so that the ions can diffuse and become concentrated and result in the precipitation of calcium phosphate (Marshall et al. 2008: 860). The phosphate ions react with the calcium ions from calcium carbonate, which can come from different sources within the deposit including limestone or mortar fragments, human fecal material, shells of marine molluscs, fish scales and bones, faunal remains, or the leaching of natural substrate in contact with the deposit (Robinson et al. 2006: 214). The result is a cast of the organic material called a pseudomorph, which is reproduced in various degrees of perfection (Green 1979: 282, 284).

Due to their small size, seeds which possess an intact seed coat and fly puparia, with tough larval skin, are particularly well suited to preservation through this process (Robinson et al. 2006: 215). Factors such as the original percentage of calcium minerals in, and thickness of the seed's testa, the presence and amount of cuticles, lignin, and tannins within the cellular structure, and the decomposition of organic material, all impact upon the overall mineralization process (Girling 1979; Miksicek 1987; Carruthers 2000; McCobb et al. 2001; Ciaraldi 2007: 49–50). Seeds which have become mineralized typically consist of light inorganic material with a poorly defined crystalline apatite structure. The main constituent is calcium phosphate, $Ca(PO4)_6(OH)_2$, visible using X-ray diffraction, which is normally light brown, honey-colored to white in color (Green 1979: 279–281). There appears to be a bias toward seeds which are swallowed intact, such as fig achenes, and grape pips (Cool 2006: 119; Robinson et al. 2006: 215). Millets are often recovered in a mineralized state due to the fact that some millets retain their

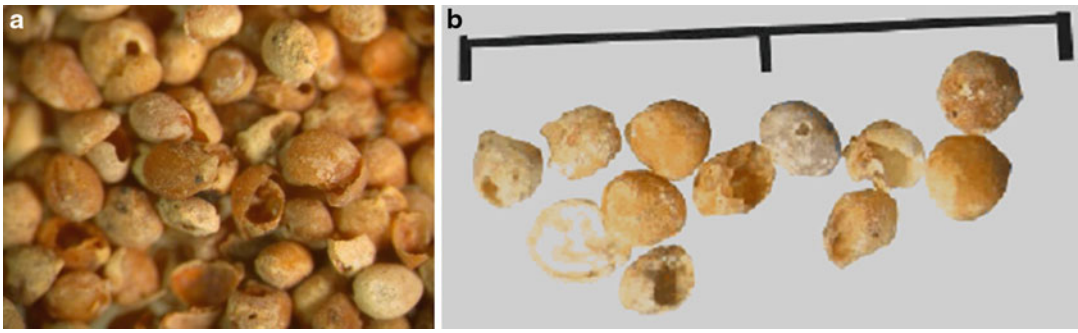

Mineralization of Macrobotanical Remains, Fig. 1 (**a**, **b**) Mineralized Ficus carica (fig) from Insula VI.I (scale in centimeters). (Photo by author) N.B Mineralized fig pips retain their characteristic pyriform shape

indigestible hull (lemma and palea) even after dehusking. Being quite small, millet grains with their intact pericarp, can pass through the human gastrointestinal tract and facilitate the mineralization process. Hence, seeds with intact thin cell walls such as fig and apple seeds which also pass through the body are much more likely to be preserved through mineralization. As van der Veen et al. (2008: 84) demonstrated in their comprehensive statistical analysis of archaeobotanical remains from Roman Britain, there is a strong correlation between plant type and preservation. A similar pattern is seen in the archaeobotanical assemblages from Insula VI.I, Pompeii, Italy, as carbonized archaeobotanical material is typically composed of olives and fruits and mineralized archaeobotanical material of small fruits seeds such as grape pips and fig achenes (Murphy et al. 2012) (Figs. 1, 2, 3 and 4).

According to Green (1979: 281), a number of factors influence the process of mineralization including soil type, type of organic refuse present, and sufficient circulation of groundwater. Kenward and Hall (2000: 519, 2008: 586) suggest that urban occupation deposits, with their variation in sedimentology and chemistry on a minute centimeter scale, present a more complex set of problems, with regard to the process of mineralization, than rural sites. Within urban occupation deposits, organic material is often preserved via anoxic water logging. Complete water logging otherwise impedes the process of mineralization. However, it appears that the process of mineralization is enhanced by the partial water logging of botanical materials

Mineralization of Macrobotanical Remains, Fig. 2 SEM of one mineralized Ficus carica (fig) from Insula VI.I. (Photo by the author)

under anaerobic conditions (Briggs and Wilby 1996 cited in Ciaraldi 2007: 49–50); although no firm scientific preservation model for the mineralization of organic deposits has been established to date (Kenward and Hall 2008: 588).

Examples

Case Study

In Pompeii, the mineralization of organic remains happens through the process of phosphatic mineralization. The majority of mineralized remains

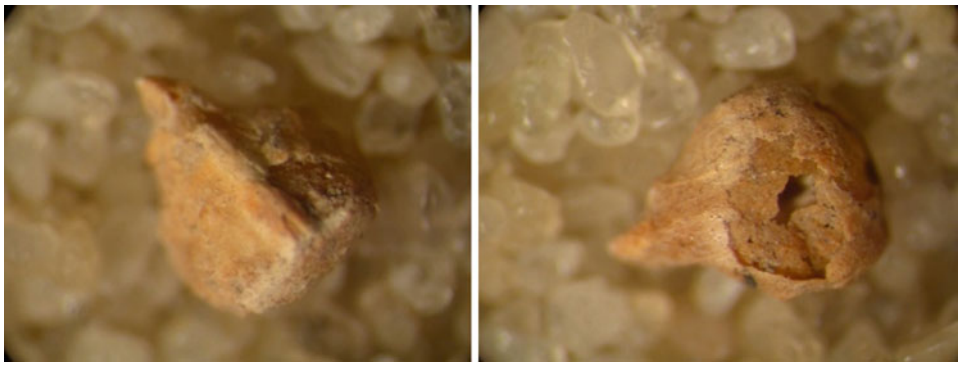

Mineralization of Macrobotanical Remains, Fig. 3 Mineralized Agrostemma githago L. (corn cockle) from Insula VI.I. (Photo by the author)

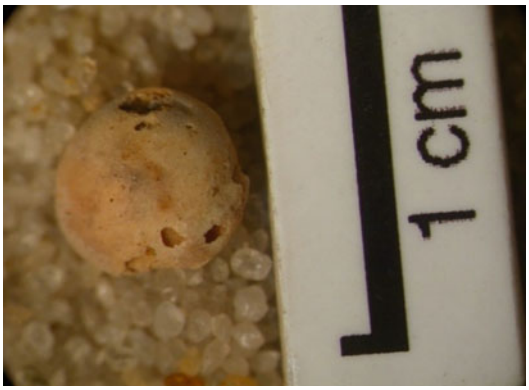

Mineralization of Macrobotanical Remains, Fig. 4 Mineralized lentil recovered from Insula VI.I. (Photo by author)

were composed of fruit, particularly small seeds, which pass through the human digestive system and are preferentially preserved. Ciaraldi's Pompeiian studies (2001: 150–151; 2007: 49–50) found that the unique taphonomy created by the copious ash and lapilli from the numerous volcanic eruptions and the alkaline volcanic soils surrounding Mount Vesuvius resulted in an archaeological matrix rich in calcium phosphate minerals.

Toilets in the kitchen area were a common feature of Pompeian households (Hobson 2009; Jansen 2001: 38). They were strategically placed in or near kitchens allowing for the disposal of burnt kitchen waste. The presence of carbonized material including nuts, weeds, and cereals testifies to this fact. Roman writer Columella mentions the usefulness of ashes as a "disinfectant," "cleaning agent," and "odor suppressant." Deposition of ashes from the cooking area into the latrine may have contributed to the mineralization process as potash, which contains potassium or potassium carbonates in water-soluble form, which along with the high percentage of organic matter in the latrine would have facilitated mineralization (Ciaraldi 2001: 67; Green 1979: 279). This could have contributed to the number of mineralized taxa recovered from this deposit. The mineralized latrine assemblage from the House of the Vestals (VI.I.vii) showed similar characteristics with the mineralized deposits from the House of Hercules' Wedding (VII.IX. x1vii) in which cereals were virtually absent and fruits and weeds were abundant. This is typical of the preservation found among mineralized contexts (Ciaraldi 2001: 149–152).

Pedological analysis at Pompeii showed that similar soil compositions are present today as in the past: loamy sand to sandy loam, with a high percentage of extractable nutrients and moisture retention capabilities with abundant ash and pumice present (Ciaraldi 2001: 66, 2007: 49; Foss 1988: 133; Foss et al. 2002: 77–78). Hence, one theory regarding mineralization is that calcium in the subsoil is dissolved into solution by a reaction of percolating ground water on available sources of phosphate (Green 1979: 281). The mineralization process was likely facilitated by a combination of mineral and volcanic ash, as well as partial water logging and leaching of unique contexts of

drains and cesspits. Exposure to large quantities of calcium phosphates produces higher quantities of mineralized material. This can be seen in specific deposits from the House of the Vestals (VI.I.vii), as identified and analyzed by Ciaraldi (2001: 162–163), including the drains which span over a century and the toilet feature.

Ciaraldi (2001: 67, 2007: 49–50) argued that some samples from the House of the Vestals (VI.I.vii) underwent water logging during stages of mineralization as a differential density of the mineralized archaeobotanical material was visible through the depth of a deposit. She hypothesized that a liquid medium facilitated this downward movement of heavy preserved botanical material. All seeds were counted, but no mention was made of either the weight or size of the seeds in this analysis. Ciaraldi (2007: 49–50) also observed aggregations of calcium phosphate minerals having vague shapes of seeds within waterlogged samples from the Villa Vesuvio. Again this suggests a possible correlation between mineralization and water logged botanical material. High temperatures are also thought to facilitate the deposition of minerals on organic material, and thus, the high temperatures during the summer months in Campania may have accelerated this process of preservation within the upper soil horizon (Ciaraldi 2001: 67, 2007: 50).

Cross-References

► Archaeobotany
► Taphonomy: Definition

References

Carruthers, W.J. 2000. The mineralised plant remains. In *Potterne 1982-5. Animal husbandry in later prehistoric Wiltshire*, ed. A.J. Lawson, 47–70. Salisbury: Trust for Wessex.

Ciaraldi, M.R.A. 2001. Food and fodder, religion and medicine at Pompeii. Unpublished Ph.D. dissertation, Department of Archaeological Sciences, University of Bradford.

Ciaraldi, M. 2007. *People and plants in ancient Pompeii: A new approach to urbanism from the microscope room, the use of plant resources at Pompeii and in the Pompeian area from the 6th century BC to AD 79,* Accordia Specialist Studies on Italy 12. London: Accordia Research Insititute, University of London.

Cool, H.E.M. 2006. *Eating and drinking in Roman Britain*. Cambridge: Cambridge University Press.

Foss, J.E. 1988. Paleosols of Pompeii and oplontism. In *Stvdia Pompeiana and Classica in honor of Wilhelmina F. Jashemski, volume 1*, ed. R.I. Curtis, 127–148. New Rochelle: Orpheus.

Foss, J.E., M.E. Timpson, J.T. Ammons, and S.Y. Lee. 2002. Paleosols of the Pompeii area. In *The natural history of Pompeii*, ed. W.F. Jashemski and F.G. Meyer, 65–79. Cambridge: Cambridge University Press.

Girling, M.A. 1979. Calcium carbonate-replaced arthropods from archaeological deposits. *Journal of Archaeological Science* 6 (4): 309–320.

Green, F.J. 1979. Phosphatic mineralization of seeds from archaeological sites. *Journal of Archaeological Science* 6 (3): 297–284.

Hobson, B. 2009. *Pompeii, latrines and down pipes, a general discussion and photographic record of toilet facilities in Pompeii*, British Archaeological Reports International Series 2041. Oxford: John and Erica Hedges Ltd.

Jansen, G.C.M. 2000. Systems for the disposal of waste and excreta in Roman cities: The situation in Pompeii, Herculaneum and Ostia. In *Sordes urbis: la eliminación de residuos en la ciudad romana: actas de la Reunión de Roma (15–16 de noviembre de 1996)*, ed. X. Dupré and J.A. Remolà, 37–50. Roma: L'Erma di Bretschneider.

Jansen, G.C.M. 2001. Water pipe systems in the houses of Pompeii: Distribution and use. In *Water use and hydraulics in the Roman city,* Archaeological Institute of America Colloquia and Conference Papers 3, ed. A.O. Koloski-Ostrow, 27–40. Dubuque: Kendall/Hunt Publishing.

Jansen, G.C.M. 2002. The Vesuvian sites before A.D 79: The archaeological, literary, and epigraphical evidence. In *The natural history of Pompeii*, ed. W.F. Jashemski and F.G. Meyer, 6–28. Cambridge: Cambridge University Press.

Kenward, H., and A. Hall. 2000. Decay of delicate organic remains in shallow urban deposits: Are we at a watershed? *Antiquity* 74: 519–525.

Kenward, H., and A. Hall. 2008. Urban organic archaeology: An irreplaceable palaeoecological archive at risk. *World Archaeology* 40 (4): 584–596.

Marshall, L.J.R., M.J. Almond, S.R. Cook, M. Pantos, M.J. Tobin, and L.A. Thomas. 2008. Mineralised organic remains from cesspits at the Roman town of Silchester: Processes and preservation. *Spectrochimica Acta* 71: 854–861.

McCobb, L.M.E., D.E.G. Briggs, R.P. Evershed, A. Hall, and R.A. Hall. 2001. Preservation of fossil seeds from a 10th century AD cess pit at Coppergate, York. *Journal of Archaeological Science* 28 (9): 929–940.

Miksicek, C.H. 1987. Formation processes of the archaeobotanical record. *Advances in Archaeological Method and Theory* 10: 211–247.

Murphy, C., G. Thompson, and D.Q. Fuller. 2012. Roman food refuse: Urban archaeobotany in Pompeii, regio VI, insula 1. *Vegetation History and Archaeobotany* 22 (5): 409–419. https://doi.org/10.1007/s00334-012-0385-8.

Robinson, M., N. Fulford, and K. Tootell. 2006. The macroscopic plant remains. In M. Fulford, A. Clarke, and H. Eckardt (ed.) *Life and labour in late Roman Silchester, excavations in insula IX since 1997,* Britannia Monograph series 22, 206–216. London: Society for the Promotion of Roman Studies.

van der Veen, M., A. Livarda, and A. Hill. 2008. New plant foods in Roman Britain- dispersal and social access, archaeobotany of Roman Britain current state and identification of research priorities. *Environmental Archaeology* 13 (1): 11–36.

Misra, Virendra Nath

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Basic Biographical Information

Virendra Nath Misra (Fig. 1) was born on 17 August 1935 to a farming family in Kandauli village in Farrukhabad district of Uttar Pradesh. In 1951 he became the first student from his village to graduate from high school, which he did at Rastogi School (latter K. R. Rastogi Inter College), Farrukhabad. In 1953 Misra passed his intermediate examination as well as the *Visharad* examination of Hindi Sahitya Sammelan, Allahabad. In 1954 he stood in first position and passed the *Prarthana* certificate examination in Sanskrit from the Government Sanskrit College, Banaras, and won a four-year government scholarship to pursue further studies in Sanskrit. He passed his B.A. entrance examination in 1955 and joined Lucknow University in 1955. He was awarded a two-year bursary scholarship from Lucknow University in recognition of his performance at the B. A entrance examination. He passed his M.-A. entrance examination in 1957 and stood first in order of merit in his class. For his performance he won the Pandit Jagpal Krishna Gold Medal. He also passed the *Purva Madhyama* exam in Sanskrit from the Government Sanskrit College, Banaras.

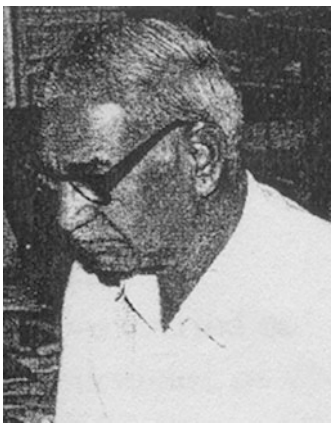

Misra, Virendra Nath, Fig. 1 Photo of Misra

After his M.A., Misra was appointed as a lecturer with the Anthropology Department at Lucknow University, where he taught prehistoric archaeology and social anthropology to B.A. and M.A. students. He got Ph.D. in 1962 from Poona University. On 15 July 1961, he was appointed to an assistant professor's post at Lucknow University and in 1962 he was awarded his Ph.D by Poona University.

From 26 July 1962 to 1981 V.N. Misra was a member staff with the Department of Archaeology, at Poona University, first as a lecturer (1961–1968) and then as reader and head of department (1968–1981). He later stated that he preferred Pune University to Lucknow University due to better facilities and atmosphere. V.N. Misra also passed certificate courses in French and German from Poona University and Max Mueller Bhavan (Goethe Institute) in 1966 and 1971, respectively, and undertook course in Russian at Poona University. In 1981 he joined Deccan College at Pune as a professor of prehistoric archaeology. Again in 1983 V.N. Misra joined the Department of Anthropology at Lucknow University on September. In 1986 he became Joint Director at Deccan College and Director of the College in 1990. He retired from the latter post on 31 August 2000. He was the editor of *Indian*

Society for Prehistoric and Quaternary Studies (ISPQS) in 1989 and also general secretary of the society from 1981 to 2000. Since 2001 he has been the president of the society.

Major Accomplishments

V. N. Misra's career in archaeology has been undertaken during a period of major change in Indian archaeology. During his lifetime many new sites have been discovered and explored. His accomplishments have been achieved local, national and international levels. V.N. Mishra's contributions to archaeology in India started early in his career. During his M.A. he participated in Sankalia's excavation of the Chalcolithic site of Navdatoli in Madhya Pradesh during December 1958. After that, he proceeded to Chittorgarh in Rajasthan in January 1959 and explored Paleolithic sites in the Gambhiri and Berach rivers. From Chittorgarh (Chitorgarh) he went to Pali in western Rajasthan (across the Aravalli Hills) to explore in the Luni River and its tributaries. Through field work in this area and in the valleys of the Banas River and its tributaries in eastern Rajasthan he discovered 14 Lower Paleolithic, 18 Middle Paleolithic, and 4 Mesolithic sites besides a number of Paleolithic and Mesolithic sites which had been discovered by M. N. Deshpande, S. R. Rao, and K. N. Puri of Archaeological Survey of India (ASI) in the valleys of the Chambal rivers and Banas rivers and their tributaries around Chittorgarh. While undertaking his doctoral studies, V.N. Misra wrote a major treatise on the Paleolithic industry of Western Rajputana, which was published in the *Bulletin of the Deccan College* (Misra 1962).

During 1964 and 1965 V.N. Misra analyzed the material from his Rajasthan field work and wrote several articles for different journals and a monograph entitled *Pre- and Protohistory of the Berach Basin*, Southeast Rajasthan, which was published by Deccan College in 1967. He also participated in the prehistoric exploration in the Narmada valley and in the excavations at the Neolithic site of Tekkalakota in Karnataka and the early site of Tripuri in Madhya Pradesh, all under the leadership of H. D. Sankalia. He also explored sites of enigmatic copper hoards as well as Painted Grey Ware and latter cultures in Hardoi, Farrukhabad, Shahjahanpur, and Kanpur districts.

In 1972, V. S. Wakankar (who discovered the site of Bhimbetka in 1957) and V.N. Misra excavated the site in collaboration with the Deccan College.

In 1977, V.N. Misra collaborated with R. P. Dhir, a well-known pedologist of the Central Arid Zone Research Institute (CAZRI), VNM and D. P. Agrawal of Physical Research Laboratory (PRL) to resume a research in Rajasthan to understand the evolution of the environment of the semiarid and arid region, known as Thar Desert, on the western side of the Aravalli. In addition to survey explorations, the team also excavated many sites, namely, Singhvi Talav, Jayal, Chhajoli, Indola-ki-Dhani, Bangar Canal, and in Didwana Lake. V.N. Mishra has played a major role in the development of archaeological research and studies at Deccan College in Pune. In December, 1991 he organized an international workshop at Deccan College on the introduction of African Cultivars into South Asia. The papers were successfully published by the Indian Society for Prehistoric and Quaternary Studies in 2003, Pune, under the tittle Introduction of *African Crops into South Asia*. V.N. Mishra also played a major role in having Deccan College granted the status of Deemed University in 1994.

In 1982, V.N. Misra with the help of V. C. Joshi, the project officer with the Ford Foundation joined the expedition led by the distinguished archaeologist J. D. Clark for search of early humans in Ethiopia. After that V.N. Misra invited Joshi to visit the Deccan College to meet his colleagues and see the research work being undertaken in archaeology. In 1983, Joshi visited and was highly impressed by the research output and potential of the department. This led to the Ford Foundation providing a grant of nearly 300,000 US dollars to the department for argumentation of research facilities. Later, the foundation awarded four more grants and an amount exceeding 800,000 US dollars in total. These grants were used for the acquisition of sophisticated research equipments such as an X-ray diffractometer,

atomic absorption spectrophotometer, a number of microscopes, several vehicles for field work, books and journals for the library and for the establishment of a computer center.

In 1972, during V.N. Misra's tenure as Director of Deccan College, the University Grants Commission in India recognized the archaeology department of the Institute for its Special Assistance Programme (SAP). In 1985 the status of the department was upgraded to being a Centre of Advanced Study (CAS). The work of the center was evaluated by expert committees in 1992 and 1998. On the basis of these reports the University Grants Commission sanctioned substantial grants to the department for the acquisition of laboratory equipments, books, journals, vehicles and the hiring of secretarial staffs. V.N. Misra also established a Deccan College emergency relief fund for the peons, watchmen, and other categories of employees whose salaries are low. In addition, he played a major role in the Indian Society for Prehistoric and Quaternary Studies in 1975, which was established to promote research in prehistory, quaternary studies, human evolution and ethnoarchaeology.

The society and its journal *Man and Environment*, which was founded in 1977, have been a misson for V.N. Misra. He was instrumental in establishing the H.D Sankalia Memorial Lecture and the H.D. Sankalia Young Archaeologist Award through the society.

V.N. Misra's distinguished international career has spanned five decades. In 1966 he collaborated with L.S. Leshnik of Heidelberg University, West Germany to carry out extensive explorations in Rajasthan and Gujarat mainly to test Leshnik's hypothesis that early agriculture may have begun in the foothill region of the Aravalli Mountains. They discovered two Mesolithic sites namely Tilwara in Barmer district in western Rajasthan and Bagor in Bhilwara district in eastern Rajasthan. V.N. Misra and his colleagues C.G. Padval and Lakshaman Matal from Pune excavated the sites jointly with the Department of Archaeology and Museums of the Rajasthan Government, Jaipur. The Bagor excavation (1968 to 1970), remains the largest Mesolithic site excavated in India and has provided excellent evidence of the process of acculturation in Indian prehistory. In 1969 V.N. Misra participated in the Second International Conference of Asian Archaeology organized by the Sri Lankan Government's Department of Archaeology at Colombo and presented a paper on his work at Bagor. In 1970 he was awarded a Homi Bhabha fellowship to study European prehistory. He gave lectures on Indian prehistory at several places and participated in Francois Bordes' excavation at Pech de I'aze and in Henry de Lumley's excavation at Grotte de Lazaret in France. On completion of the fellowship V.N. Misra prepared a monograph on *Mesolithic Age in India*, which he submitted to the Homi Bhabha Fellowship Council. In 1969 Jack Golson of the Australian National University, Canberra met V.N. Misra. He invited V.N. Misra to present a paper on Indian Microlithic industries at the eight meeting of the Far Eastern Prehistory Association, held in January, 1971 in Canberra, Australia, under the auspices of the 28th International Congress of Orientalists. In 1979 V.N. Misra went to Greece under the auspices of the Indo-Greek cultural exchange programme. During this time he visited many famous archaeological sites and museums and also gave lectures on Indian Archaeology in the Archaeology Department of the University of Athens. In 1983 he was awarded a senior Fulbright Fellowship, which he held during January–May 1984 at the Department of Anthropology, University of California, Berkeley. During his 1962 to 1964 explorations in Mewar, he discovered Balathal, one of the nine sites of the Ahar Chalcolithic culture. From the excavation in this site V.N. Misra revealed that the subsistence economy of the Balathal people consisted of cultivation and the domestication of animals and that the technology mainly consisted of copper tools though occasionally stone blades and microliths were also used. V.N. Misra has participated and presented papers in over 50 national and international conferences, seminars, symposia and workshops.

Cross-References

► Acheulean Industrial Complex
► African Stone Age
► Bhimbetka Rockshelters

▶ Ethnoarchaeology
▶ Geoarchaeology
▶ Golson, Jack
▶ Lithic Technology, Paleolithic
▶ Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic
▶ Oldowan Industrial Complex
▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
▶ Surface Survey: Method and Strategies

References

Misra, V.N. 1962. Palaeolithic culture of western Rajputana. *Bulletin of the Deccan College* 21: 86–156.

Further Reading

Misra, V.N. 1971. Two microlithic sites in Rajasthan: A preliminary investigation. *Eastern Anthropologist* 24 (3): 237–288.
Misra, V.N. 1973. Bagor- a late Mesolithic settlement in North-West India. *World Archaeology* 5 (1): 92–110.
Misra, V.N. 1976. The Acheulian industry of rock shelter F-23, at Bhimbetka. Central India. *Puratattva* 8: 13–36.
Misra, V.N. 1989. Stone Age India: An ecological perspective. *Man and Environment* 15 (1): 17–64.
Misra, V.N. 1990. Palaeolithic phase in India. *Ancient Ceylon* 7 (2): 101–149.
Misra, V.N. 1997. Balathal: A Chalcolithic settlement in Mewar, Rajasthan, India: Results of first three seasons' excavations. *South Asian Studies* 13: 251–273.
Misra, V.N. 2001. Prehistoric human colonization of India. *Journal of Biosciences* 26: 491–531.
Misra, V.N. 2004. Contribution of anthropology or archaeology to understanding the evolution of Indian society. *The Eastern Anthropologist* 57 (1): 1–27.

Mission Archaeology in North America

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Introduction

Religious missions have played an important role in colonial programs across the globe, and in North America they were one of the most intense forms of colonialism encountered by indigenous peoples. The archaeological study of missions has followed the same developmental trajectory as research in historical archaeology more generally: from particularistic studies focused on restoration of historic sites to laboratories for building cross-cultural generalizations about culture change and to increasingly collaborative research that furthers our understanding of intercultural entanglement, resistance to colonial domination, and human agency.

Mission archaeology includes research on missions founded by various religious orders representing the colonial interests of several European nations in North America. Significant archaeological work, for example, has been conducted on the interactions between Native Americans and Jesuit missionaries operating as part of the French colonial enterprise (Walthall and Emerson 1992), and archaeological studies of mission contexts are growing alongside interest in the archaeology of colonialism more broadly. Missions established in Spanish colonial territories, particularly those founded by Franciscan missionaries, have attracted the most scholarly attention due to their wide geographic range, long period of operation, and close integration into the broader Spanish Empire. These missions were intended to be the primary means of integrating diverse groups of indigenous peoples into the emerging political and economic order and were a centerpiece of the Spanish colonial strategy in North America.

Definition

Mission archaeology is usually focused on the archaeological study of mission complexes and the activities undertaken therein. Recently, however, this traditional understanding of mission archaeology has been expanded to encompass a broader range of sites as well as the social and cultural implications of missionization (Panich and Schneider 2014). Scholars interested in mission archaeology typically draw on diverse lines of evidence, including material culture, archival documents, and ethnographic data (Graham 1998: 25–26). To best highlight these trends, this entry focuses on the Spanish missions of North

America, which date from the 1560s to the 1840s and stretch from the Atlantic coast of Florida and Georgia across the borderlands to Alta and Baja California.

Key Issues

Mission archaeology today falls under the broader category of the archaeology of colonialism, and it shares many of the same theoretical concerns. In North America, missions were often the first permanent colonial establishments, and their study can inform our understanding of frontier economies, core-periphery relations, and the intersection of religious and secular interests (Van Buren 2010). Yet for most contemporary practitioners, the goal of mission archaeology is to examine the complex social relationships and cultural contacts that occurred at missions and related sites. Colonial missions were specifically designed to convert indigenous peoples not just to Christianity but also to Euro-American lifeways, providing archaeologists with datasets uniquely suited to answer broader questions about colonialism and the ways in which native peoples negotiated its constraints.

Mission Architecture

Across North America, many archaeological projects have focused on discovering and delimiting mission architecture. In the Southeast, researchers have worked to locate colonial mission complexes, none of which survived intact owing to the vagaries of climate, building materials, and other forces (McEwan 1993; Fig. 1). From Central Texas to the Californias, where arid climates and durable building materials facilitated the preservation of colonial architecture, a great deal of research has been conducted to aid the reconstruction of mission sites and their interpretation for the public (Fig. 2). In addition to providing crucial information about the history of occupation of particular sites, projects concerned with mission architecture also have the potential to illuminate more general issues of colonial and indigenous land use.

Mission Archaeology in North America, Fig. 1 Aerial photograph of the two superimposed convento structures at Mission Santa Catalina de Guale in modern-day Georgia, USA. The earlier structure is thought to have been destroyed during the 1597 Guale rebellion. (Photo courtesy of David Hurst Thomas)

Continuity and Change

In the second half of the twentieth century, much archaeological research on missions was driven by an interest in acculturation, the cultural modification that occurs as one group adopts the practices and associated material culture of another. As it was employed archaeologically, this framework sought to quantify the amount of culture change that took place among mission neophytes – as baptized native peoples were called – by examining ratios of "Indian" to "European" artifacts. Early acculturation studies at Spanish mission sites were undertaken by James Deetz at Mission La Purísima in California and by Charles Di Peso at Mission San Antonio de Padua de Casas Grandes in Chihuahua, Mexico. Despite their widespread use, particularly in California,

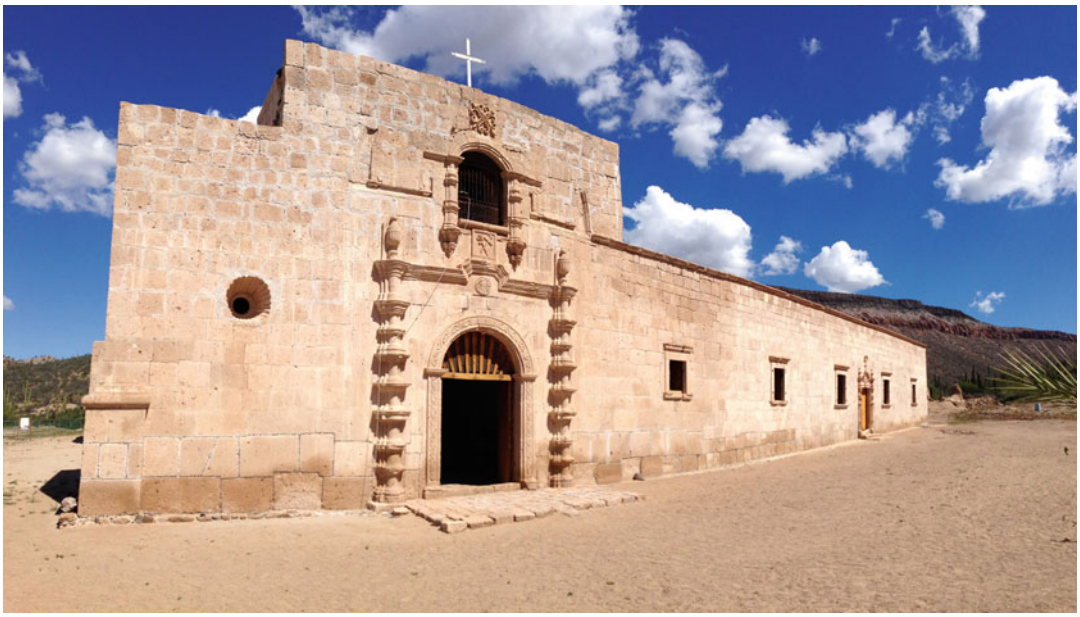

Mission Archaeology in North America, Fig. 2 Mission San Borja, Baja California, Mexico. The stone church and an earlier adobe complex have been stabilized by the Instituto Nacional de Antropología e Historia. (Photo by Lee Panich)

acculturation approaches have fallen out of favor in mission archaeology and the archaeology of colonialism more broadly. This shift stems from the recognition that the material and origin of a particular artifact say little about who used it, how it was used, or the symbolic value that may have been attached to it.

The results of several decades of mission archaeology focused on the issues of change and continuity in indigenous societies suggest that Native Americans did not necessarily abandon all of their traditional practices in favor of those of Euro-American colonizers. In Texas and adjacent portions of northern Mexico, archaeologists found that native peoples living at mission sites continued to employ ceramic and stone tool technologies that were direct extensions of precontact traditions (Hester 1989). Archaeological evidence from California additionally indicates that some native neophytes continued to dwell in traditional structures (Fig. 3) and to engage in some aspects of their hunting and gathering economies as well as other cultural practices such as gambling and contacts with indigenous communities living outside of colonial control (Lightfoot 2005; Panich 2016; Fig. 4).

Resistance and Power

Archaeologists have also sought to understand the issues of power that underpinned the missionary enterprise, which often included forced relocation, burdensome labor regimens, and strict social controls. One interesting pattern at many Southeastern missions, where shifting political alliances both facilitated and hindered missionization, is that indigenous council houses are often part of the formal mission complex, as at Mission San Luis de Talimali. This architectural layout, unique to La Florida, underscores the political accommodations made by the Spanish and their would-be converts (Milanich 1999). In the American Southwest, numerous archaeologists have investigated the Pueblo Revolt of 1680 in which Pueblo peoples launched a broad offensive against the Franciscan mission system that involved not just armed resistance but also more subtle reworking of material culture to symbolize social relationships and identities (Liebmann 2012; Preucel

Mission Archaeology in North America, Fig. 3 Native American housepit excavated near the site of Mission Santa Clara de Asís in California, USA. (Photo by Rebecca Allen)

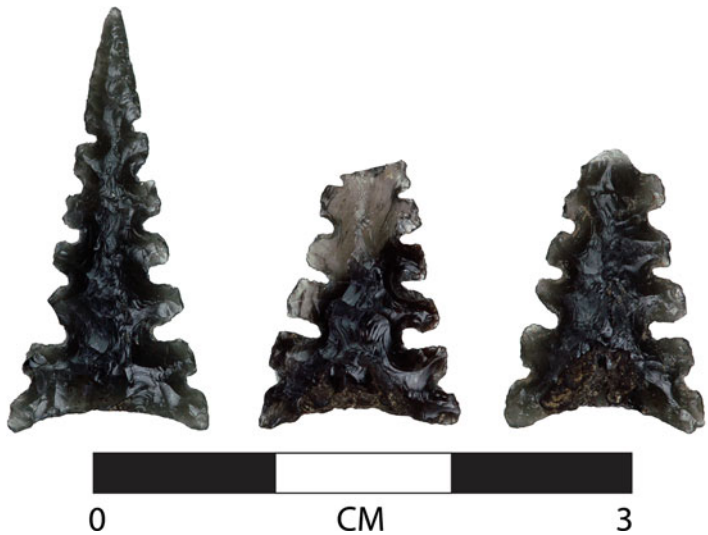

Mission Archaeology in North America, Fig. 4 Obsidian projectile points recovered from Mission Santa Clara de Asís in California, USA. The obsidian used to make the object was likely obtained from neighboring unmissionized groups. (Photo by Lee Panich)

2002). Across the continent, archaeologists are also looking beyond the mission walls to find evidence of native resistance to missionization, which often took the form of fugitivism, the maintenance of autonomous villages, and strategic alliances among native groups (Panich and Schneider 2014).

The Spanish mission system exacted a very human toll on indigenous peoples throughout North America. Bioarchaeological studies demonstrate how a variety of factors – including relocation to mission sites, increased labor demands, dietary shifts, and introduced diseases – resulted in a general decline in the health of indigenous communities, as well as in broader demographic changes during the colonial period (Larsen 2001). Despite the negative outcomes of missionization, excavations of mission cemeteries can also illuminate the power of mission doctrine and how it was negotiated by missionaries and native peoples alike. At Mission Santa Catalina de Guale in Georgia, more than 400 native individuals interred in the mission cemetery were laid to rest largely in accordance with Christian practices, although the presence of significant quantities of grave goods suggests that the Franciscan friars

Mission Archaeology in North America, Fig. 5 Assorted beads (out of almost 70,000) recovered from the Santa Catalina de Guale cemetery in Georgia, USA. Bead types pictured include Ichetucknee Blue, Seven Oaks Gilded, and several hollow, blown beads. (Photo by Bill Ballenberg, courtesy of David Hurst Thomas)

deviated from Church doctrine to accommodate the practices of local indigenous groups (Thomas 1988; Fig. 5).

Identity

Research into ethnicity and identity, long a concern for mission archaeologists, is undergoing a fundamental shift. Rather than simply measuring the loss of indigenous cultural practices in mission settings, archaeologists are today considering the various ways that native peoples reinterpreted their identities during the colonial period. In California, studies of archival documents and archaeological artifacts such as mission ceramics demonstrate that native peoples reinterpreted individual and group identity, which often coalesced around a particular mission establishment (Lightfoot 2005). In the Southeast, scholars are also examining the creation of new ethnicities at colonial sites. Christopher Stojanowski, for example, employs skeletal evidence from native communities before and after contact with Europeans to understand the process of demographic change and ethnogenesis in the region (Stojanowski 2010). Throughout North America, missionization often involved changes in the practices of everyday life as well as in group structure and social organization. To fully understand the implications of such changes, however, archaeologists are examining them not simply as the result of European domination but also as stemming from the interested actions of indigenous peoples.

Building from the material evidence for the reinterpretation of native identities in the colonial period, some archaeologists are considering the implications of missionary colonialism for native peoples today. Kent Lightfoot and colleagues are exploring this issue in California, where many former mission Indians are not recognized by the federal government as legitimate Native American groups due to the often dramatic demographic changes of the colonial period and the assumed success of the missionary program in converting native peoples to Euro-American lifeways (Lightfoot et al. 2013). Recent findings suggest that the processes of population aggregation and the creation of novel forms of social organization and identity put missionized groups at a political disadvantage compared to other indigenous groups who more closely resembled the ideal anthropological model of California Indians. By exploring the varied ways that the diverse indigenous peoples who were drawn into colonial missions managed to maintain and recreate their identities during the colonial period and its aftermath, archaeologists may find common ground for collaboration with descendant communities seeking governmental and popular recognition.

Future Directions

Mission archaeology has long focused on the impacts of missionization on Native American

groups, but current approaches are examining not just change but also the active persistence of indigenous peoples in mission contexts. Across North America, archaeological research at missions and related sites – increasingly conducted in collaboration with descendant communities – shows that native peoples often maintained settlement patterns, architectural styles, technologies, and/or diets that were distinct from those of Euro-American colonists while simultaneously adopting some aspects of introduced material culture. In many cases, the archaeological evidence can be seen as the conscious reconfiguring of traditional practices given the constraints and opportunities of the colonial period. Future research will help develop non-dichotomous ways of understanding continuity and change that highlight the agency of native people.

Yet archaeological evidence also demonstrates the tragic effects of infectious disease, stringent labor demands, and overcrowding at missions that combined to significantly change the demographic structure of native polities and which continue to reverberate across the continent. As seen in the controversy surrounding the recent canonization of Franciscan missionary Junípero Serra, who founded the Alta California mission chain, mission sites today are seen by many Native Americans and others as monuments to an unjust colonial system (Panich 2016). By revealing material evidence of daily life under missionization, archaeology can contribute to the ongoing public debate about the place of colonial missions in the contemporary landscape. The promise and challenge of mission archaeology in the twenty-first century will be to harness community collaborations and public interest to stimulate conversation about the lives of people who experienced missionization firsthand and who are today still grappling with its continuing legacies.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Ethnic Identity and Archaeology
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Lightfoot, Kent G.
- ▶ North America (USA): Historical Archaeology
- ▶ North America During the European Contact Period

References

Graham, E. 1998. Mission archaeology. *Annual Review of Anthropology* 27: 25–62.

Hester, T.R. 1989. Perspectives on the material culture of the mission Indians of the Texas-northeastern Mexico borderlands. In *Columbian consequences. Vol. 1: Archaeological and historical perspectives on the Spanish borderlands west*, ed. D.H. Thomas, 213–229. Washington, DC: Smithsonian Institution Press.

Larsen, C.S., ed. 2001. *Bioarchaeology of Spanish Florida: The impact of colonialism*. Gainesville: University Press of Florida.

Liebmann, M. 2012. *Revolt: An archaeological history of Pueblo resistance and revitalization in 17th century New Mexico*. Tucson: University of Arizona Press.

Lightfoot, K.G. 2005. *Indians, missionaries, and merchants: The legacy of colonial encounters on the California frontiers*. Berkeley: University of California Press.

Lightfoot, K.G., L.M. Panich, T.D. Schneider, S.L. Gonzalez, M.A. Russell, D. Modzelewski, T. Molino, and E.H. Blair. 2013. The study of indigenous political economies and colonialism in native California: Implications for contemporary tribal groups and federal recognition. *American Antiquity* 78 (1): 89–104.

McEwan, B.G., ed. 1993. *The Spanish missions of La Florida*. Gainesville: University Press of Florida.

Milanich, J.T. 1999. *Laboring in the fields of the lord: Spanish missions and southeastern Indians*. Washington, DC: Smithsonian Institution Press.

Panich, L.M. 2016. After Saint Serra: Unearthing indigenous histories at the California missions. *Journal of Social Archaeology* 16 (2): 238–258.

Panich, L.M., and T.D. Schneider, eds. 2014. *Indigenous landscapes and Spanish missions: New perspectives from archaeology and ethnohistory*. Tucson: University of Arizona Press.

Preucel, R.W., ed. 2002. *Archaeologies of the Pueblo Revolt: Identity, meaning, and renewal in the Pueblo world*. Albuquerque: University of New Mexico Press.

Stojanowski, C.M. 2010. *Bioarchaeology of ethnogenesis in the colonial Southeast*. Gainesville: University Press of Florida.

Thomas, D.H. 1988. Saints and soldiers at Santa Catalina: Hispanic design for colonial America. In *The recovery of meaning: Historical archaeology in the eastern United States*, ed. M. Leone and M.P. Potter, 73–140. Washington, DC: Smithsonian Institution Press.

Van Buren, M. 2010. The archaeological study of Spanish colonialism in the Americas. *Journal of Archaeological Research* 18: 151–201.

Walthall, J.A., and T.E. Emerson. 1992. *Calumet and fleur-de-lys: archaeology of Indian and French contact in the midcontinent*. Washington, DC: Smithsonian Institution Press.

Missionization and Mission Archaeology in New Zealand and Australia

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State of Knowledge and Current Debates

Recent work in the field of mission archaeology in New Zealand and Australia shows that despite often-assumed historical similarities of these geographically close countries, there were two differing histories of colonial and indigenous encounter, leading to different trajectories of missionization.

Missionization was in the vanguard of colonization in New Zealand, where the first Christian, evangelical mission was founded in 1814, preceding formal British annexation in 1840. In Australia the situation was reversed. The first British convicts arrived in New South Wales (NSW) in 1788, but despite earlier efforts, it was not until about 1832 that missions to Aboriginal Australians were properly established (Fig. 1).

New Zealand mission stations were primarily the initiative of individuals and Protestant evangelical organizations such as the Church Missionary Society (CMS) and the Wesleyan Missionary Society (WMS). Missionization in Australia was quite different (Middleton 2008: 10, 2010). "Missions" in Australia included government institutions, sometimes considered carceral, in which indigenous Aboriginals were confined, a central element in Australian Aboriginal policy (Lydon and Ash 2010: 1; Grimshaw and Nelson 2001;

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 1 Map of New Zealand and Australia showing locations of relevant sites

Sutton 2003). This pivotal difference is a factor in the analysis of a two-part typology of mission stations in the New World, the "household" and the "institutional" mission (Middleton 2008: 28–30, 2010).

Grimshaw and Nelson's (2001) analysis of the "civilizing mission" of evangelicals supports the argument for Australian missions as "carceral" institutions. In Victoria as elsewhere in Australia, the congruence of missionary goals and state agendas led to a situation where missions appeared to run almost as prisons. "Missionaries and managers appeared not to be their [inmates'] protagonists but their jailers. Religious and secular staff had acquired a capacity for surveillance, coercion and punishment … few outside Australia ever realised," where a "travesty of Christian humanitarianism" was demonstrated (Grimshaw and Nelson 2001: 297).

More recent approaches however have reconsidered the view of the Australian mission as a repressive regime (Lydon and Ash 2010: 2; Morrison et al. 2015: 98–99; see also Flexner 2014: 59–61). Lydon and Burns (2010: 41; Lydon 2014) consider this approach marginalizes Aboriginal people, perpetuating a "view of the missions as places of acculturation rather than indigenous transformation and cultural renewal," the ruins of the mission seen to mark the disappearance of Aboriginal identity and the advent of a white future. Mission stations, in this case principally government institutions run by Protestant missionaries working as their agents (Grimshaw and Nelson 2001), are now viewed as "homelands," where kinship ties were formed and Indigenous ownership assumed.

Missionization in New Zealand commenced in 1814 with the establishment of the first Church Missionary Society mission at Hohi (Bay of Islands, northern New Zealand), also the first permanent European settlement in the country (Fig. 2). This was the brainchild of Samuel Marsden, chaplain to the British convict settlement, established 1788 at Port Jackson (Sydney). Protestant missions in New Zealand exemplify the "household" mission. These were marginal, fragile establishments based on the model of the Christian household, the missionary family living

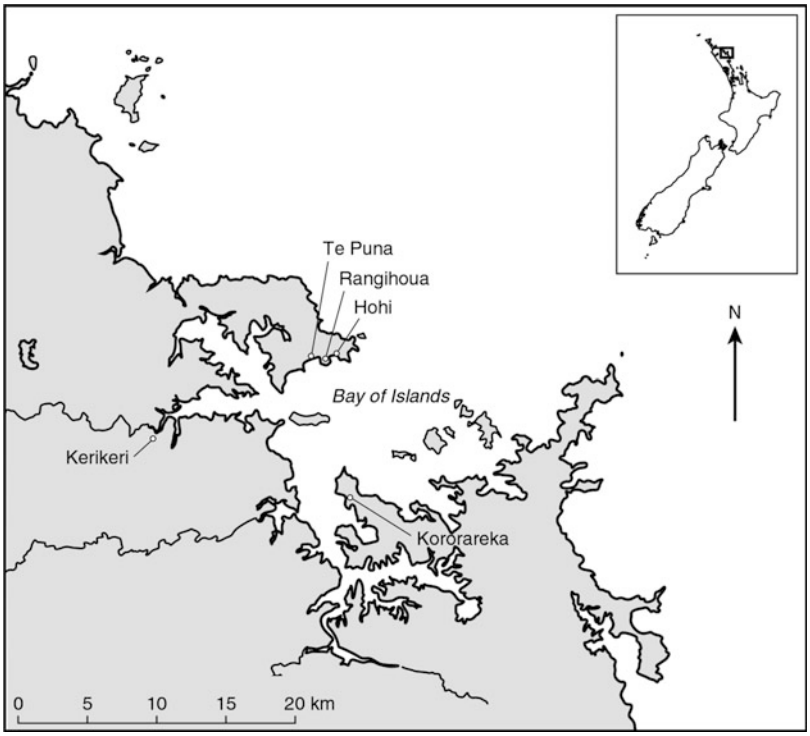

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 2 Map of Bay of Islands, New Zealand, showing relevant sites

in a small home, initially dependent on Māori benefactors for protection and food. Māori were not contained within the mission but, from the fortifications (known as *pā*) where they lived, exercised power and control over the mission's inhabitants. Spatial factors also differentiated these two models. "Household" missions were usually surrounded by fences, built to protect mission families and prevent unwanted intrusions by Māori (other than the benefactor tribe); the Māori population lived beyond these walls, the missionary often "itinerating" or traveling to nearby villages to catechize, preach, and Christianize. By contrast, the "institutional" mission usually featured fences constructed to incarcerate Aboriginal Australians. Within such institutions, Aboriginal lives were segregated and regimented and forced child removals began the phenomenon of the "Stolen Generations" (Lydon 2005). Although these were sites of coercion, they also served as "refuges from the effects of invasion" and have become sites "inscribed with new cultures and identities" (Lydon and Ash 2010: 2).

During the twentieth century, anthropologists and historians examined Australian missions and government reserves through the lens of "culture contact" and similar approaches (for examples of this literature in Victoria, see Lydon 2009: 42–66). Mission archaeology itself began in Australia with Birmingham's (1992) seminal work on Wybalenna Station, Flinders Island, where some 100 surviving Tasmanian Aboriginals were moved in 1830. Birmingham's fieldwork was undertaken between 1969 and 1971, the same decade that James Deetz began his work in California. This settlement typifies the Australian situation. Wybalenna was "part of a government segregation initiative to protect white settlers and Indigenous Australians from each other during the European occupation of Aboriginal land" (Birmingham and Wilson 2010: 18). The remnant Aboriginal population was effectively incarcerated on the island (Birmingham 1992). Birmingham (Birmingham and Wilson 2010: 17) used documentary records alongside a "limited salvage excavation" to reconstruct the 15 or so years of Aboriginal occupation at Wybalenna. Investigations revealed the chapel, built in 1837, and the remains of five brick cottages out of a row of an original twenty which had once each housed two Tasmanian couples. One of these was used as the "native issuing store" (Birmingham and Wilson 2010: 21). The cottages opened onto a terrace, which Commander George Robinson referred to as the "Natives' Square" (Birmingham and Wilson 2010: 20). A range of European items, including transfer-printed ceramics, glass, buttons, clay pipes, nails, and other metal, along with indigenous artifacts and faunal remains, was recovered, with the presence of mutton for consumption increasing over time. Other faunal elements included dog and marsupials, both large and small, as the settlement's occupants hunted for food to supplement the rations, especially when these did not arrive.

The deposition of the artifacts suggested that the cottages' inhabitants had taken up domestic practices such as routine sweeping of floors, often out the front doors of houses onto the terrace. Some items suggested rewards or gifts given for co-operating with "Robinson's work-and-reward plan" (Birmingham and Wilson 2010: 23). These included beads, marbles, tobacco, and clay pipes; tobacco apparently played an important role in this reward system and was a habit taken up "to excess." More unusual was the number of glass flakes, used for hair cutting, scarring, and medical purposes, as well as butchering meat. George Robinson's journal details daily events, rations, and goods supplied such as clothing and building materials. He also paid the inhabitants with goods for gardening, fencing, mutton birding, and sheep minding, as well as other work. Robinson established a weekly market where the Tasmanians could exchange or sell goods they had produced, including items such as wallaby skins. Wybalenna had a structure similar to many mission settlements with obligatory church attendance, work, and education programs, carried out with the typical aim of "Christianization and Europeanization" (Birmingham and Wilson 2010: 19). Wybalenna was not a success. The mortality rate was high and the settlement closed in 1847 when the last 47 surviving Tasmanians moved to a new location close to Hobart. Despite a scheme that included punishment and

regimentation, the Tasmanian inmates did not conform to expectations, and their efforts at gardening or sheep tending were unsuccessful. They lamented the loss of their traditional practices, which Robinson had effectively banned, despite promises to the contrary when the settlement was first established. Birmingham and Wilson (2010: 27) note that it was the "non-segregated Islander culture that survived," a population of European sealer men and Aboriginal women, some of whom later returned to Wybalenna and persisted on other islands in Bass strait.

While Birmingham's work at Wybalenna involved liaison with the local community of "Tasmanian islanders" (local residents) in the late 1960s (Birmingham and Wilson 2010: 17), by contrast the Lutheran mission site at Killalpaninna, in the northeast of South Australia near Lake Eyre, was long deserted and remote when research was undertaken there in the 1990s. This mission, which was also a government ration station (supplying tea, sugar, and flour), was established in Dieri country in 1867 and closed in 1914. Birmingham (2000; Birmingham and Wilson 2010) used historical and archaeological data to test a set of theories relating to Aboriginal responses to culture contact at this mission: resistance, creolization, and optimal foraging. GIS was used to carry out an extensive survey of abandoned surface scatters, which formed five distinct groups of campsite areas. No excavation was undertaken. Archaeological methods used in the project consisted of "surface surveying, mapping, quantifying and classifying material culture" from the artifact scatters (Birmingham 2000: 365). Birmingham critiqued the dichotomous "dominance-resistance" concept for lacking a "dynamic dimension," not accounting for change and innovation, and disempowering the indigenous or invaded in this equation, who were transformed into victims. Creolization and optimization theories, by contrast, allow for change and resistance without negative associations. Creolization can account for new, vigorous, hybridized forms of culture and innovative uses of material culture. In the context of the mission, optimization theory viewed the mission (and ration station) as a source of "systematic quarrying and utilization of resources" for the local population (Birmingham 2000: 363). All three of the models were confirmed at the mission, where European goods such as bottle glass and salvaged items were used in new, indigenous ways and the Lutherans themselves recorded the systematic Aboriginal exploitation of mission rations and goods, as well as the traditional Dieri practices which they themselves were destroying. Campsite artifact assemblages demonstrated differential relationships with the mission, depending on distance from the mission structures. The Lutherans dismissed the Dieri deep knowledge of the arid desert environment, in which they had traditionally lived on plant and game, drew strength from the environment through ritual and ceremony, and were part of a large network which exchanged stone, ochre, and pituri (a mixture of leaves and wood ash chewed as a stimulant). Once Dieri people had accepted baptism, they were expected to live within the "mission confines," to attend school, and to train for work as domestic or station servants and were forbidden access to traditional practices and lifestyle (Birmingham and Wilson 2010: 29), in a manner which suggests institutional control and repression. The archaeology of the earliest campsites confirmed this separation from traditional life. As the white settler pastoral economy expanded, Dieri traditional life was abandoned and Killalpaninna was eventually taken over as a cattle station, but the mission teaching in literacy, pastoral, and domestic work had provided new skills to the Dieri people, bringing about the development of "a dynamic new community with transformed skills" (Birmingham and Wilson 2010: 34).

The Moravian mission of Ebenezer, founded in 1859, was one of three established in Victoria in the second half of the nineteenth century and one of the state's six government reserves for Aboriginals (Lydon 2009: 5). In short order, in the year after its foundation, the baptism of Nathanael Pepper was celebrated there as the first Aboriginal conversion to Christianity, a "giant milestone for missionaries" (Lydon 2009: 90). Ebenezer was built on traditional country of the Wergaia-language speakers, on

land of the Wotjobaluk, at the place known by them as "Banji-bunag" or "Bunyut Bunnut," where Jane Lydon carried out a research program, starting in 2003. Lydon (2009: 254–270; Lydon and Burns 2010: 44) began this project with the acknowledgement of the "complicity" of the discipline of archaeology with imperialism, with the ways in which this created distance between Indigenous people and their heritage, and the power dynamics at play, disadvantaging those people. With this in mind, and the need to carry out research under new, decolonizing frameworks, the project at Ebenezer took place in consultation and collaboration with descendants of the Wergaia, represented by the Goolum Goolum Aboriginal Cooperative and the Wotjobaluk Traditional Land Council. The mission (a term Lydon (2009: 5) used interchangeably with "reserve") consisted initially of a complex of mission house, dormitory, kitchen, and other outbuildings such as a school room. By 1871 this had expanded to 33 buildings, including twenty "dwellings of natives," with more under construction (Lydon 2009: 136).

Archaeological investigations of the mission house site recovered an assemblage of familiar nineteenth-century artifacts, representing "systems of European domesticity" and typical of other "contemporary colonial sites across Victoria" (Lydon 2009: 137): slate pencil and tablet fragments, clay pipes, and blue and white transfer-printed ceramics in Willow and Asiatic Pheasant patterns. Familiar clothing was issued to the reserve inmates from the mission store: moleskin trousers, twill shirts, blankets, shoes, straw hats, large quantities of fabric, and more, along with supplies of tea, rice, tobacco, sugar, flour, and soap. The Moravians considered that the "consumption of European material goods" was a fundamental aspect of the measure of the "civilization" Indigenous people. This went hand in hand with their demonstration of the arts of domesticity, the cultivation of the land, and the entire adoption of European culture (Lydon 2009: 131). Important in this process was the realm of the household, where "women's domestic management became proof of missionary success" (Lydon 2009: 13).

This mission, or reserve, was a refuge for the Wergaia people from a hostile settler population; Aboriginal descendants of mission inmates now acknowledge a deep but ambivalent connection to Ebenezer and other similar places. As is the case with other Australian missions, archaeology has become important in recent years in the process of reclaiming such places for their descendent communities. While built heritage such as remaining church structures may appeal to the non-Aboriginal community, Aboriginal focus tends to rest on "the more ephemeral traces of Aboriginal-occupied households" and ancestral graves, with a variety of noninvasive archaeological techniques used to identify the location of formerly lost burials (Lydon and Burns 2010: 43). As one of the Indigenous descendants expressed this relationship, "Ebenezer itself as a building is neither here nor there for me but Ebenzer in my story lines is like my left or right arm, it's quintessential to my whole being . . . it's just part of our story" (quoted in Lydon 2009: 247).

At the northern extreme of the Australian continent, in Queensland, Morrison et al. (2015: 98) have argued that at Weipa mission, on the Cape York Peninsula, neither the "household" nor the "institutional" models apply ("Institution or village," a heading enquires). They suggest "new conceptualisations of mission communities are required . . . to highlight the evident variabilty" in the ways missions operated. The Weipa mission, one of three Moravian missions on the Cape York Peninsula, was established in 1898 on Anathangayth country, but on a reserve declared by the Queensland government. This was a Moravian mission, but established for the Presbyterian Church; while initial missionaries were Moravian, later they were Presbyterian. The site's Anathangayth name is Waypandan, where Morrison and colleagues (2015: 86) carried out collaborative research with community Elders to uncover Weipa's "real history." It only had a short life and was abandoned by 1932 when the settlement shifted. By contrast, the two other Cape York Peninsula Moravian missions, Mapoon and Arukun, continued until the 1960s. The researchers argue that "the emergence of the

social institutions used within the mission, along with the spatial practices of the missionaries, reflect a complex set of exchange relationships between Aboriginal people and missionaries focusing on labor, food and material goods" (Morrison et al. 2015: 86). As at Wybalenna, tobacco formed an important trade item and was sometimes withheld as punishment. These exchange networks were essential to the Moravian enterprise and the survival of the mission.

Morrison and colleagues surveyed 75 hectares of the mission complex, electronically recording archaeological features such as exposures of cultural material, remains of built structures, landscape modifications such as mounds and depressions, and individual artifacts. A large collection of several hundred historical photographs was also used to determine the spatial layout and function of buildings within the complex and to compare the existing landscape with aspects of the historical. Building remains included the church, with "slumped earthen walls" (originally of pise de terre construction), mission house, assistant's cottage, dormitories, and a storehouse – sometimes serving as an "impromptu jail" to incarcerate and punish mission inmates (Morrison et al. 2015: 91). The mission house was of a typical "Queenslander" style, built on high piles and of weatherboard cladding. Girls and boys were housed in separate dormitories located close to the mission house or "manse," and the site was enclosed by a complex of fences. While children were confined to dormitories at night, it appears that during the day, they were free to come and go between the mission and the outer villages where their families lived. "Physical confinement" and imprisonment were also used when children "ran away" or broke the rules, so the boundaries between freedom and restraint appear to have been quite blurred. The "village," consisting of a "long row of bark cottages" adjacent to the mission, as described by a visitor in the early twentieth century, was the frequent object of the historical photographs and was probably the two parallel rows of structural remains identified in the archaeological survey, with mounds at the rear consisting of scatters of cultural remains and midden (Morrison et al. 2015: 93).

After 18 years of labor, at Christmas in 1916, the missionary Brown lamented the lack of converts to Christianity. The mission suffered from drought and disease (malaria) and existed "mostly on government funds" as it could not produce enough food to support itself; "no fish no ducks no nothing" (quoted in Morrison et al. 2015: 87). By 1933 the mission had moved, but Aboriginal people continued to visit Waypandan, and at the time of research, Elders recalled going there as young children, remembering their parents' and grandparents' houses and orchards.

At Weipa, and as Lydon (2014: 233) found at Ebenezer, the spatial layout formed a "didactic landscape" (Morrison et al. 2015: 100), presenting a "normalizing," westernized, and hierarchical model, with "neat rows" of houses and fenced yards. Beyond this lay the village, where Aboriginal inhabitants could overlay "their own spatial practices." The same spatial layout – the row of English style cottages – was found at Wybalenna (above), equally a "didactic landscape" and perhaps typical of the Australian mission setting.

Mary-Jean Sutton's (2003: 78) analysis of 41 of Queensland's approximately 64 Aboriginal institutions found that in twelve of her sample, the use of "locks, wire mesh enclosed verandahs, barred windows, barbed wire fences, strictly regimented spaces and segregated built environments" on missions and government reserves demonstrated the characteristics of Goffman's (1962) "total institution," leading to her finding that many "missions and reserves in Queensland were total institutions and the spatial and physical environment of these institutions was an attempt at social control over Aboriginal peoples" (Sutton 2003: 78). Some missionaries themselves believed that missions functioned in a manner similar to prisons and were places where severe discipline was enforced and punishment meted out. Such institutions segregated the sexes and separated families, sometimes using wire fences and locked doors to demarcate and protect girls' dormitories, but the one key attribute of the total institution was the "division between inmates and staff"' (Sutton 2003:79). Included in this sample were the Weipa, Aurukun, and Mapoon missions, all those on the western Cape York Peninsula.

Some years later, Sutton (2015; Sutton and Colyer 2013) carried out further intensive PhD research at Mapoon, the first Moravian mission on Cape York Peninsula, established in 1891. The Indigenous Tjungundji people occupied it up until 1963, when their removal was enforced by the burning of the settlement. Sutton's (2015: Abstract) work examined the ways in which cultural heritage values are generated, and she explored the relationship between Indigenous and mission families. The "total institution" no longer formed the focus of her research, and Sutton now worked closely with the Mapoon Indigenous community on a "covenantal archaeology." This explored the trauma suffered when the Queensland Government and the Australian Presbyterian Church purposefully destroyed the mission buildings by fire in 1963. The removal of families resulted in deep trauma or "solastalgia" for the mission's former Aboriginal inhabitants and their descendants. Sutton used noninvasive archaeological techniques such as mapping and "counter-mapping," recording cultural heritage sites and adding voices of the former mission inhabitants to this. Sutton argued that "storytelling" and narrative, as told by community elders, is as an essential tool of archaeological practice at Mapoon. Mapoon's spatial layout was similar to other Queensland institutions (Sutton 2003), with surveillance and regulated spaces. While this mission had maintained control over its inhabitants, it was also a place of strong attachment for them (Sutton 2015: 177, 91), as Lydon (2009; Lydon and Burns 2010) had found at Ebenezer. The mission site formed a "cultural landscape of multiple layers and meaning and values" (Sutton 2015: 117), with the mission compound and the Mapoon Mission Cemetery forming a central focus of this. Elders use the remains of mission buildings and the surviving garden layout, including the symbolism of the Moravian missionaries, to evoke memories, forming a syncretic system of "cultural values and Indigenous agency." Both Mapoon people and former missionary families (some of whom have traditional Tjungundji names) share a strong attachment to the former mission compound and in particular the Mapoon Mission Cemetery, which is now acknowledged as an important cultural heritage site. Sutton's (2015: 228) archaeological practice was critical to the Mapoon people, as it renewed their "strong attachments to country," reestablished kinship networks, and helped to heal the solastalgia the Indigenous community experienced. These cultural heritage sites now receive the acknowledgement and preservation that they have long deserved.

The Wellington Valley mission in northern NSW was the first CMS mission in Australia, established in 1832 in the structures of the earlier Wellington Convict Station (Ireland 2010). The "colonial landscape" of the convict and then mission station remains intact, recognizable today. Tracy Ireland's (2010) work revealed the location of the former government, then mission house, military barracks, and a store, as well as other sites beyond what is now the Maynggu Ganai Historic Site, after its purchase by the NSW Government for the National Parks and Wildlife Service. The colonial government transferred the convict station to the CMS with the expectation that this would facilitate the settler acquisition of land and the acculturation of the Indigenous Wiradjuri people to work within the pastoralist industry. This was not successful, and the mission closed in 1842. Here, as well as in other missions, Aboriginal children were forcibly removed from their families and confined along with young women within the mission compound. As at the Ebenezer mission, and in New Zealand's "household" missions, the role of missionary wives within the mission house and domestic sphere played a vital role in modeling a "civilized" Christian ideology within a larger "natural" landscape (Middleton 2013a). Today, the Maynggu Ganai landscape can be read as a significant place in the "local reconciliation process," where both "black and white people together" value the landscape for its entangled cultural past and contested histories (Ireland 2010: 152). Ireland acknowledged these values, which resonate with some of Australia's most important current cultural and political issues, in the conservation plan for the site.

Ireland's examination of Maynggu Ganai Historic Site began with discussion of an 1826

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 3 Wellington Valley, New South Wales, looking east from the Government House. Augustus Earle, 1826. National Library of Australia PIC Solander Box B5 #T62 NK12/24

watercolor of the convict station by English artist Augustus Earle, featuring an Australian Aboriginal in the foreground of a colonial landscape (Fig. 3). Later that same year, Earle traveled to the Bay of Islands, New Zealand, where he executed studies of the Hohi mission (Fig. 4; Middleton 2014: 29, 31, 65; Smith et al. 2012; Smith et al. 2014), the Kerikeri mission, the Māori stronghold at Kororareka, and other subjects.

In 1806 the Rev. Samuel Marsden and the Bay of Islands chief, Te Pahi, had a fateful meeting in Sydney, NSW (Middleton 2008, 2014; Smith in press). Te Pahi had travelled there to see aspects of the English convict settlement, news of which had filtered through to him from the ships that anchored close to his home at Te Puna and Rangihoua in Pēwhairangi, the Bay of Islands, and through the few Māori who had ventured beyond New Zealand and back again in those early years of encounter, at the turn of the eighteenth century. Marsden and Te Pahi became firm friends, and Te Pahi inspired Marsden to establish a Christian mission to Pēwhairangi Māori. After delays, including his voyage back to England to get the support of the CMS for this venture, Marsden and his group of three "mechanic missionaries" and their families, along with ticket-of-leave convicts from Sydney (coming as laborers), finally anchored off Rangihoua pā at the very end of 1814. By this time, Te Pahi was dead and his nephew, Ruatara, had taken his place as chief. In turn, the well-travelled Ruatara would die in March 1815, just after Marsden left to return to Parramatta. This mission, located beneath the eye and the auspices of Rangihoua pā and its inhabitants, was not an easy place for the missionaries to live. Tribulations and conflict grew between the mission families themselves; growing food was difficult and rations supplied by the CMS were often short or nonexistent. Māori (Ngāpuhi) demanded guns in exchange for the pork and potatoes that they produced and traded with the shipping, a trade that was (nominally) forbidden to the missionaries, but necessary sometimes to obtain food.

Samuel Marsden never lived in the Bay of Islands, but traveled there seven times, the final time in 1837, not long before his death in 1838. He brought mission recruits with him, establishing new mission stations at Kerikeri (1819), Paihia (1823), and Waimate (1830) in

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 4 The mission station of Hohi to the right of the valley, with Rangihoua pā on the hill rising to the left. Augustus Earle, 1827–1828. National Library of Australia PIC T176 NK12/139

the Bay of Islands, each in turn under the control of a *hapū* and its chief (Middleton 2014).

There were no real conversions of Māori to Christianity until 1830; the CMS missionaries labored in Pēwhairangi and beyond for more than 15 years until the first Māori baptisms took place at Paihia in that year. After that time, conversions grew and there was an increasing demand from Māori to learn and use the new technology, literacy, to achieve new goals. Books, including Māori translations of the Bible and prayer books as these were achieved in the mission translation committee, became highly sought after.

Pēwhairangi, the Bay of Islands, was generally under the *mana whenua* (translated as territorial rights, power from the land, authority over land or territory) of the tribal group known as Ngāpuhi. Ngāpuhi itself was made up of a number of independent *hapū* (the primary political unit in traditional Māori society), but the *hapū* with *mana whenua* at Te Puna, Rangihoua, and Hohi were principally Ngati Torehina (who still maintain this authority today), and Te Hikutu, not part of Ngāpuhi. *Hapū* and tribal relationships were complex, interwoven with marriage alliances and intermittent internecine conflict. Land rights were often interspersed across different areas and seasons, for example, with *hapū* accessing marine resources in the summer months and gardens during spring and autumn or families having particular rights to birding in certain trees.

Ruatara and his people agreed to settle the missionaries on the land then known as Hohi, beneath the pā, but for much of the late nineteenth and twentieth centuries, this name became twisted in European orthography to "Oihi" (Smith et al. 2012: 5), as it appears in most historical literature (e.g., Elder 1932, 1934). Recently, this has been corrected and the site is now formally known once again by its traditional name of Hohi. In 1814, a European visitor who came with Marsden, John Liddiard Nicholas, described Rangihoua pā as the "largest and most populous town in the Bay of Islands" (Middleton 2014: 29). There were between 100 and 200 "huts" or houses, constructed on either side of narrow pathways, with meticulously tended gardens. Courtyards had sheds or outhouses, used for cooking and food storage. Carvings could be seen on some of the enclosures. The house of the chief, where Ruatara then lived with his three wives, was located on the highest part of the village and differed from the rest of the structures only in

being somewhat larger, about 20 ft long, 15 ft wide, and 8 ft high. Stones forming a fireplace were the only domestic goods. The interior was very smoky. Outside, baskets of food filled with fern root, dried fish, shellfish, potatoes, and calabashes of water were suspended from forked sticks driven into the ground. Fish for a winter supply were drying on stages supported by posts about 12 ft from the ground. Nicholas enjoyed meeting Ruatara's family, especially his chief wife, Rahu, an attractive woman with sparkling, animated eyes and a cheerful expression, who had recently given birth to a baby son. Samuel Marsden had brought with him a red gown, a present to Rahu from his own wife in Parramatta. Marsden helped Rahu put this gown on, replacing her "own simple dress of a mat tied around the waist" (Middleton 2014: 30).

Intensive archaeological investigations were carried out at the Hohi mission site over two seasons in 2012 and 2013 (Smith et al. 2012, 2014; Middleton 2014: 27–67; Middleton and Smith 2014), in the lead-up to the bicentenary celebrations of this significant site of nationhood, in December 2014. This project and that at Te Puna were undertaken with the consultation and collaboration of the *hapū*, Ngati Torehina, many of whom live in proximity to these sites at Wharengaere and Kerikeri. New Zealand's legislation requires this consultation (http://www.legislation.govt.nz/act/public/2014/0026/26.0/DLM4005414.html).

The mission was built on a series of terraces cut into a steep hillside, as Augustus Earle's watercolor (Fig. 4) shows. Alongside and above it stood the imposing Rangihoua pā; Samuel Marsden had purposefully established the mission there, despite the missionaries' pleas for Te Puna, a more open and fertile space on the other side of the pā. Hohi was the place where ongoing relationships between Māori and Pākehā were first established and new cultural identities forged. Prior to the mission's foundation, the site was an area of gardening for Māori, as the archaeology demonstrated.

The 2012 season uncovered the remains of a building on the upper terrace. The nature of the artifact assemblage, dominated by slate pencils (MNI of 90, from 142 individual fragments [NISP]), suggested the function of this building. It was the mission school (Figs. 5 and 6) which opened in August 1816 with Thomas Kendall as the school master and five male and nineteen female pupils on that day. Although its pupils numbered around 70 at its high point, the school had a short life and had closed by December 1818 (Smith 2014; Smith et al. 2012), although it was later reestablished in a different building. It depended on supplies of food, clothing, and "gifts" to be given to its attendees to encourage their attendance. When the CMS failed to send Kendall the goods he requested from to keep the school going, attendance dwindled and the school closed. Other artifacts from the school site included children's toys as well as greenstone jewelry – two elegant ear pendants of the kind traditionally worn by Māori. There were no domestic artifacts in this area, also pointing to the building's educational function. The school and Kendall's neighboring house had been sacked by Māori in 1823, as the documentary record described; the mission was periodically subjected to such events, known as *taua muru*, plundering parties, for infringements of cultural norms. The mission's inhabitants had to quickly come to terms with Māori cultural practices, or suffer such consequences.

The archaeological investigations revealed the building methods and dimensions of this and other first-phase mission structures, built directly onto the ground surface using a local timber not suited to lengthy preservation in the humid, damp northern New Zealand weather. The school and other structures uncovered in the 2013 season had been demolished by 1824, replaced with two second-phase mission buildings, using stone bearers to keep the timbers above ground, presumably to reduce the possibility of rot. The two second-phase buildings can be seen on the upper terrace in Fig. 4. Excavations alongside descriptions of the settlement helped to identify the houses of mission families including that of Thomas and Jane Kendall, William and Dinah Hall, and John and Hannah King. After his dismissal from the CMS in 1823 (largely for an adulterous affair with a young Māori woman, the

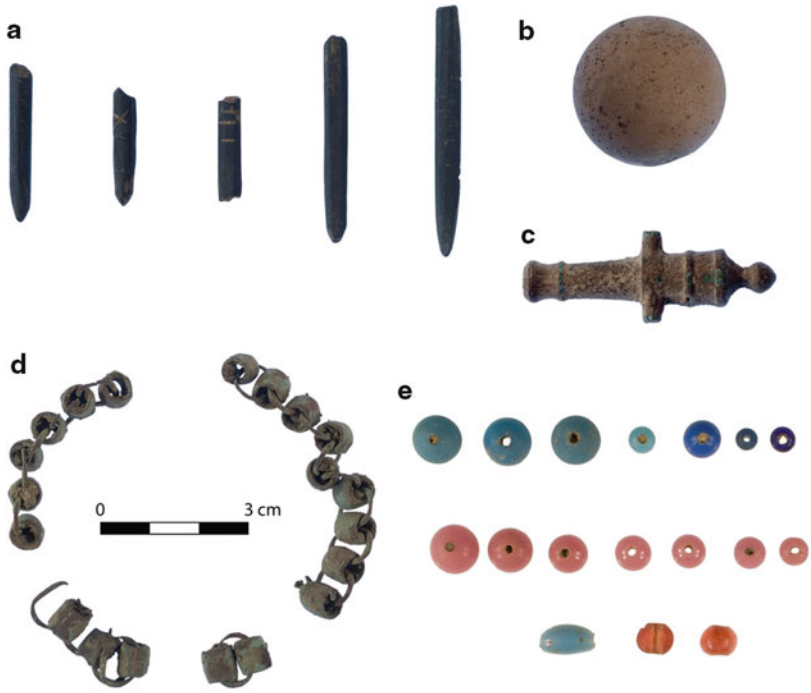

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 5 Artifacts recovered from the Hohi mission school site

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 6 Hohi excavations, foreground, with Rangihoua pā behind, 2012

daughter of a chief of the pā and part of the Kendall household), Thomas Kendall's home and the nearby school where he once taught were demolished and his house buried beneath clay, soil, and rubbish, then covered with a layer of beach pebbles. The stone fireplace over which Jane Kendall had once cooked and where some of her fragmented ceramics lay was well buried below this material. Kendall had long been out of favor with Marsden and with his missionary colleagues for a number of misdemeanors, but particularly for his close political alliance with the Ngāpuhi chief Hongi Hika (Binney 2005). It seems that they had wanted to bury the evidence of his existence at the mission.

By 1828, the Hohi mission was struggling and many of its houses were scarcely inhabitable. In that year, Marsden and the CMS committee agreed to shift the mission to Te Puna, and in 1832 the last missionaries remaining at Hohi, John and Hannah King and James and Harriet Shepherd, moved their families to new houses they had built there. By this time the center of CMS activity had moved across the Bay of Islands to Paihia, established in 1823. James and Harriet Shepherd did not stay long at Te Puna, and by about 1840 this house was abandoned.

Te Puna was located immediately to the west of Rangihoua, not far from Hohi, and remained under the *mana whenua* of the same *hapū*. Although New Zealand historians have written widely on the history of missionaries and missions, and there had been earlier, partial investigations of mission sites associated with extant mission building restoration and services upgrades, the first research-based archaeological investigation took place at Te Puna in 2002 (Middleton 2008, 2014: 206–225). This revealed the remains of the mission house, in particular the cellar, filled with artifacts and debris of the building in which the King family once lived, as they eked out a subsistence livelihood, teaching and attempting to convert Māori to Christianity, trading goods for food and labor with Māori at Rangihoua, and modeling the appropriate Christian standards of domesticity and gender roles to the Māori population from a marginal site of Christian "civilization" (Fig. 7).

The mission house was of weatherboard "frame" with attic rooms and dormer windows on the upper floor. The house had a lean-to kitchen at the west, where there was a fireplace for cooking over an open fire. Beneath the main section of the house, a large cellar formed a storage space, accessed possibly via a trap door and ladder. The cellar had a wooden floor of native timbers, the walls were lined with wooden planks, and it had recessed shelving on one side. Large

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 7 "Case gin" bottles from the Te Puna mission house cellar

hard wood (puriri) posts set into the cellar walls formed foundations for the house itself. Outbuildings lay to the east of the house. At times, up to about 20 people were accommodated there. School was held in part of the house, with Hannah King and her daughters teaching the girls from the pā and John King and his sons teaching boys. As at Hohi, slate pencil and tablet fragments were included in the Te Puna assemblage. Domestic artifacts including irons, thimbles, pins, and buttons were recovered from the cellar; these and the fabrics ordered from the mission store (shown in the mission accounts) attested to the sewing undertaken there and the efforts made to maintain appropriate standards of domesticity and appearance (Middleton 2007a, 2013a). Hannah King's needlework skills were well known, and garments stitched by her, now over 200 years old, as well as samplers by her daughters, are held in museum collections. Food was served on blue and white Staffordshire dinner sets of various patterns popular in the early nineteenth century, some of it the same china, or of the same pattern, that was brought from England and used at Hohi. Fragments of Willow, Wild Rose, Village Church, and Rhine ceramics were recovered at both sites, along with other patterns, and matching vessels are held in collections of the King family. Between ten and twenty people may have sat down to meals – the King family, Māori children and adults staying in the house, sometimes one or two chiefs from the pa, or visitors from other missions or clerics from afar (Sydney or England). Faunal remains showed that, at both sites, pork was often the main meat eaten, with occasional mutton or beef. Rabbits, fowls, and turkeys were also kept for food. Potatoes were regularly purchased from Māori at the pā, as the mission accounts showed (Middleton 2007b). Although not plentiful in the faunal assemblages, fish and shellfish were occasionally eaten, caught, or collected from the adjacent shorelines. Teawares, including elegant "London-style" ceramics, suggested that tea parties may have been part of the Te Puna mission repertoire, although Hannah King was not included in the inner coterie of mission women. These were the accoutrements of a civilized mission station, but life at Te Puna was necessarily frugal and there were no luxury or frivolous items – unless the large number of "alcohol" bottles recovered from the cellar could be considered so.

In 1834, visitors to Te Puna walked from the mission to visit Rangihoua pā. Few people were living there by this time, and it was disused and "out of repair" (Middleton 2014: 218), although the palisading fortification still stood. By this time, Hohi was abandoned and the center of both Māori and mission activity had shifted to the center of Pēwhairangi; to the missions at Kerikeri, Paihia, and Waimate; and to Kororareka, where the shipping, mostly whalers, preferred to anchor to re-water, re-victual, trade, and drink. Rangihoua was no longer the vibrant village it had been in 1814. At Paihia, the CMS mission was built on land under the control of Ngati Hine, although this was a contested place, with neighboring *hapū* equally claiming rights there, as the missionaries would soon find out to their consternation. At length, a Māori village, fenced with the usual palisading, grew up to the south of the mission buildings. Hongi Hika (Thomas Kendall's ally), of the *hapū* Ngai Tawake, purposefully placed the new Kerikeri mission beneath the eye of one of his own strongholds, Kororipo pā, with its village spreading out on a ridge above the mission. Waimate mission, on the land of Ngati Rehia and other *hapū*, was perhaps the only Bay of Islands mission station demonstrating a "civilized" landscape. Charles Darwin certainly considered this the case when he visited the mission in 1835, describing it as something of an English idyll: "the thoroughly English appearance of three well-designed, respectable houses, surrounded by gardens, out-houses, and well-cultivated fields, was surprising and delightful. . .. The farm had 'fine crops of barley and wheat in full ear," potatoes, clover, "large gardens, with every fruit and vegetable which England produces . . . asparagus, kidney beans, cucumbers, rhubarb, apples and pears, peaches, apricots, grapes, olives, gooseberries, currants, hops, gorse for fences and

English oaks!" (Darwin quoted in Middleton 2014: 183). Despite such praise, that bountiful mission farm would soon decline. Waimate too had a "village" where Māori lived adjacent to the mission, as well as at a large pā, Okuratope, nearby.

Other Protestant missions soon expanded down the length of the North Island and into the South Island, finally to the Lutheran mission on Ruapuke Island in Foveaux Strait (Middleton 2013b). Surveys of these and later CMS and WMS sites, along with archaeological, visual, and archival sources, demonstrate a similar spatial and social model of the mission station as that found at Te Puna and Hohi. The typical New Zealand mission station consisted of the missionary husband, wife, and family living in a simple, usually wooden, house, sometimes with a chapel and school associated, where they labored to convert Māori to Christianity and to bring about the cultural transformation of Māori society through the model of Christian daily life and domestic practices.

In New Zealand, as elsewhere across the New World, missionaries were deeply implicated in the processes of colonization. CMS leader Henry Williams (based at Paihia) played a pivotal role in negotiations between Māori and British with his translation (often construed as misleading) of Te Tiriti o Waitangi (the signed version of the Treaty of Waitangi) in 1840. When wars over land and sovereignty broke out, Williams and others trod a tenuous line between government policy and support for Māori, seen as disloyalty to the British (Middleton 2015). There was also the question of missionary purchases of large tracts of Māori land made prior to 1840. Trade and the development of a "spirit of commerce" were important factors in New Zealand from 1814; artifacts from the Te Puna archaeological context, analyzed alongside accounts, demonstrate the role of the mission in trading with Māori (Middleton 2007b) and the advent of capitalism, one of historical archaeology's central themes. In 1814, Māori were active agents in bringing the new institution of the mission into their midst, and they used this as a means to participate in the modern world on their own terms. The slow progress toward the missionary objective of conversion to Christianity can be attributed largely to Māori disinterest. For Ngāpuhi, the missionaries represented a source of foreign goods and, through control of these, a monopoly on power within the Māori world. Only when trade goods were more widely available and the negative outcomes of a more widespread European population became apparent did Māori seek out Christianity in the hope that it would provide access to the knowledge behind European culture (Smith 2014: 626).

A glaring difference between Australia and New Zealand is geography: Australia is a large continent, with huge variations in climate, landscape, and politics, separated into state governments. Within Australia missions varied according to these conditions. By contrast, New Zealand is a small nation of two main islands with much less variation; its nineteenth-century mission stations were more uniform in nature. They were established earlier than missions in Australia, well before colonization. By the time missions and reserves in some regions of Australia, such as Queensland, were beginning to be established in the 1890s, New Zealand missions, and especially those in the Bay of Islands, had long closed. Both kinds of missions differed in their relationships with Indigenous people. In Australia many missions and reserves were seen as places of refuge from a hostile and often violent settler population, where Aboriginals were protected and identity and culture could be renewed. At the same time, missions and reserves were also places in which trauma was experienced and is still recalled today, as Sutton has pointed out is the case at Mapoon. New Zealand missions were not reserves and were not sites of refuge. Rather, missions were established on Māori land by *hapū* and tribal authority for the benefits, such as trade and

access to European goods, they would bring. This included possible access to guns. Māori lived principally outside the bounds of the mission, although some were part of the mission households where they learned domestic skills and provided labor. Those mission sites today are not considered sacred to tribal populations, but rather as having a history shared with missionary descendants and contemporary church bodies.

Spatial layout differed between the case studies described in both countries. The New Zealand "household" mission was small; the Te Puna mission consisted of two family homes, one of which was soon abandoned. The Hohi mission houses appear to have been built in an ad hoc fashion, as needs changed or new personnel arrived. The steep hillside on which the buildings perched created challenges for the occupants, who surrounded their houses with high fences, probably to separate themselves from their neighbors, with whom they were often in dispute, as well as to protect themselves from any unwelcome Māori intrusions. These were not idealized, civilized, or "didactic" landscapes, although they were sometimes represented as such in lithographs and paintings. Māori meanwhile suited themselves, sometimes establishing villages close to the missions, such as at Paihia, or maintaining occupation of their own territories in adjacent pā and *kainga* (villages). However missions across a range of Australian sites, such as those at Wybalenna, Weipa, and Ebenezer, show planned, "civilized," didactic landscapes, demonstrating to their Aboriginal occupants how their lives should be rearranged according to Westernized and Christian ideals.

Despite their differences, whether "household," "institution," or "village," New Zealand and Australian missions shared similarities, in particular the focus on domesticity and the household as a vehicle for bringing about religious, social, and cultural change in Indigenous societies. Indigenous agency meant that this was not necessarily achieved. Māori were selective in the ways they chose aspects of the new culture for their own objectives. At Hohi, the artifact assemblages consisted primarily of "European" objects, but used in an indigenous context, as was the case at Ebenezer (Lydon 2014: 242, 246). Lydon points out that archaeologists cannot use these assemblages to argue for assimilation, acculturation, or "white settler domination" (as was once the case). The social context of such assemblages needs to be taken into account, creating more nuanced understanding of processes, stories, and histories on such complex, entangled "sites of encounter" (Lydon 2014: 233). Mission sites across both countries share archaeological assemblages with similar European artifacts, such as common ceramics, glass, metal, and other items. In all cases, "conversion was also symbolized by monogamy, nuclear family units, the adoption of European material items including styles of dress, a preference for a sedentary existence, and the inclination to work for wages or goods" (Morrison et al. 2015: 85).

In Australia, missions still remain "powerful symbols of home and country" for Aboriginal Australians (Lydon 2014: 234) in a way that could never be the case in New Zealand. There, Māori maintain *mana whenua* over pā and sites of significance, but consider mission sites such as Hohi under the *mana* of missionary descendants, or they may share this *mana* with those descendants.

Cross-References

- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Mission Archaeology in North America
- ▶ Oceania: Historical Archaeology

References

Binney, J. 2005. *The legacy of guilt a life of Thomas Kendall*. Wellington: Bridget Williams Books.

Birmingham, J. 1992. *Wybalenna: The archaeology of cultural accommodation in nineteenth century Tasmania*. Sydney: Australian Society for Historical Archaeology.

Birmingham, J. 2000. Resistance, creolization or optimal foraging at Killalpaninna Mission, South Australia. In *The archaeology of difference*, ed. R. Torrence and A. Clarke, 360–405. London: Routledge.

Birmingham, J., and A. Wilson. 2010. Archaeologies of cultural interaction: Wybalenna settlement and Killalpaninna Mission. *International Journal of Historical Archaeology* 14: 15–38. http://www.springerlink.com/content/g1826j2322745j57/.

Flexner, J. 2014. Historical archaeology, contact, and colonialism in Oceania. *Journal of Archaeological Research* 22: 43–87.

Goffman, E. 1962. *Asylums*. Chicago: Aldine Publishing.

Grimshaw, P., and E. Nelson. 2001. Empire, "the civilising mission", and indigenous Christian women in colonial Victoria. *Australian Feminist Studies* 16 (36): 295–309.

Ireland, T. 2010. From mission to Maynggu Ganai: The Wellington Valley Convict Station and mission site. *International Journal of Historical Archaeology* 14: 136–155. http://www.springerlink.com/content/5l4m136016101913/.

Lydon, J. 2005. Men in black': The Blacktown native institution and the origins of the 'stolen generations'. In *Object lessons: Archaeology and Heritage in Australia*, ed. J. Lydon and T. Ireland, 201–224. Melbourne: Australian Scholarly Publishing.

Lydon, J. 2009. *Fantastic dreaming*. Plymouth: AltaMira Press.

Lydon, J. 2014. Intimacy and distance life on the Australian aboriginal mission. In *Rethinking colonial pasts through archaeology*, ed. N. Ferris, R. Harrison, and M. Wilcox, 233–250. Oxford: Oxford University Press.

Lydon, J., and J. Ash. 2010. The archaeology of missions in Australasia: Introduction. *International Journal of Historical Archaeology* 14: 1–14. http://www.springerlink.com/content/4772527479445810/.

Lydon, J., and A. Burns. 2010. Memories of the past, visions of the future: Changing views of Ebenezer mission, Victoria, Australia. *International Journal of Historical Archaeology* 14: 39–55. http://www.springerlink.com/content/al3060002008v32r/.

Middleton, A. 2007a. Silent voices, hidden lives: Women in the CMS missionary Endeavour, Bay of Islands, 1814–1845. *International Journal of Historical Archaeology* 11 (1): 1–31. http://www.springerlink.com/content/q35l3xh812608788/.

Middleton, A. 2007b. Mission Station as trading post. The economy of the church missionary Society in the Bay of Islands, New Zealand, 1814–1845. *New Zealand Journal of Archaeology* 28: 51–81.

Middleton, A. 2008. *Te Puna – a New Zealand Mission Station*. New York: Springer. http://www.springer.com/social+sciences/archaeology+%26+anthropology/book/978-0-387-77620-0.

Middleton, A. 2010. Missionization in New Zealand and Australia: A comparison. *International Journal of Historical Archaeology* 14: 170–187. http://www.springerlink.com/content/3u34l00667q38335/.

Middleton, A. 2013a. Missionization and the cult of domesticity. In *Historical and archaeological perspectives on gender transformations: From private to public*, ed. S. Camp and S. Spencer-Wood. New York: Springer.

Middleton, A. 2013b. Mission archaeology in Aotearoa/New Zealand. In *Finding our recent past historial archaeology in New Zealand*, ed. M. Campbell, S. Holdaway, and S. Macready, 33–58. Auckland: New Zealand Archaeological Association.

Middleton, A. 2014. *Pēwhairangi–Bay of Islands missions and Māori 1814–1845*. Dunedin: Otago University Press.

Middleton, A. 2015. Missionization, Maori and colonial warfare in New Zealand. In *Oxford handbook of historical archaeology*, ed. J. Symonds and L. Wilkie. Oxford: Oxford University Press. http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199562350.001.0001/oxfordhb-9780199562350-e-32.

Middleton, A., and I. Smith. 2014. Daily Life at Hohi Mission Station: Archives and Archaeology. In *'Te Rongopai Takoto Te Pai!' bicentenary reflections on Christian beginnings and developments in Aotearoa New Zealand*, ed. A. Davidson, S. Lange, P. Lineham, and A. Puckey. Auckland: General Synod Office of the Anglican Church in Aotearoa.

Morrison, M., D. McNaughton, and C. Keating. 2015. "Their God is their belly": Moravian missionaries at the Weipa Mission (1898–1932), Cape York Peninsula. Archaeology in Oceania 50(2015): 85–104.

Smith, I. 2014. Schooling on the missionary frontier: The Hohi Mission Station, New Zealand. *International Journal of Historical Archaeology* 18: 612–628.

Smith, I., A. Middleton, J. Garland, and N. Woods. 2012. *Archaeology of the Hohi mission. volume 1: The 2012 excavations*, University of Otago studies in archaeology. Vol. 24. Dunedin: University of Otago.

Smith, I., A. Middleton, J. Garland, and T. Russell. 2014. *Archaeology of the Hohi mission volume 2: The 2013 excavations*, University of Otago studies in archaeology. Vol. 26. Dunedin: University of Otago.

Sutton, M-J. 2003. Re-examining total institutions: A case study from Queensland. Archaeology in Oceania 38(2): 78–89.

Sutton, M.-J. 2015. Remembering the mother mission: Exploring trauma, cultural heritage values and identity at Mapoon, a Former mission Village on Western Cape

York, Queensland. PhD Thesis, University of Queensland.
Sutton, M.-J., and L.B. Colyers. 2013. Understanding cultural history using ground–penetrating radar mapping of unmarked graves in the Mapoon mission cemetery, Western Cape York Peninsula, Queensland, Australia. *International Journal of Historical Archaeology* 17 (4): 782–805.

Further Reading

Birmingham, J. 1992. *Wybalenna: The archaeology of cultural accommodation*. Sydney: Australasian Society for Historical Archaeology.
Elder, J.R. 1932. *The letters and Journals of samuel marsden 1765–1838*. Dunedin: Coulls Sommerville Wilkie Ltd and AH Reed.
Elder, J.R. 1934. *Marsden's Lieutenants*. Dunedin: Coulls Somerville Wilkie and A.H. Reed.
International Journal of Historical Archaeology. 2010. 14. http://www.springerlink.com/content/1092-7697/14/1/
Lawrence, S., and P. Davies. 2011. *An archaeology of Australia since 1788*. New York: Springer.
Lydon, J., and U. Rimzi. 2016. *Handbook of postcolonial archaeology*. London/New York: Routledge.
Middleton, A. 2008. *Te Puna – a New Zealand mission station*. New York: Springer. http://www.springer.com/social+sciences/archaeology+%26+anthropology/book/978-0-387-77620-0.
Middleton, A. 2014. *Pēwhairangi–Bay of Islands missions and Māori 1814–1845*. Dunedin: Otago University Press.
Murray, T. 1996. The childhood of William Lanne: Contact archaeology and aboriginality in Tasmania. *Antiquity* 67: 504–519.
Smith, I. in press. *Pākehā Settlements in a Māori World New Zealand Archaeology 1769 to 1860*. Wellington: Bridget Williams Books.

Mizoguchi, Koji

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Basic Biographical Information

Koji Mizoguchi was born in 1963 at Kitakyushu City, Fukuoka Prefecture, Japan. He is a Japanese archaeologist who specializes in social archaeology. After being awarded his Ph.D. in archaeology from the University of Cambridge, United Kingdom, in 1995, Professor Mizoguchi became an Associate Professor in archaeology at the Graduate School of Social and Cultural Studies, Kyushu University, Fukuoka, Japan. In 2013, he was promoted to Professor at Kyushu University. From 2000 to 2002, Professor Mizoguchi taught Japanese Archaeology at the Institute of Archaeology, University College London, United Kingdom (Fig. 1).

Mizoguchi, Koji, Fig. 1 Koji Mizoguchi

Major Accomplishments

Professor Mizoguchi has published extensively on Japanese and European archaeology and on archaeological theory. His books *An Archaeological History of Japan: 30.000 BC to AD 700* (2002) and *Archaeology, Society and Identity in Modern Japan* (2006) are considered to be essential reading for anyone studying Japanese archaeology in English. His early work concentrated on the investigation of mortuary practice in the Yayoi period (900–400 BCE to mid-third-century CE) in Japan. He conducted a detailed examination of how mortuary practices informed, and were

informed by, the social structure and material culture of Yayoi societies. After that, his research scope gradually extended to explore the application of advanced archaeological theory and methodology. Often, he built on contemporary sociological and anthropological scholarship, by applying this to an understanding of prehistoric societies in Japan, notably those in the Jomon, Yayoi, and Kofun periods, and also in terms of the historical formation of Japanese national identities.

Professor Mizoguchi's English language publications have made a major contribution towards increasing international understandings of Japanese archaeology. His book *An Archaeological History of Japan: 30.000 BC to AD 700* made a groundbreaking contribution to the integration of traditional archaeological investigation and contemporary critical sociological and anthropological theory. (This encyclopedia includes no entries beginning with Mj–.Mn.) Drawing on reflexive postprocessual theory and further extending it, he critically examined the notion widely shared among the Japanese that a unique culture had existed uninterrupted on the Japanese archipelago since the first human settlements more than 30,000 years ago. His critical and reflexive investigation of Japanese archaeology was developed further in his book *Archaeology, Society and Identity in Modern Japan*, which delves into the role of archaeology in the formation of the modern Japanese nation and explores the process by which archaeological practice is shaped by national social and intellectual discourse.

Professor Mizoguchi is recognized for his contributions to the "internationalization" of Japanese archaeology. Often, outsiders view Japanese archaeology as exotic and yet esoteric. This is due to linguistic barriers and a tendency for Japanese archaeologists to focus on detailed history and chronology at national, regional, and local levels, which are, in part, a product of the meticulous and highly organized recording techniques adopted at every stage of archaeological investigations in Japan. In addition to his publications in English, Professor Mizoguchi has encouraged his students to communicate, present, and publish their research in English and to take part in archaeological excavations, workshops, and conferences abroad.

In 2006, Professor Mizoguchi was awarded the Japan Society for the Promotion of Science Prize in recognition of the contribution that his extensive publications, research, and pedagogy have made to situating Japanese archaeology within a broader framework of world archaeology. In January 2013, he was elected as President of the World Archaeological Congress (WAC) during the Seventh World Archaeological Congress, held at the Dead Sea, Jordan.

Cross-References

► Post-Processual Archaeology
► Social Archaeology
► World Archaeological Congress (WAC)

References

Mizoguchi, K. 2002. *An archaeological history of Japan: 30.000 BC to AD 700*. Philadelphia: University of Pennsylvania Press.

Mizoguchi, K. 2006. *Archaeology, society and identity in modern Japan*. Cambridge: Cambridge University Press.

Further Reading

Mizoguchi, K. 1997. The reproduction of archaeological discourse: The case of Japan. *Journal of European Archaeology* 5 (2): 149–165.

Mizoguchi, K. 2000. The protection of the site: Discursive formation and self-identification in contemporary society. *International Journal of Heritage Studies* 56 (4): 323–330.

Mizoguchi, K. 2004. Identity, modernity, and archaeology: The case of Japan. In *A companion to social archaeology*, ed. L. Meskell and R.W. Preucel, 396–414. Malden/Oxford: Blackwell.

Mizoguchi, K. 2013. *The archaeology of Japan: From the earliest rice farming villages to the rise of the state*. Cambridge: Cambridge University Press.

Mobiliary Art, Paleolithic

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The terms mobiliary/portable art refer to incised, engraved, perforated, carved, or painted remains found at Paleolithic sites from c. 40 to 10 kya. Their ability to be handled, manipulated, and transported is what in essence separates these artistic manifestations from rock and cave art. The term "art" is conventionally used yet must not be accepted in its colloquial and contemporary definition, despite the extraordinary formal qualities and technical mastery of some of these objects, which could be qualified as artistic "masterpieces." Indeed, this category includes a wide range of archeological remains bearing graphic traces, made in a high diversity of materials and media and with variable techniques, motifs, forms, and compositions (Clottes 1990a; Averbouh and Feruglio 2012; Cleyet-Merle et al. 2017). This category of "art" consists of figurines, raw materials (bones, slabs, pebbles, etc.), and personal ornaments, in addition to a variety of tools and items of hunting equipment. It comprises of very different media: transformed or non-transformed blanks, objects of utilitarian and non-utilitarian nature, and sometimes recycled items (waste from subsistence or technical spheres). The size of these objects varies significantly, ranging from minute (pieces that can hardly be held in one's hand) to massive (examples weighing dozens of kilograms that could only have been displaced a few meters at most).

A large variety of organic (bone, ivory, antler, teeth, shell, amber, coral, lignite) and inorganic materials (limestone, sandstone, schist, marl, steatite, calcite, clay) were used, some very common, others more exceptional. Constrained by environmental context, the materials exploited often show deliberate human choice within range of available resources. These choices seem to be embedded both in pragmatic technical reasons, according to the physical properties of the materials, and in cultural considerations, as highlighted by long-distance diffusion of ivory, lignite, amber, or cetacean teeth (Corchón et al. 2008, Cattin 2017). Often the material itself contributes in an active way to the creation of these pieces; the notion of "raw material blank" in this sense is too reductionist. Blank morphology can often contribute to certain anatomical distortions, focus the artist's attention on particular body parts, or constrain the postures represented. This latter case is well exemplified by the turned head of the famous bison licking its flank from La Madeleine (Fig. 1 no. 2). Sometimes this use of an object's natural morphology or features appears so intrinsically linked with the depiction (the example of the famous "pierres figures" comes to mind) that the question can be raised as to whether a symbolic or semantic link exists between material and chosen representation.

A wide range of techniques were used: engraving using fine and superficial or wide and deep incisions, these being obtained via different methods (grooving, scratching), light carving, sculpture in the round, and to a lesser extent drawing and painting. This technical diversity is partly related to the physical properties of the materials. Nevertheless, the rarefied nature of drawing and painting is striking even though taphonomic processes certainly contributed to their rarity. It does however seem that drawing and painting were used less in the production mobiliary art than in rock/cave art during the European Upper Paleolithic. Different techniques were often subtly combined: often fine engraving was used to depict the internal details on carved motifs or sculptures in the round (Fig. 1 no. 1, 2, 5; Fig. 2 no. 4–6), or in other cases, engravings were filled with red or black paint (for instance El Parpalló, Laugerie-Basse, La Vache).

Both figurative and what we perceive as abstract (i.e., nonfigurative) motifs are found on pieces of Upper Paleolithic mobiliary art. Animals largely dominate the figurative domain and

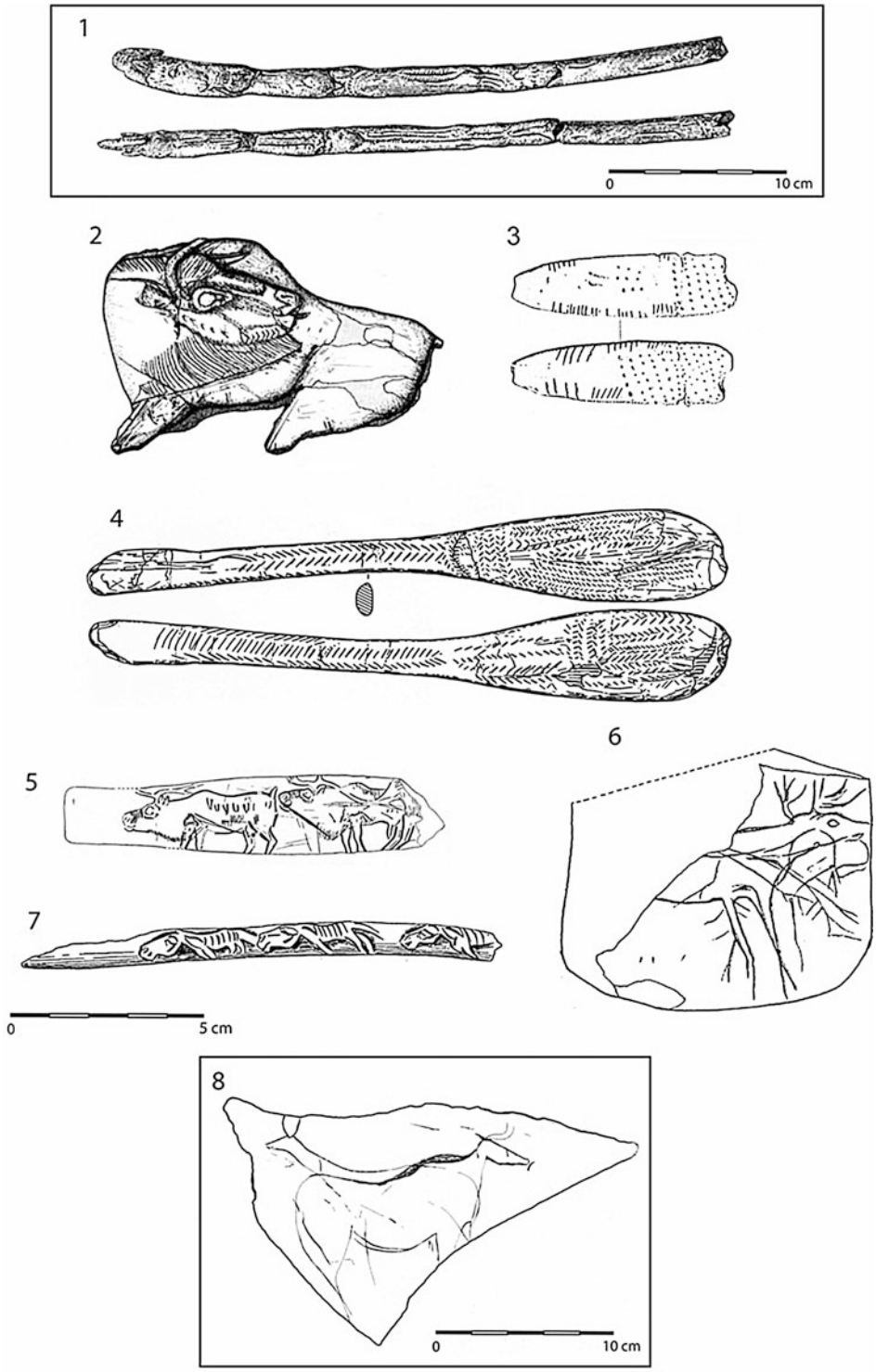

Mobiliary Art, Paleolithic, Fig. 1 (continued)

consist largely of real, i.e., non-imagined, species. Carved or engraved anthropomorphic representations with added animal features, such as the Löwenmensch (Lion man – a human with the head of a cave lion) found at Hohlenstein-Stadel (Germany), or hybrid animal depictions remain rare (Fig. 2 no. 1). Even when selected from reality, the figurative repertoire is not a carbon copy of the exterior world; rather, the attention is drawn to particular subjects. The depiction of plants is rare, and the recognition of landscape features and possible maps is heavily debated (Utrilla et al. 2009). While both are often focused on the animal world, the figurative repertoire manifest on mobiliary art appears more varied than its counterpart found on cave walls. It appears that large and medium herbivores prevail, with horse and bison being the most frequent animals depicted, followed by ibex, the sometimes-indistinguishable deer/doe, reindeer, and ox (Fig. 1 no. 1, 2, 5, 6, 7, 8; Fig. 2 no. 4–6; Fig. 3 no. 2, 3, 6; Fig. 4 no. 1–2; Fig. 5 no. 2–4; Fig. 6). Mammoths and carnivores (felines, bear, fox – Fig. 5 no. 2) can also be represented along with occasional marine mammals (seals, cetaceans), fish, birds, amphibians, and insects. Human representations are relatively abundant at a number of sites, while rare or absent at others (Fig. 2 no. 2, 3, 9; Fig. 3 no. 4; Fig. 5 no. 1). Representations of women or female body parts (pubic triangle, breasts) occur more frequently than do their male counterparts. A special category of female mobiliary art, the so-called Gravettian Venuses (Fig. 2 no. 2), represents the first known tradition of carved human representations to spread across a large territory, covering more than one million km^2. A similar tradition is known in the Upper-Final Magdalenian, whereby engraved or occasionally carved schematic female figures, whose diagnostic female attributes are often omitted leaving only the line of the back and the buttocks (Fig. 2 no. 3), are found at a similar spatial scale (Otte in Clottes 1990b; Delporte 1993). Significant formal variability is also evident in the animals which may appear realistic (Fig. 1 no. 1, 2, 5; Fig. 2 no. 4, 5, 6, 9; Fig. 4 no. 1–2; Fig. 5 no. 2–3; Fig. 6), schematic (Fig. 1 no. 8; Fig. 2 no. 3, 6), or sometimes even exaggerated (Fig. 1 no. 6, 7; Fig. 3 no. 2). Children and juvenile animals are very rare. So are artifacts, representing both domestic and hunting equipments, and other settlement-related elements. Pieces of clothing and personal ornaments are rarely depicted on the bodies, which are more often than not naked. The Gravettian "Venuses" from Central and Eastern Europe, as well as the Middle Magdalenian stone engravings from La Marche, prove as exception to this trend, noticeably with their elaborate hairdresses, belts, bracelets, and necklaces. There are two essential features of this type of iconography on European Upper Paleolithic pieces of mobiliary art. Firstly, human characteristics are secondary relative to other features, and secondly there is a broad absence of anthropogenic features (e.g., habitat structures) on the landscapes represented. Geometric motifs, including simple lines, dots, circles, triangles, chevrons, and more complex patterns also occur (Fig. 1 no. 3–4; Fig. 2 no. 7–8; Fig. 3 no. 1, 5, 7; Fig. 4 no. 3–6). A variety of different typological classifications have been proposed for organizing these so-called signs (Sauvet et al. 1977; Leroi-Gourhan 1982; Sauvet in Clottes 1990b). Simple shapes are diachronic, whereas complex shapes differ in space and time.

Compositions usually combine several motifs. The distribution of motifs tends to be adapted to the shape of the artifact (linear on elongated

M

Mobiliary Art, Paleolithic, Fig. 1 The large variety of materials and media found in the European Upper Paleolithic mobiliar art: 1/spear thrower carved into a horse head from Bruniquel (E. Cartailhac); 2/spear thrower carved into a bison licking its flank from La Madeleine (P. Paillet); 3/smoother with engraved lines and cupules from Gorge d'Enfer (Lartet and L. Christy); 4/smoother with a complex geometric decoration from Dolní-Věstonice (B. Klima); 5/engraved antler with two mating reindeers from La Vache (A. Roussot); 6/Engraving of a cervid on slab from Gargas cave (H. Breuil); 7/engraved slab with a doe and an ox from El Parpalló (V. Villaverde); 8/rod from La Madeleine with deeply engraved macrocephalic horses (H. Breuil)

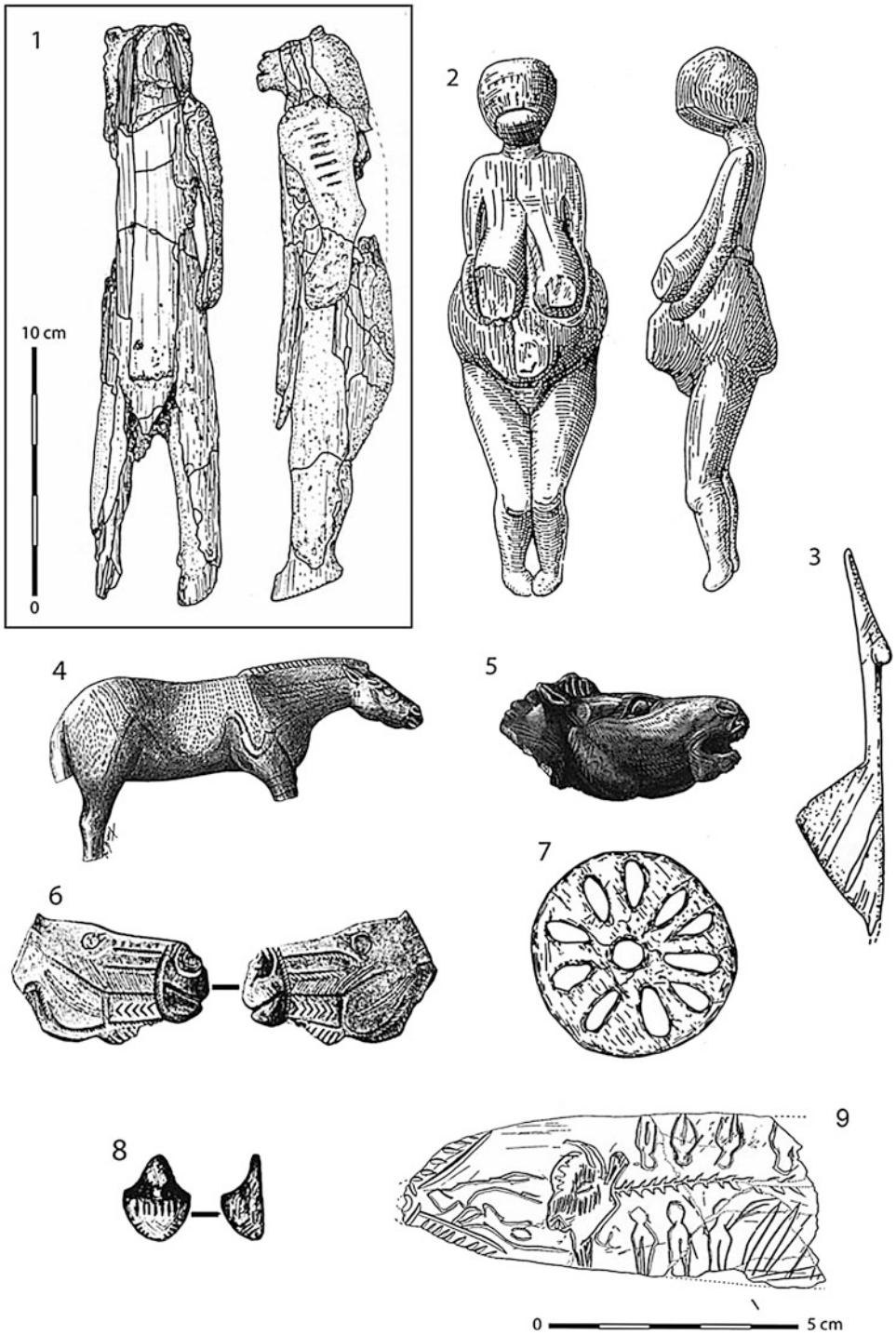

Mobiliary Art, Paleolithic, Fig. 2 Figurines and personal ornaments from the European Upper Paleolithic: 1/Hohlenstein-Stadel hybrid figurine (J. Hahn); 2/Kostienki 1-I female figurine (M. Gvozdover); 3/Gönnersdorf female figurine (G. Bosinski); 4/Lourdes horse figurine (E. Piette); 5/Mas d'Azil figurine of a whinnying horse (E. Piette); 6/Mas d'Azil *contour découpé* (E. Piette); 7/Sungir perforated disk (P.I. Boriskovski); 8/Roc-aux-Sorciers stomach-bead (L. Rousseau); 9/Pendant from Raymonden with an engraved composition of two rows of schematic human figures surrounding a bison carcass (A. Roussot)

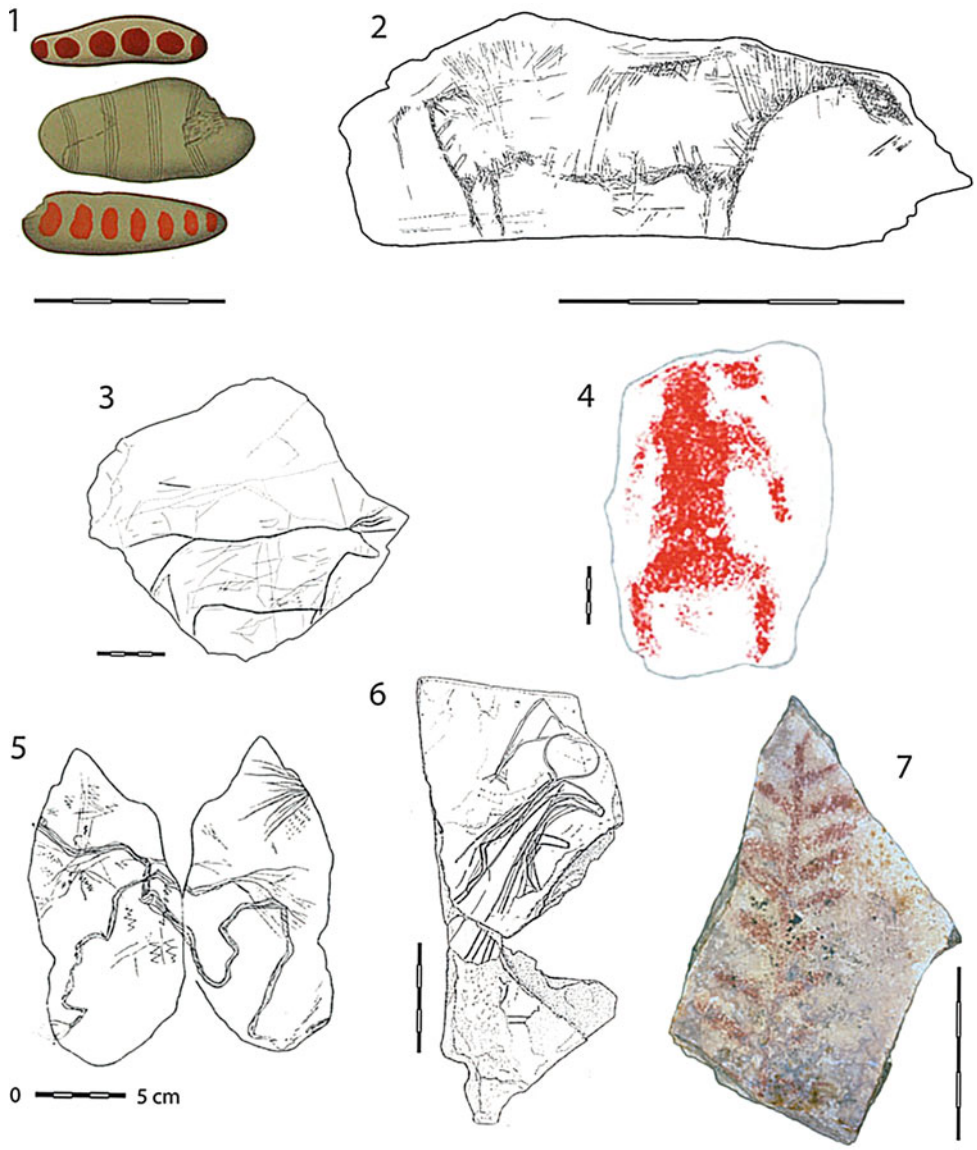

Mobiliary Art, Paleolithic, Fig. 3 Late Pleistocene-Early Holocene mobiliar art: 1/engraved and painted pebbles from Le Mas d'Azil (E. Piette); 2/engraved bone from Pont d'Ambon (P. Paillet & E. Man Estier); 3–5/engraved and painted blocks from Levanzo (P. Graciozi in Graziosi 1973), Dalmeri (G. Dalmeri), and Romanelli (D. Blanc in Graziosi 1973); 6/engraved slab from Sant Gregori (Fullolat in Clottes 1990a); 7/painted slab from El Parpalló (photo V. Villaverde)

pieces, forming a circle on round objects – Fig. 2 no. 9; Fig. 4). Figurative and nonfigurative compositions are often separated which could indicate either different roles within the graphic sphere or a system of semantic/symbolic equivalencies between the two categories of motifs. Narrative scenes are rare (Delporte in Clottes 1990b; Villaverde Bonilla in Clottes 1990b). Within the animal repertoire, special attention seems to have been given the social interactions, noticeably the specific behaviors performed during the rut (male-male competition, male-female courtship displays – Fig. 1 no. 5), though neither mating nor calving is ever depicted. Scenes depicting human-

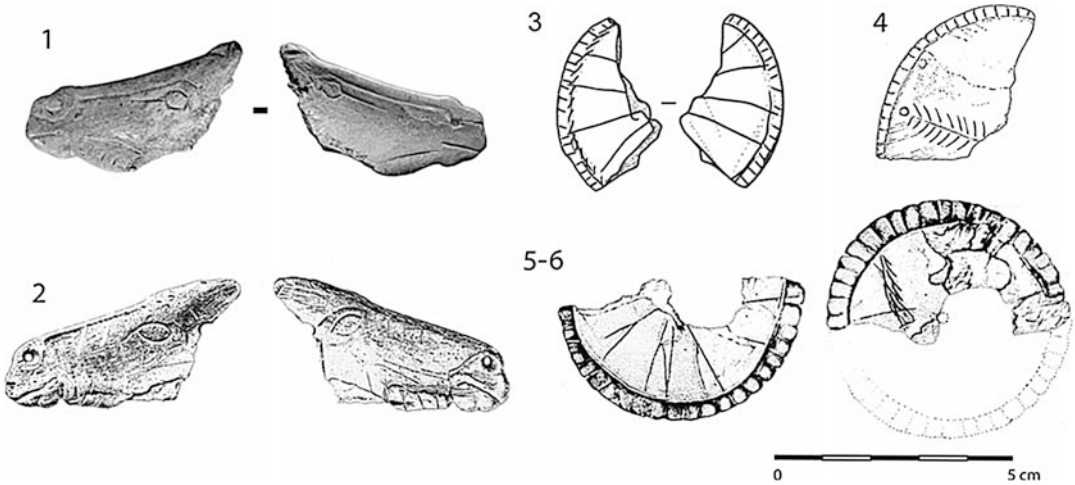

Mobiliary Art, Paleolithic, Fig. 4 Pieces of personal ornament shared between Asturias and the French Pyrenees during the Middle Magdalenian: 1, 2/*contours découpés* from Enlène (photo R. Bégouën) and La Viña (J. Fortea in Delporte 1990); 3–6/perforated disks from Isturitz (C. Lucas in Lucas 2014), Le Mas d'Azil (M. Chollot in Lucas 2014), La Viña (J. Fortea in Delporte 1990)

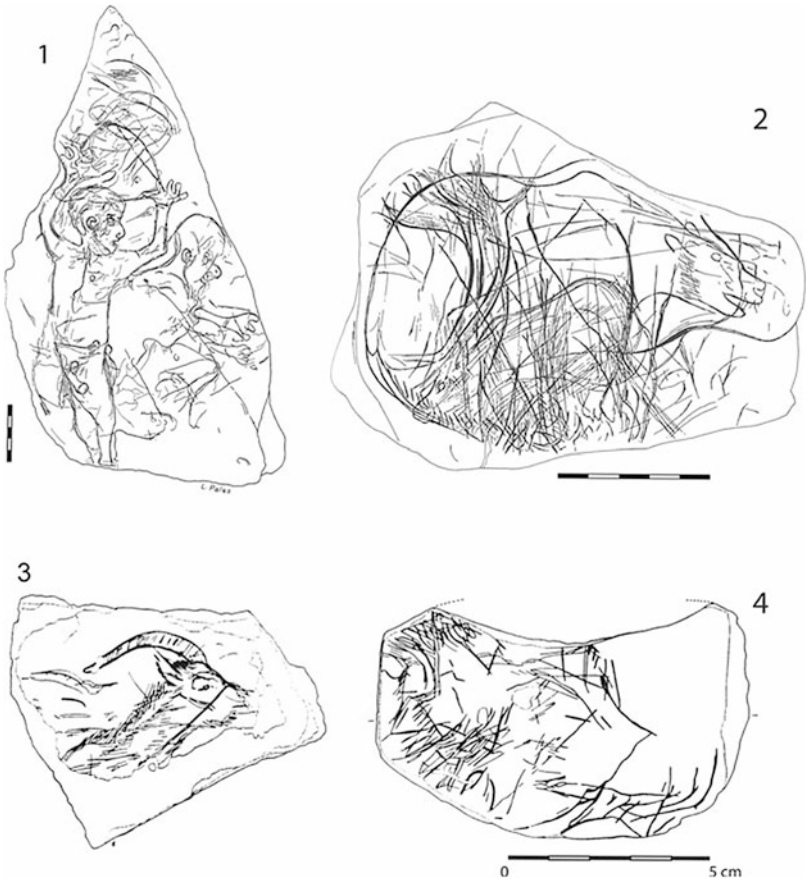

Mobiliary Art, Paleolithic, Fig. 5 Middle Magdalenian engraved slabs: human figures (1), and superimposed reindeer and bear depictions (2) from La Marche (L. Pales & M. Tassin de Saint-Péreuse in Bourdier et al. 2017); ibex (3) and bison (4) from Enlène (C. Servelle in Clottes 1990a)

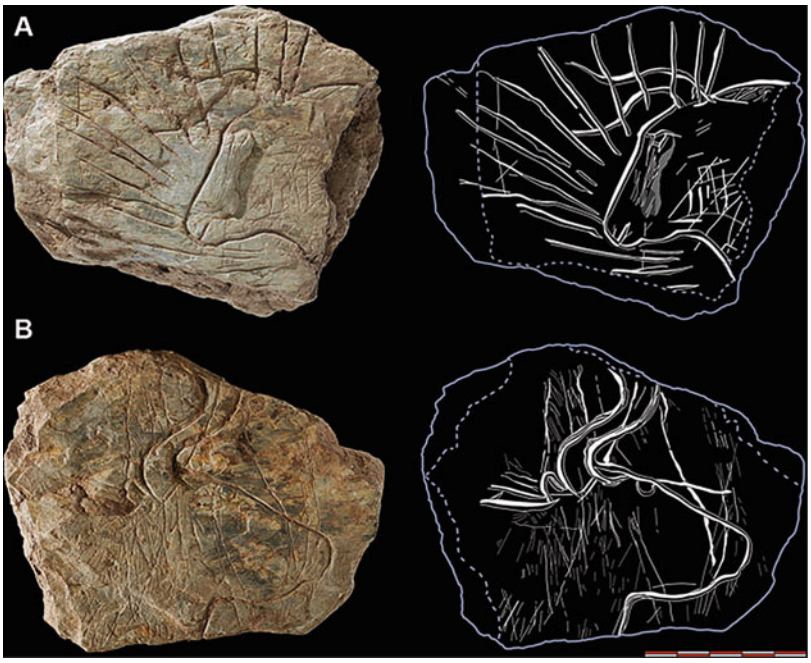

Mobiliary Art, Paleolithic, Fig. 6 Early Azilian engraved aurochs and horses on slabs from Le Rocher de L'Impératrice which show complete preservation of the graphic conventions used during the previous Magdalenian (tracings C. Bourdier, photos N. Naudinot in PLoS ONE 12(3): e0173037. doi:10.1371/journal.pone.0173037)

human (Fig. 5 no. 1) or human-animal interactions are even rarer. Some instances appear to show, for example, women's dances as depicted on engraved slabs from Gönnersdorf (Bosinski et al. 2001), or a meat sharing scene as has been suggested for the renowned pendant from Raymonden, upon which a bison carcass is surrounded by two lines of schematic human figures (Fig. 2 no. 9). Compositions nevertheless appear to be, for the most part, symbolic rather than narrative in nature. Despite biases introduced by the fragmentation of remains, structural analyses of assemblages have demonstrated the existence of certain structuring principles regarding motif compatibility or incompatibility, as well as other rules of association (Sauvet et al. 1977). Compositions do not appear to be random but are rather thought-out and structured compositional wholes.

Techniques and motifs vary according to the type of artifact (Leroi-Gourhan 1982; Delluc in Clottes 1990b). Among functional objects, items with short use-lives such as projectile points and harpoons are usually engraved with simple nonfigurative motifs. Objects that are technologically more elaborate and have longer use-lives (e.g., spear throwers, *bâtons percés*, half-round rods, spatulas, smoothers) often carry more complex compositions combining both nonfigurative and figurative motifs. Spear throwers and *bâtons percés* can be carved into animal or human forms (Fig. 1 no. 1–2). The ends of smoothers can be shaped into fish fins or other various geometric shapes. Engraved compositions can sometimes extend onto the edges of the worked piece (Fig. 1 no. 3–4). In opposition to decorated utilitarian objects, the spheres of the so-called nonutilitarian portable art are those that more often than not bear either human or animal depictions; the "figurines" are exclusively figurative in nature. The best-known examples are the aforementioned "Venus" figurines, yet animals, including herbivores (Vogelherd, Isturitz, Duruthy), carnivores (Geissenklösterle, Pavlov), and birds (Malta), are also depicted (Hahn in Clottes 1990b; Floss in White and Bourrillon 2015 – Fig. 2 no. 1–5). A few examples only portray selected body parts (the head, breasts, genitals, trunk, and thighs), and the degree of elaboration of these features is quite variable. In some cases, it appears that authors invested considerable effort in the reproduction of intricate details, while in other

cases, works appear to have been left deliberately unfinished, as can be seen in select examples from Kostienki (Abramova 1995; Dupuy in Averbouh and Feruglio 2012). Engravings on slabs differ from other mobiliary art categories in that dozens of figurative and nonfigurative depictions, as well as randomly oriented lines, may be superimposed on the same surface; all of which suggests repeated use (Bégouën et Clottes in Clottes 1990a; Rozoy in Clottes 1990a; Sieveking in Clottes 1990b; Delporte and Clottes 1996; Bosinski et al. 2001; Tosello 2003 – Fig. 1 no. 6; Fig. 5). In the sphere of personal ornamentation, modifications of anthropic origin mostly consist only of a perforation or a groove to facilitate suspension. However, fully carved beads and pendants, in some cases decorated with nonfigurative or figurative representations, also exist (Taborin in Clottes 1990b; Fig. 2 no. 7–8; Fig. 4). Shaped beads have rounded and elongated morphologies (bowl-shaped beads, tear-shaped beads, basket-shaped beads, rounded beads, perforated disks, etc.). Pendants consisting of small sculptures, or which employ the natural shape of bones to portray the heads of horses, bison, ibex, or chamois (*contours découpés*), are particularly rare (Delporte and Clottes 1996 – Fig. 2 no. 6; Fig. 4).

Mobiliary "art" is not uniformly distributed in Europe. Most examples are concentrated in a few specific areas (Southwestern France and the Cantabrian region, Southern Germany, Moravia-Czech Republic, and western Russia). Despite difficulties encountered regarding the dating of these objects, the production of mobiliary "art" does not seem stable during the Upper Paleolithic (see below). Mobiliary art is particularly abundant at some sites, with hundreds or even thousands of pieces, yet can be exceedingly rare or absent at others. From Spain to Russia, some Paleolithic sites stand out for the quality and quantity of decorated objects (Corchón Rodriguez 1986; Abramova 1995; Delporte and Clottes 1996; Bosinski et al. 2001; Tosello 2003; Arias Cabal and Ontañon Peredo 2004; Villaverde Bonilla et al. 2012):

- Spectacular bone objects come from Mas-d'Azil, Altamira, El Castillo, El Juyo, Polesini, Paglicci, and La Garma
- Antler objects from La Vache, La Madeleine, Laugerie-Basse, Isturitz, Gourdan, Plantade, Montastruc, Le Morin, Raymonden, Las Caldas, and La Viña
- Ivory objects from Dolni Vestonice, Pavlov, Kostienki, Mezin, Mezerich, Hohle Fels, Vogelherd, Geissenklösterle, and Brassempouy
- Sculptures from Grimaldi, Isturitz, and Duruthy
- Painted and engraved pebbles from Mas d'Azil and Rochedane
- Engraved and/or painted slabs from La Marche, Gönnersdorf, El Parpalló, Enlène, La Paloma, Limeuil, Fontalès, and Bédeilhac

Mobiliary "art" is found in archeological contexts that vary exceptionally in function, both within and between the different chronological phases. Sites appear to be mainly dense occupations (La Madeleine, Laugerie-Basse, Bruniquel, Fontalès, MA, Isturitz, Gourdan, La Vache, Enlène, Gönnersdorf, Pavlov, Dolni Vestonice, Kostienki, Area I of La Garma Lower Gallery, Tito Bustillo area XI, La Garma A), but examples are also documented within small hunting camp-type occupations (Roc-la-Tour, Rocher de L'Impératrice). Occasionally, small assemblages are discovered, removed from the inhabited areas of sites (Las Caldas IXc), and are sometimes associated with other structures of anthropic origin (e.g., pits at El Juyo). Mobiliary "art" and rock "art" are often found in different contexts. The two can be found together, and when this is so, it generally occurs in the context of intense occupation (La Garma Lower Gallery, Mas d'Azil, Roc-aux-Sorciers, Tito Bustillo, salle terminale de Bédeilhac, Labastide, Gargas). Barring exceptional cases of abundant personal ornaments in particularly rich burials (La Madeleine, St Germain la Rivière, Sungir, Labattut), very little mobiliary "art" is known from funerary contexts.

The Late Epigravettian of Northern Italy appears to be an exception to this trend, as burials were frequently covered with decorated rocks (Riparo Tagliente, Riparo Villabruna A).

The Emergence of Graphic Expressions

Both rock and more portable forms of graphic expression appear roughly at 37,000 cal. BP within the first European Upper Paleolithic culture (the Aurignacian) in Northern Italy (Fumane, Broglio and Gurioli 2004), Southwestern France (Blanchard, Castanet, Bourrillon and White in White and Bourrillon 2015), and Southern Germany (Hohlefels, Hohlenstein Stadel, Conard 2009). Few examples of graphic expression are documented in the Mousterian Middle Paleolithic contexts (Henshilwood and D'errico 2011). These examples consist of engraved or pecked nonfigurative motifs, such as cupules, sequential incisions, and notches, for the most part made on the bone or stone (La Ferrassie, Suard, Saint Anne I, Vaufrey, Oldisleben 1, La Quina, Tagliente, Turské Mastale, Temnata, Axlor, Vergisson IV, Bacho Kiro, L'Observatoire, Tata). A few "proto-sculptures" have also been presented (La Roche-Cotard, Tobalga), though to date there is little agreement in regard to their anthropogenic origin or the intentionality of the attributed forms. Ornaments on shell and animal teeth appear in near and during the transition between the Late Middle Paleolithic and the Early Upper Paleolithic, with dozens of discrete and regionally patterned types (e.g., Vanhaeren and D'errico 2006). Recent finds nevertheless suggest the symbolic use of raptor feathers and talons around 50,000 BP and maybe as early as 90,000 BP (Romandini et al. 2014).

The conditions, agents, or reasons for the beginning of graphic expression – whether on artifacts or rock faces – remain subjects of significant debate. This problem is central to the broader issue regarding the emergence and manifestation of symbolism in human evolution, often taken as a core element of humanity relative to other members of the animal kingdom ("homo symbolicus": Henshilwood and D'errico 2011). When did symbolic thinking start to develop? When and how was it first embodied materially? This critical issue in prehistoric archeology revolves in essence around our ability to provide a self-definition of our "modernity" or "humanity" relative to other animal species but also relative to ancestral or cousin human lineages. How unique is humanity?

In Paleolithic Europe, Neanderthal populations show examples of what could be construed as symbolic behavior, most notably through burials. Yet graphic representation on artifacts and ornaments are few, poorly diversified, and mostly quite recent (i.e., the Late Middle Paleolithic). Some have taken this to be the result of the acculturation of Middle Paleolithic Neanderthals by invading Upper Paleolithic *Homo sapiens* (i.e., "Aurignacians"), while others have put forth arguments supporting independent Middle Paleolithic inventions, and still others claim contact between these two populations necessitated new symbolic mechanisms for their sociocultural articulation. Regardless of the ultimate reality of any of these proposed scenarios, two unambiguous facts remain: (1) examples of graphic production increase significantly once *sapiens* is the clear author, and (2) figurative depictions do not become integrated into the artistic repertoire until 37,000 cal. BP (see below). This need for *sapiens* populations to express symbolic thinking through graphic production, and noticeably through depiction, is explained by two divergent theoretical mechanisms (Mellars et al. 2007; Henshilwood and D'errico 2011). For some, this feature is biologically rooted and linked with new cognitive abilities resulting from *sapiens*' novel and therefore inherently superior, brain configuration. For others, the emergence of graphic representation requires a social trigger, in addition to the aforementioned necessary biological substrate. In this second context, complex, dense, and likely extensive social networks embedded

within the Aurignacian cultural adaptation would have necessitated some form of graphic representation to indicate corporate and individual identities. This externalization of social identities, statuses, or positions would have aided in the negotiation of access to resources via social means (White 1982).

Unity and Diversity in European Upper Paleolithic Mobiliary "Art"

While we have discussed the broad commonalities of mobiliary "art," this form of graphic representation also varies through space and time in regard to the media chosen, the techniques employed, and the motifs and forms represented (Clottes 1990a; Abramova 1995; Averbouh and Feruglio 2012; Cleyet-Merle et al. 2017). Mobiliary art develops during the Aurignacian (38,000–33,000 cal. BP) in two major centers of artistic expression (White and Bourrillon 2015). The first center is located in Southwestern Germany (Vogelherd, Geissenklösterle, Hohle Fels) that is characterized by the production of animal (horse, mammoth, felid) and human figurines in ivory, including the unique discovery at Hohlenstein-Stadel of an anthropomorphic carving of a human with a lion's head (Fig. 2 no. 1). The second center is in the Périgord region of Southwestern France and is characterized by the presence of geometric marks (notches and cupules) on osseous artifacts (e.g., Lartet, Blanchard) and a high frequency of sexual representations (e.g., the sculpted phallus from Blanchard) (Fig. 1 no. 3). These motifs were also deeply pecked on freestanding blocks within occupations (Castanet, Blanchard, Belcayre), together with very schematic animals (felid, horse, ibex, bovin, rhino, mammoth).

Concomitant with the emergence of the Gravettian (33,000–24,000 cal. BP) come the first major expressions of mobiliary art during the European Paleolithic, which occur in three main areas. The oldest and most significant collection of material is located in Moravia, followed by Southwestern France and, more recently, the Ukraine. The famous lozenge-shaped female figurines displaying hypertrophic sexual attributes are known over a vast geographic space extending from France to Russia (Brassempouy, Lespugue, Grimaldi, Willendorf, Dolni Vestonice, Pavlov, Kostienki, Avdeevo, Gagarino) (Fig. 2 no. 2). This continent-wide distribution underlines a profound ideological feature that seems to be shared across different cultural groups and leads us to question both the origin and possible diffusion of this symbol (Delporte 1993). In the Pavlovian and Kostienki cultures of Central and Eastern Europe, bodies show more detail (features, hands, personal ornamentation) and coexist with a second, slenderer female morphotype (Abramova 1995; Dupuy in in Averbouh and Feruglio 2012; Gavrilov in Averbouh and Feruglio 2012). A spectacular and significantly geometric repertoire on osseous materials (Fig. 1 no. 4; Fig. 2 no. 7) develops alongside terracotta figurines (Dolni Vestonice, Predmost, Pavlov, Petrkovice, Wachtberg, Vela Spila) of women and animals (mammoth, felines, bear, wolf, birds) in certain areas. This last technical development does not seem to have spread outside Central Europe and is neither retained by the following archeological cultures. While present, mobiliary art is however less abundant in Southwestern France (El Parpalló, Isturitz, Labattut, Gargas, Pataud) and consists mainly of engraved stones with expressionist style animals (bison, mammoth, horse, aurochs) (Foucher and Foucher in Cleyet-Merle et al. 2017; Rivero and Garate in Cleyet-Merle et al. 2017; Fig. 1 no. 6, 8).

While examples of mobiliary art become more rarefied during the Solutrean, consisting of engraved stones on a handful of sites (El Parpalló, Rochefort), mobiliary art becomes quite common following the LGM, with the most famous images of European Upper Paleolithic decorated items belonging to the Magdalenian (Corchón Rodriguez 1986; Tosello 2003; Arias Cabal and Ontañon Peredo 2004; Rivero in Averbouh and Feruglio 2012; Rivero 2015; Lucas in Averbouh and Feruglio 2012; Lucas in

Cleyet-Merle et al. 2017; Pigeaud and Hinguant in Cleyet-Merle et al. 2017). During the Middle Magdalenian of Western and Central Europe (18,500–16,000 cal. BP), we observe an unprecedented diversification of mobiliary art, with the development of ornamentation on utilitarian items, from the domestic (*bâtons percés*, smoothers) to the cynegetic (spear throwers, projectile points, half-round rods; Fig. 1 no. 1–2). Many new pendant morphotypes also appear at this moment, including the famous *contours découpés* of herbivore heads (Fig. 2 no. 6; Fig. 4), as well as perforated disks (Fig. 4). Some sites also contain significant series of engraved stones (Enlène, La Marche, Bédeilhac, La Paloma, Tito Bustillo – Fig. 5). Figurative depictions dramatically increase during the Middle Magdalenian, together with narrative compositions showing the interaction between several subjects (Fig. 2 no. 9; Fig. 5 no. 1). Figurative and nonfigurative motifs become more numerous but the animals represented are not particularly diverse (horse, bison, ibex, deer). Motifs, forms, and technical processes are highly standardized. Motifs and compositions differ according to the medium used: spear throwers are carved to resemble horse heads (Fig. 1 no. 1), *bâtons percés* are sculpted to resemble bison heads or engraved with sexual motifs, hatched sinuous lines or engraved bison heads are observed on smoothers, and series of engraved V or carved tuberosities in vertical rows on projectile points are among the most typical objects (Feruglio et Averbouh in Cleyet-Merle et al. 2017). Depictions of animals are characterized by a trend toward realism with well-proportioned and complete outlines that are full of internal details, with reproductions of the sensorial organs, the coat, and the osseous reliefs, all in a stereotypical manner (Laugerie-Basse, La Madeleine, Mas-d'Azil, Bédeilhac, Altamira; Fig. 1 no. 1–2; Fig. 2 no. 4–6; Fig. 4; Fig. 5). While the aforementioned characters show strong unity, regional particularities appear in the motifs, conventions, or compositions. To cite a few examples: the "foal and bird" sculpture on spear throwers and the engraved curls on half-round rods in the Northern Pyrenees, the recurrence of realistic human depictions in the Poitou region (Fig. 5 no. 1), or the smoothers carved into fish fins in the Périgord-Quercy area (Delporte and Clottes 1996; Fuentes 2013). During the same period, mobiliary art in Eastern Europe (Mezin-Meziric culture), focusing on geometrics, contrasts significantly with regional traditions in France. This Eastern European variant consists of largely nonfigurative compositions with specific patterns of broken lines or meanders engraved on ivory "bracelets," and this same family of motifs is found in settlements painted in red on mammoth bones. In the figurative sphere, depictions concern near exclusively the female form, with two dominant morphotypes. Both are geometric in nature, lack heads, arms, and legs and emphasize the central part of the body. While one morphotype shows a triangular shape in profile, representing the buttocks, the other is seen from the front with a thin waist and wide hips.

The schematic nature of Upper-Final Magdalenian mobiliary art (16,000–14,000 cal. BP) stands out across Southwestern France and Central Europe and is best illustrated by the so-called "Schematic Feminine Figure" morphotype, which also evokes the Mezin-Meziric feminine profiles – mainly sculpted as figurines or pendants with varying degrees of simplification (Le Courbet, Lalinde, Andernach, Nebra, Petersfeld, Ölknitz – Fig. 2 no. 3). Although detailed figures do exist (Fig. 1 no. 5), animal depiction is also mostly characterized by simplified lines, including the novel representations of front-facing ibex and macrocephalic horses on projectile points and *bâtons percés* (Limeuil, La Madeleine, Gourdan, Mas d'Azil, El Valle – Fig. 2 no. 8). Both aurochs and reindeer become more commonly depicted during this period, and a special new attention seems to be given to bird and fish forms, effectively increasing the overall diversity of animals depicted.

Examples of mobiliary art become increasingly rare on the ground by the end of the Late Glacial (the Azilian of France, Spain, and Switzerland; the *Federmesser gruppen* of Central and Northern Europe), and we see a radical change

around 13,500–13,000 cal. BP. At this moment seemingly impractical media are chosen (pebbles, small slabs, bones) and engraved and/or red painted geometric compositions consisting of repetitive simple motifs, such as points, lines, crosses, and chevrons (Mas-d'Azil, Murat, Rochedane, Los Azules I; Fig. 3 no. 1), together with very rare schematic animal depictions (Couraud 1985; d'Errico 1994; Naudinot et al. 2017), become the norm. During the last Late Pleistocene traditions in Southwestern France ("Laborian"), we see the revival of very expressive animal depictions on the bone, in which very fine engravings of horses and aurochs bear geometric features, and especially filled bodies using hatch marks, grids, and sinuous lines (Paillet and Man-Estier 2014; Fig. 3 no. 2).

Relative to earlier periods and its Magdalenian contemporaries, Epigravettian (18,000–11,000 cal. BP) mobiliary art from the Italian peninsula and the Spanish Mediterranean coast is both less frequent and less well documented (Martini 2010; Astuti and Grifoni Cremonesi in Averbouh and Feruglio 2012; Villaverde Bonilla et al. 2012). Examples include mostly stone (slabs, pebbles) and bone blanks, most often engraved, and otherwise painted red (Fig. 3 no. 4). Consisting of both figurative and nonfigurative motifs, pieces show a general change in techniques, motifs, and forms similar to the trend identified in the Upper-Final Magdalenian and in the Azilian but with regional specificities. A diversity of animals is represented (snakes, birds, hare) with aurochs, horse, and cervids dominating. Human depiction remains rare in terms of relative frequency, yet it appears to become more important as exemplified by the schematic forward-facing human with outstretched arms (Dalmeri, Cervi) found in several sites (Fig. 3 no. 4). Beginning in the Late Epigravettian (16,000 cal. BP), animal representations become schematic, often depict movement, and subjects are far less detailed and often have hypertrophic trunks (Fig. 3 no. 3). In the Italian peninsula, two regional stylistic groups emerge. In Northern and Central Italy, the schematic nature of the lines is emphasized by the technical choice to depict flat figures filled in with red paint. The high frequency of ibex is another regional characteristic. The engravings from Southern Italy bear particular formal conventions that define the "Mediterranean province" developed during the 1970s: stiffer outlines, the filling in of bodies with geometric patterns, and a particular treatment of aurochs' horns (Graziosi 1973). In Mediterranean Spain, animal depictions are also schematic, but features are represented geometrically, which appears to be a regional specificity (Fig. 3 no. 6). Bodies are elongated and often have a triangular forward pointing shape, with small heads, while sensorial organs are reproduced with simple lines. The bodies also remained unfilled. During the Late Epigravettian, the nonfigurative register overcomes the figurative. Very elaborate compositions are created with repetitive patterns, including straight lines in series, as well as some new motifs: rectangles and triangles, multiple waved lines, scalariforms, and "Greek keys" (Cavallo, Romanelli, Paglicci, Parabita; Fig. 3 no. 5). Traditionally classified as nonfigurative, the so-called "ramiforms" strongly evoke leaves or branches (Villabruna A, Dalmeri, Polesini, El Parpalló – Fig. 3 no. 7) and could mark the introduction of plants into the iconographic sphere of hunter-gatherer groups during this time.

Meaning and Motivation

Numerous interpretations for both mobiliary and cave art during the Paleolithic have been offered, most of which have come under fire for one reason or another:

- For animal depictions: art for art's sake or hunting and fertility magic (E. Piette, H. Breuil)
- For female representations: fertility rites (H. Bégouën, J.-P. Duhard), ancestor cults or feminine deities, the representation of priestesses (A.P. Okladnikov, E. Saccassyn Della Santa, S.N. Zamiatnine), or the celebration of feminity (P. Rice, H. Delporte, P. P. Efimenko)
- For nonfigurative compositions: simple ornamentation (L. Tchikalenko; R. de Saint-Périer, G. H. Luquet, I. Barandiaran), personal markings (A. Leroi-Gourhan, J. Jelinek), systems of information exchange (S. Mithen, M. Conkey), and ritual markings (A. Marshack)

Structuralist interpretations (A. Leroi-Gourhan, G. Sauvet) have considered both geometric and figurative motifs as elements of a symbolic system depicting cosmological myths, revealing therefore ontological features of these societies. According to Leroi-Gourhan (1982), male-female dualism should be at the heart of all symbolic systems as he considers it to be an underlying structural element to all societies. Beginning in the 1980s, researchers became less interested in ultimate meaning, to many considered an unachievable goal, and rather shifted toward mobiliary art's function, the possible social roles these items and their graphic systems may have filled in past societies, and the motivations for graphic reproduction, all spheres being explored via different methodological approaches (technological, structuralist, contextual). This multiplication of research themes and methods is the reflection of a realization that the extremely variable media, motifs, and assemblages encountered in contexts of mobiliary art, spanning over vast geographical spaces and time depths, are likely not explainable by a single general characteristic.

Ritualistic Interpretations

There has traditionally been a hermeneutic division made between utilitarian objects used in daily life and nonutilitarian items, thought to have been created and used in religious/ritual contexts. Such an interpretation is based on figurines that were repeatedly engraved, covered with signs, which are sometimes erased, and patinas suggesting significant manipulation or the deliberate breaking of pieces. The discovery of Gravettian figurines in pits located inside or close to habitations has also been used to support the ritual hypothesis (Kostienki 1-I, Nebra, Avdeevo) (Fig. 2 no. 2). The sharpened legs on some Gravettian Venuses (Grimaldi, Savignano, Tursac, Malta) have also been used to argue that they were inserted into the ground for permanent display. Alternative interpretations have nevertheless been proposed for the broken objects. Recent technological analyses indicated that breakage on the Kostienki 1-I figurines could have resulted from accidents during manufacture (Dupuy in Averbouh and Feruglio 2012). In much the same way, the so-called ritualistic breaking of Magdalenian engraved slabs remains difficult to demonstrate. While intentional breakage is well attested at sites such as Gönnersdorf, La Marche, Limeuil, and La Madeleine, where pieces of slabs were recycled in fireplaces and/or paving floors (Fig. 5), and this breakage is often interpreted as the ritualistic destruction and scattering of the stones (Tosello 2003), it remains impossible to demonstrate the contemporaneity of the engraving and the fracturing events. This could simply be an example or secondary recycling of previously symbolic object into a utilitarian sphere, and this alternative hypothesis is supported by the fact that some depictions made on pieces had already broken.

Paleolithic Notation Systems

A. Marshack (1989), among others, conducted microscopic analyses of Paleolithic objects bearing sequences of notches, incisions, and punctures, and subsequently interpreted these as being notational systems, counting devices, or, in some instances, lunar calendars (Fig. 1 no. 3). This interpretation was based on the number of marks present on the objects and the identification of morphological variations in the marks themselves, taken to be representative of different tools. The idea of multiple tools is subsequently used to argue that various marks were added at different moments in order to record items or events. Alternative interpretations have been proposed by F. d'Errico (1994) and others based on experiments identifying different tools, showing that in a number of cases Marshack's interpretations were either (1) unsupported by the evidence or (2) that, while still best interpreted as notations, they likely differ from the systems proposed by Marshack.

Mobiliary "Art," Social Networks, and Territorial Structuring

Considering graphic expressions as a medium for information exchange to negotiate social identities, various interpretations have focused on information exchange theory (Wobst 1977; Wiessner 1983) to correlate Paleolithic mobiliary art production with socioeconomic systems and infer

community patterns (Conkey 1980; Bahn 1984; Schwendler 2005). The spatial distribution of morphotypes, motifs, forms, and/or technical processes is used to reconstruct social networks and territorial structuring (broad vs reduced; open vs closed). If single or few "exotic" morphotypes could illustrate exchanges, common formal, and technological norms revealed by techno-stylistic analyses would therefore represent more closely shared systems and thus imply regular meetings, cooperation, and partnerships between social formations. It appears therefore that very connected long-distance networks seem to develop during the Middle Magdalenian, notably between the Aquitaine and Poland (Fuentes et al. in Bourdier et al. 2017; Kozlowski et al. in Bourdier et al. 2017; Maier in Bourdier et al. 2017) and between the Northern Pyrenees and the Asturias (Corchón Rodriguez 1986; Fritz et al. 2007; Arias Cabal and Ontañon Peredo 2004; Rivero in Averbouh and Feruglio 2012; Lucas in Cleyet-Merle et al. 2017; Fig. 4). In contrast, the very specific trend to represent humans with detailed features in the Poitou, as opposed to schematic or grotesque depiction elsewhere, is seen as a mechanism of social affirmation and differentiation (Fuentes 2013; Fig. 5 no. 1).

The agents, processes, and even directions of these social dynamics are difficult to treat; do they represent direct or indirect connections, and what is the frequency and nature of these relationships (the movement of objects, individuals or families, or whole bands)? Sites with high concentrations of the most conventional mobiliary art are considered as workshops dedicated to the production of a single or a few specific item(s) for diffusion in other local or regional satellite sites, such as the projectile points and *bâtons percés* with engraved macrocephalic horses at La Madeleine during the Upper Magdalenian (Apellaniz in Clottes 1990b; Fig. 1 no. 7), or the *bâtons percés* with engraved bison heads at Isturitz during the Middle Magdalenian (Rivero 2016). Larger diffusional distances are taken to indicate increased sociocultural influence of respective sites. Since the pioneering work of M. Conkey (1980) and P. Bahn (1984), there has been a growing interest in investigating the social function of the mobiliary "art" sites, assuming they must have played critical roles for structuring social articulatory mechanisms between individuals and bands (Delporte and Clottes 1996; Rivero 2016). With regard to other archeological data (accommodation capacity of the site, thickness and number of archeological layers, diversity of activities performed, investment in the spatial structuring of the place, presence of "exotic" items and eventually of rock art), sites with high concentration of pieces are taken to characterize either base camps or aggregation sites where affiliated of bands gather. A high variety of motifs and graphic compositions with the association of elements found at other local sites and original features may differentiate the second from the first (Conkey 1980), an interpretation that has notably been put forward for the Middle Magdalenian sites of Altamira, Isturitz and Mas d'Azil, and the Pavlovian site of Pavlov I (Svoboda in Averbouh and Feruglio 2012).

Mobiliary "Art" and Social Organization

Beginning in the late 1980s, investigation into the author(s) of "decorated" items has become a central issue in exploring the social function of graphic and plastic production. Studies of form and technological analysis look into the social identity of the makers (Apellaniz in Clottes 1990b; D'errico 1994; Fritz 1999; Rivero in Averbouh and Feruglio 2012; Rivero 2016). Technical processes and sequences of movements (orientation, pressure, direction, chronology) allow analysts to recognize to recognize "signatures" and to characterize their degree of knowledge and practical know-how. In some archeological cultures, it appears that the production of mobiliary "art" was conducted by experts with a significant degree of technical know-how and profound knowledge of aesthetic conventions (Late Aurignacian in Swabian Jura, Pavlovian, Kostenkian, Middle and Upper Magdalenian). The possibility of specialization leads to questions regarding the role of these items in the economic sphere and the respective social organization of

their users/producers (prestige/division, competition/collaboration/regulation) and more broadly questions pertaining to the division labor in these societies. In others contexts, production may have been more common, meaning that techniques and forms/motifs were more easily learned and could have been reproduced by anybody, such as the Azilian painted and engraved pebbles with simple markings and geometric motifs (Naudinot et al. 2017). This dichotomy between expert and regular production could point to the changing social roles of mobiliary "art" throughout the Upper Paleolithic, yet the simplicity of techniques and forms does not necessarily mean nonspecialized production, as such elements are culturally conditioned.

In addition to identifying pieces having been worked by experts, technological analyses have also yielded evidence of novice and apprentice work (Fritz 1999; Rivero 2016), i.e., different stages within the theoretical and practical process of apprenticeship. According to degrees of technical and formal control, engraved slabs have been interpreted as either experts' sketches prior to realization on another medium (La Marche: Fig. 5 no. 1–2) or as "training blanks" for novices and apprentices (Enlène, Limeuil: Fig. 5 no. 3–4; Bégouën and Clottes in Clottes 1990a; Tosello 2003). This last interpretation has also been proposed for osseous materials showing little transformation (butchery waste, osseous industry waste, or recycled objects: Aurière in Averbouh and Feruglio 2012). The practical conditions (places, media, tools) of apprenticeship still need to be determined, while the organization of the learning process in terms of duration, number, age of individuals concerned, and mobility of the experts is more difficult to access. Finally, the stereotyped learning pathways seem to indicate to the reproduction of cultural techno-stylistic conventions. This reproduction is sometimes highly standardized, such as the case of the Middle Magdalenian where strong social control seems to have conditioned much of the graphic production. Such evidence of control is taken to reflect denser social networks and more complex social relations and perhaps even their large-scale institutionalization (Fritz 1999; Rivero in averbouh and Feruglio 2012). Other archeological cultures seem to have less strict conventions where individual liberty of creation appears to be authorized.

Some Future Perspectives

Considering the many issues faced when investigating mobiliary "art," as well as the diversity of research trends see over the last decades, a few questions stand out as necessitating particular attention moving forward. At the scale of artifacts themselves, it is first and foremost necessary to reconsider the archeological relevance of our modern classification systems: what exactly are we looking at when we question this vast and polymorphic category, dubbed mobiliary "art"? For instance, are notches on bones to be considered ornamental or could notation systems or technical by-products of certain modes of production be at play? Studies on the relationships between media and their respective graphic compositions must be further explored to remedy this situation. Within the family of objects made on osseous materials, was the selection of the material (animal, bone) random or intentional? Is there a connection between the species used as media and those depicted (Bosinski in Cleyet-Merle et al. 2017)? What can be inferred on a symbolic/interpretive level? To provide new insights into the origins, motivation, and meaning of marks and motifs, the sphere of activities in which items were involved and eventually their status (exceptional or ordinary) must be investigated, especially with regard whether items were actually used (Lucas in Cleyet-Merle et al. 2017). Taphonomic studies (D'errico and Villa 1997) have become critical to make progress regarding questions of ritual breaking and the intentional movement of some examples (slabs, figurines). For a better understanding of artifact life histories, systematic technological analysis must be used to determine whether production was segmented in

space and time and how objects were introduced into, transported from, or abandoned at sites. More generally, investigations into temporal dynamics would surely provide novel information pertaining to the sociocultural functions of mobiliary "art" and its production in societies where short-lived artifacts co-occur with objects having long use-lives and significant patinas and/or traces of repair (e.g., the repaired Montastruc mammoth-shaped spear-thrower). In technological, use-wear, and taphonomic types of analysis, the use of 3D technologies should be standard practice in attempting to accurately characterize the transformation processes of pieces at all steps of the *chaîne opératoire*, from raw material and blank selection to graphic production itself, as well as the use, reuse, and eventual discard of the objects themselves.

The hypothetical reception of these works is another critical topic which deserves more investigation. As examples of visual creation, every motif on pieces is made for an audience, whose number (individual, small group, large group) and nature (human/nonhuman, age, gender) can be extremely variable. The diversity of sites in which mobiliary "art" is documented as well as the different scales of distribution of these items (local, regional, supra-regional) obviously encompasses several contexts of reception and social uses (individual, band, inter-band). Yet addressing this issue of audience and user in regard to mobiliary "art" requires the detailed examination of their archeological context, i.e., the frequency and intensity of the occupation (stratigraphic sequence) and the nature of the activities performed in situ (artifacts, structures, marks), as has been attempted by researchers applying information exchange theory. Strategies of perception have received much less attention yet could provide other clues regarding questions of audience, the choice of "what" to communicate is not disconnected from the questions of "who" is the target, and "when" and "how" to transmit said information. It is clear that some decorated Paleolithic items were made to be seen, exhibited, exchanged, and moved, whereas others were not meant to be seen or removed from sight, whether by being hidden or destroyed. Analyzing the visibility and legibility of the objects and their graphic compositions would appear to be a particularly promising avenue in regard to these questions, yet requires some methodological advances, both in terms of tools used and analytical criteria evaluated.

When investigating the social use and meaning of mobiliary "art" in the European Upper Paleolithic, its relation with rock/cave art remains an essential topic of research, all the more so as a spatial dichotomy seems to characterize their respective locational organizations – does the fact that they are rarely found together extend to the symbolic and/or social spheres? To date, studies have focused on similarities in motifs and forms in order to develop chrono-cultural typologies of rock/cave art. A broader comparative approach that moves beyond simple time-space archeological systematics and toward audience and social function/value has yet to be conducted. Possible complementarities between these two realms of "art" remain to be explored, and their relationship settlement patterns are perhaps the most interesting future avenue of research on this theme.

It is also essential to seriously consider to continuity and change in graphic traditions during the Upper Paleolithic. Mobiliary "art" lags behind in regard to dating, especially in comparison with the significant progress made in dating rock art over last 20 years. The lack of precision in the chrono-cultural attribution of many artifacts, including some of the more classic forms – mainly the result of their older contexts of excavation – makes it all the more necessary to develop targeted absolute dating programs. Beyond directly assessing temporal shifts, placing mobiliary "art" within its cultural context would help to comparatively rethink the rhythms of change seen within different spheres of the material culture (technological, subsistence, economic, symbolic). Traditionally presented as synchronous, these evolutions and interconnections appear to be more complicated, with some instances of clear temporal

discrepancies between technical and symbolic shifts having been highlighted by new data (Naudinot et al. 2017; Fig. 6). The identification of internal evolutionary processes acting on mobiliary "art" production remains at the heart of research questions. How does the interplay between different evolutionary processes influence the origins and intensity of mobiliary "art" production and its content (in regard to stylistic continuity or rupture)? The complex relationships between mobiliary "art" production, socioeconomic systems, and their environment need to be integrated into such chrono-cultural lines of questioning. How and to what degree are changes in mobiliary "art" production reflections of greater social and economic responses to shifting climatic conditions?

All these issues require a holistic approach to mobiliary "art" with regard to its economic, social, cultural, and environmental contexts. Analyses should be conducted at several scales, from site level to general areas of influence. Like other archeological remains, mobiliary "art" must be studied as part of an interdisciplinary framework, linking different spheres of activity within prehistoric hunter-gatherer populations (subsistence, technological, symbolic, social) and exploring the role of environmental conditions in their variability. While progress has not ceased since the 1990s, the contextual approach to mobiliary "art" described here must become standard practice. Finally, these interdisciplinary approaches must also delve into other fields of human research (anthropology, ethnology, cognitive psychology) as to broaden our conceptual and methodological perspectives regarding the roles and uses of graphic production in the hunter-gatherer societies.

References

Abramova, Z.A. 1995. *L'art paléolithique d'Europe Orientale et de Sibérie [Palaeolithic art of Eastern Europe and Siberia]*. Grenoble: Jérôme Million, Collection L'Homme des Origines.

Arias Cabal, P., and R. Ontañon Peredo, eds. 2004. *La material del lenguaje prehistorico. El arte mueble paleolítico de Cantabria en su contexto*. Liebana: Gobierno de Cantabria.

Averbouh, A., and V. Feruglio. 2012. L'art mobilier pléistocène/Pleistocene portable art/Arte mobiliar del Pleistoceno. In *L'art pléistocène dans le monde/Pleistocene art of the world/Arte pleistoceno en el Mundo, IFRAO conference, Tarascon-sur-Ariège, septembre 2010*, ed. J. Clottes, 1265–1598. Foix: Préhistoire, Art et Sociétés, Bulletin de la Société Préhistorique Ariège-Pyrénées, LXV–LXVI.

Bahn, P. 1984. *Pyrenean prehistory. A palaeoeconomic survey of the French sites*. Warminster: Aris and Philips Ltd.

Bosinski, G., F. D'errico, and P. Schiller. 2001. *Die gravierten Frauendarstellungen von Gönnersdorf (Der Magdalenien-Fundplatz Gönnersdorf 8)*. Stuttgart: Franz Steiner Verlag GMBH.

Broglio, A., and F. Gurioli. 2004. The symbolic behaviour of the first modern humans: The Fumane cave evidence (Venetian Pre-Alps). In *La spiritualité, Actes du colloque de la commission 8 de l'UISPP*, ed. M. Otte, 97–102. Liège: ERAUL 106.

Bourdier, C., L. Chehmana, R. Malgarini, and M. Poltowicz-Bobak, eds. 2017. *L'essor du Magdalénien. Aspects culturels, symboliques et techniques des faciès à Navettes et à Lussac-Angles*. Paris: Société Préhistorique Française. http://www.prehistoire.org/515_p_46802/les-seances-de-la-spf.html

Cattin M. I. In press. Moving with the Magdalenians: Examples from the camp sites of Monruz and Champréveyres (Switzerland). *Quaternary International*

Cleyet-Merle, J.-J., J.-M. Geneste, and E. Man-Estier. 2017. *L'art au quotidien: objets ornés du Paléolithique supérieur, Actes du colloque international, Les Eyzies-de-Tayac, 16–20 juin 2014*. Paléo, Special Issue.

Clottes, J., ed. 1990a. *L'art des objets au Paléolithique, vol. 1: L'art mobilier et son contexte, colloque international de Foix – Le Mas d'Azil, 16–21 novembre 1987*. Paris: Ministère de la Culture, de la Communication, des Grands Travaux et du Bicentenaire.

Clottes, J., ed. 1990b. *L'art des objets au Paléolithique, vol. 2: Les voies de la recherche, colloque international de Foix – Le Mas d'Azil, 16–21 novembre 1987*. Paris: Ministère de la Culture, de la Communication, des Grands Travaux et du Bicentenaire.

Conard, N.J. 2009. A female figurine from the basal Aurignacian of Hohle Fels cave in southwestern Germany. *Nature* 459: 248–252.

Conkey, M. 1980. The identification of prehistoric hunter-gatherer aggregation sites: The case of Altamira. *Current Anthropology* 21: 609–630.

Corchón Rodriguez, M.S. 1986. *El arte mueble paleolítico cantábrico: contexto y análisis interno*. Madrid: Centro de Investigacíon y Museo de Altamira, Ministerio de Cultura.

Corchón M. A., Mateos M., Álvarez Fernández E., Peñalver E., Delclòs X., van der Made J. 2008. Ressources complémentaires et mobilité dans le Magdalénien cantabrique. Nouvelles données sur les mammifères marins, les crustacés, les mollusques et les roches organogènes de la grotte de Las Caldas (Asturies, Espagne). *L'Anthropologie* 112: 284–327.

Couraud, C. 1985. *L'art azilien. Origine-survivance*. Paris: Gallia Préhistoire, CNRS.

D'errico, F. 1994. *L'art gravé azilien. De la technique à la signification (Gallia-Préhistoire Supplément 31)*. Paris: CNRS Éditions.

D'errico, F., and P. Villa. 1997. Holes and grooves. The contribution of microscopy and taphonomy to the problem of art origins. *Journal of Human Evolution* 33: 1–31.

Delporte, H., 1990. *L'image des animaux dans l'art préhistorique*. Paris: Picard, 254 p.

Delporte, H. 1993. *L'image de la femme dans l'art préhistorique*. Paris: Picard.

Delporte, H., and J. Clottes, eds. 1996. *L'art préhistorique des Pyrénées, catalogue de l'exposition, Musée des Antiquités Nationales, château de Saint-Germain-en-Laye, 2 avril-8 juillet 1996*. Paris: R.M.N.

Fritz, C. 1999. Towards a rebuilding of the Magdalenian artistic processes: The use of microcopic analysis in the field of miniature art. *Cambridge Archaeological Journal* 9 (2): 189–208.

Fritz, C., G. Tosello, and G. Sauvet. 2007. Groupes ethniques, territoires, échanges: la "notion de frontière" dans l'art magdalénien. In *Frontières naturelles et frontières culturelles dans les Pyrénées préhistoriques, Actes de la Table Ronde de Tarascon-sur-Ariège, mars 2004*, ed. N. Cazals, J. González Urquijo, and X. Terradas, 164–181. Santander: Publican, ediciones de la universidad de Cantabria.

Fuentes, O. 2013. The depiction of the individual in prehistory: Human representation in Magdalenian societies. *Antiquity* 87 (338): 985–1000.

Graziosi, P. 1973. *L'arte preistorica in Italia*. Firenze: Sansoni.

Henshilwood, C., and F. D'errico, eds. 2011. *Homo symbolicus: The dawn of language, imagination and spirituality*. Amsterdam: J. Benjamins.

Leroi-Gourhan, A. 1982. *The Dawn of European art: An introduction to Palaeolithic cave painting*. Cambridge: Cambridge University Press.

Lucas, C. 2014. Messages codés des chasseurs magdaléniens. Approche technologique et structurale des objets ornés de compositions géométriques par les Magdaléniens des Pyrénées nord-occidentales (16.500-12.000 ans cal.B.C.). Unpublished PhD dissertation, Université Paris 1 Panthéon-Sorbonne.

Marshack, A. 1989. On wishful thinking and lunar "calendars". *Current Anthropology* 30: 491–494.

Martini, F. 2010. Aspects cosmopolites et locaux dans l'art de l'Epigravettien en Italie. In *L'art pléistocène dans le monde/Pleistocene art of the world/Arte pleistoceno en el Mundo, IFRAO conference, Tarascon-sur-Ariège, septembre 2010*, ed. J. Clottes, 472–485. Foix: Préhistoire, Art et Sociétés, Bulletin de la Société Préhistorique Ariège-Pyrénées, LXV-LXVI.

Mellars, P., K. Boyle, O. Bar-Yosef, and C. Stringer, eds. 2007. *Rethinking the human revolution*. Cambridge: McDonald Institute for Archaeological Research.

Naudinot, N., C. Bourdier, M. Laforge, C. Paris, L. Bellot-Gurlet, S. Beyries, I. Thery-Parisot, and M. Le Goffic. 2017. Evidence for Paleolithic symbolic and technological evolution divergence: The shining bull and Rocher de l'Impératrice engraved tablets. *PLoS One*. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0173037

Paillet, P., and E. Man-Estier. 2014. De nouvelles découvertes d'art mobilier laborien dans le Nord du Périgord. In *Les groupes culturels de la transition Pléistocène-Holocène entre Atlantique et Adriatique*, ed. M. Langlais, N. Naudinot, and M. Peresani, 129–154. Paris: Société Préhistorique Française. http://www.prehistoire.org/515_p_46802/les-seances-de-la-spf.html

Rivero, O. 2015. *Art mobilier des chasseurs magdaléniens á la façade atlantique*. ERAUL, 146. Liège

Rivero, O. 2016. Master and apprentice: Evidence for learning in palaeolithic portable art. *Journal of Archaeological Science* 75: 89–100.

Romandini, M., M. Peresani, V. Laroulandie, L. Metz, A. Pastoors, M. Vaquero, and L. Slimak. 2014. Convergent evidence of eagle talons used by late Neanderthals in Europe: A further assessment on symbolism. *PLoS One* 10 (7): e101278. https://doi.org/10.1371/journal.pone.0101278.

Sauvet, G., S. Sauvet, and A. Wlodarczyk. 1977. Essai de sémiologie préhistorique (pour une théorie des premiers signes graphiques de l'homme). *Bulletin de la Société Préhistorique Française* 74: 545–558.

Schwendler, R.H. 2005. Magdalenian perforated bone disks in geographic and social contexts. In *Industrie osseuse et parures du Solutréen au Magdalénien en Europe, Table-ronde sur le Paléolithique supérieur récent, Angoulême, 28–30 mars 2003*, ed. V. Dujardin, 73–84. Paris: Mémoire XXXIX de la Société Préhistorique Française.

Tosello, G. 2003. *Pierres gravées du Périgord Magdalénien. Art, symboles et territoires (Gallia Préhistoire Supplément 36)*. Paris: CNRS.

Utrilla, P., C. Mazo, M.C. Sopena, M. Martínez-Bea, and R. Domingo. 2009. A palaeolithic map from 13660 cal. BP: Engraved stone block from the Late Magdalenian in Abauntz Cave (Navarra, Spain). *Journal of Human Evolution* 57-2: 99–111.

Vanhaeren, M., and F. D'errico. 2006. Clinal distribution of personal ornaments reveals the ethno-linguistic geography of Early Upper Palaeolithic Europe. *Journal of Archaeological Science* 33 (8): 1105–1128.

Villaverde Bonilla, V., D. Román, M. Peréz Ripoll, M. Mercè Bergadà, and C. Real. 2012. The end of the Upper Palaeolithic in the Mediterranean Basin of the Iberian Peninsula. *Quaternary International* 272–273: 17–32.

Wiessner, P. 1983. Style and social information in Kalahari san projectile points. *American Antiquity* 48 (2): 253–276.
White, R. 1982. Rethinking the Middle/Upper Palaeolithic transition. *Current Anthropology* 23 (2): 169–192.
White, R., R. Bourrillon, and the collaboration of F. Bon. 2015. *Aurignacian Genius: art, technologie et société des premiers hommes modernes en Europe, Actes du symposium international, 8–10 avril 2013, New York University*. Toulouse: P@lethnologie, 7. http://blogs.univ-tlse2.fr/palethnologie/2015-revue/
Wobst, H.M. 1977. Stylistic behaviour and information exchange. In *For the director: Research essays in honour of J.B. Griffen*, ed. C.E. Cleland, 317–342. Ann Arbor: Museum of Anthropology, University of Michigan.

Moche, Geography and Culture of

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State of Knowledge and Current Debates

Time and Space

The Moche (also known as "Mochicas") were a pre-Hispanic society that developed on the desert north coast of Peru between the second and ninth centuries AD. The Moche did not develop a writing system (logographic or syllabic). They created, instead, a highly elaborated artistic record that was used as media to encode and diffuse complex symbolic messages. The refined and standardized Moche art was expressed in a variety of material mediums: murals, textiles, ceramics, and metals (Fig. 1), and has been recognized by many as one of the most remarkable art styles of the pre-Columbian Americas.

Although still controversial, Moche is considered by many as the first civilization in the Andes to attain state-level social complexity, judging by their massive adobe constructions distributed along the north coast of Peru. Its recognition as one of the first pristine states of the New World is grounded on the identification of urban features in major Moche centers that show significant political and social centrality, planning, hierarchy, and craft specialization (Fig. 2).

Discussions of the incipient development of the Moche must first consider their successful adaptation to the harsh environment that characterized the north coast of Peru in the first millennium. Geographically located between the Pacific Ocean and the western mountains of the South American Andes, the north coast is a narrow desert strip containing small rivers and oases naturally characterized by their low agricultural productivity. The natural scarcity of both water and permanent land resources has historically converted this region into a hostile and rough area for human occupation. Nonetheless, and paradoxically, early groups settled in the region as early as BC 4000 (Bird 1948). The confluence of

Moche, Geography and Culture of, Fig. 1 Gilded-copper Moche crown. It was presumably looted from the royal cemetery of La Mina (Jequetepeque Valley) Currently located in Peru's Ministry of Culture

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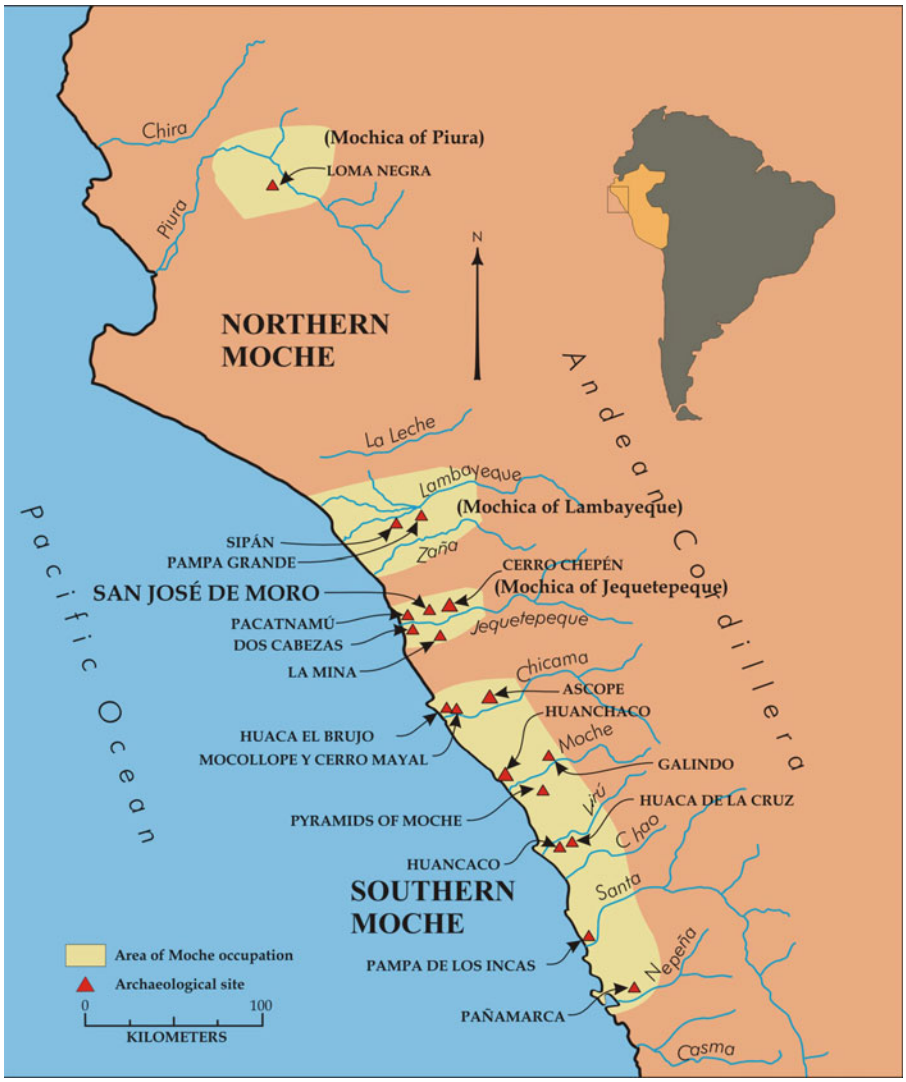

Moche, Geography and Culture of, Fig. 2 Map of the north coast of Peru indicating the most important Moche sites and those cited within the text. (Map from the archive of the San Jose de Moro Archaeological Program).

two maritime currents, the "Humboldt" cold water current and "El Nino" hot water current, established conditions for the development of one of the richest and most varied maritime ecosystems in the world. Maritime resources, combined with efficient strategies of land resource exploitation, created suitable conditions for the incipient development of pristine civilizations (Moseley 1975).

The abundance of maritime resources contained in the equatorial Pacific Ocean strongly contrasts with the periodical destruction and devastation caused by "ENSOs" (El Niño-Southern Oscillations). ENSO is defined as a drastic oscillation in the ocean-atmosphere system produced by unusually warm ocean temperatures in the equatorial Pacific. This annual phenomenon that takes place at the end of the year is frequently accompanied by severe rainfall that potentially causes destructive flooding and, subsequently, drastic droughts in the Peruvian coast. Evidence of severe El Niño phenomena has been registered on the Peruvian coast as early as 3000 BP (Sandweiss et al. 2007).

Far from constituting a threat, the mitigation of the effects caused by the El Niño phenomenon turned into opportunities for ancient Peruvian populations. It seems further evident that particularities of human agency, when stimulated by environmental stress, trigger drastic transformations that alter the economic, political, and cultural structures of human groups. In this sense, the strategies of hazard management created by the ancient coastal populations of northern Peru are considered the basis for the successful environmental adaptation in the region. The way in which El Niño impacted these populations, as well as the range of historically contingent and socially constructed options for mitigating it, sets the conditions for the emergence of "charismatic leaders" that progressively accumulate economic, political, and religious power (Billman and Huckleberry 2009).

Before the Moche appear in the archaeological record of the Peruvian north coast, many other human groups settled and successfully adapted to the hostile conditions of this part of the Central Andes: the Cupisnique, the Salinar, and the Gallinazo or Virú. Four thousand years of accumulation of knowledge, technologies, and processes of adaptation crystallized in a unique society characterized by its sociopolitical complexity, its monumental and massive constructions, and its incredibly elaborated craft technology.

Reaching a relatively homogenous consensus of what Moche was and when and how this phenomenon emerged is not simple. Throughout more than 100 years of development of Moche archaeology, a great variety of theoretical models and paradigms have been developed and proposed not only to understand the tangible manifestation of this phenomenon – its material culture – but also the complex social, political, and economic dynamics that gave it shape in a quite specific space and time.

Uncommon in Peruvian archaeology, most of what we know about the Moche people is based on data principally recovered from long-term excavation programs conducted in northern Peru. Many of them were initiated in the early 1990s and are now led by Peruvian archaeologists in collaboration with public and private institutions: the Sipán Project, led by Walter Alva; the San José de Moro Archaeological Program, led by Luis Jaime Castillo; the Huacas de Moche Project, led by Santiago Uceda and Ricardo Morales; and the El Brujo Project, led by Régulo Franco. Many of these projects have been pivotal not only in advancing our understanding about the Moche people but also in revaluing the Moche identity of contemporaneous traditional populations Likewise, these projects are very important in rescuing Moche sites seriously threatened by human destructions. Other projects conducted by foreign and Peruvian archaeologists have also been pivotal in shedding light on the emergence, development, and collapse of the Moche in different valleys along the north coast of Peru: from south to north, Milosz Giersz, Patrycja Przadka, and Krzystof Makowski in the Huarmey and Culebras Valley; Tom and Sheila Pozorski in the Casma Valley; Donald Proulx and Duccio Bonavia in the Nepeña Valley; David Wilson and Claude Chapdelaine in the Santa Valley; Gordon Willey and Jean-Francois Millaire in the Virú Valley; Garth Bawden, Brian Billman, and Gregory Lockard in the Moche Valley; Glenn Russel, Jeffrey Quilter, and Michelle Koons in the Chicama Valley; Christopher Donnan, Tom Dillehay, Edward Swenson, Marco Rosas, and Ilana Johnson in the Jequetepeque Valley; Steve Bourget in the Zaña and Virú Valleys; Carlos Wester and Manuel Curo in La Leche Valley; Izumi Shimada in the Chancay-Lambayeque Valley; and, finally, Krzystof Makowski and Peter Kaulicke in the Piura Valley (see Fig. 2).

Based on other published reviews and current state of the art of the investigation of the Moche, I will divide this article in six sections that broadly synthetize what we currently know about this enigmatic society: (1) Origins; (2) Chronology and Models of Geopolitical Organization; (3) Art, Warfare, and Ritual; (4) Death and Ancestrality; (5) Monumentality and Urbanism; and, finally, (6) Collapse. The fourth section touches upon topics that I have been exploring since 2013 based upon my own investigations at the monumental area of the San Jose de Moro site in the Jequetepeque Valley.

Origins

The study of the origins of the Moche has occupied and still occupies a prominent position within Moche archaeology. Despite the fact that this topic represented an underlying concern since the times of the first Moche scholars (Max Uhle, Rafael Larco, and Gordon Willey), there is still very little consensus about this matter.

Larco, one of the fathers of Moche archaeology, argued that the origin of the Moche state could have been intimately linked to the successful implementation of a highly complex irrigation system in the valleys of the north coast. This process might have occurred around AD 300 (Larco 1945; Willey 1953). According to Larco, irrigation canals created new forms of wealth and, along with that, unpredicted opportunities of political control and accumulation of goods. With these newfound sources of economic power, the first Moche leaders would have been able to finance the creation of centralized and hierarchical political organizations that materialized in the construction of large-scale monuments. It follows that the control of these monuments was essential for the dissemination of ideological messages since these monuments constituted receptacles for the orchestration of public rituals (Billman 2002: 394). Under this perspective, the control of rituals would have been essential since they allowed leaders to have power over the means of ideological production (DeMarrais et al. 1996). Despite that this process, as described by Larco, appears to be obvious for the rise of the first Moche leaders, it has also been relatively accepted that the circumstances in which Moche political power emerged varied according with the particular historical trajectories of each valley of the north coast.

Billman (2002, 2010) takes Larco's argument further. In investigating the origins of the Moche ruling elite in the Moche Valley, Billman argues that the managerial requirements of irrigation systems were relatively unimportant to the emergence of the Moche state in the Moche Valley. Based on regional surveys, he identifies that large-scale irrigation systems were already essential for pre-Moche groups (Cupisnique, Salinar, and Gallinazo). Nonetheless, none of these groups attained the technological advancements achieved during Moche times. Billman holds that highland-coastal interactions and, very importantly, the political control of irrigation systems (all conditions present from AD 300), along with warfare, created the conditions that allowed Moche leaders to form political units that were highly centralized as well as territorial and expansive. It is likely that intensive armed conflict provided the real opportunities for leaders to exert both coercive and ideological power in such a highly fragmented political reality (Billman 2002: 390).

Both Larco's and Billman's hypotheses are challenged by Kaulicke who states that the scenarios presented might not be applicable for the northern valleys of the Moche territory (Kaulicke 1992) (see Fig. 2). Kaulicke moves away from interpretations based on the development of agrarian systems by instead highlighting the social processes involved in the reinvention of ceramic technology. Based on the presence of a significant amount of ceramics associated with the Early Moche style in the Piura Valley (the furthest northern frontier of the Moche territory), Kaulicke suggests that the crystallization of the Moche style corresponded to a complex technological re-elaboration that occurred based on the mixture of preexisting Formative traditions and cultures. Furthermore, taking the funerary evidence as a starting point, Kaulicke argues that the social process that led to the development of the Moche style occurred in the northern valleys of the Moche territory, instead of the southern part of this territory, as Larco and Willey had traditionally argued.

Although Moche scholars have traditionally used unilineal and evolutionary models to explain the origin of the Moche state (Larco 1945), it appears that multiple conditions and factors were involved in the development of this incipient state. Castillo and Uceda (2008) argue that the rise of the Moche could have happened, contradictory to original hypotheses, in several different locations, at different moments, and under different historical contingencies (Castillo and Uceda 2008: 7). The concept of "harmonization" is used by Castillo and Uceda to explain how, under this apparent multiplicity of origins, the Moche groups were tied by elite integrating ritual practices that were generalized among different communities. In this context, ideology, along with strategic

social relations, played a pivotal role in the process of cultural harmonization and homogenization (Castillo and Uceda 2008: 7). Ideology, they say, could have constituted the most important source and strategy of power in the Moche world. They propose that ideological control could allow Moche elite groups to legitimize their economic privileges and social status and, thus, guarantee the access to power as a sacred right. In the same way that ideology could have been instrumental for Moche elite groups to keep and legitimize power, it was also fundamental in their own collapse. It has been convincingly argued that a failure of the ideological control, combined with unexpected and foreign factors, led the Moche to their imminent disappearance (Bawden 1995; Castillo 2010; Castillo and Uceda 2008; Shimada 1994). We will readdress this point in the section "Collapse".

Chronology and Models of Geopolitical Organization

The geopolitical organization of the Moche has been perhaps the most developed, yet controversial, topic within Moche archaeology. The evolution of the ideas regarding how the Moche were politically organized has certainly followed the ups and down of the varied theoretical trends of the key investigators of the Moche culture. The question of whether or not Moche was a state-level society has been and is still implicit in any research on the Moche. Principal trends can be framed within the three classical paradigms: (a) unified state, (b) dual state or multivalley state, and (c) no statehood.

Moche as a Unique Centralized and Unified State

The ideas of the Moche as a unitarian and highly centralized state were mainly developed by and inherited from Larco (1945, 1948). Larco not only published extensively about different aspects of the life of the ancient Moche people but also established the first chronological framework for the north coast of Peru. The basis for Larco's chronology (from Moche I to Moche V phase) was the subtle changes he recognized in the shapes of Moche stirrup-spout bottles from the Chicama and Moche valleys. Based on the wide and homogeneous distribution of these vessels from Chicama to Nepeña (see Fig. 2), Larco conceptualized the Moche as a centralized political entity, with a capital located in the site of Huacas de Moche, in the Moche Valley, from where influence and political control disseminated (Castillo and Quilter 2010: 5). This assertion represented, in fact, the first ever articulated idea referring to the Moche society as a whole.

In 1946, the Virú Valley Project, the first large-scale and multisite project in South America, conducted large excavations in several pre- and post-Moche sites in the Virú Valley in northern Peru. While this project introduced innovative and sophisticated methodologies for studying settlement patterns and the stylistic evolution of ceramic, many of its interpretations gave further support to Larco's concept of the centralized and unilineal evolution of the Moche (or "Huancaco phase," according to Willey (1953)). Discoveries made at both Huaca de la Cruz (Strong 1947) and Huancaco (Willey 1953), major Moche sites in the Virú Valley, were interpreted as tangible manifestations of steady campaigns of conquest launched by the Moche state to control valley resources and local populations (Gallinazo) north and southward.

A few decades later, the Moche-Chan Chan Project, under the initial direction of Michael Moseley (1992), carried out an intensive investigation in diverse sites of the Moche Valley. Although the project's work was mainly focused on the Chimú capital of Chan Chan, great emphasis was also put on studying the administrative and religious functions of Huaca del Sol and Huaca de la Luna. Moseley also supported the paradigm of the unified and conquering Moche state that spread its power up and down the north coast. Furthermore, the distinctiveness of the Moche ceramic style would have represented the "hallmark" of a corporate and state style whose production and distribution were tightly controlled by ruling elite. The distribution of these official paraphernalia espoused the dissemination of a dominant ideology contained in the images depicted on the material culture (Castillo and Quilter 2010; Quilter 2002: 159).

It is worth emphasizing here the role that iconographical studies played in the development of

the paradigm of a unitary and expansionist Moche state. Moche narrative art was unquestionably interpreted as an orthodox expression of a state artistic program (Benson 1972; Donnan 1976; Hocquenghem 1987). Iconographic studies did not question the interpretations of the political nature of the Moche organization (Quilter and Koons 2012: 25). They confirmed, rather, that Moche art was the expression of a corporate state art highly controlled both in production and distribution (Donnan 2010). Likewise, the reoccurring patterns of Moche ceremonial centers and their large-scale artistic programs supported, the idea of an imperial growth through military conquest (Fig. 3). Moche art as a whole was interpreted, thus, as an expression of religious symbolism whose dissemination was evidently promoted by state political interests.

These concepts allowed the first Moche scholars to construct a model of the rise and development of a single Moche state whose expansion started by AD 200 and was only stopped by external invasion and natural disasters occurring around AD 600. Invasions and natural disasters would have triggered the weakness of the elite's authority as well as a profound social instability in the Moche society which finally languished by the end of the Early Intermediate Period (see section "Collapse" for further details on the Moche collapse).

Moche as a Dual State or Multivalley State

In 1960 a significant number of very atypical Moche ceramics were found at the site of Vicús, Piura Valley, located 400 km north of the well-known Moche core comprised of the Chicama-Nepeña Valleys. The assemblage discovered in Piura was composed of well-elaborated Moche ceramics along with specimens belonging to the early ceramic traditions of Virú and Salinar (Kaulicke 1992; Makowski 1994). The so-called Vicús phenomenon challenged, for the first time, Larco's five-phase ceramic sequence and its scope of applicability. In this setting, the ideas

Moche, Geography and Culture of, Fig. 3 Polychrome friezes decorating the northern façade of the Moche temple of Huaca de La Luna (Moche Valley). (Photo courtesy of Luis Jaime Castillo B)

about Moche origin were also put under scrutiny. Castillo and Quilter assert "the Vicús abnormality could, by no means, be explained under Larco's centralized and political unified paradigm since, for Larco, the origin of the Moche style would have only been circumscribed to the Moche valley from which it spread" (Castillo and Quilter 2010: 11). This "abnormality" was harder to explain after the discovery of a set of royal tombs in the site of Loma Negra, also located in the Piura Valley (Makowski 1994). The subsequent discovery of other royal tombs in the early 1980s, both in La Mina in the Jequetepeque Valley (Narváez 1994) and in Sipán in the Lambayeque Valley (Alva 1988), made much more evident the gaps and limitations of Larco's chronology as well as its scope of applicability. Royal Moche families ruled the northern valleys of the Moche territory as early as their counterparts in the southern valleys. As stated above Kaulicke (1992) argued, that the origin of the Moche style would have been more associated with socio-technological phenomena occurring near modern Ecuador rather than in the Peruvian Moche-Chicama Valleys.

In 1994, Castillo and Donnan consolidated the idea of a dual Moche state. This alternative model visualized two Moche regions that coexisted relatively independent of each other: the "Southern Moche State" and the "Northern Moche State." The first state consisted of the already-known Moche core comprised of the Chicama, Moche, Virú, Chao, Santa, and Nepeña Valleys, which were incorporated by military conquest. In this territory, Larco's sequence generally holds (Castillo and Donnan 1994; Quilter 2002: 160). The Northern State included the Valleys of Jequetepeque, Lambayeque, and Piura and had a three-phased ceramic sequence, Early, Middle, and Late, different from the Southern Moche State. Although this model was primarily developed for the Jequetepeque Valley (Castillo and Donnan 1994; Castillo 2001, 2010), the idea of two Moche entities coexisting was largely supported by significant differences not only in ceramic traditions but also in funerary practices, architectural styles, and metallurgic technologies.

The idea of a dual Moche political organization was further problematic since it could explain neither the high variability in the ceramic styles present in the "Northern Moche State" nor social phenomena involved in their production (Quilter and Koons 2012; Koons and Alex 2014). Investigations led by Shimada in Pampa Grande (Lambayeque Valley), Bawden in Galindo (Moche Valley), Castillo in San José de Moro (Jequetepeque Valley), and Dillehay in various other sites in the Jequetepeque Valley provided new insights on the fluctuating, rather than static, dynamics of the Moche political organization. Greater attention was drawn to the historical and cultural particularities that triggered specific social developments, not only within each valley but also within every single site. Thus greater emphasis was put on resistance over domination, historical particularities over cultural process, agency over structure, and heterarchy over hierarchy. This trend was especially useful in the study of settlements and ceremonial centers associated with the political collapse of the Moche, which started to be intensively investigated in the 1990s (see section "Collapse").

By drawing attention to the decentralized settlement patterns in the Jequetepeque, Zaña, and Lambayeque Valleys during the Late Moche period (circa 600–800 AD), Dillehay (2001) analyzed the Moche communities in the countryside as well as their cultural responses to both political disturbance and environmental stress. He argued that Moche hinterland communities, independent of crisis situations in large Moche centers, adapted their own social organization and intercommunity relationships through shifts in their domestic and political economies. This led him to conclude that a heterarchical model of political organization, rather than a hierarchical one, can better elucidate the social dynamics within a fragmentary political landscape as seen in the Jequetepeque, Lambayeque, and Zaña Valleys in Late Moche times.

Castillo uses the notion of "heterarchical power relations" to propose his political model of "opportunistic states" (Castillo 2010). Unlike Dillehay, Castillo argues that the scenario of political balkanization in the Jequetepeque Valley took place during the Middle Moche (circa AD

400–600) and was sustained by complex and redundant irrigations systems (Castillo 2010: 83). The division of the valley into territorial units was both a cause and consequence of factionalism and confrontation among the polities. However, what made this situation a real contradiction was the high level of political integration that occurred under specific circumstances such as the celebration of large-scale rituals, the construction and maintenance of irrigations canals, and the defense against external political threat. In other words, "an ever-fluctuating political organization that turned into either an integrated or disintegrated political system depending on the opportunities and/or threats in the system" (Castillo 2010: 106). Under this paradigm, Moche statehood was neither inevitable nor stable; hence, centralization and consolidation was more opportunistic than structured.

No Paradigm, No Statehood

Quilter and Koons (2012) carried out a critical evaluation of data that allowed scholars to consolidate the notion of Moche statehood. By criticizing historical-materialistic and normative approaches, Quilter and Koons hold that the idea of Moche as a state-level entity was actually never supported by the archaeological data. They reject, therefore, the models of Moche as a single, unitary, expansionist or multivalley state. These models, based on an *a priori* search for traits and signatures of statehood revalidate, they say, neo-evolutionist approaches, which are no longer tenable given the evidence (Quilter and Koons 2012: 128). Hence, a Moche state, north, south, or altogether, is not supportable.

For Quilter and Koons, the critical issue for a better understanding of the material record associated with the Moche is not whether it was or was not a state, since definitions of statehood are always crafted by neo-evolutionist criteria that force the data into models. They, instead, argue in favor of "a closer examination of how economic and political power was distributed, marshaled, and employed within specific spatio-temporal boundaries" (Quilter and Koons 2012: 136). Since the Moche have traditionally been defined as a phenomenon of accumulated economic power (Billman 2010), we should, they say, assume that political economies varied considerably through time and space. Such a perspective they argue that can lead us to a richer understanding of the Moche and other archaeological cultures in the Andes, which were characterized by fluctuating politics and economies (Quilter and Koons 2012: 136).

They further demand a deeper analysis of the role of religion and politics in the process of making social identities within the Moche world (Quilter and Koons 2012: 37). By figuring out the ways in which religion and politics organized and interpenetrated juxtaposed each other, new insights can be gained on the multiple mechanisms of social conjunction and disjunction that were triggered under specific historical circumstances.

Other scholars have also stepped forward to further deconstruct the notion of a homogenous Moche state. Koons and Alex (2014) re-evaluate Moche political dynamics and inter-site affiliations through the application of Bayesian models onto radiocarbon dates associated with diagnostic ceramic styles. By moving away from the pervasive ideas that equate Moche ceramics with temporal phases, they argue that each valley, or region, used its own local style of ceramics that was within the understood framework of an overall aesthetic tradition: the Moche (Koons and Alex 2014: 1051). This idea has an important implication regarding the political dynamics that occurred in the north coast during the third and the tenth centuries AD, since, under this new dilemma, "aberrations" in the ceramic patterns would indicate that people were in communication and affiliated through marriage, kin, politics, religion, and other means (Koons and Alex 2014: 33). The patterns of variability do not suggest overt state control or conquest but, rather, demonstrate that the political landscape was complex and changing through time.

Art, Warfare, and Ritual

Art

Doubtless, Moche narrative art has constituted one of the most important sources of information

for studying Moche cosmology and cosmogony. The pioneering and seminal studies of Christopher Donnan (1976), Elizabeth Benson (1972), and Anne Marie Hocquenghem (1987), among others, set the basis for exploring, from an iconographic standpoint, aspects such as politics, religion, ritual, warfare, sex, and death (Bourget 2006) in the Moche world. Two methodological and interpretative approaches can be mentioned regarding the study of Moche art: the "thematic approach" and the "narrative approach."

The "thematic approach" was first developed by Donnan (1975, 1976). It is grounded on the idea that, like Western art, the iconographic characters, figures, and elements of the Moche art group are related through specific and consistent patterns of combination, i.e., themes. According to Donnan, "specific figures can be identified by noting the range of activities in which she/he is engaged, and the consistent setting in which he/she is represented" (Donnan, 1976: 8). Donnan, thus, argues that although Moche art gives the impression of representing an infinite variety of activities, it is, in reality, limited to the representation of a small number of easily recognized activities/themes, e.g., "The Sacrifice Theme," "The Burial Theme," "The Presentation Theme," "The Raft Theme," and "The Revolt of the Objects," among others (Donnan and McClelland 1979) (Fig. 4).

The "narrative approach" of Moche iconography, which opposes yet at the same time complements the previous approach, considers the themes to be, in reality, segments of a larger narrative upon which the Moche myths can be revealed (Hocquenghem 1987; Makowski 2004; Quilter 1997) (Fig. 5). These myths were the basis of the greater part of Moche art (Quilter 1997: 121). Quilter, one of the main advocates of this approach, holds that Moche myths are not necessarily depicted as a whole but rather evoked through particular elements or symbols. Hocquenghem (1987) furthers the argument by establishing links and continuities between Moche myths and those from the early historic period.

In doing so, she incorporates ethnohistorical and ethnographic accounts in order to reconstruct the temporal framework of the celebration of Moche rituals (Hocquenghem 1987; Quilter 1997).

Despite providing crucial information on the Moche people, iconographic studies of Moche art were principally based on museum collections. The fact that these studies suffered from a lack of provenience and context became an apparent problem. This deficiency, however, began to be overcome in 1987, when, due to the Sipán discovery, iconographic studies started to articulate with contextual archaeological information. The incredible resemblance between the garments

Moche, Geography and Culture of, Fig. 4 Scene of human sacrifices depicted on an elite Moche vessel. (Taken from Donnan and McClelland 1999)

and ornaments of Moche deities depicted in the iconography and those found, for instance, within the royal tombs of Sipán (Alva and Donnan 1993) and elite tombs of San José de Moro (Donnan and Castillo 1992) demonstrated, for the first time, the veracity and historicity of the depicted actions (see section "Royal and Elite Burials, Death, and Ancestors" for greater details about Moche elite burials). It became apparent that Moche elite individuals were not only actors in the "Sacrificial Ceremony" (or "The Presentation Theme") but also they were buried by personifying divine characters of the Moche pantheon (Figs. 6 and 7).

As many have argued, the enactment of the well-known "Sacrifice Ceremony" could have constituted a unifying religious element that provided cohesion to all Moche polities over time and space (Castillo and Uceda 2008; Chapdelaine 2011; Donnan 2010). Elements associated with this scene have been recovered throughout all the Moche territory: from the monumental walls at the Moche ceremonial centers of Pañamarca (Nepeña Valley), Huaca de La Luna (Moche Valley), and Huaca Cao Viejo (Chicama Valley) to the ritual paraphernalia recovered at funerary centers such as San José de Moro (Jequetepeque Valley) and Sipán (Lambayeque Valley).

Moche, Geography and Culture of, Fig. 5 Complex scene representing a Moche mortuary rite ("The Burial Theme"). (Taken from Donnan and McClelland 1979, 1999)

Moche, Geography and Culture of, Fig. 6 Scene of "The Sacrifice Ceremony" depicted on an elite Moche vessel. (Taken from Donnan and McClelland 1999)

Moche, Geography and Culture of, Fig. 7 Royal burial of the "Old Lord of Sipán" (Lambayeque Valley). (Taken from Alva 1988)

Moche, Geography and Culture of, Fig. 8 (**a**, **b**) Scenes of combat and interpersonal conflict among Moche warriors. (Taken from Donnan and McClelland 1999)

Warfare and Human Sacrifices

Another dimension where the Moche iconography has convincingly converged with the archaeological data is the study of warfare, conflict, and ritual. Moche iconography depicts graphic and vivid scenes of intrapersonal conflict, violence, and human sacrifice carried out in both mundane and extramundane locations (Fig. 8). Scenes of combat between Moche warriors have attracted, from very early on, the attention of scholars. Ferocious combats seem to have occurred at the public plazas of large-scale ceremonial centers being witnessed by hundreds, if not thousands, of spectators. As the iconographic evidence suggests,

combats were likely executed to capture victims for human sacrifices. The defeated warriors were stripped of their combat garments. Then, they walked naked through processions before the huaca, the gods, and the priests. Finally, they were sacrificed in bloody ways; the objective was to obtain their blood to be presented to the priests and gods (Castillo 2000a).

Scenes of ritual sacrifice depicted on Moche stirrup-spout bottles remained in the realm of imagination until 2001 when Bourget (2001) discovered the largest collection of human sacrifice ever found in the Moche territory. Bourget excavated 27 sacrificed individuals in Plazas 3A and 3C from Huaca de la Luna as part of at least 5 sacrificial episodes from which 2 were directly associated with the El Niño phenomenon. This evidence suggested a well-organized and systematic ritual system that constituted the basis of Moche religion and ideology.

Until the discovery of the victims of human sacrifice at Huaca de la Luna, the iconographical evidence of interpersonal violence was interpreted as proof of endemic warfare in the Moche world. The sacrificial victims found at Huaca de la Luna demonstrated, on the contrary, that this violence was more associated with magical-religious practices of a sacred nature. This affirmation had already been adverted by Donnan (1975) and Alva and Donnan (1993) who noticed that the iconography does not display real evidence of battles against foreigners. Rather, all the characters in the iconography look like Moche and not foreigner warriors. This fact made Donnan conclude that, in reality, the objective of the battles was not to kill the opponents but to incapacitate them. This argument is further reinforced by the fact that the nature of war objects (clubs and shields) represented in the iconography and excavated archaeologically would be too fragile for real combat. It does not mean that real Moche warfare did not exist, but what is represented in the art is a ritual warfare, as Donnan (1975) states, a true "warrior and death cult."

The argument in favor of ritual warfare is further supported by bioarchaeological evidence. Sacrificial victims not only show wounds made by knives and clubs but also of dismembering and de-fleshing. Body parts (jaws, genitals, and limbs) were removed and apparently scattered through the sacrificial space; in the same way, the face and body skin were partially or totally de-fleshed in order to create "flexed and extended" bodies (Verano 2001, 2008). These treatments of the victim's bodies have been considered by some as ways of sacralizing the existence and corporality of Moche warriors (Hill 2005).

The case of the sacrificial victims found at Plazas 3A and 3C from Huaca de la Luna has led Moche scholars to the discussion about of the biological origins of the sacrificial victims. In this regard, Richard Sutter's and Rosa Cortez's study of bio-distance has provided interesting insights to reassess the arguments against Moche ritual warfare (Sutter and Cortez 2005). Based on the differences of the dental traits, they determine that sacrificed individuals from Plaza 3A are genetically distinctive to the local individuals from Huaca de la Luna; therefore, sacrificed individuals were probably brought from outside, yet nearby, populations. For Sutter and Cortez (2005), this supports the hypothesis that Moche warfare was not endemic but organized and systematic. This also resonates with Verano's ideas of Moche warriors as a class of selected individuals professionally trained and engaged in one-on-one combat using maces and other close-contact weapons (Verano 2001, 2008). More sacrificial contexts from other Moche sites need to be analyzed in order to have a better understanding of the nature of this practice and its implications in the political world of the Moche.

Rituals

The case of the sacrificed victims at Huaca de la Luna has, given shape to our understanding about the nature of Moche ritual behavior as a whole. The notion of rituals as expressions of materialized and legitimized ideological power has been and is still dominant in the study of Moche rituals (Castillo and Uceda 2008; DeMarrais et al. 1996; Donnan 2010; Uceda 2000, 2008). Moche scholars have long interpreted Moche rituals as an expression of elite power within a highly stratified social system. As Castillo and Uceda (2008) argue, political roles in Moche society were

defined and acted out in dramatic ceremonies in which elaborate ritual attire and vivid symbolic images expressed narrative concepts of Moche elite power and authority. Likewise, fine-line drawings depicted scenes of ritual actions that highlighted the primacy of political leaders during these activities. Additionally, burials of high elites mirrored their privileged roles in life. Under this perspective, the Moche perfectly illustrated the strategic role of an ideology of elite culture and its effectiveness as a source of power.

The notion that equates ritual to dominant power has nonetheless been challenged by other scholars who warn about the limitations of power-based interpretations. This claim fits well with the renewed interest of Swenson in studying the political role of Moche ritual performances (Swenson 2008, 2011). Based on the excavation and analysis of various Late Moche cult centers in the Jequetepeque Valley, Swenson argues that Moche rituals occurring in medium- and large-scale ceremonial centers could have deployed polyvalent meanings on participants that enabled them to reinforce, negotiate, or even contest political and social identities within an ever-fragmented Moche world (Swenson 2011). They were not necessarily one-dimensional mechanism aimed to impose power but bi-directional processes of negotiation and contestation.

Royal and Elite Burials: Death, and Ancestors

In 1987, the discovery of Sipán's royal tombs, the richest tombs ever found in the pre-Columbian Americas, constituted an important breakthrough not only in Moche archaeology but also in Andean archaeology as a whole (Alva 1988; Alva and Donnan 1993). The complexity and lavish wealth of the ornaments made of gold, silver, copper, and semiprecious stones contained in the tombs of the Lord and the Old Lord of Sipán put into manifesto the scale of social complexity, hierarchy, and incredible capacity of accumulation of wealth in the Moche society (see Fig. 7). At least 13 royal tombs have been found within Sipán's funerary platform in the Lambayeque Valley, showing a structured genealogy of dynastic kings that ruled the valley from the 2nd to 6th centuries AD.

After since Sipán's discovery many other royal and elite burials have been excavated both scientifically and nonscientifically (by looters and grave robbers). The northern region of the Moche territory has been especially active in producing wealthy tombs. The sites of Loma Negra (Piura Valley), Úcupe (Zaña Valley), San José de Moro, La Mina, and Dos Cabezas (Jequetepeque Valley) have yielded rich and complex funerary chambers containing one or multiple elite individuals buried along with exquisitely manufactured metal, cermamic, and stone objects as well as with sacrificed individuals.

Moche funerary chambers are adobe structures of quadrangular or rectangular shape frequently roofed with frames made of cane and *algarrobo* beams. In most cases the internal walls are decorated with niches where the most valuable offerings were usually placed. In a few cases, mural paintings have also been recorded decorating the internal walls of the funerary chambers. The Moche chambers are internally organized through platforms and internal subdivisions. The mortuary coffins were often placed either in the center of the structure or on top of a raised platform. Mortuary coffins were made of cane or wooden plaques tied with metal bonds. In San José de Moro, the coffins are also decorated with metal plaques crimped onto them (Fig. 9).

Some have suggested that the individuals buried in the royal burials of Sipán, Ucupe, and Dos Cabezas might have been related either through political affiliation or kinship (Chapdelaine 2011). For example, the Lord of Úcupe discovered by Steve Bourget in 2008 (Bourget 2008) was an adult male individual that likely ruled the Zaña Valley during the Early Moche period. He was buried personifying one of the characters depicted in the well-known scene of the Sacrifice Ceremony (see Fig. 6), where another character, which the Lord of Sipan personifies, is also being represented (Alva and Donnan 1993; Bourget 2008). The similarities between the ceramic offerings in both tombs could suggest that these Early Moche polities, Sipán and Úcupe, either could have shared political ties of cooperation or were part of a shared network of exchange. Likewise, royal burials at Dos Cabezas,

Moche, Geography and Culture of, Fig. 9 Funerary coffin made of wood and cooper containing the remains of a Moche priest from San Jose de Moro. (Photo from the archive of the San José de Moro Archaeological Program)

excavated by Christopher Donnan in 2001 (Donnan 2007), contained a group of leaders from the same dynasty that ruled the Jequetepeque Valley during the Middle Moche period. These individuals likely established ties of interchange and political cooperation with elites from Sipán and Úcupe.

Elite burials discovered in San José de Moro, by Donnan and Castillo in 1991 and 1992, provided pivotal information not only to reconstruct the pyramid of social hierarchy during Late Moche times but also to decipher how power and gender were intimately articulated in this society (Donnan and Castillo 1992; Castillo and Rengifo 2008). Seven elite burials of Moche Priestesses have been found at the site across more than 20 years of investigation. These women could have formed part of a dynasty of powerful rulers that accumulated not only wealth but also political power and primacy to lead large-scale rituals (Fig. 10).

Other royal tombs have also been found in the southern part of the Moche territory, among the most remarkable, the "Lady of Cao" in Huaca Cao Viejo (Mujica 2007). The body of this Moche princess was found wrapped in textiles and inside a frame made of golden plaques. In addition, the princess' body was incredibly well preserved, showing evidence of corporal tattoos covering her completely. Other instances of burials of upper elite individuals were excavated in Huaca de la Cruz: "the tomb of the warrior-priest" and El Castillo del Santa.

Moche, Geography and Culture of, Fig. 10 Tomb of "The Moche Priestess" of San José de Moro. (Taken from Donnan and Castillo 1992)

Although death in the Moche world appears to be a largely investigated topic, it remains, paradoxically, poorly understood. Fascination with the material wealth contained in Moche burials has caused Moche scholars to place an over-exaggerated attention on the study of hierarchy, status, and power, all of which constitute intrinsic aspects of the material dimension of death. Furthermore, the recognition and identification of the individuals found within royal and elite burials with iconographic characters identified in Moche art might result in a problematic task. The little reflexive identification of characters can lead to the dangerous assumption that roles of iconographic personages must have been the same as the real elite individuals (Kaulicke 2000). This trend, conversely, results in the fact that little to no attention has been put on the study of the "immateriality" of death and, above all, the social actions hardly visible in the archaeological record and that could be intimately linked to a particular understanding of death and the body.

In an attempt to go beyond the material wealth of the Moche burials as well as explore alternative conceptualizations of the body, Kaulicke (2000) deconstructs the notion of death by introducing the notion of transformation. He attempts to decipher the symbolic transformations of dead bodies by paying close attention to the contexts, its associations, and the symbolic contents expressed within them. "Ancestrality" and ancestor worship seem to have been ubiquitous notions in Moche society. The great amount of scenes represented in both sculptural and pictorial elite vessels suggests that Moche art could have been solely articulated around mortuary rites before, during, and after the physical decease of elite individuals (Kaulicke 2000: 34). The inhumation, and particularly the transformation of the dead into ancestors, seems to have been a process that, Kaulicke says, involved the participation of a significant number of mythical beings (Kaulicke 2000: 34).

This perspective that has become mainstream in the study of the body and death in archeology resonates with my own investigation in the Jequetepeque Valley. Excavations conducted at Huaca La Capilla-San José de Moro from 2013 to 2016 have provided invaluable data to reconstruct the Moche spectacles of death celebrated at the site during Late Moche times. The remarkable resemblance between the architectural enclosures of Huaca La Capilla, many of them finely ornamented, and the architectural models or *maquetas* recovered within the complex elite burials of San Jose de Moro suggests strong symbolic connections between Moche monumental architecture, rites of ancestrality (and transfiguration), and the concept of life regeneration (Muro et al. 2016). This later manifested in the multiple scenes in Moche art where dead individuals (likely ancestors) perform rites of copulation with living women (Bourget 2006). San José de Moro has also yielded incredibly rich data of mortuary feasting and commemorative practice associated with ancestor veneration. The more complex the burial, the greater is the evidence associated with post-inhumation rites (Fig. 11).

The concept of death is also intimately related with the cyclical renovation of monumental architecture (Kaulicke 2000: 37). Huacas throughout the Moche territory are commonly receptacles of funerary contexts either these in the form of formal burials, sacrificed individuals, or even part of human bodies. This fact is accompanied with the generalized practice of altering dead bodies through either the removal of important body parts or addition of new ones from other individuals. This pattern, as Kaulicke has suggested, would entail that the physical death of the individuals would have extended over long spans of time, which, in turn, would have been linked to funerary rites. This practice would reflect a sort of "materialized memory" upon which the Moche social and political identity was grounded (Kaulicke 2000: 40).

Huacas and Urbanism

Long-term archaeological excavations conducted in large Moche *huacas* are providing new perspectives about how the urban phenomenon in the Andes was intimately linked to the development of theocratic states in the north coast of Peru.

In the Moche world, *huacas* were an essential component of the urban phenomenon. *Huacas* not only defined the sacred and religious landscape but also the spatial organization on a domestic and administrative scale. Extensive excavations,

Moche, Geography and Culture of,
Fig. 11 Evidence of funerary feasting associated with large Moche chamber tombs in San José de Moro. (Photo from the archive of the San José de Moro Archaeological Program)

conducted by Claude Chapdelaine in the large plain located between Huaca de la Luna and Huaca del Sol at the site of Huacas de Moche (NUM: "Núcleo Urbana Moche"), have revealed a complex architectural setting composed of multiple residential units articulated by corridors, avenues, and public plazas: a true Moche city (Canziani 2003; Chapdelaine 2003). Furthermore, residential quarters would have been linked both functionally and spatially with craft workshops and storage facilities.

The Moche city would have started its growth around AD 300, namely, in the Moche III phase, if not earlier (Chapdelaine registered evidence of Gallinazo and Moche II ceramics in association with the earliest occupational floors) (Chapdelaine 2003: 272). This would demonstrate that the social and political relevance of the Huacas de Moche site in the Moche Valley could have started as early as AD 200. Although the dynamics of growth of the city is still unknown, Chapdelaine suggests that the functions of this early city would have been circumscribed to religion, administration, and craft production. Also, craft specialization would have had an exceptional development in the residential quarter of the "NUM" where a significant number of dwellers were dedicated to the full-time craft of prestigious religious objects. This seems to indicate that a true urban class emerged at the Huacas de Moche site. This urban class actively participated in the accumulation of goods giving support to the wealth accumulation and the expansion of the political agenda of the governing elites.

Chapdelaine points out that the inhabitants of Huacas de Moche were innovators in building the first capital of a unique state that grew to satisfy the needs of powerful elites whose political control disseminated across the valleys of northern Peru (Chapdelaine 2003: 199). Although the idea that these elites used military coercion to expand their spheres of interaction is still debatable, the centrality, hierarchy, and scale of the Huacas de Moche site are comparable to any other Moche site. Its prominence in the Moche Valley and beyond makes it a real first-order settlement, a true state capital.

It is likely that the growth of settlements around large Moche *huacas* was strongly related with the cycles of renovations of sacred architecture. Many authors have suggested and demonstrated that Moche *huacas* were objects of frequent burials and reburials. *Huacas* were constantly covered so that new buildings were constructed on top of the previous ones (Mujica 2007; Uceda 2000, 2010). It is suggestive thinking that this behavior could

have been conditioned to religious calendars, astronomical cycles, or the need of a new leader to legitimize his power.

Excavations in other major Moche ceremonial centers, such as Huaca Cao, have advanced our understanding of Moche urbanism. Regulo Franco and his team demonstrated that both Huaca Cao and Huaca de La Luna were constructed by following the same architectural pattern. Orientation, size, and space distribution of both buildings might have responded to a very organized plan of expansion led by ruling elites. It has been relatively accepted, though, that these Moche polities did not fight one another but rather might have operated rather through strategic political alliances.

The idea that the Moche developed the first planned cities of the New World, has both advocates and critics. The presence of state bureaucracies operating in major Moche centers is still uncertain. No administrative facilities have been found yet that demonstrate the existence of specialized officers in charge of different governmental affairs as, in fact, have been demonstrated for other ancient cities. Also the existence of palaces or royal houses is still largely unknown, a requisite that has been met by other ancient groups to attain the classification of "urban."

The lack of material evidence cannot be taken as an argument to deny Moche urbanism. Uceda (2008, 2010) holds that Huaca del Sol might have been the receptacle not only of a royal palace but also of structures where the administration of state affairs was carried out. Although excavations at Huaca del Sol have already been initiated, the results are not conclusive. The degree of destruction by looting at Huaca del Sol is overwhelming, so our understanding of how this structure looked in the past will always be incomplete.

Apparently, the organization of Moche cities was defined based on the work of specialists under the control of ruling elites (Chapdelaine 2003). These specialists satisfied the needs of the dominant groups whose power was grounded in the control of prestigious religious items and ritual knowledge. Moche cities were the expression of an incipient urbanism developed by theocratic states and theater states. These latter owed their existence to their capacity to host and organize large-scale ritual spectacles that took place in massive ceremonial structures such as Huaca de la Luna, Huaca Cao, and Pañamarca (see Fig. 3). If, on one hand, these buildings were the expression of a highly structured and hierarchical society, on the other, they constituted spaces where cultural and religious identities were reaffirmed and the social order was established by the elites. The legitimization and renewal of power was, thus, achieved through propitiatory acts, human sacrifices, feasting, and other actions of a sacred nature.

Our understanding of both the Moche and Andean urbanism as a whole is still very poor. Moche scholars need to reorient their attention from the study of large and ornamented *huacas* to the study of their surrounding areas, where middle- and lower-class populations appear to have massively settled. Excavations in sites such as Pampa Grande (Shimada 1994) and Galindo (Bawden 1982, 1995) have provided important data on the social tensions that emerged in two highly hierarchical Moche V large-scale settlements. Excavations in the areas surrounding Sipán need to be conducted with urgency, not only because of the serious threats of destruction by modern inhabitants but also because it is imperative that we understand the social dynamics and urban development in this Moche site that has produced the most significant evidence of hierarchy and royal lineages.

Collapse

The fall of the Moche is a topic that has awakened hot debates among Moche scholars. Twenty years ago, the relatively accepted consensus was that the demise of the Moche occurred at some point between AD 500 and 600 (Moseley 1992; Shimada 1994; Shimada et al. 1991). According to this theory, the occurrence of a devastating El Niño phenomenon would have led to the political and economic weakening of the ruling elites and, subsequently, to their imminent demise. This theory was largely supported by the data obtained from the Quelccaya Ice Cap, which determined periods of major precipitations followed by drastic droughts hitting the north coast of Peru from

AD 563 to 594. The data from Quelccaya were additionally utilized as a basis for explaining the major social and political transformations occurring on the Peruvian coast as a whole between the sixth and seventh centuries AD (Shimada et al. 1991). As a result, sites such as Huacas de Moche would have been devastated and rapidly abandoned by its population. This idea was also supported by Moseley who registered at this site thick layers of mud and sediments on the flat areas surrounding the ceremonial mounds (Moseley 1992).

New research has demonstrated, however, that the environmental instability produced by the major rainfall and droughts did not necessarily trigger the demise of the Moche state apparatus, but rather radical transformations in settlement organization, subsistence patterns, and defensive strategies. Chapdelaine (2003) demonstrates, in light of new finds in the Huacas de Moche urban complex, demonstrates that the abandonment of the Moche city would have occurred only after AD 700 suggesting, thus, that the Moche IV phase would have lasted longer than originally believed. Uceda seconded this hypothesis based on evidence retrieved at Huaca de La Luna's New Temple. He argued that the site was completely abandoned by the Moche only after AD 850 (Uceda 2010).

Now it is known that the transformations occurred as a result of environmental stress that produced the emergence of new Moche sites such as Galindo and Pampa Grande in the valley necks of the Moche and Lambayeque Valleys, respectively. The relocation of highly nucleated and populated settlements from the lowlands to valley necks must have been motivated by the search for new and safe arable lands and water, whose control led to scenarios of political struggles and conflict.

While some scholars have prioritized environmental and external factors to explain the fall of the Moche, others have paid much more attention to the internal causes that triggered the rupture of the political and ideological structures in the Moche world. Shimada, for instance, found evidence of selective burning on most of Huaca Fortaleza – Pampa Grande, with little sign of disturbances elsewhere at the site. He postulated that the conflictive relationships between an opressive elite (Moche) and oppressed populations (Gallinazo) triggered a revolt that led to the intentional destruction of the huaca (Shimada 1994: 56). In addition, he came to the conclusion that the Moche state capital, in the Moche Valley, had potentially been relocated to the Lambayeque Valley around the seventh century AD and as the consequence of the environmental crisis (Shimada 1994: 63). Pampa Grande would be the expression of the phenomenon of relocation. This assertion is, however, still debatable due to the uncertainty of the scope of geographic applicability of the Quelccaya ice core analyses.

Shimada's internal-conflict-based interpretations resonate with the influential work of Bawden at Galindo (Bawden 1982, 1995). Bawden examines the relationship between the underlying north coast social structure and the short-term processes and events that gave shape to the Moche cultural identity in a specific time and space. The ever-conflicted relationships between structure and historically constituted agency continuously threaten social systems: a structural paradox (Bawden 1995: 271). Historically constituted agency was inevitably produced by the inherent contradictions of Moche political ideology, which always opposed the intrinsic Andean tenets of reciprocity and solidarity.

The role of ideological negotiation was, therefore, essential in the Moche world, above all, in scenarios of political and social crises. It is suggestive to think that Moche elite groups adapted and readapted the mechanism of ideological manipulations to further legitimize their authority and social privileges. Swenson, in investigating the site of San Ildefonso in the Jequetepeque hinterland, argues in favor of a process of "popularization" of Moche religion as well as of propagation of multiple ideologies in the Late Moche period (Swenson 2008). This phenomenon is evidenced by the remarkable redundancy of ramped platforms at the site whose construction and management must have been sponsored by relatively autonomous social groups that periodically congregated at the site. This phenomenon would have been a reaction against Moche urban

elites of the neighboring valleys and represented an attempt of self-empowerment as well as the appropriation of the symbolic capital of urban elites.

Unlike Swenson, Castillo bestows greater agency to the Moche elites who intentionally redesigned the strategies of ideological negotiation and manipulation. Based on funerary evidence from the Late Moche site of San José de Moro, in the Jequetepeque Valley, Castillo holds that the presence of the southern state of Wari in the Moche territory had an indirect, yet triggering, role in the collapse of the Moche elite at the site (Castillo 2000b, 2001). Fine ceramic objects of Wari and Wari-related styles have been found within the most prestigious Moche burials of San José de Moro. In addition, hybrid Moche-Wari objects also accompany the funerary assemblages. These objects, however, neither prevail in number nor are the most important objects within the funerary contexts. Wari symbols seem to have been reinterpreted and re-elaborated for intermediate societies associated with Wari as well as with Moche elite of San Jose de Moro.

Castillo's thesis differs from other interpretations that consider that the north coast was under military and political control of the Wari Empire. As Castillo argues, there is no real evidence of coercion or political confrontation in any of the Moche sites showing Wari presence (Castillo 2000b, 2001). Far from being unilineal and homogeneous the Moche-Wari relationship appears to have been of a multidimensional nature and historically contingent (Castillo et al. 2012). Castillo thus highlights the ideological contradictions that emerged once Moche ideology came into contact with foreign political and religious ideologies. While the introduction of foreign prestigious objects to the Moche sphere of interaction was considered a strategy of ideological and political reinforcement by the elites, the influence that these objects exerted could, at at the same, have accelerated the deterioration of the ideology associated with Moche elite .

Similar to the hypotheses about the origin of the Moche, there is an accepted consensus that the collapse of the Moche was also manifold (Castillo and Uceda 2008). The evidence suggests that there were multiple collapses, which occurred under various circumstances, and for a number of reasons and momenta. The Moche(s) were composed of multiple political entities, all of which emerged, developed, and collapsed under particular cultural and historical contexts. These contexts triggered complex processes of development lasting tens if not hundreds of years. Once the Moche fully disappeared from the archaeological record, power relations and authority reconfigured in the north coast of Peru resulting in the origin of later state entities such as Lambayeque and Chimu whose elites ruled the region until the Spanish conquest.

References

Alva, W. 1988. Discovering the New World's richest unlooted tomb. *National Geographic Society* 174 (4): 510–549.

Alva, W., and C. Donnan. 1993. *Royal Tombs of Sipán*. Los Angeles: Fowler Museum of Cultural History, University of California, Los Angeles.

Bawden, G. 1982. Galindo: A study in cultural transition. In *Chan Chan: Andean desert city*, School of American Research Book, ed. M. Moseley and K. Day, 255–284. Albuquerque: University of New Mexico Press.

Bawden, G. 1995. The structural paradox: Moche culture as political ideology. *Latin American Antiquity* 6 (3): 255–273.

Benson, E. 1972. *The Mochica, a culture of Peru*. New York: Praeger.

Billman, B. 2002. Irrigation and the origins of the Southern Moche state on the North Coast of Peru. *Latin American Antiquity* 13 (4): 371–400.

Billman, B. 2010. How Moche rulers came to power. Investigating the emergence of the Moche political economy. In *New perspectives on Moche political organization*, ed. J. Quilter and L.J. Castillo, 181–200. Washington, DC: Dumbarton Oaks Research and Collection.

Billman, B., and G. Huckleberyy. 2009. Deciphering the politics of prehistoric el Niño events on the North Coast of Peru. In *El Niño: Catastrophism, and culture change in ancient America*, ed. D. Sandweiss and J. Quilter. Washington, DC: Dumbarton Oaks Research Library and Collection.

Bird, J. 1948. *America's oldest farmers*. Washington, DC: Natural History Press.

Bourget, S. 2001. Rituals of sacrifice: Its practice at Huaca de la Luna and its representation in Moche iconography. In *Moche art and archaeology in ancient Peru*, ed. J. Pillsbury, 89–109. Washington, DC: National Gallery of Art.

Bourget, S. 2006. *Sex, death, and sacrifice in Moche religion and visual culture*. Austin: University of Texas Press.

Bourget, S. 2008. The third man: Identity and rulership in Moche archaeology and visual culture. In *The art and archaeology of the Moche: An ancient Andean society of the Peruvian North Coast*, ed. S. Bourget and K.L. Jones, 263–288. Austin: University of Texas Press.

Canziani, J. 2003. Estado y Ciudad: Revisión de la Teoría sobre la Sociedad Moche. In *Moche: Hacia el Final del Milenio: Actas del Segundo Coloquio sobre la Cultura Moche*, ed. S. Uceda and E. Mujica, 287–311. Lima: Fondo Editorial, Pontificia Universidad Católica del Perú.

Castillo, L.J. 2000a. The sacrifice ceremony, battles and death in Mochica art. In *La Ceremonia del Sacrificio, Batallas y Muerte en el Arte Mochica*. Lima: Museo Arqueológico Rafael Larco Herrera.

Castillo, L.J. 2000b. La Presencia Wari en San José de Moro. In *Huari y Tiwanaku: Modelos vs. Evidencias, Boletín de Arqueología PUCP 4*, ed. P. Kaulicke and W.H. Isbell, 143–179. Lima: Fondo Editorial de la Pontificia Universidad Católica del Perú.

Castillo, L.J. 2001. The last of the Mochicas: A view from the Jequetepeque valley. In *Moche art and archaeology in ancient Peru*, Studies in the history of art 63. Symposium papers XL, ed. J. Pillsbury, 307–332. Washington, DC: Center for Advanced Studies in the Visual Arts, National Gallery of Art.

Castillo, L.J. 2010. Moche politics in the Jequetepeque Valley: A case for political opportunism. In *New perspectives on Moche political organization*, ed. J. Quilter and L.J. Castillo, 83–109. Washington, DC: Dumbarton Oaks Research and Collection.

Castillo, L.J., and C. Donnan. 1994. Los Mochicas del Norte y los Mochicas del Sur, Una Perspectiva desde el Valle de Jequetepeque. In *Vicús*, ed. K. Makowski, 143–181. Lima: Colección Arte y Tesoros del Perú. Banco de Crédito del Perú.

Castillo, L.J., and J. Quilter. 2010. Many Moche models. An overview of past and current theories and research on Moche political organization. In *New perspectives on Moche political organization*, ed. J. Quilter and L.J. Castillo, 1–16. Washington, DC: Dumbarton Oaks Research and Collection.

Castillo, L.J., and C.E. Rengifo. 2008. El Género y el Poder: San José de Moro. In *Señores de los Reinos de la Luna*, ed. K. Makowski, 165–181. Lima: Banco de Crédito del Perú.

Castillo, L.J., and S. Uceda. 2008. The Mochicas. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 707–729. New York: Springer.

Castillo, L.J., F. Fernandini, and L.A. Muro. 2012. The multidimensional relations between the Wari and the Moche states of Northern Peru. *Boletín de Arqueología PUCP* 16: 53–77.

Chapdelaine, C. 2003. La Ciudad de Moche: Urbanismo y Estado. In *Moche: Hacia el Final del Milenio: Actas del Segundo Coloquio sobre la Cultura Moche*, ed. S. Uceda and E. Mujica, 247–285. Lima: Fondo Editorial, Pontificia Universidad Católica del Perú.

Chapdelaine, C. 2011. Recent advances in Moche archaeology. *Journal of Archaeological Research* 19: 191–231.

DeMarais, E., L.J. Castillo, and T. Earle. 1996. Ideology, materialization and power strategies. *Current Anthropology* 37 (1): 15–31.

Dillehay, T. 2001. Town and country in late Moche times: A view from two Northern valleys. In *Moche art and archaeology in ancient Peru*, Studies in the history of art 63. Symposium papers XL, ed. J. Pillsbury, 259–283. Washington, DC: Center for Advanced Studies in the Visual Arts, National Gallery of Art.

Donnan, C. 1975. The thematic approach to Moche iconography. *Journal of Latin American* 1 (2): 147–162.

Donnan, C. 1976. *Moche art and iconography*. 1st ed. Los Angeles: UCLA Latin American Center.

Donnan, C. 2007. *Moche Tombs at Dos Cabezas*. Los Angeles: Cotsen Institute of Archaeology at the University of California, Los Angeles.

Donnan, C. 2010. Moche state religion: A unifying force in Moche political organization. In *New perspectives on Moche political organization*, ed. J. Quilter and L.J. Castillo, 47–69. Washington, DC: Dumbarton Oaks Research and Collection.

Donnan, C., and L.J. Castillo. 1992. Finding the tomb of a Moche priestess. *Archaeology* 6 (45): 38–42.

Donnan, C., and D. McClelland. 1979. *The burial theme in Moche iconography*, Studies in Pre-Columbian art & archaeology. Washington, DC: Dumbarton Oaks Trustees for Harvard University, Library of Congress, 21th.

Hill, E. 2005. The body intact, the body in pieces: Foucault and the Moche prisoner. In *Art for Archaeology's sake. Material culture and style across the disciplines. Proceedings of the thirty-third annual conference of the archaeological Association of the University of Calgary*, ed. A. Waters-Rist, C. Cluney, C. McNamee, and L. Steinbrenner, 124–131. Calgary: The University of Calgary Archaeological Association.

Hocquenghem, A.M. 1987. *Iconografía Mochica*. Lima: Fondo Editorial de la Pontificia Universidad Católica del Perú.

Kaulicke, P. 1992. Moche, Vicús-Moche y el Mochica Temprano. *Boletín del Instituto Francés de Estudios Andinos* 21 (3): 853–903.

Kaulicke, P. 2000. *Memoria y Muerte en el Perú Antiguo*. 1st ed. Lima: Pontificia Universidad del Perú. Fondo Editorial.

Koons, M., and B. Alex. 2014. Revised Moche chronology based on Bayesian models of reliable radiocarbon dates. *Radiocarbon* 56 (3): 1039–1055.

Larco, R. 1945. *Los Mochicas (Pre-Chimu de Uhle y Early Chimu de Kroeber)*. Buenos Aires: Sociedad Geográfica Americana.

Larco, R. 1948. *Cronología Arqueológica del Norte del Perú*, Biblioteca del Museo de Arqueología Rafael Larco Herrera, Hacienda Chiclín. Buenos Aires: Sociedad Geográfica Americana. [Reimpreso en: *Arqueológicas* 25. Lima, 2001].

Narváez, A. 1994 La Mina: Una Tumba Moche I en el Valle de Jequetepeque. In *Moche, Propuestas y Perspectivas. Travaux de l'Institute Français d'Etudes Andines*, Vol 70, ed. S. Uceda, and E. Mujica, 59–92. Trujillo: Universidad Nacional de Trujillo.

Makowski, K. 1994. Los Señores de Loma Negra. In *Vîcús*, ed. K. Makowski, 135–141. Lima: Colección Arte y Tesoros del Perú, Banco de Crédito del Perú.

Makowski, K. 2004. Hacia la Reconstrucción del Panteón Moche: Tipos, Personalidades Iconográficas, Narraciones. In *El Mundo Sobrenatural Mochica: Imágenes Escultóricas de las Deidades Antropomorfas en el Museo Arqueológico Rafael Larco Herrera*, ed. M. Giersz, K. Makowski, and P. Przadka, 17–128. Lima: Fondo Editorial, Pontificia Universidad Católica del Perú.

Moseley, M. 1975. *The maritime foundation of Andean civilization*. Menlo Park: Cummings.

Moseley, M. 1992. *The Incas and their ancestors: The archaeology of Peru*. London: Thames and Hudson.

Mujica, E., ed. 2007. *El Brujo, Huaca Cao: Centro Ceremonial Moche en el Calle de Chicama*. Lima: Fundacion Wiese.

Muro, L.A., R. Verdún, and S. Ghavami. 2016. Excavaciones En La Fachada Este de Huaca La Capilla – San José De Moro: Unidades Integradas 51, 52, 53, 54, 58, 59, 60 y 62. In *Programa Arqueológico San José de Moro. Field Report 2015*, ed. L.A. Muro, 177–254. Lima: Pontifica Universidad Catolica del Peru. Field Report Submitted to the Ministry of Culture of Peru.

Quilter, J. 1997. The narrative approach to Moche iconography. *Latin American Antiquity* 8 (2): 113–133.

Quilter, J. 2002. Moche politics, religion and warfare. *Journal of World Prehistory* 16 (2): 145–195.

Quilter, J., and M. Koons. 2012. The fall of the Moche: A critique of claims for South America's first state. *Latin American Antiquity* 23 (2): 127–143.

Sandweiss, D. H., K. A. Maasch, F. T. Andrus, E. J. Reitz, M. Reidinger-Whitmore, J. Richardson III, and H. B. Rollins. 2007. Mid-Holocene Climate and Culture Change in Coastal Peru. In *Climate Change and Cultural Dynamics: A Global Perspective on Mid-Holocene Transitions*., ed. D. G. Anderson, K. A. Masssch, and D. H. Sandweiss, first edit, 25–50. First Edit. London: Academic Press.

Shimada, I. 1994. *Pampa Grande and the Moche culture*. Austin: University of Texas Press.

Shimada, I., C.B. Schaaf, L.G. Thompson, and E. Mosley-Thompson. 1991. Cultural impacts of severe droughts in the prehistoric Andes: Application of a 1,500-year ice core precipitation record. *World Archaeology* 22 (3): 247–270.

Strong, W.D. 1947. Finding the tomb of a warrior-god. *National Geographic Magazine* 91 (4): 453–482.

Sutter, R.C., and R.J. Cortez. 2005. The nature of Moche human sacrifice, a bio-archaeological perspective. *Current Anthropology* 46: 521–549.

Swenson, E.R. 2008. San Ildefonso and the "Popularization" of "Moche Ideology in the Jquetepeque Valley". In *Arqueologia Mochica, Nuevos Enfoques*, ed. L.J. Castillo, H. Bernier, J. Rucabado, and G. Lockar, 411–432. Lima: Fondo Editorial de la Pontificia Universidad Católica del Perú.

Swenson, E.R. 2011. Stagecraft and the politics of spectacle in ancient Peru. *Cambridge Archaeological Journal* 21 (02): 283–313.

Uceda, S. 2000. El Templo Mochica: Rituales y Ceremonias. In *Los Dioses del Antiguo Perú*, ed. K. Makowski, 91–101. Lima: Colección Arte y Tesoros del Perú. Banco de Crédito del Perú.

Uceda, S. 2008. En Búsqueda de los Palacios de los Reyes de Moche. In *Señores de los Reinos de la Luna*, ed. K. Makowski, 111–127. Lima: Banco de Crédito del Perú.

Uceda, S. 2010. Theocracy and secularism: Relationships between the temple and urban nucleus and political change at the Huacas de Moche. In *New perspectives on Moche political organization*, ed. J. Quilter and L.J. Castillo, 132–158. Washington, DC: Dumbarton Oaks Research and Collection.

Verano, J.W. 2001. War and death in the Moche world: Osteological evidence and visual discourse. In *Moche art and archaeology in ancient Peru*, ed. J. Pillsbury, 111–125. Washington, DC: National Gallery of Art.

Verano, J.W. 2008. Communality and diversity in Moche human sacrifice. In *The art and archaeology of the Moche: An ancient Andean Society of the Peruvian North Coast*, ed. S. Bourget and K.L. Jones, 195–213. Austin: University of Texas Press.

Willey, G. 1953. *Prehistoric settlement patterns in the Viru Valley, Peru*. Washington, DC: Smithsonian Institution, Bureau of American Ethnology, Bulletin 155.

Further Reading

Alva, W. 2016. *Sipán. Descubrimiento e Investigación*. Lima: Ministerio de Cultura.

Bawden, G. 1996. *The Moche. The peoples of the Americas*. Cambridge, UK: Blackwell Press.

Benson, E.P. 2012. *The worlds of the Moche on the North Coast of Peru*. Austin: University of Texas Press.

Bourget, S. 2006. *Sex, death, and sacrifice in Moche religion and visual culture*. Austin: University of Texas Press.

Bourget, S., and K. Jones, eds. 2008. *The art and archaeology of the Moche: An ancient Andean society of the Peruvian North Coast*. 1st ed. Austin: University of Texas Press.

Castillo, L.J., H. Bernier, J. Rucabado, and G. Lockard. 2008. *Arqueologia Mochica, Nuevos Enfoques*. 1st ed. Lima: Fondo Editorial de la Pontificia Universidad Católica del Perú.

Donnan, C.B., and D. Mcclelland. 1999. *Moche fineline painting: Its evolution and its Artists*. 1st ed. Los Angeles: University of California Los Angeles, Fowler.
McClelland, D., D. McClelland, and C.B. Donan. 2007. *Moche Fineline painting from San José Moro*. Los Angeles: The Cotsen Institute of Archaeology Press.
Pillsbury, J., ed. 2001. *Moche art and archaeology in ancient Peru*, Studies in the history of art 63. Symposium papers XL. 1st ed. Washington, DC: Center for Advanced Studies in the Visual Arts.
Quilter, J. 2011. *The Moche of ancient Peru. Media and messages*. Cambridge, MA: Peabody Museum of Archaeology and Ethnology. Harvard University.
Quilter, J., and L.J. Castillo, eds. 2010. *New perspectives on Moche political organization*. 1st ed. Washington, DC: Dumbarton Oaks Research and Collection.
Shimada, I. 1994. *Pampa Grande and the Moche culture*. Austin: University of Texas Press.
Uceda, S., and E. Mujica, eds. 1994. *Moche. Propuestas y Perspectivas*. 1st ed. Trujillo: Universidad Nacional de La Libertad, Instituto Francés de Estudios Andinos & Asociación Peruana para el Fomento de las Ciencias Sociales.

Modern Material Culture, Archaeology of

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Introduction

The archaeology of modern material culture, also known as archaeology of the contemporary past, has received increasing attention over the last 40 years. There have been two distinct stages in the development of this area of research. The first occurred during the 1970s and 1980s, when archaeologists in the United States began to question two core views of archaeology: that archaeological sites are only those that are concerned with a distant past and that archaeological information is obtained through excavation (Rathje 1981: 51–52). The questioning of these two assumptions led to the emergence of modern material culture studies as a sub-discipline within archaeology.

As Leone (1981: 7) points out, modern material culture studies developed two principal lines of inquiry. The first was investigation of the relationships between modern societies and their material culture to better understand material patterning in past societies is often described as ethnoarchaeology. The second line of inquiry was the analysis of what modern objects can reveal about present-day societies (e.g., Rathje 1974), with the aim of yielding information about an aspect of culture that is not always seen by those creating or using the materials (Leone in Gould and Schiffer 1981: 7). In the early 1990s, this area of study received a significant boost with the publication of Tilley's (1990) volume *Reading Material Culture*.

The second major phase in the development of archaeology of modern material culture emerged in the 2000s. During this time there was a greater recognition of the active role that material culture plays in the negotiation of social relationships. As Hodder (2012: 33) explains it, "materials and things are seen as actively engaged in the social process" and self and society cannot be "studied independently of materials and the object world." One expression of this trend is a tendency to replace the phrase "modern material culture" with the term "material practices" (e.g., Thrift 2008) or archaeology of the contemporary past (e.g., Graves-Brown et al. 2013). Furthermore, Hudson (1984) iterates that modern material culture "looks at the interaction between material culture and the behavior it reflects" (Hudson 1984: 32). During the 2000s research into modern material practices became increasingly directed into areas such as the analysis of what Meskell (2005) calls the archaeology of materiality, investigating homelessness, conflict and protest, multiculturalism, and social justice and following the approach of an engaged archaeology (Smith and Ralph 2019). An ethnoarchaeological emphasis on material culture analysis to develop theories to understand material patterning in past societies has remained a strong facet of this area (e.g., Politis and Alberti 2007). However, the argument that archaeology should be concerned with

understanding the distant past has largely disappeared from view, as the proponents of material culture studies work from the position that archaeology is about material practices, not time, and that therefore "the past" can be anything as small as a nanosecond gone by.

Definition

The archaeology of modern material culture is the study of society through its contemporary material remains, both real and virtual, as situated within cultural landscapes, both real and virtual. This definition draws on Smith's (2017: 7) definition of archaeology as "the study of human behaviour, past and present, through the analysis of material culture, both real and virtual, as situated within cultural landscapes," rather than the more traditional, and more bounded, definitions of archaeology as the material traces of past societies.

The archaeology of modern material culture can be defined as the archaeological study of material artifacts and landscapes that are related to the modern and postmodern period, often characterized as from the end of the Second World War to the present (cf. Harrison and Schofield 2010). Building on Rathje's (1981) earlier arguments, an important step in the redefinition of archaeology as a discipline was Harrison's (2011) call to replace the modernist trope of archaeology-as-excavation and the idea of a buried past with the alternative trope of archaeology-as-surface-survey and as a process of assembling/reassembling. González-Ruibal (2008, 2019: 12) argues that the period of interest to contemporary archaeologists is "supermodernity," which he explains is "modernity gone excessive – and awry." This distinction is based on the potentially unsuitable definitions of modernism and postmodernism, which, he contends, are periods that are temporally too short to be of real use to archaeologists, who tend to define archaeological periods in much greater length. Instead, González-Ruibal (2008) argues that we should look to the technological and material origins of the contemporary world and that the period of the First World War (1914–1918), the "horizon of destruction," might be more appropriate, though it could be earlier (González-Ruibal 2019: 13). Harrison and Schofield (2010: 2), in an earlier attempt at theorizing contemporary archaeology took a different approach, using the second half of the twentieth century as a marker for the period of interest to contemporary archaeologists, as "[t]his period encompasses the end of the Cold War and the beginning of the 'internet age', a period that sits firmly within what we would recognize to be one of 'lived and living memory."

While neither of these approaches seek to prescribe what should and should not be the object of contemporary archaeologists, they instead seek to provide more clarity to the often blurred boundaries of the subfield. Though contemporary archaeology has gained much academic traction, it largely remains undertheorized, despite the welcome and critical attempts by Harrison and Schofield (2010) and González-Ruibal (2019). Regardless of the timing of contemporary archaeology, the fact remains that the interest of contemporary archaeologists is the material culture and landscapes that are produced by contemporary societies. Their study can provide insights into an increasingly globalized world, particularly in terms of consumption, excess, disposability, and social inequality but also in terms of new modes of industry, conflict, and migration (see Mizoguchi and Smith 2019). Places and things of interest to contemporary archaeology can take many forms; in a contemporary urban setting, it might be the contents of someone's home, their vehicle, and other objects with which they interact. It could be the way a person or group has altered the physical landscape (see Hamilakis 2016; Mizoguchi and Smith 2019); or it could indeed be the way in which items from the distant past are reused in the present. The potential applications of contemporary archaeology are vast, and below we provide an overview of some recent examples. Finally, the strength of this field of study has been recognized in the current definition of archaeology used by the Society for American Archaeology, which now defines archaeology as "the study of the ancient and recent human past through material remains" (SAA 2019).

Historical Background

The archaeology of the contemporary past has undergone several key theoretical developments since its inception in the 1970s and 1980s. More recently, there have been attempts to theorize the subfield of archaeology, to determine the boundaries, or lack thereof, of contemporary archaeology (see González-Ruibal 2019; Harrison and Schofield 2010). The foundational volumes of contemporary archaeology (see individual contributions in Gould and Schiffer 1981; Rathje 1974, 1981) often applied existing methodological approaches to modern material culture and modern landscapes in what was then an innovative development for the discipline. The term "modern material culture studies" was first used to describe archaeologies of the contemporary past, though in the early twenty-first century, "archaeologies of the contemporary past" became a preferred term, not least because of the publication of Buchli and Lucas' (2001) *Archaeologies of the Contemporary Past*.

In essence, the two terms refer to the same practice. However, a key distinction is that "modern material culture studies" developed from varying approaches to ethnoarchaeology in the USA, while "archaeologies of the contemporary past" was developed by researchers in the UK and parts of Europe who were more interested in the "archaeology of us," where contemporary archaeologies could be used as a "critical intervention in contemporary society" (Shanks and Tilley 1987). Instead of the initial approaches to studying the contemporary, which were focused on the ethnoarchaeological and pedagogic value of such studies, archaeologies of the contemporary past became focused on the value of archaeology in understanding the present, as Buchli and Lucas (2001: 8) argued regarding the knowledge and themes presented in the various studies included in their volume, which "only archaeological approaches could have uncovered these themes."

Studying modern material culture reveals much about our own society. Hudson (1984: 34) argues that "the sum total of a society's artifacts. . . function as a mirror of its patterned values, beliefs and social structure." From this viewpoint, the analysis of modern material culture can address bias and contribute to a more holistic representation of a society's social, cultural, and cognitive patterns.

Key Issues/Current Debates

One of the key issues surrounding the archaeology of the contemporary past is the potential for debate around archaeological significance. Rathje's (1974) Garbage Project at the University of Arizona, which began archaeologically recording household waste as it was discarded (Shanks et al. 2004: 65), is perhaps one of the most well-known modern material culture studies and one that received considerable has criticism. At the time, few archaeologists conceded that the project was archaeology at all on the grounds that the garbage was not old enough to warrant archaeological analysis (Shanks et al. 2004: 66).

Rathje defines four key ways in which modern material culture studies contribute to archaeology. Firstly, he contends that teaching archaeological principles can be easily achieved through studying modern material culture; as after studying ourselves comparably to the ways we study past societies, students will be more equipped to approach traditional archaeological data (Rathje 1981: 53–54). Secondly, Rathje argues that core archaeological principles, including methods such as ethnoarchaeology and experimental archaeology, can be tested in modern settings (Rathje 1981: 53). Thirdly, he contends that modern material culture studies contribute to the recording of cultural history and to understanding processes and relationships between people and material culture that might otherwise be lost. Lastly, Rathje proposes that modern material culture studies can be used to identify continuing trends between past societies and those of the modern day (Rathje 1981: 55). This is particularly interesting when applied to a contact situation in which materials from more than one culture are combined in new ways (e.g., Fig. 1).

Material culture studies are a flourishing and rapidly expanding subfield in archaeology. Present emphases include the analysis of modern patterns of consumption, urban heritages, social housing, homelessness, conflict and protest,

Modern Material Culture, Archaeology of, Fig. 1 Modern material culture in a contact environment. Bough shelter for the deceased. Aboriginal community of Barunga, Northern Territory, Australia, 2015

multiculturalism, migration and displacement, digital environments, and contact studies. We recommend the work of Zimmerman et al. (2010) and Leone (2010) in the USA; Schofield and Kiddey (2011), Harrison and Schofield (2010), and Hicks and Beaudry (2010) in the UK; Meskell 2012 and Shepherd (2003) in South Africa; Frederick and Clarke (2016) and Ralph and Pollard (Pollard et al. 2017) in Australia, Holtorf (2012) in Sweden, and González-Ruibal (2008, 2019) in Spain.

There is an increased emphasis on inequality, exclusion, racism, and social justice, especially through the analysis of signs and images which focus on a particular social group, but at the same time excludes others who are from a different demographic (e.g., Fig. 2). Many projects have some urgency, as the material objects are ephemeral. In their study of the archaeology of homelessness, Schofield and Kiddey aimed to engage the homeless community of Bristol (UK) in an active heritage project mapping the archaeology of the homeless participants, essentially "constructing an archaeology of themselves" (Kiddey and Schofield 2011: 5), which focused on connections between heritage practice and policy and the benefits of participation by excluded or minority groups. This study actively involved many local homeless people who oriented the archaeologists on the material culture left behind by homeless people, including why it was there and what it meant, as some of the material culture, such as drug paraphernalia, was unfamiliar to the archaeologists. This study highlights one important reason for conducting modern material culture studies when information is still available about artifacts within the communities using them: had the archaeologists not been assisted by local people artifacts could have gone unrecorded, different meanings could have been deduced from the material culture, and an element of the patterns of the society of the homeless population of Bristol would have been lost. Furthermore, studies such as that of Zimmerman et al. (2010) and Pollard (see the entry on "▶ Homelessness, Archaeology of" in this encyclopedia) push boundaries of this subfield through a deliberate focus on informing government policy.

Three examples of archaeologies of modern material culture/the contemporary past are archaeogaming, the archaeology of displacement and forced migration, and space archaeology.

Modern Material Culture, Archaeology of, Fig. 2 Images of exclusion, Adelaide Airport, South Australia, 2013

Archaeogaming

Serious games have been an emergent archaeological interest since the 1990s and early 2000s, most notably through tools for public outreach, such as *Adventures in Fugawiland* (Price and Gebauer 1990), and, later, through excavation of the Atari Burial Ground in Almogordo, New Mexico (Reinhard 2015). However, only recently has this interest emerged as a sub-discipline of archaeology. The trend is captured in the term "archaeogaming," which was coined by Andrew Reinhard, as the name of an internet blog dedicated to discussion of the archaeology both of and in video games (Reinhard 2013). This includes consoles, computers, and mobile devices. Reinhard's (2018) book, *Archaeogaming*, is the first comprehensive study of archaeology and video games. It focusses on video games as artifacts as well as how material objects, spaces, and resources are used to construct game spaces.

This area is still developing, still finding its shape. Important studies in this process include *Okapi Island* and *Rosewood: An Interactive History*. *Okapi Island* was designed by Ruth Tringham as an interactive learning resource for archaeology students at the University of California, Berkeley. It is based on the 9000-year-old mound village of Çatalhöyük, Turkey. Similarly, Edward Gonzáles-Tennant's (2018a) *Rosewood: An Interactive History* grew out of his archaeological work on the 1923 race riots and massacres of African Americans in the Florida town of Rosewood (González-Tennant 2018b). This program allows users to interact with the material culture of the time period, access archaeological and documentary data, and hear audio recordings of survivors and descendants. While these platforms have been discontinued due to high operating costs, they demonstrate the potential of an internet environment to transmit archaeological knowledge about the past. This is a growing

trend, especially in economically advantaged countries. Future developments are likely to produce innovative ways of engaging with the past in the present. However, this could increase the gap of knowledge, skills, and interests between countries that have well-developed internet infrastructure and those that do not. As it stands, archaeogaming is largely the study of the gaming environments of wealthy countries. Of course, the internet can be used to bridge such gaps, and the work of Gonzáles-Tennant serves as a model for this.

The groundbreaking development is the application of archaeological theories and methods to virtual environments. As Aycock and Bittner (2019) point out in their analysis of the 1980 Apple II game *Mystery House*:

> Computers clearly introduce a level of abstraction that challenges the approaches of traditional fields like archaeology, and the rise of archaeogaming as a subdiscipline reflects the need to address these provocations to method and theory.

Economic Migration, Forced Migration, and Displacement

Another current trend is the archaeology of economic migration, forced migration, and displacement. There are a number of studies that have played a role in recording and ameliorating some of the distress and cultural trauma involved in this process. Here, we look at one example that focusses on the journey and one that focusses on refugee camps.

New insights into the experience of illegal migrants and into US government's federal border enforcement policy are offered in De León's (2015) study of those who cross the Sonoran Desert border between Mexico and the USA. This multifaceted interrogation of the social impact of the federal border enforcement policy highlights the manner in which this policy encourages illegal migrants to cross in extremely harsh environments with a high risk of death. De León argues that border-crossing artifacts both reflect and shape a way of being that is specific to the desert migration process. This ranges from desert memorials and artifacts relating to nonlethal injuries, such as blisters and dehydration, to the placement of guards around common entry points "as a deterrent to would-be crossers and a signal to people that they should try their luck in more remote parts of the desert" (De Leon 2015: 318). He contends that the deaths of people who are directed toward the more dangerous routes is neither random nor senseless but part of a strategic federal plan that aims to deter migration through the high numbers of deaths.

The conflicts in Syria and Iraq have forced people to migrate to other parts of the world. Often, this involves a period of residency in a refugee camp. The standout archaeological project here is Brian Tomaszewski work at the Za'atari refugee camp, Jordan. This involved residents conducting field surveys to establish detailed maps of the camps (Tomaszewski 2017). These maps addressed issues that were fundamental to the efficient running of the camps, such as the location of schools, mosques, and health centers. The participants obtained new skills that included the production of professional quality maps, which ensured sustainability when the research team was gone. In a situation where people are severely constrained using their normal abilities, the participants were able to acquire new skills and contribute to addressing the management and spatial challenges that arose from the every-changing layout of the camp.

Space Archaeology

Space archaeology is the study of "the material culture relevant to space exploration that is found on earth and in outer space . . . and that is clearly the result of human behavior" (Gorman and O'Leary 2013: 409). One key aim of space archaeology is to investigate material culture assemblages in order to understand the interaction of technology and human behavior in off-Earth environments. Research in space archaeology has investigated terrestrial infrastructure such as launch sites, tracking stations, and industrial complexes, satellites and orbital debris, lunar landing sites, Martian landing sites, and museum collections, managing the heritage values of terrestrial and lunar space sites.

Space archaeology includes the management of "space junk," which is nonfunctioning orbital debris made by humans. In 2020, more than 29,000 pieces

of space debris larger than 10 cm are being tracked in Earth's orbit. This debris includes abandoned satellites and rocket stages and small objects that were lost in space. This material is not just junk. It also has a social dimension, and it can provide insights into matters such the competition between the USA and the USSSR during Cold War. Moreover, these objects are part of the cultural heritage of humankind, and some need to be preserved as part of the story of human evolution. Space archaeologist, Alice Gorman (also known as Dr. Space Junk) compares Tranquility Base on the Moon, with its iconic astronaut boot prints, to the Palaeolithic footprints of *Australopithecus afarensis* at Laetoli in Tanzania. Space archaeologists argue that the entire solar system is a cultural landscape. From this viewpoint, Gorman (2019) points out that both Tranquility Base and Laetoli represent evidence of major evolutionary turning points.

Increasingly, the study of modern material culture is being used to shed new light on government policies by identifying cultural values that are internalized as part of a person's or community's worldview or by interpreting material patterning in terms of the success or failure of government initiatives (e.g., Zimmerman et al. 2010, Ralph and Smith 2014, De Leon 2015 and Pollard et al. 2017). Material analyses can provide new knowledge. The presence or absence of particular forms of material culture can be used to identify cultural attitudes to particular routines, processes, and disciplines. The absence of clocks and watches, for instance, might imply an inability to tell the time and/or an absence of time routines and work disciplines, as in Leone's (1999) and Handsman's (Leone and Handsman 1989) studies of eighteenth- and nineteenth-century Annapolis, and the many studies that have been inspired by this work. Moreover, material culture analyses can identify cultural inhibitors and physical barriers to engaging in activities such as education and employment that can allow people to improve their individual situations. Such research has the potential to provide the basis for the policy recommendations in skills training and cross-cultural communication. Though the archaeology of the contemporary past has been a focus of archaeological attention since the 1970s, these studies are undergoing a major rethinking in the early part of the twenty-first century. Current studies are grounded in nuanced analyses of contemporary lives, providing new insights that can only be gained through archaeological analysis.

International Perspectives

While archaeologies of the contemporary past surfaced first in the USA (Gould and Schiffer 1981; Rathje 1974, 1981), more recent work in developing this mode of archaeological enquiry has occurred in the UK (e.g., Harrison and Schofield 2010 and Graves-Brown et al. 2013) and Europe (e.g., Holtorf 2005, Burström 2009, and González-Ruibal 2019). Australia also has a strong community of scholars focused on archaeology of the contemporary past (see Frederick and Clarke 2016). While most agree on the value of contemporary archaeology to the broader discipline, there have been a number of debates around the contributions this form of archaeology can make contemporary societies. One of the key developments of contemporary archaeology was from a mostly heuristic practice, to one which sought to reveal and provide nuanced commentary on hidden aspects of contemporary societies. The question, now, is how we should go about that – in terms of both ethics and methodology. Harrison and Schofield (2010: 74) warn of the possibility for contemporary archaeologies to become voyeuristic when recording sites still in use, "to what extent might a study of street homelessness amount to voyeurism, and does the participation of a few street homeless volunteers make it an acceptable study, or is voyeurism made worse through tokenism?" Harrison and Schofield also question as to whether these interventions into living communities might cause harm, where even though community leaders have supported the project, community members may disagree, which could then lead to anger. González-Ruibal (2019) argues that the domain of archaeologists should be the archaeological, that is, material culture no longer in use. Further, he argues that blurring the lines between

archaeology, anthropology, and history could lead to a weakened archaeology. While the warnings of Harrison and Schofield coupled with Gonzáles-Ruibal's attempts to delineate contemporary archaeology are astute, they are from a European perspective and may not apply to settler/colonial nations, such as the USA, Canada, Australia, and New Zealand. Further theoretical developments from archaeologists from these regions are needed to further strengthen the sub-discipline.

Future Directions

Our attempts to theorize the archaeology of the contemporary past have incorporated the necessary developments towards archaeologies that provide a critical intervention. in the present. These approaches help us understand our world, particularly in relation to human-thing relationships, which is an area where archaeology and archaeologists are specialists. In terms of future directions for the archaeology of modern material culture, it is important to critically engage with what, why, and how of we undertake these archaeologies. While archaeologists in the USA lead the initial theoretical discourse, archaeologists in the UK and Europe have been responsible for the majority of recent academic labor around theorizing the sub-discipline. More voices are required in this discourse – particularly from those in Oceania, Africa, the Americas, the Middle East, and Asia – if we are to fully realize the potential of the archaeology of modern material culture.

There is a need for global studies that focus on the material (and immaterial) culture of everyday life, seeking to find not only the ways in which societies are linked, or the things that they have in common, but also aiming to identify the unique characteristics of particular societies. The potential for this approach is demonstrated in our study of Japan, well recognized as being a polite society. What are the material manifestations of this politeness? Some of its material dimensions are shown in Fig. 3. They include shelves to hold customer's shoes in restaurants in restaurants to keep the

Modern Material Culture, Archaeology of, Fig. 3 Archaeology of polite society. Fukuoka, Japan. 2016

floors clean, grooved lines on the pavements to guide blind people as they traverse the city, a stand to hold shopping or handbags in apartment buildings while you search for your key, and face cloths that are ubiquitous (and highly female-gendered) for cleaning sweat from your face in hot and humid weather. Modern material culture in Japan is designed to help society to be more orderly, safe, and clean and to remind people to be aware of the needs of others. In doing so it smooths the everyday lives of people in Japan.

Finally, we must not consign the development of contemporary archaeologies to theoretical debates. We need more dedicated archaeological studies that focus on contemporary materials and landscapes to further establish the potential applications and ethical boundaries of such inquiries. A major challenge will be dealing with the effects of humans on climate and the environment as part of the Anthropocene (e.g., see George and Edgeworth 2018). The insights, narratives, and data that come from the practical applications of contemporary archaeology have been invaluable to the articulation of the sub-discipline, and further dedicated studies will continue to strengthen this developing mode of archaeology.

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Ethnoarchaeology
- ▶ Graffiti Archaeology
- ▶ Hodder, Ian (Theory)
- ▶ Homelessness, Archaeology of
- ▶ Internet, Archaeology of the
- ▶ Material Culture and Education in Archaeology
- ▶ Rathje, William Laurens
- ▶ Schiffer, Michael Brian (Theory)
- ▶ Space Archaeology

References

Aycock, J., and K. Bittner. 2019. Inspecting the foundation of mystery house. *Journal of Contemporary Archaeology* 6 (2). https://doi.org/10.1558/jca.36745.

Buchli, V., and G. Lucas. 2001. *Archaeologies of the contemporary past*. London: Routledge.

Burström, M. 2009. Garbage or heritage? The existential dimension of a car cemetery. In *Contemporary archaeologies: Excavating now*, ed. C. Holtorf and A. Piccini, 131–143. Bern: Peter Lang.

De Leon, J. 2015. *The land of open graves: Living and dying on the migrant trail*. Berkeley: University of California Press.

Frederick, U.K., and A. Clarke, eds. 2016. *That was then, this is now: Contemporary archaeology and material cultures in Australia*. Newcastle-upon-Tyne: Cambridge Scholars Publishing.

George, S., and M. Edgeworth. 2018. Plastic is now part of our planet's fabric – A scientist and archaeologist discuss what happens next. The Conversation, 27 Nov 2018. Available at https://theconversation.com/plastic-is-now-part-of-our-planets-fabric-a-scientist-and-archaeologist-discuss-what-happens-next-106019. Accessed 17 Oct 2019.

González-Ruibal, A. 2008. Time to destroy: An archaeology of supermodernity. *Current Anthropology* 49 (2): 247–279.

González-Ruibal, A. 2019. *An archaeology of the contemporary era*. Abingdon: Routledge.

González-Tennant, G. 2018a. Virtual Rosewood research project. Available at: http://www.virtualrosewood.com/ . Accessed 9 June 2017.

González-Tennant, G. 2018b. *The rosewood massacre: An archaeology of history and intersectional violence*. Gainesville: University of Florida Press.

Gorman, A. 2019. *Dr Space Junk vs. the universe. Archaeology and the future*. Sydney: NewSouth Books.

Gorman, A.C., and B. O'Leary. 2013. The archaeology of space exploration. In *The Oxford handbook of the archaeology of the contemporary world*, ed. P. Graves-Brown, R. Harrison, and A. Piccini, 409–424. Oxford: Oxford University Press.

Gould, R.A., and M.B. Schiffer, eds. 1981. *Modern material culture: The archaeology of us*. New York: Academic.

Graves-Brown, P., R. Harrison, and A. Piccini. 2013. *Oxford handbook of the contemporary world*. Oxford: Oxford University Press.

Hamilakis, Y. 2016. Archaeologies of forced and undocumented migration. *Journal of Contemporary Archaeology* 3 (3): 121–139.

Harrison, R. 2011. Surface assemblages. *Archaeological Dialogues* 18 (2): 141–196.

Harrison, R., and J. Schofield. 2010. *After modernity: Archaeological approaches to the contemporary past*. Oxford: Oxford University Press.

Hicks, D., and M. Beaudry, eds. 2010. *The Oxford handbook of material culture studies*. Oxford: Oxford University Press.

Hodder, I. 2012. *Entangled: An archaeology of the relationships between humans and things*. Oxford: Wiley-Blackwell.

Holtorf, C. 2012. The heritage of heritage. *Heritage & Society* 5 (2): 53–174.

Hudson, L.B. 1984. Modern material culture studies: Anthropology as archaeology. *The American Behavioral Scientist* 28 (1): 31–39.

Kiddey, R., and J. Schofield. 2011. Embrace the margins: adventures in archaeology and homelessness. Public Archaeology 10: 4–22.

Leone, M.P. 1981. Archaeology's relationship to the present and the past. In *Modern material culture: The archaeology of us*, ed. R.A. Gould and M.B. Schiffer, 5–15. New York: Academic.

Leone, M.P. 2010. *Critical historical archaeology*. Walnut Creek: AltaMira Press.

Leone, M.P., and R.G. Handsman. 1989. Living history and critical archaeology in the reconstruction of the past. In *Critical traditions in contemporary archaeology*, ed. V. Pinsky and A. Wylie, 117–135. Cambridge: Cambridge University Press.

Leone, M.P. 1999. Ceramics from Annapolis, Maryland: A measure of time routines and work discipline. In Mark P. Leone and P.B. Potter Jr. (eds) Historical archaeologies of capitalism, pp. 195-216. Boston, MA: Springer.

Low, S., and S. Merry. 2010. Engaged anthropology: Diversity and dilemmas *Current Anthropology*. Special issue on Engaged Anthropology: Diversity and Dilemmas. Wenner Gren Symposium Supplement 2. 51(S2): 1–24.

Meskell, L. 2005. *Archaeologies of materiality*. Oxford: Blackwell.

Meskell, L. 2012. *The nature of culture: The new South Africa*. Oxford: Blackwell.

Mizoguchi, K., and C. Smith. 2019. *Global social archaeologies: Making a difference in a world of strangers*. London: Routledge.

Politis, G., and B. Alberti. 2007. *Nukak: Ethnoarchaeology of an endangered Amazonian people*. Walnut Creek: Left Coast.

Pollard, K., C. Smith, and J. Ralph. 2017. Contested spaces: The 'long-grassers', living private lives in public places. The Conversation. Available at: https://theconversation.com/contested-spaces-the-long-grassers-living-private-lives-in-public-places-72199. Accessed 11 Oct 2019.

Price, D., and A.B. Gebauer 1990. *Adventures in Fugawiland. A Computer Simulation in Archaeology* (Game). Mayfield Publishing Company: Mountain View, California.

Ralph, J., and C. Smith. 2014. 'We've got better things to do than worry about Whitefella politics': Contemporary indigenous graffiti and recent government interventions in Jawoyn country. *Australian Archaeology* 78: 75–83.

Rathje, W. 1974. The garbage project: A new way of looking at the problems of archaeology. *Archaeology* 27: 236–241.

Rathje, W. 1981. A manifesto for modern material-culture studies. In *Modern material culture: The archaeology of us*, ed. R.A. Gould and M.B. Schiffer, 51–56. New York: Academic.

Reinhard, A. 2013. What is archaeogaming? Archaeogaming, 9 June. Online: https://archaeogaming.com/2013/06/09/what-is-archaeogaming/

Reinhard, A. 2015. Excavating Atari: Where the media was the archaeology. *Journal of Contemporary Archaeology* 2 (1): 86–93. https://doi.org/10.1558/jca.v2i1.27108.

Reinhard, A. 2018. *Archaeogaming: An introduction to archaeology in and of video games*. New York: Berghahn Books.

Schofield, J., and R. Kiddey. 2011. Embrace the margins: Archaeology and homelessness. *Public Archaeology* 10 (1): 4–22.

Shanks, M., and C. Tilley. 1987. *Re-constructing archaeology*. Cambridge: Cambridge University Press.

Shanks, M., D. Platt, and W. Rathje. 2004. The perfume of garbage: Modernity and the archaeological. *Modernism/Modernity* 11 (1): 66–83.

Shepherd, N. 2003. When the hand that holds the trowel is black. *Journal of Social Archaeology* 3 (3): 334–352.

Smith, C. 2017. The social and political sculpting of archaeology (and vice versa). *Pyrenae* 48 (1): 7–44.

Smith, C., and J. Ralph. 2019. Engaged archaeology. In *Encyclopedia of global archaeology*, ed. C. Smith. New York: Springer.

Society for American Archaeology (SAA). 2019. What is archaeology? 13 Oct 2019. Online: https://www.saa.org/about-archaeology/what-is-archaeology

Thrift, N. 2008. The material practices of glamour. *Journal of Cultural Economy* 1 (1): 9–23.

Tilley, C., ed. 1990. *Reading material culture*. Oxford: Basil Blackwell.

Tomaszewski, B. 2017. Using Geographic Information Systems (GIS) in Za'atari refugee camp, Jordan for refugee community information management and mobilization: The RefuGIS project. Global Humanitarian Technology Conference (GHTC). IEEE. https://doi.org/10.1109/GHTC.2017.8239276.

Zimmerman, L., C. Singleton, and J. Welch. 2010. Activism and creating a translational archaeology of homelessness. *World Archaeology* 42 (3): 443–454.

Further Reading

Harrison, R. 2009. Excavating second life: Cyber-archaeologies, heritage and virtual communities. *Journal of Material Culture* 14: 75–106.

Holtorf, C. 2005. *From Stonehenge to Las Vegas. Archaeology as popular culture*. Lanham: Altamira Press.

Miller, D. 1987. *Material culture and mass consumption*. Oxford: Blackwell.

Soto, G. 2016. Migrant memento mori and the geography of risk. *Journal of Social Archaeology* 16 (3): 335–358.

Soto, G. 2017. Place making in non-places: Migrant graffiti in rural highway box culverts. *Journal of Contemporary Archaeology* 3 (2): 174–195.

Voss, B. 2010. Matter out of time: The paradox of the "contemporary past". *Archaeologies* 6 (1): 181–192.

Watrall, E. 2002. Digital pharaoh: Archaeology, public education and interactive entertainment. *Public Archaeology* 2: 163–169.

Wobst, H.M. 1977. Stylistic behaviour and information exchange. In *Papers for the director: Research essays in honour of James B. Griffin*, ed. C.E. Cleland, 317–342. Michigan: Museum of Anthropology, University of Michigan.

Modern Ruins: Remembrance, Resistance, and Ruin Value

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Introduction and Definition

The word *ruin* is an ambiguous and contested one. In our everyday comprehension, it easily brings to mind ancient and enchanted monumental structures, an archaeological dream world featuring celebrities such as Machu Picchu, Pompeii, and Angkor Wat. For centuries, classical and Gothic ruins inspired poets, artists, and scholars, motivated philosophical mediations, and served as instruments of contemplative and aesthetic pleasure. At the same time, the word *ruin* also has a strong negative tone to it. According to the *Concise Oxford Dictionary*, "To ruin is to inflict or bring great and irretrievable disaster upon, to destroy agency, to reduce to a state of poverty, to demoralize completely" (1964: 1095). In this active verb form, it is almost entirely associated with negative and violent processes, with destruction and demolition (Stoler 2008: 194; Japelli 2012).

While the way we think of *ancient* ruins hardly is affected by these dismal and destructive connotations, our attitude toward the ruins of the recent past is indeed very different. Through the rise of capitalist economy in the nineteenth century, mass production, consumerism, and cycles of material replacement have accelerated; increasingly larger amounts of things are increasingly rapidly victimized and made redundant. The outcome is a ruin landscape of derelict factories, closed shopping malls, overgrown bunkers, and redundant mining towns: a ghostly world of decaying modern debris normally left out of academic concerns and conventional histories. Lingering on at the outskirts of society, these redundant sites become places of abjection, giving face to a past too recent, too grim, and repulsive to be embraced as heritage (González – Ruibal 2008). Though this attitude is being challenged, as reflected in the growing archaeology of the contemporary past (e.g., Buchli and Lucas 2001; Burström 2007; Holtorf and Piccini 2009; Harrison and Schofield 2010; Olsen and Pétursdóttir 2014) and the broader popular, artistic, and scholarly interest in decay and ruination (e.g., Woodward 2002; Elíasson and Sigurðsson 2004; Edensor 2005; Hell and Schönle 2010; O'Boyle and Manaugh 2010; Romany 2010; Rowsdower 2011; DeSilvey and Edensor 2012; Mah 2012; Gordillo 2014), modern ruins still play a very marginal role in the political economy of both the past and the present.

In this entry, we shall first explore some of the causes for this othering and for the ambivalent attitude toward the ruins of the recent past. Why is it that the ruins of our own time have been considered so devoid of value – historically, aesthetically, culturally, and scientifically – compared to their ancient comrades? And, secondly, why *should* we really care about this rubble; why do these stranded beings deserve our attention? Crucial to this discussion is the materiality of memory and the historical significance of things. Is ruination just a negative process that brings "great and irretrievable disaster upon" its victims? Or can it also be seen as a mode of disclosure that enables the recovery of memories that usually do not find their way to the historical or contemporary narratives: the neglected, unsuccessful, and ineffable? A third and final topic to be explored is how the ruins of modernity *are* and may be integrated in contemporary cultural processes and critique. How their deconstructive agency may contribute to a critical aesthetics and how their ruined physique provides spaces for alternative

cultural practices. To sum up, what is the possible capital or affordance of modern ruins?

Key Issues and Current Debates

Untimely Ruins

Given the attention and care that ancient ruins are being subjected to, it is timely to ask, what is wrong with modern ruins? At first, we should note that there is an effective history of norms, values, and distastes involved. Throughout the nineteenth and early part of the twentieth century, architects, artists, and other intellectuals felt a growing concern for the development of what they considered inauthentic architecture: the vulgar iron, concrete, and glass works of contemporary engineers, as expressed, for example, in arcades, exhibition halls, factories, and bridges. One argument used to denounce these constructions was that they lacked "ruin value;" they could not produce gentle ruins of the kind left to us from classical antiquity (Yablon 2009: 8). The famous English poet, artist, and critic, John Ruskin, for example, refused to count iron constructions ("the iron roofs and pillars of our railway stations") as architecture, partly because the constructors did not have true command over iron's "modes of decay" (Ruskin 1849/2001: 68–69). Later and more infamously, the notion of ruin value that was claimed developed to a "theory" (and even a "law") by Nazi architect Albert Speer. Unable to age and ruin in a graceful way, Speer claimed that modern materials and constructions were unsuited to form the wished for "bridge of tradition" that could inspire future generations. It was "hard to imagine that rusting heaps of rubble could communicate the heroic inspirations which Hitler admired in the monuments of the past" (Speer 1970: 97).

Connoisseurs of ruins have always favored stone, the preferred building material of the archetypical ancient civilizations (Yablon 2009: 8; Cnattingius and Cnattingius 2007: 10). Modern ruins, on the contrary, are made of iron, glass, and concrete, wrong materials that do not know how to age and decay in a proper manner (Fig. 1). Their very fabric and substance prevents them from fulfilling the aesthetical expectations associated with a "proper ruin." As voiced in a recent publication, through their ruination, they will rarely be able to evoke the scenic mood needed for the

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 1 Wrong materials, wrong age. The abandoned herring rendering factory at Eyri, NW Iceland. (Photo: Þóra Pétursdóttir)

structure to proceed on to the category of "ruins" (Cnattingius and Cnattingius 2007: 10).

Another serious defect of modern ruins is of course that they are *young*, and their presence thus acts as a temporal disturbance, a noise that challenges our assumptions of time, history, progress, and sustainability. In the dominant conception, ruins are *old*; they have an "age-value" (Riegl 1903/1996) that is imperative to their legal and cultural-historical appreciation as heritage (Cnattingius and Cnattingius 2007: 12). In Norway, for example, unless otherwise specified, the monument, site, or object must not be dated later than CE 1537 in order to be certified. Judged by this criterion, modern ruins become ambiguous, even anachronistic. However, this untimeliness (after Yablon 2009) is not only provoked by being ruins of a wrong time, modern ruins are also untimely due to their wrong pace. Because although age-value, according to Alois Riegl, is at first glance revealed ". . . in the monuments' outmoded appearance" (1903/1996: 72), value, he argues, does not increase in direct correspondence to age but with the ruins' slow and uninterrupted "growth into decay" (Riegl 1903/1996: 73). Orderly decay should bear no signs of rupture or destruction, and hence, the signs of "premature aging" in modern structures are mostly seen as anything but an indication of value. The ruin, moreover, should express the kind of peaceful unity and balance with its surroundings, so that ruination may appear as the natural state of structure, and not as an unnatural rupture from its authentic being. Something which modern structures, according to Georg Simmel (1911/1959: 263), are capable of only "as if in afterthought." They pollute and disturb rather than merge with or complete a historical horizon.

Unlike classical ruins presumed to have decayed slowly and gracefully over centuries, modern ruins are often *fast* ruins, sometimes *too* fast. As Alexis de Tocqueville exclaimed after encountering an abandoned settlement in frontier New York in the 1830s, "What! Ruins so soon!" The French political thinker and traveler was struck by the radical contemporaneity of the American ruins; they were, he claimed, "day-old ruins" (Yablon 2009: 10, 20). Today we see even more extreme examples of premature ruins, sometimes preceding their own completion (Fig. 2) (e.g., Pálsson 2012; Ulfstjerne 2016). While this is of course the sad reality of many war-torn areas, the current financial crisis, for example, has made such premature ruins conspicuous in many less anticipated contexts: abandoned construction sites, holiday resorts closed before the first guest arrived, apartment houses, and even entire towns that conveniently have skipped the habitation phase and turned themselves into what artist Robert Smithson has called "ruins in reverse," structures that "don't fall into ruin after they are built but rather rise into ruin before they are built" (quoted after Yablon 2009: 12).

Modern ruins, however, are also difficult to cope with for a number of other and perhaps more subtle reasons, and one particular mode of their being may prove to be especially significant. As noted above, the term "ruin" is an ambiguous one, which can grasp ". . .both the claim about the state of a thing and a process affecting it" (Stoler 2008: 195). There is, moreover, a causal tendency to see the noun (ruin) as a frozen form, inert and passive, in contrast to the active and transient verbal form (*to ruin*). Our conception of ancient ruins belongs predominantly within the first mode. The ancient ruin is clean, fossilized, and ready-ruined; it is somehow finished and terminated (see Fig. 5). The ruins of the recent past, on the other hand, have usually not reached this state but are caught up in the ongoing process of ruin*ing* – of "unfinished disposal" (Hetherington 2004). And it may well be that it is this state of being in-between, of not belonging, that also makes the ruins of the recent past so disturbing (e.g., Burström 2009; Pétursdóttir 2014).

A parallel may be made in the context of the human body. This body is attractive and pleasing – or at least tolerable – basically in two states of its being: either as a living, functional body (preferable young, healthy, and beautiful) or as de-fleshed osteological remains, as clean bones (the latter moreover subjected to their own peculiar baroque and romantic aesthetics). It is not so attractive during its transformation between these two states, when the human fabric disintegrates and flesh decomposes and rots. Modern ruins are

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 2 Rising into ruin. Unfinished apartment block in the small town of Teriberka, Kola Peninsula, Russia. Started shortly before the fall of the Soviet Union, the construction of this building was brought to an end following the collapse. Instead, it became a valuable brick resource for the local population. (Photo: Þóra Pétursdóttir)

often in this "fluid state of material becoming" (Edensor 2005: 16); they are ruins in the making and in a number of ways affected by this ambiguity toward the fluid and transformative. Caught up somewhere in between disposal and history and waste and heritage, they are deprived of their former functional or useful value and yet seem unable to take on, or be granted, a cultural significance.

Ruin Memories

This leads us to our second matter of discussion: What is the value of this modern debris? Can we speak of a "ruin value" that is not conditioned by the often dubious effective historical connotations of the term? And why should ruins of our own time be objects of care and concern?

One argument relates to memory and the ruins' potential of challenging dominant perceptions of history and the past. Modernity is often said to be characterized by its detachment from the past. The past, we are told, is over and gone and remains only as a subject of historical inquiry: something to be recalled and reconstructed in our historical narratives. As the narratives proceed, the past is constantly left behind; former periods are replaced by later periods. Things, however, the material residues of all these replacements, object to this pace of history. Though aging and transforming, they stubbornly linger on. Thus, as Walter Benjamin asserted, the past has not budged – it actually piles up in front of our eyes (2003: 392). In different shapes, and in various conditions, it gathers and constantly sediments into potentially new environments of memory (Bergson 2004; Olivier 2011).

Despite the fact that things clearly do age differently and that their expected life lengths also vary greatly, there is a certain egalitarianism associated with their aging. Thus, and given that also

persistency can be listed among their qualities, things do not discriminate among themselves in their duration. This means that in addition to those "unbroken" things that facilitate continuous, smooth, and sustainable practices, there is a survival of the outdated and stranded. A material past that persists despite being discarded, ignored, and made superfluous – in short, the surviving material redundancy of the past (Fig. 3). Thus, in the notion of a past that sediments and swells in our midst (after Bergson 2004), there is also and always a component of the neglected, the unwanted (Olsen 2010: 166–167). Importantly, this material gathering of the past is largely not subjected to any suspicious plan or ideological script or censorship. It mostly happens in unpredictable ways and according to material trajectories that are beyond or unrelated to human control and intervention and which also allows for less edited or censored memories (Olsen 2010, 2012).

Ruined things were once useful and thus embedded in repetitious practice and infused with lived or habit memory (Bergson 2004). When outmoded and discarded, their lived and habitual significance is lost, while their physical presence, albeit ruined, continues. As such, these broken things survive and gather as the material antonyms to the habitually useful, creating a tension-filled constellation that carries the potential of triggering a particular kind of involuntary memory. Reverberating against the taken-for-granted materiality of habit memory, they become potential agents of disruption, triggering the past in a mode that Benjamin called "actualization" (Benjamin 1999: 473–476). The outdated and stranded give face to forgotten or neglected pasts, to the trivial or embarrassing, to the failed or never completed undertakings, and to the anomalies and the unstable moments. And here lies some of their value or capital: precisely by being redundant and discarded, these things reveal the gaps and crevices in the construction of history as progress, as a continuous narrative; they bring forth the abject memories that are lost in conventional history.

Just by stubbornly being (t)here, the derelict fur farm, the abandoned boarding school, the disconnected radio beacon, or the abandoned fish processing site openly rebuke the conception of history as sequenced, biographical, and progressive. They of course share this persistency and

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 3 Stranded. Redundant Soviet fishing fleet brought to rest in Teriberka, Kola Peninsula, Russia. (Photo: Þóra Pétursdóttir)

opposition with their older comrades. However, being *modern* ruins, and thus somehow closer or at least more familiar, and also through their conspicuous transient mode of being, they enact this resistance – and potential – more effectively than ancient ones. In their own and very positivistic manner, they show that history is not a projected stream leaving the past behind but that it bends and twists in a disorderly manner, interrupting the expectations of the *have been* and the *becoming*. Further, by often being negative features within the contemporary geopolitical order, the ruins of the modern also hold on and make manifest alternative geographies. They bear witness to other cultural or economic landscapes and to past presences in strange places: a stranded English train engine in an Icelandic fjord, a frozen German weather station in east Greenland, and a ruined Soviet missile hangar in Cuba (cf. Jensen and Krause 2011; Burström et al. 2011).

To speak of ruin memories may of course sound like a conceptual contradiction. Abandonment and ruination is usually understood negatively through the tropes of loss and deprivation. Through decay, withering, and corrosion, things are degraded and humiliated, while the information, knowledge, and memory embedded in them become lost along the way. However, without at all ignoring its negative aspects, not to mention the immense human traumas inflicted through its sometimes violent and catastrophic causes, ruination can be seen as disclosure – as a mode of unconcealment and thus a form of recovering memory (DeSilvey 2006). Experiencing an inhabited and well-kept building may not reveal much about the way it actually works, the diversity of materials and technologies that are mobilized to construct and operate it. If not cunningly hidden by design and architectural form, these materials and implements themselves are often absorbed by their tasks; they disappear into usefulness and chains of relations.

Decay, ruination, abandonment, and disposal, however, disturb the routinized and taken-for-granted and produce a defamiliarized landscape (Edensor 2005: 109). Plaster and wallpaper peel off, doors are opened, windows broken, and access provided (Fig. 4). The masked object is unveiled, inside is turned out, and privacy revealed. Ruination becomes a kind of slow-motion archaeology, a self-excavation that exposes the formerly hidden and back-staged. In

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 4 Inside turned out, privacy revealed. Bunk beds in rooming house for female workers at the herring factory in Eyri, NW Iceland. (Photo: Þóra Pétursdóttir)

the destruction process, new meanings may be revealed, meanings that may perhaps only be grasped at second hand when no longer immersed in their withdrawn and useful reality. Moreover, by being released from the chains of use, things themselves become more present; they appear to us in ways not seen before. And perhaps it is in this state of abandoned being, "freed from the drudgery of being useful" (Benjamin 2002: 39), that things' ownness and integrity is released and finally enables them to articulate their own source of signification?

Critical Aesthetics and Ruin Values

A final topic to be explored is how the ruins of modernity are and may be integrated in contemporary cultural processes and how they can fuel discourses of alternative aesthetics and social critique and at the same time enhance social cohesion by providing physical space for critical, marginal, or alternative cultural practices?

One outcome of the modern attitude toward things and materiality is an oppositional hierarchy between, on the one hand, functional and/or aesthetically pleasing things and, on the other, waste – all rubbish we find disgusting, ugly, polluting, and just want to rid of by increasingly more effective systems of disposal and recycling. In contrast to the attitude characterizing our not so very distant ancestors, the main rule of contemporary public aesthetics is purity and neatness, to "tidy up," to clean and repair, or better replace. Waste, including wrecked cars, abandoned buildings, and rusty oil tanks, constitutes an embarrassment and a problem that should at all costs be kept out-of-sight.

Heritage practices may at first be thought of as mediating this opposition, reflecting a care for and attentiveness to the useless and stranded. After all, it is residues such as these on which archaeologists base their entire knowledge of previous societies. More than anyone, however, archaeologists know that the dialectic between the ruin as rubbish and the ruin as heritage is a fragile one (e.g., Burström 2009; Pétursdóttir 2013; Kobialka 2014; DeSilvey 2017). But while surely not all ruins are as capable of becoming heritage, the case is rather that what is conceived of as proper heritage itself is most strongly affected by this aesthetics. The heritage site, the ancient ruin, is often staged, neat, and picturesque, providing visitors with a disciplined and purified space (Edensor 2005: 22, 95) (Fig. 5). Extraneous materials – plants, fauna, debris, and modern materials – all pollutants, are to be expunged, and further decay is staved off through restoration and preservation. Arresting decay, preventing death, of course, has always been the imperative of heritage management. And this, moreover, relates to the wider and equally ontologized modern tropes of sustainability, conservation, and the wish for eternal life in general.

Matched against this aesthetics, it is not hard to see why modern ruins fail. They are withering and crumbling: walls and concrete decompose, and nature intrudes, mingles, and reclaims. Gulls, insects, rats, fungus, scrubs, and trees invade and establish their own ruin ecologies. The previously clear distinction between the man-made and the natural surrounding evaporates. Given the imperatives of the current *Zeitgeist*, where all culture-natures should be neat, healthy, and in balance, where the human body should stay young, fit, and slender, and impairment and death increasingly seems to have become an embarrassment, these ruins make manifest conditions conspicuously at odds with dominant aesthetical, cultural, and political tropes. In their hybrid or uncanny state, they become antonyms of the modern and blur established cultural categories of past and present, purity and dirt, and waste and heritage; in short, they become matter out of place and out of time (Fig. 6).

At the same time, it is precisely this capacity, this rebellious affordance, which provides them with yet another agency and critical potential. Through their difference and disruption, they oppose and rebuke the ideal of seamlessness and tactile sterility and thereby deride taken-for-granted conventions of purity and dirt. Just think of the contrast their presumed disgraceful alteration and disintegration provides to smooth and increasingly regulated urban spaces and their normalized tactilities of domesticated sounds, smells, and sights (Edensor 2005: 57). In fact, it may be argued that the current urge to clean up and

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 5 Staged, neat, and picturesque. The ready-ruined Whitby Abbey, Yorkshire, England. (Image by Colorbox.com)

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 6 Anti-heritage. Abandoned Khrushchev era apartment block in Nikel, Kola Peninsula, Russia. (Photo: Bjørnar Olsen)

reshape cityscapes to make them efficient, tidy, and green is to deprive the city of its essential, ruin-inclusive affordances. As argued by Shannon Lee Dawdy (2010), ruins, such as neglected neighborhoods, vacant warehouses, abandoned amusement parks, and squatter camps, although controversial, may be seen as an integrated part of what we think of as the modern city:

> Looking at the prevailing images of the modern city from the eighteenth to the twentieth century, one would have to conclude that a city would be incomplete and out of balance without ruins and unpoliced zones. These are part of what we desire in a city. (Dawdy 2010: 773).

Also in this sense, ruination may be seen as a kind of return or recovery. However, it is not only a matter of aesthetics or desire but also of social needs and requirements. While modern ruins may be said to manifest or act out a cultural critique through their uncanny, abject being they are to some extent, yet paradoxically, also significant constituents in the reestablishment and maintenance of social order, to Mary Douglas, dirt resembled social disorder (Douglas 1966: 2), and it was through its abolition, through purification, that society and social order could be established. However, as everyone knows, housekeeping is mostly about making things disappear from view rather than disappear all together. Things swept away, flushed, or thrown out are thankfully no longer *here*, but they are unfortunately still *there*. As Bruno Latour (2009) has argued, this relentless strife toward a neat order of things has come to the critical point where we cannot rely on an "outside environment," or an out-of-sight environment, any more. "There is no reserve outside which the unwanted consequences of our collective actions could be allowed to linger and disappear from view" (Latour 2009: 143). Latour (2009) has even traced the rise of modern environmentalism to this growing problem of "lack of outsides."

While correctly construed, however, the relentless sedimentation of modern ruins can be seen as challenging Latour's claim. Their abject being, even in an urban context, produces "negative features" – localized outsides – that, temporarily at least, will accept the unwanted activities and residues of conventional social practices and thus keep them out-of-sight. For example, when a modern enterprise abandons a building, it is not simply left behind, becoming something past and *gone*. The building of course lingers on and is in a way "returned" to unprescribed activities and "informal economies" (Dawdy 2010: 776) (Fig. 7). It is turned into a democratic space of common access – a trash dispenser, a canvas for artists, a home for the homeless, a void for the criminal, and a center for the marginal – a place, or an "inside," for activities generally preferred out-of-sight,

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 7 Returned to unprescribed activities. Domestic house used as waste disposal for (mainly) king crab claws. Teriberka, Kola Peninsula, Russia. (Photo: Þóra Pétursdóttir)

pressed to the outskirts of the social order, enabling opportunities of alternative modes of life (Edensor 2005; Dawdy 2010: 776). In more quotidian and prosaic contexts, the lure of abandoned buildings and derelict structures is probably something most of us have experienced. They provide alternative spaces that support a range of alternative uses: places where windows are for breaking, where common rules do not apply, and the places of numerous first time experiences.

This ambiguous lure is probably also part of the reason why we today see a renewed interest in modern ruins, as exemplified by the urban explorer movement and the fast-growing number of websites, popular and academic books, and papers devoted to this topic. Tim Edensor has even claimed that there is a "turn to ruins" in the social and human sciences, similar to "the craze for ruins in the Victorian age" (2011: 162) – a kind of "Ruinenlust" (DeSilvey and Edensor 2012). However, as little as there was a craze for ruins in the Victorian age, it was in fact very selective and reserved for the few; the interest in modern ruins is still largely a marginal phenomenon, which has, for example, hardly affected heritage charters, or concern. And maybe it is this shared marginality that is the very source of this fascination. In other words, the uncanniness which prevents modern ruins from being enrolled in conventional conceptions of aesthetics, history, or heritage is also what is desired among those who are at odds with these values of the establishment (e.g., Pétursdóttir 2013; Kobialka 2014). Without this otherness and marginality, modern ruins would be less interesting as a fringe and underground phenomenon and, more seriously, also lose their greatest tangible assets with respect to infuse a critical discourse on these values.

Edensor is probably right that the new interest in modern ruins is to a considerable extent due to a current social and political unrest and a resistance toward the often naive assumptions of order and progress in modernist projects (Edensor 2011), in other words, a rejection of grand narratives and big abstract plots through the praise of the immediate but largely ignored residual by-products of these projects. Importantly, however, the ruins themselves should not be seen as simple rhetorical tools, symbols, or patent allegories in this discourse but rather as its very source and drive. They are actively part of the discourse through their "affecting presence," in form of *immediacy* and not only of mediation (Armstrong 1971: 26). And of course, if we understand their agenda correctly, it is not one of domestication or normalization but one of acknowledgment. In fact, subjecting them to sameness would easily bring their own critical voices to silence.

Future Directions

Afterthoughts

The word *ruin* is indeed an ambiguous and contested one. However, at the core of this ambiguity are real and material phenomena that despite being subjected to dominant tropes of cultural ordering also have their own integrity and wealth of affordances, including the capacity to oppose and rebuke these censoring tropes. By their very material presence, modern ruins become untimely reminders of the historical and contingent nature of these tropes and may also trigger involuntary memories of what is marginalized or left out of conventional historical accounts. As such, their "mission" seems to comply well with an underlying and justifying subtext in most archaeological discourses on the recent and contemporary past. That is, due to their multi-vocal and democratic nature, these abandoned things give voice to marginalized social groups and people; they enable other histories and alternative *human* pasts (e.g., Buchli and Lucas 2001; Olivier 2001; Harrison and Schofield 2010).

While there are a number of good reasons, politically as well as ethically, to sympathize with this emancipating perspective, the fact that it is still conveniently restricted to *our species only* calls for some final reflections. That is, despite the many democratic pleas for the marginal and othered, the things or the ruins themselves are largely regarded as mere means to reach something else and presumably more important: neglected cultures and deprived *human* agents

behind these decaying artifacts. The things or ruins themselves are little but things-for-us, reduced to what Heidegger once termed "Bestand," by which their manipulative being as "standing reserves" for us is what largely remains (Heidegger 1993; Introna 2009; cf. Olsen 2010: 82; Pétursdóttir 2014).

A radical implication of the position explored in this entry is that modern ruins are also valuable in and of themselves: as physical entities with a rightful presence in the "order" of urban or rural landscapes. This, importantly, also includes their right not to be meaningful in the dominant interpretative sense where meaning is often conflated with derivative meaning: meaning for and from us. In abandonment and ruination, things are freed from chains of use value; they are allowed to be themselves and to indulge in their own material trajectories and companionships (Fig. 8). Surely this releasement confronts our customized habit of dealing with things as goods, as tamed domesticated possessions, or as peepholes to a bygone past. Familiar things suddenly appear to us in ways never noticed, become pestering and alien, exposing some of their own unruly thingness. Acknowledging this particular integrity and affordance of modern ruins, by being exposed to their radiation of immediate and anti-intellectual meaning, may also help preparing the ground for another and yet seemingly unlikely possibility: that they themselves are the source of their own signification (cf. Benso 2000: xxvii; B ennett 2010: 108).

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 8 Released from usefulness. Floor assemblage at Sarnes boarding school, Northern Norway. (Photo: Bjørnar Olsen)

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Contemporary Past, Archaeology of the
- ▶ Homelessness, Archaeology of
- ▶ Modern Material Culture, Archaeology of

References

Armstrong, R.P. 1971. *The affecting presence: An essay in humanistic anthropology*. Urbana: University of Illinois Press.

B ennett, J. 2010. *Vibrant matter: A political economy of things*. Durham: Duke University Press.

Benjamin, W. 1999. *The arcades project*. Cambridge, MA: Belknap Press.

Benjamin, W. 2002. *Selected writings*. Vol. 3, 1935–1938. Cambridge, MA: Belknap Press.

Benjamin, W. 2003. *Selected writings*. Vol. 4, 1938–1940. Cambridge, MA: Belknap Press.

Benso, S. 2000. *The face of things: A different side of ethics*. Albany: State University of New York Press.

Bergson, H. 2004. *Matter and memory (Dover Philosophical Classics)*. New York: Courier Dover Publications.

Buchli, V., and G. Lucas, eds. 2001. *Archaeologies of the contemporary past*. London/New York: Routledge.

Burström, M. 2007. *Samtidsarkeologi: introduktion till ett forskningsfält*. Pozkal: Studentlitteratur.

Burström, M. 2009. Garbage or heritage: the existential dimension of a car cemetery. In *Contemporary archaeologies: Excavating now*, ed. C. Holtorf and A. Piccini, 131–143. Frankfurt am Main: Peter Lang.

Burström, M., A. Gustafsson, and H. Karlsson. 2011. *World crisis in ruin: The archaeology of the former soviet nuclear missile sites in Cuba*. Gothenburg: Bricoleur Press.

Cnattingius, L., and N. Cnattingius. 2007. *Ruiner: Historia öden och vård*. Stockholm: Carlssons.

Dawdy, S.L. 2010. Clockpunk anthropology and the ruins of modernity. *Current Anthropology* 51 (6): 761–793.

Desilvey, C. 2006. Observed decay: Telling stories with mutable things. *Journal of Material Culture* 11 (3): 318–338.

DeSilvey, C. 2017. *Curated decay: Heritage beyond saving*. Minneapolis: University of Minnesota Press.

DeSilvey, C., and T. Edensor. 2012. Reckoning with ruins. *Progress in Human Geography* 37 (4): 465–485.

Douglas, M. 1966. *Purity and danger: An analysis of concepts of pollution and taboo*. London: Routledge.

Edensor, T. 2005. *Industrial ruins: Space, aesthetics and materiality*. Oxford: Berg.

Edensor, T. 2011. Comments on "Ships stranded in the forest" by G. Gordillo. *Current Anthropology* 52 (2): 161–162.

Elíasson, N., and A.Á. Sigurðsson. 2004. *Abandoned farms*. Reykjavík: Edda.

Fowler, H.W., and F.G. Fowler, eds. 1964. *Concise Oxford dictionary*. Oxford: Oxford University Press.

González – Ruibal, A. 2008. Time to destroy: An archaeology of supermodernity. *Current Anthropology* 49 (2): 247–279.

Gordillo, G. 2014. *Rubble: The afterlife of destruction*. Durham: Duke University Press.

Harrison, R., and J. Schofield. 2010. *After modernity: Archaeological approaches to the contemporary past*. New York: Oxford University Press.

Heidegger, M. 1993. The question concerning technology. In *Martin Heidegger: Basic writings*, ed. D. Farell Krell, 307–342. San Francisco: HarperCollins.

Hell, J., and A. Schönle. 2010. *Ruins of modernity*. Durham: Duke University Press.

Hetherington, K. 2004. Secondhandedness: Consumption, disposal and absent presence. *Environment and Planning D: Society and Space* 22: 157–173.

Holtorf, C., and A. Piccini, eds. 2009. *Contemporary archaeologies: Excavating now*. Frankfurt am Main: Peter Lang.

Introna, L.D. 2009. Ethics and the speaking of things. *Theory, Culture and Society* 26 (4): 25–46.

Japelli, R. 2012. Engineering the ruins of constructions. *Lecture Notes in Applied and Computational Mechanics* 61: 97–122.

Jensen, J.F., and T. Krause. 2011. Wehrmacht occupations in the New World: Archaeological and historical investigations in Northeast Greenland. *Polar Record* 2011: 1–11.

Kobialka, D. 2014. Let heritage die! The ruins of trams at Depot No. 5 in Wrocław, Poland. *Journal of Contemporary Archaeology* 1 (2): 351–368.

Latour, B. 2009. Spheres and networks: Two ways to reinterpret globalization. *Harvard Design Magazine* 30: 138–144.

Mah, A. 2012. *Industrial ruination, community and place: Landscapes and legacies of urban decline*. Toronto: University of Toronto Press.

O'Boyle, S., and G. Manaugh. 2010. *Modern ruins: Portraits of place in the Mid-Atlantic region*. University Park: University of Pennsylvania Press.

Olivier, L. 2001. The archaeology of the contemporary past. In *Archaeologies of the contemporary past*, ed. V. Buchli and G. Lucas, 175–188. London: Routledge.

Olivier, L. 2011. *The dark abyss of time: Archaeology and memory*. Lanham: AltaMira Press.

Olsen, B. 2010. *In defense of things: Archaeology and the ontology of objects*. Lanham: AltaMira Press.

Olsen, B. 2012. Symmetrical archaeology. In *Archaeological theory today*, ed. I. Hodder, 208–228. Cambridge: Polity Press.

Olsen, B., and Þ. Pétursdóttir. 2014. *Ruin memories: Materialities, aesthetics and the archaeology of the recent past*. London: Routledge.

Pálsson, G. 2012. These are not old ruins: A heritage of the hrun. *International Journal of Historical Archaeology* 16 (3): 559–576.

Pétursdóttir, Þ. 2013. Concrete matters: Ruins of modernity and the things called heritage. *Journal ofSocial Archaeology* 13 (1): 31–53.

Pétursdóttir, Þ. 2014. Things out-of-hand: The aesthetics of abandonment. In *Ruin memories: materiality, aesthetics and the archaeology of the recent past*, ed. B. Olsen and Þ. Pétursdóttir, 335–364. London: Routledge.

Riegl, A. 1903/1996. The modern cult of monuments: Its essence and its development. In *Historical and philosophical issues in the conservation of cultural heritage*, ed. N. Stanley Price, M. Kirby Talley Jr., and A. Melucco Vaccaro, 69–83. Los Angeles: The Getty Conservation Institute.

Romany, W.G. 2010. *The beauty in decay: The art of urban exploration*. Berkeley: Gingko Press.

Rowsdower, Z. 2011. Fresh rot: Urban exploration and the preservation of decay. *Manitoba Anthropology. Journal of the Manitoba Anthropology Student's Association* 29: 1–15.

Ruskin, J. 1849/2001. *The seven lamps of architecture*. Cambridge: The Electric Book Company.

Simmel, G. 1911/1959. The ruin. In *Georg Simmel, 1858–1918: A collection of essays, with translations and a bibliography*, ed. K.H. Wolff, 259–266. Columbus: Ohio State University Press.

Speer, A. 1970. *Inside the Third Reich*. London: Sphere Books.

Stoler, A.L. 2008. Imperial debris: Reflections on ruins and ruination. *Cultural Anthropology* 23 (2): 191–219.

Ulfstjerne, M. 2016. Unfinishing buildings. In *Elements of architecture: Assembling archeology, atmosphere and the performance of building spaces*, ed. M. Bille and T.F. Sørensen, 387–406. London: Routledge.

Woodward, C. 2002. *In ruins*. New York: Pantheon Books.

Yablon, N. 2009. *Untimely ruins: An archaeology of American urban modernity 1819–1919*. Chicago: The University of Chicago Press.

Modern Vessel Archaeology (Iron and Steel Wrecks)

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Introduction

In 1964, the State of Western Australia protected all pre-1900 shipwrecks whether of wood or iron, propelled by sail or steam. In 1972 the acknowledged "founder" of maritime archaeology – a student of wrecks from the classical era – used the example of American Civil War vessels to attest to "the value of archaeological research on ships recent enough for photographic records to be available" (Bass 1972: 10). One was the steam-driven wooden-hulled "ironclad" USS *Cairo* (1861–1862). In the following year, another Civil War vessel the iron-hulled USS *Monitor* (1862–1862) was declared the United States' first National Maritime Sanctuary (Broadwater 2012). Just a few years later, the notion that "modern wrecks" were significant entered a previously skeptical European maritime archaeological psyche when the editors of the British-based maritime archaeological journal the *International Journal of Nautical Archaeology* carried news of the USS *Monitor* research (Watts 1975). Today iron, steel, and steamship wrecks form a significant percentage of many nation's underwater cultural heritage. When Australia proclaimed its national shipwreck legislation in 1976, for example, nearly one third of all the wrecks protected around the nation were iron-hulled sailing ships and steamers. One of the first also was the steel-hulled Japanese Submarine *IJN I 124*, (1922–1942). It had a restricted zone prohibiting entry without a permit and (as the parliamentary debates show), and it was protected more for social and political considerations than for its archaeological potential. One very modern example, and one where social implications also predominate, is the c. 220-m-long steel freighter *Edmund Fitzgerald* (1958–1975). Declared a maritime archaeological site under the terms of the *Ontario Heritage Act*, its significance to Great Lakes communities and to the relatives of those lost is undoubted. Having disappeared with all hands for decades, in remaining virtually untouched as a result – escaping the salvors and the ship-breakers who have long since claimed their more accessible shallow-water counterparts – *Edmund Fitzgerald* is inexorably becoming the only intact example of its type. To students of mid-to-late twentieth-century technology, shipping, and crewing practices, its full archaeological and technological significance will not be realized for generations to come nonetheless. There are many other examples globally, and the archaeological worth of these "unique" wrecks is escalating as the years pass.

Definition

Though relatively recent– post the nineteenth-century Industrial Revolution – iron, steel, and steam shipwrecks can provide, through archaeology, information that is not available in the accepted accounts, in archives, or in oral histories. These data can be technical, technological, economic, social, and behavioral. These "modern" wrecks can also be the catalyst for a wide range of associated historical, economic, and anthropological studies, with their finding and the analysis often providing a raison d'être and focus for those studies.

As with their older counterparts, some "modern" vessels constitute the world's "shared maritime heritage." A good example is the hundreds of Japanese midget submarines lost or abandoned around the globe in WWII. Not only did a recent study reveal social, historical, and technical details not available previously, but it also showed the extent to which these vessels were socially and emotionally shared by Japan and by every nation in whose water they lie (Delagado et al. 2016).

In some cases, there will be more than two nations involved, especially where a range of countries were involved in a particular event, e.g., the many vessels lost in the various phases of the construction of the Panama Canal. Another example is a suite of French, British, and

Australian iron and steel warships and other vessels (barges, freighters, and small troop-carrying boats) sunk by Turkish forces during the Dardanelles campaign in WWI. One of this group, the lost submarine *AE2* (1913–1915), became a focus for Turkish interests seeking to raise it in celebration of the successful defense of their homeland against invading enemy forces. *AE2* is also a prime example of a case where shared cultural heritage is valued and managed by two once warring nations acting in concert. There will be many similar examples across the globe.

The modern maritime archaeological powerhouses of Asia have developed extensive archaeological programs, and in some cases, modern wrecks are the subject of academic interest. The mid-1990s investigation of iron- and steel-hulled steamship wrecks in the Lakshadweep Islands in the Arabian Sea off India is an example of this process (Gaur et al. 1998). These countries and many of the signatories to the UNESCO convention on the Underwater Cultural Heritage, which protects all sites a century or more old, will inexorably continue this process. Of special regional and national interest will be those iconic modern ships of commerce and war that are representative of defining civil wars and modern struggles for political, social, and economic freedom. A prime example is Sun Yat Sen's SS *Zhongshan Jian* (1910–1938), which was raised with many artifacts in 1997 and excavated to become a centerpiece of its own Museum in Wuhan. One interesting example, albeit one far removed geographically from its chief stakeholders, is the Confederate commerce raider CSS *Alabama* (1862–1864). It was sunk by USS *Kearsage* off Cherbourg, France. A very rich wreck, with considerable social significance to both sides of the American Civil War, armaments, and other objects have been raised in concert with French specialists in readiness for an exhibition in the USA. At the other end of the spectrum is the relatively sterile SS *Conch* (1892–1903), a very early shell oil tanker and popular dive site. Here, as in many other instances across the globe, a modern wreck's value for dive tourism now serves to help protect the site from further salvage (Muthucimnerana 2007). A rare example of the early tankers, SS *Conch* is also of increasing historic and socioeconomic relevance with connotations for an oil-dependent world. In that respect, *Conch* is part of the "global maritime heritage."

The Development of the Discipline

In tracing the antecedents of modern ship archaeology, two defining modern wreck studies occurred in 1983. One was the corrosion assessment of the massive steel-hulled USS *Arizona* (1915–1941) at Pearl Harbor in Hawaii (This is ongoing, e.g., Foecke et al. 2010). The other was the archaeological-behavioral study of the tiny iron-hulled SS *Xantho* (1848–1872). Having commenced with a pre-disturbance biological and electrochemical (corrosion) analysis by diving conservators, followed by the application of anodes to help preserve the hull and its unique ex-Royal Navy gunboat engine, the latter study firmly cemented the place of diving corrosion scientists in iron (and steel) ship studies and in modern maritime archaeology. Conversely the de-concretion and disassembly of the *Xantho* engine was treated as an excavation in its own right, performed by the conservators yet supervised by the archaeologist in charge – posing questions, assisting and closely observing throughout, and revealing new information about the technology and also behavior of those who owned and operated the vessel (Veth and McCarthy, 2001). That the engine can now be turned over by hand, attests to the successful application of conservation expertise and the essential role conservators (including diving conservators) have in successfully managing modern wrecks. Another development in the *Xantho* instance was the production of an archaeologically based working model of the engine. Commonplace in the study of the hulls and rigging of wrecks of ancient sailing vessels where plans and descriptions are sparse – or nonexistent (as was the case with the engine from the *Xantho*) – the value of working models based on the archaeological drawings taken from "modern vessels" has been clearly demonstrated. *Xantho* is also a prime example

where "public archaeologists," i.e., those employed by and acting on behalf of an institution, have an overarching obligation to the people inhabiting and visiting the region it serves – in this case a museum. In this instance, traditional reporting methods such as technical reports, articles, books, and websites are, of necessity, augmented by works aimed at that broad spectrum of society that frequents the museum in which the objects are housed and interpreted (McCarthy 2017). Part of the Western Australian Museum's "wreck access," program *Xantho* is an underwater "museum-without-walls," while its engine features in a special gallery (Figs. 1 and 2).

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 1 The SubMarine Explorer wreck at the Pearl Islands in Panama (JP Delgado)

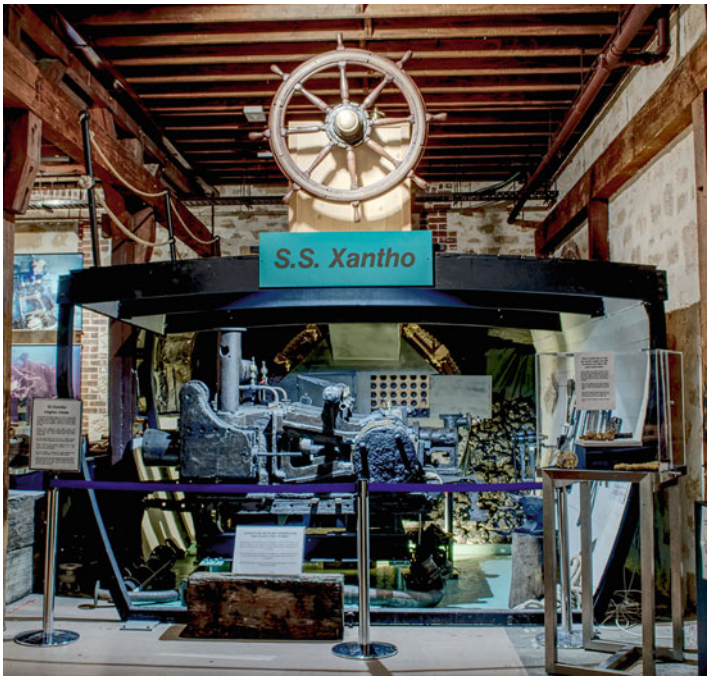

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 2 SS *Xantho* engine in 2017, appearing in an underdeck scene at the Western Australian Shipwreck Museum (K. Edwards)

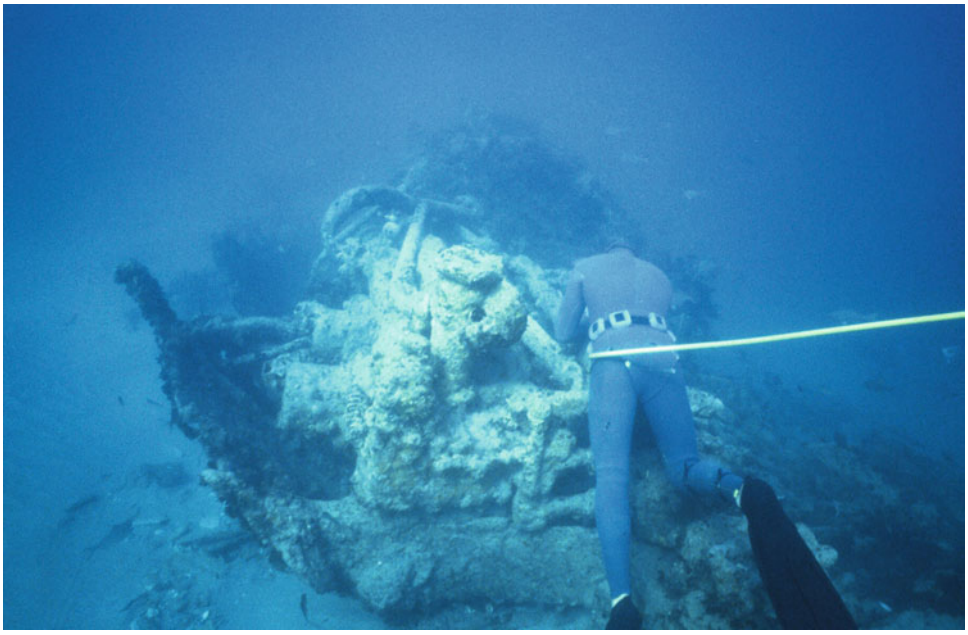

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 3 SS Xantho Engine in 1985 on the seabed (P. Baker)

The "in-laboratory" excavation of the Confederate submarine *H. L. Hunley* (1863–1864) along with the human remains and personal effects of the Civil War dead contained within (Fig. 3) proved another milestone in modern vessel archaeology. This forensic exercise together with the recording, analysis, and exhibition methods utilized to bring the project to the general public (including working models and computer graphics of the cramped interior) became the benchmark in "post-raising" archaeology, conservation, and presentation method (Mardikian et al. 2009).

Where excavation is indicated, or can be supported by the required conservation expertise and the long-term commitment of staff and resources, limited excavation is most often the result at modern wrecks. Enclosed compartments help reduce the negative aspects of excavation (e.g., seabed scouring, accelerated degradation) especially where the process can be quarantined to one discrete section of a site. An example is the fieldwork conducted at the iron-hulled SS *City of Launceston* (1863–1865) involving a full archaeological survey, corrosion and biological studies, and the testing by excavation of one discrete accommodation area, recovering but a few objects and leaving all other compartments and their contents untouched (Anderson 2009). This is perhaps as it should be. For as observed by one of the better known practitioners, "modern" shipwreck conservation needs can "last well beyond the tenure of many directors of museums and their employees, as well as that of corporate sponsors" (MacLeod, 2016).

Another trend in modern ship archaeology has been toward thematic studies linking sites of similar type and purpose. One example is the Civil War blockade-runner type, with the Confederate paddle steamers *Denbigh* (1860–1865) and *Mary Celestia* (1861–1864) among the best known. Another is the study of the American river steamboat, e.g., *Heroine* (1832–1838). Another relatively recent trend includes managing shipwrecks of all types and ages as part of the "cultural landscape" of a place or region. Here a wreck may not be excavated at all but is archaeologically surveyed, assessed, and valued as an integral part of a far wider suite of natural and cultural sites (see Ford 2011). Such a large collection of sites in close proximity can also be of ongoing social and economic value to the communities in whose water they lie, thereby extending the "landscape" into modern times.

A prime example is the well-known and much-visited wrecks of Chuuk (Jeffery 2006). These are also the focus of studies essential in understanding the many thousands of wartime wrecks that will inexorably release oils and other toxic substances into the water column.

Notable early examples of modern wreck studies are *Holland I* (1901–1913), RMS *Titanic* (1911–1912), and the German battleship *Bismarck* (1939–1941). All occurred in 1985. While *Holland* resulted in the preservation and presentation of a seminal, groundbreaking "type," *Titanic* and *Bismarck* provided a great deal of additional information about how the two ships sank and solving a number of ongoing mysteries. By the quality of their recording, they also set an early benchmark for the then burgeoning discipline of non-disturbance deepwater shipwreck analysis or archaeological survey by remote sensing. Remote-operated vehicles and manned submersibles, together with remote-sensing equipment such as magnetometers and side-scan sonar, are now commonplace in finding, examining, and analyzing wrecks. These and others following are characterized by what is essentially an expert "remote site analyst" or "archaeological surveyor" directing activities and operating at considerable distance from the wreck itself.

The 2008 examination of the WWII adversaries HSK *Kormoran* and HMAS *Sydney*, in over 2000 m of water off Shark Bay in Western Australia, led to a circumstance where the material evidence on the seabed became *the* essential factor leading to a forensically based resolution of the vast majority of the 67-year-old mysteries and controversies surrounding the battle. The archaeological evidence also helped attest to the veracity of the much-maligned German victor's report of where the battle took place and what occurred after the opening salvo. As an indication of the rapid development of both deepwater expertise and of 2D and 3D recording method in both shallow and deep water, these two wrecks were revisited in 2015 with astounding results. These include over half a million very high definition images and video which was the result of the simultaneous deployment of two ROVs acting in concert each fitted with a very large number of still and video cameras and a similar number of lights. Here for the first time, a series of electrochemical, biological, and other tests were able to be conducted by a large range of scientists on two modern wrecks, lying relatively close to each other and where variables such as date lost, salinity, oxygen levels, depth, marine life, etc. are controlled. Many samples, from the seabed and rusticles from each wreck, were recovered from both sites. Studies are ongoing and will appear in many technical journals (McCarthy 2016) (Fig. 4).

SubMarine Explorer (1864–c.1875) (Fig. 5) is subject to a large tidal range and is in a place where wrecks rarely survive due to their increased

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 4 Hunley conservator Paul Mardikian with H.L Hunley at the Warren Lasch Conservation Center. Photo Grace Beahm, Post & Courier (with permission)

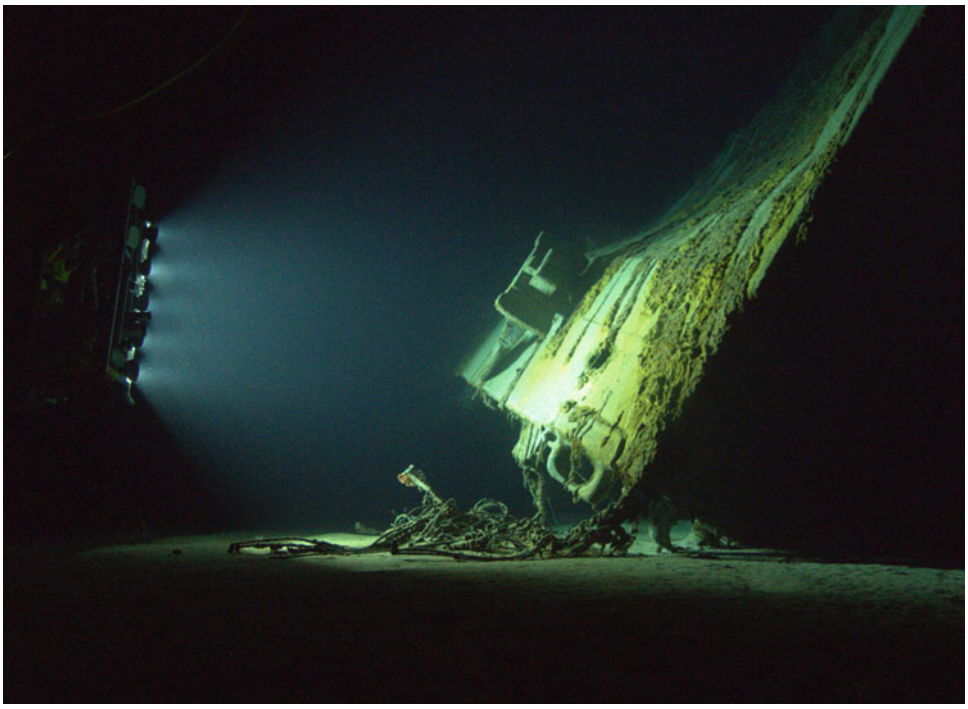

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 5 The inverted bow of HMAS Sydney. It is being lit by one ROV, photographed by the other and both are streaming video and still photographs from an array of 10 cameras

vulnerability to both natural and human forces. Intended as the Union reply to CSS *H. L. Hunley*, it was launched too late for the American Civil War and was sent to the Panamanian pearl fishery where after astounding successes, it was abandoned in the Pearl Islands and then lost to living memory. A limited excavation of the vessel's bilge and the detailed inspection and analysis of its internal configuration, fittings, and fixtures supplemented the relatively sparse detail found in the archives. This research led not only to the study of the development of the vessel and its groundbreaking submarine technology but also to a study of its builder, its people, and to those allied and associated matters that any investigating maritime archaeologist working in the historical and industrial period is invariably drawn subsequent (or prior) to an archaeological survey, site analysis, or excavation. In this instance, it was to metallurgy and iron founding: the American Civil War, German immigration into the USA, the ancient Panama pearl fishery, the unrecognized advent of the "bends" or decompression sickness in the underwater environment, and much more (see Delgado 2012). Though much had been written about these various subjects, more had been learned as a result of the *SubMarine Explorer* study. As was the case with *Xantho*, the anomalous remains on the seabed also led to the investigation of the role of an innovative entrepreneur and to a study of the premature use of technology in industry in a "frontier" setting. Of additional import, by virtue of the policy of social inclusion evident throughout the study, *SubMarine Explorer* has proved to be a catalyst for an enhanced Panamanian appreciation of their extensive modern maritime heritage post better-known Spanish-colonial and "pirate" eras.

Because those with iron and steel hulls are not affected by shipworm and because they are relatively recent, many modern wrecks often remain highly visible. For that reason, they have also become a major part of the world's wreck access programs, underwater "wreck trails," or "museum-without-walls" presentations, for example, the wartime wrecks of Coron Bay in the Philippines, Bikini Atoll, Chuuk (Truk Lagoon) in the Pacific, the Dry

Tortugas in Florida, Full Fathom Five National Marine Park in Canada, the many NOAA Sanctuaries, world heritage-listed Papahānaumokuākea National Monument, Rottnest Island in Australia, and Scapa Flow in Great Britain, to name a few of the better known. In heralding another important direction, there are many wrecks in flora and fauna sanctuaries, such as the marine parks mentioned above. Occasionally, as at SS *Omeo* (1858–1905), an individual wreck in very shallow water at Coogee near Fremantle has become the focus for the development of an underwater park with underwater sculptures and other attractions. At this and the many facilities mentioned above, the visitor is presented with interpretive (above and underwater) material both on site, on websites, and in social media (Fig. 6).

In many cases, the wrecks have become an educational "hook" or catalyst, in effect tools – educational transports – seamlessly leading the viewer into a greater appreciation of the history and events that transpired often into the underlying economics, technology, work practices at sea, entrepreneurial activity, society, and its mores. For the academic, there are also numerous anthropologically based studies into wrecks or a suite of wrecks of the modern era popular in some maritime archaeological circles (e.g., Gould 2010). These are also many examples of extensive site-specific analyses of the ubiquitous nineteenth-century sailing barques and ships, e.g., *Glamis* (1876–1913) in the Grand Cayman Islands, Jamaica (Ho 2004), and *Sepia* (1864–1898) off Fremantle. While the former concentrated on the technology, the history, and comparative studies, the latter focused on a limited test excavation designed to examine loading methods, colonial trade, and the survivability of cargo (Souter 2009). Over the course of many studies such as those mentioned above, commonalities were observed for iron and steel wrecks. One fundamental principle is what has become known as the "waterline theory of iron ship disintegration" illustrating that an upright iron or steel ship will invariably settle on a seabed of soft sediment down to the waterline (Riley 1988). A major manifestation of this phenomenon occurs in deep- and shallow-water "ship graveyards" into which many vessels that escaped wrecking or the ship-breaker were consigned. As a global phenomenon these provide an opportunity for a wide range of comparative studies and public interaction (Richards

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 6 SS *Omeo* a very popular wreck, now at the center of the Coogee Maritime Trail. WA Museum

2008). Not all are underwater. "The Purton Hulks," a group of around 80 wrecks, for example, lie along the banks of the River Severn surrounded by grass, all accessible by scholars and picnicking families, adults, and children alike. These are a prime example of the potential social, educational, and recreational value of the modern wreck.

Finally in progressing from the shallows and the shore, another significant development in modern ship archaeology and site analysis has been the increasing depths at which wrecks are being accessed by divers. As an example of this, at the 1985 practical and theoretical iron and steamship seminar held during the SS *Xantho* excavation, the deepest wreck described was but 30 m. At a follow-up seminar held two decades later, it was in excess of 100 m. This was due to the advent of "technical diving" (open-circuit mixed gas and closed-circuit rebreather) methods and their becoming commonplace across the globe. To an extent, this mirrors the arrival of the scuba tank on the recreational scene 30 years earlier – ushering in a new era in study, analysis, archaeological survey, excavation, conservation, and presentation of modern iron and steel ships. In utilising a combination of geophysics, including multibeam sonar, ROVs and technical divers to examine 76 shipwrecks including 22 vessel sunk during the Battle of Jutland in 1916, Innes McCartney and his teams have taken modern vessel archaeology to yet another level (McCartney 2016).

Cross-References

- ▶ Australia: Maritime Archaeology
- ▶ Canada: Cultural Heritage Management
- ▶ China: Museums
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation in Museums
- ▶ Cultural Heritage and the Public
- ▶ Deep-Water Archaeology
- ▶ Heritage Museums and the Public
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Maritime Landscapes
- ▶ Site Formation Processes
- ▶ Society of the Ship
- ▶ Television and Archaeology: Views from the UK and Beyond
- ▶ US National Park Service and World Heritage
- ▶ Volunteers in Archaeology
- ▶ War at Sea Archaeology

References

Anderson, R. 2009. The maritime archaeology of the intercolonial passenger steamship in Victoria. In *Iron, steel and steamship archaeology. Papers from the 2nd Australian seminar held in Perth, Melbourne and Sydney 2006*, ed. M. McCarthy et al., 152–158. Perth: W.A. Museum.

Bass, G.F., ed. 1972. *A history of seafaring based on underwater archaeology*. London: Thames and Hudson.

Broadwater, J.D. 2012. *USS monitor: A historic ship completes its final voyage*. College Station: Texas A&M University Press.

Delagado, J., T. Kerby, H.K. Van Tilburg, S. Prtice, O. Varmer, M.D. Cremer, and R. Matthews. 2016. *The lost submarines of Pearl Harbor: The rediscovery and archaeology of Japan's top-secret midget submarines of world war II*. College Station: Texas A&M University Press.

Delgado, J.P. 2012. *Misadventures of a civil war submarine: Iron, guns and pearls*. College Station: Texas A&M Press.

Foecke, T., L. Ma, M. Russell, and L. Murphy. 2010. Investigating archaeological site formation processes on the battleship USS *Arizona* using finite element analysis. *Journal of Archaeological Science* 37 (5): 1090–1101.

Ford, B. 2011. *The archaeology of maritime landscapes*. New York: Springer.

Gaur, A.S., K.H. Vora, S. Sundaresh, P. Tripati, P. Gudigar, and S.N. Bandodker. 1998. Exploitation of steam engine wrecks off Minicoy Island, Laksadsweep, India. *International Journal of Nautical Archaeology* 27 (3): 225–236.

Gould, R. 2010. *Archaeology and the social history of ships*. 2nd ed. London: Cambridge University Press.

Ho, B.S. 2004. An archaeological study of *Glamis*: The role of a 19th-century iron barque (Electronic Theses, Treatises and Dissertations. Paper 4022). Available at: http://diginole.lib.fsu.edu/etd/4022

Jeffery, W. 2006. A CRM approach in investigating the submerged world war II sites in Chuuk Lagoon. *Micronesian Journal of the Humanities and Social Sciences* 5 (1–2): 136–155.

MacLeod, I.D. 2016. Refining conservation treatments for Iron shipwrecks: Lessons learned from experiences with the USS *Monitor* (1862) and the SS *Xantho* (1872). *The Bulletin of the Australasian Institute for Maritime Archaeology* 40 (1): 39–50.

Mardikian, P., M. Drews, N. Gonzalez, P. Viviés, and J. Hunter. 2009. Searching for a diamond in the rust: A review of large-scale archaeological iron conservation projects, 1980–2006. In *Iron, steel and steamship archaeology. Papers from the 2nd Australian seminar held in Perth, Melbourne and Sydney 2006*, ed. M. McCarthy et al., 82–88. Perth: W.A. Museum.
McCarthy, M., ed. 2016. *From great depths: The wrecks of HMAS Sydney and HSK Kormoran*. Perth: WA Museum & UWA Press.
McCartney, I. 2016. Jutland 1916: the archaeology of a naval battlefield. London: Conway.
McCarthy, M. 2017. *Xantho and the Broadhursts*. Perth: Hesperian Press.
Muthucimnerana, R. 2007. SS *Conch* a wreck with a reputation. *AIMA Newsletter* 27 (2): 27–30 Available at: http://www.aima.iinet.net.au/publications/newsletters/docs/NLv27n2y08.pdf.
Richards, N. 2008. *Ships' graveyards: Abandoned watercraft and the archaeological site formation process*. Gainesville: University Press of Florida.
Riley, J. 1988. The waterline theory of iron ship disintegration. In *Iron ships and steam shipwrecks. Papers from the first Australian seminar on the management of iron vessels and steam shipwrecks*, ed. M. McCarthy, 191–197. Perth: W.A. Museum.
Souter, C. 2009. Archaeology of the iron barque: Stowage on the *Sepia*. In *Iron, steel and steamship archaeology. Papers from the 2nd Australian seminar held in Perth, Melbourne and Sydney 2006*, ed. M. McCarthy et al., 159–164. Perth: W.A. Museum.
Veth, P., and M. McCarthy. 2001. Types of explanation in maritime archaeology: the case of the SS *Xantho*. In *Maritime Archaeology in Australia: A reader*, ed. M. Staniforth and M. Hyde, 46–51. First published in AA Australian Archaeology, Number 48, 1999: 12–15.
Watts, G.P., Jr. 1975. The location and identification of the ironclad USS *Monitor*. *International Journal of Nautical Archaeology* 4 (2): 301–328.

Modern World: Historical Archaeology

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Introduction

Beginning in the 1990s, a number of historical archaeologists began using the term "the historical archaeology of the modern world" to define their research. Their use of this term was designed to refine the meaning of "historical archaeology" to refer to a specific topic of investigation, the archaeology of post-Columbian history, or sites dating to after about 1500 CE. Since then, the term has been used in at least two ways, as the archaeology of a particular period of history, and as an archaeology specifically designed to constitute a critique of modernity.

Definition

Scholars in diverse fields disagree about the precise meaning of "modernity," but when historical archaeologists write about it they typically mean the post-Columbian, or post-1500 CE world. Many historical archaeologists equate modernity with European expansionism beginning with the Portuguese and Spanish voyages of conquest and terminating at the present. This understanding, however, does not preclude the presence of "multiple modernities," the myriad sociocultural environments that may have had little or nothing to do with European interaction, but which existed in parallel with the European world.

The concept of an archaeology of the modern world developed in the 1970s because of two prominent definitions of historical archaeology. The first, offered by Robert Schuyler (1970: 84), defined "historic sites archaeology" (a specialized term then also used for historical archaeology) as "the material manifestations of the expansion of European culture into the non-European world starting in the fifteenth century and ending with industrialization or the present depending on local conditions." Shortly thereafter, James Deetz (1997: 5) provided a similar definition of historical archaeology: "the archaeology of the spread of European culture throughout the world since the fifteenth century and its impact on indigenous peoples." Some archaeologists today approach both definitions with caution believing that Schuyler and Deetz put too much emphasis on Europeans. They believe that the argument implicit in these definitions is that indigenous peoples only reacted to European culture, or, to state it differently, that the transference of objects and ideas was only one directional, from Europeans to indigenous peoples. Other

archaeologists believe to the contrary that the Schuyler/Deetz definitions highlight an important historical process that has affected the way the world has developed since Europeans began their global efforts to colonize, exploit, and control the non-European world.

The perspective that historical archaeology involves the investigation of the post-Columbian world, however, represents a narrow view of the field. A broader understanding is that historical archaeology includes all research that uses archaeological and historical sources of information in relatively equal proportions. These sources can include ethnographies, personal memories, ancient texts, inscriptions and drawings on walls, photographs, transcriptions of oral testimonies, and just about any other material that can provide information about past lived experience. This broader definition thus encompasses the research of Egyptian, classical, medieval, and other archaeologists who regularly employ non-excavated materials in their research. The broadness of this definition is confusing, however, because all archaeologists – even those studying precontact indigenous cultures – might be considered historical archaeologists because they regularly rely on the written works of other archaeologists, colonial missionaries and explorers, and professional field anthropologists to enrich their understanding of ancient ways of life. As a result, most archaeologists who self-identify as historical archaeologists tend to use the more narrow definition of their field, and concentrate their efforts on post-1500 CE history.

Two variants of the historical archaeology of the modern world developed as archaeologists became increasingly comfortable describing their research in terms of modernity. To avoid confusion, "global historical archaeology" may be used to refer specifically to post-Columbian historical archaeology that usually begins with contact situations that involved indigenous cultures and Europeans (e.g., Hall 2000). This kind of archaeology is most consistent with the Schulyer/Deetz definition. "Modern-world archaeology," on the other hand, is a term used to refer to an archaeological critique of modernity, largely focusing on the material and cultural manifestations of colonialism, capitalism, Eurocentrism, racialization, and other entwined processes that were practiced after about 1500 CE and which continue to affect the world's peoples today (Orser 1996).

A primary research topic of modern-world archaeology is the process of becoming modern, with the four processes noted above being a central focus. These four processes, which were put into operation in the world after 1500 CE – by various cultures and at different times – are tightly interlinked and coterminous. The conjunction of these processes provides both the unique character of the modern era and the rationale for investigating it using the multidisciplinary tools and approaches of historical archaeology.

Key Issues and Future Directions

Archaeologists of the modern world do not believe that historical archaeologists should ignore non-European peoples; such a position runs counter to the theoretical foundations of anthropological archaeology. Labeling the archaeology of the modern world Eurocentric – because of its concern with the power and reach of post-1500 CE European nation-states (including the United States) – is an inaccurate oversimplification.

Both global historical archaeology (defined by era of interest) and modern-world archaeology (defined by era and the critique of modernity) are concerned with the myriad linkages between past and present. An interest in the process of modernity, however framed, makes the archaeology of recent history relevant to scholars concerned with transnational geopolitics, global emancipation, and multicultural understanding.

One great potential of the archaeology of the modern world stems from the archaeologists' ability to conduct multiscalar analysis. Archaeologists can examine lived history at different scales because of the richness and diversity of the extant sources. The inspiration for this line of inquiry stems from the research of French historian Fernand Braudel (1972). Braudel saw history as involving three processes: short-term events (e.g., events, individuals; which he called *evenements*), medium-term structures (e.g., social and economic history, regions, worldviews;

conjonctures), and long-term structures (e.g., history of civilization, long-term trends; the *longue dureé*). These processes, though they have the appearance of relating only to time, also have significant spatial meaning. The examination of the short term might involve specific individuals and unique events, but these individuals and events had to occur within discrete physical settings. Given this materiality, Braudel's concepts thus have tremendous application to the archaeology of the modern world. The excavation of a house foundation and yard inhabited by a specific person or family might constitute the short term, and the medium term might involve a broader analysis of the neighborhood during the time the family occupied the dwelling. The *longue dureé* might involve an analysis of the entire historical era into which the family – and people like them – operated. To use the enslavement of Africans as an example, the short term could be the excavation of a cabin site on a colonial plantation in Jamaica, the medium term could be the analysis of the slave regime on the island, and the *longue dureé* might involve the entire history of African enslavement in the British Atlantic world.

Globalization is one topic that is especially amenable to analysis as part of the archaeology of the modern world. Globalization is a huge subject with myriad definitions, but one easy way to envision it is as "a state of the world involving networks of interdependence at multicontinental distances. The linkages occur through flows and influences of capital and goods, information and ideas, and people and forces, as well as environmentally and biologically relevant substances (such as acid rain or pathogens)" (Keohane and Nye 2000: 105). This definition stresses two key elements. It promotes the idea of multiscalar analysis because the various linkages have local, regional, and transcontinental expressions. At the same time, the definition does not denigrate the large-scale networks of interaction that existed before 1500 CE, but simply argues that modern-era globalization was enacted on a scale that linked together vastly different peoples across huge distances. These cultures would never have been in contact without globalization. The definition also creates space for the analysis of environmental degradation and biological change in the analysis, topics that have had archaeological significance for years and which continue to have profound importance today. The addition of contagion is especially important for post-Columbian history because it creates space to investigate the transference of disease as a result of cultural contact.

Archaeologists can investigate modern globalization using diverse sources of information. Most pointedly they can employ their special skills in excavation and artifact analysis, modes of investigation not available to scholars in other disciplines. Much archaeological research will undoubtedly concentrate on the local recontextualizations of introduced material objects as part of a process called glocalization.

Glocalization refers to "the interpenetration of the global and the local resulting in unique outcomes in different geographic areas" (Ritzer 2003: 192). Glocalization is a process well studied by cultural anthropologists, and an awareness of the process in archaeology has led to the writing of "alternate histories" of the modern world, histories that can be used to promote human rights, cultural awareness, and sensitivity to the wishes and worldviews of people throughout the world.

Archaeologists of the modern world are uniquely situated to examine the historical and material roots of globalization and glocalization using their unique sources, including excavated artifacts, information revealed in buried structures, and a diverse range of textual materials. They can chart the initiation, growth, and eventual termination of cultural interactions in the post-1500 CE world using Braudel's ideas about space and time as a starting point. Through this research, archaeologists of the modern world can learn about our own times and gain fuller understandings of their historical and cultural roots.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Ceramics: Colonoware
- ▶ Ceramics: European Cream to Whitewares in the USA
- ▶ Ceramics: Majolica in Colonial Latin America

▶ Ceramics: Scientific Analysis
▶ Ceramics: Stonewares
▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
▶ Clay Pipes in Historical Archaeology
▶ Colonial Encounters, Archaeology of
▶ Consumption, Archaeology of
▶ Critical Historical Archaeology
▶ Decolonization in Archaeological Theory
▶ Estate Landscapes in Historical Archaeology
▶ Farmsteads and Rural Life in the United States, Archaeology of
▶ Historical Archaeology
▶ Industrial Archaeology
▶ Labor Archaeology
▶ Maritime Historic Site Management for the Public
▶ Maritime History
▶ Material Culture and Education in Archaeology
▶ Mission Archaeology in North America
▶ Modern Material Culture, Archaeology of
▶ Nationalism and Archaeology
▶ New Spain: Forts and Transport Archaeology
▶ Plantation Archaeology
▶ Postcolonial Archaeologies
▶ Post-Medieval Archaeology
▶ Race in Archaeology
▶ Social Memory in Archaeological Theory
▶ World-Systems Analysis

References

Braudel, F. 1972. The Mediterranean and the Mediterranean world in the age of Philip II. Translated by S. Reynolds. London: Collins.

Deetz, J. 1997. *In small things forgotten: The archaeology of early American life*. Garden City: Anchor Press/Doubleday.

Hall, M. 2000. *Archaeology and the modern world: Colonial transcripts in South Africa and the Chesapeake*. London: Routledge.

Keohane, R.O., and J.S. Nye Jr. 2000. Globalization: What's new? what's not? (and so what?). *Foreign Policy* 118: 104–119.

Orser, C.E., Jr. 1996. *A historical archaeology of the modern world*. New York: Plenum.

Ritzer, G. 2003. The globalization of nothing. *SAIS Review of International Affairs* 23: 189–200.

Schuyler, R.L. 1970. Historical archaeology and historic sites archaeology as anthropology: Basic definitions and relationships. *Historical Archaeology* 4: 83–89.

Molluscs (Invertebrates): Analyses in Environmental Archaeology

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Introduction

Due to their variable but generally high inorganic content, shells of the phylum Mollusca constitute one of the most durable categories of biogenic finds in the global archaeological record. Mollusc shells are omnipresent and often highly visible in the archaeological contexts across the globe, with the rare exception of wet-preserved contents of acidic bog contexts. The nature and quantity of archaeological mollusc shells vary tremendously among sites, chronological periods, and geographic areas, from 125 ka BP sites associated with early modern humans in eastern Africa (Stinger 2000) to elaborate ornaments from Pre-Columbian Colombia (Carvajal-Contreras 2011). Depending on the geographic area and research question, investigations may focus on molluscs of terrestrial, freshwater, or marine origin, and they may focus on molluscs that were exploited as food resource or as raw material in artifact manufacture. Because mollusc shells archive changes in their ambient environment as they grow incrementally (Richardson 2001), archaeological mollusc shells can become subjects of independent or integrated studies of paleoenvironmental conditions.

Definition

The analysis of mollusc remains from archaeological contexts is an integral part of environmental archaeology and zooarchaeology. Both human-modified and naturally occurring mollusc remains can be subject to molluscan analysis in archaeology. The nature of archaeological mollusc evidence can be alternatively classified in terms of different molluscan taxa and habitats.

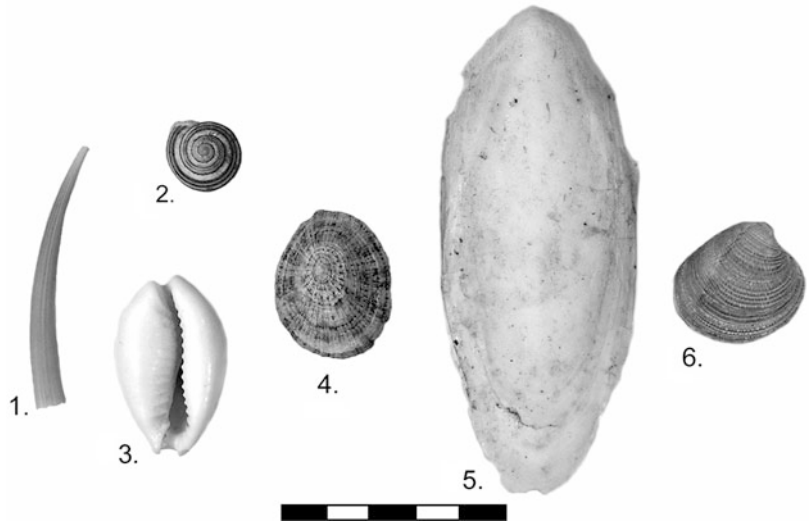

Molluscs (Invertebrates): Analyses in Environmental Archaeology, Fig. 1 Examples of mollusc shells that occur frequently in archaeological contexts (1) Scaphopoda, *Dentalium* shell; (2) Gastropoda, terrestrial (land) snail; (3) Gastropoda, Cypraeidae, "cowrie shell"; (4) Gastropoda, *Patella rustica*; (5) Cephalopoda, *Sepia* sp., "cuttlefish bone"; (6) Bivalvia, *Chamelea gallina*

Archaeological molluscs of terrestrial origin consist of gastropods and are colloquially dubbed as land snails. Molluscs originating from marine environments mainly comprise both gastropods (e.g., whelks, topshells, limpets) and bivalves (e.g., clams, oysters), but remains of other classes of marine molluscs such as cephalopods (typically cuttlefish bones) and scaphopods (typically *Dentalium* shells) may also occur commonly in certain contexts (Fig. 1). Artifacts made of molluscs, molluscs that represent food, and naturally occurring molluscs are usually handled separately from each other.

The study of archaeological mollusc shells is increasingly commonly referred to as "archaeomalacology" since the beginning of the twenty-first century (Bar-Yosef Mayer 2005; Çakırlar 2011). The analysis of mollusc shells tackle a seemingly unlimited range of anthropological and paleoenvironmental issues (Claassen 1998). Analytical methods of archaeomalacology include taxonomic identification, sclerochronology (incremental analysis), taphonomy, biometry, quantitative estimations of abundance, ubiquity, dietary contribution, and habitat construction, as well as experimental archaeology of artifact technology and ethnoarchaeology. Common themes in the study of archaeological molluscs include dietary reconstruction, long-distance contact, artifact technology and use, symbolic uses of shells pertaining to belief systems and representation of socioeconomic class and status, industrial activities, seasonality of food acquisition, and human exploitation pressure on marine ecosystems. Theoretical approaches to archaeomalacology have been largely dominated by optimal foraging concepts on the one hand and culture-historical approaches on the other.

Historical Background

The study of archaeological molluscs has developed as a distinct field within environmental archaeology (Brothwell and Higgs 1969) and zooarchaeology (Grigson and Clutton-Brock 1984). J. Evans' work on land snails in the context of British archaeology has played a key role in the recognition of mollusc remains as a source of paleoenvironmental information in the UK (Evans 1972). With the rise of Middle-Range Theory in archaeology and New Archaeology, the field developed rapidly in North America, focusing mostly on developing methods to decipher the meaning of gigantic masses of mollusc remains in coastal shell remains for post-Pleistocene adaptations of hunter-gatherer-fisher groups. The historically important study of Ertebølle culture in prehistoric northwestern Europe has also benefited from these

international developments in terms of the methodological aspects pertaining to related molluscan evidence.

One landmark in the history of archaeological mollusc analysis is a pilot study that used the light stable isotopic (carbon and oxygen) compositions of archaeological *Cerastoderma glaucum* (lagoon cockle) incremental biocarbonate in estimating shellfish gathering seasonality (Shackleton 1970). Further methodological advancements in applications of sclerochronology (analysis of ontogenic incremental shell patterning) and shell ecomorphology – relating shell size and shape to molluscan habitats – continue to contribute to the methodological development of the field (Michel et al. 1992).

Key Issues/Current Debates

Studies of archaeological mollusc shells contribute to current debates concerning a number of key issues in archaeology, ranging from the evolution of shared symbolism in recent species of *Homo* (e.g., D'Errico et al. 2005) to the reconstruction of past human impact on marine resources to serve as a baseline for conservation efforts (Marelli and Arnold 2001).

Some of the most tangible lines of archaeological evidence related to the biological and cognitive evolution of recent *Homo* sub/species occur in the form of mollusc shells. Perforated *Nassarius* shells from human encampments dating back to c. 80,000 years ago constitute some of the earliest ornaments used by humans in Africa (D'Errico et al. 2005). The anthropogenic origin of the perforations was established by experimental work on modern shells. Taphonomic observations using SEM microscopy showed use wear, indicating that perforated objects were strung and probably worn as personal ornaments. Recent well-dated finds indicate that Neanderthals in Europe also manufactured and used perforated and ochre-dyed marine molluscs (Zilhão et al. 2010). The power of such studies in convincing others to see the tangible imprints of hominid symbolism comes from their vigorous use of combined actualistic and stratigraphic research. Experimental work and comparative SEM studies of results have also been of great use in reconstructing the manufacture process and utilization of mollusc shell objects of symbolic value in more recent periods, for example, in aboriginal Australia (Szabó et al. 2007).

Although claims about the significance of the role that marine molluscs played as a food resource during *Homo sapiens*' dispersal out of Africa – together with other marine food resources enabling them to explore coastal routes – have sparked some attention (Stinger 2000), for the time being, evidence for intensive exploitation of molluscs by early modern humans can only be substantiated for the later Palaeolithic phases in Southern Africa (Middle Stone Age, c. 50 ka BP) (Klein et al. 2004). Intensive exploitation of marine molluscs, however, does not become evident until the widespread appearance of shell middens during the Late Pleistocene and Early Holocene on almost all coasts of the world, from Japan to Denmark and Peru (Waselkow 1987). Despite the amplitude and ubiquity of mollusc remains at these and subsequently formed shell middens, whether molluscs constituted, in simplest terms, a dietary staple or supplement for coastal groups who occupied them is still debated (Fa 2008).

The various methods developed to assess the dietary role of molluscs for past human groups, as well as other issues pertaining to shell midden archaeology, such as site duration and seasonality, have also been received with mixed criticism and praise. For example, Claassen (1998: 49) has called for caution toward the common use of decrease in mean shell size as a proxy for declining survivorship in mollusc populations due to human exploitation, arguing that the method dismisses other factors – including pressure from predators other than humans – as potential causes for changes in shell size. Similar debates on methodology have gradually led to the advancement of the analytical procedures used to investigate archaeological molluscs, leading to the more common integration of actualistic research on geographically coherent modern mollusc populations as a means of modeling past human behavior relating to shellfish use.

Molluscs (Invertebrates): Analyses in Environmental Archaeology, Fig. 2 A sample of crushed *Hexaplex trunculus* (Muricidae) snails from Late Bronze Age Troy. The shells are crushed in the process of dye manufacture

Other lines of actualistic research, such as ethnographic observations of forager groups, have greatly added to our understanding of the formation of mollusc evidence (Meehan 1982). To these, we can add the contribution of experiments conducted by Ruscillo (2005) that shed light on the formation of the mollusc evidence in detecting origins and scale of a dye industry in the Mediterranean region that used the purple substance secreted by Muricid snails' hypobranchial gland as raw material (Fig. 2). The so-called murex or purple dye industry is mentioned in the Old Testament and by Classical authors. The antiquity and nature of ancient dye manufacture using Muricid snails is a frequently visited issue also in South American archaeology.

International Perspectives

Current international research on archaeological molluscs can be summarized into three broad categories: scholarship that focuses on archaeological molluscs as artifacts, molluscs as dietary remains, and molluscs as climatic archives. While artifacts made of molluscs tend to receive more scholarly attention in parts of the world where molluscs played a more visible role in the symbolic world of past cultural groups (e.g., Pre-Columbian Meso-America), in other parts of the world where shell middens are abundant (e.g., Denmark, Japan, California), archaeological molluscs are commonly investigated to test hypotheses relating to the adaptations of hunter-forager groups. Studies that consider the role of molluscs as a food resource in past farmer-herder societies are significantly less common. In studies of post-Neolithic, sedentary societies, mollusc remains (sometimes including fossil molluscs) are commonly used to map long-distance exchange patterns (e.g., Red Sea shells in Bronze Age Mesopotamia), ritual behavior (e.g., mollusc shells adorning the dead), symbolism, and artifact technology. If the variability of the prominence of these two research foci is in part determined by the nature of evidence that varies from one region to the other, it is also in large part dictated by dominant regional academic traditions. Although the exploration of archaeological molluscs, especially land snails, as vessels of past environmental conditions has left a significant impact on the archaeological traditions of some countries like the UK (Evans 1972), this resource has gone almost completely unnoticed in others.

The Archaeomalacology Working Group of the International Council for Archaeozoology (ICAZ) has been fundamentally instrumental in bringing together the multiplicity of international perspectives since its establishment in 2002. Admittedly, proceedings and newsletters of the group (Bar-Yosef Mayer 2005; Çakırlar 2011) testify to its limited success in embracing shell midden and sclerochronological research.

Future Directions

The field of sclerochronology has witnessed a huge leap forward in the recent decade (Schöne and Gillikin 2013), but it unfortunately remains almost entirely unrelated to anthropological (primarily forager behavior) and paleoenvironmental research encapsulated by archaeomalacology. The next decade will hopefully bring along effective communication between

archaeomalacology and sclerochronology that will create important opportunities for application in both fields. For the advancement of the analysis of mollusc artifacts, there is ample room toward the under-explored sources of ethnography and use-wear studies. The archaeology of mollusc remains would also benefit from more effective integration with ichthyoarchaeology especially in forming firm baselines for research in conservation biology.

The above-mentioned lines of research, with their differing foci on artifactual mollusc remains, dietary mollusc remains, and mollusc remains as paleoenvironmental proxies, are likely to prevail and progress as largely independent specializations. At the same time, recent studies give clues toward the likelihood that greater shared ground is to be found across the existing "subdisciplines" with interest in archaeological molluscs. This is evident, on the one hand, in the greater emphasis put on the biological and environmental properties of worked and used shells, and in the attention paid to the taphonomy of mollusc remains considered to represent dietary activities on the other, leading to better understandings of, for example, site formation processes. Such developments can only be beneficial for the progress of the field as a whole.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Biometry in Zooarchaeology
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Ethnoarchaeology
- ▶ Experimental Maritime Archaeology
- ▶ Human Impacts on Ancient Marine Ecosystems
- ▶ International Council for Archaeozoology (ICAZ)
- ▶ Middle-Range Theory in Archaeology
- ▶ Molluscs (Isotopes): Analyses in Environmental Archaeology
- ▶ New Archaeology, Development of
- ▶ Taphonomy: Definition
- ▶ Zooarchaeology

References

Bar-Yosef Mayer, D., ed. 2005. *Archaeomalacology: Mollusks in former environments of human behavior. Proceedings of the 9th ICAZ Conference in Durham, 2002*. Oxford: Oxbow Books.

Brothwell, D., and E.S. Higgs, eds. 1969. *Science in archaeology*. London: Thames and Hudson.

Çakirlar, C., ed. 2011. *Archaeomalacology revisited: Non-dietary use of molluscs in archaeological settings. Proceedings of the archaeomalacology sessions at the 10th ICAZ Conference, Mexico City, 2006*. Oxford: Oxbow Books.

Carvajal-Contreras, D. 2011. Shell artefacts from the Gold Museum in Colombia: A view from the intermediate area. In *Archaeomalacology revisited: Non-dietary use of molluscs in archaeological settings. Proceedings of the archaeomalacology sessions at the 10th ICAZ Conference, Mexico City, 2006*, ed. C. Çakırlar, 19–29. Oxford: Oxbow Books.

Claassen, C. 1998. *Shells*, Cambridge Manuals in Archaeology. Cambridge: Cambridge University Press.

D'Eerrico, F., et al. 2005. *Nassarius kraussianus* shell beads from Blombos Cave: Evidence for symbolic behaviour in the Middle Stone Age. *Journal of Human Evolution* 48 (1): 3–24.

Evans, J.G. 1972. *Land snails in archaeology with special reference to the British Isles*. London: Seminar.

Fa, D.A. 2008. Effects of tidal amplitude on intertidal resource availability and dispersal pressure in prehistoric human coastal populations: The Mediterranean-Atlantic transition. *Quaternary Science Reviews* 27: 2194–2209.

Grigson, C., and J. Clutton-Brock, eds. 1984. *Shell middens, fishes, and birds*, Animals in Archaeology 2, British Archaeological Reports International series 227. Oxford: Archaeopress.

Klein, R.G., G. Avery, K. Cruz-Uribe, D. Halkett, J.E. Parkington, T. Steele, T.P. Volman, and R. Yates. 2004. The Ysterfontein 1 Middle Stone Age site, South Africa, and early human exploitation of coastal resources. *Proceedings of the National Academy of Sciences of the United States of America* 101 (16): 5708–5715.

Marelli, D.C., and W.S. Arnold. 2001. Shell morphologies of bay scallops, *Argopecten irradians*, from extant and prehistoric populations from the Florida Gulf coast: Implications for the biology of past and present metapopulations. *Journal of Archaeological Science* 28: 577–586.

Meehan, B. 1982. *Shell bed to shell midden*. Canberra: Australian Institute for Aboriginal Studies Press.

Michel, R., J. Lazar, and P. Mcgovern. 1992. Indigoid dyes in Peruvian and Coptic textiles of the University Museum of Archaeology and Anthropology. *Archaeomaterials* 6: 69–83.

Richardson, C.A. 2001. Molluscs as archives of environmental change. *Oceanography and Marine Biology. Annual Review* 39: 103–164.

Ruscillo, D. 2005. Reconstructing Murex royal purple and Biblical blue in the Aegean. In *Archaeomalacology: Molluscs in former environments of human behaviour. Proceedings of the 9th ICAZ Conference, Durham 2002*, ed. D. Bar-Yosef Mayer, 99–106. Oxford: Oxbow Books.

Schöne, B.R., and D.P. Gillikin. 2013. Unravelling environmental histories from skeletal diaries – Advances in sclerochronology. *Palaeogeograpy, Palaeoclimatology, Palaeoecology.* https://doi.org/10.1016/j.palaeo.2012.11.026.

Shackleton, N.J. 1970. Stable isotope study of the palaeoenvironment of Nea Nikomedeia, Greece. *Nature* 227: 943–944.

Stinger, C. 2000. Coasting out of Africa. *Nature* 405: 24–26.

Szabó, K., A. Brumm, and P. Bellwood. 2007. Shell artifact production at 32,000–28,000 BP in Island Southeast Asia. *Current Anthropology* 48 (5): 701–723.

Waselkow, G.A. 1987. Shellfish gathering and shell midden archaeology. *Advances in Archaeological Method and Theory* 10: 93–210.

Zilhão, J., D.E. Angelucci, E. Badal- García, F. D'Errico, F. Daniel, L. Dayet, and J. Zapata. 2010. Symbolic use of marine shells and mineral pigments by Iberian Neandertals. *Proceedings of the National Academy of Sciences* 107 (3): 1023–1028.

Molluscs (Isotopes): Analyses in Environmental Archaeology

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Introduction

Mollusc shells are a common component of many archaeological assemblages. Archaeological mollusc shell accumulations are typically the result of food refuse and may be present within a settlement or as a midden nearby. Mollusc-based artifacts such as shell scrapers and shell beads have also been found in sites from Paleolithic to recent times in many geographic areas. However, some terrestrial mollusc shells may be present in archaeological assemblages even though humans did not actively collect them. Studying the chemistry of shells from archaeological assemblages provides a means to study paleoclimate and paleoenvironmental change that is directly correlated to human activity. Shell chemistry of the final growth increments can also yield information on the seasons in which the shells were harvested. Incorporating climate and seasonality studies within archaeological investigations provides insight on how humans interacted with their environment. Stable oxygen isotope analysis is one of the most common geochemical techniques applied to the analysis of archaeological shells and will be the primary focus of this review.

Definition

The Phylum Mollusca

The Mollusca are a phylum of soft-bodied invertebrates whose bodies are often protected by shells composed of calcium carbonate (either calcite or aragonite). Gastropod and bivalve shells are the most commonly preserved mollusc remains in archaeological sites. Both live in marine, freshwater, and estuarine environments, while gastropods also live in terrestrial environments. The usefulness of mollusc shells as high-resolution environmental archives stems from their shell's incremental growth patterns. Bivalve bodies are encased by a shell consisting of two valves, joined by a hinge. The shells grow by depositing successive increments of calcium carbonate from the umbo to the ventral margin (Fig. 1). Gastropods are encased within a shell, which is often coiled. The shell grows by depositing calcium carbonate growth increments from the apex to the shell lip (Fig. 2).

Molluscs generally precipitate their shells in equilibrium with surrounding ambient environmental conditions. Therefore, the physical and chemical properties of mollusc growth increments record changes in the mollusc's ambient environment during growth. Depending on shell growth rates, high-resolution sampling of these shells can yield environmental information from decadal to

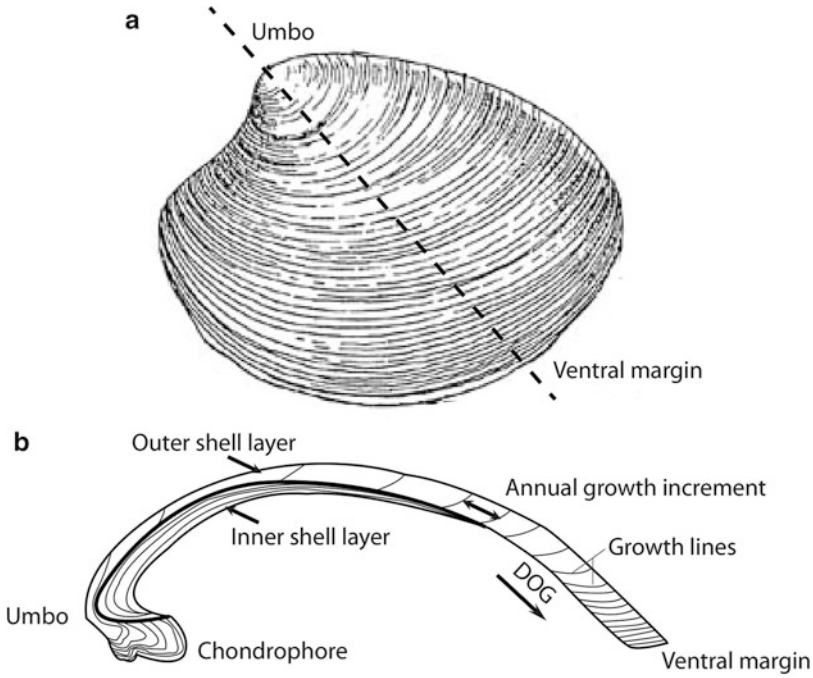

Molluscs (Isotopes): Analyses in Environmental Archaeology, Fig. 1 Idealized morphology of a bivalve shell. The dashed line in (**a**) shows the location of the cross section in (**b**). *DOG* direction of growth

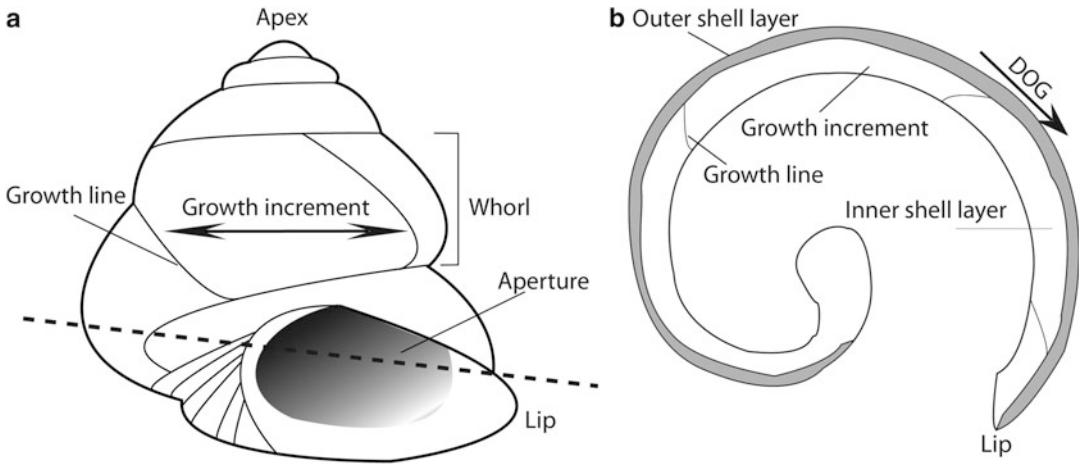

Molluscs (Isotopes): Analyses in Environmental Archaeology, Fig. 2 (**a**) Idealized external morphology of a coiled gastropod shell. The dashed line in (**a**) shows the location of the cross section in (**b**). *DOG* direction of growth

subdaily timescales. Short-lived species can record seasonality and weather extremes, and long-lived species can record decadal- to centennial-scale climatic oscillations.

Molluscs are widely distributed in varied environments and are abundant from the tropics to the poles. This offers the potential for high-resolution time series analyses from almost every geographic region. Many other quaternary environmental proxies such as ice cores and marine sediment cores are limited in their geographical extent and temporal resolution.

Stable Isotopes

Isotopes are atoms of the same chemical element that have the same number of protons (thus the same atomic number) but different numbers of neutrons (thus different atomic masses). Stable isotopes have nuclei that do not decay to form other isotopes. Chemically, all isotopes of the same element behave identically. However, due to their differences in atomic weight, the lighter isotopes have different kinetic properties, causing them to respond at different rates during biological and geochemical processes. In "light" stable isotopes with low atomic masses, the differences in weight between the isotopes are large enough for physical, chemical, and biological processes to cause fractionation whereby the ratio of heavy to light isotopes in the system changes. Oxygen is the most routinely studied stable isotope in archaeological mollusc shells. It has three stable isotopes ^{16}O, ^{17}O, and ^{18}O. The application of oxygen isotope analysis to mollusc shells uses the ratio of ^{16}O to ^{18}O. As the differences in natural abundances of stable isotopes are usually very small, the ratio of heavy to light isotopes is measured with reference to the isotope ratio in an international standard in delta (δ) notation:

$$\delta X = R_{sample} - R_{standard}/R_{standard} - 1 \times 1000$$

X = the heavy isotope and R = the ratio of heavy to light isotope. Measurements are expressed in parts per mil (‰).

If δX is more positive, the sample has a higher ratio of heavy to light isotopes than the standard.

Oxygen Isotopes in Marine Shells

The isotopic composition of marine shell is controlled by water temperature and the isotopic composition of seawater (Kennett and Voorhies 1996). In modern marine environments in mid-to high latitudes, the role of evaporation and rainfall on the overall isotopic composition of seawater is negligible, making sea surface temperature (SST) the primary fractionation factor (Fig. 3). Warmer temperatures enrich ^{16}O relative to ^{18}O, to generate isotopically negative signatures, while cooler temperatures produce positive signatures. In these temperature-dominated systems, $\delta^{18}O$ amplitude (the difference between maximum and minimum isotopic values) records the range of seasonal water temperature fluctuations experienced by a mollusc during growth. The relationship between shell $\delta^{18}O$, water $\delta^{18}O$, and sea surface temperature has been expressed in several equations, so $\delta^{18}O$ in shells can be used to quantitatively reconstruct sea surface temperature regimes of the past (e.g., Dettman et al. 1999). In tropical regions, interannual temperature changes are minimal, so $\delta^{18}O$ of mollusc shells can be used to reconstruct paleo-$\delta^{18}O$ of the water, which is mainly controlled by the amount and composition of rainfall. In such regions, $\delta^{18}O$ can be used to reconstruct precipitation and monsoon regimes.

Oxygen-Stable Isotopes in Terrestrial Molluscs

Oxygen isotope ratios of terrestrial mollusc shells provide a record of continental climatic conditions. In terrestrial shells, the water ingested by the snails principally controls $\delta^{18}O$. However, due to the variability in the oxygen isotope composition of the environmental water consumed by the snails, there is no worldwide correlation between snail shell $\delta^{18}O$ and a single environmental variable (see Zanchetta et al. 2005 for a review of recent studies): in humid regions at lower latitudes, meteoric water or precipitation tends to dominate the signal, while at higher latitudes in more temperate climates, temperature and humidity are the primary variables. Isotopic signatures of land snails from archaeological contexts should be validated in relation to a thorough assessment of isotopic data from live-collected snails of the same or similar species from a similar geographic range and within the expected foraging range of the archaeological site or under experimentally controlled conditions, to provide a baseline for the interpretation of the paleoenvironmental and archaeological data.

Oxygen Isotopes in Estuarine Shells

The mixing between marine and freshwater complicates the interpretation of stable isotope ratios in estuarine shells. In estuarine environments, oxygen isotopes and shell growth may be

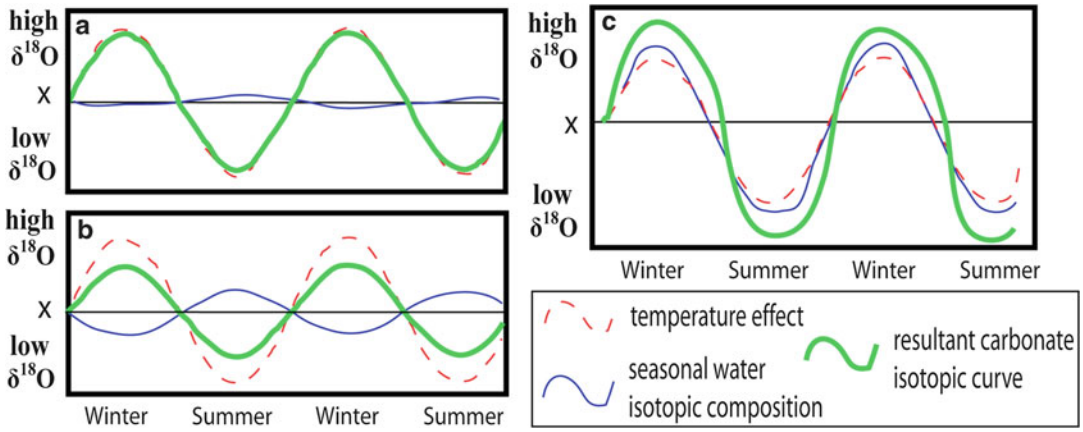

Molluscs (Isotopes): Analyses in Environmental Archaeology, Fig. 3 Simple models of seasonal change in shell $\delta^{18}O$ expressed as a deviation from a mean value (X). Temperature is identical in **a**, **b**, and **c**. (**a**): Change in water composition is negligible and temperature is the principal fractionation factor, so the isotope curve closely follows the temperature effect; (**b**): change in water composition is larger. This could be caused by increased summer evaporation or heavier seasonal precipitation; (**c**): higher amplitudes in negative seasonal precipitation combine with temperature to create larger amplitudes in the resultant carbonate isotopic curve (Modified from Dettman and Lohmann 1993)

differently affected by factors such as turbidity, temperature, and salinity variations. In tropical regions, where temperature remains more constant throughout the year, oxygen isotopes from estuarine shells can be used to detect salinity changes from freshwater inputs including changes in paleorainfall/paleomonsoon and seasonal variations in runoff (e.g., Kennett and Voorhies 1996). Outside of the tropics the situation is more complicated as both temperature and salinity variation can differently affect the oxygen isotope record (Fig. 3).

Oxygen Isotopes in Freshwater Shells

Freshwater molluscs present a greater challenge for interpretation than marine molluscs, as the oxygen isotope ratios preserved within shell carbonate preserve evidence of various environmental effects. The $\delta^{18}O$ composition of the ambient freshwater can vary significantly with changes in evaporation and precipitation (e.g., Fritz and Poplawski 1974). In lakes with closed catchments and long water residence time, the local precipitation-evaporation balance is likely to be the controlling parameter on water $\delta^{18}O$ composition. By contrast the controlling parameters in lakes with open catchments and low water residence time are likely to be precipitation $\delta^{18}O$ and/or temperature. In river and lake systems, high evaporation results in more positive $\delta^{18}O$. This has the effect of reducing the seasonal amplitude signal (Fig. 3). River systems may be enriched along their flow paths with isotopically heavy or light rainwater, which will either dampen or heighten the amplitude signatures of the shell (Fig. 3). In order to apply $\delta^{18}O$ analysis for paleoclimatic reconstructions in freshwater systems, a thorough study of modern populations of the proxy species is necessary in order to interpret the paleorecord.

Historical Background

Urey (1947) was the first to reveal that the oxygen isotope composition of biogenic carbonate is temperature dependant, showing that variations in the temperature of the water from which the carbonate was precipitated should lead to predictable variations in the $\delta^{18}O$ ratios of the carbonate. Soon after, Epstein et al. (1951) formulated an empirical paleotemperature equation based on isotopic analyses of molluscs with known growth temperatures.

Season of Collection

The initial focus of stable oxygen isotope analysis on archaeological mollusc shells was on determining the season of shell collection. Shackleton (1973) was the first to recognize that the $\delta^{18}O$ value of the last deposited growth increment reflects the environmental conditions at the time of the animal's death. Season of collection analysis is possible when a primary variable affects the stable isotope composition of the shell. For example, in tropical marine settings, water temperature is fairly constant but $\delta^{18}O$ of the water is affected on a seasonal basis by the $\delta^{18}O$ composition and amount of rainfall. In temperate marine settings, water $\delta^{18}O$ is fairly constant so $\delta^{18}O$ in mollusc shells is primarily influenced by sea surface temperature. Season of collection information is useful for archaeologists because in midden shells, death occurred due to collection by ancient human foragers. Seasonal patterns of shellfish collection bear directly upon interpretations of site use and subsistence behavior, providing important data to aid analyses of foraging practices from the archaeological record. Shellfish season of collection data can be combined with other archaeological data to gain a more complete picture of site use patterns.

These methods have been successfully applied in marine, freshwater, and estuarine environments around the world. In earlier studies, there was debate over the temporal resolution that could be obtained from shell-edge $\delta^{18}O$ values. Killingley (1981) contended that monthly resolution was possible, while Bailey et al. (1983) suggested that only seasonal resolution could be attained. More recently, there has been a growing awareness of the importance of modern validation studies on the proxy species in habitats close to the archaeological study site to understand how factors such as seasonal or ontogenetic variability in growth rates may affect the sample resolution in different environments and latitudes (e.g., Mannino et al. 2003).

The number of samples analyzed in archaeological season of collection studies must balance the need to analyze enough shells per archaeological context to detect meaningful foraging patterns with the need to characterize the pattern of growth to accurately determine season of collection (Mannino et al. 2003). Measuring only the outermost growth increment allows many shells to be characterized using minimal analyses. This strategy works well to identify seasonal extremes (summer and winter); however, it is more difficult to disentangle signatures from shells collected during transitional conditions (autumn and spring). Sequential analyses covering a year or more of shell growth allow more accurate determination of season of shell collection but require many samples from a single shell, so limit the number of individual shells that can be analyzed. Recent studies have suggested a medium between these two extremes whereby the pattern of stable isotope variation of three or four sequential samples inward from the outermost growing edge can accurately illustrate season of death (Mannino et al. 2003).

Paleoclimate

Mollusc shell chemistry provides an archive of climatic and environmental data. Oxygen isotope records from archaeological mollusc shells allow us to study how humans responded to changing climatic regimes in the past. Emiliani et al. (1964) were the first to apply oxygen isotope analyses to archaeological shells to reconstruct paleoclimate. They studied limpets and top shells from Haua Fteah in Libya and Arene Candide in Italy and identified late Quaternary climatic oscillations that correlated with regional Mediterranean climate records.

Most early applications of stable isotope analysis on mollusc shells focused on grinding up whole shells for bulk analyses to obtain average annual climate records (e.g., Mook 1971). Innovations in mass spectrometry and reductions in analysis costs allowed smaller sample sizes to be analyzed, permitting more routine subsampling of shells to obtain series analyses within a single shell.

Recently, there has been a shift toward combining records of shell growth and geochemistry in order to obtain highly detailed time-resolved records of climate and environment. This research comes under the umbrella of sclerochronology,

the study of the physical and chemical variations in the accretionary hard parts of organisms. The time span and resolution that can be obtained for climate records from mollusc shell growth increments depends upon on the sampling method used, the growth rates, and the longevity of the shell. The majority of molluscs exploited by humans have life spans typically less than 10 years. Subsamples from short-lived species produce subseasonally resolved snapshots of the amplitude of the seasonal cycle at the time of shell growth.

In the last decade, highly detailed long-term climate records have been obtained from long-lived bivalve species such as *Arctica islandica* which can live for over 500 years. These slower-growing molluscs can provide annual to decadal records of climate change which may allow identification of climate cycles such as the North Atlantic Oscillation (NAO) as well as long-term climatic oscillations such as Dansgaard/Oeschger cycles throughout the late Pleistocene. Cross-dating techniques, where the individual histories of several shells can be aligned chronologically based on overlaps in their periods of shell growth, allow the reconstruction of longer time series of environmental change. For example, cross-dated archaeological *A. islandica* shells from a Norwegian Stone Age midden have been used to reconstruct a 155-year record of climate related to prehistoric occupations (Helama and Hood 2011).

Shell Sourcing

Another novel application of stable oxygen isotope analyses to archaeological mollusc shells is the use of $\delta^{18}O$ to track foraging ranges. In areas with differential freshwater inputs/salinity regimes but similar temperature ranges, the shape of the seasonal $\delta^{18}O$ curve should be similar, but the absolute values should vary in tandem with salinity (e.g., Andrus and Thompson 2012). Examining the changes in salinity from $\delta^{18}O$ allowed the collection range along the coast to be estimated, allowing more detailed reconstructions of foraging strategies beyond season of collection.

Key Issues/Current Debates

Vital Effects

As with any living creature, molluscan life cycles are complex. An attempt to understand their growth cycles, physiology, and habitat preferences must be made before their shell morphology and geochemistry can be interpreted with confidence (Schöne 2008).

Shell growth may be modulated by internal rhythms or by environmental factors such as temperature extremes, turbidity, storms, or predation. Under favorable ambient environmental conditions, most molluscs precipitate shell material at regular intervals, termed growth increments. Regular periods of slowdown and cessation of growth result in growth lines that interrupt growth increments with periodicities ranging from subdaily to annual. Shell growth may also cease at irregular timescales as the animal aestivates as a result of ambient environmental conditions that exceed the physiological tolerance of the organism such as increased temperature or salinity. In all cases, there are times when ambient environmental conditions are not recorded in shell growth (Schöne 2008).

Shell growth is generally faster during favorable environmental conditions. Therefore, isotopic records taken at regular intervals across a growth band will be biased toward the animal's physiological optimum. Reproduction may slow growth in some species. Mollusc growth rates also vary throughout their life cycles, tending to decrease as the animals age. Variable growth rates will result in time-averaged values for shell carbonate for the periods of slower shell growth. Research on modern populations has shown that the timing and regularity of growth line and growth increment deposition can vary from species to species and sometimes within a single species across different latitudes and environments. These variations need to be understood in order to apply an appropriate sampling methodology to reliably interpret the isotopic records. When a mollusc's growth rate is understood, the time averaging caused by variable growth rates can be corrected for by mathematically weighting each sample (Schöne 2008).

Understanding the habitat preferences of different mollusc species is also crucial to the interpretation of their isotopic signatures. Different species of molluscs that live contemporaneously within a marine, freshwater, or terrestrial context can have different isotopic composition due to differences in water-isotope composition between different microhabitats. Furthermore, in ancient contexts where chronological resolution is more limited, the range in isotope ratios for each species from a single context can be large. Only by analysis of a significant number of species-specific shells from each sampling interval can a true understanding of environmental change be obtained.

Past Water Composition and the Reconstruction of Sea Surface Temperature

Temperature equations (e.g., Dettman et al. 1999) offer the opportunity to reconstruct sea surface temperature from marine shell $\delta^{18}O$ as long as the $\delta^{18}O$ of the seawater where the shell grew is known or can be estimated. Changes in continental ice volume have caused the oxygen isotope ratios in seawater to vary considerably throughout the Quaternary. Mollusc shell $\delta^{18}O$ is a function of both $\delta^{18}O$ of ambient water and temperature. In order to calculate paleotemperatures from shell $\delta^{18}O$, an estimate of paleo $\delta^{18}O$ of seawater must be used. Paleo-seawater $\delta^{18}O$ is most commonly evaluated indirectly through the analysis of $\delta^{18}O$ in fossil carbonates such as planktonic foraminifera or from analysis of resistant organic compounds (alkenones) preserved in sediment cores. Another method is to directly measure $\delta^{18}O$ from pore water extracted from marine sediment cores. Such studies have shown that the last glacial maximum had the highest $\delta^{18}O$ values in the last glacial cycle corresponding with maximum ice sheet extent. This reflects the $\delta^{18}O$ of past bottom waters which can be extrapolated to surface waters. For a more detailed discussion of seawater $\delta^{18}O$ composition, see Rohling (2007).

These methods of paleo-water $\delta^{18}O$ reconstruction yield average values that cannot account for seasonal fluctuations in water composition or for differences in seawater $\delta^{18}O$ that can occur over small geographic ranges. A change in water $\delta^{18}O$ of just 0.5 ‰ (which is the typical seasonal range for many parts of the Mediterranean) can lead to a calculated temperature difference of 2 °C. Applying this to the paleorecord where seawater $\delta^{18}O$ is less well constrained could lead to uncertainties of several degrees in temperature reconstructions. These factors must be borne in mind when using mollusc shell stable isotopes for paleothermometry studies.

Diagenesis

In archaeological mollusc shells, recrystallization of the shell carbonate due to diagenesis will alter the isotopic ratios in the shell carbonate. Diagenesis can occur because of cementation (the addition of abiotic carbonate after death) or because of dissolution and re-precipitation of carbonate within the shell after death. If these phases are analyzed, they do not represent the chemistry of shell growth but the chemistry of the water at the time of diagenesis. Therefore, care must be taken to avoid sampling regions of shells that are diagenetically altered. This can be done in a variety of ways. High-resolution microscopy can be used to directly observe diagenetic alteration in polished section. Sampling strategies or sampling "maps" can then be devised in order to avoid the recrystallized part of the shell. X-ray diffraction can be routinely applied to detect recrystallization in shells originally composed of aragonite that may be altered to the more stable carbonate form of calcite.

Future Directions

As this review shows, stable oxygen isotope analyses on archaeological mollusc shells can yield valuable high-resolution, quantitative environmental archives from the time of shell growth as well as provide information on prehistoric human subsistence strategies. Future research is likely to focus on four key issues:

1. *Modern validation studies*: It is becoming increasingly evident that inter- and intraspecies differences in growth rates, physiology, and environmental responses can cause variations

in the isotopic profiles of mollusc shells. Therefore, before stable isotope analysis is applied to archaeological shells, it is necessary to examine modern populations of the proxy species to understand how isotopic variation in shell carbonate correlates to local environmental conditions. This allows potential isotopic offsets between the environmental signal and the shell carbonate to be identified and, potentially, allows the generation of a more quantitative record of environmental change.

2. *Integration of sclerochronology and cross-dated chronologies*: The integration of detailed studies of shell growth with geochemical sampling enables the generation of high-resolution time-resolved records of environmental change. Cross-dated chronologies can then be constructed to generate continuous, high-resolution records of climate change from archaeological sites.
3. *Combination of stable isotopes with other proxies*: In some mollusc species, element ratios such as Mg/Ca and Sr/Ca serve as proxies for sea surface temperature that are not influenced by the stable isotope composition of ambient water. The combination of independent methods of temperature reconstruction with stable isotope analysis allows the effects of changing water composition from factors other than temperature (such as rainfall) to be disentangled from the isotope record to provide a more robust proxy of temperature. However, the incorporation of strontium and magnesium into mollusc shell carbonate appears to be more variable between and within species, so more work on modern validation of these trace element proxies is necessary before the potential of these integrated records can be realized (e.g., Surge and Walker 2006).
4. *Clumped isotope geochemistry*: This newly emerging field examines the extent to which isotopes such as ^{13}C and ^{18}O bond with or near each other rather than with the surrounding light isotopes. The proportions of ^{13}C–^{18}O bonds in carbonate minerals are sensitive to their growth temperatures, independent of bulk isotopic composition. Therefore, clumped isotopes in ancient carbonate can be used as a quantitative paleotemperature proxy that requires no assumptions about the $\delta^{18}O$ of waters from which carbonates grew (Eiler 2007). The application of clumped isotope analysis to marine and freshwater shells is rapidly expanding; however, the infancy of the techniques means extensive modern validation studies are needed. Furthermore, large sample sizes are required, currently hindering the application of this technique to seasonality studies. The only study to date that has investigated clumped isotopes of modern terrestrial shells showed the results were complicated by snail ecophysiological adaptations such as shell color, morphology, and behavior (Zaarur et al. 2011). Thus, further work is required to disentangle their influence before this technique can be applied to archaeological terrestrial shells.

Cross-References

- ▶ Isotope Geochemistry in Archaeology
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Zooarchaeology

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References

Andrus, C.F.T., and V.D. Thompson. 2012. Determining the habitats of mollusk collection at the Sapelo Island shell ring complex, Georgia, USA using oxygen isotope sclerochronology. *Journal of Archaeological Science* 39: 215–228.

Bailey, G.N., M.R. Deith, and N.J. Shackleton. 1983. Oxygen isotope analysis and seasonality determinations: Limits and potential of a new technique. *American Antiquity*: 390–398.

Dettman, D.L., and K.C. Lohmann. 1993. Seasonal change in Paleogene surface water delta18 O: Freshwater bivalves of western north America. In *Climate change in continental isotope records*, ed. P.K. Swart, K.C. Lohmann, J.A. McKenzie, and S. Savin, 153–163. Washington: American Geophysical Union.

Dettman, D.L., A.K. Reische, and K.C. Lohmann. 1999. Controls on the stable isotope composition of seasonal growth bands in aragonitic fresh-water bivalves (Unionidae). *Geochimica et Cosmochimica Acta* 63: 1049–1057.

Eiler, J.M. 2007. "Clumped-isotope" geochemistry – The study of naturally-occurring, multiply-substituted isotopologues. *Earth and Planetary Science Letters* 262: 309–327.

Emiliani, C., L. Cardini, T. Mayeda, C.B.M. McBurney, and E. Tongiorgi. 1964. Palaeotemperature analysis of marine molluscs (food refuse) from the site of Arene Candide cave, Italy and the Haua Fteah cave, Cyrenaica. In *Isotopic and cosmic chemistry*, ed. S. Craig, S.L. Miller, and G.J. Wasserburg, 133–156. Amsterdam: North Holland.

Epstein, S., R. Buchsbaum, H. Lowenstam, and H.C. Urey. 1951. Carbonate-water isotopic temperature scale. *Geological Society of America Bulletin* 62: 417.

Fritz, P., and S. Poplawski. 1974. 18O and 13C in the shells of freshwater molluscs and their environments. *Earth and Planetary Science Letters* 24: 91–98.

Helama, S., and B.C. Hood. 2011. Stone Age midden deposition assessed by bivalve sclerochronology and radiocarbon wiggle-matching of *Arctica islandica* shell increments. *Journal of Archaeological Science* 38: 452–460.

Kennett, D.J., and B. Voorhies. 1996. Oxygen isotopic analysis of archaeological shells to detect seasonal use of wetlands on the southern Pacific coast of Mexico. *Journal of Archaeological Science* 23: 689–704.

Killingley, J.S. 1981. Seasonality of mollusk collecting determined from O-18 profiles of midden shells. *American Antiquity* 46: 152–158.

Mannino, M., A. Baruch, F. Spiro, and K.D. Thomas. 2003. Sampling shells for seasonality: Oxygen isotope analysis on shell carbonates of the inter-tidal gastropod *Monodonta lineata* (da Costa) from populations across its modern range and from a Mesolithic site in southern Britain. *Journal of Archaeological Science* 30: 667–679.

Mook, W.G. 1971. Paleotemperatures and chlorinities from stable carbon and oxygen isotopes in shell carbonate. *Palaeogeography Palaeoclimatology Palaeoecology* 9: 245–263.

Rohling, E.J. 2007. Oxygen isotope composition of seawater. In *Encyclopedia of quaternary science*, ed. S.A. Elias, 1748–1756. Amsterdam: Elsevier.

Schöne, B.R. 2008. The curse of physiology – Challenges and opportunities in the interpretation of geochemical data from mollusk shells. *Geo-Marine Letters* 28: 269–285.

Shackleton, N.J. 1973. Oxygen isotope analysis as a means of determining season of occupation of prehistoric midden sites. *Archaeometry* 15: 133–141.

Surge, D., and K.J. Walker. 2006. Geochemical variation in microstructural shell layers of the southern quahog (*Mercenaria campechiensis*): Implications for reconstructing seasonality. *Palaeogeography Palaeoclimatology Palaeoecology* 237: 182–190.

Urey, H.C. 1947. The thermodynamic properties of isotopic substances. *Journal of the Chemical Society*: 562–581.

Zaarur, S., G. Olack, and H.P. Affek. 2011. Paleoenvironmental implication of clumped isotopes in land snail shells. *Geochimica et Cosmochimica Acta* 75: 6859–6869.

Zanchetta, G., G. Leone, A.E. Fallick, and F.P. Bonadonna. 2005. Oxygen isotope composition of living land snail shells: Data from Italy. *Palaeogeography Palaeoclimatology Palaeoecology* 223: 20–33.

Further Reading

Álvarez, M., I.B. Godino, A. Balbo, and M. Madella. 2010. Shell middens as archives of past environments, human dispersal and specialized resource management. *Quaternary International* 239: 1–7.

Andrus, C.F.T. 2011. Shell midden sclerochronology. *Quaternary Science Reviews* 30: 2892–2905.

Gröcke, D.R., and D.P. Gillikin. 2008. Advances in mollusc sclerochronology and sclerochemistry: Tools for understanding climate and environment. *Geo-Marine Letters* 28: 265–268.

Jones, D.S., D.F. Williams, M.A. Arthur, and D.E. Krantz. 1984. Interpreting the paleoenvironmental, paleoclimatic and life history records in mollusc shells. *Geobios* 17: 333–339.

Schöne, B.R., and D. Surge. 2005. Looking back over skeletal diaries – High-resolution environmental reconstructions from accretionary hard parts of aquatic organisms. *Palaeogeography Palaeoclimatology Palaeoecology* 228: 1–3.

Molodin, Vyacheslav I.

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Basic Biographical Information

Vyacheslav Ivanovich Molodin (Fig. 1) was born in 1948. He was a Soviet and Russian archaeologist who specialized in archaeology and the prehistory of Siberia. Molodin was born in Orhovo village of the Brest Region. In 1971, he graduated from the Department of History and Philology at the Novosibirsk State Pedagogical Institute. In 1984, he received his doctorate degree in history.

V.I. Molodin joined the Siberian Branch of the USSR Academy of Sciences in 1971 as

Molodin, Vyacheslav I., Fig. 1 Vyacheslav Ivanovich Molodin

postgraduate student of the Institute of History, Philology, and Philosophy where he was Head of the Division from 1989 to 1991. In 1992, he became Professor and Deputy Director of the Institute of Archaeology and Ethnography of the Siberian Branch of the Russian Academy of Sciences. He was elected a full member of the Russian Academy of Sciences in 1997. From 1997 to 2001, he was Deputy Chairman of the Siberian Branch of the Russian Academy of Sciences. He was the First Deputy Chairman of the Siberian Branch of the Russian Academy of Science from 2001 to 2007.

V.I. Molodin is a member of the Presidium of the Siberian Branch of the Russian Academy of Sciences, as well as the Bureau of the Department of History and Philology of the Russian Academy of Sciences. He is a corresponding member of the German Archaeological Institute.

Major Accomplishments

V.I. Molodin discovered and studied a number of archaeological cultures that existed in Siberia and Central Asia. He has a wide field of scientific interests, such as prehistoric art, Bronze and Iron Age of Siberia, Altai, Mongolia, ethnogenesis, and paleogenetic studies. He developed an ingenious interpretation of the origin of people who inhabited the southern region of Western Siberia from Upper Paleolithic through to the late Middle Ages. He studied the unique and chronologically diverse burial complex of Sopka-2 in the Baraba forest-steppe, as well as the Russian stockaded towns (Ilim, Kazym). He was a Codirector of the international program "Pazyryk" and the Russian-German expedition that discovered and studied a unique settlement of Chicha in Baraba, which dated as far back as the ninth to seventh century BCE. The multidisciplinary research at these sites that was carried out under his direction and actual participation provided fundamentally new scientific knowledge of this region's occupation.

He took part in foreign archaeological research projects in Mongolia, Cuba, Japan, Canada, and Syria. A number of his works were dedicated to the history of science and science studies, as well as church archaeology. He has been awarded state prizes and decorations from Russia as well as foreign countries.

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Cross-References

► Altai: Paleolithic
► Siberia: Paleolithic

References

Molodin, V.I. 1977. *Epokha neolita i bronzy lesostepnogo Ob-Irtyshiya*. Novosibirsk: Nauka.
Molodin, V.I. 1979. *Kyshtovskyi mogilnik*. Novosibirsk: Nauka.
Molodin, V.I. 1983. *Baraba v epokhu bronzy*. Novosibirsk: Nauka.
Molodin, V.I. 2000. *Drevnosti ploskogoriya Ukok: tainy, sensatsii, otkrytiya*. Novosibirsk: Nauka.
Molodin, V.I. 2001. *Pamyatnik Sopka-2 na reke Omi, in Kulturno-khronologicheskii analiz pogrebalnykh kompleksov epokhi neolita i rannego metalla*. Vol. 1. Novosibirsk: Nauka.
Molodin, V.I 2003. *Drevnee iskusstvo Zapadnoi Sibiri*. Seoul (in Korean and Russian).

Monasticism in Southern Italy (Fourth to Eleventh Century)

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State of Knowledge and Current Debates

The political division between Byzantines and Longobards had a great influence over the religious and ecclesiastical geography of Mezzogiorno. This division was further marked after 731/732, when the dioceses of the Byzantine provinces of Southern Italy were transferred under the authority of the Patriarchate of Constantinople. As a result, Byzantium limited the influence of Rome aiming to create a national Church united by the common denominator of Greek culture. This operation soon failed in Naples and the city went back to the Roman jurisdiction. On the other hand, the same intent succeeded in Calabria and Sicily where the re-hellenization managed by Byzantium during the sixth to seventh century could reinforce the already strong hellenization coming from Magna Graecia. Those last regions and also some part of Lucania were populated by large communities of hellenophones, thus they were deeply influenced by Greek-Byzantine spiritual models of the Eastern Christian world and by the Greek-rite monasticism too. Instead, Mid-Northern Apulia, Ex-Longobard Northern Calabria (seventh to ninth century) and Campania were located out of these ideal borders. Because these regions were essentially characterized by latinophones, so by Latin monasticism too.

It is possible to identify the Latin monasticism with the St. Benedict Rule only during the Carolingian Age (eighth to ninth century). According to the centralization policy of the Frankish Kings, the operation aimed to homogenize monasticism across Western Europe and it was led by St. Benedict of Aniane. The so-called Pre-Benedictine monasticism (fifth to eighth century) can be described as a colorful mosaic in which the fascination of heremitism (=solitary life) was deeply felt even where *stabilitas loci* had been imposed as the base of the community life (Pricoco 2011: IX–XVII). On the contrary, the Benedictine monasticism was essentially shaped around cenobitism (=communal life), while the influence of heremitism can be collocated in the tenth to eleventh century. The monastic life was organized by the Rule together with some additional *consuetudines* formulated from the seventh century in order to satisfy the new needs emerging when the congregation started to grow.

The Italo-Greek monasticism was essentially characterized by heremitism practiced through the forms of anachoresis (=solitude) as well as hesychia (=two or three people living in different cells). The hagiography has clearly shown how the Italo-Greek monks and saints preferred to live as hermits, according to the Greek-Byzantine spirituality which considered heremitic life as the highest monastic ideal. However, around the tenth to eleventh century, also the Italo-Greek monasteries were reformed through cenobitical life. This change mainly followed imperial and ecclesiastical laws that preferred a cenobitical organization of monasticism since it was considered the best solution in order to avoid anarchy among monks. These laws also allowed the monks to live temporarily as hermits with the approval of their abbots.

Greek-Byzantine monasteries were generally organized through the τυπικά written by their abbots or by the founders. Generally speaking, every monastery for men was independent, but monasteries for women had to be dependent on something or someone (i.e., a male monastery, a bishop, or a laic protector). Scholars largely agree on stating that there was a lack of an official and acknowledged rule across the Byzantine monastic world. However, since 787 St. Basil's Rule seemed to be acknowledged by the ecclesiastical authorities at the Council of Nicaea II, who reformed the double-monasteries settled across the Empire through "*regulam sancti patris nostri Basilii, et secundum praeceptionem eius*" (can. XX = Alberigo et al. 1991: 153–154). In this case, the Conciliar Fathers mentioned the set of Rules written by Basil the Great (329–379) for monks and nuns, which greatly influenced the

development of monasticism. The definition of "Basilian monk" is inappropriate to the historical context here debated since the Basilian order involving all the Greek-rite monks which settled across the Roman Church territory was established only in the sixteenth century by the Papacy.

The issue of vows, which in the current imagination correspond to the beginning of the monastic life, is also quite problematic. This cannot be said for the High Middle Ages' monasticism, nor for Greek-Byzantine and Latin monasticism. Until the twelfth to thirteenth century and sometimes later than that, the Latin monks and nuns often began their monastic life informally, through formulas that avoided mentioning the solemn vows (chastity, poverty, obedience). Instead, the vow of seclusion was imposed to nuns only after the Council of Trento (1545–1563), and it was erroneously considered a way to homogenize with the feminine monasticism at that time.

The female monasticism of the late sixteenth century can be described as a heterogeneous and complicated world. Monasteries for women had been organized by the rules designed for male monasteries, which proved to be unsuitable for nuns. This situation led the nuns to apply informal rules in order to fill up this legislative gap. As a result, each single monastery had become a sort of *unicum* organized by its particular *consuetudines*. The nuns of the Middle Ages usually preferred the cenobitical life, which was not as harsh as heremitism, avoiding experiences characterized by severe physical mortifications. In addition, the cloister often allowed the nuns to preserve their social status and all the privileges related to it. The survival of six Byzantine monasteries' τυπικά (twelfth to fifteenth century), for example, testifies that the nuns living there were divided according to a marked hierarchy which favored the nobles by guaranteeing them easier tasks and comfortable lodging. A marked social difference was also governing the lives of the Byzantine monks, especially inside the main monasteries. Stoudios Monastery, for example, presented a similar scenario. This famous Constantinopolitan monastery was characterized by a strong hierarchy before the more egalitarian reform implemented by St. Theodore the Studite (759–826).

A long tradition of studies has identified St. Antonius as the person who inspired the feminine cenobitical model. According to tradition, it seems that before moving to the desert to live as an hermit, St. Antonius imposed on his sister and to other virgins the cenobitical lifestyle (Ath. *Vita Ant.* III, 1 = Bartelink et al. 1981[3]: 11). This version of facts cannot be accepted anymore thanks to a new and reliable version of his hagiography that states that St. Antonius had given custody of his sister to some pious virgins living at home in order to educate her to virginity (Ath. *Vita Ant.* III, 1 = Baldi 2015: 39). In any case, it has been clearly shown how women played a main role in Christianizing the Roman aristocracy, thanks to the communities of pious virgins or widows which were attested in Rome since the fourth century (Borsari 1963: 9–22; Bozzarello 2017: 158–204; Burgarella 1982: 57–71; Creytens 1965: 45–84; Galatariotou 1988: 283–290; Kazhdan et al. 1991: 269, 1136, 1392–1394; Morini 1999: 53–65; Pelliccia and Rocca 1973–2013: (8) 1420-1428, (10) 552ss.; Penco 1985: 21–173; Pertusi 1965: 382–426; Sansterre 1995: 57–92; Talbot 1985: 1–20).

Status quaestionis and future directions of studies on Medieval monasticism have been exhaustively shown and summarized by the scholars who gathered in Brescia (2000) under the coordination of G. Andenna (2001). In this occasion, the contribution of G. Vitolo (Andenna 2001: 259ss.) must be mentioned. The author, after summarizing the current state of knowledge on Medieval monasticism in Mezzogiorno – mainly reached through the indefatigable work of French and Italian scholars along the second half of the twentieth century – has underlined with appropriate scientific acuity some conceivable future developments of studies by analyzing new and updated sources and repertories.

Centuries Fourth to Sixth

Monasticism started around the second half of the fourth century in Sicily, where it was brought by

monks coming from the Eastern Mediterranean world. Then it spread across all of the Mezzogiorno region toward the end of the following century (Borsari 1963: 23–26). At that time monasticism was already present in Naples. The Monastery of St. Severinus in *Lucullanum*, where the relics of St. Severinus have found shelter, was built around 492–495/496 (Eugippius *Vita sancti Severini* 46, 1–6 = Genovese 2012: 128–131). The monastery was furnished with a *scriptorium* and a rich library by Abbot Eugippio (509–after 533), so becoming an important cultural center and an inspiring model for the creation of the monasteries of *Vivarium* and Monte Cassino.

Contrary to a late tradition (tenth century), it is difficult to be able to identify with certainty St. Gaudiosus, Bishop of Abitinae, as the real founder of the Monastery at Caponapoli. This was the same monastery that had St. Agnellus (532/539–593/600) as abbot (*Lib. Mir. s. Agnelli* prol. = Vuolo 1987: 149–152). The arrival in Naples of St. Gaudiosus is believed to be coeval to the arrival of Quodvultdeus (†453), Bishop of Carthage, who was expelled from Africa in 439 by the Vandal King Gensericus. However the source that documents the Vandal persecution of the African Catholic community does not confirm this version (Victor Vitensis *Historia Pers. Afr. Prov.* I, 5 = CSEL 7 = it. trans. Costanza 1981: 34–35). Nevertheless, all along the Late Antiquity the African culture had deeply influenced Naples, which, at the beginning of the sixth century, could be considered the main Mediterranean archive of St. Augustine's books (Genovese 2012: 13–16).

Vivarium represented an excellent archive of Greek and Latin authors; it had a *scriptorium* and a library. This monastery was founded by Cassiodorus in his family's estate at *Scyllaceum* (Squillace), in Calabria, where he retired in 554. The monastic complex was composed by two monasteries: the former *monasterium Castellense* for hermits, and the latter *monasterium Vivariense* for cenobites. *Vivarium* had its apogee under Cassidorus, followed by a gradual decline until its final downfall attested in the seventh century (Penco 1985: 46–50).

According to the traditional version, Monte Cassino had been founded a few years before by St. Benedict himself (529) after leaving his cave in Subiaco, where he had lived as a hermit for 36 months. Monte Cassino was shortly abandoned by its monks because of the Longobard sack in (577) and it was re-inhabited around 718, when Pope Gregory II (715–731) encouraged Abbot Petronax of Brescia to restore it. In 883 Monte Cassino fell under the Saracens, who demolished the Monastery and slew Abbot Bertharius. Consequently, the monk fled to Teano and then to Capua. Around 950, Monte Cassino was brought back to life by Abbot Aligern (948–985) and a new age of political, economic, and cultural power began (tenth to eleventh century) (Bloch 1986: 4–14; Penco 1985: 131–141).

The Gregorian Age (590–604)

The devastation brought on by the Longobard invasion (568–571) had a great impact over the already depressed economy of Italy. To escape the widespread poverty and a permanent state of war, many monks, ecclesiastics, and lay members of the aristocracy left the peninsular Mezzogiorno and fled to Sicily, the Byzantine region that was spared by the Longobard invasion. According to the traditional historiographical thesis, the main cause of this exodus was the systematic persecution of ecclesiastics and monks by the Longobards. But recently, this thesis has been proved wrong because the episodes of murder should be read as isolated events committed in order to steal precious furnishings or to suppress any opposition from local communities to the military invasion.

Nevertheless, the monasteries were heavily hit by the crisis and suffered from poverty. The crisis was partially alleviated by Roman Church funding. The contributions often made of small monetary subsidies allowed the survival of the monks. Regarding this matter, the relavant donation of 80 lb. of gold (=36 kg) per year, which was divided among the 3000 nuns exiled in Rome (ca. 2 solidi to each nun) by Pope Gregory I, is needed to be mentioned (Greg. Mag. *Reg. Epist.* V, 30 = Recchia 1996b: 160–163). The members of the Roman aristocracy also supported

the monasteries. According to the principles of evergetism, they richly endowed the monasteries that they had previously founded or restored (Borsari 1963: 29–32; Bozzarello 2015: 47–65). Despite all the difficulties, monasticism had planted its roots across the whole Mezzogiorno in the last century of the Late Antiquity.

Centuries Seventh to Eighth

Because of limited sources, little is known of Southern Italy's monasticism in the seventh to eighth century. In any case, a valuable influence over the cultural and religious life at that time had the migrants who came from the Eastern provinces of the Empire and fled to Mezzogiorno and especially to Rome, escaping from the Persian and Arabic invasion of their native lands (seventh century). Despite its small proportions, this migration was relevant because it included members of the social, cultural, and political *élites* of the Byzantine provinces (Borsari 1963: 9–12, 35).

Theodore of Tarsus was one of those migrants. After being nominated Bishop of Canterbury by Pope Vitalianus (668), he moved to England together with the African monk Adrianus, Abbot of Nisidano's Monastery, which was located in the *insula-patrimonium* of Nisida, close to Naples. Once they arrived in England, the two clergymen organized the English Church according to the Roman Church discipline (Beda *Hist. Eccl.* IV, 1 = Lapidge and Chiesa 2008: 328–331), while Adrianus introduced some of the Neapolitan Church's customs to England's Medieval Sanctoral (Cilento 1969: 533–536).

Thanks to a generous number of sources, we have a good knowledge of Naples and its monasteries. *Vitae* of St. Patricia (Acta Sanct. *Aug. V*: 199–219) tells us the life, death, and miracles of the Byzantine virgin. She died near Naples in the late seventh century and her body was miraculously carried to and buried in the male Monastery of Sts. Nicander and Marcian. This is why the place has been known as Monastery of St. Patrizia since the tenth century. Shortly after, her grave attracted an increasing number of virgins and nuns who chose it as a gathering place. The Neapolitan *dux* allowed the women to settle into the Monastery and he moved the monks into the Monastery of St. Sebastian, also known as St. Sebastian *casapicta* in *viridario* or Sts. Theodore and Sebastian. This is the Monastery of Sts. Erma, Sebastian, Cyriac, and Pancras, which had been built before 599 (Kehr 1935: 460; Bozzarello 2017: 96–99).

In 763, the feminine Monastery of Sts. Marcellinus and Peter (Capasso 1881: (1) 262–263) is attested. The monastery fell into decadence and it was restored toward 818–841 by Theodonanda, widow of *Dux* Antimus, who transferred it "*in suo praetorium*," to her palace (Waitz 1878: 428). This has been the only feminine Greek-rite monastery of Naples. It was converted into a Benedictine monastery probably around the eleventh to twelfth century (Luzzati Laganà 1982: 729–752).

Our sources testify that feminine monasticism greatly developed during the eighth century, especially under Bishop Stephen II (767/768–800). The Bishop founded the Monastery of St. Pantaleo, near *balneum Nustriani* (fifth to twelfth century). *Dux* Sergius IV, who organized its life according to the St. Benedict Rule, joined that monastery to the one of Sts. Gregory and Sebastian and turned it into the Monastery of S. Gregorio Armeno (1009). Concerning the foundation of Sts. Gregory and Sebastian, unfortunately, no reliable sources are available. It have been allegedly built around the eighth to ninth century, while the relics of St. Gregory the Illuminator arrived in Naples through Amalfium toward the ninth century, when their *inventio* in Constantinople was recorded. According to a traditional version of the events, the monastery was founded by the Byzantine nuns escaping from the Iconoclastic persecution; however, this version proved to be unreliable since this migration never happened (Bozzarello 2017: 181–190). Bishop Stephen also founded the feminine monasteries of St. Festus and St. Gaudiosus (Waitz 1878: 426). Regardless of its devotional aspect, the operation managed by Stephen can be seen as an efficient choice that allowed the Dukedom's economy to expand by unblocking the Neapolitan construction industry, which had been stagnant for two

centuries. Lastly, two minor monasteries are also attested in Capri and Miseno around 719–731 (Kehr 1935: 429).

Centuries Ninth to Eleventh

In less than a century the whole of Sicily, from Mazara to Taormina (827–902), fell under the rule of the Arab Aghlabites, who were replaced by the Arab Kalbites after 909. Due to the invasion, many monks and civilians from Sicily fled to the peninsular Mezzogiorno, especially to Calabria and Lucania: St. Elias of Enna (823–903/904) moved to Saline, in Southern Calabria; St. Christopher of Collesano and his wife, Kale, together with their sons, St. Sabas and St. Makarios (tenth century), spent their lives living in Merkourion, Latinianon, and Lagonegro, which were between Northern Calabria and Southern Lucania, founding the monasteries of St. Micheal in Merkourion, St. Lawrence in Latinianon, St. Philip at Lagonegro. St. Luke of Armento (or of Demenna), St. Vitale of Castronuovo, St. Leo-Luke of Corleone, and St. Philaret (tenth to eleventh century) also lived a considerable part of their monastic lives in Calabria and Lucania (Borsari 1963: 40–76; Morini 1999: 15–23). The Arab invasion had been an opportunity for the Greek-Byzantine monasticism to carry on its expansion following the colonization of new Southern Italy's provinces led by Byzantium (Burgarella 1982: 57–58).

Siculo-Greek and Calabro-Greek monks preferred to move to the Byzantine lands of Mezzogiorno, mainly because of cultural affinity. They often migrated toward the Northern part of Mezzogiorno, especially Campania, since Calabria became unsafe because of Arabic raids. After leaving Merkourion (981), St. Nilus the Younger (910–1004) fled to Capua, where he was welcomed at the court of the Longobard Prince Pandolfus Ironhead. St. Nilus spent the last part of his life in exile across those Latin lands: he lived with his monastic family in Valleluce (981–996), in *Terra sancti Benedicti*, Serperi (996–1004), near Gaeta, and Grottaferrata (1004), near Rome (*Vita s. Nili* XI-XIV= Giovanelli 1966: 89–110). The itineraries covered by the Italo-Greek saints traced the routes usually followed by the pilgrimage *ad limina apostolorum*: a pilgrimage that passed through territories such as the ex-Byzantine or Longobard Dukedoms of Campania (Campania and South Latium), where hellonophones have been traditionally welcomed (Sansterre 1988: 701–750; Burgarella 2002: 934–988). Besides, the itinerary followed by St. Nilus clearly shows his intention to link the Italo-Greek monasticism to Rome and its papacy rather than to Byzantium (Burgarella 1982: 67–69).

The Norman Conquest

In terms of monasticism, the Normans did not make any major changes. They carried on a gradual Latinization of the conquered territories and they transferred the ex-Byzantine dioceses of Mezzogiorno under the authority of Rome. The Normans, as the Byzantines, gave to the monasteries a strategical function in order to control and manage the territory. This strategy, for example, was applied in Calabria through the establishment of St. Mary at Sant'Eufemia (1062), St. Mary La Matina near San Marco Argentano (1065), and the Holy Trinity at Mileto (1080), all monasteries which were ordered by St. Benedict Rule.

The Normans strategically supported the Greek-rite monasticism by re-founding or richly endowing the main monasteries and by joining the small ones to the great and influential monasteries of Mezzogiorno. The Greek-Byzantine monasticism survived in Calabria and Sicily thanks to a strong hellenization of the population in those regions. This allowed those territories to maintain the Greek language and to become the homeland of the first Humanism initiated by Barlaam of Seminara (1290–1348) and Leonzio Pilato (1310–1365) among others. The Norman occupation and the end of the Byzantine rule did not stop the Italo-Greek monasticism. In fact, the spread of monasticism turned into new forms of organization that carried on its cultural influence deeper

than before. At the same time, however, this phase also corresponds to the beginning of its slow decline due to the end of the relations between Calabria and the East, and especially due to the gradual marginalization suffered by the the Italic hellenophones in the new Kingdom.

Concerning the Normans' support of the Greek-rite monasteries, the main monasteries are worth mentioning. The Monastery of St. Mary of Patir, usually called the New Hodegetria, which is located about 15 km west of Rossano (prov. Cosenza), was founded at the beginning of the twelfth century by the Calabrian monk Bartholomew of Simeri, who had lived as a hermit in the mountains near Rossano. The patron of the monastery was the Admiral Christodoulos, a high official of Greek descent at the Norman court of Sicily who had the title of *protonobelissimos*. Despite the resistance of the Greek Archbishop of Rossano, Nicholas Maleinos, Bartholomew placed the new foundation under the protection of Rome and St. Mary of Patir was granted privileges by Pope Paschal II (1105) as well as by Norman authorities. Throughout the twelfth century St. Mary of Patir had an important Greek *scriptorium*. The monastery functioned until 1806, and its church is still in good condition. Architecture and depictions were inspired by Byzantine art features that evolved into a Norman *koinè* over different areas of Mezzogiorno (Kazhdan et al. 1991: 1596).

Connected to St. Mary of Patir is the Monastery of St. Salvatore *in Lingua Phari* in Messina founded by Luca, pupil of Bartholomew, thanks to the support of King Roger II. The monastery was richly endowed with royal grants and its Abbot, Luca, raised to the ranks of archimandrite (1131). The Archimandritate of St. Salvatore gathered under its authority about 40 Greek-rite monasteries settled between Sicily and Calabria (1133); these monasteries were divided in two types according to the juridical *status* of their dependency.

In 1168, under King William the Good, also the Monastery of Sts. Elias and Anastasius of Carbone in Lucania was raised to archimandritate (Penco 1985: 209–213; Borsari 1963: 89–121).

Campania and Samnium

The Dukedom of Naples was essentially characterized by Latin monasticism, even if it was an heterogenous environment in terms of influences, cultures, rites, and lifestyles. Since the early eleventh century the Neapolitan authorities applied the St. Benedict Rule to homogenize the city monasticism, while the remaining pockets of hermetism had already been eliminated in the late ninth century. Under the rule of the Normans, in the twelfth century, the Latinization process also included a few Greek-rite monasteries in Naples (Luzzati Laganà 1982: 729–731) such as the monasteries of Sts. Sergius and Bacchus and Sts. Marcellinus and Peter. The Monastery of Sts. Sergius and Bachus, which had been united to the Monastery of Sts. Theodore and Sebastian in the tenth century, shared with a few other monasteries the monopoly over the management of agriculture in the Dukedom (Feniello 2011: 135–160). Its monks essentially came from the Neapolitan hinterland, so only a few of them had Greek origins. Also the feminine community of Sts. Marcellinus and Peter, dependent on the Monastery of Sts. Sergius and Bachus, shared the same Neapolitan origins. It is interesting to notice how these nuns maintained some typical Byzantine customs, i.e., the ablutions at baths or the ownership of some personal servants (Bozzarello 2017: 165–169, 197).

The coastal territories belonging to the Longobard Salerno and the ex-Byzantine Amalfium were largely characterized by cave monasteries and sanctuaries. The Sanctuary of St. Michael the Archangel in Olevano sul Tusciano, 30 km southeast of Salerno, was visited in 870 by the Frankish pilgrim monk Bernardus and his two companions. Three years before this visit, on the way to the Holy Land, these pious monks-pilgrims had already been at the Sanctuary of St. Michael the Archangel on Mount Gargano, which had been a popular destination for the whole Middle Age (*Itinerarium Bernardi Monachi Franci* IV-X = Tobler & Moliner: 310–314). Escaping the Arabs, St. Saba of Collesano fled to Atrani (982) and Vietri

(986/988), where he lived in two caves (Borsari 1963: 49, 73). Leo, then Archbishop of Amalfium, built the Monastery of Sts. Cyriac and Giulitta in a "*criptam de supra civitate Atrani*" before 987 (Kehr 1935: 389). The Monastery of the Holy Trinity (=SS. Trinità) at Cava de' Tirreni (prov. Salerno) was founded by Alferius (ca. 1011), a monk from Salerno educated in Cluny. The monastery originated from a cave that had already been occupied by Liutius (post 999–1001), monk-pilgrim of Monte Cassino who came back from the Holy Land in 999–1001 (Kehr 1935: 310–313; *Chronica Monasterii Casinensis* II, 30 = Hofmann 1980: 221). This is the monastery where Dauferius-Desiderius, the great Abbot of Monte Cassino (1058–1087) then Pope Victor III (†1087), started his monastic life.

The Holy Trinity at Cava was involved in the reconfiguration of the whole monasticism of Salerno, operation led by Prince Guaimario III (998–1027) and Prince Guimario IV (1027–1052). The juridical organization of the Holy Trinity was inspired by Cluny's model, especially under Abbot Peter, Alferius' nephew. The monastery was directly subjected to the Holy See, thus it was independent from the political authority of the Bishop of Salerno. Following the example of Cluny, the monastery federated many small Latin and Greek-Byzantine monasteries around itself, in the so-called *Ordo Cavensis*, imposing its power over a very large and homogeneous area (Penco 1985: 185–187).

In Benevento, as well as in Salerno (eighth century), monasticism developed under the great impulse of the Longobards – converted to Christianity in the late seventh century – and it was deeply influenced by Monte Cassino. The same influence fell over the Northern-Eastern Campania (Teano-Capua), Samnium and Picenum (i.e., Chieti), areas of great economic interests since the age of Abbot Bertharius (856–883) (Penco 1985: 131–141). Abbot Bertharius had failed in his attempt to unite the Southern Italy dominions against the Saracens who, coming from Sicily and from the Emirates of Taranto (840–880) and Bari (847–871), were devastating this part of Italy. As a consequence, the Muslims could easily sack Subiaco (829–830), Tivoli, the Roman country (876), and the Neapolitan borders (812–861/865), destroying the Monasteries of St. Modestus in Benevento (ca. 850), S. Vincenzo al Volturno (881), and Monte Cassino (883).

The Monastery of S. Vincenzo had been built around 703 near the source of the river Volturno, in the Dukedom of Benevento, and organized according to St. Benedict Rule. After its destruction, the surviving monks fled to Capua, where they lived until 915, when the Monastery of S. Vincenzo was finally restored. The choice made by the monks was influenced by the coeval relocation from Teano to Capua of the Monte Cassino's community, which was supported by Longobard authorities. In the following decades, S. Vincenzo took care the political and economic reorganization of the monastery. Around 950 its properties were rearranged in the so-called *Terra sancti Vincentii*. Thanks to some privileges granted by popes and emperors, the monastery gained great juridical and spiritual autonomy (tenth to eleventh century). However, after the middle of the eleventh century, S. Vincenzo al Volturno suffered from the great political influences of Monte Cassino, thus it gradually fell into decadence (Kehr 1935: 245–247; Marazzi 2010: 191–200).

The Monastery of Monte Cassino had been restored by Aligernus around 950. As well as S. Vincenzo, also Monte Cassino managed an efficient organization of the *Terra sancti Benedicti*, first under Aligernus and then under Abbots Theobaldus (1022–1035) and Richerius (1038–1055), who improved what was done by their predecessor. This was the apogee of Monte Cassino, which could impose itself as a leader in the political reorganization of Southern Italy. With the capitulation of Bari to the Normans (1071), Byzantium was forced to leave Italy to the Normans, while the Great Schism of 1054 had built the precondition that will lead to the political break between Rome and Byzantium at the time of the Fourth Crusade (1202–1204), when the Westerners sacked and subjugated Constantinople. The Normans, once they had gained the support of the Papacy, initiated the invasion of Mezzogiorno.

Abbot Desiderius was the promoter of the alliance between the Papacy and the Normans and he constantly worked to defend it, especially under the Papacy of Gregory VII (1073–1085), when it seemed to have been almost irreparably compromised. This is why when Desiderius finally accepted the papacy in Capua (1087), he moved to Rome escorted by the Normans, who freed the city from his enemies (Bloch 1986: 84ss.; Cowdrey 1983: 99ss.; Penco 1985: 222–226).

Calabria, Lucania, and Apulia

The process of hellenization reached Calabria at the beginning of the Byzantine dominion, while in Lucania hellenophones' settlements are attested only after the tenth century, after the Byzantine re-conquest (late ninth century) and at the time of the creation of the Theme of Lucania (975–1031/1043), which was located at the border of the new Theme of Calabria. The Italo-Greek Monasticism of Calabria and Lucania mainly flourished in four different areas: Saline, the present area formed by Oppido Mamertina, Palmi and Gioia Tauro in Southern Calabria; Merkourion, which had its center in the hinterland of Scalea and in the Lao River's valley, in Northen Calabria, which was well known for the settlements of St. Fantino the Younger (tenth century) and St. Nilus of Rossano; Latinianon, which was located in the Sinni River's valley, on the Eastern side of Lucania; and the hinterland of Lagonegro (prov. Potenza), in the Western side of Lucania. However, Greek-Byzantine monasteries are also attested in other parts of these regions (i.e., hinterland of Mesiano near Vibo Valentia, Mount Mula near Cassano) and a few have been reported in the Mid-Northen Apulia (Borsari 1963: 40–76; Burgarella 1982: 57–71).

The Italo-Greek monasteries were usually self-sufficient economic centers (von Falkenhausen 1978: 29–55). Their economic reorganization corresponds to the one of the main Latin monasteries in Northern Mezzogiorno – S. Vincenzo al Volturno and Monte Cassino – in terms of chronology and methods. The Italo-Greek monasteries followed the cenobitical rule, but their monks were also allowed to live as hermits for limited periods of time. Concerning the Italo-Greek settlements, it is also worth mentioning the "monk-owners" called kelliotes settled in Oppido (eleventh century), who lived in their own properties and conducted a life of work and prayer. They did not depend on any monasteries but on the local bishop (Burgarella 1982: 57–71).

The Monasticism of Latin Lucania and Apulia is richly documented only from the eleventh century, time of the first Normans' settlement; little information can be gathered from High-Medieval sources. The Normans were generally supportive of Monte Cassino, S. Vincenzo al Volturno, and Cava while extending their religious and political influence over those territories.

Venosa, a native city of the Latin poet Horatius, in Lucania, hosted the Abbey of Holy Trinity. The abbey was allegedly founded or re-founded by Drogon of Hauteville, Lord of Venosa after 1043: the evidence of its existence is not dated earlier than 1044. It gained great power around the end of the eleventh century when it became juridical independent, but it soon fell into decadence. It was then subjected to Cava de' Tirreni (1139), which reformed the monastery and restored its monastic life (Houben 1987: 86–108). The Holy Trinity of Cava further extended its influence on Venosa after having conquered Salento and Southern Apulia (late eleventh century) thanks to the support granted by the Normans of Apulia (Penco 1985: 239).

The development of a monastic life across Mount Gargano, Matera, Avellino, and Nola is particularly related to two influent people who operated during the first half of the eleventh century: St. William of Vercelli (†1142) and St. John of Matera (†1139). St. William founded Montevergine (prov. Avellino), which was born as a monastic community of hermits gathered around him. During a long pilgrimage across Mezzogiorno, St. William, according to his hagiography, established several monasteries in Campania thanks to the support of King Roger II of Sicily, his protector and friend. Montevergine,

however, lived its apogee after St. William's death, when it became a Benedictine monastery. St. John of Matera and St. William had intertwined lives. St. John was the founder of St. Mary of Pulsano on Mount Gargano and of other monasteries in Northen Apulia: all of the monasteries founded by him adopted a severe and elaborated version of the St. Benedict Rule (Penco 1985: 231–239; Fonseca 2008: 75–99; Andenna: 266ss.).

Feminine Monasticism

Since the 1970s, feminine monasticism has acquired its specific autonomy in academic research, after having been partially ignored or superficially studied before. This has allowed us to gain a deeper understanding of the phenomena as long as the studies had not been influenced by political needs. Limited data, however, have been collected on the feminine monasticism of the High-Middle Ages (Andenna 2001: 131–189); hopefully future research will fill this gap.

A few and often not reliable elements are known about high-medieval feminine monasticism of Apulia and Lucania. Only since the Norman age, a relevant network of feminine monasteries developed and flourished; most of them were independent monasteries that followed the St. Benedict Rule (De Leo 1983–1984: 283–324; Fonseca 2008: 11–21, 45–74). Little is known about the Italo-Greek feminine communities: we do not have enough documentation regarding those communities in the Byzantine age and it is only possible to find a small amount of information about them in the saints' hagiographies. More sources have been found concerning the Greek-rite feminine monasteries of Mezzogiorno from the post-Byzantine centuries, when the characteristics of the Italo-Greek monasticism did not change under the authority of Rome (Fonseca 2008: 23–43).

Many feminine monasteries in Mezzogiorno have been documented in the Gregorian age. An officer, an ecclesiastic or a layman, was responsible for the economic management of those monasteries. The officer granted ownership over the monastery and its properties and he was supposed to be its protector, assuring that the monastery received fiscal exemptions (Greg. Mag. *Reg. Epist.* I, 67; IV, 9 = Recchia 1996a: 246–247; Recchia 1996b: 30–35). It is a kind of Byzantine ἔφορος (tenth century), person charged with the administration of feminine Greek-rite monasteries. The presence of an officer (*praeceptor*) is still attested for Neapolitan feminine monasteries – i.e., S. Gregorio Armeno – at the beginning of the eleventh century, while in the following centuries the task to preserve the autonomy of those monasteries was transferred to the main families of the Neapolitan aristocracy (Bozzarello 2017: 181–184).

Cross-References

- ▶ Baths and Bathing, Greek
- ▶ Baths and Bathing, Roman
- ▶ Italy: Medieval Archaeology
- ▶ Naples, Iconoclasm in (731/732–800)
- ▶ Sicily and Magna Graecia, Archaeology of

References

Alberigo, G., ed. et al. 1991. *Conciliorum Oecumenicorum Decreta*, consulenza di H. Jedin, ed. bil., trad. it. A. Nicora Alberigo. Bologna: EDB.

Andenna, G., ed. 2001. *Dove va la storiografia monastica in Europa? Temi e metodi per lo studio della vita monastica e regolare in età medievale alle soglie del terzo millennio, Atti del Convegno internazionale (Brescia-Rodegno, 23–25 marzo 2000)*. Milano: Vita e Pensiero.

Baldi, D., ed. 2015. *Atanasio di Alessandria, Vita di Antonio (Collana di testi patristici, 241)*. Roma: Città Nuova.

Bartelink, G.J.M., et al., eds. 1981[3]. *Atanasio, Vita di Antonio (Scrittori greci e latini)*, 1981[3]. Roma-Milano: Mondadori.

Bloch, H. 1986. *Monte Cassino in the middle ages*. Vol. I (parts I–II). Cambridge: Harvard University Press.

Borsari, S. 1963. *Il monachesimo bizantino nella Sicilia e nell'Italia meridionale prenormanne*. Napoli: Istituto Italiano per gli Studi Storici.

Bozzarello, L. 2015. Enti e politiche assistenziali nel ducato bizantino di Napoli. *Aiônos. Miscellanea di studi storici* 19: 47–65.

Bozzarello, L. 2017. *Napoli bizantina. Aspetti politici e religiosi*. Unpublished PhD dissertation, Università della Calabria.

Burgarella, F. 1982. Aspetti del monachesimo greco nella Calabria bizantina. In *Per una idea di Calabria. Immagini e momenti di storia calabrese, Atti del Convegno (Cosenza, 27–28 novembre 1981)*, ed. P. Falco and M. De Bonis, 57–71. Cosenza: Ed. Periferia.

Capasso, B. 1881. *Monumenta Neapolitani Ducatus historiam pertinentia*. Vol. 1. Napoli: Regio Typ. F. Giannini.

Cilento, N. 1969. La cultura e gli inizi dello studio. In *Storia di Napoli. volume 2/2: Alto Medioveo*, ed. E. Pontieri et al., 521–639. Napoli: Società Editrice Storia di Napoli.

Costanza, S., ed. 1981. *Vittore di Vita. Storia della persecuzione vandalica in Africa (Collana di Testi Patristici, 29)*. Roma: Città Nuova.

Cowdrey, H.E.J. 1983. *The age of abbot Desiderius: Montecassino, the papacy and the Normans in the eleventh and early twelfth centuries*. Oxford: Clerendon Press.

Creytens, R. 1965. La Riforma dei monasteri femminili dopo i Decreti Tridentini. In *Il Concilio di Trento e la Riforma Tridentina, Atti del Convegno storico internazionale (Trento, 2–6 settembre 1963)*, ed. H. Jedin et al., vol. 1, 45–84. Herder: Roma-Freiburg-Basel-Barcellona-Wien.

De Leo, P. 1983–1984. L'esperienza monastica benedettina femminile in Puglia nel Medioevo. Aspetti e problemi. In *L'esperienza monastica benedettina e la Puglia, Atti del Convegno di studio in occasione del XV centenario della nascita di S. Benedetto (Bari-Noci-Lecce-Picciano, 6–10 ottobre 1980)*, ed. C.D. Fonseca, vol. 1, 283–324. Galatina: Università degli Studi di Lecce.

Feniello, A. 2011. *Napoli. Economia e società (902–1137) (Nuovi studi storici, 89)*. Roma: Istituto Storico Italiano per il Medioevo.

Fonseca, C.D., ed. 2008. *Il monachesimo femminile tra Puglia e Basilicata, Atti del Convegno di studi promosso dall'Abbazia benedettina barese di Santa Scolastica (Bari, 3–5 dicembre 2005)*. Bari: Edipuglia.

Galatariotu, C. 1988. Byzantine women's monastic communities the evidence of the Typika. *Jahrbuch der österreichischen Byzantinistik* 38: 283–290.

Genovese, A. 2012. *Eugippio Abate. Opere: Vita di san Severino, La Regola, Estratti dalle opere di sant'Agostino (Scrittori della Chiesa di Aquileia 7)*. Roma-Gorizia: Città Nuova-Società per la conservazione della Basilica di Aquileia.

Giovanelli, G., ed. 1966. *Vita di S. Nilo. Fondatore e patrono di Grottaferrata*. Grottaferrata: Badia di Grottaferrata.

Hoffmann, H., ed. 1980. *Die Chronik von Montecassino (MGH, SS rer. Lang.)*. Hannover: Hahn.

Houben, H. 1987. *Medioevo monastico meridionale (Nuovo Medioevo, 32)*. Napoli: Liguori Editore.

Kazhdan, A.P., Talbot, A.-M., Cutler, A. (ed) et al. 1991. The oxford dictionary of Byzantium. New York/Oxford: Oxford University Press.

Kehr, P.F. 1935. *Italia pontificia. Vol. 8: Regnum Normannorum – Campania*. Berlin: Weidmann.

Lapidge, M., and P. Chiesa, ed. 2008. *Beda, Storia degli inglesi*. Vol. 2 (Scrittori greci e latini). Roma-Milano: Fondazione Lorenzo Valla-Mondadori.

Luzzati Laganà, F. 1982. Le firme greche nei documenti del Ducato di Napoli. *Studi medievali* 3ªs. a. 32 f. 2: 729–752.

Marazzi, F. 2010. San Vincenzo al Volturno dal sacco arabo all'Età Normanna (X-XII secolo): Riposizionamento politico e ristrutturazione materiale. In *Il Molise medievale. Archeologia e Arte*, ed. C. Ebanista and A. Monciatti, 191–200. Firenze: All'Insegna del Giglio.

Morini, E. 1999. *Monachesimo greco in Calabria. Aspetti organizzativi e linee di spiritualità (Quaderni della Rivista di Bizantinistica, 15)*. Bologna: Lo scarabeo.

Pelliccia, G., and G. Rocca, eds. 1974–2003. *Dizionario degli Istituti di Perfezione*. VOLL. 10. Roma: Edizioni Paoline.

Penco, G. 1985. *Storia del monachesimo in Italia. Dalle origini alla fine del Medioevo (Complementi alla Storia dell Chiesa diretta da H. Jedin)*, ed. E. Guerriero. Milano: Jaka Book.

Pertusi, A. 1965. Aspetti organizzativi e culturali dell'ambiente monacale greco dell'Italia meridionale. In *L'Eremitismo in Occidente nei secoli XI e XII: problemi e ricerche, Atti della seconda settimana internazionale di studio (Mendola, 30 agosto – 6 settembre 1962)*, ed. G. Tabacco et al. Milano: Università del Sacro Cuore.

Pricoco, S., ed. 2011. *La Regola di san Benedetto e le Regole dei Padri*. Milano: Mondadori.

Recchia, V., ed. 1996a. *San Gregorio Magno. Lettere. Vol. 1 (Opere di Gregorio Magno, V/1)*. Roma: Città Nuova.

Recchia, V., ed. 1996b. *San Gregorio Magno. Lettere. Vol. 2 (Opere di Gregorio Magno, V/2)*. Roma: Città Nuova.

Sansterre, J.-M. 1995. Recherches sur les ermites du Mont-Cassin et l'érémitisme dans l'hagiographie cassinienne. *Hagiographica* 2: 57–92.

Sansterre, J.-M. 1988. *Le monachisme byzantin à Rome*, in *Bisanzio, Roma e l'Italia nell'alto medioevo*. XXXIV Settimana di studio del Centro Italiano di Studi sull'Alto Medioevo (Spoleto, 3–9 aprile 1986), 701–750. Spoleto: CISAM.

Talbot, A.-M.M. 1985. A comparison of the monastic experience of byzantine men and women. *Greek Orthodox Theological Review* 30 (1): 1–20.

Tobler, T., and A. Molinier, eds. 1879. *Itinera Hierosolymitana et descriptiones Terrae Sanctae*. Vol. 1, 241–281. Genevae: J.G. Fick.

Von Falkenhausen, V. 1978. *Aspetti economici dei monasteri bizantini in Calabria (sec. X-XI), in Calabria bizantina. Aspetti sociali ed economici, Atti del terzo incontro di Studi bizantini (Reggio Calabria-Bova, 4–5 maggio 1974)*, 29–55. Reggio Calabria: Parallelo 38.

Vuolo, A., ed. 1987. *Una testimonianza agiografica napoletana: il 'Libellus miraculorum s. Agnelli' (sec. X)*. Napoli: Edizioni Scientifiche Italiane.

Waitz, G., ed. 1878. *Gesta episcoporum Neapolitanorum* (MGH SS rer. Lang.), 398–439. Hannover: Impensis Bibliopolii Hahniani.

Further Readings

Burgarella, F. 1988. Bisanzio in Sicilia e nell'Italia meridionale: i riflessi politici. In *Dall'esarcato di Ravenna al tema di Sicilia*, ed. A. Guillou and F. Burgarella, 249–370. Torino: UTET.

Burgarella, F. 2002. L'eparchia di Mercurio: territorio e insediamenti. *Rivista di Studi Bizantini e Neoellenici* 39: 59–92.

Corsi, P. 1984. I monasteri greci femminili e la loro organizzazione giuridica: alcuni esempi. In *Le abbazie nullius. Giurisdizione spirituale e feudale nelle comunità femminili fino a Pio IX, Atti del Convegno di studio (Conversano, 29–30-31 ottobre 1982)*, ed. F. Marangelli, 161–187. Schena: Fasano di Puglia.

Dalena, P. 1996. *Istituzioni religiose e quadri ambientali nel Mezzogiorno medievale*. Cosenza: Due Emme.

Granier, T. 2001. Les échanges culturels dans l'Italie méridionale du haut Moyen Âge: Naples, Bénévent et le Mont-Cassin aux VIIIe-XIIe siècles. In *Actes des congrès de la Société des historiens médiévistes de l'enseignement supérieur public. 32e congrès*, ed. P. Boucheron, 89–105. Dunkerque: Publications de La Sorbonne.

Guillou, A. 1970. La classe dei monaci-proprietari dell'Italia bizantina (Sec. X-XI). Economia e diritto canonico. *Bullettino dell'Istituto Storico Italiano per il Medio Evo e Archivio Muratoriano* 82: 159–172.

Hodges, R. 1987. Scavi a San Vincenzo al Volturno: un centro regionale ed internazionale dal 400 al 1100. In *Archeologia e storia del Medioevo italiano*, ed. R. Francovich, 211–234. Roma: La Nuova Italia Scientifica.

Martin, J.-M. 2005. Hellénisme politique, hellénisme religieux et pseudo-hellénisme à Naples (VIIe–XIIe siècle). *Nea Rhome* 2: 59–77.

Palmieri, S. 1996. Duchi, principi e vescovi nella Longobardia meridionale. In *Longobardia e longobardi nell'Italia meridionale. Le istituzioni ecclesiastiche, Atti del 2° Convegno internazionale di studi promosso dal Centro di Cultura dell'Università Cattolica del Sacro Cuore (Benevento, 29–31 maggio 1992)*, ed. G. Andenna and G. Picasso, 43–100. Milano: Università Cattolica del Sacro Cuore.

Vitolo, G. 1987. Caratteri del monachesimo nel Mezzogiorno altomedievale (secoli VI–IX). In *Montecassino. Dalla prima alla seconda distruzione. Momenti e aspetti di storia cassinese (secc. VI-IX), Atti del II Convegno di Studi sul Medioevo Meridionale (Cassino-Montecassino, 27–31 maggio 1984)*, ed. F. Avagliano, 31–54. Montecassino: Pubblicazioni cassinesi.

Von Falkenhausen, V. 1982. I Bizantini in Italia. In *I Bizantini in Italia*, ed. G. Cavallo et al., 1–135. Milano: Scheiwiller.

Von Falkenhausen, V. 2012. I documenti napoletani come fonte per lo studio delle interferenze greco-latine (IX–XII secolo). In *La lingua dei documenti notarili altomedievali dell'Italia meridionale. Bilancio degli studi e prospettive di ricerca*, ed. R. Sarniciola, P. Greco, and G. Pianese, 107–126. San Vitaliano: Tavolario Edizioni.

Mongolia: Archaeological Heritage

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Introduction

In Mongolia, as in many other areas of the world, the science of archaeology has its origin in the activities of private collectors and foreign explorers. One of the first archaeological discoveries of great significance for Mongolian heritage dates to 1889, when the Russian explorer N. M. Yadrintsev (Russian Imperial Geographical Society) identified the ruins located on the bank of the Orkhon River as those of Kharkhorin (Karakorum), the capital of the thirteenth-century Mongolian Empire. In the same region and during the following years, two scientific expeditions, one led by the Finnish scholar A. Heikel and the other by Russian archaeologist and explorer V. V. Radlov, examined the eighth-century Turkic *Khoshoo Tsaidam* stelae which bear inscriptions in both Turkic runes and Chinese script. Their work allowed for the translation of early Turkish writing and the discovery of the history of the first Turks – a heritage now shared by both Turkish people and Mongolians. During his expedition, V. V. Radlov also carefully recorded numerous stone stelae carved with depictions of flying deer and other symbols through a collection of drawings, thus calling attention to these now famous anthropomorphic Late Bronze Age/Early Iron

Age (mid-second to mid-first millennium BCE) monuments known as "deer stones." The findings of this expedition were published in the late nineteenth century in a four-volume Atlas of Mongolian antiquities – the first of its kind (Radlov 1892–1899).

Following up on these reports, the Russian archaeologist P. K. Kozlov led an expedition to Mongolia in the 1920s in order to excavate high-profile archaeological sites that included the Mongolian imperial capital of Karakorum (thirteenth century CE), the early Turk sites in *Khoshoo Tsaidam* (seventh–eighth century CE), and Noyon-Uul, an elite cemetery belonging to the Iron Age and Xiongnu period (2nd BCE–2nd CE), the first state-like polity to develop in Mongolia.

While these early expeditions laid the foundation for the type of archaeological work that even now continues to a certain degree in Mongolia, that is, traveling around and excavating intriguing burials and monuments of many periods, they also put Mongolia on the archaeological map and showed the country's incredibly rich archaeological heritage that today continues to attract numerous archaeologists and tourists from various countries worldwide.

Key Issues/Current Debates/Future Directions/Examples

The History of the Protection of Mongolia's Archaeological Record

Early evidence for the "protection" (or preservation) of archaeological sites and artifacts in and around Mongolia is rare but can perhaps be traced to the efforts of Peter the Great in the eighteenth century. Indeed, it is Peter the Great who was the first to recognize the artistic value of the artifacts of the steppe nomads that were being looted from thousands of burials across the Inner Eurasian steppes, and he ordered that the looted art from these burials be bought up and sent to St. Petersburg. Certainly this did little to discourage looting and arguably only encouraged it. Nevertheless, this loot formed the basis of the great collection of the Hermitage Museum.

In Mongolia proper, there are stories that mention that in the past, people were fined with livestock for looting or damaging ancient burials, but it is not until 1921, after the People's Revolution, that state policy was formulated for the first time for the protection of historical and cultural heritage. This was done under the management of the newly founded Institute of Literature and Script (later to become the Institute of Science and finally the Mongolian Academy of Sciences) which had the mandate to register, document, and protect historical and cultural heritage. Early on and in accordance with the new policy, the Institute organized research projects in the modern provinces of Töv, Arkhangai, Bulgan, and Övörkhangai where they began to register and document known historical places of importance, such as the monasteries of Saridagiin khiid, Baruun khuree, and Erdene Zuu, Mongolia's oldest Buddhist monastery. Starting in 1935, Prefectural Research Centers were established in every province of Mongolia, and their work has led to a vast amount of documented information on historical and cultural heritage sites throughout the country. Paradoxically, archaeological expeditions in Mongolia during these early times were all directed by foreign explorers, and no laws existed to keep the excavated artifacts inside Mongolia.

The following decade was marked by the Second World War, and although Japanese archaeologists continued to work in Imperial Japanese-controlled areas of Inner Mongolia and Manchuria, little archaeological work was carried out in Soviet-controlled "Outer" Mongolia. As a result, much of the work done in this region during this period was synthetic in nature.

By the 1950s, Soviet archaeology had arrived in Mongolia, and after the Second World War, the great majority of archaeological work there was done by Soviet archaeologists, though some of it was also carried out by European and Japanese scholars. Of particular importance during this time were the archaeological expeditions at Karakorum led by Russian scholar S. V. Kiselev. These excavations were the training ground for the first generation of native Mongolian archaeologists lead by Kh. Perlee and Ts. Dorjsuren. Shortly

after, both Perlee and Dorjsuren would go on to resume excavations at the Xiongnu period Noyon-Uul cemetery – the first Mongolian-led archaeological expedition.

This period also marked another milestone in cultural heritage legislation. In 1941, the Presidium of the State Baga Khural (State Assembly) adopted new rules for the protection, preservation, and regulation of historical and cultural heritage, the most important one being that henceforth monuments and objects of historical and cultural heritage found on the Mongolian territory were recognized as national property. Despite this, no law was in effect to keep the archaeological materials inside the country. Yet during this time and under the administration of Kh. Perlee (Mongolian Academy of Sciences), a database was developed in order to record the results of archaeological excavations. This first "handwritten" database is kept at the Institute of Archaeology, Mongolian Academy of Sciences. For the next 30 years, no changes were made to the legislation regarding the protection of historical and cultural heritage, although in 1964 Mongolia did sign the international UNESCO Convention for the protection of cultural property in the event of armed conflict that was previously adopted at The Hague (Netherlands) in 1954.

It is not until 1970 that the State Assembly adopted a new law for the protection of cultural properties within the Mongolian People's Republic. Although only in effect in its original form until 1994, this new legislation now comprehensively and systematically included all activities related to research, analysis, conservation, preservation, promotion, and dissemination of historical and cultural heritage within Mongolia. This led to a heightened awareness of national heritage and to a period when the Mongolian government commissioned numerous projects that aimed at discovering, registering, and conserving works of historical and cultural significance. Due to these efforts, especially in regard to the dissemination of the information, the outside world gradually started to get to know about Mongolia's unique cultural heritage.

The 1990s marked a turn not only in the political sphere with the fall of the Soviet Union and Mongolia's transition toward democracy but also in cultural heritage protection. In 1994, the State Assembly adopted a Historical Monuments Act which made the vandalism of sites illegal. Unfortunately, the responsibility of enforcing the law and protecting the monuments was left to local residents alone, and though means to finance this new law were included in the legislation – including investment from the state and income from tourism – no moneys were ever made available. Consequently, the looting and destruction of sites continued. Nonetheless, following the guidelines of this Act, the Ministry of Culture established a Center for Cultural Heritage which instituted a unified cultural heritage registration database in 1996. This registry complies with ICOMOS' principles for the recording of monuments and sites as it was ratified by the 11th ICOMOS General Assembly in 1996.

After several amendments made to the 1994 Historical Monuments Act and under the provisions of the 2001 Law on Protecting Cultural Heritage of Mongolia, hundreds of historical and archaeological sites are now officially under the protection of either the Mongolian state, individual provinces (*aimags*), or rural districts (*sums*). In reality, however, there are little differences between these levels of "protection" beyond prestige. Indeed, the level of recognition depends on the historical or cultural significance of a site or monument. But even the ones on the state list do not receive more protection than the ones on the other lists. It is merely more difficult to get permits to conduct archaeological work at these sites. None receive financial support from the government for their protection or conservation, and protecting these sites consists essentially in protecting the natural aspects around the sites and restricting or banning mining and development in the inscribed areas. Some of the most significant sites on the state list of protected monuments are listed and briefly described in Box 1.

Among the most important sites in terms of Mongolian heritage, however, are those located in the Orkhon Valley in central Mongolia. In 2004, the UNESCO World Heritage Committee inscribed the Orkhon Valley Cultural Landscape on the World Heritage List, one of only two inscribed sites to date in Mongolia. The protected region covers an area of about 122 ha and is rich with a diversity of prehistoric and historic sites, including Khar Balgas (the capital of the Uyghur Khanate, which ruled Mongolia from CE 745–854), Karakorum (the great Mongol capital, which was established in 1235 by Chinggis [Genghis] Khan's successor and third son Ögödei Khan), and the sixteenth-century Erdene Zuu monastery (Mongolia's oldest Buddhist monastery, founded in 1586 by Ablai Khan). Interestingly, the colossal grey brick walls that enclose the monastery's compound were constructed using the stones and bricks from the nearby ruined capital of Karakorum City. In collaboration with the Mongolian government, a new museum sponsored by the Japanese government opened its doors in 2010. In addition to exhibiting the findings of various archaeological projects at Karakorum, including those from the 2000–2004 German-Mongolian excavations, the museum's mission is said to include research as well as the collection and preservation of artifacts.

The only other sites on UNESCO's World Heritage List were just added in 2011 after a sustained effort by renowned art historian Esther Jacobson-Tepfer (University of Oregon) and are subsumed under the Petroglyphic Complexes of the Mongolian Altai. These Complexes consist of three rock art sites which display large concentrations of well-preserved petroglyphs and funerary monuments that range in date from the early-mid-Holocene (c. 11,000–6,000 years BP) to the Turkic period (7th–8th c. CE). The three rock art sites, *Tsagaan Salaa-Baga Oigor* (*Ulaankhus sum*), *Upper Tsagaan Gol* (rock arts of Shiveet Mountain), and *Aral Tolgoi* (*Tsengel sum*, *Bayan-Ulgii*), are also included on the list of historical and cultural properties that are under state protection.

Box 1Significant Sites Inscribed on the State List of Protected Monuments

Gandantegchinlen Monastery (1840–)

Located northwest of Ulaanbaatar's city center, this monastery is the center of Mongolian Buddhism and houses the Mongolian Buddhist University. It is one of few monasteries that survived the 1930s Stalinist purges when most monasteries were destroyed. It houses a large library of rare books and manuscripts in Mongolian and Tibetan on Buddhist philosophy, astrology, and medicine.

Bogd Khan's Green Palace (or "Winter Palace")

Located on the south side of Ulaanbaatar, this European-style building was built in 1905 by Tsar Nicholas II of Russia for Öndör Gegeen ("High Lama"), Mongolia's eighth and last religious and political leader. It is now a museum.

Bilge Kagan and Kül Tegin stelae

These are two of the most famous of Mongolia's stone stelae. They are both located near Kharkhorin (Karakorum) City in the Orkhon Valley, date from 732 CE, and bear inscriptions in both Turkic runes and Chinese script. Both are also dedicated to the Turkish Khans who ruled Mongolia between the sixth and eighth centuries. The stelae have been taken under preservation by the Turkish International Cooperation and Development Agency (TIKA) through the construction of a local museum. The National Museum of Mongolia (in Ulaanbaatar) exhibits a copy of the stelae.

Uushgiin Uwur Deer Stone Complex

Located in Khovsgol province, the Uushgiin Uwur Deer Stone Complex includes 18 deer stones. These, as others across western and north-central Mongolia, are associated with sacrificial offerings of horses whose east-facing heads, cervical

(continued)

Box 1Significant Sites Inscribed on the State List of Protected Monuments (continued)

vertebrae, and hooves are buried in a shallow pit below a small circular mound of stones. Often accompanied by stone burial mounds known as *khirigsuurs*, these monuments together form what increasingly seems to be closely related components of a single Late Bronze Age ceremonial complex. The joint Mongolian-Smithsonian Deer Stone Project has carefully documented the Khovsgol deer stones, which includes for the first time three-dimensional records of individual monuments (Fitzhugh 2005).

Xiongnu Period Sites

All important Xiongnu period sites are on the state list, including the elite cemeteries Tsaram (southern Buryatia), Gol Mod 1 and 2 and Noyon-Uul (north-central Mongolia), Takhiltyn Khotgor (western Mongolia), and Duurlig Nars and Bor Bulag (eastern Mongolia).

Conclusion: Current Problems and Prospects

Despite the 1994 Historical Monuments Act, there is unfortunately still very little enforcement of the laws nor a structured monitoring system in place to prevent theft or destruction at important heritage sites. A major problem in establishing a national level protection plan stems not only from a lack of coordination at the government level but from the more basic problem of having a territory the size of Mongolia and only some 50 professional archaeologists to manage the vast numbers of antiquities and sites. Accordingly, many historical and cultural sites continue to be destroyed by human activity and natural decay. For example, physical damage to some monuments has recently increased due to certain worshiping practices. This includes the spraying of milk and butter oil on ancient stone stelae and the practice of wrapping the stones with silk scarves (*khadag*) – a practice which traps in moisture and thus accelerates decay.

More significantly, economic changes in Mongolia in the past 20 years have caused more families to fall below the poverty level, and one way some herders have found to supplement their income has been to sell looted antiquities to tourists. Fortunately, there is an increasing awareness of the problems related to the issue of cultural heritage protection in Mongolia, and a number of national and international efforts for protecting, preserving, and even restoring monuments are in progress.

For example, shepherded by the second author, the recently established Mongolian Tangible Heritage Association (NGO) works at protecting the tangible heritage of Mongolia by working to improve legislation linked to cultural heritage, by communicating and cooperating with international organizations that have the same aims, and by implementing concrete comprehensive projects that strive to protect Mongolia's tangible heritage. One such recent project was the restoration of the *Jargalantiin Am* deer stone site in Khanuy Valley, Arkhangai *aimag*, one of Mongolia's most important deer stone sites yet discovered and soon to be included on the provincial (*aimag*) list of protected sites (Turbat et al. 2011).

Detailed inventory work by Esther Jacobson-Tepfer and colleagues in the Altai region of western Mongolia, as well as work by the members of the Smithsonian Institution's Deer Stone Project, has also done much for digitally recording (and thus preserving) important data regarding rock art sites and other archaeological monuments.

In addition, the arrival of large western mining companies in Mongolia has recently spurred the development of a cultural resource management (CRM) arm in the Institute of Archaeology, in the National Museum of Mongolia, at the National University of Mongolia, at the University of Science and Technology, and at the International Institute of Nomadic Culture. This promises systematic, funded fieldwork and published reports on the archaeology from areas threatened by mining.

International collaborative research projects and support from foreign governments are also playing an important role in cultural heritage preservation. To be sure, to date almost all financial support for Mongolian heritage comes from foreign sources. For example, over the past decade alone, the USA has provided over US $800,000 in nine separate grants under the Ambassador's Fund for Cultural Preservation. As mentioned earlier, the building of museums in the ancient capital city of Karakorum, which house artifacts of national significance, has been sponsored by the Turkish and Japanese governments.

That being said, all these efforts will be for naught without a change in local public attitude toward archaeology and cultural heritage. The National Museum of Mongolia in Ulaanbaatar as well as local provincial museums is playing important roles in this regard by promoting public awareness. However, increasing economic hardship among herders promises to be the biggest challenge to overcome. Clearly, the support of the local population is essential for the protection of cultural heritage, especially given the vastness of the country and the lack of available human and financial resources.

Cross-References

- ▶ Altai: Paleolithic
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Heritage and Archaeology

References

Fitzhugh, W.W., ed. 2005. *American-Mongolian deer stone project: Field report 2005*. Washington, DC: Arctic Studies Center, Smithsonian Institution.

Radlov, V.V., ed. 1892–1899. *Atlas der Alterthümer der Mongolei [Atlas drevnostei Mongolii]. Arbeiten der Orchon-Expedition [Trudy orkhonskoi ekspeditsii]*. St. Petersburg.

Turbat, T., J. Bayarsaikhan, D. Batsukh, and N. Bayarkhuu. 2011. *Deer stones of the Jargalantyn Am*. Ulaanbaatar: Mongolian Tangible Heritage Association NGO, US Embassy in Mongolia, National Museum of Mongolia & Institute of Archaeology MAS.

Mongolia: Paleolithic

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Introduction

The Paleolithic of Mongolia has been investigated for about a century since the original proposition of a Central Asian origin of humans by H. F. Osborn (e.g., 1927). Between 1920 and 1930, explorer R. C. Andrews conducted surveys in the Gobi and the Gobi-Altai regions but failed to find evidence supporting this hypothesis. The first convincing evidence for Pleistocene human occupation is represented by artifacts collected along the Saikhan and Arts Bogd Uul ranges and nearby Orog Nuur Lake. Archaeologist N. C. Nelson, however, could not find anything comparable to the West European Lower Paleolithic (Fairservis 1993). Between 1927 and 1935, the Chinese-Swedish expedition led by explorer S. A. Hedin investigated Mongolia and Northern China. The team's archaeologist F. Bergmann was not more successful in finding grounds for Osborn's hypothesis. In 1949, during a Soviet-Mongolian scientific expedition, A. P. Okladnikov, assisted by N. Ser-Ojav, discovered the Paleolithic site of Molty-nam along the left bank of the Orkhon River, close by the town of Karkhorin (Okladnikov 1978). Other Paleolithic localities were found in the Tola Valley, in the vicinity of Ulaanbaatar, and nearby Mt. Bogdoul. Upper Paleolithic artifacts were reported near the city of Darkhan and along the Khalkin-Gol River. In the 1950s, Ser-Ojav and Mongolian scholars such

as H. Perlee and Ts. Dorsjuren surveyed almost the entire Mongolian territory (Gunchinsuren 2009). They reported finds attributed to the Paleolithic period in the Gobi-Altai region. Russian geologists N. Florensov and N. Skvortsov identified flint quarries with Levallois-Mousterian artifacts in the southern and in the southeastern part of Mongolia. During the 1960s, the cooperation between Okladnikov and Mongolian scholars continued, notably with the excavation of the Molty-nam site (Fig. 1).

In 1969–1970, further surveys in eastern Mongolia also led to the description of "pre-Upper Paleolithic" artifacts, such as pebble tools, from the vicinity of the town of Sainshand (Okladnikov 1978). Starting from 1983, a Soviet-Mongolian expedition directed by A. P. Derevianko surveyed the Valley of the great lakes in western Mongolia, the central and eastern Gobi-Altai district, and the southern ranges of the Khangai Mountains (Derevianko et al. 2000b). Excavations at Orkhon-1 and Orkhon-7 sites, Orog Nuur 1 and 2, or Nariyn Gol-1–17 were carried out in the framework of this project. Starting from 1995, J. W. Olsen, A. P. Derevianko, and D. Tseveendorj initiated the Joint Mongolian--Russian-American Archaeological Expeditions (JMRAAE). This program includes excavations of newly discovered sites in Northern Mongolia and in the Central Gobi region, but also intends to generate chronometric data (Gladyshev et al. 2010a). Numerous sites were documented in the Ikh Tulberiin Gol Valley, and excavations were conducted at the Tolbor 4 site, but also at Tolbor 15. In Central Gobi, cave sites such as Tsagaan-Agui and Chikhen-Agui were excavated by an international team (Derevianko et al. 2004). Between 1999 and 2001, the Dörölj 1 site, located along the Eg River, was excavated by a joint Mongolian-French team led by J. Jaubert (Bertran et al. 2003; Jaubert et al. 2004). This project followed a survey of Paleolithic locations in the Hovd province and a geological reassessment of the Molty-nam geological section. A fossil uncovered at Salkhit, northeast Mongolia, was recognized in 2006 as a human skullcap (Coppens et al. 2008). Since 2010, ongoing study has been devoted to both the morphology of the skull and its geological and chronological position. Furthermore, archaeological surveys are being conducted by J. Braga, N. Teyssandier, D. Tseveendorj, and B. Gunchinsuren in the vicinity of the find. In Khentii province, geoarchaeological researches were recently conducted by M. Izuho and B. Tsogtbaatar at the Khanzat-1 locality and by S. Yi at the site of Rashaan Khad. In 2011, an international team started excavations at the newly discovered site of Tolbor 16, in Bulgan province, under the direction of N. Zwyns,

Mongolia: Paleolithic, Fig. 1 Map with the main stratified sites and human remains mentioned in the text (Modified after NASA World Wind)

S. Gladyshev, and B. Gunchinsuren. All in all, almost a century of research has brought substantial advances in the understanding of Mongolian Paleolithic, and recent projects have yielded promising results that contribute to these efforts.

Definition

The Paleolithic of Mongolia can be defined based on the Eurasian system of division into three main periods: the Lower, Middle, and Upper Paleolithic. The Lower Paleolithic corresponds to the first human occupation of Mongolia and is not yet dated. The Middle Paleolithic would start at the end of the Middle Pleistocene and last until c. 50 ka. The Upper Paleolithic covers a time range from c. 50 ka to the end of the Pleistocene.

Key Issues/Current Debates

The Lower Paleolithic

Previous researches have underlined the difficulty in attributing archaeological material to this period as it often occurs as surface or redeposited assemblages. The presence of a Lower Paleolithic human occupation is inferred from typo-technological descriptions of lithic assemblages, or on the basis of taphonomic features such as the patina. In southwestern Mongolia, the Kholobolchi assemblage was collected during Andrews's expedition (American Natural History Museum collection). It includes moderately patinated artifacts such as choppers and chopping tools, adzes, and flakes, made of metamorphic rocks (quartzite, basanite). The assemblage of Ulan Nor is said to be more evolved and was produced on red jasper (Fairservis 1993). In Eastern Mongolia, Okladnikov pointed out the archaic typological aspects of surface collections from the Sainshand area (Okladnikov 1978). The described pebble implements are associated with vast basins formerly covered by lakes. Okladnikov considered these artifacts as "very similar to the most ancient pebble implements found in Africa and Western Europe." Chopping tools, blocks with bifacially shaped working edges, are reported and have been referred to as "proto-hand axes" or "biface preforms." The latter type of artifact is reported westward, in south-central Mongolia, nearby the city of Dalanzadgad and on the western edge of the Gobi-Altai area. Split pebbles, choppers, and chopping tools were collected from Bayan-Ölgii, the westernmost province of Mongolia, and their ancient age is inferred from the observed patina. Okladnikov (1978) acknowledged, however, that pebble tools occur in various chronological contexts in Siberia. More recently, researches at Tsagaan-Agui Cave, in the Gobi-Altai province, have yielded assemblages of archaic aspect in the lower part of the sequence (Derevianko et al. 2000a). The tool kit includes biface preforms and "spurs," elements that also occur in the surface collections of the Flint Valley (Derevianko et al. 2002). More surprising are the reported "proto-wedge-shaped cores" with bladelet removals and the flake cores similar to the preferential Levallois method. This material has been compared with other assemblages from Lake Balkhash (eastern Kazakhstan) and interpreted as belonging to "Levallois-Acheulean-like" industries. They are tentatively interpreted as evidence for population movements from west to east. The age of human occupation is inferred from radio-thermo-luminescence (RTL) dates derived from layers 5–12 and ranges between 170 and 650 ka. Although an inversion of polarity was detected in the entrance (layer 11) and first interpreted as the Upper Matuyama chron (Derevianko et al. 2000a), the RTL dates are considered much too old. In fact, they could reflect the high residual signals of unbleached sediment particles (Derevianko et al. 2004).

In sum, the cultural and/or chronological attributions of the so-called Lower Paleolithic assemblages in Mongolia remain unclear due to the current lack of contextual data. Therefore, pending new discoveries, the timing and the nature of the earliest human occupation in this region remain uncertain.

The Middle Paleolithic

The recognition of the Middle Paleolithic occupations of Mongolia is complicated by the lack of contextual data available, numerous assemblages

being surface collections. In other words, the problems of definition mentioned for earlier periods also apply to the Middle Paleolithic. As is often the case in Asia, archaic technological features are relatively ubiquitous, and a well-pronounced flake technology occurs in assemblages from various periods. In the absence of a chronological framework, the boundary between the Lower and Middle Paleolithic remains unclear. According to some authors, Levallois technology first occurs among the Acheulean-like assemblages that would later develop toward a Mousterian techno-complex (Derevianko et al. 2000a). The earliest evidence of Levallois-like technology has been reported in the lower part of the section at Tsagaan-Agui, but Middle Paleolithic assemblages are better attested in the middle part of the section starting from 90 to 70 ka. Together with Orog Nuur I-II and Argalant I, it corresponds to the Orog Nuur Levallois-Mousterian variant (Derevianko et al. 2004), also known by the surface assemblages from the Valley of Lakes. The latter are not dated and their chronological assignment is based on their degree of weathering, their patina, and their techno-typological features. The undated material from the localities of Hoit Tsenker gol and Tzakhiriin uzuur, in Western Mongolia, may also represent evidence for Levallois technology (Jaubert et al. 1997). In fact, Mousterian as found in Central Asia (e.g., Teshik-Tash) or the Altai "Sibiryachikha" Mousterian is still unknown in Mongolia. Stronger evidence of Levallois-like technology is documented in Northern Mongolia and is associated with the earliest manifestation of blade production. These assemblages illustrate the shift from the Middle to Upper Paleolithic.

The Upper Paleolithic

The beginning of the Upper Paleolithic in Mongolia is characterized by the spread of blade-based lithic assemblages. The earliest examples have been reported from Northern Mongolia. Using material from recent excavations and newly obtained chronometric data, S. Gladyshev and colleagues have proposed a periodization of the Upper Paleolithic into three main stages (Gladyshev et al. 2010a) (Fig. 2).

The oldest occurrence of Upper Paleolithic technology comes from Horizons 5 and 6 at Tolbor 4. The blade-based assemblages are characterized by the production of massive-to-medium blades with parallel ridges and facetted or plane platforms. Lithic reduction is mainly represented by bidirectional cores with two opposed platforms, with alternate use of the broad and narrow faces, or by genuine volumetric cores. Crested blanks are detached to initialize reduction or to reshape the core convexities. These technical blanks, as well as slabs displaying a specific morphology, are transformed into burin cores for the production of small blades and bladelets. Convergent blades with Levallois morphology are produced in the framework of the

Mongolia: Paleolithic, Fig. 2 View of the Tolbor Valley. (Photo credit N. Zwyns)

blade reduction, but smaller size points also occur. The radiocarbon dates available for these two levels seem to indicate an age c. 40–37 kyr uncal. BP (Gladyshev et al. 2010a). These assemblages are chronologically and technologically similar to the Initial Upper Paleolithic as defined in the Siberian Altai (Zwyns 2012) (Fig. 3).

The second chronological stage includes Early Upper Paleolithic assemblages from Tolbor 15, Horizons 5–7, Tolbor 4, Dörölj 1, Chikhen-Agui Rockshelter, and Chikhen 2 (Gladyshev et al. 2012). Reconstructed reduction sequences mainly show production of large-to-medium size blades from unidirectional volumetric blade cores. The blanks show an increase in plain platforms prepared by thin abrasion, likely representing the generalization of soft-hammer use. Burin-core technology is absent; however, a tendency to "microlithization" is expressed by the production of bladelets detached from truncated-facetted or narrow-faced cores. The occasional occurrence of elements such as carinated end scrapers and bladelets with marginal retouch is considered as a typical feature for these assemblages dated between 33 and 26 ka uncal BP. Orkhon-1 (units 1) and Orkhon-7 (unit 1) seem to represent the latest assemblage of this chronological group, dated to between 26 and 23 kyr uncal. BP.

The third chronological group is known only from the middle Selenga Valley with the Horizons 3 and 4 from Tolbor 15 (Gladyshev et al. 2010b). Bladelets are produced by percussion and by pressure flaking from micro-cores of fine-grained raw material. The only date available for this group indicates an age c. 15–14 ka uncal. BP and as such represents the only Paleolithic occupation directly dated post-Late Glacial Maximum (Fig. 4).

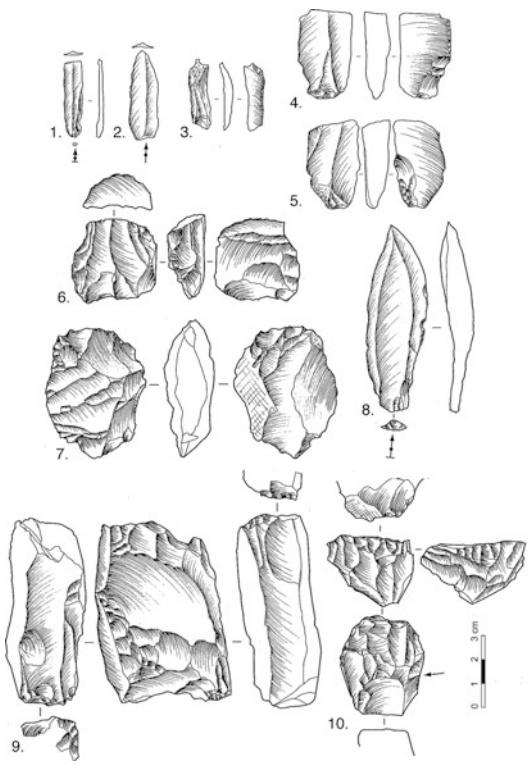

Mongolia: Paleolithic, Fig. 3 Tolbor 15, Early Upper Paleolithic artifacts from Horizons 6 and 7. (*1*, *2*) Small laminar blanks. (*3–5*) Retouched laminar blanks. (*6*, *7*, *10*) Bladelet cores. (*8*) Blade blanks. (*9*) Narrow-faced blade core. (Drawings by N. Zwyns)

Human Fossils

The skullcap from the Salkhit Valley, in northeast Mongolia, is so far the only Pleistocene human fossil found in Mongolia. It consists of a frontal with partial nasals and parietal bones of unclear taxonomic affiliation. Initially referred to as *Mongolanthropus* (Tseveendorj et al. 2006), its relatively robust morphology was also described as a combination of *Homo erectus*, *Homo neanderthalensis*, and Asian archaic *Homo sapiens* features (Coppens et al. 2008). No archaeological material was found associated with the fossil, and although the fauna found in the vicinity would indicate a Pleistocene age, numerous questions remain regarding the context of the find. The reassessment of the geological context, the direct dating, and detailed morphological analysis of the fossil being conducted by J. Braga, D. Tseveendorj, and B. Gunchinsuren are currently ongoing.

Future Directions

Numerous questions remain concerning the timing of the earliest peopling of Mongolia. Although the presence of *Homo erectus* in the region is assumed, in situ evidence of Lower

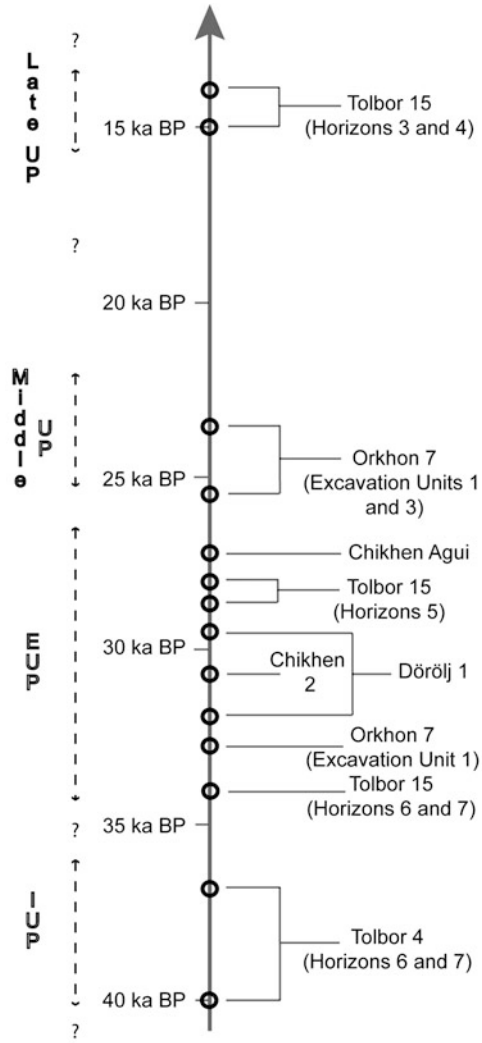

Mongolia: Paleolithic, Fig. 4 Periodization of the Mongolian Upper Paleolithic based on chronometric data. (Modified after Gladyshev et al. 2010)

Paleolithic occupations is rather elusive, and no systematic production of bifaces of Acheulean type is documented. Current understanding of Middle Paleolithic human occupation of Mongolia reflects similar problems. Levallois technology is clearly documented in surface collections but is far less represented by in situ examples. The origin and the processes of development of this technology are still poorly understood, and the makers of the Middle Paleolithic assemblages are still unknown. In southern Siberia, the recent sequencing of a previously unknown genome seemingly indicates that a population of archaic hominins, known as the Denisovans, occupied a vast territory ranging from the Siberian Altai to Australia until the Late Pleistocene. Mongolia overlaps with the geographical range of the Denisovans and therefore appears to be a key area for our understanding of Northeast Asia. So far, not much is known about the morphology, the timing of emergence, and the material culture of these enigmatic hominins. The earliest appearance of blade assemblages and the subsequent spread of microblade technology could suggest cultural contacts with the Altai and probably with northern China during a period that corresponds to the first appearance of modern humans in Southeast Asia. Furthermore, the appearance and development of microblades produced by pressure flaking also underline the relevance of Mongolia in the debate concerning the peopling of America (Gladyshev et al. 2010b).

Addressing key issues regarding the role played by exogenous cultural influences and environmental factors in the development of the Mongolian Paleolithic requires the acquisition of an extensive data set. Intensive dating programs such as the one provided by the JMRAAE project stand as the first breakthrough in the Paleolithic periodization of Mongolia (Gladyshev et al. 2010a) and are examples of the kind of efforts that will be pursued in forthcoming years. Beyond historico-cultural issues are numerous behavioral, ecological, and environmental questions that the results of ongoing and future field projects will help to address.

Cross-References

- ▶ Altai: Paleolithic
- ▶ Crimean Middle Paleolithic
- ▶ Crimean Upper Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ European Middle Paleolithic: Geography and Culture
- ▶ *Homo erectus*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*

▶ Insular Southeast Asia in the Lower Paleolithic
▶ Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic
▶ Mousterian Industry Tradition
▶ Northern and Central Asia: Culture During the Lower Paleolithic Era

References

Bertran, P., M. Fontugne, and J. Jaubert. 2003. Permafrost aggradation followed by brutal degradation during the upper pleniglacial in Mongolia: The probable response to the H2 Heinrich event at 21 kyr BP. *Permafrost and Periglacial Processes* 14: 1–9.

Coppens, Y., D. Tseveendorj, F. Demeter, T. Turbat, and P.-H. Giscard. 2008. Discovery of an archaic *Homo sapiens* skullcap in northeast Mongolia. *Comptes Rendus Palevol* 7: 51–60.

Derevianko, A.P., J.W. Olsen, D. Tseveendorj, A.I. Krivoshapkin, V.T. Petrin, and P.J. Brantingham. 2000a. The stratified cave site of Tsagaan Agui in the Gobi Altai (Mongolia). *Archeology, Ethnology and Anthropology of Eurasia* 1: 23–36.

Derevianko, A.P., V.T. Petrin, D. Tseveendorj, E.V. Deviatkin, V.E. Larichev, R.S. Vasilievsky, A.N. Zenin, and S.A. Gladyshev. 2000b. Kamennyi vek Mongolii: Paleolit i neolit severnogo poberezhia Doliny Ozer [*The Stone age of Mongolia: Palaeolithic and Neolithic of the northern shores of the Valley of Lakes*]. Novosibirsk: Institute of Archaeology and Ethnography SBRAS (in Russian with summary in English).

Derevianko, A.P., A.N. Zenin, J.W. Olsen, V.T. Petrin, and D. Tsevendorj. 2002. *Paleoliticeskie kompleksy kremnevoj doliny (gobijskij altaj)* [*The Stone Age of Mongolia: Paleolithic assemblages from Flint Valley (Gobi Altai)*]. Novosibirsk: Institute of Archaeology and Ethnography SBRAS (in Russian with summary in English).

Derevianko, A.P., P.J. Brantingham, J.W. Olsen, and D. Tseveendorj. 2004. Initial Upper Paleolithic blade industries from the north-central Gobi Desert, Mongolia. In *The early Upper Paleolithic beyond western Europe*, ed. J. Brantigham, P.S.L. Kuhn, and K.W. Kerry, 207–222. Berkeley: University of California Press.

Fairservis, W.A. 1993. *Archaeology of the southern Gobi of Mongolia*. Durham: Carolina Academic Press.

Gladyshev, S., J. Olsen, A.V. Tabarev, and Y.V. Kuzmin. 2010a. Chronology and periodization of Upper paleolithic sites in Mongolia. *Archaeology, Ethnography and Anthropology of Eurasia* 38: 33–40.

Gladyshev, S.A., A.V. Tabarev, and J.W. Olsen. 2010b. Origin and evolution of the late Paleolithic microindustry in northern Mongolia. *Current Research in the Pleistocene* 27: 38–39.

Gladyshev, S.A., J.W. Olsen, A.V. Tabarev, and A.J.T. Jull. 2012. The Upper Paleolithic of Mongolia: Recent finds and new perspectives. *Quaternary International* 281: 36–46.

Gunchinsuren, B. 2009. Introduction into Stone Age of Mongolia. In *Current archaeological research in Mongolia. Papers from the First International Conference on 'Archaeological Research in Mongolia', held in Ulaanbaatar, August 19th–23rd, 2007*, ed. J. Bemman, H. Parzinger, E. Pohl, and D. Tseveendorj, 21–26.

Jaubert, J., P.H. Giscard, Z. Batsaikhan, D. Erdenebaatar, and C. Servelle. 1997. Contribution à la connaissance du Paléolithique de Mongolie: etude de sites de l'Aimak de Hovd (Altai Mongol). *L'Anthropologie* 101: 419–447.

Jaubert, J., P. Bertran, M. Fontugne, M. Jarry, S. Lacombe, C. Leroyer, E. Marmet, Y. Taborin, and B. Tsogtbaatar. 2004. Le Paléolithique supérieur ancien de Mongolie: Dörölj 1 (Egiin Gol). Analogies avec les données de l'Altai et de Sibérie. In *Section 6:le Paléolithique supérieur/The Upper Palaeolithic, sessions générales et posters. Actes du XIVéme Congrés de l'U.I.S.P.P., Université de Liége, Belgique, 2–8 sept. 2001*. British Atchaeological Reports International series 1240, ed. M. Dewez, P. Noiret, and E. Teheux, 225–241. Oxford: Archaeopress.

Okladnikov, A.P. 1978. The Paleolithic of Mongolia. In *Early Paleolithic in South and East Asia*, ed. F. Ikawa-Smith, 317–325. Paris.

Osborn, H.F. 1927. Recent discoveries relating to the origin and antiquity of man. *Science New Series* 65 (1690): 481–488.

Tseveendorj, D., N. Batbold, and T. Amgalantugs. 2006. Mongolanthropus was discovered in Mongolia. *Studia Archaelogica Instituti Archaeologici Academia* 23 (1): 5–16.

Zwyns, N. 2012. *Laminar technology and the onset of the Upper Paleolithic in the Altai, Siberia. Studies in human evolution*. Leiden: Leiden University Press.

Further Reading

Bemman, J., B. Ahrens, C. Grutzner, R. Klinger, N. Klitzsch, F. Lehmann, et al. 2011. Geoarcheology in the steppe: First results of the multidisciplinary Mongolian-German survey project in the Orkhon Valley, central Mongolia. *Studia Archaelogica Instituti Archaeologici Academia* 30 (5): 69–97.

Derevianko, A.P. 2001. The Middle to Upper Paleolithic transition in the Altai (Mongolia and Siberia). *Archaeology, Ethnology and Anthropology of Eurasia* 2 (3): 70–103.

Derevianko, A. P., and A.V. Kandyba. 2009a. Arkeologicheskii kompleks pamiatnikov srednei gorii verknego paleolita Orkhon-1 i Orkhon-7 [Mongolia archeological complexes from the Middle and Upper Paleolithic sites of Orkhon-1 and Orkhon-7]. *Problems of Archeology, Ethnography and Anthropology in*

M

Siberia and Neighboring Territories 16: 111–16 (in Russian).

Derevianko, A. P., and A.V. Kandyba. 2009b. K voprocy o perekode srednego paleolita k verknemy na territorii mongolii: Resultatii poslednikh isslodevanii [On the Middle to Upper Paleolithic transition in Mongolian territory]. *Problems of Archeology, Ethnography and Anthropology in Siberia and Neighboring Territories* 15: 117–22 (in Russian).

Derevianko, A.P., J.W. Olsen, D. Tseveendorj, V.T. Petrin, A.N. Zenin, A.I. Krivoshapkin, et al. 1996. *Archaeological studies carried out by the joint Russian-Mongolian-American expedition in Mongolia in 1995*. Novosibirsk: Institute of Archaeology and Ethnography SBRAS.

Derevianko, A.P., A.N. Zenin, E.P. Rybin, S.A. Gladyshev, A.A. Tsybankov, J.W. Olsen, et al. 2007. The technology of early Upper Paleolithic lithic reduction in northern Mongolia: the Tolbor-4 site. *Archaeology, Ethnology and Anthropology of Eurasia* 29 (1): 16–38.

Derevianko, A.P., J.W. Olsen, D. Tseveendorj, S.A. Gladyshev, T.I. Nokhrina, and A.V. Tabarev. 2008. New insights into the archeological record at Chicken Agui rockshelter (Mongolia). *Archaeology, Ethnology and Anthropology of Eurasia* 34 (2): 2–12.

Izuho, M., B. Tsogtbaatar, T. Yamaoka, K. Hayashi, and A. Enkhtor. 2009. Preliminary report of geoarchaeological investigation at Khanzat-1, eastern Mongolia. In *Current archaeological research in Mongolia. Papers from the First International Conference on 'Archaeological Research in Mongolia',held in Ulaanbaatar, August 19th-23rd, 2007*, ed. J. Bemman, H. Parzinger, E. Pohl, and D. Tseveendorj, 47–54.

Kolomiets, V.L., S.A. Gladyshev, E.V. Bezrukova, E.P. Rybin, P.P. Letunova, and A.A. Abzaeva. 2009. Environment and human behavior in northern Mongolia during the Upper Pleistocene. *Archaeology, Ethnology and Anthropology of Eurasia* 37 (1): 2–14.

Lbova, L.V. ed. 2005. *Paleoliticheskie Kultury Zabaikalya I Mongolii* (*Novye Fakty, Metody I Gipotezy*). [*Paleolithic cultures in Transbaikal and Mongolia* (New facts, methods and hypothesis)]. Novosibirsk: Institute of Archaeology and Ethnography SBRAS.

Rybin, E.P., S.A. Gladyshev, and A.A. Tsybankov. 2007. Vozniknovenje i razvitie 'otsepovik' industrii rannei porii verknego paleolita cevernoi mongolia [Emergence and development of a new early Upper Paleolithic industry in northern Mongolia]. In *Severnaya Evrasia v Anthropologenie. Chelovek Paleolitechnologii, Geoecologia, Ethnografii i Anthropologii*, 137–152 (in Russian).

Slavinsky V.S., and A.A. Tsybankov. 2006. Rekonstruktsiya tekhnologii rasschepleniya kamnya tekhnokompleksa Orkhon-7 (raskop 1), Yuzhnyi Khangai (po dannym remontazha) [Reconstruction of the flaking technology from the Orkhon-7 (excavation 1) technocomplex, southern Khangai (from refits)]. In *Chelovek i prostranstvo v kulturakh kamennogo veka Evrazii*, 151–173. Novosibirsk: Izd. IAE SO RAN (in Russian).

Monte Albán (Zapotec): Geography and Culture

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Introduction

Monte Albán (500 BCE–CE 700) was the most important regional center of the Oaxacan region and political capital of the Zapotec. Its location on the top of a mountain at 400 m above the level of the Valley of Oaxaca was a defensive but also a valuable ideological aspect for the ruling elite. In 1987 Monte Albán and the city of Oaxaca were declared by UNESCO (United Nations Educational, Scientific and Cultural Organization) as World Cultural Heritage. Today, a great percentage of the central, ceremonial, and administrative structures and plazas has been restored and constitutes a great example of the political and social organization of the Zapotec culture in pre-Hispanic times but also a major touristic attraction.

Definition

Monte Albán was one of the first cities in Ancient Mexico and is today one of the archaeological zones that most impact the visitor by the dimensions of the Grand Plaza surrounded by temples and structures and above all by its location at the top of a mountain at the center of the Valley of Oaxaca. Monte Albán reached at its maximum development a population of 35,000 people; however, its founding, growth, and splendor as the capital of the Zapotec were the result of a long process of survival and colonization of the first inhabitants of the region and later of organizational strategies of the elites in the three valleys forming the great Valley of Oaxaca.

Key Issues/Current Debates/Future Directions/Examples

The foundation of Monte Albán toward the year 500 BCE. as the Zapotec capital was part of a process of economic and political integration as well as great growth and population concentration, which in turn increased the levels of social inequality in the region. During the previous phases, the dominant center was San José Mogote with other minor settlements around this site; however, between the year 500 and 300 BCE., San José Mogote lost almost its entire population and a new level of hierarchy was created with Monte Albán with over 155 new settlements around the cite (Blanton 1978: 87–91; Flannery and Marcus 1983) (Fig. 1).

The growth of Monte Albán was fast because for the next phase (MA-II, 100 BCE–CE 250), the city reached 4 km^2. With the Grand Plaza as the religious and administrative center of the site, with rectangular shape, oriented north–south is bounded by structures with temples and residences at the top, forming an impressive group. The temples were built with adobe on stone foundation walls; its walls were covered with stucco and painted. Their roofs were flat, supported by wooden posts supporting the walls. Some of the buildings that surround this square show the characteristic Teotihuacan style "*talud* and *tablero*" as decorative architectural elements (Fig. 2). In the northeast corner of the plaza, the ballcourt that had a ritual and religious sense is located with a north–south orientation. Another smaller ballcourt is near to the elite house of Tomb 105, in the northeast portion of the site (Blanton 1978).

Outside the ceremonial center, located at the highest part of the mountain, civil constructions and residential areas were distributed on the slopes, through terraces. Most of the domestic units included also a small orchard, one or several storage pit, and work areas. Although with multiple variants, these units kept a constructive pattern which highlights the presence of a central courtyard, with the rooms around it. Domestic groups lived in these houses for several generations. The size of the house, the central courtyard, and its proximity to the Grand Plaza or to a barrio center have been used as indicators of the socioeconomic status of each family, although there were also differences based on gender, age, and prestige reached within the group (González Licón 2009, 2011).

One particular element of the Zapotec culture is the custom of building tombs to bury their dead. The number, type, and form of these are very broad. They go from simple pits dug under the floor of the rooms without any apparent construction to the elaborate tombs with complex facades, jambs, and lintels with bas-reliefs, and multiple

Monte Albán (Zapotec): Geography and Culture, Fig. 1 General view of Monte Albán. (Photograph taken by the author)

Monte Albán (Zapotec): Geography and Culture, Fig. 2 Building "L". (Photograph taken by the author)

cameras. Some have walls decorated with polychrome murals, with scenes of ceremonial and rituals, such as Tombs number 104 and 105 (Fig. 3).

Others, not as majestic as the previous ones, have marveled at the world for its content, as it was the case of Tomb number 7 (Caso 1969). It is a Zapotec, reused later by Mixtec, elite residence who decides to deposit their ancestors in this sacred place. So they removed part of the ceiling of the tomb, removed the remains that were there, and then put on the floor the skeletons of nine individuals accompanied by a large number of objects finely processed in a variety of materials such as gold, silver, jade, and turquoise among others (González Licón and Márquez 1990) (Fig. 4).

Funerary practices are part of the everyday life of peoples from its most remote past. These arise in accordance with the philosophy of human groups in each particular social context, thus vary in accordance with different cultures, with their social and economic organization, with the degree of technological development, with the ideology, with the complexity of his religious beliefs, and so on. Human being has always expressed a special cult for the afterlife and the boundary between the two, death.

Monte Albán (Zapotec): Geography and Culture, Fig. 3 Reconstructed south wall of Tomb number 105. (Photograph taken by the author)

The Zapotec tombs were incorporated in domestic architecture, usually located under the floor of the most important rooms, facing the central courtyard. The tomb was an enclosure that its owner would occupy after his death; among the Zapotec, the tombs are buildings that resemble the structure of the rooms they occupied in life. Example of this is Tomb number 5 of Suchiquiltongo, with the constructive characteristic style of phase IIIb–IV (650–800 CE), building replicas of the fronts of four rooms arranged around a central courtyard (Méndez 1990).

Monte Albán (Zapotec): Geography and Culture, Fig. 4 House of Tomb number 7. (Photograph taken by the author)

The funerary pattern typical of Monte Alban consisted in the reuse of graves; the most obvious example is found in Tomb number 7, where the richest site offering was located. The interesting thing about this case is that being a Zapotec tomb of phase IIIb, it was reused later in phase V by Mixtec. For this purpose, they took out everything Zapotec and later placed or rather spread across the tomb the remains of nine individuals accompanied by his offering. Not all the tombs were reused, for instance, Tomb number 104 was located with a skeleton in anatomical position, the offerings and the paint intact, although the latter seems to have been finished in a hurry, since "leakages" of painting can be seen in some strokes.

The motives in the murals appear to be symbolic, with complex representations of deities or priests with associated glyphs. The most ancient known, associated to the funerary architecture, mural is Tomb number 72 of Monte Alban, which represents several glyphs in red color. In other examples, processions of men or women singing in any religious ceremony appear. The murals are colorful and predominate the shades of red, white, yellow ochre, green, turquoise, blue, and black. The paintings in the tombs of Monte Albán phase IIIa show some resemblance with the frescoes of Teotihuacan, although in a style clearly Zapotec.

In addition to the murals, many tombs were accompanied by the typical Zapotec funerary urn. Both have been assumed initially as representations of gods, although currently is the notion that some of the murals as well as urns with anthropomorphic representations represent priests and members of the nobility. Many of these figures wear masks that relate to any of the main deities as *Cociyo* "Rain God," *Pitao Cozobi* "Corn God," or some other supernatural force; however, under the mask, the representation is distinctively human. Perhaps they were representations of ancestors, which could serve as intermediaries between them and the gods. The same respect and value that had old age was influenced not only by the accumulation of knowledge and experience that the elderly possessed but also because they were very close to arrive with the gods. Buildings on many of the tombs have offerings and burials associated, which suggest rituals related to the ancestors as members of the domestic group, who will continue many years after his physical burial.

Around the year CE 700, Monte Albán ceased to grow and ceased new constructions and maintenance of large buildings, so it was eclipsing gradually, although this does not mean that it would have been abandoned violently. The latest archaeological excavations on the site indicate

that a good number of houses remained inhabited at least until phase V (1300–1521 CE).

The fall of Monte Albán allowed the other cities that already existed strengthen, as well as the emergence of new ones. Cities in these phases IV and V did not maintain total control of the valley. They retained certain autonomy and created alliances through marriage and trade when it was convenient. It was a period of great social and political instability. The most important sites at this stage in the Valley of Oaxaca are Suchiquiltongo, Lambityeco, Mitla, and Zaachila (Blanton and Kowalewski 1981).

In phase V, the militarism in the Valley of Oaxaca expands, in the same way that was happening elsewhere in Mesoamerica. The Mexica arrives to the valley, who established themselves permanently in the area and finally conquered the cities more important as Zaachila, Cuilapan, and Mitla. It was however a temporary domain. Shortly before, they had arrived as groups from the Mixtec, engaging in continuous struggles for the domain of land and control of tribute. The Mixtec managed to dominate at a certain time and created a political center at Cuilapan (Marcus and Flannery 1996).

For this period there was contact with other groups by trade. There was also an intense artistic and technological exchange across styles and forms that are shared with the cultures developed in places away as the Basin of Mexico and in the area of Puebla and the Mixtec region with the Valley of Oaxaca. It is in this stage that Mitla was consolidated as the religious center of the valley. Mitla was one of the most important cities of the Valle de Tlacolula, outstanding among other aspects, by the construction of elite residences decorated with stone mosaics forming designs of great beauty and harmony. It was a dispersed settlement with constructions that took advantage of the small elevations of the land, with low platforms. Predominate within the site domestic complexes type Palace, with large central courtyards, under which tombs with elaborated architecture were constructed (Blanton et al. 1999).

Performing rituals in the region of Oaxaca and particularly in the valley was an important aspect for the maintenance of the ideology and group cohesion. Evidence of ceremonial and rituals have been recorded in all the periods of occupation and in most of the Mesoamerican urban centers. In the particular case of Monte Albán, it is clear that ideological control was important not only for the ruling elite but also for ordinary people who participated in them. The general population was participating in ceremonies and public rituals but also carried out ceremonies to the interior of the domestic group. For the ruling elite, the development of the ideological and symbolic world was a way to increase their power and control over their constituencies. As a corporate society, they focused more on domestic production. The cohesion necessary to achieve this inner wealth was achieved through management of the ideology suitable, materialized in rituals and ceremonies.

Cross-References

- ▶ Buildings, Archaeological Study of
- ▶ Cultural Heritage and the Public
- ▶ Excavation Methods in Archaeology
- ▶ Mesoamerica: Complex Society Development
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Mexico's Heritage and Management
- ▶ UNESCO's World Heritage List Process

References

Blanton, R.E. 1978. *Monte Albán: Settlement patterns at the ancient Zapotec capital*. New York: Academic.

Blanton, R.E., and S.A. Kowalewski. 1981. Monte Albán and after in the Valley of Oaxaca. In *Supplement to the handbook of Middle American Indians*, ed. J.A. Sabloff, vol. 1, 94–116. Austin: University of Texas Press.

Blanton, R.E., G.M. Feinman, S.A. Kowalewski, and L.M. Nicholas. 1999. *Ancient Oaxaca. The Monte Albán state*. Cambridge: Cambridge University Press.

Caso, A. 1969. *El tesoro de Monte Albán* (Memorias del INAH 3). México: INAH.

Flannery, K.V., and J. Marcus, eds. 1983. *The cloud people: Divergent evolution of the Zapotec and Mixtec civilizations*. New York: Academic.

González Licón, E. 2009. Ritual and social stratification at Monte Albán Oaxaca. Strategies from a household perspective. In *Domestic life in prehispanic capitals. A study of specialization, hierarchy, and ethnicity* (Studies in Latin American ethnohistory and archaeology VII; Memoirs of the museum of anthropology 46), ed. L. Manzanilla, and C. Chapdelaine, 7–20. Ann Arbor: University of Michigan.

González Licón, E. 2011. *Desigualdad social y condiciones de vida en Monte Albán, Oaxaca*. México: INAH, ENAH, Conacyt.

González Licón, E., and L. Márquez. 1990. Costumbres funerarias en Monte Albán. In *Monte Albán*, 53–138. México: Citibank.

Marcus, J., and K.V. Flannery. 1996. *Zapotec civilization: How urban society evolved in Mexico's Oaxaca Valley.* London: Thames and Hudson.

Méndez, E. 1990. El descubrimiento de la Tumba 5 de Huijazoó. In *Monte Albán*, 39–179. México: Citicorp-Citibank.

Monte Testaccio (Rome, Italy)

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Definition

Monte Testaccio is located next to the Tiber River, near the Porta San Paolo and the well-known pyramid-shaped tomb of Gaius Cestius, within what was the warehouse district, *horrea*, of ancient Rome (Fig. 1). An artificial hill with a perimeter of almost 1 km and a height of 50 m, Monte Testaccio was formed from the remains of fragments of millions of amphorae deposited there during the first three centuries CE. It is common to find stamped inscriptions on many of these amphorae. The toponym *Mons Testaceus* (Monte Testaccio in Italian) derives from the Latin word *testa*, meaning a fragment of pottery, hence the popular alternate name of "Monte dei Cocci." This hill stands out in the middle of the plain below the Aventine Hill and constitutes a singular element in the topography of ancient Rome (Aguilera Martín 2002) (Fig. 2). Although we do not have any ancient literary testimony of this hill, its enormous bulk was always evident both to the inhabitants of the city and to its visitors.

Historical Background

The first historical record we know of comes from an inscription dated to the eighth century CE that is preserved at the entrance of the Church of Santa Maria in Cosmedin, wherein the donation to the church of a portion of land that is in Testaccio is recorded. Over the centuries, theories were put forward that tried to explain its origins. For some the Testaccio had been formed because of the stacking of the remains of the fire of Rome in 64 CE during the reign of Nero. For others it had been formed from the waste of the pottery workshops located in its vicinity over the centuries. Some believed that it had been formed from the remains of cinerary urns from pagan cemeteries looted by Christians. As early as the Middle Ages, the idea that Monte Testaccio had been formed out of the remains of the vessels that arrived in Rome containing the payment of tribute from the provinces to the capital of the empire was spread; for this reason it was called *mons omnium terrarum*. In the Middle Ages, the area was uninhabited, and the place became the center of the Roman carnival. Carts with steers and pigs were thrown from the top of the hill, which the young men, paladins of every region of the city, then had to spear and carry a piece of meat home to their loved ones. In the middle of the sixteenth century, this festival was moved to the current Via del Corso. Also, in the middle of the sixteenth century, the Vatican artillery conducted target practice against the eastern side of the Testaccio. In the middle of the seventeenth century, wineries began to be created at the base of the mountain. They soon discovered that fresh air that maintained a constant temperature emanated from the interior of the mountain, and this helped maintain the wine. These cellars spread around the base of the mountain, and so to them we owe the current perimeter of the Testaccio. The Testaccio was presented as a bare hill that had already been compared to the

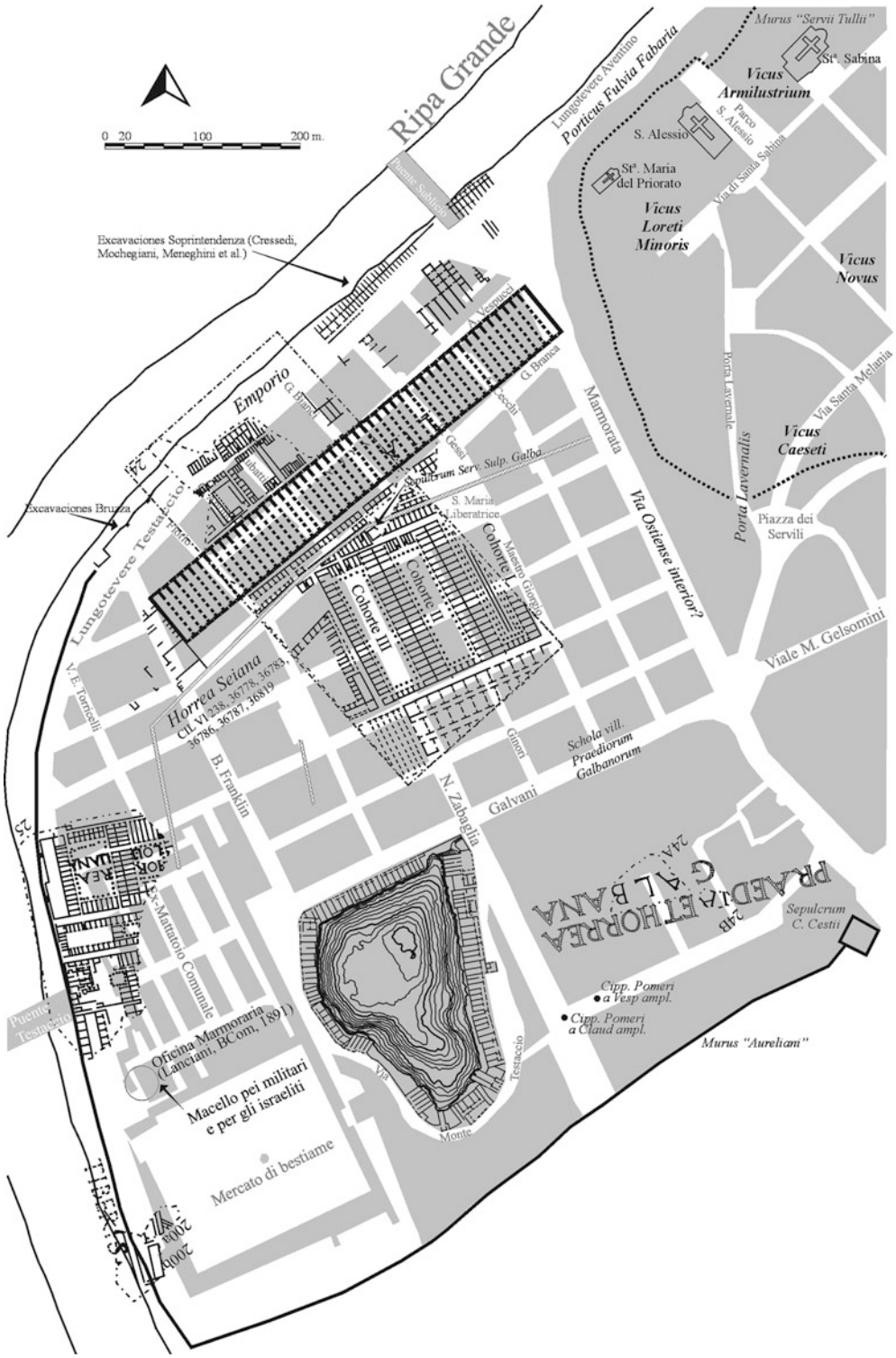

Monte Testaccio (Rome, Italy), Fig. 1 Roman settlement in the Testaccio area (Aguilera Martín 2002)

Monte Testaccio (Rome, Italy), Fig. 2 Aerial view of the Testaccio

Golgotha. In the eighteenth century, three crosses were installed on the mountain, and a via *crucis* ("way of the cross") was organized from the church of Santa Maria in Cosmedin to the top of the Testaccio; there is still a cross as a memory of a celebration that lasted until the middle of the twentieth century. The Testaccio was also a quarry for materials, as people took advantage of ceramic fragments for the foundations of buildings or to repair roads. In 1742 a communal edict was established that prohibited the removal of materials from the Testaccio under threat of very steep fines, although it must have been ignored because in 1744, the Comune was forced to issue a new order. In the nineteenth century, the so-called bacchanals of the Testaccio are well known in Rome; in fact it was to celebrate the feast of the harvest and new wine, festivals sung by all Romanesque poets, including Giuseppe Gioachino Belli. In the middle of the nineteenth century, with the creation of the new slaughterhouse in Rome, the area became a working-class neighborhood. It was also in the middle of the nineteenth century that the scientific studies of Monte Testaccio began.

It was W. H. Gomonde who first proposed that the Testaccio had been formed during the last centuries of the Roman Empire, having found a coin of Gallienus (Gomonde 1853). Shortly after this August Reifferscheid observed that the inscriptions that were on the amphorae were all in Latin, for which reason he proposed that they came from the western part of the Roman empire, since there were no texts in Greek (Reifferscheid 1865). Father Luigi Bruzza was the first to affirm that the materials in Monte Testaccio, as shown by the stamps on the amphorae, came from the Roman province of Baetica (Andalusia, Southern Spain) (Bruzza 1872).

When in 1872 the young Heinrich Dressel returned to Rome, after studying in Berlin, where he had worked with Th. Mommsen, he decided to devote himself to studying the materials of Monte Testaccio. Until then those who had been interested in the Testaccio had limited themselves to making a collection of amphora stamps.

Dressel decided to carry out a research project establishing that two conditions must inform the study: establish how the mountain was formed and when. He decided to divide the mountain into sectors, and each sector was divided according to its height. Dressel indicated whether the material he collected and inventoried was found in situ or if it was material that for any reason, ancient or modern turbation, was not in its original location (Fig. 3). He arrived at the conclusion that certain stamps were to be found in certain places. He could verify that all the material corresponded, fundamentally, to two types of amphora. One, on which almost all the stamps were found, corresponded to a type of globular amphora, which constituted most of the material deposited there. Other fragments, also frequent but in smaller quantities, corresponded to a type of amphora made with a clay of better quality than the former. One day in 1873, when he was on the mountain, a great storm allowed him to discover something he had been seeking for some time: on these amphorae were not only the stamps but also a series of painted inscriptions, so-called *tituli picti*, that remained hidden under a layer of lime that covered the fragments and that only became visible when moistened. The Romans had thrown lime on the fragments of amphoras, no doubt to eliminate odors and bacteria.

In Dressel (1878) presented the first results of his work, creating a system to organize the different types of stamps and explain their various contents. At the same time, he was able to decipher and explain the painted inscriptions (*tituli picti*). He was able to determine that, at least, there were four fundamental elements, which he defined with the Greek letters, *alpha*, *beta*, *gamma*, and *delta* (Fig. 4). *Alpha*, on the neck of the amphora, is an amount that Dressel was able to identify as the tare of the amphora (approximately 30 kilos). *Beta*, under *Alpha*, contains the name of one or more individuals, which Dressel interpreted as the name of the content producer. *Gamma*, under *Beta*, is again an amount that represents the weight of the net content of the amphora. The relation between the volume of the amphora and the weight of its content allowed Dressel to establish that the content was olive oil; the net content of oil was close to 216 Roman pounds, about 70 kilos of oil. These three inscriptions were written using a flat brush. To the right of these three inscriptions, next to the handle of the amphora, was written the annotation *Delta*, written with a hard point, a *calamus*, which showed that it was the control of the amphora at the time of filling. A barred R (*recognitum* or *recencitum*) clearly indicates that it was a control. The names of Baetican cities were mentioned – Hispalis (Seville), Corduba (Córdoba), and Astigi (Écija). This does not mean that all the amphorae were controlled in these cities, but these three were the capitals of three of the four *conventus* into which Baetica was divided, so the names of these cities indicate the fiscal district from which they were issued. The amount indicated in *Gamma* was repeated. Names appear in the nominative and the genitive cases that likely point to the individuals in charge of carrying out the control. On occasion, a toponym appears, in our opinion, the name of the precise place of embarkation and, in particular, the consular dating, the year in which the amphora was issued.

With this method Dressel was able to affirm the following: (a) that the Testaccio had been formed over a long period of time, since on its surface he had found consular dates between the years 145 and 257 CE and that, therefore, its beginnings should date much earlier; Dressel proposed that this should be fixed in the time of Emperor Augustus (reigned 27 BCE to 14 CE); (b) that it had been formed in an organized way, since he found the different dates in different concrete places; and (c) that almost all the material deposited there came from Baetica.

His claim that almost all the material came from Baetica received a rapid criticism. Hirschfeld claimed that it was material from Gallia, for he had also found many of the stamps that appeared in the Testaccio along the Rhone Valley and concluded that, therefore, the Testaccio amphorae containing wine had come from the Gallia. In 1912 Heron de Villefosse published two Gallic inscriptions in which characters known in the Testaccio appeared and showed that the individuals named in *beta* position in the Testaccio amphorae were not the olive oil

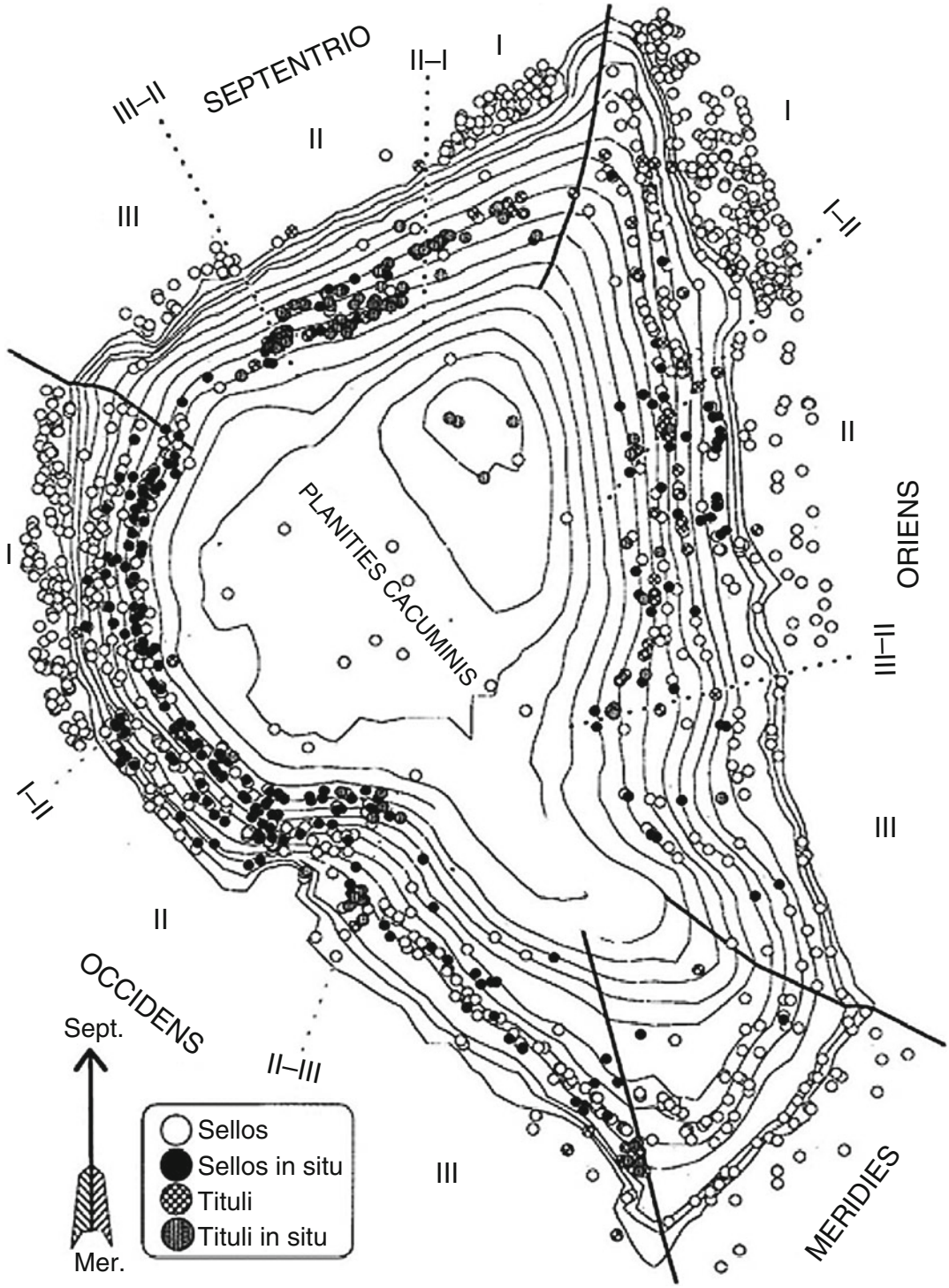

Monte Testaccio (Rome, Italy), Fig. 3 Distribution of stamps and *tituli picti* found by Dressel

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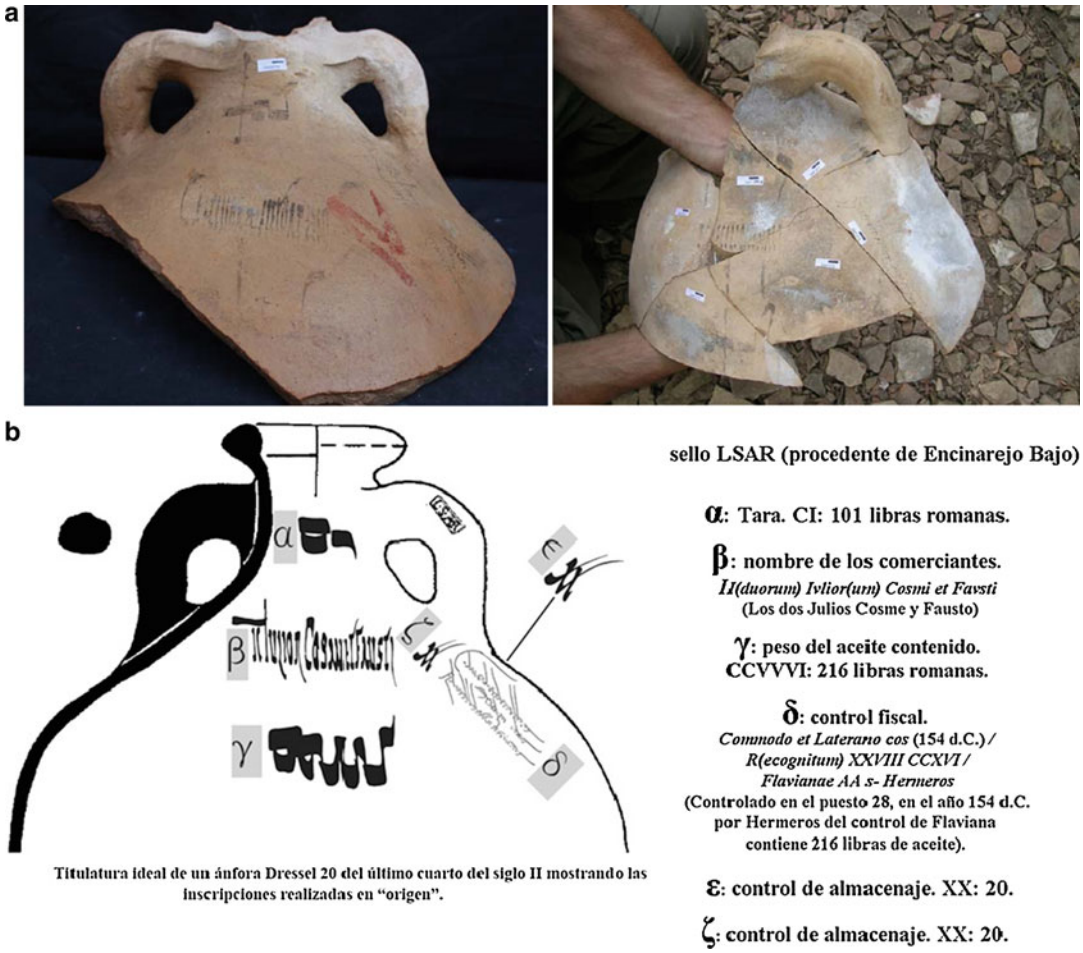

Monte Testaccio (Rome, Italy), Fig. 4 (**a**) Dressel 20 type amphora with its *titulus* found in Testaccio. (**b**) Diagram of the titulus pictus on a Dressel 20 type amphora

producers but the merchants. This fueled the discussion about the origin of these amphorae. Dressel defended himself in his day by saying that the names of the cities that appeared in the Testaccio amphorae were names of Baetican cities. Perhaps what his contemporaries did not understand is that the immense majority of the amphorae, those that carried the inscriptions, belonged to a unique type (later called Dressel 20 amphoras) and that, therefore, they all came from the same region. In 1881 Dressel, along with Bruza, conducted a series of surveys in the Testaccio, which allowed him to confirm his hypothesis. All the material was published in volume XV, 2 of the *Corpus Inscriptionum Latinarum* (Dressel 1899). Almost at the same time that Dressel worked in the Testaccio, G. Bonsor was discovering in Baetica the workshops in which the amphorae that arrived at the Testaccio were produced, but it took a long time to know one another's works.

On the other hand, Dressel had the opportunity to study the amphorae found in the filling of the Castro Praetorio pit, north of the city of Rome (Dressel 1879). There he found a wide variety of amphorae and their inscriptions, which allowed him to establish a typological table in which he could distinguish different types and products contained in them and, in some cases, the origin of these products. Although Dressel had laid the

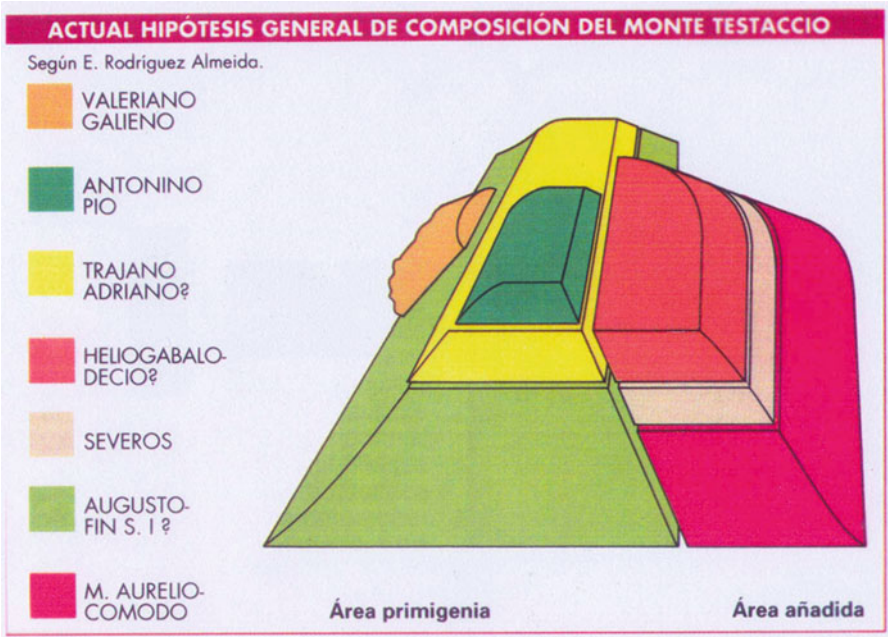

Monte Testaccio (Rome, Italy), Fig. 5 Hypothesis of material build-up in Testaccio (Rodríguez Almeida 1984)

foundations for the development of amphorology, it would still be a long time before it developed fully.

In the mid-1960s, M. Ponsich (1974, 1979, 1987, 1991) resumed the surveys in Baetica, finding new workshops that produced olive oil amphorae, identifying many new stamps, and E. Rodríguez Almeida resumed Dressel's surveys in the Testaccio, providing new and interesting data (Rodríguez Almeida 1972, 1984, 1989). Based on the data from Dressel, Rodríguez Almeida proposed that the Testaccio had been formed as a first platform, developed between the time of Augustus and 149 CE and then a second platform, west of the first, which developed from the Antonine era to the Severan era. He also considered that to the east of the first platform, there had been a small deposit with materials from the mid-third century (Rodríguez Almeida 1984) (Fig. 5).

Also, in the middle of the twentieth century, the development of underwater archaeology demonstrated that the amphorae constituted most of the cargoes of the ships. From this was triggered, first, the interest in identifying the different types, their places of production, and their chronologies and, consequently, the study of the economic significance of this trade. In 1978 the first international congress on olive oil production and trade in antiquity was held (Blázquez Martínez 1980) and in 1982 the second (Blázquez Martínez and Remesal Rodríguez 1983). From this moment the Testaccio, a landfill for the Romans, became an exceptional archive for the study of the ancient Roman economy. An archive that had the peculiarity of referring to a single product, olive oil, whose documentation came almost exclusively from a single Roman province, Baetica. The Testaccio offers an abundant documentation that is not only chronologically serialized but also unique for the study of the Roman economy (Remesal 2013).

International Perspectives

The study of the presence of Baetican olive oil in Germania (Remesal Rodríguez 1986, 1997) gave rise to a new interpretation of the Roman economy. Up to this moment the theoretical discussion on the Roman economy was divided between two

opposing poles, the so-called primitivists, who understood that the Roman economy had little in common with the modern economy and "modernists," who understood that there were not many differences between the economic structures of the Roman world and ours. In any case, it was understood that the Roman state had intervened little on the economic development of imperial Rome. The abundant presence of Baetican olive oil amphorae in Roman military camps in Germania, amphorae containing an exogenous product and foreign to the Germanic diet, prompted Remesal Rodríguez to propose that these had reached the *limes* through a redistributive system organized by the Roman state, which led him to propose that the *praefectura annonae* was not only responsible for organizing the supply of wheat to Rome but intervened on many other products not only to maintain peace in Rome but also to ensure the supply of the army. Among such products there was, ever since the time of Augustus, olive oil, one of the determining elements of the Mediterranean diet, as evidenced by the existence of Monte Testaccio, given that its origins must be traced, as proposed by Dressel (1878), to the principate of Augustus (27 BCE to 14 CE). This led him to discuss the relationship between the political evolution of the empire and the evolution of food control and to study the role of each province of the empire in terms of this need of the empire to redistribute some fundamental products, food or not. In this way, the state became the engine of certain economic relations (Remesal Rodríguez 2011).

These theories are today one of the central points of the debate and interpretation of the economic organization of the Roman Empire. This approach needed new approaches in order to discuss the issue. These theories have been accepted by some and criticized by others (Remesal Rodríguez 2011, 41–42 collects references to both). Criticism has gone in two directions: on one hand, the relative use of the Atlantic route as the main route of trade between Baetica and the northern provinces, against the traditional view that the main route was the Rhone Valley (Wierschowski 2001; see my replica Remesal Rodríguez 2002). Tchernia (2002) joined the discussion, who in 2011 reprinted his previous article without taking into account my answer to Wierschowski (Tchernia 2011; 2012). On this issue see our latest work (Rubio-Campillo et al. 2018). For perspectives related to the administrative organization of the Roman Empire, see Eck (2006) and my own response (Remesal Rodríguez 2008).

In 1989, the CEIPAC research group (website: http://ceipac.ub.edu/) was created at the University of Barcelona under the direction of Prof. J. Remesal Rodríguez. This group has two purposes: to create a computer-based corpus in which all the known amphoric epigraphy was collected and to carry out new excavations on Monte Testaccio.

CEIPAC's epigraphic corpus currently contains more than 43,000 records, stamps, *tituli picti*, and graffiti on amphoras, which contain almost one million pieces of data. It was created as a relational database in the Structured Query Language (SQL) system and has an ICT system (information and communications technology), which allows any researcher, from anywhere in the world, to initiate this type of research. This database is integrated into the project *Epigraphie amphorique* of the Union Académique Internationale, a project in which various academies participate.

The CEIPAC (Centro Para El Estudio De La Interdependencia Provincial En La Antigüedad Clásica) database now has been migrated to an ontological system, which allows new possibilities for analyzing inscriptions, which we can now relate to the information collected in other databases. The interaction between historians, archaeologists, computer scientists, mathematicians, and physicists working on social networks is opening new perspectives to the development of research on the Roman economy (Remesal Rodríguez 2017).

Excavations at Monte Testaccio have been carried out since 1989 under the direction of Professors Blázquez Martínez (†2016) and Remesal Rodríguez (Blázquez Martínez and Remesal Rodríguez 1999, 2001, 2003, 2007, 2010, 2014; Blázquez Martínez et al. 1994). The excavations in the Testaccio have two purposes: to

come to better understand the formation of the mountain itself and to increase our volume of data.

Our excavations have allowed us to better understand the order of deposition of materials and propose a hypothesis about the composition of the mountain, in which there are only the remains of amphorae. Of the ancient extent of Monte Testaccio, only the northern boundary is conserved, and it has lost a lot of material on its eastern, western, and southern sides. We have studied the density and the volume of the hill which allows to affirm that at present the remains of some 25 million amphorae are still preserved. Of these, between 80% and 85% come from *Baetica*; between 10% and 15% depending on the time come from North Africa, Libya, and Tunisia; and the remaining, no more than 1% or 2%, is made up of amphorae from the eastern Mediterranean. The scarce presence of African material would be integrated into the discussion about the intervention of the Roman administration in the distribution of food products. So surprising is the scant presence of African oil amphorae in the Testaccio as in the western provinces of the empire. African amphorae in the Testaccio appear very fragmented, so it is now difficult to understand their *tituli picti*. On the other hand, seals are also scarce, particularly on Leptin amphorae; on those of Africa Proconsularis, they are more frequent in the middle of the third century CE, and they come, fundamentally, from Hadrumetum and from Sulectum (see Revilla Calvo 2014).

Monte Testaccio was formed from a systematically organized platform, for which the entire Baetican olive oil amphorae were taken there; some of them had their bottom broken and were placed forming a row that determined the limit of the discharges; these amphorae were then filled with other fragments to make them heavier and fix them better to the ground; behind them they proceeded to unload, fragmenting the rest of the amphoras right there. Subsequently, another row was formed, and the process was repeated, thus creating walls with an inclination close to 45° (Fig. 6). When these platforms reached a certain height, another one was built a little lower, forming a stepped pyramid (Fig. 7).

Later, when the maximum height of the first platform was reached, around 149 CE, the steps that had been forming were filled in. In any

Monte Testaccio (Rome, Italy), Fig. 6 Wall made of amphoras in Testaccio

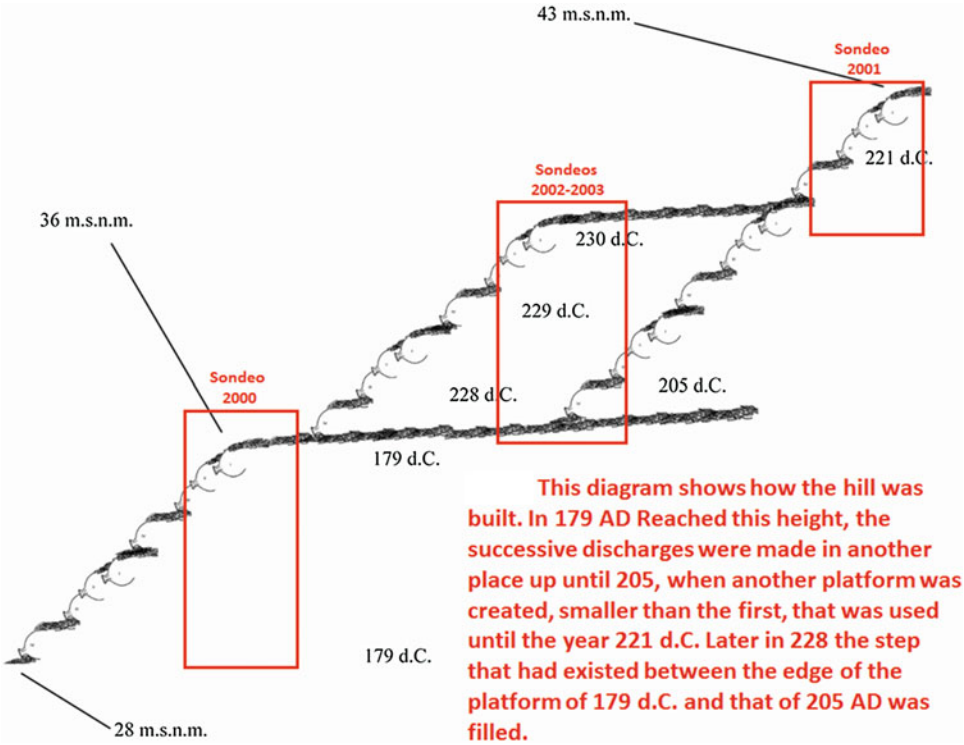

Monte Testaccio (Rome, Italy), Fig. 7 Material build-up on Testaccio's southern slope

case, it is not necessary to think, as proposed by Rodríguez Almeida, that there must have been a first great platform but that from a nucleus it was extended in one direction or another depending on the immediate interests of the moment; therefore, in our excavations we have found deposits of the same year in different places and heights. One of the novelties about the formation of the mountain is to have been able to verify that what Rodríguez Almeida considered as a small discharge from the middle of the third century CE is, in fact, the remains of a third platform that expanded all along the eastern side of the mountain (Fig. 8). In addition, our surveys of 1990–1991 and 2009 have allowed us to delimit the point of contact between the two platforms indicated by Rodríguez Almeida.

As a whole, our surveys have allowed us to know in a more precise way the distribution of the material in what we can call the "skin of the mountain," defining, to a large extent, the evolution and growth in height of the deposits. To the dates obtained by Dressel, we have been able to add new ones by increasing the known chronological series, particularly relevant are the dates relevant to the period of the reign of Commodus, as well as the Severan and post-Severan periods. We have identified numerous *tituli picti beta*, that is, names of merchants hitherto unknown, and we have also found a large number of *tituli picti delta*. At this point we can offer with much better documentation for their interpretation, as well as a considerable number of new stamps and the possibility of better dating for many other extant examples that were already known. With regard to African amphorae, Monte Testaccio is also our best source of information to date the typological-chronological evolution of African amphorae dedicated to the transport of olive oil. This is due to the fact that in the Testaccio, we have also found a large number of stamps on these amphorae that we have been able to date, and we also have a series of hitherto unknown *tituli picti* on these amphorae. The same can be said in

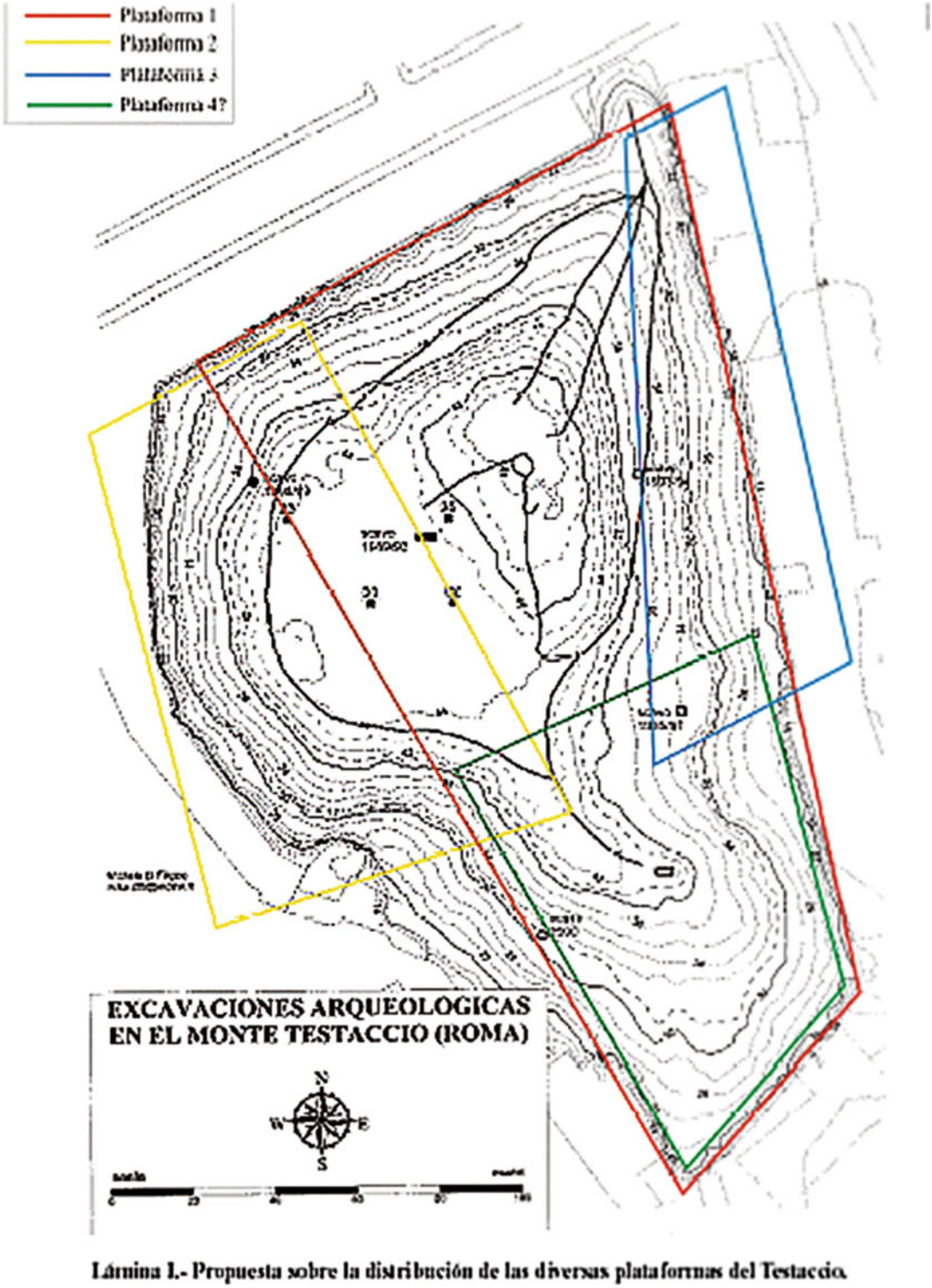

Lámina I.- Propuesta sobre la distribución de las diversas plataformas del Testaccio.

Monte Testaccio (Rome, Italy), Fig. 8 Current hypothesis of the formation of the mound

relation to the amphorae coming from the eastern Mediterranean.

Future Directions

The Baetican olive oil amphorae are in a paradigmatic situation in relation to other amphora types:

1. We know their places of production in Baetica.
2. They are the most frequently stamped amphorae. The stamps on Baetican olive oil amphorae (Dressel 20 type) are composed of the *tria nomina* of a free individual (e.g., citizen or freedman) which we consider the name of the person who ordered the amphora. To these stamps are added others in which the name of the workshop is recorded; others, however, collect a servile name, a *cognomen*, which we interpret as the name of the potter or workshop leader. Sometimes, all of this information can appear combined in a single stamp. Also frequent are the graffiti *ante cocturam*, made when the clay was still soft (i.e., pre-firing). Sometimes these are acronyms that indicate quantities, sometimes names appear, and in others a calendar date (day of the month) or a consular date (year) appears.
3. Baetican stamps were distributed throughout the western part of the Roman Empire.
4. We have the information obtained from Monte Testaccio. First, thanks to the dates obtained in the Testaccio, we can date many of the stamps that archaeologists find in their excavations throughout Europe, so we can help them date their excavations. But since we know the place of production of many of them in Baetica, we can help them understand the relationships that were established between Baetica and the findspot, which, in addition, helps to raise issues related to the organization of trade between the place of production in Baetica and the place of final deposition that is under study.

At a typological level, the Baetican olive oil amphorae offer some possibilities for analysis that can facilitate an understanding of the evolution of the amphora types and the organization of work within each of the production centers. For example, by relating the production of amphorae of a certain production center with the stamps that appear on them, we have been able to establish that various hands have produced amphorae that have been stamped with the same stamp, that is, the person in charge of stamping it was different from the people who made the amphorae, which helps us to understand the management system of the workshops.

The importance of Monte Testaccio lies in its significance for the study of the economic history of the Roman Empire. The fact that the Baetican olive oil amphorae are the most widespread in the western part of the Roman Empire allows us to study, through them, the trade routes and the structure of relations between the Mediterranean provinces and the central European provinces.

The *tituli picti beta* put at our disposal a large number of names of actors linked to the world of commerce in the Roman Empire. Studying the relationship between these characters and identifying their period of activity and their links with other characters reveal the structure of the organization of trade in the Roman world and the relationship between public and private in this area.

The *tituli picti delta* show, in its development, the changes in the administrative organization of the Roman Empire. This study allows for a better understanding of the evolution of the intervention of the administration in the economic development.

The progress of these studies requires the development of formal methods that enable each of the different elements in their category to be compared with each other. Stamps, *tituli picti*, and graffiti, at the same time, compare the information they offer us as a whole, that is, to be able to establish the link between these three types of documents. This would allow to reach some very specific analytical possibilities, difficult to do with other materials.

The current discussion seeks to define the relationships that existed between political and economic power in imperial Rome, based on the idea that the emperor was forced to maintain social peace in Rome, which, as Juvenal said, consisted

of *panem et circenses* ("bread and circuses"). Securing the food supply of Rome and its army was the emperor's first obligation. This fact conditioned the political evolution of the Roman Empire. Defining the role played by each province in this concert is a task for the future (Remesal Rodríguez 2011).

Cross-References

- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Trade and Transport in the Ancient Mediterranean

References

Aguilera Martín, A. 2002. *El monte Testaccio y la llanura subaventina: topografía extra portam trigeminam*. Rome: Consejo Superior de Investigaciones Científicas, Escuela Española de historia y arqueología en Roma.

Blázquez Martínez, J.M., ed. 1980. *Producción y comercio del aceite en la Antigüedad. Primer Congreso Internacional*. Madrid: Universidad Complutense.

Blázquez Martínez, J.M., and J. Remesal Rodríguez, eds. 1983. *Producción y comercio del aceite en la Antigüedad. Segundo Congreso Internacional. Sevilla 1982*. Madrid: Universidad Complutense.

Blázquez Martínez, J.M., and J. Remesal Rodríguez, eds. 1999, 2001, 2003, 2007, 2010, 2014. *Estudios sobre el Monte Testaccio (Roma)*, Vols. I; II; III; IV; V; VI. Barcelona: Universitat de Barcelona Edicions.

Blázquez Martínez, J.M., J. Remesal Rodríguez, and E. Rodríguez Almeida. 1994. *Excavaciones arqueológicas en el monte Testaccio (Roma)*. Madrid: Instituto de Conservación y Restaurción de Bienes Culturales.

Bruzza, L. 1872. Vari oggetti antichi rinvenuti nell'Emporio romano. *Bulletino dell'Instituto di Corrispondenza Archeologica* V: 134–145.

Dressel, H. 1878. Ricerche sul monte Testaccio. *Annali dell'Instituto di Corrispondenza Archeologica* 50: 118–192.

Dressel, H. 1879. Di un grande deposito di anfore rinvenuto nel nuovo quartiere del Castro Pretorio. *Bullettino della Commissione Archeologica Comunale di Roma* 7: 36–192.

Dressel, H. 1899. *Corpus Inscriptionum Latinarum. XV/2. Instrumentum domesticum*. Berlin: G. Reimerum.

Eck, W. 2006. Der praefectus annonae. Ein Superminister in Imperium Romanum? *Xantener Berichte* 14: 49–57.

Gomonde, W. 1853. Adunanza de 25 Febrajo 1853. *Bulletino dell'Instituto di Corrispondenza Archeologica* VII: 85.

Ponsich, M. 1974, 1979, 1987, 1991. *Implantation rurale antique sur le Bas-Guadalquivir*, Vols. I; II; III; IV. Paris/Madrid: Casa de Velázquez.

Reifferscheid, A. 1865. Il monte Testaccio. *Bulletino del Instituto di Corrispondeza Archeologica* XI: 235–240.

Remesal Rodríguez, J. 1986. *La annona militaris y la exportación de aceite bético a Germania*. Madrid: Editorial de la Universidad Complutense.

Remesal Rodríguez, J. 1997. *Heeresversorgung und die wirtschaftlichen Beziehungen zwischen der Baetica und Germanien. Materialen zu einem Corpus der in Deutschland veröffentlichten Stempel auf Amphoren der Form Dressel 20*. Stuttgart: Theiss.

Remesal Rodríguez, J. 2002. Heeresversorgung im frühen Prinzipat. Eine Art, die antike Wirtschaft zu verstehen. *MBAH* 21 (1): 69–84.

Remesal Rodríguez, J. 2008. Olearii. In *Atti Della XIVe. rencontre sur l'épigraphie in onore di Silvio Panciera con altri contributi di collleghi, allievi e collaboratori*. Tituli, Vol. 9, M.L. Caldelli, G.L. Gregori, and S. Orlando (a cura di), 349–374. Roma: Quasar.

Remesal Rodríguez, J. 2011. *La Bética en el concierto del Imperio Romano*. Madrid: Real Academia de la Historia.

Remesal Rodríguez, J. 2013. El Monte Testaccio. De Vertedero a archivo. *Atti della Pontificia Accademia romana di Archeologia (Serie III). Rendiconti* LXXXV: 111–128.

Remesal Rodríguez, J., ed. 2017. *Economía romana. Nuevas perspectivas/The Roman economy. New perspectives*. Barcelona: Universitat de Barcelona Edicions.

Revilla Calvo, V. 2014. Ánforas africanas de fines del s. II d.C. del Monte Testaccio (Campañas 2000 y 2005), in Blázquez Martínez, J.M., Remesal Rodríguez, J. (eds). 559–570.

Rodríguez Almeida, E. 1972. Novedades de epigrafía anforaria del monte Testaccio. In *Recherches sur les amphores romaines*, ed. F. Zevi, 107–241. Rome: École française de Rome.

Rodríguez Almeida, E. 1984. *Il Monte Testaccio. Ambiente, storia, materiali*. Rome: Ed. Quasar.

Rodríguez Almeida, E. 1989. *Los tituli picti de las ánforas olearias de la Bética. I, Tituli picti de los Severos y de la Ratio Fisci*. Madrid: Editorial de la Universidad Complutense.

Rubio-Campillo, X., J.-M. Montanier, G. Rull, J.M. Bermúdez Lorenzo, J. Moros Díaz, J. Perez González, and J. Remesal Rodríguez. 2018. The ecology of Roman trade. Reconstructing provincial connectivity with similarity measures. *Journal of Archaeological Science* 92: 37–47.

Tchernia, A. 2002. L'arrivée de l'huile de Bétique sur le limes germanique: Wierschowski contre Remesal. In *Vivre, produire et échanger: reflets méditerranéens. Mélanges offert à Bernard Liou*, ed. L. Rivet and

M. Sciallano, 319–324. Montagnac: Éditions Monique Mergoil.
Tchernia, A. 2011. *Les romains et le commerce*, 323–334. Naples: Centre Jean Bérard.
Tchernia, A. 2016. *The Romans and trade*, 255–264. Oxford: Oxford University Press.
Wierschowski, L. 2001. Die römische Heeresversorgung im frühen Prinzipat. *MBAH* 20 (2): 37–61.

Monte Verde, Archaeology of

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Introduction

Monte Verde is located in south-central Chile. The site is an open-air campsite on the banks of a small stream, surrounded by sandy knolls, small bogs, and damp forests that have been there since late Pleistocene times. The bog later developed in the stream basin, covering the abandoned site under a layer of peat. Because the lack of oxygen in the bog inhibited bacterial decay and because the constant saturation prevented drying for thousands of years, all kinds of organic materials that normally disappear from the archaeological sites have been preserved. An interdisciplinary research team of more than 60 scientists has studied the remains excavated from two areas at the site, called Monte Verde I and Monte Verde II.

Key Issues

Monte Verde II exhibits the remains of 10-m-long tent-like structure made of wood and animal hides. The frame was constructed of logs and planks anchored by stakes, and the walls were poles covered with animal hides. Several pieces of cordage and string made of reed wrapped around wooden posts and stakes, recovered among the architectural remains, show that the people planned a lengthy stay. The tent's dirt floor was embedded with hundreds of microscopic flecks of hide tissue, suggesting that it was covered with animal skins. On the floor of the tent were brazier pits lined with clay and surrounded by stone tools and the remains of edible seeds, nuts, and berries. Outside the tent were two large communal hearths, a store of firewood, wooden mortars with their grinding stones, and three human footprints near one of the large hearths. All these remains indicate tasks, primarily food preparation and consumption, tool production and maintenance, and the construction of shelters.

In a second structure, wishbone shaped in ground plan and made of wooden uprights set into a foundation of sand and gravel hardened with animal fat. Parts of gomphotheres and paleo-llama carcasses were butchered, hides were prepared, and tools were manufactured in and around the structure. Eighteen probable medicinal plants were found inside the structure – the same species the Mapuche people, who live in the area today, use to treat various diseases. Although some of these plants grew locally, about half came from coastal environments approximately 70 km to the west, and one was found only in arid regions about 700 km to the north. Since only the medicinal parts of the plants were found in the site, we know they had only one use to the Monte Verdeans.

In addition to medicinal herbs, the remains of a wide variety of edible plants were recovered from the hearths, living floors, and small pits, along with the remains of gomphotheres, paleo-llama, small animals, and freshwater mollusks. Aquatic plants from distant freshwater marshes and lagoons of the flood plain and from brackish marshes of the river delta provided the greatest variety and, along with meat and wild potatoes, the bulk of the diet. Most of these ecological zones are located far away along the Pacific shoreline or in the Andean mountains. The presence of exotic foods, including seaweed, and other items at the site shows that coastal habitats also provided important resources to the Monte Verde economy.

The wooden artifacts excavated at the site include digging sticks, mortars, fragments of two

lances, stakes, and the poles used for building the tent. Bone artifacts consist of a baton for striking flakes off stones, tools made of mastodon tusks, and probable digging and prying tools. Three different stone tool technologies also exist at the site, including bifacial tools, unifacial implements and waste debris, and grinding stones.

The distinct living structures, features, and concentrations of specific materials at the site suggest that occupation was continuous and that portions of the site were used more intensively than others. Different kinds of artifacts give evidence of a wide variety of activities to be done. One living space, for example, contained stone artifacts made of quartz coupled with edible fruits and tubers from plants that grow only in brackish estuaries, suggesting that the occupants may have specialized in collecting resources from the coast. Elsewhere in the living tent, stone scrapers and pieces of animal skin were found in a hide-working zone. The internal division and size of the tent suggests that people had a mixed hunting and gathering economy focused on many different ecological zones. A long sequence of radiocarbon dates on both different materials from the site places the Monte Verde II occupation at about 12,500 B.P.

Buried in a different area of Monte Verde, we found a possible earlier occupation, Monte Verde I, with 26 stone tools and three burned clay features. Radiocarbon dates placed this possible occupation around 33,000 years ago. Although the geology is intact, the radiocarbon dates are valid, and the human artifacts are genuine, the research team is very hesitant to accept this older level without more evidence.

The 12,500 B.P. Monte Verde II component represents a settlement that practiced a generalized economy throughout most of the year. The archaeological evidence suggests that the settlement was formed by a small group of colonizers who lived along the banks of the small stream. Although few contemporary sites have been found in the Americas, it is probable that the people at Monte Verde were part of a low-density population adapted to the cool, temperate forest of south-central Chile after deglaciation.

Cross-References

▶ Hunter-Gatherer Settlement and Mobility
▶ Hunter-Gatherers, Archaeology of

Further Reading

Adovasio, J. 2002. *The first Americans*. New York: Random House.
Bryan, A.L. 1973. Paleoenvironments and cultural diversity in late Pleistocene South America. *Quaternary Research* 3: 237–256.
Dillehay, D.T. 1997. *Monte Verde: A late Pleistocene settlement in Chile, Vol. 2: The archaeological context and interpretation*. Washington, DC: Smithsonian Institute Press.
Dillehay, D.T. 2000. *The settlement of the Americas: A new prehistory*. New York: Basic Books.
Dillehay, D.T. 2004. *Monte Verde: Un asentamiento de la Edad de Hielo en el sur de Chile*. LOM Ediciones: Santiago.
Dixon, J. 1999. *Bones, boats and bison*. Albuquerque: University of New Mexico Press.
Meltzer, D. 2004. Peopling of North America. *Developments in Quaternary Science* 1: 539–563.

Montelius, Oscar

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Basic Biographical Information

Gustav Oscar Montelius (1843–1921), Swedish archaeologist, professor and keeper of National Antiquities, studied history and Scandinavian languages at the University of Uppsala 1861–1869 (Fig. 1). He was a close friend with Hans Hildebrand (1842–1913), the son of Bror Emil Hildebrand (1806–1884), the Swedish keeper of National Antiquities. The two young students were both influenced by the advances in geology and paleontology in France and by Darwin's *On the Origin of Species* (1859). During his studies, Montelius worked as an assistant at Statens Historiska Museum in Stockholm, where he and

Montelius, Oscar, Fig. 1 Oscar Montelius (1843–1921)

H. Hildebrand took part in creating a new, permanent exhibition of archaeological finds that opened in 1866 and was organized according to C. J. Thomsen's Three-Age System. Montelius' doctoral dissertation was about the Iron Age in Sweden (1869). He worked as an antiquary (curator) at the Historical Museum (1868–1907) under the direction of H. Hildebrand, whose successor as keeper of National Antiquities he was 1907–1913. He obtained the title of Professor *h.c.* in 1888, was conferred the title of Dr. *h.c.* in Greifswald 1906, and was offered the position as the director of the Museum für Völkerkunde in Berlin 1907, an offer which he declined. Montelius was the editor of two important periodicals: *Svenska Fornminnesföreningens Tidskrift* (1884–1905) and *Nordisk Tidskrift* (1879–1921).

Major Accomplishments

Montelius' first major work was *Sveriges forntid* (Swedish Prehistory) (1872–1874), the first survey of the culture history of prehistoric Sweden confirming the Three-Age System of C.J. Thomsen. The survey was updated in later editions, and his *Minnen från vor forntid* (1917) has remained a standard catalogue of Swedish Stone and Bronze Age antiquities. In the book *Om tidsbestemning inom bronsåldern* (1885), Montelius divided the Bronze Age in six periods. His chronological scheme is still being used today. He also divided the Stone Age in five and the Iron Age in eight periods.

Montelius was aware that in order to date the Scandinavian prehistoric periods, it was necessary to connect them with historically dated material in the Near East and the Mediterranean. So he became the first Scandinavian archaeologist, who systematically studied prehistory on a continental scale. For 15 years, he spent part of his time on journeys to museums in Europe, especially in Germany, Switzerland, and Italy. The Swiss lake dwellings and grave finds being excavated in Northern Italy provided important new material that allowed comparison of find material north and south of the Alps linking the Scandinavian sequence to the Mediterranean. Montelius worked out chronologies in a series of publications: *Die Bronzezeit im Orient und in Griechenland* (1892), *La Civilisation primitive en Italie* (1895–1910), *Pre-Classical Chronology in Greece and Italy* (1896), *The Tyrrhenians in Greece and Italy* (1896), and *Die vorklassische Chronologie Italiens* (1912). Montelius was convinced that the roots of civilization lay in the Near East, and he saw the spread of civilization as waves of diffusion and migration from the Southeast. The diffusionist view was expressed in *Der Orient und Europa* (1899) and in *Die ältere Kulturperioden im Orient und in Europa* (1903–1923). Montelius constructed a timescale that became widely used and which was not surpassed before later in the twentieth century, when radiocarbon datings opened up for a longer chronology and challenged the diffusionist paradigm (Renfrew 1973: 20–47).

Beside as a diffusionist, posterity has also labeled Montelius a typologist. The ordering of types to form sequences, often from the simple to the more advanced, analogous to biological evolution, was initially used by H. Hildebrand and developed by Montelius, who described the method in the first part of *Die ältere Kulturperioden*. Opposition to the method was expressed *i.a.* by the contemporary Danish archaeologist Sophus Müller. In reality, Montelius did not construct his chronologies using typology alone but based his chronological sequences

primarily on find combinations (Gräslund 1987: 70–85). Whether or not typology can be used as an independent method has been a matter of discussion through the twentieth century, especially among Swedish archaeologists (see further readings, Malmer in Åström (ed.) 1995).

Cross-References

► Thomsen, Christian Jürgensen

References

Gräslund, B. 1987. *The birth of prehistoric chronology. Dating methods and dating systems in nineteenth-century Scandinavian archaeology*. Cambridge: Cambridge University Press.

Montelius, O. 1872–74. *Sveriges forntid*. Stockholm: P.A. Norstedt & söner (French edn. 1874: *La Suède préhistorique*. Stockholm; German edn. 1885: *Die Kultur Swedens in vorchristlicher Zeit*. Berlin: Georg Reimer).

Montelius, O. 1885. *Om tidsbestämning 1874: inom bronzåldern med särskildt afseende på Scandinavien*. Kungliga Vitterhets Historie och Antiqvitets Akademiens Handlingar 30. Stockholm. (English edn. 1986: *Dating in the Bronze Age with special reference to Scandinavia*. Stockholm: K. Vitterhets Historia och Antikvitetsakademien).

Montelius, O. 1895–1910. *La civilisation primitive en Italie depuis l'introduction des métaux*. I, 1895. II, 1904-10. Stockholm.

Montelius, O. 1899. *Der Orient und Europa*. Stockholm: Königliche Akademie der schönen Wissenschaften, Geschichte und Altertumskunde.

Montelius, O. 1903–23. *Die ältere Kulturperioden im Orient und in Europa* I-II. Stockholm. – Part I published separately as *Die Typologische Methode*. Stockholm 1903.

Montelius, O. 1917. *Minnen från vor forntid*. Stockholm: P.A. Norstedt & söner (English edn. 1922: *Swedish antiquities*. Stockholm).

Renfrew, C. 1973. *Before civilization. The radiocarbon revolution and prehistoric Europe*. London: Jonathan Cape.

Further Reading

Åström, P. (ed.) 1995. *Oscar Montelius 150 years. Proceedings of a colloquium held in the Royal Academy of Letters, History and Antiquities, Stockholm, 13 May 1993*. Kungl. Vitterhets Historie och Antikvitets Akademien Konferenser 32. Stockholm: Almqvist & Wiksell International.

Klindt-Jensen, O. 1975. *A history of Scandinavian archaeology*. London: Thames and Hudson.

Trigger, B. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.

Monumental Architecture in Precontact Polynesia

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State of Knowledge and Current Debates

The islands of the Eastern Polynesian triangle, bounded by the Hawaiian Archipelago, New Zealand (Aotearoa), and Easter Island (Rapa Nui) and those of Western Polynesia, which includes Tonga and Samoa, were home to diverse indigenous societies. Such groups were organized as chiefdoms and archaic states prior to European contact (Kirch 2017). As with other complex societies worldwide, the power and authority of Polynesian chiefs were materialized in diverse ways, often through the construction of monumental architecture. Before launching into a discussion of historical trends and current research on Polynesian monumental structures, we must first ask: What constitutes monumental architecture in Polynesia?

Historical linguistics document a long history of shared Polynesian terms related to ritual structures, some of which become elaborated as monumental sites in later prehistory. The Proto-Polynesian word ∗*malaqe* is robustly reconstructed from 25 cognate reflexes in different Polynesian languages and dialects (Kirch and Green 2001, Table 9.2). Throughout Polynesia, these reflexes of the ancient word ∗*malaqe* reference ritual or ceremonial spaces, yet such sites likely varied greatly in architectural form and function. At European contact Polynesian monumental sites encompassed more than just ritual-use sites and included structures with a wide range of form and

function, including sites with ceremonial use, elite residential use, and those used in warfare/competition. Consequently, a variety of stone architectural sites, from temples to tombs, have been classified as monumental architecture in Polynesian surface surveys.

The question of how to define and operationalize the term monumental is still debated in Polynesia, similar to other regions worldwide (Osborne 2014). Many archaeologists in Polynesia focus on the size and scale of the structure as the most important characteristic of monumentality. Typically, size and scale are treated in a relative fashion, with the largest monuments considered "monumental." For example, in a Tongan case study, Clark and Martinsson-Wallin (2007; see also Pulemelei examples in Martinsson-Wallin 2007, 2016) discussed massive mounds with greater than 2500 m^2 volume as monumental structures for chiefly residence or burial and as foci for ceremonial and religious activity. Yet in introducing a recent edited volume on Pacific Island monumentality (Martinsson-Wallin and Thomas 2014), Martinsson-Wallin (2014) took a more holistic approach, arguing that monuments are durable sites with massive social meaning (i.e., monumentality). Whether taking a scalar or social landscape approach, archaeologists in Polynesia agree that diverse forms of monumental architecture are found in the region during the precontact era.

Generalized Types of Polynesian Monumental Architecture

Monumental structures in Polynesia tend to coalesce around several broad categories: mortuary structures, ritual sites, elite residences and elite specialized-use structures, and fortifications. Mortuary structures include burial mounds, such as Tongan *fa'itoka*, mounds with gravel paving or coral slab facing, *malae*, and *langi*, the latter served as royal burial mounds of the highest ranking chiefs (Fig. 1) (Burley 1998; Clark and Martinsson-Wallin 2007; Kirch 1990; see also Sand 1993, 1999 for 'Uvea). Monumental ritual sites in Eastern Polynesia include the well-known *marae-ahu* complexes with temple and altar complexes well distributed on the landscape (Figs. 2 and 3) (Campbell 2006; Kahn and Kirch 2014; Kirch 1985; Kirch and Green 2001; Millerstrom 2006; Molle 2016; Rolett 2010; Stephens 2016; Wallin 1993). Perhaps the best-known structures in the *ahu-marae* complex are the Easter Island *moai*, which sit on stone-faced *ahu* or altars (Martinsson-Wallin 1994). Yet large-scale temples are also found throughout Eastern Polynesia, notably Hawaiian *heiau*, Marquesan *me'ae*, and Society Island and Tuamotuan *marae*.

Large-scale domestic sites, oftentimes with elaborate architecture and numerous auxiliary structures, have been associated with high ranking elites in many Polynesian archipelagoes (Allen 2010; Clark and Martinsson-Wallin 2007; Davidson 1974; Kahn 2005, 2016a; Kirch 2010; Martinsson-Wallin 2016; Weisler and Kirch 1985). While such sites are often not truly massive in size, they are much larger than the average domestic sites in the region, thus lending themselves to monumental nomenclature according to the relative scaling fashionable in the region. Kirch (2010: 166–171) recently argued that Hawaiian chiefs and their retinues lived in "palace-like" royal complexes. These were often were large in size, were constructed from specialized materials, and were found in close association with monumental temples. Other Polynesian contexts also have elite specialized structures that are frequently large in size, such as stone-faced wells for bathing, star mounds which served as pigeon snaring mounds or chiefly sitting mounds in Samoa and Tonga (Fig. 2) (Burley 1996; Clark and Herdrich 1993; Sand et al. 2018; Quintus and Clark 2019), and council meeting platforms in the Society Islands (Fig. 3) (Kahn and Kirch 2014). Such sites have an air of monumentality when compared to other architectural sites recorded in regional settlement patterns. In the Tongan context, Freeland et al. (2016) have noted how these large specialized structures were visible displays of chiefly prerogatives (see also Burley 1996; Kirch 1988); similar arguments have been made for specialized elite structures in the Society Islands and Hawai'i (Hommon 2013; Kahn in press; Kahn and Kirch 2014; Kirch 2010). Yet variability exists, as Quintus and Clark's (2019) recent investigation of Samoan star mounds

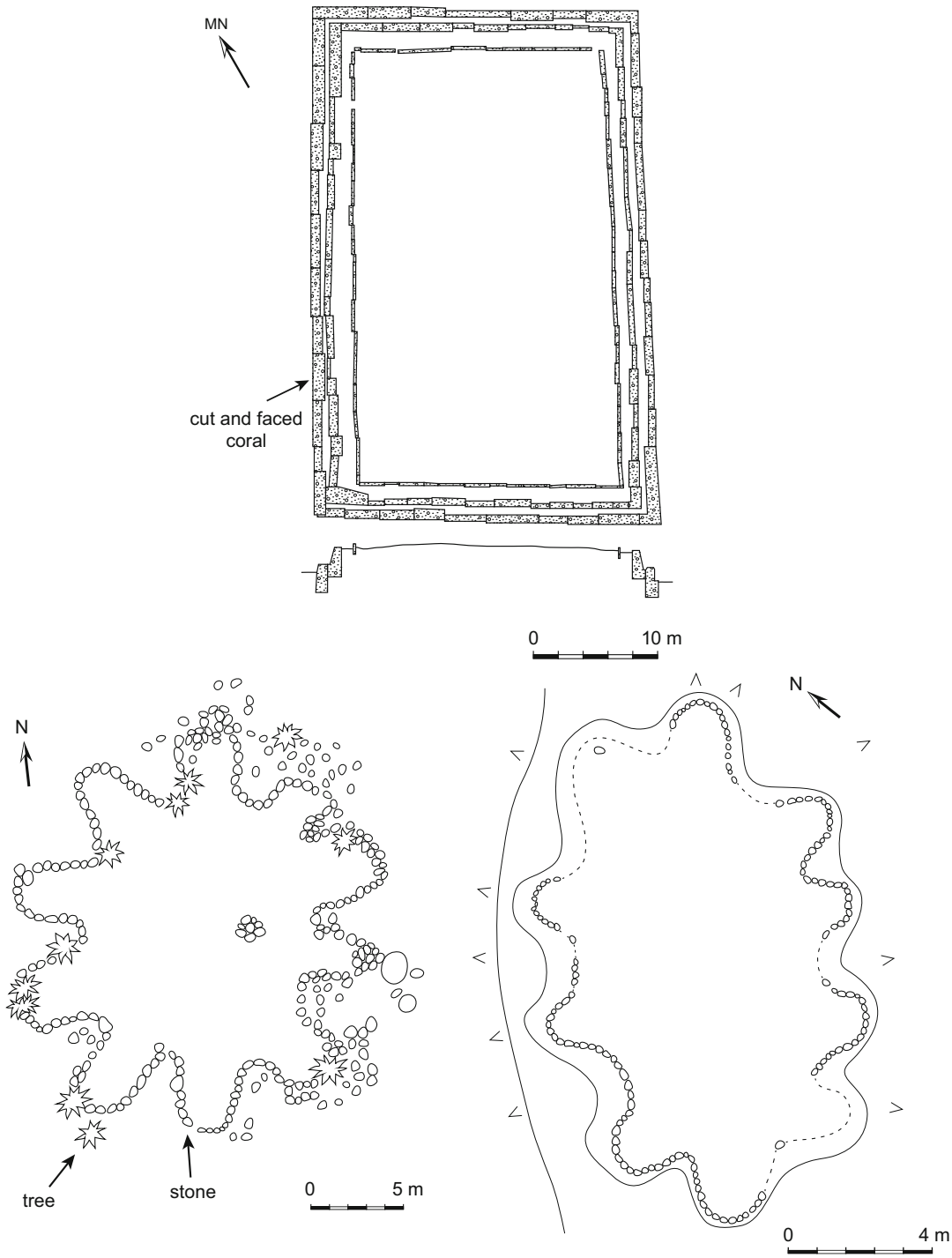

Monumental Architecture in Precontact Polynesia, Fig. 1 Some forms of monumental architecture found in Western Polynesia: Upper, Langi tomb, Lapaha, Tonga. (Modified from Clark et al. 2016, Fig. 1); Lower, star mounds, Samoa. (Modified from Herdrich 1991, Fig. 1)

Monumental Architecture in Precontact Polynesia, Fig. 2 Restored Marae ʻĀrahurahu, Paea, Tahiti, Society Islands. *Marae*/*ahu* is to the right, pavement is in the middle. (Photo courtesy of Heidy Baumgartner Lesage and Pierre Lesage)

highlights their role in status negotiation between individuals (among chiefs, among chiefs, and talking chiefs) and the group (between titled and untitled individuals).

Fortified sites in Polynesia have also garnered attention for their monumental size. Ditch and moat systems and ridgetop forts required massive modifications to the landscape and often covered large footprints (Anderson and Kennett 2012; Best 1993). While monumental ritual sites were not commonly constructed in southeastern Polynesia, large fortified sites reached their apogee there, including highly visible ridgetop villages in Rapa and *pa* complexes in New Zealand (Allen 2016; Anderson 2018; Kennett et al. 2006; Sutton et al. 2003). Finally, while not commonly considered monumental by archaeologists in the region, certainly the scale of landesque capital intensification in some archipelagoes, such as Samoa with its ditch and parcel terrace complexes (Quintus et al. 2016) and Hawai'i with its stone-faced irrigation complexes (McElroy 2007), could be considered by some to reach monumental proportions in localized contexts.

Historical Trends

As synthetic studies of Polynesian archaeology have noted, early salvage ethnographers and cultural historians from the 1920s up until World War II completed important field archaeology in the Pacific Island region (Burley 1998; Burley and Addison 2018; Kirch 2018). In Polynesia, a number of researchers mapped stone structures such as tombs, mounds, and temples, oftentimes focusing on structures that were monumental in scale. Works by Bennett (1931), Emory (1924, 1928, 1933, 1934), and McAllister (1933) began to investigate the form of monumental architecture, most notably Hawaiian *heiau* and French Polynesian *marae*, as an avenue to understand migration and colonization patterns in Eastern Polynesia. Emory's (1933) typology of Society Island *marae* defined three "types" of *marae (*Inland, Coastal, Leeward Island). Utilizing chiefly genealogies, and trait lists of various temple types such as Hawaiian *heiau* and Tuamotuan and Tahitian *marae*, Emory developed a relative chronology of Society Island temple types. He argued that inland types with coral faced *ahu* (altars) developed into megalithic Leeward types and Coastal types, where the size of the structure was enlarged and the architectural components were elaborated (Emory 1933: 40). In Western Polynesia, McKern (1929) began to classify Tongan monumental architecture and identified its relative homogeneity across the entire archipelago. In effect researchers were using monumental architecture as a *fossil directeur* to postulate about movements of people and ideas and to track culture change.

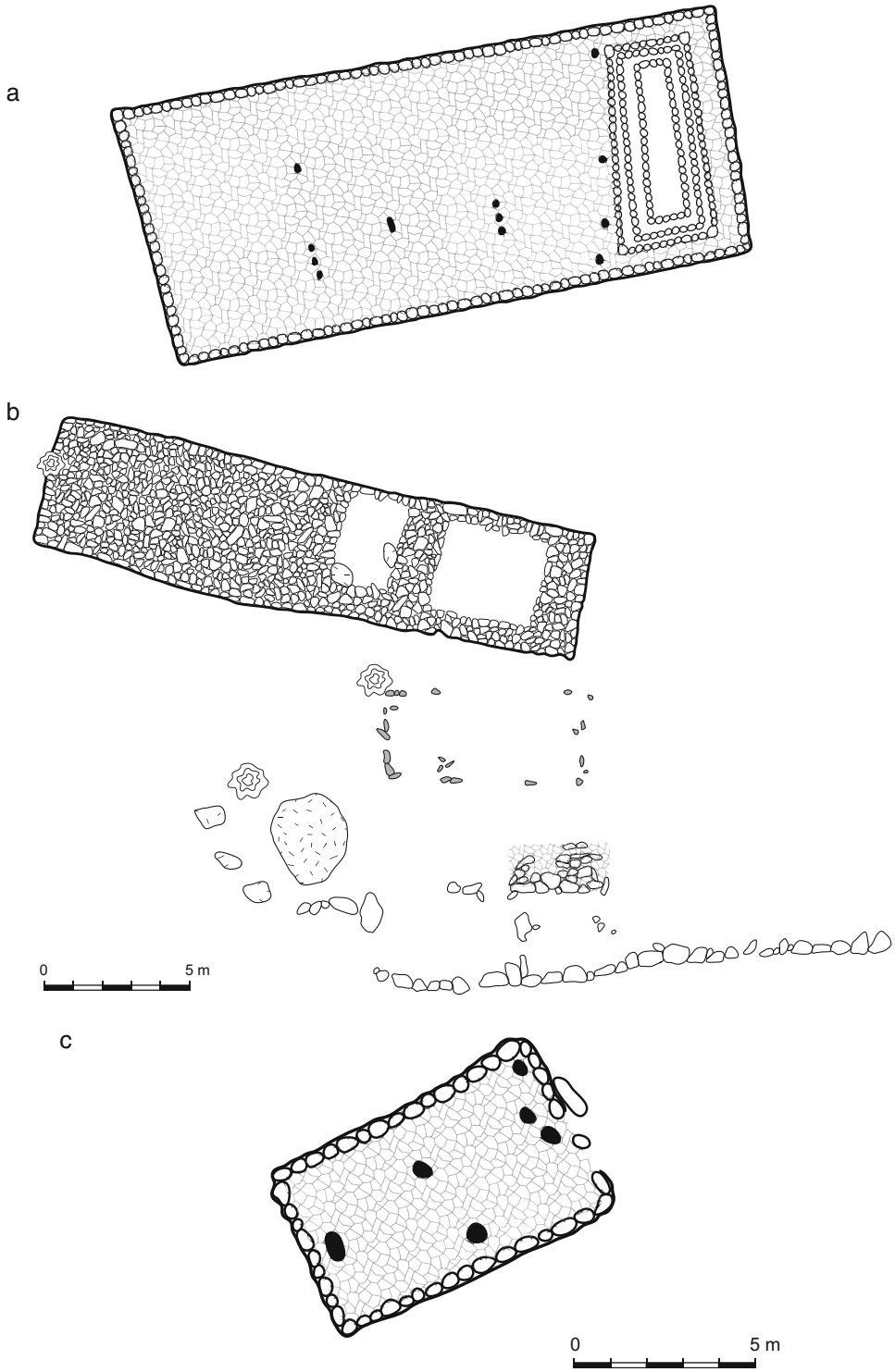

Monumental Architecture in Precontact Polynesia, Fig. 3 (continued)

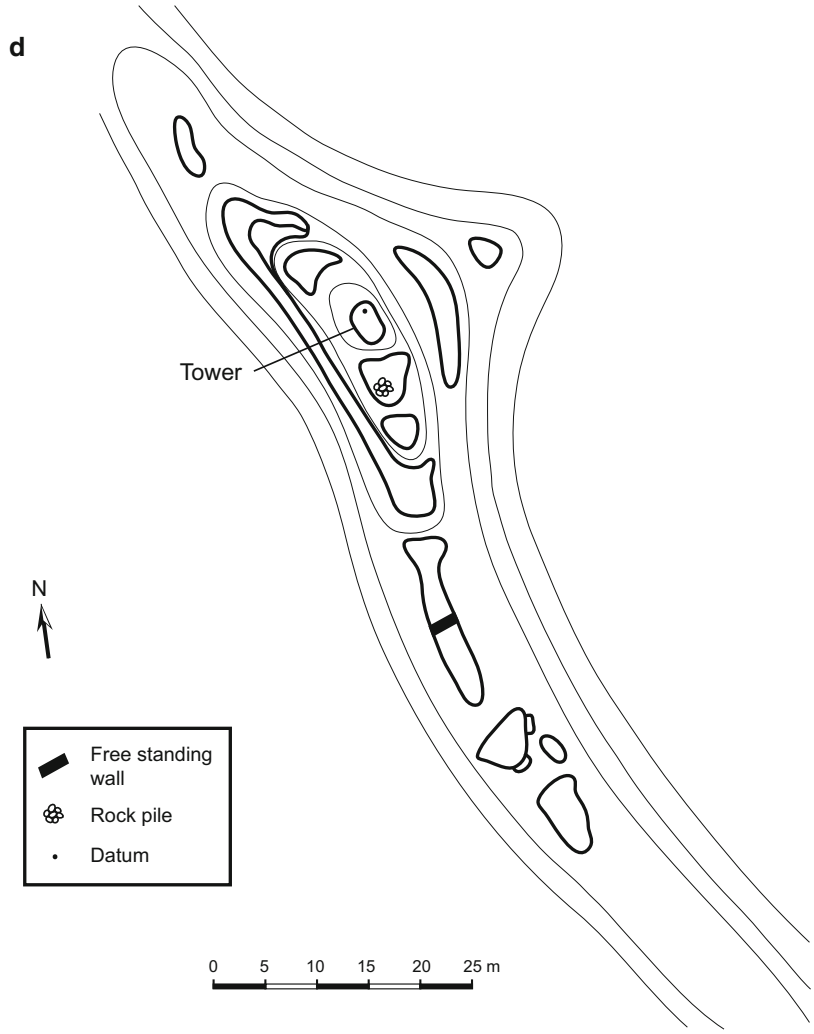

Monumental Architecture in Precontact Polynesia, Fig. 3 Some forms of monumental architecture found in Eastern Polynesia: (**a**) *Marae*/*ahu*, Society Islands; (**b**) Council meeting platform, Society Islands, (**c**) Shrine, Society Islands, (**d**) Fort, Rapa, Austral Islands. (Modified from Anderson and Kennett 2012)

From the 1950s onward, radiocarbon dating ushered in a new period of Polynesian archaeology, one dominated by culture historical questions. Few monumental sites such as temples or tombs were excavated at this time. Yet, the focus on dating coastal middens and rockshelter sites and investigating change through time in artifact form and function had important implications for later studies of monumental architecture. Suggs's (1961) holistic research in the Marquesas Islands began to model how monumental stone architecture, such as *me*'*ae*, stone house platforms, and ridgetop forts, changed through time and began to relate these architectural changes to human demography and island ecology. Green's settlement pattern study in the 'Opunohu Valley, Society Islands, recorded an impressive 136 sites regarded as *marae* or shrines (Green et al. 1967, Table 13). Green excavated three monumental temple structures in the 'Opunohu, using his results to assess and revise Emory's (1933) hypothetical chronology of *marae* development. Green divided Inland *marae* into six subtypes, defined on the specifics of *ahu* form and "decorative

treatment" of the *ahu* (Green et al. 1967: 141). Perhaps most influential was Green's theory that "social differentiation and stratification" which had developed by the eighteenth century were greatly effecting settlement patterns and monumental construction patterns in ancient Tahitian society (Green et al. 1967: 162–163). Such social analyses paved the way for comparative studies of monumental architecture in Polynesian chiefdoms focused on chiefly rank and power.

In the 1960s and 1970s, processual archaeologists in Polynesia widely adopted the settlement pattern approach, a perspective which lent itself to a focus on monumental architecture. Field-based studies began to refine functional types of monumental sites in an attempt to increase archaeological understandings of site use (Kirch 1988). Analyzing the role of monumental architecture in Polynesia likewise emerged as a research goal, often in conjunction with exploring the political and ideological power of elites (Earle 1991). In effect, researchers began using such structures as a proxy for prestige rivalry and elite power, namely, as visual symbols of chiefly authority and hegemony (Burley 1994, 1996; Green 1993; Kirch 1990, 1991). Others stressed how chiefly control over the economy could be articulated through ideology and religious authority at megalithic ceremonial sites (Kolb 1994a, b). Keeping in line with processual archaeologists interest in evolutionary change, Polynesian archaeologists applied the study of monumental architecture to understanding the levels of sociopolitical complexity reached in different Polynesian chiefdoms, whether simple or complex or traditional, open, and complex (see Earle 1991; Kirch 1984) in addition to exploring other questions of evolutionary change (Graves and Ladefoged 1995). Efforts to seriate *marae* and other forms of monumental architecture reflected increased attention to chronology building, in part to refine our understanding of the function of Polynesian monumental architecture (Cochrane 1998, 2002; Graves and Cachola Abad 1996).

In the 1990s some archaeologists in Polynesia began to question the notion that monumental architecture was purely a representation of chiefly economic, political, and ideological power. Studies began to explore how monumental architecture, such as New Zealand *pa*, could serve as symbolic places, markers of territoriality, and loci of group identity (Barber 1996). This trend followed earlier critiques of Polynesian sociopolitical organization that had explored structural and cosmological aspects of Polynesian settlement patterns (Sutton 1990; Weisler and Kirch 1985). The timing of monumental site construction and its relationship to social dynamics, such as collective action, political tensions, and the need to develop, maintain, and strengthen allegiances, became new foci of research (Kolb 2006; McCoy et al. 2011; Wallin and Martinsson-Wallin 2011). Studies began to investigate monumental architecture as aspects of both sacred landscapes and social hierarchies (Campbell 2002, 2006; Kahn and Kirch 2011; McIvor 2015). Recent works have focused on Polynesian monumental architecture as having strategic social value, embodying cosmological principles and world views, creating landscapes encoded in social memories, and reconfiguring human experiences by creating a sense of place (Hamilton 2016; Hamilton et al. 2008; Martisson-Wallin 2014; Richards et al. 2011). Others have explored monumental architecture as territorial displays or costly signals that marked important natural resources (DiNapoli et al. 2019). Finally, some recent studies have stressed the linkage between ritual authority, political power, and monumental architecture, arguing that ritual actions legitimated hierarchical structures broadly within communities and regions rather than just supporting the individualistic power of particular chiefs (Kahn 2016b; Kahn and Kirch 2014; Quintus and Clark 2019).

Current Studies: A Diversity of Methodological and Theoretical Perspectives

Current research on monumental architecture in Polynesia is characterized by a diversity of methodological and theoretical approaches. Methodological debates focus on long held questions of how site form relates to function and the timing and pace of monumental architecture construction. Theoretical perspectives are diverse,

ranging from those applying Marxist-inspired perspectives to monumental architecture, ideology, and chiefly power, to evolutionary approaches exploring phylogeny and historic connections between Polynesian societies, and to social perspectives focusing on the built environment as the creation of places imbued with social memory. Below I briefly introduce some methodological and theoretical topics of continued debate in the region. While the list is not exhaustive, my goal is to give the reader a taste of the current flavors dominating monumental architectural studies in Polynesia.

Methodological Advances and Site Identification: GIS and LiDAR

As with global archaeology, GIS and varied remote sensing techniques have revolutionized field surveys and interpretations of monumental architecture in the Pacific Islands (McCoy 2017; McCoy and Ladefoged 2009). While archaeologists in the region have utilized aerial images for some time in field surveys, commercial satellite images have allowed for the detection of monumental structures and the sites connecting them, as with Easter Island *moai* statues and transportation roads (Lipo and Hunt 2005; McCoy 2018). LiDAR has been used in Tonga and Samoa to identify complete cultural landscapes, including monumental architecture such as burial mounds; star mounds; other mounds of unspecified function, ditch, terrace, and embankment features; and hilltop forts (Fig. 4) (Cochrane and Mills 2018; Freeland et al. 2016; Jackmond et al. 2018; Quintus et al. 2015, 2017). As Freeland and colleagues have noted (2016), the ability to study full cultural landscapes and the monuments therein will refine our understanding of Tongan prehistory, notably in assessing labor requirements needed for constructing massive chiefly mounds versus constructing subsidiary mounds. In addition, the development of regional databases, such as the Samoa Archaeological Geospatial Database combining spatial and temporal data into a single searchable database format, has and will continue to facilitate regional scale analyses of monumental architecture (Morrison et al. 2018).

Methodological Advances and Site Chronologies: AMS 14C Dating, U-TH Dating, and Phylogenetic Analysis

While there is broad acceptance that Polynesian built landscapes, with their diverse forms of monumental architecture, represent palimpsests of construction and use through time, we still lack adequate chronometric datasets needed to refine our temporal scales of analysis in many regions (Flexner 2014; Kahn 2011; Morrison and O'Connor 2018; Mulrooney 2012). Certainly the availability of larger 14C datasets, many of which have good representation of AMS dates on short-lived materials, has allowed for more sophisticated temporal analyses (Kahn 2011; Kahn and Kirch 2011, 2014; Kirch 2010: 160–162; Kolb 2006; Wallin et al. 2007). Some studies have coupled chronometric analysis with seriation of temple types in order to look at long-term sequences of change in monumental architecture and its relationship to the political economy and centralization of elite power (Kahn and Kirch 2014; McCoy et al. 2011; see also Mulrooney and Ladefoged 2005). High-precision ^{230}Th/U dating of corals used in architectural elements or as offerings on monumental sites has revolutioned temporal chronologies in the Hawaiian Islands and Society Islands (Kirch and Sharp 2005; Kirch et al. 2015; Sharp et al. 2010). These data have forced archaeologists in Eastern Polynesia to ponder the rapid imposition of ritual control systems and to rethink models concerning tempos of cultural change.

Finally, similarities in Polynesian ritual architecture have long been used to study cultural phylogenies and culturally shared traits (Kirch and Green 1987, 2001). Cochrane (2015, see also 1998) has expanded on this theme, using cladistic analysis to quantify patterns of relative phylogenetic similarity in Polynesian ritual architecture. No clear phylogenetic patterns or specific lineages of cultural transmission were found, suggesting either high rates of innovation in monumental ritual architecture and a great deal of cultural sharing or horizontal trait transmission. Likewise, Molle's (2016) more traditional taxonomic classification of Tuamotuan *marae* was completed as a first step toward the analysis of

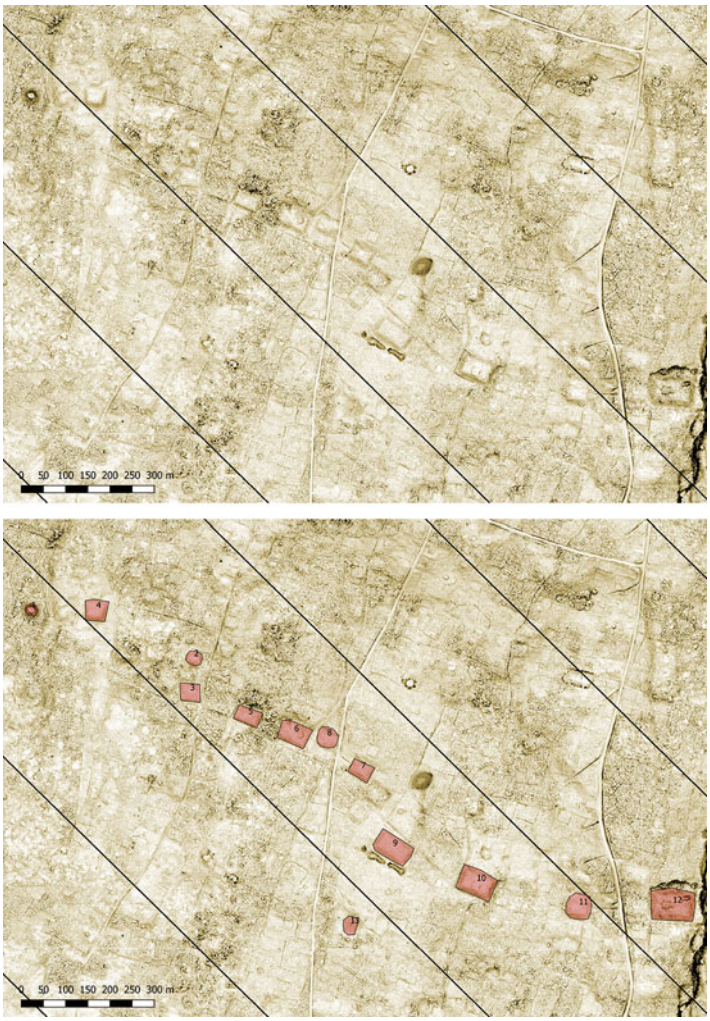

Monumental Architecture in Precontact Polynesia, Fig. 4 LiDAR image with large platforms highlighted, Maninoa and Siumu Village, Upolu Island, Samoa. (Courtesy of Greg Jackmond and Center for Samoan Studies)

historic developments in the region. His study of shared temple names documented widespread *marae* networks across the archipelago. Certainly as regional databases of temples and monumental architecture proliferate, the ability to carry out more computational-based analyses, such as social network analysis, will grow.

Cultural Structuring of Space

Since Weisler and Kirch's seminal article (1985) on Kawela, Moloka'i settlement patterns in the Hawaiian Islands, archaeologists have been attune to the cultural logic embedded in Polynesian landscape use and monumental architecture therein. In a recent Samoan case study, Quintus and Clark (2016) identified large terrace and ditch features in spatially prominent contexts as chiefly residences and sacred open spaces (*malae*). Across such landscapes, they found that Samoan spatial logic was expressed as seaward/leeward and center/periphery dichotomies. One exception was the spatial location of star mounds, which the authors identify as liminal sacred spaces where "individuals could usurp, or at least challenge, the power of leaders"(Quintus and Clark 2016: 11). Other regional Samoan settlement pattern analyses confirm the unique spatial location of star mounds at high elevation points on ridgetops, supporting their specialized function (Morrison et al. 2018). While a different sort of monument, the *Are Metua* or the parent road of Rarotonga, Cook Islands, served as a prehistoric circuit road

structuring the daily movement of people within the broader landscape of residences and ritual structures (*marae*), including "living marae" with ongoing use by descendant communities (Campbell 2006; Downes et al. 2017). A particularly innovative variation on the theme of cultural landscapes is the study of the orientation of Polynesian monumental architecture. Recent works have argued that the layout of some Eastern Polynesian temples, and other monumental structures was organized to align to sacred natural features on the landscape (mountains, cardinal direction, etc.), as well as important celestial events (such as the rising of Pleiades) (Edwards and Belmonte 2004; Kirch 2004a, b; Kirch et al. 2013; Ruggles 2001). Such studies share much with trends in social archaeology that broadly strive to place built landscapes into holistic cultural contexts.

Monumental Architecture as Collective Labor and Community Identity

Along with the notion of changing architectural form, archaeologists in Polynesia continue to be interested in the size and scale of monumental architecture as a means of assessing community labor inputs and exploring collective identities and territoriality (Ladefoged and Graves 2006; Kolb and Snead 1997; Kirch 2010: 156–159; Shepardson 2005). In a comparative Pacific/Mediterranean Island study, Kolb examined the labor necessary to construct and/or transport materials of Rapa Nui *moai* and their constituent *ahu* versus the staged construction of massive Hawaiian *heiau*. He argued that productive circumscription and social competition influenced the rise and use of monumental construction on islands. In a Hawaiian case study, Kirch (2010) utilized rank size distributions of monumental *heiau* (temples) to define specific types (i.e., those for fertility and crop production versus those for war). These data were explored to investigate methods of chiefly ideological control, regulation of tribute, and definition of territorial boundaries.

In terms of community identity, Dixon et al. (1995) provided an exploration of intra- and inter-island political domination in Hawaiian precontact history. Surface mapping of *heiau* on Lana'i demonstrated the hegemonic influence of Maui and the eventual subjugation of Lana'i under Maui rule. In a related manner, Martinsson-Wallin and Wallin (2014) argued that Easter Island *moai* served as symbolic capital materializing competition between junior and senior lineages in the built environment, in effect visually marking tensions between local groups and community level districts.

Other studies have taken a more emic approach to exploring monumental architecture and community identity. Utilizing a house society perspective, Kahn and Kirch (2014) argued that early investments in the landed estate (including elaborate residences) and the ritual estate (including monumental temples and shrines) established access to the corporate estate's natural resources in the Society Islands. Conte and Dennison's analysis (2009) of a Tuamotuan *marae* also took an innovative approach, exploring aspects of intentionally "forgotten histories" in a community's memory. At marae Te Tahata, a series of shallow skeletal burials dated to 1850 when major European-introduced epidemics had devastating effects on Tuamotuan communities. Because these deaths resulted from violent encounters, voluntary silences were reinforced, as traditional *tapu* (taboo) notions of not speaking of the dead were followed so as to protect the living. The chaotic nature of the postcontact period also weakened avenues for the transmission of traditional knowledge, leaving the *marae* and its use as a burial ground part of "forgotten histories." Whether exploring status negotiations, political conflicts, or the effects of European contact, current monumental architecture studies in Polynesian highlight how such sites provide contexts for studying varied social processes.

Relationships to Socioeconomic and Ritual Power of Ruling Elites

For the large part, recent studies of Polynesian monumental architecture largely take economic-ideological approaches. Data are often interpreted through a materialist lens, similar to works in other regions such as DeMarrais et al.'s seminal article on Ideology, Materialization, and Power Strategies (1996). A number of scholars argue

that Polynesian monumental architecture played a pivotal role in supporting ritual authority and oftentimes led to centralized elite sociopolitical power, particularly in the most complex chiefdoms and archaic states (Clark and Reepmeyer 2014; Clark and Martinsson-Wallin 2007; Maric 2016; McCoy et al. 2011; Kahn 2016b; Kahn and Kirch 2014; Kirch 2010; Kikiloi 2012; Kolb 2006). Yet in many regions, baseline survey and additional excavation need to be carried out. As McCoy and Nees (2014: 27) have argued, we need to understand "the organizational principles and beliefs manifested in Polynesian religious architecture" and to refine our knowledge concerning the function and meaning of particular monuments. Below I discuss current ceremonial center-based research in the two archaic states found in the region (Hawaiians Islands, Tonga), as well as research carried out in the most complex of Eastern Polynesian chiefdoms (Society Islands).

The last decade of Polynesian monumental archaeology research has seen sustained interest in investigating chiefly centers and economic control over resources and tribute (Fig. 5) (Kahn in press). In the Hawaiian Islands, temples were hierarchically organized, with each district having its own war temple (Kirch 2010: 60). Kirch (2010: 50) points toward the existence of Hawaiian chiefly centers and royal centers with large domestic sites adjacent to temples as characteristics of the Ku and Lono state religion (see also Cordy 2000; Kolb 1991, 1999). Hinterland regions like Kahikinui, Maui, also saw a rapid imposition of the temple system in the mid-sixteenth century during a period of unification and consolidation (Kirch 2010: 157–165; Kolb 1994a). Interestingly, Hommon's analysis of temples associated with high ranking Hawaiian chiefs argued that late eighteenth-century political centralization saw a de-emphasis on monumental architecture, although he argued that such sites were essential to the aggrandizement of earlier chiefs (Hommon 2013: 248–249, Table 15.6).

In terms of the spatial layout of royal centers, McCoy (2018) recently used LiDAR- and GIS-based data to examine landform and monumental architecture at several centers in the Kona District of Hawai'i Island. By estimating the amount of area available for gathering communities and crowds, McCoy hypothesized that political leaders tried to artificially elevate the density of crowds at low-turnout events while at the same time leaving enough room to accommodate high-turnout events. In a GIS analysis of Hawai'i Island *heiau* viewsheds, Phillips et al. (2015) illustrated that Leeward Kohala Field System temples had more expansive viewsheds through time (see also McCoy et al. 2011). They argued that *heiau* were constructed to ensure place-based agricultural fertility, as well as to extend their visibility into adjacent political districts, thereby reinforcing connections between ideology, chiefly authority, and resource management. A similar Oahu-based analysis concluded that the elevated positions of *luakini heiau* afforded expansive views over surrounding landscapes, situating such temples as highly visible symbols of both political power and chiefly ritual authority (Lyman 2012). Such studies emphasize the multifunctionality of Hawaiian monumental architecture, most notably their engagement in economic, ideological, and political spheres.

Recent analyses of monumental architecture in the Tongan archaic state likewise have emphasized the role of chiefly centers in the development of centralized authority. Lapaha, a political center in the southern portion of the group, comprises a central place covering more than 50 ha replete with royal chiefly tombs, ditch systems, earthen burial and sitting platforms, bathing wells, a canoe harbor, and a wharf (Fig. 6) (Clark et al. 2008; Kirch 1984). The Lapaha tombs represent a dramatic increase in size when compared to tombs at the earlier chiefly center of Heketa, with some of the most elaborate Lapaha tombs representing "energy-expensive structures" (Clark et al. 2016). Major landscape transformations, including land reclamation to build a wharf for double-hulled canoes and construction of a water-filled ditch to demarcate this sacred space, likewise speak to transformations of social space and chiefly authority (Clark et al. 2008). Clark (2015) argued that the specialized nature of the Lapaha center, focused almost exclusively on royal tombs, as well as the tombs' massive size, served as highly

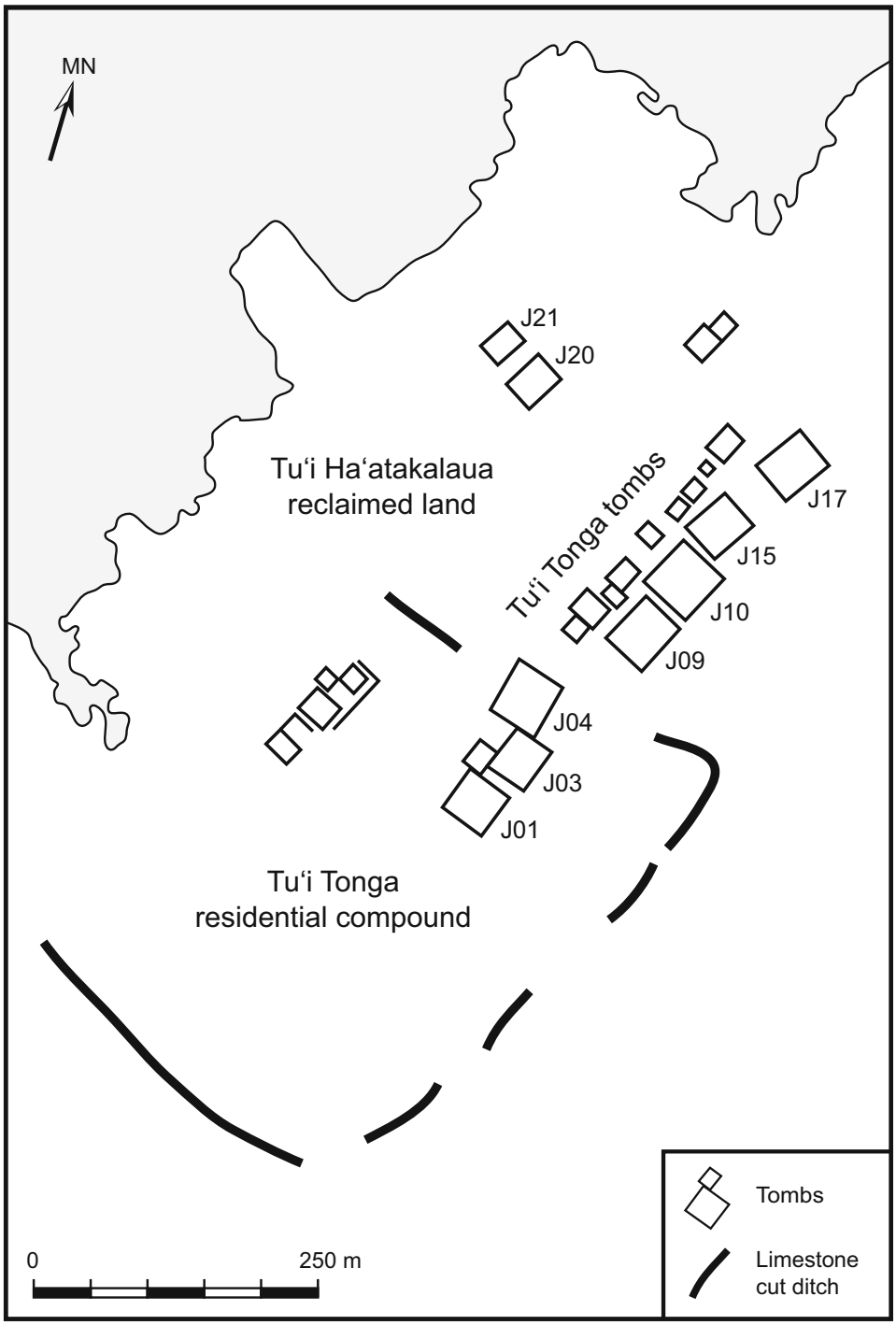

Monumental Architecture in Precontact Polynesia, Fig. 5 Plan view of a Tongan chiefly center, Lapaha. (Modified from Clark et al. 2016)

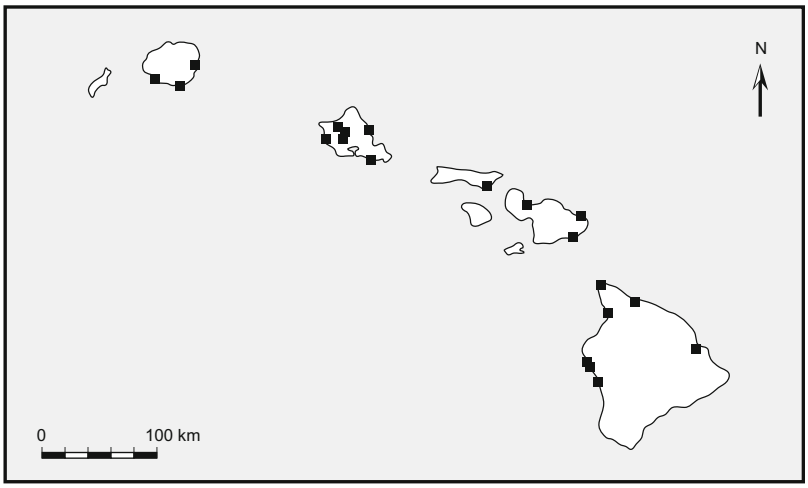

Monumental Architecture in Precontact Polynesia, Fig. 6 Distribution of chiefly centers in the Hawaiian Islands. (Modified from McCoy 2018)

visual symbols of power and authority, in effect transmitting the semidivine nature of the Lapaha chiefs to the surrounding community. High frequencies of nonlocal stone tools at Lapaha likewise speak to how Tongan chiefs maintained a centralized political system dependent on long-distance canoe voyaging and amassing goods (Clark et al. 2014). Archaeological dating programs demonstrate that rapid site construction sequences at Lapaha emerged during a period of increasing political centralization and chiefly economic power (Clark et al. 2008, 2014).

While more limited in scope, studies in the Society Islands, the most complex of Eastern Polynesian chiefdoms, have likewise suggested correlations between the centralization of elite political and socio-ritual power and the construction of primary and secondary ritual-political centers. Maric's (2016) analysis of Ma'ohi oral traditions emphasized how chiefs asserted divine right through marriage alliances with the "royal" Tamatoa lineage from 'Opoa on Ra'iatea, whose leading elites presided at the chiefly center of Taputapuatea (Fig. 7). While "royal" *marae* were constructed as early as the fifteenth century, in the seventeenth to eighteenth centuries a new war cult dedicated to the god 'Oro saw the construction of larger and more elaborate chiefly centers on coastal promontories (Kahn and Kirch 2014; Maric 2016; Sharp et al. 2010; Wallin 2014). These new ceremonial centers had similar site types and reproduced much of the same spatial layout as the original Taputapuatea ceremonial complex (Ra'iatea Island) (see Kahn in press), considered to be the first ceremonial center dedicated to the 'Oro war cult. Like the Hawaiian and Tongan examples, the elaboration of Mā'ohi chiefly centers occurred rapidly within a context of increasing centralization of elite power. By the seventeenth century, chiefs increasingly controlled surplus agricultural production which was funneled up to elites as tribute at ceremonial centers with megalithic *marae* and a range of socio-ritual specialist structures (i.e., meeting houses, council meeting platforms, archery platforms) that were often monumental in their size and architectural elaboration (Kahn and Kirch 2011, 2014; Lepofsky and Kahn 2011).

Related research on minor ritual-political centers has also augmented our understanding of how secondary chiefs deployed the construction and use of monumental architecture, and the ceremonies carried out therein, in power building strategies. Inland aggregate ritual centers were increasingly constructed by competing Mā'ohi junior elites (i.e., secondary chiefs) from the seventeenth century onward (Fig. 8) (Kahn 2011; Kahn and Kirch 2014). Such bounded ritual zones allowed junior elites to manipulate local

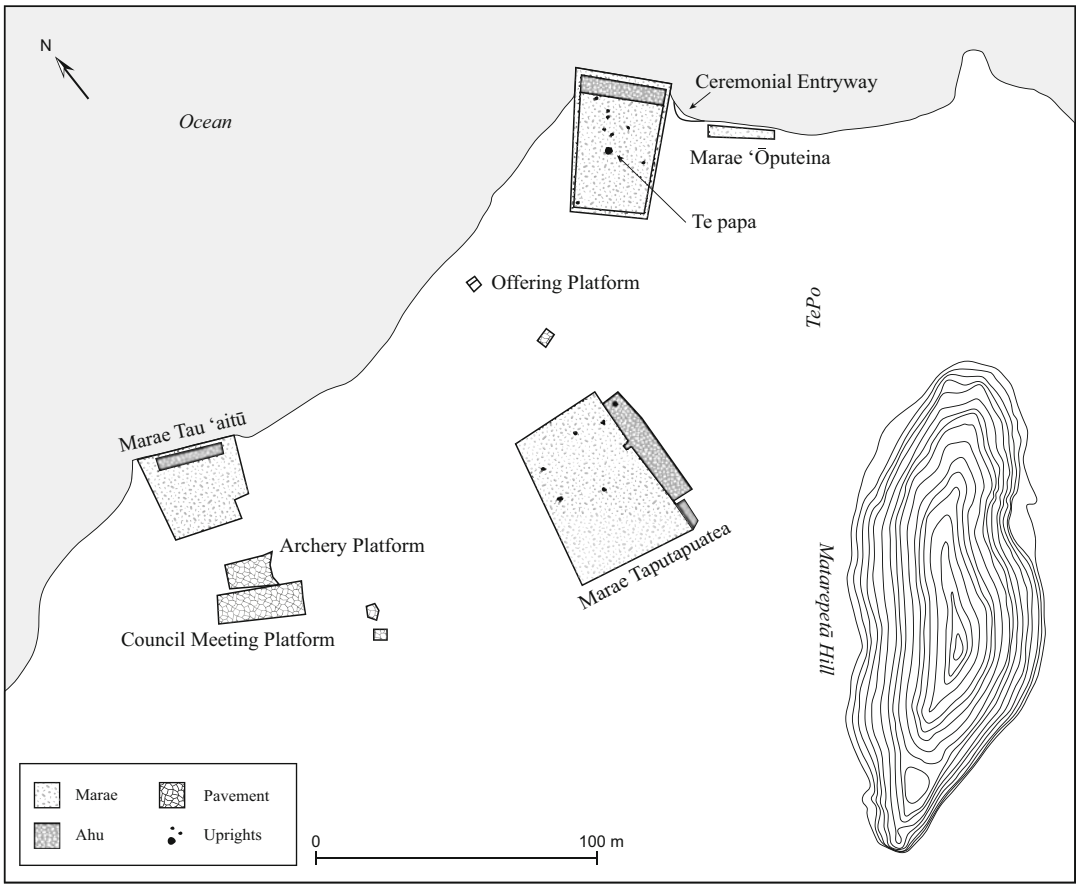

Monumental Architecture in Precontact Polynesia, Fig. 7 Plan view of Taputapuatea chiefly center, ʻOpoa, Raʻiatea, Society Islands

political economies and integrate community-based economic practices within the regional ritual calendar, just as primary centers afforded the most high ranking chiefs avenues for establishing, maintaining, and expanding their sociopolitical, economic, and religious power (Kahn in press). Yet these secondary centers also offered junior elites access to the performative and intermeshed power of ritual, sport, feasting, and gift exchange. Such social practices both buttressed the specific roles of junior elites within regional hierarchies and provided opportunities for negotiating and contesting the contingent forces of *mana* (sacred power) at multiple scales within the hierarchy, namely, between and among chiefs and secondary chiefs, chiefs and *raʻatira*, and elites versus commoners (Kahn in press).

Concluding Thoughts

While Polynesian monumental architecture studies are both broad and dynamic in terms of archaeological method and theory, I end with some brief thoughts for how the field might move forward. Currently, there is no singular accepted definition of monumental architecture in the region. Researchers utilizing economic models tend to emphasize monument size, while those utilizing socially informed landscape models tend to emphasize site context and site proxemics. While this is not inherently problematic, it does pose the question: what was the meaning of such structures to the Polynesians themselves? Further research into site place names (toponyms) and their role in the rich corpus of Polynesian

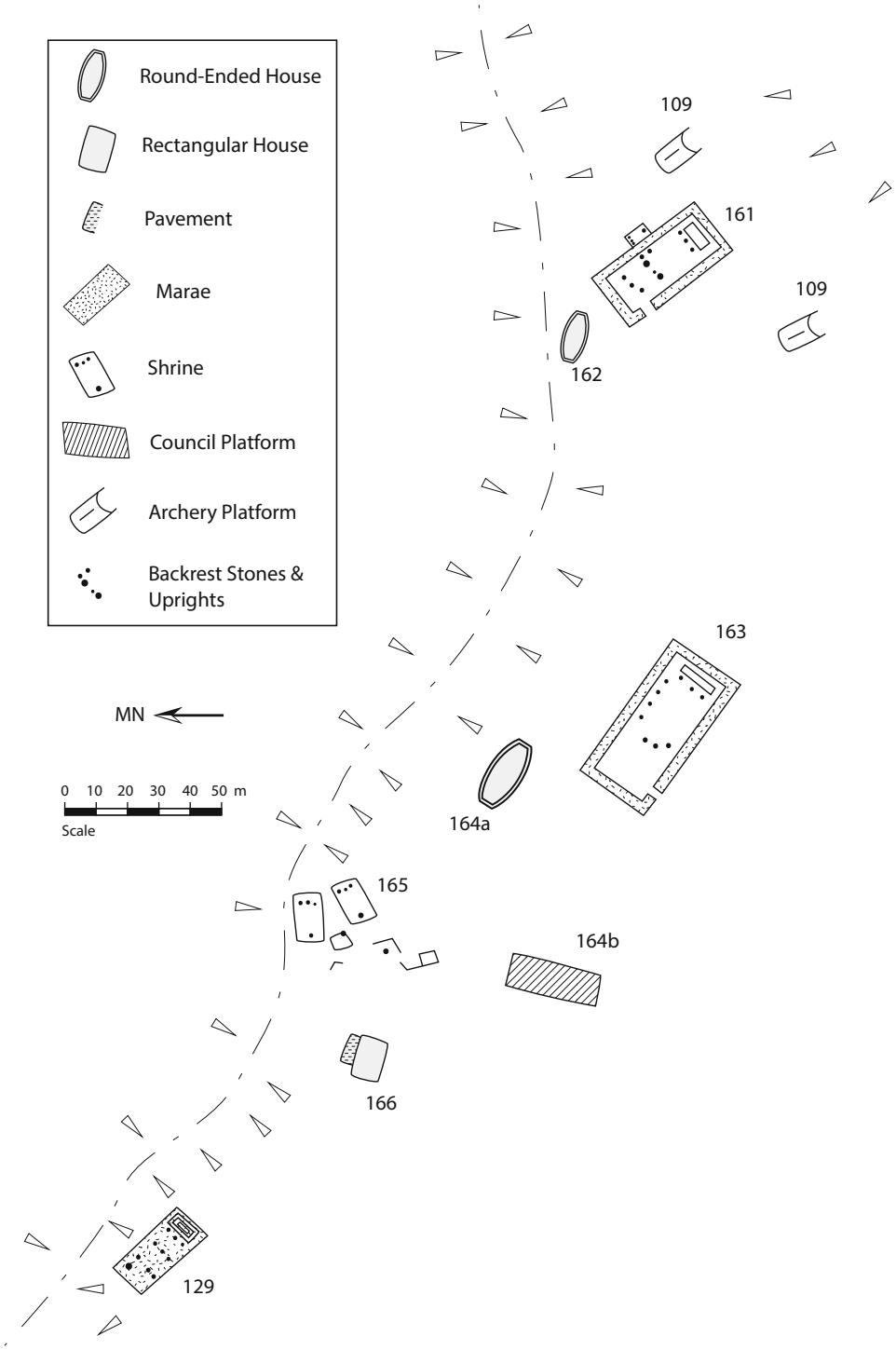

Monumental Architecture in Precontact Polynesia, Fig. 8 Plan view of the ScMo-129-161-163 secondary chiefly center, ‘Opunohu Valley, Society Islands

precontact myths and legends may help to tease out such emic views. Secondly, for a region that has had a long history of comparative archaeological research, there have been few recent efforts to synthesize Polynesian monumental architecture from a regional point of view, where monuments from one cultural group are compared to another (but see Cochrane 2015; Kolb 2012). Certainly, in one sense, the lack of comparative work continues due to the paucity of foundational data. For example, some archipelagoes in Central Eastern Polynesia, such as the Austral Islands and the Gambier Islands, lack detailed inventory survey data, while most Central Eastern Polynesian archipelagoes, such as the Tuamotus, Marquesas, Gambiers, and Australs, have limited chronological data on monumental sites. Unfortunately, the pace of modern development is negatively impacting Polynesian monumental structures in many locales; on the whole regional preservation rules are not strong enough, nor is there monetary support to enforce them. As such, archaeologists should prioritize community-based projects focused on specific monuments or regions that weigh heavily in particular community's minds. If not, the oral traditions and early survey work of the first half of the twentieth century might be the only lasting traces of these dynamic structures that remain for Polynesian communities in the long term. As archipelago-wide datasets expand and become more available, comparative studies relating island isolation, natural resources, and level of social complexity should incorporate comparative analyses of monumental architecture to investigate how factors such as isolation and social circumscription relate to sociopolitical and economic expressions of authority.

Cross-References

- ▶ Early Regional Centers: Evolution and Organization
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Statues and Monumental Art in Archaeology
- ▶ Woodland and Mississippian Cultures of the North American Heartland

References

Allen, M.S. 2010. Oscillating climate and socio-political process: The case of the Marquesan chiefdom, Polynesia. *Antiquity* 849 (323): 86–102.

Allen, M.W. 2016. Food, fighting, and fortifications in pre-European New Zealand: Beyond the ecological model of Maori warfare. In *The archaeology of food and warfare*, ed. A.M. VanDerwarker, G.D. Wilson, and D. Gregory, 41–59. New York: Springer.

Anderson, A. 2018. The prehistory of South Polynesia. In *Oxford handbook of oceanic archaeology*, ed. E. Cochrane and T. Hunt, 396–415. Oxford: Oxford University Press.

Anderson, A., and D.J. Kennett, eds. 2012. *Taking the high ground: The archaeology of Rapa, a fortified Island in remote East Polynesia*. Vol. 37. Canberra: ANU E Press.

Barber, I.G. 1996. Loss, change, and monumental landscaping: Towards a new interpretation of the "Classic" Maaori emergence. *Current Anthropology* 37 (5): 868–880.

Bennett, W.C. 1931. *Archaeology of Kauai.* Bernice P. Bishop Museum Bulletin 80. Honolulu.

Best, S. 1993. At the halls of the mountain kings. Fijian and Samoan fortifications: Comparison and analysis. *The Journal of the Polynesian Society* 102 (4): 385–447.

Burley, D. 1994. Settlement pattern and Tongan prehistory: Reconsiderations from Ha'apai. *Journal of the Polynesian Society* 103 (4): 379–411.

Burley, D. 1996. Sport, status, and field monuments in the Polynesian chiefdom of Tonga: The pigeon snaring mounds of northern Ha'apai. *Journal of Field Archaeology* 23 (4): 421–435.

Burley, D. 1998. Tongan archaeology and the Tongan past, 2850–150 B.P. *Journal of World Prehistory* 12 (3): 337–392.

Burley, D.V., and D. Addison. 2018. Tonga and Samoa in oceanic prehistory: Contemporary debates and personal perspectives. In *Oxford handbook of oceanic archaeology*, ed. E. Cochrane and T. Hunt, 231–251. Oxford: Oxford University Press.

Campbell, M. 2002. Ritual landscape in late pre-contact Rarotonga: A brief reading. *Journal of the Polynesian Society* 111 (2): 147–170.

Campbell, M. 2006. Memory and monumentality in the Rarotongan landscape. *Antiquity* 80 (307): 102–117.

Clark, G. 2015. Chiefly tombs, lineage history, and the ancient Tongan state. *Journal of Island and Coastal Archaeology* 11 (3): 1–18.

Clark, J.T., and D.J. Herdrich. 1993. Prehistoric settlement system in eastern Tutuila, American Samoa. *The Journal of the Polynesian Society* 102 (2): 147–185.

Clark, G., and H. Martinsson-Wallin. 2007. Monumental architecture in West Polynesia: Origins, chiefs and archaeological approaches. *Archaeology in Oceania* 42 (Supplement): 28–40.

Clark, G., and C. Reepmeyer. 2014. Stone architecture, monumentality and the rise of the early Tongan chiefdom. *Antiquity* 88 (342): 1244–1260.

Clark, G., D. Burley, and T. Murray. 2008. Monumentality and the development of the Tongan maritime chiefdom. *Antiquity* 82 (318): 994–1008.

Clark, G., C. Reepmeyer, N. Melekiola, J. Woodhead, W.R. Dickinson, and H. Martinsson-Wallin. 2014. Stone tools from the ancient Tongan state reveal prehistoric interaction centers in the Central Pacific. *Proceedings of the National Academy of Sciences* 111 (29): 10491–10496.

Clark, G., C. Reepmeyer, and N. Melekiola. 2016. The rapid emergence of the archaic Tongan state: The royal tomb of Paepaeotelea. *Antiquity* 90 (352): 1038–1053.

Cochrane, E.E. 1998. The chronological and spatial relationships of ceremonial architecture: Seriation of marae. *Rapa Nui Journal* 12: 3–9.

Cochrane, E.E. 2002. Separating time and space in archaeological landscapes: An example from windward Society Islands ceremonial architecture. In *Pacific landscapes: Archaeological approaches*, ed. T.N. Ladefoged and M.W. Graves, 189–209. Los Osos: Easter Island Foundation Press.

Cochrane, E.E. 2015. Phylogenetic analysis of Polynesian ritual architecture suggests extensive cultural sharing and innovation. *The Journal of the Polynesian Society* 124 (1): 7–46.

Cochrane, E., and J. Mills. 2018. LiDAR imagery confirms extensive interior land-use on Tutuila, American Sāmoa. *Journal of Pacific Archaeology* 9 (1): 70–78.

Conte, E., and K.J. Dennison. 2009. *Te Tahata: Etude d'une marae de Topoto (Nord); Archipel des Tuamotu, Polynésie française*. Punnauia, Les Cahiers du CIRAP 1.

Cordy, R.H. 2000. *Exalted sits the chief: the ancient history of Hawai'i Island*. Honolulu: Mutual Publishing.

Davidson, J. 1974. Samoan structural remains and settlement patterns. In *Archaeology in Western Samoa*, Bulletin 7, ed. R.C. Green and J.M. Davidson, vol. II. Auckland: Auckland Institute and Museum.

DeMarrais, Elizabeth, Luis Jaime Castillo, and Timothy Earle. 1996. Ideology, materialization, and power strategies. *Current Anthropology* 37 (1): 15–31.

DiNapoli, R.J., C.P. Lipo, T. Brosnan, T.L. Hunt, S. Hixon, A.E. Morrison, and M. Becker. 2019. Rapa Nui (Easter Island) monument (ahu) locations explained by freshwater sources. *PLoS One* 14 (1): e0210409.

Dixon, B., A. Carpenter, F. Eble, C. Mitchell, and M. Major. 1995. Community growth and Heiau construction: Possible evidence of political hegemony at the site of Kaunolū, Lāna'i, Hawai'i. *Asian Perspectives* 34 (2): 229–255.

Downes, J., C. Richards, L. Shaw, and F. Torres. 2017. Survey and assessment of the Ara Metua (Ara Nui o Toi) and associated sites and monuments of Rarotonga, Cook Islands. Unpublished report accessed online https://www.uhi.ac.uk/en/t4-media/one-web/university/archaeology-institute/Survey-of-Ara-Metua-Raratonga-report%2D%2D-final.pdf.

Earle, T. 1991. *Chiefdoms: Power, economy and ideology.* Cambridge, UK: Cambridge University Press.

Edwards, E., and J.A. Belmonte. 2004. Megalithic astronomy of Eastern Island: A reassessment. *Journal for the History of Astronomy* 35: 421–433.

Emory, K.P. 1924. *The island of Lanai*. Bernice P. Bishop Museum Bulletin 116. Honolulu.

Emory, K.P. 1928. *Archaeology of Nihoa and Necker islands*. Bernice P. Bishop Museum Bulletin 9. Honolulu.

Emory, K.P. 1933. *Stone remains in the Society Islands*. Bernice P. Bishop Museum Bulletin 116. Honolulu.

Emory, K.P. 1934. *Archaeology of the Pacific equatorial islands*. Bernice P. Bishop Museum Bulletin 123. Honolulu.

Flexner, J. 2014. Some thoughts on the past and future of archaeological mapping in Polynesia. Blog post, Then Dig. *UC Berkeley: Archaeological Research Facility.* Retrieved from https://escholarship.org/uc/item/2p0598q3.

Freeland, T., B. Heung, D.V. Burley, G. Clark, and A. Knudby. 2016. Automated feature extraction for prospection and analysis of monumental earthworks from aerial LiDAR in the Kingdom of Tonga. *Journal of Archaeological Science* 69: 64–74.

Graves, M.W., and C.K. Cachola-Abad. 1996. Seriation as a method of chronologically ordering architectural design traits: An example from Hawai'i. *Archaeology in Oceania* 31 (1): 19–32.

Graves, M.W., and T.N. Ladefoged. 1995. The evolutionary significance of ceremonial architecture in Polynesia. In *Evolutionary archaeology: Methodological issues*, ed. P.A. Telster, 149–174. Tucson: University of Arizona Press.

Green, R.C. 1993. Community-level organisation, power and elites in Polynesian settlement pattern studies. In *The evolution and organisation of prehistoric society in Polynesia*, Monograph 19, ed. M.W. Graves and R.C. Green, 9–12. Auckland: New Zealand Archaeological Association.

Green, R.C., K. Green, R.A. Rappaport, A. Rappaport, and J. Davidson. 1967. *Archeology on the island of Mo'orea, French Polynesia*. Anthropological papers of the American Museum of Natural History 51. New York.

Hamilton, S. 2016. Materialising Island worlds: The case of prehistoric Rapa Nui (Easter Island). In *Rapa Nui–Easter Island: Cultural and historical perspectives*, ed. C.H. Mückler, 129–147. Berlin: Frank & Timme.

Hamilton, S., S. Nahoe Arellano, C. Richards, and H.F. Torres. 2008. Quarried away: Thinking about landscapes of megalithic construction on Rapa Nui (Easter Island). In *Handbook of landscape archaeology*, ed. B. David and J. Thomas, 176–186. Walnut Creek: Left Coast Press.

Herdrich, D.J. 1991. Towards an understanding of Samoan star mounds. *The Journal of the Polynesian Society* 100 (4): 381–435.

Hommon, R.J. 2013. *The ancient Hawaiian state: Origins of a political society.* Oxford University Press.

Jackmond, G., D. Fonoti, and M.M. Tautunu. 2018. Samoa's hidden past: LiDAR confirms inland settlement and suggests larger populations in pre-contact

M

Samoa. *Journal of the Polynesian Society* 127 (1): 73–90.

Kahn, J.G. 2005. *Household and community organization in the late prehistoric Society Islands (French Polynesia)*. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Berkeley.

Kahn, J.G. 2011. Multi-phase construction sequences and aggregate site complexes of the prehistoric windward Society Islands (French Polynesia). *Journal of Island and Coastal Archaeology* 6: 24–50.

Kahn, J.G. 2016a. Household archaeology in Polynesia: Historical context and new directions. *Journal of Anthropological Research* 24 (4): 325–372.

Kahn, J.G. 2016b. Public versus corporate ritual in the Prehistoric Society islands (French Polynesia): A multi-scalar analysis of religious practices. *Séances de la Société Préhistorique Française* 7: 141–161.

Kahn, J.G., and P.V. Kirch. 2011. Monumentality and the materialization of ideology in Central Eastern Polynesia. *Archaeology in Oceania* 46: 93–104.

Kahn, J.G., and P.V. Kirch. 2014. *Monumentality and ritual materialization in the Society Islands: The archaeology of a Major ceremonial complex in the Opunohu Valley, Mo'orea*. Honolulu: Bishop Museum Press.

Kennett, D., A. Anderson, M. Prebble, E. Conte, and J. Southon. 2006. Prehistoric human impacts on Rapa, French Polynesia. *Antiquity* 80 (308): 340–354.

Kikiloi, S.T. 2012. *Kūkulu manamana: Ritual power and religious expansion in Hawai'i the ethno-historical and archaeological study of Mokumanamana and Nihoa islands*. Unpublished Ph.D. dissertation, Department of Anthropology, University of Hawaii at Manoa.

Kirch, P.V. 1984. *The evolution of the Polynesian chiefdoms*. Cambridge, UK: Cambridge University Press.

Kirch, P.V. 1985. *Feathered gods and fishhooks*. Honolulu: University of Hawaii Press.

Kirch, P.V. 1988. *Niuatoputapu: The prehistory of a Polynesian chiefdom*, Thomas Burke Memorial Washington State Monograph 5. Seattle: Burke Museum.

Kirch, P.V. 1990. Monumental architecture and power in polynesi. An chiefdoms: A comparison of Tonga and Hawaii. *World Archaeology* 22 (2): 206–222.

Kirch, P.V. 1991. Chiefship and competitive involution: The Marquesas Islands of eastern Polynesia. In *Chiefdoms: Power, economy and ideology*, ed. T.K. Earle, 119–145. Cambridge, UK: Cambridge University Press.

Kirch, P.V. 2004a. Temple sites in Kahikinui, Maui, Hawaiian Islands: Their orientations decoded. *Antiquity* 78: 102–114.

Kirch, P.V. 2004b. Solstice observation in Mangareva, French Polynesia: New perspectives from archaeology. *Archaeoastronomy: The Journal of Astronomy in Culture* 18: 1–19.

Kirch, P.V. 2010. *How chiefs became kings: Divine kingship and the rise of archaic states in ancient Hawai'i*. Berkeley: University of California Press.

Kirch, P.V. 2017. *On the road of the winds: An archaeological history of the Pacific Islands before European contact*. Berkeley: Univ of California Press.

Kirch, P.V. 2018. Voices on the wind, traces in the earth: Integrating oral narrative and archaeology in Polynesian history. *Journal of the Polynesian Society* 127 (3): 275–306.

Kirch, P.V., and R.C. Green. 1987. History, phylogeny, and evolution in Polynesia. *Current Anthropology* 28 (4): 431–456.

Kirch, P.V., and R.C. Green. 2001. *Hawaiki, ancestral Polynesia: An essay in historical anthropology.* Cambridge, UK: Cambridge University Press.

Kirch, P.V., and W.D. Sharp. 2005. Coral 230Th dating of the imposition of a ritual control hierarchy in precontact Hawaii. *Science* 307 (5706): 102–104.

Kirch, P.V., C. Ruggles, and W.D. Sharp. 2013. The "Pānānā" or "sighting wall" at Hanamauloa, Kahikinui, Maui: Archaeological investigation of a possible navigation monument. *The Journal of the Polynesian Society* 122 (1): 45–68.

Kirch, P.V., R. Mertz-Kraus, and W.D. Sharp. 2015. Precise chronology of Polynesian temple construction and use for southeastern Maui, Hawaiian islands determined by 230 Th dating of corals. *Journal of Archaeological Science* 53: 166–177.

Kolb, M.J. 1991. *Social power, chiefly authority, and ceremonial architecture in an island polity, Maui, Hawaii*. Ph.D. dissertation, University of California, Los Angeles. Ann Arbor: University Microfilms.

Kolb, M.J. 1994a. Monumentality and the rise of religious authority in precontact Hawai'i. *Current Anthropology* 35 (5): 521–547.

Kolb, M.J. 1994b. Ritual activity and chiefly economy at an upland religious site on Maui, Hawai'i. *Journal of Field Archaeology* 21 (4): 417–436.

Kolb, M.J. 1999. Monumental grandeur and political florescence in pre-contact Hawai'i: Excavations at Pi'ilanihale Heiau, Maui. *Archaeology in Oceania* 34 (2): 71–82.

Kolb, M.J. 2006. The origins of monumental architecture in ancient Hawai'i. *Current Anthropology* 47 (4): 657–665.

Kolb, M.J. 2012. The genesis of monuments in island societies. In *The comparative archaeology of complex societies*, ed. Michael E. Smith, 138–164. Cambridge, UK: Cambridge University Press.

Kolb, M.J., and J.E. Snead. 1997. It's a small world after all: Comparative analyses of community organization in archaeology. *American Antiquity* 62 (4): 609–628.

Ladefoged, T.N., and M.W. Graves. 2006. The formation of Hawaiian territories. In *Archaeology of Oceania: Australia and the Pacific Islands*, ed. Ian Lilley, 259–283. Oxford: Blackwell Publishing.

Lepofsky, D., and J.G. Kahn. 2011. Cultivating an ecological and social balance: Elite demands and commoner

knowledge in ancient ma'ohi agriculture, Society Islands. *American Anthropologist* 113 (2): 319–335.
Lipo, C.P., and T.L. Hunt. 2005. Mapping the prehistoric statue roads on Easter Island. *Antiquity* 79: 158–168.
Lyman, K. 2012. *Visibility analysis of Oahu Heiau*. Unpublished M.A. thesis, Department of Geography, University of Hawai'i at Mānoa.
Maric, T. 2016. From the valley to the shore: A hypothesis of the spatial evolution of ceremonial centres on Tahiti and Ra'iatea, Society Islands. *Journal of the Polynesian Society* 125 (3): 239–262.
Martinsson-Wallin, H. 1994. *Ahu – The ceremonial stone structures of Easter Island: Analyses of variation and interpretation of meanings. Aun 19*. Uppsala: Societas Archaeologica Upsaliensis.
Martinsson-Wallin, H. 2007. Samoan archaeology – a review of research history. *Archaeology in Oceania* 42 (1): 1–36.
Martinsson-Wallin, H. 2014. Introduction. In *Monuments and people in the pacific*. Studies in Global Archaeology 20, ed. H. Martinsson-Wallin and T. Thomas, 9–44. Uppsala: Uppsala University.
Martinsson-Wallin, H.A. 2016. *Samoan archaeology and cultural heritage: Monuments and people, memory and history*. Oxford: Archaeopress.
Martinsson-Wallin, H., and T. Thomas. 2014. *Monuments and people in the Pacific*, Studies in Global Archaeology 20. Uppsala: Uppsala University.
Martinsson-Wallin, H., and P. Wallin. 2014. Spatial perspectives on ceremonial complexes: Testing traditional land divisions on Rapa Nui. In *Monuments and people in the Pacific*, Studies in Global Archaeology 20, ed. H. Martinsson-Wallin and T. Thomas, 317–342. Uppsala: Uppsala University.
McAllister, G.A. 1933. *Archaeology of Oahu*. Bernice P. Bishop Museum Bulletin 104. Honolulu.
McCoy, M.D. 2017. Geospatial big data and archaeology: Prospects and problems too great to ignore. *Journal of Archaeological Science* 84: 74–94.
McCoy, M.D. 2018. Celebration as a source of power in archaic states: Archaeological and historical evidence for the Makahiki festival in the Hawaiian islands. *World Archaeology*. https://doi.org/10.1080/00438243.2018.1445554.
McCoy, M.D., and T.N. Ladefoged. 2009. New developments in the use of spatial technology in archaeology. *Journal of Archaeological Research* 17 (3): 263–295.
McCoy, P.C., and R. Nees. 2014. A re-examination of Kenneth P. Emory's theory of Necker type marae in the summit region of Mauna kea, Hawai 'i: Many marae or shrines later. *Society for Hawaiian Archaeology Special Publication* 4: 27–50.
McCoy, M.D., T.N. Ladefoged, M.W. Graves, and J.W. Stephen. 2011. Strategies for constructing religious authority in ancient Hawai'i. *Antiquity* 85 (329): 927–941.
McElroy, W. 2007. *The development of irrigated agriculture in Wailau Valley, Moloka'i island, Hawai'i*. Unpublished Ph.D. dissertation, University of Hawai'i at Mānoa.
McIvor, I.H. 2015. Monumental ideology: A GIS spatial analysis of interior features of Matakawau Pā, Ahuahu (stingray point Pā, great Mercury Island), New Zealand. *The Journal of the Polynesian Society* 124 (3): 269–302.
McKern, W.C. 1929. *Archaeology of Tonga*. Bernice P. Bishop Museum Bulletin 60. Honolulu.
Millerstrom, S. 2006. Ritual and domestic architecture, sacred places, and images: Archaeology in the Marquesas archipelago, French Polynesia. In *Archaeology of Oceania: Australia and the Pacific Islands*, ed. Ian Lilley, 259–283. Oxford: Blackwell Publishing.
Molle, G. 2016. Exploring religious practices on polynesian atolls: A comprehensive architectural approach towards the 'marae' complex in the Tuamotu islands. *The Journal of the Polynesian Society* 1225 (3): 263.
Morrison, A.E., and J.T. O'Connor. 2018. Settlement pattern studies in Polynesia: Past projects, current progress, and future prospects. In *The Oxford handbook of prehistoric Oceania*, ed. Ethan Cochrane and Terry Hunt, 450–472. Oxford: Oxford University Press.
Morrison, A.E., T.M. Rieth, E.E. Cochrane, and R.J. DiNapoli. 2018. The Samoa archaeological geospatial database: Initial description and application to settlement pattern studies in the Samoan Islands. *Journal of the Polynesian Society* 127 (1): 15–34.
Mulrooney, M. 2012. *Continuity or collapse? Diachronic settlement and land use in Hanga Hoonu, Rapa Nui (Easter Island)*. Unpublished Ph.D. dissertation, University of Auckland.
Mulrooney, M.A., and T.N. Ladefoged. 2005. Hawaiian heiau and agricultural production in the Kohala dryland field system. *The Journal of the Polynesian Society* 114 (1): 45–67.
Osborne, J.F., ed. 2014. *Approaching monumentality in archaeology*. Albany: SUNY Press.
Phillips, N., T.N. Ladefoged, B.W. McPhee, and G.P. Asner. 2015. Location, location, location: A viewshed analysis of heiau spatial and temporal relationships in leeward Kohala, Hawai'i. *Journal of Pacific Archaeology* 6 (2): 21–40.
Quintus, S., and J.T. Clark. 2016. Space and structure in Polynesia: Instantiated spatial logic in American Sāmoa. *World Archaeology* 48 (3): 395–410.
Quintus, S., and J.T. Clark. 2019. Ritualizing hierarchy: Power strategies and pigeon catching in ancient Samoa. *Journal of Anthropological Research* 75 (1): 48–68.
Quintus, S., Melinda S. Allen, and Thegn N. Ladefoged. 2016. In surplus and in scarcity: agricultural development, risk management, and political economy on Ofu Island, American Samoa. *American Antiquity* 81 (2): 273–293.

Quintus, S., J.T. Clark, S.S. Day, and D.P. Schwert. 2015. Investigating regional patterning in archaeological remains by pairing extensive survey with a lidar dataset: The case of the Manu'a group, American Samoa. *Journal of Archaeological Science: Reports* 2: 677–687.

Quintus, S., S.S. Day, and N.J. Smith. 2017. The efficacy and analytical importance of manual feature extraction using Lidar datasets. *Advances in Archaeological Practice* 5: 1–24.

Richards, C., K. Croucher, T. Paoa, T. Parish, E. Tucki, and K. Welham. 2011. Road my body goes: Re-creating ancestors from stone at the great moai quarry of Rano Raraku, Rapa Nui (Easter Island). *World Archaeology* 43 (2): 191–210.

Rolett, B.V. 2010. Marquesan monumental architecture: Blurred boundaries in the distinction between religious and residential sites. *Archaeology in Oceania* 45 (2): 94–102.

Ruggles, C. 2001. Heiau orientations and alignments on Kaua'i. *Archaeoastronomy: The Journal of Astronomy in Culture* 16: 46–82.

Sand, C. 1993. A preliminary study of the impact of the Tongan maritime chiefdom on the late prehistoric society of 'Uvea, Western Polynesia. *The Evolution and Organisation of Prehistoric Society in Polynesia, Monograph* 19: 43–51.

Sand, C. 1999. Empires maritimes préhistoriques dans le Pacifique: Ga'asialili et la mise en place d'une colonie tongienne a Uvea (Wallis, Polynésie occidentale). *Journal de la Société des Océanistes* 108 (1): 103–124.

Sand, C., D. Baret, J. Bole, A. Ouetcho, and M. Sahib. 2018. Samoan settlement pattern and star mounds of Manono Island. *The Journal of the Polynesian Society* 127 (1): 91–110.

Sharp, W.D., J.G. Kahn, C.M. Polito, and P.V. Kirch. 2010. Rapid evolution of ritual architecture in central Polynesia indicated by precise 230Th/U coral dating. *Proceedings of the National Academy of Sciences* 107 (30): 13234–13239.

Shepardson, B.L. 2005. The role of Rapa Nui (Easter Island) statuary as territorial boundary markers. *Antiquity* 79 (303): 169–178.

Stephens, J. 2016. *Making sense of monumentality: A multisensory archaeological approach to Hawaiian ritual architecture*. Unpublished Ph.D. dissertation, University of Hawai'i, Manoa.

Suggs, R. 1961. *The archeology of Nuku Hiva, Marquesas Islands, French Polynesia*. Anthropological Papers of the American Museum of Natural History 49. New York.

Sutton, D.G. 1990. Organisation and ontology: The origins of the Northern Maori chiefdom, New Zealand. *Man* 25 (4): 667–692.

Sutton, D.G., L. Furey, and Y.M. Marshall. 2003. *The archaeology of Pouerua*. Auckland: Auckland University Press.

Wallin, P. 1993. *Ceremonial stone structures: the archaeology and ethnohistory of the Marae complex in the Society Islands, French Polynesia*. Ph.D. dissertation, Societas Archaeologica Upsaliensis.

Wallin, P. 2014. Chiefs, Fashion and Zeitgeist: Exclusion as an Expension Strategy in Kinship Based Groups in the Society Islands. In *Monuments and people in the Pacific*. Studies in Global Archaeology 20, ed. H. Martinsson-Wallin and T. Thomas, 297–316. Uppsala: Uppsala University.

Wallin, P., and H. Martinsson-Wallin. 2011. Monumental structures and the spirit of chiefly actions. *Time and Mind* 4 (1): 43–58.

Wallin, P., H. Martinsson-Wallin, and G. Clark. 2007. A radiocarbon sequence for Samoan prehistory and the Pulemelei Mound. In *Archaeology in Samoa. The Pulemelei investigations.* Archaeology in Oceania vol 42 supplement, ed. H Martinsson-Wallin, 71–82. University of Sydney, Sydney.

Weisler, M.I., and P.V. Kirch. 1985. The structure of settlement space in a Polynesian chiefdom: Kawela, Moloka'i, Hawaiian Islands. *New Zealand Journal of Archaeology* 7: 129–158.

Morgan, Jeff

Jeff Morgan
Global Heritage Fund, Palo Alto, CA, USA

Basic Biographical Information

Jeff Morgan is a trained city and regional planner, earning a B.S. from Cornell University. He received an M.S. in Management from Stanford University's Graduate School of Business.

Major Accomplishments

Jeff Morgan is the executive director of the Global Heritage Fund (GHF), a position he has held since founding the organization in 2002. He is a member of the Global Heritage Fund's Senior Advisory Board and the Board of Trustees. In the position of executive director at GHF, he is responsible for global conservation excellence, building a leading international conservancy and improving the lives in communities where GHF sites are located. He also serves on the Stanford Institute for Economic Policy Research Advisory Board.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Sustainability and Cultural Heritage
- ▶ Sustainable Cultural Tourism Policies: Overview

Further Reading

Di Giovine, M.A. 2009. *The heritage-scape: UNESCO, world heritage, and tourism*. Lanham: Lexington Books.

Leask, A., and A. Fyall. 2006. *Managing world heritage sites*. Amsterdam: BH/Elsevier.

Mathers, C., T. Darvill, and B.J. Little, eds. 2005. *Heritage of value, archaeology of renown. Reshaping archaeological assessment and significance*. Gainesville: University Press of Florida.

Morgan, J.C., and J.J. Morgan. 1991. *Cracking the Japanese market: Strategies for success in the new global economy*. New York: Free Press.

Morgan, J.J., and Global Heritage Fund. 2004. *Saving our global heritage*. Palo Alto: GHF Press.

Timothy, D.J., and S.W. Boyd. 2003. *Heritage tourism*. Harlow: Prentice-Hall.

Unesco. 2012. *World heritage sites. A complete guide to 936 UNESCO world heritage sites*. 4th ed. Buffalo: Firefly Books.

Morwood, Michael

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Basic Biographical Information

Michael (Mike) Morwood (Fig. 1) was awarded his B.A. in Archaeology at Auckland University, New Zealand, in 1973, receiving his Masters in the following year. In 1972 the Auckland University Department of Anthropology awarded Morwood the Anthropology Prize for academic excellence. Morwood commenced further graduate studies in 1976 at the Australian National University. He was awarded his Ph.D. in 1980. His dissertation was titled *Art and Stone: Towards a Prehistory of Central-Western Queensland* (Mike Morwood 2010).

Morwood began his career employed as regional archaeologist by the Queensland State Archaeology Branch of the Department of Aboriginal and Islander Affairs (DAIA) between 1974 and 1976. After receiving his doctorate, he returned to the DAIA in Queensland as a field and research archaeologist. In 1981 he began lecturing at the University of New England. As a part of the School of Human Environmental Studies, Morwood lectured in Australian archaeology, Southeast Asian and Pacific archaeology, rock art, archaeological field methods, and archaeological lab methods. It was during this time he discovered *Homo floresiensis*, a hominin species that "...prompted reassessment of fundamental tenets in palaeoanthropology...concerning the peripheral role of Asia in early hominin evolution" (Professor Michael "Mike" Morwood 2011). Morwood moved to Wollongong University in 2007 where he is currently a professor at the School of Earth and Environmental Studies. His research interests include archaeology of Southeast Asia and Australia, early hominin evolution and dispersals, origins of modern humans, rock art, Southeast Asian biogeography, and ethno-archaeology.

Mike Morwood was elected President of the Australian Rock Art Research Association in 1992, a position he held until 2000. In 2003, Morwood was elected a Fellow of the Australian Academy of the Humanities, an organization dedicated to the advancement of knowledge in humanities. Other professional positions he has held include Professorial Fellow Archaeology in the School of Earth and Environmental Studies at the University of Wollongong between 2007 and 2009, Adjunct Professorial Fellow at the University of Western Australia between 2009 and 2010, Adjunct Professorial Fellow at the University of New England from 2009, Adjunct Professorial Fellow at Charles Darwin University from 2009, and Adjunct Professorial Fellow at Padjadjaran University, Bandung, from 2010.

Major Accomplishments

Models for the early hominin dispersal out of Africa received considerable attention when the

Morwood, Michael, Fig. 1 Mike Morwood in the field in Sulawesi, Indonesia

joint Australian-Indonesian research team headed by Professor Morwood discovered *Homo floresiensis* in the Liang Bua cave on the Island of Flores, Indonesia (Morwood and Oosterzee 2007). The finding of *Homo floresiensis*, released on the 28 October 2004, has implications for the dispersal of hominin and human dispersal out of Africa and the colonization of Asia. It has attracted substantial debate from, in part, supporters of the multiregionalist theory of *Homo sapiens* evolution (Morwood). The continued study of *Homo floresiensis* has taken a multidisciplinary approach including paleoanthropological, morphological (see Kaifu et al. 2011), and pathological analysis combined with dentition study, ancient DNA extraction, and tomographical techniques. Of additional interest to the find are the lithic tools associated with the discovery of *Homo floresiensis* and the cognitive behaviors connected with their manufacture and use (Brumm et al. 2006). Recent research estimates the faunal sequence and minimum age for hominins on Flores at 1.1 million years ago, ensuring the study covers the entire period of hominin habitation in the region. Excavations at Mata Menge, Flores, hope to provide greater evidence on the early hominin colonization of the Indonesian area. The public interest in these hominin finds has sparked numerous documentaries and written works detailing all manner of scientific investigation and discussion on the subject.

More recent multinational research projects have identified the interactions of human activity, the local environment, climates, and island faunas in long-term changes in Indonesia. The implications for island biogeography and evolution can be seen extending throughout significant periods of time. A collaborative project, with funding from the Australian Research Council, involving Indigenous communities, the University of New England, the Australian National University, the W.A. Department of Environment and Conservation, the Kimberley Foundation, and Heliwork, is looking at the complex cultural sequences resulting from human occupation and the impacts on faunal habitation through investigating the distribution, chronology, and subject matter of cultural heritage sites. The research being conducted

in the Kimberly region of Australia may provide evidence of the effect of environmental and cultural alteration as a result of climate change and human habitation in the area (Professor Michael "Mike" Morwood 2011).

Mike Morwood's innovations in on-site field data recovery include the adaptation of shoring techniques found on industrial construction sites that are well suited for deep excavations. In addition, Morwood developed effective wet-sieving techniques that greatly improved finds recovery from excavated material. He is known for his use of an intelligent database design for recording excavated materials and the documentation of site contexts. His experience in directing large-scale projects has ensured the success of collaborative projects between local government agencies, research centers, and interdisciplinary organizations, both in Australia and Indonesia.

As a globally recognized scholar, Mike Morwood is known for his interdisciplinary projects that have embraced various media avenues to promote archaeology to the public. His publications communicate the excitement of archaeological discovery to a wider audience. His scientific research encourages the use of high-profile discoveries to promote archaeology. He is also recognized for his enthusiastic and high-quality training of students and postdoctoral scholars. His former students hold high-level government posts, business and academic positions throughout Australia and in other countries where he has conducted research. Mike Morwood died in July, 2013 in Darwin, Australia.

Cross-References

- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Ethnoarchaeology
- ▶ Out-of-Africa Origins

References

Brumm, A., F. Aziz, G.D. van den Bergh, M.J. Morwood, M.W. Moore, I. Kurniawan, D.R. Hobbs, and R. Fullagar. 2006. Early stone technology and its implications for Homo floresiensis. *Nature* 441: 624–628.

Kaifu, Y., H. Baba, T. Sutikna, M.J. Morwood, D. Kubob, E.W. Saptomoc, Jatmikoc, R. Due Awec, and T. Djubiantono. 2011. Craniofacial morphology of Homo floresiensis: Description, taxonomic affinities, and evolutionary implication. *Journal of Human Evolution* 61 (6): 644–682.

Mike Morwood. 2010. Available at: http://www.uow.edu.au/science/eesc/eesresearcacademics/UOW087562.html. Accessed 28 Feb 2013.

Morwood, M.J., and P. van Oosterzee. 2007. *A new human: The discovery of the Hobbits of Flores*. Washington, DC: Smithsonian Books.

Professor Michael "Mike" Morwood. 2011. Available at: https://cas.uow.edu.au/members/UOW094308.html. Accessed 29 Feb 2013.

Further Reading

Aziz, F., M.J. Morwood, and G.D. van den Bergh, eds. 2009. *Palaeontology and archaeology of the Soa Basin, central Flores, Indonesia*. Bandung: Indonesian Geological Survey Institute.

Morwood, M.J. 1982. *The ethnography of Aboriginal groups in the Central Queensland Highlands*, Cultural resource management monograph series. Vol. 1. Brisbane: Queensland Government.

Morwood, M.J. 1989. The archaeology of Aboriginal art in S.E. Cape York: A preliminary report on the 1989 fieldwork. *Rock Art Research* 6 (2): 155–156.

Morwood, M.J. 1990. The prehistory of Aboriginal land use on the upper Flinders River, North Queensland Highlands. *Queensland Archaeological Research* 7: 3–56.

Morwood, M.J. 2002. *Visions from the past; the archaeology of Australian Aboriginal art*. Sydney: Allen and Unwin.

Morwood, M.J., and D.R. Hobbs, eds. 1992. *Rock art and ethnography*, AURA occasional publication. Vol. 5. Melbourne: Australian Rock Art Research Association.

Morwood, M.J., and P. van Oosterzee. 2007. *The discovery of the Hobbit: The scientific breakthrough that changed the face of human history*. Sydney: Random House.

M

Mosaics: Conservation and Preservation

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Introduction

Conservation is the process of preserving cultural heritage for the benefit of future generations. Mosaics present particular challenges, whether

in situ on archaeological sites or within museum collections.

Definition

Mosaics in the Classical tradition consist of a surface of small cut cubes (*tesserae*) of stone, ceramic, or glass (forming the *tessellatum*), often in a decorative configuration. This is the visible part of a composite structure, with a support of multiple levels of lime mortar and a stone rubble base, many times thicker than the *tessellatum* itself. The Latin nomenclature for these different layers is known from the writings of the Roman architect Vitruvius. In Roman architecture, the vast majority of mosaics were floor pavements, but they also embellished walls and vaults as well. In other cultures, different materials may be found. The reference in this entry is to Hellenistic/Roman/Byzantine mosaics.

The origin of Classical mosaics is in the Hellenistic pebble pavements of the eastern Mediterranean. They formed an integral part of much Roman architecture throughout the Empire and endured through the Umayyad and Byzantine periods.

Conservation of mosaics entails numerous activities, such as modification of their environment to mitigate the causes of deterioration or restoration of their structural stability through the addition of new materials.

Key Issues/Current Debates/Future Directions/Examples

Historical Legacy

European interest in Classical antiquity in the Renaissance was invigorated by the discovery of Pompeii and Herculaneum in the mid-eighteenth century.

Early interventions involved the lifting of selective parts of mosaics, usually the highly prized figurative *emblemmata* (central panel), to be displayed in antiquarian collections much as paintings. Presumably, those of lesser interest were abandoned. The detached *tessellatum* was reset onto a new mortar bed of lime mortar or gypsum (or cement mortar from the nineteenth century), fixed to a sturdy support such as wood or stone slate. Restoration of the decorative pattern of the *tessellatum* often utilized loose *tesserae* from the excavation, with a degree of speculation depending on the extent of its preservation. Mortar grouting was then applied into the joints between *tesserae*, followed by mechanical abrasion of the surface to achieve a smooth and polished finish. This effaced differences between the authentic and restored artifact. Wax was often applied to mosaics exposed indoors to enhance color contrast; it darkened over time.

The first tentative attempts at the preservation mosaics in situ occurred from the late eighteenth century. In central Europe, this sometimes entailed the erection of simple vernacular structures over mosaics to protect them from inclement weather and vandalism.

Surviving mosaics, either lifted or conserved in situ, constitute a fraction of those discovered and either willfully destroyed or lost through neglect.

The removal of mosaics to museums was intended as an act of preservation. However, this was by no means guaranteed, and countless lifted mosaics have perished either in site stores or in museums, particularly if they were never reset on a solid new mortar support.

The most unwitting damage sustained by treated mosaics is through the use of artificial Portland cement mortars, progressively developed over the nineteenth century and employed exclusively in many countries through the twentieth century (see below). This was further exacerbated by the introduction of reinforced iron into new cement mortar supports in the twentieth century.

In the last quarter of the twentieth century, a greater appreciation for the value of mosaics in their authentic architectural context focused energies on their conservation in situ. Throughout Europe, protective cover buildings were erected over many structures containing mosaics. Revival of the use of traditional lime mortars for building

conservation was beneficial for mosaics as well, in reaction to the damage inflicted by mortars based on cement.

Better technical interventions such as these have not been sufficient to address the general crisis in the conservation of mosaics on archaeological sites, as a result of poor management. Loss of this heritage is progressive, relentless, and immeasurable.

Deterioration and Damage

Ancient Damage

Any pavement is subject to physical abrasion and impact damage within an occupied building. Indeed, ancient repairs to mosaics are frequently encountered. Disasters such as fire or earthquake were also common. With eventual abandonment, mosaics were buried through a combination of building collapse and site erosion.

Buried Mosaics

In a burial environment, the constituent materials of mosaics (stone, ceramic, and mortar) sustain much slower rates of deterioration than in an exposed one, with large variations in temperature and moisture content. This accounts for the intrinsic survival of so many ancient mosaics. However, some damage may occur from tree roots, burrowing animals, and weak inorganic acids in soil; the latter may leach out calcium carbonate from mortar, resulting in a friable matrix without binding power. In contrast, thin "veils" of calcium often precipitate onto the surfaces of mosaics in burial conditions; these cause no physical harm but do obscure the surface.

Exposed Mosaics In Situ

Upon excavation, all archaeological features undergo a physical "shock" through exposure to a more dynamic ambient environment in which physical and chemical processes interact to degrade materials. The rate of deterioration depends on several factors, intrinsic to the materials of the mosaic, its physical history, and the aggressiveness of its new environment.

Inherent natural faults in its materials, such as *tesserae* of clay-rich sedimentary limestone, may fracture and delaminate in humid conditions. As composite structures, mosaics have multiple planes of weakness, which offer preferential paths for root penetration or detachment of different horizontal layers from differential dimensional change. Ancient mortar, which has degraded in burial conditions (see above), results in a loss of physical integrity of the composite structure, including the large-scale detachment of *tesserae*.

Low forms of plant life (such as moss) lead to the colonization by higher plants, whose root structures can destroy entire pavements. Another potentially aggressive form of environmental degradation is from soluble salts in the soil. Dissolved in groundwater, these migrate into a mosaic structure through capillary forces; in dry ambient conditions, they crystallize and expand within the pore structure of stone, ceramic, or mortar near the surface. Certain compound salts increase many times in volume upon crystallization and eventually destroy such porous materials. A powdery material is the result.

Inappropriate Interventions

The use of cement mortars, and iron-reinforced cement supports, has been the most harmful form of intervention. Cement is an impervious material with high soluble salt content, concentrating moisture movement, and associated decay in the ancient fabric; furthermore, it is very difficult, if not impossible to completely remove. Where iron reinforcement is present in external or damp internal environments, moisture penetrates through micro-fissures and cracks, causing the corrosion and expansion of the iron and fracturing of the mosaic itself. Gradual loss of alkalinity of the cement also results in iron corrosion.

The process of lifting and relaying of the *tessellatum* on a new mortar support results in a loss of material authenticity and integrity, as the ancient bedding layers which contain much technological information are destroyed; relaying also normally creates an aesthetically bland, flat surface, particularly if cement is used. A common finishing

technique was (and still is in some countries) the physical abrasion of the surface of the *tessellatum* to remove any lime concretion and thus enhance the overall design of the mosaic. This further compromises archaeological integrity.

Storage and Presentation Environments

The damage from damp storage environments has been cited above. Storage facilities designed without regard to potential risks can be subject to flooding, fire, or theft. Museum buildings with damp problems can also cause damage to mosaics presented on floors or mounted on walls.

Modern cover buildings erected over mosaics in situ are sometimes designed without an adequate understanding of the condition of sheltered mosaics and the attendant risk environment. This means they either fail to protect from obvious environmental factors (such as site hydrology) or they create an internal environment which accelerates damage from natural processes (as crystallization of soluble salts).

Lack of Maintenance

Poor or nonexistent maintenance is the principal cause of deterioration of mosaics in situ in exposed environments. Poor maintenance is a direct result of incompetent or ineffective management structures and poor training and not necessarily the lack of sufficient financial resources.

Assessment

Any conservation intervention should be preceded by an assessment of a number of factors:

- Significance of the mosaic: cultural importance (in terms of materials, iconography, and craftsmanship) within a specific region
- Condition of the mosaic: current physical state of the materials and structure and the cause (s) and rate of deterioration
- Vulnerability of the mosaic within its risk environment: local environmental risks (e.g., soluble salts, flooding)

The assessment of significance should normally be carried out during a preliminary archaeological inventory (e.g., the creation of an academic *corpus* of ancient mosaics for a given region and country). This, in turn, should contribute to the national Sites and Monuments Record, providing unique numerical identities to each mosaic within a GIS matrix.

There are essentially three levels of mosaic condition survey:

- Preliminary or reconnaissance survey: a relatively rapid initial survey to capture basic data about the condition of a large number of mosaics
- Detailed (or conventional) condition survey: a detailed inspection usually for more significant pavements
- Specialist survey: material analysis or geological prospection undertaken for significant pavements at risk

A condition survey considers and records: the context of the mosaic (the natural environment and building structure within which it is contained), the materials and structure of the mosaic, any repairs or interventions, and, finally, the physical manifestations of deterioration and their likely causes. The survey report should provide recommendations for intervention, and prioritization of treatments, based on diagnosis and prognosis.

Conservation Interventions

Good management of collections of mosaics, either in situ or in museums, requires an understanding of their significance, condition, and risk, in order to identify the interventions which will guarantee the most beneficial outcome. Only individuals with the appropriate knowledge, experience, and skill to implement them should undertake any interventions in mosaics.

The care of mosaics in situ is particularly challenging, given the aggressive environmental forces to which these are subject. In order to best preserve the mosaic heritage with finite financial resources, a variety of conservation measures usually need to be implemented, following a prioritized program. This should take into account the

significance and condition of pavements, ease of access, existing or planned visitor interpretation, and available resources:

- Reburial of mosaics not to be presented in the foreseeable future
- Presentation and interpretation of selective mosaics on a planned visitor circuit (with consolidation, maintenance, and monitoring), possibly under cover buildings

Stabilization of Mosaic Context

Erosion of slopes around exposed mosaics deposits soil which promotes vegetation. Slopes can be stabilized by natural or synthetic netting fabricated for this purpose and the planting of indigenous shrubs.

Where such mosaics are in the path of recurrent rain runoff, land drains can be placed in strategic positions to intercept and evacuate water. Site drainage may also help reduce moisture content within a mosaic and consequently growth of microorganisms on it. Modern synthetic "geodrains" are relatively narrow and thus limit the destruction of archaeological stratigraphy for their installation.

Mosaics in situ within unstable or faulty structures (ancient ones or modern cover buildings, museums, stores) are at risk of damage. Also, exposed mosaics on slopes may be undermined by natural erosion. Masonry repairs need to be undertaken to secure perimeter structures and mosaic foundations, possible with enhanced drainage.

Reburial of Mosaics In Situ

Archaeological mosaics have survived due to a burial environment, and the reinstatement of a burial regime can be a very effective conservation option, if well planned. This may be for short periods (e.g., between excavation seasons), for moderate periods (e.g., during planning for a new cover building), or for the long-term periods (where presentation of the pavement is not currently envisaged). Reburial also prevents deterioration from aggressive soluble salts, where these are present.

Effective protection requires the design of a good burial cover (appropriate materials and stratigraphy), perimeter drainage, and maintenance. Intimate contact between the surface and cover medium (usually soil) is essential. Synthetic separation membranes, such as geotextiles are often incorporated into the reburial stratigraphy, to facilitate re-excavation, or provide chronological "markers" to future archaeologists. These are not strictly necessary in conservation terms; they may inhibit the free movement of water in the reburial regime, which can have detrimental consequences, or promote root growth under the membrane.

Cover Buildings or Shelters

Mosaics exposed to the elements in situ will invariably deteriorate at a faster rate than if protected under cover. To be most effective, cover buildings or shelters need to be designed to a very specific brief, addressing the vulnerability of the mosaic and associated environmental hazards.

Consolidation and Stabilization of Mosaics

The vast majority of remedial repairs to mosaics can be carried out with a palette of lime mortars, based on a binder of lime and an aggregate of sand. Lime is of two varieties, dependant on the mineral properties of the parent stone: non-hydraulic lime, which sets in reaction with carbon dioxide in the air, and natural hydraulic lime, which sets additionally through a chemical reaction with water. The former is appropriate for most surface treatments, while the later is necessary for surfaces of mosaics which are persistently damp or for the grouting of voids within mosaics where there is less ambient carbon dioxide available.

Technicians undertaking repairs should be adequately trained in the use of lime mortars, which must be properly specified and applied, if they are not to fail. Cement-based mortars are never appropriate nor gypsum in external environments.

Typical mortar treatments consist of:

- Protective borders around the exposed edges of the *tessellatum* to retain *tesserae* in place
- Filling of deep joints between *tesserae* where original mortar is lost
- Filling of losses in the *tessellatum* to prevent water ponding and growth of vegetation
- Readhesion of loose *tesserae*
- Injection grouting of voids in mortar support layers to prevent collapse or detachment

Mosaics to be presented require additional consideration of the appearance of new mortar. Color and texture of mortars used on the surface are provided by careful selection of the mortar aggregate and finishing treatment.

A less frequent treatment is the consolidation of degraded *tesserae*, usually caused by soluble salts. This is a specialist process using chemical consolidants, undertaken by an experienced conservator. There is no perfect chemical consolidant, and efficacy is limited by residual salts and by external exposure.

Cleaning

Periodic cleaning of mosaics is necessary, particularly in external environments to remove microorganisms or accumulated soil, which encourages plant growth. This is done with clean water and nonionic detergent (which leaves no harmful residual products), applied with soft brushes and sponges. Biocides should be used with caution, as their residual effect is limited and some leave soluble salts in the mosaic as well.

Surface lime concretions should never be removed by aggressive abrasive methods, as this destroys the integrity of the *tessellatum*. Sensitive methods include mechanical removal by scalpel, controlled micro-abrasives, or by chemical means with chelating agents. These are specialist techniques undertaken by or under the close supervision of a qualified conservator.

Surface Coatings

There is often a desire to enhance the design of the *tessellatum* with surface coatings. These all darken with time and attract air-borne particulates and therefore should never be used outdoors. Even if a coating is reversible at the time of application, it may become less so over time, making removal problematic. They are best avoided.

Treatment of Mosaics on Iron-Reinforced Cement

Maintenance Corrosion of iron reinforcement in external environments cannot be prevented, but its rate can be mitigated by systematic maintenance to prevent ingress of liquid water. This means filling all cracks and micro-fissures with suitable mortars.

Storage Detached mosaic panels with iron-reinforced backings should be stored in the driest conditions possible to reduce the rate of corrosion.

Removal of Backing Remedial techniques for the stabilization of reinforced concrete in modern buildings include passivation of iron by means of cathodic protection or sacrificial anode cathodic protection. Unfortunately, this technology is not easily transferable to mosaics on archaeological sites but may be possible inside a museum.

Mosaics in an advanced state of deterioration can only be rescued through the removal of the backing. This is an expensive and laborious exercise, undertaken by conservators with specialist experience, using stone cutting equipment under precision control. The *tessellatum* is secured in advance with multiple layers of natural fabric and reversible adhesive to secure it during this operation.

When most of the cement has been removed, the *tessellatum* is mounted on a new support as described in the section immediately below.

If mosaics in situ contain corroding iron bars near the surface, it may be possible to remove them surgically, after facing the surface with fabric applied with reversible adhesive and filling voids with mortar.

Lifting and Relaying

Current cultural heritage policy endeavors to preserve mosaics in situ, either through reburial or presentation. In some instances, lifting and relaying may be required:

- For very degraded mosaics with large areas of loose *tesserae*
- For mosaics subject to erosion from aggressive soluble salts from the ground
- Where the site is to be destroyed for development

In advance of lifting, the *tessellatum* is rigorously cleaned and stabilized with mortar as necessary. It is then faced with several layers of natural fabric, applied in intimate contact with the surface, with a reversible adhesive. Depending on the size of the pavement and complexity of design of the *tessellatum*, it is either cut into small sections or lifted intact. Metal blades and rammers are used to undercut the mortar support layer, and the each small section of the *tessellatum* is then "sandwiched" and secured between wooden boards for transport away from the site. If the *tessellatum* is to be lifted whole, it is fixed to large wooden drum and rolled as it is undercut; this operation carries greater risk of damage.

Relaying In Situ A mosaic to be reinstated in situ requires a solid new foundation (of hydraulic lime mortar, but cement mortar may be used if not in immediate contact with the *tessellatum*). On sites with high levels of soluble salts and a high water table, a conventional damp-proof course should be inserted into the new mortar foundation. New perimeter drainage should be installed as required.

Degraded bedding mortars are recorded prior to their removal from the back of the *tessellatum*. It is then relayed on the new foundation with lime mortar, the facing is detached and the surface made good with mortar.

Relaying on Panels New solid mounts or supports are required for those mosaics which cannot be returned to their original site. Cement-based materials and iron reinforcement are never appropriate. Instead, best practice utilizes synthetic "honeycomb" boards consisting of an internal matrix of aluminum in honeycomb form, with surfaces of glass fiber in epoxy resin. Being rigid, strong, and lightweight, such panels are ideal supports for detached mosaics. They are fixed to the *tessellatum* with epoxy resin or epoxy foam, with an intermediate "intervention layer" of reversible lime or synthetic mortar.

Such honeycomb panels and epoxies are widely available and affordable in developed countries. Elsewhere, they are expensive and difficult to procure. Research is underway to identify local alternatives.

Maintenance and Monitoring

The preservation of all mosaics, either in situ or in museum collections, requires ongoing care, through maintenance and monitoring of condition. This is the most neglected conservation activity.

Good maintenance requires the creation of maintenance schedules, both for mosaics and their context (site store, museum, or cover building). There are three complementary types of inspection:

- Periodic inspections: on a planned basis at defined intervals
- Occasional inspections: following severe weather or unforeseen events (e.g., floods)
- Cyclical or planned preventive maintenance: at predetermined intervals

Routine tasks consist of vegetation removal (done with care to avoid surface disruption) or treatment with benign herbicides, cleaning of the *tessellatum*, maintenance of protective site barriers, and stabilization of the *tessellatum* with small lime mortar repairs.

Regular monitoring of the condition of mosaics is the responsibility for those who care for them, to ensure that problems are noted as they arise and defects are treated in a timely manner.

Conclusion

The material, aesthetic, and archaeological integrity of most mosaics can be preserved with confidence by the technical means described above. However, this requires both adequate training in

their execution, understanding of their vulnerability, and implementation of a robust management context to guarantee their continued survival.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Field Stabilization of Immovable Heritage
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Site Visitation and Interpretation: Management
- ▶ Stone Treatments in Archaeological Conservation and Preservation
- ▶ Stone: Preservation and Conservation

Further Reading

Corfield, M. 2003. A framework for the documentation of in situ conservation projects. In *Mosaics make a site. The conservation in situ of mosaics on archaeological sites. Proceedings of the VIth International Conference of the International Committee for the Conservation of Mosaics. Nicosia, Cyprus, 1996*, ed. D. Michaelides, 123–148. Rome: ICCROM.

Getty Conservation Institute. 2003. *Mosaics* in situ *project. Illustrated glossary. Definitions of terms used for the graphic documentation of* in situ *floor mosaics*. Available at: http://www.getty.edu/conservation/publications/pdf_publications/mosaicglossary.pdf. Accessed 23 Oct 2012.

Getty Conservation Institute. 2011. *Technical training for the maintenance of* in situ *mosaics. 2011 edition*. Available at: http://www.getty.edu/conservation/publications_resources/pdf_publications/tech_training_en.pdf. Accessed 23 Oct 2012.

Henry, A., and J. Stewart, eds. 2011. *Mortars, renders & plasters*. Practical Building Conservation series. Farnham: Ashgate in association with English Heritage.

International Committee for the Conservation of Mosaics (ICCM). n.d. Available at: http://www.iccm.ac.cy/. Accessed 23 Oct 2012.

Roby, T. 2004. The reburial of mosaics: An overview of materials and practice. *Conservation and Management of Archaeological Sites* 6: 229–236.

Roby, T. 2006. The conservation of mosaics in situ: Preserving context and integrity. In *Stories in stone. Conserving mosaics of Roman Africa. Masterpieces of the National Museums of Tunisia*, ed. A. Ben Abed, 101–113. Los Angeles: J. Paul Getty Trust.

Roby, T., and M. Demas, eds. 2012. *Mosaics in situ. An overview of literature on conservation of mosaics in situ*. Los Angeles: Getty Conservation Institute. Available at: http://www.getty.edu/conservation/publications_resources/pdf_publications/lit_review.pdf. Accessed 23 Oct 2012.

Sease, C. 2003. Planning for conservation of an in situ mosaic, before, during, and after excavation. In *Mosaics make a site. The conservation in situ of mosaics on archaeological sites. Proceedings of the VIth International Conference of the International Committee for the Conservation of Mosaics. Nicosia, Cyprus, 1996*, ed. D. Michaelides, 67–76. Rome: ICCROM.

Stanley Price, N., ed. 1991. *The conservation of the Orpheus mosaic at Paphos, Cyprus*. Marina del Rey: The Getty Conservation Institute. Available at: http://www.getty.edu/conservation/publications_resources/pdf_publications/orpheus_mosaic.pdf. Accessed 23 Oct 2012.

Stewart, J. 2004. Conservation of archaeological mosaic pavements by means of reburial. *Conservation and Management of Archaeological Sites* 6: 237–246.

Stewart, J. 2012. The stabilisation and protection of archaeological sites from natural processes. In *Selected readings from ATHAR- conservation of cultural heritage in the Arab region: Issues in the conservation and management of heritage sites*, 83–91. Sharjah: ICCROM.

Torraca, G. 2009. *Lectures on materials science for architectural conservation*. Los Angeles: The Getty Conservation Institute. Available at: http://www.getty.edu/conservation/publications/pdf_publications/torraca.pdf. Accessed 23 Oct 2012.

Moseley, Michael

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Basic Biographical Information

Andean archaeologist, member of the National Academy of Sciences, and fellow of the AAAS and Guggenheim, Mike Moseley is known for his research on early South American civilizations,

the intersection between man and his environment, and pioneering work in geoarchaeology. Moseley was educated at Berkeley (BA 1963) and Harvard (PhD 1968).

Born in Dayton, Ohio, to a military family, Moseley moved through Wiesbaden, Germany; Washington, DC; and the Dakotas before landing in southern California as a youth. His talent for archaeology was recognized early as a teenager where he was engaged in field archaeology in the mountain West and Grand Canyon in his early years. After completing his BA and PhD, Moseley taught at Harvard University, University of Chicago, and University of Florida over the course of his career, mentoring dozens of PhD students through the years. During his time in Chicago, he was also Curator of Anthropology at the Field Museum of Natural History.

Major Accomplishments

Moseley's PhD thesis and later book on the maritime foundations of Andean civilization (1974) reconfigured the understandings of the underpinnings of social complexity, arguing that rich marine fisheries as well as agriculture could form the economic base for the rise of complex polities. He later directed the Chan Chan Moche Valley Project (Moseley and Cordy-Collins 1991; Moseley and Day 1982), one of the largest collaborative research programs on urban prehistory ever developed in the Andes. His interest in the environmental foundations of urbanism led him to direct the Proyecto Riego Antiguo (1983) to examine the foundations of Moche irrigation systems. This work propelled his interest in how natural disasters affected human societies and led him to develop several innovative field methodologies in geoarchaeology (Moseley 1997, 2002).

Moseley's interests shifted to the south-central Andes in the late 1970s, where he was instrumental in building research programs at Tiwanaku as advisor to the National Archaeological Institute of Bolivia. Shortly thereafter, he partnered with Peruvian colleagues to establish the Programa Contisuyo based in the Moquegua valley of southern Peru. His and colleagues' discoveries of Tiwanaku and Wari colonies around the site of Cerro Baul propelled research on the earliest expansive states in the Andes in the only area where both maintained long-term colonial projects (2005). The Programa Contisuyo has hosted over one hundred investigators and dozens of research projects over more than 35 years since Moseley founded it. The Programa generated the research and collections base for the Museo Contisuyo, which has been Moseley's seat of investigations in Peru since 1994, as well as being the principal archaeological museum and public outreach center in far southern Peru.

Moseley's work has been truly influential in the generation of archaeological scholars working in the Andes today. He and his students have produced a large number of the professional archaeologists working in South America. His most important publications speak to the modern relevance of his work. From *Maritime Foundations of Andean Civilization* (1974) to *The Incas and Their Ancestors* (1992) to Burning Down the Brewery (2005), he has been a grand synthesizer of the human past.

Cross-References

- ▶ Andes: Origins and Development of Agriculture
- ▶ Andes: Prehistoric Art
- ▶ Andes: Prehistoric Period
- ▶ Moche, Geography and Culture of
- ▶ Wari, Geography and Culture of

References

Moseley, Michael. 1974. *The maritime foundations of Andean civilization*, 131 pp. Menlo Park, CA: Cummings Publishing Company.

Moseley, Michael. 1983. The good old days were better: Agrarian collapse and tectonics. *American Anthropologist* 85 (4): 733–799.

Moseley, Michael. 1992. *The Incas and their ancestors: The archaeology of Peru*, 272 pp. London: Thames and Hudson.

Moseley, Michael. 1997. Climate, culture and punctuated change: New data, new challenges. *Review of Archaeology* 18 (1): 19–28.

Moseley, Michael. 2002. Modeling protracted drought, collateral natural disaster, and human responses in the Andes. In *Catastrophe and culture: The anthropology of disaster*, 187–212. Santa Fe: School of American Research Press.

Moseley, Michael, and A. Cordy-Collins, eds. 1991. *The northern dynasties: Kingship and statecraft in Chimor*, 548 pp. Washington, DC: Dumbarton Oaks.

Moseley, Michael, and Kent Day, eds. 1982 *Chan Chan: Andean desert city*, 440 pp. Albuquerque: School of American Research, University of New Mexico Press

Moseley, M.E., D.J. Nash, P.R. Williams, A. Miranda, and M. Ruales. 2005. Burning down the Brewery: establishing and evacuating an ancient imperial colony at Cerro Baúl, Peru. *Proceedings of the National Academy of Sciences of the United States of America* 102 (48): 17264–17271.

Mostny, Grete

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Basic Biographical Information

Grete Mostny Glaser was born on September 14, 1914, in Linz, Austria, but she lived most of her life in Chile. She lived there for about 50 years and became a Chilean citizen in 1946. She died of cancer in Santiago on December 15, 1991.

She studied at the University of Vienna's Faculty of Arts where she earned his first PhD in Egyptology, African Studies and Prehistory. She earned a second PhD at Brussels Free University in Belgium, in Philology and Oriental History with honors in Ancient Orient. Although her PhD dissertation was delivered and passed, her PhDs degree ceremony was not carried out since as it was scheduled for March 15, 1938, and 2 days earlier Hitler had Austria annexed to Germany (Durán 1977, Acevedo 2014).

In 1939, Grete arrived at Valparaíso city in Chile, together with her mother, and met her brother, who was there waiting for them. In Chile, she held a long and prolific career in archaeology, working at the most important State museum: the National Museum of Natural History. She was the Head of the Anthropology Department between 1943 and 1964, and then she was appointed Director, a position she held until 1982. In the 186 years of its existence, this institution had been managed only by two women, and Grete Mostny was the first.

From the moment Grete Mostny arrived, she stood out in the Chilean scientific scene. On the one hand, she was part of a context where archaeology was performed by professionals with university education in fields outside the discipline. On the other hand, her background and contacts with European archaeology allowed her to be a highly qualified counterpart to receive researchers, such as Junius Bird, who carried out works in the Chilean territories.

Grete Mostny residence in Chile, and her position as Director of the National Museum of Natural History led her to experience the violence of oppressive states, this time by the *coup d'etat* deployed by Augusto Pinochet on September 11, 1973, against the democratically elected government of Salvador Allende. Despite the country's political milieu, budget cuts, and the dictatorship's lack of interest in cultural issues, Mostny managed to keep control of the museum management and development, in the process succeeding in remodeling the museum ground floor in order to open a new permanent exhibition.

Throughout her life and after her death, Grete Mostny received a series of distinctions. She was a permanent member of the International Congresses of Prehistoric and Protohistoric Sciences, of the Latin American Association of Museums, of the International Council of Monuments Executive Council, and of the Pan American Institute of Geography and History's Anthropology Committee. In 1949, the University of Cuzco awarded her the *Honoris Causa* PhD. In 1967, the government of Austria gave her a national honor award in Arts and Sciences. In 1977, she was appointed honorary member of the Chilean Society of Archeology. In 2013, the Faculty of History and Cultural Studies of the University of Vienna created the Grete Mostny *Dissertationspreis*, which recognizes the best doctoral theses. In addition, a prize that bears her name is awarded at the National Museum of Natural History's Junior Science Fair, which was created by Grete Mostny in 1970 (Acevedo 2014).

Major Accomplishments

Grete Mostny was a key figure in the development of archaeology in Chile. She was not only the first archaeologist, professional, and scholar, and the first woman to do archaeological research in the country, but also one who made great contributions to the discipline. Mostny developed a prolific body of research on archaeology, ethnography, ethnohistory, and physical anthropology throughout the country that was published in different journals in Chile and abroad. Among her publications, one of the most important is her book *Precolumbian Cultures of Chile* (1954a), later reprinted as *Prehistory of Chile* (1970), which have been reprinted several times. This is one of the few publications that summarize the pre-Hispanic history of the country and accounts for one of Mostny's main concerns: the protection and diffusion of national cultural heritage. Her commitment to heritage and her work in the National Museum of Natural History allowed her to access, recover, and preserve the famous "mummy" of El Plomo Mount. This was the frozen body of a child who was offered and buried in the high Andean peaks of Santiago by the Inka State in the sixteenth century AD. The child was found and dug out by mine surveyors at the top of the hill and then taken to Santiago City. It was due to Grete Mostny's efforts and determination that the child of El Plomo Mount was acquired and preserved by the museum. Today, it is one of the best examples of the Inkas high andean peaks rituals in the south of the Empire. Mostny also developed and published the study of this body, becoming one of the first multidisciplinary works on this subject (Mostny 1957).

This integrated approach to the register is expressed in her work on the Peine region, where she combines the ethnographic, linguistic, bioanthropological, and archaeological work to understand the Atacameña community. This is one of the first investigations that apply ethnoarchaeological perspectives to the study of Andean societies and to rescue ethnographic information for the interpretation of the archaeological record (Mostny 1954b).

A concern for the conservation of, and education about, cultural heritage was central to Grete Mostny's work and legacy, and it left a deep trace in Chile. Through her work at the National Museum of Natural History, she created the National Museology Center (1968), the first of its kind in Latin America directed toward training specialists in the field. She also founded the Museum Conferences

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(1977) to bring together the Chilean specialists in the field of Museology. She promoted the creation of the Association of Chilean Museums (1959) and the Latin American Association of Museums (1973). In 1967, she founded Chile's Scientific Youth, which later gave way to the Junior Science Fair, designed to promote the practice and teaching of science to schoolchildren. This activity continues to this day bringing together thousands of people in each of its presentations.

Cross-References

- ▶ Chile's World Archaeological Heritage and Its Management
- ▶ Museo Chileno de Arte Precolombino, Chile

References

Acevedo, N. 2014. Recordando a Grete Mostny Glaser al cumplirse cien años de su natalicio. *Boletín del Museo Nacional de Historia Natural* 63: 225–237.

Durán, E. 1977. *Biografía de la Dra. Grete Mostny*. In H. Niemeyer (ed), Actas del VII Congreso Nacional de Arqueología Chilena, vol I, 8–15. Santiago: Ediciones Kultrun.

Mostny, G. 1954a. *Culturas Precolombinas de Chile*. 1st ed. Santiago: Editorial Pacífico.

Mostny, G. 1954b. *Peine: Un pueblo Atacameño*. Santiago: Instituto de Pedagogía, Facultad de Filosofía, Universidad de Chile.

Mostny, G. 1957. La momia del cerro El Plomo. *Boletín del Museo Nacional de Historia Natural* 27: 1–119.

"Motif" in the Archaeology of Art

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Introduction

The term *motif* is perhaps the most widely used in archaeology art, in both rock art studies and portable art. This is a category of analysis that has dominated the field through all its theoretical and methodological perspectives (Fiore 2009). However, few authors have focused on defining it, often assuming its highly intelligible meaning. Overall, there seems to be an implicit or explicit agreement among specialists that consider the motifs are graphic and conceptual units of visual speech, though many disagree about their formal and semantic definition.

Definition

Motif is an expressive and consistent component of design, characterized by their shape, color, size, position, orientation, texture, etc. (Fiore 2009). Motifs integrate bigger compositions while they articulate spatially and meaningfully with other elements. It is then an expression unit and, as such, expresses a particular view of the world; thus, it is valid to be used as a unit of analysis (Aschero 1988).

According to Gradin (1978), who has been particularly interested in the notion of motif, it is a representation that was made in the same time (execution unit) and with a certain sense (motivational drive unit).

Key Issues and Current Debates

The classification of motifs is another challenge faced in archaeological art studies. Many authors propose a distinction between *simple and complex motifs*. The first are those formed by a single element; all its lines, or its entire surface, are connected into a single entity, displaying a continuous trace which is the result of a unitary creative act. Complex motifs are likely to be constituted by two or more elements that are linked together based on morphological grounds or content (Gradin 1978). This division is based on the number of items that a motif integrates and is common in rock art studies and also in studies of the decoration of artifacts, especially ceramics (Rice 1987).

To some extent, the concept of motif is independent of the technical support and execution,

beyond the conditioning that these factors impose. Thus, classification criteria refer primarily to issues of composition, morphology, analogy, and association. In this regard, it is appropriate to consider another parallel way of grouping the motifs – agreed by most researchers – depending on the presence or absence of a recognizable formal correlate with the physical world. The division between figurative and nonfigurative patterns derives from this.

The *figurative motifs* answer to an attempt to apprehend the external forms. In that sense, in this category all the images which allow – partially or totally – to recognize objective world elements of both realistic (recreation or model representation of physical existence) or fantastic (creation or presentation of imaginary figures which combine or reformulate real elements) are included (Gordillo 2009). In contrast, in the *nonfigurative motifs*, no direct empirical analogies are recognized and are presented as linear elements, geometric shapes, irregular shapes, spots, stains, etc.

Indeed, the precise boundaries between figuration and nonfiguration are often arbitrary, and it is difficult to establish whether there is a difference of essence or grade between the two categories – a problem also found with Western art, which is where this classification comes from. It is likely that many nonfigurative motifs have an origin or figurative counterpart; it is appropriate to consider the *geometric reduction* process, a phenomenon that leads explicit figures of varied figurative levels to the reduction in abstract figures (Leroi-Gourham 1989). Also, in the social context of their production, nonfigurative motifs could represent or be associated with real but unknown referents because of the semantic and temporal distance that separates emic viewers from etic categories (Groupe 1993).

Ethnographic research done by Dolmatoff Reichel (1985) illustrates this point. This study focused on certain geometric or "abstract" motifs which were recurring throughout the material culture of the northwest Amazon Tukano Indians. These motifs, according to the author, are inspired by phosphenic hallucinatory images and also form a coded system where each of those have a fixed ideographic sign value, aspects that are likely to be overlooked by us in the study of past societies.

In short, these observations lead us to a critical problem in the archaeology of art. Motif, as part of a system of symbols, is a reference to something else. And what is communicated by the symbol depends on the viewer's cultural background. If this motif shares the same visual system as the one of the producer, what is expressed on the motif and what is communicated to him can be very similar. For archaeology, where prehistoric art manifestations are studied, this merging is not possible; however, beyond the original semantic and elusive content, shape analysis provides a means to access the way in which the art system operates (Ross et al. 2008).

From the perspective of structural analysis, the proposal is to go beyond the factual or descriptive level and, without the imperative to interpret the allegorical dimensions or the conventional meanings associated originally with each motif, hold the possibility of accessing the unconscious deep and essential meanings immanent to the thought systems of society (see Criado Boado and Penedo 1993). Using a formal analysis of oppositions, the motif of representation that applies to the artist's intention reveals their articulation in the designs and the principles that structure them. In this line of analysis, Kusch (1991) considers that the motif presents "attributes of composition" (view, orientation, attitude, distribution, etc.) pointing to structural and conceptual aspects, where deep meanings live and operate replacing their immediate morphology.

Cross-References

- ▶ Art Studies: Normative Approaches
- ▶ Leroi-Gourhan, André
- ▶ Pigment Analysis in Archaeology
- ▶ Reichel-Dolmatoff, Gerardo
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art, Forms of
- ▶ Style: Its Role in the Archaeology of Art

References

Aschero, C. 1988. Cave paintings, activities and natural resources, archaeological framing. *Contemporary Archaeology Argentina. News and Perspectives*: 109–142.

Criado Boado, F., and J. Penedo Romero. 1993. Hunters and wildlife: A contrast between art and art Paleolithic Levantine postglacial. *Prehistory Jobs* 50: 39–56.

Fiore, D. 2009. La materialidad del arte. Modelos económicos, tecnológicos y cognitivo-visuales. In *Perspectivas actuales en arqueologia Argentina*, ed. R. Barberena, K. Borrazzo, and L.A. Borrero, 121–154. Buenos Aires: IMHICIHU, Editorial Dunken.

Gordillo, I. 2009. *Domains and image resources. Ceramic iconography Ambato Valley*, Atacameños studies, Surandinas archaeology and anthropology, vol. 37, 99–121. San Pedro de Atacama.

Gradin, C. 1978. Some aspects of the analysis of rock art. *Journal of Neuquén Provincial Museum* 1: 120–133.

Groupe μ. 1993. *Visual sign treatment. For a rhetoric of the image*. Madrid: Chair Ediciones SA.

Kusch, M.F. 1991. Shape, pattern and figuration in painted pottery and recorded the Aguada. In *Rock art in contemporary archeology*, ed. M. Podesta, M.I. Llosas Hernandez, and S. Renard of Coquet, 14–24. Buenos Aires: Comprehensive Graphic Lounge.

Leroi-Gourhan, A. 1989. *The prehistory*. Madrid: Editorial Labor.

Reichel-Dolmatoff, G. 1985. Shamanistic and neurophysiological aspects of indigenous art. In *Rock Art Studies*, 291–307. Santiago: Chilean Museum of Pre-Columbian Art.

Rice, P. 1987. *Pottery analysis. A soucebook*. Chicago: The University of Chicago Press.

Ross, J., D.R. Valenzuela, M.I. Hernández Llosas, L. Briones, and C.S. Santoro. 2008. More than the motifs: The archaeological analysis of rock art in arid regions of the southern hemisphere. *Chungará* 40 (Special Issue): 273–287.

Further Reading

Loendorf, L. 2001. Rock art recording. In *Handbook of rock art research*, ed. D. Whitley, 55–79. Oxford: AltaMira Press.

Panofsky, E. 1972. *Studies in iconology. Humanistic themes in the art of the Renaissance*. New York: Harper and Row.

Ucko, P., ed. 1977. *Form in indigenous art. Schematisation in the art of Aboriginal Australia and prehistoric Europe*. Canberra: Australian Institute of Aboriginal Studies.

Mound Building, Social Complexity and Horticulture in the Lower Paraná River

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Introduction

Pre-Hispanic earth mounds, known as "cerritos," "cerros," "túmulos," "lomas," "islas," "bordos" and "montones" (in Spanish), "aterros" and "tesos" (in Portuguese), and "îvî choví" (in Guaraní), across southeastern South America are one of the most conspicuous cultural manifestations preserved in the vast lowlands. In most cases, these mounds are located in flood zones. They have been interpreted as a specific adaptive strategy used by different South American indigenous populations, from the middle Holocene, to occupy fluvial plains that are periodically flooded and have high biodiversity. The use of land to build structures with dry surfaces for settlement and other functions allowed them to access the rich aquatic and terrestrial resources available within these environments surrounded by rivers, lagoons, and wetlands. Many of these mounds are in the huge La Plata River basin (Fig. 1), in its main tributaries such as the Upper Paraguay River, the Lower and Middle Paraná River, the Lower Uruguay River, in eastern and northeastern Uruguay, southeastern Brazil, and possibly in Esteros del Iberá, although the Iberá area has not been systematically studied. Hundreds of elevations were recorded in the floodplain between the Dulce and Salado rivers of Santiago del Estero. Some of them are natural levees whose upper parts were unintentionally elevated by people (Martínez et al. 2011), and some others would be artificially built mounds with depressions possibly linked to sediment extraction (Togo 2004).

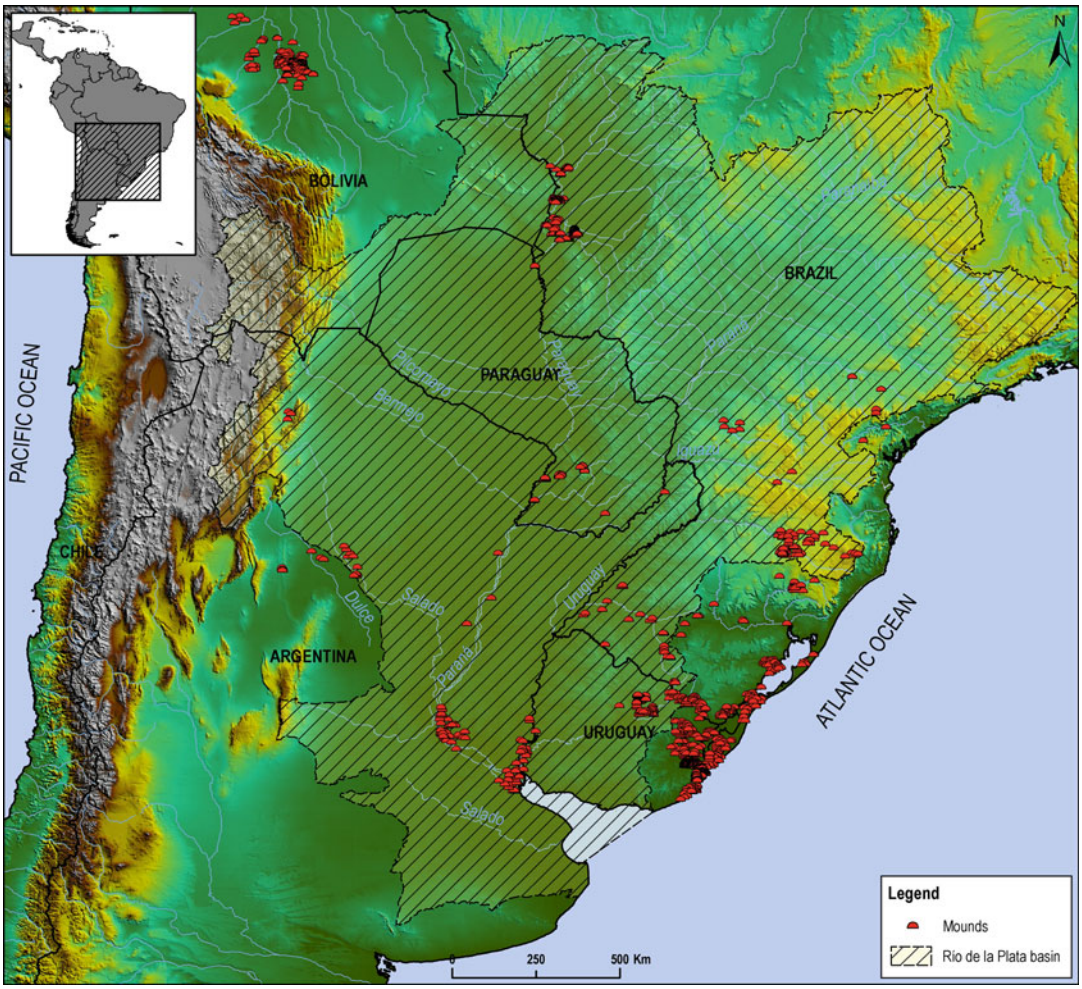

Mound Building, Social Complexity and Horticulture in the Lower Paraná River, Fig. 1 Main areas with earth mounds studied in the La Plata basin and neighboring regions, based on research and surveys by Anderson Marques García, Rafael Milheira, Irina Capdepont, Camila Gianotti, José Iriarte, Rafael Corteletti, Francisco Noelli, Jonas Gregorio de Souza, José Togo, Constanza Taboada, Gabriela Ortiz, Carlos Pusineri Scala, Pedro Ignácio Schmitz, Jose Luis dos Santos Peixoto, Jorge Eremites de Oliveira, William Denevan, Clark Erickson, Heiko Prümers, and Carla Jaimes Betancourt. Note: In the zones of greater concentration, the symbol represents archaeological localities with several earth mounds. With the exception of Garcia (2012), there are no synthesis maps on their spatial distribution, and many areas have not been surveyed, so this represents only a minimal number of mounds

Within the La Plata basin, small earth mound structures were also recorded in a few sites of the so-called San Francisco Culture in Jujuy province (Ortiz 2003).

In some areas of the lowlands in the La Plata basin, the concentration of earth mounds is high and has been well studied. In the Gran Pantanal of the Upper Paraguay River (Pusineri Scala 1973; Eremites 1996; Peixoto 2005), in the Yaguarí and Caraguatá basins in Uruguay (Gianotti 2016), and in the Laguna Merim (Bracco et al. 2000; see review in Iriarte et al. 2016), more than 1000 mounds were recorded in each region. Thousands of mounds exist in the Brazilian highlands, linked to the subterranean and enclosure complexes of the Taquara/Itararé Tradition, although these mounds are not associated with flood zones. Although not in the La Plata basin, the Llanos de Mojos shows

several thousand artificial mounds related to other important engineering works such as raised fields for cultivation, rectilinear causeways or raised roads, and canals for water distribution and navigation (Erickson 2000; Prümers and Jaimes 2014). Despite some common characteristics (most are in flood zones and were built in the late Holocene), the earth mounds have specific regional traits and belong to different cultural contexts.

In the Lower Paraná and Lower Uruguay floodplains, the earth mounds are the most visible features of the archaeological record and were early recognized as constructed structures in the first archaeological investigations of the region in the late nineteenth and early twentieth centuries. Like with the tesos of Marajó Island, the lomas of Llanos de Mojos, and the sambaquí shellmiddens in south-central coast of Brazil, since the recognition of the earth mounds of southern Mesopotamia (region bounded by the Paraná, Uruguay, Iguazú, San Antonio, and Pepirí Guazú rivers), it has been debated whether their genesis was cultural, natural, or a combination of both. Current studies have confirmed that the indigenous populations of the Lower Paraná (Bonomo et al. 2011a; Politis et al. 2011; Castiñeira et al. 2013, 2014) and Lower Uruguay (Castro 2016) not only occupied natural high places but also had the ability to modify and transform the landscape by building mounds. These studies have confirmed that a great number of the settlements were mounds formed partially or totally by anthropic action, resulting from both accretion due to repeated human occupations and intentional elevation of the ground by addition of clays with plastic properties and other thicker cohesive materials like potsherds. Identifying which of these two processes occurred in each case requires detailed geoarchaeological analysis, which are very scarce in the study area. In addition, in most cases, the anthropic elevation of the habitable surface took advantage of pre-existing natural elevations, such as levees and dunes.

Recent regional research in the Upper Paraná Delta has associated some of the mounds of the Lower Paraná River with societies characterized by some degree of complexity or by social hierarchies evidenced in at least first-order community leadership and with small-scale horticultural practices assigned to the Goya-Malabrigo archaeological entity (Fig. 2, Politis and Bonomo 2012).

Mound Building, Social Complexity and Horticulture in the Lower Paraná River, Fig. 2 Main features of the material culture associated with Goya-Malabrigo archaeological entity

Both aspects have already been suggested through certain ethnohistorical information and archaeological remains (Serrano 1930; Ceruti 2003). However, only recent evidence generated by current methods (e.g., studies of starches and phytoliths) has made it possible to approach these issues in the light of contemporary theoretical approaches, shifting the axis of the discussion of the earth mounds of the Lower Paraná and Lower Uruguay rivers. At present, the study of the mounds can neither ignore the processes of social complexity nor lack an integral evaluation of the economy of the societies that built them.

This contribution summarizes the main issues related to the indigenous populations that occupied the alluvial plain of the Lower Paraná River during the late Holocene, especially since ca. 2000 years BP. This extremely flat alluvial environment was inhabited by populations that constructed earth mounds, had a diet based on wild resources complemented with house-garden horticulture, and revealed a certain level of social complexity, characterized as rank societies. This region had intense cultural dynamics that included the local groups as well as the Guaraní and possibly the Arawak, both descendants of populations probably originating in the Amazon basin but certainly expanding beyond it. The diversity of ethnonyms that the first European conquerors used to describe the Lower Paraná groups in the early sixteenth century (Chaná-Timbú, Timbú, Mbeguá, Mocoretás, Carcaraes, Corondás, Colastinés, Guaraní, among others) reflects this dynamics and is the result of evolutionary/adaptive processes and of particular historical trajectories.

Environment

The Paraná River stretches about 4200 km along the La Plata basin, the second largest hydrographical basin in South America, after the Amazon River. Along the Paraná, the most important river in the basin, a narrow gallery forest acts as a biological corridor in a north-south direction for thousands of kilometers, connecting the tropical forests of Brazil with the temperate grasslands of the Argentine pampas. The course of the Parana River has been divided according to several criteria. In this chapter, we use the most usual division in Argentina, where the river travels around 1930 km: the Upper Paraná, from its source to the confluence with the Paraguay River; the Middle Paraná from there to the beginning of the pre-Delta in the city of Diamante; and the Lower Paraná, comprising mainly a large delta, about 300 km long by 60 km wide (maximum), until it flows into La Plata River. The Delta, classically divided into Upper, Middle, and Lower Delta (Fig. 3), is a wide alluvial floodplain (around 14,000 km^2) consisting of a set of islands surrounded by narrow waterways and formed by the regular accumulation of sands, clays, and limes deposited mainly by the river.

The Delta, like the alluvial plain of the Middle Paraná, is a very dynamic environment, with a complex hydrological regime that subjects the low zones to periodic floods at different times of the year. These periodic changes in the river level blurred the boundaries between the islands and the aquatic environment. Heavy precipitation, especially in the tropical and subtropical zones of Brazil, frequently associated with the El Niño weather phenomenon, also causes extraordinary floods that partially or almost totally cover the deltaic environment. The Paraná River is the largest freshwater fishing area in Argentina since it harbors a great variety of aquatic resources that are continuously renewed with the movement of the waters. During the floods, nutrients are added to the soils with the agricultural potential of the levees, but there are also important changes in the distribution of the biota and therefore of the main usable resources. On the one hand, the space for animals, such as marsh deer (*Blastocerus dichotomus*), capybara (*Hydrochaeris hydrochaeris*), and coypu (*Myocastor coypus*), is limited and concentrated on high places, which facilitates their hunting. On the other, fish and mollusks are dispersed making it difficult to obtain them, although when water recedes, the fish that are trapped in secondary courses and in shallow water bodies can be harpooned.

The coastal plain, together with the subaerial platform constituting the Paraná Delta sensu *lato*,

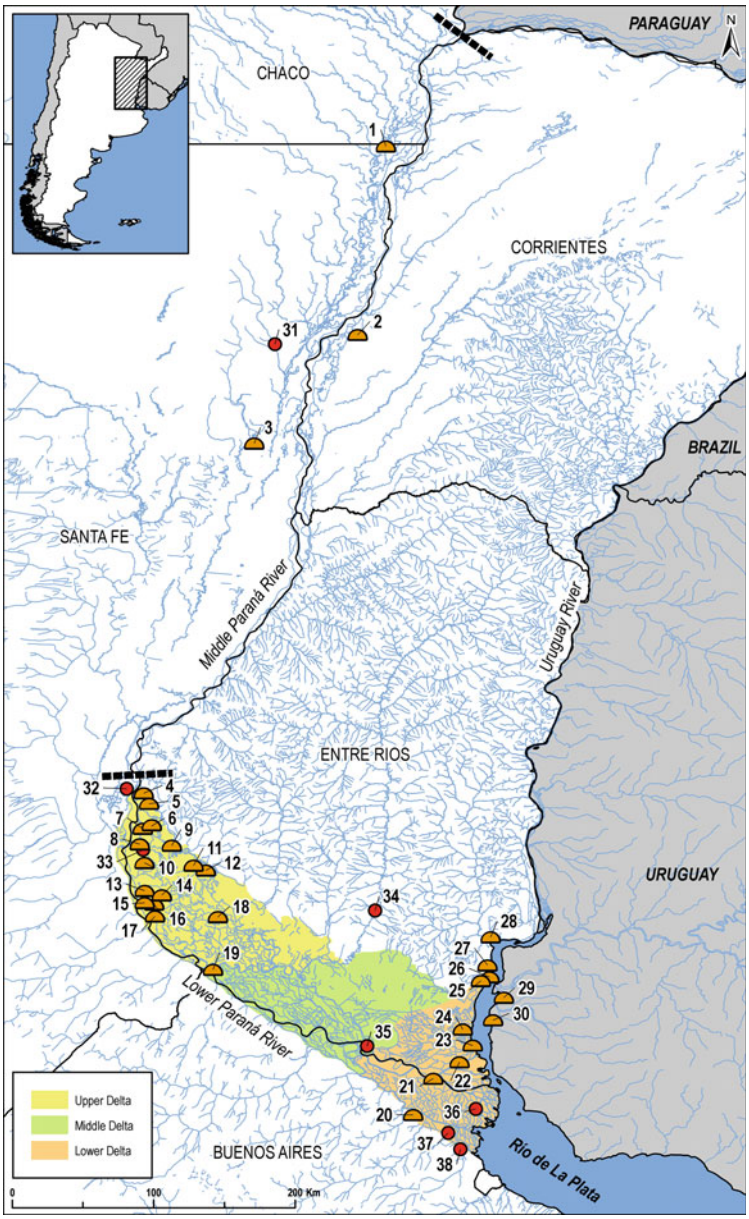

Mound Building, Social Complexity and Horticulture in the Lower Paraná River, Fig. 3 Middle and Lower Paraná River with the subdivision into Upper, Middle, and Lower Delta and main archaeological mounds (1–30) and other sites (31–38) mentioned in the text: 1. Co. Aguará; 2. Túmulo del Usuró; 3. La Lechuza; 4. Co. Tapera Vázquez; 5. Co. Farall; 6. Co. de Diego; 7. Co. de las Cañas 1; 8. Co. Barrancas; 9. Co. Los Cardos; 10. Los Dos Cerros 1 and 2; 11. Co. Tejeira; 12. Co. El Lucerito; 13. Co. El Durazno 1 and 2; 14. Co. Puesto Acosta; 15. Co. El Castaño I and II; 16. Los Tres Cerros 1, 2 and 3; 17. Co. Grande de la Isla de Los Marinos; 18. Co. Lote 11; 19. Co. Grande del Paraná Pavón; 20. Túmulo de Campana; 21. Túmulo I (=El Cerrillo) and II del Paraná Guazú; 22. Túmulo I del Brazo Gutiérrez; 23. Túmulo I and II del Brazo Largo; 24. El Aserradero; 25. Co. de los Pampas o Túmulo de Estoponda; 26. Sambaquí de Puerto Landa o Co. Godoy; 27. Túmulo de Lucuix; 28. Co. de Boari 3; 29. La Blanqueada; 30. Colonia Concordia; 31. Malabrigo 1 to 9; 32. Co. de las Pajas Blancas 1; 33. Laguna de los Gansos 1 and 2; 34. Laguna del Negro; 35. Isla Lechiguanas I; 36. Río Paraná Miní; 37. A° Malo; 38. A° Sarandí

extends over a gently sloping terrain genetically linked to the transgressive-regressive Pleistocene-Holocene events (Cavallotto et al. 2005; Codignotto 2004). According to the paleoenvironmental reconstructions, the pre-deltaic tidal plain would have been formed after the end of the transgression, which reached its highest level ca. 6000 BP. Later on, during the first regressive stage, the coastal plain began to take shape from the accumulations of different sedimentary facies: deltas, plains with beach ridges, beaches, and tidal and coastal lagoon plains. However, it was during the second stage of the regressive event, subsequent to 4000 BP, that the coastal plain acquired its present configuration. Therefore, the human occupation of the area could have developed on the mud of the pre-deltaic tidal plain or, at a later time, on alluvial clayed mud or mud sediments deposited by floods in the lower Paraná River (Castiñeira et al. 2013).

Historical Background

Archaeological investigations on the Lower Paraná began at the end of the nineteenth century and were pioneering in Argentina. The earliest references to archaeological materials in the region – corrugated urns with lid and polychrome vessels, both from the Guaraní – dated ca. 1818 and 1858 and were made by Francisco Javier Muñiz in a report on the islands of the Paraná River presented to the government and by Marcos Sastre in his famous book *El Tempe Argentino,* respectively. In 1877 Estanislao Zeballos and Pedro Pico excavated the site called Túmulo de Campana in the Buenos Aires province, one of the first archaeological excavations in Argentina. While this site was erroneously attributed to the Guaraní, it was the first identification of an anthropogenic earth mound that had been used for both settlement and funerary purposes. According to the excavators, it was an artificial mound, where they recovered human skeletons, remains of domestic activities, bone tools, and pottery with zoomorphic appendages of birds, mammals, and mollusks.

Contemporaneously in 1877, Ramón Lista described two burial mounds in the south of Entre Ríos province and attributed to them a purely anthropic origin. Later in 1880, Florentino Ameghino correlated these mounds and Túmulo de Campana with the burial mounds of southern Brazil and of Uruguay, proposing the hypothetical existence of a "people of the tumulus." At the end of the nineteenth century, the investigations of Juan Bautista Ambrosetti in the Goya archaeological sites on the Paraná River, Corrientes province, showed the great areal dispersion of the ceramic style characterized by zoomorphic appendages. This author associated these materials with those of Túmulo de Campana, which constituted the first attempt at regional integration. Later, based on the documentation and a sketch, Luis Maria Torres considered that one of the excavated sites was an artificial mound and named it Túmulo del Usuró.

In the early twentieth century, Luís María Torres directed research in the Paraná Delta from the La Plata Museum, thus initiating a long institutional tradition of archaeological studies in the area. He carried out intense field work on isolated mounds in flood zones and, in agreement with Lista, considered that they had been raised by the indigenous people to avoid flooding (Fig. 4). He argued that although the sandy nuclei of the mounds, which he called túmulos, were natural, their height had been increased by humans, who had added layers of humus and clay and cultural remains (Torres 1911). Torres attributed the differences observed in the decoration of the pottery of the Delta to different ethnic groups of historical times, although in the sector that he studied, the zoomorphic appendages were very scarce. One of his contributions was the detailed description and analysis of the abundant human skeletons found in the Delta.

Torres's proposal was later refined by Félix Outes, who distinguished three successive groups based on pottery and other elements. According to Outes (1918), the first group had a very simple and "primitive" pottery with few incised or painted items associated with bone tools and burials on elevated grounds, "apparently

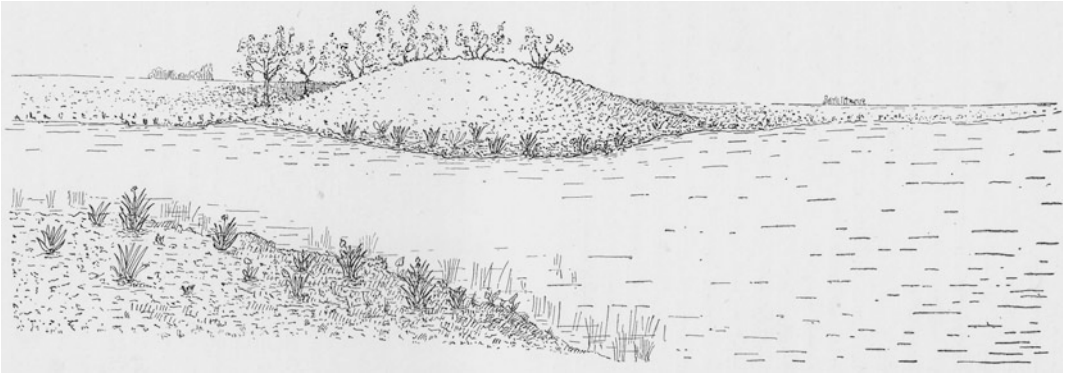

Mound Building, Social Complexity and Horticulture in the Lower Paraná River, Fig. 4 Sketch of Túmulo I del Río Carabelas, excavated by Luis María Torres

tumulus." The second group were builders of mounds, used for burials, who decorated pottery depicting humans and more frequently animals (which, according to Torres, could be evidence of Arawak influence), few stone instruments, and bone tools. The third group, of Guaraní origin, was characterized by large funerary polychrome or corrugated urns, polished axes, and scarce bone tools. Such cultural patterns were later widely accepted by the different researchers who studied the archaeology of the Paraná River.

In 1923, Joaquín Frenguelli and Francisco de Aparicio excavated some elevations outside the Delta, in the vicinity of Malabrigo River, on the right bank of the Paraná alluvial plain in Santa Fe Province. They stated that these elevations would not be burial mounds but old consolidated dunes on which indigenous people settled to protect themselves from floods. According to Frenguelli and de Aparicio (1923), the elevations represented remains of a dune chain, which ran parallel to the Malabrigo course and was cut transversely and shaped like ridges by the action of the water that flowed down to the river bank. Over time the high sectors were fixed by vegetation and occupied by indigenous populations. Due to Frenguelli's considerable stratigraphic experience as a geologist, his work has highly influenced later studies on mounds even to date. It led to interpretations that indigenous occupations had occurred only on natural elevations. This concept was extended to the archaeological record of a vast region, including the Argentine Northeast and the so-called Mesopotamia Santiagueña (between the Dulce and Salado rivers).

In the same year, 1923, Pablo Gaggero and Octavio Fernández of the La Plata Museum excavated a small round mound in the Lower Delta (Fig. 5) and suggested that it was of cultural origin. In 1925 the American archaeologist Samuel Lothrop excavated three archaeological sites in the Lower Delta and its immediate plain and, according to the ethnohistorical accounts, attributed one to a Guaraní village (Arroyo Malo site), another to a settlement of the Querandíes (Arroyo Sarandí site), and the third one to the Chaná-mbeguá or Chaná (El Cerrillo site). The author held that the last two records formed a single cultural unit, thus homogenizing the diversity identified in the archaeological record by other researchers. As for the earth mounds, Lothrop (1932: 186) found no evidence to consider the elevation excavated at El Cerrillo as partly artificial and argued that "the general distribution of rubbish indicated that the living surface had been gradually elevated as a result of occupancy." In 1939 Alberto Rex González investigated the Cerro Grande del Paraná Pavón archaeological site, which he differentiated from the elevations of eolic origin identified by Frenguelli and from the mounds with intentional addition of sediments studied by Torres. In agreement with Lothrop, he argued that the site was a small natural elevation that gradually increased in volume by natural deposit and in smaller proportion by anthropic action.

Mound Building, Social Complexity and Horticulture in the Lower Paraná River, Fig. 5 Two general views of Túmulo II del Brazo Largo, excavated by Gaggero and Fernández

In 1926, Héctor Greslebin conducted controlled stratigraphic excavations in several mounds in the floodplain of the Lower Uruguay River and stated that the mounds were totally or partially constructed (e.g., Túmulo de Lucuix and Sambaquí of Puerto Landa, respectively) although in agreement with Torres, he supported the coexistence of occupations on elevations of eolic and fluvial origin. For Greslebín (1931), the mounds were created or conditioned for protection from the floods of the Uruguay River. Other important research on Uruguay River was that of Pedro Krapovickas, who re-excavated some of the mounds studied by Greslebin. Krapovickas presented a detailed stratigraphic profile of Cerro Godoy (or Sambaquí of Puerto Landa) and Cerro de Los Pampas (or Túmulos de Estoponda) and concluded that the former was accretional, a dump raised by accumulation of waste, while the latter was a mound built on a pre-existing dune, by "consciously or unconsciously mixing" archaeological materials.

Based on his long term investigations, Antonio Serrano established the "fundamental lines" of the pre-Hispanic past of the Paraná and Uruguay rivers, which were valid until the 1970s. In a way, Serrano introduced some concepts of the North American culture history approach. He elaborated an explanatory model on the historical development of the Argentine Northeast or

Mesopotamian littoral, based on the spatial variations of the archaeological ceramics and the location of the different ethnic groups that the European chroniclers recognized in the sixteenth and seventeenth centuries. He proposed an initial ceramic occupation of populations from "Cultura Entrerriana" (Entre Ríos Culture) that would later receive, in the Paraná and Lower Uruguay, the contributions of more advanced ceramist groups of Amazonian origin, which he called "Ribereños Plásticos" (Riverside craftspeople). He stated that although the basic characteristics of the previous pottery were maintained, with these contributions, artistic representations of animals were incorporated in the ceramics (zoomorphic appendages, especially depicting birds and mammals). This author considered that the changes in the pottery reflected the spread of innovative ideas and the dispersion of new populations that arrived in the region by migratory waves from neighboring areas. Like de Aparicio, Badano, and Gaspary, among others, Serrano argued that the archaeological materials of the "Ribereños Plásticos" belonged to the Chaná-Timbú aborigines of the time of the conquest. In his general classification of the indigenous populations of the entire Argentine territory (Serrano 1941), he classified the Paraná populations as "intermediate agriculturalists" who were organized in "grandes cacicazgos" (great chiefdoms). Serrano associated long cylindrical artifacts, called "pylons," made with allochthonous lithic raw materials, with symbols of political or religious authority (Serrano 1930). He summarized the discussion about the existence of cerritos or mounds, and although he knew about the existence of mounds built in the Delta, following Frenguelli, he thought that in most cases (mainly in the Middle Paraná), the mounds were remains of ancient consolidated dunes or levees with no significant modifications, on which the indigenous populations settled (Serrano 1950).

In addition, from a more eclectic culture history perspective, Ciro René Lafon conducted research in several sectors of the Lower and Middle Paraná and the Lower Uruguay rivers. He was rather skeptical about the cultural origin of the Delta cerritos and preferred to call them elevations, instead of mounds or tumulus, for the sake of objectivity, although he recognized the anthropic over-elevation by accretion. For example, he argued that El Aserradero site was placed on a levee whose height was increased by the remains and waste left by the inhabitants. Concerning the mounds of the Middle Paraná, he wondered whether they were true "tumulus or tells" or accumulations of dwellings and trash where the dead were buried. An interesting observation by Lafon (1971: 131), based on Palavecino, was that he attributed some type of horticulture ("primitive paleoamazonian agriculturalists") to what was later called Goya-Malabrigo. This somehow anticipated the later confirmation of the existence of horticulture in these populations.

After her participation in the group led by Eduardo Cigliano, Maria Amanda Caggiano focused on the Lower Delta of Paraná and Lower Uruguay. By analyzing the ceramic pastes and tempers with which the ceramic vessels were manufactured and their decoration styles, she expanded the archaeological categories of Serrano (e.g., that of the Ribereños Plásticos and the Ibicueña). Following this author's outline and based on excavations of new sites located on levees; paleo-levees or marshland borders, among them Isla Lechiguanas I; and several ^{14}C datings, Caggiano (1984) aimed to establish a chronological sequence that would integrate the regional variability of the archaeological materials.

In the mid-1980s, based on his work in the Middle Paraná, Carlos Ceruti proposed a sequence of "two cultural types": Cancha de Luisa and Goya-Malabrigo. An important antecedent was the article by Schmitz et al. (1972), based on materials excavated in 1948 by González in the vicinity of Goya. Later, Ceruti (2003) proposed a model of cultural development that integrated the cultural entities proposed within an ecological framework. We will focus here on Goya-Malabrigo (=Ribereños Plásticos), because it is better characterized and because abundant earth mounds have been detected. It derives its name from the union of two of the most widely studied localities at the beginnings of archaeology in the Argentine Northeast: Goya, where

zoomorphic appendages were first presented in detail, and Malabrigo, about 55 km southwest of the first archaeological sites. Both localities were early recognized as the centers of an area with the greatest abundance of plastic representations, whose distribution reached the Lower Delta of the Paraná, though with lower density (Serrano 1950; de Aparicio 1949). Ceruti did not discuss the earth mounds in depth, but based on observations from current settlers who continue to erect mounds to resist flooding, he suggested that housing areas could have been elevated by both accretion and intentional sediment transport.

Since the mid-1990s, Alejandro Acosta and Daniel Loponte carried out research in a restricted area of the Lower Paraná floodplain (the bajíos ribereños), continuing the study of sites reported by Lafon and adding some new ones. However, they did not identify the presence of earth mounds. They even argued that the cerritos of Entre Rios were actually natural levees that were occupied and that classical sites in the literature, such as Túmulo de Campana, would be located on natural geoforms. Recently, they reported on occupations on dune formations and recognized a few anthropic mounds in the flood plains of southern Entre Ríos.

Since the 1990s, a series of studies on mounds has been carried out in the Upper Delta and on the right bank of the Middle Paraná (Santa Fe), by Universidad Nacional de Rosario. A noteworthy investigation is the excavation of earth mounds at Cerro El Castaño 1 and 2 by Juan Nóbile and Silvia Cornero in the former area (Cornero 2009). In the latter, Cornero excavated La Lechuza site, and Campos (2001) made sedimentary and distribution studies of the archaeological materials and concluded that it is an elevated structure with anthropic contribution. As for Cerro Aguará, Laura Pérez Jimeno (2007: 75) mentions that it is one of the highest cerritos in the area but believes that its genesis is due to the formation of the levees. However, she does not rule out anthropic activity in the contribution of the materials.

Since 2006, our research team has conducted archaeological investigations of the Upper Delta of the Paraná and its adjacent plain. As a result of our field work, 84 archaeological sites were surveyed, 25 of which are on the plain and 59 on the islands. We found that 37 of these island sites are earth mounds. We also conducted research in the classical archaeological sites of the Paraná, such as Cerro Grande at Isla de los Marinos and Cerro de las Pajas Blancas 1, and studied old museum collections of sites characterized by their excavators as mounds, namely, Túmulo de Campana, Túmulos I and II del Paraná Guazú, Túmulos I and II del Brazo Largo, and Túmulo I del Brazo Gutiérrez, among others. To evaluate the archaeological potential of the Upper Delta, test pits were performed in more than 30 sites, and larger excavations were carried out in seven of them: Cerro Tapera Vázquez, Los Tres Cerros 1 and 2, Laguna de los Gansos 1 and 2, Cerro Farall, and Laguna del Negro (Bonomo et al. 2011b, 2016; Politis et al. 2011; Apolinaire 2017). In addition, this project included detailed geoarchaeological studies of the cerritos, thus facilitating the discussion of their genesis and formation with a novel dataset (Castiñeira et al. 2013, 2014). More recently GIS tools and concepts derived from graph theory have been combined to analyze the Upper Delta archaeological data (basically mounds), as done by Apolinaire and Bastourre (2016). These authors found that there is a positive correlation between mound size and centrality values (both in the hydrographical network and in the sites network) and that the most prominent places are central in terms of the cultural landscape. They also proposed that the position within interaction networks conditioned the existence of hierarchical relationships and the chances to accumulate foreign goods. In addition, complementary bioanthropological studies were done to better understand the funerary practices conducted in these mounds (Scabuzzo et al. 2015).

Linked to our project, Juan Carlos Castro has investigated the Lower Uruguay River from the Argentine side since 2009 and has registered several mounds and studied museum collections of others. In particular, he conducted a detailed excavation of Cerro de Boari 3 archaeological site, near the mouth of the Gualeguaychú River, and refined the chronology of its formation. These studies (Castro 2016) add to the classics of Greslebín, Krapovickas, and others on the

Uruguayan bank, such as Túmulo de La Concordia and Cerrito de La Blanqueada, and have made it possible to conduct modern geoarchaeological studies on the genesis of the cerritos on Uruguay river.

Key Issues/Current Debates

The natural or artificial origin of the pre-Hispanic mounds of the Lower Paraná and Uruguay rivers has been subject of active debate. As explained in the previous section, different alternatives have been proposed to explain the genesis of the mounds: massive events of anthropic construction, growth by accretion derived from successive human occupations, use of dunes or levees, and combination of natural elevations at the base and anthropic accumulations at the top. At present, most authors recognize human participation (intentional or not) in the elevation of the mounds (Campos 2001; Ceruti 2003; Cornero et al. 2007; Nóbile 2002; Bonomo et al. 2011a). What seems clear today is that not all mounds have the same origin and development as they correspond to different cultural and natural processes.

According to the ^{14}C ages obtained (Fig. 6), stable human occupation of the Upper Delta

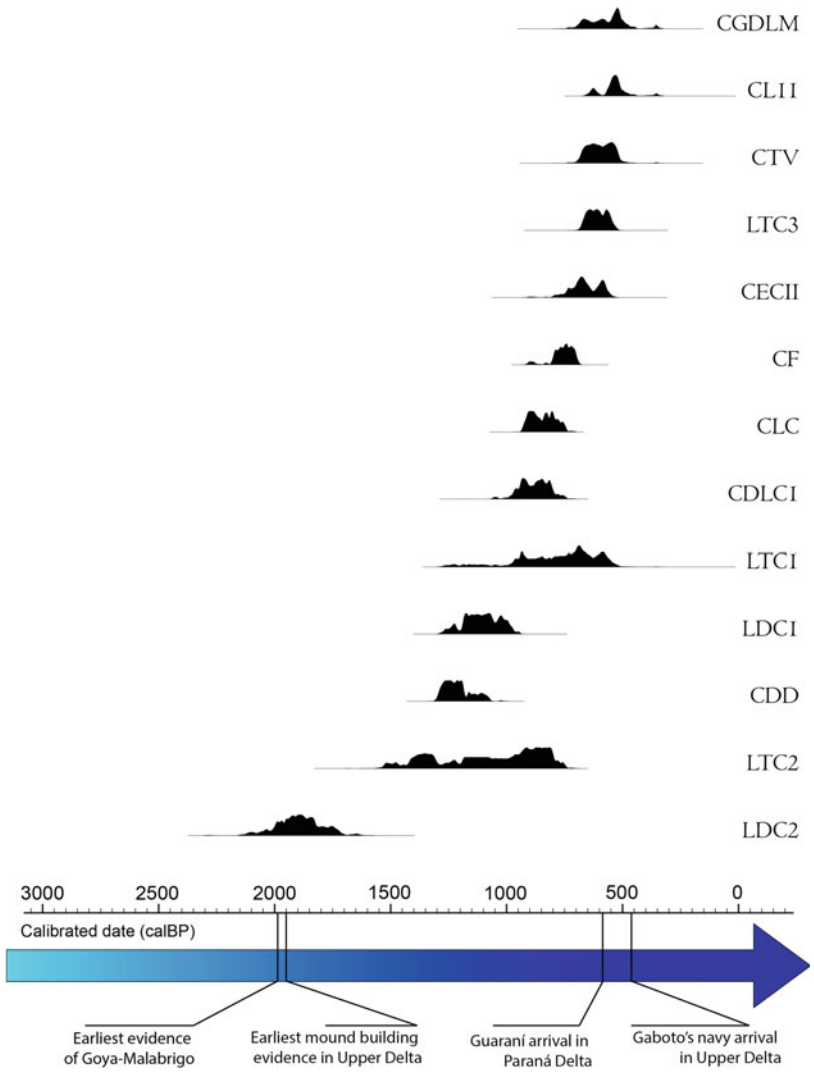

Mound Building, Social Complexity and Horticulture in the Lower Paraná River, Fig. 6 Chronology of human occupations on mounds in the Upper Delta of the Paraná River in the context of the main cultural events at local

would have taken place from ca. 2000 years ^{14}C AP, rather long after the area was available, after the last Holocene transgressive event. At least it is from that date that the first evidence was obtained for the construction of earth mounds at Los Dos Cerros 1 archaeological site (Castiñeira et al. 2017). These constructions provided stable settlement surfaces, which were little affected by floods. The earth mounds were erected to establish residential areas – in some cases forming small villages – where domestic activities and funeral practices were carried out. These practices, which included primary and secondary burials and assemblages of skeletal parts, surely turned the spaces devoted to the ancestors into places where the collective memory was constructed and reaffirmed. It has also been suggested that some sectors of the mounds could have been used as gardens, probably in the domestic context (Sánchez et al. 2013). These structures may form groups of two or three, but they are usually separated from each other, showing a predominantly dispersed settlement pattern. This does not mean that they were isolated and disconnected units; on the contrary, they appear to have been integrated into local systems of intragroup interaction and supraregional exchange networks (Apolinaire and Bastourre 2016) that ensured the arrival of personal adornments made of metal and other exotic products.

As expressed for some time (e.g., Outes 1918; Gaspary 1950; Serrano 1950; Caggiano 1984; Bonomo et al. 2011a), the genesis of the Lower Paraná-Uruguay cerritos is not uniform and neither can they be assigned to a single archaeological entity. Although many earth mounds have been attributed to Goya-Malabrigo in the Lower Paraná and Lower Uruguay rivers, other earth mounds have been detected in sites not attributable to Goya-Malabrigo (e.g., Túmulo II del Brazo Largo, Túmulo I and II del Paraná Guazú on the Lower Paraná Delta), some of which have been assigned to Ibicuí or Ibicueña facie (Serrano 1950; Caggiano 1984).

Concerning the genesis of the elevations, at least three basic types have been described:

(a) Earth mounds that were totally or partially constructed with the intentional contribution of sediments (clay and thicker materials), usually resulting from multiple occupations over several centuries.
(b) Accretional earth mounds, deriving from human occupation (without intentional contribution of sediments) on naturally elevated landscape geoforms. The height is increased by the accumulation of materials discarded and abandoned in the settlements (e.g., housing collapse).
(c) Elevations that are not earth mounds but natural geoforms where human occupation did not alter the height. In the Lower Paraná and Uruguay rivers, the most widely used geoforms in types b and c are levees and dunes.

One of the main difficulties in studying the genesis of the Lower Paraná earth mounds has been the shortage of systematic and intensive studies. In recent years, high resolution planimetric surveys with total station (Fig. 7) and geoarchaeological studies in some sites of the Upper Delta have shown the three types of elevations (Bonomo et al. 2011a; Politis et al. 2011; Castiñeira et al. 2013, 2014): Los Tres Cerros 1, a good example of an anthropic construction; Cerro Tapera Vázquez, representing the second group (an occupation on a naturally elevated form with anthropic accretion); and Laguna de los Gansos 1 and 2, exemplifying occupations on levee without altering height. In the following section, we summarize the information of these sites, because in addition to the detailed geoarchaeological studies, the contextual archaeological data and the relatively adjusted chronology allowed us to address the other two issues related to mounds: social complexity and economy.

Los Tres Cerros 1 (LTC1)

Archaeological locality Los Tres Cerros (Victoria, Entre Ríos) is located on the left bank of the Zanjón Almada and composed of three earth mounds in close proximity, surrounded by extensive marshland after flooding. These elevated sites are generally protected from flooding and thus

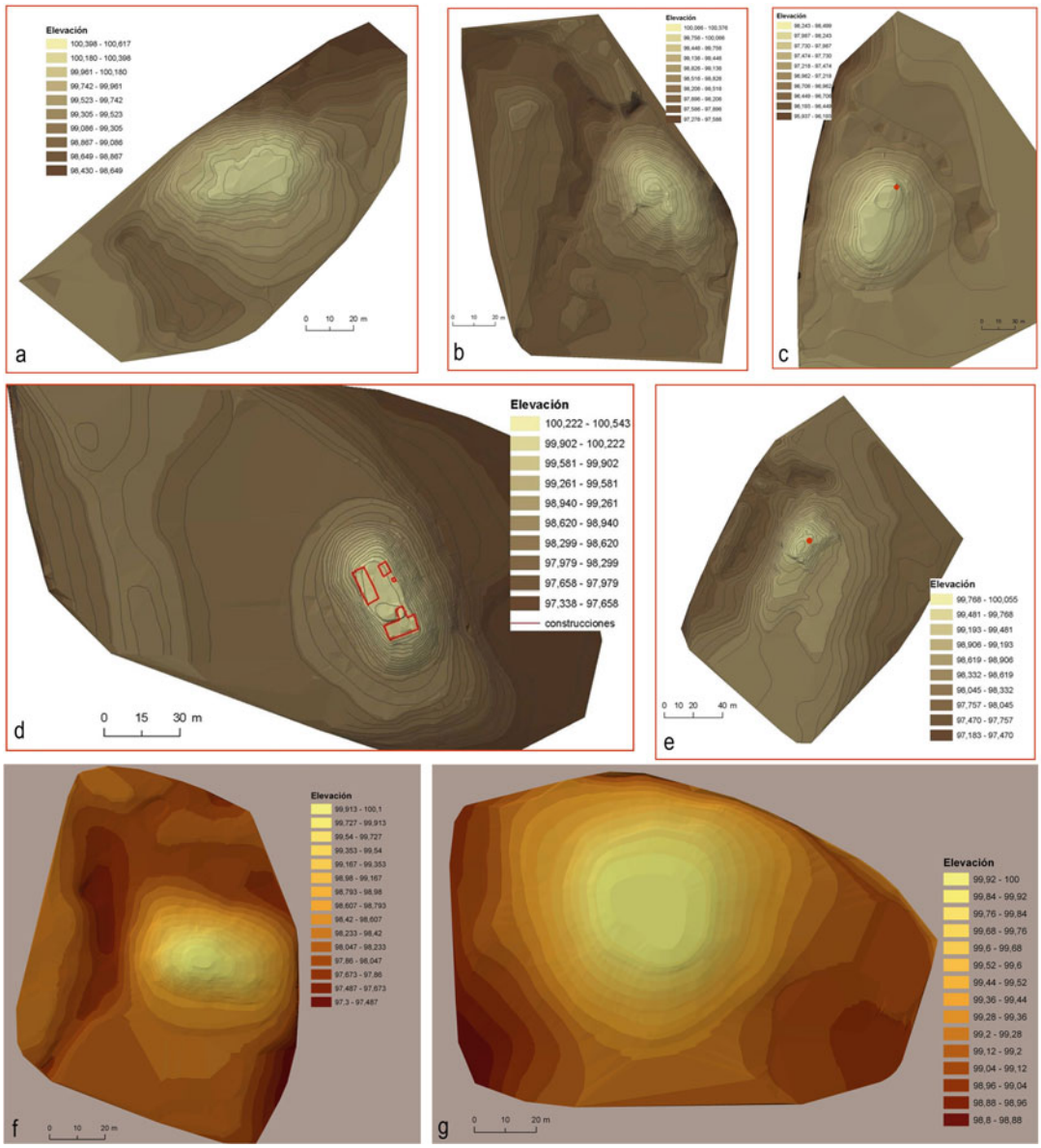

Mound Building, Social Complexity and Horticulture in the Lower Paraná River, Fig. 7 Planimetric surveys of mounds with total station, jointly conducted with Camila Gianotti: (**a**) Cerro Puesto Acosta, (**b**) Cerro El Durazno 1, (**c**) Cerro El Lucerito, (**d**) Cerro Tejeira, (**e**) Cerro Barrancas; (**f**) digital elevation models of Cerro Grande de la Isla de los Marinos and (**g**) Cerro Lote 11. Note the depressed zones surrounding some of the mounds that could have functioned as sediment extraction areas for the construction

function as shelter for tree species in a grassland-dominated space. The archaeological materials are distributed in the three mounds, in the adjacent plain, and in three microreliefs near the cerritos. Successive campaigns between 2008 and 2012 carried out tens of stratigraphic test pits, planimetric surveys of the mounds and of their constructive layers, and excavations, with 33 m^2 excavated at the top and base of Los Tres Cerros 1 and 4 m^2 at the top of Los Tres Cerros 2. These efforts made it possible to conduct archaeological, geological, and botanical studies in this locality.

Mound Building, Social Complexity and Horticulture in the Lower Paraná River, Fig. 8 General view of Los Tres Cerros 1 mound

LTC1 (Fig. 8) is the central mound relative to the other two elevations, standing out from the surrounding flat terrain as the highest structure. It is an artificial construction that was raised more than two meters above the plain with the ad hoc addition of significant amounts of sediments and, to a lesser extent, discarded and abandoned remains during occupations. Castiñeira et al. (2013) reported that the mound structure presents anthropic accumulations of sediments, in situ burnt soil, and archaeological materials. The mound is composed of different levels of accretion with a high content of organic matter that contrasts with the poor soils of the area. Significant textual and mineralogical discrepancies were found between the natural sediments of the adjacent plain and those of the mound, modified by fire and the addition of sherds, charcoal, valves, and bones. These thicker textured materials would have been intentionally included not only to increase the height and widen the base of the mound but also to strengthen the fine sediments and maintain the integrity of the structure. The fire was also used to consolidate and protect the structure from erosive agents, eliminate weeds, condition the ground, and harden possible dwelling floors. The compositional differences between argilominerals of the mound structure and the adjacent natural horizons indicate that the sediment extraction area used for the mound elevation was not related to the alluvial sediments of the surrounding plain. On the contrary, the selection of mud with cohesive properties from specific areas was favored because it met construction requirements (Castiñeira et al. 2013).

Building this mound required moving more than 1700 m^3 of sediment in different stages of community work distributed over centuries. The 21 radiocarbon dates obtained in LTC1 show that the site was occupied between 1200 and 560 years BP, with prolonged periods of stability alternated with episodes of abandonment and later reoccupation. Throughout this period, populations devoted to hunting, gathering, fishing, and horticulture used the mound for domestic activities and funerary practices (Politis et al. 2011; Scabuzzo et al. 2015). At the top of the mound, these domestic activities were identified through the presence of bonfires, wells with abundant fish remains, possible postholes (circles

5–11 cm in diameter preserved in the burnt soil), and the aforementioned dwelling floors. The waste at the top was cleaned, as shown by the dump detected at the base of the mound, containing high density of sherds, fractured and burned animal bones with cut marks (Bastourre 2014). This concentration of materials at the base of the mound also received contributions of materials removed and redeposited by natural agents.

The chronology, geographical location, and stylistic and technological characteristics of the ceramics are associated with the Goya-Malabrigo archaeological entity (Ceruti 2003; Politis and Bonomo 2012). The pottery dominates the artefactual set of the site with more than 30,000 potsherds found in excavation (Di Prado 2015). Manufacturing was carried out on site, as indicated by the presence of clay dough and rollers and ceramic flatteners. The characteristic "campanas" (=bells) made of pottery were found in LTC1. These campanas are cylinder-shaped or truncated cone pieces, open at the bottom, usually with a zoomorphic appendage at the top. Other pieces were found, such as a vessel with three inner compartments, a spindle whorl, trimmed silhouettes in the shape of psittacines (including macaws and parrots), and solid three-dimensional appendages depicting birds, mammals, reptiles, and mollusks. Noteworthy appendages include heads of bird that have colorful and bright plumage (psittacines), birds of prey (falconiforms), and solitary animals that are dangerous to humans (e.g., ophidians). Drag-and-jab was the predominant decorative technique, used for drawing straight and stepped lines, zigzags, and geometric figures. Lithic artifacts are very scarce, and the raw materials came from different geological formations located over 50 and 230 km from LTC1. Different types of bone artifacts have also been recovered: grooved, semi-grooved and flat tips with and without peduncle, harpoon tips, and a pendant.

Abundant bones and teeth were found, corresponding to coypu (*Myocastor coypus*) and capybara (*Hidrochoerus hidrochaeris*), the most widely represented species of rodents, which presented fractures and traces from disarticulation of the carcasses, leather extraction, and meat consumption (Bastourre 2014). Other resources are the wild cavy (*Cavia aperea*), carnivores such as neotropical otter (*Lontra longicaudis*), pampean fox (*Lycalopex gymnocercus*), freshwater clams (*Diplodon* sp.), and very low frequency of ampullarids. In addition, fish skull bone, thorns, and vertebrae were found: tararira (*Hoplias malabaricus*), sábalo (*Prochilodus platensis*), boga (*Leporinus obtusidens*), chanchita (*Cichlasoma facetum*), and common armado (*Pterodoras granulosus*). In general, this faunistic composition, which indicates an economy strongly oriented toward aquatic resources, is frequent in the vast majority of sites in the Lower and Middle Paraná River (Ceruti 2003; Pérez Jimeno 2007).

Archaeobotanical studies (Sánchez et al. 2013) in LTC1 identified phytoliths of palmaceous plants, *Equisetum* sp., *Canna* sp. (achira tuber), and Orizeae (family that includes wild rice). Further evidence of manipulation of wild vegetables was also found in morphotypes related to *Zea mays* (maize) and Cucurbitaceae. The flotation technique permitted the discovery of carbonized maize seeds in levels dated between ca. 580 and 860 years BP (Colobig et al. 2015). Maize phytoliths were also detected in sedimentary samples from the lower levels of the site dated before 1030 years BP. These results support the presence of a horticultural component in the subsistence of LTC1 inhabitants, from the beginning of the mound elevation. However, according to recent isotopic studies, the contribution of cultivated plants such as corn would have been complementary.

Another finding in this domestic context was that of human bone remains of at least 16 adult, adolescent, and infant individuals of both sexes (Scabuzzo et al. 2015). These human bones were arranged in two sectors of the site: at the base of the mound, where most of the individuals were found, and at the top, where red painted remains of a single individual were recovered inside a hearth. At the base of the mound, the layers containing the skeletons presented abundant ceramic and food remains, among them mandibles and teeth of coypu and burned vertebrae of fish, as well as valves of *Diplodon* sp. arranged in layers above and below the human burials. Although

some elements, such as valves or large fragments of in situ broken vessels, are clearly associated with burials, other materials were surely part of the sediments where the skeletons were buried and with which they were covered. In fact, below the highest concentration of human skeletons, the previously mentioned dump was recorded.

At LTC1, a differential manipulation of the skeletal remains is reflected in elaborate mortuary practices (Scabuzzo et al. 2015). These practices included primary burials, secondary packages, and the arrangement of isolated anatomical parts with soft tissues that kept them articulated. The bodies were therefore subject to various treatments and different trajectories of burial, exhumation, and reburial. The seven ^{14}C dates of these human remains comprise between 650 and 850 years BP, subsequent to the beginning of the construction of the mound around 1000 BP. The available information indicates that the mound was first a residential area and later began to be used also as a burial place.

Cerro Tapera Vázquez (CTV)

The CTV archaeological site is located in the meander plain of El Ceibo stream, inside the Pre-Delta National Park. It is an elliptical mound rising 1 m above the levee adjacent to the stream. In 2008, 16 m^2 were excavated in the highest part of the mound. Its elevation is partly anthropic as a result of accretion of materials during human emplacement (Bonomo et al. 2011b). This occupation extends ca. 100 m along the levee with greater density of materials in the mound, indicating some spatial differentiation of the activities.

The ceramic assemblage shows the predominance of medium- to large-sized open containers with large globular shapes, thin walls, and in some cases closer mouths, smoothed or polished surfaces fired in an oxidizing atmosphere. The recovered items are associated with processing, transport, and/or storage containers. The two- and three-dimensional zoomorphic appendages, decorations with drag-and-jab, a spouted spoon, globular pots with closed mouths, and possible campanas fragments at CTV, together with their ^{14}C age of 520–650 years BP, geographical location, and ecological specificity, all fall within the Goya-Malabrigo entity characteristics. The pottery, with its typical zoomorphic appendages, shows how the animal universe was symbolically and materially incorporated into the cultural sphere of the indigenous populations that lived in the Lower Paraná river.

The site reflects an economy closely associated with the abundant aquatic resources of the Paraná River, including mainly mammals (*Myocastor coypus*, *Hydrochaeris hydrochaeris*, *Blastocerus dichotomus*, and *Ozotoceros bezoarticus*), fishes (Siluriformes and Characiformes), and birds (*Podiceps major* and indeterminate Aves). Archaeobotanical studies made it possible to identify *Phaseolus* sp., *Zea mays*, *Prosopis* cf. *nigra*, *Canna* sp., and Arecaceae. Like numerous sites distributed from the depression of the Salado River in the Pampas to the Humid Chaco, CTV favored the exploitation of coypu. The abundant remains of abandoned coypu with ample evidence of anthropic modification show that site occupation was mainly oriented to the intensive capture, processing, and consumption of this taxon. This orientation toward the exploitation of a given resource makes it possible to integrate the site into a greater settlement system composed of places with different functions, hierarchy, and intensity of occupation. Within this system, CTV would not have functioned as a main residential settlement (village with semipermanent occupation) but rather as a second-order settlement with less intense and recurring occupations.

Laguna de los Gansos 1 and 2 (LDLG1 and 2)

In the archaeological locality Laguna de los Gansos (Diamante, Entre Ríos), an area of 44 m^2 was excavated in LDLG1 and of 16 m^2 in LDLG2. LDLG1 is located in a naturally elevated levee (Bonomo et al. 2016). During its occupation, mainly coypu, capybara, and marsh deer were exploited, and maize was possibly consumed. Ceramic containers of low and open forms predominate, such as plates and medium-sized and small bowls, which indicate they were used for processing and serving food or liquids. The ceramic displays some characteristics similar to those described for Goya-Malabrigo (e.g.,

simply containers, decoration with drag-and-jab, and zoomorphic appendages). In addition to its location in the same levee, LDLG2 shares the exploitation of fauna resources linked to aquatic environments and stylistic ceramic features. It is distinguished by the discovery of human remains that show two clear modes of contemporary burial: primary burial and burial with extraction of the trunk and upper limbs and rearrangement of the skull.

The locality was occupied by populations assigned to Goya-Malabrigo, at least in two different periods. LDLG2 was occupied ca. 600 years ^{14}C BP. Complex mortuary practices were carried out, including dismemberment, selection of parts, and rearrangement of some anatomical sectors of the same individual. This shows that part of the mortuary rituals was based on manipulation of bodies, a tradition shared by different Late Holocene societies of the Paraná River. LDG1 is a succession of shorter occupations on a levee between ca. 1200 and 1800 years ^{14}C BP. It had specific purposes, one of which would have been hunting of large rodents and marsh deer. These sites were occupied only during times with low to medium levels of the river and would have been temporarily occupied and of lower hierarchy than those developed on mound structures located beyond the reach of regular floods.

To sum up, recent research on the mounds of the Upper Delta made it possible to propose the anthropic character of the constructions (Castiñeira et al. 2013; Politis et al. 2011). These constructions were made by populations associated with the Goya-Malabrigo archaeological entity (Ceruti 2003; Politis and Bonomo 2012), whose subsistence was based on the hunting of mammals (coypu, capybara, cavy, and cervids), fishing, and, to a lesser extent, exploitation of birds, reptiles, and freshwater mollusks. This diet was complemented by gathering of wild fruits and cultivation of corn, squash, and beans (Bonomo et al. 2011a; Sánchez et al. 2013; Colobig et al. 2015). The results of our studies (Fig. 9) show the presence in the Paraná Delta of an American widespread complex of seed crops, the corn-bean-squash triad. This confirms the presence of domestic plants among the Goya-Malabrigo populations, although they were traditionally considered hunter-gatherers. It also opens a new horizon of interpretation, as they would not be complex hunter-gatherers but small-scale horticulturists who probably practiced house-garden horticulture. These crops preceded the arrival of the Guaraní in the region, who had been identified as those introducing the crops in the Lower Paraná and Uruguay rivers.

The first European expedition to the Paraná River, undertaken by Sebastián Caboto (1526–1530), described the local indigenous populations (Chaná, Chaná-Timbú, Timbú, Mbegúas, and Carcarais), who would be the sixteenth-century ethnographic expression of the Goya-Malabrigo archaeological entity. The Santa Cruz document, produced during this expedition, illustrates the presence of horticulture and, specifically, the importance of corn sowing and harvesting on the islands during the summer when the river waters were low. Luis Ramírez's famous letter of 1528 shows that other populations besides the Guaraní practiced maize, squash, and bean horticulture.

The information available to date on the Lower Paraná, especially that in early chronicles and, to a lesser extent, in the archaeological record, suggests some level of stable sociopolitical hierarchies, that is, first-order community leadership. Archaeological evidence shows that the burials of some individuals contained pendants and beads made of copper and bronze. The allochthonous nature of the raw materials, the metallurgical techniques, and the designs of these metal ornaments would indicate their Andean origin. Such differential treatment at death could reflect asymmetrical social relations in which some members of the society had unequal access to imported goods from very distant areas, which could have been used to consolidate their prestige and status. In the case of Goya-Malabrigo, special attention was given to the bodies of certain individuals, as shown by one of the secondary burials of La Palmera II site in the Middle Paraná river (Ceruti 2013). The body was accompanied by a varied funerary trousseau (valve collar beads, bone points, zoomorphic appendages, and a

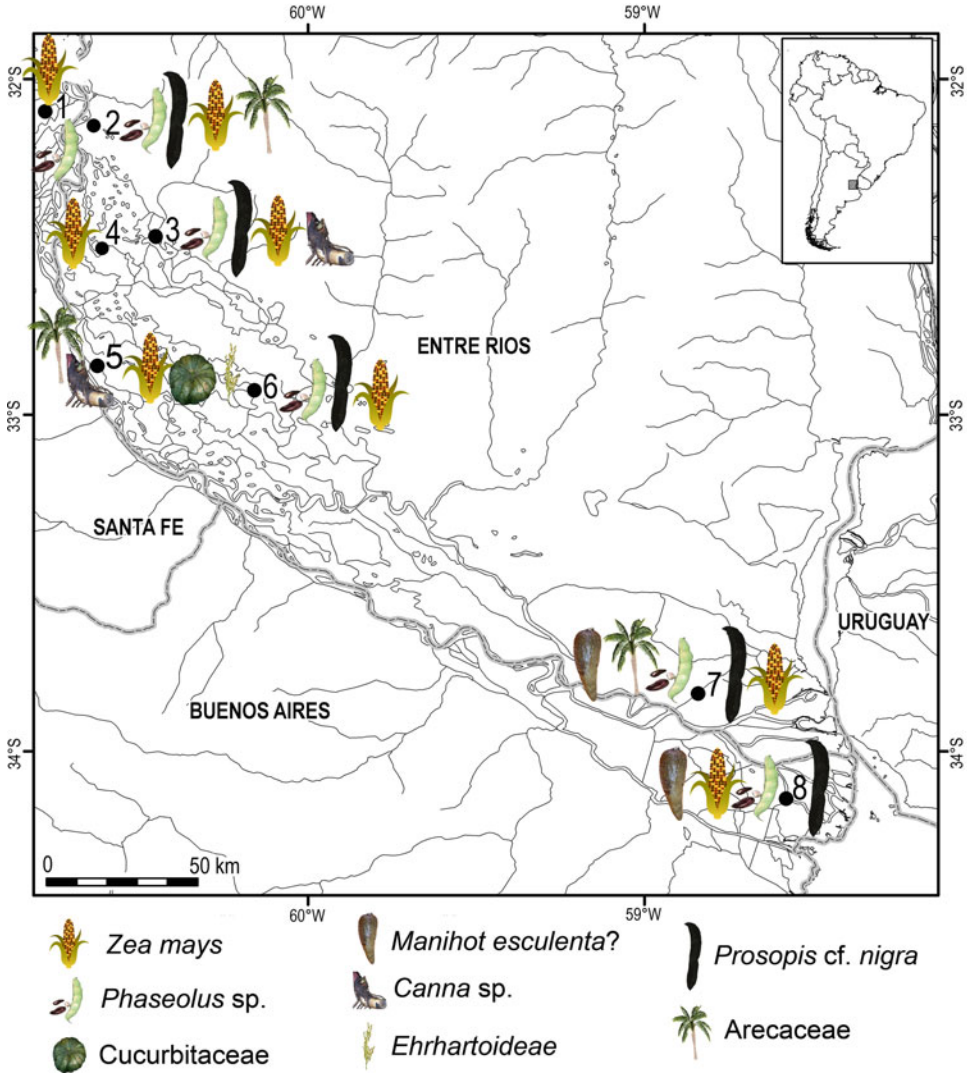

Mound Building, Social Complexity and Horticulture in the Lower Paraná River, Fig. 9 Summary of the identified plants in the Paraná Delta 1. Cerro de las Pajas Blancas 1; 2. Cerro Tapera Vázquez; 3. Cerro Los Cardos; 4. Laguna de los Gansos 1; 5. Los Tres Cerros 1; 6. Cerro Lote 11; 7. Túmulo I del Brazo Largo; 8. Río Paraná Miní

copper plaque), with possible offerings (an articulated hand and several phalanges), and covered by blocks of sandstone and caliche stone. This complex burial seems to reflect differences according to the status that the person had when alive, as described by some chronicles.

Sixteenth-century chroniclers called the indigenous chiefs of the Lower and Middle Paraná rivers as "mayoral" and "principal." The Spaniards referred to some islands and even some groups by the names of these leaders (used as ethnonyms), which reinforces the idea of formal and permanent leadership. The Spaniards gave European objects to the indigenous chiefs and, in return, received large quantities of corn and fish for several days. This suggests that some of the host leaders controlled some of the resources produced by the community and that they were able to store and redistribute the food. While lax leadership with fragile stability existed, some strong leaders, known for hundreds of kilometers, had some control over fishing and hunting territories.

Serrano (1950: 143) mentions the existence of caciques of greater hierarchy, like Corundá (after whom the Corondás group was named), whose fame of "señor principal" (=main lord) of the coasts of the Parana River reached beyond his territory and was known among the indigenous people of Santiago del Estero. This shows the presence of highly prestigious characters known in a vast region. In some situations, these leaders would confederate to coordinate warlike actions against the Spaniards, which suggests the ability to direct combat and defense operations and to make alliances between politically autonomous units.

It could then be proposed that the non-Guaraní indigenous groups of the Lower and Middle Paraná rivers (those generically called Chaná-Timbú and their predecessors from pre-sixteenth centuries) had a sociopolitical organization that could be included within what is classically known as rank society (Fried 1967). Within such societies, high-rank families or individuals had regular and repetitive authority (albeit weak obedience of their followers); all members of society, be they families or individuals of high rank or not, had guaranteed direct access to the same basic subsistence resources; the division of labor would be primarily based on gender and age, with limited specialization; control of long-distance exchanges and redistribution of the abundant resources and collective products were managed by these leaders or permanent chiefs (see Chapman 2003: 36–37, 85). However, the available information is still insufficient for a more detailed analysis of the level of social inequality of the Paraná River populations.

Summary

The earth mounds of the Lower Paraná and Lower Uruguay rivers are the most visible archaeological features in the contemporary landscape. They are the result of an important investment of human labor, generally on elevated geoforms, which have marked in the cultural topography for two millennia. These widespread architectural structures shaped the landscape of the floodplains of both rivers and were associated with populations differing in their ethnic, economic, and sociopolitical characteristics. Most of the earth mounds have been assigned to the Goya-Malabrigo archaeological entity, although those in the Lower Delta have mainly been attributed to the facie Ibicuí or Ibicueña. The characteristics and sociocultural context of these mounds are different from those of nearby areas such eastern Uruguay and southeastern Brazil, associated with the Vieira Tradition.

These earth mounds had in principle residential and funeral functions and were major settlements within the hierarchy of settlements in the region. The most important ones were probably village loci, while others would have been used for house-garden horticulture. Due to their additive property, once the mounds were constructed by sediment movement, they were permanent, transgenerational, and most of them continued growing as a result of successive occupations. This generated a virtuous circle because once a surface had been raised, it became an attractive space for further human occupations. The sequence elevation-occupation-disposal-abandonment-elevation/conditioning-reoccupation created a structure that increased its height and visibility over time and was transformed into privileged places of the landscape. In addition, these domestic places shared the locus with human burials, linking living groups with their ancestors at specific points of this built landscape. The great complexity with which the dead were treated indicates a significant investment of time and effort in conditioning the remains of the ancestors and shows the central role of ancestry in social reproduction (Goldstein 1995; Budja 2010). In this way, the mounds were signified and re-signified over time and probably constituted places of memory and ancestry. They represented the practical advantage of occupying floodplains and at the same time a space of high social and symbolic value.

Cross-References

► Agricultural and Social Earthworks in the Guianas

▶ Earthworks of the Amazon
▶ Earthworks of the Llanos de Mojos
▶ The Earthen Mounds (*Cerritos*) of Southern Brazil and Uruguay

References

Apolinaire, E. 2017. Arqueología del suroeste de Entre Ríos: tecnología, subsistencia e interacción social en tiempos prehispánicos. Unpublished Ph.D. dissertation, Universidad Nacional de La Plata.

Apolinaire, E., and L. Bastourre. 2016. Nets and canoes: A network approach to the pre-Hispanic settlement system in the Upper Delta of the Paraná River (Argentina). *Journal of Anthropological Archaeology* 44: 56–68.

Bastourre, L. 2014. Estudios arqueofaunísticos en el Delta Superior del Paraná: el sitio Los Tres Cerros 1 (Provincia de Entre Ríos, Argentina). *Revista Chilena de Antropología* 30: 109–115.

Bonomo, M., G. Politis, and C. Gianotti. 2011a. Montículos, jerarquía social y horticultura en las sociedades indígenas del Delta del río Paraná (Argentina). *Latin American Antiquity* 22 (3): 297–333.

Bonomo, M., M.M. Colobig, E. Passeggi, A. Zucol, and M. Brea. 2011b. Multidisciplinary studies at Cerro Tapera Vázquez site, Pre-Delta National Park, Argentina: The archaeological, sedimentological and paleobotanical evidence. *Quaternary Internacional* 245: 48–61.

Bonomo, M., G. Politis, C. Silva, L. Bastourre, A. Ramos van Rapp, C. Castiñeira, C. Scabuzzo, and E. Apolinaire. 2016. Estado actual de las investigaciones en la localidad arqueológica Laguna de los Gansos (Diamante, Entre Ríos). *Revista del Museo de Antropología* 9 (2): 51–66.

Bracco, R., L. Cabrera, and J.M. López Mazz. 2000. La Prehistoria de las Tierras Bajas de la Cuenca de la Laguna Merín. In *Arqueología de las Tierras Bajas*, ed. A. Durán and R. Bracco, 13–38. Montevideo: MEC.

Budja, M. 2010. The archaeology of death from "social personae" to "relational personhood". *Documenta Praehistorica* 37: 43–54.

Caggiano, M.A. 1984. Prehistoria del noreste Argentino, sus vinculaciones con la República Oriental del Uruguay y sur de Brasil. *Pesquisas, Antropología* 38: 1–109.

Campos, G.L. 2001. Análisis litogenético de la matriz sedimentaria de los sitios arqueológicos "La Lechuza" y "Puerto Perita". Unpublished dissertation, Universidad Nacional de Rosario.

Castiñeira, C., A. Blasi, G. Politis, M. Bonomo, L. Del puerto, R. Huarte, J. Carbonari, F. Mari, and F. García-rodriguez. 2013. Origin and construction of mounds in the Upper Paraná Delta Wetlands (Argentina). *Archaeological and Anthropological Sciences* 5 (1): 37–57.

Castiñeira, C., A. Blasi, M. Bonomo, G. Politis, and E. Apolinaire. 2014. Modificación antrópica del paisaje durante el Holoceno tardío: las construcciones monticulares en el Delta Superior del río Paraná, Argentina. *Revista de la Asociación Geológica Argentina* 71 (1): 33–47.

Castiñeira, C., E. Apolinaire, A. Blasi, M. Bonomo, G. Politis, L. Bastourre, and F. Mari. 2017. *Pre-Hispanic settlements in hydrometeorologically susceptible areas during late Holocene: The Upper Delta of the Paraná River Case*. The Holocene 27 (12): 1801–1811.

Castro, J.C. 2016. Late-Holocene indigenous occupation of the Uruguay river (Argentina). *DIGit. Journal of the Flinders Archaeological Society* 3: 42–53.

Cavallotto, J.L., R.A. Violante, and F. Colombo. 2005. Evolución y cambios ambientales de la llanura costera de la cabecera del río de La Plata. *Revista de la Asociación Geológica Argentina* 60: 353–367.

Ceruti, C.N. 2003. Entidades culturales presentes en la cuenca del Paraná Medio (margen entrerriana). *Mundo de Antes* 3: 111–135.

Ceruti, C.N. 2013. *Indicios de complejidad social en un enterratorio de la entidad cultural arqueológica Goya-Malabrigo*. Hernandarias, Dpto. Paraná, provincia de Entre Ríos. Paper presented at the V Encuentro de Discusión Arqueológica del Noreste Argentino, Goya, August 14–16, 2013.

Chapman, R. 2003. *Archaeologies of complexity*. London: Routledge.

Codignotto, J. 2004. Delta. Evolución Geológica. In *Atlas ambientalde Buenos Aires*. Available at: http://www.atlasdebuenosaires.gov.ar/aaba/. Accessed 22 Dec 2016.

Colobig, M.M., J.O. Sánchez, and A. Zucol. 2015. Análisis de macrorestos vegetales en el sitio arqueológico Los Tres Cerros 1 (isla Las Moras, Victoria, Entre Ríos). *Revista del Museo de Antropología* 8 (1): 115–124.

Cornero, S. 2009. Apuntes de arqueología de islas. Sitio El Castaño, boca de la Milonga, río Paraná. *Anuario de Arqueología* 1 (1): 153–160.

Cornero, S., F. Solomita, and P. Curetti. 2007. Componente arqueofaunístico del sitio La Lechuza (provincia de Santa Fé). *Actas del XIV Congreso Nacional de Arqueología Argentina* 1: 167–171. Rosario.

De Aparicio, F. 1949. The archaeology of the Paraná River. In *Handbook of South American Indians*, ed. J. Steward, vol. 3, 57–68. Washington, DC: Smithsonian Institution.

Di Prado, V. 2015. Estudio comparativo de las prácticas de elaboración y uso de la alfarería prehispánica del centro-este de Argentina desde una perspectiva macro-rregional. Unpublished Ph.D. dissertation, Universidad Nacional de La Plata.

Eremites, J. 1996. *Guató: argonautas do pantanal*, Coleção Arqueologia 2. Porto Alegre: EDIPUCRS.

Erickson, C.L. 2000. Lomas de ocupación en los Llanos de Moxos, Bolivia. In *Arqueología de las Tierras*

M

Bajas, ed. A. Durán and R. Bracco, 207–226. Montevideo: MEC Americana.

Frenguelli, J., and F. de Aparicio. 1923. Los paraderos de la margen derecha del río Malabrigo (departamento de Reconquista, Prov. de Santa Fé). *Anales de la Facultad de Ciencias de la Educación* 1: 7–112.

Fried, M.H. 1967. *The evolution of political society.* New York: Random House.

Garcia, A.M. 2012. Sítio Arqueológico do Pororó: um Cerrito na mesorregiãocentroocidentalriograndense (Pinhal Grande). Unpublished Magister dissertation. Mestrado em Patrimônio Cultural, Universidade Federal de Santa Maria.

Gaspary, F. 1950. Investigaciones Arqueológicas y Antropológicas en un cerrito de la Isla de Los Marinos (Pcia. de Entre Ríos). *Publicación del Instituto de Arqueología, Lingüistica y Folklore* 23: 3–66.

Gianotti, C. 2016. Paisajes sociales, monumentalidad y territorio en las tierras bajas de Uruguay. Unpublished Ph.D. dissertation, Universidade de Santiago de Compostela.

Goldstein, L.G. 1995. Regional approaches to mortuary analysis. In *Landscapes and mortuary practices: A case for regional perspectives*, ed. L.A. Beck, 101–124. New York: Plenum Press.

Greslebín, H. 1931. Las estructuras de los túmulos indígenas prehispánicos del departamento de Gualeguaychú (Prov. de Entre Ríos), RA. *Revista de la Sociedad de Amigos de la Arqueología* 5: 5–51.

Iriarte, J., P. Deblasis, J.G. de Souza, and R. Corteletti. 2016. Emergent complexity, changing landscapes, and spheres of interaction in southeastern South America during the middle and late Holocene. *Journal of Archaeological Research*. https://doi.org/10.1007/10814-016-9100-0.

Lafon, C.R. 1971. Introducción a la Arqueología del Nordeste argentino. *Relaciones de la Sociedad Argentina de Antropología* 5 (2): 119–152.

Lothrop, S.K. 1932. Indians of the Paraná Delta, Argentina. *Annals of the New York Academy of Science* 32: 77–232.

Martínez, A.T., C. Taboada, and A. Auat. 2011. *Los hermanos Wagner. Arqueología campo arqueológico nacional y construcción de identidad en Santiago del Estero, 1920–1940*. Bernal: Universidad Nacional de Quilmes.

Nóbile, J. 2002. Arqueología Uruguaya hacia el fin del Milenio. In *Asentamiento y subsistencia en la llanura aluvial del río Paraná (Sector Bajo Paraná): aproximaciones a un modelo regional*, ed. S. Cavellini, C. Curbelo, J. Geymonat, S. Pintos, M. Marenales, M. Moreno, and G. Rolando, 187–193. Montevideo: Gráficos del Sur.

Ortiz, G. 2003. La mitad verde del mundo Andino. Investigaciones arqueológicas en la vertiente occidental de los Andes y tierras bajas de Bolivia y Argentina. In *Estado actual del conocimiento del denominado complejo o tradición cultural San Francisco, a 100 años de su descubrimiento*, ed. G. Ortiz and B. Ventura, 23–71. Unju: CREA.

Outes, F.F. 1918. Nuevo jalón septentrional en la dispersión de las representaciones plásticas de la cuenca paranaense y su valor indicador. *Anales de la Sociedad Científica Argentina* 85: 53–66.

Peixoto, J.L.S. 2005. Relação entre os Aterros e níveis hidrológicos do rio Paraguai, Pantanal. Paper presented at the XIII Congresso da Sociedade Brasileira de Arqueologia. Campo Grande, Sept 4–8, 2005.

Pérez Jimeno, L. 2007. Investigaciones arqueológicas en el sector septentrional de la llanura aluvial del Paraná, margen santafesina. La variabilidad del registro arqueológico. Unpublished Ph.D. dissertation, Universidad Nacional de La Plata.

Politis, G., and M. Bonomo. 2012. La entidad arqueológica Goya-Malabrigo (Ríos Paraná y Uruguay) y su filiación Arawak. *Boletín de la Sociedade de Arqueología Brasileira* 25 (1): 10–46.

Politis, G., M. Bonomo, C. Castiñeira, and A. Blasi. 2011. Archaeology of the Upper Delta of the Paraná River (Argentina): Mound construction and anthropic landscapes in the Los Tres Cerros locality. *Quaternary International* 245: 74–88.

Prümers, H., and C. Jaimes. 2014. 100 años de investigación en los Llanos de Mojos. *Arqueoantropológicas* 4 (4): 11–55.

Pusineri Scala, C.A. 1973. Los montículos o yvy choví del Paraguay. *Anuario de la Academia Paraguaya de la Historia* 14: 117–124.

Sánchez, J.O., M.M. Colobig, A.F. Zucol, G. Politis, M. Bonomo, and C. Castiñeira. 2013. Primeros resultados sobre el uso prehispánico de los vegetales en el sitio arqueológico Los Tres Cerros 1 (Victoria, Entre Ríos, Argentina): análisis del registro biosilíceo. *Darwiniana* 1 (2): 201–219.

Scabuzzo, C., M.A. Ramos van Raap, M. Bonomo, and G. Politis. 2015. Estudios bioarqueológicos en el sitio Los Tres Cerros 1 (Delta Superior del río Paraná, Entre Ríos, Argentina). *Boletim do Museu Paraense Emílio Goeldi, Ciências Humanas* 10 (2): 487–518.

Schmitz, P., C. Ceruti, A.R. González, and A. Rizzo. 1972. Investigaciones arqueológicas en la zona de Goya (Corrientes) Argentina. *Dédalo* 15: 11–121.

Serrano, A. 1930. Un nuevo tipo de instrumento de piedra del litoral argentino. *Revista de la Sociedad de Amigos de la Arqueología* 4: 205–209.

Serrano, A. 1941. Clasificación de losaborígenes argentinos. *Revista de la Universidad Nacional de Córdoba* 27 (9–10): 3–33.

Serrano, A. 1950. *Los primitivos habitantes de Entre Ríos*, Serie II. Paraná: Ediciones de la Biblioteca Entrerriana ¨General Perón".

Togo, J. 2004. Arqueología Santiagueña: Estado actual del Conocimiento y Evaluación de un Sector de la Cuenca del Río Dulce. Unpublished Ph.D. dissertation, Universidad Nacional de La Plata.

Torres, L.M. 1911. *Los primitivos habitantes del Delta del Paraná*. Buenos Aires: Biblioteca Centenaria 4, Universidad Nacional de La Plata.

Further Reading

Bonomo, M., F. Aceituno, G. Politis, and M.A. Pochetino. 2011. Pre-Hispanic horticulture in the Paraná Delta (Argentina): Archaeological and historical evidence. *World Archaeology* 43 (4): 557–579.

López Mazz, J., S. Rostain, and D. Mckey. 2016. Cerritos, Tolas, Tesos, Camellones y otros montículos de las tierras bajas de Sudamérica. *Revista de Arqueologia* 29 (1): 86–113.

Milheira, R.G., M.G. Peçanha, and C.V. Mühlen. 2014. Arqueologia Ibero-americana e Transatlântica: Arqueologia, Sociedade e Território. In *Mapeamento Arqueológico dos Cerritos da Lagoa do Fragata, Capão do Leão-RS*, ed. J.B. Campos, J.J. Zocche, J.F. Cerezer, and L.M. Oosterbeek, 51–70. Erechim: Habilis.

Noelli, F.S., and J.G. de Souza. 2017. Novas perspectivas para a cartografia arqueológica Jê no Brasil meridional. *Boletim do Museu Paraense Emílio Goeldi, Ciências Humanas* 12 (1): 57–84.

Price, T.D., and G.M. Feinman, eds. 2012. *Pathways to power. New perspectives on the emergence of social inequality*. New York: Springer.

Mousterian Industry Tradition

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Introduction

Everything about the Neanderthals (and the Mousterian industry which, by definition, defines their tools) arouses great interest among our species. In fact, since the 1980s, the matter of the transition between the last Neanderthals and the first modern humans has generated an unprecedented scientometric concentration (research projects, academic meetings, publications, and excavations). All possible approaches (chronological, geoenvironmental, behavioral, socioeconomic, anthropological, etc.) have been pursued to attain a more nuanced and higher-resolution view, resulting in a history without artificial breaks or divisions, as could only be expected from a historical perspective.

The material culture of our genus clearly evolved over the millennia. Studied by lithic typology in the first place, and by analogous methods (typometric, technological, morphotechnical, and traceology) in later years, this approach has incurred in two main defects. First, it has been too schematic, excessively dividing up a conduct (material), in order to attribute a certain chronology to a certain collection. The second defect is that of particularism, by copying a natural geological concept (the fossil guide) and applying it to human-made objects, which are subject to infinite variability and convergence mechanisms that are inexistent in Nature. These are the circumstances surrounding the casuistry to be described.

Definition

The Mousterian culture, in all its variants, was defined in the late nineteenth century (1872), when Gabriel de Mortillet changed the nomenclature based on the presence of certain animal species in the archaeological record (as proposed by Lartet) into the system followed in geological stratigraphy at that time: an eponymous site displaying the main characteristics of the period was chosen and used as its name. Thus, the cave of Le Moustier (Dordogne, France) was selected as the characteristic site of the Mousterian period.

Since François Bordes (1953) first defined it systematically, Mousterian lithic industry has been characterized by four main factors. First, it developed a series of techniques, which were little used before, for the centripetal removal of blanks, which gave rise to the Mousterian and Levallois cores. In addition, the format of the blanks was very monotonous: a large part of Mousterian assemblages consists of flakes. The same can be said of the retouched assemblages, as a single type, the side scrapers, comprises over half (occasionally over 80%) of the tools. Finally, the character of the Mousterian as a "plateau culture" is quite striking. This refers to the fact that the Mousterian soon differentiated itself from the industrial technocomplexes preceding it, but then did not display a clear evolutionary sequence in

the period, which lasted for between 100,000 and 220,000 years.

About 42,000 years ago in Europe, technocomplexes that steadily differed from the Mousterian and which are attributed to our species began to appear. Over much of the continent, under different forms, the Aurignacian represents the first material culture of anatomically modern humans or "Cro-Magnon Man." In certain areas, like northern Italy, the south of France, or northern Iberia, "transition complexes" (Uluzzian, Chatelperronian, Bachokirian, Szeletian, among others) acted as a link between the end of the Middle Paleolithic (and the Neanderthals) and the start of an unquestionable Upper Paleolithic (and the presence of modern humans). We find, for example, a variable proportion of objects exhibiting certain inertia and which have led to the identification of remains of Mousterian tradition in later phases of prehistoric assemblages. Hence, the main issues associated with the presence of Mousterian tradition industries in more recent times can be summarized as follows: what the effect of the human phyletic change in the material remains fossilized in the archaeological record is, and on an even more basic level, what the mechanisms regulating the transmission of knowledge (including technical knowledge) within preliterate societies are.

Historical Background

Paradoxically, as hunter-gatherer societies are essentially nomadic, the description of Paleolithic groups has been over-static. Progress in the description of the Neanderthal bands who were responsible for Mousterian technocomplexes has been made in parallel, yet without many connections, with the characterization of their Cro-Magnon counterparts. For decades, the dominant methodologies used in the study of the lithic technocomplexes of each species were the systems devised by the husband and wife scholars François and Denise Bordes on common foundations, but without foreseeing any connections or mechanisms of conversion. The question of the chronology of the series being studied was previous to the selection of a determinate methodology; in those cases when it was supposed that it was a Lower or Middle Paleolithic series, the type-list proposed by François Bordes was applied, whereas if it was thought that it belonged to a phase of the Upper Paleolithic, it was studied according to the type-list of Denise de Sonneville-Bordes. In this situation, it is difficult to seek the antecedents of the Upper Paleolithic in the late Mousterian, or the inertia of Mousterian industries in the Early Upper Paleolithic. There is, therefore, a serious methodological issue in this debate, as it has proven necessary to develop new classification and analytical systems to be able to trace the transfer of material knowledge between human groups that even belonged to different species.

The four constants in Mousterian lithic assemblages have been cited above (centripetal reduction techniques, flake production, overrepresentation of side scrapers – the implement of reference – and the long-lasting state of a technocomplex in which it is difficult to distinguish a sequence). Each of these has undergone a differential historical development, within a common historiographical framework where the first typological studies pioneered by Bordes and Bourgon (1951) have been refined by the contribution of technologists (like Boëda, Turq, and Bourguignon) and specialists in raw material procurement (like Geneste and Morala, among others). In this way, if the concept of Mousterian industry was originally linked to its typological characterization (the overabundance of side scrapers, which attracted inordinate classificatory interest), it now possesses an eminently technological definition. Indeed, the vitality of technological studies on the Mousterian has encouraged the French "technological school," which seeks to foster this epistemological approach to Paleolithic societies.

Key Issues/Current Debates

Research on Mousterian industry and its durability in later contexts has advanced notably in the last three decades. Without any doubt, this progress is directly related to the impulse in

technological studies of Paleolithic technocomplexes in Old World schools of thought. European schools, particularly in France, shifted the focus of their research in the last decades of the twentieth century, from typological studies and the interpretation of Mousterian industrial variability to the integral description of the lithic exploitation systems that give rise to lithic technocomplexes.

A first approach to Mousterian industry is concerned with the mechanisms of procurement and selection of the lithic raw material to be worked. Although all predator human societies – whatever the human species – are nomadic and highly mobile, their interaction with lithic raw material varies in time, space, and depending on the species involved. Indeed, throughout the Paleolithic, it is easy to identify a changing selection of the most suitable raw materials (usually with a siliceous matrix, such as flint, quartz, or quartzite), even if it meant transporting it from increasingly distant sources. Thus, human types previous to the Neanderthals used the nearest materials to their settlement and sacrificed the technical versatility of the chosen material to this ease of procurement, with the result of making rougher kinds of implements. Our own species, in the opposite extreme, carefully chose the most appropriate materials to make a wide range of stone tools and weapons, in different formats and with careful details. This obviously implies that frequent journeys had to be made to the outcrops of the best raw materials, where even the form of the material (nodules, blocks, slabs, etc.) and its size were selected to obtain the best product for the kind of exploitation to be applied. In the case of the Mousterian, it corresponds to Neanderthal groups, who lie in an intermediate position between these two extremes. Except for particular cases of proximity or distance from the best raw materials, the geographical range of lithic procurement is intermediate, and the use of local raw materials, of poorer quality, to shape large multipurpose tools was often combined with the transport of high-quality materials to make certain implements, such as the Mousterian points. Therefore, it cannot be claimed (as has sometimes been argued) that strategic and selective procurement of raw materials did not exist in the Mousterian. Furthermore, taking into account the above point about camps established near or distant from high-quality raw materials, in this variable, it is possible to identify a certain chronological sequence in the behavior of Neanderthals and even the first groups of modern humans in each regional environment.

From a typometric viewpoint, J. G. D. Clark's classic work (World Prehistory) institutionalized a generic classification of prehistoric hunter-gatherer groups according to the predominant form of their stone tools. Mode 1 groups based their lithic industry on large stones that were barely modified. They were gradually replaced by Mode 2 societies in which the generally large tools were shaped by bifacial knapping techniques. The Neanderthal groups being studied here belong within Mode 3, when the lithic assemblages are based on flake blanks, and these were in turn replaced by Mode 4 groups, when blade formats became predominant. In general terms, these modes are equivalent to the Lower Paleolithic (Modes 1 and 2), Middle Paleolithic (Mode 3), and Upper Paleolithic (Mode 4). In addition to the Eurasian Mousterian, Mode 3 also applies to the technocomplexes of the African Middle Stone Age (MSA), which is similar but was not produced by Neanderthal humans, who did not exist in Africa. This very general classification has acquired a symbolic value which needs qualifying: the flake format appeared together with the first human industries, both as a by-product of knapping larger tools and in the use of the edges produced. Similarly, even when blade production became widespread, flakes remained a significant part of lithic assemblages, although the novelty of blades and bladelets tends to receive more attention. The traditional characterization of the Mousterian as a flake industry is therefore not exclusive to this period, as flakes are found in the assemblages of any period and are sometimes the most abundant format type in collections.

The third of the factors allows a better chronocultural discrimination of Mousterian industries and the degree of permeability towards this technical tradition by other technocomplexes. This is a series of methods of lithic exploitation aimed at

the systematic production of flakes, which are linked in a more general way with Mousterian or Mousteroid industries. Thus, in societies with industries attributed to Modes 1 and 2, the presence of flakes is a by-product of knapping larger tools or of unplanned, even anarchic, exploitations with the object of obtaining cutting edges. The most significant conceptual change represented by Mousterian or Mode 3 industries (including the African MSA) is connected with this preplanned reduction of the nodules of raw material and the consequent systematic exploitation of the cores. As a result, this first standardization in reduction methods was deliberately aimed at producing a large number of blanks (which could be used directly or act as preforms for an increasingly wide range of tools). In addition, it should be noted that very old Mousterian varieties with blade reduction methods have recently been described for the northwest of France.

In general terms, the most usual name given to this first planned method of lithic reduction is centripetal knapping. Essentially, one or two parallel planes are defined to work the core, with a circular or subcircular shape. The raw material is worked by centripetal removals, from the outer edge towards the center of the working surface, alternating the removals from each surface when two parallel sides exist. As the core reduction advances, this procedure produces very characteristic core shapes, called "tortoise shell" pyramidal or bipyramidal forms. This "Mousterian technique" used this way of working in a generic way, and it thus represents a substantial change in comparison with the anarchic exploitation in the Lower Paleolithic. However, since the beginnings of prehistoric research, a very specific centripetal reduction method has been identified as the "Levallois technique." This technique, originally erroneously associated with a culture (Levalloisian), is one of the most sophisticated forms of lithic reduction practiced in Prehistory and is still difficult to replicate in experimental archaeology. It is a particular form of centripetal reduction in which the shape and size of the blanks to be removed are predetermined. After carefully preparing a striking platform at one of the ends of the centripetal extraction plane, two parallel and convergent extractions are removed to determine a central arris that will guide the symmetry of later extractions (flakes, blades, and, above all, Levallois points, which can be used as spear points with hardly any modifications). The characterization of the Levallois technique experienced rapid progress in the 1980 and 1990s, with the research of E. Boëda (1994) especially, later refined by L. Bourguignon (1999), which has succeeded in identifying the great variability within the technique (Erin and Lycett 2012). From the geographical viewpoint, the distribution of this technique is comparable to that of Neanderthal humans and the Mousterian, basically in Eurasia. However, from the chronological point of view, the different varieties of the Levallois technique extend beyond the lower and upper limits of the Mousterian, from about 300,000 years ago to the Gravettian complex. In short, as has occurred with the evolving definition of the Mousterian and other technical traditions linked with it since the nineteenth century, like the Tayacian, increasing knowledge in recent decades has produced a richer and more nuanced understanding, with greater internal variability and flexibility of previous overrigid spatial and temporal frameworks.

Within the characterization of the Mousterian, the typological factor has traditionally been studied most. Unlike the situation in the much shorter Upper Paleolithic, whose typological diversification has allowed internal systematization since the first research in the nineteenth century, the material monotony of the Mousterian has been an obstacle hindering all attempts at organizing the period. A single tool type (side scrapers) always accounts for the majority of the retouched stone tools, sometimes amounting to over 80% of the total. Other types are found with the side scrapers, like denticulates, simple retouched points, backed knives and objects continuing from earlier periods (trihedrals, bifaces, cleavers, etc.), as well as tools that would become more frequent in later stages (truncated pieces, perforators, end scrapers, and a few burins). Due to the great numerical weight of side scrapers, several attempts have been made at classifying them according to their morphological

appearance, as a way to achieve an internal logic to so many millennia of typological monotony. In the end, proposals attributing a certain chronology to a certain variety of side scraper have been unsuccessful, just as a later attempt to give chronological meaning to the so-called facies ended in failure. Indeed, François Bordes identified several varieties or facies of the Mousterian, depending on the types used, the percentages in which they appeared, or the presence of the Levallois technique: Typical Mousterian, Mousterian of Acheulian tradition (subtypes A and B), Denticulate Mousterian, and Charentian Mousterian (La Quina and Ferrassie varieties), among other proposals that were put forward in the 1960s and 1970s. The failure in the translation of the Mousterian facies, first in chronological terms (Bordes) and then in functional terms (Binford), marked the end of the typological cycle in Mousterian studies, which was definitively replaced by the technological approach. Many of the aspects that had previously been studied through typology, such as Quina side scrapers, Tayac types, and the Levallois concept itself, were now given an exclusively technological consideration.

The above description is an account of Mousterian industrial tradition. Another extrinsic factor is related with the homogeneity exhibited by this tradition for over 200,000 years. Neither the change in perspective involved in replacing typology with technology nor the introduction of absolute dating procedures that cover the chronological range of the Mousterian (unlike radiocarbon dating) has achieved an internal systematization of the Mousterian. Although great progress has been made in understanding the internal diversity of the Mousterian, which now encompasses a much larger chronological range than previously thought, the concept of a "plateau culture" created by the Neanderthals, with hardly any internal evolution and with no temporal sequencing, must be maintained at the present time.

International Perspectives

The geographical distribution of archaeological deposits belonging to the Mousterian culture is concentrated in Europe and central Asia, with a high density of sites in the Near East. The distribution of researchers and research centers is not arbitrary either. Although numerous American researchers have recently started to investigate this period, the main schools of thought publishing about the Mousterian are still in Europe and the Near East. This circumstance has produced certain inertia in the lines of thought going back to the late twentieth century. A frequent approach studied during the last 30 years is concerned with the transition from the Middle to the Upper Paleolithic, the end of the Neanderthals, and the expansion of the Cro-Magnons across the Old World. Since the discovery of a Neanderthal individual in a Chatelperronian level in the cave of Saint-Césaire (Charente, France), the traditional concepts maintained about this phase have been questioned. Each of the changes implicated in this transition (which has come to be known as the Transition, with a capital letter) has been exhaustively reappraised, from the anthropological change to the transformation in symbolic behavior, including the material aspect. The sequence of the variables mentioned above (the raw material used, the increase in the use of blades, changes in technological reduction methods, the introduction of Upper Paleolithic typological elements) and above all the rate and ways in which these changes took place have been the cause of an enriching debate, with countless nuances and references in the literature. The regions where most debate has been generated, as they posses very varied portions of the record, are in the center and east of France, the north of Spain, the Swabia (on the border between Germany and Switzerland), northern Italy, and the Near East.

Future Directions

In the light of this debate on the archaeological understanding of transitions and the creation of a specific commission in the IUPPS about this topic (Camps and Chauhan 2009), in coming decades, detailed regional knowledge will be attained about the circumstances of the transition in each area. Although Paleolithic human societies were

nomadic, they are described in a paradoxically static way, based on the description of a single site or several contemporary deposits, in a single regional environment. The fact that the objective of Prehistory is to obtain an understanding of historical processes from a record with geological resolution does not help in acquiring a precise view of complex underlying cultural phenomena. The material record, due to its archaeological characteristics (it is conserved relatively well and abundant at most sites, its techno-typological evolution is known, and a tested geochronological framework is associated with it), is especially appropriate for a more dynamic reconstruction, in terms of the introduction of innovations and the persistence of industrial traditions in later phases. Future decades will doubtlessly see conflicting information, contradictory with what are regarded as certainties today. However, progress in the knowledge of Prehistory, as in many other scientific disciplines, often comes from situations of crisis, their solution, and the new epistemological and methodological approaches introduced during the whole process.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ African Stone Age
- ▶ Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)
- ▶ Central Asia: Paleolithic
- ▶ Crimean Middle Paleolithic
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
- ▶ *Homo neanderthalensis*
- ▶ Lithic Technology, Paleolithic
- ▶ Middle East Middle to Upper Paleolithic Transitional Industries
- ▶ Neanderthals and Their Contemporaries

References

Boëda, E. 1994. *Le concept Levallois: Variabilité des méthodes*. Monographie du CRA 9. Paris: CNRS.

Bordes, F. 1953. Essai de classification des industries 'moustériennes'. *Bulletin de la Société Préhistorique Française* 50: 457–466.

Bordes, F., and M. Bourgon. 1951. Le complexe moustérien: Moustériens, Levalloisien et Tayacien. *L'Anthropologie* 55: 1–23.

Camps, M., and P. Chauhan, eds. 2009. *A sourcebook of paleolithic transitions: Methods, theories and interpretations*. New York: Springer.

Eren, M.I., and S.J. Lycett. 2012. Why Levallois? A morphometric comparison of experimental 'preferential' Levallois flakes versus debitage flakes. *PLoS One* 7 (1): e29273. https://doi.org/10.1371/journal.pone.0029273.

Further Reading

Barton, C. 1988. *Lithic variability and middle Paleolithic behavior*. British Archaeological Reports, International series 408. Oxford: Archaeopress.

Bar-Yosef, O., and L. Meignen. 2001. The chronology of the Levantine middle Palaeolithic period in retrospect. *Bulletins et mémoires de la Société d'Anthropologie de Paris* 13 (3–4): 269–289.

Binford, L.R., and S.R. Binford. 1966. A preliminary analysis of functional variability in the Mousterian of Levallois facies. *American Anthropologist* 68 (2–2): 238–295.

Bourguignon, L. 1997. Le Moustérien de Type Quina: Nouvelle définition d'une entité technique. Unpublished PhD dissertation, París X.

Dibble, H.L., and N. Rolland. 1992. On assemblage variability in the middle Paleolithic of western Europe. History, perspectives and a new synthesis. In *The middle Paleolithic: Adaptation, behavior and variability*. University Museum Monograph 72, eds. H.L. Dibble, and P. Mellars, 1–28. Philadelphia: University of Pennsylvania.

Féblot-Augustins, J. 1997. *La circulation des matières premières au Paléolithique*. Liège: ERAUL.

Geneste, J.M., J. Jaubert, M. Lenoir, L. Meignen, and A. Turq. 1997. Approche technologique des Moustérien Charentien du Sud-Ouest de la France. *Paléo* 7-8: 101–142.

Jaubert, J. 1999. *Chasseurs et artisans du Moustérien*. Paris: La Maison des Roches.

Mellars, P. 1996. *The Neanderthal legacy. An archaeological perspective from western Europe*. Princeton: Princeton University Press.

Mora, R., J. Martínez, I. De la Torre, and J. Casanova. (dirs.) 2008. *Variabilidad técnica del Paleolítico Medio en el sudoeste de Europa*. Treballs d'Arqueologia 14. Barcelona: Universitat Autònoma de Barcelona.

Moyer, C.C., and N. Rolland. 2001. Understanding the middle Palaeolithic assemblage typology. *Antiquity* 75: 39–43.

Rios-Garaizar, J. 2012. *Industria lítica y sociedad en la Transición del Paleolítico Medio al Superior en torno al Golfo de Bizkaia*. Santander: Ediciones de la Universidad de Cantabria.

Movius Line

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Introduction

Over 70 years ago, Hallam L. Movius, Jr. (1907–87), in the first major synthesis of early Paleolithic materials from East and Southeast Asia (Movius 1943, 1944, 1949), observed that the stone implements that were being recovered from Pleistocene deposits from the area were very different from those that had been known from the deposits of similar ages elsewhere in the Old World. The line that marked the boundary of the eastern and western cultural complexes during the early prehistoric times came to be known as the Movius Line, and probable causes for the difference, as well as the existence of the demarcation line itself, have been the topic of debate over the decades, particularly in recent decades, as new archaeological, geochronological, and chronometric data are brought to light and interpretations from different perspectives are being offered.

Definition

The Movius Line, running across northern India, delineates the area characterized by what Movius called "Chopper/Chopping-tool Culture" from the "Hand-axe Culture" area to the west (See Fig. 1). On his return from the field research in Burma and Java with the Joint American Southeast Asiatic Expedition for Early Man, 1937–1938, Movius found it necessary to formulate a new typological scheme in order to describe the artifacts of the newly found assemblages. He offered the following terms, emphasizing, as he did on many occasions since, that these categories are based on the form and the technique of manufacture only, without implying the possible function of the implements (Movius 1943: 350–353, See Fig. 2):

(a) *Choppers*: Tools with round, semioval, or almost straight cutting edges which have been formed by the removal of flakes on the upper surface of the implement only in most cases, although some are flaked on the lower surface as well.
(b) *Chopping-tools*: Bifacial core implements, usually made on pebbles, with sinuous cutting edge produced by alternate flaking.
(c) *Hand adzes*: Unifacial implements of roughly tabular form, with slightly rounded or even a pointed cutting edge, which forms a right angle with the long axis of the implement.
(d) Scrapers: Smaller version of choppers that are made on cores or flakes.

In the more comprehensive syntheses of the early prehistoric assemblages from South and East Asia as a whole, the choppers and the scrapers, which were distinguished by the size difference, were collapsed into one category of *Choppers and/or Scrapers,* while a new category of "Proto-hand-axes" was added to accommodate the artifacts recovered from Patjitan in Java (Movius 1944: 91–92, 1949: 350; See Fig. 2: no.4).

(e) *Proto-hand-axes*: Crude and roughly pointed or oval types of hand adzes of plano-convex section, worked on the upper surface only, leaving large areas of cortex at the butt ends. Typologically transitional between hand-adzes and true hand-axes.

As of the late 1940s when the concept was proposed, the components of the Chopper/Chopping-tool Culture (or Chopper/Chopping-tool Complex, as he uses the terms interchangeably even in the same publication, e.g., Movius 1949: 408, 409) were the Soan (sometimes spelt "Sohan") of the Siwalik Hills region of the Indian subcontinent, the Anyathian of Burma (now Myanmar), Tampanian of the Malay Peninsula, the Patjitanian (now called Pacitan) of Java, and the Choukoutienian (now spelt Zhoukoudian) of North China (see Map on Fig. 1). As Movius frequently emphasized (e.g., Movius 1944: 103, 1949: 408), the area of the Chopper/Chopping-tool Culture is distinguished from the

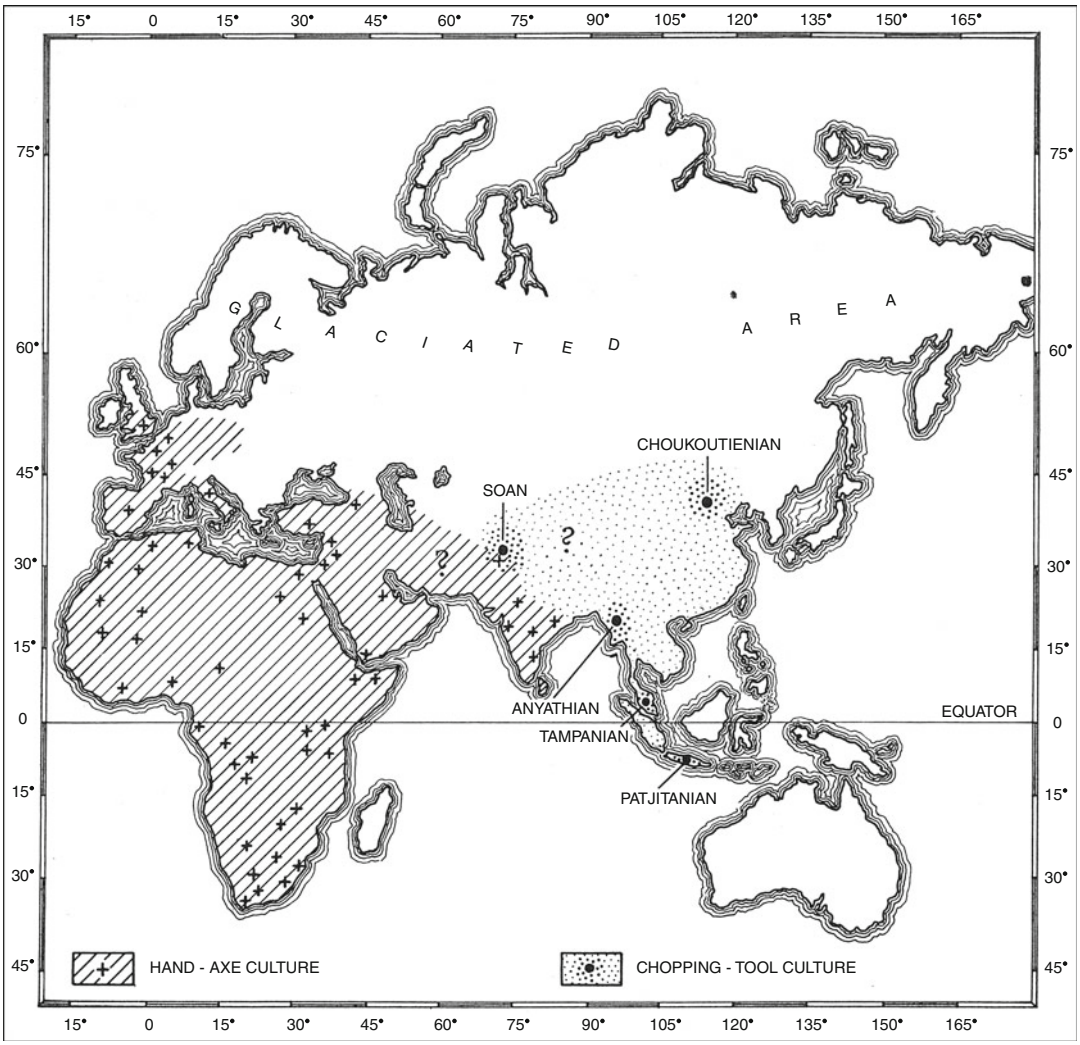

Movius Line, Fig. 1 Distribution of Hand-axes Culture and the Chopping Tools Culture during the Middle Pleistocene, as presented by Movius (1949: 409)

Hand-axe Culture area of the west, not only by the presence of the categories of stone tools mentioned above but also by the absence of the fully bifacial Acheulean-type hand-axes and the Levallois method of flake detachment that characterize the Lower and Middle Paleolithic of Africa and western Eurasia. The area east of the Movius Line was depicted as being culturally homogeneous, with little change over a long period.

It should be noted that, while the concept of the "Chopper/Chopping-tool Complex," as well as Movius's definitions of tool-types such as the "hand-adze," were being widely accepted through the 1940s and 1950s, it was not until 1965 when the dividing line was given the name. It appears that the name originated with Carleton S. Coon (1904–1981), in his controversial book on race, where he stated: "during the Pleistocene the inhabited parts of the Old World were divided into two archaeological regions, a western and an eastern one, by a geographic frontier that we shall call Movius's Line, after its discoverer" (Coon 1965: 47–48). In recent

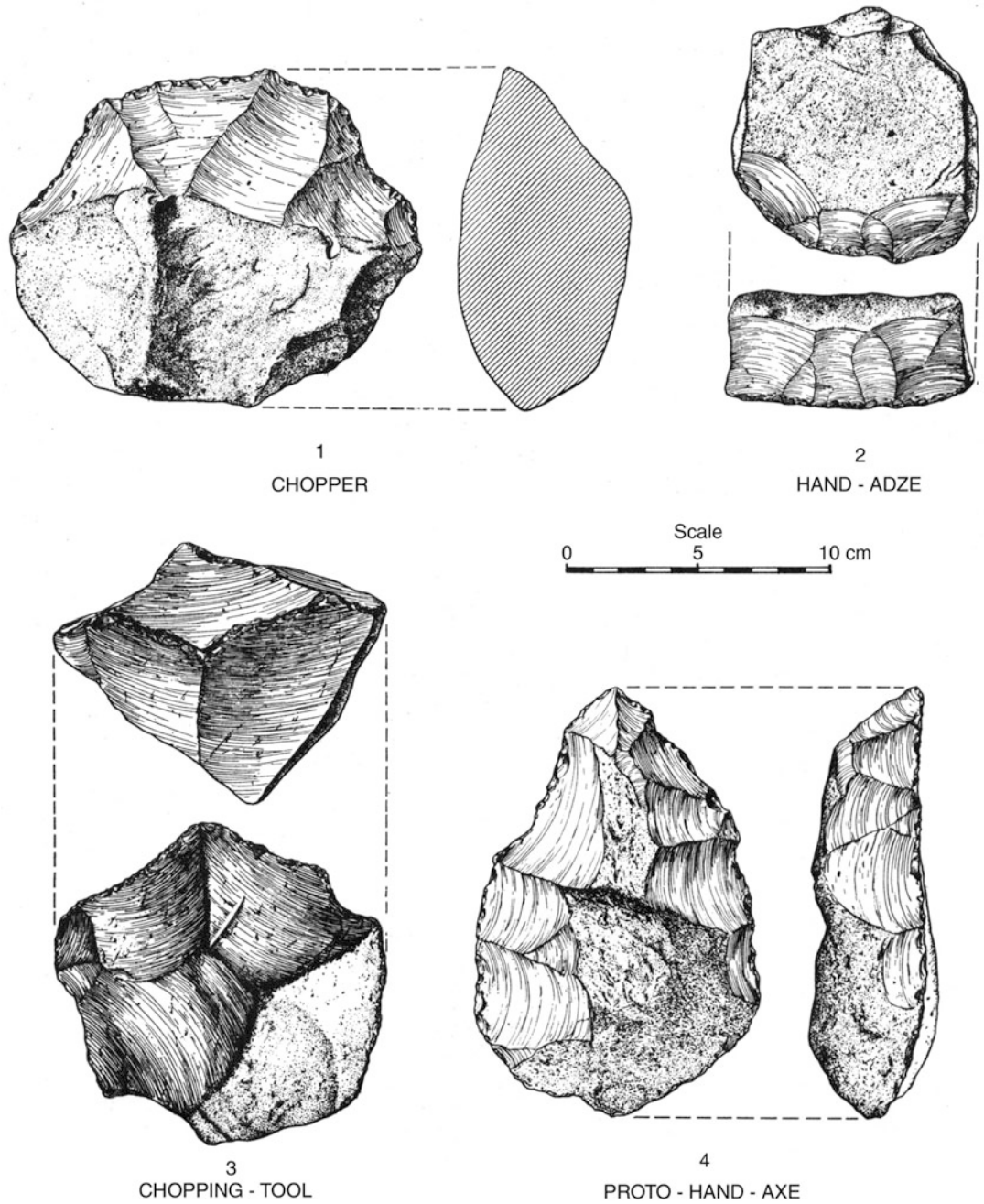

Movius Line, Fig. 2 Major Components of the Chopper/Chopping-Tool Culture after Movius (1949: 351)

years, most authors refer to the line as "Movius Line" (e.g., Dennell 2009; Keats 2002; Lycett and Bae 2010; Schick 1994) without the "apostrophe S."

Key Issues/Current Debates

In his expanded treatise on the Lower Paleolithic of the region, Movius (1949: 410) observed that

pebble tools appear to have been present as the "basic cultural substratum" in many parts of the Old World, before the development of the fully bifacial Acheulean hand-axes, but the latter did not appear in the region under consideration.

Then, he concluded the monograph with the statement:

> Perhaps the most important single conclusion to be drawn from the implications of the new archaeological material brought to light during the last fifteen years in Southern and Eastern Asia is that this area cannot be considered in any sense 'progressive' from a cultural point of view... In other words, the archaeological, or palaeo-ethnological, material very definitely indicates that as early as Lower Palaeolithic times Southern and Eastern Asia as a whole was a region of cultural retardation. Therefore, it seems very unlikely that this vast area could ever have played a vital and dynamic role in early human evolution, although very primitive forms of Early Man apparently persisted there long after types at a comparable stage of physical evolution had become extinct elsewhere. (Movius 1949: 411).

Many readers, including the emerging generation of Asian scholars who were now frontline practitioners investigating the archaeological heritage of their own countries, found this characterization of the area objectionable, particularly with the phrase "as early as Lower Palaeolithic times," which implied that it is still "culturally retarded." Linking the cultural retardation to the presence of "primitive" forms of humans was taken to indicate racism. A few years later, however, Movius modified his view as follows:

> "...it is very much more likely that this occurred because of a failure of more advanced techniques to diffuse into the area than because the primitive types of mankind who lived there during Middle Pleistocene times were incapable of understanding the new and improved methods that had been and were being developed elsewhere in the Old World...." (Movius 1953: 189).

To paraphrase this observation in current terminology, a widespread dispersal of the Oldowan tool complex or the Mode I technology of Clark (1969) was followed in Africa, Europe, and western and southern Asia by Mode II technology with Acheulian toolkit containing fully bifacial hand-axes and cleavers, but the Mode II technology failed to reach east of the Movius Line. Although the allusion to cognitive incompetence due to biological limitation was removed, the image of the region as cultural backwaters, isolated from the centers of cultural innovation, remained.

As the pace of archaeological research picked up and flow of information improved in postwar Asia, bifacial tools were reported from several sites, such as Dingcun (formerly spelt "Ting-Ts'un") (Aigner 1978; Pei et al. 1958), and Kehe (also spelt "K'oho") (Chia et al. 1962) in China, Mount Yarkh in Mongolia (Okladnikov 1978), Gongenyama in Japan (Maringer 1956), and Mount Do in Vietnam (Boriskovsky 1978) (Fig. 3). These findings, particularly the recovery of bifacial artifacts in Chongok-ni (also spelt as "Chongok-ri" and "Jeon-gok-ri") in Korea starting in 1978 (Kim and Bae 1983), led some authors to recommend that the concept of the Movius Line be abandoned. For example, Yi and Clarke (1983: 190) stated: "Movius's simplistic classificatory scheme for Asian Palaeolithic should be discarded, for it ignores the very real complexity of the Palaeolithic of the area."

Is the Movius Line Still Valid?

Bifacially prepared large cutting tools continue to be reported from various parts of East Asia. Particularly noteworthy is a series of discoveries in recent years of clusters of sites where sizable numbers of bifaces were recovered. The clusters are located in the Bose (also spelt "Baise") Basin in Southern China (Hou et al. 2000; Wang et al. 2014), the Luonan Basin in Central China (Wang 2005), the Imjin-Hantam River Basin on the Korean Peninsula (Norton et al. 2006), and various locations in the island chain of Indonesia, including Sangiran in Java and along the Ogan River in southern Sumatra (Fig. 3). The Bose artifacts are described as being "Acheulean-like" (Hou et al. 2000), while the Luonan specimens are reported to fit "comfortably within the Acheulean range of variation" (Petraglia and Shipton 2008: 965), and the bifacial tools from Indonesia are seen as the evidence for "the arrival of typical Acheulean technology" around 0.8 million years ago in Indonesia, where it coexisted, perhaps

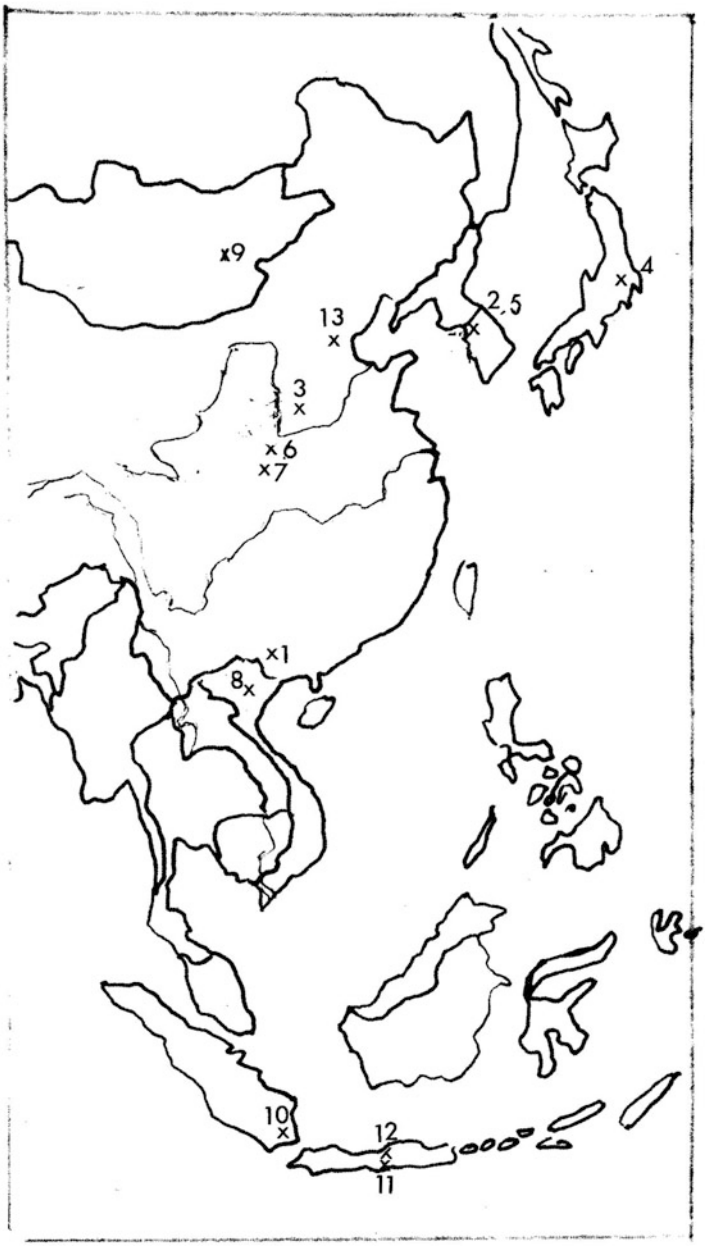

Movius Line,
Fig. 3 Archaeological Sites Mentioned in the Text. *1* Bose Basin, *2* Chongok-ri, *3* Dingcun, *4* Gongenyama, *5* Imjin/Hantan Basin, *6* Kehe, *7* Luonan Basin, *8* Mount Do, *9* Mount Yarkh, *10* Ogan River, *11* Pacitan, *12* Sangiran, *13* Zhoukoudian

briefly, with the pebble tool tradition (Simanjuntak et al. 2010: 421).

The situation is clearly far more complex than what Movius depicted over 70 years ago. The cultural landscape is certainly not homogenous nor is it monotonously unchanging. Nevertheless, a number of authors expressed the view that "the Movius Line remains a useful demarcating line between those regions of Asia and Europe where bifaces were commonly used, and those where they were not (e.g., Dennell 2009: 434; Schick 1994; Keats 2002). In proposing a concept of "Movius Line sensu lato," Norton et al. (2006: 534) observed the following:

1. Compared to East Africa and India, the frequency of hand-axes sites in East Asia is significantly lower.

2. The percentage of bifaces in the East Asian assemblages is usually much lower than coeval sites in India and East Africa.
3. East Asian hand-axes are morphologically different from those in the west (they are thicker, often with a plano-convex cross section).

Explanations for the Movius Line

If the Movius Line, even in a somewhat modified sense, is still a viable concept, what is/are the reason(s) for its existence? Possible factors considered by various researchers include the following:

1. **The limitations placed by the nature of the available lithic material**

This was one of the factors Movius himself mentioned as a possible reason why the fully bifacial hand-axes and the Levallois technique of flake production were absent from the area, but his position appears to shift over the years (e.g., Movius 1943: 376, 1944: 75–76). In his last statement on the question, he stated that it was not the determining factor because "even in cases where flint was available, the typology of the artifacts inevitably remained within the strictures of the general pebble tool category" (Movius 1978: 354). Indeed, Schick (1994: 589) shows a thin, well-prepared hand-axe she manufactured from a piece of tabular limestone, found near the Zhoukoudian site, well-known for the choppers, chopping tools, and simple flake tools made of quartz and quartzite.

On the other hand, Leng and Shannon (2000), based on detailed examination of artifacts and replication experiments using the same lithic materials as the archaeological specimens at five Chinese and three Indian sites, state that the raw material can strongly affect the typology of the end product. They note also that producing tools from brittle and junctured quartzite is just as cognitively challenging as producing a symmetrical straight edge out of uniformly structured chert.

2. **Barriers to migration and cultural diffusion**

As noted above, Movius (1953: 189) suggested that the chopper/chopping-tool tradition persisted because of "a failure of more advanced techniques to diffuse into the area" without specifying what may have caused it. Recent reviews (e.g., Dennell 2009; Lycett and Bae 2010) considered the possibility that the Himalayan mountain range; Qinghai-Tibetan Plateau; the major river systems like the Ganges-Brahmaputra, the Irrawaddy, and the Mekong; and the tropical rain forests may have acted as barriers for human movement and cultural transmission. Lycett and Bae (2010: 527) conclude, however, that with the exception of the Himalayan and Qinghai-Tibetan Plateau, which were not penetrated until the latter part of the Late Pleistocene, the geographic and topographic barriers do not appear to provide a full explanation for the Movius Line.

3. **Alternative non-lithic raw material (bamboo) and importance of flakes**

It has been suggested by a number of researchers that the reason why the early inhabitants in the area east of the Movius Line did not expend much time and efforts in manufacturing bifacially prepared tools was the presence of alternative non-lithic raw materials, such as bamboo, which could serve as cutting tools, as well as containers, and has the advantage of being lightweight for carrying during long foraging trips. Pope (1989) has demonstrated the overlap of the distribution of bamboo in eastern Asia with the Movius' Chopper/Chopping-tool Culture area. Schick (1994: 591) illustrates how a piece of split bamboo can serve as a very effective butchering tool and notes that bamboo can be easily worked with simple stone tools.

In this connection, it should be pointed out that Movius' Chopper/Chopping-tool Complex overemphasizes the core tools, when in fact the toolkit is characterized by the dominance of small flakes. It has been argued that it is the flakes struck-off pebble cores, used as expedient tools to make the real primary tools out of such organic

materials as bamboo, that characterized the early Paleolithic assemblages of East and Southeast Asia (Ikawa-Smith 1978).

Unfortunately, the perishable nature of the non-lithic materials preclude the survival of actual evidence. One hopeful indication is the report that a scanning electron microscope examination revealed morphological differences in the cut marks experimentally produced on mammalian bones by bamboo knives from those produced by chert blades (West and Louys 2007). The authors state, however, that marks made by bamboo knives tend to be shallow, thus are likely to fade more easily than those made by stone tools. Nevertheless, it opens a possibility to confirm the "bamboo hypothesis," if and when a zooarchaeological specimen with cut marks that match the tell-tale morphological characteristics of the marks made by bamboo knives.

4. **Demography and transmission of technical knowledge**

The last possible reason for the Movius Line to be considered here is the difficulty for a group of sparsely distributed mobile hominids to maintain a set of complex technical knowledge such as Acheulean toolmaking technology. Schick (1994: 590) notes that as a group of hominids moved into a new area, they may face problems such as locating the lithic materials suitable for biface production, and it may take many years or even a generation before such a material is located. In the meantime, they would have made simpler tools using locally available materials, and the transmission of the technical knowledge would have been interrupted, and the technological tradition could eventually be lost.

Lycett and Norton (2010), in their demographic model to account for the Movius Line, suggest that the thick hand-axes that have been recovered from East Asian sites are the results of convergence with the Acheulean development elsewhere, not the result of intrusion from the west. Hand-axes may have been manufactured in several places in eastern and southeastern Asia for short periods of time, but production did not continue, in their view, because of the demographic conditions: the population density was low, with a small number of skilled practitioners, and the opportunities of sociocultural interaction and transmission of knowledge would have been limited.

Current State and Future Directions of Research

In one of his last statements on the subject, Movius (1978: 354) stated that "[t]he underlying reasons for this remarkable conservatism still remain unfathomed." Sixteen years later, Schick (1994: 591) echoed the sentiment by subtitling the concluding section of her chapter on the Movius Line as "The Movius Line is still a paradox." After decades of debate and a series of recent discoveries, opinions are still divided as to the validity and/or usefulness of the Movius Line. On the one hand are those who advocate discarding the concept (e.g., Bar-Yosef and Wang 2012), while on the other are those who favor keeping it in order to test its validity (e.g., Wang et al. 2014). With the increasing number of new finds, additional chronometric dates and geochronological observations, and adoption of new theoretical perspectives, however, we have also seen some researchers who have change their opinions in recent years. Most remarkable reversal of the view that came to this writer's attention is the recent statement by Dennell (2016), who, contrary to his position in 2009 (see above), now states that "the Movius Line is no longer an appropriate way of studying the Early Palaeolithic of East and Southeast Asia, and should be disregarded."

Dennell (2016) elucidates his reasons for his new position in the following way: (1) Fossil records indicate that China during the Middle Pleistocene was not as isolated from the rest of Eurasia as has been suggested. It is therefore possible that dispersal of hominins from west to east or vice versa could have taken place. (2) The definition of "Acheulean" is no longer clear, and, in any event, the proportion of biface in an assemblage vary greatly in in Africa and western

Eurasia as it does in East Asia. (3) Bifacial hand-axes were absent from Zhoukoudian assemblages because they are in caves, as they are rare in cave sites elsewhere as well. And finally (4) none of the assemblages in south and southeastern Asia Movius named in his original formulation of the "Chopper-Chopping Tool Culture" area (see Fig. 1) is contemporaneous with the Middle Pleistocene Acheulean assemblages elsewhere.

Efforts will continue to be made to increase quantitative data comparing morphology of bifaces from both sides of the Movius Line. Efforts will also be directed to obtain more precise dates on relevant assemblages, those containing "Acheulean-like" bifacial elements as well as those consisting only of core and flake tools. Many of the early Paleolithic artifacts have been collected from the surface and remain undated. Even when chronometric dates are available, there often are questions concerning the relationship of the artifacts to the dated samples. Reliable dates, matched with quantitative data on assemblage composition and artifact morphology, will contribute toward gaining a perspective on the patterns of appearance of bifaces in eastern Asia, in relation to the simpler core and flake tools. When compared with the patterns of temporal and spatial distribution and the characteristic shapes of the bifacial artifacts elsewhere, particularly in southwestern Asia and Indian subcontinent, the distribution patterns may clarify one of the outstanding issues: Was the eastern hand-axe indigenous or the result of diffusion from the west? If they are brought in from the west, when did it happen?

Experimental replication of artifacts, cut mark analyses, and paleoenvironmental studies will also be pursued, as will further inquiries into paleodemography. When suitable human fossils are found, and DNA could be extracted, we might learn something about the biological affinities of the ancient toolmakers. In short, a well-coordinated multidisciplinary approach would help toward solving the "paradox" of the Movius Line.

References

Aigner, J.S. 1978. Important archaeological remains from North China. In *Early Paleolithic in South and East Asia*, ed. F. Ikawa-Smith, 163–232. The Hague: Mouton.

Bar-Yosef, O., and Y. Wang. 2012. Paleolithic archaeology in China. *Annual Review of Anthropology* 41: 319–335.

Boriskovsky, P.I. 1978. Some problems of the Paleolithic of South and Southeast Asia. In *Early Paleolithic in South and East Asia*, ed. F. Ikawa-Smith, 87–95. The Hague: Mouton.

Chia, L.P., T.Y. Wang, and C. Wang. 1962. *Kéhé: An early Palaeolithic site in south-western Shansi (Summary)*. Beijing: Science Press.

Clark, J.G.D. 1969. *World prehistory: A new outline*. Cambridge: Cambridge University Press.

Coon, D.S. 1965. *The living races of man*. New York: Alfred A. Knopf.

Dennell, R. 2009. *The Palaeolithic settlement of Asia*. Cambridge: Cambridge University Press.

Dennell, R. 2016. Life without the Movius Line: The structure of the East and Southeast Asian early Palaeolithic. *Quaternary International* 400: 14–22.

Hou, Y., R. Potts, B. Yuan, Z. Guo, A. Deino, W. Wang, J. Clark, G. Zie, and W. Huang. 2000. Mid-Pleistocene Acheulean-like stone technology of the Bose Basin, South China. *Science* 287: 1622–1626.

Ikawa-Smith, F. 1978. Introduction: The early Paleolithic tradition of East Asia. In *Early Paleolithic in South and East Asia*, ed. F. Ikawa-Smith, 1–10. The Hague: Mouton.

Keats, S.G. 2002. The Movius Line: Fact of fiction? *Bulletin of the Indo-Pacific Prehistory Association* 22: 17–24.

Kim, W.Y., and K.D. Bae. 1983. *Report of excavation, 1979–83. Chongokni.* Bureau of Cultural Properties, Kora.

Leng, J., and C.L. Shannon. 2000. Rethinking early Paleolithic typologies in China and India. *Journal of East Asian Archaeology* 2: 9–35.

Lycett, S.J., and C.J. Bae. 2010. The Movius Line controversy: The state of the debate. *World Archaeology* 42: 521–544.

Lycett, S.J., and C.J. Norton. 2010. A demographic model for Palaeolithic technological evolution: The case for East Asia and the Movius Line. *Quaternary International* 211: 55–65.

Maringer, J. 1956. Einige faustkeilarige Geräte von Gongenyama (japan) und die Frage des japanischen Paläeolithikums. *Anthropos* 51: 175–179.

Movius, H.L. 1943. The Stone Age of Burma. *Transactions of the American Philosophical Society* 32: 341–394.

Movius, H.L. 1944. Early man and Pleistocene stratigraphy in southern and eastern Asia. In *Papers of the peabody museum of American Archaeology and Ethnology,* Harvard University, vol 19(3) Cambridge, Mass: The Museum.

Movius, H.L. 1949. The lower Palaeolithic cultures of southern and eastern Asia. *Transactions of the American Philosophical Society* 38: 329–420.

Movius, H.L. 1953. Old World prehistory: Paleolithic. In *Anthropology today*, ed. A.L. Kroeber, 163–192. Chicago: University of Chicago Press.

Movius, H.L. 1978. Southern and eastern Asia: Conclusions. In *Early Paleolithic in South and East Asia*, ed. F. Ikawa-Smith, 352–361. The Hague: Mouton.
Norton, C.J., K. Bae, J.W.K. Harris, and H. Lee. 2006. Middle Pleistocene handaxes from Korean Peninsula. *Journal of Human Evolution* 51: 527–536.
Okladnikov, A.P. 1978. The Paleolithic of Mongolia. In *Early Paleolithic in South and East Asia*, ed. F. Ikawa-Smith, 317–325. The Hague: Mouton.
Pei, W.C., J.K. Woo, L.P. Chia, M.C. Chow, H.T. Liu, and C.Y. Wang. 1958. *Report on the excavation of Palaeolithic sites at Tingtsun, Hsiangfen-hsien, Shansi Province, China*. Beijing: Science Press.
Petraglia, M.D., and C. Shipton. 2008. Large cutting tool variation west and east of the Movius Line. *Journal of Human Eovlution* 55: 922–966.
Pope, G.G. 1989. Bamboo and human evolution. *Natural History* 10: 48–57.
Schick, K.D. 1994. The Movius Line reconsidered: Perspectives on the Earlier Paleolithic of Eastern Asia. In *Integrative paths to the past: Paleoanthropological advances in Honor of F. Clark Howell*, ed. R. Corruchini and S. Ciochon, 569–594. Englewood Cliffs: Prentice Hall.
Simanjuntak, T., F. Semah, and C. Gaillard. 2010. The Palaeolithic in Indonesia: Nature and chronology. *Quaternary International* 223–224: 418–421.
Wang, S.J. 2005. *Perspectives on Hominid behaviour and settlement patterns: A study of the lower Palaeolithic sites in the Luoanan Basin, China*, BAR International. Ser. S1406. Oxford: Archeopress.
Wang, W., C.J. Bae, S. Huang, X. Huang, F. Tian, J. Mo, Z. Huang, C. Huang, S. Xie, and D. Li. 2014. Middle Pleistocene bifaces from Fenghudao (Bose Basin), Guangxi, China. *Journal of Human Evolution* 69: 110–122.
West, J.A., and J. Louys. 2007. Differentiating bamboo from stone tool cut marks in the zooarchaeological record, with a discussion on the use of bamboo knives. *Journal of Archaeological Science* 34: 512–518.
Yi, S., and G.A. Clark. 1983. Observations on the lower Palaeolithic of Northeast Asia. *Current Anthropology* 24: 181–202.

Movius, Jr., Hallam L.

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Basic Biographical Information

Hallam L. Movius, Jr. was born in Newton, Massachusetts, in 1907 and educated at Harvard University. He was appointed as a tenured professor of anthropology at Harvard in 1950 and was also curator of Paleolithic archaeology in the Peabody Museum of Archaeology and Ethnology. He retired from teaching in 1974 and from his curatorship in 1976. He died at home in Holyoke, Massachusetts, on 30 May 1987.

Major Accomplishments

For many years, Movius was considered the dean of Paleolithic studies in the United States. Not the first American to work in the Paleolithic (Homer Kidder, Harper Kelley, and Alonzo Pond preceded him), he was certainly the most influential and productive for several decades from the late 1930s onward. He established it firmly as a discipline in a major university, and he was the dominant figure in undertaking fieldwork, training graduate students, and creating broad regional and interregional syntheses. During those years, he made the Peabody Museum one of the world's focal points for Paleolithic research.

As a young man he seemed destined for a career in finance or business like his father. While an undergraduate at Harvard from 1926 to 1930 he developed a strong interest in archaeology and especially Old World prehistory. His first fieldwork was at the Neolithic site of Homolka in Czechoslovakia in 1930. In 1932, he participated in Dorothy Garrod's investigations at Mugharet es-Skhul in Palestine. From 1932 to 1936, he was in Ireland as a member of a Harvard expedition, excavating a number of Late Mesolithic and Early Neolithic sites around the island. These were the basis for his 1937 doctoral dissertation. In 1937, he briefly abandoned European prehistory to join an international expedition in East Asia. With Helmut de Terra and Pierre Teilhard de Chardin, he spent 4 months in the field in Burma. Following this, he visited Java to inspect Paleolithic sites and artifacts under the guidance of G. H. R. Von Koenigswald. The research produced several monographs on the Early Paleolithic of South and East Asia that were remarkable syntheses of archaeological, geological, and paleontological data extending from India to China and the East Indies, with tentative interregional correlations and interpretations and an innovative lithic

terminology defining the great chopper-chopping-tool complex (Movius 1948).

He is probably best remembered today for his work in East Asia, but he chose not to return there after 1938. From 1942 to 1946, he served in the US Army Air Corps as an intelligence officer overseas. After discharge, he resumed his duties at Harvard as a teacher and curator. His research interests now lay in the Upper Paleolithic of Western Europe, particularly France. He excavated the site of La Colombière in eastern France in 1948, where his discovery of an "Upper Perigordian" engraved pebble spurred a lasting interest in Paleolithic art. He was intrigued by the controversy over the so-called Aurignacian-Perigordian dichotomy in southwestern France and decided to evaluate the hypothesis through new fieldwork. From 1958 to 1964, he excavated the deep stratified rockshelter of Abri Pataud in Les Eyzies, Dordogne, and the analysis and publication of the results occupied him for the rest of his active professional life (Movius 1974). He continued to work after suffering a stroke in 1970 but in his last years was virtually incapacitated.

Movius saw as one of his responsibilities making the results of Paleolithic research available to the international scholarly community. He had a large network of correspondents around the world, in Europe, Africa, and Asia who kept him informed of their investigations and sent him their publications. He encouraged the translation and publication of reports written in Russian, Chinese, and Japanese that were virtually unknown in the West. In 1952, he prepared a far-ranging synthesis of the state of Paleolithic research for an international symposium in New York (Movius 1953). Not the least of the contributions of this article was introducing to English-speaking scholars the recent technological studies and quantitative methods of the young French prehistorian François Bordes.

In the early years of radiocarbon dating, he operated a kind of international clearing house for the new method and undertook to accept Paleolithic charcoal samples from colleagues overseas without access to radiocarbon facilities which were then analyzed in American laboratories.

Movius' research was characterized by meticulous, intensely focussed work. From his days in Ireland, he had strongly emphasized the necessity of interdisciplinary research, studying archaeological remains in their environmental and ecological contexts, and he continued this approach in France. In the 1950s, he was greatly impressed by the work of Grahame Clark and André Leroi-Gourhan in exposing living surfaces and activity areas. He attempted this at Abri Pataud while simultaneously paying careful attention to the complex stratigraphy of the site as he unraveled the relationships between the 14 or so cultural levels from the Early Aurignacian to the Solutrean. His interpretation of the Aurignacian and other hearths illustrates his growing interest in what some call social archaeology (Fig. 1).

It cannot be said that he created a school or even a band of disciples with a specific orientation. One reason may be that he rarely made specific statements about his own methodological and theoretical principles. He usually preferred to leave them implicit in his published work rather than spell them out. Movius did not enjoy professional controversies and disputes. In the face of criticisms, he preferred a dignified silence rather than defense or counterattack. This may account

Movius, Jr., Hallam L., Fig. 1 Photograph of Hallam Movius at Abri Pataud in 1958 with students

for the absence of direct responses to the charges made by some authors against his interpretation of the apparently long period of lithic artifactual stasis in Asia, east of the "Movius Line." While in 1948, he had used language suggesting the area had been unprogressive and even culturally retarded, in his 1953 paper, he rejected explanations based on biological or cultural inadequacy. Given his deeply conservative temperament and humanistic outlook, his depiction of a long, separate, and relatively unchanging regional lithic tradition may be viewed as consonant with his own innate devotion to stability and continuity.

Cross-References

► Lithic Technology, Paleolithic
► Movius Line

References

Movius, H.L., Jr. 1948. The lower palaeolithic cultures of southern and eastern Asia. *Transactions of the American Philosophical Society* 38: 4.

Movius, H.L., Jr. 1953. Old World prehistory: Paleolithic. In *Anthropology today, an encyclopedic inventory*, ed. A.L. Kroeber, 163–192. Chicago: University of Chicago Press.

Movius, H.L., Jr. 1974. The Abri Pataud program of the French Upper Paleolithic in retrospect. In *Archaeological researches in retrospect*, ed. G.R. Willey, 87–116. Cambridge, MA: Winthrop Publishers.

Muckelroy, Keith (Extreme Environments)

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Basic Biographical Information

Born: September 6, 1951; Died: September 8, 1980.

Keith Muckelroy earned his undergraduate degree at the University of Cambridge in 1974 under the tutelage of Grahame Clark and David Clarke. While there, he learned to dive with the Cambridge University Underwater Exploration Group (CUUEG) and became involved in the excavation of the seventeenth-century Dutch East Indiaman *Kennemerland*, which had wrecked in the Out Skerries, Shetland, in 1664. Following graduation, he began an assistantship in maritime archaeology under Colin Martin at the newly formed Institute of Maritime Archaeology at the University of St. Andrews, in Scotland. Over the following six years, Muckelroy continued working at the excavation of *Kennemerland* while leading other expeditions in England and Greece and began a new position as the Archaeologist Diver in the National Maritime Museum's Archaeological Research Centre in Greenwich, England. By 1978, he had returned to Cambridge to begin his doctoral research, preliminarily titled "Site Analysis and Maritime Archaeology"; had published additional articles in *The International Journal of Nautical Archaeology*, *World Archaeology*, *Britannia*, and *Progress in Underwater Science*; and finished his first book, *Maritime Archaeology* (Daniel 1980). His final two manuscripts, *Archaeology Under Water* and *Discovering a Historic Wreck*, were published following his death in a diving accident in Loch Tay, Scotland.

Major Accomplishments

Muckelroy's interests stretched beyond maritime archaeology, but they focused primarily in the analytical investigation and interpretation of sites under water. This was the subject of his Ph.D. research and many of his publications. His 1975 article in *The International Journal of Nautical Archaeology* applied matrix analysis and numerical taxonomy to the assemblage of *Kennemerland* to determine how much the various classes of artifacts in the assemblage had been scattered by the wrecking process. A 1976 article in *World Archaeology* attempted to codify and to illustrate the different forces transforming a ship into an archaeological assemblage (Fig. 1), whereas two articles published in 1977 used the Kendall ranking coefficient to reveal the relationship between

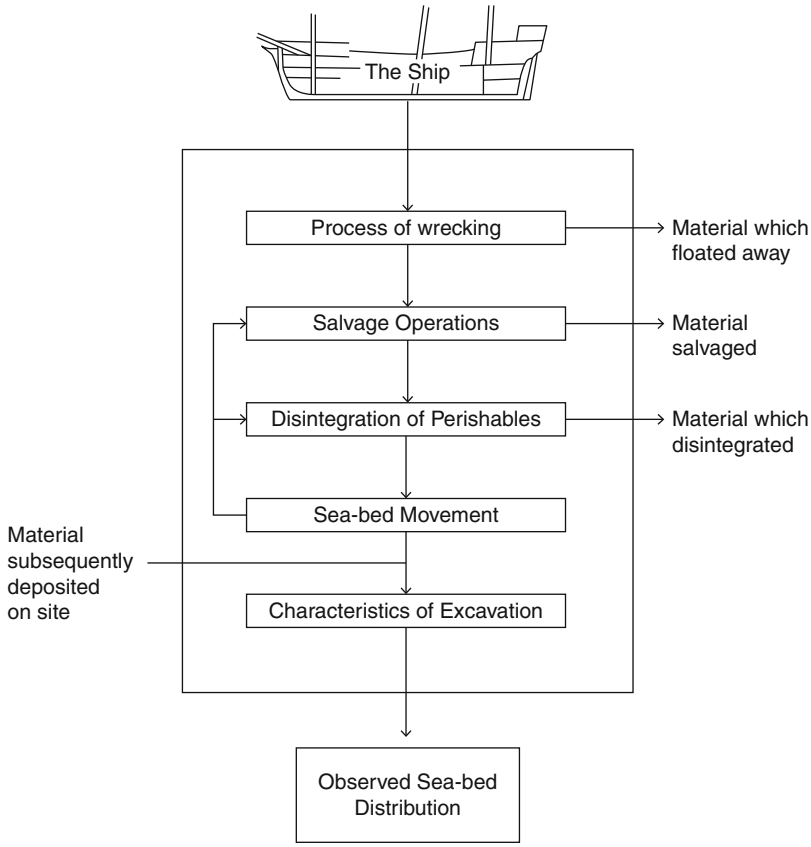

Muckelroy, Keith (Extreme Environments), Fig. 1 In 1976, Muckelroy published a chart depicting the forces that affect a ship as it sinks and becomes an archaeological site on the seafloor

site cohesion and 11 environmental factors. These studies built the content of the second half of his 1978 book, *Maritime Archaeology*, but they also reveal the influence of Grahame Clark and David Clarke in Muckelroy's thinking. Grahame Clark may have inspired Muckelroy's 1977 articles through a chapter on site preservation in his *Archaeology and Society*. As Clark wrote about different climates, Muckelroy wrote of currents, winds, and waves; as Clark wrote of different soils, Muckelroy wrote of the topography of the seabed and different deposits. Clark's discussion on social behavior on land, then, became salvage operations under water (Clark 1939: 57–85; Daniel 1977a: 112–3, 1977b: 51). In contrast, David Clarke's impact may have been more fundamental. Much of Muckelroy's application of statistical analyses adapted ideas in Clarke's *Analytical Archaeology* and, behind that, the influence of Systems Theory and an emphasis on explicit methodologies characterizing New Archaeology. Moreover, Muckelroy's goals may have emulated Clarke's as well.

Clarke's *Analytical Archaeology* promoted matrix analysis as a central, hierarchical paradigm in archaeology and was, effectively, a guide that other archaeologists could follow. The second half of Muckelroy's *Maritime Archaeology*, titled "Towards a theory of maritime archaeology," similarly creates an interpretive framework to guide maritime archaeologists through their investigations of shipwrecks. This framework was based upon the different techniques tested in his articles published in 1975, 1976 and 1977. As a group, they demonstrate different stages in the process of transforming an assemblage into the ship it represents. The 1977 studies quantify how environmental factors may affect the preservation and distribution of an assemblage, his 1976 article demonstrates how to predict differences between

the content of the assemblage and the content of the original ship, and the 1975 essay proposes how to determine the functions of objects within the assemblage. In short, these articles and Muckelroy's book contain explicit techniques which, when arrayed together, become the essence of a paradigm needed to recreate a ship from the assemblage left on the seafloor.

Keith Muckelroy wrote his articles and books at a time when maritime archaeology was still young, yet no longer a novelty, and its terrestrial predecessor was assimilating the new philosophical and analytical methodologies that had asserted themselves in the previous decade. As a result, Muckelroy's landscape in the United Kingdom and particularly at Cambridge – what he called a "hothouse of academic archaeology" – was a combination of vibrant individuals redefining archaeology in a variety of ways (Daniel 1978: ix). In addition to Grahame Clark and David Clarke, Muckelroy's mentors also included Colin Martin, George Bass, Nicholas Flemming, Robert Yorke, Joan du Plat Taylor, and A.J. Parker. These were people who were developing new methods of gathering archaeological data from new sources in the sea and testing new perspectives on how best to interpret and understand that information. Much of Muckelroy's work demonstrates his attempts to integrate these influences, but due to his early death they reflect only his first attempts to do so. While he was fundamental in demonstrating the potential of applying statistical analysis to the interpretation of sites under water, he did not have a chance to explore its potential to the fullest. As valuable as it is, then, his corpus represents the beginning of years of scholarship, not the end; his plans and vision, then, may only be extracted from the material in hand while their fulfillment lay with his successors.

Cross-References

- ► Bass, George Fletcher
- ► Clark, John Grahame Douglas
- ► New Archaeology, Development of
- ► Underwater Archaeology

References

Clark, G. 1939. *Archaeology and society*. London: Methuen and Co., Ltd.

Daniel, G. 1977a. Historic wreck sites and their environments. *Progress in Underwater Science* 2: 111–120.

Daniel, G. 1977b. Historic wreck sites in Britain and their environments. *The International Journal of Nautical Archaeology* 6: 47–57.

Daniel, G. 1978. *Maritime archaeology*. Cambridge: Cambridge University Press.

Daniel, G. 1980. Obituary, Mr. Keith Muckelroy. Promising work on underwater archaeology. *The Times*, 13 Sept 1980.

Further Reading

Clarke, D. 1968. *Analytical archaeology*. London: Methuen and Co., Ltd.

Harpster, M. 2009. Keith Muckelroy: Methods, ideas and maritime archaeology. *Journal of Maritime Archaeology* 4: 67–82.

Muckelroy, K. 1975. A systematic approach to the interpretation of scattered wreck sites. *The International Journal of Nautical Archaeology* 4: 173–190.

Muckelroy, K. 1976. The integration of historical and archaeological data concerning an historic wreck site: The 'Kennemerland'. *World Archaeology* 7: 280–290.

Muckelroy, K. 1980. *Archaeology underwater: An atlas of the world's submerged sites*. New York: McGraw-Hill.

Muckelroy, Keith (Underwater and Maritime Archaeology)

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Basic Biographical Information

Keith Muckelroy (1951–1980) (Fig. 1) studied Archaeology and Anthropology at Jesus College, Cambridge, between 1970 and 1974, achieving a first class degree. He was particularly receptive to the teachings of the prehistorians Grahame Clark and David Clarke and acquired excavation experience on land sites, including Wroxeter. In 1971, he learned to dive with the Cambridge University Underwater Exploration Group. Two years later, as their diving officer, he led an expedition to survey the submerged harbor at Apollonia,

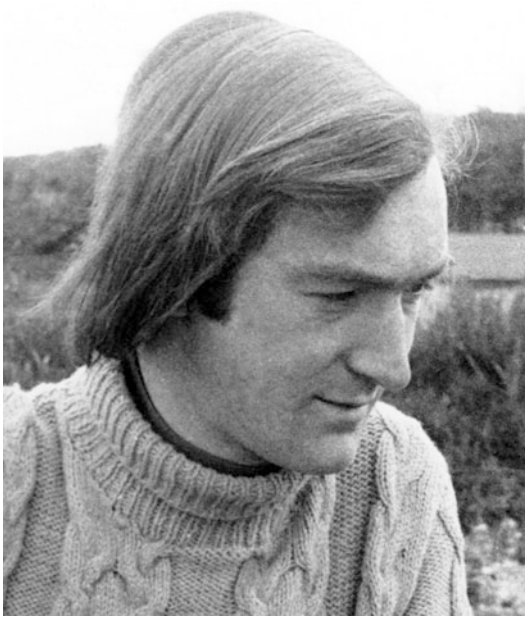

Muckelroy, Keith (Underwater and Maritime Archaeology), Fig. 1 Keith Muckelroy

Libya. Membership of this group of divers from a range of academic disciplines introduced Keith to similar groups from other universities.

In 1971, divers from Aston University had located the Dutch East Indiaman *Kennemerland*, wrecked in 1664 off Out Skerries, Shetland. Keith joined them in 1973, and this scattered site became the main focus for his study of wreck-formation processes. After graduation, he joined Colin Martin in the recently established Institute of Maritime Archaeology at the University of St Andrews, on the east coast of Scotland, and spent summers working with Colin and the author on the wrecks of the *Dartmouth* in the Sound of Mull, Scotland (1690); *El Gran Grifon* off Fair Isle, Scotland (1588); and *La Trinidad Valencera* off Donegal in Ireland (1588). In addition to this, he continued his work on the *Kennemerland* and, as part of a large team, on the *Mary Rose* (1545) excavation.

Keith was a hard worker, dedicated to his subject, but easy to work with. He was able to combine the practical side of diving with high-caliber field archaeology and to engage in debate and theorizing. He had very clear views on ethics and deplored the argument – widely advocated in some quarters during the 1970s – that archaeologists could work with treasure hunters. Those of us who knew him and worked with him sometimes teased him for his single-mindedness, but he had a very human side too, and we all miss him and still wonder how his ideas and career might have developed.

Major Accomplishments

"Between his graduation from Cambridge University in 1974 and his death in 1980, Keith Muckelroy's work and ideology were crucial in promoting an alternative research methodology in maritime archaeology" (Harpster 2009: 67). In this early period of the development of maritime archaeology, it was unusual for someone to enter it from a standard archaeological background, rather than from a sense of adventure, a love of diving, or a love of boats.

Between 1975 and 1978, he published seven articles in academic journals. His first book, *Maritime Archaeology*, published in 1978, has since achieved seminal status. He also became involved in work on two underwater finds of Bronze Age material off the south coast of England. So within a few years, he managed to gain experience of quite a number and wide range of sites. In 1977, he left St Andrews and returned to Cambridge to work towards a Ph.D. on "Aspects of Maritime Archaeology, with Special Reference to Cross-Channel Contacts in the Later Bronze Age." In 1980, he joined the Archaeological Research Centre at the National Maritime Museum in Greenwich, but in September 1980, while working on the excavation of a crannog in Loch Tay, Scotland, he was drowned.

Students still discuss Muckelroy's ideas, and some have tried to produce a sequel to his published work or further develop his ideas, but none has yet fully succeeded. Subsequent generations of students in the UK have not yet produced a maritime archaeologist of similar caliber, breadth of interest, and single-minded determination. "In the ten years since he learned to dive as an undergraduate . . . he had achieved more than

many achieve in four decades of a working life" (McGrail 1980).

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Clark, John Grahame Douglas
- ▶ Martin, Colin
- ▶ Ship Archaeology
- ▶ Wreck Site Formation Processes

References

Harpster, M. 2009. Keith Muckelroy: Methods, ideas and maritime archaeology. *Journal of Maritime Archaeology* 4: 67–82.

McGrail, S. 1980. Obituary: Keith Muckelroy. *International Journal of Nautical Archaeology* 9 (4): 276.

Further Reading

Muckelroy, K. 1975. A systematic approach to the investigation of scattered wreck sites. *International Journal of Nautical Archaeology* 4 (2): 173–189.

Muckelroy, K. 1976. The integration of historical and archaeological data concerning an historic wreck site: The *Kennemerland*. *World Archaeology* 7: 280–290.

Muckelroy, K. 1977. Historic wreck sites in Britain and their environments. *International Journal of Nautical Archaeology* 6 (1): 47–57.

Muckelroy, K. 1978. *Maritime archaeology*. Cambridge, MA: Cambridge University Press.

Muke, John

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Basic Biographical Information

John Muke (1960–) is a member of the Tangilka tribe from Tumba in the Middle Wahgi Valley of the highlands of Papua New Guinea. As well as being a prominent archaeologist within Papua New Guinea, John is also required to fulfil the traditional role of a "big man" within his community.

John went from Mount Hagen High School to the University of Papua New Guinea (UPNG), Port Moresby, in 1979. He subsequently obtained his Bachelor of Arts in 1982, specializing in archaeology under the tutelage of Professor Les Groube. He continued his archaeological studies, specializing in research on waisted blades, at the Australian National University for a Bachelor of Literature (B. Litt.) between 1982 and 1985 (Muke 1984).

In 1985, John began his Ph.D. in ethnoarchaeology at Cambridge University under the supervision of Professor Ian Hodder. John's Ph.D. research marked a dramatic departure from his previous, more conventional archaeological studies and drew heavily upon his own experiences of warfare in the Wahgi Valley (Muke 1992). Following completion of his Ph.D., John returned to Papua New Guinea to take up a lecturing position within the Department of Anthropology and Sociology at UPNG.

Between the late 1990s and early 2000s, John transitioned from being an academic archaeologist at UPNG to becoming a consultant in a range of cultural, economic, and social fields. Consultancy projects included water usage/provision and poverty alleviation for squatter settlements in Port Moresby and the prevention of HIV/AIDS in the Wahgi Valley. At the same time, he maintained an active interest in, and was an advocate for, cultural heritage at Kuk and elsewhere in the country (Muke 1998, 2000). From around 2005, John's consultancy – Social Research Institute – has focussed more heavily on cultural resource management projects in the country, most of which are associated with large, resource extraction developments.

Major Accomplishments

John's B.Litt. studies on waisted blades continued research begun with Les Groube on this distinctive type of stone axe-adze found across New

Guinea, as well as in Australia and elsewhere. Waisted blades are generally associated with the Pleistocene, although they have also been reported from Holocene contexts on New Guinea (Bulmer 2005). At the time, waisted blades found on the Huon Peninsula marked the (then) earliest evidence for the presence of humans on the island of New Guinea around 40,000 years ago (Groube et al. 1986).

While lecturing at UPNG, John embarked on new archaeological investigations in the highlands, which provided an opportunity to train a new generation of archaeologists. For example, in 1993 and 1994, he directed wetland archaeological investigations at a newly drained coffee plantation at Kana, Middle Wahgi Valley (Muke and Mandui 2003). Archaeological finds at Kana suggested several episodes of drainage for cultivation extending back to c. 3000 years ago, including evidence for the cultivation of wax gourd (*Benincasa hispida*) 3000–2000 years ago. During this time, John maintained regular contact with the Kawelka at Kuk Swamp in the Upper Wahgi Valley in order to monitor the site following reoccupation by traditional landholders (Muke 1998).

In 2006, John volunteered to codirect (with myself) the completion of the World Heritage nomination for the Kuk Swamp site in the Upper Wahgi Valley. John's role, together with that of his long-term friend and colleague Jo Mangi, was to complete the traditional land-use management plan for the site, which would be a world-first for a World Heritage Site (Muke et al. 2007). John's long association with the Kawelka at Kuk was important to the successful inscription of Kuk in 2008 and ongoing management of the site. Although the management plan for Kuk only exists in draft form, it incorporates traditional community social structures, land-use practices, and values that enable effective management of the site in the often fluid economic, political, and social contexts of the Wahgi Valley today.

A Personal Aside

I first met John in 1987 while an undergraduate in geography at Cambridge University. He was instrumental in my becoming interested in the geography and long-term history of the highland peoples of Papua New Guinea. Since then, he directly facilitated several aspects of my research in the interior of the country, including fieldwork in 1990 for a Master of Science in geography, during which time I stayed with his brother, Sali/Charley Muke, and other family members in the Middle Wahgi and Lower Jimi Valleys.

His continued community engagement with the Kawelka community at Kuk Swamp, as well as with Professor Jack Golson in Canberra, kept the metaphorical "road" open for me to undertake archaeological excavations there in 1998 and 1999 for my Ph.D. More recently, he has facilitated and supported – and we have worked together on – several archaeological research projects and cultural resource management projects in different parts of the interior of Papua New Guinea. The most significant of these is the inscription of the Kuk Early Agricultural Site to the World Heritage List in 2008. As I write this biography in 2012, we are still working together on Kuk and other projects in the country.

My indebtedness to John is clear from the above personal history. However, he has been a mentor to many others within and outside Papua New Guinea. Over the last 20 years, he has worked tirelessly, and often struggled, as an advocate of archaeological and cultural issues within Papua New Guinea. The cultural heritage of Papua New Guinea would be greatly impoverished without his efforts.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Mangi, Joseph Tumbe
- ▶ Vegeculture: General Principles

References

Bulmer, S. 2005. Reflections in stone: Axes and the beginnings of agriculture in the Central Highlands of New Guinea. In *Papuan pasts: Cultural, linguistic and biological histories of Papuan-speaking peoples*, Pacific

linguistics, ed. A. Pawley, R. Attenborough, J. Golson, and R. Hide, vol. 572, 387–450. Canberra: RSPAS, ANU.
Groube, L., J. Chappell, J. Muke, and D. Price. 1986. A 40,000 year-old human occupation site at Huon Peninsula, Papua New Guinea. *Nature* 324: 453–455.
Muke, J. 1984. The Huon discoveries: A preliminary report on the stone artifacts and a comparative analysis of the distribution of waisted stone tools in Greater New Guinea. Unpublished B. Litt. dissertation, Australian National University.
Muke, J. 1992. The Wahgi Opo-Kumbo. An account of warfare, Central Highlands, New Guinea. Unpublished PhD dissertation, University of Cambridge.
Muke, J. 1998. The death (and re-birth) of Kuk: A progress report on the recent developments at the Kuk prehistoric site. In *Kuk heritage: Issues and debates in Papua New Guinea*, ed. A. Strathern and P.J. Stewart, 64–86. Port Moresby/Townsville/Pittsburgh: PNG National Museum/Centre for Pacific Studies/Okari Research Group.
Muke, J. 2000. Ownership of ideas and things: A case study of the politics of the Kuk prehistoric site. In *Protection of intellectual, biological and cultural property in Papua New Guinea*, ed. K. Whimp and M. Busse, 96–115. Canberra/Port Moresby: Asia Pacific Press/Conservation Melanesia Inc.
Muke, J., and H. Mandui. 2003. In the shadows of Kuk: Evidence for prehistoric agriculture at Kana, Wahgi Valley, Papua New Guinea. *Archaeology in Oceania* 38: 177–185.
Muke, J., T.P. Denham, and V. Genorupa. 2007. Nominating and managing a world heritage site in the highlands of Papua New Guinea. *World Archaeology* 39: 324–338.

Multicultural Archaeology

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Introduction and Definition

Archaeological discourses related to the creation and functioning of national societies have lost momentum and significance as a result of the emergence of multiculturalism. Multiculturalism has the main tenets of modern societies crumbling, especially the construction of unified collectivities (national societies) in terms of culture, language, and history. In the last two or three decades, multiculturalism has set in motion profound changes, especially regarding the organization of society, which is now premised upon the coexistence of diverse constituencies, conventionally referred to as *cultural diversity*. The modern struggle, often violent, to unify society has been abandoned. Indeed, multiculturalism does not demand "Otherness" (alterity) to be like the self; rather, it encourages Otherness to conserve (or to strengthen or to create) its diversity.

Archaeology has been shaped by this social order and a *multicultural archaeology* has emerged. In order to keep pace with multicultural changes (which archaeology has neither championed nor promoted but which it must accommodate, often unwillingly), profound as they are, four changes have taken place in archaeology: (a) its practice has been opened to local actors; (b) the circulation of discourse has been widened; (c) other historical horizons have been included in interpretations; and, (d) exclusive control of some disputed issues has been given up.

Multiculturalism is not an innocent realignment of society. It has been widely criticized by those who believe that it promotes cultural diversity but ignores the needs and expectations of those who are different. Cultural diversity is channeled to suit multicultural needs, mostly in a political vacuum. The multicultural celebration of diversity, which encourages the proliferation of local and specific identities, effectively weakens more inclusive, binding, and stronger identities. In a world of fragmented identities, no matter how strong they are individually, the system reigns. Multicultural archaeology also falls prey to such critiques. Further, while it tolerates different representations of the past and even the widening of their scenic display, it remains untouched in metaphysical and ontological terms. The masterstroke of archaeology in multicultural times – changing in order to remain the same – mimics what the textualist anthropologists of the 1980s did, about whom Johannes Fabian (1990: 761) wrote, "Should we therefore fear that what looks like a crisis is just a lot of noise made by anthropologists regrouping in their attempts to save their representer's privileges?" Archaeologists, members of

a privileged cognitive minority, do not want to lose the privileges granted to them by virtue of their ownership of a manner of representation that, at most, they are willing to share but are unlikely to change. Moreover, the acceptance of archaeology by dissenting agendas – the best known being feminist and indigenous archaeologies – is premised upon the idea that what has been wrong is not the discipline itself but the way it has been used. This has had the effect of strengthening and thus hardening its philosophical fabric. Yet, there are truly contesting actors that strip archaeology bare, exposing the functioning of the discipline in multicultural times and showing how it contributes to the reproduction of asymmetrical positions with regard to historical representations.

Historical Background

Archaeology related to nation-states through the creation of the national self. Archaeology provided the historical depth and the unified symbolism upon which modern society was formed. It provided the nation with the continuity it needed to not appear as a blatant transgression of what it replaced. The *new* (modernity, the nation-state, the national society) found in the *archaeological* (material-based discourses about antiquities and forebears) a deep density. What does it mean to be national/modern in archaeological terms? It means to update storytelling, to make it transcendent (objective, neutral), to bring a collectivity (national society) and a singularity (the modern individual) to recognize themselves mutually as whole and part, uniting them in a ceremonial, mnemonic space.

Archaeological time performed three functions: it was a measure of progress (society knew where it was, where it was heading, and where it came from); it was a means of control (individuals had to adjust to a temporal behavior that established an origin, a route, and a destiny); and it was the signal of a symbolic exchange (between society and expert knowledge). Archaeology was thus created by modernity to produce a new temporality, suited for the emergence of a national *us* (deep, homogenous, projective, and shared). From such an *us*, as in many other fields of the new nation (e.g., education, health, and law), Otherness was evicted. The archetypical *savage* (the negative counterpoint of the modern *us*) was cast as an outsider of modernity, its dark side, which was to be incorporated or eliminated.

For more than two centuries, archaeology and nationalism grew alongside each other. About two decades ago, the symbolic field of modernity was reorganized, especially with regard to the composition of society; a homogeneous society gave way to a heterogeneous one. As a result of this reorganization, the *savage* was no longer castigated but was elevated to a building block of the new society thus created: diverse, multiple, and plural. Multiculturalism assumed that the savage as *diversity* would abandon its role as a nemesis of modernity only to be tamed and organized. The political eroticism of modernity, whereby Otherness was attracted into the national society, was replaced by the tolerant coexistence of the diverse. The promotion of cultural diversity, unthinkable during modern times, is today a categorical imperative, in the plain Kantian sense, an autonomous and self-sufficient mandate.

The key words linking multicultural reforms are *recognition, autonomy*, and *limits*, especially with respect to ethnic groups. *Recognition* has been heralded, since the early 1980s, as the most important imprint of the new society. Indeed, as Charles Taylor (1994: 38) pointed out, there was a drastic shift from the politics of equal dignity to the politics of recognition:

> With the politics of equal dignity, what is established is meant to be universally the same, an identical basket of rights and immunities; with the politics of difference, what we are asked to recognize is the unique identity of this individual or group, their distinctness from everyone else. The idea is that it is precisely this distinctness that has been ignored, glossed over, assimilated to a dominant or majority identity.

Such recognition was not a mere statement, though, as Taylor continued, "But the further demand we are looking at here is that we all *recognize* the equal value of different cultures; that we not only let them survive, but acknowledge their *worth*" (Taylor 1994: 64; italics in the

original). However, what has become clear after almost three decades of multicultural policies world round is that Taylor's caveat was all but ignored. The multicultural conviviality of cultural diversity has not meant the recognition of the worth of the different but merely its existence, which has thus been organized and, to a large extent, isolated.

Varying in intensity and scope, multicultural reforms tended to secure or to consecrate the territorial, legal, educational, administrative, fiscal, and linguistic *autonomy* of culturally diverse groups. Provided that autonomies of any kind within national borders were always the conundrum of modern political theory, multiculturalism made certain that the autonomy it predicated was not meant to be the demise of the (relatively) cohesive societies that modernity strove so hard to build. As a result, autonomy was consecrated, but within *limits*. Taylor (1994: 62) stated, "liberalism can't and shouldn't claim complete cultural neutrality. Liberalism is also a fighting creed. The hospitable variant I espouse, as well as the most rigid forms, has to draw the line." Legal autonomy, for instance, is granted to minorities with differential conceptions and practices of justice, at times quite apart from modern law; yet, such an autonomy can only be enacted within cultural and territorial limits, that is, it can only apply to certain individuals and in certain places.

Recognition, autonomy, and limits all work together, in a tense yet productive entanglement, to build new post-national societies. However, one prominent symbolic field was apparently spared from multicultural reorganization: history. Multicultural concessions establish a limit set forth by state policies. There are borders that autonomy (ethnic or otherwise) cannot cross: a claim to national autonomy within the nation is one; history is another. History is still an arena – controlled by the state and by academic disciplines – for the deployment of a collective *us*, which becomes an increasingly blurred category in multicultural times. If modern archaeology once had a clear relationship with nationalism, now its home is in utter disarray. If before it administered discourses for dealing with an Other external to modernity, it now ignores what kind of discourses it administers given that such an Other is no longer an exteriority but a constitutive interiority. Is it to keep telling the history of a homogeneous, static, and disciplined *us*, even when constitutive Otherness strives to build itself in difference and disjunction and the cultural diversity multiculturalism widely espouses thrives? Or, rather, is it to write a new (multiple, plural) history in which those Others formerly banished are also represented, those very Others currently struggling to find a place and a time, no matter that they do it by claiming agendas that are utterly anachronistic for the West? In either case, the situation is a complex one for archaeology. If it embraces the former, it would be asserting that multiculturalism may have arrived, but nothing has really changed for the discipline. Yet, that assertion would be backed by the state itself, incoherently exhibiting its modern mnemonic apparatus intact, a strategy that would be utterly anachronistic were it not overtly calculated. (Central museums, for instance, are still national.) The state continues to endow its material referents and build its narratives with a particular yet universalized meaning; it simultaneously creates and condemns an inclusive identity. Legal jurisdictions establish the political legality of the state in the enactment of laws about heritage, which, in the end, regulate the enunciation of historical narratives. The latter endow expert knowledge (such as that of museums and archaeologists) with the right to establish and legitimate the apparatus of censorship that regulates the production and reproduction of historical discourses based on objects.

If archaeology champions the latter, that is, a multiple and plural history, whatever that may be, it would be sailing uncharted waters. That would not be a problem in and of itself if it were not for the unknown and unwanted surprises that may be waiting. For one thing, multiplicity would mean two things: either different histories living side by side – which is a naïve utopia, anyway, given the operation of hegemony – or an umbrella history, somehow modeled in national discourses, under which several particularities would bloom. For the other, a radical Otherness may wish to explode whatever there is left of national histories. In such

a case, reconstituting the shattered whole would be a tremendous task and most likely useless.

In archaeology a middle way has been adopted that feels safe and controllable; there is neither the reproduction of a national, unified history nor an unknown (and perhaps impossible) multiple history. The curious approach that has been adopted mixes a bit of old positivism, albeit nuanced, with another bit of a new constructivism. It is stated that the past is fully knowable through scientific means yet that the past is a historically shaped construction is also accepted. The latter, incidentally, entails the legitimacy of different accounts of the past. In its own way, multicultural archaeology follows a contemporary demand for social justice, which has become a necessity and, additionally, a trope (empty, at that). It engages diversity only marginally, almost unwillingly. Archaeology is not that engaged, after all, at least not in relation to the needs and expectations of nonacademic actors. Multicultural archaeology thus follows the threadbare and orthodox trails of positivism, it disdainfully observes (but selectively uses) the different histories that postmodern capitalism forces it to tolerate, and pleases itself by existing (with the security it obtains from the institutional apparatus) in a world of separate histories, tamed and exploited by the market.

This conundrum – the mix of *positivism* and *constructivism* – is not new. It has occurred in history a number of times. It was perhaps inaugurated by the Marxist insistence on the historical character of the superstructure and, at the same time, on the universality of historical materialism. Critical theory tried to find a way out this *cul-de-sac* by postulating the relativity of superstructural truths, checked by critical reflexivity and by their nesting in political realities. Some archaeologists have tried to bring this home. Moshenska (2009: 47), for example, has stated that "public archaeology in the broadest sense is that part of the discipline concerned with studying and critiquing the processes of production and consumption of archaeological commodities." But for most of archaeology this conundrum is nothing more than an unlikely (but powerful) normal cocktail, which defines the borders of *multicultural archaeology*, a strategy of disciplinary practice that, from afar (not the neutral distance of scientific times but the cynical remoteness of the political correct), contemptuously allows the existence of other historical accounts while it hardens its own operations. Thus, archaeology has accommodated to multicultural mandates by adopting a more democratic, tolerating outlook. In the meantime, other histories (whether based on archaeological narratives or not) strive to find their way. The net result is that historical fragmentation lives alongside a hardened, academic, and state-founded discipline, which by sheer ideology and hegemony still reigns, a pure multicultural product.

The multicultural hardening of archaeology *qua* Western discipline has been enhanced by so-called alternative archaeologies, which challenge the hegemony that have been enjoyed by positivist archaeology for so long a time. Indigenous archaeologies (Watkins 2000; Smith and Wobst 2005), for instance, depart from certain archaeological practices, especially if colonial, and may even position their own agendas, but accept the foundational principles of the discipline. Indigenous peoples even willingly offer to dissolve radical dichotomies: "Indigenous Archaeology is perhaps uniquely positioned to creatively challenge hegemonic categories and dismantle binary frameworks such as 'Indian' and 'archaeologist' " (Colwell-Chanthaphonh et al. 2010: 231). Good intentions notwithstanding, banishing a perhaps important confrontational dichotomy mostly serves to unite and solidify archaeology by making it more democratic. If the dichotomy indigenes-archaeologists was heated and strenuous some while ago, exclusive and irreconcilable, indigenous archaeologies would dissolve it. Theoretical work following Joe Watkins' (2000) book, which "has begun to explicitly frame Indigenous Archaeology as an effort to challenge the discipline's colonialist underpinnings" (Colwell-Chanthaphonh et al. 2010: 228), is based in the implicit that a "decolonized" archaeology can retain the modern core of the discipline. How can alternative archaeologies be defined "as multiple discourses and practices on things from another time" (Hamilakis 2011: 408) if they retain the ontological core of the modern

conception of time pasts? Can such "another time" be effectively enacted through/from modern ontology? Hardly so, because one of the main tenets of indigenous archaeologies, as put forward by one of its better-known proponents, states that "While focus and specifics may vary, one common thread among Indigenous archaeologies that I have observed is an incorporation of, and respect for, the experiences and epistemologies of Indigenous groups globally" (Atalay 2008: 29). For that reason, indigenous archaeologies are at odds to secure being an alternative to something. If *indigenous* is to retain an anti-modern stance (or, at least, a will to be alternative to modernity), where lay most of its political power and utopian promises, it cannot be an adjective to archaeology (a modern discipline practiced by indigenes) but a substantive implying alternative cosmologies in their own. In short, alternative archaeologies that retain the basic tenets of archaeology reassure Western cosmology. Further, alternative archaeologies are the best things that have happened to archaeology since the scientific consensus of the 1960s broke off: the Other is no longer a nemesis but an ally.

This rapid sketch of multicultural archaeology would not be complete without a discussion of the market. Going public, the motto of multicultural archaeology, is tantamount to going into the market while preserving a democratic, open, and tolerant attitude. But it may be the case that the way archaeology has so eagerly embraced the market in the last three decades – in Cultural Resource Management/Cultural Heritage Management (CRM/CHM) operations, museums, the heritage business, and revival parks – is a symptom of its uneasiness. Instead of facing head-on the riddles created by opening up the formerly closed field of historical representation, archaeology goes placidly to the marketplace and delays the confrontation of other realities, hoping that such a deferral will last forever.

Key Issues/Current Debates

The characteristics that define a multicultural archaeology can also help to outline the most pressing issues it now faces. They can be better grasped, however, by first presenting the general critiques raised against multiculturalism itself.

A Critique of Multiculturalism

The coexistence of diverse cultures is a trademark of multiculturalism; yet it is a politics of diversity based on the *recognition* of a stereotypical, virtual, and segregated Other. The "real other" (who responds diversely, not always pacifically, democratically, or humanistically to the pressures of savage capitalism, to the speed of global fluxes, and to postideological violence) must give way, without stridencies, to an "imagined" Otherness (who lives its bucolic and exotic life in a world of tolerance and separation, assiduously visited by the market). As Slavoj Žižek (1998: 157) noted, multicultural tolerance

> excuses the folkloric Other, deprived of its substance (as the multiplicity of 'ethnic foods' in a contemporary megalopolis show) but denounces any "real" Other due to its 'fundamentalism,' given that the core of otherness exists in the regulation of its pleasure: the 'real Other' is, by definition, 'patriarchal,' 'violent,' never the Other of ethereal wit and charming customs. One is here tempted to re-actualize the old Marcusean notion of 'repressive tolerance,' considering it now as the tolerance of the Other in its aseptic and benign form, which forbids the dimension of the Real of the pleasure of the Other.

Terrible concepts, indeed: regulation of the pleasure of Otherness; repressive tolerance; stigmatization, and, at the same time, promotion of primordialism. Multiculturalism organizes cultural diversity, nominating and creating it from the state, multilateral agencies, nongovernmental organizations (NGOs), and the academy, while the "real" Otherness is repressed by its virtual reflection. It neutralizes the activism of the different by imposing limits, legal and otherwise, and by delivering it to the market, which treats it just as diversity, controlled and promoted as authentic and pure.

The distance between diversity and difference is thus the main multicultural limitation, both a characteristic and a symptom. In fact, the decades that followed the last world war, but especially the last three decades, have witnessed the general

abandonment of pejorative and stigmatizing categories (inferior, primitive, and underdeveloped races) and the enlivening of cultural relativism (diverse cultures) that deactivates wide-base organizations, deracializes racism (but keeps it intact), and reifies/functionalizes differences (as diversity) to downplay inequalities. As Claudia Briones (2005: 22) pointed out, "Cultural difference emerges as a quasi-ontological property because social relations that recreate processes of alterization are presented and explained unlinked from the organization of capital and from international and national power." The multicultural idea of diversity wants heterogeneity to be understood as "a mosaic of monochrome identities" (Brubaker and Cooper 2000: 33), eliminating historical specificities, processes of alterization, asymmetries, and power relations. Therefore, it is necessary to establish the distance between diversity – that which multiculturalism promotes: quiet, safe, exotic, complacent, organized, and mercantile – and difference – the "constant production and emergence of subjects in the onslaught of their antagonisms and tensions" (Segato 2007: 27–28) – and to understand Otherness in its happening.

As if this were not an almost insurmountable problem, multiculturalism is fraught with constitutive tensions, the most prominent of which are the contradiction between individual and collective rights, and the autonomy accorded to different symbolizations of society and life. Although the latter has been curtailed by the establishment of limits, it nevertheless remains potentially explosive. The "solution" multicultural societies have adopted to solve these problems is deferral and, when circumstances are pressing, casuistry.

A Critique of Multicultural Archaeology

In light of the critique of multiculturalism I have just sketched, I can also posit a critique of multicultural archaeology with regard to its main characteristics: (a) an open practice; (b) a widened circulation of archaeological discourses; (c) an expanded archaeological hermeneutics; and (d) an abandonment of its control over certain issues. Firstly, the *open practice* it champions has only allowed local actors to be members of research teams or, at most, to be trained in the discipline. Such openness has normally been framed under the heading "collaboration," but power relations are rarely at stake. Most archaeologists are content to offer cultural crumbs to communities (a local museum, a video, a booklet) while preserving the control of key issues (research designs, destination of findings, production and dissemination of narratives). Secondly, a *widened circulation of archaeological discourses* – which, along with collaboration form the backbone of so-called *public archaeology*, part and parcel of a more comprehensive entity that I have chosen to call *multicultural archaeology* – has had two results: it reproduces the archaeological canon more widely, and it furthers the reification and objectification of the past, such as in the case of local museums. Thirdly, *an expanded archaeological hermeneutics*, achieved by incorporating non-Western conceptions of the past, has doubtlessly enriched the explanatory potential of the discipline but has not engaged intercultural understandings. Such an interpretative expansion, many times resorting to alien cosmologies that produce curious argumentative hybrids (for instance, live objects, with agency, amidst rigid functional frames), deepens a logocentric arrogance but does not aim to forge non-hierarchical relationships. As a result, historical diversity (that is, differential interpretations of the past, including the conception of what the past is) is a mere instrument for a more vigorous archaeology. And fourthly, *relinquishing control* over certain issues means precisely that: *certain* issues and under *certain* circumstances. This characteristic has been more commonly achieved through the selective repatriation of biological and cultural remains. Although repatriation is an important resource whose potential for social movements cannot be doubted, it is worth asking why it has become so central and visible for archaeology. As if answering such a question, Chris Gosden (2001: 258) noted, "The agency of native peoples in the past in creating colonial forms has a strong echo in the present, where demands for archaeologists to create more locally sensitive views of history are now backed by legislation. This means that present research must be a collaborative project

between archaeologists and local people and that this can only come about *once the injustices of the past have been redressed, which will often mean the return of skeletal or cultural material* considered to have been inappropriately obtained, stored, or displayed" (italics added). Repatriation is a highly debated topic in contemporary archaeology, not so much because giving back sites, things, and remains undermines the fundamentalist view of most archaeologists, but because it has become the ideal place to expiate colonial guilt. Archaeologists are firmly convinced that repatriation will heal *the injustices of the past*. Their sacrifice is rather small: returning (or sharing) a few things while preserving their cognitive privileges, the logocentric gaze, a solid narrative network, and their mnemonic impact.

In short, multicultural archaeology participates in the incoherent multicultural historical discourse, whose *us* has never been so blurred. Besides, it intentionally postpones the solution of the tensions it has contributed to creating, such as the purported autonomy of historical representations. It does so by treating different conceptions of history as a mere isolated diversity – suitable for market exploitation, as in the heritage boom of the last three decades (Martín 2000) – with no consequences whatsoever for society at large.

Future Directions

Current times – postmodern, transmodern, postindustrial – show the new face of bourgeois society, in which identities formerly antagonistic and exclusive now coexist amidst the placid (yet, proven explosive) pacifism of multicultural relaxation. A wide variety of genders and ethnic groups are now a part of the current landscape of the world, whereas before there were only heterosexual and national citizens. Such an unlikely coexistence is the crowning achievement of contemporary capitalism – even more so than replacing commodities by desire in the imagination of people.

Until two decades ago, non-Western histories and their way of relating to materiality and heritage were unknown to the state and to academic disciplines. The symbolic field of history was rather stable and unified around the national self. What has made those histories visible now? Anti-colonialists struggles, of course, but also a more subtle reason: the multicultural search of diversity, the appropriation and neutralization of the different that, in other circumstances, could destabilize the already stabilized by dint of hegemony and hard ideological work. (In this new hegemonic act, fully agreed to by the different, the market thrives.) In this apparently open and horizontal scenario, a "reformed" archaeological establishment is happy to concede to former marginal actors what it cherishes most: epistemic disciplinary coherence. Its gains are numerous. It keeps practicing archaeology as it has been known (it changes nothing of its metaphysical and ontological fabric); it does it publicly (generously); it feels more democratic (by *sharing*); it gets closer to what used to be called *the savage*, appeasing his/her desires and convincing itself that disciplinary nearness translates into spatial, temporal, and cultural coalescence.

But dissonance and confrontation have not ceased to exist; they can be gauged by examining the relationship of archaeology with indigenous peoples, still its most ferocious opponent. To begin with, indigenous peoples and archaeologists think, feel, and expect different things of their mutual concurrence to the discipline. For the archaeologists, the issue is crystal clear: the indigenous acceptance of an open and democratic (multivocal) archaeology is the best hope for their future. Multicultural archaeologists are delighted to share their knowledge with the masses, dressed with ethnic garments. Their enlightened move pleases them because they disguise as altruism and political correctness their unwavering commitment to the Western cosmology. On the other hand, the positioning of indigenous peoples before archaeology is not consensual. Some value archaeological processes and results if they are part of their agendas, considering that material objects and features turned archaeological by academic or community-appropriated discourses can serve to strengthen historical reflection, central in social mobilization and life. Others confront

archaeology and reject altogether any possible transaction with it. A perusal of the geographical distribution of those two antithetical positions will show that the former is mostly exercised by native groups in industrialized democracies while the latter characterizes most indigenous peoples in the old Third World. Such a distribution is not odd; it closely responds to the differential effectiveness of multicultural policies, to how successful they have been in building strong hegemonies, accomplished more completely in those countries where nationalism was more aggressive and triumphant.

Those who confront archaeology and want to know nothing about it raise their voices from a discursive emergence, from a distance, even from an assumed exteriority. They expose and challenge what the West has done and drag its institutions, including academia, into the fight. Confrontation of the West is not new – it is centuries old – but it gained more coherence and strength since the 1950s, starting with the anticolonial wars in Africa. It has increased its pace and intensity in the multicultural stage, where actors with opposed agendas concur. One of the actors concurring to the historical scene reconfigured by multicultural policies, of which repatriation is one of the most prominent, is archaeology. By its mere concurrence it pretends to forget that something is happening, that some people challenge its work. Archaeologists then sink in utter silence and keep on doing what they have always done, protected by a solid and conservative *esprit de corps* nurtured by esoteric meetings and publications, or they talk the multicultural language. They talk about dialogue and participation. They talk an empty language. But, should archaeologists be surprised that their work is now contested, many times from an aggressive radicalism that they see as unjustified violence against their hygienic operation? The perhaps good intentions of archaeologists, convinced that their sharing of archaeological secrets is the ultimate concession democracy can dispense, bounces back against a solid wall of rejection at the grass-roots level.

Multicultural archaeology opens the world of representation and gives access to other subjects who represent; however, it wants representation to be a mere nonpolitical epiphenomenon of the hierarchical relations it seeks to preserve. The multiple representations of the past that are incidentally released by the autonomy inherent in multicultural reforms (although historical autonomy is conspicuously absent from constitutional and legal mandates) are separated from the world of power. But, what happens if we consider representation as praxis, as suggested by Johannes Fabian (1990)? It would happen that the presence of the Other is felt, lived, and accepted outside of representation as a epiphenomenon – a representation that, at any rate, has been premised upon the absence of the Other. If a plural, horizontal, and open world (historical and otherwise) is to mean something beyond harmless relativistic pluralism, it can be found in the struggle for a radical Otherness. Rita Laura Segato (2007: 18) wrote in this regard,

> The fight of those social movements inspired by the project of a 'politics of identity' will not achieve the radical nature of the pluralism it intends to assert unless insurgent groups depart from a clear conscious of the depth of their "difference," that is, the proposal of an alternative world that guides their insurgency. I hereby understand such a difference not as with regards to substantive contents in terms of supposedly traditional, crystallized, still and impassive 'customs' but as difference on goal and perspective by a community or a people.

The radicalization of Otherness means the liberation of its force, restrained by the nets of cultural diversity. It is to think it as happening (to think relations, becoming, powers), something that can destabilize the stabilized. To destabilize the archaeological canon: that can be the minimal purpose of an emergent tradition that disbelieves, deviates, from multicultural archaeology. As Arturo Escobar (1996: 39) wrote about his book against development "the purpose of the analysis is contributing to liberate the discursive filed so the task of imagining alternatives can begin." Because we dwell in naturalized worlds – created by the cultural, social, political, and economic hegemony of a system, a class, a cosmology – trying to dwell in denaturalized worlds is not easy but surely not impossible. We first have to make them, or to unmake them, liberating the

discursive field. That (un)making is a task of happening: something that is, becomes, lives.

Cross-References

- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Nationalism and Archaeology

References

Atalay, S. 2008. Multivocality and indigenous archaeologies. In *Evaluating multiple narratives: Beyond nationalist, colonialist, imperialist archaeologies*, ed. J. Habu, C. Fawcett, and J.M. Matsunaga, 29–44. New York: Springer.

Briones, C. 2005. *(Meta) cultura del Estado-nación y estado de la (meta) cultura*. Popayán: Universidad del Cauca.

Brubaker, R., and F. Cooper. 2000. Beyond "identity". *Theory and Society* 29 (1): 1–47.

Colwell-Chanthaphonh, C., T.J. Ferguson, D. Lippert, R.H. McGuire, G. Nicholas, J. Watkins, and L. Zimmerman. 2010. The premise and promise of indigenous archaeology. *American Antiquity* 75 (2): 228–238.

Escobar, A. 1996. *La invención del Tercer Mundo*. Bogotá: Norma.

Fabian, J. 1990. Presence and representation: The other and anthropological writing. *Critical Inquiry* 16: 753–772.

Gosden, C. 2001. Potscolonial archaeology. Issues of culture, identity, and knowledge. In *Archaeological theory today*, ed. I. Hodder, 241–261. Oxford: Polity Press.

Hamilakis, Y. 2011. Archaeological ethnography: A multitemporal meeting ground for archaeology and anthropology. *Annual Review of Anthropology* 40: 399–414.

Martín, J. 2000. El futuro que habita la memoria. In *Museo, memoria y nación*, ed. G. Sánchez and M.E. Wills, 33–63. Bogotá: Museo Nacional.

Moshenska, G. 2009. What is public archaeology? *Present Pasts* 1: 46–48.

Segato, R.L. 2007. *La nación y sus otros. Raza, etnicidad y diversidad religiosa en tiempos de políticas de la identidad*. Buenos Aires: Prometeo.

Smith, C., and M. Wobst, eds. 2005. *Indigenous archaeologies: Decolonizing theory and practice*. London: Routledge.

Taylor, C. 1994. *Multiculturalism. Examining the politics of recognition*. Princeton: Princeton University Press.

Watkins, J. 2000. *Indigenous archaeology. American Indian values and scientific practice*. Walnut Creek: Altamira Press.

Žižek, S. 1998. *Multiculturalismo o la lógica cultural del capitalismo multinacional*. Buenos Aires: Paidós.

Multiple Microfossil Extraction in Environmental Archaeology

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Introduction

Microfossils can be defined as biogenic particles invisible to the naked eye and deposited in any type of soil or sediment context (Coil et al. 2003: 991). These may typically include ancient silica phytoliths, diatoms, faunal spherulites, starch granules, calcium oxalates, cellulose rings, chrysophytes, and micro-charcoal, but any other microscopic particle that is an organism itself or that is part of one may also be included in the definition. This type of research recognizes its origins in phytolith studies (since Pearsall 1978; Piperno 1988, and many others), but it gives other microfossils the same level of importance, partly based upon the development of low-chemical extraction procedures that allow more types be preserved. Laboratory procedures optimized for obtaining as many types of microfossils as possible in a single extraction process have been explored (Coil et al. 2003; Korstanje 2003, 2004), leading to what today may be called "multiple microfossil analysis" (Korstanje 2009). The idea of obtaining multiple microfossil assemblages from the same extraction process has the benefit of allowing a high number of samples to be run without the specific procedures required for each type of microfossil. This approach also circumvents some of the more complex taxonomic analysis and interpretations, which require qualified experts for each of kind of microfossil. However, to answer some research questions, this kind of sophistication is not necessary, and processing for individual types would require many extra working hours using processes already known to be time-consuming. Conversely, for human

perception skills, the possibility of having multiple microfossil types together on the same slide gives the researcher an instant idea about the microfossil assemblages and patterns that might differentiate, for instance, a corral structure from an agricultural enclosure. Finally, the protocols used for multiple extractions do not always require sophisticated laboratory conditions, and their use has led to interesting results regarding the recovery of microfossil assemblages.

Since this methodology started to be used, many scholars in South America and other parts of the world have been improving it, especially for the study of agricultural soils, cattle management, environmental issues, food production and processing, and artifact use in archaeology.

Definition

Laboratory Procedures

The multiple microfossil extraction procedure consists essentially of a low-chemical protocol, which follows several of the ordinary steps for phytolith extraction, with minor modifications. An added benefit of developing low-chemical and low-tech extraction protocols is the lower hazards and costs associated with such approaches.

Samples are dried in the laboratory oven at low temperatures until weight is stabilized. Equal splits of soil samples are deflocculated by adding sodium hexametaphosphate overnight. Clays are separated and eliminated by gravity using only distilled H_2O in the liquid columns. Decantation times are determined according to Stokes' Law, using a centrifuge. Samples are then sieved (50–55 mm mesh) for removal of sand (which is separated but stored to scan for larger phytolith types), and then silts are separated. Then silts are floated using the centrifuge in a zinc iodide (ZnI_2) heavy liquid solution, prepared at a density of 2.3. There are references in the literature to the use of sodium polytungstate as the heavy liquid for floatation, but this chemical can have unfavorable results in some soil conditions, and since this was the case here, zinc iodide is a recyclable salt that was used instead and found to work well.

After establishing the possibility of using faunal spherulites as evidence for the deposition of camelid dung, experiments were conducted with modern dung samples from the species *Lama pacos* and *Lama glama*, in order to determine the susceptibility of these microfossils to destruction by some common extraction chemicals. To determine whether these procedures were equally valid for most of the microfossils being looked for, tests were run which included different combinations of solution densities, mounting media, time, and temperature conditions for drying (Korstanje 2003, 2004). These experiments clearly showed that when used as the heavy liquid for microfossil extraction, ZnI_2 does not damage or destroy any of the non-silica microfossils, e.g., starch, pollen, or spherulites.

Finally, we tested whether our protocol was adequate for producing visually clear slides for microfossil identification purposes or whether protocols with higher chemical impacts would allow more specimens to be identifiable. Again, projecting the numbers obtained to equivalent density measurements, the comparison shows that the protocol used is appropriate to allow even the most specific types of silica phytolith identification (Korstanje 2009).

Historical Background

Over the last 40 years, phytolith researchers have developed the tools to directly approach landscapes, open-air sites, and artifacts, in contexts where macro-remains are not preserved. In the 1980s, one of the field's principal specialized manuals indicated some of the roles of phytoliths for archaeobotanical studies (Piperno 1988: 168) as:

1. The origins and dispersals of domesticated plants and development of agricultural systems
2. The availability, economic usage, and noneconomic roles of wild plants
3. The nature of environments and environmental modification associated with past human occupation of sites
4. The relationship between technology, economy, and social organization.

Most archaeologists interested in economics and food production were excited enough with these types of possibilities, but there were still more topics which could also be added to the approach from this point of view, such as site formation processes and taphonomy. Following this logic, we started our research on agricultural systems in El Bolsón valley (Catamarca, Argentina), but once we realized the limitations of phytolith analysis for our area, much of the enthusiasm passed away and showed us that we needed extra tools to answer our questions. Since then, we have refocused the research on the possibilities of whole microfossil assemblages as a tool for studying ancient agricultural sites (Korstanje 2009).

The study of Andean pre-Hispanic agricultural technology in the high semiarid valleys of northwestern Argentina has required multiple archaeological dimensions to be integrated into the research:

(a) The range of Andean crop spheres may include both high-altitude taxa (tubers/pseudo-cereals) and middle-altitude taxa (maize, beans, chili pepper, squashes).
(b) The possible occurrence of a relationship between husbandry and agricultural practices (fodder, fertilizers, alternating the use of corrals as agricultural fields).
(c) The coexistence of irrigated and nonirrigated systems.

In northwestern Argentina, phytolith analysis was initially inspired by the low levels of macrobotanical recovery from open-air fields, found at high-altitude, semiarid sites occupied during the early phases of agriculture. Phytoliths were the main target microfossils at first, because they were the most durable type of plant microfossil and there was also an existing tradition in these studies in South America (Zucol et al. 2008). As processing of phytolith reference materials and archaeological sediment samples progressed, the limitations of a phytolith-centered approach became more apparent. For example, few of the indigenous tuber taxa and *cheno-am* taxa potentially cultivated during the early phases of these occupations produce diagnostic or abundant phytoliths. At that point, the only regional crops seemingly amenable to producing phytolith evidence were maize, beans, and cucurbits (Piperno 1988; Korstanje and Babot 2007), certainly important crops but not sufficient for explaining ancient Andean agriculture.

Apart from the limitations relating to the set of plants growing in the area and the possibilities for their representation through phytolith production, the identification of plant taxa from the fields was crucial for demonstrating what people directly cultivated as opposed to what they consumed or exchanged, since most investigations of agricultural research questions are derived from samples from domestic contexts (Pearsall 1978, 1993; Rosen and Weiner 1994) or from lagoon systems (Kealhofer and Piperno 1994). This difference in the origin of the samples is important, since agricultural sites are open-air sites which do not have the stability of lagoons, as their soils have been plowed and worked at various times. Eventually, extraction and examination of additional microfossil types have not only enhanced the interpretive potential of the phytolith data in this research but have also produced data sets that have been more relevant to the given research questions. For instance, multiple microfossil types support interpretations related to site formation as well as to soil use and function.

To arrive to what today is called multiple analysis methodology, the spirit of earlier phytolith research that considered only two types of micro-remains together (e.g., Kealhofer and Piperno 1994; Campos et al. 2001) was followed to some extent. In those cases, the major advantage was to enhance the potential of one microfossil over the other, for example, using pollen for Asteraceae (difficult to identify from phytoliths) and phytoliths for Poaceae (difficult to identify from pollen) or other possible combinations within siliceous algae and phytoliths. Although they were still the result of different laboratory procedures and research methodologies, studies like these were the first alert that showed that two microfossils together explained more than one alone while strengthening the individual possibilities.

Good environmental and soil conditions for microfossil preservation encouraged further use of starch grains, within a wide variety of non-silica microfossils. From the first stages of the research, it was readily apparent that sediment samples contained at least some well-preserved starch. Starch granules in these areas have turned to be especially important, due to the variety and importance of tuber crops in the Andes, which have found to produce no clearly identifiable silica phytoliths or to produce none at all. Much effort was therefore put into exploring how different types of multiple microfossil protocols might affect starch recovery and damage (Korstanje 2003), to preserve the ability to make taxonomic identifications and reliable calculations.

After development of this laboratory goal perspective, the next step was to go straight into microfossil research with an extraction protocol and including the analysis of all possible microfossils (faunal, algae, and botanical) and their relationships with the characteristics of the soil matrix. This matrix is the natural and cultural context which can be used to make sense of microfossils. These assemblages explain some of the trends in a site's formation processes and, more importantly, are positive evidence of cultural practices in ancient soil use (Korstanje et al. 2014).

Key Issues

The Potential of the Microfossil Record in Relation to Agriculture and Domestic Activities

From the early years of this research and development of the methodology, it has been suitable to identify early husbandry practices from archaeological open-air fields and rock-shelter contexts and to track the chronological and spatial distributions of economic activities for a better understanding of ancient soil use and the archaeological components that survive to the present. However, specifically for agricultural research problems, a methodology considered to be a step further than "multiple microfossil research" is being improved upon by combining and jointly interpreting other soil science information (Korstanje and Cuenya 2008, 2010). The chemical characteristics of a soil under agricultural use covary depending on whether the crop plants contribute or extract various substances or elements. The parameters used to understand each field and soil use condition are principally organic matter and phosphorus, since although there are other chemical elements that can be added or removed during soil use (such as nitrogen, calcium, iron, etc.), it is these two components that are the most stable for studying ancient soils (Porta Casanellas et al. 1994). This is because, even if soils are not closed systems, nor encapsulated and isolated in time, some stable features such as P are preserved in time and become indicators of the prehistoric uses of soils.

Regarding corrals and pens used for domesticated animals, the multiple microfossil approach is important in two ways. At a micro-regional level, distinguishing corrals from agricultural fields can be an important issue, and this is possible if there are some well-preserved paleofeces with which to make a comparison and where phytolith patterns from dung (frequencies and types) should be clearly detectable in some of the soil samples. In such cases, the additional microfossil indicators of spherulites are useful for interpretation of structures as corrals. In another example, microfossil assemblages extracted from a well-preserved camelid dung layer in a rock-shelter site have suggested that domesticated camelids may have been fed with some of the same crops that humans consumed, since *Cucurbita* sp. and *Zea mays* phytoliths were found in the preserved dung. As was the case in Brochier et al. (1992), analyzing several types of microfossils together, especially examination of the relationship between phytoliths, diatoms, and faunal spherulites, could also improve interpretation of the depositional origins of these assemblages.

At a larger regional level, the composition of dung may help to understand the routes taken by nomadic pastoralists and caravans, because there might be more diversity in grasses and therefore in phytolith assemblages from dung (Korstanje 2004).

The methodology has also been suitable for revealing the complex functionality of structures where site uses had previously been assumed from architectural features alone – including residential areas, agricultural fields, corrals, or a combination of these (Korstanje and Cuenya 2008, 2010). To some extent, the methodology has also been applied to broader topics, such as understanding artifacts used for food processing and meal preparation (Babot 2009) or evidence for the consumption of hallucinogens in residues from pipes and other artifacts (Martin Silva et al. 2016). In these last cases, the laboratory procedures were adapted due to the small amounts of sediment and residues recovered, with almost no laboratory processing necessary in the extraction and following a similar low-chemical approach as with multiple microfossil extraction.

Microfossil Associations, Physical/Chemical Soil Characteristics, and Human Activities

After realizing the advantages and possibilities of incorporating multiple types of microfossils (Coil et al. 2003), it was necessary to evaluate their potential contributions as data for a specific research problem. Assuming that there would be poor organic preservation in open-air fields and sites, research strategies were designed to include the analysis of microfossil assemblages. In addition to its particular taxonomic identification, the relative frequency of each type of microfossil by locus and structure type is considered relevant for distinguishing practices and activities in agricultural landscapes and sites.

Phytoliths are good indicators for identifying grasses, but for a micro-region such as a valley, there may be not enough variability in grass species to characterize clear patterns. The cultivars recorded in the Andes are not equally as recognizable in the archaeological record. However, among them is maize, as a grass in the Poaceae family that is major producer of silica phytoliths in its vegetative as well as reproductive structures, and there can be a high expectation of finding diagnostic maize phytoliths in areas where maize has been cultivated. Alternatively, since potatoes are in the family Solanaceae, which does not produce diagnostic phytoliths, there is no expectation of finding them, but instead it is possible to anticipate diagnostic starch granules. In this way, taxonomic determinations are performed using broader microfossil assemblages, using silica phytoliths and starch granules for the determination of Andean crops (Korstanje and Babot 2007). From these examples, scholars interested in using this methodology should review the expectations appropriate for their own study area and plant record.

Calcium oxalate crystals from plants have very restricted diagnostic potential and, since they are quite fragile, are not recoverable in most contexts. However, since these always occur in modern samples of camelid feces, they can be used as supporting evidence for the presence of feces when faunal spherulites are also present. These have recently been shown to be very important working in specific small-scale contexts, such as pipe residues, where a narrow group of hallucinogenic or narcotic plants are expected to be present. Cellulose rings also have very limited diagnostic possibilities, but they are very common in fibrous taxa such as plants from the Bromeliaceae family, so these can be recorded as present/absent as possible indicators of plants used for traditional crafts.

In South America, siliceous microalgae, such as diatoms, are mainly used as an indicator of irrigation, based upon their frequency of appearance. Even though diatoms have taxonomic importance for specialists and may give information about their immediate environment in ancient times, in multiple microfossil analysis, they are taken only as an auxiliary evidence for those cases where a genus from a very specific type of environment is present in the samples. This is because at a micro-regional level, diatom assemblages do not necessarily present enough complexity to reflect subtle environmental conditions or changes. Instead, diatoms are more useful for explaining regional diversity in broad categories (dry/humid, salty/non-salty, marine/continental, etc.).

The Chrysophyceae are lesser-known (golden brown) algae, reported as nitrogen indicators (presence/absence). This level of identification is similar to that usually applied to microscopic

charcoal, which can be used to identify the presence of fires, although it is not used for taxonomic identification of the wood's origin.

Finally, since Andean camelidae spherulites can be differentiated from those of European cattle (Canti 1998), but cannot be used to distinguish different camelid species, these are used on a presence/absence basis to indicate dung or to indicate the arrival of European cattle. Nevertheless, spherulites must be taken into account with care. Their presence indicates dung, regardless of the abundance (while not necessary manure), but their absence does not indicate absence of dung, as it has been seen that the same animal in different environmental situations may produce large quantities of spherulites or none at all (Korstanje 2004). We have the additional problem that camelid herds in the past, the same as today, were fed with the remains of harvests, and therefore, their manure may contain the same phytolith assemblages as the agricultural fields. Likewise, during fallow times, the same grasses that camelids graze may easily propagate in the agricultural fields as these seeds can be carried in dung. Consequently, the phytolith assemblages may be similar in both cases. At this point, phytolith assemblages may be useful only in comparing the frequencies of different phytolith types and cross-checking with other independent archaeological evidence, such as architectural features or other characteristics of the locality if no architecture is present.

Once scholars have researched the regional circumstances, the local characteristics of each microfossil assemblage, and the preservational features based upon soils, sites, and climates, the next step is to put all these data in dialogue with the research questions. For instance, freshwater diatoms in a context with a high-frequency assemblage of middle-altitude crop phytoliths might be considered as an indicator of irrigation, while starch granules from pseudo-cereals and faunal spherulites in a context of low-frequency assemblage of middle-altitude crop phytoliths may indicate fertilization and/or nonirrigated agriculture, among other sets of possibilities.

Based on criteria similar to those described above, it has been possible to find a correspondence within every set of microfossil combinations and soil characteristics, matched with expectations from the perspective of ancient soil use. Some proposals can be presented for the research area in the following synthesized way: if there are α and β in x proportions, we can assume a κ use of land. For example, if we find high values of organic matter (O.M.) and an average abundance of silica phytoliths, we can infer that the soils have not been used for agriculture (Korstanje and Cuenya 2010). It is important to remember that these are comparative, not absolute, values, and so "high" does not mean any particular number but a value that is higher than that of the control sample. This interpretation should also be considered in relation to particular local, contextual, or environmental factors. To follow this reasoning, it is important to remember that even if microfossils represent independent evidence in the epistemological sense, they should be explained in relation to contextual data, including archaeological architecture and artifact analysis. We cannot consider them without taking into account the fact that, as with any other archaeological ecofact (e.g., macroscopic plant or faunal remains), similar combinations may lead us to infer different circumstances or activities depending upon the context of recovery.

It is also important to stress that, as this methodology can be used to study other agricultural systems besides those of the Andes, scholars must create their own baselines for research, as some of the initial conditions may be different.

Taphonomy, Regional Aspects, and Limitations of the Methodology

One of the main strengths of phytoliths as a type of archaeological evidence is that, under normal conditions, they are deposited in the soil directly in situ after the plant decays (Piperno 1988). However, it is important to consider the intromission of phytoliths from the soil fraction transported by wind in arid environments. In fact, this condition is quite important when studying open-air production sites, although is a matter of taphonomy and site formation process that can be evaluated just as in any other archaeological feature and situation. In some cases, for example, there may be an advantage because the sites are

located on high mountain slopes, where neither the water nor the wind can carry in sediments from other locations. However, in this case, we have the opposite effect: high levels of aeolian and hydraulic erosion lead to a high loss of the soil's silt fraction. In this sense, it is likely that a high proportion of the original microfossil assemblage has been deposited in the lower areas and lagoons of the valley.

Also, it has been assumed that phytoliths are highly stable in soils and show little mobility, constrained by the same taphonomic processes as any other particle included in the silt fraction. In soil science, it is considered that at a textural level, there is stability of the particles in the silt fraction (Porta Casanellas et al. 1994), but this does not mean that there are no micro-movements of the individual particles. In a soil under agricultural use, periodic plowing incorporates an extra dynamism to soil weathering and leaching. However, this does not create any definitive limit for the study of ancient soils, since this type of bias can be avoided by making comparisons among samples from similar types of environments and soils. In other words, soils from similar environments are easier to compare (e.g., arid to arid), but unless one carries out a comprehensive taphonomic analysis for each situation, comparing soil uses between two very different environments is not recommended (e.g., arid to humid).

Regarding microfossil specimens and classes, taphonomic and site formation factors may also cause differential preservation of siliceous and non-siliceous microfossils. While the first group will prove to be harder and more durable in general, silica phytoliths and diatoms may also be broken by physical action, altered in general shape, or become thinner and more translucent due to chemical processes of the natural silica cycle. Spherulites are very fragile not only to physical conditions but more importantly to chemical conditions. Also, the morphology of many starch granules has been shown to be affected by surrounding conditions. The reasons could be related to either natural site formation or diagenetic processes, but also to processes of cultural manipulation, or to laboratory extraction procedures. Natural and ancient cultural damage is not considered as a problem but as a source of information. These situations only affect the possibility of making a precise diagnosis of origin, but, as already noted, although taxonomic recognition may be desirable, it is not a critical issue for this kind of research, as it involves work at the level of microfossil assemblages in order to infer the general environmental or cultural patterns, rather than only to classify the taxonomic origin of individual specimens.

Future Directions

The developing trend toward multiple microfossil extraction and interpretation appears to represent a positive direction (Korstanje et al. 2014). Experiences with microfossil research in archaeology make it difficult to justify any programmatic statements regarding how microfossil research should be done. A better understanding of the nature and taphonomy of microfossils shows that in most cases a single microfossil type would not be sufficient to grasp the dimensions of the entire problem of ancient animal/agriculture relationships. Such a methodology may be perfectly applicable in other environments or parts of the world, but, of course, knowledge of all the factors and particularities related to the soils, plants, and people in these other areas must also be taken into account by the researchers.

A wider range of microfossil types can contribute to archaeological problem solving, and the further development of "reconnaissance" and low-destruction laboratory protocols are directions that will help microfossil research in archaeology to further advance and also to become more accessible to more archaeologists. Having the ability to view several microfossil types on a single slide aids interpretation of individual microfossil types while opening up new research questions and archaeological contexts.

The results of 20 years of research suggest that a wide range of microfossil assemblages may most effectively address research questions regarding agricultural and production systems. For example, when discussing economic crises in the ancient past, those have involved shortages

in staple foods or breakdowns in systems for their production, storage, or preservation (Pilaar Birch and Wallduck 2001). To test this, through collaborations by an interdisciplinary team of geologists, pedologists, palynologists, and archaeologists with various specializations, but particularly on microfossil research, it is possible to observe the existence of micro-changes at the environmental and landscape level. Also, when these lines of microfossil-based evidence are combined with information from more traditional archaeological avenues such as architectural interpretation of site function, spatial distribution of material evidence for economic activities, and geomorphological signs of field irrigation, the possible interpretive advantages of jointly extracting and interpreting several types of microfossils become apparent. An important point is that these data come from the field record itself rather than from inferences based on macro-remains in residential areas or on ethnographic records and analogies. Therefore, combined studies of soil and microfossil assemblages have demonstrated new possibilities in archaeology for recognizing and explaining activities directly from the sites.

Microfossil research in archaeology continues to develop on a truly international scale and, even when performed following the footprint of each region and its academic traditions, is to some extent open to the exchange of results and ideas. New advances and wisdom can be found well beyond the mainstream of Anglophone literature. Established and emerging research will also expand the range of research questions addressed with microfossils, especially using experimental archaeology to identify patterns of microfossil distribution and to associate these with the activities that produced them.

Cross-References

- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Alpaca and Llama: Domestication
- ▶ Archaeobotany
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Maize: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Potato: Origins and Development

References

Babot, M. del P. 2009. La Cocina, el Taller y el Ritual: Explorando las Trayectorias del Procesamiento Vegetal en el Noroeste Argentino. *Darwin* 47 (1): 7–30.

Brochier, J.E., P. Villa, M. Giacomarra, and A. Tagliacozzo. 1992. Shepherds and sediments: Geo-ethnoarchaeology of pastoral sites. *Journal of Anthropological Archaeology* 11: 47–102.

Campos, S., L. Del Puerto, and H. Inda. 2001. Opal phytolith analysis: Its applications to the archaeobotanical record in the East of Uruguay. In *Phytoliths: Applications in earth sciences and human history*, ed. J.D. Meunier and F. Colin, 129–142. Rotterdam: A.A. Balkema Publishers.

Canti, M.C. 1998. The micromorphological identification of faecal spherulites from archaeological and modern materials. *Journal of Archeological Science* 25: 435–444.

Coil, J., M.A. Korstanje, S. Archer, and C. Hastorf. 2003. Laboratory goals and considerations for multiple microfossil extraction in archaeology. *Journal of Archaeological Science* 30: 991–1008.

Kealhofer, L., and D. Piperno. 1994. Early agriculture in Southeast Asia: Phytolith evidence from the Bang Pakon Valley, Thailand. *Antiquity* 68: 564–572.

Korstanje, M.A. 2003. Taphonomy in the lab: Considerations on starch damage from multiple microfossil recovery in sediments. In *Phytolith and starch research in the Australian-Pacific-Asian regions: The state of the art*, Terra Australis 19, ed. D.M. Hart and L.A. Wallis, 105–118. Canberra: Pandanus Books.

Korstanje, M.A. 2004. Microfossils in camelid dung: Taphonomical considerations for the archaeological study of agriculture and pastoralism. In *Biosphere to lithosphere: New studies in vertebrate taphonomy*, ed. T. O'Connor, 70–78. Oxford: Oxbow Books.

Korstanje, M.A. 2009. Microfósiles y agricultura Prehispánica: Primeros Resultados de un Análisis Múltiple en el N.O.A. In *Fitolitos: estado actual de su conocimiento en América del Sur*, ed. A.F. Zucol, M. Osterrieth, and M. Brea, 249–263. Mar del Plata: Universidad de Mar del Plata, Argentina.

Korstanje, M.A., and M. del P. Babot. 2007. Andean crop sphere: vegetal and faunal microfossil characterization. In *Plants, people and places: Recent studies in phytolithic analysis. Proceedings of the 4th*

International Meeting on Phytolith Research, ed. M. Madella and D. Zurro, 41–72. Oxford: Oxbow Books.

Korstanje, M.A., and P. Cuenya. 2008. Arqueología de la agricultura: Suelos y microfósiles en campos de cultivo del Valle del Bolsón, Catamarca, Argentina. In *Matices interdisciplinarios en estudios fitolíticos y de otros microfósiles*, British Archaeological Reports International series 1870, ed. M.A. Korstanje and P. Babot, 133–147. Oxford: Archaeopress.

Korstanje, M.A., and P. Cuenya. 2010. Ancient agriculture and domestic activities in north-western Argentina: A contextual approach studying silica phytoliths and other microfossils in soils. *Journal of Environmental Archaeology* 15 (1): 43–63.

Korstanje, M.A., P. Cuenya, and M. Maloberti. 2014. El análisis múltiple de microfósiles como herramienta para estudiar paisajes agrícolas y prácticas campesinas: una síntesis metodológica. In *Avances y desafíos metodológicos en Arqueobotánica: miradas consensuadas y diálogos compartidos desde Sudamérica*, Monografías arqueológicas. Facultad de Estudios de Patrimonio Cultural, ed. C. Belmar and V. Lema, 252–275. Chile: Universidad SEK. ISBN 978-956-7137-82-4.

Martin Silva, V., G. Miguez, and M.A. Korstanje. 2016. Análisis de Microvestigios en Pipas Procedentes en Ocupaciones Prehispánicas ee las Selvas Meridionales del Noroeste Argentino. El Caso de Yánimas 1. Estudios Atacameños. n.53, pp. 33–52. Chile. ISBN: 0718-1043.

Pearsall, D. 1978. Phytolith analysis of archaeological soils: Evidence for maize cultivation in formative Ecuador. *Science* 199: 177–178.

Pearsall, D. 1993. Contributions of phytolith analysis for reconstructing subsistence: Examples from research in Ecuador. In *Current research in phytolith analysis: Applications in archaeology and paleoecology*, MASCA research papers in science and archaeology 10, ed. D. Pearsall and D. Piperno, 109–122. Pennsylvania: University of Pennsylvania, Philadelphia.

Pilaar Birch, S., and R. Wallduck. 2001. Archaeology and economic crises. *Archaeological Review from Cambridge* 26 (1): 1–6.

Piperno, D. 1988. *Phytolith analysis: An archaeological and geological perspective*. San Diego: Academic.

Porta Casanellas, J., M. López Acevedo Reguerín, and C. Roquero De Laburu. 1994. *Edafología para la Agricultura y el Medio Ambiente*. Madrid: Mundi-Prensa.

Rosen, A.M., and S. Weiner. 1994. Identifying ancient irrigation: A new method using opaline phytoliths from emmer wheat. *Journal of Archaeological Science* 21: 125–132.

Zucol, A.F., M. Brea, and E. Passeggi. 2008. Los Estudios Fitolíticos en América del Sur, una Visión Retrospectiva. In *Matices Interdisciplinarios en Estudios Fitolíticos y de otros Microfósiles*, British Archaeological Reports International series 1870, ed. M.A. Korstanje and P. Babot, 3–24. Oxford: Archaeopress.

Multivocality and Archaeology

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Introduction

This entry will attempt to define multivocality and describe how it has been used in archaeology, as well as explore some of the strategic issues and challenges inherent when attempting to enact it in practice. Part of this discussion will situate multivocality alongside other issues which usually accompany it or are sometimes conflated with it, in both theoretical and practice-based (case study) writing.

Definition

A textbook definition of the word is "many voices" – a fairly simple idea which becomes more complex in practice. The idea of "voices" can refer to differences in opinion, ethnicity, class, education, gender, culture, and just about any other form of human identity and variation that exists. In addition, people who claim one voice or another as "dominant" in one particular context can just as easily claim another in a different context – in some situations a person might speak as "a woman," in others as "an archaeologist," in others as "a Native American," in others a "business person,". . .and so on. A key point, when considering multivocality, is that each person has the potential to speak and identify with many different voices, even if they may choose one over another in any particular political or social situation.

Key Issues/Current Debates

In archaeology the idea of multivocality most often refers to the either the differences between

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professional archaeologists (so-called experts) and the diverse publics that archaeologists deal with or the differences between the different publics themselves. In addition, it refers to the ways that these different people and groups value, interpret, and find meaning in any given archaeological site, as well as the narratives they create about places and objects. These differences do not necessarily fall into predictable, seemingly simple categories of ethnicity, training, gender, and the like. In addition, although the realities of "standpoint" and individual perspective are critical when considering multivocality, how it plays out in practice varies from situation to situation, project to project, and person to person.

Multivocality is one of several ideas that are central to the practice of postprocessual archaeology, although it has found expression in other forms of social inquiry as well – postprocessual archaeology does not "own" multivocality, even within archaeology, even though much can be found about it in postprocessual writing. Some other postprocessual ideas, which are related to multivocality and often discussed at the same time, include reflexivity, interactivity, relevance, criticality, openness, transparency, and pluralism. In projects which aim for multivocality, both archaeologists and diverse publics (or, to use a currently popular term, stakeholders) attempt to find ways for different points of view about history, meaning, and physical remains to be expressed, *at the same time*. The ideal scenario is that they do this *together*, that power (to "own," control, interpret, assign meaning, etc.) is shared among different stakeholders, and that one group does not have power at the expense of another.

Multivocality can operate, and be analyzed, both locally and globally – although it is important to understand that these arenas constitute and influence each other and the categories "local" and "global" should not be seen as rigid, simple, or non-permeable. For the purposes of this broad discussion, on local levels multivocality can refer to the idea that different (often previously marginalized) groups should have a voice in interpreting archaeological findings or, similarly, that different groups should have a role in studying and publicly interpreting history in ways which may include archaeology but is not limited to it. There are many examples of this across the discipline, in which a variety of people with different skillsets and interests have collaborated in planning museum displays, interpretive centers, web sites, and the like. In many of these examples, different perspectives (about history, about "being," about a site, etc.) are presented alongside each other, with equal standing. In global contexts, multivocality is often seen as a way to democratize archaeology itself and, even more broadly, to have a role in global justice and human rights movements. In these contexts it is seen as one way to dismantle larger forces of colonialism and is often enacted in the work that archaeologists and others do with international organizations such as UNESCO and the World Archaeological Congress. Therefore, there are important differences of scale as different archaeologists engage with the idea of multivocality. Some focus mostly on local practice, and others situate their work in broader arenas, but all modes of practice have important roles in articulating contemporary archaeological discourse about multivocality.

Some important issues and challenges arise at all scales, however. One has to do with past practices and the complicity of archaeology (and, in some contexts, anthropology) in maintaining dominant hegemonies and imperialist power structures. Put simply, those who have been oppressed in the past, or who are still oppressed today, often see archaeology as part of that oppression and thus suspect. Another has to do with relativism. Is any perspective – any truth, any voice – as legitimate as another? How does any person, or group, evaluate differing truth claims? Most archaeologists are willing to engage respectfully with those whose epistemological and ontological perspectives are widely different from their own, and some archaeological approaches emphasize, more than others, the value of multiple lines of evidence when interpreting material remains. However, few archaeologists are willing to reject empiricism altogether. Despite this, many have found ways to have positive, multivocal, and democratic conversations with those who have different perspectives. Most recently,

archaeologists who are, themselves, members of indigenous groups have explored approaches which neither reject nor privilege Western mainstream approaches but instead create new, hybrid approaches which allow for the idea that different "truths" can be equally true, even if they are not commensurable in a scientific sense (Atalay 2008).

In all of these approaches to multivocality, the ideal scenario, as noted above, is usually defined as one where there is *mutual* empowerment between different groups. Obviously this ideal is difficult to achieve. In a global context, multivocality has mostly to do with eliminating the power imbalances caused by centuries of domination by "the West." In commercial archaeology (Cultural Resource Management, known as "CRM") contexts worldwide, power is almost always weighted towards professionals, policy makers, and private property advocates (such as property developers) who are in turn subject to (and supportive of) the power held by politicians. In other contexts, especially over the last couple of decades, some tribal/indigenous groups now have real power with respect to some issues (although it is important to note that some groups do not; see the sections of this volume that deal with indigenous legislation in different contexts). In addition, issues surrounding class, race, and gender, as well the legislative and cultural specifics that emerge from different legal, governmental, and geographical contexts, complicate and influence who has the "real" power in any given situation. Despite these realities, many archaeologists across the globe have attempted to create situations in which multiple voices and narratives can at least be expressed and where there is genuine, reciprocal dialogue between various people and roles. These sorts of projects are sometimes enacted as "collaborations," not as multivocality per se – in practice, the terms and ideas are often conflated.

Examples

Writing about multivocality within archaeology tends to fall into three different and often overlapping areas: theorizing multivocality, operationalizing multivocality, and, more recently, evaluating multivocality. Much of the writing by the various postprocessual archaeologists can be seen as theorizing multivocality (as well as theorizing as the other key ideas in postprocessualism). The literature on this is huge; one example would be Hodder and Hutson (2004) but see "Further Reading" for more. Several of the writers who are interested in theory have also attempted to operationalize multivocality – that is, to apply specific multivocal strategies to specific projects. Two of these would include Hodder (2000) and McDavid (2002).

Other writers have concentrated on operationalizing – that is, on practice. Most public archaeology writing over the past two decades would fall into this category (see "Further Reading"). Although some of the individual contributions to these volumes discuss the author's underlying theoretical assumptions, for the most part these case study volumes focus on practice. Practice-oriented multivocality work would also include that done by countless agency, academic, nonprofit, and museum archaeologists who now routinely acknowledge (and sometimes seek) multiple voices to engage with, even when they do not (or sometimes cannot) write about this aspect of their practice. Some of these operate in the CRM field, where opening up their practices in an explicit way can be difficult, given the push-pull of client interests and politics. In these cases, multivocality often exists, but in a more hidden way that is seldom written about in public forums (but see (LaRoche 2011) for an important example where it is).

Although the focus in this article is on multivocality, it is important to be aware that many of the ideas mentioned above as, together, informing a postprocessual approach (reflexivity for example), usually occur together. That is, archaeologists who seek multivocal strategies usually hope that their work will be reflexive, open, relevant, collaborative, and so on. A useful idea to take on board, if one is attempting to develop strategies along these lines, is the "collaborative continuum" suggested by Chip Colwell-Chanthaphonh and T. J. Ferguson (2008). Here one accepts that even though all projects will fall at one point or

another along a continuum of collaboration, multivocality, mutual empowerment, etc., it is still worthwhile to make an effort that works *towards* these things. Therefore, with respect to multivocality, one may find, close to one end of the spectrum, "top-down" outreach efforts aimed mainly at simply sharing archaeological information with different groups. Near the other, one would find projects which are truly multivocal and mutually empowered in all stages of the project – from planning to implementation to interpretation and public interpretation. Stephanie Moser and her colleagues, at the University of Southampton in England, have developed a useful methodological framework for this type of work (Moser et al. 2002). Although it was written specifically for a volume on "community archaeology," it is applicable to a broader discussion of multivocality as well. The introduction to the same volume, and the case studies, is also very useful.

In these sorts of attempts, sharing "real" power is seen as preferable. How this is defined, however, and the degree to which it can be achieved are extremely context-specific. Strategies that are useful for one project may be less or not at all useful for another – there is no one-size-fits-all method for "what works." Even so, it is fair to say that it is now relatively commonplace for archaeologists to make an attempt, at least, to open their work to other voices and perspectives. Again, the idea of a continuum is useful here.

Even when archaeologists attempt to create multivocal projects at the mutually empowered end of the spectrum, the result is not always positive. As noted above, each party has to evaluate the truth claims of other parties and to have a basic acceptance that multiple, even contradictory, truths can exist in any given project or any social or political contexts (even if one does not accept the hybrid approaches noted above). One only has to look at the fraught and bloodstained histories that exist in many parts of the world to know that this is often difficult (Meskell 1998). In order to create successful multivocal projects, archaeologists have experimented with different approaches – philosophical pragmatism (Preucel and Bauer 2001; McDavid 2002; Saitta 2007), participatory action approaches (Pyburn 2009), applied and "activist" anthropology (Shackel and Chambers 2004; Stottman 2010), community archaeology (Marshall 2002), and others. It is not unusual for writers who are allies with respect to the "big" goals of postprocessual practice (to be multivocal, open, reflexive, collaborative, etc.) to have different methodological, philosophical, or theoretical approaches. It is also very common for the same people to contribute to different edited volumes subsumed under different overall approaches.

Future Directions

The most recent writing about multivocality attempts to evaluate it, not to simply describe or celebrate it (both of which are common to much of the earlier writing – critical analysis of multivocality has been rare). Evaluative, critical pieces examine when multivocality works, when it does not, and why this is the case either way – and avoids the taken for granted that multivocality is always a good thing. One of these new publications, targeted specifically towards the issue of multivocality, is Habu et al. (2008). In this volume various authors (from Europe, North American, Latin America, and Asia) look critically at the roots of multivocality (as noted above, the intellectual traditions of "the West") and question whether it is always useful or even appropriate. As Hodder put it in his contribution to this book:

> . . .achieving the participation of marginalized groups involves a lot more than providing a stage on which they can speak. It involves changing practices and contexts so that disadvantaged groups have the opportunity to be heard and responded to. It involves trying to move away from the methods and principles that are attuned to the Western voice. It involves ethics and rights. (Hodder 2008: 196)

Archaeology as a multivocal exercise is still relatively new. Typically archaeological information has been, and still is, both created and presented in authoritative ways by archaeologists who want to promote archaeological agendas (such as research or stewardship). Therefore, those who attempt to enact multivocal

archaeology projects work against a long history of archaeological discourse which has not encouraged debate and critique – much less the mutual sharing of power. Multivocal archaeologies are, therefore, often difficult, and attempts to create them are often unsuccessful.

Even so, as more and more models of this sort exist, it is likely that more and more *will* be seen as successful by both archaeologists and their publics – they will move beyond dialogue (Hodder 2008) to create new and different ways of creating and implementing new archaeological projects, new ways of interpreting archaeological sites, and new ways of expressing "truth." In short, consideration of the issues involved in multivocality, either as a theoretical idea or as a framework for practice, is a necessary part of conducting an ethical archaeology in the twenty-first century.

Cross-References

- ▶ Community Archaeology
- ▶ Heritage and Archaeology
- ▶ Indigenous Archaeologies
- ▶ Post-Processual Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Reflexivity in Archaeology

References

Atalay, S. 2008. Multivocality and Indigenous archaeologies. In *Evaluating multiple narratives: Beyond nationalist, colonialist, imperialist archaeologies*, ed. J. Habu, C. Fawcett, and J.M. Matsunaga, 29–44. New York: Springer.

Colwell-Chanthaphonh, C., and T.J. Ferguson. 2008. Introduction: The collaborative continuum. In *Collaboration in archaeological practice: Engaging descendant communities*, ed. C. Colwell-Chanthaphonh and T.J. Ferguson, 1–32. Lanham: Altamira Press.

Habu, J., C. Fawcett, and J.M. Matsunaga, eds. 2008. *Evaluating multiple narratives: Beyond nationalist, colonialist, imperialist archaeologies*. New York: Springer.

Hodder, I., ed. 2000. *Towards reflexive method in archaeology: The example at Çatalhöyük*. Cambridge: McDonald Institute for Archaeological Research.

Hodder, I. 2008. Multivocality and social archaeology. In *Evaluating multiple narratives: Beyond nationalist, colonialist, imperialist archaeologies*, ed. J. Habu, C. Fawcett, and J.M. Matsunaga, 196–200. New York: Springer.

Hodder, I., and S. Hutson. 2004. *Reading the past: Current approaches to interpretation in archaeology*. Cambridge: Cambridge University Press.

LaRoche, C.J. 2011. The anthropology of archaeology: The benefits of public intervention at African–American archaeological sites. In *The Oxford handbook of public archaeology*, ed. R. Skeates, C. McDavid, and J. Carman, 629–658. Oxford: Oxford University Press.

Marshall, Y., ed. 2002. *World Archaeology* (special issue: Community archaeology) 34.

McDavid, C. 2002. Archaeologies that hurt; descendents that matter: A pragmatic approach to collaboration in the public interpretation of African–American archaeology. *World Archaeology* 34: 303–314.

Meskell, L., ed. 1998. *Archaeology under fire: Nationalism, politics and heritage in the Eastern Mediterranean and Middle East*. London: Routledge.

Moser, S., D. Glazier, J.E. Phillips, L.N. el Nemr, S. Richardson, A. Conner, and M. Seymour. 2002. Transforming archaeology through practice: Strategies for collaborative archaeology and the Community Archaeology Project at Quseir, Egypt. *World Archaeology* 34: 220–248.

Preucel, R.W., and A.A. Bauer. 2001. Archaeological pragmatics. *Norwegian Archaeological Review* 34 (2): 85–96.

Pyburn, K.A. 2009. Practising archaeology – As if it really matters. *Public Archaeology* 8: 161–175.

Saitta, D.J. 2007. *The archaeology of collective action*. Gainesville: University Press of Florida.

Shackel, P.A., and E.J. Chambers, eds. 2004. *Places in mind: Public archaeology as applied anthropology*. New York: Routledge.

Further Reading

Atalay, S. 2006. Introduction: Decolonizing archaeology, in 'Decolonizing archaeology – Efforts to transform a discipline'. *American Indian Quarterly* 30.

Derry, L., and M. Malloy, eds. 2003. *Archaeologists and local communities: Partners in exploring the past*. Washington, DC: Society for American Archaeology.

Hodder, I. 1992. Interpretive archaeology and its role. In *Theory and practice in archaeology*, ed. I. Hodder, 183–200. London/New York: Routledge.

Hodder, I. 1999. *The archaeological process: An introduction*. Oxford: Blackwell.

Jameson, J.H., Jr., ed. 1997. *Presenting archaeology to the public: Digging for truths*. Walnut Creek/London/New Delhi: Altamira Press.

Leone, M.P. 1982. Some opinions about recovering mind. *American Antiquity* 47: 742–760.

McGhee, F.L. 2008. African American oral history and archeology: Perceptional politics, political practice. *Bulletin of the Texas Archaeological Society* 70: 95–105.

Merriman, N., ed. 2004. *Public archaeology*. London/New York: Routledge.

Preucel, R.W., ed. 1991. *Processual and postprocessual archaeologies: Multiple ways of knowing the past*. Carbondale: Southern Illinois University, Center for Archaeological Investigations.
Preucel, R.W., and S.A. Mrozowski, eds. 2010. *Contemporary archaeology in theory: The new pragmatism*. Oxford: Wiley-Blackwell.
Skeates, R., C. McDavid, and J. Carman, eds. 2011. *The Oxford handbook of public archaeology*. Oxford: Oxford University Press.
Sorensen, M.-L.S., and J. Carman, eds. 2009. *Heritage studies: Methods and approaches*. London: Routledge.
Stottman, J., ed. 2010. *Archaeologists as activists: Can archaeologists change the world?* Tuscaloosa: University of Alabama Press.
Watkins, J. 2001. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: Altamira Press.

Mulvaney, John

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Basic Biographical Information

Derek John Mulvaney (Fig. 1) is an Australian archaeologist and is often referred to as the "Father of Australian Archaeology". Mulvaney was born in 1925 in Yarram, Victoria, Australia, and spent most of his youth and teenage years in the regional Victorian towns of Yarram, Albert and Rainbow. He attended the Rainbow Higher Elementary School until he finished the tenth grade, when he moved closer to Melbourne with his family so that he could attend high school in Frankston. Once Mulvaney completed the 11th grade at Frankston High School, he registered as a student-teacher and worked at the Frankston Primary School for a brief period during 1942–1943.

Mulvaney, John, Fig. 1 Derek John Mulvaney

Growing tired of teaching, Mulvaney joined the Air Training Corps in the hope of being a navigator for the Royal Australian Air Force (RAAF). He was enlisted in Somers Initial Training School in 1943, soon after his 18th birthday, where he trained as an aircraftsman second class. During further training in Canada, Mulvaney was promoted to the rank of Pilot Officer of the RAAF and was posted in England for 2 years during the end of the Second World War. Mulvaney was 20 by the time he returned to Australia and he says that the experience was essential to his adulthood as he "departed for Canada as a country lad and returned a serious adult. [His] experience fostered maturity and determination, infused with a romanticism for the past" (2011: 38).

Upon his return from deployment during the Second World War, Mulvaney enrolled in the History department, the University of Melbourne, during 1946–1948. Mulvaney studied British, Australian, and ancient European history as an undergraduate and undertook a master's degree, for which he received a first, for his study on ancient Britain. It was during his university years and his tenure as a university tutor (1949–1951) that Mulvaney was first introduced to archaeological field work and excavation. After receiving the result of his master's research, he applied for a traveling research scholarship in the Australian National University (ANU), which was only usually awarded to advanced researchers. ANU granted Mulvaney a scholarship on the condition that he enrolled for an undergraduate degree at the university he chooses. The University of Cambridge was the most attractive to Mulvaney because the subjects offered coincided with his

interests and the demand for an Australian archaeologist: the Paleolithic. Between 1951 and 1953, Mulvaney studied archaeology at Cambridge and took part in and conducted several excavations. Following his graduation from Cambridge, he was offered a post in Auckland, New Zealand, to set up a university archaeology department; however, he declined as he had already received a position in his old department at the University of Melbourne. Jack Golson, a colleague of Mulvaney, took up the post in Auckland instead.

Mulvaney married Jean Campbell during February 1954 and they were blessed with six children in the following decades. During this decade, Mulvaney continued to support his family by working at the university where he was inspired by the research into ancient Australia by museum curators, Fred McCarthy, Norman Tindale, and Edmund Gill. Mulvaney was determined that Aboriginal occupation of Australia was much older than European Australians believed; however, he had trouble convincing many people. Mulvaney decided that excavation and analysis was the only way to prove the claims of McCarthy, Tindale, and Gill, and he put this into practice at an excavation of Kenniff Cave in Queensland. The radiocarbon dating of charcoal recovered from Kenniff Cave returned dates of 16,000 BP, which Mulvaney claims to be "one of the most stimulating episodes of [his] career" (2011: 113).

Made clear by the persistent thievery and "collecting" that occurred on sites that he excavated, such as Fromm's Landing in South Australia, Mulvaney strongly believed that Australia's heritage legislation needed to be updated and enforced. Mulvaney became an advocate for the legislative protection of Aboriginal cultural heritage throughout his career. After witnessing the destruction of an Aboriginal rock-art site in Tasmania, 1962, Mulvaney successfully campaigned with Rhys Jones for the Tasmanian government to establish heritage legislation, which was put in place in 1975. Departing the University of Melbourne in 1964, Mulvaney took up a new post with the Prehistory department at the ANU and was elected as a council member of the Australian Institute of Aboriginal Studies (AIAS). This new post allowed him to research Australian archaeology without the time and facility restrictions he experienced at the University of Melbourne. Mulvaney became an executive member and chair of the Prehistory Advisory Committee in 1965 and edited a volume in Australian archaeology on behalf of the AIAS in 1968. Mulvaney published his first book on Australian archaeology with Thames and Hudson in 1969, titled *The Prehistory of Australia*, and Penguin Books published a revised second edition in 1975. This book was the first to focus on Aboriginal history before European settlement. As part of the AIAS council, Mulvaney was involved in the 1975 Australian and New Zealand Association for the Advancement of Science conference in Canberra where the Australian Archaeological Association was formed.

Teaching commitments was part of a multitude of burdens that Mulvaney faced in the late 1970s and early 1980s. His commitments to several councils, such as the Heritage Commission, the Interim Council of the National Museum of Australia, the AIAS, and the Joint Academics Committee on the Protection of Prehistoric Places, left little time for anything else, except for his family, for which he always found the time (Mulvaney 2011: 225). In 1977, Mulvaney was the chief Australian delegate to the UNESCO meeting in Paris, which determined the criteria for World Heritage listing. Mulvaney says that he "believe[s] that the criteria that we drew up… were sound ones, providing equal status for natural and cultural values," however, he has become disillusioned with the current status of World Heritage listing and says that it is "out of hand" (2011: 219–220).

Before his retirement, Mulvaney was inducted as a Companion of the Order of St Michael and St George in 1982. Mulvaney retired from the ANU at the end of 1985, and in the early stages of his retirement, he wrote a book that investigated Aboriginal encounters with non-European people, entitled *Encounters in Place*, which was published in 1989. In 1990, the ANU inaugurated the annual Mulvaney Lecture, which honors Mulvaney's career and contribution to Australian

archaeology. Notable events in Mulvaney's retirement include becoming the chair of the new Australian Capital Territory Heritage Commission during 1986–1989, being elected as secretary of the Australian Academy of the Humanities between 1989 and 1996, and being inducted as an Officer of the Order of Australia in 1991. During the late 1990s and throughout the 2000s, Mulvaney continued to write about his career, Australian archaeology and early Australians; the third edition of his book *The Prehistory of Australia* was revised with coauthor Johann Kamminga in 1999 and released as *Prehistory of Australia*. Mulvaney illustrates that his career has contributed to "a story that places Aboriginal societies at both the beginning and centre of Australian history" and that "[his] trowel and [his] pen have contributed to overcoming that silence of ignorance and prejudice" (2011: 332).

Major Accomplishments

The major accomplishments of John Mulvaney include being the first professor of archaeology with direct involvement in Australian prehistory; Establishing Aboriginal occupation of Australia during the Pleistocene; Being a mentor and/or teacher of most prominent Australian archaeologists; Helping secure the Willandra Lakes Region and Kakadu on the World Heritage List; Being a pioneer in engaging with Indigenous Australians about their cultural heritage; Successfully campaigning for the legislative protection of Aboriginal and Australian cultural heritage; Long-term commitment to Australian archaeology by serving on and chairing several of Australia's councils for heritage.

Cross-References

- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Golson, Jack

References

Mulvaney, J. 2011. *Digging up a past*. Sydney: University of New South Wales Press Ltd.

Mummy Studies

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Introduction

Mummies are one of the most appealing subjects within the field of archaeological science, not only to the general public but also to academics. Due to their unique preservation status, mummies can provide specialist avenues to historical and scientific knowledge of the past that cannot be obtained by other research methods. Thanks to the interdisciplinary work carried out by teams of scholars representing a great variety of research fields, mummies have provided us with unique opportunities to better understand the peoples and societies of ancient and later times (Cockburn et al. 1998).

Definition

Mummies are human (or animal) remains displaying preserved non-bony tissues. The term *mummy* is a derivation from the Old Persian word, *mumeia*, or *mum*, meaning bitumen or pitch (Lynnerup 2007). We call them mummies when a reasonable amount of soft tissue is preserved to an extent that the skin and/or hair, muscles, ligaments, tendons, or even internal organs can be observed (Lynnerup 2007).

Historical Background

In the fourteenth to fifteenth centuries, Egyptian mummies were imported into Europe for sale as medicines (Pringle 2001). In 1798, scientists accompanied Napoleon Bonaparte's invasion of Egypt to investigate one of the greatest civilizations in the ancient world (Lynnerup 2007). Inspired by mummies' academic significance and general curiosity value, museums in Europe and America started to import mummies for display in their collections (Pringle 2001). Soon thereafter, the initial stages of serious mummy science were led by pioneering scholars. Thomas Joseph Pettigrew's *A History of Egyptian Mummies* in 1834 is generally regarded as the beginning of serious systematic research on mummies (Aufderheide 2003; Lynnerup 2007), while the first examination using X-rays was carried out as early as 1896 (Cockburn et al. 1998). In the early twentieth century, Sir Grafton Elliot Smith, one of the most acclaimed Egyptologists worldwide, created a milestone in the history of mummy research, by being the first person to use X-ray to examine a mummy. When the tomb of Tutankhamen was discovered, Grafton was responsible for the examination of his preserved body. He used the same approach that is taken today using more sophisticated techniques (CT, MRI, and so on). In the 1970s, the mummy of Pharaoh Ramses II was examined by a team of over 100 scientists. The first computed tomography (CT) scanning of a mummified specimen was carried out in 1976 (Chhem and Brothwell 2008), while the Manchester Mummy Project released its findings in a series of studies presented to the public in 1979. By then, the concept of interdisciplinary research was established within the field of mummy studies (Lynnerup 2007). It is also noteworthy that, since the 1990s, a great number of international symposiums and conferences have hosted researchers to exchange information on various mummy investigations (Pringle 2001; Lynnerup 2007). Nowadays, many new biotechnological tools continue to be applied in mummy studies worldwide.

Key Issues/Current Debates

Research Techniques: The new research techniques recently introduced in mummy studies are providing access to the great stores of scientific information lurking within mummified tissues. Morphological inspection, the most conventional and simplest technique, has been widely utilized in anthropology so far (Aufderheide 2003). Histology is useful as well, particularly in determining the degree of preservation as well as in identifying specific signs of disease such as atherosclerosis, liver cirrhosis, neoplastic lesions, and others (Aufderheide 2003; Lynnerup 2007). A highly significant finding of electron microscopy is that no matter how well-preserved the mummies were, most mummified tissues were composed mainly of collagen (Lynnerup 2007). A comprehensive and detailed knowledge of mummies was gained by performing full autopsies (Aufderheide 2003), which also enables acquisition of rich scientific information on mummification procedures (Lynnerup 2007). However, these advantages notwithstanding, "to autopsy or not" has long been the question of two opposing groups: one argues that autopsy is indispensable to serious, comprehensive scientific analysis; the other argues that autopsy is unnecessarily invasive and destructive (Pringle 2001; Lynnerup 2007).

Radiology: Of all noninvasive techniques, radiographic tools are the most widely recognized for their scientific utility (Chhem and Brothwell 2008). Sex, age, and other physical traits can be estimated by radiological analysis (Lynnerup 2007). Through radiology, moreover, pathological signs such as degenerative changes and traumas can be accurately identified (Lynnerup 2007). CT radiography enables effective assessment and diagnostics for mummies by means of image reconstruction (Lynnerup 2007). One such example is the prehistoric mummy found in a Tyrolean Alps glacier, also known as the Tyrolean Iceman or "Ötzi" (see "Ötzi, the Iceman," below). Upon CT scanning, the mummy's anthropological traits could be comprehensively evaluated; even a probable cause of death was identified: an arrowhead lodged in the left shoulder area (Fleckinger

2014). Like CT scanning, magnetic resonance imaging (MRI) has been widely employed in mummy research (Chhem and Brothwell 2008). Although CT diagnostics have become the routine tool of mummy studies, we often are faced unpredicted problems: the possible misdiagnosis of mummified structures on CT images. As each mummified organ undergoes serious taphonomic changes due to displacement and dehydration after death, the interpretation of CT images of mummified remains was always challenging even to expert radiologists (Aufderheide 2003). Based on this premise, a *post-factum* autopsy was sometimes necessary to confirm the nature of the mummified structures on radiological images (Kim et al. 2017). By this procedure, the risk of data misinterpretation could be reduced; and the accuracy of the diagnosis was improved. Pathological changes in each mummified organ could be more certainly diagnosed by the accumulated data of CT diagnostics (Kim et al. 2017).

Craniofacial Reconstruction (CFR): The mummies' reconstructed portraits provide us with the chance to see their physical appearance. CFR is a forensic technique that has primarily been applied to identify mummies' antemortem faces. It entails two main steps: first, the skull model is reconstructed by CT images to be used as a template for CFR of mummies (Lynnerup 2007); second, the data are post-processed by an advanced computerized system. By the procedure, the face can be recreated as a reliable reference for the depiction of a mummy's figure (Lynnerup 2007).

Endoscopy: This technique, originally developed for clinical medicine applications, is another nondestructive investigative tool utilized in mummy studies (Pringle 2001). Unfortunately, the internal organs of mummies, as viewed by endoscopy, usually bear little resemblance to those of living individuals. Endoscope insertion into internal cavities is not easy either, as there is no or little room due to the collapse of internal organs (Aufderheide 2003). Moreover, due to the brittleness of dried mummy tissues, sampling with steel biopsy jaws also is challenging (Aufderheide 2003). Overall, endoscopy could not be a "gold standard" for investigation of mummified remains though it is certainly useful in some exceptional cases.

Chemical Analyses: Stable isotope analysis of bone collagen is frequently applied in order to reconstruct the dietary history of mummified subjects (Lynnerup 2007). For such analyses, hair samples are more commonly used. As hair grows at a constant rate and is not remodeled after it forms, the attributes of hair enable consideration of dietary intake patterns in a detailed chronological fashion (Lynnerup 2007). Studies of proteins, lipids, and trace elements also are important in mummy studies. Alcohol or other drug use (e.g., cocaine or nicotine) could be detected by chemical analysis of mummies (Lynnerup 2007).

Ancient DNA (aDNA) Analysis: Since the first scientific report of ancient DNA (aDNA), genetic information continues to be acquired from prehistoric or historic mummies (Lynnerup 2007). The preservation status of aDNA in mummy tissues is far better than in any other ancient specimens; and among mummies, permafrost specimens have better-preserved aDNA than those found in arid regions (Gilbert et al. 2007). Notwithstanding the achievements of the past decades, the authenticity of aDNA analysis has often been seriously challenged as a result of contamination of samples by modern DNA from the environment. Cross-contamination between mummy specimens also has been an issue of concern. Strict criteria for the handling of samples thus have been introduced and enforced to minimize the possibility of contamination in aDNA analysis. The reliability of such studies has improved since the recent introduction of the advanced New Generation Sequencing (NGS) technique, which provides a more sophisticated means of checking for specimen contamination (Orlando et al. 2015). Ancient DNA analysis can be essential to the confirmation of nongenetic diagnoses of ancient diseases as well as to the understanding of the evolutionary processes of pathogens by gleaning genetic information from mummies (Lynnerup 2007).

Mummification Processes: How mummification occurred in various natural environments and cultural contexts is of central importance to

researchers. The mechanisms whereby tissue degradation was hindered and bodies preserved during the mummification process have been eagerly sought out by scientific studies performed over the course of several decades (Aufderheide 2003). Both natural and artificial mummification processes have been revealed so far (Lynnerup 2007). The former is induced by extremely hot, dry, or cold conditions, without any techniques of manipulation by humans. These mummies have been found in arid environments such as Taklimakan, Nubia, the Canary Islands, Chile, and Peru, as well as the American Southwest (Cockburn et al. 1998; Lynnerup 2007). Permafrost regions such as Greenland, the Andean highlands, Siberia, Canada, Alaska, and the Tyrolean Alps also are conducive to natural mummification (Lynnerup 2007). Meanwhile, artificial mummification is facilitated by embalming practices that must have originated from ancient knowledge about the long-term preservation of fish or meat. Embalmers removed internal organs and treated bodies with substances including natural salt (natron) and resins, among others (Cockburn et al. 1998).

Paleopathology: New biological techniques enable more precise tracing of the pathologies of mummified people (Cockburn et al. 1998). With these new approaches, mummy studies can demonstrate various signs of ancient diseases and causes of death that could not be revealed by the simple examination of skeletal remains. For example, careful examinations can yield evidence of traumatic wounds and pathologies that often are very illuminative of mummified people's diseases (Aufderheide and Rodriquez-Martin 1998; Lowenstein 2004). Mummies often showed forensic traces of execution or of victimization by violence (Lynnerup 2007). Pathologies of the cardiovascular system (atherosclerosis, myocarditis, pericarditis, coronary artery disease) and pulmonary system (anthracosis, emphysema, hemorrhage) often are discovered in mummies (Aufderheide 2003; Lynnerup 2007). Calculus formations in the biliary as well as urinary systems have been observed in mummies (Lynnerup 2007). Compared to modern people, tumors have been rarely reported from mummies, possibly due to the relatively shorter life expectancy or fewer carcinogenic factors prevailing in ancient environments (Aufderheide and Rodriguez-Martin 1998). Infectious diseases have been traced by analysis of aDNA and/or histology. In the case of tuberculosis, for instance, the histological diagnosis of acid-fast bacilli in mummified tissues has proved useful in detection of the ancient genome of the tubercle bacillus (Lynnerup 2007). Syphilis and smallpox have also been identified in mummies through the gross examination of lesions as well as by aDNA analysis (Lynnerup 2007).

Parasitology: The study of ancient parasites is carried out to understand parasitism throughout history. It illuminates not only parasitism itself but also its sociocultural aspects by showing the interactions among parasites, hosts, and environments. Enteric helminth infection has been diagnosed by microscopic examinations of mummy coprolites. Ancient parasite eggs also have been subjected to aDNA analysis. Among the most commonly identified ancient parasite species are nematodes (*Ascaris*, *Trichuris*, hookworms, etc.) and trematodes (*Clonorchis*, *Paragonimus*, etc.). Notably, the study of hookworm and whipworm eggs has contributed constructively to the debate on how human beings could pass from Old World Siberia to New World America via the Bering land bridge (Aufderheide and Rodriquez-Martin 1998). Other important subjects of parasitological study have been trypanosomiasis, malaria, leishmaniasis, and schistosomiasis (Lynnerup 2007). Louse and flea infestations were also reported from pre-Columbian Peruvian, Aleutian, and Greenland mummies (Lynnerup 2007).

Everyday Life: One of the most fascinating aspects of the scientific investigation of a mummy is that we can catch glimpses of the ancient individual's everyday life. For instance, the presence of anthracosis in mummy lungs has suggested the possibility that sooty air was inhaled while living in an enclosed space with a fireplace or oil lamps installed (Aufderheide 2003). Finding the *Trichinella* parasite in a Greenland child mummy's muscle revealed the historical origin of an old custom of that region, according to which the season's first catch of walrus was eaten raw. Due to the *Trichinella* parasite's ability to infect through the ingestion of raw walrus meat, this

custom can be traced back to at least the sixteenth century, the time at which the mummy was estimated to have lived. In addition to many mummy tattoos reported worldwide (Krutak 2013), other cultural ritualistic markers such as earlobe piercings and male circumcision also have been reported, based on examinations of mummies of ancient Egypt as well as South America (Aufderheide 2003).

Ethical Issues: Mummy research has sparked ethical controversies about the removal of mummy clothing, adornments, burial shrouds, etc. as well as the display of bodies in public spaces (Day 2014; Moissidou et al. 2015). Strict ethical protocols have been established to guarantee the respectful treatment of mummified corpses (Kreissl Lonfat et al. 2015; Kim et al. 2017). Most fundamentally, researchers must obtain the requisite permissions before undertaking any mummy examinations. Even in cases where family members, descendants, or relevant agencies generously allow such studies, other ethical issues surrounding the conduct of autopsies come into play. Actually, as the mummified corpse is the vestige of a living person, unnecessary damage should always be avoided as much as possible (Kim et al. 2017). Furthermore, whereas scientists typically prefer autopsy for more detailed research on mummies, archaeologists and curators are less happy with this invasive technique. Some diagnostic tools used in clinical medicine, such as endoscopy and CT, have thus been gradually introduced into mummy studies as noninvasive alternatives to autopsy (Lynnerup 2007). In specific circumstances such as rescue archaeology, however, the usual consensus on the use of noninvasive analysis often has to be abandoned. The choice of an invasive or noninvasive technique as the principal research tool will always accord with the circumstances of an individual case in terms of the best balance of ethics and efficiency (Kim et al. 2017).

International Perspectives

Egyptian Mummies: Ancient Egyptian mummies are the most famous and best studied among those that had formed "artificially" as the result of the employment of specific embalming techniques (Cockburn et al. 1998). To the ancient Egyptians, the body was to be manipulated so as to be rendered incorruptible and thus indistinguishable from the living appearance of that person. This was central to ancient Egyptians' ideology concerning the afterlife (Lynnerup 2007). Bodies dating to Egypt's pre-dynastic period have sometimes been found desiccated and mummified even without having undergone any embalming process, due most likely to the sand's wicking action secondary to its porosity (Aufderheide 2003). Artificial mummification in ancient Egypt was developed from experience. As far as the mummification rites of the ancient Egyptians are concerned, our current knowledge is significantly indebted to Herodotus (Cockburn et al. 1998). There are, however, many variations to this theme. According to Herodotus, one of the Egyptians' main embalming techniques was the removal of all body organs and fluids. The brain tissue and other internal organs were extracted and then deposited in canopic jars. The body fluids were also removed using salts (natron) to hinder putrefaction. All of the embalming rites collectively were developed to advanced levels over the course of centuries (Lynnerup 2007). The complete embalming process can be summarized as follows (Cockburn et al. 1998):

(1) The corpse was laid on a table.
(2) The brain was removed through the nose by means of a hooked metal rod.
(3) The abdominal organs were extracted through abdominal incisions (usually on the left side), and the thoracic organs were removed through incisions made in the diaphragm.
(4) The body cavities and viscera were sterilized.
(5) The viscera were dried and treated with resin, wrapped in linen, and placed in canopic jars.
(6) The thoracic and abdominal cavities were stuffed temporarily with packing materials, preparatory to a 40-day process of complete desiccation.
(7) After completion of the drying process and the subsequent removal of the packing materials, resin or resin-impregnated cloth was

packed into the cranium, while the other body cavities were stuffed with linen cloth and bags.

(8) The body was anointed with fragrant materials; the orifices of the head were packed with wax or resin-soaked linen. Molten resin was smeared over the entire body to act against the reentry of moisture and to strengthen the skin.

(9) The body, finally, was wrapped in linen bandages wherein amulets and other pieces of jewelry were placed.

The overall process of embalming took 70 days. Macroscopic, histological, and endoscopic examinations have revealed several pathological signs in Egyptian mummies. The calcified ova of *Schistosoma haematobium* have been observed in mummy kidneys, which must have caused hematuria among living ancient Egyptians. Upon radiological examination, arthritis, arterial calcification, and bone infarction have been found. Harris lines, a sign of intermittent disease or malnutrition, could be identified in about 30% of radiographs of Egyptian mummies' tibiae, which indicates generally poor nutrition among ancient Egyptian children and adolescents (Cockburn et al. 1998).

Ötzi, the Iceman: On September 19, 1991, this famous mummy was found in the Ötztal Alps. Along with this mummified man, a number of cultural artifacts also were collected, including grass string and matting, a birchbark container, axe, dagger, sheath, longbow, quiver, net, fur cap, backpack, shoes, and coat and leggings made of domestic goat skin, among others (Fleckinger 2014). Based on the results of archaeological analysis and radiocarbon dating, this man is estimated to have lived between 3350 and 3100 BCE (the late Neolithic or Cooper Age) (Fleckinger 2014). The mummy was initially investigated at the Institute for Forensic Medicine in Innsbruck, Austria, and subsequently at the Institute for Mummy Studies at the European Academy (EURAC) in Bolzano, Italy. Through these analyses, many details were revealed, including brown eyes, 50 kg of weight, 45.7 years of age, and degenerative changes in the joints (Fleckinger 2014). Ancient DNA (aDNA) analysis can reveal much information that is unobtainable by any other means (Fleckinger 2014). For instance, 96% of his nuclear genome could be sequenced. His Y chromosome haplogroup was G2a2b, now very rare in Europe and mainly distributed in Sardinia and Corsica. He also had a genetic predisposition to cardiovascular diseases (atherosclerosis), and aDNA analysis also revealed that Ötzi was lactose intolerant (Keller et al. 2012). The Iceman's body displayed over 50 tattoos, which might correspond to acupuncture pressure points (Samadelli et al. 2015). CT also was employed in studies of Ötzi, the most significant result of which was the identification of an arrowhead in his left shoulder, which was concluded to be the cause of his death. It appears that the Iceman was shot from behind, by an arrow shot from a considerable distance (Fleckinger 2014). Unfinished arrows and a half-completed bow indicative of a rearming process, combined with his fractured ribs, suggest that he had been involved in a violent encounter. This study reveals the personal tragedy that the Iceman experienced (Spindler et al. 1996; Fleckinger 2014). Ötzi currently resides in Bolzano's South Tyrol Museum of Archaeology.

Mummies in Catacombs and Crypts: Mummies have been discovered in churches and convents of Europe, with the largest number being found in Italy (Aufderheide 2003; Lynnerup 2007). Several hundred mummified individuals, for instance, are maintained in the Catacombs of the Capuchin Brothers in Palermo, Sicily. These mummies were found in burial contexts ranging from the medieval period through to the renaissance and up to more recent times (Cockburn et al. 1998). In general, church mummies can be divided into two different categories: natural and artificial. The natural mummification that occurred in Southern Italy was caused by favorable climatic and environmental conditions, further facilitated by drainage of cadaveric fluids, as carried out in the crypts of churches over the course of several months. In some cases, cadaveric liquids could be collected in large stone or pottery vases. Processes of evisceration or injection with chemical preservatives, in contrast, determined artificial mummification.

Bog Bodies: In Northern Europe, unique mummies known as "bog bodies" have been

discovered. These bodies had been mummified as the result of having been buried in the acidic-anaerobic environment of peat bogs (Lynnerup 2007). Sphagnan, a polysaccharide compound of the sphagnum mosses present in such bogs, is important to impede the decomposition of dead bodies. Specifically, by chelating calcium, sphagnan causes demineralization of the bony tissues, making bog-buried bodies lose their hardness and become pliable (Lynnerup 2007). Due to this leaching of calcium from the bones, radiographs of bog bodies are not very informative (Lynnerup 2007). Although the estimated dates of the bog bodies range from 900 BCE to 1800 CE, those representing the years 600 BCE to 300 CE attracted particular scholarly attention for having been early Germanic peoples of Northern Europe (Spindler et al. 1996). The most interesting aspect of prehistoric bog bodies is the commonly detected evidence of trauma resulting either from socially sanctioned punishment or physical violence.

Guanche Mummies: The Canary Islands archipelago was colonized following the Spanish conquest of these lands in the fifteenth century. Prior to this, aboriginal people dwelled there. The Guanche mummies of the Canary Islands that were discovered by colonizing Spaniards have long been the subjects of academic debates. In these cases of mummification, the embalming techniques employed were evisceration, sand stuffing and the use of preservatives. After being embalmed, the bodies were placed in caves on the islands (Cockburn et al. 1998).

North American Mummies: In the United States, prehistoric mummies of Amerindian peoples have been discovered in rock shelters, dry pits, or the cysts of caves and overhangs (Cockburn et al. 1998). The mummies were discovered and investigated in Texas, Kentucky, and Tennessee. Arrested growth lines showed that these individuals sometimes must have starved while alive. Dental diseases were the most consistently observed health problems among them. In Florida, the mummified brain of a hunter-gatherer, which was date-estimated to 7000–8000 BP, was discovered in a peat bog. The potential of mummy studies in North America, however, declined appreciably after the Native American Graves Protection and Repatriation Act was passed in 1990, which legislated that human remains that were discovered should be repatriated to Native American tribes.

South American Mummies: The oldest artificially created mummies in the world have been found in the Chinchorro culture along the Atacama coast in present-day Chile, dated to approximately 9000 years ago (Cockburn et al. 1998). The earliest Chinchorro mummies are those of children whose bodies were anthropogenically reconstructed after death. Their viscera and brains were removed; the legs, arms, and trunk were reinforced by sticks; and the faces were coated with thin clay and painted. The Chinchorro diet was mainly composed of marine products, followed by terrestrial meats and plants. They had very few dental cavities due to a diet low in carbohydrates and high in abrasive materials. Since these children were infected by tapeworm parasites, it is likely that they ate raw or poorly cooked fish. Later in history, ancient Peruvian sedentary farmers positioned the bodies of their dead upright while wrapping them in discrete layers of ceremonial garments and wrapping cloths. The preservation of the Middle Horizon period mummies in large bundles might have been achieved specifically via desiccation by means of natural agents and by tightly wrapped cotton layers that absorbed bodily decomposition fluids. The tradition of bundle burials continued, though regional variations in the wrapping of the cadavers have been noted. Detailed information on the final stage of Andean prehistory, which began with the emergence of the Inca Empire and ended with the Spanish conquest of 1534, has been available in the form of a rich corpus of ethnohistory written during the early stages of the colonial period. At this point, the cadaver was eviscerated and treated with certain balsamic substances to preserve it. The viscera were placed in freshly made ceramic vessels buried next to the mummy bundle. Mortuary practices clearly were conditioned to a considerable degree by social status. While the common people typically were

buried with few possessions, the bundles of the elite contained masses of textiles, instruments, and other goods. Although royal Incan mummies might have been embalmed, the detailed process employed has yet to be fully revealed. Incan mummies found in high-altitude (5200–6700 m) mountain areas are also well known. These individuals may have been intoxicated with alcoholic corn beer or narcotic coca leaves prior to being sacrificed by strangulation, or they may simply have been abandoned to die of exposure. The most famous of these mummies include the frozen Inca girl *Juanita* discovered on Mount Ampato and an 8- to 9-year-old Inca child found at 5400 m on the Cerro El Plomo peak in the Andes (Spindler et al. 1996; Cockburn et al. 1998).

Arctic and Subarctic Mummies: Postmortem degradation was hindered in the arctic and subarctic regions, by the combination of year-round low temperatures, low air humidity, high winds, and the sheltered positions of graves (Cockburn et al. 1998). A scholarly interest has been aroused due to these remains' excellent preservation status. This is particularly true in the cases of mummies found in the Aleutian Islands, Alaska, Greenland, Canada, and Siberia (Lynnerup 2007). One such example is the frozen female mummy (200–500 CE) washed out of a low beach cliff at Saint Lawrence Island (Alaska) in the Bering Sea. Pathological signs of coronary and aortic atherosclerosis, anthracosis in the lung, and a temporal bone fracture were found. Mummified people were also found in a crushed winter house in the Arctic region of Alaska. They appear to have died of *ivu*, an accident caused by the inland incursion of broken sea ice. Signs of massive anthracosis, osteoporosis, atherosclerosis, and bacterial endocarditis were discovered. The most famous Arctic mummies are those discovered at Qilakitsoq in Northwestern Greenland. These well-preserved mummies of the Thule culture, the direct ancestors of the present Eskimo population of the Eastern Arctic, likely were buried around 1475. They exhibited anthracosis, Down's syndrome, osteoporosis, nasopharyngeal carcinoma, and other diseases commonly found in modern Eskimo populations. Mummies discovered in Arctic regions provide us with special insights into the unique health and disease conditions prevalent in prehistoric Arctic ecosystems (Spindler et al. 1996).

Asian Mummies: There has been a prevailing belief that mummification does not occur naturally in East Asia due to high-humidity and high-temperature conditions coupled with the lack of any widespread tradition of artificial embalming reported for the region. However, mummies of Buddhist monks have often been reported in certain Asian countries. In Japan, self-mummification was attempted by Buddhist priests who were later worshipped in a Buddhist sanctuary (Cockburn et al. 1998). There also have been medieval aristocratic mummies (Fujiwara family) discovered in Japan. Although the exact cause of mummification in these cases remains mysterious, it is generally accepted that embalming might have been carried out. In China and Siberia, various types of mummies have been found under different circumstances. In brief, a mummified female dating to the Han Dynasty (206 BCE to 220 CE) was discovered in a Mawangdui tomb (Aufderheide 2003). Naturally mummified cases also have been found in the dry region of Loulan in the Tarim Basin, Xinjiang Province (Aufderheide 2003). Between 1929 and 1949, Rudenko investigated graves (dated to the fifth to third century BCE) in Pazyryk (Altai Mountains), located on the border between Siberia and Outer Mongolia. The mummified bodies found therein belonged to seminomadic tribes who had roamed the Siberian steppes in ancient times. The Pazyryk mummies had been artificially prepared by the removal of the brain and other internal organs. In South Korea, over the course of the past several decades, well-preserved mummies have been discovered in tombs dating to the Joseon Dynasty (1392–1910 CE). Despite their academic significance, the Joseon mummies' historical origins and related preservation mechanism(s) are still uncertain. The only fact that has been confirmed to date is that mummies discovered in the Chinese tombs of the Song, Yuan, Ming, and Qing dynasties share a structural

similarity to the Korean mummies and their tombs (Oh et al. 2017). In the wake of a series of important scholarly achievements, most researchers now agree on the academic value of mummies found in Asia.

Fire Mummies: Sometimes mummification by desiccation was achieved by a smoking treatment of the corpse. This tradition has been reported from North America as well as Oceania (Lynnerup 2007). One such example is the tattooed mummies of the Ibaloi people in the province of Benguet (Kabayan), Philippines. In these cases, mummification was most likely done through desiccation, since there was no evidence of evisceration (Beckett et al. 2017). After death, the body of the deceased was seated on a chair constructed of local materials. Then, a low fire was lit below the chair to enhance desiccation, hence the name "fire mummies." The fire must have created a microenvironment of decreased humidity and elevated temperature around the mummified body. The fire and wood smoke also would induce mummification by making the environment hostile to bacterial proliferation and insect infestation (Beckett et al. 2017).

Future Directions

Since the beginning of mummy research, many scholars have been devoted to the discovery of the key aspects of mummies and mummification worldwide. As this trend continues to develop, we must prepare for further innovation in mummy research. Most importantly, when a new scientific study on mummies is planned and then carried out, a sufficient number of ready-to-use samples should be made available. In this respect, the establishment of a tissue bank of mummified specimens might be a good way to start.

Cross-References

- ▶ Aufderheide, Arthur Carl
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA

References

Aufderheide, A.C. 2003. *The scientific study of mummies*. Cambridge, UK: Cambridge University Press.

Aufderheide, A.C., and C. Rodriguez-Martin. 1998. *The Cambridge encyclopedia of human paleopathology*. Cambridge, UK: Cambridge University Press.

Beckett, R.G., G.J. Conlogue, O.V. Abinion, A. Salvador-Amores, and D. Piombino-Mascali. 2017. Human mummification practices among the Ibaloy of Kabayan, North Luzon, the Philippines. *Papers on Anthropology* 26 (2): 24–37.

Chhem, R.K., and D.R. Brothwell, eds. 2008. *Paleoradiology. Imaging mummies and fossils*. Berlin: Springer.

Cockburn, T.A., E. Cockburn, and T.A. Reyman, eds. 1998. *Mummies, disease, & ancient cultures*. 2nd ed. Cambridge, UK: Cambridge University Press.

Day, J. 2014. 'Thinking makes it so': Reflections on the ethics of displaying Egyptian mummies. *Papers on Anthropology* 23 (1): 29–44.

Fleckinger A. 2014. *Ötzi, the Iceman, the full facts at a glance*. 4th updated ed. Folio, Vienna/Bolzano.

Gilbert, M.T., D. Djurhuus, L. Melchior, N. Lynnerup, M. Worobey, A.S. Wilson, C. Andreasen, and J. Dissing. 2007. MtDNA from hair and nail clarifies the genetic relationship of the 15th century Qilakitsoq Inuit mummies. *American Journal of Physical Anthropology* 133: 847–853.

Keller, A., A. Graefen, M. Ball, M. Matzas, V. Boisguerin, F. Maixner, P. Leidinger, C. Backes, R. Khairat, M. Forster, B. Stade, A. Franke, J. Mayer, J. Spangler, S. McLaughlin, M. Shah, C. Lee, T.T. Harkins, A. Sartori, A. Moreno-Estrada, B. Henn, M. Sikora, O. Semino, J. Chiaroni, S. Rootsi, N.M. Myres, V.M. Cabrera, P.A. Underhill, C.D. Bustamante, E. Egarter Vigl, M. Samadelli, G. Cipollini, J. Haas, H. Katus, B.D. O'Connor, M.R. Carlson, B. Meder, N. Blin, E. Meese, C.M. Pusch, and A. Zink. 2012. New insights into the Tyrolean Iceman's origin and phenotype as inferred by whole-genome sequencing. *Nature Communications* 3: 698.

Kim, Y.-S., M.J. Kim, H.A. Hong, C.S. Oh, R. Bianucci, and D.H. Shin. 2017. The scientific and ethical background of the invasive studies on the Korean mummies of the Joseon dynasty. *Asian Journal of Paleopathology* 1: 5–11.

Kreissl Lonfat, B.M., I.M. Kaufmann, and F.J. Rühli. 2015. A code of ethics for evidence-based research with ancient human remains. *Anatomical Record* 298: 1175–1181.

Krutak, L. 2013. The power to cure: A brief history of therapeutic tattooing. *Zurich Studies in Archaeology* 9: 27–34.

Lowenstein, E.J. 2004. Paleodermatoses: Lessons learned from mummies. *Journal of the American Academy of Dermatology* 50: 919–936.

Lynnerup, N. 2007. Mummies. *Yearbook of Physical Anthropology* 50: 162–190.

Moissidou, D., J. Day, D.H. Shin, and R. Bianucci. 2015. Invasive versus non invasive methods applied to mummy research: Will this controversy ever be solved? BioMed Research International, 192829.
Oh, C.S., I.U. Kang, J.H. Hong, S. Slepchenko, J.B. Park, and D.H. Shin. 2017. Tracing the historical origin of Joseon mummies considering the structural similarities between the burial systems of Korean and Chinese dynasties. *Papers on Anthropology* 26 (2): 68–81.
Orlando, L., M.T. Gilbert, and E. Willerslev. 2015. Reconstructing ancient genomes and epigenomes. *Nature Reviews Genetics* 16 (7): 395–408.
Pringle, H. 2001. *The mummy congress. Science, obsession, and the everlasting dead*. New York: Hyperion.
Samadelli, M., M. Melis, M. Miccoli, E. Egarter Vigl, and A.R. Zink. 2015. Complete mapping of the tattoos of the 5300-year-old Tyrolean Iceman. *Journal of Cultural Heritage* 16 (5): 753–758.
Spindler, K., H. Wilfing, E. Rastbichler-Zisserning, D. zur Nedden, and H. Nothdurfter. 1996. *Human mummies: A global survey of their status and the techniques of conservation*, The man in the ice. Vol. 3. Wien: Springer.

Mundo Maya

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Introduction

Mundo Maya ("Maya World"), formerly referred to as La Ruta Maya ("The Maya Route"), is a joint effort among the Ministries of Tourism from Belize, El Salvador, Guatemala, Honduras, and Mexico to promote tourism throughout southern Mexico and upper Central America. Geographically, the Mundo Maya covers approximately 500,000 km^2, encompassing all of Belize and Guatemala, the western half of El Salvador, northern and western Honduras, and the Mexican states of Chiapas, Tabasco, Campeche, Yucatan, and Quintana Roo.

The Organización Mundo Maya program works with the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and other agencies to identify a wide range of cultural and natural resources considered appropriate for international tourism in this region, such as Pre-Columbian Maya ruins, Spanish Colonial towns, contemporary Maya villages, beaches, waterfalls, volcanoes, and tropical forests. By coordinating contiguous tourist destinations across national boundaries – all linked directly or indirectly to ancient and modern Maya peoples – the program seeks to facilitate the growth and development of the tourism industry, including ethnic tourism, adventure tourism, ecotourism, luxury tours, language learning, and other touristic experiences. The greater goal of the program is to strengthen local economies, assist in the planning and training of local economic development products and projects, preserve cultural patrimony and ecological resources, and advance the welfare of indigenous Maya communities.

Definition

A typical trip through the Mundo Maya (e.g., Brosnahan 1991; Knopf 1995) for a foreign tourist might begin in Cancún, Mexico, one of the largest resort areas developed along the Caribbean coast (Fig. 1). From there, one can travel inland to the World Heritage site of Chichén-Itzá and then back to Yucatan's coast to Tulum, touted as one of the most picturesque Maya ruins, set atop a steep cliff overlooking white sand beaches and turquoise waters. From Tulum, one can head south to Belize, crossing the border at Chetumal and heading on to Orange Walk to visit the Lamanai ruins, accessible only by a jungle river cruise. Heading farther south toward Belize City, one can book a tour of Altun Ha, Belize's largest Maya site. A side trip can be taken to visit the beaches of Ambergris Caye and Caye Caulker. From Belize City, one can head west to San Ignacio (a popular respite for tourists and archaeologists alike), to visit the ancient Maya city of Xunantunich and other nearby sites.

A short journey across the Guatemalan border leads to the twin cities of Flores and Santa Elena deep in the Petén jungle, which provide departure points to another large World Heritage site, Tikal. From Tikal, one can head south to Guatemala City

Mundo Maya, Fig. 1 Map of the Mundo Maya, showing a "typical" tourist route

to explore the colonial town of Antigua, the Maya markets of Chichicastenango, and the volcano-studded Lake Atitlán, surrounded by contemporary Maya villages. From Guatemala City, one can head east across the border to Honduras to visit a third World Heritage site, the ruins of Copán. Heading north from Copán to Honduras' coast, a ferry shuttles travelers to Roatán Island, which boasts access to the world's second longest coral reef – a mecca for divers and snorkelers. A short trip by plane or ship from Roatán back to Cancún completes the trip.

Historical Background

The idea of interlinking touristic experiences across the Maya region was originally introduced in the 1960s, with both the Organization of American States (OAS) and the Inter-American Development Bank (IDB) expressing interest in its promotion (Burtner 2004). However, the program did not advance until the "return to democracy" in Guatemala, with the inauguration of a civilian president (Vinicio Cerezo) in 1986. After tourism boycotts of the region by solidarity organizations

and the international media because of political unrest and human rights abuses subsided, the tourism circuit was officially launched in 1989 as "La Ruta Maya" by Wilbur Garrett (1989), a former editor of National Geographic magazine who formed La Ruta Maya Conservation Foundation and, together with Partners for Livable Places, presented the proposal to regional governments. Mexican President Carlos Salinas de Gortari convened the first meeting of the organization and, on behalf of the tourism ministry of Mexico, assumed initial leadership of the group. Amid growing economic uncertainty, tourism was viewed as a new strategy for regional economic development that moved away from agricultural exports and allowed areas without viable exports to be exploited.

The Mundo Maya concept, introduced by Guatemalan anthropologist Alberto Rivera, developed separately and with a distinct focus on "alternative" or sustainable tourism and community participation – both lacking within the originally proposed framework of La Ruta Maya. Driven by the potential for marketing and diversification of the tourism product, La Ruta Maya was transformed into Mundo Maya in 1992 (OMM 1992), with the intention of showcasing the living Maya alongside the archaeological sites of their ancestors. This move was pursued as part of an effort to attract a new type of tourist, coined the "cultural tourist," who tended to stay longer and spend more money than the average beach-going tourist (Machuca 1999). The ecological conservation goals that relied on "low-impact" tourism alternatives remained unchanged. In this plan, the Maya were portrayed as partners. However, the national ecotourism councils established to implement the goals of the program proved to be largely ineffective, encumbered by the inefficiency of government bureaucracies, and the result was an increased role for the private sector.

Between 1999 and 2003, the Mundo Maya Sustainable Development Tourism Program was established with an initial investment of US$150 million from the Inter-American Development Bank (IDB). As part of this initiative, a Technical Secretariat was created to identify priority investments, seek private sector funding for individual projects, and advance consultation and training programs to build capacity in local communities. Although regional and international funding bodies have continuously provided large sums of money through grants and loans, until recently these had been limited mainly to actions such as feasibility studies and broader organizational support. Since 2001, the IDB has been the main financier of the OMM, providing amounts that range from US$70,000 to US$40.8 million for individual projects (IDB 2003).

Key Issues/Current Debates

The success of the Mundo Maya program is uncertain. While economic growth, improved infrastructure, and the conservation of cultural and natural resources have all increased dramatically in recent years, two long-term changes to local populations have accompanied these developments. First, in packaging and branding the Mundo Maya for advertising, the incredible cultural and linguistic diversity of indigenous peoples in the region has become homogenized into a single idealized ethnic group, "the Maya" (van den Berghe 1994; Castañeda 1996), with which many local individuals do not identify (Montejo 2002; Magnoni et al. 2007). "Mayanizing' tourism as such has led to unresolved conflicts between developers, tourists, and non-Maya indigenous groups (Figueroa et al. 2012; Brondo 2013). Moreover, local communities are often considered by many to be the direct descendants of the ancient Maya civilization, an assumption that ignores a thousand years of conquest, colonialization, and incorporation into emerging nation states (Farriss 1992; Restall 2008). Distilling diversity in this way has created opportunities for ecotourism initiatives to romanticize contemporary Maya peoples as "noble savages" living in harmony with the environment, a colonialist attitude that subjects Maya communities to the state's market-based agendas (Wainwright 2011; Medina 2012).

Second, in promoting the Mundo Maya for touristic consumption, descendant communities and cultural heritage have become appropriated and highly commoditized in recent years (Medina

2003; McAnany 2016). The consequences of these ongoing processes can be devastating to local communities that increasingly experience loss of identity and cultural heritage through imposed and invented traditions, loss of participation in determining their future, loss of political and economic independence, and other forms of structural violence (Breglia 2006; Little 2008). McAnany and Parks (2012) have suggested the phrase "heritage distancing" to refer to these neoliberal processes of alienation that distance contemporary Maya peoples from their history and heritage, thereby advancing colonialist strategies to profit from tourism of the "ancient Maya" (Ardren 2004).

Future Directions

In the near and longer term, the Mundo Maya initiative will have to overcome a number of challenges if it is to be sustainable. Economic development has been uneven across the region, with some communities receiving greater emphasis than others (Brown 1999). This legacy, combined with recent "pro-poor" growth initiatives advanced by the United Nations Sustainable Development Goals (Ramos and Prideaux 2014), has contributed to the underdevelopment of non-tourist zones and has stimulated short-distance movements of increasingly larger numbers of people (Juárez 2002). In addition, the emphasis on tourism as a primary source of revenue for many communities has increased dependence on external funding agencies and multinational corporations, creating a system that is not resilient to future changes in global markets (Walker 2005). The recent violence in Mexico and the 2009 coup d'état in Honduras, for example, have had massive impacts on the tourism industry in those countries, sometimes compromising economies of the entire towns (Euraque 2010).

Perhaps the greatest challenge for the Mundo Maya is developing the capacity to adapt to the consequences of climate change over the next century, which will create social, economic, and political vulnerabilities, especially for growing urban populations. Major infrastructural changes may need to be implemented in coastal regions to counteract the damage caused by greater storm surge due to sea level rise (Wells et al. 2016). For inland regions, costs needed to mitigate the adverse impacts of increased storm frequency and intensity may escalate. This kind of long-term planning appears to be a concern of some entities involved in the organization (SECTUR 2017, 2011), yet long-standing problems with existing infrastructure have yet to be addressed in many areas of the Mundo Maya. If current trends persist, unequal access to the economic benefits of tourism development is likely to increase across social, economic, and geographic divides – contributing to the exacerbation of already existing inequalities throughout the region.

Cross-References

- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values, Communication of
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mexico's Heritage and Management
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

References

Ardren, T. 2004. Where are the Maya in ancient Maya archaeological tourism? Advertising and the appropriation of culture. In *Marketing heritage: Archaeology and the consumption of the past*, ed. Y. Rowan and U. Baram, 103–113. Walnut Creek: Altamira Press.

Breglia, L.C. 2006. *Monumental ambivalence: The politics of heritage*. Austin: University of Texas Press.

Brondo, K.V. 2013. *Land grab: Green neoliberalism, gender, and Garifuna resistance in Honduras*. Tucson: University of Arizona Press.

Brosnahan, T. 1991. *La ruta Maya – a travel survival kit*. Berkeley: Lonely Planet Publications.

Brown, D.F. 1999. Mayas and tourists in the Maya world. *Human Organization* 58: 295–304.

Burtner, J.C. 2004. Travel and transgression in the Mundo Maya: Spaces of home and alterity in a Guatemalan tourist market. Unpublished PhD dissertation, University of Texas, Austin.

Castañeda, Q.E. 1996. *In the museum of Maya culture: Touring Chichén Itzá*. Minneapolis: University of Minnesota Press.

Euraque, D.A. 2010. *El golpe de estado del 28 de junio de 2009, el patrimonio cultural y la identidad nacional de Honduras*. San Pedro Sula: Centro Editorial.

Farriss, N.M. 1992. *Maya society under colonial rule: The collective enterprise of survival*. Princeton: Princeton University Press.

Figueroa, A.J., W.A. Goodwin, and E.C. Wells. 2012. Mayanizing tourism on Roatán Island, Honduras: Archaeological perspectives on heritage, development, and indigeneity. In *Global tourism: Cultural heritage and economic encounters*, ed. S. Lyon and E.C. Wells, 43–60. Lanham: AltaMira Press.

Garrett, W.E. 1989. La Ruta Maya. *National Geographic* 4: 424–479.

Inter-American Development Bank (IDB). 2003. Initiative launched to promote sustainable tourism in Mayan region of Central America. Electronic document, http://www.iadb.org/en/news/news-releases/2003-01-16/initiative-launched-to-promote-sustainable-tourism-in-mayan-region-of-central-america,56.html. Accessed 13 July 2017.

Juárez, A.M. 2002. Ongoing struggles: Mayas and immigrants in tourist era Tulum. *Journal of Latin American Anthropology* 7: 34–67.

Knopf Guides. 1995. *The route of the Mayas*. New York: Alfred A. Knopf.

Little, W. 2008. Living within the Mundo Maya project: Strategies of Maya handicrafts vendors. *Latin American Perspectives* 35: 87–102.

Machuca, J.A. 1999. Mundo Maya: el proyecto de una nueva regionalización en el contexto de la globalización. In *Dimensión social del patrimonio cultural del Mundo Maya*, ed. N. Peñaflores Ramirez, L. Castañeda Cerecero, and E. Marmolejo Morales, 21–25. México: Instituto Nacional de Antropología e Historia.

Magnoni, A., T. Ardren, and S. Hudson. 2007. Tourism in the Mundo Maya: Inventions and (mis)representations of Maya identities and heritage. *Archaeologies: Journal of the World Archaeological Congress* 3: 353–383.

McAnany, P.A. 2016. *Maya cultural heritage: How archaeologists and indigenous communities engage the past*. London: Rowman and Littlefield.

McAnany, P.A., and S. Parks. 2012. Casualties of heritage distancing: Children, Ch'orti' indigeneity, and the Copán archaeoscape. *Current Anthropology* 53: 80–107.

Medina, L.K. 2003. Commoditizing culture: Tourism and Maya identity. *Annals of Tourism Research* 30: 353–368.

Medina, L.K. 2012. The uses of ecotourism: Articulating conservation and development agendas in Belize. In *Global tourism: Cultural heritage and economic encounters*, ed. S. Lyon and E.C. Wells, 227–250. Lanham: Altamira Press.

Montejo, V. 2002. The multiplicity of Mayan voices: Maya leadership and the politics of self-representation. In *Indigenous movements, self-representation, and the state in Latin America*, ed. K.B. Warren and J.E. Jackson, 123–148. Austin: University of Texas Press.

Organización Mundo Maya (OMM). 1992. Convenio constitutivo de la Organización Mundo Maya. Electronic document, http://www.inecc.gob.mx/descargas/ai/con199323.pdf. Accessed 13 July 2017.

Ramos, A.M., and B. Prideaux. 2014. Indigenous ecotourism in the Mayan rainforest of Palenque: Empowerment issues in sustainable development. *Journal of Sustainable Tourism* 22: 461–479.

Restall, M. 2008. Maya ethnogenesis. *Journal of Latin American Anthropology* 9: 64–89.

Secretaria de Turismo, México (SECTUR). 2011. *Mundo Maya 2012*. Boletín Informativo 111/2011. México: Secretaría de Turismo.

Secretaria de Turismo, México (SECTUR). 2017. Diagnostico Mesa 4 Mundo Maya. *Foro sobre Gobernanza para un Turismo Sustentable, 4 de Julio de 2017, Mérida, Yucatán*. Electronic document, https://www.gob.mx/cms/uploads/attachment/file/240753/Mesa_4_Mundo_Maya.pdf. Accessed 20 July 2017.

van den Berghe, P. 1994. *The quest for the other: Ethnic tourism in San Cristóbal, Mexico*. Seattle: University of Washington Press.

Wainwright, J. 2011. *Decolonizing development: Colonial power and the Maya*. Hoboken: Wiley.

Walker, C. 2005. Archaeological tourism: Looking for answers along Mexico's Maya Riviera. *National Association for the Practice of Anthropology Bulletin* 23: 60–76.

Wells, E.C., R.K. Zarger, L.M. Whiteford, J.R. Mihelcic, E.S. Koenig, and M.R. Cairns. 2016. The impacts of tourism development on perceptions and practices of sustainable wastewater management on the Placencia Peninsula, Belize. *Journal of Cleaner Production* 111: 430–441.

M

Murra, John

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Basic Biographical Information

John Victor Murra (Fig. 1) (24 August 1916 [Odessa, Ukraine]–16 October 2006 [Ithaca, NY, USA]) was an American economic anthropologist who combined ethnohistory, ethnography, and

Murra, John, Fig. 1 John Victor Murra (1965). (Credit: John Victor Murra Archive, Junius Bird Laboratory for South American Archaeology, Division of Anthropology, American Museum of Natural History)

archaeology to study state societies of the South American Andes, in particular the Inca Empire (Tawantinsuyu). In his youth in Bucharest (Romania), Murra studied modern languages at the Lycée Georghe Lazer where he learned French, English, and German, in addition to Russian and Romanian. He would later develop fluency in Spanish. In Bucharest, Murra became involved in communist youth groups and was briefly incarcerated. Upon the recommendation of his father, Murra moved to Chicago in 1934 to pursue his education and lived with an uncle. There, he continued his political activism and volunteered to fight alongside the anti-fascist, Republican coalition in the Spanish Civil War (1936–1939). His military papers were issued in 1937, and in 1939, Murra was injured in combat, temporarily paralyzed, and interned in a French camp.

Upon his return to the USA, Murra resumed coursework at the University of Chicago and majored in sociology. In 1940, he participated in his first archaeological excavations as part of the Illinois Field School directed by Fay-Cooper Cole. In 1941 and 1942, Murra was hired as Supervisor for the "Project 9B-Ecuador-1941-42," one of the 11 Latin American projects under the umbrella of the Institute of Andean Research and funded in part by the Council of National Defense of the US Department of State. The field project was officially directed by Fay-Cooper Cole. Along with Field Assistant Donald Collier, Murra carried out survey and excavations in the south of Ecuador, most notably at the site of Cerro Narrío (Collier and Murra 1943). Based on his field research in Ecuador, he was invited by Julian H. Steward to contribute to the *Handbook of South American Indians* (Murra 1946, 1948).

Upon graduating with a MA in anthropology in 1942 (thesis entitled "Cerro Narrío and Andean Chronology"), Murra continued his war effort by helping administer questionnaires to Spanish Civil War veterans. The following year, he assisted anthropologist Ruth Benedict in interviewing Thai (called Siamese at the time) immigrants to the USA. He became instructor of anthropology at the University of Chicago in 1943 and also held visiting positions at the University of Wisconsin, University of Puerto Rico, and Brooklyn College until 1950. At that time, Murra was hired at Vassar College where he would teach undergraduate women until 1963. Before his hire at Vassar, he also worked in the Caribbean as part of the "Study of Man in the Tropics" program, supervising fieldwork students from various universities including Yale.

In 1956, Murra completed a PhD dissertation on "The Economic Organization of the Inca State" at the University of Chicago. His doctoral research was carried out in the New York Public Library and based mainly on published sources. Once naturalized in the USA and with a passport in hand, Murra returned to the Andes in the late 1950s. Between 1963 and 1966, he directed the multidisciplinary project "A Study of Inca Provincial Life" funded by the National Science Foundation. The project incorporated ethnohistory, ethnography, linguistics, ethnobotany, and archaeological research at Huánuco Pampa. Upon encouragements from local authorities,

Murra, John, Fig. 2 Murra at Santa María del Valle, Huánuco (1964). (Credit: John Victor Murra Archive, Junius Bird Laboratory for South American Archaeology, Division of Anthropology, American Museum of Natural History)

Murra's team also worked on the restoration of Inca masonry (Murra and Hadden 1966). From that moment onward, Murra became recognized as a leading authority on Peru and the Inca. While in Peru, he also instructed at the Universidad Nacional Mayor de San Marcos. Upon his return from the field in 1966, Murra became the first NSF postdoctoral associate at the Smithsonian Institute. In 1968, he joined the anthropology faculty at Cornell University where he taught, researched, and advised graduate students until his retirement in 1982. As Professor Emeritus, Murra continued to be active as he consulted and taught at various institutions including the Museo Nacional de Bolivia (1982–1983), Universidad Complutense de Madrid (1983–1984), Universidad de Chile (1984), London School of Economics (1987), and Universidad de Buenos Aires (1987–1988) (Figs. 2 and 3).

Throughout his career, Murra was active in various anthropological organizations including the American Society for Ethnohistory (board member [1962–1969], director [1970–1971]), the American Ethnological Society (councilor [1961–1964], director [1972–1973]), the Institute of Andean Research (director [1977–1983]), and the American Anthropological Association (president nominee). He also was a founding member of the Instituto de Estudios Peruanos and the Asociación Peruana de Antropología e Historia.

M

Major Accomplishments

Murra is most famous for his pioneering contributions to economic anthropology and ethnohistorical research in the Andes. Methodologically, he recognized the importance of colonial reports (*visitas*), brought attention to Felipe Guaman Poma de Ayala's accounts and coordinated their translation from vernacular Spanish and Quechua (Guaman Poma de Ayala 1980 [ca. 1616]), as well as approached historical documents from an anthropological perspective (Murra 1961, 1962). Murra's ethnohistorical insights have shaped the understanding of the role of craft and food production and state-sponsored settlement under the Inca imperial regime. His dissertation work on the economic organization of the Inca state led to the realization of the importance of redistributive economic systems in the Andes (Murra 1980).

Through the ethnohistorical study of kin ties and trade systems during Inca times, as well as

Murra, John, Fig. 3 Murra (center) at Muru Wayin, Huánuco, with Juan Ossio (left) and Rogger Ravines (right) (1964). (Credit: John Victor Murra Archive, Junius Bird Laboratory for South American Archaeology, Division of Anthropology, American Museum of Natural History)

fieldwork in the Huánuco region of Peru, Murra (1975, 1985) elaborated the "ecological complementarity" explanatory framework. According to this model, also known as "zonal complementarity" or "vertical archipelago," ethnic groups, or in the case of the Inca a state system, exploited various ecological niches located at different elevations along the Andean landscape. Murra imagined these non-contiguous productive regions as "islands," tied together through kinship and economic interdependencies. A classic case is represented by the Lupaca, a large ethnic kingdom centered around the Lake Titicaca that included peripheral colonies in the coastal region of northern Chile, as well as in the eastern slopes of the Andes toward the Amazonian lowlands.

Although less famous for his archaeological contributions, Murra nevertheless pioneered field archaeology and culture history in Ecuador and in the Huánuco region of the north central highlands of Peru. He directed a multidisciplinary team at Huánuco Pampa which helped train several US and Peruvian archaeologists and fueled various studies of Inca provincial life, storage, material culture, and architecture (Morris et al. 2011; Morris and Thompson 1970, 1985). The American Museum of Natural History has archives of Murra's project at Huánuco Pampa, while the Smithsonian Institute holds the bulk of his papers. Murra was a strong and early advocate of Afro-American civil rights.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Altitude Environments in Archaeology
- ▶ Andes: Prehistoric Period
- ▶ Archaeobotany
- ▶ Archaeology and Geography
- ▶ Archaeology as Anthropology
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Central Andes: Prehispanic Hunter-Gatherers
- ▶ Early Complex Society in South America, The Development of
- ▶ Inca State and Empire Formation
- ▶ Oral Sources and Oral History
- ▶ Paleoethnobotany
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ South American Geography and Chronology

References

Collier, Donald, and John V. Murra. 1943. *Survey and excavations in Southern Ecuador*, Field Museum of Natural History Anthropological Series 35. Publication 528. Chicago: Field Museum Press.

Guaman Poma de Ayala, Felipe. 1980 [ca. 1616]. *El primer nueva crónica y buen gobierno*, ed. John V. Murra and Rolena Adorno. Colección América Nuestra 31. Quechua translation by Jorge Urioste. México: Siglo Veintiuno.

Morris, Craig and Donald E. Thompson. 1970. Huanuco Viejo: An Inca Administrative Center. *American Antiquity* 35 (3): 344–362.

Morris, Craig, and Donald E. Thompson. 1985. *Huánuco pampa: An Inca City and its Hinterland*. London: Thames and Hudson.

Morris, Craig, R. Alan Covey and Pat H. Stein. 2011. *The Huánuco Pampa Archaeological Project (Volume 1, The Plaza and Palace Complex)* Anthropological Papers of the American Museum of Natural History 96. New York: American Museum of Natural History.

Murra, John V. 1946. The historic tribes of Ecuador. In *Handbook of South American Indians*, ed. Julian H. Steward, 161–168. Washington, DC: Smithsonian Institute.

Murra, John V. 1948. The Cayapa and the Colorado. In *Handbook of South American Indians*, ed. Julian H. Steward, 277–291. Washington, DC: Smithsonian Institute.

Murra, John V. 1961. Social structural and economic themes in Andean ethnohistory. *Anthropological Quarterly* 34 (2): 47–59.

Murra, John V. 1962. An archaeological "restudy" of an Andean ethnohistorical account. *American Antiquity* 28 (1): 1–4.

Murra, John V. 1975. *Formaciones económicas y políticas en el mundo andino*. Lima: Instituto de Estudios Peruanos.

Murra, John V. 1980. *The economic organization of the Inca State*. Greenwich: JAI Press.

Murra, John V. 1985. "El Archipélago Vertical" Revisited. In Andean Ecology and Civilization: An Interdisciplinary Perspective on Andean Ecological Complementarity, edited by Shozo Masuda, Izumi Shimada and Craig Morris, pp. 3–13. Papers from the Wenner-Gren Foundation for Anthropological Research, 91. Tokyo: University of Tokyo Press.

Murra, John V., and Gordon J. Hadden. 1966. Informe presentrado al Patronato Nacional de Arqueología sobre la labor de limpieza y consolidación de Huánuco Viejo (20 de julio a 23 de noviembre 1965). In *Cuadernos de Investigación Antropológica*, 129–144. Huánuco: Universidad Nacional Hermilio Valdizán.

Further Readings

Barnes, Monica. 2009. John Victor Murra (August 24, 1916–October 16, 2006): An interpretive biography. *Andean Past* 9: 1–63.

Barnes, Monica. 2010. John Victor Murra's Provincial Inca life project and an American national anthropology. *Antiquity* 84 (326):On-Line Project Gallery. http://www.antiquity.ac.uk/projgall/barnes326/

Barnes, Monica. 2013. John Victor Murra, arqueólogo accidental: de Cerro Narrío a Huánuco Pampa. In *Historia de la Arqueología en el Perú del siglo XX*, ed. Henry Tantaleán and César Astuhuamán, 551–574. Lima: Instituto Francés de Estudios Andinos.

Block, David, and Monica Barnes. 2009. Bibliography of works by, in honor of and about John Victor Murra. *Andean Past* 9: 48–63.

Henderson, John S., and Patricia J. Netherly. 1993. Introduction: Murra, materialism, anthropology, and the Andes. In *Configurations of power: Holistic anthropology in theory and practice*, ed. John S. Henderson and Patricia J. Netherly, 1–8. Ithaca: Cornell University Press.

Lechtman, Heather N., Freda Yancy Wolf de Romero, Patrica J. Netherly, Ana María Lorandi, Victoria Castro, Rolena Adorno, Inge Maria Harman, and Silvia Raquel Palomeque. 2009. John Victor Murra: A mentor to women. *Andean Past* 9: 65–85.

Salomon, Frank. 2009. "Kinsmen resurrected" John Victor Murra and the history of archaeology. *Andean Past* 9: 87–102.

M

Murray, Tim

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Basic Biographical Information

Tim Murray (Fig. 1) is an archaeologist and professor based in Melbourne, Australia. His interest in the material culture of the past began as a child collecting stone tools on his family property in rural New South Wales. He was educated in Sydney and embarked on an arts degree at the University of Sydney in the late 1970s, combining philosophy, anthropology, and history. He graduated with a double honors degree in history and anthropology, exploring the life and career of Gordon Childe (anthropology) and nineteenth-century race theory (history). After fellowships in Cambridge and the University of Arizona, he returned to Sydney to complete a doctoral dissertation, entitled *Remembrances of Things Present:*

Murray, Tim, Fig. 1 Tim Murray

Appeals to Authority in the History and Philosophy of Archaeology.

Tim Murray joined Professor Jim Allen in his newly formed archaeology department at La Trobe University in Melbourne, Australia, in 1986 and was appointed to the Chair on Allen's retirement in 1995. He became Head of the School of Historical and European Studies in 2001 and Dean of the Humanities and Social Sciences in 2010. At this time he was appointed Charles La Trobe Professor in recognition of his distinguished service to the University in research. He stepped down as Dean in 2014 and has returned to research.

Throughout his career, Tim Murray has pursued ambitious academic research while managing senior administrative duties. He remained active and engaged in the international research community as a research fellow and has held visiting professorships in France, the United Kingdom, the Netherlands, Sweden, the People's Republic of China, and the United States of America. He was made a Fellow of the Society of Antiquaries of London and Australian Academy of the Humanities in 2003. He was awarded a Doctor of Letters by La Trobe in 2015 in recognition of his contribution to archaeological theory, historical archaeology, and the history of archaeology.

Major Accomplishments

Tim Murray is best known as a theoretical archaeologist. In the 1980s and 1990s, he was one of a small group of archaeologists instrumental in focusing on the importance of temporality in the archaeological record that has come to be known as time perspectivism (Murray 1999a). He has been a vocal critic of theoretical approaches that reduce archaeology to a kind of "paleoethnography" by adopting models from anthropology with little consideration about how to adapt these to make them more appropriate to prehistoric archaeological contexts (Lucas 2007: 156). Throughout his career, these concerns have underpinned a broad engagement with all levels of archaeological inquiry, its history, and politics.

His early research on the prehistory of Australia and the Pacific was in the field of settlement patterns and frontier modeling. He has conducted pioneering research into contact societies and the history of the Van Diemen's Land Company. Following a dispute with traditional owners in Tasmania in the early 1990s, his contentious pursuit of access to archaeological data drew global attention to the negotiation of cultural rights of archaeological recourses. Many years after the resolution of the debate (Lucas 2007: 156), Murray continues to comment on the maturing relationship between archaeologists and traditional owners of Australia's prehistoric archaeological information (Murray 2011).

In recent years Murray's exploration of the archaeology of the modern city has fostered rich, data-driven contributions to the histories of working-class Melbourne and Sydney, which have significant global implications. This work is complemented by Murray's multi-scalar approach to the analysis of the city (known affectionately as the telephone dial, Murray and

Mayne 2001: 104), where the dynamic intersection of historical and archaeological records of "vanished communities" and urban landscape frames has underwritten new histories of the modern city. These research projects into the recent past have also spawned his current interest in transnational archaeologies, which are the subject of the series of Smuts lectures delivered in Cambridge in 2006.

A deep interest for the theoretical development, industry, and social orders of the nineteenth century underlies much of Murray's research into the historiography of the discipline of archaeology. He has edited five volumes of the *Encyclopedia of Archaeology* (Murray 1999b, 2001) and written a single-volume history of archaeology *Milestones in Archaeology* (2007). His research on pioneers in Australian archaeology remains a seminal and much-cited work (Murray and White 1981).

Despite his reputation as theoretical archaeologist, throughout his career, Murray has committed to a range of initiatives to improve practices in archaeology, heritage, education, and research across the humanities. Handbooks on archaeological practice (Birmingham and Murray 1987), the establishment of the first indigenous training program for heritage managers, and a digital repository for historical archaeological databases in 2011 have supported the integration of archaeological outcomes for public consumption in Australian museums and school curricula.

Tim Murray built the La Trobe Archaeology Program into a global archaeology department and has fostered the research of many students and colleagues. He has successfully engaged in productive collaborations with historians, technical specialists and heritage experts, and archaeologists working in the discipline's many subfields.

Cross-References

- ▶ Allen, Jim
- ▶ Australasian Historical Archaeology
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Childe, Vere Gordon (Theory)

References

Birmingham, J., and T. Murray. 1987. *Historical archaeology in Australia: A handbook*. Sydney: Australian Society for Historical Archaeology.

Lucas, G. 2007. Visions of archaeology. An interview with Tim Murray. *Archaeological Dialogues* 14 (2): 155–177.

Murray, T. 1999a. *Time and archaeology*. London: Routledge.

Murray, T. 1999b. *Encyclopedia of archaeology: The great archaeologists*. Santa Barbara: ABC-CLIO Press.

Murray, T., ed. 2001. *Encyclopedia of archaeology: History and discoveries*. Santa Barbara: ABC-CLIO Press.

Murray, T. 2007. *Milestones in archaeology*. Santa Barbara: ABC-CLIO Press.

Murray, T. 2011. Archaeology and indigenous peoples: A maturing relationship? *Annual Review of Anthropology* 40: 363–378.

Murray, T., and A. Mayne. 2001. Imaginary landscapes: Reading Melbourne's 'Little Lon'. In *The archaeology of urban landscapes: Explorations in slumland*, ed. A. Mayne and T. Murray, 89–105. Cambridge, UK: Cambridge University Press.

Further Readings

Murray, T., and J.P. White. 1981. Cambridge in the bush? Archaeology in Australia and New Guinea. *World Archaeology* 13: 255–263.

M

Museo Chileno de Arte Precolombino, Chile

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Basic Information

Located on 361 Bandera St., the Chilean Museum of Pre-Columbian Art (www.precolombino.cl) preserves, investigates, exhibits, and spreads one of the best and most prestigious private collections of Pre-Columbian art of the American continent. From the initial donations made by the founder of the institution, the Chilean architect Sergio Larraín García-Moreno (1905–1999), collections have increased due to new donations, extended loans and acquisitions among other

issues. At present, the estate holds 8,500 objects, some of which are presented in two permanent exhibitions: Pre-Columbian America in Art (Aldunate et al. 1998) and Chile before Chile (Sinclaire 2014).

To visit *Pre-Columbian America in Art*, it is necessary to go to the second floor, where it can be observed a monumental metallic map of North America, Central America, the Caribbean and South America, with the main cultural areas and indigenous societies that developed before the European contact. Distributed in seven rooms, with an area of 740 m^2, there are 75 display units in which approximately 700 pre-Columbian pieces are exhibited. With a map of the American continent without the political boundaries that today divide the countries, the exhibition tries to represent the diversity of American peoples through their works of art, trying to balance an aesthetic approximation with a thematic approach, without putting aside the historical, geographical and cultural context of the objects. The starting point of the visit is an introductory room, where the pieces that the Museum estimates are its masterpieces are displayed. At the end of this room, the visitor can go to the right and visit the show cases destined to the Middle and Mesoamerican areas, or go to the left, to visit those consecrated to the Southern and Central Andean areas, and the Caribbean and Amazonian areas. Maps and pictures on the cultural area corresponding to each room provide spatial, temporal and cultural information. The itinerary includes a room dedicated to textile art, considered by many as a "Major Art of the Andes". A second itinerary, shorter and exclusively thematic, can be made circulating in the outer corridors of the rooms.

To visit the *Chile before Chile* exhibition, it is necessary to go down to the first floor of the building. The area of its only room covers 440 m^2, where 300 objects are displayed in 17 large showcases and other display units. The exhibition is divided into five geocultural regions: Far North, Near North, Central area, Southern area and Rapa Nuí (Eastern Island). Although the montage is markedly aestheticizing and the content essentially thematic, a panel of more than 4 m long provides space-time information on the societies mentioned in each expository unit. The purpose of this exhibition is to celebrate the first human societies that inhabited the territories that today constitute the Republic of Chile, to make their achievements, art and beliefs public, including these peoples'descendants, the present indigenous ethnic groups. Contents related to this exhibition can be found at www.chileantesdechile.cl.

In the first floor, corresponding to the surface level of the building, there are two rooms, with an area of 285 m^2, which are used together or separately for temporary exhibitions. In the site www.precolombino.cl many of the more than 50 temporary exhibitions made by the Museum during its more than three decades of existence can be "visited". In the book Compartiendo memoria (Berenguer and Torres 2011) curatorial and museographical foundations can be known as well as the backstage of 30 those exhibitions, as different members of the Museum's historical community remember. Temporary exhibitions for children have been set up, others focused on a single large piece of pre-Columbian art, in a unique theme or a single culture, some focused on topics usually avoided in our milieu, or in traditionally excluded groups from the national museum discourse.

The Museum is much more than a set of showrooms. An important component is the Department of Conservation, where the heritage of archaeological and ethnographic objects of the institution is registered, preserved and restored, as well as those collections in transit due to some temporary exhibition. The Curatorial Department is responsible for developing the concept, the script and the contents of the exhibitions, as well as advising visiting curators, editing publications associated with each exhibition and organizing scientific meetings. In addition, each curator develops basic research projects, particularly in archaeology, and supervises projects of associated researchers, mainly those related to the Museum's collections, to pre-Hispanic art or to art with pre-Hispanic roots. Since 1986, this department has published the Bulletin of the Chilean Museum of Pre-Columbian Art, an

indexed journal in the main international indexes of scientific publications and the only one that publishes articles on pre-Columbian art from all over the Continent (www.boletinmuseoprecolombino.cl). With the support of private institutions, the Museum has published numerous exhibition catalogs, room guides, books, magazines and other printed material, generally in Spanish and English, which have served to increase the library's patrimony through exchange with other institutions. Almost all of these publications are on the site www.precolombino.cl, and, according to the open access policy maintained by the institution in this matter, they can be downloaded freely by any user. The Library of the Museum is a unit specialized in books and magazines of archaeology, American prehistory, anthropology, pre-Columbian art and museology, which supports the different departments and units of the institution, as well as students, professionals, researchers, artists and various sectors, at national and international level, that demand the use of information resources. One of the most recent creations is the Intangible Heritage Center, a unit focused on the local culture of Chile that offers an audiovisual archive of more than 10,000 records in video, audio and photography format to the public. The center registers, preserves, investigates and spreads oral knowledge, memory, art, ritual, history and the indigenous and *mestizo* identity of Chile. The Museum's website (www.precolombino.cl), with its several hundred pages and its great amount of information, has become a global reference on pre-Columbian America. Other presences of the Museum in the network are www.lospreco lombinos.cl (for children) and www.chilepre colombino.cl.

History

The Chilean Museum of Pre-Columbian Art operates in the former Palace of the Royal Customs, one block from the *Plaza de Armas* in Santiago. The occupation of the place dates back to pre-Hispanic times, as evidenced by the excavations carried out in the courtyards of the present Museum, which have recovered archaeological materials from the Inca and immediately Pre Inca periods (Berenguer and Torres 2011: 184–185). During the first years of the Colony it was the residence of Juan de Cuevas, Corregidor of Santiago, and between the seventeenth and eighteenth centuries, there were Jesuit settlements. At the beginning of the nineteenth century, Governor Luis Muñoz de Guzmán ordered to build the Royal Customs Palace and commissioned the military engineer José María Atero to do it. He built it between 1803 and 1807 with the Italian architect Joaquín Toesca and Ricci's plan. It is a neo-classical style building with two floors and two large interior courtyards. After Independence (1810), the building houses the National Library and from 1845 to 1968 the Courts of Justice. After a fire that year, which destroyed its facilities and archives, the palace is declared Historic Monument of Chile. In 1979, the property was transferred to Santiago City Hall, which commissioned the architect Fernando Riquelme to recover the first floor of the building, intervening through the construction of a pedestrian walkway to avoid its demolition. At the end of that decade, the Larraín Echenique Family Foundation signed an agreement with Santiago City Hall, through which the Chilean Museum of Pre-Columbian Art was created. According to this agreement, the building entity delivers the former Palace of Royal Customs for the operation of the institution and an annual contribution of money to ensure its financing. The Foundation in turn provides a collection of a thousand pre-Columbian objects and an important bibliographical and documentary complement. In 1979, under the direction of the architect Jaime Burgos Frías, the reconstruction and restoration works of the north wing of the palace began and the expert museologist and Italian architect Darko Pandakovic's counselling is achieved. Pandakovic is responsible for the design and interior equipment of the restored area of the building (Berenguer and Torres 2011: 36–40). The Museum is opened on December 10, 1981 with a permanent exhibition and a catalog of the show (Anónimo 1981). Through a series of restoration works, carried out in the 1980s and 1990s, the palace is completely rebuilt and fully equipped,

with all its facilities being used by the institution (Aldunate et al. 1998: 77).

The genesis of the original collection of the Museum is found in the passion that Sergio Larraín García-Moreno (1905–1999) cultivates, from a very early age, for medieval, oriental and modern art. This passion and his taste for collecting lead him to fall in love with pre-Columbian art, finding in this artistic past of America a stimulus to form a collection of works from the main pre-European cultures of the American continent. (Aldunate et al. 1998: 69) In 1979, Larraín donates this collection to the Fundación Familia Larraín Echenique to create the Chilean Museum of Pre-Columbian Art, and 9 years later he makes a second donation (Berenguer 1988), which materialized at the end of the following decade, after his death. One of the main features of this collection is that its pieces were not chosen for scientific or anthropological reasons, neither encyclopedic reasons, but according to the eminently esthetic criterion of the donor. From there the name "museum of art" derives, to distinguish it from one of anthropology, archaeology or ethnography (Aldunate et al. 1998: 72). However, at the time of forming the Museum's staff, it is integrated mainly by archaeologists. As a consequence, almost from the outset, a contradiction arises between the primarily aesthetic vision with which the institution is founded and the anthropological vision in which archaeologists are usually trained in Chile (Berenguer and Torres 2011: 34–35, 47–48, 51). Given this characteristic and the fact that the initial team lacked training and experience in museology, the Museum is developed with a very particular professional mark, which cannot be ignored when considering the uniqueness of its cultural offer.

The most recent remodelling of the building was carried out by the architect Smiljan Radic and concluded in 2014. He understood the redesign of the north and south patios of the building, the installation of a cafeteria, a shop and a new reception. He also understood the construction of the great hall for the permanent exhibition *Chile before Chile*, located in the underground and whose museographic project was commissioned to the British designer Geoffrey Pickup. Radic's remodelling included the construction of spacious underground facilities for the Collections Department and the Library, and the building's second floor for the offices of the Curatorial Department and the Education / Mediation and Communications and Public areas.

Major Impact

During the last 30 years and especially since the return of democracy (1990) and the enactment of Indigenous Law No. 19,253 (1993), Chile has significantly increased the interest and appreciation for the vernacular cultures of the American continent. The Chilean Museum of Pre-Columbian Art has played an important role in this change of way of thinking. A museum dedicated to art, focused on the pre-Columbian, Americanist and without frontiers, came to fill an evident void, since there was nothing similar in Chile, or in Latin America. The message of the inaugural exhibition, at the end of 1981, was that the countries of America have a common past in the indigenous peoples' history and art. Making this past known was important for a society like Chile, educated in the idea of the cultural homogeneity of the nation, to recognize its indigeneous roots, that is, its own ethnodiversity.

From this first permanent exhibition, carried out within a historical-cultural theoretical perspective, over the years, thematically structured exhibitions were transposed, partly due to the influence of the temporary exhibitions, but above all, because they allowed diverse topics to be approached in a more attractive way and without the linearity of chronologically structured expositions. *Pre-Columbian America in Art* (1998) is an example of that change of vision applied to the permanent exhibition.

Although the Museum originated in the appreciation of the aesthetic values of the pre-Columbian world, it has always been a place where principles, values and postures were confronted and questioned. The internal conflict for more than two decades between a conception of art as something purely aesthetic or contemplative and the anthropological approach to its contents, was solved as the Cultural Studies in the world overturned the old paradigm of the

autonomy of art, to install this within history and society. Although the aesthetic considerations on the exhibited pieces are important and from a Western perspective it is possible to evaluate these pieces as works of art, it cannot be forgotten that almost all are ritual objects. Today the Museum understands that just as there is gratification in contemplating the beauty of these objects, so there is in understanding its historical, functional and symbolic contents.

Among the most pressing challenges for the Museum over these years, one will be to address the legitimate concern of the sponsors for measuring the impact of the initiatives they support through the number of visitors. The difficulty is to do so without giving too much to the so-called fallacy of numerical approval and without falling into the formula of the museum-spectacle. Another challenge is to readjust the offer to a more educated, demanding, participatory and commited audience to the value of cultural diversity. This is somehow the result of the Museum's own success. To satisfy it, however, it will be necessary to move towards new discourses, formats and ways of looking, perhaps towards plural narratives and alternative visions. In particular, the Museum should advance towards proposals that use the past to reflect on the present, fostering a form of linkage between object, interpretive and public content that some call contemporaneity of meaning.

References

Aldunate, C., F. Mena, and R. Ruiz, eds. 1998. *América Precolombina en el Arte*. Santiago: Banco Santiago/Museo Chileno de Arte Precolombino.

Anónimo. 1981. *Museo Chileno de Arte Precolombino*. Santiago: Banco O'Higgins/Museo Chileno de Arte Precolombino.

Berenguer, J., ed. 1988. *Obras Maestras. Museo Chileno de Arte Precolombino*. Santiago: Banco O'Higgins/Museo Chileno de Arte Precolombino.

Berenguer, J., and A. Torres. 2011. *Compartiendo memoria: 30 años del Museo Chileno de Arte Precolombino*. Santiago: Museo Chileno de Arte Precolombino/Consejo Nacional de la Cultura y las Artes.

Sinclaire, C., ed. 2014. *Chile antes de Chile*. Santiago de Chile: Museo Chileno de Arte Precolombino.

Museo de La Plata

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Basic Information

The Museo de La Plata (La Plata Museum) (Fig. 1) belongs to the Facultad de Ciencias Naturales y Museo (School of Natural Sciences and Museum) of Universidad Nacional de La Plata (La Plata National University), Argentina. It was founded in 1884 as a museum of Buenos Aires Province dedicated to research and the display of Natural History, Archaeology, and Fine Arts, among other disciplines. In 1906 it became part of the public university. Since then it has played a key role at national level in academic training in Anthropology in close proximity to the Natural Sciences, a field that has been the main focus of the institution since the early 1920s (García 2010). It is currently an important center for paleontological, zoological, botanical, and geological research and for studies of the different anthropological fields organized within the Anthropology, Ethnography, and Archaeology Divisions. Since its inception, the museum has significantly contributed to education through its exhibits, three of them dedicated to the Archaeology of Argentina, Latin America, and Egypt. The museum's magnificent neoclassic building were designed by the Swedish Henrik Gustav Adam Aberg and the German Carl Ludwig Wilhelm Heynemann. The building was inspired by the European museums of the time, but it had a delicate Americanist influence on its decoration, with designs depicted on textiles, metal objects, and pottery of Aztec, Maya, Andean, and Mapuche origins.

Major Impact

Archaeology, which in Argentina became a research field in the second half of the nineteenth century, was one of the pillars of the Museo de La

Museo de La Plata, Fig. 1 La Plata Museum. (Photo by Bruno Pianzola)

Plata. The museum's foundational collection comprised mainly of anthropological and archaeological objects donated by its founder, the collector of antiquities Francisco P. Moreno (Farro 2009; Podgorny 2009). Moreno appointed the naturalist Florentino Ameghino for a short period as the museum's deputy director and secretary, who later proposed the existence of a local hominization process, arguing that humankind had originated in the Argentinean Pampas during the Tertiary period. Moreno also involved the institution in the border dispute with Chile, organizing topographic expeditions along the Andes. Samuel Lafone Quevedo and Luis María Torres, who dedicated much of their lives to Archaeology in Argentina, succeeded Moreno as directors of the museum. In this context, the discipline was an essential element on which the foundations of the institution were laid in its first 50 years of existence. This led to scientific expeditions for the collection of archaeological objects on the field and to the acquisition of important collections, such as that of Benjamín Muniz Barreto, consisting of a unique documentary and photographic record and more than 10,000 items obtained in excavations in the Northwest of Argentina. These objects are part of the extensive collections of the Archaeology Division, which now comprise over 90,000 items mainly from Argentina but also from other American, European, African, and Asian countries. It is therefore the most important repository of archaeological remains in Argentina.

Besides managing and conserving the collections, the Archaeology Division is responsible for coordinating archaeological research studies developed in the Museo de La Plata. It is one of the museum's divisions with the largest number of members; currently more than 60 among researchers, fellows, technicians, and curators of the collections of its three deposits. In addition to the different subjects studied about human behavior through material culture, a constant interaction with Earth and Biological Sciences takes place at the institution with a strong naturalist imprint. These investigations are carried out in order to enhance the cultural heritage of past societies, within an updated scientific framework guided by the ethics

of professional practice and respect for the rights of indigenous people.

Most of the archaeologists that work at the museum take part in the academic education of undergraduate and graduate students of the Facultad de Ciencias Naturales y Museo of Universidad Nacional de La Plata. They are professors in the Doctorate in Natural Sciences, created in 1912 as an undergraduate and a doctorate program, and professors in the undergraduate Anthropology program, created in 1958, which includes three specializations: Social Anthropology, Physical Anthropology, and Archaeology. At the same time, the Anthropology program was created at the University of Buenos Aires (UBA) as well as the National Council of Scientific and Technical Research (CONICET). Following the French CNRS, this last institution aimed to train scientists dedicated exclusively to research. This promoted Archaeology as a discipline in the following decades and continues to do so.

College life at the museum was severely affected by successive interventions, termination of teaching positions, and serious institutional problems on several occasions (e.g., 1946, 1966, 1973, and 1976). A period that was particularly painful was the last military dictatorship (1976–1983) marked by a strong control of the subjects' social contents; the Social Anthropology Specialization was temporally closed, some faculty members such as Alberto Rex González were laid off (see Soprano 2010; Politis and Curtoni 2011), and some researchers were ousted from the museum, and consequently their research teams were dismantled. During this fateful period of Argentinean history, a significant number of students and, to a lesser extent, young graduates of Anthropology between the ages of 20 and 30 were persecuted due to their political activism and left-wing ideas and were kidnapped and disappeared or murdered by the military dictatorship. Only after the return of democracy in 1983 was academic freedom and individual rights reestablished, thus giving rise to a new period for teaching and researching Archaeology at the Museo de La Plata and in Argentina.

Since 1994 the return of the indigenous chief Inakayal's remains was made to his Tehuelche descendants in the Patagonia homeland, becoming the first reburial held in the country. After the military campaigns (1879–1880) against the Pampas and Patagonia indigenous peoples, Inakayal was transferred from prison to the Museo de La Plata, where he and other indigenous people began to do maintenance tasks and served as live models for mural paintings. When Inakayal died, his brain, scalp, bones, and mortuary mask were extracted. All these elements became part of the museum's collections as cultural heritage of the past. Finally, in 2006 upon the request of indigenous communities, the aboriginal human remains were removed from the museum's exhibitions. Thus, a complex but essential path toward reparation for the rights of indigenous societies has begun, enabling them to decide on the fate of their ancestors' remains. In this way the Museo de La Plata has taken an active role in the restitution of human remains in Argentina.

Cross-References

► The Museo Etnográfico "Juan B. Ambrosetti"

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References

Farro, M. 2009. La formación del Museo de La Plata. *Coleccionistas, comerciantes, estudiosos y naturalistas viajeros a fines del siglo XIX*. Rosario: Prohistoria Ediciones.

García, S.V. 2010. *Enseñanza científica y cultura académica. La Universidad de La Plata y las Ciencias Naturales (1900–1930)*. Rosario: Prohistoria Ediciones.

Podgorny, I. 2009. *El sendero del tiempo y de las causas accidentales. Los espacios de la prehistoria en la Argentina*. Rosario: Prohistoria.

Politis, G., and R.P. Curtoni. 2011. Archaeology and politics in Argentina during the last 50 years. In *Comparative archaeologies. A sociological view of the science of the past*, ed. Ludomir R. Lozny, 495–525. New York: Springer.

Soprano, G. 2010. La enseñanza de la arqueología en la Facultad de Ciencias Naturales y Museo de la Universidad Nacional de La Plata. Un análisis sobre el liderazgo académico de Alberto Rex González y Eduardo Mario Cigliano (1958–1977). *Revista del Museo de Antropología* 3: 171–186.

Further Reading

Museo de La Plata website. (n.d.): http://www.museo.fcnym.unlp.edu.ar

Podgorny, I., and M.M. Lopes. 2008. *El Desierto en una vitrina. Museos e historia natural en la Argentina, 1810–1890*. México: Limusa.

The Museo Etnográfico "Juan B. Ambrosetti"

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The Museo Etnográfico "Juan B. Ambrosetti" was founded by the Facultad de Filosofía y Letras of the University of Buenos Aires in 1904 with the purpose of systematically developing anthropological and archaeological research, as well as to establishing the social and humanistic disciplines in Argentina. Its founder was Juan Bautista Ambrosetti, who directed the institution between 1904 and 1917. He imagined it as a public space for the transfer of knowledge and education in the broadest sense, as well as a research and higher education institute (Perez Gollán 1997 [1987]). At that time, the museum was one of the first university institutions in South America seriously concerned about archaeological research, along with La Plata Museum and the university itself. The broad research role of the museum required the constitution of collections that were capable of covering geographies and cultures of the five continents. In addition, a primary specialization in Argentine archeology and ethnography was developed. The establishment of this coincided with the creation of ethnographic museums in different parts of the world in the late nineteenth and early twentieth centuries, establishing an institutional network for the exchange of publications, materials, and information.

The museum's collections were developed thanks to donations, purchases from merchants of cultural goods, and the financing of expeditions of their museum personnel and scientists linked to them. Between 1904 and 1912, the number of donations reached the approximate number of 2000 objects, from some seventy-five donors. These were added to the materials and information obtained through archaeological and ethnographic campaigns, which, all together, managed to compose a heritage of 12,156 cataloged pieces (Ambrosetti 1912). The establishment of the museum involved the formation of networks of collaborators, which ranged from patrons and officials to collectors, military, and businessmen. Ambrosetti planned, as a diagrammed, as a strategy, the laying of the development of a network to support the local collection of objects, using administrative and bureaucratic state channels (Ambrosetti 1912; Perazzi 2011; Pegoraro 2005). The collection was also increased through purchases of private collections and exchanges, based on international communication networks that relied on diplomatic connections, and ordering originals, replicas, decals, or three-dimensional reproductions from related institutions (American Museum of Natural History of New York, Royal Ethnographic Museum of Leyden, Smithsonian Institution of Washington, National Museum of Fine Arts, among others). However, perhaps the most important aspect of the museum was the organization of field work, related to the role of Ambrosetti as a teacher of American Archeology, which gave students the possibility to learn the methods and techniques of field work and also cooperate in the laboratory tasks that were undertaken in the Museum. There were 24 expeditions between 1904 and 1929, as well as the Debenedetti (1915) and the Holmberg (1924) Expeditions, all focused on the archeology of northwestern Argentina. Equally, instructions were also sent to collect archaeological and ethnographic objects in different areas of Patagonia (Pegoraro 2005).

At the beginning the Museum worked in the basement of Viamonte 430 Street, where Buenos Aires University had a location. Then, in 1927 it was moved to its current headquarters of Moreno 350 Street, in the neighborhood of Monserrat, a building designed by Pedro Benoit, a famous architect, as the first seat of the Faculty of Law

at the university. In 1947, almost all the anthropological materials that were part of the National Museum of Natural Sciences were incorporated (except some of Ameghino's collections), accreting notoriously the patrimonial heritage of the Ethnographic Museum. The creation of the Anthropological Sciences Career in 1958 was a fundamental milestone in the development of this institution, beyond socio-political developments that would affect the growth of Argentine Anthropology at different times (i.e., the Night of the Long Sticks during the penultimate military dictatorship,1966–1973; and the last civic-military dictatorship, 1976–1983).

Thus, began a trajectory that characterizes and particularizes the Museo Etnográfico, even today, which links teaching, research, documentation, conservation, transfer, educational outreach, and commitment to the community, each intimately associated with the other in a single institution and embedded in an institution of high academic studies.

However, it when J. A. Perez Gollán was Director (1987–2005), that innovative and modern proposals and management plans were prepared. While these are recorded in various documents, they, which only partially reveal the major intellectual, ideological, and empirical changes that took place since then (Perez Gollán 1997 [1987]); Pérez Gollán and Dujovne 1996, 2001). During this period, weaknesses vacancy areas, and needs were diagnosed, both human and material. He underpinned a reopening of the exhibitions, both to scholar and general public http://museo.filo.uba.ar/exposiciones Exhibitions and http://museo.filo.uba.ar/actividades activities give an account of the state of the matter in the topics they address.

Currently, the Museum's exhibitions focus on historical and social processes and are complemented by other activities (http://museoetnografico.filo.uba.ar). The preparation of exhibitions draws on the skills of researchers, designers, curators, and educators. The available exhibition space is limited and therefore most of the collections are stored. Researchers and students can access the collections stowed in the deposits. For the transfer of knowledge, there are two specialized areas: an Educational Outreach Area, which works with different levels of education and with teacher training institutions; and a Cultural Action Area that deals with the general public as well as cultural and artistic activities related with the mission of the Museum.

The research also focusses on conservation activities. Good documentation is essential for the conservation and management of collections and is inextricably associated with the investigation of the meaning of cultural materials. The documentation and research of objects turn them into heritage that can be passed on to future generations. The tradition of teaching was part of the establishment of the museum. Even today, there are lectures and seminars by anthropology staff of the Facultad de Filosofía y Letras of the University of Buenos Aires, as well as a specialization in Museums, Cultural Transmission and Anthropological Collections Management. The Museo Etnográfico develops workshops on museological issues, and teacher training courses, in addition to training its own staff and those from other institutions. For over 100 years, the Museo Etnográfico "Juan B. Ambrosetti" has played a lead role in conserving, researching and teaching of ethnographic collections in Argentina.

References

Ambrosetti, Juan Bautista. 1912. *Memoria del Museo Etnográfico, 1906 a 1912*. Buenos Aires: Compañía Sud-Americana de Billetes de Banco.

Pérez Gollán José Antonio. 1997 [1987]. *Proyecto para el Museo Etnográfico (agosto 1987)*. Noticias de Antropología y Arqueología n°17, Buenos Aires. https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0717-73562015000200003

Pérez Gollán José Antonio y Marta Dujovne 2001. De lo hegemónico a lo plural: un museo universitario de antropología. Entrepasados. Año X – n° 20-21:197–208.

Pérez Gollán, José Antonio and Marta Dujovne. 1996. *El Museo Etnográfico: funciones y balance de una gestión. Runa, Archivo para las Ciencias del Hombre; volumen XXII*. Instituto de Ciencias Antropológicas – Museo Etnográfico "J. B. Ambrosetti", Facultad de Filosofía y Letras, Universidad de Buenos Aires. Buenos Aires: 119–131. Buenos Aires.

Pegoraro, Andrea. 2005. Instrucciones y colecciones en viaje. Redes de recolección entre el Museo Etnográfico

y los Territorios Nacionales. *Anuario de Estudios en Antropología Social* 5: 49–64. Buenos Aires.
Perazzi, Pablo. 2011. La antropología en escena: redes de influencia, sociabilidad y prestigio en los orígenes del Museo Etnográfico de la Universidad de Buenos Aires. *Anthropologica, Lima* 29: 215–231.

Museo Nacional de Antropología, México

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Basic Information

The Museo Nacional de Antropología (the National Museum of Anthropology, http://www.mna.inah.gob.mx), hereafter MNA, is the oldest, largest, and most famous anthropological museum in Latin America. Located in Chapultepec Park in Mexico City, the MNA focuses on displaying the cultural diversity and development of native societies of Mesoamerica through an exhibition that begins by explaining the meaning and practice of anthropology. It then addresses the origins of the American indigenous peoples (including the theories of Paleo-Indian migration and settlement in the Americas) and goes on to explain in a rather "monographic" fashion, the characteristics and achievements of the principal pre-Columbian ancient civilizations from the pre-Classic, Classic, and post-Classic periods (i.e., Olmec, Teotihuacan, Toltec, Mexica-Aztec, Maya, Mixtec-Zapotec, and Occident and Northern cultures). The exhibition culminates in an ethnographic exhibition on various indigenous communities currently living in Mexico. This perspective, broad in both time and space, represents the core spirit of the Latin American School of Anthropology to study and disseminate American indigenous cultures, which is also articulated in the museological and architectural rationale of the MNA, as well as in its research, dissemination, and educational activities. Since 1939, foundation year of Instituto Nacional de Antropología e Historia (INAH, today part of the newly established Mexican Ministry of Culture), the MNA has been one of its most prominent (national) museums.

History

The genesis of the MNA's archaeological collection can be traced back to the scientific cabinets of collections accumulated in New Spain and, in particular, to the late eighteenth-century collection preserved at the Real y Pontificia Universidad de México (1551–1865), an early academic and higher-educational institution, where – inspired by a Creole nationalistic ideology – the first Museo Nacional Mexicano (Mexican National Museum, MNM) was officially founded by the government of the newly independent Mexican Republic in 1825 (Morales Moreno 1994: 164, 172). Although Mexican archaeology was a subject of burgeoning interest for both local and foreign scholars during the first half of the nineteenth century, local political instability surely limited the academic and curatorial development of the MNM until 1865, when it was relocated to the former Casa de Moneda, a northern annex of the Palacio Nacional (Solis 2001: 34).

The following three decades saw the consolidation of the MNM with the opening of a series of themed galleries (like the famous Galeria de Monolitos), that displayed documents, natural history specimens, antiquities, and historical artifacts, the establishment of a library devoted to both public instruction and scholarly research, the publication of scholarly journals (*Anales del Museo* y *Revista Científica Mexicana)*, and the launching of a series of courses and academic events on national history, archaeology, ethnology, and indigenous languages that can be considered the disciplinary origins of anthropology in Latin America (Morales-Moreno 1994: 238–304).

With the departure of the natural history collections to the Museo del Chopo in 1906, the

MNM reformulated its *reason d'être* according to its newly acquired name: Museo Nacional de Arqueología, Historia y Etnografía (the National Museum of Archaeology, History and Ethnography, hereafter MNAHE), a process that initiated a flourishing era with growing responsibilities. Apart from the accession of a large number of antique sculptures and artifacts from all over the country acquired from private collections and field expeditions organized, authorized, or supported by the museum itself, aid from the federal government enabled the renovation of the exhibition galleries that became not only the depositary of national treasures but also the showcases for the visualization of an imaginary golden pre-Columbian time that provided ideological foundations for the Porfiriato regime from a scholarly perspective (Morales-Moreno 1994: 305–83).

By 1910, the narrative of this political agenda that reconciled patriotic visions of ancient and modern Mexico was articulated by the museum hosting the celebrations of the 100th anniversary of the Independence of Mexico. Then the MNAHE also evolved into a complex multifaceted institution that consisted of departments of archaeology, anthropology, history, ethnography, anthropometry, industrial art, conservation of archaeological and historical monuments, publications, and education. Furthermore, within the framework of the XVI International Congress of Americanists, American Anthropology experienced a key event in its professional evolution with the founding of the International School of Archaeology and Ethnology within the MNAHE, the predecessor of the ENAH-INAH (Rutsch 2007).

Although the Mexican Revolution brought about the interruption of the museum's activities for period of time, post-revolutionary governments later ensured that the MNAHE maintained its long-standing position as the "national institute *par excellence*, that unlike any other, reflected the very patriotic essence" of Mexico (Castillo Ledón 1924, in Morales Moreno 1994). Further acknowledgment of the museum's educational role was confirmed by its incorporation into the Secretaría de Educación Pública (the Public Education Ministry) in 1921. During the 1930s, ethnographic research by the MNAHE was central to the articulation of an indigenous policy articulated by the regime of President Cardenas as well as to the development of *avant-garde* anthropological studies, congresses, and exhibitions (Solis 2001: 35).

After the establishment of Instituto Nacional de Antropología e Historia (the National Institute of Anthropology and History) in 1939 and the foundation of the Museo Nacional de Historia (the National Museum of History) in 1944, the MNAHE underwent its last organizational transformation becoming the Museo Nacional de Antropología (MNA), a museological, research, and scholarly institution with a solid and growing international reputation.

In 1964, with the full support of President López Mateos, a new building for the MNA was inaugurated at Chapultepec Park, Mexico City (Fig. 1). Its architectural design, by Pedro Ramírez Vázquez (1919–2013) (2008), represented a revolutionary concept, with a total area of 70,000 m^2 with 30,000 m^2 for galleries and open spaces for exhibition purposes and 15,000 m^2 for collection deposits, curatorial, research, and service sectors.

Impact

Apart from being a major touristic and educational landmark in Mexico, the MNA is an icon of Mexican museography worldwide. Its galleries are organized around an open central patio, decorated with the famous "parasol" – a monumental roofed pillar with engraved decoration inspired by pre-Colombian figures – and an internal garden water mirror, which provides independent access to exhibitions and thus free visitor movement and permits the integration of the museum with Chapultepec Park. Specifically designed decorative architectural elements and a series of commissioned works of art by famous modern Mexican artists (Rufino Tamayo, Carlos Mérica, Rina Lazo, Mathias Goeritz) complement the exhibition setting, which includes replicas of pre-Columbian buildings and lifelike reconstructions

Museo Nacional de Antropología, México, Fig. 1 Facade of Museo Nacional de Antropologia (MNA-INAH). (Credits: Mtra. Martha Elena Ortiz Sánchez)

of some aspects of indigenous cultures (Ramírez Vazquez 2008).

The MNA houses the National Anthropological Library, which holds the most important and largest collection of pre-Columbian codices in the world. It additionally has three large auditoriums for academic events; galleries for temporary exhibitions, recently presenting displays on ancient world civilizations; open spaces, used for academic and more recently political ceremonies; administrative, research, and laboratory areas; offices for educational services and guided tours; parking lots; shops; a restaurant; and a cloakroom.

The order of the archaeological galleries, defined by a cultural-historical theoretical approach, as well as the prominent position of the Aztec culture in the arrangement, has been subject to several critiques, including one by Octavio Paz (1970: 279–281), who exposed the political agenda implicit in the representation of Mesoamerican cultures, stating that the MNA is a architecturally crafted myth that represented the currency of an ideological nationalistic model based on the political domination of the central Mexican political aristocracy and thus questioned the idea that Mexicans are still articulating its patriotic archetype on the basis of admiring pre-Columbian ruins. Further criticism regarding the political bias that uncovers the ethnographic displays has also been addressed (i.e., Carillo Sierra 1994: 48).

Since its inauguration, the MNA has undergone few changes in its original architecture and museography, although from 1998 to 2005, some galleries, including the Temporary Exhibition Area, were renovated as part of a major restructuring plan, a work that was concluded before 2005, when the museum celebrated its 40th anniversary (Ramírez Vázquez 2008). Since then, the MNA has hosted major blockbuster exhibitions on various ancient civilizations, thus underlying the international impact of both the museum and INAH. During 2014, the MNA patronage celebrated the 50th anniversary of the museum with a series of events, including the publication of a lavished illustrated book (A.A.V.V 2014) composed of essays by prominent Mexican historians, archaeologists, and art specialists, such as Eduardo Matos Moctezuma, Salvador Rueda, Colette Almanza, Frida Gorbach, Thalía Montes, Antonio Saborit, Ana Garduño, Frida Escobedo, and Claudia Barragán, who analyzed its origins and history. This *obvre* that saw light into both a commercial (5000 items) and a collector's edition (250 items).

Cross-References

▶ Heritage Museums and the Public
▶ Nationalism and Archaeology

References

A.A.V.V. 2014. *Museo Nacional de Antropología 50 aniversario (1825–1964)*. México: PMNA/Conaculta/INAH.
Carrillo-Sierra, D. 1994. *Cien años de Etnografía en el Museo*. México: INAH.
Morales-Moreno, L. 1994. *Ancestros y Ciudadanos: El Museo Nacional de México 1790–1925*. Unpublished PhD dissertation, Universidad Iberoamericana.
Paz, O. 1970. *Posdata*. México: Siglo XXI.
Ramírez Vázquez, P. 2008. *Museo Nacional de Antropología: gestión, proyecto y construcción*. México: INAH.
Rutsch, M. 2007. *Entre campo el gabinete Nacionales y extranjeros en la profesionalización de la antropologia Mexicana (1877–1920)*. México: INAH/IIA-UNAM.
Solís, F. 2001. "El Museo Nacional de Antropología y su Historia". *Alquimia* 4 (12): 38–41.

Further Readings

Museo Nacional de Antropología, México. n.d. Available at: http://www.mna.inah.gob.mx/

Museo Nacional de Arqueología, Antropología e Historia del Perú

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Basic Information

Founded in 1822, the National Museum – as it was formerly known – is Peru's oldest state museum. With more than 23,000 m^2, 30 exhibition galleries, 100 employees, and about 250,000 objects, it is also the largest and most prestigious of the country. Originally created as a History, Archaeology, Ethnology, and Natural History Museum, it was in the first half of the twentieth century that it split into an Archaeology-Anthropological Museum and a History Museum, although sharing a common building since 1924. The Natural History section was also separately refounded in another museum and building. In 1992, the Museum was reunited but keeping the official names while it was divided into National Museum of Archaeology, Anthropology, and History of Peru.

Its importance lies in the vast and diverse holdings, which are more than 250,000 items of invaluable ceramics; textiles; metals; lithic, organic, human, and animal remains; Colonial and Republican paintings; and other artwork, dating from the beginning of Andean culture c. 5000 BCE to the present. The archaeological collections are world renowned because most of them have archaeological context and are well documented. The museum houses a historical archive as well as a photographic archive and library that are accessible to researchers and students.

Its permanent exhibition halls display its achievements, which is the Peruvian civilization development in a chronological sequence spanning from the first settlers to the Republican period. Signature objects are the Raimondi stela; the largest known Nasca drum (almost 1 m high) (200 BCE–600 CE); a high relief sculpture depicting crossed arms of Kotosh (2000 BCE), over 200 large textiles, called mantos, of Paracas culture (500–100 BCE), the oldest ones in the Americas; a significant collection of Colonial paintings from the Cuzco School; and a large-scale model of Machu Picchu with buttons that allow visitors to identify key sectors of the complex.

The building itself is also attractive for its architecture and interior gardens. Built by renowned Portuguese architect Raul Maria Pereira, it was the first design for a museum in Peru. The building was constructed around a Colonial house that dates probably to the seventeenth century. The Spanish Viceroy Jose de la Pezuela bought the house in the late eighteenth century as his summer residence. During the Independence, the Libertadores Jose de San

Martin and Simon Bolivar lived here. Hence, the house is known today as the Quinta of the Libertadores. It shows the former inhabited spaces of Don Jose de San Martin and Don Simon Bolivar.

The National Museum is located in Pueblo Libre, a district about 3 km from downtown Lima.

Major Impact

The Museum is paramount to the history of Peru. After more than 180 years, the National Museum has played a main role in defining Peruvian history and identity. From its beginning, the directors strived to study and reconstruct the past events of Peruvian history, since nothing beyond the Inca period was known. The museum's first collections gathered in the nineteenth century were lost to Chile during the Pacific War (1879–1884). Besides the Colonial paintings and other historical objects that were timely put in safety hands, the only archaeological item recovered was symbolically the Raimondi stela, which depicts the ancient Andean Viracocha deity dated c. 1000 BCE. This deity accompanied the cultural development of Peru until the Inca period. It is a famous stone carving of the Chavin culture found by the Italian explorer Antonio Raimondi in 1861. From 1906 onward, the new museum's directors started a series of field researches in Archaeology and Ethnology, collecting material that was the foundation for the reconstruction of Peruvian past as it is known today. Especially the study of the pre-Hispanic history based on extensively archaeological excavations was the main focus of the National Museum. This task is nowadays no more performed, and the museum activities are those dedicated to exhibits, education, and other outreach cultural activities.

The museum's collections are formed not only by whole pieces but also include over 10,000 boxes with archaeological remains as products of several excavation campaigns. Other research material that is invaluable for scientific study can also be found. Along with the material, the archive holds archaeological field notes, photographs, drawings, and other historical documentation.

Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Andes: Prehistoric Period
- ▶ Archaeology and Anthropology
- ▶ Bonavia, Duccio
- ▶ Chronological Systems, Establishment of
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Flannery, Kent Vaughn
- ▶ Hispanic South America: Historical Archaeology
- ▶ Inca State and Empire Formation
- ▶ Lumbreras, Luis Guillermo
- ▶ Marcus, Joyce
- ▶ Uhle, Friedrich Max
- ▶ Vandalism and Looting (Ethics)
- ▶ Vicus

References

Anónimo. 1906. *Museo de Historia Nacional*. Lima: Imprenta La Industria.

Anónimo. 1992. *MNAA. Museo Nacional de Arqueología y Antropología. Guía Oficial*. Lima: Museo Nacional de Arqueología y Antropología.

Arellano Hoffmann, C. 2008. Museo Nacional de Arqueología, Antropología e Historia del Perú. In *Pueblo Libre. Historia, cultura y tradición*, 78–95. Lima: Municipalidad Distrital de Pueblo Libre, Universidad Alas Peruanas.

Arellano Hoffmann, C. 2010. Gestión, desarrollo y proyección de museos del INC. El ejemplo del Museo Nacional de Arqueología, Antropología e Historia del Perú (MNAAHP). In *Gestión de Patrimonio, Museos y Tráfico Ilícito de Bienes Culturales (Ayacucho, 25–27 de mayo de 2009)*, ed. A. Castelli, 35–53. Lima: OEI y AECID.

Arellano Hoffmann, C. 2012. Perú: El Museo Nacional de Arqueología, Antropología e Historia como espejo de la historia y sociedad peruana. *Revista Museos* 30: 25–33.

Coloma Porcari, C. 1990. El virrey Pezuela y su palacio de la Magdalena: documentos inéditos (1818–1925). *Historia y Cultura* 19: 9–84.

Tello, J.C., and T. Mejía Xesspe. 1967. Historia de los museos nacionales del Perú, 1822–1946. *Arqueológicas* 10: 1–259.

Museo Nacional de los Ferrocarriles Mexicanos

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Basic Information

Opened to the public on May 5, 1988, the Mexican National Railroad Museum, *Museo Nacional de los Ferrocarriles Mexicanos* (MNFM), is located in two old railway stations: *Ferrocarril Mexicano* and the *Mexicano del Sur* in Puebla, Puebla. Public access is through Calle 11 Norte, 1005, Centro Histórico, Puebla, Puebla. The principal phone number is (+) 222 774 0106, and the web address is http://museoferrocarrilesmexicanos.gob.mx/. It also has a presence on Facebook, Twitter, and YouTube. It receives about 100,000 visitors each year. Most days it is open from 9AM to 5PM.

The outdoor exhibit covers the grounds and marshaling yards of both stations and is composed of an extensive collection of rolling stock from the late nineteenth to the mid-twentieth century. The collection includes engines (locomotives), carriages (coaches), brake vans (cabooses), flat wagons (flatcars), covered goods wagons (boxcars), and dedicated and specialized wagons such as cranes, mail cars, and so forth. Many are open to inspection.

The oldest locomotive is FCM 40 which was built by Baldwin Locomotive Works, Philadelphia, USA, in 1881. It entered service as a wood burner and was subsequently updated to first a coal and then oil burner. It is a 2-8-0 with a standard gauge of 4 ft and 8.5 in.

The youngest locomotive is the Diesel Electric SBC – 22003 which was built by the Electro-Motive Division of General Motors in 1944. It entered service on the Sonora-Baja California Railroad in 1964 and heralded the change from steam to diesel-electric power in Mexico. It is the last known FT model in existence and in serviceable condition.

As of January 2012, the MNFM includes the Railroad Center for Documentation and Research: *Centro de Documentación e Investigación Ferroviarias* (*CEDIF*) which houses an extensive collection of original documents, plans, and photos as well as a full research library that deal with all aspects of the construction, development, and maintenance of the principal railroads and many subsidiary lines that are generally available to researchers weekdays from 9AM to 5PM. Appointments are advised.

The library of the *CEDIF* houses over 40,000 documents ranging from the project of the earliest proposed railroad from the port of Veracruz to Mexico City, which was printed by Ignacio Cumplido in 1837, to many modern academic publications. It is complemented by a Historical Archive, Special Collection of Plans, Photographic Archive, and the Jésus García Oral History Archive.

The Historical Archive includes about 4 km of files and documents that principally deal with the administration of the *Ferrocarril Mexicano* (1869–1950), *Ferrocarril Sudpacífco de México* (1887–1960), as well the *Junta Directiva* of the *Ferrocarriles Nacionales de México*. The Special Collection of Plans houses over 200,000 plans dating as far back as the Imperial Mexican Railroad of the 1860s. It also includes the architectural plans for many stations and plans that complement the different inventories undertaken in the twentieth century. The Photographic Archive includes some 86,000 images. Some 31,500 are products of a national inventory undertaken in the 1920s and 1930s. The Jésus García Oral History Archive includes over 100 recordings of active and retired railroad personnel as well as riders of the "Bestia," the freight train that transports illegal immigrants from Central America to the southern United States border.

Since its founding, the *MNFM* has supported and organized 14 Nation Meetings of Railroad Researchers (*Encuentros Nacional de Investigadores del Ferrocarril*) which have taken place in Puebla, Puebla; San Luis Potosí, San Luis Potosí; and Xalapa, Veracruz.

Since 2007, the *MNFM* has published the journal *Mirada Ferroviaria* three times a year, available

online (http://www.museoferrocarrilesmexicanos.mx/boletines.php).

Major Impact

The indoor exhibit relies on graphics and railway paraphernalia to portray the economic and political importance of the Mexican railway system. From its humble beginnings in 1837, the railway played a crucial role in the economic expansion in the nineteenth century that culminated in the Mexican Revolution (1910–1918). During the Mexican Revolution, control of the railway lines had both strategic and tactical implications. After the Mexican Revolution, most of the railway infrastructure was either replaced or updated. It reached its apex in the mid-1940s, but the expansion of the national road system and the associated intercity (interurban) bus systems and trucking companies, together with a falling rate of reinvestment, led to stagnation and then decay.

Cross-References

► Industrial Archaeology
► Mexico: Historical Archaeology

References

Brown, R.B., ed. 2009. *Introducción e impacto del Ferrocarril en el Norte de México*. México: Universidad Autónoma de Ciudad Juárez.

Ebergenyi Magaloni, I. 1986. *Primera aproximación al estudio del sindicalismo Ferrocarrilero en México, 1917–1936 (Cuaderno de Trabajo 49)*. México: Instituto Nacional de Antropología e Historia.

Kuntz-Ficker, S., and P. Riguzzi. 1996. *Ferrocarriles y vida económica en México (1850–1950): Del Surgimiento tardío al decaimiento precoz*. México: El Colegio Mexiquense, A. C.

Meyer-Cosío, F.J. 2011. *Ferrocarriles y la revolución Mexicana*. México: Universidad Autónoma de Querétaro.

Urías, B., A. J del Palacio, L. Caso, and Ferrocarriles Nacionales de México. 1987. *Los Ferrocarriles de México 1837–1987*. México: Ferrocarriles Nacionales de México.

Yañes-Rizo, E. 1994. *Los Días del Vapor*. México: Instituto Nacional de Antropología e Historia.

Museo Tecnológico del Vidrio

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Basic Information

The Museo Tecnológico del Vidrio (Technological Glass Museum) is located in the old La Granja Royal Glass Factory, one of the most significant industrial building of the Enlightened Spain (Fig. 1).

In this sober building, built by order of King Charles III according to the plans of the quantity surveyor Joseph Díaz Gamones, the National Central Glass Foundation was set up in 1982, with the goal of reclaiming the old building, its history, and its most traditional techniques. Its over 25,000 m^2 of area currently houses the Technological Glass Museum, the Library, and the

Museo Tecnológico del Vidrio, Fig. 1 Part of the building of the Royal Glass Factory of La Granja

Higher Education Institution of Glass, as well as Furnaces and workshops.

For further information, go to http://www.fcnv.es/.

Major Impact

The visit begins in the Furnaces Hall, an outstanding space with a basilican design, having two great domes made of brick, where the melting furnaces are located. In this singular space, visitors find the Technological Exhibition, where you can learn about different manufacturing processes of glass, from the traditional to the mechanized by means of diverse elements such as furnaces from distinct eras, machines and ancient mills, work tools, molds, and raw materials.

From the firewood patio visitors can access to the glass furnace, where the glassblowers reproduce the ancient pieces of La Granja crystal with great skill using the traditional glassblowing method with a blowpipe. Undoubtedly, this is the favorite space for our visitors, where the magic of glass is shown in its entire splendor. Nowadays, Royal Glass Factory production are faithful to its handmade tradition and its superior quality of raw materials (Fig. 2).

On the other side of the Furnace-Hall, you can find the Stainedglass room, with an important collection from the workshops of Maumejean. Towards the end of the nineteenth century and in the first half of the twentieth century, this prestigious workshop, with commercial offices in France and Spain, supplied a great number of religious and civil buildings, and individual homes, in Europe as well as America, Africa, and even Asia. The stainedglass window of Cristo de Martorell, exhibited in the 1925 World Fair of Paris, heads the exhibition from the large Southern window of the second dome.

Crossing the Museum lounge, we come into the Polishing Nave, a wide space of rectangular design, with a narrow corridor in the center, supported by two rows of pillars and lowered arches, all made of granite. In this nave, you can still see the remains of the famous Water Machine, designed by Demetrio Crow, which moved not only the grinding benches, used to polish the glass of mirrors, but also the various mills for grinding raw materials, including several lathes to work the windows of the upper floor. A scale model in the gallery explains the peculiarities of this hydraulic machine.

In this great nave, the visitor can also find the Gallery of Bottles and Containers which gathers

Museo Tecnológico del Vidrio, Fig. 2 Furnaces-Hall of the technological area of the museum with machinery used in glass production

in one place the best European collections of bottles, flasks, and containers for pharmaceutical products, as well as for storage of solids and perfume bottles, organized chronologically from the sixteenth to the nineteenth centuries. You can also find how the English wine bottle evolved through the centuries, as well as other peculiarities of this interesting collection.

Through the Polishing Nave, the visitor can access to the historical production of the Royal Glass Factory Gallery, composed of one of the most important collections nowadays, not only for the number and diversity of its pieces but also for their high quality and originality. This collection was formed by pieces from different loans, such as of the National Museum of Decorative Arts of Madrid, Patrimonio Nacional, and the Prado Museum, as well as its own collections, acquired over the years by the National Central Glass Foundation.

Finally, on the upper floor of the same nave, the visitor finds the Gallery of Contemporary Glass Exhibition, which includes the most recents glass trenes of the las few years all over the world. Of note is the collection of sculptures by the Segovian Torres Esteban, as well as collections from Japanese sculptors and from the Czech Republic.

Cross-References

- ▶ Association Internationale pour l'Histoire du Verre (AIHV)
- ▶ Conservation in Museums
- ▶ Corning Museum of Glass
- ▶ Spain: Archaeological Heritage Management

Further Reading

Pastor Rey de Viñas, P. 1994. *Historia de la Real Fábrica de Cristales de La Granja de San Ildefonso durante la Época de la Ilustración (1727-1810)*. Madrid: Fundación Centro Nacional del Vidrio. Patrimonio Nacional y CSIC.

Pastor Rey de Viñas, P. 1989. *Historia de la Real Fábrica de Cristales de La Granja*. In *Historia, repertorios decorativos y tipologías formales*. Madrid: Arte Segovia, S.L.

Museos de Real de Monte

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Basic Information

The Historical Archives and Mining Museum is a Civil Association located in the mining district of Real del Monte and Pachuca, in Central Mexico. It is dedicated to the protection, conservation, and reusing of industrial heritage sites since 1987. It mainly consists of historical archives and several museums.

Major Impact

The Historical Archives of the Compañía Real del Monte y Pachuca (AHMM) houses a collection dating from 1727 to 2002. The AHMM opened in April, 1987, are among the most important of their kind in Mexico. Being one of the few private archives with a general guide to its holdings published, it has acquired the status of a legal entity. Its collection of textual and visual documents has been the cornerstone for the establishment of four museums and is mostly grounded upon a clear feedback system between the archive and the museums (e.g., Oviedo Gámez and Hernández Badillo 2003). Since the opening of these facilities, the demand for service has increased not only the archive but the periodicals and newspaper archive as well as the library. Today, a historical archive with 275 years of information, mostly as the result of the concentration of archives, has been enriched by an image bank of photos, plans, and posters, fully available for scholarly research, to students, and the general public.

Opening in July 1993, the Mining Museum is devoted to the history of geological explorations, exploitation, and mineral processing. It also features social and labor aspects, such as the organization of workers and the efforts on the part of

Museos de Real de Monte, Fig. 1 Acosta Mine Site Museum. (Photographed by Marco A. Hernández Badillo)

Mexican, British, and American entrepreneurs and workers to reduce the number of mining accidents. Located in the main patio and gardens is The industrial archaeology space. There one can see not only the heavy machinery employed at that time but an old perforator from the late nineteenth century. Also on display are the Mack vehicles that transported the ore from the processing hacienda of Loreto to the railway station, and an 80-t crane from "The Brown Hoisting Machinery Co." of Cleveland.

The Acosta Mine Site Museum (Fig. 1) opened in July, 2001, and includes the following areas: the superintendent's office and house, a head frame, and the drain gallery used to extract minerals. In addition, two of the major attractions for the visitor are the drain gallery, used to extract minerals, and the entrance tunnel to the depot with a level of 180 in the "Mina Dificultad." In addition, there is The Forge and The Boiler Room, where archaeological excavations exposed the nineteenth century steam boilers' ash pits. Of the former, two of them were restored and one more was consolidated in order for the public to see the condition in which they were. The material collected consisted of iron and ceramic pieces and brick crumbs. Finally, there are two areas specially designed for children in which the first history and visual arts workshops have taken place. These events culminated in the publication of a guide on the Acosta Mine Site Museum illustrated by children.

The "Nicolás Zavala" Cultural Center/Workers' Medicine Museum opened in October, 2004. The Hospital of the Compañía Real del Monte y Pachuca (CRDMyP) consists of preserved twentieth century buildings, furnishing, surgical and rehabilitation equipment, and x-ray machine and an apothecary that was donated to the AHMM in 1996 by the CRDMyP. When it ceased to function, the following areas and services were present: a reception area, an apothecary, an x-ray room, and a room for hospitalized patients. Besides this, there was a doctor's office, a nurses' station, and recovery, treatment, and rehabilitation rooms. Finally, it included an operating room with its sterilization and equipment area, a bathroom with shower and tub, an area for ironing sheets, and a mortuary chapel. All of these facilities and features as well as a laundry room are housed in the Workers' Medicine Museum (Fig. 2).

The exhibition display design respected this division so that a visit to the museum begins with a stop at the former chapel. There one can see posters printed by the safety department

Museos de Real de Monte, Fig. 2 Workers' Medicine Museum. (Photographed by Marco A. Hernández Badillo)

Museos de Real de Monte, Fig. 3 La Dificultad Mine Site Museum. (Photographed by Marco A. Hernández Badillo)

describing accidents that occurred in mines. It includes the Archives of the Word.

The Dificultad Mine, Site Museum and Interpretation Center, was opened in May, 2011. The main objective of the museum is to offer to the visitors a comprehensive vision regarding the essential role of "La Dificultad" mine in the history of the mining district and the importance that this place has nowadays as an example of the historical, technological, and cultural heritage. Although these topics are complex, we are trying to explain them in a simple, didactic, and accessible way to all kinds of public through the appropriate resources offered by museography. The use of images, scale reproductions, and interactive examples are designed not only to allow an in-depth appreciation of the subject but its recreation, in such a way that visitors can have access to the necessary information, while at the same time, they can live the experience of touring a real mining site (Fig. 3).

The museum has an important and representative sample of the essential engines to perform mining work. The archaeological materials

consist of an old hoist from the steam era kept in this mine. This represents a rare example in the mining district of an almost intact machine. One of the most important attractions of this exhibition is the steam hoist, adapted to work with electricity so that visitors can see it operating. As a historical complement, illustrations and information cards can be seen and in them the history of hoists, from the ones operated with animal traction to the ones using other forms of power such as steam or electricity, is narrated.

The Andrés Manuel del Río Lithotheque, the drilling cores storage area, houses thousands of core samples boxes and probably, this is the most unusual place of the mine. Visiting it and listening to the explanation of the importance of the geological exploration works can provide an illustrative knowledge of the mineralogical work performed by mining companies. This area has become a mineral sample exhibition room, possibly the first one of its kind in Mexico.

These museums are part of the Silver Route, an important tourist circuit that includes six municipalities in the State of Hidalgo. The scheduled routes take visitors through picturesque mining towns, revealing the richness of the industrial heritage as a learning experience provided by the AHMM (e.g., Oviedo Gámez and Hernández Badillo 2011).

Cross-References

- ▶ Industrial Archaeology
- ▶ Industrial Heritage in Archaeology
- ▶ Litvak King, Jaime
- ▶ Mexico: Historical Archaeology

References

Oviedo Gámez, B., and M.A. Hernández Badillo. 2003. Un archivo de empresa, base para el rescate y conservación del patrimonio industrial: el Archivo Histórico de la Compañía de Minas de Real del Monte y Pachuca (1556–1967). In *La cultura industrial mexicana. Primer encuentro Nacional deArqueología Industrial*, ed. S. Niccolai and H. Morales, 143–155. México: BUAP-CMCPI.

Oviedo Gámez, B., and M.A. Hernández Badillo. 2011. *Guía Ruta de la Plata. Turismo cultural en sitios de patrimonio minero*. México: Archivo Histórico y Museo de Minería, Asociación Civil.

Further Reading

Archivo Histórico y Museo de Minería. 1997. *Canto en la tierrae imagen ante eltiempo: El distrito minerode Real de Montey Pachuca*. México: Archivo Histórico y Museo de Minería Asociación Civil.

Archivo Histórico y Museo de Minería. 2008. *Museo de Sitio MinaAcosta/Site Museum Acosta Mine*. México: Archivo Histórico y Museo de Minería Asociación Civil.

Hernández Badillo, M.A. 2007. *Entre la tierra yel aire/ Between the earth and the air*. México: Archivo Histórico y Museo de Minería Asociación Civil.

Oviedo Gámez, B. 2005. Avances en la organización y promoción de archivos históricos mineros de Real del Monte, Pachuca y Atotonilco El Chico. *América Latina en la Historia Económica* 23: 139–148.

Oviedo Gámez, B., and M.A. Hernández Badillo. 2005. *Centro Cultural Nicolás Zavala Museo de Medicina Laboral*. México: Archivo Histórico y Museo de Minería Asociación Civil, Consejo Nacional para la Cultura y las Artes, Fondo Nacional para la Cultura y las Artes.

Oviedo Gámez, B., and M.A. Hernández Badillo, eds. 2011. *Mina La Dificultad. Museode Sitio y Centrode Interpretación*. México: Archivo Histórico y Museo de Minería Asociación Civil, Fondo Nacional para la Cultura y las Artes, Consejo Nacional para la Cultura y las Artes.

Oviedo Gámez, B., M. Iwadare Ijima, and M.A. Hernández Badillo, eds. 2010. *Patrimonio industrial minero. Nuevasalternativas para una granhistoria*. México: Archivo Histórico y Museo de Minería, Asociación Civil, TICCIH.

M

Museum Education and Archaeology

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Introduction

Archaeology, museums and education are three fields which have, for the most part of their history, been inextricably linked. Archaeological museums are places of learning not only because

they are deliberately created or maintained as hubs of knowledge, but also because they often act as formal or informal actors in debates about identity, communities, as well as the nature of knowledge itself (cf. Stone 1994; Hooper-Greenhill 1996). In this entry, we will consider how archaeological knowledge is communicated and/or facilitated by museums, and we will reflect on the effect and purposes of this.

Definition

I take archaeology to mean both the practice and the subject matter of investigating a past milieu through its material remains (and often intangible survivals), whether this is recent (e.g. World War II archaeology) or chronologically remote (e.g. the Paleolithic). Official practitioners of archaeology are usually certified as professionals by authoritative bodies, such as university departments or (local) archaeological services (e.g. CIfA 2019; Register of Professional Archaeologists 2019).

I take education, more generally, to mean any activity, structured or unstructured, certified and systematic or not, whether in a specifically designed environment or not, which results in a person's or group's learning: the acquisition of new ideas, skills or information which can then be applied to achieve previously unattainable intellectual or practical connections. I take museum education to be the direct or indirect learning outcome of the interaction between museums and their stakeholders, usually (but often not) specifically designed and intended by staff as a mediated experience toward their audiences, on-site, off-site or online (e.g. Stone 1994; Lea 2000).

I take the relationship between museum education and archaeology to mean the proactive/formal or informal education that museums which host archaeology (not just archaeological museums) impart on their stakeholders, usually but not exclusively their visitors (see, e.g., Silberman 1995).

Historical Background

Museums started as educational places which brought together ancient artefacts, curios, objects of beauty and preserved parts of nature, so as to not only serve as collections of information but to also help educate further, first their wealthy owners, then their equals and patrons and then their communities, cities, countries, or (eventually) global audiences (cf. Barker 2010; Schubert 2016; Barrett 2012: 45–80). Archaeology developed from collections of art objects into eventually fully flung collections of art and archaeology (usually combined, even unintentionally). Although museum education with specific reference to archaeology has always been part of the equation, it has developed as a proactive, targeted movement in the last few decades, most notably from the 1980s onward, with a marked proliferation of relevant bibliography from the 1990s onward (cf. discussions in Lea 2000: 317; Barker 2010). Museum education in archaeology developed differently in different countries, depending on the archaeological and museological paradigms of each, influenced by cultural, political and other circumstances (cf. Barker 2010: 296). For example, as will be seen below, a museum with archaeological artefacts operating in a largely conservative regime might offer educational opportunities which emphasize local pride, national importance, and the like, whereas a museum with a colonial history of collections might, in this postmodern, post-colonialist era, reinvent itself by offering educational opportunities which promote ideas of globalization. Overall, however, the shift from the "self-evident" or passive educational role of the museum to its active commission of educational techniques was largely due to the changing role of the museum in general within the context of changes of class and economy, with consumerism, among other things, being a catalyst (see analysis in Barker 2010). It is also due to the increasing role of the museum as a socially engaged and relevant actor.

Key Issues/Current Debates

There are a number of key issues and debates which pertain to archaeology and museum education. Some regard museum practice more generally and others pertain to archaeology more specifically. Several pertain to the role of museums or collections in the imparting, facilitating or even questioning of archaeological knowledge. And although the archaeological museum or collection is usually acutely aware and active regarding its educational role nowadays, it can also impart knowledge in more subtle, indirect or even unintended ways. I categorize the relevant debates and educational processes under eight themes.

Archaeological Method

One of the current debates is whether (and how) to show to the public how archaeology operates, how archaeological knowledge might be arrived at and also why illicit antiquities are problematic (cf. Stone 1994; Argyropoulos et al. 2014). This is often a deliberate attempt to educate visitors and definitely an intellectual outcome of postmodernity, in recognition of the fact that the museum is not the educational be-all and end-all of archaeological knowledge: it devolves the learning experience to visitors, instead of imposing monolithic knowledge on them (cf. Silberman 1995). However, not all museums are comfortable with this approach, and some prefer to avoid this intellectual synergy (expert + visitor = shared knowledge) altogether. In museums which do, however, make this effort, audiences are educated in various ways about archaeological method, e.g. through diagrams of stratigraphy (Fig. 1a), props (Figs. 1b, 7c, and 8e) or displays mimicking a historical archaeological process (Fig. 1c). Visitors other than volunteers, on occasion and unintentionally, may also get a glimpse of other related "behind-the-scenes" archaeological and museological processes which add to their knowledge and understanding of the sector as a whole. Such processes may include re-exhibition (Fig. 1d), storage (Fig. 1e), as well as study (e.g. measurement, moving) and in situ conservation. For example, the author's study of some material at the Archaeological Museum of Chania, Crete, Greece, in 2009 was facilitated by museum staff through stationing the author in one of the museum galleries. In that way, the author and related archaeological work became (unintentionally) part of the museum's exhibits for the visitors to observe for the duration of the research.

Gallery Flows

One of the indirect ways in which museum education in archaeology can be offered is the regulation of gallery flows and the role of exhibits as signposts or focal points. This results in the engineering of visitors' circulation (cf. discussion in Barker 2010: 296–297). Although artefact displays might have been adapted to gallery space, rather than the other way round, often the planned direction of visitor flows indirectly affects their educational experiences of spaces and artefacts. Visitors going through the Aegean collections of the British Museum, situated in a corridor-like gallery (Fig. 2a), will not necessarily focus on and learn about artefacts in the same way that visitors will do for the statue of Nike of Samothrace in the Louvre (Fig. 2b). The former exhibits are more contextualized in their display, and learning about them can be mediated through tours or by visitor engagement with information in the gallery. But the structure of the gallery "funnels" people through, instead of providing a self-contained, cross-referenced environment. Conversely, the Nike of Samothrace is decontextualized as an objet d'art, but its striking focal position and cul-de-sac architectural environment elicit more attention and curiosity from the visitors, whether their learning is active (mediated, acted) or passive (observation). Gallery flows might indeed be designed with particular educational outcomes in mind. The exhibition and gallery spaces of the Parthenon Frieze (Fig. 2c) are deliberately designed so that visitors can see the composition in the round (following the frieze around) and therefore understand its original placing, even though the modern viewing angle is completely different. Similarly, sculptures on podia, rather than against walls or even recesses (Fig. 2d), even when placed in "through-galleries,"

Museum Education and Archaeology, Fig. 1 *Archaeological method*. (**a**) Andover Museum UK, February 2018 (image reproduced with permission Hampshire Cultural Trust – Museum of the Iron Age and Andover Museum, www.hampshireculture.org.uk); (**b**) Durham Museum of Archaeology, UK, 2019 (image and its reproduction courtesy of Durham Museum of Archaeology); (**c**) Archaeological Museum of Kythera, Greece, Aug. 2018 (image reproduced with permission, exhibits © of the Archaeological Museum of Kythera, Hellenic Ministry of Culture and Sports/Archaeological Receipts Fund); (**d**) The Louvre, Paris, France, June 2009; (**e**) Archaeological Museum of the Lemesos (Limassol) District, Cyprus, August 2007 (image reproduced with permission from the Department of Antiquities, Republic of Cyprus). All photography, unless stated otherwise, by and © of the author 2007–2018

Museum Education and Archaeology, Fig. 2 *Gallery flows*. (**a**) British Museum, London, UK (image and its reproduction with permission by the British Museum Images); (**b**) The Louvre, Paris, France, June 2009; (**c**) Acropolis Museum, Athens, Greece, June 2009 (image reproduced with permission, exhibits © of the Acropolis Museum); (**d**) The Metropolitan Museum of Art, New York, USA, March 2009 (image reproduced with permission). All photography, unless stated otherwise, by and © of the author 2009

can indirectly educate visitors as to viewing angles, technique, proportions, chronological connections, stylistic development etc.

Art and Exhibition

Museum and gallery architecture is very diverse (Schubert 2016: esp. 99ff., 121–133). Collections may be held in historic buildings, whose original purpose was not museological, or spaces and exhibition cases may be custom-built. These "shells" need also be considered as educational devices: they frame the exhibition philosophy and impart (or even impose) particular aesthetic knowledge and ideals to their audiences. For example, the

futuristic design of the museum at Maa-Palaeokastro in Cyprus is complemented by the minimalist aesthetic of its archaeological exhibition inside and of its landscape outside (Fig. 3a). This is in stark contrast to sections of the Louvre (Fig. 3b) (eadem: 124–128), whose

Museum Education and Archaeology, Fig. 3 (continued)

lavish palatial interiors host artefacts (e.g. statues) exhibited with an art historical rather than an archaeological approach and aesthetic. The purposely built architecture, complete with Mycenaean-style embellishments, of the Prehistoric Collection (the "Mycenaean room") at the National Archaeological Museum in Athens (Fig. 3c) acts as a stage for the finds from Mycenae and elsewhere, attempting to replicate a Mycenaean "ambience." In other examples (Fig. 3d–h), the display of medium- to small-scale artefacts may be hosted within cases or installations which either arrange them in visually striking ways while allowing them to take center stage or create a contrast between the (preconceived) aesthetics of these artefacts and a deliberately (post) modernist aesthetic. Such choices make an educational statement about a particular set of preferred aesthetics, which vary depending on the overall traditionalist or postmodernist agenda of the museum. This, of course, brings us back to the initial purpose of museums: to educate about the art historical or natural world but also to cultivate a particular (overwhelmingly upper-class) aesthetic viewpoint.

Information and Typologies

One of the biggest educational challenges for archaeological collection experts is how to organize information in ways that offer both pleasant and immediate experiences, as well as bite-sized knowledge, toward understanding the exhibits (e.g. Silberman 1995). Some collections offer a richer array of text and/or artefacts (e.g. Fig. 4a) whereas others a more minimalist approach (e.g., Fig. 4b, c). Almost all exhibits, however, are ultimately organized as typologies, the cornerstones of the sector. These are typologies of artefact shapes, such as those of figurines (e.g. Fig. 4b); technologies, i.e. techniques of certain people or periods (e.g. Fig. 4c); assemblages, i.e. artefacts found in the same contexts or site-types or used in the same type of processes, such as trade (e.g. Fig. 4d); or cultures (e.g. Archaic Greek, Fig. 4e). In most cases, they are an attempt to educate audiences in the logic of chronological progressions and stylistic evolutions.

Context and Relevance

Artefacts may appear in exhibition installations which can allude, imitate or even enhance the environment in which these artefacts were originally used or eventually found. This is almost always an artificial and museum-mediated educational trope, but it helps shape the visitors' learning experience through visualization and contemporary contextualization (Johnstone 1998; Forrest 2013). Finds from a burial context (Fig. 5a) can be grouped as an assemblage against a photographic background of the burial context in which they were found (or another one like it), like a vintage photograph taken of contemporary people against a studio background of a landscape or building interior. Although the museum and the visitor know this is an artificial setting, both enter into the process of revisualizing the original context and eventual excavation of these artefacts. For example, artefacts of the Uluburun shipwreck at the Bodrum

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Museum Education and Archaeology, Fig. 3 *Art and exhibition*. (**a**) Museum at Maa-Palaeokastro, Cyprus, August 2007 (image reproduced with permission from the Department of Antiquities, Republic of Cyprus); (**b**) The Louvre, Paris, France, June 2009; (**c**) National Archaeological Museum, Athens, Greece, September 2016 (image reproduced with permission, exhibits © of the National Archaeological Museum of Athens, Hellenic Ministry of Culture and Sports/Archaeological Receipts Fund); (**d**) Neues Museum, Berlin, Germany, December 2016 (image reproduced with permission, Staatliche Museen zu Berlin, Ägyptisches Museum und Papyrussammlung); (**e**) The Origins Centre Museum, Johannesburg, South Africa, July 2007 (image reproduced with permission); (**f**) Staatliches Museum für Archäologie, Chemnitz, Germany, October 2016 (image by Michael Jungblut, reproduced with permission, © Landesamt für Archäologie Sachsen/Staatliches Museum für Archäologie Chemnitz, Aufnahme: Michael Jungblut); (**g**) Herakleion Archaeological Museum, Greece, September 2015 (image reproduced with permission, exhibits © of the Herakleion Archaeological Museum, Hellenic Ministry of Culture and Sports/Archaeological Receipts Fund); (**h**) Bristol Museum and Art Gallery, UK, February 2018 (image reproduced with permission from the Bristol Museum and Art Gallery). All photography, unless stated otherwise, by and © of the author 2007–2018

Museum Education and Archaeology, Fig. 4 *Information and typologies*. (**a**) Museum of Byzantine Culture, Thessaloniki, Greece, August 2012 (image by Dr. T. Grimshaw, image reproduced with permission from photographer and museum, exhibits © of the Museum of Byzantine Culture, Hellenic Ministry of Culture and Sports Archaeological Receipts Fund); (**b**) and (**d**) Archaeological Museum of Mycenae, Greece, March 2010 (images reproduced with permission, exhibits © of the Argolid Ephorate of Antiquities/Archaeological Museum of Mycenae, Hellenic Ministry of Culture and Sports/Archaeological Receipts Fund); (**c**) Staatliches Museum für Archäologie, Chemnitz, Germany, October 2016 (image by Michael Jungblut, reproduction permission courtesy of and © Landesamt für Archäologie Sachsen/Staatliches Museum für Archäologie Chemnitz); (**e**) The Fitzwilliam Museum, Cambridge, UK, July 2018 (image reproduced with permission by The Fitzwilliam Museum, Cambridge). All photography, unless stated otherwise, by and © of the author 2010–2018

Museum of Underwater Archaeology, Turkey, are currently staged in a quasi-replica of the shipwreck, so that the audiences can learn how goods might have been stacked on board or where people would circulate and live on the ship. Reconstructions can go even further by recreating entire living spaces which facilitate a "walk-in" experience: original artefacts might be confined in specially built cases which are incorporated in, and ultimately subordinate to, the overall reconstructed ancient environment. This is the case with an installation of an Iron Age round house at the Museum of the Iron Age, Andover, UK (Fig. 5b). This approach has the advantage of creating knowledge opportunities not only through exhibits and text (visual and auditory knowledge), but also through the sense of space and proportion (physical and aural apprehension etc.). Even if exhibits are not staged within larger simulating installations, they can be made relevant to audience experiences. This is another museum strategy of not only educating but also eliciting connections between ancient artefacts and current, often personal, visitor situations (cf. Johnstone 1998). One case in point are fibulae (brooches) or earrings exhibited against a background of a person wearing these (Fig. 5c). The installation and exhibition of the artefacts may also be deliberately staged against the background of the museum's modern setting (Fig. 5d). In that way, the visitor may be instructed to reflect upon similarities and differences between the world represented within the museum and the one which exists outside it (and of which the museum and the visitor are integral parts themselves). The museum, therefore, can make socially engaged educational statements.

Human Interaction

When museums exhibit artefacts with the intention of educating users, the issue of interaction becomes important, especially regarding representations of humans (e.g. statues, armor) or actual human remains. There are numerous exhibition and education philosophies concerning human representations, depending on the tradition within which the collection operates and the expectations of the audiences (cf. Swain 2006). For artefacts which represent but are not the human body *per se* (e.g. armor), installation is more often than not a propping up of the artefacts in question, so that they *approximate* the human body (Fig. 6a). A particular educational statement is therefore being made about concepts of the human form, humanity, the ancient human experience, etc. In museums which have traditionally operated within an art-historical paradigm, the exhibition of life-size or larger than life human representations might be staged so that the visitors can learn from stylistic, artistic and emotive parameters of the artefacts. For anthropomorphic representation exhibits, people can be provided with space and permission to sketch artefacts as works of art (Fig. 6b), they may be channeled to interact with a room of statues from an upper or lower level (Fig. 6c, d), they may be confronted (and therefore juxtaposed) with an iconostasis of such representations, or they may even be allowed to literally come face-to-face with anthropomorphic representations (Fig. 6e).

The exhibition of and education about archaeological human remains in museum contexts is a very controversial and long-debated aspect of museological and archaeological practice. The debates mainly concern the ethics of the (often colonial or even slave trade) acquisition, ownership and exhibition of human remains (cf. Curtis 2003; Cornu 2009; Kenny 2013). They also concern the degrees of exhibition acceptability, depending on the nature of these remains: e.g. skeletons and bog bodies present different museological and ethical educational challenges. A commendable example is the exhibition "London Bodies" at the Museum of London, UK (cf. Swain 2006). As in this case, often, the human remains, which have an emotional as well as educational effect on the viewer, are installed in an area which one has to choose to visit, instead of an area through which visitors are channeled as part of a more general gallery flow. Consequently, the museum imparts archaeological knowledge in a number of ways: it educates users as to how bodies were deposited and preserved; it sensitizes people regarding the human experience; and it elicits social reflexivity about the ethical choice, made by the visitor, of (not) viewing the body.

Museum Education and Archaeology, Fig. 5 (continued)

Replicas and Hands-on Experiences

Archaeological artefact replicas have long played a valuable educational role (cf. Foster and Curtis 2016; Simandiraki-Grimshaw, Sattler and Angermüller 2020). They used to be a larger part of museum exhibitions up until the middle of the twentieth century CE, especially in the cases of collections or entire museums connected to University Departments of Art and Archaeology. For example, the Museum of Classical Archaeology at Cambridge University, UK, is, in its majority, comprised of replicas. Similarly, the Abguss-Sammlung Antiker Plastik of the Freie Universität in Berlin, Germany (Fig. 7a), is entirely composed of replicas which had had variable origins and biographies prior to their exhibition there (and which can generate further "faithful" replicas for archaeological collections elsewhere). Several museums also exhibit clearly labeled replicas alongside original artefacts (e.g. Fig. 7b), even though the practice is less common now than it had been until the middle of the twentieth century CE. Museums may even make these replicas available to the visitor for handling, as is the case with replica crania in the Origins Centre Museum in Johannesburg (Fig. 7c) or a replica bust of Nefertiti in the Neues Museum, Berlin, Germany. These replicas serve several purposes, primarily educational. Many were created and collected at a time when slides, books and photocopying were very expensive educational means and when the Internet, 3D scanning/printing and online databases did not exist. Several university departments and museums acquired or even commissioned replicas of specific artefacts (often statues), in order to train their students or fill in gaps in the exhibited material. The handling of replica objects also began as a training necessity but has become more prolific in multisensorial education, in the enablement of visually impaired visitors (cf. the Museum of Touch in Athens, Greece). An additional reason for the use of replicas in archaeological education in museum contexts is the creation of an "ambience" (e.g. Fig. 7b). While not necessarily replicating an environment, this rather conveys the atmosphere of the context in which the exhibited originals existed, complemented by the replicas (see discussion of "atmospherics" in Forrest 2013).

Museopedagogy

The most explicit way in which archaeological education is created or facilitated in a museum context is through opportunities for adapted interaction, teaching and further study (cf. esp. Hooper-Greenhill 1996; Lea 2000; Barker 2010). Typically, in-gallery materials may be adapted for different audiences, e.g. different information stands/booklets for adults and for children (Fig. 8a). Another common trope is an interactive or cinema room, sometimes furnished with museum-themed equipment (Fig. 8b), where relevant videos (in 2D or 3D) might be shown. Other types of interactive exhibits might simulate a research environment, whereby the visitor is invited to manipulate technology in order to understand nearby exhibits better (Fig. 8c).

For adults, the museum might organize gallery talks and tours, study days, volunteering (in the gallery, the storeroom or a relevant excavation), or outreach days, such as themed events (e.g. Christmas), tying in with wider and contemporary social occasions or concerns. For children, educational archaeological provision is usually more extensive and tied in, wherever and whenever possible, with the country's national curriculum. Relevant materials are often designed by heritage and education specialists (e.g. museopedagogy experts) on a freelance or permanent basis, depending on the museum's budget. Before their museum visit, children, parents and teachers may be able to consult online materials, e.g. databases, online

Museum Education and Archaeology, Fig. 5 *Context and relevance*. (**a**) and (**c**) Archaeological Museum of Kythera, Greece, August 2018 (images reproduced with permission, exhibits © of the Archaeological Museum of Kythera, Hellenic Ministry of Culture and Sports Archaeological Receipts Fund); (**b**) Andover Museum, UK, February 2018 (image reproduced with permission, Hampshire Cultural Trust – Museum of the Iron Age and Andover Museum, www.hampshireculture.org.uk); (**d**) Acropolis Museum, Athens, Greece, June 2009 (image reproduced with permission, exhibits © of the Acropolis Museum). All photography by and © of the author 2009–2018

Museum Education and Archaeology, Fig. 6 (continued)

games, timelines, lesson plans, worksheets etc. During their visit, they may be given worksheets to complete when going through the museum and locating artefacts or be instructed to draw, debate etc. Children may also be given education packs to borrow or buy, which are tailored to specific exhibits, themes or events. Several museums also offer specialist interactive installations, physical as well as electronic (e.g. the ceramics interactive wall of the Bristol Museum and Art Gallery, Bristol, UK; Fig. 8d), or even mock excavations (Fig. 8e). In addition, many museums have dedicated educational rooms, equipped with props, visuals, dressing-up materials, toys, replicas, information and drawing sheets etc. (Fig. 8f; cf. Fig. 1b). The archaeological collection of artefacts in a museum context thus becomes not just a passive but an active experience, deliberately entered into by both the provider (museum, parent, teacher) and the recipient (child, adult).

In effect, the visitors can nowadays choose their level of educational engagement, from a moderated educational engagement in the gallery to a fully interactive experience online and offline. The philosophy of most museums which host archaeological artefacts, therefore, is to be funds of knowledge and to facilitate an appropriately twenty-first century CE pluralistic exploration of the past (but under specialist guidance and within specialist predetermined constraints).

International Perspectives

This author's archaeological, museological, and educational experience is rooted in the Greek and British relevant traditions and informed by current German museological practice, as well as other sectors and locales, through collaborations, visits or study. It is also shaped by the author's specialization, which lies in Greek (especially Aegean Bronze Age) archaeology, as well as FE and HE educational provision. In this context, I have experienced all aforementioned conditions and approaches at play. The perspective which permeates my understanding of how education operates in museums which host archaeology is one of a number of tensions.

One tension I can discern is between the role of archaeology as the sole object of a museum or as a subset within its larger collections, e.g. natural, artistic, ethnographic etc. (e.g. the Bristol Museum and Art Gallery, UK, the Neues Museum, Berlin, Germany etc.). The educational provision for such archaeological collections may emphasize typological and national knowledge less, instead trying to cast the archaeological materials more as means of understanding humanity across cultures and of understanding how knowledge is formed across disciplines. This is borne not only out of the nature of the once disparate collections which may have accumulated to form a museum. It may also be due to a postmodern need to reinterpret what was once a (quasi) colonial collecting strategy (e.g. the collection of archaeological and ethnographic artefacts, human remains, works of art etc. from a number of countries). There are, however, many cases where the museum solely hosts archaeological material and might indeed have been created with particular material and exhibition philosophy in mind (e.g. the Acropolis Museum, Athens, Greece), either in a traditional, Glyptothek-style, arrangement or a postmodernist, thematic display and educational provision. The tension there lies, especially in many Greek museums, between, on

Museum Education and Archaeology, Fig. 6 *Human interaction*. (**a**) Archaeological Museum of Nafplion, Greece, March 2010 (image reproduction with permission and exhibit © of the Argolid Ephorate of Antiquities/ Nafplion Archaeological Museum, Hellenic Ministry of Culture and Sports Archaeological Receipts Fund); (**b**) The Metropolitan Museum of Art, New York, March 2009 (image reproduced with permission); (**c**) Acropolis Museum, Athens, Greece, June 2009 (image reproduced with permission, exhibits © of the Acropolis Museum); (**d**) The Louvre, Paris, France, June 2009; (**e**) Pierides Archaeological Museum, Larnaca, Cyprus, August 2007 (image reproduced with permission by the Pierides Archaeological Museum). All photography by and © of the author 2007–2010

Museum Education and Archaeology, Fig. 7 *Replicas and hands-on experiences*. (**a**) Abguss-Sammlung Antiker Plastik, Freie Universität, Berlin, Germany, December 2016 (image reproduced with permission from the Abguss-Sammlung Antiker Plastik, Freie Universität, Berlin); (**b**) The Aegean Gallery, Ashmolean Museum, Oxford, UK (image and its reproduction with permission and © of the Ashmolean Museum, University of Oxford); (**c**) The Origins Centre Museum, Johannesburg, South Africa, July 2007 (image reproduced with permission from the Origins Centre). All photography, unless otherwise stated, by and © of the author 2007–2016

the one hand, the museum's role in educating about the past and making this relevant to the present and, on the other hand, the museum's role in eliciting pride from the visitor who might perceive the exhibited archaeology as his/her heritage. The museum might even espouse particular archaeological-political agendas (e.g. the return of the Parthenon Marbles, cf. Hamilakis 2011; also see the mode of exhibition in Fig. 2c, emphasizing the replicas which stand in for the original sculptures kept in the British Museum).

Another tension involves the accessibility of archaeological education for museum users. In Greek museums, there is a tension between, on the one hand, making exhibits, their descriptions and their understanding accessible to multiple audiences through e.g. educational packs, online games and guided tours, and, on the other hand, deliberately separating the museum and its professionals from the public, in an obvious confirmation of authority (cf. Ntaflou 2011; relevant general debate in Barker 2010: 297–298). The

Museum Education and Archaeology, Fig. 8 *Museopedagogy.* (**a**) Andover Museum, UK, February 2018 (image reproduced with permission, Hampshire Cultural Trust – Museum of the Iron Age and Andover Museum, www.hampshireculture.org.uk); (**b**) Archaeological Museum of Nafplion, Greece, March 2010 (image reproduced with permission from and © of the Argolid Ephorate of Antiquities/Nafplion Archaeological Museum, Hellenic Ministry of Culture and Sports Archaeological Receipts Fund); (**c**) Staatliches Museum für Archäologie, Chemnitz, Germany, October 2016 (image reproduced with permission from the Landesamt für Archäologie Sachsen/Staatliches Museum für Archäologie Chemnitz); (**d**) Bristol Museum and Art Gallery, UK, February 2018 (image reproduced with permission from the Bristol Museum and Art Gallery); (**e**) Roman Museum, Canterbury, UK (image reproduced with permission from the Roman Museum); (**f**) Andover Museum, UK, February 2018 (image reproduced with permission, Hampshire Cultural Trust – Museum of the Iron Age and Andover Museum, www.hampshireculture.org.uk). All photography by and © of the author 2010–2018

latter is done through the use of sometimes inaccessible archaeological terminology (cf. Plantzos 2011), overly typological or chronological arrangements or text-heavy displays. Such tensions might, in fact, exist in the very same museum and enacted by the very same professionals, depending on the situation.

A third type of tension concerns the archaeological education allowed. However inclusive, multimodal and multicultural, the museum still wants and needs to set boundaries regarding what is and is not acceptable. There may be, for example, both archaeologically plausible and archaeologically unsubstantiated interpretations of a particular archaeological artefact exhibited in a museum (e.g. the Phaistos Disc in the Herakleion Archaeological Museum, Greece). The museum, in its exhibition, documentation, guided tours, educational materials, online information, and even souvenir shop, will follow the interpretations which seem plausible to its staff and other experts, without necessarily refuting or even acknowledging competing or discredited interpretations. In this case, the museum regulates the knowledge to be propagated and, usually silently, moderates the official limitations of archaeological knowledge.

Yet another type of tension regards visitors' educational expectations. These vary greatly, according to age, learning style, learning tradition, mood, sole or group visit etc. But the museum can only enable people to pursue particular types of archaeological education, and this is done through all the aforementioned approaches. So, if someone is averse to interactive events, he/she can choose guided tours or sole study during a visit. The key to a successful educational museum provision, in my experience and from my perspective, is the existence of a choice of opportunities for learners to tailor their pedagogical journey. It is also the museum's realization that it ought to educate people toward critical and informed thinking, rather than proselytize them (at least this is the ICOM code of ethics which many museums purport or aim to follow).

Future Directions

Where does the future of museum education in archaeology lie? We need to ask ourselves whether this means where we think the field is heading toward or where we would like it to do so. There is a clear shift globally. Older museological paradigms assumed that museums were "neutral" conduits of knowledge, the latter communicated through an array of selected and categorized artefacts (cf. discussion in Merriman 2000). Nowadays, the tendency is toward more up-to-date paradigms, whereby museums (should) act toward outreach, inclusivity, social relevance, current debate and entertainment (cf. Lea 2000: 317).

However, museums also have to compete for the publics' and learners' affections. Visiting a museum and engaging with its archaeological artefacts at a time of high-tech distractions, such as mobiles, tablets and the like, can be challenging as well as potentially fruitful. It is challenging because the museum visit and its educational elements are seen as an entertainment exercise (cf. Foley and McPherson 2000), on a par with seeing a film or visiting a theme park, with all the pitfalls this equation entails. It is rewarding because the museum, in designing its educational provision, can harness available technologies toward engaging its audiences in ways they are already familiar with (e.g. QR codes, online games, podcasts etc.; cf. Rayward and Twidale 1999; Charitonos et al. 2012). In my opinion, the use of technology as an educational mediator is desirable, but as a component alongside other, multimodal, educational means: props and replicas, physical play and activities, multilingual, jargon-free information panels, community events etc.

In addition, education may be more accessible now, but it is also much more varied. Consequently, the museum is no longer the authoritative educator it once saw itself as, and archaeological educational provision in a museum context is currently trying to redefine itself within a barrage of authoritative and non-authoritative voices (cf. Merriman 2000). There is, therefore, an understandable tendency for museum education in archaeology to engage in wider networks, such as school curricula and online and offline communities, as an educational moderator and controller. With regard to making the collections accessible and relevant, good examples include the

monthly rotation of "unseen" (i.e. non-exhibited) artefacts in the National Archaeological Museum, Athens, Greece; the artistic interventions at the inauguration (June 2009) of the Acropolis Museum, Athens, Greece; as well as thematic events according to yearly occasions, such as an exhibition on witchcraft at the Ashmolean Museum, Oxford, UK, to coincide with Halloween ("Spellbound," 2018–19). In terms of opening gallery spaces and exhibits for the education of local communities, good examples include volunteering, outreach collaborations with local bodies (e.g. schools, archaeological associations), as well as popular publications, lectures and short courses. With regard to educational materials, good examples include the online resources of the Metropolitan Museum of Art, New York, USA; the in-house educational packs and school competitions of the Goulandris Museum of Cycladic Art, Athens, Greece; and the multimodal, interactive elements in the galleries of the State Museum of Archaeology in Chemnitz, Germany.

Archaeology, as field and museum practice, as well as educational provision, has the potential for real social service and even change, as long as it is not distracted by the different purposes and agendas of the elements with which it competes. In my view, the educational role of the museum is to not only impart knowledge about the past but to also participate in current debates, however challenging (socially, politically, disciplinarily) this may be (cf. Stone 1994; Hamilakis 2011). For example, archaeological exhibitions and tailored educational activities about migrations, persecutions, fake news, human trafficking and war atrocities might be difficult. But they would have the potential for social relevance and meaningful debate and would sensitize and educate future generations. In this sense, the museum would not (only) be the propagator of (often class-specific) archaeological aesthetics and interpretations of selected material; it could also redefine itself as a proactive social actor on current debates and pedagogy (cf. Lea 2000: esp. 323–4; Grek 2009; Chan 2011).

Finally, although the aforementioned good examples are not characteristic of many or even the majority of archaeological museums and archaeological collections, in my opinion they represent promising future developments. All in all, museum education in archaeology has the means, drive and potential to emerge, and is already doing so, as an interactive facilitator. In that capacity, it can bridge the past, present and future in imaginative, inclusive and socially engaged ways.

Cross-References

- ▶ Parthenon (Elgin) Marbles: Case Study
- ▶ Public Archaeology and Education: Present Relevance to the Past

References

Argyropoulos, V., E. Aloupi-Siotis, K. Polikreti, R. Apostolides, W. El Saddik, R. Gottschalk, M. Abd el Nazeer, M. Vryonidou-Yiangou, P. Ashdjian, M.-C. Yannoulatou, S. Simon, W. Davis, and V. Kassianidou. 2014. Museum education and archaeological ethics: An approach to the illicit trade of antiquities. *Journal of Conservation and Museum Studies* 12 (1): 1–8.

Barker, A. 2010. Exhibiting archaeology: Archaeology and museums. *Annual Review of Anthropology* 39: 293–308.

Barrett, J. 2012. *Museums and the public sphere*. Chichester: Wiley-Blackwell.

Chan, A.A. 2011. Translating archaeology for the public: Empowering and engaging museum goers with the past. *International Journal of Heritage Studies* 17 (2): 169–189.

Charitonos, K., C. Blake, E. Scanlon, and A. Jones. 2012. Museum learning via social and mobile technologies: (how) can online interactions enhance the visitor experience? *British Journal of Educational Technology* 43 (5): 802–819.

CIfA. 2019. Chartered Archaeologist. https://www.archaeologists.net/chartered

Cornu, M. 2009. The human body in the museum: From a person to an object. *Art Antiquity and Law* XIV (3): 219–236.

Curtis, N.G.W. 2003. Human remains: The sacred, museums and archaeology. *Public Archaeology* 3 (1): 21–32.

Foley, M., and G. McPherson. 2000. Museums as Leisure. *International Journal of Heritage Studies* 6 (2): 161–174.

Forrest, R. 2013. Museum atmospherics: The role of the exhibition environment in the visitor experience. *Visitor Studies* 16 (2): 201–216.

Foster, S.M., and N.G.W. Curtis. 2016. The thing about replicas – Why historic replicas matter. *European Journal of Archaeology* 19 (1): 122–148.

Grek, S. 2009. 'In and against the museum': The contested spaces of museum education for adults. *Discourse:*

M

Studies in the Cultural Politics of Education 30 (2): 195–211.
Hamilakis, Y. 2011. Museums of oblivion. *Antiquity* 85 (328): 625–629.
Hooper-Greenhill, E., ed. 1996. *The educational role of the museum*. London: Routledge.
Johnstone, C. 1998. Your granny had one of those!' How visitors use museum collections. In *History and heritage, consuming the past in contemporary culture*, ed. J. Arnold, K. Davies, and S. Ditchfield, 67–77. Shaftesbury: Donhead.
Kenny, S.S. 2013. The development of medical museums in the antebellum American south. *Bulletin of the History of Medicine* 87 (1): 32–62.
Lea, J. 2000. Teaching the past in museums. In *The archaeology education handbook, sharing the past with kids*, ed. K. Smardz and S.J. Smith, 315–327. Walnut Creek: Altamira Press.
Merriman, N. 2000. The crisis of representation in archaeological museums. In *Cultural resource management in contemporary society: Perspectives on managing and presenting the past*, ed. F.P. McManamon and A. Hatton, 300–309. London: Routledge.
Ntaflou, C. 2011. The new acropolis museum and the dynamics of National Museum Development in Greece. In *Great narratives of the past: Traditions and revisions in national museums conference proceedings from EuNaMus, European National Museums. Identity politics, the uses of the past and the European citizen*, Paris, 29 June–1 July & 25–26 Nov 2011, ed. D. Poulot, F. Bodenstein, J.M. Lanzarote Guiral, 97–111. EuNaMus report no 4. Linköping: Linköping University Electronic Press.
Plantzos, D. 2011. Behold the Raking Geison: The New Acropolis Museum and its context-free archaeologies. *Antiquity* 85: 613–625.
Rayward, W., and B. Twidale. 1999. From docent to cyberdocent: Education and guidance in the virtual museum. *Archives and Museum Informatics* 13 (1): 23–53.
Register of Professional Archaeologists. 2019. What is the Register of Professional Archaeologists? https://rpanet.org/about-the-register/
Schubert, K. 2016. *The Curator's egg: The evolution of the museum concept from the French revolution to the present day*. London: Ridinghouse.
Silberman, N.A. 1995. The politics and poetics of archaeological narratives. In *Nationalism, politics, and the practice of archaeology*, ed. P. Kohl and C. Fawcett, 249–262. Cambridge: Cambridge University Press.
Simandiraki-Grimshaw, A., F. Sattler, and K. Angermüller, eds. 2020. *Replica knowledge: An archaeology of the multiple past*. Berlin: K.Verlag.
Stone, P.G. 1994. Introduction: A framework for discussion. In *The presented past: Heritage, museums and education*, ed. P.G. Stone and B.L. Molyneaux, 15–28. London: Routledge.
Swain, H. 2006. Public reaction to the displaying of human remains at the Museum of London. In *Human remains and museum practice*, ed. J. Lohman and K. Goodnow, 97–105. Paris: UNESCO and the Museum of London.

Museum of New Zealand Te Papa Tongarewa

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Basic Information

Located in the capital city of Wellington, Te Papa is New Zealand's national museum, which has been innovative, successful, and controversial in equal measure since it opened in 1998. Voted the best museum in the region on TripAdvisor, Te Papa is the most visited museum in Australasia; by mid-2017, more than 25 million people had attended. Its most successful exhibition, *Gallipoli: The Scale of Our War*, which deals with the ANZACs (soldiers from Australia and New Zealand in World War I), has attracted 1.5 million visitors (McCarthy 2018).

Te Papa is the short form of the full name "Museum of New Zealand Te Papa Tongarewa." The Māori name can be translated as a "receptacle of treasured possessions." It alludes to "mother earth" (*Papatūānuku*) in the Māori creation story but can also mean land, foundation, or platform and recalls the traditional *papahou*, or treasure box, containing a rare variety of *pounamu* (greenstone). The "new" museum was in fact not new at all, but a reinvention of its various predecessors: the Colonial Museum founded in 1865, which became the Dominion Museum in 1907, the National Art Gallery and Dominion Museum in 1936, the National Museum in 1972, and finally in 1992 the Museum of New Zealand Te Papa Tongarewa. By the early 1980s, the then National Museum had outgrown its building, and its Māori, Pacific, and history displays were showing signs of being out of step with a changing society (McCarthy 2007). Plans for a new national museum overlapped with, and to some extent grew out of, the groundbreaking *Te Maori* exhibition which toured the USA and New Zealand, 1984–1987. Certainly the museum came under intense pressure for change from Māori leaders

in a period of intense debate about the contemporary relevance of the Treaty of Waitangi, New Zealand's founding document signed in 1840.

The 1985 report *Nga Taonga o te Motu* led on to the establishment of a project development team in 1988 which in turn produced a concept in 1989 recognizing the Treaty and acknowledging the two main cultures of the nation: Māori and Pakeha (European). The new museum was formalized by legislation in 1992 which, controversially for some, integrated the collections of the gallery and museum, leading to criticism from art critics that art should be displayed by itself in a more traditional style.

Opened in 1998, Te Papa quickly exceeded its visitor targets and attracted a large and genuinely diverse audience including an unprecedented proportion of Māori visitors. The outstanding features of the new museum which delighted mass audiences and annoyed academic critics – the interactives, the busy "malled" spaces, the celebration of popular culture, and New Zealand identity – signaled a shift away from the old gallery and museum with their somewhat stuffy image and elite audience. Developers sought to reposition Te Papa within the leisure and tourism industry with a strong branding and marketing drive. This emphasis on accessible interpretation for a broad audience reflected the postmodern tenets of the "new museology," a philosophy which favored the museum as forum rather than temple, and stressed public scholarship and audience-focused exhibitions rather than an inward preoccupation with collections and connoisseurship. These features were seen in other "new" museums in Australia, Canada, and the USA in the 1980s and 1990s, a trend which has generated much debate in the academic literature of museum studies (Message 2006). Into this heady mix of nation building, project management, and museological experimentation was added the distinctive local ingredient of "biculturalism," the idea of two (bi) cultures in one country based on the Treaty (Message 2006; McCarthy 2011). In 2017–2018 the museum was undertaking a renewal of its policy and practice and developing a series of new exhibitions including an increasing emphasis on digital storytelling (McCarthy 2018).

Major Impact

Several aspects of Te Papa could be mentioned as creating an impact on museology internationally, not least the creation of a lively visitor experience and the playful approach to labels and interactives in the multimedia exhibitions. However Te Papa is probably best known for the integration of Māori values into "bicultural" museum practice. A raft of policies define biculturalism: *mana taonga* (see below), *mātauranga Māori* (Māori knowledge/world view), and *tikanga taonga* (Māori practices for managing *taonga* or treasures). These policies were operationalized successfully in parts of the institution – notably collection management and exhibition development – while other areas remained within conventional parameters. Officially Te Papa now saw itself as a *kaitiaki* (guardian, caretaker) rather than owner of taonga and initiated and maintained a complex and at times difficult process of consultation with major tribes around issues such as handling and display of *taonga*, repatriation, human remains, etc. The clearest example of biculturalism at work is Te Papa's functioning *marae*, a ceremonial meeting space where visitors are welcomed, especially the *iwi* (tribes) who are "in residence" every 2 years hosting events and mounting an exhibition.

The central plank of biculturalism is the *mana taonga* policy. *Mana taonga* means literally the power and authority (*mana*) that resides in/derives from cultural treasures (*taonga*). In policy and practice, *mana taonga* is a declaration of the Māori control of Māori *taonga* and consequently a new way of thinking about the relationship of museums and source communities in which anyone who had collections in the museum has the right to participate in their management (McCarthy et al. 2016). The policy had a profound impact on professionals working in the museum project and transformed museological practice in terms of ownership, authority, and identity.

At the level of everyday museum practice, one of the most interesting transformations was the expansion of collection care and management to accommodate the spiritual practices that were necessary for the handling, storage, and conservation of sacred ancestral objects (*taonga*), practices generally (but not always) carried out by Māori

people who form the majority of staff working with these collections (McCarthy 2011). It is worth noting that Pacific collections and exhibitions have also been developed in a comparable way, particularly with the contemporary material culture of Pacific Islanders living in New Zealand (Mallon et al. 2012).

References

Museum of New Zealand Te Papa Tongarewa. Website available at: http://www.tepapa.govt.nz/pages/default.aspx

Further Reading

Mallon, S., K. Mahina-Tuai, and D. Salesa, eds. 2012. *Tagata o le moana: New Zealand and the people of the Pacific*. Wellington: Te Papa Press.

McCarthy, C. 2007. *Exhibiting Maori: A history of colonial cultures of display*. Oxford/New York: Berg.

McCarthy, C. 2011. *Museums and Maori: Heritage professionals, indigenous collections, current practice*. Wellington: Te Papa Press.

McCarthy, C. 2018. *Te Papa: Reinventing New Zealand's national museum, 1998–2018*. Wellington: Te Papa Press.

McCarthy, C., P. Schorch, and A. Hakiwai. 2016. Globalizing Māori museology: Reconceptualising engagement, knowledge and virtuality through Mana Taonga. *Museum Anthropology* 39 (1): 48–69.

Message, K. 2006. *New museums and the making of culture*. Oxford/New York: Berg.

Museum of San Pedro De Atacama, Northern Chile

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Introduction

While European nation-states were using archaeology and museums to develop their national identities, the latter also started a great diaspora, expanding to the Americas during the first half of the nineteenth century, going hand in hand with the independence of Spanish and Portuguese colonies (Swain 2007). Like their European counterparts, the new American nation-states were constructed following the ahistorical principle of homogeneity (Gnecco 2002) unifying their peoples through the appeal to a singular past and a sense of commonality, excluding and denying the existence of culturally differentiated groups within them (Benavides 2001).

American museums are associated with colonial practices of excavation, collection, and exhibition of human bodies and indigenous objects. Through these devices, archaeology provided the scientific means to demonstrate the racial superiority of the colonizers and justify the dispossession of indigenous lands, knowledge, bodies, and collections. With the establishment of nation-states, both museums and archaeology contributed to nationalist discourses (Díaz-Andreu 2007), either through their interpretations or through the material evidence that allowed constructing the history of these new imagined communities (Anderson 1991). The early enactment of laws that reaffirmed the state ownership of archaeological heritage also implied the heritagization and nationalization of indigenous archaeological bodies and objects (Rodríguez 2010). Parallel to this, European culture and values prevailed over those of indigenous peoples, who were considered part of the past and were therefore subject to domination and museization.

It is impossible to dissociate the museums' histories from the histories of indigenous peoples that inhabited and inhabit the current national territories. In the last six decades, it is also difficult to separate museums and archaeology from indigenous struggles over their cultural, territorial, and sovereign rights (Fine-Dare 2002). In this context, indigenous leaders and intellectuals have questioned the colonial scientific practices of excavation, collection, and exhibition (Deloria 1988; Mamani 1989), as well as the treatment of their ancestors and sacred objects (Fforde 2002; Garcia 2016). In North America, decolonization activism was identified with the "Native American Museum Movement" (Arthur 2014), at whose

heart the activism of repatriation and reburial was installed (Riding In 2005). In South America, the indigenous critique to archaeologists and museums occurred more recently, especially from the 1990s with the implementation of multicultural policies and the visibility of ethnic demands (Gnecco and Ayala 2011). The lack of participation, community permission, and information about research projects, as well as their demands to manage archaeological sites and museums, is central to indigenous claims. The excavation of cemeteries, exhibition of human remains, and removal of objects from their territories are also critical aspects within indigenous contestations. While there is a great diversity of indigenous peoples in the Americas, several of these demands, in some cases all, have been used as banners of criticism toward archaeology and museums by indigenous leaders and intellectuals. The crisis of representation of archaeology and anthropology and the discussions regarding their authoritative voice to speak for or about the "other" have also been at the center of this debate, while indigenous peoples claim they are the ones who must speak for themselves (v.gr. Deloria 1988).

The repercussions of indigenous activism have been visible in museums, which aside from critically assessing their histories have also generated discussions about new practices and methodologies for indigenous inclusion and decolonization (Lonetree 2012; Phillips 2011). Criticisms regarding the treatment of indigenous sacred bodies and objects stand out not only because of their repercussions on national and international laws and codes of ethics but also on working protocols for collections and exhibits (Fine-Dare 2002; Endere and Ayala 2011; Arthur 2014; Ametrano 2015). There have also been important changes in archaeology and despite being marginal approaches with respect to dominant archaeology, new forms of relationship with indigenous peoples are currently being sought through decolonial, public, community, collaborative, and indigenous archaeologies (Watkins 2005; Smith and Martin Wobst 2005; Atalay 2006; Colwell-Chanthaphonh and Ferguson 2008; Silliman and Ferguson 2010; Montenegro 2014).

In the following pages, we will address these and other debates, focusing on the case of the Museum of San Pedro de Atacama and the relationship of its archaeologists with the Atacameño indigenous people. We believe that a critical analysis of its history and taking charge of it will allow us to shed a light over new types of relationships and collaborative works between archaeologists and indigenous peoples. As Shepherd said in the Virtual Forum: Archaeology and Decolonization: "Before understanding or appreciating where we want to go or what we want to become, we need to understand what we have been and the forces and contexts that have made us what we are" (Haber and Gnecco 2007: 404–405).

A Brief History of the Museum

The Atacameño people are the indigenous inhabitants of northern Chile; their homeland centers around the Atacama Desert (Region of Antofagasta), known as the driest desert in the world (Fig. 1). The extreme aridity of the environment has favored the preservation of archaeological sites and objects, organic materials such as wood and textiles, and where naturally mummified remains of human beings are not uncommon. For this reason the Atacama Desert has become a center of archaeological research. The Atacameños have coexisted with archaeologists for more than a century and with the Archaeological Museum of San Pedro de Atacama for 60 years. Throughout their history this indigenous people has undergone a series of drastic changes, from the Spanish conquest to the establishment of the Chilean neoliberal multicultural state. These changes are reflected in their integration to industrial mining in the twentieth century and more recently to the tourism industry, which has led traditional agropastoral economy to a secondary position (Vilches et al. 2015). Another consequence of this process was the loss of their language Kunza; the last native speakers of Kunza died in the 1950s. Despite these changes, the Atacameños retain their cultural traditions. In the last 20 years, a process of recognizing and strengthening their identity has

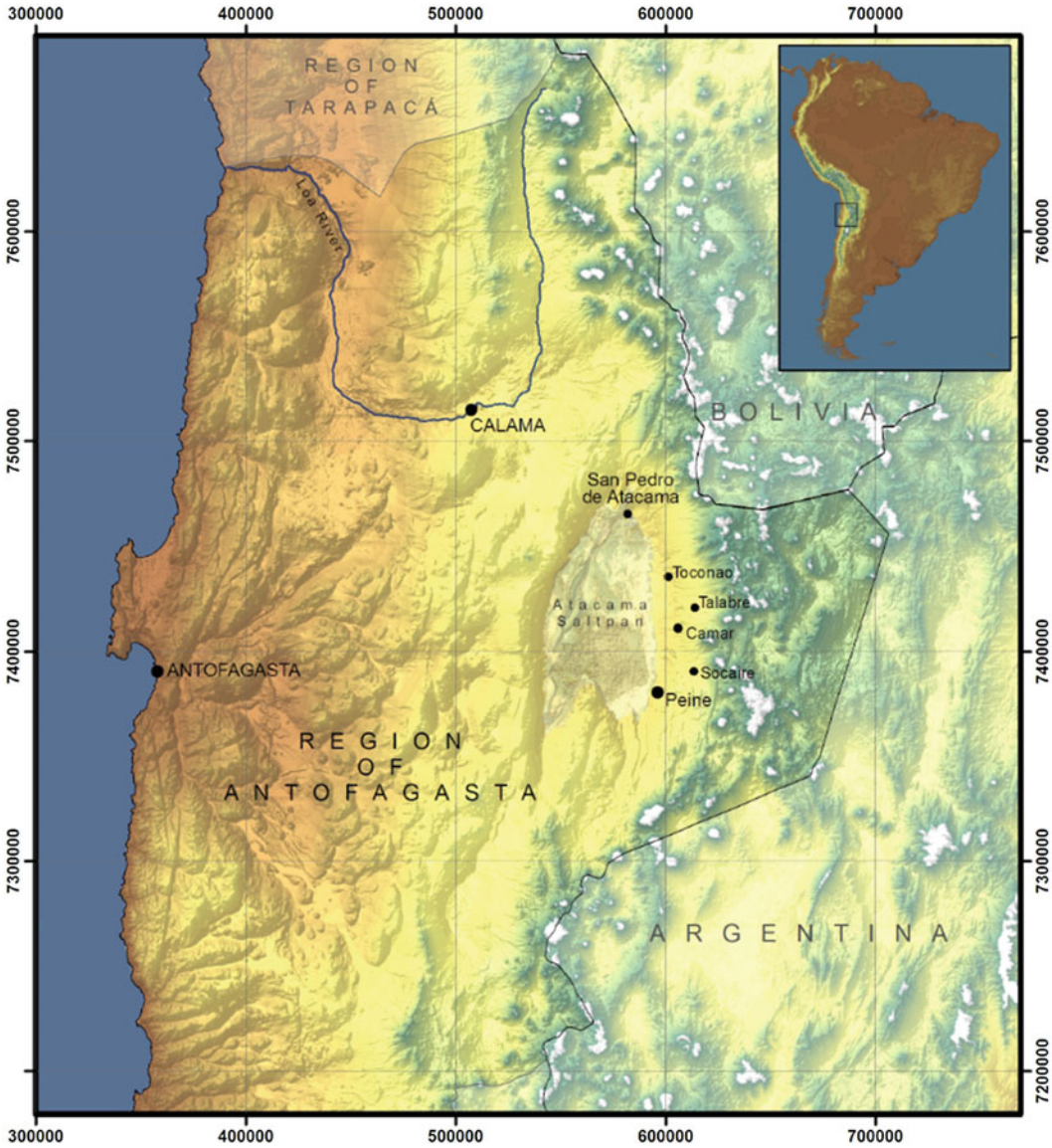

Museum of San Pedro De Atacama, Northern Chile, Fig. 1 Region of Antofagasta, traditional homeland of the Atacameño people. (Map by Mariana Ugarte)

made them critical stakeholders in the archaeological and political courses that affect them (Ayala 2008, 2011).

Archaeology in the Atacama Desert began shortly before the territory was annexed to Chile following the War of the Pacific with Bolivia and Peru in the late nineteenth century. The interest of the Chilean government to assimilate the indigenous peoples that inhabited this region prompted the development of archaeology, as it was important to know the indigenous past to carry out this process. Moreover, producing and possessing information about this territory (geological, archaeological, sociocultural) was a strategy of symbolic ownership amidst border disputes (see also Romero 2003; Ayala 2008; Kalazich 2015).

In the first half of the twentieth century, several local and foreign archaeologists were investigating in this area, including Max Uhle (v.gr. 1913), Ricardo Latcham (v.gr. 1936), Aureliano Oyarzún (v.gr. 1910), and Grete Mostny (v.gr. 1949). However, the arrival of Gustavo Le Paige in 1953, a Belgian Jesuit priest and amateur archaeologist, was crucial to the development of archaeology in the Atacama as well as to the notoriety of this region internationally. He conducted excavations at a variety of sites along the Atacama Basin, rock shelters, mountain-top ritual sites, open camps, and lithic quarries, although it was the excavation of funerary contexts which characterized the focus of his work as well as the provenance of the collection (Núñez 1993). It was with these materials and human remains that Le Paige inaugurated the Archaeological Museum in 1957 in San Pedro de Atacama's Parish House (casa parroquial). In 1958 this museum was incorporated to Universidad del Norte. In 1962, the priest began the construction of a purposefully built precinct to hold and display the ever-increasing archaeological collection, which he did with the aid of military conscripts, Atacameño builders and some of the Atacameño children that usually accompanied him in his excavations (Núñez 1993). In 1963, during the celebration of the First Chilean Archaeology Conference in San Pedro de Atacama, Le Paige inaugurated one pavilion of the new building. Later, two more were built and the museum finished with a total of three pavilions: one for the permanent exhibit, another for laboratories, offices and the library, and a third one for the storage of the collections. In 1991, with contributions from Minera Escondida, the Treasury Room was built to display the golden objects collection. (The collection is made mainly by golden vases and plaques from the Larache archaeological site in San Pedro de Atacama. Minera Escondida Limitada, operated by BHP Billiton, which provided the funds to build the room is one of the largest transnational mining companies in the Antofagasta Region. Through CSR image-cleansing policies and Fundación Minera Escondida the company channels resources to fund educational and social participation programs in the Antofagasta Region.) This building would work, with some later additions, until 2015, when it was demolished for the construction of a new museum.

After the death of Gustavo Le Paige in 1980, the direction of the Archaeological Museum of San Pedro de Atacama was taken up by various archaeologists who motivated the flow of visiting researchers and the increase of its permanent academic staff. In 1984 the Instituto de Investigaciones Arqueológicas y Museo (Institute of Archaeological Research and Museum – hereafter IIAM) was created, from the merger between the Department of Archaeology at Universidad del Norte (later to become Universidad Católica del Norte, UCN) and the Archaeological Museum of San Pedro de Atacama. While the growth of the academic staff has been gradual over time, from 2006 onward the number of researchers has increased with the opening of their postgraduate programs (in which the doctorate program is taught jointly with Universidad de Tarapacá in Arica).

In 2002, the Museology Area was created, initially, to stabilize the archaeological collection left by Le Paige and his successors, since a majority of the objects and human bodies of this collection were damaged by the absence of conservation treatments and appropriate storage facilities. Due to increasing contestation to the museum by the indigenous community, this task became an institutional priority in those years. Shortly after the museographic work to improve the permanent exhibit and create temporary exhibitions began. After 20 years of the exhibit created by Le Paige, in the mid-1980s the museum opened a new permanent exhibition to the public. Because human bodies continued to have a central role in the new museographic display, indigenous leaders demanded their removal from the exhibition. For this reason, renewing the permanent exhibit also became an important goal for the museum in the twenty-first century.

In 2004, due to the increase of indigenous criticisms against the museum, also related to demands of community participation, having a

voice in excavation permits, the management of sites and the museum, as well as the custody of archaeological heritage, the Unit of Relations with the Atacameño Community (URCA) was created. This area of public relations was especially focused in building and maintaining the ties between the Atacameño people and this institution (Ayala 2008, 2014). It was also in charge of the heritage education program called Andean School (Escuela Andina). The Area of Education was created in 2009, with the aim of promoting and disseminating the local cultural heritage through guidance services and educational activities. The opening of these new areas generated several changes within and outside the institution, since previously the IIAM had been characterized by a strong emphasis on research, leaving aside the development of museological and educational programs.

After almost 50 years of operation, in 2009 the museum was found to have structural damage which deemed the building dangerous for both people – museum workers and visitors – and the archaeological collection. Although at first the university had planned improvements to the building, the regional government got involved laying out a multimillion-worth project financed by the National Fund for Regional Development through a loan from the Inter-American Development Bank. The idea was to establish an ultra-modern and spacious museum in the so-called archaeological capital of Chile, to be administered jointly by Universidad Católica del Norte, the Consejo de Pueblos Atacameños (Atacameño Peoples Council), and the state (Regional Government and Municipality of San Pedro de Atacama), through a form of organization and structure that has not been defined yet.

The construction part of the project implied the total demolition of the previous structure, for which it was thought in two stages: first, the construction of a temporary precinct to hold the entire archaeological collection and locate the research space for permanent staff and visiting fellows while the construction of the new museum took place. The conservation consultants worked with the Le Paige museum conservation team during 18 months to properly catalogue and establish all conservation measures to move some 400,000 objects, 5000 human skulls, and 400 mummified human remains. The second stage is the construction of the new museum, which was to begin in January 2015 and be finished by March 2016. This step could not start until the entire collection was safely moved and stored in the temporary facility. The movement of the archaeological collection was finalized in 2016; it was composed of some 12,000 boxes of various materials. The temporary structure was built with the appropriate infrastructure according to the requirements of conservation of the collection, guaranteeing its protection as long as needed. It also includes spaces for the continuity of the research activities conducted at the institute and museum: laboratories, offices documentation center, and classroom, among others. There were, however, several problems with the implementation of the second stage of the project, as to this date the new museum has not been built. At the place lay the ruins of the old museum, which was partially demolished shortly after the collection was moved.

Since the new museum project implied a new but unknown organizational scheme with other stakeholders, between 2015 and 2016 the IIAM took precautions to safeguard both its research unit and archaeological collection, therefore "dividing" the IIAM into the Instituto de Arqueología y Antropología – IAA, and the Museum R.P. Gustavo Le Paige, each with its own director, but under the umbrella of the IIAM.

In 2017, the IIAM opened a communications post, which has had an important role over the last 2 years in the development of outreach initiatives and the activation of institutional social networks. The ninth version of the Andean School was applied for by this unit, participating also in the publication of an archaeological atlas for children (see Figueroa 2018) and a series of lectures on heritage and conservation. Due to the "temporary" location of the IIAM in the outskirts of San Pedro de Atacama (Fig. 2), the use of social media and regular news updates in the website and local newspapers have been fundamental to maintain links with the town and its publics.

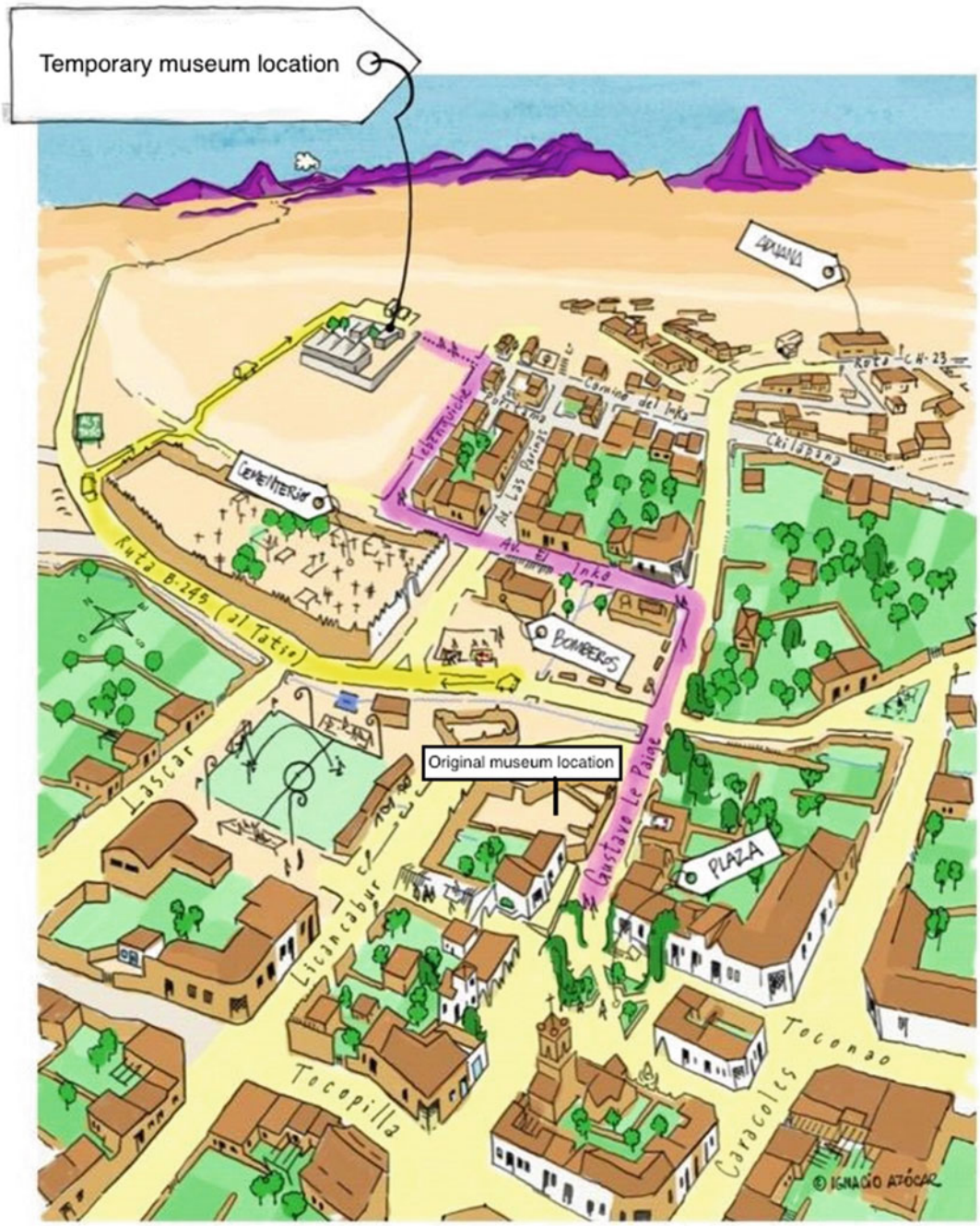

Museum of San Pedro De Atacama, Northern Chile, Fig. 2 Original and temporary locations of the Archaeological Museum in San Pedro de Atacama. (Illustration by Ignacio Azócar)

M

The Museum's Relationship with the Atacameño People

The Beginning and Professionalization of the Museum

Since its inception, this institution showcased the scientific work of Le Paige and his desire as a collector. Le Paige excavated a variety of archaeological sites with an emphasis on cemeteries. As mentioned before, Le Paige and the archaeologists who came after him eventually collected over 5000 human skulls, 400 mummified human remains, and 400,000 objects. Therefore, the exhibits of this museum were characterized by the presence of human bodies and funerary objects from pre-Hispanic tombs. While Le Paige was one of the defenders of the historical continuity of the Atacameños, this was not meant to validate their opinions. The Atacameños' critique referring to Le Paige's archaeological work is mainly associated to the excavation of hundreds of burials, a fact that seen in the context of local practices and discourses from that time went against their values and beliefs (see also Spahni 1967: 131–132). The Atacameños refer to archaeological sites as places of the *abuelos* (grandparents) or *gentiles* (heathens), spaces and things that must be respected and feared in which the "land or the abuelos can catch you and get you sick," reasons for which they should not be disturbed nor visited, or objects taken from them. The *abuelos* are the ancestors of the Atacameño people. Le Paige was aware of these local beliefs; however his scientific interest for Atacameño archaeology led him to deny the practices and discourses of the indigenous population, together with the cultural meanings that the archaeological remains portray for them. His attitude was not only coherent with the political context as well as with the development of archaeology in those years but also with his practice as a priest by which he must have had considered important to eradicate these "pagan beliefs" in a crusade of his own, similar to the "extirpation of idolatries." Taking into account the power of Le Paige as a scientific-religious authority in a social and political context that did not favor indigenous peoples, it was difficult for Atacameños to express their disagreement regarding the excavation of archaeological burials (Ayala 2011).

> There were people who were outraged at him but also I do not know if they manifested it or showed it in a soft way or in very different ways that made him rethink his attitude regarding the work he was developing as archeology. (Atacameño 1, 2004) (By petition of the majority of the people interviewed, their names remain concealed (Ayala 2008).)

Also, some people stopped attending mass because of their strong discontent with Le Paige archaeological activities:

> . . .with Father Le Paige many people drifted apart from the church when he started to work the archaeological part because well, the father did not hide much what he had, he had a lot of skulls. (Atacameño 2, 2003)

In this context, Le Paige reproduced colonial relations of denial with the Atacameños, since, despite knowing of the disagreement the communities held regarding his archaeological practice, he continued excavating cemeteries and displaying human bodies, which created a distance between the museum and the local community. Discrepancies surrounding his archaeological practices were also rose in the private realm, in the families where children that accompanied Le Paige to archaeological sites were reproached, a context in which these fears were not expressed to the father.

On the other hand, Le Paige was aided in his excavations by some Atacameño children that would later be part of the staff of the museum, as well as some of their offspring. Their words about Le Paige are of gratitude and kindness; most of them are or were practitioners of Atacameño traditions and concerned with the dissemination of their culture. Every year, the Atacameño families close to the priest organize a mass and luncheon for his birthday, to which all museum and institute staff are invited.

Le Paige was concerned with the objects staying in the region instead of being shipped elsewhere, entering private or public collections in some distant country or other cities of Chile (Le Paige 1957; Núñez 1993); the looting of archaeological sites had already began, so the

priest would tell the children to let him know first if they heard of any discovery, which he rewarded with powder milk and other groceries. At least that way the objects stayed in the region (Núñez 1993). In addition, not only did the father conduct archaeological digs following his own explorations, but also people would approach him and tell him about archaeological remains they had found in their lands or directly took objects to him.

Thus, the relationship of Le Paige with the Atacameño people, although framed within structural asymmetrical power relations characterized by the denial of ethnic agency, had also some nuances, especially in the relationships built between the priest and the people closer to him (Ayala 2008, 2011). (For an interesting study of the religious, political, and intellectual career of G. Le Paige, linked to the analysis of republican colonialism, military indigenism, and the history of local anthropology, see Pavez 2012.)

During the late 1960s, doctoral researchers from Columbia University conducted their studies in the Antofagasta Region. They came with grants from the US National Science Foundation (NSF), the Chile Exploration Company (Guggenheim brothers), and the Chuquicamata Copper Company, PLC, a joint society between the Chile Exploration Company and Codelco (see, e.g., Pollard 1970; Druss 1976). US public-private involvement in foreign research contributed to the dissemination of positivistic theoretical frameworks in Chilean archaeology, exhibiting the traits of imperialist archaeology (see Trigger 1984). (US research interventionism abroad had begun with Project Camelot (1964–1965) (Galtung 1968), with Latin America as one of its priority regions. Although the project was short-lived, as seen above funding continued being allocated to foreign research in different fields of the social sciences.)

With the death of Le Paige and the arrival of new archaeologists in the 1980s, there were some changes to the museum. These changes were framed in a more professional approach to archaeology and the replacement of some exhibits from the time of Le Paige. However, the new exhibits continued to represent the Atacameños as part of the past and continued to use human bodies and funerary objects. Parallel to this, archaeologists continued excavating cemeteries and thus continued transgressing and denying local beliefs regarding the *abuelos* or ancestors. Therefore, the local community perceived the museum as a place of exclusion and was regarded with distrust. Some Atacameños claim that they "hated" this institution and forbade the entrance of their families to its facilities.

> There were at least 10 years of torment, of madness. Of torment really. I came to think that 80% of the town people were against us and the remaining 20% was indifferent.... I'm talking about that period at the end of the 80's. And I thought that all the effort that I had done was worthless because things did not improve, they were worse and the attitude of the Atacameños, at the same time they begin to accept their atacameñidad, they rejected it more. (Archeologist 6, 2004)

Despite this conflict some attempts were made by archaeologists to include the local community through guided visits to archaeological excavations. These activities were well received by some member of the Atacameño community: "Look, I think it was a pretty relationship, at least I had a good experience, but that was me, this was around 82" (Atacameño 2, 2003).

At the time, the national context was that of Pinochet's dictatorship (1973–1990). Despite the closure of universities and/or academic departments, and the persecution, detention, and disappearance/execution of social scientists all along the country (Garreton 2005), San Pedro became some sort of a safe haven for archaeologists to continue developing research. The appointment of a military rector at UCN that was an archaeology and anthropology enthusiast was quite significant for the survival of the discipline and its practitioners in the region. In parallel, historizing critical geopolitical spaces, such as the regions of northern Chile – which had been until the 1900s part of Peru and Bolivia – continued to be an important strategy of territorial control, as it was also at the wake of the twentieth century (see above; Ayala 2008; Romero 2003). In addition, the presence of US scholars in the region must have deemed this region as non-insurgent.

The Museum in the Multicultural Era

With the return of democracy in 1990 after 17 years of dictatorship and the enactment of the Indigenous Law in 1993, Chile started to be represented as a multicultural nation and thereby active in imposing a change in relations between the state and indigenous peoples. The reconfiguration of the Chilean state in the democratic period goes hand in hand with the installation of neoliberal multiculturalism, which generated a new ideological, legal, and institutional scenario oriented toward indigenous peoples. With the participation and recognition of cultural difference as a new art of government, culture began to occupy a central place in public debate and in the identity construction of indigenous populations and the new Chilean nation. Since the state had previously disseminated a nationalist discourse of rupture between the indigenous past and present, the multicultural political discourse changed the relationships of these populations with their past, when the Indigenous Law suggested that the ethnic groups are descendants of pre-Hispanic societies. This law also integrated indigenous peoples to the national history, and this led Chilean people to reimagine themselves as a multiethnic nation and to reinvent themselves through a long-standing linear temporality, which places the pre-Hispanic past at the origins of the multicultural Chilean nation. On the other hand, the re-elaboration of the past of ethnic groups in Chile has been a process of readjustment, tensions, and contradictions between the preexisting notions of identity, ancestrality, and temporality and those imposed by the multicultural state (Ayala 2014).

Initially, the Indigenous Law did not consider the Atacameños as one of the country's ethnic groups; the Atacameño leaders needed to meet a number of demands of information to be included in this legislation. The information requested included archaeological research to validate their historical continuity. In this context, Atacameños went to the Museum of San Pedro de Atacama looking for antecedents as an indigenous people. Together with archaeologists they gathered information that could guarantee the chronological depth of this ethnic group, traveling later to the capital Santiago to process their recognition. Once legally recognized by the state, the Atacameño raised a number of criticisms and demands against archaeology and the museum of San Pedro de Atacama. However, archaeologists of this institution "were locked in a glass bubble" according to the director at that time, Agustin Llagostera, and denied the indigenous demands. Archaeologists were increasingly immersed in their research problems. Under these circumstances, archaeologists were involved in disputes over control and rights to archaeological heritage. This was clearly reflected in the process of protecting and managing archaeological sites, driven by the state and ethnic groups. In this case, archaeologists were engaged in political alliances that sought to define the ownership of indigenous heritage and the type of projects to be conducted.

During the 1990s, the museum's exhibition continued stereotyping the Atacameños as part of the past, and the human bodies continued to occupy a central place in the exhibits. At the same time, ethnic leaders claimed they did not feel represented by this institution and made demands that they no longer wanted to be treated as "museum pieces" and said "were a living culture and not mere objects." In this scenario, while the Chilean multicultural state acknowledged the existence of the Atacameños in this decade, the museum of San Pedro de Atacama perpetuated the image of decline of these populations by focusing on pre-Hispanic periods in its exhibits.

For four consecutive years, every October 12 (Columbus Day) the Atacameños lit candles in front of the museum in San Pedro de Atacama, in consideration of the ancestors held by the museum. Leaders of the indigenous group Zhali Lickan Ckappur once took over the museum, in circumstances that the professionals of this institution do not acknowledge saying: "It was not a proper takeover." At the same time, Atacameño workers from this institution remember this event:

> 2002 seems to me, 2001, because it was the last protest they made. They arrived at the Museum around 4 in the afternoon and entered. They threw, well, a *llijlla* (Andean textile used for ceremonies) on the floor, they put coca leaves ... [they started] doing a *pago* (Offering to Mother Earth

> (Pachamama)) there. You did not really understand what it is because it had no *aloja* (Local drink made with the pods of *Algarrobo* (*Prosopis*) trees), it did not have *coca*, it did not have alcohol that was the other drink that the old people consumed ... nothing, at least corn *chicha*, nothing. So making a *pago* with what they never consumed is like weird. Also on the flexit floor they were not going to be able to throw it to the *Pacha* (Mother Earth), nothing. Then they were there talking a few words and then went out and there again began to make a *pago* at the entrance, on the right, there they knelt and there they were giving the fight.(Atacameño 6, 2004)

According to the archaeologists working at the museum, these events were treated with indifference because, "we were very distanced, we had devoted ourselves to the scientific academic work" (Archaeologist 7, 2004). In 2000, on the eve of October 12, there was an attempt to burn down the Museum of San Pedro de Atacama. For the archaeologists from the museum, this was a manifestation of the Atacameño community, they stated that this was "the climax of the rupture between the institution, academia, and the indigenous community" (Archaeologist 7, 2004). The situation was not handled as an institutional problem associated with the relations with the community but as a danger for the museum and the archaeologists.

> No substantive decision was made. Because for me the underlying situation was not only to recognize the need that we had to be more active with the community, not to be something so alien to them, but to do something. (Archeologist 6, 2004)

This distancing of relations, or lack thereof, evidences a denial of the Atacameños as a subject of interaction – the denial of their right to have an opinion about archaeological practice and a lack of acknowledgment of the value of such opinion. Despite the existing demands and critiques to the discipline, the archaeologists have ignored them and marginalized themselves from the process.

In response to this conflicting context, in 2001 there was a change in relations between the museum and the Atacameños; the institution began to take actions to address the problem. However, this was accomplished without an internal discussion concerning relationships with the indigenous community. The museum began its process of openness to Atacameño participation without a clear policy. First, in 2001 the museum organized "roundtable discussions" with leaders of the Atacameño community. Some participants in the first discussions found it somehow "cathartic" with moments of tension between archaeologists and Atacameños. At the second discussion in 2003 according to some ethnic leaders, a new museum project was announced without much dialogue; for the archaeologists it was an opportunity to communicate about the activities they were carrying out. In 2005 the third discussion took place with the aim of acknowledging the perceptions, interests, and sensibilities of the local population, with the intent of opening discussions so as to create an institutional policy regarding relations with the community; however these discussions did not produce a clear policy.

In 2002 the Andean School was created, an annual program of heritage education from which scientific discourse is disseminated from within the museum and other universities in northern Chile. Since its inception this project was funded by national and international institutions (National Monuments Council, National Indigenous Development Corporation, Origins Program/Ministry of Development and Planning/ Inter-American Development Bank); thus their approach is strongly associated with state indigenous policy. This program had 20 places for Atacameño students who had classes in archaeology, anthropology, history, geography, ecology, and heritage. In the first 8 years of this program, there was a growing interest from the Atacameño community to be a part of the Andean School. In 2008, this program became a Diploma on Heritage Education. Talking about this school, the Atacameños assume the lack of technical skills in their communities: "we need technical advice, technical support, technical assistance: lawyers, anthropologists, archaeologists, but positive, not negative, with a high point of view, not that speculate" (Atacameño 8, 2004). Also, the Atacameño students used their participation in the Andean School as an opportunity to present old and new demands to the museum. Until today, it is a program that has significant impact in transforming the relationship between this institution and the indigenous community. It has also influenced the

changing public image of the museum, which is now represented as an open space for indigenous participation. The Andean School operated for eight seasons and was then shut down in 2010 due to lack of funding and matching agendas. As will be seen in the following pages, this program will open again in 2018.

As mentioned above, the institutional opening produced by the Andean School led to the creation in 2004 of an area specially dedicated to ethnic ties with the museum, the Unit of Relations with the Atacameño Community (URCA). This position was in charge of the formulation and execution of outreach programs, organization of dialogue tables, the reception and answer to petitions for professional consultancies, or the museum's participation in community activities. The work developed through a mediator was welcomed by indigenous communities and associated organizations since they had a specific person in the museum to make demands and petitions. However, an important issue brought about with this modality was that it was a way of establishing a relation with the Atacameños from the outside, since the direct relation was delegated to a mediator. The political and strategic character of this position must not be overlooked, which was created as a response to the conflicts risen between archaeologists and the Atacameño community (Ayala 2011). This area was shut down in 2011 due to changes in the direction of the IIAM.

Parallel to this PR position, the institution initiated a community museum outreach program and a research project developed by the Atacameños on Atacameño ethnoastronomy. In 2007 the museum removed the human bodies or *abuelos* from the permanent exhibit after a year of bimonthly meetings between museum professionals and community representatives. At the same time, modifications were made to the museographic display text including a brief story about the history and contemporary life of the Atacameños. With these actions the museum began the process of accepting the Atacameños as the historical occupants of the land and their status as a living culture.

It can certainly be said that there has been a major shift in relations between the museum of San Pedro de Atacama and the Atacameño community since the beginning of this century. However, it cannot be said that the museum has decolonized its archaeological practices. In analyzing the inner workings of programs developed for indigenous participation, power asymmetries have been reproduced by this institution. Mainly that the decisions made concerning indigenous participation have been made without the participation of the Atacameños.

The roundtable discussions conducted by the museum have not always considered the concerns of indigenous leaders. In addition, these meetings had no set agenda; in 10 years there were only three meetings of any importance to the Atacameño community. On the other hand, while the Andean School created a space for the participation of the Atacameño people, the museum limited and controlled their participation. In fact, the Atacameños were integrated as students and visitors of this institution and did not participate in decisions about the Andean School program or the museum. An example of this was the indigenous demand that Atacameño teachers be included on an equal footing with the professional teachers employed by the Andean School; this demand was unmet by the fact that the museum decided the level of inclusion of these Atacameño teachers. Another disconnection was between the discourse of community involvement of some teachers of this program and their professional practice. Some of the archaeologists who taught at the Andean School were involved in environmental assessment projects that threatened the interests of the Atacameños. This has been one of the strongest criticisms from the Atacameño community (Ayala 2008; Marcos 2010). (At present, and as part of a commitment to ethical research, IIAM academics do not participate in environmental impact assessments or act as consultants for the mining companies operating in the area nor do they participate in calls for grants made by these companies.)

The program to remove the human remains from the permanent exhibit has been criticized both by researchers at the museum and Atacameño leaders. It was considered that the representation of indigenous communities was

not inclusive enough. However, its greatest effect has been to silence the discussion of the reburial of archaeological human bodies or *abuelos*. This was one issue that the museum was not willing to discuss in those years; the bodies were removed from the display only to be deposited in storage areas specially constructed inside the museum.

The absence of an institutional policy that guided the participation of the indigenous community has affected the programs undertaken by the museum. Until today, the characteristics of the indigenous programs as that of education and outreach programs depend more on personal rather than institutional agendas. Therefore, changes in management affect the way forward in the ethnic relations and resources allocated to it, which historically have been scarce. This was more than clear with the closure of URCA.

As we saw in previous pages, when analyzing the spaces of indigenous participation opened by the museum in San Pedro de Atacama, the educational, public relations and management of archaeology aspects stand out, which has been installed as the new disciplinary format and the "must" be for many professionals. This tendency conforms to what Ayala (2014) defines as multicultural archaeology, an approach which recognizes indigenous people, opens archaeology to their participation, or accepts the indigenous property of heritage. However, this ends up being a mere formalism to continue practicing an archaeology rather than questioning its power and place of enunciation (see Dawdy 2009; La Salle 2010). It is a traditional archaeology that conforms to the mandates of multiculturalism, a waist adjustment characterized by talks and outreach courses that promote "restricted and controlled indigenous participation." Eventually, this is followed by the participation of community members as labor in the excavations and the cleaning of materials, without having a voice in the design, formulation, development, interpretation, and/or results of the project itself or in the taking of decisions on recovered collections (see Kalazich 2015). However, it is also true that multicultural archaeology has opened up spaces of indigenous participation that did not exist previously, as well as debates on the social and political consequences of archaeology highlighting the difficulties of articulating theory and practice in building new relations with communities.

The Demolition of the Museum Building

In recent years, the demolition of Le Paige's museum in 2015 produced new conflicts with the local community. The new museum project included both the building (storage space for the archaeological collection, laboratories, offices, exhibition spaces) and the museography: scripts (written discourses) and displays (visual discourses). Because public funds were to be used, the project was executed through a national request for tenders, thus outsourcing a decision-making process that by all means required local participation and discussion. The project had been submitted as an Environmental Impact Declaration (DIA in Spanish) to the Environmental Impact Assessment System (SEIA) and within it to a public consultation process. Such consultation is more of a screen, non-binding and participation is minimal. Indigenous communities would later claim that the project should have gone through indigenous consultation as established by the 169 ILO Convention (which is also non-binding, but the forms of participation are more accepted by indigenous communities than the former).

This project also created different reactions within the diverse stakeholders involved in or affected by cultural heritage decision-making, social science and heritage research sectors, the local communities, professional unions, scientific societies, the institute and museum staff, and tourism operators, among others. Some were enthusiastic about the idea of an avant-garde museum in San Pedro de Atacama's main square; it would contribute to the quality of the services offered to the tourists, boosting the town's notoriety worldwide. Others emphasized in the improvement of the storage conditions, especially that of the *abuelos* or Atacameño ancestors. In this regard, the measures taken by the conservation specialists were not only technical as to meet international conservation standards with acid-free boxes, barcodes, and a thorough documentation of the collection but also, and more importantly, were

borne out of a profound respect and care for the ancient ones, built on local knowledge regarding funerary practices and rites, which was possible due to the work of Atacameño women in this unit.

Some were critical about the architectural design of the new ultramodern museum; its size, construction materials, and design proper were put into question due to its location in a rural town; the emphasis should be on the local communities, not necessarily the tourists, some said.

Yet others were concerned with the legacy of priest Le Paige. The museum building – its materiality – was, after 60 years, part of the cultural heritage of San Pedro de Atacama and its history, of the history of archaeology, and of the archaeological heritage of this region. Thus, it should have been preserved as a ruin, an archaeological site, locating the new museum project elsewhere. How is it that heritage professionals seek to erase critical aspects of San Pedro's past? It seemed illogical to some that the National Monuments Council would authorize the demolition of a building that had such an impact in the town. For others however, it was part of a history that was better to erase, which also speaks of the impact of the museum, both materially and symbolically. Anyhow, the land on which the museum was built was private property but ceded in perpetuity to UCN as long as it continued to have a museum in place; thus building the museum elsewhere was not an option.

Unquestionably, the museum building was not in conditions to continue storing the collection or being habitable for much longer. The heavy winds, occasional sand storms, and rain were a threat to the museum's dead and living. But maybe, it needed not to be completely destroyed; the new museum could have incorporated an architectural testimony of Le Paige's museum within its structure, for example. There seemed to have been a lack of discussion regarding what heritage is, its meanings, histories, and purposes, that went beyond the regional government's desire to carry out such a project, and focused instead on a local scale, on a situated architectural and museographical design.

Parallel to this process, with both the opening of a communications position at the institute and a current administration more sensitive to indigenous claims at both university and institute level, several steps have been taken on the side of education and outreach, such as the reopening of the Andean School in its ninth version; the opening of a small exhibit at the temporary precinct, which displays a part of the archaeological collection organized by materiality; and a more straightforward communication with some indigenous communities and the Atacameño People's Council, which is also fueled by a new set of relationships and interests.

Regarding the Andean School, its relaunch in 2018 was related to the ever-growing interest on behalf of the local population – native and non-native – in the local past, in acquiring scientific knowledge and tools, especially with the growth of tourism on the one hand and the ever-present mining industry seeking to exploit the resources found within their ancestral territories on the other. The funding for this new version of the Andean School was obtained through a grant from the National Funds for Culture and Arts; most teachers and the facilities used were provided by the IIAM and also included Atacameño teachers. The Diploma consisted of nine modules taught by specialists in each area: environment and first settlers of the Atacama; Center South Andean iconography; geo-heritage; rock art; symbolism, celebrations and rituals in the Andes, and linguistic heritage; state, communities, and political ecology; multivocal values of cultural heritage; and heritage conservation. Like in previous years, this program received a high number of applications; from 70 applications 30 were selected, of which 22 were Atacameños. One of the current problems of the Andean School, as stated for previous versions, is the lack of permanent funding, thus subject to competitive grants that may or may not pull through.

The museum exhibit at the temporary precinct emerged after the realization that the stay would not be that temporary but could rather last 5 more years. Due to the location of this temporary precinct slightly outside of the town in a barren land

plot and the inexistence of a museum display that would bring school children, local people, and tourists, there was no presence of the IIAM in the San Pedro cultural scene. Thus, the museum area created a showcasing space for the most emblematic materials and objects, which was inaugurated by the end of 2017. No human remains are included in this exhibit. Since then, primary and secondary school children, local community members, tourists, and researchers have been able to see and know about the fundamentals of the archaeological objects held at the museum. It was also available for the Andean School students.

During 2018, some strings to bring the museum project back to life started being pulled, and a productive and critical dialogue has just began between several stakeholders – Atacameño Peoples Council, IIAM, UCN, regional government, and municipality – addressing what kind of museum it should be, the types of community participation sought, and how will the stakeholders be articulated in the future management of the museum.

Final Words

The history of the museum of San Pedro de Atacama, located in the main town of the Atacameño people, is closely related to the history of this indigenous community. We cannot talk about this museum without mentioning its relations with the Atacameño people, which have been changing throughout their 60 years of coexistence and have fluctuated between relationships of denial, dialogue, negotiation, mediation, and collaboration. The different sociopolitical contexts experienced by Chilean society, in general, and indigenous people, in particular, have influenced the relationships between archaeologists from this museum and the Atacameño people.

Since the establishment of the Chilean multicultural state in the 1990s and the empowerment of indigenous peoples, the Atacameños stand out as one of the main stakeholders regarding the archaeological heritage in their territory. Disputes and conflicts between the museum and Atacameño leaders have become visible, and, despite the changes in this institution, different opinions and interests persist, although agreements have sometimes been reached as well as collaborative experiences. Depending on the context and the agents involved, certain events have triggered disputes, conflicts, and estrangements in the multicultural era. The most recent is the construction of the new museum, which evidences a historical dispute over control, custody, and rights over the archaeological heritage in San Pedro de Atacama. At the same time it shows the changing nature of Atacameño's heritage values, since the museum created by Le Paige, once considered for some indigenous leaders as the icon of a history of denial and domination, currently is valued by others as part of their history and heritage.

However, while the museum of San Pedro de Atacama has built new relationships with the Atacameños in the last 20 years and has marked a milestone in this field, asymmetries of power still exist based on the fact that Atacameño people are not fully integrated in decision-making processes. It remains to be seen if the organizational structure of the future museum will be able to critically and consciously address these power imbalances and move toward decolonizing and decolonized relationships.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Archaeology and Politics
- ▶ Archaeology as Anthropology
- ▶ Community and Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Engagement in Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Decolonization in Archaeological Theory
- ▶ Heritage and Archaeology
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Indigenous Archaeologies

▶ Latin American Social Archaeology
▶ Multicultural Archaeology
▶ Museo Chileno de Arte Precolombino, Chile
▶ Nationalism and Archaeology
▶ Nationalism and Archaeology: Overview
▶ "Public" and Archaeology
▶ Public Archaeology, The Move Towards
▶ Social Archaeology
▶ South American Archaeology: Postcolonial Perspectives

References

Ametrano, Silvia J. 2015. Los procesos de restitución en el Museo de la Plata. *Revista Argentina de Antropología Biológica* 17 (2): 1–13.

Anderson, Benedict. 1991. *Imagined communities*. London: Verso.

Arthur, Jacinta. 2014. *Reclaiming Mana. Repatriation in Rapa Nui*. PhD Dissertation, University of California, California.

Atalay, Sonya. 2006. Indigenous archaeology as decolonizing practice. *American Indian Quarterly* 30 (3–4): 280–310.

Ayala, Patricia. 2008. *Políticas del Pasado: Indígenas, arqueólogos y estado en Atacama*. San Pedro de Atacama: Instituto de Investigaciones Arqueológicas y Museo R. P. Gustavo Le Paige.

Ayala, Patricia. 2011. The indigenous other in Atacameño archaeology. In *Indigenous peoples and archaeology in Latin America*, ed. Cristóbal Gnecco and Patricia Ayala, 109–130. Walnut Creek: Left Coast Press.

Ayala, Patricia. 2014. Patrimonialización y Arqueología Multicultural en San Pedro de Atacama (Norte de Chile). *Estudios Atacameños* 49: 69–94.

Benavides, Oscar H. 2001. Returning to the source: Social archaeology as Latin American philosophy. *Latin American Antiquity* 12 (4): 355–370.

Colwell-Chanthaphonh, Chip, and T.J. Ferguson. 2008. Introduction: The collaborative continuum. In *Collaboration in archaeological practice*, ed. Chip Colwell-Chanthaphonh and T.J. Ferguson, 1–32. Lanham/Plymouth: AltaMira Press.

Dawdy, Shannon Lee. 2009. Millennial archaeology: Locating the discipline in the age of insecurity. *Archaeological Dialogues* 16 (2): 131–142.

Deloria, Vine. 1988 [1969]. *Custer died for your sins: An Indian manifesto*. Norman/London: University of Oklahoma Press.

Díaz-Andreu, Margarita. 2007. *A world history of nineteenth-century archaeology: Nationalism, colonialism, and the past*. Oxford: Oxford University Press.

Druss, Mark. 1976. Medio ambiente, economía de subsistencia y patrones de asentamiento del Complejo Chiu Chiu (ca. 3000 a 2000 AC), norte de Chile. *Estudios Atacameños* 4: 19–24.

Endere, María Luz and Patricia Ayala. 2011. Normativa Legal, Recaudos Éticos y Práctica Arqueológica. Un Estudio Comparativo de Argentina y Chile. Chungará Revista de Antropología Chilena 44 (1): 39–58.

Fforde, Cressida. 2002. Collection, repatriation and identity. In *The dead and their possessions: Repatriation in principle, policy and practice*, ed. Cressida Fforde, Jane Hubert, and Paul Tumbull, 25–46. London/New York: Routledge.

Figueroa, Valentina, ed. 2018. *Atlas arqueológico para niños. Conociendo a los antiguos habitantes de mi región: Antofagasta*. San Pedro de Atacama: Qillqa.

Fine-Dare, Kathleen. 2002. *Grave injustice. The American Indian Repatriation Movement and NAGPRA*. Lincoln/London: University of Nebraska Press.

Galtung, Johan. 1968. Después del proyecto Camelot. *Revista Mexicana de Sociología* 30 (1): 115–141.

Garcia, Ben. 2016. For whom the human remains. In *Remix: Changing conversations in museums of the Americas*, ed. Selma Holo and Mari-Tere Alvarez, 72–75. Oakland: University of California Press.

Garreton, Manuel Antonio. 2005. Social sciences and society in Chile: Institutionalization, breakdown and rebirth. *Social Science Information* 44 (2–3): 359–409.

Gnecco, Cristobal. 2002. La indigenización de las arqueologías nacionales. *Convergencia* 9 (27): 133–149.

Gnecco, Cristobal and Patricia Ayala. 2011. Indigenous People and Archaeology in Latin America, Left Coast Press, California.

Haber, Alejandro, and Cristobal Gnecco. 2007. Virtual forum: Archaeology and decolonization. *Archaeologies* 3 (3): 390–412.

Kalazich, Fernanda. 2015. Memory as archaeology: An experience of public archaeology in the Atacama Desert. *Public Archaeology* 14 (1): 44–65.

La Salle, Marina. 2010. Community collaboration and other good intentions. *Archaeologies* 6 (3): 401–422.

Latcham, Ricardo E. 1936. Atacameño archaeology. *American Anthropologist* 38 (4): 609–619.

Le Paige, Gustavo. 1957. Museo de San Pedro de Atacama. *El Chululo* 1: 6.

Lonetree, Amy. 2012. *Decolonizing museums: Representing native America in national and tribal museums*. Chapel Hill: The University of North Carolina Press.

Mamani, Carlos. 1989. History and prehistory in Bolivia: What about the Indians? In *Conflict in the archaeology of living traditions*, ed. Robert Layton, 46–60. London/New York: Routledge.

Marcos, María Soledad. 2010. *La arqueología bajo la perspectiva de la comunicación: estudio de caso en San Pedro de Atacama, Chile*. Masters Dissertation,

Universidad Católica del Norte – Universidad de Tarapacá.
Montenegro, Mónica. 2014. Una experiencia de arqueología publica y colaboración intercultural en el sector Septentrional de Argentina. *Revista de Arqueología Publica* 10: 25–43.
Mostny, Grete. 1949. Ciudades atacameñas. *Boletín del Museo Nacional de Historia Natural* 24: 125–211.
Núñez, Lautaro. 1993. *Gustavo Le Paige S.J.: cronología de una misión*. Antofagasta: Universidad Católica del Norte.
Oyarzún, Aureliano. 1910. Contribución al estudio de la influencia de la civilización peruana sobre los aborijenes de Chile. *Boletín del Museo Nacional de Chile* II (1): 3–37.
Pavez, J. 2012. Fetiches Kongo, momias Atacameñas y soberanía colonial. Trayectoria de Gustavo Le Paige S.J. (1903–1980). *Estudios Atacameños* 44: 35–72.
Phillips, Ruth B. 2011. *Museum pieces: Toward the indigenization of Canadian museums*. Montreal: McGill-Queen's University Press.
Pollard, Gordon. 1970. *The cultural ecology of ceramic stage settlement in the Atacama desert*. PhD dissertation, Columbia University.
Riding In, James. 2005. Decolonizing NAGPRA. In *For indigenous eyes only. A decolonization handbook*, ed. Waziyatawin Angela Wilson and Michael Yellow Bird, 53–66. Santa Fe: School of American Research.
Rodríguez, Mariela E. 2010. *De la "extinción" a la autoafirmación: procesos de visibilización de la Comunidad Tehuelche Camusu Aike (provincia de Santa Cruz, Argentina*). PhD Dissertation, Georgetown University.
Romero, Alvaro. 2003. Arqueología y pueblos indígenas en el extremo norte de Chile. *Chungara* 35 (2): 337–346.
Silliman, Stephen, and T.J. Ferguson. 2010. Consultation and collaboration with descendant communities. In *Voices in American archaeology*, ed. Wendy Ashmore, Dorothy T. Lippert, and Barbara J. Mills, 48–72. Washington, DC: Society for American Archaeology.
Smith, Claire, and H. Martin Wobst. 2005. Decolonizing theory and practice. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. Claire Smith and H. Martin Wobst, 5–16. New York: Routledge.
Spahni, Jean-Christian. 1967. Les Indiens de la Cordillére des Andes. Paris: SCEMI.
Swain, Hedley. 2007. *Introduction to museum archaeology*. New York: Cambridge University Press.
Trigger, Bruce G. 1984. Alternative archaeologies: Nationalist, colonialist, imperialist. *Man* 19 (3): 355–370.
Uhle, Max. 1913. La civilización atacameño. Nachlass: *Werkmanuskripte* 30.
Vilches, Flora, Cristina Garrido, Patricia Ayala, and Ulises Cárdenas. 2015. The contemporary past of San Pedro de Atacama, Northern Chile: Public archaeology? *Archaeologies* 11 (3): 372–399.
Watkins, Joe. 2005. Through wary eyes: Indigenous perspectives on archaeology. *Annual Review of Anthropology* 34: 429–449.

Museum Security Network (MSN)

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Basic Information

The Museum Security Network (MSN) is a Google Group listserv that keeps the public informed about the protection, preservation, and conservation of cultural heritage. The MSN was founded in 1996 by Ton Cremers, who served as head of security at the Rijksmuseum in Amsterdam, the Netherlands, from 1980 to 2003. Since 2003, Cremers has operated a museum security consulting company. In March 2010, Mark Durney, who operates Art Theft Central, a website providing news about and insights into art crime trends, began moderating the listserv. Jonathan Sazonoff has served as a contributing editor since 1997 and helped establish the MSN's multilingual scope.

The MSN's original aim was to serve as a source of information for cultural property protection professionals. Today, the MSN functions as a clearinghouse of information, and on a daily basis, Durney circulates online news articles, crime alerts, and subscribers' comments from around the world and in a variety of languages including English, French, Spanish, Italian, German, Dutch, and Mandarin via the listserv. Topics covered by its daily digest of information range from art theft to fakes and forgeries, from looted art and antiquities to conservation and restoration, from art vandalism and iconoclasm to restitution, as well as a number of other relevant issues. Its subscriber list has expanded since 1996 and now includes lawyers, security officials, museum professionals, conservators, academics, appraisers, art loss adjustors, insurers, galleries, dealers, auction

houses, and private investigators, among its 600 members. The breadth of topics and quality of information disseminated has enabled it to become an invaluable resource to so many people with a vested interest in cultural heritage.

Major Impact

Frequently, the MSN is the first to break news alerts related to stolen or looted cultural property. During Interpol's 6th International Symposium on Works of Art, Antiques, and Cultural Property at Lyon, France, in June 2005, a general secretariat delegate mentioned that he was first notified of a theft by the MSN, not by the member country/countries concerned (Interpol Minutes n.d.). The MSN's alerts have facilitated the recovery of stolen cultural property. In June 2006, 4 headrests and 2 Makonde masks were stolen in a daylight theft from the National Gallery in Harare, Zimbabwe. The director of the National Gallery, Doreen Sibanda, notified the MSN, local authorities, and Interpol in Lyon, France. In November 2006, an American collector of African antiquities contacted the MSN because someone based in Poland had offered him objects that closely resembled those published on the MSN. The seller, who was also discovered to be the thief, was later apprehended.

The MSN was also involved in a landmark First Amendment Internet legal ruling. In 2000, attorney Ellen Batzel sued Ton Cremers and her handyman Bob Smith for defamation after Cremers circulated a message authored by Smith on the listserv that claimed that Batzel was a descendant of a Nazi leader and that she harbored looted art from World War II in her home. Three years later, the Ninth Circuit Court of Appeals found that Cremers, who chose to post Smith's message on the listserv after reading it and making a few edits, was immune from liability under Section 230 of the Communications Decency Act of 1996 (CDA) so long as a reasonable person could conclude that the information provided by Smith was meant for publication on the Internet (Batzel v. Smith, 333 F.3d 1018, 1031 (9th Cir. 2003)).

The MSN is fully independent and refrains from any financial associations with commercial organizations active in the aforementioned fields. It is recognized as a cultural heritage resource by the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Criminal Police Organization (Interpol), the Federal Bureau of Investigation (FBI), the Smithsonian, and the Getty, among many other organizations. Over the past decade, the MSN representatives have been invited to meetings and conferences hosted by Interpol, the International Council of Museums (ICOM), UNESCO, and other cultural and educational institutions.

The MSN serves to establish qualitative data that generates awareness related to the realities of art crime. Due to the fact that art crimes are often underreported and misunderstood, the MSN seeks to collect and disseminate information that enables its readers to analyze the current trends and to develop new methods that help better preserve the cultural record.

Cross-References

- ► Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)
- ► UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (1995)

References

Interpol Minutes. n.d. *6th International symposium on works of art, antiques, and cultural property*, Lyon, 21–23 June 2005. Available at http://www.interpol.int/Public/WorkOfArt/Conferences/20050621/minutes.pdf. Accessed 23 June 2011.

Further Reading

Brodie, N., and K.W. Tubb, eds. 2001. *Illicit antiquities: The theft of culture and the extinction of archaeology*. London: Routledge.

Durney, M. 2011. How an art theft's publicity and documentation can impact the stolen object's recovery rate. *Journal of Contemporary Criminal Justice* 27 (4): 438–448.

Museums and Memory Experiences

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Introduction

The study of "memory" has seen a steady proliferation across many humanities and social science disciplines dealing with the past, including archaeology, geography, history, heritage studies, anthropology, and museum studies. Here, it is stretched beyond a psychological interest in individual cognition to that of public or collective memory, which operates at a broader, communal level. One of the most obvious forums through which this type of remembering is engaged with is that of the museum, a cultural space that is today often referred to as a "site of memory" (Nora 1989) or a "memoryscape" (Edensor 2005). These sit alongside other socially and spatially produced sites of memory, such as memorial sites, war monuments, graffiti sites, plaques, and historic districts, all of which are public places onto which specific narratives about the past – official and otherwise – are etched. Whether literally or metaphorically, these places embody and speak of the past and, in so doing, push forward messages about identity and belonging in the present.

Numerous recent events have served as potent reminders of the power and politics of memory. Most visible here has been the removal of Confederate statues in the United States, particularly that of General Robert E Lee in Charlottesville, Virginia, in 2017, which triggered violent confrontations between those with opposing views on the past that statue embodied. Likewise, Australia has been embroiled in sustained public debate over a range of statues, memorials, and acts of commemoration that legitimize discourses of "discovery" and dispossession; in the United Kingdom, the "Rhodes must Fall" campaign similarly revolved around disputes about dissonant pasts and their protagonists. While these examples spill out beyond the walls of the museum (and thus the remit of this entry), they nonetheless amplify the importance of memory, and the work it does in wider society. They also point clearly to the power such memory has to breed rage, regret, and resentment, along with a host of other – both positive and negative – emotions.

Definition

The idea of "memory" that circulates within the museum setting is a peculiar one. Indeed, memory is able to permeate that cultural space despite the absence of both substance, in the sense of a "remembering subject," and physical organ – something that actually operates memory – such as the human brain (Weltzer 2010: 5). Rather than thinking in terms of individual memory, the museum context calls for a different sort of conceptualization – one that is cultural and social and thus one that exists *between* people and not exclusively *within* them (Weltzer 2010: 5). Here, it is comprised of shared meanings, narratives, and images that are compressed together into a useable past which can be "... harnessed for some purpose in the present" (Wertsch 2002: 31). As Jay Winter (2009: 252), a prominent scholar working in the field of remembrance, has argued, museums can thus be understood as physical "sites of memory," or those "places where groups of people engage in public activity through which they express 'a collective shared knowledge ... of the past, on which a group's sense of unity and individuality is based'" (Winter 2009: 252; see also Crane 2011; Dittmer and Waterton 2016).

Dealing as they do with collective memories, or that "... what remains of the past in the lived experience of groups" (Cubitt 2007: 10), museums are necessarily imbued with messages and meanings that are social in origin and embedded in a range of cultural and political contexts. The memories they trigger or produce are thus also inflected with, and influenced by, language, rituals, and commemorations, and perform in a variety of processes that make past events meaningful in the present. This type of memory is highly contested – as the examples with which

this entry opened illustrate – and draws implicitly upon notions of power; indeed, remembering in a museum setting is always selective and thus yields to particular versions of the past which prioritize certain actors at the expense of others. Of course, not all memory experiences occurring within the museum setting are the same. Rowe et al. (2002) have identified four key ways in which memory is utilized and/or engaged with in museums, all of which oscillate between "the museum" and "visitor" as producers of those memories. They begin with a memory experience that encourages visitors to tap into larger group narratives and make links with their own life stories; importantly, in these exchanges the larger narratives remain undisrupted, with individual memories simply rolled into them in order to give them meaning (Rowe et al. 2002). Their second form of memory experience likewise envisions an intersection of larger, official memories with personal ones, but here those personal memories are utilized in a bid to expand the relevance of the museum to a wider population. In other words, the personal stories of previously excluded groups are used as an "entry point" or guide for the co-opting of a broader range of participants into authorized narratives (Rowe et al. 2002). The third and fourth modes of memory associated with museums are geared around an assumption of active engagement on the part of museum visitors. In the first of these, museum visitors undertake what Rowe et al. (2002) label "poaching," a process in which the overarching narrative plays second fiddle to the more important personal memories – authorized narratives thus become those from which visitors seek to escape in order to enter a more intimate space of private remembering (Rowe et al. 2002: 106). These performances operate *outside* of the parameters set up by official memories. The final proposed way in which visitors may engage is via memory work that serves to furnish museum narratives with personal accounts that either support or deny their message. Rather than using the museum's cultural spaces to launch into their own memories, visitors draw those memories *into* the public narratives already on display. They become, as Rowe et al. (2002: 108) point out, "authorities in their own right who can testify as to the truth of the museum's representation." This is of course in no way an exhaustive list of the ways visitors experience memories within the museum setting, but it does serve as an indication of the nuanced ways in which such engagements may occur.

Key Issues/Current Debates

The memorialization of the history of enslavement and the trading of African people offers insight into the different, and often conflicting, ways that collective memories and recollections of the past can be evoked and experienced in the museum setting. In the UK, for example, the history of "abolition" has been retold and remembered in a number of exhibitions, through which museums have been transformed into either sites of resistance, memorials to suffering, or celebrations of individual heroism (for an expansion of this argument, see contributions in Smith et al. 2011 and their analyses of the bicentenary of the abolition of the transatlantic slave trade). As different interest groups and stakeholders undertake performances of remembering at the various museums dedicated to this theme, they rehearse and make new meanings for themselves in the present, often regarding issues of social justice, emancipation, or "race relations." Such themes have also been comprehensively explored in the American context by the geographer Derek Alderman, particularly the American South, whose work has challenged the racist narratives often brought to bear on the history of slavery at southern plantation museums (see Alderman et al. 2016; Alderman and Modlin 2016).

A second example can be drawn from the "history wars" surrounding the display of the cockpit and nose section of the *Enola Gay* in the proposed exhibition, "The Crossroads: The End of World War II, the Atomic Bomb, and the Origins of the Cold War," at the Smithsonian Air and Space Museum in Washington, DC (Wallace 1996). This is an example of a failed exhibition that has since become synonymous with debate due to the perceived threats it made to American collective memories and sense of "self." In the

proposed museum script, a challenging narrative was used to question the dropping of the atomic bomb on Hiroshima, a narrative that was vehemently opposed by a number of stakeholder groups, including US veterans. Embedded within the ensuing debate was a fear that creating such a critical memory space would unsettle broader, national memories of peace and heroism for museum visitors, triggering in their stead a newer memory laced with issues of guilt and culpability. Thus, perhaps more than any other in the field, the example of the failed *Enola Gay* exhibition captures the power of ideological messages implicit within the display of memory.

However, perhaps the most widely cited examples illustrating the relationship between museums and memory emerge from attempts to engage with the meaning of Holocaust remembrance. Indeed, the capacity of museums to adequately capture and represent the Holocaust has been a central debate within the museology literature for decades. This is because it stands in as a powerful example of how the past can be remembered differently by different individuals and communities. Levy and Sznaider (2002), for example, provide a thorough analysis of the disparate memory experiences encountered in Israel, Germany, and the USA, noting that the strategies of remembrance drawn upon in each country are inflected by the wants and demands of specific – and disparate – interest groups. For Israel, this has produced an ambivalence oscillating between silenced remembering and sacred remembrance (Levy and Sznaider 2002). In Germany, the immediate silences following the war have today been replaced with a critical and self-reflective narrative espoused in its national museums (Levy and Sznaider 2002), while the USA, by contrast, performs its own unique memorialization, referred to as the "Americanization of the Holocaust," a point evidenced by the sheer number of museums dedicated to its theme (Novick 1999; see also Young 1993). In all three contexts, museums have to flirt with, and respond to, a range of social and political tensions and match these against their own politics of display. As a consequence, the museum one chooses to visit – be it the Holocaust History Museum (Jerusalem), the Jewish Museum (Berlin), or the United States Holocaust Memorial Museum (Washington, DC), for example – mediates almost entirely the memory experiences that history has to offer.

The three museum experiences briefly described above are situated within a social context motivated by examinations of national guilt and apology, in which broader narratives of self and identity were – and continue to be – put at risk. In these scenarios, there has been a tendency to construct and use seemingly consensual narratives as something of a metaphoric screen (see Sturken 1991: 118). Such screen memories are granted the power to master the process of remembering for a whole range of subaltern and alternative groups, thus underscoring the political nature of memory both within museums and more generally. What this tells us is that the notion of memory can never be called upon to simply provide nostalgic and apolitical reflections of the past; rather it is itself a concept shot through with conflict as a range of memories work in tension with each other.

It also tells us that behind such screens lies a range of highly emotive and affective experiences. Thus, a more recent move in the literature has sought to bring the politics of affect and emotion to bear on the museum-memory nexus (see Gregory and Witcomb 2007; Witcomb 2014; Schorch et al. 2017; Tolia-Kelly 2017; Dittmer and Waterton 2017). This move is underpinned by the proposition that in order to engage positively in memory-work, museums need to retain currency, relevance, and continuing debate, as well as the ability to prompt a form of "critical learning" (Simon et al. 2000: 7; see also Cooke and Frieze 2017). Two case studies drawn from the Australian context speak to this idea: the Jewish Holocaust Centre and the Immigration Museum, both located in Melbourne. The former is the focus of recent work by Cooke and Frieze (2017), who have examined the role of survivor guides and eye-witness (oral and video) testimony in such exhibitions, the incorporation of which precipitates a range of emotional and bodily responses in visitors. Likewise, Philipp Schorch et al. (2017) have explored the notion of "affective cosmopolitanism" in the context of the

Immigration Museum, foregrounding, in particular, the emotional affordances of individual objects, photographs, and the faces and stories of tour guides. Importantly, they also point to the capacities of visitors to *be* affected.

This emerging interest in the academic literature in the way emotion and affect figures in the memory-work undertaken within the spaces of museums continues to grow. It brings with it an additional dimension to the museum-memory nexus and makes prominent the potential for affective-subjective dynamics within the museum setting, which in turn might trigger embodied engagements and acts of meaning-making.

Cross-References

► Social Memory in Archaeological Theory

References

Alderman, D.H., and E.A. Modlin Jr. 2016. On the political utterances of plantation tourists: Vocalizing the memory of slavery on River Road. *Journal of Heritage Tourism* 11 (3): 275–289.

Alderman, D.H., D.L. Butler, and S.P. Hanna. 2016. Memory, slavery, and plantation museums: The River Road Project. *Journal of Heritage Tourism* 11 (3): 209–218.

Cooke, S., and D.-L. Frieze. 2017. Affect and the politics of testimony in Holocaust museums. In *Heritage, affect and emotion: Politics, practices and infrastructures*, ed. D. Tolia-Kelly, E. Waterton, and S. Watson, 75–92. London: Routledge.

Crane, S.A. 2011. The conundrum of ephemerality: time, memory and museums in. In *A companion to museum studies*, ed. S. Macdonald, 98–109. Malden, MA: Blackwell Publishing Ltd.

Cubitt, G. 2007. *History and memory*. Cambridge: Cambridge University Press.

Dittmer, J., and E. Waterton. 2016. Embodied memory at the Australian War Memorial. In *Memory, place and identity: Commemoration and remembrance of war and conflict*, ed. D. Drozdzewski, S. De Nardi, and E. Waterton, 169–188. London: Routledge.

Dittmer, J., and E. Waterton. 2017. Affecting the body: Cultures of militarism at the Australian War Memorial. In *Heritage, affect and emotion: Politics, practices and infrastructures*, ed. D. Tolia-Kelly, E. Waterton, and S. Watson, 47–74. London: Routledge.

Edensor, T. 2005. *Industrial ruins: Space, aesthetics and materiality*. Oxford: Berg.

Gregory, K., and A. Witcomb. 2007. Beyond nostalgia: The role of affect in generating historical understanding at heritage sites. In *Museum revolutions: How museums change and are changing*, ed. S. Knell, S. Macleod, and S. Watson, 263–275. London: Routledge.

Levy, D., and N. Sznaider. 2002. Memory unbound: The Holocaust and the formation of cosmopolitan memory. *European Journal of Social Theory* 5 (1): 87–106.

Nora, P. 1989. Between memory and history: *Les Lieux de Mémoire*. Translated by M. Roudebush. *Representations* 26: 7–25.

Novick, P. 1999. *The Holocaust and collective memory: The American experience*. London: Bloomsbury Publishing Plc.

Rowe, S.M., J.V. Wertsch, and T.Y. Kosyaeva. 2002. Linking little narratives to big ones: Narrative and public memory in history museums. *Culture and Psychology* 8: 96–112.

Schorch, P., E. Waterton, and S. Watson. 2017. Museum canopies and affective cosmopolitanism: Cultivating cross-cultural landscapes for ethical embodied responses. In *Heritage, affect and emotion: Politics, practices and infrastructures*, ed. D. Tolia-Kelly, E. Waterton, and S. Watson, 93–113. London: Routledge.

Simon, R.I., S. Rosenberg, and C. Eppert. 2000. Introduction: Between hope and despair – The pedagogical encounter of historical remembrance. In *Between hope and despair: Pedagogy and the remembrance of historical trauma*, ed. R.I. Simon, S. Rosenberg, and C. Eppert, 1–8. New York: Rowman and Littlefield.

Smith, L., G. Cubitt, R. Wilson, and K. Fouseki, eds. 2011. *Representing enslavement and abolition in museums*. London: Routledge.

Sturken, M. 1991. The wall, the screen and the image: The Vietnam veterans memorial. *Representations* 35: 118–142.

Tolia-Kelly, D. 2017. Race and affect at the museum: The museum as a theatre of pain. In *Heritage, affect and emotion: politics, practices and infrastructures*, ed. D. Tolia-Kelly, E. Waterton, and S. Watson, 33–46. London: Routledge.

Wallace, M. 1996. *Mickey Mouse history and other essays on American memory*. Philadelphia: Temple University Press.

Weltzer, H. 2010. Re-narrations: How pasts change in conversational remembering. *Museum Studies* 3 (3): 5–17.

Wertsch, J.V. 2002. *Voices of collective remembering*. Cambridge: Cambridge University Press.

Winter, J. 2009. Historians and sites of memory. In *Memory in mind and culture*, ed. P. Boyer and J.V. Wertsch, 252–268. Cambridge: Cambridge University Press.

Witcomb, A. 2014. Look, listen, feel: The first peoples exhibition at the Bunjilaka Gallery Melbourne Museum. *THEMA: La Revue des Musees de la Civilisation* 1: 49–62.

Young, J.E. 1993. *The texture of memory: Holocaust memorials and meaning*. New Haven: Yale University Press.

Museums and the Distortion of Archaeology for Political Purposes

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Introduction

Museum interpretations of archaeological materials not surprisingly often reflect the general worldview of their audiences. Thus, during the late nineteenth and early twentieth centuries, various neophyte American museums developed exhibits that highlighted local prehistoric cultural origin explanations from racist perspectives or from "fantastic archaeology" perspectives. Often, these two approaches were combined, with museums arguing that the indigenous Americanist populations could not possibly have created the local archaeological sites and artifacts, based on perceptions from racial stereotypes. Rather, the curators looked to settings like Atlantis or Mu or to voyagers from Old World civilizations to produce these cultural manifestations, which they believed spread in successive waves via diffusion. These interpretations then served to reinforce local political agendas for paternalism, peonage, and slavery.

By the second half of the twentieth century, due to methodological advances such as radiocarbon assays and trace element analyses, the common political uses of archaeological museum materials had changed.Cultural-historical explanations replaced diffusionism. With the consolidation of U.S. scientific hegemony over countries in Latin America after WW II, there was essentially a type of cultural imperialism in place in interpretations. European philosophical "enlightenment" led exhibit preparators to feel that the use of logical positivism and empiricism, as employed in cultural processual studies, could definitively answer cultural evolutionary questions. There were continuing arguments whether museum curators should employ particularistic approaches; whether they should adhere to description only, just presenting a chronicle without implying causality; or whether they should employ generalizing perspectives, driven by processual or theoretical concepts.

The leading proponents of this processual approach were museum staff trained or influenced by European and U.S. institutions, who sought to create exhibits explaining materials in terms of social institutions. Prehistoric societies' features often were interpreted in terms of market forces, utilizing the parameters which shaped contemporary western economies. This practice developed into culture-ecological and neo-evolutionary models in the 1960s and 1970s, with a further subsequent shift from cultural-historical reconstructions to ecological-systemic approaches. But at the same time some scholars began arguing for a more relativistic, post-processualist viewpoint. This latter framework focused on the historic actor and reminded the viewer that knowledge is socially constituted and additionally that museum agendas are conditioned by nationalistic goals.

Key Issues/Current Debates/Future Directions/Examples

In Latin America particularly, exegesis of regional museum trajectories shows that under the guise of promoting cultural patrimony, institutional displays have been much influenced by imperialism, colonialism, and nationalism. Prehistoric cultural models that national museums have supported have changed with respect to the intended audience. U.S. cultural imperialism, manifested through its museum and research personnel essentially appropriating and manipulating viewpoints relevant to zonal archaeological resources, ignored the native peoples' own traditional perceptions. There is an active dialectical discussion between the non-indigenous primarily Euro-American populations, for whom the indigenous prehistoric patrimony is often mainly academic, and the First Nations groups, for whom museum studies are on one hand a study of their ancestral

heritage but on the other hand often a direct challenge to their own cultural narratives.

An excellent example of national governmental involvement in museum archaeology can be seen in Bolivia. A focus on the importance of archaeological Tiwanaku to the national patrimony was emphasized from the beginning of the twentieth century, with the most popular models arguing for its genesis from "lost Atlantis." But by mid-century, the local Aymara people were seen as progenitors, and with the Bolivian MNR revolution of 1952, it was decided to make Tiwanaku a fundamental part of state indigenismo policies. The restoration process and development of a major museum for the site was a political decision, the funding based on restoring the site to its presumed original glory to serve as a "sacred" political ancestral place for the country, the focal point of the national cultural patrimony. Moreover, a concern for the physical preservation of the national cultural heritage from the site was pursued by museum personnel. Foreign researchers had been siphoning off the finest and best of the Bolivian national heritage to European and North American museums. Hence, at the same time that state museum workers were instrumental in creating legislation to glorify Tiwanaku as the origin of high Andean culture, ancestral to the Incas, they simultaneously labored to make it illegal to export any further patrimonial cultural materials.

Museum positions in most of the American republics are still very much an upper-middle class career, and museum staffs are unconsciously (usually but sometimes overtly) influenced by cultural goals of their economic class. And because funding for archaeological cultural studies in several Latin American republics has been primarily controlled by the respective governments, national agencies tended to keep a tight control of dissemination and interpretation of the resulting data and often did not allow the publication or display of dissonant findings that did not support the current regime's agenda. The local archaeological reconstructions often became microcosms of the larger agendas influencing the politics of the world; for example, U.S. trained archaeologists often unconsciously imposed capitalistic models on the evidence, based on their own situations.

The domination of capitalist (and now neoliberal) economic philosophy from the North led various Latin American archaeologists, who often found Marxist perspectives more intellectually congenial, to call for a restructuring of archaeological interpretations in museums. Peruvian personnel initiated a new research agenda, termed "social archaeology," which spread throughout Latin America. For them, society was defined by its productive forms; hence, they argued that museum exhibits should no longer be based upon traditional stylistic or chronological criteria but on productive features.

This agenda led to the founding of the "Latin American Social Archaeology School" at a meeting in Teotihuacan, Mexico, in 1975. Participants explored many of these Marxist interpretations, deciding to develop a political approach for studying Latin American archaeology and for explaining prehistory to museum patrons, based on what they viewed as non-imperialist/non-bourgeoisie procedures. They set out arguments for what portions of the classic Marxist evolutionary model could be imported into Latin American interpretations and which ones were inappropriate, adopting a program which eschewed dogmatic Marxism, strongly rejected French structural Marxism, modified the approach to the study of modes of production through including the influence of culture, and advocated the use of the social practice of museum archaeology as a tool with which to fight for oppressed indigenous peoples' rights.

The "social archaeology" paradigm as well argued that national political agendas always influenced the actual practice of archaeology, and therefore, museum archaeology should explicitly become a part of such political agendas. It also contended that the indigenous peoples had spent millennia in discovering the optimum method of exploitation of the American environment, while the present Euro-American neoliberalism methods were resulting in the destruction of the environment, desertification, and other ecological disasters. Thus, its adherents argued that

the indigenous population had been disenfranchised, without its own cultural patrimony intact, and the Eurasian and African immigrant populations were also being denied access to a native patrimony that they did not know they had, because the previous intellectual perspective was unworkable. Hence, they proposed that museums should employ "social archaeology" practice as one political vehicle by which both the First Nations and the modern nation-states incorporating them might reclaim their appropriate patrimony.

The synopsis of changing viewpoints for interpreting the corpus of archaeological materials included within museum exhibits makes it clear that elucidating the past has been sociologically determined and not determined by dispassionate scientific rationality.

Cross-References

- ▶ Archaeology and Politics
- ▶ Ethics of the Archaeological Record
- ▶ Heritage and Public Policy
- ▶ Indigenous Archaeologies
- ▶ Latin America: Indigenous Peoples' Rights
- ▶ Nationalism and Archaeology

Further Reading

Browman, D.L. 2009. La Sociedad Arqueológica de Bolivia y su influencia en el desarrollo de la práctica arqueológica en Bolivia. *Nuevos Aportes* 4: 29–54.

Cunliffe, B.W., W. Davies, and C. Renfrew, eds. 2002. *Archaeology: The widening debate*. Oxford: Oxford University Press.

Delle, J.A., I. Chymz, O. Ferreira Dias, T. Andrade Lima, B.J. Meggars, and P.P.A. de Funari. 2003. On collaboration, class conflict, and archaeology in Brazil. *International Journal of Historical Archaeology* 7: 223–227.

de Funari, P.P.A. 2002. Class interests in Brazilian archaeology. *International Journal of Historical Archaeology* 6: 209–216.

Lumbreras, L.G. 1972. *La Arqueologia como Ciencia Social*. Lima: Editores Histar.

McGuire, R.H. 2008. *Archaeology as political action*. Berkeley: University of California Press.

Politis, G.G. 1995. The socio-politics of the development of archaeology in Hispanic South America. In *Theory in archaeology: A world perspective*, ed. P.J. Ucko, 197–225. London: Routledge.

Politis, G.G., and B. Alberti, eds. 1999. *Archaeology in Latin America*. London: Routledge.

Vargas Arenas, I., and M. Sanoja Obediente. 1993. *Historia, identidad y poder*. Caracas: Fondo Editorial Tropykos.

Museums of Brazil

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State of Knowledge and Current Debates

The history of museums in Brazil reflects the different policies of colonization, conquering of territories, and creation of imperial and national discourses. From museums and research institutions founded to study and collect materials for the metropolis to museums created for a new discourse of nation (in the twentieth century) or as cultural commodities, legitimating narratives and subaltern memories, eclipsed by historical memory and official discourse, the museums of Brazil are instruments of negotiation of identities and social policies.

The history of museums in Brazil begins in the eighteenth century. In the city of Recife, it is possible to identify the first collecting experiences at the Vrijburg Palace (completed in 1642, during the rule of Mauritius of Nassau, during the Dutch occupation), in the form of a botanical garden, a zoo, and a curiosity cabinet, known as "Count's Office" (Gabinete do Conde) or "Natural History Museum" (Almeida et al. 2011). In the city of Rio de Janeiro, in 1784, Viceroy D. Luiz de Vasconcellos e Sousa, Count of Figueró, created the Casa de História Natural (House of Natural History), also known popularly as Casa dos Pássaros (House of Birds), for its main collection of stuffed birds. Francisco Xavier Cardoso Caldeira (also known as Francisco Xavier

Cardoso dos Pássaros) was responsible for its maintenance until his death in 1810. Luis Antonio da Costa Barradas became the second and last responsible for this institution, as it was closed in 1813. Its main purpose was to collect and prepare faunal specimens, sending them alive or stuffed to Lisbon, capital of the Portuguese Monarchy, upon request, and stand as a somewhat cabinet of curiosities.

According to D'Almeida (2015), the end of Casa dos Pássaros might have been caused by a disinterest of Count of Resende, successor of Count of Figueró, which led to abandonment and closing of its activities after the death of Francisco Xavier Cardoso. In 1813, Casa dos Pássaros was formally extinguished by Prince Regent D. João VI. Its collections were transferred to the Academia Real Militar (Royal Military Academy), where some of it was lost without conservation.

In 1818, D. João VI founded, in the capital of the then Viceroyalty, the Museu Real (Royal Museum), as part of the many institutions created to accommodate the transfer of the court to the colony (Brasil 1818; Museu Real n.d.). Located in the downtown area of Rio de Janeiro, the Museu Real (renamed as Museu Imperial e Nacional in 1824, and as Museu Nacional in 1890) was transferred in 1892 to the former residence of D. Pedro II, ousted emperor in 1890, after the proclamation of the new republican regime. The palace, located in Quinta da Boa Vista Park, houses collections of anthropology, archaeology, ethnology, linguistic (mainly records and studies about indigenous languages), botany, zoology, geology, and paleontology.

At first, as a colony and during the monarchy, Museu Nacional was the central institution representing and showcasing natural and cultural goods from the Brazilian territory. The main objective stipulated in its foundation decree was to "promote the knowledge and studies of natural Sciences in the Kingdom of Brazil," to analyze what could be applied in the industry, commerce, and arts (Brasil 1818).

The product of expeditions conducted by naturalists and findings made by particulars were sent to Museu Nacional. This focus on scientific expeditions, in a Natural History perspective, researching, cataloguing, and collecting samples of natural materials and local species, was the base for creating other museums of Natural History through the nineteenth century, reflecting regions of interest, such as listed in Fig. 1.

Name	Created in	Location	Current affiliation
Museu Real (Royal Museum, currently known as Museu Nacional, National Museum)	1818	Rio de Janeiro, state of Rio de Janeiro Southeast Region	Federal University of Rio de Janeiro
Gabinete de História Natural do Maranhão (Natural History Cabinet of Maranhão)	1844	state of Maranhão North Region	extinguished in date unknown
Museu Paraense (currently known as Museu Paraense Emílio Goeldi)	1866	Belém, state of Pará North Region	Ministry of Science, Technology, Innovation and Communication
Museu Paranaense	1876	Curitiba, state of Paraná South Region	State of Paraná (since 1882. Created as a private museum)
Museu Botânico do Amazonas (Botanical Museum of Amazonas)	1883	Manaus, state of Amazonas North Region	Closed in 1890 (created as an imperial museum)
Museu Paulista	1894	São Paulo, state of São Paulo Southeast Region	São Paulo University (a state university)

Museums of Brazil, Fig. 1 Natural History museums created in the nineteenth century

The Ancient Egypt and Greco-Roman collections housed in Museu Nacional were acquired through the royal family, as the former was brought in 1844 by D. Pedro I, and the latter brought by Empress Teresa Cristina, wife of D. Pedro II, in 1853. Therefore, Museu Nacional reflects different interests, from state policies to what the royal family envisioned for a national and imperial museum, having European museums as an inspiration to be followed (Schwarcz and Dantas 2008; Santos 2000, 2015).

The Exposição Anthropologica Brasileira of 1882 (Brazilian Anthropological Exhibition) at the Museu Nacional was marketed as the first exhibition about Brazilian anthropology, with material culture and human remains from indigenous people, from their own collections and other institutions, such as the ceramic artifacts of Marajoara Culture, part of the collection of the Museu Paraense Emilio Goeldi, another very important museum for the development of science and the preservation of the country's cultural heritage, located in the state of Pará, northern Brazil. Exhibition rooms were named after famous naturalists and historical characters, such as Lund Room (Peter Lund) with human remains, and Anchieta Room (Jesuit missionary José de Anchieta) with assorted photos and paintings of indigenous people from different authors, and with a copy of Anchieta's first grammar of the Tupy language (Museu Nacional 1882a, b). In a bid to place the Brazilian national museum as an equal within the international museum scenario, the exhibition portrayed a narrative about a rich past of the Brazilian territory, and the indigenous people as remnants of such past. The exhibition reflected the state policies of forced settlements based on race hierarchy and classification of indigenous people as primitive and needing to be "civilized" (Agostinho 2017; Reis 2016).

Most debates about history and geography occurred within the historical institutes, such as Instituto Histórico Geográfico Brasileiro (IHGB, Brazilian Geographical Historical Institute, founded in 1838 in Rio de Janeiro/Capital) and regional institutes as Instituto Histórico e Geográfico de Pernambuco (created in 1862) and Instituto Histórico e Geográfico de Alagoas (created in 1869). The Museu Paulista (São Paulo), created in 1895 as a museum of Natural History, became a symbol of national history, as it was installed in monument-building commemorating the independence of Brazil, the Monumento do Ipiranga, planned since 1824 and built from 1885 to 1890 (Moraes 2008).

In 1922, given the demand by intellectuals for a museum dedicated to national history, president Epitácio Pessoa created the Museu Histórico Nacional (National Historical Museum), in downtown Rio de Janeiro (still the Capital at that time). Museu Histórico Nacional was the first Brazilian college of museology and currently is part of the Instituto Brasileiro de Museus, IBRAM (Guedes 2010). Museu Nacional became part of the Universidade Federal do Rio de Janeiro in 1946, while Museu Paulista became part of the Universidade de São Paulo in a process initiated in 1934 and completed in 1963. From 1934 to 1963, different departments, such as zoology were transferred to USP, leaving Museu Paulista as a museum of history, ethnography, and archaeology. In 1989, archaeological and anthropological collections were transferred to the Museu de Arqueologia e Etnologia (Archaeology and Ethnology Museum, created in 1964), also part of USP, becoming a museum focused on historical collections about São Paulo (Ornstein and Barbuy 2015).

The Museu de Arqueologia e Etnologia of USP was created as Museu de Arte e Arqueologia (Museum of Art and Archaeology) to house classical collections donated along the 1960s from Italy, Chipre, and Portugal. At the same time, efforts to also represent the Brazilian society, African and African-Brazilian ethnographic collections, Pre-Columbian archaeological collections were added to the museum. Therefore, in 1972, the museum was renamed as MAE, reflecting its research focus and collections (Fleming and Florenzano 2011).

Regarding governmental agencies and policies of protection and regulation of cultural heritage and museums, in 1937, through law number 378, the Serviço do Patrimônio Histórico e Artístico Nacional (SPHAN, Service of Historical and Artistic Heritage) was created to promote the

conservation, register, and knowledge of national historical and artistic heritage (Rezende et al. 2015a). From archaeological sites to historical buildings, the SPHAN was responsible of registering all cultural heritage, mobile and immobile, and substituting the extinguished Conselho Nacional de Belas Artes (National Council of Fine Arts).

In 1946, SPHAN was changed to DPHAN, Diretoria do Patrimônio Histórico e Artístico Nacional (Historical and Artistic Heritage Directory), through the decree 8534, which also detailed its attributions and responsibilities. Beyond protection, conservation, and registering, DPHAN became responsible to oversee artistic and antiquities trade, coordinate federal museums under its subordination, advise other museums, and promote and guide the creation of museums of arts, history, ethnography, and archaeology (Brasil 1946; Rezende et al. 2015b).

With the reorganization of Ministério da Educação e Cultura (Education and Culture Ministry) in 1970, DPHAN was changed to IPHAN, Instituto do Patrimônio Histórico e Artístico Nacional (Historical and Artistic Heritage Institute). In 1976, a new regiment was published (Portaria MEC n°. 230), adding new departments within the institute, such as Divisão de Museus e de Difusão Cultural (Division of Museums and Cultural Diffusion) and Divisão de Arqueologia (Division of Archaeology). In 1979, IPHAN became a secretary superior to the Ministry of Education and Culture, renamed as Secretaria do Patrimônio Histórico e Artístico Nacional (SPHAN, Secretary of Historical and Artistic Heritage) as a result of the incorporation of the National Center for Cultural Reference (CNRC) and the Historical Cities Program (PCH) and the operation alongside the National Pro-Memory Foundation, resulting in the optimization and dynamization of actions in favor of Brazilian cultural heritage. From 1990 through 1994, in the middle of a political crisis, MEC and some cultural foundations were closed, while IPHAN was renamed as IPBC, Instituto Brasileiro do Patrimônio Cultural (Brazilian Institute of Cultural Heritage). The institute became known again as IPHAN in 1994, after a series of manifestations against the name IBPC. Currently, IPHAN is a government autarchy under the Ministry of Citizenship (Rezende et al. 2015b, c).

Nevertheless, in 2009, IBRAM, Instituto Brasileiro de Museus (Brazilian Institute of Museums) was created as an autarchy under the Ministry of Culture (Brasil 2013). All attributions regarding museums were transferred from IPHAN to IBRAM, being responsible for ensuring and implementing the National Museum Policy (PNM), created in 2003, among other duties and competences (Art. 3 and 4 of Law No. 11.906/09), while also being directly responsible for 30 museums, formerly under IPHAN management (Silva 2015). Therefore, museums with archaeological collections and cultural heritage must follow policies and answer to both IPHAN and IBRAM, since the archaeological heritage, as assets of the Union, is under the tutelage of IPHAN.

The number of museums in the twentieth century grew exponentially. In 1953, Heloísa Alberto Torres, director of the National Museum, organized and published Museums of Brazil, listing 175 museums, with names, addresses, and short descriptions. In 1973 and 1978, two editions of Guia dos Museus do Brasil (Guide of Museums of Brazil) were published, listing respectively 399 and 401 museums. Different methods of identifying museological institutions are also one of the reasons for fluctuation of total number of Brazilian museums. In 1983 and 1986, the Catálogo dos Museus do Brasil (Catalog of Museums of Brazil) listed 926 and 1158 institutions, while Guia de Museus Brasileiros (Guide of Museums of Brazil), organized based on CAMUS (Base de Dados de Museus Brasileiros/Database of Brazilian Museums, since 1993, at São Paulo University), listed in 1997 and 2000 only 755 and 529 institutions (Santos et al. 1984; Universidade de São Paulo 1997, 2000; Instituto Brasileiro de Museus 2011a).

In 2011, the Guia dos Museus Brasileiros (Guide of Brazilian Museums), published by Instituto Brasileiro de Museus (Brazilian Institute of Museums), presented a list of 3025 museums, with information such as address, date of creation, actual state, and type of

collections. The online version of Guia is divided in six volumes, covering museums in each one of the five regions of Brazil plus one volume dedicated to extinguished, renamed, or assimilated museums, virtual museums, and museums still being implemented.

In December 2015, the Rede Nacional de Identificação de Museus (ReNIM, National Network of Museum Identification) and the online platform Museusbr were launched, creating an accessible database for registering and updating information about new and current museums (IBRAM 2017). The Museusbr is open access and searchable (http://museus.cultura.gov.br/). The decree regulating ReNIM was published in January 9, 2017, having as obligatory members IBRAM and the Comitê Gestor do Sistema Brasileiro de Museus (SBM, Management Committee of the Brazilian System of Museums), and through membership of the state, district, or municipal systems of museums and state, district, or municipal public agencies (Brasil 2017). In 2017, over 3500 museums are registered and mapped in the Museusbr platform (Fig. 2).

The Cadastro Nacional de Museus has 11 categories regarding typology of collections: anthropology and ethnography, archaeology, visual arts, natural sciences and natural history, science and technology, history, image and sound, virtual, bibliothecographic, documental, archival. The last three categories distinguish, respectively, collections of printed materials; collections of manuscripts, printed, or digital materials organized under a specific theme; and collections of documents accumulated by a person or institutions throughout their career or history, as a product of their activities (IBRAM 2011b).

According to Bruno (2008, 2013/2014), the intense criticism of Brazilian museums through the twentieth century promoted profound changes to practices of collection, musealization, and meaning of cultural heritage. Social inclusion and participation have become key elements, especially in museums with ethnological and

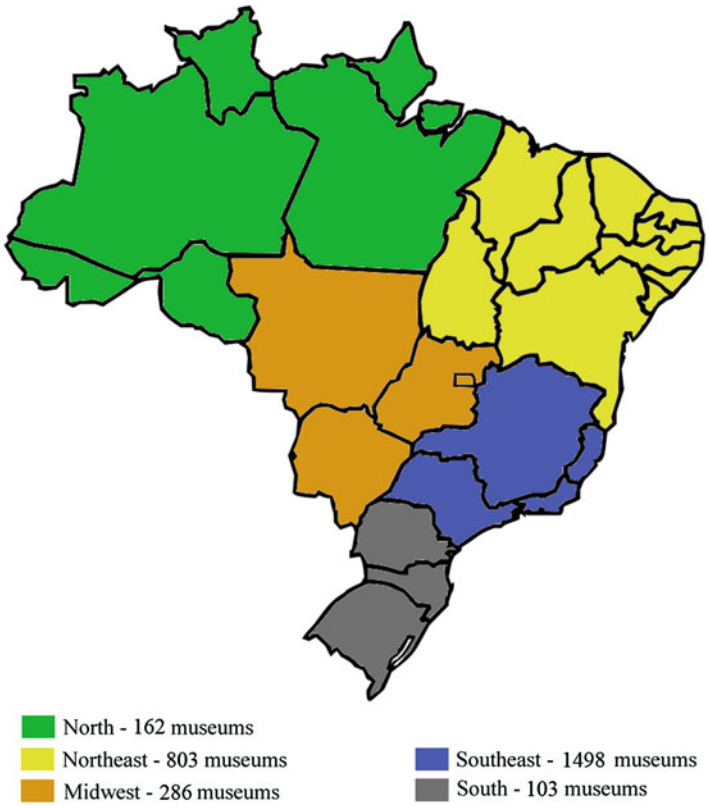

Museums of Brazil, Fig. 2 Map of regions of Brazil, with the total number of museums per region

archaeological collections. Nevertheless, the decolonization of exhibitions and collection is an ongoing process, marked by two centuries of selective silencing and narratives. As Bruno analyzes (1999, 2013/2014), museums with archaeological collections deal with a so-called stratigraphy of abandonment, as colonial history was used for national narrative silencing precolonial and indigenous history. It is noteworthy that this *stratigraphy of abandonment* signals the secondary/eclipsed place that memories, heritages, and their narratives from the precolonial past still occupy both cultural heritage and formal school education.

Thus, in addition to the effects of the *stratigraphy of abandonment*, museums with archaeological collections face specific challenges related to the particularities of the management of archaeological materials (complicated by the increment of Contract Archeology, as the number of collections has increased exponentially in scale, a result of a developmental political-economic agenda) and the need to recognize its political dimension (Saladino 2015).

According to the decree n. 8.124, 17th October 2013 (subsection IX, chapter 1), regulating the Museums Statute (a Lei n° 11.904/09), a museum is:

> instituição sem fins lucrativos, de natureza cultural, que conserva, investiga, comunica, interpreta e expõe, para fins de preservação, estudo, pesquisa, educação, contemplação e turismo, conjuntos e coleções de valor histórico, artístico, científico, técnico ou de outra natureza cultural, abertos ao público, a serviço da sociedade e de seu desenvolvimento.

> a non-profit, cultural institution that preserves, investigates, communicates, interprets and exhibits, for the purpose of preservation, study, research, education, contemplation and tourism, series and collections of historical, artistic, scientific, technical or of other cultural nature value, open to the public, at the service of society and its development.

It is worth mentioning the consonance of the museum definition consolidated in public policies for the sector with the proposal by ICOM. However, it should be remembered that the diverse and distinct museum experiences developed around the world motivate a reflection on the purpose of the museum institution in the twenty-first century, beyond the administration of memory and preservation of its materiality, aiming to contribute to human dignity and social justice, assuming an inclusive and decolonial political stance.

Currently, the Brazilian museum diversity is noteworthy. Experiences and trajectories are markedly different, regardless of the management model adopted, some breaking with colonial logic, others radicalizing in decoloniality and others still following the Cartesian-scientist paradigm, aligned with the idea of the monopoly of truth attributed to modern science. It is worth noting that the rooting of the Social Museology paradigm enables several museum configurations, such as the community museums (as an illustration we highlight the Museu da Maré and the Favela Museum), the organic museums of the sertão of northeastern Brazil, and also the resignification of traditional museums, such as the Museum of Archeology and Ethnology at the University of São Paulo, which has been exhibiting collectively curated exhibitions with indigenous groups. This diversity was driven by the consolidation of public policies and their institutional instruments, funding and democratization, aligned with the notions of "heritage, social memory and museal processes in decolonial perspective" (Chagas 2017: 135).

The construction of the Museu do Amanhã (Museum of Tomorrow, inaugurated in December 2015) continues the trajectory of national narrative as spectacle, as an effort to place the nation as part of the international scene of (now postmodern) museums. Marketed as a legacy from the Marvelous Port project (a so-called reinvention of the port neighborhood), for the many international events such as the 2014 World Cup and the 2016 Olympic Games, it was an important element of a discourse of modernization and urban development of a notoriously decayed part of the center neighborhood of Rio de Janeiro. As a symbol of what should have been the revitalization of an historical neighborhood socially forgotten for so long, the Museu do Amanhã might represent the increasing social inequality of Brazilian society and the long-standing social debt. The narrative of progress stated in its name called attention

to the disregard for the existing museums and their collections lacking much needed support. Such urban revitalization proposal was nothing more than the same old story (Ferreira 2011; Bulcão 2017), a discourse of monumental constructions and ambitious look into a future, disconnected from our present and past.

Resulting from the same urban program linked to major sporting events held in Rio de Janeiro in the recent past, is the Museum of Removals, created by the activism and political positioning of a community removed from its territory. It is a museum that also deals with the possible future, but anchored in memories and a decolonial perspective.

However, political-economic reconfigurations have resulted in a weakening of policy effects, leading to weakening of key aspects such as budget allocation and other funding instruments, in addition to hiring specialists to renew staff. The progressive cut of funding and protection for historical buildings has deeper effects. Just in the last few years, different institutions suffered from uncontrollable fire. On December 21, 2015, the Museum of Portuguese Language was completely devastated, with only the building remaining. On September 2, 2018, the oldest museum of Brazil, the National Museum, suffered a fire that tore through all the collections housed in its main building, a royal palace over 200 years old. In fact, on June 6, the Museum had celebrated its 200 years anniversary. For decades the administration has sought funding for fire prevention, and to move all laboratories to another facility, aiming to keep the palace solely for exhibitions.

The public outcry for the tragedy of the National Museum added to encompassing sense of impotence felt by the Brazilian society. Different sectors are mobilizing to find ways to prevent another preventable and long announced tragedy. From universities, collaborative networks, IBRAM, IPHAN, and parliamentarians of the state of Rio de Janeiro, there is a general feeling of needed change. Nevertheless, the ongoing crisis in Brazil feeds into fallacious dissent over what matters most, if in a society plagued with such social inequality the reconstruction of a museum should take precedence over health and education.

Cross-References

▶ Brazil: Cultural Heritage Management Education

References

Agostinho, Michele de Barcelos. 2017. A Exposição Antropológica Brasileira de 1882: práticas de colecionamento e circulação de indígenas no Museu Nacional. In *Anais do 41° Encontro Anual da ANPOCS*, Caxambu. 1–29.

Almeida, Argus Vasconcelos de, Maria Adélia Borstelmann de Oliveira, and Isabelle Maria Jacqueline Meunier. 2011. Animais e plantas do horto zoo-botânico do palácio de Friburgo (1639–1645) construído por Maurício de Nassau no Recife. *Filosofia e História da Biologia* 6 (1): 19–35. Available from: http://www.abfhib.org/FHB/FHB-06-1/FHB-6-1-02.html.

Brasil. 1818. Decreto de 06 de junho de 1818. Crêa um Museu nesta Côrte, e manda que elle seja estabelecido em um predio do Campo de Santa'Anna que mande comparar e incorporar aos proprios da Corôa. In: Coleção de Leis do Império do Brasil, vol 1, 60. Available from: http://www2.camara.leg.br/legin/fed/decret_sn/anterioresa1824/decreto-39323-6-junho-1818-569270-norma-pe.html

Brasil. 1946. Decreto-lei n°. 8.534, de 02 de janeiro de 1946. Passa à Diretoria do Patrimônio Histórico e Artístico Nacional o Serviço do mesmo nome, criado pela Lei número 378, de 13 de janeiro de 1937, e dá outras providências. Rio de Janeiro/Capital Federal.

Brasil. 2013. Decreto n° 8.124, de 17 de Outubro de 2013. Regulamenta dispositivos da Lei n° 11.904, de 14 de janeiro de 2009, que institui o Estatuto de Museus, e da Lei n° 11.906, de 20 de janeiro de 2009, que cria o Instituto Brasileiro de Museus – IBRAM. D.O.U., 18 de outubro de 2013. Brasília.

Brasil. 2017. Portaria n° 7 de 9 de Janeiro de 2017. Fica instituída a Rede Nacional de Identificação de Museus – RENIM. D.O.U., 10 de Janeiro de 2017. Brasília.

Bruno, Maria Cristina. 1999. Musealização da arqueologia: um estudo de modelos para o projecto de Paranapanema. *Cadernos de Sociomuseologia* 17 (17): 8–288.

Bruno, Maria Cristina. 2008. Museu, Identidades e Patrimônio Cultural. *Revista do Museu de Arqueologia e Etnologia* Suppl 7: 145–151.

Bruno, Maria Cristina. 2013/2014. Musealização da arqueologia: caminhos percorridos. *Revista de Arqueologia* 26–27 (2–1): 4–15.

Bulcão, L. 2017. Museu do Amanhã: A Cultura como Ícone do Planejamento Estratégico, Barbárie ou Civilização na Construção do Amanhã? Intercom – Sociedade Brasileira de Estudos Interdisciplinares da Comunicação. 40° Congresso Brasileiro de Ciências da Comunicação, 1–12.

Chagas, Mario de Souza. 2017. Museus e patrimônios: por uma poética e uma política decolonial. *Revista do patrimônio histórico e artístico nacional* 35: 121–138.

D'Almeida, J.M. 2015. Do Gabinete de Curiosidades do Vice Rei D. Luiz de Vasconcelos ao Museu Nacional da Quinta da Boa Vista. *Historia Scientiarum* 8: 1–7.

dos Santos, F. H., F. M. Moura, and N. Fernandes. 1984. *Catálogo dos museus do Brasil*, 2 ed., rev. atual. Rio de Janeiro: Associação Brasileira de Museologia.

Ferreira, M.L.M. 2011. Políticas da memória e políticas do esquecimento. Aurora. Revista de Arte, Mídia e Política 10: 102–118. Available from: https://revistas.pucsp.br/aurora/article/view/4500/3477

Fleming, M.I.D., and M.B.B. Florenzano. 2011. Trajetória e perspectivas do Museu de Arqueologia e Etnologia da USP (1964–2011). *Estudos Avançados* 25 (73): 217–228.

Guedes, A.C. 2010. Museu Histórico Nacional. *Comunicação & Educação* 15 (3): 131–136.

Instituto Brasileiro de Museus. 2011a. Museus em números. Brasília: IBRAM. Available from: http://www.museus.gov.br/museus-em-numeros/

Instituto Brasileiro de Museus. 2011b. Guia dos museus brasileiros. Brasília: IBRAM. Available from: http://www.museus.gov.br/guia-dos-museus-brasileiros/

Instituto Brasileiro de Museus. 2017. Cadastro Nacional de Museus. Available from: http://www.museus.gov.br/sistemas/cadastro-nacional-de-museus/

Moraes, F.R. 2008. Uma coleção de história em um museu de ciências naturais: o Museu Paulista de Hermann von Ihering. *Anais do Museu Paulista: História e Cultura Material* 16 (1): 203–233.

Museu Nacional. 1882a. *Revista da Exposição Antropológica Brasileira*. Rio de Janeiro: Tipografia Pinheiro.

Museu Nacional. 1882b. *Guia da Exposição Anthropológica Brasileira realisada pelo Museu Nacional do Rio de Janeiro a 29 de julho de 1882*. Rio de Janeiro: G. Leuzinger.

Museu Real. n.d. Dicionário Histórico-Biográfico das Ciências da Saúde no Brasil (1832–1930). Fundação Oswaldo Cruz. Available at: http://www.dichistoriasaude.coc.fiocruz.br

Ornstein, S.W., and H. Barbuy. 2015. Museu Paulista: contribuições acadêmicas e políticas. In *USP 80 anos*. São Paulo: EDUSP.

Reis, Silvia. 2016. Finding the past in the landscape: Sambaqui and Kaizuka amid appropriation and construction of identities (Brazil and Japan). *Archaeologies* 12 (2): 182–214.

Rezende, M.B., B. Grieco, L. Teixeira, and A. Thompson. 2015a. Serviço do Patrimônio Histórico e Artístico Nacional – SPHAN. In *Dicionário IPHAN de Patrimônio Cultural*, orgs. M.B. Rezende, B. Grieco, L. Teixeira, and A. Thompson. Rio de Janeiro: IPHAN/DAF/Copedoc.

Rezende, M.B., B. Grieco, L. Teixeira, and A. Thompson. 2015b. Diretoria do Patrimônio Histórico e Artístico Nacional – DPHAN. In *Dicionário IPHAN de Patrimônio Cultural*, orgs. M.B. Rezende, B. Grieco, L. Teixeira, and A. Thompson. Rio de Janeiro: IPHAN/DAF/Copedoc.

Rezende, M.B., B. Grieco, L. Teixeira, and A. Thompson. 2015c. Instituto do Patrimônio Histórico e Artístico Nacional – IPHAN. In *Dicionário IPHAN de Patrimônio Cultural*, orgs. M.B. Rezende, B.Grieco, L. Teixeira, and A. Thompson. Rio de Janeiro: IPHAN/DAF/Copedoc.

Saladino, Alejandra. 2015. Museus e Arqueologia: algumas reflexões sobre a preservação dos bens arqueológicos. *Revista Tempo Amazônico* 3 (1): 159–177. Available from: http://rj.anpuh.org/resources/download/1482451237_ARQUIVO_Texto9ArtigodeAlejandraSaladinoFinalizado.pdf.

Santos, M.S. 2000. Os museus Brasileiros e a constituição do imaginário nacional. *Sociedade e Estado* 15 (2): 271–302.

Santos, S.F. 2015. Espaços Femininos na Magna Grécia e Sicília: estudo comparativo da iconografia dos vasos da Coleção Teresa Cristina e de vasos italiotas, siciliotas e áticos dos séculos V-IV a.C. Tese de Doutorado. Programa de Pós-graduação em Arqueologia. Universidade Federal do Rio de Janeiro.

Schwarcz, L.M., and R.M.M.C. Dantas. 2008. O Museu do Imperador: quando colecionar é representar a nação. *Revista do Instituto de Estudos Brasileiros* 46: 123–164.

Silva, M.V.T. 2015. Do Sphan ao IBRAM: subsídios para Compreender a produção documental dos museus do Instituto Brasileiro de Museus (IBRAM). *Revista Eletrônica Ventilando Acervos* 3 (1): 60–75.

Universidade de São Paulo. 1997. *Guia de museus brasileiros*. São Paulo: USP.

Universidade de São Paulo. 2000. *Guia de museus brasileiros*. São Paulo: EDUSP.

Myanmar (Burma): Archaeological Heritage and Its Management

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Introduction

Myanmar's predominantly Buddhist culture has a substantial archaeological heritage. Religious buildings, some dating back to the first millennium CE, number in the thousands. Many active Buddhist sites are managed by trustees,

sometimes with input from government authorities. Gazetted archaeological sites, such as Bagan with its more 3,300 buildings, are managed by the Department of Archaeology, National Museum and Library, which is a division of the Ministry of Culture. The ministry states in part that its mission is "to love and cherish the country and the people by taking pride in our traditions as well as by preserving, exposing and propagating Myanmar cultural heritage . . . to help develop unity, nationalistic spirit and patriotism among the people." The Archaeology Department employs conservators and engineers to maintain and repair buildings and their contents, as well as research officers, who conduct excavations.

Myanmar (Burma): Archaeological Heritage and Its Management, Fig. 1 Myanmar (Burma) and some of its main archaeological and cultural sites

Historical Background

Paleolithic to Early Urban

Myanmar (Fig. 1) has had human settlement dating back to between 55,000 and 70,000 years ago, when the dispersal of modern *homo sapiens* out of Africa brought about the occupation of the coast of the Arabian Peninsula, the river valleys of India and Burma, Island Southeast Asia, and Australia. In Myanmar, this population is still visible in Paleolithic tools that have been found across the Ayeyarwady Valley. Occupation of cave sites from around 10,000 years ago has been detected, with the gradual appearance of polished stone tools, incised pictographs, and ochre paintings.

Settlements from the Bronze Age (from around 1500 BCE) and the Iron Age (from 500 BCE) have been located in Upper Burma. By the middle of the first millennium BCE, the arrival of iron technology coincided with an expansion of personal wealth and clear evidence of social differentiation, notably in the Samon Valley and at Halin. Some skeletons from this period are found with armloads of bracelets, their clothing, and persons decorated with hundreds of beads. Burials include bronzes that probably come from southern China (Fig. 2), carnelian beads originally from India but quickly produced locally, and blue-green glass ornaments in styles also found as far away as Cambodia, all suggesting that goods and information travelled long distances over the trade routes of the time.

Migrants from the Samon Valley probably built, from around CE 200, huge walled cities at Pinle and Halin, north of the Samon, and Beikthano and Sriksetra, to the south. Brick construction, Indic deities, and cremation suggest that the indigenous leaders were enthusiastic adaptors of cultural notions from India. Known today as the Pyu (a name given to them by the Chinese), these people developed extensive rice agriculture in and around their cities. Their religion incorporated Buddhism, Hinduism, naga (snake/dragon) worship, and animism. Their settlements feature pots of cremated bones buried in or around brick shrines. The Pyu used coins (Fig. 3) which featured Indian-style symbols but no names or dates.

Myanmar (Burma): Archaeological Heritage and Its Management, Fig. 2 Bronze pull toy from a Samon Valley grave, probably traded from southern China

Myanmar (Burma): Archaeological Heritage and Its Management, Fig. 3 Indic symbols and Pyu rising sun design on a coin from Halin

A few words of the Pyu language have been translated from inscriptions, but they left behind few written records.

The dominance of the Pyu cities gradually faded away due to a combination of factors including siltation of their agricultural systems, a decline in the authority of the chiefly families and the intrusion, including slave raids, by Nanchao, a Tibeto-Burman-speaking principality in what is now Yunnan. The Pyu lands and cities were slowly incorporated into the Bagan kingdom. Halin had a governor appointed by Bagan in the eleventh century. There are records of princes of Bagan being given Sriksetra to "eat," which meant they were entitled to its revenues. The Shans (or Tai) arrived between the ninth and eleventh centuries and settled in the hills on the Thai-Burma border. The other major group was the Mon, who spoke a language in same family as Khmer and appeared to have migrated into southern Burma from the old Dvaravati kingdom in Thailand.

While the Pyu were active on the central plain, across the Arakan Yoma (mountain range) on the west coast were two contemporary and in many ways similar cities. Dhanyawadi (fourth to sixth centuries CE) and Vesali (fifth to eighth centuries CE) were also large sites enclosed by brick walls. These cities also used coins with Indian symbols. Artworks suggest a mixture of Buddhist and Hindu elements.

Bagan: Eleventh to Fourteenth Century CE

There is a substantial gap between the traditional history and the evidence of archaeology for the first millennium CE in Myanmar. We know from dates on burial urns, for example, that there was a royal dynasty at Sriksetra between CE 688 and 718. These were leaders whose names all ended in "vikrama," a Sanskrit title. Despite the Burmese chronicles' enthusiasm for listing royal dynasties, the "vikramas" are never mentioned. According to the traditional histories, a dynasty of kings ruled at Bagan from the first century CE, but there is little evidence to support this. We know, however, that pottery was being made at Bagan perhaps as early as CE 760. There are also temples, pottery, beads, and Buddhist artworks in the Pyu style at Bagan, suggesting that the site may have been settled during the second half of the first millennium.

Inscriptions at Bagan itself are known so far only from the early twelfth century, although some of these refer to earlier events. Bagan was the site of an artistic and building explosion from the eleventh century (Fig. 4), peaking with the construction of more than 2,500 religious structures in the thirteenth century. Early artisans may have arrived from India, as expanding Hindu and Moslem polities reduced the demand there for Buddhist art and architecture.

Myanmar (Burma): Archaeological Heritage and Its Management, Fig. 4 The Shwezigon Pagoda, Bagan

After 300 years of military domination and economic expansion, the Bagan kingdom was put under pressure by the Mongols in the late thirteenth century. The commitment of resources to religious buildings also appears to have overstretched the economy. The center of Burman government gradually moved north to the area around Mandalay and remained there for most of the time until colonization. The geopolitical contraction of Bagan was followed by an expansion of Mon polities in the south and the rise of Mrauk-U on the west coast.

Mrauk-U

During the Bagan period, a number of small principalities on the west coast, such as Sambawak, Launggret, and Parein, led fairly autonomous lives, despite occasional attempts by kings of Bagan to carry off the Mahamuni image, which was believed to be a life portrait of the Buddha. In the 1500s, King Min Bin employed Portuguese mercenaries to help fortify his city, train his army, and equip his fleet. Mrauk-U took advantage of Bengal's war with the Mughals to seize East Bengal, which it held as vassal for more than a century. Eventually the Burmese King Bodawpaya (1782–1819) conquered Mrauk-U. After centuries of trying, the Burmese removed the Mahamuni image to Mandalay. At the same time, the Burmese took several Khmer bronze statues, which had passed through several hands before reaching Mrauk-U. They are now in the Mahamuni pagoda compound in Mandalay.

Other Kingdoms

With the decline of Bagan, Central Myanmar split into small kingdoms, Burman, Mon and, Shan, which regularly fought each other. At times, Bagan was a staging post for armies moving north or south, and its vast treasures, buried inside pagodas as Buddhist offerings, were regularly pillaged. In the eighteenth century, the Burmese King Alaungpaya, a dominant military leader, founded the Konbaung Dynasty which ruled Burma from Arakan to Tenasserim. In 1767, Burmese troops besieged Ayutthaya, pillaged the city, and carried off many captives. Ayutthaya never recovered, and the Thais reestablished their capital in what is now Bangkok.

Colonial Period to Independence

Territorial conflicts between the British in India and local Burmese armies led to the first British-Burmese war in 1824. In a process of colonial annexation that took several decades, the British finally took over all of Burma in 1886. The Burmese king and his family were exiled to India, and the last Mughal emperor was exiled to Burma. His grave can be visited in Yangon.

Japanese forces entered Burma in 1941. The British, including many Indian troops and civilians, retreated to India, burning or scuttling the old

Irrawaddy Flotilla that had plied the "road to Mandalay" as they left. Some of these vessels have been rehabilitated and are functioning examples of the country's modern technological heritage.

Key Issues and Current Debates

Heritage Sites

Paleolithic implements have been found throughout Myanmar, at sites such as Magwe, Yenanchaung, and Chauk in Central Myanmar and along the river terraces of Ayeyarwaddy near Sale and Bagan-Nyaung U. Stone implements have also come from cave sites such as Pindaya, under what are now Buddhist shrines, and Padah-Lin, which like several other cave sites is protected as much by its remoteness as by official decree. The Archaeology Department maintains a list of sites and their locations, but they are rarely visited except for study purposes.

There are 16 officially gazetted Bronze and Iron Age sites, some of which have been excavated and published by a joint Myanmar-French team. Details of sites can be found on Archaeology Department websites. Rather than provide a URL that may become outdated, we suggest that interested parties search the internet using keywords such as *Myanmar*, *ministry*, and *culture*.

Seven sites are designated as "Pyu ancient cities." These are Beikthano, Sriksetra, Halin, Kyaikkatha, Wethali (Vesali), Pinle (Maingmaw), and Tagaung. Halin, whose history goes back at least 4,500 years to a Neolithic pottery production site, also has several Neolithic, Bronze, and Iron period excavations conserved under cover as site museums.

Thirty-three areas are named as cultural heritage zones. These are generally sites that feature Buddhist pagodas, monasteries, or major sculptures. They include Bagan, Bago, several pagodas in the Mandalay area, Sagaing (a huge monastic site on the west bank of the Irrawaddy from Mandalay), and cave sites including Kawgun, which contains ancient stone sculptures.

The Archaeology Department has a priority list of over 2,000 buildings with mural paintings, suffering from water leakage, the key factor in deterioration. There are more than 4,000 stone inscriptions, many housed locally in more than 50 storage sheds. Scholars occasionally obtain rubbings from these. The sheds are usually maintained by monasteries, villages, or pagoda committees. Other classes of object that are the focus of conservation are parabaiks (folded paper books), inscribed bronze bells, clay votive tablets, and palm-leaf manuscripts.

In 2011, conservation-repair-reconstruction schemes were active at Sriksetra (Thayekhittaya), Bagan, Halin, Inwa, Bago, Pakhangyi, Tagaung, and Mrauk-U. There was also a focus on the restoration of nineteenth-century wooden monasteries at Mandalay, Sagaing, Inwa, Sale, Salin, Legaing, Pakhangyi, and Pakhannge and repair of the wooden U Bein Bridge at Amarapura.

The Department of Archaeology, National Museum and Library maintain museums at 12 archaeological sites, with important collections at Bagan, Sriksetra (Hmawza), and Mrauk-U, as well as the National Museum in Yangon. There are many small museums in monasteries or local towns, under local control.

The Myanmar government has "spent a large amount of state budget for the national culture preservation" by building replica royal palaces at Bagan, Bago, Shwebo, and Mandalay, as a "symbol of success" and a "way of uplifting . . . the national prestige." In 2012 the nomination process for UNESCO World Heritage status was commenced for the Pyu Ancient Cities, Sriksetra, Beikthano and Halin.

Anthropoid Origins

The study of Myanmar's paleontological record was brought to attention worldwide in 1999 when anthropologist Gustaaf Houtman focused on a search for fossils, including early primates, in a critique of what he called "Myanmafication," an institutionalization of tradition for political purposes. In particular, he pointed to the substantial involvement of the military in the search in the mid-1990s for primate fossils around the Pondaung hills. The paleontological evidence supports the theory that East Asia, including

Myanmar, may have been the homeland of the first primates. However, Myanmar scholars have at times taken theory as fact, linking this directly to later human populations, as "proof" that "Myanmar's pre-history dates back 50 million years."

The Mon Paradigm

The first significant leader of the Bagan period is considered to be Anawrahta (r. 1044–1077), although his story is suffused with legend. He is credited with the construction of irrigation works at Kyaukse, after dreaming of three snakes (perhaps representing the major rivers) which he battled. Anawrahta is said to have conquered a Mon-Khmer-speaking kingdom at Thaton, southeast of the modern capital Yangon (Rangoon), taking captives, Buddhist scriptures, and a generally more advanced culture to Bagan. The standard histories of Burma accept the story of the Mon conquest as factual. Professor Michael Aung-Thwin has suggested that the story was made up several centuries after the alleged event and has been wrongly adopted as fact by modern historians. This debate continues at conferences and in print.

The Repair Program

In 1975, a severe earthquake damaged many buildings at Bagan. UNESCO became involved in reconstruction. Since 1994, repairs have largely been funded by donations raised locally – something seen by many as an act that acquires religious merit. International participants in the post-earthquake repairs remain concerned about the direction the donor program has taken and the quality of the work. A cultural heritage conference was told in 2007 that "the utilisation of new materials and the indiscriminate use of concrete have contributed to falsifying to a considerable extent the existing monuments . . . the recommendations of UNESCO for the conservation of the masonry works and the paintings with the drawing up of a master plan went unheeded." In defense of the repair programme, Culture Minister Win Sein had said in 2001 that the objectives had been to satisfy the donors, to retain the original workmanship and design, and to make the buildings last longer. "These are living religious monuments highly venerated and worshipped by Myanmar people" he said, "it is our national duty to preserve, strengthen and restore all the cultural heritage monuments of Bagan to last and exist forever."

Cross-References

- ▶ Cultural Heritage Site Damage Assessment
- ▶ Disaster Response Planning: Earthquakes
- ▶ Statues and Monumental Art in Archaeology

Further Reading

Thaw, Aung. 1971. The 'Neolithic' culture of the Padah-lin caves. *Asian Perspectives* 14: 123–133.

Aung-Thwin, M. 1985. *Pagan: The origins of modern Burma*. Honolulu: University of Hawaii Press.

Aung-Thwin, M. 2005. *The mists of Ramanna: The legend that was lower Burma*. Honolulu: University of Hawai'i Press.

Bautze-Picron, C. 2003. *The Buddhist murals of Pagan*. Bangkok: Orchid Press.

Frasch, T. 1996. *Pagan; Stadt und Staat*. Stuttgart: Franz Steiner.

Gutman, P. 1976. *Ancient Arakan, with special reference to its cultural history between the 5th and 11th centuries*. Canberra: Australian National University.

Gutman, P. 2001. *Burma's lost kingdoms: Splendours of Arakan*. Bangkok: Orchid Press.

Gutman, P., and B. Hudson. 2004. The archaeology of Burma, from the Neolithic to Pagan. In *Southeast Asia: From prehistory to history*, ed. I. Glover and P. Bellwood, 149–176. Abingdon/New York: Routledge Curzon.

Houtman, G. 1999. Remaking Myanmar and human origins. *Anthropology Today* 15: 13–19.

Hudson, B. 2005. A Pyu Homeland in the Samon Valley: A new theory of the origins of Myanmar's early urban system. In *Myanmar Historical Commission Conference Proceedings*, vol. 2, 59–79. Yangon: Ministry of Education, Union of Myanmar.

Hudson, B. 2008. Restoration and reconstruction of monuments at Bagan (Pagan), Myanmar (Burma). *World Archaeology* 40: 553–571.

Hudson, B., and T. Lustig. 2008. Communities of the past: A new view of the old walls and hydraulic system at Sriksetra, Myanmar (Burma). *Journal of Southeast Asian Studies* 39: 269–296.

Luce, G.H. 1969. *Old Burma- early Pagan*. New York: Artibus Asiae and the Institute of Fine Arts, New York University.

Luce, G.H. 1985. *Phases of pre-Pagan Burma*. Oxford: Oxford University Press.
Moore, E. 2007. *Early landscapes of Myanmar*. Bangkok: River Books.
Movius, H.L. 1943. The Stone Age in Burma. *Transactions of the American Philosophical Society* 32: 341–394.
Pautreau, J.-P., A.-S. Coupey, et al. 2010. *Excavations in the Samon Valley: Iron Age burials in Myanmar*. Chiang Mai: Mission Archaeologique Francaise Au Myanmar.
Stadtner, D.M. 2011. *Sacred sites of Burma: Myth and folklore in an evolving spiritual realm*. Bangkok: River Books.
Stargardt, J. 1990. *The ancient Pyu of Burma: Early Pyu cities in a man-made landscape*. Cambridge: PACSEA.

Mytum, Harold

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Basic Biographical Information

Harold Mytum, an authority in the archaeology of early Christian Ireland, Iron Age Wales, and the mortuary monuments of the modern world, was born in 1955. Mytum's B.A. (1977) and M.A. (1981) were from Selwyn College, Cambridge, and his Doctorate (1984) from Keble College, Oxford; his doctoral dissertation topic was *Settlement and Economy in Early Christian Ireland*.

Before completing his Doctorate, Mytum was appointed James Knott Research Fellow in the Department of Archaeology at the University of Newcastle (1980–1982) and then Lecturer in Archaeology at the University of York (1982). He would remain at York for the next 25 years, serving as Head of Department between 1996 and 2001 and promoted to Reader in Archaeology in 1998; during his time at York, Mytum was instrumental in the growth of historical archaeology (in the American sense of the archaeology of the post-1500 period) within the department. Mytum left York in 2007 to become the Director of the Centre for Manx Studies within the University of Liverpool's School of Archaeology, Classics and Egyptology. He was a Council Member of the Society for Medieval Archaeology from 1988 to 1997 and was the Editor of the society's journal *Medieval Archaeology* from 1989 to 1997. Mytum has also been a Committee Member of the Society for Church Archaeology (2007–2008) and a Council Member of the Society for Post-Medieval Archaeology from 2011; he served as the latter's President from 2014 to 2017, subsequently serving a 3-year term as Vice President and demonstrating a keen interest in SPMA's history while holding these offices (e.g., Mytum 2016). Mytum was elected a Fellow of the Society of Antiquaries of London in 1987.

Major Accomplishments

Mytum's core research areas are diverse, and while there are arguably links between each of them (religion, particularly Christianity, linking his work in Ireland and postmedieval mortuary monuments; the late Iron Age and immediate post-Roman periods linking some of his work in Ireland, Wales, and the Isle of Man), the totality of his work offers no straightforward overall categorization, except perhaps in his willingness to apply theory-informed analysis to fields where theoretical approaches were previously often lacking and his geographical focus on the area bordering the Irish Sea. Mytum's book *The Origins of Early Christian Ireland* (Mytum 1992) was one of the first attempts to develop a theory-informed approach to the archaeology of early medieval Ireland. Initially criticized on publication for its overtly theoretical approach (e.g., Sharpe 1993), the book's subsequent standing has grown significantly as Irish archaeology has come to engage more deeply with theory.

In Wales, Mytum was the Director of the long-running Castell Henllys project at the namesake Iron Age and Romano-British hill fort in north Pembrokeshire (between Fishguard and Cardigan). This 20-year project ran from the

mid-1980s until the first decade of the twenty-first century (Mytum 2013). During this project's long life, Mytum developed a strong interest in experimental building reconstruction and public interpretation. The long-running training excavations at Castell Henllys, which encompassed Iron Age, Romano-British, and postmedieval sites, included students from the United Kingdom, Australia, Europe, and North America. Since becoming Director of the Centre for Manx Studies, Mytum has extended this research to the Isle of Man, so that his focus on the Iron Age and early medieval period now encompasses the entire Irish Sea region.

Since the early 1990s, Mytum has increasingly turned his attention toward the postmedieval period, with a particular focus on mortuary monuments and gravestones and latterly on the archaeology of internment and prisoner of war camps (e.g., Mytum 2017). Much of his work on mortuary monuments has focused on Wales and Ireland (e.g., Mytum 2002) but has also encompassed international comparative studies (Mytum 2006), guides to graveyard recording (Mytum 2000), and overviews of mortuary monuments and burial grounds (e.g., Mytum 2004). While Mytum has not been the only British archaeologist to study death and commemoration in this period, he has been at the forefront of a those seeking to not only make the British archaeology of postmedieval death and commemoration more theory aware but also to make British postmedieval archaeology more generally engaged with theory.

Cross-References

- ▶ British Isles: Medieval Archaeology
- ▶ Churchyard Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Internment and Prisoners of War in Historical Archaeology
- ▶ Medieval Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Tarlow, Sarah

References

Mytum, H. 1992. *The origins of early Christian Ireland*. London: Routledge.

Mytum, H. 2000. *Recording and analysing graveyards*, Council for British archaeology handbook. Vol. 15. New York: Council for British Archaeology.

Mytum, H. 2002. A comparison of nineteenth and twentieth century Anglican and nonconformist memorials in north Pembrokeshire. *The Archaeological Journal* 159: 194–241.

Mytum, H. 2004. *Mortuary monuments and burial grounds of the historic period*. New York: Kluwer Academic/Plenum.

Mytum, H. 2006. Popular attitudes to memory, the body, and social identity: The rise of external commemoration in Britain, Ireland, and New England. *Post-Medieval Archaeology* 40: 96–110.

Mytum, H. 2013. *Monumentality in later prehistory; Building and rebuilding Castell Henllys Hillfort*. New York: Springer.

Mytum, H. 2016. A short history of the society for post-medieval archaeology. *Post-Medieval Archaeology* 50 (1): 6–18.

Mytum, H. 2017. Commentary: Intimate memories and coping with World War II internment. *Historical Archaeology* 52 (3): 609–616.

Sharpe, R. 1993. The origins of early Christian Ireland. By Harold Mytum. *Early Medieval Europe* 2: 88–90.

Further Reading

Carr, G., and H. Mytum, eds. 2012. *Cultural heritage and prisoners of war: Creativity behind barbed wire*. New York: Routledge.

Mytum, H. 2003. The Vikings in Ireland: Ethnicity, identity and culture change. In *Contact, continuity and collapse. The Norse colonization of the north Atlantic*, Studies in the early middle ages, ed. J. Barrett, vol. 5, 113–137. Turnhaut: Brepols.

Mytum, H. 2007. Materiality and memory: An archaeological perspective on the popular adoption of linear time. *Antiquity* 81: 381–396.

Mytum, H. 2010. Ways of writing in post-medieval and historical archaeology: Introducing biography. *Post-Medieval Archaeology* 44: 237–254.

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Nabta Playa: Agriculture and Domestication

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Introduction

Nabta Playa is an ancient ephemeral lake and prehistoric archaeological site located in southern Egypt (Wendorf and Schild 2001; Fig. 1). Although the modern Nabta region is barren and lacks surface water due to its extremely arid climate, there was enough rainfall during antiquity to support a shallow 1,500 km^2 lake and to sustain a savannah grassland and various human activities. Extensive excavations in the region of Nabta have yielded valuable insights regarding the local Late Stone Age – Neolithic culture – and the climate change that caused desertification in this part of Saharan North Africa during the Late Holocene (e.g., Wendorf and Schild 1980, 2001 and references therein).

Key Issues/Current Debates/Future Directions/Examples

The archaeological, paleobotanical, and paleontological records near Nabta enable reconstructions of the critical adaptations and transitions from foraging to food production, domestication, and the practice of animal husbandry (Close 1987). Sites in the area preserve prehistoric dwelling structures, storage pits, wells, and various artifacts preserved in stratified contexts, including characteristic tool assemblages and microliths, decorated pottery and plainware, grinding tablets, and ostrich eggshell beads. More than 100 published radiocarbon dates constrain the occupation during wet phases and the timing of intervening droughts when arid, harsh conditions caused abandonment (Nicoll 2001, 2004; Fig. 2). Interpretation of the material culture suggests that the Neolithic people at Nabta developed more elaborate traditions and practices with increasing social complexity over time (Close 1987; Wendorf and Schild 1998, 2001).

Activities at Nabta commenced around 11,000–9,300 cal BP. The people appear to have herded cattle, but there is intense debate about whether the *Bos* varieties discovered in the excavations were domesticated (Wendorf and Schild 2001). It has been proposed that Nabtans might have regarded their cattle as economic units of social status and prestige, like some modern pastoralists in Africa that herd animals for a regular supply of milk and blood (Close 1987). However, these assertions are speculative, and such ethnographic analogues may not be relevant for reconstructing the Neolithic.

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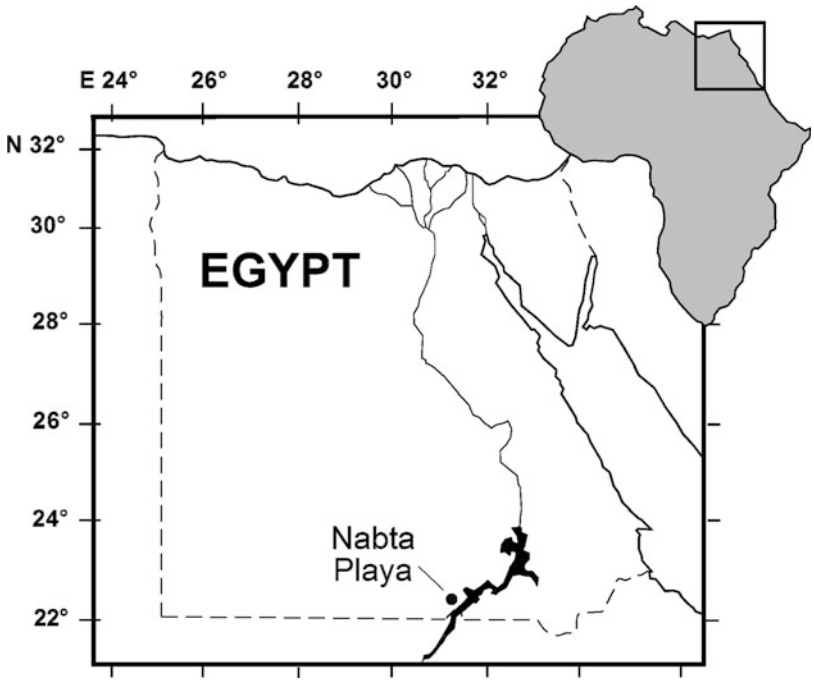

Nabta Playa: Agriculture and Domestication, Fig. 1 Location of Nabta Playa in southern Egypt, approximately ~100 km west of the Nile River Valley and 50 km north of the Sudan border

ka cal BP	ka 14C BP	Geologic Time			Cultural Associations, Variant Typologies, and Notable Events after Nicoll (2001, 2004) and Wendorf et al. (1990, 2001).				Local Enviromental Changes, S. Egypt
0	0	QUATERNARY PERIOD	Late Holocene	Historic	Islamic Period Byzantine Period Graeco-Roman Period Pharaonic Kingdoms			first camels appear Dynastic apex Old Kingdom collapse Nile valley population boom "Exodus" from desert megalithic alignments, stone cirles	hyperarid pervasive droughts wind deflation refugia estabilshed arid period; low Nile
1	1								
2	2								
3	3								
4	4		Middle Holocene		Predynastic		***Bunat El Ansam*** **"Megalith-Builders"**		less surface water storage and vegetation
5	5					Late			
6	6						***Ru'at El Baqar*** **"Cattle-Keepers"**	cattle burials nomadic pastoralism	aridification
7	7				Neolithic	Middle	***Ru'at El Ghanam*** **"Sheep-Herders"**	1st villages, ceremonial centres sedentism caprovids	aeolian activity droughts
8	8		Early Holocene	Prehistoric			***El Jerar*** ***El Nabta***	bladelet technology; microliths	lakes filled; maximal vegetative cover
9	9					Early	***El Ghorab*** ***El Adam***	ferst cattle & pottery use of wild millet, legumes opportunistic pastoralism	transition to more rainfall & humid conditions
10	10								
11	11		Late Pleistocene		Late Palaeolithic-Middle Stone Age			flake technology	arid conditions aeolian activity
12									
13									
14									
15									

Nabta Playa: Agriculture and Domestication, Fig. 2 Major variants (italicized) and cultural transitions described at Nabta Playa and the surrounding region, modified after Nicoll (2004, 2012) and references therein

A drought caused the desiccation of Nabta Playa after 9,300 cal BP and forced people to migrate to areas with more water, causing consequent population increases along the Nile River Valley and other areas (Nicoll 2012). The people returning to Nabta after 9,000 years ago established larger settlements in which the huts were arranged in straight lines, and large, walk-in water wells were dug. The numerous grinding stones around Nabta suggest that cereal foods were consumed. More than 20,000 carbonized plant remains from 127 species were recovered from the excavations, including 10 tree and shrub varieties that are common in the Sahel and require 100–200 mm of rainfall per year. Paleobotanical remains included a number of edible plant foods, including variants of wild millets, sorghum, legumes, tubers, and fruits. Preserved bones of small animals (e.g., hares and gazelles) near the dwellings indicate that meat was part of the local sustenance. By ~8,800 cal years ago (~7,800 BP, uncalibrated), pottery was produced locally (Wendorf and Schild 2001, and references therein).

Between 8,000 and 7,000 years ago, Nabta Playa became dry and was abandoned during two major drought periods bracketed by radiocarbon dates. As hyperarid conditions developed, the water table dropped, the savanna grassland diminished, and wind deflation intensified, creating impossible living conditions. The people returning to Nabta after these droughts abated forged a more complex and organized society. The archaeological remains suggest the Nabtans practiced a ritualistic belief system associated with livestock. Excavated items supporting this inference include sacrifices of young cows, and their burial in clay-lined and roofed chambers marked with overlying stone slabs. The inhabitants of Nabta also constructed ~25 complex building structures with surface and subterranean features, including storage pit chambers and a shaped stone that might possibly represent the oldest sculpture in this part of Egypt (Nicoll 2012 and references therein).

Another significant find in the Nabta region is a Late Neolithic cemetery. Excavators discovered more than thirty graves, containing the remains of 69 individuals in all. Some of the graves had multiple and symbolic burials, and there were also two secondary burials, in which the skeleton eye sockets were filled with teeth (Kobusiewicz et al. 2004). A series of furnished graves date to 6,400 and 6,000 uncalibrated radiocarbon years BP. Associated grave goods – including carnelian beads, shell bracelets, polished stones, pottery, ochre, needles, stone tools, and carved figures – demonstrate that the Nabtans had trade connections across the region. The interpretation that these people practiced transhumance is substantiated by the graves containing offerings of disarticulated cattle and caprovid (e.g., goat, sheep) bones. Some evidence dating to ~8,100 years ago suggests the domestication of larger animals, goats, and sheep and development of animal husbandry, but these are controversial interpretations (Wendorf and Schild 2001).

The Nabtans erected monuments and megaliths made of large stone slabs, and these are thought to be among the oldest ceremonial centers and astronomical calendars found in this part of Africa (Wendorf and Schild 2001). Many of these structures involve large worked stones known as stelae or tumuli and are arranged on the landscape as mounded complexes, bedrock carvings located below the ground surface, semicircles, and linear orientations. Within the monuments, butchered cattle, goats, and sheep bones have been found, and these are interpreted as animal offerings. One tumulus site dating 7,400 years ago contained sacrificial remains of a calf buried in an elaborate chamber covered with tree branches (Wendorf and Schild 2001).

As drought conditions worsened around Nabta, water sources dried up, and the grassland disappeared ~6,000 year BP; the area was inhospitable after 5,300 years ago (3,350 BCE). Around 4,780 BP, hyperaridity prevailed, and the Sahara became established. This profound environmental change precipitated migration – an "Exodus event" in which humans left desert locales for more reliable water sources. As the

Nabtan and desert peoples relocated, they inevitably contributed their own culture and beliefs to the birth of ancient Egyptian religion and the Pharaonic civilization, which was organized around irrigation agriculture within the overpopulated Nile River Valley (Nicoll 2004, 2012).

Cross-References

- ▶ Cattle: Domestication and Development
- ▶ North and Saharan Africa: Geography and Chronology
- ▶ North and Saharan Africa: Geography and Culture During the Lower Stone Age

References

Close, A.E., ed. 1987. *Prehistory of arid North Africa*. Dallas: Southern Methodist University Press.

Kobusiewicz, M., J. Kabaciński, R. Schild, J.D. Irish, and F. Wendorf. 2004. Discovery of the first Neolithic cemetery in Egypt's western desert. *Antiquity* 78: 566–578.

Nicoll, K. 2001. Radiocarbon chronologies for prehistoric human occupation and hydroclimatic change, Egypt and Sudan. *Geoarchaeology: An International Journal* 16: 47–64.

Nicoll, K. 2004. Records of recent environmental change and prehistoric human activity in Egypt and northern Sudan. *Quaternary Science Reviews* 23: 561–580.

Nicoll, K. 2012. Geoarchaeological perspectives on Holocene climate change as a civilizing factor in the Egyptian Sahara. In *Climates, landscapes, and civilizations*, Geophysical Monograph series 198, ed. L. Giosan, D.Q. Fuller, K. Nicoll, R.K. Flad, and P.D. Clift, 157–162. Washington, DC: American Geophysical Union. https://doi.org/10.1029/2012GM001219.

Wendorf, F., and R. Schild. 1980. *Prehistory of the eastern Sahara*. New York: Academic.

Wendorf, F., and R. Schild. 1998. Nabta Playa and its role in northeastern African prehistory. *Journal of Anthropological Archaeology* 17: 97–123.

Wendorf, F., and R. Schild. 2001. *Holocene settlement of the Egyptian Sahara, volume 1: The archaeology of Nabta Playa*. New York: Kluwer Press.

Further Reading

Close, A.E. 1990. Living on the edge: Neolithic herders in the eastern Sahara. *Antiquity* 64: 79–96.

Malville, J.M., F. Wendorf, A.A. Mazar, and R. Schild. 1998. Megaliths and Neolithic astronomy in southern Egypt. *Nature* 392: 488–491.

Rice, M. 2003. *Egypt's making. The origins of ancient Egypt 5000–2000 BC*. London: Routledge.

Nam, Sylvia

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Basic Biographical Information

Sylvia Nam is an Assistant Professor in the Department of Anthropology at the University of California, Irvine. She was a University of California President's Postdoctoral Fellow in the Department of Anthropology at the University of California, Riverside. She received her Ph.D. in City and Regional Planning with a designated emphasis in Global Metropolitan Studies from the University of California, Berkeley.

Major Accomplishments

Her work has been supported by the Fulbright Institute of International Education, and the University of California Office of the President.

Cross-References

- ▶ Authenticity and the Manufacture of Heritage

References

Nam, S. 2011. Phnom Penh from the politics of ruin to the possibilities of return. *Traditional Dwellings and Settlements Review* 23 (1): 55–68.

Naples, Byzantine Dukedom of (Centuries VI–IX)

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State of Knowledge and Current Debates

The history of Naples can be written thanks to a large number of documents that were saved and

recopied across the sixteenth to nineteenth centuries by many erudite scholars of heraldry and antiquities. These people, in searching for the ancient splendor of Naples, wrote monumental books on their native city. Even if those books are often unreliable, they still allow us to use information in written and material sources which is otherwise lost. Bartolommeo Capasso (1815–1900) can be considered an heir but also a brilliant renewer of this long tradition. Between 1881 and 1892, he wrote three famous and essential books containing the whole *corpus* of sources concerning the Dukedom of Naples, titled *Monumenta ad Neapolitani Ducatus historiam pertinentia*, which data were finely organized and commented by Giovanni Cassandro in his *Il ducato bizantino* (1969), surely the most comprehensive research on the theme.

Over the last 30 years, the most interesting contributions concerning Naples in the High Medieval Ages have come from archaeology through new excavations or reinterpretations of old ones (i.e., new facts about the Neapolitan port, the coast of Campania, the episcopal area). This is why a partial reconsideration of the Byzantine ages in Naples, the weakest part of even the most detailed research on the Dukedom, seems to be necessary.

Political History

The Dukedom of Naples was a province of the Byzantine Empire between the sixth and twelfth centuries. When it was conquered by the Normans (1139–1140), the Dukedom's territory included only the city of Naples and its hinterland. The dominion, however, had acquired its political independence since the middle of the ninth century, when its formal dependency on Constantinople was preserved to legitimize the creation of a hereditary state (Gay 1980: 225).

Born as Greek Cumae's colony, the ancient Naples developed on two different sites: the former of Parthenope (eighth century B.C.), seated on Pizzofalcone Hill and the island of Megaris (also known as Macharis, *Insula maris* or *Insula Salvatoris*, a place once attached to the mainland, while nowadays it is occupied by Castel dell'Ovo); the latter of *Neapolis* (sixth century B.C.), located away from the coast on Parthenope's left side. About two centuries later, *Neapolis* moved under Roman political influence and jurisdiction. From the fourth century B.C. to 476 A.D., it was a Roman city. After the fall of the Roman Empire, it passed through the reigns of Odoacre (476–493) and Theodoric (493–526) and his successors, enjoying the favor of the Goth government.

Loyal to the Goths, Naples was conquered for the first time by the Byzantine army led by Belisarius in 536 (Proc. *Bell. Goth.* I, 8–10 = Haury and Wirth 1963). According to some sources, the Byzantine soldiers devastated the city and decimated the population. This could be the reason why Naples was repopulated by people coming from villages and cities of Southern Italy, Sicily, and Africa. Perhaps something similar happened then or later. In any case, this tradition cannot be entirely accepted because the sources related to the event are dated, unreliable, or partisan. Moreover the elements handed down by those sources seem to be *tòpoi* because they are often connected to other war events of Neapolitan medieval history (Duchesne 1886: 290; Land. Sag. *Hist. Rom.* XVIII, 15–16 = Crivellucci 1968: 45–46; Burgarella 1988: 319; *Cron. di Part.* 49–50 = Kelly 2011: 232–238). Around 543 the Byzantines lost Naples. The city was conquered by the new Goth King, Totila. Only at the end of the Gothic War, Naples passed again to the authority of Constantinople which organized Italy, the new province of the Empire, according to the *Pragmatica Sanctio pro petitione Vigilii* (554).

The Byzantine authority over the whole Italy ended around 568–571, when the Longobards occupied more than a half of its territory (Pavia, Spoleto, Benevento). This pushed the Byzantine Emperor Maurice (582–602) to rearrange the Empire's Western provinces. The traditional separation between military and civil powers imposed by Diocletian and Constantine (third–fourth centuries) – a formal principle until the time of Justinian (527–565), even if it was often not observed – was thereby replaced by a new administrative organization, the Exarchate, according to which the military power and its

official, the Exarch, were imposed on the apex. Around 584–591 the Exarchates of Italy and Africa were created: the former based in Ravenna and the latter in Carthage. The political map of Italy had been changed. Under the control of the Exarchate of Ravenna were organized a series of Dukedoms, including the one of Naples. Sicily and Sardinia were not part of this system, because the former was connected directly to Constantinople and the latter to the Exarchate of Africa (Diehl 1888: 3–79; Burgarella 1988: 273–280).

The *dux* or *magister militum* was imposed on the apex of local Dukedoms. At the beginning the *dux* was charged only with military power. During the first decades of the seventh century, the *dux* progressively gained both military and civil powers, replacing the civil governor, *iudex provinciae*, that was suppressed. The last *iudex* mentioned in a source (625–638) is the *iudex Campaniae* (Kehr 1935: (8) 420). An *officium* composed of a plethora of officers was also established, and among them were *tribuni* and *comites*; these military commanders were established in *castra* and *civitates* (Diehl 1888: 3–79). The Roman curial system on the other hand failed, even if some of its delegates are still mentioned in the seventh century. Many of the tasks that used to be managed by *curiales*, especially poverty support policies and tax collection, were mainly managed by the Roman Church and the different local dioceses (Bozzarello 2015: 47–65).

At the beginning of the Exarchate, local *duces*, and other local officers, were chosen by the Exarch. From the second half of the seventh century, instead, *basileus* replaced the Exarch by choosing himself the new *duces* or just confirming the election carried out by different local soldiers. Naples was the first province in which this new system was adopted. The *Dux* Basilius (661–666) was ordered or ratified by *Basileus* Constans II (641–668) from Constantinople (Fedele 1903: 567). This operation was part of the whole Italian province rearrangement policy managed by the Armenian Emperor during his long journey in Italy (663–668), where he introduced the elements on which the future *basileus* Justinian II (685–95; 702–711) and Leo III (717–741) built the Theme of Sicily (692–695) and adopted the fiscal reform (731/732). In the new system arranged by Constans II, Sicily became the center of the Southern Italian administration. From this time the ancient region *Brittiorum*, known nowadays as Calabria, and the actual Salento or Terra d'Otranto, the region known across Antiquity and Late Antiquity as Calabria, became closely connected to Sicily (Burgarella 1988: 301–304). No evidence can prove the same thing for Naples, which was probably connected to the island at a later time (692/695 or 751). In the Naples of Basilius, where Constans II was twice in 663, the *Basileus* allegedly established new Byzantine regular troops (Paul. Diac. *Hist. Lang.* V, 12 = Zanella and Luiselli 2014: 438) and introduced the Neapolitan Mint, which occasionally worked (Pavini Rosati 1982: 665).

The political significance of Naples, designed by Constans II, became more relevant under the reign of Leo III, who transformed it into an archiepiscopal and autocephaly city, independent from Rome. This gave it an important role in the rearranged policy of the Southern Italian ecclesiastical geography (Waitz 1878: 422). In this case, Naples' political survival was only guaranteed by Stephen II, duke (755–767/768) and then bishop (768–800). Who, following his strong and clever opponent, Arechis II of Benevento (758–787), supported an intelligent policy of variable alliances. Indeed, Stephen II confirmed the civil authority of Byzantium on Naples through the seizure of the pontifical *latifundia* there located and the ecclesiastic authority of Roman Church on Neapolitan diocese and its bishop through a strong latinization of civic spirituality (Waitz 1878: 425–427; Fedele 1903: 570).

Moreover Stephen, who had imposed as dukes his sons and his son-in-law, had tried to build a dynastic dominion, but his system collapsed a few years after his death. Only under the *Dux* Sergius (†864), this political system was finally imposed, and the problems related both to the right of succession and to its legitimacy were definitely solved (Waitz 1878: 431; Fedele 1903: 571).

Territory, Borders, *Castra*, and *Civitates*

After the Longobardic invasion of Benevento (570), the borders of the Byzantine Campania together with the Dukedom of Naples were established by Lago di Patria in the North and Sele river, near to Salerno, in the South. *Terra Laboris* or *Liburia*, Acerra, Nola, and Nocera were the Eastern borders of the Neapolitan dominion, while the islands of Ischia, Procida, Capri, and Nisida marked its maritime and Western borders. In 593–594 the Longobards took Capua and then Salerno in 640. Gaeta had gained its independence from Naples in the second half of the eighth century. That example was followed in the ninth century by Amalfi and Sorrento. Around the tenth–eleventh century, the Neapolitan Dukedom's borders were set not too far from its capital.

Naples was protected by its strong position, reinforced by powerful walls. Recent archaeological studies have shown the different building steps of the walls: built in fourth–fifth B.C., it was restored for the first time in the fourth–third century B.C. by doubling (Boetto et al. 2010: 115) and for the second time in 440 A.C. by Valentinian III, Augustus of the Western part of the Empire (*CIL* X 1485). This is the reason that Naples seemed to be and really was almost unassailable by the Byzantine soldiers led by Belisarius, who managed to enter into the city by passing through an aqueduct breach (Proc. *Bell. Goth.* I, 10 = Haury and Wirth 1963). In 543 Totila took Naples by starving the people. Because of fear that the Byzantines could try a new siege of Naples to reconquer such a strong emplacement, he demolished part of the city walls (Proc. *Bell. Goth.* III, 8; Haury and Wirth 1963).

According to a late version of events (ninth century), the city walls had been reinforced by Belisarius, who added seven magnificent towers. Then, under the authority of Narses (555–568), who ordered the extension of Naples toward the sea, walls were built as far as the coast, where he ordered a ship's storage area to be built (*Vita s. Athanasii* I, 15–18 = Vuolo 2001: 116–117). In my opinion, this version of events is partially reliable. During the whole of the Middle Ages, the Neapolitan city walls were far away from the coast. They were separated from the coast by another fortified area called *Castellione nobum*, probably built in the tenth century (Feniello 1991: 175–179). Building cities far away from the coast, however, was common for the Byzantines. For example, the anonymous military treatise known as *De re strategica* or *Peri strategikès* (Dennis 1985: 32–37), written in the sixth century, in its chapters concerning cities and building techniques, recommends to build city walls of about 4 m height, between 18 m and 62 m away from the coast. Therefore, in my opinion, the anonymous hagiographer wrongly ascribed to Narses the huge public building (=*firmissimum aedificium*) near the Neapolitan harbor and connected to commercial uses a building that, as archaeologists have shown, was built in the seventh century (Giampaola et al. 2005: 47–91; Giampaola and Carsana 2010: 119–132). The same hagiographer ascribed to Narses the introduction of the city customs in Naples: an office that is attested to in Naples by proofs dated not before 1018, even if it was created in the Byzantine Empire under Justinian (Capasso 1881–1892: (377) 235–236).

From the Late Antiquity, a period of decadence began for Puteoli. Its acropolis became smaller, and even its port, which had been prosperous and active for centuries, was inactive (Schmiedt 1978: 171–172; Varriale 2004: 299). According to Procopius (Proc. *Bell. Goth.* I, 11 = Haury and Wirth 1963), during the Gothic War, Naples and Cumae were the only two fortified towns in Campania, and both were controlled by Byzantine garrisons. As well as Naples, after 543, even Cumae felt under Gothic control. Toward the last years of the war, the *castrum* was chosen by Aligern, Teia's brother, and his soldiers as a safe shelter for the royal treasure. Seated along Campania's coast on a step hill, Cumae had powerful walls and a strong geographical position (Agathias *Hist.* I, 8 = Keydell 1967: 19–20). That is the reason why Cumae was inviolable for the Byzantines, even when they demolished the Southern side of the walls, and Narses could gain the *castrum* only because Teia voluntarily surrendered.

It is highly probable that Narses ordered the fortifications to be rebuilt when the war ended. Recent archaeological excavations have shown

that during the sixth–seventh centuries, Cumae was an important Byzantine military base, almost abandoned by the civilian population (Caputo et al. 2012: 103–119). The partial depopulation of Cumae (Greg. Mag. *Reg. Epist.* IX, 143 = Recchia 1996–1999: 320–323) is allegedly the reason that Gregory the Great (590–604) ordered that his diocese be joined to Miseno in 592 (Greg. Mag. *Reg. Epist.* II, 37 = Recchia 1996–1999: 328–331). The independence of the diocese of Cumae was not restored before 649 (Kehr 1935: 469), and it is allegedly related to a steady rebirth of its civic life.

The strong maritime position of Cumae should be the reason it was invaded by the Longobardic troops of Romualdo II of Benevento (716/717), who were looking for a maritime passageway. The Longobard seizure was short. The reaction of the Neapolitans was almost immediate, and Cumae was reconquered by the *Dux* John (711–719), who was richly funded by the Roman Church with 70 pounds of gold (Paul. Diac. *Hist. Lang.*, VI, 40 = Zanella and Luisella 2014: 524–527; Duchesne 1886: 400–401; Waitz 1878: 422; Kehr 1935: (1–2) 471). This military operation was probably necessary because of the failure of a previous military operation by the Byzantine Navy led by Conon, the future *Basileus* Leo III, who, according to some isolated Eastern sources, had been in Campania in 715–717 (Gero 1973: 30; Burgarella 1988: 317–318).

Cumae was sacked by the Saracens in 915 and then definitively destroyed by the Neapolitans in 1207. The diocese of Cumae was divided between Naples and Aversa (Vitolo 1990: 79).

Connected to Cumae is the history of the close *castrum* of Miseno. Ruled by a Byzantine *comes*, Miseno had been fortified before November 589, but the *castrum* already needed to be restored in 599 (Greg. Mag. *Reg. Epist.* IX, 53; IX, 65; IX, 122 = Recchia 1996–1999: 182–185, 198–199, 286–287). In this case, the building expenses were partially supported by the Roman Church, who were concerned with protecting both the local bishop and the rich part of *Patrimonium sancti Petri* located between Cape Miseno and Nisida. Miseno, moreover, seemed to be really important for the Papacy, because this port was on the maritime route which linked Rome to Sicily, the pontifical granary (Greg. Mag. *Reg. Epist.* IX, 145 = Recchia 1996–1999: 322–325). As new archaeological studies have recently confirmed, at that time Miseno was an important economic center, which can be described as a manufacturing and exporting site (De Rossi et al. 2010: 487–495). The history of Miseno ended in 846, when it was destroyed by the Saracens. From that time its diocese was joined to the Naples diocese (Waitz 1878: 432–434).

During the High Middle Ages, the area Cumae-Miseno was Naples' maritime and land route to Rome. The main reason for this strategical arrangement was related to the Longobardic invasion of Capua, a city in which several Roman streets had their junction. Naples moved to Cumae-Miseno the ancient functions of Capua. This has recently been confirmed by archaeological studies, which have shown how this area was closely connected to Naples in the seventh century, in particular to its port through the Roman via *per cryptam*, a street that had been modified in order to respond to the new economic needs of medieval mobility (Giampaola et al. 2005: 47–91; Giampaola and Carsana 2010: 119–132).

Concerning the minor Neapolitan *castra*, mention should be made of the small *castrum* or *castellum Lucullanum*, which nowadays corresponds to the area between Municipio Square, Pizzofalcone, and Castel dell'Ovo. This place took its name from the Roman Senator Lucius Licinius Lucullus, owner of a magnificent residence located in the area which was turned into an imperial residence later on. *Castrum* was only built in the fifth century. Here in 476 the last Roman Emperor Romulus Augustulus was exiled with a considerable 6000 *nomìsmata* or *solidi* revenue. Here, some years later (492–495/496), the exile Saint Severinus' (†482) monastic community (Eugippius *Vita sancti Severini* 46, 1–6 = Genovese 2012: 128–131) was welcomed in grand style by the Neapolitans. The community was settled in the Monastery of St. Severinus in *Lucullanum*, one of the biggest cultural centers of the Middle Ages, famous all over Europe for both the Saint's relics and its active *scriptorium* (Bozzarello 2015: 61).

During the Middle Ages, the *castrum Lucullanum* was mainly characterized by monastic settlements. Most of the monks here were cenobites, who lived in a monastery. A few hermits lived in the *castrum* as well, but during the ninth century, they became cenobites under Saint Bishop Athanasius I (849–872), who organized them in the new Monastery of St. Salvatore *in Insula maris* (*Vita s. Athanasii* IV, 35–40 = Vuolo 2001: 128–129).

In September 902 the Neapolitan authorities, *Dux* Gregory IV (989–915) and Bishop Stephen III (898–906), ordered the demolition of the *castrum*, already almost uninhabited, because they feared that the Muslim invaders, led by the Emir of Ifriqiya Ibrâhîm II ibn Ahmad, wanted to capture the place in order to turn it into a strategical base to attack Naples (Capasso 1881–1892: (1) 1–4). The military aspects of this operation were useless because the Muslim invasion was stopped by the death by dysentery of the Emir at Cosenza in October 902, and the soldiers left Southern Italy in retreat (Talbi 1966: 526–530). The few inhabitants of *castrum*, mainly monks, had already been moved into Naples, where they would have been well defended by the strong city walls. Therefore the old Monastery of St. Severinus *in Lucullanum* was abandoned, and its monks were moved into the Monastery of St. Severinus *in vico Missi*, then known as Monastery of Sts. Severinus and Sosius (about 930) and nowadays the location of the Public Archives of Naples (Capasso 1881–1892: (1) 1–4, 169; Kehr 1935: 457–459).

Despite its destruction, however, the *castrum* was not totally abandoned. Documents attest to some inhabitants in the tenth century and afterward. For example, the presence of some monks living in the *Insula Salvatoris* in the tenth century has been documented (Pertz 1848: 344). It's highly probable that the source refers to the Monastery of St. Salvatore *in Insula maris*, where some monks lived until 1132 before moving to other places (Kehr 1935: 462). But these are isolated proofs. From the tenth century, the *castrum* was mainly managed by some Neapolitan monasteries as an economic district, in which especially fishing was developed.

Ports

The port of Miseno, an ex Roman Navy port, during the Late Antiquity, was well connected to Rome. Cumae and Puteoli were totally or partially inactive during the same age. In the maritime Neapolitan system, the other minor ports, for example, Nisida (located near Miseno), Castellammare di Stabia, and Sorrento, had little importance. The main ports in Campania were Amalfi (ninth–tenth centuries) and Salernum (tenth–eleventh centuries, which had almost a monopoly over the Mediterranean trade; but at the time of their power, these ports were already not included in the Neapolitan borders.

The golden age of the port of Naples began under the Norman Kingdom. Its port, however, was active and important even in the High Middle Ages, and it was well connected to the East, especially to Alexandria (Greg. Mag. *Reg. Epist.* X, 21 = Recchia 1996–1999: 566–573).

Since the sixteenth century, Neapolitan erudites and historians have been involved in searching its locality, but only in the nineteen century, the first well-founded but partial hypotheses on this issue were provided by some scholars. New archaeological studies, related to excavations carried out on the Underground Line 1 area, have shown that, between the centuries fourth and third B.C. and fifth A.C., the port of *Neapolis* was located in today's Municipio Square. This place, however, was abandoned in the fifth century because of the formation of a lagoon. In the later sixth century, the port was moved to the new coastal stretch corresponding to the present Bovio Square, where it was settled for the whole Middle Ages (Giampaola et al. 2005: 47–91; Giampaola and Carsana 2010: 119–132).

According to Bartolommeo Capasso, the first scholar who located a port section in Municipio Square, the port of Naples was divided in two different basins separated by a strip of land. Capasso believed that the first and bigger basin, *Portus de illu Vulpulum*, was located in the present area formed by Castel Nuovo, Municipio Square, and Medina Street, while the second one, *Portus de illu Arcina*, smaller than the

other, was used by the Normans as a navy yard and located in the present area formed by Porto Street and Maio di Porto (Capasso 1881–1892: (377) 235–236). *Vulpulum* and *Arcina* were allegedly two sections of a whole port, not two portal basins. Whatever the real portal structure might be, Capasso has described the particular situation existing in 1018, when the document concerning the port was written. A document written in 839, instead, talks only about a «*portum Neapolim*», where Constantine, «*ypatus castri Kaietani*», would have sent 10 *modii* (=about 441 lb or 200 kg) of wheat to his sister Elizabeth and his nephew Theodore (Capasso 1881–1892: 263–264).

In 1018 the maritime city customs, managed by John Atalaricus, were connected to the Neapolitan port (Capasso 1881–1892: (377) 235–236). John Atalaricus is related to the famous suit brought by him against Pancratius, the Sts. Sergius and Bacchus' abbot. According to a privilege granted by the Neapolitan *Dux* John (allegedly in 999?), Pancratius refused to pay the import and export duties to Atalaricus. Sts. Sergius and Bacchus' privilege was recognized by the civic court once in 1018 and twice at the end of the eleventh century, when another Atalaricus led the city customs, almost as if customs were a family inheritance. This last information implies that even the city customs were one of the ex public offices subcontracted by *duces* to increase the public revenue. In my opinion, it is certain that the *Atalarici* were formally heirs of the Byzantine *kommerkiarios* or *parathalassites*, the customs officers in charge of collecting maritime duties. A *parathalassites* of Palermo is mentioned in a Greek inscription (1081) discovered in Sicily. According to Helene Ahrweiler, who has stressed the importance of this proof, the inscription shows that a Byzantine customs had been established in Palermo (Ahrweiler 1961: 245). But in the meantime, this proof is the reason that the presence of a maritime customs in Naples can be hypothesized for the Byzantine age. When the Neapolitan port was one of the main Byzantine ports in the Southern Italy, it was often chosen as a landing site by imperial dignitaries and ambassadors coming from Constantinople (Gundlach 1892: (17) 515, (58) 583–584, (82) 615–616).

Patrimonium Campaniae

The *Patrimonium Campaniae* was a part of the whole *Patrimonium sancti Petri*. Before the twelfth–thirteenth centuries, the *Patrimonium sancti Petri*, named by Byzantine sources as Saints Peter and Paul's *Patrimonium*, indicated the *latifundia* owned by the Roman Church: the expression, in short, meant patrimonial and not political control exercised by popes over those territories. It was a formal distinction, because from the eighth century, the Roman Church started to exercise a real political control over her *Patrimonium*.

The *Patrimonium sancti Petri* originated from the donations made by the Emperor Constantine to each church founded by him. From the sixth century, those properties were unified, and the new whole *Patrimonium* was moved under the pontifical control. During the age of Gregory the Great, *latifundia* of the *Patrimonium* were mainly located among Central and Southern Italy, Sicily, Sardinia, and Corsica. The same pope managed a new strongly centralized system to control the whole *patrimonium* which was divided into smaller local and regional *patrimonia*, composed of smaller properties called *massae* and *fundi*. Every single *patrimonium* was managed by a *rector*, an officer chosen by the pope and subject to him.

The first officer known for the *patrimonium Campaniae* is the *defensor* Constantine (558–560). The *rector* Theodimus is known in the eighth century, and he took part in John's siege of Cumae (716/717).

In my opinion, relevance of the *Patrimonium Campaniae* increased in the new Gregorian system. In September 591 the Neapolitan Bishop Demetrius had been already overthrown by Gregory (Greg. Mag. *Reg. Epist.* II, 3 = Recchia 1996–1999: 276–279), who, in Campania and elsewhere, often employed a sort of modern spoils system. Between 591 and 592, Gregory replaced the *rector* Anthemius (591; 594–603) with the Subdeacon Peter, a person identified by scholars with the famous homonym mentioned in the Gregorian *Dialogi* (Pietri and Pietri 2000: 1762–1771). Probably the troubles connected to

the political instability of that area, often vulnerable to Longobard assaults (581–591/592), and the weakness of the new episcopal vicarious, Paul of Nepi, chosen by Neapolitans as Demetrius' substitute, led Gregory to move his loyal and strong Peter (592–593) into Naples from Sicily. Peter could manage that situation better than both Anthemius and Paul. An improvement of the military situation, at least for Naples as *rector*'s headquarters, and a new stronger bishop, Fortunatus (593–600), led Gregory to recall Anthemius and replace Peter (Greg. Mag. *Reg. Epist.* IV, 31 = Recchia 1996–1999: 76–79).

Around the sixth–seventh centuries, the *Patrimonium Campaniae* located in the Dukedom of Naples was composed of the following: the «*possessio insula* cum *castro*», that is Nisida, the income of which was 80 *solidi*; the «*insulam Meseno* cum *possessiones ad eandem insulam pertinentes*», that is Cape Miseno, whose income was 810 *solidi*; and the «*possessio Macari*» (=the island of Megaride), in *castrum Lucullanum*, whose income was 150 *solidi* (Duchesne 1886: 170–187). Some other properties are attested in 719–731: the island of Capri, with the monastery of St. Vincentius and its jurisdiction; the monastery of St. Pancratius «*situm extra castrum Mesenate*»; the hamlets of Castromaiore and Ninfise (=*Nymfulas*?) located «*infra insulam Capris patrimonii Neapolitani*»; and «*lacum q. d. Iacaonia ex corpore patrimonii Campaniae Neapolim*». These last mentioned *latifundia* are known through the pontifical letters which document the rent paid to the Neapolitan *Dux* Theodorus (719–729) and a certain *religiosa diaconissa* Matrona (Kehr 1935: 429). The reason for this choice is unknown. It's highly probable that in the eighth century, the Papacy was unable to guarantee a profitable management of those properties and their rent was considered the most convenient economic solution.

Naples: Cathedrals and Episcopal Area

During the High Middle Ages, the episcopal area of Naples was a large architectural complex composed of a group of different buildings, often connected to each other. The main buildings of this area were the two cathedrals, Santa Restituta and Stephania, and this is why Naples has often been described by scholars in the improperly named «double cathedral» model. This complex was almost completely demolished between 1294 and 1314, when the new cathedral of Madonna Assunta was built by the Angioinian kings. In any case, some recent archaeological studies, centered on a reinterpretation of excavations carried out at the beginning of twentieth century, have shown how the episcopal area was allegedly organized during the High Middle Ages.

The episcopal complex was built between the fourth and fifth centuries in a residential area inhabited from the Greek age. The new use of the area caused its depopulation, so many old buildings were redeployed as religious buildings. According to the legend, the first cathedral of Santa Restituta was built under the reign of Constantine, at the beginning of the fourth century. But this version cannot be considered. Archaeologists have proved that Santa Restituta was built not before the fifth century. The same scholars have also discovered that in front of the church or at its side, there was a magnificent and large courtyard which allowed the different buildings of the area to be connected to each other. This courtyard can be identified with the courtyard discovered in the excavations of the episcopal *insula*'s Northern side, which had been wrongly identified before as the atrium of Stephania, San Lorenzo *ad fontes*, or *consignatorium alvatorum* built by the Neapolitan Bishop John III (615–636) (Ebanista 2016: 125–172).

Only a century later «*copulatam* cum *Episcopio*» (Waitz 1878: 409), the second Neapolitan cathedral, the Stephania, was built. It was so called because of its founder, the Bishop Stephen I (. . .ca. 495–499–500–502–510). Restored twice by John II *Mediocris* (533–553) and Stephen II, in both cases because of a fire which burned its apse, the church preserved a magnificent mosaic commissioned by John II (Waitz 1878: 410, 426).

John II also sponsored the building of San Lorenzo, known as San Lorenzo Maggiore, nowadays located in St. Gaetano Square, in Naples.

His successor, Vincentius (. . .558–559. . .), had restored and enlarged the paleochristian church of San Giovanni (Picone 2008: 40–41): this church, known as San Giovanni Maggiore, is the place where in the eighteenth century, a famous marble calendar made in the ninth century was discovered. San Giovanni Maggiore was restored once in the Angioinian age and twice in the nineteenth century. According to a Neapolitan source, the same Vincentius built the «*baptisterium fontis minoris intus episcopio et accubitum* (=triclinium or cenaculum) *iuxta positum grandi opere depictum*» (Waitz 1878: 412). This *accubitum* cannot be identified with the apse discovered in the excavations of the episcopal *insula*'s courtyard, on the Eastern side of the current Santa Restituta chapel, because the apse and its decoration were allegedly built around 475–525 (Ebanista and Cuccaro 2010: 521–530). Vincentius' operation followed the same as that led by Bishop Soter (. . .465. . .), who divided «*fontes maiores*» located in the episcopal area (Waitz 1878: 414). In the opinion of many scholars, this implied that Soter had allegedly restored the baptistery build by his predecessor, Severus (. . .387/393–397/398. . .), a baptistery which has been traditionally identified with the magnificent San Giovanni in Fonte, but actually this hypothesis seems to be weak and unfounded (Rotili 1978: 26–27; Ebanista 2016: 146–148).

In the episcopal area, Stephen II sponsored the building of the church of San Pietro (Waitz 1878: 425–426). Later Bishop Paul III (801–821) had built at the episcopal entrance a great *horreum* (=granary) with a *cubiculum* (=oratory) (Waitz 1878: 427). On the episcopal staircase, a *xenodochium*, a pilgrims' shelter, was built by Athanasius I (Waitz 1878: 434). In any case, the *horreum* and the *xenodochium* increased the Neapolitan welfare system composed of diaconies, baths, and monastic hospitals. All of these institutions allowed Neapolitans to be fed and cared for from the Late Antiquity to the Early Middle Ages, when they were forced to depend on public *frumentatio* (=wheat distribution system) and healthcare (Cilento 1969a: 670; Bozzarello 2015: 47–61).

Athanasius I, however, was the author of a project thought to give to the episcopal area a new architectonical organization, in which two cathedrals were arranged with better connection. This operation was followed by a liturgical reorganization of the same cathedrals. Therefore, he ordered the establishment of the ebdomadaries in Stephania, who had to celebrate a daily mass according to the Roman Church discipline, and a primordial cathedral chapter in Santa Restituta (*Vita s. Athanasii* IV, 35–40 = Vuolo 2001: 127–128).

Cross-References

- ▶ Monasticism in Southern Italy (Fourth to Eleventh Century)
- ▶ Naples, Iconoclasm in (731/732–800)

References

Ahrweiler, H. 1961. Fonctionnaires et bureaux maritimes a Byzance. *Revue des Etudes byzantines* 19: 239–252.

Boetto, G., V. Carsana, and D. Giampaola. 2010. I relitti di Napoli e il loro contesto portuale. In *Archeologia. Storia. Etnologia navale, Atti del I convegno nazionale* (Cesenatico-Museo della Marineria, 4–5 Aprile 2008), ed. S. Medas, M. D'Agostino, and G. Caniato. Venezia: ISTIAEN.

Bozzarello, L. 2015. Enti e politiche assistenziali nel ducato bizantino di Napoli. *Aiônos. Miscellanea di studi storici* 19: 47–65.

Burgarella, F. 1988. Bisanzio in Sicilia e nell'Italia meridionale: i riflessi politici. In *Dall'esarcato di Ravenna al tema di Sicilia*, ed. A. Guillou and F. Burgarella, 249–370. Torino: UTET.

Capasso, B. 1881–1892. *Monumenta Neapolitani Ducatus historiam pertinentia*. Vol. 3. Napoli: Regio Typ. F. Giannini.

Caputo, P., G. Carandente, M. Del Villano, and G. Cesare. 2012. Note sulla terrazza superiore dell'acropoli di Cuma. In *Cuma. Il Tempio di Giove e la terrazza superiore dell'Acropoli. Contributi e documenti*, ed. C. Rescigno, 103–119. Venosa: Osanna.

Cassandro, G. 1969. Il ducato bizantino. In *Storia di Napoli. volume 2/1: Alto Medioevo*, ed. E. Pontieri et al., 3–408. Napoli: Società Editrice Storia di Napoli.

Cilento, N. 1969a. La Chiesa di Napoli nell'Alto Medioveo. In *Storia di Napoli. volume 2/2: Alto Medioveo*, ed. E. Pontieri et al., 641–753. Napoli: Società Editrice Storia di Napoli.

Crivellucci, A. 1968. *Landolfi Sagacis Historia Romana. Voll. 2,* (Fonti per la Storia d'Italia 49–50). Torino: Istituto Storico Italiano per il Medio Evo.

De Rossi, G., V. Di Giovanni, P. Miniero, et al. 2010. Il porto di Miseno (Campania-Italia) in età tardoantica: analisi dei contesti ceramici. In *Late roman coarse wares, cooking wares and amphorae in the Mediterranean. Archaeology and archaeometry. Comparison between Western and Eastern Mediterranean*, ed. S. Menchelli, S. Santoro, and M. Pasquinucci e G. Guiducci, vol. 1, 487–495. Oxford: Archaeopress.

Dennis, G.T. 1985. *Three Byzantine Military Treatises* (CFHB 35 = Dumbarton Oaks Texts 9). Washington, DC: Dumbarton Oaks.

Diehl, Ch. 1888. *Études sur l'administration byzantine dans l'Exarchat de Ravenne (568–751)*. Paris: E. Thorin.

Duchesne, L. 1886. *Le Liber Pontificalis. Tome 1*. Paris: E. Thorin.

Ebanista, C. 2016. Eodem tempore fecit Constantinus Augustus basilicam in civitatem Neapolim*: nuovi dati sull'origine del gruppo episcopale partenopeo*. In *Costantino e i Costantinidi. L'innovazione costantiniana, le sue radici e i suoi sviluppi. Pars I* (Studi di Antichità Cristiana 66), Acta XVI Congressus Internationalis Archaeologiae Christianae (Romae, 22–28/09/2013), ed. O. Brandt and G. Castiglia, 125–172. Città del Vaticano: Pontificio Istituto di Archeologia Cristiana.

Ebanista, C., and A. Cuccaro. 2010. I mosaici pavimentali paleocristiani del "grande edificio" nell'Insula Episcopalis di Napoli. In *Atti del XV Colloquio AISCOM* (Aquileia, 4–7 febbraio 2009), ed. C. Angelelli and C. Salvetti, 521–530. Tivoli: Scripta manent.

Fedele, P., ed. 1903. Chronicon ducum et principum Beneventi, Salerni et Capuae et ducum Neapolis. *Archivio Storico per le Province Napoletane* 2: 565–573.

Feniello, A. 1991. Contributo alla storia della «iunctura civitatis» di Napoli nei secoli X–XIII (I). *Napoli Nobilissima* 30: 175–200.

Gay, J. 1980. *L'Italia meridionale e l'impero bizantino. Dall'avvento di Basilio I alla resa di Bari ai Normanni (867–1071)*. Sala Bolognese: Forni (Reprinted Firenze 1917).

Genovese, A. 2012. *Eugippio Abate. Opere: Vita di san Severino, La Regola, Estratti dalle opere di sant'Agostino* (Scrittori della Chiesa di Aquileia 7). Roma-Gorizia: Città Nuova-Società per la conservazione della Basilica di Aquileia.

Gero, S. 1973. *Byzantine iconoclasm during the reign of Leo III with particolar attention to the Oriental sources* (Subsidia 52). Louvain: Secrétariat du CSCO.

Giampaola, D., and V. Carsana. 2010. Fra Neapolis e Parthenope: il paesaggio costiero ed il porto. In *Ricoveri per navi militari nei porti del Mediterraneo antico e medievale*, ed. D.J. Blackman and M.C. Lentini, 119–132. Bari: Edipuglia.

Giampaola, D., V. Carsana, G. Boetto, et al. 2005. La scoperta del porto di Neapolis: dalla ricostruzione topografica allo scavo e al recupero dei relitti. *Archeologia Mediterranea Marittima* 2: 47–91.

Gundlach, W. 1892. *Codex Carolinus* (MGH, Epistolae 3/I): 469–657. Berlin.

Haury, J., and G. Wirth. 1963. *Procopii Caesariensis opera omnia. 2: De bellis libri 5–8*. Leipzig: B.G. Teubner.

Kehr, P.F. 1935. *Italia pontificia. Vol. 8: Regnum Normannorum – Campania*. Berlin: Weidmann.

Kelly, S. 2011. *The Cronaca di Partenope. An Introduction to and Critical Edition of the First Vernacular History of Naples (c. 1350)* (The Medieval Mediterranean. Peoples, economies and culture, 400–1500, 89). Leiden-Boston: Brill.

Keydell, R. 1967. *Agathiae Myrinaei Historiarum libri quinque* (Corpus Fontium Historiae Byzantinae 2). Berlin: E. de Gruyter.

Pavini Rosati, F. 1982. Monetazione bizantina in Italia. In *I Bizantini in Italia*, ed. G. Cavallo et al., 653–669. Milano: Libri Scheiwiller.

Pertz, G.H., ed. 1848. *Vita Iohannis abbatis Gorziensis, auct. Iohanne abbate S. Arnulfi* (MGH, Scriptores in Folio, 4): 335–377. Hannover.

Picone, R. 2008. Reimpiego, riuso e memoria dell'antico nel medioevo. In *Verso una storia del restauro. Dall'età classica al primo Ottocento*, ed. S. Casiello, 31–60. Firenze: Alinea editrice.

Pietri, Ch., and L. Pietri. 1999–2000. *Prosopographie de l'Italie chrétienne (313–604). Volumes 2.* (Prosopographie chretienne du Bas-Empire 2). Roma: École Française de Rome.

Recchia, V., ed. 1996–1999. *San Gregorio Magno. Lettere. Voll. 4* (Opere di Gregorio Magno, V/1–4). Roma: Città Nuova.

Rotili, M. 1978. *L'arte a Napoli dal VI al XIII secolo*. Napoli.: Società editrice napoletana.

Schmiedt, G. 1978. *I porti italiani nell'Alto Medioevo*, in *La navigazione mediterranea nell'Alto Medioevo. volume 1.* XXV Settimana di Studio del CISAM (14–20 aprile 1977), 129–245. Spoleto: CISAM.

Talbi, M. 1966. *L'émirat aghlabide (184–296. 800–909): Histoire politique*. Paris: Librairie d'Amerique et d'Orient Adrien Maisonneuve.

Varriale, I. 2004. Costa flegrea e attività bradisismica dall'antichità a oggi. In *Rotte e porti del Mediterraneo dopo la caduta dell'impero romando d'Occidente: continuità e innovazioni tecnologiche e funzionali*, Atti del IV seminario ANSER (Genova, 18–19 giugno 2004), ed. L. De Maria and R. Turchetti, 291–310. Soveria Mannelli: Rubbettino.

Vitolo, G. 1990. Vescovi e diocesi. In *Storia del Mezzogiorno. volume 3: Alto Medioevo*, ed. G. Galasso and R. Romeo, 73–151. Napoli: Edizioni del sole.

Vuolo, A. 2001. *Vita et Translatio S. Athanasii Neapolitani episcopi (BHL 735 e 737) sec. IX* (Fonti per la storia dell'Italia medievale. Antiquitates 16). Roma: Istituto Storico Italiano per il Medio Evo.

Waitz, G., ed. 1878. *Gesta episcoporum Neapolitanorum* (MGH SS rer. Lang.): 398–439. Hannover.

Zanella, A. & Luiselli, B. 2014. *Paolo Diacono. Storia dei Longobardi. Testo latino a fronte* (Classici latini e greci). Milano: Rizzoli.

Further Readings

Arnaldi, G. 1986. Alle origini del potere temporale dei papi: riferimenti dottrinari, contesti ideologici e pratiche politiche. In *Storia d'Italia. volume 9: La Chiesa e il potere politico dal Medioevo all'età contemporanea*, ed. G. Chittolini and G. Miccoli, 43–71. Torino: UTET.

Bozzarello, L. 2016. *Napoli bizantina. Aspetti politici e religiosi*. Unpublished PhD dissertation, Università della Calabria.

Bozzarello, L. 2017. Ricerche su eremiti e pellegrini nel Mezzogiorno medievale. *Christianitas. Rivista di Storia Pensiero e Cultura del Cristianesimo* 9: 81–106.

Burgarella, F. 1989. Le terre bizantine (Calabria, Basilicata e Puglia). In *Storia del Mezzogiorno. volume 2/2: Il Medioevo*, ed. G. Galasso and R. Romeo, 413–717. Napoli: Edizioni del sole.

Burgarella, F. 1991. Dalle origini al Medioevo. In *Cosenza. Storia Cultura Economia*, ed. F. Mazza. Soveria Mannelli: Rubbettino.

Capasso, B. 1984. *Topografia della città di Napoli nell'XI secolo*. Sala Bolognese: Forni editore (Reprinted Napoli 1895).

Cilento, N. 1969b. La cultura e gli inizi dello studio. In *Storia di Napoli. volume 2/2: Alto Medioveo*, ed. E. Pontieri et al., 521–639. Napoli: Società Editrice Storia di Napoli.

De Boor, C. 1883–1885. *Theophanis Chronographia. Voll. 2*. Leipzig: B.G. Teubner. (eng. trans. Mango & Scott 1997. Mango, C. & Scott (ed), R. 1997. *Theophanes the Confessor,* The Chronicle *of Theophanes Confessor: Byzantine and Near Eastern* History *AD 284–813*. Oxford: Clarendon Press).

Del Treppo, M. 2005. Bartolommeo Capasso, la storia, l'erudizione. In *Bartolommeo Capasso. Storia, filologia, erudizione nella Napoli dell'Ottocento* (Storici e Storia, 6), ed. G. Vitolo, 15–131. Napoli: Guida Editore.

Du Fresne, Seigneur, and C. Du Cange. 1883–1938. *Glossarium mediae et infimae latinitatis*. Vol. 10. Niort-Paris: L. Favre.

Ebanista, C. 2005. L'atrio paleocristiano dell'Insula Episcopalis di Napoli. Continuità d'uso e trasformazioni funzionali. *Archivio Storico per le Province Napoletane* 123 (2005): 50–92.

Ebanista, C. 2009. L'atrio dell'Insula Episcopalis di Napoli: problemi di architettura e topografia paleocristiana e altomedievale. In *Tardo Antico e Tardo Medioevo: filologia, storia, archeologia, arte*, ed. M. Rotili, 307–375. Napoli: Arte tipografica.

Giampaola, D., and F. Longobardo. 2000. *Napoli greca e romana tra Museo archeologico nazionale e centro antico*. Napoli: Electa.

Giampaola, D., et al. 2010. *Napoli, la città e il mare. Piazza Bovio: tra Romani e Bizantini*. Milano: Electa.

Kazhdan, A.P., Talbot, A.-M., Cutler, A (ed). et al. 1991. The Oxford dictionary of Byzantium. New York/Oxford: Oxford University Press.

Li Pira, F. 2009. *La cattedrale di Napoli ed il capitolo dei canonici dalle origini al secolo XIV*. Unpublished PhD dissertation, Università degli Studi di Napoli "Federico II".

Morhange, C., and L. Stefaniuk. 2010. Cuma. Evoluzione dei paesaggi litorali nella depressione sud-ovest di Cuma da 4000 anni. Il problema del porto antico. In *Cuma, Atti del quarantottesimo Convegno di Studi sulla Magna Grecia (Taranto, 27 settembre – 1 ottobre 2008)*, ed. G. Pugliese Carratelli et al., 303–322. Taranto: Scorpione Editrice.

Naples, Iconoclasm in (731/732–800)

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State of Knowledge and Current Debates

Between 1970 and 1989 some among the historians interested in the Neapolitan Dukedom's events preferred to pay specific attention on the eighth century and, in particular, to the Iconoclastic period. This debate was animated mainly by P. Bertolini (1970: 349–440, 1974: 101–127) and P. Schreiner (1979: 113–128, 1988: 366–368). According to the traditional view (Gay 1980: 18; Schipa 1923: 33; Cilento 1969: 647–654), which has its roots in the seventeenth century (Chioccarello 1643: 70–71), Bertolini tried to confirm the adhesion of Naples to Iconoclasm through new proofs and inquiries. Schreiner instead worked to deny Neapolitan doctrinal Iconoclasm through a reconsideration of the same proofs used by Bertolini. In 1989, F. Luzzati Laganà participated in the debate supporting the thesis of Napolitan Iconoclasm. Her paper (Luzzati Laganà 1989: 99–115), however, conveyed too many influences coming from Bertolini's paper, especially in the exegesis of sources and revealed its own weakness in several passages. In 2005, the debate was resumed by

J.-M. Martin, who, as well as Schreiner, denied any kind of doctrinal Iconoclasm in Naples (Martin 2005: 62–64).

Status quaestionis concerning issues of Neapolitan Iconoclasm has been recently summarized by A. Acconcio Longo, who, following Luzzati Laganà, has considered a short and almost irrelevant application of doctrinal Iconoclasm in Naples highly probable (Acconcia Longo 2012: 221–238). The historical debate is mainly related to the interpretation of some of *Gesta episcoporum Neapolitanorum*'s passages (Waitz 1878: 422–425) – passages that have been read by Acconcia Longo with appropriate scientific acuity. So, if a new reconsideration of the so-called Neapolitan Iconoclasm is possible nowadays, it is above all for her contribution. No elements or relevant proofs can be taken from hagiography, numismatics, and sphragistics (Bozzarello 2017: 127–128). Scholars have shown that the mention of Naples "*et le régions située jusqu'au fleuve de Rome*" (Auzépy 1997: 219) as shelter for Iconodules could describe the real situation lived in those territories, not at the time of St. Stephen the Younger's martyrdom (765) but more than 50 years later, when the hagiography was composed (807/809) (Auzépy 1997: 5–9; Acconcia Longo 2012: 224; Martin 2005: 62–64). St. Januarius' representation on the 20 *nummi*'s *recto* (Sambon 1919: 71–73) is allegedly related to the consolidation of his veneration among the Neapolitans and the ducal family as well (Schreiner 1988: 366–368; Bozzarello 2017: 128–129). In any case, the replacement of the previous representation of Emperor Leo III (717–741) with the one of St. Januarius has to be interpreted as a free choice made by the Neapolitan Mint according to the freedom concerning figurative issues granted by Byzantium to the peripheral Mints (Arslan 2005: 1059–1096). Also, in coeval Neapolitan seals religious characters are often represented. But in both cases, coins and seals repeated artistic codified models very common across the Byzantine world (Bascapé 1969: 178–180).

Concerning *Gesta*, instead, the sprain of a sheet which once worked as a union-sheet between its first part (eighth/ninth century) and its second part (tenth century) – joined together in *Vat. Lat.* 5007 during the thirteenth century – has been often considered a censorship done by Iconodules after their definitive victory (Bertolini 1974: 113–127; Acconcia Longo 2012: 104); but a sheet-spread has been instead denied by Schreiner (1979: 124–125; Schreiner 1988: 367). It is a break which occurs in Bishop Calvus' biography (750–762), significantly in its part concerning some heroic ventures managed by *Basileus* Constantine V (741–775). Indeed, similar and coeval tales have survived in Armenia with no censorship (Gero 1973: 135–136) because these kinds of tales have no relationship with Iconoclasm: they are simply related to imperial propaganda involved in describing Constantine V as a protector of his subjects (Acconcia Longo 2012: 221–237).

Definition

Iconoclasm (from εἰκονοκλάστης, "image-destroyer") was a religious movement of the eighth and ninth century that denied the holiness of icons and rejected icon veneration. Clerical opposition to the artistic depiction of sacred images had its roots at the beginning of Late Antiquity, but the birth of icon veneration across Western and Eastern Christians can be set around the seventh century. Iconoclasm became a movement when Emperor Leo III began to support it publicly in 726 and to ratify on the 7 January 730, through an edict commanding the destruction of the icons of the saints. This destruction was revealed by removing the famous icon of Christ placed on Chalke Gate, despite the opposition of the Patriarch of Constaninople, Germanos I. In any case, the persecution under Leo III appears to have been limited to instances of destroying church decorations, portable icons, and altar furnishings or, according to the latest interpretations, limited to instances of moving icons into hidden spaces of churches, and removing icons and relics placed near the altar. Leo's operation, however, was distant from the radicalism and violence of his son Constantine V, who, after a temporary restoration of Iconodulism imposed by usurper

Artabasdos, summoned a council in Hieria (754) where the 338 bishops there assembled ratified once again imperial Iconoclasm. Iconoclasm waned after Constantine's death, and *Basilissa* Irene (797–802), ruling for her 10-year-old son Constantine VI, together with patriarch Tarasios secured an official condemnation of Iconoclasm at the Council of Nicaea II (787). However, old and new disagreements across followers of the Iconodule party led to a new rebirth of Iconoclasm, which had its last phase in 815–843 (Gero 1973: 94–122, 129; Kazhdan et al. 1991: 975–977; Gallina 1997: 152–179; Noble 2009: 10–45; Brubaker and Haldon 2011: 32–66, 151–155)

Historical Development

Iconoclasm was allegedly extended to the Western Byzantine provinces, including Southern Italy, in 731/732. The dioceses of Illirycum, Crete, Calabria, Sicily, Sardinia, and Naples were transferred from the authority of Rome to the authority of the Patriarchate of Constantinople. This measure, which was ecclesiastic in nature, incidentally drew a new map of Byzantine Italy, designating Sicily and Calabria as preferred areas of the Byzantine Empire, following the way already thought by Constance II (641–668). The enlargement of the Constantinopolitan Patriarchate was lawfully arranged according to counciliar canons in which ecclesiastical geography was tightly tied to civil geography. Actually, it was the revenge of the Empire against the Roman Church, that in 724/725 had refused to devolve the Italian province's duties to Byzantium and later condemned Iconoclasm in the Roman synod of 731. All these operations favored the birth of the separatist movement of the Exarchate and *Venetiae*, which, searching for freedom from Byzantium (726/727), was then defeated in 727 by Exarch Eutichius. In any case, in 731/732 Byzantium was trying to create in Southern Italy a national Church united by the common denominator of Greek culture (De Boor 1883: 404–413 = Mango and Scott 1997: 558–573; Paol. Diac. *Hist. Lang.*, VI, 49 = Zanella and Luisella 2014: 532–533; Anastos 1957: 14–31; Guillou 1969: 209–227, 1977: 105–106, 1988: 30–31; Burgarella 1988: 320–323, 1989: 438–446; Von Falkenhausen 1982: 36–40).

Leo's measure was actually a seizure of pontifical *latifundia*. Abrogating the Roman Church's fiscal exemption given by Emperors Constantine IV (668–685) and Justinian II (685–695; 702–711) (Burgarella 1988: 320–323, 1989: 438–446), Leo III allowed the Empire to seize the whole fiscal revenue coming from *Patrimonium sancti Petri* located in Theme of Sicily and Dukedom of Calabria, which, according to an estimate done by Guillou (1977: 105–106, 1988: 30–31), consisted in ca. 5,25 talents of gold (=373.332 *solidi* or *nomìsmata*) (De Boor 1883: 410 = Mango and Scott 1997: 568). It is highly probable that in the Byzantine Campania pontifical properties were simultaneously seized, even if this seizure is attested to by proofs not before 764–766 (Gundlach 1892: (37) 547–550; Kehr 1935: 420).

According to *Gesta* (Waitz 1878: 422), almost simultaneously at his designation (717) the new bishop of Naples, Sergius, was elevated to archbishop by the Patriarch of Constaninople, but he quickly refused the new rank because of the Pope's opposition. Therefore, Sergius was absolved, but not before having publicly renewed his obedience to Rome. These events, indeed, should be referred to the period after 731/732 and connected to Leo's reform. This interpretation could be demonstrated through proof handed down by St. Willibald's *Itinenarium* in which Naples is described as an archbishopric, so with the rank that Naples probably had when Willibald was living in Monte Cassino between 729 and 739 (*Vita s. Willibaldi* 31 = Tobler and Moliner 1879: 273; Burgarella 1988: 310–312). While the renting of some Neapolitan pontifical *latifundia* granted by Pope Gregory II (719–731) to *Dux* Theodorus (719–729) and to a certain *religiosa diaconissa* Matrona (Kehr 1935: 429) could be read as the proof of political and administrative arrangements still unmodified before 731/732. The reason of this rent is allegedly economic. In the eighth century, the Papacy was unable to guarantee a profitable management of those properties,

and their rent could have been considered the most convenient economic solution.

Once it was raised to the rank of archiepiscopal so autocephalous see, Naples became independent from its lawful patriarch, the Pope. Thus, Naples became a second Ravenna, a city elevated to autocephalous see by Constance II in 666 (Guillou 1969: 209–227). Implicit was the Byzantine drawing to give to Naples a central role in the new Italian ecclesiastical geography, transforming bishoprics located across the peninsular Mezzogiorno into territories subjected to the new metropolitan see (Von Falkenhausen 1982: 36–40). A measure which would have facilitated imperial seizure of the whole *Patrimonium sancti Petri* located in Southern Italy.

Iconoclasm in Naples was a fiscal-political issue and not a doctrinal issue (Schreiner 1988: 366–368; Martin 2005: 62–64). A document dated 763 can be considered the proof that the Neapolitan diocese was still under the authority of the Roman Patriarchate (Capasso 1881: (2) 262–263). So the later exile of the Neapolitan Bishop Paul II (763–767), often wrongly interpreted as the proof of an Iconoclastic Naples, appears to have been the answer given to Rome by the civic establisment that was trying to assume and reaffirm autocephalous see's lawful rights. According to *Gesta* (Waitz 1878: 424–425), Paul, who had been chosen by Pope Paul I, his friend, was consacrated in Rome 9 months after his appointment. But when he came back to Naples, the Neapolitans, who were followers of the Iconoclasm, refused him and he was exiled from the city. His exile ended 2 years later, around 764/765, when Neapolitan *primates* allowed him to move again into the city. According to G. Cassandro (1969: 41) a letter dated 764–766 is probably related to this event. Through this letter Pope Paul I thanked Pepin, King of the Franks, for the threats against authorities of Gaeta and Naples carried out to restore the old procedure which allowed elected bishops to be consacrated in Rome by the pope (Gundlach 1892: (37) 547–550; Kehr 1935: 420). So Neapolitan *primates*, fearing a conceivable Carolingian invasion, could have thought to withdraw their veto.

In the eighth century, the Neapolitan authority appears to be involved in controlling the elections of bishops. Sergius was imposed by *Dux* John (711–717). According to *Gesta* his election was the accomplishment of an *ex voto* for the Neapolitan victory at Cumae over the Longobards (716/717). Perhaps also Bishops Cosmas (748–750) and Calvus were imposed by *duces* and their party. On the contrary, Paul should have been the candidate of the clergy. The election of bishops, indeed, was still formally delegated to the city assembly formed by clergy, aristocracy, and *populus*, which chose its candidate through public acclaim. Only a rebirth of the party close to the Neapolitan establisment allowed *Dux* Stephen II to be elected bishop at Paul's death. This is the meaning of John Diaconus' words, author of the second part of the *Gesta*, who has described the election of Stephen as related to the death of all Neapolitan clerics because of the plague (Waitz 1878: 426; Bozzarello 2015: 57). Even if the ecclesiastical canons forbade laic men from participating in episcopal elections, the appointment of Stephen was confirmed and ratified by the Pope as it had earlier been done in Ravenna by consecrating Sergius (Bertolini 1970: 402). Enjoying the favor of Neapolitans, Stephen could manage to take the whole control of the Dukedom in order to avoid conceivable clashes between the highest authorities of the Dukedom and their loyal parties. Therefore, troubles related to the election and assignment of the Neapolitan bishops across the eighth century appear to have been political conflicts between hostile parties, which are often attested to in the Mediterranean cities and in Naples as well, especially during episcopal elections (Patlagean 1986: 93–126; Bozzarello 2017: 68–80, 143–151).

Stephen was actually the leader of the Neapolitan policy in the second half of the eighth century. (767/768–800). He managed a strong policy of Latinization of the Neapolitan Church and its institutions, indicating the way then followed by Bishops John IV (842–849) and St. Athanasius I (849–872) (Bozzarello 2017: 152–157). According to Rome, he was a strong opposer of doctrinal Iconoclasm, as some of his choices in art and architecture clearly show. A good example of his

policy is represented by the building of St. Peter's church in the episcopal area (Waitz 1878: 426; Luzzati Laganà 1989: 110–111; Lucherini 2009: 51–73). Here, at its entrance, he ordered the painting of the first six Ecumenical Councils as a protest against the coeval removal of the same images at Milion of Constantinople ordered by Constantine V (Waitz 1878: 426; Luzzati Laganà 1989: 110–111). In the meantime, he was also a loyal imperial officer by refusing to delete the seizure of pontifical properties located in Dukedom of Naples. This is shown by events occurring in 779–780 and related to the invasion of Terracina, managed by "*nefandissimi Neapoletani cum perversis Grecis*." Terracina, *castrum* placed under "*dicione beati Petri*," had been occupied by Neapolitans together with Byzantines following Arechis II's advice. According to sources, Pope Adrianus I would have surrendered Terracina to enemies in return for Neapolitan *Patrimonium Campaniae*. But this pact failed once again because of Arechis' intrigues, and the Byzantine seizure of "*patrimonium* (…) *beati Petri apostoli, quod ibidem in Neapoli ponitur*" continued (Gundlach 1892: (61) 588–589, (64) 591–592; Kehr 1935: 420, 430).

It is highly probable, moreover, that this seizure was confirmed after the Council of Nicaea II when Iconodulism was re-established as a cult only. This had been possible thanks to the division between fiscal and doctrinal issues, a measure which was approved in Sicily and Calabria, lands of strong hellenization. While, at the same time, it was disapproved by Pope Adrianus I, who, before the formal Council's openining, had asked for the restitution of *Patrimonium sancti Petri* located in Mezzogiorno still seized by the Byzantines (Burgarella 1988: 331–331, 1989: 446).

Cross-References

- ▶ Iconography in the Roman World
- ▶ Imperial Cult, Roman
- ▶ Monasticism in Southern Italy (Fourth to Eleventh Century)
- ▶ Numismatics, Ancient Greek
- ▶ Numismatics, Roman Imperial

References

Acconcia Longo, A. 2012. Costantino V a Napoli. *Rivista di Studi Bizantini e Neoellenici* 49: 221–238.

Anastos, M.V. 1957. The transfer of Illyricum, Calabria and Sicily to the jurisdiction of the patriarchate of Constantinople in 732–733. *Studi bizantini e neoellenici* 9: 14–31.

Arslan, E.A. 2005. *Scelte iconografiche e linguistiche nella moneta*, in *Comunicare e significare nell'Alto Medioevo*. LII Settimana di Studi del Centro Italiano di Studi sull'Alto Medioevo (Spoleto, 15–20 Aprile 2004), 1059–1096. Spoleto: CISAM.

Auzépy, M.-F., ed. 1997. *Le vie d'Étienne le jeune par Étienne le Diacre*, Birmingham Byzantine and Ottoman monographs, 3. Aldershot: Variorum.

Bascapé, G.C. 1969. *Sigillografia. Il sigillo nella diplomatica, nel diritto, nella storia, nell'arte. 1: Sigillografia generale. I sigilli pubblici e quelli privati*. Milano: Giuffrè.

Bertolini, P. 1970. La serie episcopale napoletana nei secc. VIII e IX. Ricerche sulle fonti per la storia dell'Italia meridionale nell'alto medio evo. *Rivista di storia della Chiesa in Italia* 24 (2): 349–440.

Bertolini, P. 1974. La Chiesa di Napoli durante la crisi iconoclasta. Appunti sul codice Vaticano Latino 5007. In *Studi sul Medioevo cristiano offerti a Raffaello Morghen per il 90° anniversario dell'Istituto Storico Italiano (1883–1973)*, 101–127. ISIM: Roma.

Bozzarello, L. 2015. Enti e politiche assistenziali nel ducato bizantino di Napoli. *Aiônos. Miscellanea di studi storici* 19: 47–65.

Bozzarello, L. 2017. *Napoli bizantina. Aspetti politici e religiosi*. Unpublished PhD dissertation, Università della Calabria.

Brubaker, L., and J. Haldon. 2011. *Byzantium in the iconoclast era (c. 680–850). A history*. New York: Cambridge University Press.

Burgarella, F. 1988. Bisanzio in Sicilia e nell'Italia meridionale: i riflessi politici. In *Dall'esarcato di Ravenna al tema di Sicilia*, ed. A. Guillou and F. Burgarella, 249–370. Torino: UTET.

Burgarella, F. 1989. Le terre bizantine (Calabria, Basilicata e Puglia). In *Storia del Mezzogiorno. volume 2/2: Il Medioevo*, ed. G. Galasso and R. Romeo, 413–717. Edizioni del sole: Napoli.

Capasso, B. 1881. *Monumenta Neapolitani Ducatus historiam pertinentia*. Vol. Vol. 1. Napoli: Regio Typ. F. Giannini.

Cassandro, G. 1969. Il ducato bizantino. In *Storia di Napoli. volume 2/1: Alto Medioevo*, ed. E. Pontieri et al., 3–408. Napoli: Società Editrice Storia di Napoli.

Chioccarello, B. 1643. *Antistitum Praeclarissimae Neapolitanae Ecclesiae Catalogus. Ab Apostolorum temporibus ad hunc usque nostram aetatem, et ad annum MDCXLIII*. Neapolis: F. De Petris.

Cilento, N. 1969. La Chiesa di Napoli nell'Alto Medioveo. In *Storia di Napoli. volume 2/2: Alto Medioveo*, ed. E. Pontieri et al., 641–753. Napoli: Società Editrice Storia di Napoli.

De Boor, C. 1883. *Theophanis chronographia*. Vol. 1. Leipzig: B.G. Teubner. English editon: 1997. *Theophanes the confessor, The chronicle of theophanes confessor: Byzantine and near eastern history AD 284–813* (trans: Mango, C. and ed. Scott, R.). Oxford: Clarendon Press.

Gallina, M. 1997. Ortodossia ed eterodossia. In *Storia del Cristianesimo. Vol. 2: Il Medioevo*, ed. G. Filoramo and D. Menozzi. Roma-Bari: Laterza.

Gay, J. 1980. *L'Italia meridionale e l'impero bizantino. Dall'avvento di Basilio I alla resa di Bari ai Normanni (867–1071)*. Sala Bolognese: Forni. (repr. Firenze 1917).

Gero, S. 1973. *Byzantine iconoclasm during the reign of Leo III with particolar attention to the Oriental sources*, Subsidia 52. Louvain: Secrétariat du CSCO.

Guillou, A. 1969. *Régionalisme et indépendance dans l'Empire byzantin au VIIe siècle. L'exemple de l'Exarchat et de la Pentapole d'Italie*, Istituto Storico Italiano per il Medio Evo. Studi Storici – Fasc. 75–76. Roma: ISIME.

Guillou, A. 1977. La Sicile byzantine. Etat de recherches. *Byzantinische Forschungen* 5: 95–145.

Guillou, A. 1988. L'Italia bizantina dall'invasione longobarda alla caduta di Ravenna. In *Dall'esarcato di Ravenna al tema di Sicilia*, ed. A. Guillou and F. Burgarella, 1–248. Torino: UTET.

Gundlach, W. (ed) 1892. *Codex Carolinus* (MGH, Epistolae 3/I), 469–657. Berlin: Weidmann.

Kazhdan, A.P., Talbot, A.-M., Cutler, A. (ed) *et al* 1991. The Oxford dictionary of Byzantium. New York/Oxford: Oxford University Press.

Kehr, P.F. 1935. *Italia pontificia. Vol. 8: Regnum Normannorum – Campania*. Berlin: Weidmann.

Lucherini, V. 2009. L'architettura della Cattedrale di Napoli nell'Altomedioevo: lo sguardo verso Roma del vescovo-duca Stefano II (766-794). *Hortus Artium Medievalium* 13: 51–73.

Luzzati Laganà, F. 1989. Tentazioni iconoclaste a Napoli. *Rivista di studi bizantini e neoellenici* 26: 99–115.

Mango, C., and R. Scott, ed. 1997. *Theophanes the Confessor, The Chronicle of Theophanes Confessor: Byzantine and Near Eastern history AD 284–813*. Translated with the assistence of G. Greatrex. Oxford: Clarendon Press.

Martin, J.M. 2005. Hellénisme politique, hellénisme religieux et pseudo-hellénisme à Naples (VIIe–XIIe siècle). *Nea Rhome* 2: 59–77.

Noble, T.F.X. 2009. *Images, iconoclasm and the Carolingians*. Philadelphia: University of Pennsylvania Press.

Patlagean, E. 1986. *Povertà ed emarginazione a Bisanzio: IV-VII secolo*. Roma-Bari: Laterza.

Sambon, A. 1919. *Recueil des Monnaies Médiévales du Sud de l'Italie avant la domination des Normands*. Paris: Bibliothèque du Musée.

Schipa, M. 1923. *Il Mezzogiorno d'Italia anteriormente alla monarchia: Ducato di Napoli e Principato di Salerno*. Bari: Laterza.

Schreiner, P. 1979. Problemi dell'iconoclasmo nell'Italia meridionale e nella Sicilia. In *Le relazioni religiose e chiesastico-giurisdizionali*, Atti del Congresso di Bari (Bari, 29–31 ottobre 1976), 113–128. Roma: Centro di Studi sulla Storia e la civiltà adriatica.

Schreiner, P. 1988. Der byzantinische Bilderstreit: kritische Analyse der Zeitgenössichen meinungen und das urteil der nachwelt bis heute. In *Bisanzio, Roma e l'Italia nell'Alto Medioevo. Vol. 1*, XXXIV Settimana di Studi del Centro Italiano di Studi sull'Alto Medioevo (Spoleto, 3–9 Aprile 1986), 319–407. CISAM: Spoleto.

Tobler, T., and A. Molinier, eds. 1879. *Itinera Hierosolymitana et descriptiones Terrae Sanctae*. Vol. 1, 241–281. Genevae: J.G. Fick.

Von Falkenhausen, V. 1982. I Bizantini in Italia. In *I Bizantini in Italia*, ed. G. Cavallo et al., 1–135. Milano: Scheiwiller.

Waitz, G., ed. 1878. *Gesta episcoporum Neapolitanorum* (MGH SS rer. Lang.), 398–439. Hannover: Impensis Bibliopolii Hahniani.

Zanella, A., and B. Luiselli, eds. 2014. *Paolo Diacono. Storia dei Longobardi. Testo latino a fronte (Classici latini e greci)*. Milano: Rizzoli.

Narrative and Storytelling for Archaeological Education

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Introduction

The aphorism "Archaeology is… the driest dust that blows" is credited to Mortimer Wheeler, one of the great popularizers of archaeology. Storytelling is one tool to prevent this fate and to make the past accessible to the present. Although it involves creating narratives using archaeological information, storytelling is not merely inventing fanciful stories to rescue children from classroom boredom. As this section is located in the Public Education category of this publication, the reader might assume that storytelling is a one-way process, something professionals (producers) do for the edification of the public (consumers). But this is only part of the story. As something that insiders do for the uninitiated, this is an epistemologically safe approach that draws a hard line between an intellectual pursuit that deals in hard data and the emotional response of encountering the lived

experiences of people in the past. To suggest the latter opens archaeologists up to personal vulnerability. If archaeological storytelling were only a pedagogical technique, it would be of little interest to non-teachers. On the contrary, storytelling has both didactic and reflexive benefits. It has value for both its creators and their audience. But what is storytelling? Who is the public and what are they being educated about?

Definition

A story is a piece of prose or poetry that has narrative structure which, according to archaeologist Mark Pluciennik (1999), involves characters, events, and plotlines. For the present purpose, archaeological storytelling means the creation of prose, poetry, performance, song, or other mode by an archaeologist that incorporates archaeological data, has narrative structure, and that transcends standard archaeological presentation. I exclude most mass-market novels from this genre, as they are understood to be inventions regardless of how deeply they may draw from the archaeological record. I distinguish between products created explicitly for public outreach and those created both by and for archaeologists themselves. There is obvious overlap here, but at some point definitions are odious.

Why "storytelling"? I have used the term to de-intellectualize and separate the fledgling practice from the near impenetrable argot of literary theory (Praetzellis 1998). "Telling stories" has an intentional naivety that contrasts with the self-conscious and theoretically loaded "constructing narratives." To some degree and for some practitioners, storytelling is an attempt to regain part of archaeology's lost innocence. It encourages the reader to empathize with the characters, to enter their world and recognize their humanity. Narrative evokes an emotional rather than an intellectual response: coming across the skull of "poor Yorick," Hamlet reflected on mortality, not physiology. "Narrative 'truth'," wrote Bruner, "is judged by its verisimilitude rather than its verifiability" (1991: 13).

Key Issues/Current Debates

The rise of the narrative genre in the fields of history and archaeology is an outgrowth of intellectual movements of the 1960s and 1970s that lead away from the scientific, generalizing explanation of past events and processes to a more descriptive mode (Stone 1979). Hayden White's (1973) essay expressed what many historians had been thinking for years: that primary texts themselves are historical interpretations. At the same time, cultural anthropologist Clifford Geertz claimed that ethnographic descriptions are "not privileged, just particular: another country heard from" (1973: 23). Postmodern skepticism with the metanarratives of the past gave a new respectability to the study of the small scale and local.

While historians delved into micro-history, archaeologists too began to people the anonymous past. The household was well suited to tease out gender relations that were often more visible at this scale of analysis (e.g., Spector 1993). Phenomenology became a useful method at larger scales: Mark Edmonds (1999), for example, reconstructed how ancient peoples may have experienced their cultural landscape. Edmonds' narratives and the work of Chris Tilley (1997) leave one wondering how it is possible to appreciate the functioning of a ritual structure without considering the emotional responses of the people who used it.

One of the outcomes of archaeology's loss of innocence is that each generation must puzzle over how it can remain authoritative while being honest about its epistemology. Narrative and phenomenological approach are subject to frequent critiques from within archaeology. These concern both the intellectual validity of these approaches (e.g., Fleming 2006) and the possibility that archaeology as a field may lose its credibility with the public – and consequently its funding – if practitioners stray from conventional scholarship. Blur the distinction between what we know with some level of certainty and what we merely speculate, and the ice becomes thin indeed (Kristiansen 2011).

While it lived in the rarified atmosphere of the academy, archaeology shared the protected status

of many another esoteric specialty. But the rise of legally mandated and public-funded archaeology since the 1980s injected another consideration: the necessity to justify archaeology's cost by an equivalent public benefit. "Telling the stories" of places listed on the USA's National Register of Historic Places involves a range of modes including drama (Thomson and Harper 2000), while fictional accounts based on archaeological and archival sources have been used for decades to present the results of legally mandated archaeology to the general public (e.g., Praetzellis and Praetzellis 1984; Kane and Keeton 1994).

For the practitioner writing about his or her site, storytelling gives the freedom that only comes with an explicitly personalized narrative. The necessity to maintain an objective stance is gone. Invented dialogs invite intellectual thought experiments about potential meanings. Seemingly mundane objects can be explored and recontextualized regardless of their apparent scientific significance. And the standard site report's seamless teleology can be mangled by pursuing one or other of the odd quirks that influenced the investigation. One outcome is esthetic, for the creator derives fulfillment from the creative process by which he or she constructs a reality in which "their" people interact with the objects and documents that have come to be familiar with the investigator. Simultaneously, it is an exercise in reflexivity, a reminder to archaeologists that we ourselves assign meaning and pattern from a range of possibilities.

Examples

Archaeological narrative has several audiences (including the creators themselves) and has many forms. In this section, I present examples of the form organized by structure or mode, since this is how the audience experiences it. The modes are stories, pedagogical dialogs, performances, and novels.

Stories often take the form of archaeologically informed descriptions of mundane events whereby the archaeologist presents site formation processes, for example, the stories that form the introduction to Deetz's (1996) book *In Small Things Forgotten* that include the purchase of some pots that might be later found by an archaeologist. Stories may also attribute theoretically informed motives to the characters as in Spector's wonderfully empathetic *What this Awl Means* (1993). In recent decades, archaeologists have become less timid about straying from the straight road of science and into the potentially treacherous paths of phenomenology. Tilley (1997) is one of the best exponents of an archaeology that inserts emotional response into the understanding of Neolithic landscapes to figure out how people experienced the ritual structures they created. Interpreting publically funded archaeological investigations, the audience for stories is as wide as can be, including the general public, students, and archaeologists.

Dialogs pit characters' opposing views against each other in more or less realistic conversations often about the nature of archaeological discourse itself. In the premiere example, Flannery's (1982) moral tale *The Golden Marshalltown*, the Old Timer matches wits with an ambitious, amoral upstart over what it means to be a real archaeologist. Dialogs have been a popular pedagogical technique since Socrates, as the writer sets up questions and answers to echo the natural give-and-take of natural argumentation. In Johnson's popular textbook *Archaeological Theory* (2010), the useful but annoying foil Roger Beefy (who loves archaeology but can't see the point of all that theory stuff) interjects many of the empiricist, common sense remarks that are so familiar to undergraduate teachers. My own textbook *Death by Theory* (Praetzellis 2011) attempts something similar in the guise of a cartoon-illustrated murder mystery novel. The audience for dialogs – whose authors intentionally avoid the jargon and convoluted construction that baffles the uninitiated – tends to be university students and professional archaeologists.

Performances and multimedia presentations include pieces created primarily to be experienced in real time by an audience rather than to be read from a book. The emphasis is often on the emotional impact created by theatricality as a reflexive and possibly transformational experience for

fellow archaeologists at a professional venue (e.g., Praetzellis and Praetzellis 1998). Bapty's (1990) play "The Agony and the Ecstasy" is an internal dialog about the creation of the past through interpretation through the Inward voice, the Outward voice, and the Past. That the audience is other archaeologists is made clear by the fact that the action takes place at 3:10 p.m. on 19 December 1990 at a particular academic conference: the Theoretical Archaeology Group meeting in Lampeter, Wales. The use of Web-based hypertext documents in archaeology is exemplified by Rosemary Joyce's Sister Stories project that began in 1994 (Lopiparo and Joyce 2003). Seeking an alternative way to interpret archaeological insights, Joyce hyperlinked portions of the sixteenth-century Florentine Codex (a sixteenth-century ethnography of the Nahuatl-speaking people of the Aztec empire) onto a map at locations that would have been familiar to these people. Finally, there are Tringham's movies that reflect, among other things, on archaeologists' complex emotional relationships with their sites. "Back in My Hometown" (Tringham 2010), for example, was created for and aired at the 2010 Society for American Archaeology conference, while the multimedia RAVE (Real Audiences and Virtual Excavations) was Tringham's keynote address at the 2003 Society for California Archaeology conference.

Archaeo-historical novels consist of prose storytelling on a grand scale. While individual stories tend to interpret particular short-lived events, these novels often have complex storylines that extend over long periods. What separates work in this category from conventional historical fiction is their level of documentation – archaeological, documentary, and ethnographic. It is no accident that this mode is often selected by senior archaeologists who use the medium to reflect on archaeological interpretation and their own role in the process. These people have decades of experience to offer and, as recognized scholars, are less susceptible to the kind of criticism for venturing into the narrative mode that might derail a less established career. Layton's novels (1999, 2002) imagine the origins and eventual disposition of the cargo of a vessel that wrecked off the California coast through the eyes of Native Americans, seamen, and the sport divers and archaeologists who eventually brought the collection to light. In contrast to Layton's books, which are extensively footnoted to the archaeological and sources upon which the author relied, are Nelson's mystical novels of Neolithic Korea (1999, 2004). Footnotes would only disturb the flow of these lyrical works through which the author convincingly peoples the ancient past to explore gender, shamanism, and ethnic identity. The audience for archaeo-historical novels ranges from the general public to university students and professional archaeologists.

Cross-References

- ▶ Allen, Mitchell
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Beaudry, Mary C.
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Formal Education up to Age 18, Archaeology in
- ▶ Multivocality and Archaeology
- ▶ Public Education and Archaeology: Disciplining Through Education

References

Bapty, I. 1990. The agony and the ecstasy: The emotions of writing the past, a tragedy in one act for three voices. *Archaeological Review from Cambridge* 9 (2): 233–242.

Bruner, J. 1991. The narrative construction of reality. *Critical Inquiry* 18: 1–21.

Deetz, J.F. 1996. *In small things forgotten: An archaeology of early American life*. New York: Anchor Books.

Edmonds, M. 1999. *Ancestral geographies of the Neolithic: Landscape, monuments and memory*. London: Routledge Press.

Flannery, K. 1982. The golden Marshalltown: A parable for the archeology of the 1980s. *American Anthropologist* 84 (2): 265–278.

Fleming, A. 2006. Post-processual landscape archaeology: A critique. *Cambridge Archaeological Journal* 16 (3): 267–280.

Geertz, C. 1973. *The interpretation of cultures: Selected essays*. New York: Basic Books.
Johnson, M. 2010. *Archaeological theory: An introduction*. New York: Wiley.
Kane, S., and R. Keeton. 1994. *Beneath these waters: Archeological and historical studies of 11,500 years along the Savannah River*. Atlanta: National Park Service.
Kristiansen, K. 2011. Theory does not die it changes direction. In *The death of archaeological theory?* ed. J. Bintliff and M. Pearce, 72–79. Oxford: Oxbow Books.
Layton, T. 1999. *The voyage of the frolic*. Stanford: Stanford University Press.
Layton, T. 2002. *Gifts from the celestial kingdom*. Stanford: Stanford University Press.
Lopiparo, J., and R. Joyce. 2003. Crafting cosmos, telling sister stories, and exploring archaeological knowledge graphically in hypertext environments. In *Ancient muses: Archaeology and the arts*, ed. J. Jameson Jr., C. Finn, and J. Ehrenhard, 193–205. Tuscaloosa: University of Alabama Press.
Nelson, S. 1999. *Spirit bird journey*. Littleton: RKLOG Press.
Nelson, S. 2004. *Jade dragon*. Littleton: RKLOG Press.
Pluciennik, M. 1999. Archaeological narratives and other ways of telling. *Current Anthropology* 40 (5): 653–678.
Praetzellis, M., ed. 1998. Archaeologists as storytellers. *Historical Archaeology* 32.
Praetzellis, A. 2011. *Death by theory: A tale of mystery and archaeological theory*. Lanham: AltaMira Press.
Praetzellis, A., and M. Praetzellis. 1984. *Gone, but not forgotten: Historical glimpses of the Lake Sonoma area*. San Francisco: US Army Corps of Engineers.
Spector, J. 1993. *What this awl means: Feminist archaeology at a Wahpeton Dakota village*. Minneapolis: Minnesota Historical Society Press.
Stone, L. 1979. The revival of narrative: Reflections on a new old history. *Past and Present* 85: 3–24.
Thomson, R., and M. Harper. 2000. *Telling the stories*. Washington, DC: National Park Service.
Tilley, C. 1997. *A phenomenology of landscape: Places, paths and monuments*. Oxford: Berg.
Tringham, R. 2010. Back in my hometown. Available at: http://www.ruthtringham.com/Ruth_Tringham/Opera_links.html. Accessed 17 July 2012.
White, H. 1973. Interpretation in history. *New Literary History* 4 (2): 281–314.

Further Reading

Praetzellis, A. 1998. Why every archaeologist should tell stories once in a while. *Historical Archaeology* 32 (1): 1–3.
Praetzellis, A., and M. Praetzellis. 1998. A Connecticut merchant in Chinadom: A play in one act. *Historical Archaeology* 32 (1): 86–93.
Tringham, R. 2003. Real audiences and virtual excavations (RAVE): The construction of a cultural heritage place at Çatalhöyük. *Society for California Archaeology Newsletter* 37 (1): 18.

Nasca and Pampa Jumana Lines and Geoglyphs

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State of Knowledge and Current Debates

Thousands of giant ground drawings scribed by ancient inhabitants onto the Pampa Jumana of southern Perú in the Río Grande de Nazca ("Nasca" refers to the archaeological culture; "Nazca" refers to geographic locations) drainage are known as the "Nasca geoglyphs" or "Nasca lines." Artifacts associated with the geoglyphs suggest that they were known and used as early as the Early Horizon through Inca domination (Table 1).

Although the region lies on the northern extent of the arid Atacama Desert, adjacent river valleys are generally reliable sources of water and excellent soils for agriculture and habitation. The Pampa Jumana, measuring approximately 3 × 10 km, contains the densest concentration of geometric and biomorphic figures. Geoglyphs, predominantly geometric beyond this bounded region, are found north in the Palpa Valley and south of Nazca along the foothills of the Andes mountains (MAP). The style and content of many of the geoglyphs echo other forms of artistic expression of pre-Nasca and Nasca cultures, while other geoglyphs appear to lie outside the known artistic corpus.

Nasca and Pampa Jumana Lines and Geoglyphs, Table 1 South Coast of Perú cultural chronology

Formative Period	1800-800 BCE
Early Horizon (Ocucaje)	800-200 BCE
Early Intermediate period (Nasca)	200 BCE – 650CE
Middle Horizon (Huari influence)	650-1000 CE
Late Intermediate Period (Ica)	1000-1450 CE
Late Horizon (Inca)	1450-1532 CE

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The geoglyphs were noted in 1926 by the archaeologists Kroeber, Tello, and Mejia while they were undertaking archaeological survey in southern Perú (Mejia Xesspe 1940). The sixteenth-century Spanish chronicler Pedro Cieza de León may have referred to the geoglyphs in 1553, and in 1586 the provincial magistrate Luis de Monzón referred to "caminos" – roads – in southern Perú that were likely the long linear geoglyphs abundant throughout the region (Clarkson 1985).

Systematic studies of the Nasca geoglyphs began in the 1940s and have expanded to explore their role in the worldview and lifeways of the inhabitants of the region, including astronomy, calendars, religion, and agriculture. Scholarly research in the Nazca region has been broad based, encompassing archaeology, history, ethnography, art history, hydrology, geology, and geography (Kosok 1965; Reiche 1980; Reinhard 1985; Hadingham 1987; Morrison 1987; Aveni 1990, 2000; Aveni and Silverman 1991; Rickenbach 1999; Silverman and Proulx 2002). More recent research has included the use of remote sensing technologies to identify additional archaeological sites related to geoglyphs, particularly in the adjacent region of Palpa (Isla and Reindel 2005; Sauerbier et al. 2006; Lambers and Sauerbier 2009; Reindel and Wagner 2009). Additionally, much literature on Nasca geoglyphs falls within the realm of unsystematic research, and Nasca culture and geoglyphs are perhaps better known for popularized fantastic claims that have little or no context within Andean culture history. Such claims deny the ingenuity, creativity, and intelligence of a rich cultural adaptation that thrived for hundreds of years in one of the driest deserts in the world.

Nasca geoglyphs are intentional human-created renderings of biomorphic, geometric, and abstract forms and are situated on stable surfaces of the desert adjacent to the river valleys of the region. There is evidence of use and reuse of the geoglyphs, beginning with the Early Horizon.

The manufacture of geoglyphs was easily accomplished, requiring neither great strength nor large numbers of people; the execution of the geoglyphs did require forethought, planning, and skill. The desert surface is a natural palette, comprised of light-colored alluvial outwash from the Andean foothills, overlain by stones with dark-colored desert varnish. A "subtractive" geoglyph is made by removing or sweeping aside stones to reveal the lighter-colored substrate in sharp contrast. An "additive" technique provides visual definition to a geoglyph by contrast and shadows cast by low continuous mounds of stones swept aside to outline the desired form. Both manufacturing techniques are stable enough to withstand substantial winds, rain, and earthquakes. The need invoked in the popular literature for aerial viewpoints to see the geoglyphs disregards the parameters of Nasca geoglyphs as non-static images and presupposes a Western tradition of viewing "art" on a vertical surface. The linear geoglyphs are easily visible from the ground from a fixed point on the geoglyph. Conversely, the biomorphic figures, measuring up to 125 m, cannot be fully seen from a static location; there are no natural elevated locations from which the biomorphic figures can be seen, and there is no evidence of constructions. The biomorphic figures were rendered by a single line the width of a walking path that delineates the figure; "seeing" a figure requires experiencing it by walking through the shape.

The motifs of Nasca geoglyphs include naturalistic and abstract (biomorphic) and geometric forms. Flora and fauna associated with motifs on ceramics, textiles, gourds, and other contemporaneous media provide information on naturalistic and abstract imagery. Geometric lines, trapezoids, and spirals are widespread throughout the Nazca region. Straight lines associated with "line centers" emanate from natural projections of the Andean foothills onto the pampas; these lines range up to several kilometers long. The lines extend unerringly straight, regardless of the terrain, suggesting a necessity of form that ignores convenience and suggests ritual walking. The geometric forms are not clearly identifiable in other forms of Nasca material culture, although Andean concepts of radiality associated with kinship, society, numerics, toponomy, and calendrics can be correlated with radiating forms of line centers.

The locations selected to create geoglyphs were deliberately and carefully chosen to avoid areas affected by water. The annual rise in the rivers running through the region, resulting from seasonal precipitation in the Andes, is confined to the rivers, and water flow through the pampa quebradas is minimal and predictable. An exception is found in long straight lines which can run for several kilometers, many of which cross seasonal watercourses. When a line cannot be seen on the opposite side of a watercourse, a cairn is usually present to guide the direction. Geoglyphs are also situated on the flanks of low alluvial hills; the visibility of these figures is assured by their elevation (Clarkson 1985).

The purposes and ages of the Nasca geoglyphs have remained at the core of investigations, and applications of new hypotheses and technologies continue to spur debate, reexamination, and reconsideration.

Water has been the basis of several studies over the decades. The water table is alternately very deep on the pampa – i.e., inaccessible – and accessible in the river valleys via natural springs and *pukios* (system of wells and subterranean aqueducts). Seasonal rainfall in the Andes results in an increase in water in the pukios and ability to maintain permanent habitation and agriculture (ONERN 1971). The necessity of assuring reliable water generates cultural responses that are elaborated through ethnographic comparisons that are based on documented factors of Andean cultures (Reinhard 1985; Urton 1990). The pukios are an ingenious water control system built where there was accessible water; the ancient builders not only mentally and physically connected springs with a fluctuating water table where it was relatively close to the surface at the valley bottoms, they avoided unnecessary evaporation of precious water (Clarkson and Dorn 1995; Schreiber and Lancho 1995, 2003).

The twentieth-century rediscovery of the Nasca geoglyphs prompted speculation about their antiquity, particularly because they lack obvious cultural contexts to date them. In spite of controversies about viable dating methods and results (Whitley 2009), independently derived ages (Silverman and Browne 1991; Dorn et al. 2001; Greilich et al. 2004) indicate that the majority of the geoglyphs were made during Nasca culture.

Maximum age estimates can be ascertained by dateable artifacts encountered on geoglyphs. The first systematic age estimates for the geoglyphs of the Pampa Jumana were derived by these means (Hawkins 1974; Clarkson 1990), associating biomorphic geoglyphs within the Nasca culture and geometric geoglyphs with the later Ica culture. The area has been repeatedly traversed since the arrival of Europeans in the sixteenth century, and such age determinations can be confused by more recent visitors redepositing or removing archaeological materials. The time lag between the creation of a geoglyph and deposition of artifacts, either through accident or by design, is indeterminate through this method. Similarly, a ^{14}C age of 525 ± 80 CE obtained by Strong in 1957 from a wooden post in a geoglyph provides no direct evidence of the association of the wood with the geoglyph.

Intrusive features associated with geoglyphs may provide a relative chronological sequence. Aerial photographs can show overlapping geoglyphs, a distinction that is difficult to observe from the ground; the lapse of time between the geoglyph creations is also indeterminate.

Bioarchaeological research related to the Nasca geoglyphs has further added to information about the ages of the geoglyphs, plus the people who were associated with them through ritual and burial. These participants originate both locally and from distant locations in Perú (Conlee et al. 2009; Knudson et al. 2009).

A series of ^{14}C assessments were made on desert varnish on pukios and geoglyphs in the Nazca region in the late twentieth century; the results were and are considered experimental, irrespective of the confirmed fraudulent accusations that the widely tested methodology was rigged (Whitley 2009; Dorn and Krinsley 2011). Significant advances and refinements of the methods to date desert varnish have been developed by Tanzhou Liu (2003; Liu and Broecker 2000, 2007, 2008a, b). Oxidizable carbon ratio (OCR) dating provided viable ages for geomorphological features at Nasca, and this dating

technique can provide more statistically viable ages for geoglyphs (Dorn et al. 1992; Dorn 2004: 18). Optically stimulated luminescence (OSL) has also proved to be a viable means of dating geoglyphs (Rink and Bartoll 2005).

There is no doubt that the geoglyphs were reused: there is no evidence to indicate that the original purpose for which a geoglyph was made maintained an identical use or meaning for ensuing generations or cultures. Astronomy, ritualized travel, pilgrimage, and metaphorical and allegorical water conduits between the Andes mountains and the river valleys (Reinhard 1985; Aveni 1990; Silverman 1993; Vaughn and Van Gijseghem 2007) are well-substantiated hypotheses. Geoglyphs considered within the context of related symbols on ceramics, textiles, and architecture provide insightful information on the environment, subsistence, and belief systems.

Damage and destruction by humans remain the greatest threat to the Nasca geoglyphs, where even footprints persist for decades. The natural environment has remained stable since before human occupation of the region. Rainfall and inundation on the geoglyphs is virtually nonexistent, and the frequent winds are insufficient to dislodge the stones that comprise the geoglyphs. Conservation and protection of the Pampa Jumana is enshrined by Peruvian law, and Nasca geoglyphs were granted World Heritage status in 1994. In spite of rigorous protection, the Nasca geoglyphs and region have been plagued by an increase in land squatters looting, and vandalism (Lasaponara et al. 2012; Lasaponara and Masini 2016; Masini et al. 2016; Tapete et al. 2013). In 2014 Greenpeace activists left a protest message in the midst of the concentrated area of geoglyphs, causing an international uproar and a rapid apology from Greenpeace (Greenpeace 2014).

Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Geoglyphs
- ▶ Landscape Archaeology
- ▶ Rock Art, Forms of
- ▶ South American Rock Art

References

Aveni, A.F., ed. 1990. *The lines of Nazca*, Memoirs of the American Philosophical Society 183. Philadelphia: American Philosophical Society.

Aveni, A.F. 2000. *Between the lines: The mystery of the giant ground drawings of ancient Nasca, Peru*. Austin: University of Texas Press.

Aveni, A.F., and H. Silverman. 1991. Between the lines: Reading the Nazca markings as rituals writ large. *The Sciences* 31 (4): 36–42.

Clarkson, P.B. 1985. The archaeology and geoglyphs of Nazca, Peru. Unpublished PhD dissertation, University of Calgary.

Clarkson, P.B. 1990. The archaeology of the Nazca Pampa, Peru: Environmental and cultural parameters. In *The lines of Nazca*, Memoirs of the American Philosophical Society 183, ed. A. Aveni, 115–172. Philadelphia: American Philosophical Society.

Clarkson, P.B., and R.I. Dorn. 1995. New chronometric dates for the puquios of Nasca, Peru. *Latin American Antiquity* 6 (1): 56–69.

Conlee, C.A., M.R. Buzon, A.N. Gutierrez, A. Simonetti, and R.A. Creaser. 2009. Identifying foreigners versus locals in a burial population from Nasca, Peru: An investigation using strontium isotope analysis. *Journal of Archaeological Science* 36: 2755–2764.

Dorn, R.I. 2004. Experimental approaches to dating petroglyphs and geoglyphs with rock varnish in the California deserts: Current status and future directions. In *The human journey and ancient life in California's deserts*, Maturango museum publication 15, ed. M.W. Allen and J. Reed, 211–224. Ridgecrest: Maturango Museum.

Dorn, R.I., and D.H. Krinsley. 2011. Spatial, temporal and geographic considerations of the problem of rock varnish diagenesis. *Geomorphology* 130: 91–99.

Dorn, R.I., P.B. Clarkson, M.F. Nobbs, L.L. Loendorf, and D.S. Whitley. 1992. New approach to the radiocarbon dating of rock varnish, with examples from drylands. *Annals of the Association of American Geographers* 82 (1): 136–151.

Dorn, R.I., E. Stasack, D. Stasack, and P.B. Clarkson. 2001. Analyzing petroglyphs and geoglyphs with four new perspectives evaluating what's there and what's not. *American Indian Rock Art* 27: 77–96.

Greenpeace. 2014. Greenpeace releases the following apology about the Nasca Lines protest. 6 Oct 2014. Available via http://www.greenpeace.org/usa/research/nazca-apology/ Accessed 22 Oct 2017.

Greilich, S., B. Kromer, I. Unkel, and G. Wagner. 2004. Neue Ansätze der Chronometrie in der peruanischen Archäologie: Ortsaufgelöste Lumineszenz- und AMS-Radiokohlenstoff-Datierung. In *Neue naturwissenschaftliche Methoden und Technologien für die archäologische Forschung in Palpa, Peru*, 27–30. Palpa: Museo de Palpa.

Hadingham, E. 1987. *Lines to the mountain gods: Nazca and the mysteries of Peru*. New York: Random House.

Hawkins, G. 1974. Prehistoric desert markings in Peru. *National Geographic Reports* 1967: 117–144.

Isla, J., and M. Reindel. 2005. New studies on the settlements and geoglyphs in Palpa, Peru. *Andean Past* 7: 57–92.

Knudson, K.J., S.R. Williams, R. Osborn, K. Forgey, and P.R. Williams. 2009. The geographic origins of Nasca trophy heads using strontium, oxygen, and carbon isotope data. *Journal of Anthropological Archaeology* 28: 244–257.

Kosok, P. 1965. *Life, land and water in ancient Peru*. Brooklyn: Long Island University Press.

Lambers, K., and M. Sauerbier. 2009. Context matters: GIS-based spatial analysis of the Nasca geoglyphs of Palpa. In *New technologies for archaeology: Multidisciplinary investigations in Palpa and Nasca, Peru*, ed. M. Reindel and G. Wagner, 321–338. Berlin: Springer.

Lasaponara, R., and N. Masini. 2016. Combating. In *The ancient Nasca world: New insights from science and archaeology*, ed. R. Lasaponara, N. Masini, and G. Orefici, 605–633. Berlin: Springer.

Lasaponara, R., M. Danese, and N. Masini. 2012. Satellite-based monitoring of archaeological looting in Peru. In *Satellite remote sensing*, ed. R. Lasaponara and N. Masini, 177–193. Berlin: Springer.

Liu, T. 2003. Blind testing of rock varnish microstratigraphy as a chronometric indicator: Results of late quaternary lava flows in the Mojave Desert, California. *Geomorphology* 53: 209–234.

Liu, T., and W.S. Broecker. 2000. How fast does rock varnish grow? *Geology* 28: 183–186.

Liu, T., and W.S. Broecker. 2007. Holocene rock varnish microstratigraphy and its chronometric application in the drylands of western USA. *Geomorphology* 84: 1–21.

Liu, T., and W.S. Broecker. 2008a. Rock varnish microlamination dating of late quaternary features in the drylands of western USA. *Geomorphology* 93: 501–523.

Liu, T., and W.S. Broecker. 2008b. Rock varnish evidence for latest Pleistocene millenial-scale wet events in the drylands of western United States. *Geology* 36: 403–406.

Masini, N., M. Danese, A. Pecci, M. Scavone, and R. Lasaponara. 2016. Nasca lines: Space tracking of vandalism. In *The ancient Nasca world*, ed. R. Lasaponara, N. Masini, and G. Orefici, 635–656. Springer International Publishing.

Mejia Xesspe, T. 1940. Acueductos y caminos antiguos de la hoya del Río Grande de Nazca. In *Actas y Trabajos Científicos del 27 Congreso Internacional de Americanistas*, vol. 1, 559–569.

Morrison, T. 1987. *Mystery of the Nasca lines*. Suffolk: Nonesuch Expeditions Ltd.

Onern (Oficina Nacional de Evaluación de Recursos Naturales). 1971. *Inventario, evaluación y uso racional de los recursos naturales de la costa: cuenca del Río Grande v 1 & 2*. Lima: Presidencia de la República, Perú.

Reiche, M. 1980. *Geheimnis der Wüste/Mystery on the desert/Secreto de la pampa*. Stuttgart: Heinrich Fink Gmbh & Co.

Reindel, M., and G. Wagner, eds. 2009. *New technologies for archaeology: Multidisciplinary investigations in Palpa and Nasca, Peru*. Berlin: Springer.

Reinhard, J. 1985. *The Nazca lines: A new perspective on their origin and meaning*. Lima: Editorial Los Pinos.

Rickenbach, J., ed. 1999. *Nasca: geheimnisvolle Zeichen im Alten Peru*. Zurich: Museum Reitberg.

Rink, W.J., and J. Bartoll. 2005. Dating the geometric Nasca lines in the Peruvian desert. *Antiquity* 79: 390–401.

Sauerbier, M., G. Schrotter, H. Eisenbeiss, and K. Lambers. 2006. Multi-resolution image-based visualization of archaeological landscapes in Palpa (Peru). In *From space to place (Proceedings of the 2nd international conference on remote sensing in archaeology, BAR international series 1568)*, ed. R.L. Campana and M. Forte, 353–359. Oxford: Archaeopress.

Schreiber, K.J., and J. Lancho. 1995. The puquios of Nasca. *Latin American Antiquity* 6 (3): 229–254.

Schreiber, K.J., and J. Lancho. 2003. *Irrigation and society in the Peruvian desert: The puquios of Nasca*. Lanham: Lexington Books.

Silverman, H. 1993. *Cahuachi in the ancient Nasca world*. Iowa City: University of Iowa Press.

Silverman, H., and D. Browne. 1991. New evidence for the date of the Nasca lines. *Antiquity* 65: 208–220.

Silverman, H., and D. Proulx. 2002. *The Nasca*. Malden: Blackwell.

Tapete, D., F. Cigna, N. Masini, and R. Lasaponara. 2013. Prospection and monitoring of the archaeological heritage of Nasca, Peru with ENVISAT ASAR. *Archaeological Prospection* 20: 133–147.

Urton, G. 1990. Andean social organization and the maintenance of the Nazca lines. In *The lines of Nazca*, Memoirs of the American Philosophical Society 183, ed. A. Aveni, 173–206. Philadelphia: American Philosophical Society.

Vaughn, K., and H. Van Gijseghem. 2007. A compositional perspective on the origins of the "Nasca cult" at Cahuachi. *Journal of Archaeological Science* 34: 814–822.

Whitley, D.S. 2009. *Cave paintings and the human spirit: The origin of creativity and belief*. Amherst: Prometheus Books.

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Basic Biographical Information

Dr. George Nash is currently an associate professor, a senior researcher at IPT Portugal, and a lecturer at the Museum of Prehistoric Art (Quaternary and Prehistory Geosciences Centre, Macao, Portugal). George has been a professional archaeologist for the past 30 years and has undertaken extensive fieldwork on prehistoric rock art and mobility art in Chile, Denmark, Israel, Indonesia, Malaysia, Norway, Spain, and Sweden (Fig. 1). Between 1994 and 1997, he directed excavations at the La Hougue Bie passage grave on Jersey, one of Europe's largest Neolithic monuments, and has directed excavations at the World Heritage Site and Grade I listed building of Westminster Hall, London.

Nash, George, Fig. 1 Dr. George Nash

Major Accomplishments

George Nash has written and edited many books on prehistoric art and prehistoric monumentality including *Status, Exchange and Mobility: Mesolithic Portable Art of Southern Scandinavia* (1998), *Signifying Place and Space: World Perspectives of Rock Art and Landscape* (2000), *European Landscapes of Rock-Art* (2002) (Fig. 2), *The Figured Landscapes of Rock-art: Looking at Pictures and Place, edited with Christopher Chippindale* (2004), *The Architecture of Death* (2006), *Art as Metaphor* edited with Aron Mazel and Clive Waddington (2007) (Fig. 3), *The Archaeology of People and Territoriality* (2009) and *The Levantine Question* (2012) and, *the most recent publication Archeologies of Rock Art: South American Perspectives* (2018).

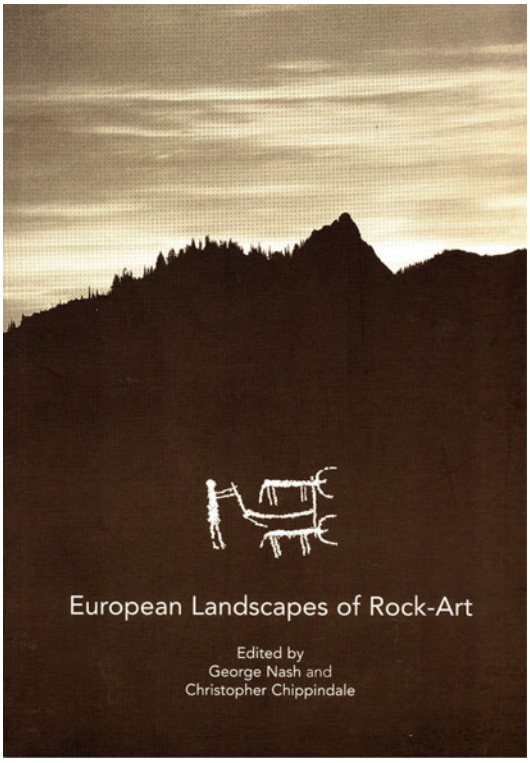

Nash, George, Fig. 2 *European Landscapes of Rock-Art* (Edited by George Nash and Christopher Chippindale (Routledge))

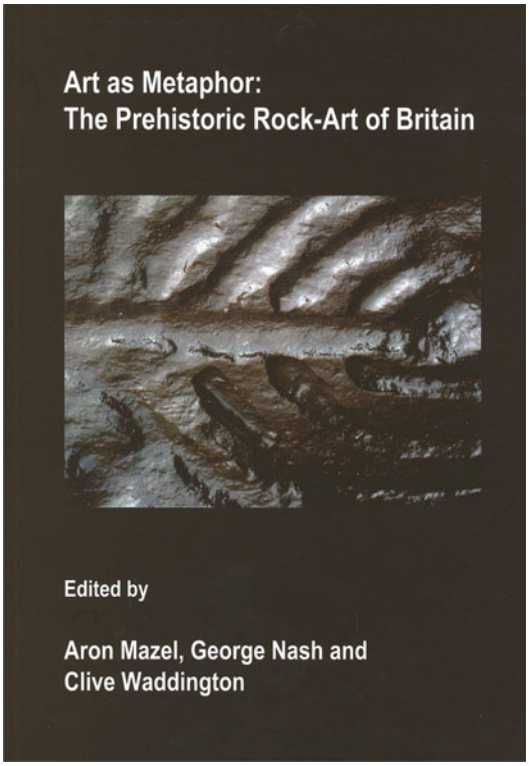

Nash, George, Fig. 3 *Art as Metaphor: The Prehistoric Rock-art of Britain* (Edited by Aron Mazel, George Nash, and Clive Waddington (Archaeopress))

Dr. Nash has authored 120 peer-reviewed papers and has edited, co-edited, and written over 30 books. George is currently involved in four major rock-art recording and interpretation projects in the central Andean region of Chile, the Golan Heights and Negev desert of Israel, and the Val Camonica in Northern Italy, looking at Iron Age house carvings. In Wales, he is co-director of the Welsh Rock Art Organisation (WRAO) and is about to coordinate and direct a rock-art landscape project in Staffordshire, Central England. He has also written and presented programs on European rock art and contemporary graffiti for the BBC and has presented programs in Europe and North America. George is also currently involved in two projects: a pigment analysis on painted imagery in Iberian megaliths and establishing a prehistoric rock-art inventory for Wales.

Since 2009 George Nash has directed a number of major field projects including an excavation of a Neolithic gallery grave in Delancey Park, north of St. Peter Port, Guernsey, part of a 3-year project, and a Neolithic portal dolmen in South West Wales. In 2010, George made the discovery in a South Wales cave of Northwestern Europe's oldest rock art which was dated using uranium-series disequilibrium dating methods to c. 14,505 BP.

In 2011 and as part of his ongoing publishing commitments, George has co-edited and published two seminal works, *European Landscapes of Rock-Art* (2002), with Christopher Chippindale (Fig. 2) and was also part of the editorial team responsible for the publication of *Art as Metaphor* (2007) (Fig. 3). Recently, George has published (with the late Andrew Townsend) *Decoding Neolithic Atlantic and Mediterranean Islands* (2016).

Cross-References

► European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
► Palace of the Boyne (Brú na Bóinne)

References

Chippindale, C., and G.H. Nash, eds. 2004. *Figurative landscapes of rock-art*. Cambridge, UK: Cambridge University Press.

Garcia Arranz, J.J., H. Collado Giraldo, and G. Nash, 2012. The Levantine question: post-palaeolithic rock art in the Iberian Peninsula. El problema "Levantino": Arte Rupestre post-paleolitico en la Península Ibérica. Archaeolingua: Budapest.

Mazel, A., G.H. Nash, and C. Waddington, eds. 2007. *Metaphor as art: The prehistoric rock-art of Britain*. Oxford: Archaeopress.

Nash, G.H. 2006a. *The architecture of death: The Neolithic chambered monuments of Wales*. Hereford: Logaston.

Nash, G.H., and C. Chippindale. 2002. *European landscapes of rock-art*. London: Routledge.

Further Reading

Nash, G.H. 2006. Light at the end of the tunnel: The way megalithic art was viewed and experienced. *Documenta Praehistorica* XXXIII: 209–228.

Nash, G.H. 2011. Replicating cultural landscapes: Interpreting rock-art in the Valcamonica, Lombardy, Italy. *Landscapes Journal* 2: 1–19.

Nash, G.H. 2012. Megalithic rock art of the Mediterranean and Atlantic seaboard Europe. In *A companion to rock art*, ed. J. McDonald and P. Veth, 127–142. New York: Blackwell.

Nash, G.N., P. van Calsteren, L. Thomas, and M.J. Simms. 2012. A discovery of possible upper palaeolithic parietal art in Cathole cave, Gower Peninsula, South Wales. *Proceedings of the University of Bristol Spelaeological Society* 25 (3): 327–336.

Nationalism and Archaeology

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Introduction

Throughout the last two centuries, nationalism has played an increasingly key role in world politics. Scholarship, however, only awoke to its significance and started analysing it after World War II (Kohn 1946), especially from the late 1960s on (Barnard and Mechner 1965; Deutsch 1966; Kedourie 1966; Smith 1976; Hobsbawm 1990). With the exception of a few comments made by early scholars (Myers 1907: 319; Himmelman 1976: 119–130), it has only been in the last few years that archaeologists have come to realise the importance of discussing the effect that nationalism has had on the discipline and the way in which archaeologists interpret the past. In this, as in many other aspects, archaeologists demonstrate that they are citizens of the world and that the experiences they live through influence their professional practice. This upsurge in interest among archaeologists is related to the rise of nationalist movements throughout the world, due to the end of political regimes in countries such as Spain, Yugoslavia and the USSR, in some cases resulting in conflict and the appearance of new nation-states, political changes that archaeologists have personally experienced. National and ethnic identities are often overlapping phenomena, and recent ethnic conflicts, such as those in Jerusalem and India, have also involved nationalistic uses of archaeological remains that archaeologists have had to deal with. Ethnic conflicts are also behind political claims of indigenous communities throughout the world; these are having a profound effect on the practice of archaeology in an increasing number of countries, leading to a transformation in the definition of archaeology and a change in what it means to be an archaeologist.

Definition

Nationalism is a doctrine that holds that 'humanity is naturally divided into nations, that nations are known by certain characteristics which can be ascertained, and that the only legitimate type of government is national self-government' (Kedourie 1993: 1). For the last two decades, however, many scholars have emphasised the constructivist nature of the nation, arguing that nations do not have an objective existence. Nations are imagined communities (cf. Anderson 1991), whose individuals see themselves as bound together by their culture, history, and common ancestry. Archaeology's potential to provide the nation with information about these ties, especially where history is not able to do this, makes this discipline important in the eyes of the nation.

It is now broadly accepted that archaeology is one of a range of disciplines that feeds national history and national identity. National history needs a past and its drafting usually takes the form, for the earliest periods, of a discrete number of archaeological cultures that are then identified with a particular ethnic group considered to be the origin of the modern inhabitants of the nation. Territory, politics and ethnicity are thus intertwined. Migration and adaptation are often the mechanisms used to explain changes in material culture over time, together with, in many cases, the arrival in the area of new ethnic groups that are also integrated into the national history in some capacity (either as new members of the nation or as its foes). Therefore, national narratives need archaeology, but they also need other disciplines such as history, philology and anthropology. Depending on the way in which the nation is described, some of these disciplines will have more importance than others. Thus, philology is highly considered and subsidised in countries where the national language is key to national identity. Archaeology has a high status in countries where archaeologists provide a wealth of data to describe a nation's Golden Age; Italy and Mexico with their Roman and Aztec pasts are good examples of this. However, although archaeology may not be able to provide such highly esteemed data to explain national identity in other areas of

the world, the information from archaeologists is still useful for writing the nation's history, and this explains the global presence of archaeologists in every country. Their role as data providers for writing the record of the national past is still needed, as national history is not a static narrative, but one that needs to be continuously negotiated and recreated. What it means to be a Canadian or an Australian today is different from what it meant only half a century ago. This explains the continuing importance of archaeology, and how the past of these countries is understood has moved on from the narrative held decades ago. With their practice, archaeologists have been active creators of national identity everywhere in the world, and have also provided the information for others to recreate the national past.

Historical Background

The relationship between nationalism and archaeology started with Modernity, i.e., with the creation of the modern state, although there are precedents in the early modern period and before. The word nation derives from Latin and originally referred to a group of people born in the same territory, either a region or a country. It was used as such in the medieval period and found, for example, in English documents in the formula super omnes nationes. We can find a few examples of the use of the classical past in the medieval period, such as the selection of classical themes to decorate Charlemagne's coffin. However, the main language at the time was that of the Bible. It was during the Renaissance that Europe rediscovered the classical world. The development of urban centres allowed the emergence of a new group in society formed by merchants and traders and a growth in the economic power of the nobility and the monarchy. All these groups needed new forms of political self-definition and new ways of expressing power that would symbolically separate the rulers from the religious medieval discourse, and this was achieved through the language and imagery of Antiquity. Thus, the Roman dictator Cola di Rienzo (c. 1313–1354) legitimised a newly created Roman Republic with the use of the recently discovered fragmentary copy of Vespasian's Lex de Imperio from the first century. This was probably the first time, but by no means the last, that an archaeological object was used to claim political rights in the early modern age.

The concept of the state accepted in Modernity came to be in the early modern era: the use of vernacular languages, the monetisation of the economy, and the decline of the three-order society (peasantry, nobility and clergy). The classical past became one of the main forms of expressing power, and classical antiquities were thus turned into political and social assets. This explains the excavations undertaken from the sixteenth century on in those countries where the Roman Empire had been present, and the collections of antiquities gathered in cabinets of curiosities. It also explains how in the political revolutions of the last third of the eighteenth century, the past appropriated was that of the Classical Civilisations – mainly Rome, but also Greece and Egypt. The idea of the Classical was associated with all that was right, good and useful, and the newly self-defined nations felt confident in considering themselves the true inheritors of Classical Greece and Rome. In this, as in everything else in these first decades of nationalism, the realities on the ground show that there are no clear-cut features that completely separate the onset of the political use of archaeology from the previous period.

The term 'civic nationalism' (also confusingly known as 'political nationalism') has been used by scholars of nationalism to refer to the earliest type of nationalism, characterised by an understanding of individuals as political beings whose self-fulfilment was linked to citizenship and patriotism. The frequent links between these and the Classical past explains the importance given to antiquities in the first museum opened for the enjoyment and enlightenment of a nation – the Louvre, the transfer of antiquities from Rome to Paris during the Napoleonic occupation of Rome, and the inclusion of an antiquarian on the Commission of Sciences and Arts sent to Egypt to learn about the country. The importance of the past – and in particular, the spectacular

monumental remains left behind by ancient civilizations – was also paramount in the earliest nationalist uprisings, when the presence of remains in the territory that were linked to vanished great civilisations was used to justify the national character of the revolutionaries both in Greece and the Spanish Latin American colonies.

However, the character of nationalism changed in the 1840s, and this had a profound effect on the main interests driving the search for antiquities. The task scholars undertook in rationalising cultural and national difference came together with an increasing importance given to language and race in defining the nation. Experts in the study of nationalism have designated this new phenomenon as "mystical" nationalism and, more recently, "cultural" or "ethnic" nationalism. In ethnic or cultural nationalism, nations are defined as units formed by individuals who share a common history and, therefore, form part of the same ethnic group – or, in nineteenth-century parlance, race – speak the same language, and share a distinctive set of customs or culture. A series of new disciplines were professionalised at the time in connection with the new definition of nationalism: first philology and then, in the middle decades of the century, physical anthropology. At the time, the assumption was that the concept of nation was objective and unproblematic, and therefore most believed that there was a direct correspondence between language, race and nation, or, as the latter became increasingly known, culture.

Unsurprisingly, the transformation of the meaning of nation and nationalism from civic to cultural nationalism influenced the study of the archaeological past. The national past became not only that of the Classical civilisations (associated with the ideas of the Good, the Rational and the Truth), but also increasingly that of the groups who had actually lived in the country. In Europe, this led to the social recognition of enquiries about the prehistoric and medieval pasts. For the periods in which no documents existed, the groups inhabiting the national territory were identified by scholars on the basis of the information provided both by the Bible and the Classical sources. It became increasingly clear that the professionalization of the teaching of national prehistoric and medieval archaeology was needed; however, although some posts were created in universities and similar learning bodies, this would mainly have to wait until the twentieth century. In universities and museums, it was more common to find specialists in the archaeology of the ancient Classical civilisations. Beyond Europe racism affected archaeology in two ways. On the one hand, monuments produced by ancient civilisations were considered to have been made by lesser races, and in comparison to the always superior Classical model, they were deemed inferior. On the other hand, where no monuments existed, the indigenous populations living in the area were considered to be a suitable source of information about the prehistoric times. The increasing importance of imperialism as an accurate method of considering a nation's success only exacerbated these trends. Yet, it was in this period that the first local archaeologists started to work on the archaeology of the colonial and imperial areas with no tradition of Western antiquarianism; countries such as India, Indonesia, Egypt and the Ottoman empire. They had to overcome many difficulties to be accepted as members of the profession and to have their opinions heard, not least because of the obstacles created by their fellow imperial colleagues.

After World War I, nationalism became universally accepted as the proper political method for legitimising the political division of the world into sovereign states. In archaeology, this translated into a definite interest in archaeological cultures and ethnogenesis, the latter being the search for the origin of a single ethnic group that characterised the nation, or that of the mixing of many different ethnic groups (see the concept of mestizaje in much of Latin America). It also translated into further growth in the institutionalisation of archaeology, with the creation of more museums, university chairs in archaeology, in which prehistoric and medieval archaeology had an increasing presence, and a generalisation of heritage offices in a rising number of countries. The instability created by the agreements drafted at the close of World War I, however, led to a crisis in democracy and the emergence of extreme

nationalism, especially in Europe. The practice of archaeology reflected this, particularly in countries where the Golden Ages of the nation were able to benefit from archaeologists' work. On the one hand, the number of jobs increased significantly. Examples of this in Europe are an explosion in the number of departments of Prehistory in Germany, and also the increase in funding for Roman archaeology in Italy. On the other hand, this came together with an imbalance in the archaeological periods for which the state was prepared to fund research, resulting in prioritising work on the periods and types of data that justified political narratives. Unfortunately, as happened at excavations such as the Ara Pacis and the Ostia harbour in Italy, the search for immediate results compromised the quality of the work. The political support for racism also led to an increase in archaeology interpreted racially in order to fit contemporary politics. The potentially harmful effects of state funding were a matter of debate in countries such as Britain that were still clutching to democratic regimes, and was reflected, for example, in the conference on 'The Future of Archaeology' held in London in 1943.

The end of World War II soon meant the division of the world into two blocks, in what became known as the Cold War. The state of political affairs affected archaeology in many ways. On the western side of the Iron Curtain, most countries in Europe and America went through a period of apolitisation, partly as a reaction to the previous abuses and to a genuine desire for scientific objectivity. However, in countries such as the US, the McCarthy era had a chilling effect on any political leanings archaeologists may have had. There, rather than being a choice, apolitisation became a self-enforced practice. To the east of the Iron Curtain, archaeology was used under Soviet nationalism to legitimise the political regimes with a generalisation of ethnogenetic studies. In the developing world, the decolonisation of countries, including many in Africa, led to a process of nation-building that had an impact not only on the use of archaeology to create a national past for the new nation, but also on its institutionalisation. A similar process has occurred since the dismembering of the Soviet Union in 1991.

Key Issues and Future Directions

In addition to the nationalisation of the archaeological past going on in the new nation-states, an alternative process has been taking place among indigenous peoples around the globe. To a great degree, this is a movement that can be equated with nationalism. In the United States, the civil rights movement of the mid-1950s raised awareness of the rights Native Americans should have. The American Indian Movement (AIM) was formally founded in 1968 and actions quickly began against archaeologists and physical anthropologists. Their claims were soon heard in other English-speaking areas of the world, and demands to control their past also started in these areas. The demands of indigenous peoples led to legislation such as NAGPRA in the US in 1990 and the Mabo decision of the Australian High Court in 1992, recognising native title to lands in Australia. In addition, there has been a movement for the return of cultural property held in museums to indigenous populations and the repatriation of human remains. The repatriation of antiquities is also being sought by sovereign states on the basis that they were illegally removed from those countries. Examples of this are Greece's request for the return of Elgin Marbles and Guatemala's demand for the Boston Museum of Fine Arts to return the Landon T. Clay collection of Mayan antiquities. The new climate created by these claims and the successes in defying the priority given so far to members of the archaeological profession to rule on everything related to the physical remains of the past has led to new petitions by other communities. These include those from local communities in Europe and elsewhere over the archaeological remains found in their own parish or province, and other faith-based communities such as Hindus, modern re-created beliefs such as Druids, and gender-based movements such as the Mother Goddess movement. The challenges created by all these competing claims to the past are having a profound effect on the makeup of archaeological practice.

Most current debates on the relationship between nationalism and archaeology assess archaeology's potential for nationalist manipulation (Kohl and Fawcett 1995; Atkinson et al. 1996;

Díaz-Andreu and Champion 1996; Silberman and Small 1997; Meskell 1998; Díaz-Andreu 2007; Kohl et al. 2007). Most of the studies of nationalism and archaeology of this kind have looked into particular case studies, and there is an increasingly bulky literature on the subject. The challenges facing archaeology today have also led to a flurry of discussion meetings and publications (Gathercole and Lowenthal 1990; Barkan and Bush 2002; Wylie 2005; Brunk and Young 2009). One of the latter trends regarding studies of the relationship between nationalism and archaeology relates to some recent studies that have paid attention to the commodification of the past and the national marketing of heritage (Rowan and Baram 2004; Pomeroy-Kellinger and Scott 2007).

There are several theoretical discussions in which archaeologists looking at the influence of nationalism on their discipline could engage more widely. One of them is the idea of banal nationalism. Billig (1995) analyses how individuals internalise their national identity so that they perceive themselves as members of the nation even if they are not explicitly reminded of it. It is possible to argue that archaeology is potentially a part of the routine of the national forms and symbols that allow the transformation of nationalism into national identity. Archaeological symbols on coins, such as the owl of Athena on Greek one-euro coins or the Pharaoh's bust on Egyptian one-pound coins, help to reproduce the nation. Archaeological practice also has nationhood continually in its background. The productions of the archaeological profession – national conferences, the language used in publications, and the territory covered in journals and books – are daily reminders of national identity.

Cross-References

- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Modern World: Historical Archaeology
- ▶ Supermodernity and Archaeology

References

Anderson, B. 1991. *Imagined communities. Reflections on the origin and spread of nationalism*. 2nd ed. London: Verso.

Atkinson, J.A., I. Banks, and J. O'Sullivan, eds. 1996. *Nationalism and archaeology*. Glasgow: Cruithne Press.

Barkan, E., and R. Bush, eds. 2002. *Claiming the stones, naming the bones: Cultural property and the negotiation of national and ethnic identity*. Los Angeles: Getty Research Institute.

Barnard, F.M., and F. Mechner. 1965. *Herder's social and political thought: From enlightenment to nationalism*. Oxford: Clarendon Press.

Billig, M. 1995. *Banal nationalism*. London: Sage.

Brunk, C.G., and J.O. Young, eds. 2009. *The ethics of cultural appropriation*. Oxford: Blackwell.

Deutsch, K.W. 1966. *Nationalism and social communication*. 2nd ed. (1st in 1953). Cambridge, MA/London: M.I.T. Press.

Díaz -Andreu, M. 2007. *A world history of nineteenth-century archaeology. Nationalism, colonialism and the past*. Oxford: Oxford University Press.

Díaz -Andreu, M., and T. Champion, eds. 1996. *Nationalism and archaeology in Europe*. London/Boulder: UCL Press/Westview Press.

Gathercole, P., and D. Lowenthal, eds. 1990. *The politics of the past*. London: Unwin Hyman.

Himmelman, N. 1976. *Utopische Vergangenheit. Archäologie und moderne Kultur*. Berlin: Mann.

Hobsbawm, E.J. 1990. *Nations and nationalism since 1780: Programme, myth, reality*. Cambridge: Cambridge University Press.

Kedourie, E. 1966. *Nationalism*. 3rd ed. London: Hutchinson University Library.

Kedourie, E. 1993. *Nationalism*. 4th ed. Oxford: Blackwell.

Kohl, P.L., and C. Fawcett, eds. 1995. *Nationalism, politics, and the practice of archaeology*. Cambridge: Cambridge University Press.

Kohl, P., M. Kozelsky, and N. Ben-Yehuda, eds. 2007. *Selective remembrances: Archaeology in the construction, commemoration, and consecration of national pasts*. Chicago: University of Chicago Press.

Kohn, H. 1946. *The idea of nationalism*. New York: Macmillan.

Meskell, L., ed. 1998. *Archaeology under fire. Nationalism, politics and heritage in the Eastern Mediterranean and Middle East*. London: Routledge.

Myers, J.L. 1907. The making of modern archaeology. *The Burlington Magazine for Connoisseurs* 10: 317–319.

Pomeroy-Kellinger, M., and I. Scott, eds. 2007. *Recent developments in research and management at world heritage sites*, Oxford Archaeology Occasional Paper 16. Oxford: Oxford Archaeology.

Rowan, Y., and U. Baram, eds. 2004. *Marketing heritage: Archaeology and the consumption of the past*. Walnut Creek: Altamira Press.

Silberman, N.A., and D. Small, eds. 1997. *The archaeology of Israel: Constructing the past, interpreting the present*, Journal for the Study of the Old Testament Supplement series 237. Sheffield: Sheffield Academic Press.
Smith, A.D. 1976. *Nationalist movements*. Basingstoke: MacMillan.
Wylie, A. 2005. The promise and perils of an ethic of stewardship. In *Embedding ethics*, ed. L. Meskell and P. Pels, 47–68. Oxford/New York: Berg.

Nationalism and Archaeology: Overview

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State of Knowledge and Current Debates

Introduction

Nationalism is an ideology and social practice which makes the "nation" the major political agent and privileges national interests over all the others. In relation to incorporation rules, scholars distinguish between civic nationalism (inclusive) which embraces all people having citizenship and ethnic nationalism (exclusive) which selects people depending on their origins (on the principle of "blood" which usually emphasizes ethnic origins through paternal or maternal lines or both). With reference to goals, one can distinguish between political, economic, and cultural nationalisms. Nationalism usually (although not always) refers to shared language and culture, their continuity in time, and ethnic roots in a given geographical area. Imagination and emotions play an important role in the development of these ideas. An image of a cohesive and rooted community serves to legitimate a nation's claims for sovereignty within a well-bounded territory. All these images and ideas need to be supported with solid scholarly arguments including references to the traces of the ancestors' activity materialized in historical and archaeological sites and monuments.

It can also be argued that nationalism served to enhance archaeology's professionalization in many areas as well as further its institutionalization. This is because archaeology has been used in numerous instances to claim a nation's long continuity in time through its rich past and ancient roots. For this goal an essentialist approach has often been exploited – one which reifies the nation in order to increase national consolidation. This approach has obtained a new direction under globalization of which by-products have been localization and a passion for local identities. As a result, the role of "ethnic nationalism" has evolved and become more complex. The struggle for recognition has intensified in many places, and cultural heritage claims have become an important social symbol legitimizing political and cultural assertions for many groups. Some crucial questions arise from these concepts however such as what is included or excluded from a "national heritage"? and whose heritage is it that is being privileged?

Archaeology for Nationalism

Archaeology is valued by those wishing to use it for nationalistic purposes for its ability to provide material evidence of long cultural continuity and to establish links with remote ancestors. Even recent newcomers can be fascinated with their predecessors' achievements in the remote past (e.g., Neolithic shrines are considered national treasury in Malta; see Fig. 1). A presentation of the ancestors' advancements (e.g., various inventions, monument buildings, writing, or a formation of state) including discoveries of new lands plays a great positive role. All of these images may provide psychological comfort and foster self-respect. In addition, the remembrance of glorious ancestors may also be used by people who have experienced historical trauma (e.g., colonial suppression, discrimination, ethnic cleansings, and especially genocide).

Even in cases where ancestors may have suffered defeats, an idea of heroism and sacrifice for the sake of people's freedom may still be valued. Material evidence of such feats (e.g., Masada in Israel – see Fig. 2, Numancia in Spain, and Alésia in France) become national holy places and sites

Nationalism and Archaeology: Overview, Fig. 1 Neolithic shrine in Malta. (Author's photo)

Nationalism and Archaeology: Overview, Fig. 2 Masada, Israel. (Author's photo)

of pilgrimage and respect. All this may assist in the struggle for national independence and sovereignty as well as the building or restoration of a national state. Archaeological findings can also serve as markers of national territory and be used as national symbols (e.g., the state emblem of the Republic of Sakha – see Fig. 3). In addition, special museums may be established to respect ancestors and be illuminated by archaeological findings and discoveries (e.g., as in the case of the Museum of the Yayoi culture, Osaka, Japan – see Fig. 4). Monuments of national glory can also

be designed using archaeological prototypes (as in the case of Almaty, Kazakhstan – see Fig. 5). Archaeological artifacts too can be represented in national decorations, design elements, and national costume as well as in art, theater, and cinema. Sometimes they are depicted on banknotes and coins, postcards, and stamps and used in advertisements (e.g., Aztec Templo Mayor on Mexican coins; the lur, the sun-wagon, and the "Golden Horns" on Danish coins; a Chalcolithic pot from Vuchedol on the Croatian banknote; the Saka warrior on the Kazakhstan banknote – Fig. 6). Newly established ethnic (pagan) religions (i.e., neo-pagan religions being a segment of the New Age religiosity) encourage worship of grave mounds, dolmens, and ancient stone idols. Some archaeological sites have also become centers of worship and places of pilgrimage (e.g., Stonehenge in England, the Bronze Age site of Arkaim in the Southern Urals – see Fig. 7 – or the medieval town of Bulgar in Tatarstan). All these manifestations and developments are encouraged by a nationalism aspiring to strengthen its positions with references to the remote past.

Nationalism and Archaeology: Overview, Fig. 3 The state emblem of the Republic of Sakha. (Author's photo)

A view of the past is commonly exploited by the state as the key symbolic resource to claim the given territory and to establish its borders, as well as for territorial expansion, struggle for spheres of interests, legitimation of power in general, and colonial rule in particular. At the same time the colonial and Indigenous peoples refer to the remote past to claim their right for independence (this was characteristic in colonial times – e.g., for the Indian nationalists who glorified the Aryans and for the Black African leaders in South Rhodesia who referred to the Great Zimbabwe – and also in certain federal multicultural states, e.g., in the USSR where the Armenians were searching for their ancestors in the state of Urartu). Thus, archaeology is used for ideological struggle and propaganda by various actors in different contexts (Fowler 1987; MacDonald et al. 1995). Nazi Germany provides us with the most evident and tragic case when the

Nationalism and Archaeology: Overview, Fig. 4 Museum of the Yayoi culture, Osaka, Japan. (Author's photo)

Nationalism and Archaeology: Overview, Fig. 5 The column in Almaty, Kazakhstan. (Author's photo)

Nationalism and Archaeology: Overview, Fig. 6 The Saka warrior on the Kazakhstan banknote. (Author's photo)

nation's claims were approved with reference to the "race" theory including the Nazi interpretation of archaeological data (Härke 2000).

It is not only states that may strive to present a positive view of the past but also societies as well as particular social and cultural groups. Indeed, icons of social memory can serve as a basis for sovereignty and encourage national self-awareness and self-respect.

Social Context of Archaeology, and Nationalism

Thus, archaeology develops and is used in various social and political contexts serving several functions and with various goals. This is precisely why Bruce Trigger distinguished between nationalist, colonialist, and imperialist (world-oriented) archaeology. Being somewhat arbitrary, the scheme is based on the idea that "archaeology does not function independently of the societies in which it is practiced" (Trigger 1984). Trigger associated the very emergence of prehistoric archaeology in Europe with the interests of the middle class which, on the one hand, were the bearer of the idea of progress yet, on the other, shared ideas of romanticism encouraged by nationalism, especially after the Napoleonic period (Trigger 1989). Thus, nationalism provided archaeology with important social and political functions.

At the same time, archaeology also affected nationalism by focusing on autochthonous origins, long national genealogy, and rigid boundaries of ethnic territories. Nationalism also encourages a view of archaeological culture as a material manifestation of an ethnic group. This assists in the acquiring of remote ancestors and providing the myth of a "golden age" with its desired materiality. Ancient finds that can be associated with the idea of "originality" can play an important role in establishing these views and can also become symbols of national identity. Illustrations of this point include the Celtic cross and Celtic decorations in Ireland; the lur, the sun-wagon, and the "Golden Horns" in Denmark; the "Venetian horse" in Slovenia; and the Persian rhytons in Kazakhstan.

Archaeology is represented in various countries by distinct "national traditions," is structured differently depending on the political agenda, and can play various political roles. Philip Kohl distinguishes between two models which associate nationalism with archaeology in their own ways: (a) in the way nations have been built up by immigrants or shaped by their miscegenation with Indigenous peoples and (b) the way that

Nationalism and Archaeology: Overview, Fig. 7 Pilgrims in Arkaim, the Southern Urals, Russia. (Author's photo)

nations have been shaped after a collapse of colonialism (Kohl 1998: 233). He also notes that even spatially distant Near Eastern archaeology was very important for the national prestige of the world powers.

One can reveal variability in terms of not only space but also time. For example, according to Margarita Diaz-Andreu, the past was used and even viewed quite differently at the time of civic nationalism's domination (1789–1860s) and later on after the emergence of ethnic nationalism. Scholars became aware of the links between archaeology and history only by the very late nineteenth century after the unification of Italy and Germany (Diaz-Andreu 2007). In addition, at that time archaeology was greatly affected by colonial views and "racial" ideas became popular in that context.

Dominant ideologies play a crucial role in shaping the view of ancestors. Indeed, before the growth of ethnic nationalism, European nationalists neglected an idea of rootedness in the soil and highly valued ancestors that arrived from elsewhere bringing with them products of "civilization." For example, in the nineteenth century, the British preferred intruding Anglo-Saxons and even Phoenicians as ancestors rather than the Indigenous Britons.

In the nineteenth century, European romantic nationalism encouraged archaeology to study the past of the peoples, some of whom made up majorities in the well-established states (e.g., in Denmark) and others who were the minorities who struggled for civil rights and sometimes aspired to have their own state (e.g., Czechs). Dominant majorities and minorities used the same approaches to interpret the remote past yet developed different views of the past to achieve different goals. In particular the culture-historical approach in archaeology was used in this regard. In due course, archaeological cultures began to be viewed as the material remains of ancient ethnic groups. A theoretical foundation for this approach was developed by G. Kossinna who was followed by V. Gordon Childe (Trigger 1989: 161–173). The cultures' dynamics (evolution, territorial expansion, area shrinkage, and disappearance) were uncritically viewed as a real history of distinct ancient ethnic groups. This simplified and one-dimensional approach has been strongly criticized and revised during the last 20–30 years.

Views of the Past, Archaeology, and Nation-Building

In due course, the issue of whose ancestors were represented by particular archaeological cultures

became a sensitive topic. The past proved to be a contested field which permanently accompanied a struggle for national self-determination. In this context, archaeology has been extensively utilized by minorities who did not have written traditions. In any event, archaeology has provided arguments for national pride for ancestors who were associated with creativity and outstanding achievements. It also became less necessary to search for European ancestry beyond the borders of Europe. Thus, by the end of the nineteenth century Germans, for example, began to locate ancient "Aryans" in Northern Europe as though they spread out from there throughout the world.

Yet, because of colonial politics, the Near East was still viewed in the nineteenth century as the "cradle of the Western civilization," and this interpretation was supported by Biblical traditions (Silberman 1989). In the eighteenth and nineteenth centuries, British and French colonialism, which was interested in control of the past of subjugated peoples, encouraged a view of civilization movement Ex Oriente Lux. This demand was met by researchers studying Biblical archaeology in their search for material traces of the Biblical record through their attempts to prove the Christian beliefs that underpinned the identities of many Europeans.

While discovering the roots of contemporary peoples, nationalist archaeologists contributed to contemporary nation-building. As already noted, nationalist archaeology reached its climax in Nazi Germany. In the late twentieth century nationalist archaeological approaches suffered a decline in Western and Central Europe but were on the rise in Eastern Europe due to the decline and then the collapse of communism which was finally replaced with nationalism. An emergence of the EU encouraged public interest in the common Celtic substratum which was met in the 1980s and 1990s by a number of exhibitions focused on the Early Iron Age as though it witnessed the initial forms of European unity (e.g., exhibitions such as "Celts – The Roots of Europe" in Venice in 1991 and "Mysteries of the Celts" in Frankfurt-on-Main in 2002).

Whereas some nations developed their views of the glorious past in the course of territorial and political expansion (e.g., Great Britain and France at the epoch of colonial empires), others did so while losing their former territories as their national borders shrank (e.g., Denmark in the nineteenth century). Some countries (such as Russia-USSR and Yugoslavia) experienced both developments in different periods of their history. These cases demonstrate how the same archaeological data receive different treatment and interpretation depending on the political environment (Shnirelman 2005). Until recently a struggle for "heritage" was aimed at overcoming colonial residues and was perceived as "postcolonial resistance." However, nowadays it is often waged between young nations arising out of colonial pasts or aimed against local minorities. While minorities have in recent times spoken from the margins in many countries, their status has been changing and they may now speak from a more authoritative position in some instances.

According to Trigger, "colonial archaeology" developed in the states built up by "white" immigrants (e.g., USA, Canada, Australia, and New Zealand). The newcomers viewed local people as "primitive" with static cultures, and if their culture was perceived to have changed over time, then this was seen as a result of external influences. This view served to legitimate European rule as a civilizing mission. The historical heritage of Indigenous peoples was also appropriated by the newcomers. Thus, Cecil Rhodes believed that Great Zimbabwe in the former South Rhodesia was originally inhabited by the Phoenicians and "white" Americans ascribed the Ohio mounds to some "superior race" (Silverberg 1968).

The nationalism of younger nations has also drastically affected the strategies and focus of regional archaeologies. Until recently the Paleolithic was the core issue in Sub-Saharan Africa where foreign archaeologists were searching for human ancestors; the Early Iron Age was less known because it had nothing to do with the "white man's past." The Africans' creativity was denied, and "whites" were less interested in their past. The "native" Early Iron Age archaeology began developing only under independence. Likewise, in British India, colonial archaeologists were interested only in the Indo-European

antiquities and Harappan civilization, the latter being associated with intruders. A "native" archaeology focused on local cultures developed only in independent India and Pakistan. It is in this way that colonial archaeology turned into a nationalist one. Yet, even before independence, the discoveries of Indian antiquities encouraged a growth of both national self-awareness and local nationalism. Nonetheless, prehistory was still privileged in independent India in contrast to the medieval period dominated by Islam. Nowadays archaeological data are often used by Hindu radicals to prove allegedly autochthonous origins of the Aryans. India serves a case where under radical Hinduism, some archaeologists reject secular nationalism in favor of religious views of the past (Ratnagar 2007).

Sometimes nationalism encourages extreme autochthonism. There are cases where the earliest remains of *Homo* species having been discovered in the territory of a contemporary state has become a point of pride and has been associated with the beginning of continuous human evolution up to the contemporary population. Thus, the *Homo erectus* remains from the Azykh cave in Azerbaijan were advertised as the "first Azerbaijani," the *Homo erectus* find from Dmanisi in Georgia was associated with the "first European," and remains of the early primates in Myanmar were announced as the forefathers of the humanity. In the first case, one deals with national claims for territory (the Azykh cave is situated in the Nagorny Karabakh), in the second case with an aspiration to be included into the EU, and in the third case with the fosterage of patriotism and self-respect in one of the poorest countries in the world.

Indigenous peoples usually appreciate more moderate views of the past presenting the given region as being populated long before colonization – this ensures that they are able to build up their life without intervention from outside as their remote ancestors did (Spriggs 1999: 120). For example, in response to a colonial view introduced by the Chinese and French, which exaggerated the role of the intruders, under independence, Vietnamese archaeologists argued that higher cultures flourished long before the Chinese arrived. This archaeology was a salve for the trauma caused by the long struggle for independence. A restoration of the devastated country demanded for a memory of the local ancient state that developed before Chinese occupation.

Nowadays, many Western archaeologists quite consciously support minority groups while confirming their claims for local natural resources and even political autonomy with a reference to archaeological data and the concept of autochthonism.

Nationalists make a choice between various explanatory models depending on political agendas. The migratory model is popular in case of territorial expansion and an autochthonous one in cases where territorial sovereignty has been gained or where there has been territorial shrinkage. The first model was common for colonial or expansionist powers. Imperialism encouraged migration models which were used to discover the early ancestors' resettlements and their occupation of the vast lands as a civilizing mission of the "white people," "children of the Sun" (G. Elliot-Smith), or "Indo-Germans" (G. Kossinna). Colonial and imperialist archaeology welcomed "racial" ideas which explained sociocultural development with a reference to biology (Trigger 1989: 111–138). For example, a view of the German master race was developed by Kossinna which was appreciated by the Nazis.

The nationalist archaeology in Turkey after 1923 is a clear case of the second model. To legitimate itself, the new state has emphasized an autochthonism in which views of the past incorporated the entire cultural heritage of Asia Minor including the pre-Islamic period. As a result Islamic archaeology is less developed in Turkey even today. Likewise, to legitimate his power in Iran, Reza Pahlavi paid great attention to the glorification of a pre-Islamic past and supported the restoration of early traditions associated with Zoroastrianism.

Sometimes new states appreciate a view of ancestors-invaders who were associated with military glory or a civilizing mission (e.g., the early Magyars in Hungary – Fig. 8, or the Scythians in Ossetia). In addition, during a struggle for independence and/or after victory, nationalists can

Nationalism and Archaeology: Overview, Fig. 8 A celebration of the 1100th anniversary of the ancestors' arrival to Hungary (Budapest 1996). (Author's photo)

interpret the same archaeological data in different ways. For example, under British rule, Indian nationalists appreciated the Aryans' arrival from elsewhere, yet after India gained independence, they began to present Northern India as a cradle of the Aryans.

Indeed, the autochthonous model fits nationalist agendas better than migration theories. This is because such models meet the demand for a view of the ancestors' independent development and high cultural achievements in the given territory. In some cases, external influences are entirely denied and suggestions of diffusion or migration are treated as survivals of a colonial mentality. Material evidence of influences can thus be ignored and hidden from outsiders. For example, about 20 years ago, the Chinese authorities temporarily denied access to foreign archaeologists to the remarkable finds in Xinjiang, where rich graves with Caucasian skeletons were discovered dating to the late second mill. BCE, and Korean scholars and tourists were not allowed access to Northeast China where the early Korean state of Koguryo was situated in the past.

When external impacts are accepted, local archaeologists sometimes make a case for such influences as arriving without the involvement of the neighboring state which practiced colonial rule until recently. For example, for some time, Irish archaeologists viewed the dolmen culture as having arrived from the Mediterranean area (circumventing England) and Korean archaeologists have at times argued that bronze technology arrived from Mesopotamia rather than through China.

Sometimes conflicting interests cause confusion – an idea of "originality" demands for particular ancestors, but political alliances need common ancestors to make allies closer to each other. Political unification encourages a view of common ancestors (as in the reference to the Celtic past in the EU – see above), although particular polities appreciated views of different ancestors in the former time.

Being based on rigid centralization, authoritarian and totalitarian regimes aspire to develop a view of cultural homogeneity in the past (e.g., the Celtic idea in Spain under Franco, the image of the Roman Empire in Italy under Mussolini, and the view of Gauls in France under the Vichy). In contrast, liberal rule, through an emphasis on cultural plurality, encourages a view of the past that privileges cultural heterogeneity. For example, in Great Britain the mixing of different groups and cultures in the past (e.g., Britons, Anglo-Saxons, Romans, and Normans) was seen to have predetermined the viability of the current nation and its ability for colonial expansion.

In the USSR, a view of cultural heterogeneity was accepted only in combination with the ideas of the state-shaping role of ethnic Russians as well as the leading role of titled peoples in the national

republics in remote times. State centralization was based on rigid ethnic hierarchy which determined a view of the past. In some cases this model resulted in an appropriation of the minorities' past by dominant majorities (e.g., in China and Japan).

In culturally heterogeneous societies, the dominant majority sometimes uses views of the past for legitimating its domination, whereas minorities may use archaeology for claims relating to equality or political sovereignty. In the first case, majorities may be searching for remote ancestors at the given territory – for example, attempts of certain "whites" to find traces of ancient transatlantic migrations and to ascribe the Native American antiquities to intruders from Europe and North Africa or, at least, from the area of some so-called "higher" civilizations. In some circumstances, fakes have even been employed to achieve these goals. To defend their human rights and to resist discrimination, minorities may use the same resources: either by searching for their autochthonous origins or by attempting to trace their ancestors' migrations to the new territory (e.g., the "Black Celts" in Great Britain or "Ancient Egyptians" in the New World).

It should also be remembered that the interpretation of the past is affected by the investigator's political views. A military victory over the Arabs in 1948 encouraged the Israeli general-archaeologist Yigael Yadin to treat an Israelite resettlement to the Promised Land as a conquest, whereas the Left Zionist Yohanan Aharoni viewed this as a slow peaceful infiltration. It also affected the choices of archaeological sites investigated by the archaeologists. Whereas Yadin focused on excavations of the Canaanite city of Hazor (which was destroyed at the eve of the Early Iron Age), Aharoni searched for the early Israelite settlements in the Galilee hills (Abu el-Haj 2001: 99–116).

Nationalism can even affect field methods. Indeed, some archaeologists, when in search of nationally important material evidence, have destroyed upper layers without employing standard recording techniques or have neglected the small finds that illuminate everyday life in the past in favor of large monumental constructions of "national significance." Thus, in some cases, nationally "sensitive" findings are privileged at the expense of what "has no importance" (Abu el-Haj 2001: 148–158).

One has also to distinguish between "native archaeology" and "archaeology abroad." The former focuses on the search for one's own ancestors and the restoration of a long genealogy. This type of archaeology is also often more emotional. Such archaeology is based on ethnic nationalism which is characteristic for Eastern and South-Eastern European countries and was encouraged in the former USSR where ethnicity was institutionalized. The latter calls for "objectivity" and scientism and can ignore the emotions of the local inhabitants. It is a stepchild of imperialism, and it is here that evolutionary approaches have been utilized (Trigger 1989). Noteworthy, this approach has been characteristic not only in Western archaeology but also in Soviet archaeology represented in the core – in Moscow and Leningrad (by contrast to archaeology in particular republics).

Certain authors make a distinction between national and nationalist archaeology: the former deals with archaeological investigations within the national state, and the latter is sensitive to political blueprints mobilizing archaeology to take part in nation-building and the shaping of national identity (Kohl 1998: 226 – see also Trigger 1989). At the same time, archaeology played various roles in this process in different countries, and its evaluation is a matter for discussion. Indeed, whereas in some countries national pride focused on Paleolithic archaeology (e.g., in France), in others the archaeology of the Neolithic and Bronze Ages was highlighted (e.g., in Scandinavia). Sometimes the emphasis changed over time as occurred in Germany (e.g., from philhellenism to primordial Germanic tribes). This change reflected the unification of Germany and a growth of German nationalism and chauvinism (Arnold and Hassman 1995; Marchand 1996; Härke 2000).

Archaeology and Politics

The abovementioned case studies serve to illuminate the fact that views about the past are highly

dependent on political factors which affect archaeology as well. This means that archaeology can hardly be considered as "value-free research." Archaeologists can be just as affected by social stances as can the amateurs and politicians who may also use views of the past to serve their own causes. In choosing a field or an object of study or by giving names to archaeological cultures, classifying data, restoring genealogies, and establishing borders, archaeology is also an active political agent.

At the same time we should be careful to distinguish that while on the one hand archaeology is a professional activity with its own theory, methodology, and ethical code, on the other its products can be used by amateurs and politicians. One should also distinguish between cases where archaeological knowledge is used for political purposes as opposed to an archaeologists' active participation in national movements.

For example, there were many colonial and military officials who developed "racial" doctrine. And in some new independent states, archaeologists have often shared nationalist ideologies which have affected their professional activities. In Bulgaria, for example, archaeologists, as custodians of the national past, actively participated in politics and occupied important state positions. In Israel well-known politicians and military officers were among the first archaeologists. In Myanmar, members of the military government actively participated in the search for "early humans" in the 1990s.

Sometimes archaeologists may purposely attempt to avoid politics (e.g., in Ireland and Japan), yet their discoveries may still be used to serve political ends. In Southern Rhodesia, archaeology was strictly controlled by colonial officials. At the same time, African revolutionaries used archaeological knowledge to further their own interests. In Iran, Shah Reza Pahlavi and his successor Mohammad Reza Shah paid great attention to history and encouraged archaeological investigations as they found a basis for patriotism in the achievements of ancient Iranian kings. In contemporary India, some archaeologists willingly serve Hindu politics. To put it briefly, in various countries, professional archaeology has complicated relationships with nationalist movements.

In any case, archaeological results depend not only on scholarly methodology but also on external social factors. Moreover, today a "folk archaeology" may develop in conjunction with professional archaeology and is based on non-scholarly (or pseudo-scholarly) views. This new type of archaeology may offer its own interpretation of well-known archaeological discoveries and/or make forgeries. This type of archaeology develops nationalist, "racial," or religious ideas (New Age style).

Nationalism Against Archaeology

The relationships between nationalism and archaeology are not without problems. There is an ambivalent attitude towards archaeology in the former colonies, and it is often by no means positive. In many Arab countries, it is an "elite knowledge" which is far from ordinary people who share prejudices about the pre-Islamic past. Negative feelings against archaeology in the Arab countries of the Middle East were also provoked by its long association with colonial rule. One can observe the same attitudes among Indigenous Australians.

In Africa, while using contemporary ethnic names in their reconstructions of the regional past, the "white" archaeologists unconsciously provoked ethnic separatism and, thus, undermined the nation-state. As a result, suspicion has ensued. The "white" settlers also were threatened by archaeologists whose presentations of the past inspired "black" movements. On their side, while coming to power, "black" leaders called into question the ability of "whites" to provide objective interpretations about the past.

In some cases, new archaeological studies and interpretations contradict the views of the past developed under a local nationalism and informed by oral traditions. In addition, the meaning of local sites for archaeologists and Indigenous peoples can differ greatly. Indeed, archaeologists may simply view the sites as objects of scholarly interest, whereas local people may respect them as sacred places.

Nationalism can also hinder the archaeological study of some sites and periods. Indeed, ethnic nationalism focuses on the search for its own ancestors; the "others" are either ignored or treated as enemies. In the latter case, their achievements may be downplayed or archaeological studies about such groups may be hindered or even prohibited by the authorities. Examples of such situations include studies of the Golden Horde, Khazar Kaganate, and Scandinavians' (Viking) activity in the early medieval period in the USSR, the Muslim past in Spain and Israel, and Caucasian Bronze Age burials in China. In Egypt, under President Naser, it also became impossible to study the Aramaic ward on Elephantine Island where the Jewish garrison was stationed in the fifth century BCE.

The history of archaeology has witnessed fierce debates on the ethnic attribution of early sites and early ethnic boundaries. Sometimes this has resulted in the destruction of particular sacred sites and attempts to replace them with some others (e.g., the demolition of Babri Masjid in Ayodhya, India, in 1992). Faked "archaeological data" has even been forged in such instances. In other cases, local sacred places may be owned by several different religious communities, and there is the difficult issue regarding which one has to be maintained and restored first (e.g., Judaic, Christian, and Muslim sites in Israel).

Debates about the ethnic past can also become important components of ideological confrontation resulting in bloody wars. In the course of warfare, early sites and monuments have been purposefully destroyed to erase the memory of the enemies from the local past (such as the recent wars in the Balkans, in Abkhazia, in Chechnya). Sometimes a reinterpretation of the past and religious prohibitions result in the destruction of early sites or archaeological data – e.g., the destruction of ancient statues of Buddha in Bamiyan, Afghanistan, in March 2001, under the Taliban rule as well as all of the Buddha images in the National Museum in Kabul; a decline of interest in the pre-Muslim past in Egypt under Naser; the marginalization of archaeology in Iran after the revolution as "despots' maid"; and the demolition of the mosque in Ayodhya. After 1974 a cleansing of the Greek antiquities took place in the northern (Turkic) part of Cyprus including the looting of archaeological materials, the destruction of medieval churches, and the prohibition of archaeological excavations. Thus, nationalism can both encourage archaeological investigations and result in the destruction of archaeological sites and looting of archaeological treasuries.

Sometimes the dominant religion may demand the "forgetting" of the evidence of other religions (e.g., as in the case of the Russian Empire where archaeologists focused on the Christian sites at the expense of Islam and paganism) – state atheism too has hindered studies of religious aspects of the past (e.g., an ignorance of the Church archaeology in the USSR). Young nations may also occupy themselves with studies of the remote past and ignore the era of recent colonial rule. In the Middle East, local archaeologists have also ignored ruins of the Ottoman period which remind them of the suffering under sultan despotism (Silberman 1989: 231–232). In Ireland, local archaeologists are less interested in studying the period after the Anglo-Norman invasion, whereas in Mexico they focus on the pre-Columbian past at the expense of colonial remains, and in India, local archaeologists ignore medieval sites associated with Muslim rule. All this may reach a climax in "racial" attitudes which are sometimes encouraged and used in a radical nationalism. As a result, some archaeologists have warned us against the usage of archaeological data in contemporary politics (MacDonald et al. 1995).

Archaeology and Ethics

In contemporary archaeological practice, we often attempt to deal with "multiple pasts" – a situation which has raised the issue of the archaeologists' responsibility and role in "shaping identities." This is an especially complex problem in the case of contested territories where neighboring groups struggle for historic heritage and where each side attempts to ascribe local archaeological sites to their own ancestors (Shnirelman 2001, 2006, 2009). While understanding the dangerous nature of such debates, certain scholars discuss the moral responsibilities of archaeologists who, by the results of their studies, support one side and unconsciously or otherwise encourage intergroup

conflicts or separatism (Spriggs 1999: 116–118). Such situations may also result in ideological struggles between archaeologists. Yet this is not a solution because nationalists are interested in political benefits rather than plausible scholarly results. Therefore, archaeologists who follow scholarly methodology are unable to provide them with the desired "truth," and nationalists may simply develop their own interpretations of archaeological data.

As a result, archaeologists today can be faced with the problem of choosing whether or not to be loyal to scholarship or to neglect it in favor of local nationalism or minority rights, and where the latter may be the case, which side to take in a multicultural milieu when different ethnic groups are claiming the same historical resources. Such situations raise significant ethical dilemmas for archaeologists.

Over the last 20–30 years, archaeologists have become increasingly aware of these problems which have resulted in provocative and stimulating discussions which will no doubt continue into the future (Trigger 1984, 1989; Silberman 1989; Kohl and Fawcett 1995; Schmidt and Patterson 1995; Atkinson et al. 1996; Diaz-Andreu and Champion 1996; Kohl 1998; Meskell 1998; Malone and Kaner 1999; Diaz-Andreu 2001, 2007; Kohl et al. 2007).

Cross-References

- ▶ Archaeology and Politics
- ▶ Bamiyan Buddhas
- ▶ Childe, Vere Gordon (Theory)
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Ethics in Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Race in Archaeology
- ▶ Trigger, Bruce Graham
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Abu El-Haj, N. 2001. *Facts on to ground: Archaeological practice and territorial self-fashioning in Israeli society*. Chicago: The University of Chicago Press.

Arnold, B., and H. Hassman. 1995. Archaeology in Nazi Germany: The legacy of the Faustian bargain. In *Nationalism, politics, and the practice of archaeology*, ed. P.L. Kohl and C. Fawcett, 70–81. Cambridge: Cambridge University Press.

Atkinson, J., I. Banks, and J. O'Sullivan, eds. 1996. *Nationalism and archaeology*. Glasgow: Cruithne Press.

Diaz-Andreu, M., ed. 2001. Nationalism and archaeology. *Nations and Nationalism* 7 (4): 429–531.

Diaz-Andreu, M. 2007. *A world history of nineteenth-century archaeology. Nationalism, colonialism and the past*. Oxford: Oxford University Press.

Diaz-Andreu, M., and T. Champion, eds. 1996. *Nationalism and archaeology in Europe*. London: UCL Press.

Fowler, D.D. 1987. Uses of the past: Archaeology in the service of the state. *American Antiquity* 52 (2): 229–248.

Härke, H., ed. 2000. *Archaeology, ideology and society. The German experience*. Frankfurt am Main: Peter Lang.

Kohl, P.L. 1998. Nationalism and archaeology: On the considerations of nations and the reconstructions of the remote past. *Annual Review of Anthropology* 27: 223–246.

Kohl, P.L., and C. Fawcett, eds. 1995. *Nationalism, politics and the practice of archaeology*. Cambridge: Cambridge University Press.

Kohl, P.L., M. Kozelsky, and N. Ben-Yehuda, eds. 2007. *Selective remembrance: Archaeology in the construction, commemoration, and consecration of national pasts*. Chicago: Chicago University Press.

MacDonald, K.C., F.Y.C. Hung, and H. Crawford. 1995. Prehistory as propaganda. *Papers from the Institute of Archaeology* 6: 1–10.

Malone, C., and S. Kaner, eds. 1999. Special section: Heritage and archaeology in the Far East. *Antiquity* 73 (281): 585–629.

Marchand, S. 1996. *Dawn from Olympus: Archaeology and philhellenism in Germany, 1750–1970*. Princeton: Princeton University Press.

Meskell, L., ed. 1998. *Archaeology under fire: Nationalism, politics and heritage in the Eastern Mediterranean and Middle East*. London: Routledge.

Ratnagar, S. 2007. The Aryan Homeland debate in India. In *Selective remembrance: Archaeology in the construction, commemoration, and consecration of national pasts*, ed. P.L. Kohl, M. Kozelsky, and N. Ben-Yehuda, 349–378. Chicago: Chicago University Press.

Schmidt, P.R., and T.C. Patterson, eds. 1995. *Making alternative histories: The practice of archaeology and history in non-Western settings*. Santa Fe: School of American Research Press.

Shnirelman, V.A. 2001. *The value of the past. Myths, identity and politics in Transcaucasia*. Osaka: National Museum of Ethnology.
Shnirelman, V.A. 2005. Politics of ethnogenesis in the USSR and after. *Bulletin of the National Museum of Ethnology (Osaka)* 30 (1): 93–119.
Shnirelman, V.A. 2006. The politics of a name: Between consolidation and separation in the Northern Caucasus. *Acta Slavica Iaponica* 23: 37–73.
Shnirelman, V.A. 2009. Aryans or proto-Turks? Contested ancestors in contemporary central Asia. *Nationalities Papers* 37 (5): 557–587.
Silberman, N.A. 1989. *Between past and present. Archaeology, ideology, and nationalism in the modern Middle East*. New York: Anchor Books.
Silverberg, R. 1968. *Mound builders of ancient America. The archaeology of a myth*. Athens: Ohio University Press.
Sklenař, K. 1983. *Archaeology of central Europe: The first 500 years*. Leicester: University Press.
Spriggs, M. 1999. Pacific archaeologies: Contested ground in the construction of Pacific history. *The Journal of Pacific History* 34 (1): 109–121.
Trigger, B.G. 1984. Alternative archaeologies: Nationalist, colonialist, imperialist. *Man* 19 (3): 355–370.
Trigger, B.G. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.

Nationalism and Politics in Chinese Archaeology

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Introduction

Although China looks back at a history of more than a thousand years of antiquarian and proto-archaeological studies, modern field archaeology was only introduced to China in the early twentieth century. In a time of rising nationalism, archaeology played a significant role in the (re-) construction of China's national history. The search for the cultural origins of the country became the driving force in the development of the discipline in China, exerting remarkable influence on its theoretical research orientations and interpretations of archaeological finds.

From the very beginning, Chinese archaeology has been indicative of changing social and political paradigms: over the course of the twentieth century the many changes in the political landscape of China from the Republican era (1912–1949) to the years of the rule of Mao Zedong毛泽东 (1893/1949–1976) and the tumultuous decade of the Cultural Revolution (1966–1976) followed by the era of "reform and opening-up" under Deng Xiaoping邓小平 (1978–1997) until today's increasingly nationalist rhetoric, Chinese archaeology always functioned both as an indicator and an instrument of particular social and political agendas. The diverse and ever-changing concepts of nationalism in China along with different state systems (1912–1949/since 1949) and institutional structures heavily influenced the development of Chinese archaeology and resulted in a wide range of approaches to fundamental archaeological problems. The introduction of western field methods in the late 1920s on the one hand, the influence of Marxist ideology since the early 1950s as well as the challenges of internationalization and globalization in recent decades on the other, shaped Chinese archaeology into a social science that closely links material culture with history and its ever-political overtones. While the main objective of Chinese archaeology – the reconstruction of the country's national history and the identification of its cultural origins – remains almost entirely unchanged, new research approaches are being incorporated into the discipline's overall research agenda in recent years, allowing for a more international orientation of the field and the use of state-of-the art methods and technologies (Liu 2017). Politics and nationalism came to play a decisive part in the development and objectives of Chinese archaeology right from the start and – with regard to more recent developments in China's ideological and geopolitical strategy – will likely continue to do so.

Definition

In its most generic form, the concept of archaeology in China – *kaoguxue* 考古学or "investigating

antiquity" in Chinese – is a term borrowed from the title of a catalogue of antiques (*Kaogu tu* 考古图, 1092) by Song (960–1276) scholar Lü Dalin 吕大临 (1046–1092). It was only reintroduced to Chinese scholarly discourse from Japan in the second half of the nineteenth century where it had been adopted for the phenomenon of western field archaeology and describes the scientific study and excavation of material and environmental remains of past human life and activities. However, in modern and contemporary China it is also closely linked to the spheres of nationalism and politics, ultimately aimed at substantiating the principles of historical evolution, and functioning as a tool for the reconstruction of the nation's history as well as an agent for the Marxist theoretical framework of historical materialism (Liu 2017). Over the course of its historical evolution during the Republican era (1912–1949) Chinese nationalism was informed by modernism, progressivism, historical criticism, and social Darwinism, while after the founding of the People's Republic of China in 1949 Marxist worldviews, the concept of Sinocentrism and the doctrine of the cultural and national unity of China proved most influential to Chinese nationalism and – therefore – Chinese nationalist archaeology (Trigger 2006).

Historical Background

1919–1949

Chinese Nationalism and Archaeology During the First Half of the Twentieth Century

Modern field archaeology in China has a history of approximately one hundred years. It was first introduced during the time of the May Fourth Movement (Wusi yundong 五四运动) of 1919. Starting out as a protest against the treaty of Versailles, young Chinese intellectuals and scholars associated with the movement soon adopted Western ideas and embraced new concepts of democracy and science. Caught up amidst heated debates about China's cultural foundations – their past, present, and future – archaeology quickly became entangled with politics (Xia 1979). On the one hand, archaeology was seen as a new approach towards understanding China's historic and prehistoric past and its material remains. On the other hand, archaeology and archaeological finds early on were regarded as a means to reestablish and reinforce a national identity in China that was neither solely based on Western perception of Chinese history nor on traditional Confucian historiography (Chang 1981).

At the turn of the twentieth century, China witnessed a surge in nationalism that was directed against the rule of the Manchu dynasty that invaded the country some 250 years earlier as well as against the geopolitical ambitions of Western colonial powers and growing Japanese aggressions. Political figures of the day like Sun Yat-sen (Jiang Jieshi 蒋介石, 1866–1925) or Liang Qichao 梁启超 (1873–1929) called for a new national consciousness and a Chinese identity based on cultural and historic grounds. This new nationalism, based on notions of heritage and history that were imported to China by foreign-trained members of the intellectual elite, soon gained momentum and became an important political incentive to the development of archaeology in China (Falkenhausen 1995).

Chinese nationalism in the late nineteenth and early twentieth century started out as an ethnocentrically inclined approach, focusing on the Han majority and marginalizing minority groups that were widely expected to integrate themselves and their traditions into the grand narrative of a commonly shared cultural origin (Dikötter 1992). After the founding of the Republic of China in 1912, however, concepts of a multiethnic nationalism started to emerge that stressed national and political unity of the peoples of China (minzu zhi tongyi民族之统一) over ethnical concerns, trying to merge the minorities of the Manchus, the Mongols, the Hui (Huizu回族), and the Tibetans with the Han ethnic majority into the so-called Five-Race Republic (wuzu gonghe 五族共和) as an entity of shared cultural origins and values (Mullaney 2010). Not surprisingly, the century-long oppression of the Han by the Manchu elite had ripple effects on the perception of ethnicity, history, and culture. Nationalistic approaches therefore endorsed archaeology as a means of proving the existence of a common

source of all things quintessentially Chinese. Against this background, the discovery of the Shang oracle bones in 1928 with their inscribed characters that still bore resemblance, albeit it remotely, to the contemporary writing system of China was seen as conclusive evidence of the existence and perpetuation of a set of essential cultural qualities that shaped Chinese society and civilization since antiquity.

The Formative Years of Chinese Archaeology (1928–1949)

The earliest archaeological excavations on Chinese soil took place at the cave site at Zhoukoudian in the vicinity of Beijing. First discovered in 1918, large-scale excavations started in 1928. It was the Swedish geologist Johann Gunnar Andersson (1874–1960) and his Austrian-born assistant Otto Zdansky (1894–1988) who also worked on the remnants of the Shang capital Anyang as well as the remains of the neolithic Yangshao culture in Henan's Yellow River Valley that heralded the beginnings of archaeology in China and prepared the ground for the future.

Zhoukoudian

The excavation of specimens of *Homo erectus*, the so-called Peking man (Beijing yuanren 北京猿人, *Sinanthropus pekinensis*/*Homo erectus pekinensis*), at the site in Zhoukoudian周口店 unearthed some of the oldest human remains found to date, providing the contemporary discourse with palpable proof of the indigenous origins of the (Han) Chinese people, opposing notions of "foreign" traces in the evolution of Chinese civilization and culture that flared up in contemporary scholarly debates, instead pointing to the indigenous genesis of Chinese ethnicity (Gao 2010; Leibold 2006; Jin and Su 2000). The discovery of the Peking man gave an affirmative boost to the contemporary political and scholarly narrative that centered on (Han-Chinese) ethnicity and the origins of Chinese culture and civilization (Liu 2017).

Anyang

In the same year, excavations at Zhoukoudian started, local Chinese archaeology entered its initial stage. In 1928, Harvard trained archaeologist and founding director of the Academia Sinica (Zhonyang yanjiuyuan 中央研究院), the Chinese Institute for History and Philology, Li Ji 李济 (1896–1979) led a team of Chinese archaeologists to work at the site of the ruins of the former Shang capital Yin (Yinxu 殷墟) in modern day Anyang 安阳in Henan province, in an effort to identify China's cultural roots through archaeological methods (Brown 2008). Randomly discovered in 1899 and first excavated by Andersson in 1921, the site yielded large amounts of oracle bones – mainly ox scapulae – and inscribed tortoise shells that represented a direct link to China's cultural origins and the age of the Sage Kings of high antiquity (Bagley 1999). The project in Anyang was the first state-sponsored archaeological excavation in China driven by a strong sense of scientific and technological enthusiasm and a robust nationalism that was regarded as a remedy for China's social and political backwardness by many young scholars and intellectuals of the time (Liu 2017).

The Yangshao Culture

The Yangshao culture (仰韶, ca. 5000–3000 BCE) was named after the place of its first discovery by Andersson in 1921. During his excavations, Andersson's finds of ornately decorated pottery let him to the conclusion that its patterns originated in Central Asia or even in the Near East rather than in the Central Plains of China, providing first evidence of a diffusion of cultural knowledge and practice from the west. According to Andersson's findings, the Yangshao culture was preceded by the Qijia culture齐家 (2200–1600 BCE) that throve in today's Qinghai province, proposing an origin of the Yangshao pottery that was to be found even further in the west of China. Andersson's hypothesis sparked a heated argument about the origins of Chinese culture and civilization that dominated archaeological circles in China for decades. Andersson's diffusionist approach was fiercely contested by contemporary and later Chinese scholars, yet it played into the debate about single, dual or even multiple origins of Chinese civilization that reverberated in the nationalist outlook and scholarly

discussions of the discipline in later years (Liu 2017). Ultimately, Andersson's hypothesis was refuted by pioneering archaeologist Xia Nai's夏鼐 (1910–1985) excavations of Qijia culture remains in Qinghai province during the 1950s, proving that the Yangshao culture was in fact older than the Qijia culture. This, of course, disproved a western origin of the Yangshao culture, yielding a considerable increase in nationalist rhetoric in Chinese archaeological discourse of the day (Liu 2017).

The Longshan Culture

When the Longshan龙山 culture (ca. 3000–1900 BC) was first excavated at the Chengziya 城子崖site in Shandong by Wu Jinding吴金鼎 (1901–1948) in 1930, Chinese archaeologists were quick to ascertain the autochthonous nature of the found black pottery. For the first time material evidence confirming the existence of an ancient indigenous Chinese culture that flourished in the east of China was available for scientific study. The Yangshao and Longshan cultures were believed to have fused with each other – thus suggesting a dual origin of Chinese civilization – and eventually shaped what was later to become the Shang dynasty (Liu 2017; Bagley 1999).

A Reappraisal of the Past: The "Doubting Antiquity School"

During the formative years of Chinese archaeology, many of the long-established historical narratives were challenged by an ever-growing awareness of and appreciation for modern field methods and new approaches towards the reconstruction of China's past. In the search for scientific evidence, Confucian notions of history and historiography were re-examined and scrutinized. Chinese intellectuals and scholars of the period like Hu Shi 胡适 (1891–1962), Gu Jiegang 顾颉刚 (1893–1980), and Qian Xuantong 钱玄同 (1887–1939) began to waver in their convictions as to the consuetudinary tropes of the origins and evolution of Chinese civilization. The so-called "Doubting Antiquity School" (*Yigupai* 疑古派) questioned the authenticity of pre-Qin historical texts and the accuracy of the dynastic histories. They disputed the notion that the Grand Historian Sima Qian 司马迁 (145–86 BC) could have had access to reliable historical sources from antiquity detailing an ever distant past that otherwise has not left any surviving records. However, when archaeological excavations unearthed the inscribed Shang period oracle bones and tortoise shells in Anyang which detailed many aspects of the dynasty's history that were consistent with Sima Qian's *Records of the Grand Historian* (Shiji 史记) – thus substantiating its historic lore – the critical approach of the "Doubting Antiquity School" gradually became invalid (Hon 1996).

Chinese archaeologists of the time eagerly strove to prove the indigeneity of Chinese culture and to fend off suggestions of foreign origins as laid out in Andersson's diffusion hypothesis, engaging in the reconstruction of a national identity centered on cultural history and its material remains (Liu 2017). Despite the political fragmentation and rampant warlordism pointing to the inevitable fate of the Republic on mainland China during the years leading to the Japanese invasion in 1937, the young discipline of archaeology flourished and produced the first generation of native Chinese archaeologists such as Liang Siyong 梁思永 (1904–1954) and Xia Nai, who came to dominate the field for decades. As of 1937, the year of the outbreak of the second Sino-Japanese War, most excavations and archaeological surveys were suspended, except for some fieldwork in remote areas unaffected by the war. During the years of civil war (1945–1949), no major excavations were conducted. It was only after the founding of the People's Republic of China in 1949 that archaeological work resumed.

1949–1976

Chinese Archaeology in the Age of Marxism and Maoism

The decades leading from the founding of the People's Republic of China in 1949 to the death of Mao Zedong and the end of the Cultural Revolution in 1976 saw many developments in the field of Chinese archaeology: excavations, formerly concentrated on well-defined areas, were

conducted all over the country, providing new data and bridging some of the obvious lacunae earlier archaeological endeavors had left open; the systematic training of young archaeologists and the establishment of archaeological institutions and museums; the adoption of new dating and excavating methods; the publication of finds and data. However, the new ruling Communist Party also quickly recognized the potential archaeology had as an instrument of propaganda and so political ideology came to play a more substantial part in Chinese archaeology than ever before. While first efforts to align traditional historical Chinese narratives with Marxist interpretations of history can be found in a book by writer and politician Guo Moruo郭沫若 (1892–1978) called *A Study of Ancient Chinese Society* (中国古代社会研究 Zhongguo gudai shehui yanjiu) published in 1930, it was not until the early 1950s that Marxist evolutionary interpretations of human history and their Maoist extrapolations set the background against which Chinese archaeology developed its theoretical framework that was to dominate archaeological research for next three decades. Dialectical materialism on the one hand and class struggle on the other were the two guiding principles Chinese scholars of the day had to grapple with, although the historiographic leanings of Chinese archaeology never ceased to influence the discipline (Falkenhausen 1993; Chang 1981). Yet, despite ideological trench-fighting Chinese archaeology largely remained fixated on elites and the center of Chinese civilization instead of turning to the common people and the periphery. Many prominent archaeologists of the time like father of Chinese "socialist archaeology" Xia Nai, who became the first director of the newly founded Institute of Archaeology within the Chinese Academy of Sciences in 1950, adjusted to the new political and ideological challenges to the field. During his tenure, state-commissioned salvage excavations surged due to the enormous increase in construction projects that were undertaken everywhere in the country (Liu 2017). Interpreting Chinese history by using Marxist models came to shape Chinese archaeology and prehistoric research for the next 30 years. In addition to the quest of identifying the very roots of Chinese culture and civilization which had not been given up after the communists seized power, lending credence to the Marxist interpretations of Chinese history by virtue of archaeological finds was understood as the new mission of the field.

In 1950, archaeological work resumed at the sites of Anyang and Yangshao, both of which had been abandoned in 1937. Dating endeavors at the Yangshao site initially indicated that it had been among the earliest Neolithic cultures in China. Excavations at Miaodigou in Henan province unearthed a type of pottery that pointed to the existence of a transitional culture between the Yangshao and Longshan cultures, attesting to the fact that the two cultures were, indeed, successive instead of contemporaneous, indicating a single source Chinese civilization and culture originated from (Liu 2017; Chen 2009). Later excavations at the sites of the Hemudu culture 河姆渡 (5500–3300 BC, discovered in 1973) in Zhejiang province, the Peiligang culture 裴李岗(7000–5000 BC, discovered in 1977) in Henan or the Nanzhuangtou culture南庄头 (12.600–11.300 BC, discovered in 1986) in Hebei province, however, proved to be much older than the remains both at Yangshao and Longshan, signifying a more varied origin of Chinese civilization than previously assumed (e.g. cf. Guo et al. 2002). Anyang on the other hand was discarded as the earliest capital of the Three Dynasties period after older remains of city, palace, and burial structures were excavated in Erligang二里冈 and Erlitou 二里头, Henan Province, inciting passionate debates about the historicity of the much contested Xia dynasty (Liu 2009; Zhao 1987).

Archaeology During the Cultural Revolution

Much like today, archaeological finds during the 1950s and 1960s were regarded as material evidence of a highly developed Chinese culture that was to reinstate national pride in the Chinese people, at the same time functioning as a means for mass education and the development of class-consciousness (Liu 2017). The objects retrieved from archaeological excavations were not only seen as proof and examples of the highly

developed productivity and creativity of early levels of Chinese civilization but also as material evidence of a bygone past that allowed for the people to be exploited and enslaved by the feudal ruling class. When the Cultural Revolution started in 1966, most archaeological work ceased, although never completely. Some projects, including salvage excavations, were still conducted and publicized as achievements of the "Great Proletarian Cultural Revolution guided by Chairman Mao's revolutionary line and supported by the broad worker, soldier, and peasant masses" (Xia 1974), e.g., excavations of Shang period burial structures in Changsha, Hunan province, in 1966; the discovery of the jade burial suits of Prince Liu Sheng刘胜 (died 113 BC) and his consort dating from the Western Han dynasty (220 BC -9) in their tomb in Mancheng, Hebei province, in 1968; or assemblages of fine pottery from the Tang dynasty (618–907) found in tombs in Luoyang, Henan province, in 1971 (Xia 1974). Despite these efforts, the Cultural Revolution and its social, political, ideological, and economic bearing greatly impacted contemporary archaeology and archaeologists. Scholars and university professors were demoted, students joined the Red Guards and resorted to criticizing and ousting their former teachers, and a whole generation of archaeologists, students and professors alike, was relocated to the countryside to learn from workers and peasant-farmers. Even though the Red Guards were dismissed by Mao Zedong in 1969 and the first international exhibitions of Chinese archaeological finds were held in London and Paris in 1973 to showcase China's past glory and her modern day scholarly and technological accomplishments, it was only after Mao's death in 1976 and the demise of the Gang of Four that Chinese archaeology, like all Chinese scholarship, gradually recovered.

1978–1997

Reform and Opening-Up

With the discovery of the Terracotta Army (Bingmayong 兵马俑), in the vicinity of the First Emperor's (Qin Shi Huangdi 秦始皇帝, 259/221–210 BC) tomb northeast of Xi'an in Shaanxi Province in 1974, Chinese archaeology entered a new phase. Due to the political and social unrest of the years towards the end of the Cultural Revolution, the discovery of the pits containing over 10,000 figurines of warriors, horses, and carriages was disclosed to the public with a delay of more than a year in July 1975. The Terracotta Army soon became world famous and archaeologists and visitors alike flocked to the site. In 1979 a museum was built to cater for the rising numbers of tourists and to educate the Chinese public about what was considered one of the most important archaeological finds of the century, equaling the discovery of the tomb of Pharaoh Tutankhamun in the Valley of the Kings by Howard Carter in 1922. For the first time, an archaeological site in China became the centre of attention of international media coverage and the first international exhibition of the terracotta warriors was curated in Melbourne in 1982 (Portal 2007). Further attesting to the new open door policy that was implemented during the reform era under Deng Xiaoping邓小平 (1904/1978–1997), the Terracotta Army and the Mausoleum of the First Emperor were among the first Chinese sites ever to be included in the UNESCO World Heritage list in 1987, marking an initial step towards the globalization of Chinese archaeology. While during the Cultural Revolution most of China's state-to-state foreign relations remained tense and complicated – despite China's accession to the United Nations in 1971 – the 1980s, however, witnessed a considerable increase in diplomatic and scholarly exchange between China and the rest of the world. Among his "Four Modernizations" (si ge xiandaihua 四个现代化) as part of his reform policies that were to transform China into a modern and competitive nation and to rejuvenate her economy, Deng Xiaoping stressed the role of scholarly exchange, science, and technology as one of the four major fields in which China needed to catch up with modern times (the others were agriculture, industry, and national defense). Contrary to what has been long-established ideology, Deng Xiaoping declared the end of the class struggle, and an overall modernization of all parts of China's socio-economic, educational, and

scientific/scholarly structures became the new future directive (Hsü 1990). Because of the opening and reform policies and due to growing scholarly exchange, Western state-of-the-art archaeological methods and theories were introduced to China. And while Deng Xiaoping was calling for a new market economy and rapid social change, Chinese archaeology of the day was to reach a subtle balance between the problem of defining a "modern archaeology with Chinese characteristics" and a growing nationalism that was in part rooted in the new challenges China faced in her relationships with other countries in the globalized world (Liu 2017). Apart from ongoing and ever-expanding excavation efforts throughout the country, the 1980s and 1990s witnessed a significant shift in archaeological debates about the origins of Chinese civilization. While during the first decades of the People's Republic of China a center-periphery theory with a focus on the cultural predominance of the Han majority was in place, archaeologists in the early 1980s shifted their interests to reflect the changed political climate after the Cultural Revolution: renowned archaeologist Su Bingqi苏秉琦 (1909–1997) proposed an approach called "regional systems and local cultural series" (quxi leixing 区系类型) which stressed a multiregional origin of prehistoric Chinese civilization, mostly based on finds of ceramic assemblages that suggested the independent development of different regional cultures (Su 1984). Su's approach supplied the contemporary academic debate with a frame of reference for the reconstruction of Chinese national history that accounted for the shifting approach towards the question of multiregional origins of Chinese civilization (Falkenhausen 1995), at the same time reflecting the changing political climate that also addressed the multiethnic realities of modern China (Heberer 2017). Another important development of the decade was the increased commitment of the People's Republic of China to multilateral and international cooperation. Not only did China enforce a domestic law for the protection of cultural relics and against illicit trade and smuggling in 1982, she also acceded to the major international convention for the protection of cultural heritage, the UNESCO Convention of 1972, which China ratified in 1985, having an immediate impact on the archaeological discourse of the time: in 1991, China officially allowed for international collaborations and foreign archaeologists from the US, Great Britain, France, Germany, Israel, Korea, etc. to work in the country for the first time in over 45 years (Liu 2017). Despite a decidedly nationalist stance of most of the academic discourse in Chinese archaeology at the time, scholarly exchange, international conferences, and joint fieldwork, as well as the growing influx and reception of international scholarly publications changed the academic environment to a more collaborative and co-operative one.

The Xia-Shang-Zhou Chronology Project

Despite these developments, the mid 1990s witnessed a noticeable resurgence of nationalism in China that was in part a reaction to the social changes and challenges brought about by Deng Xiaoping's economic reform but also in part to the lack of a new, legitimizing ideology that filled the conceptual void after the end of Maoism (Gries 2004). These conditions prepared the ground for an academic opposition against what was perceived as foreign interference and criticism of the credibility and reliability of Chinese archaeological dating methods: the Three Dynasties Chronology Project (Xia Shang Zhou duandai gongcheng 夏商周断代工程). This large-scale project was geared towards the identification and documentation of the primal stages of dynastic rule in China and was included in the government's ninth 5-year-plan of 1996 (1996–2000) and launched the same year (Shaughnessy 2009). The project originated in the attempt to adjust China's history and its prehistoric beginnings to the histories of ancient Egypt and Mesopotamia, trying to bridge the existing gap of 1000 years between them. The project started after a state visit of a Chinese diplomatic delegation to Egypt where the delegates were introduced to a newly developed dating scheme, which combined radiocarbon dating with historical textual analysis and other methods, for the reign periods of Egyptian Pharaohs, providing scholars with a detailed chronological record of dynastic rule in

ancient Egypt. China, they felt, was lacking in that respect, not only with regard to the time span Chinese archaeological surveys recorded but also with regard to their accuracy. The main objectives of the project were (1) to set up a detailed timeline for the early period of dynastic rule in China from the beginnings of the Shang dynasty to the beginnings of the Zhou dynasty; (2) to determine a chronology for the Western Zhou period; (3) to draft a basic time frame for the Xia dynasty (Xia-Shang-Zhou Duandai Gongcheng Zhuanjiazu 2000). After 4 years of research that involved more than 200 scholars from a multitude of scientific backgrounds, the project had yielded none of the projected results, instead it created controversial debates about its objectives, its methods, and its results – or the lack thereof (Shaughnessy 2009). Yet, a great many projects followed the Xia-Shang-Zhou Chronology Project under the new Searching for the Origins of Chinese Civilization Research Scheme (中华文明探源工程 Zhonghua wenming tanyuan gongcheng, 2002–2015) set up by the Ministry of Science and Technology (中华人民共和国科学技术部 Zhonghua renmin gongheguo kexue jishu bu), albeit smaller in scope, but nevertheless as ambitious as the Chronology Project in their quest to identify the earliest traces of Chinese civilization (Wang 2011). Studying the origins of China's earliest cultures, the Research Scheme also aimed at tracing cultural flows and interactions between ancient China and its neighbors in order to understand China's role in the development of world civilizations (Lee 2002).

Key Issues/Current Debates

Chinese Archaeology in the New Millennium

While China witnessed rapid social change and economic development since Deng Xiaoping's new policies of "reform and opening-up," leading towards a package of economic reforms termed "Socialism with Chinese characteristics," the political objectives of Chinese archaeology have changed only slightly. During the Cultural Revolution and the years of Mao's rule archaeology served as a means for displaying the achievements and the resilience of the people as well as exposing the failures and hardships of the past, caused by an unjust socioeconomic and political system that was to be swept away by the socialist revolution of the communist party and its leaders. Today archaeological finds serve as a means to, again, reinstate national pride and dignity in the Chinese people and to cater for a collective cultural elation that is supposed to make up for the lack of political freedom in China's One-Party-State. Since President Xi Jinping习近平 (∗1953) took office in 2013, China has witnessed a surge in nationalism and communist party propaganda rhetoric reminiscent of the past. Much like their predecessors in the 1990s and early 2000s, the current Chinese government views archaeology not only as a tool for mass education but also as an important asset in its foreign- and geopolitical strategy (Perry 2017).

"One Belt One Road"

The "One Belt One Road" initiative (Yi dai yi lu 一带一路), first launched in 2013 at the direction of President Xi Jinping, plays a significant role in China's current development strategy as it is the country's largest investment and infrastructure project to date. Both the "Economic Belt Silk Route" (Sichou zhi lu jingji dai 丝绸之路经济带) and the "21st Century Maritime Silk Route" (Ershiyi shiji haishang sichou zhi lu 二十一世纪海上丝绸之路), following historical trade routes along the silk road that connected China with Central Asia, Persia, India, and the Middle East from the times of the Han dynasty to the decline of the Mongolian Empire, are not only of paramount economic and political importance to the Chinese state with regard to the development of a unified global market that involves the economies of more than 60 countries spanning four continents, but also with regard to China's cultural and – therefore – archaeological agenda (Sidaway and Woon 2017; Aoyama 2016). This includes joint archaeological projects and scholarly co-operations with countries and institutions along the Overland Silk Road – e.g., in Tajikistan and Uzbekistan, but also with more remote partners at the other

end of the Eurasian continent like the collaboration between the Palace Museum in Beijing and the Department of Archaeology at Durham University (Durham University 2016) – as well as along the Maritime Silk Road in South East Asia. This development points to a shift in China's national cultural and archaeological discourse and its conceptual specifications as archaeological research in China today is closely linked to the country's geopolitical and economic agenda (Liu 2017).

Underwater Archaeology

Although comparatively small in budget and scope, China also riveted on her underwater cultural heritage and invested in the development of an autochthonous underwater archaeology since the late 1990s, which, alongside her military presence in the South China Sea, emphasizes her claim to territorial and economic hegemony in the area (Hoagland 1997). Initially China started her underwater archaeology program as a counter measure against treasure hunters illicitly salvaging objects from Chinese ships sunk in international waters. However, China's determination to become a factor in marine archaeology follows yet another agenda: firstly, Chinese shipwrecks found in the South China Sea as well as other maritime regions of East- and South-East Asia conform seamlessly with the narrative of China's geopolitical identity as an assurgent international trading nation that boasts a long tradition of trade and commerce dating back at least to the Ming dynasty. Secondly, the discovery of shipwrecks and other finds in the South China Sea is regarded as proof of China's inherent right to her claims to territorial hegemony over her neighbors in the ongoing quarrels about maritime boundaries and exploitation rights. Archaeological evidence of a century-long Chinese presence in the region therefore equates to China's claim to these waters as traditionally being part of the Chinese territory. Irrespective of ongoing academic debates, offshore exploration and the drilling of crude oil as well as military operations and maneuvers make the South China Sea an area of core interest for the People's Republic of China. Thus not only underwater archaeology but archaeology as a whole serves a meaningful purpose in the country's current – and future – political and strategic agenda (Adams 2013).

Future Directions

In his book on archaeological evidence of the origins of the Chinese people, Su Bingqi declared that "a golden age of Chinese archaeology is arriving" (Su 1994). Looking back at his statement today, he was certainly right. Over the course of the last century, tens of thousands of archaeological sites and millions of objects dating from the Palaeolithic to the beginning of the Qing dynasty have been found in Chinese soil, and a vast quantity of to date undiscovered sites is expected to be excavated in the near future. These finds not only attest to the cultural achievements of China but at the same time to her political power and significance, defining her place among the oldest human civilizations in the world, as well as to the future potential of archaeology as one of the "most rapidly developing fields of social science in China" (Liu 2017). Yet, due to the growing decentralization that diverted cultural authority from the central government in Beijing to the provincial governments over the last decades, leaving them responsible for museums, public administration of cultural heritage, and archaeological excavations, the country's provinces witness striking disparities in funding and infrastructural assistance of archaeological projects (Zan 2014). With regard to the allocation of funds and resources for archaeological projects, the rich provinces of the east coast have a clear advantage to their poorer neighbors in central or western China, leading to a geographical imbalance and a divide between the east and the rest of the country that will probably grow even further (Visconti 2016). Moreover, Chinese archaeology today is not only faced with financial and infrastructural concerns as well as with methodological questions and the issue of the general reliability of data from Chinese excavations but also with a certain reluctance to adopt a more global perspective within Chinese academic circles. Yet, international co-operations are rapidly growing in

number and will likely continue to do so, as will international joint scholarly publications and translations of publications from western archaeological journals into Chinese and vice versa (Visconti 2016). However, and notwithstanding the breath-taking pace of change in present-day China, it does not seem feasible that the country will give up its nationalist and ideology-ridden approach towards archaeology and the (re-) construction of a history that serves the present in the foreseeable future.

Cross-References

- ▶ Archaeology and Politics
- ▶ Chinese Archaeology in the Twenty-First Century
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Marxism and Archaeology in the Soviet Union and China
- ▶ Nationalism and Archaeology: Overview

References

Adams, J. 2013. The role of underwater archaeology in framing and facilitating the Chinese National Strategic Agenda. In *Cultural heritage politics in China*, ed. T. Blumenfield and H. Silverman, 261–282. New York: Springer.

Aoyama, R. 2016. "One belt, one road": China's new global strategy. *Journal of Contemporary East Asia Studies* 5 (2): 3–22.

Bagley, R. 1999. Shang archaeology. In *The Cambridge history of ancient China: From the origins of civilization to 221 BC*, ed. M. Loewe and E. Shaughnessy, 124–231. Cambridge: Cambridge University Press.

Brown, C. 2008. Li Ji: Father of Chinese archaeology. *Orientations* 39: 61–66.

Chang, K.C. 1981. Archaeology and Chinese historiography. *World Archaeology* 13 (2): 156–169.

Chen, X. 2009. *Zhongguo kaoguxueshi yanjiu luncong* 中国考古学史研究论丛. Beijing: Wenwu chubanshe.

Dikötter, F. 1992. *The discourse of race in modern China*. Stanford: Stanford University Press.

Durham University. 2016. Durham archaeology in China. https://www.dur.ac.uk/archaeology/research/projects/asia/palace-museum/?itemno=31859#top. Accessed 10 Feb 2019.

Falkenhausen, L.v. 1993. On the historiographical orientation of Chinese archaeology. *Antiquity* 67: 839–849.

Falkenhausen, L. v. 1995. The regionalist paradigm in Chinese archaeology. In *Nationalism and the practice of Chinese archaeology*, ed. P. Kohl and C. Fawcett, 198–217. New York: Cambridge University Press.

Gao, X. 2010. Revisiting the origin of modern humans in China and its implications for global human evolution. *Science China: Earth Sciences* 53 (12): 1927–1940.

Gries, P.H. 2004. *China's new nationalism: Pride, politics, and diplomacy*. Berkeley/London: University of California Press.

Guo, R., J. Li, and Y. Yasuda. 2002. The Nanzhuangtou and Hutouliang sites: Exploring the beginnings of agriculture and pottery in North China. *The Origins of Pottery and Agriculture* 193–204.

Heberer, T. 2017. *China and its national minorities. Autonomy or assimilation?* London: Routledge Revivals.

Hoagland, P. 1997. Managing the underwater cultural resources of the China seas: A comparison of public policies in mainland China and Taiwan. *The International Journal of Marine and Coastal Law* 12 (2): 265–283.

Hon, T.-K. 1996. Ethnic and cultural pluralism: Gu Jiegang's vision of a new China in his studies of ancient history. *Modern China* 22 (3): 315–339.

Hsü, I. 1990. *China without Mao. The search for a new order*. Oxford: Oxford University Press.

Jin, L., and B. Su. 2000. Native or immigrants: Modern human origin in East Asia. *Nature Reviews* 1: 126–133.

Lee, Y.K. 2002. Building the chronology of early Chinese history. *Asian Perspectives* 41 (1): 15–42.

Leibold, J. 2006. Competing narratives of racial unity in republican China: From the Yellow Emperor to Peking Man. *Modern China* 32: 181–220.

Liu, L. 2009. Academic freedom, political correctness, and early civilisation in Chinese archaeology: The debate on Xia-Erlitou relations. *Antiquity* 83: 831–843.

Liu, L. 2017. A history of Chinese archaeology. In *Handbook of east and southeast Asian archaeology*, ed. J. Habu, P.V. Lape, and J.W. Olsen, 39–58. New York: Springer.

Mullaney, T. 2010. *Coming to terms with the nation: Ethnic classification in modern China*. Berkeley: University of California Press.

Perry, E.J. 2017. Cultural governance in contemporary China: "Re-orienting" party propaganda. In *To govern China. Evolving practices of power*, ed. V. Shue and P.M. Thornton, 29–55. Cambridge: Cambridge University Press.

Portal, J. 2007. *The first emperor: China's terracotta Army*. Cambridge: Harvard University Press.

Shaughnessy, E.L. 2009. Chronologies of ancient China: A critique of the 'Xia–Shang–Zhou chronology project'. In *Windows on the Chinese world: Reflections by five historians*, ed. Clara Wing-chung Ho, 15–28. Lanham: Lexington Books.

Sidaway, J.D., and C.Y. Woon. 2017. Chinese narratives on 'one belt, one road'(一带一路) in geopolitical and imperial contexts. *The Professional Geographer* 69 (4): 591–603.

Su, Bingqi. 1984. *Guanyu kaoguxue wenhua de quxi leixing wenti* 关于考古学文化的问题 [On the problem of regions, series and types of archaeological cultures]. In *Su Bingqi kaoguxue lunshu xuanji* 苏秉琦考古学论述选集 [Selection of archaeological writings by Su Bingqi], 225–234. Beijing: Wenwu chubanshe.

Su, Bingqi 苏秉琦. 1994. *Huaren – long de chuanren – zhongguoren: kaogu xungen ji* 华人龙的传人中国人: 考古寻根记 [Hua people – descendants of the dragon – Chinese: An archaeological seeking after roots]. Shenyang: Liaoning daxue chubanshe.

Trigger, Bruce G. 2006. *A history of archaeological thought*. New York: Cambridge University Press.

Visconti, C. 2016. *Un secolo di archeologia cinese. Storia della disciplina dall'inizio del XX secolo ai giorni nostri*. Milano: Mondadori.

Wang, W. 2011. The present status and prospect of the researches on the origins of Chinese civilizations: Focus on the first stage (2004–05) of the exploration on the origin of Chinese civilization project. *Chinese Archaeology* 7: 1–16.

Xia, N., ed. 1974. *New archaeological finds in China. Discoveries during the cultural revolution*. Beijing: Foreign Languages Press.

Xia, N. 1979. "Wusi yundong he Zhongguo jindai kaoguxue de xingqi" 五四运动和中国近代考古学的兴起. *Kaogu* 3: 193–196.

Xia-Shang-Zhou Duandai Gongcheng Zhuanjiazu 夏商週斷代工程專家組, [Xia-Shang-Zhou Chronology Project]. 2000. Xia Shang Zhou duandai gongcheng 1996–2000 nian jieduan chengguo baogao (jianben) 夏商周斷代工程 1996–2000 年階段成果報告 [Report on the Xia-Shang-Zhou Chronology Project, 1996–2000]. Bejing: Shijie Tushu Chuban Gongsi.

Zan, L. 2014. Cultural heritage in China: Between policies, development, professional discourse, and the issue of managing. *Public Archaeology* 13 (1–3): 99–112.

Zhao, Z. 1987. "Lun Erlitou yizhi wei Xiadai wanqi duyi" 论二里头遗址为夏代晚期都邑 (On the Erlitou site as a capital of the late Xia dynasty). *Huaxia Kaogu* 2: 196–204.

Further Reading

Andersson, J.G. 1943. Researches into the prehistory of the Chinese. *Bulletin of the Museum of Far Eastern Antiquities* 15: 1–304.

Chang, K.C. 1977. Chinese archaeology since 1949. *The Journal of Asian Studies* 36 (4): 623–646.

Chang, K.C. 1986. *The archaeology of ancient China*. New Haven: Yale University Press.

Diaz-Andreu, M. 2001. Nationalism and archaeology. *Nations and Nationalism* 7 (4): 429–440.

Fitzgerald, J. 1996. The nationless state: The search for a nation in modern Chinese nationalism. In *Chinese nationalism*, ed. J. Unger, 56–85. Armonk: M.E. Sharpe.

Liu, L., and H. Xu. 2007. Rethinking Erlitou: Legend, history and Chinese archaeology. *Antiquity* 81 (314): 886–901.

Tong, E. 1996. Thirty years of Chinese archaeology (1949–1979). In *Nationalism, politics and the practice of archaeology*, ed. P. Kohl and C. Fawcett, 177–197. Cambridge: Cambridge University Press.

Wang, T. 1997. Establishing the Chinese archaeological school: Su Bingqi and contemporary Chinese archaeology. *Antiquity* 71 (271): 31–36.

Zhang, L. 2011. Soviet inspiration in Chinese archaeology. *Antiquity* 85 (329): 1049–1059.

Zhang, L. 2013. The Chinese school of archaeology. *Antiquity* 87 (337): 896–904.

Native American Graves Protection and Repatriation Act (NAGPRA), USA

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Brief Definition of the Topic

The Native American Graves Protection and Repatriation Act (NAGPRA) (sections 3001 through 3015 of volume 25 of the United States Code) is a federal law instituted in 1990 to facilitate the return of human remains, funerary objects, sacred objects, and objects of cultural patrimony to lineal descendants, Indian tribes, and Native Hawaiian organizations. The law provides a process for the return of certain items and ancestral remains held by federal agencies, museums, and educational institutions obtained through archaeological excavations or other collection practices to these groups, which are broadly defined to be Native American. NAGPRA also recognizes the interest of Native American tribes affiliated with burial sites discovered on federal and tribal lands through present-day activities.

Human remains must be clearly identified as "Native American" to be repatriated by a tribe. Funerary objects that fall under NAGPRA fall into two categories: associated funerary objects and unassociated funerary objects. Associated funerary objects are documented to a specific burial site and/or associated with human remains

that are in the possession of an agency, museum, or institution. The funerary objects and human remains, however, do not necessarily have to be at the same location, just known to have once been together in their original context. Often funerary objects and human remains were separated once excavated and are today located in separate agencies, museums, or institutions. Unassociated funerary objects are either known or believed to have been from a burial context, but the human remains once associated with them are now not in the possession of a known agency, museum, or institution. This often occurs when human remains become undocumented or lost by institutions that once held them but documentation on the funerary objects is clear.

Sacred items that can be repatriated through NAGPRA include specific ceremonial objects used by Native American religious leaders for religious practices, and that are still needed for present-day practices.

These may include items such as pipes, baskets, clothing, masks, or other religious items used in ceremonial practices. Objects of cultural patrimony are defined as "having ongoing historical, traditional, or cultural importance central to the Native American group or culture itself, rather than property owned by an individual Native American" (National NAGPRA n.d.). These objects should never have been separated from the group. The famous wampum belts of the Haudenosaunee (or Iroquois) that represent an important part of tribal history are one example of this type of object.

All federal agencies are required to comply with NAGPRA, as well as any public and private museum, educational or other institution that has received federal funds. The Smithsonian Institution must comply with a separate repatriation law, enacted in 1989, entitled the National Museum of the American Indian Act. Compliance involves providing an inventory of Native American humans remains (whether culturally affiliated or not yet culturally affiliated) and consulting with tribes to determine cultural affiliation, as well as sending summaries of artifact collections with Native American objects to tribes that may have an interest in these collections. Cultural affiliation is defined as "a relationship of shared group identity which can be reasonably traced historically or prehistorically between a present day Indian tribe or Native Hawaiian organization and an identifiable earlier group" (National NAGPRA). In 2010, an amendment to the Act provided a process for the return of human remains and objects that have been defined by institutions and museums as "culturally unidentifiable" or "CUI" (see http://www.gpo.gov/fdsys/pkg/FR-2010-03-15/html/2010-5283.htm for more information).

NAGPRA only applies to tribes as defined by the US federal government, that is, federally acknowledged tribes and Native Hawaiian organizations with a government-to-government relationship with the US government. Non-federally recognized tribes, or lineal descendants from such groups, may not directly make claims through NAGPRA, although they may request repatriations through the National NAGPRA Review Committee, which meets twice per year to hear such requests, disputes between institutions and tribes, and conduct other business related to the law.

Many consider NAGPRA to be a cultural property law, while others consider it more of a human rights law that was the result of decades of protest and activism by Native American leaders. The several decades leading up to the passing of the Act in 1990, in particular, saw a number of high-profile protests focused on the public display in museums and institutions and continued excavation of Native American burials and objects across the country. While the law has facilitated a large number of repatriations over the past several decades, many thousand human remains and objects still await repatriation and lack of compliance by agencies, museums, and institutions has been an ongoing issue.

Cross-References

- ► Activism and Archaeology
- ► Ethics and Human Remains
- ► Ethics in Archaeology
- ► Ethics of Collecting Cultural Heritage
- ► Human Remains in Museums

▶ Indigenous Archaeologies: North American Perspective
▶ Indigenous Peoples, Working with and for
▶ North America (USA and Canada): Museums
▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice
▶ Repatriation Acts: The Politics of Repatriation in North America

References

National NAGPRA. n.d. Available at: http://www.nps.gov/history/nagpra/ (accessed 18 December 2012).

Further Reading

American Indian Ritual Object Repatriation Foundation. 1995. *Mending the circle: A native American repatriation guide*. New York: American Indian Ritual Object Repatriation Foundation. Available at: http://www.repatriationfoundation.org

American Indian Ritual Object Repatriation Foundation. 2008. Available at: http://www.repatriationfoundation.org/mtc.html (accessed 18 December 2012).

Fine Dare, K. 2002. *Grave injustice: The American Indian repatriation movement and NAGPRA*. Lincoln: University of Nebraska Press.

Mihesuah, D., ed. 2000. *Repatriation reader: Who owns American Indian remains?* Lincoln: University of Nebraska Press.

Swidler, N., K.E. Dongoske, R. Anyon, and A. Downer, eds. 1997. *Native Americans and archaeologists: Stepping stones to common ground*. Walnut Creek: AltaMira Press.

Natural Hazards Versus Cultural Heritage

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Introduction

Natural hazards are usually approached by geosciences (geology, geography); they are a cause of planetary evolution that can be divided into geological hazards (earthquakes, volcanic eruption), meteorological hazards (hailstorm, heat wave, cyclones, ice storm, tornado), and hydrological hazards (floods, droughts, mudslides). Over the last decades, due to the technological evolution, the research undertaken in order to understand and predict natural hazards has made serious progress. When a natural hazard is affecting the cultural heritage integrity, the process can be fast and lead to permanent destruction or slow, depending on the severity of the hazard. Along history, natural hazards lead to the destruction of some famous monuments: the pyroclastic flows from Vesuvius completely destroyed Pompeii in 79 A.D.; the Colossus of Rhodes and the Pharos Lighthouse have been destroyed by earthquakes in 227 B.C. and in the fourteenth century, respectively; mausoleum of Halicarnassus has been destroyed by floods and earthquakes in the fifteenth century; (Will and Meier 2007), etc. The consequences are disastrous and important data is lost; this information could offer more insights into human evolution (Romanescu 2013a, b), the habits of a certain population, people's behavior, or evolution of culture.

N

Definition

Natural hazards are severe and extreme weather and climate events that occur naturally in all the parts of the world; some areas of the globe are more vulnerable to certain hazards than others, according to the local natural characteristics. The global climatic changes have a significant role in the triggering and development of natural hazards, which are exponentially increasing every year (Will and Meier 2007). The term cultural heritage was known since antiquity (Migoñ 2013) and represents an expression of the way in which a community developed and lived, passed on to future generations, including customs, practices, objects, places, values, and artistic expressions. Since humans were using the environment in order to live and search for food, they inevitably got in contact with natural hazards, whether they were aware or not. The

importance and value of cultural heritage are growing every year and are reflecting the scientific, historical, economic (Romanescu 2014), and the artistic significance of an asset that has been created in the past and are part of the local community.

Historical Background

There are many studies that are applied for hazard identification, monitoring, analysis, and prediction, but not so many are applied in the field of cultural heritage. The beginnings of these studies are in the early 1970s, but in the recent years, the trend is growing; even so, the need of studies that treat both natural hazards and cultural heritage is tremendous (Agapiou and Lysandrou 2015). With the technological evolution and a continuously improved methodology, the number of studies is growing each year. Some of the hazards are easier to be identified, analyzed, and predicted. The most representative studies are related to gully erosion (Pederson et al. 2006; Romanescu et al. 2012a; Romanescu and Nicu 2014; Nicu 2016a; Nicu and Romanescu 2016) (Fig. 1), landslides (Sdao and Simeone 2007; Tarragüel et al. 2012; Sdao et al. 2013; Nicu 2017a; Nicu and Asăndulesei 2018) (Fig. 2), coastal erosion (Gontz et al. 2011; Khakzad et al. 2015; May 2015; Usmanov et al. 2018) (Fig. 3), and floods (Lanza 2003; Wang 2015). The continent with the highest number of studies is Europe, which also has the richest and most diverse cultural heritage in the world. The monuments that have a significant historical importance and an outstanding universal value are included in the UNESCO World Heritage List (WHL), which totalizes 1052 properties; they are divided into three categories: cultural sites, natural sites, and mixed sites (http://whc.unesco.org/en/list/). According to a UNESCO survey, 89% of all biosphere reserves, 82% of all geoparks, and 96% of World Heritage sites are exposed to at least one type of natural hazard, which can turn into a disaster and eventually affect the site's integrity. This means more than 1500 cultural and natural sites in 144 countries.

Key Issues/Current Debates

The world's cultural heritage is at great vulnerability (Nicu 2017b), as shown by a few studies that successfully integrated modern techniques (Agapiou et al. 2015) and historical maps (Nicu 2016b, 2017c) approaches. It is not only a scientist task to undertake research and to record the fact that cultural heritage is under threat from natural hazards, policy makers and local authorities need also to be involved. Saving as much spatial data as possible, integrating it with the help of GIS, generating 3D models (Romanescu et al. 2012b), and realizing soil erosion predictive models will lead to a better understanding for local authorities and stakeholders to plan economic activities, minimize damages costs, improve environmental protection, and the most important thing, and protect cultural heritage. The main issues that are leading to a bad management of cultural heritage are the lack of qualified personnel, the lack of funding, the lack of education of the community, and the lack of a complete inventory with a precise location. Conservation and protection strategies need to be implemented, according to the natural conditions of the affected areas; they have to be in accordance to the respective country/region legislation regarding the protection of cultural heritage and suppose to involve the local population, improvement in the administration of cultural heritage, development of cultural resources, and a sustainable use of cultural heritage resources.

International Perspectives

Risk assessment and reduction are one of the main challenges of the modern times, which nonetheless represent one of the main points on UNESCO's agenda. During the last years, at an international level, there have been a few research projects dealing with the use of modern technologies (RS and GIS) in order to evaluate, assess, manage, and predict natural and/or man-made hazards applied to cultural heritage. The projects can be considered as a base for future research and a good platform to unite researchers and

Natural Hazards Versus Cultural Heritage, Fig. 1 (continued)

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authorities in the attempt to save the world's cultural heritage. A few of them are listed below:

1. Climate for culture (https://www.climateforculture.eu/index.php?inhalt=home) – the project was financed by the European Commission from 2009 to 2014; the main scope of the project was to employ simulation and modeling tools to better predict the influence of the changing outdoor climate on the microclimate in historic buildings until 2100 and to assess the damage potential of these microclimates on art collections in different climate areas. Buildings from different climate areas and with an outstanding universal and cultural value were used as case studies; the latest technology developed within the framework of important European projects was employed. The project leader was the Fraunhofer-Gesellschaft research organization from Germany, along with research institutes and universities from Europe (Czech Technical University of Prague; Italian National Research Council; University of Zagreb; Foundation for Research and Technology, Greece; Max Planck Institute for Meteorology; Technical University Munich; Eindhoven University of Technology; University of Ljubljana; Gradbeni Institut ZRMK, Slovenia; Uppsala University; National Trust for England, Wales and Northern Ireland; Center for Documentation of Cultural and Natural Heritage, Egypt; the National Institute of Cultural Heritage, France; the Evangelical church, Romania; etc.). The results consisted of a number of 30 publications and 22 presentations, which brought significant updates and new insights into conservation and preservation of cultural heritage.
2. Fluvial processes and sediment dynamics of slope channel systems: Impacts of socioeconomic and climate change on river system characteristics and related services (FLUMEN) (http://flumen-irses.eu/) – it was a joint project that ran in 2012–2016 between University of Florence (Italy), Moscow State University (Russia), Kazan Federal University (Russia), University of Palermo (Italy), University of Tübingen (Germany), Kazimierza University (Poland), Stockholm University (Sweden), Alexandru Ioan Cuza University of Iasi (Romania), and Institute of Ecology and Geography (Republic of Moldova); the project studied the effects of changes on river systems at different spatial and temporal scales and assess the impact on cultural heritage sites, among other issues. The special focus was on remote sensing, aerial photography, field surveys with total station and GPS, and statistical analysis, all integrated into a GIS.
3. Archaeological analysis and heritage valorization of three landscapes of the Roman conquest of Hispania (second to first centuries B.C.). Sub-project: Southwest of Hispania Ulterior (Spain) (http://oliba.uoc.edu/UAB/) – the project is a joint initiative of three research centers, Autonomous University of Barcelona, University of Alicante, and CSIC Institute of Archaeology-Mérida; the final aim of the project is to help transfer to society the results of several years of survey and excavation of the research team in three different regions of former Hispania. The results will offer a high potential in what regards the cultural and touristic development of rural areas, with the revalorization of the rich archaeological heritage that can become a valuable resource for local development. The methodology is based on geospatial technologies, remote sensing, aerial archaeology, pedestrian, and geophysical survey.

Natural Hazards Versus Cultural Heritage, Fig. 1 Gully erosion affecting two archaeological sites (*Mlada* and *Dealul Manastirii*, located in the northeastern part of Romania, Valea Oii catchment; Cucuteni-Baiceni gully); (**a**) the dislocated area on 10.10.2012; (**b**) the dislocated area on 10.05.2013; (**c**) thalweg after the junction of both torrents before the thresholds being built; (**d**–**f**) concrete thresholds as part of the mitigation measures to stop the erosion process built in the summer of 2014; (**g**) black locust saplings planted in the upper part of the gully; (**h**) fences of fascine from the right side of the gully; (**i**) topographic surveys of the gully on 11.09.2014

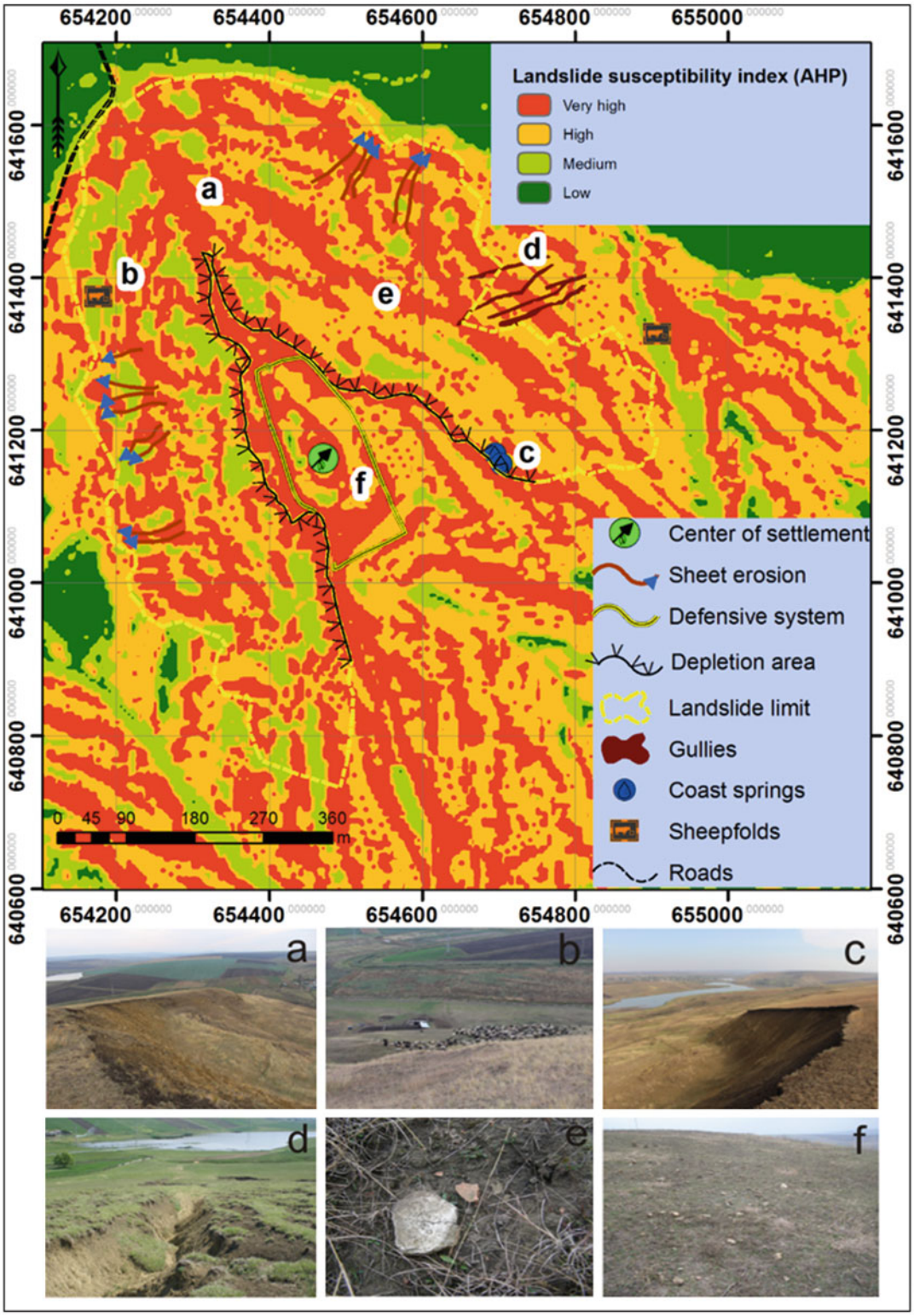

Natural Hazards Versus Cultural Heritage, Fig. 2 (continued)

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4. Insurance as a tool to protect cultural heritage against natural and man-made hazards – a joint project between the Institute of Archaeological Heritage, Monuments and Sites IBAM, Italian National Research Council, and the Department of Economic Science, University of Salento (Italy), which aims to investigate the role of the insurance in the protection of cultural heritage against natural and man-made hazards.
5. Remote sensing science center for cultural heritage (acronym ATHENA) (Cyprus) (https://athena2020.eu/) – this project aims to establish a Center of Excellence in the field of Remote Sensing for Cultural Heritage in the areas of Archaeology and Cultural Heritage through the development of an enhanced knowledge base and innovative methods; the center represents a joint project of the Remote Sensing and Geo-environment Research Laboratory at the Cyprus University of Technology (CUT), the Institute of Archaeological and Architectural Heritage of the National Research Council of Italy (IBAM-CNR), and the German Aerospace Center (DLR). The project is according to the EU policies and international conventions related to cultural heritage protection, management, and good practice guides.
6. Cultural landscape risk identification management and assessment (acronym CLIMA) (Cyprus) – the project aims to promote interdisciplinary research, based on a soil-oriented approach, to develop effective tools for the authorities responsible for cultural landscape preservation; also, the project is to design and implement a Web GIS-based multitask platform in order to integrate different remote sensing techniques. They will be used to map, diagnose, and monitoring the cultural landscapes including buried and exposed archaeological remains.
7. Nondestructive approaches to complex archaeological sites. An integrated applied research model for cultural heritage management (acronym PROSPECT) (http://arheoinvest.uaic.ro/research/prospect/) – the project is a joint initiative of Alexandru Ioan Cuza University of Iasi (Interdisciplinary Research Department – Field Science, Arheoinvest Platform), Romanian Academy (Iasi Institute of Archaeology), and SC Arheo Management SRL; it is funded by the Romanian National Research Council (grant no. 314/2014). The main objective of the project is the elaboration and implementation of a functional applied research model based on integration and development of noninvasive techniques, with the goal of understanding and evaluating the complexity of the prehistoric archaeological sites. The specific objectives refer to identifying habitation models, describing the prehistoric communities' behavior in certain environmental conditions, evaluating and monitoring the natural hazards that affect the prehistoric sites, and proposing a touristic management model.
8. Research laboratory "Kosmoecology" as a part of a strategic academic unit "Astrochallenge: cosmology, monitoring, navigation, applications" (acronym OPENLAB) – the project is a joint between Alexandru Ioan Cuza University of Iasi (Interdisciplinary Research Department – Field Science, Arheoinvest Platform, Romania) and Kazan Federal University (Russian Federation). The project aims to test different GIS and RS techniques applied to cultural heritage assessment and preservation in Romania and Russian Federation; the focus is on

Natural Hazards Versus Cultural Heritage, Fig. 2 Landslide susceptibility map (*Dealul Mare Filiasi/Dealul Boghiu* archaeological site – Chalcolithic/Cucuteni A_3, located in the northeastern part of Romania, Valea Oii catchment) overlaid by the main natural and anthropic factors; (**a**) the northern extremity of the landslide depletion area; (**b**) sheepfold located in the northwestern part of the site on the landslide body; (**c**) the escarpment area measuring about 6 m; (**d**) gully erosion located at the base of the landslide body; (**e**) archaeological remains (Chalcolithic pottery pieces) carried down the landslide body; (**f**) scattered pottery remains inside the settlement

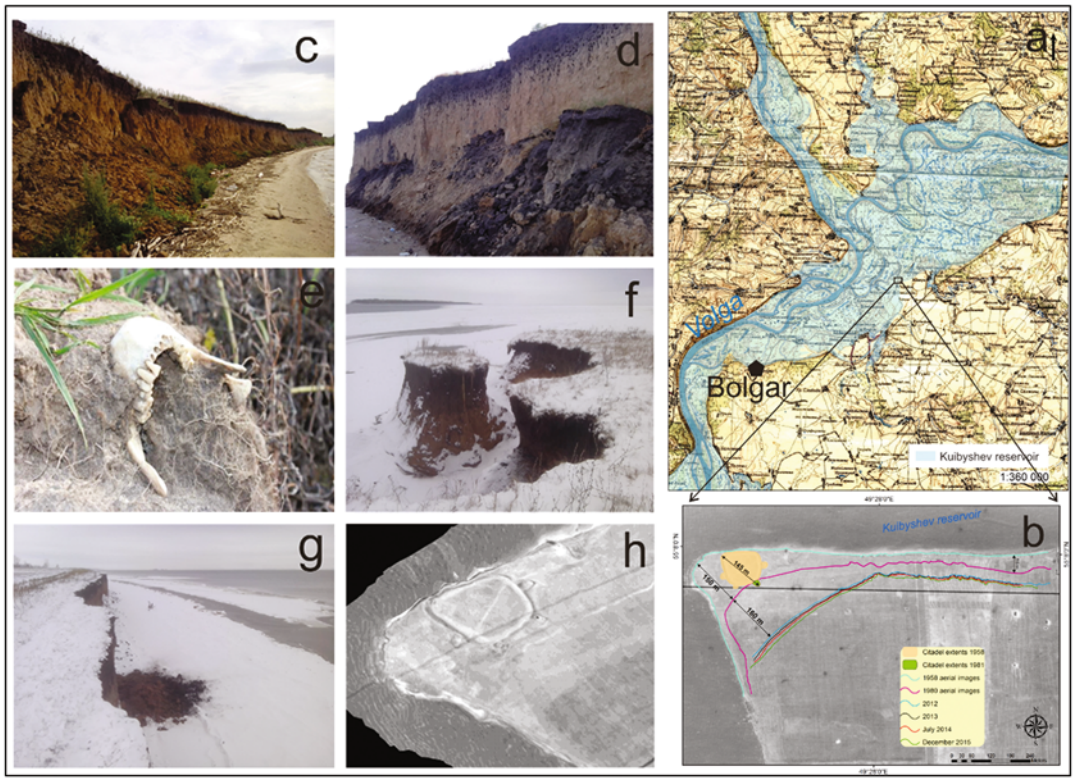

Natural Hazards Versus Cultural Heritage, Fig. 3 Coastal erosion of archaeological sites ((**a**) case of *Devichy Gorodok hillfort* – Bulgarian Culture X-XIII centuries, located in the Republic of Tatarstan, Spaskiy municipal district, on the left bank of Kuibyshev Reservoir, Russian Federation); (**b**) topographic surveys overlapping the Soviet aerial image from 1958, highlighting the fast coastal recession; (**c**, **d**) dislocated material during the July 2014 field trip; (**e**) animal remains coming to surface as a consequence of coastal erosion in the eastern part of the site; (**f**, **g**) dislocated areas during the December 2015 field trip; (**h**) 3D modeling of the settlement (hillfort) before being completely destroyed

monitoring cultural heritage sites located in coastal areas of Russia's reservoirs and to test landslide susceptibility models in the assessment of cultural heritage sites from the Moldavian Plateau, Romania.

9. Protection of European cultural heritage from geo-hazards (acronym PROTHEGO) (http://www.prothego.eu/home.html) – a joint research project funded between 2015 and 2018, under the framework of the Joint Programming Initiative on Cultural Heritage and Global Change (JPICH), Heritage Plus, under ERA-NET plus and the Seventh Framework Programme (FP7) of the European Commission. The project partners are the Institute for Environmental Protection and Research (ISPRA, Italy), Natural Environment Research Council (NERC, UK), Cyprus University of Technology (CUT, Cyprus), University of Milano-Bicocca (UNIMIB, Italy), and Geological Survey of Spain (IGME). The main goals of the project are to enhance cultural heritage management practices at national level; reinforce institutional support and governance through knowledge and innovation; identify, assess, and monitor risks; and strengthen disaster preparedness at heritage properties in the future.
10. Multidisciplinary complex project for the monitoring, conservation, protection, and promotion of the Romanian cultural heritage (acronym RO-CHER) – the project is

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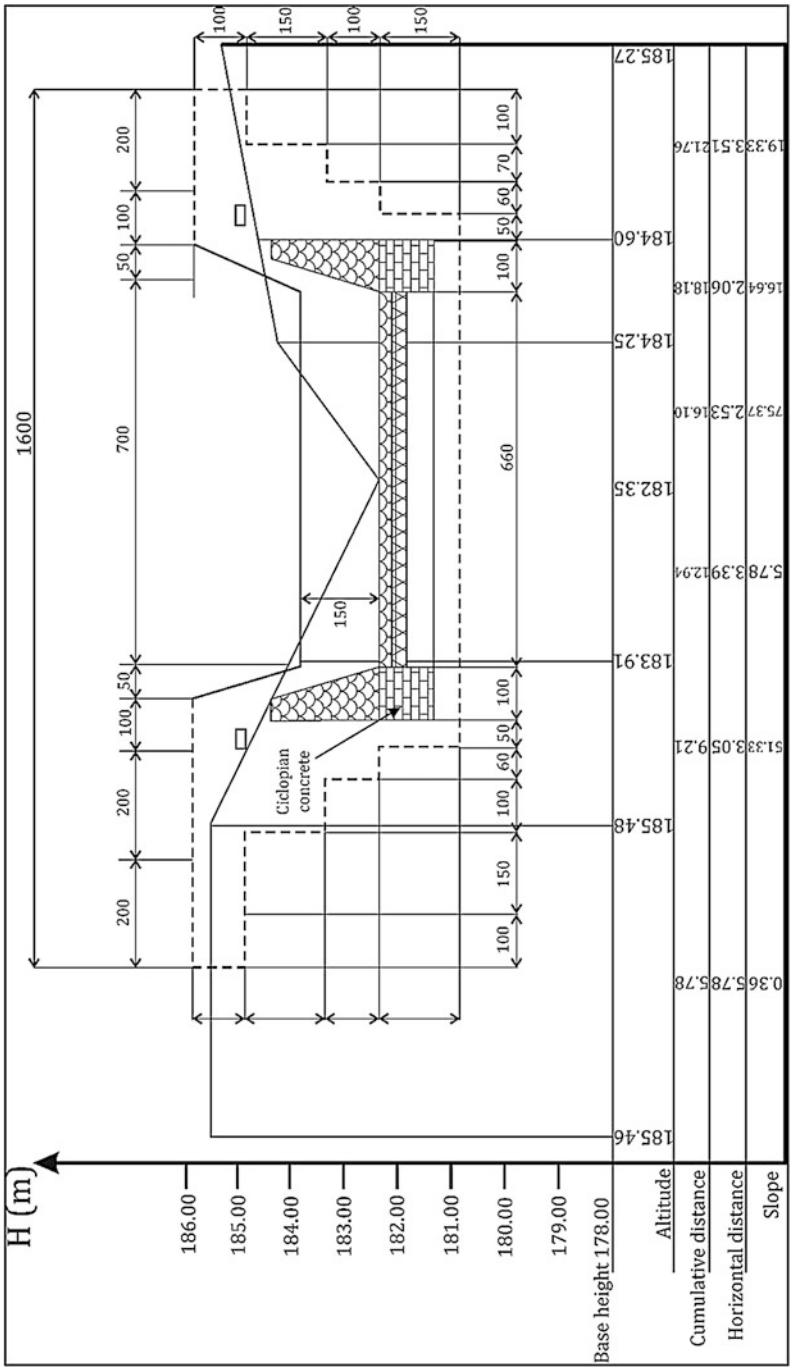

Natural Hazards Versus Cultural Heritage, Fig. 4 Technical details of the concrete thresholds built inside the Cucuteni-Baiceni gully (Valea Oii catchment, NE Romania) in order to stop the gully head retreat

financed by the Executive Agency for Higher Education, Research, Development, and Innovation Funding (UEFISCDI), Romania, from 2018 to 2020. The main coordinator of the project is the Romanian Space Agency, together with the National Institute for Research and Development in Chemistry and Petrochemistry (Bucharest), University of Agronomic Sciences and Veterinary Medicine of Bucharest, National Museum of the Union (Alba Iulia), and Museum of Dacian and Roman Civilisation (Deva). The project has four main objectives: monitoring the cultural heritage objectives with the aid of space technologies, development of materials and innovative techniques based on soft nanomaterials for safeguarding the cultural heritage, recommendation of an integrated management system (conservation, restoration, protection) for mobile and immobile cultural heritage objectives, and promoting cultural heritage by using state-of-the-art technologies of digital reconstruction.

The above projects brought significant insights into using modern technologies in the field of cultural heritage and their contribution is highly acknowledged. More projects like these are needed in order to save as much spatial data as possible in order to mitigate the negative effects of natural hazards on cultural heritage.

Future Directions

The application of soil erosion (gully erosion, landslides – Fig. 2) predictive models to cultural heritage assessment would be a proper way of mitigation (Nicu 2018). Once the assessment and mitigation are done, the proposals for prevention (Fig. 4) and preservation can start. Special attention must be given to areas with high and very

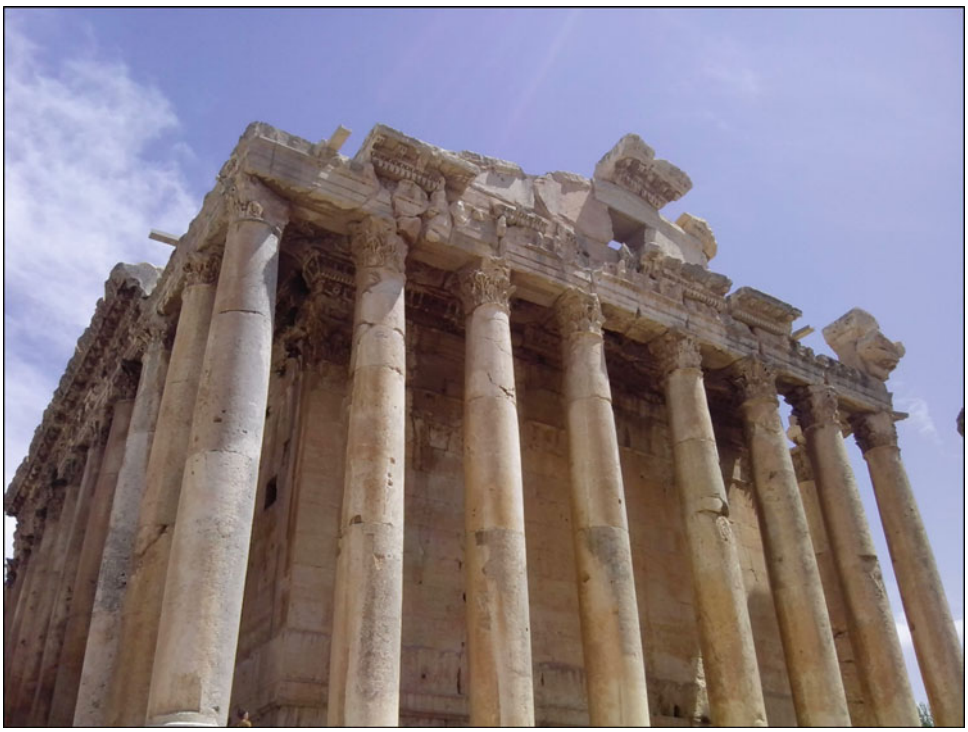

Natural Hazards Versus Cultural Heritage, Fig. 5 Instability process of the decorated roof at *Temple of Bacchus*, part of Baalbek Roman Archaeological Site (the largest and most impressive Roman Temple complex in the world, part of UNESCO World Heritage, Beqaa Valley, northeastern Lebanon)

high erosion potential. Other processes that should benefit from researchers attention are weathering and biotic processes (root wedging); weathering represents a natural process that affects cultural heritage stability over long periods of time (Fig. 5). The prevention and protection of cultural heritage from natural hazards is a difficult issue, due to their location in areas prone to these hazards. For example, the steep slopes used in the past by Neolithic population as a defensive system became in time areas with a very high erosion potential; moreover, these areas represent landslide depletion areas or gully lateral banks. Sites located near coastal or seismic prone areas are the most vulnerable; in this case, prevention measures should be taken, like consolidation.

The significance of cultural heritage and the opportunities that this part of the sector could create for both professionals in the field and for local communities is of great value; under a proper management and touristic promotion, it can boost the local economy and contribute to the population well-being. In order for this to be possible, preservation and mitigation measures need to be taken. Future mitigation measures can include restoration, excavation, site mapping, and eco-friendly erosion control measures. The measures undertaken have to be made in a sustainable way (Khalil et al. 2018). However, the research must be converted into policy action. There is a difficult issue in the attempt to financially evaluate the damages caused by natural hazards on cultural heritage; most of the monuments, not only those listed on the UNESCO WHL, have an outstanding universal value which goes beyond the material loss. It is a value that grows in time and gives the place a special and unique universal characteristic that cannot be found somewhere else.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Landscape Archaeology
- ▶ Natural Hazards Versus Cultural Heritage

References

Agapiou, A., and V. Lysandrou. 2015. Remote sensing archaeology: Tracking and mapping evolution in European scientific literature from 1999 to 2015. *Journal of Archaeological Science: Reports* 4: 192–200. https://doi.org/10.1016/j.jasrep.2015.09.010.

Agapiou, A., V. Lysandrou, D.D. Alexakis, K. Themistocleous, B. Cuca, A. Argyriou, A. Sarris, and D.G. Hadjimitsis. 2015. Cultural heritage management and monitoring using remote sensing data and GIS: The case study of Paphos area, Cyprus. *Computers, Environment and Urban Systems* 54: 230–239. https://doi.org/10.1016/j.compenvurbsys.2015.09.003.

Gontz, A.M., C.V. Maio, E.K. Wagenknecht, and E.P. Berkland. 2011. Assessing threatened coastal sites: Applications of ground-penetrating radar and geographic information systems. *Journal of Cultural Heritage* 12: 451–458. https://doi.org/10.1016/j.culher.2011.03.003.

Khakzad, S., M. Pieters, and K. Van Balen. 2015. Coastal cultural heritage: A resource to be included in integrated coastal zone management. *Ocean Coast Management* 118: 110–128. https://doi.org/10.1016/j.ocecoaman.2015.07.032.

Khalil, A.M.R., N.Y. Hammouda, and K.F. El-Deeb. 2018. Implementing sustainability in retrofitting heritage buildings. Case study: Villa Antoniadis, Alexandria, Egypt. *Heritage* 1 (1): 6. https://doi.org/10.3390/heritage1010006.

Lanza, S.G. 2003. Flood hazard on cultural heritage in the town of Genoa (Italy). *Journal of Cultural Heritage* 4: 159–167. https://doi.org/10.1016/S1296-2074(03)00042-6.

May, V. 2015. Coastal cliff conservation and management: The Dorset and East Devon coast world heritage site. *Journal of Coastal Conservation* 19 (6): 821–829. https://doi.org/10.1007/s11852-014-0338-8.

Migoñ, P. 2013. Cultural heritage and natural hazards. In *Encyclopedia of natural hazards*, ed. P.T. Bobrowsky, 135–140. Dordrecht: Springer.

Nicu, I.C. 2016a. *Hydrogeomorphic risk analysis affecting Chalcolithic archaeological sites from Valea Oii (Bahlui) watershed, Northeastern Romania: An interdisciplinary approach*. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-25709-9.

Nicu, I.C. 2016b. Cultural heritage assessment and vulnerability using analytic hierarchy process and geographic information systems (Valea Oii catchment, North-Eastern Romania). An approach to historical maps. *International Journal of Disaster Risk Reduction* 20: 103–111. https://doi.org/10.1016/j.ijdrr.2016.10.015.

Nicu, I.C., and G. Romanescu. 2016. Effect of natural risk factors upon the evolution of Chalcolithic human settlements in North-Eastern Romania (Valea Oii watershed). From ancient time dynamics to present day degradation. *Zeitschrift für Geomorphologie* 60 (1): 1–9. https://doi.org/10.1127/zfg/2015/0174.

Nicu, I.C. 2017a. Frequency ratio and GIS-based evaluation of landslide susceptibility applied to cultural heritage assessment. *Journal of Cultural Heritage* 28: 172–176. https://doi.org/10.1016/j.culher.2017.06.002.

Nicu, I.C. 2017b. Natural hazards – a threat for immovable cultural heritage. A review. *International Journal of Conservation Science* 8 (3): 375–388.

Nicu, I.C. 2017c. Tracking natural and anthropic risks from historical maps as a tool for cultural heritage assessment: A case study. *Environment and Earth Science* 76 (9): 330. https://doi.org/10.1007/s12665-017-6656-z.

Nicu, I.C. 2018. Natural risk assessment and mitigation of cultural heritage sites from North-eastern Romania (Valea Oii river basin). *Area*. https://doi.org/10.1111/area.12433.

Nicu, I.C., and A. Asăndulesei. 2018. GIS-based evaluation of diagnostic areas in landslide susceptibility analysis of Bahluieț River Basin (Moldavian Plateau, NE Romania). Are Neolithic sites in danger? *Geomorphology* 314: 27–41. https://doi.org/10.1016/j.geomorph.2018.04.010.

Pederson, J.L., P.A. Petersen, and J.L. Dierker. 2006. Gullying and erosion control at archaeological sites in Grand Canyon, Arizona. *Earth Surface Processes and Landforms* 31: 507–525. https://doi.org/10.1002/esp.1286.

Romanescu, G. 2013a. Geoarchaeology of the ancient and medieval Danube Delta: Modeling environmental and historical changes. A review. *Quaternary International* 293: 231–244. https://doi.org/10.1016/j.quaint.2012.07.008.

Romanescu, G. 2013b. Alluvial transport processes and the impact of anthropogenic intervention on the Romanian littoral of the Danube Delta. *Ocean and Coastal Management* 73: 31–43. https://doi.org/10.1016/j.ocecoaman.2012.11.010.

Romanescu, G. 2014. The catchment area of the Milesian colony of Histria, within the Razim-Sinoie lagoon complex (Romania): Hydro-geomorphologic, economic and geopolitical implications. *Area* 46 (3): 320–327. https://doi.org/10.1111/area.12093.

Romanescu, G., and I.C. Nicu. 2014. Risk maps for gully erosion affecting archaeological sites in Moldavia, Romania. *Zeitschrift für Geomorphologie* 58 (4): 509–523. https://doi.org/10.1127/0372-8854/2014/0133.

Romanescu, G., V. Cotiugă, A. Asăndulesei, and C.C. Stoleriu. 2012a. Use of the 3-D scanner in mapping and monitoring the dynamic degradation of soils: Case study of the Cucuteni-Baiceni Gully on the Moldavian Plateau (Romania). *Hydrology and Earth System Sciences* 16: 953–966. https://doi.org/10.5194/hess-16-953-2012.

Romanescu G, V. Cotiugă, A. Asăndulesei. 2012b. Use of terrestrial 3D laser scanner in cartographing and monitoring relief dynamics and habitation space from various historical periods. In *Cartography – a tool for spatial analysis*, ed. C. Bateira, 49–74. InTech: Croatia. https://doi.org/10.5772/47776.

Sdao, F., and V. Simeone. 2007. Mass movements affecting goddess Mafitis sanctuary in Russano din Vaglio (Basilicata, southern Italy). *Journal of Cultural Heritage* 8: 77–80. https://doi.org/10.1016/j.culher.2006.10.004.

Sdao, F., D.S. Lioi, S. Pascale, D. Caniani, and I.M. Mancini. 2013. Landslide susceptibility assessment by using a neuro-fuzzy model: A case study in the Rupestrian heritage rich area of Matera. *Natural Hazards and Earth System Sciences* 13: 395–407. https://doi.org/10.5194/nhess-13-395-2013.

Tarragüel, A.A., B. Krol, and C. van Westen. 2012. Analysing the possible impact of landslides and avalanches on cultural heritage in Upper Svaneti, Georgia. *Journal of Cultural Heritage* 13: 453–461. https://doi.org/10.1016/j.culher.2012.01.012.

Usmanov, B., I.C. Nicu, I. Gainullin, and P. Khomyakov. 2018. Monitoring and assessing the destruction of archaeological sites from Kuibyshev reservoir coastline, Tatarstan Republic, Russian Federation. A case study. *Journal of Coastal Conservation* 22 (2): 417–429. https://doi.org/10.1007/s11852-017-0590-9.

Wang, J.-J. 2015. Flood risk maps to cultural heritage: Measures and process. *Journal of Cultural Heritage* 16: 210–220. https://doi.org/10.1016/j.culher.2014.03.002.

Will, T., and H.-R. Meier. 2007. Cultural heritage and natural disasters: Risk preparedness and the limits of prevention. In *Cultural heritage and natural disasters risk preparedness and the limits of prevention: Heritage at risk*, ed. M. Hans-Rudolf, M. Petzet, and W. Thomas, Special ed., 9–20. Dresden: TUDpress.

N

Further Reading

Agapiou, A., V. Lysandrou, K. Themistocleous, and D.G. Hadjimitsis. 2016. Risk assessment of cultural heritage sites clusters using satellite imagery and GIS: The case study of Paphos District, Cyprus. *Natural Hazards* 83 (1): 5–20. https://doi.org/10.1007/s11069-016-2211-6.

Alexander, D. Cultural heritage and disasters. https://www.ucl.ac.uk/rdr/hide-events/heritage-and-disasters/cultural-heritage-and-disasters

Howard, A.J. 2013. Managing global heritage in the face of future climate change: The importance of understanding geological and geomorphological processes and hazards. *International Journal of Heritage Studies* 19 (7): 632–658. https://doi.org/10.1080/13527258.2012.681680.

http://www.unesco.org/new/en/natural-sciences/special-themes/disaster-risk-reduction/geohazard-risk-reduction/unesco-designated-sites/. Accessed 21 June 2018.

Margottini, C., F. Fidolini, C. Iadanza, A. Trigila, and Y. Ubelmann. 2015. The conservation of the Shahr-e-Zohak archaeological site (Central Afghanistan): Geomorphological processes and ecosystem-based mitigation. *Geomorphology* 239: 73–90. https://doi.org/10.1016/j.geomorph.2014.12.047.

Marzeion, B., and A. Levermann. 2014. Loss of cultural world heritage and currently inhabited places to

sea-level rise. *Environmental Research Letters* 9 (3). https://doi.org/10.1088/1748-9326/9/3/034001.
McKercher, B., P.S.Y. Ho, and H. du Cros. 2005. Relationship between tourism and cultural heritage management: Evidence from Hong Kong. *Tourism Management* 26: 539–548. https://doi.org/10.1016/j.tourman.2004.02.018.
Pavlova, I., A. Makarigakis, T. Depret, and V. Jomelli. 2017. Global overview of the geological hazard exposure and disaster risk awareness at world heritage sites. *Journal of Cultural Heritage* 28: 151–157. https://doi.org/10.1016/j.culher.2015.11.001.
Vecco, M. 2010. A definition of cultural heritage: From the tangible to the intangible. *Journal of Cultural Heritage* 11 (3): 321–324. https://doi.org/10.1016/j.culher.2010.01.006.
Watt, J., J. Tidblad, V. Kucera, and R. Hamilton, eds. 2009. *The effects of air pollution on cultural heritage*. US: Springer-Verlag.

Ndoro, Webber

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Basic Biographical Information

Webber was born in Goromonzi, Zimbabwe, in 1959. He grew up in the Domboshava area just outside of Harare, the capital city of Zimbabwe. He did his Bachelor of Arts degree at the University of Zimbabwe from 1980 to 1982. He obtained an MPhil in archaeology at the University of Cambridge (1987) and MA in architectural conservation from the University of York (1990) and received his Ph.D. in Archaeology from the University of Uppsala (2000). Webber got into archaeology and heritage management by chance. It was during his undergraduate time that he was introduced to archaeology as part of the history courses. At the time, archaeology was not yet taught as a separate subject at the University of Zimbabwe. It was introduced in 1985. He, however, started practicing archaeology in 1985 after he moved to joined the National Museums and Monuments of Zimbabwe (NMMZ) as a curator. His initial responsibility was to look after archaeological collections in the Museum of Human Sciences in Harare (formerly Queen Victoria Museum) and to conduct archaeological field research within NMMZ's northern region. In 1987, he became the resident archaeologist at Great Zimbabwe, after its listing as a UNESCO World Heritage Site in 1986. In 1991, he was appointed national monument program coordinator. Ndoro left NMMZ to join the University of Zimbabwe as a lecturer in the Archaeology Unit in May 1994. He taught archaeology and cultural heritage management (CRM) course to both undergraduates and postgraduates. He worked for the university for 12 years during which time he had become a senior lecturer in the Department of History. Webber Ndoro joined ICCROM in 2002 as a project manager for AFRICA 2009. Although he had done a few assignments as a consultant and facilitator, this post exposed him to greater variety of issues within African heritage management. AFRICA 2009 was a successful Pan-African program geared toward finding lasting solutions to the management and conservation of immovable cultural properties on the continent. While archaeological in nature, many of these have historical and spiritual connections to living communities. This brings a management complexity which is not often encountered on other continents. In 2008, Webber Ndoro joined the newly established African World Heritage Fund (AWHF) as its inaugural director. This organization coordinates the effective management of World Heritage Sites on the continent. It also strives to increase the visibility of African World Heritage places by, among other things, helping African countries navigate the process of nominating their places of cultural and natural significance onto the World Heritage List. With AWHF, Webber (Fig. 1) has found an outlet for the issues that he had championed for many years. Under his stewardship, AWHF has assisted in the inscription of close to 20 sites from various African countries onto the World Heritage List. Several more are on the tentative list.

Major Accomplishments

Webber Ndoro was probably the first professionally trained Zimbabwean heritage manager.

Ndoro, Webber, Fig. 1 Webber Ndoro standing in the parallel passage of the Great Enclosure at Great Zimbabwe UNESCO World Heritage Monument, Zimbabwe. (Photo from the University of Zimbabwe Archaeology Unit Archives)

Together with a few others, he was also one of the first trained archaeologists in the country. This set him up as a pioneer in many senses. He, however, surpassed the expectations of a pioneer, and he steered the discipline of archaeology in extraordinary directions, especially in the area of archaeological heritage management. He contributed significantly toward a more holistic management of archaeological heritage and cultural heritage in general. His pragmatic outlook of cultural heritage management has resulted in such approaches as the incorporation of local communities, the consideration of intangible aspects, and the acceptance of the concept of cultural landscapes as compared to cultural sites. He has passionately championed the need for social and economic beneficiation of communities that live with and around World Heritage sites and other significant cultural sites (Ndoro 2015a, 2017). He has also taken up the cause to see cultural heritage play a major role in solving conflicts around the continent by fostering cohesion and tolerance between and among community members (Ndoro 2016). All this has seen him become the face of African heritage management today.

Webber has contributed immensely to the training of archaeologists and heritage managers currently practicing in Africa. As they say, charity begins at home. Webber's contribution in germinating heritage management in Zimbabwe can never be overemphasized. At the university, he was instrumental in introducing heritage management courses to the archaeology curricular. In the early 2000s, he also spearheaded the introduction of a master's in heritage management that was to act as a training pool for not only Zimbabwean heritage managers but other managers from Southern Africa and beyond. He managed to inculcate urgency for heritage management in many of his students, a job he continues to do despite having moved outside of full-time academia over a decade ago. He has become a mentor even to the professionals since his approach to heritage management has always emphasized capacity building and skills development of local heritage practitioners across the continent.

Webber's major accomplishments are in finding workable solutions to heritage management in Africa. His work at Great Zimbabwe has had an immense impact on how archaeological sites and other World Heritage sites are managed. It also led to the proper management of other national monuments in Zimbabwe, especially those of the Zimbabwe culture. On the continental side, his pragmatic heritage management approaches have changed the attitude from one of just importing ideas from outside the continent wholesale into one that is result-oriented and based on the African culture and experience. He advocates for prioritizing traditional knowledge as solutions to some of the continent's perennial problems (Ndoro 2015b). He has helped in policy formulation at national and international level. As a member of and panelist at many of the meetings coordinated by organizations such as ICOMOS, ICCROM, and World Heritage committees, he

brought African heritage management issues to the attention of the world. His work with organizations such as the World Bank, UNESCO, and Getty Conservation Institute and heritage organizations from various countries has made sure that solutions for African heritage management challenges are found and implemented.

Many of the heritage management challenges in Africa were emanating from disfranchisement of the communities that live with heritage places. Ndoro brought one of the best solutions to these challenges by advocating for the employment of traditional management systems that communities have always used to look after the heritage places. He supported the concept of the community participation, in a way, which brings in a viable and less expensive heritage management systems. Community participation and the traditional management systems help lessen the burden for formal heritage institutions that cannot afford the financial resources required to look after heritage places in Africa.

One of the greatest legacies that Webber will eventually leave is in his publications. He has continued to write and co-author books, book chapters, and academic journal articles on archaeology and heritage management in Africa. He has also written material digestible by the general public (e.g., Pwiti and Ndoro 2014; Ndoro 2004). Any researcher dealing with heritage management in Africa should not overlook Webber's publications. His publications should be the first port of call for any student who is interested in heritage management, the management, and conservation of dry stonewalled monuments, community participation, or the role of culture in development and peace building.

As an acknowledgement of his enormous contribution to scholarship and professional heritage management, Webber has received a number of outstanding awards. He has been awarded African Diaspora World Tourism Award – for the promotion of African heritage places (2013) – and the prestigious 2015 ICCROM Award for his "outstanding contribution to the field of cultural heritage conservation." He has recently been awarded the Order of Civil Merit (commander) awarded by His Majesty the King of Spain (2017). The Association of Southern African Professional Archaeologists (ASAPA) has bestowed him honorary membership in recognition of his profound contribution to archaeological research and conservation in the region.

References

Ndoro, W. 2004. *The preservation of Great Zimbabwe: Your monument, our shrine*, ICCROM Conservation Studies 4. Rome: ICCROM.

Ndoro, W. 2015a. World heritage sites in Africa: What are the benefits of nomination and inscription? In *A companion to heritage studies*, ed. Logan W., M. N. Craith, and U. Kockel, 392–409. Oxford: John Wiley & Sons.

Ndoro, W. 2015b. Use of traditional knowledge systems to promote DRR. In *Proceedings of International Expert meeting on cultural heritage and disaster resilient communities within the framework of the 3rd UN World Conference on Disaster Risk Reduction (WCDRR)*. Tokyo: Independent Institutes for Cultural Heritage.

Ndoro, W. 2016. Leveraging culture for peaceful, tolerant and socially inclusive cities. In *Culture urban future: Global report on culture for sustainable urban development*. Paris: UNESCO.

Ndoro, W. 2017. World heritage and development in Sub-Saharan Africa. *American Anthropologist* 119 (1): 129–131.

Pwiti, G. and W. Ndoro. 2014. The archaeological heritage of Africa. Cambridge: Cambridge University Press.

Further Reading

African World Heritage Fund Reports., http://awhf.net/reports-2/

Chirikure, S., M. Manyanga, W. Ndoro, and G. Pwiti. 2010. Unfulfilled promises? Heritage management and 159 community participation at some of Africa's cultural heritage sites. *International Journal of Heritage 161 Studies* 16 (1–2): 30–44.

Chirikure, S., F. Bandama, K. Chipunza, G. Mahachi, E. Matenga, P. Mupira, and W. Ndoro. 2016. Seen but not told: Re-mapping great Zimbabwe using archival data, satellite imagery and geographical information systems. *Journal of Archaeological Method Theory*. https://doi.org/10.1007/s10816-016-9275-1.

Ndoro, W. 2001. *Our shrine, your monument: The preservation of Great Zimbabwe*. Uppsala: Uppsala University Press.

Ndoro, W. 2015. Guest editorial: Heritage Laws: Whose heritage are we protecting? *South African Archaeological Bulletin* 70 (202): 135–137.

Ndoro, W., and G. Pwiti. 2005. *Legal frameworks for the protection of immovable cultural heritage in Africa. ICCROM conservation studies*. Rome: ICCROM.

Ndoro, W., and G. Wijesuriya. 2015. Heritage management and conservation: From colonization to globalization.

In *Global heritage: A reader*, ed. L. Meskell, 131–149. Chichester: Wiley Blackwell.
Ndoro, W., A. Mumma, and G. Abungu, eds. 2008. *Cultural heritage and the law: Protecting immovable cultural heritage in English speaking countries of sub-Saharan Africa*, ICCROM Conservations Studies 8. Rome: ICCROM.
Ndoro, W., S. Chirikure, and J. Deacon, eds. 2017. *Managing heritage in Africa: Who cares?* London: Routledge.
WEBBER NDORO ICCROM Award., http://www.iccrom.org/webber-ndoro-to-receive-prestigious-iccrom-award/

Neanderthals and Their Contemporaries

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Introduction

The Neanderthals are the longest-recognized nonmodern humans known to science and are usually referred to their own species, *Homo neanderthalensis*. Geographically restricted to Europe and Western to West-Central Asia, fossil data suggest that they are contemporary with early members of our species (*H. sapiens*, or modern humans), as well as other nonmodern forms of the genus *Homo*. Genetic data suggest the Neanderthal lineage split from that of modern humans sometime between 800,000 and 300,000 years ago. However, most Neanderthal fossil specimens themselves have been recovered in Late Pleistocene contexts dating from ca. 130,000 to 30,000 years ago. Some scientists argue that the Sima de los Huesos sample from the Atapuerca Hills of northern Spain, which date to ca. 430,000 years ago, are Neanderthals, especially since genetic data link the two samples, but the Sima sample lacks many of the uniquely derived Neanderthal features.

Archaeologically, Neanderthals are most frequently associated with Mousterian tools, a Middle Paleolithic industry found in Europe, Western Asia, and parts of North Africa. However, late (ca. 32,000–36,000 years ago in radiocarbon years) Neanderthals in southwestern France (and likely Spain north of the Cantabrian Mountains) are associated with the Châtelperronian industry, which is typologically considered by archaeologists to be either a fully Upper Paleolithic or (more commonly) a transitional Middle-to-Upper Paleolithic industry. Neanderthals have also been thought to have been the makers of similar "transitional" Industries in Italy and Greece (the Uluzzian), and the Czech Republic, Slovak Republic, and Hungary (the Bohunician and Szeletian), but this view has recently come into question (see below).

Definition

Homo neanderthalensis is the fossil hominin species most closely related to our own species, *Homo sapiens* (modern humans). Neanderthals are distinguished from modern humans and other hominin species by a long-recognized suite of anatomical (and now genetic) characters, some of which are ancient retentions (*plesiomorphies*) shared with other nonmodern human species and others which are uniquely or shared-derived (evolved) characters (*apomorphies*). Ancient retentions in the Neanderthal skull include especially large shovel-shaped incisors (although in older adults the crowns of these teeth are extensively worn through paramasticatory use), long and low cranial vaults with pronounced brow ridges, prognathic (forward-projecting) faces that lack canine fossae but which have wide nasal apertures, and mandibles without a forward-projecting chin. Ancient retentions in the skeleton below the skull (i.e., the postcranial skeleton) include wide pelves with elongated public bones, strongly built and more horizontally oriented spinous processes in the cervical vertebrae, and the large, robustly built transverse processes of the lumbar vertebrae. Neanderthal ribs are also large and robust, and there are some data to suggest that the inferior aspect of their rib cage was less constricted (i.e., more open) than those of *Homo sapiens*, perhaps to accommodate the

wider pelvis. As was the case with earlier hominins, including members of the genus *Australopithecus*, the Neanderthal elbow joint evinces a relatively short ulnar coronoid process. Neanderthals (including Neanderthal infants) are also like earlier hominins in that they are characterized by limb bones with thickened cortical bone and smaller medullary (marrow) cavities. Neanderthal muscle attachment areas, particularly on the bones of the upper limb, are indicative of a heavily muscled physique; this, too, is a plesiomorphy retained from earlier *Homo*.

There are relatively few derived characters of the postcranial skeleton, the most noteworthy being a depression, or sulcus, along the axillary (lateral) border of the scapula corresponding to the scapular attachment of the teres minor muscle, one of the muscles of the rotator cuff. This sulcus tends to be found on the ventral, or rib cage, side of the scapula in *Australopithecus afarensis* (A.L. 288-1, or "Lucy"), *Homo erectus*, and *H. sapiens*, but in Neanderthals, it is almost exclusively found on the dorsal (back) side of the scapula's axillary border. Derived characters of the skull include size reduction in brow ridges, chewing musculature, and cheekbones relative to Early and Middle Pleistocene *Homo*, larger brains (in absolute terms Neanderthal brains are on average larger than those of *Homo sapiens*: 1350 cc for *H. sapiens*; 1520 cc for *H. neanderthalensis*), occipital buns, and a unique, ovoid depression of dubious function at the rear of the cranium known as the suprainiac fossa. Yet perhaps the most commonly cited distinctive anatomical feature of Neanderthals is their midfacial prognathism, i.e., the anatomical configuration in which the region of the face nearest the body's midline (primarily the nose and anterior dentition) is projecting. Projecting faces are also characteristic of earlier hominins, but Neanderthals differ from the ancestral condition in that the more lateral portions (or sides) of the face (predominately the zygomatics, or cheekbones) are in a more posterior position than would be typical for earlier members of the genus *Homo*. When considered as a whole, the morphological differences between the Neanderthals and our own species are quite marked (Figs. 1 and 2). In fact, multivariate analyses of craniofacial measurements consistently cluster the Neanderthals apart from *Homo sapiens* in multivariate space. In contrast, the differences among recent *H. sapiens* in craniofacial morphology are much smaller – this despite our own species' global distribution. It is of note that these anatomical differences between Neanderthals and modern

Neanderthals and Their Contemporaries, Fig. 1 Oblique views of the skull of (L to R) La Ferrassie 1 (*Homo neanderthalensis*) and Cro-Magnon 1 (*Homo sapiens*). The canine fossa is the depression visible under the orbits in the cheekbone area of Cro-Magnon 1. (Photo copyright John Reader)

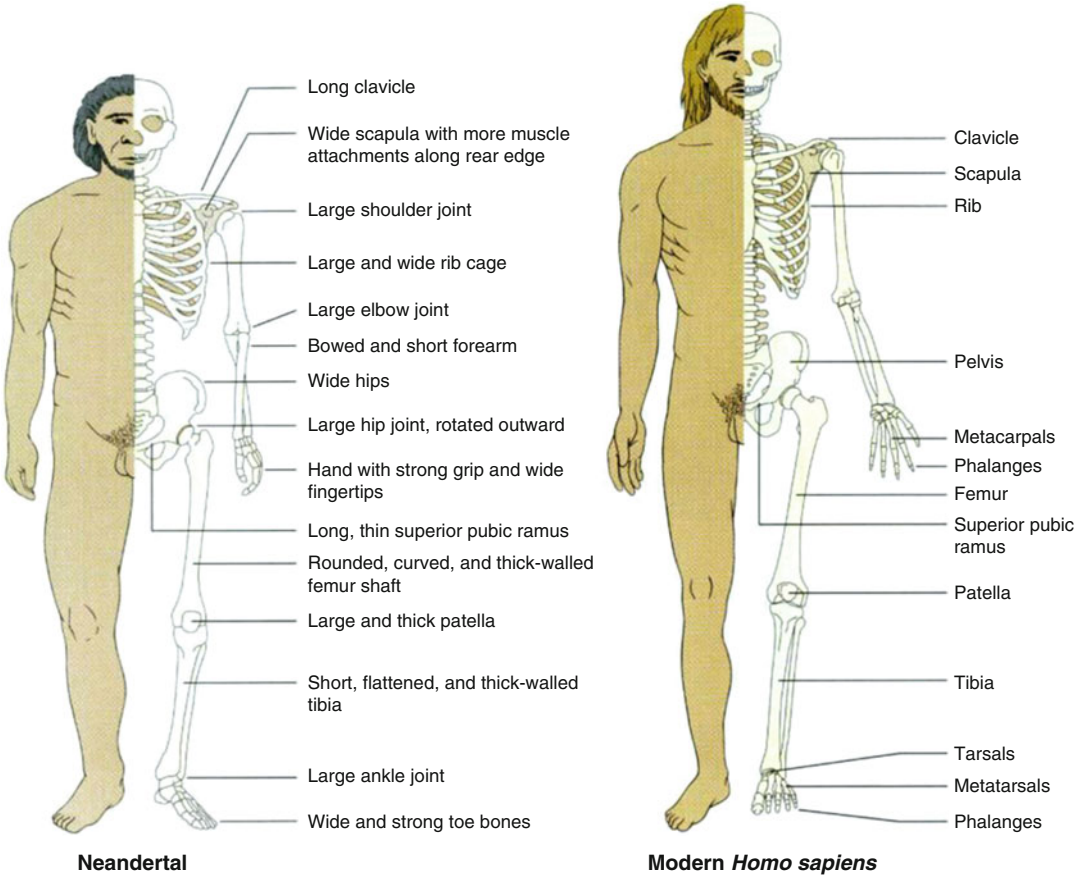

Neanderthals and Their Contemporaries, Fig. 2 Schematic views of a male *Homo neanderthalensis* (L) compared with a male *H. sapiens* (R). (From Stringer and Gamble 1993)

humans are manifested despite the fact that the Neanderthal genome is over 99% identical to ours, indicating that perhaps only a few key changes in regulator genes differentiate the two taxa.

Historical Background

The first Neanderthal recognized as such was discovered at the (now obliterated) cave site of Feldhofer, in the Neander Valley (or "Thal" in nineteenth-century German) near Düsseldorf in 1856. Two other Neanderthals had previously been discovered, one at Engis, Belgium, in 1829 or 1830 and a second at Forbes' Quarry in Gibraltar in 1848, but neither of these specimens was recognized as a nonmodern form of human until decades later. Thus the term "Neanderthal" stuck as both the vernacular and scientific (*Homo neanderthalensis* King 1864) name for the human species represented by the individuals from Feldhofer and similar specimens from across Europe into Western to West-Central Asia.

Many scientists were at first reluctant to accept the Neanderthals as a prehistoric "race" or species of humans, even when further discoveries were made in Belgium at La Naulette in 1866 and in 1880 in what is now the Czech Republic at the site of Šipka. Among the most vocal critics was Prussian anatomist Rudolf Virchow, known as the "father of pathology," a staunch anti-evolutionist, who concluded that all of the newly discovered Neanderthal specimens were modern humans evincing various pathological conditions. Virchow's position became untenable after the

1886 discovery of two Neanderthal individuals at the Belgian site of Spy, which were preserved under an undisturbed stalagmitic layer and associated with both extinct mammals and "primitive" (Mousterian) stone tools.

Perhaps the most culturally salient Neanderthal individual was discovered in 1908 at the site of La Chapelle-aux-Saints in Corrèze in southwestern France. The relatively complete and well-preserved skeleton of this adult male individual was given to Prof. Marcellin Boule, who published a series of important articles on it from 1911 to 1913. In these articles, he took great pains to emphasize its "ape-like" nature (Fig. 3). Boule erroneously reconstructed the Chapelle-aux-Saints Neanderthal as having had a stooped posture, due in part to a perceived lack of modern humanlike spinal curvatures. Boule also reconstructed La Chapelle as having walked with a bent-kneed gait. It is to Boule whom we owe the popular conception (which still persists today) of the Neanderthal as primitive brute.

Over the course of the twentieth century and into the twenty-first, many more Neanderthal remains were discovered across Europe, which is widely regarded as the continent on which the Neanderthals evolved. Indeed, a number of Neanderthal features, including their foreshortened distal limb segments and wide bodies with voluminous, barrel-shaped rib cages (and even their large noses), have been argued to be the result of adaptation to the glacial cold of Pleistocene Europe. In Europe clearly diagnosable Neanderthal remains have been recovered in Belgium, Croatia, the Czech Republic, France, Georgia, Germany, Gibraltar, Greece, Hungary, Italy, the Netherlands, Portugal, the Slovak Republic, Russia, Spain, and Ukraine. The twentieth century also saw the discovery of multiple diagnosable Neanderthal skeletons in Israel, Iraq, Syria, and Uzbekistan. These European and Western Asian specimens have added greatly to our knowledge of Neanderthal anatomy and our understanding of their temporal and geographic range. Recently an anatomically nondiagnostic partial juvenile skeleton from Okladnikov Cave and a pedal phalanx from the nearby Denisova Cave in southern Siberia had Neanderthal mitochondrial DNA (mtDNA) sequences – extending the species' range to the Altai Mountains of southern Siberia (Fig. 4, and see below). Thus Neanderthals ranged from the Iberian Peninsula in the west across Europe into Western Asia and northwest up into southern Siberia. In contrast, no Neanderthals have been recovered from Africa, where almost all Neanderthal contemporaries, at least based on the fossil record (and not analyses of recent human DNA; see below), appear to be representatives of modern humans (*Homo sapiens*). Likewise, no Neanderthals are yet known from the Indian subcontinent or Eastern Asia. Neanderthal contemporaries in this region are variably referred

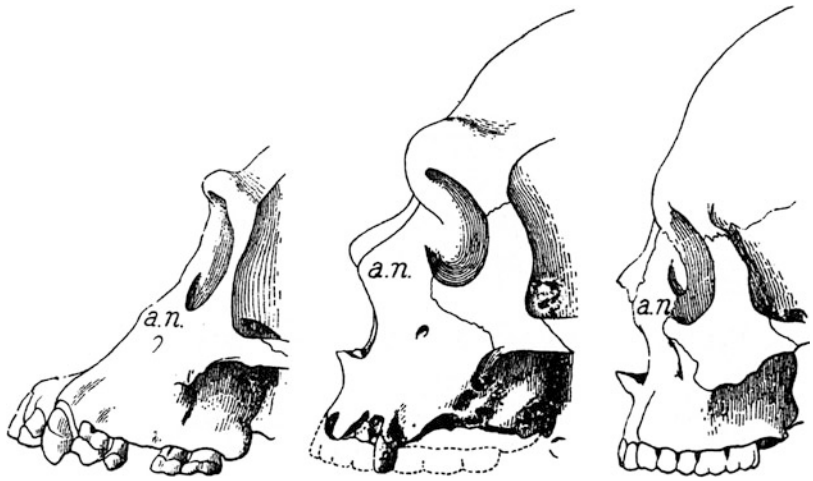

Neanderthals and Their Contemporaries, Fig. 3 Lateral views of crania of (L to R), a chimpanzee, La Chapelle-aux-Saints Neanderthal, and a modern human from one of Boule's publications. He emphasized the facial prognathism as a primitive feature aligning the chimpanzee with the Neanderthal. (From H.F. Osborn (1915) *Men of the Old Stone Age*)

Neanderthals and Their Contemporaries, Fig. 4 Map showing the approximate range of *Homo neanderthalensis*, including the recent discoveries from the Altai Mountains in southern Siberia. (From Krause et al. 2007)

to *H. erectus*, *H. floresiensis*, or *H. sapiens*, and possibly *H. heidelbergensis* (but see below).

Key Issues/Current Debates

The oldest question in the study of human evolution is that of modern human origins or the evolutionary emergence of our own species. Since the second half of the nineteenth century, this question has been intimately tied to the "Neanderthal question"; i.e., what role, if any, did the Neanderthals play in our own species' evolution? The last three decades saw the rise of competing models of modern human origins, with the multiregional evolution (MRE) and recent African origin (RAO) models representing diametrically opposing views. The MRE position, championed by Milford Wolpoff and colleagues, was that in the Middle and Late Pleistocene, genetic exchange between hominins across the Old World kept geographically dispersed populations of the genus *Homo* from differentiating to the point that they became separate species. Therefore, the origins of modern humans are not the origin of a new species, or a speciation event per se, but rather is simply the process of a global fixation of anatomical *characters* that we today recognize as "anatomically modern" – e.g., high, globular, rounded, crania, small brow ridges, forward-projecting chins, and non-projecting faces tucked beneath the frontal lobes of the brain. The MRE model also held that the Neanderthals made significant genetic contributions to the populations of modern humans who succeeded them in Europe and Western Asia. In contrast, RAO proponents, such as Chris Stringer, argued that the emergence of *Homo sapiens* was a cladogenetic (speciation) event, with modern humans evolving first in Africa ca. 200,000–300,000 years ago and then expanding to replace their nonmodern cousins in southern and northern Africa, the Levant, Eastern Asia, and ultimately Europe. Some RAO proponents argued that spoken language was unique to the newly evolved species and was ultimately the key to its/our success. However, since we now know Neanderthals had the derived, humanlike version of the *FOXP2* "speech and language"

gene, and given that Neanderthal basicranial, mandibular, and hyoid anatomy would not preclude human-like speech, and considering the large size of the Neanderthal brain, it appears unlikely that among the hominins only *Homo sapiens* could speak.

Many RAO proponents also argued that as separate biological species (following Mayr 2000), there was no successful interbreeding between *Homo sapiens* and *H. neanderthalensis*; rather the two species were reproductively isolated from each other. In other words, even if members of the two species recognized each other as potential mates, any resulting offspring of such unions were incapable of reproducing themselves, in much the same way as mules, the offspring of a horse mother and a donkey father, are almost always sterile.

Beginning in the 1980s intermediate models staked out the middle ground between the MRE and RAO approaches. In particular, the "Assimilation" model of Fred Smith and Erik Trinkaus (Smith 1994) and the "Replacement with Hybridization" model of Günther Bräuer (2008) agreed with the RAO position that modern humans evolved first in Africa, but unlike many RAO supporters, these workers saw paleontological evidence for varying amounts of successful interbreeding between *Homo sapiens* and nonmodern species of the genus *Homo*.

While paleontologists heatedly debated the issue of modern human origins for over 150 years, the question was ultimately answered in 2010 when the draft sequence of the Neanderthal genome was published (Green et al. 2010). Green and colleagues found that uniquely Neanderthal genetic sequences survive even today among non-African people, and they estimate that the proportion of Neanderthal ancestry in these non-Africans to be somewhere between 1% and 4%. It is notable that this finding is more in line with the predictions drawn from the "Assimilation" or "Replacement with Hybridization" models than with those made by either MRE or RAO. What remains a point of contention, however, is how to interpret this Neanderthal genetic contribution to (at least some) living humans. Does it represent multiple interbreeding events across Europe and Western Asia over the course of many millennia, or is it a remnant of extremely rare interbreeding that occurred only infrequently, perhaps only a few times in Western Asia? The fact that there is actual genetic evidence of interbreeding at least 30,000 years after it occurred suggests to many that the former is more likely than the latter.

Also related to this question (and still hotly debated) is the question of temporal overlap between Neanderthals and modern humans in Europe. The earliest directly dated, anatomically diagnostic, modern human in Europe is that of Oase, Romania, dated to 35,000 years BP (uncalibrated), and there are also tool industries which to date have only been associated with *H. sapiens* that date back some 40,000 years in Europe. Late Neanderthals are said to date to as recently as 32,000–33,000 BP (radiocarbon years) at the site of Vindija in Croatia, and some Mousterian deposits in southern Iberia are said to postdate 30,000 BP (although both sets of dates are disputed by some workers, some of whom argue that no Neanderthal is securely dated to later than 38,000 BP in radiocarbon years; e.g., Jöris and Street 2008). The late Mousterian dates, if accurate, would seem to indicate a temporal overlap of *Homo sapiens* and *H. neanderthalensis* in Europe of perhaps as much as 12,000 years. However, these dates fall at the very limits of the applicability of radiocarbon dating, and to further complicate matters, there is a radiocarbon plateau at ca. 35,000 BP. Perhaps more importantly, given the fluidity of material culture, tools should never be used as genetic markers – and in the archaeological record, we do have multiple examples of modern humans making and using Mousterian tools!

An additional potential geographical area of contact between *Homo sapiens* and *H. neanderthalensis* is the Levant, the region along the eastern shore of the Mediterranean. *Homo sapiens* is found in the southern Levant at ca. 100,000 BP, while *H. neanderthalensis* remains are found there dating to ca. 50,000–60,000 BP (Fig. 5). While some have interpreted these data as indicative of a period of 50,000 years of temporal overlap between the two species in the region, this

Neanderthals and Their Contemporaries, Fig. 5 The skull of the Amud I *Homo neanderthalensis* specimen from northern Israel, dated to ca. 50,000 years ago (above), compared with the Skhul V *H. sapiens* specimen from northern Israel, which likely dates between 100,000 and 80,000 years ago. (Photo copyright Israel Antiquities Authority (Jerusalem) and Dr. Eric Delson)

is unlikely to be the case. Since we now know that Neanderthals and modern humans were at least somewhat interfertile, the notion that they could live side by side in a small area like the southern Levant for tens of millennia, while remaining biologically distinct populations is extremely improbable. What seems much more likely is that the two hominin species were in the region at different times and under different climatic regimes. Specifically, it appears that *Homo sapiens* expanded out of Africa and into the Levant during the relatively warmer climes of the Last Interglacial and later retreated back into Africa as the climate deteriorated with the onset of glacial conditions at ca. 75 ka (MIS 4). Likewise, as has been argued for many years by Bernard Vandermeersch (1981) and others, the Neanderthals may not have been in the Levant prior to 75 ka and perhaps only expanded into the region from Europe (and/or from the region [s] surrounding the Caucasus Mountains and Caspian Sea) with the onset of deteriorating climatic conditions in the north. Analyses of microfauna by the late Eitan Tchernov support this conclusion, since he found that the small mammal faunal (microfaunal) remains from the Levantine *Homo sapiens* site of Qafzeh have a broad and distinctive Afro-Arabian component, while later microfauna associated with *Homo neanderthalensis* (or at least with cultural remains assumed to be associated with that species) at sites such as Tabun and Hayonim are characterized by many fewer Afro-Arabian elements and a much greater number of Palearctic species (Tchernov 1998). Based on zooarchaeological data, then, contacts between the two species were likely relatively fleeting in the southern Levant.

Another unresolved issue concerning the Neanderthals and their contemporaries is that of the emergence of "modern" behavior and whether the Neanderthals were themselves capable of it. The issue of behavioral modernity has its roots in the archaeological study of the Middle-to-Upper Paleolithic transition in Europe. Viewed through a European lens, the Upper Paleolithic, which begins to appear ca. 40,000 years ago in Europe, represents the high-water mark of Paleolithic culture. In the Upper Paleolithic, we have the first-time appearance (in Europe, at least) of large numbers and types of bone and antler tools, particularly those made in such a way as to take advantage of bone's special properties, such as barbed harpoon points. Complex rock-lined fireplaces complete with ventilation systems replace simple Middle Paleolithic hearths. Vivid and realistic cave paintings, and mobile art in the form of small sculptures, also make their first appearance in the Upper Paleolithic, and there is also a technological shift in the Upper Paleolithic toward stone implements made on long parallel-sided blades. This suite of technological and artistic characters came to be viewed by archaeologists as the "total package" indicative of "modern" human behavior. In contrast, the

preceding European Middle Paleolithic industry (the Mousterian) had virtually no evidence of art, with stone tools made on Levallois and other pre-prepared flakes that were only occasionally blades. Likewise, the Mousterian had very few bone and antler tools. Archaeologists and biological anthropologists alike, then, interpreted the Middle-to-Upper Paleolithic transition as indicative of the work of two different types, or species, of hominin. The Middle Paleolithic (Mousterian) tools were the work of Neanderthals, who lacked the cognitive capacity to make art or complicated tools. The Upper Paleolithic, then, with its art and technological complexity, was exclusively the work of modern humans. This perspective hit a stumbling block when in 1979 a Neanderthal skeleton was unearthed from Châtelperronian levels at the French site of St.-Césaire. Up until that point, archaeologists had considered the Châtelperronian to be (typologically, at least) an Upper Paleolithic industry. Could the Neanderthals be capable of making Upper Paleolithic tools after all? Further analyses revealed that previously nondiagnostic human remains from Châtelperronian levels at the French site of Grotte du Renne at Arcy-sur-Cure were also Neanderthal, and these specimens were also associated with evidence of personal adornment in the form of pierced animal teeth.

Some workers responded to this "problem" by demoting the Châtelperronian (and similar industries such as the Szeletian, Bohunician, and Uluzzian) from truly Upper Paleolithic industries to "transitional" Middle-to-Upper Paleolithic industries. Many also came to view these "transitional" industries as a kind of Neanderthal response to the superior technology brought into Europe by "invading" modern humans. In other words, the Upper Paleolithic-type tools found in the Châtelperronian were either manufactured in imitation of modern humans' technology or, alternatively, were acquired by Neanderthals via trade with modern humans. Archaeologist Paul Mellars (2005) goes so far as to invoke the timing of the appearance of these transitional industries as evidence that the Neanderthals borrowed these technological innovations from modern humans. He notes that Neanderthals used nothing but Middle Paleolithic tools until the relatively sudden appearance of transitional industries ca. 40,000 years ago – a date too coincidentally correlated with the first appearance of anatomically modern humans in Europe not to be causally related to them.

Archaeologist João Zilhão (2006) disagrees, arguing instead that the Châtelperronian and similar industries were autochthonous developments with their technological roots in the preceding local Mousterian. He and his colleagues also argue that given taphonomic processes and the error ranges inherent in radiometric dating, one cannot reject the null hypothesis that the Châtelperronian is older than the Aurignacian (the industry argued by many archaeologists to be the earliest "truly" Upper Paleolithic industry in Europe) at every site that contains both industries. Zilhão also argues that since there is some (albeit relatively rare) evidence for art in Mousterian contexts at multiple European (and therefore presumed Neanderthal) sites, and given the fact that some hunter-gatherers in the ethnographic present manufacture simple lithic technologies and/or make no art on durable materials (i.e., their art would be "archaeologically invisible"), one cannot create a definition of "modern" human behavior that does not either (1) include Neanderthals or (2) exclude some groups of living humans. This debate has also become a bit more complicated when it was revealed that deciduous molars, said to be derived from Uluzzian levels in Italy, cluster in multivariate space with modern human deciduous molars, and not those of Neanderthals (Benazzi et al. 2011).

Some researchers criticize the traditional definition of modern human behavior by arguing that the "trait list" approach to defining "modern" behavioral characteristics is Eurocentric and ignores the archaeology of other regions, especially Africa, where arguably many "modern" behavioral characters first appear in Middle Paleolithic (Middle Stone Age, or MSA) contexts (McBrearty and Brooks 2000; Shea 2011). Others posit that the behaviors traditionally viewed as "modern" are most likely outgrowths of shifts in climate, resource intensification, or even population density (Henshilwood and Marean 2003). Recently, one researcher has even called for an

end to the use of the "behavioral modernity" concept altogether (Shea 2011), but given the fascination we humans have for what makes us unique, this issue is unlikely to go away anytime soon.

A final notable area of debate surrounding the Neanderthals involves how many species of hominin coexisted with them. Recently, new excavations at the Moroccan site of Jebel Irhoud uncovered modern (or nearly modern) *H. sapiens* fossils dated by thermoluminescence (TL) and electron spin resonance (ESR) to ca. 250,000–350,000 years ago (Richter et al. 2017). Other early modern humans from North Africa dating to ca. 100,000 years ago include fossils from Dar-es-Soltan and Grotte des Contrebandiers. In East Africa nearly modern *H. sapiens* from Omo Kibish and Herto in Ethiopia date to ca. 190,000–160,000 years ago, while in the southern Levant (at sites such as Qafzeh and Skhul) and southern Africa (at sites such as Klasies River Mouth), these hominins date to ca. 120,000–100,000 years ago. All of these dates make early *H. sapiens* contemporary with *H. neanderthalensis*, and interestingly, these modern humans, like most Neanderthals, are associated with Middle Paleolithic (MSA, Mousterian, or Aterian, depending on the region in question) tools.

Yet how many other species of hominin might also be contemporary with the Neanderthals? As mentioned above, at Denisova Cave in the Altai Mountains of southern Siberia, mtDNA taken from a pedal phalanx identify the specimen as Neanderthal. However, genetic data from a manual phalanx and molar recovered from the same site are argued to be from a previously unknown species of hominin, referred to as "Denisovans." Genetic sequences of living Africans reveal introgression from a presumably extinct species of African hominin previously unknown to science, and this species is thought to have been contemporary with Neanderthals (Lachance et al. 2012).

In terms of fossil data for the contemporaneity of other hominin species with Neanderthals, recent discoveries at the site of Lingjing in the Henan province of China of fossil hominins dating to ca. 105,000–125,000 years ago (Li et al. 2017) are of interest because while they are not fully Neanderthal in morphology, they nonetheless have some Neanderthal characters, prompting some to suspect that they might represent the so-called Denisovans. Thus far, no DNA has been successfully extracted from these specimens. Earlier specimens from China include material from Jinniushan (dating to ca. 280,000–250,000 years ago) and Dali (dating to ca. 230,000–180,000 years ago) that may be contemporary with the earliest Neanderthals, although they are likely older than most (if not all) of them. Neither specimen shows any uniquely derived Neanderthal characters, and some researchers refer the specimens to *Homo erectus* (Dali's cranial capacity [ca. 1120 cc] is close to the *H. erectus* mean). However, both specimens are derived enough that they do not easily fit within the *H. erectus* hypodigm. Jinniushan's cranial capacity (ca. 1400 cc), for example, is higher than the modern human mean, and while Dali's face is badly distorted, its neurocranium is decidedly less so, and the shape of its cranial vault is much more derived than what is typically considered *H. erectus*-like. Similarly, the Late Pleistocene (ca. 150,000–100,000 years ago) Chinese Maba (Mapa) partial cranium is likewise considered by many to be too derived in its morphology to be referred to *Homo erectus*. The question as to which taxon it does belong, however, is much more complicated. The specimen does not preserve any uniquely Neanderthal characters, nor does it appear to be derived enough to warrant inclusion in *H. sapiens*. One possible taxonomic assignment for Jinniushan, Dali, and Maba is *Homo heidelbergensis*, but many reserve this name for European and/or African Middle Pleistocene specimens only. Another possibility, as mentioned above, is that at least some of these specimens represent the population known as "Denisovans." Yet another option is to refer these hominins to "archaic" *Homo sapiens*, but this term is problematical for two reasons. First, as was pointed out by F. Clark Howell, nowhere else in plant or animal taxonomy is a qualifier put before a species name; a specimen or subpopulation either belongs to a species, or it does not. The second problem is that "archaic" *H. sapiens* is somewhat vague in meaning, since this term has been used to describe modern human specimens from Qafzeh and

Skhul, and even the Neanderthals themselves! Milford Wolpoff solves this (and similar) dilemmas by sinking all specimens assigned to the genus *Homo* from all continents over the last 2.0 million years into *Homo sapiens*. From the perspective of Ernst Mayr's biological species concept, he is on solid ground in so doing, since most likely all member species of the genus *Homo* would have been interfertile – i.e., capable of producing "hybrid" offspring that could themselves reproduce (Jolly 2001; Holliday 2006). Wolpoff's taxonomic scheme ignores interesting and important biological variation, however, and would make the discussion and teaching of human evolution difficult, at best.

Another locale where multiple fossil hominins have been recovered since the end of the nineteenth century is the Indonesian island of Java. While its dating remains problematic, the site of Ngandong in Java has long been thought to be ca. one million years later than other *Homo erectus* sites on the island, and while the Ngandong crania show larger braincases on average than early Javanese *H. erectus*, paleoanthropologist Susan Antón has shown that in all other aspects of their cranial morphology, the Ngandong crania are quite *Homo erectus*-like. Beginning in the mid-1990s, the Ngandong remains were even thought by some to date to the Late Pleistocene, although a Middle Pleistocene age now seems much more likely (Indriati et al. 2011). Such a date could make the Ngandong *H. erectus* specimens contemporary with the earliest Neanderthals (although they likely antedate most Neanderthals).

Also in Indonesia, a find of great importance was the 2004 discovery of diminutive hominin specimens from the site of Liang Bua on the island of Flores, where at least one small-brained individual dating to the Late Pleistocene (ca. 60,000–100,000 years ago) evinces cranial morphology similar to both 1.9 million-year-old *H. habilis* from Africa and 1.7 million-year-old *H. erectus* fossils from Dmanisi in Georgia (Fig. 6). While not universally accepted by the scientific community, this specimen and other less complete specimens from Liang Bua have over the last few years become more widely viewed as representative of a late-surviving descendant species of the earliest *Homo* that expanded beyond the African continent: *Homo floresiensis* – a very "primitive-looking" species contemporary with *Homo neanderthalensis*.

More recently, another "primitive" species of the genus *Homo*, *H. naledi*, was uncovered in a seemingly deep cave context in the Rising Star cave system in South Africa (Berger et al. 2015). With an average cranial capacity of ca. 500 cc, the specimen is not much more encephalized than *H. floresiensis* and is generally less encephalized than *H. erectus*. Surprisingly, the deposits in which the *H. naledi* material was recovered, as well as some of the *H. naledi* teeth themselves, were dated by Uranium-Thorium, paleomagnetic, and ESR methods to a fairly recent date of ca. 236,000–335,000 years ago (Dirks et al.

Neanderthals and Their Contemporaries, Fig. 6 Lateral view of casts of 1.9 million-year-old KNM-ER 1813 (*Homo habilis*), 1.7 million-year-old Dmanisi 2700 (*H. erectus*) and 60,000–100,000-year-old Liang Bua 1 (*H. floresiensis*). Despite the difference in dates, the crania are remarkably similar in size and morphology. (Photo credit: Chris Stringer, Natural History Museum, London)

2017). These dates, while controversial, could make *H. naledi* contemporary with the earliest Neanderthals.

Future Directions

Discoveries of Neanderthals are still being made at sites across Europe and Western Asia, and one trend that is likely to continue is one begun at the site of El Sidrón in Spain. Here Neanderthal DNA has been recovered, and so archaeologists excavate there in clean-room gear in order to minimize the chances of contaminating fossil DNA with that of recent humans (Fig. 7). In addition to the ongoing international effort to isolate more Neanderthal DNA from existing (and future) fossil finds, genetic researchers such as John Hawks and Laurent Abi-Rached are sorting through the many millions of base pairs of Neanderthal DNA in the draft sequence, searching for evidence of the action of selection on the Neanderthal phenotype, and trying to understand the nature of the Neanderthal genetic contribution to living people. Other scientists, such as Robert Franciscus, are using animal models and 3D morphometrics to better understand the developmental pathways involved in growing a projecting Neanderthal face vs. a non-projecting modern human one. Scientists like Michael Richards and colleagues are exploring Neanderthal diets by examining stable carbon and nitrogen isotopes isolated from their bone collagen. These data indicate that at least some European Neanderthals ate a primarily meaty diet and that most of their dietary meat came from terrestrial herbivores. More data on Neanderthals from a wider geographic area would be welcome, and future work with oxygen and strontium isotopes isolated from Neanderthal tooth enamel has the potential to tell us if diet changed during growth and development and even how far individual Neanderthals (or their contemporaries) ranged during their lifetimes. Did Neanderthals, for example, tend to remain in the local area of their birth, or did they frequently venture much farther afield? Finally, researchers like John Shea and Steven Churchill are gathering new experimental data using living human subjects to more fully explore just how Neanderthals used their upper limbs, and armaments, in hunting – is the long-distance throwing of spears, for example, a modern human innovation, one Neanderthals lacked? All of these approaches are likely to prove fruitful over the coming decades as scientists endeavor to learn more about humanity's closest fossil relatives.

Neanderthals and Their Contemporaries, Fig. 7 Archaeologist excavating in El Sidrón cave in northern Spain. Note the clean-room gear being worn. (From Fortea et al. 2008)

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Ancestry Assessment
- ▶ Archaic *Homo sapiens*
- ▶ Australopithecines
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone Tools, Paleolithic
- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition

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- ▶ Crimean Middle Paleolithic
- ▶ Crimean Upper Paleolithic
- ▶ Dali, Archaeology of
- ▶ Dmanisi Hominins and Archaeology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ East Asia: Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ European Middle Paleolithic: Geography and Culture
- ▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ Middle East Middle to Upper Paleolithic Transitional Industries
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Fossil Records of Early Modern Humans
- ▶ *Homo erectus*
- ▶ *Homo heidelbergensis*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Human Evolution: Multiregional Origins
- ▶ Human Evolution: Use of Fire
- ▶ Human Evolution: Theory and Progress
- ▶ Lithic Technology, Paleolithic
- ▶ North and Saharan Africa: Geography and Culture During the Lower Stone Age
- ▶ Out-of-Africa Origins
- ▶ Stringer, Chris
- ▶ Techniques of Paleolithic Art
- ▶ Taphonomy in Human Evolution
- ▶ Wolpoff, Milford H.

References

Benazzi, S., K. Douka, C. Fornai, C.C. Bauer, O. Kullmer, J. Svoboda, I. Pap, F. Mallegni, P. Bayle, M. Coquerelle, S. Condemi, A. Ronchitelli, K. Harvati, and G.W. Weber. 2011. Early dispersal of modern humans in Europe and implications for Neanderthal behaviour. *Nature* 479: 525–528.

Berger, L.R., J. Hawks, D.J. de Ruiter, S.E. Churchill, P. Schmid, L.K. Delezene, T.L. Kivell, H.M. Garvin, S.A. Williams, J.M. DeSilva, M.M. Skinner, C.M. Musiba, N. Cameron, T.W. Holliday, W. Harcourt-Smith, R.R. Ackermann, M. Bastir, B. Bogin, D. Bolter, J. Brophy, Z.D. Cofran, K.A. Congdon, A.S. Deane, M. Dembo, M. Drapeau, M.C. Elliott, E.M. Feuerriegel, D. Garcia-Martinez, D.J. Green, A. Gurtov, J.D. Irish, A. Kruger, M.F. Laird, D. Marchi, M.R. Meyer, S. Nalla, E.W. Negash, C.M. Orr, D. Radovcic, L. Schroeder, J.E. Scott, Z. Throckmorton, M.W. Tocheri, C. VanSickle, C.S. Walker, P. Wei, and B. Zipfel. 2015. *Homo naledi*, a new species of the genus *Homo* from the Dinaledi Chamber, South Africa. *eLife* 4: e09560.

Bräuer, G. 2008. The origin of modern anatomy: By speciation or intraspecific evolution? *Evolutionary Anthropology* 17: 22–37.

Dirks, P., E.M. Roberts, H. Hilbert-Wolf, J.D. Kramers, J. Hawks, A. Dosseto, M. Duval, M. Elliott, M. Evans, R. Grün, J. Hellstrom, A.I.R. Herries, R. Joannes-Boyau, C.J. Placzek, J. Robbins, C. Spandler, J. Wiersma, J. Woodhead, and L.R. Berger. 2017. The age of *Homo naledi* and associated sediments in the Rising Star Cave, South Africa. *eLife* 6: e24231.

Fortea, J., M. de la Rasilla, A. Garcia-Tabernero, E. Gigli, A. Rosas, and C. Lalueza-Fox. 2008. Excavation protocol of bone remains for Neanderthal DNA analysis in El Sidrón Cave (Asturias, Spain). *Journal of Human Evolution* 55: 353–357.

Green, R.E., J. Krause, A.W. Briggs, T. Maricic, U. Stenzel, M. Kircher, N. Patterson, H. Li, W. Zhai, M.H.-Y. Fritz, N.F. Hansen, E.Y. Durand, A.-S. Malaspinas, J.D. Jensen, T. Marques-Bonet, C. Alkan, K. Prüfer, M. Meyer, H.A. Burbano, J.M. Good, R. Schultz, A. Aximu-Petri, A. Butthof, B. Höber, B. Höffner, M. Siegemund, A. Weihmann, C. Nusbaum, E.S. Lander, C. Russ, N. Novod, J. Affourtit, M. Egholm, C. Verna, P. Rudan, D. Brajkovic, Ž. Kucan, I. Gušic, V.B. Doronichev, L.V. Golovanova, C. Lalueza-Fox, M. de la Rasilla, J. Fortea, A. Rosas, R.W. Schmitz, P.L.F. Johnson, E.E. Eichler, D. Falush, E. Birney, J.C. Mullikin, M. Slatkin, R. Nielsen, J. Kelso, M. Lachmann, D. Reich, and S. Pääbo. 2010. A draft sequence of the Neanderthal genome. *Science* 328: 710–722.

Henshilwood, C.S., and C.W. Marean. 2003. The origin of modern human behavior: Critique of the models and their test implications. *Current Anthropology* 44: 627–651.

Holliday, T.W. 2006. Neanderthals and modern humans: An example of a mammalian syngameon? In *Neanderthals revisited: New approaches and perspectives*, ed. K. Harvati and T. Harrison, 281–298. New York: Springer.

Indriati, E., C.C. Swisher III, C. Lepre, R.L. Quinn, R.A. Suriyanto, A.T. Hascaryo, R. Grün, C.S. Feibel, B.L. Pobiner, M. Aubert, W. Lees, and S.C. Antón. 2011. The age of the 20 meter Solo River terrace, Java, Indonesia and the survival of *Homo erectus* in Asia. *PLoS One* 6 (6): e21562.

Jolly, C.J. 2001. A proper study for mankind: Analogies from papionin monkeys and their implications for

human evolution. *Yearbook of Physical Anthropology* 44: 177–204.
Jöris, O., and M. Street. 2008. At the end of the ^{14}C time scale – The Middle to Upper Paleolithic record of western Eurasia. *Journal of Human Evolution* 55: 782–802.
King, W. 1864. The reputed fossil man of the Neanderthal. *Quarterly Review of Science* 1: 88–97.
Krause, J., L. Orlando, D. Serre, B. Viola, K. Prüfer, M.P. Richards, J.-J. Hublin, C. Hänni, A.P. Derevianko, and S. Pääbo. 2007. Neanderthals in central Asia and Siberia. *Nature* 449: 902–904.
Lachance, J., B. Vernot, C.C. Elbers, B. Ferwerda, A. Froment, J.M. Bodo, G. Lema, W. Fu, T.B. Nyambo, T.R. Rebbeck, K. Zhang, J.M. Akey, and S.A. Tishkoff. 2012. Evolutionary history and adaptation from high-coverage whole-genome sequences of diverse African hunter-gatherers. *Cell* 150: 457–469.
Li, Z.Y., X.J. Wu, L.P. Zhou, W. Liu, X. Gao, X.M. Nian, and E. Trinkaus. 2017. Late Pleistocene archaic human crania from Xuchang, China. *Science* 355: 969–972.
Mayr, E. 2000. The biological species concept. In *Species concepts and phylogenetic theory: A debate*, ed. Q.-D. Wheeler and R. Meier, 17–29. New York: Columbia University Press.
McBrearty, S., and A.S. Brooks. 2000. The revolution that wasn't: A new interpretation of the origin of modern human behavior. *Journal of Human Evolution* 39: 453–563.
Mellars, P. 2005. The impossible coincidence. A single-species model for the origins of modern human behavior in Europe. *Evolutionary Anthropology* 14: 12–27.
Osborn, H.F. 1915. Men of the Old Stone Age: Their environment, life and art. New York: Charles Scribner's Sons.
Richter, D., R. Grün, R. Joannes-Boyau, T.E. Steele, F. Amani, M. Rué, P. Fernandes, J.-P. Raynal, D. Geraads, A. Ben-Ncer, J.-J. Hublin, and S.P. McPherron. 2017. The age of the hominin fossils from Jebel Irhoud, Morocco, and the origins of the Middle Stone Age. *Nature* 546 (7657): 293–296.
Shea, J.J. 2011. *Homo sapiens* is as *Homo sapiens* was. *Current Anthropology* 52: 1–35.
Smith, F.H. 1994. Samples, species, and speculations in the study of modern human origins. In *Origins of anatomically modern humans*, ed. M.H. Nitecki and D.V. Nitecki, 227–249. New York: Plenum.
Stringer, C., and C. Gamble. 1993. *In search of the Neanderthals*, 79. New York: Thames and Hudson.
Tchernov, A. 1998. The faunal sequence of the Southwest Asian Middle Paleolithic in relation to hominid dispersal events. In *Neanderthals and modern humans in western Asia*, ed. T. Akazawa, K. Aoki, and O. Bar-Yosef, 77–90. New York: Plenum.
Vandermeersch, B. 1981. *Les hommes fossiles de Qafzeh (Israël)*. Paris: Centre National de la Recherche Scientifique.
Zilhão, J. 2006. Neanderthals and moderns mixed, and it matters. *Evolutionary Anthropology* 15: 183–195.

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic

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State of Knowledge and Current Debates

Introduction

The Near East is situated at the crossroads between the genus *Homo*'s African evolutionary core and the Eurasian periphery (Fig. 1). The Paleolithic and Neolithic prehistory of the Near East is literally central for understanding the genus *Homo* as a globally distributed lineage, whose single surviving species – *Homo sapiens* – continues to shape and be shaped by the terrestrial, omnivorous, extractive, and socially intensive niche with which it has coevolved. This essay examines the general theoretical issue of biocultural evolution in the context of Near Eastern geography, climate, ecology, and Stone Age prehistory. In doing so, it offers an overview of Paleolithic and Neolithic paleoanthropology and archaeology, with basic introductory information about industries, technocomplexes, fossils, and key sites in chronological context.

The Paleolithic begins with the late Pliocene emergence of Lomekwian hammer-on-anvil chipped stone technology (ca. 3.3 million years ago [mya]) in East Africa, followed by the oldest freehand Oldowan chipped stone technology (Harmand et al. 2015). The oldest well-documented Oldowan occurrence outside of Africa comes from Dmanisi, on the northern margin of the Near East, but a small Oldowan surface assemblage, likely associated with the Erq al-Ahmar formation in the Jordan Valley, Israel, would be roughly contemporaneous, ca. 1.80 mya. The Paleolithic continues until the end of Pleistocene (ca. 11.7 thousand years ago [kya]). The Prepottery Neolithic of the Near East then stretches from the Pleistocene-Holocene

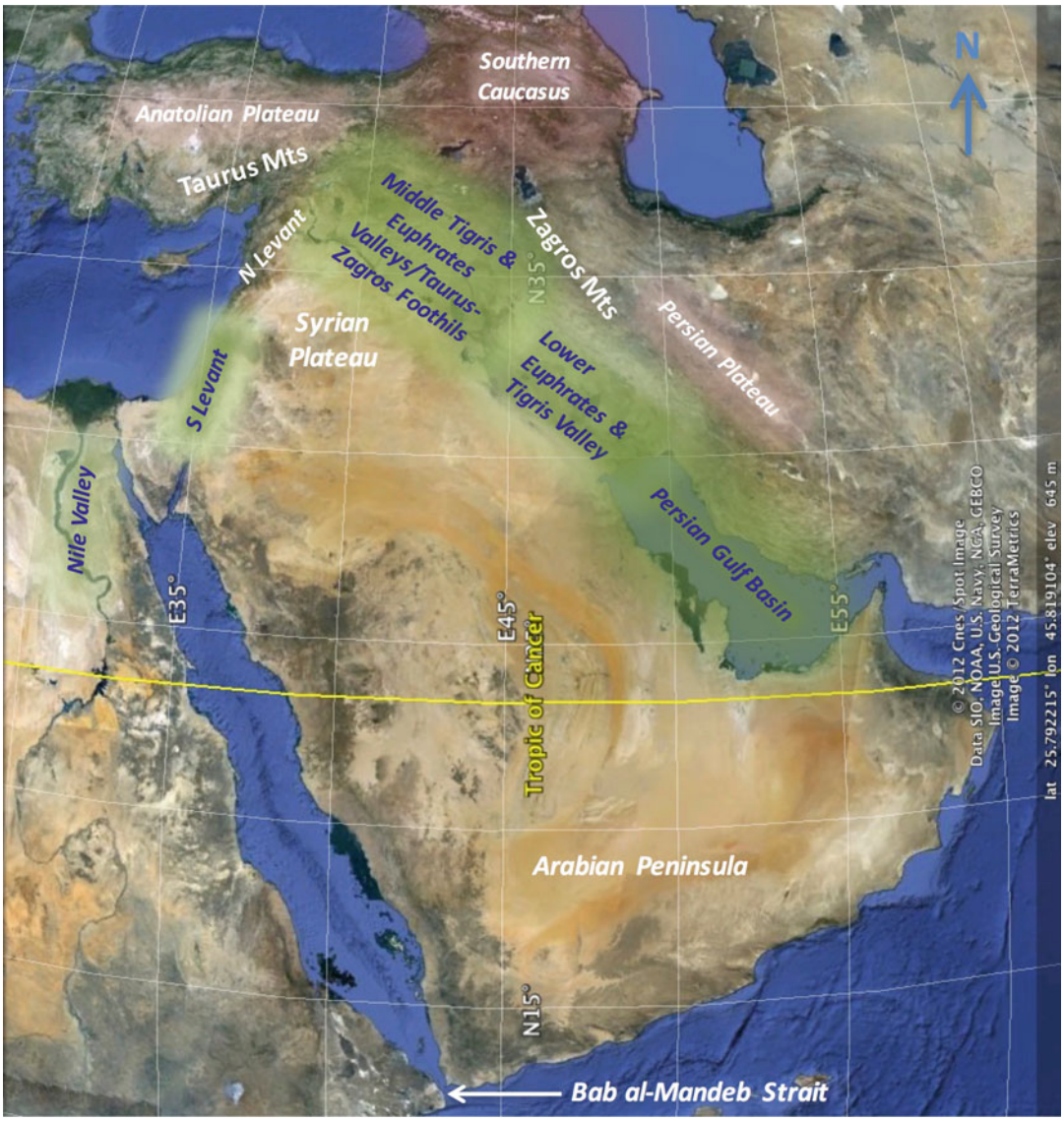

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 1 Regions and locations in the Near East that are key for understanding the geographic structure of human dispersals and population interaction in the Pleistocene and early Holocene

transition to ca. 8.20 kya. Figure 2 is a timeline summary of Pleistocene-Holocene prehistory in the region.

Across the vast temporal extent of the Paleolithic, the Near East exhibits a continuous – or nearly continuous – record of human occupation (Bar-Yosef 1980), but paleoanthropological interest in the region emphasizes how it contains migration or dispersal corridors linking East and North Africa to western and southern Eurasia (Groucutt et al. 2015). The Paleolithic settlement of the Near East was recurrently shaped by African population expansions into the region, in turn shaping further population waves into the rest of Eurasia. The inference of repeated out-of-Africa (OOA) Pleistocene range expansions is broadly empirically based on human fossil and archaeological evidence, thoroughly backed up

PREPOTTERY NEOLITHIC 12-8.2 kya	PPNB/C—*Agricultural villages throughout Near East; complex household and communal rituals, especially mortuary ritual*	10.5—8.20 kya
	PPNA—*Early agriculturalist-forager hamlets and villages; monumental communal architecture at Jericho and Gobekli Tepe*	11.7—10.5 kya
EPIPALEOLITHIC 20-12 kya	Late Epipaleolithic—*Natufian archaeological culture in the Levant; sedentary settlements appear throughout the Near East*	15—12 kya
	Middle Epipaleolithic—*Geometric microlith production widely adopted*	17—15 kya
	Early Epipaleolithic—*Microlithic technocomplexes become widespread*	20—17 kya
UPPER PALEOLITHIC c. 50/45 kya—20 kya	Late Upper Paleolithic—*High-mobility hunter-gatherer behaviors and technocomplexes with bladelets and microlithic points*	30—20 kya
	Early Upper Paleolithic—*Blade, point, endscraper, and burin-rich technocomplexes; EUP appears to be associated with anatomically modern human expansion into Eurasia*	50/45—30 kya
MIDDLE PALEOLITHIC c. 250/200 – 50/45 kya	Late Middle Paleolithic—*Levantine Levalloiso-Mousterian; Zagros-Anatolian side-scraper-rich Mousterian; Neandertal burials*	75—50/45 kya
	Mid-Middle Paleolithic—*Levallois flake and blade production extensive; early AMH burials c. 100 kya; possible Neandertal presence*	130—75 kya
	Early Middle Paleolithic—*Levallois and prismatic blade technology; extensive use of campfires at Hayonim Cave*	250/200–130 kya
LOWER PALEOLITHIC 1.8 mya – c. 250/200 kya	Acheulo-Yabrudian—*restricted to central Levant; Qesem Cave evidence of blade production, hunting of prime adult big game.*	400—250 kya
	Acheulean—*biface technology widespread; Kalatepe Deresi evidence of > 1 mya presence in Anatolia; Gesher Benot Ya'akov evidence of campfires and omnivorouscentral-place foraging, c. 800 kya*	1.? – 0.2? mya
	Developed Oldowan—*'Ubeidiya key southern Levantine lake-margin site*	1.5 mya
	Oldowan—*Erq el-Ahmar possible evidence of early Homo*	1.8 mya

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 2 Key evolutionary periods, hallmarks, and archaeological technocomplexes/industries in the Pleistocene and early Holocene prehistory of the Near East

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by geographic analyses of ancient and extant genomic variation. By virtue of the region's supracontinental geographic setting, the human occupation of the Near East must have shaped these OOA range expansions, but very importantly, there is still considerable debate over the environmental context and systemic biological and cultural causes. This debate is vital for ongoing research on three chronologically successive hallmark developments:

- The initial human expansion out of Africa in the Lower Pleistocene (ca. 2.6 mya – 0.78 mya)
- The spread of modern human anatomy out of Africa, across the Middle-Late Pleistocene transition (marine isotope stages 5–6, ca. 170–80 kya)
- Following a later Middle Paleolithic episode in which European Neandertal anatomy spread into the Near East (ca. 80–50 kya), the decisive expansion of Upper Paleolithic technology – associated with modern human anatomy – in the Late Pleistocene (ca. 50–20 kya)

In addition, *the transition from the final Paleolithic – known in the region as the Epipaleolithic – to the Neolithic (seen at a long-term scale from* ca. *20 kya – 8 kya) is often viewed through the lens of the transition to sedentism, agriculture, and village life, which emerged "full-blown" in the Prepottery Neolithic B period of the Near East*. Notably, the Near Eastern case may represent the earliest primary prehistoric transition from a hunting and gathering subsistence mode

to a predominantly agricultural one (Bar-Yosef 1998a; Sherratt 2007).

The theoretical emphasis in this essay is on a complex systems evolutionary approach for considering the debates and open questions surrounding the Near East's crossroads setting for recurrent, supracontinental, biocultural change during the Stone Age. It is emphasized that new scientific insights, novel questions, and critical humanistic concerns and lessons drawn about Near Eastern prehistory must rely on interdisciplinary integration of evolutionary biology, ecology, environmental science, and diverse social science frameworks, including both quantitative and interpretive cultural approaches.

Near Eastern Geography, Climate, and Ecology in the Pleistocene and Early Holocene

The Near East is generally considered to encompass a large portion of Southwestern Asia, including the following key subregions: the eastern Mediterranean Levant, the Arabian Peninsula and adjoining Transjordanian and Syrian plateau semiarid zones, Mesopotamia, the arc of the Taurus-Zagros Mountains, the Taurus-Zagros foothills, and the Anatolian peninsula (see Fig. 1). The Near East is geographically conspicuous as the link between Africa and the rest of Eurasia, placing it at the center of the largest contiguous landmass that has existed since the Pliocene.

Major Geographic Structure of the Near East

In identifying and understanding the paths that ecologically connect Africa with Eurasia, paleoanthropological research has focused on how overall geographic structure has shaped a persistent climatic and phytogeographic pattern among the major regions that comprise the Near East. In general, the Levant is relatively well watered by a

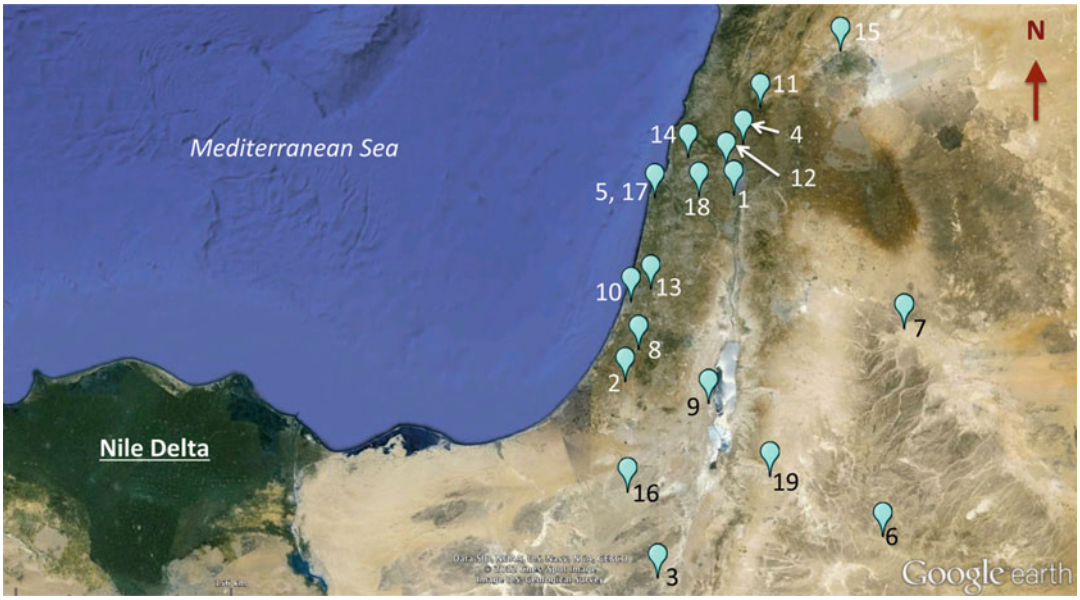

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 3 Selected Lower and early Middle Paleolithic (LP and MP) sites in the southern Levant. Lower Pleistocene sites: 1, 'Ubeidiya (LP); 2, Bihar Ruhama (LP); 3, Zihor Lake (LP); sites with Early-Middle Pleistocene sequences, 4, Gesher Benot Ya'akov (LP); sites with Early, Middle, and Late Pleistocene sequences, 5, Tabun Cave (LP-MP); Middle Pleistocene sites, 6,'Ayoun Qedim (LP); 7, Ain Soda (LP); 8, Revadim Quarry (LP); 9, Oumm Qatafa (LP); 10, Holon (LP); 11, Berekhat Ram (LP); 12, Zuttiyeh Cave (LP); 13, Qesem cave (LP); 14, Hayonim Cave (LP-MP); 15, Yabrud 1 Rockshelter (LP-MP); 16, Rosh Ein Mor (MP); Upper Pleistocene sites, 17, Skhul Cave (MP); 18, Qafzeh cave (MP-UP); 19, Ain Difla (MP). See Bar-Yosef (1994, 1998a) and Kuhn (2002) for further information about Lower and early Middle Paleolithic sites in the Near East and Anatolia. Base map source: Google Earth

highly seasonal, westerly winter monsoon system. This has yielded a robust Mediterranean environment extending west-east, from the coast to the Transjordanian and western Syrian plateaux. The Anatolian plateau and much of the Taurus-Zagros arc, with their higher elevations, also receive substantial precipitation, but the combination of a more continental Eurasian setting and higher altitudes notably results in colder winter temperatures and, often, snowfall. The Arabian Peninsula is arid, with a band of semiarid steppe extending in an arc from the Transjordanian and Syrian plateaux across Mesopotamia. The Near East is dominated, then, by semiarid or arid habitats. However, the Tigris-Euphrates valley in Mesopotamia has a geomorphological history that can be traced to the late Pliocene (Yacoub 2011), and substantial geological basins in semiarid zones – including El Kowm in Syria and Azraq in Jordan – have supported strongly flowing springs and widespread wetlands from at least the Middle Pleistocene onward. In these areas that otherwise received very little precipitation, stable hydrological features ensured permanent freshwater corridors and oases. This would have made the entire zone from Arabia to Mesopotamia attractive for mobile hunter-gatherer groups. In fact, as Rose (2010) has detailed, the Persian Gulf Basin would have been a wetland for large stretches of the Pleistocene, fed by strong freshwater springs. Even when prevailing climatic conditions were at their driest (occurring during the most extreme hot and cold hemispheric or global episodes), predictable major wetlands and riverine corridors would have persisted across the Arabian and Mesopotamian zones.

Recently, researchers have more broadly emphasized just how important this geographic structure has been for Pleistocene human evolution (Groucutt et al. 2015). Rich alluvial systems or wetland basins situated in extensive semiarid or arid regions characterize not only the Arabia-Mesopotamia-Persian Gulf Basin region but also the entirety of North Africa. The sub-Saharan African geographical core zone of human evolution has been linked to Eurasia via this supra-continental arid/semiarid belt that was conspicuously dissected and dotted by major permanent rivers and oases. When human populations were growing or at prevailing carrying capacity in sub-Saharan Africa, forager groups would have budded off, almost always able to exploit predictably located resource-rich habitats along the Nile drainage, in North African oases, or along Arabian coastal zones accessible via Bab al-Mandeb (see Fig. 1). A high-mobility hunter-gatherer strategy of movement along rivers and coasts and between spring-fed wetland basins would have involved long-distance moves along rich corridors embedded in an otherwise ecologically impoverished desert/steppe belt. Quite simply, the high contrast in ecological productivity between rivers and wetlands, on the one hand, and desert and semiarid steppe, on the other, would have essentially funneled mobile hunter-gatherers from the sub-Saharan African core to the Eurasian periphery in Pleistocene human evolution. It should be noted that occasionally, this very same structure would have supported funneling hunter-gatherer migration from Eurasia into sub-Saharan Africa, but paleoanthropological and genetic evidence overwhelmingly suggests that sub-Saharan Africa was a dominant net population source for migration throughout most of the Pleistocene (Mallick et al. 2016; Pagani et al. 2016).

N

The Near East and Climate Change

Human prehistory in the Near East, of course, has not simply been determined by the basic geographic structure of environmental variation. Biocultural evolution in the genus *Homo* has been a complex systemic process, and an important environmental dimension of the complex biocultural systems evolution has involved major global or Northern Hemisphere Pleistocene and early Holocene climate changes. These climate dynamics have driven fluctuations in boundary locations and in the scale of difference in seasonality and ecological productivity between adjacent habitat zones. Again, these include the Arabian-Mesopotamian arid/semiarid belt, the Levant, the Taurus-Zagros foothills, the Taurus-Zagros Mountain arc, and the Anatolian plateau.

The Pleistocene and early Holocene periods were marked by recurrent swings in prevailing temperature and rainfall levels, unfolding at scales

from centuries to millennia, and this environmental dynamism was only magnified by the Near East's geological and climatic complexity. The region is situated at the confluence of still active tectonic trends, reflecting a relatively ancient collision of the Arabian plate with Eurasia, resulting in closure of the Tethys Sea and formation of the Taurus and Zagros mountains, the more recent Miocene formation of the Mediterranean Basin, and the Pliocene onset of rifting from East Africa to the Levant. The region's climate is dominated – from south to north – by the Saharo-Arabian desert belt, westerly Mediterranean monsoon systems, and westerly continental systems. Yet, because of the region's tectonic history, we see striking topographic and geological variation in the Levant, Anatolia, and the Taurus-Zagros mountains. This has generally meant that within and between the subregions comprising the Near East, gradients between warmer and cooler and wetter and drier climatic patterns could be especially sharp, well within a day's walk. During generally warm and humid hemispheric or global climatic swings, the Near East would have had an especially high proportion of ecotonal habitat, with immediate access to rich forest, gallery forest, wetland, and grassland plant and animal food resources. During cool and dry climatic episodes, well-watered lower-elevation regions – conspicuously including the southern Levant, the narrow northern Levantine and Anatolian coasts, and the Taurus-Zagros foothills – would have been important ecological refugium zones within the larger region. These refugium subregions would have maintained substantial year-round plant and animal resource diversity in a mosaic of forest, grassland, wetland, and littoral habitats. Moreover, the zones adjoining major rivers – notably the lower courses of the Tigris and Euphrates – and wetland basins in semiarid habitats sometimes experienced grassland soil development during moderately cool periods. This is because atmospheric precipitation increased, while riverine and lacustrine evaporation rates fell. Such periods included portions of marine isotope stages 4 and 3 (including the intervals ca. 75–50 kya and 40–30 kya) (Torfstein et al. 2013). Paths between year-round refugia – including the southern Levant – and wetland patches nestled in adjacent semiarid subregions would have become more stable and ecologically productive during moderately cool episodes. While it is currently possible to sketch the pattern of ecological connections between subregions under recurrent Pleistocene climatic fluctuations, their complexity makes it an outstanding challenge to link specific climate changes to particular developments in human biocultural evolution.

Microenvironmental Variation Within and Between Near Eastern Subregions

Indeed, ongoing research continues to provide striking detail about variation in past Near Eastern environments. In this section, the resulting significant microenvironmental variation – observed at multiple scales between 1 and 1000 km – is examined more closely. For instance, the west-east geological and topographic structure of the Mediterranean Levant is generally similar from south to north – with coastal hills or mountains, interior valleys, a western rift escarpment mountain range, a deep rift valley, and an eastern plateau. Yet, if we compare the southern portion (roughly from the Gaza coast to the Israel-Lebanon border) to the northern portion (roughly from southern Lebanon to the Syria-Turkey border), it may be emphasized that the slightly higher latitude and substantially higher elevation of the Lebanon Mountains increase the role of snowfall and snowmelt on water availability (through spring and lake formation), vegetation patterns, and landscape stability and erosion dynamics, when compared to the southern Levant. Moreover, the higher elevation of the Bekaa portion of the rift valley – when compared to the Jordan Valley-Dead Sea basin to the south – entails substantially colder, often inhospitable winter conditions. Thus, although the southern Levant also exhibits dramatic microenvironmental variation, often over very short distances, we see relatively warmer winter temperatures from the broader Mediterranean coastal plain, across the lower interior hills and mountains, into the much deeper rift valley (the Jordan and Dead Sea basin), to the Transjordanian plateau. The result is less temperature seasonality and

greater overall environmental productivity in the southern than in the northern Levant.

It is instructive to consider how this example of subregional environmental variation would have been significant for hominin foragers over distances of 10s to 100s of kilometers, well within the range of macroband or dialect group territories of ethnographically or ethnohistorically documented hunter-gatherers. Such geographic variation may be most clearly appreciated for Lower and Middle Pleistocene OOA expansion episodes, which – according to all available evidence – predated the adoption of tailored clothing and rigid footwear technology. Modern human thermoregulatory adaptations – in the absence of effective insulating technological solutions – allow us to withstand sustained prevailing temperatures no lower than 0 ° C without suffering physiological consequences that have immediate- or long-term stress-related fitness effects. Neandertals and cold-adapted modern humans, with shorter limbs and short but wider torsos, would only have achieved limited adaptive benefits, slightly pushing the low-temperature tolerance level or increasing endurance under conditions of marginal balance between energy intake and heat loss. Of course, clinal selection for thermoregulatory adaptation across latitudinal gradients – even in the face of extensive gene flow – is well documented for contemporary humans. Still, even cold-adapted human populations – including Neandertals – would not have been able to sustain extended activity in subfreezing winter daytime conditions without insulating clothing (White 2006). At higher elevations substantially more habitat in the northern Levant would have had subfreezing winter conditions for much of the Pleistocene. During extreme hemispheric or global cold climatic episodes, the cold-season duration and spatial extent of such habitat would have increased more in the northern than in the southern Levant. Thus, during the warmer spring, summer, and fall seasons, the northern and southern Levant alike would have provided abundant freshwater sources and diverse large animal, small animal, and high-quality plant (fruit, seed, tuber, and nut) resources. Yet, the southern Levant would have encompassed more winter refugium habitat, as well as more easily passable long-distance west-east corridors to rich permanent lakes, wetlands, and springs in the semiarid or arid zones that extend from the Arabian Peninsula northward to Mesopotamia (including important permanent oases with deposits stretching back to the Middle Pleistocene, such as the Azraq, Jordan, and Ain Hummal, Syria).

For much of the Pleistocene, then – from the earliest expansion of the genus *Homo* out of Africa to the onset of the Upper Paleolithic – local hominin carrying capacities in the Near East would have been limited, not only by average annual environmental productivity and water availability but also by winter temperature and snow cover. More specifically, if winter represented the season during which per capita hominin energy and nutrient balance (calories and vital nutrients in vs. out) reached an annual minimum, then carrying capacity would have been especially strongly limited by seasonality on a subregional scale in the Near East. This would have had a vital implication, in turn, for the hominin behavioral dynamics shaping colonization and range expansions out of Africa and into Eurasia via the Near East. The subregional diversity seen throughout the region – exemplified by the northern vs. southern Levant's latitudinal and topographic differences – entails that seasonal winter zones of relatively high temperature and ecological productivity would have been localized centers of higher hominin population density and social interaction intensity. Topographically accessible paths between such winter refugia would also have been particularly important for relieving seasonally concentrated social scalar stress, or for maintaining social relationships and sharing information for reducing risk across a wider territory.

Winter refugium subregions – with relatively high moisture and limited winter cold temperatures – would include most of the southern Levant, coastal areas of the northern Levant and Anatolia, and the middle Tigris-Euphrates valleys and lower Taurus foothills. In semiarid or arid areas, more localized winter refugia would have existed at major oases, inland lakes, and wetlands. During Pleistocene periods

of lower sea level, the basin that is now the Persian Gulf would have been a much larger marshland or delta landscape, potentially becoming an additional refugium. The lower Tigris-Euphrates valleys would have provided a rich year-round corridor, cutting through a semiarid zone, connecting the lower Mesopotamian/Persian Gulf delta and middle Tigris-Euphrates refugia. Populations in the Mediterranean and Negev-Sinai semiarid zones in the southern Levant would have been connected to much of Arabia and Mesopotamia – via long-distance residential mobility or long-term demographic migration, through a network of seasonally wet wadis, wetlands, and lakes (Groucutt and Petraglia 2012).

Environmental Implications for Human Evolution

This seasonality-based human evolutionary ecology framework sets up a strong expectation that, although the Mediterranean zone and rift basin in the southern Levant would have provided the richest winter refugium zone just outside of Africa, this well-studied subregion's own prehistory cannot be understood without exploring in greater detail how it is interconnected with the rest of the Near East. At the same time, of course, increasing research interest in the Arabian Peninsula should continue to be contextualized within the broader Near East, too. Recent arguments may be correct that the Bab al-Mandeb-Arabian Coast was a more important long-term physical connector between Africa and Eurasia than was the Nile Valley-Sinai-southern Levant. However, the evolutionary ecology of hunting and gathering in the terrestrial, omnivorous, extractive, and socially intensive human niche carries some necessary implications for understanding human population dynamics. Recurrent prehistoric demographic migration streams or expansion waves beginning in Africa and spreading via the Near East into Eurasia would have unfolded over millennial scales, as migration or wave-front advance rates resolved across multiple generations. In order for any mobile Near Eastern hunter-gatherer population to feed such sustained intergenerational demographic growth, it would have to exhibit ecologically resilient socio-technological adaptations across multiple subregional and regional phytogeographic zones.

It is arguably the case that some prehistoric research has focused too much on quibbling over alternative compelling narrative-driven hypotheses – such as Nile Valley-southern Levant vs. Bab al-Mandeb-Arabian Coast as main dispersal corridor, or fast versus slow OOA expansions. It may be more theoretically appropriate – considering the geographic-environmental structure of the Near East – for researchers to work more explicitly with a regional dynamic complex systems framework. Smaller-scale shifts in residential mobility strategies, shifts in the geographic distribution and size of social networks, and intergenerational migration-dispersal episodes would have sustained the broader trends of expansion into Eurasia by unfolding at centennial or millennial timeframes within the Near East, mainly among:

- *Richer winter refugia* – the southern Levant, the narrower coastal patches of the northern Levant and Anatolia, and the Middle Tigris-Euphrates valleys/southern Taurus-Zagros foothills
- *Winter refugium corridors or patches embedded in semiarid and arid zones* – most notably the Lower Tigris-Euphrates valley and Persian Gulf Basin, along with stable or fluctuating wetlands, rivers, and streams across Syria, Jordan, southern Mesopotamia, and the Arabian Peninsula
- *Ecologically rich zones that are inhospitable for at least a month or more in winter* – including higher-altitude portions of the northern Levant, much of the Anatolian plateau, and the Taurus-Zagros mountains

This framework is important, in part, because it allows us to model Pleistocene biocultural evolution in the Near East at a finer scale and more accurate level of complexity. While climate change is still considered a critical factor for evolutionary and behavioral change, it is recast from being a primary factor, such as simply forcing the development or disappearance of additional green corridors across the North African-Arabian arid

belt. It becomes, instead, an exogenous long-term variable affecting the position of ecological boundaries and the overall ecological differences between adjacent subregions – with the biocultural evolutionary implications varying under prevailing conditions of demography, biological variation, social organization, technology, and socioculturally produced symbolic structures.

Trends in Pleistocene and Early Holocene Biocultural Evolution

The ecological framework outlined in the previous section sets the stage for looking at the well-recognized and long-debated four prehistoric Near Eastern hallmarks noted in the introduction. This section aims to consider thoroughly the evolutionary issues that may be elucidated by applying the complex systems ecological perspective to the available paleoanthropological evidence associated with each hallmark.

Earliest Expansion of the Genus *Homo*: Out of Africa, into the Near East

Initial OOA expansion, primarily associated with the Lower Pleistocene – 2.60–0.78 mya – is well documented by in situ and surface Oldowan, Developed Oldowan, and Early Acheulean assemblages in the southern Levant (Figs. 3 and 4). Together, these sites fall into the Lower Paleolithic period. The sites are concentrated in the Mediterranean vegetation zone and the well-watered, very warm Jordan Valley-Dead Sea basin. At ca. 1.80 mya, the geologically oldest deposits likely associated with Lower Paleolithic artifacts are those of Erq al-Ahmar formation in the Jordan Valley. The best-known early localities – with stratified layers associated with lithic artifacts, faunal assemblages, and other archaeological traces – are 'Ubeidiya and Gesher Benot Ya'akov (Bar-Yosef 1998b; Goren-Inbar 2011). Long-term research at these sites documents geographic expansion in the genus *Homo*'s terrestrial, omnivorous, technologically dependent extractive niche. The exceptional preservation of botanical materials at Gesher Benot Ya'akov, dated to the Lower-Middle Pleistocene boundary, ca. 0.78 mya, is especially important. Associated with chipped stone artifacts and an animal bone assemblage, key food plant remains include edible underground storage organs (USOs), nuts, seeds, and fruits. Gesher Benot Ya'akov provides the best available archaeological evidence that, by the end of the Lower Pleistocene, human colonization of regions outside of Africa involved complex, socially coordinated and transmitted stone tool production practices, controlled use of fire, and a remarkably ecologically broad-spectrum pattern of omnivorous foraging with central-place consumption.

Even more than the Lower Pleistocene archaeological record in North Africa, the southern Levantine sites strongly – albeit indirectly – support the inference that early *Homo*, with evolutionary origins in sub-Saharan Africa, exploited Saharan green corridors and oases in the process of population growth and range expansion. Yet, the extreme rarity or absence of Lower Pleistocene archaeological sites in the northern Levant, Arabia, Mesopotamia, the Taurus-Zagros arc, and the Anatolian plateau suggests that hominin exploitation of patchy wetland corridors/oases or higher-altitude warm-season resources was limited, most likely occurring during relatively (geologically) ephemeral warm and humid climatic periods. Such periodic exploitation has been documented at Kaletepe Deresi 3 in central Turkey, dating to ca. 1 mya (Slimak et al. 2008). Successful Lower Pleistocene Eurasian range expansion may be clearly interpolated, not only by the rich record from Dmanisi but also by the establishment of substantial Lower Pleistocene hominin populations in eastern Asia and traces of Lower Pleistocene colonization in Western Europe. While future research will likely reveal more significant traces of Lower Pleistocene human settlement in Near Eastern subregions outside the southern Levant, the behavioral ecology of hunting and gathering predicts that population densities would have been very low where aridity or cold winter temperatures limited food or water availability and strongly raised the daily energetic costs of foraging. From a taphonomic perspective, we would expect archaeologically visible early sites to be very rare in the desert/steppe belt or at higher elevations. A further implication for Lower Pleistocene human evolution is that the initial

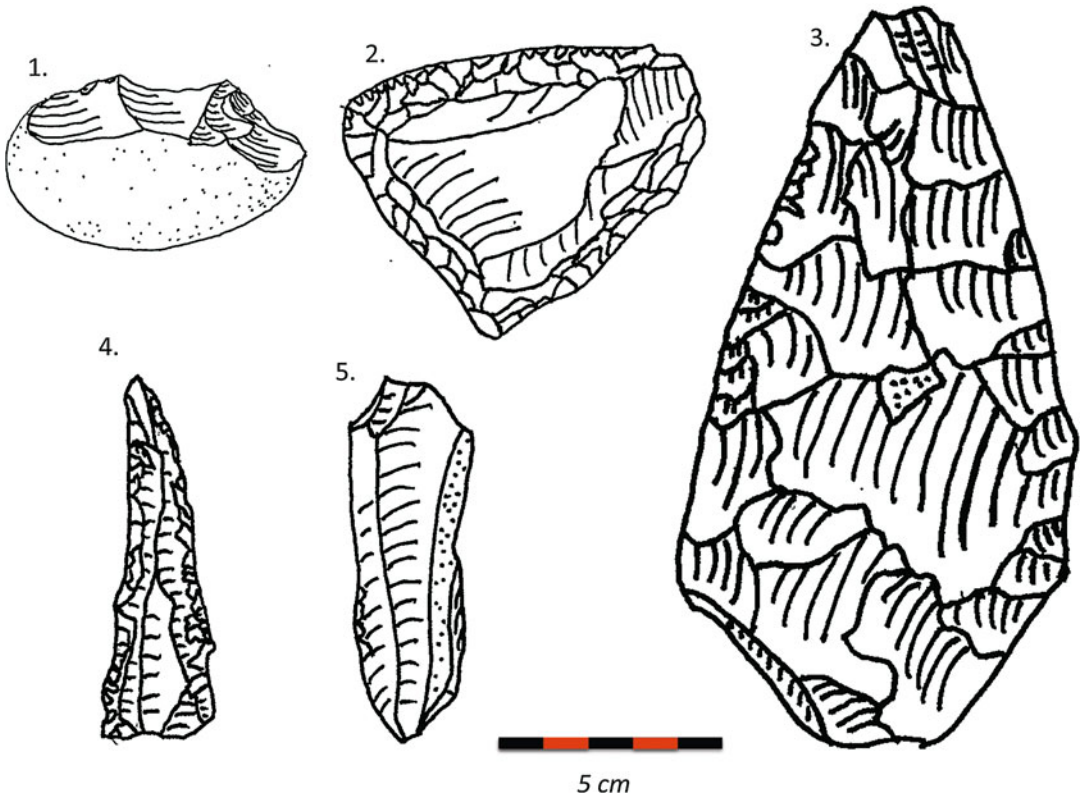

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 4 Examples of chipped stone tool types and technological features in Lower and early Middle Paleolithic technocomplexes in the Near East: 1, Oldowan chopper; 2, Acheulo-Yabrudian scraper; 3, Acheulean handaxe; 4, early Middle Paleolithic retouched Levallois blade; 5, Amudian facies (Acheulo-Yabrudian) naturally backed blade

expansion out of Africa may have involved recurrent local extinction and substantial chronological gaps in subregional occupation in much of the Near East.

Ecological Selective Pressures and Adaptive Evolution in the Lower Pleistocene The Lower Pleistocene would have been a (very long) period during which evolutionary selection pressures remained high for embodied socio-cognitive adaptations to reliably exploit diverse, dispersed, and often unpredictable plant and animal food resources. Such emergent adaptative phenotypes would likely have included increasingly complex linguistic information exchange; symbolic construction of self and other; ability to conceptualize narratives that enabled construction of memory, future planning, and decision-making; participation in larger, more stable long-term social networks; and coevolving life-history patterns of extended juvenile dependency periods and more intensive, cooperative parental transfer of resources to offspring. These adaptations in modern humans represent the evolutionary inheritance of long-term Pleistocene changes in brain ontogeny and anatomy, in the neuroendocrine system overall, and in growth and aging patterns across the life span. They now fit *Homo sapiens* to a globally distributed, ecologically dominant, and increasingly disruptive niche – one that is not only terrestrial, omnivorous, and extractive but also conspicuously socially intensive. Yet, there is very little clear evidence and, as a result, little scientific consensus about how these critical adaptations coevolved with the human niche in the Lower Pleistocene (and through the rest of the

Pleistocene, for that matter). What was the tempo and mode of their evolution? More specifically, to what extent was punctuated evolution involved in the spread of adaptive phenotypes, driven by recurrent speciation, range expansion, and competitive exclusion of one *Homo* population by another? Alternatively, to what extent did socio-cognitive and life-history adaptations evolve in a gradual pattern within a framework of multi-regional gene flow between sub-Saharan Africa and Eurasia, via the Near East?

The Tempo and Mode of Human Evolution in the Middle Pleistocene Two important trends are clear concerning hominin macroevolution in the subsequent Middle Pleistocene (ca. 0.78–0.13 mya; Fig. 3). The first is that sub-Saharan Africa remained a dominant source of population – and thus genetic variation – spreading via green corridors and oases across the Saharo-Arabian desert/steppe belt into Eurasia (Groucutt et al. 2015; Hublin et al. 2017). The second is that, whatever the nature of biological evolution in socio-cognitive and life-history adaptations during the Middle Pleistocene, the archaeological traces of human behavior indicate complex group-based omnivorous foraging – including hunting of prime adults from large ungulate prey species – along with social post-capture mobile-camp processing and consumption activity and complex group-based technological raw material provisioning and production patterns. In the Near East, recent exciting analyses have provided such evidence dating to the very end of the Lower Pleistocene at Gesher Benot Ya'akov, where researchers report the earliest well-documented instance of controlled use of campfires associated with omnivorous food remains and stone tools (Goren-Inbar 2011). Work at Qesem cave, dating to the mid-Middle Pleistocene, has yielded further contextual archaeological evidence for large game hunting and food sharing in a mobile camp setting (Stiner et al. 2011). Perhaps even more importantly, at least some of these social hunter-gatherer behaviors are documented within the arid/semiarid belt and higher-elevation zones – for instance, at the later Lower Paleolithic 'Ayoun Qedim site in the Jafr Basin, Jordan (Rech et al. 2007) – where year-round occupation would have been marginally productive compared to the southern Levant or the Taurus-Zagros foothills.

The Initial Spread of Modern Human Anatomy: Out of Africa, into the Near East

The initial OOA spread of modern human anatomy, across the Middle-Upper Pleistocene transition (ca. *130 kya, defining the boundary between marine isotope stages 6 and 5, together encompassing the span 170–80 kya*) is documented in the Near East most spectacularly by the mobile camp/burial sites of Skhul and Qafzeh caves, both located in the southern Levantine Mediterranean vegetation zone (Hovers 2009). Key Near Eastern sites that date to the end of the middle and beginning of the Upper Pleistocene are included in Fig. 3 (the site of Jebel Faya, with stratified early and mid-Upper Pleistocene archaeological components is shown in Fig. 5). The OOA expansion of anatomically modern humans is also indicated by recent comparative genetic analyses focusing on extant neutral variation in the Arabian Peninsula, further suggestively supported by archaeological work in southern Arabia (Groucutt and Petraglia 2012; see Fig. 5). Across North and sub-Saharan Africa, fossil finds dating more broadly to the 300–130 kya interval (the end of the Middle Pleistocene) provide the earliest evidence of modern craniofacial anatomical patterns (Hublin et al. 2017). However, the relatively abrupt appearance of two southern Levantine sites with multiple primary interment features – all dating to the interval ca. 130–90 kya, corresponding to the first millennia of the Upper Pleistocene – suggests a local cultural tradition of mortuary ritual in mainly *anatomically modern* mobile hunter-gatherer societies. The social networks, symbolic structures, and associated cosmologies that constituted and were constituted by the ritual practices cannot be reconstructed. Yet, the symbolically dramatic, ritualized response to the fundamental social crisis of death constitutes a hallmark human group-level behavior, which strongly shapes the surviving group members' comprehensive, shared memory and embodied

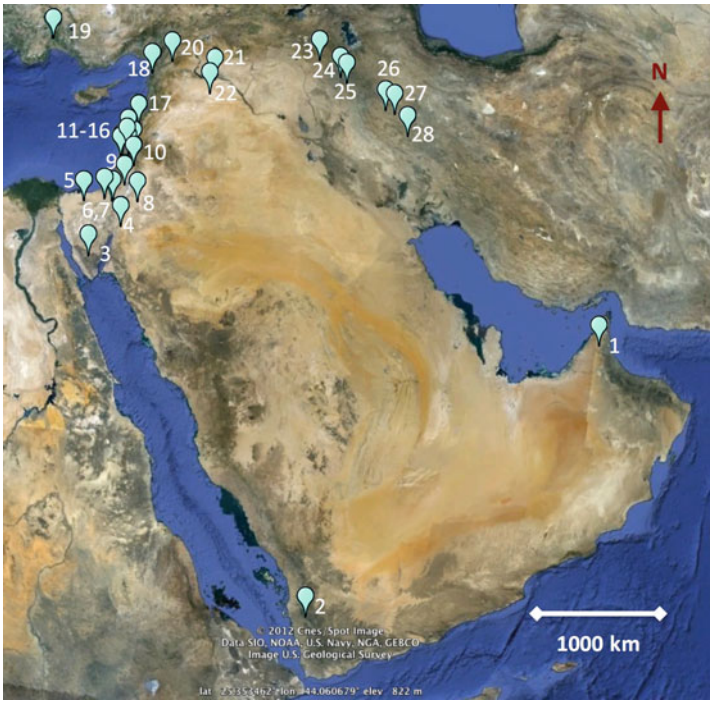

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 5 Selected late Middle Paleolithic (LMP) and early Upper Paleolithic (EUP) sites in the Near East: 1, Jebel Faya (EUP [with mid-Middle Paleolithic component]); 2, Shi'bat Dihya 1 (LMP); 3, Abu Noshra (EUP); 4, Tor Faraj (LMP); 5, Lagaman sites (EUP); 6, Nizzana XIII (EUP); 7, Boker Tachtit and Boker (EUP); 8, Tor Sadaf and Thalab al-Buhayra (EUP); 9, Erq el-Ahmar (LMP-EUP); 10, Mughr el-Hamamah (EUP); 11, Kebara Cave (LMP-EUP); 12, Tabun Cave (LMP) and el-Wad Cave (EUP); 13, Hayonim Cave (EUP); 14, Qafzeh Cave (EUP); 15, Amud Cave (LMP); 16, Manot Cave (EUP); 17, Ksar Akil Rockshelter (LMP-EUP); 18, Üçağızlı; 19, Karain Cave (LMP), Cave (EUP); 20, Dederiyeh Cave (LMP); 21, Wadi Kharar 16R (EUP); 22, Umm el-Tlel (LMP-EUP); 23, Shanidar Cave (LMP-EUP); 24, Zarzi Cave (EUP); 25, Hazar Merd Cave (LMP); 26, Warwasi Rockshelter (LMP-EUP); 27, Bisitun and Kobeh Caves (LMP); 28, Yafteh Cave (EUP). Base map source: Google Earth

sense(s) of identity in relation to others, to place, and to time. The repetitive nature of the ritualized interment of the dead at Qafzeh and Skhul caves points toward long-term cultural reproduction of social relationships, place, descent, and memory among mobile – indeed, quite likely very highly mobile – hunter-gatherer populations.

As important as this earliest evidence of mortuary ritual may be, the debate remains the same over how – in terms of macroevolutionary tempo and mode – the underlying socio-cognitive capacity evolved. Do we see a punctuated spread of anatomically modern human (AMH) populations that evolved in North and sub-Saharan Africa? Or do we see a more complex, gradual process of biocultural evolution, involving a multilevel social and biological interaction of local Near Eastern groups with sporadically expanding African groups, of groups in richer winter refugium habitats with groups in more marginal or patchier zones within the Near East, and of Near Eastern groups with neighboring South Asian, Central Asian, southern Caucasus, and European ones? Of course, the actual answer may be somewhere between the two theoretical extremes of punctuated speciation/replacement and biocultural gradualism.

The evidence for initial Upper Pleistocene Near Eastern AMH populations descending from late Middle Pleistocene African ancestors and constituting hunter-gatherer societies who practiced mortuary rituals may be especially

attention-grabbing. The Near Eastern data on emerging complexity in Upper Pleistocene human evolution becomes even more striking when one considers that all of the carefully excavated and radiometrically dated burials in the Near East from the subsequent period, ca. 80–50 kya, include individuals with predominantly Neandertal anatomical features (Bar-Yosef 1994). Radiometric analyses of animal teeth that may be stratigraphically associated with the Neandertal female adult burial from the Tabun Cave suggest that humans with Neandertal traits may have been in the southern Levant even earlier, contemporaneous with the anatomically modern humans interred at Skhul and Qafzeh (Grün and Stringer 2000). Uranium-thorium dating of calcitic crusts forming on an isolated anatomically modern human skull cap from Manot Cave most likely places the re-expansion of African or Saharo-Arabian populations beginning ca. 60–50 kya (Hershkovitz et al. 2015). In this critical period, it is currently unclear how the population-biological turnover – with anatomically modern humans largely replacing Neandertals – actually unfolded across the entirety of the Near East. However, new breakthroughs in genomic analyses of modern and ancient genomes alike suggest that Neandertal and anatomically modern human populations sporadically admixed over thousands of years, most likely in the Near East (Mallick et al. 2016). This is broadly consistent with the shifting morphological patterns of the Near Eastern human fossils themselves, across the Middle-Upper Pleistocene boundary.

It is important to remember that Neandertals were a western Eurasian network of populations that exhibited a suite of cranio-dental and post-cranial anatomical features tending to distinguish them, not only from African AMH but also from Asian and possible archaic African populations in the late Middle-Upper Pleistocene timeframe, from ca. 200 kya onward. Neandertals themselves may be assumed to have descended, for the most part, from western Eurasian populations established during earlier Lower or Middle Pleistocene expansions out of Africa. The African AMH morphological pattern incorporates a relatively high, rounded cranial vault, limited midfacial prognathism, strong basicranial flexion, chin formation, and a relatively narrow torso with non-cold-adapted brachial and crural indices (resulting in a higher encephalization quotient). The Neandertals, in contrast, tend to display strong midfacial prognathism associated with a straight or receding mandibular symphyseal region, a distinctive occipital morphology involving lambdoidal flattening, posterior "bunning," a wide suprainiac fossa, maximal cranial breadth in the supramastoid region, and small, medio-inferiorly oriented mastoid processes. Neandertal postcranial anatomy tends to be robust, combining cold-adapted torso shape and limb proportions with locomotive adaptations for high activity levels. Although Neandertal brains were as large or larger than those of AMH (fully in the modern human range), their higher body mass indices yield an encephalization level similar to that of Middle Pleistocene archaic *Homo*. At least for males – who are better represented among post-cranial remains – the Neandertal anatomical pattern is suggestive of high caloric intake and high energy flux. As a consequence, reconstructing Neandertal diet and behavior is vital for modeling possible differences with AMH in activity adaptations and their life-history consequences in terms of growth rates, growth-maturation trade-offs, adult maintenance-fertility trade-offs, and intergenerational resource transfer effects imposed by variation in adult longevity. The complete anatomical pattern is most often observed on European Neandertals dating to the Upper Pleistocene, in the period ca. 130–45 kya. This pattern is also observed on Neandertal skeletons from burials in Shanidar Cave, located in the Zagros foothills – set in a key Near Eastern winter refugium zone. The Shanidar burials have been dated by conventional radiocarbon assays on associated charcoal fragments, and although there is substantial uncertainty over such ages, the burials probably date to (very roughly) 50 kya (Solecki 1971).

It is emphasized that the Neandertal anatomical pattern fully emerges earliest in Western Europe, ca. 200–120 kya, and consequently, the appearance of Neandertal features in the Taurus-

Zagros foothills, the northern Levant, and the southern Levant between ca. 80 and 50 kya (and possibly earlier in marine isotope stage 5, ca. 130–80 kya) indicates that a trend of population expansion from Europe to the Near East interrupted the incipient spread of AMH populations out of Africa (Bar-Yosef 1994). Notably, skeletal specimens generally described as Neandertal from the southern Levant also show some features of the parietal or mastoid regions more commonly expressed in AMH (Kramer et al. 2001). Recent comprehensive reconstruction of ancient DNA extracted from European Neandertal bones indicates that all living non-Africans have inherited roughly 1–4% of their DNA from Neandertals – with most or all of the remainder from early AMH ancestors. The southern Levant – as perhaps the most important Near Eastern winter refugium zone, especially well linked to semiarid zone green corridors and oases – is the most obvious candidate area for Neandertal-AMH population mixture in the initial portion of the Upper Pleistocene. Yet, this only intensifies the debate over tempo and mode. Are we observing competition between biologically distinct populations, with limited hybridization? Or are we seeing a regional, shifting population balance – perhaps due to climate change or even cultural-technological innovation – in anatomical or life-history features favored by natural selection?

It should not be surprising that the (apparently predominantly anatomically) Neandertal societies who occupied the Near East in the mid-Upper Pleistocene interval, ca. 80–50 kya, appear to have been at least as socially complex and ecologically adaptive as the earlier AMH communities, especially when it came to mobile hunting and gathering in relatively marginal ecological zones, including both semiarid and higher-elevation habitats (Henry 2003). Given the behavioral similarities between AMH and Neandertal hunter-gatherer societies in the earlier Upper Pleistocene of the Near East, it becomes even that much more challenging to clarify the systemic causes for the observed, long-term geographic shifts in anatomical variation.

The Middle-Upper Paleolithic Transition, Disappearance of Neandertals, and Eurasian Spread of Anatomically Modern Humans

*The decisive expansion of Upper Paleolithic technology – significantly associated with modern human anatomy – in the later Upper Pleistocene (*ca. *50–20 kya)* marks the disappearance of the Neandertal anatomical pattern in the Near East (and the rest of western Eurasia). In fact, the spread of Upper Paleolithic technology and modern human anatomical features had global biocultural ripple effects. The expansion of early Upper Paleolithic populations across Eurasia strongly contributed to the predominantly sub-Saharan African pattern of genetic variation seen in all living humans. That is to say, the bulk of extant non-African neutral genetic variation is a subset of variation found in living sub-Saharan African populations (Mallick et al. 2016). During the Upper Paleolithic, major innovations involving refined fiber working, tailored clothing and rigid footwear, compound tool production (with replaceable flint tool or point inserts), projectile hunting weaponry, and body and clothing decoration become efficiently produced and widely employed for the first time outside of sub-Saharan Africa. While it is likely that Eurasian adoption (s) were sometimes the result of independent invention, it is at least as likely that the socio-demographic and ecological conditions favoring adoption of these key technological innovations developed later outside of Africa. These innovations facilitated more sustainable or successful long-term hunter-gatherer occupation of highly marginal Eurasian zones, including higher-altitude or higher-latitude areas with very long winters or very little rainfall, including interior Arabia and Mongolia. The development of Upper Paleolithic Eurasian societies – and the longer-range exchange networks that often shaped them – unfolded slowly, over a ca. 30,000-year period.

Upper Paleolithic emergence, with AMH re-expansion out of Africa, appears to have begun in the Near East before spreading into Eurasia. More specifically, available radiocarbon dating evidence indicates that the Upper Paleolithic emerged first in the Levant – and, quite

likely, was localized in the southern Levant, between 50 and 45 kya (Alex et al. 2017). Key late Middle Paleolithic and early Upper Paleolithic sites in the Near East are shown in Fig. 5. Between 45 and 40 kya, aspects of Upper Paleolithic material culture spread or were independently adopted across southeastern, central, and much of Western Europe (Bar-Yosef and Belfer-Cohen 2010; Kuhn and Zwyns 2014).

The very earliest Near Eastern Upper Paleolithic is archaeologically recognizable by specific changes in lithic technology. In fact, aside from shifts in blank production, flake-use, and retouched-tool production practices, the earliest Upper Paleolithic layers do not exhibit evidence for residential and mobile foraging behavior patterns that are dramatically – or at least, clearly archaeologically – different from those evidenced from underlying final Middle Paleolithic deposits. Moreover, artifacts and features that have been proposed as part of an Upper Paleolithic behavioral "revolution" are actually rare or absent in earliest Upper Paleolithic Near Eastern sites. These include decorative beads and pendants, bone tools and points, and formal burials, all of which gradually increase frequency after 45 kya, only later becoming substantially more common during the Epipaleolithic period, ca. <20 kya. The early Upper Paleolithic, at first, involves adopting new patterns or combinations of lithic technologies for mobile foraging and campsite tasks.

What is it that changed in the Near Eastern Middle-Upper Paleolithic transition? Terminal Middle Paleolithic assemblages exhibit few formal tools except for Levallois points. While some late Middle Paleolithic chipped stone assemblages indicate a tendency toward producing narrow elongated blanks, lithic reduction is dominated by the unidirectional convergent Levallois technique for producing broader points and flakes. In contrast, the oldest documented Upper Paleolithic assemblages are more clearly "leptolithic," or blade-focused, in core-reduction practices (Fig. 6). Moreover, formal retouched points and tools are much more diverse and abundant. They variably include relatively thick convergent points, narrow points on blades (el-Wad points), end scrapers, burins (often on truncations), scaled pieces, and retouched blades.

For the most part, the earliest Upper Paleolithic assemblages – that is, those dated to ca. 50–40 kya – are from sites in the Levant (see Fig. 5). They usually conform to one of two technological patterns, the Early Ahmarian and the Initial Upper Paleolithic. The Early Ahmarian technocomplex features prismatic blade and bladelet production, often on single-platform narrow- or broad-fronted cores, along with el-Wad points. According to the most recent, careful work on pretreating wood charcoal samples and measuring their ^{14}C levels, the oldest Early Ahmarian assemblages are from Kebara and Manot caves, near the Mediterranean coast in northern Israel; these occupations likely date to ca. 47–45 kya (Alex et al. 2017). The lithic assemblage from Mughr el-Hamamah includes Early Ahmarian prismatic blade(let) production technology and may be as old as 45 kya. The Initial Upper Paleolithic (IUP; often referred to as the Emiran in the southern Levant) involves a core-reduction strategy combining prismatic blade production on the lateral portions of the core, with the main prepared-core convexity utilized for Levallois elongated point production. Interestingly, at most sites with IUP assemblages, there are also stratigraphically younger Early Ahmarian deposits. However, the reverse sequence has not been documented. Currently, it appears that Early Ahmarian technologies were adopted immediately following the late Middle Paleolithic in Mediterranean vegetation zones in the southern Levant. In surrounding areas – including the Negev, southern Jordanian highlands, the mountainous Mediterranean coast from Lebanon to Turkey, and northern Syria – IUP technologies were first utilized, only subsequently giving way to Early Ahmarian ones. The oldest dated Upper Paleolithic assemblages from the Taurus-Zagros foothills are assigned to the Baradostian technocomplex; they appear to be somewhat younger in age (ca. 40–35 kya), exhibiting retouched blade and bladelet products similar to those from Early Ahmarian assemblages in the Levant. As a cautionary note, chronological details in different parts of the Near East remain uncertain. Across

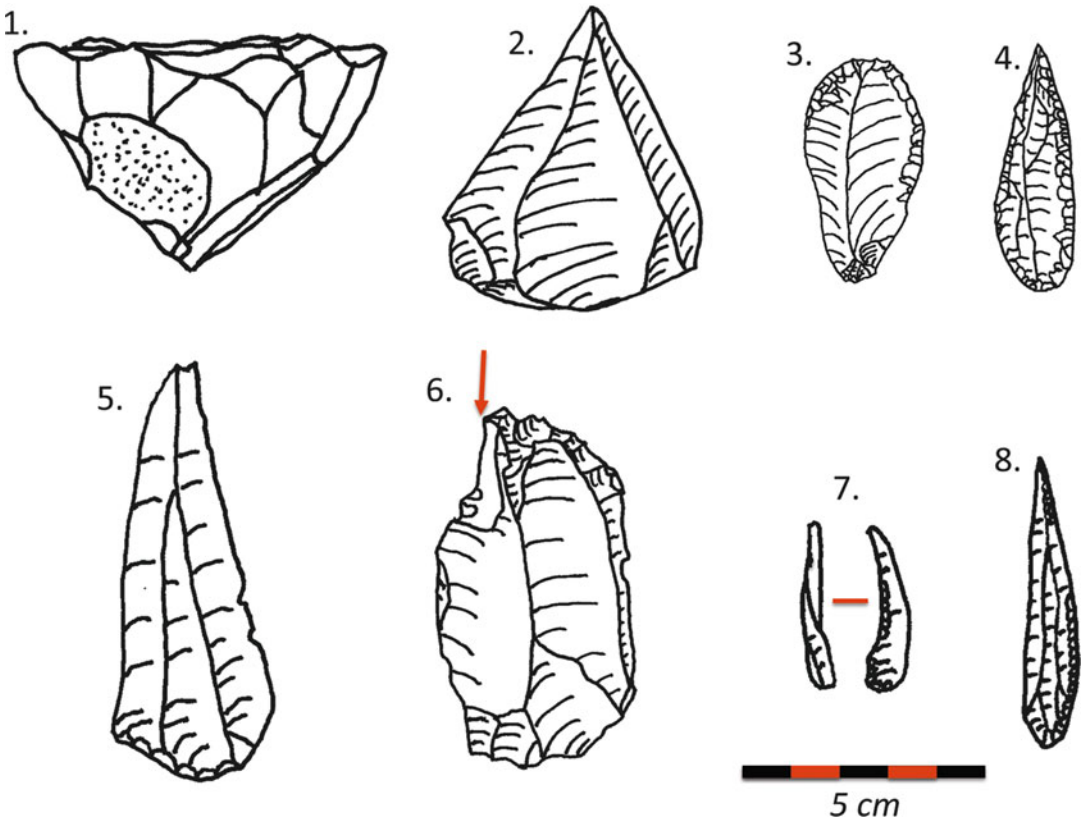

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 6 Examples of chipped stone tool types and technological features from mid-Middle Paleolithic, late Middle Paleolithic, early Upper Paleolithic, and late Upper Paleolithic technocomplexes in the Near East. 1, mid-Middle Paleolithic radial Levallois core (lateral view); 2, late Middle Paleolithic Levallois point; 3, initial Upper Paleolithic/Emiran end scraper; 4, initial Upper Paleolithic/Emiran Ksar Akil point; 5, initial Upper Paleolithic/Emiran Levallois-like blade; 6, Levantine Aurignacian burin; Late Ahmarian Dufour bladelet; Early Ahmarian el-Wad point

the wider early Upper Paleolithic timeframe 50–30 kya, it may still be technically challenging to sample, pretreat, and date biogenic materials suitable for radiocarbon dating. This is especially the case when materials are poorly preserved or from old excavations with poorer control over depositional context. Thus, an important focus for future work is clarifying geographic variation within the Near East over the chronology of early Upper Paleolithic technological change in environmental and biocultural context.

Explaining the Middle-Upper Paleolithic Transition: A Socio-Technological Hypothesis Indeed, elucidating how and why socio-technological practices changed in this critical interval can clarify why anatomically modern humans largely replaced Neandertals across western Eurasia between ca. 50 and 30 kya. Kuhn and Stiner (2006) have presented theoretical arguments and tentative evidence to support a key inference. The elongated blanks, burins, end scrapers, and retouched blades that mark the earliest Upper Paleolithic assemblages in the Near East were part of an otherwise hidden – but profound – shift in social organization. The production of smaller flint tools and projectile points that were likely hafted – and often used for working hide, wood, or bone – likely marks an increased labor investment in technological production to

support hunting, gathering, and food processing. Thorough ethnographic comparison of hunter-gatherer social organization indicates that high labor investment in technological production tasks often corresponds to effective division of labor, usually along adult gender lines. Thus, Kuhn and Stiner identify a hallmark biocultural evolutionary development in the early Upper Paleolithic: the establishment of more stable social networks, constituted by more predictable co-residence practices and cooperative organization of labor.

This model has two important predictions that find preliminary empirical support. First, on an evolutionary, intergenerational timescale, increased division of labor should be an economic response to rising human population impact on those food resources which – other things being equal – offered higher calorie and nutrient returns under the prevailing late Middle Paleolithic socio-technological systems. During the interval ca. 65–50 kya, cooperative hunting practices focused around Levallois technology appear to have been sufficiently successful to depress wild cattle populations in the food web surrounding Kebara Cave, located near Mt. Carmel's southern tip. Among the largest herbivorous mammals in the Pleistocene Near East, wild cattle (*Bos primigenius*) provided foraging groups with especially rich post-capture nutrient returns. Yet, the late Middle Paleolithic archaeological sequence in Kebara Cave reveals that, from an early, relatively high focus on wild cattle (ca. 65 kya), identifiable *Bos* food remains decline in abundance, becoming uncommon in the uppermost Middle Paleolithic layers (Speth and Clark 2006). Across Near East sites, wild cattle never reach the relative-abundance peak; when compared to other hunting resources, they attain in the lowermost layers of Kebara Cave (Fig. 7). Speth and Clark argue that human hunters – likely Neandertal or admixed Neandertal-modern human populations, to judge by hominin skeletal remains from late Middle Paleolithic burials – had at least a local impact on *Bos* populations. Second, late Middle Paleolithic socio-technological systems appear to have been organizationally simpler, involving fewer task-specific technological products and greater mobility than those seen in later Upper Paleolithic ones; the time allocation trade-off between more flexible foraging and residential mobility, on the one hand, and more technological task activity, on the other, would marginally favor the lower body mass and less powerful masticatory biomechanics of anatomically modern humans, compared with Neandertals. In metabolic and dietary terms, the Upper Paleolithic pattern would have traded off greater daily energy flux – in which more calories would have been spent searching for higher caloric rewards involved in hunting – for lower variation in daily energy balance, which a marginal increase in plant foods would have provided. The demographic consequences of such a shift may have been small but substantial, leading to higher fertility, lower infant and juvenile mortality, and greater post-reproductive longevity.

It is important to note that the development of greater culturally structured division of task labor may have occurred substantially earlier in parts of sub-Saharan Africa. In any case, the shifts occurring in the earliest Upper Paleolithic in the Near East appear to have had long-term consequences. The social practices that shaped and reinforced division of labor would have been set within mobile camps, during moves between campsites, on raw material provisioning trips, and on foraging trips. Near Eastern Upper Paleolithic sites – when compared to deposits from earlier periods – appear to vary along a substantially greater spectrum of ephemeral, task-specific camps and larger, repeatedly occupied mobile base camps. Occupation of higher-elevation, semiarid, and arid zones gradually became more successful, complex, and resilient. By the onset of the Epipaleolithic (ca. 20 kya), a persistent social boundary in lithic style had crystallized between the Mediterranean zone and adjacent semiarid zones in the southern Levant (Stutz and Estabrook 2004). At the same time, the early Epipaleolithic record around the Azraq Basin, Jordan, indicates that this boundary was actively, dynamically negotiated (Richter et al. 2011). Early and middle Epipaleolithic (ca. 20–15 kya) basecamp sites that were repeatedly reoccupied exhibit some durable stone-foundation architectural structures and burials, especially in the southern Levantine Mediterranean zone.

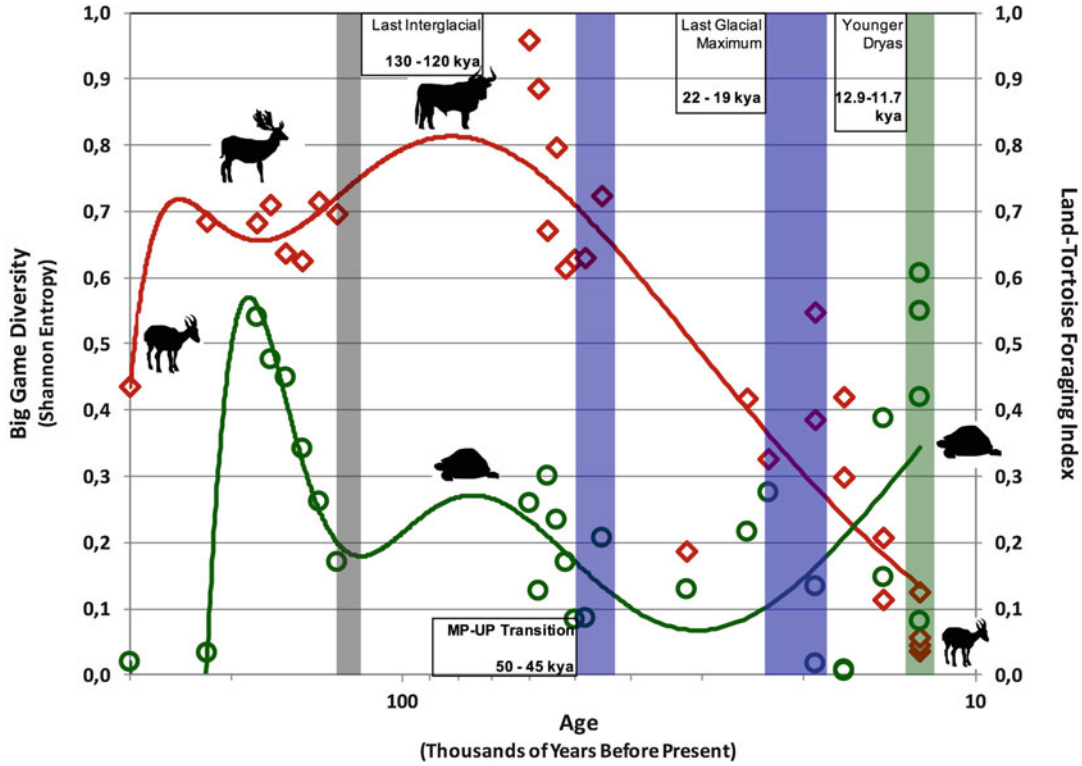

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 7 Long-term dynamics in big game (as represented by aurochs, fallow deer, and mountain gazelle) and small game (as represented by spur-thighed tortoise) in southern Levantine Middle Paleolithic, Upper Paleolithic, and Epipaleolithic archaeofaunal assemblages, from ca. 200 kya to 12 kya. Big game evenness (left vertical axis) measures the dominance – or lack of it – among bones and bone fragments from large (mainly aurochs), medium (mainly fallow deer), and small (mainly gazelle) ungulate species. Because aurochs were relatively less frequently hunted by humans during the Pleistocene, evenness values approaching 1.0 during the late Middle Paleolithic reflect greater focus or success in hunting "the biggest of the big." Evenness values approaching 0.0 during the Early and Late Natufian cultural periods reflect the preponderance of gazelle bones in these late Epipaleolithic assemblages. Testudo abundance index (right vertical axis) refers to the number of identifiable spur-thighed tortoise (*Testudo graeca*) bones and bone fragments relative to the number of big game bones in the same assemblage. Taken together, the two archaeozoological measures suggest that as Middle Paleolithic foragers became more successful at hunting big game – more often taking larger-bodied species – human population grew slightly but significantly, generating predation pressure on smaller, easy-to-capture animal food resources. In the late Middle and Upper Paleolithic, as human population growth and ongoing hunting success depressed big game populations, foragers turned increasingly to a wider diversity of small animal and plant food resources. In the Early and Late Natufian periods (ca. 15–12 kya), the *Testudo* abundance index rose dramatically, as big game continued to shrink in economic and dietary importance. Big game evenness and *Testudo* abundance index values calculated from published data

Anatomically Modern Human (Re)Expansion in the Middle-Upper Paleolithic Transition Kuhn and Stiner's division-of-labor model is compelling because of its broad biocultural explanatory reach, although much work remains to evaluate its predictions in greater detail. Researchers have also long sought to trace the population-biological dimensions of the Middle-Upper Paleolithic transition, as it roughly coincides with a key episode of anatomically modern human expansion out of Africa or southern Arabia. Levantine lithic assemblages with IUP core-reduction technology also variably incorporate artifacts – such as Nubian cores, chamfered

pieces, Emireh points, and Umm el-Tlel points – that are made with seemingly arbitrary, stylistic preparation or final-shaping removals. As its name suggests, the Nubian core-reduction approach to producing convergent flakes is a Middle Stone Age African phenomenon. However, Nubian cores are known from Middle Paleolithic sites in the Arabian Peninsula and Negev Desert. Nubian cores are notably part of the lithic assemblage from Boker Tachtit Level 1, an IUP site in the Negev Desert (see Fig. 5). The Nubian core pattern – and its formal similarity to Near Eastern IUP core reduction – supports the tantalizing possibility that some earliest Upper Paleolithic technologies in the Near East were influenced by social interaction and demographic expansion from Africa (Goder-Goldberger et al. 2016). However, Early Ahmarian technology appears to be a local southern Levantine development, attributes of which subsequently spread – likely through a combination of demographic growth, dispersal, and social interaction – to other parts of western Eurasia. At this point, evidence remains limited that Near Eastern early Upper Paleolithic material culture was directly influenced by demographically expanding anatomically modern humans, migrating out of Africa, via the Nile Valley or Bab el-Mandeb.

The Long-Term Emergence of Domestication and Agriculture in the Near East

*The transition from the final Paleolithic to the Neolithic is often viewed through the lens of the transition to sedentism, agriculture, and village life, which emerged "full-blown" in the Pre-pottery Neolithic B period of the Near East (*ca. *10.5–8.25 kya).* Flannery's (1969) classic archaeologically focused discussion of long-term Near Eastern sociopolitical change – along with the ecological and economic foundations and consequences of that change – included a key suggestion. He argued that plant domestication and agricultural production, which developed in the early Holocene, unfolded at the end of a long-term economic shift from large wild animal resources to more abundant but smaller animal and plant food packages. Moreover, he pointed to then preliminary evidence that the trend toward "broad-spectrum foraging" began early in the Upper Paleolithic. Although the systemic causes of the Middle-Upper Paleolithic transition remain poorly understood, more recent research indicates that the Upper-Final Paleolithic shift toward smaller hunted and gathered food packages may have had incipient southern Levantine origins in the (Neandertal-dominated) late Middle Paleolithic, ca. 65–50 kya (Speth and Clark 2006). Put another way, over roughly the last 60,000 years of Near Eastern prehistory, large hunted game became less and less important as a caloric and nutritional resource. At the same time, smaller animal and plant "resource packages" that are resilient to overharvesting became more central to the human diet. This background to the Near Eastern origins of agriculture is important because it involves what appears to be a continuous long-term trend (see Fig. 7).

How Did Plant and Animal Resource Consumption Change in the Long-Term Transition to Agriculture? The Upper Paleolithic and early Epipaleolithic use of food resources appears to change subtly and gradually from ca. 40–15 kya, with some fluctuations forced in part by climate change. As for the later Middle Paleolithic, small- and medium-sized ungulates – such as fallow deer, gazelle, wild boar, and wild sheep and goat – comprise the bulk of big game assemblages from across the Near East. Small game tends to be dominated by easy-to-capture terrestrial animals, especially land tortoises (see Fig. 7). However, when measured by species presence alone, small game assemblages are often diverse, including small mammals (often hare), waterfowl, and other game birds. Some riverine, lacustrine, and even marine coastal fish and shellfish are documented in the archaeozoological record. The late Upper Paleolithic site Ohalo II, Israel (ca. 23–22 kya), and the early Epipaleolithic site of Kharaneh IV, Jordan (ca. 19–18 kya), preserve especially rich charred plant food assemblages. Ohalo II provides evidence for a broad spectrum of wild fruit, nut, grain, and tuber resources (Kislev et al. 1992). It is worth noting that recent phytolith extraction and identification research on late Middle Paleolithic deposits in the southern

Levant also indicates human (likely Neandertal) exploitation of fruit, nut, and grass (presumably including starchy seed) food resources (Henry 2003). The late Middle Paleolithic phytolith evidence is supported by the rare, exceptionally well-preserved charred botanical sample from the Middle Paleolithic layers of Kebara Cave, revealing that Neandertal foragers regularly gathered wild pulses, among other food plants. These emerging – albeit still limited – results on Upper Pleistocene Near Eastern plant food exploitation may be combined with archaeozoological research to suggest that the long-term shift toward smaller-package-sized food resources initially developed continuously and slowly, probably across the Middle-Upper Paleolithic transition.

Recent research on the Epipaleolithic in Jordan has been important for shedding light on how climatic and ecological gradients (see Fig. 1) may have shaped long-term biocultural change in the Near Eastern transition to agriculture. It appears that, as overall population densities grew to a critical threshold, hunter-gatherer groups more regularly sustained exploitation of wetland patches, which dotted the steppic or semiarid eastern flank of the southern Levant. In Eastern Jordan, the number and maximum size of archaeological sites jump substantially from the late Upper Paleolithic to the early Epipaleolithic. This transition unfolds during the Last Glacial Maximum (LGM), ca. 23–19 kya. This was a period of cold, dry climate globally. In the Near East, the cooler prevailing temperatures depressed annual precipitation rates, but they also reduced evaporation. The result was patchy change in water availability and vegetation regimes. In the southern Levant, the Lake Lisan that filled the Jordan Valley shrank progressively during the LGM. However, wetlands and upland lakes continued to dot the Transjordanian highlands and portions of Eastern Jordan. These were areas that – due to their higher elevation and relatively lower rainfall – supported lower annual biomass production than much of the western portion of the southern Levant. Thus, they would have had lower, spatially patchier amounts of edible plant and animal foods for human foragers. Still, predictable lacustrine and wetland zones – such as the ancient Lake Hasa and the wider Azraq region – were more intensely exploited by mobile foragers. At least occasionally, hunter-gatherers may have visited or remained in these areas throughout the year, especially the rich Azraq Basin (Richter et al. 2013). Substantial variation in bladelet and point manufacture and form suggests that material culture style was important in negotiating social relationship networks and boundaries. However, the very long-term trend in animal prey overexploitation – seen in the richer Galilee, Mt. Carmel, and Jordan Valley zones – does not develop around the ancient Lake Hasa or Azraq Basin, even into the early Holocene (Martin et al. 2016; Munro et al. 2016; Stutz et al. 2009). It is likely that the costs – in terms of foraging risks and residential-move distances – limited human ecological impact on the eastern portion of the Levant. At the same time, the Mediterranean vegetation zone and rich Jordan Valley remained a hunting-and-gathering refugium. Within this area, dotted by multiple biodiversity hotspots, human population densities gradually rose over millennial timescales. The higher rates of social interaction in co-residential, foraging, mobility, and ritual-gathering contexts had to be negotiated, influencing biocultural change in ways that have yet to be fully understood. An interesting focus for future research is how interaction between ecologically more productive lower-elevation refugia – including portions of the southern Levant and the Taurus-Zagros foothills – and patchier wetland oases in steppic and semiarid zones dynamically shaped both population growth within the Near East and demographic expansion into surrounding areas.

Such tension – between how forager social networks dwelled in the ecologically richer and wetter western Mediterranean and Jordan Valley zones and how they exploited the ecologically patchier grassland areas to the east and south – appears to have been involved with a major, punctuated prehistoric change occurring around 15 kya. At this time, the Early Natufian archaeological culture emerged, with several larger semisedentary or sedentary hamlets (ca. 1000–2000 m^2 in area) established in the Mt. Carmel,

Galilee, and Jordan Valley areas of the southern Levant. The successive Early and Late Natufian archaeological cultures (ca. 15–13 and 13–12 kya, respectively) involved substantial change in the scale and organization of settlement and food exploitation, mainly in the Levant. Figure 8 shows the distribution of Early and Late Natufian sites in the Near East. As many sites incorporate burial features, the Natufian archaeological culture also marks a shift in how regularly mortuary ritual produced social memory, a sense of place and of kinship descent within habitation loci. There is indirect evidence for Early Natufian Mediterranean zone population densities having risen, compared to earlier periods. In the Mt. Carmel and Galilee area of the southern Levant, Early Natufian archaeofaunal samples show a striking drop in the relative proportions of fallow deer bone fragments, when compared to immediately preceding Epipaleolithic periods. Gazelle bones dramatically come to dominate the big game fraction. In other words, considering that adult gazelles have roughly 1/3 to 1/5 the body mass of adult fallow deer, Early Natufian big game food resources include mainly "small big game" (Stutz et al. 2009). In fact, for the first time in the Pleistocene sequence of anthropogenic big game bone assemblages in the Near East, Early Natufian samples incorporate a large fraction of remains from very young, incompletely grown juvenile

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 8 Early Natufian sites (red markers) and Late Natufian sites (green markers) in the Near East. Orange markers show southern Levantine sites with stratified Early Natufian and Late/Final Natufian components. Green dashed line shows approximate current boundary between Mediterranean vegetation and Irano-Turanian steppe/grassland vegetation. Base map source: user Fulvio314 on http://it.wikipedia.org

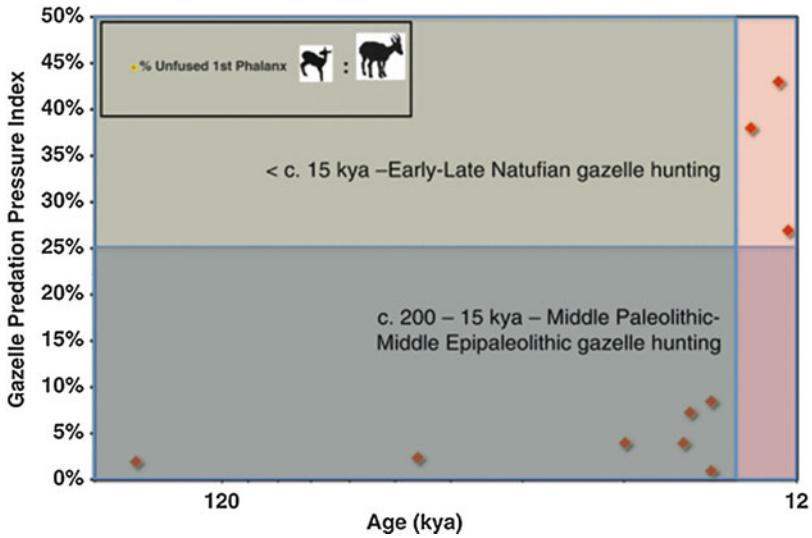

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 9 The gazelle predation pressure index is the proportion of unfused first phalanges among all gazelle phalanges in Middle Paleolithic, Upper Paleolithic, and Epipaleolithic archaeofaunal assemblages in the southern Levant, ca. 200–12 kya. The mountain gazelle (*Gazella gazella*) first phalanx fuses around ca. 6 months of age, well before the juvenile has reached adult size. Thus, the substantial jump in juvenile gazelle proportions seen for the Early and Late Natufian periods signals a drop in the caloric and nutritional value of the typical big game catch while also further contributing to big game population depression. The index is calculated from published data

gazelles (Fig. 9). Moreover, Early Natufian small game assemblages exhibit a sudden shift – when compared to earlier Epipaleolithic or Upper Paleolithic samples – to a dominance of sessile animals, mainly hare and partridge (Stutz et al. 2009). After ca. 15 kya, hunter-gatherer populations were having an ecological impact on economically key prey species in the food webs set in Mediterranean and Jordan Valley refugium zones (Stiner and Munro 2002; Stutz et al. 2009).

Paleobotanical remains are generally poorly preserved in Early Natufian sites. It is unclear if there was an equally dramatic shift in the composition of the Early Natufian plant food spectrum. Preservation of charred botanical remains has proven poor at southern Levantine Early Natufian sites, but phytolith analysis suggests that forest resources, such as acorns, were gathered and utilized (Rosen and Rivera-Collazo 2012). Nutritional and caloric arguments would predict that rich, seasonally available foods that could be mass-collected and stored would be favored. Such resources in the final Pleistocene of the southern Levant would notably include acorns, wild pulses, wheat, and barley. The focus on fast-reproducing, fast-escaping small game – now very well documented by Stiner and Munro's (2002) pioneering analyses – provides an economic context that would also be congruent with mass collection of ecologically abundant starchy, fatty, or protein-rich plant foods. Both fast-reproducing small game and rich plant foods require high up-front technological investment for humans to harvest, transport, and process them sufficiently effectively. As the work by Stiner and Munro indicates, sessile small game would likely have been captured during Early Natufian times with complicated technological aids. These would include traps (which would not have to be constantly monitored), bow and arrow or harpoon technologies, and tracking or hunting dogs. All of these innovations would have substantially increased post-encounter return rates. If well curated, the initial investment in such technology would have paid off over weeks, months, or years of use. Perhaps most importantly, such small game species would be relatively undisturbed by human presence; their

high reproductive rates could offset intensive human predation. Thus, even as Early Natufian hunter-gatherers ate more hare, partridge, waterfowl, fish, and other sessile animals, encounter rates would unlikely have been depressed. It is important to note that the technological investment in sickles, baskets, mortars and pestles, and – possibly – storage pits for high-quality seed, nut, and lentil exploitation involves a conspicuously similar up-front cost and delayed returns, when compared to intensive sessile small game hunting.

Yet, there are two potential differences with seed, lentil, and nut exploitation. First, efficient harvesting and processing may be enhanced, not only by technology but also by social organization. Economies of scale, leadership, and task-specific division of labor can improve harvest rates, plant regeneration rates, and the effectiveness of storage and food processing. Whereas the adoption of small game hunting technology would mainly involve intensification of existing Upper Paleolithic hunter-gatherer social relations, the biological and physical properties of especially rich seed and nut resources can focus common interests and favor cultural transformation toward a larger scale of work organization, shaping seasonal ritualized aggregations or feasts. Moreover, an economy of scale supported by more complex organization could enhance plant habitat and dispersal, creating further ecological conditions for increasing caloric and nutritional return rates. Second, the biological and physical properties of starchy or fatty plant foods can – with efficient technology and organization of grinding and cooking – be used to produce relatively energy-rich gruels or porridges that can significantly augment lactation and reduce weaning ages, thereby increasing overall fertility rates in the community.

Over a period of generations, then, systemic change would most likely involve dynamic feedbacks among plant resource growth and patch distribution; technology supporting and facilitating harvesting, food processing, and storage; ritualization, genres of discourse, identities, built environments, cultural landscapes and temporalities, and cosmological idealization of a social order; practical social organization of plant food exploitation, along with social negotiation over task group mobilization, especially in the face of resource scheduling conflicts and the need to reach consensus about opportunity costs; practices of exchange, storage, and consumption; population fertility, mortality, health, and activity patterns; and migration, social boundary negotiation, and intermarriage practices.

It is not until the succeeding Late Natufian archaeological culture (ca. 13–12 kya) that we see evidence for a further, clear increase in the economic importance of rich, starchy plant foods. The site of Tell Abu Hureyra in the northern Levant shows that, for one thing, the Late Natufian archaeological culture – which stratigraphically succeeds the Early Natufian at several sites in the southern Levant – involved intense gathering and processing of wild plant foods in the Middle Euphrates valley. Late Natufian sites are geographically widespread, also found in the Eastern Jordanian Black Desert, the Negev Desert, and the Sinai Peninsula (see Fig. 8). Analysis of the charred macrobotanical remains from Abu Hureyra shows that, at the very beginning of the Late Natufian archaeological culture (Abu Hureyra 1, Phase 1), a year-round basecamp settlement was supported by a starchy plant-food foraging "basket" strongly dominated by wild wheat and rye. The technology and organization of seed resource exploitation practiced by the inhabitants of Abu Hureyra appear to have been resilient to rapid-onset climate change, which occurred during the cold and dry Younger Dryas episode (12.9–11.7 kya). Gordon Hillman (reporting in Moore et al. 2000) documents a Younger Dryas-associated shift toward a much broader spectrum of wild seeds, nuts, and fruits, available from a wider diversity of habitat zones, during the Abu Hureyra Phase 2 and 3 occupations. Similar Younger Dryas patterns of broad-spectrum seed and lentil exploitation have been documented at other late Epipaleolithic sites in the northern Levant and eastern Anatolia. These include Mureybet and Hallan Çemi. In the southern Levant, although Late Natufian sites also lack good macrobotanical preservation,

evidence for the increasing dietary importance of starchy seed resources comes mainly from phytolith evidence (Rosen and Rivera-Collazo 2012). It also comes from an indirect – but compelling – source. The Early-Late Natufian transition across the Levant, ca. 13 kya, is archaeologically marked, in part, by a shift from deep groundstone mortars in the Early Natufian to flat, more portable groundstone slabs in the Late Natufian phase. Dubreuil's (2004) microwear analysis comparing Early Natufian deep mortars with Late Natufian grinding slabs indicates that the former were used to crush and grind multiple food and pigment resources, whereas the latter functioned primarily to process starchy grains. It is notable that small sessile game comprises a smaller proportion of the animal bones from most Late Natufian sites, when compared to the EN pattern of small-sessile-game dominance. At the same time, Late Natufian big game assemblages remain overwhelmingly defined by gazelle remains (i.e., the smallest body-size category of big game available in regional ecosystems), and 35–40% of those gazelle bones are represented by even smaller, pre-reproductive subadult animals (Stutz et al. 2009). Gazelle populations under predation by humans appear to have been intensively targeted throughout the Early and Late Natufian cultural phases, but small fast game became less economically important in the Late Natufian. While recovery and analysis of plant food remains must be an important focus for future Epipaleolithic research in the Near East, there is a strong circumstantial case that starchy seeds – including wild precursors to many domesticated grains and pulses – supplied an increasing proportion of the per capita calories consumed in Late Natufian societies.

The Early and Late Natufian archaeological cultures provide evidence that wild plant resources increased – in successive steps over more than three millennia – in nutritional, energetic, and cultural importance for Near Eastern human populations. Experimental harvesting work suggests that the Late Natufian cultural phase likely involved small-scale predomestication cultivation activities. The succeeding Prepottery Neolithic A period (ca. 12.0 kya – 10.5 kya) has yielded indications that – at the very end of the Younger Dryas or the beginning of the Holocene – domesticated grains and lentils began to be planted, harvested, and consumed. However, this early agricultural production was mixed with a broad spectrum of gathered seeds, nuts, fruits, and lentils (Asouti and Fuller 2013; Willcox 2007). Wild big and small game continued to be hunted. During the Prepottery Neolithic B period (ca. 10.5–8.2 kya), wheat agriculture became the dominant plant-food-producing technology across the Near East, and sheep and goat domestication also spread quickly throughout the entire region. It was during the PPNB period – with the settlement of villages organized in uncut stone or mudbrick house blocks – that the "Neolithic Revolution" in the Near East took hold, sending out population and cultural ripple effects across much of Eurasia and into Africa.

Sociocultural and Environmental Implications of the Long-Term Transition to Agriculture The previous section presented an overview of how the omnivorous food resource base changed over a long but critical timeframe in Near Eastern prehistory – from the early Upper Paleolithic to the Prepottery Neolithic B period (ca. 50 kya – 8.2 kya). Sherratt (2007) has directly compared the agricultural technology underlying the shift to a carbohydrate-intensive plant-based diet to modern industrialization's extraction, transportation, and communication technologies – the adoption and development of which drove and were in turn sustained by fossil fuel extraction. The so-called Neolithic Revolution – which, to be sure, unfolded gradually over many generations – came to impact dramatically how energy flowed between ecosystems and the human populations that recurrently engineered and impacted them. The early adoption of agriculture, domestication, and more widespread food storage in the PPNB period substantially raised local ecological carrying capacities, sustaining higher annual rates of energy and nutrient extraction for human groups. Yet, agriculture also created the

complex potential for systemic environmental, demographic, and cultural disruption and transition, over time and at multiple geographic scales.

The Near East's later Upper Pleistocene and early Holocene archaeological record traces a very gradual long-term average decline in the nutritional and energetic importance of big game, followed by a series of stepwise increases in the importance of energy-rich plant foods. This transition in the human omnivorous relationship to surrounding food webs tilted toward plant resources across the Early Natufian, Late Natufian, Prepottery Neolithic A, and Prepottery Neolithic B phases. Archaeological evidence also provides information about associated behavioral changes, involving raw material provisioning; tool production and use; hunting, gathering, food processing, and consumption; combustion technology for cooking, warmth, and other activities; residential mobility and social organization; and, for later time periods, animal domestication and the building, use, maintenance, and abandonment of complicated architectural structures – including monumental features – along with mortuary and other community rituals, social identity production, social boundary maintenance, and exchange and long-distance social networks (Asouti and Fuller 2013).

It is with Early Natufian emergence that we observe a departure from the Upper Paleolithic and earlier Epipaleolithic trend of long-term gradual behavioral change. The Early Natufian archaeological culture (ca. 15–13 kya) is associated not only with a seemingly quantum shift in food economy; it also involved the settlement of large (ca. 1000–2000 m^2), likely continuously occupied sedentary hamlets, with durable subcircular architectural structures and mortuary features located under, inside of, and between structures. The behavioral changes surrounding Early Natufian foraging and food consumption appear to have involved mainly intensification of earlier Epipaleolithic and Upper Paleolithic labor and social relationship patterns. In contrast, the Early Natufian shift in settlement – with greater social and physical investment in spatially dense, long-lasting shelters, food preparation areas, and communal spaces that were often marked by mortuary features – would have integrally involved a reconfiguration of social relationships, cultural mechanisms for resolving conflicts, and cultural ideas and experiences of social time, landscape, and memory.

Sedentary settlement in the Early Natufian archaeological culture was a response – in no small part, initially, at least – to long-term predation pressure on big game (Stutz et al. 2009). Larger prey – such as gazelle, wild goat, or fallow deer – appear to have become overhunted, demographically depressed, and more costly to search for. This would have been the result of long-term positive feedback between hunting success and population growth, unfolding slowly, at centennial or millennial timescales. Consequently, the sedentary foraging of smaller, easy-to-find, but costly-to-process plant and small game foods became more economical. The alternative would have involved paying the metabolic, social, and foraging opportunity cost of increasing the length and frequency of moves between mobile camps. The social and cultural implications of sedentary settlement, though, were likely transformative. Early Natufian sedentism may have been sustained by intensive hunting and gathering, but Early Natufian cultural structures for managing social life – within and between families, camps, and perhaps descent groups – may have been integral to negotiating the changing system of social relationships in the subsequent Late Natufian (ca. 13–12 kya) food economy, as starchy seeds, nuts, and lentils took on increasing energetic and nutritional importance.

Indeed, the conspicuous increases in the complexity of settlement organization and ritual practice that developed gradually – throughout the Near East, from the Late Natufian phase through the Prepottery Neolithic A (ca. 11.7–10.5 kya) and B/C (10.5–8.2 kya) periods – may be understood as a complex, recurrent process of social negotiation and reorganization at multiple population scales. With the Prepottery Neolithic A development of monumental architecture – including the tower and wall at Jericho and the extraordinary structures and relief carvings at Göbekli Tepe (Fig. 10; Schmidt 2010) – we see the emergence of a clear early Holocene trend, one

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 10 Enclosures C (foreground), D (rear-right), B (rear center), and A (rear-left) at the PPNA-PPNB site of Göbekli Tepe in southeastern Anatolia. The round enclosures are associated with Layer III at the site, which is dated to the Prepottery Neolithic A (PPNA) or very onset of the PPNB (ca. 11.5–10.5 kya). Further details are given in Schmidt (2010). The stone sculpture and reliefs on the limestone stelae that dominate the Göbekli Tepe enclosures – but that are also found in the nearby PPNA village site of Nevali Çori – are evidence suggesting that the transition to agriculture and village life integrally involved extraordinary social, worldview, and ideological change among early Neolithic communities throughout the Near East. Photo credit: Wikimedia Commons

that continues through the Prepottery Neolithic B with the construction and settlement of the first large villages. The built environment and community ritual increasingly structured social relationships and experiences, mediated by the ideological dimensions of monuments, dwelling, landscape, and the symbolic constitution of culture and nature. The prehistoric biocultural dynamics spanning the Early and Late Natufian phases through the Neolithic Revolution involved material manifestations of the social negotiation of worldview and community order.

Discussion and Conclusions: From Intercontinental Connections to Globalization

In this essay it is suggested that a geographically grounded approach – involving a consideration of biocultural dynamics at multiple spatial scales – gives a more thorough appreciation of the systemic causes and implications of long-term human population growth, range expansion, and the emergence of sociocultural complexity. This theoretical foundation helps us to clarify why major debates about the Near East's role in human prehistory still deal with classic evolutionary questions of tempo and mode. Have the interactions among genetic variation, ecological setting, demography, and culture emerged gradually throughout the Pleistocene? Alternatively, has it been mainly shaped by punctuated evolution – involving speciation, mainly in sub-Saharan Africa, range expansion, and competitive exclusion within and outside of Africa? Yet, the Near East is all the more important when one further considers the later prehistoric emergence of Upper Paleolithic social networks, Epipaleolithic sedentary settlements, and Neolithic animal and plant domestication and village life. This latter development moves theoretical attention away from macroevolutionary tempo and mode toward complex biocultural dynamics within anatomically modern *Homo sapiens*.

Indeed, the long-term Upper Paleolithic shift to smaller animal and plant food-resource "packages" preceded and shaped the so-called Neolithic Revolution in the Near East. This development

further contributed to a supracontinental transition. Viewed from a Paleolithic vantage point – which highlights the role of OOA population dynamics – the Neolithic is a turning point in human prehistory. No longer is Africa the geographic driver of major biocultural change on a supracontinental scale. Neolithic and agricultural emergence is mainly an endogenous biocultural development within the Near East. Here, population expansion, sociocultural interaction, and technological diffusion catalyze the spread of agriculture into much of Asia, Europe, and – indeed – Africa. From the ecological complex systems perspective emphasized in this essay, four general questions can crystallize ongoing research on the Upper Paleolithic, Epipaleolithic, and Prepottery Neolithic in the Near East:

- What were the systemic interactions among social networks, cultural symbolic structures (including landscape and the anthropogenic built environment), human agency, human demography, and the demography and (perhaps anthropogenically altered) habitat of plant and animal food resources?
- How did behavioral, symbolic, and food-web changes impact human genetic variation – by influencing patterns of random and culturally structured drift, gene flow, and natural selection?
- How did hemispheric or global climate change affect the timing and dynamics of major biocultural trends, such as the initial shift to sedentary settlement or the widespread adoption of grain agriculture?
- How did social interactions, migration, and interbreeding between populations in adjacent phytogeographic zones and subregions within the highly environmentally diverse Near East shape the long-term late Pleistocene-early Holocene biocultural change – especially as technological developments of textile and basketry production, tailored clothing, durable shelter, trapping and hunting projectiles, dog domestication, food storage, and agriculture dramatically altered food calorie production, energy balance, and stress across the entire region?

Clearly, these critical questions deal with intricate complex systems dynamics. And so far, research on Near Eastern Neolithic emergence has largely contributed to clarifying the questions themselves. Much inquiry remains to provide satisfying scientific answers.

The Near Eastern transition to agriculture is key for understanding a pivotal biocultural development in very long-term Upper Pleistocene-early Holocene shift from a core-periphery structure to a truly global Holocene pattern of population distribution. The study of Near Eastern prehistory highlights humanity's shared, predominantly African late Middle and Upper Pleistocene ancestry. It also has the potential to elucidate the intricate prehistoric underpinnings of Holocene developments as varied as prehistoric sociopolitical complexity and inequality, recent processes of gene-culture interaction, language and cultural diversification, and the historical development of world-systems political economy. Amplifying a suggestion made by Bar-Yosef (1998a) – concerning how insights from studying the transition to agriculture could illuminate the Middle-Upper Paleolithic transition in the Near East – this essay points toward a similar but broader approach. If the systemic and dynamic climatic, ecological, biological, demographic, and socio-symbolic factors involved in the largely endogenous Near Eastern agricultural transition can be clarified, perhaps paleoanthropologists can utilize such insights into biocultural evolution, in order to trace more intricately the human dimensions of earlier, recurrent Pleistocene OAA population expansions into Eurasia – which unfolded via the Near East.

References

Alex, B., O. Barzilai, I. Hershkovitz, et al. 2017. Radiocarbon chronology of Manot Cave, Israel and Upper Paleolithic dispersals. *Science Advances* 3: e1701450.

Asouti, E., and D.Q. Fuller. 2013. A contextual approach to the emergence of agriculture in Southwest Asia: Reconstructing early Neolithic plant-food production. *Current Anthropology* 54: 299–345.

Bar-Yosef, O. 1980. Prehistory of the Levant. *Annual Review of Anthropology* 9: 101–133.

Bar-Yosef, O. 1994. The contributions of southwest Asia to the study of the origin of modern humans. In *Origins of anatomically modern humans*, ed. D.V. Nitecki and M.H. Nitecki, 23–66. Boston: Springer.

Bar-Yosef, O. 1998a. On the nature of transitions: The middle to Upper Palaeolithic and the Neolithic revolution. *Cambridge Archaeological Journal* 8: 141–163.

Bar-Yosef, O. 1998b. Early colonizations and cultural continuities in the lower Palaeolithic of western Asia. In *Early human behaviour in the global context: The rise and diversity of the lower palaeolithic period*, ed. M. Petraglia and R. Korisettar, 221–279. New York: Routledge.

Bar-Yosef, O., and A. Belfer-Cohen. 2010. The Levantine Upper Palaeolithic and Epipaleolithic. In *South-Eastern mediterranean peoples between 130,000 and 10,000 years ago*, ed. E.A.A. Garcia, 144–167. Oxford: Oxbow.

Dubreuil, L. 2004. Long-term trends in Natufian subsistence: A use-wear analysis of ground stone tools. *Journal of Archaeological Science* 31: 1613–1629.

Flannery, K.V. 1969. Origins and ecological effects of early domestication in Iran and the Near East. In *The domestication and exploitation of plants and animals*, ed. P.-J. Ucko and G.W. Dimbleby, 73–100. Chicago: Aldine. Available on-line: http://www.cabdirect.org/abstracts/19701602489.html;jsessionid=2B216A423BA46D2FDF4463DCBFA66C1B. Accessed 1 Sept 2012.

Goder-Goldberger, M., N. Gubenko, and E. Hovers. 2016. "Diffusion with modifications": Nubian assemblages in the central Negev highlands of Israel and their implications for Middle Paleolithic inter-regional interactions. *Quaternary International* 408: 121–139.

Goren-Inbar, N. 2011. Culture and cognition in the Acheulian industry: A case study from Gesher Benot Ya'aqov. *Philosophical Transactions of the Royal Society B: Biological Sciences* 366: 1038–1049.

Groucutt, H.S., and M.D. Petraglia. 2012. The prehistory of the Arabian peninsula: Deserts, dispersals, and demography. *Evolutionary Anthropology: Issues, News, and Reviews* 21: 113–125.

Groucutt, H.S., M.D. Petraglia, G. Bailey, et al. 2015. Rethinking the dispersal of Homo sapiens out of Africa. *Evolutionary Anthropology: Issues, News, and Reviews* 24: 149–164.

Grün, R., and C. Stringer. 2000. Tabun revisited: Revised ESR chronology and new ESR and U-series analyses of dental material from Tabun C1. *Journal of Human Evolution* 39: 601–612.

Harmand, S., J.E. Lewis, C.S. Feibel, et al. 2015. 3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya. *Nature* 521: 310–315.

Henry, D.O. 2003. *Neanderthals in the Levant: Behavioural organization and the beginnings of human modernity*. Continuum International Publishing Group, New York.

Hershkovitz, I., O. Marder, A. Ayalon, et al. 2015. Levantine cranium from Manot Cave (Israel) foreshadows the first European modern humans. Nature advance online publication. Available on-line: http://www.nature.com/nature/journal/vaop/ncurrent/full/nature14134.html. Accessed 28 Jan 2015.

Hovers, E. 2009. *The lithic assemblages of Qafzeh cave*. Oxford: Oxford University Press.

Hublin, J.-J., A. Ben-Ncer, S.E. Bailey, et al. 2017. New fossils from Jebel Irhoud, Morocco and the pan-African origin of Homo sapiens. *Nature* 546: 289–292.

Kislev, M.E., D. Nadel, and I. Carmi. 1992. Epipalaeolithic (19,000 BP) cereal and fruit diet at Ohalo II, Sea of Galilee, Israel. *Review of Palaeobotany and Palynology* 73: 161–166.

Kramer, A., T.L. Crummett, and M.H. Wolpoff. 2001. Out of Africa and into the Levant: Replacement or admixture in western Asia? *Quaternary International* 75: 51–63.

Kuhn, S.L. 2002. Paleolithic archeology in Turkey. *Evolutionary Anthropology: Issues, News, and Reviews* 11 (5): 198–210.

Kuhn, S.L., and M.C. Stiner. 2006. What's a mother to do? The division of labor among Neandertals and modern humans in Eurasia. *Current Anthropology* 47: 953–981.

Kuhn, S.L., and N. Zwyns. 2014. Rethinking the initial Upper Paleolithic. *Quaternary International* 347: 29–38.

Mallick, S., H. Li, M. Lipson, et al. 2016. The Simons genome diversity project: 300 genomes from 142 diverse populations. *Nature* 538: 201.

Martin, L., Y.H. Edwards, J. Roe, and A. Garrard. 2016. Faunal turnover in the Azraq Basin, eastern Jordan 28,000 to 9000 cal yr BP, signalling climate change and human impact. *Quaternary Research* 86: 200–219.

Moore, A.M.T., G.C. Hillman, and A.J. Legge, eds. 2000. *Village on the Euphrates: From foraging to farming at Abu Hureyra*. New York: Oxford University Press.

Munro, N.D., M. Kennerty, J.S. Meier, et al. 2016. Human hunting and site occupation intensity in the Early Epipaleolithic of the Jordanian western highlands. *Quaternary International* 396: 31–39.

Pagani, L., D. J. Lawson, E. Jagoda, et al. 2016. Genomic analyses inform on migration events during the peopling of Eurasia. Nature advance online publication. Available on-line: http://www.nature.com/nature/journal/vaop/ncurrent/full/nature19792.html. Accessed 4 Oct 2016.

Rech, J.A., L.A. Quintero, P.J. Wilke, and E.R. Winer. 2007. The lower paleolithic landscape of 'Ayoun Qedim, al-Jafr Basin, Jordan. *Geoarchaeology* 22: 261–275.

Richter, T., A.N. Garrard, S. Allock, and L.A. Maher. 2011. Interaction before agriculture: Exchanging material and sharing knowledge in the final Pleistocene Levant. *Cambridge Archaeological Journal* 21: 95–114.

Richter, T., L.A. Maher, A.N. Garrard, et al. 2013. Epipalaeolithic settlement dynamics in Southwest Asia: New radiocarbon evidence from the Azraq Basin. *Journal of Quaternary Science* 28: 467–479.

Rose, J.I. 2010. New light on human prehistory in the Arabo-Persian Gulf Oasis. *Current Anthropology* 51: 849–883.

Rosen, A.M., and I. Rivera-Collazo. 2012. Climate change, adaptive cycles, and the persistence of foraging economies during the late Pleistocene/Holocene transition in the Levant. *Proceedings of the National Academy of Sciences* 109: 3640–3645.

Schmidt, K. 2010. Göbekli Tepe – The Stone Age Sanctuaries: New results of ongoing excavations with a special focus on sculptures and high reliefs. *Documenta Praehistorica* XXXVII: 239–256.

Sherratt, A. 2007. Diverse origins: Regional contributions to the genesis of farming. In *The origins and spread of domestic plants in Southwest Asia and Europe*, University College London Institute of Archaeology Publications, ed. S. Colledge and J. Conolly, 1–20. Walnut Creek: Left Coast Press.

Slimak, L., S.L. Kuhn, H. Roche, et al. 2008. Kaletepe Deresi 3 (Turkey): Archaeological evidence for early human settlement in central Anatolia. *Journal of Human Evolution* 54: 99–111.

Solecki, R.S. 1971. *Shanidar, the first flower people*. New York: Alfred A. Knopf.

Speth, J.D., and J.L. Clark. 2006. Hunting and overhunting in the Levantine Late Middle Palaeolithic. *Before Farming* 2006 (3): 1–42.

Stiner, M.C., and N.D. Munro. 2002. Approaches to prehistoric diet breadth, demography, and prey ranking Systems in Time and Space. *Journal of Archaeological Method and Theory* 9: 181–214.

Stiner, M.C., A. Gopher, and R. Barkai. 2011. Hearth-side socioeconomics, hunting and paleoecology during the late lower Paleolithic at Qesem Cave, Israel. *Journal of Human Evolution* 60: 213–233.

Stutz, A.J., and G.F. Estabrook. 2004. Computationally intensive multivariate statistics and relative frequency distributions in archaeology (with an application to the Early Epipaleolithic of the Levant). *Journal of Archaeological Science* 31: 1643–1658.

Stutz, A.J., N.D. Munro, and G. Bar-Oz. 2009. Increasing the resolution of the broad Spectrum revolution in the Southern Levantine Epipaleolithic (19–12 ka). *Journal of Human Evolution* 56: 294–306.

Torfstein, A., S.L. Goldstein, M. Stein, and Y. Enzel. 2013. Impacts of abrupt climate changes in the Levant from last glacial Dead Sea levels. *Quaternary Science Reviews* 69: 1–7.

White, M.J. 2006. Things to do in Doggerland when you're dead: Surviving OIS3 at the northwestern-most fringe of Middle Palaeolithic Europe. *World Archaeology* 38: 547–575.

Willcox, G. 2007. The adoption of farming and the beginnings of the Neolithic in the Euphrates Valley: Cereal exploitation between the 12th and 8th Millennia cal BC. In *The origins and spread of domestic plants in southwest Asia and Europe*, University College London Institute of Archaeology Publications, ed. S. Colledge and J. Conolly, 21–36. Walnut Creek: Left Coast Press.

Yacoub, S.Y. 2011. Stratigraphy of the Mesopotamia Plain. *Iraqi Bulletin of Geology and Mining* Special Issue: 47–82.

Further Reading

Bar-Yosef, O., and F.R. Valla, eds. 2013. *Natufian foragers in the Levant: Terminal Pleistocene social changes in Western Asia*. Ann Arbor: International Monographs in Prehistory.

Enzel, Y., and O. Bar-Yosef, eds. 2017. *Quaternary of the Levant*. New York: Cambridge University Press.

Near East (Including Anatolia): Origins and Development of Agriculture

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Introduction

It is only during the last 10,000 years that *Homo sapiens* adopted a production economy based on cultivation of a selection of plants. Our species evolved as hunter-gatherers for more than 90% of its history. In many regions around the world, plants were taken into cultivation during the early Holocene. The cultivation of wild plants created new conditions in which selective pressures led to morphological domestication and production economies. Estimates of the number of regions worldwide where hunter-gatherer societies adopted cultivation have increased as researchers discover more of these. A conservative estimate would be 11, while some scholars would suggest over 20. A production economy permitted higher densities of population. The social consequences of this change in subsistence economy vary widely from region to region. In the Near East, the establishment of mixed farming based on wheat, barley, pulses, and herding of sheep, goat, cattle, and pigs was particularly productive and as a result spread rapidly to Europe and Central Asia. It fueled the civilizations of Mesopotamia, Egypt, Greece, and Rome. European colonialists introduced these species into many parts of the world.

The Near East is characterized by high biodiversity, in particular hundreds of species of

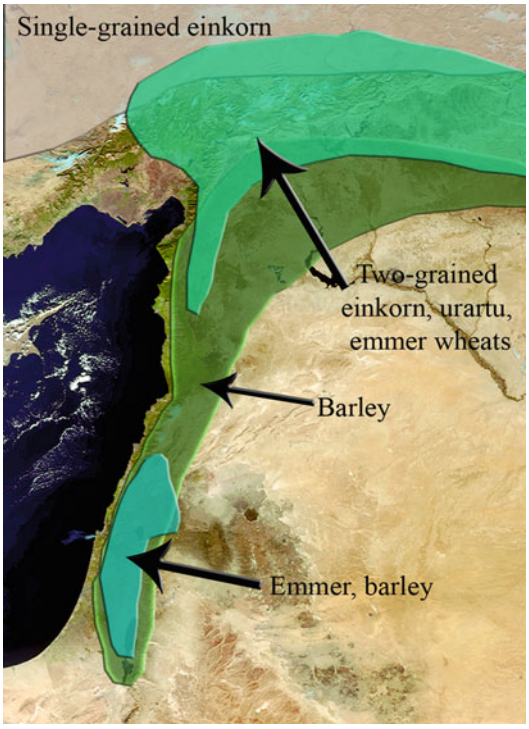

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 1 Present-day natural distributions of wild wheats and barley (einkorn populations in southern Syria are not shown). Past distributions were possibly different, single-grained einkorn has expanded into secondary habitats, and einkorn may have had a more southerly distribution during favorable climatic conditions

wild annual pulses and grasses. Environmental degradation over the last 10,000 years caused by overgrazing, agriculture, and deforestation masks the fact that this area at the end of the Pleistocene and beginning of the Holocene was rich in wild game, fruits, nuts, and seeds. The variation in vegetation and climate over short distances, for example, Mediterranean forests with 400 mm of rain give way to open steppe with less than 150 mm in less than 50 km, meant that a wide variety of food resources were available near the sites. This diversity and abundance provided circumstances favorable for the development of agriculture. Figure 1 shows the present-day natural distribution of wild wheats and barley, which grow in an arc that sweeps from the Zagros foothills west to the Taurus and then down a narrow strip parallel with the Levantine coast. This arc, which lies between the arid interior steppe and the more humid (and in the past more wooded) hillsides, is often referred to as the Fertile Crescent.

Definition

Agriculture implies *cultivation*, which may be defined as encouraging plants to propagate. This definition would include practices of hunter-gatherer populations in the recent past which, although having little contact with farmers, encouraged the propagation of wild plants that they gathered in order to avoid over-exploitation. This may indeed have been the case for Paleolithic foragers. Cultivation was not invented, but was the result of humans mimicking what they observed in nature. This might explain why agriculture arose independently in different areas of the globe. However, incipient cultivation of this kind has not been identified on archaeological sites. In the Near East the earliest cultivation so far recognized is *pre-domestic cultivation*, defined as the cultivation of morphologically wild plants. This is a prerequisite phase which led to morphological *domestication*, defined by specialists as a genetic change caused by selective pressures brought about by cultivation. In the case of Near East grain crops, most authorities agree that initial domestication involved unconscious or natural selection as opposed to conscious selection. This resulted in populations better adapted to cultivation. Morphological domestication can in some cases be identified from charred remains. *Agriculture* is an established production economy in which farmers depend for their subsistence on cultivation and, in many instances, herding. *Wild progenitors* are the living survivors of species that were taken into cultivation and domesticated.

The terms *PPNA and PPNB* were coined by Kathleen Kenyon for the Pre-Pottery Neolithic

levels at Jericho. These terms have remained in use simply as chronological demarcations and are used for the northern and southern Levant.

Historical Background

Interest in the origins of agriculture and domestic plants dates back to the nineteenth century, that of Darwin being a prime example, but in the Near East concrete archaeological data was extremely limited until the second half of the twentieth century. In the 1950s, three sites produced identifiable charred remains which could be dated by radiocarbon: Jericho located near the Jordan Valley in the West Bank, excavated by Kathleen Kenyon, Beidha in southern Jordan excavated by Diana Kirkbride, and Jarmo located in northern Iraq in the foothills of the Zagros Mountains, excavated by Robert Braidwood. Maria Hopf and Hans Helbaek (1959) were pioneering archaeobotanists at this time. For several decades these sites were key examples of early-agriculture villages. From the 1960s onwards more and more sites were discovered. The year 1969 brought the seminal publication *The Domestication and Exploitation of Plants and Animals* (Ucko and Dimbleby 1969) with ground-breaking papers by David Harris, Daniel Zohary, Kent Flannery, Willem van Zeist, and Jane Renfrew. In the 1970s, Willem van Zeist established sound methods of identification and sampling, while Gordon Hillman developed interpretive tools for the discipline. They worked on charred material from Mureybet and Abu Hureyra, key sites located in northern Syria. Meanwhile, agronomist Jack Harlan and geneticist Daniel Zohary were investigating plant domestication from a biological point of view and examining wild ancestors in their natural habitats. Their research led to a better understanding of the processes involved in domestication and continued for many years (Harlan 1995; Zohary et al. 2012).

Archaeologists have much debated the theoretical explanations for the origins of agriculture. One of the first was Gordon Childe, who in the 1920s, developed the concept of the Neolithic Revolution. Today the consequences of adopting agriculture are seen as revolutionary, rather than the process. Hypotheses abounded in the second half of the twentieth century. In 1953 D. Clarke developed an ecological model, L. Binford's 1969 model was demographic, and K. Flannery in 1969 produced a model based on the broad spectrum revolution. In the 1990s O. Bar-Yosef among others suggested that climate change was a prime factor for the origins of agriculture. These models were based on environmental determinism. Sociocultural models were developed by Jacques Cauvin (2000) who saw religion as a key factor, while for Trevor Watkins, social complexity and the concept of the house as home were contributing factors.

Between 1995 and 2013 there has been a tremendous increase in the number of sites and the quantity and quality of analyzed plant remains. This has resulted in a body of information which provides a complex chronological and geographical picture and a mosaic of different cultural and environmental zones. Clearly no simple explanation for the adoption of cultivation would be applicable to the whole region.

Late Upper Paleolithic Foragers

Detailed evidence for late Upper Paleolithic subsistence comes from a single site, Ohalo II dated to 23,000 BP (Weiss et al. 2008) (for Cultural Periods, see Table 1). Situated on the shore of the Sea of Galilee in present-day northern Israel, Ohalo II became waterlogged, which provided exceptional conditions of preservation (see Fig. 2 for dates and locations of the sites mentioned). Several brush huts were excavated which contained thousands of seeds including grasses and cereals, notably wild emmer and wild barley. A large quern was found in one hut, associated with charred cereal grains and presumably used for grinding grain. This exceptional site provides evidence that subsistence was based on a broad spectrum of plant and animal species. However, comparisons with other sites are problematic because sites of this period are rare. It is probable that this broad spectrum subsistence, based partly on cereals, was more generalized in the southern

Near East (Including Anatolia): Origins and Development of Agriculture, Table 1 A summary of plant subsistence, cultural periods, and dates. Not all scholars agree on the dates for these periods. Rather than giving a range of dates for the beginning and the end, dates here have been rounded off

Subsistance	Cultural period	Dates BP cal.
Expansion of farming outside of the Near East	Various	8500–8000
Established mixed farmers	Middle PPNB and later	9800–8500
Early stages of domestication	Early PPNB	10,500–9800
Cultivator/hunters, pre-domestic cultivation	PPNA and Khiamian	11,700–10,500
Cereals, small seed gathering, climatic deterioration	Early/Late Natufian	13,000–11,700
Sedentary villages, cereal gathering	Early Natufian	14,500–13,000
Cereal and wild grass gathering (broad spectrum)	Kebaran	23,000–14,500

Levant than this one surviving site suggests. Ohalo II was inhabited during the Glacial Maximum when climate conditions to the north in Anatolia would have been severe, which explains the lack of contemporary sites in this area.

The Epipaleolithic: Prelude to Cultivation

Sedentary Villages and the Early Natufian Homeland: 14,500–13,000 BP cal

The term Natufian comes from Wadi an-Natuf and was coined by Dorothy Garrod, Professor of Archaeology at Cambridge University from 1938 to 1952. This period saw a more favorable climate as ice sheets receded from northern Europe. At this time site density increased dramatically in the southern part of the Fertile Crescent. Most archaeologists agree that some sites represent the earliest known sedentary communities (Bar-Yosef 1998). The most spectacular is the site of Malaha located near Lake Huleh in northern Israel. Here archaeologists unearthed the earliest known houses that represent a sedentary way

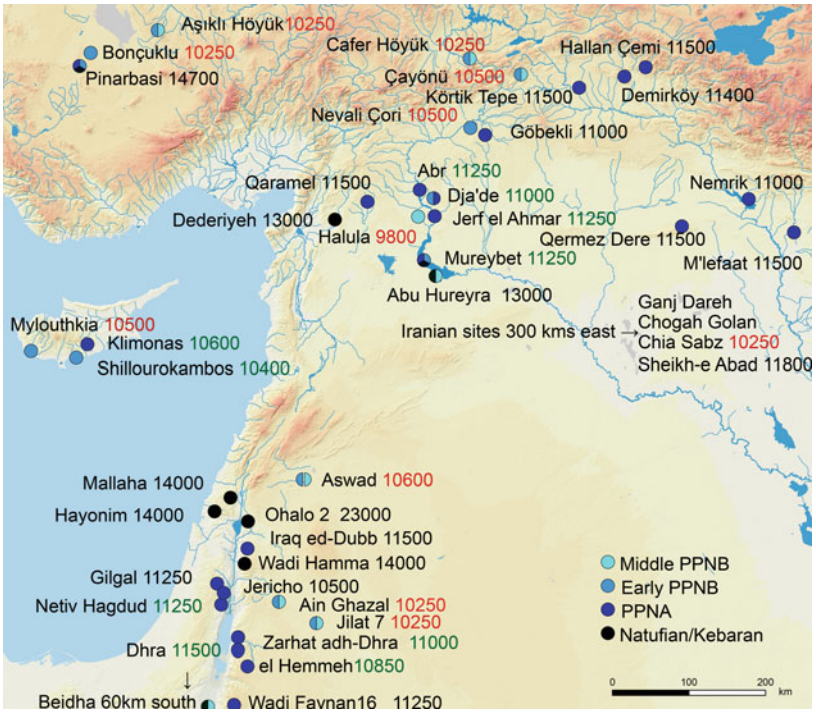

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 2 Map of selected sites. Dates are given as a rounded mean for early levels: *green*, sites with pre-domestic cultivation; *red*, early instances of morphological domestication; however, some need to be verified

of life. Excavations revealed a house of more than 7 m in diameter made of large stone blocks. Stone mortars, probably used for processing grain, 40 cm in height and weighing over 20 kg, were found at Malaha. Unfortunately no plant remains were recovered, but at contemporary sites in the region such as Wadi Hammeh and Hayonim, a few charred cereals were recovered, leaving little doubt that plant gathering similar to that of Ohalo II was still in use. The only site in Anatolia for this period is Pinarbashi which is situated in a rockshelter. It is interpreted as being inhabited by highly mobile hunter-gatherers.

Climatic Deterioration: Late and Final Natufian 13,000–11,700

The late and final Natufian is characterized by a decline in the number of sites in the southern Levant (Bar-Yosef and Vallat in press). For most scholars, this decline is associated with the deteriorating worldwide climatic conditions known as the Younger Dryas (Bar-Yosef 2011). During the 1990s this deterioration was hypothesized as being a major incentive that led foragers to adopt cultivation (see below).

Plant remains in the southern Levant are rare. However, two late Natufian sites in northern Syria occupied during the Younger Dryas have produced rich plant remains. These are Abu Hureyra, situated in arid steppe on the banks of Euphrates and Dederiyeh situated in the Mediterranean maquis less than 50 km from the coast. These two sites have contrasting plant assemblages which reflect the different species of edible plants available in the Mediterranean zone compared to the steppe. At Dederiyeh grains of wild wheats and other wild progenitors dominate the grain assemblage, whereas at Abu Hureyra small seeds from the valley bottom such as members of the knotweed family and small-seeded grasses are the most frequent (Table 2, Fig. 3). Nuts of terebinth are common at both sites, and at Dederiyeh almonds are also frequent. Cultivation during this period has been suggested by more than one scholar. But the plant assemblages at these sites suggest that local gathering was dominant and solid evidence for cultivation is not forthcoming (Colledge and Conolly 2010). However, small-scale cultivation should not be ruled out, although it would leave little or no recognizable trace in the archaeological record.

Pre-Pottery Neolithic: The Early Farmers

Pre-Domestic Cultivation, Khiamian and PPNA, 11,700–10,500

Not all scholars agree on the dating of the early Neolithic periods. The year 11,700 BP cal. is used here for the end of the Natufian; it corresponds with the Younger Dryas/Holocene boundary and the beginning of the Khiamian period which links the Natufian to the PPNA. It was named after the site of el Khiam, where notched arrowheads, characteristic of this period, were first found. Khiamian sites and plant remains are rare. But layers dated to this period at Mureybet (Ibáñez 2008) and Tell Qaramel, located, respectively, not far from late Natufian Tell Abu Hureyra and Dederiyeh, produced plant assemblages similar to their Natufian counterparts although they existed almost a millennium later. After 11,300, PPNA sites are more numerous and many have rich finds of charred plants. Six sites in the southern Levant and five in the northern Levant provide evidence that the subsistence economies were becoming more and more reliant on pre-domestic cultivation (Willcox et al. 2012).

Cereals and pulses, the founder crops, become more common than plants that were not domesticated (Table 1 and Figs. 2, 4, and 5), although this is not the case at Korkik Tepe and Halan Çemi. At Jerf el Ahmar, a gradual reduction in gathered plants from lower to upper levels can be seen. Small-seeded grasses such as *Stipa* and Panicoid types are frequent, as well as other small seeds such as members of the Cyperaceae and knotgrass families (Willcox et al. 2008). The decrease in the gathering of these seeds was compensated for by an increase in the use of founder crops, notably barley, emmer, einkorn, lentil, and pea, which were probably cultivated.

Weeds of cultivation or arable weeds are perhaps the best indicators of pre-domestic cultivation (Colledge 1998). These plants thrive

Near East (Including Anatolia): Origins and Development of Agriculture, Table 2 Absolute counts of edible taxa from selected sites in northern Syria and southeast Turkey. All plants are morphologically wild. *Blue highlights* taxa that tend to increase during the sequence, while *green highlights* taxa that decrease and were eventually abandoned. While absolute counts are not reliable when comparing sites, these results have been verified by ubiquities and percentages

			Abu Hureyra 1	Dederiyeh	Qaramel	Hallan Çemi	Tell 'Abr	Mureybet 3	Jerf el Ahmar 1	Jerf el Ahmar 2	Dja'de
	Dates cal. yr BP	from	13250	13180	12000	11500	11500	11500	11500	11200	11000
		to	12750	12950	11500	11200	11200	11200	11200	11000	10300
Cereals	Einkorn/Rye grain		888	0	1170	19	2999	2000	1382	1055	1120
	Einkorn spikelet base		0	2	292	0	0	0	0	5	16
	Rye spikelet base		0	0	0	0	0	p	121	22	16
	Wild/domestic barley grain		0	10	217	124	190	164	2353	6474	3763
	Wild barley spikelet base		0	0	0	0	?	6	1546	1746	153
	Single grained einkorn grain		0	173	1108	0	90	1	18	49	302
	Emmer grain		0	0	4	0	0	0	0	0	192
Pulses	Lentil		48	17	1113	11	230	28	452	1147	5850
	Pea/vetch/		48	11	682	748	37	13	146	237	1952
	Chickpea		0	0	0	0	0	0	0	0	3
	Broad bean		0	0	0	0	0	0	0	0	2
	Bitter vetch		3	3	11	29	0	4	10	46	34
Small edible seeds	Feather grass		1573	280	526	76	0	0	2	51	272
	Rush seeds		4776	0	59	4415	0	22	15	14	32
	Panicoid grasses		342	0	1	4415	0	24	19	1	0
	Knot grass family		4848	0	11	3748	0	351	359	126	37
Fruits Nuts	Fig seeds		0	0	4	0	0	3	1	10	42
	Almond		0	1380	2214	179	0	0	760	666	2
	Terebinth		357	9694	1705	120	2	12	1302	1274	911
	Totals of edible plants		12883	11570	9117	13884	3548	2628	8486	12923	14699
	Vol sediment litres		7925	11.5	1772	19393	452	?	6210	5904	6122
	Number of samples		21	?	108	175	30	27	154	81	229
			Late Natufian	Late Natufian	Khiamian	PPNA	PPNA	PPNA	PPNA	PPNA	Early PPNB

when the soil is disturbed by cultivation and have been evolving since the Neolithic. The number of species increased as agriculture spread into new habitats. Charred weed seeds are common on PPNA sites. The number of arable weed taxa occurring on PPNA sites is equal to or in some cases higher than that found on middle PPNB agriculture sites (Fig. 4).

Grain size increased during the PPNA, particularly in the case of barley, for example, at Jerf el Ahmar and Zahrat adh-Dhra (Fuller 2007). This is often cited as a sign of morphological

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 3 Photos of wild progenitors. (**a**) Wild einkorn under experimental cultivation in southern France. Note the detached spikelets. (**b**) Wild emmer. (**c**) Wild einkorn, mountains of eastern Turkey. (**d**) Wild chickpea. These wild progenitors were photographed in their natural habitats in the Karadag Basalt Mountains in eastern Turkey

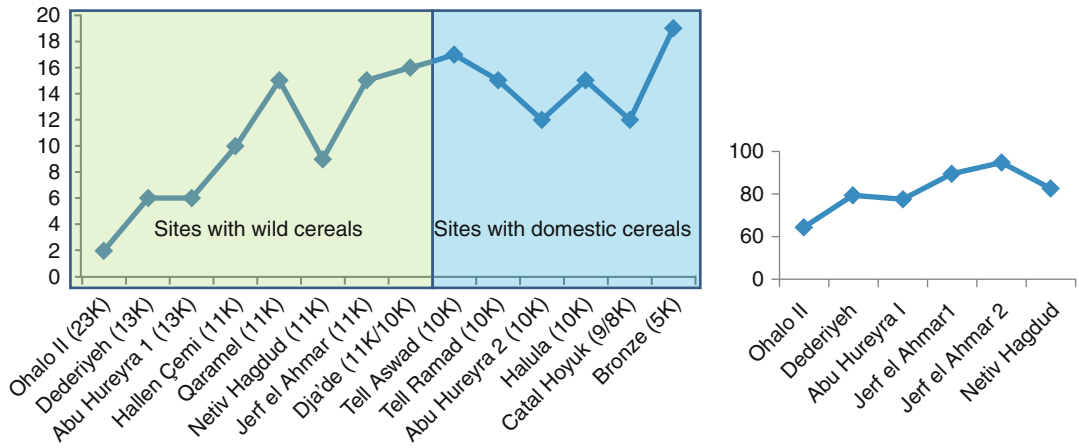

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 4 The graph to the left gives the number of arable weed taxa present on sites which have over 10,000 seed items identified. The number of weed taxa during the PPNA suggests pre-domestic cultivation. Right gives the percentage by volume of cereals compared to small-seeded grasses at selected sites

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Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 5 Examples of ancient charred remains and their modern equivalents. *Top left*, seeds of centaury (a weed taxon) (Dja'de); *left*, shells of almond (Tell Qaramel). *Second row left*, modern wild rye with einkorn in the *center* and rye spikelet bases to the *right* (Jerf el Ahmar). *Third row left*, single-grained einkorn (Qaramel); *center*, modern equivalent; *right*, modern charred and ancient charred (Jerf el Ahmar), spikelet bases of wild einkorn. *Bottom row left*, modern and ancient fragments of terebinth fruits; *center*, examples of whole fruits; *right*, terminal protuberance of a Stork's-bill single-seeded akene (weed taxa)

domestication. However, a phenotypic increase in size resulting from improved growing conditions is an alternative explanation.

Another indication of pre-domestic cultivation is the introduction of crops into areas outside their natural habitats. Thus, rye and two-grained einkorn were the only cereals present at Natufian Abu Hureyra. By the PPN, barley, single-grained einkorn, and emmer had been introduced in that order at Jerf el Ahmar and Dja'de. Then pulses, notably broad bean and chickpea, appear for the first time far from their natural habitats. At Zahrat adh-Dhra in the Jordan Valley, emmer was common, but the site is situated in an area too dry for this crop to grow naturally.

That cereals became increasingly important during the PPNA can be seen not just from the archaeobotany but also from tools such as querns and sickle blades and from storage structures (Willcox and Stordeur 2012). At Jerf el Ahmar large area excavations provided a wealth of information for large-scale cereal exploitation (Fig. 6). Cereals were a major component of the diet; over 15,000 remains of charred wild barley, wild rye, and wild einkorn were identified. This represents more than half of all the seed and fruit

Near East (Including Anatolia): Origins and Development of Agriculture,
Fig. 6 Examples of large-scale cereal use. *Top left*, burnt daub from a roof structure with cereal chaff impressions; *left*, wall with stones that was covered with a thick render of building earth which contained cereal chaff, examples from Jerf el Ahmar. *Middle left*, latex cast of building earth showing the impressions left by cereal chaff which had decomposed. *Middle right*, one of many buildings which contained several querns. *Bottom left*, two basalt querns from Jerf el Ahmar; *right*, collection of querns left after the excavations at Beidha (early Neolithic site in Jordan), photo 1985

remains from the site. But the archaeological evidence for cereal use is equally impressive. Querns used for grinding cereals were found in situ in buildings, frequently occurring three to a room, suggesting that grinding was being practiced in an organized manner, three querns being used simultaneously in a single architectural and social unit. This suggests that cereal processing played an essential role in the everyday economy of the site, and was probably intertwined with the social structure of village life. In addition, chaff, the residue of processing, was used in vast quantities as a tempering medium in the daub constructions. Examination of large quantities of burnt building earth at Jerf el Ahmar, Tell 'Abr, and Mureybet revealed perfect impressions of chaff, consisting of awns, glumes, lemmas, and spikelet bases. Chaff was systematically added to building earth to reduce shrinkage and increase strength. This technique is still used today in many parts of the world, including northern Syria. Chaff must have been available in massive quantities, given the size of the buildings at Jerf el Ahmar and the fact that they were regularly maintained, destroyed, and rebuilt. The quantity is surprising if we take into account that the de-husking of hulled cereals, particularly barley, produces a low proportion of chaff to grain.

Large-scale collective storage of grain occurred in communal buildings at Jerf el Ahmar, Tell 'Abr, and Dr'a in the Jordan Valley. Not surprisingly, rodent infestation by the familiar domestic mouse (*Mus musculus domesticus*) occurred. These animals left gnaw marks on objects, charred droppings, and their bones and teeth. Evidence for domestic house mice has been found in the southern Levant at Hyonim B and Netiv Hugdud and at several sites in the north.

Sickle blades used for harvesting show an increase in the intensity of use. This is revealed by the characteristic gloss caused by the buildup of a film of plant silica on the cutting edge of the tool (Ibáñez 2008). At Jerf el Ahmar and contemporary sites on the Euphrates, there is an increase in both size and quantity of these tools compared to earlier sites.

In conclusion, the inhabitants at most but not all of the small PPNA villages were cultivators; however, there is no evidence of herding. These societies hunted big game such as aurochs, equids, gazelles, and small game, including birds. The bones of these animals are very common, suggesting that meat was an important element in the diet. These hunter-cultivators were found across the Levant. In northern Iraq cereals and pulses were also in use, although it is not known whether they were cultivated or not.

Expansion into Cyprus and Central Anatolia: The First Signs of Morphological Cereal Domestication in the Early PPNB 10,500–9700

During this period, emmer, einkorn and probably pulses were introduced to Cyprus. Whether or not they were already domesticated is not known. This represents the first sign of cultivators expanding into new territory. The site of Klimonas, dated to the beginning of the early PPNB (or the end of the PPNA) at about 10,600, is the earliest site with cereals on the island. The inhabitants hunted local wild boar. Some three or four centuries later at the sites of Shillourokambos and Mylouthia, cattle, sheep, goat, and other animals were introduced. With this agricultural package came the domestic mouse, presumably introduced accidentally with grain supplies. The introduction of mice implies that large quantities of cereals were being regularly imported.

Expansion towards the north appears to have been limited by the Taurus Mountains until the early PPNB. Cafer Hüyük is the earliest site found beyond the Cilician Gate (Gülek Bogazi), where the Euphrates cuts a gorge through the Taurus.

To the west, recent excavations in central Anatolia at Aşıklı Höyük and Bonçuklu, where a phase with sunken oval houses has been unearthed, have demonstrated that cultivation and herding were developed in this area during the early PPNB. These sites are culturally distinct from those to the east suggesting that agriculture developed independently in central Anatolia rather than being introduced from the east.

Cereals and herding have been identified at early PPNB sites farther east in the Zagros foothills such as Ganj Dareh, Chogah Golan, Tepe

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 7 The site of Aşıklı Höyük in central Anatolia showing the almost urban nature of this settlement (photo Research Project). Similar settlements in terms of surface area and density of habitats can be found in middle PPNB levels at Halula and Tell Abu Hureyra. These settlements developed as a consequence of a production economy

Abdul Hosein, and Chia Sabz, dated to between 10,250 and 10,500. This suggests as in the case of central Anatolia that agriculture developed locally, probably derived from PPNA sites in northern Iraq.

Morphological domestication of cereals and the first signs of herding appear during this period. Wheat and barley domestication can be identified by the loss of the dispersal mechanism. This is visible in archaeobotanical specimens when the abscission scar is examined; part of the upper spikelet adheres to the scar, indicating the artificial break of domestic cereals. Possible finds of domestic einkorn have been reported from sites such as Nevalı Çori and Cafer Höyük in the northern Levant. At the time of writing, the dating and the domestic status of these finds need to be reexamined. In the southern Levant at Aswad, the earliest levels, dated to the early PPNB, contain domestic barley and possibly emmer wheat. Domestication of emmer and barley was also reported at Wadi el-Jilat 7 and Ain Ghazal.

In conclusion, cereal domestication was not fully established because high proportions of wild spikelets were still present. Agriculture was in the process of developing independently in five geographic regions: southern Levant, northern Levant including eastern Anatolia, Cyprus, central Anatolia, and the Zagros foothills of Iran and Iraq.

Fully Established Farming and Later Expansion: 9700, Middle PPNB, and Beyond

Continuity between the early PPNB and the middle PPNB is poorly documented. Whether this is due to a hiatus or to the fortuitous nature of archaeological discoveries is not known. Whatever the case, by around 9700 large settlements developed which included more than ten times the surface area of the early PPNB and PPNA sites (Fig. 7). These settlements were totally dependent on agriculture; gathering and hunting were minor secondary activities. Emmer wheat, hulled barley, lentils, peas, chickpea, and broad bean became the dominant crops across the whole region in the same way that cattle, sheep, goat, and pig became the norm. No doubt other crops that have left no remains were also cultivated. Both crop plants and animals have domestic morphologies but wild specimens persist. Middle PPNB levels at Aşıklı Höyük, in central Anatolia, and at Halula and Abu Hureyra in the northern Levant or late PPNB levels at Ain Jammam, Baster, Ain Ghazal, and as-Sifiya in the southern Levant represent fully established agricultural communities of near-urban dimensions.

Agricultural expansion out of the Near East is poorly understood at the time of writing, with the exception of Cyprus, mentioned above. The dates for early farming settlements elsewhere are controversial and likely to change in the future; those

presented here are given as ranges or rounded off. It was not until more than a millennium and half after the establishment of agricultural settlements in the Near East that farming villages appeared in new areas. As we have seen, early Neolithic settlements occurred in Iran; further expansion east is illustrated by two sites dated to between 8400 and 8000 in which emmer, einkorn, barley, sheep, and goat were found: Mehrgarh in southern Pakistan and Jeitun in Central Asia. To the west across the Bosphorus, in Thrace and northern Greece, the earliest farming sites dated to between 8300 and 8000 BP cal. Farther north, the Caucasus sites in Armenia dated to about 8000, while to the south, the earliest farmers in Egypt were cultivating the land about 7500.

Key Issues/Current Debates

The question of whether agriculture in the Near East originated at a single center and subsequently diffused rapidly outwards, or was a protracted process occurring simultaneously across the region, has been much debated. In the 1960s and 1970s, Jericho was considered the key site from which agriculture diffused. By 2000, a small area of southeast Anatolia was seen by agronomists as being the core area; their hypothesis was based on the present-day distribution of wild progenitors and DNA fingerprinting of modern einkorn wheat, rather than archaeology. This hypothesis has been questioned, because in the surrounding regions pre-domestic cultivation predates sites in the so-called core area (Fuller et al. 2011). While some crops may have originated in southeast Anatolia, for example, chickpea, archaeology clearly shows that in adjacent regions (see map), local wild populations were taken into cultivation as early as or earlier than in southeast Anatolia.

Another debate which concerns agronomists and geneticists concerned with biodiversity has been about whether the major crops were taken into cultivation just once or many times. These researchers wanted to know whether today's crops are monophyletic or polyphyletic in origin. The first DNA studies on einkorn in 1997 suggested monophyletic origins. However, subsequent studies are not so clear-cut; other crops such as barley show polyphyletic origins. Studies of modern populations cannot provide the full story because many cultivars have become extinct over the last 10,000 years. For the moment, the debate continues as new information accumulates.

Identifying domestication is an important issue for the origins of agriculture, and not all researchers agreed on the criteria. Van Zeist recognized in 1984 that the earliest domestic populations contained significant proportions of wild specimens. This was later confirmed at several other sites (Tanno and Willcox 2006). This discovery led scholars to question earlier hypotheses proposing that domestication could have occurred rapidly in a few generations. It is now generally accepted that domestication was a slow, protracted, and continual process. PPNA societies took local wild wheats and barleys into cultivation in widely separated regions, and domestication occurred more than once and independently in those different regions.

What were the factors that caused hunter-gatherers to become farmers? This debate has been going on since the 1920s. On the one hand, there are determinists who see natural phenomena as being the catalysts, while on the other, there are those who regard an increase in cultural complexity as the catalyst. But was increased sociocultural complexity the cause or was it the consequence of adopting agriculture? (Watkins 2010). Given the time scale and the geographic and climatic diversity across the vast region inhabited by late Pleistocene/early Holocene societies, factors like climate change, population increase, over-exploitation of resources, and societal developments would have played more or less important roles at different times and different places. With regard to climate change, several researchers have suggested that sustainable agriculture would have been difficult during the late Pleistocene but that the more stable conditions of the early Holocene favored agriculture (Fig. 8) (Willcox et al. 2009). The debates continue as new discoveries are made.

Finally, brewing has been mentioned as a possible use for cereals from the Natufian onwards (Haaland 2007). While the idea may seem

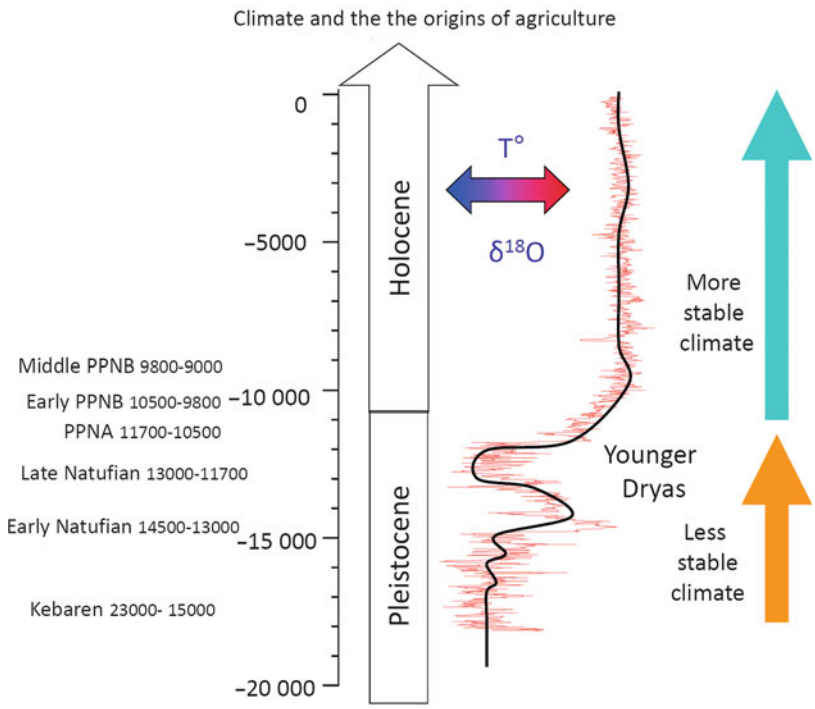

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 8 The *black curve* gives average worldwide changes in oxygen isotope 18 which reflects global temperatures. Postglacial warming coincides with the increase in density of sites in the southern Levant while the Younger Dryas cooling with decreased density. Holocene warming coincides with the development of PPNA sites and pre-domestic cultivation. The *red curve* gives shorter-term amplitude changes in temperature which are greater during the Pleistocene suggesting unstable climatic conditions. At the start of the Holocene, changes are less severe indicating more stable climate conditions. Several scholars suggest that durable agriculture would be more viable with the stable climatic conditions of the Holocene

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attractive, the arguments are speculative, and at the time of writing, there is no factual scientific evidence for brewing in the Near East for the Natufian or PPN periods.

International Perspectives

The Near East is just 1 of at least 11 and perhaps over 20 regions where agriculture developed independently around the world. While it is often considered to have been the earliest known center where farming developed, it is possible that cultivation was adopted in tropical regions during the Pleistocene although little evidence has survived. Taphonomic factors have an effect on the international perspective concerning the origins of agriculture. Non-charred plant materials, including pollen, decompose and oxidize readily in aerobic archaeological sediments, while anaerobic or desiccating conditions are very rare. The semiarid conditions of the Near East favor the preservation of inert charred plant remains because bioturbation and mechanical abrasion are minimal. Thus, the Near East has provided far more information than other regions.

The distribution of archaeological research for the Near East is uneven. Survey coverage of the Near East is irregular; there are vast areas which have not been surveyed. Dam construction on the Euphrates has led archaeologists to carry out numerous rescue excavations in the valley between 1970 and 2000, favoring this area. And of course changing political situations in the lands of the Near East have affected research into the origins of agriculture.

Future Directions

The discovery of new sites in the future will have impact on our view of the origins of agriculture in the Near East, as have the exceptional discoveries of the past few decades. These discoveries are often fortuitous because systematic surveys are lacking in all areas. Detailed systematic survey work in the future will no doubt bring to light new sites, especially in more remote areas. Satellite imagery will no doubt become a useful tool for surveying, but must be backed up by ground surveys.

There is room for improvement in the accurate identification of charred plant remains. Weeds are often only identified to genus and so can only be defined as assemblages. Extinct cereals like the new glume wheat are being recognized, and this aspect will no doubt be developed in the future. So far ancient DNA has been found to be too degraded in specimens of plant remains from the Near East. New techniques may make breakthroughs possible in the future.

Climate data from locations in the Near East are very limited and often poorly dated. Future studies of natural climatic archives such as lake, marine, and cave sediments will provide more accurate data for paleoclimate research.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Agriculture: Definition and Overview
- ▶ Ali Kosh: Agriculture and Domestication
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Çayönü: Agriculture and Domestication
- ▶ Chickpea: Origins and Development
- ▶ Childe, Vere Gordon (Theory)
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Göbekli Tepe: Agriculture and Domestication
- ▶ Jericho Archaeological Site
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Wheats: Origins and Development

References

Bar-Yosef, O. 1998. The Natufian culture in the Levant, threshold to the origins of agriculture. *Evolutionary Anthropology* 6 (5): 159–177.

Bar-Yosef, O. 2011. Climatic fluctuations and early farming in West and East Asia. *Current Anthropology* 52 (suppl. 4): S175–S193.

Bar-Yosef, O., and F. Valla. in press. *The Natufian culture of the Levant II*. Ann Arbor: International Monographs in Prehistory.

Cauvin, J. 2000. *The birth of the gods and the origins of agriculture*. Cambridge: Cambridge University Press.

Colledge, S. 1998. Identifying pre-domestication cultivation using multivariate analysis. In *The origins of agriculture and crop domestication*, ed. A. Damania, J. Valkoun, G. Willcox, and C.O. Qualset, 121–131. Aleppo: ICARDA.

Colledge, S., and J. Conolly. 2010. Reassessing the evidence for the cultivation of wild crops during the Younger Dryas at Tell Abu Hureyra, Syria. *Environmental Archaeology* 15: 13–124.

Fuller, D. 2007. Contrasting patterns in crop domestication and domestication rates: Recent archaeobotanical insights from the Old World. *Annals of Botany* 100 (5): 903–924.

Fuller, D., G. Willcox, and R. Allaby. 2011. Cultivation and domestication had multiple origins: Arguments against the core area hypothesis for the origins of agriculture in the Near East. *World Archaeology* 43: 628–652.

Haaland, R. 2007. Porridge and pot, bread and oven: Food ways and symbolism in Africa and the Near East from the Neolithic to the present. *Cambridge Archaeological Journal* 17 (2): 167–183.

Harlan, J. 1995. *The living fields our agricultural heritage*. Cambridge: Cambridge University Press.

Helbaek, H. 1959. Domestication of food plants in the Old World. *Science* 130: 365–372.

Ibáñez, J. J., ed. 2008. *Le site néolithique de Tell Mureybet (Syrie du Nord): en hommage à Jacques Cauvin*. BAR International series 1843. Oxford: Archaeopress.

Tanno, K.-I., and G. Willcox. 2006. How fast was wild wheat domesticated? *Science* 311: 1886.

Ucko, P., and G.W. Dimbleby, eds. 1969. *The domestication of plants and animals*. London: Duckworth.

Watkins, T. 2010. New light on Neolithic revolution in south-west Asia. *Antiquity* 84: 621–634.

Weiss, E., M.E. Kislev, O. Simchoni, D. Nadel, and H. Tschauner. 2008. Plant-food preparation area on an Upper Paleolithic brush hut floor at Ohalo II, Israel. *Journal of Archaeological Science* 35 (8): 2400–2414.
Willcox, G., and D. Stordeur. 2012. Large-scale cereal processing before domestication during the tenth millennium BC cal. in northern Syria. *Antiquity* 86 (331): 99–114.
Willcox, G., S. Fornite, and L. Herveux. 2008. Early Holocene cultivation before domestication in northern Syria. *Vegetation History and Archaeobotany* 19 (1): 151–158.
Willcox, G., R. Buxo, and L. Herveux. 2009. Late Pleistocene and Early Holocene climate and the beginnings of cultivation in northern Syria. *The Holocene* 19 (1): 151–158.
Willcox, G., M. Nesbitt, and F. Bittmann. 2012. From collecting to cultivation: Transitions to a production economy in the Near East. Special Issue. The origins of agriculture in the Near East. *Vegetation History and Archaeobotany* 21 (2): 81–167.
Zohary, D., E. Weiss, and M. Hopf. 2012. *Domestication of plants in the Old World*. 4th ed. Oxford: Oxford University Press.

Further Reading

Barker, G. 2009. *The agricultural revolution in prehistory: Why did foragers become farmers?* Oxford: Oxford University Press.
Edwards, P.C., J. Meadows, G. Sayej, and M. Westaway. 2004. From the PPNA to the PPNB: New views from the southern Levant after excavations at Zahrat adh-Dhra 2 in Jordan. *Paléorient* 30 (2): 21–60.
Kuijt, I., and B. Finlayson. 2009. Evidence for food storage and predomestication granaries 11,000 years ago in the Jordan Valley. *Proceedings of the National Academy of Science* 106 (27): 10966–10970.
Lewis-Williams, D., and D. Pearce. 2005. *Inside the Neolithic mind: Consciousness, cosmos, and the realm of the gods*. London: Thames and Hudson.
Mithen, S.J. 2003. *After the ice: A global human history, 20,000–5000 BC*. London: Weidenfeld & Nicolson.
Tanno, K., and G. Willcox. 2012. Distinguishing wild and domestic wheat and barley spikelets from early Holocene sites in the Near East. *Vegetation History and Archaeobotany* 21 (2): 107–115.
Van Zeist, W., and J.A. Bakker-Heeres. 1984. Archaeobotanical studies in the Levant 3. Late Palaeolithic Mureybet. *Palaeohistoria* 26: 171–199.
Van Zeist, W., and G.J. De Roller. 1994. The plant husbandry of Aceramic Cayönü, E. Turkey. *Palaeohistoria* 33 (34): 65–96.
Weiss, E., M. Kislev, and A. Hartmann. 2006. Autonomous cultivation before domestication. *Science* 312: 1608–1610.
Willcox, G. 2004. Measuring grain size and identifying Near Eastern cereal domestication: Evidence from the Euphrates valley. *Journal of Archaeological Science* 31: 145–150.
Willcox, G. 2005. The distribution, natural habitats and availability of wild cereals in relation to their domestication in the Near East: Multiple events, multiple centres. *Vegetation History and Archaeobotany* 14 (4): 534–541.
Willcox, G. 2012. Searching for the origins of arable weeds in the Near East. *Vegetation History and Archaeobotany* 21 (2): 163–167.

Nemrud Dağ, Archaeology of

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Introduction

Nemrud Dağ (alternatively spelled as Nemrut Dağ or Nemrud Dağı) is a Taurus mountain with a height of 2,205 m in southeastern Turkey (province of Adıyaman) in the northern part of a small region at the Euphrates that was known as Commagene in antiquity. The burial site of King Antiochos I of Commagene (69–36 BCE) is located at its summit: a temple-tomb (*hierothesion*) designed to be the focal point of a highly original and typical late-Hellenistic project of dynastic self-presentation extending throughout the entire kingdom. The *hierothesion* has never been in use, and its completion was probably hurried along in an improvised manner soon after Antiochos I died; it should be dated, therefore, roughly between 50 and 35/30 BCE. The actual tomb of the king has been searched for intensively, but it has not been found as yet. Nemrud Dağ is remarkable for the fact that it has preserved a highly standardized *Bildprogramm* juxtaposing so-called "Greek" and "Persian" (or "Iranian") elements. The king himself provides a motivation for this through an extensive "foundation text" executed as a monumental inscription at the site itself.

In this entry, Antiochos I characterizes his *hierothesion* as "the throne of the gods," which it is in literal sense (see below). As such, in recent decades, the spectacular site of Nemrud Dağ has been developed into one of Turkey's most important archaeological landmarks, also with the incentive to draw tourists into a relatively poor and underdeveloped area. The issue of stakeholders at this UNESCO World Heritage Site therefore presents a complicated case. Already at the end of the nineteenth century, a German expedition (led by Carl Humann and Otto Puchstein) and an Ottoman expedition (led by Osman Hamdi Bey) competed with each other to claim the site's scientific "discovery" and publication. After WWII, the American archaeologist Theresa Goell worked at Nemrud Dağ while the rest of Commagene, most notably Arsameia ad Nymphaios (see below), was the focus of the work of German epigraphist Friedrich Karl Dörner from Münster, who founded the *Forschungsstelle Asia Minor*. Nevertheless, both scholars collaborated throughout their projects; Münster remains the home of Commagene-studies today. During the past decade, an international team under the aegis of the University of Amsterdam (the Netherlands) worked on the conservation of the site, soon followed by a Turkish team from the Middle East Technical University with the support of a major EU grant. Unfortunately, these recent efforts have not resulted in a satisfying heritage plan, and the monument is still under threat.

Definition

Nemrud Dağ and Commagene

The site consists of three terraces around a tumulus, which has been transformed into a prominent landmark by means of covering the original mountain peak with a layer of artificial gravel. The tumulus was visible from large distances, and because of this visibility, we may assume that Antiochian kingship made itself felt throughout Commagene (Figs. 1 and 2).

This was strengthened by the fact that mountain peaks in the vicinity of important Commagenean settlements had similar dynastic sanctuaries – although generally, these were smaller, less complex, and did not always contain a royal tomb. Nemrud Dağ was therefore part of a kind of "grid" of dynastic self-presentation spanning the whole of Commagene.

Of the three terraces surrounding the tumulus, the East and West terraces are the most prominent; these could be reached from the valleys below via marked processional roads. The so-called North terrace, more like a passageway connecting the East and West "courts," was apparently intended to display a large number of stelae, but only their sockets were put in place, and the project was left unfinished. The East terrace was the most spacious area around the tumulus (around 500 m^2), and its condition has been explored to the full. Rising above the terrace and almost placed against the tumulus, a group of five colossal (originally 8–10 m high) statues were found, flanked at both sides by animal groups consisting of a lion and an eagle (Fig. 3).

The statues are built up by dry-stone masonry consisting of large blocks of yellowish-white limestone in six to eight horizontal layers. Due to earthquakes, the heads of the statues have broken off and fallen down onto the terrace – recently, they have been placed in a row in front of the statues. The monumental inscription, inscribed at the back of the colossi, identifies the figures that are displayed (Fig. 4).

Centrally positioned is Zeus-Oromasdes flanked (at the north side) by Apollo-Mithras-Helios-Hermes and Artagnes-Herakles-Ares and (at the south side) by the goddess Commagene (a personification of the region) and Antiochos I himself. The king thus places himself amid those whom he apparently upholds as the main gods of his pantheon. For a Hellenistic ruler, it was not unusual to claim divinity and to be worshipped as a god. In Egyptian temples, for instance, the Ptolemies received libations and incense as *synnaoi theoi* (temple-sharing deities): the same was intended to occur at Nemrud Dağ. However, the "double identity" of the gods seems remarkable here: they are designated simultaneously as "Greek" (e.g., *Zeus*, the main deity of the Greeks) and "Persian" or "Iranian" (e.g.,

Nemrud Dağ, Archaeology of, Fig. 1 Plan of the site. (After the forthcoming book by H.A.G. Brijder, with permission)

Oromasdes, the main deity of the Persians). The style of the statues seemingly aims for a similar kind of "blending of West and East" and is therefore often defined as "Greco-Persian." This practice seems visible also in the so-called *dexiosis* reliefs, placed before the colossi toward the terrace. On these, the king is portrayed in a very "Eastern" attire (with the Armenian *tiara*, Persian boots, and regalia like a sash) shaking hands with, in one example, a distinctly nude and "Greek" Herakles (Fig. 5).

Originally, the so-called Lion horoscope was also part of this sculptural ensemble: a relief showing a lion with specific stars and planets scattered all over and representing an astronomical constellation. On the East terrace itself, the

Nemrud Dağ, Archaeology of, Fig. 2 The tumulus from a distance. (Photo: Jurriaan Venneman)

Nemrud Dağ, Archaeology of, Fig. 3 Colossal statues, East terrace. (Photo: Jurriaan Venneman)

Nemrud Dağ, Archaeology of, Fig. 4 Part of the *nomos* inscription, East terrace. (Photo: Jurriaan Venneman)

Nemrud Dağ, Archaeology of, Fig. 5 Herakles *dexiosis*, West terrace. (Photo: Jurriaan Venneman)

north and south sides are lined with a "wall" of large reliefs displaying the "ancestors" of the king. Here Antiochos I expresses his wish for double identity through genealogy by claiming that he descends from the Achaemenids (and ultimately the "king of kings" Dareios) from his father's side and, via the Seleucids, from the Macedonian royal house (and ultimately Alexander the Great) from his mother's side. The reliefs show and identify these ancestors (15 "Persian" and 17 "Greek"), who are all portrayed in a very recognizable "Greek" or "Persian" style. All these elements (the colossal statues of the four gods and Antiochos I, the *dexiosis* reliefs, the Lion horoscope, and two rows of ancestor reliefs) are also encountered on the West terrace. There, however, was less space available: the *dexiosis* reliefs were therefore placed next to the statues, and the Seleucid and Macedonian "ancestors" were placed opposite the colossi. The original situation has not been as well preserved as on the East terrace, as the colossi have entirely collapsed.

The other dynastic sanctuaries throughout Commagene – designated as *hierothesion* when a royal tomb would be present, otherwise simply called *temenos* – shows (selections of) a similar repertoire of text and material culture. This was standardized to such an extent that when fragments of the monumental inscription (or related texts) are found, they often can immediately be recognized as (part of) paragraph *x* or *y*. This does not mean, of course, that variation was impossible, as is illustrated by archaeological finds from Arsameia ad Nymphaios, a site relatively near Nemrud Dağ that has been explored by a German team in the 1950s, 1960s, and 1970s. Inscriptions from Antiochos I claim that here his father, Mithridates I Kallinikos (c. 100 BCE–70 BCE), was buried and that Antiochos I established a cult for him. At Arsameia ad Nymphaios, there were also colossi and *dexiosis* reliefs and cultic proscriptions like at Nemrud Dağ, but the role of Mithras seems to have been more prominent. On the main plateau, banqueting rooms were found corresponding to the Hellenistic Mediterranean

style of the period; at Nemrud Dağ, we do not have such buildings. Next to the banqueting rooms, the excavators place the royal temple-tomb for Mithridates I Kallinikos in the dynastic "Greco-Persian" style; the archaeological evidence is scant due to a thorough destruction by later building phases.

Current Debates and Future Directions

There are three key issues for the archaeology of Nemrud Dağ and Commagene.

The first revolves around value judgments and what one could call a "contextual, Hellenistic understanding" of the material. Antiochos' project of dynastic self-presentation is often interpreted negatively, as a failed attempt. This would become clear also from the "hybridity" of the Antiochian style – with the word hybrid intended as a pejorative qualification. Illustrative is the remark by Bert R.R. Smith (Smith 1985: 275) that Antiochos I "suffered probably from both paranoia and megalomania." Through this approach, Nemrud Dağ has been written out of Hellenistic archaeology and history as something marginal and non-representative. Other research, however, stresses the originality and ingenuity of the Antiochian project and sees its eclecticism as typical for the late Hellenistic period. The mausoleum of Augustus, for instance, could be argued to constitute a remarkable parallel to Nemrud Dağ in rather more structural terms. Visibility within the urban landscape was applied as a major instrument for dynastic display by Augustus, who also used a canonical text (the *res gestae*), a colossal statue, and a strong focus on genealogy. This resulted in a monument that was stylistically highly eclectic, as was Nemrud Dağ. Be that as it may, the archaeology of Nemrud Dağ would certainly profit from taking its object more seriously and trying to understand Commagene as one of the many "centers" of Hellenistic *koine*. Such an approach is strengthened by recent archaeological finds showing that this rich and strategically positioned kingdom at the Euphrates was not at all a cultural backwater but a fully fledged part of the Hellenistic Mediterranean and Near East.

The second key issue revolves around the nature of the sources to our disposal. These are often imagined as "ausnehmend gut" (Schwertheim 2005: 77) because of the availability of texts as well as material culture from a relatively securely dated historical context that, moreover, would add to an interconnected understanding of both. For archaeology, this has resulted in a dominant influence of the texts in historical and archaeological interpretation. However, (almost) all our sources are part of the program of display designed by Antiochos I and are therefore likely to provide us a dynastic image, but not a historical reality. Moreover, there is (almost) no evidence that is *not* part of this Antiochian program. In other words, we cannot check or contextualize his "propaganda." It could be argued, therefore, that our sources are in fact not good at all as they are extremely one-sided and (potentially) misleading. The gravity of this matter becomes clear from the excavations at Arsameia ad Nymphaios. In the texts from this site, Antiochos I boasts to have substantially enlarged and enriched an older Commagenean settlement (mentioning new royal palaces, a water supply, a military base, etc.), but more than two decades of investigations led by Friedrich Karl Dörner (from 1953 to 1976) failed to find any of these nor does there seem to have been a pre-Antiochian phase. The archaeology of Commagene, therefore, has an unstable foundation seeing that it has so far focused solely on the dynastic monuments. No first-century BCE Commagenean village or city has been excavated; its capital Samosata (Samsat) has only been provisionally explored and published and is now beneath the waters of a large reservoir; there is (almost) no epigraphical record outside the Antiochian texts; no intensive field survey has been undertaken. In other words, we do not really know what the relation was between the thoroughly Hellenistic project of dynastic display and the social context in which it was supposed to function, as that context is simply not available. This is one of the reasons why the recent work by

Engelbert Winter (Münster) and his team in Doliche is so important: here we have an Antiochian *temenos* that stood in relation to an older cultic context.

The third and final key issue for the archaeology of Nemrud Dağ and Commagene is how to understand this "coming together of East and West at the Euphrates" theoretically. Most scholars argue, often implicitly, that we would deal here with acculturation processes like Hellenization and Persianization. The topographical position of Commagene is thus considered to be the key to the understanding of its material culture: "East" and "West" literally seem to meet here. For instance, Bruno Jacobs (Jacobs 2003), the author of a series of important interpretative articles on the archaeology of Nemrud Dağ and Commagene, assumes the existence of Greek and Persian elites in society. Antiochos I would have tried to reach and integrate these groups by means of his double-styled language of images. Such a hypothesis, although well imaginable, is difficult to prove seeing that we know so little about late Hellenistic Commagenean society (see key issue 2). Moreover, if we take Nemrud Dağ seriously as Hellenistic *koine* (see key issue 1), other strands of interpretations emerge. Referring to things "Greek" and "Persian" seems in the first place to have to do with cultural memory and invention of tradition, as in the first century BCE, neither Greeks nor Persians were a real (political) factor anymore whatsoever. However, as cultural concepts, "Greek" and "Persian" styles and elements played an important role within the Hellenistic world and its *koine*. It is perhaps more likely, therefore, that we should try and interpret the "Greek" element not in terms of Hellenization but in terms of *Hellenism* and the "Persian" element not in terms of Persianization but in terms of *Persianism*. Taking up these kinds of elements because of the meanings and associations they had acquired over time and putting them together in innovative combinations are typical for the culture of late Hellenistic *bricolage*. From this perspective, Nemrud Dağ could be argued to be a most significant case study for the archaeology of the (late) Hellenistic world, as it attests to the first-century BCE eclecticism that Augustus would use to create the canon that we call Roman. It is Wolfram Hoepfner (Hoepfner 2000) who first seems to have realized this perspective to a full extent. In general terms, the Hellenism and Persianism of Antiochos I can be explained as follows. "Doing Greek" was the way for a local dynast to show that he was significant (or wanted to play a role) on the Hellenistic stage, as Hellenism simply was the language of culture and modernity. "Doing Persian" was the way to claim dynastic legitimacy in a region where the Achaemenids were the last uncontested rulers of a true world-empire. There is certainly a lot more to explore from this perspective, an important point of discussion being the fact that the dynastic program of Antiochos I seems to have been targeted more toward his rival Hellenistic kings than toward the population of his small kingdom. But we can only do so when Nemrud Dağ is given a more central place in the archaeology of the Hellenistic and Roman Near East. Given the large array of important discussions to which Nemrud Dağ seems able to contribute (to name but a few: the functioning of Hellenistic *koine*, Hellenism and Persianism in antiquity, dynastic propaganda and the language of images, the divinity of Hellenistic rulers, Romanization in the East, the contextualizing of the Augustan cultural revolution), it certainly deserves that place.

The work by Theresa Goell from the 1950s, finally published by Donald H. Sanders in 1996, remains the most important point of departure for the archaeology of Nemrud Dağ itself (Sanders 1996). It is best consulted together with the review by Bruno Jacobs (Jacobs 1998). For recent work by the international team, see the articles by Eric M. Moormann and Miguel John Versluys and the final report edited by Herman A.G. Brijder (2014); for the most recent Turkish project on the site, see contributions to Winter (2011). The best general introduction to the archaeology of Nemrud Dağ and Commagene is Wagner (2000) now with Brijder (2014). All historical information on Commagene, Antiochos I, and his dynasty has been assembled in Facella (2006). Margherita Facella, Bruno Jacobs, and Jörg Wagner have published important interpretative essays on Antiochos I and his dynastic program. The best

introduction to the epigraphic source material is now Crowther and Facella (2003) (with full bibliography). Arsameia ad Nymphaeum has been published in two volumes: Dörner and Goell (1963) and Hoepfner (1983). Ongoing work in Doliche is published in the *Istanbuler Mitteilungen*, so far in volumes 55 (2005: 191–214) and 56 (2006: 185–205); see most recently several articles in Winter 2011 and contributions to the most recent volumes of the series *Asia Minor Studien* like Winter (2014). Michael Blömer and Engelbert Winter have now published (Blömer and Winter 2011) an up-to-date archaeological guide of Commagene with all basic information and full bibliography. Several volumes of the series *Asia Minor Studien* deal with Commagenean archaeology specifically, most recently Winter (2008, 2011, 2014). Merz and Tieleman (2012) contains several articles dealing with the question of commagenean identities in the first century BCE and the first century CE;; fundamental for that debate now Blömer 2014; a rich catalogue and thorough interpretation of the stone reliefs from the Roman period. I have tried to describe Nemrud Dağ from a wider Hellenistic perspective in terms of *bricolage* using Hellenism and Persianism (Versluys 2013, 2017).

Cross-References

► Hellenistic and Roman Anatolia, Archaeology of
► Interculturality and Archaeology

References

Blömer, Michael. 2014. Steindenkmäler römischer Zeit aus Nordsyrien. Identität und kulturelle Tradition in Kyrrhestike und Kommagene, X, 420 S., 97 Taf., Pp ISBN 3-7749-3874-8.

Blömer, M., and E. Winter. 2011. *Commagene. The land of gods between the Taurus and the Euphrates*, An archaeological guide. Istanbul: Homer Kitabevi.

Brijder, H.A.G., ed. 2014. *Nemrud Dagı. Recent archaeological research and conservation activities in the tomb sanctuary on Mount Nemrud*. Boston/Berlin: De Gruyter.

Crowther, C., and M. Facella. 2003. New evidence for the ruler cult of Antiochos of Commagene from Zeugma. In *Neue Forschungen zur Religionsgeschichte Kleinasiens*, Asia Minor Studien, ed. G. Heedemann and E. Winter, vol. 49, 41–80. Bonn: Habelt.

Dörner, F.K., and T. Goell. 1963. *Arsameia am Nymphaeum. Die Ausgrabungen im Hierothesion des Königs Mithridates Kallinikos 1953–1956*. Berlin: Gebr. Mann.

Facella, M. 2006. *La dinastia degli Orontidi nella Commagene ellenistico-romana*. Pisa: Giardini.

Hoepfner, W. 1983. *Arsameia am Nymphaios, Volume II: das Hierothesion des Königs Mithridates I. Kallinikos von Kommagene nach den Ausgrabungen von 1963 bis 1967*. Tübingen: E. Wasmuth.

Hoepfner, W. 2000. Arsameia am Nymphaeum und der Allgötterkult Antiochos' I. Schriften, Bilder und Säulen als Zeugnisse späthellenistischer Kultur. In *Gottkönige am Euphrat. Neue Ausgrabungen und Forschungen in Kommagene*, ed. J. Wagner, 56–73. Mainz am Rhein: Philipp von Zabern.

Jacobs, B. 1998. Review of Sanders 1996. *Archäologische Mitteilungen aus Iran und Turan* 30: 344–351.

Jacobs, B. 2003. Überlegungen zu Ursachen und Gründen für die Konzeption von Heiligtumsausstattungen in der späthellenistischen Kommagene. In *Kulturkonflikte im Vorderen Orient an der Wende vom Hellenismus zur römischen Kaiserzeit*, ed. K.-S. Freyberger, A. Henning, and H. von Hesberg, 117–121. Rahden: Leidorf.

Merz, A., and T. Tieleman. 2012. *The letter of Mara bar Sarapion in context*, Culture and history of the ancient Near East. Vol. 58. Leiden/Boston: Brill.

Sanders, D.H., ed. 1996. *Nemrud Daği: the Hierothesion of Antiochos I. of Commagene. Results of the American excavations directed by Theresa B. Goell*. Vol. I–II. Winona Lake: Eisenbrauns.

Schwertheim, E. 2005. *Kleinasien in der Antike. Von den Hethitern bis Konstantin*. München: Beck.

Smith, R.R.R. 1985. Review of Hoepfner 1983. *Journal of Roman Studies* 75: 275–277.

Versluys, M.J. 2013. Material culture and identity in the late Roman Republic (ca. 200 BC – ca. 20 BC). In *Blackwell companion to the archaeology of the Roman Republic*, ed. J. de Rose Evans, 647–662. Oxford: Blackwell.

Versluys, M.J. 2017. *Visual style and constructing identity in the hellenistic world: Nemrud Dağ and Commagene under Antiochos I*. Cambridge: Cambridge University Press.

Wagner, J., ed. 2000. *Gottkönige am Euphrat. Neue Ausgrabungen und Forschungen in Kommagene*. Mainz am Rhein: Philipp von Zabern.

Winter, E., ed. 2008. *Patris Pantropos Kommagene. Neue Funden und Forschungen zwischen Taurus und Euphrat*, Asia Minor Studien. Vol. 60. Bonn: Habelt.

Winter, E. 2011. *Von Kummuh nach Telouch. Historische und archäologische Untersuchungen in Kommagene*, Asia Minor Studien. Vol. 64. Bonn: Habelt.

Winter, E. 2014. *Dolichener und Kommagenische Forschungen VI. Kult und Herrschaft am Euphrat*, ed. v. Engelbert Winter, Bd. 73, XI, 397 S., 28 Farbtaf., 60 Taf., Pp.

Netherlands: Cultural Heritage Management

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Introduction

In the Netherlands, the professional archaeology had its start in 1818 with the appointment by the national government of Caspar Jacob Christiaan Reuvens as archaeology professor at the University of Leiden and as the director of a national museum for antiquities that he had to develop. Reuvens (1793–1835) was actually the first university professor of prehistoric archaeology in the world (Brongers 1973). It was however already long before this that a concern for the preservation of archaeological phenomena had emerged. That happened in the 1730s, when the best-known Dutch monuments, the *hunebedden* (megalithic burial chambers of c. 3400 BCE–2850 BCE), became endangered due to a massive attack of shipworms (*Teredo navalis*) on the Dutch coastal defenses. As these "termites of the sea" were eating the piles in the dikes, loads of heavy stone material was needed to restrengthen the dikes. Poor inhabitants of the province of Drenthe saw in this an opportunity to earn some money by collecting and selling the free stone material that was abundant in the boulder clay soil in the North. But the *hunebedden* also provided a rich source for heavy stone material and were dismantled rapidly. When the provincial government of Drenthe realized what was at stake, they announced on 21 July 1734 a resolution to protect the tombs against stone digging (Brongers 1976). Even a pecuniary punishment of 110 gold guilders could be imposed. With this, the first monuments legislation was a fact, and it can be considered the start of cultural heritage management in the Netherlands. Since then the approach has obviously been altered drastically. Especially in the last two decades, when market-driven development-led archaeology was introduced, a complete transformation of Dutch heritage management has been witnessed.

Key Issues/Current Debates/Future Directions/Examples

The first legal provisions to preserve the archaeological heritage did not have much effect. The destruction of the *hunebedden* continued, because the risk of being caught was low and very few people were fined. Even governments seemed to have used stone material from the megalithic structures, for instance, to improve roads. When in 1818 a first formal inventory of the burials was made, it was clear that additional protective measurements were needed. These were effectuated as of 1846 when the provincial and national government started to purchase the sites. By 1872, a total of 45, nearly all that remained, was owned by the authorities. These, and eight others that were added afterward, have all been preserved till the present day (Rijksdienst voor het Cultureel Erfgoed 2009).

Although in a way effective, this type of protection was clearly not systematic and structural. The state's and professional archaeology's main interest concerned scientific research, to learn about the material culture through excavations and collecting finds. Reuvens, for instance, initiated a national documentation of archaeological sites (Willems 1997), but his focus and that of succeeding archaeologists like Jan Hendrik Holwerda (1873–1951) and Albert Egges van Giffen (1884–1973) was on developing excavation methods. For instance, as curator of the Drents Museum in Assen, Van Giffen was assigned in 1919 by the Minister of Education, Art and Science to make an inventory of the condition of the remaining megalithic tombs and to do some restoration works, but these preservation activities were restricted to these most prominent archaeological phenomena and had an incidental character (Fig. 1).

Growing Awareness

A first step toward a more systematic focus on preserving the archaeological heritage was the

Netherlands: Cultural Heritage Management, Fig. 1 One of the 53 remaining *Hunebedden*. Their rapid destruction in the eighteenth century raised awareness that the archaeological remains needed protection of the authorities. (Photo: M.H. van den Dries)

initiation, on 24 May 1940, of a national advisory committee (Rijkscommissie voor het Oudheidkundig Bodemonderzoek) and an office for the archaeological heritage (Rijksbureau voor het Oudheidkundig Bodemonderzoek, RBOB). Besides documenting finds, one of the first tasks of the office was to list the artificial dwelling mounds (*terpen*) in need of protection. At that time, it had just become clear that these artificial dwelling mounds, which were constructed in the north of the Netherlands from c. 500 BCE to protect people and cattle against the sea, were even more threatened than the *hunebedden*. They consisted of very fertile soil, which was harvested intensively to fertilize the poor sandy soils in other parts of the country (Fig. 2). This exploitation had started slowly in the 1850s, became very popular as of the 1870s, and had its peak in the 1920s (Rijksdienst voor het Oudheidkundig Bodemonderzoek 2002: 17). So, when in 1943 the exploitation of the *terpen* was finally legally restricted and the RBOB made its inventory, it turned out that, for instance, the province of Friesland had already lost more than 75% of its original 910 dwelling mounds (Halbertsma 1963). Thanks to this protection policy, approximately 350 dwelling mounds are preserved. In fact, dwelling mounds are one of the best represented categories on the list of nearly 1,800 national monuments (Rijksdienst voor het Cultureel Erfgoed 2009: 31).

The need for a more systematic care for monuments became even more apparent after the Second World War, when war-damaged historical buildings and the archaeological remains in the subsoil had to be protected against massive reconstruction activities. So, in 1947, two new state agencies were founded for this purpose, one for historic buildings (Rijksdienst voor de Monumentenzorg, RDMZ) and one for archaeological research (Rijksdienst voor het Oudheidkundig Bodemonderzoek, ROB) (Willems 1997). Van Giffen became the director (1947–1949) of the latter. Although he kept his chair at Groningen University and became primarily famous for developing excavation techniques, Van Giffen also had genuine preservation motives. For instance, his selection of sites for excavation was often directed by considerations of threat. After his retirement, he even became the first and only State Inspector for the protection and maintenance of *hunebedden* and restored archaeological monuments.

Netherlands: Cultural Heritage Management, Fig. 2 The exploitation of the *terp* of Hogebeintum, 1896. (Source: van den Berg 1981)

Shared Responsibility

The ROB's main task was to make an inventory of all archaeological monuments in the Netherlands and to subsequently take care of their protection and preservation. In practice, this meant that almost all capacity was directed toward rescue excavations. Due to the large scale of postwar reconstruction works, land reclamation projects in the new polders, and the reallotments policy, the ROB was preoccupied with excavating the remains that these activities exposed (Willems 1997). Large numbers of volunteers were hired to assist, but also additional specialist capacity was needed. Thus, in 1954, a nautical archaeological department was established to take care of the shipwrecks that were uncovered in the polders.

Additional digging capacity was also gained from the university departments in Leiden, Amsterdam, and Groningen, and as of 1960, individual municipalities started to establish their own archaeological service (Sarfatij 1990). The first was Rotterdam, that suffered from the most extensive war destruction, but others followed soon. Currently, over 40 municipalities and around 20 regions have an archaeological service (www.gemeente-archeologen.nl). Between the late 1960s and early 1970s, a network of 12 provincial archaeologists was subsequently developed that covered the entire country. This in particular introduced a more continuous and systematic care for endangered archaeological sites.

Successive Monument Acts

A first effective attempt to prevent the rapid destruction of both historic buildings and archaeological sites and to start protecting them was made with the introduction of the Monuments Act in 1961. It defined a monument as immovable property created by man which is more than 50 years old and of general interest on account of its beauty or scientific or cultural value. It required each municipality to draw up a list of historic buildings, and it subsequently banned any alterations to, or demolition of, these listed buildings without the Minister's consent. For the archaeology, the law introduced the obligation to report chance finds and a prohibition on digging without an excavation license.

As it also paved the way for the protection of valuable historical entities such as townscapes, the Monument Act has been rather effective for the protection of historic monuments. In 1970, the monument lists were completed for all municipalities, and in 1980, 42,000 monuments were protected, including over 1,400 archaeological sites. Its success however also resulted in a lack of finances for the maintenance and restoration of all these monuments and very time-consuming

administrative procedures (Van Haaff 2006). It led to appeals against listings by private owners of monumental buildings and a stagnation in new listings. The need for a new way of handling monuments grew, along with a desire to protect other cultural elements as well, like younger buildings and underwater cultural heritage. Thus, a revision of the act was initiated, though it only entered into force in 1988.

The most important change for historic monuments was the principle of decentralization, by which municipalities gained much more authority. Proposals for listings no longer came from the central Monuments Council but from municipalities themselves. For archaeology, the revision meant that sites could be protected better. First, finds were now legally owned by the state (or a municipality with a license and a repository), and sites outside the territory of a municipality, like maritime sites, could be designated as a monument too. Moreover, excavation permits were no longer given to individuals or provinces but to the national service, universities, and municipalities only. In order to gain more control over the archaeological record, such bodies were also obliged to give notice of all excavations and to report the results to the State Service.

International Influence

Although it was clear that the rescue archaeology practice was disastrous for the preservation of the archaeological record, it continued during the 1980s and early 1990s. As the Netherlands were involved in the revision of the Council of Europe's European Convention on the Protection of the Archaeological Heritage of 1969, an attempt was made to integrate the care for the archaeological heritage in the national planning process, but the national law in force, the revised Monument Act of 1988, provided no legal means. This practice only changed after the Malta Convention was signed, in 1992 in Valletta, and authorities started to adapt their policy regarding the archaeological heritage.

As of the 1990s, other international agreements on cultural heritage gained influence on Dutch policies and approaches as well. Until then, only the first protocol of the UNESCO Convention for the Protection of Cultural Property in the Event of Armed Conflict (The Hague 1954) had been signed (in 1958), but after the Malta Convention, the country soon signed the UNESCO World Heritage Convention (1972). This led to the listing in 1995 of the first and so far only archaeological site, Schokland (www.schokland.nl), on the World Heritage list. Subsequently, the Council of Europe's Treaty of Granada (1994) was ratified in 1994, followed by the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970) in 2009. In 2016, it was announced by the Ministry of Education, Culture and Science and the Ministry of Foreign Affairs that they had started the ratification of the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage.

Implementing the Valletta Principles

The implementation of the Malta convention has had a major impact on the management of the archaeological heritage in the Netherlands. The centralized and state-dominated archaeological system was replaced by a decentralized and liberalized system with a commercial archaeological sector, and archaeological research was integrated in all planning, building, and land development processes. It was implemented in national legislation in September 2007 by means of the *Wet op de Archeologische Monumentenzorg*, WAMZ, which was an amending law that simultaneously adapted all related laws, like the Monuments Act and the Housing Act (http://wetten.overheid.nl/).

Already from 1998 onward, however, when the Dutch Parliament ratified the Malta Convention, the principles of the Malta Convention were systematically applied in case of soil disturbances by the national, regional, or local governments. This rapidly generated a lot of mitigation projects. As the small group of 30 organizations holding an excavation permit could not conduct all the extra work, the State Secretary for Culture, economist Rick van der Ploeg, decided to allow a free market system with a commercial sector for archaeological work (Willems 2005: 50–54). While awaiting this to be implemented in the legislation, an interim policy allowed companies from 2001

onward to "borrow" the excavation license of the State Service.

The ministry acknowledged that instruments for quality management would be needed as well. It was considered a risk that commercial and financial considerations of the archaeological contractors and building companies would prevail over those of the (scientific) quality of the work. Adding rules and regulations was politically only feasible, however, if the archaeological community would take care of some parts of the quality management too (so-called self-regulation). Thus, a mixture of both publicly and privately organized instruments was designed. As the commitment of the archaeological community was needed for the successful development and implementation of most of these instruments, they were developed in concert by a large number of archaeologists (Van den Dries and Willems 2007).

On the public side, an excavation permit and an inspectorate (www.erfgoedinspectie.nl) complemented the Monument Act. On the private side, a quality standard (www.sikb.nl), a professional register, and a research agenda (www.noaa.nl) were initiated. The quality standard describes how the archaeological processes and procedures should be carried out and by whom (Willems and Brandt 2004). The professional register lists the individual archaeologists who, after a peer review, are allowed to take care of these activities. The research agenda sets prevailing scientific research questions.

In 2016, the WAMZ was replaced and incorporated into the Heritage Act. The aim was to integrate the legislation on archaeology with other acts on movable cultural heritage, to improve the system of quality control and – in due time – to simplify all regulation on environmental planning (Krauwer 2015). It implies that excavation permits are no longer granted by the National Agency for Cultural Heritage (www.cultureelerfgoed.nl), the former ROB. They have been replaced by certificates (see www.sikb.nl). Certificates are granted by independent accreditation bodies that have been accredited by the Dutch Accreditation Council.

These instruments are all closely linked. A certificate is, for instance, only granted if a contractor can demonstrate compliance with the Quality Standard and employs qualified archaeologists. The Inspectorate subsequently monitors whether in practice people comply with the legislation and the self-imposed quality measurements. The system gradually has become operational as of 2001, and since July 2016, all elements – including the register – are functioning. The system is completed as originally intended.

Malta in Practice

Due to the revision of the law, care for the archaeological record is now integrated in planning processes, and local authorities have to take known and unknown archaeological remains into account when they define a new or revise an existing development plan. In this development plan, the authorities indicate the valuable archaeological areas in which private developers and property owners are required to conduct (and pay for) validations and impact assessments when they apply for a building permit. In 2009, an inventory showed that 32% of the municipalities had indeed included provisions to protect the archaeological heritage in all their development plans and another 57% in some of their development plans (Erfgoedinspectie 2010: 102).

The local authorities have various moments and instruments to administer the heritage management process. First, the competent authority points out its research demands in a project outline (which in practice is often written by an archaeological consultant). This project outline serves as a basis for the subsequent tendering process, by which the developer selects an archaeological constructor to do the research. The archaeological contractor is obliged to follow the demands of the project outline, and the municipality has the authority to verify whether the demands of the project outline are being followed. Next, the authority takes the assessment results into account when they decide on the building permit and whether a mitigation process must be carried out or whether the terrain will be protected. In case of further archaeological research, the municipality authorizes the site report which contractors are obliged to produce within 2 years after the fieldwork has finished. At the end of the process, the

reports and results are published by the State agency. The finds, soil samples, and documents are kept by the provincial authority.

Some Facts and Figures

The implementation of the Malta principles has had a serious impact. For 2007/2008, it was estimated that 90% of the work is developer-funded (Waugh 2008). In particular, the number of inventories and field evaluations has increased tremendously since 2000 (Fig. 3). The number of excavations remained relatively small, till 2008 just under an annual number of 200 (Van den Dries et al. 2010). It is not known to what extent this reflects "preservation in situ." An inventory by one of the companies shows that nearly 40% of the sites they discovered may have been preserved in situ (Schutte et al. 2011). The heightened attention on the archaeological heritage has however not led to a substantial growth of legally protected archaeological monuments; in 2002, nearly 1,700 were listed and, in 2007, 1,770 (Rijksdienst voor het Cultureel Erfgoed 2009: 29). In 2017, this number had decreased to 1,448 (https://erfgoedmonitor.nl/sites/default/files/views_filebrowser/_def-erfgoedmonitor-jaarcijfers2016-a3liggend.pdf).

Most of field work is carried out by the commercial sector (Fig. 4). At the start of 2011, 19 companies had a license to excavate, mid-2017 30 had obtained a certificate (https://www.sikb.nl/archeologie/certificeren-en-registratie/certificaathouders). Municipalities can still obtain permission to excavate too. At the start of 2011, 23 municipal archaeological services had a license, but they increasingly focus on developing and applying heritage policies and on public outreach activities rather than on field work. In 2017, only 16 had opted to obtain a certificate. In addition, an increasing number of municipalities work together to create a regional archaeological service. It implies that at least 70 of all 318 municipalities (22%) have archaeological knowledge at their disposal. Both municipal and regional services participate in a network, called CGA (www.gemeente-archeologen.nl). Together the sector reported in 2016 nearly 4,000 archaeological activities, including 1,144 desk-based researches and 166 excavations (https://erfgoedmonitor.nl/sites/default/files/views_filebrowser/_def-erfgoedmonitor-jaarcijfers2016-a3liggend.pdf).

Apart from the companies with a license, at least another 100 private companies are active on the archaeological market. Most of them are doing various kinds of activities for which no license is needed, like consultancy, specialist services, presentations, etc. Most of the companies are joint in one of the two branch

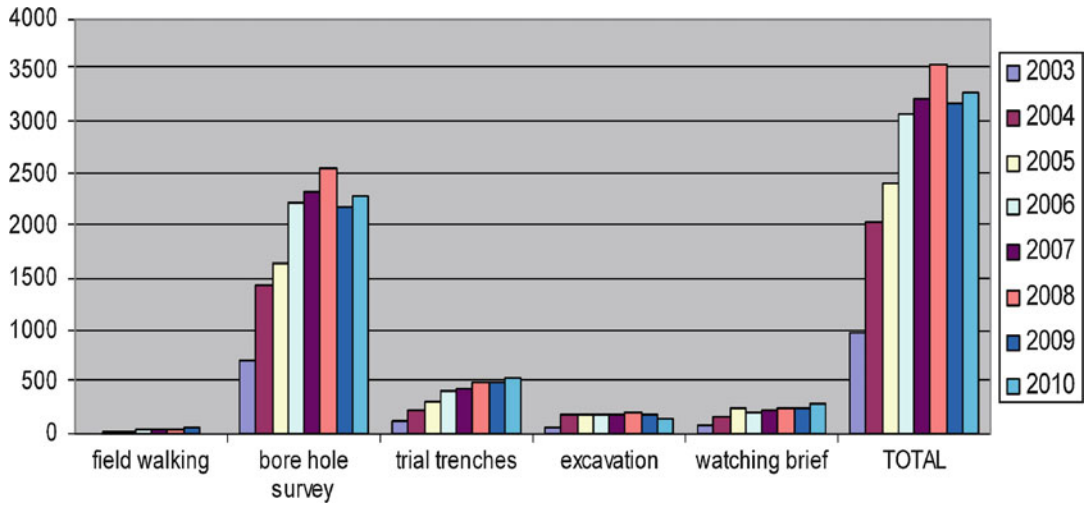

Netherlands: Cultural Heritage Management, Fig. 3 The annual number of field work projects as of 2003. (Source: archaeological information system ARCHIS, 2011)

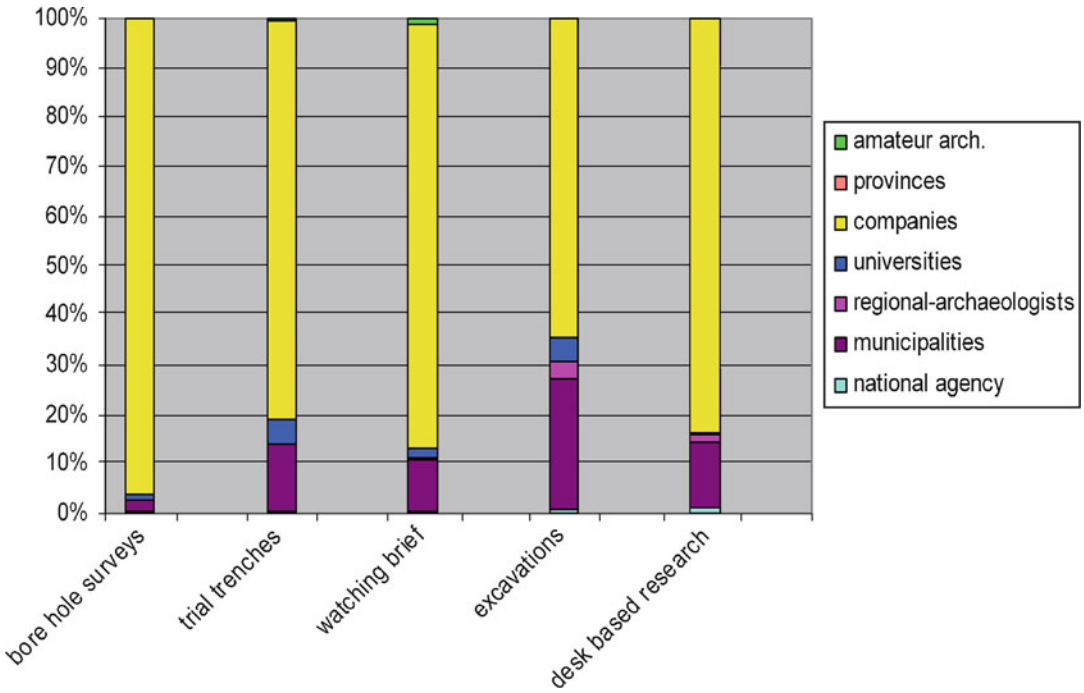

Netherlands: Cultural Heritage Management, Fig. 4 Most archaeological (field) work is nowadays carried out by commercial companies. (Source: archaeological information system ARCHIS, 2011)

organizations, VOIA (www.voia.nl) and NVAO (www.opgravingsbedrijven.nl).

As a result of the emerging commercial sector, employment in archaeological heritage hugely increased from an estimated number of around 800 in 2000 to over 1100 in 2011. It implied that prior to the global economic crisis of 2008/2009, there was almost full employment of the Netherlands' archaeologists. This also attracted large numbers of students for all five universities (Leiden, Groningen, two in Amsterdam, and Nijmegen) where archaeology is being taught. On a yearly basis, around 150 students start an archaeological training at one of the universities (www.vsnu.nl).

Cross-References

- ► European Convention on the Protection of Archaeological Heritage (1992)
- ► UNESCO (1972) and Malta (1992) Conventions
- ► Willems, Willem J.H.

References

Brongers, J.A. 1973. *1833: Reuvens in Drenthe. Een bijdrage tot de geschiedenis van de Nederlandse archeologie in de eerste helft van de negentiende eeuw*, Nederlandse Oudheden 4. Bussum: Unieboek.

Brongers, J.A. 1976. Material for a history of Dutch archaeology up to 1922. *Berichten ROB* 26: 7–62.

Erfgoedinspectie. 2010. *Monitorboek Erfgoedinspectie 2009–2010*. Den Haag: Erfgoedinspectie. Available at: http://www.erfgoedinspectie.nl/uploads/publications/monitorboek_erfgoedinspectie_2009_2010.pdf

Halbertsma, H. 1963. *Terpen tussen Vlie en Eems*. Groningen: Wolters.

Krauwer, M. 2015. Paving the way. In *Fernweh. Crossing borders and connecting people in archaeological heritage management. Essays in honour of prof. Willem J.H. Willems*, ed. M.H. van den Dries, S.J. van der Linde, and A. Strecker, 132–135. Leiden: Sidestone Press.

Rijksdienst voor het Cultureel Erfgoed. 2009. *Erfgoedbalans 2009. Archeologie, monumenten en cultuurlandschap in Nederland*. Amersfoort: Rijksdienst voor het Cultureel Erfgoed. Available at: http://www.cultureelerfgoed.nl/organisatie/publicaties-rijksdienst/erfgoedbalans-2009

Rijksdienst voor het Oudheidkundig Bodemonderzoek. 2002. *Archeologiebalans 2002*. Amersfoort: Rijksdienst voor het Oudheidkundig Bodemonderzoek.

N

Sarfatij, H., ed. 1990. *Verborgen steden, stadsarcheologie in Nederland*. Amsterdam: Meulenhoff.

Schutte, I.A., M.E. Lobbes, and M. Verbruggen. 2011. *Wie wat bewaart, die heeft wat. Kanttekeningen bij de werking van de Wet op de Archeologische Monumentenzorg (WAMZ)*, RAAP-Rapport 2525. Weesp: RAAP Archeologisch Adviesbureau.

van den Berg, H.M. 1981. *Noordelijk Oostergo. Ferwerderadeel*. Den Haag: Staatsuitgeverij.

van den Dries, M.H., and W.J.H. Willems. 2007. Quality management – The Dutch perspective. In *Quality management in archaeology*, ed. W.J.H. Willems and M.H. van den Dries, 50–65. Oxford: Oxbow Books.

van den Dries, M.H., K.E. Waugh, and C. Bakker. 2010. A crisis with many faces. The impact of the economic recession on Dutch archaeology. In *Archaeology and the global economic crisis – Multiple impacts, possible solutions*, ed. N. Schlanger and K. Aitchison, 55–68. Tervuren: CultureLab. Available at: http://ace-archaeology.eu/fichiers/25Archaeology-and-the-crisis.pdf

van Haaff, G. 2006. Veertig jaar wettelijke bescherming van archeologische monumenten. In *Uit balans, wordingsgeschiedenis en analyse van het bestand van wettelijk beschermde archeologische monumenten*, ed. P.A.M. Zoetbrood, C.A.M. van Rooijen, R.C.G.M. Lauwerier, G. van Haaff, and E. van As, 17–25. Amersfoort: Rijksdienst voor Archeologie, Cultuurlandschap en Monumenten.

Waugh, K.E. 2008. *Discovering the archaeologists of Europe: The Netherlands, archaeology labour market intelligence survey 2007–8*, Vestigia report 595. Amersfoort: Vestigia. Available at: http://www.discovering-archaeologists.eu/national_reports/DISCO_national_Netherlands_English_final.pdf

Willems, W.J.H. 1997. Archaeological heritage management in the Netherlands: Past, present and future. In *Archaeological heritage management in the Netherlands. Fifty years state service for archaeological investigations*, ed. W.J.H. Willems, H. Kars, and D.P. Hallewas, 3–34. Assen: Van Gorcum.

Willems, W.J.H. 2005. Contract archaeology and quality management in the Netherlands. In *Innovatie in de Nederlandse Archeologie*, ed. M.H. van den Dries and W.J.H. Willems, 153–161. Gouda: SIKB.

Willems, W.J.H., and R.W. Brandt. 2004. *Dutch archaeology quality standard*. Den Haag: Erfgoedinspectie. Available at: http://www.sikb.nl/upload/documents/archeo/knauk.pdf

Further Reading

Aitchison, K. 2009. After the 'gold rush': Global archaeology in 2009. *World Archaeology* 41 (4): 659–671.

Bazelmans, J. 2011. Serving two masters: Dutch archaeology since the Valletta Convention. In *Development led archaeology in Northwest Europe, proceedings of a round table at the University of Leicester 19th–21st November 2009*, ed. L. Webley, M. vander Linden, C. Haselgrove, and R. Bradley, 9–21. Oxford: Oxbow Books.

Kristiansen, K. 2009. Contract archaeology in Europe: An experiment in diversity. *World Archaeology* 41 (4): 641–648.

RIGO Research and Advies. 2011. *Ruimte voor archeologie, themaveldrapportages evaluatie WAMZ*. Amsterdam: RIGO Research and Advies. Available at: http://www.rijksoverheid.nl/documenten-en-publicaties/rapporten/2011/10/19/rapport-ruimte-voor-archeologie-themaveldrapportages-evaluatie-wamz.html

Sarfatij, H. 1997. Urban archaeology in the Netherlands: Its position in modern archaeological heritage management. In *Archaeological heritage management in the Netherlands. Fifty years state service for archaeological investigations*, ed. W.J.H. Willems, H. Kars, and D.P. Hallewas, 217–238. Assen: Van Gorcum.

van den Dries, M.H. 2011. The good, the bad and the ugly? Evaluating the three models of implementing the Valletta Convention. *World Archaeology* 43 (4): 598–609.

van den Dries, M.H., and S.J. van der Linde. 2012. Twenty years after Malta: Archaeological heritage as a source of collective memory and scientific study anno 2012. *Analecta Prehistorica Leidensia* 43/44: 9–19.

Willems, W.J.H. 2007. Met Malta meer mans? Een persoonlijke terugblik. In *Van contract tot wetenschap, tien jaar archeologisch onderzoek door Archol BV, 1997–2007*, ed. R. Jansen and L.P. Louwe Kooijmans, 45–58. Leiden: Archol BV.

Willems, W.J.H., H. Kars, and D.P. Hallewas, eds. 1997. *Archaeological heritage management in the Netherlands. Fifty years state service for archaeological investigations*, 3–34. Assen: Van Gorcum.

Neustupný, Evžen

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Basic Biographical Information

Evžen Neustupný was born in Prague, Czech Republic (formerly Czechoslovakia), in 1933. He studied prehistory and Egyptology at the Charles University in Prague and received his Ph.D. in prehistoric archaeology in 1957. Until 1966, he worked with rescue excavations of endangered sites at the Most branch of the Institute of Archaeology of the Czechoslovak Academy. He returned to Prague in 1966, and until 1998, he worked in the Institute mainly on archaeological theory and served from 1990 to 1993 as

its director. At the same time, Neustupný was a member of the presidium of the Czechoslovak Academy of Sciences. In 1998, he was the founding director and full professor of the Department of Archaeology at the University of West Bohemia in Pilsen. His specialization is archaeological theory and method, and the prehistory and protohistory of Central Europe ranging from the Neolithic to the Medieval periods.

Neustupný has published five monographs, three edited books, and more than 190 articles. Though his main publications focus on method and theory in archaeology – culminating in his renowned book, *Archaeological Method* (1993) and recently complemented by *Method of Archaeology* (2007) and *Theory of Archaeology* (2010), both not yet translated into English – his broad research interests and output range from studies on relative chronology to radiocarbon dating, from taphonomy to paleodemography, and nutrition through Central European pre- and protohistory. He has been both an active and accomplished field archaeologist – especially during his years at Most, when he spent most of the year in the field and created an effective documentation system for archaeological data from the excavation to laboratory analysis and recording to storage including a pioneering georeferencing of sites in coordinates – and acclaimed connoisseur of material culture, especially that of the Eneolithic period of Central Europe.

Neustupný's archaeological work and research has to be seen in light of the rise and fall of communism in Central and Eastern Europe. His deep conviction and refusal to be manipulated or silenced by its academic leadership is applaudable. On a side note, in the Czech language, *neustupný* means intransigent, unyielding, or pertinacious (Kuna 2012: 3), which quite adequately describes both his personal character and professional work ethic. As a student inspired by Marx, Saussure, and Hegel, he scrutinized the widespread (in continental Europe) culture-historical approach, using similar approaches as the early New Archaeologists/Processualists, such as deductive cognitive models and multivariate methods in mathematical analysis. It is especially interesting that Neustupný – completely isolated from Western archaeological communities – wrote an article on the preservation of bones at prehistoric settlements in the same year (1981) as Binford's famous "Bones" book.

Major Accomplishments

Evžen Neustupný's major accomplishments are in archaeological research and method and theory. He succinctly incorporates these in this writings ranging from *Czechoslovakia before the Slavs* (1961), an internationally acclaimed but in Czechoslovakia heavily criticized outline of the prehistory of this country, which he cowrote with his father, the well-known Czech archaeologist Jiří Neustupný (1905–1981), to his Marxist-inspired book *The beginnings of patriarchy in Central Europe* about the Eneolithic period (1967) and his more recent work on the "*Origin of Megalithic Architecture in Bohemia and Moravia"* (2001). He is also known for his witty, award winning *Antiquity* essay, "Whither Archaeology?" (1971), and his eloquent characterization of paradigm shifts in archaeology. More recently, he has disassociated himself from the processualism which 40 years ago he regarded as the driving force of integration of theory and practice in archaeology (Kuna 2012: 16).

His long-lasting influence on and intellectual struggle with European archaeology is a significant contribution. In particular, his early interest and rigorous support for radiocarbon dating (Bucha and Neustupný 1967) and eventually its calibration not only gained him an invitation to the prestigious Nobel symposium held in Uppsala, Sweden, in 1969 (Neustupný 1970) but also changed our understanding of European prehistory forever. He also coined enduring concepts and theories, such *social landscape* (1998) and lately *artifact archaeology* (2007, 2010), which are widely used both in Continental European and Anglo-American archaeology. His criticism that postmodern/postprocessual archaeologists were so far unable to provide an adequate approach to study the role of the individual as well as events in the past is the basis of a new theory he is currently developing to better understand culture change and culture transfer by rapid transformation of

symbolic cultural systems rather than by vast migration (Kuna 2012: 21–22). In his impressive body of work, Evžen Neustupný has shown that the minority status of Czech archaeology in his division of archaeological communities into mainstreams and minorities might have to be reconsidered.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Medieval Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Radiocarbon Dating in Archaeology
- ▶ Taphonomy: Definition

References

Bucha, V., and E. Neustupny. 1967. Changes of the earth's magnetic field and radiocarbon dating. *Nature* 215: 261–263.

Kuna, M. 2012. Intransigent archaeology. An interview with Evžen Neustupný on his life in archaeology. *Archaeological Dialogues* 19 (1): 3–28.

Neustupny, E. 1967. K počátkům patriarchátu ve střední Evropě [The beginnings of patriarchy in central Europe]. *Rozpravy ČSAV* 77 (2): 79.

Neustupny, E. 1970. The accuracy of radiocarbon dating. In *Nobel symposium*, ed. I.U. Olsson, vol. 12, 23–34. Stockholm.

Neustupny, E. 1971. Wither archaeology? *Antiquity* 45: 34–39.

Neustupny, E. 1981. Zachování kostí z pravěkých sídlišť [Destruction of bones in prehistoric sites]. *Archeologické rozhledy* 33 (2): 154–165.

Neustupny, E. 1993. *Archaeological method*. Cambridge: Cambridge University Press.

Neustupny, E. 2001. The origin of Megalithic architecture in Bohemia and Moravia. In *The archaeology of cult and religion*, ed. P. Biehl, F. Bertemes, and H. Meller, 203–207. Budapest: Archaeolingua.

Neustupny, E. 2007. *Metoda archeologie* [Method of archaeology]. Plzeň.

Neustupny, E. 2010. *Teorie archeologie* [Theory of archaeology]. Plzeň: Aleš Čeněk.

Neustupny, E., and J. Neustupny. 1961. *Czechoslovakia before the Slavs*. London: Thames and Hudson.

Further Reading

Kuna, M., and N. Venclova, eds. 1995. *Whither archaeology? Papers in honour of Evžen Neustupný*. Prague: Institute of Archaeology.

Neustupny, E. 1982. Prehistoric migrations by infiltration. *Archeologické rozhledy* 34: 278–298.

Neustupny, E. 1995. The significance of facts. *Journal of European Archaeology* 3 (1): 189–212.

Neustupny, E. 1998a. Otherness in prehistoric times. In *The world-view of prehistoric man*, ed. L. Larsson, 65–71. Lund: The Royal Academy of Letters, History and Antiquities.

Neustupny, E., ed. 1998b. *Space in prehistoric Bohemia*. Praguea: Institute of Archaeology.

Neustupny, E. 2000. The measure of deforestation in prehistoric Central Europe. In *Archeologia w teorii i praktyce*, ed. A. Buko and P. Urbańczyk, 345–352. Warszawa.

Neustupny, E. 2002. Czech archaeology at the turn of the millennium. In *Archaeologies of Europe. History, methods and theories*, ed. P.F. Biehl, A. Gramsch, and A. Marciniak, 283–288. Münster/New York: Waxmann.

Neustupny, E., ed. 2008. *Archeologie pravěkých Čech 4. Eneolit* [Archaeology of prehistoric Bohemia 4. Eneolithic]. Praha.

Neutron Activation Analysis (NAA): Applications in Archaeology

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Introduction

The chemical composition of archaeological materials has long been recognized as occupying an important role to archaeometric studies of technology, provenance, dating, authentication, conservation, preservation, and restoration (Pollard et al. 2007). Archaeologists make use of chemical data on man-made artifacts to investigate the impact of social and economic developments on changes in ancient technology. Compositional analyses of artifacts make it possible for archaeologists to conduct provenance and dating studies and to use the information to develop models of prehistoric migration and exchange (Glascock and Neff 2003). Knowledge of artifact compositions can assist museum curators in determining the authenticity of artifacts and in the development of methods for preserving and protecting

valuable and unique cultural objects (Lister and Renshaw 2004).

One of the important instrumental analytical techniques used to perform chemical analysis of archaeological materials is neutron activation analysis (NAA). The technique was employed to a study of artifacts for the first time during the mid-1950s (see review by Speakman and Glascock 2007). NAA continues, today, to occupy an important role as one of the key analytical methods used to chemically characterize a broad range of artifact types. This entry will explain how the NAA technique works.

Key Issues

Theory Behind Neutron Activation Analysis

NAA is a sensitive multi-element analytical technique used to perform both qualitative and quantitative analysis of major, minor, and trace elements in almost any type of sample (i.e., solid, liquid, or gas). The basis for NAA is that by exposing a sample to neutrons, nuclear reactions are induced with the nuclei of atoms present in the sample. The induced nuclear reactions are followed by the emission of gamma rays that can be detected and their characteristic energies measured to identify the specific nuclear reaction (s) taking place and, hence, identify the elements present in the sample. By measuring the number of emitted gamma rays, the amounts of different elements in the sample can be determined with a high degree of accuracy and precision. For many elements, the sensitivities possible with NAA are at levels ranging into the parts per million, parts per billion, and below. Because it is possible to determine a large number of elements in a wide range of sample types, NAA methods can be used to establish compositional profiles or "chemical fingerprints" of samples to support research in a variety of disciplines ranging from archaeology to zoology (Alfassi 1990).

Readers wanting more information about the theory and practice of NAA and related methods of activation analysis should consult the following references: De Soete et al. (1972), Ehmann and Vance (1991), Glascock (1998), and Neff (2000).

Nuclear Reactions

Nuclear reactions occupy a central role for all methods of activation analysis. In a nuclear reaction, the incident particle interacts with the target nucleus either by scattering or by absorption. The interaction causes the nucleons (i.e., protons and neutrons) present in the nucleus to become excited. The process frequently results in creation of a different product nucleus and the emission of one or more particles and/or photons. The diagram shown in Fig. 1 illustrates a typical nuclear reaction involving interaction of an incident neutron with a target nucleus followed by the emission of both prompt particles and prompt gamma rays and resulting in a new product nucleus. In this example, the latter nucleus happens to be radioactive. Whether or not this new nucleus happens to be radioactive will depend on the nuclear

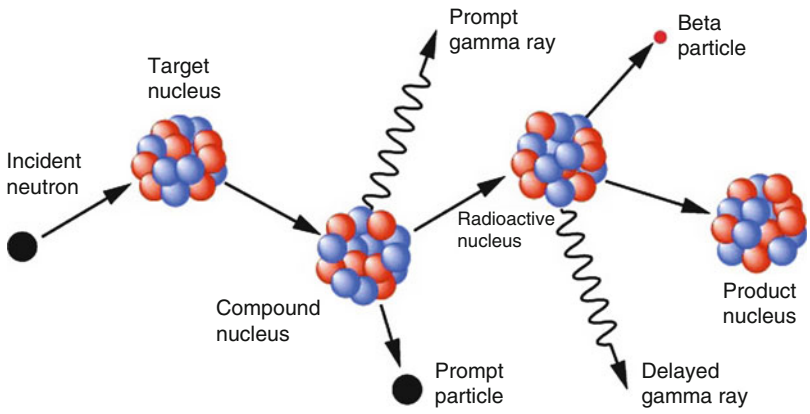

Neutron Activation Analysis (NAA): Applications in Archaeology, Fig. 1 Sketch showing a nuclear reaction between an incident neutron and a target nucleus. The prompt and delayed emissions that follow from the reaction are also shown. In NAA, the energy and intensity of the delayed gamma signal is measured to determine quantitative composition of the sample

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properties of the new nuclide. If a radioactive nucleus is produced, the emission of additional decay particles or decay gamma rays will follow through one or more decays until a stable product nucleus is created.

A typical nuclear reaction can be described by the general expression

$$a + A \rightarrow [X] \rightarrow b + B + Q \qquad (1)$$

or in shorthand notation as $A(a,b)B$. In the expression shown here, a indicates the incident particle or radiation, A is the target nucleus, $[X]$ is the compound nucleus in a state of excitation, B is the product nucleus, b is the exiting particle or radiation, and Q accounts for the total amount of energy released or absorbed during the reaction. When Q is positive, the reaction is exoergic. When Q is negative, the reaction is endoergic.

Some of the incident neutron energy is used to conserve momentum for the particle-nucleus system. Therefore, the incident neutron must have a kinetic energy in excess of the Q value. The minimum amount of kinetic energy required for a particular nuclear reaction to take place is known as the minimum threshold energy or E_T.

Most of the reactions used for NAA are exoergic such that the reaction can take place when the incident neutron has a kinetic energy of nearly zero. This is the situation for reactions involving the absorption of thermal or epithermal neutrons. These reactions are also referred to as neutron capture or (n,γ) reactions. At higher neutron energies and when the threshold energy is exceeded, particle-emission reactions such as (n,p), (n,α), (n,n′), and (n,2n) are more common. The diagram shown in Fig. 2 illustrates a portion of the Chart of the Nuclides and shows the positions of product nuclides for selected nuclear reactions relative to the target nucleus.

Most NAA applications rely on measurement of the prompt gamma rays emitted from the compound nucleus $[X]$ or delayed gamma rays emitted from the product radionuclide B. The measurement of delayed gamma rays is usually preferred over measurement of prompt gamma rays because the sensitivities are much higher. The main

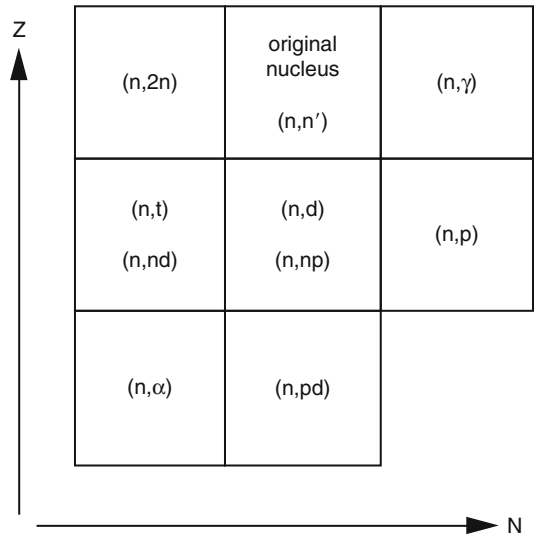

Neutron Activation Analysis (NAA): Applications in Archaeology, Fig. 2 Relative locations of the products from various neutron-induced processes on the Chart of the Nuclides. Z is the number of protons and N is the number of neutrons in the nucleus

exceptions are those elements that do not produce a convenient radionuclide (e.g., B, Li, P, Y, Bi, and Pb) for one reason or another. For these elements, it is sometimes necessary to measure the prompt gamma rays or consider use of a completely different analytical method.

Reactor Neutron Spectrum and Reaction Cross Sections

Nuclear reactors based on the fission of uranium offer the most intense neutron sources available for NAA. The neutron spectrum in a reactor consists of three regimes as illustrated in Fig. 3. In the high-energy region, fission-produced neutrons still have most of their original energy (i.e., approximately 2–6 MeV) and are frequently called primary fission or "fast" neutrons. Fast neutrons lose their energy rapidly through elastic scattering with moderating materials in the reactor, such as water and graphite. Neutrons in the energy range from 0.5 eV to 1 MeV are commonly referred to as epithermal neutrons and have been partially slowed down. At energies below 0.5 eV, the neutrons are usually referred to as thermal neutrons, and they have slowed to where they

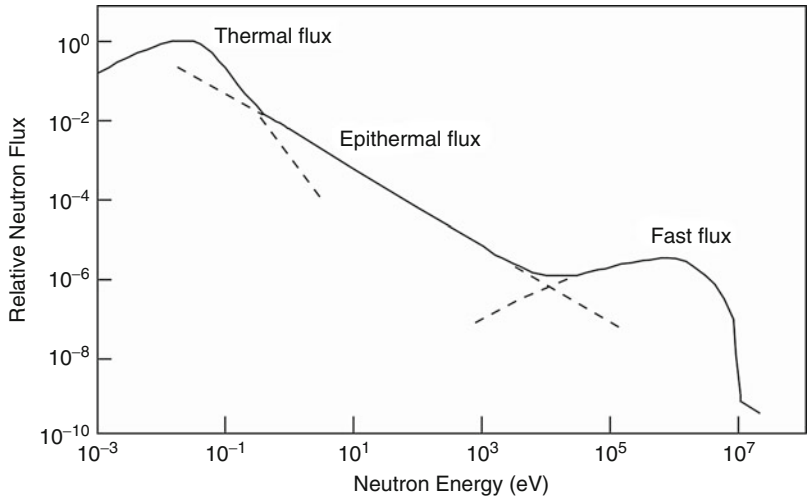

Neutron Activation Analysis (NAA): Applications in Archaeology, Fig. 3 A typical neutron spectrum from a nuclear fission reactor

have a velocity distribution similar to that of the molecules and atoms in their surroundings. In a typical light-water-moderated reactor, the fluxes of epithermal and fast neutrons are on the order of 2–3% and 6–8%, respectively, of the thermal neutron flux.

The interaction rate for a given nuclear reaction depends on the number of incident neutrons, the number of target nuclei of a particular type present in the target sample, and the probability that the particular nuclear reaction will occur. To a first approximation, the reaction probability, σ, for a single incident neutron is similar in magnitude to the cross-sectional area of the target nucleus, which for most nuclei is on the order of 10^{-24} cm^2. For the sake of convenience, reaction cross sections are usually expressed in units of barns (b), where 1 b = 10^{-24} cm^2. Actual reaction cross sections will vary widely according to the energy and the type of incident particle, the identity of the target nuclide, and the specific type of reaction. In general, neutron capture (n,γ) reactions with low-energy neutrons have the highest cross sections and account for a majority of the radioactivity produced by NAA.

Epithermal neutrons also contribute to the total amount of radioactivity produced by (n,γ) reactions. However, since the number of epithermal neutrons is much smaller, their contribution is usually much less. Due to resonances in the cross-section curve above 0.5 eV, the (n,γ) cross section varies widely. To facilitate the calculation of radioactivity induced by epithermal neutrons, an epithermal cross section (also called the effective resonance integral) is defined by the expression

$$I = \int_{0.5eV}^{\infty} \frac{\sigma(E)}{E} dE \qquad (2)$$

Because both thermal and epithermal neutrons can induce (n,γ) reactions, a non-rigorous but commonly used expression to describe the total reaction rate for a particular nuclide in a uniform flux of incident neutrons is given by

$$R = n\left[\varphi_{th}\sigma_{th} + \varphi_{epi}I\right] \qquad (3)$$

where n represents the number of target atoms belonging to the nuclide of interest in the sample, φ_{th} and φ_{epi} are the respective thermal and epithermal neutron fluxes (cm^{-2} s^{-1}), and σ_{th} and I are the respective thermal and effective resonance integral cross sections (b).

Although reactions involving low-energy neutrons tend to have the highest cross sections, the magnitudes of the cross sections are quite variable and depend greatly upon the target nucleus. At higher neutron energies, the cross sections for (n,γ) reactions are very small. Instead, reactions that result in the ejection from the nucleus of one

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or more particles – (n,p), (n,α), (n,n′), and (n,2n) – are dominant. As mentioned earlier, these reactions are only possible if the neutron energy is above the minimum threshold energy. Because the energy distribution is complex at high neutron energies, an average cross section for fast neutrons is defined by the expression

$$\overline{\sigma_f} = \frac{\int_{E_T}^{\infty} \sigma(E)\varphi(E)dE}{\int_{E_T}^{\infty} \varphi(E)dE} \tag{4}$$

Using this average cross section, the total reaction rate for a particular fast neutron reaction is given by the equation

$$R = n\varphi_f \overline{\sigma_f} \tag{5}$$

where φ_f is defined as the average fast neutron flux. There are only a few instances in which fast neutrons are important to NAA. Among these are the measurement of nickel using the ^{58}Ni(n,p)^{58}Co reaction and corrections to the (n,γ) reactions for several light-mass elements (e.g., Na, Mg, Al) due to interference from fast neutron reactions. In general, fast neutron reactions range in magnitude from about 0.5 to 10^{-12} b.

For nuclear reactions involving neutrons, the attenuation of neutrons by the sample is usually not a problem because neutrons have no charge and they pass through most samples being analyzed by NAA with very little attenuation. However, the presence of certain high cross-section elements (e.g., boron, cadmium, gadolinium, gold) in a sample can have a significant absorption effect on neutrons causing variations in the neutron flux. This effect is commonly referred to as sample self-shielding. Charged particle beams and photon beams are affected differently from neutrons, such that absorption effects must be considered on the basis of both particle energy and atomic number of the target matrix.

Radioactive Decay

Radioactive decay involves the spontaneous transformation of atoms by emission of particles or gamma rays from the nucleus or by the emission of X-rays after capture of shell electrons by the nucleus. When performing activation analysis, one must recognize the radioactive species, the amount of radioactivity present, and the length of time that the radioactivity will be present. Radioactive decay is a statistical process. For a sample that has been made radioactive, there is no way to predict which atom will be the next to decay, but it is possible to describe the decay characteristics of the entire sample. The number of atoms of a particular radionuclide that decay per unit of time is defined as the activity, **A**, and this rate of decay is known as the fundamental law of radioactivity:

$$A = -\frac{dN}{dt} = \lambda N \tag{6}$$

where N is the number of radioactive atoms and λ is defined as the decay constant. The value of λ is different for each species of radionuclide. The solution to Eq. 6 gives an equation describing the time dependence of the number of atoms of a particular radionuclide present as

$$N(t) = N_0\, e^{-\lambda t} \tag{7}$$

where N_0 is the number of radioactive atoms at time $t = 0$. Therefore, radioactive decay follows the exponential law, and the activity of the radionuclide is controlled by a characteristic property known as the half-life (i.e., the period of time during which half of the original atoms of that nuclide disintegrate). Since the activity is proportional to the number of radioactive atoms, it also decreases exponentially according to the expression:

$$A(t) = A_0\, e^{-\lambda t} \tag{8}$$

The exponential behavior of radioactivity, as defined by Eqs. 5 and 6, is due to the fact that all radioactive transmutations are essentially random. Deviations from this behavior are increasingly smaller as larger numbers of radioactive atoms are monitored.

The half-life is related to the decay constant according to

$$t_{\frac{1}{2}} = \frac{\ln 2}{\lambda} = \frac{0.693}{\lambda} \quad (9)$$

The half-lives of various radionuclides range from milliseconds to several times the age of the universe.

Radionuclide Production

For most NAA measurements, the numbers of nuclei decaying are measured during a post-irradiation time period. The number of decaying nuclei for a particular species depends on the total number of radioactive nuclei produced during the irradiation less the number of nuclei that decayed during the irradiation period and the number that decay during the interval between the end of irradiation and the beginning of measurement. Thus, the rate of production, half-life, length of irradiation (T_i), length of decay (T_d), and length of measurement (T_c) must be considered.

Mathematically, the rate of change in the number of radioactive nuclei during irradiation is given by the difference between rate of production and rate of decay. If one assumes that the sample was irradiated by a uniform flux, an equation to describe the rate of change is

$$\frac{dN^*}{dt} = R - \lambda N^* \quad (10)$$

where R is the reaction rate and N^* is the number of atoms of the radionuclide present. If the Eq. 10 is integrated using the initial condition that $N^*(t = 0)$, then the total number of radioactive nuclei present at the end of irradiation is

$$N_0^* = \frac{R}{\lambda}\left(1 - e^{-\lambda T_i}\right). \quad (11)$$

In general, measurement of radiation emitted from activated samples does not begin immediately after irradiation, but after some period of decay. Under normal conditions, short decay times are used for radionuclides with short half-lives and long decay times are used when the half-life of the radioisotope of interest is long. The long decay time allows possible short-lived nuclides with initially high activities to become insignificant. Therefore, an equation describing the number of radioactive atoms that decay between the start and end of a measuring period is

$$\Delta N = \frac{R}{\lambda}\left(1 - e^{-\lambda T_i}\right)e^{-\lambda T_d}\left(1 - e^{-\lambda T_c}\right) \quad (12)$$

Special Conditions for NAA

When the sample matrix contains high concentrations of Na, Al, K, Sc, Cr, Mn, Fe, or certain other elements with high thermal neutron cross sections, it can be difficult to measure low-concentration elements due to the masking of activities by the major elements. A possible solution for this problem exists for elements that have high ratios of I/σ_{th}. The sensitivities for elements such as Ag, As, Au, Gd, In, Mo, Pd, Pt, Ta, Th, U, and W can be improved by using neutron filters made of B or Cd which themselves have high thermal neutron cross sections to shield samples from thermal neutrons. The technique is known as epithermal neutron activation analysis (ENAA), and by suppressing those elements most sensitive to thermal neutrons, the relative sensitivities for elements with high I/σ_{th} ratios are enhanced. In this same way, the shielded irradiations are also useful for fast neutron activation analysis (FNAA) when the (n,p), (n,α), (n,n'), and (n,2n) reactions are being used to correct for possible interferences with (n,γ) reactions.

Calculating Concentrations

In NAA, the radioactive nuclei produced usually undergo decay to daughter nuclei by emitting beta particles. The daughter nuclei created are often in excited states and undergo emission of one or more gamma rays before arriving at a ground state. In conjunction with the irradiation and decay parameters, measurement of these gamma rays yields the information necessary to determine the abundances of elements in the irradiated sample.

Gamma rays interact with matter in several ways, one of which is an absorption process by which the energy of the gamma ray is transferred to photoelectrons inside a semiconductor detector. The photoelectrons are converted into electrical pulses which can be measured to determine the energy of the incoming gamma ray. A typical

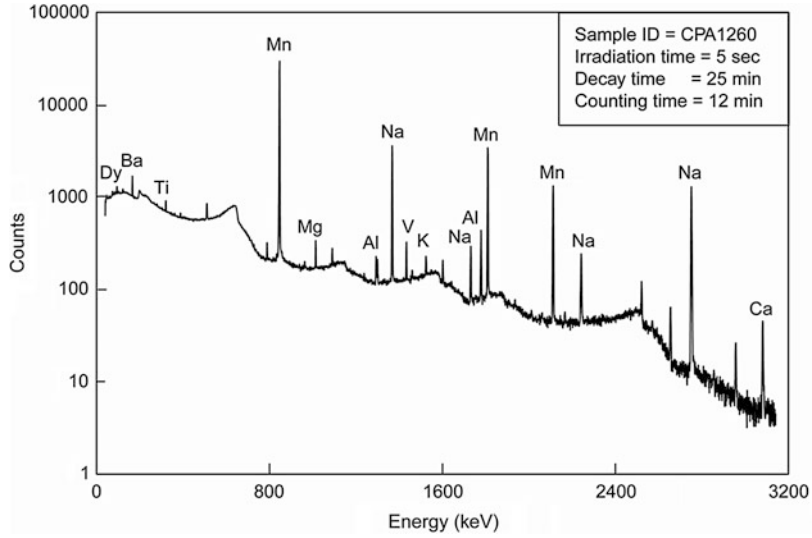

Neutron Activation Analysis (NAA): Applications in Archaeology, Fig. 4 Gamma-ray spectrum from a sample made radioactive by neutron activation

spectrum of gamma rays collected in a high-purity germanium (HPGe) detector used to measure a sample of obsidian after irradiation is shown in Fig. 4.

The photopeaks shown in Fig. 4 are the main gamma rays detected from different radioactive isotopes present in the sample. The actual number of gamma rays collected by the HPGe detector is smaller than the total number of decays due to several factors:

1. The intensities (gamma-ray branching ratios) of emitted gamma rays are in many cases less than 100%. This means that a gamma ray of a particular energy may not be released with every decay event.
2. Some of the emitted gamma rays do not reach the detector. Due to the isotropic nature of gamma-ray emission, only those headed in the direction of the detector can be measured. In addition, absorbing materials between the sample and the detector will reduce the number arriving at the detector.
3. A portion of the gamma rays will pass through the detector without interacting, especially the high-energy gamma rays. In other cases, some gamma rays lose part of their energy through Compton scattering and pair production effects, thus contributing to the gamma continuum beneath the photopeaks of interest.

Peak identification can be accomplished by consulting a number of compilations of decay schemes and related tables listing the associated gamma-ray energies and branching ratios (Erdtmann and Soyka 1979; Firestone et al. 1996). For most peaks, the peak area can be determined by summing the total number of counts under the peak and subtracting an estimated or fitted background. The count rate for a particular gamma ray is then calculated by dividing the peak area by the counting time.

In order to convert the measured count rates into concentrations, one can use an absolute method based on the knowledge of all nuclear and experimental parameters. For NAA measurements using thermal and epithermal neutrons, an equation to express the activity present at any time is

$$A = \left(\frac{m}{M} N_A \theta\right)\left(\varphi_{th}\sigma_{th} + \varphi_{epi} I\right) P_\gamma \varepsilon S D C \quad (13)$$

where m = mass of sample (g), M = atomic weight (g mol^{-1}), N_A = Avogadro's number (6.02×10^{23} molecules mol^{-1}), θ = isotopic abundance, $P\gamma$ = intensity of the measured gamma ray, ε = efficiency of the detector at the energy of the measured gamma ray, S = irradiation factor ($1 - e^{-\lambda Ti}$), D = decay factor ($e^{-\lambda Td}$), and C = count factor ($1 - e^{-\lambda Tc}$).

The absolute activation analysis procedure using Eq. 13 is rarely used in NAA because much easier comparator methods are normally preferred. The equation used to calculate the mass of an element present in an unknown sample relative to a standard with known concentration is

$$\frac{A_{\text{sam}}}{A_{\text{std}}} = \frac{m_{\text{sam}}\left(e^{-\lambda T_d}\right)_{\text{sam}}}{m_{\text{std}}\left(e^{-\lambda T_d}\right)_{\text{std}}} \tag{14}$$

where $A =$ the activity or count rate for the sample (sam) and standard (std), $m =$ mass of the element, and $T_d =$ the decay time. When performing short irradiations, the irradiation, decay, and counting times are usually identical for all samples and standards (i.e., the steps are performed on individual samples and standards sequentially, and all counting uses the same geometry) such that all time-dependent and geometric factors will cancel. Thus, the previous equation simplifies to

$$c_{\text{sam}} = c_{\text{std}} \frac{W_{\text{std}}}{W_{\text{sam}}} \frac{A_{\text{sam}}}{A_{std}} \tag{15}$$

where $c =$ concentrations of the element of interest in the sample and standard, respectively, and $W =$ the weights of the sample and standard.

Standard Reference Materials and Quality Control Monitors

A majority of today's NAA laboratories utilize one or more multi-element calibration standards when performing an analysis. The basic procedure is to collect gamma-ray spectra for both unknowns and standards under conditions that are as similar as possible, then to use one of the equations above to calculate concentrations for the elements whose peaks appear in the gamma spectra of both the standards and the unknowns. Quality control and check standards are usually included with each batch irradiation in order to provide an independent check on the quality of the data and to identify mistakes, such as weighing errors, before the data are interpreted by archaeologists. Certified reference standards for analysis of archaeological and geological materials can be purchased from the National Institute of Standards and Technology (NIST). Other well-known sources of standard reference materials are the United States Geological Survey and the Geological Survey of Japan.

Advantages and Disadvantages of NAA

Neutron activation analysis has a number of important advantages for analysis of many types of archaeological specimens. One of the most important is the transparency of artifact matrices containing high amounts of elements such as C, N, O, and Si. These elements make up the abundance of the sample matrix for a large fraction of archaeological and geological materials; however, by NAA, these elements will hardly form any radioactive isotopes. This makes NAA a more sensitive technique for measuring the trace and minor elements present in solid sample matrices without the need for sample dissolution. Thus, for most types of archaeological samples, it is rarely necessary to perform any sample preparation other than size reduction to obtain an appropriate amount of sample material (usually 100–200 mg is sufficient, but sometimes as little as 5 mg can be used). This limited requirement for sample preparation reduces the likelihood of contamination caused by sample preparation.

Most sources of systematic or random error such as interfering nuclear reactions, overlapping spectral lines, and dead-time losses are readily identifiable, since the theory of NAA is well understood. Nearly all of the interferences that occur can be corrected by adjusting the decay time before measurement or by measuring the same sample twice using different irradiation conditions to correct for fast neutron interferences. Due to its outstanding precision and accuracy, NAA is usually considered the referring technique for samples that yield differing results when analyzed by other analytical techniques.

Neutron activation analysis has some limitations also. Extremely large samples cannot be analyzed in a reactor without making the entire sample radioactive. Therefore, for large artifacts or museum objects, analytical samples must be obtained by removing a piece of the object (e.g., drilling from an obscure location is often recommended). Because NAA usually requires the sample material to be irradiated and measured

following a period of decay, the results are not available immediately. And, in recent years, the number of research reactors has declined such that NAA is gradually becoming less available and the remaining capability is more expensive.

Conclusions

This brief resume has concentrated on describing the basic theory and application of NAA. The method is very sensitive and has a broad range of applications. It is important that users of any analytical methodology understand and recognize the capabilities and limitations of the methods being employed so that accurate and reproducible measurements of major, minor, and trace elements can be performed.

Cross-References

- ▶ Archaeometry Laboratory at the University of Missouri Research Reactor (MURR)
- ▶ Ceramics: Scientific Analysis
- ▶ Provenance Studies in Archaeology

Acknowledgments This work was supported in part by a grant from the US National Science Foundation (BCS-0802757).

References

Alfassi, Z.B., ed. 1990. *Activation analysis*, Vols. I & II. Boca Raton: CRC Press.

De Soete, D., R. Gijbels, and J. Hoste. 1972. *Neutron activation analysis*. Chemical Analysis: A series of Monographs on Analytical Chemistry and Its Applications 34. New York: Wiley.

Ehmann, W.D., and D.E. Vance. 1991. *Radiochemistry and nuclear methods of analysis*. Chemical Analysis: A Series of Monographs on Analytical Chemistry and Its Applications 116. New York: Wiley.

Erdtmann, G., and W. Soyka. 1979. *The gamma rays of the radionuclides: Tables for applied gamma ray spectroscopy*. Weinheim: Verlag Chemie.

Firestone, R.B., V.S. Shirley, C.M. Baglin, S.Y. Chu, and J. Zipkin. 1996. *Table of isotopes*. 8th ed. New York: Wiley.

Glascock, M.D. 1998. Activation analysis. In *Instrumental multi-element chemical analysis*, ed. Z.B. Alfassi, 93–150. Dordrecht: Kluwer Academic Publishers.

Glascock, M.D., and H. Neff. 2003. Neutron activation analysis and provenance research in archaeology. *Measurement Science and Technology* 14: 1516–1526.

Lister, T., and J. Renshaw. 2004. *Conservation chemistry: An introduction*. London: Royal Society of Chemistry.

Neff, H. 2000. Neutron activation analysis for provenance determination in archaeology. In *Modern analytical methods in art and archaeology*, ed. E. Ciliberto and G. Spoto, 81–134. New York: Wiley.

Pollard, A.M., C.M. Batt, B. Stern, and S.M.M. Young. 2007. *Analytical chemistry in archaeology*. Cambridge Manuals in Archaeology. New York: Cambridge University Press.

Speakman, R.J., and M.D. Glascock. 2007. Acknowledging fifty years of neutron activation analysis in archaeology. *Archaeometry* 49: 179–183.

Further Reading

Knoll, G.F. 2010. *Radiation detection and measurement*. 4th ed. New York: Wiley.

Nevada Test Site

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Introduction

The Nevada Test Site, now named the Nevada National Security Site due to a change of mission, is located 105 km northwest of Las Vegas and is operated by the US Department of Energy's Nevada Site Office. This test site was the United States continental nuclear testing ground during the Cold War. Between January 20, 1951, and September 23, 1992, the United States conducted 928 nuclear tests there, 100 atmospheric and 828 underground tests (US Department of Energy 2000: xxviii). Other nuclear-related projects also were carried out within the site boundaries, an area of 3520 km^2.

Key Issues/Current Debates/Future Directions/Examples

For many years, archaeological research focused solely on prehistoric and historic cultural

resources, ignoring nuclear testing remains. In 1991, Colleen M. Beck presented a proposal to the Nevada Site Office that outlined the historic importance of the built environment associated with nuclear testing and the need to document these locations. On September 26, 1991, the first nuclear testing-related structure, an underground parking garage designed as a fallout shelter, was studied by an archaeologist and an architect. This research was immediately followed by documentation of the 1527 ft. tall Bare Reactor Experiment Nevada tower, a tower that housed a nuclear reactor used in experiments to accurately estimate the radiation doses received by selected survivors of the atomic bombings of Nagasaki and Hiroshima.

From 1991 forward, the archaeological study of nuclear testing sites has been an integral component of the cultural resources program for the site (Beck 2002). The concept of doing archaeology of Cold War buildings and structures, much less nuclear testing-related locations, was slow to acceptance in the archaeological community. A 1995 article on nuclear testing studies in Archaeology Magazine (Johnson and Beck 1995) generated discussion as to whether or not this work qualified as archaeology and also served as an impetus and example for Cold War archaeological studies related to military installations, government facilities, civilian structures, and at other nuclear facilities within the Department of Energy complex (Schofield et al. 2006; Nickens et al. 2001; Harvey 2001; McGehee 2001).

Between 1991 and the end of 2011, the nuclear archaeology program at the site has documented more than 650 nuclear testing-associated buildings, structures, and objects, as well as artifacts related to the construction and use of testing locations. In the Frenchman Flat historic district (Johnson et al. 2000) and the Apple-2 historic district (Johnson and Edwards 2000), archaeologists recorded the actual structures and features that survived nuclear tests. The Frenchman Flat inventory is noteworthy because no one knew how many nor the types of structures and features left. The archaeological study identified a surprising 157 structures (Fig. 1) and features from 14 atmospheric tests. At the Apple-2 test, one of the wood two-story houses (Fig. 2) still remains, a building type best known from the iconic film footage of the destruction of a similar building by the nuclear blast. One atmospheric test, named Grable, was the only time a nuclear device was shot from a cannon as a nuclear projectile. Although the coordinates of the explosion were documented, the location where the cannon had been placed had been lost through time. An archaeological survey found this place over 10 km south of the detonation. It was identified based on the presence of a trench with substantial

Nevada Test Site, Fig. 1 Nuclear testing remains in Frenchman Flat

Nevada Test Site, Fig. 2 Apple-2 two-story house with blast damage

Nevada Test Site, Fig. 3 Sedan Crater

tie-downs, communication cables, and other assorted artifacts.

In the early 1960s, there were tests associated with the Plowshare Program, a series of projects to evaluate the feasibility of using nuclear detonations for peaceful purposes, such as construction of canals and harbors and to increase oil and gas production. One of these locations, the Sedan Crater (Fig. 3) on the Nevada Test Site is listed on the United States National Register of Historic Places. Archaeologists further identified and documented a number of Plowshare locations in the western United States outside the Nevada Test Site. This research studied locations that had fallen from common knowledge within the Department of Energy after the program ended

Nevada Test Site, Fig. 4 Nuclear testing tunnel entrance

and this work is the only compilation of information on this aspect of the Plowshare Program (Beck et al. 2011).

After 1963, testing was conducted underground in tunnels and vertical shafts. Although craters from nuclear tests in vertical shafts are common, there has been little research conducted at these locations. In recent years, there has been a long-term project to document the historic landscapes of nuclear testing tunnels (Fig. 4) for horizontal underground tests (Drollinger et al. 2011; Jones et al. 2013). Associated landscape features number as many as 200 with a single tunnel. A recent study of structural response program structures, built to study the effect of underground detonations in tunnels and vertical shafts on buildings, provided information about 14 structures that have become enigmas on the landscape.

The sets of benches where dignitaries and others watched the atmospheric tests are a favorite of visitors because everyone tries to imagine what it was like to view a nuclear detonation. Archaeological studies have been completed on News Nob, the best known of the viewing locations and on five other sets at other locations. Three of these sets were first documented through archaeological research.

Archaeological research also has been conducted at other locations related to nuclear research, such as Camp Desert Rock, military trenches, an experimental farm, and the Nuclear Rocket Development Station. At the south end of the test site is Camp Desert Rock, the place where military personnel were stationed during their participation in maneuvers for atmospheric tests. Although all standing structures have been removed, the remains produced a remarkably well-preserved vision of the camp organization. Even trenches near testing locations used by the troops still exist. At the north end was the Environmental Protection Agency experimental farm. Besides a crop field, this farm included a laboratory and dairy facilities for the 100-head herd that was used to determine if radioactive materials in the environment were being transported to humans through the soil-forage-cow-milk food chain. In another area, four facilities at the Nuclear Rocket Development Station present a complex picture of the research and development activities for a nuclear reactor-powered rocket for long trips in space (Drollinger et al. 2000; Beck et al. 2001). A smaller, yet similar facility for the development of nuclear reactor-powered ramjet engines for cruise missiles has also been studied by archaeologists. Rail lines were used to transport the reactors and engines for testing purposes. For years, many of the railroad vehicles, modified for this specialty research, could not be located nor could information about their disposition. Then, it was discovered that most had been stored in an open-

air facility that is now a documented archaeological site.

Future directions in research will develop a methodology to study vertical underground nuclear tests, identify the changes in the cultural landscape based on what is known about the appearance of a test location when it was ready for the detonation, and how the test location looks today. Efforts will continue to document and analyze the nuclear landscape.

Near the test site, archaeologists have been conducting research at a peace camp. This study tells the other side of the nuclear story. Two archaeologists who worked on the Nevada Test Site, Colleen M. Beck and Harold Drollinger, with John Schofield, who had been involved in a peace camp project at Greenham Common in England, began surveying the camp in 2002. Based on a preliminary visit, these archaeologists estimated 50 or so features in the area. Much to their

Nevada Test Site, Fig. 5 Peace Camp symbol

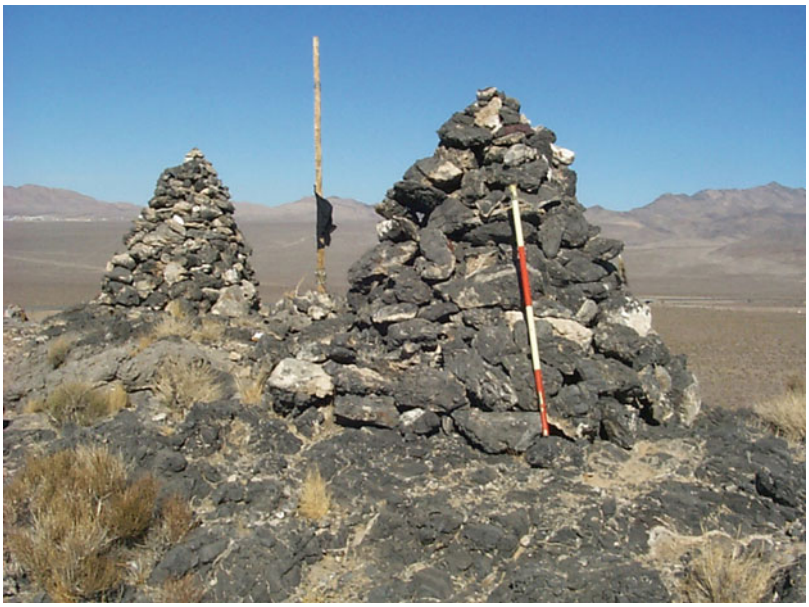

Nevada Test Site, Fig. 6 Rock cairns on hill

surprise, in addition to camping and cooking areas, a Western Shoshone ceremonial space, and some easily seen rock features and geoglyphs, the peace activists expressed their views through a rich artistic tradition that has been left on the landscape. There are geoglyphs of peace signs (Fig. 5), rock circles, sculptures, and drainage tunnels with antinuclear and peace-related paintings and personal expressions. Even the top of a nearby hill is covered with items, such as large rock cairns (Fig. 6), offerings, a stone compass, and a red clay sculpture of a pregnant woman. The discovery of the extensive use of the landscape was not anticipated nor were the more than 800 features that have been recorded there (Schofield et al. 2006; Beck et al. 2007, 2009).

More than 200 antinuclear and peace groups used this area. The largest demonstration was the American Peace Test in 1988 with more than 8000 participants (Butigan 2003). The Peace Camp continues in use today with dozens instead of thousands of people gathering together. The challenge of working at this location has been the changing landscape due to reuse of the area during the research and subsequently, an uncommon aspect to most archaeology that will lead to future recording of new features and alterations to existing features.

Cross-References

- ▶ Archaeology and Politics
- ▶ Buildings, Archaeological Study of
- ▶ Cold War
- ▶ Modern Material Culture, Archaeology of

References

Beck, C. 2002. The archaeology of scientific experiments at a nuclear testing ground. In *Matériel culture: The archaeology of 20th century conflict*, ed. J. Schofield, W. Johnson, and C. Beck, 65–79. London: Routledge Press.

Beck, C., H. Drollinger, and N. Goldenberg. 2001. *Historic American Engineering Record, Nevada Test Site, Test Cell A facility, HAER no. NV-33*. Washington, DC: Library of Congress.

Beck, C., H. Drollinger, and J. Schofield. 2007. Archaeology of dissent, landscape and symbolism at the Nevada peace camp. In *Fearsome heritage: Diverse legacies of the Cold War*, ed. J. Schofield and W. Cocroft, 297–320. Walnut Creek: Left Coast Press.

Beck, C., H. Drollinger, and J. Schofield. 2009. Archaeologists, activists, and a Nevada peace camp. In *Contemporary archaeologies: Excavating now*, ed. C. Haltorf and A. Piccini, 95–112. Berlin: Peter Lang.

Beck, C., S. Edwards, and M. King. 2011. *The off-site Plowshare and Vela Uniform programs, Volumes 1–3*. Desert Research Institute Cultural Resources Technical Report 111. Las Vegas: Desert Research Institute.

Butigan, K. 2003. *Pilgrimage through a burning world: Spiritual practice and nonviolent protest at the Nevada Test Site*. Albany: State University of New York Press.

Drollinger, H., C. Beck, and N. Goldenberg. 2000. *Historic American Engineering Record, Nevada Test Site, Test Cell C facility, building 3210, HAER no. NV-30-A*. Washington, DC: Library of Congress.

Drollinger, H., R. Jones, T. Bullard, L. Ashbaugh, and W. Griffin. 2011. *A historical evaluation of the U12n tunnel, Nevada National Security Site, Nye County, Nevada*. Desert Research Institute Cultural Resources Technical Report 106. Las Vegas: Desert Research Institute.

Harvey, D. 2001. Historic architectural overview of the Department of Energy's Hanford Site, Washington. In *Eureka: The archaeology of innovation and science, proceedings of the 29th Annual Conference of the Archaeological Association of the University of Calgary*, ed. R. Harrison and R. Gillespie, 227–239. Calgary: Archaeological Association of the University of Calgary.

Johnson, W., and C. Beck. 1995. Proving ground of the nuclear age. *Archaeology* 48 (3): 42–49.

Johnson, W., and S. Edwards. 2000. *Survival town: The Apple-2 historic district, Nevada Test Site, Nye County, Nevada*. Desert Research Institute Cultural Resources Technical Report 99. Las Vegas: Desert Research Institute.

Johnson, W., B. Holz, and R. Jones. 2000. *A Cold War battlefield: Frenchman Flat Historic District, Nevada Test Site, Nye County, Nevada*. Desert Research Institute Cultural Resources Technical Report 97. Las Vegas: Desert Research Institute.

Jones, R., H. Drollinger, T. Bullard, L. Ashbaugh, and W. Griffin. 2013. *A historical evaluation of the U16a tunnel, Nevada National Security Site, Nye County, Nevada*. Desert Research Institute Cultural Resources Technical Report 107. Las Vegas: Desert Research Institute.

McGehee, E. 2001. Legacies of the past: The built environment at Los Alamos National Laboratory, New Mexico. In *Eureka: The archaeology of innovation and science, proceedings of the 29th Annual Conference of the Archaeological Association of the University of Calgary*, ed. R. Harrison and R. Gillespie, 254–266. Calgary: Archaeological Association of the University of Calgary.

Nickens, P., M. Wright, and N. Cadoret. 2001. The military presence on the Hanford nuclear landscape: Implications for archaeological resource management and

historic preservation. In *Eureka: The archaeology of innovation and science, proceedings of the 29th Annual Conference of the Archaeological Association of the University of Calgary*, ed. R. Harrison and R. Gillespie, 240–253. Calgary: Archaeological Association of the University of Calgary.

Schofield, S., C. Beck, and H. Drollinger. 2006. Alternative archaeologies of the Cold War: The preliminary results of fieldwork at the Greenham and Nevada peace camps. In *Landscape under pressure, theory and practice of cultural heritage research and preservation*, ed. L. Lozny, 149–162. New York: Springer.

United States Department of Energy. 2000. *United States nuclear tests July 1945 through September 1992: DOE/NV 209 Rev 15*. Las Vegas: United States Department of Energy Nevada Operations Office.

Neves, Eduardo Góes

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Basic Biographical Information

Eduardo Góes Neves (Fig. 1) was born on March 24, 1966, in São Paulo, Brazil. He has a B.A. in History from the University of São Paulo and a Ph.D. in Archaeology from Indiana University, in the United States. He is the Director of the Laboratory of Tropical Archaeology (ARQUETROP) at the Museum of Archaeology of the University of São Paulo. From 2009 to 2011, he was the President of the Brazilian Archaeological Society. He is a member of numerous international boards in archaeology and anthropology, including the board of the Wenner-Gren Foundation.

Major Accomplishments

Eduardo Neves is part of a group of archaeologists that in the 1990s and 2000s started a movement that revolutionized understandings of the ancient occupation of the Amazon prior to onset of European colonization in the sixteenth century CE (MacEwan et al. 2001). Those archaeologists, including Michael Heckenberger, Stéphen Rostain, Edithe Pereira, Heiko Prümmers, Denise Schaan, Vera Guapindaia, Cristiana Barreto, and Denise Gomes, have produced evidence for dense, sedentary, and long-term occupation in different parts of the Amazon. This evidence challenged the then accepted view that the ancient people of the Amazon had mobile lifestyles in small, unstable, and short-lived settlements. Neves' work seeks to move away from environmental determinism and social evolutionary

Neves, Eduardo Góes, Fig. 1 Eduardo Neves in the field at Hatahara site, Central Amazon, 2006. (Photo Val Moraes, Central Amazon Project)

typologies to develop new theoretical frameworks to understand the long history of intertwinement between native populations and nature in the wet tropics.

Among Neves' major contributions to archaeology is the systematic study of the nutrient-rich and highly productive *terra preta* soils of the Amazon. *Terras pretas* have been known to naturalists since the late nineteenth century, but it was only 100 years later that geochemical and archaeological research demonstrated that they were created by human management in the past. This recognition brought further data to show that ancient Amazonian have modified their natural settings, presenting a direct challenge to the theory of environmental determinism that dominated Amazonian archaeology through much of the second half of the twentieth century. Neves also did work with Indigenous people of the Amazon such as the *Tukanoan* and *Palikur* Indians (Green et al. 2003), in an attempt to match oral traditions and archaeological data. The results point to a remarkable fit between these different sources of data and show that these Indigenous people have occupied their current areas continuously for many centuries.

In 1995 Eduardo Neves, together with Michael Heckenberger and James Petersen, started the Central Amazon Project (CAP), which Neves led until 2010. Petersen's untimely and unfortunate death in 2005, when he was shot in a robbery at a roadside restaurant during fieldwork, was a major blow to everyone involved in that long-term research effort. Indeed, Petersen's loss was felt not only by those with whom he worked in the Amazon but also among his colleagues and students from the Caribbean and New England, in the United States.

The Central Amazon Project is the longest-running project held in Amazonian archaeology. It has included the careful and intense mapping of dozens of the large archaeological sites located around the area of confluence of the Amazon and Negro rivers in Brazil, the establishment of a regional chronology and interdisciplinary research. However, its major contribution probably comes from the fact that it provided a venue for younger archaeologists, Brazilian and foreign, to obtain their graduate and undergraduate training in Amazonian archaeology. This was done through field schools held annually and also through the graduate program in archaeology at the University of São Paulo, in collaboration with other institutions such as Cambridge University, the University of California at Berkeley, Kansas University, the French National Museum of Natural History, and the Brazilian National Museum.

Neves has also made a major contribution to the development of robust theory in South American archaeology through his work, together with Pedro Funari, in the conception and inception of the "South American Theoretical Archaeological Meetings" (TAAS), which they initiated at the city of Vitória, Brazil, in 1998. Since that time, TAAS meetings have been held regularly, on average every 3 years, in different South American countries such as Argentina, Colombia, and Venezuela. Over the years TAAS meetings, which are self-regulatory and unattached to any archaeological association, have provided an opportunity for South American archaeologists to meet and discuss topics related to the history and political dimension of the practice of archaeology in the continent.

Aside from research and teaching, Eduardo Neves has played a major part in the development of a framework for the practice of professional archaeology in Brazil. He has trained and supervised a host of young archaeologists which are active in Amazonian research and currently work and teach at different local universities and research institutions. He has designed and helped to create the undergraduate program in archaeology at the State University of Amazonas and is continuously engaged into widening the possibilities for the socially conscious practice of archaeology in the Amazon.

Cross-References

► Amazonian Dark Earths: Geoarchaeology
► Archaeological Theory: Paradigm Shift

References

Green, L.F., D. Green, and E.G. Neves. 2003. Indigenous knowledge and archaeological science: The challenges of public archaeology in the Reserva Uaçá. *Journal of Social Archaeology* 3: 366–398.

MacEwan, C., C. Barreto, and E. Neves, eds. 2001. *Unknown Amazon: Culture in nature in ancient Brazil*. London: British Museum Press.

Further Reading

Heckenberger, M.J., and E.G. Neves. 2009. Amazonian archaeology. *Annual Review of Anthropology* 38: 251–266.

Neves, E.G. 2006. *Arqueologia da Amazônia*. Rio de Janeiro: Jorge Zahar.

Neves, E.G. 2011. Archaeological cultures and past identities in precolonial Central Amazon. In *Ethnicity in ancient Amazonia: Reconstructing past identities from archaeology, linguistics, and ethnohistory*, ed. A. Hornborg and J. Hill, 31–56. Boulder: University of Colorado Press.

"New 7 Wonders of the World" Campaign

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Brief Definition of the Topic

The "Seven Wonders of the Ancient World" are well known to anyone who has had a Western-style high school education. They were located around the Mediterranean and Fertile Crescent. The list of these monuments was the result of peripatetic Hellenic colonization and early tourism. The best known of the Greek lists was made in the first half of the second century BCE by Antipater of Sidon. The most commonly cited ancient seven wonders were: Pyramids of Giza, Hanging Gardens of Babylon, Temple of Artemis at Ephesus, statue of Zeus at Olympia, Mausoleum of Halicarnassus, Colossus of Rhodes, and Lighthouse of Alexandria.

Two thousand years later, in 2001, Canadian-Swiss Bernard Weber created the "New Seven Wonders of the World Foundation" (N7WF) and launched a worldwide competition to create a new list. Countries were invited to nominate their sites and to encourage their citizens to vote for the "wonders." The winners were announced on 7 July 2007 in Lisbon. The N7WF claimed that some 100 million votes had been cast. The winners were Chichen Itza, Colosseum of Rome, Machu Picchu, Great Wall of China, Petra, Taj Mahal, and the non-ancient Christ Redeemer Statue overlooking Río de Janeiro. The reason for including this campaign in the *Encyclopedia of Global Archaeology* is because of the challenge the N7WF presented to UNESCO's own World Heritage List and because the campaign itself showed the tight relationship between national archaeological patrimonies, coveted international prestige, and the global tourism industry.

UNESCO stated on 20 June 2007 (before the results of the contest were known): "There is no comparison between Mr. Weber's mediatised campaign and the scientific and educational work resulting from the inscription of sites on UNESCO's World Heritage List. The list of the '7 New Wonders of the World' will be the result of a private undertaking, reflecting only the opinions of those with access to the Internet and not the entire world. This initiative cannot, in any significant and sustainable manner, contribute to the preservation of sites elected by this public" (UNESCO 2007).

UNESCO's attitude is hypocritical, given the severe criticism that has been directed at its World Heritage Committee in recent years over its politicization and the lack of transparency of its decision-making and because the driving force behind countries' nominations is rarely site preservation but rather national pride, international recognition, and potential marketing of a new tourist attraction. UNESCO provides little money for site preservation and, as its own List quickly approaches one thousand inscriptions, one must consider that the N7W popular poll has selected six (not the Christ the Redeemer Statue) truly spectacular and significant sites that do meet the UNESCO criteria for "outstanding universal value" (see http://www.culture.gov.uk/images/consultations/UNESCO10_criteria.pdf).

In contrast to UNESCO's monopolization of cultural heritage authority, the United Nations praised the N7W campaign as part of its "Millennium Development Goals." On 8 July 2007, the United Nations Office of Partnerships lauded the campaign, noting its "aim to contribute to the process of uplifting the well being and mutual respect of citizens around the world, through encouraging interaction, expression of opinion and direct participation by voting and polling on popular themes and global issues which are understandable to everyone" (United Nations 2007).

Cross-References

- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes

References

UNESCO. 2007. UNESCO confirms that it is not involved in the "New 7 wonders of the world" campaign. Available at: http://whc.unesco.org/en/news/352.

UNESCO's criteria for the assessment of Outstanding Universal Value. n.d.. Available at: http://www.culture.gov.uk/images/consultations/UNESCO10_criteria.pdf.

United Nations. 2007. World votes for New Seven Wonders. Available at: http://www.un.org/partnerships/YNewsNew7Wonders.htm.

New Archaeology, Development of

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State of Knowledge and Current Debates

Introduction

"When he goes out in the open, he not only keenly observes the activities of people and their consequences in the material world but also seeks to recognize patterns in both and link these together." This is a comment about recently deceased Lewis Binford, the principal proponent of New Archaeology, which the author heard during his tenure as a Fulbright Senior Research Fellow at the University of New Mexico, Albuquerque, in 1987 from one of the doctoral students there. It captures equally well the whole message of New Archaeology. The defining features of New Archaeology are as follows:

1. Emphasis on the recognition of interrelationships among various units of the archaeological record
2. Adoption of scientific reasoning for isolating causative factors that enable us to infer human behavior from these linkages
3. Imparting an overall anthropological dimension to the discipline by way of making the explanation of cultural similarities and differences across time and space as its primary goal

These are now firmly entrenched in the fabric of contemporary archaeology.

This entry investigates the following major aspects of New Archaeology: (a) the overall academic ferment that prevailed in social sciences in the mid-twentieth century; (b) how it facilitated or even anticipated the growth of a nonconformist movement in archaeology; (c) reconceptualization of theoretical and methodological domains of the whole discipline; (d) growth of sub-schools within New Archaeology; (e) some examples of field research from both New and Old Worlds involving the application of New Archaeology's formulations in theory and method; and (f) the place of New Archaeology in the context of later developments in the discipline.

Background

Far from constituting an aberration, the rise of New Archaeology fits in very well with our knowledge of the history of major developments in both the natural and social sciences, each one continuously striving to achieve a more systematic and comprehensive understanding of the whats, wheres, whens, hows, and whys of a specific portion of the empirical world forming its

subject matter. One general feature that strikes us is that all these disciplines were initially preoccupied with singular-atomistic studies, which were subsequently replaced by perspectives treating phenomena as *Ganzheiten* or interconnected wholes.

Secondly, in their formative stages, these sciences primarily concerned themselves with the identification of broad, long-term trends about their respective domains of the empirical world. Soon a need was felt to put these sweeping ideas on a sounder basis by taking up systematic studies of spatially and temporally limited portions of reality. In the physical sciences, experimental method played an important part in these fresh studies from the beginning of the eighteenth century. Commenting on its role, Heisenberg (1952: 79) wrote: "This method could be applied to individual problems posed by nature and hence it was no longer a question of understanding a single interconnected whole but of a detailed analysis of many small specific connections." Highlighting a similar situation that prevailed in the social sciences, the nineteenth-century French sociologist-philosopher Tarde averred: ". . .a new science begins by assuming the existence of large-scale "apparent" regularities, but can genuinely advance only with the discovery of the real, small-scale repetitions" (as quoted by Martindale 1961: 446).

It was against this wider background that many of the social sciences took new incarnations towards the end of the nineteenth century and in the first half of the next century. New Geography, New History, New Sociology, New Anthropology, New Political Science, etc. appeared on the academic horizon.

In its antiquarian stages, archaeology too was concerned with particular sites and monuments and then started recognizing broad, long-term trends in the preliterate past of humankind. C.J. Thomsen's Three-Age system – Stone, Bronze, and Iron Ages – was the first step in this direction (Thomsen 1848). These ages were much elaborated and improved upon in the second half of the nineteenth century by John Lubbock and many other workers in Europe. Benefiting from the recognition of these stages and also from the archaeological discoveries made in the first half of the twentieth century, several evolutionary or developmental models of the preliterate stage were put forward. Publications such as Gordon Childe's *Man Makes Himself* (1936) and *What Happened in History* (1942) and Leslie White's *The Evolution of Culture: The Development of Civilization to the Fall of Rome* (1959) not only strengthened the discipline's academic identity and brought the story of humankind to the threshold of the educated layperson but also gave a fillip to regional archaeological investigations in both Old and New Worlds. Thus, culture history, involving the preparation of regional timetables of culture, emerged as a dominant trend by the mid-twentieth century.

Cultures were defined as recurrent series of similar-looking artifactual assemblages having spatiotemporal boundaries. The introduction of various scientific techniques and methods after World War II added an extra dimension to the study of the archaeological record (Brothwell and Higgs 1963). Wherever large-scale excavations were undertaken, it was even possible to say something about the past lifeways. In short, lots of queries about the whats, whens, and wheres of the archaeological record were raised and successfully answered. Soon some books devoted to theory and method also appeared, e.g., Grahame Clark's *Archaeology and Society* (1939), Gordon Childe's *Piecing Together the Past* (1956), Willey and Phillips's *Method and Theory in American Archaeology* (1958), and Stuart Piggott's *Approach to Archaeology* (1959).

These positive developments, while they constituted what David Clarke (1973) called the stage of self-consciousness, were not without their skeptics. Clarke (1968: xiii) himself called the whole endeavor "an undisciplined empirical discipline." The issue for the discipline was epistemological in nature and necessitated a reexamination of its foundations and a logical analysis of its concepts. In other words, questions were raised about the quality of knowledge itself about the past. Could one elevate this knowledge from the level of data-packed, inductive generalizations or assortments of facts to that of seeking interconnections among these facts? Observations

like the one made by the French filmmaker Louis Renoir that "I care not for things themselves but their interconnections" began to find an echo in archaeological circles too. Gordon Childe (1935) and John Bennett (1943) called attention to reading the meanings of the archaeological record in functional terms. In his Rickett Memorial Lecture of 1953, Grahame Clark diagrammatically represented human culture as made up of various structural components, all linked one with another and with the environment (Clark 1960: 175). Walter Taylor's (1948) book *A Study of Archaeology* not only advocated contextual and functional approaches to the analysis of archaeological data but in fact anticipated the more recent interpretive trends by locating the source of behavior in human minds and the various feelings and sentiments generated there. Julian Steward's (1955) cultural ecology stressed the need for monitoring interconnections between cultural and environmental components, while Willey and Phillips (1958) called for an anthropological orientation to the whole discipline.

But all these views and ideas were in the form of isolated pleas for improvement and therefore failed to make any significant impact on the archaeological community. It was left to the proponents of New Archaeology to coalesce these "germs of thought" and add to these the hardware as formed by statistical techniques for pattern recognition and the software as provided by principles of the scientific method. Once this fusion took place, a virtual manifesto was born, as contained in the initial writings of Lewis Binford (1962, 1964, 1965, 1968a) and David Clarke (1968, 1973). One is reminded here of the analogy provided by the famous pamphlet of 1929 issued by the Vienna Circle, which wanted to free empirical sciences from the "metaphysical and theological debris of millennia" and inject into these a scientific world conception (wissenschaftliche Auffassung) (Hahn et al. 1929). Archaeology simply represents the latest example among empirical sciences which experienced this shift from a mere concern with bundles of facts to the construction of positivist and verifiable knowledge about the real world. It is unimaginable that without the background provided by this fundamental change, the ideational trends that later arrived in archaeology would have found a rationale for their genesis.

Birth of New Archaeology

The actual genesis of New Archaeology took place in the 1960s. Not many feathers will be ruffled when it is said that the *dramatis personae* comprise just two figures – David Clarke from England and Lewis Binford from the USA. Let us first consider the views of Clarke. He introduced statistical methods to understand variability in the archaeological record, be they simple artifacts or megalithic tombs. By means of matrix analysis, Clarke recognized two main geographical or functional series within the British Beaker pottery dated to the third millennium B.C. (Clarke 1962). In 1968 he published his book *Analytical Archaeology*, which sought to revamp the whole conceptual framework of the discipline. Of particular importance is his conception of cultures as systems consisting of components interacting among themselves and with the environmental subsystems. His paper "Archaeology: The Loss of Innocence" was a terse (hence termed gobbledygook by readers in Britain) but welcome exposition of the major tenets of the new stream of thought (Clarke 1973). He identified four stages in the development of archaeology, viz., stages of consciousness, self-consciousness, critical self-consciousness, and self-critical self-consciousness. He also advocated the study and interpretation of the archaeological record with reference to four paradigms (geographical, anthropological, morphological, and ecological). Clarke visualized that the application of these four paradigms would lead to improvements in theory formation at four levels: concepts, information, reasoning, and general theory. These views surely reflect Clarke's larger conception of the archaeological record in cultural and anthropological terms. Finally, he defined New Archaeology as "an interpenetrating set of new methods, new observations, new paradigms, new philosophies and new ideologies within a new environment" (Clarke 1973: 12). His death in 1976 at the young age of 38 robbed archaeology of one of its most fertile minds.

Binford's contribution to the emergence of New Archaeology was as much an expression of mind inspired by ideas about the relevance of scientific reasoning and statistical techniques for pattern recognition as it was the product of clashes of ideas with senior colleagues like James Griffin and Robert Braidwood at the universities of Michigan and Chicago about the nature of the archaeological record and its potentialities to inform us about the past. The introductory portions of the three volumes containing his collected essays (Binford 1972a, 1983a, 1989) and also the inside view provided by one of his group members (Flannery 2006) provide many gripping details of the birth pangs as well as of later developments concerning New Archaeology's efforts to direct attention to the larger anthropological goals of the discipline (Willey and Sabloff 1980: 181–210; O'Brien et al. 2005: 36–66). Binford (1972: 1–14) told us how his stint of military service in East Asia created in him an interest in observing simple societies, this in turn motivating him to enroll for a graduate program in anthropology, and how he developed "archaeology commitment" in order to provide a temporal perspective for explaining diversity in human societies across the globe. He also told us about the clashes he had with senior archaeologists about the very definition of concepts like culture, the whys and hows of the emergence of food-producing way of life, and explanation of variability in archaeological record. So it fell upon Binford to play the role of a Darwin as well as that of a Huxley.

The Structure of New Archaeology

With this background we shall now identify the main propositions of New Archaeology. It should be noted at this stage that the phrase New Archaeology was a pejorative expression used by critics for lumping together unconventional papers that were being presented by Binford and his group at meetings of the Society for American Archaeology in the early 1960s. Binford himself was content with characterizing the views of his group as "New Perspectives" that call for "some fundamental changes in the way archaeologists viewed the archaeological record and particularly in the conventions then current for assigning meaning to archaeological facts" (Binford 1986: 459). But the label got entrenched in the literature.

Conceptual Changes

New Archaeology argued for a basic epistemological change. In traditional archaeology, facts per se – be these about dates, sizes of sites, or the actual finds – constituted knowledge and were regarded as self-explanatory. These were only required to be organized into assortments or groups. Generalizations in the form of summaries of facts constituted knowledge about the past, e.g., culture X has red and grey ceramic fabrics in equal proportions, represented by 13 and 16 vessel shapes, respectively. New Archaeology raised doubts about the limitations of this form of knowledge in promoting the cause of anthropological orientation to archaeological record. As Bertrand Russell would have argued, can we meaningfully understand the world around us by merely enumerating its "furniture?" The anthropological dimension, involving the study of development of human cultural forms along space and time trajectories, required the archaeologists to thread their facts together. Adopting the age-old saying "Divided we fall, united we stand," the new epistemological turn laid emphasis on linkages among facts.

This epistemological reorientation entailed two drastic changes in the culture concept. First, in the place of the earlier "shreds and patches" and trait list versions, cultures now began to be treated as totalities or systems comprising not merely component elements but their interrelationships as well. Secondly, the normative definition of culture as a repository of ideas and norms held in the minds of people was now substituted by a functional definition treating it as an extrasomatic means of adaptation. Butzer (1982) independently discussed at length the operational strategies required for putting the concept of adaptation to use. This redefinition of culture highlighted the study of culture process, which has become synonymous with New Archaeology.

In order to emphasize the importance of anthropological orientation to the discipline advocated by him, in the initial stages, Binford did talk of archaeology's contribution to the

understanding of diachronic or long-term trends in the evolution of culture and even referred to tracking down "laws of cultural dynamics." But it was soon realized that this task must be preceded by a more fundamental task, i.e., holistic understanding of spatially and temporally limited segments of the archaeological record. This required a shift of emphasis from the study of culture of humankind to the investigation of cultures of peoples. It is the study of this synchronic aspect of culture which constitutes culture process; it finds expression at numerous places in the writings of both Clarke and Binford. Their views were influenced by systems framework and the ecosystem approach which had just emerged as prominent analytical tools in the empirical sciences.

A few additional remarks are warranted on this specific issue. David Clarke (1968: Chaps. 2 and 3) viewed archaeological cultures as vast information systems, made up of several interlinked subsystems. He viewed the aim of archaeology as the identification of patterns or regularities in the functioning of cultural systems, which in turn would lead to a higher body of knowledge in the form of models and hypotheses. Binford espoused the culture process concept in more elaborate terms.

Writing in 1968, Binford stated: "Process, as I understand it, refers to the dynamic relationships (causes and effects) operative among the components of a system or between systemic components and the environment" (Binford 1972a: 117). Some years later, he warned that "A cultural system is not a summation of all the events, behaviours or other transactional phenomena going on at a given time, but rather the conditioning organizational framework within which all these events transpire" (Binford 1981a: 201). Later, Binford underlined the priority of the study of process at a synchronic level in these words: "...before archaeologists could cite formal variability in the archaeological record as indicative of large-scale process, evolution, system changes, ethnicity, or even such historical events as migrations, we had to be able to recognize the archaeological record at differing organizational scales" (Binford 1989: 18).

Thus, in their advocacy of the cause of culture process, neither Clarke nor Binford showed any interest in producing yet another grand model of cultural evolution. Rather their interest was in "freezing" cultural systems in space and time in order to understand their functioning. This synchronic process orientation of New Archaeology was influenced by the prevailing functionalist trends in anthropology via the writings of Leslie White and others. As stated earlier, it constitutes a major instance of the operation of two important trends noticed in the history of factual sciences. These are as follows: (a) a coming into vogue of theories treating phenomena as *Ganzheiten* in replacement of singular-atomistic studies and (b) a shift of emphasis from the formulation of linear or long-term trends to the detection of constant, short-term relationships, and uniformities. It is worth noting here that processual orientation to the study of social phenomena was already a prominent feature of the American social sciences like sociology, political science, and economics in the early part of the twentieth century (Kress 1970).

Methodological Innovations

To give effect to these radical conceptual changes, New Archaeology proposed innovations in the methodological approaches or strategies to be adopted for studying the archaeological record at various levels. Realizing that cultural systems of whatever age always operate at a regional level but never exclusively at the level of individual sites – however big these might be, a Cahokia or a Troy or Harappa – Binford called for the employment of a regional research strategy in field investigations. In his own words, he said: "It is argued that the methodology most appropriate to the study of culture process is a regional approach in which we attempt to gain reliable and representative information covering the internal structure and ecological systems" (Binford 1964: 160). The archaeological record was now visualized as consisting of populations of cultural items, cultural features, sites, and ecofacts or non-artifactual data of cultural significance. Since it is not always possible to exhaustively study all

portions or aspects of regional or site data, New Archaeology for the first time introduced probability sampling methods and multistage fieldwork into the discipline for identifying and studying representative units of data universe.

As a complement to these innovations in field strategies, New Archaeology also called for a more rigorous analysis of the archaeological record itself. Reference has already been made to Clarke's use of matrix analysis for restudying British Beaker pottery. Under Albert Spaulding's tutelage, Binford acquired familiarity with multivariate statistical techniques which proved to be extremely helpful to him in identifying patterns in the archaeological record and also in inferring similarities and differences among cultural systems.

These innovations in field methodology and data analysis were pooled together by Binford to develop a research paradigm called the settlement system approach (Binford and Binford 1969). While settlement pattern studies stop at the level of descriptive accounts of distribution of sites on a given patch of landscape (Willey 1953; Chang 1968), the settlement system approach is explanatory in nature and seeks to lay bare the linkages between site contexts, resource use schedules, demographic arrangement, and ecological setting. While neighboring human groups may share similar genetic, linguistic, and historical traditions, they nevertheless tend to develop their own settlement systems due to differences in both natural and social environments. Initially, the settlement system approach was developed by Binford to explain variability in the French Mousterian assemblages. This work and his prolonged ethnoarchaeological study of the Nunamiut Eskimos of Alaska enabled him to formulate the forager versus collector model of hunter-gatherer settlement systems (Binford 1980). His more recent book *Constructing Frames of References: An Analytical Method for Archaeological Theory Building* (2001) extended this model to cover all major hunter-gatherer societies spread across the world. With some additions and variations, it is also applicable to the study of food-producing and other developed cultural systems.

The Role of Scientific Reasoning

There are two important and overarching aspects of New Archaeology – both falling within the domain of scientific reasoning (Paddayya 1983, 1990: 8–19). One of these concerns the nature and role of laws or generalizations in archaeological research. This topic generated much debate in the discipline and to some extent even scandalized New Archaeology by caricaturing its proponents as "a law and order group." During his visit to one of the universities in Midwest America in 1999, the author noticed on the doorway of a senior faculty member this short inscription: "All generalizations are false." This hostile attitude to the topic was occasioned by certain misconceptions: (a) traditional archaeology's relativistic and trait list conceptions of human cultures, providing no scope for generalizations; (b) the supposedly inviolable nature of lawlike propositions in the natural sciences; and (c) the unwarranted view that laws in archaeology must refer to long-term trends in human culture.

Such misconceptions are totally uncalled for on various counts. First, laws do not exist in nature but are conventions made by us to designate recurring patterns or associations (causal and otherwise) among phenomena. Secondly, there is no finality attached to them, since the empirical world is infinite and new data could necessitate revision or even discard of existing generalizations. So the inscription on the doorway of the American professor should more appropriately read: "All generalizations are false and are liable to be replaced by newer ones." Thirdly, generalizations are not ends in themselves but form "an indispensable instrument of historical research" (Hempel 1965: 231). Mandelbaum (1977) aptly called them the "mortar" of historical accounts. Fourthly, the oft-repeated dichotomy that sociocultural sciences are idiographic (seekers of individual facts) and that natural sciences are nomothetic or lawmaking is totally false. The fact is that research in all empirical sciences presupposes an unending cycle between acquisition of facts and threading them together with the help of generalizations. Hence, both groups of sciences are idiographic as well as nomothetic. There is absolutely no way that

archaeology can be excluded from this matrix and accorded a special status.

As pointed out by Hempel (1965: 242–243), past-related sciences like history and archaeology do make use of prescientific generalizations of everyday experience as well as generalizations adopted from both social and natural sciences. Archaeology has made its own generalizations, e.g., Three-Age system, law of evolutionary potential, and law of cultural dominance (Stickel and Chartkoff 1973).

Middle Range Theory, as developed by Lewis Binford, seeks to identify more of such general propositions (Arnold III 2003). It rises above the earlier arbitrary ways of giving meanings to the archaeological record and aims to develop a fresh cognitive frame of reference. This cognitive framework consists of ideas and concepts in terms of which one could diagnose the archaeological record in order to identify the processes that led to its formation (Binford 1977, 1981a). Binford visualized that Middle Range Theory (encompassing ethnoarchaeological research, use-wear analyses, and bone taphonomy) could produce patterns at three levels: (a) first-order field or laboratory observations about various segments of the archaeological record, (b) second-order observations recognizing patterns between two or more variables, and (c) pattern recognition leading to theory formation which establishes causal links in cultural systems and explains their functioning. Middle Range Theory paves the way for General Theory which has the task of "understanding the processes responsible for change and diversification in the organizational properties of living systems" (Binford 1977: 7).

Binford's book *Constructing Frames of Reference: An Analytical Method for Archaeological Theory Building* (2001) contains a large number of lower-, middle-, and higher-order generalizations arrived at after a comparative study of 340 hunter-gatherer societies of the world. Referring to their possible use to archaeologists, Binford (2001: 3) writes: "...From the equations developed in the book an archaeologist can anticipate many of the properties of hunter-gatherer groups that might be expected to occur at a given location, at an archaeological site or at a series of sites...the explanatory theory is available for archaeologists to use deductively by reasoning to or simulating changing conditions and thereby providing patterns of change that can be expected to occur in the archaeological record at specific locations...."

Another major contribution made by New Archaeology to the discipline relates to the introduction of the method of hypothesis testing. Traditional archaeology was mainly based on the use of intuitive and ex cathedra statements. Attention was now focused on the need to test the reliability of archaeological reconstructions. For this purpose the method of the hypothesis-forming part of the philosophy of science was adopted. In Binford's own words, "The accuracy of our knowledge of the past can be measured; it is this assertion which most sharply differentiates the new perspectives from more traditional approaches. The yardstick of measurement is the degree to which propositions about the past can be confirmed or refuted through hypothesis-testing" (Binford 1972a: 90). Although one could locate some instances of hypothesis formulation in traditional archaeology, e.g., Thomsen calling his Three-Age system a conjecture to be confirmed or rejected in the light of future work and the Iraq Jarmo project of Robert Braidwood (1974) for ascertaining Neolithic origins, New Archaeology's culture process goals called for a formal introduction of the hypothetico-deductive method in order to deal with the problems of the whys and hows of culture process. It involves putting forward a hypothetical answer to a problematic situation concerning the archaeological record and deducing from it consequences which could be tested with reference to the empirical world. In the natural sciences, the application of this method led to far-reaching qualitative changes in knowledge formation.

As with the topic of laws, the method of hypothesis too invited much doubt and disbelief in archaeology in the initial stages. The reason was that traditional archaeology had by and large been content with answering questions of what, when, and where by making inductive statements taking the form of summaries of facts. The scope for raising why and how queries was limited. Moreover, it was mistakenly believed that

hypotheses should always involve "if, then" causal links. The truth is that research in empirical sciences has much scope for and needs non-causal hypotheses too. The Greek philosopher Novalis put this issue very well: "Hypotheses are like nets; only he who casts, will catch" (Popper 1980: 11). In our own times, the French scientist Poincare tendered this useful advice: "Instead of summary condemnation we should examine with the utmost care the role of hypothesis; we shall then recognize not only that it is necessary, but that in most cases it is legitimate. We shall also see that there are several kinds of hypotheses; that some are verifiable, and when once confirmed by experiment become truths of great fertility; that others may be useful to us in fixing our ideas, and finally, that others are hypotheses only in appearance, and reduce to definitions or to conventions in disguise" (as quoted in Copi and Gould 1972: 284).

Aftermath

Estimates of the place of New Archaeology vary. James Griffin (1985) observed total silence about it while reviewing his career achievements in archaeology. Walter Taylor (1972) called these ideas "old wine in new skins." In contrast to this opinion, another senior archaeologist Paul Martin (1972) called it a revolution. But this has been denied by Meltzer (1979); he believes that it represents a continuum with traditional perspectives.

Revolution or not, New Archaeology represents a set of eclectic conceptual and methodological tenets aimed at a reorientation of our basic perceptions of the archaeological record. The following are the principal new perceptions:

(a) Systemic conception of cultures in the place of the traditional type-fossil and trait list views
(b) Emphasis on knowing how cultures function with reference to their own components as well as surrounding environmental and social milieu
(c) Adoption of a regional perspective in field studies
(d) Use of various pattern recognition techniques
(e) Emphasis on the use of generalizations secured via Middle Range Theory
(f) Application of the method of hypothesis

All these were geared to raise knowledge of the past from the level of accumulation of individual facts to the status of science that seeks to identify their interconnections and explain their whys and hows (Wylie 1981; Watson 1991; Gamble 1999; Meltzer 2011). New Archaeology thus achieved the effect of the "lowering of foundations" of the discipline and brought in a new paradigm in the sense of "a universally recognized scientific achievement that for a time provides model problems and solutions to a community of practitioners" (Kuhn 1962: x).

New Archaeology failed to remain a unified stream of thought. Influenced or inspired by it in one way or another, several "newer" archaeologies appeared on the American scene from the 1970s onwards. These include an "explicitly scientific" archaeology (Watson et al. 1971), the behavioral archaeology of Michael Schiffer, cultural materialism (Segraves 1974), Marxist archaeologies (Spriggs 1984), critical archaeology (Leone et al. 1987), Annales perspectives (Knapp 1992), cognitive processual archaeology (Renfrew 1994), and evolutionary archaeologies (Maschner 1996; O'Brien and Lyman 2000). While no doubt conceding the importance of processual orientation provided to the discipline by New Archaeology and also its efforts to strengthen the discipline's conceptual foundations, these perspectives seek to attend to some of the gaps left untouched by the main program.

Among these behavioral archaeology, as developed by Michael Schiffer, is a more prominent and enduring one. Schiffer successfully argued that inferring human behavior from the archaeological record entails us to first recognize the processes involved in the transformation of objects from one state to another within the original systemic or living context and then their transfer to the archaeological context (Schiffer 1976). He also pointed out that archaeologists paid no attention to the possible cultural as well as natural processes that acted upon the archaeological record since its disconnection with its creators. Thus, Schiffer highlighted for the first time the need to understand the processes that create as well as transform the archaeological record before we use it for reconstructing past human behavior

(Schiffer 1995). It is not surprising therefore that the topic of formation processes (*c*-transforms and *n*-transforms) has become an integral component of contemporary archaeology's suite of research strategies (Schiffer 1987).

Impact

Let us briefly consider the impact made by New Archaeology on the discipline. Its theoretical and methodological propositions made sense particularly to those who were actively involved in the study of the archaeological record in the field or laboratory and who desired to pull out interconnections of various kinds from the "teeth of stubborn and irresistible" facts. Citation of a few studies carried out at site or regional levels will serve the purpose of this encyclopedic entry. Let us start with the two architects themselves.

Two of David Clarke's reinterpretations of the European archaeological record are fascinating examples of model building. First, we will consider his restudy of the archaeological record of the British Iron Age site of Glastonbury excavated three quarters of a century ago. His efforts to infer "mutual relationships and the strengths and covariation of those relationships in a variety of alternative classificatory dimensions" led him to slot this small Iron Age site at a lower level of the four-tier settlement (and impliedly social) hierarchy that existed in the marshlands of Somerset (Clarke 1972). The second study concerns the nature of economic organization of the North European Mesolithic phase. Clarke carefully examined the functional aspect of microlithic assemblages and implications of the spurt in vegetative growth consequent upon the retreat of ice sheets from North European plains. This led him to doubt the traditional emphasis on hunting. Instead he proposed the view that the Mesolithic subsistence economy "may have approached limited, fire-controlled asexual horticulture and arboriculture, based on vegetatively reproducing *root* staples, forest *perennials*, controlled nut and fruit trees, backed up by shell-fish, dog and pig husbandry. . ." (Clarke 1978: 36).

Binford's first major use of the new armature for approaching the archaeological record concerned the four or five variants that had been recognized by Francois Bordes within the French Mousterian. Raising serious objections to Bordes' interpretations equating the variants with different ethnic groups, he and his wife Sally Binford put forward the famous functional argument which sought to trace assemblage variability to functional variability, which in turn is governed by seasonal variability in the availability of resources (Binford and Binford 1966). This argument was extended to account for variability in the Late Acheulian assemblages from Olorgesailie, Kalambo Falls, and other sites in Africa (Binford 1972b). Later Binford used this strategy and reexamined the faunal collections obtained much earlier from Olduvai Gorge localities in East Africa from the point of view of bone taphonomy and arrived at the startling conclusion that the early hominins, far from being great hunters, were only scavengers of the leftovers of meat from carnivore kill sites (Binford 1981b, 1983b). Likewise the mighty "elephant hunters" of Torralba were reduced to the status of mere expedient exploiters of animal food resources naturally available in the ecosystem (Binford 1987). These studies provided much stimulus to contemporary research on bone taphonomy and hominin dietary patterns.

Likewise, in his paper "Post-Pleistocene Adaptations," Binford (1968b) reviewed evidence pertaining to origins of food-producing ways of life. Going beyond "nuclear zone" and "culture was ripe" theories, he put forward the view that in the Near East evidence of plant and animal domestication at the primary level would be found not in the areas occupied by sedentary forager-fisher groups but in the adjacent zones. He further pointed out that evidence for independent experiments in food production could be expected from various areas in both New and Old Worlds – a proposition upheld by a series of field projects undertaken subsequently.

The Mousterian debate with Bordes made Binford realize the need to supplement archaeological data with analogies arising from the study of the actual functioning of living hunter-gatherer societies. His 4-year-long (1969–1973) field studies among the Nunamiut Eskimos of Alaska and the resulting publication set a model for later work

in hunter-gatherer ethnoarchaeology (Binford 1978). It has already been mentioned that the settlement system approach to the archaeological record developed by him is a lasting contribution to the discipline and, with suitable modifications and additions, is helpful for studying the structure and functioning of even agropastoral and other later cultures.

We will now examine the use of new ideas by other archaeologists. The volume *New Perspectives in Archaeology*, edited by Sally and Lewis Binford (1968), contains a set of ten papers presented at a symposium organized in Denver in 1965 as part of the annual conference of the American Anthropological Association. These papers represent the first-generation applications of New Archaeology in the Americas. Irven DeVore, one of the seven leading non-archaeological anthropologists of the time who had been invited to comment on these papers, summed up the overall positive response in these words: "...I warmly applaud the shift in emphasis in archaeological thinking in recent years as evidenced, for example, by the papers in this symposium. In the past we were presented with lithic industries which, to judge by their descriptions, were copulating, hybridizing, evolving, adapting, and producing offspring..." (DeVore 1968: 346).

The papers by James Deetz, William Longacre, James Hill, and Robert Whallon used ceramic data from individual American archaeological sites to make inferences about social organization (demographic aspects and residence and descent rules). The papers by Howard Winters, Kent Flannery and Michael Coe, and Stuart Struever, also dealing with North American sites, were broader in scope and region oriented. More importantly, these papers adopted ecosystem and functionalist orientations for studying the archaeological record of the Formative and Classic stages. This volume also included three papers which took the new ideas to the Old World – Sally Binford's paper on variability in the Near Eastern Mousterian, James Sackett's paper on the French Upper Paleolithic, and Frank Hole's study of the early food-producing culture of Iran.

Coincidentally, in 1968 another set of eight interesting essays appeared as part of an edited volume entitled *Anthropological Archaeology in the Americas* (Meggers 1968). These essays, arising from lectures delivered during the two previous years under the auspices of the Anthropological Society of Washington, were very much in alignment with the new ideas that were already in the air; in fact three of the writers also published papers in *New Perspectives* as mentioned above. These contributions once again laid emphasis on systemic and superorganic conceptions of culture and the role of the natural environment. Stuart Struever argued for a methodological reorientation in American archaeology in order to come to grips with the new goals. James Deetz's essay dealt with issues relating to the contact period. The remaining six papers (by J. Campbell, E. Wilmsen, J. Schoenwetter and A. Dithert Jr., K.V. Flannery, W. Sanders, and D. Thompson) reflected the use of new ideas and methods in the investigation of American archaeological sites belonging to paleo-Indian and later cultural stages.

Subsequently some of the above-mentioned authors elaborated on these beginnings and completed major research projects, e.g., Flannery's (1976, 1986) work on the early food-producing cultures of the southern highlands of Mexico and Winters' (1969) work on the Riverton culture of Wabash valley in Illinois. Other major projects, which also fall within the framework of New Archaeology, include the work of MacNeish and others on the emergence of food-producing way of life in the Tehuacan valley (MacNeish et al. 1972) and Adams' work in Mesopotamia (1965, 1966; Adams and Nissen 1972).

The volume *Processual Archaeology*, edited by Johnson (2004), contains a set of another ten essays representing third-generation studies employing the approaches recommended by New Archaeology. These concern site or regional-level studies of sites belonging to hunter-gatherer and later stages and clearly show that the themes broached by New Archaeology are still vibrant in contemporary archaeology both in America and the Old World. Surely, between 1968 and the volume edited by Johnson, there have

been a good number of field studies of hunter-gatherer, food-producing, and state-level societies in different parts of the world which benefited from New Archaeology's propositions (O'Brien et al. 2005: Chaps. 3 and 4). But it may as well be the case that just as one does not always notice Darwin's name in the discussions concerning the theory of evolution, the inspiration provided by New Archaeology does not always find explicit mention.

India is one of the few regions outside the Anglo-American world which began to favorably respond to the call of New Archaeology from an early stage. Thanks to the initiative taken by Sankalia (1977) and the inspiration provided by Binford's month-long personal visit to Deccan College in Pune in 1986 to give a series of lectures on the basic premises and applications of New Archaeology, Indian archaeology began to experience the influence of New Archaeology from an early stage. The settlement system perspective has been adopted for studying Paleolithic and Mesolithic sites which were for a long time dubbed as producing only "stones" and "more stones" (e.g., Murty 1981; Paddayya 1982; Raju 1988; Mohanty 1990; Cooper 1997; Selvakumar 1997). Settlement system studies have also been undertaken with reference to the early food-producing communities of the Deccan (Dhavalikar 1988) and the Indus civilization (Possehl 2002a, b). New Archaeology's regional approach to the archaeological record was employed with excellent results for studying the medieval capital of Vijayanagara in South India. The 700 localities found in an area of 250 km^2 around this city facilitated a much better understanding of the dynamic relationships between the city and its hinterland (Sinopoli 2007). Also, the topic of formation processes has taken firm root in Indian archaeology (Paddayya 2007). It is a stunning fact that in 1963, Raymond Allchin published a comprehensive study of the Neolithic ashmounds of the Deccan, which involved not only sound traditional archaeology but also the employment of strategies like hypothesis testing, the regional approach, and the interpretation of the archaeological record in terms of human motives that later became major tenets of New Archaeology and post-processual archaeology (Allchin 1963).

Conclusion

Scientific research is dynamic and builds upon existing blocks of knowledge. Thus, it was not surprising when in 1982 Ian Hodder put forward the view that material culture items, their functional roles apart, are symbols in action and shape human minds (Hodder 1982). This was the beginning of post-processual archaeology, which emphasizes that archaeology cannot stop at the level of reconstructing past human behavior but must trace it back to human feelings, sentiments, and emotions (Flinders Petrie actually put forward this idea a hundred years ago (Petrie 1972)). Interpretation replaced explanation as the discipline's goal. As in the case of New Archaeology, this trend also soon experienced a stream of sub-trends – semiotic archaeology, archaeological poetics, hermeneutical archaeology, structuralist archaeology, phenomenological archaeology, agency theory, etc., which are fit topics for separate encyclopedic entries. Attention was also drawn to the sociological dimensions of the study of the past – gender archaeology, public archaeology, archaeology as sociopolitical action in the present, etc.

New Archaeology's propositions were for some time questioned and even derided by these more recent trends. But soon the falsity of a mind-body dichotomy, which had plagued European philosophy for centuries, began to dawn upon us, and it was then easy to appreciate that the interpretation of human cultures as ideational systems has to rest upon their study as functioning systems in the material world. The great German *litterateur*, Bertolt Brecht, expressed this notion in a few beautiful words: "Erst kommt dass Fressen und dann die Moral." It is good to note that Hodder himself has recently called for an integrated approach for decoding what he calls "human-thing entanglement" in the past (Hodder 2011).

Seen in a wider context, the traditional culture history approach, New Archaeology, and ideational perspectives, far from being mutually exclusive, are actually complementary to one

another. If one may slightly rephrase Thomas Kuhn (1977), academic tensions are not only essential but beneficial. Depending upon the nature and extent of the previous work on the archaeological record, their application will vary from area to area and from problem to problem. Much wisdom lies in the message which Buddha gave to the perplexed village folk of North India 2500 years ago: "Listen to all kinds of teachings but adopt what suits you, employing your own powers of observation and reasoning!"

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Archaeological Record
- ▶ Archaeology and Anthropology
- ▶ Behavioral Archaeology
- ▶ Hypothesis Testing in Archaeological Theory
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of
- ▶ Processualism in Archaeological Theory

References

Adams, RMcC. 1965. *Land behind Baghdad: A history of settlement on the Diyala plains*. Chicago: University of Chicago Press.

Adams, RMcC. 1966. *The evolution of urban society: Early Mesopotamia and prehispanic Mexico*. Chicago: Aldine.

Adams, RMcC, and H.J. Nissen. 1972. *The Uruk countryside: The natural setting of urban societies*. Chicago: University of Chicago Press.

Allchin, F.R. 1963. *Neolithic cattle-keepers of South India: A study of the Deccan ashmounds*. Cambridge: Cambridge University Press.

Arnold, P.J., III. 2003. Back to basics: The middle-range program as pragmatic archaeology. In *Essential tensions in archaeological method and theory*, ed. T.L. Van Pool and C.S. Van Pool, 55–66. Salt Lake City: University of Utah Press.

Bennett, J.W. 1943. Recent developments in the functional interpretation of archaeological data. *American Antiquity* 9: 208–219.

Binford, L.R. 1962. Archaeology as anthropology. *American Antiquity* 28: 217–225.

Binford, L.R. 1964. A consideration of archaeological research design. *American Antiquity* 29: 425–441.

Binford, L.R. 1968a. Archaeological perspectives. In *New perspectives in archaeology*, ed. S.R. Binford and L.R. Binford, 5–32. Chicago: Aldine.

Binford, L.R. 1968b. Post-Pleistocene adaptations. In *New perspectives in archaeology*, ed. S.R. Binford and L.R. Binford, 313–341. Chicago: Aldine.

Binford, L.R. 1969. Stone tools and human behaviour. *Scientific American* 220: 92–101.

Binford, L.R. 1972a. *An archaeological perspective*. New York: Seminar Press.

Binford, L.R. 1972b. Contemporary model building: Paradigms and the current state of Palaeolithic research. In *Models in archaeology*, ed. D.L. Clarke, 109–166. London: Methuen.

Binford, L.R., ed. 1977. *For theory building in archaeology: Essays on faunal remains, aquatic resources, spatial analysis, and systemic modeling*. New York: Academic.

Binford, L.R. 1978. *Nunamiut ethnoarchaeology*. New York: Academic.

Binford, L.R. 1980. Willow smoke and dogs' tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45: 4–20.

Binford, L.R. 1981a. Behavioral archaeology and the "Pompeii premise". *Journal of Anthropological Research* 37: 195–208.

Binford, L.R. 1981b. *Bones: Ancient men and modern myths*. New York: Academic.

Binford, L.R. 1983a. *Working at archaeology*. New York: Academic.

Binford, L.R. 1983b. *In pursuit of the past: Decoding the archaeological record*. New York: Thames & Hudson.

Binford, L.R. 1986. In pursuit of the future. In *American archaeology: Past and future*, ed. D.J. Meltzer et al., 459–479. Washington, DC: Smithsonian Institution Press.

Binford, L.R. 1989. *Debating archaeology*. San Diego: Academic. Republished in 2009 in paperback edition, with a new preface. Walnut Creek: Left Coast Press.

Binford, L.R. 2001. *Constructing frames of reference: An analytical method for archaeological theory building using ethnographic and environmental data sets*. Berkeley: University of California Press.

Binford, L.R., and S.R. Binford. 1966. A preliminary analysis of functional variability in the Mousterian of Levallois facies. *American Anthropologist* 68: 238–295.

Binford, S.R., and L.R. Binford, eds. 1968. *New perspectives in archaeology*. Chicago: Aldine. Republished as *Archaeology in cultural systems* in 2008. Chicago: Aldine Transaction.

Braidwood, R.J. 1974. The Iraq Jarmo project. In *Archaeological researches in retrospect*, ed. G.R. Willey, 61–83. Cambridge, MA: Harvard University Press.

Brothwell, D., and E. Higgs, eds. 1963. *Science in archaeology: A survey of progress and research*. London: Thames & Hudson.

Butzer, K.W. 1982. *Archaeology as human ecology: Method and theory for a contextual approach*. Cambridge: Cambridge University Press.

Chang, K.C., ed. 1968. *Settlement archaeology*. Palo Alto: National Press Books.

Childe, V.G. 1935. Changing methods and aims in prehistory: Presidential address. *Proceedings of the Prehistoric Society* 1: 1–15.

Childe, V.G. 1936. *Man makes himself*. London: Watts & Co.

Childe, V.G. 1942. *What happened in history*. New York: Penguin.

Childe, V.G. 1956. *Piecing together the past: The interpretation of archaeological data*. London: Routledge & Kegan Paul.

Clark, J.G.D. 1960. *Archaeology and society: Reconstructing the past*. London: Methuen. First published in 1939.

Clarke, D.L. 1962. Matrix analysis and archaeology with particular reference to British beaker pottery. *Proceedings of the Prehistoric Society* 15: 371–382.

Clarke, D.L. 1968. *Analytical archaeology*. London: Methuen.

Clarke, D.L. 1972. A provisional model of an Iron Age society and its settlement system. In *Models in archaeology*, ed. D.L. Clarke, 801–869. London: Methuen.

Clarke, D.L. 1973. Archaeology: The loss of innocence. *Antiquity* 47: 6–18.

Clarke, D.L. 1978. *Mesolithic Europe: The economic basis*. London: Duckworth.

Cooper, Z. 1997. *Prehistory of the Chitrakot Falls, Central India*. Pune: Ravish Publishers.

Copi, I.M., and J.A. Gould, eds. 1972. *Readings on logic*. New York: Macmillan.

DeVore, I. 1968. Comments. In *New perspectives in archaeology*, ed. S.R. Binford and L.R. Binford, 346–347. Chicago: Aldine.

Dhavalikar, M.K. 1988. *First farmers of the Deccan*. Pune: Ravish Publishers.

Flannery, K.V., ed. 1976. *The early Mesoamerican village*. New York: Academic.

Flannery, K.V. 2006. On the resilience of anthropological archaeology. *Annual Review of Anthropology* 35: 1–13.

Gamble, C. 1999. Lewis Binford. In *Encyclopedia of archaeology – The great archaeologists*, ed. T. Murray, vol. II, 811–834. Santa Barbara: ABC-CLIO.

Griffin, J.B. 1985. An individual's participation in American archaeology. *Annual Review of Anthropology* 14: 1–23.

Hahn, H., O. Neurath, and R. Carnap. 1929. Wissenschaftliche Weltauffassung: Der Wiener Kreis. Translated and published as *The scientific conception of the world: The Vienna circle* in 1973. Dordrecht: Reidel Publishing Company.

Heisenberg, W. 1952. *Philosophical problems of nuclear science*. London: Faber & Faber.

Hempel, C.G. 1965. *Aspects of scientific explanation and other essays in the philosophy of science*. New York: Free Press.

Hodder, I. 1982. Theoretical archaeology: A reactionary view. In *Symbolic and structural archaeology*, ed. I. Hodder, 1–16. Cambridge: Cambridge University Press.

Hodder, I. 2011. Human-thing entanglement: Towards an integrated archaeological perspective. *Journal of the Royal Anthropological Institute (N.S.)* 17: 154–177.

Johnson, A.L., ed. 2004. *Processual archaeology: Exploring analytical strategies, frames of reference and culture process*. West Port: Praeger.

Knapp, A.B.., ed. 1992. *Archaeology, annales and ethnohistory*. Cambridge: Cambridge University Press.

Kress, R.M. 1970. *Social science and the idea of process*. Urbana: University of Illinois Press.

Kuhn, T.S. 1962. *The structure of scientific revolutions*. Rev edn in 1970. Chicago: University of Chicago Press.

Kuhn, T.S. 1977. *The essential tension: Selected studies in scientific tradition and change*. Chicago: University of Chicago Press.

Leone, M.P., P.B. Potter, and P.A. Shackel. 1987. Toward a critical archaeology. *Current Anthropology* 28: 283–302.

Macneish, R.S., M.L. Fowler, A.G. Cook, F.A. Peterson, and J.A. Neely. 1972. *The prehistory of the Tehuacan valley, volume 5: Excavations and reconnaissance*. Austin: University of Texas Press.

Mandelbaum, M. 1977. *The anatomy of historical knowledge*. Baltimore: John Hopkins University Press.

Martin, P.S. 1972. The revolution in archaeology. In *The revolution in archaeology: A guide to theory and contributions*, ed. M.P. Leone, 5–12. Carbondale: Southern Illinois University Press.

Martindale, D. 1961. *The nature and types of social theory*. London: Routledge & Kegan Paul.

Maschner, H.D.G., ed. 1996. *Darwinian archaeologies*. New York: Plenum.

Meggers, B.J., ed. 1968. *Anthropological archaeology in the Americas*. Washington, DC: Anthropological Society of Washington.

Meltzer, D.J. 1979. Paradigms and the nature of change in American archaeology. *American Antiquity* 44: 644–657.

Meltzer, D.J. 2011. *Lewis Roberts Binford 1931–2011: A biographical memoir*. Washington, DC: National Academy of Sciences.

Mohanty, P.K. 1990. *Mesolithic settlement system of Keonjhar district, Orissa*. Unpublished PhD dissertation, University of Pune.

Murty, M.L.K. 1981. Hunter-gatherer ecosystems and archaeological patterns of subsistence behaviour on the southeast coast of India: An ethnographic model. *World Archaeology* 12: 47–58.

O'Brien, M.J., and R.L. Lyman. 2000. *Applying evolutionary archaeology: A systematic approach*. New York: Kluwer.

O'Brien, M.J., R.L. Lyman, and M.B. Schiffer. 2005. *Archaeology as a process: Processualism and its progeny*. Salt Lake City: University of Utah Press.

Paddayya, K. 1982. *The Acheulian culture of the Hunsgi valley (peninsular India): A settlement system perspective*. Pune: Deccan College.

Paddayya, K. 1983. Myths about the new archaeology. *Saeculum* 34: 70–104.

Paddayya, K. 1990. *The new archaeology and aftermath: A view from outside the Anglo-American world*. Pune: Ravish Publishers.

Paddayya, K., ed. 2007. *Formation processes and Indian archaeology*. Pune: Deccan College.

Petrie, W.M. 1972. *Methods and aims in archaeology*. (Originally published in 1904). New York: Benjamin Blom.

Piggott, S. 1959. *Approach to archaeology*. Harmondsworth: Penguin.

Popper, K.R. 1980. *The logic of scientific discovery*. London: Hutchinson.

Possehl, G.L. 2002a. The early Harappan. In *Recent studies in Indian archaeology*, ed. K. Paddayya, 112–128. New Delhi: Munshiram Manoharlal.

Possehl, G.L. 2002b. The mature Harappan. In *Recent studies in Indian archaeology*, ed. K. Paddayya, 129–139. New Delhi: Munshiram Manoharlal.

Raju, D.R. 1988. *Stone age hunters: An ethnoarchaeology of Cuddapah region, Southeast India*. Pune: Ravish Publishers.

Renfrew, C. 1994. Towards a cognitive archaeology. In *The ancient mind: Elements of cognitive archaeology*, ed. C. Renfrew and E.B.W. Zubrow, 3–12. Cambridge: Cambridge University Press.

Sankalia, H.D. 1977. *New archaeology: Its scope and application to India*. Lucknow: Ethnographic and Folk Culture Society.

Schiffer, M.B. 1976. *Behavioural archaeology*. New York: Academic.

Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico Press.

Schiffer, M.B. 1995. *Behavioral archaeology: First principles*. Salt Lake City: University of Utah Press.

Segraves, B.A. 1974. Ecological generalization and structural transformation of socio-cultural systems. *American Anthropologist* 76: 530–532.

Selvakumar, V. 1997. *Investigations into the prehistoric and protohistoric cultures of the Upper Gundar basin, Madurai district, Tamilnadu*. Unpublished PhD dissertation, University of Pune.

Sinopoli, C.M. 2007. Formation processes and the Vijayanagara metropolitan survey. In *Formation processes and Indian archaeology*, ed. K. Paddayya, 161–169. Pune: Deccan College.

Spriggs, M., ed. 1984. *Marxist perspectives in archaeology*. Cambridge: Cambridge University Press.

Steward, J. 1955. *Theory of culture change: The methodology of multilinear evolution*. Urbana: University of Illinois Press.

Stickel, G.E., and J.L. Chartkoff. 1973. The nature of scientific laws and their relation to law-building in archaeology. In *The explanation of culture change: Models in prehistory*, ed. C. Renfrew, 663–671. London: Duckworth.

Taylor, W.W. 1948. *A study of archaeology* (Memoir 69). (Reprinted in 1983 Carbondale: Southern Illinois University). Washington, DC: American Anthropological Association.

Taylor, W.W. 1972. Old wines and new bottles: A contemporary parable. In *Contemporary archaeology: A guide to theory and contributions*, ed. M.-P. Leone, 28–33. Carbondale: Southern Illinois University Press.

Thomsen, C.J. 1848. a) A cursory view of the monuments and antiquities of the north; b) Objects of the heathen period; c) Of the different periods to which heathen antiquities may be referred. In *Guide to northern archaeology*, translated and edited by the Earl of Ellesmore. (Originally published in Danish in 1836 as *Ledetraad til Nordisk Oldkindighed*. Copenhagen: The Royal Society of Northern Antiquities). London: James-Bain.

Watson, R.A. 1991. What the new archaeology has achieved. *Current Anthropology* 32: 279–291.

Watson, P.J., S.A. LeBlanc, and C. Redman. 1971. *Explanation in archaeology: An explicitly scientific approach*. New York: Columbia University Press.

White, L.A. 1959. *The evolution of culture: The development of civilization to the fall of Rome*. New York: McGraw-Hill.

Willey, G.R. 1953. *Prehistoric settlement patterns in the Viru valley, Peru* (Bulletin 155). Washington, DC: Bureau of American Ethnology.

Willey, G.R., and P. Phillips. 1958. *Method and theory in American archaeology*. Chicago: University of Chicago Press.

Willey, G.R., and J.A. Sabloff. 1980. *A history of American archaeology*. 2nd ed. San Francisco: W.H. Freeman & Co.

Winters, H.D. 1969. *The Riverton culture: A second millennium occupation in the central Wabash valley* (Report 13). Springfield: Illinois State Museum.

Wylie, M.A. 1981. *Positivism and the new archaeology*. Ann Arbor: University Microfilms.

Further Reading

Binford, L.R. 1965. Archaeological systematics and the study of culture process. *American Antiquity* 31: 203–210.

Earle, T.K. 1991. Toward a behavioral archaeology. In *Processual and postprocessual archaeologies*, ed. R.-W. Preucel, 83–95. Carbondale: Southern Illinois University.

Flannery, K.V., ed. 1986. *Guila Naquitz: Archaic foraging and early agriculture in Oaxaca, Mexico*. Orlando: Academic.

Leone, M.P., ed. 1972. *Contemporary archaeology: A guide to theory and contributions*. Carbondale: Southern Illinois University Press.

Panja, S. 1996. *Mobility strategies, site structure and settlement organization: A case study of chalcolithic sites in the middle Bhima valley with special reference to Inamgaon*. Unpublished PhD dissertation, University of Pune.

New Spain: Forts and Transport Archaeology

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Introduction

Although the Spanish conquest of Central Mexico and the Aztec capital of Tenochtitlan took a little over 2 years, the conquest of northern New Spain took 400 years to complete, using the same strategies as the original conquerors, explorers, and adventurers radiated from Mexico City in search of fame and fortune. In that search, they furthered the principal goals of the Spanish colonial enterprise: profit, evangelization, and cultural expansion, co-opting indigenous social and economic systems where possible and creating new-life ways and urban centers where convenient and viable.

Historical Background

Opening bridle paths and wagon roads was part and parcel of the expanding colonial enterprise. Many were built on preexisting trails that integrated the ebb and flow of ideas, knowledge, and commerce that was Mesoamerica. These trails were quickly converted from trails of integration to trails of destruction and subjugation. They radiated from the metropolitan capital to the newly created provincial capitals and principal ports and sustained the authority and power of the Spanish crown. Initially less than a meter wide and defined by the continual passage of *tamemes* (porters), human beasts of burden capable of carrying 35 kg on their backs, these trails had to be adapted to the needs of horses, mules, and wagons that carried far greater loads and to the needs of their drivers. They were widened, graded, and given firmer substrates. Permanent sources of drinking water and areas of forage were found. Way stations were built (Rees 1975; Lira López 2009). Initially, the old and the new modes of transportation coexisted and adapted together, but as time went by and the volume of freight increased, *arrieros* (teamsters) replaced *tamemes*.

The colonization and pacification of northern New Spain was built on the establishment of missions, mines, and market towns that formed a series of networks, or heartlands, integrated by a principal artery – *el Camino Real de Tierra Adentro* (the Royal Inland Road) – that began in Mexico City. By the late sixteenth century, that artery reached its maximum extension in northern New Mexico. Branches to the east and west covered immense areas. Toward the end of the seventeenth century, the western branch extended all the way to San Francisco, California, while the eastern branch tentatively reached the border between Texas and Louisiana (Fig. 1).

As the frontier moved further north, the distances between settlements grew, the population density shrank, and the need for protection increased as travelers were continually subject to surprise attacks and ambush by nomadic people intent on dislodging the invaders and purloining the exotic goods they carried.

While the Spanish terms *fuerte* and *presidio* can be translated into the single English word "fort," in New Spain, they were distinct classificatory terms. Forts, such as the Fuerte de San Juan Ulúa (Veracruz) or the Fuerte de San Diego (Acapulco), were major military defensive installations designed to defend sea ports from foreign invaders. As such, they tended to be strategically located and heavily armed. They were generally built and rebuilt by military engineers.

Presidios, derived from the Latin *præsidium* meaning frontier defensive outpost, were

New Spain: Forts and Transport Archaeology, Fig. 1 Road network in New Spain in the early 1800s. (Map created by P. Fournier)

generally landlocked, considerably smaller, and less robust than forts. When initially built in New Spain, they were expected to protect and defend the civilian settlements on the northern frontier of New Spain and the commerce that flowed along the *Camino de la Plata* (Silver Road), precursor to the *Camino Real de Tierra Adentro*. At that time, they may have been manned by no more than a dozen soldiers and officers garrisoned in a small blockhouse. By the beginning of the eighteenth century, the nature of the threat had changed, and the presidios had evolved into much larger rhomboid or quadrilateral structures that included one or more towers, which when fully complimented may have housed as many as a hundred soldiers and officers (Fig. 2).

The new garrisons formed a defensive line from California to Texas designed to keep out native populations to the north and those to south of the Spanish controlled areas. In the case of *presidios* located in the arid lands of northern New Spain, the soldiers and their families lived in and nearby the architectural complex and often engaged in small-scale agriculture and cattle raising outside it to complement their official rations. The troops were of mixed ancestry, the product of several generations of Spanish, indigenous, and African liaisons; some *presidio* soldiers had relations with and sometimes married native women.

Key Issues

Forts

Forts were massive defensive structures designed within the parameters of European siege warfare to defend crucial trade nodes in New Spain such as the ports of Veracruz, the principal point of access linking the colony to the Iberian Peninsula, and Campeche in the southern fringes of the Viceroyalty, a major source of tropical woods and dye stuffs. The structures visible today were built in the late eighteenth century to replace earlier earthworks that had failed to deter attacks by pirates, buccaneers, and corsairs.

The lack of concerted archaeological research is evident. Excavations have been either subsidiary to the installation of modern infrastructure or auxiliary to the conservation, restoration, and reconstruction of public places or specific buildings.

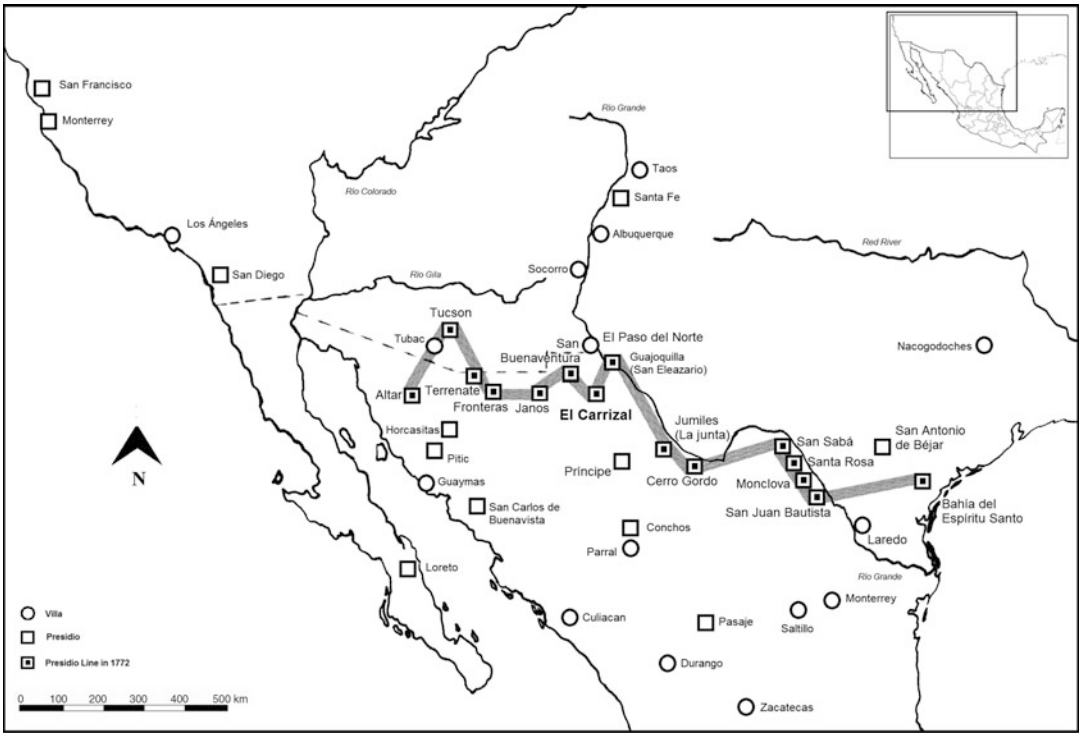

New Spain: Forts and Transport Archaeology, Fig. 2 The *presidio* line of northern New Spain in 1772. (Map created by P. Fournier and A. Avila)

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In New Spain, the wealthiest people lived in urban centers located in the highlands, far from unhealthy port towns. In the case of the port of Veracruz and the San Juan de Ulúa fort, the archaeological record indicates that the construction of inns (*ventas*) on the mainland in front of the fort preceded the construction of the earliest massive defenses. The material evidence also shows that the nascent Veracruz was little more than a shanty town until the middle of the eighteenth century (Hernández Aranda 2006). However, after the harbor and the town were devastated by fires and hurricanes several times, in 1737, orders were issued to construct walls surrounding the settlement and to replace the all-pervasive wooden huts with masonary buildings. The residents of Veracruz did not live in opulence. They were middle- to low-class merchants from Spain and New Spain; store and inn owners; sailors, porters, and soldiers stationed at the fort; and servants, African slaves, and free mulattos. Excavations at residences, inns, a shipyard site, and in the San Juan de Ulúa complex have uncovered architectural fills, leaving activity areas ill defined. The associated ceramics found were largely tablewares: 70% plates and 15–12% cups and mugs, but unlike assemblages recovered from mixed deposits in urban centers (Hernández Aranda 2004) such as Mexico City, there were no clear indications of class distinctions.

Although not strictly a fort but a walled city supported by bulwarks and redoubts, Campeche, a town built on an existing pre-Hispanic settlement, has provided a wide range of ceramics including sixteenth century majolica from Spain, seventeenth and eighteenth century majolica from Puebla, and the ever-present glazed or unglazed coarse earthenwares and olive jars. Nineteenth century artifacts underline the role of international trade in Campeches' growth and development (e.g., Ojeda Mas 1998).

Presidios

In the case of *presidios*, their setting and construction ranged from simple adobe houses to walled quadrangles protected by one or more towers and housing barracks, a chapel, officers' quarters, a smithy, and a gunpowder house. There would have been only one entrance. Often, there was a corral against one of the external walls. Many of the buildings may have been incorporated into, or abutted, the enclosing wall. The exterior walls were almost 2 m high and may have included firing slits and some form of interior bench or walkway that would have given the defenders a height advantage over any potential attacker whether mounted or on foot. They were not provided with canons and generally lacked an interior water source that would have succored them in times of a siege. Luckily, they rarely had to face such an eventuality. Their marauding challengers never, or rarely, saw the need to attack these static bulwarks. They found it easier to avoid them and go after their weak spot: the horse pasture. Due to the arid nature of the local environment and the limited ability to grow fodder on whatever bottom lands that might have been available, the presidios' horses all too often had to be grazed away from the presidio itself where they were exposed to ambush and stampede. It was also easier and more profitable to attack the pasture, leaving the presidial cavalry on foot and at a significant disadvantage until the horses could be replaced (Fig. 3).

Rex Gerald's (1968) seminal study examined and summarized what was known about the architecture and artifacts of the line of *presidios* that extended from California to Chihuahua. Williams (1991), Costello and Walker (1987), and Voss (2008) have studied and summarized different aspects of the history, architecture, and associated features of military settlements in Sonora, Arizona, and California. Subsequent research has focused on a number of *presidios* across the Spanish Borderlands (e.g., Bense 2004) such as El Carrizal, Chihuahua (Brown et al. 2004), and Aguaverde, Coahuila (Turpin and Eling 2004). Nonintrusive research techniques have included subsurface interface radar, proton magnetometry, and EDM topographic surveys (e.g., Brown et al. 2004). Stratigraphic excavations of architectural features have recorded both construction techniques and materials and helped to identify and interpret activity areas (e.g., Bense 2004; Brown et al. 2004). In a few instances, human burials have been recovered and subject to relevant osteological studies including osteometric analyses of morphological features of crania and teeth (Costello and Walker 1987). Zooarchaeological and macro-botanical remains have also been studied to better understand living conditions and foodways (e.g., Pavao-Zuckerman and LaMotta 2007).

Handwrought and cast-iron items, various metal utensils, glass containers, lead musket balls, gunflints, clothing and personal items, and other material remains have been analyzed (e.g., DiPaolo Loren 2001; Fox et al. 2009). Indigenous, Hispanic, Chinese, and European ceramic wares have been used as chronological markers and have helped to identify the extent and nature of regional exchange systems. Neutron activation analyses were applied to understand the colonial economic adaptation of plain ceramics, lead-glazed wares, and majolica from the Presidio San Francisco district. The results illustrate the development of local pottery production of plain and glazed wares, exchanges between mission sites, and the relevance of imports from Mexico in the daily lives of people of European descent in the fringes of New Spain (Skowronek et al. 2009).

The most common wares were regionally made brown wares produced by both *mestizo* (people of indigenous and European descent) and indigenous groups (e.g., Brown et al. 2004). While some results suggest there were few social markers in the archaeological record, others suggest that colonists sought to differentiate themselves from the indigenous population through their material possessions (e.g., Brown et al. 2004; Voss 2008). In this case, ethnogenesis provides a theoretical framework to help understand the creation and continual evolution of cultural identities, with special reference to gender and sexuality (Voss 2008).

While the specific ceramic assemblage from each site is distinct, the ceramic assemblage from El Carrizal, Chihuahua would seem to be

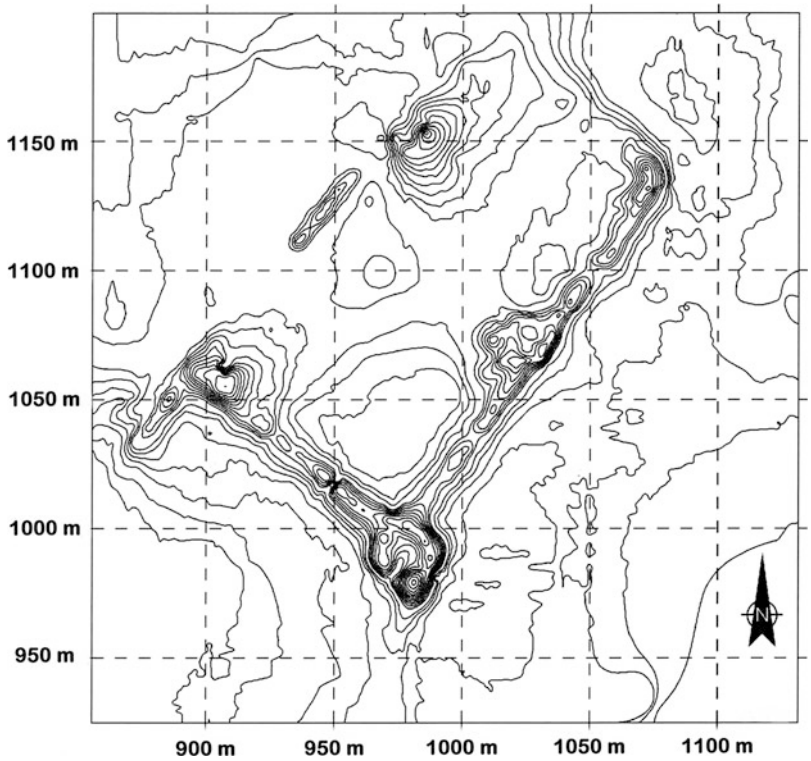

New Spain: Forts and Transport Archaeology, Fig. 3 Topographic map of Presidio El Carrizal, Chihuahua (Brown et al. 2004: 278)

fairly representative. This consisted of 1,509 sherds of which 80.78% were regionally produced brown wares, plain (95.32%), decorated red-on-brown (4.35%), and burnished tradewares (0.33%). The plainware vessel forms included jars, bowls, platters, basins, *comales* (corn tortilla griddles), and discs made from recycled sherds. The bichrome wares included jugs, basins, bowls, and jars (Brown et al. 2004). The remaining 19.22% of the ceramic materials was composed of majolica tradewares from Puebla, Guanajuato, and probably Aguascalientes (8.48%); lead-glazed ceramics from western and central Mexico (4.31%) or from northern New Spain (Presidios Green, 4.17%); British creamware (0.13%); British and Dutch white wares (0.99%); Mexican white wares (0.07%); Chinese porcelain pertaining to the Qing dynasty (0.33%); olive jars (0.20%); Tonalá burnished ceramics (0.20%), from western Mexico; coarse earthenwares (0.13%); and industrial porcelain (0.20%) (Fig. 4).

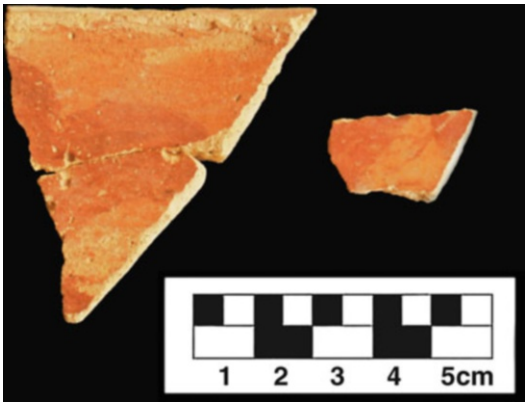

New Spain: Forts and Transport Archaeology, Fig. 4 Indigenous *red-on-brown bowl* fragments from *presidio* El Carrizal

These data indicate that Spanish-tradition ceramics used to display status in urban colonial culture were scarce because of distance, cost, and difficulties in transport. Ceramic forms, dominated by native brown wares, were employed for

a variety of culinary, storage, table-service, lighting, and amusement purposes, evidencing the distinct residential character of the military settlement.

Transport and Way Stations (*Parajes*)

Two groups of sites, the first in the Valle de Maltrata, Veracruz, and the second at Paraje de San Diego, in southern New Mexico, can be used to demonstrate the changes from foot path to bridle path to roadway and on to the introduction of the railroads and expressways.

Valle de Maltrata, Veracruz

The Valle de Maltrata is a narrow crucial pass from the coastal plain of Veracruz to the Mexican Highlands and as such has seen innumerable travelers over the last 5,000 years or more. First, in pre-Columbian Mesoamerica, *tamemes* carried on their backs trade goods and tribute through the mountains. During the colonial period, the introduction of horses, mules, and wagons saw an increase in the commercial traffic and the introduction of cobblestone avenues. Then, in the late 1800s, the railroad replaced the avenue, and in time, the expressway replaced the railroad.

As a result of archaeological surveys, stone-paved sections of several roads in the Valle de Maltrata have been registered. Although details are not provided (Lira López 2009: 140), their width and the use of switchbacks and massive, arched, stone bridges indicate that wagon and mule trains crossed the mountain passes easily. Surface collections recovered in and around the zone where causeways are located date from the early colonial to the modern period. The Early Colonial and Later Colonial period are defined by distinctive majolica types, while the Modern period is defined by a dramatic increase in metallic artifacts and nineteenth century majolica types (Lira López 2009).

Paraje de San Diego, New Mexico

The Paraje de San Diego is a well-known cluster of sites that includes a camp ground or way station that was used by Juan de Oñate, conqueror of New Mexico, in 1598. Depending on the direction of travel, it provides water before or after crossing the Jornada del Muerto, a 90-km stretch of the Camino Real de Tierra Adentro that lacks adequate water. The ceramic and artifact assemblages (e.g., majolica, lead-glazed pottery, olive jars, Chinese porcelains, indigenous ceramics, glass, and metal) indicate that the site was commonly used from the early eighteenth to the mid-twentieth century; moreover, low percentages of pre-Columbian pottery were found (e.g., Fournier 1999). The research began with a metal detector survey to determine site boundaries which was followed by an intensive surface collection that provided material that also could be conveniently divided into three periods. The subsequent excavation provided a ceramic assemblage of 668 sherds of which the majority of pieces are limited to the period, c. 1650–1680. Forms concomitant with the preparation and serving of food are the most common: soup plates (30%), bowls (12%), cups (20%), and jugs or pitchers *(jarros)* (3%). Cooking vessels include jars (*ollas*) (24%) and basins (*cazuelas)* (1%); water jars are limited to 5% (Staski 1998; Fournier 1999). The limited morpho-functional variability is a result of the nature of activities carried out at the site, used as a camp for repeated short-term occupation, where food was cooked and served and water was gathered (Staski 1998) by travelers and merchants who transported goods along the Camino Real.

Ongoing investigations include studies of *haciendas* and mining towns along the Camino Real (e.g., Fournier and Blackman 2010) as well as an interdisciplinary and inter-institutional research project – "Cultural Heritage and Identity," codirected by J. Pacheco, P. Fournier, and M.A. Morales – extending from central Mexico to Durango (http://promep.sep.gob.mx/ResultadosConvocatoriasPTC/2012/Redes.htm).

Future Directions

As they develop, the material correlates of the archaeology of forts and transportation in New Spain will provide a better understanding of the daily lives of those that rarely make it into the history books such as the soldiers, stevedores and teamsters, and their families. Each *presidio* was

built in the colonial period and reflects both specific local needs and the overarching goals of the viceregal authorities. They share a common cultural sequence defined by the ebb and flow of the viceregal policies and modified by regional political, socioeconomic, and military considerations. However, only a limited number of *presidios* have been partially excavated, and as a result, a concerted effort is warranted to expand the study of forts and transportation before the relevant sites are destroyed by neglect, vandalism, and rural and urban development (Figs. 5 and 6).

Steps have already been taken to address this. In 1994, a cultural, academic, and technical cooperation agreement was signed by the National Institute of Anthropology and History (INAH), the

New Spain: Forts and Transport Archaeology, Fig. 5 A poorly preserved segment of the Royal Road in Zacatecas. Note the completely vandalized historical marker in front of the electric post

New Spain: Forts and Transport Archaeology, Fig. 6 Ruins of a colonial bridge on the Camino Real, destroyed by a rural road in Zacatecas

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University of New Mexico, and the Office of Cultural Affairs of New Mexico to develop projects related to the research and conservation of the natural, cultural, archaeological, historical, and paleontological heritage of the Camino Real de Tierra Adentro (http://www.oas.org/udse/cic/ingles/web_cic/programamexicoheritage.htm). However, while the idea was to promote Royal Road research, tourism, and dissemination, the impact and results have been limited (e.g., Pacheco and Sánchez 2000).

The Camino Real traverses ten states in Mexico, without counting its eastern and western branches. Most scholars often carry out their work in isolation from their colleagues and seldom join efforts to integrate research results for the understanding of the social, economic, and political past processes associated with this road. In Mexico, archaeological research is governed by federal laws and INAH's guidelines, always privileging the pre-Columbian heritage. Scarce funding is a major problem for the development of interdisciplinary projects with a historical archaeology component that investigate, document, protect, and promote public understanding and appreciation of the Camino Real.

In anticipation of the designation in 2000 of El Camino Real de Tierra Adentro National Historic Trail in Texas and New Mexico spanning more than 650 km of the Royal Road, a number of archaeological studies – both surveys and excavations – were undertaken. Many of the results have been published in the Bureau of Land Management Cultural Resources Series (e.g., Palmer 1993; Palmer and Fosberg 1999). Since 2003, El Camino Real de Tierra Adentro Trail Association (CARTA n.d.), in collaboration with the National Parks Service, the Bureau of Land Management, the New Mexico Department of Cultural Affairs, and various Mexican organizations such as INAH, state cultural institutes, and local universities, has striven to highlight the importance of the Camino Real de Tierra Adentro and to promote its protection and study, as well as to facilitate the participation, involvement, and understanding of the communities along the trail as they celebrate the many facets of their multicultural and multiethnic history, the traditions of a living trail (http://www.caminorealcarta.org/aboutCARTA.htm).

Most recently, in 2010, 60 historic sites along the Mexican section of the Camino Real de Tierra Adentro were added to UNESCO's World Heritage List. However, most of them have not experienced an increase in tourism or substantial economic development. As mentioned, many historical landmarks continue to be subject to neglect and vandalism. In a country where the tourism industry is a major economic force, initiatives for engaging government institutions in the protection and in-depth study of the sites along centuries-old trajectory of the road, and public involvement through educational and outreach programs to promote the cultural importance to the communities that it served are pending tasks.

Cross-References

- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Fortifications, Archaeology of
- ▶ Fournier, Patricia
- ▶ Heritage Tourism and the Marketplace
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Mexico: Historical Archaeology
- ▶ Mission Archaeology in North America
- ▶ Neutron Activation Analysis (NAA): Applications in Archaeology
- ▶ Zooarchaeology

References

Bense, J. 2004. Presidios of the North American Spanish borderlands. *Historical Archaeology* 38 (3): 1–5.

Brown, R.B., P. Fournier, J.A. Peterson, D.A. Hill, and M. Willis. 2004. Settlement and ceramics in Northern New Spain: A case study of brownware pottery and historical change. In *Surveying the archaeology of Northwest Mexico*, ed. G. Newell and E. Gallaga, 265–268. Provo: University of Utah Press.

Carta: El Camino Real de Tierra Adentro Trail Association. n.d. Available at: http://www.caminorealcarta.org/aboutCARTA.htm (accessed 31 July 2012).

Costello, J.G., and P.L. Walker. 1987. Burials from the Santa Barbara Presidio Chapel. *Historical Archaeology* 21 (1): 3–17.

DiPaolo Loren, D. 2001. Manipulating bodies and emerging traditions at the Los Adaes Presidio. In *The archaeology of traditions. Agency and history before and after Columbus*, ed. T.R. Pauketat, 59–76. Gainesville: University Press of Florida.

Fournier, P. 1999. Ceramic production and trade on the Camino Real. In *El Camino Real de Tierra Adentro, volume 2*, ed. G.G. Palmer and S. Fosberg, 153–176. Santa Fe: Bureau of Land Management.

Fournier, P., and M.J. Blackman. 2010. Recorridos a lo largo del Camino de la Plata: El Real de Minas de Pánuco y la Hacienda del Buen Suceso, Zacatecas. In *Patrimonio, identidad y complejidad social*, ed. P. Fournier and F. López, 309–340. México: Instituto Nacional de Antropología e Historia.

Fox, A.A., S.P. Nesmith, and D.E. Fox. 2009. *Silent witness to Texas history: Archeology and artifacts of Goliad's Presidio La Bahia*. Austin: Presidio La Bahia and the Catholic Diocese of Victoria in Texas.

Gerald, R.E. 1968. *Spanish Presidios of the late eighteenth century in northern New Spain*. Museum of New Mexico Research records 7. Santa Fe: Museum of New Mexico Press.

Hernández Aranda, J. 2006. La población en el crecimiento urbano de Veracruz. *Gabinete de Arqueología* 5: 163–174. Available at: http://www.cubaarqueologica.org/document/bga5.pdf (accessed 10 February 2013).

Lira López, Y. 2009. El valle de Maltrata, Veracruz. Ruta de comunicación y comercio durante más de 3000 años. In *Caminos y mercados de México*, ed. J. Long Towell and A. Attolini Lecón, 129–149. México: Universidad Nacional Autónoma de México, Instituto de Investigaciones Históricas/Instituto Nacional de Antropología e Historia.

Ojeda Mas, H. 1998. Arqueología histórica en el recinto amurallado de la ciudad de Campeche. *Investigadores de la Cultura Maya* 6: 384–408.

Pacheco, J., and J.P. Sánchez, eds. 2000. *Memorias del coloquio internacional El Camino Real de Tierra Adentro*. México: Instituto Nacional de Antropología e Historia.

Palmer, G.G., ed. 1993. *El Camino Real de Tierra Adentro*. Cultural Resources series 11. Santa Fe: New Mexico State Office, Bureau of Land Management.

Palmer, G.G., and S. Fosberg, eds. 1999. *El Camino Real de Tierra Adentro, volume 2*. Cultural Resources series 13. Santa Fe: New Mexico State Office, Bureau of Land Management.

Pavao-Zuckerman, B., and V.M. LaMotta. 2007. Missionization and economic change in the Pimería Alta: The zooarchaeology of San Agustín de Tucson. *International Journal of Historical Archaeology* 11: 241–268.

Rees, P.W. 1975. Origins of colonial transportation in Mexico. *Geographical Review* 65: 323–334.

Skowronek, R.K., M.J. Blackman, and R.L. Bishop. 2009. Locally-made or imported? Identifying ceramic composition variation in the San Francisco Presidio jurisdiction. *Historical Archaeology* 43 (4): 1–21.

Staski, E. 1998. Change and inertia on the frontier: Archaeology at the Paraje de San Diego, Camino Real, in southern New Mexico. *International Journal of Historical Archaeology* 2: 21–44.

Turpin, S.A., and H.H. Eling Jr. 2004. Aguaverde: A forgotten Presidio of the line, 1773–1781. *Journal of Big Bend Studies* 16: 83–128.

Voss, B.L. 2008. *The archaeology of ethnogenesis: Race, sexuality, and identity in colonial San Francisco*. Berkeley: University of California Press.

Williams, J.S. 1991. *Architecture and defense on the military frontier of Arizona, 1752–1856*. Unpublished Ph. D. dissertation, The University of Arizona.

Further Reading

Arthur, D., J. Costello, and B. Fagan. 1975. A preliminary account of Majolica sherds from the Chapel Site, Royal Spanish Presidio, Santa Barbara, California. *Kiva* 41: 207–214.

Bartel, B. 1991. Archaeological excavation and education at the San Diego Royal Presidio, 1987–1990. *The Journal of San Diego History* 37: 1–30.

Blind, E.B., B.L. Voss, S.K. Osborn, and L.R. Barker. 2004. El presidio de San Francisco: At the edge of empire. *Historical Archaeology* 38 (3): 135–149.

Bolton, H.E. 1947. The West Coast corridor. *Proceedings of the American Philosophical Society* 91: 426–429.

Bruseth, J.E., J.J. Durst, T. Osburn, K. Gilmore, K. Hindes, N. Reese, B. Meissner, and M. Davis. 2004. A clash of two cultures: Presidio La Bahía on the Texas coast as a deterrent to French incursion. *Historical Archaeology* 38 (3): 78–93.

Butzer, E.K. 1997. The Roadside Inn or Venta: Origins and early development in New Spain. In *Conference of Latin American geographers yearbook*, ed. D.J. Robinson and C.E. Doenges, 1–16. Austin: University of Texas, Institute of Latin American Studies.

Calvo, T. 1997. *Por los caminos de Nueva Galicia. Transportes y transportistas en el siglo XVII*. México: Universidad de Guadalajara, Centre Français d'Études Mexicaines et Centraméricaines.

Fagan, B.M. 1976. *The royal Presidio of Santa Barbara: Archaeology of the Chapel site*. California: Santa Barbara Trust for Historic Preservation.

Fournier, P. 1997. Mexican ceramic analysis. In *A presidio community on the Rio Grande: Phase III testing and historical research at San Elizario, Texas, volume 1*, ed. B.J. Vierra, J. Piper, and R.C. Chapman, 199–255. Albuquerque: Office of Contract Archeology, University of New Mexico.

Fournier, P. 2006. Arqueología de los caminos prehispánicos y coloniales. *Arqueología Mexicana* XIV (81): 26–31.

Gregory, H.F., G. Avery, A.L. Lee, and J.C. Blaine. 2004. Presidio Los Adaes: Spanish, French, and Caddoan interaction on the northern frontier. *Historical Archaeology* 38 (3): 65–77.

N

Ivy, J.E. 1990. *Presidios of the Big Bend area*. Santa Fe: Southwest Cultural Resource Center.

Ivy, J.E. 2004. The presidio of San Antonio de Béxar: Historical and archaeological research. *Historical Archaeology* 38 (3): 106–120.

Marshall, M.P. 1999. Journal of a reconnaissance of the Camino Real. In *El Camino Real de Tierra Adentro, volume 2*, ed. G.G. Palmer and S.L. Fosberg, 15–39. Santa Fe: Bureau of Land Management.

Moorhead, M.L. 1975. *The Presidio: Bastion of the Spanish borderlands*. Norman: University of Oklahoma Press.

Naylor, T.H., and C. Polzer. 1986. *The Presidio and militia on the northern frontier of New Spain, 1570–1700*. Tucson: The University of Arizona Press.

Olson, A.P. 1985. Archaeology at the Presidio of Tucson. *Kiva* 50: 251–270.

Pavao-Zuckerman, B., and D. DiPaolo Loren. 2012. Presentation is everything: Foodways, tablewares, and colonial identity at Presidio Los Adaes. *International Journal of Historical Archaeology* 16: 199–226.

Reslewic, S., and J.H. Burton. 2002. Measuring lead isotope ratios in Majolica from New Spain using a nondestructive technique. In *Archaeological chemistry: Materials, methods, and meaning*, ed. K.A. Jakes, 36–47. Washington, DC: American Chemical Society.

Richter-Tate, C. 2009. *Tepic to San Blas: A geographical reconstruction of a segment of the Camino Real of colonial Mexico*. Unpublished Master's dissertation, University of Nebraska at Omaha.

Roney, J. 1993. Tracing the Camino Real: The Chihuahua section. In *El Camino Real de Tierra Adentro*, ed. G.G. Palmer, 85–99. Santa Fe: Bureau of Land Management.

Schurz, W.L. 1939. *The Manila Galleon*. New York: E.P. Dutton.

Staski, E. 1995. *Research on the American West: Archaeology at Forts Cummings and Fillmore*. Cultural Resources series 12. Santa Fe: New Mexico State Office, Bureau of Land Management.

Staski, E. 2004. An archaeological survey of El Camino Real de Tierra Adentro, Las Cruces-El Paso. *International Journal of Historical Archaeology* 8: 231–245.

Staski, E. 2005. *Final report: Archaeological survey and testing along a segment of the Camino Real on the New Mexico State University's Chihuahuan Desert Rangeland Research Center*. Santa Fe: Historic Preservation Division, Department of Cultural Affairs.

Staski, E. 2011. Ephemeral sites and inertia along El Camino Real de Tierra Adentro: Evidence from nearly two decades of archaeological research. In *Contemporary archaeologies of the southwest*, ed. W. Walker and K.R. Venzor, 245–260. Boulder: University Press of Colorado.

Suárez Aguilar, V., and H. Ojeda Mas. 1996. *Arqueología Histórica en la Ciudad de Campeche*. Campeche: Universidad Autónoma de Campeche.

Swann, B.N. 2002. Material culture at Presidio Santa María de Galve (1698–1722): Combining the historical and archaeological records. *Southeastern Archaeology* 21: 64–78.

Vierra, B.J., J. Piper, and R.C. Chapman, eds. 1997. *The Presidio and the river on the borderlands*. Albuquerque: Office of Contract Archaeology, University of New Mexico.

Voss, B.L. 2005. From Casta to Californio: Social identity and the archaeology of culture contact. *American Anthropologist* 107: 461–474.

Voss, B.L. 2011. The archaeology of indigenous heritage at Spanish-colonial military settlements. In *Rethinking the archaeology of resistance to Spanish colonialism in the Americas*, ed. M. Liebmann and M.S. Murphy, 243–266. Santa Fe: School for Advanced Research.

Walter, T.K. 2004. The archaeology of Presidio San Sabá: A preliminary report. *Historical Archaeology* 38: 94–105.

Williams, J.M. 2007. *GIS-aided archaeological research of El Camino Real de Los Tejas with focus on the landscape and river crossings along El Camino Carretera*. Unpublished Master's dissertation, Stephen F. Austin State University.

Williams, J.S. 1997. Adobe ramparts: Archaeology and the evolution of Presidio San Diego. *Pacific Coast Archaeological Society Quarterly* 33: 29–56.

Williams, J.S. 2004a. The evolution of the Presidio in northern New Spain. *Historical Archaeology* 38 (3): 6–23.

Williams, J.S. 2004b. San Diego Presidio: A vanished military community of upper California. *Historical Archaeology* 38: 121–134.

Niah Cave (The West Mouth)

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Introduction

Niah Cave is one of a large system of caverns situated at the base of a large limestone massif in the lowland rainforests of Sarawak, Malaysia, and is one of the largest Palaeolithic sites in Southeast Asia. The main archaeological site is the West Mouth, an enormous cavern that links via internal passages to several smaller cave mouths, one of which, Lobang Hangus, also contains Palaeolithic deposits. The West Mouth contains evidence of human activity dating from at least 50,000 years ago until the historic era. The site also contains a long history of human

Niah Cave (The West Mouth), Fig. 1 View looking east into the main E-Series trench excavation areas in the West Mouth. Tom Harrisson and others pictured working on a north-facing section. (Image courtesy of Dr. Ipoi Data, Sarawak Museum Image Archive)

burial dating from 12,000 BCE until 200 BCE that encompasses a rich tradition of depositional practices including flexed burial, secondary jar burial, cremations, and supine coffin burials (Lloyd-Smith 2009).

The site was first excavated by a team led by the curator of the Sarawak Museum, Tom Harrisson and his wife Barbara from 1954 to 1967 (Fig. 1), by Zuraina Majid in 1977 (Zuraina Majid 1982), and most recently by Professor Graeme Barker, who directed the Niah Cave Project from 2000 to 2003. The aim of the original excavation was the discovery of early human remains following the remarkable discoveries of *Homo erectus* (*Pithecanthropus erectus*) by Eugene Dubois at Trinil, Java, Indonesia, in 1891. The site and Tom Harrisson became world famous with the discovery of anatomically modern human remains, a skull and tibia, in 1958, that were radiocarbon dated to c. 40,000 years BP (Harrisson 1959). While the original excavation team left extensive records of their work with the Sarawak Museum, a final report on the site was never published.

Key Issues/Current Debates/Future Directions/Examples

Harrisson was innovative at the time for the extensive use of the new radiocarbon dating technique and use of other specialists such as the geologist, Dr. Schroder, from the Brunei Shell Petroleum Company, to recover pollen from the cave sediments to understand the Pleistocene environment, and Lord Medway, now Earl of Cranbrook, to analyze and interpret the cave fauna. His wife Barbara, while not a trained archaeologist, ran the excavation during Tom's absences, was present during the initial discovery of the Deep Skull, and professionally directed the recovery of human remains from the extensive and complex late Holocene cemetery also discovered in the West Mouth. A final report on the cemetery excavations was published by Barbara Harrisson in the Sarawak Museum Journal in 1967 (Harrisson 1967).

A major flaw of Tom Harrisson's site interpretation was that he believed sediments had accumulated gradually at a relatively fixed rate of 1 in. (2.5 cm) every 521 years (Harrisson 1958). Harrisson directed excavators to remove sediment in arbitrary horizontal spits, unwittingly cutting through a complex and often, convoluted set of sedimentary sequences. As a result there remained serious doubts among the archaeological community about the veracity of Harrisson's chronological and typological interpretations, leaving Niah sidelined from major archaeological debates in the region (Spriggs 1989; Bellwood 1997).

The Niah Caves Project

The Niah Caves Project (NCP), 2000–2003, was instigated to resolve several unanswered questions about the precise chronology of the site, the age of the Deep Skull, and details of the stratigraphic and cultural sequences (Barker et al. 2000, 2001, 2002a, b, 2003, 2007, 2011). The project was multidisciplinary involving experts in a wide range of fields to address the complex formation history of the site and draw as much information about occupation history from the remaining sediments, while minimizing

further physical impact to the site. The NCP investigations recovered a remarkable record of organic remains from the Pleistocene layers of this site, including animal bone, fish bone, mollusks, macroplant remains, starch granules, and organic tools including attached bindings. From these investigations excavators have been able to reconstruct details of diet and hunting technology.

Reanalysis of the Deep Skull determined its age to range between 42,000 and 39,000 years old, based on ABOX radiocarbon dates of nearby charcoal and uranium-series dating of bone fragments from the cranium (Barker et al. 2007). The skull and tibia fragments remain the oldest modern human remains in Southeast Asia. Further radiocarbon dating of charcoal associated with stone tools, burnt bone, and hearths indicates human occupation at Niah from at least 50,000 years ago (Barker et al. 2007; Higham et al. 2008). The recovery of flaked stone below these radiocarbon dates suggests possible earlier occupation, but attempts to date these and lower layers using optically stimulated luminescence were unsuccessful (Stephens 2004).

Organic remains from the site provide a rare insight into the technical capabilities and knowledge of these late Pleistocene foragers. Faunal remains include large numbers of bearded pig, *Sus barbatus*, Malay tapir, *Tapirus indicus*, bovids and sambar deer, *Cervus unicolor*, as well as a range of reptiles, fish, and bats. They harvested freshwater snails such as the gastropod *Paludomus everetti* and the mussel *Ctenodesma borneensis*. Plant foods represented include a wide range of fruits, nuts, and tubers, and these indicated that people were able to detoxify poisonous plants from the Late Pleistocene. After the Last Glacial Maximum, there is evidence that people may have engaged in burning forest edges to enhance plant and animal productivity (Hunt and Rushworth 2005).

Charred nut fragments included fragments of the toxic plant, *Pangium edule*, recovered in deposits dating from at least 40,000 years ago (Barton and Paz 2007). This plant is deadly to humans if not properly processed; even so fermented nuts remain a popular food today in some parts of Malaysia. From deposits dating to around 20,000 years ago, macro-remains of several yams and tuberous plants were recovered, including the toxic yam, *Dioscorea hispida*, and the aroid known as taro, cf. *Colocasia* elim. *Esculenta*, as well as other unidentified tuberous remains (Barton and Paz 2007). Recovery of starch granules from the cave sediments revealed further use of yams including cf. *Dioscorea* sp., as well as the forest aroid *Alocasia longiloba* (Barton 2005). The latter plant is avoided as a food today, as it is considered too itchy, but produces large rhizomes, which could have been eaten in the past. Starch granules of the sago palm *Eugeissona utilis* were also recovered from deposits dating to 40,000 years ago, indicating the use of this palm as a food source at this early time (Barton 2005). These findings show that early foragers had knowledge of useful sources of starchy foods such as yams, rhizomes, and starch storing palms, and they also knew how to detoxify some very poisonous plants.

Bone points were recovered from early Pleistocene contexts, but none have been securely dated. The earliest bone point comes from Trench HR/1 at 120–123 in. (300–307.5 cm) (corresponding to c. 40,000 years ago). Analysis of wear patterns on this point and eight others suggests their use as multifunctional tools, including for crafts like basketry (Rabett et al. 2006). A total of fourteen bone points from Lobang Hangus (a cave entrance on the opposite side of the limestone massif to the West Mouth), dated from 14,000 years ago, were identified as projectile armatures, probably part of a bow and arrow technology (Piper and Rabett 2009: 562). From the West Mouth, bone bipoints, including examples made from the spines of freshwater stingrays, were dated to 12,000 years ago (Barton et al. 2009). Several of these retained traces of hafting resins and fiber bindings. It is thought that these were part of a composite spear technology, such as a multipronged fishing leister.

The lithic technology is relatively informal throughout, consisting primarily of unretouched quartzite flakes struck from river pebbles and cobbles with some use of quartz, chert, shale, and limestone. Organic residue analysis of the lithic technology revealed use of silica-rich plants like

bamboo, rattans, and palms from the earliest levels. Several tools from layers dating to around 40,000 years ago had been used to work plant resins, suggesting use as mastics and composite organic tools might date from the earliest periods of human occupation at this site. There is a relatively sudden addition of ground stone, cobble mortars after 17,000 BP associated with an increase in woody ash deposits that might suggest a change in site use intensity at this time. Later Holocene layers contain polished pebble axes and a variety of adzes, but there are no secure dates for the establishment of these traditions in the West Mouth.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Rice: Origins and Development
- ▶ Taro: Origins and Development
- ▶ Vegeculture: General Principles
- ▶ Yams: Origins and Development

References

Barker, G., H. Barton, P. Beavitt, S. Chapman, M. Derrick, C. Doherty, L. Farr, D. Gilbertson, C. Hunt, W. Jarvis, J. Krigbaum, B. Maloney, S. McLaren, P. Pettitt, B. Pyatt, T. Reynolds, G. Rushworth, and M. Stephens. 2000. The Niah Caves Project: preliminary report on the first (2000) season. *Sarawak Museum Journal* 55: 111–149.

Barker, G., D. Badang, H. Barton, P. Beavitt, M. Bird, P. Daly, C. Doherty, D. Gilbertson, I. Glover, C. Hunt, J. Manser, S. McLaren, V. Paz, B. Pyatt, T. Reynolds, J. Rose, G. Rushworth, and M. Stephens. 2001. The Niah Cave Project: The second (2001) season of fieldwork. *Sarawak Museum Journal* 56: 37–119.

Barker, G., H. Barton, M. Bird, F. Cole, P. Daly, D. Gilbertson, C. Hunt, J. Krigbaum, C. Lampert, H. Lewis, L. Lloyd-Smith, J. Manser, F. Menotti, V. Paz, P. Piper, B. Pyatt, R. Rabett, T. Reynolds, M. Stephens, G. Thompson, M. Trickett, and P. Whittaker. 2002a. The Niah Cave Project: The third (2002a) season of fieldwork. *Sarawak Museum Journal* 57: 87–177.

Barker, G., H. Barton, P. Beavitt, M. Bird, P. Daly, C. Doherty, D. Gilbertson, C. Hunt, J.S. Krigbaum, H. Lewis, J. Manser, S. McClaren, V. Paz, P. Pipper, B. Pyatt, R. Rabett, T. Reynolds, J. Rose, G. Rushworth, and M. Stephens. 2002b. Prehistoric foragers and farmers in south-east Asia: Renewed investigations at the Niah Cave, Sarawak. *Proceedings of the Prehistoric Society* 68: 147–164.

Barker, G., H. Barton, M. Bird, F. Cole, P. Daly, A. Dykes, D. Gilbertson, C. Hunt, H. Lewis, L. Lloyd-Smith, J. Manser, S. McLaren, F. Menotti, V. Paz, P. Piper, B. Pyatt, R. Rabett, T. Reynolds, M. Stephens, G. Thompson, and M. Trickett. 2003. The Niah Cave Project: The fourth (2003) season of fieldwork. *Sarawak Museum Journal* 58: 45–199.

Barker, G., H. Barton, M. Bird, P. Daly, I. Datan, A. Dykes, L. Farr, D. Gilbertson, B. Harrisson, C. Hunt, T. Higham, J. Krigbaum, H. Lewis, S. McLaren, V. Paz, P. Pike, P. Piper, B. Pyatt, R. Rabett, T. Reynolds, J. Rose, G. Rushworth, M. Stephens, C. Stringer, and G. Thompson. 2007. The 'human revolution' in tropical Southeast Asia: The antiquity of anatomically modern humans, and of behavioural modernity, at Niah Cave (Sarawak, Borneo). *Journal of Human Evolution* 52: 243–261.

Barker, G., L. Lloyd-Smith, H. Barton, F. Cole, C. Hunt, P. Piper, R. Rabett, V. Paz, and K. Szabo. 2011. Foraging-farming transitions at the Niah Caves, Sarawak, Borneo. *Antiquity* 85: 492–509.

Barton, H. 2005. The case for rainforest foragers: The starch record at Niah Cave, Sarawak. *Asian Perspectives* 44: 56–72.

Barton, H., and V. Paz. 2007. Subterranean diets in the tropical rainforest of Sarawak, Malaysia. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives (One World Archaeology)*, ed. T.P. Denham, J. Iriarte, and L. Vrydaghs. California: Left Coast Press Inc.

Barton, H., P.J. Piper, R. Rabett, and I. Reeds. 2009. Composite hunting technologies from the Terminal Pleistocene and early Holocene, Niah Cave, Borneo. *Journal of Archaeological Science* 36: 1708–1714.

Bellwood, P. 1997. *Prehistory of the Indo-Malaysian Archipelago*. 2nd ed. Honolulu: University of Hawai'i Press.

Harrisson, T. 1958. The Caves of Niah: A history of prehistory. *Sarawak Museum Journal* 8: 549–595.

Harrisson, T. 1959. New archaeological and ethnographic results from Niah Caves, Sarawak. *Man* 59: 1–8.

Harrisson, B. 1967. A classification of Stone Age burials from Niah Great Cave, Sarawak. *Sarawak Museum Journal* 15 (30-31 New series): 126–200.

Higham, T.G.F., H. Barton, C.S.M. Turney, G. Barker, C. Bronk Ramsey, and F. Brock. 2008. Radiocarbon dating of charcoal from tropical sequences: Results from the Niah Great Cave, Sarawak, and their broader implications. *Journal of Quaternary Science* 23: 1–9.

Hunt, C., and G. Rushworth. 2005. Cultivation and human impact at 6000 cal yr B.P. in tropical lowland forest at Niah, Sarawak, Malaysian Borneo. *Quaternary Research* 64: 460–468.

Lloyd-Smith, L. 2009. Chronologies of the dead: Later prehistoric burial practices at the Niah Caves, Sarawak.

Unpublished Ph.D. dissertation, Department of Archaeology, University of Cambridge.
Majid, Zuraina. 1982. The West Mouth, Niah, in the prehistory of Southeast Asia. *Sarawak Museum Journal* 52 ((New Series)): 1–200.
Piper, P.J., and R.J. Rabett. 2009. *Hunting in a tropical rainforest: Evidence from the terminal Pleistocene at Lobang Hangus, Niah Caves*. International Journal of Osteoarchaeology: Sarawak.
Spriggs, M. 1989. The dating of the island Southeast Asian Neolithic: An attempt at chromometric hygiene and linguistic correlation. *Antiquity* 63 (1): 587–613.
Stephens, M. 2004. OSL dating of quartz grains from the guano-rich cave deposits of Niah, Sarawak, Malaysian Borneo: Preliminary results. *Quaternary Newsletter* 102: 67–70.

Further Reading

Higham, T.F.G., H. Barton, C.S.M. Turney, G. Barker, C. Bronk Ramsey, and F. Brock. 2009. Radiocarbon dating of charcoal from tropical sequences: Results from the Niah Great Cave, Sarawak, and their broader implications. *Journal of Quaternary Science* 24 (2): 189–197.

Niah Caves: Role in Human Evolution

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Introduction

The Niah Caves of coastal Sarawak in northern Borneo (N 3° 48′ 54.6, E 113° 46′ 52.3″) have been a subject of archaeological interest ever since the mid-nineteenth century, when the naturalist Alfred Russel Wallace visited Sarawak in 1855 to collect biological specimens and, though he was unable to visit the caves, reported their likely significance for anthropological research to Charles Darwin and Thomas Huxley (Sherratt 2002). The 1950s and 1960s excavations of Tom and Barbara Harrisson brought the caves to international attention, especially those in the West Mouth of the Great Cave (Fig. 1), in particular their discovery of an anatomically modern skull that they dated to c. 40,000 BP, the so-called Deep Skull (Fig. 2). Renewed investigations since 2000 have confirmed the central importance of the site for human evolution studies in Southeast Asia (Barker et al. 2007, 2013; Barker 2013).

Definition

The Niah Caves lies within the Gunong Subis, a steep-sided limestone massif close to the northern shoreline of Sarawak. In the 1950s and 1960s, Tom and Barbara Harrisson conducted excavations in many of the cave entrances, but the largest, and most important for early prehistory, were those in the West Mouth of the Great Cave. In February 1958, a team led by Barbara Harrisson discovered in the deepest part of their excavation near the front of the West Mouth (the "Hell Trench") the skull and other bones of an anatomically modern human (Brothwell 1960), its antiquity indicated by charcoal found the previous year near the skull findspot which was dated by the then revolutionary method of ^{14}C dating to 39,820 ± 1012 BP (GrN-1339C; calibrated, the date would be 42,391–45,629 BP) (Harrisson 1958). Other finds indicated that the West Mouth was used for human occupation and burial from the time of the "Deep Skull" more or less to the present day, and their excavations in the other entrances of the Great Cave and other caves elsewhere in the Gunong Subis yielded further evidence for human settlement and/or burial at different periods of the past. The work gave the caves iconic status in the archaeology of Island Southeast Asia as having the longest sequence of human occupation known in the region (though older fossils have since been found elsewhere in the region, e.g., Mijares et al. 2010; Demeter et al. 2012).

For a number of reasons, the Harrissons were never able to publish their excavations in final form, and despite the many interim papers they published, some of their discoveries, stratigraphic findings, and interpretations were controversial. One of the criticisms raised by scholars subsequently was that, given the fact that caves frequently have complex dipping deposits, the excavation method of horizontal spits used by

Niah Caves: Role in Human Evolution, Fig. 1 The West Mouth of the Great Cave; the archaeological reserve is on the far *right*, immediately in front of the tourist boardwalk visible on the skyline. (Photograph: Graeme Barker)

the Harrissons (Fig. 3) was likely to have mixed together material of different ages. Also, a key component of their dating was extrapolation by depth, Tom Harrisson arguing that the most common deposit in the West Mouth, what he called the "pink and white layer," accumulated as a drizzle of sediment from the cave roof at a steady and constant rate, but a simple depth-age relationship in cave sediments ran counter to the experience of most cave excavators. The major question was whether the Deep Skull was really as old as Tom Harrisson claimed. The Malaysian archaeologist Zuraina Majid conducted further smaller-scale excavations in the West Mouth that made a notable contribution to understanding the Niah sequence (Zuraina Majid 1982), but significant uncertainties remained. This was the context for a further program of fieldwork and related laboratory, artifactual, and archival studies (the Niah Caves Project, hereafter the NCP) that began in 2000, coordinated by Graeme Barker (University of Cambridge). The main fieldwork took place between 2000 and 2004, and analytical work has continued ever since, focussed both on materials from the new fieldwork and the rich assemblage of archaeological finds – which include animal bones, human bones, shells, stone tools, bone tools, pottery, textiles, and beads – from the previous excavations.

Key Issues/Current Debates/Future Directions/Examples

The NCP investigations in the West Mouth have defined a series of major geomorphic and palynological phases bracketed by new ^{14}C dates (Gilbertson et al. 2005; Higham et al. 2008; Fig. 4). In the period >50,000–37,000 BP, colluvium (defined as Lithofacies 2C) slid down from the cave lip into a natural basin on its interior side, where it interbedded with silts and clays formed by episodes of streamflow from the cave interior (Lithofacies 2). The climate alternated between warmer and wetter, and cooler and drier, conditions, with corresponding landscape changes between lowland forest, mangroves, and coastal swamps (in the former) and dry montane and lowland forest (in the latter). It became progressively drier and cooler after c. 45.000 BP, though there were still episodes of hot wet climate when lowland rainforest and mangroves developed in the vicinity of the caves. Around c. 35,000 BP, possibly triggered by a major roof fall, earthquake, or very wet episode, there was a major collapse of wet guano (Lithofacies 3) in the West Mouth interior that caused a mudflow that filled the West Mouth basin, deforming and covering the existing sediments. Thick sequences of archaeology-rich brown silts (Lithofacies 4) then

Niah Caves: Role in Human Evolution, Fig. 2 (*top*) The discovery of the "Deep Skull." The label to the *left* of the partially excavated skull refers to the location of the charcoal found the previous year and dated to c. 40,000 BP; (*bottom*) the Deep Skull after restoration (*top*) and a modern human skull (*bottom*). (Photographs reproduced with permission of Sarawak Museum)

built up across the front of the West Mouth, forming from soon after the mudflow to the Early Holocene c. 8500 BP. Most of the latter sediments were removed by the earlier excavators but enough remain to indicate that human activities in the Terminal Pleistocene and Early Holocene included the digging of pits and their filling with food refuse. The windblown component in Lithofacies 4 and the associated palynological record suggest an overall trend towards a drier and more open landscape in this part of northern Borneo c. 20,000–10,000 BP, before the hot and wet climate of coastal Sarawak today, and dense rainforest, developed with the onset of the Holocene.

Fragments of the Deep Skull (which belongs to a teenage girl) have been dated using the uranium-series method to about 37,000 years ago (Barker et al. 2007). The NCP has established its likely stratigraphic position within the Lithofacies 2 sediments but has obtained ^{14}C dates on charcoal from *higher up* the profile of c. 40,000 BP. Furthermore, the sediments cemented within the skull are very different from those of Lithofacies 2 in terms of their bulk characteristics, geochemistry, and palynology, and most strikingly include large granite crystals, the nearest sources of which are a considerable distance away in the Rajang Valley and on Mount Kinabalu. The discrepancies in the dating, sedimentology, geochemistry, and palynology are consistent with the skull and its associated long bones (a left femur and right proximal tibia: Krigbaum and Datan 2005) having been in a pit dug down from the Lithofacies 4 sediments into the Lithofacies 2 sediments, i.e., that they are the result of deliberate burial rather than, say, parts of a body dumped on the cave lip that slipped down naturally into the natural basin behind it and was incorporated in the Lithofacies 2 stream sediments there (Hunt and Barker 2013). An intriguing further hint at ritual activity associated with the heads of the dead is traces of a red wash, probably from a tree resin (Pyatt et al. 2010), on the interior surface of human skull fragments that have been found among the vertebrate fauna from the Harrisson excavations, from the same depths as the Deep Skull.

Evidence for hominin presence in the West Mouth goes back to c. 50,000 BP. Dates of this antiquity on charcoal have been obtained from excavating one of the surviving Harrisson balks (HP/6) in the Hell Trench (Fig. 5), from a series of organic-rich "palaeosurfaces" full of charcoal and ash, with occasional humanly struck stone

Niah Caves: Role in Human Evolution, Fig. 3 Tom Harrisson excavating in 1958 in the West Mouth of Niah Great Cave. (Photograph reproduced with permission of Sarawak Museum)

flakes and numerous fragments of butchered animal bone. These palaeosurfaces, formed of organic debris slipping down from the cave lip into the basin within the Lithofacies 2C colluvium, appear to equate to the rich "bone-under-ash layer" that the Harrissons discovered in their basal spits; charcoal samples from the latter, curated in Sarawak Museum, have yielded dates of comparable antiquity to those from the excavated balk. Hominins were regularly visiting the West Mouth from c. 50,000 BP to the period when the Deep Skull was deposited, their visits resulting in the accumulation of lenses of ash, charcoal, and other cultural refuse along the front of the West Mouth entrance. There is no human skeletal material to demonstrate conclusively that these remains were deposited by groups of *Homo sapiens*, as opposed to other forms of hominin present in Island Southeast Asia at this time, notably *Homo floresiensis*, but the identical nature of the depositional activities and material culture in the earliest layers compared with those associated with the Deep Skull makes a very strong case that they were. A 1.5-m deep sounding excavated after the removal of the HP/6 balk, below where it stood, found fragments of butchered bone and a humanly struck jasper flake in the basal context reached, indicating some kind of definite hominin presence before 50,000 BP. This is beyond the range of radiocarbon, and unfortunately, the West Mouth sediments lacked the quartz grains essential for OSL dating, but the finds clearly imply that 50,000 BP can be treated as a *terminus ante quem* date for hominins, almost certainly *Homo sapiens*, in the Niah Caves.

The palynology of the cave sediments, the vertebrate fauna and molluscs from the Harrisson and NCP excavations, and macroscopic plant remains – phytoliths and starch grains – indicate that these hominins foraged

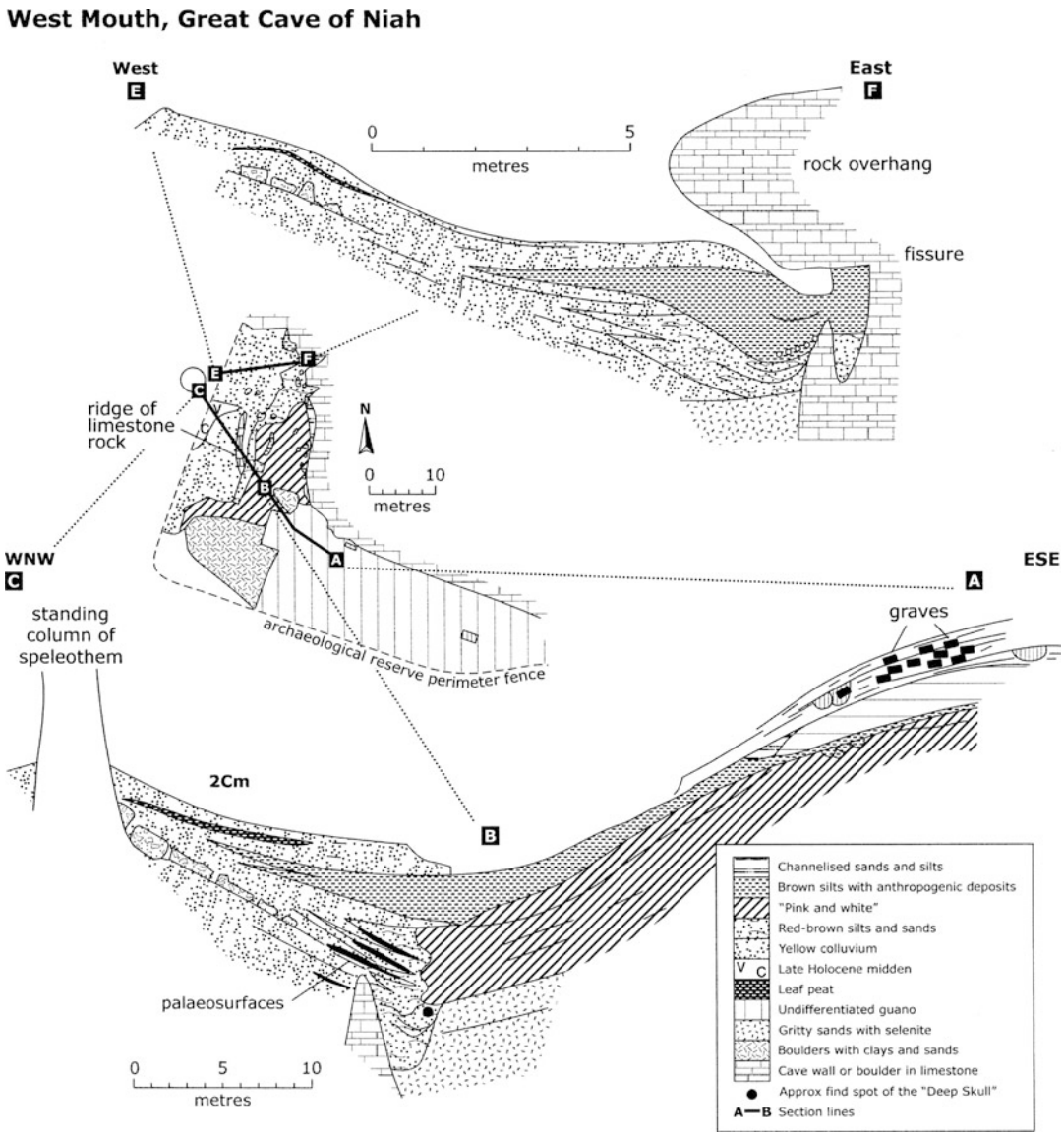

Niah Caves: Role in Human Evolution, Fig. 4 Schematic representation of the Late Quaternary lithostratigraphy of the northern part of the West Mouth of the Great Cave (Revised from Gilbertson et al. 2005). The present surface of the surficial deposits is the result of earlier excavations. Heights are given with reference to the site datum (~50 m above sea level). (Illustrations: Tim Absalom)

around the Niah Caves in a mosaic landscape that included montane forest (on the Gunong Subis massif), open woodland, scrub, lowland dipterocarp rainforest, riparian swamp forest, and mangrove swamp, interspersed with lakes or large rivers, smaller fast-flowing streams, and stagnant ponds (Barker et al. 2007). They especially hunted the bearded pig along with a wide variety of other prey including arboreal species such as orang-utan. There are hints in the age composition of the fauna that trapping or snaring may have been employed as well as spearing. They collected a wide range of molluscs from rivers, streams, ponds, and swamps,

Niah Caves: Role in Human Evolution, Fig. 5 Excavating the Harrisson balk HP/6 in the Hell Trench (looking south). The excavator is trowelling one of the ash- and organic-rich layers dated to c. 45,000 BP that form part of the overall body of colluvial sediments (Lithofacies 2C) that dip east into the cave from the entrance lip. A similar organic-rich layer is visible as the white smears in the balk behind him. (Photograph: Graeme Barker)

and fished these same localities. Some of the most remarkable evidence for the foraging systems of the Niah modern humans is a suite of macroscopic and microscopic botanical remains recovered from the new excavations: nuts, fruits, tissues (parenchyma) of tuberous plants such as yam and swamp taro, and starch grains of sago palm – plants that needed time and effort in the case of sago (to extract the pith) and in many cases careful processing to remove toxins. Peaks in *Justicia* pollen suggest that people were also burning forest edges to improve the productivity of forest clearings for plants such as tubers (Hunt et al. 2007), a strategy that would have improved their own plant food supply and also attracted animals such as pigs to these locations. Biomass burning of this kind is also known from New Guinea at this time (Summerhayes et al. 2010).

The Niah Caves may not tell us when anatomically modern humans first reached Sundaland, but they provide rich evidence for the latter's presence here from c. 50,000 BP, how they managed their subsistence activities, the climatic and environmental conditions in which they lived, and hints at their ritual lives. To collect the range of fauna and flora represented in the archaeological record of the West Mouth in this period required ingenuity, a considerable degree of targeting, and forward planning. Niah is currently the only site in Southeast Asia and Australia in the 50,000–35,000 BP time bracket with a well-dated human fossil associated with detailed evidence for the behavior of that hominin, and in this case, they are both strikingly "modern."

Cross-References

- ▶ First Australians: Origins
- ▶ Fossil Records of Early Modern Humans
- ▶ *Homo sapiens*
- ▶ Radiocarbon Dating in Archaeology

N

References

Barker, G., ed. 2013, in press. *Rainforest foraging and farming in Southeast Asia: the archaeology of the Niah Caves, Sarawak*. Cambridge: McDonald Institute for Archaeological Research.

Barker, G., H. Barton, M. Bird, P. Daly, I. Datan, A. Dykes, L. Farr, D. Gilbertson, B. Harrisson, C. Hunt, T. Higham, J. Krigbaum, H. Lewis, S. McLaren, V. Paz, A. Pike, P. Piper, B. Pyatt, R. Rabett, T. Reynolds, J. Rose, G. Rushworth, M. Stephens, C. Stringer, and G. Thompson. 2007. The 'human revolution' in tropical Southeast Asia: The antiquity of anatomically modern humans, and of behavioural modernity, at Niah Cave (Sarawak, Borneo). *Journal of Human Evolution* 52: 243–261.

Barker, G., D. Gilbertson, and T. Reynolds, eds. 2013, in press. *Archaeological investigations in the Niah Caves, Sarawak, 1954–2004*. Cambridge: McDonald Institute for Archaeological Research.

Brothwell, D.R. 1960. Upper Pleistocene human skull from Niah caves, Sarawak. *Sarawak Museums Journal (new series)* 15–16: 323–349.

Demeter, F., L.L. Shackelford, A.-M. Bacon, P. Duringer, K. Westway, T. Savavongkhamdy, J. Braga, P. Sichanthongtip, P. Khamdalayong, J.-L. Ponche, H. Wang, C. Lundstrom, E. Patole-Edoumba, and A.-M. Karpoff. 2012. Anatomically modern human in Southeast Asia (Laos) by 46 ka. *Proceedings of the National Academy of Sciences*. https://doi.org/10.1073/pnas.1208104109.

Gilbertson, D., M. Bird, C. Hunt, S. McLaren, R. Mani Banda, B. Pyatt, J. Rose, and M. Stephens. 2005. Past human activity and geomorphological change in a guano-rich tropical cave mouth: Initial interpretations of the late Quaternary succession in the Great Cave of Niah, Sarawak. *Asian Perspectives* 44 (1): 16–41.

Harrisson, T. 1958. The caves of Niah: A history of prehistory. *Sarawak Museum Journal* 8 (12): 549–595.

Higham, T., H. Barton, C. Turney, G. Barker, C. Bronk Ramsey, and F. Brock. 2008. Radiocarbon dating of charcoal from tropical sequences: Results from the Niah Great Cave, Sarawak, and their broader implications. *Journal of Quaternary Science* 24: 189–197.

Hunt, C.O., and G. Barker. 2013, in press. Missing links, cultural modernity and the dead: Anatomically modern humans in the Great Cave of Niah (Sarawak, Borneo). In *East of Africa: South Asia, Australia, and human origins*, ed. R. Dennell, and M. Porr. Cambridge: Cambridge University Press.

Hunt, C.O., D. Gilbertson, and G. Rushworth. 2007. Modern humans in Sarawak, Malaysian Borneo, during Oxygen Isotope Stage 3: Palaeoenvironmental evidence from the Great Cave of Niah. *Journal of Archaeological Science* 34: 1953–1969.

Krigbaum, J., and I. Datan. 2005. The Deep Skull and associated human remains from Niah Cave. In *The Perak Man and other prehistoric skeletons of Malaysia*, ed. Z. Majid, 131–154. Pulau Pinang: Penerbit Universiti Sains Malaysia.

Majid, Z. 1982. The West Mouth, Niah, in the prehistory of Southeast Asia. *Sarawak Museum Journal* 31(n.s. 52): 1–200.

Mijares, A.S., F. Détroit, P. Piper, R. Grün, P. Bellwood, M. Aubert, G. Champion, N. Cuevas, A.D.E. Leon, and E. Dizon. 2010. New evidence for a 67,000-year-old human presence at Callao Cave, Luzon, Philippines. *Journal of Human Evolution* 59: 123–132.

Pyatt, B., G. Barker, R. Rabett, K. Szabó, and B. Wilson. 2010. Analytical examination of animal remains from Borneo: The painting of bone and shell. *Journal of Archaeological Science* 37: 2102–2105.

Sherratt, A.J. 2002. Darwin among the archaeologists: The John Evans nexus and the Borneo Caves. *Antiquity* 76: 151–157.

Summerhayes, G.R., M. Leavesley, A. Fairbarn, H. Mandui, J. Field, A. Ford, and R. Fullagar. 2010. Human adaptation and plant use in Highland New Guinea 49,000 to 44,000 years ago. *Science* 330: 78–81.

Nicholas, George P.

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Basic Biographical Information

George P. Nicholas (b. 1953) knew he wanted to become an archaeologist by the age of eight. His first archaeological fieldwork was during summers as a high school student enrolled in the Franklin Pierce College (New Hampshire) archaeological field school, directed by Howard Sargent. Nicholas received his B.A. in Anthropology from Franklin Pierce in 1975 and his M.A. from the University of Missouri–Columbia in 1978, supervised by William Marquardt and W. Raymond Wood. In 1976–1977, he was the archaeologist for the New Hampshire Water Commission, followed by a short stint as a Research Associate at Phillips Exeter Academy in New Hampshire. In 1978–1980, he did postgraduate research at the University of Maine's Institute for Quaternary Research. From 1983 to 1990, he pursued his doctorate at University of Massachusetts–Amherst under the supervision of Dena Dincauze and was a Research Associate with the American Indian Archaeological Institute, working with Russell Handsman. His Ph.D. was awarded in 1990 for a dissertation on early postglacial land-use patterns and wetland ecology at Robbins Swamp (CT). In 1990, Nicholas with his wife, Catherine Carlson (also an archaeologist), and their two sons moved to British Columbia. Beginning in 1991, Nicholas developed and directed a university-based program in Indigenous Archaeology for Simon Fraser University (SFU) and the Secwepemc Cultural Education Program located on the Kamloops Indian Reserve (Fig. 1). At the time, this was the only postsecondary archaeology program for Aboriginal students in Canada. From 1991 to 2004, Nicholas directed 12 archaeology field schools and numerous research and cultural resource management projects, providing training to

Nicholas, George P., Fig. 1 1991 Secwepemc/Simon Fraser University Indigenous Archaeology Field School, Kamloops, British Columbia: (*left* to *right*) Mel Seymour, Steve Lawhead, Petrina Schooner, George Nicholas, Diane Biin, Dean Billy, Gladys Baptiste, Debbie Jules, Laurie Kennedy, John Jules, Percy Casper, and Donna Dillman. (Photo courtesy of George Nicholas)

several hundred Aboriginal students in a setting where students were always considered part of the research team. Many of his students now work for various First Nations governments or have found full- or part-time employment in cultural resource management, criminal forensic investigations, museums, and other archaeology-related fields. During this time, he was also Project Archaeologist for a 6-year study of Secwepemc People and Plants (directed by Nancy Turner) and a collaborator on the Project for the Protection and Repatriation of First Nation Cultural Heritage (directed by Catherine Bell and Robert Paterson). In 2006, upon becoming a full professor, Nicholas moved to the main SFU campus in Burnaby, BC, where he teaches, among other things, archaeological theory, Australian archaeology and ethnography, and lithic technology (Fig. 2).

Nicholas served as editor in chief of the *Canadian Journal of Archaeology* from 2001 to 2007 and currently is coeditor (with Julie Hollowell) of the World Archaeological Congress *Research Handbooks in Archaeology* series, published by Left Coast Press. He is an adjunct faculty member in archaeology at UMass–Amherst and at Flinders University in Adelaide, South Australia.

Major Accomplishments

Over his career, Nicholas has directed numerous fieldwork and research projects in western Canada and the northeastern United States from academic-based research to community-oriented archaeology training and cultural resource management projects. In the 1970s and 1980s, his primary research interests encompassed environmental archaeology and human influences on landscape in the Northeast, with a focus on the role of wetlands on landscapes occupied by hunter-gatherers. His article in *Current Anthropology* (1998) examined this topic

Nicholas, George P., Fig. 2 George Nicholas in Kamloops, BC 1995. (Photo by Shauna Huculak)

from a global perspective, noting how widespread and long-lived the association between humans and wetlands has been and documenting how attention to wetlands reveals significant and often unexpected evidence of distinctive human activities, not found elsewhere. Nicholas also edited *Holocene Human Ecology in Northeastern North America* (Plenum, 1998), which challenged conventional thinking about the way humans influenced and were influenced by their environments.

After moving to British Columbia, Nicholas' interests turned to Indigenous peoples and their involvement with the practice and process of archaeology. In 1997, the edited volume *At a Crossroads: Archaeology and First Peoples in Canada* (coedited by Nicholas and Thomas Andrews) assessed the state of Indigenous-oriented archaeology in Canada in the late 1990s and offered examples of innovative and successful strategies for creating more equitable archaeological practice. This volume was followed by numerous book chapters and conference presentations on Indigenous archaeology (Nicholas 2008), collaborative practice, and decolonizing approaches, as well as an edited volume, *Being and Becoming Indigenous Archaeologists* (Left Coast Press, 2010) with chapters contributed by 37 Indigenous archaeologists around the world, sharing stories of their career paths.

In recent years, a major focus of Nicholas' work has been on intellectual property issues related to archaeology and cultural heritage. His 2004 article "Copyrighting the Past," written with Kelly Bannister, represents the first direct examination of issues concerning intellectual property within the realm of archaeology. In 2007, Nicholas was awarded a prestigious Major Collaborative Research Initiative grant from Canada's Social Science and Humanities Research Council for an international and interdisciplinary research initiative titled "Intellectual Property Issues in Cultural Heritage: Theory, Practice, Policy, Ethics." This 7-year project supports community-based research on a range of emerging heritage issues with the goal of informing practice and policy (see www.sfu.ca/ipinch). Although serving as project director of this major initiative occupies much of his time these days, Nicholas manages to keep up with all of his other interests. While remaining fully rooted in and devoted to the discipline, he has always pushed archaeology slightly beyond its comfort zone to places that foster critical reflection, creativity, and groundbreaking scholarship.

Cross-References

► Handsman, Russell G.
► Hunter-Gatherers, Archaeology of

▶ Indigenous Archaeologies
▶ Intellectual Property Issues in Cultural Heritage (IPinCH) Project

References

Nicholas, G.P. 1998a. Wetlands and hunter-gatherers: A global perspective. *Current Anthropology* 39 (5): 720–731.
Nicholas, G.P., ed. 1998b. *Holocene human ecology in northeastern North America*. New York: Plenum.
Nicholas, G.P. 2008. Native peoples and archaeology. In *The encyclopedia of archaeology*, ed. D. Pearsall, vol. 3, 1660–1669. Oxford: Elsevier.
Nicholas, G.P., ed. 2010. *Being and becoming indigenous archaeologists*. Walnut Creek: Left Coast Press.

Further Reading

Nicholas, G.P., and T.A. Andrews, eds. 1997. *At a crossroads: Archaeology and first peoples in Canada*. Burnaby: Archaeology Press.
Nicholas, G.P., and K.P. Bannister. 2004. Copyrighting the past? Emerging intellectual property rights issues in archaeology. *Current Anthropology* 45 (3): 327–350.
Nicholas, G.P., and J. Hollowell. 2007. Ethical challenges to a postcolonial archaeology: The legacy of scientific colonialism. In *Archaeology and capitalism: From ethics to politics*, ed. Y. Hamilakis and P. Duke, 59–82. Walnut Creek: Left Coast Press.
Nicholas, G.P., and A. Wylie. 2009. Archaeological finds: Legacies of appropriation, modes of response. In *The ethics of cultural appropriation*, ed. J. Young and C. Brunk, 11–54. Chichester: Wiley-Blackwell.

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Basic Biographical Information

Hans Niemeyer (1921–2005) was one of the founders of contemporary archaeology in Chile and was renowned for his contributions to the field of scientific methodology, geography, and the prehistory of the arid desserts and northern semiarid deserts of the country. However, among his many achievements, he is also considered to be the father of the study of rock art. Niemeyer showed interest in these visual artifacts from the beginnings of his passion for the discipline, in an era where the function of rock art was limited to decorating the covers of conference proceedings and other archaeological publications (Niemeyer 1955). He was a hydraulics engineer by profession, a job which led him to travel to the most significant river basins in the country, from the extreme north to Chilean Patagonia. His vocation as an explorer also allowed him to record numerous rock sites and provide the first Chilean rock art panorama at an international level, despite his colleagues' failure to understand the archaeological value of such kind of evidence.

Major Accomplishments

Niemeyer discovered and recorded important rock art sites in the eastern valleys, in Tarapacá, the Atacama Desert, the semiarid north, the central zone, and the Aysén region in the extreme south of Chile. His contributions were not limited to recording as his work also served to establish analytical descriptions, taxonomies, quantitative methods, and the referential styles and interpretation of these visual forms. After 25 years of arduous work in the field, he formulated the first styles by which he organized the enormous range of rock art varieties known for that era.

Although his styles appear governed by monothetic rules, he included other motifs in accordance with the rule of association, a task which allowed him to offer intuitive polythetic classifications. Among these styles several stand out, including the style of *Sierra de Arica* (extreme north of Chile), with its paintings of schematic hunters and naturalistic llamas; the *style of Guaiquivilo*, the fitomorphic engravings, animal and human footprints, and symmetrical figures and curved outlines of which extend widely through the Andean foothills of central Chile (Niemeyer and Weissner 1971; Niemeyer 1972); the *Aconcagua style* with its stylized human figures and subcircular outlines referred to as "signo

escudo" (shield sign) (Niemeyer 1964); and his contributions to the Patagonian style characteristic of the South American cone (Niemeyer 1976). The most traditional were the definitions of the *Limarí style* of faces or masks recorded in the semiarid north of Chile (Niemeyer 1979) or the *El Médano style* (coast of Antofagasta), where we observe extraordinary scenes of trawling whales and other marine mammals (Niemeyer 2010).

Niemeyer worked on rock art right up until a few days before his death. Completely blind, and suffering from a lung condition, he worked on his final and most precious work, the rock paintings of the marine hunter-gatherers of Taltal, of the coastal mountain range of Antofagasta (Niemeyer 2010). He passed away before seeing his book of the "El Médano" paintings published, but he completed the task he considered his primary responsibility: to suitably pass on the fruits of his labor.

Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Rock Art, Forms of
- ▶ Style: Its Role in the Archaeology of Art

References

Niemeyer, H. 1955. Investigación arqueológica en el valle de Huasco. *Notas del Museo Arqueológico de La Serena* 4: 1–12.

Niemeyer, H. 1964. Petroglifos en el curso superior del río Aconcagua. In *Arqueología de Chile Central y áreas vecinas, Tercer Congreso Internacional de Arqueología Chilena*, 133–150. Santiago: Viña del Mar.

Niemeyer, H. 1972. *Las pinturas rupestres de la Sierra de Arica*. Santiago: Editorial Jerónimo de Vivar.

Niemeyer, H. 1976. La cueva con pinturas indígenas del río Pedregoso (Departamento de Chile Chico, Provincia de Aysén, Chile). *Revista del Museo de Historia Natural de San Rafael* III (1/4): 339–353.

Niemeyer, H. 1979. Variación de los estilos de arte rupestre en Chile. In *Actas del VII Congreso de Arqueología de Chile*, 649–660. Santiago: Ediciones Kultrun.

Niemeyer, H. 2010. *Crónica de un descubrimiento: Las pinturas rupestres de El Médano, Taltal*. Santiago: Museo Chileno de Arte Precolombino.

Niemeyer, H., and L. Wiessner. 1971. Los petroglifos de la cordillera andina de Linares (Provincia de Talca y Linares, Chile). In *Actas del VI Congreso Nacional de Arqueología Chilena*, 405–470. Santiago.

Further Reading

Mostny, G., and H. Niemeyer. 1983. *Arte rupestre chileno*, Serie Patrimonio Cultural Chileno. Santiago: Colección Historia del Arte Chileno, Departamento de Extensión Cultural del Ministerio de Educación.

Nkang: Early Evidence for Banana Cultivation on the African Continent

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Introduction

The site of Nkang (11°19′E; 4°16′N) is located about 10 km east of Monatele, in the Lekie division, and 70 km to the northwest of Yaoundé, Cameroon. It is one of the most northern sites belonging to a group of large Stone to Metal period large settlements recorded in the Yaoundé area.

Excavations at Nkang exposed 11 pits as big as 3–15 m^3 volume. They were clustered and spaced some meters intervals and apparently were not linked to any other archaeological features. These pits were originally dug as wells, which were then filled in with refuse following

abandonment. The pits contain admixed soils with broken ceramics, stone tools, iron slags, charcoal, seeds, and faunal remains.

The chronology of Nkang is based on eight radiocarbon dates on charcoal samples recovered from six pits. Three samples recovered from pit F9 were radiocarbon dated between 2850 and 2300 cal BP (800–350 cal BCE with a 95% level of confidence).

Definition

After a comparative study of the volcaniform phytoliths from modern reference samples of *Musa* species and the two endemic African *Ensete* species (*E. ventricosum* and *E. Giletti*), archaeological volcaniform phytoliths recovered from two pits (F9 and F7NF) at Nkang have been positively identified as deriving from *Musa* (Mbida et al. 2001, 2006). Based on the modern-day distribution of bananas on the African continent (De Langhe et al. 1996), they are assigned to plantain. These volcaniforms were recovered from soil sediments (F9 and F7NF) and in a carbonized organic crust adhering to a potsherd (F9).

Two Musa species, *Musa acuminata* and *M. balbisiana*, played a key role in a complex domestication process that involved intra- and interspecies hybridization and plant translocation and ended in polyploidization, seed sterility, and parthenocarpy. Given that the wild ancestors of the African bananas are not native to the continent, any archaeobotanical find of *Musa* means some form of (proto) agricultural or agricultural practice. Based on modern-day distribution of bananas (De Langhe et al. 1996), any archaeobotanical evidence for Musa sp. in the West African context indicates the cultivation of AAB plantains.

The evidence for plant food production during the 3rd millennium BP is in agreement with the recovering of bones of domesticated sheep and goat from other pits features (Mbida et al. 2000) assigned to the same occupation period as the banana phytoliths.

The archaeo-environmental reconstruction for the site is a mixed of primary, pioneer, and old secondary forests and Savannah settings. This is consistent with climatic phase Kibangian B that started around 3000 years ago and would have caused a retraction and fragmentation of the forested habitats and a possible lengthening of the dry season (Mbida et al. 2006).

Plantains are edaphically much more demanding than other banana cultivars and require easy access to nutrients. The older deposits within the pits at Nkang are enriched in organic matter, carbonate, and phosphate. Usually, such refuse dumps are located in the backyards of houses and close to settlements. Thus, the archaeological contexts of the phytoliths along with the edaphic and likely paleoenvironmental conditions are all highly suggestive of plantain cultivation in backyards close to settlements, rather than in forest clearings (Mbida et al. 2006).

The findings at Nkang pertain to four major questions in African prehistory (Neumann and Hildebrandt 2009):

- Early contacts between Africa and Asia
- The contacts and exchanges between coastal African and the central part of the continent
- The antiquity of exotic crops in Africa
- The role of banana cultivation in the spread of Bantu-speaking farmers

Key Issues/Current Debates/Future Directions/Examples

Recently, the original morphological criteria used to distinguish *Musa* and *Ensete* volcaniforms have been revised and confirmed (Perrier et al. 2011). These criteria enable the chronological framework for the domestication, evolution, and diffusion of banana cultivars to be anchored, namely, between 6950 and 6400 cal BP at Kuk, Papua New Guinea (Denham et al. 2003), and

2750–2300 cal BP at Nkang, Cameroon (Mbida et al. 2001, 2006).

So far, the Nkang findings have not been replicated at other sites in Africa. Claims for *Musa* phytoliths at Munsa (Uganda), putatively dated to c. 5000 years ago (Lejju et al. 2005; Leju et al. 2006), are inconclusive due to problems of chronostratigraphic integrity and phytolith identification. More recent archaeological investigations in southern Cameroon for slightly more recent periods (c. 2400–2200 years ago) substantiate a food production system based on Savannah cereal crops (*Pennisetum glaucum*) in combination with the exploitation of plant resources from primary forests (Neumann et al. 2012). The Savannah cereal component was only possible in southern Cameroon during a drier paleoclimatic event starting around 2500 years ago, likely postdating the bananas at Nkang, that resulted in forest fragmentation and a more marked seasonality. To date, the Nkang findings have not been corroborated by archaeobotanical evidence from other sites in the region.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Bananas: Origins and Development

References

De Langhe, E., R. Swennen, and D. Vuylsteke. 1996. Plantain in the early Bantu world. In *The growth of farming communities in Africa from the Equator southwards*. Azania 29–30, ed. J.E.G. Sutton, 147–160.

Denham, T.P., S.G. Haberle, C. Lentfer, R. Fullagar, J. Field, M. Therin, N. Porch, and B. Winsborough. 2003. Origins of agriculture at Kuk Swamp in the Highlands of New Guinea. *Science* 301: 189–193.

Lejju, J.B., D. Taylor, and P. Robertshaw. 2005. Late-Holocene environmental variability at Munsa archaeological site, Uganda: A multicore, multiproxy approach. *The Holocene* 15: 1044–1061.

Leju, J.B., P. Robertshaw, and D. Taylor. 2006. Africa's earliest bananas? *Journal of Archaeological Science* 33: 102–113.

Mbida, Ch., W. Van Neer, H. Doutrelepont, and L. Vrydaghs. 2000. Evidence for banana cultivation and animal husbandry during the first millennium BC in the forest of South Cameroon. *Journal of Archaeological Science* 27: 151–162.

Mbida, Ch., H. Doutrelepont, L. Vrydaghs, Ro. Swennen, Ru. Swennen, H. Beeckman, E. De Langhe, and P. de Maret. 2001. First archaeological evidence of banana cultivation in central Africa during the third millennium before present. *Vegetation History and Archaeobotany* 10: 1–6.

Mbida, Ch., E. De Langhe, L. Vrydaghs, H. Doutelepont, Ro Swennen, W. Van Neer, and P. de Maret. 2006. Phytolith evidence for the early presence of domesticated banana (Musa), in Africa. In *Documenting domestication. New genetic and archaeological paradigms*, ed. M.A. Zeder, D.G. Bradley, E. Emshwiller, and B.D. Smith, 68–81. Berkeley: University of California Press.

Neumann, K., and E. Hildebrandt. 2009. Early banana in Africa: The state of the art. *Ethnobotany Research and Applications* 7: 353–362. http://lib-ojs3.lib.sfu.ca:8114/index.php/era/article/view/361. Accessed 17 July 2012.

Neumann, K., K. Boesten, A. Höhn, S. Kahlheber, A. Ngomanda, and B. Tchiengué. 2012. First farmers in the Central African rainforest: A view from southern Cameroon. *Quaternary International* 249: 53–62.

Perrier, X., E. De Langhe, M. Donohue, C. Lentfer, L. Vrydaghs, F. Bakry, F. Careel, I. Hippolyte, J.P. Hory, Ch. Jenny, V. Lebot, A.M. Risterucci, K. Tomekep, H. Doutrelepont, T.B. Ball, J. Manwaring, P. de Maret, and T.P. Denham. 2011. Multidisciplinary perspectives on banana (Musa spp.) domestication. *Proceedings of the National Academy of Sciences* 108 (28): 11311–11318.

Further Reading

De Langhe, E. 2007. The establishment of traditional plantain cultivation in the African rain forest: A working hypothesis. In *Rethinking agriculture. Archaeological and ethnoarchaeological perspectives.* One world archaeology, ed. T. P. Denham, J. Irarte, and L. Vrydaghs, 361–370. California: Left Coast Press.

De Langhe, E., L. Vrydaghs, P. de Maret, X. Perrier, and T. Denham. 2009. Why bananas matter. *Ethnobotany Research and Applications* 7: 165–177. http://lib-ojs3.lib.sfu.ca:8114/index.php/era/article/view/356. Accessed 17 July 2012.

Perrier, X., F. Bakry, F. Careel, Ch. Jenny, J.P. Horry, V. Lebot, and I. Hippolyte. 2009. Combining biological approach to shed light on the evolution of edible banana. *Ethnobotany Research and Applications* 7: 199–216. http://lib-ojs3.lib.sfu.ca:8114/index.php/era/article/view/362. Accessed 17 July 2012.

Noël Hume, Ivor

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Basic Biographical Information

An accidental, mostly self-taught archaeologist, prolific writer and one of the founders of historical archaeology in North America, Ivor Noël Hume (known as Nöel) was born in London on November 4, 1927. He studied at Framlingham College and St. Lawrence College in England, spent a brief period in the British Army, and was an assistant stage manager at a London theater. In 1949, he began his archaeological career, joining the staff of London's Guildhall Museum and studying under Adrian Oswald, a pioneer in clay tobacco pipe studies. In 1957, Noël Hume was hired as the first full-time trained archaeologist at Colonial Williamsburg, Virginia, and later became chief archaeologist and director of the expanded archaeology program at Colonial Williamsburg and subsequently the director of the Department of Archaeological Research where he remained until his retirement in 1988. He separated archaeological excavation and laboratory analyses from the Office of Architecture and instituted open-area stratigraphic excavation with grid squares and balks replacing narrow trenching and test pitting done by his predecessors. In addition, he introduced meticulous excavation with trowels and other hand tools (rather than using shovels) and the systematic retrieval and documentation of features and artifacts. This allowed researchers to understand the relationships of buildings to one another and reconstruct Williamsburg's cultural and social history. Hence, the archaeology practiced at Williamsburg is essentially the model for historical archaeology and interpretation practiced today.

Major Accomplishments

His publications, academic and public lectures, and television appearances popularized archaeology and wedded colonial history, archival research, archaeological excavation, and material culture studies into the discipline of historical archaeology. He is a fellow of the Society of Antiquaries of London and served as vice president of the British Society of Post-Medieval Archaeology. The author of 34 major books, monographs, and excavation reports, Noël Hume's achievements include discovering the first traces of England's failed Roanoke Island Colony, excavations at the seventeenth-century site of Wolstenholme Towne, one of the earliest Virginia settlements after Jamestown, and at Martin's Hundred, where its inhabitants were massacred. In Colonial Williamsburg, he conducted major excavations at the original site of Eastern State Mental Hospital, the James Geddy House and Shop, and rigorously documented site evolution at Weatherburn's Tavern. Three Colonial Williamsburg Foundation reports in 1969 focused on glass, pottery, and porcelain; others included the Weatherburn Tavern, English Delftware (1977), and an array of artifacts (1996, 2005), as well as the excavations at Carter's Grove (1974) and Martin's Hundred (1983). In retirement, he directed an excavation (1991–1992) at the Fort Raleigh National Historic Site on Roanoke Island, North Carolina, and located Thomas Harriot's 1585–86 "science center." In 1993, Queen Elizabeth II of Great Britain recognized his achievements, and he was made an Officer of the Order of the British Empire (OBE) for service to the British cultural interests in Virginia.

A majority of his fieldwork and artifact studies were undertaken with his wife of 43 years, Audrey Baines (1927–1993); the couple was childless. In 1994, he married a close friend and colleague, Carol Grazier, and suddenly had a family of four

Charles C. Kolb has retired.

stepchildren (sons Michael and David Grazier, daughters Andrea Zecca and Kristen Welch, and nine grandchildren). Kristen was with Noël Hume when he died following a brief illness on February 4, 2017. He lived in Williamsburg until his passing, writing plays and film scripts, publishing on archaeological topics, and contributing to the *Colonial Williamsburg Journal* and annual *Ceramics in America*. In his posthumous final publication, "A New Bloome" (*Ceramics in America 2016*: 226–237) Nöel Hume rewrote the story of the John Bloome's pearlware puzzle jug dated to 1798 initially published in *Ceramics in America 2014*: 2–18. He reinterpret the polychrome painted decoration of the ship, orthography (Bloome = Bloom), and redated the jug to 1797 – demonstrating meticulous research, candor, and wit.

An interview with Miller (2011) and 350-page autobiography *A Passion for the Past: The Odyssey of a Transatlantic Archaeologist* (2010) is significant, enlightening resources. The original manuscript for this book, "Uneasy Stages: the Making of an Unconventional Archaeologist" (654 pp.) was reviewed for the Director of the University of Virginia Press in September 2008 by Charles C. Kolb – some materials from it are used in this entry.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Conservation and Preservation
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Corning Museum of Glass
- ▶ Historical Archaeology
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ North America (USA): Historical Archaeology
- ▶ South, Stanley A.

References

Noël Hume, I. 1963. *Here lies Virginia; an archaeologist's view of colonial life and history.* (Reprint 1994. Charlottesville: University Press of Virginia). New York: Knopf.

Noël Hume, I. 1969. *Historical archaeology.* (Reprint 1975. New York: Norton). New York: Knopf.

Noël Hume, I. 1970. *A guide to artifacts of colonial America*. (Reprint 2001. Philadelphia: University of Pennsylvania Press). New York: Random House.

Noël Hume, I. 1974. *All the best rubbish*. (Reprint 2009. New York: Harper Paperbacks). New York: Harper & Row.

Noël Hume, I. 1982. *Martin's hundred*. New York: Knopf.

Noël Hume, I. 1994. *Virginia adventure, Roanoke to James Towne: An archaeological and historical odyssey.* (Reprint 1997. Charlottesville: University Press of Virginia). New York: Knopf.

Noël Hume, I. 2001. *If these pots could talk: Collecting 2000 years of British household pottery.* Hanover: Chipstone Foundation/University Press of New England.

Noël Hume, I. 2010. *A passion for the past: The odyssey of a transatlantic archaeologist*. Charlottesville/London: University of Virginia Press.

Further Reading

Klinghoffer, Eric, ed. 2013. *A glorious empire: Archaeology and the Tudor-Stuart world: Essays in honor of Ivor Nöel Hume*. Oxford: Oxbow Books [15 contributions].

Noël Hume, I. 1953. *Archaeology in Britain – Observing the past*. London: W. & G. Foyle.

Noël Hume, I. 1956. *Treasure in the Thames*. London: Frederick Muller.

Noël Hume, I. 1957. *Great moments in archaeology.* London: Phoenix House.

Noël Hume, I. 1966a. *Excavations at Clay Bank in Gloucester County, Virginia, 1962–1963*. Washington, DC: Smithsonian Institution.

Noël Hume, I. 1966b. *Excavations at Tutter's Neck in James City County, Virginia, 1960–1961*. Washington, DC: Smithsonian Institution.

Noël Hume, I. 1966c. *Excavations at Clay Bank in Gloucester County, Virginia, 1962–1963*. Washington, DC: Smithsonian Institution.

Noël Hume, I. 1968. *1775; another part of the field*. New York: Knopf.

Noël Hume, I. 1969a. *Glass in Colonial Williamsburg's archaeological collections*. Williamsburg: Colonial Williamsburg Foundation.

Noël Hume, I. 1969b. *Pottery and porcelain in Colonial Williamsburg's archaeological collections*. Williamsburg: Colonial Williamsburg Foundation.

Noël Hume, I. 1969c. *Archaeology and Wetherburn's Tavern*. Williamsburg: Colonial Williamsburg Foundation.
Noël Hume, I. 1971. *Archaeology*. London: Gifford.
Noël Hume, I. 1974. *Digging for Carter's Grove*. Williamsburg: Colonial Williamsburg Foundation.
Noël Hume, I. 1977. *Early English delftware from London and Virginia*. Williamsburg: Colonial Williamsburg Foundation.
Noël Hume, I. 1983. *Discoveries in Martin's Hundred*. Williamsburg: Colonial Williamsburg Foundation.
Noël Hume, I. 1996. *In search of this & that: Tales from an archaeologist's quest*. Williamsburg: Colonial Williamsburg Foundation.
Noël Hume, I. 2005. *Something from the cellar: More of this & that*. Williamsburg: Colonial Williamsburg Foundation.
Noël Hume, I. 2011. *Belzoni – The giant archaeologists love to hate*. Charlottesville/London: University of Virginia Press.
Noël Hume, I., and H.M. Miller. 2011. Ivor Noël Hume: Historical archaeologist. *The Public Historian* 33: 9–32.
Noël Hume, I., and A. Noël Hume. 2001. *The archaeology of Martin's hundred, part I: Interpretive studies; part II: Artifact catalog*. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology and the Colonial Williamsburg Foundation.

Nomads in the Near East

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What Are Nomads?

Pastoral nomadic societies are generally defined as those human groups engaged in herd animal husbandry as a primary economic activity and by the consequent need to migrate seasonally to support those herds. Nomadic herders have been a ubiquitous feature of Near Eastern landscapes since prior to the beginnings of recorded history. The mythologies and stereotypes surrounding these groups, originating in the earliest times and continuing through the modern era, are present in histories, literature, film, and nowadays, on the internet. They are primarily those of the noble savage, the primitive, proud, and independent nomad, living off his (and the gender is part of the myth) herds, raiding, and posing a constant threat to the well-being of civilized urban and sedentary society.

Of course, the myth is the result of processes of othering which created a basic bipolarity in perceptions of Near Eastern societies. In fact, nomadism in the Near East comprises a complex and variegated set of adaptations to a mosaic of physical environments, social ecologies, ethnicities, technologies, and changing historical circumstances. Usually defined on the basis of the underlying commonalities of keeping herds and seasonal residential mobility, mobile pastoralists (also pastoral nomads, Bedouin, nomadic herders, nomadic pastoralists, transhumants, etc.) are ubiquitous even today on the landscapes of the Near East, from Baluchistan through Libya, and beyond, well evident in the iconic black tent (Fig. 1), the classic, if not exclusive, mode of nomadic residential structure.

Analytically, Near Eastern nomads are usually contrasted on the one hand with sedentary farming systems (and attached urban systems) and on the other with hunter-gatherers (e.g., Cribb 1991; Khazanov 1984). Stereotypically, traditional ethnographies have thus emphasized the polarity between the settled and the nomad and between farming and herding; in complement, early histories and ethnographies stripped nomadic societies of chronological context and dynamism, placing them in some fossilized social evolutionary limbo between the "primitive" band level societies and more "civilized" chiefdoms and early states. Anthropology in the past 50 years has challenged the essentialist distinctions between farming and herding, and between the settled and the nomadic, emphasizing the spectrum of behaviors along the two axes, farming versus herding and sedentism versus mobility. Archaeology in the past two decades has demonstrated the cumulative and dynamic nature of pastoral and nomadic adaptations in the region over the past ten millennia (Rosen 2017).

Nomads in the Near East, Fig. 1 Typical black tent south of Rajif in southern Jordan Highlands, 1998. (Photograph courtesy of BA Saidel)

As implied by the various names assigned to the phenomenon, pastoral nomads (also nomadic pastoralists), mobile pastoralists, nomadic herders, etc. are characterized by ownership of herds and mobile lifestyles. Cribb (1991) defined the phenomenon by presenting two axes of variability, the one from sedentism to great mobility and the other from full-time practice of agriculture with very few herd animals to no agriculture and general dependence on herds. Mobile pastoralism (a term less laden with preconceptions) is perceived as falling at the far end of the axes, albeit drawing lines defining the edges of the phenomenon is not practical.

Variability in Nomadic Societies in Recent Times

Any discussion of recent nomadic pastoral societies must begin with the tremendous variability inherent between the societies classified as such. Although various analytic typologies have been suggested to describe this variability, any understanding must begin with the great environmental contrasts evident in the vast territory of the Near East, extending some 3000 km from the Zagros to central Libya (Fig. 1), and a roughly equal distance from Turkey to South Arabia, defining the Near East as a unit very loosely so as to include the modern social groups often linked together under the rubric "Bedouin." Thus, the mountain ranges of Iran and Turkey include peaks over 5000 m in altitude, with intermontane basins and plateaus 2000–3000 m high; these contrast markedly with the desert plains of Arabia, Syria, and the Sahara; the Mediterranean zone around the fringes of the Mediterranean Sea offers a forested and parkland zone mosaic of environments, and the riverine valleys and plains of the Nile and Mesopotamia contrast again in basic environmental parameters. Associated with this great range of physical geographic variability, climate and environments in different regions vary greatly as well. Thus, the Saharo-Arabian deserts, beginning just south of the Mediterranean Sea in Africa, and extending eastward into the Arabian Peninsula, nowhere receive more than 200 mm of rainfall per year, and for the most part rainfall averages less than 150 mm, and in many places, in the Rub al-Khali (the Empty Quarter) and in the Central Sahara, yearly average rainfall may be less than a centimeter. However, in the higher mountain areas, rainfall may achieve 1000 mm or more,

and the Mediterranean coastal areas, the Indian Ocean coast of South Arabia, and the Anatolian and Iranian Plateaus commonly average between 400 and 900 mm per annum. With the exception of the southern regions, subject to summer monsoon rains from the Indian Ocean, rainfall is restricted to the winter months, falling almost exclusively between October and April, and primarily between December and March. Temperatures vary with altitude and latitude. Thus, temperatures in the higher areas, in Anatolia and Iran, average roughly between 7 °C and 10 °C; in the Mediterranean zones, between 15 °C and 20 °C; and in the more southern desert zones, between 20 °C and 30 °C. Seasonal and diurnal variation are considerable as well. Vegetation communities, and vegetation cover, correlate with these climatic and environmental attributes. The coastal areas are characterized by Mediterranean vegetation, open parkland grading into Mediterranean chaparral and maquis, succeeded by Irano-Turanian steppe vegetation, and in turn, by Saharo-Arabian vegetation communities. The drier, the less plant coverage. The better watered regions show mixed forest vegetation, although the highest regions may be above tree lines and dominated by shrubs and grasses. The riverine areas, especially the Nile and the Tigris and Euphrates basin, offer permanent running water sources, the Nile characterized by broad leaf vegetation and Mesopotamia by temperate grasslands. The deep deserts, the central Sahara or the Rub al-Khali in Arabia, show sparse vegetation at best, usually only along the wadi courses.

At its most basic level, this environmental variability correlates with basic structures of pastoral mobility in the Near East. Thus, for example, in Cyrenaica, tribes are organized altitudinally, with sedentary farming segments occupying the northern, higher and well-watered zone, sheepherders and goat herders exploiting the steppe zones on the southern slopes, and camel herders inhabiting the deeper desert zone. Each group is affiliated with the same overall tribe but occupies different ecological niches. Seasonal movements tend to be north-south, generally on the order of less than 100 km round trip and perhaps 200–300 m altitudinally, exploiting the different environmental zones in the different seasons. The extreme vertical nomadism of Zagros pastoralists is another example of adaptation to specific contrasting environments, with groups such as the Basseri, the Lurs, and the Bakhtieri moving herds of sheep upward of 1000 m in altitude and 600–800 km in distance (round trip) into the higher mountains with the spring thaw to exploit montane pastures in the summer, and descending to the lowlands in the winter to avoid winter snows and make use of winter rain fed pastures. This type of vertical nomadism, exploiting the environmental contrasts offered by altitude, is complemented by horizontal nomadism (cf. Johnson 1969), exemplified by such groups as the Ruwallah, in the north Arabian and Syrian deserts, and the al-Murrah, in central Arabia and the Rub al-Khali. Seasonal migrations of these camel nomads sometimes extended to greater than 1000 km round-trip, the ecological contrasts required for seasonal pastures afforded only over large and usually north-south expanses. In the Mediterranean zone, such long distance migrations are often not necessary, and migrations may be on the scale of less than 100 km round trip.

Beyond the direct impact of environmental variability on patterns of mobility, the species of animal herded, and indeed subspecies, may be influenced by environment. Thus, camel predominate among the deep desert nomads, whereas sheep are the most common herds in the mountainous areas of Iran and Turkey, and different subspecies of domestic sheep are present in different environments of Iran. Sheep and goat characterize the herds of the Mediterranean desert fringes. Although perhaps a component in some early herding societies, cattle play little role in modern Near Eastern nomadic communities, presumably because they are ill-adapted to the marginal zones inhabited by recent nomads. Agricultural practices may also be determined by environment. Opportunistic agriculture cannot be practiced in the arid zones (except in special microenvironments), but in the Mediterranean zone and along its margins, Bedouin groups have often taken up farming, either as a supplementary practice or in the course of longer term sedentarization. As per Cyrenaica, tribal organization may be attached to environmental patterns and consequent subsistence practice.

Furthermore, environment in the Near East is not a static background to which societies adapt and stabilize. Climatic and environmental change requires constant adjustment by all human groups. Such major environmental trends as the desiccation of the Sahara and the disappearance of Arabian lakes had large impacts on nomadic adaptations, resulting in ever changing patterns of mobility, the exploitation of herds, and relations with the settled zones. Smaller scale environmental change, such as shifting water courses, local salinization, minor shifts in rainfall patterns, and the disappearance of local springs, each affected local and regional histories as well. Thus, historical variability must be greater than that which is evident in modern day societies.

If in some sense environmental variables indeed lie at the core of the need to migrate seasonally (in the Near East, in search of pasture or water), recent mobile pastoralism cannot be reduced to a mere function of environment; economic, social, ideological, political, and technological factors, both internal and external, play major roles in the structure and dynamics of recent nomadic societies in the Near East. That is, pastoral nomadism is not a primitive and autonomous subsistence system, and in the Near East, nomadic groups are tied inextricably to modern markets and to local and regional politics, of course varying with social, economic, and political geographies. Thus, for example, the sale of pastoral products to urban markets, especially meat and wool, relies on market demand for specific products often defined by fashion (e.g., specific types of wool) and taste (e.g., lamb vs. mutton), or political exigency, as in the military alliances between tribes and the British during the First World War. Market demands directly influence, for example, migratory behaviors in the timing of arrival to market and the specific choice of market. Local political constraints can also directly affect migrations, for example, in the need to negotiate right-of-ways through farming zones. Such external relations may effect fundamental changes in power relations within tribes as larger political powers impose leaders of their choice, or indeed necessitate and facilitate the creation of larger scale power hierarchies. Modern technologies, such as guns, automobiles, and irrigation from distant sources, also have had tremendous impacts, changing power relations, as for example in the Arab Revolt during the First World War, or impacting local environments, as in the extinction or near extinction of many native species with the introduction of the gun. In many places, environmental degradation, desertification, can be directly attributed to pastoral overgrazing in marginal areas, but overgrazing should only be seen as a proximate cause; such underlying factors as the imposition of modern borders across extensive grazing areas and rapid population growth resulting from partial sedentarization, increased prosperity and access to modern medicine and technologies created the pressures resulting in overgrazing (e.g., Thomas and Middleton 1994). The low populations of premodern desert populations, combined with the absence of technologies of mass environmental impact, suggest ancient herders had much lesser impacts on their landscapes than modern groups.

Populations of nomadic groups in the Near East grew tremendously in the twentieth century, creating fundamentally new social contexts, not comparable to earlier times. Between the economic impacts of modern global markets on the Near East, the impact of modern medicine on mortality rates, the imposition of state authority on previously tribal areas, and, as earlier, the imposition of modern borders on previously open areas, processes of sedentarization accelerated, all resulting in a demographic explosion. For example, Bedouin in the Negev, Israel's southern desert, increased from an estimated 55,000 in Late Ottoman times to 70,000 just before the founding of the State of Israel, to well over 200,000 in the region today. The impact of this population growth on all other aspects of Bedouin life was tremendous, not least resulting in serious overgrazing (caused also by constraints on grazing caused by modern borders) and land degradation. Processes of rapid sedentarization and acculturation have often resulted in strained relations and conflicts between the state and the tribal societies.

Imposing analytic order on such variability, researchers have also noted common themes (beyond nomadism and pastoralism). Islam has

been the virtually exclusive religion of nomadic groups for several centuries, the last Christian Bedouin having died out several centuries ago. In this, patterns of gender organization (e.g., the segregation of women's quarters) and standardized ritual, for example, in open-air mosques, are common. With few exceptions, Near Eastern nomadic societies are dominated by patrilineal segmentary political organization. The Tuareg offer an exception but are also beyond the geographic expanse dealt with here (Murphy 1967). Tapper (1979) has suggested that apparent modalities in organizational levels (reflecting levels of segmentation) are the result of human biological constraints. Ideologically, most Near Eastern nomadic groups profess egalitarianism as an ideal, but differences in status between lineages at various scales are common. Leadership is thus partially ascribed since leaders will not originate in lesser lineages, but power is not absolute and leadership must be established and maintained.

Finally, the dynamics of nomadic societies are such that there is constant movement between nomadism and sedentism. Barth (1961) described two pathways for individual shifts between these states, poverty and wealth. Nomads who lose their herds often become settled wage laborers, while those who accumulate wealth usually invest in land. Larger tribal scale shifts may occur as groups gain access to arable lands, often through geopolitical processes, and slowly sedentize in the shift to farming. In recent times, nation-states have actively encouraged and sometimes forced sedentarization. Archaeologically and historically tracing these shifts can be methodologically difficult.

Ancient Nomads

Sources for the Study of Ancient Nomads

Analytic approaches to the study of ancient herding societies have tended to focus on origins, the appearance of the first pastoral nomads, thus emphasizing the distinction between nomads and other societies, especially in the Near East. If modern ethnography has blurred the discrete lines between pastoral and agricultural economies, those lines are even more blurred when looking at the evolution of these societies. There is no point of origin, but rather a long and dynamic process of adaptation as different herd animals were adopted into desert societies, exploited for different purposes, the strategies for exploitation shifted, and as those desert societies continually evolved into new forms. Thus, in addition to the variability outlined for modern pastoral societies, one must consider the additional variability of such societies over the course of millennia and the causalities behind this dynamic variability. The study of this variability derives from three basic sources for examining nomads in the past: (1) modern ethnographies, (2) ancient texts, and (3) the archaeology of these societies. Each requires its own critical approaches, offering both important data sets and insights, but also significant pitfalls. Furthermore, the spatial and chronological distributions of these sources are uneven (Table 1). If we have ethnographies of nomadic groups from all over the Near East and North Africa, the historical sources and archaeology are subject to the vagaries of the ancient writers' interests and the preservation of those texts, and to the different developmental trajectories of archaeological research in different regions.

As above, if ethnographies and ethnohistories offer us a profound understanding of the modern adaptation that we call mobile pastoralism, they are also limited in time depth and reflect modern contexts. Thus, such themes as the impact of geographic constraints, the significance of relations between the desert and the sown, general strategies of herd management, etc. may have general relevance for the study of ancient nomads, and such data as the biological requirements of domestic goats and sheep (or camels, donkeys), their genetics, etc. (e.g., Zeder et al. 2006) may be more or less directly applicable to all such animals. Nevertheless, recent and subrecent nomadic societies are firmly embedded in the modern world and cannot be simply grafted onto ancient times. As is true with all ethnographic analogy in archaeology, the ideas and paradigms deriving from modern groups should be conceived of as hypotheses and must be examined in the light of

Nomads in the Near East, Table 1 Chronological chart of absolute chronology, major periods, processes, features, and events reviewed in the text. Dates are approximate

	Periods	Notes	Evidence and geography
			Recent ethnography, history
1000 CE	Islamic		
		Islam	Camp sites, Eastern Desert Egypt Southern Levant
0	Classical	Rome/*Limes Palaestina*	
			Classical texts
1000 BCE	Iron Age		Egyptian texts
		Camel domestication	
2000 BCE	Late Bronze Middle Bronze		Texts, Mesopotamia (e.g., Mari)
3000 BCE	Early Bronze	Cities, early Complex societies Donkey domestication	Southern Levant/Sinai camp sites
4000 BCE	Chalcolithic	Systematic copper Production	Southern Levant/Sinai camp sites
5000 BCE		Development of desert tribal society, Desert shrines	Negev camp sites
6000 BCE	Late Neolithic	Herding-gathering Desert/steppes	
			Eastern Jordan campsites
7000 BCE		Diffusion of domestic Goats/sheep to peripheries	
8000 BCE	Early Neolithic	Goat/sheep domestication in settled zone	Tepe Ganj Dareh (Iran), Near Eastern Neolithic villages

the texts and archaeology of ancient nomads. The great impact of modern contexts can be seen in a range of subjects, including technology, demography, size of markets, and shifting physical and social geographies.

A few examples will suffice to indicate the impact of modernity on nomadic adaptations and to indicate why we cannot simply graft models generated from ethnography onto the past. The introduction of the gun into Bedouin societies into the late eighteenth and nineteenth centuries affected the balance between settled societies and the nomads, rendering tribal societies a greater threat and requiring much greater response by the state; the unconstrained use of guns brought to extinction such species as ostriches, onagers, deer, and oryx and drastically reduced populations of gazelle, ibex, and various predators, changing basic ecologies; it affected hunting and raiding strategies, and Saidel (2000) has noted that even the transition from matchlock to flintlock rifles changed raiding strategies from sedentary ambush to mounted raids. The introduction of tobacco in the sixteenth and seventeenth centuries is one example of the qualitative changes in external relations, with Bedouin groups importing not only the tobacco in large quantities from distances greater than common in earlier periods, but also importing the pipes with which to smoke it. The introduction of petrol powered pumps, installed on refurbished wells from abandoned sedentary settlements, offered new sources of water, deep in the desert, with obvious impacts on tribal distributions and the ability to practice agriculture. In general, the presence of ruins, dating especially from the Classical Era, including cisterns, wells, agricultural terraces, silos, threshing floors, and various buildings, also offered infrastructures for modern nomads not available to ancient groups, especially as concerning run-off irrigation agriculture practiced by many Bedouin groups in the early twentieth century in the southern Levant.

In contrast to ethnography, ancient texts offer contemporary perspectives on the nomads of the time. There are a large number of texts relating to nomadic groups in the ancient Near East, offering invaluable information deriving from such documents as treaties, travelers' accounts, trade records, military accounts, literary texts, and conquest lists. Major sources, for example, include: (1) the Mari texts, deriving from the mid-second millennium BCE archives at the city of Mari on the middle Euphrates with over 400 texts directly concerning tribal groups (Kupper 1957; Rowton 1974, 1977), (2) Classical period travelers' descriptions of nomadic groups and events involving them such as those discovered in the archive at Santa Katerina in South Sinai (Mayerson 1994) or recorded in classical texts such as Herodotus, Diodorus of Sicily, Strabo, and others, (3) a range of late second and early first millennium BCE Egyptian inscriptions describing the extra-urban Shasu pastoralists, (4) Arab histories such as that of Ibn Khaldun, reflecting perceptions of nomads in the Middle Ages, and (5) various early literary texts which may reflect aspects of non-urban societies, such as Gilgamesh. The Bible also contains information concerning tribal groups, although it has been reworked significantly and deciphering its historicity is a complex problem. In general, the texts provide glimpses of great detail into aspects of nomadic lifeways, data not available from other sources, and specific to regions and periods.

In terms of the chronological and spatial distributions of ancient texts, it is obvious that texts do not exist for the prehistoric periods, thus fundamentally limiting historical investigations to later periods. Geographically, pre-Classical period texts are limited to those derived from Mesopotamian and Egyptian sources, which vary considerably chronologically. Thus, for example, the Mari archives offer a depth of perspective on second millennium Syrian nomads unavailable from any other sources. In contrast, although the Nabateans have been viewed as quintessential nomads, our sources for their nomadic origins are restricted to single paragraph in Diodorus of Sicily, recounted from Hieronymus of Cardia writing some two centuries earlier.

The problems of the texts are the standard problems of historiography. The issue of bias may be especially acute since the nomads were rarely literate and the texts reflect the perspective of the settled peoples almost exclusively. Among the Egyptian inscriptions, descriptions of nomads may be recycled from period to period; often the everyday relations between desert and sown are not evident and the texts reflect the conflicts, which constitute news. The Nilus Narrative offers the dramatic account of a nomadic raid on monastic settlements in South Sinai and recounts the kidnapping of a youth, his father's search for him, and his ultimate rescue; Mayerson (1994) compares the story to one from the Wild West but claims it reflects basic underlying tensions between tribal groups and the state. This may be true, but it is fundamentally incomplete in the absence of the daily peaceful relations that obtained. The Blemmyes, putative nomads of Classical Egypt (Dijkstra 2012), are described by Strabo as headless, their faces embedded in their chests, perhaps a reflection of hooded robes, but regardless clearly undermining the reliability of the source. The third millennium BCE Amorites described in Mesopotamian sources as eaters of raw meat is clearly intended as a pejorative (e.g., Porter 2012 for discussion of Amorites as nomads).

The archaeology of mobile pastoralists in the Near East (and for that matter, elsewhere as well) is a relatively young subfield, both within the general study of pastoralism and within archaeology in general (e.g., Bar-Yosef and Khazanov 1992). Although traditional archaeology in the Near East has tended to discount the potentials of the discipline for analysis of past nomadic societies, prehistoric archaeology has long studied small mobile groups in the deep past. The apparent myopia of Near Eastern archaeology is a matter of methods for certainly the study of small herder groups cannot be based on field or analytic methods appropriate for study of massive fortifications, temples, palaces, cities, or even sedentary villages. The very ability of archaeologists to even identify small encampments has been questioned, and when they are identified, archaeologists accustomed to digging large sites often cannot

see the potentials in their analysis (Rosen 2017). To offer an example of the contrasts that may exist between sedentary and nomadic sites, the ceramic assemblage from the nomadic encampment of Nahal Tsafit in the north central Negev, date to ca. 4000 BCE, contained only 18 diagnostic sherds (and only 254 body sherds). The assemblage from the contemporary village site of Shiqmim, about 50 km northwest, contained over 3000 diagnostic sherds. The study of such small assemblages requires different approaches.

More to the point, in the past several decades, pastoral campsites have been increasingly recorded by researchers more attuned to the demands of an archaeology of mobile pastoralists. These sites, their distributions, architecture, material culture assemblages, and other remains (bone assemblages, botanical remains, micro-archaeological analyses, etc.) offer a vast new data set barely tapped in the study of ancient nomads. The archaeological remains clearly complement and supplement materials from ethnography and text history; in particular, they offer perspectives on societies with little or no historical imprint, sometimes predating historical records, and in other cases, providing substance to the scant mentions in the histories. No less important, the archaeological materials greatly expand the range of variability present in the ethnographic record, for example, to societies predating the domestication of the camel, or for that matter, of pack animals in general.

The problems of the archaeological record of pastoral nomadic societies are those of prehistoric archaeology. The record is very much a function of where research has been conducted, at what level of intensity, and in what environments. Thus, the deserts of eastern and southern Jordan, the Negev, and Sinai have provided the greatest amount of archaeological data on early nomads, a result of both intensive archaeological research and the desert environment in which sites are readily visible during pedestrian survey. In other regions, small campsites may be buried under alluvium, near invisible due to vegetation, or destroyed by agricultural practices and other development. In light of the very recent development of interest in the archaeology of nomads, the political constraints of working in recent decades in the Near East have also resulted in a patchiness to the record.

Conceptually, unlike traditional Near Eastern archaeology, it is hard to tie pastoral encampments to political histories or to specific events of the historical record. Unlike the tells of Near Eastern archaeology, which come with modern names and can often be identified with specific ancient sites, campsites reflect general process and can rarely be securely identified with places or peoples. That is, the questions to be asked of the archaeological record of mobile pastoralists differ from those usually addressed to the archaeology of sedentary societies. Nevertheless, the potentials for new perspectives and new insights from this almost untouched aspect of the archaeological are great.

Domestication and the Earliest Herding Societies in the Peripheral Zones

The domestication of goat and sheep, on which the earliest herding societies were based, occurred within the contexts of settled Early Neolithic cultures in the Near East. In the hilly flanks of the Fertile Crescent, along the edges of the Zagros and Taurus Mountains, the transition from hunting wild goat (*Capra aegagrus*) to herding domestic goat (*Capra hircus*) can be traced over the course of the ninth millennium BCE (Table 1), most notably at the site of Tepe Ganj Dareh, in northwest modern Iran, an early Neolithic village (Zeder and Hesse 2000). There are crucial datum points to be emphasized in this transition:

1. Although it is trivial to note, goats were not domesticated at some single point source. Goat hunting occurred over a large expanse of the northern and eastern highlands of the Near East (the apparent core areas of wild goat distribution). The evolution from hunting to herding probably occurred over this entire expanse as technological and social trends diffused rapidly within a similar cultural matrix. If Tepe Ganj Dareh is taken as a point source, it should be taken that way only for heuristic purposes.
2. The agents of domestication were sedentary village farmer-hunters. This contradicts earlier assumed evolutionary sequences based

essentially on racist notions of cultural sophistication drawn from nineteenth-century ethnography and which reconstructed a progressive sequence from hunting-gathering societies to herding societies to peasant farming societies to civilization (e.g., Childe 1951: 20–36). This idea of farmer-hunters, which seemed odd to European conceptions of progress, is well represented by New World farming societies (based on maize), where no herd animals were ever domesticated given the absence of easily domesticated species.

3. The implicit default in many reconstructions of animal domestication, seemingly based on analogy with modern herding societies, that is, the Bedouin, is that these early Neolithic societies had large herds. These herds would presumably have achieved the magic number of 40–50 head per nuclear family, again based on analogy with recent mobile sheep and goat herding societies in the Near East. There is no evidence that these earliest experiments in domestication resulted in herding practices of such large numbers of animals and more critical evaluations suggest barnyard type adaptations where families had only a few animals, kept in close proximity to the family itself, within the confines and immediate vicinity of the villages (e.g., Arbuckle 2014). No evidence for specialized herding facilities has been discovered either within the village sites of the Near East, or outside them, for example, in the form of stabling in rock shelters, corrals, or herding camps (per contra Hole 1974).
4. Assuming a Zagros-Taurus origin of goat and sheep domestication, the idea of herding, and perhaps the animals themselves, spread rapidly throughout the Near East. If the earliest evidence for domestic animals (goats) at Tepe Ganj Dareh dates to the mid-late ninth millennium BCE (and dates are not precise), then certainly by the terminal ninth/early eighth millennium BCE, domestic goats are present as far west as the Levant (e.g., Horwitz et al. 1999). Again, dates are not precise. The rapidity of the diffusion of domestic goats, and shortly afterward if not contemporaneously, sheep, is notable; it indicates that this new subsistence technology, one perspective for looking at the adoption of domesticate animals, was easily integrated into the Early Neolithic village social matrix. Indeed, one sees little immediate impact on architecture or other physical features of the archaeological record such as troughs or corrals. Notably, some Levantine faunal assemblages show a single phase transition from intensive hunting of gazelle to goat husbandry, from 60% to 80% gazelle bones to similar percentages of goat bones in the transition from Early Pre-Pottery Neolithic B to Middle Pre-Pottery Neolithic B (Davis 1984). In spite of this apparently rapid transition, it was not all-encompassing but mosaic in its distribution; some sites continue to show a dominance of gazelle, although by the Late Neolithic, this is no longer the case (Horwitz 2003).

That is, by the early/mid-eighth millennium BCE, sedentary village sites in the Near East had achieved the basic subsistence farming complex that would remain the staple until recent times, including cereals (wheat and barley), legumes (chick peas, sweet peas), some fruits, and sheep and goats. (The cash crops that would characterize Mediterranean agriculture, olives, grapes, and fruits were domesticated only later, in Late Neolithic and Chalcolithic times.) In significant contrast, in the desert and steppe zones later to be home to mobile pastoral societies, complex band level societies whose subsistence was based on hunting-gathering continued to dominate through the end of the PPNB.

This time lag between the adoption of domestic herd animals in the settled zones and in the desert, on the order of 500–1000 years, reflects fundamental differences in the basic adaptations. The integration of goats and sheep into village farming societies seems to have been an adjustment; the transition from desert hunting-gathering to herding demanded fundamental changes in lifestyles. Ingold (1980) explored some of the ramifications of this transition in his study of reindeer domestication among the Lapps, touching on such aspects as contrasts in settlement patterns and ideologies reflecting ownership. Beyond this, if

one considers the necessities of herd maintenance, then in exchange for constant access to the animals, desert herders must provide constant subsistence for them. Ingold importantly distinguishes between ranching, where animals are owned but to a degree autonomous, and herding, where the animals are constantly provided for. It is unlikely that goat and sheep herds were ranched, especially given the environments into which they expanded in the course of their adoption into desert hunter-gatherer societies.

The Transition to Herding in the Steppes and Deserts of the Near East

The earliest clear evidence for an association between seasonal habitation sites and domestic goats and sheep in the peripheral zones in the Near East derives from the eastern desert of Jordan and dates to the PPNC, the first half of the seventh millennium BCE, post-dating the collapse of the mega-sites of the Pre-Pottery Neolithic B (Garrard et al. 1996; Betts 2008). These sites seem to reflect a general continuation of desert PPNB architecture and material culture but show for the first time varying quantities of goat and sheep in the faunal assemblages (Martin and Edwards 2013). That is, there was no immediate adoption of goats and sheep with an abandonment of hunting, but a long and probably rather opportunistic adoption of small numbers of domesticates into these peripheral hunting-gathering societies. The chronology of this adoption, apparently coincident with the collapse of Pre-Pottery Neolithic B social frameworks, most evident in the abandonment of the PPNB megasites, suggests a causal relationship. Certainly the source of the desert domesticates is to be found in the adjacent sedentary societies; however, the mechanisms of transfer and adoption are not clear. Some researchers have suggested that the PPNB collapse is accompanied by a fissioning process wherein pastoral groups split off from their sedentary cousins, expanding into the periphery with their herds (Kohler-Rollefson 1992). Alternatively, the social breakdown of the PPNB collapse must also have affected relations between the peripheral hunter-gatherer societies and their sedentary cousins. It is in this transition to a new social matrix, involving changes in trade relations, value of goods, and social networks, that the adoption of domestic animals into desert societies occurred.

By the end of the seventh and into the sixth millennium BCE, transformations in the proto-

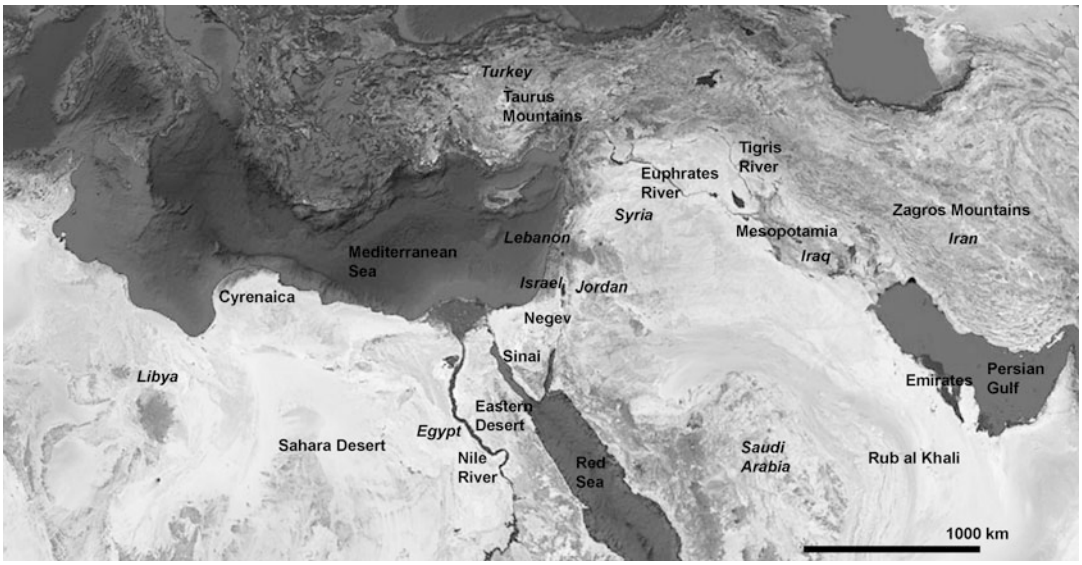

Nomads in the Near East, Fig. 2 Map of the regions and geographic features mentioned in the text. Modern states are italicized

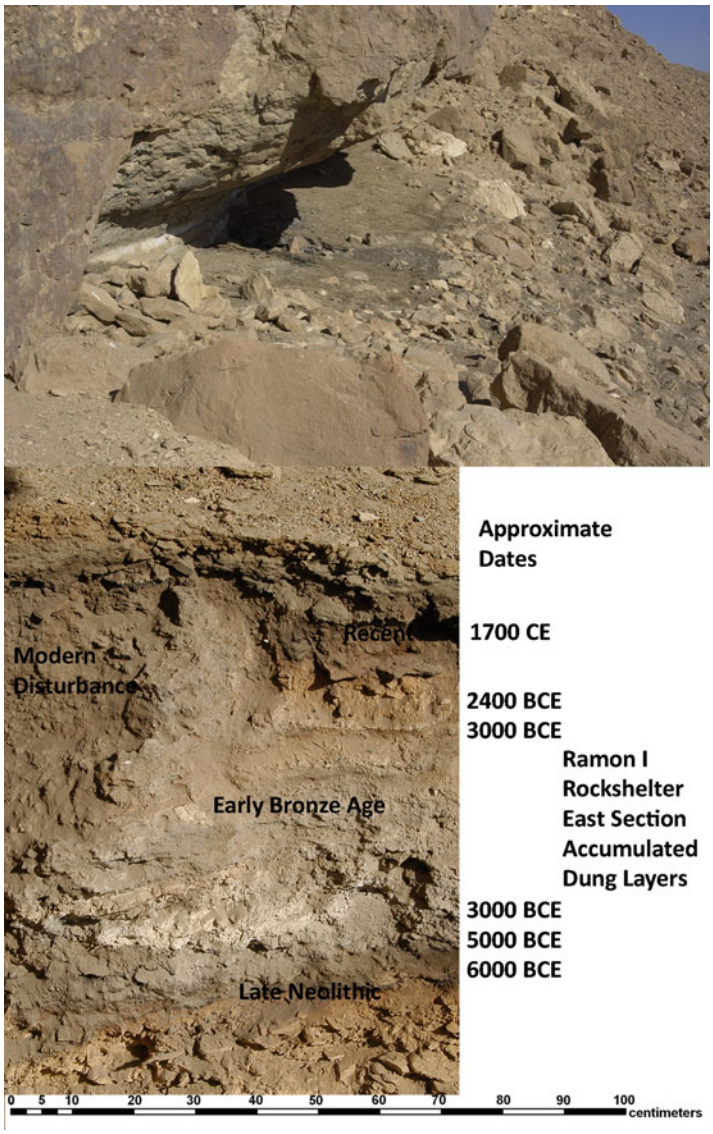

Nomads in the Near East, Fig. 3 Ramon 1 rock shelter (Negev, Israel), showing general view (upper) and east section with accumulated dung layers (SA Rosen)

herding societies of the peripheral zones are evident. Rock shelters (Fig. 2) in the Negev show layers of goat/sheep dung dated to ca. 6000 BCE reflecting stabling of herds of animals (Fig. 3). These dung layers reflect two innovations in herding: (1) the presence of relatively large herds is reflected in the accumulation of dung layers in the rock shelters, a phenomenon seen in recent herding societies as well, and (2) the off-site stabling of animals, away from the actual habitation sites, indicating organization of herding with goatherds/shepherds, beyond the physical association of the herds with family groups. If the chronology of this transformation is correct, then the reorganization of herding practices may be an adaptation to the 8.2 k (6200 BCE) climatic event, a climatic deterioration which may have required more extensive grazing into order to support ever growing herds.

This transformation in herding practices seems to be accompanied by basic changes in the pastoral societies themselves. In the sixth millennium BCE, the following features appear in the archaeological record of the southern Levantine deserts:

1. The basic pattern of campsite architecture shifts from clustered or single round or oval pit houses to enclosure-and-attached-room compounds (Fig. 4). These consist of large round and sometimes irregular shaped enclosures constructed of low walls of fieldstone with small round or oval rooms (sometimes u-shaped) attached around the periphery of the enclosure. Although preserved walls are of stone, they are rarely higher than two or three courses and undoubtedly represent hut bases which had organic superstructures. The enclosures have been invariably interpreted as pens. This shift in architecture thus reflects a

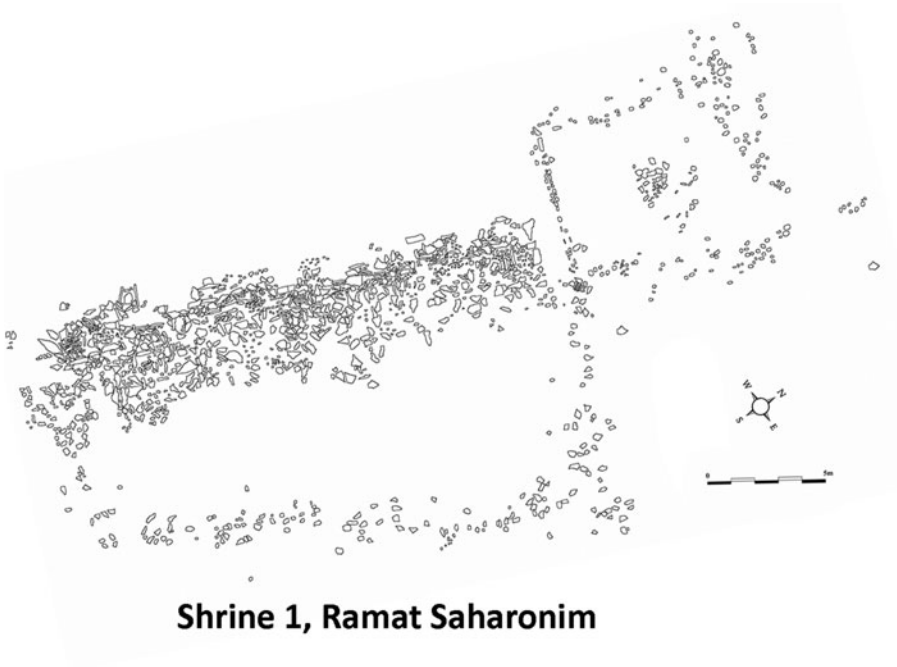

Nomads in the Near East, Fig. 4 Shrine 1 at Ramat Saharonim, Negev (Late Neolithic), aligned with the setting sun of the summer solstice (SA Rosen)

major change in architectural function to serve the more intensive herding of the period.

2. In the mid-sixth millennium BCE, and continuing minimally for hundreds of years if not more, mortuary and shrine complexes appear, sometimes as separate phenomena but often linked. Fields of burial cairns, often with hundreds of large cairns and platforms, have been documented in the deserts of Arabia, eastern Jordan, the Negev and Sinai, and the different variants (e.g., nawamis, tower tombs) have been dated securely from the mid-sixth millennium through the third millennium BCE. Conceptually, similar phenomena are found in the dolmens of Syria, which extend into the southern Levant, but whose chronologies are still disputed. The most common shrines (sometimes referred to as open-air temples) consist of open rectangular or quadrilateral courtyards, typically 8 × 20 m in dimensions, demarcated by small upright slabs around the circumference. The western side of the courtyard is often a massive double wall built of larger blocks which stood about 1.5 m high and was about half a meter thick, with intentional fill between the outer blocks. Variants include an elongate cell with small stelae in the interior, the large western wall without the attached courtyard, and complexes with various additional features (geoglyphs, additional structures), not always contemporaneous. The solstice orientation of these shrines is striking such that a line orthogonal to the massive western wall invariably aligns with the setting sun of the summer solstice, plus or minus a few degrees (Fig. 5).
3. Although rock art is notoriously difficult to date, recent studies in the Negev have constructed a chronology based on superposition of elements within single panels, and on differential patination on different components within single panels (to avoid the problems of variability in patina development). Tying the relative chronology to features within the rock art which may serve as fossil indices (the presence of ridden camels and donkeys, the presence of the compound bow, the presence of specific sword types, inscriptions, etc.) suggests that the earliest systematic and common appearance of petroglyphs is dated to this period of consolidation of herding practices and pastoral society in the region.
4. Desert kites are large animal drive traps, constructed of converging walls, sometimes hundreds of meters in length, with either enclosures or pits/falls at the apex of the converging walls. Walls are rarely higher than two or three courses; they work because the tendency of such animals as gazelle is to avoid jumping over barriers during flight. They reflect communal hunts, strategic planning in their location and in the investment, and probably some kind of ownership or rights of usage. There is still no consensus on dating; although most authorities agree that the peak in use and construction occurred during the fourth and third millennia BCE, there are hints of earlier phases of construction during the Late Neolithic.
5. The material culture transformations following the Pre-Pottery Neolithic are varied, and the trajectories of development in the desert diverge from those of the settled zone. Although pottery emerges in the late seventh millennium BCE in the early stages of the Late Neolithic in the sedentary zone, it becomes common, if not abundant, in the desert only some two millennia later. Lithic functions and technologies diverge as well. If by the end of the sixth millennium BCE chipped stone arrowheads have disappeared from the settled Mediterranean zone societies, they continue in use in the desert at least through the mid-third millennium BCE, most notably in the form of transverse points. The rise of large flake industries in the desert began with Tuwailan bifacial knives, dating to the seventh and perhaps early sixth millennium BCE. This industry was the technological precursor to the tabular scraper industry, wherein large cortical flakes, 10–20 cm in largest dimension, were produced in large numbers and traded into the settled zone in the fifth through third millennia BCE. Although there has been debate concerning the intensity of production of these pieces, there is consensus on their association with desert pastoral societies. Notably, there is no evidence for

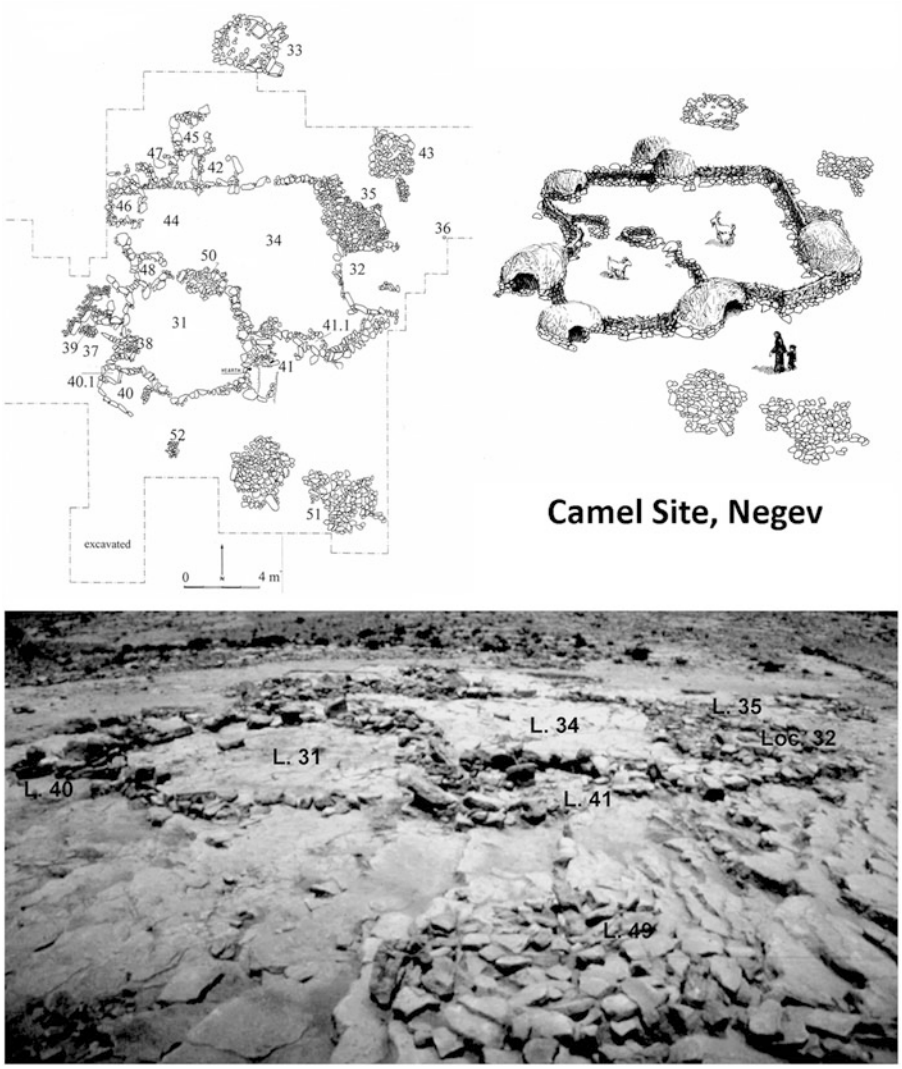

Nomads in the Near East, Fig. 5 Enclosure-and-attached-room architecture, Camel Site, Negev, Late Timnian. Reconstruction drawn by H. Sokolskaya. (ca. 3000 BCE)

production of these scrapers, which likely functioned more as knives, in the settled zones. Finally, by the late fifth millennium BCE, copper production begins to play a role in the Ghassulian Chalcolithic culture of the Mediterranean zone. Crucially, the copper sources are present only in the desert zone, and there is increasing evidence that the early mining and trade in copper was undertaken primarily by the pastoral nomadic societies inhabiting those regions.

All told, these innovations and transformations suggest the crystallization of a new social matrix in the desert, one based on the centrality of herding. This is seen most obviously in the transition to enclosure-and-attached-room architecture (Fig. 4). The construction of cairn fields and megalithic ritual sites also reflect social innovations in the desert, suggesting new social functions and needs which can also be linked to the herding revolution. Thus, cairn fields suggest

increased territoriality, especially in their visibility from great distance; the increased territoriality can be attributed to the absolute need to support herds. Both the cairns and the shrines reflect both new levels of labor organization and hierarchy, and public declarations of ideology and cosmology, tools for legitimization of the social order. Similar arguments can be made for the significance of the rock art, in a new symbolic order, the desert kites, in new forms of communal action and ownership, and in the intensification of exchange as reflected in the tabular scraper trade. For the deserts of the southern Levant, this new cultural formulation has been dubbed the Timnian Cultural Complex. The Timnian represents a greater level of social complexity than evident in earlier periods in the desert zones (and it is important to note that discussion is restricted here to these peripheral areas), one which can comfortably be subsumed under the general rubric of tribal society.

The Evolution of External Relations

Anthropological analyses of recent Eurasian nomads have more or less debunked the myth of modern pastoral nomadic autonomy. They have demonstrated repeatedly the dependence of nomadic societies on their sedentary counterparts for a range of goods and services (including the possibilities of tribute, raiding, or conquest to obtain these) or the adoption of sedentary practices such as agriculture, at least part time. On the other hand, as in the previous section, in the earliest stages of the development of peripheral pastoralism, nomadic economies are perhaps best characterized as herder-gatherers and *were* essentially autonomous, with herding essentially replacing hunting. Thus, the issue of when dependence and interdependence between the settled and the nomadic developed is of great interest.

Addressing this issue, by the fourth and third millennia BCE, relations between peripheral nomads and settled society intensified greatly, especially as villages and towns evolved into cities and states, offering goods, services, and markets for peripheral tribal groups. This intensification seems to mark that initial transition to the economic asymmetries that characterize recent relations between nomads and settled societies.

In this context, there are three developments concomitant with the rise of intensified exchange: (1) The development of complex societies, elite consumers, and larger markets in the settled zones, (2) the discovery of and increased demand for goods and materials deriving from the peripheral zone feeding into those complex societies, and (3) the domestication and systematic exploitation of pack animals, facilitating the mass movement of goods. There is clearly an interdependence between these developments. Without pack animals, large quantities of goods would have been more difficult to move through the desert, and without the demand for such goods and materials, the selective pressures which resulted in the domestication of the donkey, and later the camel, would have been of a much lesser order.

The development of complex societies, that is, cities and states, is a prerequisite for conditions of dependence and economic asymmetry. Subsistence level village society, virtually by definition, could not produce the surpluses required to support large peripheral tribal groups, and did not provide the markets to justify significant investment in providing goods and services offered by those groups. Thus, the rise of economic asymmetries and dependence relationships was historically and geographically specific, as complex societies evolved in different chronological trajectories in different regions. Within the Near East, as a more or less integrated region, the chronological variability may be limited, but at the edges, for example, in North Africa, Southern Arabia, or even the Southern Levant, somewhat removed from the evolution of primary states, lag times may be evident.

It is notable that a number of researchers have linked the rise of peripheral pastoral societies specifically to the development of centralized states (Lees and Bates 1974; Sumner 1986). Alizadeh (2010) has proposed that the early states on the Iranian Plateau originated in the crystallization of nomadic tribes as regional political powers. If on the one hand this seems to contradict

received knowledge on the evolution of early states in the region, the relationship between pastoral tribal societies and the Mari kingship, in the second millennium BCE, seems well documented historically (Fleming 2009) and thus should not be rejected out of hand.

Beyond the chronological contingencies, the specifics of the goods and services also vary. Such goods as wool and copper clearly played major roles in the intensification of desert-sown relations. Trade in other goods, such as milling stones and tabular scrapers, also seems to have intensified. One might also make a case for materials less archaeologically or historically evident, such as dairy products and meat, the provision of caravan services, and conversely, protection. Other objects, such as beads, shells, and semi-precious stones, continued to be exchanged between the peripheral and settled zones, but it is hard to see in them reasons for or evidence of intensification.

A few examples illustrate the ideas. Historically, texts from third millennium BCE Mesopotamia indicate the production of vast quantities of woolen textiles in the Mesopotamian heartland, the wool ostensibly originating with tribal groups raising sheep on the periphery of the riverine lands. Although there is circumstantial evidence for spinning of animal fibers as early as the seventh millennium BCE at Tell Sabi Abyad, in northern Syria (Rooijakkers 2012), intensive exploitation of (downy) wool is only dated to the third millennium in Mesopotamia and can perhaps be pushed back to the fourth millennium. Porter (2012) attributes such importance to wool production that she sees the nomads of the period integral to the very development of these early complex societies, to a degree echoing the claims of Alizadeh (2010). Algaze (2009), adopting third millennium economic models, also stressed the importance of woolen textiles (and by implication of sheep herding) for the Uruk expansion. The impact of the increase in demand on the wool producers, the peripheral pastoralists, would have been great.

Copper production and metallurgy, in general, have often been proposed as prime factors in the rise of complex societies, in the need for specialized production, as goods cementing ties between elites, as rare goods symbolizing and legitimizing political hierarchies, as major new technologies, etc. In the Southern Levant, copper sources are located in Wadi Feinan, in modern day southern Jordan, in Timna, in the southern Negev of modern day Israel, and in South Sinai, in Egypt, all three deep in what would have been nomad territories in the fifth and fourth millennia BCE. That is, the involvement of nomads at various levels in the early copper trade, in the late fifth and early fourth millennia BCE, makes geographic sense. Material culture from the sedentary zone, the Ghassulian Chalcolithic, is lacking in the copper source areas, and the agents of mining, trading, and perhaps the production of some artifacts seem to have been the nomads of the aforementioned Timnian Culture. Although ultimately co-opted by various kinds of incursions from the settled zones in the third millennium BCE (trade stations, mining camps), the demand for copper seems to have stimulated settled-nomad relations and nomads continue to be involved in the metal trade through the end of the third millennium BCE.

The general intensification of relations stimulated by one or more factors also facilitated other aspects of trade. Thus, in Jordan, massive numbers of tabular scrapers were produced in the desert and exported into the settled zone; all researchers concur that this was part of the nomad-settled trade system. Similarly, in the Negev, there is ample evidence for nomadic production of milling stones from sandstones available only in the periphery and their trade into the settled zone. Other goods such as beads, shells, and semi-precious stones also moved from the desert into the settled zone. Evidence for intensified dairying (in bones on sedentary sites) in the third millennium BCE suggests a possible market for dairy products from the desert as well. The diversification of nomad economies here, tapping into sedentary markets, in modern times has been dubbed multiresource nomadism. It has early roots.

The impact of the domestication of the donkey cannot be underestimated. Although goats can be loaded with perhaps 30 kilo of goods, and there

are hints in some figurines that they may have been exploited in this way, the domestication of the donkey marks a major increase in the efficiency of overland transport. Donkeys can carry on the order of 80–100 kilo of goods over long distances, over areas where wheeled vehicles could not pass. The transport of heavy milling stones, large quantities of ores or copper tools, or of tabular scrapers was only made possible by the systematic integration of the domesticated donkey into trade systems in the mid-fourth millennium BCE. They were the primary means of land transport of goods in the Near East from their domestication in the mid-fourth millennium BCE until the introduction of the domestic camel, more than 2000 years later. Caravan trade thus becomes a staple of nomadic adaptations, and is reflected in the increased diversity of goods, included heavy and bulk goods, moving from desert to sown very early on. The point here is that none of these processes, the rise of complex economies and societies, the intensification of nomad-sedentary trade, and the domestication of the donkey, are independent. Each provides contexts and feedback loops for the other. In these interrelationships, nomadic tribes prospered, ultimately achieving relationships, economic and demographic, from which there was no return to previous states of autonomy and subsistence.

Social Integration

As earlier indicated, our knowledge of the history of mobile pastoralism is geographically and chronologically patchy. Beyond the southern Levantine deserts, little archaeological study has been conducted of nomadic sites themselves, small campsites, shepherds' stations, larger encampments, etc. However, by the late third and second millennia BCE, historical sources (notably not available for earlier periods) become a prime source of information and understanding of nomadic societies. For the earlier part of this span, the historical references to the Amorites are problematically stereotypical. Similarly, assumptions as to the nomadic nature of the Kura Axes archaeological culture(s) are also based on little beyond speculation. On the other hand, the second millennium BCE archives from Mari, a city state on the Euphrates, contained over 400 texts relating to nomads and offer information on subsistence, settlement, political organization and affiliation, movements, and cultural affiliation. In a series of integrative essays based especially on these archives, Rowton (1974, 1977) defined two types of Near Eastern nomadism, enclosed and external. Enclosed nomadism is that which filled the interstices between settlements in the Near Eastern steppes, beyond the rivers and hills and is tied inextricably to local politics and society, a dimorphic society. External nomadism is that which was to be found beyond the edges of the fertile zones. Indeed, the Mari archives offer the first detailed text-based perspective on pastoral societies in the Near East. There has been little corresponding archaeological research, and there are no parallel texts for earlier periods, rendering comparative analysis of earlier nomadic societies (as in the preceding section) difficult. Strangely, even the archaeological record of the second millennium BCE in the desert regions has been lacking, a source of some debate on the efficacy even conducting archaeological investigations of nomadic societies in later periods.

The Mari archives present a picture of essential integration between the tribal groups and the Mari state. Fleming (2009) connects the very kingship of Zimri Lim to tribal connections. If at one level the state seems to be in constant tension with the tribes, in negotiations with them, on the other, these are not the negotiations conducted with other states but with components of the larger Mari system. The texts, written from the perspective of the ruling powers in Mari, reflect all of the factors which would impact on relations with the state, including the co-option of local leadership, drafting of soldiers, and taxes/payments of various kinds. They indicate also that the various tribes, for example, the *Bani Yamina*, migrated seasonally with their herds, although we have no indication as to who actually moved, the entire population, smaller groups, or only shepherds. At least some of the tribes resided in villages and engaged in agriculture.

It is notable that interpretations of the Mari archives as reflecting nomads reflect the

anthropological and historical concerns of the day. Thus, in the earliest synthetic study Kupper (1957) very much adopted a "struggle between the desert and the sown" approach. Writing a generation later, and in light of anthropological analyses of modern nomads, less polarized approaches were adopted. In the works of Fleming (2009) and Porter (2012), much greater basic political integration is emphasized.

Further texts, deriving from a wide range of sources, also reflect various kinds of extra-urban tribal groups. Thus such groups as the Sagaz, the Apiru (perhaps equivalent of Sagaz), and the Shasu are mentioned in texts from all over the Near East (Bottero 1954; Giveon 1971). These are not ethnic designations but refer to socioeconomic status, perhaps as one might refer to peasants within a specific region. Although the term "Bedouin" has been used, this is to adopt a term with accepted meaning and to thus impose it on groups which probably did not resemble the Bedouin (e.g., no camels until the latest periods of the texts). The Apiru are described variously as extra-urban, nomadic, brigands, mercenaries, but are not associated with pastoralism in the texts. The Shasu, on the other hand, are described in a similar fashion, but also had flocks; one late reference even refers to them as tent dwellers, although they are also indicated as living in villages. The problem with all of these is that the texts offer us only glimpses, small windows of selected facts; it is not even possible, for the most part, to string together a reliable chronology. Eph'al (1984) had summarized much of the literature on the nomads on the fringes of the settled regions in the Iron Age, deriving especially from Assyrian records. We thus have a record of Assyrian campaigns against the marauders, sometimes offering invaluable information on these groups (e.g., the use of frame tents, camels). But we cannot even identify the specific geography of these campaigns.

The introduction of the camel during the Iron Age, in the Near East most especially the dromedary, comprises another step in the cumulative adaptations which characterize recent nomads. We have little reliable information on the initial stages of camel domestication, which seems to have occurred in the Persian Gulf area. The camel is not mentioned in any of the Mari texts, or for that matter any contemporary text prior to the late second millennium BCE, claims for the donkey-of-the-sea as camel notwithstanding (Lambert 1960). However, by the Iron Age, faunal assemblages begin to show camel bones regularly, if not always abundantly. The Assyrians had already integrated camels as pack animals into their campaigns in Palestine, and the desert caravan trade seems to have adopted the more efficient camels over donkeys by the beginning of the first millennium BCE (Sapir-Hen and Ben-Yosef 2013). The adoption of camels into the economic systems of the Near East considerably enhanced all aspects of nomadic society. Camels can carry three times the load of donkeys; they can travel longer distances without water, penetrating into the deep desert. This ability, combined with the rapidity of travel on camel back and the introduction of the North Arabian saddle allowing more effective warfare, also comprise a new threat to sedentary society and to caravan trade (Bulliet 1990). The adoption of the camel sets the stage for the later configurations of nomadic societies, to develop most notably in the succeeding Classical Era.

The Classical Era

The millennium-plus span from the end of the Iron Age through the Early Islamic period, Classical Antiquity, saw the establishment of the premodern configuration of nomadic societies in the Near East. The states of this period offered new markets, at the scale of large states and empires, for adjacent (and interstitial) nomads, and new economic frameworks and opportunities. Examples include the impact of treaties on settlement systems (including payments in exchange for keeping the peace and the co-option of tribes for military service), the employment of nomads as laborers and mercenaries| in sedentary settlements especially in the frontier areas, stock raising for imperial military for both food and transport, and the state construction of such infrastructures as wells, cisterns, and agricultural systems deep in the deserts, affecting nomadic trade and subsistence. Long range caravan trade based on camels became established, either controlled by nomadic

groups or subject to their raids. Together these economic stimuli probably resulted in significant demographic growth and would seem to have effected political changes and the rise of federations of nomadic tribes, constituting more than nuisance threats to the adjacent states. Toward the end of the period, the adoption of Islam resulted in a new set of symbols and behaviors, seen for example in the presence of open air mosques. In fact, in the deserts of the southern Levant, the presence of numerous mosques in association with nomadic encampments suggests early and relatively easy adoption of Islam.

Numerous classical texts describe the relations between nomads and settled peoples in this period, and the archaeology of the Eastern Desert of Egypt and the southern Levant deserts has revealed a general Classical Nomadic Complex (Rosen 2009). Two types of texts offer different perspectives, dovetailing in viewing the nomads as "other." Travelers' and literary accounts describe the exotic aspects of nomadic cultures. For example, the Blemmyes are described by Strabo as headless, with facial features embedded in their chests; travelers' accounts from Sinai describe the miserable state of desert inhabitants' existence, often stressing the hostile aspect of relations. Treaties and histories stress the conflicts between the tribal groups and the state. Mayerson (1994), in a rather traditional view of history as writ large, has characterized the relations between the Roman (and Byzantine) empire and nomadic tribes on the edges of the empire as essentially hostile.

The archaeology of the nomads, as opposed to the archaeology of the state facing the nomads as in the *Limes Palaestina*, offers a complementary perspective. Beginning in the Hellenistic period and continuing through the Early Islamic period, archaeology in southern Jordan, southern Israel, and the Eastern Desert of Egypt documents a new settlement type, consisting of rows of round structures built of field stones, usually along wadi terraces (Fig. 6). These vary in degree of investment, sometimes consisting of proper walls, sometimes only wall bases, and sometimes only the outline of tent bases, the stones marking the cleared areas or the stones used to hold down tent flaps. Aggregate sites may consist of anywhere from 4 to 5 structures up to dozens, and sites with single structures are also known. Site distributions in the Negev and Jordan indicate seasonal movement from the desert zones into the agricultural zones (also in the arid zones, but based on run-off irrigation), with patterns of population aggregation and dispersal.

Chronologically, this nomadic complex seems to begin in the Hellenistic era, with the Nabateans, in the last centuries of the first millennium BCE (according to the texts), or archaeologically perhaps somewhat later. Given only a few excavations, and the difficulties of precise chronology based on surface survey collections, chronological trends in the nomadic system are difficult to reconstruct. There are hints of demographic growth and increasing camp size (for the aggregate seasonal camps) among the nomadic groups on the edges of the empire by the mid-first millennium BCE. These trends probably also reflect changes in patterns of mobility. Certainly, if one accepts the texts at face value, the Nabateans sedentized and formed a state initially based on trade. However, the nomadic complex which seems to have begun with Nabatean nomads did not cease with that transformation, and beyond the settled zones of the Nabatean kingdom, archaeology demonstrates the continued presence of nomads through the second half of the first millennium CE.

Contrary to the picture of hostility obtained from the texts, the proximity of the nomadic systems to the sedentary agricultural systems, including solitary farmhouses, small villages, and towns at the edge of the Roman/Byzantine/Islamic empires, suggests that real threats were rare. In South Sinai, hundreds of monks lived side-by-side with the local pastoral population. The archaeology indicates that over 90% of the pottery found on nomadic sites derived from the settled zone. Other preserved material culture including milling stones, metals, and coins also derived from the settled zone. In the absence of agricultural installations (field systems, threshing floors) in much of the nomadic zone, and given the presence of milling stones, trade in agricultural goods seems likely. Fish bones in the middle of the

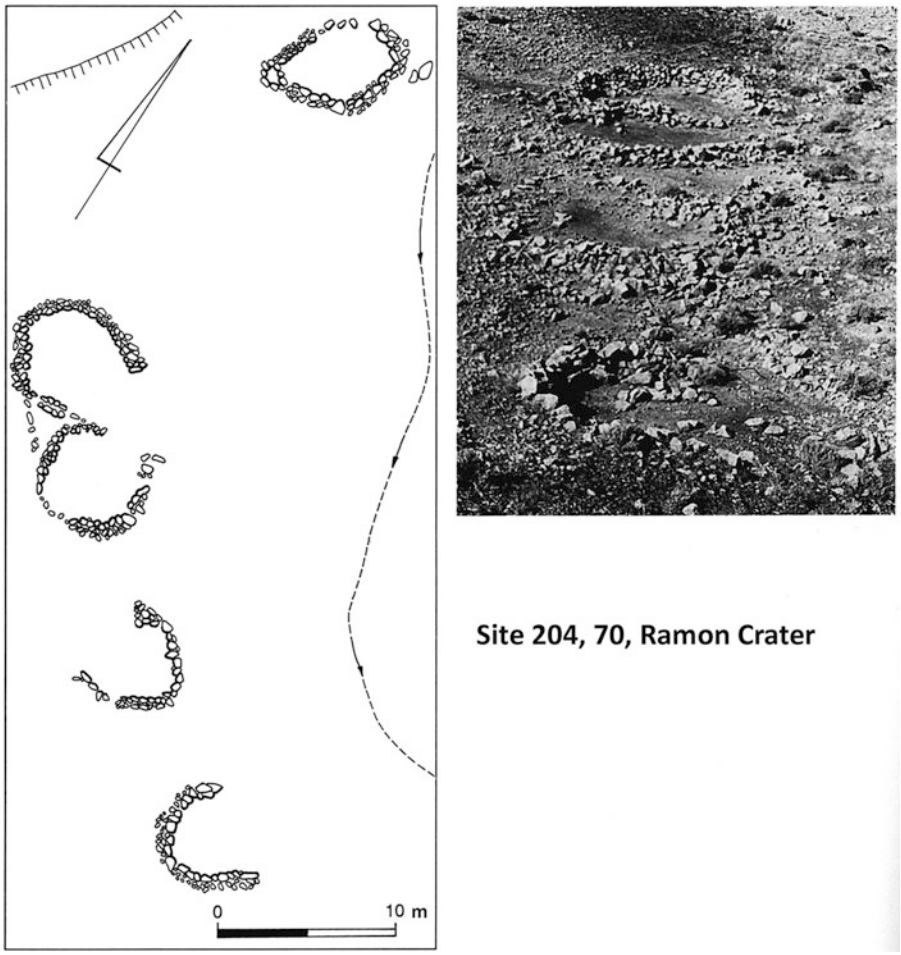

Nomads in the Near East, Fig. 6 Classical period (Byzantine) nomadic site consisting of line of round structures, tent bases or hut bases, along wadi terrace. Site 204/70 (p. 57) in Rosen SA (1994) *Archaeological Survey of Israel Map 204, Makhtesh Ramon*. Israel Antiquities Authority, Jerusalem

desert suggest trade in dried fish, also deriving from the settled zone. This would accord with much modern ethnography. In fact, reading between the lines in the texts, economic relations between the nomads and the state include a wide range of links (e.g., animal trade, guides, labor), belying a picture of underlying hostility. In fact, for the nomads on the edge of the empire (although not necessarily for those deep in Arabia), one may posit an economic dependence on the settled zone. Certainly, with the collapse of the settled system at the periphery at the end of the Ummayad period (in the mid-eighth century CE), the nomadic complex collapsed as well.

Final Notes

The study of ancient mobile pastoralists in the Near East is still not yet a mature field of historical or archaeological research. Research has been uneven, both chronologically and geographically. Many historical records have yet to be investigated, and the archaeology of campsites is in its infancy as a subdiscipline. Nevertheless, recent important work from all over the region demonstrates the potentials research on ancient nomads. Several important trends are evident.

The idea that nomads do not leave remains, or at least not enough remains that can be profitably

analyzed, is no longer the default assumption of archaeologists working in the Near East. Recent work in Turkey, Kurdistan, and Iran add significantly to the body of research from the Southern Levant. In the near future we can expect to see historical syntheses of these researches. Indeed, most recently the archaeological exploration of recent nomadic sites offers perspectives on interpretations of ancient sites, but also new insights on nomadic cultures in the past several centuries, insights not available from our ethnographies and histories.

The myths of nomadism no longer dominate the historical and anthropological narratives. Few archaeologists or historians automatically graft the paradigms of the struggle between the desert and sown directly onto the past. In a more nuanced way, although ethnoarchaeology will ever play an important role in archaeological research, the perils of mechanical adoption of recent insights are also understood. There is understanding that nomadic societies have evolved socially, politically, and historically no less than their sedentary counterparts, that modern nomadic societies are not timeless fossils hearkening back to an ahistorical past. The study of that past has much to offer, not only for understanding the historical specifics of nomadic peoples, or even the more complete histories of specific times and places, including the nomads, but for the general understanding of the human condition.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Asses/Donkeys: Domestication
- ▶ Camels: Domestication
- ▶ Domestication: Definition and Overview
- ▶ Goat: Domestication
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ North and Saharan Africa: Geography and Chronology
- ▶ Sheep: Domestication

References

Algaze, G. 2009. *Ancient Mesopotamia at the dawn of civilization: The evolution of an urban landscape*. Chicago: University of Chicago Press.

Alizadeh, A. 2010. The rise of the highland Elamite State in Southwestern Iran. *Current Anthropology* 51: 353–383.

Arbuckle, B.S. 2014. Pace and process in the emergence of animal husbandry in neolithic Southwest Asia. *Bioarchaeology of the Near East* 8: 53–81.

Barth, F. 1961. *Nomads of South Persia*. Boston: Little Brown.

Bar-Yosef, O., and A.M. Khazanov, eds. 1992. *Pastoralism in the Levant*. Madison: Prehistory Press.

Betts, A.V.G. 2008. Things to do with sheep and goats: Neolithic hunter-forager-herders in North Arabia. In *The archaeology of mobility,* Cotsen Advanced Seminars 4, eds. H. Barnard and W. Wendrich, 25–42. Los Angeles: UCLA.

Bottero, J. 1954. *Le problème des Habiru*. Paris: Imprimerie Nationale.

Bulliet, R. 1990. *The camel and the wheel*. New York: Columbia University Press.

Childe, V.G. 1951. *Man makes himself*. New York: New American Library.

Cribb, R. 1991. *Nomads in archaeology*. Cambridge: Cambridge University Press.

Davis, S. 1984. Climatic change and the advent of domestication: the succession of ruminant Artiodactyls in the Late Pleistocene - Holocene in the Israel region. *Paléorient* 8(2): 5–15.

Dijkstra, J. 2012. Blemmyes, noumades and the eastern desert in late antiquity. Reassessing the written sources. In *History of the peoples of the Eastern desert,* Cotsen Institute of Archaeology Monograph 73, eds. H. Barnard and K. Duistermaat, 238–247. Los Angeles: UCLA.

Eph'al, I. 1984. *The ancient Arabs*. Jerusalem: Magnes Press.

Fleming, D.E 2009 Kinship of city and tribe conjoined: Zimir-Lin at Mari. In *Nomads, tribes and the state in the ancient Near East: Cross-disciplinary perspectives,* The Oriental Institute of the University of Chicago Seminar 5, ed. Szuchman J, 227–240. Chicago: University of Chicago.

Garrard, A., S. Colledge, and L. Martin. 1996. The emergence of crop cultivation and caprine herding in the "marginal zones" of the southern Levant. In *The origins and spread of agriculture and pastoralism in Eurasia*, ed. D.R. Harris, 204–226. Washington, DC: Smithsonian Institution Press.

Giveon, R. 1971. *Les Bedouins Shosou des documents Egyptiens*. Documenta et Monumenta Orientis Antiqui XVIII. Leiden: Brill.

Hole, F. 1974. Tepe Tūlā'ī: An early campsite in Khuzistan, Iran. *Paléorient* 2: 219–242.

Horwitz, L.K. 2003. Temporal and spatial variation in neolithic caprine exploitation strategies: A case study

N

of Fauna from the site of Yiftah'el (Israel). *Paléorient* 29: 19–58.

Horwitz, L.K., E. Tchernov, P. Ducos, C. Becker, A. Von Den Driesch, L. Martin, and A. Garrard. 1999. Animal domestication in the southern Levant. *Paléorient* 25: 63–80.

Ingold, T. 1980. *Hunters, pastoralists and ranchers*. Cambridge: Cambridge University.

Johnson, D.L. 1969. *The nature of nomadism: A comparative study of pastoral migrations in Southwestern Asia and Northern Africa,* Department of Geography Research Paper # 118. University of Chicago, Chicago.

Khazanov, A.M. 1984. *Nomads and the outside world*. Cambridge: Cambridge University Press.

Kohler-Rollefson, I. 1992. A model for the development of nomadic pastoralism on the Transjordanian Plateau. In *Pastoralism in the Levant: Archaeological materials in anthropological perspective,* Monographs in World Archaeology 10, eds. O. Bar-Yosef and A M. Khazanov, 11–18. Madison: Prehistory Press.

Kupper, J.-R. 1957. *Les Nomades en Mesopotamie Au Temps Des Rois de Mari*. Paris: Bibliotheque de la Faculte de Philosophie et Lettres de L'Universite de Liege.

Lambert, W.G. 1960. The domesticated camel in the second millennium – Evidence from Alalakh and Ugarit. *Bulletin of the American Schools of Oriental Research* 160: 42–43.

Lees, S.H., and D.G. Bates. 1974. The origins of specialized pastoral nomadism: A systemic model. *American Antiquity* 39: 187–193.

Martin, L., and Y. Edwards. 2013. Diverse strategies: Evaluating the appearance and spread of domestic Caprines in the southern Levant. In *The origins and spread of domestic animals in Southwest Asia and Europe,* Institute of Archaeology Publications 59, eds. S. Colledge, J. Conolly, K. Dobney, K. Manning, and S. Shennan, 49–82. Walnut Creek: University College London/Left Coast Press.

Mayerson, P. 1994. *Monks, martyrs, soldiers, and Saracens. Papers on the Near East in late antiquity (1962–1993)*. Jerusalem: Israel Exploration Society.

Murphy, R.F. 1967. Tuareg kinship. *American Anthropologist* 69: 163–170.

Porter, A. 2012. *Mobile pastoralism and the formation of Near Eastern civilizations: Weaving together society.* Cambridge: Cambridge University.

Rooijakkers, C.T. 2012. Spinning animal fibres at late neolithic Tell Sabi Abyad, Syria? *Paléorient* 38: 93–109.

Rosen S.A. 1994. Archaeological survey of Israel Map 204, Makhtesh Ramon. Israel Antiquities Authority, Jerusalem.

Rosen, S.A. 2009. History does not repeat itself: Cyclicity and particularism in nomad-sedentary relations in the Negev in the long term. In *Nomads, tribes and the state in the ancient Near East: Cross-disciplinary perspectives,* The Oriental Institute Seminar 5, ed. J. Szuchman, 57–87. Chicago: University of Chicago.

Rosen, S.A. 2017. *Revolutions in the desert: The rise of mobile pastoral societies in the Negev and the arid zones of the southern Levant*. New York: Routledge.

Rowton, M.B. 1974. Enclosed nomadism. *Journal of the Economic and Social History of the Orient* 17: 1–30.

Rowton, M.B. 1977. Dimorphic structure and the parasocial element. *Journal of Near Eastern Studies* 36: 181–198.

Saidel, B.A. 2000. Matchlocks, flintlocks, and saltpetre: The chronological implications for the use of matchlock muskets among Ottoman-period Bedouin in the southern Levant. *International Journal of Historical Archaeology* 4: 191–216.

Sapir-Hen, L., and E. Ben-Yosef. 2013. The introduction of domestic camels to the southern Levant: Evidence from the Aravah Valley. *Tel Aviv* 40: 277–285.

Sumner, W. 1986. Proto-Elamite civilization in Fars. In *Gamdat Nasr: Period or regional style*? Beihefte zum Tubinger Atlas des Vorderen Orients, 62, eds. U. Finkbeiner and W. Rollig, 199–211. Weisbaden: Reichert.

Tapper, R. 1979. The organization of nomadic communities in pastoral societies of the Middle East. In *Pastoral production and society*, ed. Equipe Ecologie et Anthropologie des Societes Pastorales, 43–66. Cambridge: Cambridge University Press.

Thomas, D.S.G., and N.J. Middleton. 1994. *Desertification: Exploding the myth*. New York: Wiley.

Zeder, M.A., and B. Hesse. 2000. The initial domestication of goats (*Capra Hircus*) in the Zagros mountains 10,000 years ago. *Science* 287: 2254.

Zeder, M.A., D. Bradley, E. Emshwiller, and B.D. Smith, eds. 2006. *Documenting domestication: New genetic and archaeological paradigms*. Berkeley: University of California Press.

Further Reading

Selected Ethnographies

Bates, D.G. 1973. *Nomads and farmers: A study of the Yoruk of Southeastern Turkey,* Anthropological Papers of the Museum of Anthropology 52. Ann Arbor: University of Michigan.

Behnke, R.H Jr. 1980. *The herders of Cyrenaica*, Illinois Studies in Anthropology 12. Urbana: University of Illinois.

Black-Michaud, J. 1986. *Sheep and land*. Cambridge: Cambridge University Press.

Cole, D.P. 1975. *Nomads of the nomads: The Al Murrah Bedouin of the Empty Quarter*. Arlington Heights: Harlan Davidson.

Eloul, R. 2010. *Culture change in a Bedouin Tribe: The ʻarab al-Ḥǧerāt, Lower Galilee, A.D. 1790–1977,* Anthropological Papers of the Museum of Anthropology 97. Ann Arbor: University of Michigan.
Lancaster, W. 1997. *The Rwala Bedouin today.* Prospect Heights: Waveland Press.
Marx, E. 1967. *Bedouin of the Negev.* New York: Praeger.
Musil, A. 1928. *The manners and customs of the Rwala Bedouins*. New York: American Geographical Society.
Salzman, P.C. 2000. *Black tents of Baluchistan*. Washington, DC: Smithsonian Press.

Selected Text Histories and Studies

Luke, J.T. 1965. *Pastoralism and politics in the Mari period*. Ann Arbor: University Microfilms.
Matthews, V.H. 1978. *Pastoral nomadism in the Mari kingdom (*ca. *1830–1760 B. C.)*. American Schools of Oriental Research Dissertation Series 3. Cambridge, MA: American Schools of Oriental Research.
Parker, S.T. 1986. *Romans and Saracens: A history of the Arabian frontier.* American Schools of Oriental Research Dissertation Series 6. Winona Lake: Eisenbrauns.
Shahid, I. 1984. *Byzantium and the Arabs in the fourth century.* Washington, DC: Dumbarton Oaks.
Shahid, I. 1989. *Byzantium and the Arabs in the fifth century.* Washington, DC: Dumbarton Oaks.

Selected Monographs and Anthologies

Barnard, H., and W. Wendrich, eds. 2009. *The archaeology of mobility,* Cotsen Advanced Seminars 4. Los Angeles: UCLA.
Betts, A.V.G., D. Cropper., L. Martin., and C. McCartney. 2013. *The later prehistory of the Badia. excavations and surveys in Eastern Jordan*, Levant Supplementary Series 11. Oxford: Oxbow.
Khoury, P.S., and J. Kostiner, eds. 1990. *Tribes and state formation in the Middle East*. Berkeley: University of California.
Rosen, S.A. 2011. *An Investigation into early desert pastoralism: Excavations at the camel site, Negev,* Cotsen Institute of Archaeology Monograph 69. Los Angeles: UCLA.
Rosen, S.A., and G. Avni. 1997. *The ʻOded sites: Investigations at two early Islamic pastoral encampments in the South Central Negev,* Beersheva XI. Beersheva: Ben-Gurion University.
Saidel, B.A., and M. Haiman, eds. 2014. *Excavations in the Western Negev Highlands: Results of the Negev emergency survey 1978–89,* British Archaeological Reports International 2684. Oxford: Archaeopress.
Szuchman J., ed. 2009. *Nomads, tribes and the state in the ancient Near East: Cross-disciplinary perspectives,* The Oriental Institute Seminar 5. Chicago: University of Chicago.

Nondestructive Subsurface Mapping in Field Archaeology

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Introduction

Archaeological *excavation* provides unparalleled detail of past lives, but it is a costly process and destructive to the site under investigation. Cost and respect for the resource means that excavation can only be applied over limited areas. By contrast, subsurface mapping methods can cover wide areas while leaving the site intact (Scollar et al. 1990). These methods, once regarded only as a means of finding sites (prospection), represent now a complementary tool kit for detailed archaeological investigation of a site and its surrounding landscape. The methods provide overviews of human activity and buried structures of archaeological and historical interest in increasing detail over considerable areas. Subsurface mapping also permits the selection of high-potential areas for targeted scientific excavations and provides a broader settlement context for sites already excavated. Recent developments based on high-resolution multichannel near-surface geophysical technology and advances in state-of-the-art remote sensing now permit the cost- and time-efficient spatiotemporal archaeological investigation and documentation of buried features across entire landscapes. This has applications in both research and rescue projects.

Key Issues

The most commonly used ground-based archaeological subsurface survey methods are magnetic, electromagnetic and geoelectric (Gaffney and

Gater 2003). Less frequently employed are geochemical methods, the best known being phosphate mapping. Traditionally *surveys* are conducted manually in rectilinear grids using tape measures and survey lines placed on the ground for orientation and facilitating exact sample positioning and spacing. The advent of automated positioning systems in form of *Global Positioning Systems* (GPS) or *total station survey instruments* (TST) permits the rapid high-precision location of *anomalies* (high and low readings) recorded by geophysical instruments. The output of these surveys is essentially a map of these subsurface anomalies in two dimensions, although georadar adds the third dimension by presenting the anomalies in "depth slices" (see below).

Magnetic Methods

Magnetic archaeological survey, also known as magnetometry, is based on the passive measurement of the earth's magnetic field using highly sensitive magnetometer instruments (Aspinall et al. 2008; Becker 2009; Fig. 1). Magnetic archaeological prospection can be used for the detection of ferromagnetic objects, such as iron objects or slag from metal production sites, causing a relatively strong localized disturbance in the earth magnetic field, as well as for the detection of thermoremanently magnetized, burned archaeological structures, as, for example, hearths, kilns, bricks, or ceramics. The topsoil displays in general a substantially increased magnetization compared to deeper soil horizons and the underlying geological layers, a fact known as the *Le Borgne effect*, which is thought to be based on natural (e.g., forest fires, lightning strikes, oxidation of magnetite to maghemite) and anthropogenic influences (use of fire in prehistoric times). Hence, under favorable geological conditions, it can be possible to successfully locate and map archaeological trenches, pits, and postholes containing prehistoric topsoil in a matrix of relatively lower magnetization (Fig. 2). In order to be able to detect the small magnetic field variations caused by archaeological structures in the presence of a strong earth magnetic field, two magnetometer sensors are placed vertically above each other, resulting in an instrument known as a gradiometer: both sensors measure the effect of the earth's magnetic field as well as any of its temporal variations, which can be caused, for example, by solar activity, while the sensor that is closer to the ground measures the stronger effect of any structures buried within the shallow subsurface. State-of-the-art archaeological magnetic survey is conducted using one or more magnetometers (*fluxgate*/*Foerster* type, *Overhauser*, or *optically pumped cesium magnetometers*) along measurement transects with no more than 50-cm parallel spacing and 10-cm inline sample spacing. In general, no definite information about the depth of structures causing variations in the magnetic data can be derived from magnetic prospection.

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 1 Motorized magnetometer prospection at the Iron Age site of Uppåkra in southern Sweden using a multichannel Foerster gradiometer array mounted on a nonmagnetic cart. (Image courtesy of Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology)

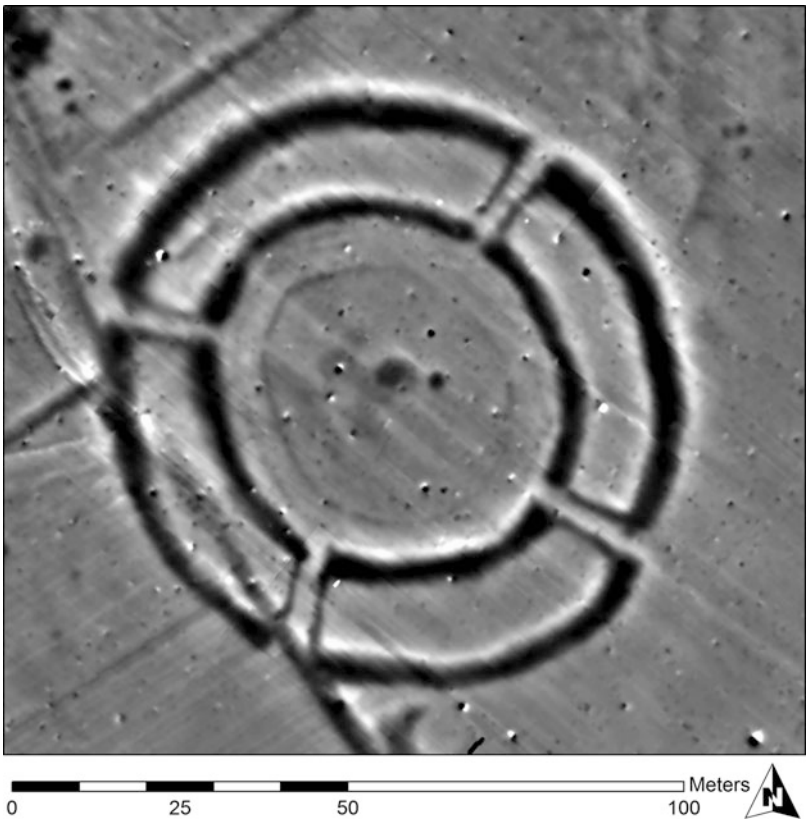

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 2 Magnetic prospection result showing the Neolithic ring ditch of Steinabrunn in Austria measured with a multichannel cesium magnetometer system. The amplitude range of the *gray* scale image is −8/+12 nT (*white/black*). (Image courtesy of Wolfgang Neubauer)

Geoelectric Methods

Geoelectric survey, also termed resistivity or earth resistance survey, is based on the measurement of the resistance of artificially injected electrical currents into the subsurface (Hesse et al. 1986). The electrical soil resistance (or its reciprocal value, the electrical conductivity) is strongly dependent on the presence and amount of soil humidity, pore space, and salt and ion content in the shallow subsurface, as well as archaeological features present, which can cause measureable electrical effects at the surface. Positive features, such as stone walls, contrast with negative features, where the soil filling usually retains a greater amount of moisture. In suitable ground and weather conditions, resistance measurements can be used to locate stone structures, walls, and cavities due to their relatively increased electrical resistance, while filled ditches and pits can show by virtue of their relatively increased electrical conductivity. Geoelectric measurements are generally conducted by injecting an alternating electrical current into the soil using two electrodes. The electrical potential associated with the injected current is affected by an electrically heterogeneous subsurface, which can cause a measureable variation of the electrical potential at the ground surface. Therefore, two additional electrodes are employed in commonly used four-electrode arrays in order to measure the electrical potential over a fixed distance. At the surface, soil resistivity represents an average of the values along the flow path of the electrical current and is hence called *apparent resistivity*. The depth of investigation is a function of the distance between the current electrodes. By varying this distance it is possible to investigate the change of apparent soil resistivity with depth. Using a linear multi-electrode array, it is possible to record the soil resistance with increasing electrode spacing at different depth levels, resulting in a so-called *pseudosection*. Most geoelectric archaeological prospection surveys are conducted manually using a fixed electrode frame or fixed

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 3 Automatic Resistivity Profiling with two ARP(c) systems. The electrodes are the toothed wheels. (Image courtesy of Geocarta, Paris)

multielectrode arrays with 0.5- or 1.0-m probe spacing, resulting in relatively limited spatial measurement progress. In the UK and in France, experiments have been conducted employing towed carts equipped with spiked electrode wheels. In recent years motorized geoelectric cart systems have been developed in France, permitting considerable spatial coverage rates with three simultaneously measured depths of investigation (Fig. 3).

Electromagnetic (EM) Methods

Electromagnetic (EM) archaeological survey methods comprise magnetic susceptibility, the Slingram method, induction methods, and metal-detecting and ground-penetrating radar (GPR), also known as soil radar or georadar.

Magnetic susceptibility is a dimensionless measure indicating a material's degree of magnetization in response to an applied magnetic field (*magnetizability*). On the earth all materials are naturally exposed to the earth's magnetic field. Using dedicated instruments, sometimes called *Kappameter*, the magnetic susceptibility of soil layers, stones, and objects of archaeological interest can be determined in the field, or soil samples can be taken into the laboratory for measurement. An increased magnetic susceptibility of soil samples can indicate cultural layers due to thermoremanently increased magnetization. Spatial measurements of the distribution of the soil magnetic susceptibility can thus reveal areas of archaeological activity.

The *Slingram* method utilizes a transmitter and a receiver coil with constant spacing between them. A primary low-frequency EM field generated by the transmitter coil is projected into the ground where it induces eddy currents in electrically conducting objects and materials. These induced currents give rise to a secondary EM field that can be detected by the receiver coil, simultaneously measuring the apparent resistivity and magnetic susceptibility of the ground. The method is used widely for the characterization of soils (*pedology*) and in precision farming. Other EM *induction meters* can be used to locate and map changes in clay content and soil humidity, filled-in trenches, walls, as well as areas of increased magnetic susceptibility, indicating cultural layers, fire places. A typical EM induction meter consists of a rod with transmitting and receiver coils mounted at its opposite ends. The system is carried or towed on a sledge horizontally over the ground along measurement transects. Measurements are usually recorded with an inline spacing of several decimeters, while transect spacing in case of instruments with 1-m coil separation should be around 50 cm. The depth of investigation corresponds to approximately half the

transmitter-receiver spacing. Data positioning can be implemented using a global positioning system antenna or reflectors and a robotic TST. State-of-the-art EM induction meters using several receiver coils permit the simultaneous recording of electrical conductivity and magnetic susceptibility of the soil at four depth levels. Using motorized vehicles these systems can cover several hectares per day with 80-cm transect spacing (Fig. 4). A great advantage of the EM method over geoelectric survey (or georadar) is the fact that it does not require a contact to the ground and that it can be used efficiently in environments with high soil conductivity (e.g., wet soils, clay, salt-water beaches, arid regions with high electrical topsoil conductivity).

Metal detectors are manually operated EM induction devices designed for the detection of metal objects in the topsoil and shallow subsurface. In the case of the popular very-low-frequency (VLF) or induction balance detectors, the effect of the oscillating primary EM field generated by the transmitter coil onto the receiver coil is electrically balanced in the absence of a nearby metal object. In the presence of a metal object, this balance is disturbed and the machine emits a visual and audio signal. Modern computerized metal detectors permit the discrimination of metals and the cancelation of effects caused by soil mineralization. The depth of investigation of a metal detector for metal objects the size of a coin corresponds approximately to the diameter of the search coil used. In many countries the use of metal detectors is regulated by law.

Ground-penetrating radar is an active survey method based on the reflection of a short electromagnetic impulse off subsurface layer interfaces and structures with differing dielectric properties, such as buried foundations, cavities, and stones in the shallow subsurface (Conyers 2004). A short electromagnetic impulse with a frequency band between 100 megahertz (MHz) and 1 GHz is emitted into the ground from a transmitter antenna located on the ground surface, and the reflected radar signal is recorded by a receiver antenna as function of the time that has passed since pulse emission. Transmitter and receiver antennae are placed next to each other in commonly used soil radar systems. Depending on the pulse frequency, the power of the antenna output and the electrical conductivity of the soil, signal penetration depths between 0.5 and 5 m depth can be achieved. Georadar measurements are conducted along straight transects and measurements are made with close inline spacing of, for example, 2 or 5 cm. State-of-the-art in professional archaeological survey is a transect spacing of not more than 25 cm when measuring with a 500-MHz GPR

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 4 The DUALEM-21S sensor for simultaneous measurement of apparent resistivity and magnetic susceptibility mounted in a sled, pulled by an all terrain vehicle with DGPS and Lightbar Guidance System. (Image courtesy of Wim De Clercq, Gent University)

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 5 Motorized GPR survey with the 16-channel MALÅ Imaging Radar Array at the UNESCO World Cultural Heritage site Birka-Hovgården. Data positioning is conducted with the GPS antenna mounted on top of the GPR system. (Image courtesy of Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology)

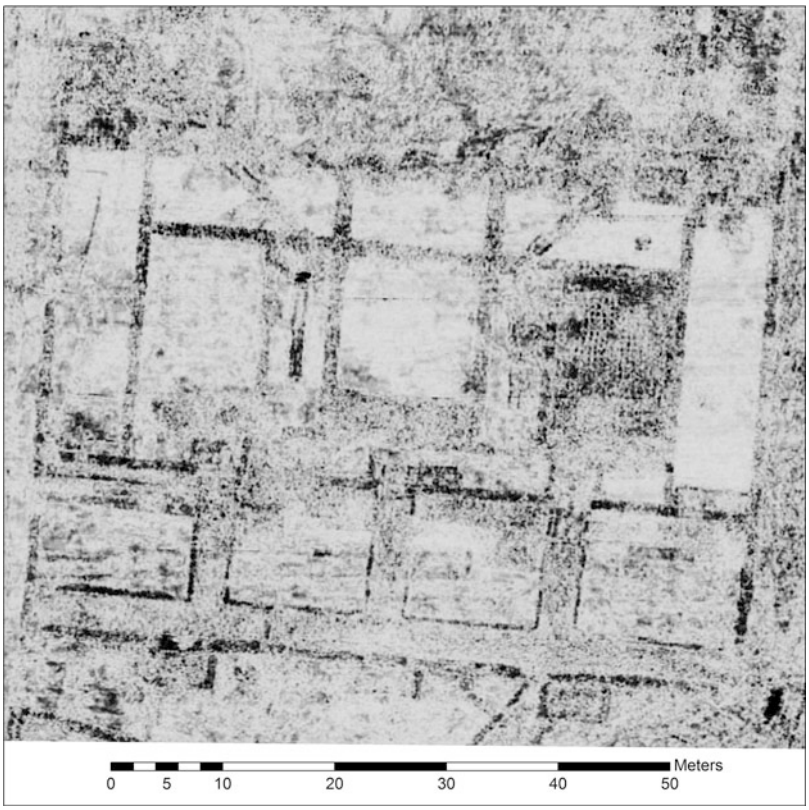

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 6 Georadar depth slice measured with the 16-channel 400-MHz MALÅ Imaging Radar Array (MIRA) with 8-cm transect spacing showing the southern part of the main building at the Forum of the Roman town of Carnuntum. In the high-definition data for the first time the individual brick columns of the hypocaust system under the floor of the easternmost room became visible. (Image courtesy of Archeo Prospections®)

antenna. Exact data positioning is achieved with help of a distance wheel mounted on the GPR cart or sledge and guidance lines placed on the ground with constant intervals, or through the use of a differential GPS with centimeter accuracy. Modern multichannel georadar array systems (Fig. 5) offer dense high-resolution measurements with as little as 8-cm transect spacing (Fig. 6). Densely

measured 2D georadar sections, which can be thought as vertical scans through the subsurface, can be merged into virtual 3D data volumes. Subsequently these data volumes can be cut into horizontal slices, showing structures at approximately the same depth (*GPR depth slices*). Archaeological structures contained in georadar data are often more recognizable when presented in plan view as horizontal depth-slice images. Of all archaeological subsurface methods, GPR generates the largest amount of data and offers highest spatial measurement resolution, horizontally and vertically, and the best chance of assessing the depth of features.

Seismic Methods

Geophysical seismic reflection and refraction methods are only rarely used for archaeological onshore prospection due to the rather time-consuming data acquisition and data processing involved, as well as due to the relatively low imaging resolution. Special application cases are, for instance, the seismic investigation of the depth to bedrock at an archaeological site, or the nondestructive testing (NDT) of architecture using ultrasound. In marine and underwater archaeology seismic geophysical prospection methods, such as *sonar* (e.g., chirp sonar, side-scan sonar), boomer, pinger, sparker, and *sub-bottom profiler*, are successfully used for the detection and mapping of archaeological and historical structures (e.g., wrecks, harbor constructions) on and below the seafloor.

Geochemical Methods

Geochemical archaeological survey methods are based on the mapping of distribution and amount of specific chemical elements and compounds within the soil for localization and delimitation of archaeological sites, as well as for a more detailed analysis of known sites and the function of subareas (Oonk et al. 2009). Compared to the number of geophysical surveys, the number of reported geochemical surveys is small, due to the relatively slow data acquisition involved. Most commonly employed have been soil phosphate measurements using sample intervals between 1 and 50 m with the goal of locating and delimiting prehistoric settlement sites. Increased phosphate values can indicate the presence of cultural layers of archaeological interest due to the release of phosphate ions during the decay of deposited organic material (occupational waste and manure) and their subsequent binding to soil particles. Other geochemical prospection methods involve the analysis of heavy metals in archaeological soils to identify metalworking sites. Aside from increased phosphate, archaeological soils commonly show anomalous levels of calcium, copper, magnesium, potassium, sodium, and zinc. One concern regarding geochemical mapping for archaeological prospection is the comparability of data values obtained from different soil phases. Geochemical methods are also erosive since samples have to be taken.

Future Directions

Archaeological subsurface surveys all map variations in the physical or chemical properties of the topsoil and the near subsurface. Digital systems generate the maps as gray scale (Figs. 2 and 6) or color-coded raster images located on the local or national grid. The use of Geographical Information Systems (GIS) aids interpretation by presenting these geophysical maps within the context of previous discoveries or modern land use (Neubauer 2004). Improved digital imaging is an important part of current R&D.

The most important parameters affecting the efficiency of subsurface archaeological prospection methods are sensitivity, speed, and sample spacing (Becker 2009). Considerable advances have been made using motorized multichannel systems with GPS positioning and navigation. Understanding of the nature of structures observed in geophysical data is being improved empirically by comparison with the results of subsequent excavations. Research into the visibility of buried archaeological structures using different survey methods continues. Of particular interest in this regard are "ghost" structures visible in the geophysical record that fail to show during subsequent excavation.

References

Aspinall, A., C. Gaffney, and A. Schmidt. 2008. *Magnetometry for archaeologists*. Lanham: AltaMira Press.
Becker, H. 2009. Caesium-magnetometry for landscape archaeology. In *Seeing the unseen – geophysics and landscape archaeology*, ed. S. Campana and S. Piro, 129–165. London: CRC Press.
Conyers, L.B. 2004. *Ground-penetrating radar for archaeology*. Walnut Creek: Alta Mira Press.
Gaffney, C.F., and J. Gater. 2003. *Revealing the buried past: Geophysics for archaeologists*. Briscombe Port Stroud: Tempus Publishing Ltd.
Hesse, A., A. Jolivet, and A. Tabbagh. 1986. New prospects in shallow depth electrical surveying for archaeological and pedological applications. *Geophysics* 51 (3): 585–594.
Neubauer, W. 2004. GIS in archaeology – the interface between prospection and excavation. *Archaeological Prospection* 11: 159–166.
Oonk, S., C.P. Slomp, and D.J. Huisman. 2009. Geochemistry as an aid in archaeological prospection and site interpretation: Current issues and research directions. *Archaeological Prospection* 16: 35–51.
Scollar, I., A. Tabbagh, A. Hesse, and I. Herzog. 1990. *Archaeological prospecting and remote sensing*. Cambridge: Cambridge University Press.

Non-places in Archaeology

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Introduction

The question of "non-places" in archaeological research is likely to evoke strange reactions from archaeologists and non-archaeologists alike. In both a practical and discursive sense, archaeology is in the very business of *making places* as it substantively engages in processes of materializing and articulating the absent, the forgotten, the concealed, or even the excessive (Buchli et al. 2001: 171). Namely, archaeology articulates these undisclosed figures and processes as distinctive places, what we have come to understand as archaeological sites and "the past."

How, then, are we to understand the archaeology of non-places? The term "non-place" used by archaeologists comes from the French anthropologist, Marc Augé, who views non-places (*non-lieux*) as an opposite polarity to "anthropological places," which are generally regarded as localized, organic, familiar, known, occupied, and meaningful to both occupants and observers (Merriman 2004). Places come into being through the ongoing negotiation of social relations, shared histories, and identities (Augé 1995). While non-places take part in this negotiation, they represent the negative polarities of such processes. Moreover, for Augé, non-places and their proliferation are a distinctive characteristic of supermodernity and include spaces of transit or faceless transaction that tend to evoke feelings of isolation, detachment, and suspension. In short, non-places appear to lack a sociality characterized by a sense of rootedness, attachment, and belonging.

Evocative of transience, suspension, and unrootedness, non-places orient the archaeological gaze towards the abject, the subaltern, and the marginalized. These subjects are often viewed as the embarrassing underside of history and society, as they remind us of humanity's failings, malice, and brutality; they also evoke feelings of alienation, isolation, and willful forgetting. Histories of the abject and dispossessed often dissolve into non-places – the scars or ruins of modernity (or history) – because they inspire little if any personal or collective investment in them (Moran 2004). But the material record does maintain traces of such histories and archaeology stands to offer a unique perspective into those histories of human society and culture largely neglected by or inaccessible to discursive productions of scholarly analysis.

The archaeology of non-place, then, marks a critical turn to actively incorporate histories of the subaltern and dispossessed into the field of archaeological knowledge. While the concept of "non-place" has particular resonance with those who study the archaeology of the contemporary past or present (Gonzalez-Ruibal 2008; Harrison and Schofield 2010; Harrison 2011), its application need not be limited to examinations of the twentieth and twenty-first centuries. Processes of exclusion and marginalization as well as experiences of alienation and isolation are not restricted

to the (post/super) modern experience. They are a part of almost every "complex" society. We might therefore refigure the concept of non-place in terms of the more general idea of an archaeology of alienation articulated through material, social, spatial, and temporal vectors. This specific attention to subaltern histories provides a fuller archaeological accounts of the past and gives the discipline some political teeth in its accounts of the historical past and the present.

Key Issues/Current Debates

Augé's Non-lieu

We should begin by revisiting Augé's specific idea of non-place and why it has gained some traction in archaeological circles. While the term "non-place" has appeared in many, it is a concept that has received much critical attention and has received much criticism, much of which is valid and some of which likely derives from miscues from the peculiar style of this particular ethnographic project. Merriman notes that *Non-Lieux, Introduction à une anthropologie de la surmodernité* (1992) should be taken as a form of self-analysis through a fictional style of ethnological writing (2004: 149). With this project, Augé does not seek to present multitude of potential experiences. With reductive simplicity, Augé states: "If a place can be defined as relational, historical and concerned with identity, a space which cannot be defined as relational, or historical, or concerned with identity will be a non--place" (Augé 1995: 78). His analysis focuses on spaces of transit – airport lounges, motorways, theme parks, supermarkets, and motels – that he sees as coming into experience and memory only partially formed. These are non-places, material, physical, and inherently transitional.

Contrary to Augé's Pierre Dupont in fluid movement, there are many who would not experience these spaces as non-relational, non-historical, or sites of non-identity. There are also places where people get stuck, sometimes to the extent that they become suspended in (and in some ways defined by) their denied access to history, social relations, and identity. Augé's style of semi-fictional, ethnological self-analysis asserts one perspective over numerous other possibilities, including those that would foster a more habitual, long-standing engagement with these spaces. Given this limited vision, Augé's conceptualization of the non-place has been criticized as being conceptually blunt and lacking the nuance necessary to address the heterogeneous complexity of sociomaterial forms, relations, and networks (see Merriman 2004: 147–52; Latour 1993: 100–1). Despite this limitation, Augé, in the end, does retreat from a blunt opposition between place and non-place. Rather, he underscores the co-constitutive play that defines the relationship between the two: "[non-place] never exists in its pure form; places reconstitute themselves in it; relations are restored and resumed in it . . . Place and non-place are rather like opposed polarities: the first is never completely erased, the second is never totally completed; they are like palimsests on which the scrambled game of identity and relations is ceaselessly rewritten" (Augé 1995: 78–9).

The often quoted definition of non-places as "non-relational, non-historical and not about identity" is therefore misleading. Non-places are not relationally and socially bereft; rather, they provoke and enable modes and socialities of dwelling-in-movement or dwelling-in-betweenness as a counterpoint to dwelling-in-place (see also Sekedat and Aldred 2011). As Augé states, "a person entering a space of non-place is relieved of his usual determinants. He becomes no more than what he does or experiences in the role of traveller, customer or driver" (1995: 103). But this description of non-place assumes that the "social game" is always being played elsewhere, namely, in a place (Augé 1995: 111). However, the "gentle form of possession" one might experience in non-places – what Augé describes as identity-loss – is not always temporary or gentle. Those non-places that delineate the margins rather than the articulating nodes of society – slums, refugee camps, tent towns, clandestine detention centers – can suspend their dwellers in a long-term or even semipermanent state of transience and negation. For pavement dwellers, slum residents, refugees, and numerous others, dispossession becomes a significant part of their identity and relations.

In a sense, non-places produce non-persons – those stripped of the basic social "determinants" that allow their full recognition by the state and other members of society. In some cases this stripped state is not merely temporary. Abject non-places differ from locations such as airports, transit systems, and shopping malls in the sense that their "visitors" do not engage in contractual relations with such spaces or the powers that govern them (see Augé 1995: 101). There is no check-out counter, toll booth, or passport control from which one can "retrieve" and assert his or her identity, reclaiming the rights and recognition it entails. The camp, slum, or detention center is often marked by the lack of contractual relations. Here, the contract is null and void. Transience, suspension, and nonrecognition become a way of dwelling (in relation to the governing powers and normative practices), and the non-place takes on place-like qualities, where "travelers" are forced to grow roots, as it were. Non-places at the social, economic, and political margins critically demonstrate how the interplay of place and non-place articulate complex, heterogeneous, and dynamic constitutions of social spaces and agents.

Examples

Contemporary spaces of the abject and the dispossessed perhaps have most captivated the archaeological gaze focused on the present day. Not trivially, it is in the examination and constitution of material traces of the abject, alienated, and subaltern that marks a critical archaeological contribution to contemporary culture studies (Buchli et al. 2001; Buchli 2007; Harrison and Schofield 2010). Archaeological expertise is not just about locating and illuminating a distant and remote past. Rather, on a more general level, it is about uncovering that which has remained unspoken, hidden, or overlooked. Unlike other disciplinary forays into contemporary material culture studies that tend to aim at discursive forms, archaeology, by necessity, has become adept at negotiating the non-discursive, quotidian traces human activity. This focus is critical: through the archaeological attention to non-discursive, taken-for-granted activities, "the archaeological act comes directly into contact with the subaltern, the dispossessed and the abject" (Buchli et al. 2001: 14). Buchli and Lucas critically remind us that the realm of discourse (and the realm of most scholarly work) is the realm of the enfranchised, whereas the non-discursive realm of the quotidian and taken-for-granted often leaves the only traces of subaltern activities and experiences (Buchli et al. 2001: 14). In the study of the contemporary past, archaeology can uniquely examine and help constitute the histories of those people whom society pushes to the margins. Indeed, many scholars argue that given this distinctive position, archaeology has a particular obligation to bring to light those obscured and often painful pasts that haunt contemporary life, and a responsibility to the individuals, communities and institutions implicated by archaeological work to help them come to terms with their recent hidden histories and ongoing circumstances (Buchli 2007; Harrison and Schofield 2010: 9; Zimmerman et al. 2010).

An emergent archaeological subfield now focuses on spaces of the abject or the "scars" of modernity (Gonzalez-Ruibal 2008), such as mass graves and genocide (Crossland 2000, 2002; Funari and Zarankin 2006; Ferrandiz 2006; Gonzalez-Ruibal 2008); landscapes of war and conflict (Schofield 2005, 2009; Saunders 2007); concentration camps (Kola 2001; Myers 2010; Myers and Moshenska 2011); the homeless (Zimmerman and Welch 2006), the welfare state (Harrison 2009), abandoned buildings, parks, and towns (Edensor 2005; Pringle 2009; Andreassen et al. 2010), and places devastated by disasters (Gould 2007). These are non-places of the recent past and present, but both have a distinct orientation towards articulating a particular history of the modern condition. Many of these engage with and extend studies of the "contemporary past" (Rathje 1979; Gould and Schiffer 1981; Buchli 1999; Graves-Brown 2000; Buchli et al. 2001; Rathje and Murphy 2001) and combine conventional archaeological methods and analyses with those

from ethnography and textual, material, and visual culture studies. Oftentimes, there are explicit political projects underwriting the study of modernity's detritus and failures, whether it is putting archaeology to work as bearing witness to an abject, forgotten past, or as a kind of therapeutic project in reconciliation and retribution or as a political commentary on the conditions and issues of the present (Harrison and Schofield 2010: 149). In this arena, archaeology gains political teeth and social relevance and, in many instances, aligns itself with social justice and heritage ethics.

The challenge of non-places also brings attention to the noninvasive methodologies of archaeological analysis and how they can be uniquely employed in the study of the present. Archaeological non-places are not just abandoned ruins and uninhabited sites hiding in plain sight (Harrison and Schofield 2010). They are, of course, also inhabited. Indeed some archaeological methods combined with new technologies can be used to examine physically inaccessible sites. Adrian Myers has used Google Earth to track the growth of Camp Delta at Guantanamo Bay, demonstrating how traditional archaeological analyses combined with satellite imagery can quantify the material manifestations of secretive government policies (2010). When applied towards challenging official governments statements, the use of such viewing technology can serve to democratize the "panoptic gaze" traditionally reserved for the powerful (Bernbeck 2008); importantly however, Myers reminds us that it also produces an essentially distancing and potentially dehumanizing perspective and thus should be used ethnically, ideally in concert with other more intimate, on-the-ground archaeological techniques (Bernbeck 2008). On the flip side, archaeologists are also employing standard archaeological methods such as survey, mapping, photography, and artifact collection to study transiently inhabited sites such as Black Rock City at Burning Man (Carolyn L. White) and the sites and material culture of undocumented migrants crossing the southwest American border (Jason P. de Leon).

Future Directions

From Augé to the archaeologists that have mobilized his concept, the non-place appears as a distinctly modern or contemporary feature of society. However, I would argue that a theory and politics of non-place could have a much broader application in archaeology. What is common in all accounts and applications of the non-place are notions of alienation and suspended recognition that take on spatial and material entailments. Non-places, past and present, direct our attention to those histories that often lie outside the lines of traditional archaeological inquiry – the more visible hegemonic and normative practices and structures. And yet, as Victor Buchli, Gavin Lucas, and others have persuasively argued, archaeology is uniquely equipped to deal with the unarticulated histories of the dispossessed and subaltern. Furthermore, such histories provide important and evocative counterpoints to dominant historical modes and narratives we have so far produced and stand to provide a richer and more balanced picture of the human condition in various times at various places.

Archaeology has made some notable strides in this general direction. For decades, many researchers have increasingly pursued archaeologies "from below." Many projects now form research questions around and implement methodologies to analyze quotidian activities and practices, and there is an expanded focus on "non-elite" and non-monumental structures and sites. But these projects still maintain a distinct focus on normative, dominant structures rather than on the subaltern and alienated. The question then is how might one locate a non-place (which may or may not have been materially enduring) in the archaeological record, especially in the absence of written records and archives that may have marked its existence? If we are speaking of locating sites such as ancient detention areas, or refugee camps, then it is often a matter of luck (for example, the fortuitous finding at Vindolanda during the 2011 excavations). But merely locating such "non-places" is not tantamount to an archaeology of non-place. Rather, it is a particular kind of

(postcolonial) attention to the analysis of human activity that constitutes such a project.

Attending to the pasts and histories of those at the social margins, embraces a certain kind of postcolonial logic and also stands to provide a more resonant and fuller account of the past. While articulating the histories of the subaltern and abject in ancient times may lack the political urgency of similar projects focused on the present (there is no chance of generating strategies for political change), these histories nonetheless may testify to the lives and conditions of persons from diverse sectors of society but also complicate and challenge our current understandings of ancient hegemonic forms. Just as detention centers, homeless camps and abandoned theme parks reveal the abuses, inequalities, and failures of modern societies and thus contribute to a more balanced view of modernity; the study of past non-places may similarly provide more nuanced accounts of ancient life and societies.

An archaeology of non-place thus requires a shift in perspective and mode of intellectual inquiry. Following Ian Lilley, subaltern and marginal histories should not only be articulated and investigated; rather, it is also a matter of "moving the interests of the periphery to the center" (2011: 142). This shift should not only apply to contexts of the recent or contemporary past. Rather it should inform the archaeological project more broadly. The greater value of doing an archaeology of non-place lies in the way it stands to fill in some discursive "blind spots" of traditional archaeological knowledge. What interpretive possibilities emerge when we focus our analytical gaze first on the place of transit, the slum, the ludic object, or daily practices of the dispossessed? Situating the spatio-material entailments of alienation at the center of archaeological inquiry does the double work of compelling researchers to ask why certain places, objects, and narratives have been written out of history while at the same time asserting their right to be "recorded" in the archaeological record.

Within archaeology, Augé's concept of non-lieu connects sites of transition, movement, and in-betweenness to states of alienation, abjection, and dispossession. Given the unique expertise of archaeology in dealing with non-discursive material traces and remains, the discipline has a certain obligation to further pursue and develop its interpretive sensibilities to include those pasts and histories which have been historically excluded.

Cross-References

- ▶ Archaeology and Politics
- ▶ Internment and Prisoners of War in Historical Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Supermodernity and Archaeology

References

Aldred, O. 2011. *Part 3. In-betweeness and chiasma. Moving on to mobility: Archaeological ambulations on the mobile world*. Stanford: Stanford University. Available at: http://traumwerk.stanford.edu/archaeolog/2011/02/part_3_of_moving_on_to_mobilit.html.

Andreassen, E., H. Bjerck, and B. Olsen. 2010. Persistent memories. *Pyramiden – a Soviet mining town in the High Arctic*. Trondheim: Tapir Akademisk Forlag.

Augé, M. 1995. *Non-places: Introduction to an anthropology of supermodernity*. London/New York: Verso.

Bernbeck, R. 2008. Structural violence in archaeology. *Archaeologies* 4 (3): 390–413.

Buchli, V. 1999. *An archaeology of socialism*. Oxford/New York: Berg.

Buchli, V. 2007. Opinion. *Conservation Bulletin* 56: 14.

Buchli, V., G. Lucas, and M. Cox. 2001. *Archaeologies of the contemporary past*. London/New York: Routledge.

Crossland, Z. 2000. Buried lives: Forensic archaeology and Argentina's disappeared. *Archaeological Dialogues* 7 (2): 146–159.

Crossland, Z. 2002. Violent spaces: Conflict over the reappearance of Argentina's disappeared. In *The archaeology of 20th century conflict*, One world archaeology, ed. J. Schofield, C.M. Beck, and W.G. Johnson, 115–131. London: Routledge.

Edensor, T. 2005. *Industrial ruins: Space, aesthetics and materiality*. New York: Berg Publishers.

Ferrándiz, F. 2006. The return of civil war ghosts: The ethnography of exhumations in contemporary Spain. *Anthropology Today, Anthropology Today* 22 (3): 7–12.

Ferrándiz, F. 2008. Time to destroy: An archaeology of supermodernity [with comments]. *Current Anthropology* 49 (2): 247–279.

Ferrándiz, F. 2011. Digging Franco's trenches: An archaeological investigation of a nationalist position from the Spanish Civil War. *Journal of Conflict Archaeology* 6 (2): 97–123.

Funari, P., and A. Zarankin. 2006. *Arqueología de la represión y resistencia en América Latina en al era de*

las dictaturas (décadas de 1960–1980). Córdoba: Encuentro Grupo Editor.
Gould, R.A. 2007. *Disaster archaeology*. Salt Lake City: University of Utah Press.
Gould, R.A., and M.B. Schiffer. 1981. *Modern material culture: The archaeology of us*. Academic.
Graves-Brown, P. 2000. *Matter, materiality, and modern culture*. London/New York: Routledge.
Harrison, R. 2009. Towards an archaeology of the welfare state in Britain. *Archaeologies* 5 (2): 238–262.
Harrison, R. 2011. Surface assemblages. Towards an archaeology in and of the present. *Archaeological Dialogues* 18 (02): 141–161.
Harrison, R., and J. Schofield. 2010. *After modernity: Archaeological approaches to the contemporary past*. Oxford: Oxford University Press.
Kola, A. 2001. Badania archeologiczne terenu byłego obozu zagłady Żydów w Sobiborze. Przeszłość i Pamięć. *Biuletyn Rady Ochroni Pamięci Walk i Męczeństwa* 4: 115–122.
Latour, B. 1993. *We have never been modern*. Cambridge, MA: Harvard University Press.
Merriman, P. 2004. Driving places Marc Augé, non-places, and the geographies of England's M1 motorway. *Theory, Culture & Society* 21 (4–5): 145–167.
Moran, J. 2004. History, memory and the everyday. *Rethinking History* 8 (1): 51–68.
Myers, A. 2010. Camp Delta, Google Earth and the ethics of remote sensing in archaeology. *World Archaeology* 42 (3): 455–467.
Myers, A., and G. Moshenska, eds. 2011. *Archaeologies of internment*, One world archaeology. New York: Springer.
Pringle, H. 2009. Witness to genocide. *Archaeology Magazine* 62 (1). Available at: http://www.archaeology.org/0901/etc/iraq.html.
Rathje, W.L. 1979. Modern material culture studies. In *Advances in archaeological method and theory*, ed. M.B. Schiffer, 1–37. New York: Academic.
Rathje, W.L., and C. Murphy. 2001. *Rubbish! The archaeology of garbage*. Tucson: University of Arizona Press.
Saunders, N.J. 2007. *Killing time: Archaeology and the First World War*. Stroud: Sutton.
Schofield, J. 2005. *Combat archaeology: Material culture and modern conflict*. London: Duckworth.
Schofield, J. 2009. *Aftermath: Readings in the archaeology of recent conflict*. New York: Springer.
Zimmerman, L.J., and J. Welch. 2006. Toward an archaeology of homelessness. *Anthropology Newsletter* 47 (2): 54.
Zimmerman, L.J., C. Singleton, and J. Welch. 2010. Activism and creating a translational archaeology of homelessness. *World Archaeology* 42 (3): 443–454. https://doi.org/10.1080/00438243.2010.497400.

Further Reading

Beck, C.M., W.G. Johnson, and J. Schofield, eds. 2002. *Matériel culture: The archaeology of twentieth-century conflict*. London: Routledge.
Bender, B. 2001. Landscapes on-the-move. *Journal of Social Archaeology* 1 (1): 75–89.
Buchli, V., G. Lucas, and M. Cox. 2001. *Archaeologies of the contemporary past*. London: Routledge.
González-Ruibal, A. 2006. The dream of reason. *Journal of Social Archaeology* 6 (2): 175–201.
Graves-Brown, P. 2011. Touching from a distance: Alienation, abjection, estrangement and archaeology. *Norwegian Archaeological Review* 44 (2): 131–144.
Haglund, W.D., M. Connor, and D.D. Scott. 2001. The archaeology of contemporary mass graves. *Historical Archaeology* 35 (1): 57–69.
Hall, M. 2000. *Archaeology and the modern world: Colonial transcripts in South Africa and Chesapeake*. London: Routledge.
Lemaire, T. 1997. Archaeology between the invention and the destruction of the landscape. *Archaeological Dialogues* 4 (01): 5–21.
Sørensen, T.F. 2009. The presence of the dead. *Journal of Social Archaeology* 9 (1): 110–135.
Theune, C. 2010. Historical archaeology in national socialist concentration camps in central Europe. *Historische Archaologie* 2. Available at: http://www.histarch.uni-kiel.de/2010_Theune_high.pdf.
Weiner, J.F. 2011. The appropriation of an Aboriginal landscape in northern New South Wales. *The Australian Journal of Anthropology* 22 (2): 189–202.
Zarankin, A., and C. Niro. 2009. The materialization of sadism; archaeology of architecture in clandestine detention centers (Argentinean military dictatorship, 1976–1983). In *Memories from darkness*, ed. P. Funari, A. Zarankin, and M. Salerno, 57–77. New York: Springer.
Zarankin, A., and M. Salerno. 2011. The engineering of genocide: An archaeology of dictatorship in Argentina. In *Archaeologies of internment*, ed. A. Myers and G. Moshenska, 207–227. New York: Springer.

N

Nonstructural Sites: Monitoring

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Introduction

After the initial inventory of an archaeological site, periodic visits may be required to determine that the site conditions have not been altered by either naturally occurring events or by human intervention. Although the methodology of inventory is often outlined in considerable detail, the

techniques of monitoring sites are much less rigorously defined.

Definition

Nonstructural archaeological sites include a vast array of cultural remains which are not buildings or structures. Rock art sites, battlefields, mounds, flint quarries, and painted caves are common examples of nonstructural archaeological resources. Many of these sites are located below the ground surface, and their significance is unknown until appropriate analysis can be conducted.

Key Issues/Current Debates/Future Directions/Examples

The laws, policies, and regulations that are the basis of historic preservation are usually outlined in considerable detail by the national, state, or tribal entities which manage them. A considerable body of information, guidelines, and procedures is available in the professional literature (National Park Service 1983; Hardesty and Little 2000; King 2000). The legal frameworks that constitute tribal, state, and national preservation programs clearly specify requirements for the identification of sites for eligibility to various lists. Inclusion on these lists elevate the sites to national or international status for the recognition of outstanding cultural value to society. Two examples of such programs are the National Register of Historic Places in the United States (NRHP) (National Park Service 2002) and the World Heritage list maintained by the United Nations Educational, Scientific and Cultural Organization (UNESCO World Heritage List n.d.).

Because of the wide variety of nonstructural sites, environmental conditions, and possible impacts, a single set of monitoring criteria is not feasible. Those who seek guidance in formulating monitoring practices will find considerable information on the inventory techniques but little information on monitoring. In many cases, monitoring is perceived as a one-time effort in conjunction with construction or earth moving to identify cultural resources. Literally thousands of nonstructural sites have been identified in preparation for highway construction, damming of waterways, encroachment of suburbs, etc., but the results have been primarily "salvage archaeology" and not monitoring in the strict sense. Land modification by grading and earth movement is particularly damaging to small surface sites. Many members of the public may not be aware of the historic preservation laws and not fully understand the damages their own actions may do.

In other cases, monitoring consists of posing security personnel at the sites, primarily to curtail looting and vandalism (UNESCO n.d.).

The reason for this is that a far greater number of sites are seriously damaged or destroyed by human actions than by natural processes (Wood and Johnson 1978; Wildesen 1982).

The need for systematic monitoring is frequently mentioned in requirements to protect historic/archaeological properties, but is not discussed in detail. Given limited funding, many programs focus their monitoring efforts on a very narrow range of highly sensitive and/or highly visible sites, such as rockshelters, rock art, mounds, cemeteries, and battlefields that are primarily threatened by looting and vandalism. Such efforts may (depending on field protocols and data management) be adequate for those sites, but such highly selective monitoring is not really sufficient for compliance with the intent of relevant historic preservation law. Extended site monitoring is thus often seen as an activity that is important but less critical than site discovery and evaluation.

One innovative monitoring program in the western United States seems to be working well. This program, called SITEWATCH, is currently being used by several US government entities including the National Park Service, the US Forest Service, and the Bureau of Land Management (New Mexico Historic Division 2007). Sitewatch recruits and trains volunteers from the public sector who then are assigned particular sites to monitor. Participants provide their own transportation, cameras, and other equipment and try to visit the

site on a regular basis. After each visit, a short form and relevant photography are submitted to the managing agency. This program shifts some of the financial and labor costs from the managing agency to the volunteers.

The US military manages thousands of hectares of land containing cultural resources. The US Corps of Engineers has developed criteria and protocols which address how to best monitor archaeological resources (Department of the Army US Army Corps of Engineers 2009). The focus of their guidelines is to detect changes and mitigate damage. Also addressed is perhaps the most difficult part of monitoring which is data management. The rapid technological changes in global positioning units, digital cameras, high-resolution photography, and custom software can make compatibility across time and computer platforms difficult.

A particularly sensitive environment is that of caves in which drawing or paintings are located. One cave in particular which has received considerable recent attention is that of Lascaux in France. Discovered in 1940, it was opened to the public in 1948 and up to 100,000 visitors per year entered the cave to view the magnificent paleolithic paintings. Over the years, several species of fungi, algae, and mold have been transferred from visitors or equipment to the atmosphere of the cave and consequently to the cave walls and paintings. In addition, lint and other organic materials are shed by visitors as they move through the cave environment. Lint, dead skin cells, and other organic materials act as a food source for microorganisms (Jablonsky et al. 1993).

By 1963 changes of airflow, relative humidity, and aggressive growth of microorganisms ultimately lead to the closure of the cave to general visitation, and a replica of a portion of the cave was created nearby. The lessons learned from this have lead to the closure of a number of painted caves to the general public. Some cave environments are so delicate that general visitation by the public will never be feasible without significant detriment to the resource (Bradshaw Foundation n.d.). Conversely, caves such as the World Heritage Site of Sterkfontein which are devoid of significant rock art are routinely visited without damage to the resources which, in this case, are remains of ancient hominids (UNESCO Cradle of Humanity n.d.).

A successful monitoring program requires a significant commitment of both time and money. Many monitoring programs are managed by tribal, state, or national entities where personnel and budget constraints may curtail or even eliminate a monitoring program. A successful monitoring program will identify goals, possible impacts, and treatments, develop appropriate forms for recording conditions, and identify standard operating procedures. Baseline and routine monitoring procedures will be established and documented. There must be written protocols for the use of electronic equipment (digital cameras and global positioning units) to assure the uniform and consistent acquisition and management of data.

The proliferation of devices such as smartphones and electronic tablets makes monitoring information easier to acquire, and these data can often be imported directly into existing programs and files. Regardless of how the data are acquired, they should be backed up on a routine basis and a copy of all data should be stored off-site. One new feature of the Internet is the concept of the "cloud" which allows data to be stored on an external server on the Internet. Authorized personnel can then retrieve and edit these data. Since the software used to manage data will probably be revised and updated over time, the data must also be kept up-to-date. Standard off-the-shelf software programs should be used to insure a smooth transition in the event key personnel are moved or new computer systems are acquired.

Cross-References

- ▶ Atlantic Ocean: Maritime Archaeology
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Bradshaw Foundation. n.d. Available at: http://www.bradshawfoundation.com/lascaux/index.php (accessed 15 August 2012).

Department of the Army U.S. Army Corps of Engineers. 2009. *Best practices for archaeological site monitoring.* Public Works Technical Bulletin 200-1-60. Washington, DC: U.S. Army Corps of Engineers. Available at: http://www.wbdg.org/ccb/ARMYCOE/PWTB/pwtb_200_1_60.pdf (accessed 11 August 2012).

Hardesty, D.L., and B. Little. 2000. *Assessing site significance: A guide for archaeologists and historians*. Walnut Creek: AltaMira Press.

Jablonsky, P., S. Kraemer, and B. Yett. 1993. Lint in caves. In *1993 national cave management symposium proceedings, Carlsbad, New Mexico, October 27-30, 1993*, ed. D.L. Pate, 73–81. Huntsville: National Speleological Society.

King, T.F. 2000. *Federal planning and historic places: The section 106 process*. Walnut Creek: AltaMira Press.

National Park Service. 1983. Secretary of the interior's standards and guidelines for archaeology and historic preservation (48 FR 44716). Available at: http://www.nps.gov/history/local-law/arch_stnds_0.htm (accessed 4 August 2012).

National Park Service. 2002. *How to apply the national register criteria for evaluation*. National Register Bulletin 15. Washington, DC: U.S. Department of the Interior, National Park Service.

New Mexico Historic Division. 2007. Available at: http://www.nmhistoricpreservation.org/programs/sitewatch.html (accessed 16 August 2012).

UNESCO. n.d. Cultural landscape and archaeological remains of the Bamiyan Valley. Available at: http://whc.unesco.org/en/list/208 (accessed 13 July 2012).

UNESCO Cradle of Humanity. n.d. Available at: http://whc.unesco.org/en/list/915 (accessed 5 August 2012).

UNESCO World Heritage List. n.d. Available at: http://whc.unesco.org/en/list (accessed 15 August 2012).

Wildesen, L.E. 1982. The study of impacts on archaeological sites. In *Advances in archaeological method and theory*, ed. M.B. Schiffer, vol. 5, 51–96. New York: Academic.

Wood, W.R., and D.L. Johnson. 1978. A survey of disturbance processes in archaeological site formation. In *Advances in archaeological method and theory*, ed. M.B. Schiffer, vol. 1, 315–381. New York: Academic.

Further Reading

Jones, K.L. 2007. *Caring for archaeological sites: Practical guidelines for protecting and managing archaeological sites in New Zealand*. Wellington: Department of Conservation.

Kelly, S. 2007. *Developing and implementing archeological site stewardship programs*. Technical Brief 22. Washington, DC: U.S. Department of the Interior, National Park Service. Available at: http://www.nps.gov/archeology/pubs/techBr/tch22.htm (accessed 9 September 2012).

Society for American Archaeology. 2004. Professional standards for the determination of archaeological value. Available at: http://www.saa.org/Portals/0/SAA/GovernmentAffairs/ARPAstandards.pdf (accessed 12 September 2012).

Walton, A. 2003. *Methods for monitoring the condition of historic places*. Department of Conservation Technical series 27. Wellington: Department of Conservation.

Norms of Quito (1967)

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Introduction

The document known as Norms of Quito is the outcome of an experts meeting convened by the Organization of American States (OAS) between 29 November and 2 December 1967, held in the capital city of Ecuador, to discuss on the preservation and utilization of monuments and sites of artistic and historic values of the Americas, especially those located in Latin America. Since the document can be considered a milestone in the evolution of the theory and practice of heritage conservation, the central purpose of these notes is to highlight the main aspects introduced and developed in the Norms of Quito. In order to better understand its significance, it is necessary to shortly explain the context in which it was conceived, both in terms of the situation in the Americas and in the field of monument conservation and restoration.

Definition and Key Issues

The Organization of American States was created in 1948; among other purposes, it seeks to promote social and economic development, fostering dialogue and strong relationship among the countries of the Americas. In 1961 the USA launched

the program Alliance for Progress with the aim of canalizing the economic and social assistance of the country to Latin America. One of the main meetings promoted by OAS over that period was held in Punta del Este, Uruguay, in April 1967. The final document stresses the compromise of reinforcing the objectives of the Alliance for Progress and, among other issues, the economic integration and industrial development of Latin America, the multinational action for infrastructure projects, and the educational, scientific, and technological development. Among the aims of education, it is explicitly cited to create or reinforce the services of conservation of the cultural heritage. In this framework, it is possible to state that the Norms of Quito are a typical product of the period; the idea of economic and social development was crucial at that time; the document places cultural heritage as a resource to reach that goal.

Up to the 1960s, just a few international meetings on conservation of monuments and sites had been held. The first international document on heritage conservation is the Athens Charter of 1931; in 1964, a second International Congress of Architects and Technicians of Historic Monuments was held in Venice. The outcome of that meeting is the International Charter for the Conservation and Restoration of Monuments and Sites, known as the Venice Charter, which sets out doctrinaire and theoretical principles that guided technical interventions over the last 50 years. Another result of the Venice meeting was the foundation, 1 year later, of the International Council on Monuments and Sites (ICOMOS), the main worldwide non-governmental organization which deals with heritage protection and conservation.

The Venice Charter, one of the milestones in the evolution of the theory of conservation and restoration, is a short text elaborated by experts and addressed especially to experts. The document of Quito completes the ethical contents of the Venice Charter with operational principles oriented to the utilization and enhancement of monuments and sites of historic, archaeological, and artistic values. Maybe the most important conceptual idea is that monuments and sites constitute economic resources in the same sense as the natural wealth of the country, and they can become therefore instruments for development and progress. The document introduces a series of concepts that anticipate the idea of "integrated conservation" that would appear in the 1970s: not only technical aspects are considered but also economic, social, juridical, and administrative. The necessity of integrating conservation of monuments and sites in the framework of national territorial planning and the active participation of communities are stressed. In this sense, it is a document addressed to a wider audience than the Venice Charter and, especially, to decision-makers related to public policies, planning, and economic development.

The idea of utilization of monuments and sites had been cited in the Venice Charter when setting out that "the conservation of monuments is always facilitated by making use of them for some socially useful purpose." The Norms of Quito further explores this aspect and makes usability of cultural heritage as one of the main topics of reflection. Monuments and sites must fulfill a social function. The idea of "enhancing" is introduced in the sense of making maximum use of existing resources; the proposal is incorporating economic potential, "making an exploited resource productive," by a process that enhances its historic or artistic significance and "raises it from exclusive domain of erudite minorities to the awareness and enjoyment of the masses."

One of the main sections of the document is dedicated to monuments and sites as tourist attractions. Even if there were some previous documents that dealt with the relationship between cultural heritage and tourism, the Norms of Quito anticipate one of the main issues that arouse in the field of heritage conservation and management over the end of the twentieth and the beginning of the twenty-first centuries, when tourism appears as an extraordinary economical force that has both positive and negative impacts on cultural assets. The document of Quito establishes that tourism can contribute to raise awareness on the importance and national significance of monuments; together with adequate restoration and

maintenance, infrastructure works are also required to complete the travel plant of a region.

Current Debates

Forty-five years after the meeting of Quito, the situation of the countries of the Americas, the evolution of theory and practice of heritage conservation and management, and the very concept of cultural heritage have considerably changed. It does not mean, nevertheless, that the Norms of Quito should be considered only a historic document, a step in the evolution. Some of the issues introduced in 1967 are still a matter of reflection and debate; some of the situations regarding the lack of adequate protection or management of cultural heritage can still be observed, not only in Latin America but also in other regions of the world. The relationship between cultural heritage and sustainable development is at the center of the current debate and was proposed by UNESCO for the commemoration of the 40th anniversary of the World Heritage Convention in 2012. When reading the Norms of Quito today, it becomes evident that, although the document was conceived taking into account especially the situation of the Latin American countries, the approach and principles can be applied to different geo-cultural contexts and most of them are still valid. It is a document that can be revisited because it is still a source of inspiration for reflection on how to adequately manage cultural heritage.

Cross-References

- ► Charter for the Conservation of Historic Towns and Urban Areas (Washington 1987)
- ► International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

Further Reading

International Charter for the Conservation and Restoration of Monuments and Sites (The Venice Charter). 1964. Available at http://www.icomos.org/en/charters-and-texts.

OAS. 1967. Declaracaión de los Presidentes de América. Reunión de Jefes de Estado Americanos. Punta del Este, Uruguay, 12 al 14 de abril de 1967. Available at http://www.summit-americas.org/declaracion%20presidentes-1967-span.htm.

The Norms of Quito, 1967. Available at http://www.icomos.org/en/charters-and-texts

North Africa, Roman

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Introduction

North Africa was a remarkably prosperous territory throughout its ancient history and under Roman rule achieved a level of affluence to which the physical remains attest. It was the birthplace of the Severan dynasty (late second to third centuries CE) and the home of such literati as Terence, Apuleius, Tertullian, and St. Augustine. It made significant contributions to the agricultural wealth of the Roman Empire and had thriving ceramic and mosaic industries. By the second century CE, the region counted over 600 cities, many of which contained striking examples of monumental architecture.

The French were the first to excavate the region following their invasion of Morocco, Algeria, and Tunisia in the nineteenth century; they dominated all fields of North African study well into the twentieth century. The Italians have imparted a similar colonial legacy in Libya, where they continue to be the primary excavators. Only after the Second World War did other international groups become involved, in particular the British, Canadians, Americans, and, since the 1970s, Maghrebian scholars.

There were two broad ethnic groups by the time of Roman occupation: those whom the Greek sources called Libyans (and whose descendants modern historians call Berbers) and the Carthaginians, or western Phoenicians, whom the Romans called *Poenici*. The Libyans were the earlier inhabitants: though their precise origin

is uncertain, it seems that they migrated westward from the Egyptian Sahara and occupied much of the region by at least the second millennium BCE. Centuries later, the Libyans were widely dispersed and had developed into a number of different peoples with their own regional traditions and dialects. Chief among them were the *Mauri* of Morocco and western Algeria, the *Numidae* of the Tell in northwestern Tunisia and northeastern Algeria, the *Gaetuli* of the coastal hinterland between the Atlantic coast and the Gulf of Syrtes, and the *Garamantes* of the Libyan pre-desert. Ancient sources made reference to a number of other tribes and subtribes based on geographical, ethnic, cultural, political, and linguistic grounds, but these are often vague and conflicting. Nonetheless, it seems that the *Mauri*, *Numidae*, *Gaetuli*, and *Garamantes* were confederations at the top of the tribal hierarchy, made up of conglomerates of various tribes and subtribes (Fig. 1).

Definition

Roman North Africa refers to the northwestern region of the continent that was ruled by the Romans as a series of provinces for over 500 years. Roman occupation began after the destruction of Carthage in 146 BCE and the subsequent annexation of its territory as the province of *Africa Vetus*, in modern Tunisia. At its greatest extent, in the third century CE, it occupied the littoral plain north of the Sahara, between the Atlas Mountains in the west and the Altars of Philainos on the Gulf of Syrtis in the east.

Historical Background

Sometime in the first half of the first millennium BCE, the Phoenicians founded a series of trading colonies along the coast of North Africa, the most important of which was Carthage. Their primary interest in the area, at least initially, was directed toward western Mediterranean trade, rather than the establishment of settlement colonies and the development of African hinterland. The Phoenicians established a number of other trading posts throughout the western Mediterranean, namely, Spain, Sardinia, Sicily, and Malta, to achieve these same ends. It was not until the fifth century BCE, after defeat by the Greeks in Sicily and victory over the Libyans in northeastern Tunisia, that Carthage turned its attention inland, in

North Africa, Roman, Fig. 1 Distribution map of peoples in North Africa (Law 1978a: 142, Fig. 22). (Copyright of Cambridge University Press 1978. Reprinted with the permission of Cambridge University Press)

particular, toward the fertile Cape Bon peninsula. Here, Carthage developed a number of large estates that produced a variety of cash crops; this area increasingly became the chief focus of economic and political interest in the third century BCE as Carthage lost control of the western Mediterranean in the Punic Wars (264–146 BCE) with Rome.

The First Punic War (264–241 BCE) was the first of three wars that witnessed the increasing involvement of Rome in the political, economic, and social affairs of North Africa, which the Roman historians Polybius, Livy, and Diodorus Siculus describe. Interactions between Rome and Carthage during the fifth and fourth centuries BCE were generally limited to a series of treaties detailing trading rights in the western Mediterranean and, in the third century BCE, an alliance to oust King Pyrrhus of Epirus from Sicily. By this time, Rome had consolidated her power over southern Italy and was increasingly concerned over Carthaginian involvement in Sicily. War broke out between them over control of the island, at the end of which the Romans had succeeded in driving out the Carthaginians, while forcing them to pay heavy indemnities.

The loss of Sicily, and subsequently Sardinia, compelled Carthage to seek new sources of capital in Spain. This proved to be a successful strategy, and Carthage, under the leadership of the Barcids, gained considerable wealth and manpower from this new territory. This was a source of alarm for Rome, who established a treaty with Carthage in 220 BCE limiting Carthaginian expansion to the river Ebro in Spain. Rome, moreover, had formed an alliance with a town south of the Ebro, Saguntum, which lay within Carthaginian limits. When Hannibal besieged the town in 218 BCE, the result was a renewed conflict between Rome and Carthage, the Second Punic War (218–201 BCE). Despite a series of early victories, the Carthaginians were defeated by a Roman invasion of North Africa. Carthage had now lost Spain and a number of African territories, was forbidden to wage war without the permission of Rome, compelled to assist with Roman wars, and forced to pay an annual indemnity.

The terms of peace between Rome and Carthage also granted to Masinissa (c. 240 or 238 to c. 148 BCE), king of the *Massylii* and Roman ally, the restoration of all lands ever belonging to him or his ancestors. Whether these lands comprised the territory surrounding Carthage or not, Masinissa nonetheless began a gradual encroachment of Carthaginian territory. Carthage was not permitted to declare war according to the terms of the treaty, and Rome elected not to intervene. The subsequent outbreak of war between Carthage and Masinissa in 150 BCE constituted a breach of the treaty, and the following year, Rome declared war on Carthage. This engagement was the Third Punic War (149–146 BCE), which resulted in the destruction of Carthage and the annexation of its territory as the Roman province of Africa.

The nature of Roman involvement in the area for the next two centuries was sporadic and military. In 111 BCE, Rome declared war on Jugurtha, a descendant of Masinissa, when a struggle for the Numidian throne led him to kill a number of Italian settlers. Following his defeat, Rome established a series of client kings, who were variously involved in the civil wars between Marius and Sulla and subsequently Caesar and Pompey. Caesar's victory in 46 BCE brought an end to the civil war and much of the Numidian kingdom. The territory of North Africa at this time was reorganized: the original African province was now called *Africa Vetus* and the new annexation, *Africa Nova*. To the west, Octavian annexed Mauretania in 33 BCE and subsequently reestablished it as a client kingdom; in 29 BCE, he sent a *deductio* of colonists to Carthage and by 27 BCE had united *Africa Vetus* and *Africa Nova* as *Africa Proconsularis*. The late first century BCE to early first century CE witnessed a number of revolts in the pre-desert areas that resulted in the permanent installation of the Third Augustan Legion in southern Numidia and a second annexation of Mauretania in 40 CE.

At this point, North Africa was fully absorbed into the Roman Empire, and its administration changed accordingly. A *proconsul* governed *Africa Proconsularis*, the most important,

wealthy, and urbanized province of the region, as a senatorial province. Its territory included much of Tunisia, eastern Algeria, and the littoral of western Libya (later known as Tripolitania). A legate appointed by the emperor, however, controlled the legion stationed in the Algerian portion of the province nearly independently. *Mauretania* was administered by equestrian *procuratores* as two separate provinces, *Mauretania Caesariensis* in the east and *Mauretania Tingitana* in the west.

There was relatively little military presence in the provinces during the first two centuries CE. The Third Augustan legion, which consisted of approximately 5,000 legionaries and 15,000–20,000 auxiliaries, occupied all 110,000 square miles of the region. Half of these were stationed in *Mauretania Tingitana*, conversely one of the most heavily militarized provinces. The other half were stationed in southern Numidia, along the *limes* (frontier) of *Mauretania Caesariensis* and Tripolitania, first in Ammaedara, then Theveste, and, by the beginning of the second century, Lambaesis. These areas were also the location of a number of veteran colonies, particularly in southeastern Numidia, whose inhabitants remained culturally distinct from the majority of the indigenous population.

Apart from a few cities founded by Romans, the majority were of Punic and Libyan origin. The lowest ranking were the peregrine *civitates*, non-citizen communities that were recognized by Rome as self-governing and thus retained their pre-Roman magistrates, *sufetes*. Leading inhabitants often petitioned for these communities to become *municipia*, which adopted Roman constitutions and whose senior magistrates were granted Roman citizenship. The highest-ranking settlements were the *coloniae*, all of whose freeborn residents obtained Roman citizenship, whether or not any Roman colonists had ever settled there.

Administration of these settlements was typically undertaken by local city magistrates, and in communities that adopted Roman styles of government, the *decuriones* were chiefly responsible. They were involved in the collection of taxes, the handling of local law courts, and the construction and maintenance of public buildings; they also comprised the local city council (*ordo*) in each community. It was under their direction that North African cities developed a characteristically Roman appearance: *fora*, theaters, circuses, baths, temples, and amphitheaters were erected in most cities from the late first to early third centuries CE. The decurial office became increasingly prestigious and lucrative, since it offered lower ranking magistrates and wealthy North Africans the opportunity to achieve the authority, distinction, and recognition with which they were able to rise in the imperial administration.

For Rome, the chief objective of these magistrates and their cities was contribution to the *annona* in the form of taxes paid in-kind. These primarily consisted of agricultural foodstuffs: grain, which by the mid-first century furnished two-thirds of Rome's yearly grain supply, and olive oil, initially from Tripolitania, and in the late-second-century Tunisia as well. To achieve these ends, land was farmed intensively and the pre-desert areas heavily irrigated. Much of this land consisted of imperial estates leased out to private individuals, typically senators, under long-term leases. Free peasants farmed the land as sharecroppers on behalf of their landlords, and in the second century CE, the imperial government offered incentives that promoted not only increased production but also stability in tenure.

North Africa continued to prosper under these conditions well into the early third century CE. Cities grew in size and number: by this time there were 500–600 cities, 200 of which were located in the fertile areas of northern Tunisia. Agricultural production of grain and olive oil spread into the pre-desert areas to satisfy demand; on a smaller scale, the ceramic, textile, and quarrying industries increased. A number of the local elite, strengthened by their newfound wealth, had entered into the imperial administration. Many became senators and acted as patrons of their native cities, petitioning to raise the status from *municipium* to *colonia*. These kinds of developments accelerated during the reign of Lucius Septimius Severus (193–211 CE), the founder of the Severan dynasty of Roman emperors and a native of Lepcis Magna. Under his rule many

North African communities were given municipal rights; to his hometown he granted the highest possible status for a provincial city, that of *ius Italicum*, which exempted it from certain forms of taxation. The province of *Numidia* was created from the southeastern region of Algeria and populated by the legion and veteran colonies.

A rebellion in 235 CE brought this prosperity to an end. The legions stationed in Pannonia had murdered the last of the Severans and proclaimed their commander, Maximinus Thrax, emperor. As a reward for their loyalty, Maximinus doubled the soldiers' pay and raised taxes in order to cover the costs. These exactions were particularly heavy in *Africa Proconsularis*, and in 238 CE, a group of landowners there murdered the *procurator* and proclaimed their *proconsul* Gordian emperor in revolt. The Numidian-based legion remained loyal to Maximinus, however, and ensuing conflict between the two groups resulted in the death of Gordian, his son, many of their supporters, and a number of the landowning elite. The next 50 years were marked by a succession of soldier emperors whose rule weakened North Africa, particularly at its borders. The dissolution of the Third Augustan Legion in 238 CE left the provinces largely defenseless to a series of attacks by Libyan tribes, which, despite the legion's restitution in 253 CE, resulted in the abandonment of *Mauretania Tingitana* by the end of the century. There is little evidence of public building at this time, and what did occur appears to have been the initiative of emperors or imperial governors, not private individuals. The ceramic industry was likewise in a state of flux: production of Tunisian fineware, once common throughout Italy, ceased, but other centers of production arose.

The rule of Diocletian (284–305 CE) resolved North Africa's third-century crisis and revised the organization and administration of the provinces. The region was first contracted: following the outbreak of warfare in southern *Mauretania Tingitana*, the province was largely abandoned and what remained was left to Spain. The remaining provinces were subdivided: *Mauretania Caesariensis* became *Mauretania Sitifensis* and *Mauretania Caesariensis*; *Numidia* was divided between *Numidia Cirtensis* in the north and *Militiana* in the south, only to be reunited in 314 CE; *Africa Proconsularis* became *Zeugitana* in the north, *Byzacena* in the south, and *Tripolitania* in western Libya. The provinces were then brought together under imperial control and formed the *dioecesis Africae*. Governors of senatorial rank continued to supervise the proconsular provinces, which initially included *Zeugitana* only but later the reunited *Numidia* (c. 320 CE) and *Byzacena* (c. 340 CE). The other provinces were governed by a *vicarius*, an official of equestrian rank with a general supervisory role, who was answerable to the emperor.

The reforms of Diocletian initially left the armies of North Africa under the control of *praesides*, provincial governors of equestrian rank, who were in turn supervised by the *vicarius*. By the mid-fourth century CE, however, the civil and military functions of these governors were increasingly separated, and control of the armed forces became the responsibility of military specialists, *duces* and *comites* (dukes and counts), who were often of equestrian rank. The *praesides* remained the civilian governors of the provinces without proconsular rank.

The increasing centralization of power that occurred in the fourth and early fifth centuries CE brought with it the growth of an imperial bureaucracy that in many ways supplanted the judicial, financial, and administrative duties of local city magistrates. In particular, imperial officials were now responsible for the assessment and collection of taxes, a lucrative job that allowed its officers to finance public building projects. There were approximately 20,000 open positions in the imperial administration, many of which were short-term and granted senatorial rank to its officers; as a result of which, participation in the imperial bureaucracy was not only desired but required for the ambitious local elite. Nevertheless, the cities of North Africa continued to prosper, since many of these new senators retained close ties with their home communities. Under their jurisdiction many civic buildings were renovated, including *fora*, amphitheaters, bathhouses, and theaters. Moreover, since these new senators

were no longer required to own land in Italy, many began inhabiting their landed estates; a large number of villas with elaborate decoration dominate the coast and country of North Africa during this period. Only the far western and eastern portions of North Africa seem to have suffered at this time: Volubilis in *Mauretania Tingitana* was no longer part of the empire, and Lepcis Magna was subject to a number of attacks by Libyan tribes from which it never recovered.

The Christian community of North Africa grew significantly over the course of the second and third centuries CE but emerged in the early fourth as a substantial and divided one. The Great Persecution of 303 CE, issued by Diocletian, led a number of clergy members to hand over church scriptures to their city officials. These men became known as *traditores* and were required to undergo penance and a second baptism before readmission into the church. Moreover, their previous sacraments were rendered invalid. Thus, when, in 311 CE, a new bishop of Carthage, Caecilianus, was ordained without the consultation of the Numidian bishops, the latter claimed that Caecilianus was ordained by a *traditor* and his appointment invalid. The Numidian bishops, moreover, elected their own bishop of Carthage, first Maiorinus, then Donatus, who gave his name to the rival sect.

There now existed two opposing churches in Africa, the Catholics and the so-called Donatists, which created a schism that lasted until the early fifth century CE. During this time both churches maintained a separate administration, ordained a separate bishop, and upheld different policies, including those on the redemption of the *traditores*. Although church councils, official investigations, and the imperial government supported the Catholics, the Donatists continued to expand, particularly in the inland regions of *Africa*, *Byzacena*, and *Numidia*. Persecutions of the Donatists were sporadic and did nothing to quell the movement; the exile of Donatus in 355 CE only temporarily slowed Donatist growth, and by the late fourth century, the church had more than 300 bishops, support of most rural populations, and fidelity of many in the towns. By 420 CE, however, the Donatist church was more or less defeated when the Catholic church successfully implicated the Donatists in a series of military revolts and the imperial government declared Donatism heresy (405 CE), even illegal (in 411 CE). Both churches were to be united, Donatist clergy exiled, Donatists fined, and their property confiscated.

The Vandal invasion of 429 CE, however, brought an end to this religious conflict as well as Roman rule in North Africa. Over the course of the next 10 years, the Vandals took control of *Proconsularis*, *Byzacena*, and eastern *Numidia*; Carthage fell in 439 CE. Western *Numidia*, *Tripolitania*, and the *Mauretania* were occupied by 455 CE. The Vandals confiscated properties throughout *Proconsularis*, exiled or enslaved their landowners (of whom a large number were senators and other imperial officials), and distributed the land to Vandal followers. In the remaining provinces, landowners could retain their estates so long as they paid taxes. By the end of the fifth century CE, the Vandal kings, in an attempt to make Arian Christianity the official religion, exiled Catholic and Donatist bishops.

Despite changes in government, the African provinces prospered under Vandal rule. The region was now governed by a king to whom *comites* (companions), royal notaries, and Arian bishops were answerable, but civilian and municipal administration functioned without substantial change. The end of the *annona* to Italy and a flourishing in the Tunisian fineware industry brought a significant amount of wealth to the region. Exports of North African amphorae increased throughout the Mediterranean. Baths and churches continued to be constructed and maintained; a wide array of literary works were being produced.

Economic and political activity at this time was concentrated in towns and other rural settlements, a pattern mirrored in the increasing ruralization of urban centers. There is no visible decrease in the population of towns and rural settlements, but a number of cities appear to have suffered significant contraction and, in the case of Lepcis Magna, abandonment. In the cities, *fora*, temples, and

theaters were no longer used for their original purposes; some *fora* even became areas for pressing olives. The Roman administration gradually became decentralized and was eventually superseded by the authority of the tribes. Indeed, the most prosperous regions were those that depended less on interactions with the Mediterranean world and more on those with Romano-Libyan tribes. These Romano-Libyans, who came to control much of southern *Numidia* and both *Mauretania* by the early sixth century, were contributors to a new regional trade based on the intensive agricultural cultivation of their territory.

The Byzantine invasion of 533 CE removed Vandal kings from the seat of authority in North Africa, replacing them with the Byzantine emperor. A brief period of prosperity followed, during which time the emperor founded two new cities and began building campaigns in existing ones. Catholic bishops recovered their positions and privileges, churches were reconstructed and refurbished, and certain estates were returned to their Roman landowners.

The situation reversed in the mid-sixth century CE, due to a succession of natural, political, and religious crises. An outbreak of plague in 542 CE was followed shortly thereafter by an agricultural disaster; two years later, a Libyan revolt spread throughout *Tripolitania*, *Byzacena*, and southern *Numidia*; and, in the same year, a new schism divided the churches of Africa, Constantinople, and Rome. Similar disruptions are visible in the economy and archaeology of the region. The production of fineware decreased substantially and, in Tunisia and eastern Algeria, at least, was discontinued. Exports from North Africa became rare, and what little trade remained was directed eastward. Settlement patterns changed significantly: in the cities, amphitheaters and circuses were no longer used, luxury villas were transformed into farms, and cemeteries replaced urban centers. Forts and Christian basilicas were the only new constructions but were more Byzantine in style. By the end of the sixth century, however, a series of attacks led by the Arabs effectively brought an end to whatever traces of *Romanitas* and Christianity remained and introduced Islam to the area.

Key Issues/Current Debates

The mechanisms of imperialism and approaches to identity are at the center of current scholarly debates, concerning what it meant to be Roman in North Africa. Cultural exchange is no longer viewed as the active enforcement of the dominant power and passive acceptance (or aggressive resistance) of the subject; rather, it is generally accepted as the reciprocal transfer of culture and ideas, which varies according to region. The number of Roman public buildings and inscriptions throughout urban and rural settlements in North Africa attests to enthusiastic support of Roman culture, but the contemporaneous presence of Neo-Punic inscriptions and private monuments in indigenous styles points to the survival of local traditions (Mattingly 1995, 2004; Fentress 2006).

This then poses the questions of who engaged in these activities, what they stood to gain, and why? It is generally agreed that, at least in other provinces of the empire, the greatest level of compliance and adoption took place among the highest levels of society, that is, the ruling elite. The local, provincial elites were active agents in the adoption of Roman culture, while the lower classes became involved through emulation of their superiors. The subject remains understudied in North Africa, however (Mattingly 2011). Some studies accept the outright Romanization of the area (Picard 1990), while others see the provincial elite as recipients (Thébert 1978) or resistors (Bénabou 1976). The extent to which the lower classes participated, particularly in rural areas, is also uncertain. Whatever the case, it is important to allow for significant variability within and between different groups and in different regions (Mattingly 2011).

The study of economic history occupies a central position in current scholarship, questioning the extent to which Roman North Africa contributed to the economy of the empire (Wilson 2002; Dossey 2010). It also asks how the economy operated on local, provincial, and empire-wide levels, what were the primary industries, and who were the proponents of this activity. The Roman North African economy seems to have

been largely agricultural: Rome, in the early empire, formulated an economic policy in order to exploit the resources of the provinces for the long-term needs of the empire. In *Africa Proconsularis*, the imperial administration promoted intensive agricultural cultivation by leasing out imperial land to small-scale farmers, offering incentives for them to farm as intensively as possible, and overseeing their management through a group of middlemen (Kehoe 1988). More recently, scholars have examined the contributions of economies beyond agriculture, including ceramic (Hayes 1972; Carandini 1983; Peña 1998), olive oil (Mattingly 1985), and textile industries (Wilson 2001). While the presence of African Red Slip ware and amphorae throughout the Mediterranean, in addition to the number of olive presses throughout the African hinterland, suggests a highly diversified and vibrant local and empire-wide economy, it remains uncertain to what degree this matched the importance of agriculture.

The diversity of funerary architecture and its occupation of the Roman North African landscape have long attracted the attention of scholars. A number of tomb types have been identified and classified throughout Africa's long history, including *haouanet* (rock-cut tombs), *cupulae* (barrel-vaulted monoliths), and tower mausolea. Recently, however, scholars have focused on how these tombs and their associated rituals were connected to particular landscapes (Stone and Stirling 2007). It examines how individuals incorporated both local environment and funerary monument to communicate ideas of property rights, identity, and ritual behavior. What is more, the study of funerary rituals and monuments offers one of the best means through which to study displays of cultural identity, particularly in a region such as North Africa, which witnessed successive changes in dominant powers.

International Perspectives

The majority of research undertaken on the Roman history and archaeology of North Africa has been from a distinctly colonialist perspective (Mattingly 2011). From the French and Italian excavations of the nineteenth century to the more recent work of American and British scholars, outsiders have historically determined the region's Roman past. This is due in large part to the French and Italian appropriation of Roman history as their own; they believed themselves successors to this portion of the Roman Empire and even imitated imperial accomplishments. To that end, indigenous culture was discredited and viewed as a passive, if not rebellious, recipient of superior, foreign regimes (Gsell 1933; Munzi 2001). When Maghrebian scholars entered the discussion in the 1970s, they highlighted indigenous cultural (as opposed to military) resistance to Roman influence (Benabou 1976; Leveau 1978). While neither extreme is currently propounded, North African history continues to be approached primarily as a history of other peoples in the region (Punic, Roman, Vandal, Byzantine, Arab, and so on). Only very recently have scholars focused on the activities of the indigenous and nonelite peoples, which have revealed them as innovators of agricultural technology, agents in the economy, assimilators of Roman culture, and members of highly stratified social networks in their own right. While this research has made significant contributions to understanding North Africa's Roman history, it is necessary to pursue aspects of the Romano-African culture, in particular, and reintegrate them into the cultural heritage of Morocco, Tunisia, Algeria, and Libya (Mattingly 2011).

Future Directions

Of particular significance in future studies of Roman North Africa is the analysis of Roman imperialism and its effect on local, indigenous societies (Mattingly 2011). Rather than understand the empire simply from the "ruler and subject" point of view, this approach explores the various effects and experiences encountered at all levels of society. It questions the extent to which the imperial center is the agent of this change; likewise, it asks how subordinate

populations experienced empire and how this was manifest in their behavior and material culture. Cultural change, then, is viewed as the coexistence and exchange of values between indigenous cultures and prevailing power. It does not ignore the voices of the elite presented in contemporary literary sources, but supplements them, primarily through material culture, with the remaining subject population.

Postcolonial approaches to the study of Roman imperialism may have the most far-reaching impact in this field (Mattingly 2011). Postcolonialism, which concerns the effects of colonialism and colonization, has gained ground in historical research on empire from different periods and regions; it emphasizes the new identities created and negotiated both at the limits and in the center of empire. Given the abundance of archaeological evidence attesting to the activities of the elite (senatorial, provincial, and local), military communities, and subject peoples, Roman North Africa seems well suited to this approach. Likewise, the presence of contemporary Roman, Punic, and Libyan ethnicities (and combinations thereof) contributes to what must have been a fairly heterogeneous part of the empire.

Roman Africa is relevant to the field of economic studies, which is important for understanding the urbanization and functioning of the empire, in particular the study of commodities and their contribution to the imperial economy. Studies in the production and distribution of commodities, such as pottery, amphorae, olive oil, marble, mosaics, and textiles, have gone some way in illustrating the diversity of the Roman economy (though primarily agricultural) and the relationships between local, regional, and long-distance trade systems. Patterns of consumption are necessary, however, in order to better understand what proportion of the population benefitted from this economic production. In particular, analysis of patterns of consumption in rural and urban settings permits the identification of different settlement types; this, in turn, allows for diachronic comparison of settlements on a regional and empire-wide basis.

Cross-References

- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Economy, Roman
- ▶ Numismatics, Roman Imperial
- ▶ Urban Planning, Roman
- ▶ Western Roman Provinces, Archaeology of the

References

Benabou, M. 1976. *La résistance africaine à la romanisation*. Paris: François Maspero.

Carandini, A. 1983. Pottery and the African economy. In *Trade in the ancient economy*, ed. P. Garnsey, K. Hopkins, and C.R. Whittaker, 145–162. Berkeley: University of California Press.

Dossey, L. 2010. *Peasant and empire in Christian North Africa*. Berkeley: University of California Press.

Fage, J.D., ed. 1978. *The Cambridge history of Africa c. 500 BC – AD 1050*. Cambridge: Cambridge University Press.

Fentress, E. 2006. Romanizing the Berbers. *Past and Present* 190: 3–33.

Gsell, S. 1918/1929. *Histoire ancienne de l'Afrique du Nord*. Paris: Hachette.

Gsell, S. 1933. La Tripolitaine et le Sahara au III siècle de notre ère. *Mémoires de l'Institut National de France* 43: 149–166.

Hayes, J.W. 1972. *Late Roman pottery*. London: British School at Rome.

Kehoe, D. 1988. *The economics of agriculture on Roman imperial estates in North Africa*. Göttingen: Vanderhoeck & Ruprecht.

Leveau, P. 1978. La situation coloniale de l'Afrique romaine. *Annales ESC* 33: 89–92.

Mattingly, D.J. 1985. Olive oil production in Roman Tripolitania. In *Town and country in Roman Tripolitania*, ed. D.J. Buck and D.J. Mattingly, 27–46. Oxford: Oxford University Press.

Mattingly, D.J. 1995. *Tripolitania*. London: B.T. Batsford Limited.

Mattingly, D.J. 2004. Being Roman: Expressing identity in a provincial setting. *Journal of Roman Archaeology* 17: 5–25.

Mattingly, D.J. 2011. *Imperialism, power, and identity: Experiencing the Roman Empire*. Princeton: Princeton University Press.

Munzi, M. 2001. *L'Epica del ritorno. Archaeologia e politica nella Tripolitania Italiana*. Roma: L'Erma di Bretschneider.

Peña, J.T. 1998. The mobilization of state olive oil in Roman Africa: The evidence of late 4th-c. *ostraca* from Carthage. In *Carthage papers: The early colony's economy, water supply, a public bath, and the*

mobilization of state olive oil, ed. J.T. Peña, J.J. Rossiter, A.I. Wilson, C. Wells, M. Carroll, J. Freed, and D. Godden, 117–238. Portsmouth: Journal of Roman Archaeology.
Picard, G.-C. 1990. *La civilisation de l'Afrique romaine*. Paris: Études Augustiniennes.
Stone, D.L., and L.M. Stirling, eds. 2007. *Mortuary landscapes of North Africa*. Toronto: University of Toronto Press.
Thébert, Y. 1978. Romanisation et déromanisation. Histoire décolonisée ou histoire inversée. *Annales ESC* 33: 64–82.
Wilson, A. 2001. Timgad and tectile production. In *Economies beyond agriculture in the classical world*, ed. D.J. Mattingly and J. Salmon, 271–296. London: Routledge.
Wilson, A. 2002. Urban production in the Roman world: The view from North Africa. *Papers of the British School at Rome* 70: 231–273.

Further Reading

Cherry, D. 1998. *Frontier and society in Roman North Africa*. Oxford: Clarendon Press.
Frend, W.H.C. 1978. The Christian period in Mediterranean Africa, c. AD 200 to 700. In *The Cambridge history of Africa*, ed. J.D. Fage, 410–489. Cambridge: Cambridge University Press.
Law, R.C.C. 1978a. North African in the period of Phoenician and Greek colonization, c. 800 to 323 BC. In *The Cambridge history of Africa*, ed. J.D. Fage, 87–147. Cambridge: Cambridge University Press.
Law, R.C.C. 1978b. North Africa in the Hellenistic and Roman periods, 323 BC to AD 305. In *The Cambridge history of Africa*, ed. J.D. Fage, 148–209. Cambridge: Cambridge University Press.
Leppelley, C. 2001. *Aspects de l'Afrique romaine: Les cités, la vie rurale, le christianisme*. Bari: Edipuglia.
Raven, S. 1984. *Rome in Africa*. London: Longman.

North Africa: Historical Archaeology

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Introduction

The archaeological investigation of North Africa emerges in the late nineteenth and early twentieth centuries in coordination with European colonial projects across the region as part of the expansion of classical and Orientalist scholarship into the study of sites along the southern Mediterranean coast. French, German, and to some extent British and American expeditions dominated the countries of Morocco, Algeria, and Tunisia well into the postcolonial period, while Italian-led excavations proliferated in Libya. It has only been since the latter part of the twentieth century that the archaeological services of the various independent states have asserted local control over the archaeological record within their borders. The case of Libya is somewhat exceptional in the wake of decades-long sanctions that led to the near cessation of foreign missions to its many sites. Similarly political unrest in Algeria at times has drastically reduced the contributions of international teams. It is still too early to predict how the landscape for a renewed archaeological involvement in several of these countries will change following the protest movements which took place in various North African states in 2011–2012, some resulting in the ousting of long-held dictatorial regimes.

During the first century of scientific excavations, most work was concentrated on the classical period cities of the North African littoral. This is hardly unsurprising given the scholarly agenda of most Euro-American scholars for whom North Africa's importance in world history only begins largely as a result of the Phoenician and later Roman colonization which established an impressive network of roads and cities all along the southern rim of the Mediterranean. This process of urbanization, the establishment of far-flung trade networks, and later the workings of Roman imperialism often served as ideological support for the new European colonizers who sought to establish what they saw as a similar *missioncivilatrice* in the various regions of North Africa. That sentiment is neatly captured in an address to French army officers in Morocco in 1925 where one official advised them to let the indigenes know "that we Roman were here before the Arabs" (cited in MacKendric 1980: 319). Unsurprisingly under these ideological circumstances, archaeological work has concentrated most heavily on the great classical period cities

such as Carthage, Leptis Magna, Timgad, and Volubilis as a demonstration of the grandeur and accomplishments of a colonial settler society that had turned the region into an agriculturally productive, imperial engine. More recently archaeological work of the classical period has begun to examine the relationship of these colonial centers to a largely indigenous rural hinterland in an effort to understand the impact of Carthage, Rome, and Byzantium on the substrate "tribal" societies.

Despite the early emphasis placed on the classical period during European colonialism of North Africa, the early twentieth century saw some limited efforts to conduct archaeological research on the postclassical era particularly for the region's seventh-century transition from a Byzantine domain to one under Arabo-Islamic control. As with the work of classical period scholars, questions regarding the processes of urbanization and imperial settlement and control continued to dominate research programs. French archaeologists in particular were occupied with developing an ideal typical notion of the "Islamic city." Indeed, the cities of North Africa, both living and ruined, became the prototypes both for an essentialized Islamic period urbanism and notions of space as fixed by Islamic principles.

Definition

The geographical limits of North Africa defy precise demarcation but have largely been agreed upon to include the region stretching from the Atlantic coast of Morocco to the western desert of Egypt. It extends from the southern Mediterranean into the largely uninhabited zones of the Sahara desert. Demographically the vast majority of the peoples of this region were to be found either along the coast, where seasonal rains allow for reasonably predictable agricultural production, or in various mountain ranges that offer both protection and possibilities for animal husbandry, control of trade routes, and other economic opportunities related to natural resources. Additionally, small population pockets are to be found in a handful of oasis settlements. Traditionally, Egypt has not been included in the historical or archaeological study of North Africa, with early European scholars referring to the region as Barbary of Africa minor. It is somewhat complicated to justify this exclusion particularly given that various imperial polities that ruled the Nile valley also exerted control over parts of Cyrenaica, the modern-day eastern Libyan coast. Similarly, an oasis settlement such as Siwa in the Egyptian western desert, both historically and to the present day, has a much stronger cultural affinity toward the ethnic Berber groups of North Africa than they do with the peoples of the Nile. Early Islamic geographers themselves were in disagreement about the exclusion of Egypt and the nature of the region's eastern border, and even one scholar of the tenth century CE, al-Muqaddasi, proposed the inclusion of Sicily and Spain into what was termed in Arabic as *al-Maghrib* (lit. the west or where the sun sets).

North Africa is dominated by a climate marked by hot dry summers with wetter cooler conditions in the winter months. The fringes of the Sahara are significantly more arid, while areas such as the Atlas Mountains tend to be more temperate than on the coast. These weather patterns have allowed the region to sustain cereal cultivation since the Neolithic, though annual rainfall variations can often lead to disastrous results. The economy has witnessed diversification through a long tradition of sheep and goat pastoralism, while both herder and agricultural livelihoods have together lead to destruction to woodlands that were once part of the landscape. In many ways this region is not at all dissimilar to other parts of the Mediterranean, one reason why it may have been attractive to colonists from the Levant, Greece, Italy, and elsewhere.

Key Issues

Phoenician and Roman Eras

Archaeological evidence for major settlements is lacking prior to the founding of the many colonial emporia which were initiated with the establishment of Carthage by the Phoenicians early in the first millennium BCE. Historical evidence for the indigenous populations is limited to references in

ancient sources to groups lumped together with the ethic term Libyes, although the nomenclature for the territorial locations of a handful of tribal confederations survives. The contemporary term "Berber," which is used to refer to North Africans who do not associate themselves as Arabs, is itself a corruption of the Greek epithet *barbaroi*, meaning non-Greek speakers. It is important to note that the archaeological study of these indigenous groups, whether nomads or settled farmers, has been secondary in most cases to the study of those outsiders who would transform the region through urbanization and imperial politics. An important exception is the Garamantes, first mentioned in Book IV of Herodotus' *History* and whose society and its archaeological signatures have become of focus of much research in recent decades.

Cities dominate the focus of most archaeological research projects in North Africa, none more so than the seminal site of Carthage, which has been excavated since the nineteenth century and with major projects undertaken as part of a campaign to save the site in the 1970s and 1980s under the auspices of UNESCO. Such concerted attention to this principal seat of Punic control, which ruled over much of North Africa for more than half a millennium prior to its final conquest by Rome in 146 BCE, has allowed archaeologists to reveal most of the city's main features. The ruins of ancient Carthage which span from its Phoenician inception through to the end of Byzantine control in the late seventh century CE are located in what are today the suburbs of Tunis, the modern capital of Tunisia. Excavations have revealed much of the town's citadel, known as the Byrsa, though its earliest occupation levels have been largely truncated by the transformation of the area by Roman period engineers. Other areas of major study have focused on the port of Carthage, the key to the city's role as a major Mediterranean trading hub that vied with Rome for control of that sea. The city was served by two harbors, one that was devoted to the military and the other to commercial operations, demonstrating the dual nature of the social context in which its inhabitants lived. Of its major urban institutions perhaps the most intriguing is that of the tophet, or precinct of Tanit, a religious sanctuary in which the citizens were known to practice various forms of ritual human infant and animal sacrifice. This open-air enclosure delimited by a temenos wall was filled with centuries of cremated urn burials which were surmounted by variously decorated stone markers. Similar sanctuaries of the Punic culture have been excavated at various other North African sites and were in use even into the Christian era.

While Carthage was certainly the most famous of the Phoenician settlements, it was by no means the only one; rather it was the center of a far-flung network of ports all along the North African coast and beyond. Of these Kerkouane is perhaps the most well preserved and archaeologically best documented with two main periods of occupation that were interrupted by an invasion from Sicily and with the town abandoned at the start of the Punic Wars with Rome. This was a walled town with a system of wide streets laid out orthogonally. Near the center of the urban landscape was a large courtyard structure with stone benches that may have served as a temple for an unknown cult. The archaeological record also indicates that this was a center for the production of the much famed purple dye of the Phoenicians, owing to the large quantities of Murex shells recovered from an area of the site that appears to have been an industrial zone of kilns and workshops. Further east lay the province of Tripolitania which was colonized in the seventh century BCE, taking its name from the region's three main urban foundations: Labdah/Leptis Magna, Sabratha, and Trablus/Oea. The region west of Carthage as far as Tangiers and even beyond exhibits numerous Phoenician coastal settlements that appear at roughly equal intervals. Archaeologists, taking note of this apparent uniform spacing, have suggested that this was designed to provide ports at a distance of about one day's sail (c. 30–40 km). While suggestive of the possibility that first millennium BCE traders operated a system similar to that of *cabotage* (short coastal sailing and trading known through documentary evidence from the early modern period), the chronology of many sites suggests they were somewhat later than the height of Phoenician power in the region.

The Roman conquest of Carthage, resulting in the city's brutal destruction, would nevertheless maintain and indeed expand this urban network begun by the Phoenician colonists. The transition to Roman rule and the status of various parts of North Africa as either directly controlled provinces or client kingdoms have left substantial traces in the archaeological record. The degree to which the southern Mediterranean underwent a process of Romanization, an analytical term deeply contested among classical archaeologists for its ability to capture the nature of the cultural, political, and economic interactions that developed with the construction of the vast Roman Empire, remains at the center of much research for this period. The archaeological record of life in Roman North Africa provides us with a large volume of data regarding the transformation of the region into a granary of the empire, for the new municipal intuitions and urban amenities, as well as the system of defenses that sought to ensure the productivity of its land and the safety of its cities. A major force in these changes was the Roman army which was responsible for extensive public works. Across the region the archaeological record is still replete with evidence of the roads, aqueducts, fortresses, and walls which imperial forces put in place. Urban landscapes became filled with theaters, baths, temples, nymphaea, and with the coming of Christianity as a state sanctioned religion all manner of ecclesiastical structures. The security situation, which was largely designed to make nomads sedentary and thus lessen their threat to urban centers, was so successful at times as to allow some towns, such as Cuicul and Teuchira in Cyrenaica to do without defensive walls.

The city, however, was not the only beneficiary of Roman rule. Imperial estates abounded as well as the privately owned *latifundia* for which Roman Africa had become famous. Archaeological surveys have shown that large swaths of previously unproductive land came under cultivation in many areas due to extensive walled terracing which would fall into disrepair and neglect after Rome withdrew and the Vandals moved in. To a certain degree, this would be resuscitated as the region was reorganized as a province of Byzantium. This productive land was the basis for an economy that supported large numbers of wealthy landowners and entrepreneurs who had the wealth to build large private residences throughout the region. These manors and estates have received much attention by archaeologists and art historians alike for their numerous fine floor mosaics depicting many aspects of Roman life in the province. This visual culture has suggested not only the prosperity which many segments of the society enjoyed but also their close ties to Roman cultural practices, even when inscriptional evidence suggests that the patron was of Punic origin.

The Coming of Islam

North Africa's emergence in the late seventh century as part of *Dar al-Islam* (lit. the house of Islam) following the conquests of the Arab-Muslim armies was to signal a profound change in course for this region. Of the most important transformations that this area entertained were the migration of large number of Arabs and other Easterners and the establishment of Islam and the Arabic language as major cultural forces. These long-term processes that do not really begin until well into the tenth century and later have largely been ignored by archaeological research and left to scholars of the textual record. What can be stated is that for the indigenous Berber populations, their incorporation within the expanding Muslim world would have a far more profound effect on their politics and culture than what was experienced during previous imperial interactions with either Rome or Carthage. The archaeological record of both cities and other sites has demonstrated major shifts in the kinds of material culture, economic lifeways, as well as social relations within communities. More specifically archaeological work has demonstrated that new trade networks developed that linked North Africa with the wider Near East, West Africa, and beyond. This region became the conduit for the major supply of commodities such as gold, ivory, and labor that came from other parts of the African continent. The manufacturing centers in Egypt and Iraq would in turn supply the growing city states and minor principalities across

the *Maghrib* with luxury goods ranging from ceramics to new plant species originating from the Indian subcontinent. A good example of these interconnections and their material culture correlates can be found in the archaeology of the Moroccan site of Sijilmasa, a major caravan station for the gold trade.

The Orientalist notion of the quintessential "Islamic city" has been widely influential for much of the early archaeological work that analyzed the record of the Islamic periods in North Africa. In many ways this is a continuation of classical archaeology's fascination with urban landscapes and an effort to articulate an abrupt rupture between the periods of late antiquity and Islam. This project has become increasingly more nuanced in recent decades with work at a multitude of sites, including costal redoubts (*rabitat*, s. *ribat* in Arabic) such as Monastir and Sousse demonstrating elements of both continuity with the existing built environment and aspects of adaptation to changed political and cultural climates.

Questions of empire and imperial control continue to play a role in archaeological investigations as North Africa enters into the early modern period. Excavations at the site of Qsar es-Seghir in northern Morocco are an early example of global historical archaeology particularly as it relates to the development of the European colonial enterprise. In this case excavators revealed the impact of Portuguese colonial expansion beginning with Henry the Navigator in the fifteenth century. The project also initiated a regional archaeological survey that tackled questions of smaller scale urban settlement patterns that demonstrated the role of larger political forces and imperial integrations in shaping the organization of settlement hierarchies.

Future Directions

As the archaeology of North Africa enters the twenty-first century, it faces a number of uncertainties and challenges as well as opportunities. While much of the future of archaeology in this region will be shaped by the rapidly changing political climate and the amount of resources that governments and other funders are willing to expend on the rich heritage of their territories, there continues to be a strong local interest in studying the various pasts which the archaeological record can reveal. Despite this desire to sponsor archaeological work, many sites are threatened by rapid urban expansion, the consequences of political turmoil, worsening environmental conditions, and the general perception that the field of archaeology is less prestigious or lucrative than other professions and thus unattractive as a career option. Regardless, partnerships between local and foreign scholars continue to build on the work of previous generations often despite of a legacy of colonial and Orientalist attitudes that have guided much of that previous scholarship and practice in the field.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ North Africa, Roman
- ▶ West and Central Africa: Historical Archaeology

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Further Reading

Benco, N.L. 1987. *The early medieval pottery industry at al-Basra, Morocco*, BAR International series. Oxford: Archaeopress.

Boone, J., and N.L. Benco. 1999. Islamic settlement in North Africa and the Iberian Peninsula. *Annual Review of Anthropology* 28: 51–71.

Dunbabin, K.M.D. 1978. *The mosaics of Roman North Africa: Studies in iconography and patronage*, Oxford Monographs on Classical Archaeology. Oxford: Oxford University Press.

Ennahid, S. 2002. *Political economy and settlement systems of medieval northern Morocco: an archaeological-historical approach*, BAR International series 1059. Oxford: Archaeopress.

Hurst, H., and L. Stager. 1978. A metropolitan landscape: The late Punic port at Carthage. *World Archaeology* 9: 334–346.

Liverani, M. 2000. The Garamantes: A fresh approach. *Libyan Studies* 31: 17–28.

Manton, E.L. 1988. *Roman North Africa*. London: Seaby.

Mattingly, D.J. 1997. Imperialism and territory: Africa, a landscape of opportunity? In *Dialogues in Roman*

imperialism, Journal of Roman Archaeology Supplementary series 23, ed. D.J. Mattingly, 115–138. Portsmouth: Journal of Roman Archaeology.
Mattingly, D.J., ed. 2003. *The archaeology of Fazzan, volume 1: Synthesis*. London: The Society for Libyan Studies Monograph, and Socialist People's Libyan Arab Jamahariya Department of Antiquities.
Pedley, J.G. 1980. *New light on ancient Carthage: papers of a symposium*. Ann Arbor: University of Michigan Press.
Peña, J.T. 1998. *Carthage papers: The early colony's economy, water supply, a public bath, and the mobilization of state olive oil*, Journal of Roman Archaeology Supplementary series 28. Portsmouth: Journal of Roman Archaeology.
Redman, C.L. 1986. *Qsar es-Seghir: an archaeological view of medieval life*. Orlando: Academic Press.
Rind, M. 2009. *Römische Villen in Nordafrika: Untersuchungen zu Architektur und Wirtschaftsweise*, BAR International series. Oxford: Archaeopress.
Shaw, B.D. 1995. *Environment and society in Roman North Africa*. Aldershot: Variorum.
Van Dommelen, P. 1997. Colonial constructs: Colonialism and archaeology in the Mediterranean. *World Archaeology* 28: 305–323.

North America (USA and Canada): Museums

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Introduction

Museums of archaeology in North America include at least three distinct kinds of entities: (1) museums in the strict sense, combining maintenance and care for permanent archaeological collections with their public interpretation; (2) science or interpretive centers, which interpret archaeological knowledge and material evidence of the past but do not hold or curate permanent collections; and (3) repositories, which care for collections but do not embrace a public education or interpretive role.

Taken as a whole, museums play a crucial role both in preserving material evidence of humankind for the benefit of future generations and in interpreting that past for broad public audiences. Their potential to increase knowledge regarding the past is considerable – a survey in 2000 found that 88% of American adults had visited museums interpreting archaeological materials (Fig. 1). It is less clear that this potential has been fully realized; that same survey found that less than 10% reported learning about archaeology from those visits (Ramos and Duganne 2000).

Today there are some 34,000 museums in the USA and Canada, but the precise number holding archaeological collections, and the scale of those collections, is not known. By any measure, however, the scale is immense. In fiscal year 2019, estimates of US federal collections were more than 82 million objects, not including more than 52,000 linear feet of associated documentation and records (or the collections of the Smithsonian Institution). Harvard's Peabody Museum of Archaeology and Ethnography holds more than

North America (USA and Canada): Museums, Fig. 1 Museums can play a profound role in educating the public about both the past and its study, largely by allowing the public to engage with authentic objects and better understand their importance in archaeological inference. (Milwaukee Public Museum; Photo Alex W. Barker)

1.2 million catalogued objects and more than half a million photographic images, while the Canadian Museum of Civilization holds some three million objects.

This entry deals primarily with North American museums as archaeological institutions. For entries regarding museum representation and critical approaches to museum interpretation, see the entries "▶ Museums and the Distortion of Archaeology for Political Purposes" and "▶ Museums and Memory Experiences," in this encyclopedia.

Definition

Within the United States, museums are defined by statute as a public or private nonprofit agency or institution organized on a permanent basis for essentially educational or aesthetic purposes which, utilizing a professional staff, owns or utilizes tangible objects, cares for them, and exhibits them to the public on a regular basis. In Canada, museums are similarly defined as permanent, not-for-profit institutions that acquire, preserve, research, interpret, and exhibit the tangible and intangible evidence of society and nature, whose exhibits are regularly open to the general public. Both the American Alliance of Museums (AAM, until 2012 the American Association of Museums) and the Canadian Museums Association (CMA) broaden these definitions somewhat to include entities that do not manage collections (science centers), and within the USA in particular, there are a range of repositories which manage collections with limited or no public exhibition or interpretation.

Relatively few museums in the USA and Canada are dedicated exclusively to archaeology (Fig. 2). Some include ethnology and anthropology more broadly (e.g., the US National Museum of the American Indian, the Peabody Museum of Archaeology and Ethnology, the Arizona State Museum, or the Canadian Museum of Civilization), while others include archaeology within a broader set of disciplines within natural history (e.g., the American Museum of Natural History, the Smithsonian's National Museum of Natural History, the Field Museum of Natural History, the Denver Museum of Nature and Science, the Royal Alberta Museum, or the Natural History Museum of Los Angeles County) or general museums (e.g., the Glenbow Museum, the Royal Ontario Museum, or the Milwaukee Public Museum). More recently museums created and managed by Native communities have been developed (e.g., Alutiiq Museum and Heritage Center, Mashantucket Pequot Museum and Research Center, Ksan Historical Village and

North America (USA and Canada): Museums, Fig. 2 Yukon Beringia Interpretive Centre, a noncollecting institution, interprets the archaeology and paleoecology of the "land bridge" once connecting the Old and New worlds. (Photo by Hans-Jürgen Hübner, http://en.wikipedia.org/wiki/File:Whitehorse_entrance_Yukon_Beringia.JPG. GNU Free Documentation License)

Museum, Aanischaaukamikw Cree Cultural Institute, Huhugam Heritage Center) interpreting the past from the standpoint of indigenous communities.

Other museums (e.g., the Metropolitan Museum of Art, the Cleveland Museum of Art, or the Getty Museum and Villa) hold archaeological objects but manage and interpret them exclusively as works of art. Museum ethical standards, particularly within the USA, reflect a tension between these aesthetic vs. anthropological approaches, with museums managing objects as works of art often arguing for less rigorous requirements regarding provenance and legal export. Essentially this reflects a valorization of essential qualities of individual objects on the one hand, and their significance, context, and potential to inform understandings of social meanings and processes on the other.

Historical Background

In the nineteenth and early twentieth centuries, museums were the primary institutional settings for North American archaeology. Most of the great North American archaeological museums were founded during this period, and many amassed the bulk of both their collections and their stature prior to World War I. In the middle decades of the twentieth century, the primary context for Americanist archaeology shifted to universities, with the unintended effect of separating the creation and interpretation of archaeological collections from their curation and care. But while the intellectual focus shifted away from museums, this was also a period in which massive archaeological collections were generated through federally funded projects, creating and sometimes filling both freestanding and university-based museums and repositories. In some cases collections remained under the control of academic departments without explicit arrangements for longer-term care, creating legacy collections whose status and care remains a challenge. In the closing decades of the twentieth century and opening decades of the twenty-first century, those roles have further fragmented, with the majority of archaeological materials now being generated by cultural resource management (CRM) and contract-based archaeological projects (in Ontario, e.g., it is estimated that 80–90% of all archaeological fieldwork is contract-based CRM work). This fragmentation has led to a separation between the archaeologists conducting the bulk of fieldwork and the resultant collections (archaeologists in CRM), the substantive scholarly and grant-funded research based on fieldwork and collections (archaeologists in higher education), and the management, care, and stewardship of those collections (archaeologists in museums). Lack of coordination between the three sectors has resulted in rapidly growing collections whose research value is largely unknown, and may result in additional fieldwork on questions which could be effectively addressed by extant data already in repositories and museums.

By the late 1970s, a "curation crisis" had been recognized, with museums lacking the space, funding, and staff to adequately deal with burgeoning collections resulting from CRM compliance. Museums and repositories were to have been integral parts of heritage management from its inception; the 1906 US Antiquities Code required that objects collected be placed in public museums and permits were to designate a publicly accessible repository. In more recent years, CRM projects have included curation fees for the management and care of collections resulting from compliance activities, but for the most part, these have been simple fee-for-service arrangements not based on the research value of the collections themselves.

Several important trends emerged in the late 1980s and early 1990s. Thoughtful approaches to the ethics of collecting the cultural property of indigenous communities (e.g., Messenger 1989), critical studies of museums as institutions and their representation of the other (e.g., Karp and Levine 1991), and increased attention to the impact of museum acquisitions on antiquities trafficking and site looting (e.g., Tubb 1995) all changed and enriched discourse in museum archaeology. These trends have continued and accelerated in the opening decades of the twenty-first century.

At the same time, Native concerns over both the way their cultures were represented in and cultural property and human remains appropriated

by museums came to the fore. In the USA, these concerns led to the Native American Graves Protection and Repatriation Act (NAGPRA) and the National Museum of the American Indian Act. These laws allowed Native communities to reclaim human remains and four categories of objects from museums based on cultural affiliation: (1) funerary objects associated with human remains in a museum's collection; (2) funerary objects not associated with human remains in a museum's collection; (3) objects of cultural patrimony; and (4) sacred objects. In Canada, the Task Force on Museums and First Peoples was created to address concerns raised by a Glenbow Museum exhibition organized to coincide with 1988 Calgary Olympic Games. Native communities found the original title, layout content, and sponsorship inappropriate, and these concerns led to the Task Force's recommendations which have permanently altered the relationship between First Peoples and Canadian museums.

Key Issues/Current Debates

Curation Crisis

No resolution to the ongoing "curation crisis" has yet been offered (Bawaya 2007). New or expanded federal repositories in the USA and Canada address some shorter-term aspects of the curation crisis, but do not address the needs of nonfederal museums, repositories, tribal museums, or university museums. The rate of compliance activities and the resulting growth of collections continue apace (Fig. 3), without equivalent increases in government or private support for curatorial activities. While the rate of compliance-related collections growth at the Canadian Museum of Civilization has slowed, it has increased correspondingly at provincial and territorial museums. Government support for museums continues to decrease both as appropriations for governmental museums and repositories and as grants for nongovernmental entities. The US National Science Foundation no longer supports curatorial activities or collections improvement grants, and both restructuring of Canadian museums and reduced support for both Canadian museums and agencies that support museums place further stresses on overstretched staff. And while many aspects of legal or ethical mandates for repatriation and consultation are valuable and long overdue, they further overextend museums which had already been recognized as understaffed, underfunded, and overcrowded prior to these mandates. This is essentially a funding issue and is unlikely to be resolved in the near term.

NAGPRA and Repatriation

NAGPRA has had significant effects on American museums, most positive. Canadian repatriation

North America (USA and Canada): Museums, Fig. 3 Archaeological collections from compliance activities continue to grow at a faster rate than funding for their curation. (University of Missouri Museum Support Center; Photo Alex W. Barker)

protocols based on recommendations of the Task Force on Museums and First Peoples lack the force of law, but are accepted by all major Canadian museums. Consultation with Native communities has increased, summaries and inventories have improved intellectual control over many categories of archaeological materials and remains, and a range of collaborative research and interpretive projects have been developed. An increasing number of curators in anthropology and archaeology museums have built successful academic careers by working with Native communities and making those relationships the basis and subject of their scholarly study. While the costs of NAGPRA compliance were a considerable concern in the years following passage of the Act, most museums have now adjusted their staffing levels and expectations to accommodate compliance activities. Most current concerns regarding NAGPRA involve the disposition of human remains whose cultural affiliation cannot be determined. Recent regulatory changes (codified under US federal regulations as 43CFR10.11) mandate the disposition of human remains to claimant groups even if there is no evidence that they are culturally affiliated to the remains themselves; some museum and scientific organizations have expressed concern that this provision conflicts with the Act's original intent.

While both NAGPRA and the recommendations of the Task Force on Museums and First Peoples have had generally positive impacts on the relations between museums and the communities they study, they privilege certain kinds of research at the expense of others. Legal and voluntary restrictions on the analysis of human remains have had a clear and continuing effect on scientific studies of the human past; since North American museums hold human remains from other areas of the world as well, one outcome has been that archaeologists and physical anthropologists are able to better address questions regarding the human career in some geographical areas but in others must leave them unaddressed.

Conservation

Scientific advances in conservation have greatly improved our knowledge of how to preserve and protect cultural collections. In part this has resulted in better understanding of environmental factors and preventative care (Elkin and Norris 2019), and in part in improved interventions for conserving and stabilizing individual objects. Along with these advances has come an increased appreciation of the effects of older chemical treatments, particularly the use of arsenical and mercuric compounds, on modern collections (Charola and Koestler 2010). The contaminants limit the utility and accessibility of some older organic collections. Repatriation of contaminated objects is a significant and well-documented problem, particularly for objects being repatriated because they are required for continuing religious purposes. A growing body of literature deals with both the identification and amelioration of contaminants, and helping claimant communities manage risks associated with these objects.

As museums have become more sensitive to the concerns of Native communities (Clavir 2002), conservation approaches have changed to accommodate respectful treatment including the inclusion of sacred plants, orientation of objects, organization of collections, and the performance of necessary ceremonies. In some cases these protocols contradict conservation guidelines based exclusively on preservation and reflect a more inclusive approach to stewardship (Ogden 2004).

Museums and Unprovenanced Collections

In April 1970 the University of Pennsylvania Museum of Archaeology and Anthropology issued the Pennsylvania Declaration, which affirmed that the Museum would purchase no antiquities for its collections unless accompanied by a provenance "pedigree" – the first major market country museum to take such a position. Shortly thereafter the UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property was signed. The 1970 date for the UNESCO Convention has become an ethical touchstone for many US museums (Canadian law prohibits the importation of cultural objects unless legally exported from their country of origin). The Association of Art Museum Directors (a US-based organization limited to the directors of the

200 largest art museums) had previously established guidelines allowing the purchase of antiquities by museums if it could be shown that objects had left their country of origin at least 10 years before. Numerous archaeological organizations (including the Society for American Archaeology, the Archaeological Institute of America, the American Anthropological Association, and the Council for Museum Anthropology) raised strong concerns that these guidelines served less to prevent site looting than to regularize it. In 2008 both AAMD and AAM released revised standards for the acquisition of antiquities. Both organizations required museums to obtain documentation that objects had either left their source countries before the date of the UNESCO Convention or that they had been legally imported; AAM guidelines went considerably further by requiring that objects also have been legally exported from their country of origin, a much more stringent standard. In recent years AAMD restrictions have lessened, with a larger number of objects with incomplete provenance being accepted by US art museums.

Deaccessioning

In addition to the restrictions on the acquisition of archaeological material previously noted, once antiquities enter the US or Canadian museum collections, they are subject to additional restrictions on any future use. Federally associated collections or collections in federal repositories cannot generally be culled by deaccession (removed from permanent collections) under current US regulations, creating a problematic situation where collections may be culled or limited as part of the research design or field component of research, but once they are transferred to a museum or repository no deaccession or management by culling is allowed. Currently there are initiatives to allow such deaccessioning under specific conditions similar to those used by nonfederal museums, but they have not yet been adopted. Normally reasons for deaccessioning include lack of relevance to the institution's scope, limited or negligible value for study, duplication (both of the foregoing usually applying to works of art rather than research collections), poor condition or deterioration beyond the point at which conservation is feasible, determination that the object is a fake or forgery, determination that the museum does not and cannot hold good title, or a valid repatriation claim. In addition to any ethical restrictions on sale of antiquities, museum ethics restrict the use of any proceeds from the sale of deaccessioned objects of any kind to the acquisition of more representative or useful objects, preferably in the same collections area. AAM guidelines also allow funds to be used for the specific conservation of objects within the collection, narrowly defined. Under no circumstances may the proceeds be used for general operations. Several university-based museums have violated these guidelines in recent years, including Brandeis University, which sought to deaccession and sell its collections to make up for market losses to its university endowments, and Fisk University, which agreed to sell collections objects for operating funds in violation of both applicable ethics codes and restrictions of the original donor.

Virtual Data and Physical Objects

While broad metadata standards for archaeological data exist (the Dublin Core and its various extensions including the Darwin Core for biological materials, CIDOC, and the associated ISO 21127 standard), they are neither fully embraced nor systematically applied. The conceptual complexity of some of these data models adds to the challenge of systematic implementation; CIDOC 5.0.1, for example, includes 86 classes and 137 properties (and their inverses) as part of its schema. In 2011 the US National Science Foundation solicited white papers identifying "big questions" or pressing needs in the social and behavioral sciences – issues that could allow major advances in research with the infusion of significant funding. One of the needs identified (and endorsed by the American Anthropological Association) was a systematic survey and inventory of all of the cultural holdings already housed in American museums, repositories, and institutions of higher education. Artifacts Canada, an initiative of the Canadian Heritage Information Network (CHIN), already allows the public limited search access to some four million selected objects in Canadian museums.

The expansion of Canadian and US Museum Studies programs in the late twentieth century – and of online version of these programs in the twenty-first century, making them more accessible to smaller museums, tribal museums, and affordable to nontraditional scholars – has increased the professionalism and working knowledge of many entry-level museum staff, as well as honing and updating the skills of more senior staff. Much of this training focuses on interpretation and the stewardship of physical things, including both paper records and collections objects. The emerging demands of electronic resources and collections are quite different, and museum organizations (CMA, AAM, CHIN) and funders like the US Institute for Museum and Library Services and National Endowment for the Humanities have increasingly focused on training new museum professionals to meet the changing demands of digital collections (CHIPs Workshop Report 2008).

Institutional efforts to capture and maintain digital archaeological archives are already underway. In Canada, the Sustainable Archaeology program at Western and McMaster universities serves as a cooperative for the archiving of both physical and digital archaeological data on a fee-for-service basis. First Nations communities are active partners in developing management and access standards. In the USA, the Digital Archaeological Record (tDAR) serves as an international archive for digital data relating to archaeological investigations and scholarship, focusing primarily on sustainable archiving and the specific requirements of digital curation. The Alexandria Archive Institute, another US-based entity, focuses on open access scholarly communication and data sharing through digital access. In 2019 the American Anthropological Association launched the Open Anthropology Research Repository (OARR), an open access, discipline-specific platform for sharing and archiving research and documents.

Scholarly Status of Curatorial Activities

With the shift from the museum to the academy as the primary venue for substantive archaeological research in North America came changes in the ways in which scholarly productivity was measured. In recent years museum anthropologists in the USA and Canada have worked to have curatorial activities unique to the museum field – organization of exhibitions, consultation with descendant communities, work as experts on cultural property issues, and other endeavors which may not lead to journal-based publication – recognized in promotion and tenure decisions. Efforts in this area were led by the Council for Museum Anthropology, a professional society within the American Anthropological Association. In 2012 AAA issued promotion guidelines for practicing professional anthropologists and archaeologists and also established expert review panels of practicing professionals to assist academic units in both promotion decisions and departmental program reviews (American Anthropological Association 2011).

Accreditation and Standards

Museum accreditation within the USA has been performed by the AAM through a separately established Accreditation Commission since the early 1970s and involves a combination of institutional self-study, review by Accreditation Commission staff, peer evaluation by a visiting committee of accreditation reviewers, and a final decision by the Commission. Accreditation has generally been for 10 years or less, although this was recently increased to 15 years as part of reorganization and streamlining of the accreditation process. As of 2019 1081 US and Canadian museums had achieved AAM accreditation.

Within Canada, the Canadian Association of Professional Conservators (CAPC) has had an active accreditation program in place since the early 1970s. Accreditation is based on a formal application with supporting credentials and documentation, followed by a peer evaluation conducted by a four-person Board of Examiners. The evaluation includes both general conservation knowledge and techniques/knowledge specific to the applicant's area of specialization. Within the USA the American Institute for the Conservation of Historic and Artistic Works (AIC) proposed an examination-based certification program, but the initiative was defeated in 2009 by a vote of the membership.

No accreditation or licensing mechanisms for other archaeological museum professionals are currently in place in either the USA or Canada.

International Perspectives

Archaeology as Anthropology

Unlike other continents, archaeology in North America has been traditionally viewed as a subdiscipline of anthropology with closer intellectual ties to ethnography than to either history or geology. Developing from museum contexts in which the material culture of communities both extant and extinct was being systematically organized, during periods in which there were few chronological controls, North American archaeology was heavily influenced by the direct historical approach (itself born in museum contexts) which constructed cultural chronologies by working backward from living communities into the prehistoric past. Organizational schema such as the Midwestern Taxonomic System – initially developed at the Milwaukee Public Museum in the 1930s – used material culture trait lists to organize archaeological assemblages relative to one another and to those of historic groups. While in many respects this anthropological approach has benefited North American archaeology, it also reflects a racial disconnect in which archaeology as anthropology divorces Native histories from broader national histories privileging European colonization at the expense of aboriginal occupations (Ames 1992).

Composition of the Archaeological Archive

Archaeological collections in North American museums and repositories generally include both physical objects from excavations as well as all associated records and documentation, in distinction from some other countries (e.g., Scotland and Wales, where objects are held by regional museums and records by their respective Royal Commissions for Ancient and Historic Monuments). Management of this larger archaeological archive is understood to begin with the research design stage, long before the initiation of fieldwork (e.g., Sullivan and Childs 2003), and most archaeological codes of ethics stress the equal importance of object and record.

International Treaties and Trafficking

While Canada and the USA are both source and market countries in the global antiquities trade, for the most part both are viewed as markets, legally allowing the commercial movement of objects illegally removed from their country of origin; in recent years applicable Canadian laws have reduced the import of unprovenanced or illegally exported cultural objects.

Museums in the USA and Canada are subject to several international treaties affecting their ability to acquire and accession objects. Both Canada and the USA are signatories to the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property, although the USA accepted only articles 7b and 9 and Canada's implementation focuses primarily on article 3. Implementation within the USA depends on negotiated memoranda of understanding between the USA and other signatories to the Convention, since ratification only 19 such memoranda have been completed (as of early 2020). In Canada both exports of cultural materials from Canada and imports of cultural property from source nations are controlled, but foreign governments seeking return of objects must compensate individuals or institutions who acquire objects without knowledge that they were acquired in violation of applicable law. Both the USA and Canada are also signatories to the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict; the USA formally ratified the Convention in 2008, more than 15 years after its promulgation. Neither the USA nor Canada is a signatory to the UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects.

Ownership and Title

Property laws in Canada and the USA do not vest ownership of antiquities in the federal government unless the material originates from public lands. Similarly, and in contrast to some other parts of the world, Canada and the USA never

established a national museum system with a centralized administrative center supervising smaller regional museums. Different museums developed independently following quite distinct developmental trajectories, informed by a range of interests and concerns, and including museums organized as public charities or nonprofit corporations, arms of government (local, state/provincial, national, or tribal), or units within institutions of higher education, among others. Title and control over collections vary considerably across this range of institutional forms. Changing forms of governance has also complicated issues of title. Privatization of some previously city- or county-run institutions has led to different models for collections ownership. In some cases the nonprofit organization operating the museum assumes ownership for objects acquired after privatization; in other instances, the organization manages collections whose title is vested elsewhere.

Canadian museums generally receive a larger proportion of overall funding from government than do American museums. Nongovernmental museums in the USA reported in a 2008 survey that less than 24% of funding derived from government support at any level and most of that funding was targeted at science museums and science centers.

Within the USA one of the major changes affecting museum title in the latter part of the twentieth century was the development of the McClain doctrine, a set of legal principles holding that if a foreign nation state has well-defined and enforced laws vesting ownership of archaeological materials in the state, then that nation state has standing to bring legal action in US courts against looters and traffickers under the US National Stolen Property Act. While convictions under the doctrine have been few, and one recent case (between the St Louis Art Museum and the Egyptian government over a cartonnage funerary mask of Ka-Nefer-Nefer) has called into question how broadly the doctrine can be applied, McClain problematizes title for objects without clear provenance, making museums more sensitive to the need for adequate documentation prior to acquisition.

Future Directions

Achieving Balance Between Museum Functions

Early twentieth-century North American museum theorists like John Cotton Dana emphasized the public education rather than purely research role of museums. In a landmark 1992 report, *Excellence and Equity*, the American Association of Museums called on all museums to place education at the center of their public service role and make education part of all museum activities. North American museums continually rebalance and reexamine the resources allocated within museums for primary research and for public education; in more recent decades research allocations have also had to compete against the desire to attract more visitors to museums in order to increase earned revenues and leisure market share in an increasingly competitive environment (Fig. 4). Similarly, the rise of repositories holding collections on a fee-for-service basis has increased concerns that strategic growth of museum holdings based on long-term value may be compromised by short-term efforts to raise revenue through curation fees on the one hand or increased gate and visitor traffic on the other. Some curators find research becoming a residual activity – something they can do when or if the more pressing demands of public engagement, education, fundraising, and management allow. And while the curatorial function is central to the idea and character of the museum, it is not generally a revenue-generating position and is hence subject to close scrutiny during cycles of budget reductions.

Audience

In recent decades North American museums in general have increasingly focused on the needs of visitors. While generally positive, these efforts have led to increased demands on curators to engage in social media, fundraising, and public relations events which are aimed less at research or education in the formal sense than public engagement more broadly, which may erode the core curatorial functions. Partially countering this trend, archaeology museums have increasingly

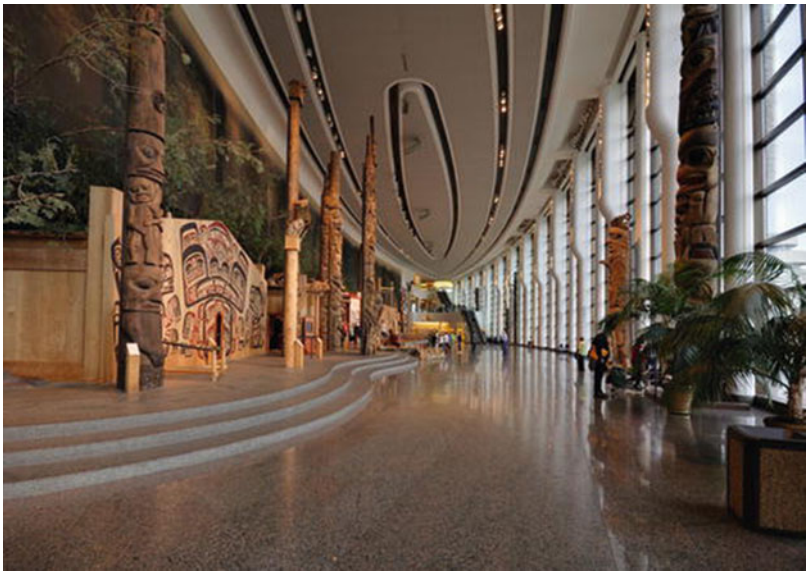

North America (USA and Canada): Museums, Fig. 4 Over the course of the twentieth century, the primary emphasis of North American museums shifted from behind-the-scenes research and curation to public interpretation and engagement. (Canadian Museum of Civilization, Hull, Quebec, Canada. Photo by Taxiarchios228, http://commons.wikimedia.org/wiki/File:Gatineau_-_QC_-_Canadian_Museum_of_Civilization5.jpg. GNU Free Documentation License)

focused on the viewpoints and values of source communities, in part to undo stereotypes reified and perpetuated by previous generations of museum exhibitions and practices. This can create tensions between common models for museum interpretation which allow considerable latitude to the visitor in meaning-making and concerns of Native communities who wish to more clearly define how they are perceived and portrayed.

While many North American museums recognize the need to better serve and engage minority populations, few have successfully done so on a sustained and continuing basis. Minority populations constitute 34% of the US population, for example, but minority individuals represent only 9% of museum visitors. Demographic trends suggest that by sometime in the middle of the twenty-first century, minority groups will actually form the aggregate majority of the US population. While museums – and particularly anthropology and archaeology museums – have become increasingly sensitive to the interests of Native or source communities regarding core issues including rights, repatriation, and representation, they have generally been less responsive to the demands of other minority populations they serve as visitors, whose needs may be different from or in competition with the interests of Native communities.

At the same time, one of the fastest-growing areas within the broader museum community is "tribal" museums, created and managed by tribes, First Nations, or descendant Native communities (Fig. 5). Coupled with the expansion of tribal historic preservation programs and increasing number of Native peoples pursuing careers in anthropology and archaeology, this trend may profoundly change both the ways in which museums are perceived by descendant communities and the representational tropes by which Native peoples are depicted in museums generally. In a 2003 survey of 74 tribal museums, conducted by the American Association for State and Local History, "cultural preservation" and "role as a repository" were identified as a tribal museum's most important functions. The same survey indicated that the primary audience for most tribal museums was other tribal members (Abrams 2003).

Title

Accessioning reflects an assertion of title to collections, but several trends in cultural property law and ethics call into question aspects of the goodness of title many museums assume they enjoy. NAGPRA avoided constitutional challenge as a taking by asserting that museums never held good title to certain cultural collections in the first

North America (USA and Canada): Museums, Fig. 5 An important trend in the later twentieth and twenty-first century has been the rise of Native museums interpreting indigenous histories and identity through Native voices. (Photo by Elliot Schwartz for Studio EIS, http://en.wikipedia.org/wiki/File:StudioEIS_Mashantucket_Pequot_Museum.jpg. GNU Free Documentation License)

place. The McClain doctrine similarly questioned the clarity of title to certain kinds of cultural materials if good provenance was not proven. And although the recommendations of the Task Force on Museums and First Peoples do not impact issues of legal title, they do problematize the ethics of asserting title to certain categories of material. Broader issues of image rights and intangible property are likely to become more sharply defined in coming decades, undermining nineteenth-century Lockean constructions of museum collections as private property. A gradual shift is thus likely from management of collections based primarily on legal title or ownership of objects to management based on defined rights and agreements, with title being recognized as problematic in many cases and separated from the custody and use of collections by museums. Numerous examples are already in place where museums manage and interpret collections by agreement with source countries or descendant communities rather than asserting title.

New Museum Formats

In an age of increasingly immersive and experiential entertainment, more didactic and static museums struggle to engage and retain visitors. Traditional forms of display tend to privilege authentic objects but struggle to place them into meaningful living contexts that excite the imagination of visitors. More interactive formats are better at creating a sense of wonder, but often do so at the expense of the real objects. The rise of virtual or online museums offers tantalizing promise for the provocative and multivocal interpretation of archaeological collections, yet it also poses significant pitfalls. Technical challenges are being addressed through innovative partnerships and increasing technological sophistication of museum staff, but some museum professionals see a risk of further undercutting support for archaeological collections by separating their public interpretation (which can be mounted without the infrastructural demands of brick-and mortar-museums) from their care and curation, which ultimately depend on physical space and staff.

Cross-References

- ▶ China: Museums
- ▶ Conservation in Museums
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ East Africa: Museums
- ▶ Encyclopedic Museum
- ▶ Heritage Museums and the Public

▶ Human Remains in Museums
▶ Ireland: Archaeological Museums
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▶ Museums and Memory Experiences
▶ Museums and the Distortion of Archaeology for Political Purposes
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▶ Turkey: Archaeological Museums
▶ United Kingdom: Archaeological Museums
▶ Vandalism and Looting (Ethics)
▶ West Africa: Museums

References

Abrams, G. 2003. *Tribal museums in America*. Nashville: American Association for State and Local History. Available at: http://www.aaslh.org/documents/AASLHTribalMuseums.pdf. Accessed 12 Oct 2012.

American Anthropological Association. 2011. Guidelines for evaluating scholarship in the realm of practicing, applied and public interest anthropology for academic promotion and tenure. Available at: https://s3.amazonaws.com/rdcms-aaa/files/production/public/FileDownloads/pdfs/cmtes/copapia/upload/Practicing-Guidelines-FINAL-with-logo.pdf. Accessed 18 Feb 2020.

Ames, M. 1992. *Cannibal tours and glass boxes: The anthropology of museums*. Vancouver: UBC Press.

Bawaya, M. 2007. Archaeology: Curation in crisis. *Science* 317: 1025–1026.

Charola, A., and R. Koestler. 2010. *Pesticide mitigation in museum collections: Science in conservation. Proceedings from the MCI workshop series*. Washington, DC: Smithsonian Institution Press. Available at: https://repository.si.edu/bitstream/handle/10088/8829/MC1_Charola_web-FINAL.pdf?sequence=1&isAllowed=y. Accessed 18 Feb 2020.

Clavir, M. 2002. *Preserving what is valued: Museums, conservation, and first nations*. Vancouver: UBC Press.

Cultural Heritage Information Professionals (CHIPs). 2008. *Cultural heritage information professionals workshop report*. Sarasota: Ringling Museum of Art.

Elkin, L., and C.A. Norris, eds. 2019. *Preventive conservation: Collective storage*. New York: Society for the Preservation of Natural History Collections.

Karp, I., and S. Levine, eds. 1991. *Exhibiting cultures: The poetics and politics of museum display*. Washington, DC: Smithsonian Institution Press.

Messenger, P.M., ed. 1989. *The ethics of collecting cultural property: Whose culture? Whose property?* Albuquerque: University of New Mexico Press.

Ogden, S., ed. 2004. *Caring for American Indian objects: A practical and cultural guide*. St Paul: Minnesota Historical Society Press.

Ramos, M., and D. Duganne. 2000. *Exploring public perceptions and attitudes about archaeology*. Washington, DC: Society for American Archaeology.

Sullivan, L., and T. Childs. 2003. *Curating archaeological collections: From the field to the repository*. Walnut Creek: Altamira Press.

Tubb, K. 1995. *Antiquities trade or betrayed: Legal, ethical and conservation issues*. London: Archetype.

Further Reading

American Association of Museums. 2008a. *National standards and best practices for US museums*. Washington, DC: AAM Press.

American Association of Museums. 2008b. AAM standards regarding archaeological material and ancient art. Available at: https://www.aam-us.org/programs/ethics-standards-and-professional-practices/archaeological-material-and-ancient-art/. Accessed 18 Feb 2020.

Association Of Art Museum Directors. 2008. Report of the AAMD task force on the acquisition of archaeological materials and ancient art. Available at: https://www.cambridge.org/core/journals/international-journal-of-cultural-property/article/report-of-the-aamd-task-force-on-the-acquisition-of-archaeological-materials-and-ancient-art-revised-2008/F26F4DF5FA5795E505E27C10491AEA58. Accessed 18 Feb 2020.

Barker, A. 2010. Exhibiting archaeology: Archaeology and museums. *Annual Review of Anthropology* 39: 293–308.

Bouquet, M., ed. 2001. *Academic anthropology and the museum: Back to the future*. New York: Berghahn Books.

Cassman, V., N. Odegaard, and J. Powell, eds. 2007. *Human remains: Guide for museums and academic institutions*. Lanham: Altamira Press.

Lazrus, P., and A. Barker, eds. 2012. *All the king's horses: Essays on the impact of looting and the illicit antiquities trade on our knowledge of the past*. Washington, DC: Society for American Archaeology Press.

National Park Service. 2011. 36CFR79 Curation of federally-owned and administered archeological collections. Available at: https://www.nps.gov/Archeology/collections/laws_04.htm. Accessed 18 Feb 2020.

Pearce, S. 1990. *Archaeological curatorship*. Washington, DC: Smithsonian Institution Press.

Renfrew, C. 2000. *Loot, legitimacy and ownership*. London: Duckworth.

Swain, H. 2007. *An introduction to museum archaeology*. New York: Cambridge University Press.

Task Force On Museums And First Peoples. 1992. *Turning the page—Forging new partnerships between museums and first peoples: A report jointly sponsored by the Assembly of First Nations and the Canadian Museums Association*. Ottawa: Task Force on Museums and First Peoples.

UNESCO. 1970. Convention on the means of prohibiting and preventing the illicit import, export and transfer of ownership of cultural property. Available at: http://portal.unesco.org/en/ev.php-URL_ID=13039&URL_DO=DO_TOPIC&URL_SECTION=201.html. Accessed 18 Feb 2020.

US Government Printing Office. 2012. Electronic code of federal regulations title 43 public lands: interior part 10 Native American graves protection and repatriation regulations. Available at: https://www.ecfr.gov/cgi-bin/text-idx?type=simple;c=ecfr;cc=ecfr;sid=abefc428407c704d63fef71637939827;idno=43;region=DIV1;q1=NATIVE%20AMERICAN%20GRAVES%20PROTECTION%20AND%20REPATRIATION;rgn=div5;view=text;node=43%3A1.1.1.1.10. Accessed 18 Feb 2020.

North America (USA): Historical Archaeology

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Introduction

In the USA, historical archaeology involves cultural resource management, heritage studies, public and advocacy archaeology, and academic training and research. The National Archaeology Program comprises legislation, policies, education, funding, and land, site, and collections ownership and management in the public trust. A national register of historic landmarks and places and a system of national parks and monuments preserve an increasingly broad cross section of the nation's material legacy. These programs, along with an array of state, local, and private enterprises, enable people to confront material pasts. While archaeology remains implicated in the reproduction of mythic national histories in the USA, significant efforts to interrogate and challenge these histories strive to engender empathy and understanding of past struggles and experiences.

Multiscalar, multivocal approaches are most advocated, through which researchers consider individual objects or object constellations in local, regional, national, and global settings of production, exchange, consumption, use, and disposal. To understand people-object networks and entanglements, analyses are approached from the perspectives of individuals and groups in diverse structural positions in society. Contemporary historical archaeology in the USA is exploring how forces of colonialism, capitalism, nation-state formation, industrialization, mass population movements, racism, gender and sexuality, and cultural encounters shaped the post-Columbian world (e.g., Paynter 2000). This essay is structured around four issues that dominate our discourses and practices: the relationships of structure and agency, and of archaeologists and publics; the materiality of social and cultural processes and practices; and the global phenomena of colonialism, capitalism, and industrialization.

Definition

The definition, or boundaries, of historical archaeology has been contested from the beginning. Today, US historical archaeologists define the field as historical anthropological or anthropological historical approaches to study of (a) European colonial conquest and the encounters of peoples, environments, and objects that ensued; (b) capitalism and the modern world; (c) the past, using all available lines of evidence, including material culture (i.e., environment, landscape, architecture, objects, texts, images), living people, and memory.

Historical Background

The origins of the contemporary practice of US historical archaeology lie in (1) nineteenth-century anthropological archaeology studies of American Indian cultures, (2) Colonial Revival-inspired historic sites movement, and (3) Great Depression public works projects in the 1930s and 1940s. The nation's first heritage preservation legislation, the Antiquities Act, dating to 1906, established the federal government's responsibility to recognize and protect archaeological sites

on land it owns or controls. Historic sites like Virginia's colonial capital, Williamsburg, became the focus of private preservation projects in the 1920s and 1930s. Depression-era public works projects fostered the expansion in scope and scale of public archaeology across the USA and the development of salvage archaeology. Heritage and environmental movements in the 1960s led to legislation establishing the National Register of Historic Places, mandating national cultural resource inventories, and sponsoring surveys in advance of federal construction. These laws fueled the development of the cultural resource management industry in the 1970s.

Intellectually, historical archaeology has a dual, historically dichotomous, identity as science and/or humanity. This binary has opposed anthropological etic versus emic perspectives and foci on populations in environmental-cultural systems versus histories of peoples and their systems of meaning. Stanley South modeled the scientism of processual, New Archaeology for historical archaeology in his 1977 work, *Method and Theory in Historical Archaeology.* Processual archaeology challenged traditional "handmaiden to history" archaeology, seeking to reveal the material culture patterns defining site types and cultural affiliation, which in turn would elucidate processes of cultural variation and change. Studies of enculturation and adaptation in colonial settings ensued. James Deetz's *In Small Things Forgotten* also appeared in 1977, introducing a mentalist, structuralist approach to studying early American life. Deetz argued that the Enlightenment (Georgian) world view precipitated the greatest cultural transformation in European American life. This had implications for all material culture as people reordered their world in concert with their new understandings.

A related debate centered on sources of evidence, especially the place of documentary analysis in historical archaeology. Contextual, interpretive historical ethnographies of people and place and critical perspectives on the legacies of capitalism, racism, and nationalism began to appear in the mid-1980s. Their authors imagined the relationship of text, site, and object differently, but they shared a goal of critically querying and analyzing texts as well as traditional archaeological evidence.

Key Issues/Current Debates

Social theory, and especially debates over the relationship of structure (e.g., the state) and the nature, extent, and circumstances of individual agency, dominates the intellectual discourse in American historical archaeology today. Various theoretical perspectives orient research on social and cultural processes and identity along with global phenomena like colonialism, capitalism and modernity, industrialization and consumerism, and the institutionalization of American life.

Structure and Agency

Marxists rejected the social unity and ahistoricism of the concept of *world view* espoused by structuralists James Deetz and Henry Glassie. They take a dialectic view of the dynamic web of internal relations constituting society, giving special attention to the inherent contradictions of capitalism and the *ideologies* that reproduce it (McGuire 2006:125–127, in Hicks and Beaudry 2006). In this view, ideology defines the self-other relationships that structure people's understanding of the world (Burke 2006:137, 139 in Hall and Silliman 2006). For epistemological Marxists, ideology is true and false consciousness; the individual itself is an ideological construct of capitalism, as is the concept of agency itself in historical archaeology (Matthews 2010:2). Others hold a more sociological view, focusing on the function of ideology. They have adopted, and challenged, a variety of social theorists' conceptions, including Gramsci's hegemony, Althusser on ideology as material practice, Bourdieu's *habitus*, and Giddens' "lived experience" (Burke 2006:129–130, 133 in Hall and Silliman 2006).

Contextual, *interpretive* approaches seek to decenter master narratives and understand the multiplicities and ambiguities of past experiences. Attending to multilocality and multivocality, and reflecting on the relationships among archaeologists and their sources, these archaeologists produce alternative histories in the traditions of

historical ethnography, Clifford Geertzian "thick description," and narrative. They give voice to individuals and to everyday artifacts in innovative and provocative forms including artifactual storytelling and archaeological biography (Beaudry and Symonds 2010:xii–xx; Janowitz and Dallal 2013).

Feminist scholars argue for the centrality of gender in human history and have explored the construction and dismantling of gender hierarchies. They have replaced the either-or structuralist, androcentric perspectives inherent in previous archaeological research with inclusive both-and approaches in their studies of minorities as well as women (Spencer-Wood and Matthews 2011; Spencer-Wood 2013).

Historical ecological and *evolutionary* archaeologists are challenging another fundamental dualism: nature-culture. Work in the American West has conceptualized the environment as a networked ecological theater experiencing cycles of boom and bust prompted by global technological and economic change. Human action comprises strategic responses to this economy-environment in order to maximize profit opportunistically and resiliently, with the fittest surviving (Hardesty 2010). Insight into the intersections among contemporary environment-economy-public health problems is driving important work in this tradition, including contemporary garbology studies (Shackel 2009:3).

Social and Cultural Processes and Structures

Archaeologists continue to struggle with defining and operationalizing appropriate social analytical units for the study of self-fashioning and "othering." Scholars now challenge the family household as the basic social unit of analysis, charging that the choice represents an uncritical transferal of normative middle-class, European American domestic practices and ideals into archaeologists' methodological structures. Critically examining internal dynamics, production, and consumption activities, archaeologists seek to understand diversity and change within households and households' relationship to society (Fogle et al. 2015). Multiscalar identity demands multiscalar levels of analysis: individual personhood; meaningful, organizing social groupings; geographic proximity locally, regionally, nationally, and globally. Archaeological approaches to individual materiality seek to interrogate social identity and cultural diversity holistically through studies of embodiment, life course analysis, and networking. These analyses of intersectionality aim to reintegrate the individual and understand the interpenetrations of gender, race, sexuality, class, age, ethnicity, and other vectors of identity (White 2009; Janowitz and Dallal 2013). These structures are introduced below and elaborated in subsequent sections.

Gender and Sexuality: Current debates surround the biological sex-cultural gender model versus performance theory, which challenges the validity of the nature-culture duality (Voss 2006:107–108 in Hall and Silliman 2006). Gender and power studies highlight heterarchy and the diverse forms of power, with special emphasis on cooperative power. American historical archaeologists are latecomers to the study of sexuality and the application of queer theory and masculinity theory. Prostitution, birth control, reform institutions, and interracial unions have received most attention. Same-sex relations, sexual violence, and concubinage are more recent topics (Voss 2008).

Race: Racialization assigns people to essentialist groups based on physical appearance allowing them to be perceived as biologically inferior and socially unequal (Orser 2007:9). Many US archaeologists place racialization at the heart of American social life. Diasporas, the traumatic global movement of peoples involving famine, war, enslavement, ethnic cleansing, and conquest, create prime circumstances for racialization. Pragmatist philosophy contributes a focus on the consequences of actors' choices and actions (Agbe-Davies 2015); others are applying affect theory, queer theory, and ontological approaches to materiality (Arjona 2017, in White and Fennell). Another important impulse is the emerging generation of archaeologists bringing their lived experiences of racial dynamics to bear on their analytic perspectives (Fennell 2017).

Labor: Work involves material and social practices, not just technology, production, waste, and

products. The administration, management, supervision, and imposition of labor, as well as laborers' accommodations, resistance, and daily living, form growing foci of study.

Class: Although a considerable historical archaeological literature on class exists in the USA, the fundamental definition of class as a thing or a relation remains contested. In thing studies, class is imagined as a hierarchical ordering like a ladder. Marxian scholars see class as a dialectical relation comprising the whole of lived experience. They deconstruct experience to examine each part's fits and functions within the social totality (Wurst 2006:191, 195 in Hall and Silliman 2006).

National: Nationalist studies emerged in the context of American exceptionalism and explore the processes of becoming American. Fictive and illusive, national identity and citizenship (political and cultural) rely on practices of inclusion and exclusion that archaeologists can investigate at institutions of Americanization and through the politicization of consumption (Camp 2013). These archaeologies complicate our understanding of the interactions of power, language, history and tradition, religion, and perception that create, maintain, and subvert national identity (Brooks and Mehler 2017).

Ethnicity: US immigrant history has generated great interest not only in nationalism but also in the processes and purposes of ethnic stereotyping and boundary maintenance responses that challenge social marginalization. Current approaches focus on hybridity and the ways people imbue material culture with meanings that reference common identities. Heritage formation among ethnic groups is investigated as a process of constant reevaluation of these meanings based on new group experiences and structural changes (Brighton 2009:145–146; Fennell 2017).

Age: Age and life course studies in US historical archaeology are few. These are beginning to challenge essentialist perspectives on childhood and research children "becoming" and "being."

Religion: Processual scientism and Marxism in American historical archaeology have disparaged the importance of religion to past peoples and limited archaeological investigations of "mainstream" religion (Veit et al. 2009). Studies of Spanish missions and dissenting religious societies like the Shakers and Mormons, as well as gravestones and cemetery landscapes across the country, are countering this position. Renewed interest in the archaeology of religion, folk religion, magic, and ritual is dismantling Eurocentric definitions and the conceptual hierarchy of relationships (Manning 2014).

Global Phenomena

Colonialism

From the Atlantic World to the Pacific Rim, US historical archaeologists are probing how colonialism worked as a contentious yet "shared project" simultaneously in homelands and colonies. Long conceptualized as a neutral set of "contacts" among natives and newcomers, the shift to "colonialism" acknowledges the concerted effort of settler populations to dominate indigenous peoples based on ideologies of inherent inequality and racism, acts of labor control, dispossession, and economic marginalization (Silliman 2005:59–66). A "cottage industry of resistance studies in archaeology" has resulted; their challenge is to determine what constituted and meant resistance to whom (Liebmann and Murphy 2011:9).

Others counter that it is Eurocentric to cast all native actions in colonial settings as mitigating oppression. Doing so risks romanticization, homogenization, and a denial of agency. These archaeologists decenter resistance to examine other motivations and intentions (Liebmann 2011:200 in Liebmann and Murphy 2011). Some have turned to micronarratives to nuance and explain the generic macronarrative of the Columbian conquest (Liebmann and Murphy 2011:9–10). Rejecting essentialist notions of native material culture, they focus on processes of entanglement, survivance, ethnogenesis, creolization, hybridity, syncretism, materiality, social memory, and bricolage, actively repudiating concepts and narratives of tragedy, dominance, or victimization without necessarily assuming any group's cultural superiority (Kelly and Hardy 2011:181; Silliman 2005:68). Community and

persistence through residence are foregrounded, such as in recent work on Southern New England native peoples on reservations (Ferris 2009; Jordan 2014; Silliman 2014, in Ferris et al. 2014). Even more complex and informative about colonial processes of ethnogenesis and racism are examples such as the African Seminole emergence from alliances among Florida native people and African escapees from captivity (Weik 2012).

Environmental archaeologists are analyzing the interactions among native, settler, and environment that transformed pre-colonial landscapes. They are exploring the ways European livestock and crops impacted the environment as well as how colonists learned about the new environment, adjusted their practices and thinking, and ultimately relinquished their expectations from home as they sought to reproduce a familiar diet (Mrozowski 2006). Others are documenting the ways space served as a tool of racialization, resistance, and appropriation (Agbe-Davies 2015).

Informed by and challenging the Deetzian tradition, archaeologists continue to examine the implications of the Enlightenment in the eighteenth century. The nature-culture divide, order and chaos, reason and science, and the beginnings of individualism and consumerism represent central topics of concern (Matthews 2010:58–61). The culture of gentility that emerged within Atlantic world cosmopolitanism prompted growing consumerism in early eighteenth-century urban America from St. Augustine through Charleston, South Carolina, to New York, Boston, and Portsmouth. The commonality and variability among individual choices in personal hygiene, dress and adornment, and home furnishing and the elaboration of foodways have received special attention (Heath et al. 2017).

Capitalism and Modernity

Modernity is the central phenomenon of study for archaeologists who identify the USA as a nation-state founded on a culture of capitalism. However considerable disagreement surrounds the conception of modernity as a research orientation (Cobb in Heath et al. 2017:273). Some define capitalism as an economic system and social order for the creation of private profit. In capitalism, an ideology legitimizing consumer greed and accumulation enables the commodification of everything (Mrozowski 2006:11). For others, capitalism wrought a fundamental change in relations between workers and owners so that the former sell their labor to the latter. The key elements of US capitalism they examine include the factory system, time and body discipline, the corporation as a vehicle for capital investment, and the deskilling of labor (Shackel 2009:21–22). All share a critical interest in the construction of the individual in the commodity market, the sources of means to distinguish the self as an authentic individual (Matthews 2010; Leone and Knauf 2015).

Obstacles to archaeologists' ability to understand the material and discursive legacy of capitalism include inadequate conceptions of meanings of privilege, poverty, and wealth (Matthews 2010:44). For example, recent work is investigating African Americans' role in the market economy of the American South and the persistence of historical practices today (Joseph in Proebsting and Gary 2016).

Industrialization Historical archaeologists of nineteenth- and twentieth-century industrialization in the USA examine the technologies, costs and benefits, environmental impact, and laboring life-worlds associated with industrial processes of centralizing, mechanizing, and standardizing production. Technological studies address the machines, equipment, buildings, and landscapes that industrial labor created and altered and the raw materials and transformative processes that created consumer goods, tools, equipment, and transportation systems. Other projects are investigating the relationships, institutions, and practices that controlled workers' lives (Gadsby 2011:12, in Spencer-Wood and Matthews 2011). Archaeologists have documented the material growth, maturity, and evolution of industrial processes and the industrial city. Increasing privatization of workers, the growing importance of immigrant labor, and the erosion and ultimate abandonment of corporate paternalist responsibility for worker

welfare took material form in an increasing divergence in the living conditions and domestic environments of labor and management (Mrozowski 2006).

The industrialization of rural America through the development of scientific, mechanized agriculture forms another research focus. Archaeologists are probing the complex, uneven efforts to standardize and homogenize agricultural production in order to maximize efficiency and thus profit. In the twentieth century, rural electrification, new technologies and crop regimes, new class and gender roles and structures transformed rural life. Archaeological examinations of the material culture of domestic and farm life are revealing how people countered the pressure to homogenize locally, regionally, and socially (Groover 2008).

In the nineteenth and early twentieth century, scholars have argued that the American West was an "underdeveloped periphery of the northeastern, industrial, capitalist core" (Matthews 2010:132). Valued for its sites of resources extraction and low labor value, the West was dominated by corporate, regional hierarchies of resource extraction, milling, redistribution, and transportation. Workers in the West were predominantly unskilled, sharing similar experiences of transience and intense alienation (Matthews 2010:132–135). Archaeological work has centered on mining, the railroad, ethnic group experiences, and West Coast urbanization.

The USA has a long tradition of idealistic social reform. By the nineteenth century, many utopian or "intentional" communities had formed to reject or resist features of industrial capitalism and husband patriarchy. These communities, the Shakers among the most well known, used material culture explicitly to promote an alternative social order and relations. Recent research has emphasized the place of liminality and communitas in these projects and charted community responses to internal and external pressures over time. Feminist scholars are illuminating the interplay of ideology and practice in the construction of gendered hierarchies or equalities in these communities. All stress the importance of utopian imaginations today in creating a future not based on war, terrorism, and inequality (Kozakavich 2017).

Nature and Culture American historical archaeologists have increasingly accepted that the nature-culture dichotomy is a social construct. Under capitalism, abstract processes of commodification transformed nature into spatially and statistically differentiated units of exchange (e.g., land, animals, plants, water; Matthews 2010; Mrozowski 2006). In the Southwest, archaeologists are coming to understand "the subtle reorganization of the anthropogenic landscape resulting from the interaction and persistence" of indigenous, Spanish, and Anglo-Americans (Edwards and Trigg in Proebsting and Gary 2016). In colonial capitalist cities such as Boston, social and functional specialization and segregation led rather to dramatic anthropogenic changes to the environment (Landon et al. in Proebsting and Gary 2016). Deteriorating environmental conditions in mill and worker domestic yards produced poor sanitation, contaminated water, and high disease loads that city governments were slow to address (Matthews 2010:119–131; Shackel 2009:28–38). Later nineteenth- and early twentieth-century domestic reform movements also transformed urban landscapes, blurring the public-private and culture-nature ideological distinctions through creation of corporate housekeeping places and other alternative domestic forms (Spencer-Wood 2013).

Social Relations and Identity *Race*: For decades, archaeologists working at Southern plantations have investigated enslaved living conditions, foodways, belief systems, power relations, informal economies, and Africanisms and composed detailed portraits of life in bondage (Groover 2008). Today, African diaspora archaeologists are deconstructing whiteness and challenging racist histories and the persistence of racialization (Matthews 2010:178; Matthews and McGovern 2015). Informed by critical systematics, some are examining the implications and outcomes of object classification schema. Their

findings challenge essentialist categorizations that insidiously reproduce race and racism unsupported by the objects, which too often are invoked to stand in for people (Agbe-Davies 2015).

Black feminist archaeologists are illuminating the special exploitations associated with sexuality and enslaved women and the gendering of spirituality and African diaspora cosmology (Voss 2008:115). In the Northeast, the first region to enslave Africans in what became the USA and to craft postbellum multiracial societies, archaeologies of slavery and race are countering mythic narratives of the region as the home of liberty and abolition (Orser in Matthews and McGovern 2015).

Indigenous archaeology studies are contesting racist interpretations by rejecting static colonizer/colonized, Indian/European dichotomies and focusing on the constant negotiation of social categories. By engaging with indigenous categories and concepts, archaeologists deny European American intellectual superiority, diversify perspectives, and disrupt dominant, racist approaches (Ferris et al. 2014).

Concepts of diaspora and racialization have also been extended to explain the experience of other groups, especially the Irish and Chinese. One study of the Irish diaspora after the 1840s potato famine examined how Irish immigrants strategically used the symbols of their racialized identity to contest and disrupt the dominant discourse of exclusion and, ultimately, to accept the ideology of mainstream American consumerism and achieve a level of incorporation into American society (Brighton 2009). Studies in the Western USA examine the grounding of Chinese racialization in American isolationist anti-immigration policies and ideologies (Orser 2007:125–178; Voss and Allen 2008:5).

Class: The making of the middle class in nineteenth-century America, the segregation of work and home, shifting gender roles, domesticity and changes in household organization, and other entanglements have been explored in cities, towns, and farming communities from New York to California. Studies of the relationships between middle- and working-class cultures, for example, are rejecting the model of emulation, with its implications that working-class people lacked cultural autonomy (Mrozowski 2006:152). The recent economic downturn has revived interest in poverty, modeled as a form of internal colonialism. The capitalist ideology of individual responsibility for success and failure has effectively criminalized poverty (Spencer-Wood and Matthews 2011:1–2).

Consumerism and Domesticity Authenticity and competency in interpretive symbolic expressions became important in the ideologically individualistic society enabled by eighteenth-century mercantilism (Matthews 2010:3). Researchers are examining the processes of commodification, the capitalist networks through which commodities moved, and the impact of commodification on individual expression (Mullins 2011; Heath in Heath et al. 2017:56). Studies of nineteenth-century mass consumerism evidence technological advancement in foods, dining, hygiene, and health care reinforced by middle-class Protestant religious ideology that translated goods into social position and morality (Brighton 2009:123). In the industrializing West, large-scale producers and locals used consumption to adjust to transformations engendered by economies of scale, in the process creating new ways of life within capitalism (Matthews 2010:141–147). In the twentieth century, transportation and communication technologies spread goods and ideals into rural America, creating a national consumer culture (Paynter 2000:176).

Shopping studies have illuminated the active role of material culture at the moment of consumption, when value and meaning are assigned in these economic, social, and political acts of cultural recreation. At home, these new goods negotiated family and society, work and home, private and public, male and female, and women's moral authority and responsibility. In this way, mass production collapsed distinctions between the market and domestic sites like the dining

table, at which individualism and discipline were highly ritualized. But did hierarchies of dining wares, forms, styles, and functions sacralize capitalist social relations or the moral authority of women? Did lower middle-class, immigrant women in cities use expensive teawares to create community, reject isolation, express ethnicity, signal acceptance of capitalist ideologies, and/or assert domestic power (Brighton 2009:7; Matthews 2010:94–99, 158–159; Mullins 2011:178)?

The most stringent critique of archaeologies of consumerism claims that most archaeologists have yet to imagine approaches that challenge the simple presumption that past people were economically rational consumers who merely projected uncomplicated, bounded identities onto static material things (Mullins 2011:2–3). They do not ask why people *wanted* consumer goods rather than reiterating the factors enabling access such as availability, wage labor increases, social mobility, advertising, or simplistic explanations of emulation (Mullins 2011:2–3, 42–43). One current approach probes the reciprocal relationships between objects' social symbolic roles and the physical properties or materiality limiting or enabling those roles (Heath in Heath et al. 2017:3).

Violence

The archaeology of conflict and violence has a long history in US historical archaeology. Excavations at forts and battlefields have enabled study of ordinary soldiers and officers across time and space, the complexities of provisioning and transporting armies, the cultural landscapes of encampments, and the course of battle events using multiple lines of evidence (e.g., Comer 2013; Geier et al. 2014). Comparative analyses of forts are revealing differences in colonial nations' goals and approaches to dealing with the frontier, native populations and each other, as well as differences between expected and actual behavior that led to violent conflict (Cobb and Sapp in Geier et al. 2014). Other archaeologies of the American wars of independence focus on European cultural contributions to development of an American citizens' army, along with economic and political policies that precipitated and sustained war (Comer 2013.)

In the archaeology of nineteenth- and twentieth-century war, Civil War archaeologists marked the 150th anniversary of the conflict by launching initiatives to better understand enslaved and free African Americans' roles. At World War II Japanese incarceration camps, archaeologists are examining the camps' materiality as tools of racism and institutionalized efforts to break families, as well as the internees' responses.

Class war is another significant arena of violence archaeologists are targeting in efforts to historicize contemporary structures and promote social change. The mining industry is a special target, with projects in Colorado, Pennsylvania, and West Virginia (McGuire 2014). Archaeologies of sexual violence are emerging principally in the contexts of enslavement, colonial conquest, and prostitution.

Institutionalization of American Life

Archaeological studies of almshouses, schools, reformatories, hospitals, prisons, and asylums abound. The most provocative work asserts that America is a carceral society in which institutional confinement functions as a specific mode of population management. Asking "why incarcerate?" archaeologists probe the relation of individual and state and the ways that the state uses institutional incarceration to reconstruct the citizen-self and purge society of the uncivil and unproductive. Colonial institutions are situated in the context of European global imperialism (McAtackney and Palmer 2016). Archaeologists are examining the profoundly material, embodied experiences of confinement constituted in architecture, landscape, furnishings, tools and materials of labor, food, clothing and bodily care objects, and illicit objects. Study of these body-space-object relations reveals the dynamics of punishment, reform, and deterrence, domination and resistance, respite and ritual, survival and exchange in circumstances that deprive individuals of their basic security,

material possessions, social life, individual freedom, and personal expression (Casella 2007).

Archaeology and Publics: Community, Shared Authority

Archaeology is an act of commemoration, and archaeologists today are rethinking what, why, how, and for whom they are remembering. Recasting the relationships among archaeologists and publics has been driven by the ethical question of who owns the past, literally and figuratively. The issue of who makes decisions about preservation, access, commodity and intellectual ownership, possession, disposition, funding, and interpretation of archaeological sites, collections, and human remains in the USA is highly contested. Justifications for historical archaeology include learning, sharing, entertaining, provoking, empowering, promoting community and economic development, and undoing historical injustices.

Critical Marxists strive to gain knowledge of, critique, and transform the world (McGuire 2006:124, in Hicks and Beaudry 2006). They work to illuminate and intervene in power structures that deny freedoms. For example, historical archaeologies of urban gentrification and the active material erasure of the poor from the American landscape and economy reveal and challenge the process today (Gadsby 2011:22, in Spencer-Wood and Matthews 2011). Studies in this tradition advance a postcolonial present by defying those who use "notions of freedom and resistance to feed global domination and ideologies of privilege" (Weik 2012:153).

Critical scholarship also challenges the professional authority structures of bureaucratic archaeology in favor of local definitions of the value of the past and local archaeological action (Palus et al. 2006:84–100 in Hall and Silliman 2006). Community-centered projects are questioning the post-civil rights movement emphasis on positive change to reveal the constancy of racial inequality in the USA today (Matthews 2010:42–43). Others target labor struggles. Archaeological collaborations investigating the Colorado Coalfield War of 1914, in which the National Guard killed strikers and family members, galvanized unionized workers in the region today. They now see their contemporary struggles as a continuation of the struggle at Ludlow (McGuire 2014). This archaeological movement for working-class justice is gaining momentum, with projects such as the one at Blair Mountain, West Virginia, the site of another coal mine worker uprising in 1921.

Another impetus to reassess public archaeology in the cultural resource management sector is the current pro-development, anti-regulatory political climate in the USA. Efforts involve justifying how and why federal funds are spent, increasing program efficiency and knowledge of the past as well as public engagement, participation, and ownership (Sebastian and Lipe 2009; Matthews 2016).

Most Americans encounter archaeology as heritage tourists at museums and historic sites. These are key venues at which archaeologists help both to critique the white, elitist, progressive, and nationalist ideologies that have driven historic preservation and interpretation and to introduce more inclusive histories. Alternative, revisionist memories of negative heritage in the USA, for example, are being made at sites of military forts and battlefields, burial grounds, and institutions (Shackel 2009:95–103).

International Perspectives

Global historical archaeology is a rapidly expanding work in progress, engaging American archaeologists with alternative intellectual traditions, cultural processes, and phenomena, particularly in the Atlantic, Pacific, and Anglophone worlds. Reconsideration of scale has fostered explorations of the interconnections that have defined the modernizing world. A new holism is emerging, rooted in rejection of singular metanarratives and embracing of comparative perspectives. Archaeologists are probing and parsing local-global entanglements in diverse historical, geographical, social, and cultural contexts.

Many of these entanglements have colonial origins. American archaeologists are collaborating in new ways with indigenous peoples,

archaeologists, and publics in imperial homelands and other former New World, European, African, and Pacific colonies. Plant, animal, food system, pathogen, and manufacturing studies are deepening understandings of the biological and environmental exchanges and consequences of colonialism. Archaeologists are re-conceptualizing indigeneity in association with new models of hybridity, appropriation, resistance, adaptation, and identity and conducting in-depth, diachronic studies of diversity in European and local cultures, geographies, and sociopolitical organizations (Liebmann and Murphy 2011; Kelly and Hardy 2011). One important focus of this work is on the everyday lived experience of indigenous, marginalized, and colonized people (Ferris et al. 2014).

Increased attention to the colonial transformation of Europe since the fifteenth century is further complicating and challenging colonial metanarratives. So too is the explicitly global scope of diasporic orientations and the attention directed at the materiality of pre-diasporic experiences and structures and the forces leading to diaspora. Archaeologists are interrogating the materiality of alienation, accommodation, appropriation, acceptance, and other transformative processes experienced by diaspora subjects. In the process, they are problematizing and complicating concepts of resistance (Weik 2012).

Archaeologies of mobility trace the movement of goods, people, and ideas through time and around the world. "Through… engagement [s] with consumer goods, people in Asia, Europe, Africa, and the Americas created and maintained complex connections that influenced Western ideologies relating to individuality, community, and cosmology (Thomas 2004:5–6), and indigenous concepts of value, power, and spirituality" (Ogundiran 2002; Potter 2006; cited in Heath 2017). These changes were fundamental to the rise of modernity (Heath in Heath et al. 2017:4). So too were colonial institutions complicit in forging the materiality of modern power dynamics (McAtackney and Palmer 2016:472).

"Recent scholarship has revolutionized the ways in which archaeologists conceptualize capitalism and its effects…. New spatial geographies, time periods, and subjects have been opened up to the critical lenses of historical archaeology, highlighting the diversity of economic parts… across different contexts worldwide" (Leone and Knauf 2015:3). New perspectives on globalized industrial production challenge simple models that hold the global distribution of commodities responsible for threatening cultural diversity while revealing how a globalizing economy has bred environmental and social injustice. The scale and ubiquity of industrial facilities rendered obsolete by rapidly changing technologies and corporate quests for cheaper labor have produced an increasingly global trail of communities coming to terms with industrial legacies and identities. Similarly, the escalating destructive power of war technologies has scarred ever-larger areas of the global landscape, defying the imaginaries of victory and heroism that have inspired traditional memory-making and marking.

American historical archaeologists also share with international colleagues the current preoccupation with identity and identity-making processes and forces that characterizes the postmodern condition. Race and ethnicity, gender, sexuality, age, and other categorizations have been deployed in context specific, and often fluid, ways. Archaeologists show that identities are culturally constructed, not biologically determined (Leone and Knauf 2015:9; Ferris et al. 2014). Identity-making in the postmodern world has revived interest in heritage and cultural tourism. US historical archaeologists have found employment, opportunities for activism, and intellectual enrichment and challenges in the heritage industry (e.g., Schiffer 2017).

Future Directions

Pragmatic, economic, technological, legal, social, political, theoretical, cultural, and philosophical forces and events will inform the future of American historical archaeology, as they have the past. Economic recession and raging ideological

stalemates over America's capitalist-socialist future have shunted public attention away from archaeology. This has produced urgency in archaeology to confront the issues surrounding rights and privileges, public values, cultural memory, and shared authority. The outcome will have a profound impact on the future of the field. The relevance of historical material evidence to contemporary concerns will continue to justify future endeavors. Archaeologies of gender, sexuality, individuality, and consumerism will persist, with growing significance given to authenticity, advertising, and branding. With the aging of the post-World War II generation, the latter end of the life course promises to join childhood studies as a focus of interest. Archaeologists already study the recent past and the present, although not yet with full comprehension of how the lack of temporal distance is implicated in our preservation and interpretation decision-making. Indeed, historical archaeologists must prepare to engage with more complex temporalities in future studies of modernity and supermodernity.

American archaeologists must expand multiscalar, comparative approaches. More investigations of human-land-object forms of association, occupation, and ownership will illuminate alternative ways of valuing past material remains and guide decision-making for the future. "Studying history backwards" may help us understand the contested and contingent history of capitalism by elucidating the preconditions that shaped the present and considering how the present "conditions" the future (Wurst and Mrozowski 2014:211). Contemporary health, environmental, climatic, and social problems are transnational, and so must be archaeologists' contributions to their comprehension and solution.

The cultural resource management industry and academic historical archaeology must respond to both politico-economic challenges and the intellectual critique of historical archaeology as a capitalist practice and imperial force. Curricula designed to produce archaeological labor minimize anthropology and history, failing to prepare students to assess ideologies of progress, critique the contemporary global order, and counter the global heritage crisis (Gnecco and Dias 2015:689; Hutchings and LaSalle 2015:699, in Gnecco and Dias 2015).

All these future endeavors require historical archaeologists to reexamine the classificatory schemes used to organize and analyze artifacts, to negotiate rapidly changing technologies, and to make difficult decisions about curation. Social media, 3D animation, virtual reality, and other technologies must be used efficiently, innovatively, ethically, and with diligent attention to preserving data in accessible formats for the future. American archaeologists will continue to face a curation crisis. Digital curation offers opportunities but is no substitute for the materiality of the object. It remains crucial that archaeologists actively engage with diverse others about the question, what cultural materials from the past will have a future, why, and who shall decide?

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Annapolis: Historical Archaeology
- ▶ Archaeology as Anthropology
- ▶ Atlantic World: Historical Archaeology
- ▶ Battlefield Archaeology
- ▶ Beaudry, Mary C.
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Conservation and Management of Archaeological Sites
- ▶ Consumption, Archaeology of
- ▶ Critical Historical Archaeology
- ▶ Deagan, Kathleen A.
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Engendering Historical Archaeology
- ▶ Ethnic Identity and Archaeology

- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Glassie III, Henry H.
- ▶ Heritage and Archaeology
- ▶ Historical Archaeology
- ▶ History and Archaeology: Relationship Over Time (US Perspective)
- ▶ Households and Domesticity: Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Leone, Mark P.
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Mission Archaeology in North America
- ▶ Modern World: Historical Archaeology
- ▶ North America during the European Contact Period
- ▶ North America (USA): Historical Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Overseas Chinese Archaeology
- ▶ Plantation Archaeology
- ▶ Post-Processual Archaeology
- ▶ Public Archaeology and Education: Present Relevance to the Past
- ▶ Social Identity in Historical Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ South, Stanley A.
- ▶ Space, Place, and Architecture in Historical Archaeology
- ▶ United States: Cultural Heritage Management
- ▶ Urban Archaeology
- ▶ Urban Archaeology at Five Points

References

Agbe-Davies, A. 2015. *Tobacco, pipes, and race in colonial Virginia: Little tubes of mighty power*. Walnut Creek: Left Coast Press.

Beaudry, M., and J. Symonds, eds. 2010. *Interpreting the early modern world: Transatlantic perspectives*. New York: Springer.

Brighton, S. 2009. *Historical archaeology of the Irish diaspora*. Knoxville: University of Tennessee Press.

Brooks, A.M., and N. Mehler, eds. 2017. *The country where my heart is: Historical archaeologies of nationalism and national identity*. Gainesville: University of Florida Press.

Burke, H. 2006. Ideology and the material culture of life and death. In *Historical archaeology*, ed. M. Hall and S. Silliman, 128–146. Malden: Blackwell.

Camp, S.L. 2013. *The archaeology of citizenship*. Gainesville: University of Florida Press.

Casella, E.C. 2007. *The archaeology of institutional confinement*. Gainesville: University of Florida Press.

Comer, D., ed. 2013. *The archaeology of interdependence: European involvement in the development of a sovereign United States*. New York: Springer.

Fennell, C. 2017. Introduction: Navigating intersections in African diaspora archaeology. *Historical Archaeology* 51(1): 1–8.

Ferris, N. 2009. *The archaeology of native-lived colonialism. Challenging history in the Great Lakes Region*. Tucson: University of Arizona Press.

Ferris, N., R. Harrison, and M.V. Wilcox, eds. 2014. *Rethinking colonial pasts through archaeology*. Oxford: Oxford University Press.

Fogle, K.R., J.A. Nyman, and M.C. Beaudry, eds. 2015. *Beyond the walls: New perspectives on the archaeology of historical households*. Gainesville: University of Florida Press.

Gadsby, D. 2011. "We had it hard... but we enjoyed it": Class, poverty, and pride in Baltimore's Hamden. *Historical Archaeology* 45(3): 11–25.

Geier, C.R., D.D. Scott, and L.E. Babits, eds. 2014. *From these honored dead: Historical archaeology of the American Civil War*. Gainesville: University of Florida Press.

Gnecco, C., and A.S. Dias, eds. 2015. Contract archaeology. *International Journal of Historical Archaeology*. 19(4): 687.

Groover, M.G. 2008. *The archaeology of North American farmsteads*. Gainesville: University of Florida Press.

Hall, M., and S.W. Silliman, eds. 2006. *Historical archaeology*. Malden: Blackwell.

Hardesty, D.L. 2010. *Mining archaeology in the American West: A view from the silver state*. Lincoln: University of Nebraska Press and Society for Historical Archaeology.

Heath, B. 2017. An historical archaeology of consumerism; Re-centering objects, re-engaging with data. In *Material worlds: Archaeology, consumption, and the road to modernity*, 1–8. New York: Taylor & Francis.

Heath, B.J., E.E. Breen, and L.A. Lee, eds. 2017. *Material Worlds: Archaeology, consumption, and the road to modernity*. New York: Taylor & Francis.

Hicks, D., and M.C. Beaudry, eds. 2006. *The Cambridge companion to historical archaeology*. Cambridge: Cambridge University Press.

N

Hutchings, R. and M. La Salle. 2015. Archaeology as disaster capitalism. *International Journal of Historical Archaeology* 19(4): 699–720.

Janowitz, M., and D. Dallal, eds. 2013. *Tales of Gotham, historical archaeology, ethnohistory and microhistory of New York City.* New York: Springer.

Jordan, K. 2014. Pruning colonialism: Vantage point, local political economy, and cultural entanglement in the archaeology of post-1415 indigenous peoples. In *Rethinking colonial pasts through archaeology,* ed. N. Ferris, R. Harrison, and M. Wilcox, 103–120. Oxford: Oxford University Press.

Kelly, K.G., and M.D. Hardy. 2011. *French colonial archaeology in the Southeast and Caribbean*. Gainesville: University of Florida Press.

Kozakavich, S. 2017. *The archaeology of utopian and intentional communities*. Gainesville: University of Florida Press.

Leone, M.P., and J.E. Knauf, eds. 2015. *Historical archaeologies of capitalism*. New York: Springer.

Liebmann, M. 2011. The best of times, the worst of times: Pueblo resistance and accommodation during the Spanish reconquista of New Mexico. In *Enduring conquests: Rethinking the archaeology of resistance to Spanish colonialism in the Americas,* ed. M. Liebmann and M.S. Murphy. Santa Fe: School for Advanced Research Press.

Liebmann, M., and M.S. Murphy, eds. 2011. *Enduring conquests: Rethinking the archaeology of resistance to Spanish colonialism in the Americas*. Santa Fe: School for Advanced Research Press.

Manning, M.C., ed. 2014. Magic, religion, and ritual in historical archaeology. *Historical Archaeology* 48(3): 1.

Matthews, C.N., ed. 2010. *The archaeology of American capitalism*. Gainesville: University of Florida Press.

Matthews, C.N., ed. 2016. Historical archaeology in the next decades. *Historical Archaeology* 50(3): 1.

Matthews, C.N., and A.M. McGovern, eds. 2015. *The archaeology of race in the Northeast*. Gainesville: University of Florida Press.

McAtackney, L., and R. Palmer, eds. 2016. Colonial institutions: Uses, subversions, and material afterlives. *International Journal of Historical Archaeology* 20(3): 471.

McGuire, R. 2006. Marxism and capitalism in historical archaeology. In *The Cambridge companion to historical archaeology*, ed. D. Hicks and M. Beaudry, 123–142. Cambridge: Cambridge University Press.

McGuire, R.H. 2014. Won with blood: Archaeology and Labor's struggle. *International Journal of Historical Archaeology* 18 (2): 259–271.

Mrozowski, S.A. 2006. *The archaeology of class in urban America*. Cambridge: Cambridge University Press.

Mullins, P.R. 2011. *The archaeology of consumer culture*. Gainesville: University of Florida Press.

Ogunduran, A. 2002. Of small things remembered: Beads, cowries, and cultural transformations of the Atlantic experience in Yorubaland. *The International Journal of African Historical Studies* 35(2/3): 427–457.

Orser, C.E., Jr. 2007. *The archaeology of race and racialization in historic America*. Gainesville: University Press of Florida.

Palus, M., M. Leone, and M. Cochran. 2006. Critical archaeology: Politics past and present. In *Historical archaeology,* ed. M. Hall and S. Silliman, 84–104. Malden: Blackwell.

Paynter, R. 2000. Historical archaeology and the post-Columbian world of North America. *Journal of Archaeological Research* 8 (3): 159–217.

Potter, S. 2006. Early English effects on Virginia Algonquian exchange and tribute in the Tidewater Potomac. In *Powhatan's Mantle: Indians of the Colonial Southeast,* ed. G. Waselkov, P. Hood, and T. Hatley, 215–241. Lincoln: University of Nebraska Press.

Proebsting, E., and J. Gary, eds. 2016. Contributing to the archaeology of American landscapes. *Historical Archaeology* 50(1): 1.

Schiffer, M.B. 2017. *Archaeology's footprints in the modern World*. Salt Lake City: University of Utah Press.

Sebastian, L., and W.D. Lipe, eds. 2009. *Archaeology & cultural resource management: Visions for the future*. Santa Fe: School for Advanced Research Press.

Shackel, P. 2009. *The archaeology of American labor and working class life*. Gainesville: University of Florida Press.

Silliman, S. 2005. Culture contact or colonialism: Challenges in the archaeology of native North America. *American Antiquity* 70: 55–74.

Silliman, S. 2014. Archaeologies of indigenous survivance and residence: Navigating colonial and scholarly dualities. In *Rethinking colonial pasts through archaeology*, ed. N. Ferris, R. Harrison, and M. Wilcox, 57–75. Oxford: Oxford University Press.

Spencer-Wood, S.M., ed. 2013. *Historical and archaeological perspectives on gender transformations: From private to public*. New York: Springer.

Spencer-Wood, S.M., and C.N. Matthews, eds. 2011. Archaeologies of poverty. *Historical Archaeology* 45(3): 33.

Thomas, J. 2004. *Archaeology and modernity.* London: Routledge.

Veit, R.F., S.B. Baugher, and G. Scharfenberg, eds. 2009. Historical archeology of religious sites and cemeteries. *Historical Archaeology* 43(1): 1.

Voss, B. 2006. Engendered archaeology: Men, women, and others. In *Historical archaeology*, ed. M. Hall and S. Silliman, 107–127. Malden: Blackwell.

Voss, Barbara L. 2008. Sexuality studies in archaeology. *Annual Review of Anthropology* 37: 317–336.

Voss, B.L., and R. Allen. 2008. Overseas Chinese archaeology: Historical foundations, current reflections, and new directions. *Historical Archaeology* 42 (3): 5–28.

Weik, T.M. 2012. *The archaeology of antislavery resistance*. Gainesville: University of Florida Press.

White, C., ed. 2009. *The materiality of individuality: Archaeological studies of individual lives*. New York: Springer.
Wurst, L. 2006. A class all its own: Explorations of class formation and conflict. In *Historical archaeology*, ed. M. Hall and S. Silliman, 190–206. Malden: Blackwell.
Wurst, L. and S. Mrozowski, 2014. Toward an archaeology of the future. *International journal of historical archaeology* 18(2): 210–223.

North America During the European Contact Period

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State of Knowledge and Current Debates

Introduction

Beginning in the age of discovery and exploration, European powers made contact with Native peoples in North America and subsequently colonized the continent. The cultural encounters that took place in North America during the European contact period have had a profound influence on world history with a lasting material legacy. In conjunction with ethnologists, historians, and demographers, archaeologists have employed documentary sources, ethnographic materials, oral accounts, and pictorial images to decipher the archaeological traces of contact to understand the interactions between Natives and newcomers (e.g., Galloway 1991; Nassaney and Johnson 2000a; Paterson 2011: 133–196). Many of the central questions pertaining to the contact period revolve around the ways in which Indigenous peoples, Europeans, and Africans influenced each other and how they impacted the environment in the process of cultural interaction and colonial engagement. While earlier scholarship emphasized the dominating role of Europeans, more recent work examines the agency of colonial actors of various identities, their creative responses to a rapidly changing social and political landscape, and the benefits of such a shift in perspective.

This entry discusses the significance of the North American contact period within the context of a broader global historical archaeology. It begins by examining the spatial, temporal, and practical dimensions of the European contact period. A brief overview of Native North America at contact is presented, followed by a history of early exploration and colonial encounters. A discussion of archaeological investigations into the contact period and some of the interpretive frameworks that have been used provide the context for the framing questions and enduring themes that have guided and emerged from archaeological research. Some of the salient research results pertaining to the materiality of contact are presented along with current debates that will propel future work in fruitful directions as the field becomes increasingly inclusive and attentive to a multiplicity of voices that reflect various stakeholders with an interest in the outcome of archaeological studies.

The Spatial and Temporal Scope of the North American Contact Period

For the purposes of this entry, North America is defined in ethnological terms to include the continental area north of Mexico City. Early anthropologists differentiated the cultural and political attributes of the occupants of this large landmass from those of Mesoamerica – particularly the state-level societies of the Valley of Mexico, the Yucatan, and areas further south – and organized groups into culture areas based on cultural and material similarities and differences (Fig. 1). They recognized that Native North America was by no means uniform, since it was marked by considerable phenotypic variation representing more than 500 ethnic groups speaking nearly 300 languages organized into some 60 discrete linguistic families. Europeans lacked the conceptual framework to account for these populations when they first encountered them in the sixteenth century, leading to a range of divergent ideas

North America During the European Contact Period, Fig. 1 Culture areas of Native North America and the locations of select ethnic groups when first documented in written records. (Map drawn by Jason Glatz)

about their history and origins. Archaeologists have since demonstrated that North America has been occupied for over 10,000 years, while many Native groups claim ancestry on this continent since time immemorial.

A few archaeologists have proposed trans-Atlantic contacts in pre-Columbian times, some even dating back to the Upper Paleolithic. However, with the exception of limited Norse settlement in the north Atlantic, no contacts prior to CE 1492 have been substantiated archaeologically. Thus, the contact period in North America began in the late fifteenth century and "by convention... commonly refers to the temporal range in which European colonists and Native peoples established social relations" (Wilcox 2009: 27). Of course, Indigenous communities interacted with culturally diverse peoples prior to the arrival of Europeans. Moreover, because contact can take many forms, it is incumbent upon scholars to define what they mean precisely by "contact" and to justify its analytical utility.

Bradley (2012) has suggested four phases or stages in the contact experience. The first phase is a rumor or report of an unusual occurrence. The second phase is marked by physical evidence such as a piece of imported brass or a glass bead. In the next phase, initial face-to-face contact occurs, and this becomes sustained interaction in the fourth phase. These phases may occur very rapidly or over a period of decades in some regions.

The first two phases have been referred to as "protohistory" to describe the indirect impact of Europeans (Paterson 2011: 167). This connotes derisively that Natives lived "before history" until Europeans arrived, a distinction reified by the term "prehistory." While the terms prehistory and protohistory are fading from use in many scholarly circles due to their pejorative connotations, documentary sources undeniably were created and are available for study in some cultural

contexts (when literate people were present) and not in others. Rather than seeing documents as creating a gulf between periods, they can be viewed more profitably as another line of evidence for historical reconstruction. Of course, written documents are no panacea for historical archaeologists and must be used critically just as should all sources since they harbor biases and limitations (see Galloway 1991).

Some archaeologists have critiqued the contact period terminology and the conceptual baggage associated with it (Silliman 2005), preferring the term "colonialism" because contact implies a benign relationship of relatively short duration. On the other hand, colonies as an extension of empire did not exist for much of North America until the last half of the seventeenth century when both the French and the English became real imperial powers. Before that, most of the European settlements in eastern North America were commercially based enterprises or religious refuges. The advent of colonialism involved "the projects and practices of control marshaled in interactions between societies linked in asymmetrical relations of power, and the processes of social and cultural transformation resulting from those practices" (Dietler 2005: 54). Contact in North America consistently carries colonialist connotations.

Colonies, by their very nature, are associated with states and empires during periods of expansion (Rogers 2005: 353). Colonial ventures provide opportunities for trade, information exchange, technological transfer, and ethnogenesis – the creation of new ethnic groups and forms of cultural practice. From an archaeological perspective, colonialist relations often involved goods that were produced, exchanged, and employed to further the colonial enterprise or resist its imposition, along with the ideological changes and continuities that accompanied it. Given its focus on the long-term and the material conditions of social life, archaeology is well poised to contribute to our understanding of cultural contact and entanglement. By examining the expansion of the capitalist world system – which was responsible for the most extensive implementation of colonialism (and contact) in world history – archaeology can expose evidence that is complementary and sometimes contradictory to written documents (Nassaney and Johnson 2000b; Dietler 2005: 50). The archaeology of contact is firmly grounded in the field of historical archaeology, which emerged in North America in the 1960s as the study of the expansion and impact of European culture. While material culture in all its forms is central to the field, historical archaeologists typically employ multiple lines of evidence produced in different contexts to interrogate and interpret how artifacts and the built environment were implicated in the interactions engendered by contact in North America.

Native North Americans on the Eve of European Contact

Prior to European explorations, mobile hunter-gatherers, semisedentary horticultural societies, and more centralized agricultural groups occupied most of North America north of the Rio Grande. Farmers dependent upon maize, beans, and squash were concentrated in the Eastern Woodlands and in arable areas of the Southwest (Fig. 1), whereas others could rely on the natural bounty of the environment that yielded plentiful plant and animal food resources that varied by season and locale. Some groups modified the landscape to increase resource productivity through the construction of raised fields, irrigation ditches, fish weirs, and wing traps to capture animals. Many also managed resources through controlled burning that encouraged edge areas and promoted other ecological benefits. Native peoples everywhere scheduled their activities and movements in accordance with the spatial and temporal distribution of resources and devised social networks to buffer against resource fluctuations. Reciprocity was widely practiced as the means by which goods were distributed and consumed.

Kinship was the dominant metaphor in Native societies and created a sense of belonging by virtue of the roles that were assigned to individuals according to age, gender, and skill. Women were generally seen as life givers and in charge of reproduction, plant gathering, cultivation, and child rearing. Men, in contrast, played a more public role spending much of their "time away

from their villages and families, hunting, trapping, fighting, and conducting diplomacy" (Kicza and Horn 2013: 22).

Political positions ranged from achieved to hereditary in different ethnic groups. Power was seldom monopolized as leaders were expected to lead through example and consensus was usually sought. While men held many of the political offices in Native societies, women were not excluded. They could also exert influence both directly through the leaders they selected for office and indirectly through gossip and other informal means. In general, male and female roles were seen as complementary in Native societies without one having dominion over the other (cf. European patriarchy).

Native cosmology recognized various animated forces at work in the universe, both in this world and in the upper and underworlds. Phenomena and objects as diverse as trees, the wind, illness, stone tools, animals, and celestial bodies were seen to have inherent qualities that were to be respected as part of an interdependent web of connections that were important to sustaining human life. Ritual acts were often oriented toward maintaining those interconnections so as to achieve and renew the physical, social, and ideological well-being of individuals but more importantly, the community. This is the worldview that guided many Native peoples as they tried to rationalize and accommodate the European invasion.

Early European Explorations and Encounters in North America

Europe was marked by an expanding mercantile economy in the fifteenth century with the capital and infrastructure to seek out raw materials and luxury goods in distant lands. Early encounters with Native peoples were initially unintentional and incidental; Native groups were not initially part of Europeans' imperial designs, though they were subject to immediate manipulation to ensure a competitive advantage in territorial expansion. While the history of encounters and appropriation varies in its details, what followed for several centuries throughout North America are a recurrent series of social, political, economic, and ideological contests that pitted Native against newcomer in a struggle for power and hegemony. Abductions, disease, warfare, exchange, intermarriage, migration, conversion, overexploitation, accommodation, and rebellion occurred repeatedly on a pan-continental scale as a result of cultural interactions involving misunderstanding, fear, greed, and power.

In the early years of contact, European settlement was often tentative and ephemeral. Natives usually outnumbered Europeans who depended upon their hosts for subsistence, marriage partners, appropriate technologies, and information needed for survival. To court their favor, Europeans often presented Natives with gifts such as cloth, glass beads, brass bells, copper kettles, iron hatchets, knives, axes and other metal implements, which they employed in familiar and innovative ways (Loren 2008). Failure to live up to Native protocols in exchange and other interactions was often disastrous, leading to conflict and ruin (Mallios 2006). Eventually, European disease, warfare, and subversive political tactics weakened Native groups allowing Europeans to gain a foothold. But not before Native groups made concerted, collective efforts to repel Europeans and restore former cultural practices. Rebellions and revitalization movements, such as King Philip's War (1675–6), the Pueblo Revolt (1680), the Natchez Uprising (1729), and Pontiac's Rebellion (1763), were common events throughout the history of contact. European imperial desires could be thwarted by Native actions indicating that outcomes of contact were always contentious, often negotiable, sometimes amicable, and never inevitable. This is easily forgotten when the history is told from the perspective of the dominant culture that assumed Native disappearance, marginalization, or absorption instead of continuity, persistence, and survivance. This divergence of perspective fuels the politicization of the contact period and leads to significant disagreements over reconstructions of the past. The causes and effects of European and Native actions are of central importance to our understanding of the contact period and are constantly being reinterpreted in light of new theoretical frameworks that illuminate data from varying angles, a recurrent theme of this essay.

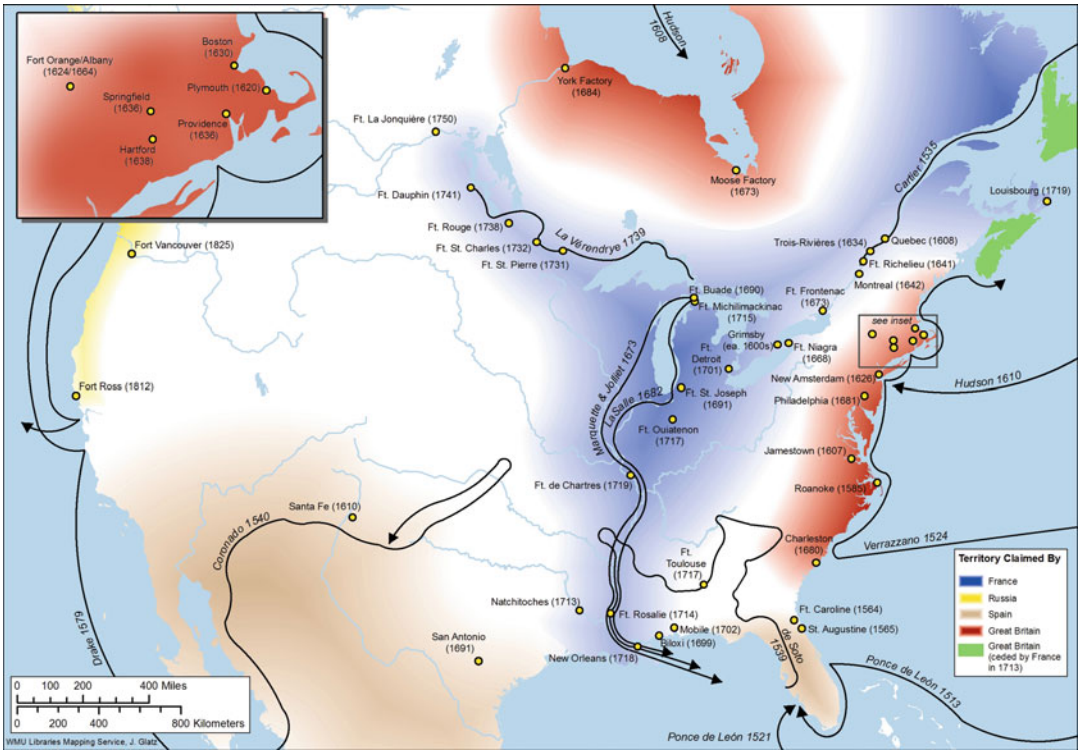

North America During the European Contact Period, Fig. 2 Routes of European explorers, territorial claims of European powers, and locations of early colonial settlements and archaeological sites. (Map drawn by Jason Glatz)

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In the sixteenth and seventeenth centuries, the Spanish, French, Dutch, and English vied openly against each other in North America (Fig. 2). Expansion was driven by efforts to discover a westward passage, find new tribes to convert, search for resources, and stake territorial claims. Explorations across the north Atlantic were undertaken to exploit rich sources of codfish or seek a more direct route to the Far East, which gradually led to increasing geographic knowledge of the North American landmass. Capitalizing on developments in seafaring technologies, England, France, and Spain became the dominant colonial powers as they claimed territory and established permanent settlements in North America. The shifting political geography of North America reflects the ebb and flow in the fortunes of various empires as they attempted to control land and exploit profitable commodities to bolster national pride and fill royal coffers.

By the middle of the eighteenth century, England had permanent settlements along the Eastern Seaboard from the Gulf of Maine to the South Atlantic Slope with a combined population in excess of one million colonists (Fig. 2). English posts also ringed Hudson's Bay to take advantage of prime northern fur-bearing animals. France had entered the interior of the continent through the St. Lawrence River valley and expanded west into the Great Lakes region, nearly to the Rocky Mountains, and down the Mississippi River Valley to the Gulf of Mexico. Spain had settled the southern reaches of the continent, following on the early explorations of de Soto in the Southeast (1539) and Coronado in the Southwest (1540). They eventually blended missionary and agricultural activities to harvest souls and cash crops through the use of Native labor.

The Spanish first landed in Florida in 1513, though their efforts to colonize the Southeast were largely unsuccessful. The de Soto *Entrada*

(1539–1543) traveled hundreds of miles through the region and eventually crossed the Mississippi River. Its chroniclers have left us tantalizing glimpses into chiefly societies before their dissolution. Apart from the presence of a limited number of Spanish goods in Native sites, the most lasting effects of the *Entrada* were the trail of destruction left in its wake and the deleterious effect that disease may have had among the population. Spanish settlement, beginning with the establishment of St. Augustine (1565), was confined to Florida. Towns, fortifications, and missions soon dotted the landscape until the late eighteenth century when Spain ceded Florida to the English.

Spanish settlement of the American Southwest followed from the successful conquest of the Aztecs further south in the sixteenth century. Northern Mexico contained some of the richest silver deposits in the region, prompting the Spanish to found mining towns and establish farms and ranches to feed these communities (Kicza and Horn 2013: 121). The Spanish also established missions on the frontiers of their empire in Texas, Arizona, and eventually Alta California (1769) as they had in La Florida. Efforts to expand north were in response to Russian exploitation along the Pacific Coast and England's territorial acquisitions after the Treaty of Paris (1763), which posed threats to the security of Spanish colonies. The Franciscans attracted Natives to their missions and attempted to convert them to agriculturalists and Christianity. The surplus produced in the missions supplied the nearby *presidios* (military bases) where soldiers were stationed for protection and to help capture runaways, demonstrate Spain's claim to California, and block Russian expansion to the south.

In the course of exploring and colonizing the continent in their search for precious metals, spices, and a route to the Far East, Europeans often settled for less lucrative resources like fish, timber, and furs, particularly in more northerly regions. Native peoples were usually recruited to harvest the raw materials, which were acquired through trade for manufactured goods. Exchange was one of the most significant mechanisms of interaction during the contact period, serving social, political, as well as economic functions. The depletion of furs in Europe enticed Basque and French fishermen to exchange iron and brass trifles for furs in Newfoundland perhaps as early as the fifteenth century. The demand for furs and hides fueled the trade, which became pervasive throughout North America and persisted for nearly four centuries. The fur trade illustrates the types of relationships that developed between Natives and Europeans and their social, economic, political, and environmental effects.

The French were especially active in the fur trade beginning in 1534 when Jacques Cartier encountered Micmac Indians near the mouth of the St. Lawrence River willing to trade furs for European goods. The English and Dutch soon entered the fray, exploring and subsequently establishing settlements along Hudson's Bay (1608) and the Hudson River (1614), respectively – bodies of water that provided access to the resources of the continent's interior. The English, Dutch, and French soon realized that furs were plentiful and potentially profitable. Competition to obtain the furs from Native producers in North America drove political and economic relations well into the nineteenth century.

Beaver was the preferred fur-bearing animal in much of North America, predominantly for its short undercoat fur that could be processed into felt for hats that marked social status in Western Europe and in the colonies. But other animals were also deemed desirable for various purposes leading to trades in buffalo, sea otter, and deer. Furs were implicated throughout North America during the contact period. Whatever the specific resource, European traders generally relied on Native peoples to capture and process the furs, for which they obtained manufactured, imported goods that served to cement the relationships that were more than merely economic in nature.

While the fur trade illustrates the close entanglements between Europeans and Natives, it also drove exploration as beaver were overexploited and sources of furs began to decrease along the Eastern Seaboard. After 1700, Native peoples in the northern fur trade no longer brought their furs to large trade fairs in Montreal; the French began

expanding west and establishing trading posts in closer proximity to their Native allies. French exploration and expansion of the trade was made possible by support from the Crown, knowledge of the interior gained from the Natives, and a desire to claim new lands in advance of other Europeans.

For the French, who were never able to attract as large of a settler population as the English or Spanish, Native relations in the fur trade were essential for their survival in the New World. The fur trade was the glue that bound the interests of the French and their Native allies against their enemies – the English and the Five Nations Iroquois. It also demonstrates that alliances were not always built along cultural lines. In an effort to secure the interior, establish Native alliances, and thwart British and Iroquois efforts to expand westward from the Atlantic Coast, the French established a string of posts in the western Great Lakes region beginning in the late seventeenth century (Fig. 2). Among them was Fort St. Joseph, an important frontier outpost in the North American interior (Nassaney et al. 2003). Initially established in the 1680s as a mission on the St. Joseph River near a strategic portage that linked the river and the Great Lakes basin to the Mississippi drainage, the fort became the keystone of French control of the southern Lake Michigan region. For nearly a century, this post served as a hub of commercial, military, and religious activity for local Native American populations and European colonial powers. It afforded a vital link in the colony's communications network and played a major role in the exchange of manufactured commodities for furs obtained by the Natives.

While the French controlled much of the trade in the St. Lawrence-Great Lakes riverine system, the English had established settlements in Massachusetts and Virginia. From Jamestown (1607), they hoped to raid Spanish vessels returning to Europe laden with precious metals. The region soon supported a considerable population that profited from tobacco production. The Pilgrim settlement at Plymouth (1620) was founded for religious freedom in an area that had been decimated by disease. The remnant peoples there welcomed the English as potential political and military allies against the Narragansetts who had been less affected by the epidemics (Kicza and Horn 2013: 153–154). The English population, which grew rapidly with settlements at Boston (1630), Springfield (1636), Providence (1636), and Hartford (1638), soon placed pressure on Native lands in the region. An early effort to confine Native groups to small tracks of land occurred in eastern Massachusetts beginning in the 1650s where John Eliot established a series of "praying towns" that were ostensibly designed to convert Native peoples to Christianity and assimilate them to English society, albeit with marginal success.

The Narragansetts and neighboring coastal groups in southern New England played important roles in colonial politics throughout the seventeenth century. These people participated in the fur trade by producing wampum – beads from marine shell – that were exchanged to the colonists for manufactured goods (Bradley 2011) (Fig. 3). The wampum was in turn moved into the interior where it was accepted in trade for furs. Through networks like this, European goods reached Native hands long before Indigenous peoples saw the traders themselves.

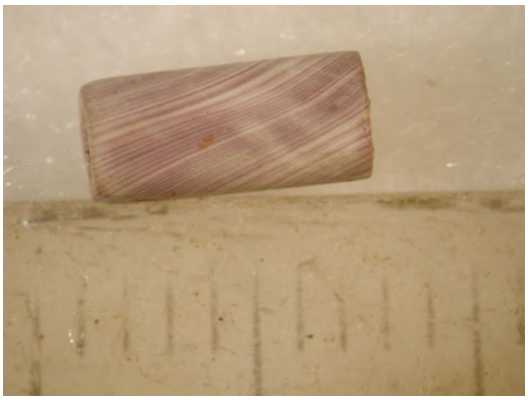

North America During the European Contact Period, Fig. 3 Wampum has been referred to as the magnet that drew the beaver out of the interior forests. Made of marine shell from coastal New England and New York, these small, cylindrical beads served political, social, and economic functions throughout the colonial period in much of the Eastern Woodlands. Length: 70 mm. (Photo by Lisa Marie Malischke)

The English also sought to access furs from the interior through a more northerly route; hence, they chartered the Hudson's Bay Company (HBC) in 1670 and established several posts along the shore of the bay to keep down costs (Klimko 2004: 160–161). As with the Montreal trade fairs, aboriginal groups were drawn to the HBC posts to trade. Also similar to the French situation, the presence of independent traders who traveled into the interior eventually forced the HBC to construct inland posts, prompting western expansion (Klimko 2004: 161) stretching all the way to what would become British Columbia and US Pacific Northwest.

In an effort to anchor Britain's claims to the Oregon Country, the HBC established the headquarters of its Columbia Department at Fort Vancouver in 1825 (Wilson 2011: 7). Over the next two decades, the fort became the fur trade capital of the Pacific Northwest with warehouses, locally produced goods, and agricultural surpluses to supply fur brigades, Indians, settlers, and up to two dozen other company posts in the department "from Russian Alaska to Mexican California and from the Rocky Mountains to the Pacific Ocean, a territory of approximately 700,000 square miles" (Wilson 2011: 7). Peoples of diverse backgrounds inhabited Fort Vancouver including English, Scots, French-Canadian, Hawaiian, Portuguese, *métis*, or from one of more than 30 Native American groups including Cree, Delaware, Haida, and Iroquois. The offspring of European fur traders and Native women led to the creation of a distinctive *métis* identity (Wilson 2011: 10). Some colonial powers such as Spain, Russia, and France encouraged interethnic unions as a strategy to populate distant frontiers (Lightfoot 2005: 216). While Britain did not, it was often difficult to regulate practices at places distant from the metropolis.

A rigid social hierarchy marked colonial life throughout much of North America. Moreover, this hierarchy was expressed through distinctive consumption patterns associated with food remains, ceramics, architecture, and a host of other prosaic objects used and discarded in daily practice. In the Columbia District of the Northwest, clerks and officers occupied buildings within Fort Vancouver's palisade, whereas *engagés* (company employees) lived in a multiethnic village of over 600 people. The higher ranks were generally English, Scottish, or French-Canadian, whereas the hired hands were French-Canadian, American Indian, Hawaiian, or *métis*. Cultural background dictated to a large degree one's occupation and prospects for economic mobility (Langford 2011: 30). In addition to processing furs, activities included logging, ship building, farming, and various crafts to support and diversify the economic pursuits of the company (Wilson 2011: 8–10). The artifacts recovered from the site testify to this social variation as well as the cultural changes that were taking place in house construction, subsistence, and dining practices and the accommodations the villagers made to intense cultural interactions.

Europeans made contact with coastal peoples of the Pacific Northwest well before the HBC. Sir Francis Drake had visited the region in the sixteenth century, but the English did not establish any permanent settlements there. However, after the Russians began to acquire and market pelts to the Chinese in the seventeenth century, they soon crossed the Bering Strait (1742) and settled in Alaska to exploit sea mammals for their furs (Lightfoot 2005). From 1743 to 1800, Russian fur traders obtained more than eight million rubles worth of skins (Gibson 1988: 376). In 1799, Tsar Paul granted the Russian-American Company a charter giving it a monopoly over all Russian economic activities in North America. Employing Hawaiians, Aleuts, Native Californians, and Creoles (offspring of Russian and Native unions), the Russians instituted a system of forced labor to acquire furs from Alaskan waters and as far south as northern California that could be sold at a considerable profit to Chinese merchants. Russian exploration along the California coast led to the establishment in 1812 of Colony Ross at the mouth of the Russian River just north of San Francisco Bay. The purpose of the settlement was to grow wheat and other crops to sustain Russian traders in Alaska, hunt marine mammals, and trade with Spanish California (Lightfoot 2005). The site was a successfully functioning multicultural settlement for nearly 30 years when the

Russian-American company decided to abandon the colony due in part to the depletion of the California sea otter population. Mexican and American settlers also posed a challenge to Russian claims in the region, demonstrating that sovereignty in North America rested on the ability to seize, occupy, and hold territory – usually by force.

This brief overview suggests that there was significant temporal, spatial, and cultural variation in the activities associated with Native and European interactions in the contact period of North America. Yet similarities abound as all areas experienced trade, information exchange, technological innovation, and the creation of new forms of cultural practice (Rogers 2005: 352–3). Archaeology can provide the data to examine how these large-scale processes were experienced at the local level since archaeological materials derive from daily activities. Approaches to the archaeological record of contact have changed over the past century in accordance with intellectual shifts both internal and external to the discipline and form the basis for the following discussion.

History of Archaeological Investigations into the Contact Period

Anthropologists showed little interest in the contact period and its consequences in the early twentieth century. Driven by the salvage ethnography that aimed to capture traditional Native culture prior to contact, ethnographers such as Franz Boas, Alfred Kroeber, Robert Lowie, and Julian Steward aimed to reconstruct Native societies unspoiled by European influence (Ramenofsky 1991). The prevailing ideology of the dominant society posited the vanishing Indian; assimilation was seen as the means for Native survival, as promulgated in government policies such as the Dawes Act of 1887, which sought to complete the process of dispossessing Natives from their land. With the advent of acculturation studies in the 1930s and the work of the Indian Lands Claim Commission (1940s), archaeologists began to examine the impact of European culture on Native societies. They aimed to demonstrate the ways in which Native societies had become more like European ones, perhaps most readily apparent by the imported goods that they had adopted. The advent of processual archaeology in the 1960s, which sought generalized and dehistoricized explanations for human behavior, did little to promote contact period studies (Wilcox 2009: 46–48), nor did the rise of historical archaeology that focused on European sites of national significance like Williamsburg, Mount Vernon, and Monticello, though trading posts were also of interest (e.g., Fort Michilimackinac). Most of the posts were examined for purposes of reconstruction with the aim of interpreting their role in manifest destiny and in support of other national myths (see Klimko 2004).

The Native American Reorganization Act of 1934, Native activism such as the formation of the American Indian Movement in the 1960s, increasing numbers and vocalization of federally recognized groups, and the debates that led to the Native American Graves Protection and Repatriation Act (1990) laid the groundwork for the conceptual spaces needed to discuss Native history, the contact period, and colonialism in fundamentally different ways by the late twentieth century. Despite claims to the contrary, Native living descendants had not vanished. Many were hidden in plain sight, and their cultural persistence, as expressed in practices and beliefs that set Indigenous peoples apart from the dominant society, contradicted the dominant narrative and the biological imaginings that justified dispossession. Under the banner of post-processual archaeology, interpretations shifted toward an interest in meaning, an insider's perspective, and multivocality. While it is difficult to tease out the influence of Native voices from the contributions of other disenfranchised groups (e.g., people of color, other minorities, and women) to this movement, what is clear is that political action effected this change (Nassaney 2012). As a result, Indigenous peoples and other stakeholders throughout the United States and in many other parts of the world are now seen to have a legitimate interest in the past and, by extension, a concern for archaeology. More specifically, the interpretations given to the events of the contact period have practical implications. Furthermore, Native experiences in

the contact period were different from those of the colonizers. This realization underscores the idea that archaeological interpretations can serve, reinforce, or challenge dominant *and* subordinate ideologies. These pragmatic concerns over power inform the interpretive frameworks that have been used to examine the contact period, a summary of which follows.

Interpretive Frameworks

Whatever happened in the European contact period remains unchanged; however, our perceptions of it are constantly in flux due to shifts in the way we see the world based on our theoretical framework, social identity, and a host of other factors (Nassaney 2012). A number of interpretive frameworks have been employed to examine the contact period. They are presented in roughly chronological order, but they should not be seen as paradigmatic replacements. Some approaches are complimentary, while others are clearly contradictory and developed in response to shortcomings of previous perspectives.

Acculturation was the dominant interpretive framework for understanding the contact period for most of the twentieth century. Acculturation often carried the embedded assumption that European culture was destined to replace Native cultures due to racial and technological superiority. This explained the drastic and continued decrease in Native population and the proclivity of the survivors to adopt European goods. Researchers employed this relatively straightforward – though in hindsight theoretically unsophisticated – research methodology by comparing quantities of traditional and imported objects to assess the extent to which Indians had become civilized. The increase in Western goods over time was interpreted as evidence for the inevitable process of cultural decay.

The rediscovery of Marxian approaches in anthropology in the work of Eric Wolf and others in the 1950s paved the way for a concern with political economy and the ways in which labor is organized and surplus is mobilized on a global scale. World-system theory sought to explain the factors that led to global inequities and identified core areas of resource accumulation and peripheral areas of resource extraction. Gold and silver mines in Spanish possessions, English plantations run by African slave labor, the French fur trade, and other New World practices were the means by which Europe underdeveloped and economically marginalized their colonial subjects. While world systems explained the growth of mercantile capitalism, it failed to account for the diversity of responses at the periphery and denied the disenfranchised proletariat the exercise of agency in their actions and avenues for self-expression, accommodation, and resistance.

Critical theory is another organizing framework that owes its genesis to Marx and his predecessors and has played a role in contact studies (Nassaney 1989, 2012). Critical theorists posit that contemporary social and political conditions influence interpretations of the archaeological record that, while created in the past, only exists in the present. Thus, material remains are subject to varying interpretations according to the personal and political predilections of the interpreter. Critical theory calls us to recognize that the archaeological record is underdetermined with ample room for ideological bias to creep in.

It follows that seemingly disempowered stakeholders in excluded positions can use archaeology to challenge the status quo and subvert a dominant ideology. In the post-NAGPRA world, an Indigenous archaeology has emerged that aims to reintegrate "Indigenous materials, remains, history, and research with contemporary Indigenous peoples" and their concerns (Wilcox 2009: xii). By creating conceptual space for Indigenous matters, the narratives that posit the disappearance and alienation of Native peoples from their pasts can be reversed, and attention can be focused on explaining the rather remarkable existence of Native peoples in contemporary society 500 years after Columbus (Wilcox 2009). The archaeologies that result from such practice and our understandings of the contact period will be fundamentally transformed.

While yet to be fully realized, some archaeologists are attempting a comparative study of colonialism through which the experiences of all people within the contact period in North America and beyond can be juxtaposed to gain an

understanding of "glocalization" – the intersection between the global processes that accompanied contact everywhere and the local responses of colonial subjects (both colonized and colonizers). Moreover, the genres have become blurred, to paraphrase Clifford Geertz, in a process of hybridization that challenges us to avoid essentialized categories like dominant/subordinate, colonized/colonizer, and continuity/change. These identities are increasingly seen as fluid and situational and can be no more fixed in matters of policy than in material practices. The archaeology of the contact period, with its theoretical ebbs and flows, gives us an opportunity to create a new world in the twenty-first century as we simultaneously rewrite the past by interpreting material remains in ways that accord with a larger chorus of voices that strives for justice and equity. Ultimately, the archaeological study of the contact period can shed light on cultural continuities and discontinuities as two sides of the same coin and its significance for understanding ourselves in the present.

Framing Questions and Enduring Themes in the Archaeology of European Contact

Just as our understanding of the contact period is in flux, so too are the framing questions that we pose about the past. Yet in an effort to situate knowledge claims, culture contact archaeologists want to know what we know about past culture contact and how we know it. They aim to determine the types of encounters that occurred and their outcomes. Moreover, they are particularly interested in the material manifestations of the human responses to culture contact.

Murray (2004) has identified five variables of interest in the archaeological study of contact in settler societies, which were developed to examine contact in a comparative framework. These include (1) chronology of colonization, (2) types of societies encountered, (3) intentions of the colonizers and responses of the colonized, (4) demographics of colonization, and (5) duration of colonization (see also Lightfoot (2005) and Rogers (2005) for complementary organizing frameworks). Although these categories are by no means mutually exclusive, they can serve to focus the study of the archaeological evidence in the contact period in select areas of North America in an effort to highlight enduring themes.

Basic archaeological matters of space, time, and form interest archaeologists who study culture contact, even though they have access to documentary sources. Researchers continuously work to establish a chronological framework for contact by creating artifact typologies that are temporally sensitive (e.g., Quimby 1966). In the Southeast, archaeologists have tried to identify and locate objects associated with de Soto in order to trace his travels through the region. More importantly, such objects can increase temporal precision of sites in order to examine their distribution over time to evaluate models that posit shifting political and population dynamics prior to European contact. Chronology is an important variable because the changing political and demographic conditions of both Indigenous societies and colonizing powers influenced the type and intensity of impact. For example, the strategy and tactics that Native peoples used to counter English colonialism in southeastern New England changed considerably after their experiences in the Pequot (1637) and King Philip's (1675) wars; thereafter, they employed new strategies of accommodation to ensure biological survival that influenced settlement-subsistence strategies and land use practices.

The nature of social formations had a significant impact on the activities and outcomes of colonial interactions. Groups ranged along a spectrum from relatively egalitarian, hunter-gatherers to more centralized, ranked societies. These organizational forms often correlated with population size and surplus mobilization. As European populations increased, Native mobility was compromised making it difficult to maintain traditional subsistence practices. The result was often a decrease in mobility, more intensive land use practices, or wage labor that required new seasonal movements.

The effect of contact on Native peoples has been a central issue in the study of culture contact. Research shows that there was considerable variation in the "degree to which colonial agents actually dominated native peoples and exerted

power in the exploitation of resources, goods, and labor" (Lightfoot 2005: 210). In order to assess this process in qualitative and quantitative ways, archaeologists often sought to establish an ethnographic baseline. Thus, considerable efforts have been expended on identifying the precontact predecessors of historically documented ethnic groups often using the direct historical approach. Archaeologists have also challenged the reliability of the ethnographic record, arguing that groups were compromised by disease and population loss and consequently were fundamentally transformed by the time their lifeways were documented (Ramenofsky 1987). While most archaeologists agree that Native societies had no immunity to Old World diseases before contact, there is little consensus on the severity of population loss. Precontact population estimates range from 1 to 18 million (see Ramenofsky 1987: 6–21). While a reliable estimate likely falls somewhere in between, it seems equally likely that catastrophic disease often led to population decline well in advance of permanent European settlement in some parts of North America such as the Lower Mississippi Valley. Those groups that were located farther inland, those that were mobile, or those that were necessary for European survival were likely to have had different post-contact experiences (Ramenofsky 1987: 175).

Permanent European settlements along the Eastern Seaboard in the seventeenth and eighteenth centuries led to large-scale population shifts from east to west over much of the Eastern Woodlands. Such movements in turn pressured adjacent groups in a domino effect that had significant consequences for group size and ethnic identity. For example, the Five Nations Iroquois experienced population decline in the early seventeenth century perhaps brought about by European disease. They used guns acquired from the Dutch to exert military pressure on neighboring tribes to obtain war captives that could be adopted as fictive kin. This aggression triggered a series of population movements that led to demographic shifts felt onto the Plains. Southwest Michigan was abandoned, and the Potawatomis migrated to the western shore of Lake Michigan where they coalesced with unrelated groups. Amalgamation was partly a result of demographic imbalances brought about by disease and warfare, factors that were critical in the changing social landscape of Native North America after contact.

In southwest Michigan, archaeologists are examining the distribution of settlements immediately before, during, and after the French and English occupancy of Fort St. Joseph. Precontact settlements seem to lack imported manufactured goods, which typically were available well in advance of permanent European settlement (cf. Ehrhardt 2005). The absence of sites that reflect the "protohistoric period" suggests that the region may have been abandoned in the mid-seventeenth century due to Iroquoian threats; reoccupation followed after the French pacified the area in the late seventeenth century. Suffice it to say that population movements were extremely dynamic during the contact period reflecting new economic practices, political strategies, and military tactics.

The timing of contact and the composition of the social groups involved were related to the intentions of the colonizers and responses of the colonized. When sixteenth- and seventeenth-century French explorers were seeking a westward passage, they solicited information from Natives as to the existence of interior water routes that led to an inland sea. In the course of their initial chance encounters with Native peoples, they often exchanged goods of little economic importance to ensure safer passage and reliable information. When it became apparent that the existence of any such route lay far to the west, relations became less casual and more formal as each group saw the other as a potential ally in the larger political machinations that mark human groups everywhere.

As pointed out by Marcel Mauss nearly a century ago, economic exchanges in the form of gifts serve to solidify social relations, and European contact in North America was no exception. Inspired by the acculturation paradigm, archaeologists have used material remains acquired as gifts and in exchange to monitor various aspects of the contact experience. Europeans acquired a host of New World products and adopted associated practices; most of these have been examined as part of

North America During the European Contact Period, Fig. 4 Modern recreations of common eighteenth-century trade goods including kettles, firearms, axes, cloth and clothing, beads, and silver ornaments. (Photo by Barbara Cook)

a larger Columbian exchange that focused on the transfer of pathogens and domesticates for tobacco and maize. Considerably, more attention has been paid to the imported, European-manufactured goods that appear in trade lists and inventories of archaeological materials from post-contact Native sites throughout the continent (Fig. 4).

Despite earlier facile interpretations, archaeological studies have repeatedly shown that Native peoples were discriminating consumers who selected objects that were consistent with their belief systems. For example, at the Grimsby site, an early-seventeenth-century Native cemetery in southern Ontario, "the Neutral were in possession of a large amount of trade goods, but this material. . . had almost no impact upon the pattern of values and attitudes which we know as Neutral culture. The people were guided by their own way of doing things, by their own cultural configuration" (Kenyon 1982: 226). Similarly, none of the trade goods that were adopted by late-eighteenth- and early-nineteenth-century Indians along the Saskatchewan River and elsewhere in the West "were necessities for daily life. Indians [acquired goods that enhanced]. . . their repertoire of artifacts without eliminating their own manufactures" (Kehoe 2000: 181). Their basic way of life was not altered until after the devastating epidemics of the nineteenth century. As for new adoptions in clothing, Native women's readiness to adopt new styles was a pragmatic choice that reflected comfort, cheapness, and "appropriation of generally desired innovations" (Kehoe 2000: 183).

The presence of imported goods in Native sites often testifies to ways in which objects were adopted, transformed, and reinterpreted within a Native worldview. Yet, these seemingly practical choices also had unintended consequences. For example, copper-base kettles were commonly acquired by Natives after contact and were frequently buried with their owners or users at the time of death (Fig. 5). Kettles were subject to wear rendering them in need of repair until the end of their use life when they were frequently cut into ornamental shapes in the form of tinkling cones, hair pipes, or beads (Fig. 6). Such goods were exchanged over long distances and were often acquired by Native peoples well before they encountered Europeans themselves (Ehrhardt 2005). Kettles also afforded some people greater mobility. For example, when the Micmacs received copper kettles in exchange for furs, they were no longer tethered to large wooden caldrons for food processing and hence ranged further afield in search of furs thereby expanding their hunting territory (Martin 1975).

This and numerous other examples demonstrate how Indigenous peoples adopted European technology and used it in new ways that led to

cultural changes. Archaeologists may be hard-pressed to distinguish between processes of change and continuity as both are simultaneously at play. The adoption of alien goods challenges archaeologists to reconceptualize objects as having essential characteristics indicative of Native or European culture. Furthermore, some objects like tinkling cones and wampum had their genesis in the process of cultural exchange and are clearly products of cross-cultural interaction.

North America During the European Contact Period, Fig. 5 Brass kettles, like this eighteenth-century specimen from the vicinity of Fort St. Joseph, were often acquired by Native peoples and used in ways that were both intended and unintended by their European makers. (Photo by Roger L. Rosentreter. Courtesy of the Fort St. Joseph Museum Collection)

In late-seventeenth- to mid-nineteenth-century plantation contexts from the Chesapeake south to the Carolinas, archaeologists have recovered a distinctive ceramic type referred to as colonoware – a low-fired, often locally produced, hand-built earthenware (Singleton and Bograd 2000). Interestingly, it exhibits traits of both Indigenous and African ceramic traditions, often rendered into forms that appealed to British colonial tastes (Fig. 7). While archaeologists initially thought Indians made it, a growing consensus suggests that colonoware is a product of interaction constructed by both African and Native Americans. It exhibits certain preferable qualities that had practical advantages over iron pots and other kinds of cookware. Moreover, they were found "in the kitchens of planter families as well as in the cabins of slaves" (Singleton and Bograd 2000: 15). This example emphasizes the meaning of an artifact to the people who used it over who made it. It also points to the syncretism and cultural borrowing that characterized the contact period for several centuries.

While domestic settings often reflect the role of artifacts in daily use, mortuary remains represent a context in which Native peoples negotiated new social relations and manipulated material culture to express old and new beliefs in an effort to counter colonialism. Recent archaeological studies have shown that ritual acts and associated objects were significant elements in Native responses to the changing social and political

North America During the European Contact Period, Fig. 6 Tinkling cones adorned both Native and European garments, bags, and moccasins in fur trade society in the western Great Lakes region. (Photo by Brock Giordano. Courtesy of the Fort St. Joseph Museum Collection)

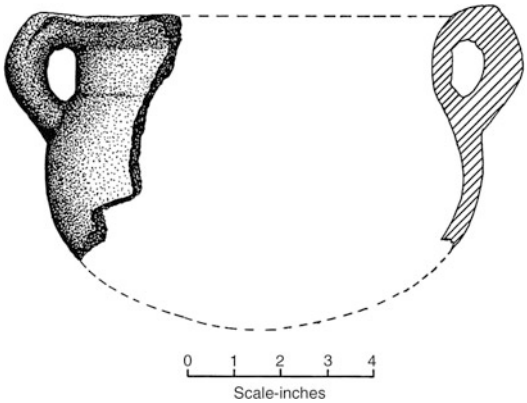

North America During the European Contact Period, Fig. 7 This colonoware vessel from Fort Moultrie in South Carolina imitates the form of a legless iron pot, complete with round, loop handles. (Courtesy of the University of South Carolina Institute of Archaeology and Anthropology)

North America During the European Contact Period, Fig. 8 White clay pipes were mass produced initially in England and Holland and traded extensively throughout North America in the seventeenth and eighteenth centuries. Photo by Tori Hawley. (Courtesy of the Fort St. Joseph Archaeological Project)

conditions brought about by European interactions (see Nassaney 1989, 2004).

In southeastern New England and elsewhere in North America, Native religious practitioners employed tobacco in sacred rituals to ensure spiritual and physical well-being. Social disruptions brought about by disease and warfare challenged Indigenous beliefs leading some segments of society to search for new ways to secure their own earthly or heavenly salvation. Archaeological and ethnohistorical evidence suggests that smoking became more widespread in Native society by the mid-seventeenth century as men, women, and children adopted it. While the expansion of the practice was facilitated by the introduction of widely available European-manufactured white clay pipes (Fig. 8), the reasons for the expansion of the practice were more complex than mere emulation of European recreational usage. Instead, there was an attempt to expand and redefine aspects of Native ritual activity to rectify a declining social and spiritual order (Nassaney 2004: 135). Women were active agents who sought to appropriate tobacco to rationalize the demographic, social, and political upheavals that Native communities experienced. Their efforts are visible in new artifact forms and changing mortuary patterns that signal an attempt to ameliorate the imbalances that Europeans caused.

Female use of tobacco in Native society was an attempt to connect with the cosmological forces that could help restore balance in an increasingly unintelligible world of death, animosity, and conflict. As tobacco use expanded in society, ritual became less institutional and more personal as the efficacy of religious specialists was called into question. The practice became popular among those who circumvented the hegemony of traditional healers and sought their own direct communication with spirit beings.

Pipes are not the only artifacts that had ideological significance for Native peoples under colonialism. Effigy pestles, which are long cylindrical stones with a sculptured representation at one end (Fig. 9), were made and used during the contact period in the greater Northeast (Nassaney and Volmar 2003). The recurrent association of these artifacts with women in death and in folk tales and the animals they depict suggests that these artifacts are symbols of female power that were first crafted in the seventeenth century. Furthermore, the creatures they depict evoke mythological symbols of supernatural beings that signal women's social position in Algonquian society. In the onslaught of a crumbling social order that challenged the predictability of roles and relations, it appears that individuals developed new ways to make contact with other worldly forces

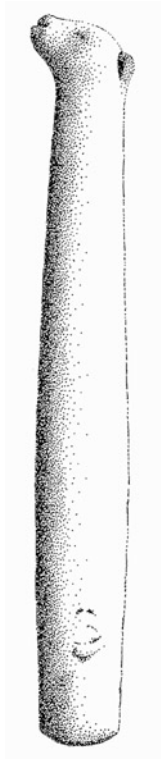

North America During the European Contact Period, Fig. 9 Effigy pestles recovered from archaeological sites in southern New England seldom exhibit utilitarian wear suggesting they served a different function. This bear effigy was recovered from the Burr's Hill site, an eighteenth-century Wampanoag cemetery in Warren, RI, along the eastern shore of Narragansett Bay. (Drawing by Pamela Rups)

and beings as a way to rectify an unstable situation represented through mortuary ritual and effigy pestles.

Native peoples exhibited cultural flexibility and resilience by incorporating many Western forms of material culture into their way of life (e.g., white clay pipes). Yet many core features of Native culture persisted. Despite a decrease in their numbers and land base and the encroachment of colonists, they retained and reshaped their ethnic identities as they sought to remain autonomous communities (Kicza and Horn 2013: 184).

One means of ensuring cultural and biological survival in the contact period was the interethnic unions formed between individuals – the most intimate of interactions. Mixed-race groups emerged in the form of Spanish *mestizos*, French *métis*, and Russian Creoles. Most often, they were the offspring of Native women and European men. Loren (2010) has examined how this new identity was expressed archaeologically through the medium of clothing and adornment. She finds archaeological, historical, and ethnographic examples of attire that reveal a pattern of varied small finds such as shell ear pins, tinkling cones, and brass buttons worn by people who exhibited mixed fashions (Loren 2010: Fig. 2.6); this intimates that disparate clothing styles were the norm for some segments of society despite sumptuary laws that prohibited them. She posits that this sartorial stance "allowed individuals to move through complex and socially restrictive colonial landscapes to create new identities" (Loren and Beaudry 2006: 266). The consumption of goods played a central role in identity formation in culturally mixed settings; objects enabled "people to locate others within social fields through the perception of embodied tastes and various indexical forms of symbolic capital" (Dietler 2005: 64).

The material manifestations of colonial entanglements are clearly revealed in the archaeological record, particularly in the objects of daily life that were used and discarded; these materials are indicative of other cultural changes that permitted both Natives and newcomers to persist. For example, cloth was among the most frequently traded commodities by value and volume, despite the abundance of less perishable iron, brass, and glass artifacts in the archaeological record. The acquisition of cloth contributed to a decline in the production of leather and hide clothing, which were labor-intensive tasks that were predominantly women's work (Anderson 1994). Thus, women could reallocate their labor to other activities, perhaps associated with processing furs for the burgeoning European market or embroidering beads onto garments using distinctive Native motifs. Thus, Indigenous labor often focused on a more limited range of activities, sometimes driven by European demands. Rogers (1993) documented a major decline in Arikara artifact categories linked to several activity sets such as scraping, pounding, knapping, and chopping among others and an increase in many of the Euro-American activity sets on the Northern Plains in the first third of the nineteenth century. This pattern suggests discontinuities in activities as a consequence of social disruptions caused by contact.

Some European goods acquired in exchange for furs were substitutes for Native counterparts,

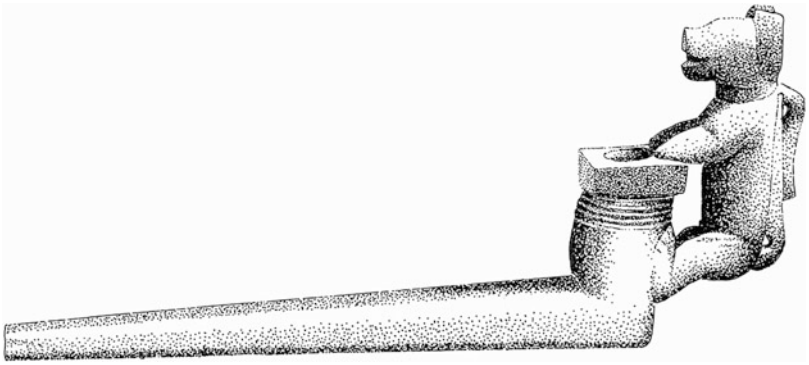

North America During the European Contact Period, Fig. 10 An elaborate lapidary industry developed in New England after contact once Natives gained access to metal files. Stone pipes were among the objects produced, including this specimen from the Burr's Hill site, in Warren, RI. (Drawing by Pamela Rups)

but many were used in distinctively Native ways. Some objects (e.g., military attire) served as markers of newly emergent political statuses, which increased social inequalities, whereas other commodities (e.g., iron drills, files) facilitated the intensification of wampum production and a lapidary industry used to create elaborate forms of smoking pipes (Fig. 10). Commodity exchange affected Native groups in two other related ways. First, imported goods often replaced Native goods freeing up time for Native producers to reallocate their labor, as in the case of the adoption of European cloth. Second, Native peoples channeled their labor to produce goods that Europeans wanted to acquire. For instance, the English were eager to obtain maize from Native trading partners in the early stages of their interactions in southeastern New England. Later on, they demanded increasing quantities of wampum to secure economic stability and increase political influence in the region. Thus, Native participation in the fur trade had a significant influence on the ways in which labor was allocated and organized. By the end of the seventeenth century, the events of the colonial encounter that left many people landless made it impossible for them to maintain an economy that reflected an earlier (i.e., precontact) division of labor and enticed them into becoming wage laborers. But Native peoples were responding to these new conditions even before they became dispossessed.

Native efforts to meet European demands for deer hides in the Southeast are reflected in butchering patterns observed on deer carcasses during the seventeenth century in the Ridge and Valley province of the Appalachian Highlands. Some sites "show a greater reliance on white-tailed deer and a decline in the diversity of non-fur-bearing animals" as a result of participation in the deerskin trade (Lapham 2005: 22). Native hunters developed a selective predation strategy intended to procure deerskins specifically for commercial trade (Lapham 2004: 189). Evidence of intensified processing activities throughout the region is also reflected in the increased production and use of beamers – bone tools "used to scrape hair and fatty debris from deerskins during the initial processing stage" (Lapham 2005: 23). Finally, deer bones exhibit cut marks consistent with skinning to maximize the size of the hide that was removed intact.

In sum, new production activities that developed to fulfill European desires led to the acquisition of manufactured goods that effectively replaced their Native counterparts soon after contact. Metal knives, axes, and drills quickly replaced many types of stone tools (Nassaney and Volmar 2003). Metal hoes also became common, although some elderly women resisted their adoption and sought to retain their shell equivalents in seventeenth-century New England. The broad range of European cloth types at a Narragansett Indian cemetery may be taken to indicate that cloth became widely available after 1650. Brass kettles and imported ceramic containers made Native ceramic technology nearly obsolete by the end of the seventeenth century in the Northeast and the Midwest, though it apparently persisted in areas of the Southeast well into the

nineteenth century. Caddoan ceramics in east Texas were produced until 1805 and were common on Spanish mission sites, suggesting the incorporation of Native elements into the mission system (Perttula 1993: 104). While generalizations can be offered for the observed patterns, it remains necessary to examine localized contexts to illuminate why some practices and goods were absorbed into the everyday lives of people, while others were ignored, rejected, or contested (Dietler 2005: 62).

European contact also had profound ecological consequences that are reflected archaeologically. Cronon (1983) examined the impact of the introduction of new species on Native societies. While some groups were reluctant to adopt Old World domesticates, remains of cow, sheep, swine, chicken, and various imported plant foods like peaches and watermelons have been recovered from Native sites throughout North America. Furthermore, the behaviors of large ungulates like horse, pigs, and cattle threatened the habitats of animals that Native peoples depended upon with deleterious effects on Native subsistence strategies.

The demands brought about by the commercial harvesting and processing of animal resources, especially as related to the fur and deerskin trades, often led to overexploitation. Native peoples responded by relying on alternate species, moving their settlements, or engaging in wage labor. The Dutch arrived in New Netherlands in 1624, and trading posts were soon established on the Connecticut and Delaware rivers. Yet the decimating effects of the early fur trade forced the Dutch to move their posts upriver when coastal beaver populations were overhunted (Brasser 1978: 82). The outcomes of overexploitation drove fur traders and Native hunters further inland and upriver throughout the seventeenth and eighteenth centuries. Commercial hide exploitation redirected exchange networks, altered political alliances, created political factions, reshaped gender relations, and transformed belief systems (Lapham 2004: 191). The forces set into motion during the contact period had enduring effects.

Future Directions

North America during the European contact period has been well documented through the writings of explorers, settlers, soldiers, and missionaries. However, this record reflects the perceptions of a small, literate segment of the population. Natives passed down their experiences after contact through oral traditions, though these are often inaccessible to researchers who have either neglected to consult them or have been unable to decode them for historical and anthropological information. While both documentary sources and oral accounts have great potential to inform on the North American contact period, both Natives and newcomers left an equally important body of data that can be exhumed and interpreted to examine what happened in the past and who was involved. While archaeology is fragmentary by its very nature and subject to its own set of biases, it "offers a continually evolving database that can serve as a crosscheck against insights gained through other approaches" (Nassaney and Johnson 2000b: 5). Artifacts are also multidimensional symbols, insofar as they express technological, social, and ideological aspects of culture simultaneously. It is their multivalency that makes them such powerful interpretive tools.

Thus, archaeology can furnish evidence about the contact period that is different from and independent of the colonial texts of historians (Dietler 2005: 50). It can reveal the subaltern histories that were created alongside the dominant narratives and in so doing, contribute to the historical experiences of marginalized groups. This has long been a hallmark of historical archaeology. Recent archaeologies of colonialism have continued to examine the "conditions surrounding Indigenous peoples' engagement with Europeans and the impacts of those entanglements on material and social identities" (Nassaney 2012: 6). Some have concluded that the collaborative study of colonial contexts can work to decolonize archaeological practice by promoting a redistribution of power and authority through the creative flow of knowledge among different partnering groups (Atalay 2006; Nassaney 2012).

Should archaeology continue to follow this direction, it will become increasingly emancipatory by providing a conceptualization of the contact period that aims to "pay homage to hybridity, emphasize cultural fluidity, acknowledge human agency, and empower contemporary cultural groups who have a stake in the history of. . . the colonial enterprise" (Nassaney 2012: 17). Archaeologists of this ilk will become receptive to the concerns of stakeholders who have a vested interest in the analysis of the contact period impelling efforts to be more inclusive in practice. Even in the absence of direct collaboration "non-Indigenous archaeologists need to help each other develop the capacity to witness how we reproduce a colonialist discourse" as they "examine and rectify their own colonial practices and work toward a broader reconciliation between their practice and the stakeholders with whom we share an interest" (Nassaney 2012: 18).

Archaeology of the North American contact period is still in its infancy, but it will come of age by embracing right relations. This will require practitioners to face up to the colonialist legacy so that we can all recover from it, engage in the process of healing, and make ourselves whole. There is a profoundly spiritual dimension to the work of interpreting the North American contact period. Archaeologists hold the tools to amend past wrongdoings and create greater equity in a way that restores dignity to all the historical agents who became entangled in contact, whether of their own doing or not.

Cross-References

- ► Colonial Encounters, Archaeology of
- ► Indigenous Archaeologies
- ► Mission Archaeology in North America
- ► North America (USA): Historical Archaeology

References

Anderson, D.L. 1994. The flow of European trade goods into the western Great Lakes region, 1715–1760. In *The fur trade revisited*, ed. J.S.H. Brown, W.J. Eccles, and D.P. Heldman, 93–115. East Lansing: Michigan State University Press & Mackinac Island: Mackinac State Historic Parks.

Atalay, S. 2006. Indigenous archaeology as decolonizing practice. *American Indian Quarterly* 30 (3 & 4): 280–310.

Bradley, J. 2012a. Re-visiting wampum and other seventeenth-century shell games. *Archaeology of Eastern North America* 39: 25–51.

Bradley, J. 2012b. From the edge to the middle, the Onondaga Iroquois in 1550 and 1675. In: Paper presented at the 77th Annual Meeting of the Society for American Archaeology, Memphis.

Brasser, T.J. 1978. Early Indian-European contacts. In *Handbook of North American Indians: Northeast*, ed. B.G. Trigger, vol. 15, 78–88. Washington (DC): Smithsonian Institution.

Cronon, W. 1983. *Changes in the land: Indians, colonists, and the ecology of New England*. New York: Hill & Wang.

Dietler, M. 2005. The archaeology of colonization and the colonization of archaeology: Theoretical challenges from an ancient Mediterranean colonial encounter. In *The archaeology of colonial encounters*, ed. G.J. Stein, 33–68. Santa Fe: School of American Research Press.

Ehrhardt, K.L. 2005. *European metals in native hands: Rethinking technological change 1640–1683*. Tuscaloosa: University of Alabama.

Galloway, P.K. 1991. The archaeology of ethnohistorical narrative. In *Columbian consequences: The Spanish borderlands in Pan-American perspective, volume 3*, ed. D.H. Thomas, 453–469. Washington (DC): Smithsonian Institution Press.

Gibson, J.B. 1988. The maritime trade of the north Pacific Coast. In *Handbook of North American Indians: History of Indian-White relations, volume 4*, ed. W.E. Washburn, 375–390. Washington (DC): Smithsonian Institution.

Kehoe, A.B.. 2000. François' House, a significant pedlars' post on the Saskatchewan. In *Interpretations of Native North American life: Material contributions to ethnohistory*, ed. M.S. Nassaney and E.S. Johnson, 173–187. Gainesville: Society for Historical Archaeology and University Press of Florida.

Kenyon, W.A. 1982. *The Grimsby site: A historic neutral cemetery*. Toronto: Royal Ontario Museum.

Kicza, J.E., and R. Horn. 2013. *Resilient cultures: America's Native peoples confront European colonization, 1500–1800*. Boston: Pearson.

Klimko, O. 2004. Fur trade archaeology in western Canada: Who is digging up the forts? In *The archaeology of contact in settler societies*, ed. T. Murray, 157–175. Cambridge: Cambridge University Press.

Langford, T.E. 2011. Identity: Using objects to "fit in" and "stand out". In *Exploring Fort Vancouver*, ed. D.C. Wilson and T.E. Langford, 29–49. Vancouver: Fort Vancouver National Trust.

Lapham, H.A. 2004. "Their complement of deer-skins and furs": Changing patterns of white-tailed deer

N

exploitation in the seventeenth century southern Chesapeake and Virginia hinterlands. In *Indian and European contact in context: the mid-Atlantic region*, ed. D.B. Blanton and J.A. King, 172–192. Gainesville: Society for Historical Archaeology and University Press of Florida.

Lapham, H.A. 2005. *Hunting for hides: Deerskins, status, and cultural change in the protohistoric Appalachians*. Tuscaloosa: University of Alabama.

Lightfoot, K. 2005. The archaeology of colonization: California in cross-cultural perspective. In *The archaeology of colonial encounters*, ed. G.J. Stein, 207–235. Santa Fe: School of American Research Press.

Loren, D.D. 2008. *In contact: Bodies and spaces in the sixteenth- and seventeenth-century eastern woodlands*. New York: Rowman & Littlefield.

Loren, D.D. 2010. *The archaeology of clothing and bodily adornment in colonial America*. Gainesville: University Press of Florida.

Loren, D.D., and M.C. Beaudry. 2006. Becoming American: Small things remembered. In *Historical archaeology*, ed. M. Hall and S.W. Silliman, 251–271. Oxford: Blackwell.

Mallios, S. 2006. *The deadly politics of giving: Exchange and violence at Ajacan, Roanoke, and Jamestown*. Tuscaloosa: University of Alabama Press.

Martin, C. 1975. The four lives of a Micmac copper pot. *Ethnohistory* 22 (2): 111–133.

Murray, T. 2004. The archaeology of contact in settler societies. In *The archaeology of contact in settler societies*, ed. T. Murray, 1–18. Cambridge: Cambridge University Press.

Nassaney, M.S. 1989. An epistemological inquiry into some archaeological and historical interpretations of 17th century Native America-European relations. In *Archaeological approaches to cultural identity*, ed. S. Shennan, 76–96. London: Unwin Hyman.

Nassaney, M.S. 2004. Native American gender politics and material culture in seventeenth-century southeastern New England. *Journal of Social Archaeology* 4 (3): 334–367.

Nassaney, M.S. 2012. Decolonizing archaeological theory at Fort St. Joseph, an eighteenth-century multi-ethnic community in the western Great Lakes region. *Midcontinental Journal of Archaeology* 37 (1): 5–24.

Nassaney, M.S., and E.S. Johnson, eds. 2000a. *Interpretations of Native North American life: Material contributions to ethnohistory.* Gainesville: Society for Historical Archaeology and University Press of Florida.

Nassaney, M.S., and E.S. Johnson. 2000b. The contributions of material objects to ethnohistory in Native North America. In *Interpretations of Native North American life: Material contributions to ethnohistory*, ed. M.S. Nassaney and E.S. Johnson, 1–30. Gainesville: Society for Historical Archaeology and University Press of Florida.

Nassaney, M.S., and M. Volmar. 2003. Lithic artifacts in seventeenth-century Native New England. In *Stone tool traditions in the contact era*, ed. C.R. Cobb, 78–93. Tuscaloosa: University of Alabama.

Nassaney, M.S., W. Cremin, R. Kurtzweil, and J.A. Brandão. 2003. The search for Fort St. Joseph (1691-1781) in Niles, Michigan. *Midcontinental Journal of Archaeology* 28 (2): 107–144.

Paterson, A. 2011. *Amillennium of cultural contact*. Walnut Creek: Left Coast Press.

Perttula, T.K. 1993. Kee-oh-na-wah'-wah: The effects of European contact on the Caddoan Indians of Texas, Louisiana, Arkansas, and Oklahoma. In *Ethnohistory and archaeology: Approaches to postcontact change in the Americas*, ed. J.D. Rogers and S.M. Wilson, 89–109. New York: Plenum.

Quimby, G.I. 1966. *Indian culture and European trade goods*. Madison: University of Wisconsin Press.

Ramenofsky, A.F. 1987. *Vectors of death: The archaeology of European contact*. Albuquerque: University of New Mexico Press.

Ramenofsky, A.F. 1991. Historical science and contact period studies. In *Columbian consequences: The Spanish borderlands in Pan-American perspective*, ed. D.H. Thomas, vol. 3, 437–452. Washington: Smithsonian Institution Press.

Rogers, J.D. 1993. The social and material implications of culture contact on the northern Plains. In *Ethnohistory and archaeology: Approaches to postcontact change in the Americas*, ed. J.D. Rogers and S.M. Wilson, 73–88. New York: Plenum.

Rogers, J.D. 2005. Archaeology and the interpretation of colonial encounters. In *The archaeology of colonial encounters*, ed. G.J. Stein, 331–354. Santa Fe: School of American Research Press.

Silliman, S.W. 2005. Culture contact or colonialism? Challenges in the archaeology of Native North America. *American Antiquity* 70 (1): 55–74.

Singleton, T.A., and M. Bograd. 2000. Breaking typological barriers: Looking at the colono in colonoware. In *Lines that divide: Historical archaeologies of race, class, and gender*, ed. J.A. Delle, S.A. Mrozowski, and R. Paynter, 3–21. Knoxville: University of Tennessee Press.

Wilcox, M.V. 2009. *The Pueblo revolt and the mythology of conquest: An indigenous archaeology of contact*. Berkeley: University of California Press.

Wilson, D.C. 2011. Fort Vancouver: History, archaeology, and the transformation of the Pacific Northwest. In *Exploring Fort Vancouver*, ed. D.C. Wilson and T.E. Langford, 1–27. Vancouver: Fort Vancouver National Trust.

Further Reading

Bradley, J.W. 1987. *Evolution of the Onondaga Iroquois: Accommodating change, 1500–1655*. Syracuse: Syracuse University Press.

Brain, J.P. 1979. Tunica treasure. In *Peabody Museum of Archaeology and Ethnology, Harvard University and Salem (MA)*. Cambridge: Peabody Museum.
Ceci, L. 1977. The effect of European contact and trade on the settlement patterns of Indians in coastal New York, 1524–1665: The archaeological and documentary evidence. Unpublished Ph.D. dissertation, City University of New York.
Crosby, A. 1973. *The Columbian exchange*. Westport: Greenwood.
Cusick, J.G., ed. 1998. *Studies in culture contact: Interaction, culture change, and archaeology.* Carbondale: Center for Archaeological Investigations, Southern Illinois University.
Deetz, J. 1977. *In small things forgotten: The archaeology of early American life*. Garden City: Anchor Press.
Dolin, E.J. 2010. *Fur, fortune, and empire: The epic history of the fur trade in America*. New York: W.W. Norton.
Eccles, W.C. 1972. *France in America*. New York: Harper Row.
Fitzhugh, W.W., ed. 1985. *Cultures in contact: The European impact on Native cultural institutions in eastern North America, A.D. 1000–1800*. Washington: Smithsonian Institution Press.
Jordan, K. 2009. Colonies, colonialism, and cultural entanglements: The archaeology of postcolumbian intercultural relations. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 31–49. New York: Springer.
Juen, R.B., and M.S. Nassaney. 2012.*The fur trade,* Fort St. Joseph Archaeological Project Booklet series 2. Kalamazoo: Western Michigan University.
Lightfoot, K.G. 2005. *Indians, missionaries, and merchants: The legacy of colonial encounters on the California frontiers*. Berkeley: University of California Press.
McBride, K.A. 1990. The historical archaeology of the Mashantucket Pequots, 1637–1900: A preliminary analysis. In *The Pequots in southern New England: The fall and rise of an American Indian nation*, ed. L.M. Hauptman and J.D. Wherry, 96–116. Norman: University of Oklahoma Press.
Oswalt, W.H., and S. Neely. 1999. *This land was theirs*. 6th ed. Mountain View: Mayfield.
Paynter, R. 2000. Historical archaeology and the post-Columbian world of North America. *Journal of Archaeological Research* 8 (3): 169–217.
Peyser, J.L., ed. 1992. *Letters from New France: The upper country 1686–1783*. Urbana: University of Illinois Press.
Quimby, G.I. 1939. European trade articles as chronological indicators for the archaeology of the historic period in Michigan. *Papers of the Michigan Academy of Science, Arts, and Letters* 24: 25–31.
Robinson, P.A. 1990. *The struggle within: The Indian debate in seventeenth century Narragansett country.* Department of Anthropology, Binghamton University: Unpublished Ph.D. dissertation.
Rogers, J.D., and S.M. Wilson, eds. 1993. *Ethnohistory and archaeology: Approaches to postcontact change in the Americas*. New York: Plenum.
Rubertone, P.E. 1989. Archaeology, colonialism, and 17th-century Native America: Towards an alternative interpretation. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 32–45. Boston: Unwin Hyman.
Rubertone, P.E. 2001. *Grave undertakings: An archaeology of Roger Williams and the Narragansett Indians*. Washington (DC): Smithsonian Institution Press.
Trigger, B.G., and W.R. Sagerty. 1996. Entertaining strangers: North America in the sixteenth century. In *The Cambridge history of the Native peoples of the Americas*, ed. B.G. Trigger and W.E. Washburn, vol. 1, 399–460. Cambridge: Cambridge University Press.
Wolf, E. 1982. *Europe and the people without history.* Berkeley: University of California Press.

North American Classification Schemes: Overview

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Introduction and Definition

North American archaeology can be defined as the study of the material remains of past North American peoples and restricted to areas north of central Mexico, mostly in the United States and Canada. Although this field did not develop in complete isolation from European archaeology or from research on the civilizations of Mexico and other parts of Central and South America, it has several distinctive and interrelated features (Willey and Sabloff 1993).

First, from its beginnings in the antiquarianism of the eighteenth and nineteenth centuries, North American archaeology has focused on scientific questions such as those related to artifact typology, geography, and stratigraphy rather than on art, iconography, and other more humanistic topics. These emphases can be attributed to the levels of human sociocultural organization observed among North American Indians at

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European contact and evidenced in the material remains of North America. When compared to peoples in Central and South America, North Americans have been perceived as relatively less complex socioculturally, and their study has fallen largely within the tradition of natural history. This orientation continues to this day despite growing recognition of the limitations of evolutionary typologies and contemporary interest in iconography and religion.

Second, until the latter third of the twentieth century, North American archaeologists primarily focused on the prehistoric past rather than on the historical developments following the arrival of Europeans in North America. Despite the tremendous potential for investigation of historical topics, most North American archaeologists have studied prehistory, all the while seeing North American prehistory as largely cutoff from history and understanding the cultures of contemporary Native American descendants as too modified to provide many significant insights into the past. Coincident with the development of a robust historical archaeology of North America over the last few decades, the indigenous people of this continent have increasingly asserted their interest in and relevance to the archaeology of their ancestors. Both of these developments have had major effects on theory and practice and made it clear that the traditional classificatory schemes employed by North American archaeologists and discussed in this entry may not be heuristically sufficient.

Finally, in North America, archaeology is understood as one of the four fields of anthropology. The commitment to a four-field anthropological approach developed by the Boasian school of anthropology in the early twentieth century has defined how archaeology has developed in North America. In this school of thought, culture was understood as divisible into distinct units or cultures with unique characteristics and histories and bound together by norms of behavior. In turn, North American archaeology can be understood as an investigation of the past cultures of the Native Americans being studied by ethnographers. In fact, in the early twentieth century, anthropologists studying indigenous peoples often did both ethnographic and archaeological research. At this time, documenting customs, language, biology, and material culture, before what was thought to be the inevitable further loss of culture, were all seen as essential pursuits for the anthropologist, and archaeology was part of this process. Most North American archaeologists are still trained in anthropological holism and view themselves as contributing to the field of anthropology. Today, even though the unit concept of culture has been questioned, most contemporary North American archaeologists still understand archaeological evidence as culture and focus their research on investigations of material culture as a means of understanding the cultures of the past.

Given these perspectives, a central problem has been how to organize the North American archaeological record into meaningful cultural units for productive investigation and scholarly communication. Such cultural units have been perceived as more or less mirroring cohesive subdivisions of the past cultural world. Their grouping into classificatory schemes at various temporal and spatial scales also has been considered a legitimate means of summarizing as well as understanding the past. Methodology for creating classification schemes developed within the normative framework, a historical approach to culture that dominated anthropological theory in the early twentieth century. This normative approach defines culture as shared ideas, beliefs, values, customs, and artifacts. Anthropological and archaeological theory has moved beyond this approach, but North American archaeology continues to use basic classificatory schemes relying on the dimensions of space, form, and time recognized by the culture historians of the first half of the twentieth century. Although often questioned and nearly universally considered limited in their accuracy in representing the past, these classificatory devices remain in use for want of superior methods. Familiarity with these schemes is central to understanding the field of North American archaeology.

Historical Background

Space and the Development of the Culture Area Concept

Although nineteenth-century scholars understood that there had been geographically circumscribed cultural expressions within North America such as Hopewell or Fort Ancient in Ohio (Trigger 2006: 279–280), inclusive geographic means of understanding North American indigenous cultures first developed around the turn of the twentieth century when the concept of culture areas was developed (Holmes 1914; Wissler 1926). These formulations had the practical advantage of providing a way of organizing ethnographic and archaeological collections for museum display and study that was not dependent on the unilineal evolutionary typologies that were then falling out of favor among anthropologists. The translation of these culture area schemes from ethnographic regions to the prehistoric past was seamless because, at this time, North American scholars did not believe there was any great time depth to the Native American past. These formulations gave more importance to natural or environmental features than to historical or evolutionary trajectories, but in order to avoid falling into a simple geographical or environmental determinism, they relied on diffusion from cultural centers to explain the distribution of cultural traits.

Perhaps the most important work on the concept of North American culture areas was Kroeber's *Cultural and Natural Areas of Native North America* originally published in 1939, but republished several times because of its seminal significance (Kroeber 1963). Kroeber defined the culture areas of North America in terms of meticulously enumerated cultural traits, an approach that lent itself to subsequent statistical analyses (e.g., Driver and Massey 1957). He took pains, however, to point out that his focus was on whole cultures rather than traits per se. Kroeber also was not an environmental determinist, and he wrote before the development of theory in cultural ecology (Steward 1955) that would greatly impact North American archaeology. He notes that although cultures cannot be completely understood without reference to their natural context, "the immediate causes of cultural phenomena are other cultural phenomena" (Kroeber 1963: 1). His focus was on the delineation of cultural climaxes within the commonly recognized North American culture areas; these were examples of what he called cultural intensity or points "from which the greatest radiation of culture material has taken place in the area" (Kroeber 1963: 223).

By the mid-twentieth century, it was clear that culture areas could not necessarily be defined by the distribution of archaeological traits. However, the practice of using natural areas as a means of bounding archaeological regions or, as suggested by Rouse, of identifying one's data with the cultural center it most closely resembled continued among archaeologists (Webster 2008: 17).

Over time thinking about Native Americans in terms of culture areas has become convention within both North American archaeology and ethnology. No matter that the theoretical basis of this approach in environmental possibilism and diffusionism has long been repudiated by North American archaeologists. North American archaeologists recognize that cultural centers and boundaries cannot really be projected backward in time over many millennia. They also recognize that within culture areas at any given point in time, actual cultural diversity was greater than these formulations imply, and particular cultural groups may not fit the generalities for a given area. Today, as the normative idea of culture has been challenged, and many contemporary archaeologists focus on variability rather than classification, the limitations of the concept of culture area are clear. Nonetheless, North American archaeologists continue to find culture area designations useful in organizing their data. Scholars define their regional specialties in terms of these areas, and they are used in introductory textbooks on North American archaeology.

North American archaeologists commonly recognize ten pre-Columbian culture areas with the

North American Classification Schemes: Overview, Fig. 1 Native American culture areas

boundaries defined more or less as shown in Fig. 1. These areas are the Arctic, Subarctic, Northwest Coast, Plateau, California, Great Basin, Southwest, Plains, Southeast, and Northeast culture areas. Commonly accepted generalizations about the cultures of these areas are also summarized in Table 1 although cultural variation actually was greater than this table implies.

Formal Variation and Temporal Change

Early twentieth-century American archaeologists focused on formal variation as they tried to make

North American Classification Schemes: Overview, Table 1 Characteristics of the North American culture areas

Culture area	Generalizations related to economy and material culture	Generalizations related to sociopolitical organization and religion
Arctic	Exploitation of sea mammals, caribou and fish; tailored clothing, elaborate harpoons, umiaks, kayaks, and dogsleds; wood, stone, sod, and snowhouses	Organization into bands; bilateral descent; shamans
Subarctic	Exploitation of caribou, moose and fish; semi-tailored clothing and snowshoes, toboggans, bark canoes, basketry; lean-tos and rectangular log-frame houses, conical tents	Organization into bands; bilateral, matrilineal and patrilineal descent; shamans, shaking tent divination
Northwest coast	Exploitation of salmon, sea and land mammals; elaborate woodworking, dugout canoes; rectangular, plank, multifamily houses; elaborate masks	Villages, social classes, slaves; matrilineal and patrilineal descent; potlatches, elaborate ceremonies
Plateau	Exploitation of salmon, game and roots; basketry, bark fiber clothing; semi-subterranean winter pithouses and reed or mat-covered summer houses	Villages; bilateral descent; shamans, diverse spirits
California	Exploitation of acorns, mesquite beans, game, and marine resources; basketry, seed-grinding stones, sinew-backed bows; brush, bark and grass shelters	Bands and tribes, ranked societies along southern coast; bilateral descent; shamans, elaborate female puberty ceremonies
Great Basin	Exploitation of pine nuts, rabbits and antelope; basketry, seed-grinding stones, sinew-backed bows, nets for land mammals; brush, bark and grass shelters	Bands; bilateral descent; shamans, elaborate female puberty ceremonies
Southwest	Cultivation of maize, beans, and squash as well as exploitation of game and domesticated turkeys; irrigation; pottery and basketry, cotton garments; multiroom pueblos	Villages; matrilineal and bilateral descent; elaborate ceremonial round, kivas, masked dancers
Plains	Cultivation of maize and beans as well as exploitation of bison; bone and skin-working, dog-drawn travois, game surrounds, hide shields; skin tipis	Bands; bilateral, patrilineal and matrilineal descent; vision quests and guardian spirits
Northeast	Cultivation of maize, beans, and squash as well as exploitation of game and fish; hide clothing, bark canoes; wigwams and multifamily longhouses, palisades	Tribes and confederacies; matrilineal and patrilineal descent; secret societies, seasonal ceremonial round, dogs eaten ceremonially
Southeast	Exploitation of maize, beans, and squash and exploitation of game and fish; clothes made of feathers over netting, storage facilities, rectangular multifamily structures, fortifications	Tribes, confederacies, chiefdoms; matrilineal descent; complex ceremonies, sun worship, priests

(After Oswalt 2009: Table 1.1).

sense of the increasing array of materials from archaeological survey and excavation. While archaeologists in the Southwestern United States took one direction focusing on stratigraphy and chronology, other North American archaeologists were focusing on formal variation alone to create taxonomies.

In the Southwest, Kidder (1924) and others were creating ceramic types based on attributes with temporal variation through the use of stratigraphic control and seriation. The growing use of the stratigraphic method led to the increased use of metrical rather than natural stratigraphic controls during excavation. There was considerable debate over the reliability of using arbitrary excavation levels. These methods led Kidder to start developing a broad cultural chronology which culminated in the Pecos Conference in 1927, a

North American Classification Schemes: Overview, Table 2 Pecos classification as originally defined

Original period	Traits
Pueblo V (historic)	AD 1600 to present
Pueblo IV (proto-historic)	Widespread abandonment, decline in artistic elaboration, plain pottery wares
Pueblo III (great pueblo)	Very large communities, artistic elaboration, and craft specialization
Pueblo II	Small villages, pottery corrugated over entire surface
Pueblo I (proto-pueblo)	Above ground structures of contiguous, rectangular rooms, pottery with unobliterated coils or bands at neck, cranial deformation
Basketmaker III (post Basketmaker)	Pithouses or slab houses, plain pottery, no cranial deformation
Basketmaker II (Basketmaker)	No pottery, but agriculture and atlatl present
Basketmaker I (early Basketmaker)	Preagriculture, no longer in use and considered the archaic

meeting of the leading archaeologists working in the Southwest to create a chronological classification system that could be used throughout the Southwest. The result was the Basketmaker I–III/Pueblo I–V sequence still used in modified form in the northern Southwest. As shown in Table 2, this nomenclature was based on a taxonomic classification of architecture, community patterns, pottery styles, and other artifacts. In noting that the "Pecos Classification" was more a pattern of cultural change than a chronological scheme, Winifred and Harold S. Gladwin criticized the system for its lack of applicability to areas outside of the northern "Pueblo" area such as the Hohokam and Mogollon regions. Gladwin proposed a classification based upon a tree analogy with three major roots (Anasazi, Hohokam, and Mogollon), leading to a variety of stems, branches, and phases (Gladwin and Gladwin 1934). While this taxonomy was based primarily on "cultures" grouped together because of similar traits, it also relied upon geography in its formulation. The chronology was assumed in the nature of the tree analogy with roots preceding stems and so forth.

At the same time, other North American archaeologists also were struggling with creating taxonomies that would help them to sort the increasing amount of data being generated by archaeologists. The most influential of these efforts was the Midwestern Taxonomic System, sometimes referred to as the McKern Classification (McKern 1939). Although linked to McKern, this taxonomic system was the result of a decade of debate among Midwestern archaeologists about the need for a common classification system to aid in comparative studies. One unique aspect of this classification as opposed to the Pecos Classification was its specific exclusion of time and space as defining attributes. Instead this system was designed to rely on "determinants,"' diagnostic traits that could be used to distinguish "manifestations" of culture. This grouping of determinants could then be used to create a classification to distinguish cultures. This resulted in the levels of classification noted in Fig. 2.

Although the Midwestern system initially ignored time and space, an important implicit assumption was that this strict taxonomy would eventually relate to time and space. In this context, an archaeological culture was based upon shared physical characteristics. The goal was to distinguish these cultures which would then occupy distinct times and places.

These initial classifications based upon the variability in formal attributes all had a similar concern in terms of trying to distinguish archaeological cultures and establish a sequence of culture change. This initial concern was linked to the lack of data early North American archaeologists had about the sequence of events or about different groups of people. However, by the mid-twentieth century, archaeologists were starting to focus on what these "typologies" represented in terms of function and cultural context. Julian Steward and Frank Setzler (1938) in their article titled "Function and Configuration" were among the first to note a lack of focus by archaeologists on understanding or describing cultures. They criticized archaeologists for focusing too much on building artifact chronologies without considering the culture that produced the artifacts.

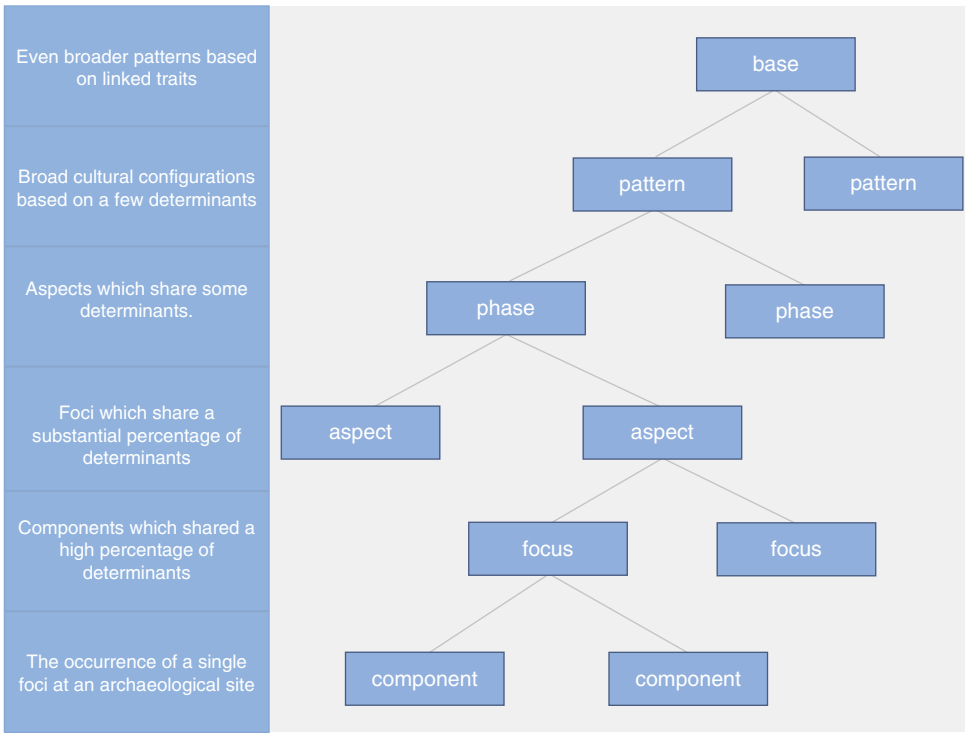

North American Classification Schemes: Overview, Fig. 2 Units of the Midwestern classification

Archaeologists also were debating what the formal typologies they created actually represented. Some, including Ford (1954), suggested that typologies were simply useful tools abstracted by the archaeologist to answer their specific research questions. Spaulding (1953) and others argued that archaeologists could derive types that had demonstrable meaning for the people of the past. Rouse (1960) suggested ways in which types could be either abstracted by the researcher or discovered as part of a past culture. Rouse proposed these as two different ways to classify artifacts. Analytic classification could be used to discover the modes of a culture. Taxonomic classification involves using different modes (attributes) to create types meaningful to the archaeologist's research question. For example, if you are creating temporal types, you only use those modes that reflect variation in time and space, such as the shape of a projectile point. But if you are interested in reconstructing lifeways, you might use another mode such as raw material type for these projectile points.

Until 1928, North American archaeologists generally thought that humans had a relatively brief presence of only a few millennia in North America. Then, a fluted spearpoint was discovered embedded in the rib cage of an extinct bison skeleton being excavated at Folsom, New Mexico. This find established an Ice Age presence for humans in the Americas and made the question of temporal variation much more significant.

Nevertheless, through most of the first half of the twentieth century, American archaeologists had to deal with temporal variation by relying on relative dating techniques such as stratigraphy, seriation, and typology. With the development of absolute dating techniques by the 1950s, such as tree-ring dating in the Southwest and radiocarbon dating for the rest of North America, archaeologists not only had a key to building chronological sequence, but could measure the time depth of

human occupation in the New World inferred from the Folsom find.

About this same time, Willey and Phillips (1958) attempted to bring the diversity of perspectives on American archaeological method and theory together into a more coherent classification. The focus in American archaeology had been on culture history, attempting to order the archaeological record into a sequence over time and space. Willey and Phillips proposed what they called an "Operational Basis for Culture-Historical Integration" as an attempt to define the way archaeologists actually use the dimensions of time, space, and form. In this volume, they defined only two basic archaeological units for classification, the component and the phase. These were common terms used in archaeology, but Willey and Phillips tried to more precisely define their use in archaeology as the elements of formal variation. The component is the single manifestation of a culture at an archaeological site. They define the phase as "an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time" (Willey and Phillips 1958: 22).

Willey and Phillips also operationalized terms for space (site, locality, and region) and time (local sequence and regional sequence). These provide the context for the basic archaeological units of phase and component. Beyond these basic units, they provide what are called integrative units of horizon and tradition. The horizon marks traits and assemblages whose distribution in space suggests a rapid spread over a broad area. The tradition is a temporal continuity represented by persistence in technologies or related forms.

Taken together these concepts were meant to help archaeologists construct local and regional culture histories. But in this volume, the authors took it a step further in response to the neo-evolutionary approaches becoming popular at mid-century. They propose the use of a "Historical-Developmental Approach" (Willey and Phillips 1958: 61). It is here that they propose a series of developmental stages distinct from periods. While the term period refers specifically to chronology, the stage can be defined by content regardless of time. These developmental stages

North American Classification Schemes: Overview, Table 3 North American stages as defined by Willey and Phillips

Willey and Phillips stages	Characteristics defined by Willey and Phillips	North American expressions
Postclassic	Breakdown of classic styles and culture, continued urbanization but militarism, secularism and warfare, interregional transference of styles but aesthetic decline	None
Classic	Beginnings of urbanism, florescence of material culture, climax in architecture and sophisticated art	None
Formative	Development of agricultural lifeways especially maize agriculture, sedentary village life, minimal social complexity	Hohokam, Anasazi and Mogollon in the southwest; woodland mound building cultures of the northeast and southeast, primarily middle woodland, Mississippian developments; possibly Plains Village cultures
Archaic	Migratory hunting and gathering cultures in increasing modern environments, addition of groundstone as well as bone technology, small but sometimes longer-term settlements, diversification of subsistence pursuits	Eastern archaic, plains archaic, southwestern archaic, desert archaic and probably maritime cultures of the California and northwest coast
Lithic	Initial adaptation to new world environments, reliance on rough and chipped stone tool technology, small-scale, mobile societies, emphasis on hunting	Paleoindian

are defined as descriptive although "founded on common participation in important historically derived traditions" (Willey and Phillips: 64). They were intentionally trying to avoid the common criticism of being unilineal evolutionists. The five stages of development they proposed for American archaeology are Lithic, Archaic, Formative, Classic, and Post-Classic (Table 3). Willey and Phillips saw this descriptive process of defining formal variation, plotting it in time and space, and identifying their functions and relationships as "archaeology's primary tasks, on the descriptive level of organization" (Willey and Phillips 1958: 61). Although they recognized the need for explanation in archaeology, they did not propose any archaeological methods for achieving this.

The culmination of this approach can be seen in Willey's seminal work *An Introduction to American Archaeology, vol. 1: North and Middle America.* In his Introduction, Willey states "The intent of the book is history—an introductory culture history of pre-Columbian America" (1966: 2). As such he has demonstrated the utility of the classificatory methods espoused in the Willey and Phillips volume. At the same time he specifically notes, "I shall be less concerned with process or a search for cultural 'laws' than with at times attempting to explain why certain cultural traditions developed, or failed to develop, as they did." The goal of his synthesis was culture historical-developmental interpretation, not explication of culture process.

Key Issues/Current Debates

In a general sense, these concepts defined by Willey and Phillips are still being used by North American archaeologists today. Archaeologists are still defining components and phases or horizons and traditions. However, in many regions, the way in which these terms and especially the stage concept are operationalized has been modified. For example, the lithic stage is usually referred to as the Paleo-Indian period, and while the Archaic is referenced by most archaeologists, it is as likely to be called a period as a stage. North American archaeologists generally do not use the concept of a Formative stage, although they do recognize the development of agricultural societies in the Southwest, the Plains, the Northeast, and the Southeast. In the Southwest culture area, horticulture was important in the various regional traditions (e.g., Ancestral Pueblo and Hohokam) that developed after approximately CE 200. In the Plains, the Northeast, and the Southeast, Woodland cultures after approximately 1000 BCE can be considered to parallel the Formative. In all these regions, experimentation with plant cultivation and domestication began in the Archaic, but the cultural characteristics associated with the Formative by Willey and Phillips are more fully evident after the Archaic. In the Western parts of the United States, there is little evidence of a Formative. However, settled life and the development of social hierarchies did develop in some areas. Along the Pacific Coast, complex hunter-gatherers, who developed social ranking, had hereditary chiefs, and lived in large, settled communities, are found in the later pre-Columbian times. Neither the Classic nor the Post-Classic was recognized as occurring in North America by Willey and Phillips, and North American archaeologists do not use these concepts at all. Nevertheless, Willey and Phillips' "primary task" of formulating archaeological units that are assumed to represent cultural units has not been abandoned.

Continuing Methodological and Theoretical Developments

The advent of the "new archaeology" in the 1960s altered perceptions of Willey and Phillips' approach. Since most North American archaeologists remain basically processualist theoretically, this critique of culture history is entrenched in the thinking of North American archaeologists even today. The essence of the processualist critique of attempts at classification involved defining earlier archaeologists as culture historians who saw the ordering of cultures in time and space as the primary goal of archaeology. Processualists did not so much reject the classification methods of culture historians as make an argument that this was not the only contribution of archaeology to

the understanding of past cultures. Classification of assemblages into components and phases and their grouping into larger units such as traditions and stages was understood to be a descriptive step that preceded the reconstruction of past lifeways and ultimately the exploration of questions of culture process. As anthropologists, processualist archaeologists were more interested in how culture functioned and explaining the process of change than in the ordering of components and phases. Nevertheless, it was believed necessary to build on culture history to accomplish these loftier ends (Leone 1972: 26). As a result, the classificatory schemes, including local phases and regional traditions and the stages proposed by Willey and Phillips, have continued to be utilized in North American archaeology. Perhaps because of processualism's disdain for culture-historical analyses of chronology and time-space systematics, many of the specific archaeological units North American archaeologists still employ have not been critically evaluated.

A systemic, adaptive approach led processualists to view archaeological phases as rough equivalents of cultures. In this view, the archaeological record provides evidence of cultural systems which in turn can be characterized by particular adaptive strategies. Culture change results from factors such as environmental change or human population growth which upset the systemic equilibrium. Influenced by neoevolutionary thought as well as the variability evident in a growing body of data, some archaeologists rejected Willey and Phillips' stage concepts. These North American archaeologists have argued that North American archaeological data should be grouped into periods of time rather than the stages of cultural development. In practice, however, periods often have been treated as being characterized by cultures having the attributes of Willey and Phillips' stages, and evolutionary assumptions have been implicit. For example, the Archaic period peoples of North America have been characterized rather universally as small bands of seasonally mobile hunter-gatherers even though the growing body of data on the Archaic indicates considerable diversity in economic, sociopolitical, and ideological traits (Emerson and McElrath 2009).

Thus, although the "new archaeology" of the late twentieth century criticized the approach of earlier culture historians, processualists used many of these concepts as a starting point for their attempts at explanations of culture process. More recently, in the twenty-first century, archaeologists from a variety of theoretical perspectives are rejecting these basic unit concepts outright, noting their asynchronic and nomothetic nature. The new evolutionary archaeology proposed by Dunnell (1978) and others rejects the notion of starting with cultural units in favor of defining specific traits and tracking the adaptedness of traits rather than cultural units. On the other side of the theoretical spectrum, these culture unit concepts are also rejected by postprocessualists because of the lack of concern for the individual and the role of agency in a dynamic cultural system. There is also the criticism that working from a culture unit concept constrains a variety of explanatory frameworks, such as ideology, art, religion, or even gender.

Future Directions

Given recent assaults on the theoretical assumption that unit cultures exist as discrete, stable entities in the past and present, it might be expected that traditional classificatory schemes, resting on this very assumption, would be abandoned. However, there are aspects of the practice of North American archaeology in the twenty-first century that fosters the continued use of these classificatory schemes. First, processualism, albeit a modified processualism that has been influenced by the postprocessualist critique, remains the basis for the majority of North American archaeology (Hegmon 2003). Given the view that establishing the regional culture history is a basic step that precedes more sophisticated analyses, North American archaeologists still utilize these classificatory units.

Second, and perhaps most importantly, the development of cultural resource management (CRM) has encouraged the continued use of recognized units of culture history such as phases and traditions. Since the 1960s, a series of laws in both the United States and Canada have explicitly

defined archaeological sites as well as historical structures as cultural resources that must be managed for the benefit of society at large. Today, the vast majority of archaeology done in North America is done to define which resources are important enough to be protected from the processes of development. Alternatively, the effects of development must be mitigated through thorough excavation or recordation of these sites and structures (King 2008). Traditional academic archaeology done for research sake certainly persists in universities and museums, but most archaeologists work for government agencies, engineering, or archaeological firms in the growing industry generated by CRM laws. One result of this trend has been the frequent disengagement of many practicing archaeologists from the meta-debates about archaeological theory and method going on in scholarly circles. Thus, the critique of the unit culture assumption has not been thoroughly examined by those doing the majority of the archaeology taking place in North America.

Moreover, the requirements of CRM archaeology, which include efficiently assessing the significance of sites and their assemblages in a timely manner, lend themselves to fairly simplistic adoption of the classificatory schemes developed by culture historians. It is easy to conceptualize the task of the CRM archaeologists as filling in missing gaps in our knowledge of past cultural entities through archaeology. This is, of course, not an entirely a theoretical undertaking, but theory may seem to have a less obvious place in this kind of work especially to harried practitioners working for clients with deadlines. These circumstances encourage the writing of reports that rely on boiler plate descriptions of cultural phases and regional traditions defined in state preservation plans. Such reports may fit the results of survey and excavation into existing classificatory schemes uncritically. There may also be a tendency to define the job of the CRM archaeologists as generating data, which can be utilized by others in synthetic and regional evaluations that are outside the CRM practitioner's purview. Whether or not such synthetic work ever actually happens seems less important than completing reports and moving on to the next project.

Third, a reengagement with culture-historical classification stems from the increasing interest of Native Americans in archaeology. The need to correlate material culture and its distribution with specific historical ethnicities has increased rather than decreased in the age of the Native American Graves Protection and Repatriation Act (NAGPRA). At the same time, the ethical awareness of North American archaeologists that consultation and collaboration with descendant populations is desirable has grown. This has reinforced the importance of the systematics of culture history (Webster 2008). Some of the same archaeologists, who critique the normative culture unit assumptions employed in traditional classification and seek multivocal interpretations of the past, recognize the need to identify ethnicity in the archaeological record. As imperfect as culture history classifications are, they remain the starting point for much of this discussion. Fortunately, in pursuit of ethnicity, archaeologists are much more likely to critically evaluate regional schemes of culture history.

For these reasons, the traditional North American classificatory schemes are likely to remain important in the actual practice of North American archaeology despite calls for focusing less on culture as a normative whole. Thus, it remains important for archaeologists studying prehistoric North America to understand the nature and formulation of these units.

North American archaeology's traditional classification schemes were developed in the first half of the twentieth century around concepts of space, form, and time. Culture areas within which cultures tended to be similar were recognized first, and they continue to be referenced today despite general understanding that they do not begin to capture the true variability and nuance of past cultures. The concept of unit cultures recognizable in the distribution over time and space of material culture traits was developed by the middle of the twentieth century. These formulations recognized components and phases that can be grouped into regional traditions and horizons. Ultimately, these classificatory units have been thought to relate to stages of development or to prehistoric periods. Despite recognition that these

units mask variability and debate about the underlying concept of unit cultures, these units are still employed by North American archaeologists.

While the continued sway of processualism among North American archaeologists as well as the growth of CRM archaeology may encourage less than critical use of regional schemes for phases and traditions, the sociopolitics of contemporary North American archaeology also encourage a renewed interest in the recognition of ethnicity in the archeological record. These research interests, which often lead to a critique of the concept of unit cultures altogether, are more likely to generate critical reevaluation of the culture-historical classifications used by North American archeologists.

References

Driver, H.E., and W.C. Massey. 1957. Comparative studies of North American Indians. *Transactions of the American Philosophical Society* 67: 165–456.

Dunnell, R.C. 1978. Style and function: A fundamental dichotomy. *American Antiquity* 43: 142–202.

Emerson, T.E., and D.L. McElrath. 2009. The eastern woodlands archaic and the tyranny of theory. In *Archaic societies: Diversity and complexity across the midcontinent*, ed. T.E. Emerson, D.L. McElrath, and A.C. Fortier, 23–38. Albany: State University of New York Press.

Ford, J.A. 1954. On the concept of types: The type concept revisited. *American Anthropologist* 56: 42–57.

Gladwin, W., and H.S. Gladwin. 1934. *A method for designation of cultures and their variations (medallion papers 15)*. Globe: Gila Pueblo.

Hegmon, M. 2003. Setting theoretical egos aside: Issues and theory in North American archaeology. *American Antiquity* 68: 213–243.

Holmes, W.H. 1914. Areas of American cultural characterization tentatively outlined as an aid to the study of antiquities. *American Anthropologist* 16: 413–446.

Kidder, A.V. 1924. *An introduction to the study of southwestern archaeology with a preliminary account of the excavations at Pecos (papers of the southwestern expedition 1)*. New Haven: Phillips Academy.

King, T.F. 2008. *Cultural resource laws and practice*. 3rd ed. Lanham: Altamira Press.

Kroeber, A.L. 1963. *Cultural and natural areas of native North America*. Berkeley: University of California Press.

Leone, M.P. 1972. Issues in anthropological archaeology. In *Contemporary Archaeology: a guide to theory and contributions. Carbondale: Southern*. Illinois: University Press.

Mckern, W.C. 1939. The Midwestern taxonomic method as an aid to archaeological culture study. *American Antiquity* 4: 138–143.

Oswalt, W.H. 2009. *This land was theirs: a study of Native North Americans*. 9th ed. New York: Oxford University Press.

Rouse, I. 1960. The classification of artifacts in archaeology. *American Antiquity* 25: 313–323.

Spaulding, A.C. 1953. Statistical techniques for the discovery of artifact types. *American Antiquity* 18: 305–313.

Steward, J.H. 1955. *Theory of culture change*. Urbana: University of Illinois Press.

Steward, J.H., and F.M. Setzler. 1938. Function and configuration in archaeology. *American Antiquity* 4: 4–10.

Trigger, B.G. 2006. *A history of archaeological thought*. 2nd ed. Cambridge: Cambridge University Press.

Webster, G.S. 2008. Culture history: A culture-historical approach. In *Handbook of archaeological theory*, ed. R.-A. Bentley, H.D.G. Maschner, and C. Chippindale, 11–27. Lanham: Altamira Press.

Willey, G.R. 1966. An introduction to American archaeology. In *North and middle America*, vol. 1. Englewood Cliffs: Prentice-Hall.

Willey, G.R., and P. Phillips. 1958. *Method and theory in American archaeology*. Chicago: University of Chicago Press.

Willey, G.R., and J.A. Sabloff. 1993. *A history of American archaeology*. 3rd ed. New York: Freeman.

Wissler, C. 1926. *The relation of nature to man in aboriginal America*. New York: AMS Press.

North American Megafauna Extinction: Climate or Overhunting?

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Introduction

Around 50,000 years ago, North America was home to 48 genera of large terrestrial mammals. But by 10,000 years ago, 36 of those genera had become extinct (Table 1). The disappearance of such a huge proportion of animal types is bewildering. By far, most of the extinct genera were "megafauna," which are animals having an adult body mass >45 kg (>100 lbs). Equally surprising

North American Megafauna Extinction: Climate or Overhunting?, Table 1 Extinct genera and their common names, with radiocarbon dates (and calibrated ages in parentheses) which may mark the approximate time of their last appearances in North America

Family	Genus	Possible last appearance date in radiocarbon years BP (approx. midpoint of calibrated years BP)
Pampatheriidae	*Pampatherium* (southern pampathere)	Not available
	Holmesina (northern pampathere)	21,150 ± 400 (25,400)
Glyptodontidae	*Glyptotherium* (Simpson's glyptodont)	23,230 ± 490 (27,428)
Megalonychidae	*Megalonyx* (Jefferson's ground sloth)	11,485 ± 40 (13,336)
Megatheriidae	*Eremotherium* (Laurillard's/ Rusconi's ground sloth)	38,860 ± 1300 (42,861)
	Nothrotheriops (Shasta ground sloth)	11,020 ± 200 (12,910)
Mylodontidae	*Paramylodon* (Harlan's ground sloth)	12,333 ± 33 (14,285)
Mustelidae	#*Brachyprotoma* (short-faced skunk)	13,740 ± 145 (16,607)
Canidae	#*Cuon** (dhole)	Not available
Ursidae	*Tremarctos** (Florida cave bear)	23,230 ± 490 (27,428)
	Arctodus (Giant short-faced bear)	10,870 ± 75 (12,760)
Felidae	*Smilodon* (saber-toothed cat)	11,130 ± 275 (13.003)
	Homotherium (scimitar cat)	13,970 ± 310 (17,500)
	Miracinonyx (American cheetah)	14,935 ± 610 (18,100)
	*Panthera** (American lion)	11,355 ± 55 (13,150)
Castoridae	*Castoroides* (giant beaver)	10,850 ± 60 (12,750)
Hydrochoeridae	*Hydrochoerus** (Holmes' capybara)	12,000 ± 300 (13,850)
	Neochoerus (Pinckney's capybara)	Not available
Leporidae	#*Aztlanolagus* (Aztlan rabbit)	>31,150
Equidae	*Equus** (American horse)	10,870 ± 45 (12,750)
Tapiridae	*Tapirus** (tapir)	10,940 ± 100 (12,900)
Tayassuidae	*Mylohyus* (long-nosed peccary)	11,860 ± 40 (13,700)
	Platygonus (flat-headed peccary)	11,060 ± 60 (12,900)
Camelidae	*Camelops* (Yesterday's camel)	11,180 ± 45 (13,000)
	Hemiauchenia (large-headed llama)	12,210 ± 430 (14,400)
	Palaeolama (stout-legged llama)	10,890 ± 130 (12,800)
Cervidae	*Navahoceros* (mountain deer)	12,860 ± 400 (15,400)
	Cervalces (stag-moose)	10,800 ± 45 (12,700)
Antilocapridae	#*Capromeryx* (diminutive pronghorn)	12,200 ± 200 (14,300)
	Tetrameryx (Shuler's pronghorn)	23,230 ± 490 (27,400)
	Stockoceros (pronghorn)	12,520 ± 200 (14,650)
Bovidae	*Saiga** (saiga)	Not available
	Euceratherium (shrub-ox)	11,630 ± 150 (13,400)
	Bootherium (helmeted musk ox)	10,980 ± 80 (12,900)

(continued)

N

North American Megafauna Extinction: Climate or Overhunting?, Table 1 (continued)

Family	Genus	Possible last appearance date in radiocarbon years BP (approx. midpoint of calibrated years BP)
Gomphotheriidae	*Cuvieronius* (gomphothere)	11,550 ± 60 (13,400)
Mammutidae	*Mammut* (American mastodon)	10,630 ± 80 (12,600)
Elephantidae	*Mammuthus* (mammoth)	10,710 ± 130 on mainland (12,500)
		5600 ± 600 on St. Paul Island (6300)

Note that some of these dates are not universally accepted, because they were not made directly on bones or dung from the genera. References are in Barnosky et al. (2004), Faith and Surovell (2009), and Surovell et al. (2016: www.pnas.org/lookup/suppl/ https://doi.org/10.1073/pnas.1504020112/-/DCSupplemental). An *asterisk* in the table indicates a genus which survived outside North America. Four genera which are not megafauna are marked #. Date calibrations were performed online at http://intcal.qub.ac.uk/calib/

is that the extinctions affected taxa with very different diets – including herbivores which were grazers, browsers, and mixed feeders, as well as carnivores – living in a wide range of distinct ecozones. Not only were the extinctions unusual in being so biased toward animals of large body size and so unselective for feeding habits; they also seem abrupt. The last dated appearances of close to half the extinct genera fall between ~12,000 and 10,000 radiocarbon years before the present (~13,800–11,500 cal BP) in the lower 48 United States, in what has been termed as "synchronous" extinction event (Faith and Surovell 2009). Some extinct megafaunal genera might have disappeared earlier than that, but reliable dates on those fossil taxa are much too few to be sure. One species of the megafaunal genus *Mammuthus* (*M. primigenius* = woolly mammoth) actually died out much later than the other three species (*M. columbi* = Columbian mammoth, *M. jeffersonii* = Jeffersonian mammoth, *M. exilis* = pygmy mammoth), in the mid-Holocene, on a remote Bering Sea island (Graham et al. 2016).

These extinctions are even more extraordinary when compared to North America's earlier extinctions. They are not part of a "mass" extinction, as were the earlier ones, because of the clear size selectivity and the extremely wide variety of other animals that did not die out, particularly reptiles, medium-size and small mammals, and fish. Some bird genera disappeared around the same time, but many of them were scavengers which probably could not survive the loss of so much terrestrial carrion.

The Current Debate

Several possible explanations for the extinctions have been advanced, such as a disease capable of jumping species and spreading through the genera that became extinct, brought by dispersing humans or perhaps their dogs. Hyper-lethal disease organisms may or may not have been introduced by human dispersal into late Pleistocene North America, but clear evidence for pathogens in all the extinct genera and for an ability to jump to so many different species have not been identified. Another proposed explanation is that a meteoritic impact or huge airburst event from a meteor or comet(s) occurred over the eastern Canadian ice sheets about 12,900 calibrated years ago (Firestone et al. 2007), creating a powerful explosion and aftermath like nuclear winter, wiping out many species of large animals and severely challenging human survival; however, disagreements have been plentiful over whether true stratigraphic markers of such an explosive event have been correctly identified. Further weakening this hypothetical explanation is the fact that some megafauna which were present at the time in North America such as brown and black bear (*Ursus* spp.), whitetail and mule deer (*Odocoileus* spp.), and moose (*Alces alces*) did not become extinct.

A much more popular explanation for the dieouts is the cycle of major climate changes occurring before the megafauna disappeared. Global ice sheets had grown to maximum sizes between 33,000 and 26,500 calibrated years ago, holding steady until they began melting after 19,000 years ago. Climatic oscillations over the next nine

North American Megafauna Extinction: Climate or Overhunting?, Table 2 Major climatic intervals in the northern hemisphere during the last part of the Pleistocene, cited in radiocarbon years and also "ka," indicating thousands of calendar years before year 2000

Climatic interval	Approx. radiocarbon age (approx. age in calendar years)	General characteristics
Last Glacial Maximum	23,000–18,000 (26.5–19 ka)	Cold, dry
End of Last Glacial Maximum	16,000 (19 ka)	Warming
Bølling	12,500 (15 ka)	Relatively warm, moister
Older dryas	12,000 (13.8 ka)	Cool
Allerød	11,500 (13.3 ka)	Warmer, moister
Younger dryas begins abruptly	11,000 (12.9 ka)	Cold

millennia (Table 2) would have periodically stressed megafaunal populations in the northern hemisphere, by reducing optimal food resources and removing the connectivity between patches of different resources. This might seem to be the most obvious solution to the extinction mystery, but the storyline has been challenged by scientists who emphasize two important facts: (1) Similar cycles of climatic changes had already occurred several times over the past two million years, yet they had not led to such extinctions; and (2) a completely new factor had appeared just before the time of the extinctions: the earliest humans had dispersed into North America from Asia, according to the most credible archeological and genetic evidence.

The two leading hypotheses for explaining the extinctions – climate change and human effects – need to be sized up against each other.

One Hypothesis: Climate Change Caused the Extinctions

Climate change is almost a default explanation for the cluster of selective extinctions, especially among scientists who do not think mobile human foragers armed only with stone-tipped spears and at low population densities could have eradicated megafaunal populations in an entire continent.

The sizes of megafaunal populations after the Last Glacial Maximum are unknown, although geographical distributions seem to be broad (FAUNMAP Working Group 1994). During the last millennia of the Pleistocene, climates shifted dramatically (Table 2), and these shifts must have greatly affected megafaunal ranges when preferred forage plants were locally extirpated or redistributed in the continent. Different subpopulations of animals may have been depleted to relatively low numbers due to the disruption and the displacement of vegetational communities in response to the climatic oscillations. Yet even relatively widespread genera abruptly died out; the extinctions did not preferentially affect only the genera whose geographic ranges had been seriously reduced.

Several researchers have suggested possible ecological processes through which megafaunal taxa were driven to extinction during this difficult interval of ever-shifting climatic conditions. For example, Guthrie (1984) proposed that the trend toward zonal vegetation replacing highly diverse mosaic plant communities at the end of the Pleistocene reduced nutrient balance and plant diversity, forcing megafauna to feed more heavily on limited types of plants whose antiherbivory chemical compounds were harmful in higher doses, eventually leading to population crashes and extinctions of large-bodied animals with specialized diets.

This proposal is reasonable to explain extinctions in some parts of the continent, but not all. The main problem with attributing the extinctions only to climate change is that no unidirectional set of paleoenvironmental changes affected all of North America at the end of the Pleistocene. In some parts of the continent, open habitats expanded at the expense of woody habitats, while in other parts, woodlands and forests began replacing the more open environments of

the Pleistocene. Thus, diverse megafaunal foraging opportunities did not vanish from the entire continent, although the megafauna did vanish everywhere. Isotope studies show there was geographic variability in megafaunal diets, implying that at least some genera were capable of switching diets to take advantage of local vegetational communities. The complete disappearance of so many grazers, browsers, and mixed feeders during a period of variably responding plant resources is not easily explained.

New analytical methods have been applied to pinpoint a cause in nature, but these tend to contribute even more uncertainty. For example, ancient DNA (aDNA) recovered from bones of extinct megafauna of known ages have been analyzed to identify the times when genetic diversity had dramatically dropped; the implication is that when climate-caused fragmentation of animal populations led to lowered genetic diversity such as by the disappearance of haplotypes from the genome, the proportions of deleterious traits would have increased in subpopulations, fecundity would have dropped, and rates of developmental problems would have risen. These genetic problems are assumed to be harbingers of extinction drawing near. But interestingly, some taxa which survived the extinctions such as *Ursus* (bear) and *Canis lupus* (wolf) are today genetically less diverse than some genera which did go extinct. Thus, while a loss of genetic diversity implies that the continental populations of some genera had been fragmented, by itself it does not mean those genera were inevitably doomed to extinction.

Furthermore, aDNA studies of several extinct northern North American genera (*Panthera* [lion], *Mammuthus*, *Ursus*, *Equus* [horse]) (Ersmark et al. 2015 and references therein) show that while genetic diversity had indeed dropped in those genera before the Last Glacial Maximum, their genetic diversity later began recovering in the time interval just before the first appearance of humans. Perhaps just as importantly, not every extinct genus had suffered reduced genetic diversity just before extinction, such as the flat-headed peccary *Platygonus compressus* (Perry et al. 2017), making it unlikely that this genus was in decline or had been fragmented for long into isolated subpopulations. This genus vanished without showing the signs of climate-induced genetic problems.

Another argument is sometimes advanced to support the serious effects late Pleistocene climate changes had on megafauna: The body sizes of some genera were larger before the extinctions, implying that environmental stresses such as declines in optimal forage were forcing major evolutionary changes which some genera perhaps could not attain quickly enough. For example, the body size of one extinct genus in Alaska, *Equus*, rapidly declined in the late Pleistocene before becoming extinct, construed as indirect evidence of climate-caused ecological stress in response to depressed forage productivity (Guthrie 2003). However, shrinking body size, like reduced genetic diversity, was survived by other large mammals which faced the changing conditions of the late Pleistocene. Modern elk (*Cervus elaphus*) and bighorn sheep (*Ovis canadensis*) in the Northwestern USA and *Bison* in the mid-continent had larger body sizes in the Pleistocene than in the Holocene, but they are still with us. Shrinking body size due to climate change indicates that genera were capable of re-adapting to changing vegetational communities.

A Competing Hypothesis: Humans Caused the Extinctions

Climate change to account for extinctions has not been proven completely wrong, but it does not seem possible to prove it completely right, either. Ever since the nineteenth century, a competing hypothesis has been gaining support – the view that hunting by humans was the decisive factor that led to the extinctions (a concept termed "overkill"). The first hints that humans were contemporaneous with the extinct animals were discovered in the early and mid-1800s, and scientists began debating whether Stone Age humans could have destroyed so much animal life. The overkill hypothesis has had varying degrees of acceptance within the scientific community, but its appeal expanded in the 1960s and afterward when

paleoecologist Paul Martin (e.g., 1984) presented a vigorous series of arguments pointing out that so many megafaunal genera had survived multiple episodes of severe climate changes for more than a million years. What the large animals could not survive, according to Martin and adherents, was the appearance of modern *Homo sapiens* in their ranges. The worldwide dispersal of modern *Homo sapiens* had begun ~60,000 years ago, and it is in this period of global colonization that most extinctions occurred in each continent and island, one after another. The extinctions correlate well with the earliest human presence in most landmasses, but they do not correlate well with climate changes on those landmasses.

Human influence on the extinctions may have been on multiple levels. Habitat alterations such as deliberate burning by dispersing human foragers would have had adverse impacts on megafaunal species. Killing by humans also would have been a significantly destructive factor. Partial support for the overkill hypothesis can be found in the fossil record; for example, the geographical distribution of North American *Mammuthus* was actually more extensive in the climatically ameliorating interval of the Late Glacial (15,000–10,000 radiocarbon years BP) than during the earlier severe conditions of the Last Glacial Maximum (Agenbroad 2005), suggesting population recovery for this genus just before its extinction, around the time of the most widespread appearance of early human cultures.

In Paul Martin's favored variant of the overkill hypothesis, known as "blitzkrieg" or explosive overkill, the rapidly dispersing population of new human arrivals in the New World encountered large mammals that were naively ineffective at escaping from such an unfamiliar new predator, and human hunting as it spread over the continent steadily decimated the animal populations in a short time. Martin's critics pressed him to explain the almost absolute lack of kill sites of most of the extinct megafaunal genera in North America, but Martin had reasoned that kills made so quickly would not be expectably preserved in open-air sites, other than from animals with bones as massive as those of mammoths and mastodons, except in unusual circumstances. This is not an empirically testable hypothesis, but it is in agreement with observations from long-term neotaphonomic fieldwork that has documented the rarity of animal skeletons in unsettled parts of the world as bones are consumed by scavengers, scattered to become undiscoverable over time, or weather away (e.g., Haynes 1980).

It is true that direct evidence is scarce for human killing of most of the extinct megafaunal taxa (Table 3), but the numbers of kill sites are still impressive when their dating is considered; a geologist might see most of them as near-coincidental. More than a dozen sites in North America are generally accepted as human-made kills of mammoths, mastodons, and gomphotheres, and many more have been claimed as kills but are not universally accepted. The total number of all megafauna – proboscidean and non-proboscidean – in these possible kill sites is 112, of which 84 are the elephant-like animals (*Mammuthus*, *Mammut*, and *Cuvieronius*). The number of sites claimed to be proboscidean kills in Table 3 is nearly one-fifth of the total number of all reported proboscidean bone sites dating to the Late Glacial interval, according to the online Faunmap database (http://www.ucmp.berkeley.edu/faunmap/), implying human predation was a major cause of deaths in this time.

In a few cases, mammoth sites with associated stone tools might have been scavenged by humans after the animals were found dead, but the discovery of killing implements (stone spear points) in sites along with cutmarks on meat-bearing bones from sites such as Blackwater Draw, Dent, and Duewall-Newberry (Krasinski 2010) indicate many if not all of the animals were actively killed by humans. Saunders (1980) proposed that some multi-mammoth sites were the remains of family groups killed together by human hunters, but analyses of isotopes in mammoth teeth from several of these sites (Hoppe 2004; Fisher and Fox 2007) have revealed the accumulations are probably the remains of individual animals from different family groups which had been killed in separate events. Although the physical efforts needed to pursue, kill, and process prey animals as huge as mammoths may have been high, the archeological record shows that humans did preferentially select the largest megafaunal taxa, deliberately choosing

North American Megafauna Extinction: Climate or Overhunting?, Table 3 North American extinct megafaunal sites claimed to be kills made by humans; some have been doubted

Site	Prey genus and species	Cultural association and radiocarbon date(s) (BP)
Ayer Pond, WA	*Bison antiquus*, MNI = 1	No lithics, possibly human-broken bones; 11,990–11,700
Blackwater Draw, NM	*Mammuthus columbi*, MNI = 6; *Bison antiquus*, MNI = 1	Clovis lithics, butcher-marked bones; 11,040–11,630
Burning Tree, OH	*Mammut americanum*, MNI = 1	No lithics; possibly butcher-marked bones; 11,660 and 11,450 on possible gut contents, 10,860 on mammoth bone
Coats-Hines, TN	*Mammut americanum*, MNI = 1	Untyped lithics (flakes, scrapers, biface, gravers); disturbed sediments, wide date range (27,050–6,530)
Colby, WY	*Mammuthus columbi*, MNI = 7; *Camelops hesternus*, MNI = 1; *Equus* sp., MNI = 1	Clovis lithics; 11,220; 10,864
Dent, CO	*Mammuthus columbi*, MNI = 15	Clovis lithics, butcher-marked bones; 11,200; 10,980–10,670
Domebo, OK	*Mammuthus columbi*, MNI = 1	Clovis lithics; ~11,000
Duewall-Newberry, TX	*Mammuthus columbi*, MNI = 1	No typed lithics, possibly butcher-broken and marked bones; estimated 12,000–10,000
Dutton, CO	*Mammuthus columbi*, MNI = 1; *Equus* sp., MNI = 1	Clovis lithics; <11,710
Escapule, AZ	*Mammuthus columbi*, MNI = 1	Clovis lithics; no direct date
El Fin del Mundo, Mexico	*Cuvieronius* sp., MNI = 2	Clovis lithics; 11,550
Hebior, WI	*Mammuthus primigenius*, MNI = 1	Untyped lithics; possibly butcher-marked bones; 12,480–12,590
Heisler, MI	*Mammut americanum*, MNI = 1	No lithics, possibly butcher-marked bones; 11,770
Hiscock, NY	*Mammut americanum*, MNI = 6	Clovis points; 9,150–11,390
Huntington Canyon, UT	*Mammuthus columbi*, MNI = 1; *Arctodus simus*, MNI = 1	Non-Clovis projectile point possibly from same stratum as mammoth; 11,220
Kimmswick, MO	*Mammut americanum*, MNI = 2	Clovis lithics; no direct date
Lange-Ferguson, ND	*Mammuthus columbi*, MNI = 2	Clovis lithics, possibly human-broken bones; no direct date
La Prele, WY	*Mammuthus columbi*, MNI=1	Untyped flake tools, bone needles, bone bead, lithic chopper with proboscidean residue, red ocher pieces; multiple Clovis-age dates
Lehner, AZ	*Mammuthus columbi*, MNI = 13	Clovis lithics; 10,900
Leikum, AZ	*Mammuthus columbi*, MNI = 2	Clovis lithics; no direct date
Lindsay, MT	*Mammuthus columbi*, MNI = 1	No lithics, possibly cutmarked bones; 12,330 – 12,105
Lubbock Lake, TX	*Mammuthus columbi*, MNI = 2(?)	Clovis lithics; 11,100
Manis, WA	*Mammut americanum*, MNI=1	Possible bone projectile point embedded in a rib; 11,800
Miami, TX	*Mammuthus columbi*, MNI = 5	Clovis lithics; between 11,400 and 10,500
McLean, TX	*Mammuthus columbi*, MNI = 1	Questionably associated Clovis point; no date
Murray Springs, AZ	*Mammuthus columbi*, MNI = 2; *Bison antiquus*, MNI = 13	Clovis lithics; 10,900
Naco, AZ	*Mammuthus columbi*, MNI = 1	Clovis lithics; no direct date
Navarette, AZ	*Mammuthus columbi*, MNI = 1	Two Clovis points; no direct date

(continued)

North American Megafauna Extinction: Climate or Overhunting?, Table 3 (continued)

Site	Prey genus and species	Cultural association and radiocarbon date(s) (BP)
Norwich Township, OH ("Firelands Ground Sloth")	*Megalonyx jeffersonii*, MNI = 1	No lithics, possible toolmarks from meat-stripping; 11,740 ± 35
Page-Ladson, FL	*Mammut americanum*, MNI = 1	Non-Clovis lithics, possibly cut tusk; 12,450 (average of 6 dates)
Pleasant Lake, MI	*Mammut americanum*, MNI = 1	No lithics, possibly butcher-marked bones; >10,395
Rawlins, WY ("U.P. Mammoth")	*Mammuthus columbi*, MNI = 1	Untyped lithics; 11,280
Santa Isabel Ixtapan, Mexico	*Mammuthus columbi*, MNI = 1	Lithics, possibly associated non-Clovis projectile point; no direct date
Schaefer, WI	*Mammuthus primigenius*, MNI-1	Untyped lithics, possibly butcher-marked bones; 12,390–12,310
Sloth Hole, Aucilla River, FL	*Mammut americanum*, MNI = 1+	Fluted point variants, lithics, bone tools, 33 ivory points; no direct date
Wally's Beach, Alberta	*Camelops hesternus*, MNI = 1; *Equus* sp., MNI = 7	Possibly butcher-marked bones, untyped lithics; possible blood residue on lithics; 11,070

For more information and references, see Haynes (2002, 2015) and Surovell and Waguespack (2009). "Clovis" lithics refers to typologically distinct stone artifacts of the Clovis era; the sites of this era have been dated 11,550–10,800 radiocarbon years BP (roughly 13,400–12,700 calibrated years ago) (Waters and Stafford 2007). Other sites may belong on this list. "MNI" in the table refers to minimum number of individuals

to bypass the more abundant and easier-to-kill smaller species at certain times and places (Surovell and Waguespack 2009). Human foragers possibly sought not only food from the largest animals but also the added prestige associated with the ability to kill such imposing creatures.

Future Directions in the Search for a Cause

It is anything but clear what ultimately caused the extinctions. Lately the trend in interpretations has been toward a dual causality model for extinctions on several continents and landmasses, in which range restrictions and limited genetic connectivity among metapopulations – the results of oscillations in climate and vegetation – were made much deadlier by the addition of modern *Homo sapiens*, and the two factors together led to the disappearance of the large mammals. This dual causality concept has gained traction among scientists who realize that theories of single causes, such as climate change or hunting by humans, are by themselves imperfect. The synergistic interplay of climate stresses and human impacts will have to be painstakingly worked out separately for each extinct taxon (Barnosky et al. 2004), but it does appear that the extinctions' tipping point in North America was the entry and spread of *Homo sapiens*.

Cross-References

- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Glacial Advances in Asia, Europe, and North America
- ▶ Haynes, Jr., C. Vance
- ▶ *Homo sapiens*
- ▶ Paleoindians
- ▶ Peopling of the Americas

References

Agenbroad, L.D. 2005. North American proboscideans: Mammoths: The state of knowledge, 2003. *Quaternary International* 126–128: 73–92.

N

Barnosky, A.D., P.L. Koch, R.S. Feranec, S.L. Wing, and A.B. Shabel. 2004. Assessing the causes of late Pleistocene extinctions on the continents. *Science* 306: 70–75.

Ersmark, E., L. Orlando, E. Sandoval-Catellanos, I. Barnes, R. Barnett, A. Stuart, A. Lister, and L. Dalén. 2015. Population demography and genetic diversity in the Pleistocene cave lion. *Open Quaternary* 1 (4): 1–15.

Faith, J.T., and T. Surovell. 2009. Synchronous extinction of North America's Pleistocene mammals. *Proceedings of the National Academy of Sciences of the United States of America* 106: 20641–20645.

Faunmap Working Group. 1994. FAUNMAP: A database documenting late Quaternary distributions of mammal species in the United States. *Illinois State Museum Scientific Papers* 25, No. 1.

Firestone, R.B., A. West, J.P. Kennett, T.E. Bunch, Z.S. Revay, P.H. Schultz, T. Belgya, D.J. Kennett, J.M. Erlandson, O.J. Dickenson, A.C. Goodyear, R.S. Harris, G.A. Howard, J.B. Kloosterman, P. Lechler, P.A. Mayewski, J. Montgomery, R. Preda, T. Darrah, S.S. Que Hee, A.R. Smith, A. Stich, W. Topping, J.H. Wittke, and W.S. Wolbach. 2007. Evidence for an extraterrestrial impact 12,900 years ago that contributed to the megafaunal extinctions and the Younger Dryas cooling. *Proceedings of the National Academy of Sciences of the United States of America* 104: 16016–16021.

Fisher, D.C., and D.L. Fox. 2007. Season of death of the Dent mammoths. In *Frontiers in Colorado Paleoindian archaeology: From the Dent site to the Rocky Mountains*, ed. R.H. Brunswig and B. Pitblado, 123–153. Boulder: University Press of Colorado.

Graham, R.W., S. Belmecheri, K. Choy, B.J. Culleton, L.J. Davies, D. Froese, P.D. Heintzman, C. Hritz, J.D. Kapp, L.A. Newsom, R. Rawcliffe, E. Saulnier-Talbot, B. Shapiro, Y. Wang, J.W. Williams, and M.J. Wooller. 2016. Timing and causes of mid-Holocene mammoth extinction on St. Paul Island, Alaska. *PNAS* 113 (33): 9310–9314.

Guthrie, R.D. 1984. Mosaics, allelochemics, and nutrients: An ecological theory of late Pleistocene megafaunal extinctions. In *Quaternary extinctions: A prehistoric revolution*, ed. P.S. Martin and R.G. Klein, 259–298. Tucson: University of Arizona Press.

Guthrie, R.D. 2003. Rapid body size decline in Alaskan Pleistocene horses before extinction. *Nature* 426: 169–171.

Haynes, G. 1980. Prey bones and predators: Potential ecologic information from analysis of bone sites. *OSSA* 7: 75–97.

Haynes, G. 2002. *The early settlement of North America: The Clovis era*. Cambridge: Cambridge University Press.

Haynes, G. 2015. The millennium before Clovis. *PaleoAmerica* 1 (2): 134–162.

Hoppe, K.A. 2004. Late Pleistocene mammoth herd structure, migration patterns, and Clovis hunting strategies inferred from isotopic analyses of multiple death assemblages. *Paleobiology* 30: 129–145.

Krasinski, K.E. 2010. Broken bones and cutmarks: Taphonomic analyses and implications for the peopling of North America. Unpublished PhD dissertation, University of Nevada, Reno.

Martin, P.S. 1984. Prehistoric overkill: The global model. In *Pleistocene extinctions: A prehistoric revolution*, ed. P.S. Martin and R.G. Klein, 354–403. Tucson: University of Arizona Press.

Perry, T., A.L. van Loenen, H. Heiniger, C. Lee, J. Gongora, A. Cooper, and K.J. Mitchell. 2017. Ancient DNA analysis of the extinct North American flat-headed peccary (*Platygonus compressus*). *Molecular Phylogenetics and Evolution* 112: 258–267.

Saunders, J.J. 1980. A model for man-mammoth relationships in late Pleistocene North America. *Canadian Journal of Anthropology* 1: 87–98.

Surovell, T.A., and N.M. Waguespack. 2009. Human prey choice in the late Pleistocene and its relation to megafaunal extinctions. In *American megafaunal extinctions at the end of the Pleistocene*, ed. G. Haynes, 77–105. Dordrecht: Springer.

Surovell, T.A., S.R. Pelton, R. Anderson-Sprecher, and A.D. Myers. 2016. Test of Martin's overkill hypothesis using radiocarbon dates on extinct megafauna. *PNAS* 113 (4): 886–891.

Waters, M.R., and T.W. Stafford Jr. 2007. Redefining the age of Clovis: Implications for the peopling of the Americas. *Science* 315: 1122–1126.

Further Reading

Alroy, J. 1999. Putting North America's end-Pleistocene megafaunal extinctions in context. In *Extinctions in near time: Causes, contexts, and consequence*, ed. R.-D.E. MacPhee, 105–143. New York: Kluwer/Plenum.

Anderson, E. 1984. Who's who in the Pleistocene: A mammalian bestiary. In *Quaternary extinctions: A prehistoric revolution*, ed. P.S. Martin and R.G. Klein, 40–89. Tucson: University of Arizona Press.

Barnosky, A.D., P.L. Koch, R.S. Feranec, S.L. Wing, and A.B. Shabel. 2004. Assessing the causes of late Pleistocene extinctions on the continents. *Science* 306: 70–75.

Bartlett, L.J., D.R. Williams, G.W. Prescott, A. Balmford, R.E. Green, A. Eriksson, P.J. Valdes, J.S. Singrayer, and A. Manica. 2016. Robustness despite uncertainty: Regional climate data reveal the dominant role of humans in explaining global extinctions of Late Quaternary megafauna. *Ecography* 39: 152–161.

Bunch, T.E., R.E. Hermes, A.M. Moore, D.J. Kennett, J.C. Weaver, J.H. Wittke, P.S. DeCarli, J.L. Bischoff, G.C. Hillman, G.A. Howard, D.R. Kimbel, G. Kletetschka, C.P. Lipo, S. Sakai, Z. Revay, A. West, R.B. Firestone, and J.P. Kennett. 2012. Very high-temperature impact melt products as evidence for

cosmic airbursts and impacts 12,900 years ago. *PNAS* 109 (28): 11066–11067.

Burney, D.A., and T.F. Flannery. 2005. Fifty millennia of catastrophic extinctions after human contact. *Trends in Ecology and Evolution* 20: 395–401.

Byers, D.A., and A. Ugan. 2005. Should we expect large game specialization in the late Pleistocene? An optimal foraging perspective on early Paleoindian prey choice. *Journal of Archaeological Science* 32: 1624–1640.

Cannon, M.D., and D.J. Meltzer. 2004. Early Paleoindian foraging: Examining the faunal evidence for large mammal specialization and regional variability in prey choice. *Quaternary Science Reviews* 23: 1955–1987.

Daulton, T.L., S. Amari, A.C. Scott, M. Hardiman, N. Pinter, and R.S. Anderson. 2017. Comprehensive analysis of nanodiamond evidence relating to the Younger Dryas impact hypothesis. *Journal of Quaternary Science* 32 (1): 7–34.

Feranec, R.S. 2004. Geographic variation in the diet of hypsodont herbivores from the Rancholabrean of Florida. *Palaeogeography, Palaeoclimatology, Palaeoecology* 207: 359–369.

Fiedel, S. 2009. Sudden deaths: The chronology of terminal Pleistocene megafaunal extinction. In *American megafaunal extinctions at the end of the Pleistocene*, ed. G. Haynes, 21–37. Dordrecht: Springer.

Fiedel, S., and G. Haynes. 2004. A premature burial: Comments on Grayson's and Meltzer's "Requiem for overkill". *Journal of Archaeological Science* 31: 121–131.

Graham, R.W., and E.L. Lundelius Jr. 1984. Coevolutionary disequilibrium and Pleistocene extinctions. In *Quaternary extinctions: A prehistoric revolution*, ed. P.S. Martin and R.G. Klein, 211–222. Tucson: University of Arizona Press.

Grayson, D.K. 1984. Nineteenth-century explanations of Pleistocene extinctions: A review and analysis. In *Quaternary extinctions: A prehistoric revolution*, ed. P.S. Martin and R.G. Klein, 5–39. Tucson: University of Arizona Press.

Grayson, D.K., and D.J. Meltzer. 2003. A requiem for North American overkill. *Journal of Archaeological Science* 30: 1633–1648.

Grund, B.S., T.A. Surovell, and S.K. Lyons. 2012. Range sizes and shifts of North American Pleistocene mammals are not consistent with a climatic explanation for extinction. *World Archaeology* 44: 43–55.

Haile, J., D.G. Froese, R.D.E. MacPhee, R.G. Roberts, L.J. Arnold, A.V. Reyes, M. Rasmussen, R. Nielsen, B.W. Brook, S. Robinson, M. Demuro, M.T.P. Gilbert, K. Much, J.J. Austin, A. Cooper, I. Barnes, P. Möller, and E. Willerslev. 2009. Ancient DNA reveals late survival of mammoth and horse in interior Alaska. *Proceedings of the National Academy of Sciences of the United States of America* 106: 22352–22357.

Harris, A.H. 1985. *Late Pleistocene vertebrate paleoecology of the West*. Austin: University of Texas Press.

Haynes, G. 2009a. Introduction to the volume. In *American megafaunal extinctions at the end of the Pleistocene*, ed. G. Haynes, 1–20. Dordrecht: Springer.

Haynes, G. 2009b. Estimates of Clovis-era megafaunal populations and their extinction risks. In *American megafaunal extinctions at the end of the Pleistocene*, ed. G. Haynes, 39–54. Dordrecht: Springer.

Kennett, D.J., J.P. Kennett, A. West, C. Mercer, S.S. Que Hee, L. Bement, T.E. Bunch, M. Sellers, and W.S. Wolbach. 2009. Nanodiamonds in the Younger Dryas boundary sediment layer. *Science* 323: 94.

Koch, P.L., and A.D. Barnosky. 2006. Late Quaternary extinctions: State of the debate. *Annual Review of Ecology and Evolutionary Systematics* 37: 215–250.

MacPhee, R.D.E., and P.A. Marx. 1997. The 40,000 year plague: Humans, hyperdisease and first-contact extinctions. In *Natural change and human impact in Madagascar*, ed. S. Goodman and B. Patterson, 169–217. Washington, DC: Smithsonian Institution Press.

Martin, P.S. 1973. The discovery of America. *Science* 179: 969–974.

Martin, P.S. 1990. 40,000 years of extinctions on the "planet of doom". *Palaeogeography, Palaeoclimatology, Palaeoecology* 82: 187–201 (Global and Planetary Change Section).

Martin, P.S., and D.W. Steadman. 1999. Prehistoric extinctions on islands and continents. In *Extinctions in near time: Causes, contexts, and consequences*, ed. R.D.E. MacPhee, 17–55. New York: Kluwer Academic/Plenum.

Mithen, S. 1993. Simulating mammoth hunting and extinction: Implications for the late Pleistocene of the central Russian Plain, In: *Hunting and animal exploitation in the later Palaeolithic and Mesolithic of Eurasia*, eds. G.L. Peterkin, H.M. Bricker, and P. Mellars, 163–78. Anthropological Papers of the American Anthropological Association 4.

Mosimann, J.E., and P.S. Martin. 1975. Simulating overkill by Paleoindians. *American Scientist* 63: 303–313.

Nickell, Z.D., and M.D. Moran. 2017. Disease introduction by aboriginal humans in North America and the Pleistocene extinction. *Journal of Ecological Anthropology* 19(1) (In Press). http://scholarcommons.usf.edu/jea/vol19/iss1/2. https://doi.org/10.5038/2162-4593.19.1.1193.

Paquay, F.S., S. Goderis, G. Ravizza, F. VanHaeck, M. Boyd, T.A. Surovell, V.T. Holliday, C.V. Haynes Jr., and P. Claeys. 2009. Absence of geochemical evidence for an impact event at the Bølling-Allerød/Younger Dryas transition. *Proceedings of the National Academy of Sciences of the United States of America* 106: 21505–21510.

Prescott, G.W., D.R. Williams, A. Balmford, R.E. Green, and A. Manica. 2012. Quantitative global analysis of the role of climate and people in explaining late Quaternary megafaunal extinctions. *Proceedings of the National Academy of Sciences of the United States of America* 109 (12): 4527–4531.

Saunders, J.J. 1992. Blackwater Draws: Mammoths and mammoth hunters in the terminal Pleistocene. In *Proboscideans and Paleoindian interactions*, ed. J.W. Fox, C.B. Smith, and K.T. Wilkins, 123–147. Waco: Baylor University Press.

Scott, A.C., M. Hardiman, N. Pinter, R.S. Anderson, T.L. Daulton, A. Ejarque, P. Finch, and A. Carter-Champion. 2017. Interpreting paleofire evidence from fluvial sediments: A case study from Santa Rosa Island, California, with implications for the Younger Dryas Impact Hypothesis. *Journal of Quaternary Science* 32 (1): 35–47.

Steadman, D.W., and P.S. Martin. 1984. Extinction of birds in the late Pleistocene of North America. In *Pleistocene extinctions: A prehistoric revolution*, ed. P.S. Martin and R.G. Klein, 466–477. Tucson: University of Arizona Press.

Surovell, T.A., V.T. Holliday, J.A.M. Gingerich, A. Ketron, C.V. Haynes Jr., I. Hilman, D.P. Wagner, E. Johnson, and P. Clayes. 2009. An independent evaluation of the Younger Dryas extraterrestrial impact hypothesis. *Proceedings of the National Academy of Sciences of the United States of America* 106: 18155–18158.

Wittke, J.H., J.C. Weaver, T.E. Bunch, J.P. Kennett, D.J. Kennett, A.M.T. Moore, G.C. Hillman, K.B. Tankersley, A.C. Goodyear, C.R. Moore, I.R. Daniel Jr., J.H. Ray, N.H. Lopinot, D. Ferraro, I. Israde-Alcántara, J.L. Bischoff, P.S. DeCarli, R.E. Hermes, J.B. Kloosterman, Z. Revay, G.A. Howard, D.R. Kimbel, G. Kletetschka, L. Nabelek, C.P. Lipo, S. Sakai, A. West, and R.B. Firestone. 2013. Evidence for deposition of 10 million tonnes of impact spherules across four continents 12,800 years ago. *PNAS* 110 (23): E2088–E2097.

North American Mound Builders: Hopewell, Natchez, Cahokia

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Introduction

In the minds of most Americans of the nineteenth century, the native inhabitants encountered in the eastern United States were not the builders of the earthen monuments scattered across the landscape. Native Americans found living among them north of the Ohio River professed no knowledge of their builders. The mounds must have been constructed in the distant past because centuries-old trees were found growing on them. The two findings coalesced into the belief that the mounds were remains of a lost race that derived from Mexico where mound building had a long-recognized history. It was not until archaeological investigation had conclusively determined that Native Americans were indeed descendants of the Mound Builders that the invention of a lost race was disposed of. These same investigations demonstrated an antiquity that rivals that of their presumed source south of the United States. Mound building can be traced to back to 4000 BCE (Milner 2004). As a consequence, the central reason for seeking external influence ceased to be relevant. But other considerations remain. Beliefs and practices known ethnohistorically as well as archaeological evidences are reminders that Mesoamerican culture is not entirely divorced from the history of the mound builders. The question remains – were Mesoamerican innovations so important that they were responsible for creating structural changes in the long-term history of the mound builders? Or did they only color that history? A tension between these positions poses an appeal to exogenous forces on the one hand as against a history that is essentially self-contained. The final assessment is likely to be a more measured perspective as new research sheds light on old assumptions. The quest for answers continues to stoke many debates including the role of Mesoamerica.

Definition

Presently, the ethnic connections between the precontact builders of mounds and the post-contact Native Americans are firmly established. Notwithstanding this connection, no other overall designation has arisen to replace the term, mound builders, despite its origin in a racial mythology about the precontact inhabitants of the eastern United States. It does have usefulness as applying to a major historical chapter in the history of Native Americans. In the first place no single group of people is descended from these ancient peoples. Diverse language groups appear

to have participated in major mound-building programs. The major language groups are the Caddoan, Iroquoian, Muskogean, and Siouan. However, it is probably no accident that their descendants and cultural representatives happen to have been singled out by congress in the nineteenth century as deserving a distinct citizenry status as the Five Civilized Tribes (Fogelson 2004; Townsend and Sharp 2004). Although these tribes dominate the list of descendants, many smaller tribes that had historical connections to the Mound Builders lost their separate identity by incorporation into larger tribes, such as the Creeks. Among them are the Natchez of the state of Mississippi, who were a notable example of a once famous mound-building tribe that joined the Creek Confederacy out of necessity.

In many respects, our perspective to the precontact history of the East has been framed by a natural historical approach to the past. Tracking the historical ecology through time has been enormously successful in explaining economic and social developments (Smith 1993, 1995). Improvement in the productivity of natural environments following the Ice Age has been an important factor in increasing the resource base for humans and extending the duration of sedentary settlement. Against the background of this process, plants became domesticated from local species, although the fact that some of these species were the same or potentially the same as plants in Mesoamerica has led to a reawakening of old debates (Smith 1995). A critical area of debate has been over the role maize cultivation had in supporting cultural complexity and major monument construction. That debate has been settled by placing monuments well before the introduction of maize around 1 CE. Even in the centuries that immediately followed its introduction, archaeological discovery has shown that maize was a minor dietary item until about 1000 BE and did not dominate foodways until 1200 BE. As important as the development of maize consumption was in fueling Mississippian Period societies, it cannot be cited as a factor earlier in time.

The place of domesticated plants in mound builder history continues to be a critical issue, although the debate over the source of the principle starch grain (*Zea mays*) has been settled by establishing the Southwest as the immediate source, not directly with Mesoamerica (Smith 1993, 1995). However, the possibility exists that various varieties of this and other domesticates were introduced more directly.

The importance of a maize-based diet is that it is associated with the period of greatest expansion of the widespread distribution of mound building (Smith 1993, 1995; Milner 2004). But as agriculturally beneficial environments shrank in extent and became increasingly unstable around 1400 CE, the distribution of mound use diminished and the frequency of mound renewal declined. The final blow was struck during the seventeenth century by the persistent slave-raiding expeditions that took place from the Atlantic Coast. These raids undermined the sacred authority of chiefs and the priests that were in charge of political activities associated with mounds before European contact. Dislocations of populations that ensued from climate change led to the abandonment of territories in the Ohio Valley and Great Lakes that centuries before European contact had been the home of a long tradition of mound building. Replacement peoples from the north and east knew little of the mound-building practices.

N

Key Issues

Issues of Scale and Organization

Behind every major earthwork lies the question of how self-sufficient collectors or farmers managed to recruit and direct the necessary labor force behind monument building. It is commonly thought that the more the effort toward constructing a monument, the more the enterprise is likely to be embedded in a complex political organization. However intuitively satisfying this relationship might be, it is reliable only in very broad terms. It cannot be measured off on an interval scale. The social processes inherent in increasing social complexity create structural discontinuities in the capacity to amass labor and other resources. For instance, if large monument construction were calculated by its labor value, then logically these constructions would appear to

be out of range for small-scale economies. Concluding from labor value alone, one might rate the society in question much more complex than other more reliable material indicators would indicate (e.g., subsistence organization, local population sizes). In the case of monuments constructed by mound builders, earthwork mass, to take one term of an equation, has to be scaled in terms of overall labor input and duration of the enterprise. When the three measures are balanced in particular cases, then the short time that field investigation shows it took to erect exceptionally massive mounds, such as Mound A at Poverty Point and Monks Mound at Cahokia, reveals the capacity in those cases to marshal extraordinarily large labor pools (Kidder 2012). However these pools of labor might have been marshaled, the aggregate size is the critical factor. Bear in mind that any enterprise of the magnitude we are speaking of simply cannot afford to interrupt the processes of acquisition and preparation of food. This realization is all the more stark when due consideration is taken of the food resource base of Poverty Point, which is fishing and plant collecting albeit in a highly productive base of aquatic and wetland resources (Gibson 2000). In the case of Cahokia, maize and other cultivated plants yielded comparable productivity to the same kind of wetland/aquatic resource base many miles to the north (Milner 2006).

Centralization of Authority

The matter of adequate-sized labor pool connects with another debate. We have already shown that in two large construction projects, the size of the labor pool available for short periods had to have been drawn from a much wider catchment than usually projected from local support alone. In the case of the large geometric Hopewell earthworks the labor pool likewise does not appear to match the population size that can be mustered from the scattered settlements of rather small size. The ensuing debate revolves around the distribution of population that supported the monumental earthworks of Ohio Hopewell. Since substantial villages have not been found, was the dispersal of population sufficient to provide the construction and support for these mound centers (Byers and Wymer 2010)? The answer has an impact on whether or not pilgrims are dependent upon for labor or whether the local population was sufficient. The relationship between the major multi-mound geometric earthworks and the support population also raises the issue of settlement permanence during the Middle Woodland Period.

This issue touches on the kind of leadership required since planning of the enterprise and coordinating the execution entails uncommon experience and or knowledge (Gibson and Carr 2004). These considerations play heavily into the debate over the matter of social complexity throughout mound builder history (Byers and Wymer 2010). Whereas some scholars have made Poverty Point out to be an expression of chiefly power (Gibson 2000), others have preferred an egalitarian organization because of the fisher-collector economy. Cahokia (IL) has even been placed in its own social category of civilization by calling into question the entire evolutionary scale (Pauketat 2007). One conclusion that can be drawn from these debates is that social evolutionary schemes abstracted from sources outside the subcontinent poorly fit its observed social history. Some have called into question those scales.

Sacred Authority

Other issues come into play. If specialized expertise for mound building is involved how are leaders to acquire it? Does this expertise enter in a significant way into the attainment of political leadership? If they go to far distant places to gain this expertise, do those trips leave traces with hard evidence?

Archaeological investigations have shown that mound building on a small scale can be traced to back to 4000 BCE when more plentifully available food resources made frequent movement of settlements less attractive (Smith 1993). These life-sustaining resources then led, where it was possible, to the entrenchment of claims of ownership and to the planting of burials nearby as a form of certification. These early expressions were usually small and basically made up of mounded cemeteries. Mounds in many cases thereby

became the by-product of the continuity of cemetery usage of particularly important place on the landscape, defined either economically or spiritually. Although the cemetery function of mounds was probably the most widespread usage in time and place, the most conspicuous uses have other functions as well. These are the geometric earthworks of the Hopewell period and the platform mounds of the Mississippian period. From such usages an association of mound burial with spiritual connections developed.

Two of these connections stand out for comment. The first and probably the earliest of these are constructions guided by, if not dedicated to, the observance of celestial risings and settings. The sun is particularly important after 1200 CE, whereas the moon is previously important (Byers and Wymer 2010). The second spiritual connection is as a repository for the remains of the celebrated ancestors (Smith and Miller 2009). The remains of members of the founding lineage were housed in shrines or temples dedicated to their veneration and from whom sacred powers flow to the chief, his living relatives, and his priesthood. The two functions were often combined.

Shrine-based authority for central leadership is largely guided by our text-based understanding of Natchez cultural practices, which have a strong connection with Natchez hierarchical social and political organization. The Natchez case has provided the principle model for chiefdom level of organization in the East. They were organized around matrilineal groups that traced their descent from a tribal semi-deified culture hero. Genealogical seniority was translated into rank with rich clans composing a social tier of nobles. The chief, called the Sun, controlled the tribal ancestor shrine that housed the stone image of that hero as well as the remains of the chief's immediate family and ancestors.

Exotic Material Objects

The subject of spiritual authority leads to a question about it social impact, particularly when such authority derives from features of a sacred place on the landscape. One model is to have people flock in pilgrimages to spiritual places on a regular basis in Hopewell and early Mississippian times (Beck 2003; Byers and Wymer 2010). The attractiveness of this model puts the hosts at spiritual places in the advantageous position of directing visitors in making large monumental projects. The sacred contexts of these projects would be one that would appeal to the circumstances of attraction in the first place. One advantage of this pilgrimage model is that it explains the appearance of large numbers of people that appear to have been enlisted in the colossal mound-building projects. Only the large quantity of food remains need to be documented for brief periods during warm weather.

During the Hopewell Period, quantities of objects and raw materials moved over long distances, coming from peninsular Florida, Ontario, and Yellowstone Park. Some of the largest aggregations of obsidian bifaces and marine shell containers and ornaments ended up in south-central Ohio during the Hopewell Period. A parallel situation at Cahokia exists before 1200 CE in the quantity of marine shell from Florida waters that ended up there (Milner 2006). The question remains was this due to traders departing from the northern centers to acquire valuable raw materials or were visitors from the south journeying north with goods. What part did either of these economic movements take and with regard to the potential role that down-the-line trade played? A finding in favor of journeys to the spiritual places supplies a much needed explanation for the strong presence of exotic goods and the intense periods of mound building that created some of the more spectacular examples of monumental construction in the past.

Impact of Warfare

The impact of deadly conflict until relatively recently was measured by the presence and frequency of fortified settlements. Only with detailed examination of human remains did the record of pervasive violence begin to emerge. That record reveals that the kinds and intensity of violence through time and place were indicative of patterned responses to social, political, and

environmental stresses (Chacon and Mendoza 2007). While episodic flare-ups of deadly violence were present from at least 4000 BCE, continent-wide patterns appeared in the centuries during which local population crowding can be documented. Preceding and during the adoption of maize agriculture is one such period and another is during periods when well-organized polities of aggregated settlers fueled by maize agriculture expand at the expense of less organized groups.

Examples

Relatively early in this history, a large set of earthworks was constructed near the confluence of the Red River with the Mississippi. The Poverty Point is a complex of earthworks spread over 900 acres that was established around 1650 BCE. The central mound of Poverty Point, Mound A, faced a fanlike configuration of six concentric ridges that resembled half of an octagon. Five paths ran through the juncture of the sides from a point radiating from the riverbank. Mound A is aligned with the centerline of this fan. The complicated geometry that underlies this configuration demonstrates the presence of a command of large-scale planning and constructional execution associated with some kind of leadership. Mound A is the second largest mound in the United States by bulk. Archaeological investigation revealed that construction took only 3 months starting between 1450 and 1250 BCE. The planning and execution that went into this monumental achievement is all the more remarkable considering that the supporting economy was based on fish and other wetland resources.

The Hopewell period is the next notable time of extensive mound construction. At this time, mound building was accompanied by an exuberant art style that endured from about 100 to 400 CE with distinct phases therein. The cultural markers of this period are discontinuously present from Florida to the Great Lakes and from the Appalachian mountains to the area of Kansas City. They testify to a new cultural unity among local self-sufficient small-scale gardeners. Major mound groups not attached to local communities were situated in two kinds of locations, either on boundaries between major watersheds or at places uniquely positioned to observe celestial events, in other words places that accessed major sources of spiritual power located in the heavens. Largely small-scale self-sufficient settlements distributed over much of the Midwest and Mid-south were tied by the movement of finished goods and selected raw materials.

The third Mississippian period saw the creation of major earthworks from roughly 1050–1200 CE that appeared to continue the well-established attraction of spiritual centers. The difference was in the population sustaining power of maize agriculture that led to much larger and more permanent settlements. Cahokia was one of the largest such aggregation consisting of 150 ha of occupation and at least 102 mounds of which the central monument, Monks Mound, stands 30 m high with a footprint of 7 ha. This nascent city was in the neighborhood of other large settlements on the floodplain of the Mississippi River, altogether making a large population presence along the Mississippi River. Monks Mound stood in the center of a cruciform of four monumental plazas. Around 1200 CE, social changes took place that greatly increased the number and distribution of townsites through the Midwest and Southeast where maize cultivation was possible in the vicinity of wetland environments. By this time the relationship of population and these resources created the notable distribution of earthworks that provided an identifier for the period. But those earthworks became less important as warfare intensified and Europeans embarked on projects of large-scale trade and colonization.

Cross-References

► Cahokia
► Poverty Point, Archaeology of

References

Beck, R.A. 2003. Consolidation and hierarchy: Chiefdom variability in the Mississippian Southeast. *American Antiquity* 68: 641–664.

Byers, A.M., and D.A. Wymer, eds. 2010. *Hopewell settlement patterns, subsistence, and symbolic landscapes*. Gainesville: University Press of Florida.

Chacon, R.J., and R.G. Mendoza, eds. 2007. *North American indigenous warfare and ritual violence*. Tucson: University of Arizona Press.
Gibson, J.L. 2000. *The ancient mounds of poverty point: Place of rings*. Gainesville: University Press of Florida.
Gibson, J.L., and P.J. Carr, eds. 2004. *Signs of power: The rise of cultural complexity in the Southeast*. Tuscaloosa: University of Alabama Press.
Fogelson, R.D., ed. 2004. *Handbook for North American Indians, volume 14: Southeast*. Washington, DC: Smithsonian Institution.
Kidder, T.R. 2012. Poverty point. In *Oxford handbook of North American archaeology*, ed. T. Pauketat, 460–470. New York: Oxford University Press.
Milner, G.R. 2004. *The moundbuilders: Ancient peoples of eastern North America*. London: Thames and Hudson.
Milner, G.R. 2006. *The Cahokia chiefdom: The archaeology of a Mississippian society*. 2nd ed. Gainesville: University Press of Florida.
Pauketat, T.R. 2007. *Chiefdoms and other archaeological delusions*. Walnut Creek: Altamira Press.
Smith, B.D. 1993. *Rivers of change: Essays on early agriculture in eastern North America*. Washington, DC: Smithsonian Institution Press.
Smith, B.D. 1995. *Emergence of agriculture*. New York: W. H. Freeman & Co.
Smith, K.E., and J.V. Miller. 2009. *Speaking with the ancestors: Mississippian stone statuary of the Tennessee-Cumberland area*. Tuscaloosa: University of Alabama Press.
Townsend, R., and R. Sharp, eds. 2004. *The hero, hawk, and the open hand: American Indian art of the ancient Midwest and South*. Chicago: Art Institute of Chicago.

Further Reading

Parker Pearson, M. 1999. *The archaeology of death and burial*. Stroud: Sutton Publishing.

North American Plains: Geography and Culture

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State of Knowledge and Current Debates

Introduction

This entry spans the entire North American Great Plains and more than 12,000 years. The goal is to present important issues, debates, and data organized in a chronological, geographical, and topical format. Citations were limited as to number, and so review essays are emphasized, especially those covering the broadest range of topics. Sometimes more recent citations were eliminated in favor of earlier, broader ones. Readers wanting details can check references in these essays and do electronic keyword searches. All radiocarbon dates are uncalibrated.

Initial Occupation of the Americas

It is possible North America was occupied as early as 130,000 years ago (Holen et al. 2017). That idea is subject to much disagreement. Until about 20 years ago, America's earliest occupants were thought to arrive through a corridor between the Laurentide and Cordilleran glaciers (Fig. 1). The corridor is available around 13,000 years ago (BP, or before present). Clovis complex represented those peoples. With general acceptance of the 15,000 BP Monte Verde, Chile site, pre-Clovis occupations became more likely.

A Pacific coast route into the Americas is favored now because the ice-free corridor did not exist. The interglacier route becomes a later, secondary path (Meltzer 2009: 5). A third route across northern Alaska and Canada and down the Atlantic coast is also possible (O'Rourke and Raff 2010: Fig. 1). The lack of ancient DNA (aDNA) analyses prevents assessment of whether a particular Plains cultural complex descends from people who followed any of these routes. A proposal that Solutreans from southern France first colonize the Americas receives no support from DNA studies (Skoglund and Reich 2016: 28). DNA research indicates an Asian origin, of some complexity itself, for Native Americans (Skoglund and Reich 2016).

Pre-Clovis

For the Plains, two sites possibly represent occupations earlier than 15,000 years ago, La Sena in Nebraska and Kanorado in Kansas. There are other sites proposed as well going back to 40,000 BP (Holen and Holen 2014: 435). These sites are controversial because stone tools are not present (Kornfeld et al. 2010: 71–73). The Buttermilk Creek complex in central Texas dates between 13,000 and 15,500 BP. This complex includes lithic

North American Plains: Geography and Culture, Fig. 1 North American glaciers and possible routes for occupying the Americas

technology attributes that could be precursors to Clovis (Jennings and Waters 2014). We know little of Pre-Clovis lifestyles. The Plains were potentially settled late, possibly following the Colorado and/or Columbia river valleys (Anderson et al. 2014: 189, 196–199; Erlandson 2014).

Clovis Complex

Clovis represents the earliest Plains occupation about which there is no disagreement. The hallmark is a large, basally fluted projectile point. The flute generally covers only a small part of the point's surface. These points were part of a

spear, lance, and/or atlatl (spear thrower) system. There are a variety of other tools as well (Meltzer 2009: 242–246). Clovis likely develops from people already resident in North America, quite possibly in the Great Plains (Holliday and Miller 2014: 222).

Clovis dates from 11,500 or perhaps even 11,000, to 10,800 BP. This short amount of time implies rapid radiation of either the point style or people across the landscape. Nonetheless, regional variations develop. The complex overlaps the early part of the Younger Dryas climatic event and a change to a colder, wetter climate (Meltzer 2009: 50–60, 254–255).

Lifestyles of Clovis people remain little known. People are often portrayed as moving over great distances. Widespread distribution of high-quality stone tool material types supposedly reflects this mobility. However, other factors, such as trade, could be responsible (Amick 2017). Now-extinct mammoths are seemingly common game. Nonetheless, other large animals plus a wide range of smaller animals are clearly used (Meltzer 2009: 273–279). We know essentially nothing about plant use (Adair 2003: 277).

It is possible, but unclear, that people with other projectile point styles are present contemporaneously with Clovis. Associating dates with these complexes is difficult.

Pleistocene Extinctions/Overkill

Toward the end of the Pleistocene epoch and continuing into the early Holocene, many animal species become extinct or change morphologies, especially size. The question is whether climate change (Younger Dryas) or human hunting pressure is responsible (Meltzer 2009: 255–268). The debate remains unresolved, with new culprits occasionally introduced. Likely both climate change and humans are involved, along with other factors, but to different degrees for each species (Meltzer 2009: 267).

Post-Clovis to 8,000 BP

The largest and most numerous game after 10,000 BP is the bison. Although different bison species are recognized based on morphology, ancient and modern mtDNA studies indicate only one species (O'Shea 2012).

Folsom Complex

Folsom follows Clovis. The hallmark is a projectile point with basal fluting that covers most of both faces. Reason(s) for fluting is unclear. Another important diagnostic tool is ultrathin bifaces used for skinning bison (Meltzer 2009: 295–297, 303). Folsom complex dates between 10,900 and 10,200 years ago. The Younger Dryas (11,000–10,000 BP) is contemporary with Folsom (Meltzer 2009: 284–285).

Folsom potentially derives from Clovis. Earliest dates suggest a northwestern Plains origin (Fig. 2). Folsom replaces Clovis there either through cultural diffusion or actual population movement. On the southern Plains, population replacement is more likely (Collard et al. 2010). Folsom is basically a Plains complex with different complexes appearing elsewhere in North America coming from Clovis and/or Pre-Clovis.

Primary game is bison. Nonetheless, smaller game is more important than traditionally recognized (Hill 2008; Meltzer 2009: 301–302). Although Folsom no doubt exploits wild plant resources, there is almost no evidence (Adair 2003: 277–278).

Folsom points are often of high-quality lithic material moved over long distances. Consequently, Folsom is portrayed as moving significant distances in pursuit of bison (Meltzer 2009: 286). However, exotic materials are restricted principally to projectile points, and these could just as easily be moved through social interaction with other groups.

Folsom people build a variety of structures, especially in the Rocky Mountains region. Some are mud-walled, while others are temporary, more akin to tipis. None are year-round permanent residences but are used seasonally, perhaps repeatedly (Meltzer 2009: 299, 301). If occupations are repeated, then Folsom movement is scheduled and not a free-ranging following of bison.

Late Paleo-Indian

Many different cultural complexes follow Folsom indicating significant cultural diversification and

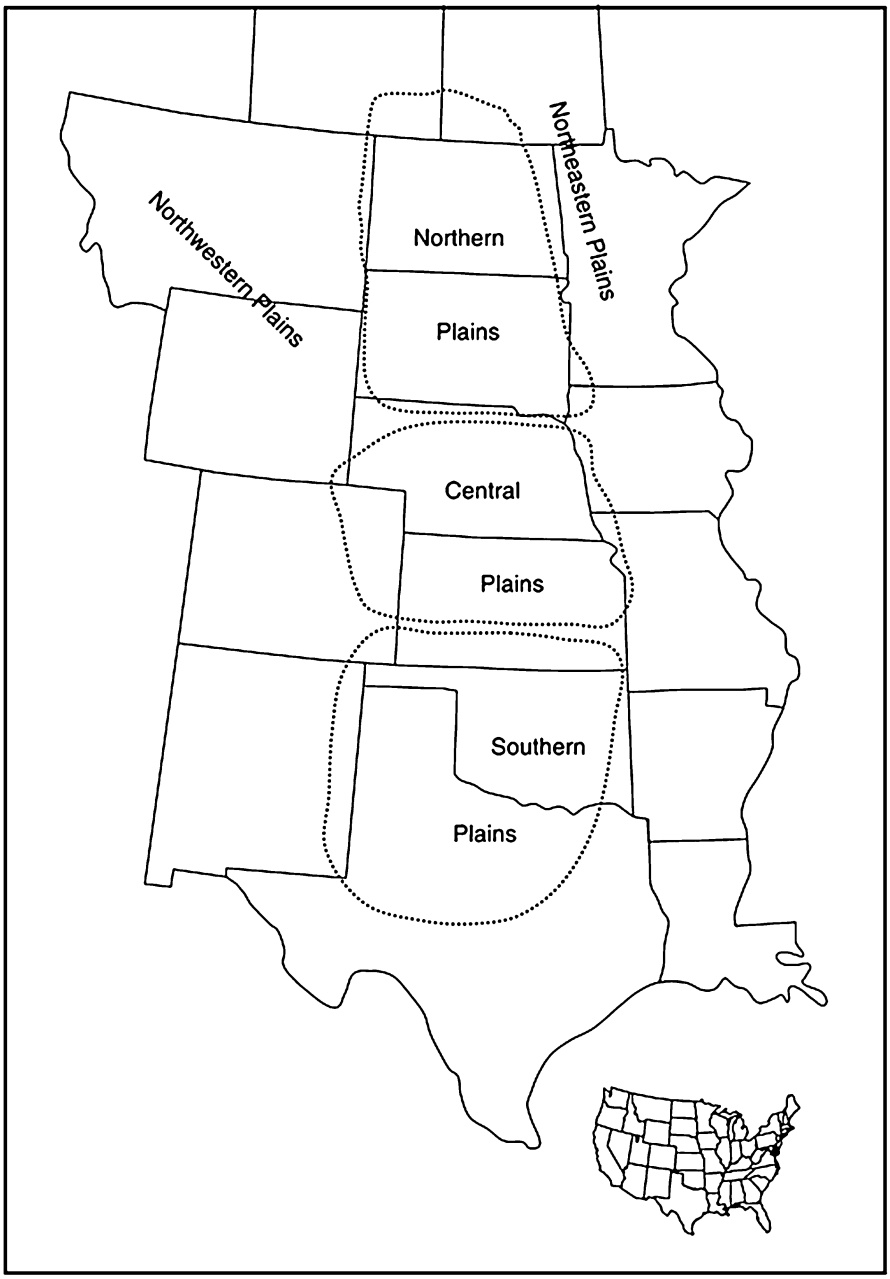

North American Plains: Geography and Culture, Fig. 2 Plains subareas

likely a reduction in mobility. Most are not well dated. They are considered together here. Climatically a trend begins to a warmer and dryer climate. Most complexes hunt bison, but smaller fauna is far more important than previously thought (Hill 2008).

Lanceolate-shaped projectile point types lacking fluting are diagnostic (Hofman and Graham 1998: 109–113). Late Paleo-Indian complexes generally date between 10,200 and 8,000 years ago (Hofman and Graham 1998: 103). Beginning around 8,000 BP, climatic drying and

warming intensifies, bison begin to undergo a decrease in body size and an increase in herd size, and projectile point styles change to stemmed and notched forms. Late Paleo-Indian origins are unclear and subject to debate but to some degree likely lie in Folsom. Continuities are seen among earlier and later complexes within Late Paleo-Indian as well (Kornfeld et al. 2010: 85–86, 89).

Use of exotic lithics continues, but locally available stone materials increase. Diversification in projectile point styles and increasing use of local lithics suggest an increasing population and movement over smaller areas. Evidence for structures includes temporary shelters such as tipis, whose presence is marked by stone rings, to more permanent constructions having stone-lined walls (Hofman and Graham 1998: 112, 121–122; Kornfeld et al. 2010: 401). The latter may indicate repeatedly utilized base camps. Bison-kill rituals have resemblances to those of historic tribes (Kornfeld et al. 2010: 232–233).

Bison remain the primary game, but the importance of small animals is likely underestimated. Reliance on quick reproducing but harder to catch small prey potentially reflects resource depression in some locations by latest Paleo-Indian times (Hill 2008: 46–47). Little is known about Late Paleo-Indian plant use (Adair 2003: Table 7.2).

There are no aDNA analyses for human skeletal remains from the Great Plains for the period 15,500–8,000 BP. Human skeletal remains are rare. Paleo-Indian and later Archaic populations are relatively homogeneous craniometrically. Homogeneity potentially results from widespread mating networks associated with low population densities (Key 1983: 66).

Plains Archaic Period

Holocene Climatic Optimum (HCO)

Plains climate between roughly 9,000 and 4,500 BP is marked by episodes of pronounced aridity and high temperatures (Grimm et al. 2011). Bison size declines rapidly between 8,000 and 6,500 BP and continues to around 2,000 BP when bison become smaller than modern individuals, especially on the southern Plains (Hill et al. 2008: 1759–1760; Martin et al. 2018). Bison possibly shift their ranges east, west, and perhaps north. Herds are potentially more localized (Widga et al. 2010).

Early Plains Archaic Period

The Early Plains Archaic coincides with HCO. The hallmark is large, stemmed, and notched projectile points of various styles used as part of an atlatl complex. Ground stone implements, such as manos and metates, used primarily to process plant materials increase. A variety of cultural complexes are recognized (Kay 1998: 174–193, Fig. 6.1). Subsequent discussion generalizes across these.

The Early Plains Archaic generally runs from around 8,000 BP to around 6,000 BP. However, there is much variation in dates depending on whether changing projectile point styles or changing subsistence strategies are considered important.

Origins are in earlier Paleo-Indian populations as Late Paleo-Indian projectile point styles and characteristics, along with other artifact types, continue into the Early Archaic, overlapping with new styles and objects (Dyck and Morlan 2001: 115; Vehik 2001: 148; Collins 2004: 118; Jennings et al. 2015: 257). What little human skeletal material there is supports continuity as well (Key 1983: 66; Gill 2010: 533–534).

Because of HCO, it was once thought humans left the Plains, either moving west into the Rockies or east into better-watered locations. However, we now know wholesale abandonment does not occur. Nonetheless, some Plains peoples may move away, but others living outside the Plains may expand into the region (Kay 1998: 173, 185, 188–189; Vehik 2001: 148–149; Jennings et al. 2015: 258). Human population possibly declines.

People live in the best-watered places. Diversification in projectile point and other artifact types along with increased use of local stone suggests people move over smaller areas. Structures likely to be houses are more frequent. These represent repeatedly used base camps. Temporary structures, such as tipis, continue in use (Vehik 2001: 148; Kornfeld et al. 2010: 392, 395–398, 401).

Bison are uncommon and herds possibly are localized. Resource use expands to include not

only medium-size animals such as deer, small animals such as rabbit, mussels, and fish but also baking of bulbs in earth ovens and burned rock features and seed processing with ground stone implements such as manos and metates (Adair 2003: Table 7.3; Collins 2004: 119–120; Johnson and Holliday 2004: 290; Kornfeld et al. 2010: 249–254, 395–398; Widga et al. 2010).

We know little about social and political organization. Small family units and networks of such units (bands) are probably characteristic. Where gathering contributes substantially to food supplies, the role of women in society may be more important (Vehik 2001: 149). The presence of nonlocal materials likely reflects trade rather than the size of space over which people move (Vehik and Baugh 1994: 251).

More speculatively, late in this period movement of people from the intermountain northwest onto the northwestern Plains may reflect an expansion of proto-Algonquian speakers. Mitochondrial DNA analyses indicate Algonquian speakers spread from west to east over the last 3,000–4,000 years (Malhi et al. 2001: 38–41). Historical linguistics analyses produce similar results (Campbell 1997: 152–154). Glottochronology suggests a date of about 5,000 years ago for the origin of Plains Algonquian with eastern Algonquian languages developing later (Holman et al. 2011: Table 6). An east–west trade across the northern Plains at this time is supportive (Vehik and Baugh 1994: 251).

Perhaps proto-Algonquian expansion across the northern Plains is why northwestern Plains craniometrics indicate similarity through time to a sample of modern Algonquians (Gill 2010: 543).

Middle Plains Archaic Period

Large projectile points are the primary diagnostic artifact. Most have a large, broad blade, but there is a diversity of hafting styles. Some use corner, basal, or side notches, while others are simply stemmed. There are many other regionally diagnostic artifacts. Ground stone, primarily used to process wild plants, increases. Burned rock features are common over much of the Plains.

The period begins around 6,000 BP and ends around 4,000 BP. Where beginnings and end dates are set depends upon what individual researchers consider important for defining the period. Increasingly, the end is set at a change to a wetter and cooler climate around 4,400 BP.

Similarities between Plains Middle Archaic projectile point styles and styles outside the Plains are sometimes taken to reflect movements of people. Diffusion of point styles rather than movement of people is seldom considered. It is likely most Plains peoples stay in place adjusting to changing climate and resource conditions, albeit continued population decline is quite possible (Vehik 2001: 149–150; Gill 2010: 534).

People remain hunters and gatherers. Although small herds of bison are present, dental abnormalities among southern high Plains samples suggest bison are under stress, probably from poor range conditions (Johnson and Holliday 2004: 290). Bison size decreases. Most sites with bison are on the high Plains, but bison are occasionally found eastward. Large-scale bison hunting is rarely indicated. Most faunal inventories contain deer and small animals.

Plant resources are primarily wild, although some late sites in the high Plains and Rocky Mountain foothills have maize. Perhaps more important is widespread use of a variety of wild oily and starchy seeds, such as goosefoot, knotweed, smartweed, marsh elder, and sunflower. Some of these will ultimately be domesticated albeit not necessarily on the Plains. *Prunus* begins to appear quite often in botanical assemblages (Adair 2003: 279–286). This genus is consistently used through time and, along with grape, other berries, fruits, and nuts, may be an "encouraged" or "managed" wild plant.

Burned rock middens and earth ovens are used to bake bulbs, roots, shellfish, insects, and meat. Surface water is limited to the point that wells are excavated in several locations on the southern high Plains. Favorable settings with strong springs, streams, or lakes are repeatedly occupied. Houses are uncommon, but pit houses, house basins, and tipi rings are present on both the western and eastern Plains. Mobility is likely high and population densities low. However, both reuse of sites and the occasional construction of burial mounds and cemeteries may mark use

rights to resources. Defined burial locations may also tie dispersed peoples together through ceremonies and feasting. There is not a lot of information on health status, but high dental wear likely reflects use of stone grinding to process food. There are also examples of frequent disruption in bone growth, possibly from food stress. There is little to suggest much difference in sociopolitical organization compared to the Early Archaic (Myster and O'Connell 1997: 151; Kay 1998: 179; Collins 2004: 120–121; Johnson and Holliday 2004: 290–291; Perttula 2004: 375; Kornfeld et al. 2010: 254–255, 392, 401; Whittaker 2016).

In southeast Oklahoma, a series of sites show continuity in artifact styles from the Middle Archaic through later periods when people speaking Caddoan languages occupy the area. People speaking Northern Caddoan languages ultimately come to occupy the Plains from Oklahoma to North Dakota. It may be from southeast Oklahoma that ancestral Northern Caddoans begin their movement out on to the Plains.

Late Plains Archaic Period

Broad-bladed, corner-, or side-notched dart points are the principal diagnostic items. Contracting stem points that may also be knives are present as well. Later, the bow and arrow, marked by much smaller projectile points, may start to appear, especially on the northern Plains. Occasionally pottery occurs late in the period.

The beginning date is increasingly set at around 4,000 BP or to the end of HCO. The ending date is extremely variable. For some parts of the Plains ceramics, smaller projectile points and/or domesticated plants may mark the end date. These appear around 2,000 BP. In other locations, they appear later or not at all, especially domesticated plants. In those cases, the Archaic can extend until after European contact. The terminal date is here set at 2,000 BP.

Changes in projectile point styles often are used to suggest population movements. Mogollon people from the Southwest and Numic peoples (ancestral Shoshone) from the northern Great Basin may expand onto the southwestern and northwestern Plains, respectively. Movements of peoples already on the Plains are also possible. That these new point styles may simply diffuse across the Plains is seldom addressed. Most origins are seen in earlier Plains complexes (Kay 1998: 189; Dyck and Morlan 2001: 123; Vehik 2001: 150). Craniometrics suggest both population continuity and an influx of genes not only from the Great Basin but also from areas east of the Plains (Key 1983: 63–66; Myster and O'Connell 1997: 214–215; Gill 2010: 543, 552).

A marked increase in the number of sites is taken to reflect a population increase. However, decreased erosion and deposition also may increase site visibility compared to earlier (Perttula 2004: 375–376; Kornfeld et al. 2010: 122).

In response to increasing population, mobility declines requiring more use of local resources and a greater variety of food sources, perhaps especially seeds. An emphasis on use of local lithic resources reflects the decline in mobility. A diversity of animal resources is utilized. Bison are important game in most areas (Dyck and Morlan 2001: 121–125; Vehik 2001: 150–151; Johnson and Holliday 2004: 292; Kornfeld et al. 2010: 124–125, 255–260).

Wild plant inventories emphasize nuts and the seeds of goosefoot, pigweed, knotweed, marsh elder, and sunflower. *Prunus* and grape are also present. Cultivated or domesticated plants include squash on the eastern edge of the Plains and maize on the western edge. Most ethnobotanical samples yield wild plants exclusively (Adair 2003: Table 7.3).

Use of burned rock facilities and earth ovens continues (Vehik 2001: 150; Collins 2004: 121; Perttula 2004: 376). Houses include brush structures as well as more substantial constructions such as pit houses. However, tipi rings are frequent, especially on the northern Plains (Kornfeld et al. 2010: 392, 401).

Ossuary and mound burial are documented on the northeast Plains' margin but organized burial programs are uncommon. Health quality varies. In some locations, diet quality may be problematic. Infections and other health-related problems represented by bone growth arrest lines appear occasionally. More common is severe

tooth wear. Cavity rates are highly variable but generally are low with some exceptions. The low caries rate may reflect higher meat intake. Conversely, a higher plant, especially seed, intake may be responsible for the few instances of high cavity rates. It seems health status is mostly good. Evidence for conflict is rare (Myster and O'Connell 1997: 152–153; Vehik 2001: 150; Owsley and Bruwelheide 1996: 190; Gill 2010: 539).

Sociopolitical organization likely remains based on families and networks among families (bands). Where bison are a significant resource, the basic residence group may be larger than elsewhere, at least seasonally, as bison are a clumped rather than dispersed resource. Increasing population and residence group size are associated with increasing political complexity, perhaps involving something similar to tribal systems of political organization. Where gathering provides most food, the status of women is likely higher than where animal hunting is most important.

Trade increases (Vehik and Baugh 1994: 253). With increasing population and smaller resource areas, interaction networks potentially intensify if not expand in size. However, trade also is a mechanism for status enhancement within the context of increasing political complexity.

With a change to a more mesic climate, people bearing an adaptive strategy focused on forested environments and speaking Caddoan languages may expand westward following stream valleys out onto the southern Plains. Glottochronology indicates ancestral Northern or Plains Caddoan diverged from ancestral Caddoan languages during this period (Holman et al. 2011: Table 6). Speakers of proto-Kiowa and/or Tanoan languages are possibly represented in southwestern Plains Jornado Mogollon assemblages and/or in assemblages from southeast Colorado with Basketmaker affiliations. Craniometric studies indicate continuity with Paleo-Indians – at least on the central and northern Plains (Key 1983: 63–66). On the extreme speculative end, perhaps the latter are associated with ancestral Missouri River and/or Mandan Siouan languages and cultures.

Plains Woodland Period

At the beginning of the period (2,000 BP), the climate is relatively cool and moist. Episodes of drought increase toward the end of the period at around 1,000 BP (Schmeider et al. 2011: 1808). Sedentism, ritual architecture, ceramics, arrow points, and domesticated plants increase in importance. The number of archaeological complexes increases. However, ceramic rather than lithic remains define these. Because pottery is a plastic medium, it conveys more cultural information than do reductive mediums like stone.

Early Plains Woodland Period

If not for ceramics, there is little to differentiate this period from the Late Archaic. On the eastern edge of the Plains, earliest ceramics date to a little before 2,000 BP. Ceramics resemble types in the Illinois area. However, for much of the Plains, the Woodland period is defined by the slightly later appearance of ceramics resembling Illinois Hopewell. In southeast Oklahoma and eastern Texas, ceramic connections are to the lower Mississippi valley, especially Tchefuncte complex. On the southwestern edge of the Plains, ceramics have connections to Jornada Mogollon. Increasing use of ceramics reflects reliance on simmering and boiling to process the small seeds that are becoming important food resources (Johnson 2001: 159; Boyd 2004: 317; Perttula 2004: 376; Kornfeld et al. 2010: 62).

Although large dart points resembling those of the Late Plains Archaic continue, smaller points representing the bow and arrow increase. Not all researchers agree on how to recognize bow and arrow technology when only the stone point remains (Dyck and Morlan 2001: 122–123; Boyd 2004: 314, 328–329; Johnson and Holliday 2004: 292).

Domesticated plants increase. Nowhere on the Plains do domesticates provide a majority of the food supply though.

Few sites on the Plains show connections to Early Woodland period ceramics of the eastern United States. Thus, this study defines the Early Plains Woodland period as dating between 2,000 and 1,500 BP (CE 0–500).

Strong similarity of most Early Plains Woodland material culture to that of the Late Archaic indicates most people remain where their ancestors lived (Johnson and Holliday 2004: 292; Logan 2006: 76–84). There are some exceptions. Most notable is Kansas City Hopewell centered on the juncture of the Kansas and Missouri rivers. It is still unclear whether this complex reflects a movement of people from Illinois or contact with people in Illinois or a complex mix of both (Logan 2006: 76). Craniometric analyses indicate Kansas City Hopewell is quite distinct from other Plains Woodland populations (Key 1983: 69, 71, 93, 105) suggesting an intrusive population.

On the southwestern Plains, Jornada Mogollon affiliated groups are also possibly intrusive (Boyd 2004: 296). Biological and archaeological evidence for population change exists in the northwestern Plains' Besant complex as well. But biological change is not consistently evident in all members of the complex (Key 1983: 71). Appearance of new projectile point styles is often taken to represent new peoples or movement of peoples, but diffusion of point styles across people is seldom considered. Sometime after 1,700 BP, Plains elements appear in northern Fremont complex of the Great Basin, possibly introduced by ancestors of southern Athapaskans (Apache and Navaho) perhaps represented by the Promontory Point complex (Dyck and Morlan 2001: 125–127, for more details on the Athapaskan issue see articles in Seymour 2012). Mitochondrial DNA studies suggest Fremont in the Great Salt Lake area is related to Puebloan (Anasazi) people of the Southwest and not Athapaskans, however (Kaestle and Smith 2001: 4).

Most plant resources are wild. Emphasis is on seed-producing plants, although nuts, bulbs, and roots remain in use. Berries and fruits increase. Maize is in some high Plains and northern Plains sites. Domesticated sunflowers, squash, tobacco, and marsh elder occur occasionally (Adair 2003: Tables 7.5–7.10). Chipped stone double-bitted axes increase (Perttula 2004: 376). Possibly these reflect clearance for crop planting. However, more consideration needs to be given to woodland thinning for management of wild resources such as nut trees, fruit trees, and berry vines.

Bison kills take place just east of the southern high Plains but are increasingly uncommon farther eastward (Boyd 2004: 318, 328; Johnson and Holliday 2004: 292–293). Bison are more frequent northward (Dyck and Morlan 2001: 124–125; Johnson 2001: 162–165).

Based on increased site numbers, population continues to grow. Population on the northwestern Plains reaches its height by 1,500 BP (Kornfeld et al. 2010: 130).

Burial mounds exist the length of the Plains, especially in eastern areas. Their inspiration is traced to the Mississippi River Valley, especially Illinois Hopewell and Marksville complexes (Johnson 2001: 161–162; Perttula 2004: 377, 388; Gill 2010: 534–535). These mounds involve obvious alterations of the landscape and likely mark use rights to certain areas. That a group's ancestors are buried there reinforces those rights.

Structures considered to be houses increase. These are circular to oval in outline. Stone foundations mark some central high Plains houses. Increased house construction suggests declining mobility or repeated returns to certain locations. Stone tipi rings are common on the northern Plains (Boyd 2004: 328; Perttula 2004: 377; Kornfeld et al. 2010: 392, 398, 401). Tipis may be present elsewhere but possibly held down by more perishable materials such as wood or bone.

Bison pound or corral construction increases on the northwestern Plains. Some are used and repaired repeatedly. Shaman huts are nearby (Kornfeld et al. 2010: 260–268). Again, this suggests smaller exploitation areas.

Cooking by roasting pit and hot rocks declines. Wylie pits in North Central Texas are roasting ovens for processing abundant, but seasonally limited, root and nut resources. Feasting and mortuary events also take place here (Vehik 2001: 153). Feasting is a potential response to declining mobility as it facilitates interaction with others. Feasting is also a mechanism by which political leaders increase power. Ceramic vessels used to boil and simmer increasingly replace hot rock cooking.

Information on health and diet is not available specifically for the Early Plains Woodland period. Tooth wear rates tend to be high and caries rates

low. High wear reflects use of resources, probably seeds, processed through stone grinding. Caries rates suggest higher meat consumption. Episodic stress rates can be comparatively high. Malnourishment is occasionally indicated. Decline in life expectancy starts to take place on the northwestern Plains. On the southern Plains, however, health appears good (Owsley and Bruwelheide 1996: 190, 193, 196–197; Myster and O'Connell 1997: 159–160, 222; Perttula 2004: 377). Conflict seems to increase across the Plains (Myster and O'Connell 1997: 159, 222; Boyd 2004: 309–311, 330). Potentially an increasing population is responsible for at least some of these trends.

Trade increases and can serve to tie less mobile populations together, thereby reducing risk from famine and conflict. Trade also provides a mechanism by which political leaders can increase power. Interaction of some Plains groups with Hopewell and Marksville is indicated, but nothing suggests Plains groups consistently provide commodities to the Hopewell trade network (Vehik and Baugh 1994: 254–255).

People depending on bison hunting likely have larger social groups at least seasonally. Males have greater status and authority in such societies. Increasing population size and dependence on smaller areas for resources can facilitate increasing political complexity. Nonetheless, most political systems were probably similar to band and tribal organizations.

More speculatively, Northern Caddoan languages must be expanding their distribution northward. Although this expansion is assumed to involve population replacement, craniometric analyses place Keith variant of the central Plains (an often postulated Northern Caddoan group) closer to northern Plains complexes that are likely ancestral to Missouri Valley or Mandan Siouan people (Key 1983: Figs. 15, 18). Possibly, the expansion of Northern Caddoan languages is accomplished through intermarriage and cultural assimilation as much as by actual population movement.

Algonquian peoples continue to live on the northern Plains. However, there is little agreement on which complexes represent them.

Tanoans, possibly including the Kiowa, may be represented in Jornada Mogollon-related complexes of Southwest and West Texas. There also may be Tanoan speakers in southeast Colorado since some complexes there have Southwest connections. Kiowa origins perhaps are better sought in southeast Colorado among groups with Southwest cultural affiliations and high Plains adaptations.

Late Plains Woodland Period

Small projectile points become common after 1,500 BP, especially corner-notched forms often called Scallorn. Ceramics increase, although some western complexes show little to no use of them (Johnson 2001: 166–171; Vehik 2001: 153–154; Boyd 2004: 314; Collins 2004: 122–123).

The beginning date is commonly set at 1,500 BP (CE 500). This coincides with an episode of drought. The end date is set at 1,100–1,000 BP (900–1,000 CE) when several cultural and climatic changes take place. In the extreme southern and northwestern Plains, 1,500 BP marks the start of the Late Prehistoric period.

Continuity in culture and population is likely. In some cases, Early Plains Woodland complexes continue into this period. There are a few exceptions to continuity nonetheless. The spread of small arrow point styles and ceramic attributes are often taken to indicate actual movements of people. Thus, expansion of Southwest, Athapaskan, Numic, and Algonquian peoples is proposed, even though some may already be resident on the Plains from earlier. Diffusion of point and ceramic styles across populations is only occasionally addressed (Key 1983: Fig. 15; Dyck and Morlan 2001: 125–127; Johnson 2001: 166–170; Boyd 2004: 296–329; Perttula 2004: 376–377; Logan 2006: 84–85; Kornfeld et al. 2010: 131).

Site numbers increase, and more cultural complexes are recognized. Together they suggest an increasing population (Logan 2006: 88).

Bison decline east of the central and southern high Plains. This is possibly in response to drought. The northern Plains seem unaffected. Central and southern Plains peoples rely more on seeds and nuts along with a diversity of smaller game animals. Most plant foods are wild. Bulbs

and roots seem less common except perhaps on the high Plains. Domesticates involve mostly maize, sunflower, squash, and marsh elder (Johnson 2001: 166–170; Vehik 2001: 155; Adair 2003: Tables 7.5–7.9; Boyd 2004: 307, 318–321; Kornfeld et al. 2010: 398).

Greater investment in facilities construction suggests repeated or long-term use of a location. Houses are found in almost all parts of the Plains. Predominant house outline is oval to circular. Framework is lightly built. In the high Plains of Colorado and New Mexico, use of dry laid masonry perhaps reflects some connection with the Southwest. Tipi rings are frequent on the northern and northwestern Plains. Residences generally are loosely distributed across the landscape either singly or in small groups (Johnson 2001: 166–168; Boyd 2004: 304–307, 328; Perttula 2004: 377; Logan 2006: 84–86; Kornfeld et al. 2010: 398).

Storage pits are present in more sedentary settings (Johnson 2001: 165–168; Boyd 2004: 304–307, 317). Most are used to store food. People store food where resource productivity is highly seasonal and/or insufficient to supply people with food year-round. Storage increases as population grows.

Mound, ossuary, and cemetery burial are all practiced (Vehik 2001: 154; Johnson 2001: 166–170; Perttula 2004: 377–378). The use of planned, spatially restricted burial programs marks use-rights to resources and provide opportunities for social interaction.

Burned rock middens and roasting/baking pits still occur. However, ceramics and boiling/simmering of food increase (Boyd 2004: 305–306; Perttula 2004: 377; Kornfeld et al. 2010: 398).

Bison corrals continue on the northwestern Plains. However, bison jumps are increasingly frequent. While corrals permit taking only a few animals and require fewer humans, jumps can kill large numbers of bison but require more humans (Kornfeld et al. 2010: 269, 272–273). Bison jumps are a possible focus of intergroup gatherings.

There are not a lot of data on health. The information noted for Early Plains Woodland likely is relevant to this period as well.

Skeletal evidence suggests conflict is more frequent on the western edges of the Plains (Boyd 2004: 325–327; Collins 2004: 122–123; Gill 2010: 536). But otherwise, conflict seems infrequent.

Trade is less prominent. Perhaps this is because social groups are more localized and independent (Vehik and Baugh 1994: 255–256). Low conflict rates are supportive of that idea. But declining mobility, increasing storage, and spatial concentration of burials suggest external connections should be important. Potentially, short-distance trade used to build risk-minimization networks is more important than long-distance trade to fund status and power acquisition by political leaders. Short-distance trade can be more difficult to recognize archaeologically. Risk-minimization networks and short-distance trade can produce the regionally similar material cultures seen among Late Woodland complexes.

Dispersal of houses and settlements suggests sociopolitical organization emphasizes families and networks among families. Communal burial programs and bison jumps are episodic events networking dispersed families and groups together. Consequently, political power is potentially weak and dispersed during Late Woodland times.

The expansion of Northern or Plains Caddoans northward likely continues. Problems noted for Early Plains Woodland in tracing this movement remain.

Origins of the Middle Missouri tradition, ancestors of the Mandan, Hidatsa, and Crow (Missouri Valley Siouans) are traced to the Late Woodland of Iowa and Minnesota (Wood 2001: 186, 190). Yet, at the same time, many other Late Woodland complexes on the northeastern edge of the Plains share ceramic similarities both with earlier Woodland and later Middle Missouri tradition complexes (Johnson 2001: 166). Craniometrics emphasize these local connections as well (Key 1983: Fig. 15). Although an expansion of Middle Missouri tradition peoples may take place, perhaps local northern Plains people more often adopt the material cultures and languages of Middle Missouri tradition.

Late Prehistoric Period

The end of Late Woodland and the start of the Late Prehistoric period overlap the Medieval Warm Period (MWP) or Medieval Climatic Anomaly (MCA). The MCA is variably dated. Often it begins at 1,150 BP (CE 850) and ends at 750 BP (CE 1,250). The main characteristic is periods of prolonged drought extending for decades with the first major episode appearing around 1,000 BP (Herweijer et al. 2007: 1354–1357).

Projectile points are small triangular forms. These potentially mark use of the compound, reflex bow. Ceramics increase greatly. They are frequently decorated with designs that vary both within and between sites. These designs presumably communicate information about group memberships, associations, and beliefs as well as reflect temporal changes in those behaviors. Signaling group memberships or identity may increase in importance with greater competition for resources within and between social groups.

Domesticated plant use increases significantly and possibly rapidly. Bison increase their numbers and range as well. The strategies used to integrate these resources into human life help define the period.

Several cultural traditions mark the Late Prehistoric (Fig. 3). Traditions consist of many smaller groups or complexes having similar material cultures through time. Plains Village, Middle Missouri, Coalescent, Oneota, and Caddoan traditions are most significant.

In this study, the Late Prehistoric period is divided into three parts, Late Prehistoric I, II, and III. Although this subdivision is not common practice, the divisions reflect substantial changes in lifeways.

Late Prehistoric I

Domesticated crops, especially corn, increase. There is overlap between small corner-notched (Scallorn and other styles) points and small, triangular points with side notches and sometimes a basal notch. Numerous cultural complexes are defined based primarily on differences in ceramic decoration.

Date is 1,000–750 BP (CE 1000–1,250). The period co-occurs with MCA.

Origins of most Late Prehistoric I complexes lie in the preceding local Late Woodland (Drass 1998: 423, 429–430, 440; Gunnerson 2001: 234; Henning 2001: 222, 225; Johnson 2001: 172; Wood 2001: 190). Population movements do occur, however. The Middle Missouri tradition expands westward into the Dakotas following the Missouri River Valley. At the same time, resident populations are incorporated into the tradition as well (Key 1983: Fig. 17; Wood 2001: 190).

Oneota tradition begins westward expansion from Wisconsin. Oneota represents people with Chiwere-Winnebago and Dhegiha Sioux languages, perhaps more the former than the latter. Both population replacement and incorporation of local people occur (Henning 2001: 229–233). An example of Oneota incorporation of locals is western Illinois Oneota where ancient mtDNA haplotype distribution is very similar to that for modern Algonquians instead of Siouans (Eshleman et al. 2003: 10).

People from Cahokia, at the junction of the Missouri and Mississippi rivers, are sometimes proposed to move west to the junction of the Kansas and Missouri rivers where they establish a bison procurement operation. Material culture from the proposed colony, Steed-Kisker complex, is mostly of types common to the Plains Village tradition, however. Steed-Kisker craniometric similarities are strongest with Plains Village tradition as well (Key 1983: 89, Fig. 21; Steinacher and Carlson 1998: 254–255). Steed-Kisker is not a Cahokia colony.

The Plains Village tradition represents people who mostly speak Northern or Plains Caddoan languages. Central Plains Village tradition complexes are ancestral primarily to various groups of Pawnee, while southern Plains Village tradition complexes are principally ancestral to various groups of Wichita. Some members of the Plains Village tradition may expand westward on to the high Plains where they depend more upon hunting than farming. However, other possibilities include seasonal-only (summer/fall) use of the region or local hunter/gatherer adoption of Plains Village material culture (Gunnerson 2001: 234).

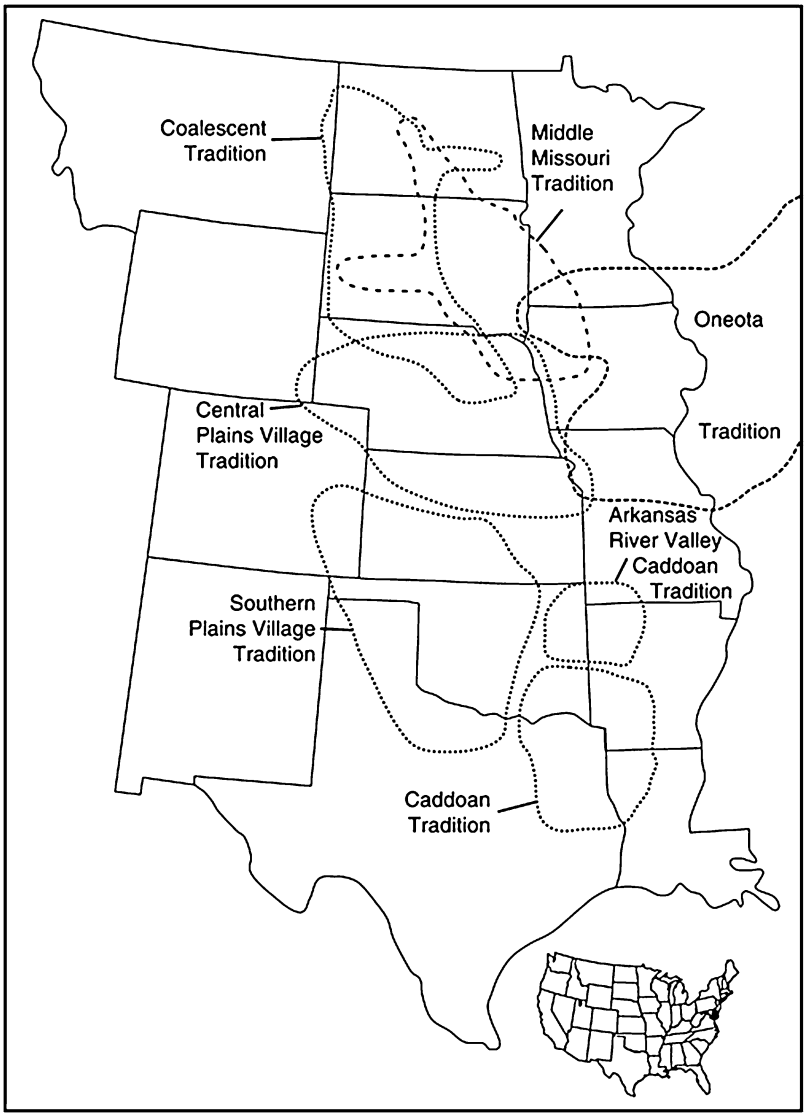

North American Plains: Geography and Culture, Fig. 3 Late Prehistoric period cultural traditions

Late in the period, central Plains Village tradition people may move northward abandoning, at least partially, more western locations. Central Plains Village tradition craniometrics indicate people in more northern locations are distinct from those in southern locations, though (Key 1983: 79–83, Fig. 18). Thus, to reiterate, movement of Northern Caddoan languages northward is as much about incorporation of local residents as it is their replacement.

Population increase is often invoked in explanations for the spread of Plains Village, Middle Missouri, and Oneota traditions. The number of sites certainly increases, and so population likely grows. However, on the northwestern Plains, population declines (Drass 1998: 428; Wood 2001: 190; Kornfeld et al. 2010: 130).

Subsistence varies. Wild plants are sometimes still the only resources utilized, especially in western areas. Domesticated plant use increases eastward. Bison increase on the western edge of the Plains. On the northwestern Plains, corrals, jumps, and arroyo traps show repeated use. Eastward deer are more often used (Drass 1998: 424, 429, 433; Steinacher and Carlson 1998: 246, 250, 253–254; Dyck and Morlan 2001:

N

128; Henning 2001: 227; Adair 2003: Tables 7.11, 7.13, 7.16; Kornfeld et al. 2010: 268–276). People use resources that are locally available, supplementing them with farm products.

Houses are more substantially built, especially among farming peoples. Plains Village, Coalescent, and Middle Missouri tradition complexes construct square or rectangular houses. Houses on the southwestern Plains sometimes have stone foundations and can be built contiguously reflecting possible influences from Pueblo architecture. Stone circles reflect use of tipis. In the southern and central Plains, houses tend to be sparsely distributed along drainages, either singly or in small groups. Larger groupings occur in the Caddoan tradition and in the northern and northeastern Plains. Fortified villages occur in Middle Missouri tradition (Drass 1998: 423, 428–429, 432–433, 439; Johnson 1998: 313, Fig. 10.4a, b; Steinacher and Carlson 1998: 241, 245, 248–249, 252–253, 256; Wood 2001: 192; Perttula 2004: 379–385; Kornfeld et al. 2010: 398–399, 401).

Storage pits are important among sedentary farmers but do not occur in large numbers except perhaps on the northern Plains. Predominantly they are either bell-shaped or cylindrical in profile (Drass 1998: 429, 433, 439; Steinacher and Carlson 1998: 241; Henning 2001: 224–226; Wood 2001: 188). Analyses of storage pit size and density could provide information on the extent to which various groups of people rely on stored resources and likely farming.

Mound construction in the Caddoan tradition is used both for elite burial and elevation of elite residences. Mound and ossuary burial continue in some parts of the central and northern Plains. However, in general, mound and ossuary burial seem in decline, except on the northeastern Plains. Cemeteries increase and some may serve multiple villages or hamlets. On the northwestern Plains, burials are placed in crevices or exposed (Steinacher and Carlson 1998: 242, 246, 250, 254, 257; Dyck and Morlan 2001: 128; Henning 2001: 224–226; Perttula 2004: 379–384; Gill 2010: 536, 540).

With increasing use of maize and consumption of carbohydrates, caries increase. Tooth wear declines in a few places suggesting a less abrasive diet and perhaps ways of processing grains other than stone grinding. Incidences of episodic biological stress lessen, possibly because the food supply is more stable and sufficient. Stress does not disappear completely, however. On the northwestern Plains, people are perhaps not doing well since the average age at death declines. Increased competition for food under a high population density may be responsible. The caries rate in this area declines reflecting an increase in the consumption of bison meat compared to high carbohydrate plant foods (Owsley and Bruwelheide 1996: 190, 193–197; Myster and O'Connell 1997: 164–171, 228; Gill 2010: 539, 546). The MCA does not seem to have a strong negative effect on human health.

Conflict increases (see articles in Clark and Bamforth 2018 for detailed explorations of Plains warfare during the Late Prehistoric). Both hunter/gatherers and farmers are involved. The exact cause of conflict is unknown. Athapaskans moving south and east and Puebloan peoples moving east may be responsible on the west-central and southern Plains (Drass 1998: 423; Steinacher and Carlson 1998: 254; Wood 2001: 190–192; Collins 2004: 122–123; Gill 2010: 536, 546–548). Competition over access to bison and farm land may be important as well.

Trade increases both among Plains groups and with people living outside the Plains. Stones and ceramics are most easily identified, but, no doubt, other, more perishable, resources such as bison products are also traded. On the southeastern edge of the Plains, the formation of complex political systems among Caddoan tradition members is associated with acquisition of many Plains resources. Trade increasingly is for political purposes rather than for food or technology resources (Vehik and Baugh 1994: 257–259; Vehik 2002: 44–51).

Given dispersal of houses and settlements, political systems emphasizing networks among families are likely. Many cultural complexes grade into one another rather than having sharp boundaries, which suggests politics involves local, fluid networks of relations, probably much like tribal organizations. Nonetheless, planned, visible, and spatially restricted mortuary practices

indicate rights to resources remain important. In some places, the construction of special ritual structures, concentration of nonlocal materials at one or a few sites, and multicommunity mortuary facilities suggest access to political power and resources has some inequalities within and between communities. This is most pronounced among Caddoan tradition societies.

Expansion of the Plains Village, Middle Missouri, and Oneota traditions possibly is a result of farming with the greater food supply fueling population growth and expansion but also causing land exhaustion. Yet, climate conditions do not seem that favorable to farming, and craniometric data suggest less actual movement than commonly assumed. Instead, perhaps because of long periods of drought, farming (and increased storage) is added to diversify subsistence. Plains Village tradition expansion is possibly most successful precisely because it maintains a more diversified subsistence.

Late Prehistoric Period II

The predominant point style is small, triangular, and side notched. Bison procurement and processing tools are common. Use of ceramics increases. Farming tools such as grinding stones, bison shoulder blade hoes, and bison tibia digging stick tips are frequent.

While some climatic researchers suggest a cooler and wetter climate starting around 800 BP (CE 1,200), others continue MCA through this period. The MCA may end abruptly around 600 BP (CE 1,400) (Herweijer et al. 2007: 1354). Some sites from Late Prehistoric I are covered by wind-blown dust as are some sites from this period (Johnson 1998: 328). Climatic conditions are likely comparatively dry.

This period extends from 750 to 600/550 BP (CE 1,250–1,400/1,450). The end is marked by major environmental and cultural changes.

Many complexes descend from those of Late Prehistoric I or are continuances of those complexes, but there are exceptions (Drass 1998: 421–422, 430, 433, 439; Johnson 1998: 313, 327–328; Steinacher and Carlson 1998: 244, 248, 255–256; Gunnerson 2001: 234; Wood 2001: 192–193). The problem of material culture similarities not agreeing with craniometric analyses continues. Some complexes on the southwestern Plains have a southern Plains Village tradition material culture, but craniometrics indicate a lack of similarity to other Plains Village tradition cultures. Neither do these groups resemble earlier populations (Brooks 2004: 335). Other southern Plains groups adopt a southern Plains Village tradition bison hunting material culture as bison populations increase and expand (Vehik 2001: 155–156; Collins 2004: 122–123, 125).

The Missouri River Valley in the northern Plains is a favorable location for farming. Not only are many members of the Middle Missouri tradition resident along the Missouri River, but other related groups may move into the valley from elsewhere (Wood 2001: 193). Craniometrics supports the idea of diverse origins for people of the Middle Missouri tradition as noted earlier (Key 1983: Figs. 17, 19).

Several complexes in eastern North Dakota, western and northern Minnesota, and southern Manitoba and Saskatchewan potentially represent Siouan and Algonquian peoples. These complexes appear to move northward and westward (Dyck and Morlan 2001: 128–129; Henning 2001: 230). Perhaps they do so in pursuit of bison.

A new tradition, the Coalescent, has origins in central Plains Village tradition (Northern Caddoans) – at least to some extent (Johnson 1998: 327–328). Expansion of Coalescent tradition north along the Missouri River pushes Middle Missouri tradition people northward.

Population may increase, but toward the end of the period, significant rearrangements of people begin. There is population movement and amalgamation, but there also may be population loss (Drass 1998: 422, 431–432).

Many Plains peoples intensify farming, but some remain hunter/gatherers. Bison increase in numbers and distribution. They are the primary game for most Plains peoples (Drass 1998: 421, 431, 433; Steinacher and Carlson 1998: 255; Gunnerson 2001: 235–236; Henning 2001: 229; Vehik 2001: 155–156; Wood 2001: 188; Adair 2003: Tables 7.12, 7.13, 7.14, 7.16; Collins 2004: 122–123; Perttula 2004: 383).

While farmers are associated with relatively permanent houses, some bison hunters have seasonal village residency in similar houses. Houses are mostly square or rectangular. Structures with circular floor plans occur on some Plains Village and Coalescent tradition sites but are most common on Caddoan tradition sites in east Texas. Houses with stone foundations are constructed in the southwestern Plains. Some are built contiguous to one other, like a pueblo. Although some houses continue to occur singly or in small groups scattered along stream drainages, larger clusters exist in almost every complex. It is not clear what prompts formation of larger aggregations. Conflict is likely involved to some degree, as may be social and economic opportunities some communities might offer over others (Drass 1998: 419, 425–426, 430–432, 440; Johnson 1998: 313; Steinacher and Carlson 1998: 255; Wood 2001: 193; Perttula 2004: 379, 382).

Storage pits are extremely common, especially among farmers (Drass 1998: 419, 425, 430, 433, 440; Henning 2001: 229; Wood 2001: 188; Perttula 2004: 379). Along the southeastern edge of the Plains, aboveground storage facilities are also indicated (Perttula 2004: 379, 382–383). They are likely also present elsewhere. With increasing reliance on seasonal food production through farming, along perhaps with periodic drought episodes, the need to store food increases.

Among Caddoan tradition societies on the southeastern edge of the Plains, burials are placed in mounds and cemeteries. These reflect complex sociopolitical systems and differential access to wealth, power, and authority. Mound building and ossuary construction decline elsewhere. Cemetery burial increases. The presence of a few large cemeteries in association with some villages suggests multicommunity mortuary practices. These perhaps maintain the communal aspects of mound and ossuary mortuary rituals while introducing new, more hierarchical features. Some Plains Village tradition complexes may also have charnel or other specialized mortuary houses. In some cases, there is no evidence regarding how deceased society members were treated. Scaffolding or other forms of exposing the dead may be indicated by this lack of mortuary evidence (Drass 1998: 419, 423–426, 430, 439; Johnson 1998: 313–316; Perttula 2004: 379–386). Important shifts in mortuary ideology are suggested, but their nature is unclear.

Residence in villages and reliance on high carbohydrate diets impacts health. Southern Plains Village tradition people have high preadult mortality, but older adults live longer compared to those from farther north and later in time. Caries and alveolar bone pathology rates for the southern Plains are high. This suggests a high carbohydrate intake. Earliest Coalescent tradition skeletal material indicates a rate of episodic biological stress higher than in southern Plains Village tradition groups. The rate is also higher than in later Coalescent groups (Owsley and Bruwelheide 1996: 162–3,190, 193–194, 196, Table 70). Much more research is necessary to substantiate and reconcile these features and define their causes.

Violence is common. Depending on location, settlements emphasize high locations such as mesas, peninsula settings having commanding valley views, large village size, closely spaced settlements, abandonment of areas once occupied, and fortification. Skeletal trauma is widespread. The best testament is the Coalescent tradition Crow Creek village where over 500 people were massacred. Caddoan tradition iconography emphasizes violence, albeit that violence is not very visible in archaeological remains (Drass 1998: 422–423; Johnson 1998: 313, 316; Gunnerson 2001: 236–237). It is not clear who is fighting whom or what the reasons for conflict are. Access to bison, interethnic relations, competition for farmland, status acquisition, and retaliation for grievances may all be involved. Although not recognizable in material culture assemblages, Athapaskan ancestors of the Apache and Navaho must be moving south and east onto the high Plains.

Some earlier trade relations cease, but trade between Plains groups intensifies as does trade with groups in surrounding regions (Vehik and Baugh 1994: 259–261). What is archaeologically visible today are nonlocal shells, stones, and ceramics with some of the latter often being local copies of what must be more prestigious

wares. Trade in bison hides, skulls, meat, and tool bones are of possible equal, if not greater, importance. Explanations for how and why trade intensifies are many. Most emphasize mechanisms for obtaining food. However, political intensification potentially results in greater emphasis on nonlocal materials as markers of inequalities (Vehik 2002).

Sociopolitical organization increases in complexity among many. For Caddoan tradition peoples, this is the time of maximum political complexity similar to chiefdoms. Many Plains Village tradition sites have structures whose large size, form, placement, and/or content indicate specialized ritual or political activities. Some Middle Missouri tradition villages also are organized around central plazas (Brooks 1987: 142, 151; Brown 1996: 183–191; Gunnerson 2001: 236; Wood 2001: 193; Perttula 2004: 380, 382–386). Given specialized ritual and political structures, patterned village layouts, and labor organization necessary to design and construct increasingly sophisticated fortifications, it is likely most Late Prehistoric II societies are more complexly organized than earlier.

Late Prehistoric Period III

Significant cultural changes start taking place with the end of Late Prehistoric II. The changes are poorly understood but involve pronounced social change and population movement.

This period coincides with the Little Ice Age (LIA) climatic episode. When LIA begins and ends is not agreed upon, but usually the starting date is around 600 BP (CE 1,400). The transition is abrupt. For the Plains, temperatures are colder and precipitation increases, albeit moisture remains on the dry side. Changes on the northern Plains may be greatest. Although favorable for farming, studies suggest dry growing seasons – at least in some places. Droughts occur but are not as severe as during MCA. Bison numbers and distribution expand greatly (Herweijer et al. 2007: 1354; Lohse et al. 2014).

The primary projectile point style remains a small triangular form, but most are not notched. Tools associated with bison processing increase. Ceramics increase in frequency, especially among farmers. Among horticulturists, crop production and processing tools are numerous.

Late Prehistoric III starts between 600 and 550 BP (CE 1,400–1,450). Setting a termination date is somewhat arbitrary. Sometimes a terminal date is determined by the appearance of Europeans. That varies, however, as Europeans visit the southern Plains in CE 1,541, while on the northern Plains, it may be more than two centuries later. The termination date is set here at 350 BP (CE 1,650). There is little evidence for Europeans having much influence or presence on the Plains prior to that date.

The Arkansas River Valley member of the Caddoan tradition begins the period with exhumation of the dead and their reinternment in a massive mound construction event. Although perhaps reflecting the maximum political complexity achieved in this area, there is soon a decline. Sometime in the late seventeenth century CE, the Arkansas River Valley Caddo abandon a place lived in for several thousand years, move south, and become the Northern Caddoan-speaking Kichai. Caddoan tradition people living in east Texas and adjacent areas show less abrupt change. They are ancestors of various Caddoan groups such as the Hasinai and Kadohadacho (Brown 1996: 187, 191–200; Perttula 2004: 393–407).

Southern Plains Village tradition people abandon some places lived in for 400+ years. Why is unclear. Climate changes unfavorable to farming are perhaps responsible. However, potentially bison hunting becomes more productive than farming, instigating abandonment of farming. Increasing conflict may encourage people to move. Changes begin early in the fifteenth century CE. Farmers from different southern Plains locations coalesce along the eastern Plains margin, while bison hunters dominate western areas. Coalescing farmers and some of the mobile bison hunters are ancestors of the Northern or Plains Caddoan-speaking Wichita (Drass 1998: 422, 424–425, 431–434, 441–444; Vehik 2001: 156–157; Johnson and Holliday 2004: 293).

Central Plains Village tradition peoples reside in central and northern Nebraska. They farm and

hunt bison. They are ancestors of the Northern Caddoan Pawnee and perhaps of some Arikara. It is difficult to trace precise relationships through material culture or craniometrics (Key 1983: Fig. 21; Steinacher and Carlson 1998: 258–259).

The Coalescent tradition includes ancestors of the Arikara and possibly part of the Pawnee. This issue is complex, both biologically and culturally, and is not well understood. Coalescent tradition expands northward. They farm and hunt bison (Key 1983: Fig. 21; Johnson 1998: 309, 327–331; Steinacher and Carlson 1998: 258–259). They may make greater use of wild resources than does Middle Missouri tradition.

Members of Oneota tradition maintain a strong presence on the eastern edge of the central Plains. They farm and hunt bison farther out onto the Plains as well. Connections with Historic Plains groups are complex and difficult to trace (Key 1983: 86, 96; Henning 2001: 229–230, 232–233).

Middle Missouri tradition people move northward along the Missouri River, pushed by Coalescent tradition. If the Crow do not split from the Hidatsa earlier, they do so now. Middle Missouri tradition farms heavily and hunts bison. Other complexes with strong similarities to Middle Missouri tradition live to the north of the Missouri River, but their relationships are unclear. They farm to varying degrees and hunt bison (Johnson 1998: 329; Dyck and Morlan 2001: 129–130; Wood 2001: 194).

Athapaskan ancestors of the Apache meanwhile are moving on to the western Plains. Two associated complexes are Dismal River in southwest Nebraska and northwest Kansas and Tierra Blanca in the Texas panhandle (Gunnerson 2001: 239; Vehik 2001: 156). They are strongly associated with bison hunting.

Ancestors of several other historically known ethnic groups are likely on the Plains at this time. They include the Kiowa, Arapahoe, Gros Ventre, Dakota, Assiniboine, Blackfoot, Plains Cree, and others. However, making connections to specific archaeological complexes is difficult, and there is much disagreement (Hanson 1998; Dyck and Morlan 2001).

Both population decline and increase are proposed. Impressions of increase may come from coalescence of people in a few locations, while decreases may reflect abandonment of other areas. European epidemic diseases do not seem a problem for the Plains until after 1,650 and so is an unlikely cause of depopulation (Vehik 1994: Table 11.5; Perttula 2004: 398, 403, 406). Warfare is common and a potential source for movements leaving impressions of population increase and decrease (Steinacher and Carlson 1998: 259).

Subsistence is more specialized, emphasizing farming or bison hunting – not to say that doing one precludes the other. Farming tends to be more conspicuous on the eastern Plains and bison hunting on the western Plains. Domesticates are corn, beans, squash, and sunflower. A variety of wild fruits, nuts, and seeds are collected, and their growth likely encouraged. A marked increase in bison jumps after CE 1,500 in the northwestern Plains no doubt reflects larger bison populations (Drass 1998: 443–444; Dyck and Morlan 2001: 129; Gunnerson 2001: 240; Vehik 2001: 156–157; Wood 2001: 188; Adair 2003: Tables 7.12–7.14, 7.16; Perttula 2004: 394, 405; Kornfeld et al. 2010: 131; Lohse et al. 2014).

Sedentary farmers construct substantial houses. Circular floor plans increasingly replace rectangular or square designs. Some full-time bison hunters maintain villages where they are seasonally sedentary. Stone rings mark the use of tipi-like structures. Particularly among farming groups, structures are much less often strung out across the landscape. Not uncommonly villages are quite large (Drass 1998: 440, 443; Johnson 1998: 318; Gunnerson 2001: 240; Vehik 2001: 156–157; Wood 2001: 194; Perttula 2004: 393, 395, 399; Kornfeld et al. 2010: 401).

Farmers have many storage pits. They are larger and more numerous than earlier. This reflects increased dependence on maize farming – both for subsistence and trade. Storage facilities are smaller and fewer among bison hunting and foraging peoples (Drass 1998: 440, 443; Gunnerson 2001: 240; Henning 2001: 229; Vehik 2001: 156; Wood 2001: 188; Perttula 2004: 395, 398).

Mound construction declines in the Caddoan tradition and is rare elsewhere. Interment of the

dead becomes increasingly uncommon among farmers as well as hunters and foragers. The lack of burials suggests the use of exposure (Johnson 1998: 319; Henning 2001: 230; Wood 2001: 188; Perttula 2004: 393–396, 400–404). Changes in Plains mortuary practices from interment in earth to exposure above ground culminate in this period. The causes are unclear but may reflect the idea that burial underground brings the deceased closer to the underworld while scaffolding and exposure brings them closer to the above world.

Absence of burials results in much less information on health. Caddoan tradition health conditions overall are good. The northwestern Plains' caries rate is low probably a result of increased meat eating. Northwestern Plains' skeletal evidence indicates increasing violence against women as bison hunting increases. As hunting is primarily a male activity, the more it contributes to the economy, the less the value of female labor. The less women are valued, the greater the incidence of violence against them (Johnson 1998: 329; Perttula 2004: 393–394, 405; Gill 2010: 546–549).

Conflict is extensive. Fortifications exist on both the southern and northern Plains, but not all sites are fortified. Abandonment of some locations and coalescence in others very likely are defensive measures (Johnson 1998: 318; Vehik 2001: 156–157; Wood 2001: 188). Causes include those mentioned for Late Prehistoric II. Warfare is potentially so intense that people of some cultural complexes may make no genetic contribution to later groups (Steinacher and Carlson 1998: 259).

Trade increases (Vehik and Baugh 1994: 261–264). Possibly this is to temper warfare by establishing intergroup relations facilitated by ceremonies like the Hako/Calumet. Other possibilities include intensifying relationships to mitigate risks of food insufficiency, creating mutualistic partnerships for the exchange of bison and corn, forming a world system centered on the Southwest, and intensifying political complexity (Vehik 2002; Perttula 2004: 406).

Coalescence of once independent social groups, intensifying conflict, and increasing subsistence specialization favor increasing sociopolitical complexity among some, but certainly not all, Plains populations. Some Plains Village tradition settings have specialized structures for ritual and political activities. In other Plains Village, Coalescent, and Middle Missouri tradition complexes, larger lodges in central locations provide similar services. Patterned village layouts and sophisticated fortifications imply some degree of sociopolitical complexity. Among Arkansas River Valley members of the Caddoan tradition, political complexity declines (Johnson 1998: 318; Vehik 2002; Wood 2001: 194; Perttula 2004: 401, 406).

Conclusions

The prehistory of Plains peoples is complex. It involves actual movements of people, but perhaps more important may be culture-switching within the context of a variety of transformative situations. The ethnic groups recognized in the nineteenth century must be understood as a product of long-term development with especially pronounced changes still ongoing at the time of the European intrusion.

Cross-References

- ▶ Agricultural Practice: Transformation through Time
- ▶ Agriculture: Definition and Overview
- ▶ Animal Paleopathology
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Cahokia
- ▶ Chronological Systems, Establishment of
- ▶ Clovis and Folsom, Indigenous Occupation Prior to
- ▶ Culture in Archaeology

- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
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- ▶ Fortifications, Archaeology of
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- ▶ North American Mound Builders: Hopewell, Natchez, Cahokia
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- ▶ Southwest United States and Northwestern Mexico: Geography and Culture
- ▶ Squash: Origins and Development
- ▶ Woodland and Mississippian Cultures of the North American Heartland
- ▶ World-Systems Analysis

References

Adair, M.J. 2003. Great Plains ethnobotany. In *People and plants in ancient eastern North America*, ed. P. Minnis, 258–346. Washington, DC: Smithsonian Books.

Amick, D. 2017. Evolving views on the Pleistocene colonization of North America. *Quaternary International* 431: 125–151.

Anderson, D.G., T.G. Bissett, and S.J. Yerka. 2014. The late-Pleistocene human settlement of interior North America. In *Paleoamerican Odyssey*, ed. K.E. Graf, C.V. Ketron, and M.R. Waters, 183–203. College Station: Texas A&M University Press.

Boyd, D.K. 2004. The Palo Duro complex. In *The prehistory of Texas*, ed. T.K. Perttula, 296–330. College Station: Texas A&M University Press.

Brooks, R.L. 1987. *The Arthur site: Settlement and subsistence structure at a Washita River phase village*, Studies in Oklahoma's past 15. Norman: Oklahoma Archeological Survey.

Brooks, R.L. 2004. From stone slab architecture to abandonment. In *The prehistory of Texas*, ed. T.K. Perttula, 331–344. College Station: Texas A&M University Press.

Brown, J.A. 1996. *The Spiro ceremonial center, the archaeology of Arkansas valley Caddoan culture in eastern Oklahoma*, Memoirs of the museum of anthropology 29. Ann Arbor: University of Michigan.

Campbell, L. 1997. *American Indian languages*. New York: Oxford University Press.

Clark, A.J., and D.B. Bamforth, eds. 2018. *Archaeological perspectives on warfare on the Great Plains*. Louisville: University Press of Colorado.

Collard, M., B. Buchanan, M.J. Hamilton, and M.J. O'Brien. 2010. Spatiotemporal dynamics of the Clovis-Folsom transition. *Journal of Archaeological Science* 37: 2513–2519.

Collins, M.B. 2004. Archeology in central Texas. In *The prehistory of Texas*, ed. T.K. Perttula, 101–126. College Station: Texas A&M University Press.

Drass, R.R. 1998. The southern Plains villagers. In *Archaeology on the Great Plains*, ed. W.R. Wood, 415–455. Lawrence: University Press of Kansas.

Dyck, I., and R.E. Morlan. 2001. Hunting and gathering tradition: Canadian Plains. In *Plains*, Handbook of North American Indians 13, ed. R.J. DeMallie, 115–130. Washington, DC: Smithsonian Institution.

Erlandson, J.M. 2014. After Clovis-First collapsed: Reimagining the peopling of the Americas. In *Paleoamerican Odyssey*, ed. K.E. Graf, C.V. Ketron, and M.R. Waters, 127–132. College Station: Texas A&M University Press.

Eshleman, J.A., R.S. Malhi, and D.G. Smith. 2003. Mitochondrial DNA studies of Native Americans: Conceptions and misconceptions of the population prehistory of the Americas. *Evolutionary Anthropology* 12: 7–18.

Gill, G. 2010. Advances in northwestern Plains and Rocky Mountain bioarchaeology and skeletal biology. In *Prehistoric hunter-gatherers of the High Plains and Rockies*, ed. M. Kornfeld, G.C. Frison, and M.L. Larson, 531–552. Walnut Creek: Left Coast Press.

Grimm, E.C., J.J. Donovan, and K.J. Brown. 2011. A high-resolution record of climate variability and landscape response from Kettle Lake, northern Great Plains, North America. *Quaternary Science Reviews* 30: 2626–2650.

Gunnerson, J.H. 2001. Plains Village tradition: Western periphery. In *Plains*, Handbook of North American Indians 13, ed. R.J. DeMallie, 234–244. Washington, DC: Smithsonian Institution.

Hanson, J.R. 1998. The late High Plains hunters. In *Archaeology on the Great Plains*, ed. W.R. Wood, 456–480. Lawrence: University Press of Kansas.

Henning, D.R. 2001. Plains Village tradition: Eastern periphery and Oneota tradition. In *Plains*, Handbook of North American Indians 13, ed. R.J. DeMallie, 222–233. Washington, DC: Smithsonian Institution.

Herweijer, C., R. Seager, E.R. Cook, and J. Emile-Gray. 2007. North American droughts of the last millennium from a gridded network of tree-ring data. *Journal of Climate* 20: 1353–1376.

Hill, M.E. 2008. Variation in Paleoindian fauna use on the Great Plains and mountains of North America. *Quaternary International* 191: 34–52.

Hill, M.E., M.G. Hill, and C.C. Widga. 2008. Late Quaternary *bison* diminution on the Great Plains of North America: Evaluating the role of human hunting versus climate change. *Quaternary Science Reviews* 27: 1752–1771.

Hofman, J.L., and R.W. Graham. 1998. The Paleo-Indian cultures of the Great Plains. In *Archaeology on the Great Plains*, ed. W.R. Wood, 87–139. Lawrence: University Press of Kansas.

Holen, S.R., and K. Holen. 2014. The mammoth steppe hypothesis: The middle Wisconsin (oxygen isotope stage 3) peopling of North America. In *Paleoamerican Odyssey*, ed. K.E. Graf, C.V. Ketron, and M.R. Waters, 429–444. College Station: Texas A&M University Press.

Holen, S.R., T.A. Deméré, D.C. Fisher, R. Fullagar, J.B. Paces, G.T. Jefferson, J.M. Beeton, R.A. Cerutti, A.N. Rountrey, L. Vescera, and K.A. Holen. 2017. A 130,000-year-old archaeological site in southern California, USA. *Nature* 544: 479–483.

Holliday, V.T., and D.S. Miller. 2014. The Clovis landscape. In *Paleoamerican Odyssey*, ed. K.E. Graf, C.V. Ketron, and M.R. Waters, 221–245. College Station: Texas A&M University Press.

Holman, E.W., C.H. Brown, S. Wichmann, A. Müller, V. Velupillai, H. Hammarström, S. Sauppe, H. Jung, D. Bakker, P. Brown, O. Belyaev, M. Urban, R. Mailhammer, J.-M. List, and D. Egorov. 2011. Automated dating of the world's language families based on lexical similarity. *Current Anthropology* 52: 841–875.

Jennings, T.A., and M.R. Waters. 2014. Pre-Clovis lithic technology at the Debra L. Friedkin site, Texas: Comparisons to Clovis through site level behavior, technological trait-list, and cladistic analyses. *American Antiquity* 79: 25–44.

Jennings, T.A., A.M. Smallwood, and M.R. Waters. 2015. Exploring late Paleoindian and early Archaic unfluted lanceolate point classification in the southern Plains. *North American Archaeologist* 36: 243–265.

Johnson, C.M. 1998. The Coalescent tradition. In *Archaeology on the Great Plains*, ed. W.R. Wood, 308–344. Lawrence: University Press of Kansas.

Johnson, A.E. 2001. Plains Woodland tradition. In *Plains*, Handbook of North American Indians 13, ed. R.J. DeMallie, 159–172. Washington, DC: Smithsonian Institution.

Johnson, E., and V.T. Holliday. 2004. Archeology and late Quaternary environments of the southern High Plains. In *The prehistory of Texas*, ed. T.K. Perttula, 283–295. College Station: Texas A&M University Press.

Kaestle, F.A., and D.G. Smith. 2001. Ancient mitochondrial DNA evidence for prehistoric population movement: The Numic expansion. *American Journal of Physical Anthropology* 115: 1–12.

Kay, M. 1998. The central and southern Plains Archaic. In *Archaeology on the Great Plains*, ed. W.R. Wood, 16–47. Lawrence: University Press of Kansas.

Key, P.J. 1983. *Craniometric relationships among Plains Indians*, Report of Investigations 34. Knoxville: University of Tennessee, Department of Anthropology.

Kornfeld, M., G.C. Frison, and M.L. Larson. 2010. *Prehistoric hunter-gatherers of the High Plains and Rockies*. 3rd ed. Walnut Creek: Left Coast Press.

Logan, B. 2006. Woodland adaptations in eastern Kansas. In *Kansas archaeology*, ed. R.J. Hoard and W.E. Banks, 76–92. Lawrence: University Press of Kansas.

Lohse, J.C., D.B. Madsen, B.J. Culleton, and D.J. Kennett. 2014. Isotope paleoecology of episodic mid-to-late Holocene bison population expansions in the southern Plains, U.S.A. *Quaternary Science Reviews* 102: 14–26.

Malhi, R.S., B.A. Schultz, and D.G. Smith. 2001. Distribution of mitochondrial DNA lineages among Native American tribes of northeastern North America. *Human Biology* 73: 17–55.

Martin, J.M., J.I. Mead, and P.S. Barboza. 2018. Bison body size and climate change. *Ecology and Evolution* 8: 4564–4574.

Meltzer, D.J. 2009. *First peoples in a new world*. Berkeley: University of California Press.

Myster, S.M.T., and B. O'Connell. 1997. Bioarchaeology. In *Archeology and bioarcheology of the Northern Woodlands*, Arkansas Archeological Survey research series 52, ed. E.D. Benchley, B. Nansel, C.A. Dobbs, S.M.T. Myster, and B. O'Connell, 215–302. Fayetteville: Arkansas Archaeological Survey.

O'Rourke, D.H., and J.A. Raff. 2010. The human genetic history of the Americas: The final frontier. *Current Biology* 20: R202–R207.

O'Shea, L.E. 2012. Southern Plains bison mtDNA and what it says about the past. Unpublished Master's dissertation, University of Oklahoma.

Owsley, D.W., and K.L. Bruwelheide. 1996. Bioarcheological research in northeastern Colorado, northern Kansas, Nebraska, and South Dakota. In *Archeology and paleoecology of the central Great Plains*, Arkansas Archeological Survey research series 48, ed. J.L. Hofman, 150–202. Fayetteville: Arkansas Archaeological Survey.

Perttula, T.K. 2004. The prehistoric and Caddoan archeology of the northeastern Pineywoods. In *The prehistory of Texas*, ed. T.K. Perttula, 370–407. College Station: Texas A&M University Press.

Schmeider, J., S.C. Fritz, J.B. Swinehart, A.L.C. Shinneman, A.P. Wolfe, G. Miller, N. Daniels, K.C. Jacobs, and E.C. Grimm. 2011. A regional-scale climate reconstruction of the last 4000 years from lakes in the Nebraska sand hills, USA. *Quaternary Science Reviews* 30: 1797–1812.

Seymour, D., ed. 2012. *From the land of ever winter to the American southwest*. Salt Lake City: University of Utah Press.

Skoglund, P., and D. Reich. 2016. A genomic view of the peopling of the Americas. *Current Opinion in Genetics & Development* 41: 27–35.
Steinacher, T.L., and G.F. Carlson. 1998. The central plains tradition. In *Archaeology on the Great Plains*, ed. W.-R. Wood, 235–268. Lawrence: University Press of Kansas.
Vehik, S.C. 1994. Cultural continuity and discontinuity in the southern Prairies and Cross Timbers. In *Plains Indians, A.D. 500–1500: Archaeological cultures to historic groups*, ed. K.H. Schleiser, 239–263. Norman: University of Oklahoma Press.
Vehik, S.C. 2001. Hunting and gathering tradition: Southern Plains. In *Plains*, Handbook of North American Indians 13, ed. R.J. DeMallie, 146–158. Washington, DC: Smithsonian Institution.
Vehik, S.C. 2002. Conflict, trade, and political development on the southern Plains. *American Antiquity* 67: 37–64.
Vehik, S.C., and T.G. Baugh. 1994. Prehistoric plains trade. In *Prehistoric exchange systems in North America*, ed. T.G. Baugh and J.E. Ericson, 249–274. New York: Plenum Press.
Whittaker, W.E. 2016. The Palace site and the appearance of house basins in the middle Archaic. *Plains Anthropologist* 61: 250–272.
Widga, C., J.D. Walker, and L.D. Stockli. 2010. Middle Holocene diet and mobility in the eastern Great Plains (USA) based on $\delta^{13}C$, $\delta^{18}O$, and $^{87}Sr/^{86}Sr$ analyses of tooth enamel carbonate. *Quaternary Research* 73: 449–463.
Wood, W.R. 2001. The Plains Village tradition: Middle Missouri. In *Plains*, Handbook of North American Indians 13, ed. R.J. DeMallie, 186–195. Washington, DC: Smithsonian Institution.

North American Rock Art, Fig. 1 Pictographs or rock paintings are common in many regions in North America. Although *red*, made from ocher, is the most common color employed, this is an example of a *black* and *white* bichrome painting from the southern Sierra Nevada, California

North American Rock Art

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Introduction and Definition

Rock art is a landscape art: images created on natural rock surfaces, such as cave walls and ceilings, cliff and boulder faces, and the natural ground surface. North America, especially western North America, has a very rich record of rock art. This includes rock paintings and drawings (pictographs; Fig. 1); peckings, incisings, and scratchings (engravings or petroglyphs; Fig. 2); and intaglios and rock alignments (earth figures or geoglyphs; Fig. 3). Although contemporary and historical Euro-Americans have sometimes created graffiti of various kinds on the landscape, rock art in this discussion is limited to imagery created by Native Americans.

Description

The earliest North America immigrants are assumed to have brought rock art production with them from Siberia. Though the age of this initial colonization is still uncertain, it is thought to have occurred c. 15,000 Years Before Present (YBP) or earlier, with the ultimate antiquity of North American art as yet unknown. Despite this difficulty, growing evidence suggests that rock art was not simply present prior to 10,000 YBP,

North American Rock Art, Fig. 2 Petroglyphs or rock engravings are found throughout North America but are especially common in the desert regions where dark rock varnish coatings provide a distinct contrast with the lighter, underlying heart rock. These examples are from the Coso Range, California

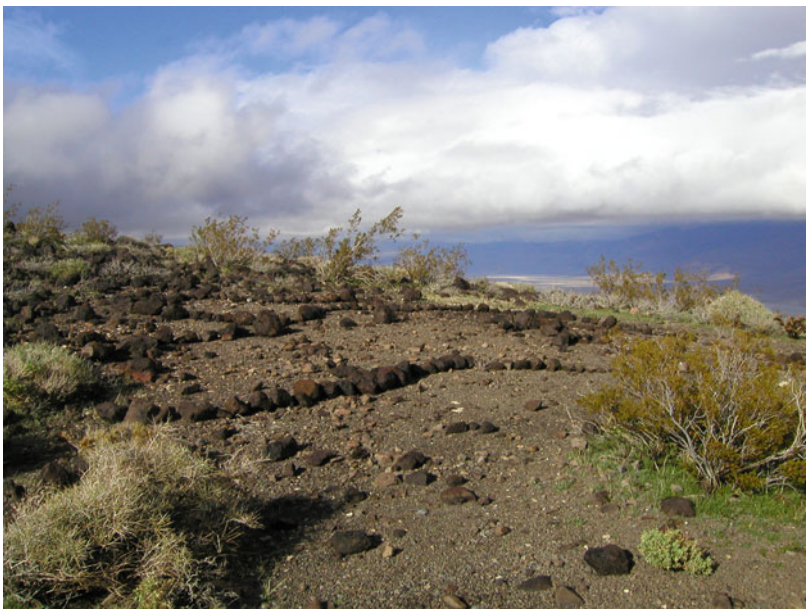

North American Rock Art, Fig. 3 Geoglyphs or earth figures include rock alignments and intaglios (which are scraped into a desert pavement). This example of an alignment is from the Slate Range in eastern California

during the Paleo-Indian period, but that regional traditions had already been established by that time. In the Great Basin and the greater Southwest, a Great Basin Petroglyph Tradition was established by at least 12,000 YBP (Whitley and Dorn 2012; Fig. 4). This is characterized by a wide variety of geometric motifs and figurative images of simple stick-figure humans and bighorn sheep (*Ovis canadensis*). In the northern Plains, Early Hunting Tradition petroglyphs have similar antiquity. They include quadrupeds of various kinds, typically with exaggerated "ball feet," simple humans, nets, and *atlatls* (spear-throwers; Tratebas 2012). On the southern Plains, the Old Incised Tradition consists of fine-lined incised geometric designs (Loendorf 2012). Created as both rock and mobile art, this also may be 12,000 or more years in age. It is likely that

North American Rock Art, Fig. 4 Bighorn sheep petroglyphs from the Coso Range, California, have been chronometrically dated to as early as 11,200 YBP. These early motifs are heavily revarnished, as shown by these examples from an early Coso site

other early regional traditions existed but have not yet been identified, including early painted art (as has been found in South America).

Subsequent rock art illustrates two widespread (but not universal) temporal trends: increasing regionalization and/or greater artistic elaboration and augmentation over time. By roughly 7000 YBP (the Middle Archaic), regional patterns that existed during the historical period began to develop. These approximately follow ethnographic "culture areas" (Fig. 5), as described by anthropologists, signaling the fact that the historical cultural distributions themselves have relatively great time depth.

The Great Basin Petroglyph Tradition, widespread across the west during the early Holocene, retracted over time, ultimately being primarily restricted in a core area consisting of the Great Basin physiographic region. Although the tradition thus has great time depth, change is visible in increasing artistic elaboration (e.g., complex "patterned body" anthropomorphs in addition to stick figures) over time, as well as by the development of localized variants with their own specific stylistic and motif emphases (Whitley et al. 1999). An increase in rock art production also appears to have occurred during the last few thousand years, with the tradition continuing into the historical period.

A distinct California Tradition developed in southwestern California by or shortly after the Middle to Late Archaic (by 3000–4000 YBP) and continued into the historical period (post-230 YBP; Whitley 2000). This primarily consists of pictographs, the majority of which are simple monochrome geometrics and stick-figure humans, lizards, snakes, and other animals. In certain regions, particularly in the Chumash area around Santa Barbara and in the southern Sierra Nevada, bichrome and polychrome paintings were created. Some of this art is quite elaborate if not psychedelic in appearance.

The Northwest Coast Petroglyph Tradition, like the renowned wood carvings and sculptures from this region, is highly conventionalized with a strong iconographic coherence (Keyser and Poetschat 2012). Sites are commonly located on boulders on the coast, at or near the tide line, in

North American Rock Art, Fig. 5 North American rock art is best discussed in terms of nine ethnographic culture areas, as shown here

N

proximity to villages at the mouths of salmon-spawning streams. Motifs emphasize schematized human faces/masks, along with a variety of geometric forms and zoomorphs, such as bears, birds, fish, and sea mammals. The earliest of these sites appear to date to approximately 4000–2000 YBP, with the motifs becoming increasingly conventionalized after that date. The tradition continued into the historical period.

Arctic rock art is rare, consisting of sporadic pictograph and petroglyph sites (Stevens 1974). Motifs are similar to those found in the Northwest Coast Petroglyph Tradition, but lack the conventionalization typical of that adjoining region, and cannot be said to constitute either a recognizable style or tradition. The petroglyphs are believed to date from roughly 1200 YBP but may be earlier.

The Columbia Plateau Tradition includes pictographs and petroglyphs sharing widespread thematic consistency, despite a series of regional stylistic variants (Keyser 1992). The tradition is predominated by simple stick-figure humans, block-bodied animals, rayed arcs, tally marks, "sun" symbols, and other geometric motifs, but the hallmark consists of one or (often) two stick-figure humans standing under rayed arcs. The discovery of both pictograph and petroglyphs panels buried by datable volcanic ash indicates that Plateau rock art began before 7000 YBP, possibly much earlier. More elaborate stylistic variants of the tradition developed regionally after about 1500 YBP, and Plateau rock art continued to be created in contemporary times.

Whereas the rock art traditions described above were created by hunter-gatherers or hunter-gatherer-fishers, the rock art of the Southwest was partly produced by settled farmers, following the development of agriculture approximately 2000 years ago (Schaafsma 1980; Bostwick 2002). One result is a complicated rock art record, reflecting the large series of cultures in this large area. At least five regional styles were present in the Southwest by the Early to Middle Archaic (if not earlier), including a southeastward extension of the Great Basin Tradition, discussed previously. This Archaic/hunter-gatherer substrate includes both pictograph and petroglyphs. Although not universally present, one characteristic of these early traditions is large anthropomorphs (Fig. 6), many of which are elaborately and/or flamboyantly rendered.

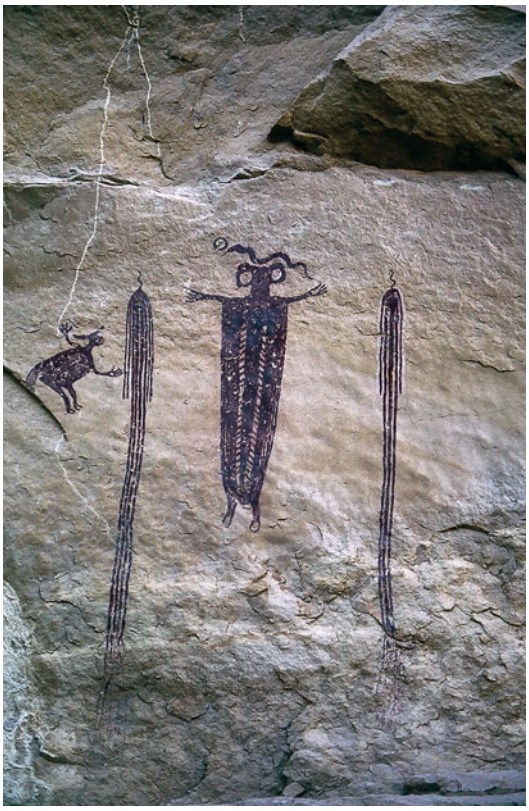

North American Rock Art, Fig. 6 The Archaic hunter-gatherer substrate of the American Southwest is notable for large anthropomorphic pictographs found in Utah. This example is from the Head of Sinbad site

A great proliferation of Southwestern styles occurred after about 2000 YBP, during the Puebloan and Hohokam period, with the development of local farming cultures and probably reflecting the appearance of priestly religions and cults (Fig. 7). Pictographs and petroglyphs are again present, with the motifs typically (though not invariably) consisting of relatively simple and regionally conventionalized images. Certain of these styles retracted geographically or disappeared c. 700 YBP, following the Puebloan collapse. The incursion of hunter-gatherers and pastoralists after that event added another layer

North American Rock Art, Fig. 7 The Puebloan farmers of the American Southwest created rock art in a number of contexts, including a ritual salt pilgrimage, where they engraved their clan symbols at the sacred site of Willow Springs. Shown here are bear clan symbols

of complexity to Southwestern rock art, with the appearance of a series of new tribal styles, sometimes with wide geographical extent.

Great Plains rock art, like that of the Southwest, is complex and diverse, again reflecting a changing mix of hunter-gatherers, farmers, and, historically, pastoralists – the famous Plains "horse cultures" that developed following the Spanish reintroduction of the equine into the Americas (Keyser and Klassen 2001; Loendorf 2008). Petroglyphs tend to be most common overall, though pictographs predominate in the northwestern Plains, with designs ranging from simple, crudely pecked geometrics to finely rendered polychrome figurative images. Motifs include geometrics, supernatural beings, war exploits, and a wide range of animals, including especially horse, deer, and elk (wapiti).

The Early Hunting Tradition, on the northern Plains, and Old Incised Tradition, in the south, demonstrate that Great Plains rock art was created as early as 12,000 YBP. The Early Hunting Tradition continued until approximately 2500 YBP, after which a series of more localized styles developed on the northern Plains. The Old Incised Tradition, in contrast, was replaced by the South Plains Archaic Tradition at c. 7000 YBP. The apparently "pan-tribal" Ceremonial Style developed as an overlay across much of the Plains after about 2000 YBP. The Biographic Style appeared c. 400 YBP and continued into the historic period. Like the ceremonial art, it was pan-tribal in distribution and is linked to the historical horse cultures. Much of its art is related to raiding and war (Fig. 8), which were endemic in the region during this period.

Petroglyphs are more common than pictographs in the Eastern Woodlands Tradition which, in addition to these two common kinds of rock art, also includes "mud glyphs" (Diaz-Granados and Duncan 2004). These are images that were scraped into the soft-sided walls of dark-zone caves. Birds are the predominant motifs at Eastern Woodlands sites, with the thunderbird serving as the hallmark of the region. This was a large, supernatural being whose flapping wings caused wind and thunder. Other common motifs include anthropomorphs of various types, including faces, geometrics, animal tracks, various other animals, other supernatural beings, and weaponry. Although some images include significant detail, overall the art is relatively simple and only minimally elaborated. The currently earliest dated Eastern Woodlands art was created about 7000 YBP, but the tradition is likely more ancient in origin. Most of the art appears to date to the last 2000 years however, with much of it reflecting the iconography and beliefs of the widespread

North American Rock Art, Fig. 8 Commemorative rock art, made to memorialize war honors and events, is common in the Great Plains. This example is from La Barge Bluffs, Wyoming

Southeastern Ceremonial Complex associated with the Mississippian culture.

The Northern Woodlands (or Canadian Shield) Tradition primarily consists of monochrome pictographs, though with a concentration of petroglyphs towards its southeastern extreme. Common motifs include a variety of simple humans, often with upraised arms and with variable body shapes; birds; tracks; snakes, lizards, turtles, and various quadrupeds; "mythological beings"; drums and canoes; and geometrics (Rajnovich 1995). The painted sites are commonly located on vertical or near vertical cliff faces that front lakes or rivers, whereas the incised (and occasional pecked) petroglyphs occur on flat horizontal outcrops. The Northern Woodlands Tradition dates as early as 2000 years ago, with the tradition continuing into historical times.

Historical Background

Euro-American intellectual interest in North American rock art began with the writings of the Puritan Cotton Mather, at the beginning of the seventeenth century (Whitley 2001). This sets the tone for the first two-and-a-half centuries of occasional rock art study, which was philologically oriented, emphasizing the putative significance of the art in terms of the origins of writing. An ethnographic approach was introduced in the mid-nineteenth century by Henry T. Schoolcraft who, though still interested in philology, recognized the religious origin of much of the art. Garrick Mallery, at the end of that century, provided the first continental synthesis. Like Schoolcraft, Mallery cited then-available ethnographic data and also acknowledged the art's religious significance.

The combination of the early philological interests and the later ethnographic approaches had an important implication for the history of North American rock art research. The study of much of global rock art can be understood historically as an outgrowth of the discovery and acceptance of the antiquity of western European Upper Paleolithic art. One result was the strong influence that European interpretations had on rock art studies in other regions, particularly hunting magic. North American rock art, in contrast, had its own research tradition prior to the systematic study of the European art. Ironically, the influence of the European hunting magic interpretation on North American rock art interpretation only developed as this explanation was losing favor in that region.

The first "modern" regional synthesis, in the sense of including a systematic data analysis, was provided in 1929 by Julian Steward, an anthropologist who subsequently gained renown for his theory of multilinear evolution and contributions to cultural ecology. Perhaps surprisingly, given his anthropological background, Steward effectively denied any connection between historical tribes and rock art – or maybe this is not surprising in light of his insistence (despite his own evidence) that hunter-gatherer cultures were principally "gastric" in nature. Steward's attitude was perpetuated by many subsequent archaeologists, who accepted on faith the contention that most regional rock art traditions were necessarily prehistoric, not also potentially historical/ethnographic, in age. Perhaps the most influential of these archaeologists were Robert Heizer and Martin Baumhoff (1962) who published a widely read monograph on Great Basin rock art. Among other matters, this introduced hunting magic as the preferred interpretation of hunter-gatherer rock art, at the same time that European Upper Paleolithic archaeologists were rejecting that theory.

Heizer and Baumhoff were, however, traditional cultural-historical archaeologists, and their interest in rock art was not on the agenda of then-developing processual archaeology. A professional rock art research lacuna resulted, with subsequent North American rock art studies, with only occasional exception, the product of amateurs. The most prominent of these was Walt Disney cartoonist Campbell Grant, who championed hunting magic in a prolific, and again influential, series of popular books and articles.

The common processual archaeological dismissal of rock art was ostensibly based on the fact that, at that time, it could not be dated, but the deeper issue was that symbolism and cognition were considered epiphenomenal and, therefore, of little importance in the cultural ecological and materialist paradigm of that period. Significant professional archaeological interest in rock art, accordingly, did not reappear until the late 1970s, promoted by a series of factors. One was then-widespread cultural interests in shamanism and archaeoastronomy and their apparent connections to some hunter-gatherer rock art. Another was renewed attention to ethnographic research, especially in the far west, and the "discovery" of rock art ethnography. Initial attempts at chronometric dating also started at this time. But perhaps the most important variable, in the long-term reemergence of North American rock art research, was the development of heritage management as the primary emphasis of archaeological work. This required the consideration of all aspects of the archaeological record, not just those pertaining to individual research designs, and it involved the consideration of a wide range of heritage values, including specifically art, aesthetics, and, ultimately, Native American religious concerns and issues.

North American rock art research, accordingly, has flourished in the last three decades as the archaeological profession has increasingly reoriented itself towards heritage management. Direct chronometric dating techniques, though sometimes still experimental, have dispelled the contention that the art is entirely undatable. Post-processual archaeology, with its interest in symbolism and interpretation, has provided a theoretical justification for rock art studies. Perhaps most importantly, however, legally mandated Native American involvement with heritage management has pushed sacred sites, including rock art, to the forefront of concern.

Key Issues/Current Debates

As with many global regions, North American archaeology originated when colonialist attitudes about indigenous peoples were prevalent. North American rock art research is no different and, while many archaeologists have moved beyond the primitivist biases that colonialism engendered, colonialist thought remains the subtext of the most significant current debate in North American rock art research (Whitley and Whitley 2012). This concerns ethnography: whether there is directly relevant rock art ethnography in certain regions; what this ethnography implies about origins, functions, and meanings of the art; and the potential relevance of ethnographic accounts to truly

prehistoric rock art corpora. Although seemingly an empirical controversy, the debate is founded on underlying and opposing philosophical positions, with largely unrecognized but significant social implications.

Although commitments on both sides of this debate vary from extreme to moderate, the colonialist position can be generally characterized as denying or downplaying any putative ethnographic data in favor of interpretations based on contemporary western archaeological models and contexts. This partly reflects the belief that a complete or near-complete cultural disjunction exists between the pre- and post-European contact periods. Where ethnographic information is admitted to exist, the statements are considered to be literal and factual comments that can be fully understood in contemporary and rationalist Euro-American intellectual terms. Where such statements make no obvious rationalist sense, in western scientific terms, they are dismissed as evidence of rock art ignorance by indigenous informants, thereby supporting the entirely prehistoric-age interpretation of the art.

The postcolonialist attitude, in contrast, starts with the premise that rock art ethnography may exist in many regions. If found to be present and despite the fact that substantial disruption occurred to indigenous cultures with European contact, specific aspects of these cultures, such as religious beliefs and practices, may not have been entirely destroyed, and precontact indigenous knowledge may have been preserved. Statements of religious belief, from this position, are recognized as inherently counterfactual in nature, with ethnographic data thereby frequently requiring symbolic-metaphoric interpretations, which must be contextualized in terms of relevant indigenous thought systems. Continuity between the ethnographic/historical and more truly prehistoric periods, if any, must be empirically demonstrated on a case-by-case basis, but the passage of time alone is not considered an adequate justification for denying this possibility. (Change occurs over time, but time does not cause change to occur.) Over a century of continuity in ethnographic comments about rock art, in a series of North American regions, has been cited in support of this position and contrasted with the fact that prevailing and opposing, more "purely archaeological" interpretations have consistently changed, on average, every decade.

These two philosophical and methodological positions underpin the current, most visible aspect of North American debate, which concerns the shamanistic interpretation of certain corpora of this art. Some (but not all) North American hunter-gatherer rock art has been interpreted as shamanistic, based on ethnographic and other lines of evidence (including, using independent data and a separate approach to analysis, the neuropsychological model for the forms of the mental imagery of trance; see Lewis-Williams and Dowson 1988). These interpretations have been contested, in some cases vigorously, primarily by simply denying the relevance of the ethnographic data. Alternative explanations have only occasionally been offered in the shamanistic critiques. These commonly emphasize hunting magic. Although there is ethnographic evidence for shamanistic hunting magic rock art in some but not most regions (Keyser and Whitley 2006), the critiques instead follow the colonialist archaeological assumption that dietary concerns were the primary basis for non-Western ritual and belief and that western intellectual models best explain all types of human behavior.

The social implications of these contrasting positions are only occasionally recognized. The colonialist stance reiterates the view that Native Americans do not, and historically did not, have any knowledge of rock art and that the art is therefore necessarily prehistoric, not potentially ethnographic/historical, in age. This effectively separates Native Americans from any direct connection with the archaeological record and serves to strip them of their patrimony. This last fact has particularly important consequences now that Native American tribes have been awarded legal rights to aspects of the archaeological record and are actively attempting to reestablish their claim to their patrimony and heritage. The postcolonialist opinion holds that there is a direct link between contemporary Native Americans and at least the recent prehistoric past. Based on widespread ethnographic evidence, it emphasizes the sacred

nature of rock art sites and acknowledges their importance in terms of social memory, education, and self-identity for tribal peoples. Postcolonial rock art research has served as an effective bridge between archaeologists and Native Americans, whereas the colonialist agenda perpetuates the divide and antagonism that has traditionally existed in North America between the two parties.

Other key current research topics include the gender implications of rock art; the widespread, unusual acoustical properties of many rock art sites; the relationship of rock art sites to the landscape, in both symbolic and adaptive terms; chronometric dating, including the dating of the earliest art; and site management and conservation techniques and approaches. Because of Native American's increasing participation in heritage management, including the prioritization of their heritage values during the planning for site management, research on management and conservation techniques is likely to increase in the future.

International Perspectives

The divergent history of North American rock art research, relative to the remainder of the western (and especially Anglophone) world, initially sets it apart from global research trends. This isolation has continued, to a certain degree, with international practices and interests having only limited impact, although there are two important exceptions to this generalization. The first concerns shamanistic interpretations of hunter-gatherer rock art. Despite debate, ethnographically based shamanistic interpretations of North American rock art had been suggested at least since Mallery in the nineteenth century, and they are currently advocated for specific American regions and corpora by a number of archaeologists. David Lewis-Williams' (e.g., 2012) shamanistic research on South African San (Bushman) rock art has, accordingly, resonated with North American researchers, with a significant methodological and philosophical impact on them, especially concerning the use of ethnographic data. His parallel development of the neuropsychological model for the mental imagery of trance has likewise been influential analytically, though in fact it was inspired by slightly earlier work on Chumash rock art in southern California by Thomas Blackburn. Similarities in the kinds of ethnographic and prehistoric cultures present, and the types of data available for analysis, helped create a natural research bridge between these two geographically distant regions. Furthermore, the emphasis on the origin and meaning of rock art in both of these regions sets them slightly apart from hunter-gatherer rock art research in some other parts of the world, notably Australia, where the primary concern typically is the implications of the art for social processes rather than its symbolism and religious significance.

The second area of research in which North Americanists have heavily participated is rock art chronometrics. In this case, the specialized kinds of expertise and equipment needed to conduct these studies necessarily require international collaboration, with Americanists participating fully in this regard. Although much remains to be done, the first steps towards a chronometric understanding of worldwide rock art have occurred, and North American researchers have played a key role in this regard, both in terms of establishing regional North American chronologies and in the development of the techniques to date rock art globally.

More than research history serves to separate North American rock art studies from international ones, however, specifically with reference to one of the most widely studied problems in archaeology. This is the initial appearance of art and its implications for the beginnings of behavioral-cognitive modernity. There is a consensus that art and modernity developed long before the Americas were colonized, despite the fact that we are still not certain when that event occurred. Regardless of specific date, it seems unlikely that North American research can directly contribute to this central archaeological issue.

Future Directions

North American rock art, despite substantial research and management advances in the last few decades, confronts a series of daunting

challenges. The amount of rock art, especially in the west, is quite high: over 1500 sites are known in California alone, for example, with similar numbers in surrounding states. But very few sites have been fully documented or carefully researched, let alone published. At the most basic level, there is still a substantial amount of foundational work that must be completed before the full range and variability of the continental record is known and before regional rock art chronologies are adequately understood. Fewer still of these sites have been subjected to proper condition assessments; hence, the relative preservational status of North American rock art, including the potential for its long-term sustainability, is all but unknown in any general sense. These circumstances suggest an agenda for future North American rock art research and management. This would include, first, a substantial program of systematic data collection. The recent proliferation of digital recording equipment and techniques, which have increased the accuracy of documentation, facilitated data storage and manipulation, and dramatically improved fieldwork efficiency, enhances but does not guarantee the possibility of achieving this goal.

Continued chronometric research is also seriously needed, second, both in terms of technique development and improvement, and empirical applications. Although some locales have at least preliminary chronometric sequences, such as the Great Basin, Lower Pecos, and northern Plains, almost no chronometric dating has occurred in others (e.g., the Columbia Plateau). Yet this kind of information is crucial not simply to understand the art but also to better integrate it into regional cultural-historical sequences.

Professional site management (including conservation) approaches and applications need to be applied, third, not simply on an ad hoc site-by-site basis, as has occurred to this point, but regionally and collectively. These include professional site documentation, condition assessments, and management plans. Absent these kinds of programs and information, applied on a regional scale, site management will consist of little more than putting out forest fires, thereby remaining cost ineffective and, potentially, futile in terms of the larger resource base. Like the other items on this list, this is a massive and difficult goal to achieve. But the recent development of rapid, quantitative approaches to site condition assessment (Dorn et al. 2008) makes this at least possible, though, again, far from guaranteeing completion.

The future of North American rock art, from this perspective, can be seen optimistically. We now have the tools and abilities to obtain a better understanding of this art and ensure its long-term preservation. But it will be up to this and future generations of the archaeological community to see that the appropriate steps are implemented to fulfill this agenda.

Cross-References

- ▶ Hunter-Gatherers, Archaeology of
- ▶ Lewis-Williams, James David
- ▶ Rock Art, Forms of
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts

References

Bostwick, T.W. 2002. *Landscape of the spirits: Hohokam rock art at South Mountain Park*. Tucson: University of Arizona Press.

Diaz-Granados, C., and J. Duncan, eds. 2004. *The rock-art of eastern North America: Capturing images and insight*. Tuscaloosa: University of Alabama Press.

Dorn, R.I., D.S. Whitley, N.V. Cerveny, S.J. Gordon, C.D. Allen, and E. Gutbrod. 2008. The rock art stability index (RASI): Improving the sustainability of rock art sites. *Heritage Management* 1: 37–70.

Heizer, R.F., and M. Baumhoff. 1962. *Prehistoric rock art of Nevada and eastern California*. Berkeley: University of California Press.

Keyser, J.D. 1992. *Indian rock art of the Columbia Plateau*. Seattle: University of Washington Press.

Keyser, J.D., and M. Klassen. 2001. *Plains Indian rock art*. Seattle: University of Washington Press.

Keyser, J.D., and G. Poetschat. 2012. *Clan crests and shamans' masks: Petroglyphs in southeast Alaska*. Portland: Indigenous Cultures Preservation Society.

Keyser, J.D., and D.S. Whitley. 2006. Sympathetic magic in western North American rock art. *American Antiquity* 71: 3–26.
Lewis-Williams, J.D. 2012. Rock art and shamanism. In *A companion to rock art*, ed. J. McDonald and P. Veth, 17–33. Oxford: Wiley-Blackwell.
Lewis-Williams, J.D., and T.A. Dowson. 1988. The signs of all times: Entoptic phenomena in upper Palaeolithic art. *Current Anthropology* 29: 201–245.
Loendorf, L.L. 2008. *Thunder and herds: The rock art of the High Plains*. Walnut Creek: Left Coast Press.
Loendorf, L.L. 2012. Old petroglyphs on the North American High Plains. In *L'Art Pleistocene dans le Monde. Actes du Congres IFRAO* 2010, ed. J. Clottes. Prehistoire, Art et Societies: *Bulletin de la Societie Prehistorique Ariege-Pyrenees* LXV–LXVI, 112–113.
Rajnovich, G. 1995. *Reading rock art: Interpreting the Indian rock paintings of the Canadian shield*. Toronto: Natural Heritage.
Schaafsma, P. 1980. *Indian rock art of the Southwest*. Santa Fe and Albuquerque: School of American Research and the University of New Mexico Press.
Stevens, E.T. 1974. Alaskan petroglyphs and pictographs. Unpublished MA dissertation, University of Alaska.
Tratebas, A. 2012. Late Pleistocene rock art traditions on the North American Plains. In *L'Art Pleistocene dans le Monde. Actes du Congres IFRAO* 2010, ed. J. Clottes. Prehistoire, Art et Societies: *Bulletin de la Societie Prehistorique Ariege-Pyrenees* LXV–LXVI, 108–109.
Whitley, D.S. 2000. *The art of the shaman: Rock art of California*. Salt Lake City: University of Utah Press.
Whitley, D.S. 2001. Rock art and rock art research in worldwide perspective: An introduction. In *Handbook of rock art research*, ed. D.S. Whitley, 7–54. Walnut Creek: AltaMira Press.
Whitley, D.S., and R.I. Dorn. 2012. The earliest rock art in far western North America. In *L'Art Pleistocene dans le Monde. Actes du Congres IFRAO* 2010, ed. J. Clottes Prehistoire, Art et Societies: *Bulletin de la Societie Prehistorique Ariege-Pyrenees*, LXV–LXVI, 106–107.
Whitley, D.S., and T.K. Whitley. 2012. A land of visions and dreams. In *Issues in contemporary California archaeology*, ed. T. Jones and J. Perry, 255–314. Walnut Creek: Left Coast Press.
Whitley, D.S., J.M. Simon, and R.I. Dorn. 1999. The vision quest in the Coso Range. *American Indian Rock Art* 25: 1–32.

Further Reading

Wellman, K. 1979. *A survey of North American Indian rock art*. Graz: Akademische Druck-und Verlagsanstalt.
Whitley, D.S., ed. 2001. *Handbook of rock art research*. Walnut Creek: AltaMira Press.
Whitley, D.S. (ed.) 2011. *Introduction to rock art research*, 2nd rev edn. Walnut Creek: Left Coast Press, Inc.

North American Terminal Pleistocene Extinctions: Current Views

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Introduction

The end of the Pleistocene in North America witnessed the extinction of a remarkable array of large mammals, encompassing at least 32 genera of megafauna (animals > 44 kg) and another 4 genera of smaller mammals (Table 1). The majority of extinct genera ($n = 30$), including mammoths and mastodons, saber-toothed cats, and giant ground sloths, became globally extinct at this time, whereas a handful ($n = 6$) disappeared from North America while continuing to survive elsewhere. Altogether, more than 70% of North America's megafaunal genera disappeared (Barnosky et al. 2004). In addition to extinctions at the generic level, several megafaunal species with surviving North American congeners also disappeared near the end of the Pleistocene, including the dire wolf (*Canis dirus*), the American lion (*Panthera atrox*), Harrington's mountain goat (*Oreamnos harringtoni*), and the beautiful armadillo (*Dasypus bellus*).

North America's late Pleistocene extinctions are not only remarkable in terms of the diversity of animals to disappear but they are also noteworthy in that the extinctions primarily affected the larger species (Koch and Barnosky 2006). While it is true that some of the extinct mammals were small in size, such as the Aztlan rabbit (*Aztlanolagus agilis*, ~2 kg) and the diminutive pronghorn *Capromeryx minor* (~10 kg), the majority ranged in size from large to massive. For example, the giant beaver *Castoroides ohioensis* weighed up to 100 kg (compared to

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North American Terminal Pleistocene Extinctions: Current Views, Table 1 Extinct late Pleistocene mammals of North America

Order	Family	Genus	Common name
Cingulata	Pampatheriidae	*Pampatherium*	Southern pampathere
		Holmesina	Northern pampathere
	Glyptodontidae	*Glyptotherium*	Simpson's glyptodont
Pilosa	Megalonychidae	*Megalonyx*	Jefferson's ground sloth
	Megatheriidae	*Eremotherium*	Rusconi's ground sloth
		Nothrotheriops	Shasta ground sloth
	Mylodontidae	*Paramylodon*	Harlan's ground sloth
Carnivore	Mustelidae	*Brachyprotoma*	Short-faced skunk
	Canidae	*Cuon*[a]	Dhole
	Ursidae	*Tremarctos*[a]	Florida cave bear
		Arctodus	Giant short-faced bear
	Felidae	*Smilodon*	Sabertooth
		Homotherium	Scimitar cat
		Miracinonyx	American cheetah
Rodentia	Castoridae	*Castoroides*	Giant beaver
	Caviidae	*Hydrochoerus*[a]	Holmes' capybara
		Neochoerus	Pinckney's capybara
Lagomorpha	Leporidae	*Aztlanolagus*	Aztlan rabbit
Perissodactyla	Equidae	*Equus*[a]	Horses
	Tapiridae	*Tapirus*[a]	Tapirs
Artiodactyla	Tayassuidae	*Mylohyus*	Long-nosed peccary
		Platygonus	Flat-headed peccary
	Camelidae	*Camelops*	Yesterday's camel
		Hemiauchenia	Large-headed llama
		Palaeolama	Stout-legged llama
	Cervidae	*Navahoceros*	Mountain deer
		Cervalces	Elk-moose
	Antilocapridae	*Capromeryx*	Diminutive pronghorn
		Tetrameryx	Shuler's pronghorn
		Stockoceros	Pronghorns
	Bovidae	*Saiga*[a]	Saiga
		Euceratherium	Shrub ox
		Bootherium	Harlan's muskox
Proboscidea	Gomphotheriidae	*Cuvieronius*	Cuvier's gomphothere
	Mammutidae	*Mammut*	American mastodon
	Elephantidae	*Mammuthus*	Mammoths

[a]Genus survives outside North America

~20 kg in its living relatives) and the giant ground sloth *Eremotherium*, weighing in at ~3500 kg, was comparable in mass to an African elephant (*Loxodonta africana*). All North American mammal species larger than 1000 kg disappeared, as did more than half of those between 32 and 1000 kg (Koch and Barnosky 2006).

Of the 36 genera to disappear during the late Pleistocene, the last appearances of 16 are securely dated to between 12,000 and 10,000 radiocarbon years ago (all dates discussed here are in radiocarbon years) (Grayson 2007; Faith and Surovell 2009), a time period referred to here as the terminal Pleistocene. The remaining

taxa are quite rare in the fossil record, and most lack reliable last appearance dates altogether, hindering the establishment of a comprehensive extinction chronology. However, statistical analyses of the chronology suggest that all genera may have disappeared during the terminal Pleistocene (Faith and Surovell 2009). The clustering of extinctions at this time coincides with a period of dramatic climate change, which caused massive shifts in the composition and distribution of plant and animal communities, and with the arrival of Clovis hunter-gatherers in North America, which until recently has been considered the earliest secure evidence of people on the continent. These temporal associations play an important role in attempts to explain the extinctions.

Definition

Why did North America's Pleistocene megafauna disappear? For decades archaeologists, paleontologists, and a range of Quaternary scientists have tried to account for the extinctions. Stemming from their chronological correlations with the extinctions, there are two dominant explanations for the losses: climate change and human predation. Understanding their role in the extinctions has been the subject of intense debate that continues today.

Historical Background

Nineteenth-Century Explanations

The historic roots of scientific enquiry into the problem of North America's late Pleistocene extinctions have been traced in great detail by Grayson (1984). The following discussion draws heavily from his work.

Although it is now accepted as fact that extinctions occurred in the past as they do today, the recognition that species could become extinct emerged only during the late eighteenth century. Prior to then, naturalists studying the history of life found the possibility of extinction both unlikely and a direct challenge to the presumed divinity of creation. However, at the very end of the 1700s, owing largely to the work of French naturalist Georges Cuvier, a growing body of fossil evidence demonstrated without question that extinct animals lacking living representatives once inhabited the earth.

With the reality of extinction clearly demonstrated, it did not take long for naturalists to become aware of the magnitude of extinctions in North America. By 1825, ten extinct North American mammals were recognized, including two species of giant ground sloth (*Megalonyx* and *Eremotherium*), two proboscideans (*Mammuthus* and *Mammut*), and several artiodactyls (e.g., *Bootherium* and *Cervalces*), among others. Many naturalists working on the topic, including Charles Darwin, reacted to the growing awareness of the magnitude of North America's extinctions with utter astonishment.

The mounting evidence for massive extinctions in North America and elsewhere posed a scientific problem that demanded explanation. Stemming from the presumption that the extinction of Pleistocene mammals occurred suddenly, extinction scenarios forwarded in the early 1800s included rapid and catastrophic geological change of a sort never before observed in modern times (e.g., global glaciation, flooding on a biblical scale). These catastrophist explanations were rejected by uniformitarians, most notably British geologist Charles Lyell, who, believing the extinctions to have occurred over an extended period of time, argued that slow, natural changes across the surface of the earth were to blame. Although the precise nature of such changes was rarely made explicit, possible mechanisms include gradual changes in the physical environment, such as climate, seasonality, or habitat structure.

Arguments that humans played a role in prehistoric extinctions were initially formulated in the late eighteenth century and became increasingly popular through the 1800s. Prior to the 1850s, however, a crucial stumbling block was that evidence for the contemporaneity of people with extinct megafauna was lacking. At the time, the antiquity of humanity had yet to be

established, and most naturalists, including Cuvier and Lyell, believed that the emergence of people postdated the extinct Pleistocene mammals. This perspective changed during the 1850s, when archaeological research in France and England provided unequivocal stratigraphic evidence that people and extinct Pleistocene megafauna coexisted. For Lyell, who had long recognized the potential impact of humans on modern plant and animal communities, an anthropogenic role in the extinctions seemed the most powerful explanation. Many of his contemporary naturalists soon followed suit, suggesting that humans were solely, or at least partially, responsible for past extinctions on a global scale.

Emergence of the Contemporary Debate

Although the scientific context within which the debate takes place has changed significantly, many contemporary explanations for the extinctions are rooted in those that emerged in the nineteenth century, focusing primarily on the extent to which people or external physical change (e.g., climate change) contributed to the extinctions.

One of the more important factors in the emergence of the modern extinctions debate was the advent of radiocarbon dating. Before then, those interested in the matter could only speculate as to when the extinctions took place, posing obvious challenges when attempting to relate the losses to causal mechanisms. Even with the availability of radiocarbon dating, however, establishing a reliable chronology proved challenging in the past and continues to do so in the present. For example, early attempts (1957–1960) to establish an extinction chronology for North America's megafauna led to the conclusion that the extinctions were Holocene in age, with many species disappearing around 8000 years ago, but some surviving until as recently as 2000 years ago. Such a chronology would be rejected out of hand today.

Making use of the growing list of radiocarbon dates for extinct megafauna, in 1967, Paul Martin published one of the most influential analyses of the extinctions (Martin 1967). Noting that carefully excavated and well-dated Holocene archaeological sites consistently lacked remains of extinct megafauna, Martin truncated the extinction chronology and suggested that the main wave of extinctions occurred around 11,000 years ago. This corresponded precisely with emerging dates for Clovis archaeological sites, which at the time represented the earliest evidence for the peopling of the Americas. As discussed below, Martin believed that this temporal correlation was not coincidental.

Martin (1967) was impressed by the fact that most of the animals lost in North America were large herbivores or the carnivores and scavengers that were ecologically dependent on those herbivores. Large herbivores were potentially attractive prey to Clovis hunters, a premise supported at the time by archaeological associations between Clovis points and mammoth remains. Martin was also struck by the fact that the late Pleistocene extinctions differed from those documented earlier in the Cenozoic in that (1) the ecological niches of extinct forms were not replaced by new or closely related species and (2) there was no appreciable extinctions in the small mammals, reptiles, amphibians, or plants. These factors set the late Pleistocene extinctions apart from presumably climatically driven losses earlier in time. Perhaps most intriguing, not only did human colonization correspond with extinction of the megafauna in North America but a parallel correlation between human colonization and the loss of megafauna also seemed apparent elsewhere (e.g., Australia, New Zealand, and South America). To Martin, the only mechanism capable of accounting for this was human predation. Today, this argument is widely known as the "overkill hypothesis."

Over the years, Martin (1984) refined the details of Pleistocene overkill in North America. He hypothesized that around 11,500 years ago, Clovis hunters entered the continent through an ice-free corridor east of the Canadian Rockies and encountered an abundance of large prey that were naïve to human predators (i.e., lacking adequate defense behaviors). With such an abundant supply of easily captured prey, Clovis hunters rapidly multiplied and spread across the continent. In doing so, they devastated North America's large mammal community and brought about the extinction of the megafauna in a geological instant. This rapid extinction is referred to as the "blitzkrieg" model. To support the plausibility of blitzkrieg, Martin cites evidence for the ecological

devastation and extinctions wrought by humans following the colonization of islands and extrapolates these data to the continental scale.

Although the inferred 11,000 BP extinction wave overlaps with the appearance of Clovis in North America, the end of the Pleistocene is also characterized by dramatic environmental change. Many Quaternary scientists attempted to incorporate such change into explanations for the extinctions. Stemming from observations made in the 1960s that late Pleistocene biotic communities often contained a mixture of northern and southern species – referred to as disharmonious or nonanalog associations – it was suggested that late Pleistocene climates were more equable than those of the Holocene (i.e., less extreme seasonal fluctuations). In short, warmer winters allowed southern forms to expand north and cooler summers allowed northern forms to expand south. In the same year that Martin formulated the overkill hypothesis, Axelrod and Slaughter independently applied this concept to the problem of the extinctions, arguing that increased seasonality at the onset of the Holocene was to blame for the losses.

Since then, numerous additional climatic explanations have been developed to account for the loss of North America's megafauna. Among the more widely cited explanations are those of Graham and Lundelius (1984) and Guthrie (1984). Graham and Lundelius' (1984) coevolutionary disequilibrium hypothesis argues that as climates became less equable at the onset of the Holocene, changes in vegetation structure caused coevolved mammal communities to disassemble, disrupting ecological relationships between plants and animals. For large herbivores, the outcome was reduced niche differentiation and heightened competition for forage, ultimately leading to the extinction of species less adapted to the novel plant communities. Guthrie (1984) proposes that a long and varied growing season during the Pleistocene promoted a diverse, spatially complex vegetation mosaic capable of supporting a wide range of large herbivores. A possible transition to shorter and less varied growing seasons at the onset of the Holocene increased zonation in the plant communities and decreased the quantity and quality of forage available to large herbivores, with extinction following. A more recent, but related, hypothesis argues that rising atmospheric CO_2 concentrations near the end of the Pleistocene lowered plant nutrient content, initiating a series of feedback mechanisms that caused megafaunal populations to crash (Faith 2011).

Key Issues and Current Debates

The debate over the cause of North America's megafaunal extinctions is far from resolved today. Although each scenario advanced to explain the losses has its strengths, one does not have to look far to find weaknesses. Some of the major issues that routinely emerge in the debate are highlighted below.

Pleistocene Overkill

Archaeological Evidence

The fiercest criticism of overkill comes from archaeologists who see little empirical evidence for it. The overkill hypothesis proposes that Clovis people hunted massive quantities of now-extinct megafauna on a continental scale. However, among the 36 genera of large mammals to disappear near the end of the Pleistocene, kill sites have been confidently documented only for mammoth, mastodon, and camel. For the remaining genera of extinct mammals, there is no evidence of human predation whatsoever, causing many to doubt the fundamental premise of overkill.

Martin (1984) responded to this argument by suggesting that the North American extinctions occurred so rapidly in geological time that archaeological evidence of overkill should be very difficult to come by. At the same time, however, proponents of the overkill hypothesis, including Martin, cite the abundance of kill sites for moas in New Zealand as evidence that human predation drove the extinction of these large flightless birds. This contradiction that overkill can lead either to an abundance or scarcity of evidence poses a serious logical challenge to the hypothesis. This challenge appears to have been met in an upcoming paper by Surovell and Grund (2012), who argue that the archaeological signature of overkill can be very different (i.e., many or few kill sites) depending on the temporal depth of the

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extinctions, human demographics, and taphonomic bias. For now, only time will tell whether the absence of evidence for hunting of extinct North American megafauna is truly evidence of its absence.

Island Extinctions

Is it possible that small populations of hunters armed with Stone Age technology could cause massive extinctions on a continental scale? Among supporters of the overkill hypothesis, the answer is unquestionably yes. To establish that catastrophic anthropogenic extinctions are not only feasible but have happened numerous times in human prehistory, Martin draws upon evidence from island settings. Across the islands of the world, there is unquestionable evidence that extinctions rapidly followed in the footsteps of human colonists. The apparent synchrony between island colonization and extinctions, together with colonization of the Americas and extinctions, contributes to an appealing, albeit disheartening, argument – wherever people went in prehistory, extinctions followed.

The logic behind connecting what happened on islands to what happened on continents has been challenged repeatedly in the literature (e.g., Grayson 2011). Namely, it is well established that island populations are vulnerable to extinction because of their small population size, clearly delineated and often small habitable landmass, and lack of source populations from elsewhere. These factors are not in play at the continental scale. In addition, extinctions on islands are often the result of a combination of factors, including human predation, introduction of alien species (e.g., dogs, pigs, rats), and vegetation change. In no case is it clear that hunting alone drove island extinctions, as required by overkill. In short, the fact that people contributed to island extinctions is largely irrelevant to what happened in North America.

Colonization of the Americas

At the time of the formulation of the overkill hypothesis, Clovis archaeological sites, typically dated to between 11,570 and 10,900 radiocarbon years ago (Meltzer 2004), represented the earliest evidence of people in the Americas. The apparent synchrony between colonization and extinctions supported the rationale behind overkill, especially considering the parallel – although debatable – correlation between island colonization and extinctions. However, there is now compelling evidence that the Americas were colonized well before Clovis. At Monte Verde in southern Chile, some 16,000 km south of the Bering land bridge connecting Asia to North America, there is spectacularly preserved evidence for a pre-Clovis presence in the Americas dating to 12,500 radiocarbon years ago (Dillehay 1997). Moving further north, the Paisley Caves in Oregon provide the oldest evidence for humans in North America, based on human coprolites dated to between 12,260 and 12,400 years ago (Gilbert et al. 2008). There is even evidence that people hunted mastodon prior to Clovis, as indicated by the Manis mastodon from Washington, which dates to 11,960 radiocarbon years ago and was found to have a bone projectile point embedded in its rib (Waters et al. 2011).

It is now clear that people were present in the Americas well before Clovis and that they overlapped with and hunted some of the megafauna for upwards of 2000 years. Given the difficulties in detecting the earliest people or the latest megafauna in North America, this temporal overlap is likely to increase with future field work. This protracted overlap falsifies the strict blitzkrieg model of the extinctions and raises questions concerning the supposed rapidity with which humans are said to have exterminated the megafauna. However, it is impossible to say how much overlap is "too much" to accommodate within an overkill scenario, and there is little reason why humans could not have contributed to the extinctions over extended periods of time.

Extinction Chronology

In order for humans to have hunted North America's Pleistocene megafauna to extinction, those megafauna had to have been present when humans arrived. Of the 36 mammal genera involved, however, only 16 can be shown to have survived to the time of human arrival on the continent (Grayson 2007; Faith and Surovell

2009). Thus, the reason archaeologists have failed to provide substantial evidence for human predation on extinct megafauna could be because the potential prey became extinct long before humans arrived on the scene. For example, there is no evidence that *Aztlanolagus* or *Eremotherium* survived the Last Glacial Maximum.

The possibility of extinctions prior to the terminal Pleistocene poses an obvious problem for the overkill hypothesis. However, those taxa missing from the terminal Pleistocene tend to be poorly represented in the fossil record. This raises the possibility that insufficient sampling is responsible for their absence from the terminal Pleistocene, in which case overkill remains viable. A statistical examination of the radiocarbon chronology of extinctions suggests that this is likely the case (Faith and Surovell 2009). Nevertheless, overkill critics argue that even if this is true, it remains possible that the megafauna had begun to decline long before then (Grayson 2011). For example, experts in the paleobiology of the giant ground sloth *Eremotherium* believe that plummeting winter temperatures at the onset of the Last Glacial Maximum caused its range to contract southward to the point where it was extirpated from North America (McDonald and Lundelius 2009). This is consistent with its fossil history and implies that *Eremotherium* was absent from North America long before it was colonized (the latest *Eremotherium* survived in South America).

The Broader Picture

Although the extinction of the megafauna at the end of the Pleistocene is astounding in its scope, the story does not end there. At the same time that extinctions were taking place, both small mammals and plants were undergoing substantial range shifts. Even a species of spruce tree (*Picea critchfieldii*), which was abundant and widespread in the Lower Mississippi Valley during the Last Glacial Maximum, did not survive the end of the Pleistocene. These changes cannot be explained by human activities but are attributed without issue to climate change. In addition, at least 19 genera of birds disappeared during the late Pleistocene. Some of these, including the massive *Teratornis*, were scavengers whose extinctions were likely tied to the loss of the megafauna. However, others include flamingoes, shelducks, and jays. Their disappearance at the end of the Pleistocene is more difficult to attribute, directly or indirectly, to human predators.

Multiple lines of evidence indicate that the end of the Pleistocene was a tumultuous time for North America's plant and animal communities. At least some of these changes, but perhaps all, cannot be accounted for by people. This simplicity appeals to critics of overkill, since only climate change is capable of explaining the entire suite of biotic changes observed at the end of the Pleistocene. As discussed below, however, climatic arguments are not without their own set of problems.

Climate Change

Although there is good reason to doubt that people played a role in the extinctions, even outspoken critics of the overkill hypothesis readily admit that compelling climatic explanations are lacking (e.g., Grayson 2011). There are many reasons for this, although the simplest is that none have explicitly linked climatic variables to the paleoecology of extinct species, such as dietary habits, habitat preferences, and geographic range, in any persuasive manner. There are several other problems that plague attempts to explain the extinctions by climatic mechanisms, briefly discussed below.

Previous Climate Change

There is no question that the end of the Pleistocene was a time of dramatic climate change on a global scale, with profound impacts on the plant and animal communities of North America. However, dramatic climate changes occurred repeatedly during glacial/interglacial cycles throughout the Quaternary. Yet in North America, massive extinctions are observed only at the end of the Pleistocene. There is no evidence that the magnitude or rapidity of change at this time was any more extreme than during earlier glacial/interglacial cycles, causing many to doubt that climate change adequately explains the extinctions (Barnosky et al. 2004; Koch and Barnosky 2006). For climate change to remain a viable

explanation, it must be demonstrated that climate change at the end of the Pleistocene was somehow unique.

Supporters of climatic explanations note that our understanding of the magnitude and rapidity of climate changes during previous glacial/interglacial cycles is based primarily on isotopic evidence from deep sea or ice cores. Although these data provide insight into global temperatures and continental ice volumes, they provide no insight into variables that may be relevant to the extinctions, including vegetational complexity, seasonality, or duration of the growing season. Of equal importance, global climate records are not a substitute for empirical paleontological and paleobotanical data documenting the response of biotic communities to climate change. In short, scientists do not yet know whether climate change at the end of the Pleistocene was unique or not.

Selectivity of the Extinctions

Compared to earlier episodes of mammal extinctions in North America, the late Pleistocene extinctions are unusual in that the losses disproportionately affected large mammal species. Smaller mammals, which were commonly the victims of climate-driven extinctions earlier in time, fared quite well at the end of the Pleistocene. This pattern lends some support to the argument that people, rather than climate, drove the extinctions, since larger species are presumably preferred prey. Body size alone, however, does not explain the entire situation. Johnson (2002) showed that extinction risk was highest among species with low reproductive rates regardless of body size. Among those species with low reproductive rates that survived, many are arboreal, nocturnal, or prefer to live in densely vegetated habitats. These are precisely the sort of traits that would reduce their possible interaction with human foragers, suggesting that humans did indeed play a role in the extinctions. If climate change alone were to blame for the extinctions, it is very difficult to imagine why it would spare arboreal or nocturnal animals. The selectivity of extinctions has yet to be adequately explained by extinction scenarios relying on climate change.

Empirical Problems

In addition to the issues raised above, some of the more noteworthy attempts to explain the extinctions in terms of climate change (Graham and Lundelius 1984; Guthrie 1984) also suffer from a lack of empirical support. For example, paleobotanical evidence provides no evidence for changes in vegetation complexity of the sort proposed by Guthrie (1984). Likewise, several lines of evidence suggest that late Pleistocene climates were characterized by higher seasonality in both temperature and solar insolation compared to today, in contrast to the predictions of the coevolutionary disequilibrium hypothesis (Graham and Lundelius 1984). While intriguing, these climate hypotheses are not convincing.

International Perspectives

North America was not the only continent to suffer major megafaunal extinctions near the end of the Pleistocene. Across the continents, more than 90 genera of megafauna disappeared within the last 100,000 years or so (Barnosky et al. 2004; Koch and Barnosky 2006). The international perspective on North America's losses is largely colored by debates over the cause of extinctions elsewhere. The case of Australia, which in many ways parallels the North American debate, provides an excellent example.

Many of the empirical challenges that hinder resolution of the debate in North America are also evident in the Australian record. Of ~68 extinct Pleistocene species, there are 25 known to have survived to the late Pleistocene (beginning at 130,000 years ago), of which only 15 are known to overlap with human colonization of the continent ~45,000 years ago. It is unclear whether those species missing from the time of human arrival reflect extinction earlier in time, as argued by advocates of climatic explanations, or instead insufficient sampling of the fossil record, as argued by supporters of anthropogenic extinction scenarios. The empirical evidence for human involvement in the extinctions is particularly weak. Whereas North America has confirmed kill sites for three genera of

megafauna, Australia has none. This is interpreted by some as evidence that people had little to do with the losses, whereas others argue that such evidence is neither expected nor necessary. Sweeping climatic explanations have been proposed, although, as is the case for North America, none are particularly compelling as they do not explicitly link climatic variables to the individual species.

Considering the parallel structure of the debate, the Australian perspective on what happened in North America largely depends on one's viewpoint on the Australian losses. Those favoring anthropogenic extinctions in Australia see the losses in North America as part of a global pattern of colonization followed by massive extinctions (Brook et al. 2007). On the other hand, there are many Quaternary scientists who see very little evidence of this in Australia or in North America (Wroe et al. 2006).

Future Directions

Speculation and debate over the cause of North America's megafaunal extinctions has persisted since the problem was recognized in the nineteenth century. Although continued fieldwork and technological advances have improved the quantity and quality of data available since then, the debate is far from resolved today. There is reason to believe that this is largely due to the manner in which hypotheses are framed (Grayson 2007).

Most attempts to explain the loss of North America's Pleistocene megafauna, whether in terms of human activities or climate change, share the following similarities: they try to account for (1) the loss of all species (2) at the same time (3) by the same mechanism. Such blanket explanations ignore the fact that extinction is an evolutionary process that must be understood at the level of individual species and in terms of their ecology, demography, and biogeographic histories. For example, by proposing that human predation or climate change between 12,000 and 10,000 years ago caused all extinctions, one overlooks the fact that the ground sloth *Eremotherium laurillardi*, which seems to have preferred subtropical to tropical climates, likely retreated into South America long before then (McDonald and Lundelius 2009). This clearly illustrates why it is important to examine the history of individual species when trying to understand what happened to them. An end of the extinctions debate will require future scientists to examine the biogeographic histories of individual species in relation to paleoclimatic, paleoecological, and archaeological data.

Cross-References

► Peopling of the Americas

References

Barnosky, A.D., P.L. Koch, R.S. Feranec, S.L. Wing, and A.B.. Shabel. 2004. Assessing the causes of late Pleistocene extinctions on the continents. *Science* 306: 70–75.

Brook, B.W., D.M.J.S. Bowman, D.A. Burney, T.F. Flannery, M.K. Gagan, R. Gillespie, C.N. Johnson, P. Kershaw, J.W. Magee, P.S. Martin, G.H. Miller, B. Peiser, and R.G. Roberts. 2007. Would the Australian megafauna have become extinct if humans had never colonized the continent? Comments on "A review of the evidence for a human role in the extinction of Australian megafauna and an alternative explanation". *Quaternary Science Reviews* 26: 560–564.

Dillehay, T.D. 1997. *Monte Verde: A late Pleistocene settlement in Chile. volume 2: The archaeological context*. Washington, DC: Smithsonian Institution Press.

Faith, J.T. 2011. Late Pleistocene climate change, nutrient cycling, and the megafaunal extinctions in North America. *Quaternary Science Reviews* 30: 1675–1680.

Faith, J.T., and T.A. Surovell. 2009. Synchronous extinction of North America's Pleistocene mammals. *Proceedings of the National Academy of Sciences of the USA* 106: 20641–20645.

Gilbert, M.T.P., D.L. Jenkins, A. Götherstrom, N. Naveran, J.J. Sanchez, M. Hofreiter, P.F. Thomsen, J. Binladen, T.F.G. Higham, R.M. Yohe, R. Parr, L.S. Cummings, and E. Willerslev. 2008. DNA from pre-Clovis human coprolites in Oregon, North America. *Science* 320: 786–789.

Graham, R.W., and E.L. Lundelius Jr. 1984. Coevolutionary disequilibrium and Pleistocene extinctions. In *Quaternary extinctions: A prehistoric revolution*, ed. P.S. Martin and R.G. Klein, 223–249. Tucson: University of Arizona Press.

N

Grayson, D.K. 1984. Nineteenth-century explanations of Pleistocene extinctions: A review and analysis. In *Quaternary extinctions: A prehistoric revolution*, ed. P.S. Martin and R.G. Klein, 5–39. Tucson: University of Arizona Press.

Grayson, D.K. 2007. Deciphering North American Pleistocene extinctions. *Journal of Anthropological Research* 63: 185–213.

Grayson, D.K. 2011. *The Great Basin: A natural history.* Berkeley: University of California Press.

Guthrie, R.D. 1984. Mosaics, allochemics, and nutrients: An ecological theory of late Pleistocene extinctions. In *Quaternary extinctions: A prehistoric revolution*, ed. P.S. Martin and R.G. Klein, 259–298. Tucson: University of Arizona Press.

Johnson, C.N. 2002. Determinants of loss of mammal species during the late Quaternary 'megafauna' extinctions: Life history and ecology, but not body size. *Proceedings of the Royal Society of London B* 269: 2221–2227.

Koch, P.L., and A.D. Barnosky. 2006. Late Quaternary extinctions: State of the debate. *Annual Review of Ecology, Evolution, and Systematics* 37: 215–250.

Martin, P.S. 1967. Prehistoric overkill. In *Pleistocene extinctions: The search for a cause*, ed. P.S. Martin and H.E.J. Wright, 75–120. New Haven: Yale University Press.

Martin, P.S. 1984. Prehistoric overkill: The global model. In *Quaternary extinctions: A prehistoric revolution*, ed. P.S. Martin and R.G. Klein, 354–403. Tucson: University of Arizona Press.

McDonald, H.G., and E.L. Lundelius Jr. 2009. The giant ground sloth Eremotherium laurillardi (Xenarthra, Megatheriidae) in Texas. In *Papers on geology, vertebrate paleontology, and biostratigraphy in honor of Michael O. Woodburne*, ed. L. Albright, 407–422. Flagstaff: Museum of Northern Arizona Bulletin 65.

Meltzer, D.J. 2004. Peopling of North America. In *The quaternary period in the United States*, ed. A.R. Gillespie, S.C. Porter, and B.F. Atwater, 539–563. Amsterdam: Elsevier.

Surovell, T.A., and B.S. Grund. 2012. The associational critique of Quaternary overkill and why it is largely irrelevant to the extinction debate. *American Antiquity* 77 (4): 672–687.

Waters, M.R., T.W. Stafford, H.G. McDonald, C. Gustafson, M. Rasmussen, E. Cappelini, J.V. Olsen, D. Szklarczyk, L.J. Jensen, M.T.P. Gilbert, and E. Willerslev. 2011. Pre-Clovis mastodon hunting 13,800 years ago at the Manis Site, Washington. *Science* 334: 351–353.

Wroe, S., J. Field, and D.K. Grayson. 2006. Megafaunal extinction: Climate, humans and assumptions. *Trends in Ecology and Evolution* 21: 61–62.

Further Reading

Fiedel, S., and G. Haynes. 2004. A premature burial: Comments on Grayson and Meltzer's "Requiem for overkill". *Journal of Archaeological Science* 31: 121–131.

Firestone, R.B., A. West, J.P. Kennett, L. Becker, T.T. Bunch, Z.S. Revay, P.H. Schultz, T. Belgya, D.J. Kennett, J.M. Erlandson, O.J. Dickenson, A.C. Goodyear, R.S. Harrison, G.A. Howard, J.B. Kloosterman, P. Lechler, P.A. Mayewski, J. Montgomery, R. Poreda, T. Darrah, S.S. Que Hee, A.R. Smith, A. Stich, W. Topping, J.H. Wittke, and W.S. Wolback. 2007. Evidence for an extraterrestrial impact 12,900 years ago that contributed to the megafaunal extinctions and the Younger Dryas cooling. *Proceedings of the National Academy of Sciences of the USA* 104: 16016–16021.

Gill, J.L., J.W. Williams, S.T. Jackson, K.B. Lininger, and G.S. Robinson. 2009. Pleistocene megafaunal collapse, novel plant communities, and enhanced fire regimes in North America. *Science* 326: 1100–1103.

Grayson, D.K., and D.J. Meltzer. 2002. Clovis hunting and large mammal extinction: A critical review of the evidence. *Journal of World Prehistory* 16: 313–359.

Grayson, D.K., and D.J. Meltzer. 2003. A requiem for North American overkill. *Journal of Archaeological Science* 30: 585–593.

Guthrie, R.D. 2006. New carbon dates link climate change with human colonization and Pleistocene extinctions. *Nature* 441: 207–209.

MacPhee, R.D.E. 1999. *Extinctions in near time: Causes, contexts, and consequences*. New York: Kluwer/Plenum.

Martin, P.S. 2005. *Twilight of the mammoths: Ice Age extinctions and the rewilding of North America*. Berkeley: University of California Press.

Robinson, G., L.P. Burney, and D.A. Burney. 2005. Landscape paleoecology and megafaunal extinction in southeastern New York. *Ecological Monographs* 75: 295–315.

North and Saharan Africa: Geography and Chronology

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Introduction

Northern Africa is the northernmost region of the African continent, linked by the Sahara to Sub-Saharan Africa and by Egypt to the Sinai Peninsula, which is in Asia. Northern Africa can be divided into four big natural zones: the first is Maghreb that stretches from Tunisia to Morocco along the Mediterranean coast and is

North and Saharan Africa: Geography and Chronology, Fig. 1 Map of North Africa

predominantly mountainous (Fig. 1); the second is the Sahara region, covered by the desert that goes from the Atlantic to the Red Sea; and the third is Sahel, a belt of grasslands and savannas south of the desert. Finally there is the Nile Valley that borders the Sahara desert to the east.

Northern Africa is underlain by folded sedimentary rock and is, geologically, more closely related to Europe than to the rest of the continent of Africa. The Atlas Mountains, which occupy most of the region, are a part of the Alpine mountain system of southern Europe.

The North Africa plateau is formed mostly by a tableland of very ancient rocks, today occupied by the Sahara desert. The internal area of the tableland is broken by some isolated mountain massifs: Ahaggar, Tibesti (where the highest peak in the mountains is Emi Koussi, 3415 m high), and Darfur (where the highest point is mount Marra, 3088 m). This vast region is skirted to the west by a plane that stretches around the estuary of the river Senegal, to the north by Libyan and Tunisian planes, to the northwest by the Atlas Mountains where the highest peaks are the High Atlas and Mount Toubkal (4167 m). Several big rivers flow at the edge of the Sahara; they have a tropical regime with a single high water season in correspondence to the rain season. The Nile, the longest river in the world and in Africa (6671 km), after having crossed Sudan where the waters of the Blue Nile and of the Atbarah River flow into it, enters Egyptian territory through a narrow valley and then flows through a vast plane to the delta that empties into the Mediterranean. Mali and Niger are crossed by the river Niger, while the southwest border of Mauritania is crossed by the Senegal River. Lake Chad is located in the Sahara desert; its size varies because of evaporation and irregular rainfall (Longman 1974).

The overall critical political issues in North Africa determined, in recent years, a reduced quantity of fieldwork and data collections. This situation offered the chance for an interpretative work on data already collected and published in the past. Often this speculative step of the research took advantage of new dating protocols and integrated methodology of study. Crossed sets of data and multidisciplinary approaches opened new perspectives on crucial issues, such as the paleoenvironment during the MIS 5, related to

the Out of Africa theory and about the Mid-Holocene aridification of the Sahara.

A few very interesting interpretative papers came out, which offered new interpretations about paleoclimatic and archaeological aspects of North African prehistory.

In this new edition of the Global Encyclopedia of Archaeology, we will shortly update the information widely discussed before about North African Geography and Chronology (Mutri 2014), showing the state of the art of the geography and prehistoric archaeology of North Africa in a paleoclimatic perspective.

Historical Background

Research in North Africa started in the colonial period and has since then been characterized by a multidisciplinary approach.

Geographical explorations, aimed at better understanding the geography and the geology of the desert areas, were carried out together with ethnographic studies that brought into light the variety of the Berber and Bedouin cultures, their economic systems, the relations between the groups, and the subordination to the dominant Arab culture and to the concept of centralized state.

Archaeological research was also the result of such strong interest in the region.

In Tripolitania and Cyrenaica, the British with McBurney and the Italians with Petrocchi are the protagonists of the discovery and excavation of archaeological sites of great importance (McBurney 1967; Petrocchi 1940).

But the Sahara in particular came to be at the center of the attention of the pioneers of research.

The archaeological exploration of the African continent has developed in parallel with the colonial period.

In the first half of the twentieth century, the archaeological exploration of the Sahara also intensified, especially by French and Italian archaeologists. The discovery of rich rock art (dating from the late Paleolithic to modern times) and Paleolithic and Neolithic sites allowed the reconstruction of the population of the region from the early Paleolithic periods to the present (Fig. 2) (Le Quellec 2008).

Several authors have highlighted the importance of the multidisciplinary studies on North Africa and on the Sahara that have contributed to the understanding of climate change and man's adaptation to it.

Key Issues

Paleoclimate

The study of the climate history registered in the lake sediments in various zones of the Sahara has

North and Saharan Africa: Geography and Chronology, Fig. 2 Rock Art from Tassili

allowed reconstructing the various climatic phases of the Quaternary period. The sediments of the Lake Megafezzan and of the Tunisian Chotts clearly indicate the presence of 17 glacial cycles, interrupted by short humid periods and by interglacial periods. About 10,000 BP, at the time of the Holocene Climate Optimum, the Sahara was covered by a savanna and was rich of vegetation. During this phase the African Monsoon moved north where a series of wetlands consequently formed, making it also possible for men to inhabit the area again (Su and Neelin 2005). The actual hyperarid climate of the Sahara stabilized around 4,000 BP, following a steady process of desiccation that started around 6,000 BP. Around 5,000 BP, the African Monsoon gradually moved south, and this led to the definitive drying up of the area.

From 150,000 to 130,000 BP, Africa experienced colder and more arid condition than the present. Around 130,000 BP, a warm phase moister than the present began, and this lasted until 115,000 BP, with greater rainforest extent and the deserts almost completely covered with vegetation. Subsequent cooling and drying of the climate led to a cold, arid maximum at 70,000 ^{14}C, followed by a slight moderation of climate, and then a second aridity maximum at around 22,000–13,000 ^{14}C. Conditions then quickly became warmer and moister, though with an interruption by aridity around 11,000 ^{14}C. A resumption of warm, moist conditions led up to the Holocene "optimum" of greater rainforest extent and vegetation covering the Sahara. Conditions then became somewhat more arid and similar to the present. Relatively brief arid phases (e.g., 8,200 ^{14}C years ago.) appear to punctuate the generally moister early and Mid-Holocene conditions.

Around 150,000 years ago. There was the maximum of the penultimate glaciation (Oxygen Isotope Stage 6) with generally drier conditions than present and extended desert in North Africa (Van Andel and Tzedakis 1996).

Between 125,000 and 120,000 years ago, there was the moistest phase of the Eemian interglacial (Isotope Stage 5e). Rainforest occupied a far greater area than at present, and rainfall was generally higher over North Africa.

During the period between about 110,000 and 11,000 ^{14}C years ago, there was a great deal of variability in climate across the North African region, though conditions were generally drier and cooler than at present.

The most intensely dry and cool phases across Northern Africa and Arabia are thought to correspond to cold, ice-rafting phases in the North Atlantic.

The period between 90,000 and 110,000 years ago represents the arid phase following the end of the Eemian interglacial. There are indications from the record of desert-dune formation across southwestern Africa that at least part of this phase was extremely arid (Stokes et al. 1997). Desert conditions seem to have existed over a large area west of about 25 deg.E and south of about 18 deg.S.

An intense cold stage occurred between 75,000 and 58,000 (Oxygen Isotope Stage 4). Sea level was about 75 m below the present level, and vegetation conditions seem to have been much as they were at the Last Glacial Maximum (see below), with greater-than-present desert extent in North Africa (Van Andel and Tzedakis 1996).

The Oxygen Isotope Stage 3 period, between 57,000 and 24,000 BP, was characterized by an unstable climate that fluctuated on timespans of a few thousand years (Van Andel and Tzedakis 1996).

Shortly before the Last Glacial Maximum, 28,000–22,000 ^{14}C years ago in North Africa/the Levant, conditions around 28,000–25,000 ^{14}C years ago seem to have been significantly moister than at present, with soils being formed (Goodfriend 1988). This may reflect conditions moister than present across North Africa in general.

The Last Glacial Maximum aridity goes from 22 until 13,000 ^{14}C years ago and may have been a slightly moister phase (though still very arid) separating two extremely arid phases. Aridity and, to a lesser extent, cooling are the major features of Africa during the full glacial period. Ancient sand dune distributions suggest that the Sahara desert zone extended hundreds of kilometers further south than at present, compressing the other vegetation and climate zones equatorward. However, in a restricted area of the northwest Sahara, greater

winter rainfall seems to have given moister conditions, with a belt of semi-desert appearing to the south of the present-day desert margin (Hooghiemstra et al. 1992).

Around 12,500 ^{14}C years ago, there appears to have been a rapid further increase in temperature and in moisture availability throughout most of Africa.

During the Younger Dryas, approximately 10,800–10,200 ^{14}C years ago, a cold, dry period affected Europe, and at the same time, Africa also seems to have experienced a relatively arid phase. In North Africa, for example, the water levels of Lake Chad fell, although Thomas and Thorp (1993) suggest that the climate may not have been much drier than at present. The levels of east African lakes fell during the Younger Dryas (apparently gradually over several hundred years), and there was a reduction in forest pollen in the mountains.

After the Younger Dryas, conditions became moister. The vegetation zones of the Sahara seem to have lain in similar positions to those of the present day (Lézine 1989), although Thomas and Thorp suggest from the level of Lake Chad that conditions were moister than present at around 10,000 ^{14}C years ago.

After 9,000 ^{14}C years ago, conditions in North and Central Africa had become much moister than at present. The Sahara desert had virtually disappeared under a mixture of semiarid and seasonal vegetation types (Lézine 1989; Ritchie 1994).Organic-rich mud layers in the Eastern Mediterranean suggest maximum precipitation and freshwater discharge by the Nile between 9,000 and 8,000 ^{14}C years ago.

Between 8,000 and 7,000 ^{14}C years ago, due to the much greater rainfall, Lake Chad (in the southern Sahara) was greatly expanded in area during all or most of this phase and surrounded by extensive inter-dune wetlands.

The generally northward movement of monsoon rains into the Sahara region can be expected to have resulted in a northward expansion of rainforest as well, and this does appear to be the case from the pollen record (Brooks et al. 2005). A conjectural boundary for the rainforest zone is drawn here.

A severe arid phase (correlated in many places around the world) seems to have affected North Africa around 7,500 ^{14}C years ago (Alley et al. 1997), perhaps lasting for a century or two. There was a reduction in Nile flooding, in NW Sudan lake levels, and at sites in the Western Sahara, the Sahel, and sub-equatorial Africa.

Between 6,500 and 5,000 ^{14}C years ago, conditions across northern, central, and east Africa became somewhat drier than before but were still moister than today. For example, on the basis of pollen and charcoal, Neumann et al. (1995) suggest a mixture of semi-desert and denser scrub and grassland for the Western Sahara, in areas that are now extremely arid. A similar picture is obtained by Ritchie (1994) on the basis of pollen evidence and by Lario et al. (1997) for the Blue Nile on the basis of sedimentological and zoological indicators.

After about 5,000 ^{14}C years ago, lake levels suggest that aridity in North Africa became more severe, culminating in an arid phase about 3,800 ^{14}C years ago, a partway return to moist conditions 4,000–3,000 ^{14}C years ago, and a decline to aridity thereafter (Petit-Maire and Gua 1996).

The extension of the Green Sahara from 130 to 70 ka BP has been revised in a recent paper by Scerri et al. (2014). Using the Biomes from Community System Model elaborated by Hijmans et al. (2005), the authors reclassified the data into ArcGIS, adding new variables such as temperatures and precipitations. The simulated model shows that with an increase of precipitation, the biomes were transformed and a complex paleohydrological network were activated. That elaborated system of lakes and river could have played an important role in the spread of genus *Homo* in North Africa.

Short wet periods were already individualized by Drake et al. (2013) for the timespan between 350 and 20 ka BP, using a combination of OSL dating, GIS, and PDF. The result showed that the spatial distribution of humid sites is compatible with a number of different modern human dispersal theories.

As stated by Nicoll (2016), also spring-fed paleolakes were crucial in modern human dispersal. Data from Bir Tarfawi and Bir Sahara, in

the Western Desert of Egypt, nowadays hyperarid, were re-analyzed after a series of SAR-OSL dates have been collected from the five paleolake phases known in the area (Wendorf et al. 1994).

Except for the last phase, which starts at 41 ka BP and seems to be characterized by an arid to hyperarid climate, the other four paleolake phases show different degrees of water presence. The presence of spring water determinated the formation of favorable biomes outside the usual "Out of Africa" corridors.

Clarke et al. (2016) analyzed the climatic change during the Mid-Holocene in Near East and related area, among which the Western Desert of Egypt was also considered. Combining terrestrial and marine record, the authors individualized two distinct periods of increased aridity, one at the beginning of the fourth millennium BC (3600–3700) and one at the end (3100–3300). From 13,000 to 3500 BP, six main ecological phases of evolution of water basins in Farafra Oasis were recognized (Gallinaro 2008). A moment of environmental and ecological variability was individualized from 6600 and 5200 BP, which indicates a drying trend.

Homination

The first hominid remains found in North Africa is the *Australopithecus bahrelghazali*, found in Chad. The remains is a fragment of jaw found in the valley of Bahr el Ghazal near Koro Toro. This species is dated to between 3.5 and 3.0 million BP and is therefore contemporary *Australopithecus afarensis* (Brunet et al. 1995).

The first evidence of human occupation in North Africa is in the form of the comparatively rare occurrence of very early stone tools. The majority of these Oldowan sites are undated, but the date 1.8 million years proposed for the site of Aïn Hanech in Algeria (Sahnouni et al. 2002) suggests that hominins colonized North Africa at the same time that the first dispersals into Eurasia were taking place. Oldowan sites in the Sahara are extremely rare. Although Oldowan artifacts have been found at several localities, these are rarely in either stratigraphic position or as part of unmixed deflated archaeological assemblages. Four areas appear to have clear evidence for an Oldowan occupation – the Saoura Valley in Algeria, around the Richât Massif in Mauritania, Enneri in Chad, and Fezzan in Libya. Interestingly, there are no well-documented Oldowan sites in Egypt and Nubia (Veermersch 2001), suggesting that the Nile was not a main route of hominin dispersal in the Lower Pleistocene (Mirazon-Lahar 2010).

Around the same period, Acheulean complexes started to appear also in Mediterranean Africa, in Ain Hanech in Algeria or in the Thomas Quarry 1, and in Casablanca in Morocco; on the other hand, sites in Western Africa seem to be rare.

In the Western Desert of Egypt, the Acheulean findings have been studied since the first decades of the past century following the research carried out by G. Caton Thompson and E.W. Gardner in the oasis of Kharga and Dakhla. Other sites have been located in more recent years such as the sites 8715 in Umm Shagir, Arkin 8 in Nubia, the site 8817 in the Dungul oasis, and BS14 in the Bir Sahara depression. The Acheulean sites along the Atbara in Sudan seem to be more recent, while the excavations made in 1949 in Abu Anga near Khartoum by A.J. Arkell allowed to unearth manufacts that were identified as Acheulean sensu lato by F. Wendorf.

North Africa and the Sahara have a rich record of Acheulean sites, a small number of which are dated. The nature of the artifacts and the distribution of the few dates that exist suggest that early Acheulean occupation in the Lower Pleistocene was also very ephemeral – the key locality being the complex of sites at Casablanca, Morocco, where the oldest archaeological industry is an early Acheulean assemblage dated to approximately 1 million years. Late, Middle Pleistocene Mode 2 localities are much more frequent and probably indicate a change in either biogeographic patterns (perhaps associated with the establishment of glacial cyclicity and recurrent wet episodes) or the adaptive scope of hominin groups.

Middle Stone Age and Anatomically Modern Human

The record of the Middle Stone Age/Middle Paleolithic in North Africa and the Sahara is

extremely rich, although the almost complete absence of dated sites makes its interpretation difficult. In Sub-Saharan Africa, the MSA first appears between ~350,000 and 300,000 BP, disappearing in the last 50,000 years. This 300,000-year period encompasses major climatic shifts that would have made the Central Sahara at certain times uninhabitable and at other times part of a rich ecosystem interconnected by rivers and lakes, deeply affecting the biogeographic distribution of hominin populations. The period also encompasses major evolutionary events, in particular the first evidence of modern humans in East Africa around 200,000 BP, as well as of their first dispersal out of Africa in the subsequent wet interglacial phase 130,000 to 100,000 BP. The beginning of this dispersal is archaeologically difficult to identify, as the stone tools manufactured by early humans did not differ substantially from those produced by other hominins since ~ 300,000 BP (including the Neanderthals). However, once established in North Africa, these early humans developed a new cultural identity, the Aterian, which has distinctive stone tools. The Aterian has been dated in Morocco from 110,000 to at least 80,000 BP (Barton et al. 2009) (Fig. 3). However, the extremely arid conditions that prevailed in the Central Sahara between 70,000 and 14,000 BP probably restricted the temporal extent of the Aterian occupation in the region.

A series of fossils seems to confirm the African origin of the anatomical modern human *Homo sapiens*, the most famous being the Jebel Irhoud fossil, related to a MSA technology as Musterian and/or Aterian. Some of the more ancient fossils are related to Acheulean technocomplexes.

The most important element that indicated an early development of a modern behavior as regards the production and spreading of iconic symbols can be found in the Blombos cave in the South African Republic. Two small ochre fragments flattened by scraping and then engraved were found in the Middle Stone Age levels and were dated to over 75,000 BP with the thermoluminescence method.

Late Stone Age and Out of Africa

Late Stone Age defines the technological complexes and cultures that developed in Africa in the last phases of the Pleistocene that clearly presents innovative features compared to the previous phases. In this period in the whole African continent, blade industries are developed by *Homo sapiens*, and microlithic characteristics also become more marked. This phenomenon took place at different times in the different regions, and this underlines the role played by the environment in the decision-making process of the groups of humans.

Before hominins could disperse out of Africa, they needed to disperse out of their likely area of endemism in Sub-Saharan Africa to North Africa, the most likely departure point for Eurasia. Prior to the Middle Pleistocene, successful long-term colonizations of North Africa by hominins were very rare and apparently less successful than their colonizations of Eurasia. The Early Pleistocene hominin dispersal into Eurasia was most probably along the western coast of the Red Sea. The ability of hominins to successfully disperse into Eurasia and successfully colonize northern continents was made possible by the ecological and climatic diversity within Africa (Lahar 2010) (Figs. 4 and 5).

International Perspective

The migration of *Homo sapiens* out of the African continent is currently one of the most debated topics in the scientific debate. Many scholars support the *Out of Africa* model rather than the others (replacements, assimilations, multiregional models (Aiello 1993). Probably modern humans used many ways to leave Africa, and multiple dispersal events, according to many scholars, are the most probable explanation to their exit (Garcea 2010; Gunz et al. 2009), even if the Levantine corridor may still be considered as the main route of human dispersal during the MIS 5e -125-120 ka BP (Smith 2010).

Shea (2003) recognized two main episodes in the Out of Africa 2 model, the first one from 130 and 80 ka BP and the other one after 50 ka BP.

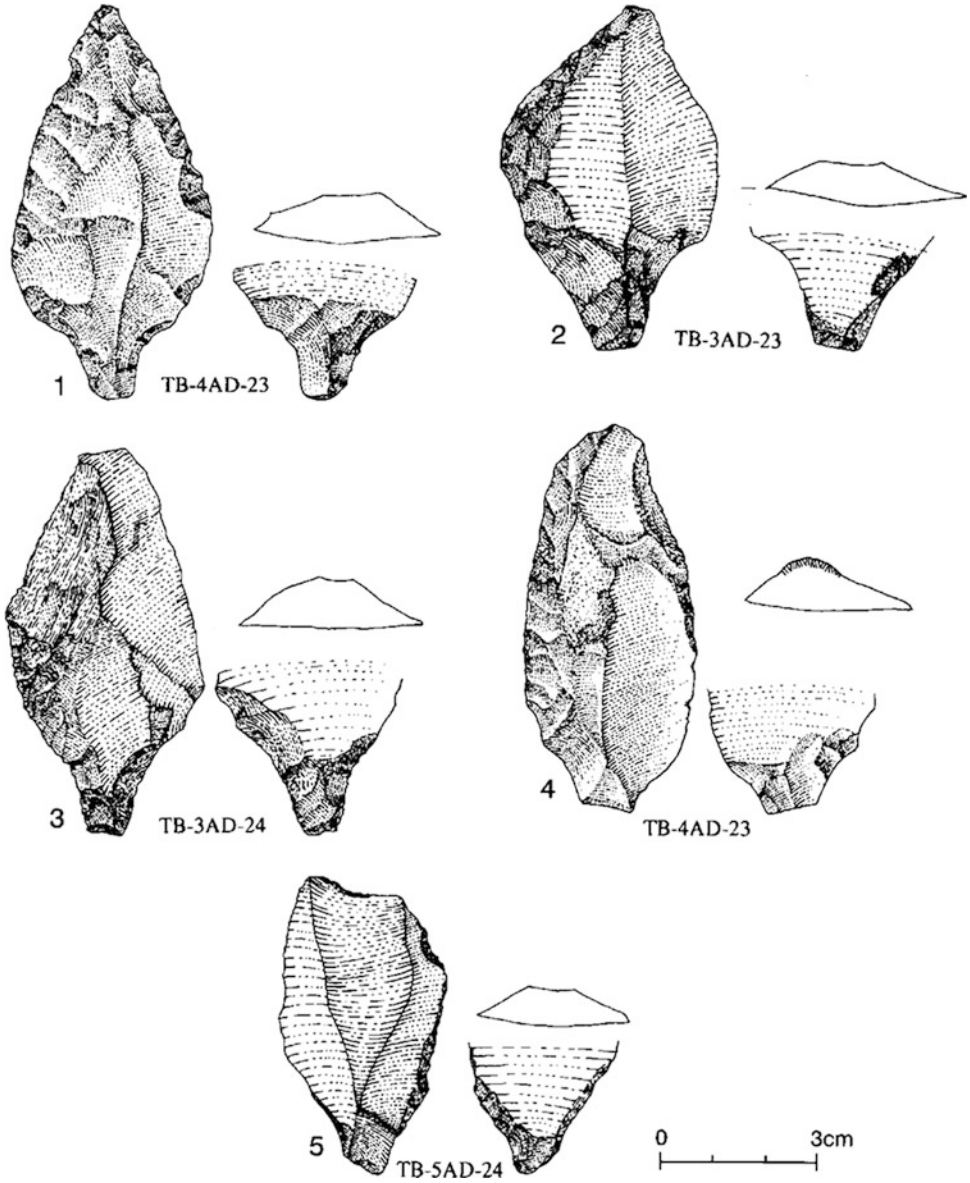

North and Saharan Africa: Geography and Chronology, Fig. 3 Aterian peduncolate

If the makers of Aterian and Taramsa lithic complexes were the protagonists of the first episode (Garcea 2010), after 50 ka BP, *Homo sapiens* from the African Mediterranean coasts have definitely replaced Neanderthals in the Levant.

During the Pleistocene the occupation of the Sahara, an area far from the Mediterranean coast and from the Nile Valley, was determined by the availability of water. The most critical period is the Late Pleistocene that corresponds to the Late Stone Age phase. The present state of research in fact seems to indicate an interval between the last Aterian traces that date to 60 ka and the scarcity of LSA occupations (30,000). The areas close to the

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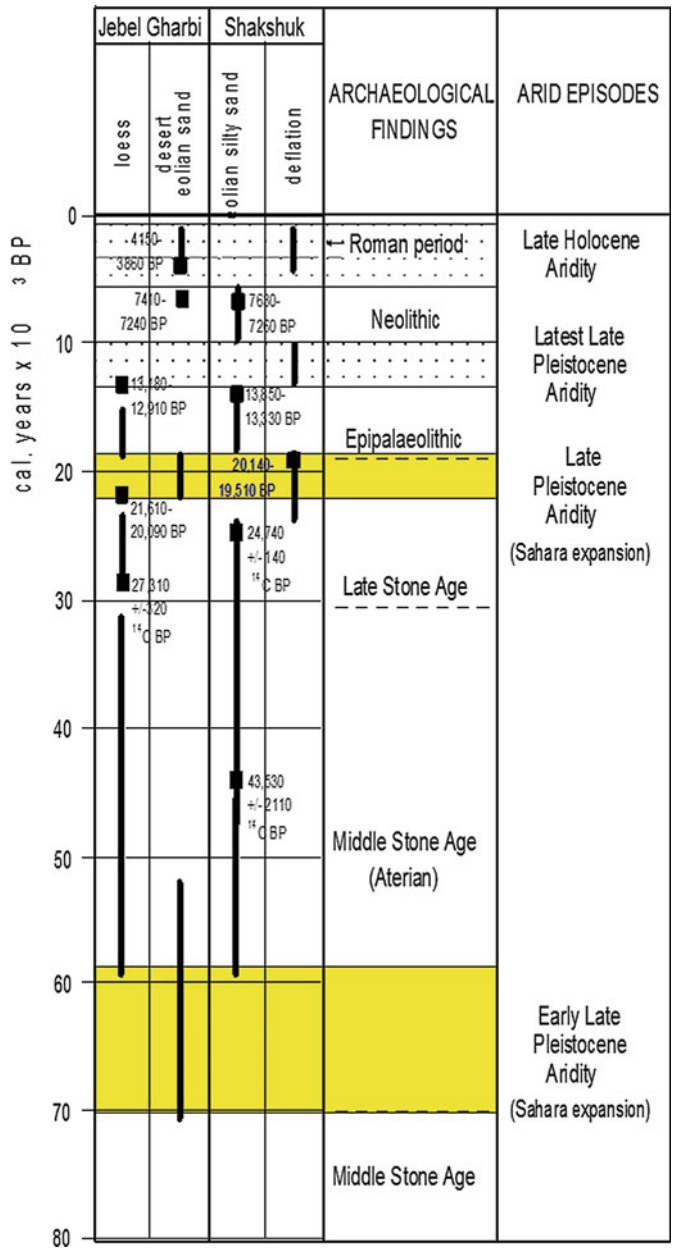

North and Saharan Africa: Geography and Chronology, Fig. 4 LSA. Chronology and palaeoclimatology of Jebel Gharbi

coastline present a different situation: despite a time interval between the emergence of the two cultures, these cover a shorter timespan that goes from 40,000 to 24,000 BP.

The last phases of the occupation of the Sahara can be referred to the Holocene, after 10,000 BP, when the arid and hyperarid areas were again covered by vegetation and inhabited by animal species. There is evidence that in the same period, domestic livestock appeared in Eastern Sahara and then probably spread West around 7,000 BP.

The spreading of the microlithic industries in the Sahara zone and more in general in North Africa took place over a long period of time. The phenomena of the reduction of tools and the backing of the edges take place for the first time with the Iberomaurusian culture (>20,000 BP) and are well documented by the important sequences in

North and Saharan Africa: Geography and Chronology, Fig. 5 Hafted geometric tool

the sites of Tamar Hat, Taforalt, and Haua Fteah. Examples of what has been called the "programmatic use of the environment" have been traced working on some famous sites in the Nile Valley, such as Wadi Kubbaniya and Shabona. A. Testart has emphasized the different adaptation patterns followed by the hunter-gatherer cultures and the coexistence of sedentary and mobile groups with a variety of intermediate patterns, a variety of techno-economic specializations, storing methods, and social organizations (Testart 1982).

Around 12,000–10,000 BP, there was a peak in humidity, precipitations exceeded evaporation, and the rainfalls probably occurred at regular intervals (Vernet 1995). From then on, adaptation in the Sahara regions took place in more diverse and complex ways, indicating a higher degree of interaction between man and the surrounding environment. In the Western Desert of Egypt, the sequences of the sites of Nabta and Bir Kiseiba indicate that occupation there started at the end of the arid phase. Bir Kiseiba was inhabited again for the first time in the period called el-Adam that goes from 10,000 to 8,200 BP. The site is important because remains of oxen were found there (dating to 10,220 to 9,460 BP) and were considered domestic by A. Gautier (1984). Although this hypothesis was opposed for some time, it was however very important in re-framing the problems related to the Neolithic production in the Sahara. The oases of Selima, Siwa, Farafra, Dakhla, and Kharga provide more evidence of humid conditions in the early antico Holocene.

The most ancient traces of human presence in the southern area of the Nile Valley are to be found in the remains of the Lower Paleolithic (pre-Chellean, Chellean, Acheulean, Micoquian) and Middle Paleolithic (Mousterian) industries, unearthed in fluvial terraces that date to the Middle and Late Pleistocene (600,000–90,000 BC).

Lithic industries became stylistically very diverse in the Lower Pleistocene (20,000–8,000 BC); traces of both macrolithic and microlithic industries have been found in the valley, defined as Epi-Levalloisian because of the Levallois stone knapping\flaking technique typical of the Middle Paleolithic, and microlithic blade industries, often characterized by an intensive use of scrapers. Both these industries seem to be of Nilotic origin and would thus indicate the presence of indigenous populations with different cultural traditions in the same area. They could represent a paleo-African tradition typical of northeast Africa. The Epi-Levalloisian industries include the Halfan (about 18,000–15,000 BC) between the second cataract and Kom Ombo, the Edfuan (about 15,800–15,000 BC) in the region of Esna, the Sebilian (about 13,000–9,000 BC) between the second cataract and Qena, and the Afian (about 12,000 BC) in the region of Kom Ombo. The blade industries include the Fakhurian (about 16,000–15,600 BC) in the region of Esna, the Menchian (about 13,000–9,000 BC) in the area of Kom Ombo, the Isnian (about 11,000–10,500 BC) in Esna (Esna), the Sebekian (about 14,000–11,600 BC), and the Silsilian (about 13,000 BC) in Kom Ombo. The remains of fauna associated to these industries clearly indicate the exploitation of the river resources with activities such as fishing, hippopotamus hunting, gathering of freshwater molluscs, and \or hunting of wild livestock in the nearby savannas. The sites are generally small in dimension and seem to suggest camps that were used seasonally by groups of 5–40 individuals.

However the presence of millstones and grinders in the Menchian and Isnian sites suggests that these groups also gathered wild grasses and consequently that they were preadapted to the preparation of food.

There is no certain evidence that blade industries derived directly from the Middle Stone Age industries in Northern Africa. Even the Dabban present in Libya between 40,000 and 20,000 BP seems to be a result of influences from the Cyrenaica (like the more ancient pre-Aurignacian). Until the end of the Middle Stone Age, changes occurred at a slow pace. The Dabban also asserted itself as a lasting and stable tradition, and only after 18,000 BP did a series of changes take place more rapidly and in shorter time, both in the Nile Valley and in the Maghreb territories.

An increased regional diversification, which characterizes the Late Pleistocene, could be the consequence of a higher population density and the symptom of specific forms of a more differentiated adaptation. Moreover, the technological specialization of the period indicates a more efficient exploitation of resources. The indirect percussion with punch technique in fact allowed to manufacture more efficient tools.

The Iberomaurusian and the Caspian are the two main cultures of the North African Late Stone Age. The first spread along the coast and inland toward the wet area of Tell from Eastern Morocco to the Gulf of Tunis, between 20,000 and 10,000 BP. Iberomaurusian was first classified by J. Roche (1963); later J. Tixier (1963) designed a system that was adopted as typological model for all the North African Late Stone Age \Epipaleolithic industries, devised by analyzing the various deposits in the Maghreb region. It is known that this definition was given at the beginning of the last century in a context in which North African studies tended to view the archaeological and industrial aspects in relation to a specific historic-geographic dimension. Today, on the contrary, the tendency is to have a general view of the Late Pleistocene technology in all of Northern Africa (including the Nile Valley), which represents the preliminary step to food production.

The Mechta el-Arbi human type (or Mechta-Afalou) is considered the prototype of the anatomically modern North African man. Remains were found in the numerous Iberomaurusian necropolises. A similar type, called Mechtoid, was found in cemeteries that are present in fewer number than the necropolises (better known are Gebel Sahaba and Tushka) in the Nile Valley (Wendorf et al. 1989.) The Capsian physical type tends to be more fragile than the Mechta el-Arbi; it has a long and slim face and small mandibles. The Capsian were called proto-Mediterranean by G. Camps, thus implying a connection with the actual Berbers (Camps 1982). The Capsian culture attracted the attention of researchers for a long time. Today less importance is given to this culture that in fact lasted for a shorter time than what was believed and occupied a smaller portion of the territory. It is considered to have developed between the Pleistocene and the Holocene, prevalently during the last phase. Geographically its expansion was limited to Tunisia and to the north province of Algeria. It lasted approximately from 11,000 to 8,000 BP. To a certain degree, the Capsian industry can be considered a transitional industry that flourished at the end of the Iberomaurusian. It is a Pleistocene industry characterized by an advanced degree of technological ability, ceramics, and food production (Lubell and Sheppard 1997; Barich and Conati Barbaro 2003). Probably some Capsian groups, which were already sedentary and had developed intensive gathering strategies, helped in the diffusion of new techniques for resource exploitation that had originated outside Maghreb and that spread in the VIII and VII millennium BP. It can be said that this Late Stone Age/Epipaleolithic complex brought on the progressive shift to the pastoral economy in Maghreb, the so-called Neolithic-of-Capsian tradition.

The classification of the Late Stone Age microlithic industries in the Nile Valley is complex, in particular with regard to the industries that flourished between 19,000 and 10,000 BP.

The most ancient industries that can be defined as late Paleolithic are in the area of Wadi Halfa. While the Khormusian is still part of the Levallois tradition, the Halfan in Lower Nubia and the Kubbaniyan in Upper Egypt between 19,000 and 17,000 BP are characterized by important

microlithic features such as microblades and microflakes and by a recurrent Ouchtata presence in the Kubbaniyan. Both cultures practiced hunting in the savanna, game and large-size animal hunting, but also fishing in the river Nile. The high number of grindstones found in the various complexes suggests also that they were gatherers of tubers and wild grasses. The use of the tuber and of a very common plant in the habitat of the Nile (*Cyperus rotundus*) is well documented in the Wadi Kubbaniya site, where many examples of a complex use of the environment in ancient periods can be found. The exploitation of big quantities of fish and wild plants indicates treatment and storage systems that allowed to keep resources and consume them at a later time. This is a strongly innovative aspect that indicates a major change that occurred in the habits that had been of immediate consumption in the case of simple gatherers.

The Late Stone Age Nilotic industries reveal elaborations and complex processes of differentiation that occurred from 16,000 BP especially in Upper Egypt. The main industries can be dated to the Lower Paleolithic alluvial phase in which the size of the river Nile grew smaller because of a reduced flow of water from the springs. This however did not affect human occupation that is on the contrary attested to be consistent by several large sites and by the contemporary development of differentiated economic activities. Around 12,000 BP, a crisis caused by the onset of an arid period determined the spread of intensive gathering in order to integrate the protein diet, though there is no evidence of stable settlements at the time. On the contrary the crisis determined an increase in fishing activities that lasted for a long period. The Elkab site in Upper Egypt that dates to around 8,000 BP is emblematic: here a settlement of hunters and fishermen was occupied for a brief period by humans that developed a highly microlithic industry, where the main components are backed bladelets. Despite the lack of evidence of food production, it is reasonable to believe that the Nilotic groups in the final phases of the Pleistocene were preadapted to animal breeding and controlled wild herd animals like cattle and gazelles. Here however animal breeding, mainly of sheep and goats from the Near East, started around 6,500 BP (5,000 cal. BC) together with the cultivation of barley and wheat, also from the Near East.

Food Production

The most ancient agricultural society known to us in the Nile Valley (and in all of North Africa) is located in the Fayyum depression, in Lower Egypt. Between 8,000 and 7,000 BP, this area was inhabited by sedentary hunters and fishermen (Fayyum B/Qarunian) that made use of microlithic tools and bone harpoons in a context in which the traditional Epipaleolithic economy was still dominant (Figs. 6 and 7). Around 6,800 BP, the first food-producing groups settled in the Fayyum area (Fayyum A/Fayyumian. The characteristics of this culture, i.e., the establishment of sedentary settlements, cereal preservation systems, and fully domesticated resources to dispose of, make the Nilotic Fayyum A culture the real precursor of the settlements of the later Predynastic period.

Northeast Africa offers a series of essential data for the study of the origin of the first types of herding systems, from the beginning of the Holocene in the Western Desert of Egypt, where domestication first started and then spread to the rest of the African territories, to the west, toward the Central Sahara, and to the east in the Nile Valley. With concern to this aspect, and also with regard to incipient cultivation practices, recent studies have sufficiently brought to light the important role this territory and the other Egyptian oasis played (especially Farafra, Dakhla, and Kharga) as autonomous areas for important proto-Neolithic developments and as areas of innovation that connected the Sahara to the Nile Valley (Barich 2002) (Fig. 8).

The Neolithic el-Nabta type (between 8,100 and 7,900 BP) saw the recolonization of the Nabta-Kiseika region at the end of a period of extreme aridity followed by a new humid phase. In this period regular rainfalls provided the conditions for a more stable settlement and for the emergence of a permanent village, the Nabta E-75-6, which is similar to Ti-n-Torha East in Tadrart Acacus, Libya. Wild cereals (sorghum and millet) have been found in recent excavations of F. Wendorf and R. Schild in Lower Nubia and in the Upper Nile.

North and Saharan Africa: Geography and Chronology, Fig. 6 Neolithic pottery

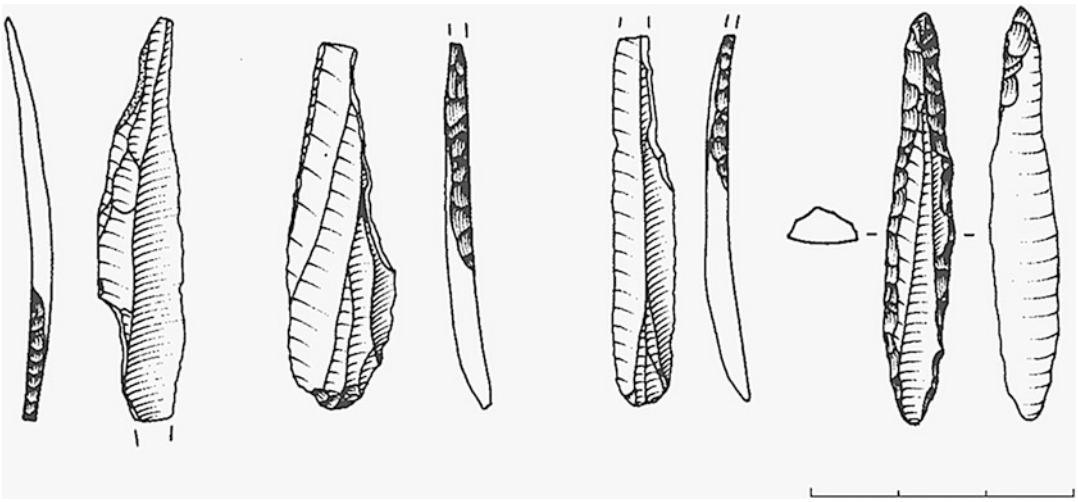

North and Saharan Africa: Geography and Chronology, Fig. 7 Cran bladelet from Early Holocene site, Hidden Valley Plateau, Farafra Oasis

This research has allowed to identify two main phases of the alluvial deposit during the Late Pleistocene. In Wadi Kubbaniya the sediments of the late Paleolithic deposit have been identified at around 12 m above the actual level of the *wadi* bed and date to between 20,000 and 12,400 BP. In this period the river was less active because of the arid climate, vegetation grew scarce at the source of the river,

North and Saharan Africa: Geography and Chronology, Fig. 8 Proto-Neolithic cultures of Sahara and Nile Valley

Approximate Age Years B.P.	Cultural Stratigraphic Units Dakhleh Oasis	Kharga Oasis	Developmental Stages
4000 6000	Sheikh Muftah Unit	Yebsa Unit	Neolithic
	Bashendi Unit	Baris Unit	
8000 10,000	Masara Unit	Midauwara Unit	Epipalaeolithic
15,000	?	New "2008" unit [undefined]	cf. Later Stone Age (LSA)
40,000	Sheikh Mabruk Unit	Khargan Unit(s)	(Terminal, TMSA)
50,000	"318" unit		
100,000	Dakhieh unit	Kharga Aterian Unit	Middle Stone Age
140,000	[undefined units]	Matana Unit	(Younger, YMSA)
200,000	Tenelda Unit Gifata Unit	Refuf Unit	(Older, OMSA)
300,000 400,000	Balat Unit	Dharb el-Gaga Unit KO10 unit	(Terminal . TESA)
	[undefined units: Upper and Lower African Acheulian *sensu Stricto*]		Earlier Stone Age (ESA)
1,500,000 2,500,000		?? cf. Oldowan Complex	(Developmental, DESA)

and the consequent colluviation in the banks and the great mass of detritus being transported determined a rapid growth of the alluvial plane of the Nile (Wendorf et al. 1989).

The issue concerning the local domestication of cattle that started with the first wild *Bos primigenius* type has been long debated in African studies. In the area of Bir Kiseiba, more than 10,000 faunal remains, mostly species that were adapted to arid climate (hares and gazelles), were found. Some remains of oxen, in an extremely fragmented state, were classified, with a high degree of uncertainty, as domestic remains, or in an incipient state of domestication (Gautier 1984). It was observed that wild examples of Bovidae (oxen or buffalo) could in no way have survived in a climate with such a low humidity level. Presently the new study of the microcondial DNA of

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the *Bos* type has revealed an ancient separation (that occurred about 25,000 BP) between the African heads and the Eurasian and Indian ones, thus confirming the hypothesis that the African bovine domestication process occurred independently (Holl 1998). This process seems to have taken place in the first phase of the Holocene, at a time in which the monsoon cycle stabilized and summer rainfalls appeared again. Groups that came from the Nile Valley (probably belonging to the Qadian culture) reoccupied the territory that had previously been hyperarid for thousands of years. The possession of small domestic herds made the occupation of desert lands easier, providing an important source of protein during the recurring climate crisis. This hypothesis also explains the rapid spread of livestock in the Central Sahara communities. The arid interval observed in the Sahara sequences between 7,900 and 7,700 BP must be considered in relation to the coeval increase of the first experiments in livestock herding carried out by the groups that inhabited the Central and Western Sahara territories (Barich 2002).

Data about the Holocene communities in the Central Sahara has been classified into two categories. The most impressive collection documents the cave art repertoire, carved or painted on the walls of rock shelters in Tassili n'Ajjer, in Tadrart Acacus, in Messak, and in Ahaggar (Sansoni and Emmanuel 1994; Muzzolini 1995; Mori 1998). This region played a key role in the transfer of domestic livestock from Eastern Sahara toward the regions in the south and west. More precise indications about the later phase of the development of Saharan pastoralism have emerged thanks to research carried out in Acacus (Cremaschi and Di Lernia 1998) that shows a diffusion of sites from Erg Uan Kasa to Tanezzuft, between 5,000 and 4,000 BP.

In Niger the first evidence of a pastoral economy dates to the middle of the VII millennium BP and is to be found in the sites of Dogomboulo and Rocher Toubeau and especially in the sites of Adrar Bous. The Tenerian is the pastoral culture par excellence; this culture reached its peak around 5,000 BP and was particularly widespread along the eastern edges of the Air, between the Adrar Bous and Areschima (Roset 1987). The economy of this pastoral group was based on herding, hunting, and extensive wild grain gathering. The studies by F. Paris on Neolithic and post-Neolithic burials in the region of Adrar Bous provide original data regarding the composition of the expansion of settlements during the Late Holocene (Paris 1996, 1997). During the period that goes from the middle of the V millennium to the middle of the IV millennium BP, a number of groups immigrated to this region; these groups had a structured social organization that might also have included é*lites* that built burial monuments and were different from the local group-types from a paleoanthropological point of view. Paris asks where these new populations came from. Because the burial monuments were mostly for men, he suggests that they were intended for prominent people such as the heads of the group and that the organization was of an aristocratic type similar to a chiefdom. The Tenerian culture ended around 3,800 BP, when the climate conditions worsened.

In the coast regions west of North Africa, the traits of the material culture that are commonly called Neolithic (ceramics, polished stone tools, arrow heads worked on both sides) are to be found only in a very restricted area opposite Gibraltar in Northern Morocco (in the territories of el-Khril near Tangier). As regards the bovine and caprovine remains associated in these sites to the Cardial style pottery, Camps (1982) noted that: "It would seem that in this area the introduction of domesticated animals coincided with the beginning of the pottery production."

In Haua Fteah the phase F, documented by the levels VIII–VII (from 6,800 to 4,800 BP – 5,000 to 2,700 BC), was attributed by C.B.M. McBurney (1967), the first archaeologist to work on the site, to the sphere of the Neolithic of Libyco-Capsian Tradition. Mostly caprovine remains were found in Haua Fteah (the presence of bovines is not certain). The caprovines are small in size, especially if compared to the Libyco-Capsian type (levels X–IX). This change seems to have occurred suddenly and non-gradually: E.S. Higgs (author of the zooarchaeological study) concluded that goats

had been imported at a more advanced stage of domestication.

More important information regarding the pastoral organization in these Northern regions come from the Capéletti cave (Khanguet Si Mohammed Tahar) in the Aures Mountains of eastern Algeria (Roubet 1979). The cave is at about 1,500 m above the sea level and shows an uninterrupted stratigraphic sequence caused by a very slow sedimentation process that took place over a period of about 2000 years in the Mid-Holocene (from 6,530 to 4,300 BP). The most ancient phase of occupation (from 6,530 to 5,900 BP) shows no presence of domestic livestock. Later (in the second period) the cave was inhabited by shepherds that made use of Capsian type tools; also tools that consisted in a ceramic piece with a cone-shaped bottom and manufacts in polished stone were found, sometimes decorated and carved. Because of the similarities with the Capsian, the culture was called Neolithic-of-Capsian tradition. The groups of humans exploited a wide range of resources, though this did not include small-size livestock: land and freshwater molluscs, great quantities of various wild plants (Fig. 9). The men were mammal hunters, especially antelopes and gazelles, and of avifauna. The available data seem to indicate a system of transhumance between the plane, occupied in winter, and the plateau, occupied during the summer (Holl 1998). The dimensions of the Capélletti cave suggest that it was inhabited by specialized groups (task groups) of young men that lead the livestock to pasture.

There is a clear chronological *décalage* in the distribution of the pasture lands outside the areas described up to now, both in the Saharan territories and in Sub-Saharan Africa. It is known that the presence of the tsetse fly that infested the southern regions was an impediment (though also cultural factors may have played an important role). The data available does not provide any evidence of domestic livestock on the northwest borders of the Sahara, in the area situated in the Algerian and Moroccan regions of Atlas and Aures, to the north, and in Tanezrouft in the south, along the border between Mali and Algeria. This area seems to have been inhabited by mobile groups of hunter-gatherers (culture of Hassi el-Abiod, culture of Kobadi). Considering this evidence it is correct to say that the northwest portion of the Sahara did not function as a corridor for the passage of domestic livestock from North (Aures) to West Africa. On the contrary the first pasture sites that date to 6,000–5,000 BP (like the famous Adrar Bous in Niger) are located along the western edges of the Ténéré from where probably they spread south and southwest, toward the Atlantic coast of Western Sahara in Tintan and Chami, the Taoudenni basin at Erg i-in-Sâkâne in the Adrar des Ifoghas, the Tilemsi Valley in Mali, Dhar Tichitt in Mauritania, Azawagh Valley in Niger, reaching Kintampo and Ntereso in Ghana.

From the "nucleus" in Eastern Sahara, the pastoral communities rapidly migrated toward the Central Sahara, then return toward the Nile then Sudan, and from here continue toward southern regions. The migration paths are marked by typical settlements, hearths, megalithic burial structures, vast pottery deposits, and burial and ceremonial monuments. In Eastern Sahara the routes intersected in the area between the Egyptian oasis and the Nile. Together with the core-farming activity, agricultural activities, involving imported plant species, were also important in the Nile Valley.

The occupation of the region reached a peak in the Holocene period. The expression *Saharan Neolithic* (also identified as *Sharo-Sudanese Neolithic* by G. Camps) refers to a spectrum of cultural traits that emerged between 10,000 and 5,000 BP in the central area of the Sahara, between 15′ and 25′ N. Lat. Among the innovative aspects that characterize these cultures (that include a series of technological traits, artistic aspects, and settlement patterns), the production of pottery and food preparation, in the context of a pastoral economy, are no doubt the most important elements.

With regard to cultivation processes, the only available evidence indicates the use of species of the millet and sorghum group.

The beginning of the transformation in living habits in the Sahara region coincided with the

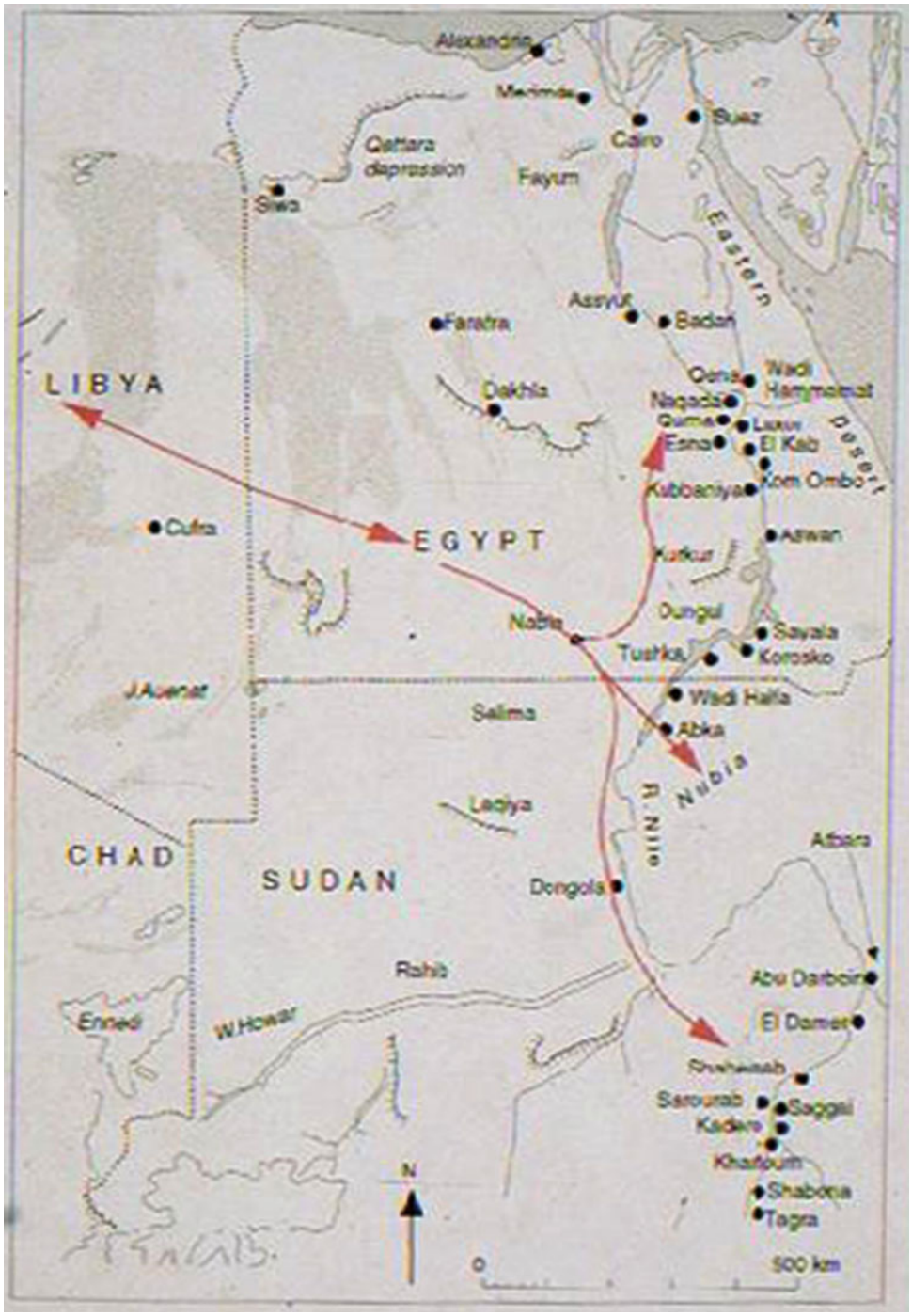

North and Saharan Africa: Geography and Chronology, Fig. 9 Proto-Neolithic developments and as areas of innovation that connected the Sahara to the Nile Valley

onset of rainfalls and with the consequent reoccupation of the territoriesthat had been practically abandoned during the arid phase that reached its peak around 20,000. In the transition phase between the Pleistocene and the Holocene, the types of culture that developed were based on

the exploitation of water resources that determined a lifestyle that the archaeologist J.E.G. Sutton defined as "water culture." At first this definition was criticized by many; today it is considered appropriate.

The most reliable sequences in Egypt, Libya, and Niger date the first occupations of the Sahara to the period in which the monsoon cycle stabilized again in the earliest phase of the Holocene. The Nabta and Bir Kiseiba sequences, in the Western Desert of Egypt, begin at the end of the long arid period that followed the Aterian humid period.

The first occupation at Bir Kiseiba (called el-Adam phase, between 10,000 and 8,200 BP) is important because it is where the remains of oxen were found (dated between 10,220 and 9,460 BP) in the E-79-8 site. The el-Nabta Neolithic type (between 8,100 and 7,900 BP) is characterized by the recolonization of the region at the end of a phase of extreme aridity that was followed by the onset of a new humid phase.

During this period more regular rainfalls allowed more stable settlements and the establishment of a permanent village, Nabta E-75-6, which is similar to Ti-n-Torha East in the Acacus area, Libya. Many comparisons have been made between the lithic industry found in the E-75-6 site and the industries of other sites in the western part of the desert, like Wadi Bakht in Gilf el-Kebir, Abu Ballas, and Lobo opposite the Great Sand Sea, the Masara B horizon from Dakhla, and the Early Holocene horizon in Farafra.

In Libya the sequence of the main occupation has been identified in the Tadrart Acacus mountains that, together with the Algerian massif Tassili n'Ajjer, constitutes the most important cave art complex in the Sahara. In the Wadi Ti-n-Torha (Barich 1987), Ti-n-Torha East appears to be a real proto-village with a series of hut bases close to the rocky sides of the *wādī*. The types of fauna indicate an economy based on hunting, fishing, and gathering. It is worth mentioning some very baldy preserved remains of a large-sized bovine (that date to between 8,500 and 8,000 BP). Gautier suggested the remains were of a domestic ox, a hypothesis that was not confirmed by the research carried out later. The stratigraphic series that are visible in the three Wadi Ti-n-Torha sites (East Shelter, the Two Caves site, and the North Shelter) covers the whole period of the Early Holocene.

The sequence at Niger also displays a series of stratigraphic and chronological similarities with the situation in Libya. The research carried out by J. Desmond Clark in Wadi Greboun and in Adrar Bousfu identified an Epipaleolithic culture (Kiffian) in the 1980s; more research by J.P. Roset brought into light sights that date to around the same period: Temet 1 (between 9,650 and 9,450 BP), Ti-n-Ouaffadene (9,360–9,080 BP), and Adrar Bous 10 (9,220–8,840 BP). The lithic complexes are of an Epipaleolithic type, though they also display a rich pottery tradition. On the whole it has been observed that there is a large chronological gap between the first remains of what is believed to be domestic oxen in the Western Desert and the remains found in other regions, such as Saharan and North African. In Niger the sites of Dogomboulo (between 7,100 and 6,600) and Rocher Toubeau (5,650–5,500 BP) are the first examples of an occupation that dates to the Mid-Holocene based primarily on farming. The lithic complex of this horizon (Tenerian) is characterized by large bifacial tools such as gouges, discs, arrow heads, and polished axes. An almost complete skeleton of a domestic ox (*Bos taurus*) found at Agorass n'Tast was dated to between 6,250 and 5,250 BP.

In the area of Uan Muhuggiag, the presence of domestic oxen from the VIII millennium BP is certain although the fauna of the region included also many wild species. In the period between 6,000 and 5,000 BP, the pastoral culture spread to all of the Central Sahara region.

The description of the Neolithic of Sudanese tradition given by A.J. Arkell was based on the similarities between decorative motifs, the wavy line motif, and the dotted wavy line motif that can be found both in the Sahara and in Sudan. Arkell dated the Khartoum Mesolithic, the most ancient, to around 8,000 BP. Today it is believed that the economic transition in Sudan should be considered in connection to the arrival of groups from other regions that brought with them domestic species. The region of Nabta Playa, in the north, has been indicated as one of the places from where these domestic species arrived after having crossed the Nile Valley.

At the beginning of the Holocene (around 8,000–5,000 BC), Upper Egypt was occupied by populations with lithic industries of local Late Pleistocene tradition. They are the Tarifian (about 8,000–6,000 BC) in Thebes, Elkabian (about 6,500–5,000 BC) in the region of Elkab, and Qarunian, initially defined Fayyum B (about 6,100–5,200 BC), in the Fayyum depression. The Elkabian and the Qarunian are associated with a number of remains of fish that confirm an intensive exploitation of water resources.

The so-called Early Khartoum Mesolithic culture, originally thought to have been confined to the areas surrounding the Nile, seems to have spread widely in semi-desert areas. There were therefore two residential zones, between the Nile and the mountains: the area by the river, inhabited during the arid season, between October and June, and the area inland, inhabited during the rainy seasons, in summer. The two areas were equipped with sites for functional and seasonal specialization, hunting stations installed on the peaks of the many *gebels*, within an 8 km radius around the inhabited sites. These have been identified as living quarters because of the deposits found in very thick stratifications. The presence of many burial sites is an indication of the custom of burying the dead inside the village, by the entrance of the huts.

The sites of this early phase are dated in Central Sudan to between 8,000 and 6,500 BP (Caneva 1983; Caneva et al. 1993). They are all characterized by the presence of the earliest type of Sudanese ceramics, pottery items of various sizes, generally large, globular shaped, made with a fine and well-baked clay, with a lithic filler and a surface decorated by impression or engraving. The most significant ornamental motif that is present on more than 20% of the items is the wavy line combed motif, which gives the name to this culture and constitutes the distinctive trait of the Sudanese culture if compared to the coeval Saharan.

The horizon that followed, the Late Mesolithic dotted wavy line pottery, is defined by the sudden appearance of a more uniform pottery production, characterized by a more fragile consistence and a less sophisticated baking process and by decorations obtained solely by impression with combs that create a wolf tooth motif, often dotted wavy lines. The appearance of this type of pottery dates to 6,100 BP like the other type and has the same stratigraphic position as the wavy line pottery, in all the sites were it has been observed, like Shaqadud (Marks and Mohammed-Ali 1991) and Kabbashi (Caneva et al. 1993). The groups that produced it, hunters, as in the first culture, occupy the same area by the river and the same inland territories, though in a less intense and articulated way, and for a shorter period of time. The simultaneous appearance of a uniform pottery, identical to the one of the Central Sahara and of the regions confining with Chad, suggests that the groups of hunters that gradually migrated toward the Nile Valley came from these regions.

^{14}C dating, all around 6,100 BP, indicates that this development took place in a very short time. The pastoral groups, dated to between 5,800 and 5,500 BP, which came from the same Saharan regions, only arrived in the Nile Valley 200 years later. Domestic animals were certainly imported into Sudan from northwest African regions. The characteristics of the first cultures with an economy based on production in Sudan are the same as the Saharan ones, though they seem to have undergone an *itinerant* process, in the course of a slower migration process, which was probably more divided and fragmented compared to the first culture, having been carried out by several groups at different times. From this moment a continuous development toward nomadic pastoralism can be traced in Sudan.

Researches in the Western Desert carried out in the last 20 years by R. Kuper (1989) have shown that the desert was crossed more than inhabited and that the majority of sites identified date to later periods, post-Neolithic, in particular to the type called Halbmond-Leiterband because of its characteristic pottery decorations (4000 BP).

Cross-References

- ► African Stone Age
- ► Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ► Archaic *Homo Sapiens*

References

Aiello, L.C. 1993. The fossil evidence for modern human origins in Africa: A revised view. *American Anthropologist* 95 (1): 73–96.

Alley, R., P. Mayewski, T. Sowers, M. Stuiver, K. Taylor, and P. Clark. 1997. Holocene climatic instability: A prominent, widespread event 8200 yr ago. *Geology* 25: 483–486.

Barich, B.E. 1987. *Archaeology and environment in the Libyan Sahara*, Cambridge monographs in african archaeology. Oxford: B.A.R.

Barich, B.E. 2002. Archaeology of Farafra Oasis (Western Desert, Egypt) – A survey of the most recent research. *Archéo-Nil* 12: 101–108.

Barich, B.E., and C. Conati Barbaro. 2003. *Ras El Wadi: New data for the Study of the Epipalaeolithic Tradition in Northern Libya*. Vol. XXV, 75–146. Origini.

Barton, R.N.E., A. Bouzouggar, S.N. Collcutt, J.-L. Schwenninger, and L. Clark-Balzan. 2009. OSL dating of the Aterian levels at Dar es-Soltan I (Rabat, Morocco) and implications for the dispersal of modern Homo sapiens. *Quaternary Science Reviews* 28: 1914–1931.

Brooks, N., I. Chiapello, S. Di Lernia, N. Drake, M. Legrand, C. Moulin, and J. Prospero. 2005. The climate-environment-society nexus in the Sahara from prehistoric times to the present day. *The Journal of North African Studies* 10: 3–4, 253–292.

Brunet, M., A. Beauvilain, Y. Coppens, É. Heintz, A.H. Moutaye, and David Pilbeam. 1995. The first australopithecine 2,500 kilometres west of the Rift Valley (Chad). *Nature* 378: 273–275.

Camps, G. 1982. *La Préhistoire: à la recherche du paradis perdu*. Paris: Perrin.

Caneva, I. 1983. Excavating Saggai 1 in Pottery Using Gatherers and Hunters at Saggai (Sudan): Preconditions for Food Productions. Origini. Rivista di Prehistoria e Protostoria delle Civiltà Antiche 12 (1): 7–29.

Caneva, I., E.A.A. Garcea, A. Gautier, and W. Van Neer. 1993. Pre-pastoral cultures along the central sudanese nile. *Quaternaria Nova* III: 177–252.

Clarke, J., N. Brooks, E.B. Banning, Miryam Bar-Matthews, S.L.C. Campbell, M. Cremaschi, S. Lernia, N. Drake, M. Gallinaro, S. Manning, K. Nicoll, G.S. Philip, R. Ulf-Dietrich Schoop, M.A. Tafuri, B. Weninger, and A. Zerboni. 2016. Climatic changes and social transformations in the Near East and North Africa during the 'long' 4th millennium BC: A comparative study of environmental and archaeological evidence. *Quaternary Science Reviews* 136: 96–12.

Cremaschi, M., and S. Di Lernia, eds. 1998. *Wadi Teshuinat. Palaeoenvironment and Prehistory in south-western Fezzan (Libyan Sahara)*. Milano: CNR.

Drake, N.A., P. Breeze, and A. Parker. 2013. Palaeoclimate in the Saharan and Arabian Deserts during the Middle Palaeolithic and the potential for hominin dispersals. *Quaternary International* 300: 48–61.

Gallinaro, M. 2008. Il nomadismo pastorale nel Deserto Occidentale Egiziano durante l'Olocene: il ruolo rivestito dagli Steinplatz nei modelli di occupazione del territorio (Nomadic pastoralism in the Egyptian Western Desert during the Holocene: The role of the Steinplatze in regional settlement patterns) (Unpublished Ph.D. thesis). University of Naples "L'Orientale".

Garcea, E.A.A. 2010. The spread of Aterian Peoplesin North Africa in South Estern Mediterranean peoples between 130,000 and 10,000 years ago Oxbow Books Ed. by E.A.A. Garcea.

Gautier, A. 1984. Archaeozoology of the Bir Kiseiba region, eastern Sahara. In *Cattle-keepers of the Eastern Sahara: The Neolithic of Bir Kiseiba*, ed. F. Wendorf, R. Schild, and A.E. Close, 163–187. Dallas: Southern Methodist University Press.

Goodfriend, G.A. 1988. Mid-Holocene rainfall in the Negev Desert from C13 of land snail shell organic matter. *Nature* 333: 757–760.

Gunz, P., F.L. Bookstein, P. Mitteroecker, A. Stadlmayr, H. Seidler, and G.W. Weber. 2009. Early modern human diversity suggests subdivided population structure and a complex out-of-Africa scenario. *Proceedings of the National Academy of Sciences of the United States of America* 106 (20): 6094.

Hijmans, R.J., S.E. Cameron, J.L. Parra, P.G. Jones, and A. Jarvis. 2005. Very high resolution interpolated climate surfaces for global land areas. *International Journal of Climatology* 25: 1965–1978.

Holl, A.F.C. 1998. The Dawn of African pastoralism: An introductory note. *Journal of Anthropological Archaeology* 17: 81–96.

Hooghiemstra, H., H. Stalling, C.O.C. Agwu, and L.M. Dupont. 1992. Vegetational and climatic changes at the northern fringe of the Sahara 250,000–5,000 years BP: Evidence from 4 marine pollen records located between Portugal and the Canary Islands. *Review of Palaeobotany and Palynology* 74: 1–53.

Kuper, R. 1989. The Eastern Sahara from North to South: Data and dates from the B.O.S. project. In *Late Prehistory of the Nile Basin and the Sahara*, ed. L. Krzyzaniak and M. Kobusiewicz. Poznan.

Lario, J., S. Sánchez-Moral, V.M. Fernández, A. Jimeno, and M. Menéndez. 1997. Palaeoenvironmental evolution of the Blue Nile (Central Sudan) during the Early and Mid-Holocene (Mesolithic-Neolithic transition). *Quaternary Science Reviews* 16: 583–588.

Le Quellec, J.-L. 2008. Per le pitture rupestri si apre una nuova era. *Quaderni Darwin* 1 (8): 62–67.

Lézine, A.M. 1989. Late Quaternary vegetation and climate of the Sahel. Quaternary Research 32 (3): 317–334.

Longman. 1974. *African geography for schools: A handbook for teachers Unesco Source Book*.

Lubell, D., and P. Sheppard. 1997. *History of physical anthropology: An encyclopedia*, 834–837. New York: Garland Press. Northern African advanced foragers.

Marks, A.E., and A. Mohammed-Ali. 1991. *The Late Prehistory of the Eastern Sahel. The Mesolithic and Neolithic of Shaqadud, Sudan*. Dallas: Southern Methodist University Press.

McBurney, C.B.M. 1967. *The Haua Fteah in Cyrenaica*. Cambridge: Cambridge University Press.
Mirazon-Lahar. 2010. Saharan Corridors and their role in the evolutionary geography of 'Out of Africa I in out of Africa I. *Vertebrate Paleobiology and Paleoanthropology* 0: 27–46.
Mutri, G., 2014. North and Saharan Africa: Geography and Chronology. *Encyclopedia of Global Archaeology.* 5435–5453.
Muzzolini, A. 1995. *Les images rupestres du Sahara*. Vol. 1. A. Muzzolini.
Nicoll. 2016. A revised chronology for Pleistocene paleolakes and Middle Stone Age – Middle Paleolithic cultural activity at Bîr Tirfawi – Bîr Sahara in the Egyptian Sahara. *Quaternary International*, pp 1–11.
Paris, F. 1996. Les sepultures du Sahara nigerien du neolithique a l'islamisation: Coutumes funeraires, chronologie, civilisations. 2. Corpus des s' epultures fouill' ees'. PhD thesis, Paris I (Panth'eon-Sorbonne). Accessed August 2002 to June 2003.
Petrocchi, C. 1940. Ricerche preistoriche in Cirenaica. *Africa Italiana*, VII, Anno XVIII (1–2): 1–33.
Ritchie, J.C. 1994. Holocene pollen spectra from Oyo, northwestern Sudan: Problems of interpretation in an hyperarid environment. *The Holocene* 4 (1): 9–15.
Roche, J. 1963. *L'Epipaléolithique Marocain*. Lisbon: Fondation Calouste Gulbenkian.
Roset, J.P. 1987. Néolithisation, Néolithique et post-Néolithique au Niger nord-oriental. *Bulletin de l'Association française pour l'étude du quaternaire* 24 (24–4): 203–214.
Roubet, C. 1979. *Économie Pastorale Préagricole en Algérie Orientale: le Néolithique de Tradition Capsienne*. Paris: CNRS. 1985.
Sahnouni, M., et al. 2002. Further research at the Oldowan site of Ain Hanech, North-eastern Algeria. *Journal of Human Evolution* 43.6: 925–937.
Sansoni, U., and Emmanuel, A. 1994. Le più antiche pitture del Sahara: l'arte delle teste rotonde. Jaca Book.
Scerri, E.M.L., N.A. Drake, R. Jennings, and H.S. Groucutt. 2014. Earliest evidence for the structure of *Homo sapiens* populations in Africa. *Quaternary Science Reviews* 101: 207–216.
Shea, J.J. 2003. Neandertals, competition, and the origin of modern human behavior in the Levant. *Evolutionary Anthropology: Issues, News, and Review Volume* 12 (4): 173–187.
Smith, J.R. 2010. Palaeoenvironments of Eastern North Africa and the Levant in the Late Pleistocene. In *South-Eastern Mediterranean peoples between 130,000 and 10,000 years ago*, ed. E.A.A. Garcea, 6–17. Oxford: Oxbow Books.
Stokes, S., D.S.G. Thomas, and P.A. Shaw. 1997. New chronological evidence for the nature and timing of linear dune development in the Southwest Kalahari Desert. *Geomorphology* 20: 81–93.
Su, H., and J.D. Neelin. 2005. Dynamical mechanisms for African monsoon changes during the mid-Holocene. *Journal of Geophysical Research* 110: D19105.
Testart, A. 1982. The significance of food storage among Hunter-Gatherers: Residence patterns, population densities, and social inequalities. *Current Anthropology* 23 (5): 523–537.
Thomas, M.F., and M.B. Thorp. 1993. The geomorphology of some Quaternary placer deposits. *Zeitschrift fu¨r Gemorphologie, Supplementband* 87: 183–194.
Tixier, J. 1963. *Typologie de l'Epipaléolithique du Maghreb*. Paris: Mémoires du C.R.A.P.E. (II).
Van Andel, T.H., and P.C. Tzedakis. 1996. Palaeolithic landscapes of Europe and Environs, 150,000 – 25,000 years ago. *Quaternary Science Reviews* 15: 481–500.
Veermersch, P.M. 2001. 'Out of Africa' from an Egyptian point of view. *Quaternary International* 75: 103–112.
Vernet, R. 1995. *Climats Anciens Du Nord De L'Afrique*. Paris: L'Harmattan.
Wendorf, F., R. Schild, and A. Close, eds. 1989. *Prehistory of Wadi Kubbaniya. Vols. 2 and 3*. Dallas: Southern Methodist University.
Wendorf, F., R. Schild, A.E. Close, H.P. Schwarcz, G.H. Miller, R. Grun, A. Bluszcz, S. Stokes, L. Morawska, J. Huxtable, J. Lundberg, C.L. Hill, and C. McKinney. 1994. A chronology for the Middle and Late Pleistocene wet episodes in the eastern Sahara. In *Late quaternary chronology and paleoclimates of the eastern mediterranean, radiocarbon*, ed. O. Bar-Yosef and R.S. Kra, 147–168. Tucson: The University of Arizona.

North and Saharan Africa: Geography and Culture During the Lower Stone Age

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State of Knowledge and Current Debates

North and Saharan Africa: Geomorphology and Climatic History

North and Saharan Africa constitute a vast geographical region delineated by the Mediterranean Sea to the north, the Red Sea to the east, and the Atlantic Ocean to the west. The Sahara desert sands are bordered to the south by the Sahel savannah grasslands, a shifting transitional ecoregion in perpetual expansion and contraction

under the impulse of cyclical climate change. Presently, North Africa partly or wholly embraces Morocco, Algeria, Tunisia, Libya, and Egypt, while Saharan Africa includes the northerly sectors of Mauritania, Mali, Niger, Chad, and Sudan. The most striking geomorphological feature of this region is, of course, the Sahara desert, a vast platform punctuated by high plateaus and mountain ranges whose foundations are composed of Precambrian era rocks. This ancient platform was warped up, denuded, and eroded over time into swells and basins. Sandstone and limestone deposits were accumulated after global warming during the Cretaceous Period that caused huge areas of the Sahara to be submerged. Organic oceanic sediments amassed during this period were transformed into the petroleum and natural gas deposits that are currently exploited by countries like Libya, Algeria, and Nigeria. Over the following millennia, extensive and recurring erosion stripped sediments of the organic nutrients needed for agriculture but maintained their component mineral deposits (bauxite, salt, manganese, iron, gold, copper, uranium). This wealth of natural resources spurred the development of geological research and surveying in the Sahara desert. Explorations for natural resources have indirectly contributed to the growing awareness of this region's prehistory by tracing its geological and geomorphological past and by providing a framework for the understanding of the appearance and evolution of human life in this expansive territory (Fig. 1).

Today, the Sahara represents a variety of landscapes bordered by coastal areas comprising the majority of the population. Inland, the topography

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 1 Satellite image showing the countries presently included in North and Saharan Africa

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is relatively monotonous, punctuated by sandy deserts, ridges and basins, and mountains and valleys. The land ascends gradually from the western Atlantic shoreline to form vast plains, and the northerly Atlas Mountain range culminates at Mount Toubkal at an altitude exceeding 4,000 m. Long, profound valleys cut into the plains that extend southward from the Atlas Mountains, reaching into the Algerian Desert regions. Southern Algeria's Hoggar Mountains (3,000 m) and the Emi Koussi volcano (3,500 m) in northern Chad's Tibesti massif are among the most important elevations of today's Sahara. Occasionally, oases with their associated vegetation break with the general aridity of the desert. The mythical great Nile River marks the overall landscape as it flows northward out of Ethiopia, through Sudan and into Egypt, where its huge delta spews fresh water into the Mediterranean Sea. Remarkable expanses of desert surround this vital water source. Other massive expanses of sand deserts are those of Algeria's Great Erg and Libya's Fezzan basin. The central regions of the Sahara, from southern Algeria to western Sudan, are characterized by barren plateaus and hills with a mean altitude of 180–365 m (Fig. 2).

Throughout the Quaternary Period (c. 2.5 Mya), the Sahara offered diverse climatic

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 2 Present-day desert landscapes from western Morocco – near the junction between Morocco, Algeria, and Mauritania. Sparsely wooded, savannah-like landscape (*above*). Denuded and eroded primary rock surface (*below*) (Photos Jordi Mestre, IPHES, Spain)

scenarios that culminated in a variety of landscapes, including tropical and savannah-like environments well suited to a broad spectra of large and small mammals, including hominins. At the onset of the Quaternary, intense rainfall severely eroded the highlands, redepositing masses of sediment and developing important water systems and alluvial terraces. These waterways constitute the single most important element permitting early humans to occupy and settle the northerly sectors of the African continent. Lakeside regions developed providing ideal settings for human life, and river valleys constituted passageways permitting populations to disperse into new territories. Looking at the Sahara desert today – one of the most inhospitable places on earth – it is difficult to imagine that it once provided a flourishing environment favorable to human life. In fact, desertification of the region began only some 4–5 Kya, when shifts in the earth's axis caused temperatures to increase and precipitation to decrease. From that time, the area suffered the transformation of its tropical plant life into savannah grasslands that finally culminated in the installation of desert conditions.

Much of North African Quaternary climatic history has been interpreted by comparing its geomorphological and stratigraphical associations with evidence from the European Mediterranean coastal areas, notably some well-dated sequences from Italy, France, and Spain. A well-established sequence of fossil shorelines has been proposed especially for the Atlantic facade of Casablanca, as well as in other regions of Morocco and Algeria. Correlations have also been established using paleoclimatic data obtained from deep-sea cores or pollen and vegetation sequences. In North and Saharan Africa, as elsewhere, cyclical climatic change characterizes the Quaternary Period, and its glacial/interglacial dynamics caused variations in pluviosity, marine transgressions, and regressions, as well as in isostatic phenomenon. The most significant effect of climate change influencing the spread of early humans into this zone was certainly the periodic extension of the Sahara desert (Aouraghe 2006). Landscape settings shifted throughout the Pleistocene from dryer, desert conditions to tropical savanna with sparse forest containing Mediterranean essences. These settings provided the ecological conditions necessary to harbor a wide variety of large mammals, many of which were of Afro-tropical origin. Although it is likely that hominins formed a part of migratory waves of animals moving out from similar landscapes to the south and to the east at specific times throughout the Quaternary, there is a paucity of evidence of human activity in this area during the Lower Stone Age.

Many of the large mammals sustained in the region from the Late Pliocene into the Upper Pleistocene underwent slight or no anatomical change and therefore present little biochronological significance. The earliest Pleistocene, characterized by a general lowering in temperatures and increased aridity, is distinguished by open landscapes populated with large, grazing herbivores. Temperatures and pluviosity augmented from around 1.2 Mya, favoring the establishment of extensive water systems and their corresponding forest environments. From around 0.9 Mya, temperatures decreased, degrading landscapes and provoking important changes in corresponding faunal associations. The beginning of the Middle Pleistocene, from 0.78 Mya, is marked by the return of higher temperatures, while the Upper Pleistocene, from around 0.12 Mya, was considerably colder and dryer (Agustí et al. 2009).

Except for intense research in the Atlantic coastal region of Morocco (the Casablanca cave sequence) and in Algeria (Ternifine, Ain Hanech, Ain Boucherit), North and Saharan Africa have been neglected in terms of Early Paleolithic research, especially when compared to East and South Africa. But recent findings have highlighted their importance as a source of knowledge about our shared, distant past. The once widely accepted hypothesis postulating a unique emergence for humanity – east of the great African Rift Valley (*East Side Story*, Kortlandt 1972; Coppens 1994) – has been under question since 1993, when fossil hominins dating to 3.6 Mya were discovered nearly 2,500 km west of the Rift Valley, near Koro Toro in Chad (Brunet et al. 1995). The finds were attributed to a new species of australopithecine named *Australopithecus bahrelghazali*, commonly referred to as

"Abel." Just a few years later, in 2001, new fossils were brought to light in the Chadian, Djurab Desert belonging to a bipedal hominin nearly 7 Myrs old. These hominin remains, denominated *Sahelanthropus tchadensis* or "Toumaï," were also recognized as belonging to a new species and are thought to represent one of the earliest human ancestors, perhaps the closest yet to the chimpanzee-*Homo* divergence. These important discoveries have established Saharan Africa as a key zone for the emergence, evolution, and diffusion of ancient hominins.

Europe and Africa have been separated by the Mediterranean Sea ever since the Atlantic Ocean breached the landmass joining these two continents over 5 Mya. This natural barrier favored evolutionary divergence of humans and other species on either side of the divide, but it did not entirely impede their passage from one to the other throughout the different phases of the Quaternary Period. Although relatively little is known of the timing and mechanisms through which such migrations occurred, growing evidence of a hominin presence in Eurasia from the Early Pleistocene underlines the key role played by the northerly regions of Africa. This region constitutes an obvious geographical crossroads, a sort of greenhouse where favorable conditions encouraged the growth of human culture and socialization that would eventually enable them to establish the demographic success necessary for their spread into Eurasia.

Pioneering archaeological and geological research began in North Africa during the late nineteenth century, notably along the northern Atlantic coastline near Casablanca, revealing evidence of a long succession of human cultures in the area. Except for some precise dating carried out on the Casablanca sequences (OSL, U/Th, ESR, Raynal et al. 2010), the specific geomorphological history of the region has not proven particularly favorable for radiometric dating techniques. Overall, difficulties in obtaining reliable radiometrical dates for artifact-yielding sediments of North African sites have impeded establishing a chronostratigraphical framework within which to place the archaeological finds. Unlike in the East African Rift Valley, North Africa has undergone modest volcanic activity during the Quaternary – its sedimentological record does not offer the same context of successive layers of datable tuff and/or volcanic ash separating neatly stratified deposits. Nor has the region known comparable tectonic activity that, in the East African Rift Valley, exposed the huge stratified sequences that provide a virtually uninterrupted record of fossil-bearing sedimentary sequences for the entire Plio-Pleistocene. Well-preserved fossils and artifacts within datable, sequential volcanic deposits have made East Africa an ideal ground for spectacular discoveries in a well-calibrated chronological framework. Extensively documented research carried out in the Rift Valley since the 1970s, for example, in the Hadar, Afar regions, Omo Valley, Koobi Fora, and Olduvai Gorge (Ethiopia, Kenya, Tanzania), provides a foundation with which to compare North African faunal, hominin, and lithic discoveries, helping to establish their own chrono-cultural evolutionary trajectory. The difficulties in elaborating this framework have steered systematic archaeological research away from the earliest phases of the Paleolithic in the Sahara and Maghreb regions and toward the more recent periods such as the Neolithic and the Bronze Age.

Early Pleistocene (Gelasian Stage, 2.588–1.806 Mya)

Pre-Acheulian/Oldowan/Mode 1

The earliest cultural manifestations of the Lower Stone Age are referred to as *pre-Acheulian*, *Oldowan*, or *Mode 1*. These denominations, corresponding to the *variability* phase of human cultural evolution (Carbonell et al. 2009, 2016), are poorly documented throughout North and Saharan Africa. In contrast, elsewhere on the continent, notably along the East African Rift Valley, discoveries are multiplying, and the age of the earliest stone tool assemblages has been pushed back to 2.6 Mya (Semaw et al. 1997) or older (Harmand et al. 2015). So far, the oldest stone assemblages are known only from this part of the globe and are characterized by worked cobbles and nonmodified flakes. In Africa, the period covered by the cultural umbrella most often referred

to as the "Oldowan" is situated between c. 2.5 and 1.7 Mya. From around 2 Mya, stone industries tend to increase in technological variability, and some assemblages include polyhedrons and/or spheroids.

Following discoveries in East Africa, *Homo habilis* was commonly accepted to be the author of the first stone tool industries. But other hominins, such as robust and gracile australopithecines, are also present at some sites during the same time frame. These hominins have been found in possible or probable association with cut-marked bones and/or knapped stone industries (Leakey 1971; Howell et al. 1987; Sussman 1991; Kimbel et al. 1997; de Heinzelin et al. 1999; Kuman and Clark 2000; McPherron et al. 2010). While the evidence for australopithecines and early *Homo* and their stone industries dating to this time frame is comparatively abundant in South and East Africa, not a single hominin fossil attributed to this period has yet been discovered in North or Saharan Africa. In the future, exploring the earliest phases of hominin expansion into this region will be essential to understanding how they survived and proliferated in the face of the changing paleoenvironmental conditions of the Quaternary Period. North and Saharan Africa certainly holds unexploited information fundamental to understanding the key phases of early human morphological evolution and how stone technologies allowed them to develop culturally and socially, eventually favoring their demographic spread into other regions of the globe.

Migrations of other species from South and East Africa into North and Saharan Africa are documented at the paleontological site of Ahl al Oughlam, a quarry located at Casablanca (Morocco) and dated to 2.5 Mya (Raynal et al. 1990; Geraads 2006). This site has yielded a rich collection of large fossil vertebrates, including tropical species such as elephants, giraffes, rhinoceros, horses, Hippotraginae, and Tragelaphinae, as well as numerous amphibians, reptiles, and birds. In spite of the wide variety of large and small vertebrates found there (over 60), no evidence of a human presence has yet been identified.

The warmer and wetter climatic conditions from around 1.8 Mya resulted in the development of important river systems that crisscrossed the region, depositing thick alluvial deposits. Resulting lakes and marshes provided favorable conditions for a lush, forested environment rich in biological diversity. To date, Algeria boasts the only two excavated sites so far attributed to this period: Aïn Hanech and El Kherba (Sahnouni and de Heinzelin 1998; Sahnouni 2005, 2006; Sahnouni et al. 2002, 2010). These two open-air sites are located in floodplain deposits at the edge of the eastern sector of the Algerian high plateau (Sétif Province). They have yielded a rich faunal assemblage in association with stone tools, knapped from local limestone and flint. The assemblages include cores, sub-spheroids, spheroids, flakes, and retouched pieces. Because of their low degree of formal standardization, their lack of handaxes or cleavers, and the presence of spheroids and orthogonal flaking, these industries are attributed to the Oldowan techno-complex. The age of the sites has been evaluated using paleomagnetic and biochronological criteria to between 1.95 and 1.77 Mya (Sahnouni et al. 2002). Paleoenvironmental conditions assessed for this time frame from faunal remains and radiocarbon isotopes confirm the dominance of an open, grassy landscape with sparse woodlands and indicate a progressive increase in aridity over time (Sahnouni et al. 2010). Species of biochronological interest include *Kolpochoerus heseloni*, *Dicerorhinus africanus*, and *Anancus* (Sahnouni and van der Made 2009) (Fig. 3).

Elsewhere in Algeria, few other Oldowan occurrences are well documented. The El Mansourah open-air site, for example, has yielded Oldowan industries analogous to those from Aïn Hanech, without handaxes and cleavers. The faunal assemblage shows similarities to Aïn Hanech, but some species may indicate that the site is slightly older (Chaid-Saoudi et al. 2006). However, further research is required in order to establish the relationship between the stone industries and the faunal remains. The faunal list includes *Kolpochoerus*, a suid indicative of the Lower Pleistocene. The bovid *Tragelaphus* cf. *gaudryi* predates the *Tragelaphus algericus* from the Early to Middle Pleistocene site of Ternifine. The presence of *Hippopotamus* and *Reduncini* indicates a nearby water source.

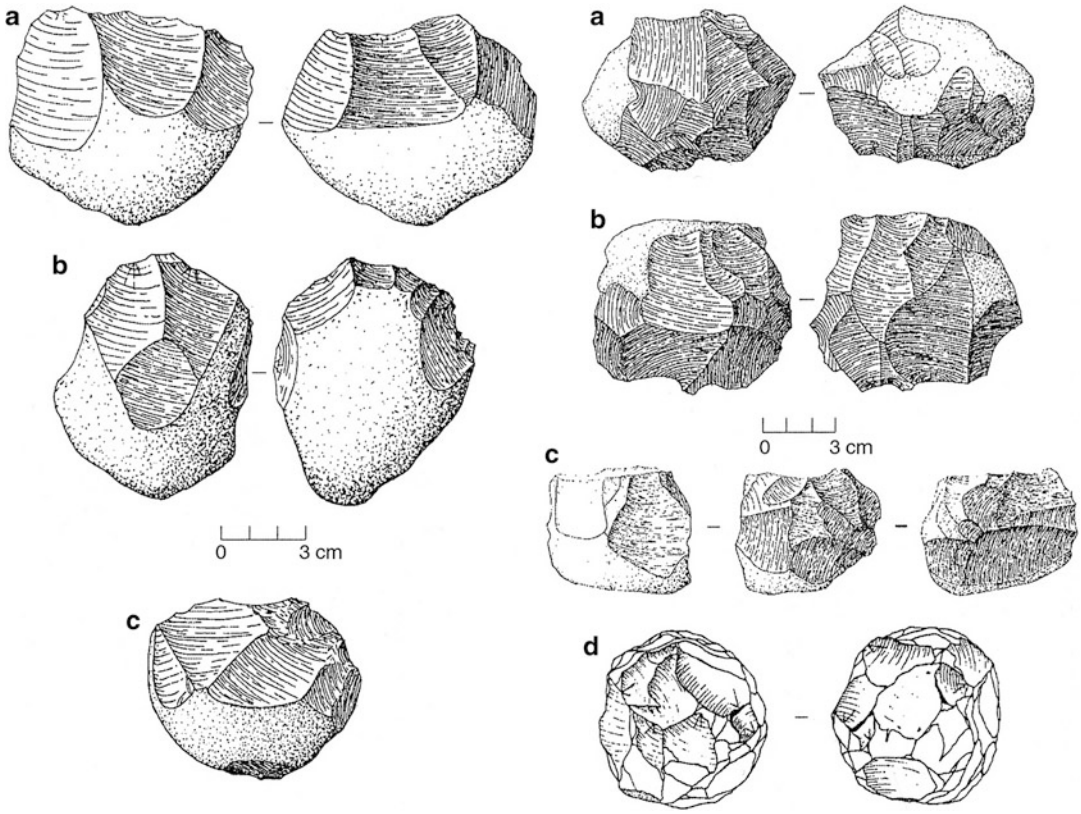

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 3 Typical Oldowan tools from El Kherba and Ain Hanech in Algeria, 1.8 Mya. *Left*: (**a**) and (**b**) are from El Kherba (Redrawn by de Heinzelin); (**c**) is from Aïn Hanech (Drawn by de Heinzelin). *Right*: (**a**), (**b**), and (**c**) are from Aïn Hanech (Redrawn by de Heinzelin); (**d**) is from Aïn Hanech (Drawn by Wilkerson) (Sahnouni and de Heinzelin 1998)

Throughout the rest of North and Saharan Africa, additional evidence for the presence of human populations producing Oldowan-type industries is sparsely documented, and as we have noted, systematic research for the earliest phases of hominin evolution needs to be developed further. In Libya, for example, there have been spot finds of Oldowan tools (worked cobbles) and Acheulian tools (handaxes, cleavers), but they lack precise chronostratigraphical information. The same is true of Egypt, where only isolated finds have been cited (Vermeersch et al. 1990). The situation is similar for the more southerly regions of Saharan Africa, in Mauritania, Mali, Niger, Chad, and Sudan, where there is a paucity of excavated sites and/or spot finds attesting to the presence of early hominins. While to date there have been no finds of early *Homo* dating to this time frame, discoveries of Oldowan tools attest nonetheless to their presence in North and Saharan Africa very early on, establishing the region as a foothold for understanding the subsequent emergence of ever more numerous prehistoric civilizations, both inside and outside of Africa.

Early–Middle Pleistocene (Calabrian Stage, 1.806–0.781 Mys, to Ionian Stage, 0.126–0.781 Mys)

Acheulian/Mode 2

During the *Acheulian* or *Mode 2*, the evidence for stone industries belonging to the *diversity* and *multiplicity* phases of human cultural evolution (Carbonell et al. 2009, 2016) becomes relatively more abundant throughout North and Saharan Africa. Cutting tools such as handaxes, cleavers,

and picks, shaped on large flakes (L > 10 cm, Sharon 2009, and references therein), are emblematic of this new phase of human technological know-how. Throughout the Acheulian, stone knapping was often performed using bifacial technology to extract flakes from disc-shaped cores. Small retouched toolkits appear and develop extensively to include several varieties of converging scrapers (pointed tools). In Africa, the emergence of Acheulian technology is generally believed to coincide with the appearance of *Homo erectus/Homo ergaster*. Behavioral changes accompanying the acquisition of new and advanced technological skills are perceivable in the archaeological record. Higher group mobility, increased social complexity, and organized hunting practices are among the observed achievements.

To date, the oldest known Acheulian industries have been discovered in Kenya, at Kokiselei 4, and in Ethiopia, at Konso-Gardula, dating, to around 1.75 Mya (Lepre et al. 2011; Beyene et al. 2013). By around 1.5 Mya, Acheulian sites became increasingly numerous in South and East Africa (Leakey 1971; Piperno and Bulgarelli-Piperno 1974; Isaac and Harris 1978; Texier 1995; de la Torre 2011). The increase in the number of sites as well as in individual site densities points to adaptive success linked with newly acquired techno-social skills. Sites with continuous stratigraphical sequences covering this time range, such as Olduvai Gorge or Melka Kunturé, bear witness to the generalization of this transition. Acheulian industries are present on the continent up to around 0.3 Mya when they are progressively supplanted by the Middle Stone Age (MSA) industrial complex.

Nascent Acheulian culture (*diversity* phase, Carbonell et al. 2009, 2016) in Africa thus coincides with the installation of the more humid climatic conditions characterizing the beginning of the Calabrian or the earliest Lower Pleistocene (c. 1.7 Mya). Human expansions outside of Africa apparently coinciding with this new cultural phenomenon took place within the context of the more arid conditions of the second half of the Early Pleistocene (c. 1.6–1.4 Mya, Ubeidiya, Israel, Bar-Yosef and Goren-Inbar 1993; Agustí et al. 2009). This second phase is marked by human demographic growth and the progress and complexification of Acheulian-producing populations inside and outside of Africa. The shift in climatic conditions also spurred a new wave of faunal migrations, with the arrival in North Africa of new species of east African origin, such as *Connochaetes*, *Theropithecus*, and *Elephas atlanticus* (Aouraghe 2006).

Acheulian industries and/or *Homo erectus* fossils are documented just prior to the onset of the Middle Pleistocene, at least 1 Mya in North and Saharan Africa. Nevertheless, the paucity of organized research programs in the region explains why much of the material has been recovered only from isolated finds without chronostratigraphical context. Distinctive features of early Acheulian industries in North and Saharan Africa include the mastery of large flake production from giant cores using technologies specifically developed for the production of blanks for large cutting tools (such as bifacial, sliced slab, Kombewa, Victoria West, cobble opening flake or *éclat entame*, Tabelbala-Tachenghit, or Levallois; Tixier 1956; Biberson 1961; Balout et al. 1967; Alimen 1978; Sharon 2009), a range of retouched tools, and the widespread use of discoid knapping technology for flake production. On a wider scale, analogous characteristics are observed in lithic assemblages from the Iberian Peninsula and restricted areas of southern France, India, and the Levant (Santonja and Villa 2006; Sharon and Barsky 2016; Bourguignon et al. 2016; Pappu et al. 2011; Goren-Inbar et al. 2000). Comparatively, looking eastward at the Engel Ela-Ramud basin (Eritrea), important lithic assemblages have been found, sometimes associated with fauna of Oldowan, Acheulian, Middle, and Late Stone Ages (Martínez-Navarro et al. 2016).

Apart from the very large size of some of the stone implements, another distinctive – and intriguing – feature of the North and Saharan African Acheulian is the sheer density of LCTs present in some areas. The existence of huge surfaces literally "paved" with handaxes and cleavers poses important problems of interpretation of these occurrences. It seems plausible that vast areas of North and Saharan Africa where such

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 4 Accumulation of Acheulian tools in place at Yeslem II (*left*). Large-sized cleaver from Yeslem II (*right*) (Adrar Region, Mauritania, De Lumley et al. 2006)

accumulations have been cited constitute zones of frequentation by hominin groups over thousands of years, probably connected with waterways. The combination of high occupation frequency and very slow sedimentation could help to explain the abundance of stone tools found in some cases (Fig. 4).

Given problems related to obtaining precise chronological information for many of the finds, attempts were made early on to create a chronological framework based on the overall morphology of LCTs, particularly handaxes and cleavers (Tixier 1956; Biberson 1961, 1967). In general, the more thoroughly knapped and symmetrical pieces were thought to be more recent than more partially or less "finely" worked pieces. However, research has since revealed that the concept of a progressive morphological symmetry observable over time is not a valid chrono-cultural notion. On the contrary, some Acheulian sites with long stratigraphical sequences demonstrate that handaxes morphology sometimes shows an inverse tendency, with the more elaborate tools representative of the older levels and the more partially manufactured pieces exhumed from the more recent levels (in Syria, e.g., at Nadaouiyeh I; Le Tensorer et al. 1993, or in France, at the Caune de l'Arago, Barsky and de Lumley 2010). Today, other factors are known to influence the overall morphology of stone tool industries, such as raw material quality and availability as well as differences in site function (as in the Acheulian sequences of Atapuerca's Gran Dolina and Galería, Ollé et al. 2013).

Major Acheulian Occurrences in Chronostratigraphical Context

The earliest and best documented evidence of Acheulian culture in North and Saharan Africa is from the Casablanca sequence in Atlantic Morocco. Situated on a plateau (or meseta) of northwestern Morocco, between the Atlantic coastline and the Middle Atlas Mountain range, Casablanca is well known for its exceptional stratigraphical sequences covering nearly 6 Myrs of geological and archaeological history. The huge sections composing these formations were fortuitously exposed after extensive quarrying was carried out to accommodate Casablanca's expanding urban context. The thick deposits are characterized by a series of barrier beaches of marine and eolian origin, disposed parallel to the present-day shoreline (Fig. 5). Formed by the gradual uplifting of the Moroccan coastline, the age of each of the

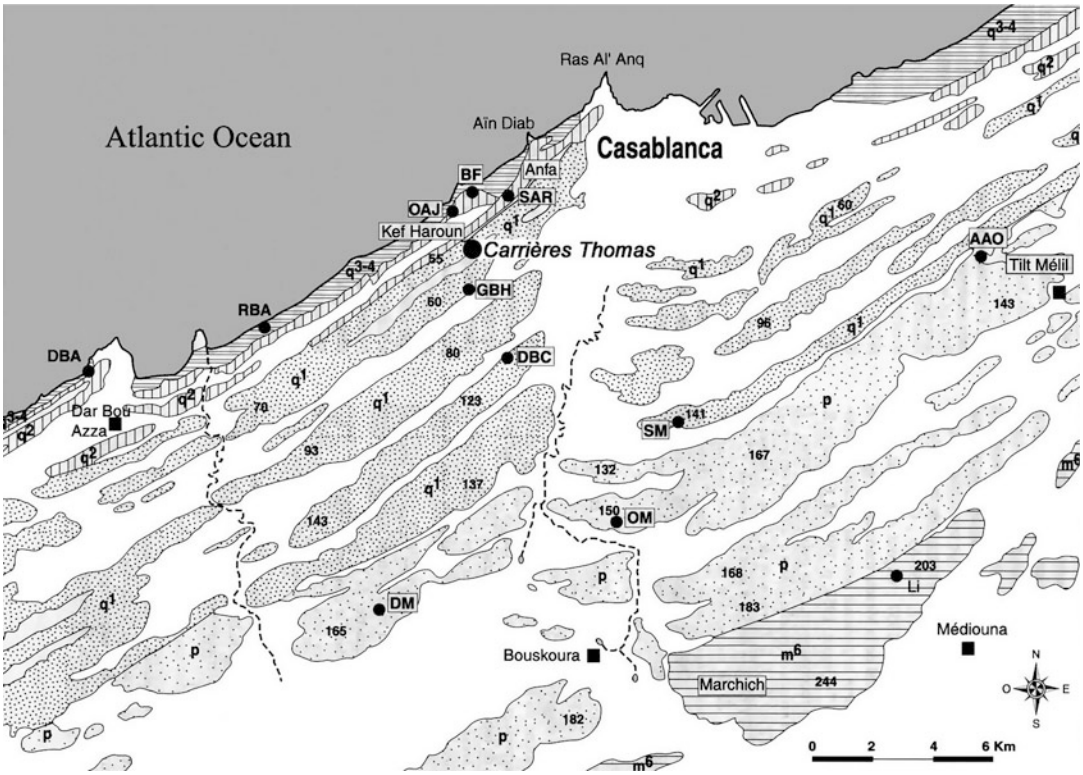

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 5 View of the Miocene, Pliocene, and Pleistocene sedimentary sequence in the region of Casablanca in Atlantic, Morocco. The sections exposed by quarrying provide an exceptional sedimentary record covering nearly 6 Myrs. A number of archaeological cave and open-air sites dating to the Early and Middle Pleistocene were discovered and excavated here since the early nineteenth century. These sites constitute the best known reference for the appearance of *Homo erectus* in North Africa and the development of Acheulian culture (After Raynal et al. 2010). q^{3-4} ,Upper Pleistocene and Holocene; q^2, Middle Pleistocene; q^1, Lower Pleistocene; p, Pliocene; m^6, Miocene (Messinian). Sites illustrated: Thomas Quarry (Thomas I, III, Oulad Hamida 1); AAO, Ahl Al Oughlam; BF, Bir Feghloul; DBA, Bar Bou Azza; DBC, Dar Bouchaïb Oulad Caïla; DM, Douar Mouhak; GBH, Ghandour Ben Habib; Li, Lissasfa; OQJ, Oulad Aj J'mel; OH, Oulad Hamida; OM, Oulad Malik; RBA, Reddad Ben Ali; SAR, Sidi Abderrahmane Quarries; SM, Sidi Messaoud (Raynal et al. 2010)

stepped, dune-covered beaches increases progressively as one moves inland. The successive phases of marine and continental deposition exposed by quarrying in the sections near Casablanca provide a unique opportunity to observe the paleo-littoral context of the region and its evolution over time. They continue to provide a solid foundation for the establishment of the chronostratigraphical framework, for the Maghreb, and beyond.

Since explorations and research were initiated in the first quarter of the last century, the Casablanca depositional sequence has been the object of intense research aiming to understand the mechanics of its formation and to establish a chronostratigraphical framework within which to place its important archaeological occurrences (Neuville and Ruhlmann 1941; Lecointre 1952; Dresch et al. 1952; Biberson 1961; Lefèvre and Raynal 2002 and references therein). Early excavations carried out at Sidi Abderrahmane (Schneider Quarry) revealed for the first time the great antiquity of the human presence on the Moroccan coastline (Neuville and Ruhlmann 1941), attracting early on the attention of eminent prehistorians like Abbé H. Breuil (Institut de Paléontologie Humaine, Paris). Progressively, exploitation of the quarry was to disclose the existence of other cavities containing

archaeological material (*Rhinocéros, grotte de l'Éléphant, grotte de la Gazelle, grotte du Cheval, Cap Chatelier*). Even though the area was classed as a cultural heritage site in 1951, it has been poorly protected, and the degradation of the relationships between quarry workers and archaeologists eventually led to the partial destruction of the sites and unfortunate losses of many of the artifacts.

Biberson exhumed the first remains of *Homo erectus* in 1955 from the *Grotte des Littorines*, including a fragmentary mandible, in association with Acheulian tools and abundant Upper-Middle Pleistocene faunal remains. The human bones were promptly attributed to a new species: *Atlanthropus mauritanicus*. Following a period of neglect lasting nearly 20 years, new excavations were finally undertaken in 1978 thanks to the initiative of the *Service de l'Archéologie du Ministère des Affaires Culturelles du Royaume du Maroc* and then under the direction of the *Institut National des Sciences de l'Archéologie et du Patrimoine* in collaboration with French researchers. The excavations undertaken in the 1950s by Biberson gave rise to the first typological lexicon defining primitive stone industries. This work provided one of the first foundations for a synthetic chrono-cultural framework alongside the widespread lexicon defined by Mary Leakey, based on her monumental work on the lithics from Olduvai Gorge (Leakey 1971).

Today, multidisciplinary research continues to work toward the realization of a coherent correlative synthesis between regional stratigraphy and global glacio-eustatic events in order to precisely evaluate the age of the artifact-yielding deposits of the Casablanca sequence (Texier et al. 1994, 2002; Lefèvre and Raynal 2002). A joint project between France and Morocco has undertaken systematic explorations of the region since 1988 (Raynal and Texier 1989). Different methods have been applied in attempts to establish a reliable chronology (U/Th radiometrical dating, parallelisms with the well-calibrated northern Mediterranean littoral formations and glacial deposits, biochronological criteria such as the succession of foraminifera fauna documented in deep-sea cores). Some of the correlations are based on research carried out in central Italy (Ambrosetti et al. 1972) where a chronological framework has been elaborated according to parallelisms prepared between alternating periods of sedimentation and erosion and marine glacial oscillations by the intermediary of faunal and floral evolution (Fig. 5).

The earliest evidence for hominin activity from the Casablanca sequence comes from the Thomas-Oulad Hamida Quarries complex Unit L and Hominid Cave at Thomas Quarry 1, dating to the end of the Early Pleistocene. Other key archaeological sites identified around the Sidi Abderrahmane locality belong mostly to the Upper-Middle Pleistocene and are representative of the final phases of the Acheulian or the beginning of the MSA (Upper Pleistocene): Bears Cave, Cap Chatelier, Rhino Cave at Oulad Hamida Quarry 1, Sidi Abderrahmane Extension, and Sidi Al Khadir open-air sites.

The age of the hominin-bearing archaeological Level L at Thomas Quarry 1 is evaluated to around 1 Mya (Raynal and Texier 1989; Raynal et al. 2002, 2009), making it the oldest archaeological site with hominin remains in all of North and Saharan Africa. Following systematic investigations at this site, carried out by P. Biberson (1961), a hemimandible of a robust hominin was unearthed in 1969 by P. Beriro and attributed in the same year to *Atlanthropus mauritanicus*. This attribution was based on finds discovered at Ternifine (Algeria) by C. Arambourg in the 1950s (Arambourg 1957; Ennouchi 1969). More recently, these fossils were denominated *Homo rhodesiensis* (Hublin 2001). The early hominins present at Casablanca are generally recognized to be within the variability of robust *Homo erectus* such as those from the Chinese site of Zhoukoudian or from Java, in Indonesia. Between 1994 and 2009, more human remains were exhumed from Thomas Quarry Hominid Cave, including a child's hemimandible, vertebra in anatomical connection, and isolated teeth, found in association with Acheulian tools and faunal remains (Raynal et al. 2010).

The rich faunal assemblage from Thomas Quarry 1 includes *Hippopotamus amphibius* s.1, *Equus mauritanicus*, *Ceratotherium simum*, elephants, *Gazella atlantica*, *Connochaetes*

taurinus, *Ursus* sp., *Crocuta crocuta*, and *Theropithecus* cf. *atlanticus* translating an open, savannah grassland environment with sparse wooded areas (Geraads 1980, 2002; Geraads et al. 1980). Unfortunately, most of the species provide little biochronological information, and they persist in (North) Africa up to the end of the Middle Pleistocene. However, the presence of a third molar from the suid *Kolpochoerus* and the characteristics of the micromammalian assemblage both confirm an Early Pleistocene age for this site (Geraads et al. 1986).

The stone industries (Raynal and Texier 1989; Raynal et al. 2010), ascribed the *Early Acheulian*, were knapped from quartzite cobbles and blocks and flint nodules collected nearby. They include some handaxes, cleavers, and picks on large flakes or cobbles, as well as worked cobbles and cores. Knapping technology was unifacial unidirectional or discoid. Some flakes were produced from polyhedrons. There are also some retouched tools.

Rhinoceros Cave, situated in the Oulad Hamida 1 Quarry, yielded Acheulian stone tools and numerous large vertebrate fossils, among which the white rhinoceros is particularly well represented. The faunal assemblage seems to indicate an open, relatively arid environment. The age of the accumulation is evaluated to around 0.4 Mya (by ESR on tooth enamel).

As a whole, the Casablanca complex provides essential information concerning the appearance of *Homo erectus* in the North African regional context and their evolution toward *Homo sapiens* in an area of the globe where no intermediary fossils (*Homo neanderthalensis*, *Homo heidelbergensis*) have yet been brought to light. Furthermore, the Casablanca sequence, covering around 800 Kyrs of early human cultural evolution, offers a precious database for understanding the variability of Acheulian culture over time. The data so exceptionally preserved and brought to light at this locality is essential for understanding the scenario of early human migrations into Eurasia throughout the different periods of the Early and Middle Pleistocene (Fig. 6).

Fragmented skull parts found in 1933 near Rabat and the Salé cranium (0.4 Mya) found in

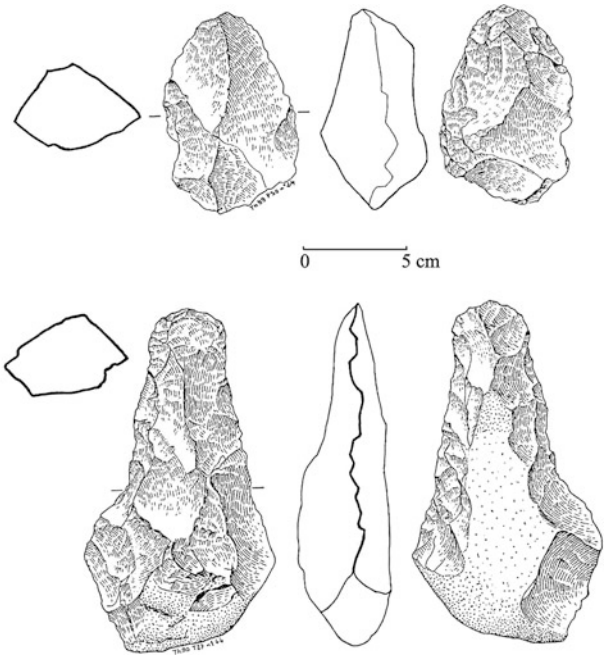

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 6 *Left*: *Homo mauritanicus* mandible from Thomas Quarry 1, Casablanca (Morocco). *Right*: Retouched tool and hand axe emblematic of Acheulian culture – both from Thomas Quarry 1 (Raynal et al. 2010)

1971 show features reminiscent of *Homo erectus* but also display some more advanced characteristics evoking a local evolution to *Homo sapiens*.

In sum, evidence from the Atlantic coast of Morocco indicates the presence of Acheulian-producing populations from around OIS 17 to 5, thanks to a few key, hominin-yielding sites (Sidi Abderrahmane, Thomas Quarry, Oulad Hamida, Rabat, Salé), allowing to postulate that the transition from *Homo erectus* to *Homo sapiens* occurred in this region between around 0.4 and 0.2 Mya (Aouraghe 2006) in agreement with new discoveries at Jebel Irhoud (Hublin et al. 2017). This hypothesis is mainly based on the observation of changes in stone tool technology and human anatomical characteristics over time.

Another site in Morocco that yielded remains of *Homo mauritanicus* with Acheulian tools is Aïn Maârouf, an inland locality discovered in the 1950s (Choubert and Sittler 1957) near El Hajeb, in an open-air context (Hublin 1992). This occurrence has also revealed fossils of large mammals such as elephants and hippos. The presence of *Antelope Parmularius ambiguus*, a species known elsewhere in North Africa only from Ternifine, suggests a chronological affinity between these two sites (Geraads and Amani 1997).

Elsewhere in North Africa, one of the most important Acheulian occurrences in a precise stratigraphical context is the Middle Pleistocene site of Ternifine (Tighennif; Palikao), located in Algeria, near the city of Mascara (Arambourg 1955; Arambourg and Hoffstetter 1963; Balout et al. 1967; Geraads et al. 1986). At this open-air site, large vertebrate fossils (elephant, rhino, hippo) were first unearthed from a dune embankment in the last quarter of the nineteenth century after quarrying was carried out for construction purposes (Pomel 1878, 1893–1897). Following initial excavations, the prehistoric stone industries found there were described by Tommasini (1886). The archaeological site, surmounted by a Muslim cemetery, was systematically exploited some years later when Arambourg recognized its archaeological potential after exploring the area in 1931. Arambourg undertook excavations in the waterlogged basal sector of the mound and exhumed hominin remains (a parietal, three mandibles, and isolated teeth; Hublin 1985) that were attributed to *Atlanthropus mauritanicus* (within the range of Asian *Homo erectus*). These remains were found in association with stone tools ascribed to an *Early Acheulian* morpho-complex, as well as large vertebrate fossils (Arambourg 1955). The site was further excavated from 1981 to 1983 (Geraads et al. 1986).

The Ternifine site deposits, nearly 7 m thick, are composed of alternating layers of clays and sands accumulated from a nearby paleo-lake and the artesian springs that fed into it. Analysis of the surface of sand grains composing much of the infill revealed their origin from eolian transport. The age of the archaeological levels has been assessed mainly from biochronological criteria and paleomagnetic evaluations to c. 0.7 Mya (Geraads et al. 1986; Raynal et al. 2001). The animal fossils collected from the different archaeological levels suggest an open, savannah-like environment surrounding the site. Taxonomically, Ternifine differs significantly from the older sites of Aïn Hanech or Aïn Boucherit, resembling more closely Thomas Quarry 1 at Casablanca (Geraads et al. 1986).

The stone industry includes cobble tools as well as a number of characteristic large flakes shaped into handaxes, trihedrals, and cleavers (Balout et al. 1967; Sharon 2011). These "heavy duty" tools were made from cobbles or slabs of sandstone, quartzite, and some limestone. In addition, there are some small flint flakes (Balout et al. 1967; Geraads et al. 1986). The "cobble opening flake method" (*éclat entame*) was used by hominins to obtain large flakes that needed only modest transformation to be shaped into handaxes and cleavers (Sharon 2009, 2011). Flat cobbles were used to extract *entame* and Kombewa flakes, a distinctive feature of the Ternifine industry that is also observed at some sites in the Iberian Peninsula (Sharon 2011). This particular shared technological know-how could have been transmitted via the Straits of Gibraltar some time after its development (Sharon 2011).

In Tunisia, the excavated Acheulian site of Sidi Zin (El Kef, Belhouchet 2001) was discovered during geological research around Fef (Dumon 1942). Excavations revealed three distinct

archaeological levels containing stone tool assemblages with limestone handaxes and cleavers attributed to the Final Acheulian. Relatively numerous shaped tools (LCTs) are found with some worked cobbles and small cores and flakes knapped from local flint. The stratigraphical sequence is surmounted by a layer of tufa containing a "Mousterian" industry knapped in flint.

Other Lower Stone Age Occurrences

In Morocco, a number of open-air stations were reported to contain scatters of Oldowan-type industries: Tardighet-er-Rahla, Douar Doum (Rabat), and Salé plateau (Biberson et al. 1958–1959; Biberson 1961), but these were later discounted because of their uncertain stratigraphical position and/or doubts concerning their anthropic origin (Debénath 2000). In northeastern Morocco, abundant and remarkably rich prehistoric sites assigned to all periods of human cultural evolution attest to the continuous occupation of the area. But systematic research still needs to be developed to properly document the archaeological treasures of this region. The oldest occurrences are found in deeply eroded, staged alluvial terraces, and conglomerates. Acheulian industries are sometimes found in scatters over surfaces thousands of square meters in diameter, but most occurrences are devoid of faunal remains, and the dating of the sandy, artifact-rich sediment continues to pose methodological difficulties. Some of the sites contain lithics with rolled surfaces attesting to their transport after the erosion and dismantling of their original alluvial context.

In Algeria, there are numerous Acheulian findings in many regions. In the Algerian Sahara, the site of Erg Tihodaine (Djanet, Tamanrasset) has been reported to present a collection of Acheulian implements. At N'Gaous (N'Gaous, Batna), a travertine sequence contains different stratified Acheulian levels in open-air conditions (Sahed 2011). Other sites (Tabelbala-Tachenghit, Djebel Meksem, Tessala, Aoulef, Reggane, Saoura, Bordj Tan Kena) are attributed to the Early Pleistocene on the basis of the composition and general morphology of the stone industries they contain. Unfortunately, most are non-stratified scatters of industries, and they are generally lacking in associated fauna (Champault 1951; Balout 1955; Hugot 1955; Laplace-Jauretche 1956; Alimen and Chavaillon 1960; Ramendo 1963; Roubet 1967; Thomas 1973; Alimen 1978; Heddouche 1980).

One significant open-air site is Errayah, situated in northwestern Algeria (Sidi Ali, Mostaganem). This site has provided a stratigraphical sequence comprising distinct archaeological levels with lithics (large and regular flakes, cores, retouched tools, worked cobbles, handaxes, cleavers, and trihedrals) believed to represent a sequence of successive cultural phases of the Acheulian (Derradji et al. 2017). Raw materials are from local sources and include sandstone, quartzite, and flint. This site is one of many discovered in 1996 during surveying near the coastline at Mostaganem. Excavated since 2001, the site's deposits are mostly sands, accumulated in a fluvial environment upon a clayey Miocene substrate. Unfortunately, there is no fauna at Errayah, and no dates have yet been made available for this site (Derradji 2006; Derradji et al. 2017).

A very rich Acheulian industry is described from another Algerian open-air site – El Mansourah (Constantine) – discovered in 1953. The assemblage is composed of some quartzite handaxes and cleavers, worked cobbles, spheroids, cores, and flakes. Initially, the presence of trihedral forms alongside polyhedrons was interpreted to represent some kind of "intermediate" cultural manifestation between the spheroid-rich industries of Aïn Hanech and the more developed bifacial industries with which they continue to coexist (such as those from Ternifine; Laplace-Jauretche 1956).

In Tunisia, Oldowan industries are poorly documented from precise stratigraphic situations. However, some Acheulian localities have been mentioned following explorations in the early nineteenth century (E. Gobert). Still, the Lower Stone Age remains sparsely documented throughout the country: a few localities are known from Quaternary alluvials in the southwestern Tunisian high plateaus. Flakes, cobble tools, and handaxes were found at two stations near Gafsa, El Mekta, and Redeyef. The latter has yielded some facetted

polyhedrons in flint (Gobert 1910). Some bifacial choppers have also been reported from the northeastern coast of Tunisia (Gragueb and Oueslati 1990). At Wadi Sarrat (Le Kef Prov., Tunisia), there are Acheulian and Aterian lithics in association with rich faunal assemblages (Martinez-Navarro et al. 2014).

Studies of Pleistocene archaeology documenting the presence of Acheulian peoples in southern Egypt were methodically undertaken in the 1930s at Kharga Oasis (Caton-Thompson 1932) and also at Gilf Kebir (Bagnold et al. 1939). Acheulian industries are known from various localities to the south, essentially near the Sudanese border at Bir Tarfawi-Bir Sahara (Schilde and Wendorf 1975, 1981; Wendorf et al. 1976; Hill 2001). The Bir Tarfawi-Bir Sahara region is localized in the Darb el Arba'in Desert (Haynes et al. 1997; Hill 2001), one of the most arid regions of the world today whose history is marked by dramatic climatic change. During the wetter, pluvial periods of the Middle Pleistocene, the region was home to a wide variety of mammals, including hominins, living in a lush, forested environment. A few, isolated discoveries of Acheulian industries have been reported from the Saharan portions of Sudan, Chad, and Libya (Hill 2001). The presence of fossil springs at these localities underlines the need for a source of fresh water for the survival of early humans (Figs. 7 and 8).

In the westerly sectors of Saharan Africa, in Mauritania, pre-Acheulian and Acheulian industries were recognized as early as the 1930s, for example, in the outer ring of the Guelb er Richat structure, also known as the "eye of the Sahara" (Adrar region). The unique elliptical structure of the Guelb results from the differential erosion of rocks composing the dome. After explorations in the region, Théodore Monod discovered and described Early Paleolithic industries from El Beyyed, Oued Akerdeil, Tazazmout, and Aderg (Monod 1975). These finds were to spur further research in the surrounding Quaternary sedimentary sequence by a French-Mauritanian team (Giresse et al. 2012).

Surveying in the Oued Akerdeil from 1998 led to the discovery of more Lower Stone Age sites at El Beyyed, notably Yeslem I, II, and III (De Lumley et al. 2006), which have yielded handaxes and cleavers of extraordinarily large

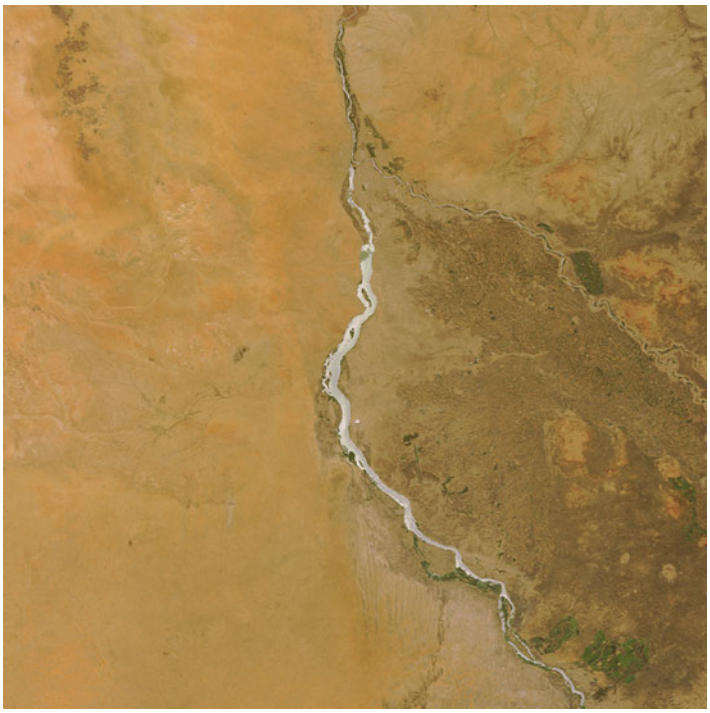

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 7 Arial view of the present-day Nile and Blue Nile Rivers showing irrigated farmland surrounded by vast expanses of the Sudanese desert. (Source: http://www.eosnap.com)

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 8 Natural underground water source surging out of a barren desert landscape in Western Sahara (Photo Jordi Mestre, IPHES)

dimensions. These artifacts form a part of an assemblage that includes chopping tools, cores (mainly discoidal), and flakes, knapped predominantly from locally available quartzitic sandstone. Some faunal remains were recovered from Yeslem III, and the presence of hippopotamus and crocodile remains indicates a watery environment. Overall, the faunal list portrays a savannah landscape with some canopy forest in proximity to water sources, suggesting perhaps a lake-edge environment. This paleoecological assessment is buttressed by data obtained from the sedimentological analysis suggesting a fluvial origin for the deposits. It has not been possible to evaluate the age of the sites using biochronological criteria since the species represented survive in the region up to the end of the Pleistocene.

Waterways, Water Systems, and Hominin Dispersions out of Africa

Close examination of trends in environmental conditions in which Lower Stone Age Pleistocene hominin sites occur in North and Saharan Africa (and elsewhere) evidences the key role played by waterways and water systems for human survival and diffusion. The extension and layout of these waterways dictated emplacements of early human settlements and migration routes.

Observation of the archaeological record from Eurasia during the Early and Middle Pleistocene is essential to understanding why, how, and when hominins from North and Saharan Africa dispersed northward across the Mediterranean seaway. Of paramount importance to this understanding is the Dmanisi site, situated in the piedmont of Georgia's Caucasus Mountain range, since it has provided the earliest evidence of a hominin presence outside of Africa. Juxtaposing Central Asia, Eastern Europe, and the Near East, Dmanisi has yielded Oldowan industries with faunal and hominin remains attributed to *Homo georgicus* and dated to 1.8 Mya (Gabunia et al. 2002). According to current data, the first peopling of Eurasia likely took place when hominins moved out of their African homeland via one or more of four potential passageways: the Gibraltar Straits, the Tunisia-Sicily route, across the Sinai and into the Levant, or via the Bab-el-Mandeb Straits (Fig. 9).

Geographically, migrations across the Straits of Gibraltar into the Iberian Peninsula appear as an obvious route out of the Maghreb – but there are numerous difficulties in providing evidence that early humans were in fact capable of making such a voyage (swimming, navigation). Nevertheless, cultural similarities in lithic assemblages between these two regions have often been noted for the Lower Paleolithic (Sharon 2011) and also for the Middle and Upper Paleolithic (Otte 2007). Today this corridor is only 15 km wide, and this

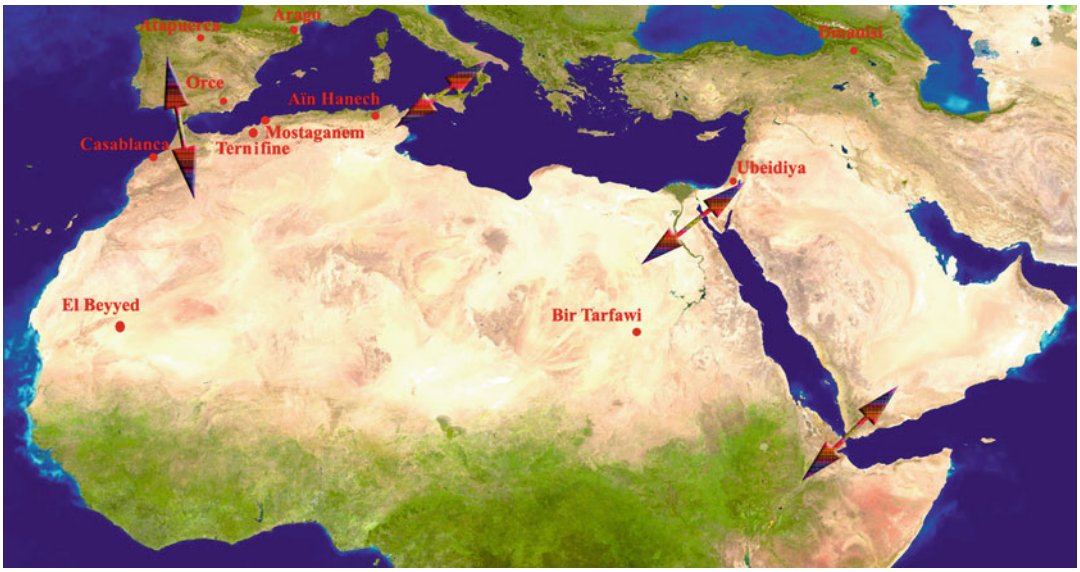

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 9 Map showing some Oldowan and Acheulian sites in North and Saharan Africa and in Mediterranean Europe, as well as possible migration routes (*from left to right*: Morocco, Spain via Gibraltar Straits; Tunisia, Sicily route, Levant passageway; Djibouti, Yemen via the Bab-el-Mandeb Straits). Oldowan sites: (Spain) Atapuerca (Sima del Elefante, Gran Dolina levels TD4, TD5, TD6) and Orce (Barranco León and Fuente Nueva 3) (Georgia), Dmanisi; (Algeria) AÏn Hanech. Acheulian sites: (Spain) Atapuerca (Galería, Gran Dolina); (France) Caune de l'Arago; (Levant) Ubeidiya; (Morocco) Casablanca sequence; (Algeria) Ternifine, Mostaganem; (Mauritania) El Beyyed; (Egypt) Bir Tarfawi

distance may have been lessened by lower water levels during glacial events. The highlands present on either side of the straits are clearly visible in fine weather conditions and must have been a lure for human populations through time. Although the depth of the ocean at this particular point has always been too great to allow for the formation of a land bridge, emerged island-hopping remains within the range of possibilities for humans to have crossed over from Africa into Europe (and vice versa).

In Iberia and some areas of southern France, the Acheulian differs compared to the rest of Europe, with the toolkits showing more morpho-technological affinities to the African industries (Sharon and Barsky 2016; Bourguignon et al. 2016). Industries are characterized by large flakes transformed into handaxes and – especially – cleavers. The relative abundance of cleavers in Spanish assemblages constitutes a particularity suggesting African heritage with possible migrations via Gibraltar. In fact, the frequency of these tools diminishes progressively as one moves eastward and northward out of the Iberian Peninsula. The expansion of the Acheulian in Europe postdates that of Africa, and there are a number of sites spanning MIS 16-MIS12 (Villa et al. 2016) (e.g., the Caune de l'Arago in France and Atapuerca in Spain c. 0.6 and c. 0.5 Mya, Barsky and de Lumley 2010; Rodríguez et al. 2011). In Europe, assemblages attributed to the Acheulian are now thought to have appeared as early as 1 Myrs ago (Barranc de la Boella, Vallverdú et al. 2014; Mosequera et al. 2015). Acheulian industries are abundant in the alluvial terraces of Iberia, in particular around the Meseta.

Among the excavated sites, Pinedo (Toledo), situated in river deposits of the middle terrace of the Tage, has yielded cobble tools and trihedrals, as well as handaxes with a low level of symmetry. The assemblage has been described as belonging to an early phase of the Acheulian. Similar industries have been found on the middle terraces of the Tormes, in the northern part of the sub-Meseta (levels III and II, La Maya). The open-air, elephant kill sites of Torralba and Ambrona (Central

Meseta), systematically excavated over large surface areas, are attributed to OIS 12 although precise dates are not available. The assemblages have been assigned to either the *Lower Middle Acheulian* (Howell and Freeman) or to an *Evolved Middle Acheulian* (Bordes and Santonja). Just 18 km southeast of Madrid, on a flood plain of the Jarama riverbed, Aridos I and II are also open-air, elephant kill sites that have yielded similar Acheulian tools.

The longest and most complete archeostratigraphical record on the Iberian Peninsula is from the Sierra de Atapuerca sequence (Rodríguez et al. 2011; Ollé et al. 2013). The karstic system exposed long stratigraphical sections after a trench was dug out for the passage of a cargo train (*Trinchera del Ferrocarril*). Atapuerca's Elefante, Galeria, and Dolina sites have yielded stone industries, fauna, and hominin remains providing an almost complete record of human occupation of Europe during the Pleistocene (c. 1.2–0.25 Kya). At the Elefante site, level TE9 has yielded stone tools and hominin remains dated to 1.2 Mya. The unique handaxe from the Sima de los Huesos, found in association with numerous *Homo heidelbergensis* skeletal remains (28 almost complete individuals), is dated to 0.53 Mya (Bischoff et al. 2007). This tool currently represents the oldest evidence for possible symbolic behaviour in Acheulian culture in Spain in a well-stratified and precisely dated context (Carbonell and Mosquera 2006).

Some authors postulate the Levantine corridor as the most probable route taken by hominins out of Africa and into Eurasia at the beginning of the Early Pleistocene (Agustí and Lordkipanidze 2010), and it is probable that pioneering hominin groups originated from the lands now occupied by the Sahara desert. Human groups producing Oldowan-type industries could have spread throughout North Africa and then into the Western Mediterranean basin, frequenting deltaic and other water-rich environments in search of prey. Coastal routes would have provided resource-rich environments attracting plentiful animals and encouraging hominin settlement. Some well-known archaeological occurrences in Spain bear witness to this early occupation of Europe, at least as early as 1.4–1.2 Mya, at Barranco León and Fuente Nueva 3 (Orce, Andalusia, Toro Moyano et al. 2010b), Sierra de Atapuerca's Sima del Elefante level TE9 (Burgos, Carbonell et al. 2008), and also Gran Dolina TD4, 5, 6 (0.8 Mya, Carbonell et al. 1995). Following the transition to the Acheulian and the appearance of *Homo erectus*/*Homo ergaster*, new waves of migration back and forth from Africa and Eurasia took place from around 1.6–1.5 Mya (Ubeidiya and Attirampakkam; Bar-Yosef and Goren-Inbar 1993; Pappu et al. 2011) and especially after around 0.9–0.8 Mya (GBY, Yunxian; Goren-Inbar et al. 2000; De Lumley and Tianyuan 2008; Sharon 2011) (Fig. 9).

Concluding Remarks

The Aïn Hanech and El Kherba sites (1.8 Mya, Algeria, Sahnouni 2006; Sahnouni et al. 2010) prove that North Africa was inhabited by hominins producing Oldowan industries during the Early Pleistocene, although the paucity of sites in the Maghreb region has led some authors to point out the possible incidental nature of this occupation. Presently, it appears clear that North and Saharan Africa harbor some of the richest Acheulian sites in the world attesting to the occupation of this zone throughout the Middle Pleistocene. Toward the end of the Upper Pleistocene, from around 0.3 to 0.2 Mya, within the context of a continuing climatic trend toward increased aridity, the more complex Middle Stone Age lithic assemblages, with their profusion of divers, small retouched tools, replaced Acheulian industries. In the context of the gradual replacement of *Homo erectus* by *Homo sapiens*, knapping technology continued to complexify, orienting production toward highly standardized flakes.

Continued surveying, cartography, and systematic research will surely reveal more evidence for the earliest occupation of this vast and little known area of our African homeland. In the future, improved and modernized technologies will contribute to the discovery of new Lower Stone Age sites in the more remote and inhospitable areas of the Sahara desert. We may look forward to the establishment of collaborative programs combining the infrastructure and funding

necessary to effectively excavate the sites and adequately curate the artifacts discovered.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Handaxes and Biface Technology
- ▶ Hominids, Earliest African
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ North and Saharan Africa: Geography and Chronology
- ▶ Oldowan Industrial Complex
- ▶ Stone Tool Usewear and Residue Analysis

References

Agustí, J., and D. Lordkipanidze. 2010. How "African" was the early human dispersion out of Africa? *Quaternary Science Reviews* 30 (11): 1338–1342.

Agustí, J., H.A. Blain, G. Cuenca-Bescós, and S. Bailon. 2009. Climate forcing of the first hominid dispersal in western Europe. *Journal of Human Evolution* 57: 815–821.

Alimen, M.H. 1978. *L'évolution de l'Acheulien au Sahara Nord-Occidental (Saoura – Ougarta – Tabelbala)*. Paris: CNRS.

Alimen, M.H., and J. Chavaillon. 1960. Présentation de "galets aménagés" des niveaux successifs du Quaternaire ancien de la Saoura (Sahara). *Bulletin de la Société Préhistorique Française* 57: 373–374.

Ambrosetti, P., A. Azzroli, P. Bonnadonna, and M. Follieri. 1972. A scheme of Pleistocene chronology for the Tyrrhenian side of central Italy. *Bulletin de la Société Géologique Italien* 91.

Arambourg, C. 1955. The gisement de Ternifine et l'Atlanthropus. *Bulletin de la Société Préhistorique de France* 52: 94–95.

Arambourg, C. 1957. Récentes découvertes de paléontologie humaine réalisées en Afrique du Nord française (L'Atlanthropus de Ternifine – L'Hominien de Casablanca). In *Third Panafrican congress on prehistory, Livingstone 1955*, ed. J.D. Clark and S. Cole, 186–194. London: Chatto & Windus.

Arambourg, C., and R. Hoffstetter. 1963. The gisement de Ternifine I. Première partie: Historique et géologie. *Archives de l'Institut de Paléontologie Humaine* 32: 9–36.

Aouraghe, H. 2006. Histoire du peuplement paléolithique de l'Afrique du Nord et dynamique des interactions entre l'homme et son environnement. *Comptes Rendus de Palevol* 5: 237–242.

Bagnold, R.A., R.F. Peel, O.H. Myers, and H.A. Winkler. 1939. An expedition to the Libyan Desert. *Geographical Journal* 93: 281–313.

Balout, L. 1955. *Préhistoire de l'Afrique du Nord. Essai de chronologie*. Paris: Éditions AMG.

Balout, L., P. Biberson, and J. Tixier. 1967. L'Acheuléen de Ternifine (Algérie), gisement de l'Atlanthrope. *L'Anthropologie* 71: 217–237.

Barsky, D., and H. de Lumley. 2010. Early European mode 2 and the stone industry from the Caune de l'Arago's archeostratigraphical levels "P". *Quaternary International* 223–224: 71–86.

Bar-Yosef, O., and N. Goren-Inbar. 1993. *The lithic assemblage of Ubeidiya. A Lower Paleolithic site in the Jordan Valley*. Jerusalem: Institute of Archeology/Hebrew University of Jerusalem.

Belhouchet, L. 2001. Étude technologique des bifaces des niveaux inférieur et moyen de Sidi Zin (Le Kef, Tunisie). *Préhistoire Anthropologie Méditerranéennes* 10–11: 97–106.

Beyene, Y., S. Katoh, G. Woldegabriele, W.K. Hart, K. Uto, M. Sudo, M. Kondo, M. Hyodo, P.R. Renne, G. Suwa, and B. Asfaw. 2013. The characteristics and chronology of the earliest Acheulain at Konso, Ethiopia. *PNAS* 110 (5): 1584–1591.

Biberson, P. 1961. Le cadre paléogéographique de la préhistoire du Maroc atlantique et le Paléolithique inférieur du Maroc atlantique. *Publications du Service des Antiquités du Maroc, Rabat fas*c. 16 & 17.

Biberson, P. 1967. *Some aspects of the Lower Paleolithic of Northwest Africa. Background to evolution in Africa*, 447–475. Chicago/London: University of Chicago Press.

Biberson, P., G. Choubert, A. Faure-Muret, and G. Lecointre. 1958–59. Contribution à l'étude de la "Pebble Culture" du Maroc atlantique. *Bulletin d'Archéologie Marocaine* 3: 7–53.

Bischoff, J.L., R.W. Williams, R.J. Rosenbauer, A. Aramburu, J.L. Arsuaga, N. García, and G. Cuenca-Bescós. 2007. High-resolution U-series dates from the Sima de los Huesos hominids yields 600 $\pm^{\infty}$66 kyrs: Implications for the evolution of the early Neanderthal lineage. *Journal of Archaeological Science* 34 (5): 763–770.

Bourguignon, L., D. Barsky, J. Ivorra, L. de Weyer, F. Cuartero, R. Capdevila, C. Cavallina, O. Oms, L. Bruxelles, J.-Y. Crochet, and J.R. Garaizar. 2016. The stone tools from stratigraphical unit 4 of the Bois-de-Riquet site (Lézignan-la-Cèbe, Hérault, France): A new milestone in the diversity of the European Acheulian. *Quaternary International* 411 (Part B): 160–181.

Brunet, M., A. Beauvilain, Y. Coppens, E. Heintz, A.H.E. Moutaye, and D. Pilbeam. 1995. The first australopithecine 2,500 kilometres west of the Rift Valley (Chad). *Nature* 378: 273–275.

Carbonell, E., J.M. Bermúdez de Castro, J.L. Arsuaga, J.C. Díez, A. Rosas, G. Cuenca, R. Sala, M. Mosquera, and X.P. Rodríguez Álvarez. 1995. Lower Pleistocene hominids and artifacts from Atapuerca-TD6 (Spain). *Science* 269: 826–830.

Carbonell, E., and M. Mosquera. 2006. The emergence of a symbolic behaviour: the sepulchral pit of Sima de los Huesos, Sierra de Atapuerca, Burgos, Spain. Comptes Rendus Palevol 5 (1–2): 155–160.

Carbonell, E., J.M. Bermúdez de Castro, J. Parés, A. Pérez-González, G. Cuenca-bescos, A. Ollé, M. Mosquera, R. Huguet, J. Van Der Made, A. Rosas, R. Sala, J. Vallverdú, N. García, D. Granger, M. Martinon-torres, X.P. Rodríguez, G. Stock, J.M. Vergés, E. Allué, F. Burjachs, I. Cácares, A. Canals, A. Benito, C. Díez, M. Lozano, A. Mateos, M. Navazo, J. Rodríguez, J. Rossell, and J.L. Arsuaga. 2008. The first hominin of Europe. *Nature* 452: 456–470.

Carbonell, E., R. Sala, D. Barsky, and V. Celiberti. 2009. From homogeneity to multiplicity: A new approach to the study of archaic stone tools. In *Interdisciplinary approaches to the Oldowan*, ed. E. Hovers and D. Braun, 25–38. Dordrecht: Springer.

Carbonell, E., D. Barsky, R. Sala, and V. Celiberti. 2016. Structural continuity and technological change in Lower Pleistocene toolkits. *Quaternary International* 393: 6–18.

Caton-Thompson, G. 1932. The royal anthropological institute's prehistoric research expedition to Kharga Oasis, Egypt: Second season's discoveries. *Man* 158: 1–7.

Chaid-Saoudi, Y., D. Geraads, and J.P. Raynal. 2006. The fauna and associated artefacts from the Lower Pleistocene site of Mansourah (Constantine, Algeria). *Comptes Rendus Palevol* 5: 963–971.

Champault, B. 1951. L'industrie de Tachenghit. *AFAS 70 ème Congrès pour l'Association Française pour l'Avancement des Sciences* 3: 123–130.

Choubert, G., and C. Sittler. 1957. Les terrasses de l'Aïn Maarouf et la micro-flore sporo-pollinique de ses dépôts néolithiques (région d'El Hajeb, Maroc), *INQUA Congrès*, Madrid, pré-tirage.

Coppens, Y. 1994. East side story, the origin of humankind. *Scientific American* 270: 88–95.

de Heinzelin, J., J.D. Clark, T. White, W. Hart, P. Renne, G. WoldeGabriel, Y. Beyene, and E. Vrba. 1999. Environment and behaviour of 2.5-million-year-old Bouri hominids. *Science* 284: 625–629.

de la Torre, I. 2011. The early stone age lithic assemblages of Gadeb (Ethiopia) and the developed Oldowan/Early Acheulean in East Africa. *Journal of Human Evolution* 60: 768–812.

De Lumley, H., and L. Tianyuan (Coords.). 2008. Le site de l'homme de Yunxian: Quyuanhekou, Quingqu, Yunxian, Province de Hubei. Paris: CNRS Editions.

De Lumley, H., O. Chérif Touré, M. Ould Rachid, A.-M. Moigne, A. Dambricourt-Malassé, T. Saos, D. Pleurdeau, C. Seaseau, M. Diebold, and Y. Kernaleguen. 2006. Découvert d'un assemblage lithique sous un encroûtement calcaire à El Beyyed Yeslem II, Mauritanie. *Comptes Rendus Palevol* 5: 263–271.

Debénath, A. 2000. Le peuplement préhistorique du Maroc: Données récentes et problèmes. *L'Anthropologie* 104: 131–145.

Derradji, A. 2006. Le site acheuléen d'Errayah (Mostaganem, Algérie) dans son contexte géologique. *Comptes Rendus Palevol* 5: 229–235.

Derradji, A., F. Chemerik, M. Medig, Z. Harichane, and S. Chibane. 2017. Errayah, un site Acheuléen recent dans la partie littorale nord-occidentale de l'Algérie (Sidi-Ali, Mostaganem). *L'Anthropologie* 121: 179–188.

Dresch, J., M. Gigout, F. Joly, J. Le Coz, and R. Raynal. 1952. Aspect de la géomorphologie du Maroc. *Publications de la XIXème Congrès Géologique International* (Monographies régionales 3). Maroc, Rabat.

Dumon, E. 1942. Découverte d'une station acheuléenne dans la région du Kef. *La Revue Tunisienne* 52: 347.

Ennouchi, E. 1969. Découverte d'un pithecanthropien au Maroc. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences Serie D* 269: 763–765.

Gabunia, L., M.A. de Lumley, A. Vekua, D. Lordkipanidze, and H. de Lumley. 2002. Discovery of a new hominid at Dmanisi (Transcaucasia, Georgia). *Comptes Rendus Palevol* 1: 243–253.

Geraads, D. 1980. La faune des sites à *Homo erectus* des carrières Thomas (Casablanca, Maroc). *Quaternaria* 22: 65–94.

Geraads, D. 2002. Plio-Pleistocene mammalian biostratigraphy of Atlantic Morocco. *Quaternaire* 13: 43–53.

Geraads, D. 2006. The late Pliocene locality of Ahl Al Oughlam Morocco: Vertebrate fauna and interpretation. *Transactions of the Royal Society of South Africa* 61: 97–101.

Geraads, D., and F. Amani. 1997. La faune du gisement a *Homo erectus* de l'Ain Maarouf, près de El Hajeb (Maroc); the fauna of Aïn Maarouf, an *Homo erectus* site near El Hajeb, Morocco. *L'Anthropologie* 101: 522–530.

Geraads, D., P. Beriro, and H. Roche. 1980. La faune et l'industrie des sites à *Homo erectus* des carrières Thomas (Maroc). Précisions sur l'âge de ces Hominidés. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences Serie D* 291: 195–198.

Geraads, D., J.J. Hublin, J.J. Jaeger, S. Sen, H. Tong, and P. Toubeau. 1986. The Pleistocene hominin site of Ternifine Algeria: New results on the environment, age and human industries. *Quaternary Research* 25: 380–386.

Giresse, P., O. Sao, and H. de Lumley. 2012. Étude paléoenvironnementale des sédiments quaternaires du Guelb er Râchat (Adrar de Mauritanie) en regard des sies voisins ou associés du Paléolithique inférieur. Discussion et perspectives. *L'Anthropologie* 116: 12–38.

Gobert, E. 1910. Balles polyédriques à facettes convexes du paléolithique nord-africain. *Bulletin de la Société Préhistorique de France* 7: 417–419.

Goren-Inbar, N., C.S. Feibel, K.L. Verosub, Y. Melamed, M. Kislev, E. Tchernov, and I. Saragusti. 2000. Pleistocene milestones on the out-of-Africa corridor at Gesher Benot Ya'aqov, Israel. *Science* 289: 944–947.

Gragueb, A., and A. Oueslati. 1990. Les formations quaternaires des côtes nord-est de la Tunisie et les

N

industries préhistoriques associées. *L'Anthropologie* 91: 259–292.

Harmand, S., J.E. Lewis, C.S. Feibel, C.J. Lepre, S. Prat, A. Lenoble, X. Boës, R.L. Quinn, M. Brenet, A. Arroyo, N. Taylor, S. Clément, G. Daver, J.-P. Brugal, L. Leakey, R.A. Mortlock, J.D. Wright, S. Lokorodi, C. Kirwa, D.V. Kent, and H. Roche. 2015. 3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya. *Nature* 521 (7552): 310–315.

Haynes, C.V., Jr., T.A. Maxwell, A. El Hawary, K.A. Nicoll, and S. Stokes. 1997. An Acheulian site near Bir Kiseiba in the Darb el Arba'in Desert, Egypt. *Geoarcheology: An International Journal* 12: 819–832.

Heddouche, A.E.K. 1980. Découverte d'une industrie à galets aménagés au Sahara nord-oriental. *Libyca* 28: 105–112.

Hill, C.L. 2001. Geologic contexts of the Acheulian (Middle Pleistocene) in the eastern Sahara. *Geoarcheology: An International Journal* 16: 65–94.

Howell, F.C., P. Haesaerts, and J. de Heinzelin. 1987. Depositional environments, archaeological occurrences and hominids from members E and F of the Shungura formation (Omo Basin, Ethiopia). *Journal of Human Evolution* 16: 665–700.

Hublin, J.J. 1985. Fossil hominids of the north African Middle Pleistocene and the origin of *Homo sapiens*. In *Ancestors, the hard evidence*, ed. E. Delson. New York: Alan R. Liss, Inc.

Hublin, J.J. 1992. Le fémur humain Pléistocène moyen de Aïn Maarouf (El Hajeb, Maroc). *Comptes Rendus de l'Académie des Sciences* 314: 975–980.

Hublin, J.J. 2001. Northwestern African Middle Pleistocene hominids and their bearing on the emergence of *Homo sapiens*. In *Human roots. Africa and Asia in the Middle Pleistocene*, ed. L. Barham and K. Robson-Brown, 99–121. Bristol: Western Academic and Specialist Press Ltd.

Hublin, J.-J., A. Ben-Ncer, S.E. Bailey, S.E. Freidline, S. Neubauer, M.M. Skinner, I. Bergmann, A. Le Cabec, S. Benazzi, K. Harvati, and P. Gunz. 2017. New fossils from Jebel Irhoud, Morocco and the pan-African origin of *Homo sapiens*. *Nature* 546: 289–292.

Hugot, H. 1955. Un gisement à pebble tools à Aoulef. *Travaux de l'Institut de Recherches Sahariennes* 8: 131–153.

Isaac, G., and J. Harris. 1978. In *Koobi Fora research project*, ed. M.G. Leakey and R.E. Leakey, vol. volume 1, 64–85. Oxford: Clarendon.

Kimbel, W.H., D. Johanson, and Y. Rak. 1997. Systematic position of a maxilla of homo from Hadar, Ethiopia. *American Journal of Physical Anthropology* 103: 235–262.

Kortlandt, A. 1972. *New perspectives on ape and human evolution*. Amsterdam: Stichting voor Psychobiologie.

Kuman, K., and R.J. Clark. 2000. Stratigraphy, artefact industries and hominid associations for Sterkfontein, member 5. *Journal of Human Evolution* 38: 827–847.

Laplace-Jauretche, G. 1956. Découverte d'un gisement à galets taillés (Pebble Culture) dans le quaternaire ancien du Plateau de Mansourah (Constantine). *Bulletin de la Société Préhistorique Française* 53: 215–216.

Le Tensorer, J.M., S. Muhesen, and R. Jagher. 1993. *Nadaouiyeh I Aïn Askar: une grande séquence paléolithique du Bassin d'El Kowm (Syrie), Premiers résultats, fouilles 1989–1992*, 11–36 (Cahiers de l'Euphrate 7). Paris: ERC.

Leakey, M.D. 1971. *Olduvai Gorge, excavations in Bed I and Bed II, 1960–1963*. Vol. volume 3. Cambridge, MA: Cambridge University Press.

Lecointre, G. 1952. Recherches sur le Néogène et le Quaternaire marins de la côte atlantique du Maroc. *Notes et Mémoires du Service Géologique du Maroc* 99: 122–123.

Lefèvre, D., and J.P. Raynal. 2002. Les formations plio-pléistocènes de Casablanca et la chronostratigraphie du Quaternaire marin du Marocrevisitées, in Paléorivages de Casablanca. stratigraphie et Préhistoire ancienne au Maroc atlantique. *Quaternaire* 13: 9–21.

Lepre, C.J., H. Roche, D.V. Kent, S. Harmand, R.L. Quinn, J.P. Brugal, P.J. Texier, A. Lenoble, and C.S. Feibel. 2011. An earlier origin for the Acheulian. *Nature* 477: 82–85. https://doi.org/10.1038/nature10372.

Martinez-Navarro, B., N. Karoui-Yaakoub, O. Oms, L. Amri, J.M. Lopez-Garcia, K. Zerai, H.-A. Blain, M.-S. Mtimet, M.-P. Espigares, N. Ben Haj Ali, S. Ros-Montoya, M. Boughdiri, J. Agusti, H. Khayati-Ammar, K. Maalaoui, M. Om El Khir, R. Sala, A. Othmani, R. Hawas, G. Gomez-Merino, A. Solé, E. Carbonell, and P. Palmqvist. 2014. The early Middle Pleistocene archeopaleontological site of Wadi Sarrat (Tunisia) and the earliest record of *Bos primigenius*. *Quaternary Science Reviews* 90: 37–46.

Martínez-Navarro, B., E. Carbonell, T. Medin, O. Oms, X.P. Rodríguez-Álvarez, S. Ros-Montoya, D. Araia, L. Tsehaie, and Y. Libsekal. 2016. The Engel Ela-Ramud Basin: A new Plio-Pleistocene archeo-paleontological site in Eritrea. Abstracts book of the 6th Annual Meeting of the European Society for the study of Human Evolution – ESHE, 14–17 September 2016 Madrid/Spain. p. 154.

McPherron, S.P., Z. Alemseged, C.W. Marean, J.G. Wynn, D. Reed, D. Geraads, R. Bobe, and H.A. Béarat. 2010. Evidence for stone-tool-assisted consumption of animal tissues before 3.39 million years ago at Dikika, Ethiopia. *Nature* 466: 857–860.

Monod, T. 1975. Trois gisements à galets aménagés dans l'Adrar mauritanien (Sahara occidental). *Provence Historique* 99: 87–97.

Mosequera, M., A. Ollé, P. Saladié, I. Cáceres, R. Huguet, A. Rosas, J. Villalaín, A. Carrancho, D. Bourlès, R. Braucher, A. Pineda, and J. Vallverdú. 2015. The Early Acheulian technology of Barranc de la Boella (Catalonia, Spain). *Quaternary International* 393: 95–111.

Neuville, R., and A. Ruhlmann. 1941. La place du Paléolithique ancien dans le Quaternaire marocain. *Hespéris* VIII.

Ollé, A., M. Mosquera, X.P. Rodríguez, A. Lombera-Hermida, M.D. García-Antón, P. García-Medrano, L. Peña, L. Menéndez, M. Navazo, M. Terradillos, A. Bargalló, B. Márquez, R. Sala, and E. Carbonell. 2013. The Early and Middle Pleistocene technological record from Sierra de Atapuerca (Burgos, Spain). *Quaternary International* 295: 138–167. https://doi.org/10.1016/j.quaint.2011.11.009.

Otte, M. 2007. Contacts entre Afrique du nord et Europe durant la préhistoire. In *Actes du premier colloque de Préhistoire maghrébine, Tome 1, Tamanrasset, CNRPAH 2011*: 193–207.

Pappu, S., Y. Gunnell, K. Akhilesh, R. Braucher, M. Taieb, F. Demory, and N. Thouveny. 2011. Early Pleistocene presence of Acheulian hominins in South India. *Science* 331: 1596–1600. https://doi.org/10.1126/science.1200183.

Piperno, M., and G.M. Bulgarelli-Piperno. 1974. First approach to the ecological and cultural significance of the Early Paleolithic occupation site of Garba IV at Melka Kunturé (Ethiopia). *Quaternaria* 18: 347–382.

Pomel, A. 1878. Ossements d'éléphants et d'hippopotames découverts dans une station préhistorique de la plaine d'Eghis (Province d'Oran). *Bulletin de la Société Géologique de France* 3: 44–51.

Pomel, A. 1893-1897. Monographies des vertébrés fossils de l'Algérie. *Publications du Service de la carte géologique de l'Algérie* 3–15.

Ramendo, L. 1963. Les galets aménagés de Reggan (Sahara). *Libyca* 11: 42–73.

Raynal, J.P., and J.P. Texier. 1989. Découverte d'Acheuléen ancien dans la carrière Thomas 1 à Casablance et problème de l'ancienneté de la présence humaine au Maroc. *Comptes Rendus de l'Académie des Sciences* 308: 1743–1749.

Raynal, J.P., J.P. Texier, D. Geraads, and F.Z. Sbihi-Alaoui. 1990. Un nouveau gisement paléontologique du Plio-Pléistocène du Maroc Ahl Al Oughlam (ancienne Carrière Déprez). *Comptes Rendus de l'Académie des Sciences* 310: 315–320.

Raynal, J.P., F.Z. Sbihi Alaoui, D. Geraads, L. Magoga, and A. Mohi. 2001. The earliest occupation of North-Africa: The Moroccan perspective. *Quaternary International* 75: 65–75.

Raynal, J.P., L. Magoga, and F.Z. Sbihi-Alaoui. 2002. Quelques caractères des industries acheuléennes du niveau L de la carrière Thomas 1 (Casablanca, Maroc). Fouilles 1988–1991. *Bulletin Archéologique du Maroc* 16: 11–43.

Raynal, J.P., F.Z. Sbihi-Alaoui, A. Mohib, M. El Graoui, D. Lefèvre, J.P. Texier, D. Geraads, J.J. Hublin, T. Smith, P. Tafforeau, M. Zouak, R. Grün, E.J. Rhodes, S. Eggins, C. Daujeard, P. Fernandes, R. Gallotti, S. Hossini, and A. Queffelec. 2009. Hominid cave at Thomas Quarry I (Casablanca, Morocco): Recent findings and their context. *Quaternary International* 223–224: 369–382.

Raynal, J.P., F.Z. Sbihi Alaoui, and A. Mohib. 2010. Bilan sur les recherches récentes sur le Paléolithique de Casablanca (Maroc). *Les Nouvelles de l'Archéologie* 120–121: 102–109.

Rodríguez, J., F. Burjachs, G. Cuenca-Bescós, N. García, J. Van der Made, A. Pérez González, H.-A. Blain, I. Expósito, J.M. López-García, M. García Antón, E. Allué, I. Cáceres, R. Huguet, M. Mosquera, A. Ollé, J. Rosell, J.M. Parés, X.P. Rodríguez, C. Díez, J. Rofes, R. Sala, P. Saladié, J. Vallverdú, M.L. Bennasar, R. Blasco, J.M. Bermúdez de Castro, and E. Carbonell. 2011. One million years of cultural evolution in a stable environment at Atapuerca (Burgos, Spain). *Quaternary Science Reviews* 30: 1396–1412.

Roubet, C. 1967. Découverte de nouveaux galets aménagés dans la région sétifienne. *Libyca* 15: 9–14.

Sahed, A.T. 2011. Contribution a l'etude des bifaces du gisement Acheuleen de N'gaous – Hodna oriental. *Antropo* 24: 71–87.

Sahnouni, M. 2005. Point des connaissances du Paléolithique ancien d'Afrique du nord et al. question de la première occupation humaine au Maghreb. In *Le Paléolithique en Afrique, l'histoire la plus longue*, ed. M. Sahnouni, 99–128. Paris: Artcom/Errance.

Sahnouni, M. 2006. Les plus vieilles traces d'occupation humaine en Afrique du nord: Perspective de l'Aïn Hanech (Algérie). *Comptes Rendus Palevol* 5: 243–254.

Sahnouni, M., and J. de Heinzelin. 1998. The site of Aïn Hanech revisited: New investigations at this Lower Pleistocene site in northern Algeria. *Journal of Archaeological Science* 25: 1083–1101.

Sahnouni, M., and J. van der Made. 2009. The Oldowan in North Africa within a biochronological framework. In *The cutting edge: New approaches to the archeology of human origins*, ed. N. Toth and K. Schick, 179–210. Bloomington: Stone Age Institute Press.

Sahnouni, M., D. Hadjouis, J. van der Made, A.E.K. Derradji, A. Canals, M. Medig, H. Belahrech, Z. Harichane, and M. Rabhi. 2002. Further research at the Oldowan site of Aïn Hanech, northeastern Algeria. *Journal of Human Evolution* 43: 925–937.

Sahnouni, M., J. van der Made, and M. Everett. 2010. Early North Africa: Chronology, ecology and hominin behavior: Insights from Aïn Hanech and El-Kherba, northeastern Algeria. *Quaternary International* 223–224: 436–438.

Santonja, M., and P. Villa. 2006. The Acheulian of western Europe. In *Axe age*, ed. N. Goren-Inbar and G. Sharon, 429–478. London: Equinox Publishing.

Santonja, M., A. Pérez-González, J. Panera, S. Rubio-Jara, and E. Méndez-Quintas. 2016. The coexistence of Acheulean and ancient Middle Palaeolithic techno-complexes in the Middle Pleistocene of the Iberian Peninsula. *Quaternary International* 411 (Part B): 367–377.

Schilde, R., and F. Wendorf. 1975. New explorations in the Egyptian Sahara. In *Problems in prehistory*, ed. F. Wendorf and A.E. Marks, 65–112. Dallas: Southern Methodist University Press.

Schilde, R., and F. Wendorf. 1981. *The prehistory of an Egyptian oasis*. Warsaw: Ossolineum.

Semaw, S., P. Renne, J.W.K. Harris, C.S. Feibel, R.L. Bernor, N. Fesseha, and K. Mowbray. 1997. 2.5-million-year-old stone tools from Gona, Ethiopia. *Nature* 385: 333–336.

Sharon, G. 2009. Acheulian giant core technology. A worldwide perspective. *Current Anthropology* 50: 335–367.

Sharon, G. 2011. Flakes crossing the straits? Entame flakes and northern Africa – Iberia contact during the Acheulian. *African Archaeological Review* 28: 125–140.

Sharon, G., and D. Barsky. 2016. The emergence of the Acheulian in Europe – A look from the east. *Quaternary International* 411 (Part B): 25–33.

Sussman, R.L. 1991. Who made the Oldowan tools? Fossil evidence for tool behaviour in Plio-Pleistocene hominids. *Journal of Anthropological Research* 47: 129–151.

Texier, P.J. 1995. The Oldowan assemblage from NY18 site at Nyabusosi (Toro-Uganda). *Comptes Rendus de l'Academie des Sciences* 320: 647–653.

Texier, P.J., D. Lefèvre, and J.P. Raynal. 1994. Contribution pour un nouveau cadre stratigraphique des formations littorales quaternaires de la région de Casablanca. *Comptes Rendus de l'Académie des Sciences* 318: 1247–1253.

Texier, P.J., D. Lefèvre, J.P. Raynal, and M. El Graoui. 2002. Lithostratigraphy of the littoral deposits of the last one million years in the Casablanca region (Morocco). Paléorivages de Casablanca. Stratigraphie et Préhistoire ancienne au Maroc Atlantique. *Quaternaire* 13: 23–41.

Thomas, G. 1973. Découverte de l'industrie du groupe de la "*Pebble Culture*" sur le versant nord des monts de Tessala (Algérie). Sa place dans la stratigraphie du Pléistocène inférieur et moyen de l'Oranie. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences Serie D* 276: 921–924.

Tixier, J. 1956. Le hachereau dans l'Acheulien Nord Africain. In *Congrès préhistorique de France. Compte-rendu de la XVème session – Poitiers-Angoulême*, *15–22 juillet 1956*: 914–23.

Tommasini, M. 1886. La sablière de Ternifine. *Bulletin de la Société de Géographie et d'Archéologie de la Province d'Oran* 6: 51–52.

Toro Moyano I., H. De Lumley, P. Barrier, D. Barsky, D. Cauche, V. Celiberti, S. Grégoire, F. Lebègue, B. Mestour, and M.H. Moncel. 2010a. *Les industries lithiques archaïques du Barranco León et de Fuente Nueva 3, Orce, basin du Guadix-Baza, Andalousie*. Monography, C.N.R.S. Editions.

Toro Moyano, I., B. Martinez Navarro, and J. Agustí, eds. 2010b. *Ocupaciones humanas en el Pleistoceno inferior y medio de la cuenca de Guadix-BazaMemoria Cientifica*. Sevilla: Junta de Andalucía, Consejería de Cultura, E. P. G. Arqueología Monográfico.

Vallverdú, J., P. Saladié, A. Rosas, and R. Huguet. 2014. Age and date for early arrival of the Acheulian in Europe (Barranc de la Boella, la Canonja, Spain). *PLosOne* 9 (7): e103634.

Vermeersch, P.M., E. Paulissen, and P. Van Peer. 1990. Le Paléolithique de la Vallée du Nil Ègyptien. *L'Anthropologie* 94: 435–458.

Villa, V., A. Pereira, C. Chaussé, S. Nomade, B. Giaccio, N. Limondin-Lozouet, F. Fusco, E. Regattieri, J.-P. Degeai, V. Robert, C. Kuzucuoglu, G. Boschian, S. Agostini, D. Aureli, M. Pagli, J.-J. Bahain, and E. Nicoud. 2016. A MIS 15-MIS 12 record of environmental changes and Lower Palaeolithic occupation from Valle Guimentina, Central Italy. *Quaternary Science Reviews* 151: 160–184.

Wendorf, F., A.E. Close, R. Schilde, R. Said, A. Gautier, and M. Kobusiewicz. 1976. The prehistory of the Egyptian Sahara. *Science* 193: 103–114.

Further Reading

Brunet, M., F. Guy, D. Pilbeam, H.T. Mackaye, A. Likius, D. Ahounta, A. Beauvilain, C. Blondel, H. Bocherens, J.R. Boisserie, L. De Bonis, Y. Coppens, J. Dejax, C. Denys, Ph. Duringer, V. Eisenmann, G. Fanone, P. Fronty, D. Geraads, T. Lehmann, F. Lihoreau, A. Louchart, A. Mahamat, G. Merceron, G. Mouchelin, O. Otero, P. Peláez Campomanes, M.S. Ponce de León, J.C. Rage, M. Sapanet, M. Schuster, J. Sudre, P. Tassy, X. Valentin, P. Vignaud, L. Viriot, A. Zazzo, and C.P.E. Zollikofer. 2002. A new hominid from the Upper Miocene of Chad, Central Africa. *Nature* 418: 145–151.

Northern and Central Asia: Culture During the Lower Paleolithic Era

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State of Knowledge and Current Debates

Recent discoveries of archeologists, anthropologists, geneticists, and other scientists have finally determined Africa to be the ancestral home of humans. The most ancient human sites of *Homo habilis* with stone tools of the Oldowan type dating from 2.4 to 2.6 Ma BP are located mostly in Eastern Africa in the area of the East African Rift.

Around 2 Ma BP, *Homo erectus* expanded beyond Africa and began dispersing over Eurasia. Available scientific data suggest that the first global wave of early human migration moved in two main directions. One direction was connected with the dispersion of ancient hominids across the Near East and Iran to the southern regions of Europe: the Caucasus and Mediterranean. Another wave moved through western regions of Asia eastward. It is hypothesized that most ancient populations moved in two eastward directions. One migration wave passed through the south of the Himalayas and Tibet through Hindustan into East and Southeast Asia, while the other migration wave passed through the Middle East Asian highlands to the areas of Central Asia, Siberia, and Far East.

North Asia

The Karama Lower Paleolithic site has provided the earliest evidence on the human habitation of the southern regions of Siberia. The Karama is located in the upper reaches of the Anui River in the northwestern Altai (Derevianko and Shunkov 2005). Four culture-bearing layers have been established in the proluvial-alluvial deposits on the gentle slope elevated to 50–60 m above the river level. The two upper layers have been established within the middle portion of the profile of boulders filled with reddish-brown loam and sand containing a considerable amount of gravel and gruss. The red-colored deposits were accumulated in the upper levels of the Anui valley during the early Middle Paleolithic according to the data of paleontological analyses (Derevianko et al. 1992a) and RTL-dating (Derevianko et al. 1992b). Dense grey sandy loam with a minor admixture of coarse-grained gravel and weathered rock fragments underlies the red layer. The lower portion of the profile contains two horizons bearing Lower Paleolithic artifacts. This portion represents an intercalation sandy loam and clayey laminations underlain by two layers of the slitozem soil (Derevianko et al. 2005). Compact buried soils are not typical for the Middle and Upper Pleistocene of North Asia. Thus, the occurrence of compact soil serves as indirect support for the early age of this pedocomplex.

The pollen analysis of the samples from the middle and lower portions of the Karama profile suggests the presence of many exotic and warmth-loving species typical for Europe and Far East in the floral associations (Bolikhovskaya and Shunkov 2005). The taxonomic composition of the group of exotic species together with the diversity of the ecological features allows us to estimate an early Middle Pleistocene age for this floral association. Available data of the paleobotanic studies suggest that the early peopling of the Altai took place under the favorable climatic conditions. The region was vegetated by birch and pine forests with an admixture of dark coniferous trees and broadleaf taxa, like elm, hornbeam, lime tree, oak, Manchurian nut tree, hazel, and mulberry tree.

The Karama archeological materials include pebble tools made on large fragments of the local volcanic rocks, mostly effusive spherulite. The industry is characterized by the irregular and parallel flaking. The primary reduction products include core-like pebbles with plain and roughly prepared striking platforms, and spalls with prepared platforms and subparallel flaking patterns of the dorsal surfaces. Sidescrapers of the longitudinal, diagonal, and transversal varieties, most of which bear natural or trimmed backs, constitute the largest tool category. Another large category includes choppers with the straight, convex, and concave working edge. The tool kit also includes denticulate notched and beak-shaped tools. Also such tools as large pebble tools with a nose-like protrusion, thick points with a wide-angle working element, knives fashioned on citron flakes with an edged back, and carinated pebble tools, which morphology is close to that of the core-like scrapers. In general, the industry can be identified as the pebble tool industry. However, the tools from the upper horizons are more progressive. The tool kit of the two upper horizons comprises cores bearing negative scars of parallel flaking, truncated spalls, trihedral point with thin thrusting tip, and carinated end-scraper fashioned through microlaminar flaking.

Geochronology of the Karama culture-bearing horizons is based on climato-stratigraphic characteristics of the lower and middle portions of the Karama sediments, which characteristics suggest the formation of these sediments during the early Middle Pleistocene four stages of various climatic conditions corresponding to two interglacial and two glacial periods (Bolikhovskaya et al. 2006). Correlations of the paleogeographical data with the data of geomorphology and lithologo-stratigraphy make it possible to infer that the sediments containing the two lower culture-bearing horizons were accumulated during a warm period most likely corresponding to the oxygen isotope stage 19 (790–760 ka). The overlying stratum of grey loam was formed during a cool period correlated to the oxygen isotope stage 18 (760–715 ka). The major part of the red-colored sediments with the two upper culture-bearing horizons was accumulated during the warm period corresponding to the oxygen isotope stage 17 (715–660 ka), while the uppermost part of it was formed during the relatively cold period corresponding to OIS stage 16 (660–620 ka).

Archaic pebble tools from Ulalinka, the site located in the lower Katun River basin in the southeastern suburb of Gorno-Altaisk (Okladnikov 1964a), attest to Lower Paleolithic human occupation of the Altai. The excavation trench established at the edge of the terrace 15 m high revealed three sediment packs of varying features separated by long sedimentation hiatuses (Tseitlin 1979). The lower portion of the profile contained clayey dark-yellow sediments intermixed with boulders, gravel, and gruss. Multicolored clay layer is overlain by the stratum of gavel and loam (pebble and boulder – in other description) containing artifacts made on fragmented quartzite pebbles. This stratum is covered by a layer of grey and brown loam; loess-like loam represents the surface layer.

Upper Paleolithic tools have been recovered from the bottom part of the loess-like loam stratum suggesting the Upper Pleistocene age of the sediments. Paleomagnetic analyses have shown the normal polarity of the upper and middle portions of the profile corresponding to the Brunhes period. The lower portion has revealed the reverse polarity that can be correlated to the Matyama paleomagnetic episode (Pospelova et al. 1980). The TL-date of 1.5 Ma BP has been generated for the dark-yellow sediments within the lower portion of the profile (Ragozin and Shliukov 1984). The loam sediments underlain by the horizon bearing Paleolithic artifacts have been correlated to the Krasnodubovsky suite of the upper Ob basin that corresponds to the early Middle Pleistocene. The dark-yellow clay deposits containing the culture-bearing horizon were correlated to the regional Kochkovsky suite and dated to the Lower Pleistocene (Okladnikov et al. 1985). However, according to the primary sources, samples for paleomagnetic analyses have not been collected from the culture-bearing horizon (Pospelova et al. 1980: 10), while the TL-date was obtained from the dark-yellow clay overlain by the boulder and pebble stratum (Ragozin and Shliukov 1984: 9). That means that the Matyama zone of reverse polarity (older than 0.7 Ma) and the TL-date of 1.5 Ma corresponding to the Lower Pleistocene do not represent the age of the culture-bearing horizon. The loam and debris horizon with artifacts that was located at the contact zone between the lower and middle portions of the profile can be correlated with the Krasnodubovski suite by the noted lithological and stratigraphic features. This attests to the early Middle Pleistocene age of this stratum (Adamenko 1970; Tseitlin 1984).

Abundant assemblage of quartzite items from the loam-debris horizon contains such doubtless artifacts as core-like pebbles with negative scars of irregular and amorphous flakes, thick pebbles trimmed along the narrow side to form choppers and chopping tools, scraper-like tools with natural backs and cutting edges prepared with the stepped trimming on flattened pebbles and pebble tools with ovoid spur-like protrusion (Okladnikov 1972; Abramova 1986).

The archaic look of the Ulalinka pebble industry and the assessed age of the country sediments as the early Middle Pleistocene are generally well correlated with the available paleomagnetic analytical data. The sedimentation hiatus between the lower and middle profile portions has been determined through analysis of the fine structure of the geomagnetic field in the

chronological interval of 300–700 ka (Pospelova et al. 1980). The age of the culture-bearing horizon can be determined within the interval of 400–600 ka.

The Lower Paleolithic site of MK 1 is located in the Kuznetsk Depression in South Siberia. It is the nearest site to the Altai. A few lithic implements have been assembled in the course of profile wall cleaning in the Mokhovo coal quarry (Derevianko et al. 1992c). Flaked stones were located on the weathering crust of the Perm sandstone deposit among clusters of siliceous quartz sandstone and gravelite rocks. The Perm sandstone layer is overlain by thick deposits of subaquatic loam of the Kedrovski suite corresponding to the second half of the Middle Pleistocene (M–R) within the regional stratigraphic scale.

The age of the Mokhovo lithic tools has been estimated on the basis of accompanying Pleistocene faunal remains and the data of the carpological analysis of the overlying sediments. The collection of heavily mineralized animal fossils contains metapodia, rid and molar fragments of a large primordial bison, and tubular bone fragments bearing blow marks and some part of the molar plate of an early mammoth form. It is most likely that these are the remains of the Mammuthus trogontherii, a typical taxon of the Viliuy faunal complex of the early Middle Pleistocene. Also, nondefinable tubular bone fragments bearing signs of artificial fragmenting have been discovered (Foronova 1998). The established composition of seeds and fruit from the lower portion of the Kedrovski suite suggests coexistence of warmth-loving and arctic plants under the cooler and more humid climatic conditions than they are nowadays. This is characteristic of OIS stage 9. On the other hand, remains of certain spore-bearing plants – indicators of the "Siberian" Mindel–Riss – have not been noted in this floral complex, which in fact suggest the age of not older than the terminal stage of that period (Nikolaev and Ponomareva 1998). On the basis of available biostratigraphic data, the minimal age of this site has been established as the upper boundary of OIS stage 9 with open lower chronological boundary (Derevianko and Markin 2007).

The MK 1 Quarry has yielded mostly siliceous quartz sandstone fragments, ovoid or rectangular in shape, bearing scars of parallel, uni- and bidirectional flaking of uncertain origin. However, four pieces show signs of premeditated flaking. These are a flat single-platform core with the prepared striking platform and negative scars of parallel elongated removals on the flaking surface, a massive asymmetrical spall, one of the thick-end-bearing pebble cortex that can served as a back and the opposing end served as a cutting edge prepared with scalar, two-step retouch, and two triangular spalls with convex dihedral striking platforms and negative scars of longitudinal and transverse removals. The artifacts bear weathering signs suggesting a long-term exposition that is well correlated with the stratigraphic position of these artifacts under the condition of the long hiatus in sedimentation.

The site of Torgalyk A is located in South Tuva in Uvs Nuur Lake basin, northernmost lake in the Mongolian Grand Lakes Depression. Archeological materials were exposed on top of a 20 m high alluvial terrace on the bank of the Torgalyk River. The surface artifact collection includes lithic tools of varying degree of surface weathering: from the slightly weathered surface to heavy corrosion cortex. Some artifacts demonstrating the heaviest degree of surface weathering have been classified as the pre-Mousterian and oldest tool category (Astakhov 1998, 2008). According to researchers (Astakhov and Yamskikh 1995), the geomorphological layer bearing the artifacts was formed during the second half of the Middle Pleistocene and weathering cortex on the artifact surfaces was likely formed during the same period (climate cooling R_1 or R_2). In this case, geological aspects so not provide any grounds for the artifact age estimation. However, determination of the oldest artifacts with heavily abraded surfaces not typical for the Tuva Middle Paleolithic complexes seems well-grounded. It can be assumed that the artifact surfaces were heavily abraded during the Middle Pleistocene.

Lithic tools made of the local alluvial pebbles, mostly hornfels on aleurolite and fine-grained sandstone, were equally dispersed over the area of about 30,000 m^2. The collection of heavily

abraded artifacts comprises more than 400 specimens including core-like pieces, thick spalls, and archaic tools.

Primary reduction is mostly illustrated by complete and fragmented pebbles bearing signs of core preparation. The subcategory of morphologically clear artifacts is dominated by the flat, mostly elongated, single and double platform cores; the shortened varieties are few. There are also cores bearing signs of the Levallois flaking, bifacially worked cores, and global-shaped varieties with multiple striking platforms. Flaking was executed from the plain striking platforms at the blunt angle. The spalls are large, elongated with heavy percussion bulbs. There are no small spalls wasted in the course of core formation and tool manufacturing in the collection.

Tools were mostly manufactured through hewing and large-faceted retouching. A few artifacts show traces of medium-sized, alternative retouch. Flat hewing, mostly on both faces, is a specific technique of fashioning bifacial tools. Many tools show various notches formed through Clactonian encoches or large-faceted retouch.

The tool kit includes amorphous sidescrapers with the convex and straight uneven cutting edges, massive spur-like points with the triangular cross section, end scrapers on elongated flakes, backed knives fashioned through abrupt retouch as well as notched, denticulate, and beak-shaped tools. The industry includes such specific tools as primitive limands and proto-limands and almond-shaped and ovoid bifaces. The bifacial tools are fashioned on large and thick spalls and elongated, flat, fractured pebbles. One of the surfaces is usually hewed more heavily with the help of large and flat removals; the other surface is flattened through broad and shallow flaking. Uneven edges on some artifacts were smoothed out through large-faceted retouch. The bases are mostly sharpened, straight, and beveled. The industry belongs to the Early Paleolithic pebble tradition based on certain elements of the Levallois flaking and the primitive technique of bifacial hewing.

A few artifacts of similar typology and degree of surface abrasion have been recorded from the two other sites at the Torgalyk, namely, at Torgalyk B and Torgalyk 1 that was defined as a "workshop on the river bank" (Derevianko et al. 1999).

In the southern part of Middle Siberia, Upper Paleolithic artifacts have been recorded within the surface-collected tools from the Kurtak archeological area in the north of the Minusa Depression. Clusters of archaic implements bearing aeolian abrasion signs have been collected from the beach of the Krasnoyarsk Dam in the areas where the Pleistocene deposits were washed out. These Pleistocene deposits have been located in the stratigraphic context between the buried soil of the OIS substage 5e and the bed of the Pliocene terrace of the Yenisei (Drozdov et al. 2000). The animal fossils associated with the same stratigraphic unit contain bones of the Khazar mammoth, large caballoid horse of the Khazar type belonging to the Early Mammoth complex (*Khronostratigraphia*... 1990). All these animal types represent typical representatives of the animal community of the second half of the Middle Pleistocene.

Basing on the technical–morphological features, researchers regard the archeological materials from the site of Razlog 2 as the oldest artifacts in the Middle Siberia (Drozdov et al. 2001). A small collection of artifacts (about 60 specimens) was assembled from the Yenisei bank. The industry belongs to the pebble type based on radial and subparallel reduction strategies. Disc-shaped and subrectangular cores, chopper-like tools with the transverse edge bearing signs of hewing, and tools with nose-shaped protruding parts are made of thick quartzite pebbles from the river alluvium. The Razliv site has yielded a mostly similar collection of archaic pebble implements. In addition to the abovementioned tool types, the Razliv tool kit includes few radial cores with two flaking surfaces, orthogonal cube-shaped cores, bifacially worked chopping-like tools, and backed scraper-like tools fashioned on citron flakes. Two loci have been established in Berezhekovo. The site has yielded pebbles with signs of hewing and retouched spalls that were recovered in association with the motley debris sediments of the second half of the Middle Pleistocene and attributed likely to the industry type described above.

The Kamenny Log site has produced the lithic artifacts with the heavily abraded surfaces that look like more developed Early Paleolithic industries. The artifact collection includes cores bearing traces of the Levallois and proto-prismatic reduction, triangular spalls with the prepared striking platform with the convex center in addition to the large pebble tools and backed citrons. The excavation area revealed a radial core and few spalls that were detached from this core and illustrated the core utilization process. This finding provides the evidence that the archaeological materials were not heavily washed out.

Abundant and interesting Lower Paleolithic materials have been reported from the south Angara basin (Medvedev 1975). Dozens of archaic quartzite implements bearing heavily weathered surfaces have been collected from surface clusters and individually along the right-side (eastern) sloppy bank of the Angara. The artifacts were mostly discovered on high hills like Mts. Olonskaya, Balushkina, Ponomarevskaya, Igetei, Tarakhai, and others. The hills represent the remnants of the ancient denudation surface elevated to the level of the watershed plateau. The artifacts were exposed on tops of the hills among the outcrops of the Jura cobbles and pebbles or else were shifted down by the erosion processes over the southern and western hill slopes at the height of 80–150 m above the valley bottom. Artifacts of the similar type and degree of surface abrasion were also discovered at the lowermost part of the sand and debris layers that were formed during the OIS 4 at the level of medial Angara terraces and shifted down on the contemporary banks of the Bratsk water reservoir.

Judging by the geomorphological position of surface exposing and conditions of relative stratification of the artifacts with abraded surfaces, the artifacts can be attributed to the period not younger than the first glacial period of the Upper Pleistocene (Tseitlin 1975). However, redeposition of the heavily abraded artifacts as well as the absence of any biostratigraphic and geochronological data do not make it possible to estimate the age of these findings more precisely. In this situation, the noted degree of weathering of the worked surfaces can be regarded as an important age indicator. The established techniques of age estimation make it possible to regard the artifacts with the heaviest degree of surface weathering as the oldest archeological materials in the region and assess their age as not younger than the second half of the Middle Pleistocene (Medvedev 2001).

The total collection of the heavily weathered artifacts comprises about 1000 fractured quartzite items including numerous cores, pebble spalls, and comparatively few typologically distinct tools. Various forms of cores demonstrate various reduction strategies simple flaking of quartzite pebbles without special preparation of the striking platform and flaking surface and specialized technique of fashioning pyramidal, convex flaking surfaces with the aid of continuous, radial hewing of both faces. The typical varieties of cores are the single-platform triangular cores with one flaking surface bearing sign of convergent flaking and flat rectangular cores with parallel flaking scars over one or two prepared striking platforms. Elongated laminar spalls including those with the parallel flaking pattern on the dorsal face, straight or curved symmetrical profile and striking platform with large facets represent the developed reduction technique.

The tool kit is dominated by the longitudinal, transverse, and combined varieties with uneven cutting edge manufactures mostly with the large retouch facets. Few pointed tools on thick convergent spalls represent likely dejete. Choppers with the straight, convex, and triangular edge have been fashioned on quartzite pebbles. There is a specific tool representing a pointed cleaver on an elongated, large, and flat spall with the transverse cutting edge and hewing signs on one surface of the lateral sides.

The artifacts collections from the Angara basin can be classified into the Tarakhai and Olon trends (Medvedev 1983). The industries of the Tarakhai trend represent pebble traditions. The technique of citron flaking was often used; various choppers represent the most typical implement in the tool kit. The Olon trend is closer to Acheulian tradition. Ovoid core-like implements bearing signs of bifacial, radial working are most typical, while the proportion of pebble tools is comparatively small.

Quartzite implements close to the tool described above in the shape, and weathering

signs have been recorded in the northern part of the Bratsk dam (Volokitin 1992). In the Angara–Okinsky basin in the erosion area of contemporary river banks that are situated at the elevation of 70–80 m above the original river level (the sites of Monastyrskaya Gora, Mys Dunaisky, Zharik), about 200 artifacts with heavily weathered surfaces were collected. Within the collection of the most archaic quartzite artifacts, ovoid cores with radial flaking patterns on the flaking surfaces, rectangular single-platform cores of the parallel reduction, longitudinal, transverse, and dejete sidescrapers with natural backs made on thick cortex spalls or on knapped pebbles, pebble choppers with convex abrupt edges and large flakes bearing discontinuous retouch traces have been noted.

The Balyshevo site located in the eastern outskirts of the Angara–Lena watershed plateau has produced interesting data relevant to the assessment of the geological age of the archaic and weathered technocomplexes from the southern parts of Middle Siberia (Zadonin 1992). The first heavily weathered quartzite artifacts were assembled from the tilled left-side slope of the Lena elevated to about 40 m above the water level. The test excavations at one of the area of the artifacts scattering yielded heavily weathered artifacts from the depth of 0.4 m in association with the weathered pebble and gravel layer on the top of the solifluction deposits aging from OIS stage 4. The complete petrographic identity of the pebble context and the associated archaic Paleolithic artifacts as well as a convergent sidescraper and a flake detached from this implement discovered in the excavation area attest to the fact that the artifacts were accumulated in association with the quartzite outcrops rather than were slid down the slope of redeposited in any other way. The predominance of primary reduction products in the collection of artifacts provides an indirect support to this inference.

In total, 130 quartzite implements have been collected from the surface and within the excavation area. The manufacturing features and the degree of worked surface weathering make it possible to establish a single technocomplex. The collection includes ovoid cores of radial pattern of flaking from one pyramidal-shaped or two convex surfaces and the cores with the convergent flaking pattern. Also, choppers on thick pebbles and sidescrapers on large cortex and semi-cortex spalls with convex, stepped edge, laminar spalls bearing marginal retouch and shortened flakes including those detached from the prepared striking platforms.

The Balyshevo industry is likely one of the youngest lithic industry among the oldest Paleolithic materials in Middle Siberia. However, heavily weathered surface that was formed under the glacial conditions during the Upper Pleistocene (OIS stage 4) did not support the hypothesis of the Middle Pleistocene age of these heavily weathered artifacts that was proposed by G.I. Medvedev (2001).

The data on the Early Paleolithic from the eastern shore of Lake Baikal (Trans-Baikal) are contradictory. Zasukhino probably represents the earliest archeological site in Trans-Baikal. Zasukhino was established within the biostratigraphic profile in the quaternary deposits of western Trans-Baikal. According to the published data (*Prirodnaia sreda*… 2003; Lbova 2005), knapped rocks were noted in four loci within this biostratigraphic profile. The artifacts were noted in association with the laminations of buried soil within the Middle Pleistocene deposits containing faunal remains of the Viatka theriocomplex. The artifacts were recovered from the contact zones of four lithological units. The lowermost unit has shown the reverse polarity and attributed to Matyama episode. The overlying sediments were formed under the normal polarity of the Earth's magnetic field. The RTL data suggest the chronological interval of 190–900 ka. Despite certain discrepancies in the straigraphic location of lithic artifacts in diagrams and descriptions, the geological age is not younger than the Middle Pleistocene.

A cluster of large pebbles noted in one of the lowermost layers containing cultural remains is noteworthy. Lenses of charcoal and fragmented burnt bones make it possible to interpret the pebble cluster as a hearth pavement. If it is really an intended artificial construction, the hearth is the oldest evidence of premeditated usage of fire in

Northern Asia. However, available publications do not provide comprehensive information concerning the features of the construction, its planigraphic context, sediment microstratigraphy, and others.

The petrographic composition of the knapped pebbles includes quartzite, vein quartz, granite–gneiss, and granite. These rocks, with the exclusion of granite, are characterized by the poor isotropic features and are not good for knapping, which features of the used raw materials make cultural attribution of the artifacts difficult. Within the rock pieces, knapped pebbles and fragments with pebble cortex. Some pieces resemble sidescrapers and choppers. Some pebble might serve as hammerstones and anvils. However, the published drawings and photos of these pieces (*Prirodnaya sreda.*. 2003) arouse doubts in the artificial origin. Such controversy in the attribution of rock pieces to artifacts requires group decisions. If the Zasukhino findings are defined as artifacts, it will give researchers the grounds to speak about human habitation of Trans-Baikal prior to the Upper Pleistocene. Presently, this possibility is only an assumption that was made by A.P. Okladnikov more than half a century ago (Okladnikov 1959).

Diring Yuriakh is the earliest Paleolithic site in Yakutia. The site is located in the middle Lena basin to the north from latitude 60. According to the recently published data (Mochanov and Fedoseeva 2002), the excavation area at Diring Yuriakh exceeds 36,000 m^2 and yields 51 clusters of cultural remains totaling to 5000 items.

Artifacts were recovered from the sediment of the 105–120 to 125–135 m high terraces overlying the common basis of the Cambrian sandstone located at the relative height of 105 m. According to Y.A. Mochanov, the culture-bearing horizon represents a thin (3–5 cm) layer of weathered pebbles and gravel. It overlies the red Pliocene sand deposits with frost clefts. Above it, there is a layer of grey loam of the horizontal laminar structure. Mochanov argues that the sediments underneath the culture-bearing horizon belong to the riverbed fascia, while those above it belong to the floodplain and old bed fascias of the alluvium of the Tabaga accumulative cycle of the Lena basin. The age of that cycle has been estimated within the range of 3.2–1.8 Ma (Mochanov 1988a). Along with the geological assessment of the age, other scientific studies have been carried out at the site. However, the results of these studies in the interpretation of the main researcher (Mochanov 1992) and the scientist who made the analyses (Penkov 1992) are ambiguous and allow for various age estimations.

With regard to the geological age of the containing sediments, Y.A. Mochanov considers the Diring Yuriakh materials as belonging to the earliest stages of the Paleolithic and believes that the only reasonable way is to compare them exclusively with the Oldowan culture in Africa (Mochanov 1988b). The Diring Yuriakh lithic industry is really archaic. The industry is characterized by irregularly split quartzite pebbles and cobles that were fashioned into various choppers, sidescraper-like implements and nosed tools as well as amorphous pebble spalls with unclear signs of premeditated knapping, anvils, and hammerstones. All the quartzite pieces show heavily weathered surfaces.

The geological and archeological old age of Diring Yuriakh that is not usual for high latitudes makes Y.A. Mochanov revive the idea of non-tropical origins of humans (Mochanov 1992). Not going into details of this issue (Ranov 2005), it is necessary to stress the key point in the Diring Yuriakh Paleolithic is the geological estimation of the age of the culture-bearing horizon being the main point of controversy between Y.A. Mochanov and his numerous opponents. V.A. Ranov and S.M. Tseitlin (Ranov and Tseitlin 1991) visited the site, studied the lithological and stratigraphic situation, and proposed a well-grounded critical assessment of the sediment origins and its relative age. According to the observations of these competent experts, the culture-bearing horizon is associated with the lower portion of the grey sediments at 5–25 cm above the top of the red Pliocene sand layer in the profiles of the 125–135 m high terrace. Thus, the culture-bearing horizon does not directly contact the Pliocene deposits as in Mochanov's interpretation. Hence, on top of the 105–120 m high terrace, the pebble and gravel sediments containing cultural

remains occurred on the layer of red pebbles because of the denudation processes. Ranov and Tseitlin argued that the Diring Yuriakh terrace was formed in two stages separated by a long hiatus. Deposition of the red, riverbed pebble and sand took place during the Pliocene, while the subaquatic grey sand and sandy loam containing cultural remains were deposited during the Pleistocene. The grey sediments were likely accumulated under the conditions of slow flowing water from a pond dammed by melting ice, most likely during the OIS stage 8. The hypothesis on the formation of the grey deposits during the Pleistocene is shared by other researchers (Alekseev et al. 1990; Waters 1999). The American researchers based their inferences on their TL dates of 267 ± 24 ka BP for the sand deposits overlying the culture-bearing horizon and 366 ± 32 ka BP for the underlying frost vein (Waters et al. 1997). Despite certain criticism of the reliability of these TRL-dates (Huntley and Richards 1997), they are well correlated to the main point of Mochanov's opponents on the Middle Pleistocene age of the sediments containing cultural remains.

The idea to assess the Diring Yuriakh age on the basis of comparisons of the technical–typological features with the earliest African complexes (Mochanov 1992) does not seem well-grounded either. Given the general similarity within a single stage of phased development, the more precise technical–typological comparisons show mostly different rather than similar features. For instance, the Diring Yuriakh collection does not include any cores, polyhedrons, disc-shaped cores, and small flake tools typical for the Oldowan (Leakey 1971). These distinctions point out the formality of comparisons of the industries from such distant regions as the northeastern part of Africa and the northeastern part of Asia. Thus, neither primitive knapping techniques nor archaic look of the pebble implements does not provide any reasonable grounds to regard the age of the Early Paleolithic site of Diring Yuriakh as older than the second half of the Middle Pleistocene.

Two other loci where archaic quartzite implements were found have been recorded in the middle reaches of the Lena (Alekseev and Cherosov 1992). Artifacts have been recovered from the layer of weathered pebble and gravel underlying the layer of modern soil on top of a 125–130 m high terrace-like surface in the Olekma River mouth. The Yunkiur site located in the vicinity to the city of Olekminsk, weather artifacts have been discovered among the layer of ventifacts that was exposed in the wind-blown sediments at the depth of 9 m from the surface of the 35–40 m high Lena terrace during the quarry works. Judging by the published drawn images and the morphological descriptions of the findings (Alekseev and Cherosov 1992: 137, 139, 141, 142), attribution of the Yunkiur items as artifacts arouses considerable doubt. In contrast, the Ust-Olekma collection includes distinct choppers with well-prepared edges, polyhedrons–spheroids, trihedral chopping tools and flakes, hammerstones, and anvil. The minimal geological age of the weathered pebble layer that was redeposited in subaerial, slope sediments in the upper portions of terraces most likely corresponds to the Upper Pleistocene, yet its initial geochronological position is not clear.

The sites with coarsely flaked pebbles that were discovered in the Amur River basin in the 1960s are noteworthy, especially from the historiographic point of view. This discovery aroused discussion about the possible peopling of North Asia in the Early Paleolithic (Okladnikov 1964b). Initially, such fractured pebbles have been discovered at Filimoshki in the upper reaches of the Zeya. The artifacts were uncovered from the upper portion of the riverbed alluvial fascia on the 10–12 m high left-bank terrace. The alluvial fascia overlies the bed of sandstone intercalated by laminations of carbonaceous shale. The culture-bearing horizon was overlain by laminations of sand and sandy loam. The layer of riverbed pebbles contains fractured pebbles of fine-grained quartzite. The variety of artifacts includes amorphous cores without prepared striking platforms, primitive sidescrapers and choppers with minor preparation of the edges, and specific tools

with nose-shaped protrusions. Similar fractured pebbles have been discovered in analogous context in several other loci at the mouth of the Ust-Tu spring at the right-side bank of the Zeya and in the vicinity to the village of Kumary in the upper Amur (Derevianko 1983).

In general, the considerably archaic look of the flaked pebbles and their relative stratigraphic position under the condition of possible repeated redeposition attest only to the minimal age of the findings in the range of the geological period when the containing sediments were formed. Initially, it was presumed that fractured pebbles were redeposited in the upper portion of the riverbed pebbles of the so-called Belogorski suite during the second half of the Middle Pleistocene (Ibid., p. 49). However, additional studies of the lithological structure of the 10–12 m high terrace 2 of the Zeya along with the data of the pollen analysis and mechanical composition of the sandy fill of the pebble layer make it possible to estimate the geological age of this layer as not earlier than the second half of the Upper Pleistocene (Tseitlin 1979). Thus, the presumed old age of these findings have not been supported by geological data, and the artifacts can be regarded only in the general context of the earliest archaeological sites in North Asia.

The similar inferences concern another unusual Paleolithic finding from the village of Bogorodskoe in the lower Amur basin (Okladnikov 1979). On the tow path on the Amur right-side bank at the foot of 20 m high terrace, a bifacially worked cordiform tool with the symmetrically convex cross section made of a dark volcanic rock was discovered. On the basis of the noted shape and the technique of working, A.P. Okladnikov interpreted this tool as an Acheulian hand axe. He argued that this hand axe fell down from the Middle Pleistocene deposits of the high floodplain terrace of the Amur and attributed it to the earliest Paleolithic stage. In fact, this tool represents a thick pebble tool with the natural back and shows bifacial working through removing short and broad spalls. The stratigraphic position of this tool is unclear; hence, its age has not been defined.

Fractured pebbles from the Sennaya-1 site are regarded as the evidence of the initial human occupation of Sakhalin. The site is located on the southeastern coast of the island (Vasilevsky 2008). The excavation trench at the gently sloping coast revealed the proluvial–alluvial deposits containing fractured pebbles. This layer has been established overlying the bed of the Middle Pleistocene sea terrace elevated to about 50 m above the sea level. The lowermost portion of the profile reveals clay and sand of subaquatic origin. Above it, a layer of dense loam intercalated with lenses of sand and sandstone pebbles and cobbles. The loam layer is overlain by a layer of light-yellow sandy loam with the humus horizon of soil on top.

The OSL dating of the middle portion of the profile suggests the age of this deposit in the range of 154–197 ka. The data of spore-pollen analyses of the lower and medial part of the loam horizon suggest that accumulation of this layer took place under the relatively warm climatic conditions favoring vegetation of dark-coniferous forests with admixture of broadleaf species. On the basis of these data, the following sedimentation sequence has been proposed. The clay and sand deposits represent the sediments of marine lagoon; the layer of loam with sand admixture was accumulated initially as the floodplain fascia during one of the warm periods of the Middle Pleistocene and as the terrace-forming sediments during the subsequent cold stage of the Middle Pleistocene. The layer of yellow sandy loam was formed during the late Upper Pleistocene, while the humus-containing horizon appeared during the Holocene.

However, the proposed geochronological scenario is poorly correlated with the lithological features of the sedimentation sequence. According to the established stratigraphic column and the lithological features (Vasilevsky 2008: 74, 75, 292), the layers attributed by A.A. Vasilevsky to distinct geological periods and paleogeographic stages are intermixed at some portions, and the continuous sequence of sediments does not show any traces of sedimentation hiatuses. The light-yellow sandy loam

overlies the dense loam without any traces of long hiatus, while according to the proposed interpretation, these two layers are separated by the hiatus lasting not less than 100,000 years. The biostratigraphic interpretation of the sediments also seems doubtful. It is based on fragmentary data from two pollen samples containing few pollen seeds, while the palynological conclusion has been made on solitary pollen seeds of oak and elm noted in the samples (Vasilevsky 2008: 250, 251). The noted stratigraphic discontinuity and the lack of reliable paleontological data make the OSL-dates debatable and require better support of the Middle Paleolithic age for the sediments containing cultural remains.

The relative age of the sites can be established on the basis of the stratigraphic position of pebble implements. Fractured pebbles were noted throughout all the lithological layers within the profile. However, about one-half of all the fractured pebbles have been recovered in association with the sediments of the terminal stage of the Upper Pleistocene and Holocene (Vasilevsky 2008: 83). Artifacts from the underlying layers demonstrate the same features as the Pebbles from the upper portions of the profile do. It makes it possible to regard the whole collection as a single technocomplex with the geological age close to the Pleistocene–Holocene threshold.

The artifact collection mostly includes indistinct fractured quartzite, flint, argillite, and other pebbles. A.A. Vasilevsky has defined core-like pebbles, thick flakes, cortical spalls, typologically indistinct sidescrapers, implements with spur-like protrusions, and knives fashioned on cortical segments. A.A. Vasilevsky argued that the tools were fashioned through mostly longitudinal and diagonal knapping with the aid of hard hammer or through a blow against the anvil. Other techniques include detaching narrow diagonal spalls and percussion technique. A.A. Vasilevsky defined these implements as remains of the Lower Paleolithic pebble industry on the basis of the noted simple knapping and secondary working techniques. It seems that the indistinct typological features of this industry can be explained by the fact that the majority of the artifacts represent defected or broken implements that are not suitable for further usage. The artifacts seem to represent raw material testing at the workshop that was destructed by slope processes judging by the deposition features.

Central Asia

According to the latest data based on the oldest Paleolithic finds from the loess–soil deposits of Tadzhikistan (Kuldara, Khonako II, Obi-Mazar-6), the appearance of *Homo erectus* in Central Asia refers to the period between 600 and 900 ka (Ranov and Schaefer 2000; Ranov 2001).

In Acheulian, technocomplexes with bifaces have been discovered in the Mugodjari Mountains in the northwestern part of Kazakhstan and represent the most interesting Early Paleolithic assemblages (Derevianko et al. 2001). The Acheulian sites of Mugodjari 3–6 represent clusters of heavily and moderately weathered artifacts on the surface of deluvial shelves and on hilltops at the outcrops of sandstone that was the main raw material for tool production. Among the collected artifacts, the sets of Acheulian foliate, ovoid, and cordiform bifaces are most noteworthy. Also cores bearing signs of the Levallois flaking, various types of sidescrapers, and notch-denticulate tools have been identified.

Other well-defined Acheulian bifaces have been recorded in the Mangyshlak Peninsula (Medoyev 1982), in Bale Hills, Semizbugu, locus 2 in the northern portions of Balkhash region (Medoyev 1970; Derevianko et al. 1993), in the southwestern and northeastern parts of the Kazakh hill country (the sites of Zhaman-Aibat 4 and Vishnevka 3) (Klapchuk 1976; Voloshin 1988), and in the left-side bank of the Irtysh in the Pavlodar region (Kudaikol) (Medoyev 1968). The lithic collections from these sites include bifacially worked tools of various types as well as products of the Levallois reduction, various sidescrapers, and notch-denticulate tools.

Archeological materials from Koshkurgan 1 located in the southwestern part of the Karatau mountain range represent a special type of the Early Paleolithic industry (Derevianko et al. 2000b). Lithic artifacts have been recovered

from the stratified context in association with animal remains of the Koshkurgan (Tiraspol) faunal complex dating from the second half of the Middle Pleistocene. Cultural remains have been recovered from the subaquatic sediments of the ascending spring within the gryphon travertine formations. The age of the fossils has been estimated through the ESR analysis in the range of 400–500 ka. Archeological materials have been defined as the pebble industry of the microlithic type. Tools were made of small pebbles of various rocks. The size of the artifacts does not exceed 4–5 cm. The Levallois and single-platform cores, shortened non-faceted spalls, simple longitudinal and double sidescrapers, and notch-denticulate tools represent the most typical artifact types.

The site of Shoktas 1 was established in the travertine sediments of the gryphon in the vicinity to Koshkurgan (Derevianko et al. 2000b). The Shoktas artifacts demonstrate technical–typological features similar to those from Koshkurgan and have been defined as the Early Paleolithic industry of small tools.

The sites of Borykazgan, Tanirkazgan, Akkol, and others (Alpysbayev 1979) from the northeastern piedmonts of the Karatau represent another type of the earliest lithic industries in Kazakhstan. These lithic industries are characterized by the pebble nonstandard cores, large chopper and chopping tools, and few flake tools. Some researchers point to the minor "proto-Levallois features" (Liubin 1970) and some clearly Levallois technological features (Medoyev 1982).

The majority of the Early Paleolithic collections in Mongolia belong to the pebble industry type. The most archaic artifacts have been reported from several loci of Nariin Gol 17 in the northern part of the Lake Valley (*Kamenny vek*... 2000e). The heavy to moderate degree of artifact surface aeolian abrasion and the position of the artifacts at the foothills and on the slopes of a high Pliocene terrace suggest the Lower Pleistocene age to this site, which is the earliest in the Mongolian Paleolithic. The Nariin Gol lithic collection includes such noteworthy items as large multi-platform orthogonal cores, cores with one flaking surface bearing the parallel reduction pattern, segments, and specific scraper-like tools.

The lithic collections from the so-called Mankhan cluster of sites in the Mongolian Altai represent the next stage of the Early Paleolithic and belong to the Middle Pleistocene according to the arguments of the researchers (*Kamenny vek*... 1990). The assemblages from these sites comprise comparatively few weathered artifacts including pebble cores bearing irregular flaking patterns, Levallois and parallel reduction cores, choppers, and notch-denticulate tools.

A.P. Okladnikov (1983) was the first to identify bifaces of the Acheulian type within the Paleolithic assemblages from the sites of Dno Gobi (Bottom of Gobi) and at Mt. Yarkh. Almond-shaped, ovoid, and subtriangular bifacial tools along with the disc-shaped, proto-Levallois, and Levallois cores represent the most archaic part of the chronologically heterogeneous assemblage of the surface-collected artifacts (Okladnikov 1986).

Archeological studies in the southern regions of the Gobi Altai provide researchers with the new data supporting the conception of dispersal of the Acheulian features in the Mongolian Paleolithic industries. The bifacially worked tools associated with the Levallois reduction products have been recorded within the collections of the heavily abraded artifacts collected from the sites in the Flint Valley (Derevianko et al. 1996), Trans-Altai Gobi (Derevianko et al. 2000c), lower stratigraphic layers in the Tsagan-Agui cave site (Derevianko et al. 2000a), and the Tsagan-Agui workshop site located at the cave (Derevianko et al. 2000d). Available data of the physical analyses of the age of the Tsagan-Agui sediments suggest that the Levallois–Acheulian traditions emerged in this region as early as in the Middle Pleistocene.

Archeological materials from Uench-1 illustrate development of the Early Paleolithic traditions during the terminal stage of the Acheulian period (Derevianko and Petrin 1992) or else during the initial Mousterian period (Okladnikov and Abramova 1994). The Uench lithic industry is distinct among other technocomplexes in the used raw materials and smaller lithic implements including the Levallois items, various sidescrapers, and backed and notch-denticulate tools. It should be

noted that the Levallois technique of stone working is the major characteristic feature of practically all the early lithic industries in Mongolia.

Cross-References

- ▶ Bone Tools, Paleolithic
- ▶ Lithic Technology, Paleolithic
- ▶ Mongolia: Paleolithic

References

Abramova, Z.A. 1986. Review of "Paleolit Sibiri". *Sovetskaya Arkheologia* 1: 271–278.

Adamenko, O.M. 1970. O geologicheskih usloviah zalegania nizhnepaleoliticheskih orudii na r. Ulalinke (g. Gorno-Altaisk). In *Sibir i ee sosedi v drevnosti*, 57–59. Novosibirsk: Nauka.

Alekseev, A.N., and N.M. Cherosov. 1992. Novye dannye o rannem paleolite Yugo-Zapadnoi Yakutii. In *Rannepaleoliticheskie kompleksy Evrazii*, 133–142. Novosibirsk: Nauka.

Alekseev, M.N., V.A. Kamaletdinov, and O.V. Grinenko. 1990. *Problemy geologii paleoliticheskogo pamiatnika Diring-Yuriakh*. Yakutsk: Preprint.

Alpysbayev, K.A. 1979. *Pamiatniki nizhnego paleolita Yuzhnogo Kazakhstana*. Alma-Ata: Nauka Kaz SSR.

Astakhov, S.N. 1998. Paleolit Tuvy. In *Drevnie kultury Tsentralnoi Azii i Sankt-Peterburg*, 109–114. St. Petersburg: Kult-Inform-Press.

Astakhov, S.N. 2008. *Paleoliticheskie pamiatniki Tuvy*. St. Petersburg: Nestor-Istoria.

Astakhov, S.N., and A.F. Yamskikh. 1995. Novye dannye o paleolite Tuvy. In *Yuzhnaia Sibir v drevnosti. Arheologicheskie izyskania*, vol. 24, 4–9. St. Petersburg: IIMK RAN.

Bolikhovskaya, N.S., and M.V. Shunkov. 2005. Climato-stratigraphic divisions of the earliest sediments from the Karama Lower Paleolithic site. *Archaeology, Ethnology and Anthropology of Eurasia* 3: 34–51.

Bolikhovskaya, N.S., A.P. Derevianko, and M.V. Shunkov. 2006. The fossil palynoflora, geological age, and cimatostratigraphy of the earliest deposits of the Karama site (Early Paleolithic, Altai Mountains). *Paleontological Journal* 40: 558–566.

Derevianko, A.P. 1983. *Paleolit Dalnego Vostoka i Korei*. Novosibirsk: Nauka.

Derevianko, A.P., and S.V. Markin. 2007. Nizhnepaleoliticheskaya stoyanka MK I na yuge Zapadnoy Sibiri. In *Kavkaz i pervonachalnoye zaselenie chelovekom Starogo Sveta*, 149–155. St. Petersburg: Vostokovedenye.

Derevianko, A.P., and V.T. Petrin. 1992. K probleme rannepaleoliticheskih industrii Centralnoi Azii. Po materialam pamiatnikov doliny r. Uench (Mongolskii Altai). In *Rannepaleoliticheskie kompleksy Evrazii*, 3–27. Novosibirsk: Nauka.

Derevianko, A.P., and M.V. Shunkov. 2005. The Karama Lower Paleolithic site in the Altai: initial results. *Archaeology, Ethnology and Anthropology of Eurasia* 3: 52–69.

Derevianko, A.P., D. Dorj, R.S. Vasilievsky, V.E. Larichev, V.T. Petrin, E.V. Deviatkin, and E.M. Malayeva, eds. 1990. *Kamennyi vek Mongolii: Paleolit i neolit Mongolskogo Altaia*. Novosibirsk: Nauka.

Derevianko, A.P., S.M. Popova, E.M. Malaeva, S.A. Laukhin, and M.V. Shunkov. 1992a. Paleoklimat severo-zapada Gornogo Altaa v eopleistocene. *Doklady Akademii Nauk* 324: 842–846.

Derevianko, A.P., S.A. Laukhin, E.M. Malaeva, O.A. Kulikov, and M.V. Shunkov. 1992b. Nizhnii pleistocen na severo-zapade Gornogo Altaia. *Doklady Akademii Nauk* 323: 509–513.

Derevianko, A.P., V.S. Zykina, S.V. Markin, S.V. Nikolaev, and V.T. Petrin. 1992c. *Pervye rannepaleoliticheskie obekty Kuznetskoi kotloviny (Stratigrafia, paleogeografia i predvaritelnye arheologicheskie opredelenia)*. Novosibirsk: Izdatelstvo IAET SO RAN.

Derevianko, A.P., B.Z. Aubekerov, V.T. Petrin, Z.K. Taimagambetov, O.A. Artiukhova, V.N. Zenin, and V.G. Petrov. 1993. *Paleolit Severnogo Pribalkhashia (Semisbugu, punkt 2, rannii - pozdnii paleolit)*. Novosibirsk: Izd. IAE SO RAN.

Derevianko, A.P., J.W. Olsen, D. Tseveendorj, V.T. Petrin, A.N. Zenin, A.I. Krivoshapkin, R.W. Reeves, E.V. Deviatkin, and V.P. Mylnikov. 1996. *Archaeological studies carried out by the joint Russian-Mongolian-American expedition in Mongolia in 1995*. Novosibirsk: Izd. IAE SO RAN.

Derevianko, A.P., S.N. Astahov, V.T. Petrin, A.N. Zenin, S.A. Gladyshev, O. Katcuja, and V.I. Kudriavtsev. 1999. Issledovania paleoliticheskih pamiatnikov v Tuve. In *Problemy arheologii, etnografii, antropologii Sibiri i sopredelnyh territorii*, vol. 5, 89–93. Novosibirsk: Izdatelstvo IAET SO RAN.

Derevianko, A.P., J.W. Olsen, D. Tseveendorj, A.I. Krivoshapkin, V.T. Petrin, and P.J. Brantingham. 2000a. The stratified cave site of Tsagaan Agui in the Gobi Altai (Mongolia). *Archaeology, Ethnology, and Anthropology of Eurasia* 1: 23–36.

Derevianko, A.P., V.T. Petrin, Z.K. Taimagambetov, Z.K. Isabekov, A.G. Rybalko, and M. Otte. 2000b. *Rannepaleoliticheskie microindustrialnye kompleksy v travertinakh Yuzhnogo Kazakhstana*. Novosibirsk: Izd. IAE SO RAN.

Derevianko, A.P., J.W. Olsen, D. Tseveendorj, V.T. Petrin, S.A. Gladyshev, A.N. Zenin, V.P. Mylnikov, A.I. Krivoshapkin, R.W. Reeves, P.J. Brantingham, B. Gunchinsuren, and Y. Tserendagva. 2000c. *Archaeological studies carried out by the joint Russian-Mongolian-American expedition in Mongolia in 1997–1998*. Novosibirsk: Izd. IAE SO RAN.

Derevianko, A.P., J.W. Olsen, D. Tseveendorj, V.T. Petrin, A.I. Krivoshapkin, and B. Gunchinsuren. 2000d.

Issledovania peshery Tsagan Agui sovmestnoi Rossiisko-mongolsko-amerikanskoi ekspeditsiei v 2000 godu. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territorii*, vol. 6, 60–63. Novosibirsk: Izd. IAET SO RAN.

Derevianko, A.P., V.T. Petrin, D. Tsevendorj, E.V. Deviatkin, V.E. Larichev, R.S. Vasilievsky, A.N. Zenin, and S.A. Gladyshev, eds. 2000e. *Kamennyi vek Mongolii: Paleolit i neolit severnogo poberezhia Doliny Ozer*. Novosibirsk: Izd. IAE SO RAN.

Derevianko, A.P., V.T. Petrin, S.A. Gladyshev, A.N. Zenin, and Z.K. Taimagambetov. 2001. Acheulian complexes from the Mugodjari Mountain Range (north-western Asia). *Archaeology, Ethnology, and Anthropology of Eurasia* 2: 20–36.

Derevianko, A.P., M.V. Shunkov, N.S. Bolihovskaia, V.S. Zykin, V.S. Zykina, N.A. Kulik, V.A. Ulianov, and K.A. Chirkin. 2005. *Stojanka rannego paleolita Karama na Altae*. Novosibirsk: Izd. IAET SO RAN.

Drozdov, N.I., V.P. Chekha, E.V. Artemiev, P. Haesaerts, and L.A. Orlova. 2000. *Chetvertichnaia istoria i arheologicheskie pamiatniki Severo-Minusinskoi vpadiny*. Krasnoyarsk: Izd. Krasnoyarsk Ped. Univ.

Drozdov, N.I., E.V. Artemiev, and V.P. Chekha. 2001. Korreliatsia rannepaleoliticheskih pamiatnikov Krasnoyarskogo vodohranilischa. In *Sovremennye problemy evraziiskogo paleolitovedenia*, 143–149. Novosibirsk: Izd. IAET SO RAN.

Foronova, I.V. 1998. Paleoteriologicheskaia harakteristika i stratigraficheskii obiem kedrovskoi svity: vozmozhnosti vozrastnoi otsenki paleoliticheskogo pamiatnika Mohovo I (Kuznetskaia kotlovina, yugo-vostok Zapadnoi Sibiri). In *Paleoekologia pleistotsena i kultury kamennogo veka Severnoi Azii i sopredelnyh territorii*, ed. N.I. Drozdov, V.P. Cheha, S.A. Laukhin, V.G. Koltsova, E.V. Akimova, A.V. Ermolaev, V.P. Leontiev, S.A. Vasiliev, A.F. Yamskih, G.A. Demidenko, E.V. Artemiev, A.A. Vikulov, A.A. Bokarev, I.V. Foronova, and S.D. Sidoras, vol. 1, 279–291. Novosibirsk: Izd. IAET SO RAN. (Khronostratigrafia paleoliticheskih pamiatnikov Srednei Sibiri (bassein r. Enisei) 1990).

Huntley, D.J., and M.P. Richards. 1997. The age of the Diring Yuriakh archaeological site. *Ancient TL* 15: 48–49.

Klapchuk, M.N. 1976. Pozdneashelskoe mestonakhozhdenie Zhaman-Aibat-4 v Tsentralnom Kazakhstane. *Sovetskaya Arkheologia* 3: 176–190.

Lbova, L.V. 2005. Rannie etapy osvoenia chelovekom Zabaikalia (novye materialy). In *Izvestia laboratorii drevnih tehnologii*, vol. 3, 60–73. Irkutsk: Izd. IrGTU.

Lbova, L.V., I.N. Rezanov, N.P. Kalmykov, V.L. Kolomiets, M.I. Dergacheva, I.N. Fedeneva, N.A. Vashukevich, P.V. Volkov, V.V. Savinova, B.-A. Bazarov, and D.V. Namsaraev. 2003. *Prirodnaia sreda i chelovek v neopleistotsene (Zapadnoe Zabaikale i Yugo-Vostochnoe Pribaikalie)*. Ulan-Ude: Izd. BNC SO RAN.

Leakey, M.D. 1971. *Olduvai Gorge, volume 3: excavations in beds I and II, 1960–1963*. Cambridge: Cambridge University Press.

Liubin, V.P. 1970. Nizhnii Paleolit. In *Kamennyi vek na territorii SSSR*, 19–42. Moscow: Nauka.

Medoyev, A.G. 1968. Stoianka-masterskaya u ozera Kudaikol. In *Novoe v arheologii Kazakhstana*, 128–134. Alma-Ata: Nauka Kaz. SSR.

Medoyev, A.G. 1970. Arealy paleoliticheskikh kultur Sary-Arka. In *Po sledam drevnikh kultur Kazakhstana*, 200–216. Alma-Ata: n.p.

Medoyev, A.G. 1982. *Geokhronologia paleolita Kazakhstana*. Alma Ata: Nauka Kaz. SSR.

Medvedev, G.I. 1975. Mestonahozhdenia rannego paleolita v Yuzhnom Priangarie. In *Drevnaia istoria narodov yuga Vostochnoi Sibiri*, vol. 3, 3–36. Irkutsk: Izd. Irkutsk Gos. Univ.

Medvedev, G.I. 1983. Paleoliticheskie obitateli yuga Sibirskogo ploskogoria i drevnie kultury Severnoi Ameriki. In *Pozdnepleistotsenovye i rannegolotsenovye kulturnye sviazi Azii i Ameriki*, 36–41. Novosibirsk: Nauka.

Medvedev, G.I. 2001. O geostratigrafii ansamblei eolovo-korradirovannyh artefaktov Baikalskoi Sibiri. In *Sovremennye problemy evraziiskogo paleolitovedenia*, 267–272. Novosibirsk: Izd. IAET SO RAN.

Mochanov, Y.A. 1988a. *Drevneishii paleolit Diringa (stratigrafia i geologicheskii vozrast pamiatnika)*. Yakutsk: JAF SO AN SSSR.

Mochanov, Y.A. 1988b. *Drevneishii paleolit Diringa (arheologicheskii vozrast pamiatnika) i problema vnetropicheskoi prarodiny chelovechestva*. Yakutsk: JAF SO AN SSSR.

Mochanov, Y.A. 1992. *Drevneishii paleolit Diringa i problema vnetropicheskoi prarodiny cheloveka*. Novosibirsk: n.p.

Mochanov, Y.A., and S.A. Fedoseeva. 2002. Arheologia, paleolit Severo-Vostochnoi Azii, vnetropicheskaia prarodina chelovechestva i drevneishie etapy zaselenia chelovekom Ameriki: Tr. Prilenskoi arheologicheskoi ekspeditsii. In *Doklady dlia Mezhdunarodnogo Severnogo arheologicheskogo kongressa*, *g*. Khanty-Mansiisk, 9–14 sent. 2002g. Yakutsk.

Nikolaev, S.V., and E.A. Ponomareva. 1998. Klimaticheskaia harakteristika vremeni formirovania otlozhenii kedrovskoi svity (QI–II kd) Kuznetskoi kotloviny po paleokarpologicheskim dannym izuchenia osnovnyh karierov otkrytoi dobychi uglia. In *Problemy rekonstruktsii klimata i prirodnoi sredy golotsena i pleistotsena Sibiri*, 254–263. Novosibirsk: Izd. IAET SO RAN.

Okladnikov, A.P. 1959. *Paleolit Zabaikalia. Obschii ocherk. Arheologicheskii sbornik. NII SO AN SSSR*. Vol. 1, 5–26. Ulan-Ude: Buryatsky kompleks.

Okladnikov, A.P. 1964a. Sibir v drevnekamennom veke. Epoha paleolita. In *Drevnaia Sibir: Maket I toma "Istorii Sibiri"*, 51–128. Ulan-Ude: n.p.

Okladnikov, A.P. 1964b. *O pervonachalnom zaselenii chelovekom Sibiri i novyh nahodkah paleolita na reke*

Zee (VII Mezhdunar. kongress antropol. i etnogr. nauk). Moscow: Nauka.
Okladnikov, A.P. 1972. Ulalinka - drevnepaleoliticheskii pamiatnik Sibiri. In *Paleolit i neolit*, vol. 7, 7–19. (MIA: No. 185). Leningrad: Nauka.
Okladnikov, A.P. 1979. K voprosu o pervonachalnom zaselenii chelovekom Sovetskogo Dalnego Vostoka i nahodka ashelskogo rubila v raione s. Bogorodskogo Ulchskogo raiona Khabarovskogo kraia. In *Drevnie kultury Sibiri i Tihookeanskogo basseina*, 6–20. Novosibirsk: Nauka.
Okladnikov, A.P. 1983. Paleolit Mongolii v svete noveishikh issledovanii. In *Pozdnepleistotsenovye i rannegolotsenovye kulturnye sviazi Azii i Ameriki*, 8–21. Novosibirsk: Nauka.
Okladnikov, A.P. 1986. *Paleolit Mongolii*. Novosibirsk: Nauka.
Okladnikov, A.P., and Z.A. Abramova. 1994. Paleolit Centralnoi Azii – Mongolii. In *Paleolit Tsentralnoi i Vostochnoi Azii*, 7–60. St. Petersburg: Nauka.
Okladnikov, A.P., L.A. Ragozin, G.A. Pospelova, Z.N. Gnibidenko, and A.I. Shliukov. 1985. K voprosu o vozraste Ulalinskogo mestonahozhdenia galechnoi kultury na Altae. *Izvestia Akademii Nauk SSSR. Seriya Geologicheskaya* 7: 74–82.
Penkov, A.V. 1992. Magnitohronologicheskie aspekty datirovania diringskogo arheologicheskogo kompleksa. In *Arheologicheskie issledovania v Yakutii: Tr. Prilenskoi arheologicheskoi ekspeditsii*, 178–87. Novosibirsk: n.p.
Pospelova, G.A., Z.N. Gnibidenko, and A.P. Okladnikov. 1980. O vozraste poselenia Ulalinka po paleomagnitnym dannym. In *Arheologicheskii poisk (Severnaia Azia)*, 3–10. Novosibirsk: Nauka.
Ragozin, L.A. & A.I. Shliukov. 1984. *K voprosu o vozraste Ulalinskoi paleoliticheskoi stoianki* (Vestnik Moscow Univ. seria 5). *Geografia* 5: 80–5.
Ranov, V.A. 2001. Loess-paleosoil formation of southern Tajikistan and the loess Palaeolithic. *Praehistoria* 2: 7–27.
Ranov, V.A. 2005. Problema vnetropicheskogo proishozhdenia cheloveka: mify i realnost. *Archaeology, Ethnology and Anthropology of Eurasia* 1: 16–20.
Ranov, V.A., and J. Schaefer. 2000. Loessic Paleolithic. *Archaeology, Ethnography and Anthropology of Eurasia* 2: 20–32.
Ranov, V.A., and S.M. Tseitlin. 1991. Paleoliticheskaia stoianka Diring glazami geologa i arheologa. *Bulletin Komissii po Izuch. Chetvert. Perioda* 60: 79–87.
Tseitlin, S.M. 1975. K voprosu o vozraste paleoliticheskih mestonahozhdenii na vysokih terrasah pravoberezhia r. Angary. In *Drevnaia istoria narodov yuga Vostochnoi Sibiri*, vol. 3, 37–43. Irkutsk: Izd. Irkutsk Univ.
Tseitlin, S.M. 1979. *Geologia paleolita Severnoi Azii*. Moscow: Nauka.
Tseitlin, S.M. 1984. Review of Ragozin L.A., Shliukov A.I. K voprosu o vozraste Ulalinskoi paleoliticheskoi stoianki, in Vestnik Mosk. Univ, Seris 5, Geografia: 80–85.
Vasilevsky, A.A. 2008. *Kamennyi vek ostrova Sakhalin*. Yuzhno-Sakhalinsk: Sakhalinskoe knizhnoe izdatelstvo.
Volokitin, A.V. 1992. Rannepaleoliticheskie mestonahozhdenia srednei Angary. In *Rannepaleoliticheskie kompleksy Evrazii*, 111–119. Novosibirsk: Nauka.
Voloshin, V.S. 1988. Ashelskie bifasy iz mestonakhozhdenia Vishnevka-3. *Sovetskaya Arkheologia* 4: 199–203.
Waters, M. 1999. Late Quaternary geology and geochronology of Diring-Yariakh, an early Paleolithic site in central Siberia. *Quaternary Research* 51: 195–211.
Waters, M., S. Forman, and G. Pierson. 1997. Diring-Yariakh: a lower Paleolithic site in central Siberia. *Science* 275: 1281–1284.
Zadonin, O.V. 1992. Paleoliticheskoe mestonahozhdenie Balyshovo I na Lene. In *Rannepaleoliticheskie kompleksy Evrazii*, 124–133. Novosibirsk: Nauka.

Northern Asia: Origins and Development of Agriculture

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Introduction

The origin and development of agriculture is one of the most important processes in human history, as it has fundamentally and irreversibly changed not only the subsistence strategies but also the whole trajectory of cultural development of human beings. Agriculture has led to the occurrence of labor division, professionalization, social inequality, and civilizations and has produced long-lasting impact on the physical evolution of human beings, the environment, and natural resources, including the soil, climate, landscape, and many flora and fauna species in the earth.

Because of these significances, the study of the origin of agriculture has been one of the most important topics in the field of archaeology, anthropology, genetics, history, historic ecology, linguistics, paleozoology, paleobotany, as well as other related disciplines of sciences and social sciences. Based on studies of these disciplines

since the 1910s, it is quite clear now that Northern Asia, which includes eastern Russia, China, Mongolia, Japan, and Korea, and stretches between latitudes approximately 72° and 19°N, and longitudes between approximately 70° and 145°E, has witnessed an independent origin and development of agriculture, with its temperate eco-zone located between latitudes approximately 43° and 25°N being the core area.

Definition

There are various definitions of "agriculture." In this entry, "agriculture" is defined as a subsistence strategy of systematic and continuous cultivation of plants and husbandry of animals, which facilitates the domestication and continuous evolution of certain plants and animals, and the development of human beings and their cultures. "Domestication" is the dynamic process of human manipulation and the genetic and physical evolution of plants and animals, which creates new species that have to rely upon human beings for their survival, and vise versa (Lu 1999, 2006). "Culture" is the integrated and dynamic system of technology, social structure, symbols, beliefs, behavior patterns, and other cognitive aspects learnt and transmitted between members of a given human society in a given period of time (Kottak 2002).

Historical Background

Studying the origin and development of agriculture in Northern Asia is primarily a result of the occurrence of modern archaeology in this area. In 1927, Swedish geologist and archaeologist Johan G. Andersson discovered rice husks on pottery dated to approximately 7,000 years ago in Yangshao, Henan Province, China (Andersson 1934). Rice remains have been found in archaeological sites of the Yayoi culture dated to between approximately 2,800 and 2,400 years ago in Japan from the 1930s onward (Misaka and Wakabayashi 2011). In the decades that followed, particularly after the 1970s, hundreds of archaeological sites dated from approximately 15,000 years to 4,000 years ago have been excavated in Siberia, Mongolian area, the Yellow and the Yangzi River Valleys, South China, Japanese archipelago, and Korean Peninsula; research methods from botany, zoology, soil analysis, isotopic analysis, genetics, chemistry, and starch analysis have been applied to archaeological studies, and enormous amount of plant and animal remains have been found and analyzed. The result provides substantial information for the understanding of the origin and development of agriculture in Northern Asia, although there are remaining questions.

Based on these studies, it seems that there are probably two centers of the origin of agriculture, with cultural contacts, in Northern Asia (Lu 2006). The first center expands from the southern edge of the Inner Mongolia to the middle to lower Yellow River reaches, where the cultivation and domestication of foxtail and broomcorn millet (*Setaria sativa* L. and *Panicum miliaceum* L., respectively) occurred at around 8,100–8,000 years ago; the second center locates mainly in the middle to lower Yangzi River valley and the adjacent Huai River, where the cultivation and domestication of one subspecies of rice (*Oryza sativa japonica*) originated at approximately 9,000–8,500 years ago (Lu 1999; Zhao 2011) (Fig. 1). So, what are the causal factors of nature and culture for the origin of agriculture in this area?

Climate and Environment

Northern Asia is a landmass of great ecological and cultural diversity. Geographical, pollen, phytolith, and soil analyses have been used to investigate the climate, natural resources, and the landscape changes in this area. Geographically, the northern part of Northern Asia is dominated by mountains, including the Altai, Tian shan, Kunlun shan, the Khreber, the Stanovoy, and the Da Hinggan Ling Mountains; between the mountains there are the Siberia, Mongolian, Qinghai-Tibet, and the Yungui Plateaus, and many rivers with the Yellow and the Yangzi River being the longest.

The climate in the continent of Northern Asia is controlled by the northward summer monsoon from the Pacific Sea and the southward winter monsoon from Siberia, while the climate of the Japanese Archipelagos and the Korean Peninsula is also affected by sea currents. Generally speaking, the Last Glacial Maximum had significant impact on this landmass, particularly on areas north of latitudes 22°N, as the climate became much colder and drier during that period (Lutaenko et al. 2007; Lim and Fujiki 2011). The rising and falling of sea levels and geological movements also play important roles in the local climatic changes from the Last Glacial Maximum between approximately 22,000 and 15,000 years ago, to the gradual warming up period between 15,000 and 12,000 years ago, and the warmer and wet Holocene Optimum between about 7,000 and 4,000 years ago (Lutaenko et al. 2007; Lim and Fujiki 2011). The period from 12,000 to 7,000 years ago saw the origin and development of prehistoric agriculture in this region.

Foragers Prior to the Occurrence of Agriculture

Between approximately 15,000 and 10,000 years ago, pottery, composite tools made by microblades and organic materials, and grinding stones independently occurred in Siberia, Japan, the middle Yellow River Valley, and South China, as new implements used by human beings to exploit different resources and develop broader spectrum subsistence strategies in various environments, including the collection of grass seeds, tubers, nuts, shells, and fishing and hunting (Lu 1999, 2006, 2008; Liu et al. 2010; Crawford 2011). The earliest rice phytolith dated between approximately 15,000 and 12,000 years ago are found in the Xianrendong and Diaotonghuan site in the middle Yangzi Valley, the Yuchanyan site at the northern border of South China, and the Zengpiyan cave in South China (Lu 2006, in press; Zhao 2011). Rice husks and phytolith of leaves have been found at Shangshan, the lower Yangzi Valley and are dated to between 10,000 and 7,500 years ago (Zhao 2011). However, it is not clear whether rice phytolith or remains found in the aforementioned sites are wild or domesticated species, nor is it certain that rice was cultivated or just collected for food and/or fuel, or for other purposes (Fig. 1) (Lu 2008; Zhao 2011). Nonetheless, these discoveries illustrate that rice was exploited by human beings in the temperate zone in Northern Asia by 12,000 years ago.

The early exploitation of millets, on the other hand, is unclear. Use-wear analysis on stone flakes found in Xiachuan (Fig. 1), Shanxi Province, China, indicates that cutting grasses was practiced at around 12,000 years ago in the middle Yellow River Valley (Lu 1999), but as millets cannot produce identifiable phytolith (Zhao 2011), and flotation has not been carried out in late Paleolithic sites in this region, the exploitation of wild millets remains to be investigated.

The Early Farmers

When the climate gradually warmed up after approximately 9,000 years ago, some societies living in the southern edge of the Inner Mongolia, the middle and lower reaches of the Yellow and the Yangzi River valley began to cultivate millets and/or rice, respectively. Grains of broomcorn and foxtail millets have been found in the Xinglonggou site in Inner Mongolia, the Cishan and Peiligang sites in the middle Yellow River Valley, the Yuezhuang site in the lower Yellow Valley, and the Dadiwan site in the upper Yellow River Valley, all dated to between 9,000 and 7,500 years ago (Fig. 1). It has been argued that the millets are domesticated except the grains found in Yuezhuang, which cannot be confidently identified (Lu 1999; Crawford 2011; Zhao 2011). Rice grains have been found in the Jiahu site in the Huai River Valley dated to between 9,000 and 7,800 years ago, in the Pengtoushan and Bashidang in the middle Yangzi Valley dated to about 9,000–7,500 years ago, and in the Shangshan site in the lower Yangzi Valley dated between 10,000 and 7,500 years ago (Fig. 1). According to Zhao (2011), the rice grains found in Jiahu are likely to be domesticated, but the species of the Shangshan rice is unclear. Rice grains found in Bashidang are probably in between wild and domesticated and are identified as a transitional species (Zhang 1998).

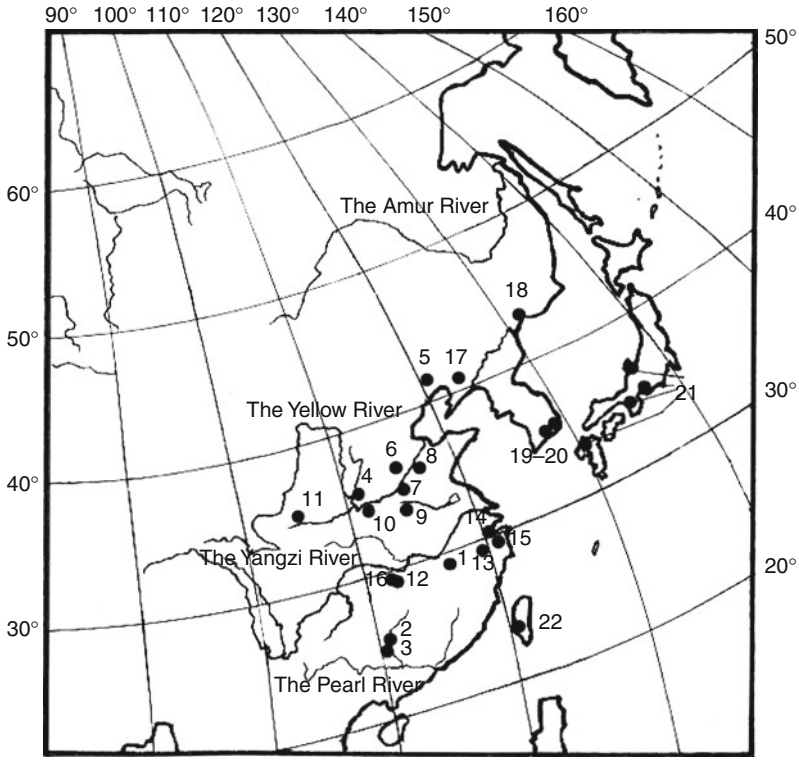

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Fig. 1 Archaeological sites mentioned in the text: *1* Xianrendong/Diaotonghuan; *2* Yuchanyan; *3* Zengpiyan; *4* Xiachuan; *5* Xinglonggou; *6* Cishan; *7* Peiligang; *8* Yuezhuang; *9* Jiahu; *10* Yangshao; *11* Dadiwan; *12* Pengtoushan/Bashidang; *13* Shangshan; *14* Kuahuqiao; *15* Hemudu; *16* Chengtoushan; *17* Xinle; *18* Krounovka 1; *19–20* Pyeonggeodong and Tongsamdong; *21* Archaeological sites of the Yayoi culture; *22* Nan-kuan-li

Although living in different environments and cultivating different cereals, the cultivators of millets and rice shared some cultural similarities. First of all, they are all sedentary, as remains of houses have been found in all the aforementioned sites. Experiments of millet and rice cultivation indicate that sedentism is a crucial condition for cereal farming (Lu 2006), and the construction of houses results from sedentism. However, houses not only are shelter for human beings, but also provide space and facility for the formation of small social units (family?) and the storage and accumulation of private or family-owned properties, which eventually leads to private properties and social inequality, although archaeological data of the early farmers do not illustrate significant gap between households at this stage (Lu in press). Second, hunting and gathering (including fishing) remained as important subsistence strategies of the early farmers, illustrating that the origin and development of agriculture is a graduate process in Northern Asia, and that foraging did not immediately diminish after the occurrence of farming (Lu 2006). In fact, it is the development of agriculture, sedentism, increased population and much greater demand for wild plant and animal resources that eventually led to the depletion of wild flora and fauna, thus forced farmers to reduce foraging and rely more on agriculture (Lu in press). Thirdly, based on pottery and stone tool analysis, labor division and craftsmanship are at a very early stage in the early farming society (Lu in press). Finally, burials have been found in all the aforementioned sites except Shangshan, and items such as tortoise shells have been found in Jiahu, manifesting the existence of cognitive sense of social unit and the possible practice of rituals (Lu in press).

Did the early farmers keep livestock? Genetic studies suggest that dog might have been domesticated in East Asia, and the earliest one might have been found in northern China dated to about 10,000–9,000 years ago, but there is no evidence that the dog keepers were farmers. The dog found with millet cultivators in the Dadiwan culture is dated to between 8,000 and 7,400 years ago (Flad

et al. 2009). The earliest domesticated pig was kept by the Jiahu rice farmers dated to approximately 8,500–7,800 years ago, and at around 8,100–7,400 years ago pig might have been husbanded by farmers at Xinglongwa in Inner Mongolia, Dadiwan in the upper Yellow River Valley, Cishan in northern China, and Kuahuqiao in the lower Yangzi River Valley (Flad et al. 2009) (Fig. 1). Sheep and goat are not locally domesticated, and might have been introduced into China by about 5,600–5,000 years ago; so would be the case for cattle, although the domestication of cattle in East Asia cannot be ruled out, as wild cattle exist in this region (Flad et al. 2009).

The Development of Agriculture

The Holocene climatic optimum between approximately 7,000 and 4,500 years ago witnessed the development of agriculture in Northern Asia, characterized by the occurrence of paddy rice field and plowing in the Yangzi River Valley, and sophisticated craftsmanship in both the millet and rice farming societies. Socially, this is an era of more stable sedentism, larger settlements, branched social units within the village, different economic and social status among members of the society, and gender differentiation (Lu 1999, in press).

This period also saw the expansion of agriculture possibly associated with human diaspora. Rice farming dispersed northward to the Yellow River Valley at about 7,000 years ago, and southward to South China by 6,500 years ago; and millet farming expanded to Xinle, Northeast China at around 6,100 years ago (Lu 2005) (Fig. 1). The number of archaeological sites with remains of millets and/or rice increased substantially, the size of many sites became bigger, and the impact of agriculture upon local environment and natural resources was also visible in this era. For example, in the Hemudu site (Fig. 1), Zhejiang Province, China, where substantial amount of rice remains were found in the 1970s, pollen profiles indicate that the quantity and variety of hardwood was very rich at around 7,000 years ago when the rice farmers arrived; however, both the quantity and variety of hardwood reduced significantly at around 6,000 years ago, after the site being occupied by farmers for about 1,000 years, clearly showing the impact of farming activities upon local vegetation (Lu in press). Vegetation changes will have impact on local fauna. The quantity and variety of animal bones found in many archaeological sites occupied by millet and/or rice farmers between approximately 7,000 and 4,500 years ago also show the trend of declining (Lu 2006, in press).

After 7,000 years ago, rice and millet farming further expanded to Russia, Taiwan, the Japanese Archipelagos, the Korean Peninsula, Southeast Asia, and the Pacific. Within Northern Asia, seeds of broomcorn millet and beefsteak plant have been found in the Krounovka 1 site dated to between 4,670 and 4,640 years ago in Primorye, Russia; wheat, barley, pea, soybean, and buckwheat have been found in various archaeological sites dated after about 5,000 years ago, and hoed agriculture occurred at around 4,500 years ago in this region (Kuzmin and Rakov 2011) (Fig. 1). Dog was the earliest domesticated animal in Russia Far East dated from about 6,800 years ago, and animal husbandry began at around 3,000 years ago, with domesticated pig, horse, and cattle (Kuzmin and Rakov 2011).

In the Korean Peninsula, no archaeological data on prehistoric agriculture is available in North Korea (Lee 2011). The earliest remains of foxtail and broomcorn millet and legumes in South Korea are found in Tongsamdong and Pyeonggeodong (Fig. 1), dated to about 5,500 and 5,000 years ago; rice remains are dated to between approximately 4,000 and 3,000 years ago, and domesticated dog occurred at about 5,500–4,000 years ago, while remains of domesticated horse and cattle are dated to about 2,300 years ago (Lee 2011). Foxtail millet and rice farming reached Nan-kuan-li, western Taiwan by 4,500 years ago (Tsang 2005). Wet-rice farming expanded to the Japanese Archipelagos in the Yayoi period at around 2,800 years ago, and became a major subsistence strategy afterward (Misaka and Wakabayashi 2011) (Fig. 1).

Domesticated species from far afield also entered Northern Asia after approximately 5,000 years ago, most noticeably wheat and barley, which are originally domesticated in West

Asia at around 10,000 years ago (Bellwood 2005) and expanded to Russia Far East (Kuzmin and Rakov 2011), the Yellow River Valley and adjacent areas by about 4,300–4,000 years ago (Zhao 2011). In other words, by 2,800 years ago, the cultivation of local species of rice and millets was practiced in continental and island Northern Asia, and "exotic" species like wheat and barley had also cultivated in the cold and temperate eco-zones.

Agriculture of Other Plants

The aforementioned archaeobotanic data are primarily retrieved by flotation and phytolith analysis, which have been applied quite extensively in archaeological works conducted in Northern Asia after the 1980s. However, not all plant remains can be identified by the two methods, particularly tuber plants, which produce no phytolith, and cannot be identified to genus or species based on their charcoal remains found in archaeological deposits. Thus in recent years starch residue analysis has also been used in archaeological works in Northern Asia. In 2003, starch residues of taro were found on tools in the Zengpiyan cave site in Guangxi, South China, but starch cannot reveal whether it is a wild or domesticated species (Lu 2008) (Fig. 1). This study shows the exploitation of taro in South China before the expansion of rice farming from the Yangzi River Valley, but it is unclear whether South China is another independent center for the origin and development of taro farming (Lu 2008).

In addition to cereals and tubers, many other plants have been exploited and possibly cultivated in Northern Asia. The Jomon people lived in Japan between 12,000 and 3,000 years ago collected and utilized many plants, including chenopods, dock, knotweeds, elderberry, grape, lacquer tree, goosefoot, walnut, beans, bottle gourd, hemp, and barnyard grass *Echinochloa crus-galli*, the latter might have been cultivated afterward (Crawford 2011). Based on genetic studies and archaeological data, it is also hypothesized that azuki and soybean might have been domesticated in Japan by the Jomon people, as well as by the Chulmun people in South Korea at around 5,300–5,000 years ago (Crawford 2011; Lee 2011), but more data are required to address these hypotheses.

Key Issues and Current Debates

Though many works have been done in the last decades, there are still issues under debate. These issues can be classified into two categories: the first one on the identification and classification of raw data, and the second one on the theoretical discourse of agriculture, such as the impetus, process and consequence of agriculture, and whether agriculture is an "advanced" development.

The Identification and Classification of Raw Data

Within this category there are debates on the progenitors of broomcorn millet and domesticated rice, as botanists and genetics still do not know much on the former, and disagree on the latter. Some scholars argue that the perennial wild rice (*Oryza rufipogon* Griff.) should be the progenitor, but others think that it should be the annual wild species (*O. nivara* Sharman and Shatry). While one subspecies of domesticated rice (*Oryza sativa japonica*) seems to have been domesticated in the Yangzi River Valley, it remains unclear where, when and by whom the other subspecies *O. sativa indica* and *O. sativa javanica* were domesticated. It is also unclear whether soybean was domesticated in Northeast China once, or was also domesticated in Korea and Japan (Crawford 2011; Lee 2011).

The question of when and how domesticated wheat, barley, and sorghum were introduced from Western Asia into Northern Asia also requires further studies (Zhao 2011). In addition, very little is known about the cultivation and domestication of many other plants, such as the Chinese tea tree, jujube, peach, lotus, water chestnuts, Chinese cabbage, and other species of vegetables, fruits, and nuts in Northern Asia (Lu 1999, in press; Crawford 2011; Kuzmin and Rakov 2011; Lee 2011).

In terms of identifying archaeobotanic findings, scholars also disagree on whether the morphological differences and measurements of rice

grains and spikelet bases, as well as the phytolith morphology of the husks and leaves of rice, can be used to distinguish wild and domesticated rice (Lu 2006, in press). As domestication is a process, there should be species in-between (Zhang 1998). Based on comparative measurements of the perennial wild rice (*O. rufipogon* Griff) and domesticated rice (*O. sativa japonica*), it is argued that a more holistic approach is required, as the size and structure of the stem and spikelet of the two species also differ and should be taken into consideration (Lu in press). Further, how to be certain that plants and animals found in archaeological sites were locally cultivated/husbanded, instead of being brought to the site as a result of cultural exchange and trading, is an important issue too (Lu 2008, in press; Crawford 2011).

There are more remaining questions on the husbandry of animals in Northern Asia. As mentioned above, the domestication of cattle, chicken, water buffalo, silkworm, and fish remains unclear to date, as scholars are debating on the identification of wild and domesticated species of cattle, chicken, and water buffalo (Flad et al. 2009; Kuzmin and Rakov 2011), and very little attention has been paid to the cultivation of silkworm and fish in Northern Asia.

Theoretical Issues

To date, the majority of scholars working on agricultural in Northern Asia agree that the origin and development of agriculture is a process, but there are different opinions on defining "agriculture," on the causal factors of the transition from foraging to farming, on the impact of cultural contact between the Yellow and the Yangzi River Valley related to the origin of agriculture, as well as the consequence of agriculture (Lu 1999, 2006; Crawford 2011; Kuzmin and Rakov 2011). Data of archaeology and other disciplines are far from sufficient to solve these debates at the present, but the consequence of agriculture seems to be very significant.

Based on archaeological, archaeobotanic, and zooarchaeological data found in Northern Asia to date, plus data from collecting, cultivation, and harvesting experiments, it is argued that when cereal cultivation began in the Yellow and the Yangzi River Valley, the productivity must be very low, particularly for rice, as the progenitor of domesticated rice is a perennial plant and produces very small amount of shattered seeds; thus, harvesting wild rice as food is highly inefficient comparing to collecting tuber plants, shells, and fishing (Lu 1999, 2006). Given the extremely low or even negative return of cultivating wild cereals at the initial stage of farming, agriculture must have been a small proportion of prehistoric economy, and it is possible that the main driving force for continuous cereal cultivation might not have been for food, although whether religious or other cognitive activities playing any role in this process requires further studies (Lu 2006, 2008, in press).

However, once occurred, cereal cultivation has significant impacts on people's way of life. First of all, it requires sedentism in order to look after and harvest the plants. Second, it requires close access to substantial amount of water and flat land. These requirements must have forced the initial cultivators to give up caves in hilly areas and move to plains and river terraces. Consequently, they had to learn to build dwellings, which was the beginning of architecture and settlement planning of human beings. Archaeological data have illustrated this change of settlement patterns in the Yangzi and Yellow River Valleys, as the prehistoric farmers are often located in the latter geographic settings (Lu 1999, in press).

Dwellings are not just for the physical protection and comfort of people. Based on ethnographic and archaeological data, it is argued that when a group of mobile people staying in caves, members of the group had to share *one* public and unstable space; there was no permanent and private space for them to keep and accumulate private properties. However, sedentism and the construction of dwellings provide stable and private spaces for people to store and accumulate their private properties, thus facilitate the occurrence and development of private (as individual or small social unit) ownership and inheritance of properties, which could be tangible items like tools, pottery, food (including the storable cereal grains), etc., or intangible items like craftsmanship and knowledge. All these have paved the way

for social inequality (Lu in press). Studies on the dynamic between agriculture, changed space structures and social changes in prehistoric Northern Asia are quite limited at the moment, and much more research is required.

As agricultural techniques developed, particularly with the construction of paddy field for rice farming as a powerful medium of human interference by around 7,000 years ago, wild cereals were gradually domesticated, farming productivity might have increased, and more mouths could be fed. On the other hand, ethnographic and historic data demonstrate that traditional agriculture (without machines) is very labor intensive, thus more hands would be required. These factors, plus sedentism, must have led to population increase, as illustrated by the significantly enlarged settlements, increased houses within each settlement, and more densely located settlements in the Yellow and Yangzi River valley, as well as in adjacent areas (Lu 1999, 2006, in press). However, much more research is required on the impact of technological changes upon demographic, economic, and social change, as it is another important theoretical issue in prehistoric Northern Asia.

With all the aforementioned material culture, economic and social changes, labor division, professionalization and standardization of craft production, increase economic, social, and political inequality gradually occurred after 7,000 years ago. As increased populations had to compete for limited land and water resources, group conflicts occurred or increased, and walled villages, and later, towns, were constructed. The earliest protective ditches surrounding a farming village have been founded in Bashidang, the middle Yangzi River Valley, dated to about 8,500–7,800 years ago (Fig. 1); and the earliest walled town has also been found at Chengtoushan in the same region dated to approximate 6,500–6,300 years ago, with rice paddy field being enclosed by the wall (Lu in press) (Fig. 1). This phenomenon clearly demonstrated that, first of all, rice field was a valuable property of the farming society at that time. Although it is not clear whether the field was publicly or privately owned, the protected rice paddy field illustrates the occurrence of immovable properties (farming land) and territory ownership in prehistoric Northern Asia. Second, the construction of these protective mechanisms indicates that there might have been group conflicts related to crops and lands. Further, these protective mechanisms are material evidence of the existence of some kind of cognitive boundary between social groups, even collective identities (Lu in press). The occurrence of individual and collective identity is a topic of cognitive archaeology and anthropology, and more attentions are deserved on this topic in Northern Asia.

More walled towns occurred in both the Yellow and the Yangzi River valleys after 6,000 years ago, particularly at around 4,800–4,000 years ago. At that time, farming techniques had developed further, rice paddy fields with irrigation system were constructed, plough was used in the Yangzi River Valley, and hoe was widely used in the continent of Northern Asia. The period between approximately 5,000–4,000 years ago saw further increased productivities and populations, accumulated tangible and intangible properties, more specified labor division and professionalization not only within the same group but between regions, and mass production of certain crafts, like pottery items, in the Yangzi River Valley. There were small and big houses within farming societies, and the quantities and qualities of burials in cemeteries varied significantly. Labor-intensive items for the social elite like jade and ivory items appeared in some of the big tombs located at human-made mounds in the lower Yangzi River Valley, possibly used for rituals and other special functions. All these illustrate the occurrence of complex society, with substantially differentiated social segments. It is based on this kind of society that ancient civilization in the Yellow River Valley occurred after 4,000 years ago (Lu in press). The formation process from complex societies to early states in Korea and Japan, on the other hand, is not very clear yet (Stark 2006).

Based on available data to date, the development of agriculture was associated with the decline of both the quantity and variety of wild plants and animals found in many archaeological sites in both the Yellow and the Yangzi River

Valley after approximately 6,000 years ago, particularly after 4,500 years ago (Lu in press). As the climate between 7,000 and 4,000 years was generally warm and moist, it is more likely that this decline was the result of human activities and increased consumption of human populations in the two river valleys, which had been intensively farmed since some 9,000–8,500 years ago. Eventually, it became more difficult for members of the farming societies to hunt and collect, and they had to rely more on a few species of cultivated cereals and livestock (Lu in press). Foraging became less important and agriculture was more dominating in the economy. The diminishment of a broader spectrum subsistence strategy not only means that human beings have been irreversibly "domesticated," that their way of obtaining food becomes more vulnerable when attacked by natural and human-made disasters, but also means that it is more difficult for the poor members of the society to obtain free food from nature (Lu in press). The lack of variety of food ingredients, particularly the insufficient meat intake, might have caused malnutrition of the lower social class, although much more physical anthropological studies of human bones are required to tackle this issue. However, historic documents show that the upper class in Bronze Age Yellow River Valley was called "meat eaters" as opposite to the grass-root people (Lu in press). Thus, the development of agriculture, and consequently the depletion of natural resources, has widened the gap between different social segments in terms of not only economic, social, and political status, but also physical well-being.

On the other hand, archaeological data and isotopic analysis seem to indicate that fishing, shell collecting, and foraging still played important roles even after the occurrence of farming in coastal and inland societies from approximately 5,500–3,000 years ago in South Korea, where intensive agriculture occurred by 3,400 years ago, possibly associated with migrating farmers from the Northern Asia continent (Lee 2011). Whether the less intensified agriculture in South Korea produced less impact on the environment and depletion of wild fauna and flora, requires further studies.

In summary, the origin and development of agriculture in Northern Asia some 9,000–8,000 years ago (Two articles published in PNAS and PLoS by Lu et al. (2009) argue that foxtail millet was domesticated in the Yellow River Valley by 10,000 years ago. However, the majority of scholars, working on prehistoric agriculture, including the author of this entry, do not agree, because the site was not re-excavated, and the archaeological context is not clear. For details please see Zhao (2011) in the reference list of this article.) have caused fundamental changes in terms of human beings' mobility, subsistence strategies, social (including kinship) and political structures, as well as their physical beings and mindsets, including the senses of property and territory ownership, and group boundary. It is primarily based on agriculture of millets, rice, wheat, and barley that ancient civilizations occurred in the Yellow River Valley by about 4,000 years ago and in the Japanese Archipelagos and the Korean Peninsula after 2,000 years ago (Lu 1999, 2006; Crawford 2011; Lee 2011; Zhao 2011). Agriculture was the choice made by some groups in Northern Asia at the beginning of the Holocene, and it has sent human beings onto a completely new trajectory with no return.

As agriculture sets the foundation of civilization, archaeologists in mainland China tend to think agriculture is an "advance," and blame environmental changes for the decline of some farming societies in the Yangzi River Valley, while scholars outside mainland China have different opinions (i.e., Lu 2006, 2008; Crawford 2011; Lee 2011). It has been argued that the current definition of "agriculture" is a Eurocentric concept (Crawford 2011), but the concept of "agriculture" in China also has a long history in the academic discourse in the Central Plain of the middle Yellow River Valley, which has been the "core area" of Chinese civilizations (Lu 1999, in press), so it really is a "Central-plain centrism" concept versus the foraging groups living in the so-called peripheral areas in China, the latter have been often described as "barbarians" and/or "backward" in China's historic documents and even the current archaeological discourse. Thus, the debate of whether agriculture is an "advance"

or is the biggest mistake made by human beings is about whether cultural changes are unilinear or multilinear, about cultural relativism *versus* cultural "evolution," about Sinocentrism and/or "Central-plain centrism" *versus* cultural diversity in areas other than the so-called core areas of the origin of agriculture, and about using the past to construct and enhance nationalism and patriotism of different polities in Northern Asia today.

International Perspectives

There are the so-called core and secondary regions in terms of the origin and development of agriculture in Northern Asia, each showing various trajectories of cultural changes from approximately 15,000 to 3,000 years ago. A comparative discussion within Northern Asia can trigger questions on the diversity of human beings and environments, as well as their unique cultures (Crawford 2011). Further, the analytic outcome from Northern Asia can also be compared with those in Southeast Asia, where rice farming occurred at approximately 4,700–4,000 years ago (Bellwood 2005). The origin and development of agriculture might have resulted in human diaspora within Asia and from Asia to the Pacific, particularly the expansion of the Austronesians and Austroasiatics, which has contributed to the current distribution of human beings in the world (Bellwood 2005).

Data found in Northern Asia to date do illustrate similarities and differences in terms of the transition from foraging to farming comparing to the origin and development of agriculture in Western Asia, which is the earliest core area of the origin and development of agriculture. With insufficient data dated to about 12,000–10,000 years ago in the Yellow and the Yangzi River Valley, it may be premature to launch a comprehensive comparison on the two "primary centers" of agriculture; but this comparison certainly will provide fundamental insights for understanding the dynamics between peoples and different natures, the unilinear or multilinear development of human cultures and societies, the inter- and intragroup interactions as one of the crucial mechanisms of cultural changes, and the creativeness of human beings as "agents" (Lu 2006, in press). Finally, the study of the origin and development of agriculture also provides lessons from the past for the present and future of humans' destinations.

Future Directions

As mentioned above, there are still many questions remaining on the origin and development of agriculture in Northern Asia. To tackle the issues, it is important to:

1. Adopt integrated multidisciplinary studies to retrieve as much information as possible at field work, such as the integration of isotopic, residue, phytolith, pollen, and use-wear analysis of archaeological findings.
2. Integrate archaeological experiments with archaeological data and information from other disciplines to understand the evolution process from wild to domesticated species and its impacts on human/cultures.
3. Apply theories of anthropology, critical geography, and sociology to study the dynamic and consequence between material culture, social, and politic institutions and cognitive changes, for example, the function and meaning of spaces in prehistoric societies or the occurrence of individual and collective identities.
4. Conduct research with scholars from different countries within and outside Northern Asia to facilitate comparative studies. In fact, this is already happening now, but it will benefit the whole field of prehistoric agriculture if this international and multidisciplinary approach becomes more common in Northern Asia.
5. Increase academic exchanges by timely publications in various languages, and by more academic meetings, site visiting, and workshops.
6. Train the younger generation with broader knowledge. Students major in archaeology should also receive introductory training on genetics, phytolith, pollen, archaeozoology, and theories of anthropology. A more in-depth and holistic study on the origin and

development of agriculture in Northern Asia can only be carried forward by scholars with broaden academic horizon.

In summary, works carried out by archaeologists, archaeobotanists, historians, zoologists, and scholars of many other disciplines in the last decades have set a solid foundation for understanding the origin and development of agriculture in Northern Asia. It is believed that with new technologies, new methods, and new mindsets, much more data will be revealed, and the whole process from foraging to farming, as well as the consequence of this transition in Northern Asia, will be much better understood, and provide food for thoughts for humans at the present and in the future on the relation between human and nature and between human cultures, as well as on the direction of human societies as a whole.

Cross-References

► Agriculture: Definition and Overview

References

Andersson, J.G. 1934. *Children of the yellow earth*. London: Trubner & Co. Ltd.

Bellwood, P. 2005. *First farmers: The origins of agricultural societies*. Cornwall, UK: Blackwell Publishing.

Crawford, G.W. 2011. Advances in understanding early agriculture in Japan. *Current Anthropology* 52: S331–S345.

Flad, R., J. Yuan, and S. Li. 2009. Zooarchaeological evidence for the earliest animal domestication in northwest China. *Kaogu* 5: 80–86, (in Chinese).

Kottak, C.P. 2002. *Anthropology: The exploration of human diversity.* 9th ed. Boston: McGraw-Hill.

Kuzmin, Y., and V.A. Rakov. 2011. Environment and prehistoric humans in the Russian Far East and neighboring East Asia: Main patterns of interaction. *Quaternary International* 237: 103–108.

Lee, G.A. 2011. The transition from foraging to farming in prehistoric Korea. *Current Anthropology* 52: S307–S329.

Lim, J., and T. Fujiki. 2011. Vegetation and climate variability in East Asia driven by low-latitude oceanic forcing the middle to late Holocene. *Quaternary Science Reviews* 30: 2487–2497.

Liu, L., F. Judith, R. Fullagar, B. Sheahan, and X. Chen. 2010. What did grinding stones grind? New light on early Neolithic subsistence economy in the middle Yellow River Valley, China. *Antiquity* 84: 816–833.

Lu, T.L-D. 1999. *The transition from foraging to farming and the origin of agriculture in China*. Oxford: Archaeopress International Series No. 774.

Lu, T.L.-D. 2005. The origin and dispersal of agriculture and human diaspora in East Asia. In *The peopling of East Asia*, ed. L. Sagart, R. Blench, and A. Sanchez-Mazas, 51–62. Oxford: Routledge Curzon.

Lu, T.L.-D. 2006. The occurrence of cereal cultivation in China. *Asian Perspectives* 45: 130–158.

Lu, T.L.-D. 2008. Prehistoric subsistence strategies and cultural development in Guilin from the terminal Pleistocene to the early Holocene. *Archaeological Studies* 7: 333–353, (in Chinese).

Lu, T.L.-D. in press. *The origin and development of rice farming and prehistoric cultural development*. Beijing: Science Press, (in Chinese).

Lutaenko, K.A., I.S. Zhushchikohovskaya, Y.A. Mikishin, and A.N. Popov. 2007. Mid-Holocene climatic changes and cultural dynamics in the basin of the Sea of Japan and adjacent areas. In *Climate changes and cultural dynamics - a global perspective on Mid-Holocene transition*, ed. D.G. Anderson, K.A. Maasch, and D.H. Sandweiss, 331–406. London: Academic Press.

Misaka, K., and K. Wakabayashi. 2011. The assimilation process in the Yayoi society of western Japan. In *Coexistence and cultural transmission in East Asia*, ed. N. Matsumoto, H. Bessho, and M. Tomii, 69–88. Walnut Creek: Left Coast Press.

Stark, M., ed. 2006. *Archaeology of Asia*. Cornwall: Blackwell Publishing.

Tsang, C. 2005. Recent discoveries at the Tapenkeng culture sites in Taiwan. In *The peopling of East Asia*, ed. L. Sagart, R. Blench, and A. Sanchez-Mazas, 63–73. Oxford: Routledge Curzon.

Zhang, W.X. 1998. Studies of ancient cultivated rice in China. *Agricultural Archaeology* 1: 51–61, (in Chinese).

Zhao, Z. 2011. New archaeobotanic data for the study of the origins of agriculture in China. *Current Anthropology* 52: S295–S305.

Further Reading

Bellwood, P., and C. Renfrew, eds. 2002. *Examining the farming/language dispersal hypothesis*. Cambridge: Oxbow Books.

Cauvin, J. 2000. *The birth of the gods and the origins of agriculture*. Translated by T. Watkins. Cambridge, UK/New York: Cambridge University Press.

Diamond, J. 1997. *Guns, germs and steel: The fates of human societies*. New York: W.W. Norton.

Denham, T., J. Iriarte, and L. Vrydaghs. 2007. *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*. Walnut Creek: Left Coast Press.

Pinhasi, R., and J.T. Stock, eds. 2012. *Human bioarchaeology of the transition to agriculture*. Chichester/Hoboken: Wiley-Blackwell.

Northern Europe: Middle to Upper Paleolithic Transition

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State of Knowledge and Current Debates

Introduction

Seen from Europe, it has been often claimed that the beginning of the "Upper Palaeolithic," around 40,000 BP, corresponds to a dual phenomenon: the development of innovative behaviors and a biological change (the disappearance of the last Neandertals and the arrival of *Homo sapiens sapiens*). These different behaviors seen as particular features of the Upper Palaeolithic (see, among others, Mellars 1989) include, for example, lithic tools based mostly on blade production, a greater variety and increased standardization of tools, bone tool production, ornaments, figurative art, greater regional variety in lithic industries and more rapid evolution through time, the existence of systematic and specialized hunting (as opposed to scavenging and opportunistic hunting that was previously more common), demographic increase, increase in the size of occupation areas, and development of dwelling structures, etc. Other criteria have also been sometimes proposed as markers of the Upper Palaeolithic, such as bladelet production (Bar-Yosef and Kuhn 1999).

Trying to escape from a definition of the Upper Palaeolithic based on European data and given the numerous evidence of so-called "Upper Palaeolithic" behaviors during the African Middle Stone Age, the "behavioral modernity" concept has been increasingly employed, being now as important as the concept of "Upper Palaeolithic" itself. However, this concept remains fuzzy; material traces of such "behavioral modernity" are not so easy to identify in the archaeological record and often correspond to the same list of behaviors (bladelet production, ornament, bone tools, etc.). But other phenomena have also been claimed to correspond to this "behavioral modernity," among others: funerary practices, sailing (involved in the peopling of Australia), rocks or bones with organized incisions, musical instruments, projectiles and other composite tools, use of pigments, planning depth in the management of raw material procurement, and the existence of exchange networks (see, e.g., McBrearty and Brooks 2000).

Whether using the concept of "Upper Palaeolithic" or of "behavioral modernity," scholars often propose to attribute these different innovative behaviors to a cognitive evolution unique to anatomically modern humans (different from the other hominins, whether Neandertals, Denisovans, or *Homo erectus*) (e.g., Mithen 1994). This model linking biological evolution and cultural changes has two variants: some scholars propose the existence of rapid and recent cognitive change (after 50,000 BP; e.g., Klein 2000), others propose slower and gradual evolution, more ancient (transition between Acheulean and *Middle Stone Age*, between 300 and 200,000 BP) unique to Africa where such "behavioral modernity" would develop in parallel with the modern anatomy of *Homo sapiens* (McBrearty and Brooks 2000). In both cases, it is then proposed that the development of the Upper Palaeolithic in the different regions of the world can be explained by the dispersal of anatomically modern humans from Africa and the Near East (in agreement with most of the palaeoanthropological and palaeogenetic hypotheses). Thus, the beginning of the Upper Palaeolithic in Europe and Asia would be strictly related to the spread of *Homo sapiens sapiens* replacing other hominins (Mellars 2006; McBrearty and Brooks 2000; Bar-Yosef 2007; Hublin 2015) even if a certain amount of admixture has now been established between different hominin populations in Eurasia based on genetic data (Prüfer et al. 2014).

Another general model proposes, on the contrary, that Upper Palaeolithic development is not related to the replacement of archaic populations by a "modern" one and that the Middle to Upper Palaeolithic transition does not correspond to a particularly deep behavioral shift (Clark 1999; Straus 1995). This transition is considered as a step during a longer and gradual evolutionary process, where selection and adaptation (notably

due to environmental changes) are the driving forces of the progressive transformation of cultural and behavioral choices. Regarding biological evolution, this "continuity" model was related to work by palaeontologists defending the idea of a multiregional origin of modern *Homo sapiens* rather than dispersal and replacement from a unique African source (e.g., Wolpoff et al. 2001) that has now been abandoned notably because of the accumulation of genetic data (e.g., Fu et al. 2016).

However, these two conceptions of the development of the Upper Palaeolithic, one in which it is seen as a "package" of behaviors unique to anatomically modern humans who spread across the globe with the dispersal of this new population, and the other in which the shift from Middle to Upper Palaeolithic is just a step among others during universal and progressive evolution, both show weaknesses that should lead to the development of more complex approaches of these issues.

Indeed, numerous discoveries and recent research show that at least some of the behaviors said to be "modern" were already present before the Upper Palaeolithic and even outside the African Middle Stone Age and *Homo sapiens sapiens* populations. Cynegetic capacities (e.g., Rendu et al. 2012); hafted tools and projectile points (Rots 2013; notably involving synthetic resins: Grünberg 2002), planning depth in the management of the lithic resources (Roebroeks et al. 1988), spatial organization of the living areas (e.g., Speth 2006), funerary practices (Rendu et al. 2014), use of bone tools (Soressi et al. 2013), and use of pigments and presence of rocks and bones with organized incisions (Soressi and d'Errico 2007) are all attested during the Middle Palaeolithic of Eurasia, notably among Neandertals.

Moreover, the artificial nature of the package of new behaviors, said to be unique to the Upper Palaeolithic or to "behavioral modernity," is also visible because it groups phenomena that developed independently at different times and in different regions. Ornaments, figurative art, or bone tools did not appear at the same time in the same regions with the presence of anatomically modern humans. The idea that it is possible to follow a dispersal of anatomically modern humans across the globe that would correspond to the development of the Upper Palaeolithic is not supported by the archaeological record.

Behind the so-called "Middle to Upper Palaeolthic transition" are thus hidden a large variety of different phenomena, and it is better to tackle them separately to be able to draw more precisely the history of the human societies during this particular period.

Related to this strongly debated issue, the European Aurignacian and "transitional industries" draw much attention to technological, behavioral, and chronological aspects. However, some regions, like North-Western Europe, and various technocomplexes, are still poorly known and often neglected when broad-scale views of this period are proposed. Concerning the North-Western Europe "transitional industry," called the Lincombian-Ranisian-Jerzmanowician (LRJ), it is nonetheless possible to integrate this region into discussions of the transitional period, concerning both cultural change and the question of the anatomy of the hominins involved, the last Neanderthals or first European *Homo sapiens sapiens*.

The Issue of the Lincombian-Ranisian-Jerzmanowician Definition: A Short History

Leaf-points made on blade blanks by partially bifacial retouch, now for the most part called "Jerzmanowice points," were discovered at several sites during pioneering nineteenth-century excavations in Great Britain, Belgium, Germany, and Poland. At that time, they were compared to the Solutrean and Protosolutrean industries. Henri Breuil (1912) described these artifacts as "Protosolutrean features," and this attribution persisted until the second half of the twentieth century (e.g., Garrod 1926). Later, some researchers (Sonnevilles-Bordes 1961) suggested an earlier age for these artifacts, and this was confirmed by the first radiocarbon dating of Nietoperzowa Cave, layer 6 (Poland) that led Waldemar Chmielewski (1961) to define the "Jerzmanowician," based mainly on the three layers (6–4) yielding blade leaf-points that he recognized during his excavations in this cave.

The Protosolutrean nature of the Jerzmanowice points from Great Britain and Belgium was later questioned, notably after the publication of Ranis Cave (Thuringia, Germany; Hülle 1977) where a layer yielding similar artifacts was found between Middle Paleolithic and Aurignacian layers, confirming the early age of this assemblage with Jerzmanowice points. In Great Britain, works by Roger Jacobi (1980) and John Campbell (1980) led to the definition of the "Lincombian," also marked by the presence of Jerzmanowice points. Finally, given the strong similarities of the leaf-points from these adjacent regions (Otte 1981), these different geographically limited names were combined into the "Lincombian-Ranisian-Jerzmanowician complex" (Desbrosse and Kozłowski 1988; here shortened to LRJ).

The definition of this new technocomplex has nonetheless often been rejected. The relevant assemblages being rare and poor, the characteristic artifacts having been often found mixed with other industries during imprecise excavations, it seemed more relevant to some researchers to not isolate these small assemblages within a separate technocomplex, but rather to consider these artifacts as part of already defined complexes. The Jerzmanowice points have thus been sometimes associated with the Aurignacian, in Great Britain and Belgium, and to the Szeletian in Central Europe (e.g., Allsworth-Jones 1986), or even to the Bohunician (Svoboda 2004: 43), as a hunting camp facies or as an economic facies (related to the availability of lithic raw material) of these complexes.

The Lincombian-Ranisian-Jerzmanowician

Geography and Chronology

Excluding dubious assemblages (lacking diagnostic artifacts), the LRJ complex has been identified at 41 sites (including isolated artifacts, sometimes from surface collections; Flas 2008). Most of them (32) are found in Great Britain (Jacobi 2007), assemblages from continental Europe (Belgium, Netherlands, Northern Germany, and Cracovian Jura) being clearly less numerous (Fig. 1). Even if the Jerzmanowice points from Czech sites are added, for which chronocultural attributions are debated (Nad Kačákem and Pekárna Caves, surface collections from Dubicko, Ondratice and the Brno region; Flas 2008), the difference between Great Britain and the continent is still significant and cannot be explained as a mere consequence of the history of Paleolithic research in these different regions.

All of the stratified LRJ assemblages (33) come from Interpleniglacial (Isotopic Stage 3) deposits. For a more precise view of the chronological situation of the LRJ, the available data are, however, rare. At Ranis, the LRJ assemblage (Ranis 2) was found in a layer between an underlying Late Middle Paleolithic (*Blattspitzengruppe*, Ranis 1) and an overlying Aurignacian level (Ranis 3; Hülle 1977). This position between the Middle Paleolithic and the Early Upper Paleolithic is also indicated by the LRJ assemblages that have been mixed with both Mousterian and Aurignacian (and/or Gravettian) artifacts during ancient excavations (e.g., Paviland, Hyena Den, Kent's Cavern, Pin Hole, Spy, Goyet; Flas 2008).

Since the development of radiocarbon techniques, many results have been used to date assemblages with Jerzmanowice points. However, after a critical review, very few of these dates can be considered as relatively reliable. Indeed, imprecision during ancient excavations, as well as reworked and obviously mixed assemblages, makes associations between the dated samples (most of the time bones without anthropic traces) and the LRJ artifacts from the same deposits (Flas 2008) quite dubious.

It is, at any rate, possible to use the few dates that give the most reliable indications. Layer 6 from Nietoperzowa Cave yielded two ^{14}C dates around 38,000 BP (uncalibrated), consistent with the site stratigraphy. Recently, more radiocarbon dates confirmed the age of this layer between 37 and 40,000 BP (uncalibrated) (Krajcarz et al. 2017).

Recently, at Glaston (England), six ^{14}C dates using ultrafiltration, made on bones directly associated with a recently excavated open-air LRJ occupation have confirmed an age around 38,000 BP (Cooper et al. 2012). These are at present the most reliable results available for the LRJ complex.

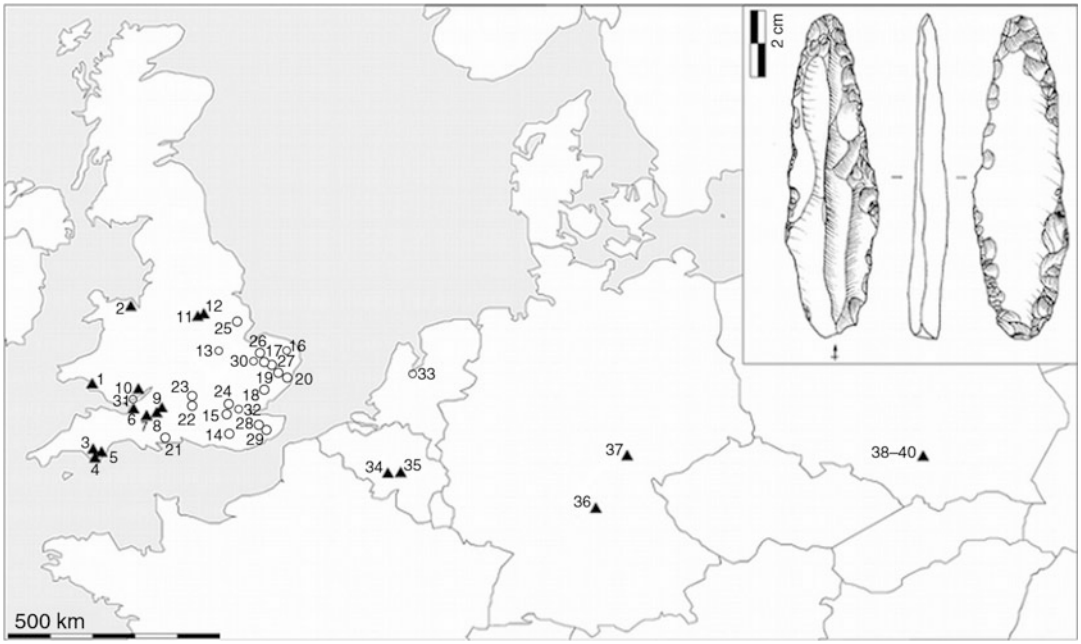

Northern Europe: Middle to Upper Paleolithic Transition, Fig. 1 LRJ sites (circle: open-air site; triangle: cave site; illustration: Jerzmanowice point from Spy cave; redrawn after Otte 1979). 1-Paviland, 2-Ffynnon Beuno Cave, 3-Bench Tunnel Cavern, 4-Windmill Hill Cave, 5-Kent's Cavern, 6-Uphill Quarry Cave 8, 7-Soldier's Hole, 8-Hyeana Den, 9-Badger Hole, 10-King Arthur's Cave, 11-Pin Hole, 12-Robin Hood Cave, 13-Glaston Grange Farm, 14-Beedings, 15-Earl of Dysart's Pit, 16-Drayton, 17-Warren Hill, 18-White Colne Pit I, 19-Eastall's Pit, 20-Bramford Road Pit, 21-Moordown, 22-Sutton Courtenay, 23-Osney Lock, 24-Creffield Road, 25-Wallow Camp, 26-Brandon, 27-Town Pit, 28-Bapchild, 29-Conningbrook Manor Pit, 30-Hainey Hill, 31-Goldcliff, 32-Temple Mills, 33-Aardjesberg, 34-Spy, 35-Goyet, 36-Zwergloch, 37-Ranis 2, 38-Grotte Nietoperzowa, 39-Grotte Koziarnia, 40-Grotte Puchacza Skała

Some other British sites have yielded similar results, between 38,000 and 36,000 BP. Nonetheless, these dates should be considered with caution, given the quality of early excavations and the nature of the deposits yielding the Jerzmanowice points and the dated bones found near them (Jacobi 2007).

While the development of the LRJ around 38,000 BP (or ca. 43,000 BP calibrated) is thus likely, the chronology of the end of this complex is more difficult to determine. Beedings, an important LRJ open-air site of South-East England, yielded a later TL date, but with a large sigma, and is considered a minimum age for the occupation (Jacobi 2007). There is only one date indicating a possible extension of the LRJ, around 30,000 BP, but it was obtained on a bone (not humanly modified) of imprecise provenience (layer 5 or 4?) from Nietoperzowa Cave. Thus, given the available chronological data, the LRJ does not seem to have existed later than 35,000 uncalibrated BP (Flas 2008).

Main Features of the LRJ Lithic Industry

Jerzmanowice points being the *fossile directeur* (and thus the most easily identifiable LRJ artifacts in mixed assemblages and in collections lacking stratigraphic context), and perhaps also due to the cynegetic function of most of the known LRJ occupations, they are the most commonly found type of tool (Figs. 1 and 2). On average, they have a length around 9–10 cm, width of 3 cm and thickness of 1 cm. However, these points show some diversity, particularly variability in size and in the extension of retouch, but such subtypological variety cannot be correlated with geography nor can it be explained by development from sturdier to lighter (gracile) points as proposed by Waldemar

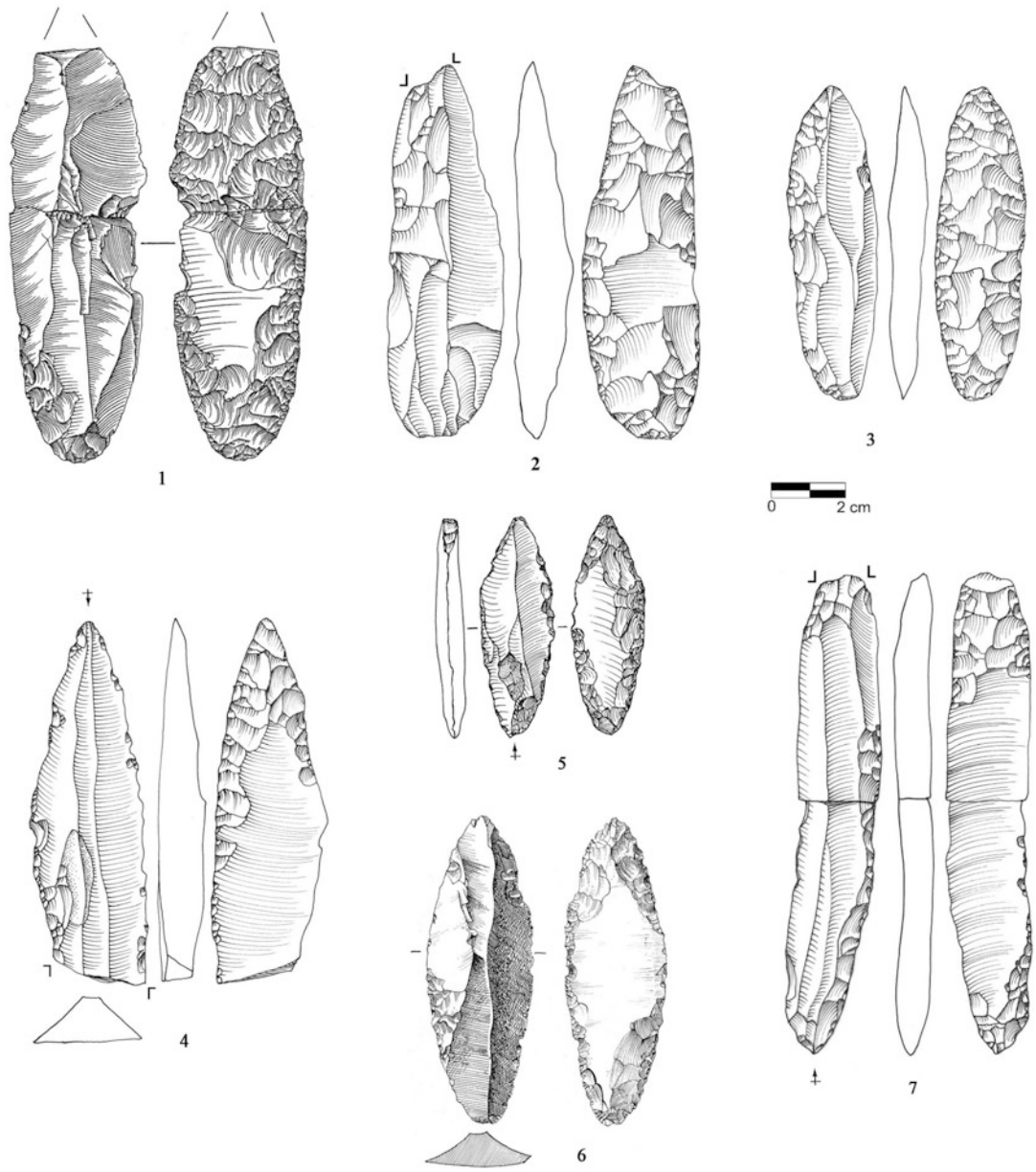

Northern Europe: Middle to Upper Paleolithic Transition, Fig. 2 Jerzmanowice points. 1: Beedings (after Jacobi 2007); 2: Kent's Cavern; 3: Robin Hood Cave; 4-5: Spy Cave (6 after Flas 2008); 6: Ranis 2 (after Hülle 1977); 7: Nietoperzowa cave

Chmielewski (1961). The variability of the Jerzmanowice points seems more likely related to properties of the blades that were used (dimensions, presence of cortex, more or less straight morphology) and, in rare cases (notably for the LRJ assemblage from Spy cave), to the reduction process of such pieces (Flas 2008).

No use-wear study has ever been made on Jerzmanowice points. Nonetheless, these pieces being pointed and symmetric, and likely axially hafted as suggested by the importance of proximal shaping (by inverse flat retouch and sometimes dorsal longitudinal thinning; Fig. 2, no 2), as well as likely impact fractures (burin-like removals,

"spin-off" removals, strongly marked bending fractures) seen on some of them (notably in the Beedings assemblage; Jacobi 2007; Fig. 2, no 1), support the hypothesis of use as projectile points.

In addition to Jerzmanowice points, LRJ assemblages may also contain bifacial leaf-points, made on blocks or large flakes (Fig. 3). They are far less numerous than the former, except in the Ranis 2 assemblage (Hülle 1977), and are only found in a few sites (Paviland Cave, Kent's Cavern, Soldier's Hole, Robin Hood Cave, Bramford Road, Nietoperzowa Cave).

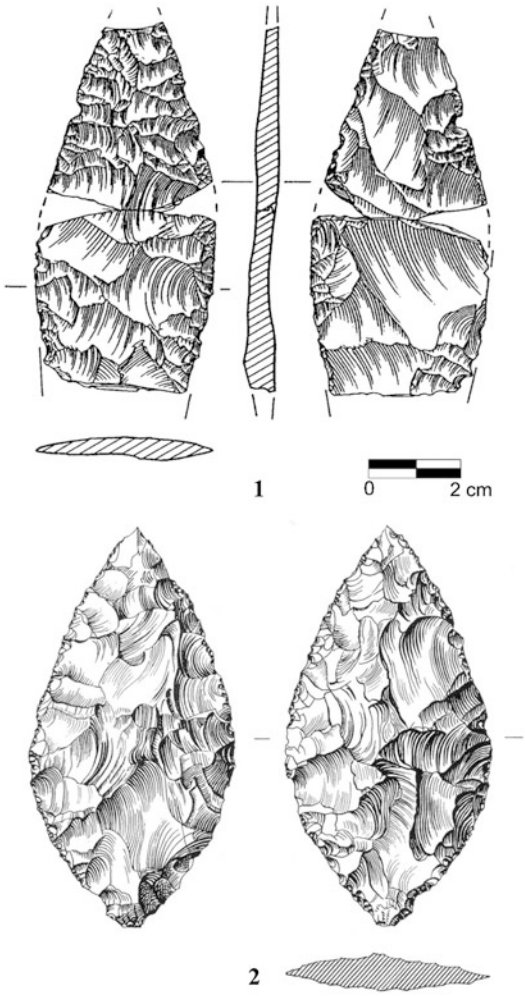

Northern Europe: Middle to Upper Paleolithic Transition, Fig. 3 Bifacial leaf-points. 1: Robin Hood Cave (after Jacobi 2007); 2: Ranis 2 (after Hülle 1977)

Other tool types are much less common (Flas 2008; Fig. 4). However, pointed blades, retouched blades, endscrapers (often made on the proximal end of blades; Fig. 5, nos 1–3), and burins (dihedral, on truncation or on break), sometimes made on former Jerzmanowice points, are present. Few truncations, perçoirs, and splintered pieces have been identified in LRJ assemblages. Beedings (Jacobi 2007) also yielded several "Kostenki knives" (Fig. 5, no 3), but their function as a tool is not certain as it is also possible that they were bladelet cores. "Archaic" tool types (sidescrapers, denticulates, notches) are sometimes present but rare, being clearly less common than typologically "Upper Paleolithic" tools.

Concerning blade production technology, some homogeneity is observed between the LRJ assemblages (Flas 2008; Jacobi 2007). The most common knapping method corresponds to blade production using cores with two opposed platforms (bidirectional) (Fig. 5, no 1; examples of blades from bidirectional debitage: Fig. 2, nos 1–3, 5, 7; Fig. 5, no 2), although unidirectional blade production is sometimes also documented. Blade knapping is most of the time done with an organic soft hammer, based on the relative thinness of blade platforms (less than 5 mm, with an average around 3 mm) and the frequent presence of a lip. Blade production is volumetric, involving preparation of the cores by different crests (central crest to initiate blade production and lateral crest to shape the back of the cores and enabling management of the transverse curvature of the knapping surface during the reduction process). The knapping surface is relatively broad with alternating use of the two opposed striking platforms, yielding mostly straight and relatively sturdy blades (around 10 cm and more, in length, ca. 3 cm in width and 1 cm in thickness), sometimes pointed (Fig. 5, no 2). These blade blanks are perfectly suitable to be transformed into Jerzmanowice points.

Bladelet production is likely if we consider some of the cores from Beedings (Jacobi 2007). Indeed, the assemblage includes small bidirectional cores that yielded bladelet-size blanks in the final production stage (Fig. 5, no 4). There are also "core-burin" and "Kostenki knives"

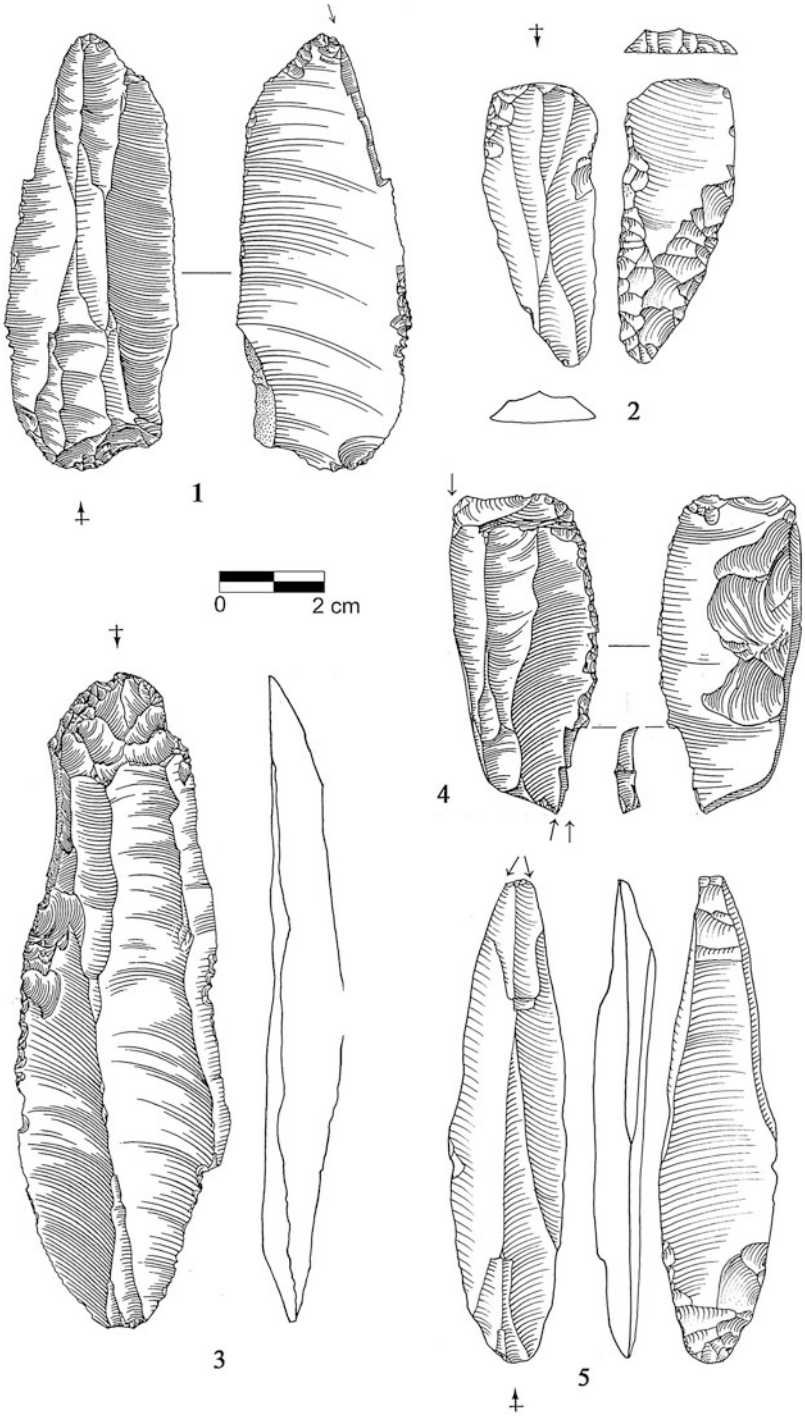

Northern Europe: Middle to Upper Paleolithic Transition, Fig. 4 LRJ. 1: burin on truncation/endscraper, Beedings; 2: endscraper, Goyet; 3: endscraper, Beedings; 4: double burin (on truncation/dihedral on angle), Beedings; 5: double burin on truncation, Robin Hood Cave. 1, 3 and 4: after Jacobi 2007

showing bladelet removals (Fig. 5, no 3). However, because of imprecision during excavation at this site, no complete description of this potential bladelet production can be drawn.

On the other hand, no flake production method has been recognized in the LRJ. The few flakes found in some of the assemblages may simply correspond to by-products of blade

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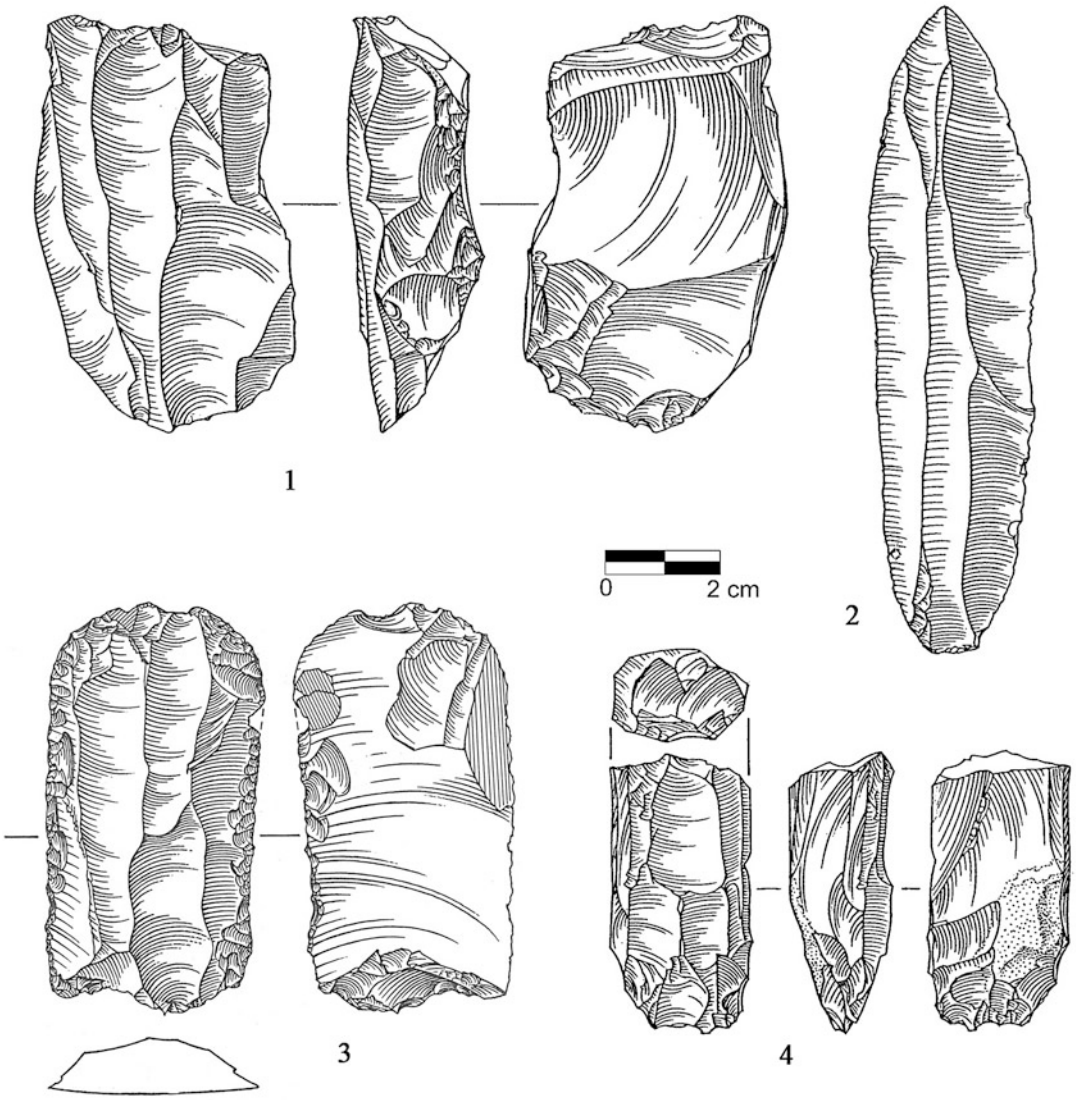

Northern Europe: Middle to Upper Paleolithic Transition, Fig. 5 LRJ, Beedings (after Jacobi 2007). 1: Blade core with two opposed platforms; 2: blade; 3: "Kostenki knife"; 4: Bladelet core with two opposed platforms

production or to flakes knapped from exhausted blade cores.

Bone Artifacts and Pendant?

Only two artifacts may possibly indicate the presence of bone tools and ornaments in the LRJ. These are a bone point (or awl) and a perforated ivory disc fragment, both from Ranis 2 (Hülle 1977). Unfortunately these two pieces are lost; the perforated disc being only known from a sketch in a field notebook, as its fragility did not permit it to be removed from the sediment. Given the excavation imprecision at Ranis, one should be particularly cautious about the attribution of these two pieces to the LRJ as no other LRJ assemblage has yielded similar artifacts. Indeed, the bone points described at Nietoperzowa Cave (Allsworth-Jones 1986: 136–137) and Soldier's Hole cannot be accepted, their anthropic nature not demonstrated and their stratigraphic origin uncertain.

The LRJ: An Independent Technocomplex

LRJ Versus Aurignacian

Some researchers have proposed that some LRJ assemblages can be considered as part of the Northern Europe Aurignacian. Yet several arguments converge to confirm that the two complexes are unrelated (Flas 2008).

The stratigraphic associations between diagnostic Aurignacian artifacts and Jerzmanowice points are rare (seven sites). Moreover, they all correspond to unreliable contexts where different industries were mixed because of geological (colluvium) and taphonomic (notably bioturbation) processes and the imprecision of ancient excavations (the seven sites being excavated before 1930). Among recently excavated sites, only Trou Magrite stratum 3 would have yielded an Aurignacian assemblage including a bifacial foliate. However, a preliminary reappraisal of the lithic collection shows that neither the Aurignacian features nor the presence of a bifacial leaf-point can be substantiated and that this assemblage corresponds more likely to a Mousterian industry (Flas 2008: 76).

The current chronological data show that Aurignacian is not found in these Northern European regions before 35,000 BP (uncalibrated; Flas 2008). This implies a hiatus of several millennia with the LRJ assemblages dated around 38,000 BP. The difference between the two complexes is also geographic: contrary to the LRJ, Aurignacian is commonly found in northern continental Europe (Meuse River basin, Middle Rhine basin, southern Poland), but is very rare in Great Britain where it has been found only in a few sites in western England and Wales (Flas 2008; Dinnis 2012).

Moreover, essential differences are obvious in blade production technologies of the two complexes. Indeed, in Aurignacian, blades are produced almost exclusively from unidirectional cores, yielding blanks that are more curved and for the most part lighter (particularly for width and thickness) than in the LRJ (Flas 2008). Blade production technology observed for the Northern Europe Aurignacian is identical to that described for other Aurignacian assemblages in Europe (e.g., Teyssandier 2008).

Central Europe: Jerzmanowician, Szeletian, and Bohunicien

LRJ assemblages from Poland have been sometimes seen as a mere facies of the Szeletian or the Bohunician (Allsworth-Jones 1986; Svoboda 2004: 43); however, the separation of these complexes is still the most likely hypothesis.

Jerzmanowice points are actually very rare in assemblages hypothetically attributed to the Szeletian (one in the assemblage from Mamutowa Cave, Poland) or to the Bohunician (two in the "Bohunician" assemblage from Dzierżysław I lower layer, Poland). Other stratified Szeletian and Bohunician sites did not yield any artifacts similar to Jerzmanowice points. The distinction between the LRJ and the Szeletian is thus not based on the simple proportion of tool types that could be related to the nature of occupations (large settlements with varied activities vs. hunting camps), but has a more profound typological and technological difference (Flas 2008).

Blade production is actually not so well developed in Szeletian assemblages, and blades appear to be mostly knapped from unidirectional cores using hard stone-hammer percussion (Neruda and Nerudová 2005; Flas 2008: 103). This strong difference with LRJ blank production, seen in several sites in different geographic contexts, cannot simply be related to the influence of available lithic raw material. "Krumlovský Les chert," the main raw material of the Moravian Szeletian, does not prevent blade production as it can be seen in the Vedrovice Ia Aurignacian assemblage (Neruda and Nerudová 2005). Moreover, Szeletian assemblages from Southern Poland (Flas 2008), using similar raw material to the LRJ, do not develop a technology similar to the former.

Similarly, the few artifacts described as "Jerzmanowice points" from stratified Bohunician assemblages do not correspond typologically to the LRJ artifacts. Moreover, Bohunician blank production is very specific (Škrdla 2003), producing elongated Levallois-like points, that cannot be mistaken for the blade production seen in the LRJ.

These strong differences between the LRJ, Szeletian and Bohunician are actually confirmed by their geographic ranges: LRJ assemblages are

mainly found in regions (Great Britain, Belgium, Northern Germany) where there are no Szeletian or Bohunician sites.

Discussion. LRJ: An Acculturation Phenomenon of the Last Northern Europe Neanderthals?

There is a consensus among researchers regarding the origins of the LRJ. All agree on the similarities observed between some of the Late Middle Paleolithic industries from Northern and Central Europe (particularly the German *Blattspitzengruppe* or "Altmühlian," or the Belgian "*Evolved Mousterian*") and the LRJ (e.g., Allsworth-Jones 1986; Bar-Yosef 2007; Chmielewski 1961; Kozłowski 1990; Otte 1990). Continuity between these industries and the LRJ is at present perhaps not as obvious than it may seem because of the lack of reliable chronological data and the problems inherent in old collections (Flas 2008); it is nonetheless clear that some technical behaviors seen in the LRJ already existed in industries from the first half of the Interpleniglacial in Northern Europe: the presence of bifacial leaf-points and blade production, especially from bidirectional cores (Piekary IIa and Ksiecia Jozefa sites; Sitlivy et al. 2007).

The LRJ thus developed around 38,000 BP uncal. (or ca. 43,000 BP calibrated) and shows an "Upper Paleolithic" technology and typology, as well as similarities with Late Middle Paleolithic industries of these regions. Then, two questions arise: who are the makers of the LRJ industry (Neanderthals or *Homo sapiens* sapiens)? If they are Neanderthal populations, can the development of an Upper Paleolithic-like industry be explained as the result of an acculturation process stemming from the contact between the anatomically modern humans spreading in Europe around that time?

No human remains are as yet directly associated with the LRJ; hunters responsible for this industry have thus been sometimes considered as Neanderthals by some scholars and as anatomically modern humans by others. For example, Stephanie Swainston (1999: 41) proposed that the LRJ corresponds to "*the earliest intrusive modern human industry*" in Great Britain. It is likely the "evolved" nature of the LRJ blade production and tool types that led it to be so attributed to anatomically modern humans. However, most of the scholars propose that they were Neanderthals because of the technical continuity detected between the LRJ and some of the Late Middle Paleolithic industries (e.g., Bar-Yosef 2007; Otte 1990).

Although no human remains are directly found in association with an LRJ assemblage, it is still possible to consider the available data to evaluate which hypothesis is more likely. Two sites have yielded remains "close" to the LRJ: a maxilla fragment from Kent's Cavern and the three Neanderthal individuals from Spy Cave.

The human remains found in the *Vestibule* of Kent's Cavern raise several issues (Jacobi 2007; Flas 2008; White and Pettitt 2012). Recent studies suggest that previous dating of this bone (around 30,900 BP uncal.) could be a minimum age due to contamination. Some fauna remains found during the same excavations have been dated using ultrafiltration and suggest an earlier age for the maxilla (before 37,000 BP radiocarbon, Higham et al. 2011). However, these human remain come from an unreliable sedimentary context excavated with very unprecise method (Jacobi 2007: 307; White and Pettitt 2012) preventing us from using dates from fauna as indications of its age, and it is only "associated" with nondiagnostic artifacts (blade fragments). Moreover, refitting of these blade fragments indicates an important disturbing of the deposits (White and Pettitt 2012). Recently new datings on more fauna remains (Proctor et al. 2017), notably fauna teeth dated at 32,200 and 32,800 uncal. BP found deeper than the maxilla, confirm the mixing, and do not support the early age previously proposed for the human maxilla fragment. It is thus clearly impossible to use this human remain to relate the LRJ assemblage from this site to an anatomical type nor to suppose an early presence of anatomically modern humans in Great-Britain.

More interesting are the Neanderthal remains from Spy Cave that have been generally related to the Middle Paleolithic assemblage from the upper part of the lower (third) layer, a Mousterian of "Charentian type." However, it should first be emphasized that according to the excavation report, human remains were found directly below the red deposits corresponding to the

second layer, this latter layer including Mousterian, but also LRJ and Aurignacian assemblages. It is thus not impossible, if the bodies were buried, that graves were dug into the lower layer and that these individuals are actually related to occupations in the second layer, thus corresponding to particularly recent Neanderthals.

This late age has been recently confirmed by ^{14}C dates on several bones and teeth belonging to these Neanderthal individuals (Semal et al. 2009). Reliable results for the adult individuals are around 36,000 BP uncalibrated. These dates fit more with the chronology of the LRJ (beginning, as we have seen, around 38,000 BP uncalibrated) than with the final Mousterian chronology that is not found so late in Northern Europe (Pirson et al. 2012). Thus, even if no direct archaeological association between the Spy Cave Neanderthals remains and the LRJ assemblage from that site can be established, these Neanderthals are chronologically more likely related to the LRJ than to the Mousterian.

Despite the lack of direct association of human remains and LRJ, the Neanderthal hypothesis is thus much more likely than the anatomically modern humans hypothesis for several reasons. First, the Late Middle Paleolithic in Northern Europe, from which the LRJ complex seems to have developed, is made exclusively by Neanderthals as is shown by the human remains from Trou de l'Abîme at Couvin (layer dated around 45,000 BP uncal.; Toussaint et al. 2010), Trou Walou layer CI-8 (around 40–38,000 BP uncal.; Pirson et al. 2012), Goyet – *Troisième Caverne* (around 40,000 BP uncal., Rougier et al. 2016) and Neandertal (around 40–39,000 BP uncal.; Schmitz et al. 2002). Second, the dates of the Spy Cave Neanderthals seem too recent to be associated with the Mousterian and fall within the LRJ chronology. They are similar to the dates from the Neandertal remains from Arcy-sur-Cure Grotte du Renne layer X that are attributed to the Châtelperronian (Welker et al. 2016). Moreover, the oldest European anatomically modern humans (Pestera cu Oase: Rougier et al. 2007) are more recent and geographically distant of the LRJ complex.

Explaining why and how important technical and behavioral transformations appeared among Paleolithic societies is a challenging task given the fragmentary and coarse resolution of the available data. In this framework, the acculturation theory, proposing that the European transitional industries (as the LRJ) are the result of acculturation of Neanderthal populations trying to imitate new technical behaviors brought to Europe as the Aurignacian complex made by anatomically modern humans (e.g., Mellars 1989; Bar-Yosef 2007), has the advantage of simplicity. However, several elements suggest that, at least in the case of the LRJ, this hypothesis is rather unlikely. First for chronological reasons: at least 3,000 radiocarbon years separate the oldest dated LRJ assemblage (around 38,000 BP) from the oldest Aurignacian assemblages in the same regions (around 35,000 BP, Flas 2015). While Protoaurignacian assemblages older than 37,000 BP exist in Europe, as at Kozarnika layer VII (Bulgaria, Tsanova 2008) or the lower layers of Isturitz (Southwest France, Szmidt et al. 2010), they remain rare (most Protoaurignacian and Early Aurignacian assemblages postdate 37–36,000 BP). Given the resolution of ^{14}C dates, we do not know if these assemblages are older or younger than, or contemporary with, the LRJ. Certainly these assemblages are distant from the regions where the LRJ developed, and the process by which the presence of blade and bladelet knappers in Bulgaria or the Pyrenees around 38,000 uncal. BP could be the stimulus, across Interpleniglacial Europe, of the development of a blade technology in Northern England and is difficult to imagine. Moreover, as has been previously shown, LRJ blade production strongly differs from the Aurignacian, and it is thus difficult to see how the latter could have participated in the development of LRJ technology, all the more since blade technology is already recognized during the Late Middle Paleolithic of Northern Europe (Sitlivy et al. 2007).

Recently, maybe because an acculturation process related to the Aurignacian complex has been challenged on the basis of chronological and stratigraphic data (e.g., Bordes 2003; d'Errico et al. 1998), other industries have been proposed as proxies for the spread of anatomically modern humans and as acculturators driving the last Neanderthals to develop the "transitional industries" (e.g., Bar-Yosef 2007). In Central Europe, the Bohunician has been seen as a complex related

to the spread of anatomically modern humans from the Near East (e.g., Bar-Yosef and Svoboda 2003). Indeed, it shows similarities with the Boker-Tachtit layers 1–2 assemblages (Skrdla 2003), and Tostevin (2007) has set out in a detailed way how the Szeletian assemblage from Vedrovice V may be seen as the result of acculturation of the local Middle Paleolithic (*Keilmessergruppe* from Kulna Cave) by the Bohunician complex. However, the extension of this model to include a scenario whereby LRJ Neanderthals are acculturated by Bohunician anatomically modern humans finds little support in evidence and is thus a weak hypothesis. There are no human remains showing that the Bohunician complex is made by anatomically modern humans, and it could alternatively correspond to the diffusion of technical ideas rather than to a population dispersal. Moreover, the relationship between Boker Tachtit (in the Negev) and the Bohunician (in Moravia) is based on technological similarities, but intermediary assemblages between these two distant regions are rare (Bar-Yosef and Svoboda 2003) and sometimes show variability (Temnata and Bacho Kiro: Tsanova 2008; Teyssandier 2008). It would be also necessary to assess other European late Middle Paleolithic industries that could potentially play a role in the emergence of the Bohunician, such as the Polish sites of Piekary IIa and Ksiecia Jozefa (Sitlivy et al. 2007), as well as Korolevo I/IIb (Ukrainia; Monigal et al. 2006) and the Bulgarian Moustero-Levalloisian with leaf-points of Samuilitsa and Muselievo (Tsanova 2008). Even if the hypothesis that Bohunician corresponds to an anatomically modern humans dispersal from the Near East is accepted, the LRJ shows different objectives and reduction strategies from the Bohunician. More generally, it is difficult to see which lithic innovations are found in Bacho Kirian or Bohunician industries that could be the stimulus for a long-distance acculturation.

Conclusion

The presence of the LRJ in North-Western Europe confirms the proliferation of technocomplexes during the Middle to Upper Paleolithic transition. In this respect, grouping together different industries under too large and poorly defined labels (such as "Szeletian") masks an essential part of these phenomena.

From an unknown origin, most likely in the context of the *Blattspitzengruppe*, the LRJ complex spread in different milieus at the end of the Middle Paleolithic, between Poland and Wales, regions where bifacial pieces and blade production have been found variably but regularly and which are thus a favorable substrate for the adoption of LRJ technology, a new mixture of already existing behaviors. Once the shift to Jerzmanowice points was established, perhaps related to a change of cynegetic behaviors, and thus the correlative production of suitable laminar blanks, "Mousterian" industries began to change to an "Upper Paleolithic" technology.

Given the available paleoanthropological and chronological data, the LRJ was much more likely made by Neanderthals, whereas the anatomically modern humans expansion in Europe seems to be concomitant with the appearance of the Aurignacian complex. At any rate, the development of the LRJ complex cannot be explained by acculturation from the Aurignacian, this complex being much later in Northern Europe and contributing nothing, at least for blade production, to the technology used by the last Neanderthals.

This shift from Mousterian technology to the LRJ is a further example of the absence of a link between an "Upper Paleolithic" lithic industry and the dispersal of anatomically modern humans, giving credence to the idea of a separation between the cultural and the biological issues involved in the "Middle to Upper Paleolithic transition" (e.g., Hovers 2006). Moreover, it confirms the existence of processes of change within the Interpleniglacial technocomplexes prior to the (Proto)-Aurignacian, as has been described in other European regions (e.g., Teyssandier 2008).

References

Allsworth-Jones, P. 1986. *The Szeletian and the transition from Middle to Upper Palaeolithic in Central Europe*. Oxford: Clarendon Press.

Bar-Yosef, O. 2007. The dispersal of modern humans in Eurasia: A cultural interpretation. In *Rethinking the human revolution*, ed. P. Mellars, K. Boyle, O. Bar-Yosef, and C. Stringer, 207–217. Cambridge: McDonald Institute for Archaeological Research.

Bar-Yosef, O., and Kuhn. 1999. the big deal about blades: Laminar technologies and human evolution. *American Anthropologist* 101 (2): 322–338.

Bar-Yosef, O., and J.A. Svoboda. 2003. Discussion. In *Stránská skála. Origins of the Upper Paleolithic in the Brno Basin, Moravia, Czech Republic*, American school of prehistoric research bulletin, ed. J.A. Svoboda and O. Bar-Yosef, vol. 47, 173–179. Cambridge, MA: Dolni Veštonice Studies 10, Peabody Museum of Archaeology and Ethnology Harvard University.

Bordes, J.-G. 2003. Lithic taphonomy of the Châtelperronian/Aurignacian interstratifications in roc de combe and Le Piage. In *The chronology of the Aurignacian and of the transitional Technocomplexes. Dating, Stratigraphies, cultural implications*, Trabalhos de Arqueologia, ed. J. Zilhão and F. d'Errico, vol. 33, 223–244. Lisboa: Instituto Português de Arqueologia.

Breuil, H. 1912. Remarques sur les divers niveaux archéologiques du gisement de Spy (Belgique). *Revue Anthropologique* 22 (2): 126–129.

Campbell, J.B. 1980. Les problèmes des subdivisions du Paléolithique supérieur britannique dans son cadre européen. *Bulletin de la Société Royale Belge d'Anthropologie et de Préhistoire* 91: 39–77.

Chmielewski, W. 1961. *La civilisation de Jerzmanowice*. Wrocław-Warszawa-Kraków: Instytut Historii Kultury Materialnej Polskej Akademii Nauk.

Clark, G.A. 1999. Modern human origins: Highly visible, curiously intangible. *Science* 283: 2029–2032.

Cooper, L., J.S. Thomas, M.G. Beamish, A. Goldwell, S.N. Colcutt, J. Williams, R.M. Jacobi, A. Currant, and T.F.G. Higham. 2012. An early Upper Palaeolithic open-air station and mid-Devensian hyeana den at Grange Farm, Glaston, Rutland, UK. *Proceedings of the Prehistoric Society* 78: 73–93.

d'Errico, F., J. Zilhão, D. Baffier, M. Julien, and J. Pélegrin. 1998. Neandertal acculturation in Western Europe? A critical review of the evidence and its interpretation. *Current Anthropology* 39 (supplement): S1–S44.

de Sonneville-Bordes, D. 1961. Le Paléolithique supérieur en Belgique. *L'Anthropologie* 65 (5–6): 421–443.

Desbrosse, R., and J.K. Kozłowski. 1988. *Hommes et climats à l'âge du mammouth. Le Paléolithique supérieur d'Eurasie centrale*. Paris: Masson.

Dinnis, R. 2012. The archaeology of Britain's first modern humans. *Antiquity* 86 (333): 627–641.

Flas, D. 2008. *La transition du Paléolithique moyen au supérieur dans la plaine septentrionale de l'Europe*, Anthropologica & praehistorica. Vol. 119. Bruxelles: Société Royale Belge d'Anthropologie et de Préhistoire.

Flas, D. 2015. The Chronocultural sequence of belgian complexes in the European Aurignacian context. In *Aurignacian genius: Art, technology and society of the first modern humans in Europe*, ed. R. White and R. Bourrillon, 57–75. Toulouse: P@lethnology 7.

Fu, Q., et al. 2016. The genetic history of ice age Europe. *Nature* 534: 200–205.

Garrod, D.A.E. 1926. *The Upper Palaeolithic age in Britain*. Oxford: Clarendon Press.

Grünberg, J.M. 2002. Middle Palaeolithic birch-bark pitch. *Antiquity* 76: 15–16.

Higham, T., T. Compton, C. Stringer, R. Jacobi, B. Shapiro, E. Trinkaus, B. Chandler, F. Gröning, C. Collins, S. Hillson, P. O'Higgins, C. Fitzgerald, and M. Fagan. 2011. The earliest evidence for anatomically modern humans in northwestern Europe. *Nature* 479: 521–524.

Hovers, E. 2006. Neandertals and modern humans in the middle Paleolithic of the Levant: What kind of interaction? In *When Neanderthals and modern humans met*, ed. N.J. Conard, 65–85. Tübingen: Tübingen Publications in Prehistory, Kerns Verlag.

Hublin, J.-J. 2015. The modern human colonization of western Eurasia: When and where? *Quaternary Science Review* 118: 194–210.

Hülle, W. 1977. *Die Ilsenhöhle unter Burg Ranis/Thüringen. Eine paläolithische Jägerstation*. Stuttgart: Gustav Fischer Verlag.

Jacobi, R.M. 1980. The upper Palaeolithic of Britain with special reference to Wales. In *Culture and environment in prehistoric Wales*, BAR British series, ed. J.A. Taylor, vol. 76, 15–100. Oxford: Archaeopress.

Jacobi, R. 2007. A collection of early Upper Palaeolithic artefacts from Beedings, near Pulborough, West Sussex and the context of similar finds from British Isles. *Proceedings of the Prehistoric Society* 73: 229–325.

Klein, R.G. 2000. Archaeology and the evolution of human behaviour. *Evolutionnary Anthropology* 9: 17–36.

Kozlowski, J.K. 1990. Certains aspects technomorphologiques des pointes foliacées de la fin du Paléolithique moyen et du début du Paléolithique supérieur en Europe centrale. In *Paléolithique moyen récent et Paléolithique supérieur ancien en Europe*, Mémoire du Musée de Préhistoire d'Île-de-France,-ed. C. Farizy (dir.), vol. 3, 125–133. Nemours: ARPAIF.

Krajcarz, M.T., M. Krajcarz, B. Ginter, T. Goslar, and P. Wojtal. 2017. Towards a chronology of the Jerzmanowician – A new series of radiocarbon dates from Nietoperzowa cave (Poland). *Archaeometry* 60: 383. https://doi.org/10.1111/arcm.12311.

Mcbrearty, S., and A.S. Brooks. 2000. The revolution that wasn't: A new interpretation of the origin of modern human behaviour. *Journal of Human Evolution* 39: 453–563.

Mellars, P. 1989. Major issues in the emergence of modern humans. *Current Anthropology* 30: 351–385.

Mellars, P. 2006. A new radiocarbon revolution and the dispersal of modern humans in Eurasia. *Nature* 239: 431–435.

N

Mithen, S. 1994. From domain-specific to generalised intelligence: A cognitive interpretation of the Middle/Upper Paleolithic transition. In *The ancient mind*, ed. C. Renfrew and E. Zubrow, 29–39. Cambridge: Cambridge University Press.

Neruda, P., and Z. Nerudová. 2005. The development of the production of lithic industry in the early Upper Palaeolithic of Moravia. *Archeologické rozhledy* 57: 263–292.

Otte, M. 1979. *Le Paléolithique supérieur ancien en Belgique*. Bruxelles: Musées royaux d'Art et d'Histoire.

Otte, M. 1981. Les industries à pointes foliacées et à pointes pédonculées dans le Nord-Ouest européen. *Archeologia Interregionalis* 1: 95–116.

Otte, M. 1990. Les industries aux pointes foliacées du Nord-Ouest européen. In *Feuilles de pierre*, ed. J.K. Kozłowski, 247–269. Liège: ERAUL.

Pirson, S., D. Flas, G. Abrams, D. Bonjean, M. Court-Picon, K. Di Modica, C. Draily, F. Damblon, P. Haesaerts, R. Miller, H. Rougier, M. Toussaint, and P. Semal. 2012. Chronostratigraphic context of the Middle to Upper Palaeolithic transition. Recent data from Belgium. *Quaternary International* 259: 78–94.

Proctor, C., Douka, K., Proctor, J.W., Higham, T. 2017. The age and context of the KC4 maxilla, Kent's Cavern, UK. *European Journal of Archaeology* 20 (1): 74–97.

Prüfer, K., et al. 2014. The complete genome sequence of a Neanderthal from the Altai Mountains. *Nature* 505 (7481): 43–49.

Rendu, W., S. Costamagno, L. Meignen, and M.-C. Soulier. 2012. Monospecific faunal spectra in Mousterian contexts: Implications for social behavior. *Quaternary International* 247: 50–58.

Rendu, W., C. Beauval, I. Crevecoeur, P. Bayle, A. Balzeau, T. Bismuth, L. Bourguignon, G. Delfour, J.-P. Faivre, F. Lacrampe-CuyaubÈre, C. Tavormina, D. Todisco, A. Turq, and B. Maureille. 2014. Evidence supporting an intentional Neanderthal burial at La Chapelle-aux-Saints. *PNAS* 111 (1): 81–85.

Roebroeks, W., J. Kolen, and E. Rensink. 1988. Planning depth, anticipation and the organization of Middle Palaeolithic technology: 'Archaic natives' meet Eve's descendents. *Helinium* 28 (1): 17–34.

Rots, V. 2013. Insights into early Middle Palaeolithic tool use and hafting in Western Europe. The functional analysis of level IIa of the early Middle Palaeolithic site of Biache-Saint-Vaast (France). *Journal of Archaeological Science* 40 (1): 497–506.

Rougier, H., S. Milota, R. Rofrogo, M. Gherase, L. Sarcina, O. Moldovan, J. Zilhão, S. Constantin, R.G. Franciscus, C.P.E. Zollikofer, M. Ponce De León, and E. Trinkaus. 2007. Peştera cu Oase 2 and the cranial morphology of early modern Europeans. *Proceedings of the National Academy of Sciences* 104 (4): 1165–1170.

Rougier, H., I. Crevecoeur, C. Beauval, C. Posth, D. Flas, C. Wißing, A. Furtwängler, M. Germonpré, A. Gómez-Olivencia, P. Semal, J. Van Der Plicht, H. Bocherens, and J. Krause. 2016. Neandertal cannibalism and Neandertal bones used as tools in Northern Europe. *Scientific Reports* 6. https://doi.org/10.1038/srep29005.

Schmitz, R.W., D. Serre, G. Bonani, S. Feine, F. Hillgruber, H. Krainitzki, S. Pääbo, and F.H. Smith. 2002. The Neandertal type site revisited: Interdisciplinary investigations of skeletal remains from the Neander Valley, Germany. *Proceedings of the National Academy of Sciences* 99 (20): 1342–1347.

Semal, P., H. Rougier, I. Crevecoeur, C. Jungels, D. Flas, A. Hauzeur, B. Maureille, M. Germonpré, H. Bocherens, S. Pirson, L. Cammaert, N. De Clerck, A. Hambucken, T. Higham, M. Toussaint, and J. Van Der Plicht. 2009. New data on the late Neandertals: Direct dating of the Belgian spy fossils. *American Journal of Physical Anthropology* 138: 421–428.

Sitlivy, V., A. Zieba, and K. Sobczyk, eds. 2007. *Middle and Early Upper Palaeolithic of the Krakow Region. Piekary IIa*. Bruxelles: Musées royaux d'Art et d'Histoire, Monographs in General Prehistory.

Škrdla, P. 2003. Bohunician Technology. A Refitting Approach. In *Stránská skála. Origins of the Upper Paleolithic in the Brno Basin, Moravia, Czech Republic*, American School of Prehistoric Research Bulletin, ed. J.A. Svoboda and O. Bar-Yosef, vol. 47, 117–151. Cambridge, MA: Dolni Veštonice Studies 10, Peabody Museum of Archaeology and Ethnology Harvard University.

SORESSI, M., and F. D'errico. 2007. Pigments, gravures, parures: les comportements symboliques controversés des Néandertaliens. In *Les Néandertaliens. Biologies et cultures*, ed. B. Maureille and B. Vandermeersch, 297–309. Paris: Éditions du CTHS.

Soressi, M., S. Mcpherron, T. Dogandzic, P. Goldberg, Z. Jacobs, Y. Maigrot, N.L. Martisius, C.E. Miller, W. Rendu, M. Richards, M. Skinner, T. Steele, S. Talamo, and J.-P. Texier. 2013. Neandertals made the first specialized bone tool in Europe. *PNAS* 110 (35): 14186–14190.

Speth, J.D. 2006. Housekeeping, Neandertal-Style: Hearth Placement and Midden Formation in Kebara Cave (Israel). In *Transitions before the transition. Evolution and stability in the Middle Paleolithic and Middle Stone Age*, ed. E. Hovers and S.L. Kuhn, 171–188. Santa Barbara: Springer.

Straus, L.G. 1995. The Upper Paleolithic of Europe: An overview. *Evolutionary Anthropology* 4 (1): 4–16.

Svoboda, J. 2004. Continuities, discontinuities and interactions in early Upper Paleolithic technologies. In *The early Upper Paleolithic beyond Western Europe*, ed. P.J. Brantingham, S.L. Kuhn, and K.W. Kerry, 30–49. Berkeley: University of California Press.

Swainston, S. 1999. Unlocking the inhospitable. In *Dorothy Garrod and the progress of the Palaeolithic. Studies in the prehistoric archaeology of the near East and Europe*, ed. W. Davies and R. Charles, 41–56. Oxford: Oxbow Books.

Szmidt, C., C. Normand, G.S. Burr, G.W.L. Hodgins, and S. Lamotta. 2010. AMS ^{14}C dating the Protoaurignacian/early Aurignacian of Ituritz, France.

Implications for Neanderthal-modern human interaction and the timing of technical and cultural innovations in Europe. *Journal of Archaeological Science* 37 (4): 758–768.

Teyssandier, N. 2008. Revolution or evolution: The emergence of Upper Paleolithic in Europe. *World Archaeology* 40 (4): 493–519.

Tostevin, G.B. 2007. Social intimacy, artefact visibility, and acculturation models of Neanderthal-modern human interaction. In *Rethinking the human revolution*, ed. P. Mellars, K. Boyle, O. Bar-Yosef, and C. Stringer, 341–357. Cambridge: McDonald Institute for Archaeological Research.

Toussaint, M., A.J. Olejniczak, S.E.L. Zaatari, P. Cattelain, D. Flas, C. Letourneux, and S. Pirson. 2010. The Neandertal lower right deciduous second molar from the "Trou de l'Abîme" at Couvin, Belgium. *Journal of Human Evolution* 58 (1): 56–67.

Tsanova, T. 2008. Les débuts du Paléolithique supérieur dans l'Est des Balkans. In *Réflexion à partir de l'étude taphonomique et techno-économique des ensembles lithiques de Bacho Kiro (couche 11), Temnata (couches VI et 4) et Kozarnika (niveau VII)*, BAR international series, vol. 1752. Oxford: Archaeopress.

Welker, F., M. Hajdinjak, S. Talamo, K. Jaouen, M. Dannemann, F. David, M. Julien, M. Meyer, J. Kelso, I. Barnes, S. Brace, P. Kamminga, R. Fischer, B.M. Kessler, J.R. Stewart, S. Pääbo, M. Collins, and J.-J. Hublin. 2016. Palaeoproteomic evidence identifies archaic hominins associated with the Châtelperronian at the Grotte du Renne. *PNAS* 113 (40): 11162–11167.

White, M., and P. Pettitt. 2012. Ancient digs and modern myths: The age and context of the Kent's cavern 4 maxilla and the earliest *Homo sapiens* specimens in Europe. *European Journal of Archaeology* 15: 1–30.

Wolpoff, M.H., J. Hawks, D.W. Frayer, and K. Huntley. 2001. Modern human ancestry at the peripheries: A test of the replacement theory. *Science* 291: 293–297.

Numismatics, Ancient Greek

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Introduction

Ancient Greek numismatics is the study of the coinage produced by the Greek cities, by their colonies in the East and the West – from India to the western Mediterranean – and by many kings, during the Archaic, Classical, and Hellenistic periods. The coinage is described as "Greek" because of the Greek legends on the coins giving a variety of information (e.g., the name of the issuing authority, a die engraver, or a mint official). Ancient Greek and Hellenistic coinage is dated roughly from the end of the sixth century BCE – from the issuing of the very first coins – down to the year 31 BCE, the date of the conquest of Egypt by Octavian. From the year 30 BCE onwards, the Roman period begins.

Definition

The coinage produced by the Greek cities and kings is a material evidence in the service of history. Coins differ from other artifacts in that state authorities issued them; they therefore constitute official documents that were used either by the city or the king who issued them to finance specific needs and to diffuse the messages depicted on their limited surface. The designs and the inscriptions played a monetary as well as a political role (the latter is especially true for the Hellenistic period) and provide precious information about many aspects of Greek civilization. In contrast with modern numismatics, where the metric system is clear and the coins indicate their numerical value, we do not possess a metrological manual for ancient Greek coinage. The numismatist has to find the answers to questions relating to attribution, dating, denomination, value, volume of issue, metal composition, and circulation – amongst others – for each coinage that was produced and survived to the present day. For these purposes, the numismatist must combine the evidence of the coins themselves with other available sources such as ancient texts, inscriptions, and archaeological finds. He will then have to consider the iconography represented on the surface of each coin, the coin legends, the symbols, any monograms, countermarks, or overstrikes – which would indicate the reuse, the "second life" of a specific coin – and employ statistical, metrological, and metallurgical analysis to carry out his research.

The Making of an Ancient Greek Coin

Coin manufacture in ancient times differed completely from modern, automated processes. All ancient coins were produced by hand in the mints of the various cities, which explains their imperfections in terms of shape. In all cases, the procedure was the same (Fig. 1): the first task was to create the blanks or flans of metal of the correct weight (according to the denomination that the mint wanted to issue). Then, the flans had to receive the impression of the obverse and the reverse types, which were engraved in negative (*in intaglio*) on the bronze or iron dies.

The obverse die was fixed in an anvil, while the reverse die was fixed on a punch that was hand-held. The weighed flan was placed on the anvil, and the punch was hit with a hammer, resulting in the impression of both dies on the flan. The result of this process was the transformation of a flan into a coin, a piece of weighed metal bearing the marks of the issuing authority that attested both its validity and its value.

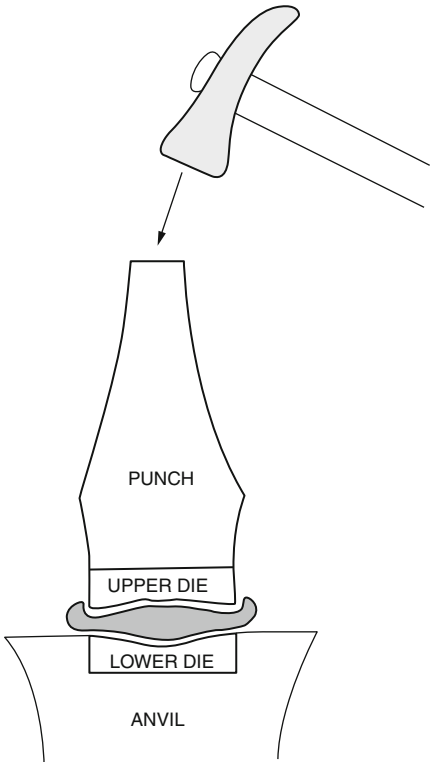

Numismatics, Ancient Greek, Fig. 1 The method of coining in ancient Greece. (From Rutter 1983: 14, Fig. 2, with permission)

The Earliest Coins and the Diffusion of the Coinage

Coinage was first issued probably in Lydia, from where it spread rapidly in the sixth century BCE to mainland Greece (Athens, Aegina (Fig. 2), Corinth), Italy and Sicily, and to specific areas under Persian control during the Archaic and Classical periods (western Asia Minor, Cyprus, Cyrene).

Phoenicians adopted coinage in the middle of the fifth century, and the Carthaginians and the Etruscans later followed suit. The spread of coinage is associated with the development of the city-state (*polis*), but not all cities issued coins. Although electrum (a natural alloy of gold and silver) was used for the earliest coins, the kings of Lydia or the kings of Persia started issuing coins in pure silver and pure gold (bimetallism) around the middle of the sixth century BCE. The Persians continued to produce gold (*darics*) and silver (*sigloi*) coins (Fig. 3) until the time of Alexander III (Alexander the Great), while the majority of the Greek cities issued coins almost exclusively in silver.

Until gold coinage was issued in large quantities by Philip II of Macedonia, by Lampsacus and Cyzicus, by Pixodarus of Karia, and by some kings of Cyprus, the Greek cities mainly issued gold coins in times of crisis. A good example is the coinage minted by the city of Athens at the end of the Peloponnesian War (431–404 BCE) when

Numismatics, Ancient Greek, Fig. 2 Aegina, silver *didrachm* (ca 510 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford. (From Howgego 1997: Fig. 16, with permission)

Numismatics, Ancient Greek, Fig. 3 Persia, gold *daric* (ca 400–330 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford. (From Howgego 1997: Fig. 30, with permission)

Numismatics, Ancient Greek, Fig. 4 Macedonia, Alexander III, silver *tetradrachm* (ca 336 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford. (From Howgego 1997: Fig. 42, with permission)

the Spartans took control of Dekeleia and prevented Athenian access to the mines of Laurion, their principal source for silver (406 BCE). In order to continue financing the war, as Pericles suggested (Thucydides, II, 13.4–5), the Athenians melted down the gold plates of seven statues of Victory and produced a gold coinage composed of various denominations (from *staters* down to *hemiobols*) that survive in a few examples today. In parallel, the Athenians issued a series of silver-plated coins (silver on the exterior and bronze in the interior), mentioned as "πονηρά χαλκία" in Aristophanes (Frogs, 717–733). Each of these coinages represents a solution of making payments and facing financial difficulties during a period of crisis.

From the middle of the fifth century BCE, some Greek cities also minted coins in bronze, a coinage of a small value that was designed to cover mostly everyday needs, which explains its local diffusion. Hoard evidence, as well as other finds, proves that fractional coinage was issued in important quantities during the Classical period by many cities.

The rise of the kingdom of Macedonia, with Philip II (360–336 BCE), who exploited the gold mines in the territory of Krenides to pay for mercenaries, then with Alexander III (336–323 BCE) and his campaign that led to the fall of the Persian Empire and the conquest of the East, changed the political scene of the Greek world and inaugurated a royal coinage of a broader scope (Fig. 4).

Alexander III gained control of the Persian treasury c. 333–330 BCE and accessed a massive amount of silver (both coined and in other forms); this booty, calculated at 180,000 *talents* of silver (a Greek *talent* is roughly equivalent to 26 kg), financed his campaign. With Alexander's conquests, coinage in gold, silver, and bronze was issued in the east, at Babylon, at Susa, and at Ecbatana, the former principal cities of Persia, while around 200 BCE, Greek coinage was produced in western India. It was even adopted by the Parthians and the Sassanians. In the north, the coinage of Phillip II and Alexander III was imitated by the Celts, the cities in the Danubian region, and later on in Gaul and Britain.

After the death of Alexander III, his empire was divided amongst his Generals. Although coinage in the name and with the types of Alexander continued to be issued after his death by these successors (the Diadochoi) for reasons of legitimization of the dynasties, soon after the adoption of the title of *βασιλεύς* – king – in 306, they started issuing coinage with their own types and legends. In the Seleucid dynasty, it is Antiochus I (281–201 BCE) who first placed his own portrait on the coins (Fig. 5), but the *Alexanders* were a dominant currency in the Seleucid Empire that retained the Achaemenid system of the division of the satrapies but – contrary to the Persian policy – did not normally allow the satraps to mint their own coins.

In the Ptolemaic kingdom, the royal Ptolemaic coinage was imposed around 290 BCE, and there is evidence for the exclusive use of the Ptolemaic currency in the kingdom which also applied in the areas of Ptolemaic control such as Cyprus, Phoenicia, and

Numismatics, Ancient Greek, Fig. 5 Antiochus I, Mint of Seleuceia on the Tigris, silver *tetradrachm* (ca 274–270 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford. (From Howgego 1997: Fig. 70, with permission)

Palestine. The Ptolemaic "closed currency system" created revenue, because foreign coins that were heavier in weight were exchanged for local coins that were lighter in weight and were legal tender in Egypt and in the areas of Ptolemaic control (at the beginning of the third century BCE, the Athenian tetradrachm weighed 17.2 g while the Ptolemaic one weighted 14.3 g). This type of exchange also helped to retain silver in Egypt, which did not possess any natural sources of that metal.

The Attalid dynasty at Pergamum, founded by Philetaerus, became a major force in Asia Minor in the third and second centuries BCE. The coinage produced adopted Alexander types in the name of Alexander, then of Seleucus, then the portrait of Seleucus with the name of Philetaerus, and his successors adopted the head of Philetaerus on their coinage.

At the beginning of the second century BCE, the introduction of the cistophoric coinage reflects a major change. The name of this coinage derives from the representation of a sacred chest (*cista*) on the coins, and in contrast to other royal coinages, it does not bear a portrait and is signed by the cities that produced it. The cistophoric coinage was issued by a number of cities and was used exclusively in the Attalid territory; it was lighter than the Attic weight by approximately 25%. Although this practice brings to mind the Ptolemaic system, the Attalid one is more complicated since the Attic weight standard was still used for export.

In the Hellenistic period, the royal coinages circulated together with the coinages of the Leagues – that is, the confederations of cities such as the Arcadian and the Boeotian – as well as those of specific cities with a status a part, such as Rhodes and Carthage.

Weight Standards

The coin, νόμισμα, is a piece of metal whose official stamp guarantees its weight and value. Each weight belongs to a specific weight standard that was adopted by the different cities (Table 1). Studies carried out in the nineteenth century have identified the main weight standards (Attic, Aeginetan, Thraco-Macedonian, Persian, as well as various local standards) that were adopted by many peripheral cities. It is still very difficult to completely understand these standards and fully trace the fractions – subdivisions of the main unit – their theoretical weight, or their exchange ratio to other coinages and/or other metals.

The best-known example is that of Athens, where the *drachm* is the basic unit: 100 *drachms* made up one *mina* and 6.000 *drachms* – that is, 60 *minae* – made up one *talent*. The *mina* and the *talent* of course describe the weight or the value of silver and do not refer to coins. The standard coin on the Attic weight standard was the *drachm* (ca 4.36 g), and there were multiples (in Athens the *decadrachm* is the highest denomination) and fractions down to 1/48 of a *drachm*, whose names appear in the texts, and are based on the equivalence of 1 Attic *drachm* to 6 *oboloi* of ca 0.72 g.

In many cases, die studies of individual coinages and thorough metrological analysis have permitted an approach to the assessment of the theoretic weight of specific weight standards.

Coin Circulation

The combined evidence of isolated coin finds and of coin hoards of different types (whether emergency or by accumulation) that were never recovered by their owners for various reasons is very important for the dating of the coins included in the hoard and for understanding the area in which specific coin types and denominations circulated. The *Inventory of Greek Coin Hoards* (IGCH) is the first publication that combined the known

Numismatics, Ancient Greek, Table 1 Some weight standards of the ancient world

Weight standards of the Greek World					
Attic			Aeginetan	Corinthian	Samian
Denomination	Number of Drachms	Grams	Grams	Grams	Grams
1 Decadrachm	10 drachms	43.66			
1 Tetradrachm	4 drachms	17.44			17.40 (stater)
1 Didrachm	2 drachms	8.72	12.6 (stater or didrachm)	8.6 (stater)	8.70 (1/2 stater)
1 Drachm	**drachm**	**4.36**	**6.3**		
Pentobolon	5/6	3.63			
Tetrobolon	2/3	2.90			2.90 (1/6 stater)
Triobolon	½	2.18	3.15		
Diobolon	1/3	1.45			1.45 (1/12 stater)
Trihemiobolion	¼	1.09			
Obol	**1/6**	**0.72**	**1.05**		**0.73 (1/24 stater)**
Tritartemorion	1/8	0.54			
Hemiobolion	1/12	0.36			
Triemitetartemorion	1/16	0.27			
Tetartemorion	1/24	0.18			
Hemitetartemorion	1/48	0.09			

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hoards up to 1973, and since then, nine volumes of *Coin Hoards* (CH), supplementing the initial catalogue, have been published (Thompson et al. 1973).

Metal Composition

The evolution of research during the twentieth century has permitted nondestructive analysis to be carried out on coins, in the search for metallic composition. Today, there are various methods that study only the surface (X-ray fluorescence (XRF and EDXRF)), a small ablated portion of the coin in the nanogram range (LA-ICP-MS), or a more important area of the object (nuclear techniques using cyclotrons such as neutron activation analysis (12 or 14 MeV)). In-depth techniques look for trace elements that could indicate the provenance of the metal and maybe that of the mint, together with the major elements such as gold, silver, and bronze. The purity – or not – of the metal can help the researcher to detect any intentional manipulations of the coinage's alloy by the issuing authorities that could help them economize in precious metal and help their cities in times of crisis.

Coin Types

Greece was not a unified state; the traditions, customs and origins of individual cities were reflected in the great variety of surviving iconographical types and coin legends.

The coins of the Archaic period mostly bear images of animals and plants, often because they are related to the products of the city or to its name. At Ephesus, the bee represented on the coins is related to the cult of Artemis, whose priests were known as "bees"; on coins of the island of Melos, the apple (μήλο in Greek) is represented, while at Selinous in Sicily, the leaf of a wild celery (σέλινον in Greek) refers both to the local products of the area and to the city's name (a "canting" or "punning" type).

Numismatics, Ancient Greek, Fig. 6 Athens, silver *tetradrachm* (ca 450 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford. (From Howgego 1997: Fig. 21, with permission)

Numismatics, Ancient Greek, Fig. 7 Bactria, Demetrius I, silver *tetradrachm* (ca 200–190 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford. (From Howgego 1997: Fig. 75, with permission)

Some cities represent images associated with local myths and traditions on their coins. In Athens (Fig. 6), from the end of the sixth century BCE, the type of Athena, the patron deity of the city, on the obverse and her sacred bird, the owl, on the reverse, with the coin legend AΘH became the characteristic types of Athenian coinage for five centuries.

During the second century BCE, the *stephanephoroi* coinage, known as "new style coinage," is named from the wreath within which the reverse design appears. Likewise, the coins of Corinth and those of Corinth's colonies represent in the fifth century BCE Athena on the reverse and on the obverse the mythical winged horse Pegasus who was tamed by the Corinthian hero Bellerophon, images that are both linked to the local myth. A sandal on a coin of Larissa alludes to a local myth about Jason, while the shield on the Boeotian coinage can be linked to the various labors of Heracles, represented on the obverse of those coins.

On rare occasions, the coin types bear a clear political symbolism, such as the control of one city by another. This is the case of the coins with Samian types issued by the Samians who occupied Zancle in Sicily in the years 493–488 BCE. Similarly when Theron, the tyrant of Acragas, conquered Himera in Sicily around 483 BCE, he altered the weight standard and depicted a crab, the characteristic type of his coins, on the reverses of the coins of the occupied city.

The earliest coins to feature portraits of living rulers first appeared in the fifth and fourth century coinages of Persian satraps of Asia Minor, such as Pharnabazos on the issues of Kyzikos, Perikles on the *tetradrachms* of Lycia, and Tissaphernes on the *tetradrachms* of Lydia. Individualized and lifelike portraits on coins (Fig. 7) became a characteristic feature of the Hellenistic period: the portrait was the main type on the obverse of the coinages of the Hellenistic rulers and was linked to the legitimization of the monarchies and the divinization of the rulers through their representation with divine attributes.

Coin Legends

Archaic, Classical, and Hellenistic coinages bear a great number of inscriptions in various local scripts. The most common inscription of the early coinages is that of the name of the city and more specifically that of the citizens. It is either represented in full (on the coins of Syracuse ΣYPAKOΣIΩN –of the Syracusans–) or in abbreviated form (as in the case of the Athenian coinage where the reverse legend AΘH abbreviates the word AΘHNAIΩN –of the Athenians–) or even as a single letter (the Archaic Greek letter *koppa* is the initial of the Corinthians on the coinage of that city) (Fig. 8).

The colonies of Corinth, although they bear the same iconography as their metropolis, differentiate their issues through the initials of their cities, Greek letters that appear below the winged horse on the reverse: for example, the letter *Λ* on the coins of Leucas and the letter *E* on those of Epidamnos. In areas such as Cyprus, Phoenicia, or Lycia, other local scripts were used on the coinages, indicating the issuing authority.

Numismatics, Ancient Greek, Fig. 8 Corinth, silver *tridrachm* (ca 345 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford. (From Howgego 1997: Fig. 18, with permission)

Alexander III placed his name and royal title on his coins, and rulers in the Hellenistic period used the Greek alphabet to indicate the name of Alexander, the name of the founder of the dynasty or their own name, followed by the title *ΒΑΣΙΛΕΩΣ* (of the king).

In addition to the coin legends, punch marks, regal dates, monograms, and magistrates' names offer additional information on the coinage of the cities and kings during the Archaic, Classical, and Hellenistic periods.

Historical Background

The collecting of Greek and Roman coins goes back to ancient and medieval times, but the study of these coinages dates from the Renaissance period in Italy, where collections were formed in the aristocratic houses (Médici, Gonzaga, Este). The work of Andrea Fulvio, *Illustrium Imagines*, dates from the sixteenth century (1517), while the very first numismatic book, *De asse et partibus ejus*, was published around that same period by Guillaume Budé (1514). In the next centuries, studies accumulated, and the eighteenth century is marked by the synthetic works of J.C. Rasche, *Lexicon universae rei numariae* (Leipzig, 1785–1805), and J.H. Eckhel, *Doctrina numorum veterum* (Vienna, 1792–1798). The establishment of the chronological perspective of Greco-Roman art, the archaeological discoveries of the nineteenth century, and the use of photography made a more substantial volume of numismatic material available for study. From the nineteenth century also begins the publication of the major coin collections in Paris (*Traité des monnaies grecques et romaines*) and in London (the *Greek Coins in the British Museum*, abbreviated as BMC). In the twentieth century, many studies of individual mints were carried out, reconstructing not only the numismatic production according to the various periods but also the analysis of the monetary politics of the issuing authority. This type of numismatic research is in our era enhanced by coin die studies, metallurgical analyses of the coins, and the application of statistical methods in numismatics that help calculate the volume of the coinages produced in a specific period.

Key Issues/Current Debates

The questions of why coinage was invented and what it's original purpose was, still have no precise answer. The issuing of the very first coins still gives rise too many discussions concerning the issuing authority that first came up with the idea of coinage – was it produced by a state or by individuals and what was the function of these coins? Although it was believed that the earliest coins were first struck in the kingdom of Lydia, evidence deriving from ancient written sources (Xenophanes and Pollux 9.83), from coins found in an archaeological context and from the existence of natural sources of electrum in the area (Herod. 1.93; 5.101), permits to argue otherwise.

Likewise, the chronology of the spread of the coinage to the Greek world is also highly uncertain and under discussion because the only datable archaeological context for the sixth century coinage is the Apadana foundation deposit in Persepolis, whose dating is placed at some point in the last quarter of the sixth century. For the fifth century, the coins found in archaeological contexts multiply, and hoard evidence offers a more concrete basis for the dating and the attribution of specific issues.

The complete understanding of the various local or "international" weight standards and especially the denominational value relation to silver, gold, and bronze issues of the various authorities is still in progress. Discussions concern the theoretical weight of denominations and

their exchange ratio as well as the attribution and dating of bronze coinages to the issuing authorities. As C. Kraay stated in 1966, "The attainment of [an] accurate chronological classification is the primary task of Greek numismatics today" (Kraay and Hirmer 1966: 20). In order to provide full and reliable information today, almost 50 years later, that task is still necessary.

International Perspectives

Research in ancient Greek numismatics has much developed in the past years, with the help of international collaborations, research projects, and online databases that make the numismatic material accessible to a much broader audience of numismatists, archaeologists, historians, and other interested members of the public.

The biggest collaborative publication effort of the past decades has been the *Sylloge Nummorum Graecorum* (SNG) project, the publication of illustrated catalogues of Greek coins in public and private collections in the British Isles, Denmark, France, Germany, Greece, Israel, Sweden, Switzerland, Italy, and the United States. The SNG collection is coordinated by the International Numismatic Commission (http://www.muenzgeschichte.ch/inc/index.html), and today it exceeds 120 publications and is accessible online (British Academy research project: http://www.sylloge-nummorum-graecorum.org/). The project *Achémenet* (http://www.achemenet.com/) collects and diffuses various sources related to the Achaemenid Empire, from publications to detailed descriptions of objects and coins. At the same time, the project *Lexicon Iconographicum Numismaticae* (LIN) from the collaboration of the Universities of Messina, Bologna, and Milan aims to put together a method for the iconographical analysis of coin types.

Future Directions

The general bibliographies in numismatics are today a valuable tool to enable the researcher to discover the latest publications. The most important general bibliography of numismatic publications (Clain-Stefanelli 1985) is currently supplemented on a biannual, annual, or even five yearly basis. These numismatic bibliographies can be found in Numismatic Literature (published twice a year by the American Numismatic Society), the "Numismatic" section of *L'Année Philologique* (Paris, Belles Lettres), the "Numismatik" section of the *Archäologische Bibliographie* (published annually with the *Jahrbuch des Deutschen Archäologischen Instituts*), and finally the *Survey of Numismatic Research*, the collection with a brief commentary of the numismatic publications that appear in the 5-year interval between each *International Numismatic Congress* (the most recent one is covering the years 2002–2007, containing over 12,000 publications from ca 4,000 authors, and it was published on the occasion of the XIV International Numismatic Congress in Glasgow that took place in 2008).

The Internet today offers a broader accessibility of coin information. Museums have started to publish their numismatic collections' databases online (The Fitzwilliam Museum in Cambridge: http://www.fitzmuseum.cam.ac.uk/opac/search/searchcm.html/The British Museum in London: http://www.britishmuseum.org/collection/The American Numismatic Society in New York: http://numismatics.org/search//The Cabinet des Médailles de la Bibliothèque Nationale de France in Paris). At the same time, coin auction archives (http://www.coinarchives.com/) today offer high-quality digital images and important information on coins that were sold in coin auctions and now reside in either private or public collections.

Cross-References

- ▶ Numismatics, Roman Imperial
- ▶ Numismatics, Roman Republican
- ▶ Trade and Transport in the Ancient Mediterranean

References

Babelon, E. 1901–32. *Traité des monnaies grecques et romaines I–IV*. Paris.

Clain-Stefanelli, E.E. 1985. *Numismatic bibliography*. Munich: Battenberg.

Howgego, C. 1997. *Ancient history from coins*. London: Routledge.
Kraay, C.M., and M. Hirmer. 1966. *Greek coins*. London/New York: Royal Numismatic Society.
Rutter, N.K. 1983. *Greek coinage*. Bucks: Shire.
Thompson, O.M., O. Mørkholm, and C.M. Kraay, eds. 1973. *An inventory of Greek coin hoards*. New York: The American Numismatic Society.

Further Reading

Amandry, M. 2006. *Dictionnaire de la numismatique*. Paris: Larousse.
Amandry, M., and D. Bateson, eds. 2009. *A survey of numismatic research 2002–2007*. Glasgow: International Numismatic Commission.
Aperghis, G.G. 2004. *The Seleukid royal economy: the finances and financial administration of the Seleukid empire*. Cambridge: Cambridge University Press.
Arnold Biucchi, C. 2006. *Alexander's coins and Alexander's image*. Cambridge, MA: Harvard University Art Museums.
Bingen, J. 2007. *Hellenistic Egypt. Monarchy. Society, economy, culture*. Berkeley: University of California Press.
Burnett, A. 1991. *Coins*. London: British Museum Press.
Carradice, I. 1995. *Greek coins*. London: British Museum Press.
Carradice, I., and M. Price. 1988. *Coinage in the Greek world*. London: Sheaby.
Crawford, M. 1983. Numismatics. In *Sources for ancient history*, ed. M. Crawford, 47–64. Cambridge: Cambridge University Press.
de Callataÿ, F. 2003. *Recueil quantitatif des émissions monétaires archaïques et classiques*. Wetteren: Universite Libre de Bruxelles.
Flament, C. 2007. *Le monnayage en argent d'Athènes. De l'époque archaique à l'époque hellénistique (c. 550–c. 40 av. J. -C.)*. Louvain-La-Neuve: Association Numismatique Hoc.
Head, B.V. 1910. *Historia Numorum*. London. http://www.snible.org/coins/hn/prefaces.html (3rd edn. in progress).
Kraay, C.M. 1976. *Archaic and classical Greek coins*. London: The British Museum Press.
Le Rider, G. 2003. *Alexandre le Grand. Monnaie, finances et politique*. Translated by W.E. Higgins. Paris: Presses Universitaires de France.
Le Rider, G., and F. deCallataÿ. 2006. *Les Séleucides et les Ptolémées. L'héritage monétaire et financier d'Alexandre le Grand*. Monaco: Éd. du Rocher.
Meadows, A., and U. Wartenberg, ed. 2002. *Coin hoards*. vol. IX. Greek hoards. London: Royal Numismatic Society.
Melville Jones, J.R. 1986. *A dictionary of ancient Greek coins*. London: Seaby.
Melville Jones, J.R. 1993. *Testimonia Numaria. Greek and Latin texts concerning ancient Greek coinage*. vol. I. Texts and translations. London: Spink and Son.
Melville Jones, J.R. 2007. *Testimonia Numaria*. Vol. II. London: Spink and Son.
Mørkholm, O. 1991. *Early Hellenistic coinage*. Cambridge: Cambridge University Press.
Nicolet-Pierre, H. 2002. *Numismatique grecque*. Paris: Armand Colin.
Picard, O. 2007. Monnaies et circulation monétaire à l'époque classique. *Pallas* 74: 113–128.
Picard, O. 2008. *Économies et sociétés en Grèce ancienne (478–88 av. J.-C.)*. Paris: Sedes.
Price, M.J. 1991. *The coinage in the name of Alexander the Great and Philip Arrhidaeus*. 2 vols. London/Zurich: The Swiss Numismatic Society in association with the British Museum Press.
Sheedy, K.A. 2006. *The archaic and early classical coinages of the Cyclades*. London: Royal Numismatic Society.
Svoronos, J.N. 1904. *Τα νομίσματα του κράτους των Πτολεμαίων*, Athens (digitalised for easy accessibility, since the book is rare, with a translation by C. Lorber). http://www.coin.com/images/dr/svoronos_book2.html

Numismatics, Roman Imperial

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Introduction

Roman imperial numismatics is the study of coins and medallions of the Roman Empire from the commencement of the reign of Augustus in 27 BCE to the reign of Anastasius (CE 491–518), whose coinage is arbitrarily chosen as the beginning of the Byzantine series on account of his bronze coinage reform. Ancient coins have survived to the modern era either because they were hoarded or randomly lost ages ago.

Definition

Roman imperial numismatics may be viewed as a subfield of ancient history or archaeology or as a specialized discipline in its own right. The educational background of a numismatist largely colors his or her approach to the subject and the sorts of questions that a numismatist will pose. For

instance, historians tend to appreciate coins as a source material for economic or narrative history in concert with textual evidence. Archaeologists have been more interested in coins as chronological indicators for their sites, although coins in context also say much about the movement of populations, localized economic conditions, and coin circulation. Art historians attend to the iconography of Roman coins, consider the semantic meaning of designs, and compare coin designs with artworks or iconographic themes in other media. Traditionally, those who identify themselves as numismatists, and who concentrate on the medium of coinage alone, grapple with the field's specialized methods, such as die studies, hoard analysis, metrology, and so on, all of which reflect more upon production context rather than the context of use or deposition that are of greater concern to archaeologists, art historians, and historians. But today, greater care is taken to apply interdisciplinary methods in the field of numismatics.

For approximately 250 years, Roman imperial coin denominations followed the structure inherited from the Republic that was based on the silver *denarius* (Fig. 1; an Augustan *denarius* is illustrated in Fig. 2). The gold *aureus* was the largest denomination worth 25 *denarii*. The regular production of a subsidiary bronze coinage was an imperial innovation. The largest bronze denomination, the *sestertius*, was introduced by Augustus in 23 BCE. It and the *dupondius* were made of a copper-zinc alloy known as *orichalcum* (brass) that gave the coins a bright, golden

	Aureus (gold)	Denarius (silver)	Sestertius (brass)	Dupondius (brass)	As (copper)	Semis (copper)	Quadrans (copper)
Aureus	1						
Denarius	25	1					
Sestertius	100	4	1				
Dupondius	200	8	2	1			
As	400	16	4	2	1		
Semis	800	32	8	4	2	1	
Quadrans	1600	64	16	8	4	2	1

Numismatics, Roman Imperial, Fig. 1 Roman imperial coin denominations and their relative value

Numismatics, Roman Imperial, Fig. 2 Silver Denarius of Augustus. Yale University Art Gallery, 2001.87.5292

appearance. This original color is not apparent after centuries of patination. However, *sestertii* and *dupondii* from the anaerobic layers at the Vindolanda excavations in northern England maintain their original appearance on account of the lack of oxygen. Smaller denominations, the *asses* and the irregularly produced *semisses* and *quadrantes*, were struck in copper which gave them a reddish color. Even in antiquity as base metal coins circulated through the years, they darkened and oxidized. This often caused confusion between the *dupondius* and the *as*; although the *dupondius* was heavier, it was approximately the same diameter as an *as*. In Nero's principate (54–68 CE), the bust of the emperor on the obverse of the *dupondius* began to be depicted with a radiate crown (Fig. 3) in order to distinguish it from the *as*, upon which the emperor typically wore a laurel crown.

Nero decreased the weight of precious metal coins and the silver coinage was gradually debased through the reign of Septimius Severus in the third century CE. Caracalla (211–217 CE) introduced a new silver denomination, the *antoninianus*, which featured the emperor's portrait with a radiate crown (Fig. 4) to differentiate it from the *denarius*. The *antoninianus* was meant to circulate as a double *denarius* in spite of the fact that it contained only one and half times the amount of silver than the *denarius*. Elagabalus discontinued production of *antoniniani*, but they were reintroduced by Balbinus and Pupienus and soon became the silver standard for the rest of the third century. By the reign of Gallienus, the silver content of the *antoninianus* had become superficial (Fig. 5 shows an *antoninianus* with a green patination, the result of high copper content). *Sestertii*, *dupondii*, and *asses* were no longer produced as the *antoniniani* had essentially become a bronze coinage.

It is important to note that the Roman imperial coinage is distinct from the Roman provincial coinage, minted by cities for local use. A local coinage was struck by some cities in the Roman West until the principates of Tiberius (14–37 CE) and Caligula (37–41 CE) when the western provincial coinage died out. In the eastern Roman Empire, provincial coinage survived until the

Numismatics, Roman Imperial, Fig. 3 Orichalcum Dupondius of Nero. Yale University Art Gallery, Ruth Elizabeth White Fund with the assistance of Ben Lee Damsky, 2007.183.6

Numismatics, Roman Imperial, Fig. 4 Silver Antoninianus of Caracalla. Yale University Art Gallery, Promised Gift of Ben Lee Damsky, TR2007.13938.716

Numismatics, Roman Imperial, Fig. 5 Debased Antoninianus of Gallienus. Yale University Art Gallery, 2001.87.15728

later third century. Roman imperial coinage was the official currency of the Roman Empire, produced at the mints of Rome and Lugdunum (Lyon, France) until Vespasian's reign when the imperial coinage became the prerogative of Rome. Nevertheless, military mints or branches of the imperial mint were in operation at various times in Rome's history and are typically included under the definition of "imperial coinage." As political power shifted away from Rome during the political, military, and economic turmoil of the third century, branch mints became the norm. In fact, the mass production of highly debased *antoniniani* by imperial mints operating in the eastern provinces was probably the reason that local mints closed in the late third century as the debased imperial currency negated the need for a locally produced bronze coinage (Burnett 1987: 63–65).

Under Diocletian and Constantine, a series of imperial mints stretching from London to Alexandria were established. Diocletian also attempted to reform the coinage with a genuine silver coin. There were also numerous attempts in the fourth century to standardize and stabilize the coinage (for a summary of third century and fourth century monetary history and changes in the organization of mints, see Burnett 1987: 63–65, 122–125; Howgego 1995: 136–140; and relevant contributions in Metcalf 2012). Although there were some purer silver coins, billon and copper coins dominated the fourth and fifth centuries CE; in the fifth century, copper *nummi* traded at 7,200 coins to the *solidus*, the standard gold denomination in the fourth and fifth centuries. Fourth and fifth century billon and copper coins were mass-produced and are, therefore, among the most common finds from excavations at Roman imperial sites.

Roman imperial gold and silver coins circulated across the Empire's wide expanse, and even beyond it. Roman gold *aurei* are commonly found in India and testify to the extent of Rome's trade. Roman imperial bronze coins were less mobile. *Sestertii*, *dupondii*, and *asses* are found more commonly in the western Roman Empire where the provincial mints had ceased to operate by the second quarter of the first century; eastern cities relied more on their local coinage. But even imperial bronze coins tended to circulate locally once they had been introduced into a region (on coin mobility and circulation, see, e.g., Duncan-Jones 1989, 1999). The absence of an adequate supply of bronze coins in the Roman West is apparent in various periods and in certain regions. In Germania, for example, local imitations of the imperial coins of Claudius were commonplace as the official coinage was in short supply (compare Figs. 6 and 7). After the establishment of imperial mints across the Empire under Diocletian and Constantine and the

Numismatics, Roman Imperial, Fig. 6 Orichalcum Sestertius of Claudius, Yale University Art Gallery, 2001.87.5471

Numismatics, Roman Imperial, Fig. 7 Imitation of a Sestertius of Claudius. Yale University Art Gallery, Gift of James H. Schwartz, 2005.6.78

implementation of a uniform coinage from Britain to Egypt, imperial bronze coinage was used everywhere but site finds as a rule tend to be comprised of coins from the most proximate imperial mint. The irregularly produced *semisses* and *quadrantes* of the first and second centuries appear to have been struck for special purposes in Rome and Italy and are more common there than in the provinces. Their occasional presence in frontier regions on the Rhine may be connected with the movement of soldiers or the imperial court (e.g., Kemmers 2003. 2006: 218–219).

Historical Background

Modern study of Roman imperial coinage began in the Renaissance (consult generally Clain-Stefanelli 1965; Giard 1981). Coins are among the most common material objects to have survived the ages; their small size and portability made them desirable collectibles for aristocrats and antiquarians who developed a taste for ancient art. Early students of numismatics published aristocratic collections, some of which became the basis of the collections in today's encyclopedic

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museums. These early numismatic books often failed to present the material in a systematic fashion and were rife with speculation, fantasies, and forgeries. Inspired by the detailed representations on Roman coinage, Renaissance artisans achieved an aesthetic quality in medallic art that had not been witnessed since Roman antiquity. At the same time, the demand for Roman coins led to the production of forgeries and fantasy pieces, a problem that continues to plague numismatics even to this day.

Serious study of numismatics began with Joseph Eckhel whose work was the first attempt to organize the vast corpus of coins in a systematic way and to sort out all the fantasies and forgeries (Eckhel 1792–1798). Antiquarian study of coins provided scholars with a detailed knowledge of coin production, mints, and chronologies, but the intense focus on the object itself limited and isolated the field. The great Roman historian Theodor Mommsen demonstrated the greater role that numismatics could play in the historical sciences with the publication of his seminal numismatic monograph in which he brought numismatics together with the critical application of epigraphic and textual evidence (Mommsen 1860); he was also one of the first scholars to make extensive use of hoard evidence.

Key Issues/Current Debates

The bronze coinage of Augustus regularly bore the reverse legend S(*enatus*) C(*onsulto*), meaning "by decree of the Senate." *S C* remained on the regular imperial bronze coinage until its disappearance in the third century. The abbreviation only rarely appeared on precious metal coins of the Roman Empire, and usually as *EX S C* when it did, in order to call attention to an act of the Senate. Mommsen (1860: 739–750) argued that *S C* indicated that the base metal coinage was the responsibility of the Senate while the lack of it on the gold and silver coinage proved they were the prerogative of the *princeps*. This rigid diarchal interpretation dominated numismatic thought for much of the twentieth century; some scholars even assumed that Rome was home to two mints, one for precious metal ("the imperial mint") and one for bronze ("the senatorial mint"). Now the majority of scholars postulate that *S C* on the bronze signified only the Senate's nominal role as the visible authorizer for the withdrawal of bronze coinage from the treasury, even though the *princeps* had come to hold that power in actuality (e.g., *RIC*^{2} I: 24, 32). No longer does the presence of *S C* on the bronze coinage affect the interpretation of designs on Roman imperial coins since, in essence, visual messages would have originated from the imperial court, not the Senate.

Hoard analysis remains an important tool available to numismatists. Hoards are dated by the latest coin in the group to provide a *terminus ante quem*. Hoards can also be compared with one another to establish chronologies for the coins themselves. The Reka-Devnia hoard is the largest and most famous hoard of Roman imperial silver coins (Mouchmov 1934; Depeyrot 2004). It was so large that it was a primary source for the writing of *Roman Imperial Coinage* (*RIC*), the standard imperial type catalogs, the earliest volumes of which were published in the early twentieth century. Recently, there has been a growing interest in quantifying the reverse types represented in coins hoards in order to examine the evidence that this might yield regarding the semantic value of numismatic images in the Roman world (e.g., Noreña 2001; Depeyrot 2004). Individual coin finds are useful for archaeologists as they can date archaeological strata and features. They can provide additional information on coin circulation and can also indicate pathways and other highly trafficked areas at a site.

Unfortunately, hoards and individual finds are most often unrecorded as coins are one of the most sought-after and collected forms of antiquities. Presently, most of the numismatic material that enters the trade is looted from Eastern European and Middle Eastern countries. Often there are highly organized criminal networks that pay gangs of metal detectorists to find coins, which are then smuggled and sold to European and American dealers. The situation in Bulgaria is particularly grim (e.g., Dietrich 2002; Petkova

2004). Dietrich (2002) records an instance in which a Bulgarian supplier to American dealers spirited a metric ton of ancient coins to the United States in 1999.

International Perspectives

In recent decades, national projects have begun to inventory coin finds within their own political boundaries. The best inventories come from the area of the former northwestern provinces of the Roman Empire, and especially the area of modern Germany. At the time of writing, 41 volumes of *Die Fundmünzen der römischen Zeit in Deutschland* (*FMRD*) have been printed, cataloging a combined total of approximately 300,000 to 350,000 coins. The first volume of *FMRD* was published in 1960, but since then, numerous other countries and regions have initiated similar series: *Die Fundmünzen der römischen Zeit in Österreich(FMRÖ)*,*Die Fundmünzen der römischen Zeit im Größherzogtum Luxemburg (FMRL)*, *Die Fundmünzen der römischen Zeit in Slowenien* (*FMRSl*), *Die Fundmünzen der römischen Zeit in den Niederlanden* (*FMRN*), *Die Fundmünzen der römischen Zeit in Kroatien* (*FMRHr*), *Die Fundmünzen der römischen Zeit in Ungarn(FMRU)*, *Die Fundmünzen der römischen Zeit in Polen* (*FMRP*), *Inventar der Fundmünzen der Schweiz* (*IFS*), and *Ritrovamenti monetali di età romana nel Veneto* (*RMRVe*). Some of the above projects have recently begun placing material online as well. Other regions such as England and Wales have online finds databases, including the Portable Antiquities Scheme (http://finds.org.uk/) which currently has recorded approximately 400,000 finds reported by metal detectorists. A large group of c. 70,000 coin finds from Rome is being prepared for comprehensive publication, but already the custodians of that data have frequently made the unpublished information available to scholars for study. Finds inventories such as these provide the groundwork for contextual numismatic research and questions that can be asked from across a number of historical disciplines (e.g., see entries in von Kaenel and Kemmers 2009).

Future Directions

Today, Roman imperial numismatics lays at the intersection of economic, historical, art historical, and archaeological research. Nonetheless, many scholars fail to consider numismatics, do not deploy its full potential, or use coins recklessly in their research. The fear of numismatics is perhaps due in part to the fact that numismatic methodology can be highly specialized and that a very narrow object-based avenue of inquiry continues to exist (discussion in von Kaenel 1994). While studies based on the objects or production contexts alone unquestionably have their applications and merits, they can be irrelevant or even unintelligible to historians outside of the small circle of numismatic specialists. Numismatists have had some difficulty making their work accessible and relevant to those who write history. It is a worthwhile challenge then for a scholar to have a command of the historical sources and material or visual culture and also to develop a deep and thorough knowledge of numismatic resources and methods. Interdisciplinary approaches are a necessity for numismatists working in the twenty-first century.

The Roman imperial coinage has been thoroughly cataloged and published, and thus there is ample room for the methodical application of numismatic evidence, especially in visual and archaeological studies. Excavated coin finds have always been of importance to archaeology for their potential to provide essential chronologies for sites and their accompanying strata (Casey and Reece 1988 is a commonly cited introduction). Over the past few decades, critical methods to deal with coin finds have been greatly advanced, particularly by the Frankfurt School (see, for example, methodological discussions in R.-Alföldi 1979; von Kaenel and Kemmers 2009). But in addition to their utility as chronological indicators, attention to archaeologically recovered finds can provide information on economic conditions, coin supply and circulation, military activity, and beyond. Coin finds can give insight into ritual practices and other forms of human behavior, as at Avenches where excavations determined that the living preferred to

deposit imperial coins with specific reverse types such as Pax, Salus, Felicitas, and Roma with the deceased (Koenig 1999).

Since the 1980s, it had been understood that the Roman state intermittently supplied the western provinces with bronze coinage. Recent research has additionally suggested that the Roman state chose to supply different populations with bronze coins laden with appropriate reverse iconography in order to communicate ideas to those populations. This phenomenon is best illustrated at Nijmegen where the Flavian bronze coin finds from the legionary fortress show a much stronger proportion of martially themed reverse types than the finds from neighboring civilian settlements or from Rome (Kemmers 2006: 189–244). This discovery ought to set an agenda for scholars asking questions about the communicative value of Roman imperial coins (Elkins 2009).

Cross-References

- ▶ Economy, Roman
- ▶ Iconography in the Roman World
- ▶ Numismatics, Ancient Greek
- ▶ Numismatics, Roman Republican

References

Burnett, A. 1987. *Coinage in the Roman world*. London: Seaby.

Casey, J., and R. Reece. 1988. *Coins and the archaeologist*. 2nd ed. London: Seaby.

Clain-Stefanelli, E.E. 1965. *Numismatics: An ancient science*. Washington, DC: U.S. Government Print Office.

Depeyrot, G. 2004. *La propagande monétaire (64-235) et la trésor de Marcianopolis (251)*. Wetteren: Moneta.

Dietrich, R. 2002. Cultural property on the move – Legally, illegally. *International Journal of Cultural Property* 11: 294–303.

Duncan-Jones, R.P. 1989. Mobility and immobility of coin in the Roman Empire. *Annali dell 'Istituto Italiano di Numismatica* 36: 121–137.

Duncan-Jones, R.P. 1999. The monetization of the Roman Empire: Regional variations in the supply of coin types. In *Roman coins and public life under the Empire*, E. Togo Salmon papers II, ed. G.M. Paul and M. Ierardi, 61–82. Ann Arbor: The University of Michigan Press.

Eckhel, J. 1792–1798. *Doctrina numorum veterum*. Vienna: Sumptibus J. Camesina.

Elkins, N.T. 2009. Coins, contexts, and an iconographic approach for the 21st century. In *Coins in context, volume 1: New perspectives for the interpretation of coin finds*, Studien zu Fundmünzen der Antike 23, ed. H.-M. von Kaenel and F. Kemmers, 25–46. Mainz: von Zabern.

Giard, J.-B. 1981. La numismatique, source de l'histoire de l'art et de l'histoire des idées. *Numismatica e Antichità Classiche* 10: 21–29.

Howgego, C. 1995. *Ancient history from coins*. London/New York: Routledge.

Kemmers, F. 2003. Quadrantes from Nijmegen: Small change in a frontier province. *Schweizerische Numismatische Rundschau* 82: 17–34.

Kemmers, F. 2006. *Coins for a legion: An analysis of the coin finds from the Augustan legionary fortress and Flavian canabae legionis at Nijmegen*, Studien zu Fundmünzen der Antike 21. Mainz: von Zabern.

Koenig, F.E. 1999. Les monnaies. In *La nécropole gallo-romaine d'Avenches "En Chaplix". Fouilles 1987–1992*, Cahiers d'archeologie romande 78, ed. D. Castella, C.M. Pruvot, H. Amrein, A. Duvanchelle, and F.E. Koenig, 427–462. Lausanne: Cahiers d'archéologie romande.

Metcalf, W.E., ed. 2012. *The Oxford handbook of Greek and Roman coinage*. Oxford: Oxford University Press.

Mommsen, T. 1860. *Geschichte des römischen Münzwesens*. Berlin: Wiedmann.

Mouchmov, N.A. 1934. *Le trésor numismatique de Réka-Devnia (Marcianopolis)*, Annuaire du Musée National Bulgare, supplément 5. Sofia: Imprimerie de l'e'tat.

Noreña, C.F. 2001. The communication of the emperor's virtues. *Journal of Roman Studies* 91: 146–168.

Petkova, G. 2004. How to get a 2000% profit from selling an object. *International Journal of Heritage Studies* 10: 361–367.

R.-Alföldi, M., ed. 1979. *Ergebnisse des FMRD-Colloquiums vom 8.-13. Februar 1976 in Frankfurt am Main und Bad Homburg V.D.H*, Studien zu Fundmünzen der Antike 1. Berlin: Gebr. Mann Verlag.

RIC= Mattingly, H., E.A. Sydenham, et al., ed. 1920. *Roman imperial coinage*. London: Spink & Son, Ltd.

von Kaenel, H.-M. 1994. Die antike Numismatik und ihr Material. *Schweizer Münzblätter* 44: 1–12.

von Kaenel, H.-M. 2009. Coins in context: A personal approach. In *Coins in context, volume 1: New perspectives for the interpretation of coin finds*, Studien zu Fundmünzen der Antike 23, ed. H.-M. von Kaenel and F. Kemmers, 9–24. Mainz: von Zabern.

von Kaenel, H.-M., and F. Kemmers, eds. 2009. *Coins in context, Volume I: New perspectives for the interpretation of coin finds*, Studien zu Fundmünzen der Antike 23. Mainz: von Zabern.

Wigg-Wolf, D. 2009. Sites as context. In *Coins in context, volume 1: New perspectives for the interpretation of coin finds. Colloquium Frankfurt a. M., October 25–27, 2007*, Studien zu Fundmünzen der Antike 23, ed. H.-M. von Kaenel and F. Kemmers, 109–125. Mainz: von Zabern.

Numismatics, Roman Republican

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Introduction and Definition

The study of the coinage of the Roman Republic covers the period from the introduction of coinage in Rome in about 300 BCE to the end of the Roman Republic. In numismatics, the latter is conventionally dated to 31 BCE, the date of the battle of Actium and the establishment of the new political order, the Roman Empire. Traditionally, the discipline only encompasses coins issued under the direct authority of Rome and excludes related contemporary coinage issued in Italy and the Mediterranean region.

Historical Background

The Development of Roman Coinage

Before the rise of the Roman Republic, some areas of Italy had developed a tradition of coinage on the Greek model from the sixth century BCE. This was however not adopted in the area of Rome, where the earliest money appears to have been in the form of bullion and currency bars.

Around the fourth century BCE (the date is not certain), cast bronze currency bars appeared, based on the weight standard of the Roman pound (about 324 g). From about 300 BCE, this was joined by the production of struck bronze and silver coins. By the early to mid-third century BCE, there were three separate monetary systems operating in Rome:

1. Cast rectangular bronze currency bars, sometimes referred to as "*aes signatum*."
2. Cast circular bronze coinage, otherwise known as "*aes grave*."
3. Struck coinage (silver and bronze) based on the Greek model but for the first time inscribed in the name of the Roman people. The silver and bronze coinage was derived from the coinage of southern Italy and appears to have had a more southerly geographical distribution than the cast coinage.

The currency bars appear to have been a fairly short-lived phase and went out of use in the middle of the third century. Around this time, the other elements were combined and operated as a single monetary system of gold and silver coins and cast bronze. A standardized design was adopted for this coinage, with a janiform head on the obverse of the silver "*quadrigati*" (so-called by numismatists for their reverse design featuring a *quadriga*, or four-horse chariot) and the cast bronze coins.

The denominations of the bronze coinage were based on divisions of the *as* (originally one Roman pound (the libral weight standard) but gradually devalued so that this became a token coinage). One *as* was divided into 12 *unciae*; the number of these represented by each coin was shown in the denominational markings on bronze coins, as in Table 1 below. These denominations remained throughout the Roman Republican period, although the weight standard of the bronze coinage suffered successive reductions over time and there were periods when bronze coinage was not issued.

Reforms of the Second Punic War

The function of coinage in the third century BCE seems to have been primarily as a tool for the state to make some payments for military and civic purposes. The very difficult military period of the second Punic War (218–201 BCE) saw successive reforms of the coinage in the form of devaluations and weight reductions (from libral, to semilibral, and post-semilibral bronze coinages) and a short-lived series of high value gold denominations. This probably reflects the unprecedented demands made on the Roman treasury at that time.

This turbulent period in Rome's monetary history ended around 211 BCE with the introduction of a completely new currency system based on the *denarius* (ten asses). This denomination persisted into the third century CE. The *denarius* was a

Numismatics, Roman Republican, Table 1 Denominations of the *denarius* system

Denomination	Date in use	Mark	Metal	Multiple of an as
Aureus	Intermittent		Gold	400 (25 *denarii*)
Denarius	c. 211 BCE	X	Silver	10
Denarius (revalued)	From 141 BCE	XVI, X crossed or X	Silver	16
Quinarius	Intermittent	V	Silver	5
Sestertius	Intermittent	IIS	Silver	2 1/2
"Victoriatus"	Up to c. 170 BCE		Silver (base)	
As	c. 215 BCE to 80 BCE	I	Copper alloy	1
Semis	c. 215 BCE to 80 BCE	S	Copper alloy	1/2
Triens	c. 215 BCE to 80 BCE	••••	Copper alloy	1/3
Quadrans	c. 215 BCE to 80 BCE	•••	Copper alloy	1/4
Sextans	c. 215 BCE to 80 BCE	••	Copper alloy	1/6
Uncia	c. 215 BCE to 80 BCE	•	Copper alloy	1/12
Semuncia	c. 215 BCE to 80 BCE	Σ	Copper alloy	1/24

silver coin of standardized design, initially depicting the head of Roma on the obverse and the Dioscuri on the reverse. Additional silver denominations of the *quinarius* (5 asses) and the *sestertius* (2.5 asses) were also introduced. The cast bronze coinage went out of use and the struck bronze followed new designs featuring heads of deities on the obverse and a prow on the reverse. Gold coins of the denomination known as the *aureus* (25 *denarii*) were only intermittently issued and their appearance can be connected with times of crisis. They appear during the civil wars of the 80s and 40s BCE, becoming more common in the final years of the Republic.

Moneyers

Initially, the coinage was produced anonymously in the name of the Roman Republic. The appearance of living individuals on Roman coins was apparently taboo, being too resonant of kingship and the Greek model of coinage, and this initial reluctance to name individuals on coins was probably a reflection of these Republican ideals. Early Roman Republican coin designs featured deities and mythological figures, particularly those related to Rome and its foundation myths (Roma, the Dioscuri and Romulus and Remus). In the period 211 BCE–170 BCE, coins are inscribed ROMA and the *denarii* carry the head of the goddess Roma.

The individuals who issued the coins, referred to as the moneyers, were junior magistrates. They held the responsibility for minting coinage from reserves held in the Treasury at Rome. They held the office of triumvir and formed a board of three men, the *triumviri auro argento aere flando feriundo* ("three men responsible for casting and striking gold, silver, and bronze") although sometimes coins were issued by other magistrates or on the authority of the senate (marked "*EX S C*"). Their number was increased to four for a short time under Caesar. From the late second century, the moneyers had an increasing influence in the selection of designs for the coinage and their identities were more clearly marked on the coins.

The earliest issuer's marks on coins are in the form of letters, monograms, and symbols. Although the names of the individual(s) issuing the coins are usually not known in this period, they are thought to be indicated by the symbols used, sometimes in the form of visual puns. For example, the symbols of birds on coins of the moneyers Turdus (RRC 193) and Gragulus (RRC 238) (*turdus* is Latin for thrush and *graculus* for jackdaw). It was not until the mid-second century BCE that more complete names appeared on the coins and the identities of the moneyers can begin to be suggested.

It is clear that over time (and particularly from the late second century), moneyers found their role in the production of coinage to be an ideal platform for political advancement and it became more acceptable to allude to familial identity and achievements. Ancestors were named or referred

to by the choice of design used on the obverse and/or reverse. For example, the ancestral achievements of the Manlii Torquati are commemorated on coins of L. Manlius Torquatus (RRC 295/1) which feature a Gaulish torc. This is a reference to the heroic deeds of T. Manlius Torquatus in Gaul in the fourth century BCE. He is said to have slain a fierce Gaulish warrior and worn his torc, gaining the cognomen "*torquatus*" (torc) (Livy 7.10).

In time, it became acceptable to honor the living as well as more distant ancestors, and finally to allude to one's own achievements. M. Caecilius Metellus placed a Macedonian shield on his coins in 127 BCE (RRC 263/1) in reference to more recent victories of his father, Q. Caecilius Metellus Macedonicus. In 128 BCE, the aedile Cn. Domitius referred to games and corn dole potentially promised during his own office by adding a corn-ear to the obverse of his *denarius* and a small figure of a man fighting a wild beast on the reverse (RRC 261/1). These changes were accompanied by a gradual move from stylized to more individualistic portraiture, with recognizable individuals depicted.

In the late Republic, this tradition was overturned by Julius Caesar, who was the first living Roman to issue coins decorated with his own portrait. While this has been seen as an illustration of his hubris, the practice was widely adopted by others in the years leading up to the end of the Republic. During this turbulent period, coins were issued by or on behalf of the various competing political factions rather than in an official capacity for the state. Perhaps the most iconic coins from this period are the *aurei* and *denarii* issued by M. Junius Brutus celebrating the assassination of Caesar on the Ides of March 44 BCE (RRC 508). They show the cap of Liberty flanked by two daggers and the date "*EID MAR*." The coinage of Octavian (later Augustus) draws on his descent from the deified Caesar, setting the iconographic tone for what became the first Imperial dynasty.

Production

Coins were for the most part made in the mint at Rome, which is known to have been near the Temple of Juno Moneta on the Capitoline Hill; later, the goddess Moneta appears on coins as the personification of the mint. The designs on the coins were struck onto the blank flans using engraved obverse and reverse dies. The number of dies used varied according to the scale and length of production. It is clear that the supply of coinage fluctuated over time, according to demands on the state (such as the payment of soldiers and public works).

The mint was able to monitor the production of successive issues of the same design by means of a system of control marks found on *denarii* from the second to early first century BCE. These took the form of sequences of letters, numerals, and symbols (sometimes paired in relation to each other, for example, a symbol of a hare on the obverse paired with that of a hound on the reverse of a *denarius* of L. Papius, RRC 384/1).

Measures were put in place to combat forgery but this still occurred. Coins are found with a copper alloy or iron core covered in silver plating. The distinctive crimped edge of a coin known as the *denarius serratus* issued for a period from the late second century BCE may have been intended to reveal the core of a solid silver coin but plated forgeries of these still occur.

The high silver content of Roman Republican *denarii* meant that they were in circulation for a long time. They are found in British hoards of the first century CE and the "legionary series" of *denarii* of Mark Antony (RRC 544), which had a slightly lower silver content, circulated into the second century CE. It is thought that Roman *denarii* were a source of silver for the production of the British Iron Age silver coinage.

Bronze coinage was not issued throughout the Republican period, but after the late second century, it may have circulated for many years after issue (coins found are often very worn). Although the *denarius* became the standard silver coin of Spain in the first century, it appears that local issues were widely used for small change in the Roman world and imitations of Roman bronze coins could also have filled this gap in other areas. In the eastern Mediterranean, bronze coinage continued to be issued by cities now under Roman rule. These are often termed "Greek Imperial" or "Roman Provincial" coinage by numismatists (listed comprehensively in Burnett et al. 1992).

Key Issues/Current Debates

As Roman Republican coins do not bear dates, early work focused on determining the chronological sequence of types and the identities of the issuers. This dating has been influenced by the presence or absence of types in dated hoards from Italy and the Mediterranean. Sydenham published a systematic typology of the series in 1952 (Sydenham 1952). This was followed by a comprehensive study of the coinage published by Michael Crawford in his 1974 work *Roman Republican Coinage* (Crawford 1974) that set out the standard typology by which the coins are now commonly described (RRC types). The types are listed in chronological order by issue, with subtypes given to different denominations and to design variations within these.

More recent work has focused on refining this chronology. McCabe (2013) has set out a new scheme for the anonymous struck bronze coinage. New discoveries of hoards have had a significant impact on the dating of the series (notably the large Mesagne hoard (Hersh and Walker 1984) which led to revision of the dating of the issues of the mid-first century BCE (see also Mattingly 2004)). Detailed studies of certain parts of the series have appeared that draw on both archaeological and historical evidence (for example, Woytek's 2003 work on the coins of the 40s BCE). Revised dating has also had an impact on the identification of the moneyers who issued particular types; in many instances, their identity is inferred from the trajectory of their political career.

Another key strand of recent research has been the estimation of volumes of production. Die studies have provided estimates of the numbers of dies in use for particular series. The extent to which this can be related to output has been fiercely debated (see, for example, Buttrey and Buttrey 1997); the number of coins produced from each die is not known. The arguments also depend on the extent to which the production of coinage was a response to contemporary military commitments.

International Perspectives

Paris has the largest collection of Roman Republican coins (at the Cabinet des Médailles in the Bibliothèque Nationale) at over 20,000 items, including the important d'Ailly collection. Important collections of Roman Republican coins are also held in London (the British Museum), Vienna (Kunsthistorisches Museum), Hannover (August Kestner Museum), Rome (Vatican, Museo Nazionale and Capitoline Museum), Turin (Museo Civico), Madrid (Museo Arqueólogico Nacional), Naples (Museo Nazionale), Berlin (Bode-Museum), Copenhagen (National Museum), and New York (American Numismatic Society). In recent years, there has been a move toward greater accessibility of museum collections, with online databases and catalogs appearing (for example, see Ghey et al. 2010). The use of linked open data methodologies has enabled the American Numismatic Society to publish an online typology Coinage of the Roman Republic Online (CRRO) with examples drawn from many of these collections.

The study of Roman Republican coinage is not limited to the academic sphere, and many leading experts are collectors or coin dealers. The illegal trade in antiquities is an important issue for this area of numismatics (and others). It is illegal to remove archaeological material from the ground without permission in many European countries. The export of coins from many countries is restricted; recent changes in legislation also ban import of early Roman Republican coins from Italy into the USA. These measures are in place to protect the archaeological context of artifacts. This context is crucial for understanding subtleties of use and dating of archaeological material. For example, estimates of numbers of coins in circulation or the contents of hoards can be difficult to make when the scale of loss through illicit activity is not known.

In England and Wales, where metal-detecting is legal (but there is a legal obligation to report finds of coin hoards under the Treasure Act), the Portable Antiquities scheme (PAS) has had much

success in encouraging finders of ancient coins and artifacts to record their objects on an online database. The large volumes of material now recorded are a significant resource for those wishing to study geographical and chronological trends in the distribution of material over a wide area.

The International Numismatic Commission holds a major conference, the International Numismatic Congress, about every 6 years. For each conference, it publishes a Survey of Numismatic Research that gives a general overview of the subject. (For the most recent report on the Roman Republican period, see Woytek and Witschonke 2015).

Future Directions

New discoveries continue to allow refinement of chronology, and there is still scope for traditional numismatic studies focusing on chronology, typology, weight standards, and iconography. Increased understanding of these basic numismatic principles will facilitate discussion of the financial and monetary history of the Roman Republican period. Progress in these areas requires collaboration with ancient historians, archaeologists, and classicists. Scientific input is also critical for our understanding of metal sources and production techniques.

A continuation of the current focus on the distribution and chronology of hoards and site finds is likely. The past few decades have been marked by the collection and storage of such data, made possible by improved information technology. Increasingly, numismatists have been working alongside archaeologists to produce contextual studies of coinage from particular sites and regions. Such applied numismatic studies at, for example, Pompeii, have given us a more complete picture of the way in which the coinage fitted into the wider monetary systems of the Roman world (for example, demonstrating the extent of use of local bronze coinage alongside Roman silver).

There are many questions to be answered about interaction between the Roman and non-Roman worlds (for example, the imitation and use of Republican coin types outside the area of Roman authority).

Cross-References

- ▶ Economy, Roman
- ▶ Iconography in the Roman World
- ▶ Numismatics, Roman Imperial
- ▶ Trade and Transport in the Ancient Mediterranean

References

Burnett, A.M., M. Amandry, and P.P. Ripollès. 1992. *Roman provincial coinage. volume 1: from the death of Caesar to the death of Vitellius (44 BC–AD 69)*. London/Paris: British Museum Press/Bibliothèque Nationale.

Buttrey, S.E., and T.V. Buttrey. 1997. Calculating ancient coin production, again. *American Journal of Numismatics* 9: 113–135.

Coinage of the Roman Republic Online. New York: American Numismatic Society. Available at: http://numismatics.org/crro/

Crawford, M.H. 1974. *Roman republican coinage*. Cambridge: Cambridge University Press.

Ghey, E. (ed.); I. Leins (ed.), and M.H. Crawford (contribution by). 2010. *A catalogue of the Roman republican coins in the British Museum, with descriptions and chronology based on M.H. Crawford, Roman republican coinage (1974)*. Available at: http://www.britishmuseum.org/research/publications/online_research_catalogues/rrc/roman_republican_coins.aspx.

Hersh, C., and A. Walker. 1984. The Mesagne hoard. *American Numismatic Society Museum Notes* 29: 103–34.

Mattingly, H.B. 2004. *From coins to history: selected numismatic studies*. Ann Arbor: University of Michigan Press.

McCabe, A. 2013. The anonymous struck bronze coinage of the Roman Republic: A provisional arrangement. In *Essays in honour of Roberto Russo*, ed. P.G. Van Alfen and R.B. Witschonke, 101–273. Zurich/London: Numismatica Ars Classica.

Sydenham, E.A. 1952. *The coinage of the Roman Republic*. London: Spink & Son.

Woytek, B. 2003. *Arma et nummi. Forschungen zur römischen Finanzgeschichte und Münzprägung der Jahre 49 bis 42 v. Chr.* Wien: Verlag der Österreichischen Akademie der Wissenschaften.

Woytek, B., and R.B. Witschonke. 2015. The Roman Republic. In *A survey of numismatic research 2008–2013*, ed. C. Arnold-Biucchi and M. Caccamo Caltabiano, 177–195. Taormina: International Numismatic Commission.

Further Readings

Burnett, A.M. 2004. *Coinage in the Roman world*. London: Spink & Son Ltd..

Crawford, M.H. 1970. *Roman republican coin hoards*. London: Royal Numismatic Society.

Crawford, M.H. 1985. *Coinage and money under the Roman Republic. Italy and the Mediterranean economy*. London: Methuen.

Grueber, H.A. 1910. *Coins of the Roman Republic in the British Museum*. London: British Museum.

Harlan, M. 1995. *Roman republican Moneyers and their coins, 63 BCE to 49 BCE*. London: Seaby.

Harlan, M. 2012. *Roman republican Moneyers and their coins, 81 BCE to 64 BCE*. Citrus Heights: Moneta Publications.

Lockyear, K. 2013. *Coin hoards of the Roman Republic online*. New York: American Numismatic Society. Available at: http://numismatics.org/chrr/

Metcalf, W.E., ed. 2012. *The Oxford handbook of Greek and Roman coinage*. New York: Oxford University Press.

Vanni, F.M., and S. Bussi. 2004. *Convengno internazionale di studio. La moneta fusa nel mondo antico. Quale alternatival alla coniazione? (Arezzo, 19–20 settembre 2003)*. Milan: Società Numismatica Italiana.

Vecchi, I. 2013. *Italian cast coinage. A descriptive catalogue of the cast bronze coinage and its struck counterparts in ancient Italy from the 7th to 3rd centuries BC*. London: London Ancient Coins Ltd.

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Basic Biographical Information

Núñez Jiménez was born in the town of Alquizar in the present-day province of Artemisa, Cuba, on April 20, 1923. He was awarded a Bachelor Degree in Science and Literature at the Secondary School in Havana. He had deep concern for nature, and in 1940 (Álvarez 1956), he founded the Speleological Society of Cuba, together with several young friends, including Omar Sanchez, Osvaldo Aguirre, and Arturo Díaz. This enterprise was devoted to serious investigation of the national geography of Cuba, particularly its underground landscapes.

Through public examination, Núñez Jiménez obtained the position of Geography and History teacher at the Institute of Secondary Education of Vedado in Havana. A year later he began the same task at the Central University of Las Villas "Marta Abreu." By 1956, he was accepted as a member of the National Board of Archaeology and Ethnology, the Ethnographic Society of Cuba, and the National Speleological Society in the USA.

Núñez Jiménez is a Philosophy and Literature graduate from the University of Havana. Four years later he published his *Geography of Cuba*. Dictator Fulgencio Batista's coup regime proscribed the book and prevented its circulation due to its revolutionary approach and its defense of the inhabitants of the Cuban jungle. He reached the rank of captain of the Rebel Army fighting under Commander Ernesto "Che" Guevara's orders, when the cities of Placetas and Santa Clara were taken. After the 1959 revolutionary triumph, he held important governmental positions as director of the National Institute of Agrarian Reform and the INRA magazine, he was appointed president of the National Bank of Cuba in 1960, and he was founder and president of the Cuban Academy of Sciences (1962–1972). In 1981, he achieved the PhD degree in Geographical Sciences issued by the "Lomonosov" Moscow State University, in the Union of Soviet Socialist Republics (USSR) (Martín 2008).

He was appointed Cuban ambassador in Perú between 1972 and 1979. Yet, he continued his archaeological work and recorded and documented rock art, visiting 72 stations in places between the borders of Chile and Ecuador and between the Pacific Ocean and the Eastern foothills of the Cordillera de los Andes; he was accompanied by recognized Peruvian archaeologists like Dr Eloy

Linares Málaga and Dr Rogger Ravines; this work ended up with the publication of Petroglyphs of Peru: World Panorama of Rock Art and the offprint, *The Stone Book of Toro Muerto*. In 1979, when he was vice minister of culture, he created the National Commission of Monuments, of which he was the president until his death. There, he encouraged the writing and enactment of the legislation to safeguard the cultural and natural heritage.

Major Accomplishments

Towards 1945, Núñez Jiménez organized a geographic expedition to the east and far east regions of Cuba, carrying out studies that contributed to the fields of geography, archaeology, and speleology. The highest point of Cuban topography is reached at Turquino Peak, and Suecia Peak, the third highest peak, was reached for the first time, while the Toa River was also explored. Due to a number of different visits to Seboruco rocky peaks from 1939, Núñez Jiménez was able to discover the oldest archaeological remains found until that time. This marked the beginning of research into the 6000-year-old Seboruco culture. In 1951, Núñez Jiménez graduated in Philosophy and Literature from the University of Havana. Four years later he published his *Geography of Cuba*. Dictator Fulgencio Batista's coup regime proscribed the book and prevented its circulation due to its revolutionary approach and its defense of the inhabitants of the Cuban jungle.

Núñez Jiménez was a bold researcher; he devoted long hours to the exploration of caves and valleys, mountains and rivers, underground water sources, and flora and fauna. His incessant work made him a member of several expeditions to the North Pole in 1972 and Antarctica in 1982. He also explored rock stations in Colombia, the Dominican Republic, the Bahamas, other islands of the Caribbean, as well as the Pascua Islands. In 1987–1988, he organized and directed the expedition "Canoeing from the Amazon River to the Caribbean," in which he travelled more than 17,400 kilometers and visited 20 countries of the Amazon and Orinoco basins and the Antilles Sea researching in the fields: rock art, speleology, karstic studies, archaeology, and history.

He lectured in several universities all over the world and received important international degrees and qualifications such as Dr *Honoris Causa* of the Central University of Ecuador; Honorary Professor of the Autonomous University of Santo Domingo, Dominican Republic; and Honorary Member of the Geographical Society of the Union of Soviet Socialist Republics in 1963. He was a member of the Czechoslovak Academy of Sciences and of the Venezuelan Societies of Speleology and Natural Sciences; he was also the founding president of the Speleological Federation of Latin America and the Caribbean and member of the National Geographic Society of the USA (Martín 2008).

Among his most important books, the following could be mentioned: *Twenty Years Exploring Cuba*, which is the documented history of the Speleological Society of Cuba (SEC) until 1961. *Cuba, with the Backpack on the Shoulders* (Ediciones Unión, La Habana, 1963) describes some expeditions carried out by the SEC. *Caves and Pictographs* (Edición Revolucionaria, La Habana, 1967) presents speleological and descriptive studies of the García Robiou and Ambrosio caves' pictograms in the provinces of Mayabeque and Matanzas, respectively (Fernández and Calzada 2012). *Cuba: Rock Art* (Editorial Científico Técnica, La Habana and Industrial gráfica S. A., Lima, 1975) has become a classic text to know the state of the art of this specialty. *Rock Art of Cuba* (Jaca book, Turin, 1985) is a picture gallery of some of the most representative stations of the country. Petroglyphs of Peru: World Panorama of Rock Art (Editorial Científico Técnica, La Habana, 1986) and *Canoeing from the Amazon River to the Caribbean* (Editorial El Conejo, Quito, 1989) are an account of the route and the places visited by the expedition. *Half a Century Exploring Cuba* (Imprenta Central de las FAR, La Havana, 1990) compiles the actions of the SEC between 1961 and 1990 (Fernández and Calzada 2012).

Núñez Jiménez was an extraordinary person and a pioneering researcher. He passed away at the age of 75 years on September 13, 1998, in the city of La Havana, leaving a remarkable legacy for present and future generations.

Cross-References

▶ Bonavia, Duccio
▶ Lumbreras, Luis Guillermo

References

Álvarez, José. 1956. *Arqueología indocubana*. La Habana: Junta Nacional de Arqueología y Etnología.

Fernández Ortega, Racso, and Anderson Calzada Escalona. 2012. Relación de los investigadores cubanos con la arqueología peruana (1953–2008). In *Historia de la Arqueología en el Perú*, ed. Henry Tantaleán and César Astuhuamán. Lima: Fondo Editorial del Instituto Francés de Estudios Andinos.

Martín, Lissette. 2008. Programa de recordación al natalicio del Doctor Antonio Núñez Jiménez. Digital version of La Habana's Tribuna newspaper. http://www.tribuna.co.cu/etiquetas/2008/abril/18/programa-antonio.html

Núñez, Lautaro

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Basic Biographical Information

Lautaro Núñez Atencio was born on January 24, 1938, in Iquique (Fig. 1). He came from a family of Spanish origin that had settled in the oasis of Pica, Tarapacá, in the seventeenth century and from a local mestizo line dating back to the nineteenth century. Although he lived in Iquique, he spent long summers with his family in Pica, where as a young boy he experienced the caravans that came to Tambo del Resbaladero run by his aunt, Luisa Núñez. The caravans that he witnessed not only brought charqui, ropes, woven items, quinoa, potatoes, and liquor, among many other goods; they also were accompanied by children, who spent several years in Pica before returning to their homes.

In Iquique he lived in El Morro, a neighborhood populated by local fishermen. With Juan Varela, who would later become a geologist and close collaborator in Lautaro's Paleo-Indian investigations and other friends, he founded the Huracán Explorers Club. This group of 12–17-year-old adolescents went on several excursions to climb the peaks of the Coastal Range, Pica and Tarapacá, camping near shell middens and cemeteries, relying on freshwater springs and coastal resources, forging a close link with the natural world. Academically, Lautaro was deeply influenced by the engineer Bertie Humberstone, the son of James "Santiago" Thomas Humberstone, founder of northern Chile's modern saltpeter industry. Bertie was a kind of philanthropist who invited children from the local school to his house in the afternoons, where they had access to his extensive library. It was on these visits that Lautaro first encountered the scholarly world of archaeology.

It is difficult to tell exactly how these early influences – his exposure to the ethnic world, the nature and its resources, and the study sessions at Bertie Humberstone's home – marked the young Lautaro, but with no doubt contributed in his decision to travel to Santiago to study history and geography at the Universidad de Chile (as at the time no archaeology programs existed in our country). In 1960 he became a research assistant at the Universidad de Chile's Center for Anthropological Studies and in 1962 was appointed director of the Museum of Calama and established the Program in Archeology and Museums at the Universidad de Chile, Zona Norte. His interest in early sites, chronology, and stratigraphy led him to the Univerzita Karlova in Prague between 1968 and 1969, where he worked on large Paleolithic sites and also married Drahomíra Srytrova, an academic with a Masters in History.

In April 1974, in the midst of intense social unrest in Chile, Lautaro was dismissed from his post for political reasons and the Archeology and Museums Program was suspended meanwhile the campuses of the Universidad de Chile Zona Norte were shut down. In January 1975 he joined the Universidad Católica del Norte and in 1984 he co-founded the Institute of Archeological Research and Museum (*Instituto de Investigaciones Arqueológicas y Museo*, IIAM),

Núñez, Lautaro, Fig. 1 Lautaro Núñez at his laboartory in San Pedro de Atacama

serving as its director for two terms. Today, he works as a researcher at IIAM and is a professor in the Masters' and Doctoral Program offered jointly by the Universidad Católica del Norte and the Universidad de Tarapacá.

Major Accomplishments

His first excavations were in northern Chile, in the Tarapacá ravine, and were carried out with D. True as part of an agreement between the Universidad de Chile and the University of California. These were Lautaro's first approaches to formative societies, and it quickly triggered his interest in the history of the processes that had led to their increasing complexity.

Upon his arrival in San Pedro de Atacama, he began a research program through the Archeological Museum. The work was financed by the Paleo-Indian Program of the Smithsonian Institution with the support of Betty Meggers and Clifford Evans and sponsored by R. P. Gustavo Le Paige, Director of the Archeological Museum, with whom Lautaro formed an abiding friendship. His study of the Paleo-Indian sites of Tagua Tagua and Quereo marked the beginning of his multidisciplinary approach, which would lead to collaborations with professionals in many fields, including his childhood friend, Juan Varela, who as a geologist accompanied Lautaro on several excavations along with specialists in paleontology and bioanthropology, among other disciplines.

At the same time, he explored other areas of interest such as caravan traffic and the relations between routes and geoglyphs. As an outcome of a conversation held with Tom Dillehay during the VII National Congress of Chilean Archeology, which was held in Alto de Vilches in 1977, the book *Movilidad Giratoria, armonía social y desarrollo en los Andes Meridionales: Patrones de tráfico e interacción económica* was conceived (Núñez and Dillehay 1979). Convinced that caravan traffic was crucial to an understanding of Andean prehistory, Lautaro pursued a Doctorate in this subject from the University of Tokyo, completing his thesis *Tráfico de complementariedad de recursos entre las tierras altas y el Pacífico en el área Centro Sur Andina*.

As a consequence of the connection he established with Dr. Martin Grosjean of the University of Bern, Switzerland, his investigations took on a new dimension: the environment. The reconstruction of the environment had always been an important element of Lautaro's work, especially in relation to early settlements, but through his research at Puripica, he sought to analyze specifically the relationship of human groups to their environment. This was the starting point for the understanding of the paleoclimatic

history of the study area; it would be followed by several interdisciplinary projects that significantly expanded the existing knowledge of human occupations in the desert environments of the western slope of the Atacama Puna region. By means of a large occupational sequence that began c. 12,000 BP, it was possible to model the relationship between human occupations and paleoenvironments. This work demonstrated the need to understand those extreme environments, where the scale and the effects of environmental variations may cause different impacts, even on microenvironments within the same region (ecorefuges) and therefore on the human groups residing there.

Lautaro Núñez always defended the autochthonous thesis, which holds that the trajectory of a society can be understood as the result of local processes deeply rooted in the archaic period. He obtained convincing support for his ideas as a result from his work at Quebrada Tulán from the late 1970s onwards, from the discovery of a large ceremonial center (Tulán-54) comparable to the earliest ones of the Circumpuna Andes and from his understanding of animal domestication centers beyond the Central Andes, among others. He believed that the particularity of formative societies could only be understood by acknowledging the early importance of exchange and interaction networks and the combined social, ritual, productive, and environmental factors that existed in each region.

The versatility of Lautaro Núñez's work makes it difficult to synthesize his many areas of interest and contributions to the field of archaeology. But these interests and contributions do share some common elements, including a strong emphasis on temporal dimension, the interdiscipline, and the need for an analytical framework firmly grounded in anthropological and ethnographic knowledge of the Andean world.

Professional Awards and Honors

During 2002 the government of Chile awarded Lautaro Núñez the National History Prize in recognition of his lifetime achievement. In 2012, in recognizance of his academic and investigative work, the Universidad Católica del Norte granted him the honorary degree of doctor honoris causa and published a book in his honor, entitled *Temporalidad, interacción y dinamismo cultural* (2011).

Lautaro Núñez's interest in our heritage – not only the archaeological but the anthropological and historical as well – led him to write several books for a wide audience. These include the popular religious practices of Tarapacá (*La Tirana del Tamarugal: del misterio al sacramento*, 1989) and on Tarapacá's society (*The evolution of a valley population and resources of Tarapacá over a Milennium*, 1986). Others focused on the impact of the Spanish conquest on the Americas (*Fiesta en la Antípoda: Reflexiones sobre el ocultamiento de América*, 1993) and also one that invited children to learn about the archaeologist's work (*Aprendamos arqueología en nuestra tierra*, 2001). This body of work not only earned Lautaro the recognition and respect of his academic colleagues but also led to him being declared an illustrious son of the city of Iquique (2003) and of Pica (2003), his places of origin.

Lautaro's work enjoys widespread international recognition, demonstrating the heights that can be attained by archaeology in the Southern Cone of America. Lautaro Núñez was a pioneer in that field and has encouraged its expansion through his interactions with colleagues in Argentina, Peru, and Bolivia.

Cross-References

- ▶ Andes: Prehistoric Period
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Paleoindians
- ▶ Peopling of the Americas

References

Núñez, L., and T. Dillehay. 1979. *Movilidad giratoria, armonía social y desarrollo en los Andes Meridionales: Patrones de tráfico e interacción económica*. Antofagasta: Universidad Católica del Norte.

Further Reading

Grosjean, M., L. Núñez, I. Cartajena, and B. Messerli. 1997. Mid-Holocene climate and culture change in the Atacama Desert, northern Chile. *Quaternary Research* 48: 239–246.

Núñez, L. 1983. *Paleoindio y Arcaico en Chile: Diversidad, secuencia y procesos*. México: Editorial Cuicuilco.

Núñez, L. 1992. *Cultura y conflicto en los oasis de San Pedro de Atacama*. Santiago: Editorial Universitaria.

Núñez, L., J. Varela, R. Casamiquela, and C. Villagrán. 1994a. Reconstrucción multidisciplinaria de la ocupación prehistórica en Quereo, Centro de Chile. *Latin American Antiquity* 5: 99–118.

Núñez, L., R. Casamiquela, V. Schiappacasse, H. Niemeyer, and C. Villagrán. 1994b. Cuenca de Tagua Tagua en Chile. El ambiente del Pleistoceno y ocupación humana. *Revista Chilena de Historia Natural* 67 (4): 503–519.

Núñez, L., M. Grosjean, and I. Cartajena. 2002. Human occupations and climate change in the Puna de Atacama, Chile. *Science* 298 (5594): 821–824.

Núñez, L., M. Grosjean, and I. Cartajena. 2005. *Ocupaciones Humanas y Paleoambientes en la Puna de Atacama*. Taraxacum: Universidad Católica del Norte.

Núñez, L., I. Cartajena, C. Carrasco, P. de Souza, and M. Grosjean. 2006. Emergencia de comunidades pastoralistas formativas en el sureste de la Puna de Atacama. *Estudios Atacameños* 32: 93–117.

Nuragic Culture and Architecture (Bronze Age to Iron Age)

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Introduction

The term "Nuragic" refers to an extensive, shared material culture that developed on the island of Sardinia beginning in the Early or Middle Bronze Age and continued at least through the Early Iron Age. Most visibly, the societies of the Nuragic culture shared a distinctive type of architectural construction: megalithic stone towers called *nuraghi* (sg. nuraghe). Archaeologists estimate that over ten thousand nuraghi once existed throughout Sardinia, although now only a few thousand are extant. In addition to the nuraghi, Nuragic societies shared other types of material culture. Similarities in the construction of tombs and cult places as well as in ceramic styles, agricultural and food processing equipment, and household objects all indicate a high degree of interaction among Nuragic societies. Although the nature of this interaction is not fully understood, it probably included trade, intermarriage, and shared rituals and may also have involved intergroup raiding and conflict.

Although the Nuragic culture developed autochthonously from earlier Neolithic and Eneolithic cultures and is unique to the island of Sardinia, similarly megalithic Bronze Age cultures developed simultaneously on Pantelleria, Corsica, the Balearic Islands, and the Iberian mainland, suggesting that the development of the Nuragic culture was part of broad changes affecting much of the West Mediterranean (cf. Blake 2001). The Nuragic culture had important connections with the East Mediterranean as well, and a variety of East Mediterranean imports have been found in excavations of Nuragic contexts.

Definition

The Nuragic culture is named after its characteristic form of architecture, the nuraghe. Nuraghi are monumental, dry masonry structures that use multistory towers in the shape of truncated cones as the basic unit of building. The first appearance of the term *nuraghe* in writing is an inscription on the lintel of Nuraghe Aidu Entos in Bortigali (Webster 2016: 2–3). The inscription is dated to the first century CE on epigraphic grounds, but the word itself does not have Indo-European roots. It is thought to be the original Bronze Age word for the towers (Lilliu 1959: 32), and some scholars use the word as a name for the Nuragic people themselves, calling them the Nur (Webster 1996: 22, 2016: 4). Although this can be a useful shorthand, it should be remembered that "Nur" is a modern coinage that may suggest more ethnic unity than the Nuragic culture actually had.

Key Issues

Architectural Overview

The earliest Nuragic structures are the corridor nuraghi, sometimes called proto-nuraghi or pseudo-nuraghi. These are monumental dry masonry platforms, each with one or more narrow corridors running through them. They often have small, roughly circular, or elliptical rooms branching off of the corridors (see Lilliu 1982: 13–29). Housing structures were built on top of these platforms, and food or livestock were probably kept in the corridors and small rooms below. Few radiocarbon dates exist for corridor nuraghi, and those that do exist have error ranges so broad as to be unhelpful in dating their period of construction. Corridor nuraghi are generally dated on the basis of pottery to the Early (c. 2000–1700 BCE) or Middle Bronze Age (c. 1700–1365 BCE).

The funerary architecture that accompanies the corridor nuraghi elaborated on the earlier traditions of the Eneolithic: cist graves, dolmens, and especially passage graves. The early Nuragic people added a curved forecourt to the plan of the passage grave to create a new kind of funerary architecture traditionally called giants' tombs (*tombe di giganti*) (Fig. 1). The forecourts of the giants' tombs were originally constructed of stele, and the central stela was often carved with a door motif and contained an opening through which offerings could be made to the dead. Forecourts were the locus for feasting rituals. Many early Nuragic giants' tombs were constructed *ex novo*, but in several instances, earlier passage graves were elaborated into giants' tombs, including the sites of Su Cuaddu de Nixìas (Lunamatrona), Li Lolghi (Arzachena), and Coddu Vecchiu or Capichera (Arzachena). Examples of cist graves and dolmens that were transformed into giants' tombs are rarer but do exist.

Nuragic construction techniques improved during the Middle Bronze Age with the discovery of how to build false tholos and true tholos chambers, beehive-shaped false domes constructed by stacking successively smaller rings of stone blocks (see discussions in Lilliu 1982: 30–61; Webster 2016: 46–51). Many corridor nuraghi were then elaborated and expanded into more complex structures that included false tholos and tholos nuraghi; this continuity of occupation can be seen at numerous sites in Sardinia such as Sa Fogaia (Siddi), Su Mulinu (Villanovafranca), and Santa Vittoria (Serri). Thousands of new Nuragic sites were also constructed at this time. Many of the sites were single towers, often called simple nuraghi. Others were multitower or complex nuraghi: two or more attached towers which frequently included an attached, walled courtyard (Fig. 2). Some sites that were founded at the end of the Middle Bronze Age developed into nuragic complexes, with multitower nuraghi at their centers surrounded by circumference walls, additional towers, and villages. Nuraghe Su Nuraxi (Barumini) and Nuraghe Arrubiu (Orroli) are two of the best known (Fig. 3).

The construction of giants' tombs also changed during the Middle Bronze Age, drawing on the improved architectural techniques of the tholos nuraghi. The orthostatic stele construction was

Nuragic Culture and Architecture (Bronze Age to Iron Age), Fig. 1 Front (*left*) and side (*right*) views of Sa Dom' e S'Orcu (Siddi), a giants' tomb in the later, coursed-stone construction style. (Photos E. Holt)

Nuragic Culture and Architecture (Bronze Age to Iron Age), Fig. 2 Nuraghe Santu Antine (Torralba), a multitower nuraghe with a central tower, courtyard, and three surrounding towers. (Photo E. Holt)

Nuragic Culture and Architecture (Bronze Age to Iron Age), Fig. 3 The Nuragic village surrounding Nuraghe Su Nuraxi (Barumini). (Photo E. Holt)

replaced by courses of stones inclining toward an arched ceiling, and the central stela with door motif was replaced by a simple opening with a stone architrave between the two wings of the forecourt (see Castaldi 1969; Blake 2001).

During the Late (c. 1365–1175 BCE) and Final Bronze Age (c. 1175–1020 BCE), successful sites such as Nuraghe Su Nuraxi and Nuraghe Arrubiu were elaborated into important centers with the addition of new walls and towers; however, the basic Nuragic construction techniques remained the same. Architectural innovation during this period came in the form of cult architecture, and the well temple or sacred spring (*pozzo sacro*) was established. These well temples utilized the tholos construction technique of the nuraghi to create

Nuragic Culture and Architecture (Bronze Age to Iron Age), Fig. 4 The entrance (*left*) and staircase (*right*) of the well temple of Santa Cristina (Paulilatino). (Photos E. Holt)

underground, vaulted chambers over naturally occurring springs. Well temples include some of the finest architecture built during the Nuragic period, and the well temple of Santa Cristina (Paulilatino) is a particularly impressive example (Fig. 4). Well temples were the sites of important Nuragic ritual and remained in use for centuries, continuing to receive votive offerings well after the end of the Nuragic culture.

During the Final Bronze Age and Early Iron Age (c. 1020–900 BCE), an important change occurred in the construction and use of Nuragic architecture. The existing nuraghi were allowed to collapse, and it is generally though not universally accepted that no new nuraghi were constructed after the Final Bronze Age (see Webster 2016 for a dissenting view). Many nuraghi fell out of use, and those that remained in use were treated as ritual spaces, taking on a ceremonial function they had not previously had (Perra 2013: 166–171). Villages were built around some nuraghi that had not previously had villages, sometimes utilizing stones from the collapsed nuraghe itself. Even the floor plans of the Early Iron Age houses were different from those of the Bronze Age. Bronze Age houses tended to be circular in plan, but the houses of the Early Iron Age were composed of many subcircular and subrectangular rooms around an open courtyard. Evidence excavated from the Early Iron Age village of Genna Maria (Villanovaforru) indicates that these rooms had distinct functions, unlike the undifferentiated space in Bronze Age houses. The new Iron Age villages also differed from their Bronze Age predecessors by being open-air villages lacking fortifications and circumference walls. Funerary architecture also changed in the Iron Age. Communal burial in giants' tombs began to give way to individual burial, such as the famous burials at Monti Prama (Cabras).

Socioeconomic Overview

The complex architectural history of the Nuragic culture with its development, elaboration, and periodic innovation indicates complex and changing socioeconomic structures. However, scholars disagree about the amount of social hierarchy present in Nuragic society when the first corridor nuraghi, giants' tombs, and tholos nuraghi were built. Some see the corridor nuraghi and single-tower nuraghi (Fig. 5) as evidence of an egalitarian society with a family-level organization (Webster 1996: 71, 96) and interpret the giants' tombs as having the same community burial function that passage tombs appear to have had in the Eneolithic. Other scholars interpret corridor nuraghi as early signs of

Nuragic Culture and Architecture (Bronze Age to Iron Age), Fig. 5 A single-tower nuraghe at Santa Cristina (Paulilatino). (Photo E. Holt)

developing hierarchy and question whether burial in the restricted space of the giants' tombs was, in fact, open to all members of society (Bernardini 2010).

In spite of the disagreements about the beginnings of Nuragic society, scholars tend to agree that by the Late and Final Bronze Age, Nuragic society had a stratified organization with privileged leaders controlling production. Many scholars see the Early Iron Age cultural transition indicated by the abandonment of the nuraghi; the construction of large, open villages; and the move away from giants' tombs toward individual burials as evidence of a codified social hierarchy (Van Dommelen 1998: 79, 105; Perra 2009). An alternative hypothesis suggests that, toward the end of the Nuragic culture, power fell out of the hands of the ruling aristocracy and into the hands of religious leaders (Campus et al. 2010: 62–8).

Carved reliefs from Medinet Habu, the mortuary temple of Rameses III in Luxor, Egypt, may show Nuragic warriors as part of an influx of Sea Peoples that was successfully repulsed c. 1200 BCE. The identification of these warriors as Nuragic is based on stylistic similarities between the helmets they are shown wearing and the helmets worn by warriors in bronze figurines produced by the Nuragic culture in the Final Bronze and Early Iron Age. This evidence may indicate that Nuragic people took part in the widespread, armed migrations that occurred at the end of the Mediterranean Bronze Age.

In general, the subsistence economy of the Nuragic people seems to have been similar to that of other Bronze Age Mediterranean cultures. The Nuragic people grew wheat and barley; raised sheep, goats, and pigs; used cattle for traction and periodically meat; and hunted, fished, and gathered according to the locally available resources (cf. Perra 2010). However, we know next to nothing about the specifics of farming and herding strategies, systems of land tenure, or the social aspects of production and storage. One important difference from other Mediterranean Bronze Age economies is that there is currently no evidence for the presence of the horse in Bronze Age Sardinia. This absence, if real, will have limited travel times, communication, and certain kinds of elite competition.

Craft production in Nuragic society is difficult to reconstruct. As often happens, we are left with abundant evidence of the most durable products and know little about the rest. Spindle whorls are frequent finds on Nuragic sites, indicating textile production, and impressions left on some types of Nuragic pottery attest to the weaving of mats and

baskets. Ceramic production came in a variety of shapes for serving, cooking, and storage and became more refined as the Nuragic period progressed. Slag, stone molds, and copper ingots of different shapes attest to a developed bronze working industry at an early stage of the Nuragic culture (see Lo Schiavo et al. 2005), though deposition of bronze artifacts did not occur in any great quantity until the Final Bronze and Early Iron Age. Numerous figurines of humans and animals, known as *bronzetti*, have been recovered from later Nuragic sites, though very few have any contextual information attached. Other common Nuragic artifacts are bone awls and pins, river pebbles used to burnish pottery, and fine sedimentary stones for sharpening metal tools. Obsidian, which is available on the island, remained an important resource for toolmaking, as it was in the Sardinian Neolithic.

The people of the Nuragic culture also participated in extensive extra-insular trade networks. Trade during the Middle, Late, and Final Bronze Age tended to be with the East Mediterranean. Numerous finds of Mycenaean and Cypriot artifacts in Sardinia include a Late Helladic IIIA2 alabastron from Nuraghe Arrubiu (Orroli), Mycenaean ceramics from Nuraghe Antigori (Sarroch), a carved hippopotamus ivory figurine from the Nuragic village Mitza Purdia (Decimoputzu), and fragments of oxhide ingots from numerous sites throughout the island (Giardino 1992). Recent work in ceramic petrography and composition studies has expanded our knowledge of Nuragic trade, identifying imports from a greater number of locations than was previously recognized as well as Nuragic ceramics that were exported to the East Mediterranean (Karageorghis 2011; Lo Schiavo 2012). Additionally, recent research in lead isotope analysis suggests that Nuragic bronze reached as far north as Scandinavia during Sardinia's Middle through Final Bronze Age (Ling et al. 2014).

At the end of the Final Bronze Age and the beginning of the Early Iron Age, people on Sardinia seem to have traded less with the East Mediterranean and focused more on the West Mediterranean and mainland Italy. The Nuragic people exchanged ceramics, weapons, and *bronzetti* with the societies of Etruria and the Iberian Peninsula.

Current Debates and Future Directions

Numerous important issues are currently being debated in the study of the Nuragic culture, the most fundamental of which is probably that of chronology. At present, the number of radiocarbon and dendrochronological dates for the Nuragic culture is small compared to the number of excavated sites, and much of the dating of settlement types, ceramic styles, and architectural changes is conventional. Two different perspectives on Sardinian chronology have therefore developed (see Van Dommelen 1998: 55). The first perspective, associated with historical and classical archaeology on Sardinia, relies primarily on textual and epigraphic evidence and on art historical comparison between Sardinian artifacts imported from the Aegean and Near East and similar artifacts found in datable contexts in the East Mediterranean. The second perspective, associated with prehistoric archaeology on Sardinia, bases its chronology on dendrochronology and radiocarbon dating (cf. Tykot 1994; Manning 1998).

A second fundamental discussion in Nuragic archaeology addresses what was the purpose of the nuraghi, a discussion that is fundamentally tied to understanding the structure and interactions of the numerous societies that made up the Nuragic culture. That the nuraghi had a primarily domestic function is no longer in doubt (cf. Blake 2001: 146), but whether the nuraghi also served a defensive function is debated. The massive walls of the nuraghi and their enclosed courtyards suggest a protective function, as does the placement of many Middle Bronze Age nuraghi in high, defensible locations with good views of the surrounding territory. The existence of circumference walls around many Nuragic villages may also indicate that defense was a concern.

However, the overbuilt, megalithic nuraghi may have served as displays of power and authority rather than as actual defensive structures. Many scholars point out that the usual archaeological indications of conflict, such as human skeletons showing violent trauma and evidence of the periodic destruction of settlements, are missing from Nuragic society (Campus et al. 2010: 67).

Archaeologists' ability to settle this debate is currently hampered by a lack of information about Nuragic settlement systems. Although the spatial relationships among visible monuments have often been studied (Trump 1990; Blake 2001; Cossu and Perra 2008), few excavations and field surveys have explored these relationships in depth. In addition, useful information about Nuragic populations is difficult to obtain because most giants' tombs were looted or reused in antiquity, destroying their contents. Without a more detailed understanding of the relationships among complex nuraghi, simple nuraghi, villages, and tombs, it will remain difficult to understand all the functions the nuraghi may have had.

Finally, there is an important debate that centers around what happened to the Nuragic culture. Some scholars see the events of the Final Bronze Age and Early Iron Age as indicating reorganization and change, resulting in a different Sardinian culture during much of the Iron Age (see Van Dommelen 1998: 76–9, 101–3; Perra 2013: 166–210). Other scholars read the continuity of Nuragic craft styles and the continued occupation of Nuragic sites as evidence for cultural continuity well beyond the Early Iron Age, continuing to use the word "Nuragic" to describe Sardinian society as late as the Punic (Lilliu 1982), Roman (Webster 1996), and even Medieval periods (Dyson and Rowland Jr. 2007).

Although much important work has been done on the archaeology of the Nuragic culture, the current state of the field invites substantial future research. New excavations and surveys, particularly projects investigating a wider range of settlement types and projects focusing on the early development of the Nuragic culture, will help resolve many of our unanswered questions about the structures and interactions of Nuragic society. The collection of new radiocarbon dates will continue to refine our knowledge of Nuragic chronology. Some projects have already begun the process of reconstructing the Nuragic environment (Ruiz-Gálvez 2005), but the need to contextualize the Nuragic economy within its resource base and natural surroundings warrants considerable further study. Finally, archaeometric techniques such as ceramic petrography are opening up exciting new avenues of research. As a field of inquiry, Nuragic archaeology has great potential for growth and development.

Cross-References

- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ Cyprus, Archaeology of
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Early Iron Age Greece (c. 1150–700 BCE).
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Italy, Sicily, Malta, and the Lipari Islands: Prehistory
- ▶ Material Culture and Education in Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Tombs, Etruscan
- ▶ Trade and Transport in the Ancient Mediterranean

References

Bernardini, P. 2010. *Le torri, i metalli, il mare. Storie antiche di un'isola mediterranea*. Sassari: Carlo Delfino Editore.

Blake, E. 2001. Constructing a Nuragic locale: The spatial relationship between tombs and towers in bronze age Sardinia. *American Journal of Archaeology* 105 (2): 145–161.

Campus, F., V. Leonelli, and F. Lo Schiavo. 2010. La transizione culturale dall'età del bronzo all'età del

ferro nella Sardegna Nuragica in relazione con l'Italia tirrenica. *Bolletino di Archeologia online* Volume speciale F: 62–76.

Castaldi, E. 1969. Tombe di giganti nel Sassarese. *Origini* 3: 119–274.

Cossu, T., and M. Perra. 2008. I sistemi territoriali della Barbagia-Mandrolisai e della Marmilla. In *Il paesaggio nuragico sull'altipiano di Pran'e Muru*, ed. F. Campus, T. Cossu, V. Leonelli, F. Lo Schiavo, M. Perra, and M. Sanges, 119–130. Orroli: Comune di Orroli.

Dyson, S.L., and R.J. Rowland Jr. 2007. *Shepherds, sailors, and conquerors. Archaeology and history in Sardinia from the stone age to the middle ages*. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Giardino, C. 1992. Nuragic Sardinia and the Mediterranean: Metallurgy and maritime traffic. In *Sardinia in the Mediterranean: A footprint in the sea*, ed. R. Tykot and T. Andrews, 304–316. Sheffield: Sheffield Academic Press.

Karageorghis, V. 2011. Handmade burnished ware in Cyprus and elsewhere in the eastern Mediterranean. In *On cooking pots, drinking cups, loomweights and ethnicity in bronze age Cyprus and neighbouring regions. An international archaeological symposium held in Nicosia, November 6th – 7th 2010*, ed. V. Karageorghis and O. Kouka, 87–93. Nicosia: A. G. Leventis Foundation.

Lilliu, G. 1959. The Nuraghi of Sardinia. *Antiquity* 33: 32–38.

Lilliu, G. 1982. *La civiltá nuragica*. Sassari: Carlo Delfino Editore.

Ling, J., Z.A. Stos-Gale, L. Grandin, K. Billström, E. Hjärthner-Holder, and P.-O. Persson. 2014. Moving metals II: Provenancing Scandinavian bronze age artefacts by lead isotope and elemental analyses. *Journal of Archaeological Science* 41: 106–132.

Lo Schiavo, F. 2012. Gli Altri: Nuragici e Ciprioti a confronto. In *I Nuragici, i Fenici e gli Altri. Sardegna e Mediterraneo tra Bronzo Finale e Prima Età del Ferro. Atti del I Congresso Internazionale in occasione del venticinquennale del Museo "Genna Maria" di Villanovaforru 14–15 dicembre 2007*, ed. P. Bernardini and M. Perra. Sassari: Carlo Delfino Editore.

Lo Schiavo, F., A. Giumlia-mair, U. Sanna, and R. Valera, eds. 2005. *Archaeometallurgy in Sardinia, from the origin to the early iron age*, Monographies instrumentum 30. Montagnac: Éditions Monique Mergoil.

Manning, S. 1998. Aegean and Sardinian chronology: Radiocarbon, calibration, and Thera. In *Sardinian and Aegean chronology*, ed. M. Balmuth and R. Tykot, 297–307. Oxford: Oxbow Books.

Perra, M. 2009. Osservazioni sull'evoluzione sociale e politica in età nuragica. *Rivista di Scienze Preistoriche* 59: 355–368.

Perra, M. 2010. Nuraghi per mangiare, nuraghi per bere: l'alimentazione in età nuragica. In *Archeologia e Territorio*, *Atti della Tavola Rotonda* " *La vita quotidiana attraverso i materiali archeologici in età nuragica"*, Loceri, 26–27 settembre 2009, 57–70. Cagliari: Solter.

Perra, M. 2013. *Une Société en Mouvement : La Transformation du Paysage et la Construction de la Société Nuragique (Sardaigne) du XVIIe Siècle au VIIIe Siècle avant J.-C*. Villeneuve-d'Ascq: Atelier National de Reproduction des Thèses.

Ruiz-gálvez, M., ed. 2005. *Territorio nurágico y paisaje antiguo. La meseta de Pranemuru (Cerdeña) en la Edad del Bronce*. Madrid: Universidad Complutense de Madrid.

Trump, D. 1990. *Nuraghe Noeddos and the Bonu Ighinu Valley. Excavation and survey in Sardinia*. Oxford: Oxbow Books.

Tykot, R. 1994. Radiocarbon dating and absolute chronology in Sardinia and Corsica. In *Radiocarbon dating and Italian prehistory*, ed. R. Skeates and R. Whitehouse, 115–145. London: The British School at Rome and Accordia Research Centre.

Van Dommelen, P. 1998. *On colonial grounds. A comparative study of colonialism and rural settlement in first millennium BC West Central Sardinia*. Leiden: Faculty of Archaeology, University of Leiden.

Webster, G.S. 1996. *The archaeology of Nuragic Sardinia*. Sheffield: Sheffield Academic Press.

Webster, G.S. 2016. *The archaeology of Nuragic Sardinia*. London: Equinox.

Further Reading

Balmuth, M., ed. 1986. *Studies in Sardinian archaeology*. Vol. II. Ann Arbor: The University of Michigan Press.

Balmuth, M. 1992. Archaeology in Sardinia. *American Journal of Archaeology* 96: 663–697.

Balmuth, M., and R. Rowland, eds. 1984. *Studies in Sardinian archaeology*. Ann Arbor: The University of Michigan Press.

Contu, E. 1997. *La Sardegna preistorica e nuragica II: La Sardegna dei nuraghi*. Sassari: Chiarella.

Cossu, T., F. Campus, V. Leonelli, M. Perra, and M. Sanges, eds. 2003. *La vita nel Nuraghe Arrubiu*. Quartu S. Elena: Grafica del Parteolla.

Lo Schiavo, F., J.D. Muhly, R. Maddin, and A. Giumlia-Mair, eds. 2009. *Oxhide ingots in the Central Mediterranean*. Roma: CNR-Istituto di Studi sulle Civiltà dell'Egeo e del Vicino Oriente.

Lugliè, C., and R. Cicilloni, eds. 2009. *Atti della XLIV Riunione Scientifica: La Preistoria e la Protostoria della Sardegna. Cagliari, Barumini, Sassari 23–28 novembre 2009, Volume I – Relazioni generali*. Firenze: Istituto Italiano di Preistoria e Protostoria.

Mastino, A., P. Giorgio Spanu, A. Usai, and R. Zucca, eds. 2011. *Tharros Felix 4*. Roma: Carrocci Editore.

Michels, J., and G. Webster, eds. 1987. *Studies in Nuragic archaeology: Village excavations at Nuraghe Urpes and Nuraghe Toscono in West-Central Sardinia*. Oxford: British Archaeological Reports.

Perra, M. 2015. *Une société en mouvement: la transformation du paysage et la construction de la société nuragique (Sardaigne) du XVII siècle au VIII siècle*

avant J.-C. Lille: Atelier National de Reproduction des Thèses.
Rowland, R. 2001. *The periphery in the center: Sardinia in the ancient and medieval worlds*. Oxford: British Archaeological Reports.

Nzewunwa, Nwanna

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Basic Biographical Information

Information on this yet-to-be-celebrated archaeologist is surprisingly quite few. From the few articles about him gleaned for this work, it was observed that he was a field archaeologist. Nzewunwa believed, and rightly, that excavation and field surveys are the principal tools of archaeology (Nzewunwa 1983). Dr. Nzewunwa obtained a B.Sc. in African Archaeology and History from the University of Nigeria, Nsukka, in 1973 and went on to the University of Cambridge, England, for a Ph.D. He earned this Ph.D. in 1979; his thesis is titled "*Aspects of Economy and Culture in the Prehistory of the Niger Delta*."

Major Accomplishments

Nzewunwa was an accomplished field archaeologist. Beginning from the early 1970s, he successfully organized, both single-handed and jointly, archaeological excavations in Nigeria particularly in the Middle Niger Valley and in the Niger Delta areas (Nzewunwa 1980, 1983). He also participated in field research works in Britain, Denmark, France, and Germany. In 1981 he was appointed Chairman of a three-man task force committee by the Archaeological Association of Nigeria (AAN) to produce a brochure on tourism in Nigeria. It was while serving in this committee that he got the inspiration to produce an enduring material to serve as a guide to available archaeological sites at that time. In 1983, he published the book titled *A Sourcebook for Nigerian Archaeology*; this book is still unparalleled in Nigeria today.

After obtaining his Ph.D. degree, Dr. Nzewunwa served as a Junior Fellow at the University of Nigeria, Nsukka, and later became a lecturer at the University of Jos (Nzewunwa 1983). Perhaps on the invitation of one of Nigeria's legendary historian – Prof. E.J. Alagoa – he finally moved to the University of Port Harcourt as a Senior Lecturer. While in Port Harcourt, he had several joint projects with Profs. E.J. Alagoa, F.N Anozie (of blessed memory), and Mr. (now Prof.) Abi Derefaka. A major product of such collaboration is the 1987 book: *The Early History of the Niger Delta* jointly edited by E.J. Alagoa, F.N. Anozie, and N. Nzewunwa. He had in 1980 published the book *The Niger Delta: Its Prehistoric Economy and Culture*.

Dr. Nwanna Nzewunwa had about ten publications in journals, books, and chapters in books until his unfortunate and untimely death. His demise, which occurred at the prime of his career, was a rude shock to the AAN and NCMM. Although the exact date of his death could not be ascertained, the event would have occurred shortly after his last major publication in 1983.

N

Cross-References

► Anozie, Fred
► West Africa: Museums
► West and Central Africa: Historical Archaeology

References

Alagoa, E.J., F.N. Anozie, and N. Nzewunwa, eds. 1987. *The early history of the Niger Delta*. Hamburg/Port Harcourt: Helmut Buske Verlag.
Nzewunwa, N. 1980. *The Niger Delta: Its prehistoric economy and culture*. Oxford: Archaeopress.
Nzewunwa, N. 1983. *A sourcebook for Nigerian archaeology*. Lagos: Standard Printing and Publishing Co, Ltd.

Further Reading

Nzewunwa, N. 1981. Archaeological research in the Middle Niger valley of Nigeria, 1980. *Kiabara* 4 (2).

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O'Connor, Susan

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Basic Biographical Information

Professor Susan Lillian O'Connor gained her BA (Hons, 1st class) in archaeology from the University of New England in 1980 and her PhD from the University of Western Australia (UWA) in 1991. She worked as a lecturer and researcher at UWA until 1994 and joined the Australian National University (ANU) in the same year as Research Fellow in the Department of Prehistory, Research School of Pacific and Asian Studies, now the Department of Archaeology and Natural History. She was Head of Department between 2005 and 2012 and was promoted to Professor in 2008 and in 2012 was made an Australian Research Council (ARC) Laureate Fellow and Distinguished Professor at ANU.

Major Accomplishments

Sue's wide research interests include the archaeology of Australia and Southeast Asia, coastal and island archaeology, maritime colonizations of Island Southeast Asia and Australia and the links between these regions, interactions between humans and their environment, Southeast Asian rock art and rock art dating, the Neolithic transition in Southeast Asia, and technological change, innovation, and transmission theory. Sue is a dedicated fieldworker often working in remote locations under difficult conditions, e.g., in Arnhem Land, the Kimberley, Indonesia, Papua New Guinea, and Timor-Leste. She has a special interest in the archaeology of the Kimberley region that spans over 25 years from her PhD research, and she has continued to pursue active research in that region. Her thesis was entitled: *A Prehistory of the Islands of the Buccaneer Archipelago and Adjacent Mainland West Kimberley, Western Australia*, and concerns the nature of Pleistocene colonization and changes in occupation from the late Pleistocene through to the late Holocene (O'Connor 1999). In 1993 she was awarded an ARC grant to investigate the antiquity of occupation and cultural transformations in hunter-gatherer societies in the Oscar Napier Ranges. This project provided the first evidence of Indigenous occupation of the Kimberley region dating back over 40,000 years, as well as the earliest evidence for rock art production in Australia (O'Connor 1995; O'Connor and Fankhauser 2001). She has continued her research interests in Western Australia with ARC projects on the effect of catastrophic marine inundation events on the archaeological record of the Pilbara and Kimberley coastline with Anthony Barham and Stewart Fallon (ANU) (Barham and O'Connor 2007), on the lifeways of the first colonists in the

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Kimberley region with Jane Balme (UWA) and Moya Smith (Museum of Western Australia) (Balme and O'Connor 2014), and in nearby Arnhem Land in the Northern Territory, working on contact period sites with Daryl Wesley (formerly ANU, now Flinders University) (Wesley et al. 2016).

Sue has always worked closely with Indigenous communities and has undertaken an Australian Institute of Aboriginal and Torres Strait Islander Studies funded joint initiative with the Worrorra community to record rock art and assess the impact of cultural tourism on sites in their country in the coastal west Kimberley (O'Connor et al. 2008). Overseas, Sue has worked on projects in Indonesia, Papua New Guinea (PNG), and Timor-Leste and was one of the first archaeologists to work in Timor-Leste after its independence. Her reassessment of the Neolithic transition holds major implications for our understanding of cultural/technological transmission between PNG/Island Melanesia and Island Southeast Asia in the early-mid Holocene (O'Connor 2006). She has discovered and excavated high profile Pleistocene sites, including Jerimalai and Laili in Timor-Leste; at 42,000 and 45,000 years old, they are the earliest site occupied by modern humans in Island Southeast Asia and contain the oldest evidence for pelagic fishing in the world (Hawkins et al. 2017; Marwick et al. 2016; O'Connor 2007; O'Connor et al. 2011). Excavation of the Pleistocene site of Makpan on Alor Island in Indonesia uncovered the world's oldest known fishhooks placed in a burial ritual, dated to 12,000 years: http://chl.anu.edu.au/news-events/news/915/distinguished-professor-sue-oconnor-finds-worlds-oldest-funereal-fish-hooks.

Sue has always been open to collaboration with colleagues from a diverse range of disciplines leading to innovative research, reflected by her successful research grants and publications. She recently completed several ARC projects in Island Southeast Asia, on indigenous fortifications and climate change in East Timor with anthropologist Andrew McWilliam (formerly ANU, now Western Sydney University) (O'Connor et al. 2012), rethinking the interaction between culture and nature in the management of cultural heritage with Denis Byrne (then Office of Environment and Heritage, New South Wales Government, now Western Sydney University) (Brockwell et al. 2013), and in Sulawesi investigating modern human colonization across our region with Ben Marwick (University of Washington) and Emma St Pierre (University of Queensland) (Aplin et al. 2016). In 2012 she won the ARC's most distinguished award, a Laureate Fellowship, to research modern human dispersal and behavioral complexity from a Wallacean and Australian perspective. She has continued to pursue this theme as part of the team that in 2017 won the ARC Centre of Excellence for Biodiversity and Heritage, based at Wollongong University: https://epicaustralia.org.au/team/susan-oconnor/.

Sue has published over 100 articles and 5 books, including O'Connor (1999), O'Connor and Veth (2000), O'Connor et al. (2005), Fairbairn et al. (2009), and Brockwell et al. (2013). As well as her outstanding research and publication record, she has made numerous other contributions to archaeology, as a teacher, editor, reviewer, examiner, consultant, committee member, and tireless promoter of Australian archaeology, both here and internationally through conference organization, numerous presentations, and media interviews. She has an excellent record of graduate completions and her past students include a principal heritage advisor with Rio Tinto; a CEO with the Department of Foreign Affairs and Trade; a former advisor to the National Directorate of Culture in Timor-Leste, now employed by UNESCO in Afghanistan; and a number of academics who hold university positions at ANU and the Universities of Cambridge, Flinders, Griffith, Queensland, University of Technology Sydney, Washington, Wisconsin, and Wollongong. Her outstanding contributions to the discipline were recognized in 2007 when she was elected Fellow of the Australian Academy of the Humanities (FAHA) and the Society of Antiquaries of London (FSA). In 2009 her efforts were rewarded by ANU when she was awarded two Vice-Chancellor's awards for staff excellence and excellence in supervision and in 2012 when she was promoted to the ANU's highest level of professorship. In 2011 she

received the Rhys Jones Medal, the highest honor awarded by the Australian Archaeological Association.

References

Aplin, K., S. O'Connor, D. Bulbeck, P.J. Piper, B. Marwick, E. St Pierre, and F. Aziz. 2016. The Walandawe tradition from Southeast Sulawesi and osseous artifact traditions in Island Southeast Asia. In *Osseous projectile weaponry: Towards an understanding of pleistocene cultural variability*, Vertebrate Paleobiology and Paleoanthropology Series, ed. M.C. Langley, 189–208. Dordrecht: Springer.

Balme, J., and S. O'Connor. 2014. Early modern humans in Island Southeast Asia and Sahul: Adaptive and creative societies with simple lithic industries. In *East of Africa. Southern Asia, Australia and human origins*, ed. R. Dennell and M. Porr, 164–174. Cambridge, UK: Cambridge University Press.

Barham, A.J., and S. O'Connor. 2007. Archaeological site stratigraphies as geoarchives for testing models of tsunami periodicity in the Holocene – case studies from Western Australian shorelines. *Quaternary International* 24: 167–168 Supplement (July 2007).

Brockwell, S, S. O'Connor, D. Byrne. 2013. *Transcending the culture-nature divide in cultural heritage: Views from the Asia-Pacific region*. Terra Australis 37. Canberra: ANU E Press. (externally reviewed and accepted December 2011).

Fairbairn, A., S. O'Connor, and B. Marwick, eds. 2009. *New directions in archaeological science*, Terra Australis 28. Canberra: ANU E Press.

Hawkins, S., S. O'Connor, T. Maloney, et al. 2017. Oldest human occupation of Wallacea at Laili Cave, Timor-Leste, shows broad-spectrum foraging responses to late Pleistocene environments. *Quaternary Science Reviews* 171: 58–72.

Marwick, B., C. Clarkson, S. O'Connor, et al. 2016. Early modern human lithic technology from Jerimalai, East Timor. *Journal of Human Evolution* 101: 45–64.

O'Connor, S. 1995. Carpenter's Gap Rockshelter 1: 40,000 years of aboriginal occupation in the Napier Ranges, Kimberley, W.A. *Australian Archaeology* 40: 58–60.

O'Connor, S. 1999. *30,000 years of aboriginal occupation in the Kimberley, Northwest Australia*, Terra Australis 14. Canberra: RSPAS, Australian National University, Archaeology and Natural History and Centre for Archaeological Research Publications.

O'Connor, S. 2006. Unpacking the island Southeast Asian neolithic cultural package, and finding local complexity. In *Uncovering Southeast Asia's past – selected papers from the tenth biennial conference of the European Association of Southeast Asian Archaeologists, The British Museum, London 14th–17th September 2004*, ed. E.A. Bacus, I.C. Glover, and V.C. Pigott, 74–87. Singapore: NUS Press.

O'Connor, S. 2007. New evidence from East Timor contributes to our understanding of earliest modern human colonization east of the Sunda Shelf. *Antiquity* 81: 523–535.

O'Connor, S., and B. Fankhauser. 2001. Art at 40,000 BP? One step closer, an ochre covered rock from Carpenter's Gap Shelter 1, Kimberley region, W.A. In *Histories of old ages: Essays in honour of Rhys Jones*, ed. A. Anderson, I. Lilley, and S. O'Connor, 287–300. Canberra: Pandanus Books.

O'Connor, S., and P. Veth, eds. 2000. *East of Wallace's line: Studies of past and present maritime cultures of the Indo-Pacific region*. Rotterdam: A. A. Balkema.

O'Connor, S., M. Spriggs, and P. Veth, eds. 2005. *The archaeology of the Aru Islands, Eastern Indonesia*. Canberra: Pandanus Books.

O'Connor, S., A.J. Barham, and D. Woolagoodja. 2008. Painting and repainting in the West Kimberley. *Australian Aboriginal Studies* 1: 22–38.

O'Connor, S., R. Ono, and C. Clarkson. 2011. Pelagic fishing at 42,000 BP and the maritime skills of modern humans. *Science* 334: 117–1121.

O'Connor, S., A. Mcwilliam, J.N. Fenner, and S. Brockwell. 2012. Examining the origin of fortifications in East Timor: Social and environmental factors. *Journal of Island and Coastal Archaeology* 7: 200–218.

Wesley, D., S. O'Connor, and J. Fenner. 2016. Re-evaluating the timing of the Indonesian trepang industry in north-west Arnhem Land: Chronological investigations at Malara (Anuru Bay A). *Archaeology in Oceania* 51 (3): 169–195.

Oceania: Historical Archaeology

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Introduction

Oceania is a vast region containing many thousands of islands that entered the modern world along a diverse range of trajectories over a period of about four centuries. Only a small proportion of these islands have seen archaeological investigations focused on this period. Where it has occurred, this research has generally concentrated on either the recent past of indigenous oceanic societies or on those of new settler communities,

with a small number of studies exploring the middle ground of new social and community identities forged through the engagement of these two worlds.

Definition

Oceania is centered on the tropical and subtropical islands of the Pacific Ocean. Precise definitions of its boundaries vary, but the term is used here to encompass the islands of Melanesia, Micronesia, and Polynesia (Fig. 1). Prehistoric human settlement had begun by c. 40 kya in the west but did not reach the southern margins of Polynesia until the thirteenth century CE. European encounters with Oceania began in 1521 with the Spanish in Guam and 4 years later the Portuguese in Yap. Following the establishment of a Spanish colony in the Philippines to the west of Oceania in 1565, regular passage of Manila galleons between there and Mexico led to sporadic encounters throughout northern parts of Oceania, which were extended southward by Spanish and Dutch explorers during the seventeenth century. However, the vast majority of oceanic islands were first encountered between the mid-eighteenth and late nineteenth centuries by ships from Britain, along with smaller numbers from America, France, and Russia. Most initial encounters arose through exploratory voyages, and seldom involved sustained contact. With only a few exceptions, more lasting engagements arose only after whalers, traders, missionaries, and purposeful colonists began to frequent the Pacific beginning in the last two decades of the eighteenth century; prior to this, there were only six attempts to establish European settlement, and all but one of these failed rapidly. The timing and nature of encounters between the Oceanian and Western worlds varied significantly between islands, providing immense potential for archaeological study.

The practice of historical archaeology is very unevenly distributed throughout Oceania. It is most strongly developed in New Zealand where it began in the 1920s and flourished after the

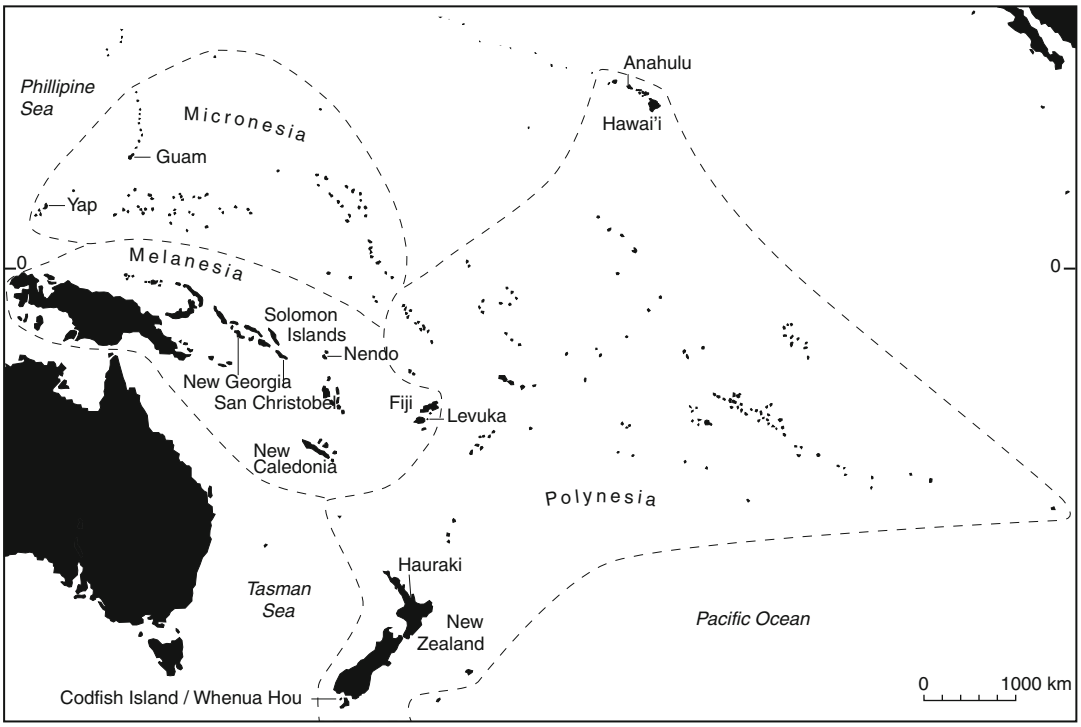

Oceania: Historical Archaeology, Fig. 1 Oceania, showing places mentioned in text

1960s (Smith 1991), although in recent decades it has been dominated by development-driven consultancy archaeology with its attendant lack of full publication (Smith 2004). In Hawaii, historical archaeology also emerged in the 1960s (Kirch 1985: 303–318) but, with some notable exceptions, has seldom been reported in published sources. Elsewhere activity has been sporadic with clusters of published work from the Solomon Islands, New Caledonia, and Fiji and more limited examples from ten further islands or island groups.

Examples

Archaeologies of Colonial Settlement

In 1595 four Spanish ships set out from Peru with the intention of establishing a colony in the Solomon Islands, discovered in 1568 by their leader Alvaro de Mendana y Neyra. Three of these ships made landfall at Graciosa Bay on Nendo Island, in the Santa Cruz group, establishing a settlement that lasted for less than 2 months before internal tensions, disease, and conflict with locals led to its abandonment. Archaeological investigations in 1970 (Allen 1976) located the settlement which disclosed a defensive ditch, a house floor, and small quantities of Spanish colonial pottery, probably from South or Central America (Gibbs 2011). Near-identical pottery was recovered from two sites at Pamua on San Cristobal Island (Fig. 2) which have been convincingly linked to an historically unrecorded settlement by people from the fourth ship in Mendana's expedition. The quantity and diversity of pottery at these sites suggest that their occupation was of slightly longer duration than on Nendo, but they too were soon abandoned. In this case at least, the impact of colonial settlement on the indigenous people and their environment was minimal.

The only permanent colonial settlement established before the late eighteenth century was founded at Agaña on the island of Guam in 1668. It incorporated both a Jesuit mission and a military presence, and provided a reprovisioning base for Manila-bound galleons on their outward journey from Mexico. Archaeological investigations of the colonial period have been limited, the most significant being excavations on the site of

Oceania: Historical Archaeology, Fig. 2 Ceramic sherds from Pamua and Graciosa, Solomon Islands. (From Gibbs 2011, published with permission of Society for Historical Archaeology)

the Spanish Governor's palace (1744–1898) which was subsequently the seat of American colonial rule then Japanese military government before destruction by bombing in 1944 (Scheutz 2007). This disclosed a ceramic assemblage dominated by oriental, particularly Chinese, wares, with only a handful of sherds attributable to New Spain and none to the Spanish homeland, demonstrating that pottery was not a significant component of the cargoes on the outward journeys of the Manila galleon trade. It also reflects the vibrant East Asian trading network centered on the Philippines since long before Spanish arrival, which was one of the main stimuli for establishment of their colonial presence (Skowronek 2009).

More typical of colonial settlement histories throughout Oceania is Fiji, where European settlement did not begin until the early nineteenth century. Burley's (2003) preliminary analysis of the archaeological record in the town of Levuka charts its emergence as a settlement of European and American beachcombers and their Fijian wives in the 1820s and 1830s, transforming into the major commercial port of call in the island group during the 1860s and its colonial capital in the 1870s, before slowly waning after the 1880s. He highlights the role of imported material goods in maintaining a sense of Europeaness within the settler community but also signifying increasing social differentiation within it.

The most substantial archaeological record of colonial settlement derives from New Zealand, where it has been integrated with the well-established prehistoric record into a long-term culture historic sequence (Smith 2008). The Maori period, covering 500 years of indigenous occupation, is followed by the Pakeha period (1792–1860) during which European immigrants were outnumbered by Maori and constrained in their geographic distribution and the Kiwi period (1860–present) when the immigrant population had numerical, military, political, and economic ascendency. First European contacts took place toward the end of the Maori period, beginning with Dutch exploration in 1642 and resuming again with British and French presence in the two decades from 1769. This was exclusively coastal exploration that left minimal trace in the archaeological record, confined largely to incorporation of the narrow range of metal and glass items initially adopted by indigenous Maori.

The Pakeha period commenced in 1792 with the onset of European settlement. For the first two decades, immigrants were sojourners who spent short periods in residence on New Zealand shores before departing again. The most important group of sojourners was sealers, mostly operating out of Australia, harvesting fur seal skins for Chinese and British markets. Archaeological sites associated with this industry include caves and hut sites that have yielded sparse artifact assemblages (Fig. 3) along with faunal remains dominated by indigenous species, making it difficult to distinguish the archaeological signature of European sojourners from that of contemporary Maori. Permanent European settlement began with the establishment of the first mission station in 1814, followed by another four missions before the end of the 1820s. Archaeological investigation of these earliest permanent settlements has been limited to date, but thorough investigation of a slightly later mission has shown that they operated as small family farming enterprises. European presence was initially confined to the northern and southern ends of New Zealand but expanded geographically in the 1830s with development of the shore-whaling industry. A key feature of the archaeological record of this industry is its diversity, with housing, artifacts, and fauna at some sites almost exclusively European in character while other exhibit distinctive Maori features (Fig. 4). Formal towns were first established in 1840, coincident with the beginnings of British colonial governance of New Zealand, a burgeoning immigrant population and a shift in economic focus from maritime extractive industries toward pastoral farming.

The archaeological record of the first four decades of the Kiwi period is characterized by the emergence of new economic pursuits, evidence of military conflict, and the growth of urbanized settlements. The discovery of gold in 1861 sparked a series of rushes that heightened the pace of immigration and transformed the mid-nineteenth-century economy. This industry was the largest single contributor to the making of

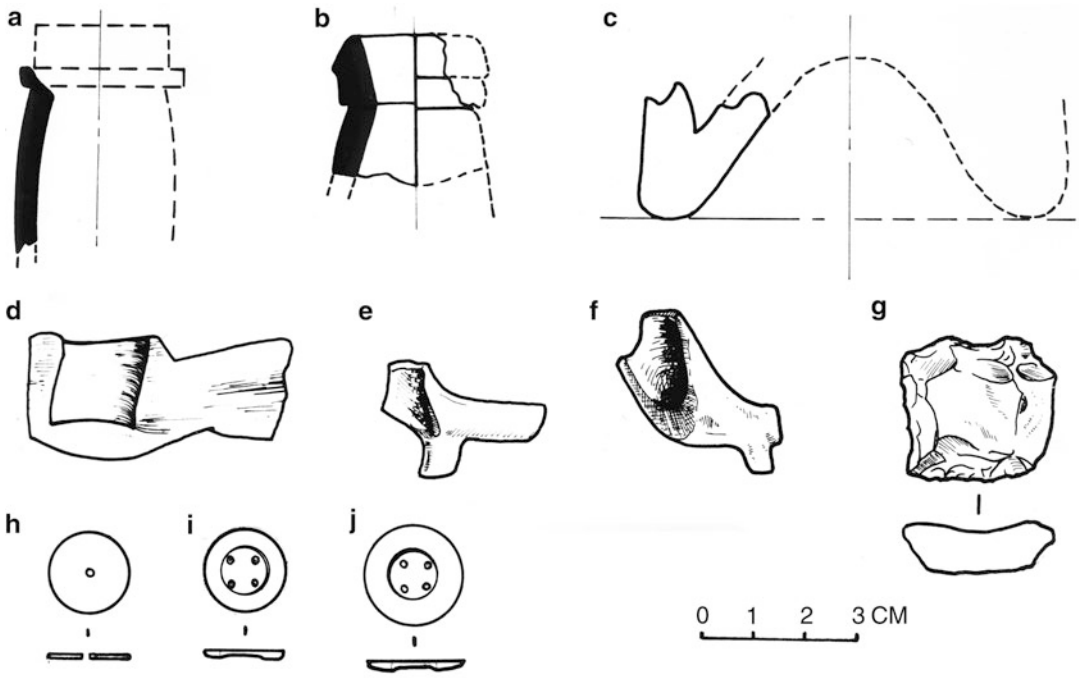

Oceania: Historical Archaeology, Fig. 3 Selected artifacts from occupation by sealers in the Southport caves, Fiordland, New Zealand: *a–c* – glass bottle fragments; *d–f* – pipe fragments of wood (*d*) and clay (*e*, *f*); *g* – gun flint; *h–j* – bone buttons

New Zealand's archaeological landscape in terms of the acreage of land covered by sites. It brought settlement to parts of the interior that had previously seen only transient Maori occupation, and left an archaeological record of both fleeting camps and permanent towns. Among the new migrants were Chinese miners whose ceramics, food containers, opium-smoking paraphernalia, and food preparation methods have all left a distinctive trace in the archaeological record.

Rising immigrant demands for land and heightening Maori resistance to its loss gave rise to a series of wars between various *iwi* (tribes) and changing combinations of British, colonial, and Maori forces. This stimulated two decades of fort building throughout central regions of the North Island and led to massive alienation of land that displaced many Maori communities and disrupted their economic activities. Archaeological investigations have demonstrated innovations in both the technology and strategy of warfare by both colonial and indigenous forces. The urban settlements that developed in the latter half of the nineteenth century have been the main focus of recent archaeological investigations of colonial settlement in New Zealand, but as yet are poorly published.

Archaeologies of Indigenous Cultural Transformation

While many earlier archaeological studies of prehistoric societies in Oceania ended at the point of European arrival, it has become increasingly common for them to explore the ways in which these societies encountered the modern world. These disclose considerable diversity in trajectories of change while at the same time highlighting indigenous agency in these processes. On New Georgia, Solomon Islands, Roviana head-hunting chiefdoms had little direct contact with the outside world until the mid-nineteenth century when trade with Europeans was commenced on terms strongly controlled by Rovianans. Archaeologically, there is little evidence of externally influenced cultural change beyond the appearance of a select range of European-manufactured items

Oceania: Historical Archaeology, Fig. 4 House from Te Hoe whaling station, Mahia Peninsula, New Zealand. The shape and dimensions of the house, its shallow porch, and scoop hearths are typically of pre-European Maori dwellings, while the vertical wooden slab construction and stone chimney are features common in houses of European whalers

on ancestor shrines (Fig. 5), but even these were incorporated into indigenous constructions of personhood (Walter et al. 2004).

While some earlier studies of culture contact in New Zealand posited rapid, widespread, and cataclysmic changes in Maori culture consequent upon European arrival, recent investigations have identified regional variations in the timing and nature of cultural borrowings and demonstrated the persistence of traditional cultural forms. Unsurprisingly the earliest adoptions are at the northern and southern ends of the country, which saw initial sustained European contact, while it was almost a century before European artifacts were common in Maori archaeological contexts from more remote localities (Coutts 1969; Phillips 2000). Irrespective of timing, there is clear evidence of selectivity in Maori adoptions of imported artifacts, plants, and animals.

Phillips' (2000) detailed study covering four centuries of pre- and post-contact Maori settlement in the Hauraki region shows that there were significant changes in settlement pattern, economy, and technology during the first four decades of the nineteenth century but that these were driven almost entirely by intertribal warfare. Although European muskets were utilized, this was essentially traditional warfare conducted for traditional reasons and similar to events that had taken place in earlier times. She characterizes this period as "a dynamic one in which Maori

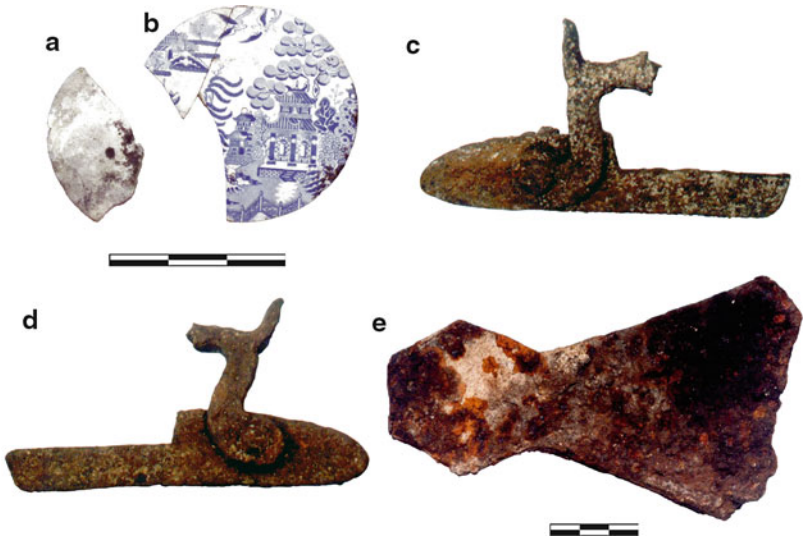

Oceania: Historical Archaeology, Fig. 5 Historic period artifacts from ancestor shrine platforms, Nusa Roviana, Solomon Islands: *a* –fragment of Tridacna shell back plate for *kapkap* forehead ornament. A circular lattice of tortoise shell would sit over this in a complete specimen; *b* – transfer printed plate ground and drilled for back plate of *kapkap* ornament; *c*, *d* – hammer mechanisms from double barrel percussion cap shotgun; *e* – iron axe head, used as tomahawk. (Courtesy of Tim Thomas, University of Otago)

responses were principally to other Maori. European goods were used to Maori ends" (Phillips 2000: 168). In the 1840s–1850s, Hauraki Maori encouraged European trade in order to increase their access to imported goods which, along with the influence of missionaries, brought greater changes. However, depopulation through epidemic diseases and, later, alienation of land were equally important factors in transformation of the indigenous world.

In Hawaii, Kirch and Sahlin's (1992) study of the Anahulu Valley on O'ahu provides perhaps the most comprehensive archaeological and ethnohistorical analysis of change within an oceanic community as it emerged into the modern world. The initial drivers of changes in settlement pattern, economy, and political organization were indigenous. Following conquest of O'ahu in 1804 during unification of the Hawaiian islands by Kamehameha I, the Anahulu valley, previously only sparsely used, became a well-populated center of agricultural intensification directed toward supplying tribute to the chiefs. At the same time, Hawaii was visited regularly by fur traders, and merchants focused on acquiring sandalwood. Interactions with these visitors were largely controlled by the chiefly class, limiting their impact on the wider community. The archaeological record from Anahulu shows that household clusters established during the first three decades of the nineteenth century conformed to the traditional pattern of a series of functionally specialized structures; with only a limited range and quantity of imported material items, many reworked for traditional purposes.

After 1830 the burgeoning Pacific whaling fleet began to frequent Hawaii, missionary activity expanded, and sugar cane plantations and cattle and sheep ranches were established, expanding connections with the wider world and increasing the pace of indigenous cultural change. Several studies have noted that while some cultural items, such as clothing, changed rapidly, others such as stone adzes remained in use for about a century after contact, indicating complexity in the processes of change (Bayman 2009).

Archaeologies of the Middle Ground

Several recent studies have examined the emergence of communities or social identities that are

neither purely indigenous nor nonindigenous. For example, the Sealers Bay community (1825–1850) on Codfish Island/Whenua Hou, New Zealand, was made up of Maori women, their partners from a diverse range of nations, and their offspring. These hybrid origins are reflected today in its legally sanctioned dual nomenclature, and apparent also in the archaeological record which shows traditional Maori earth ovens alongside European-style housing, and a material culture inventory (Fig. 6) drawn from New Zealand, Australia, and elsewhere in the Western world (Smith 2008).

Bayman (2010) has examined two individuals who played important roles in early cultural exchanges in Hawaii: John Young, a British-born sailor left behind by his ship in 1790 who lived there till his death in 1835, and Kauikeaouli who ruled as King Kamehameha III from 1824 to 1854. Young became an advisor to Kamehameha I during his unification of the kingdom, served from 1802 to 1812 as his governor of the island of Hawaii, and twice married indigenous women. Archaeological investigation of his residence disclosed a combination of Western-style and traditional Hawaiian structures and a similar

Oceania: Historical Archaeology, Fig. 6 Selected artifacts from early-nineteenth-century settlement at Sealers Bay, Codfish Island/Whenua Hou, New Zealand.: *a* – bone fishhook point; *b* – obsidian flake; *c* – chalcedony flake; *d* – fragment from argillite adze; *e–g* – bone buttons; *h* – brass watch hand; *i* – rim sherd of coarse earthenware; *j* – rim sherds of shell-edged whiteware; *k* – clay pipe manufactured by William White Glasgow; *l* – clay pipe manufactured by Joseph Elliot, Sydney

combination of artifacts. Kauikeaouli also combined Hawaiian and non-Hawaiian elements in his residences, and the artifact assemblage from one of these included numerous British, Chinese, and Japanese ceramics which, in contrast to those in sites of commoners, had not been reworked for traditional purposes. Bayman uses these two figures to emphasize the importance of exchange in the construction of the hybrid social identities during early contact in oceanic societies.

In New Caledonia, where the beginnings of historical archaeology are coinciding with the transition to independence after more than a century and a half of French colonial rule, archaeology is informing and enhancing Kanak (indigenous), Caldoche (locally born immigrant), and emerging collective identities. Excavations at penal colony sites have revealed Kanak presence in the convict administration and emphasized convict influence in Kanak clans. Kanak, Caldoche, Asian, and Polynesian school children participating in an ongoing program of excavations perceive the diverse remains they encounter as "just 'one'; the story of their nation under construction" (Sand et al. 2006: 158).

Future Directions

The vast majority of islands in Oceania are completely unexplored by historical archaeologists. Where work has been undertaken, it has disclosed both significant differences and shared themes in trajectories of change as Oceania engaged with the modern world and has highlighted the importance of this "sea of islands" as a laboratory for comparative studies of cultural change. New investigations commencing on missionization in Vanuatu will provide the first evidence of the impact of this process beyond New Zealand and Hawaii. Among other avenues ripe for exploration are comparative studies of the nineteenth-century beachcomber settlements that emerged in many of the ports frequented by trading and whaling ships, and the cultural influences of the numerous groups of indentured laborers who were transported within and into Oceania.

Cross-References

- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Colonial Encounters, Archaeology of
- ▶ Missionization and Mission Archaeology in New Zealand and Australia
- ▶ Pacific Ocean: Maritime Archaeology

References

Allen, J. 1976. New light on the Spanish settlement of the southeast Solomons: An archaeological approach. In *Southeast Solomon Islands culture history. A preliminary survey.* Royal Society of New Zealand Bulletin 11, ed. R.C. Green and M.M. Creswell, 19–29. Wellington: Royal Society of New Zealand.

Bayman, J.M. 2009. Technological change and the archaeology of emergent colonialism in the kingdom of Hawai'i. *International Journal of Historical Archaeology* 13: 127–157.

Bayman, J.M. 2010. The precarious "middle ground": Exchange and reconfiguration of social identity in the Hawaiian kingdom. In *Trade and exchange: Archaeological studies from history and prehistory*, ed. C.-D. Dillian and C.L. White, 129–148. New York: Springer.

Burley, D.V. 2003. Toward the historical archaeology of Levuka, a South Pacific port of call. *International Journal of Historical Archaeology* 7: 243–265.

Coutts, P.J.F. 1969. Merger or takeover: A survey of the effects of contact between European and Maori in the Foveaux Strait region. *Journal of the Polynesian Society* 78: 493–516.

Gibbs, M. 2011. Beyond the New World – Exploring the failed Spanish colonies of the Solomon Islands. In *Historical archaeology and the importance of material things II.* Society for Historical Archaeology Special Publication 9, ed. J.M. Schablitsky and M.P. Leone, 143–166. Rockville: Society for Historical Archaeology.

Kirch, P.V. 1985. *Feathered gods and fishhooks: An introduction to Hawaiian archaeology and prehistory.* Honolulu: University of Hawaii Press.

Kirch, P.V., and M. Sahlins. 1992. *Anahulu: The anthropology of history in the kingdom of Hawai'i*. Chicago: University of Chicago Press.

Phillips, C. 2000. *Waihou journeys. The archaeology of 400 years of Maori settlement*. Auckland: Auckland University Press.

Sand, C., J. Bole, and A. Ouetcho. 2006. Historical archaeology in island Melanesia: First research on the convict settlements of New Caledonia. *New Zealand Journal of Archaeology* 27: 145–161.

Scheutz, M.K. 2007. *The archaeology of the governor's palace: Plaza de Espana, Agaña, Guam*. Mangilao: Micronesian Area Research Center, University of Guam.

Skowronek, R.K. 2009. On the fringes of New Spain: The northern borderlands and the Pacific. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 471–505. New York: Springer.

Smith, I.W.G. 1991. Development of historical archaeology in New Zealand 1921–1990. *Australian Journal of Historical Archaeology* 9: 6–13.

Smith, I.W.G. 2004. Archaeologies of identity: Historical archaeology for the 21st century. In *Change through time: 50 years of New Zealand archaeology.* New Zealand Archaeological Oceania Association Monograph 26, ed. L. Furey and S.J. Holdaway, 251–262. Auckland: New Zealand Archaeological Association.

Smith, I.W.G. 2008. Maori, Pakeha and Kiwi: Peoples, cultures and sequence in New Zealand archaeology. In *Islands of inquiry: Colonisation, seafaring and the archaeology of maritime landscapes*, ed. G.R. Clark, B.F. Leach, and S. O'Connor, 367–380. Canberra: ANU E Press.

Walter, R.K., T. Thomas, and P.J. Sheppard. 2004. Cult assemblages and ritual practice in Roviana lagoon, Solomon Islands. *World Archaeology* 36: 142–157.

Ogundiran, Akinwumi

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Prolific writer, Professor Akinwumi Ogundiran is from Ibadan, southwestern Nigeria. Ogundiran who has been the chair of the Department of Africana Studies, University of North Carolina, at Charlotte since 2008 had his first degree, a Bachelor of Arts in Archaeology, from the Obafemi Awolowo University, Ile-Ife, Nigeria, in 1988. He bagged a first class honors, a feat that fetched him the Ajayi Fabunmi prize for the best graduating student in archaeology that year at the institution.

He had his master's at the Department of Archaeology and Anthropology, University of Ibadan, in 1991 and completed a doctoral degree program in Studies in African Archaeology at Boston University in the year 2000. Before securing his doctoral degree, Akin Ogundiran briefly worked as a graduate assistant at the Bendel (now Edo) State University, Ekpoma, and as assistant lecturer at the Delta State University and the University of Benin, all in Nigeria.

Major Accomplishments

Akin Ogundiran is a transdisciplinary scholar of Africana Studies. He privilege archaeological anthropology, material science, and historical methods for investigating the multi-scalar networks that framed community and household lives as well as cultural formation in spaces of social complexity. The geographies of his research interest are Africa and the African Diaspora with emphasis on the Yoruba world, especially from 800 A.D. to the present.

Ogundiran has contributed immensely to archaeology through his extensive research on the archaeology of Yorubaland, 1200–1900, and the African Diaspora. For example, the article titled "Material Life and Domestic Economy in a Frontier of the Oyo Empire During the Mid-Atlantic Age" published in the *International Journal of Historical Studies* in 2009 (Ogundiran 2009) addresses how the domestic economy of a hinterland Atlantic African community responded to the commercial revolutions in the Atlantic world. Between 1997 and 2000, he directed the Eka Osun project which focused on historical landscape, social memory, and regional interactions in Ilare District, Nigeria (1200–1900 CE). The result is a series of journal articles and a monograph titled "Archaeology and History in Ilare District (Central Yorubaland, Nigeria) 1200–1900" (Ogundiran 2002).

His recent programs have focused on the emergent qualities of social complexity, sacred groves and landscape studies, material experiences of ritual, and cultural political economies of empire formation of the early modern period. Professor Akinwumi Ogundiran has created novel ways for interpreting and conceptualizing material culture in the cultural history and archaeology of West Africa. For instance, in "The Making of an Internal Frontier Settlement: Archaeology and Historical Process in

Osun Grove (Nigeria), Seventeenth to Eighteenth Centuries" published in *African Archaeological Review* in 2014, Ogundiran used different data sets including the spatial layout of the site, the archaeological depositional sequence, diverse artifact categories, and oral historical sources to engage Igor Kopytoff's conceptualization of the frontier as a conservative space that relied on innovations from the metropolis.

Ogundiran is the editor of *Pre-colonial Nigeria* (Ogundiran 2005) and co-editor with Toyin Falola of *Archaeology in Atlantic Africa and the African Diaspora* (Ogundiran and Falola 2007), with Cameron Munroe of *Power and Landscape in Atlantic West Africa* (Monroe and Ogundiran 2012), and with Paula Saunders of *Materialities of Rituals of the Black Atlantic* (Ogundiran and Saunders 2014).

The scholar is a member of several editorial boards of journals around the world particularly those with special interest on African Archaeology; among these are the *African Archaeological Review*, *Journal of African Diaspora Archaeology and Heritage*, and *Azania*. He is also on the editorial board of *Journal of African Military History*, *International Journal of Philosophy and Public Affairs* as well as *African Histories and Modernities*. He is a founding co-editor of *Yoruba Studies Review.*

In the same vein, Akin Ogundiran's research has enjoyed funding from several notable funding bodies with the latest being awarded the Alfred Yip Fellow, Magdalene College, University of Cambridge in 2017. Other organizations that have identified his research include Wenner-Gren Foundation for Anthropological Research, National Endowment for the Humanities and Dumbarton Oaks, and Boston University Humanities Foundation.

The list of his publication outlets is as wide as his awards as a renowned archaeologist. His awards include the University of Texas at Austin Africanist Award for Research Excellence and the UNC Charlotte Center for Academic Excellence Teaching Award in 2011. In 2007, the United States House of Representatives gave him a special recognition certificate for Excellence in Community Service.

References

Ogundiran, A.O. 2014. The making of an internal frontier settlement: Archaeology and historical process in Osun Grove (Nigeria) seventeenth to eighteenth centuries. *African Archaeological Review.*

Ogundiran, A.O. and P. Saunders. 2014. Materialities of rituals of the black Atlantic.

Okladnikov, Alexey P.

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Basic Biographical Information

Alexey Pavlovich Okladnikov (1908–1981) was a Soviet archaeologist and historian who specialized in human prehistory, archaeology, and ethnography of Siberia, the Russian Far East, and Northern, Central, and Eastern Asia. He was born in Konstantinovshchina village of the Irkutsk Governorate in Siberia and was educated at the Irkutsk Pedagogical College before going to the Irkutsk State Pedagogical Institute to become one of the prominent Soviet historians who founded the Siberian school of archaeology.

In 1927 he joined the Irkutsk Museum as Head of Division, remaining there until 1934, when he left to study in the State Academy of the History of Material Culture in Leningrad as a postgraduate student. He continued to work there as a senior researcher until 1949. In 1947 he received his doctorate degree. In 1949–1950 he was the deputy director and head of the Leningrad Division of the Institute of the History of Material Culture. In 1951–1961 he was the head of the Department of Paleolithic in the Leningrad Division of the Institute of Archaeology. He joined the Siberian Branch of the USSR Academy of Sciences in 1961, working as head of the division of Human Research and Deputy Director of the Economics Institute until 1966. In 1962 he became professor

and head of the Department of History at the Novosibirsk State University.

In 1964 he became a corresponding member of the USSR Academy of Sciences. In 1965–1981, A. P. Okladnikov was a member of the Presidium of the Siberian Branch of the USSR Academy of Sciences. He was a founder and director of the Institute of History, Philology and Philosophy of the Siberian Branch of the USSR Academy of Sciences (1966–1981). From 1968 he was the executive editor of the journal *Izvestiya SO AN SSSR. Seriya obshchestvennykh nauk* (*Proceedings of Siberian Branch of the USSR Academy of Sciences. Series of Social Sciences)*. He was elected as a full member of the USSR Academy of Sciences (1968), a Corresponding Fellow of British Academy (1973), a foreign member of Mongolian Academy of Sciences (1974), a foreign member of Hungarian Academy of Sciences (1976), and an honorable doctor of sciences in the University of Poznań, Poland (1978). He was also a co-chairperson of the Soviet-Hungarian Committee of Historians.

A. P. Okladnikov was awarded with state prizes and the highest decorations of the USSR and foreign countries as well. His memory is perpetuated with a memorial plaque mounted on the building of the Institute of Archaeology and Ethnography SB RAS in Novosibirsk, and one of the caves in the Altai Mountains and an auditorium at the Novosibirsk State University were named after him. The Okladnikov prize was introduced for young scientists, and the scholarship in his name was established for students of the Novosibirsk State University.

Major Accomplishments

A. P. Okladnikov substantially contributed to the interpretation of human origins, as well as the early peopling of Northern Asia and America. He was the first to discover numerous sites dating back to the Paleolithic, Neolithic, and Bronze Ages in Siberia and the Russian Far East, including the first Neanderthal remains ever found in the territory of the USSR (1938, Teshik-Tash Cave in Uzbekistan). He discovered and explored the main areas of petroglyphs found to vary in styles and ages, dating from the Paleolithic to the medieval times. He was recognized as the leading authority on the prehistoric rock art. He directed the Soviet-Mongolian archaeological expedition (1960) and the Soviet-American Siberian Expedition in Alaska (1975). *The History of Siberia* was the first summary edition on the history of the eastern regions of Russia, published in five volumes under his editorial guidance.

Cross-References

► Northern and Central Asia: Culture During the Lower Paleolithic Era
► Siberia: Paleolithic

Further Reading

Okladnikov, A.P. 1949. Proshloyie Yakutii do prisoedineniya k Russkomu gosudarstvu. Yakutsk.
Okladnikov, A.P. 1966. Petroglify Angary. Moscow.
Okladnikov, A.P. 1967. Utro iskusstva. Leningrad.
Okladnikov, A.P. 1971. Petroglify Nizhnego Amura. Leningrad.
Okladnikov, A.P. 1979. Otkrytie Sibiri. Moscow.
Okladnikov, A.P. 1980. Petroglify Tsentralnoi Azii: Khobod-Somon (gora Tebsh). Leningrad.
Okladnikov, A.P. 1982. *Art of the Amur: ancient art of the Russian Far East*. New York: Harry N. Abrams Incorporated.

Oldowan Industrial Complex

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Introduction

The earliest traces of hominid cultural behavior are 149 stone tools dating to 3.3 Ma in Kenya at a site called Lomekwi 3 (Harmand et al. 2015). Large, heavy cobbles and blocks of lava were

used for cores, with 86% showing they had been worked between a hammerstone and a rock anvil (the bipolar technique) or struck against an anvil resting on the ground (the passive hammer technique). The flaking was poorly controlled, as some cores have repeated impact marks far from the edge and scars for removals often end in a step or a hinge. Because this small assemblage is characterized by percussive actions rather than skillful flaking, it has been called the Lomekwian industry and is considered to represent the dawn of lithic technology. For many years prior to this exciting discovery, researchers believed that rocks used in percussive activities must be the way in which early hominids realized that stone could be flaked to produce sharp-edged flakes – particularly because some modern African apes and even some South American monkeys use stone to break open nuts. Even earlier than 3.3 Ma, however, tools in perishable materials were certainly used and modified by ancestral hominids, because there are many such examples used by nonhuman primates. For example, chimpanzees use a variety of items as tools: leaves as sponges for water extraction and for hygiene, twigs and stems to extract termites from their mounds, hammers and anvils in both stone and wood to break open nuts, sticks to extract honey from beehives, and, most dramatically, sticks sharpened with their teeth to kill bush babies in their sleeping holes in trees. There are also recorded examples of proper toolkits that involve sticks of different thickness and strength taken to a site for extracting food, such as termites. Chimps are observed to deepen the hole in the crown of oil palm trees and use a frond as a pestle to pound and mash up the apical bud of the tree for food. Orangutans also are observed using sticks to extract fruit from its casing, and gorillas have been seen to use a stick to probe the depth of water (for a review, see Haslam et al. (2009) in Further Reading).

Some 700,000 years following the Lomekwian, the Oldowan industrial complex begins, with artifacts consisting of simple cores and flakes. The earliest Oldowan site is Ledi-Geraru in Ethiopia, dating to between 2.61 and 2.58 Ma (Braun et al. 2019). This is followed by three sites at Gona, also in Ethiopia, dating to 2.58 and 2.55 Ma (Semaw et al. 1997; Semaw 2000; Semaw et al. 2009). The knowledge of how to select appropriate raw materials and how to flake cores effectively to produce sharp-edged flakes is evident at all of these earliest Oldowan sites. We know enough today about Oldowan technology to engage in substantive debates about flaking skills, as there are more than 30 sites where the Oldowan is well documented in Africa. The overwhelming majority is found in East Africa where many assemblages, large and small, are known in Ethiopia, Kenya, and Tanzania (Gallotti 2018; Toth and Schick 2018). Four Oldowan sites are known in South Africa, with numbers of artifacts ranging from two or three at Kromdraai B to 30 at Wonderwerk Cave (Chazan et al. 2008), to over 1800 at Swartkrans (Kuman et al. 2018), and to 3500 at Sterkfontein (Kuman and Field 2009). Oldowan sites are also known in Algeria, at Ain Hanech, El-Kherba, and Ain Boucherit (Sahnouni et al. 2002, 2018). In the central African DRC, one assemblage in disturbed context is reported. Thus despite the limited occurrence of sites outside of East Africa due to constraints of geological preservation or little research, the distribution of Oldowan assemblages shows that this earliest technology was a widespread African phenomenon.

Definition

The Oldowan is defined as an early form of lithic technology that consists mainly of flaked cobbles (called cores) and the flakes struck from these cores, which were used largely in various cutting tasks suitable to their sharp edges. Glynn Isaac, a leading East African archaeologist, accurately assessed Oldowan technology as a "least effort solution" to the subsistence needs of early hominids. Most archaeologists believe that Oldowan flakes were used initially to cut meat, probably from carcasses scavenged or wrested from carnivore kills on the landscape, but soon their use was extended to other subsistence activities. This cultural tradition first appeared in Africa ca. 2.6 Ma and persisted until 1.7 Ma as a variable but simple set of regional developments grouped together as an Oldowan industrial complex. Just over 1.7 Ma,

these basic core and flake tool kits were supplemented by the first purposefully shaped heavy-duty tools in the form of hand axes and cleavers, ushering in the Early Acheulean complex. As a simple core and flake technology, the Oldowan is also referred to as a Mode I industry. The earliest well-dated occurrences in good context for such simple tools beyond Africa are at Shangchen in China ca. 2.1 Ma, at 1.85 Ma at Dmanisi, Georgia, and from ca. 1.7 in the Nihewan basin in China (see Zhu et al. 2018 for references). Beyond Africa, however, the industries are referred to as Mode I, to distinguish them from the African Oldowan, where the technology originated.

The Oldowan tradition is most often described and compared across assemblages by its core types, which Leakey (1971) described as heavy-duty tool types in her seminal work on the subject. Leakey terms these heavy-duty types as follows: choppers, cobbles flaked along the side or an extended edge, either unifacially or bifacially; discoids, cobbles flaked in a radial direction, usually on both faces; polyhedrons, cobbles flaked in random directions, obtaining a multifaceted shape; heavy-duty scrapers or core scrapers, cobbles flaked downward from a flat surface; and spheroids and sub-spheroids, polyhedrally flaked cobbles that have been battered down through use to a more spheroidal shape. Leakey considered the sharp edges where flaking platforms met to be the functional parts of the tool. She also categorized light-duty tools, consisting mainly of modified flakes, scaled pieces (outils écaillés), and occasional awls and burins. The latter two types are, however, much debated. Many archaeologists continue to use a modified version of Leakey's classification because it has good descriptive value, but most would also recognize that her heavy-duty types are mainly cores. Many thus prefer to use the terms of chopper cores, discoidal cores, polyhedral (or multifacial) cores, and single platform cores (as opposed to core scrapers, unless some use-wear justifies calling the piece a scraper). While any core type can also be used as a tool, it is important to have some evidence of use-wear on the functioning edge of the piece to call it a core tool. Spheroids have been variously discussed as tools used to pound and process food or as cobbles and cores used persistently as hammerstones, which eventually produce a more spheroidal shape.

Freehand, hard hammer percussion is the most common method used in the Oldowan (Figs. 1 and 2), but bipolar flaking is also present in some assemblages, particularly those with quartz (or Naibor Soit quartzite at Olduvai, which is often called quartz). In this technique, the pebble or cobble to be flaked is rested on a stone anvil and struck from above with a hammerstone. In contrast with the Lomekwian, bipolar flaking is not usually common in Oldowan assemblages, although exceptions occur. For example, bipolar flaking is a major component of the Swartkrans Oldowan (ca. 2 Ma) and is even used on chert and fine quartzites (Fig. 3;

Oldowan Industrial Complex, Fig. 1 Quartzite cores from the Oldowan at Sterkfontein

Oldowan Industrial Complex, Fig. 2 Quartz cores from the Oldowan at Sterkfontein

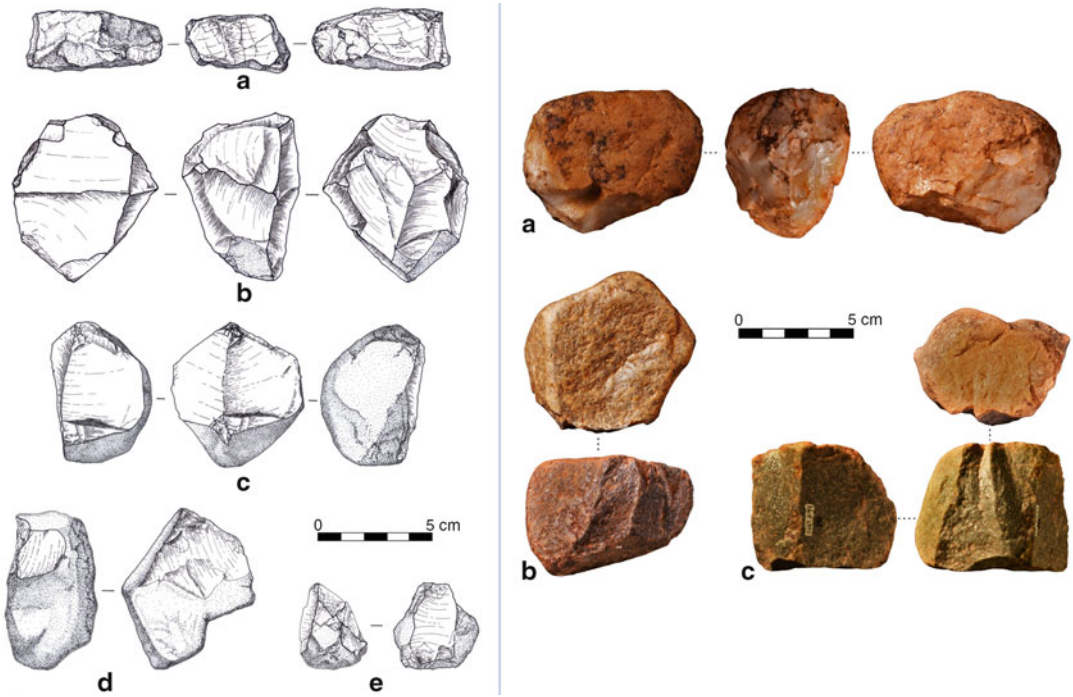

Oldowan Industrial Complex, Fig. 3 Artifacts from the Swartkrans Oldowan. *Left*: drawings of bipolar cores, with a and e in quartz and b, c, and d in quartzite, all record bipolar working except for e, which has a mix of bipolar and freehand removals. *Right*: a is a subspheroid made in quartz; b is a quartzite single platform core with five bipolar removals; c is a simple bipolar core in quartzite where a single blow has fragmented the piece (see portions to either side of the central ridge left on the core)

Kuman et al. 2018). The throwing of cobbles to initiate fracture is another technique sometimes discussed, but its characteristics can be difficult to recognize as they vary with the shape and properties of the rock.

Historical Background

The term "Oldowan" derives from Oldoway, an early name for Olduvai Gorge in Tanzania, where Louis Leakey found such tools and compared

them with other occurrences in East Africa. M. D. Leakey (1971) provided the first well-defined and fully illustrated description of the industry in her monograph on the early archaeology of Olduvai Gorge, where the relevant deposits date from 1.9 to 1.8 Ma. It was common in her day to consider that the movements of different hominid groups or hominid species were responsible for sudden changes in industrial traditions, such as the first appearance of the Early Acheulean ca. 1.6–1.4 Ma in the Olduvai sequence. Such changes in the archaeological record may appear to be sudden for geologic reasons, as no early sequence is continuous or they may indeed be sudden. Evolutionary changes in anatomy or behavior can be punctuated in nature, particularly if adaptations or innovations arise in small, localized populations that may not preserve in the fossil or archaeological records. At Gona, Ethiopia, Semaw et al. (2009) document what does in fact appear to be the sudden appearance of Early Acheulean, which they also note for other sites in East Africa. However, working in the 1970s, M. D. Leakey took a combined approach that argued for both the sudden appearance of the Early Acheulean and continuity of the Oldowan tradition. She described this continuity by grouping the Olduvai sites in a series of stages: Oldowan, followed by Developed Oldowan A at 1.7–1.6 Ma, Developed Oldowan B ca 1.5–1.4 Ma, and Developed Oldowan C persisting through much younger beds in the Olduvai sequence. Hand axes (or bifaces) were said to appear in Developed Oldowan B, but they were usually smaller than Early Acheulean examples, and as a type, they comprised less than 40% of the "core tool types" as defined by Leakey. Subsequently, some archaeologists continued to use the Developed Oldowan as an industry which contrasts with the Early Acheulean, but the A-B-C designations were avoided. Today, few researchers use the term, as the distinctions have been ascribed to differences in raw materials and in intensity of re-sharpening of the bifaces (see Semaw et al. 2009) for a comprehensive review and assessment). The result is that the Oldowan tradition is widely viewed as a distinct industry that arose by 2.6 Ma and persisted until 1.7 Ma. Semaw et al. (2009) would place the Developed Oldowan A with the Oldowan complex and the B and C variants with the Acheulean, which is also the majority opinion of other researchers.

The work of Toth (1985) was influential in shifting the historic focus on Oldowan typology and cores as tools to a more dynamic understanding of the relationship between artifacts and the raw materials on which they were made. In an experimental approach, he demonstrated how the shapes and sizes of the flaked cobbles influenced the resulting core types. He thus turned the focus from core tools to cores, arguing that the central goal of the Oldowan was to obtain sharp-edged flakes for multiple tasks but initially for the cutting of meat from animal carcasses.

Another important methodology for study of Early Pleistocene lithic assemblages was developed by Schick (1987). Both Schick and Toth worked with Glynn Isaac, whose many students were encouraged to develop projects (particularly at Koobi Fora, Kenya) that would tease out the behavioral information from the natural geologic and biological modifications to sites and their lithic and faunal assemblages. Schick's work focused on the formation and transformation of archaeological sites by natural forces, particularly in shallow water contexts affected by flooding, as most East African sites were associated with low-energy riverine deposits and lakeshore sedimentation processes. She concluded that sites exist in a continuum of contexts, from primary or pristine, largely undisturbed sites, to secondary, disturbed contexts, as well as a range of contexts intermediate between these two extremes. The movement of water across a site has the power to winnow out the smaller material, and at higher velocities it also will orientate the larger pieces in specific directions that respond to current direction and strength. Working with experimentally created assemblages, Schick also demonstrated that an undisturbed assemblage flaked on-site should consist of 60–85% of small flaking debris (pieces under 20 mm in length). Some experimental assemblages, such as those made in brittle materials like quartz, even show much higher percentages of small flaking debris (Kuman and Field 2009; see Fig. 4).

Oldowan Industrial Complex, Fig. 4 Experimental flaking of vein quartz, showing the large majority of small flaking debris in an undisturbed, complete assemblage

In these earlier years, Isaac and a number of his other students also explored the behavioral implications of sites with large numbers of bones and stones, which in the 1970s had been considered a form of home base to which hominids repeatedly returned. Over the next couple of decades, various explanations for these large sites took shape, aiming to test this "modern human" interpretation of early hominid behavior (see Plummer 2004 for a review). The formation of large sites was modeled and debated by various researchers as follows: central place foraging sites; sites that were repeatedly reoccupied by routed foraging of fixed resources; caches of lithic material actively moved to strategic locations or, alternatively, more passively accumulated lithic and bone debris forming over time at favored locations; activity locations such as kill sites; and venues where hominids gathered for safety against carnivores or took refuge to consume game that was scavenged from carnivore kills. The study of bone fracture patterns, along with cut marks indicative of scavenged or butchered game and percussion marks from the breaking open of bones for marrow, has become a highly developed method of analysis in interpreting these models and early hominid behavior in general.

Key Issues/Current Debates

The Timing of Access to Animal Carcasses

The behavioral models discussed above were hotly debated in earlier years, and many faunal analysts today continue to explore questions raised by these models, e.g., were hominids limited to scavenging scraps of animal protein from carnivore kills (i.e., late access) or did they have early access to these carcasses, obtaining the meatier portions. Researchers thus still debate the exact nature of the interaction hominids had with the associated faunas, but this is largely a research focus for the East African sites. In South Africa, only one hominid site with Early Pleistocene tools bears significant numbers of cut and percussion marks, left by the processing of carcasses by hominids, and in this case interpreted as early access (Pickering and Brain 2010). The modes of accumulation for South African faunal assemblages instead are dominated by natural and biological agents, such as carnivores, natural deathtraps, and slope wash or collapse around cave entrances. Being in secondary contexts, the lithic assemblages from these hominid sites require thorough investigation of the site formation processes affecting their accumulation before behavior (other than technological) can be interpreted. At Sterkfontein, the fauna associated with Oldowan artifacts is largely a deathtrap accumulation, with some contribution from slope wash.

Tethering to Raw Material Sources

One of the traits commonly discussed for the Oldowan is the tethering of these sites to raw material sources. While there are some exceptions, there is indeed a fairly strong pattern of Oldowan sites being more "tethered" to raw

materials than are Acheulean sites. However, Oldowan-bearing deposits are limited in number, and perhaps "tethering" is not the best term. It might be more accurate to say that stone tools are more "archaeologically visible" close to significant sources of raw material. Hominids undoubtedly transported stones and tools across the landscape to food resources, but it was primarily close to gravels and rock outcrops that hominid activities preserved best as archaeological sites. Nowhere is this clearer than in South Africa's Cradle of Humankind in Gauteng Province. This world heritage region preserves at least 14 sites with fauna and many with hominids, but during the Early Pleistocene, only the sites close to the major gravels of the Blaaubank River have substantial numbers of stone tools. At Sterkfontein and Swartkrans, both sites that are quite close to gravels, the artifacts number in the thousands, from Oldowan to Acheulean and even Middle Stone Age. Kromdraai, Coopers, and Goldsmith's sites are also relatively close to the Blaaubank gravels, but at these sites, Early Pleistocene artifacts are found in smaller numbers, perhaps because they were not so geographically favored as activity sites. And sites at considerable distance from raw material sources, namely, Gladysvale and Drimolen, have yielded only a handful of artifacts between them, while others have none at all.

Our interpretation of hominid behavior from lithic assemblages in the Oldowan is undoubtedly influenced by the methods of analysis we use. Braun and Harris (2003) have suggested a means of analyzing whole flakes in early assemblages that goes beyond simple linear measurements, which are the focus of most studies. They apply a "flake utility" index calculated from the length of a flake edge (or perimeter) in relation to the mass (or overall volume) of the piece. In particular, they compare Kenyan assemblages from Koobi Fora from the KBS/Oldowan industry (1.89–1.65 Ma) with Developed Oldowan assemblages from the Okote Member (1.65–1.30 Ma). Their goal is to use assemblages with good palaeoenvironmental and geomorphological data to address early hominid behavior in ecological terms, which they argue is a necessary prerequisite before considering hominid abilities and change through time. They conclude that the Oldowan hominids at Koobi Fora contrasted with later hominids, who knapped in a way that maximized a flake's cutting edge in relation to a given volume of raw material. By their calculations, the Developed Oldowan hominids produced at least double the number of flakes per core volume as did the KBS hominids, which would have conserved stone and allowed them to range further from raw material sources. The method is promising, but due to the small database that exists for Oldowan sites with good environmental reconstructions, it can be complicated to interpret exactly how these observations may relate to ecological and geographic factors vs. change through time.

Landscape Archaeology

At some East African site complexes, contemporary Oldowan sites occur over distances of one or more kilometers (e.g., Olduvai and Peninj in Tanzania and Koobi Fora in Kenya). Volcanic deposits provide the means of dating and correlating such deposits in both space and time, making study of hominid behavior across a portion of the landscape possible. At Olduvai, artifacts excavated from dated sites can sometimes be traced to specific raw material outcrops, which allow us to reconstruct the larger movements of hominids on the landscape. The South African early archaeological record is preserved in very different contexts. The three sites in Gauteng's Cradle of Humankind which have deposits with Oldowan-aged tools are Sterkfontein, Swartkrans, and Kromdraai B. All are underground caverns in dolomitic limestone, where material has been redeposited from occupations on the surface. In the past, researchers relied on fauna to provide relative ages. Improvements in chronology today have been made with uranium-lead dating of karst cave flowstones and cosmogenic nuclide burial dating of quartz sediments or quartz contained in lithic manuports (e.g., Granger et al. 2015). Electron spin resonance dating has also been attempted, but the geologic contexts of these sites make it a more problematic and controversial method. Even the dating of deposits with

uranium-lead must be done with great care, as many flowstones are postdepositional in time, filling in voids created by subsidence of hardened breccias or capping older deposits hundreds of thousands of years later. For the cosmogenic burial method, accuracy depends on the absence of reworking of the samples within a cave system. The recent report of Oldowan period tools at Wonderwerk Cave in the Northern Cape is in a different karst context (Chazan et al. 2008). This cave records a long sequence of occupations from the Earlier to the Later Stone Age. The lowest unit is ca 1.85 Ma and contains 2 cores and 28 small flakes. This is the only Oldowan assemblage in Africa yet found in a habitable cave context. However, the assemblage is small, which differs with later cave occupations that begin only in the Middle Pleistocene, and Wonderwerk may not have been an Oldowan occupation so much as a comfortable place to shelter from the elements.

Knapping Abilities

In recent years, the Lokalalei 2C site in Kenya (western Lake Turkana) has become almost as iconic as the important sites of Olduvai. At 2.34 Ma, this open-air site has such a well-preserved assemblage that Delagnes and Roche (2005) have been able to refit many sets of artifacts and reconstruct the selection of cobbles, along with the flaking patterns and decisions made by the hominids. Describing the "chaine operatoire" (or operational chain of actions), the authors conclude that these hominids had a good mastery of flaking skills, even planning some more complex technical actions when flaking the best shaped cobbles. They first selected angular cobbles and fragments with good edge angles for flaking, and then they exploited a large flat face as the best flaking surface. Refits showed that an average of 18 flakes was struck per core; however, in one instance, a minimum of 51 flakes were knapped, and in another, more than 73 flakes were obtained from a cobble that yielded several large fragments cycled into cores. Hammerstone impact marks show a skillful level of control (also typical of other Oldowan assemblages – Gallotti 2018). While such intelligent flaking was applied to better raw materials, poorer-quality rocks were flaked in a simpler manner. At the same time, however, the Lokalalei 2C hominids did not attempt to work rocks with less amenable shapes, which later hominids were able to master by creating the correct angles, and when the good flaking angles were lost on a core, they did not attempt to adjust them. The authors conclude that the Lokalalei 2C hominids were thus limited in their mastery of flaking, but they also state that the raw material source was less than 50 m from the site. This abundance of raw material complicates behavioral interpretation, as the hominids did not need to conserve their raw materials by correcting problems on the cores. Many more Oldowan sites and assemblages are undoubtedly needed to address such debates as skill vs. economical needs or even variability due to simple motivational differences in hominids. All of these factors influence the interpretation of archaeological sites in terms of early cultural behavior.

At a somewhat older site at Hadar, Ethiopia, Hovers (2009) has argued that hominids in fact did have some ability to correct knapping mistakes. As cores were worked to the point that flaking angles became problematic, flakes were at times detached which did not end in a fine-feathered termination but instead broke off with a stepped or hinged distal end. This left the core with a compromised surface for further flaking. Correction occurred when such cores were often rotated, so that a large flake could be struck to remove the problem area.

Even at the oldest sites at Gona, 2.6 Ma, assemblages show a clear understanding of fracture mechanics and a developed ability to make stone tools (Semaw et al. 2009). There are no signs of "incipient" abilities that improve with time, either at Gona or in the Oldowan in general, although some researchers have suggested earlier assemblages show more unifacial (than bifacial or complex) flaking. But although unifacial flaking of cobbles is prominent at some early sites, other methods are also used, and cores with complex, multifacial and bifacial flaking are of equal antiquity. Unifacial flaking seems rather to be influenced by raw material forms and the degree of intensity of flaking. Cores (and not only raw materials) were also transported to the Gona sites

for further flaking, which also is found at Sterkfontein, where many quartzite cores and flakes were brought into the site, in contrast with quartz and chert with size profiles that show they were flaked on-site. Such patterns are not uncommon in the Oldowan.

Raw Material Selectivity

The most commonly reported feature for Oldowan assemblages is the hominids' ability to determine not just the appropriate shapes of cobbles to be flaked but especially the quality of rocks and their flaking properties. Semaw et al. (2009) discuss this selectivity for the 2.6 Ma artifacts from the Gona sites. Here the raw materials consist of a number of igneous rock types. Surveys of available raw materials show that hominids selected rocks that were fine-grained and of better flaking quality, because such rocks produced tools that were sharper and more durable. The same applies to many other East African sites.

The Oldowan industry from Sterkfontein, South Africa, also exemplifies the selection of rock types for specific flaking properties ca 2 Ma (Kuman and Field 2009). Although quartzite is the most common rock type in gravels close to the site and chert is also common, the assemblage is dominated by vein quartz, which is less common, and the focus for tools was on sharp edges for light-duty cutting tasks. Vein quartz is extremely easy to flake (even in cobble shapes that are not ideal) because it is brittle, and as flaking of cobbles progresses, chunks are produced that can be further cycled into cores. The best rock for flaking at Sterkfontein was carried into the site from the river terrace a few hundred meters away. Swartkrans lies on the other side of the Blaaubank River to Sterkfontein, and the site seems to have been a little closer to the raw material source. Such differences demonstrate the importance of sampling in Oldowan archaeology. Only more assemblages in differing geographic and environmental contexts can reveal the extent of the variability and potential explanations for such differences.

Was the Oldowan Unchanging?

An important debate for some years has been the nature of the Oldowan as an evolutionary stage in cultural behavior. Semaw et al. (2009) and Stout et al. (2010) have argued that Oldowan technology persisted with little or no change for almost a million years, until the Early Acheulean appeared just over 1.7 Ma. They argue that the skill manifested from the beginning of the Oldowan, until the Developed Oldowan/Early Acheulean, is indicative of a stable, successful adaptation. At 1.7 Ma, environmental reconstruction points to a shift to drier climates, and this change coincides with the end of the period of Oldowan stasis. In contrast, others have argued that there is change exhibited during the Oldowan, with differences between the earliest assemblages (from 2.6 to 2.0 Ma) and the classic Oldowan so well known from Olduvai Gorge (1.9 to 1.7 Ma) (Kibunjia 1994; Delagnes and Roche 2005). Originally some researchers argued for a pre-Oldowan phase prior to 2.0 Ma, which has been replaced more recently by terms such as early vs. late Oldowan. The Lokalalei 2C site was pivotal in this debate as an example of the more skilled side of technological variability, suggestive of population-based differences that drove cultural (and probably also hominid) evolution. In particular, this site is contrasted with Lokalalei 1, where hinged and step-terminated scars on the cores indicate problems with the detachment of good flakes. However, critics argue that this site has problematic raw material, and it is a fact also that Lokalalei 2C shows evidence of both simple and more sophisticated flaking strategies, undoubtedly practiced by the same population. However, Gallotti (2018), in her review of some 27 East African Oldowan sites, argues against the concept of Oldowan stasis. Her reasoning (p. 26) is that, despite the presence of a variety of flaking methods in the earlier sites, some were not used consistently but "only tested," unless one examined such developments at the "inter-site scale."

Ultimately, however, opinions in this debate hinge on how stasis is actually defined, given the variability that is now documented for over 30 Oldowan sites documented across Africa. Should it be defined by the number of reduction strategies used or by the upper limits present in any particular assemblage, even if a strategy is rare? Moreover, technological and typological

differences are affected by many factors, e.g., abundance of (vs. distance from) raw material sources, ecological differences across Oldowan landscapes, specific raw material properties, individual motivation, and random walk variability. It is true that Lokalalei 2C has more retouched pieces than other early Oldowan sites, but this is an unusually well-preserved assemblage. It is also true that some of the classic Oldowan sites at Olduvai are long-term accumulations, which are more likely to preserve a greater variety of modified tool types. Additionally, some researchers have questioned the identification of retouched pieces at some Olduvai sites, which puts the argument even deeper into the realm of debate (de la Torre and Mora 2005).

Who Made the Oldowan?

There are various hominid species present on the African landscape during Oldowan times, 2.6 to 1.7 Ma. In East Africa, these include *Paranthropus aethiopicus* and *Paranthropus boisei*, the early *Homo* species of *H. habilis* and *H. ergaster*, and the *Australopithecus* species of *A. garhi* and certain specimens designated as late-occurring examples of the *Australopithecus* (see Cross-References on *Homo habilis* and Clarke 2012). In South Africa, there are also multiple species existing between 2.6 and 1.7 Ma: *A. africanus*, *A. prometheus*, *A. sediba*, *P. robustus*, *H. habilis*, and *H. ergaster* (see Cross-References noted below), although only *P. robustus* and *H. habilis* are found in association with Oldowan assemblages.

There are many researchers who firmly believe that all hominids were intelligent enough to have made Oldowan tools of one variety or another. While it is impossible to prove that some *Paranthropus* and *Australopithecus* individuals never used any stone in their subsistence behavior, the Oldowan does show a certain developed level of intellectual and manual skill and selectivity of raw materials, which suggests that early *Homo* was the main or possibly the only species able to master this level of tool manufacture. *Paranthropus* was a species highly adapted to tough or hard "fallback foods" that helped it to survive during difficult times. It became extinct ca 1 Ma, which indicates it did not possess the kind of flexible, adaptive behavior we see recorded in the Oldowan. On the other hand, the Lomekwian industry at 3.3 Ma is characterized by a less developed technology. It predates both the Oldowan and the earliest *Homo* fossils and may have been made by *Kenyanthropus platyops*, dated ca. 3.3–3.5 Ma.

Future Directions

Debates regarding Oldowan cognitive abilities and subsistence behavior are alive and well, although they will require many more excavated sites in datable contexts, with good palaeoenvironmental reconstructions, along with in-depth analyses of the lithic assemblages, to reach better consensus. However, there is much we now know about the widespread distribution of the Oldowan tradition in Africa, from North to South, and this situation will only improve with further research.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Australopithecines
- ▶ Dmanisi Hominins and Archaeology
- ▶ *Homo ergaster*
- ▶ *Homo habilis*
- ▶ Leakey Family
- ▶ Olduvai Gorge Archaeological Site
- ▶ *Paranthropus*

References

Braun, D.R., V. Aldeias, W. Archer, J.R. Arrowsmithe, N. Barakif, C.J. Campisanog, A.L. Deinoh, E.N. DiMaggioi, G. Dupont-Nivetj, B. Engdal, D.A. Fearye, D.I. Garello, Z. Kerfelewl, S.P. McPherron, D.B. Patterson, J.S. Reeves, J.C. Thompson, and K.E. Reed. 2019. Earliest known Oldowan artifacts at >2.58 ma from Ledi-Geraru, Ethiopia, highlight early technological diversity. *Proceedings of the National Academy of Sciences* 116 (24): 11712–11717.

Braun, D.R., and J.W.K. Harris. 2003. Technological developments in the Oldowan of Koobi Fora: Innovative techniques of artifact analysis. In *Oldowan: Rather*

more than smashing stones, Treballs d'Arqueologia, ed. J.M. Moreno, R. Mora Torcal, and I. de la Torre Sainz, vol. 9, 117–144. Bellaterra: Centre d'Estudis del Patrimoni Arqueologic de la Prehistoria.

Chazan, M., H. Ron, A. Matmon, N. Porat, P. Goldberg, R. Yates, M. Avery, A. Sumner, and L. Kolska Horwitz. 2008. Radiometric dating of the earlier stone age sequence in excavation I at Wonderwerk Cave, South Africa: Preliminary results. *Journal of Human Evolution* 55: 1–11.

Clarke, R.J. 2012. A *Homo habilis* maxilla and other newly-discovered hominid fossils from Olduvai Gorge, Tanzania. *Journal of Human Evolution* 63: 418–428.

de la Torre, I., and R. Mora. 2005. *Technological strategies in the lower Pleistocene at Olduvai beds I & II. Etudes et Recherches Archeologiques de l'Universite de Liege*. Liege'Universite de Liege.

Delagnes, A., and H. Roche. 2005. Late Pliocene knapping skills: The case of Lokalalei 2C, West Turkana, Kenya. *Journal of Human Evolution* 48: 435–472.

Gallotti, R. 2018. Before the Acheulean in East Africa: An overview of the Oldowan lithic assemblages. In *The emergence of the Acheulean in East Africa and beyond*, ed. R. Gallotti and M. Mussi, 13–32. New York: Springer.

Granger, D.E., R.J. Gibbon, K. Kuman, R.J. Clarke, L. Bruxelles, and M.W. Caffee. 2015. New cosmogenic burial ages for Sterkfontein member 2 *Australopithecus* and member 5 Oldowan. *Nature* 522: 85–88.

Harmand, S., J.E. Lewis, C.S. Feibel, C.J. Lepre, S. Prat, A. Lenoble, X. Boës, R.L. Quinn, M. Brenet, A. Arroyo, N. Taylor, S. Clément, G. Daver, J.-P. Brugal, L. Leakey, R.A. Mortlock, J.D. Wright, S. Lokorodi, C. Kirwa, D.V. Kent, and H. Roche. 2015. 3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya. *Nature* 521: 310–315.

Hovers, E. 2009. Learning from mistakes: Flaking accidents and knapping skills in the assemblage of A.L. 894, (Hadar, Ethiopia). In *The cutting edge: New approaches to the archaeology of Human origins*, ed. K. Schick and N. Toth, 137–150. Gosport (IN): Stone Age Institute Press.

Kibunjia, M. 1994. Pliocene archeological occurrences in the Lake Turkana basin. *Journal of Human Evolution* 27: 159–171.

Kuman, K., and A.S. Field. 2009. The Oldowan industry from Sterkfontein caves, South Africa. In *The cutting edge: New approaches to the archaeology of human origins*, ed. K. Schick and N. Toth, 151–170. Gosport (IN): Stone Age Institute Press.

Kuman, K., M. Sutton, T.R. Pickering, and J.L. Heaton. 2018. The Oldowan industry from Swartkrans cave, South Africa, and its relevance for the African Oldowan. *Journal of Human Evolution* 123: 52–69.

Leakey, M.D. 1971. *Olduvai Gorge*. Vol. Volume III. London: Cambridge University Press.

Pickering, T.R., and C.K. Brain. 2010. What taphonomically oriented research at Swartkrans cave reveals about early hominid behavior. *Journal of Taphonomy* 8: 215–232.

Plummer, T. 2004. Flaked stones and old bones: Biological and cultural evolution at the dawn of technology. *Yearbook of Physical Anthropology* 47: 118–164.

Sahnouni, M., D. Hadjoulis, J. van der Made, A. Derradji, A. Canals, M. Medig, H. Belahrech, Z. Harichane, and M. Rabhi. 2002. Further research at the Oldowan site of Ain Hanech, north-eastern Algeria. *Journal of Human Evolution* 43: 925–937.

Sahnouni, M., J.M. Parés, M. Duval, I. Cáceres, Z. Harichane, J. van der Made, A. Pérez-González, S. Abdessadok, N. Kandi, A. Derradji, M. Medig, K. Boulaghraif, and S. Semaw. 2018. 1.9-million- and 2.4-million-year-old artifacts and stone tool–cutmarked bones from Ain Boucherit, Algeria. *Science* 362: 1297–1301.

Schick, K.D. 1987. *Stone age sites in the making: Experiments in the formation and transformation of archaeological occurrences*, British Archaeological Reports, International series. Vol. 319. Oxford: Archaeopress.

Semaw, S., P. Renne, J.W.K. Harris, C.S. Feibel, R.L. Bernor, N. Fesseha, and K. Mowbray. 1997. 2.5-million-year-old stone tools from Gona, Ethiopia. *Nature* 385: 333–336.

Semaw, S. 2000. The world's oldest stone artefacts from Gona, Ethiopia: Their implications for understanding stone technology and patterns of human evolution between 2.6-1.5 million years ago. *Journal of Archaeological Science* 27: 1197–1214.

Semaw, S., M.J. Rogers, and D. Stout. 2009. Insights into late Pliocene lithic assemblage variability: The East Gona and Ounda Gona South Oldowan archaeology (2.6 million years ago), Afar, Ethiopia. In *The cutting edge: New approaches to the archaeology of human origins*, ed. K. Schick and N. Toth, 211–246. Gosport (IN): Stone Age Institute Press.

Stout, D., S. Semaw, M.J. Rogers, and D. Cauche. 2010. Technological variation in the earliest Oldowan from Gona, Afar, Ethiopia. *Journal of Human Evolution* 58: 474–491.

Toth, N. 1985. The Oldowan re-assessed: A close look at early stone artifacts. *Journal of Archaeological Science* 12: 101–120.

Toth, N., and K. Schick. 2018. An overview of the cognitive implications of the Oldowan industrial complex. *Azania: Archaeological Research in Africa* 53 (1): 3–39.

Zhu, Z., R. Dennell, W. Huang, Y. Wu, S. Qiu, S. Yang, Z. Rao, Y. Hou, J. Xie, J. Han, and T. Ouyang. 2018. Hominin occupation of the Chinese loess plateau since about 2.1 million years ago. *Nature* 559: 608–612.

Further Reading

Barham, L., and P. Mitchell. 2008. *The first Africans*. Cambridge: Cambridge University Press.

De la Torre, I. 2011. The origins of stone tool technology in Africa: A historical perspective. *Philosophical Transactions of the Royal Society B* 366: 1928–1037.

Haslam, M., A. Hernandez-Aguilar, V. Ling, S. Carvalho, I. de la Torre, A. De Stefano, A. Du, B. Hardy, J. Harris, L. Marchant, T. Matsuzawa, W. McGrew, J. Mercader,

R. Mora, M. Petraglia, H. Roche, E. Visalberghi, and R. Warren. 2009. Primate archaeology. *Nature* 460: 339–344.
Klein, R.G. 2002. *The dawn of human culture*. New York: John Wiley and Sons.
Kuman, K., and R.J. Clarke. 2000. Stratigraphy, artefact industries and hominid associations for Sterkfontein, member 5. *Journal of Human Evolution* 38: 827–847.
Plummer, T. 2005. Discord after discard: Reconstructing aspects of Oldowan hominin behaviour. In *African archaeology: A critical introduction*, ed. A.B.. Stahl, 55–92. Oxford: Blackwell Publishing.
Shick, K.D., and N. Toth. 1993. *Making silent stones speak*. New York: Simon and Schuster.

Olduvai Gorge Archaeological Site

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Introduction

Olduvai Gorge is an exceptionally rich archaeological site, preserving one of the best records of human history spanning nearly 2 Ma. The site has yielded abundant human and animal fossils and stone artifacts preserved in well-dated stratigraphic sequence. The quantity, quality, and geological context of paleontological and archaeological data provide a yardstick for rates of evolutionary changes in human form and stone tool technology. Over four hominin species, including the holotypes for *Paranthropus "Australopithecus" boisei (Zinjanthropus)* and *Homo habilis*, as well as remains of *Homo erectus* and prehistoric *Homo sapiens* have been discovered at the site (Leakey 1971). The hominin record is consistent with the evolution of stone tool technology from the Oldowan to Acheulean, Middle Stone Age, and Later Stone Age industries. The Oldowan industry (characterized by simple core-and-flake stone technology) is the earliest known human technology and was first discovered at Olduvai Gorge. More than 200 vertebrate taxa, including approximately 25 holotype species, have been documented at the site. Fossil and associated paleoenvironmental data establish the composition of the Plio-Pleistocene vertebrate communities in East Africa.

Definition

Olduvai Gorge (approximately 25 km in length and up to 100 m deep deposits) is located in the Ngorongoro Conservation Area, northern Tanzania, which is inscribed by UNESCO's World Heritage Committee as a "Mixed Property" (http://whc.unesco.org/en/list/39) (Fig. 1). The Olduvai sequence, which dates from 2.03 Ma to c. 62,000–17,000 years old, is divided into seven stratigraphic units defined from the oldest to youngest as Beds I–IV, Masek, Ndutu, and Naisiusiu (Fig. 2). Bed I and basal Bed II deposits are the best studied part of the sequence, due to the abundance of Oldowan tools and Plio-Pleistocene faunal remains found there. These older deposits have yielded fossil remains of *Paranthropus "A" boisei, Australopithecus cf. africanus*, and *Homo habilis* (Leakey 1959; Leakey et al. 1964; Clarke 2012), suggesting that three distinct forms of human ancestors lived contemporaneously during the Oldowan time, when the central portion of the Olduvai basin was occupied by a fluctuating saline-alkaline lake (Hay 1976).

Key Issues/Current Debates/Future Directions/Examples

Olduvai provides a rich record for investigating some of the fundamental questions in human evolutionary studies. These include the evolution of early behaviors of Oldowan hominins, the timing and nature of the technological shift from the Oldowan to the Acheulean, and the transition from late *H. erectus* to early *H. sapiens* (Leakey 1971; Rightmire 1983). However, this entry focuses on the origins of hominin foraging and land use behavior with evidence from the Olduvai paleo-basin.

The origins of complex social behaviors and the ecological contexts in which early human behavior evolved is one of the major problems in

Olduvai Gorge Archaeological Site, Fig. 1 A view of Olduvai Gorge as seen today

paleoanthropological research. Scientists depend on a variety of evidence from the archaeological record, which preserves traces of hominin behavior, such as stone artifacts or fossilized bones of wild animals bearing stone tool cut marks or hammerstone percussion marks. Carnivore bite marks are also important, and if detected in the fossil record may indicate the degree of predator or scavenger activity on ancient landscapes. These feeding traces are important in understanding past ecological processes, such as competition, carcass persistence, and survivorship of skeletal material, and are significant in understanding the scale of hominin-carnivore interactions and the role of predation in human evolution.

Since their initial discovery, the dense concentration of crude stone artifacts in association with fossilized bones of large and small vertebrates preserved in thin layers of sediments at Olduvai were speculated to represent "occupational sites" or "living" sites, where early hominins manufactured and/or discarded tools, processed carcasses, and consumed meat on a scale unknown among modern nonhuman primates (Leakey 1959, 1971). Living sites were viewed as favorable points on a landscape or "home bases" at which breeding groups of hominins conducted social and maintenance activities such as hunting, food sharing, and division of labor (Isaac 1978).

This generalized idea, adopted from 1960s ethnographic observations of hunter-gatherers and championed by Glynn Isaac in the 1970s, conceptualizes the evolution of early hominins as a complex interaction of social and biological adaptations. The premise of this hypothesis is that tool making, tool use, and meat eating played major roles in promoting brain development and increased social complexity. Therefore, hominin carnivory behavior, increasing dependence on stone tools, and cooperation between and within the sexes led to the advent of organized hunting, the family unit, and the division of labor, with all social and subsistence activities being centered spatially around a home base (Isaac 1978). The occurrences at Olduvai of stone tools together with broken-up animal bones, some bearing butchery marks, therefore, suggested that complex social behaviors had already evolved in Africa by 2 Ma ago (Leakey 1959; Isaac 1978).

Numerous archaeological sites recovered from Beds I and II by the Leakeys were widely accepted as home bases. These include DK (levels 1–3), FLK NN (level 3), FLK (*Zinjanthropus* level or level 22),

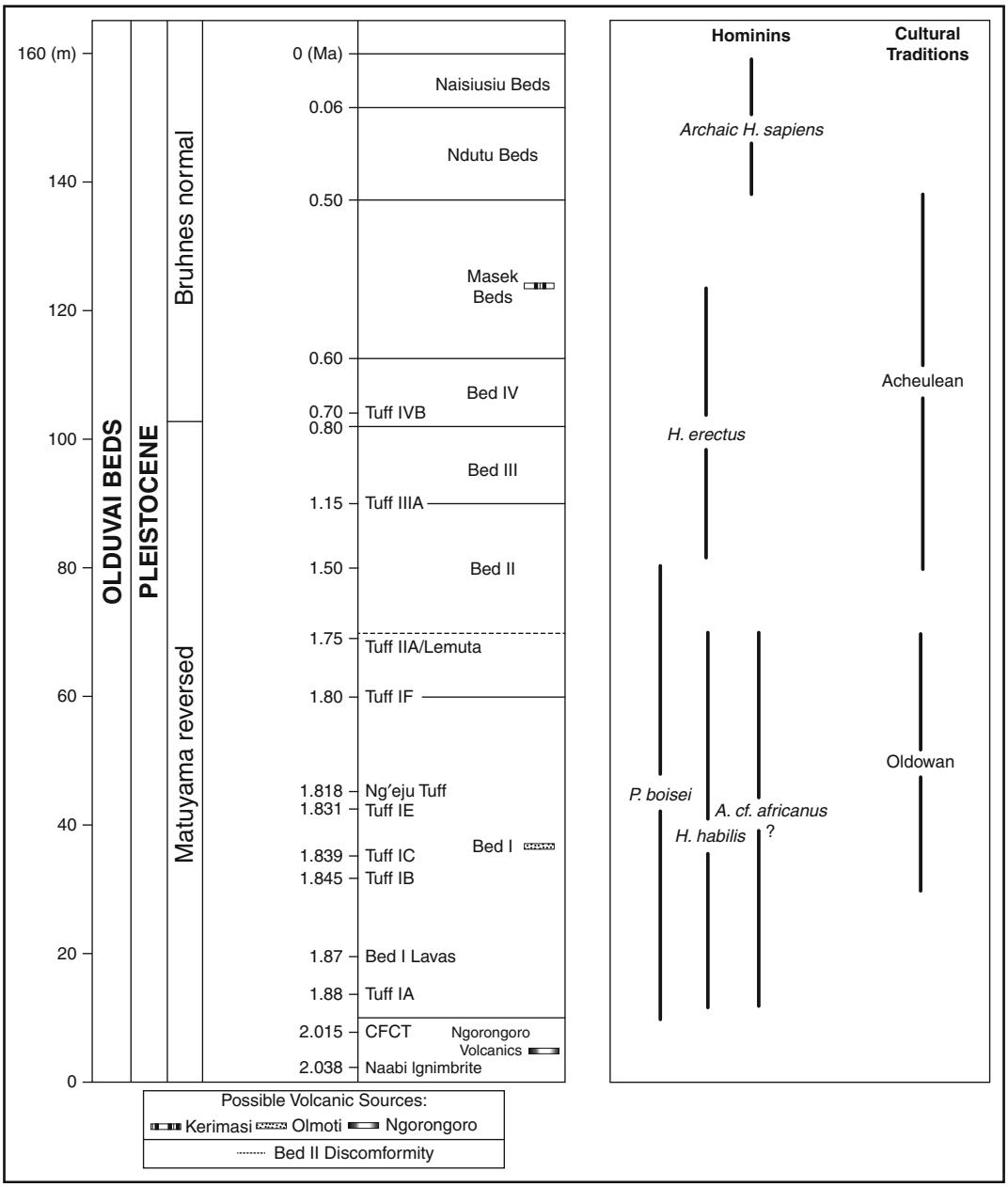

Olduvai Gorge Archaeological Site, Fig. 2 The Olduvai stratigraphy. (Modified from Hay 1976)

FLK N (levels 1–2), HWK E (levels 1–2), BK, and MNK. Since the early 1980s, archaeologists focused on the analysis of lithics and fossil bones of these assemblages, but FLK *Zinjanthropus* has received more attention than any other Oldowan assemblage because it is the largest and best preserved tool-marked bone sample.

The early view that these sites represented home bases of hominin occupation was challenged by Binford (1981), who argued that the stone artifacts and bone concentrations at sites such as FLK *Zinjanthropus* are palimpsests of both hominin and predator activities. He contended that the site was marginally attended

by hominins, whose activities were limited to scavenging carcass parts from carnivores. Binford's alternative idea was supported by evidence of large mammalian carnivore feeding traces at the sites, including gross gnawing of bones (Bunn 1981; Potts and Shipman 1981; Potts 1988).

Nonetheless, Binford's criticisms kicked off a flurry of controversy about mode of carcass acquisition by Oldowan hominins. Whether hominins actively hunted large animals or scavenged the leftovers of predator kills is still a hotly debated issue, as are the specific activities that resulted in the creation of the archaeological sites (Binford 1981; Bunn 1981; Potts and Shipman 1981; Blumenschine 1986).

Since the publication of Charles Darwin's "The Descent of Man" in the nineteenth century, the theory of "Man the Hunter" has pervaded popular and scientific literature. Hunting seems nobler than scavenging and, at first glance, more bountiful, predictable, and safe. Scavenging is perceived to be marginal, opportunistic, and dangerous. What better way to reaffirm our evolutionary success than to portray our early ancestors as mighty hunters?

Binford's proposed hominin scavenger idea led to various alternative hypotheses about the evolution of Oldowan hominin foraging behaviors and functions of the purported living sites. Bone surface modifications became central in this debate because they are the most definitive traces for determining whether carnivores or hominins had primary access to carcasses at these archaeological sites (Binford 1981; Bunn 1981; Potts and Shipman 1981; Blumenschine and Selvaggio 1988). Subsequent studies in the 1990s and 2000s have recognized tooth marks of animals other than large mammalian carnivores such as crocodile, chimpanzee, and human. Despite cautionary notes about possible superficial mimicry of stone tool cut marks and percussion marks by other agents of bone modification (Njau 2012), identification of marks on bone surfaces continues to play a critical role in the interpretation of hominin carnivory behavior in the archaeological record.

Among the proposed interpretations of Olduvai sites includes the "stone cache" hypothesis by Potts (1988). According to Potts, the Olduvai sites were simply places on the landscapes with pre-positioned concentrations of stones where hominins brought carcass parts for quick processing. Other alternative interpretations offered include routed foraging (Binford 1981), central-place foraging (Isaac 1978), dry season-riparian woodland scavenging (Blumenschine 1986), and carcass processing locus (Njau and Blumenschine 2012).

These competing explanations of site function and associated hominin behaviors, however, are still debated. This is because the spatial resolution of the landscape contexts of occurrences was too coarse to understand the ecological settings of hominin activities and activity traces. One problem was that researchers focused analysis on single sites (e.g., isolated dense clusters of stones and bones). As such the ecological contexts of hominin activities and land use behavior were not evaluated on a broad landscape scale (or beyond excavated sites).

Geological, paleontological, and taphonomical studies place the FLK *Zinjanthropus* site in a lakeshore context that has been variously interpreted as grassland, woodland, spring, and marshland (Hay 1976; Ashley et al. 2010). Despite much attention to this topic, many paleoanthropological studies were unable to provide specific ecological contexts of hominin activities. Reconstruction of specific habitats is critical for understanding patterning of hominin land use across paleolandscapes because, theoretically, the distribution of positive resources (e.g., potable water, animal and plant food, refuge trees) and negative resources (e.g., predation hazards, volcanic ash, disease) defined land use. These ecological factors can potentially predict patterns of hominin activities on the landscape as well as the traces of their activities.

The recent basin-wide analyses of Olduvai paleolandscapes (e.g., Lower Bed I, Middle Bed I, Upper Bed I, Lowermost Bed II, and levels immediately above basal Bed II) suggest that dense clusters of animal bones and stone tools at sites such as FLK *Zinjanthropus* do not represent isolated living sites but rather are part of a broad prehistoric land surface utilized extensively by

Oldowan hominins (Blumenschine et al. 2012). For example, the intensive stratigraphic, sedimentological, and paleoenvironmental work on Middle Bed I in the eastern portion of the paleolake margin have identified three landscape facets (a river channel, peninsula, and wetland settings) at the FLK area (Blumenschine et al. 2012; Stanistreet 2012). These lakeshore landscape facets are distinctive geomorphologically and ecologically, and they probably afforded hominins different and predictable types of resources (e.g., animal and plant food, climbable trees, shade trees, hazards). This study shows that hominin activities in the FLK area were focused on the "peninsula" and on the "edges of the wetlands" in general, and not at the FLK *Zinjanthropus* site in particular (Blumenschine et al. 2012).

The peninsula setting provided multiple places, which served as temporary loci where hominins frequently but hurriedly processed carcass parts abandoned there by large predators or foraged from the margins of the wetlands. Probably, hominins accessed the peninsula through the riparian corridor on the FLK Fault footwall (Blumenschine et al. 2012). The treed peninsula afforded shade and refuge from terrestrial predators. Therefore, the accumulations at the FLK *Zinjanthropus* site represent hominin activity traces at one of these relatively safe loci. Nevertheless, the peninsula and wetland edges would have also attracted ungulate prey and their concomitant predators, thus exposing hominins to high predation risk. It is, therefore, implausible that early hominins would have centered daily foraging and social activities of breeding groups at these localities (Njau and Blumenschine 2006).

Indeed, evidence of carnivore damage on hominin bones (White 1988; Njau and Blumenschine 2012) and non-hominin bones (Potts 1988) is well documented at FLK *Zinjanthropus* and other Oldowan hominin sites. It is argued that biologically active settings such as peninsula and wetland edges were also characterized by high predation risks. Therefore, just like other animals, early hominins were preyed upon or scavenged by predators (Njau and Blumenschine 2012). For example, all hominin individuals including specimens of the famous *A. boisei* skull (OH 5) found from FLK *Zinjanthropus* site bore carnivore damage. With the exception of a tooth (OH 44), other hominin materials bearing carnivore tooth damage are the cranial bones (OH 6) and leg bones (OH 35) of *H. habilis* (White 1988; Njau and Blumenschine 2012), suggesting the vulnerability of hominins to predation.

In sum, increasingly new geomorphological, paleobotanical, and paleontological data obtained from Olduvai suggests that the lake margin environments during the Plio-Pleistocene times did not provide safer place for hominins to conduct the full range of maintenance and social activities such as a typical hunter-gatherer home base (Stanistreet 2012; Blumenschine et al. 2012). Although this view is still debated, other studies contend that the clusters of bones and tools represent only irregular, brief feeding activities by possibly small subgroups of nonbreeding individuals who obtained and processed food for consumption there or transport elsewhere (Njau and Blumenschine 2012).

Although various studies confirmed that hominins made stone tools and butchered animals at the FLK *Zinjanthropus* site (Bunn 1981; Potts and Shipman 1981), the evidence is not conclusive as to what extent early hominins engaged in complex social activities such as sharing of food transported to a home base inhabited by a social group throughout successive days and nights. This landscape ecological approach for interpretation of the archaeological record suggests that if hominin home bases existed during the Oldowan times, they were located at safer sites not discovered yet in the greater Olduvai paleo-basin.

Cross-References

- ▶ Australopithecines
- ▶ Fossil Records of Early African *Homo*
- ▶ *Homo erectus*
- ▶ *Homo habilis*
- ▶ Leakey Family
- ▶ Oldowan Industrial Complex
- ▶ *Paranthropus*

References

Ashley, G.M., D. Barboni, M. Domínguez-Rodrigo, H.T. Bunn, A. Mabulla, F. Diez-Martin, and E. Baquedano. 2010. A spring and wooded habitat at FLK Zinj and their relevance to origins of human behavior. *Quaternary Research* 74: 304–314.

Binford, L.R. 1981. *Bones: Ancient men and modern myths*. New York: Academic.

Blumenschine, R.J. 1986. *Early hominid scavenging opportunities: implications of carcass availability in the Serengeti and Ngorongoro ecosystems*. British archaeological reports international series 283. Oxford: Archaeopress.

Blumenschine, R.J., and M.M. Selvaggio. 1988. Percussion marks on bone surfaces as a new diagnostic of hominid behaviour. *Nature* 333: 763–765.

Blumenschine, R.J., I.G. Stanistreet, J.K. Njau, M.K. Bamford, F.T. Masao, R.M. Albert, H. Stollhofen, P. Andrews, K.A. Prassak, L.J. McHenry, Y. Fernandez-Jalvo, E.L. Camilli, and J. Ebert. 2012. Environments and hominin activities across FLK peninsula during *Zinjanthropus* times (1.84 Ma), Olduvai Gorge, Tanzania. *Journal of Human Evolution* 63: 364–383.

Bunn, H.T. 1981. Archaeological evidence for meat-eating by Plio-Pleistocene hominids from Koobi Fora and Olduvai Gorge. *Nature* 291: 574–577.

Clarke, R.J. 2012. A *Homo habilis* maxilla and other newly-discovered hominid fossils from Olduvai Gorge, Tanzania. *Journal of Human Evolution* 63: 418–428.

Hay, R.L. 1976. *Geology of the Olduvai Gorge*. Berkeley: University of California Press.

Isaac, G.L. 1978. Food sharing and human evolution: archaeological evidence from the Plio-Pleistocene of East Africa. *Journal of Anthropological Research* 34: 311–325.

Leakey, L.S.B. 1959. A new fossil skull from Olduvai. *Nature* 184: 491–493.

Leakey, M.D. 1971. *Olduvai Gorge, volume 3: excavations in Beds I and II, 1960–1963*. Cambridge: Cambridge University Press.

Leakey, L.S.B., P.V. Tobias, and J.R. Napier. 1964. A new species of the genus *Homo* from Olduvai Gorge. *Nature* 202: 5–7.

Njau, J.K. 2012. Reading bones in Pliocene. *Science* 336: 46–47.

Njau, J.K., and R.J. Blumenschine. 2006. A diagnosis of crocodile feeding traces on larger mammal bone, with fossil examples from the Plio-Pleistocene Olduvai Basin, Tanzania. *Journal of Human Evolution* 50: 142–162.

Njau, J.K., and R.J. Blumenschine. 2012. Crocodylian and mammalian carnivore feeding traces on hominid fossils from FLK 22 and FLK NN 3, Plio-Pleistocene, Olduvai Gorge, Tanzania. *Journal of Human Evolution* 63: 408–417.

Potts, R. 1988. *Early hominid activities at Olduvai*. New York: Aldine and Gruyter.

Potts, R., and P. Shipman. 1981. Cutmarks made by stone tools on bones from Olduvai Gorge, Tanzania. *Nature* 291: 577–580.

Rightmire, G.P. 1983. The Lake Ndutu cranium and early *Homo sapiens* in Africa. *American Journal of Physical Anthropology* 61 (2): 45–54.

Stanistreet, I.G. 2012. Fine resolution of early hominin time, Beds I and II, Olduvai Gorge, Tanzania. *Journal of Human Evolution* 63: 300–308.

White, T.D. 1988. The comparative biology of "Robust" Australopithecus: Clues from context. In *Evolutionary history of the "robust" Australopithecines*, ed. F.E. Grine, 449–483. New York: Aldine de Gruyter.

Further Reading

Bamford, M.K. 2012. Fossil sedges, macroplants, and roots from Olduvai Gorge, Tanzania. *Journal of Human Evolution* 63: 351–363.

Behrensmeyer, A.K., K.D. Gordon, and G.T. Yanagi. 1986. Trampling as a cause of bone surface damage and pseudocutmarks. *Nature* 319: 768–771.

Bennett, C.E., J.D. Marshall, and I.G. Stanistreet. 2012. Carbonate horizons, paleosols, and lake flooding cycles: Beds I and II of Olduvai Gorge, Tanzania. *Journal of Human Evolution* 63: 328–341.

Binford, L.R. 1988. Fact and fiction about the *Zinjanthropus* floor: Data, arguments, and interpretations. *Current Anthropology* 29: 123–135.

Blumenschine, R.J. 1988. An experimental model of the timing of hominid and carnivore influence on archaeological bone assemblages. *Journal of Archaeological Science* 15: 483–502.

Blumenschine, R.J. 1995. Percussion marks, tooth marks, and experimental determinations of the timing of hominid and carnivore access to long bones at FLK *Zinjanthropus*, Olduvai Gorge, Tanzania. *Journal of Human Evolution* 29: 21–51.

Blumenschine, R.J., C.R. Peters, F.T. Masao, R.J. Clarke, A.L. Deino, R.L. Hay, C.C. Swisher, I.G. Stanistreet, G.M. Asheley, L.J. McHenry, N.E. Sikes, N.J. Van Der Merwe, J.C. Tactikos, A.E. Cushing, D.M. Deocampo, J.K. Njau, and J.I. Ebert. 2003. Late Pliocene Homo and hominid land use from Western Olduvai Gorge, Tanzania. *Science* 299: 1217–1221.

Blumenschine, R.J., K.A. Prassack, C.D. Kreger, and M.C. Pante. 2007. Carnivore tooth-marks, microbial bioerosion, and the invalidation of test of Oldowan hominin scavenging behavior. *Journal of Human Evolution* 53: 420–426.

Bunn, H.T., and E.M. Kroll. 1986. Systematic butchery by Plio/Pleistocene hominids at Olduvai Gorge, Tanzania. *Current Anthropology* 27: 431–452.

Davis, P.R. 1964. Hominid fossils from Bed I, Olduvai Gorge Tanganyika: A tibia and fibula. *Nature* 201: 967–968.

Domínguez-Rodrigo, M., and R. Barba. 2006. New estimates of tooth mark and percussion mark frequencies at the FLK Zinj site: the carnivore-hominid-carnivore hypothesis falsified. *Journal of Human Evolution* 50: 170–194.

Domínguez-Rodrigo, M., H.T. Bunn, A. Mabulia, E. Baquedano, and T.R. Pickering. 2010. Paleoecology and Hominin behavior during Bed I at Olduvai Gorge (Tanzania). *Quaternary Research* 74: 301–424.
Leakey, L.S.B. 1936. *Stone Age of Africa: An outline of prehistory in Africa*. London: Oxford University Press.
Leakey, L.S.B. 1965. *Olduvai Gorge 1951–61, volume 1: A preliminary report on the geology and fauna*. Cambridge: Cambridge University Press.
Lee, R.B., and I. Devore. 1968. *Man the hunter*. New York: Aldine de Gruyter.
Mturi, A.A. 1976. New hominid from Lake Ndutu, Tanzania. *Nature* 262: 484–485.
Pante, M.C., R.J. Blumenschine, S.D. Capaldo, and R.S. Scott. 2012. Validation of bone surface modification models for inferring fossil hominin and carnivore feeding interactions, with reapplication to FLK 22, Olduvai Gorge, Tanzania. *Journal of Human Evolution* 63: 395–407.
Peters, C.R., and R.J. Blumenschine. 1995. Landscape perspectives on possible land use patterns for Early Pleistocene hominids in the Olduvai Basin, Tanzania. *Journal of Human Evolution* 29: 321–362.
Pickering, T., and J. Wallis. 1997. Bone modifications resulting from captive chimpanzee mastication: Implications for the interpretation of Pliocene archaeological faunas. *Journal of Archaeological Science* 24: 1115–1127.
Plummer, T.W., and L.C. Bishop. 1994. Hominid paleoecology at Olduvai Gorge, Tanzania, as indicated by antelope remains. *Journal of Human Evolution* 27: 47–75.
Torre, I.D.L., L. McHenrry, J.K. Njau, and M. Pante. 2012. The origins of the Acheulean at Olduvai Gorge (Tanzania): New paleoanthropological project in East Africa. *Archaeology International* 15: 69–78.
White, T.D., and N. Toth. 2007. Carnivora and carnivory: Assessing hominid toothmarks in zooarchaeology. In *Breathing life into fossils: Taphonomic studies in honor of C.K. (Bob) Brain*, ed. T.R. Pickering, K. Schick, and N. Toth, 281–296. Bloomington: CRAFT Press.

Olives: Origins and Development

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Basic Species Information

The olive (*Olea europea* L.) tree is a subtropical evergreen plant that was indigenous to the Mediterranean Basin, confined by its intolerance of frost. It has adapted to long summer droughts and a semiarid temperate climate, well-drained soils, moderate-to-low pH (below 8.5), and mild soil salinity (Terral et al. 2004: 64; Doveri and Baldoni 2007: 254–255). The genus *Olea*, belonging to the family Oleaceae, currently consists of more than 20 species found in tropical and subtropical areas over five continents. Recent revisions of the taxonomy surrounding *O. europea* suggest that this species should be divided into six subspecies based on morphology and geographical distribution including: (1) subsp. *europea* with two botanical varieties *europea* (cultivated olive) and *sylvestris* (wild olive), which is widely distributed throughout the Mediterranean Basin; (2) subsp. *cuspidate* distributed from SE Asia to SW China as well as the Arabian peninsula through East and South Africa; (3) subsp. *laperrinei* is restricted to the Sahara region; (4) subsp. *maroccana*, which is restricted to Morocco; (5) subsp. *cerasiformis* restricted to the island of Madeira; and, (6) subsp. *guanchica* which is restricted to the Canary Islands.

The olive tree is a prickly, long-living evergreen, reaching heights of 15 m and a branch spread of up to 9 m. The olive tree's dense foliage is composed of elliptical-shaped leaves that are gray-green in color. Olive trees can have life spans of more than 500 years, with a few reaching 2,000 years (Doveri and Baldoni 2007: 254). In advanced age, the olive tree trunk becomes hollow, acquiring its characteristic pattern of pronounced twists and protuberances on its bark and continues to add girth to its circumference. The hermaphroditic olive flowers are wind pollinated. Most trees are self-incompatible but a few are self-compatible (Doveri and Baldoni 2007: 254). *Olea europea* L. is the only species that produces edible fruit (Manousis and Moore 1988: 7). The olive is an oleaginous, one-seeded drupe with the fruit yielding up to 50% of its weight in valuable edible oil. Technically, the olive stone (endocarp) "is a fusiform, unintegumented and sclerified endocarp, composed of two asymmetric valves [separated by a longitudinal suture line] protecting one seed"

(Terral et al. 2004: 64), with the surface covered in longitudinally aligned furrows.

The olive tree does not bear fruit for the first 10 or 12 years (Finley 1973: 31). The olive fruit takes 6–7 months to develop fully. The fruit grows slowly over the spring and summer months. A faster increase in size takes place in the autumn due to the water content. Restriction of fruit development can occur if exposed to prolonged droughts. The weight of an individual olive can vary between 1 and 15 g. Oil deposition within the fruit starts at the beginning of the month of August, increases throughout the autumn, and then reaches its peak during November–January when the fruit turns completely black. Harvesting takes place in the autumn after the dramatic increase in size has occurred and the fruit starts to change color. For oil-producing olives, harvesting takes place when the olives are completely ripe, during the months of December or January, to permit the olives to obtain their maximum size and oil content. The commonest method of extraction of the oil from the pulp involves putting the fruit through mills of the edgerunner type (Manousis and Moore 1988). Modern and traditional methods of olive oil production crush the entire olive fruit including the stone to increase oil production as the broken edges of the pit continue to grind the olive fruit, releasing more oil and facilitating the flow of the oil (Tyree and Stefanoudaki 1996: 175).

Subjected to intense climatic and anthropogenic manipulation, the olive tree is considered one of the most versatile and essential crops of the Mediterranean (Terral 2000: 127–128; Costantini and Giorgi 2001: 246; Jashemski et al. 2002; Warnock 2007: 1). Olives were the primary source of edible fat in the Mediterranean used in cooking, soap manufacturing, ointment, perfume, fuel for illumination, and medicine (Finley 1973: 31; Meyer 1980: 405; Costantini and Giorgi 2001: 246). During Roman times, there were about 20 different kinds of olive being cultivated in Italy, Spain, and North Africa; these differed in the shape; size; color of the olive fruits, from nearly white to green, violet, and deep purple; and, in the shape and size of the leaves, from small linear-laceolate to large ovate. Recent studies have shown olives contain antioxidants in abundance, represented by acteosides, hydroxytyrosol, tyrosol, and phenylpropionic acids (Doveri and Baldoni 2007: 255).

Major Domestication Traits

It is believed that oleaster (*Olea europaea* Linn. var. *sativa* DC) represents the progenitor stock from which the cultivated plant derives, which was endemic across the Mediterranean region and the Middle East (Doveri and Baldoni 2007: 253). The domestication of olives has led to the selection of olive trees with larger fruit size and higher oil content under vegetative propagation from either cuttings or grafting to indigenous oleasters (Doveri and Baldoni 2007: 253). The earliest signs for the domestication of olives are generally attributed to the areas bordering the east coast of the Mediterranean Sea during the Chalcolithic period from the fourth millennium BCE in Palestine (Zohary and Hopf 1993: 141 in Zohary 1994: 62–63; Terral et al. 2004: 64). Olive domestication in the Near East is thought to have occurred in early Bronze Age, second half of the fifth millennium BCE, based upon the discovery of olive oil presses and the presence of pollen grains, olive stones, and wood remains (Doveri and Baldoni 2007: 253). Olives have been discovered from the third millennium BC sites in Palestine and Syria and Bronze Age (3rd–2nd millennium BCE) sites in Cyprus, Greece, and northern Italy (Renfrew 1973). By the middle and late Bronze Age, olive cultivation and olive oil production seems to have been well established throughout the countries bordering the east shore of the Mediterranean Sea including Palestine and Syria to Greece (Zohary and Spiegel-Roy 1975: 187). Recent molecular analysis based upon nuclear and cytoplasmic markers from both eastern and western Mediterranean populations found that these two populations are strongly differentiated from one another (Doveri and Baldoni 2007: 255). There are now over 80 different kinds of olive

trees grown in the Mediterranean Basin (Newberry 1937).

It is not possible based upon palynological data to distinguish between wild and domesticated olives (Galili et al. 1997: 1141; Ciaraldi 2001: 172). Olives possess a high degree of variability in the size of the olive stone (endocarp) and it impossible to distinguish between the wild forms and those of cultivated varieties (Liphschitz et al. 1991: 441; Kislev 1996; Zohary and Hopf 1988 cited in Galili et al. 1997: 1141). Recent genetic work has created genetic markers of *O. europaea* which would potentially allow for the germplasm identification of olives, even with the use of poorly preserved material from herbarium specimens or archaeobotanical material (Besnard et al. 2003). Due to their preferential preservation, olive stones (endocarps) are fairly ubiquitous and usually recovered from most Mediterranean archaeological sites (Finley 1973: 31; Terral et al. 2004: 63–64).

Timing and Tracking Domestication

Domesticated olives were brought to the New World in the fifteenth century by Europeans. This was the first time that the olive tree was cultivated outside the Mediterranean Basin. Today, the olive is grown commercially in Australia, South America (Argentina and Chile), and South Africa (Doveri and Baldoni 2007: 253). Cultivated olives possess high variability. There are at least 1,275 known cultivars. Many local varieties and ecotypes have contributed to the richness of olive germplasm. Few cultivars are dispersed over widespread areas. The majority of olive cultivars are highly localized (Doveri and Baldoni 2007: 254). Cultivars are mostly diploids with a few tetraploid plants reported (Doveri and Baldoni 2007: 255). Some olive varieties are used for oil and some varieties for food as preserved olives (Feliks and Gilboa 2007: 406). In processed olive fruits, sugar content varied among olive cultivars according to processing conditions (Marsilio et al. 2001: 485) (Fig. 1).

Olives: Origins and Development, Fig. 1 Whole carbonized *Olea europea* (olive) endocarp recovered from Insula VI.I, Pompeii, Italy (scale in centimeters). (Photo taken by author)

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Date Palm: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Figs: Origins and Development
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Grapes: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Besnard, G., R.R. De Casas, and P. Vargas. 2003. A set of primers for length and nucleotide-substitution polymorphism in chloroplastic DNA of *Olea europaea* L. (Oleaceae). *Molecular Ecology Notes* 3: 651–653.

Ciaraldi, M.R.A. 2001. Food and fodder, religion and medicine at Pompeii. Unpublished Ph.D. dissertation, University of Bradford.

Costantini, L., and J. Giorgi. 2001. Charred plant remains of the Archaic period from the Forum and Palatine. *Journal of Roman Archaeology* 14: 239–248.

Doveri, S., and L. Baldoni. 2007. Olive. In *Genome in mapping and molecular breeding in plants, volume 4: Fruits and nuts*, ed. C. Kole, 253–264. Berlin: Springer-Verlag.

Feliks, J., and S. Gilboa. 2007. Olives. In *Encyclopaedia Judaica, volume 15*, ed. M. Berenbaum and F. Skolnik, 2nd ed., 406–407. Detroit: Macmillan Reference USA.

Finley, M.I. 1973. *The ancient economy*. London: Chatto & Windus.

Galili, E., D.J. Stanley, J. Sharvit, and M. Weinstein-Evron. 1997. Evidence for earliest olive-oil production in submerged settlements off the Carmel coast, Israel. *Journal of Archaeological Science* 24 (12): 1141–1150.

Jashemski, W.F., F.G. Meyer, and M. Ricciardi. 2002. Plants: Evidence from wall paintings, mosaics, sculpture, plant remains, graffiti, inscriptions, and ancient authors, catalogue of plants. In *The natural history of Pompeii*, 80–180. Cambridge: Cambridge University Press.

Kislev, M. E. 1996. The domestication of the olive tree. In *Olive oil in antiquity, Israel and neighbouring countries from the Neolithic to the Early Arab Period*. History of the Ancient Near East Studies 7, ed. D. Eitam and M. Heltzer, 3–6. Padova: Sargon.

Liphschitz, N., R. Gophna, M. Hartman, and G. Biger. 1991. The beginning of olive (*Olea europea*) cultivation in the Old World: A reassessment. *Journal of Archaeological Science* 18: 441–453.

Manousis, T., and N.F. Moore. 1988. The olive tree. *Biologist* 35 (1): 7–13.

Marsilio, V., C. Campestre, and B. Lanza. 2001. Phenolic compounds change during California-style ripe olive processing. *Food Chemistry* 72 (4): 485–490.

Meyer, F.G. 1980. Carbonized food plants of Pompeii, Herculaneum, and the Villa at Torre Annunziata. *Economic Botany* 34 (4): 401–437.

Newberry, P.E. 1937. On some African species of the genus olea and the original home of the cultivated olive-tree. *Proceedings of the Linnean Society of London* 150: 3–16.

Renfrew, J.M. 1973. *Palaeoethnobotany: The prehistory of food plants of the Near East and Europe*. London: Methuen.

Terral, J.-F. 2000. Exploitation and management of the olive tree during prehistoric times in Mediterranean France and Spain. *Journal of Archaeological Science* 27 (2): 127–133.

Terral, J.-F., N. Alonson, B.I. Capdevilla, N. Chatti, L. Fabre, G. Fiorentino, P. Marinval, G. Perez Jorda, B. Pradat, B. Rovira, and P. Alibert. 2004. Historical biogeography of olive domestication (*Olea europaea* L.) as revealed by geometrical morphometry applied to biological and archaeological material. *Journal of Biogeography* 31: 63–77.

Tyree, E.L., and E. Stefanoudaki. 1996. The olive pit and Roman oil making. *The Biblical Archaeologist* 59 (3): 171–178.

Warnock, P. 2007. *Identification of ancient olive oil processing methods based on olive remains*. BAR International series 1635. Oxford: Archaeopress.

Zohary, D. 1994. The wild genetic resources of the cultivated olive. *Acta Horticulturae* 356: 62–65.

Zohary, D., and M. Hopf. 1993. *Domestication of plants in the Old World: The origin and spread of cultivated plants in West Asia, Europe and the Nile Valley*. 3rd ed. Oxford: Clarendon Press & Oxford University Press.

Zohary, D., and P. Spiegel-Roy. 1975. Beginnings of fruit growing in the Old World. *Science* 187 (4174): 319–327.

Further Reading

Zohary, D., and M. Hopf. 2001. *Domestication of plants in the Old World: The origin and spread of cultivated plants in West Asia, Europe and the Nile Valley*. 3rd ed. Oxford: Oxford University Press.

Olmec: Geography and Culture

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Introduction

The Olmecs emerged about 1200 BCE along the rivers of Veracruz and Tabasco. The ethnicity of these people now dubbed the spoken Mixe-Zoquean or Mayan language due to lack of archaeological data, but there is no information as far as what the Olmec called themselves. There is a reliable register about their cities they founded and a list of gods worshipped. One of these gods is represented with incised flamed eyebrows found within an extensive region; for about 1000 years, these symbols and gods were used as a way of communication across a large region. Individuality, self-confidence as exact observers of nature, and self-empowerment for manipulation rose among the population as shamans and priests, for some theorist's population was divided into at least two main social classes to include commoners. Shamans developed a systematic cosmology to explain creation, origins of humankind, and used the human body and nature to explain it. Olmecs occupied a vast tropical rain forest where felines, eagles, caimans, and snakes

complemented practices and rituals. They observed a parallelism of humans with consumers of flesh that also became elements for sacrifice, bloodletting, pilgrimages, cave ritual, offerings of caches, quadripartite vision of the world, and fascination with mirrors (Miller and Taube 1993: 15).

The subject Olmec is to be divided into two parts: (1) the Olmec art style and (2) the Olmec area surrounding the Tuxtla Mountains. The art style has been reported as far away as Peru. The main Mesoamerican sites where Olmec art has been found outside the Olmec heartland are Chalcatzingo and Oxtotitlan.

The most important Olmec sites are La Laguna de los Cerros, Tres Zapotes, San Lorenzo, and La Venta. Most of the literature up until the 1960s is covered in Ignacio Bernal's *El Mundo Olmeca*. Much of the later material on the Olmec sites can be found in the supplements to the *Handbook of Middle American Indians*. San Lorenzo rose probably around 1200 BCE but gets destroyed around c. 900 BCE, about the time La Venta began to flourish (800–300 BCE). The three-site settlement pattern is laid out based on bilateral symmetry, just as their art, symbolism images, and representations are along a central axis.

There is still a general consensus that the Olmec was the fount of all later Mesoamerican civilizations. However, William Sanders in his *Mesoamerica* (with Barbara Price) insists that formative developments in the valley of Mexico were far more sophisticated than the Olmec materials. This goes along with his notion (and the ideas of many others) that central Mexico dominated all of Mesoamerica throughout history (Edward Kurjack, "personal communication").

Definition

The name Olmec is a modern corruption of Olmecatl (Nahuatl "rubber people" or "people of the rubber country"), by which the Aztecs referred to the inhabitants of the region during the Late Postclassic period. Authors like G. Lowe note five main phases of development, but that is in the Formative and Middle Formative periods starting in 1500 BCE, when it starts taking off, and by 1200 BCE coincides with San Lorenzo's growth and development. Its emergence as an important cultural power in southern Mesoamerica and its ultimate decline at the beginning of the first millennium BCE La Venta replaced San Lorenzo during the Intermediate Olmec phase (900–600 BCE) and climaxed in subsequent Terminal Olmec times. Tres Zapotes and other sites located northwest of the Tuxtla Mountains came into power in Epi-Olmec (300 BCE–1 CE) times while under the strong stylistic influence of societies on the Pacific coastal region of Chiapas and Guatemala.

La Venta contains the first radial pyramid ever built within Mesoamerican architecture, which has been interpreted as a volcano effigy. In this site, Olmecs buried pavements and caches in this radial patter, while in San Lorenzo, basalt sculpture was buried along the edges of a large ceremonial platform. Olmecs built thrones or shrines and colossal heads from which lords talked to shamans. Olmec art has not found a parallel prototype in the world, as a unique and complex art of early civilization.

The Olmecs extended from Central America to western Mexico, particularly in search of scarce highlands resources like jade. According to John Pohl, there are four main Olmec sites along a line of 100 miles from the Atlantic coast of the Gulf of Mexico; La Laguna de los Cerros y Tres Zapotes are found in the high elevated lands surrounding the mountains of Tuxtla, while San Lorenzo y La Venta are found between the alluvial plain of the rivers that drains into the ocean. Each site monopolized salt, clay, limestone, and hematite as they were exchanged with squash, beans, and corn, which allowed San Lorenzo development, and La Venta to become a ceremonial center by 800 BCE.

Magnificently carved stone sculptures are the hallmark of Olmec culture. Stones quarried in the Tuxtla Mountains, some weighing many tons, were transported over distances of more than 150 km by water and land. The corpus of sculptures includes colossal human heads that may be portraits of rulers, huge flat-topped "altars," or thrones; realistically depicted life-size human figures; and a bewildering assortment of human,

animal, and intermediate forms that combine traits of both. Scores of monuments must have been displayed simultaneously at every large Olmec center, but since few if any have been found in their original placement, it is impossible to know how they were arranged.

A unique Olmec style is evident in both the monumental sculptures and the smaller portable objects of jadeite, serpentine, clay, and other materials. According to Coe (1965), "the Olmec style is strongly contrasted with all other Middle American styles" not only in its iconographic content of baby-faced, snarling were jaguars and cleft heads but in its formal qualities of shape, line, and space. Their style was so distinctive as its components and pieces display that it can be readily attributed to Olmec artisans regardless of where the object was discovered in modern times.

Olmec commoners lived in small villages indistinguishable from those of earlier times, but the newly emergent elites along with their dependents and retainers occupied larger settlements that we can justifiably call towns. These communities became the foci of economic power, political influence, and religious leadership. Many such towns probably existed, but only San Lorenzo, La Venta, Laguna de los Cerros, and Tres Zapotes have been studied by archaeologists. Not only were these towns larger than the subordinate villages surrounding them, they also contained stone sculptures; temples and elite houses placed on the summits of earth mounds; and buried caches and offerings containing discarded monuments, greenstone celts, and figurines as well as other rare and highly prized objects.

Key Issues/Current Debates/Future Directions/Examples

The heart of the Olmec style has been debated vigorously for decades. Most authorities believe that it grew out of an earlier artistic complex indigenous to the Olmec heartland but executed in wood, cloth, and other objects that have failed to survive the ravages of time. Not everyone agrees, however, and some scholars still seek its antecedents in Guerrero, Oaxaca, Chiapas, or other regions of southern Mesoamerica. For example, if we look at the Göbekli Tepe site and the shrines of the Stone Age, in High Mesopotamia, there is evidence of a "hunter and gatherer" civilization, who also built amazing fine stone large slabs with art work sculpted in it. This evidence is forcing theories of early civilizations that do not necessarily explain the evolution of art and religion as being part of a complex society, in the whole sense of the word, but to explain more simple societies – where art gave shape to religious temples – and before the conformation of complex societies.

Striking evidence of early civilizations such as the Olmec has taken specialists like Matthew Stirling (1939) to uncover the most early dates written in the calendar called the Long Count prevalent among the Maya; nonetheless, Tres Zapotes and its Stela C lacked this type of calendrical note; Stirling correlated the date to 32 BCE, similar in time to other reading of Long Count found at Chiapa de Corzo in Tuxtla Gutierrez and La Mojarra Stela 1, depicting a standing lord wearing the principal deity headdress and regalia as those of the Maya kings. This evidence has resulted in the beginning of a formal tradition not only attributed to the Olmec but the whole in Mesoamerican art, representing the dynastic generations of rulers, registration of time with the use of calendars, and phonetic writing.

Author Richard Diehl (2004a, b) expresses that these civilizations are special kinds of human societies that have appeared only infrequently in the human past. They are more complex than the smaller-scale, simpler societies that preceded them. Their defining characteristics include complex social hierarchies, economic structures, and political systems; clearly defined territories or spheres of influence; "capitals" that were larger than the satellite communities subordinate to them and that, in some cases, true cities or urban centers, with high attainments in the arts. Architecture, calendrics, religion, ritual, written and oral literature, and other branches of esoteric knowledge that according to him reflect the presence of an upper class or elite, perhaps the trait that most distinguishes civilizations from their less complex and organized predecessors.

This take to consider findings like well-preserved wooden sculptures and objects of rubber and other perishable materials immersed in a permanently wet spring over 40 wooden busts carved out of soft wood and feature faces stylistically identical to Olmec carvings in stone, wooden scepters shaped like serpents, rubber balls, and over 100 greenstone celts that such early symbols marked the rest of ideology and Mesoamerican symbology of royal power like that shark's tooth mounted on the wooden serpent mouth scepters. An object's deliberate placement in the bottom of the spring, perhaps as offerings to a water deity sometime after 1000 BCE might make theorists formulate comparisons with distant areas, like those large heads carved at Eastern island, and the Classic Maya site of Ek Balam, this site exposing a behavior of deliberate hiding of an 8 m sculpture in decorated exterior facade of a temple that showed some of the finest stuccoes art work ever to be found within the region.

Theories hold that Olmec society contained at least two social strata: a small ruling elite and a much larger group of commoners forming large work parties; perhaps numbering in the thousands, the commoners constructed earthen mounds, transported basalt from quarries in the Tuxtlas, and carried out other projects requiring the efforts of entire communities. Monuments depict rulers wearing sumptuous capes, headdresses, jewelry, and other articles of clothing symbolic of their high status. Rulers controlled long-distance trade and exchange systems that supplied them and their supporters with obsidian, serpentine, jadeite, pottery, feathers, iron ore ornaments, and other raw materials and luxury goods that enhanced their prestige. Goods and materials that came from central Mexico, Morelos, Guerrero, Oaxaca, coastal Chiapas, and Guatemala were probably paid with cacao, jaguar pelts, crocodilian skins, stingray spines, and an array of finished products in the Olmec style.

Key issues are that most scholars agree that the Olmecs "influenced" their neighbors and later Mesoamerican civilizations but the nature and extent of their impact is the subject of spirited debate (cf. essays in Sharer and Grove 1989). Some maintain that the Olmecs were Mesoamerica's mother culture, the precocious base civilization that set the example for its less highly developed neighbors. Others maintain that Olmec societies were no more complex than their contemporaries elsewhere in Mesoamerica and that the widespread occurrence of Olmec motifs and stylistic conventions result from ideas and practices in many areas, rather than diffusion from a single Olmec source. Similarly, some authorities stress the continuities, especially in art, ideology, and religion, between Olmec culture and later civilizations, while others emphasize the differences that appeared during the later evolution of urban life.

For example, by 900 BCE, Copan down in the Maya raising civilization made imitations of Olmec ceramics and jade, while in western Mexico, Olmecs encountered with the Xochipala culture where naturalistic human figures had been made after 1500 BCE. Olmec-style petroglyphs also mark the cliffs of highland Guatemala and Chiapas, established a center at Teopantecuanitlan, Guerrero, and Olmecs performed rituals in caves at Cacahuazqui, Juxtlahuaca, and Oxtotitlan as well in Guerrero.

Some of the Oxtotitlan paintings, dating late Middle Preclassic period c. 800–500 BCE, were investigated by Dr. David Grove in 1968 and 1969. The paintings appeared in detail in several publications in Spanish and English. Scenes depicting simple geometric designs, large polychrome murals were executed on the cliff face. One painting depicts a personage wearing a bird mask and bird-feather cape. The bird mask has traits suggesting that it represents a horned owl. The personage is seated atop a large supernatural serpent face. The size of this painting is 3.8 m by 2.5 m. The graffiti and damage caused by past visitors has been eliminated, and many of the paintings have been carefully cleaned and preserved. In addition, the villagers of Acatlan have assumed the important role of caretakers and guardians of the cave and its paintings. The cave is open to public, but it is now protected by a large fence with locked gates, and people wishing to visit the cave must first register at Acatlan's municipal palace in order to gain access.

David C. Grove declares that because of its elaborate and precocious bas-relief rock art dating to c. 700–500 BCE, Chalcatzingo, Morelos, has long been recognized as one of Mexico's most important Formative period archaeological sites. For decades, scholars noted the close similarities between Chalcatzingo's rock carvings and the monumental art at distant Olmec centers on Mexico's southern Gulf Coast. However, the nature of Chalcatzingo and the "Olmec presence" there remained unclear. Had it been an Olmec colony? A trade control center? In the 1970s, the Chalcatzingo Archaeological Project, codirected by Jorge Angulo, Raul Arana, and David Grove, sought to gather data on the Formative period village – its dwellings, public architecture, and material culture – in order to better understand the site's evolution and also its relationship with the Gulf Coast Olmecs.

Chalcatzingo possesses monumental architecture, consisting of earthen platform mounds sometimes faced with stone, and began appearing in Mesoamerica around 1300 BCE during the Early Formative period (1500–900 BCE). The site is located 120 km southeast of México City in the state of Morelos, at the base of two large hills on the only good expanse of agricultural land for many miles. Chalcatzingo provides a unique opportunity to investigate the form and function of monumental architecture since it is the only known central Mexican site with evidence of monumentality in the Early Formative period.

Investigations on Chalcatzingo's settlement pattern, environment, agricultural practices, trading patterns, and social organization led to questions like, do the platform mounds serve as substructures for chiefly residences or public buildings? What are the types of activities associated with these platform mounds? How did these platform mounds change over time? The data yielded by the excavation of the platform mound was also used to examine theories of the rise of sociopolitical complexity at Chalcatzingo.

Results lead to believe that platform mounds served as substructures for the erection of important structures that functioned as a public building or multiple-purpose facilities which served as both temples and chiefly residences. Above all, monumental architecture is significant for the understanding of sociopolitical development as indicators of an inegalitarian social organization which marked its status and power through monumental constructions during the Early Formative of Mesoamerica.

Monument 32 similar to Monument 21 depicts a woman wearing elaborate clothing, holding her hands in a similar pose, and standing in front of a column. The two monuments appear to be mirror images of one another, perhaps representing a male and female who were related in some way. Cyphers Guillén (1984) has indicated the portrayal of a woman on Monument 21 commemorates a marriage alliance between the elite of Chalcatzingo and a nearby area and has identified this site as Teopantecuanitlán, Guerrero. The male personage on Monument 32 may be her marriage partner and may also come from this locale.

Long sequence of occupation of this site preceded and postdated the platform mound. Whether it was built through voluntary communal effort or under the direction of a particular individual, the platform mound indicates the existence of a centralized authority.

Analysis of the ceramics, figurines, and other artifacts associated with the platform demonstrates a similarity with materials from other sites in the Valley of México during the same period of time which indicated independent development of sociopolitical complexity at Chalcatzingo. This contradicts previous theories which postulated that cultural development at this site was the result of contact with the Olmec culture of the Gulf Coast (Piña Chan 1955; Coe 1965; Bernal 1969).

Domestic architecture, subsistence practices, food-preparation techniques, refuse disposal patterns, level of technology, economic practices, craft production, and other aspects of daily life have not been under study and form part for future studies. Only a handful of Early Formative houses from Central México have been excavated.

Cross-References

► Cueva de las Manos, Río Pinturas Cave Art
► Göbekli Tepe: Agriculture and Domestication

▶ Kondoa Rock Paintings: Traditional Use
▶ Megalithic Art: A Visual Repertoire for the Dead
▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
▶ Mesoamerica: Complex Society Development
▶ Mesoamerica: Subsistence Strategies by Region
▶ Mesoamerica's Archaic Period
▶ Urban Archaeology

References

Bernal, I. 1969. *The Olmec word*. Berkeley: University of California Press.

Coe, M.D. 1965. The Olmec style and its distribution. In *Handbook of Middle American Indians*. Vol. 3, ed. R. Wauchope and G.R. Willey, 739–775. Austin: University of Texas Press.

Cyphers Guillén, A. 1984. The possible role of a woman in formative exchange. In *Trade and exchange in early Mesoamerica*, ed. K.G. Hirth, 115–123. Albuquerque: University of New Mexico Press.

Diehl, R. 2004a. Death gods, smiling faces and colossal heads: Archaeology of the Mexican Gulf lowlands (originally as PreColumbian cultures of the Gulf coast). In *History of the native peoples of the Americas, volume 2: Mesoamerica*, ed. R.E.W. Adams and Murdo J. MacLeod. Available at: http://www.famsi.org/research/diehl/section01c.html. Accessed 12 Nov 2012.

Diehl, R. 2004b. *The Olmecs: America's first civilization*. London/New York: Thames & Hudson.

Grove, D.C. 1968. Chalcatzingo, Morelos, Mexico: A reappraisal of the Olmec rock carvings. *American Antiquity* 33: 486–491.

Grove, D. 1969. Olmec cave paintings: Discovery from Guerrero, Mexico. *Science* 164: 421–423.

Miller, M., and K. Taube. 1993. *An illustrated dictionary of the gods and symbols of ancient Mexico and the Maya*. London: Thames & Hudson.

Piña Chan, R. 1955. *Chalcatzingo, Morelos* (Informes 4). Mexico: Instituto Nacional de Antropología e Historia.

Sharer, R.J., and D.C. Grove. 1989. *Regional perspectives on the Olmec*. Cambridge: Cambridge University Press.

Stirling, M.W. 1939. *An initial series from Tres Zapotes, Vera Cruz, Mexico. National Geographic Society contributed technical papers I.* Washington, DC: National Geographic Society.

Further Reading

Coe, M., and R. Diehl. 1980. *In the land of the Olmec, volume 1: The archaeology of San Lorenzo Tenochtitlán*. Austin: University of Texas Press.

David, G. n.d. *The middle preclassic period paintings of Oxtotitlan, Guerrero*. Available at: http://www.famsi.org/research/grove/index.html#Introduction. Accessed 12 Nov 2012.

De Leonard, C. 1967. Sculptures and rock carvings at Chalcatzingo Morelos. *Contributions of the University of California Archaeological Research Facility* 3: 57–84.

Gay, C.T. 1972. *Xochipala: The beginning of the Olmec art*. Princeton: Art Museum, Princeton University Press.

Grove, D. 1970. *Los Murales de la Cueva de Oxtotitlán, Acatlán, Guerrero*. Vol. 23, *Serie Investigaciones*. México: INAH.

Jimenez, M.W. 1966. Mesoamerica before the Toltecs. In *Ancient Oaxaca*, ed. J. Paddock, 3–82. Palo Alto: Stanford University Press.

Pohl, J. n.d. *Mesoamérica*. Available at: http://www.famsi.org/spanish/research/pohl/sites/laventa.html. Accessed 12 Nov 2012.

Reilly, F.K., III. 1999. *Olmec-style iconography*. Available at: http://www.famsi.org/reports/94031/index.html. Accessed 12 Nov 2012.

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Basic Biographical Information

Keiichi Omoto, Ph. D., professor emeritus of both the University of Tokyo and International Research Center for Japanese Studies, was born on May 16, 1933, in Tokyo. His father was a professor of electrical engineering at the Tokyo Institute of Technology. Since childhood Omoto was enthusiastic about butterfly collecting, which gave him a motivation to study the diversity rather than the laws of nature. After 2 years in the General Culture Course of the University of Tokyo, he went to the Faculty of Letters and majored in German Literature. During this period, he attended a special lecture on human evolution given by Professor Hisashi Suzuki at the Department of Anthropology of the Faculty of Science. Suzuki encouraged Omoto to study Physical Anthropology in his Department. After graduation in 1956, Omoto entered the Faculty of Science and majored in Physical Anthropology. Accordingly, he has two bachelor degrees: a

Bachelor of Arts (literature) and a Bachelor of Science (Physical Anthropology). He entered the master's course of the Graduate Course of Science in 1959, at the University of Tokyo. After he obtained a Master of Science degree, he proceeded to enter the doctoral course. After finishing his coursework, he obtained a scholarship from the German government (DAAD). In 1961, he entered a Ph.D. program at the University of Munich that specialized in human genetics. His academic supervisor was Professor Karl Saller. Keiichi Omoto studied genetic polymorphisms of serum proteins using agar and starch gel electrophoresis. He received Ph.D. from the University of Munich in 1963. He then obtained the scholarship from the Alexander von Humboldt Foundation and moved to the Department of Human Genetics, University of Freiburg, Breisgau, where his supervisor was H. W. Goedde. In 1964, he returned home in Tokyo and was appointed as a research assistant in the Department of Anthropology, Faculty of Science of the University of Tokyo. Omoto received the Doctor of Science degree from the University of Tokyo in 1972 based on the doctoral thesis "Blood protein polymorphisms and the problem of the genetic affinities of the Ainu." Accordingly, he has two doctoral degrees: a Ph.D. (Munich) and a D. Sc. (Tokyo). Omoto became a lecturer and an associate professor at the same Department in 1968 and 1973, respectively. He was promoted to full professor in 1979. Starting a year before his retirement from the University of Tokyo in 1994, he served as a professor in the International Research Center for Japanese Studies in Kyoto from 1993 to 1999. He also served as a professor at Momoyama Gakuin Daigaku (St. Andrews University) in Osaka from 1999 to 2004. He was then invited to be a senior research fellow by Graduate University for Advanced Studies (Sokendai) in Hayama and managed a research team for human growth study from 2004 to 2010. He is now living in Tokyo with his wife.

Major Accomplishment

After he returned to Japan from Germany in 1964, Keiichi Omoto was involved in an anthropological study of the Ainu people in Hokkaido, the northernmost island of Japan, as a part of the International Biological Program (IBP). Together with Shogo Misawa, a doctor of the legal medicine who specialized in blood group typing, Omoto collected blood samples from the Ainu people in District of Hidaka, Hokkaido. He analyzed allele frequency data of blood groups, serum proteins, and red cell enzymes when he was a visiting research fellow at the Australian National University, Canberra, in 1970 (e.g., Omoto 1972). Later, he also studied indigenous people in Okinawa, the southernmost islands of Japan. Omoto and his collaborators collected a large number of blood samples in the 1970s and the 1980s from various indigenous peoples of the Philippines, especially focusing on the ethnic groups belonging to the negrito (small black) people, and published a series of papers on their genetic characteristics (e.g., Omoto et al. 1978; Omoto 1984). He also studied various ethnic minorities in Hainan Island and in the northern part of China in the 1980s and the 1990s with Chinese collaborators (e.g., Omoto et al. 1993). Later, Omoto carried out a series of data analyses (e.g., Omoto 1995; Omoto and Saitou 1997) with special reference on the origin of Japanese and the negrito peoples. When genome-wide SNP typing became available, the DNA samples of the Ainu and the negrito people that had been collected by Omoto were used. These massive data presented new perspectives on modern human evolution in East Eurasia (Japanese Archipelago Human Population Genetics Consortium 2012; Jinam et al. 2017, respectively). Omoto published many books written in Japanese, including *Human and Civilization* (2016). Because this encyclopedia focuses on archeology, Omoto's other academic activities have not been mentioned so far. However, he is well known as a butterfly

collector in Japan, and his collection is now stored in the University of Tokyo Museum as the "Omoto Collection." He also carried out molecular phylogenetic analyses of butterflies using mitochondrial DNA data and published papers in the journal *Gene*. He is also good at playing shogi (Japanese chess) and holds a high rank in this.

Cross-References

- ▶ History of Archaeology in Japan
- ▶ Hokkaido Sequence and the Archaeology of the Ainu People

References

Japanese Archipelago Human Population Genetics Consortium. 2012. The history of human populations in the Japanese Archipelago inferred from genomewide SNP data with a special reference to the Ainu and the Ryukyuan populations. *Journal of Human Genetics* 57: 787–795.

Jinam, A.T., et al. 2017. Discerning the origins of the Negritos, First Sundaland people: Deep divergence and archaic admixture. *Genome Biology and Evolution* 9: 2013–2022.

Omoto, K. 1972. Polymorphisms and genetic affinities of the Ainu of Hokkaido. *Human Biology in Oceania* 1: 278–288.

Omoto, K. 1984. The Negritos: Genetic origins and microevolution. *Acta Anthropogenetica* 8: 137–147.

Omoto, K. 1995. Genetic diversity and the origins of the "mongoloids". In *The origin and past of modern humans as viewed from DNA*, ed. S. Brenner and K. Hanihara, 92–109. Singapore/London: World Scientific.

Omoto, K., and N. Saitou. 1997. Genetic origins of the Japanese: A partial support for the "dual structure hypothesis". *American Journal of Physical Anthropology* 102: 437–446.

Omoto, K., et al. 1978. Population genetic studies of the Philippine Negritos. I. A pilot survey of red cell enzyme and serum protein groups. *American Journal of Human Genetics* 30: 190–201.

Omoto, K., et al. 1993. Population genetic study in Hainan Island, China. I. Distribution of blood genetic markers. *Anthropological Science* 101: 1–24.

Ontologies

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Introduction

Ontology and thinking in ontological terms has become a widespread phenomenon in recent years, crosscutting several social sciences, with a particularly strong impact on archaeological studies. In the most general of terms, ontology focuses on the world (or worlds) as it is. This turn to ontology is a reaction to the claim that archaeological reality is best understood when subsumed under epistemological principles, social theorizing, and cultural relativism. For the supporters of ontology, archaeological theory of the twentieth century was too limiting in that it artificially separated reality into its material manifestation and knowledge of that manifestation. This dual way of perceiving archaeological reality is an affectation of modernist ways of reasoning, one that sees reality as perpetually divided between being/thought, nature/culture, and subject/object. Against this, ontological perspectives promote approaches to archaeological reality by recognizing its ontologically real, inherently material, and intricately connected nature.

While ontological perspectives are theoretically quite diverse and have been influenced by a vast array of authors and disciplines, they nevertheless agree that the theoretical standards and practices of the previous century are inadequate. They criticize the idea that archaeology should focus on humans and argue that there is more to archaeology than recognizing the "web of interpretations" weaved by human actors. Ontological perspectives place archaeology closer to current trends in anthropology, to approaches developed in science and technology studies, and political ecology.

Methodologically, ontologies favor credulity and wonder in face of that which goes against our westernized, rational, and modernist view of reality; they favor approaches which perceive reality as built upon relations between objects (human and nonhuman); and they also favor the exploration of the material properties of objects, and how these properties change and are changed in their own emergence.

Definition

There are several definitions of the term "ontology" in archaeology, but these can be reduced to two main definitions. The more recurrent one is that found in the work of Benjamin Alberti (2016) which is adapted directly from the "ontological turn" in anthropology (Henare et al. 2007; Viveiros de Castro 2012). According to Alberti, rather than concerning the "world as it is," which is the conventional definition of ontology as understood in philosophical circles, ontology as applied in anthropology comes from indigenous theory and concerns the actual world of the people under analysis, rather than their worldview. More concretely, the ontological turn suggests that the differences between different human groups are more than just differences in how people perceive or know the world. Thus, instead of thinking in terms of epistemology, it is preferable to recognize reality in terms of ontological difference. It should be noted that this definition has not gone uncriticized, with some scholars pointing out that there seems to be little difference between "ontology" and "culture" (Carrithers et al. 2010).

A second definition of "ontology" comes from a metaphysical trend in archaeology, which claims some links to anthropology, but also distances itself from it in certain ways. This understanding of ontology is metaphysical in that it pays respect to the work of philosophers, rather than from anthropological studies of the previous definition. Based on the work of thinkers such as Bruno Latour, Jane Bennett, Karen Barad, among many others, archaeologists have started discussing ontology as the basis on which archaeological research should be conducted. While there are some similarities between this definition and the previous one, there are also crucial differences. On the one hand, the term "ontology" in the anthropological sense has clear methodological connotations insofar as it forces the anthropologist and/or archaeologist to abandon Western epistemological choices, which are often imposed on informants (e.g., differentiation between humans and animals) given that these choices tend to have little or no applicability in non-Western contexts. On the other hand, the term "ontology" in the current metaphysical trend in archaeology refers not to the "world" of informants, but rather to the general foundation on which reality exists. In this sense, ontology is closer to its philosophical origins as it concerns whether the world is composed of objects (Edgeworth 2016; Olsen 2010), relations (Watts 2013), or vibrant matter (Crellin 2017).

The term "ontology" is also used quite loosely to refer, at times, to the commitments followed by archaeologists in their research. In this sense, ontology concerns the objective conditions that underlie how archaeological research is conducted. For instance, Harris and Cipolla claim that most archaeological research of the twentieth century followed a dualist ontology, one which was subsumed under opposing elements such as nature/culture or mind/matter (Harris and Cipolla 2017: 27ff.). This, in turn, has led to an artificial separation of archaeological research into two poles, one that favors the study of signs, subjects, beliefs, identity, and culture, and another pole which favors the natural sciences, materials, and objects. The advocates of ontological approaches recognize that not only is this separation too artificial, it is very unlikely that people in the past recognized reality in this dual way. Against this, advocates of ontological approaches recommend dismantling these dualisms and favoring an understanding of reality which recognizes all elements as interrelated, as parts of networks, entanglements, or assemblages. This non-dualist way of recognizing reality would allow a deeper and more detailed understanding of reality, one which recognizes how humans and nonhuman objects mutually affect one another.

Historical Background

As is common with theoretical notions, it is difficult to pinpoint an exact moment when ontologies were first addressed in archaeology. If we accept that ontology refers to the objective commitments followed by archaeologists in their research, then it can be said that ontology has been a crucial element of archaeology since the birth of the discipline. However, if we are more concerned with the study of ontologies themselves, it becomes possible to historically trace when and why ontologies became important to archaeologists.

Ontology was not something that just sprung up in archaeology and anthropology out of nowhere – it has had a long gestation period outside these disciplines. Given that the concept is of philosophical origin, it comes as no surprise that it is in philosophy where the concept rose to prominence in the years preceding its archaeological and anthropological adoption. From a historical perspective, it can be said that ontology has always been a crucial element in philosophical thought. In fact, throughout history, we witness several philosophers or schools of philosophy provide ontologies as foundation for their systems of thought. This means that in many schools of philosophy, ethics, epistemology, logic, etc. can only be understood in relation to an ontology. This is not to say that all philosophy focuses on ontology, in fact, most schools of philosophy tend to ignore it or outright reject it. This is what happened during the early twentieth century when language philosophy and logical empiricism came into prominence. For these two schools of philosophy, ontology and/or anything metaphysical was to be rejected.

In continental Europe however, metaphysics and ontology remained quite popular, especially through the work of Martin Heidegger, but only up until the rise in popularity of philosophical thinkers such as Michel Foucault, Jacques Derrida, and Jacques Lacan who shifted the primary concern of continental philosophy from metaphysics to that of language, power, and society.

Outside of continental Europe, it was Roy Bhaskar who first stepped away from traditional language philosophy by addressing philosophy of science as an issue concerning the ontology of the world (Bhaskar 2008 [1977]) and by putting forward a universal ontology which conceives reality as layered. Many scholars, such as Margaret Archer and Anthony Giddens, followed his lead in the UK, and it became standard practice in the social sciences in general to conceive social reality as something involving more than just linguistic and/or normative elements. While Bhaskar's work had little influence on archaeologists (Gibbon (1989) and Wallace (2011) are some of the exceptions), it was without a doubt one of the crucial elements in conceiving society in terms of ontology. Additionally it was Bhaskar who set the stage for the rise of scholars in the UK, the USA, and continental Europe who later on started thinking in terms of ontology. One of these scholars was Bruno Latour who gradually distanced himself from the relativist philosophy of science which was popular in the 1980s and 1990s and proposed conceiving scientific reality as irreducibly ontological, that is to say, a perception of science as an enterprise involving a network of objects, such as neutrons, microscopes, and labcoats, rather than as an enterprise dictated by "worldviews" or "paradigms." Latour has had an impact in the study of ontologies in archaeological research since the early 2000s, with archaeologists adopting a wide array of his ideas from his actor-network theory (see Jones 2001) to his critique of modernity (see Martin (2013) and Witmore (2007)). Around the same time that Latour started gaining prominence in archaeological circles, a growing dissatisfaction could be felt against the interpretive archaeology of the 1990s which many viewed as too anthropocentric and idealist. As argued by Jones et al., the greatest problem of interpretive archaeology is that it perceives the human as the center of the universe, an interpreting subject surrounded by representations of objects. According to this view, nonhuman objects are important insofar as they are interpreted by a human subject (Jones et al. 2013: 19).

The dissatisfaction with this view gave prominence to phenomenological approaches in the early 2000s, which viewed humans as engaging actively with the world rather than just

interpreting it. This led archaeologists to focus more on the material culture in reconstituting the everyday life of peoples and their engagement with their physical surroundings. Bjørnar Olsen has taken this position and expanded upon it by advocating an ontology of objects (Olsen 2003, 2010). As he argues, archaeology is mired down by speculation on the thoughts and lives of past peoples when what archaeology should be focusing on the objects of analysis themselves.

A key set of ideas that has been very relevant to the discussion on ontologies comes from archaeologists who have advocated for a symmetrical ontology (Witmore 2007) or a flat ontology (Harris and Cipolla 2017). Directly influenced by Latour's critique of modernity, the idea of a symmetrical or flat ontology is based on the principle that nonhuman objects and humans are not a priori ontologically distinct, but rather a result of modernist conception of the world. This aligns with the idea that we should not be prioritizing the human interpretation of the world and that objects should, in fact, be favored by archaeological research as suggested by Olsen.

Alongside Latour, from the 2010s onward several new thinkers were added to the roster of contributors. Of these thinkers, Gilles Deleuze, via Manuel DeLanda, has contributed toward a deeper understanding on the relations between different objects through the concept of "assemblage" (Hamilakis and Jones 2017). Jane Bennett has also been a key scholar for archaeologists by expanding Deleuze's argument that agency is not exclusive to humans but rather a vibrant property of assemblages themselves. In addition to these new contributions, a new philosophical trend titled "Speculative Realism" made its way into archaeology. Of the philosophers associated to this trend, the most relevant are Quentin Meillassoux and Graham Harman. According to Meillassoux, there is an inherent principle in all post-Kantian philosophy which is to perceive thinking and being as inherently correlated and never independent from one another, what he has defined as correlationism (2008). As argued by Meillassoux, the only way to overcome correlationist perspectives of reality is to perceive reality through mathematical properties since it is these properties which can be considered to be independent from correlation between thinking and being. Harman's ideas on the other hand are based on the ontology of Martin Heidegger. Like Meillassoux, Harman's object-oriented ontology has the objective of highlighting the existence of objects in their own right and independent from our perception of them. In order for this to be possible, Harman argues that there are two conceptions of objects which must be taken into account: real objects and sensual objects. In gist, Harman argues that all objects as we recognize them are real but constantly withdrawn from us, that is to say, the essence of an object never comes into full contact with humans except through its sensual properties (Harman 2013: 24).

Anthropology's introduction to ontology follows similar to that of archaeology. First, there was a growing dissatisfaction with the representationalist viewpoint, i.e., the idea that all anthropological alterity could be reduced to difference in points of view; and second, the contributions of Latour to our understanding of Modernity and its divides like nature/culture, subject/object, human/nonhuman greatly influenced how anthropologists thought of their own biases with regards to their informants. In anthropology itself, the work of Roy Wagner and Marilyn Strathern were in the 1970s and 1980s, the precursors of the explicitly ontological mode of investigation followed more recently by scholars such as Viveiros de Castro and Martin Holbraad.

Key Issues/Current Debates

Ontology is wrapped up in a good amount of contention with many scholars rejecting key ideas associated to it, rejecting it wholesale, or just outright ignoring it. While it seems that most who have discussed ontologies agree on what should be rejected when it comes to the current *status quo* in archaeological research, there seems to be much less coherence on what should be embraced. Thus, the most glaring problem affecting our understanding of ontologies is the sheer amount of ideas which are either not relevant to the discussion or in direct opposition. As more ontologies are put

forward, it becomes more and more evident that many ideas are not compatible. For example, Quentin Meillassoux critique of correlationism is indirectly a critique of phenomenology. Thus, it means that Meillssoux's ideas are not compatible with those of Martin Heidegger and, by extension, Graham Harman, whose research is directly building upon the work of Heidegger. It comes then, as a surprise to see Meillassoux and Harman cited approvingly side by side (e.g., Edgeworth 2016). Furthermore, while Meillassoux's notion of correlationism has been employed recurrently in archaeological literature, there is no mention of the fact that Meillassoux advocates an approach to reality based on mathematical properties, which he believes to be the only way to overcome correlationism.

A similar issue can be identified when discussing all the elements which can compose an ontology. For example, in his defense of an ontology based primarily on "things," Christopher Witmore claims that things are assemblages, things are participants, and things are things (2014). This type of claim, however, can come off as a bit confusing. Ontology concerns the fundamental make-up of the world, meaning that an ontology should be a description of the world stripped to its most essential elements. By describing the world as a composition of things which are multiple (as assemblages, as participants, as things), Witmore is not really identifying the true composition of reality. This has been one of the more contentious issues surrounding ontological studies in archaeology – deciding which element is most fundamental to an ontology. For instance, both in philosophy and archaeology, there is a debate whether precedence should be given to relational networks in which things are participants or whether precedence should be given to things in-themselves regardless of their position within networks. The lack of a clear and definitive ontology and its composition shows that, despite the popularity of ontologies in archaeology, there is still little common intellectual ground.

There is also criticism that focuses not on ontologies themselves but on what we ultimately mean when we talk about humans and humanity. One of the recurrent claims involved in ontological studies is that humans should not be given ontological priority, that is to say, that humans are ontologically indistinct from nonhuman objects. Given this ontological "flatness" or "symmetry," archaeologists should support the idea of an archaeology dedicated toward the care, obligation, and loyalty to things, as opposed to an archaeology dedicated to the study of past human lifeways. This claim, however, has been subject to much discussion and criticism with many scholars outright rejecting it. For example, John Barrett has pointed out that regardless of whether humans and nonhuman objects are ontologically distinct, humanity follows a historical trajectory very much its own (Barrett 2014). Thus, what matters is not the metaphysical composition of humans and objects but the processes through which they came into existence and made themselves via their relations with one another.

Additionally, it has been pointed out that there is an overt and subtle anthropocentrism subsisting in ontological studies despite recurrent claims that anthropocentrism has been rejected. This issue is most evident when human actions and properties are used to describe nonhuman objects. For instance, Severin Fowles has noted that much of the ontological literature places nonhuman objects in the position of "interpreters" of their relations with other objects, transforming them into ethnographic informants (Fowles 2016).

Another issue is that of ontological pluralism. According to certain anthropological circles, there has been concerns as to whether pluralizing ontologies is not just cultural "relativism" in disguise. As Alberti has argued, the existence of several ontologies does not necessarily reflect "relativism" since ontologies are not the same as interpretations of a knowing subject (Alberti 2016: 168). This means that there are not multiple interpretations of one singular world, which would make truth and objectivity difficult to attain, but rather plural worlds, which relate to one another. Although this an interesting perspective on ontology, it is not free of problems: as Paolo Heywood points out (Heywood 2012), would this not entail imposing ontological pluralism onto indigenous groups who do not necessarily believe in ontological pluralism?

Finally, the most recurrent criticism of ontological studies comes from those who remain faithful to classical methods and theories from social studies. While supporters of ontologies see their ideas as valid replacements of the ideas advanced by social theory, supporters of social theory on the other hand have criticized ontological studies for failing to address power, norms, ethics, and politics in their explanations. According to these social theorists, the lack of coherent explanations on how power and moral beliefs motivate actions precludes the supporters of ontology to address real-world problems such as hunger in third world countries, wealth inequality, human trafficking, or the refugee crisis. This comes, in part, from supporting ontologies which promote "flatness" or "symmetry": by failing to see moral differences between different actors, the idea of responsibility becomes relativized and consequently, the task of identifying the "responsible actor" for a certain state of events becomes nigh impossible.

Future Directions

Thinking in terms of ontology has opened many new doors in archaeological research in the past 10 years, but it has also encountered an inordinate amount of obstacles in its way. A big part of the problem comes from keeping discussions on ontology too dependent on philosophical debate, and less on archaeological and anthropological practice. While there is some work which does manage to bridge some of the more abstract ideas associated to ontology and how archaeologists commonly interact with archaeological reality, many doubts remain on the efficacy of ontological approaches. The current debates on ontologies are mostly about philosophical premises, and on this issue, it is important that the supporters of ontological claims quickly reach some consensus concerning what key ideas and premises should be supported. Furthermore, it becomes increasingly important for the supporters of ontologies to establish a clear and concise link between the abstract philosophical discussion with archaeological practice. It is through the application of methods and perspectives associated to ontologies that the importance of ontology can really shine through. There are already some examples of these practices; however, they remain too few and far between for the rest of the archaeological community to accurately judge the advantages of ontology. Overall, for future success, the ontological turn requires:

- A clear synthesis that carefully selects those elements which are essential for a correct and concise understanding of how ontologies can actually improve the state of the art. This will require abandoning some key figures and ideas in ontological studies in favor of others.
- Identify the common ground between the more metaphysical type of ontology of archaeology and the ontological turn which has been advocated in anthropological studies.
- Identify and/or create methods which are compatible with ontological studies.

While these directions might not automatically solve all the current problems, they will nevertheless highlight the importance of conceiving archaeological reality in ontological terms. As stated by Harris and Cipolla (2017), all research is conducted under an understanding of what the world is and how it manifests, and in this sense, thinking in ontological terms is essential as a tool which parses our own research biases and ultimately what it means to practice archaeology.

Cross-References

► Assemblage Thinking
► Materiality in Archaeological Theory
► Phenomenology in Archaeology
► Symmetrical Archaeology

References

Alberti, B. 2016. Archaeologies of ontology. *Annual Review of Anthropology* 45 (1): 163–179.
Barrett, J.C. 2014. The material constitution of humanness. *Archaeological Dialogues* 21 (01): 65–74.

Bhaskar, R. 2008 [1977]. *A realist theory of science*. London/New York: Routledge.
Carrithers, M., M. Candea, K. Sykes, M. Holbraad, and S. Venkatesan. 2010. Ontology is just another word for culture – Motion tabled at the 2008 meeting of the group for debates in anthropological theory, university of Manchester. *Critique of Anthropology* 30 (2): 152–200.
Crellin, R.J. 2017. Changing assemblages: Vibrant matter in burial assemblages. *Cambridge Archaeological Journal* 27 (1): 111–125.
Edgeworth, M. 2016. Grounded objects. Archaeology and speculative realism. *Archaeological Dialogues* 23 (01): 93–113.
Fowles, S. 2016. The perfect subject (postcolonial object studies). *Journal of Material Culture* 21 (1): 9–27.
Gibbon, G.E. 1989. *Explanation in archaeology*. Oxford/New York: Basil Blackwell.
Hamilakis, Y. and Jones, A. M. 2017. *Archaeology and assemblage*. Cambridge Archaeological Journal 27 (1): 77-84.
Harman, G. 2013. The current state of speculative realism. Speculations: A Journal of Speculative Realism 4: 22–28.
Harris, O.J.T., and C.N. Cipolla. 2017. *Archaeological theory in the new millenium: Introducing current perspectives*. London/New York: Routledge.
Henare, A.J.M., M. Holbraad, and S. Wastell. 2007. *Thinking through things: Theorising artefacts ethnographically*. London/New York: Routledge.
Heywood, P. 2012. Anthropology and what there is: Reflections on "Ontology". *Cambridge Anthropology* 30 (1): 143–151.
Jones, A. 2001. *Archaeological theory and scientific practice*. Cambridge: Cambridge University Press.
Jones, A., B. Alberti, C. Fowler, and G. Lucas. 2013. Archaeology after interpretation. In *Archaeology after interpretation: Returning materials to archaeological theory*, ed. B. Alberti, A.M. Jones, and J. Pollard, 15–35. Walnut Creek: Left Coast Press.
Martin, A.M. 2013. *Archaeology beyond postmodernity: A science of the social*, Archaeology in society series. Lanham: AltaMira Press.
Olsen, B. 2003. Material culture after text: Re-membering things. *Norwegian Archeological Review* 36 (2): 87–104.
Olsen, B. 2010. *In defense of things: Archaeology and the ontology of objects*. Lanham/Plymouth: Rowman & Littlefield Publishers.
Viveiros de Castro, E. 2012. *Cosmological perspectivism in amazonia and elsewhere*. HAU: Masterclass Ser, vol. 1, 45–168.
Wallace, S. 2011. *Contradictions of archaeological theory: Engaging critical realism and archaeological theory*. London/New York: Routledge.
Watts, C.M. 2013. *Relational archaeologies: Humans, animals, things*. London/New York: Routledge.
Witmore, C.L. 2007. Symmetrical archaeology: Excerpts of a manifesto. *World Archaeology* 39 (4): 546–562.

Oral Sources and Oral History

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Introduction

The archaeological use of oral sources has gained rapid popularity in recent years as archaeologists around the world have recognized the value and need of connecting their research with topics relevant to public interest and to local community concerns. Implicit in much of this orally informed research is the use of archaeology as a means of addressing issues of social justice by empowering marginalized groups "without history" (Wolf 1982) both to create a heritage narrative by and for the people and to insert these multiple narratives into mainstream national origin stories and provide them with a role in these. Scholarly citations in the Web of Knowledge with oral history or oral traditions as keywords greatly increase in the years after 1996 and are few and far between prior to 1994. Historical analysis of the literature indicates that oral sources were being used in some areas at the beginning of organized archaeological research in those regions, Africa (Posnansky 1966; Schmidt 1978) and North America (Cushing 1886) being clear examples. This historical precedence needs to be acknowledged while also recognizing the emergence of distinctively new approaches.

One new trend worthy of attention is in the use of oral sources in the historical archaeology of the twentieth century. A 2009 study of World War II aerial bombardment seeks to link personal experience to collective memory as focused on buildings and physical sites in Germany (Moshenska 2009). A 2003 study uses oral sources in conjunction with ethnobotany, forestry, and archaeology to document recent rainforest regeneration after logging in the Solomon Islands (Bayliss-Smith et al. 2003). Another study integrates spatial data with oral histories pertaining to infant burials in unconsecrated ground (Murphy 2011). These studies indicate that at least some archaeologists

are exploring innovative connections between the material and expressive realms in framing a more human-centric perspective to the scientific practice of archaeology.

The increasing visibility of oral sources in archaeology also serves as a call to revisit fundamental practices and tenets of oral techniques, as archaeologists did not invent this mode of investigation. It is useful to distinguish two kinds of oral sources. This is important because the two kinds employ slightly different methods, theories, and applications. Still, the two are often conflated by both researcher and reader and even by the informant or narrator. The first kind is oral history, which is a record of an individual's personal experience with a past place, way of life, or event. This can be a person's life story as it intersects with the subject of archaeological interest such as at a historic place, in an archaeological site that needs to be evaluated as part of regulatory compliance, in artifacts or objects being evaluated for conservation and preservation and their value in public interpretation, or on landscapes on which now-vanished ways of life once played out. The unit of analysis in oral history is the individual, often referred to as the "informant" or narrator. The informant is one member of a group of "locals," each of whom functions as an individual source of information. The oral history technique is widely used in anthropology (Angrosino 2008), history (Vansina 1965), folklore (e.g., the many volumes of the *Foxfire* series, published by Anchor Press), sociology, and journalism. Archaeologists typically construct oral history interviews to collect information on the appearance and life history of buildings, how artifacts and the tools of technology once functioned, the demographics and social composition of user groups, social relations and ideology, and social meanings attributed to the use of space. To do oral history effectively, archaeologists benefit greatly from basic training in ethnographic methods. They would also do well to remember that the interview is a relationship between two people and can create ambiguity as well as certainty. The usual format is the audio or visually recorded interview, or written notes, which can then be transcribed for study and analysis. In this form other researchers can access the narratives and essentially use them as historical documents. In the USA, for example, the federally supported Works Progress Administration (WPA) collected many volumes of oral histories during the Depression-era 1930s, most of which are readily accessible today in print and online formats.

The second kind of oral source is the oral tradition. Oral traditions are cultural narratives such as origin stories, myths, and legends that are passed down from generation to generation orally as cultural knowledge. Typically, until the intervention of an outside researcher, oral traditions do not exist in written form. Oral traditions comprise a corpus of explanations, values, and historical facts that become the touchstones of cultural identity. Oral traditions can exist in story and song and are sometimes in whole or in part given artistic expression as glyphs on rock faces, as decorative pottery styles, and basically on any surface suitable for bearing an inscription made by the human hand. Oral traditions can be elicited by interviewing an informant, but the events and beings, human and otherwise, typically belong to a time before the informant's direct life experience. Oral traditions thus are a type of culture history and function socially as a binding historical narrative. Further, to the extent that these narratives also provide explanatory knowledge of natural history, cosmology, and physics, they also define an indigenous science. Therefore, the archaeological goals of analyzing the structure and content of oral traditions differ in some respects from the goals of oral history analysis. Unlike oral histories, oral traditions tend to be recounted as received scripts and, although personally variable and potentially idiosyncratic, cannot be further explicated by the informant beyond the initial telling. From the teller's point of view, they are whole and complete in and of themselves. Claude Levi-Strauss is well known, rightly so, for his ability to identify and break down the coded components of traditional narratives into patterned sets of opposing elements (Levi-Strauss 1966), and his structural approach has influenced the archaeological use of oral

tradition, particularly in Africa (Schmidt 1978). Levi-Strauss and most structuralists, including his archaeological disciples, agree that the oppositions that form this deep history are beyond (or beneath) the conscious intellectual repertoire of the human bearers of tradition and cannot be directly elicited through questioning.

Historical Background

The first generation of archaeologists to systematically incorporate oral sources as valid lines of evidence acknowledge the work of Jan Vansina (1965) as their primary source of inspiration (Schmidt 2006). It is not coincidence that Vansina's work and the research of these archaeologists were situated in Africa, which turned out to be a particularly rich location for developing and expanding the use of oral sources in archaeology (Shaw 1977; Schmidt 2006). Vansina, although not an archaeologist, argued that oral sources are expressive cultural messages and can be systematically analyzed to yield insights into cultural and historical process, in essence placing oral traditions within the same analytical frameworks that archaeologists use to understand the relationship between artifacts and the contexts of knowledge in which they were created. Archaeologists responded well to Vansina's comparative and integrated approach that emphasized the evidentiary potential of oral sources when carefully applied to archaeological problems.

Some archaeologists were openly dismissive of the contributions of oral sources to an explicitly scientific archaeology, but others by the mid-1980s increasingly viewed archaeology as being incomplete and even unethical in not including oral sources provided by living peoples whose ancestors created the archaeological record under investigation. In the USA, much of this rethinking initially focused on the relationship between archaeologists and American Indians (Trigger 1980), which has by now resulted in an abundantly rich literature (Swidler et al. 1997; Echo-Hawk 2000; Whiteley 2002; Mason 2006). The formal relations between federally recognized Indian Nations and archaeologists were given structure and legitimacy through federal laws and policies regarding Indian sovereign rights to the objects and places comprising their cultural heritage. Archaeologists employed in federal projects and Indian representatives of Nations whose heritage might be impacted or threatened by federal action (dam building, navigational improvements, highway construction as typical examples) together learned how to engage in the mandated consultation process, one goal of which is to elicit native testimony as to the significance of sites, landscape features, or other elements of material culture that might be incompletely understood or appreciated using standard archaeological and historical techniques alone. By law, oral histories and oral traditions are given equal status with conventional archaeological and historical evidence in determining Indian claims in both the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 and the Traditional Cultural Property process associated with the legal evaluation of significance (King 2003). These key pieces of federal law and federally mandated regulatory process have fostered a greater acceptance of oral sources by the archaeological mainstream, despite some initial reluctance to yield authority over knowledge of the past. In the USA as the cultural resource management (CRM) industry has matured in response to broader, more inclusive federal historic preservation goals, the use of oral sources has increasingly found its way, almost routinely, into a wide range of efforts aimed at promoting cultural diversity by directing archaeological attention to remains associated with minority, marginalized, or victimized populations. These projects run the gamut of current research themes or problem orientations in historical archaeology and include World War II Japanese-American internment camps and German POW camps in the USA and Canada (http://whitewaterpowcamp.com), coal mining communities (Metheny 2007), pioneer settlements and urban African-American enclaves (Weisman 2011), and immigrant populations facing the challenges of relocation (Hornung 2002).

Key Issues/Current Debates

The use of oral sources is not unique or original to archaeology. Other social sciences and humanities disciplines have developed a body of method and theory to guide the use of what for them is one of the major sources of data for their scholarly inquiries. The challenge for archaeologists is to use oral sources to both critique and expand conventional archaeological research designs in an integrative approach that demonstrates the inextricable connection between material culture and expressive culture. Clearly what is found in the ground and what comes from an informant's mouth are cultural products and reflect the interaction between individual agency and social constraint. Archaeologists through middle-range theory and increasingly sophisticated understanding of postdepositional effects on the archaeological record have taken an appropriately critical view of direct or simplistic behavioral interpretations. Likewise, they also need to develop a critical approach to the use of oral sources. As a source of data, oral histories in particular need to be problematized and subjected to analytical rigor. As Vansina cautions, oral history is the product of human memory (1965: 147), and it can be created in numerous ways to serve the subject's interests. The invention of a personal history that coincides with or articulates with larger historical events is a well-known human penchant. Further, eyewitness accounts can be clouded by smoke or dust or fear. Being in the middle of an action as it is unfolding is no guarantee of veracity and rarely affords a panoramic, distanced perspective. Personal narratives can intentionally or unintentionally fail to disclose crucial circumstances or can absorb and then repeat collective narratives in the guise of individual experience. Clearly there is skill involved in reconstructing personal and cultural realities from such narratives. Careful attention must be paid to the rigor and intellectual discipline in order to establish credibility and defensibility. Investigators must also be aware of their own biases and internalized ethnocentrisms that might privilege etic data or physical evidence over emic or internal expressions (Schuyler 1978). Archaeologists face a further challenge in giving equal footing to oral sources and the archaeological record in developing their interpretations. Some archaeologists envision a conversation between the two data sources in which contradictions or discrepancies generate new questions and enrich the potential for truly original research design (Beck and Somerville 2005). This approach, valuable in refreshing the perennial but occasionally lapsing concern with method and theory, essentially repeats the process engaged in years ago by historical archaeologists as they struggled to reconcile history's written record with what was found in the ground. As such, archaeologists should now recognize fully that oral history is a form of history, perhaps even history with a capital H, and can be subjected to textual analysis. This critical approach is of ever-increasing importance to counter any tendencies to romanticize oral sources or elevate their importance over other forms of evidence, especially if one of the goals of modern archaeology is to build synthetic, systemic, and integrated models of the human past.

New opportunities for the innovative use of oral sources will emerge as archaeologists endeavor to theorize the concept of memory as it can be investigated materially. The study of memory is gaining ascendancy in the humanities and social sciences research, meaning memory as something culturally constituted and possessed collectively or, alternatively, memory as the historical reality experienced and defined individually. This is an area that lends itself to true interdisciplinary research and to which archaeologists can uniquely contribute. Archaeologists can link both places and things to ideas about places and things carried around in people's heads and by so doing can add insights to the broader understanding of how people create the realities of their own existence through both conceptual mental frameworks and the physical structuring of space. Using places generatively to confront or prompt memories essentially as a locus of oral history production is one step toward an "archaeology of emotion" (Murphy 2011) and attempt to fundamentally reposition oral history with archaeology. Archaeologists engaged in these practices are now recognizing the complexities in assigning meanings to social phenomena that are inherently ambiguous (Mullins 2014; Olsen 2003).

International Perspectives

The use of oral sources in archaeology is most widely advanced in areas of the world where archaeologists have explicitly attempted to bridge and reconcile the historical and cultural erasures of colonialism through increased access to the archaeological record by indigenous peoples. Archaeologists working in these regions and sympathetic to the goal of connecting indigenous peoples to a past severed by colonial practices tend to view access to history as a human rights issue and the use of an indigenous-centered archaeology as one means of redressing human rights abuses. The USA (Swidler et al., Echo-Hawk 2000), Canada (Clark and Clark 1974; Stewart et al. 2000) Africa (Raharijoana 1994; Schmidt 2006, 2016), and Australia have particularly well-developed literatures in which oral sources are seen as inseparable and foundational in the development of truly indigenous archaeologies which are both empowering for the native peoples and supported by national legislation. In considering the junction of oral history and archaeology as one source of a multiple historical approach to studying Mayan populations in Guatemala, Metcalfe (2005) brings to our attention the ethical considerations in deliberately eliciting information from indigenous groups that is then restructured into Western definitions of archaeological space and content. Indeed, this can be seen as the modern version of cultural appropriation simply dressed up in the latest jargon. Metcalfe also cautions that the process of converting oral histories into scholarly research and publication brings with it, unavoidably, a shift in context that might transform or recast their original meanings and purposes. In South America, archaeologists from the US National Museum of the American Indian are using oral traditions and archaeology to develop community-level heritage projects focused on the historical and cultural significance of the Inka Road. More synthetic approaches in the historical archaeology of South America use North American methods and theory as a model and suggest that oral sources present a largely untapped potential (Funari 1997).

Europe and the UK have an emerging literature focusing on public traumas and civil strife of the recent past. Archaeologists working in Jordan have used Bedouin oral histories to address deficiencies in nomad archaeology (Simms and Russell 1997), while Caribbean archaeologists have attempted to engage modern African-descended populations with the places of their colonial past (Scudder-Temple 2009).

Many archaeologists around the world have seen the need to connect and communicate with indigenous peoples as increasingly evident and are seeking to equalize the relationship between authority derived from academy and science-based expertise and the traditional knowledge possessed by people typically cast in the "subject" role. Most of these archaeologists seek risk in foregoing the benefits and value of science and seek to balance the contributions from oral sources with those gained from traditional archaeology. Debates will continue as to how and if this balance can be achieved.

Future Directions

One of the main goals of using oral sources in archaeology is to construct a locally contextualized model of past reality that is relevant to participants, engages contemporary communities, and verifiably contributes to the broad knowledge of the human experience. Truly integrating oral sources into an archaeological research design with the level of theoretical and methodological sophistication present in other disciplines will require new approaches in training future archaeological professionals. The credibility of the oral source as a line of archaeological evidence and its ultimate acceptance as a core archaeological practice require rigorous application by trained professionals. The question then is: How to train students to be both theoretically and methodologically adept at applying an integrated ethnographic and archaeological skill set in the areas of basic research, cultural resource management, and heritage stewardship? This cross-training is not easily accomplished in the traditional academic silos in which most of the future

professionals continue to be educated (Castaneda and Matthews 2008). Many academic archaeologists already face the reality of having to submit an application for oral history research to their Institutional Review Board (IRB) or, as often referred to in European institutions, "Ethics Committee," because oral history is categorically defined as social-behavioral research and informants considered as subjects. In most cases, such research is regarded by the IRB as posing minimal risk and therefore qualifies for expedited review; nonetheless the IRB experience should not be the first and only exposure to the ethics of ethnographic research.

At present there is no unified theory shared by all archaeologists who use oral sources in their work. Some archaeologists continue to use oral sources for the conventional purpose of improving the discovery and interpretation of archaeological sites and features (David et al. 2004), while others seek to use oral sources creatively to bring new perspectives and new research questions to the archaeological record (Bernardini 2005). Some relegate oral sources to a minor supporting role in confirming alleged archaeological facts, some place the two in conflict with each other hoping that the contradictions will yield new insights, and some strive to put archaeology and oral sources side by side as parallel streams of knowledge flowing toward a larger cultural synthesis. There remain two camps of archaeologists: those who respect oral sources and bring them actively into their research and those who are deeply skeptical of any claimed continuity between the present and past as expressed through oral sources. These two strains run deep in the history of archaeology and have ebbed and flowed through time. While it seems likely that there are more archaeologists working today than ever before and that the global opportunities for archaeological research are at an all-time high, it also appears that the archaeological use of oral sources is enjoying a rise in popularity and in new, innovative forms. Undoubtedly not all of these attempts will stand the test of time, but the challenges they present will stimulate greater future awareness of the role of oral sources in archaeology.

Cross-References

- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: Australian perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Lightfoot, Kent G.
- ▶ Oral Tradition: Ancient Greece
- ▶ Posnansky, Merrick
- ▶ Schmidt, Peter R.
- ▶ Trigger, Bruce Graham
- ▶ West and Central Africa: Historical Archaeology

References

Angrosino, M.V. 2008. *Exploring oral history*. Long Grove: Waveland Press.

Bayliss-Smith, T., E. Hviding, and T. Whitmore. 2003. Rainforest composition and histories of human disturbance in Solomon Islands. *Ambio* 32: 346–352.

Beck, W., and M. Somerville. 2005. Conversations between disciplines: Historical archaeology and oral history at Yarrawarra. *World Archaeology* 37: 468–483.

Bernardini, W. 2005. *Hopi oral tradition and the archaeology of identity*. Tucson: University of Arizona Press.

Castaneda, Q.E., and C. Matthews, eds. 2008. *Ethnographic archaeologies: Reflections on stakeholders and archaeological practices*. Lanham: AltaMira Press.

Clark, A.M., and D.W. Clark. 1974. Koyukun Athapaskan houses seen through oral tradition and archaeology. *Arctic Anthropology* 11: 29–38.

Cushing, F.H. 1886. *A study of Pueblo pottery as illustrative of Zuni culture growth*, Bureau of American ethnology, fourth annual report, 467–521. Washington, DC: GPO.

David, B., I. McNiven, L. Manas, J. Manas, S. Savage, J. Crouch, G. Neliman, and L. Brady. 2004. Goba of Mua: Archaeology working with oral tradition. *Antiquity* 78: 158–172.

Echo-Hawk, R. 2000. Ancient history in the new world: Integrating oral tradition and the archaeological record in deep time. *American Antiquity* 65: 267–290.

Funari, P.P. 1997. Archaeology, history, and historical archaeology in South America. *International Journal of Historical Archaeology* 1: 189–206.

Hornung, A.J. 2002. Myth, migration, and material culture: Archeology and ulster influence on appalachia. *Historical Archaeology* 36: 129–149.
King, T.F. 2003. *Places that count: Traditional cultural properties in cultural resource management*. Walnut Creek: AltaMira Press.
Levi-Strauss, C. 1966. *The savage mind*. Chicago: University of Chicago Press.
Mason, R. 2006. *Inconstant companions: Archaeology and North American Indian oral traditions*. Tuscaloosa: University of Alabama Press.
Metcalfe, J.Z. 2005. Multiple histories: The archaeology, ethnohistory, oral history, and national history of the Iximche', Guatemala. *Totem* 13: 61–72.
Metheny, K.B. 2007. *From the miner's doublehouse*. Knoxville: University of Tennessee Press.
Moshenka, G. 2009. Resonant materiality and violent remembering: Archaeology, memory, and bombing. *International Journal of Heritage Studies* 15: 44–56.
Mullins, P.R. 2014. The rhetoric of things: Historical archaeology and oral history. *Historical Archaeology* 48: 105–109.
Murphy, E.M. 2011. Children's burial grounds in Ireland (*Cillini*) and parental emotions toward infant death. *International Journal of Historical Archaeology* 15: 409–428.
Olsen, B. 2003. Material culture after text: Re-membering things. *Norwegian Archaeological Review* 36 (2): 87–104.
Posnansky, M. 1966. Kingship, archaeology, and historical myth. *Uganda Journal* 32: 165–182.
Raharijoana, V. 1994. Archaeology and oral traditions in the Mitongoa-Andrainjato area (Betsileo region of Madagascar). In *Who needs the past?: Indigenous values and archaeology*, ed. R. Layton, 189–194. New York: Routledge.
Schmidt, P.R. 1978. *Historical Archaeology: A structural approach in an African culture*. Westport: Greenwood Press.
Schmidt, P.R. 2006. *Historical archaeology in Africa: Representation, social memory, and oral traditions*. Lanham: AltaMira Press.
Schmidt, P.R. 2016. Historical archaeology in East Africa: Past practice and future direction. *Journal of African History* 57 (2): 183–194.
Schuyler, R.L. 1978. The spoken word, the written word, observed behavior and preserved behavior: The contexts available to the archaeologist. In *Historical archaeology: A guide to substantive and theoretical contributions*, ed. R.L. Schuyler, 269–277. Farmingdale: Baywood Publishing.
Scudder-Temple, K. 2009. An absence of presence: The voices of marginalized communities in the development and implementation of cultural resource management initiatives in the British West Indies. Unpublished PhD dissertation, University of South Florida.
Shaw, T. 1977. *Unearthing Igbo-Ukwu: Archaeological discoveries in eastern Nigeria*. Ibadan: Oxford University Press.
Simms, S.R., and K.W. Russell. 1997. Tur Imdai Rockshelter: Archaeology of recent pastoralists in Jordan. *Journal of Field Archaeology* 24: 459–472.
Stewart, A., T.M. Friesen, D. Keith, and L. Henderson. 2000. Archaeology and oral history of Inuit land use on the Kazan River, Nunavut: A feature-based approach. *Arctic* 53: 26–278.
Swidler, N., K.E. Dongoske, R. Anyon, and A.S. Downer. 1997. *Native Americans and archaeologists*. Walnut Creek: AltaMira.
Trigger, B. 1980. Archaeology: The image of the American Indian. *American Antiquity* 45: 121–137.
Vansina, J. 1965. *Oral tradition: A study in historical methodology.* Chicago: Aldine.
Weisman, B.R. 2011. Florida archaeology confronts the recent past. *Historical Archaeology* 45: 16–41.
Whiteley, P.M. 2002. Archaeology and oral tradition: The scientific importance of dialogue. *American Antiquity* 67: 405–415.
Wolf, E.R. 1982. *Europe and the people without history.* Berkeley: University of California Press.

Oral Tradition: Ancient Greece

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Introduction and Definition

Oral tradition refers to cultural material transmitted orally from one generation to another without the aid of writing. It may take many forms: jokes, sayings, narrative poetry, songs, folktales, genealogies, and praise poetry. In this way, laws, prescriptions, and even historical elements are transmitted. But principally *oral tradition* refers to poetic composition and, as such, is called "oral theory" or "oral-formulaic theory." Oral tradition is distinct from the study of orality, which has to do with the nature of thought and expression in illiterate societies.

Historical Background

The study of oral traditions began in the nineteenth century with the Serbian scholar Vuk

Stefanović Karadžić (1787–1864), of peasant origins. Vuk Karadžić was a linguist and reformer of the Serbian written language, especially its orthography, bringing it closer to common speech and away from Serbian Church Slavonic. He is called the father of Serbian folklore because of his famous collections of folk songs, fairy tales, riddles, and proverbs. His studies were characterized by the same national interests as those of his contemporaries Jacob and Wilhelm Grimm, who knew Karadzic; in the culture of the folk was thought to lie the true soul of the people.

Vasily Radloff (1837–1918), a German-born Russian and the founder of the scientific study of Turkic peoples, followed up Karadzic's work with studies of the songs of the Turkic Kara-Kirghiz in central Asia. Radlov was a founder of the museum of ethnography in St. Petersburg. The work of Karadzic and Radlov provided models for the work of Milman Parry (1902–1935), creator of the oral-formulaic theory.

Milman Parry was born in Oakland, California, and studied classics at the nearby University of California in Berkeley, where he earned a BA and MA. Even as an undergraduate, Parry became interested in the Homeric Question, that is, where did the Homeric poems come from, the earliest poems in the Western tradition? These are the *Iliad* and the *Odyssey* from probably the eighth century BCE, always ascribed to a man named Homer about whom nothing is known. How did they come into being? Parry's discoveries were to revolutionize not only Homeric studies but also the study of many other literatures. While influenced by Vuk Stefanović and Vasily Radlov, his work made direct use of the insights of Marcel Jousse at the Sorbonne (1886–1961), who studied the anthropology of gesture; Matija Murko (1861–1952), a Slovene scholar who worked on south Slavic epics and whose publications in French Parry studied in Paris; and Arnold van Gennep (1873–1957), the founder of folklore studies in France, famous for his work on rites of passage. But Parry's discoveries were to go far beyond the work of any of these men.

When Parry began his work, the prevailing view of Homer was that the poems were the result of a long period of accretion and editorial redaction. The poems had been "stitched together" (an inaccurate understanding of the word "rhapsode" as "stitcher") from many shorter poems by unknown hands, perhaps in the sixth century BCE in Athens during the reign of the Peisistratids. This position was called Analysis, as opposed to the minority Unitarian view, which held that the poems were the creation of a single intelligence at a single time. Whereas the Analysts made use of narrative and logical inconsistencies, of which there are a good number, to establish the lines of demarcation between allegedly originally separate poems, the Unitarian position looked past such flaws in a theory of unitary composition.

After receiving his M.A. at Berkeley, Parry traveled to Paris in 1924 and enrolled at the Sorbonne, where he studied under the great linguist Antoine Meillet (1866–1936). In 1923 Meillet had written the following (quoted in Parry's first French thesis 1925):

> Homeric epic is entirely composed of formulas handed down from poet to poet. An examination of any passage will quickly reveal that it is made up of lines and fragments of lines which are reproduced word for word in one or several other passages. Even those lines of which the parts happen not to recur in any other passage have the same formulaic character, and it is doubtless pure chance that they are not attested elsewhere.

Meillet thought that this feature might be distinctive of orally transmitted epic (such as the *Iliad*) and suggested to Parry that he observe a living oral tradition to find out if his suggestion was accurate. He introduced Parry to Murko, who had made phonograph recordings of Serbo-Croatian heroic epic and written extensively about them. Murko sat in on Parry's Ph.D. defense and recommended that he travel to then Yugoslavia. Parry did just that in 1933–1935, with his assistant Albert B. Lord (1912–1991), and assembled the largest collection of field recordings ever made–12,500 dictated texts and sound recordings on more than 3,500 aluminum discs. Today the collection, of which only a portion is published, is housed in the Widener Library at Harvard University.

Up to the fieldwork of Parry and Lord, the theory of the oral origins of the Homeric texts

had depended on a rigorous analysis of the text, but the theory was justified by Parry and Lord's unprecedented experiment in the real world. Parry argued that Homer, like the Serbo-Croatian poets, composed orally by means of "formulas" instead of our "words." He defined a formula as "a group of words which is regularly employed under the same metrical conditions to express a given essential idea" (Parry 1971). For example, such phrases as "rosy-fingered dawn" (*eos rhododaktylos*) or "wine-dark sea" (*oinops pontos*) or "much-suffering divine Odysseus" (*polutlas dios Odysseus*) or "gray-eyed Athena" (*glaukôpis Athena*) or "swift-footed Achilles" (*podas ôkus Achilleus*), or "glancing-helmed Hektor" (*koruthaiolos Hektor*) occupy a certain portion in the metrical line and enable the singer (Greek *aoidos*) to compose rapidly. Such formulas are characterized by "thrift," that is, there is only one such formula with a certain metrical pattern occupying a certain place in the line. Such a system could not be the creation of one man, but must depend on a tradition to which the singer had access. The formulas did allow internal substitutions and adaptations in response to narrative and grammatical needs, a flexible pattern that fit varying situations, and eventually Parry formulated the notion of a "formulaic system" that contained both a constant and a variable element.

The purpose of such a system of ready-made diction was to enable composition in performance, so that traditional features of Homer's language became proof for its oral origins. The thesis seemed to explain the highly unusual *Kunstsprache*, the "artificial language" or curious so-called epic dialect that incorporated features (especially Aeolic) alien to Homer's otherwise Ionic dialect. No one ever spoke this dialect, but it must have emerged over a long period of time through exposure to various dialectal forms that proved useful to the construction of the poetic line. Such features are unknown to such demonstrably written texts as Apollonius' *Argonautica* or Vergil's *Aeneid* and could only have come into being through the generations as a collective inheritance of many singers, Parry thought.

Parry died before he could compare systematically the technique of South Slavic poetry with Homer's, and his work attracted little attention until the publication in 1960 of *The Singer of Tales* by his assistant Albert B. Lord, perhaps the most influential work of literary criticism of the twentieth century. Parry's work was gathered together and published by his son Adam Parry in 1971 as *The Making of Homeric Verse*. In the *Singer of Tales*, Lord widened the comparative investigation to include medieval English, medieval French, and Byzantine Greek literature. Together with examples of formulaic language in South Slavic epic, he described such other features of oral traditional style as the *type scene*, or "theme," and the story patterns that governed whole epics. Lord also wrote about the singer's apprenticeship, describing his study under a master as a young boy to the time of his mastery of the craft.

Parry and Lord worked with an assistant named Nikola Vujnovic, himself a singer, and conversations between him and other singers shed considerable light on the process of oral composition. We think of poems as being made up of words, but linguists cannot define a "word" except as something found in dictionaries. The concept "word" is a product of literacy. When asked "what is a word" (*retch* in Serbo-Croatian), one singer replied as follows (Foley 1995):

Nikola: Let's consider this: "*Vino pije licki Mustajbeze*" ("Mustajbeg of the Lika was drinking wine"). Is this a single *retch*?
Mujo: Yes.
Nikola: But how? It can't be *one*: "*Vino-pije-licki-Mustajbeze*."
Mujo: In writing it can't be one.
Nikola: There are four *retchi* here.
Mujo: It can't be one in writing. But here, let's say we're at my house and I pick up the *gusle* (the one-stringed instrument that accompanies heroic song) – "*Pije vino licki Mustajbeze*" – that's a single *retch* on the *gusle* for me.
Nikola: And the second *retch*?
Mujo: And the second *retch* – "*Na Ribniku u pjanoj mehani"* ("At Ribnik in a drinking tavern") – there.

In short, for the illiterate singer, a "word" is a unit of meaning, not a typographical convention

that depends on the technology of writing. Further questioning revealed that by *retch*, the singer could mean several lines, a scene, or even a whole poem.

Parry's noun-epithet formulas, such as "much-suffering divine Odysseus" (*polutlas dios Odysseus*), function in much the same way as units of composition that combine with other phrases to constitute a hexameter line. The noun-epithet formula is metrically suitable for combination with various phrases containing a verb. Together they make up a whole line. Such is true of hundreds of noun-epithet "words" for people and gods in the *Iliad* and *Odyssey*.

On a broader level, poets working in the tradition use type scenes, or "themes," to build the overall poem. We might say that the "words" are whole type scenes, standardized in outline but flexible enough to fit the immediate context. For example, in the *Odyssey*, when somebody arrives for a feast, there is always a seating of the guest, a servant brings water for washing, a table is placed before the guest, a servant provides bread and other foods, and a carver hands around meat and gold cups. Then:

> They put their hands to the good things that lay prepared before them,
> but when they had put aside their desire for food and drink . . .

Though these details are common to all scenes of feasting, a very different use is made of them in the feast of the suitors, of Odysseus on Circe's island, and of Telemachus at the house of Menelaos in Sparta, a reflection of the flexibility of the Homeric traditional style.

Typical type scenes in Homer include Battle, Travel, Speeches, Messenger Speeches, Dreams, Divine Visitation, Conference, Assembly, Supplication, Dressing, and Seduction. All such scenes can be fleshed out or compressed in accordance with the dramatic requirements of the narrative. Such type scenes are common in the south Slavic epic that Parry studied, as well as the general theme of return, also attested in the traditions of medieval England, nineteenth-century Russia, Albania, Bulgaria, Turkey, and central Asia.

Key Issues/Current Debates

The theory of oral composition was used to explain the various narrative inconsistencies of which Analysts had made so much, for the dictating poet has no way to go back and correct "errors" nor any interest in doing so. It also explained the use of such unsuitable epithets as "blameless Aegisthus" to describe the murderer of Agamemnon, or "swift-footed Achilles," while he sits calmly in his chair. It also could explain the inordinate length of the Homeric poems, because when an oral poet dictates his text, freed of the exigencies of a live performance, free to elaborate his tale at will, the songs can become very long. The *Iliad* and the *Odyssey* are far longer than any ordinary oral poem.

Lord devoted a good deal of effort to the work of a Bosnian singer from Montenegro named Avdo Međedović (1875–1973), who did dictate a poem about the same length as the *Odyssey*, called *The Wedding of Smailagic Meho* (which Lord translated, 1974: see http://www.youtube.com/watch?v=8buaCDlYU2U). Not only was the poem about the same length as the *Odyssey*, but the story is similar. A young man comes of age, he is called to marriage, there is a great battle, and in the end there is wedding. The poem far outstrips typical performances by Avdo's peers in both length and artistry. The example proved that the *Odyssey* could have come into being in just this way, as a dictated text. Such has become orthodoxy in a modern understating of the genesis of Homer's poems.

Oral Theory was initially criticized because it appeared to make the *fons et origo* of Western literature a slave to a mechanical system. Where was room for poetic invention and genius if the lines are made up of preset expressions? The contribution of individual creativity appeared to be submerged in a collective poetic tradition. However, the units of expression that Parry and Lord identified in oral verse are no more restrictive on expression than the large but finite store of words (in a conventional sense) in literate traditions. The oral-formulaic language is just that: a language, subject to the morphological and grammatical restrictions of any language.

Another criticism of the Parry-Lord oral-formulaic theory questioned the validity of the analogy between Serbo-Croatian epic and Homer, pointing to the greater "metrical strictness" of Homeric poetry and its higher quality in general. But differences in quality, whether or not they are real, depend on the skill of the composer and not on the technology he is using.

International Perspectives

The work of Parry and Lord has been applied to many other literatures, both living and in textual form, including Medieval English, Medieval French, African, Native American, and Chinese. Already in 1953, Francis P. Magoun (1895–1979), Albert B. Lord's dissertation adviser at Harvard, published a famous essay on Beowulf, "The Oral-Formulaic Character of Anglo-Saxon Narrative Poetry." In it Magoun argued that Anglo-Saxon poetry was a transcription of traditional oral performance, heavily imbued with pre-Christian values. In a related development, the Canadian media theorist Marshall McLuhan (1911–1980) began to concentrate on how communicative media shape the content of the message.

McLuhan was advisor to the Jesuit Walter Ong (1912–2003), whose interests in cultural history resulted in *Orality and Literacy* (1980), which has had considerable influence. Ong drew heavily on the work of the Anglo/American Eric A. Havelock (1903–1988), who had suggested a shift in the form of thought coinciding with the transition from "orality" to "literacy" in Ancient Greece. Writing is a technology like other technologies (e.g., fire, the iron plow, the internal combustion engine). Ong considered that when introduced to what he called a "primary oral culture" (which has no writing), writing (he means alphabetic writing) produces wide-ranging effects on economics, politics, art, and other cultural forms. Ong thought Literacy changes people's mentality, causing "interiorization" and "individuation." Without writing, people must depend on proverbs and other forms of condensed wisdom in order to make legal and moral decisions. Epic poetry provided stylized culture heroes, for example, the wise old Nestor, the clever Odysseus, or the brave Achilles. Writing allows far more individualized models for behavior.

Ong distinguished between "primary oral cultures" (which have never known writing), "craft literacy" (where scribes hold the power), and cultures with a full literacy (such as our own), in which however there may still exist a "residual orality." In primary oral cultures, thought is cyclical whereas in literate culture it is linear, historical, or evolutionary. In the modern electronic age, Ong distinguished a "secondary orality" that lives alongside writing in which a new orality is sustained by telephone, radio, television, and other electronic devices that depend for their existence on writing. Ong's works widened what we understand as oral tradition by accounting not only for the creation of literary artifacts (the preoccupation of Parry and Lord), but for their reception.

Another scholar important to the study of oral tradition was John Miles Foley (1947–2012), founder of the journal *Oral Tradition* (http://journal.oraltradition.org/) and the Center for Studies in Oral Tradition (1986) at the University of Missouri. Foley consolidated oral tradition as an academic field that brought together scholars working in disparate academic fields (but primarily ancient Greek, Anglo-Saxon, and Serbo-Croatian). Foley introduced the concept of "traditional referentiality" by which he explained the meaning of such epithets as "swift-footed Achilles" as summing up, through reference to the tradition, the whole character of Achilles. Therefore, "swift-footed Achilles" did not mean just "Achilles," as Parry thought, but embodied the whole essence of his personality.

As the study of oral tradition progressed, a great difficulty was faced in scholars' inability to define clearly what was meant by a "formula." Noun-epithet formulas were easy to find, but other formulaic expressions slipped away as one tried to pin them down. The term "formulaic system" was suggested, which contains "substitution slots" for syntactic, morphological, and narrative needs, but in fact research into the formula proved a dead end. Such could only have been the case,

just as the attempt to define a conventional "word" has proved impossible. Language is a flexible medium depending on invisible templates that generate the form on the surface. For this reason, the many attempts to define the "formula" proved ineffective, because language is not mechanical, but a human faculty whose origins and functioning are poorly understood.

Future Directions

A persistent problem with those dealing with the oral-formulaic theory and the dichotomy orality/literacy is the failure to understand that "literacy" is not a single thing. By "literacy" commentators always meant "alphabetic literacy," not understanding that there are many other kinds of literacy, for example, that prevalent in ancient Egypt or in China today (Eric Havelock did have an inkling of this). Barry B. Powell has argued that the invention of the Greek alphabet made possible a very special kind of literacy, and that it was inspired by the desire to record the *ipsissima verba* of Homer himself (Powell 1991, 2003). The strongest evidence for this thesis comes from several factors: (1) the correspondence of the apparent dates of Homer, probably the eighth century BCE, and the invention of the Greek alphabet around 800 BCE; (2) early inscriptions, which are preponderantly hexametrical; (3) the absence of references to writing in Homer (except once, where he does not understand it); and (4) the history of writing. The Greek alphabet was the first writing that could actually be pronounced, even by a non-native speaker. All other forms of writing provide only hints of the actual sound of the language represented and, in the case of Chinese, scarcely even that. The Greek alphabet was the first system of writing capable of preserving Homer, and it is odd that it actually did this if that was not the purpose of its design.

Therefore, in thinking about literacy's effect on human mentality, on its promotion of linear over cyclical thinking, for example, or on its encouragement of philosophical thought, one must remember that alphabetic literacy is a very special form of literacy invented with the express purpose of recording oral poetry. Conclusions based on it cannot be extrapolated easily to the literacy of ancient Mesopotamia, where in fact there was no philosophy. Powell argues furthermore that "orality" is nothing as such, with special qualities, and that "literacy," being very different in different cultures, has different effects, always elusive and hard to define.

The study of oral tradition has in any event been widened since the work of Parry and Lord to include philosophy, cognitive science, linguistics, communication theory, semiotics, biblical studies, communication theory, popular culture, film study, and many other fields. The recognition of oral tradition as the source and basis of the alphabetic literate tradition has profoundly altered our understanding of the past.

Cross-References

- ▶ Ceramics, Ancient Greek
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Epigraphy, Greek
- ▶ Oral Sources and Oral History
- ▶ Panhellenism
- ▶ Papyrology in the Greco-Roman World
- ▶ Preserving Heritage: The Role of the Media
- ▶ Symposion

References

Foley, J.M. 1995. Oral tradition and its implications. In *A new companion to Homer*, ed. I. Morris and B. Powell. Leiden: Brill.

Parry, A. 1971. *The making of Homeric verse*. Oxford: Oxford University Press.

Powell, B.B. 1991. *Homer and the origin of the Greek alphabet*. Cambridge: Cambridge University Press.

Powell, B.B. 2003. *Writing and the origins of Greek literature*. Cambridge: Cambridge University Press.

Further Reading

Bakker, E.J. 1996. *Poetry in speech: Orality and Homeric discourse*. Ithaca: Cornell University Press.

Edwards, M.W. 1986. Homer and oral tradition: The formula (Part I). *Oral Tradition* 1: 171–230 Available at: http://journal.oraltradition.org/issues/1ii/edwards. Accessed 30 Aug 2013.

Edwards, M.W. 1987. *Homer: Poet of the Iliad*. Baltimore: Johns Hopkins University Press.
Edwards, M.W. 1988. Homer and oral tradition: The formula (Part II). *Oral Tradition* 3: 11–60 Available at http://journal.oraltradition.org/issues/3i-ii/edwards. Accessed 30 Aug 2013.
Edwards, M.W. 1992. Homer and oral tradition: The type scene. *Oral Tradition* 7: 284–330 Available at http://journal.oraltradition.org/issues/7ii/edwards. Accessed 30 Aug 2013.
Foley, J.M. 1988. *Immanent art: From structure to meaning in traditional oral epic*. Bloomington: Indiana University Press.
Havelock, E. 1963. *Preface to Plato*. Cambridge, MA: Harvard University Press.
Lord, A.B.. 2000. *The singer of tales*. 2nd ed. Cambridge, MA: Harvard University Press.
Mededović, A. 1974. *The wedding of Smailagić Meho*. Trans. A. B. Lord. Cambridge, MA: Harvard University Press.
Morris, I., and B.B. Powell, eds. 1997. *A new companion to Homer*. Leiden: Brill.
Murko, M. 1990. The singers and their epic songs. Trans. J.M. Foley. *Oral Tradition* 5: 107–130. Available at http://journal.oraltradition.org/issues/5i/murko. Accessed 30 Aug 2013.
Ong, W. 2001. *Orality and literacy: The technologizing of the word*. 2nd ed. New York: Routledge.
Powell, B.B. 2007. *Homer*. 2nd ed. Malden/Oxford: Wiley-Blackwell.
Radloff, W. 1990. Preface to *The Dialect of the Kara-Kirgiz*. Trans. G.B. Sherman with A.B.. Davis. *Oral Tradition* 5: 73–90 Available at http://journal.oraltradition.org/issues/5i/radloff. Accessed 30 Aug 2013.

Orce: Early Pleistocene Archaeological Sites

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Introduction

Orce is the name of a town in SE Spain (province of Granada) rich in Early Pleistocene archaeological sites. Venta Micena (VM), Barranco León-5 (BL-5), and Fuente Nueva-3 (FN-3) are localities of special interest because the archaeological and paleontological evidence shows human occupation between 1.3 and 1.2 Ma. BL-5 and FN-3 have supplied a large collection of Oldowan tools associated with vertebrate fauna (Fig. 1). In addition, a fragment of a deciduous human molar was found at BL-5 site (Fig. 2), and later, a complete deciduous human molar was recovered from the same layer in 2002 (Gibert et al. 1999; Toro-Moyano et al. 2013). Recent studies showed that both deciduous molars belonged most probably to the same individual (Ribot et al. 2015). Venta Micena does not show lithic tools, but antropic action on bones has been described associated with three fragmentary human remains and fauna (Gibert et al. 2006a).

Definition

Barranco León (BL-5)

The deposit of Barranco León-5 is located in a fine sand bed varying in thickness between 10 and 25 cm that belongs to the distal part of a small alluvial system. BL-5 is a classical paleontological site, above layers BL-1 to BL-4, but is the only one that has supplied lithic tools to date (Gibert et al. 1992a, 1998; Roe 1995; Tixier et al. 1995; Toro-Moyano et al. 2013). In 1995 a deep quarry (>12 m) was excavated to reach the archaeological level. This first excavation revealed a lower mandibule of hippopotamus surrounded by more than hundred lithic artifacts associated with the following fauna: *Castillomys* cf. *crusafonti, Mimomys* sp. *Allophaiomys pliocaenicus, Equus granatensis,* and *Hippopotamus amphibious antiquus.*

Barranco León produced in 1995 114 lithic artifacts, 112 of flint 1 of quartzite and 1 of Jurassic limestone, and 20 manuports also from Jurassic limestone. Subsequent excavations have increased the faunal list and the lithic collection to more than 1000 tools (Fajardo 2008; Toro-Moyano et al. 2010, 2011). The flint from BL-5 is of good quality and is mostly gray in color although a yellow-brown variety is also present. The flint cores and flakes are small within a range of 20–61 mm with a mean of 40.7 mm. The butts have a very variable morphology, and the flakes are not usually cortical. Chopper cores of flint and limestone are also present in BL-5.

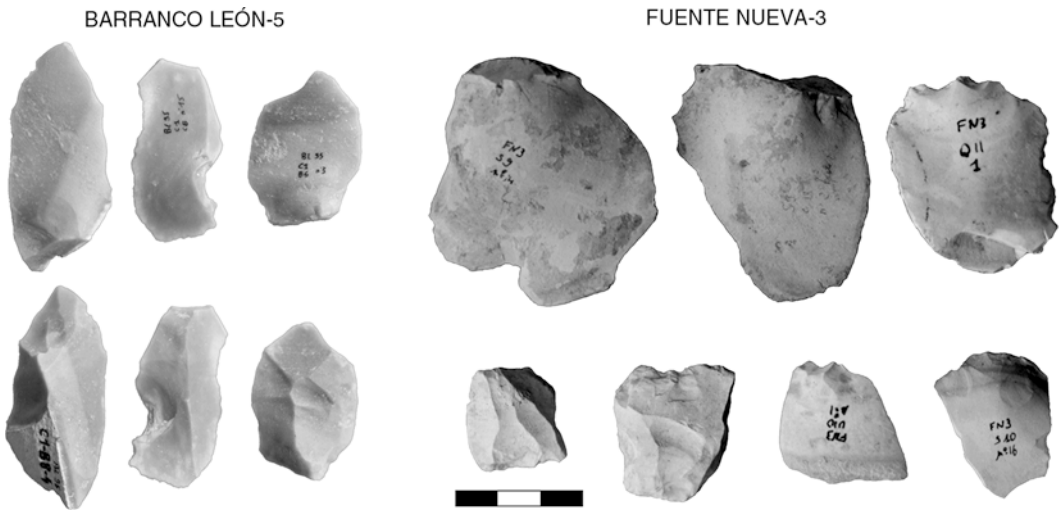

Orce: Early Pleistocene Archaeological Sites, Fig. 1 Tools from BL and from FN-3. View of Oldowan tools (unretouched flakes) from Barranco León-5 and Fuente Nueva-3. Those tools were unburied during field season of 1995, and all of them are made from local flint although from different sources

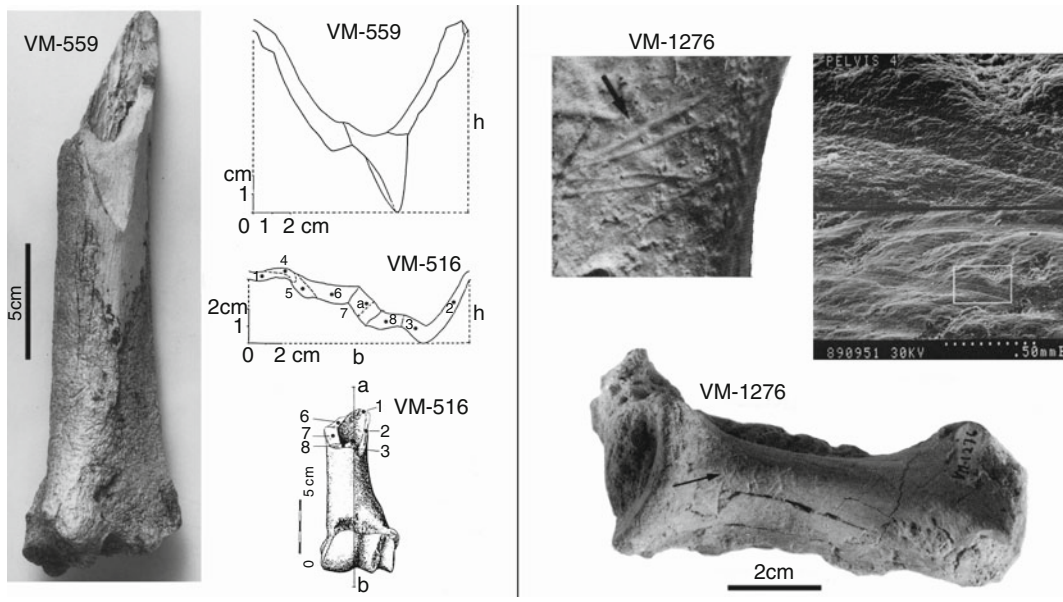

Orce: Early Pleistocene Archaeological Sites, Fig. 2 Cut marks and broken bones from VM. This figure shows an example of a bone broken by percussion from Venta Micena; those fractures show a very different pattern than bones broken by carnivores (Gibert et al. 1992a). The same figure show subparallel cut marks from a pelvis from Venta Micena; the view under SEM shows a typical micro-striation usually associated with cut marks and indicates that erosion is affecting equally the surface of the bone and the surface of the cut marks indicating an old origin

The source of the flint and limestone from Barranco León is the Jurassic Sierra de la Umbria and Periate where locally the chert replaces the Jurassic marine limestones. Blocks of quality flint (up to 10 cm) are concentrated in alluvial fan deposits down on the valley, only 2 km SE the site, behind the town of Orce.

Fuente Nueva-3

FN-3 site is located between Sierra de la Umbria to the South and Cerro de la Venta to the NE, in a marginal zone of the basin. Lithic artifacts were initially identified during a survey by Dr. J. Gibert and J. Serrallonga in 1991, later more artifacts and fossils appeared when the electrical company was carrying out work nearby (Gibert et al. 1992a).

The location of the site and a small assemblage of nine artifacts from Fuente Nueva-3 were first described in Gibert et al. (1992a), and more details on 23 artifacts can be found at Tixier et al. (1995). The first extensive excavation was developed during summer of 1995, when more than 100 lithic artifacts were recovered associated with *Mymomys* sp., *Allophaiomys pliocaeinucs, Equus granatensis, Hippopotamus amphibious antiquus, Mammuthus meridionalis,* and *Bovini indet.* The majority of the lithic artifacts were closely associated with remains of large mammals in three distinct archaeological levels. Those levels are affected by soft sediment deformation probably induced by earthquakes.

More than a hundred lithic artifacts were discovered during this initial excavation, mainly from level FN-3a. >90% of these artifacts are made with local flint although some tools of quartzite and Jurassic limestone were also identified. In addition, 20 manuports of Jurassic limestone were uncovered. Successive excavations increase the number of lithic tools and faunal list (Fajardo 2008; Toro-Moyano et al. 2010, 2011).

In Fuente Nueva-3 the flint is of uniform white color and of good quality, with some pieces having secondary iron oxide staining. Identified cores have centripetal flaking, their mean length is 65 mm, while the flakes range from 21 to 64 mm with a mean of 59 mm. Flakes have a plain striking platform and some shows probable use traces. A chopper core of quartzite was probably used as a hammerstone, to judge by abrasion on the cortical face (Gibert et al. 1998b).

Fuente Nueva-3 flint has a different origin than BL-5, and its source is still unclear; the closest sources for quartzite from BL-5 and FN3 are the Late Miocene fluvial deposits outcropping 6 km NE from FN-3 that probably were exposed during the Early Pleistocene.

The BL-5 and FN3-a lithic assemblages show no important differences. They represent a lithic technology with a very simple *chaîne opératoire*, lacking any sign of bifacial flaking technique; accordingly both can be compared to the Oldowan and even classified as such, being the first well-defined examples of Oldowan in Europe (Gibert et al. 1998b).

Venta Micena

Venta Micena site consists of a rich fossil-bearing layer (80 cm thick) that extends in horizontal lacustrine deposits for >1 km^2. Venta Micena is the richest site in fossil fauna from the Orce region. Between 1982 and 2003, >250 m^2 were excavated from 9 different quarries located on the same fossiliferous layer supplying 2867 dental pieces and 7468 postcranial fossils that correspond to at least 214 individuals (Gibert et al. 2006a). The majority of these finds come from Quarry-3, the only one that has supplied evidences of human presence. The fauna represents at least 32 species of mammals including Homo sp., *Desmana* sp., *Allophaiomys pliocaenicus, Apodemus aff. mystacinus, Castillomys crusafonti* ssp., *Eliomys intermedius, Hystrix major, Prolagus calpensis, Oryctolagus* cf. *lacosti, Ursus etruscus, Canis etruscus, C. falconeri, Vulpes praeglacialis, Homotherium latidens, Megantereon* sp., *Lynx* sp., *Pachycrocuta brevirostris, Meles* sp., *Mammuthus meridionalis, Equus granatensis, Dicerorhinus etruscus brachycephalus, Hippopotamus amphibius antiquus, Praemegaceros* sp., *Cervidae indet., Bubalus* sp., *Soergelia minor, Hemitragus alba, Testudo* sp., *Lacerta* sp., *Rana* sp., *Charadriiformes indet.* (Gibert et al. 2006a). No lithic tools have been identified to date, although pieces of Jurassic limestone were recovered in the micritic-size carbonate deposits and interpreted as transported to the site by early humans (Gibert et al. 1992a). Venta Micena shows three human remains: a parietal-occipital fragment (VM-0), a juvenile human diaphysis (VM-1960), and the mid-shaft of an adult humerus (VM-3961). As is usual in paleoanthropology, these remains generate considerable debate (Gibert et al. 1998a) and opinions (Palmqvist et al. 2005). Specifically the skull fragment VM-0

shows an unusual internal crest that was used by some to classify the specimen as a horse (Agustí and Moya 1987). The identification of similar internal occipital crests in humans and the identification of fossil human proteins in those remains by independent teams from Spain and EEUU close the debate for most of the experts (Campillo et al. 2006; Borja et al. 1997). In addition, evidences of human activity such as bones broken by rock percussion and cut marks have also been described at Venta Micena (Gibert et al. 1992a) associated with evidence of scavengers' activity (Arribas and Palmqvist 1998) showing an interesting competence between early humans and hyenas (Figs. 3 and 4).

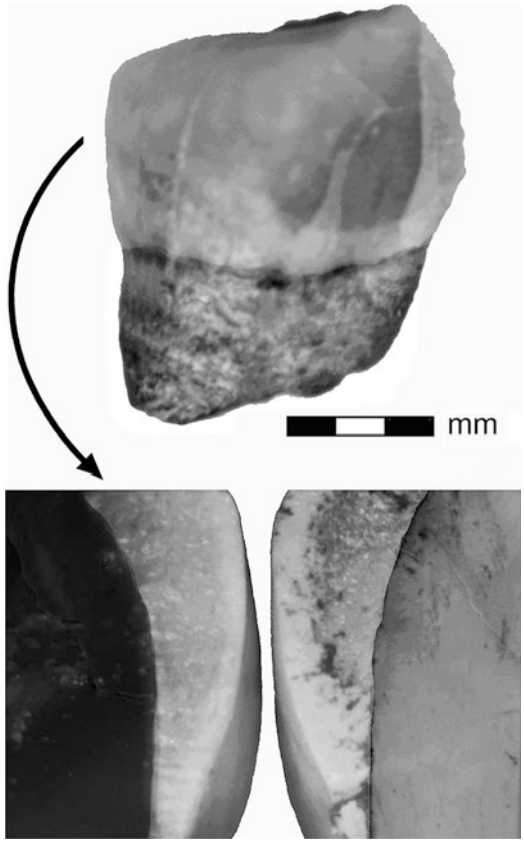

Orce: Early Pleistocene Archaeological Sites, Fig. 3 Human molar fragment from Barranco León. This molar shows characteristic human enamel features (Gibert et al. 1999, 2006a). It is compared with a half modern human molar (below right) showing identical enamel distribution. An additional human molar has been described from the same site (Toro-Moyano et al 2013; Ribot et al. 2015)

Key Issues/Current Debates/Future Directions/Examples

Implications

The exceptional sedimentary record from Orce is dated between 2 Ma at the bottom of the Salar and Vélez canyons and ~1 Ma to the top. This section can be completed to the west at Cúllar and Huéscar localities where Middle Pleistocene deposits have been preserved from erosion. Those sections occur 19 km S-SW and 7 km N-NW from Orce and contain the archaeological site of Cullar-1 dated at 0.75 Ma and the paleontological sites of Huescar-1 and Puerto Lobo with ages of ~0.9 Ma (Gibert et al. 2007a). In the same basin but 65 km to the SW, the site of Solana del Zamborino exposes a nice collection of Acheulian tools with evidences of fire that have been dated at 0.75 Ma (Scott and Gibert 2009). In summary, we can say that the Orce region has a long record of human occupation between 1.3 and 0.75 Ma. The presence in SE Iberia of the oldest Oldowan tools and later the oldest evidences of Acheulian tools in Western Europe suggest that the Strait of Gibraltar was a permeable barrier for humans during the Early Pleistocene. This hypothesis challenges classical model of human dispersal from Africa to Europe around the Mediterranean during the Early Pleistocene. Archaeological finds in Soa Basin (Flores Island) indicates that early humans were able to cross marine barriers. In addition, the presence of African primates (*Theropithecus oswaldi*) at the Early Pleistocene site of Cueva Victoria supports a dispersal of fauna through the Gibraltar Strait, probably in a moment when the sea level was low and the distance between continents was reduced substantially (Fig. 5) (Gibert et al. 1995, 2016; Ferrandez et al. 2014).

The Geology

Orce is located in the NE marginal sector of the Baza Basin, in the internal part of the Betic range. A recent geophysical survey reveals the semi-graven structure of this basin filled with marine

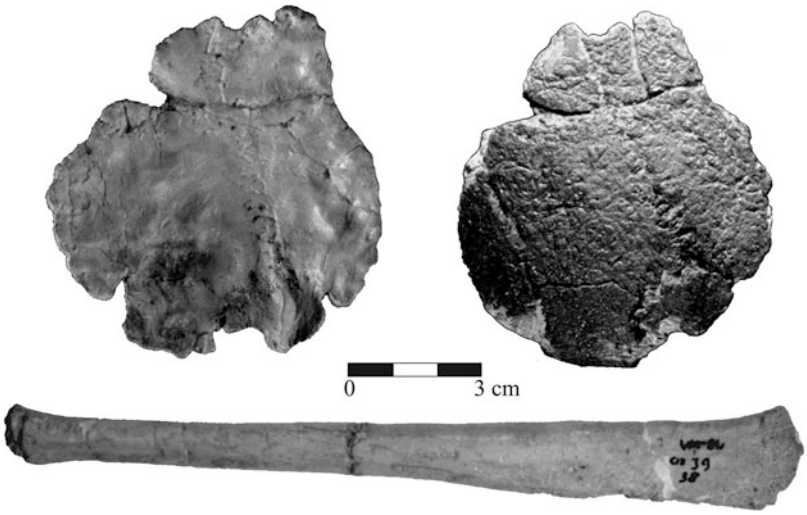

Orce: Early Pleistocene Archaeological Sites, Fig. 4 Orce man and two other human bones from VM. This figure shows external and internal view of VM-0 and a humeral shaft classified as human from Venta Micena

sediments until the basin was isolated from the sea in the Late Tortonian (7.25 Ma) (Haberland et al. 2017). Since then, lacustrine and alluvial deposits accumulate in this basin until the Middle Pleistocene (~0.5 Ma) when the Guadalquivir River captured the basin (Gibert et al. 2007a). During the Plio-Pleistocene, the Baza Basin was occupied by a large lacustrine system with a central saline lake surrounded by a fringe of marginal ephemeral ponds where all archaeological and paleontological finds occur (Gibert et al. 2007b). In Orce, the most relevant archaeological sites are found in the upper 20 m of the stratigraphy, where there is a 25 m-thick lacustrine unit outcrop (Scott et al. 2007). This unit corresponds to shallow lakes that accumulate thick deposits of fine-grained carbonatic sediments that preserved the fossils until erosion uncover those layers.

The Chronology

Since its early discovery, the fauna assemblage of Venta Micena was dated as Early Pleistocene (Biharian biozone), but a numerical age was missing. The lack of volcanic material in the basin makes paleomagnetism the best technique to solve the age of the archaeological sites. A preliminary magnetostratigraphic study claimed for the identification of the Olduvai subchron in the upper 10 m of the Barranco the Orce section (Agustí et al. 1997), located only 300 m west from Barranco León. The lower boundary of Olduvai was placed at the same stratigraphic level than the BL-5 site, suggesting an age of 1.95 Ma for BL finds (Gibert et al. 1998). Later, a review of the paleomagnetic data at Barranco the Orce proved that the rocks were remagnetized in the present field direction invalidating these old chronologies (Gibert et al. 2006b). In 2000, a study of the upper part of the Barranco León and Fuente Nueva-3 sections showed only reverse polarity placing the sites in the Early Pleistocene but without given a concrete age (Oms et al. 2000). It was in 2007 when a magnetostratigraphy for the complete section outcropping in Orce was published (Scott et al. 2007); this study showed a polarity sequence of three magnetozones with a sequence of reverse-normal-reverse polarity. Different field tests were done to guarantee that this normal zone was not remagnetized. The paleontological information permitted to correlate the normal zone with Olduvai subchron (1.98–1.75 Ma) and to date with accuracy the lower part of the section at 2 Ma and produce minimum ages for the archaeological sites of 1.3 Ma for Venta Micena, 1.25 Ma for Barranco León, and 1.2 Ma for Fuente Nueva-3 (Scott et al. 2007).

In an attempt to refine the age of Orce sites, two additional techniques were used:

Amino acid racemization analysis on remains from gastropods from Venta Micena produced an average age of 983 ± 58 Ky for the site. This age

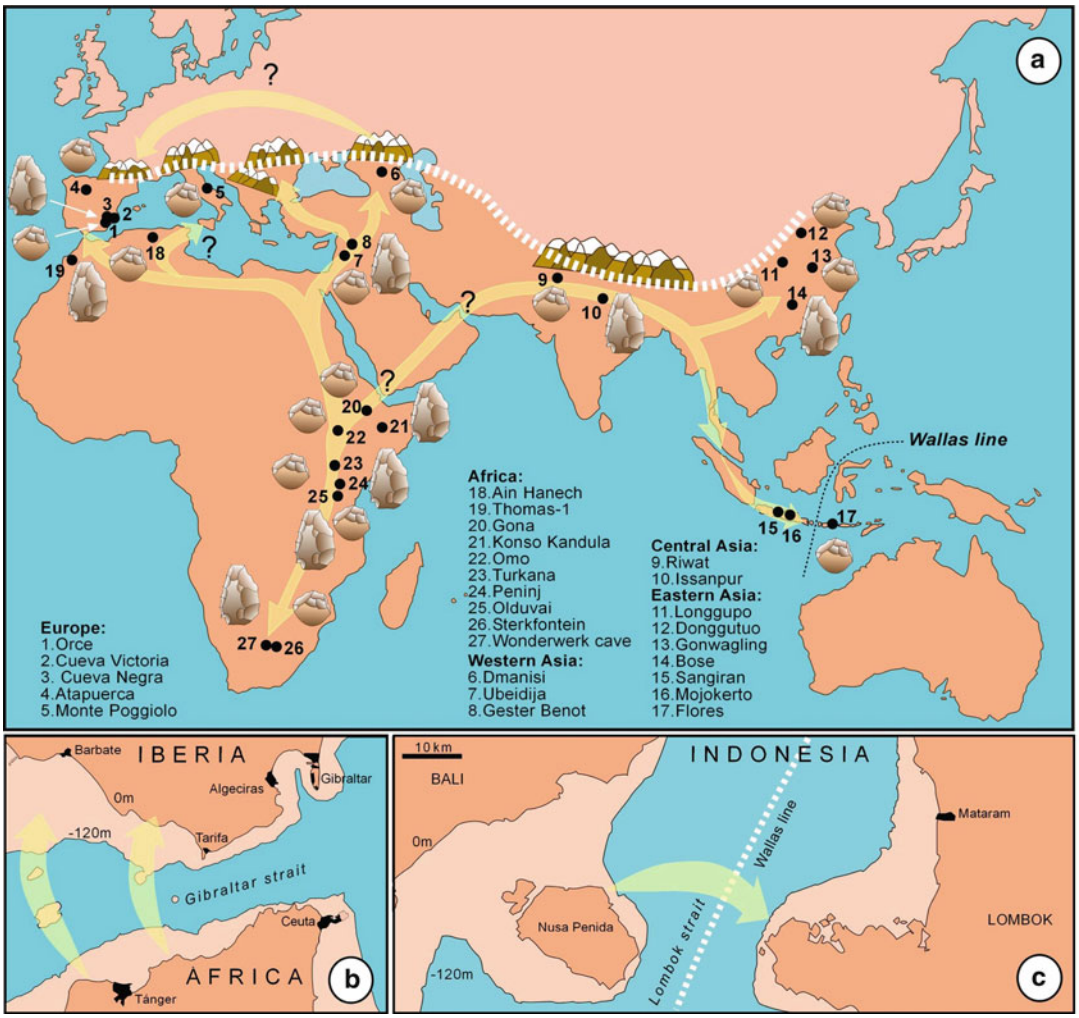

Orce: Early Pleistocene Archaeological Sites, Fig. 5 Model of dispersal. Map showing the distribution of Oldowan and Acheulian technologies during the Early Pleistocene. The presence of the oldest evidences of the African Oldowan technology and later the oldest evidences of the African Acheulian technology challenge classical view of human dispersal from Africa to Europe around the Mediterranean and suggest that the Strait of Gibraltar was a permeable barrier for humans during the Early Pleistocene. The map shows a dotted line indicating the limit of the first human dispersions; there is no evidence of human presence north of this line before 0.8 Ma. The paleogeography of the Strait of Gibraltar during a sea level fall of 120 m is also indicated; under this situation the distance between continents was reduced by 50% and some islands appeared. In Africa the oldest Oldowan is at Gona (Ethiopia, 2.6 Ma), in North Africa at the site of Ain Hanech (Algeria 1.5–1.6 Ma), in Asia at Dmanisi (Georgia, 1.7 Ma) or Riwat (Pakistan, 1.9 Ma), and in Europe at Orce at 1.25 Ma. The oldest Acheulian occurs at Konso-Gardula (Ethiopia, 1.4 Ma) or Peninj (Tanzania. 1.5 Ma), in North Africa at Thomas Quarry (Morocco at 1 Ma), in Asia at Bose (China, 0.8 Ma), and in Europe at Cueva Negra (0.9 Ma) and Solana del Zamborino (0.75 Ma), both sites in SE Iberia

was validated assuming a correct age for the site of Cullar Baza-1 of 441 ± 27 Ky obtained using the same technique (Torres et al. 1997). In 2007 a paleomagnetic study placed Cullar Baza-1 at the Brunhes-Matuyama boundary 0.78 Ma (Gibert et al. 2007a) showing a much larger error in this technique.

In recent times new attempts using combined U-series/electron spin resonance (ESR) dating method have been applied without success. In

Venta Micena, five mammal teeth were sampled. The results gave disperse ages between 1.79 + 0.30/−0.23 and 0.57 + 0.08/−0.09 Ma (Duval et al. 2011). In Barranco León and Fuente Nueva-3, nine teeth samples were analyzed. Seven samples could not be dated, and the remaining two give again non-consistent ages of 1.19 ± 0.21 Ma and 0.52 + 0.09/−0.08 Ma for FN-3 (Duval et al. 2012).

The History of the Investigations

The site of Venta Micena was discovered in 1976 during a survey led by Dr. Josep Gibert, and a second survey in 1979 identified additional fossiliferous strata in the Orce section like Barranco León, Barranco de Orce. In 1982 the first extensive excavations were developed, and after the identification of a human skull fragment at Venta Micena, more work was done between 1984 and 1986. A controversy on the Orce skull halted the excavations at Venta Micena. Between 1986 and 1994, new sites were discovered, and some worked pieces of flint and quartzite were found *in situ* at some of the beds in Barranco León and Fuente Nueva-3. In summer of 1995, the first extensive excavation at the sites of Barranco León-5 and Fuente Nueva-3 was organized by Dr. Gibert producing a large collection of tools. The finds were presented at the International Conference on Human Paleontology held at Orce in September of 1995. During this conference the participants had the opportunity to examine the sites and the finds and agreed that sites yielded very old evidences of human presence (Zihlman and Lowenstein 1996) closing the debate about the early human presence in Orce. After this conference, the "Orce man" controversy was reopened by two collaborators of Gibert who unexpectedly change their opinion about the human affinity of the Orce skull (Palmqvist 1997; Martínez-Navarro 2002; Gibert et al. 1998). Because of this new controversy, the excavations were stopped again until 1998, when a new team, that integrates these collaborators, took the control of the sites of Barranco Leon and Fuente Nueva-3. Although Dr. Gibert applied for administrative permits until his premature death in 2007, no new extensive excavations were permitted at Venta Micena until summer of 2013, when a quarry located 400 m away from Quarry-3, the richest and the only one that has supplied human remains, was reactivated. In 2017 the regional administration asked archaeologist from University of Granada to lead the research project at Orce.

The Controversy on Orce Skull

In 1982 a skull fragment with human affinities was recovered, the fossil with number VM-0, and was published and named by the news media as "Orce man." It consists of two parietals and the occipital, and its external view shows typical human anatomy. Based on its exocranial morphology, curvature, low thickness, and the *impressiones digitatae* on its endocranial face, it was concluded that VM-0 belonged to an infant around 5 years old (Fig. 1) (Gibert et al. 1983; Campillo 1989).

After the endocranial was cleaned, a small internal sagittal crest was identified. This atypical anatomical feature in humans was used by some to suggest that the fossil was not human but an equine. This rumor arrived to the press in 1984 starting a debate in the Spanish news media between supporters and rivals of the human affinity. The equine hypothesis was published finally in 1987 by two of the colleagues of Gibert who participated in the discovery (Agustí and Moyà 1987). The new classification of VM-0 was based on the presence of this atypical internal crest and a supposed *sutura coronalis* in VM-0 situated at 40 mm from lambda point. This would imply that VM-0 belonged to a being with a small brain like a horse. A detailed X-ray study proved no presence of a *sutura coronalis* in VM-0 and demonstrated that all interpretations based on the presence of a *sutura coronalis* are incorrect (Campillo et al. 2003).

The same study shows a character that proves the human affinity of VM-0: the presence of a wide *sulcus sagittalis* (9 mm), the print of the superior *sinus sagittalis*. This wide *sulcus sagittalis* drained venous blood of a big brain, like the human, but not possible in a colt whose brain size is similar to that of sheep and the *sulcus sagittalis* is much narrow (Campillo et al. 2006).

Drs. Gibert and Campillo studied a large collection of human skulls including 311 X-rays (61 infants, 73 juveniles, 177 adults) and further 735 human crania (Campillo 1989). Also 72 horse crania (2, aged 0–2 months; 6, aged 3–4 months; 15, aged 7–9 months; 49 adults) but never were able to identify an equid skull which permits an anatomical comparison with VM-0 (Gibert et al. 1998). In contrast, similar sagittal crest than the one in VM-0 was identified in humans (Campillo 1989). In 2006, the endocranial morphology of an infant skull from a Roman necropolis shows an identical internal occipital crests to that of the VM-0 fragment, confirming that such crests occur in human crania disproving all previous arguments made against the human hypothesis (Campillo et al. 2006).

In an unprecedented effort to solve the "Orce man" controversy, two different laboratories carried out independent immunological test on residual proteins extracted from these disputed fossils. Dra. Borja and Dr. Enrique García-Olivares (Univ. of Granada) detected human albumin and human immunoglobulin in all three fossils. Dr. Jerold Lowenstein (University of California, San Francisco) also detected human albumin as well as human transferring and collagen in the cranial piece (VM-0) and human albumin in VM-1960. As a further check both teams found equine albumin in specimens identified morphologically as equids, and Dr. Lowenstein identified bovine albumin in two bovine fossils (Zihlman and Lowenstein 1996; Borja et al. 1997).

The role of immunology is critical here, where the morphology is incomplete," observed Prof. Phillip Tobias (Univ. of the Witwatersrand), after close examination of the fragments. Prof. Tobias concluded that "nothing in the remaining morphology would exclude their being hominid" (Zihlman and Lowenstein 1996). In reference to the study of fossil proteins Prof. Tobias conclude, "the convergence of the two laboratories, working independently of one another, by two different methods, provides very strong evidence in support of the conclusion that all three of the bones from Venta Micena are of hominid origin" (Tobias 1998).

Cross-References

- ▶ Age Estimation
- ▶ Biomolecular Archaeology: Definition
- ▶ Dating Techniques in Archaeological Science
- ▶ Europe: Early *Homo* Fossil Records
- ▶ Europe: Paleolithic Art
- ▶ Geoarchaeology
- ▶ Handaxes and Biface Technology
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Mousterian Industry Tradition
- ▶ Tobias, Phillip V.
- ▶ Vertebrate Taphonomy in Archaeological Research

References

Agustí, J., and S. Moyà. 1987. Sobre la identidad del fragmento craneal atribuido a *Homo* sp. de Venta Micena (Orce Granada). *Estudios Geológicos* 42: 535–538.

Agustí, J., O. Oms, M. Garcés, and J.M. Parés. 1997. Calibration of the late Pliocene-Early Pleistocene transition in continental beds of the Guadix-Baza Basin (south-east Spain). *Quaternary International* 40: 93–100.

Arribas, A., and P. Palmqvist. 1998. Taphonomy and paleoecology of an assemblage of large mammals: Hyaenid activity in the lower Pleistocene site at Venta Micena (Orce, Guadix-Baza Basin, Granada, Spain). *Geobios* 31: 3–47.

Borja, C., M. García-Pacheco, E. García Olivares, G. Scheuenstuhl, and G. Lowenstein. 1997. Immunospecificity of albumin detected in 1.6 million-year-old fossils from Venta Micena in Orce, Granada, Spain. *American Journal of Physical Anthropology* 103: 433–441.

Campillo, D. 1989. Study of the Orce man. In *Los restos humanos de Orce y Cueva Victoria*, ed. J. Gibert, D. Campillo, and E. García Olivares, 187–220. Sabadell: Publicacions de l'Institut de Paleontología "Dr. M. Crusafont", Diputació de Barcelona.

Campillo, D., M. Rovira, J.A. Sanchez-Sánchez, S. Vila, J. Gibert, and L. Gibert. 2003. The Orce skull (VM-0): X-ray study. *Human Evolution* 18: 131–146.

Campillo, D., M. Cuesta, E. García-Guixé, E. Chimenos, L. Devenat, and J. Baixarias. 2006. An occipital crest in an infant cranium from the Roman necropolis of Francolí (Tarragona, Spain): Implications to the interpretation of the Orce skull. *La Revista Española de Antropología Física* 26: 93–101.

Duval, M., C. Falguères, J.-J. Bahain, R. Grün, Q. Shao, M. Aubert, J. Hellstrom, J.-M. Dolo, J. Agustí,

B. Martínez-Navarro, P. Palmqvist, and I. Toro-Moyano. 2011. The challenge of dating Early Pleistocene fossil teeth by the combined uranium series-electron spin resonance method: The Venta Micena palaeontological site (Orce, Spain). *Journal of Quaternary Science* 26: 603–615.

Duval, M., C. Falguères, J.-J. Bahain, R. Grün, Q. Shao, M. Aubert, J.-M. Dolo, J. Agustí, B. Martínez-Navarro, P. Palmqvist, and I. Toro-Moyano. 2012. On the limits of using combined U-series/ESR method to date fossil teeth from two Early Pleistocene archaeological sites of the Orce area (Guadix-Baza basin, Spain). *Quaternary Research*. https://doi.org/10.1016/j.yqres.2012.01.003.

Fajardo, B. 2008. *Les industries lithiques anciennes d'Orce: Les sites de Barranco León et Fuente Nueva-3. Leur place dans le contexte des plus anciennes industries eurasiatiques*. PhD Dissertation, University of Montpellier.

Ferràndez, C., F. Ribot, and L. Gibert. 2014. New fossil teeth of Theropithecus oswaldi from Cueva Victoria (SE Spain). *Journal of Human Evolution* 74: 55–66.

Gibert, J., J. Agustí, and S. Moyá. 1983. *Presencia de Homo sp. en el yacimiento de Venta Micena. Paleontologia i Evolució (Sabadell)*. Especial publicación, 1–12.

Gibert, J. 1992. *Presencia humana en el Pleistoceno inferior de Granada y Murcia proyecto Orce-Cueva Victoria, 1988–1992*. Orce: Museo de Prehistoria. 503 p.

Gibert, J., F. Ribot, C. Ferrandez, B. Martinez, R. Caporicci, and D. Campillo. 1989. Comparative anatomical study of the cranial fragment from Venta Micena (Orce, Spain) with fossil and extant mammals. *Human Evolution* 4: 283–305.

Gibert, J., A. Iglesias, A. Maillo, and L. Gibert. 1992a. *Industrias líticas en el Pleistoceno Inferior de la región de Orce. Proyecto Orce-Cueva Victoria. Presencia Humana en el Pleistoceno Inferior de Granada y Murcia*, 219–240. Orce: Museo de Prehistoria.

Gibert, J., M. Leakey, F. Ribot, L. Gibert, A. Arribas, and M. Martinez. 1995. Presence of the Cercopithecid genus Theropithecus in Cueva Victoria (Murcia, Spain). *Journal of Human Evolution* 28: 487–493.

Gibert, J., D. Campillo, J.M. Arqués, E. Garcia-Olivares, C. Borja, and J. Lowenstein. 1998a. Hominid status of the Orce cranial fragment reasserted. *Journal of Human Evolution* 34: 203–217.

Gibert, J., L. Gibert, E. Maestro, and A. Iglesias. 1998b. Two "Oldowan" assemblages in the Plio-Pleistocene deposits of the Orce region, south-east Spain. *Antiquity* 72: 17–25.

Gibert, J., L. Gibert, S. Albaladejo, F. Ribot, F. Sánchez, and P. Gibert. 1999. The oldest human remain from the Plio-Pleistocene deposits of Orce (south-east Spain). *Human Evolution* 14: 3–19.

Gibert, J., L. Gibert, C. Ferrandez-Canyadell, A. Iglesias, and F. González. 2006a. Venta Micena, Barranco León-5 and Fuente Nueva-3: Three archaeological sites in the early Pleistocene deposits of Orce, south-east Spain. A very remote period indeed. In *The human evolution source book*, ed. R.L. Ciochon and J. Fleagle, 327–335. Englewood Cliffs: Pearson Prentice Hall.

Gibert, L., G. Scott, and C. Ferràndez-Cañadell. 2006b. Evaluation of the Olduvai sub-chron in the Orce ravine (south-east Spain). Implications for Plio-Pleistocene mammal biostratigraphy and the age of Orce archaeological sites. *Quaternary Science Reviews* 25: 507–525.

Gibert, L., G. Scott, R. Martin, and J. Gibert. 2007a. The Early to Middle Pleistocene boundary in the Baza Basin (Spain). *Quaternary Science Reviews* 26: 2043–2065.

Gibert, L., F. Ortí, and L. Rosell. 2007b. Plio-Pleistocene lacustrine evaporites of the Baza Basin (Betic Chain, SE Spain). *Sedimentary Geology* 200: 89–116.

Gibert, L., G. Scott, D. Scholz, A. Budsky, C. Ferràndez, R. Martin, F. Ribot, and M. Lería. 2015. Chronology for the Cueva Victoria fossil site (SE Spain): Evidence for Early Pleistocene Afro-Iberian dispersals. *Journal of Human Evolution* 90: 183–197.

Gibert, L., G.R. Scott, D. Scholz, A. Budsky, C. Ferrandez, F. Ribot, R.A. Martin, and M. Lería. 2016. Chronology for the Cueva Victoria fossil site (SE Spain): Evidence for Early Pleistocene Afro-Iberian dispersals. *Journal of Human Evolution* 90: 183–197.

Haberland, C., Luis Gibert, L., Jurado, M.J., Stiller, M., Baumann-Wilke, M., Scott, G., Mertz, D. 2017. Architecture and tectono-stratigraphic evolution of the intramontane Baza Basin (Bétics, SE-Spain): Constraints from seismic imaging. 901767 - Tectonophysics. 709: 69–84.

Martínez-Navarro, B. 2002. The skull of Orce: Parietal bones or frontal bones? *Journal of Human Evolution* 42: 265–270.

Oms, O., J.M. Parés, B. Martínez-Navarro, J. Agustí, I. Toro, G. Martínez-Fernández, and A. Turq. 2000. Early human occupation of Western Europe: Paleomagnetic dates for two Paleolithic sites in Spain. *Proceedings of the National Academy of Sciences of the United States of America* 97: 10666–10670.

Palmqvist, P. 1997. A critical re-evaluation of the evidence for the presence of hominids in lower Pleistocene times at Venta Micena, Southern Spain. *Journal of Human Evolution* 33: 83–89.

Palmqvist, P., B. Martínez-Navarro, I. Toro, M.P. Espigares, S. Ros-Montoya, V. Torregrosa, and J.A. Pérez-Claros. 2005. Réévaluation de la présence humaine au Pléistocène inférieur dans le Sud de l'Espagne. *L'Anthropologie* 109: 411–450.

Ribot, F., L. Gibert, C. Ferràndez, E.G. Olivares, F. Sánchez, and M. Lería. 2015. Two deciduous human molars from the early Pleistocene deposits of Barranco León (Orce, Spain). *Current Anthropology* 56: 134–142.

Roe, D.A. 1995. The Orce basin (Andalucia, Spain) and the initial Paleolithic of Europe. *Oxford Journal of Archaeology* 14: 1–2.

Scott, G., and L. Gibert. 2009. The oldest hand axes in Europe. *Nature* 461: 83–86.

Scott, G., L. Gibert, and J. Gibert. 2007. Magnetostratigraphy of the Orce region (Baza Basin), south-east Spain: New chronologies for Early Pleistocene faunas and hominid occupation sites. *Quaternary Science Reviews* 26: 415–435.

Tixier, J., D. Roe, A. Turq, J. Gibert, B. Matinez, A. Arribas, L. Gibert, S. Albaladejo, A. Maillo e, and A. Iglesias. 1995. *Presence d'industries lithiques dans le pleistocene inferieur de la region d'Orce (Granada, Espagne): etat de la question.* Comptes Rendus. t.321, serie II, 71–78. París.

Tobias, Phillip Vallentine. 1998. Commentary on the case for early Pleistocene hominids in south-eastern Spain. *Human Evolution* 13: 91–96.

Toro-Moyano, I., H. Lumley, P. Barrier, D. Barsky, D. Cauche, V. Celiberti, S. Grégoire, F. Lebègue, B. Mestour, and Marie-Hélène Moncel. 2010. *Les Industries lithiques archaíques de Barranco León et Fuente Nueva-3*. Paris: CNRS éditions.

Toro-Moyano, I., D. Barsky, D. Cauche, V. Celiberti, S. Grégoire, F. Lebegue, M.H. Moncel, and H. de Lumley. 2011. The archaic stone tool industry from Barranco León and Fuente Nueva-3 (Orce, Spain): Evidence of the earliest hominin presence in southern Europe. *Quaternary International* 243: 80e91.

Toro-moyano, I., B. Martínez-navarro, J. Agustí, C. Souday, J.M. Bermúdez de Castro, M. Martinón-Torres, B. Fajardo, M. Duval, C. Falguères, O. Oms, J.M. Parés, P. Anadón, R. Julià, J.M. García-Aguilar, A.-M. Moigne, M.P. Espigares, S. Ros-Montoya, and M. Palmqvist. 2013. The oldest human fossil in Europe, from Orce (Spain). *Journal of Human Evolution* 65: 1–9.

Torres, T., F.J. Llamas, L. Canoria, A. Garcia-Alonso, A. Garcia-Cortes, and H. Mansilla. 1997. Amino acid chronology of the lower Pleistocene deposits of Venta Micena (Orce, Granada, Andalusia, Spain). *Organic Geochemistry* 26: 85–97.

Zihlman, A., and J.M. Lowenstein. 1996. A Spanish Olduvai? *Current Anthropology* 37: 695–697.

Further Reading

Campillo, D. 2002. *El cráneo infantil de Orce (English summary)*. Barcelona: Bellaterra Arqueología.

Campillo, D., and J.A. Barceló. 1989. Morphometric study of the internal surface of the squama occipitalis. In *Los restos humanos de Orce y Cueva Victoria*, ed. J. Gibert, D. Campillo, and E. García, 109–186. Sabadell: Institut Paleontològic Dr. M. Crusafont.

Gibert, J. 2004. *El hombre de Orce*. Córdoba: Editorial Almuzara.

Gibert, L. 2008. Dr. Josep Gibert (1941–2007): In memoriam. *Quaternary Science Reviews* 27: 1091–1092.

Gibert, J., C. Ferrandez, B. Martinez, R. Caporicci, and C. Jimenez. 1992b. *Roturas antropicas en los huesos de Venta Micena y Olduvai. Estudio comparativo. Proyecto Orce-Cueva Victoria. Presencia Humana en el Pleistoceno Inferior de Granada y Murcia*, 283–305. Orce: Museo de Prehistoria.

Gibert, J., L. Gibert, and A. Iglesias. 2003. The Straits of Gibraltar, a Plio-Pleistocene door of Europe? *Human Evolution* 18: 147–160.

Homenaje al Dr. José Gibert Clols: una vida dedicada a la ciencia y al conocimiento de los primeros europeos. 2017. F. Ribot Coord. Ed. Publicaciones Diputación de Granada. 350 p.

Jimenez, C., and J. Gibert. 1992. *Estudio comparado de los "cut-marks"de Venta Micena. Proyecto Orce-Cueva Victoria. Presencia Humana en el Pleistoceno Inferior de Granada y Murcia*, 307–340. Orce: Museo de Prehistoria.

Organic Residue Analysis in Archaeology

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Introduction

Organic residues of substances that were used in the past can survive as visible amorphous residues or trapped in the porous of archaeological materials, such as ceramic matrix or plasters. The study of these residues has relied on the possibility of identifying markers or indicators of the different substances (biomarkers) that survive through time and different postdepositional environments (Evershed 1993, 2008a).

The study of these residues that can be performed with a number of analyses, instruments, and extraction methods has provided archaeologists with interesting data on different aspects of the ancient way of life.

Historical Background

As Evershed has recently shown, a major influence in the development of the field was the emergence of a new generation of analytical chemical methodologies in the middle of the twentieth century that enabled complex environmental materials to be

studied in increasingly fine detail (Evershed 2008a). Nevertheless, it was the emergence of chromatographic methods able to achieve molecular-level resolution and recognition during the 1950s and 1960s, and in particular the development of gas chromatography (GC) coupled to mass spectrometry (MS), that allowed the real development of this field of research.

The first studies were conducted in the 1970s, being the Condamin and Formenti contribution fundamental for the development of the organic residue analysis of archaeological ceramics (Condamin et al. 1976).

After overcoming the incredulity that organic residues can survive in archaeological materials, this field of research experienced a rapid development.

It is mainly thankful to the tireless work of Richard Evershed and his group that nowadays we can really consider organic residue analysis a major field in archaeological sciences. More and more laboratories exist in Europe and in the rest of the world that perform these analyses, but none have as many publications and have faced such a wide range of themes as Bristol laboratory.

While the first analyses were mostly aimed at understanding the commodities transported in amphorae, the focus of the analyses later moved to the study of the content of cooking pots and a variety of other themes, such as linings, glues, and tars. The possibilities offered by specific techniques have provided information on the species of animals, dairy and marine products cooked in the vessels, and the origin of resins and tars. In general, during the last years the characterization of more and more numerous substances, allowed recovering information on different aspects of ancient ways of life.

In particular this was due to the use of suitable extraction and analysis methods on one side, and of the application of experimental archaeology and ethnoarchaeology to the study of chemical residues.

Key Issues

Organic residues are a complex mixture of compounds absorbed within a porous substrate that is usually not visible at naked eye. These components are too small for bacteria to penetrate and undergo weak physicochemical interactions with the ceramic matrix of the pottery vessel (Reber and Evershed 2004).

These processes protect a proportion of the absorbed residues from decay and microbial attack, preserving many of the compounds in the absorbed residue from decomposition over time (Evershed 1993). Depending on the environment in which the archaeological material was preserved, residues undergo a different degradation.

Absorbed organic residue analysis has concentrated mainly on the analysis of ceramic materials and has contributed to the identification of the ancient content of pottery and therefore its use and function.

In general, these studies have been applied in the investigation of ancient food practices, some of them being related with the early diffusion of specific foodstuff such as dairy products, maize, as well as fermented beverages, such as wine, beer, and chocolate. The data obtained have sometimes been related to major transformations in human societies, such as breeding and domestication of animals, domestication and cultivation of plants, sedentarization, and landscape use (i.e., Barnard and Eerkens 2007; Brown and Brown 2011; Regert 2011).

The study of the residues preserved in ceramics regarded more generally the alimentary practices in certain periods and the food prepared and consumed at the different sites, sometimes as part of integrated studies. Also ritual practices associated with burials have been treated (i.e., McGovern et al. 1999; Guasch-Jané et al. 2006).

More specific themes are related with the aim of establishing the use and/or function of specific archaeological materials, such as cooking pots with specific forms, *mortaria*, or *amphorae*. In particular, the study of amphorae content, which corresponded to the early stage of chemical analyses of archaeological materials (Condamin et al. 1976; Heron and Pollard 1988), has recently re-entered the landscape of the organic residue analysis demonstrating that the association between amphorae typologies and content is more complex than expected and must be treated with caution, in particular if regarded as a source

for the study of ancient Mediterranean economy (Garnier 2007; Pecci et al. 2010). Also the analyses of other ceramic vessels have provided interesting data, sometimes showing that the archaeological hypothesis on the use of ceramic vessels was not correct. The analysis of different parts of the vessels has provided information on the way of cooking in the different commodities (Evershed 2008a).

Among the compounds that more commonly are identified with the analyses of the organic residues absorbed in archaeological materials are lipids (Evershed 1993, 2008a; Regert 2011); nevertheless, also many others can be studied (Brown and Brown 2011; Barnard and Eerkens 2007; Garnier 2007; Guasch-Jané et al. 2006; Colombini and Modugno 2009).

The identification of animal origin products has been a major issue in residue analysis, being possible in establishing the species of animals that were consumed, distinguishing between adipose fat and dairy products, and identifying marine origin fats (Regert 2011); this has also allowed the discussion on animal domestication. Also vegetal fats are identified, being vegetal oils being important substances in the past. Residue analysis has confirmed that also oils different from olive oil were produced, used, and traded in ancient times (Garnier et al. 2009; Pecci et al. 2010). Other vegetables such as *Brassicaceae* and *Allium porrum* have also been identified, although with some reserve (Evershed 2008a).

Another important aspect of organic residue analysis is the characterization of amorphous materials that are found either as contents, linings, and glues of ceramic or other artifacts (stone, bone, and wood) or as bulk materials. The analysis of these materials that are usually beeswax, resins, incenses, tars, bitumen, and gums is aimed at characterizing them and identifying their source (i.e., Regert et al. 2008; Stern et al. 2008). Their analysis also sheds light on the methods of preparation of these substances and on their geographical origin, as they could also be subject to trade. These same substances can be identified and preserved in the pores of ceramic matrices. Visible residues can also be adhered to lithic tools, such as blood residues.

Residue analysis can be performed also on porous materials different from ceramics, such as the plasters of the archaeological floors of households or temples, and can be useful to identify activity areas, as the liquid or semiliquid substances produced by human activities are absorbed by the porous surfaces on which the activities are performed (Barba 2007 and his entry on "▶ Floors and Occupation Surface Analysis in Archaeology" in this encyclopedia). Nevertheless, also the plastered coatings of basins that are found in production installations can be studied to establish if they were used to produce wine, oil, or other substances (Pecci et al. 2013).

Since the beginning of chemical prospection in the 1920s, it was recognized that soils preserve the chemical signature of human activities. The analysis of samples of soil from the surface of an archaeological site can be used to suggest hypothesis on the distribution of activities at the site (Barba's entry on ▶ "Floors and Occupation Surface Analysis in Archaeology" in this encyclopedia), while the study of discarded loci can be useful to get information on the way of life of the inhabitants (Bull et al. 2003). Also changes in vegetation through time can be investigated through the analysis of organic matter in soil (van Bergen et al. 1997), and the cultivation of specific crops has been proposed (Webb et al. 2004).

Finally, the study of organic residues is also related with the conservation of materials (i.e., Mills and White 1987). It is in fact important to know their origin and degradation problems before preserving and restoring them. This area of research sometimes presents conflicts between the preservation of intact materials and their study and between their preservation for further studies and the use of modern organic polymers to consolidate and preserve the shape of the piece of art.

Analyses and Sampling

For the study of organic residues, several techniques have been applied. The choice depends on the characteristics of the materials and on the facilities available at the different laboratories. Until now, gas chromatography, (GC), gas chromatography coupled with mass spectrometry

(GC-MS), isotopic analyses (GC-C-IRMS), and pyrolysis (Py-GC-MS); high-pressure liquid chromatography (HPLC); and Fourier transformation infrared spectroscopy (FT-IR) have been the most popular, although nowadays some more have been implemented. Application of ESI and APCI has given good results, and NMR has been tested. For a first screening of the samples, also solid-phase microextraction (SPME) and other quicker methods can be used (Barnard and Eerkens 2007; Brown and Brown 2011; Colombini and Modugno 2009). Moreover, spot tests can be used both for the analysis of archaeological floors (Barba 2007) and as a first approach to the analysis of ceramic vessels. These tests do not allow identification of the specific substances that were contained in the vessels but make it possible to suggest some hypothesis on their use and discard some contents. Moreover, they could be combined with other techniques to obtain better results for the analysis of different archaeological materials (Middleton et al. 2010).

Different extraction methods have been proposed depending on the substances that are investigated and the techniques used; the total lipid extraction being the most common. Recently, several articles have been published on the possibilities of identifying wine residues in archaeological materials (Pecci et al. 2013).

As for the sampling, there is a trade-off between the quantity of sample to be analyzed and the information that can be recovered that depends on the characteristics of the samples and the techniques that can be applied (destructive versus nondestructive or micro-destructive analyses). Most of the time, especially when the residues are trapped in the matrix of ceramics and plasters, destructive analyses are carried out. An amount of sample (ranging from fractions of a gram to several grams) is crushed in order to be sure to recover information on the substances adsorbed in these matrices. Nevertheless, in specific cases, nondestructive analyses are carried out either performing the extraction without crushing the sample (i.e., with solvents directly inside an archaeological vessel) or performing microanalyses (i.e., FT-IR-LA). This is especially the case for museum objects.

As for the problem of contamination, if the materials are carefully treated after recovery, this is not common. Nevertheless, to keep a control on this phenomenon, it is important to sample the earth of the stratigraphic unit in which the ceramics or amorphous materials were found or to evaluate the differential presence of residues in several parts of the vessels.

Current Debates and Future Directions

Although organic residue analysis has been performed for several decades, there is still a lot to do, and different lines of research will have to be implemented in the future.

While radiocarbon dating is now common in archaeological projects and other archaeometrical techniques such as inorganic analysis of ceramic vessels and isotopic analyses of bones are everyday more common, the organic residue analysis of pottery is still quite rare.

Among the recent approaches to organic residue studies that deserve a special attention, the radiocarbon dating on the organic residues preserved in archaeological ceramics is particularly interesting (Berstan et al. 2008). This application will provide dates for the use of the vessels and therefore for the archaeological contexts where they come from.

Experimental DNA analyses have been applied on ceramic sherds and revealed the original contents of amphorae which had no visible physical remains (Hansson and Foley 2008). Although still in preliminary stages, the development of this kind of analyses will open a new field of molecular archaeology analyses and provide a powerful tool for obtaining information about the agricultural production, contact networks, and economies of past civilizations. The development of DNA analyses will probably change the way of performing residue analyses.

The data obtained on proteinaceous materials are also promising for the future of this kind of study, as it will provide data that can complement those obtained with lipid analyses.

As for the techniques of analysis that are already applied systematically, further investigations are

needed in the identification of the animal species with GC-C-IRMS, mainly for what concerns the data coming from regions different from Europe, with difference in C_3 and C_4 plant diffusion that can affect the results of the analyses, as well as for marine and dairy products (Regert 2011).

The recent developments suggest that new techniques each time more precise, and less destructive, will probably be available in future years.

As for the "traditional" residue analysis, until now the high costs of these time-consuming analyses and the fact that they require expensive instruments have had the consequence that they are not performed in a systematic way in archaeological projects. Nevertheless, to find a possible answer to most of the archaeological questions related to food practices and ceramic use, it will be fundamental to increase the number of samples coming from different sites and regions in the world. For instance, in order to clarify the use of specific archaeological materials such as amphorae, it will be necessary to carry out an important number of analyses and projects that involve different countries. On the other side, a diachronic study of materials coming from the same region should be performed to evaluate if important sociopolitical changes (i.e., the fall of the Roman Empire and the formation of different states in the Mediterranean area or the arrival of the Spaniards in Mesoamerica and South America) can be reflected in the food practices of the inhabitants of the region. Moreover, to use the residue analysis of pottery as markers of social relations, it will be important to look for differences among sites of the same periods and inside the same sites among different areas that can be related to different social groups. Also the analysis of materials coming from different regions in the world will be necessary to investigate ancient ways of life.

Regarding some of the issues stated above, a great limit of this kind of analyses is the difficulty in perceiving differences in the food prepared in the vessels belonging to different household, sites, or periods. Most of the time, animal and vegetal fats can be identified in the vessels analyzed, with no possibilities of pointing out major differences in the food prepared, apart from the species of animals cooked, and eventually the presence of dairy products. This fact has two implications: on one side, the right questions must be asked, taking into account all the data coming from the archaeological context; on the other side, the characterization of a bigger number of substances should be carried out. In particular, as for the question on the alimentary practices, more experiments are needed. As it has been done for oils, beeswax, wine, beer, chocolate, and a number of other substances (i.e., Evershed 2008b), foodstuffs that were typical of specific cultures should be characterized. These will be useful to recognize the changes in the alimentary practices in time and space and the influence of a culture on another one. As each cultural region has its own feeding resources, the characterization of different substances has to be done in every region.

The implementation of databases of the analyses of modern and ancient materials should be performed in order to provide a greater diffusion of the possibility of analysis and interpretation of the data and therefore increase the number of samples analyzed. Furthermore, more crossing of data among laboratories should be carried out, with the aim of the standardization of the techniques and extraction methods that can lead to the comparison among the analyses performed by different laboratories. Also the understanding of residue degradation will have to be continued, as it will allow interpreting the data of the analyses.

The study of ethnoarchaeological ceramic materials has also to be implemented for the understanding of ceramic use and residue degradation (i.e., Evershed 2008b); as ethnoarchaeological works have been carried out for the identification of activity areas in archaeological sites (Barba's entry on "▶ Floors and Occupation Surface Analysis in Archaeology" in this encyclopedia; Wells and Moreno Cortés 2010).

In general, it must be remembered that organic residue analysis is only one aspect of the global archaeological investigation that should take into account also archaeozoological, archaeobotanical studies, residues in floors, anthropological analyses, and isotopic analyses on human and animal bones, together with written sources, when they exist. The number of integrated studies should

therefore be increased to get inside such a complex world as ancient ways of life. To approach this kind of investigations, research that takes into account experiments, ethnoarchaeology, and archaeology are also to be applied.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ Bioarchaeology: Definition
- ▶ Biomolecular Archaeology: Definition
- ▶ Ceramics: Scientific Analysis
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Consumption, Archaeology of
- ▶ Cultural Heritage Objects and their Contexts
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Trade and Transport in the Ancient Mediterranean

References

Barba, L. 2007. Chemical residues in lime plastered archaeological floors. *Geoarchaeology* 22: 439–452.

Barnard, H., and J.W. Eerkens. ed. 2007. *Theory and practice of archaeological residue analysis*. BAR International Series 1650. Oxford: Archaeopress.

Berstan, R., A.W. Stott, S. Minnitt, C. Bronk Ramsey, R.E.M. Hedges, and R.P. Evershed. 2008. Direct dating of pottery from its organic residues: New precision using compound-specific carbon isotopes. *Antiquity* 82: 702–713.

Brown, T., and K. Brown. 2011. *Biomolecular archaeology: An introduction*. Chichester: Wiley.

Bull, I.D., M.M. Elhmmali, D.J. Roberts, and R.P. Evershed. 2003. The application of steroid biomarkers to track the abandonment of a Roman water course at the Agora (Athens, Greece). *Archaeometry* 45: 149–161.

Colombini, M.P., and F. Modugno. 2009. *Organic mass spectrometry in art and archaeology*. Chichester: Wiley.

Condamin, J., F. Formenti, M.O. Metais, M. Michel, and P. Bond. 1976. The application of gas chromatography to the tracing of oil in ancient amphorae. *Archaeometry* 18: 195–201.

Evershed, R.P. 1993. Biomolecular archaeology and lipids. *World Archaeology* 25: 74–93.

Evershed, R.P. 2008a. Organic residues in archaeology: The archaeological biomarker revolution. *Archaeometry* 50: 895–924.

Evershed, R.P. 2008b. Experimental approaches to the interpretation of absorbed organic residues in archaeological ceramics. *World Archaeology* 40: 26–47.

Garnier, N. 2007. Analyse de résidus organiques conservés dans des amphores: un état de la question. In *Late Roman coarse wares, cooking wares and amphorae in the mediterranean. Archaeology and archaeometry. LRCW.* BAR International Series 16622, ed. M. Bonifay and J.C. Tréglia, 39–49. Oxford: Archaeopress.

Garnier, N., C. Rolando, J.M. Hotje, and C. Tokarski. 2009. Analysis of archaeological triacylglycerols by high resolution nanoESI, FT-ICR MS and IRMPD MS/MS: Application to 5th century BC-4th century AD oil lamps from Olbia (Ukraine). *Journal of Mass Spectrometry* 284: 47–56.

Guasch-Jané, M.R., M. Iberno Gómez, C. Andrés-Lacueva, O. Jáuregui, and R.M. Lamuela-Raventós. 2006. First evidence of white wine in ancient Egypt from Tutankhamen's tomb. *Journal of Archaeological Science* 33: 1075–1080.

Hansson, M., and B. Foley. 2008. Ancient DNA fragments inside classical Greek amphoras reveal cargo of 2400-year-old shipwreck. *Journal of Archaeological Science* 35: 1169–1176.

Heron, C., and A.M. Pollard. 1988. The analysis of natural resinous materials from amphoras. In *Science and archaeology [Glasgow 1987]*. Oxford: BAR.

Loy, T.H., and E.J. Dixon. 1998. Blood residues on fluted points from Eastern Beringia. *American Antiquity* 63: 21–46.

Mcgovern, P. 2010. *Uncorking the past: The quest for wine, beer, and other alcoholic beverages*. Berkeley: University of California Press.

McGovern, P.E., D.L. Glusker, R.A. Moreau, A. Nunez, C.W. Beck, E. Simpson, E.D. Butrym, L.J. Exner, and E.C. Stout. 1999. Funerary feast fit for King Midas. *Nature* 402: 863–864.

Middleton, W.D., L. Barba, A. Pecci, J.H. Burton, A. Ortiz, L. Salvini, and R. Rodriguez Suárez. 2010. The study of archaeological floors: Methodological proposal for the analysis of anthropogenic residues by spot tests, ICP-OES, and GC-MS. *Journal of Archaeological Method and Theory* 17: 183–208.

Mills, J.S., and R. White. 1987. *The organic chemistry of museum objects*. Oxford: Butterworth-Heinemann.

Pecci, A., L. Salvini, E. Cirelli, and A. Augenti. 2010. Residue analysis of some Late Roman amphorae coming from the port of Classe (Ravenna – Italy): Relationship between form and function. In *LRCW3. Late Roman coarse wares, cooking wares and amphorae in the Mediterranean. Archaeology and archaeometry.* BAR International Series 2185, ed. S. Menchelli, M. Pasquinucci, and S. Santoro, 617–622. Oxford: Archaeopress.

Pecci, A., G. Giorgi, L. Salvini, and M.Á. Cau Ontiveros. 2013. Identifying wine markers in ceramics and plasters with gas chromatography-mass spectrometry.

Experimental and archaeological materials. *Journal of Archaeological Science* 40: 109–115.
Reber, E.A., and R.P. Evershed. 2004. How did Mississippians prepare maize? The application of compound-specific carbon isotope analysis to absorbed pottery residues from several Mississippi valley sites. *Archaeometry* 46: 19–33.
Regert, M. 2011. Analytical strategies for discriminating archeological fatty substances from animal origin. *Mass Spectrometry Reviews* 30: 177–220.
Regert, M., T. Devièse, A.S. Le Hô, and A. Rougeulle. 2008. Reconstructing ancient Yemeni commercial routes during the Middle-Ages using structural characterisation of terpenoid resins. *Archaeometry* 50: 668–695.
Stern, B., J. Connan, E. Blakelock, R. Jackman, R.A. Coningham, and C. Heron. 2008. From Susa to Anuradhapura: Reconstructing aspects of trade and exchange in bitumen – coated ceramic vessels between Iran and Sri Lanka from the third to the ninth centuries AD. *Archaeometry* 50: 409–428.
van Bergen, P.F., I.D. Bull, P.R. Poulton, and R.P. Evershed. 1997. Organic geochemical studies of soils from the Rothamsted classical experiments–I. Total lipid extracts, solvent insoluble residues and humic acids from Broadbalk Wilderness. *Organic Geochemistry* 26: 117–135.
Webb, E.A., P.S. Henry, and P.F. Healy. 2004. Detection of ancient maize in lowland Maya soils using stable carbon isotopes: Evidence from Caracol, Belize. *Journal of Archaeological Science* 31: 1039–1052.
Wells, E.C., and J.E. Moreno Cortés. 2010. Chimie du sol et activités humaines anciennes: les exemples archéologiques du Mexique et d'Amérique centrale. *Etude et Gestion des Sols* 17 (1): 67–78.

Further Reading

Ciliberto, E., and G. Spoto. 2000. *Modern analytical methods in art and archaeology.* New York: Wiley-Interscience.
Pollard, M., and C. Heron. 2008. *Archaeological chemistry.* Cambridge: Royal Society of Chemistry.

Organization of World Heritage Cities (OWHC)

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Introduction

The Organization of World Heritage Cities (OWHC) is an international non-profit, non-governmental organization which brings together the cities from around the globe that have within their territory a site that has been inscribed on the UNESCO World Heritage List.

The OWHC was created to assist member cities to adapt and improve their conservation and management methods. In the activities of the OWHC, these cities are represented by their Mayors with the participation of their heritage management experts and technicians. Cities that are not listed as well as individuals may join the OWHC as observer members.

The OWHC has five official languages, French, English, Spanish, Arabic and Portuguese, while French, English and Spanish are the OWHC working languages.

The Mayors of the OWHC member cities form the General Assembly, the paramount authority of the Organization. At its meeting every 2 years, in the course of the World Congress, the Assembly elects eight Mayors to serve on the Board of Directors that meets at least once a year.

The headquarters of the OWHC are located in Quebec City, Canada. The General Secretariat is directed by the Secretary General, appointed by the General Assembly, who oversees the execution of mandates adopted by the governing bodies, the day-to-day administration of the Organization and personnel management. Seven Regional Secretariats support the work of the General Secretariat.

Historical Background

Following the inscription of the Historic District of Old Quebec (Canada) on the UNESCO World Heritage List in 1985, the city's Mayor, Jean Pelletier, voiced the need for World Heritage Cities to join together to face the challenges and obligations of their World Heritage status.

It was left to Mr. Pelletier's successor, Mr. Jean-Paul L'Allier, also a man of vision, to organize a meeting in Quebec City in July 1991, of 41 Mayors of listed cities to take part in the First International Symposium of World Heritage Cities. The Symposium was held under the auspices of

UNESCO with the cooperation of the Government of Canada and the authorities of the Province of Quebec.

At the end of that first symposium, the elected representatives who had attended signed the Quebec City Declaration to establish a network of World Heritage Cities. Two years later at Fez (Morocco), on 8 September 1993 the Charter of the Organization of World Heritage Cities (OWHC) was adopted by the Founding General Assembly and the decision taken that the headquarters of the Organization would be established in Quebec City, Canada.

It is remarkable that the first gathering held in Quebec City led to the establishment of an international network that includes over 230 World Heritage Cities with a combined population of over 130 million people.

Key Issues

Mission

The primary objectives of the Organization are to:

- Favor the implementation of the UNESCO World Heritage Convention
- Encourage, on both regional and international levels, co-operation and the exchange of information and expertise among historic cities on matters of conservation and management in close collaboration with other organizations pursuing similar goals
- Promote public awareness to heritage values and their protection
- Foster a sense of solidarity among its member cities

To this end, the OWHC organizes World Congresses, regional conferences, seminars and workshops dealing with the challenges to be faced in the realm of management as well as strategies pertaining to the preservation and development of historic cities.

To better articulate its goals, the OWHC has followed the example of the UNESCO World Heritage Committee which outlined its Strategic Objectives, the originally four and now five Cs (Credibility, Conservation, Capacity building, Communication and Communities), in its Budapest Declaration (2002). The OWHC has set itself five strategic directions, its own five Cs, to pursue its mission:

- Collecting experiences
- Capitalizing on know-how
- Consolidating heritage enhancement
- Constructing intercity partnerships
- Contributing to the international debate

Support

The initial grant given by the Government of Canada as well as the continued support of the Province and City of Quebec in providing grants as well as staff and premises for the General Secretariat have been crucial to the continued activities of the OWHC.

In addition to the membership fees from the cities, the Organization also benefits from the wealth of human resources that exists in its member cities. The generosity that these cities have shown in putting professional staff at the disposal of the OWHC has been a tremendous asset throughout its existence. This generosity was crucial to the creation of the seven OWHC Regional Secretariats throughout the world.

The establishment of the Regional Secretariats has been very important in the development of the OWHC, playing a significant role in achieving cohesion and unity among its member cities. The Secretariats have provided a vital link between the cities of each region and the General Secretariat in Quebec City. They facilitate the implementation of programs and projects of the OWHC, adjusting them to the cultural requirements of each region. Equally important are the activities initiated by the regions themselves, especially the Regional Conferences held every 2 years between World Congresses, which can better relate to the needs of those cities that share cultural, linguistic or geographic affinities.

The seven Regional Secretariats serve the areas of Northwestern Europe, Central and Eastern Europe, Southern Europe and the Mediterranean, Latin America, Africa and the Middle East, Euro-Asia and Asia-Pacific.

The World Congress

The OWHC has long promoted the cooperation of the various actors involved in cultural heritage conservation and management. It has been said that the OWHC is the only international platform where mayors, decision-makers and experts meet together to discuss issues of mutual concern for World Heritage Cities. This synergy of authority and expertise has yielded many positive and significant results.

As envisaged from the outset, a World Congress is held every 2 years, which the OWHC considers to be its most important event. The host city of each World Congress, elected by the members of the OWHC at the previous Congress, has the responsibility of proposing a theme and making provisions for its development and presentation in the scientific sessions.

These assemblies provide a unique forum, giving decision-makers and professionals the opportunity to share their experiences and to learn about new developments and strategies for meeting the critical challenges associated with the conservation and management of World Heritage Cities.

Mayors' Workshop

The job of a Mayor of a World Heritage City is not easy. Most Mayors are not heritage experts but the responsibility of preserving or managing historic sites becomes theirs once they are elected. Having conserved their rich heritage over time, World Heritage Cities hold the keys to understanding long-term evolution of a place from the past and on to the future. City governments are at the heart of the action. As guardians of the world's heritage, World Heritage Cities face an additional challenge – any action taken at these iconic places can attract considerable attention and influence the adoption of good management practices elsewhere.

To assist the local authorities in their difficult task, from 2005, the OWHC has introduced at its World Congresses a Mayors' Workshop as a conference session, focusing on the experiences of the host city with the inclusion of site visits. These workshops, organized in collaboration with the Getty Conservation Institute, aim to raise the awareness and to enhance the sensitivity of Mayors regarding heritage issues as well as to give greater insight into the methodology of protecting and managing historic resources in their cities.

The Jean-Paul L'Allier Heritage Prize

The Jean-Paul L'Allier Heritage Prize is awarded by the OWHC, at the end of a competition and selection process, to one of its member cities that has distinguished itself by its achievements in the conservation, enhancement or management of property inscribed on the World Heritage List and located within its territory. The Prize is awarded every second year at the World Congress.

Projects and Programs

Compilation of Case Studies

The OWHC project, "Compilation of Case Studies," under the leadership of our member city, Lyon, France, and in cooperation with UNESCO, the Council of Europe, the France UNESCO Convention, the Netherlands Funds in Trust, the Getty Conservation Institute and ICOMOS, aims to take advantage of the experiences of its members and prepare a lasting contribution on two major questions that managers of historic cities face:

- How to manage an urban, inhabited and living heritage site?
- How to respect the values of heritage while allowing the city to grow and develop?

The case studies submitted from the member cities have identified and presented exemplary achievements in one of the fields of heritage management and urban development such as traffic, lodging, public space, commercial or tourism functions and architectural creations. The studies will be posted on the OWHC website, www.ovpm.org and ultimately will be published, with the addition of other studies, in the form of a "how to" guide.

Youth Programs

The OWHC public awareness program places emphasis on youth as an investment in the future. Through the years the Organization has introduced projects and programs such as international drawing contests, youth forums, the twinning between schools in World Heritage Cities and an

international video production competition. All of the youth activities aim to promote an understanding of the importance of one's cultural heritage and the need to preserve it.

City2City
The longstanding City2City program facilitates the sharing of information and expertise as well as joint initiatives between member cities.

Partners
The OWHC has had the benefit of the continuous support of its partners in its activities.

From its founding, the OWHC has enjoyed a close cooperation with UNESCO and especially the World Heritage Centre, which was instrumental in its creation. This relationship was formalized with UNESCO by the signing of a Memorandum of Understanding in February 2002. The OWHC takes part in many UNESCO initiatives, including those concerning Historic Urban Landscapes. Conversely, UNESCO supports and participates in several OWHC projects.

In addition to its collaboration in the Mayors' Workshop, the Getty Conservation Institute, chose to assist three World Congress host cities in the selection and development of their themes as well as in the selection of speakers and the format of the scientific sessions. Through the years, the OWHC has also been supported in its activities by its other partners, the Council of Europe, the Getty Foundation, ICOMOS, ICCROM and the World Monuments Fund.

Future Directions

Throughout its existence, the OWHC has been a part of the crusade for the better preservation and management of World Heritage Cities, recognizing that their inevitable evolution and growth are posing ever-greater challenges to the achievement of these goals. The OWHC through its programs and in collaboration with its partners, seeks to respond to these and other issues, to achieve a balance and make a relevant, constructive and prospective contribution for the holistic, sustainable development of its member cities.

Cross-References

- ▶ Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)
- ▶ Getty Foundation
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Monuments Fund (WMF)

Further Reading

Descamps, F. 2009. Introduction. In *Proceedings of the X World Congress of the Organization of World Heritage Cities, Quito, 8–11 September 2009*, ed. F. Descamps, 11. Los Angeles: The Getty Conservation Institute.

Manz, K.A. 2010. Introduction. *Call for posters for the XI World Congress of the Organization of World Heritage Cities*. Available at: http://www.ovpm.org/en/news/world_congress_owhc_sintra_2011_call_posters

Minaidis, L.G. 2010. Organization of world heritage cities "keeping heritage alive". *World Heritage* 55: 62–65.

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Orientalism: Islamic Archaeology and Its Colonial Context

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Introduction

For most of the history of Islamic archaeology, it has been conducted overwhelmingly by non-Muslims, often from nations with a political, and sometimes an openly colonial, interest in the

regions which contained the archaeological subject matter of their choice. These parties have predominantly, especially until World War II, been from France, the USA, Germany, and Britain, with significant contributions also from Belgium, Italy, Spain, and Russia. The broader political agenda of each of these nations had an undeniable impact on the way in which survey and excavation work was carried out and indeed the conclusions which this work produced. The advent of post-processual theory in the 1980s brought critiques of the conduct of archaeologists, pointing out that archaeology has since its origin as a serious academic pursuit been to some extent a "vehicle of validation for social groups engaged (and enmeshed) in industrial growth, capital accumulation, and colonial expansion" (Hinsley 1989: 79–80). However, it is arguable that Islamic archaeology has been *particularly* susceptible to the influence of colonial thought and practice, with Islam and its influence regarded as an exotic "other," separate and distinct from the majority of those investigating it, and depicted in opposition to an apparently superior "West."

The term "colonial" can be defined in a number of ways. Trigger (1984) attempted to make a distinction between imperial and colonial archaeology, but for much of the nineteenth and earlier twentieth centuries, the relations between Western nations and the Middle East, for example, fluctuated between the two. The definition used here is a broader one, that it is "the archaeology of countries where European powers have subjected native populations to various forms of institutionalised domination" (Jones 1997: 9).

Exploitative contact by Western nations over large areas of North Africa, Western Asia (often described as the Middle East), and Central Asia took a variety of forms. Such contact has included direct military invasion and political control (as in French control over Algeria and the Russian invasion of Turkestan in the nineteenth century), sustained attempts at political control and some military intervention (as in the British and French presence in Egypt in the nineteenth and earlier twentieth centuries), the interwar "Mandate" period (where Britain and France divided much of the Middle East between themselves in the form of "protectorates" during the 1920s and 1930s), and more complex forms of intellectual representation (as in the Americans in various parts of the Middle East and Germany in the Ottoman Empire from the very end of the nineteenth century and up to World War I). These kinds of early political and military contact had a profound impact on the ways in which archaeological thought developed, an impact which has only begun to evolve away from such a colonial outlook since the 1990s but which in some ways continues.

Historical Background

Islamic archaeology came relatively late to the attentions of European and American archaeologists. Although a rise in Orientalist literature and study had begun during the early eighteenth century, it was not until the 1880s that significant research avenues and funding structures for Islamic art, architecture, and archaeology developed (Vernoit 1997: 1–2). Islamic art had been regarded by scholars for much of the nineteenth century as unaccomplished and inferior to either Classical or Christian traditions. In 1855, James Fergusson could describe Islamic architecture in such simple and dismissive terms as "a pointed arch style, without pillars or entablatures, and with a system of ornamentation peculiar to itself" (Fergusson 1847, cited in Vernoit 1997: 1). Indeed, as late as the first decade of the twentieth century, H.C. Butler, in his otherwise pioneering publication of a survey of the Limestone Massif and Hauran regions of Syria, fails to hide his disappointment that Islamic period settlement had changed and obscured the finer, more "civilized" Roman and Byzantine architecture. He comments of the village of Harran, for example, that "unfortunately it was chosen as a place for settlement by the early Moslems and was almost completely rebuilt by them" (1907: 423).

Islamic levels were often hastily excavated, with the "real" business of Classical, Iron Age and earlier remains the intended goal. This attitude continued in some areas well after World War II. In the new state of Israel, for example,

occupation levels of the Islamic period were regarded as unimportant and routinely discarded long after a serious interest in such deposits had developed in neighboring Lebanon and Syria (Silberman 1989: 232, 234).

Key Issues

The maturing of Islamic archaeology as a subject of serious academic interest during the late nineteenth century came at a significant moment in relations between the changing political entities of North Africa, the Middle East and Central Asia, the powerful nation-states of Europe, and the United States.

The effects of this changing relationship can be seen in a number of ways, but it is important to be clear that Islamic archaeology did not simply occur *within* this political context. After all, archaeological thought and practice "must be understood as *constituted*, not just shaped or influenced or interfered with, by its social, political context" (Wylie 1989: 94). This means that not only can we recognize the presence of forms of *bias* imposed by archaeology's colonial context but it is also important to understand that Islamic archaeology was profoundly interlinked with the colonial agenda in ways which had a significant effect for the operation of *both* archaeological inquiry *and* the process of acquiring and holding colonies in predominantly Islamic lands.

The nature of that interlinkage can be defined as threefold: logistical (military and diplomatic), institutional, and intellectual. Describing and understanding the colonial context of Islamic archaeology is important not merely as an academic exercise but as a method of decoding and interpreting the significant body of work produced. However, as a counterbalance, it should be stated that to deconstruct the colonial context of Islamic archaeology is not necessarily to destroy or entirely dismiss the data and publications it produced. Substantial bodies of work have been carried out which may still be useful for scholars today, but that work may become *more useful* to us if we can understand the political context within which it was produced.

Diplomatic Context

The establishment of a permanent administrative presence created both the thirst for and the possibility of explorative missions to collect information on behalf of Western governments, and archaeology was an important and attractive target for such journeys. These journeys were described as *Reisen* by German teams, *voyages* or *missions* by the French, and *expeditions* by the British and later the Americans. Travelers such as Joseph Rousseau in Syria and Iraq in 1807, Pascal Coste in Egypt and Iran in the 1820s, Charles Texier in Asia Minor and Iran during the 1830s, de Vogüé in Syria during the 1860s, and Alois Musil in Transjordan during the 1890s combined observation of physical archaeological remains with ethnography, philology, and a broader religious and political assessment of the populations encountered.

As archaeological observation and intervention became more specialist in the later nineteenth and early twentieth centuries, the links between such practitioners and the colonial administrations for whom they worked did not diminish. For example, Austen Henry Layard served as ambassador in Istanbul during the 1880s, Gertrude Bell was influential in informing the British response to the Arab Revolt and served in the British High Commission in Iraq, and J.W. Crowfoot was a member of the Egyptian civil service. A notable consequence of the presence of European administrators in the Middle East was their ability to influence antiquities legislation and infrastructure to their advantage, such as the introduction in Egypt of an antiquities policy by Auguste Mariette in 1858, the creation in the Ottoman Empire of a General Directorate for Imperial Museums in 1889, or the creation in 1920 of a Department of Antiquities in Palestine during the British Mandate.

Military Context

Military conquest was often followed closely by archaeological examination. Russian military advances in Central Asia during the late 1860s, for example, led to a number of scientific expeditions.

Following the defeat of Abdul Malik Tura, the Russians established Samarkand as the capital of the newly formed "Russian Turkestan," and the Trans-Caspian railway reached the city in 1888. Already by 1885, one of the first large-scale excavations of an Islamic city had begun there (Rogers 1974: 50–55). Archaeology can be seen as a primary tool in this context in the interpretation and "knowing" of newly acquired territories, particularly where significant differences were perceived as existing between the conquerors and the conquered.

Furthermore, the invasion and holding of ground by military means required a detailed understanding of the topography and distribution of populations through the creation of detailed mapping. Such mapping relied initially on the sketches and descriptions made by travelers and archaeologists, and as it became more sophisticated such as those records made by the Bureau Topographique du Levant during the French Mandate over Syria in the 1920s, it in turn enabled archaeologists to discover and understand archaeological sites in more detail. The aerial photography carried out in the Middle East and North Africa by British, French, and German crews during World War I also contributed a great many new sites, with the French Jesuit Priest Antoine Poidebard a particularly notable practitioner.

Institutional Context

From the 1880s, such diplomatic and military engagement in North Africa, the Middle East, and Central Asia by France, Britain, the USA, and Russia led to the establishment of more formal institutional underpinnings and the creation of the earliest true "discipline" of Islamic archaeology. This new discipline was helped substantially by the creation of a number of foreign schools and institutes throughout the Middle East, such as the British School of Archaeology in Egypt and the Institut Français de Damas. But the early formation of research agendas using such schools as their bases was (and to some extent remains today) an almost entirely foreign phenomenon, with the conception of subjects and methods of research rarely involving any meaningful input from local archaeologists (Hull 2007: 100).

The interests of the emerging discipline of Islamic archaeology were heavily influenced by art historical interest, rather than socioeconomic analysis. As the mass surveys of the first half of the twentieth century gave way to more intensive, single-site studies, the lens, and to some extent technique, through which such studies were focused was an aesthetic one. Just as colonial ambitions were driven in part by the potential for the exploitation of natural resources and trade routes, Islamic antiquities emerged in the years prior to World War I as a desirable and marketable resource. A significant market in Islamic period objects opened up from sites such as Fustat, Rayy, and Raqqa, leading to significant amounts of looting (Vernoit 1997: 5). Such an exploitative and aesthetically driven attitude toward Islamic archaeology was not confined to the black market, with Western museums also developing a great appetite for high-status Islamic artifacts and funding research projects to gather examples into their collections (see Patterson 1986: 8 for a description of the appetite of American institutions during the nineteenth and early twentieth centuries).

Similarly, Oleg Grabar's two-volume study of Qasr al-Hayr al-Sharqi described the architectural elements of the high-status structures in some detail but failed satisfactorily to explain the site's wider function and socioeconomic context, not least due to an unwillingness to examine seriously the lower-status settlement to the east of the *qasr*. Divorced of this more nuanced and informed archaeological evidence, the standing structures seem isolated and unexplained. A more recent study has analyzed more convincingly the chronology and function of the site (Genequand 2005, 2008).

Intellectual Effects

The most influential and debilitating aspect of these earlier attempts at archaeological study of the Islamic period was not logistical or institutional but intellectual. Islamic archaeology was,

until the 1990s at the earliest, still a disconnected, specialist discipline, kept at arm's length from other periods and regions. The "Orient," and in many ways Islam specifically, was viewed as something separate and distinctly different from those Western archaeologists and institutions which were carrying out the bulk of the work.

This is in large part because archaeological study of "Eastern" subject matter has tended to be regarded as "special," unique to the "East." We may reflect, for example, on Butler's description of the surface remains of the Hauran that "it represents a distinct racial, if not national life, and which is Oriental in sentiment and in expression" (Butler 1907: vi). Opinions such as this produced a lasting attitude that such remains required a special outlook in order to deal with them. The study of Islamic archaeology, architecture, and the decorative arts tended to be associated with "academic pigeonholing with. . .'exotic' archaeological studies placed away from the received mainstream and thus made to appear remote, inaccessible and different" (Insoll 1999: 3). This is reflected in the fact that studies of Islamic archaeological material often derived from university departments whose primary emphasis was on the "Orient" as a region. Admittedly, this has led to a rich cross-fertilization of ideas from different disciplines, such as anthropology, linguistics, literature, and history. However, it may also be argued that this method of study has isolated many of the narratives drawn from Islamic material from broader, interregional intellectual processes pursued in mainstream archaeology departments whose emphasis is subject, rather than area, related. For Islamic archaeology, this situation has sometimes had the consequence of limiting the application of theoretical frameworks and field methodologies developed within archaeological practices elsewhere.

Edward Said and Orientalism

This intellectual context did not form on its own – it was directly influenced, if not largely created, by the political context within which it was first formed during the early years of substantive contact between "East" and "West" in the eighteenth and nineteenth centuries. Indeed, this context can be described as evolving into what Edward Said has termed "Orientalism," whereby representations of an "East" are juxtaposed as separate from a "West" and where "the Orient came to be seen as stagnant and despotic in order to define the democratic dynamism of Europe" (Hodder 1998: 125; Said 1978). Said asserted that the motivations behind this study, the methods through which it has been conducted, and the ways and the location in which it has been presented are "a way of coming to terms with the Orient that is based on the Orient's special place in European Western experience" (Said 1978: 1). The product of this process has been, for its creators, not only an Orient which is "a place of romance, exotic beings, haunting memories and landscapes, remarkable experiences" but also "the source of its civilizations and languages, its cultural contestant. . .its contrasting image, idea, personality, experience" (1978: 1–2). In short, Said argued that an Orient had been created which was an exotic "other," set in opposition to a more dynamic, functionally superior Occident.

The studies which have resulted from this polarized approach are, according to Said, "shot through with doctrines of European superiority, various kinds of racism, imperialism, and the like" (1978: 8). But crucially, scholarly inquiry and the cultural media which derived from such work were, consciously or otherwise, products of a colonial process and were bound up within its machinery. Archaeological surveys of the kind that created the works of de Vogüé, Butler, Creswell, Sauvaget, Bell, and others were not simply *products* of the domination of certain Western nations over the "East" – they were actively involved in the business of domination. Indeed, archaeology played a role in the depiction of a hauntingly beautiful yet despotic "East" by eighteenth- and nineteenth-century Europeans, with the historic environment forming an important backdrop in such illustrations as Delacroix's *Algerian Women in their Apartments* and Léon Benett's exotic illustrations of locations such as Samarqand for the Jules Verne novels. These depictions had a strong influence over European

and American imaginings of North Africa, the Middle East, and Central Asia. Furthermore, as is described above, the exploratory work of archaeologists on the ground also played an active role in carrying out colonial policy.

Edward Said's notion of Orientalism is not without its critics, and academics from various disciplines have expressed difficulty in accepting his view (Halliday 1993; Irwin 2007). Criticisms have been expressed that Said tended to overstate his case and that his views derived from some kind of personal grudge against Western academia. He has been accused of perpetrating the very juxtaposition of representation of which he himself complained. Said did not engage directly with archaeology in his writings. Nevertheless, the theoretical framework which he provided is regarded widely within disciplines such as anthropology as useful in accounting for the nature of Orientalist studies in the past and also in striking a cautionary note in any cultural representations, particularly when the culture is not that of those doing the representing.

One of the consequences of Orientalism is that Islam has been depicted too strongly as a divisive influence in the course of history. The influential work of the Belgian historian Henri Pirenne, often called the "Pirenne thesis," was particularly significant in this regard (Pirenne 1937). For Pirenne, the Roman Empire continued largely unchanged in the Eastern Mediterranean, and so the unity of the Mediterranean Sea in cultural and economic terms remained largely intact: it was Islam that broke the economic ties which bound the Mediterranean region together, and so the social and political processes of early medieval Europe began. Just as Said has described, Pirenne was in essence using Islam to define Europe.

For the scholars who inherited this tradition of thought, Islam was also portrayed as a divisive, cultural shock. For Georges Tchalenko (1953), who spent much of the 1930s and 1940s mapping and interpreting the olive oil-driven "dead cities" of the Limestone Massif in northwest Syria, Islam swept through the lower plains, isolating these upland communities and destroying the trade routes which had enabled olive oil to flow into Mediterranean markets. According to Tchalenko, this process impoverished the 700 or so villages of the Limestone Massif and began a process of decline and abandonment. This view can be seen as the continuation of a much older intellectual framework. In fact, the arrival of Islamic thought and the spread of Arab culture have since been shown to have occurred more gradually and in subtle and different ways throughout the Middle East and the Mediterranean (for the Limestone Massif, see Sodini et al. 1980; for more general comments on the spread of Islam, see Walmsley 2007: 45–47, 111–112).

Another consequence of the Orientalist intellectual context is what might be termed "essentialism," where Islamic culture came to be thought of as consisting repeatedly of the same elements and its material culture assumed to indicate a predictable "pattern" which could be read in a relatively simple manner wherever it is encountered. Muslim society has been assumed by some to be distinct, self-contained, and unchanging. One example of this is the nature of commentary for much of the twentieth century on the Islamic city. Some have concluded that a set number of fixed elements make up a geographical "kit" unfolded by Islamic conquerors in the seventh century and which remained in place thereafter: the high-status citadel (*qasr*), a congregational mosque, *suq*s with quarters for separate trades, communal baths, closed neighborhoods for each extended family group consisting of courtyard houses, and a caravanserai outside the city walls are some of the elements typically described (e.g., von Grunebaum 1961, cited in Carver 1996). A difficulty in such an outlook is that these elements of a "typical" Islamic city are assumed – in a fashion typical of the romantic outlook of the Orientalist – to be somehow unchanging, without the dynamism and complexity assumed of Western societies.

The apparently clear, but ultimately flawed, historical and intellectual framework which Orientalist thinking established also led to the miscategorization of sites. A stark example is provided by Fergusson's misunderstanding of the Dome of the Rock as the Church of the Holy

Sepulchre later taken over by Muslims. The significant technological achievement of the Harbaqah dam in Syria was assumed to be Roman, without any strong dating evidence to justify such a claim, simply on the grounds of its solidity and sophistication (Schlumberger 1986). This site has since been more convincingly identified as Umayyad in date, feeding as it does a sophisticated mill and irrigation system at Qasr al-Hayr al-Gharbi some 17 km away (Genequand 2006: 64).

This under-recognition of early Islamic achievement created a divisive rush to identify a clear difference and to assign this difference (even if unspeakingly) as ethnically or racially derived. Such a division seemed somehow to "fit" and to make sense to those seeking to explain the complex social and political changes of the fourth to ninth centuries. Hugh Kennedy wrote an influential piece in 1985 which sought to capture the essence of changes from Byzantine to early Islamic society in the Middle East. In "From Polis to Medina," he concludes that the wide, ordered streets of the Classical Eastern Mediterranean became in the early Islamic period cluttered, winding alleyways focused wholly on commerce at the expense of a calm and ordered urban landscape. There is almost an inference here of helpless, chaotic collapse, as "broad, colonnaded streets were invaded and divided up by intrusive structures, both houses and shops, and became more like narrow winding lanes than the majestic thoroughfares of classical antiquity; and the extensive, open agora, scene for markets and meetings, was gone" (Kennedy 1985: 4–5). Such changes also coincided with a switch away from carts toward pack animals, again Pirenne's theme of a turning inward toward the great Syrian Desert and away from the Mediterranean markets of the Roman period.

Kennedy is careful to note that some of these changes occurred earlier than the arrival of Islam, and he warns us against issuing value judgments. However, at the same time, there is a continuity of thought in Kennedy's conclusions which extends half a century back to some of Jean Sauvaget's analysis of Islamic cities in the 1920s. It was always difficult with such works to avoid the implication that the arrival of dark and winding streets somehow derived from the encroachment of a winding, deviant Oriental mind. This may not explicitly have been the intention of authors in all cases, but the insinuation could be read nonetheless. More recently, the conduct of more sophisticated urban archaeological projects with greatly improved chronologies has led many to react against the model of Classical streets becoming clogged and neglected by Islamic *suqs*. Cities like Jarash, for example, have been shown to be far from the "putrid urban skeleton left behind after the decay of a once respectable 'Roman' metropolis" in the early Islamic period, with the maintenance, enhancement, and adaptation of the municipal infrastructure of the city an ongoing priority well into the seventh and eighth centuries (Walmsley 2007: 84).

Future Directions

It has taken some time for this context of thought to change. The period following World War II was one of significant self-definition for newly formed nation-states in the Middle East, many of which established new national museums and antiquities services and developed a keen appetite for Islamic period remains to inform an emerging national identity. Such processes have been more recent in North Africa, and more recent still in Central Asia, but it remains a fact that in all of these regions, Islamic archaeology is still predominantly (though no longer exclusively) practiced by scholars from elsewhere (there are exceptions, such as Hawker et al. 2005). Until the 1990s, the research agenda employed for Islamic archaeology remained those defined prior to World War II: essentially art historical, set by Western Orientalists, and continuing to define Islam as a decisive break with the past and a divisive influence on the Mediterranean and wider region. Theoretically, practitioners of Islamic archaeology took little notice of the changes and self-reflexive thinking brought about in other archaeological disciplines from the late 1960s. Methodologically too,

excavation of Islamic sites has continued to suffer from the widespread exploitation of large, cheap, local labor forces, with projects sometimes poorly supervised and with little meaningful knowledge exchange between local archaeologists and their European and American "partners."

Over the last 30 years, there has been a gradual evolution in the relationship between Islamic archaeology and the European and American writers who are still, largely, its creators. A significant reappraisal of the impact of Islam has occurred, particularly regarding its role during late antiquity, with an emphasis now on more subtle and nuanced changes occurring in different ways in different areas. Walmsley has concluded that "while there were significant changes, overall urban life continued strongly in early Islamic Syria-Palestine" and that social changes probably did not occur to any great degree until somewhat later in the ninth century (2007: 112). The macro-social model of a widespread and sudden impact from the 630s, conceived in the later nineteenth century and continued by influential scholars like Pirenne, has been contradicted by the collection of data of a higher quality deriving from research agendas conceived within more reflexive intellectual frameworks.

Islamic material culture is now more frequently treated as the archaeological record of faith and its sociopolitical context, rather than a historical "moment" exclusive to the Middle East (Insoll 1999 is an important text in this regard). Thus, there has been a diversification of interest to Indonesia, sub-Saharan Africa, India, and indeed Western Europe.

But it is clear that the relationship between Western academia and Islamic archaeology has far from completed its evolution. We must continue to be wary of the academic exclusion of the Muslim voice; secondly, there continues to be a complex and largely unequal political relationship between those regions of the world where Islam predominates and the "West." This inequality arguably continues to lead those who play a role in representing Islam – whether scholars, journalists, or others – to continue the long tradition of overemphasizing the difference and the disconnection between Islam and others and thus failing to see some of the complex comparisons and interrelationships which certainly exist today and which archaeology can elucidate for us in the past.

And new and substantial challenges have emerged. For example, it is difficult to be sure whether the highly destructive influence of the so-called Islamic State in Iraq and al-Sham, or *Daesh*, can be considered colonial or not, but it is certainly the case that group this used archaeology in the active business of domination. Many archaeological sites, and indeed archaeologists, have been caught up in the violence in Syria, Iraq, Libya, and elsewhere, but, more than this, explicitly Islamic archaeological symbols have been damaged in order to generate publicity and to punish local populations (Harmanşah 2015). The destruction of the monastery of Dayr Mar Elian al-Sharqi, visited frequently by both Christians and Muslims within the local community, and the Great Mosque of al-Nuri in Mosul, have been cast as active players, their destruction a powerful tool used to represent a political outlook by *Daesh*, sometimes broadcast without critique by Western media.

Cross-References

- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic and Crusader Archaeologies
- ▶ Islamic and Maritime Archaeologies
- ▶ Islamic Archaeology
- ▶ Islamic Archaeology and Art History
- ▶ Military Activity in Islamic Archaeology
- ▶ Nationalism and Archaeology

▶ Ottoman Empire: Historical Archaeology
▶ Pakistan: Archaeological Museums
▶ Postcolonial Archaeologies
▶ Religion in Islamic Archaeology
▶ Rural Life in Islamic Archaeology
▶ Spain and North Africa: Islamic Archaeology
▶ Swahili Archaeology

References

Butler, H.C. 1907. *Publications of the Princeton University archaeological expedition to Syria in 1904–1905. Division 2. Ancient architecture in Syria. Section B. Northern Syria*. Leiden: E.J. Brill.

Carver, M.O.H.C. 1996. Transitions to Islam – Urban roles in the east and south Mediterranean, fifth to tenth centuries AD. In *Towns in transition: Urban evolution in late antiquity and the early Middle Ages*, ed. N. Christie and S.T. Loseby. Aldershot: Scolar Press.

Fergusson, J. 1847. *An essay on the ancient topography of Jerusalem*. London: J. Weale.

Genequand, D. 2005. From 'desert castle' to medieval town: Qasr al-Hayr al-Sharqi (Syria). *Antiquity* 79 (304): 350–361.

Genequand, D. 2006. Some thoughts on Qasr al-Hayr al-Gharbi, its dam, its monastery and the Ghassanids. *Levant* 38 (1): 63–84.

Genequand, D. 2008. The new urban settlement at Qasr al-Hayr a-Sharqi: Components and development in the early Islamic Period. In *Residences, castles, settlements. transformation processes between late antiquity and early Islam in Bilad al-Sham,* ed. K. Bartel and A. al-Razzak Moaz. Proceedings of the international conference held at Damascus, 5–9 Nov 2006. Rahden/Westf.: Verlag Marie Leidorf (Orient Archäologie 24), 2008, pp. 261–285.

Halliday, F. 1993. 'Orientalism' and its critics. *British Society for Middle Eastern Studies Bulletin* 20 (2): 145–163.

Harmanşah, O. 2015. ISIS, heritage, and the spectacles of destruction in the global media. *Near Eastern Archaeology* 78 (3): 70–177.

Hawker, R., D. Hull, and O. Rouhani. 2005. Wind-towers and pearl fishing: Architectural signals in the late nineteenth and early twentieth century Arabian Gulf. *Antiquity* 79 (305): 625–635.

Hinsley, C.M. 1989. Revising and revisioning the history of archaeology: Reflects on region and context. In *Tracing archaeology's past: The historiography of archaeology*, ed. A.L. Christiansen, 79–96. Carbondale: Southern Illinois University Press.

Hodder, I. 1998. The past as passion and play: Çatalhöyük as a site of conflict in the construction of multiple pasts. In *Archaeology under fire: Nationalism, politics and heritage in the Eastern Mediterranean and Middle East*, ed. L. Meskell, 124–139. London/New York: Routledge.

Hull, D. 2007. Working with a colonial legacy: The role of foreign archaeologists in modern Syria. In *Which past, whose future? Treatments of the past at the start of the 21st century, an international perspective: proceedings of a conference held at the University of York, 20–21st May 2005*, BAR international series 1633, ed. S. Grabow, D. Hull, and E. Waterton, 95–101. Oxford: Archaeopress.

Insoll, T. 1999. *The archaeology of Islam*. Oxford: Blackwell.

Irwin, R. 2007. *For lust of knowing: The orientalists and their enemies*. London/New York: Penguin.

Jones, S. 1997. *The archaeology of ethnicity. Constructing identities in the past and present*. London/New York: Routledge.

Kennedy, H. 1985. From polis to medina: Urban change in late antique and early Islamic Syria. *Past and Present* 106: 3–27.

Patterson, T. 1986. The last sixty years: Toward a social history of Americanist archeology in the United States. *American Anthropologist* 88 (1): 7–26.

Pirenne, H. 1937. *Mahomet et Charlemagne*. Paris: F. Alcan.

Rogers, J.M. 1974. *From antiquarianism to Islamic archaeology*. Cairo: Istituto italiano di cultura per la RAE.

Said, E.W. 1978. *Orientalism*. New York: Vintage Books.

Schlumberger, D., ed. 1986. *Qasr el-Heir el-Gharbi*. Paris: P. Geuthner.

Silberman, N.A. 1989. *Between past and present: Archaeology, ideology, and nationalism in the modern Middle East*. New York: Henry Holt & Co.

Sodini, J.-P., G. Tate, B. Bavant, S. Bavant, J.-L. Biscop, D. Orssaud, C. Morrisson, F. Poplin, and E. Will. 1980. Déhès (Syrie du Nord): campagnes I-III (1976–1978): Recherches sur l'habitat rural. *Syria* 57: 1–304.

Tchalenko, G. 1953. *Villages antiques de la Syrie du Nord, le massif du Bélus à l'époque romaine*. Paris: P. Geuthner.

Trigger, B.G. 1984. Alternative archaeologies: Nationalist, colonialist, imperialist. *Man* 19: 355–370.

Vernoit, S. 1997. The rise of Islamic archaeology. *Muqarnas* 14: 1–10.

Von Grunebaum, G.E. 1961. *Islam: Essays in the nature and growth of a cultural tradition*. London: Routledge & Kegan Paul.

Walmsley, A. 2007. *Early Islamic Syria: an archaeological assessment*, Duckworth debates in archaeology. London: Duckworth.

Wylie, A. 1989. Introduction: Socio-political context. In *Critical transactions in contemporary archaeology: Essays in the philosophy, history and socio-politics of archaeology*, ed. V. Pinsky and A. Wylie, 93–95. Cambridge: Cambridge University Press.

Orientalizing Phenomenon: Greek Archaeology Perspective

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Introduction and Definition

The Orientalizing in Greek Archaeology is something that, at first sight, looks straightforward but on closer examination becomes anything but. Traditionally, the term Orientalizing refers to a phase in Greek history when Greeks adopted a number of ideas, motifs, and technologies from the Near East and Egypt. It also corresponds to an archaeological phase within the Early Iron Age (c. 1,100–700 BCE) or Archaic (c. 700–480 BCE), usually dated to the seventh century BCE (c. 700–600). It has also come to mean a style, particularly a style of painted pottery that employs a large number of motifs or images that conspicuously display their Near Eastern or Egyptian origin. The palmette, the "tree of life," the lion, and the griffin all count as "Orientalizing" motifs. They can all be traced back to prototypes (usually to be found in metalwork) in art from the Levant (modern Syria, Palestine, Lebanon) or Egypt.

An example of this style of painted pottery is the Orientalizing of Knossos in Crete, dating to the seventh century BCE (Brock 1957; Moignard 1996, 1998). This polychrome pithos (no. 993, from tomb II in the Fortetsa cemetery near Knossos; Brock 1957: 92) illustrates many of these features traditionally taken to be "Oriental." On its central band, it has a guilloche, a cable motif which must derive from some metal prototype; on its lower belly, it has a lotus chain, again a motif common in the art of both Egypt and the Levant. The debt to Eastern prototypes is clear.

That the Orientalizing was both a style and a phase, and was confined to the seventh century, used to be one of the fixed points in the main evolutionary sequence of Greek Archaeology. Over the past three decades, however, this picture has been shattered. First, Walter Burkert redefined the Orientalizing, not as a style or a phase, but as a revolution that affected all aspects of Greek culture, both literary and material (Burkert 1992; cf. West 1997). The adoption of Oriental motifs on painted pottery was, therefore, linked to the borrowing of ideas and stories from the Levant and their incorporation into the corpus of Greek storytelling. Then Martin Bernal mounted his critique of what he saw as the "Aryan" tendencies within traditional classical scholarship (Bernal 1991). In insisting on the uniqueness of the Greek achievement, traditional scholarship necessarily downplayed Greece's debt to the Near East and Egypt (or so he argued). Sarah Morris (1992) took this argument further. For her, there was never really an Orientalizing phase. Greece was always in the process of "Orientalizing," from the Bronze Age down to the conquest of the Achaemenid (Persian) empire by Alexander the Great. Contact with, and borrowing from, the Near East was the norm rather than the exception.

The Orientalizing then can be defined in a number of ways: first, as a *phase*, confined to the seventh century, and then as a *style*, one that adopted motifs to be found on Oriental metalwork and applied them to the surface of painted pots. Neither of these definitions is very satisfactory if we want to consider the full range of the cultural encounters between the Near East and the Orient. It is perhaps best to consider the Orientalizing as a *process* whereby the Greeks adopted what they found good or useful from their Near Eastern neighbors. Or rather, it was an aspect of a wider process by which the Mediterranean world (the Greeks, the "Orientals," and various Italian peoples) became highly interconnected, especially but not exclusively during the eighth and seventh centuries BCE (Horden and Purcell 2000). There is as yet no widely accepted term for this process. However we define it, the Orientalizing remains an encounter between "the Greeks" and "the Orient." Do these categories withstand any external scrutiny?

Key Issues

Greeks and the Orient

Bernal was right about one thing: we owe to Classical scholars our commonsense notions not only of what Greek but also Oriental culture was. Greek culture is the community of Greek speakers, whose collective identity (or national consciousness) is expressed equally in its literature, philosophy, art, and material culture. But this picture does not in fact withstand any close scholarly scrutiny. It is, for example, extremely unlikely that there was anything like a Greek national consciousness, or sense of collective identity, before the sixth century BCE (i.e., after the "Orientalizing" period; see Hall 2002). Material culture groups (archaeological cultures) do not correspond to our commonsense notions of what is Greek and what is Oriental (Gunter 2009: 50–123). Ethnic, linguistic, and material culture groups are not tightly defined cultural blocks, but overlapping, polythetic sets, with porous boundaries (see Clarke 1978: 263–266 and 311–408; cf. Whitley 2001: 231–233). Take Cyprus, an island with a mixed population of Greek speakers, Phoenicians (West Semitic speakers), and "Eteocypriots" (a supposed remnant of an aboriginal population, whose linguistic affinities are unclear). During the Iron Age in Cyprus, a Late Bronze Age style of pottery gradually and seamlessly yields to something labelled "Cypro-Geometric" which in turn yields to "Cypro-Archaic." There is no Orientalizing phase as such, because (in a sense) Cyprus is a part of the Levant and shared many cultural traits with much of Northern Syria throughout this period. Nor are the distinct groups of Greek, Phoenician, and "Eteocypriot" speakers distinguished by any particular material culture traits – the chief "Phoenician" city Kition (despite its reputation as a "Phoenician colony") looks much like any other Cypriot city in the Iron Age and Archaic periods (see Iacovou 2008).

But if "Greek" and "Oriental" are not clearly defined entities or categories, where does that leave the Orientalizing? Well, it is at least clear that the inhabitants of the Aegean did gradually transform their Geometric pottery styles into something markedly more figurative and colorful and that this process involved making creative use of metalwork that came from the Near East. It is less clear, however, that this transformation was effected entirely within the seventh century BCE. Indeed, different regions of Greece had different kinds of Orientalizing phases, which do not all fall within the seventh century. In Crete, for example, contact with points further East was never really lost. The inhabitants of Knossos continued to make use of Cypriot-inspired tripods and Egyptian-style lotus-handled jugs throughout a long period from c. 1,000–600 BCE (see Brock 1957). In the ninth century BCE, large quantities of Oriental-inspired metalwork is deposited in Knossian graves, leading some scholars (notably Boardman 1967) to argue that this period saw a guild of North Syrian metalworkers set up shop in late ninth-century Knossos. Certainly, motifs derived from Levantine metalwork form part of the inspiration for the curious "Protogeometric B" style of pottery, which some have seen as Greece's first "Orientalizing" style.

Regional Variations: Athens (Attica) and Corinth

But the same is not true of other parts of Greece in this period. In Athens, Oriental objects (a North Syrian bronze bowl) and Oriental technologies (techniques of granulation and filigree in goldwork) make their appearance in rich ninth-century graves. But there is no discernible effect on the decoration of the locally produced painted ceramic finewares (Whitley 1991: 116–137). These remain strictly Geometric in their exterior decoration. In the succeeding eighth century, there are some signs that knowledge of both the iconography and techniques of Levantine metalwork are having an effect on local craftsmen. Gold bands, decorated with embossed quadrupeds, appear in some numbers, and such animals then appear in friezes on some notable pieces of Late Geometric pottery. The famous Dipylon vase, Athens NM 804, datable to around 750 BCE, almost certainly used as a grave marker for an important female aristocrat, is decorated mainly with strictly

Geometric ornament. Such animal friezes as such vessels possess remain subsidiary to the overall Geometric design (Whitley 1991: 137–180). It is only in the middle of the seventh century that Athenian (or conceivably, Aeginetan) potters and painters adopt most of the techniques of a truly polychrome, Orientalizing style (called Middle Protoattic, or the "Black and White style"). On the Polyphemos amphora from Eleusis (see Morris 1984, Fig. 6), the cables between the panels clearly derive from metalwork, and the gorgons have heads in the shape of bronze cauldrons decorated with animal protomes (the most characteristic form of Orientalizing metalwork).

Compared to its neighbor Corinth, the Athenian Orientalizing style appears half-hearted. The full-blown Corinthian Orientalizing style is called Protocorinthian and is confined to the seventh century. But it is much more deeply engaged with Near Eastern metalwork than its contemporary Athenian style or Knossian Orientalizing styles. These styles borrowed polychromy and a range of motifs (guilloche, cable, lotus). Protocorinthian – or at least Middle Protocorinthian – borrows a metalworker's technique, engraving, and applies it to painted pottery. Engraving was used to define the features, the detail of painted figures, to remarkable effect. Take the Macmillan aryballos, a highly decorated flask used for holding perfumed oil, now to be found in the British Museum. Like the Polyphemos amphora and the pithos from Knossos, this vase shows a distinctive motif derived from Oriental metalwork; on the shoulder, there is an elaborate lotus chain (or scroll). But the vase goes further, and its debt to Oriental metalwork goes deeper. Its spout/mouth is in the form of a lion's head, and the figures and the shields of the duelling hoplites are outlined with engraving. And unlike the vases from Knossos and Eleusis, whose function (or final use) was funerary and whose decoration is correspondingly large and splashy, all the figures in the Macmillan aryballos are in miniature. The vase itself is only 7 cm tall; to see the figures in the museum, you have to look through a magnifying glass.

What is most remarkable about this most creative of the Orientalizing pottery styles of Greece is that it seems to come out of nowhere. Whereas both in Knossos and in Athens there is evidence that Oriental techniques and artifacts had been known from at least the ninth century BCE, there is little evidence for Oriental stimulus in the Corinthia before c. 700 BCE. The Late Geometric Corinthian style, while distinctive, owes nothing to the Orient, and the finds of Oriental objects (some bronze bowls called phialai) that appear to have arrived in any major Corinthian sanctuary (Perachora or Isthmia) are few. One could argue that the very unfamiliarity of Oriental material culture provided a greater stimulus and thus invited a more sophisticated response. And Protocorinthian probably remains the most influential of all the Greek Orientalizing styles of the seventh century. First perfume flasks, then pouring vessels (such as the Chigi vase, an *olpe*), and finally the whole range of shapes that came later to be associated with the Greek symposium (in particular the krater) start to turn up in various sites in Italy and not only sites of Greek colonization, but Etruscan and Latin sites as well. Orientalization is thus linked to Hellenization and to that complex of mutual borrowings and interactions characteristic of the period c. 800–600 BCE ("Mediterraneanization," Morris 2003).

The Mediterranean Perspective

It is the scale, range, and profound consequences of this process of Mediterranean transformation that might make a narrow focus on styles of Greek painted pottery appear myopic in the extreme. Certainly, there was a lot more going on than some creative borrowing of craft techniques. Oriental models affected other media, sometimes in a more or less direct copying of Levantine prototypes. So the so-called Astarte (nude female) figurines that appear all over the Aegean, but especially in Crete, in the seventh and sixth centuries BCE differ only slightly from similar examples in the Levant or the Phoenician settlements in the Western Mediterranean. And much of the best evidence for the impact of Oriental material culture comes not from graves in Greece or Italy but from major sanctuary sites. Olympia, later the greatest of Panhellenic sanctuaries, became the recipient of a number of Near Eastern engraved bowls (Markoe 1985), and, in the seventh century,

Olympia becomes the home of a number of tripod cauldrons dedicated with griffin protomes, following closely on models produced in Urartu and Assyria (which in turn provided the model for the gorgon heads on the Polyphemos amphora). Sanctuaries indeed seem to fill up with various Near Eastern "entangled objects" (sensu Thomas 1991) in the seventh and sixth centuries BCE. Oriental ivories from Nimrud and the Phoenician coast are deposited in the Idaean cave along with the "Orientalizing" bronze tympana produced by Cretan craftsmen as offerings to Cretan Zeus in the eighth and seventh centuries BCE. But the most spectacular example of this tendency to deposit Oriental antiques with extended biographies is the find Aramaean horse frontlet, securely dated by its Aramaic inscription to the ninth century BCE, in a sixth-century stratum in the sanctuary of Hera on Samos (the Samian Heraion; see Kyrieleis and Röllig 1988; discussion in Gunter 2009: 124–126).

This object then illustrates one side of the multiple and multiplying entanglements that "the Orientalizing" was connected to. Some scholars have seen more in this; engagement with Oriental (and ostentatiously Orientalizing) material culture was part of a social strategy through which elites defined themselves, in Athens and elsewhere (Whitley 1994; Morris 1999: 155–191); Orientalizing imagery on Protocorinthian perfume flasks has been considered as being intimately related to the definition of Greek masculinity (Shanks 1999). But the most long-lasting of these material entanglements does not lie with biographical objects, imagery, or art. It is the adoption of the shapes and (to a lesser extent) the phonetic values of the Phoenician script (whether or not we call it a consonantal syllabary or alphabet) and its adaptation better to suit the phonetic requirements of Greek (with the addition of signs for vowels) that marks the most creative and the most long-lasting of Greek encounters with the Levant. The adoption of the alphabet (Jeffery 1990: 1–42; Whitley 2001: 128–133) sometime in the early eighth century BCE was not merely the "recovery of literacy," as if literacy is something that can be simply discarded and then found again. It was a completely different kind of literacy and produced a completely different set of material entanglements, whose effects we can feel even today. But that is another story, one that goes beyond any consideration of the "Orientalizing" in ancient Greece.

Cross-References

- ▶ Classical (Greek) Archaeology
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Panhellenism

References

Bernal, M. 1991. *Black Athena: The Afroasiatic roots of classical civilization*. 2nd ed. London: Vintage Books.

Boardman, Sir J. 1967. The Khaniale Tekke tombs, II. *Annual of the British School at Athens* 62: 57–75.

Brock, J.K. 1957.*Fortetsa: Early Greek tombs near Knossos*. British School at Athens Supplementary volume 2. Cambridge: Cambridge University Press.

Burkert, W. 1992. *The Orientalizing revolution: Near eastern influence on Greek culture in the Early Archaic Age*. Translated from the German by E. Pinder and W. Burkert. Cambridge, MA: Harvard University Press.

Clarke, D.L. 1978. *Analytical archaeology*, 2nd ed. Revised by R. Chapman. London: Methuen.

Gunter, A.C. 2009. *Greek art and the orient*. Cambridge/New York: Cambridge University Press.

Hall, J. 2002. *Hellenicity: Between ethnicity and culture*. Chicago: Chicago University Press.

Horden, J., and N. Purcell. 2000. *The corrupting sea: A study of Mediterranean history*. Oxford: Blackwell.

Iacovou, M. 2008. Cultural and political configurations in Early Iron Age Cyprus: The sequel to a protohistoric episode. *American Journal of Archaeology* 112: 625–657.

Jeffery, L.H. 1990. *The local scripts of archaic Greece*, 2nd ed. Revised with addenda by A. Johnston. Oxford: Clarendon.

Kyrieleis, H., and W. Röllig. 1988. Ein altorientalischer Pferdeschuck aus dem Heraion von Samos. *Mitteilungen des deutschen archäologischen Instituts, athenische Abteilung* 103: 37–75.

Markoe, G. 1985. *Phoenician bronze and silver bowls from Cyprus and the Mediterranean*. University of California Classical Studies 26. Berkeley/Los Angeles: University of California Press.

Moignard, E. 1996. The orientalizing pottery. In *Knossos North Cemetery: Early Greek tombs*. British School at Athens Supplementary, vol. 28, ed. J.N. Coldstream and H.W. Catling, 421–462. London: British School at Athens.

Moignard, E. 1998. Native wit: Some orientalising pottery from the Knossos North Cemetery. In *Post-Minoan Crete: Proceedings of the first colloquium*, ed. W.G. Cavanagh and M. Curtis, 80–86. London: British School at Athens.
Morris, I. 1999. *Archaeology as cultural history: Words and things in early iron age Greece*. Oxford: Blackwell.
Morris, I. 2003. Mediterraneanization. *Mediterranean Historical Review* 18: 30–55.
Morris, S.P. 1984. *The black and white style: Athens and Aegina in the Orientalizing period*. New Haven: Yale University Press.
Morris, S.P. 1992. *Daidalos and the origins of Greek art*. Princeton: Princeton University Press.
Shanks, M. 1999. *Art and the early Greek state: An interpretive archaeology.* Cambridge: Cambridge University Press.
Thomas, N. 1991. *Entangled objects: Exchange, material culture and colonialism in the Pacific*. Cambridge, MA: Harvard University Press.
West, I.M. 1997. *The east face of Helicon: West Asiatic elements in early poetry and myth*. Oxford: Clarendon.
Whitley, J. 1991. *Style and society in Dark Age Greece: The changing face of a pre-literate society.* Cambridge: Cambridge University Press.
Whitley, J. 1994. Protoattic pottery: A contextual approach. In *Classical Greece: Ancient histories and modern archaeologies*, ed. I. Morris, 51–70. Cambridge: Cambridge University Press.
Whitley, J. 2001. *The archaeology of ancient Greece*. Cambridge: Cambridge University Press.

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Basic Biographical Information

Luis Abel Orquera was born in Buenos Aires in 1935. His initial training was oriented toward the study of law; he graduated as a lawyer in 1963 at the Universidad de Buenos Aires (UBA). Orquera's interest in history was the reason why he decided to enroll in history while he was finishing his law studies. Then he changed History for Anthropology, and he graduated in anthropological sciences at the UBA in 1972. As a student he began his teaching career in archaeology until 1975, when the university's intervention prior to the dictatorship leaves him unemployed. He continued his teaching career in psychology teaching anthropology, and he resigned under the military dictatorship. He then continued his university career as a professor at the Universidad Nacional del Comahue until 1983 when he works for a short period at the Universidad Nacional de La PLata.

In 1985, Luis Abel Orquera entered CONICET (The National Council of Scientific and Technical Research) as an independent researcher and continued there until 2001 when he retired. In CONICET, he was a member of the advisory commissions of history, anthropology, and geography from 1988 to 1989 and of history and anthropology from 1989 to 1991. He was a member of the Argentine Society of Anthropology from 1969 to 1975, adviser of the commission of the college graduates in anthropology from 1971 to 1972, and secretary from 1972 to 1976.

Luis Abel Orquera was trained at the University of Buenos Aires, under the influence of the historical cultural school of O. Menghin, A. De Bormida, and C. Lafon. Prof. Orquera also claims, in his career, the influence of other authors such as F. Bordes, A. LeroiGourhan, R. Flannery, and L. Binford, among others. Both influences are observed progressively in his works: the French in the excavation methods and the typological classifications of artifacts and the American in the periodization and in his approach to culture that progressively leaves the culturalist criteria and adopts the evolutionary perspective and cultural ecology coming from the "new archaeology" (Orquera et al. 1977; Orquera 1987).

Major Accomplishments

Luis Abel Orquera collaborated in the drafting of several law projects aimed at regulating the exercise of the profession and archaeological heritage regulation, and he was a member of the Working Team for the drafting of the law project for the protection of the national archaeological heritage;

he was a member of the Commission that analyzed the preliminary draft of the law on defense of cultural heritage in 1984. He was an *ad honorem* advisor to the National Institute of Anthropology and Folklore from 1986 to1989.

In 1968, he received the National Fund of the Arts Award for the best grade point average in the Graduate Degree of Anthropological Sciences, and in 1986 he received the Honorary Merit Diploma in Archaeology and Cultural anthropology of the Konex Foundation.

Luis Abel Orquera is the founder of the Asociacion de Investigaciones Antropológicas (AIA). He was destined to shape the development of two generations of investigators in archaeological fieldwork and practical methodology, including the years of the dictatorship in Argentina. When democracy returned, this became the working place for CONICET scholarship researchers and researchers.

Luis Abel Orquera's regional project on the archaeology of the Beagle Channel (1975 to the present) is undoubtedly his main contribution from both a methodological and a theoretical point of view. His work on the sites of Lancha Packewaia (Orquera et al. 1977) and Tunel 1 (Orquera 1987; Orquera and Piana 1999a) contributed to the revision of theories such as the *arriconamiento* (cornering) of hunter gatherers, their primitivism, or their cultural and social inferiority inherited from the nineteenth century. His work allowed to improve the shell midden excavation techniques and to understand its formation processes (Orquera and Piana 1991). He emphasized the Beagle Channel's settlement antiquity (Orquera and Piana 1999a), and his work's archaeological richness modified the image of a static culture without major changes throughout the Holocene.

The work carried out from the concept of adaptive strategy with his colleague E.L. Piana contributed to a better understanding of the relationship between hunter-gatherers and fire-ground fishers (Orquera and Piana 2006, 2009). The relationship with the environment was deepened; the energetic relations existing with the fauna exploited by these groups and the relationship between the consumption of mollusks and mammals of the region were better understood. In the same way, his project contributed to analyze the strategies of these groups in terms of their mobility, vegetal resource exploitation, and their artistic manifestations (Orquera and Piana 1999b).

Luis Abel Orquera's innovative projects in Argentina integrated different disciplines that contributed to achieve the objectives multiplying the analytical ways to understand the significance of the different archaeological data. In 1987, his association with the research team of the Spanish CSIC and the catalan Universitat Autónoma de Barcelona gave a new impetus to his research. The Tunel VII site was the laboratory of this joint work. To Orquera, the basic idea of the project was to prove the hypothesis validity of some works according to which the ethnographic contact with Europe had modified the disposition of resources, essentially the pinnipeds, affecting the strategies adopted by the Fuegian canoers to the point of conducting them to their extinction. The contributions of this new project, and the contrast with the Marxist theoretical school, allowed to develop new approaches tending to the reconstitution of social behavior, the modes of production and reproduction of the Fuegian canoers, gender archaeology, site formation processes, and the archaeology of the European colonizers' contact period leading to a better understanding of the social transformations that occurred during this period. Finally, in the year 1999, he publishes with E.L. Piana (Orquera and Piana 1999a, b) two works of synthesis that present the results obtained in more than 20 years of research on Tierra del Fuego archaeology.

Since his retirement in 2001, he is still conducting research (e.g., Orquera and Piana 2006, 2009; Orquera et al. 2012) and contributing to the training of young researchers as Director of the Asociacion de Investigaciones Antropológicas (AIA).

Cross-References

- ▶ Archaeology: The World at 1800–1850
- ▶ Cultural Ecology in Archaeology
- ▶ Flannery, Kent Vaughn
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives

▶ New Archaeology, Development of
▶ Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia

References

Orquera, L.A. 1987. Advances in the archaeology of the pampas and Patagonia. *Journal of World Prehistory* 1 (4): 333–413.

Orquera, Luis A., and E.L. Piana. 1991. La formación de los montículos arqueológicos de la región del canal Beagle. *Runa* XIX: 59–82 (1989–1990). Buenos Aires.

Orquera, Luis A., and E.L. Piana. 1999a. *Arqueología de la región del canal Beagle (Tierra del Fuego, República Argentina)*. Buenos Aires: Publicaciones de la Sociedad Argentina de Antropología, 146 pp.

Orquera, L.A., and E.L. Piana. 1999b. *La vida material y social de los Yámana*. Buenos Aires: Eudeba-IFIC, 567 pp.

Orquera, Luis A., and E.L. Piana. 2006. La adaptación al litoral sudamericano sudoccidental: qué es y quiénes, cuándo y dónde se adaptaron. *Relaciones de la Sociedad Argentina de Antropología* XXX: 11–32 (2005). Buenos Aires.

Orquera, Luis A., and E.L. Piana. 2009. Sea nomads of the Beagle Channel in southernmost South America: Over six thousand years of coastal adaptation and stability. *Journal of Island and Coastal Archaeology* 4 (1): 61–81. Philadelphia (USA).

Orquera, L.A., A.E. Sala, E.L. Piana, and A.H. Tapia. 1977. *Lancha Packewaia: Arqueología de los Canales Fueguinos (Primer Informe)ED*. Buenos Aires: Huemul, 248 p.

Orquera, L.A. E.L. Piana, D. Fiore, and A.F. Zangrando. 2012. *Diez mil años de fuegos. Arqueología y etnografía del fin del mundo*. Ed. Dunken, 120 p. ISBN: 978-9870256106.

Orser, Jr., Charles E.

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Basic Biographical Information

Charles E. Orser Jr., one of the leading North American proponents of a globally aware historical archaeology of the modern world, was born in Wyandotte, Michigan, in 1950. Orser initially studied history (with minors in geology and English literature) at university, graduating from Eastern Michigan University with a B.S. in 1972. He then studied for an M.A. in Anthropology at Wayne State University, graduating in 1975. His Doctorate in Anthropology was awarded by Southern Illinois University at Carbondale in 1980; his dissertation was titled *An Archaeological and Historical Socioeconomic Analysis of Arikara Mortuary Practice*.

Orser's academic and professional career was initially focused on the Upper Midwest and Northern Plains of the United States. From 1979 to 1980, he was Assistant State Archaeologist in the Michigan History Division, Michigan Department of State. His first academic post was as Visiting Assistant Professor, Department of Sociology and Anthropology, Loyola University of Chicago (1980–1982); he then moved to the University of South Dakota, where he was Visiting Assistant Professor in the Anthropology Program (1982–1983). From 1983 to 1989, he was Assistant Professor of Anthropology, Department of Geography and Anthropology, Louisiana State University; he was granted tenure in 1988. During this time, Orser was also briefly Adjunct Faculty in the Division of Continuing Education of the University of St. Francis (Joliet, Illinois) in 1985. In 1989, he moved to Illinois State University, where he became Director of the Midwestern Archaeological Research Center. When Orser left Illinois State at the end of 2007, he had achieved the rank of Distinguished Professor of Anthropology in the Department of Sociology and Anthropology. From 2008 to 2013, he was Curator of Historical Archaeology at the New York State Museum and University of the State of New York. Since 2013 Orser has been a Research Professor at Vanderbilt University and, following a 2019 move to Canada, has concurrently been Adjunct Research Professor, University of Western Ontario, and Senior Historical Archaeologist, TMHC, London, Ontario. He is also Distinguished Professor Emeritus of Illinois State University. Orser has also held a large number of visiting positions. These include Visiting Professor, Department of Anthropology,

University of Tennessee (1988); Visiting Professor, Department of Archaeology and the Culture and Colonialism Program, National University of Ireland (1995); Visiting Professor, Department of Archaeology, University of Lund, Sweden (1996); Research Associate, Department of Anthropology, The Field Museum, Chicago (1993–2003); Adjunct Professor of the Department of Archaeology, National University of Ireland, Galway (1994–2004 and 2008–2015); Visiting Professor, Department of Archaeology, University College Dublin, Ireland (2007); and Visiting Professor, Department of Anthropology and Archaeology, University of Otago, New Zealand (2011).

Orser was a member of the Board of Directors of the Society for Historical Archaeology (SHA) between 1996 and 1998. In 2019 he was honored with SHA's J.C. Harrington Medal. This is the Society's most prestigious award and was granted in recognition of a lifetime of substantive contributions to the discipline.

Major Accomplishments

Though Orser's graduate research might have suggested a future career on the archaeology of Native Americans, his involvement in historical archaeology began before he completed his doctorate. His early publications in the field were initially focused on the Upper Midwest (e.g., Orser 1981). Over the course of the 1980s and early 1990s, however, Orser's research turned to the historical archaeology of plantations, with a particular focus on South Carolina and Georgia. This work, which culminated in the publication of *The Material Basis of the Postbellum Tenant Plantation: Historical Archaeology in the South Carolina Piedmont* (Orser 1988), served to develop many of Orser's ongoing research foci, particularly as regards race, class, status, and power and the role of material culture in the analysis of these themes. It also showed a willingness to challenge historical archaeology orthodoxies of the time, such as the use of pattern analysis in material culture interpretation (Orser 1989).

While his work continued to focus on many of the same themes, from the early to mid-1990s, Orser's attention increasingly turned to global perspectives in historical archaeology, with a particular focus on Brazil and Ireland. In his influential 1996 book *A Historical Archaeology of the Modern World*, one of the first historical archaeology volumes to argue for a coherent overtly international archaeological approach to the global nature of the modern world, Orser identified four "haunts" of historical archaeology: colonialism, Eurocentrism, capitalism, and modernity (Orser 1996: 57–58). He argued that the intersection of these themes in the fifteenth century defined both the modern world and the archaeology thereof (Orser 1996: 86). While outlining how these were relevant at both the local and the international comparative level, Orser coined what is probably his most famous maxim: "Think globally, dig locally" (Orser 1996: 183). These themes continue to inform his work (e.g. Orser 2014).

While international comparative and globally aware approaches are now much more common in historical archaeology across a range of topics, his early to mid-1990s work engaging in a theory-engaged comparative study of sites in Palmares, Brazil, and Gorttoose, Ireland, from an explicitly globalizing perspective was groundbreaking at the time. Orser's commitment to international issues in historical archaeology can also be seen in his founding of both the *International Journal of Historical Archaeology* in 1997 (he remains the editor) and the Springer book series "Contributions to Global Historical Archaeology."

While Orser continues to maintain strong research and publication links with South America, often engaging in linking transatlantic themes with South American data (e.g., Orser 2018a), the bulk of his research since the mid-1990s has focused on Ireland, where he has directed historical archaeology fieldwork in counties Roscommon, Sligo, and Donegal (e.g., Orser 2006). Much of this work has focused on Orser's familiar themes of class, status, and power (e.g., Orser 2005), usually encompassing (whether implicitly or explicitly) the globally aware approach that has characterized most of

his work since the mid-1990s. While much of his past international comparative work engages between Europe and South America, more recently he has also turned his attention to the North Atlantic (Orser 2018b). He also continues to take a strong interest in general theoretical and educational approaches to historical archaeology. His *Historical Archaeology*, currently on its third edition (Orser 2016), is one of the most widely used introductory textbooks to the subject.

Cross-References

- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Funari, Pedro Paulo A. (Historical Archaeology)
- ▶ Global Archaeology
- ▶ Hispanic South America: Historical Archaeology
- ▶ International Journal of Historical Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Plantation Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Public Archaeology, The Move Towards
- ▶ Race in Archaeology
- ▶ South, Stanley A.

References

Orser, C.E., Jr., ed. 1981. *A guide for historical archaeology in Illinois*. Chicago: Mid-American Research Center, Loyola University of Chicago.

Orser, C.E., Jr. 1988. *The material basis of the postbellum tenant plantation: Historical archaeology in the South Carolina Piedmont*. Athens: University of Georgia Press.

Orser, C.E., Jr. 1989. On plantations and patterns. *Historical Archaeology* 23: 28–40.

Orser, C.E., Jr. 1996. *A historical archaeology of the modern world*. New York: Plenum Press.

Orser, C.E., Jr. 2005. Symbolic violence, resistance, and the vectors of improvement in early nineteenth-century Ireland. *World Archaeology* 37: 392–407.

Orser, C.E., Jr., ed. 2006. *Unearthing hidden Ireland: Historical archaeology in County Roscommon*. Bray: Wordwell Press.

Orser, C.E., Jr. 2014. *A primer on modern world archaeology*. New York: Eliot Werner Publications.

Orser, C.E., Jr. 2016. *Historical archaeology*. New York: Routledge.

Orser, C.E., Jr. 2018a. *An archaeology of the English Atlantic world, 1600–1700*. Cambridge: Cambridge University Press.

Orser, C.E., Jr., ed. 2018b. *Archaeologies of the British in Latin America*. New York: Springer.

Further Reading

Orser, C.E., Jr. 1981. Uniting public history and historical archaeology. *The Public Historian* 3: 75–83.

Orser, C.E., Jr. 1988. The archaeological analysis of plantation society: Replacing status and caste with economics. *American Antiquity* 53: 735–751.

Orser, C.E., Jr. 1989. On plantations and patterns. *Historical Archaeology* 23: 28–40.

Orser, C.E., Jr. 1992. Beneath the material surface of things: Commodities, artifacts, and slave plantations. *Historical Archaeology* 26: 95–104.

Orser, C.E., Jr. 1994. Toward a global historical archaeology: An example from Brazil. *Historical Archaeology* 28: 5–22.

Orser, C.E., Jr. 1997. Archaeology and nineteenth-century rural life in County Roscommon. *Archaeology Ireland* 11: 14–17.

Orser, C.E., Jr. 1998. The archaeology of the African diaspora. *Annual Review of Anthropology* 27: 63–82.

Orser, C.E., Jr. 2000. Taking the pulse of emerging modernity. *International Journal of Historical Archaeology* 4: 275–280.

Orser, C.E., Jr. 2001. The anthropology in American historical archaeology. *American Anthropologist* 103: 621–632.

Orser, C.E., Jr. 2003. *Race and practice in archaeological interpretation*. Philadelphia: University of Pennsylvania Press.

Orser, C.E., Jr. 2005. An archaeology of a famine-era eviction. *New Hibernia Review/Iris Éireannach Nua* 9: 45–58.

Orser, C.E., Jr. 2007. *The archaeology of race and racialization in historic America*. Gainesville: University Press of Florida.

Orser, C.E., Jr. 2008. Historical archaeology as modern-world archaeology in Argentina. *International Journal of Historical Archaeology* 12: 181–194.

Orser, C.E., Jr. 2010. Twenty-first century historical archaeology. *Journal of Archaeological Research* 18: 111–150.

Orser, C.E., Jr. 2014. *Archaeological thinking: How to make sense of the past*. Lanham: Rowman and Littlefield.

Orser, C.E., Jr. 2019. The Janus face of removal. In *The archaeology of removal in North America*, ed. T. Weik, 216–225. Gainesville: University Press of Florida.

Orser, C.E., Jr., ed. 1996. *Images of the recent past: Readings in historical archaeology*. Walnut Creek: Altamira.
Orser, C.E., Jr., ed. 2001. *Race and the archaeology of identity*. Salt Lake City: University of Utah Press.
Orser, C.E., Jr., and D.W. Owsley. 1982. Using Arikara osteological data to evaluate an assumption of fur trade archaeology. *Plains Anthropologist* 27: 195–204.

Ortner, Donald J.

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Basic Biographical Information

Donald J. Ortner (1938–2012) (Fig. 1) was born on August 23, 1938, in Stoneham, Massachusetts, the son of a conservative Christian minister, A. W. Ortner, and his wife, Marie Schweizer Ortner. Drawn to science (particularly biology) in high school, he was introduced to anthropology through the works of Margaret Mead and Ruth Benedict. His M.A. thesis at Syracuse University in 1960 was a comparative sociocultural study, but he was impressed by the courses in physical anthropology taught by Gordon Bowles. After moving to Washington, DC, with his wife Joyce Elaine Walker Ortner, a registered nurse, Ortner took a job at the National Museum of Natural History (NMNH), Smithsonian Institution, as laboratory assistant to J. Lawrence Angel. Bowles and Angel were both successful products of E. A. Hooton's program in physical anthropology at Harvard, and Ortner became intrigued by Angel's insights into the dynamic interactions between human biology and culture.

Ortner, Donald J., Fig. 1 Donald J. Ortner (2010)

Encouraged by his colleagues at NMNH, Ortner entered the Ph.D. program in anthropology at the University of Kansas to study with the skeletal biologists Ellis Kerley, Thomas McKern, and William Bass. During his year of coursework at Kansas, Ortner was awarded (co-jointly with Angel) a 5-year research grant from NIH to explore the microscopic and biochemical effect of aging on human compact bone. Ortner's dissertation, *The Effects of Aging and Disease on the Micromorphology of Human Compact Bone*, deepened his understanding of the essential biological interactions between soft tissue and bone and strengthened his conviction that a solid grounding in general human anatomy and physiology is essential for anyone seeking to conduct successful research in skeletal biology.

After his return to NMNH, Ortner was appointed assistant curator in the Department of Anthropology. At this time, Angel and two other physical anthropologists at NMNH, T. Dale Stewart and Lucille St. Hoyme, were broadening the theoretical foundations of the relatively new discipline of paleopathology (the study of health and disease in antiquity), bringing a truly anthropological perspective to this mainly descriptive field. After reading Adolph Schultz' studies of skeletal pathology in wild-shot primates, Ortner was influenced by the theoretical implications of Schultz' argument that adaptation to illness (including infectious diseases, parasites, and traumatic injuries) was a very powerful force in prehuman and human evolution. To further his education in anatomy, physiology, and the mechanisms of disease processes, Ortner enrolled in a rigorous course in orthopedic pathology taught by Lent Johnson, chief of orthopedic pathology at the

Armed Forces Institute of Pathology. This course marked a turning point in Ortner's career toward understanding the complexity of various disease processes and the web of biological and cultural factors which affected their development.

After his decision to concentrate on human skeletal remains from archaeological sites (rather on living subjects), Ortner began gaining archaeological field experience by working with colleagues at burial sites in the Washington, DC, area. He quickly acquired a broad knowledge of archaeological methods and became convinced of the importance of conducting in situ examinations of skeletal remains as well as conducting sophisticated laboratory analyses. In 1976, Ortner was promoted to curator of physical anthropology in the Department of Anthropology at NMNH (the position he held until his death in 2012), and in the following year, he joined a research project sponsored by the Smithsonian Institution (1977–1981) at the Early Bronze Age I site of Bab edh-Dhrâ, Jordan, to direct excavations of the cemeteries.

Major Accomplishments

In his long and active career, Donald J. Ortner's significant contributions to biocultural anthropology and paleopathology fall into three categories.

Teaching

Ortner organized a series of special courses on human skeletal paleopathology (1971–1974, 1985) which combined lectures on orthopedic pathology and osteology with laboratory sessions devoted to studying pathological cases from the human skeletal collections at NMNH. His stated objectives were to improve the professional competence of anthropologists in paleopathology; to foster dialogues among anthropologists, physicians with specialties in skeletal radiology and orthopedic pathology, and museum staff who curate human skeletal and mummified remains; and to develop a teaching file of photographs and x-ray films of modern, documented pathological samples and an international registry of paleopathological specimens.

Beginning in 1988, Ortner offered a similar series of short courses in paleopathology (now widely emulated at European universities and research centers) at the University of Bradford, England. From 1989 to 2010, Ortner taught a series of half-day workshops in skeletal pathology at the annual North American meetings of the Paleopathology Association. In addition, Ortner mentored numerous pre- and postdoctoral students of skeletal biology and paleopathology as well as visiting professionals from many different countries who came to Washington, DC, to study the human skeletal collections under his curation at NMNH. Through these efforts, he provided invaluable training for several generations of paleopathologists, both students and professionals.

Research in Biocultural Anthropology and Paleopathology

Ortner published 4 books and more than 100 scientific articles on various topics in skeletal biology, biocultural anthropology, and paleopathology. His most influential work in the latter field is *Identification of Pathological Conditions in Human Skeletal Remains* (Ortner and Putschar 1981; Ortner 2003). Initially coauthored with the eminent pathologist Walter G. J. Putschar, this volume presents basic concepts in human skeletal biology relevant to orthopedic pathology as well as detailed descriptions, diagnoses, and interpretations of hundreds of documented pathological examples from European museums and hospital collections. His second book, *How Humans Adapt, A Biocultural Odyssey* (Ortner 1983), presents the proceedings of an international symposium sponsored by the Smithsonian Institutions. In Ortner's contributed chapter, "Biocultural Interaction in Human Adaptation," he discusses genetic adaptations (e.g., post-childhood lactose tolerance) that have appeared in human populations in response to changing cultural contexts and other important culturally mediated dimensions of human health, such as changes in exposure to zoonoses and environmental pathogens and circumstances for the transmission of human-to-human infectious diseases.

In 1988, Ortner and his longtime colleague and friend, pathologist Arthur C. Aufderheide,

organized a symposium on human paleopathology at the 12th International Congress of Anthropological and Ethnological Sciences in Zagreb, Republic of Croatia. The edited volume of proceedings from this symposium (Ortner and Aufderheide 1991), *Human Paleopathology: Current Syntheses and Future Options*, includes brief overviews of theoretical foundations, methodologies, and cutting-edge interpretations by eminent paleopathologists on six continents. Ortner's most recent book, *The Early Bronze Age I Tombs and Burials of Bâb edh-Dhrâ, Jordan* (Ortner and Frohlich 2008), presents an exemplary biocultural analysis of the mortuary features at a major archaeological site. The detailed descriptions of the archaeological contexts of the burials are matched by rigorous analysis of the human skeletons; together, they illustrate Ortner's firm commitment to the *biocultural* perspective, in which each category of material remains yields data pertinent to their mutual interpretation. Ortner's lifelong dictum is masterfully illustrated here: that skeletal biologists should seek as much information as possible about the multiple synergistic factors (both biological and cultural) affecting human growth, development, and health in order that they may interpret accurately the specific skeletal lesions that they observe and, beyond that, the biocultural significance of disease prevalence.

Service to the Discipline of Biocultural Anthropology

In addition to his educational and research responsibilities at NMNH and his publications on biocultural anthropology, Ortner made significant contributions over the past four decades to the professional development of the Paleopathology Association (PPA), a scholarly society of physicians, pathologists, anthropologists, medical historians, and others interested in ancient health and disease. He served from 1982 to 2009 as an associate editor of the PPA's quarterly, *Paleopathology Newsletter*, and has been a member of the scientific committees for the PPA Biennial European Meetings since 1986. In 1999, Ortner was chosen to serve a 2-year term as PPA's first elected president; during his tenure, he led PPA to incorporation as a "scientific/educational" federal tax-exempt organization. In 2005, in recognition of his many years of service to PPA in diverse capacities, Ortner became the first recipient of the Eve Cockburn Service Award (named for the "founding mother" of the organization).

Note

Space does not permit the inclusion of Ortner's complete list of publications nor of his impressive roster of service activities and awards from numerous international institutions. This information appears in his curriculum vitae, available from the Department of Anthropology, NMNH, Smithsonian Institution.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Demographic Transitions
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition

References

Ortner, D.J. 1983. Biocultural interaction in human adaptation. In *How humans adapt, a biocultural odyssey*, ed. D.J. Ortner, 127–145. Washington, DC: Smithsonian Institution Press.

Ortner, D.J. 2003. *Identification of pathological conditions in human skeletal remains*. 2nd ed. Amsterdam: Academic.

Ortner, D.J., and A.C. Aufderheide, eds. 1991. *Human paleopathology: Current syntheses and future options*. Washington, DC: Smithsonian Institution Press.

Ortner, D.J., and B. Frohlich. 2008. *The early Bronze Age I tombs and burials of Bâb edh-Dhrâ, Jordan*. Lanham: AltaMira Press.

Ortner, D.J., and W.G.J. Putschar. 1981. *Identification of pathological conditions in human skeletal remains*, Smithsonian Contributions to Anthropology. Vol. 28. Washington, DC: Smithsonian Institution Press.

Osteology Reference Collections

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Introduction

The fields of bioarchaeology and human skeletal biology rely extensively on human skeletal reference collections. Although clinical studies lead to some routinely employed methodology, most techniques are based upon research conducted on reference collections curated throughout the world.

Definition

Research Collections

Collections of human remains vary considerably in their composition and documentation. Ideal reference collections are large and well preserved with accurate information about the individuals represented. Most techniques of analysis are based upon collections of known individuals with documented age at death, sex, stature, ancestry, disease history, and related life information. Many collections derived from archaeological excavations lack the type of documentation listed above but are accompanied by details of site location, culture, approximate date, and related mortuary data. All collections are of great value for research, but the type of study conducted depends highly on the representation of the individuals and the nature of the associated documentation.

Knowledge of the documentation of a collection utilized in research is critical for proper interpretation and methodology development. For example, since limb proportions vary considerably among world populations, a method to estimate living stature from long bones based on a sample of individuals from one area within the United States would be limited in its application outside of the United States. Similarly, research leading to a method of estimating adult age at death should be based on collections that have individuals with documented ages in all of the appropriate age categories. Awareness of population variation in all methodology depends upon access to collections reflecting that variability. Fortunately, well-documented collections of human remains exist globally, and new assemblages continue to be formed. Corsini et al. (2005), El-Najjar (1977), Quigley (2001), and Usher (2002) provide discussions of available collections and issues relating to their documentation and representation. Collection composition can be affected by repatriation issues and other factors. The following represents a partial global listing of key reference collections of human skeletal remains.

Examples

Brest Bone Collection: Brest, France

Skeletal and dental samples in this collection were all collected at autopsy in Brest, France, between 1996 and 1997. The collection consists of approximately 450 individuals and is located at the University Hospital (Centre Hospitalier Universitaire) in Montpellier, France (Baccino et al. 1999).

British Museum of Natural History Collections: London, England

This museum holds a large number of human remains (around 20,000), but few of these are documented. The Spitalfields Coffin Plate Collection, comprising the majority of the identified individuals at the museum, represents over 900 deceased, 387 of whose identity is known from legible coffin plates. They were buried in the crypt at Christ Church Spitalfields between 1,729 and 1,859 and excavated in the 1980s.

Name, age, and date of death are all available from the coffin plates, and additional information drawn from the historical record includes place and date of birth, nationality, place of residence,

and occupation (Cox 1989). In addition to the Spitalfields collection, approximately 106 mostly Asian crania from the nineteenth century are similarly documented. Parts of the approximately 20,000 human remains originated from different institutions and collections prior to coming to the Natural History Museum (Margaret Clegg, 2011, "personal communication").

Cape Town Documented Skeletal Collection: Cape Town, South Africa

This collection is derived from cadavers dissected in the Department of Anatomy at the University of Cape Town between 1980 and 1996. Known data include age, sex, and ancestry based on common classifications of the time (Ginter 2005). Most of the 200 individuals in the collection are over the age of 50 (Robinson and Bidmos 2009).

Chiang Mai University Skeletal Collection: Chiang Mai, Thailand

This modern Thai skeletal collection is composed of the willed remains of 104 individuals (70 males, 34 females) who were collected at the Faculty of Medicine at Chiang Mai University between 1993 and 1996 (King et al. 1998; Schmitt 2004). Documented information on this collection includes age, sex, residency, occupation, and socioeconomic range (King et al. 1998).

Coimbra Identified Skeletal Collection: Coimbra, Portugal

Excavated from the largest cemetery in Coimbra (Cemiterio da Conchada), this collection is housed at the University of Coimbra in their Museum of Anthropology. The collection includes 505 individuals, mainly of Portuguese descent, with ages from 7 to 96 years and dates of birth and death from 1826–1922 to 1904–1938, respectively (Coqueugniot and Weaver 2007). Cemetery records are available with name, sex, age, place of birth and death, date and cause of death, occupation, marital status, and parents' names (Santos and Roberts 2001; Coqueugniot and Weaver 2007).

Coimbra International Exchange Skull Collection: Coimbra, Portugal

Excavated from, and curated in, the same locations as the Coimbra Identified Skeletal Collection above, this osteological collection consists of 1,075 crania (Wasterlain et al. 2011). Both sexes are represented evenly in the collection, and the individuals are mainly Portuguese (Wasterlain and Dias 2009). All are identified from the cemetery record book with information such as age, sex, place of birth and death, year and cause of death, and occupation (Wasterlain and Dias 2009; Wasterlain et al. 2011).

Coimbra Medical School Skull Collection (Escolas Médicas I): Coimbra, Portugal

This collection was the first of the Coimbra identified osteological collections (above) to be assembled at the Museum of Anthropology at Coimbra University. The skulls were collected from medical schools in Lisbon, Coimbra, and Oporto between 1895 and 1903. There are 585 complete crania (366 male, 219 female) belonging to individuals born in Portugal or the Madeira archipelago. Birth year and death year (between 1802–1890 and 1895–1903, respectively) are documented as well as sex, age, and place of birth. The collection is mainly adult; only 2.9% (17) individuals were under 20 years old at death (Cunha and Wasterlain 2007).

Francisc J. Ranier Collection: Bucharest, Romania

First established by anatomist Francis J. Ranier in the early 1900s, the Ranier collection was separated from the Anatomy Department of the University of Bucharest in 1938, to be housed in the newly established Anthropology Institute of the Romanian Academy. Composed of crania and some postcranial elements, the collection was expanded through the 1950s, with the majority of individuals collected in the 1930s and 1940s. Remains were predominantly unclaimed individuals of low socioeconomic status recovered from nearby hospitals and morgues. Sex, age, ancestry, pathology, cause of death, and profession are available for most crania; 93% of the collection

is classified as of Romanian ethnicity, with the remainder composed of various ethnic minorities. Known age at death is primarily in the 18–60-year range, with 2,123 inventoried adult males, 1,194 adult females, and 214 children. The total count of remains is 6,800 (Ion 2011).

George Huntington Collection: Washington, DC

The Huntington Collection is composed of over 3,600 documented human skeletons housed at the National Museum of Natural History of the Smithsonian Institution. George S. Huntington of the College of Physicians and Surgeons in New York City amassed these skeletons from immigrants and US citizens who died in New York City between 1893 and 1921. The collection is very well preserved and has a high level of documentation (most individuals are of known age, sex, nationality, cause of death, and in some cases occupation), broad ethnic representation, and many examples of trauma, pathology, and occupational stress (Hunt and Spatola 2008).

Grant Collection: Toronto, Ontario

This collection was received by the Anatomy Department at the University of Toronto in the early half of the twentieth century and is now part of the Anthropology Department's research collection. Local hospitals and welfare institutions provided the majority of the 202 human skeletal remains that make up the collection, of which age at death, cause of death, sex, and name are known. Most of the individuals (175) are male, and a large number of those (147) are over 40 years old (Bedford et al. 1993).

Hamann-Todd Osteological Collection: Cleveland, Ohio

This extensive collection is housed at the Cleveland Museum of Natural History and consists of 3,300 unclaimed individuals collected by Dr. T.W. Todd at the beginning of the twentieth century (Cobb 1959). Each skeleton is associated with a file outlining basic information determined by soft tissue analysis and/or hospital and autopsy records. Data include, but are not limited to, age, sex, name, cause of death, nationality, and occupation (Andersen 1986).

Human Skeletal Reference Collection of Modern Colombian Population: National Institute of Legal Medicine and Forensic Sciences, Bogota, Colombia

This collection consists of 600 skeletons of individuals of known identity who died between 2005 and 2008. Information regarding cause of death is also available (Sanabria-Medina et al. 2016).

Institute of Normal Human Anatomy Collection: Siena, Italy

This craniological collection at the University of Siena is composed of several hundred skulls amassed between approximately 1881 and 1932. Consisting of the inhabitants of Siena and its outskirts, the majority of the skulls are of known age, sex, and state of health (Guidotti et al. 1986; Brasili-Gualandi and Gualdi-Russo 1989).

Jikei Collection: Tokyo, Japan

The skeletal remains of nearly 100 adult individuals are housed at the Jikei University School of Medicine's Department of Anatomy. The deceased lived the majority of their lives in the first half of the twentieth century (İşcan et al. 1994; Tanaka et al. 2000), and cadaver records give biographical data such as sex, date of birth and death, birthplace, and cause of death (Tanaka et al. 2000).

Johns Hopkins Fetal Collection: Cleveland, Ohio

The Johns Hopkins Fetal Collection was assembled by A.H. Schultz in the 1920s from stillbirths in the Baltimore area, while he was at Johns Hopkins University. The collection is comprised of 112 fetal and infant human skulls of known age and sex; it was moved to the Cleveland Museum of Natural History in 1973 (Erikson 1981; Ridley 2002).

Lúıs Lopes Collection: Lisbon, Portugal

Begun by Lu ́ıs Lopes in the 1980s to replace the collection of Ferraz de Macedo that was mostly destroyed by a fire, this collection (also known as the Lisbon Collection) is located at the National Museum of Natural History in Portugal. The collection currently has around 1,800 mostly

complete identified individuals, many of which came from Lisbon cemeteries and were of Portuguese nationality. Data on these individuals were drawn from cemetery records or civil registration and include age, name, sex, birthplace, occupation, address, and cause of death (Cardoso 2006; Matos and Santos 2006).

Manuel da Silva Braga Collection (MSBC): Belém, Brazil

This collection was assembled from unclaimed cadavers originating in the State of Pará, Brazil. At least 88 crania are present (Cardoso 2016).

Maxwell Museum's Documented Skeletal Collection: Albuquerque, NM

This collection is located at the Maxwell Museum of Anthropology, part of the University of New Mexico. It consists of 257 (as of 2008) mostly documented (207) individuals donated from several sources including self-donations, next-of-kin, the University of New Mexico's Anatomy Department, and the Office of the Medical Investigator. Documentation on the 207 positively identified individuals varies depending on the source of donation but generally includes population affinity, age, sex, cause of death, and donation year (Komar and Grivas 2008). Most individuals died within the last 40 years and were New Mexico residents (Yoder et al. 2001).

Modern Collection of Santiago (Colección Subactual de Santiago): Santiago, Chile

Housed at the University of Chile in the Department of Anthropology of the Faculty of Social Sciences, this collection contains around 2,000 human skeletal remains and was granted to the University from the General Cemetery (Cementerio General) in Santiago during the 1970s (Rodrigo Retamal Yermani, 2011, "personal communication"). It consists of individuals who died between 1950 and 1970 whose name, age, sex, cause of death, and occasionally date of birth and death are documented (Urzúa et al. 2008).

Modern Japanese Osteological Collection: Tokyo, Japan

This modern Japanese sample is part of an anatomical collection housed at the University Museum of the University of Tokyo. It consists of well-preserved skeletons of known age and sex from individuals who died in the late nineteenth and early twentieth centuries (Case and Heilman 2005).

Museo Nazionale di Antropologia ed Etnologia di Firenze Skull Collection: Florence, Italy

Approximately 200 individuals are represented in this documented cranial sample. The deceased are from three Italian cities (Siracusa, Catania, and Firenze), and all died at the end of the nineteenth and beginning of the twentieth centuries. Hospital dissections and local cemeteries are the sources for the skeletal material, and age at death is known from the registry office (Frederic et al. 2006; Rinaldi et al. 2006).

National Museum of Health and Medicine Skeletal Collections: Washington, DC

The skeletal collections within the Anatomical Collections at this museum are numerous. Almost 5000 specimens are included in 13 collections, 12 of which are human and 6 of which are relatively well documented including the Civil War Skeletal Collection (Sledzik and Moore-Jansen 1991; Barbian et al. 2000), Indian Wars Collection (Sledzik and Moore-Jansen 1991), Forensic Anthropology Collection, and others. These collections are all curated by the National Museum of Health and Medicine, which separated from the Armed Forces Institute of Pathology (AFIP) in 2010 and is now part of the US Army Medical Research and Materiel Command (National Museum of Health and Medicine, Skeletal Collections n.d.).

Oloriz Collection: Madrid, Spain

This collection was assembled from cadavers in the latter half of the nineteenth century (1884–1898) (Oloriz 1899; Ubelaker et al. 2009) by Federico Oloriz Aguilera and is now located in the Faculty of Medicine in the Complutense Universitaria in Madrid. The collection consists of nearly 2,000 crania of known sex, age at death, and regional origin (Ubelaker et al. 2009).

Pretoria Bone Collection: Pretoria, South Africa

This collection was created in 1942–1943 and is currently held in the Department of Anatomy at the University of Pretoria (L'Abbé et al. 2005; Robinson and Bidmos 2009). Individuals in this collection are known and are either unclaimed or donated. Age, sex, and ancestry are documented on a majority of the 704 crania, 290 full, and 541 postcranial skeletons in the collection (L'Abbé et al. 2005).

The Raymond Dart Collection: Johannesburg, South Africa

Initiated in the 1920s, this collection has grown to be one of the most extensive documented collections derived from cadavers in the world. The Dart Collection includes 2,605 individuals with known population affinities, age, and sex. The collection is located in the University of the Witwatersrand in its School of Anatomical Sciences (Dayal et al. 2009).

Robert J. Terry Anatomical Skeletal Collection: Washington, DC

The Smithsonian's National Museum of Natural History houses the 1,728 individuals which compose the Terry Collection, collected first by Robert J. Terry from 1898 to 1941 and then by Mildred Trotter until 1967. All individuals in the collection died in the St. Louis, MO area, and have a morgue record with age, sex, ancestry, date of death, as well as some additional information (Boldsen et al. 2002). Most have additional forms covering dental and bone inventory, measurements, and other records (Hunt and Albanese 2005).

Royal College of Surgeons: London, England

Collections consist of pathological specimens and those involved in studies of comparative anatomy (Surgicat:surgicat.rcseng.ac.uk).

San Nicolas Tolentino Collection: Mexico City, Mexico

In the year 2000, the Department of Physical Anthropology of the Escuela Nacional de Antropología e Historia in Mexico City began exhumation at three local cemeteries to compile a contemporary skeletal reference collection. The San Nicolas Tolentino Cemetery and the 20 de Noviembre Cemetery yielded individuals buried 7–10 years prior to exhumation, whose family members were unable to pay cemetery dues. Death certificates and other records were obtained from the Civil Registry for each of the exhumed, providing date of death, cause of death, sex, age, and occupation, as well as information related to income, quality of life, and health. Individuals exhumed from the Dolores Cemetery date to the nineteenth and early twentieth centuries with little documentation but serve as a sample to test methods verified on the San Nicolas Tolentino and 20 de Noviembre collections. The 3 combined burial populations totaled 102 individuals in the year 2006, with the goal to reach a total of 2,000 male and female individuals spanning each year of life (González et al. 2006).

Sassari Collection: Sardinia, Italy

The Sassari collection, part of the Frassetto collections of the Museum of Anthropology at the University of Bologna, Italy, is made up of 606 individuals exhumed from municipal cemeteries whose deaths date to the first half of the twentieth century. The skeletons are well preserved and have associated information on sex, age, date of death, and, in many cases, date of birth and occupation (Belcastro et al. 2008; Hens et al. 2008).

Scheuer Collection: Dundee, Scotland

The Scheuer Collection is located at the Centre for Anatomy and Human Identification at the University of Dundee. The collection has approximately 150 juvenile skeletons from predominately archaeological and anatomical contexts. Some of the individuals have documented age and sex Rissech and Black 2007; Rissech et al. 2008). The University's website provides the most current information on the collection (Center for Anatomy and Human Identification, Anatomical Collections n.d.).

Spitalfriedhof St. Johann Known Age Collection: Basel, Switzerland

The Spitalfriedhof St. Johann collection consists of 220 skeletons of known age and sex identified

through hospital and cemetery records. The Spitalfriedhof St. Johann cemetery was associated with the Bürgerspital Hospital of Basel and in use from 1845 to 1865. Over two thirds of the patients who died in the hospital were buried in the cemetery, making the collection fairly representative of the hospital mortality patterns of the time. The collection is located in the Natural History Museum in Basel (Griffin et al. 2009).

St. Bride's Church: London, England

This documented skeletal collection is housed at St. Bride's Church on Fleet Street (Black and Scheuer 1996). The 244 individuals originate from the eighteenth and nineteenth century, and coffin plates document their age and sex (Gapert et al. 2009).

St. Thomas Anglican Church: Belleville, Ontario

In 1989, a portion of the 1,564 deceased interred in St. Thomas' nineteenth-century cemetery were excavated. Of the 576 disinterred individuals, 80 were personally identified by coffin plates that were still in place (Saunders et al. 1997). The names from the coffin plates correspond with the church's burial records providing data such as age, date of death, burial date and, at times, cause of death and family relationships (Saunders et al. 1993).

Universidad de Complutense Collection: Madrid, Spain

One hundred and thirty-three Spanish adults comprise this collection, 116 of whose name, birth date (range from 1880 to 1945), death date, and cause of death are known (José Antonio Sánchez Sánchez, 2011, "personal communication"). These data were gathered from the records of the South Cemetery of Madrid, from which these individuals were exhumed in 1991 (Trancho et al. 1997). A more recent exhumation from the same cemetery has provided 86 additional individuals, 84 of which have known identity, were between 20 and 55 years of age at death, and were born between 1941 and 1976 (José Antonio Sánchez Sánchez, 2011, "personal communication").

Universidad Nacional Autónoma de México Collection: Mexico City, Mexico

Initiated in 1994, this collection is part of the Faculty of Medicine in the Physical Anthropology Laboratory at the National Autonomous University of Mexico (Molgado et al. 2007). Sex is known for all of the 172 individuals that comprise the collection, and cause of death is known for some (Socorro Báez Molgado, 2011, "personal communication").

Universitat Autònoma de Barcelona (UAB) Collection of Identified Human Skeletons: Barcelona, Spain

The UAB Collection is a well-documented, well-preserved selection of 35 Catalan adults from the twentieth century. Each individual was a Spanish national interred at the Granollers cemetery in Catalonia. The cemetery register, corresponding to each grave and gravestone, contains information such as name, age, birth and death place, cause of death, parents' names, and place of residence. This information leads to the Civil Register and birth certificates, which provide a considerable amount of additional data about each of the deceased (Rissech and Steadman 2011).

University of Athens Human Skeletal Reference Collection (The Athens Collection): Athens, Greece

This modern collection was assembled between the years of 1996 and 2003 and belongs to the Department of Animal and Human Physiology at the University of Athens. Of its 225 individuals, 214 have documented occupation, age, sex, birthplace, and cause of death based on available death certificates (Eliopoulos et al. 2007).

University of Szeged Collection: Szeged, Hungary

Located in the Department of Forensic Medicine in the Faculty of Medicine, this fetal collection contains remains from individuals with known age and sex. The age range for the collection is 4–10 lunar months (Castellana and Kósa 2001).

W. Montague Cobb Human Skeletal Collection: Washington, DC

W. Montague Cobb, anatomist and physical anthropologist at Howard University, collected and prepared the collection between 1932 and 1969 from cadavers from the anatomy dissecting room. The collection includes 700 preserved skeletons with detailed anatomical, demographic, and medical records and is located in the College of Arts and Sciences at Howard University. The Cobb collection is representative of the eastern urban population of the USA during that time (Rankin-Hill and Blakey 1994).

William F. McCormick Clavicle Collection: Knoxville, TN

The McCormick Collection, housed in the Anthropology Department at the University of Tennessee, is a documented autopsy collection of approximately 2,000 clavicle pairs collected from autopsies in East Tennessee between 1986 and 1998 (Langley-Shirley and Jantz 2010).

William M. Bass Donated Skeletal Collection: Knoxville, TN

The University of Tennessee is home to the Bass Collection, which contains a large number of modern human skeletons: over 1800 as of April 2017, and growing steadily. All skeletons are donated by family, self, or medical examiner, and therefore, identity, age, sex, ethnicity, and stature are mostly known. Age ranges from infant to adult are represented by this collection (Shirley et al. 2011).

Cross-References

- ▶ Bioarchaeology: Definition
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition

References

Andersen, B.C. 1986. Parturition scarring as a consequence of flexible Pelvic architecture. Unpublished PhD dissertation, Simon Fraser University.

Baccino, E., D.H. Ubelaker, L.C. Hayek, and A. Zerilli. 1999. Evaluation of seven methods of estimating age at death from mature human skeletal remains. *Journal of Forensic Sciences* 44: 931–936.

Barbian, L.T., P.S. Sledzik, and A.M. Nelson. 2000. Case studies in pathology from the national museum of health and medicine, armed forces institute of pathology. *Annals of Diagnostic Pathology* 4: 170–173.

Bedford, M.E., K.F. Russell, C.O. Lovejoy, R.S. Meindl, S.W. Simpson, and P.L. Stuart-Macadam. 1993. Test of the multifactorial aging method using skeletons with known ages-at-death from the grant collection. *American Journal of Physical Anthropology* 91: 287–297.

Belcastro, M.G., E. Rastelli, and V. Mariotti. 2008. Variation of the degree of sacral vertebral body fusion in adulthood in two European modern skeletal collections. *American Journal of Physical Anthropology* 135: 149–160.

Black, S., and L. Scheuer. 1996. Age changes in the clavicle: From the early neonatal period to skeletal maturity. *International Journal of Osteoarchaeology* 6: 425–434.

Boldsen, J.L., G.R. Milner, L.W. Konigsberg, and J.W. Wood. 2002. Transition analysis: A new method for estimating age from skeletons. In *Paleodemography: Age distributions from skeletal samples*, ed. R.D. Hoppa and J.W. Vaupel, 73–106. Cambridge, UK: Cambridge University Press.

Brasili-Gualandi, P., and E. Gualdi-Russo. 1989. Discontinuous traits of the skull: Variations on sex, age, laterality. *Anthropologischer Anzeiger* 47: 239–250.

Cardoso, H.F.V. 2006. Brief communication: The collection of identified human skeletons housed at the Bocage Museum (National Museum of Natural History), Lisbon, Portugal. *American Journal of Physical Anthropology* 129: 173–176.

Cardoso, F.A. 2016. Remains of the dead: Exploring a human anatomical collection from Brazilian Amazon. *International Journal of Osteoarchaeology* 26 (5): 787–798.

Case, D.T., and J. Heilman. 2005. Pedal symphalangism in modern American and Japanese skeletons. *HOMO-Journal of Comparative Human Biology* 55: 251–262.

Castellana, C., and F. Kósa. 2001. Estimation of fetal age from dimensions of atlas and axis ossification centers. *Forensic Science International* 117: 31–43.

Center for Anatomy and Human Identification, Anatomical Collections. n.d.. Available at: http://www.lifesci.dundee.ac.uk/cahid/anatomical-collections. Accessed 17 Aug 2011.

Cobb, W.M. 1959. Thomas Wingate Todd. *Journal of the National Medical Association* 51: 233–246.

Coqueugniot, H., and T.D. Weaver. 2007. Brief communication: Infracranial maturation in the skeletal collection from Coimbra, Portugal: New ageing standards for epiphyseal union. *American Journal of Physical Anthropology* 134: 424–437.

Corsini, M., A. Schmitt, and J. Bruzek. 2005. Aging process variability on the human skeleton: Artificial network as an appropriate tool for age at death assessment. *Forensic Science International* 148: 163–167.

Cox, M.J. 1989. An evaluation of the significance of "scars of parturition" in the Christ Church Spitalfields sample. Unpublished PhD dissertation, University College London.

Cunha, E., and S. Wasterlain. 2007. The Coimbra identified osteological collections. In *Skeletal series and their socio-economic context*, Documenta Archaeobiologiae 5, ed. G. Grupe and J. Peters, 23–33. Rahden: Verlag Marie Leidorf GmbH.

Dayal, M.R., A.D.T. Kegley, G.Š. Trkalj, M.A. Bidmos, and K.L. Kuykendall. 2009. The history and composition of the Raymond A. Dart collection of human skeletons at the University of Witwatersrand, Johannesburg, South Africa. *American Journal of Physical Anthropology* 140: 324–335.

Eliopoulos, C., A. Lagia, and S. Manolis. 2007. A modern, documented human skeletal collection from Greece. *HOMO-Journal of Comparative Human Biology* 58: 221–228.

El-Najjar, M.Y. 1977. The distribution of human skeletal material in the continental United States. *American Journal of Physical Anthropology* 46: 507–512.

Erikson, G.E. 1981. Adolph Hans Schultz, 1891–1976. *American Journal of Physical Anthropology* 56: 365–371.

Frederic, P., E. Pacciani, and S. Gori. 2006. Age at death diagnosis by tooth wear: Reliability evaluation. A Bayesian model. In *Bayesian inference for diagnosing sex and age-at-death in skeletal remains*, ed. M. Di Bacco, P. Frederic, and F. Scalfari, 25–35. Asti: Diffusione immagine editore.

Gapert, R., S. Black, and J. Last. 2009. Sex determination from the occipital condyle: Discriminant function analysis in an eighteenth and nineteenth century British sample. *American Journal of Physical Anthropology* 138: 384–394.

Ginter, J.K. 2005. A test of the effectiveness of the revised maxillary suture obliteration method in estimating adult age at death. *Journal of Forensic Sciences* 50: 1303–1309.

González, A.T., I.D. Lara Barajas, R.R. Olvera Palma, S. García Rodríguez, and M. Silva Magaña. 2006. *Catá logo San Nicolás Tolentino: una colección osteológica contemporánea mexicana*. Mexico City: Instituto Nacional de Antropología Historia.

Griffin, R.C., A.T. Chamberlain, G. Hotz, K.E.H. Penkman, and M.J. Collins. 2009. Age estimation of archaeological remains using amino acid racemization in dental enamel: A comparison of morphological, biochemical, and known ages-at-death. *American Journal of Physical Anthropology* 140: 224–252.

Guidotti, A., A. Bastianini, G.F. De Stefano, and G. Hauser. 1986. Variations of supraorbital bony structures in Sienese skulls. *Acta Anatomica* 127: 1–6.

Hens, S.M., E. Rastelli, and G. Belcastro. 2008. Age estimation from the human os coxa: A rest on a documented Italian collection. *Journal of Forensic Sciences* 53: 1040–1043.

Hunt, D.R., and J. Albanese. 2005. History and demographic composition of the Robert J. Terry anatomical collection. *American Journal of Physical Anthropology* 127: 406–417.

Hunt, D.R., and B. Spatola. 2008. History and demographic profile of the George S. Huntington collection at the Smithsonian Institution. *American Journal of Physical Anthropology* 46: 121–122.

Ion, A. 2011. A brief overview of "Francisc J. Rainer" human osteological collection. *Annuaire Roumain d' L'Anthropologie* 48: 24–32.

İşcan, M.Y., M. Yoshino, and S. Kato. 1994. Sex determination from the tibia: Standards for contemporary Japan. *Journal of Forensic Sciences* 39: 785–792.

King, C.A., M.Y. İs¸can, and S.R. Loth. 1998. Metric and comparative analysis of sexual dimorphism in the Thai femur. *Journal of Forensic Sciences* 43: 954–958.

Komar, D.A., and C. Grivas. 2008. Manufactured populations: What do contemporary reference skeletal collections represent? A comparative study using the Maxwell Museum documented collection. *American Journal of Physical Anthropology* 137: 224–233.

L'abbé, E.N., M. Loots, and J.H. Meiring. 2005. The Pretoria bone collection: A modern south African skeletal sample. *HOMO-Journal of Comparative Human Biology* 56: 197–205.

Langley-Shirley, N., and R.L. Jantz. 2010. A Bayesian approach to age estimation in modern Americans from the clavicle. *Journal of Forensic Sciences* 55: 571–583.

Matos, V., and A.L. Santos. 2006. On the trail of pulmonary tuberculosis based on rib lesions: Results from the human identified skeletal collection from the Museu Bocage, Lisbon, Portugal. *American Journal of Physical Anthropology* 130: 190–200.

Molgado, S.B., J.R. Té Llez-Grión, and P.H. Saint-Leu. 2007. La antropología Física y la medicina en la UNAM. *Revista de la Facultad de Medicina, UNAM* 50: 17–20.

National Museum of Health and Medicine, Skeletal Collections. n.d. Available at: http://nmhm.washingtondc.museum/collections/guideganatomical/ga_skeletal/ga_skeletal.html. Accessed 17 Aug 2011.

Oloriz, F. 1899. El laboratorio de antropología de la Facultad de Medicina de Madrid. *Revista Ibero- Americana de Ciencias Medicas* 1: 76–91.

Quigley, C. 2001. *Skulls and skeletons: Human bone collections and accumulations*. Jefferson: McFarland & Co.

Rankin-Hill, L.M., and M.L. Blakey. 1994. W. Montague Cobb (1904–1990): Physical anthropologist, anatomist, and activist. *American Anthropologist* 96: 74–96.

Ridley, J.T. 2002. Sex estimation of fetal and infant remains based on metric and morphognostic analyses. Unpublished M.A. thesis, Louisiana State University.

Rinaldi, A., E. Pacciani, and S. Gori. 2006. Cranial suture closure as age at heath indicator: A further test of its reliability. In *Bayesian inference for diagnosing sex and age-at-death in skeletal remains*, ed. M. Di Bacco, P. Frederic, and F. Scalfari, 47–52. Asti: Diffusione Immagine Editore.

Rissech, C., and S. Black. 2007. Scapular development from the neonatal period to skeletal maturity: A preliminary study. *International Journal of Osteoarchaeology* 17: 451–464.

Rissech, C., and D.W. Steadman. 2011. The demographic, socio-economic and temporal contextualisation of the Universitat Autònoma de Barcelona collection of identified human skeletons (UAB collection). *International Journal of Osteoarchaeology* 21: 313–322.

Rissech, C., M. Schaefer, and A. Malgosa. 2008. Development of the femur – Implications for age and sex determination. *Forensic Science International* 180: 1–9.

Robinson, M.S., and M.A. Bidmos. 2009. The skull and humerus in the determination of sex: Reliability of discriminant function equations. *Forensic Science International* 186: 86.e1–86.e5.

Sanabria-Medina, C., G. González-Colmenares, H. Osorio Restrepo, and J.M. Guerrero Rodriguez. 2016. A contemporary Colombian skeletal reference collection: A resource for the development of population specific standards. *Forensic Science International* 266: 577e-1–577e-4.

Santos, A.L., and C.A. Roberts. 2001. A picture of tuberculosis in young Portuguese people in the early 20th century: A multidisciplinary study of the skeletal and historical evidence. *American Journal of Physical Anthropology* 115: 38–49.

Saunders, S., C. Devito, A. Herring, R. Southern, and R. Hoppa. 1993. Accuracy tests of tooth formation age estimations for human skeletal remains. *American Journal of Physical Anthropology* 92: 173–188.

Saunders, S.R., C. Devito, and M.A. Katzenberg. 1997. Dental caries in nineteenth century upper Canada. *American Journal of Physical Anthropology* 104: 71–87.

Schmitt, A. 2004. Age-at-death assessment using the os pubis and the auricular surface of the ilium: A test on an identified Asian sample. *International Journal of Osteoarchaeology* 14: 1–6.

Shirley, N.R., R.J. Wilson, and L.M. Jantz. 2011. Cadaver use at the University of Tennessee's anthropological research facility. *Clinical Anatomy* 24: 372–380.

Sledzik, P.S., and P.H. Moore-Jansen. 1991. Dental disease in nineteenth century military skeletal samples. In *Advances in dental anthropology*, ed. M.-A. Kelley and C.S. Larsen, 215–224. New York: Wiley-Liss.

Tanaka, H., P.E. Lestrel, T. Uetake, S. Kato, and F. Ohtsuki. 2000. Sex differences in proximal humeral outline shape: Elliptical Fourier functions. *Journal of Forensic Sciences* 45: 292–302.

Trancho, G.J., B. Robledo, I. López-Bueis, and J.A. Sánchez. 1997. Sexual determination of the femur using discriminant functions. Analysis of a Spanish population of known sex and age. *Journal of Forensic Sciences* 42: 181–185.

Ubelaker, D.H., A. Ross, and K.M. Zarenko. 2009. Dental disease in nineteenth century, Spain. *L'Anthropologie* 47: 273–282.

Urzúa, C.L., M.R. Balboa, R.R. Yermani, and E.A. Lafonataine. 2008. Arqueología del depó sito: manejo integral de las colecciones bioantropoló gicas en el Departamento de Antropología de la Universidad de Chile. *Conserva* 12: 69–96.

Usher, B.M. 2002. Reference samples: The first step in linking biology and age in the human skeleton. In *Paleodemography: Age distributions from skeletal samples*, ed. R.D. Hoppa and J.W. Vaupel, 29–47. Cambridge, UK: Cambridge University Press.

Wasterlain, S.N., and G.J. Dias. 2009. Amelogenesis imperfecta in an early 20th century population from Central Portugal. *International Journal of Osteoarchaeology* 19: 424–435.

Wasterlain, S.N., E. Cunha, and S. Hillson. 2011. Periodontal disease in a Portuguese identified skeletal sample from the late nineteenth and early twentieth centuries. *American Journal of Physical Anthropology* 145: 30–42.

Yoder, C., D.H. Ubelaker, and J.F. Powell. 2001. Examination of variation in sternal rib end morphology relevant to age assessment. *Journal of Forensic Sciences* 46: 223–227.

Further Reading

Introna, F., Jr., G. Di Vella, C.P. Campobasso, and M. Dragone. 1997. Sex determination by discriminant analysis of calcanei measurements. *Journal of Forensic Sciences* 42: 725–728.

Introna, F., Jr., G. Di Vella, and C.P. Campobasso. 1998. Sex determination by discriminant analysis of patella measurements. *Forensic Science International* 95: 39–45.

Powers, R. 1962. The disparity between known age and age as estimated by cranial suture closure. *Man* 62: 52–54.

Purkait, R. 2005. Triangle identified at the proximal end of femur: A new sex determinant. *Forensic Science International* 147: 135–139.
Purkait, R., and H. Chandra. 2004. A study of sexual variation in Indian femur. *Forensic Science International* 146: 25–33.

Osteology: Definition

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Osteology, from the Greek *osteon*, meaning bone, and *logos*, meaning science, is the study of the structure and function of bones.

Cross-References

► Bone: Histological Analysis
► Forensic Anthropology: Definition
► Skeletal Biology: Definition

Österreichische Gesellschaft für Mittelalterarchäologie

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Basic Information

The Austrian Society for Medieval Archaeology was founded in 1985. As in other countries, the importance of the archaeology of recent historical periods grew immensely during the mid-twentieth century, and a framework for scientific exchange was therefore needed. In line with this, the Society has the dual objectives of promoting research on the archaeology of the medieval and postmedieval periods in Austria and opening these fields up to interested laymen and women. Archaeological sources and their interpretation in a historical context provide the main focus for the work of the Society. Also, interdisciplinary approaches are strongly encouraged together with the collaboration with neighboring humanities and the natural sciences.

For many years, Prof. Dr. Fritz Felgenhauer and Prof. Dr. Sabine Felgenhauer-Schmiedt chaired the Society, and in this role, they have significantly influenced the direction of medieval archaeology in Austria and have helped place it in a wider European context. Currently, Prof. Dr. Claudia Theune, University of Vienna, is chairwoman of the Society; the vice-chairman is Dr. Thomas Kühtreiber, Institute of Material Culture of the Austrian Academy of Sciences; and the Society's secretaries are Dr. Gabriele Scharrer-Liska, University of Vienna, and Elfriede Huber, Vienna. Additional information is provided on the Society's website: www.univie.ac.at/oegm.

Major Impact

To achieve its goals, the Society organizes biennial international conferences at different locations in Austria. The primary regional focus of these is on the medieval and postmedieval archaeology of the entire Danube region, although studies on other European areas are also considered so as to provide a comparative perspective. Papers presented at these biennial meetings are regularly published in the journal *Beiträge zur Mittelalterarchäologie in Österreich*. The Society's other publications provide an overview of current research in Austria, and these include both edited volumes and monographs. Details of these can be found on the Society's website.

In addition to conferences, the Society organizes lectures and excursions to medieval monuments in Austria, and visits and guided tours in

museums aimed at providing members opportunities to study and learn about the archaeology of the medieval period in Austria. The Society also hosts an archive on medieval archaeology, which houses documents (including both plans and descriptions) on medieval fortifications and deserted villages in Austria and examples of a range of typical medieval ceramics.

Cross-References

- ▶ Deutsche Gesellschaft für Archäologie des Mittelalters und der Neuzeit e.V. (DGAMN)
- ▶ Historische Archäologie
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Ruralia: The Jean-Marie Pesez Conferences on Medieval Rural Archaeology

Ostia, Archaeology of

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Introduction

As the harbor city of ancient Rome, Ostia served to connect the city to the larger Mediterranean world. The colony was a major hub for traders and a port of entry for many international visitors, and therefore its structures range from the mundane but necessary granaries to lavish bath complexes. Certain architectural features of Ostia, such as the apartment building (*insula*) as a primary form of habitation, allow modern scholars to understand features of Roman life that have been otherwise buried beneath later construction.

Definition

Founded at the mouth of the Tiber River on the Tyrrhenian Sea approximately 30 km. west of Rome, Ostia was an early Roman colony. Occupied from the late fourth/early third century BCE through the late seventh century CE, today it is an archaeological park.

Key Issues/Current Debates/Future Directions/Examples

Key Issues: The Shape and Composition of the Ancient City

The cityscape is not strictly defined by the ordered grid of the "ideal" Roman colony (Fig. 1). The nucleus of the castrum, with the forum at its center and arterial roads crossing at the axis, maintains aspects of the early gridded layout of the first settlement. The area to the east of the castrum, especially to the north, was also built up in respect to the *decumanus*. The roads running from the south and west gates of the castrum veer off in different directions, possibly following very ancient paths to important locales such as the Tiber river mouth, the seashore, and salt beds.

Ostia's enormous urban scale combined with a relative lack of public urban monuments speaks to the utilitarian and commercial nature of the city. The giant *horrea* (grain storage facilities) dominate wide swaths of the city, and the numerous multistory apartment buildings and bathhouses provide ample accommodation, hygiene, and leisure for the large number of working-class people required to maintain the activities of a port city (Fig. 2). In addition to the monumental capitolium in the forum, temples and sanctuaries can be found in all regions of the city. Especially notable at Ostia is the large number of sanctuaries for the rites of the god Mithras, a deity who was especially popular among soldiers. No amphitheater has been discovered in or around Ostia, and so the theater seems to have been the primary center for entertainment.

Modern Appearance of the Excavations

The archaeological site of Ostia Antica is often compared to a palimpsest because the modern visitor can observe traces of structures from many phases of the city's 1,200-year history (Fig. 3). Two factors contribute to Ostia's multilayered appearance. First, the ancient residents of

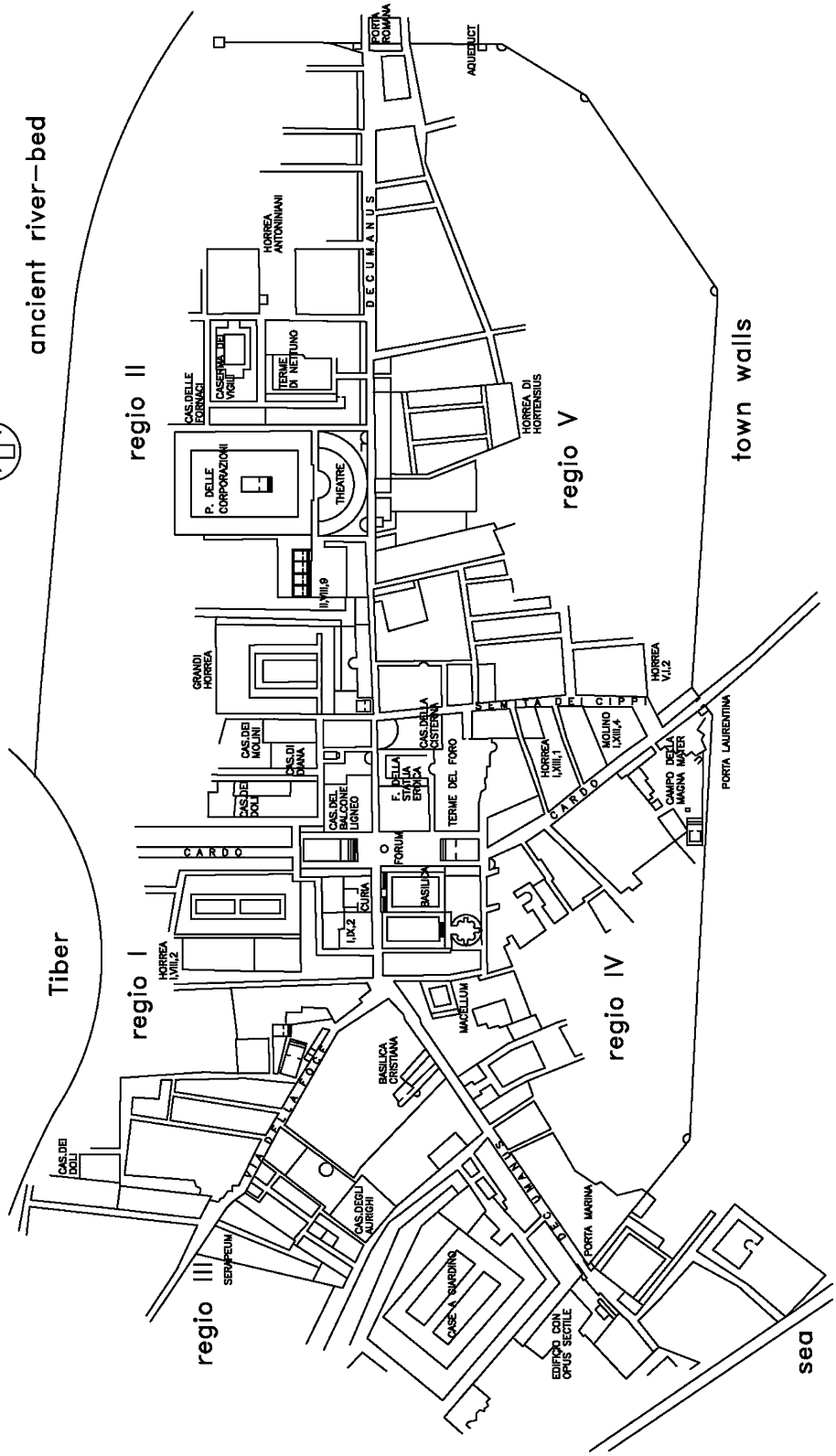

Ostia, Archaeology of, Fig. 1 Plan of the central excavated portions of Ostia, including the location of the late republican wall-circuit, the ancient course of the Tiber, and the ancient line of the seaboard. Adapted from Jan Theo Bakker, ostia-antica.org

Ostia, Archaeology of, Fig. 2 Remains of the monumental Forum Baths. ©Klaus Heese. All Rights Reserved

Ostia, Archaeology of, Fig. 3 A view of the *decumanus maximus*, facing west. To the right, structures from various dates of Ostia's history including the Baths of Neptune (second century CE), the heavily reconstructed theater (first century CE with later restorations), and the Oratory to St. Quiriacus (fourth/fifth century CE). ©Klaus Heese. All Rights Reserved

Ostia allowed some structures, such as the theater and certain temples, to remain throughout the centuries, renovating them without destroying them. Second, archaeologists and archaeological practice have combined to dictate what is seen and not seen at Ostia, leaving exposed the remains of earlier structures at lower stratigraphic levels next to the remains of much later structures.

Foundation to Early Imperial Period

Ostia's earliest extant structure is a sturdy, rectangular fortress wall constructed on the southern bank of the Tiber River mouth. Portions of the large tuff blocks were later incorporated into other structures of the city. The early walls enclosed a relatively small area (ca. 194 x 125.7 meters) with east-west and north-south roads that crossed through gates, giving the impression of a Roman military camp or castrum. Today these roads are known, respectively, as the *decumanus maximus* and the *cardo*. This fortification of Ostia took place sometime in the late fourth or early third century BCE (Martin 1996). Around this period, other nearby coastal settlements such as Lavinium

and Ardea were also fortified, forming a defensive network along the coast (Jaia and Molinari 2011).

Archaeological evidence for Ostia's development during the third and second centuries BCE is scarce. During the wars with Carthage in the third century BCE, Rome developed into a major naval power. During this time, construction at Ostia expanded beyond the castrum walls (Mar 1991). This was due to a population increase, possibly related to Ostia's new role as the assembly base for fleets during the First Punic War and perhaps also connected to the increasing population of Rome.

Two events recorded in Livy suggest that by the end of the third century BCE, Ostia had also begun to serve as a port for receiving and distributing grain (Livy *Ab Urbe Condita* 22.37.1-6; 25.20.3). Ostia lacks a natural harbor, and grain storage facilities from this period have not survived in the archaeological record. However, geophysical survey (Heinzelmann and Martin 2002) and sedimentary cores (Goiran et al. 2014) attest to the presence of a human-made river harbor ca. 600 m west of the castrum walls. The harbor, which was deep enough to accommodate large ships, was constructed at some point during the fourth to second centuries BCE (Goiran et al. 2014).

Ostia grew primarily as a port in the second century BCE and, along with the superior harbor of Puteoli to the south, received grain from Sicily, Sardinia, and North Africa. In the first quarter of the first century BCE, there is substantial evidence for the construction of elite houses (domus) along the *decumanus maximus* west of the castrum gate. The temples in the Area Sacra, including the Temple of Hercules, were also constructed at this time. A new circuit wall was built in order to protect the newly expanded city. The earliest tombs appear outside the Porta Romana gate around 50 BCE (Heinzelmann 2000); it is unclear where Ostians buried their dead prior to this time. A single, tomb-like structure known as the "Monumento Repubblicano" located on the *decumanus* across from the theater presents a possible clue, but scholars have debated over the date of its construction (second or first century BCE?) and even its original function (Sole 2002).

At the end of the first century BCE, Ostia began to flourish under the attention of the Roman elite. Marcus Agrippa paid for the construction of a monumental theater in the first century BCE (Fig. 4). In the first decades of the Common Era, a lavish temple to Roma and Augustus was built in the center of the castrum in the area that would become the Imperial Forum. This was probably the first structure at Ostia to be fitted with marble.

The Creation of Portus

Even as Ostia grew as Rome's maritime façade, the river port was incapable of bearing the increasing burden of imports, especially the grain for the *annona* (government-controlled wheat distribution). In 42 CE, the emperor Claudius undertook the construction of an artificial harbor 4 km. north of Ostia and the Tiber.

The port encompassed an area of 69 hectares, sufficient to welcome the steady stream of merchant vessels loaded with grain and other goods from all over the world. Yet the harbor of Claudius was not completely successful. Tacitus reports that in 62 CE, a storm arose that destroyed 200 ships in the harbor (*Annales* 15.18.3). In 103 CE, Trajan constructed an internal harbor in the form of a hexagonal basin enclosing an area of 39 hectares. A series of canals connected it to the Claudian harbor, the Tiber, and the sea. These harbor facilities and the surrounding community were called Portus (Keay 2005).

Key Issues: The Architectural Revolution of the Second Century

With the harbor facilities at Portus established, Ostia began to flourish, and its population expanded significantly. This necessitated a substantial rebuilding of the city in the second century CE. We know from inscriptions that the emperor Hadrian took a particular interest in the rebuilding of Ostia, but Trajan and Antoninus Pius also funded building projects (Meiggs 1973). The primary building material of this period was fire-baked bricks, replacing the tuff blocks of the previous two centuries. Throughout much of the city, the level of the ground was raised approximately 1 m, and concrete foundations were built

Ostia, Archaeology of, Fig. 4 The theater and portico. ©Klaus Heese. All Rights Reserved

Ostia, Archaeology of, Fig. 5 Hadrianic Capitolium in the forum. ©Brent Nongbri. All Rights Reserved

to support the massive brick structures, including a monumental capitolium in the forum, multistory apartment complexes, and new grain storage facilities (Fig. 5). To ensure the safety of the grain and the city's many inhabitants, firefighters' barracks were established. A number of bath complexes were established and others renovated. Many of the famous black and white mosaics typical of Ostia were installed in this period (Fig. 6). The theater and its portico were enlarged. This "architectural revolution" obliterated large swaths of the earlier city. Much of the remains that can be seen today belong to the second century or later.

Key Issues: Third Century to Abandonment

Ostia's prosperity began to wane in the third century as Portus grew to prominence. Yet even into the fourth century, late antique homes replete with fountains, marble inlays, frescoes, and statues were built in the northwest region of Ostia

Ostia, Archaeology of, Fig. 6 Detail of a mosaic in the Baths of Neptune. ©Klaus Heese. All Rights Reserved

Ostia, Archaeology of, Fig. 7 The marble decoration from the late antique "Opus Sectile House" at Ostia, reconstructed in the Museo Nazionale dell'Alto Medioevo in Rome. ©Brent Nongbri. All Rights Reserved

(Fig. 7). This flourishing of late antique architecture can be seen as opportunistic, profiting from receding spatial pressure and from the partial abandonment of parts of the city. Christian and Jewish architecture also begin to appear in this period. The Jewish synagogue was renovated with new mosaic floors in the mid-to-late fourth century (Nongbri 2015; Williams 2014), and the nearby Christian basilica, erected by Constantine I, was also renovated in the fourth and fifth centuries (Martin et al. 2002). The Goths and Vandals invaded in the fifth and sixth centuries. Although the population of the city slowly declined and structures fell into disrepair, the city was not entirely abandoned until the ninth century CE (Boin 2013).

Key Issues: The Preservation, Looting, and Excavation of Ostia

Natural forces influenced the initial preservation of Ostia and Portus. In the ninth century, the Imperial harbors silted up entirely, resulting in

malarial marshes. While the threat of malaria prevented reoccupation of the cities, both sites became a source of building material by the eleventh century, and valuable marbles were burned in lime kilns. Beginning in the fifteenth century, the sites became a source of building material for Rome, and nobility from all over Europe collected statues and inscriptions.

Meanwhile, the coastline gradually retreated westward, and a flood in 1557 altered the course of the Tiber near the site. Today, Ostia lies some 3.5 km from the seashore.

Haphazard archaeological excavations were carried out in the eighteenth and nineteenth centuries. The nineteenth century excavations contributed significantly to the Papal collections, but provenance and topography were not a priority, and few records were kept. In 1870, with the foundation of a new Italian government, Roman archaeologists such as Rodolfo Lanciani began to make records of the excavations. Regular short reports began to be published in official Italian government publications such as the *Notizie degli Scavi di Antichità*.

Dante Vaglieri, head of excavations from 1907 to 1913, systematized excavation methods. His major contribution was the establishment of meticulous documentation, a practice that subsequent directors carried out with varying degrees of commitment. Documentation came to a halt almost entirely in 1938, when Mussolini ordered extensive excavation and restoration of Ostia in preparation for a major fascist exhibition. In the years between 1938 and 1942, the excavated area of Ostia more than doubled in size, but the speed of the work prohibited more than cursory photography and documentation. This, combined with the looting and treasure hunting of the Renaissance through the nineteenth century, has resulted in massive gaps in our knowledge of Ostia for all periods. Postwar excavation and inquiries resumed the tradition of recording and photography, and scholars began to produce important volumes on aspects of Ostia's excavations, beginning with *Scavi di Ostia I: Topografia Generale* (1953).

Future Directions

Geophysical surveys carried out in the environs of Ostia demonstrate that massive areas of the city remain unexcavated. Of particular note is the vast area immediately to the south of the excavated areas. A survey completed in the 1990s revealed that this area was heavily populated with structures, including a Christian basilica and a massive villa (Martin et al. 2002). Surveys carried out immediately to the north of the Tiber in the 2000s revealed that this area also contained structures, largely unidentified. However, a clear line of a circuit wall around this northern extent of Ostia seems to match up with the line of the late Republican circuit wall to the south. This raises questions about whether Ostia's buildings occupied the north side of the Tiber in the first century BCE.

The data provided by geophysical survey do not include a chronological component; therefore small trenches excavated in specific areas of interest are necessary. This was carried out in the 1990s survey; much remains to be done in the area north of the Tiber. The analysis of core samples from drillings has also been crucial in understanding the geological conditions in which Ostia was founded and was developed.

In recent years, much archaeological enquiry has relied on the examination of archival records and the cleaning or clearing of previously excavated areas. The importance of this work cannot be overstated, as much of the excavated area of Ostia has either remained unpublished or would greatly benefit from reexamination in light of modern discoveries and with the use of new technology and typologies.

Ostia's ruins (bricks, mosaics, paintings, etc.) are constantly being altered or damaged by visitors, the climate, plant life, and modern restorations. This is difficult to prevent, and therefore a crucial task is to produce detailed descriptions and catalogues of all excavated and visible remains. A couple of blocks have been recorded in this way, but much work remains (Boersma et al. 1985; Stöger 2011).

Many thousands of graffiti scratched into the walls of Ostia remain unpublished and understudied. Thousands of stone inscriptional fragments are also unpublished and difficult to access. If Ostia is to remain a serious subject of study for current and future generations of archaeologists, these materials must be made available to scholars willing to study them and publish them in a timely manner. Similarly, the entire holdings of the photographic archive and the excavation archives must be digitized and made available online.

Cross-References

- ▶ Architecture, Roman
- ▶ Domestic Architecture, Roman
- ▶ Economy, Roman
- ▶ Lanciani, Rodolfo
- ▶ Urban Planning, Roman

References

Boersma, J.S., Th.L. Heres, H.A.G. Brijder, J.J. Feye, M. Gnade, and S.L. Wynia. 1985. *Amoenissima Civitas. Block Vii at Ostia: Description and analysis of its visible remains*. Assen: Van Gorcum.

Boin, D. 2013. *Ostia in late antiquity*. Cambridge: Cambridge University Press.

Goiran, J.P., S. Ferréol, I. Mazzini, J.P. Bravard, E. Pleuger, C. Vittori, G. Boetto, et al. 2014. Geoarchaeology confirms location of the ancient harbor basin of Ostia (Italy). *Journal of Archaeological Science* 41: 389–398.

Heinzelmann, M. 2000. *Die Nekropolen von Ostia: Untersuchungen zu den Gräberstrassen vor der Porta Romana und an der Via Laurentina*. München: Verlag Dr. Friedrich Pfeil.

Heinzelmann, M., and A. Martin. 2002. River port, *navalia* and harbour temple at Ostia: New results of a DAI-AAR project. *Journal of Roman Archaeology* 15: 5–19.

Jaia, A., and M.C. Molinari. 2011. Il Santuario di *Sol Indiges* e il sistema di controllo della costa laziale nel III sec. a.C. In *Lazio e Sabina*, ed. Giuseppina Ghini and Zaccaria Mari. Roma: Quasar.

Keay, S. 2005. *Portus: An archaeological survey of the port of imperial Rome*. (Archaeological Monographs of the British School at Rome; 15). London: British School at Rome.

Mar, R. 1991. La Formazione dello Spazio Urbano nella Città di Ostia. *Mitteilungen des Deutschen Archaeologischen Instituts Roemische Abteilung* 98: 81–109.

Martin, A. 1996. Un saggio sulle mura del *castrum* di Ostia (Reg. I, ins.x, 3). In *'Roman Ostia' revisited. Archaeological and historical papers in memory of Russell Meiggs*, ed. A. Gallina Zevi and Amanda Claridge, 19–38. London: British School at Rome.

Martin, A., M. Heinzelmann, E. De Sena, and M.G. Granino. 2002. The urbanistic project on the previously unexcavated areas of Ostia (DAI-AAR 1996-2001). *Memoirs of the American Academy in Rome* 47: 259–304.

Nongbri, B. 2015. Archival research on the excavation of the synagogue at Ostia: A preliminary report. *Journal for the Study of Judaism* 46: 366–402.

Sole, L. 2002. Monumenti repubblicani di Ostia Antica. *Archeologia Classica* 53: 137–186.

Stöger, H. 2011. Rethinking Ostia: A spatial enquiry into the urban society of Rome's imperial port-town. In *Archaeological studies Leiden University*, vol. 24. Amsterdam: Leiden University Press.

Williams, D. 2014. Digging in the archives: A late roman coin assemblage from the synagogue at ancient Ostia (Italy). *American Journal of Numismatics* 26: 245–273.

Further Reading

Calza, G., G. Becatti, I. Gismondi, G. de Angelis d'Ossat, and H. Bloch. 1953. *Scavi di Ostia I: Topografia Generale*. Roma: La Libreria dello Stato.

Meiggs, R. 1973. *Roman Ostia*. 2nd ed. Oxford: Clarendon Press.

Pavolini, C. 2006. *Ostia*. Guide archeologiche Laterza. Roma-Bari: Gius. Laterza & Figli.

Zevi, A.G., and A. Claridge, eds. 1996. *'Roman Ostia' revisited. Archaeological and historical papers in memory of Russell Meiggs*. London: British School at Rome.

Ottoman Archaeology: Localizing the Imperial

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Introduction

Ottoman archaeology is the youngest area of specialization within Islamic archaeology. Tied most closely to textual history and owing its nascence,

in part, to historians' investigations of Ottoman-era archival sources, the study of this ideologically charged era has been slow to capture the attention of archaeologists for a variety of reasons. Chronologically framed by the cultural-historical "golden ages" of Late Antiquity and the great empires of the Middle Ages, on the one hand, and the modern era, on the other, strata dating to the Ottoman period were once casually removed, either excavated without the same concern for detail as earlier strata or, in the worst case, bulldozed to reach levels of greater interest below. While these practices fortunately represent a bygone era of disciplinary history, underlying the general lack of scholarly interest in Ottoman archaeology before the 1990s are negative images of the era held by scholars for many years – the Ottoman era as the "Dark Ages," a period of decline and decay, centuries of devastation of landscapes, and abandonment of village life – and a general "aversion to the modern."

Ambiguities about the legal status of Ottoman-era sites have been a further deterrent to archaeological inquiry. Local departments of antiquities have traditionally relegated study of their Ottoman heritage to the realm of ethnography and legally defined the material culture of the era as "antiques" rather than "antiquities," with the preservation of period monuments falling under the jurisdiction of Ministries of Tourism. According to Jordan's 2005 Law of Urban and Architectural Heritage, for example, no structure postdating 1750 can be considered an antiquity, and the 1988 Antiquities Law No. 21 pertains only to moveable and immoveable objects made or modified before that date. Similarly, Israeli antiquities law, which also covers the West Bank, does not consider post-seventeenth-century sites and artifacts to be "archaeological."

The comparative youth of the Ottoman period (the Empire officially ending only in 1923) presents an array of challenges to practicing Ottoman archaeology that go beyond the legal. Stratigraphically, the most recent of Ottoman layers are located on the surface or in very shallow deposits below it. The tendency for Late Ottoman sites to be occupied to modern times mitigates against their excavation; modern development erases the trace of others. Furthermore, it is not uncommon for buildings constructed during the Ottoman period – sixteenth-century steam baths in Budapest and nineteenth-century farmhouses in Jordan, for example – to continue to be used or occupied. For these reasons, among others, there have been few systematic excavations of Ottoman-era sites, urban or rural. Archaeological surveys are challenged by the nature of Ottoman-era artifact assemblages, namely, the inability to identify and date the coarse wares that dominate surface collection. The nature of Ottoman-era surface finds, outside of pottery, present special problems: some of the most reliable and readily identifiable chronological markers of the period – coins and tobacco pipes (namely, *chibouk* bowls) – are picked off the ground through illicit collection and rarely make their appearance in archaeologists' survey reports. Dating rural sites is further complicated by the general paucity of coins and dated inscriptions outside urban centers.

These characteristics of Ottoman-era artifacts and sites aside the nature of the Ottoman Empire make archaeological investigations of it extremely difficult. Two centuries of extensive conquest, institutionalization of the millet system that lent autonomy to minority communities, and a move towards decentralization of the administration in the seventeenth century created a cultural, religious, ethnic, and geographical mosaic that extended across the Mediterranean. This rich diversity resulted in distinctive regionalisms expressed most strikingly in the material record and physical landscape: common wares, architectural styles, village structure, and land use differed markedly from one region to another, complicating interregional comparisons of the archaeological record. Moreover, the physical scale of the Empire means that scholars must either specialize in one small region or learn a variety of languages in order to work in different countries and access the local archives (a necessity of Ottoman archaeology today). The Ottoman Empire was as long-lived – spanning over six centuries – as it was physically vast. Over the course of this period different regions of Europe, the Mediterranean, and the Middle East came alternatively under or freed themselves from Ottoman control, their

material culture changed through adoption and adaptation in the process.

The textual resources of the period, on the other hand, present vast opportunities for socio-economic analysis of the archaeological record that is simply not available for the study of earlier Islamic societies. The Ottoman state was a bureaucratic behemoth: state ministries maintained detailed documentation on everything from taxation to garrison payrolls, creating multiple copies of the same for distribution throughout the Empire. The sheer quantity of these documents, their wide distribution, and the continued use of some of the most recent into modern times (such as registration of right to title to land) has guaranteed their preservation for contemporary study. The kinds of contemporary texts available include tax registers (*tapu defter*s), endowment documents (*vekfiye*s), fixed-price registers (*narh defter*s), Ottoman yearbooks (*salnameh*s), chronicles, garrison rolls, diplomatic documents and records of European consulates, monastic and church records and correspondence, travelers' accounts, Venetian cadastral maps, Late Ottoman-era land registers (post-Tanzimat), and memoirs. Such a vast and varied corpus of documents not only presents great potential for an enriched archaeological analysis but also requires from archaeologists responsible incorporation of textual analysis into their own research.

Definition

In the same sense that "Islamic archaeology" is not limited to the study of Muslim societies, the term Ottoman archaeology refers not to the study of a political entity but to the societies that once formed part of it. The fact that the borders of the Ottoman Empire were in constant flux for the six centuries of its existence means that what is chronologically "Ottoman" differs from one region to another. The Ottoman era for Bilād al-Shām, for example, lasted four centuries (1516–1918), whereas in Hungary, it survived a mere 150 years (1541–1699); Turkey's Ottoman heritage harkens back to the turn of the fourteenth century. Not all provinces, moreover, were equally incorporated into the Empire – many regions of Hungary and Greece, for example, remained outside Ottoman control. In spite of calls for an "archaeology of empire" (Baram and Carroll 2000: 12–13), "Ottoman archaeology" today generally denotes the study of a particular region, during the period that it was under Ottoman control.

The use of other terms to denote this chronological period reflects uniquely local perspectives on the period and regional developments in the discipline of archaeology as a whole. For example, chronologically the "postmedieval" period in European scholarship is roughly the archaeological equivalent of the historian's "Early Modern" era; the former, however, emphasizes the cultural break with the Middle Ages and general cultural and artistic decline. The Greek "post-Byzantine" era serves a similar purpose: it is a convenient term to denote the vast, anomalous period between the Golden Age of Byzantine hegemony and the birth of the Greek national state. A greater chronological precision is to be found with the "Ottoman-Turkish" era (*hódoltság kori régészet*) of Hungarian archaeologists, which is limited to the period of Ottoman occupation, and to only those regions directly controlled by the Ottoman state. An alternative to these is the "Late Islamic" nomenclature of archaeologists working in southern Bilād al-Shām. Recognizing that cultures do not routinely change with political transitions, this term roughly coincides with the European Early Modern era and includes the latter years of Mamluk and the duration of Ottoman control of the region.

Approaches to Ottoman Field Archaeology

Landscape Archaeology

The majority of large-scale, Ottoman projects adopt some kind of landscape approach. The discipline naturally lends itself to the study of the rural landscape, as continuity of settlement to modern times renders excavation difficult, and provincial textual sources of the period deal largely with land and the rural economy. There is an undeniable local focus to these projects; localized traditions in architecture, handicrafts, and

land use and tenure loom large in the survey reports. Landscape approaches are also necessarily multidisciplinary and rely heavily on textual analysis (namely, of tax registers and travelers' accounts), oral history, and geographical methods. Archaeological surveys in the Troodos Mountains of central Cyprus have adopted a landscape approach, combined with relevant textual analysis, identifying a range of different rural sites and human activities within the landscape in the process (Given et al. 2003). Likewise, in consultation with Venetian and Ottoman archives, intensive surface survey in the Pylos region of southwestern Greece has produced a social-economic map of the region for the late seventeenth and early eighteenth centuries (Zarinebaf et al. 2005; Davis and Davies 2007).

Landscape projects such as these rely heavily on Ottoman tax registers (*tapu defterleri*), which describe a fiscal landscape, however idealized, for the region. In combination with archaeological survey, the registers can be guides to reconstructing a peopled landscape of the period, with its great variety of settlement and land use types. The *defter*s, for example, account for settlements of different scale and function, as well as "non-settlements," such as the *mazra'ah*s (cultivated lands with no associated settlement, or seasonal settlements) and sites referred to as *khali* ("empty," or abandoned, villages) in southern Syria. The specialized terminology used in these and other Ottoman records suggests a refined understanding of the rural landscape and rural society by officialdom; archaeologists, however, have yet to fully tap these sources in interpreting the physical and functional variety of the landscapes they survey. Locating and investigating abandoned villages and tracing the movements of migrant minority groups, which are growing concerns of Ottoman landscape projects, are two areas of inquiry that have benefited from reference to such archival sources (Grivaud 1998; Sutton 2000; Davis and Davies 2007).

Increasingly such landscape projects have been turning to environmental history as a mode of inquiry about agricultural history, climate change, and landscape transformation. In an effort to better understand the pressures on villages that create the settlement cycles suggested by the archaeological record, environmental-oriented projects include extensive textual research and geomorphological and paleobotanical analyses as core components of their research structure. The Troodos Archaeological and Environmental Survey Project, to cite one example, makes use of archaeological survey data on landscape and textual data on landholding to investigate the development of social organization in the Cypriot countryside during the centuries of Ottoman hegemony there (Given and Hadjianastasis 2010). The commercialization of agriculture in Cyprus in the eighteenth and nineteenth centuries created new landed elites, spatially impacted village structure, changed consumption patterns, and transformed land use in ways that have correlates in the archaeological record. What constitutes a rural "community" in this period is expressed in surprising variety across the Cypriot landscape.

Questions about settlement cycles and landscape transformation inform environmental projects in Jordan as well. The Northern Jordan Project is a case in point. Launched in 2003 originally to investigate the phenomenon of settlement decline in the Late Islamic period in a regionally comparative fashion, the project has aggressively mined archival sources and broadened its base of environmental analysis to explore the dialectical relationships among settlement, land use, and environmental change (Walker et al. 2007). Ottoman-era archaeological research throughout Jordan, Israel, and the West Bank continues to focus on the ways the Ottoman state transformed the rural landscape and agricultural and pastoral communities of the region.

Historical Archaeology

Because of the wealth and diversity of documentary sources of the period, Ottoman archaeology is progressively becoming a text-based discipline. Increasingly more regional projects, in particular, have included on-staff professional historians with the language skills and expertise to penetrate the textual sources housed in the Ottoman archives. Ottoman archival sources most relevant to archaeologists relate to land use and agricultural and pastoral productivity (in tax and

Tanzimat-era property registers), settlement longevity and population migration (in tax registers and censuses), and the function of castles (in military rolls and ration records). Among the themes explored in hybrid textual-archaeological research are the emergence of new landed elites and the spatial world they create (Given and Hadjianastasis 2010); the physical transformation of the rural landscape by imperial policies (Davis and Davies 2007; Walker et al. 2007); the daily lives of Janissaries (Gerelyes and Kovács 2003; Hinds and Sakkout 1986; Hinds and Ménage 1991; Yenişehirlioğlu 2005: 260–261); local histories of settlement, land use, and toponymy (Zarinebaf et al. 2005); demography, migration, and the spatial variation in settlement by minorities (Davis and Davies 2007: 5); and disappearing villages and "fluid landscapes" (Grivaud 1998; Sutton 2000).

Imperial Archaeology

Given the distinctive regionalisms in culture, governance, and land use throughout the Ottoman territories, it is natural that the discipline of Ottoman archaeology has tended towards provincial specializations. In an effort to rise above the conceptual and operational divides separating specialists of the Balkans, Anatolia, and the Arab world, an imperial approach has developed, linking "local and imperial histories in dynamic relationships" (Baram and Carroll 2000: 12). The Ottoman Empire was one of the world's great empires and, as such, readily participated in global trade and markets, was impacted by such international phenomena as epidemics and disease control, and was transformed by large-scale migration and the new modes of transportation that facilitated it. The imperial approach is phenomenological and process oriented and encourages a multidisciplinary, cross-cultural perspective. Related to this approach are frontier studies that, by incorporating historical and anthropological methods, examine the dialectical and ever-changing relationships between local society and the state; consumption studies describing the material cultures and practices associated with newly introduced commodities, such as tobacco, coffee, tea, and fruit drinks (Baram and Carroll 2000; Gabrieli 2004; François 2008); interregional and comparative ceramic analyses documenting the distribution of export wares and local production and exchange of common wares (Walker 2009); and studies of the political economies and food systems of local societies transformed through incorporation into the Empire (Baram and Carroll 2000; Gabrieli 2004).

Historical Background

European Mainland

Hungary

Located in the heart of Europe, large parts of today's Hungary came under Ottoman control with the fall of Buda in 1541, the Ottomans ceding this territory a century and a half later with the signing of the Treaty of Karlowitz in 1699. Hungary provides a special perspective on the Ottoman era, as it formed at this time the Ottomans' western frontier – the border constantly in flux – and the state alternatively exercising authority in some regions of Hungary through garrisons of Janissaries or granting autonomy to others. The material culture of "Ottoman-Turkish" sites in the country reflects this diversity. The demographic landscape was, moreover, markedly transformed, with the emptying out of the plains (the *puszta*) and creation of "mega villages" (*mezővárosok*), as peasants fled Ottoman forces and clustered on larger, self-defending settlements; the imposition of the *devşirme* to recruit Janissaries from local villages; and the migrations of entire ethnic groups in and out of the region, the direct and indirect results of Ottoman settlement and military policies.

Hungarian archaeology has the longest history of excavations of Ottoman sites, and the country has some of the best and most diverse collections of Ottoman artifacts of the former Empire. It also has some of the best preservation of architectural remains outside Anatolia, the result of government policies to preserve and restore these monuments. The study of Ottoman archaeology in Hungary has its roots in written descriptions and

drawings of Ottoman architecture in the seventeenth century, immediately following the withdrawal of Ottoman forces. In the late nineteenth and early twentieth centuries, attempts to preserve monuments in Pécs and Buda led to salvage projects yielding important material evidence and chronological data. It was not until the interwar era, however, that a scholarly discipline emerged, under the influence of local ethnography and a growing interest in the applied arts. Fieldwork at Gazikasim Paşa Cami in Pécs was among the earliest of the systematic excavations; the excavation of rural, Ottoman-era settlements was driven by the search for the historical roots of traditional peasant houses and reflected the populist leanings of many scholars, writers, and artists of the 1920s and 1930s. The preoccupation with monument preservation that characterizes Ottoman archaeology through eastern-central Europe and the Balkans continued unabated through the 1970s: by 1975, 710 Ottoman structures had been recorded and registered, and these in a wide variety of forms: mosques, madrasas, schools, caravanserais, steam and thermal baths (Fig. 1), gunpowder magazines, forts, cemeteries, and tekkes (Gerelyes and Kovács 2003: 8). Such inventories preserved information about many structures that had since been demolished.

The questions asked of the archaeological record by Hungarian Ottoman specialists since the 1970s are largely informed by nationalist concerns. The phenomena of "disappearing villages" and internal migration have become research objectives in themselves, with research projects designed to identify ethnic groups in the archaeological record; distinguish "traditional" Hungarian material culture; and locate the settlements "lost" during the Ottoman wars and determine when they were abandoned, with recourse to the Ottoman *defter*s. Among the most notable in these regards are the excavations of the "lost" villages of Szentkirály in the southern Great Plain and market towns (*oppidum*s) Ete and Babócsa (with its cemetery) in southern Transdanubia, study of the Vlach coarse wares from the Békató graves, and analysis of the seventeenth-century Battonya jewelry hoard. In an effort to better understand the ways the Ottomans came to physically dominate the land, excavations have also focused on the castles of Szigetvár, Esztergom, and Visegrád, as well as the numerous palisades and their barracks (studied in conjunction with the military pay rolls

Ottoman Archaeology: Localizing the Imperial, Fig. 1 Király fürdő (Ottoman *hammam*) in Budapest, Hungary, sixteenth century

preserved in Ottoman archives), through which the hinterland was subdued.

Greece

Much of Greece came under Ottoman rule in the mid-fifteenth century and, with the exception of a brief period of Venetian control of southern Greece during the 1680s and 1690s, remained an Ottoman province until the 1821 War of Independence. Changes in land use and tenure and population migrations left traces on the Greek landscape; these "footprints" of Ottoman policy have become a focus of many regional archaeological projects in the country since the 1990s. Such projects have stood out for their systematic incorporation of archival studies into their larger research plans. The pioneering project in this regard was Cambridge's Boeotia Project, launched in the late 1970s, which has established high standards for studying settlement history in conjunction with documentary sources. The Ottoman tax registers and cadastral surveys have been invaluable in this regard for many subsequent projects in documenting settlement trends and describing the agricultural economy on a regional scale (Zarinebaf et al. 2005; Davis and Davies 2007: 5). The Ottoman *defter*s have provided a chronological anchor for the changes in settlement and land use suggested by archaeological surveys, and they have been an invaluable resource for the landscape and historical-based approaches described earlier in this entry.

Eastern Mediterranean

Cyprus

Cyprus passed from Venetian to Ottoman control in 1517 and remained under Ottoman suzerainty until 1878, when the island was "rented" to Britain under the terms of the Treaty of Berlin (Fig. 2). The seventeenth and eighteenth centuries witnessed important changes in local land use and demographics, with the establishment of *çiftlik*s, through land reclamation and requisitioning of land from indebted farmers; numerous tax rebellions; and a demonstrable drop in population. A century later, the large landed estates in Cyprus were producing wheat for export to Europe and Turkey, creating scarcities of the same commodity at home.

Interest in the physical correlates of these trends has guided the development of Ottoman archaeology in Cyprus. Regional surveys since the 1990s have been concerned with identifying the ways in which the Cypriot landscape was transformed by three centuries of Ottoman rule

Ottoman Archaeology: Localizing the Imperial, Fig. 2 Paphos fort, Cyprus, Byzantine structure refortified by the Ottomans. (Courtesy of Ruth Smadar Gabrieli)

Ottoman Archaeology: Localizing the Imperial, Fig. 3 Athassi, Cyprus, small estate in the Lagoudhera valley, Cyprus that appears in sixteenth-century village lists. Threshing floor behind the village. (Courtesy of Michael Given, Troodos Archaeological and Environmental Survey Project)

and to distinguish medieval from postmedieval occupation, an objective hindered by the nature of postmedieval coarse wares. The first of these, the Sydney Cyprus Survey Project, which was in the field from 1992 to 1997, was designed to document landscape development in the northern Troodos from the medieval through modern periods. Its research design was a sophisticated one and set high standards for future surveys, combining traditional archaeological techniques with soil science, archival research, geobotanical and archaeometallurgical analyses, architectural surveys, and ethnography into a common GIS-based database (Given et al. 2003). Following its lead, the Troodos Archaeological and Environmental Survey Project investigated settlement, land use, and resource exploitation in the Ottoman era in the northern Troodos foothills from 2000 to 2004 (Fig. 3). This project has been most effective at identifying a wide range of rural sites and human activities in the Cypriot countryside as well as documenting the seasonal and long-term movements of peoples in that landscape (Given and Hadjianastasis 2010). More recently, the French project "La constitution des paysages dans l'Orient médiévales" has applied a multidisciplinary survey and excavation design to a single site and its hinterland – Potamia-Agios Sozomenos – documenting changes in settlement and land use at this former manor house from the medieval to Ottoman transition. It is one of the few projects in Cyprus to incorporate textual analysis with excavation of a site of the later historical periods (Lécuyer et al. 2003).

Turkey

Anatolia was the homeland of the Ottoman sultans, Osman I having established there a state in 1299 that would survive for over six centuries. As Ottoman history in Anatolia differs from the other regions of the Empire, the development of Ottoman archaeology here has also followed a different trajectory, guided by the challenges of early excavations of urban sites (Athenian Agora, Corinth, Byzantine Great Palace in Istanbul, Sardis, and Ephesus), a focus on ceramic analysis, and a ready appreciation for and application of "defterology" (the study of the Ottoman tax registers, largely located in Turkish archives). In Turkey today, the emphasis of Ottoman archaeology remains the excavation of urban and industrial sites, in an effort to better date and understand the distribution of locally produced pottery.

Interest in Ottoman sites in Turkey has remained rather limited and has been focused largely on ceramic chronology. The generally poor stratigraphy of urban sites, such as Saraçhane in Istanbul, and paucity of coins made reliance on the dating capacity of Ottoman fine wares that much more important (Hayes 1992). The

Ottoman-era sites that have been excavated since the 1980s have been largely salvage projects (Saraçhane) or targeted explorations of industrial sites (the Iznik, Eyüp, and Takfur palace kilns; Demirköy foundry). Excavations at Karacahisar fortress and of the town of Bilecik are among the few systematic and long-term investigations of nonurban, nonindustrial sites (Yenişehirlioğlu 2005: 254–260).

The Arab World

The Mamluk Empire, which encompassed much of the Eastern Mediterranean and Red Sea coast since the mid-thirteenth century, fell to Ottoman forces during campaigns in Syria in 1516 and Egypt in 1517. For the next 500 years, these Arab lands comprised the eastern frontier of the Ottoman Empire. In the sixteenth century, the state built fortresses along the *hajj* route from Damascus to Mecca, manned these forts with standing garrisons, and instituted a taxation system, in Bilād al-Shām largely based on Mamluk precedents, which systematized the incorporation of towns, villages, and Bedouin tribes into the state structure. Ottoman rule in its Arab lands, however, was inconsistent, and the strategic role of the eastern frontier quickly faded by the seventeenth century, when its forces were needed on other fronts. Much administration fell to local dignitaries and tax farmers, many of the garrison forces were removed, and the state was unable to (or uninterested in) collecting taxes from large parts of southern Bilād al-Shām until the Tanzimat reforms of the late nineteenth century. The region of Transjordan, for example, maintained its autonomy, free from the presence of tax collectors or governmental officials of any form, for a good two centuries.

The kinds of Ottoman archaeology that have emerged in the modern countries carved out of this territory reflect these inconsistencies of Ottoman rule. In today's Syria, systematic archaeological exploration of the country's Ottoman heritage is best illustrated by the excavations of the two important symbols of Ottoman rule: the Damascus and Aleppo citadels. While the Damascus excavations have revealed a continuous stratigraphic record, allowing for construction of a ceramic chronological sequence spanning the medieval through Ottoman periods (François 2008), those in Aleppo have focused on the remains of house foundations dating to the seventeenth century, a period for which domestic architecture in the Levant is poorly known (Yenişehirlioğlu 2005: 263).

Interest in the highly politicized Ottoman period in Israel and the West Bank has evolved from salvage excavations, in the first case, and cultural heritage management, in the latter. The result has been a growing appreciation for the "local" in material culture and daily life as reflected in the archaeological record of this period. Excavations at Tell el-Hesi in the 1970s and 1980s marked a turning point in the archaeology of the region; the publications of this work have become a model for the excavation and publication of late historical burials and have generated interest in traditional burial practices (Eakins 1993). The increasing number of, largely salvage, excavations of rural sites by the Israel Antiquities Authority has expanded our knowledge about village society. Palestinian excavations at Ti'innik, Zir'in, and Tell Birzeit, largely in publication stage, have been informative about settlement history and the material culture of traditional Palestinian society during the transition to Ottoman rule.

Ottoman archaeology in Jordan is the most developed of all the former Arab territories. The overwhelming rural character of the country, its autonomy from the Ottoman state for much of this period, and a proven commitment to historic preservation among government authorities and domestic and foreign archaeologists are converging factors in the ways archaeological research on Ottoman Jordan has developed. Scholarly investigations of Ottoman Jordan have followed four different trajectories since the 1980s: studies of vernacular architecture, combining architectural, archaeological, and ethnographic approaches; investigations on traditional village structure and foodways; excavations of Ottoman garrisons and *hajj* forts; and multidisciplinary regional projects documenting long-term cycles in settlement expansion and abatement and corresponding changes in agriculture. Long-term excavations at

Ottoman Archaeology: Localizing the Imperial, Fig. 4 Historic village of Saham, Jordan with turn-of-the-twentieth-century farmhouses and caves used for occupation in the Late Ottoman period, Northern Jordan Project

Khirbet Faris, Tall Hisban, and Umm al-Jimal have focused on the Ottoman period at different points in their project history; the Northern Jordan Project, described above, was designed from the start to study village life during the late medieval and Ottoman periods on a regional level (Fig. 4).

Archaeological efforts in Egypt have been strikingly different. Outside of urban revitalization projects in the traditional neighborhood known as "Islamic Cairo," with its concentration of Ottoman-era grandee houses, mosques, madrasas, and fountains, and, of course, Muhammad Ali's constructions in the Cairo Citadel, specifically "Ottoman" projects in Egypt, are rare. The most important excavation of an Ottoman site in the country is that of Qasr Ibrim, the Nile garrison south of Aswan that served the Ottoman state from 1560 to 1812. This has been a very important project, as it was the first detailed study of a Janissary garrison (here housing Bosnian troops) and systematically incorporated local documentary analysis. Unlike archaeological projects in other countries that have made use of the archives of Istanbul and Ankara, this one has relied on its well-preserved collection of Turkish and Arabic texts, retrieved on site from the excavations, that describe in detail daily life in the garrison (Hinds and Sakkout 1986; Hinds and Ménage 1991).

Key Issues/Current Debates

The identification and chronology of local wares remain the greatest challenge to Ottoman archaeology. The study of Ottoman fine wares has been pivotal in dating local pottery in associated strata. Long-term American excavations in Greece – namely, that of the Athenian Agora during the 1930s and of Corinth during the 1960s – were seminal in raising an awareness of Ottoman export wares (Frantz 1942; MacKay 1967). More recent excavations in the Anatolian heartland have refined the chronology of the most widely distributed of them (Hayes 1992). Local coarse wares, which are the most common physical remnants of the period, have only recently become a focus of study on their own, and with the restricted production and distribution of glazed wares in many parts of the Ottoman Empire, the coarse wares are frequently the only evidence of settlement in the countryside. The result has been that in many regions of the former Empire, archaeological surveys have underestimated the extent of settlement of the period and exaggerated the degree of settlement decline, as Ottoman-era sites have been misidentified as medieval. The red-bodied coarse wares of Cyprus and the so-called Handmade Geometrically Painted Ware (HMGP) of southern Bilād al-Shām are the most problematic in this regard, as their production extends well into the twentieth century (Fig. 5; Gabrieli 2004; Walker 2009).

International Perspectives

Ever mindful of the legacy of the Ottoman Empire in living societies, the practice of Ottoman archaeology in the United States today tends towards a

Ottoman Archaeology: Localizing the Imperial, Fig. 5 HMGP juglet from excavations at Tall Hisban, Jordan, Field M, sixteenth-century domestic context

practical application of scholarship to local development and sustainability. This has led to such initiatives as Project Rainkeep (http://www.rainkeep.org/) and community-oriented efforts such as the Hisban Cultural Association (an NGO) and the Dhiban Excavation and Development and Umm al-Jimal Projects in Jordan; the shared heritage project at Akko in Israel; and the Islamic Cairo Historical Development Project in Egypt (associated with the American Research Center in Egypt). Multidisciplinary projects such as these are applauded locally for their commitment to community engagement and concern for economic and agricultural development.

Future Directions

For the archaeology of the Ottoman era to progress, more systematic excavations are needed. The refining of local ceramic typologies will be impossible without their retrieval from well-stratified, and datable, deposits. The ongoing commitment to regional, landscape projects is commendable and should continue, working the occasional excavation into what are essentially survey designs. The archaeologically informed textual analysis that has emerged in recent years is one of the most promising trends in fieldwork and should become a regular component of every archaeological project concerned with the later historical periods. A rigorous investigation of written sources does not mean the return to a disciplinary past, when texts determined archaeological strategies and scope. It offers, instead, new ways to understand patterns read in the archaeological record and opens new venues of inquiry in such poorly understood aspects of premodern Islamic society as pastoralism, technology, ecology, identity, and migration.

Cross-References

- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Archaeology: The World at 1800–1850
- ▶ Archival Research and Historical Archaeology
- ▶ Buildings, Archaeological Study of
- ▶ Buildings Archaeology
- ▶ Central–Eastern Europe: Historical Archaeology
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Clay Pipes in Historical Archaeology
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Contemporary Past, Archaeology of the
- ▶ Critical Historical Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Greater Syria: Islamic Archaeology
- ▶ Historical Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic and Maritime Archaeologies
- ▶ Islamic Archaeology
- ▶ Military Activity in Islamic Archaeology
- ▶ North Africa: Historical Archaeology
- ▶ Oral Sources and Oral History
- ▶ Orientalism: Islamic Archaeology and Its Colonial Context
- ▶ Ottoman Empire: Historical Archaeology
- ▶ Phytoliths in Islamic Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology

References

Baram, U., and L. Carroll, eds. 2000. *A historical archaeology of the Ottoman Empire: Breaking new ground*. New York: Kluwer Academic/Plenum Publishers.

Davis, S., and J. Davies, eds. 2007. *Between Venice and Istanbul: Colonial landscape in early modern Greece*. Hesperia Supplements 40. Princeton: American School of Classical Studies at Athens.

Eakins, J. 1993. *Tell el-Hesi: The Muslim cemetery in Fields V and VI/IX (Stratum II)*. Tell el-Hesi 5. Winona Lake: Eisenbrauns.

François, V. 2008. *Céramique de la citadelle de Damas. Époques mamelouke et ottomane*. Unpublished CDRom, Aix-en-Provence.

Frantz, A. 1942. Turkish pottery from the Agora. *Hesperia* 11 (1): 1–28.

Gabrieli, R. 2004. Under the surface: Decoration and shape in the coarse ware of medieval and post-medieval Cyprus. *Mediterranean Archaeology* 17: 287–298.

Gerelyes, I., and G. Kovács, eds. 2003. *Archaeology of the Ottoman period in Hungary*. Budapest: Hungarian National Museum.

Given, M., and M. Hadjianastasis. 2010. Landholding and landscape in Ottoman Cyprus. *Byzantine and Modern Greek Studies* 34 (1): 38–60.

Given, M., B. Knapp, and D. Coleman. 2003. *The Sydney Cyprus survey project: Social approaches to regional archaeological survey*. Los Angeles: University of California.

Grivaud, G. 1998. *Villages désertés à Chypre (fin XIIe – fin XIXe siècle)*. Nicosia: Archbishop Makarios III Foundation.

Hayes, J. 1992. *Excavations at Saraçhane in Istanbul, volume 2: The pottery*. Princeton: Princeton University Press.

Hinds, M., and V. Ménage. 1991. *Qasr Ibrim in the Ottoman period: Turkish and further Arabic documents*. London: Egypt Exploration Society.

Hinds, M., and H. Sakkout. 1986. *Arabic documents from the Ottoman period from Qasr Ibrim: Texts from excavations*. London: Egypt Exploration Society.

Lécuyer, N., G. Grivaud, D. Michaélidès, A. Nicolaïdès, C. Boutleven, L. Decock, B. Devillers, G. Guionova, E. Lead, L. Vallauri, S. Vondra, and M. Zdanowski. 2003. Potamia-Agios Sozomenos (Chypre): Potamia-Agios Sozomenos (Chypre). La constitution des paysages dans l'Orient médiévale. Rapport intermédiaire 2003. *Bulletin de correspondance hellénique* 127 (2): 574–577.

Mackay, T.S. 1967. More Byzantine and Frankish pottery from Corinth. *Hesperia* 36: 249–320.

Sutton, S., ed. 2000. *Contingent countryside: Settlement, economy, and land use in the southern Argolid since 1700*. Stanford: Stanford University Press.

Walker, B., ed. 2009. *Reflections of Empire: Archaeological and ethnographic studies on the pottery of the Ottoman Levant*. Boston: American Schools of Oriental Research.

Walker, B., E. Kenney, L. Carroll, L. Holzweg, S. Boulogne, and B. Lucke. 2007. The northern Jordan project 2006: Village life in Mamluk and Ottoman Hubras and Saham: A preliminary report. *Annual of the Department of Antiquities of Jordan* 51: 429–470.

Yenişehirlioğlu, F. 2005. L'Archéologie historique de l'empire ottoman: Bilan et perspectives. *Turcica* 37: 245–265.

Zarinebaf, F., J. Bennet, and J. Davis. 2005. *A historical and economic geography of Ottoman Greece: The southwestern Morea in the 18th century*. Athens: American School of Classical Studies at Athens.

Ottoman Empire: Historical Archaeology

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Introduction

The geographical scope and chronological span of the Ottoman Empire was huge (Fig. 1), making any assessment of its archaeology extremely challenging both because of its empirical complexity and because of the enduring political significance of its legacy. Throughout large parts of the Middle East, the Balkans and North Africa governments are still dealing with territorial, cultural, and legal issues dating back to the rule of the Ottoman sultans. In some cases such as the Israel/Palestine conflict, disputes arising out of the dissolution of the empire continue to have a worldwide impact.

Before discussing the historiography, current scope and future developments of Ottoman archaeology, it is worth briefly reviewing the accepted chronology and dimensions of the empire. The origins of the Ottoman dynasty date back to the thirteenth-century Anatolia, and Osman (?- c. 1324), its founding leader, is first mentioned in written sources from the year 1301. The fledgling Ottoman state was one of a number of small Turkic states which had established themselves between the Byzantine Empire in Western Anatolia and the Mongol Ilkhanids in the east.

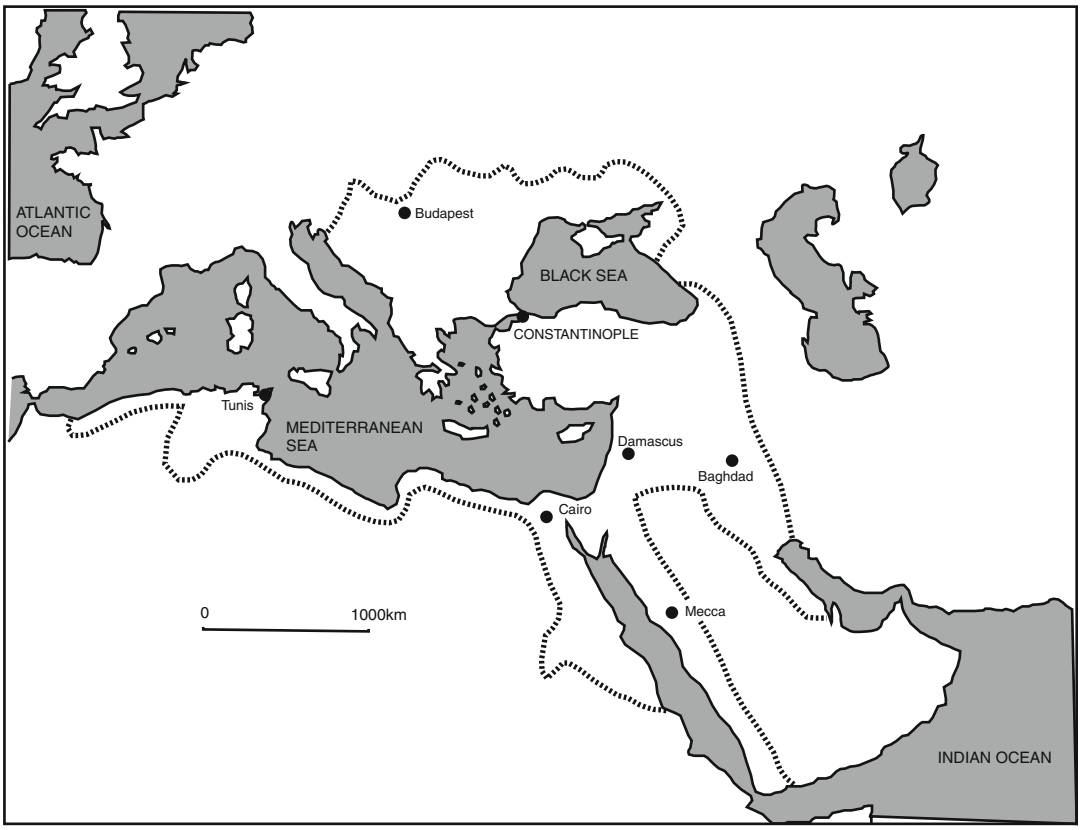

Ottoman Empire: Historical Archaeology, Fig. 1 Map showing geographical extent of the Ottoman Empire during the sixteenth and seventeenth centuries (A. Petersen)

During the 1300s the descendants of Osman began to build a state in the vicinity of Iznik in northwestern Anatolia, and the first archaeological evidence of this is a coin minted in the name of Osman's son Orhan (c. 1324–1362) and dated to 1326/7 (Finkel 2005: 7). Three important features of the Ottoman state can be detected even at this early stage: one is their relationship with the Byzantines, the second is their Turkic identity, and the third is their Muslim faith. During the 1300s and early 1400s, the Ottomans gradually increased their territory which extended on to both the Anatolian and Balkan sides of present day Turkey thereby encircling the Byzantine capital of Constantinople. In 1453 the Ottomans finally captured Constantinople, effectively ending its role for more than 1000 years as capital of the Eastern Roman Empire. In the following 500 years, Turkish rule was extended over much of the area of the former Byzantine Empire, and it is probable that the Ottoman rulers were conscious of this as they developed their own imperial vision. At its greatest extent in the sixteenth and seventeenth centuries, the Ottoman Empire extended over most of North Africa (with the exception of Morocco), the Balkans, most of the Black Sea littoral, Anatolia, Greater Syria (Bilad al-Sham), Mesopotamia, Arabia, and parts of Western Iran.

The other key component of Ottoman identity was their Turkic identity. Like the Seljuks the Ottomans traced their roots back to Turkish tribes in Central Asia, and this remained a consistent feature of their culture expressed through Turkish language and customs. Although this provided the Ottomans with a secure identity, it meant that in many of their territories and particularly in the Arab provinces they were often regarded as foreigners.

The third consistent feature of Ottoman rule was the adherence to Sunni Islam as seen in the fact that Osman had a Muslim name. Although Ottoman Islam was suffused with Sufism and ancient Turkic customs which some found distasteful, it was nevertheless Sunni and enabled the sultans to pose as leaders of the Islamic world. This role as paramount Muslim rulers was expressed both when the empire was at its most powerful when Sultan Selim I (r. 1512–1520) assumed the title of caliph and in the nineteenth century when Sultan 'Abd al-Hamid II (1876–1909) sought to revive his fortunes by styling himself as a leader of Pan-Islamism against the dominant imperial powers of Western Europe.

While the beginnings of the Ottoman Empire are shrouded in mystery, the date of the end of the empire is also unclear with a variety of dates suggested including 1922, the abolition of the Sultanate; 1923, the declaration of the Turkish Republic; 1924, the abolition of the caliphate; or 1927, the year Ataturk made his great speech defining the foundations of the modern Turkish state.

Definition

Based on this rough historical outline, it is clear that the archaeology of the Ottoman Empire lies at the intersection of several branches of mainstream archaeology which include historical archaeology, Islamic archaeology, and conflict archaeology, as well as archaeology of particular regions and countries.

The archaeology of Ottoman remains is often subsumed within Islamic archaeology which in recent decades has expanded to become a significant field within the discipline. As a field of enquiry, Islamic archaeology certainly encompasses much of the material considered by archaeologists of the Ottoman Empire – this is particularly the case for sites in the Middle East where there is a strong Muslim presence and continuity from earlier periods. However, there are some parts of Ottoman territory such as the Balkans where the Muslims were in a minority and the Islamic perspective may be less helpful. A more significant objection is that the phrase "Islamic archaeology" has several theoretical problems concerning the use of the term Islamic which in recent years has become more contentious (e.g., Is Islamic archaeology an Islamic view of the past? Can a non-Muslim study Islamic archaeology? Can non-Muslims be included within the study of Islamic archaeology?). While the term Islamic archaeology continues to grow and retains a certain currency, because of the large numbers of non-Muslims within the Ottoman Empire and because the empire operated on a worldwide scale Ottoman archaeology perhaps fits better within the remit of historical archaeology.

With its emphasis on the postmedieval world and global interactions, historical archaeology is perhaps the most suitable perspective for viewing the material remains from the Ottoman lands. In particular historical archaeology emphasizes how the Ottoman world was transformed by exchanges with the New World (e.g., tobacco and coffee, see below). Also implicit in the term historical archaeology is that it deals with societies for which there is written evidence and the Ottoman territories were extensively documented even though the full potential of that documentation is only gradually being realized by archaeologists (for a recent example of the integration of texts and archaeology, see Zarinbaf et al. 2005). Ottoman written sources include imperial and local tax registers, imperial directives, local *waqf* (charitable trusts), and court records. In addition there are a wealth of narrative accounts both Ottoman and from European travelers to the region. At this point it is worth mentioning Evliya Çelebi who traveled throughout the Ottoman Empire and wrote detailed descriptions of thousands of places. His work is indispensable to many archaeologists and is frequently used as a starting point for investigations even though on occasions he is prone to exaggeration. Another figure of major importance is the Ottoman cartographer and navigator Piri Reis (1470–1513) who mapped the Ottoman world and possibly the Americas and hence

provides an insight to the Ottoman conception of the world. Historical archaeology also places an emphasis on imperialism and the application of ideologies over large areas. However, there are some limitations to this perspective, the most obvious of which is that the early years of the Ottoman Empire, certainly up to the fall of Constantinople in 1453, are more relevant to the concerns of medieval archaeology with the focus on the decline of the Byzantine Empire and the emergence of medieval principalities. Also on a practical level the archaeology of Ottoman levels at a particular site is often carried out by archaeologists interested in medieval and earlier periods with an emphasis on continuity of community. Within this context Ottoman archaeology can be considered as part of local, national, or regional archaeology. One particularly apt regional classification is Mediterranean archaeology which emphasizes the continuity with the ancient world and the interconnections between various peoples both within and outside the territory of the Ottoman Empire.

Although there are a large number of archaeological projects which in some way include Ottoman material remains as well as a large body of articles discussing archaeological material from the Ottoman period, there are few books which focus exclusively on Ottoman Archaeology. The first attempt at an overview of the subject was Uzi Baram and Lynda Caroll's recent book with the citation (Baram and Caroll 2000). This comprises a series of articles by different authors dealing with sites and monuments ranging from Anatolia to the Red Sea. In addition, the book includes an introduction and conclusion which together make a case for an "Ottoman archaeology." The other major contribution to Ottoman archaeology is the publication of a British Academy Symposium on Ottoman frontiers edited by Andrew Peacock (2009). Although not specifically devoted to archaeology, the majority of chapters are based on archaeological fieldwork and research. Together these two books provide an excellent introduction to the scope and interest of Ottoman archaeology though a theoretically informed overview is still awaited. For the present, a number of themes or potential directions of research are suggested followed by an introduction to the regional concerns of Ottoman archaeology.

Key Issues/Current Debates

Obviously the archaeology of the vast area that comprised the Ottoman Empire is likely to encompass many diverse areas of interest. In particular the position of the Ottoman Empire between Europe, Africa, and Asia demonstrates the immense complexity and potential for the exchange of people, ideas, and cultures all of which can be investigated through archaeology. Out of this, three research themes have been selected partly because they represent areas of research already underway and partly because they indicate ways in which the Ottoman Empire has influenced the present.

Coffee and Tobacco

The consumption of coffee and tobacco are one of the defining features of the modern world, and both are intimately connected with the economic and social life of the Ottoman Empire. The origins of coffee within the Ottoman Empire (i.e., highlands of southwest Arabia and the Horn of Africa) mark it as a global commodity first exploited within the Islamic world and later introduced as a crop to a variety of locations including the Americas, Africa, and Southeast Asia. Tobacco on the other hand originated in the New World and was first imported and later cultivated as a crop in the Middle East. The history of both commodities illustrates the extent to which the Ottoman Empire was an integral part of world systems. In archaeological terms both commodities can be identified from excavations and surveys in the form of ceramic coffee cups and clay tobacco pipes and are often used as a defining feature of Ottoman period assemblages. Beyond their immediate economic significance (pilgrims traveling to Mecca could pay for their travels and make a profit by buying coffee in Mecca and selling it on their return home), both coffee and tobacco had immense social implications such as stimulating

political debate and promoting more relaxed ideas about hedonism and pleasure (Grehan 2006: 1353).

Architecture

Architecture is one of defining features of the Ottoman Empire; from mosques, fortresses, and caravanserais, the stamp of the Ottoman regime is unmistakable. For example, one of the most recognizable features of an Ottoman city is the presence of a domed mosque with pencillike slender minarets. A number of important studies of Middle Eastern cities testify the extent to which the Ottomans used architecture to imprint their vision of the world throughout the empire (e.g., Weber 2009). In art historical terms Ottoman architecture is one of the few non-western traditions to be fully incorporated into the study of historical architecture (Goodwin 1978). Much of the focus in Ottoman architecture has been on Sinan who designed many of the buildings for Sultan Süleyman the Magnificent and his successors in the sixteenth century. While Sinan's genius is well recognized, the work of later architects is now also beginning to be appreciated. As well as the famous Ottoman monuments, humbler buildings such as those lining the Hajj (pilgrimage) routes to Mecca were also of a surprisingly high standard both in terms of construction and design (e.g., Petersen 2012). In contrast to the Ottoman government structures, local buildings were generally built in the local tradition though there could be some influence from the imperial architecture. One of the challenges of Ottoman archaeology is to identify the interplay of local traditions and identity against the background of the Empire (e.g., Carlton and Rushworth 2009).

Landscapes

Because the Ottoman period is relatively recent, there has often been an assumption that the landscape and environment were much the same as today. However, increasingly archaeological projects have begun to look at the evolution of landscapes during the period (e.g., Given 2000). In Palestine, for example, it is clear that the Ottomans actively promoted settlement in the countryside (Fig. 2), both to increase their revenue base and also to secure the region against nomadic incursions and agricultural degradation. In Greece the Ottomans created agricultural estates (*çiftliks*) sometimes protected by walls and armed troops to provide a secure food source for the rulers (Zarinbaf et al. 2005). In addition to the newly introduced crops such as tobacco, cotton, and maize, the Ottoman period saw the introduction of the prickly pear cactus (*opuntia*) which was used both as a defensive barrier as well as a means of producing cochineal used as a red dye for clothing. Other characteristic plants of the

Ottoman Empire: Historical Archaeology, Fig. 2 Eighteenth century Ottoman merchant's house at Ramla in Palestine/Israel. (Photo: Author)

Ottoman period include tulips and cypress trees, both of which had considerable social and economic significance. For example, the cultivation and sale of tulips was of such importance in the early eighteenth century that the era was known as the Tulip Period (*Lale Devri*), while cypress trees were regarded as symbols of life and were often planted in cemeteries.

International Perspectives

Although there are certain issues and areas of interest to archaeologists which can be traced throughout the empire and over different time periods, there are some distinctively regional patterns and historical perspectives which can be discussed as discrete units. For ease of discussion, the empire can be divided into four large regions which are the (1) Balkans, (2) Anatolia and the Black Sea littoral, (3) the Arab Middle East, and finally (4) Egypt, Cyprus, and North Africa.

In addition to the regions within the empire, it is perhaps worth considering the possibility of investigating Ottoman archaeology beyond the borders. Examples might include the activities of slave traders in Africa (e.g., Lane and Johnson 2009), the presence of the Ottoman navy based in Toulon in France in the sixteenth century, or the Ottoman influence on fortifications and warfare in Southeast Asia.

The Balkans

The Balkan Peninsula is an extremely mountainous area of southeastern Europe which is bounded to the west by the Adriatic Sea to the south by the Ionian and Aegean Seas and to the east by the Black Sea. The northern boundary of the peninsula is marked by the Danube as well as the Sava and Kupa rivers. Linguistically, the area is highly heterogeneous with a number of diverse language types spoken including Slavic, Romance, Hellenic, Albanian, and Turkic. Historically, the Balkans are one of the oldest parts of the Ottoman Empire with Thrace conquered in the mid-fourteenth century. By the end of the same century, both Serbia and Bulgaria were also under Ottoman domination. In 1463, Bosnia and Herzegovina were annexed, and during the 1500s Hungary and Romania were added to the Ottoman possessions. An indication of the strength of Ottoman control in the region can be seen from the fact that they were able to besiege Vienna as early as 1529. The antiquity of the Turkish presence in the region is reflected in the use of a Turkish name for the peninsula (Turkish *Balkan* = forested mountain chain).

The archaeology of the Ottoman Balkans (e.g., Figs. 3 and 4) is politically one of the most contentious areas of enquiry with territorial, religious, and ethnic divisions continuing to influence how archaeology is practiced and publicized (e.g., Meskell 1998). Within each of the modern states of the Balkans, there is a different attitude to the Ottoman past and of course its archaeology. This has meant that archaeological projects and publications focusing on the Ottoman era are more common in some of the countries of the region. For example, Hungary which was occupied by the Ottomans for a relatively short period (1541–1699) has a thriving tradition of Ottoman archaeology (e.g., Gerelyes and Kovács 2003). The extent to which the Ottoman past is incorporated into the national heritage can be seen by the Gül Baba monument in Budapest. Gül Baba was a companion of Süleyman the Magnificent who died during the Ottoman siege of Budapest in 1541. The tomb, which was built between 1543 and 1548, remained a prominent landmark after the Hapsburg reconquest of the city in 1686. In the nineteenth century, the shrine was restored by the Ottoman government, and the site is now registered as a Hungarian National Monument. The site which is now owned and maintained by the Turkish government is often referred to as the most northern Muslim pilgrimage site.

Other Balkan nations have been less eager to investigate and incorporate their Ottoman past into their national heritage. For a long time, the archaeology of the Ottoman period in Greece was regarded with suspicion (e.g., Bintliff 2007: 221). This was not necessarily a reflection of the country's attitude to its Ottoman past but rather an expression of difficult relations with the Turkish Republic. However, recently this approach has begun to change spurred on partly by the work of

Ottoman Empire: Historical Archaeology, Fig. 3 Sixteenth century Ottoman bridge in Mostar, Bosnia-Herzegovina. Destroyed 1993 rebuilt 2004. (Photo: Anthony Grey 22.9.11)

Ottoman Empire: Historical Archaeology, Fig. 4 Palace of Ahmed Kuri Pasha (late eighteenth century), Ottoman governor of Berat, Albania. (Photo: Anthony Grey 31.5.12)

foreign archaeologists in Greece and partly by generally improving relations with the Turkish Republic. Important studies include the interdisciplinary Boeotia project which combines archival source material with field survey to define a pattern of settlement during the period of Ottoman rule (Kiel 1997). There have also been recent studies of Ottoman architecture in Greece, most significantly the volume produced by the Greek Ministry of Culture (Brouskari et al. 2009). In Bulgaria there has also been limited interest in the archaeology of the Ottoman period although there have been extensive historical publications dealing with this period. Guinova's 2005 publication provides a useful synthesis of recent work on Ottoman archaeology in the country.

Anatolia and the Black Sea

The modern Turkish state is more or less identical with the geographical region of Anatolia (sometimes also referred to as Asia Minor) and represents the heartland of the Ottoman state. Anatolia is bounded to the south by the Mediterranean, to the west by the Aegean, and to the north by the Black Sea. The Ottoman capital of Constantinople stands at the northwest corner of Anatolia straddling the narrow opening connecting the Black Sea to the Mediterranean. Historically, the Black Sea region was a border zone between the expanding Russian and Ottoman Empires and for convenience can be placed in the same region as Anatolia.

Despite the fact that the Turkish Republic is the direct successor of the Ottoman Empire, the attitude of modern Turkey to its Ottoman past has been ambiguous. Kemal Attaturk, the founder of the modern state, rejected the Ottoman past as "stale and unprofitable" (Finkel 2005: 1). The break with the past was symbolized by the change from the old imperial capital of Constantinople to Ankara located on the central Anatolian plateau. The emphasis within history and archaeology was on Anatolian civilizations and the Central Asian roots of the Turkish people (Özdoğan 1998). Although some Ottoman architecture was praised, the whole period was characterized as one of decline and of little relevance to the modern state. Until recently the majority of excavations and surveys in Turkey have focused on the prehistoric and pre-Islamic periods, and where the Islamic sites were investigated, the emphasis was on the medieval Seljuk remains rather than on the later Ottoman remains. Indeed, one commentator writing at the end of the 1990s wrote "with justification we can claim that during the last decades more Ottoman archaeology has been destroyed than any of the earlier periods since public opinion still posits that Byzantine and Greco Roman remains are antique whilst Ottoman ones are not" (Özdoğan 1998). However, since the late 1990s, there has been an increasing interest in Ottoman archaeology in Turkey partially reflecting a worldwide tendency of interest in the more recent past and also reflecting political changes in Turkey which have begun to see the Ottoman Empire in a more favorable light.

Apart from the coasts of Anatolia and Bulgaria, the Ottoman area of control on the Black Sea falls mostly within the Republic of the Ukraine. The region was first incorporated into the Ottoman realm in 1538 during the reign of Süleyman the Magnificent (r. 1520–1566) though the control of anything beyond the shores of the Black Sea was largely a matter of alliances rather than direct control. The Ottoman presence in these areas was mostly in the form of fortresses which remained in Ottoman control until the early nineteenth century. For examples of Ottoman archaeology in the Black Sea region, see Kellner-Heinkele et al. (2008). A summary of archaeological work on Ottoman monuments in Ukraine can be found in Bilyayeva and Ersoy (2008).

The Arab Middle East

The Arab Middle East is a term of convenience used to describe the Arab provinces incorporated into the Ottoman Empire during the early sixteenth centuries. This area comprises the modern states of Syria, Iraq, Lebanon, Jordan, Palestine/Israel, and parts of Saudi Arabia and Yemen. This area remained part of the Ottoman Empire for nearly 400 years and had a special distinction in that it contained both the spiritual home of Islam as well as the capital cities of Damascus and Baghdad. Ottoman rule in this region was described in negative terms by European nineteenth-century travelers in the Middle East, and these accounts have informed many Western perceptions of a declining Ottoman Empire. This view was reinforced during the early twentieth century when the Ottomans supported the Germans in the First World War while the British supported an Arab revolt against Turkish rule. Set against this background, it is surprising that in this area the successor states have a more positive view of the Ottoman period, and it is in this area that Ottoman archaeology is most developed. Studies of Ottoman monuments began as early as the 1930s when Jean Sauvaget (1937) published his survey of Ottoman caravanserais in Syria. In general, however, studies of the Ottoman period only became common from the 1980s

as techniques improved and recent centuries were considered legitimate subjects of archaeological investigation. A summary of historical and archaeological work in the area can be found in McQuitty (2001). The archaeology of the Ottoman period in Iraq has been less studied partly because the Ottoman presence in the area was more disrupted (this formed a border zone between the Saffavid and Ottoman Empires) and partly because of disruptions due to almost continuous warfare since the 1980s. However, Simpson's (2011) article based on fieldwork in the North Jazira provides an interesting summary of Ottoman archaeology in northern Iraq.

Within the Arabian Peninsula, Yemen and Saudi Arabia contain significant numbers of Ottoman sites and monuments, yet in both cases, for different reasons, there has been little investigation of the archaeology of the Ottoman period. In Yemen, civil war and social unrest have meant that investigations of the Ottoman period have been limited, whereas in Saudi Arabia there has been an ideological reluctance to recognize the Ottoman presence, as indicated by the destruction of Ottoman monuments in Mecca and Medina.

Yemen was incorporated into the Ottoman Empire in the sixteenth century though by the 1630s Yemeni forces succeeded in ousting the Turks. The Ottomans returned in 1872 and retained control of the Yemeni highlands until they were expelled in 1914. There have been few specific studies of Ottoman period archaeology though Ottoman period sites are mentioned in a large number of archaeological surveys. Ottoman architecture in Yemen has also been investigated as part of its wider historic heritage as well as a distinct architectural period (Farah 2011).

Two areas within Saudi Arabia were incorporated into the Ottoman regime, the Al-Hasa Oasis on the eastern coast and the Hijaz on the Red Sea coast. In addition to Ottoman buildings in Mecca and Medina, the Hijaz contains Ottoman forts along the Hajj routes (Fig. 5) as well as nineteenth-century forts associated with the Ottoman reconquest. The Al-Hasa area contains a number of Ottoman buildings including the mosque of Ibrahim.

Egypt, Cyprus, and North Africa

Egypt was incorporated into the Ottoman Empire in 1517 following the defeat of the former Mamluk rulers. In terms of population Egypt was the largest Arab province within the Ottoman Empire and as such had certain degree of autonomy which increased in the 1800s to virtual independence. In terms of archaeological research, there has been

Ottoman Empire: Historical Archaeology, Fig. 5 Ottoman Hajj fort at Mudawwara on the border of Jordan and Saudi Arabia. (Photo: Author)

an emphasis on the pre-Ottoman medieval periods both because they are more distant in time and because they are considered to be more "Egyptian" (i.e., not under foreign domination). Ottoman architecture, on the other hand, has received considerable academic attention particularly in Cairo where new architectural forms were introduced. Outside Cairo there have been a few archaeological projects which have focused on Ottoman period remains: examples include the Japanese project at Al-Tur in the Sinai (Kawatoko 1995), the excavation of Ottoman Quseir (LeQuesne 2007), and the excavation of Qasr Ibrim.

Further south in the territory of modern Sudan, the Ottomans established a presence along the Nile valley as early as the sixteenth century though the whole country was only incorporated into the Egyptian Ottoman Empire in the nineteenth century (a useful summary of Ottoman archaeology in Sudan can be found in El-Zein 2009).

The Ottoman presence in North Africa to the west of Egypt has a different character to the Balkans, Anatolia, and the Arab Middle East, though there may be some similarities to the north coast of the Black Sea. The Ottoman presence was generally limited to the coastal cities with very little influence on the interior. In many ways North Africa served as a series of naval bases which served both official Ottoman naval operations as well as local corsairs who raided throughout the Mediterranean and beyond. Little research has been carried out into the Ottoman archaeology of this area (cf. Heywood 2009), although a few studies show the potential for further work.

In regional terms it is difficult to position Cyprus within the Ottoman Empire. It has strong links to the Balkans through the Greek-speaking population and links to Anatolia and Syria through proximity and trade but are included in this section as representative of the Ottoman presence in the Mediterranean. The continuing cultural complexities of Greek and Turkish Cyprus have had obvious implications for the investigation of the Ottoman archaeology of the island; however, there have been some interesting studies which reflect this complexity (e.g., Given 2000).

Future Directions

It can be seen that archaeology of the Ottoman period already encompasses a vast area and many different forms of human settlement and interaction. Much remains to be done in integrating textual research with archaeology and also with environmental studies. Several areas with potential for further exploration include the archaeology of slavery within the Ottoman Empire (e.g., Lane and Johnson 2009); the visibility and interactions between various ethnic, religious, and social groups; long distance trade in particular connections with the Indian Ocean and the Atlantic; and the role of archaeology in developing an international heritage.

Cross-References

- ▶ Clay Pipes in Historical Archaeology
- ▶ Cyprus, Archaeology of
- ▶ Fortifications, Archaeology of
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic Archaeology
- ▶ North Africa: Historical Archaeology
- ▶ Rural Life in Islamic Archaeology
- ▶ Turkey: Archaeological Museums

References

Baram, U., and L. Carroll. 2000. *A historical archaeology of the Ottoman Empire. Breaking new ground*. New York: Kluwer Academic/Plenum Publishers.

Bilyayeva, S., and B. Ersoy. 2008. Monuments of the Ottoman period in the Ukraine. Archaeological investigations (1989–2004). In *Islamic art and architecture in the European periphery. Crimea, Caucasus and the Volga-Ural region*, ed. B. Kellner-Heinkele, J. Gierlichs, and B. Heuer, 39–44. Wiesbaden: Deutsche Morgenländische Gesellschaft. Harrasowitz Verlag.

Bintliff, J. 2007. Considerations for creating an Ottoman archaeology in Greece. In *Between Venice and Istanbul: Colonial landscapes in early modern Greece*. Hesperia supplement 40, ed. S. Davies and J.L. Davis, 221–236. Princeton: American School of Classical Studies.

Brouskari, E., J. Papageorgiou, N. Panoutsopoulos, A. Tsitouri, A. Kourtesi, E. Michalopouplou, and

E. Sikla. 2009. *Ottoman architecture in Greece*. Athens: Hellenic Ministry of Culture-Directorate of Byzantine and Post-Byzantine Antiquities.

Carlton, R., and A. Rushworth. 2009. The Krajina project: Exploring the Ottoman Habsburg borderland. In *The frontiers of the Ottoman world (Proceedings of the British Academy 156)*, ed. A.C.S. Peacock, 403–431. New York: Oxford University Press.

El-Zein, I. 2009. Ottoman archaeology of the middle Nile Valley in the Sudan. In *The frontiers of the Ottoman world (Proceedings of the British Academy 156)*, ed. A.-C. Peacock, 371–383. Oxford: Oxford University Press.

Farah, C. 2011. *The Ottoman forts and castles of Yemen: A photographic and architectural analysis*. Lampeter: Edward Mellen Press.

Finkel, C. 2005. *Osman's dream. The history of the Ottoman empire*. London: John Murray.

Gerelyes, I., and G. Kovács, eds. 2003. *Archaeology of the Ottoman period in Hungary.* Budapest: Hungarian National Museum.

Given, M. 2000. Agriculture, settlement and landscape in Ottoman Cyprus. *Levant* 38: 209–230.

Goodwin, G. 1978. *A history of Ottoman architecture*. London: Thames and Hudson.

Grehan, J. 2006. Smoking and early modern sociability: The great tobacco debate in the Ottoman Middle East (seventeenth to eighteenth centuries). *American Historical Review* 111: 1352–1377.

Guinova, G. 2005. Etat de la recherché archéologique concernant la période ottomane en Bulgarie. *Turkica* 37: 267–279.

Heywood, C. 2009. A frontier without archaeology? The Ottoman maritime frontier in the western Mediterranean. In *The frontiers of the Ottoman world (Proceedings of the British Academy 156)*, ed. A.C.-S. Peacock, 493–508. Oxford: Oxford University Press.

Kawatoko, M. 1995. *al-Tur: A port city on the Sinai Peninsula. 11th expedition in 1994*. Tokyo: Middle Eastern Culture Centre Japan.

Kellner-Heinkele, B., J. Gierlichs, and B. Heuer, eds. 2008. *Islamic art and architecture in the European periphery. Crimea, Caucasus and the Volga-Ural region.* Deutsche Morgenländische Gesellschaft. Wiesbaden: Harrasowitz Verlag.

Lane, P., and D. Johnson. 2009. The archaeology and history of slavery in South Sudan in the nineteenth century. In *The frontiers of the Ottoman world (Proceedings of the British Academy 156)*, ed. A.C.-S. Peacock, 509–538. Oxford: Oxford University Press.

LeQuesne, C. 2007. *Quseir. An Ottoman and Napoleonic fortress on the Red Sea coast of Egypt.* American Research Center in Egypt, Conservation series 2. Cairo: American University in Cairo.

McQuitty, A. 2001. The Ottoman period. In *The archaeology of Jordan*, ed. B. McDonald, R. Adams, and P. Bienkowski. Sheffield: Sheffield University Press.

Meskell, L., ed. 1998. *Archaeology under fire: nationalism, politics and heritage in the eastern Mediterranean and the Middle East*. London/New York: Routledge.

Özdoğan, M. 1998. Ideology and archaeology in Turkey. In *Archaeology under fire: Nationalism, politics and heritage in the eastern Mediterranean and the Middle East*, ed. L. Meskell, 111–124. London: Routledge.

Peacock, A.C.S., ed. 2009. *The frontiers of the Ottoman world (Proceedings of the British Academy 156)*. Oxford: Oxford University Press.

Petersen, A.D. 2012. *The Medieval and Ottoman Hajj route in Jordan: an archaeological and historical study*. Levant Supplementary series 12. Oxford: Oxbow in association with the Council for British Research in the Levant.

Sauvaget, J. 1937. Les caravanserais Syriens du Hadjdj de Constantinople. *Ars Islamica* 4: 98–121.

Simpson, S. 2011. Analysing the recent past: The archaeology of death, pastoralism, pots and pies in the Ottoman Jezira and beyond. *Al-Rafidain* 32: 57–104.

Weber, S. 2009. *Damascus. Ottoman modernity and urban transformation 1808–1918.* Proceedings of the Danish Institute in Damascus V. Aarhus: Aarhus University Press.

Zarinbaf, F., J. Bennet, and J. Davis, eds. 2005. *A historical and economic geography of Ottoman Greece: The southwestern Morea in the 18th century.* Hesperia supplement 34. Princeton: American School of Classical Studies in Athens.

Further Reading

Alexander, J. 1998. The Sahara divide in the middle Nile Valley: The evidence from Qasr Ibrim. *African Archaeological Review* 6: 73–90.

Aslanapa, O., S. Yetkin, and A. Ara. 1989. *The Iznik tile kiln excavations: The second round*, 1981–1988. Istanbul: Historical Research Foundation, Istanbul Research Center.

Auld, S., and R. Hillenbran, eds. 2000. *Ottoman Jerusalem: The living city.* London: World of Islam Festival Trust and Scorpion Books.

Behrens-Abuseif, D. 1989. *Islamic architecture in Cairo*. Leiden: Brill.

Bintliff, J., A. Ceulemans, K. De Craen, E. Farinetti, D. Kramberger, B. Music, I. Rizner, K. Sbonias, L. Sigalos, B. Slapsak, V. Stissi, and A. Vassilopoulos. 2001. The Leiden ancient cities of Boetia project: Preliminary report on the 2001 season. *Pharos: Journal of the Netherlands Institute in Athens* 9: 33–74.

Caravajal, J.C., A. Palanco, and N. Molla. 2010. The castle of Ali Pasha at Butrint: From gateway to defence line. *Antiquity* 84: 323. Available at: http://antiquity.ac.uk/projgall/carvajal323/. Accessed 12 Sept 2012.

Dankoff, R. 2004. *An Ottoman mentality: The world of Evliya Çelebi*. Leiden: Brill.

Djelloul, N. 1995. *Les fortifications côtières ottomans de la régence de Tunis (XVIe- XIXe siècles)*. Zaghouan: FTERSI.

Gerelyes, I. 2009. Garrisons and the local population in Ottoman Hungary: The testimony of the archaeological finds. In *The frontiers of the Ottoman world (Proceedings of the British Academy 156)*, ed. A.C.-S. Peacock. Oxford: Oxford University Press.

Grey, A.D., and A. Petersen. 2012. Ceramics from Qal'at 'Unaiza and other hajj forts in Jordan. In *The medieval and Ottoman Hajj route in Jordan: An archaeological and historical study*, ed. A. Petersen, 174–189. Oxford/Oakville: Council for British Research in the Levant and Oxbow.

Hattox, R. 1985. *Coffee and coffeehouses: The origins of a social beverage in the Middle East*. Seattle/London: University of Washington Press.

Kawatoko, M. 1996. *al-Tur: A port city on the Sinai Peninsula. 12th expedition in 1995*. Tokyo: Middle Eastern Culture Centre Japan.

Kawatoko, M. 1998. *al-Tur: A port city on the Sinai Peninsula. 13th expedition in 1996*. Tokyo: Middle Eastern Culture Centre Japan.

Kiel, M. 1997. The rise and decline of Turkish Boetia, 15th–19th century (remarks on the settlement pattern, demography, and agricultural production according to unpublished Ottoman-Turkish census and taxation records). In *Recent developments in the history and archaeology of central Greece. Proceedings of the 6th International Boetian Conference (BAR-IS 666)*, ed. J. Bintliff, 315–358. Oxford: Archaeopress.

King, G., and C. Tonghini. 1996. *A survey of the Islamic sites near Aden and in the Abyan district of Yemen*. London: School of Oriental and African Studies.

McQuitty, A. 1995. Watermills in Jordan. Technology, typology dating and development. *Studies in the History and Archaeology of Jordan* 5: 745–751.

Milwright, M. 2008. Imported pottery in Ottoman Bilad al-Sham. *Turkica* 40: 121–152.

Ostapchuk, V., and S. Bilyayeva. 2009. The Ottoman Northern Black Sea frontier at Akkerman Fortress: The view from a historical and archaeological project. In *The frontiers of the Ottoman world (Proceedings of the British Academy 156)*, ed. A.C.S. Peacock, 137–170. Oxford: Oxford University Press.

Saunders, N., and N. Faulkner. 2010. Fire in the desert: Conflict archaeology and the great Arab revolt in Jordan 1916-18. *Antiquity* 84: 514–527.

Schick, R. 1998. The archaeology of Palestine/Jordan in the early Ottoman period. *ARAM* 10: 563–575.

Serjeant, R.B., and R. Lewcock. 1983. *Sana. An Arabian Islamic City.* London: World of Islam Festival Trust.

Simpson, S. 2012. Finds from Qal'at 'Unaiza and other Ottoman forts on the Darb al-Hajj. In *The medieval and Ottoman Hajj route in Jordan: An archaeological and historical study*, ed. A. Petersen, 190–208. Oxford: Council for British Research in the Levant and Oxbow.

Soucek, S. 1995. *Piri Reis and Turkish map making after Columbus: The Khalili Portolan Atlas*. London: Oxford University Press in collaboration with the Nour Foundation.

Tareak Swelim, M. 1993. An interpretation of the Mosque of Sinan Pasha in Cairo. *Muqarnas* 10: 98–107.

Thys-Şenocak, L., R.H. Çelik, A. Özavaşçı, and G. Tanyeli. 2009. Understanding archaeology and architecture through archival records: The restoration project of the Ottoman fortress of Seddülbahir on the Gallipoli Peninsula of Turkey. In *The frontiers of the Ottoman world (Proceedings of the British Academy 156)*, ed. A.C.S. Peacock, 189–208. Oxford: Oxford University Press.

Vroom, J. 2003. *After antiquity: ceramics and society in the Aegean from the seventh to the twentieth century A.C. A case study from Boetia, central Greece*. Archaeological Studies, Leiden University 10. Leiden: Leiden University.

Walker, B., ed. 2009. *Reflections of empire: archaeological and ethnographic studies of pottery in the Ottoman Levant.* Annual of the American Schools of Oriental Research. Winona Lake: Eisenbrauns.

Ounjougou Site Complex, Archaeology of the

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Introduction

The Malian site complex of Ounjougou is located in the Boucle du Niger (or Niger Bend) in the Dogon Country, more precisely on the Bandiagara Plateau about 15 km east of the town of the same name (Fig. 1). It includes more than a hundred archaeological sites in a valley around the confluence of four rivers, of which the main one, the Yamé, joins the Niger 30 km north of the town of Mopti. Topographically, this zone presents as a series of gullies cut through a complex succession of Quaternary eolian, alluvial, and colluvial formations (Lespez et al. 2011). The stratigraphic sequence, which can in places be 16.50 m thick, has yielded archaeological material from the Lower Paleolithic to the present. The deposits also contain abundant vegetal remains (pollen, leaves, charcoal, wood, seeds, etc.) of excellent preservation. As a result, the site complex offers

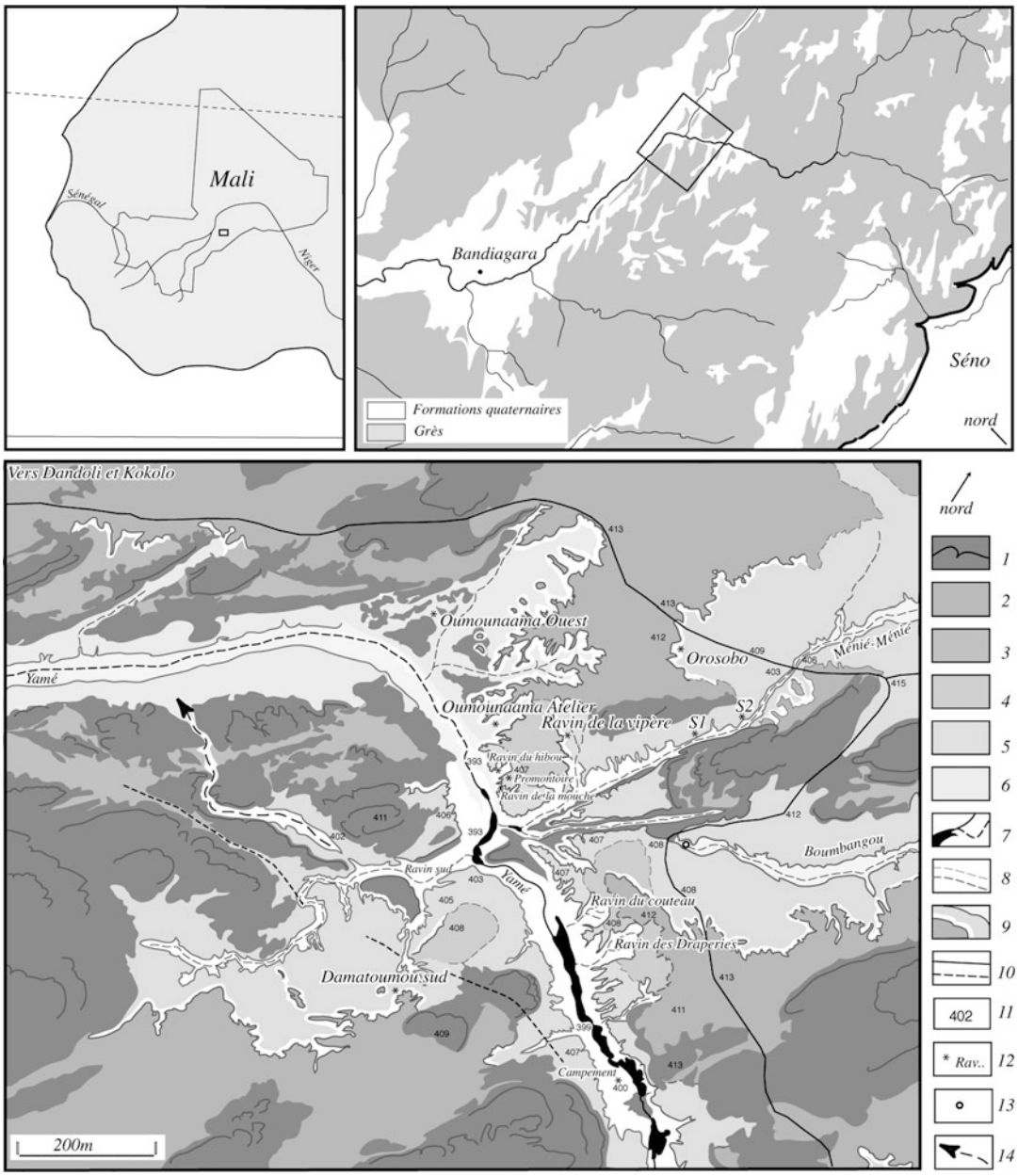

Ounjougou Site Complex, Archaeology of the, Fig. 1 Location and geomorphological presentation of the site of Ounjougou. *1*: Sandstones and scarps in sandstones; *2*: Main terrace-glacis; *3*: Eroded sectors of main glacis; *4*: Holocene terrace (8th millennium BCE); *5*: Secondary terrace-glacis; *6*: Sands and silts of alluvial accumulation; *7*: Hydrographic network and permanent lakes; *8*: Stratigraphic limits; *9*: Terraces and glacis edges; *10*: Track and relics of the colonial track; *11*: Height (meters); *12*: Archaeological sites; *13:* Infiltration of Boumbangou through sandstones; *14*: Paleoriver of Yamé. (Mapping: M. Rasse)

the possibility to place human occupations in relation to climatic and environmental changes over a long chronological sequence.

After the discovery in 1994, 13 field seasons were undertaken between 1997 and 2009 in the framework of an international and interdisciplinary

research program entitled *Human settlement and paleoenvironment in West Africa*, with 12 research institutes involved from Mali, France, Germany, and Switzerland and coordinated by the Swiss Archaeological and Ethnoarchaeological Mission in West Africa (MAESAO), now the *Laboratoire Archéologie et Peuplement de l'Afrique* at the University of Geneva (Huysecom 2002). Research carried out in this program has contributed many elements that have significantly changed our understanding of the prehistory and history of the Dogon Country, and more broadly of West Africa. In addition, while remaining attentive to the causes that lead to migration or technological innovation, they have confirmed that climatic variations that affected the modern Sahel region throughout the Pleistocene and Holocene had a decisive effect on human groups and their adaptive responses, whether by controlling the environment by systematic burning or by developing ceramics, herding, and agriculture.

Key Issues/Current Debates/Future Directions/Examples

Paleolithic Occupations

The earliest evidence of human occupation is seen at several sites in the complex where the lithic industry contains polyhedrons and sub-spheroids in quartzitic sandstone associated with worked cobbles (Soriano et al. 2010) (Fig. 2). These artifacts, which reflect an early phase of the Paleolithic by their typological and technological traits, were observed in stratigraphic context, sealed in plates of coarse sands adhering to bedrock. An OSL date for the Final Middle Pleistocene was obtained for the deposits overlying these formations, providing a terminus ante quem of 180 ka for this lithic industry. The degree of arenization (surface weathering) of the plated layers in which this industry was discovered, suggests that these deposits underwent long periods of leaching under damp warm conditions, and on typo-technological comparisons with Paleolithic material from the Maghreb, an age between 1 and 500 ky can be considered for this polyhedral industry at Ounjougou (Soriano et al. 2010).

Although having a broad archaeological visibility, the Acheulean is still absent across the entire Ounjougou zone, the Bandiagara Plateau, and the Seno Plain. This may indicate the existence in West Africa of regions not frequented by Acheulean populations, although they are well represented in neighboring regions.

A Levallois core with preferential removals, found isolated in stratigraphic context, marks the first evidence for the Middle Paleolithic at

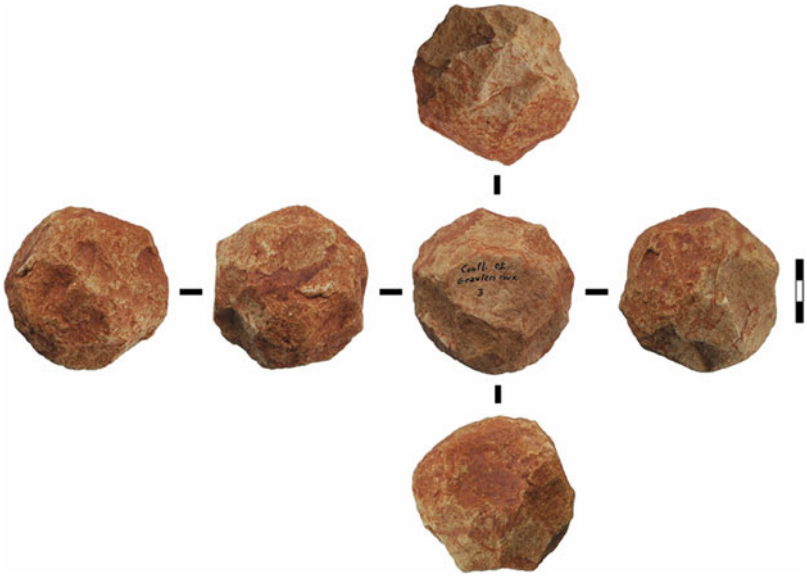

Ounjougou Site Complex, Archaeology of the, Fig. 2 Polyhedron extracted from the deepest sedimentary formations of Ounjougou

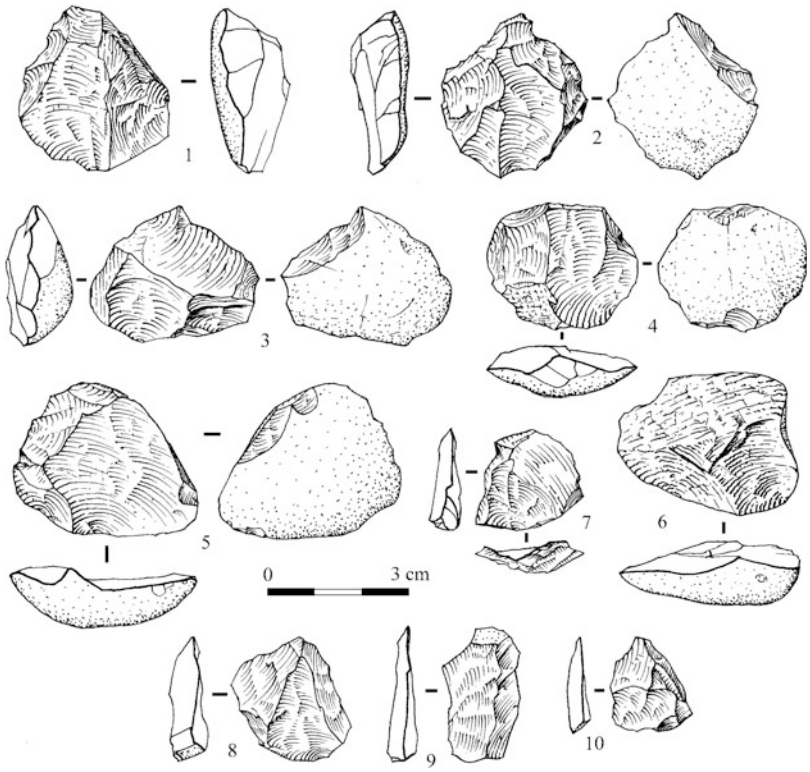

Ounjougou Site Complex, Archaeology of the, Fig. 3 The Levallois industry of the site of Ounjougou – *Orosobo 2*, dated to 35–30 ky: Lithic industry on quartz. 1–6, Levallois cores; 7–10, Levallois flakes

Ounjougou (Fig. 3). An OSL date places this core around 150 ky, in the Late Middle Pleistocene. Middle Paleolithic occupations in the Ounjougou site complex, all open air, become more common during the Upper Pleistocene: 25 typo-technologically distinct assemblages were identified between 100 and 22 ky, with a particular concentration during oxygen isotope stage 3 between 50 and 30 ky (Rasse et al. 2004; Soriano et al. 2010). All of the known occupations are open-air sites, and the lithic material for most of them is preserved in primary position or very slightly reworked in colluvial silts. Most of the reduction techniques typically recognized are represented at Ounjougou: Levallois, discoidal, unidirectional, blade, and facies with leaf-shaped bifacial pieces. The lack of technological recurrence in the chronological succession of lithic industries at Ounjougou raises questions, particularly given their diversity. We nearly never find two successive occupations with the same lithic industry. The diversity of lithic industries found in stratigraphic context at Ounjougou and their sequence without obvious logic further raises questions about population dynamics in Sahelian West Africa during the Upper Pleistocene. Even more than the observed diversity is the rate of change, which is very high since the most of the known occupations are situated during OIS 3 over a period of 30 ky years. The succession seen at Ounjougou enables us to reject the hypothesis of gradual local evolution in technological traditions for this period. It suggests rather that human groups with different technological traditions regularly succeeded one another in the region (Soriano et al. 2010).

During OIS 2, after 22 ky, the Ounjougou region underwent extremely arid conditions and appears to have been deserted by humans until the climate improved at the onset of the Holocene (Rasse et al. 2004).

Holocene Occupations

The discovery of ceramic sherds associated with grinding tools and small bifacial armatures in Holocene layers dated to the beginning of the

Ounjougou Site Complex, Archaeology of the, Fig. 4 Ceramic sherds from stratigraphic unit HA1 of Ounjougou – *Ravin de la Mouche*, older than 9400 cal BCE, including a bowl fragment (**a**) and a decorated sherd (**b**)

10th millennium cal BCE and to the 8th mill. Cal BCE has significantly altered the state of archaeological knowledge (Huysecom et al. 2004, 2009; Soriano and Huysecom 2012) (Fig. 4). Indeed, these are the oldest ceramic known today in sub-Saharan Africa. The solid stratigraphic and chronological context of the site of *Ravin de la Mouche* at Ounjougou (Rasse et al. 2006; Lespez et al. 2008; Neumann et al. 2009; Ozainne et al. 2009) indicates that knowledge of ceramic production appeared in sub-Saharan West Africa at least as early as in the Nile Valley, prior to 9400 cal BCE. This innovation, as well as very specific bifacial armatures, is probably linked to the reoccupation of the open tropical savannas that regenerated in the Dogon Country at the start of the Early Holocene. This new typo-technological complex would have spread rapidly to the north, particularly toward the central Sahara, at the same time as the movement of the front of intertropical convergence, when the Saharan zone became increasingly green, developing surfaces of edible grasses and major changes in the composition of wild fauna hunted.

During the Middle and Late Holocene, around the 5th and the mid-3rd mill. Cal BCE, we observe two phases of human reoccupation, at the sites of *Promontoire Néolithique* and *Ravin du Hibou*, showing affinities in their material culture with some Neolithic complexes in the central Sahara (Huysecom et al. 2004; Kouti and Huysecom 2007). A millennium later, during the seventeenth and sixteenth centuries cal BC, cultural complexes of the Final Neolithic that developed in the Ounjougou region present unique traits, with the appearance of pottery decorated by different kinds of roulettes with highly characteristic motifs (Ozainne in press). The existence of stone dwellings along the river, with grinding materials and abundant calcined grass stalks, is established, while the practice of millet (*Pennisetum glaucum*) agricultures is confirmed by the discovery of burned seeds dated by AMS. The Neolithic occupations were abandoned near the middle of the 1st mill. Cal BCE (Ozainne et al. 2009; Ozainne in press).

Protohistory

Protohistoric occupations over the last two millennia are less well represented at the site complex, maybe following a dry episode during the first centuries BCE/CE (Mayor et al. 2005). Excavations at *Promontoire protohistorique*, with a sequence of colluvial layers, document the domestic pottery used between the seventh and thirteenth centuries CE by populations who settled in the region prior to the arrival of the Dogons. The excavation of a rockshelter with ritual function, *Dangandouloun*, yielded abundant ceramic material of excellent quality, including jars, bowls, and many tripod cups, as well as iron weapons and ornaments (Fig. 5). A series of thermoluminescence dates places this set of objects between the seventh and twelfth century CE. Stylistic and technical analyses of the ceramics have demonstrated the primarily local production of pottery by a group of the Gur linguistic family, shaped by pulling out of a lump of clay, the use of recipients produced by Mandé groups from the Inland Niger Delta and rare importing of recipients produced on the Seno Plain or further east, shaped by pounding in a concave form above a straight mat. This indicates that the Bandiagara Plateau was located at the crossroads of at least three

Ounjougou Site Complex, Archaeology of the, Fig. 5 Pottery from the ritual rockshelter of Dangandouloun, dated between the seventh and the twelfth century CE, notably including numerous tripod cups

large cultural spheres from the second half of the 1st mill. CE (Mayor 2011).

In addition, the study of modern and past ceramic traditions, through the excavation of historical sites and collection at abandoned villages known by oral tradition, has enabled us to follow changes in styles through time and to formulate hypotheses concerning the settlement of the plateau. Finally, the reconstruction of very complex Dogon migration routes on the plateau over the last three to four centuries, understanding of the relationships that were established between the different clans, and the delimitation of ancient territories, at the heart of current land ownership disputes, were made possible through oral tradition survey (Mayor et al. 2005).

Ethnoarchaeological research has moreover been extensively undertaken for the modern ceramic traditions of the region and has enabled identification of a peasant tradition (tradition A) in the center of the Dogon Country and a series of traditions made by the wives of smiths (traditions B, C, and D). The latter are either of local origin or from societies on the periphery of this region. The map of these traditions is extremely useful to interpret archaeological remains, particularly those from the Ounjougou site complex (Mayor 2011). Finally, archaeological and ethnohistorical studies have been carried out with the smith clans and traditional iron production on the Dogon Plateau during the period between the last precolonial empires (mid-2nd millennium CE) and the arrival of French colonization (late nineteenth to early twentieth century). They have made it possible to develop an overall scenario for the history of settlement of smiths in the region and their production and to situate them within the dynamics of the central Nigerian plateau (Robion-Brunner 2010).

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Archaeobotany
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Landscape Domestication and Archaeology
- ▶ West and Central Africa: Historical Archaeology
- ▶ West and Central African Neolithic: Geography and Overview

References

Huysecom, E. 2002. Palaeoenvironment and human population in West Africa: An international research project in Mali. *Antiquity* 76: 335–336.

Huysecom, E., S. Ozainne, F. Raeli, A. Ballouche, M. Rasse, and S. Stokes. 2004. Ounjougou (Mali): A history of Holocene settlement at the southern edge of the Sahara. *Antiquity* 78: 579–593.

Huysecom, E., M. Rasse, L. Lespez, K. Neumann, A. Fahmy, A. Ballouche, S. Ozainne, M. Maggetti, C. Tribolo, and S. Soriano. 2009. The emergence of pottery in Africa during the tenth millennium cal BC: New evidence from Ounjougou (Mali). *Antiquity* 83: 905–917.

Kouti, S., and E. Huysecom. 2007. Ounjougou, Mali: New data on bifacial point production in the southern Sahara during the Middle Holocene. *Journal of African Archaeology* 5 (1): 3–15.

Lespez, L., M. Rasse, Y. Le Drezen, C. Tribolo, E. Huysecom, and A. Ballouche. 2008. L'évolution hydromorphologique de la vallée du Yamé (Pays Dogon, Mali): Signal climatique et hydrosystèmes continental en Afrique de l'Ouest entre 50 et 4 ka cal.BP. *Géomorphologie: Relief, Processus, Environnement* 3: 169–185.

Lespez, L., Y. Le Drezen, A. Garnier, M. Rasse, B. Eichhorn, S. Ozainne, A. Ballouche, K. Neumann, and E. Huysecom. 2011. High-resolution fluvial records of Holocene environmental changes in the Sahel: The Yamé River at Ounjougou (Mali, West Africa). *Quaternary Science Reviews* 30 (5–6): 737–756.

Mayor, A. 2011. *Traditions céramiques dans la boucle du Niger. Ethnoarchéologie et histoire du peuplement au temps des empires précoloniaux*. Journal of African Archaeology Monograph series 7, Human Population & Paleoenvironment in West Africa series 2. Frankfurt am Main: Africa Magna Verlag.

Mayor, A., E. Huysecom, A. Gallay, M. Rasse, and A. Ballouche. 2005. Population dynamics and Paleoclimate over the past 3000 years in the Dogon Country, Mali. *Journal of Anthropological Archaeology* 24: 25–61.

Neumann, K., A. Fahmy, L. Lespez, A. Ballouche, and E. Huysecom. 2009. The Early Holocene palaeoenvironment of Ounjougou (Mali): Phytoliths in a multiproxy context. *Palaeogeography, Palaeoclimatology, Palaeoecology* 276: 87–106.

Ozainne, S. in press. *Néolithique ouest-africain. Cadre chrono-culturel, économique et environnemental de l'Holocène récent en pays dogon (Mali)*. Journal of African Archeology Monograph series, Human Population & Paleoenvironment in West Africa series 3. Frankfurt am Main: Africa Magna Verlag.

Ozainne, S., L. Lespez, Y. Le Drézen, B. Eichhorn, K. Neumann, and E. Huysecom E. 2009. Developing a chronology integrating archaeological and environmental data from different contexts: The Late Holocene sequence of Ounjougou (Mali). *Radiocarbon* 51 (2): 457–470.

Rasse, M., S. Soriano, C. Tribolo, S. Stokes, and E. Huysecom. 2004. La séquence pléistocène supérieur d'Ounjougou (Pays dogon, Afrique de l'Ouest): évolution géomorphologique, enregistrements sédimentaires et changements culturels. *Quaternaire* 15 (4): 329–341.

Rasse, M., A. Ballouche, E. Huysecom, C. Tribolo, S. Ozainne, Y. Le Drezen, S. Stokes, and K. Neumann. 2006. Evolution géomorphologique, enregistrements sédimentaires et dynamiques paléoenvironnementales holocènes à Ounjougou (Plateau dogon, Mali, Afrique de l'Ouest). *Quaternaire* 17 (1): 61–74.

Robion-Brunner, C. 2010. *Peuplements des forgerons et traditions sidérurgiques: Vers une histoire de la production du fer sur le plateau de Bandiagara (pays dogon, Mali) durant les empires précoloniaux*. Journal of African Archaeology Monograph series 3, Human Population & Paleoenvironment in West Africa series 1. Frankfurt am Main: Africa Magna Verlag.

Soriano, S., and E. Huysecom. 2012. Lithic industry as an indicator of ceramic diffusion in the Early Neolithic of West Africa: A case study at Ounjougou (Mali). *Journal of African Archaeology* 10 (1): 85–101.

Soriano, S., M. Rasse, C. Tribolo, and E. Huysecom. 2010. Ounjougou: A long Middle Stone Age sequence in the Dogon country (Mali), In *West African archaeology. New developments, new perspectives*. BAR International series 2164, ed. P. Allsworth-Jones, 1–14. Oxford: Archaeopress.

Further Reading

Ounjougou. n.d. Available at: http://www.ounjougou.org.

Out-of-Africa Origins

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Introduction

Around 100,000 years ago, the world was inhabited by a heterogeneous group of hominins: the Neanderthals in Europe and Western Asia, Denisovans and possibly other primitive hominins in East Asia, *Homo floresiensis* on the Indonesian island of Flores, and more modern-looking humans in Africa and the Middle East. By around 30,000 years ago, most of this diversity had disappeared, and modern humans occupied much of the Eurasian continent. How did this transition occur?

Definition

The Out-of-Africa Origins model (also Recent African Origin) was developed by several workers during the 1980s and was discussed in some detail by Chris Stringer and Peter Andrews (Stringer and Andrews 1988). The hypothesis is that the modern form of *Homo sapiens*, or anatomically modern humans (and probably also fundamental aspects of modern human behavior), had evolved in Africa by at least 150,000 years ago. Around 60,000 years ago, modern humans left Africa, replacing archaic hominins outside of the continent with restricted amounts of interbreeding.

Key Issues/Current Debates/Future Directions/Examples

The origins and spread of modern humans have been hotly debated throughout the history of paleoanthropology. There are several hypotheses that explain modern human origins. The first is the Out-of-Africa or Recent African Origins hypothesis (Fig. 1). This hypothesis states that modern humans and modern human behavior evolved in Africa and then spread from Africa around 60,000 years ago, replacing archaic hominins with restricted amounts of interbreeding (Fig. 1). The second hypothesis is the regional continuity or multiregional model and proposes that modern humans evolved in parallel across the globe from the hominins that lived there at the time, with gene flow between the different lineages. A third hypothesis is the assimilation model. This model proposes a middle ground and states that modern humans evolved in Africa, but they merged with the local hominins, resulting in hybrid populations. With advances in scientific methods and additions to the fossil record, these hypotheses are ever changing, but their essence remains the same.

Below are the arguments supporting the Recent African Origins model. Evidence from the fossil record indicates that the African continent gave rise to modern humans. Both morphological and behavioral modernity evolved in Africa between ca. 300,000 and 100,000 years ago. These people would then have spread throughout Africa and across the rest of the world, replacing the other hominins with little gene flow between them. Genetic evidence from mitochondrial and Y-chromosome DNA supports this hypothesis, while nuclear DNA shows that there were also several episodes of interbreeding between *H. sapiens* and other human species (Kuhlwilm et al. 2016.

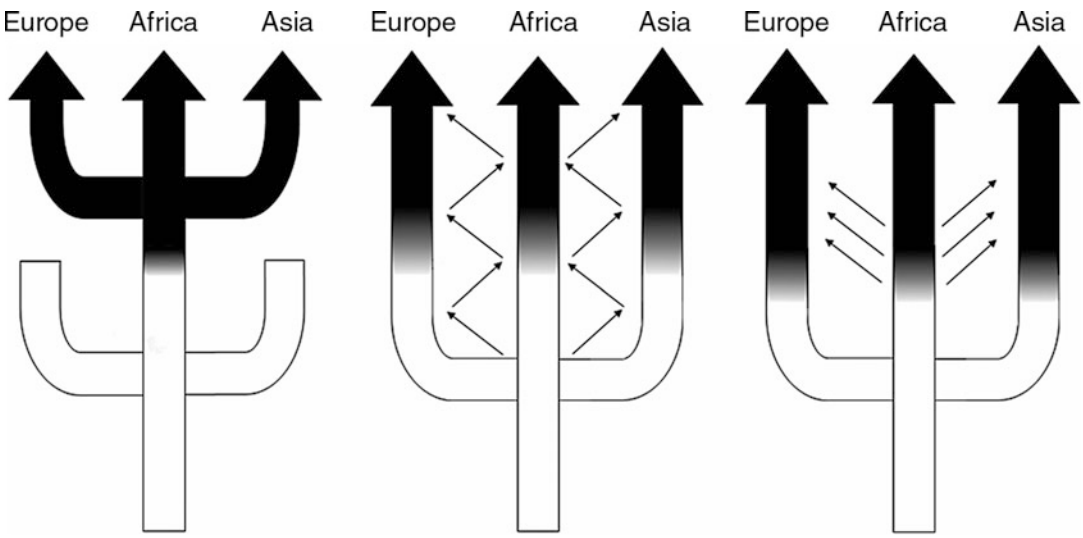

Out-of-Africa Origins, Fig. 1 Three models of modern human origins. *Left*, Out-of-Africa model; *middle*, multiregional model; *right*, assimilation model

Fossil Evidence

Until recently it was believed that the oldest modern human fossils came from East Africa and date to about 160–195,000 years. Fossils from Omo and Herto show some primitive features, but, at the same time, some derived *Homo sapiens* characteristics such as a rounded skull with high forehead, a chin, and a short face that is tucked under the large brain case. In 2017, the Moroccan site of Jebel Irhoud was dated by thermoluminescence and ESR to about 315 ± 34 thousand years old. The cranial material shows some derived *Homo sapiens* traits, such as in its facial, mandibular, and dental morphology, but retains a more primitive neurocranial and endocranial morphology. This material may be evidence of early *Homo sapiens* evolving first in North Africa, rather than East Africa (Hublin et al. 2017).

There is fossil evidence from other parts of Africa that modern humans also lived there at least 100,000 years ago. At Klasies River Mouth in South Africa, for example, the remains of several individuals have been found that suggest some modern affinity. Although the fossils are fragmentary, archaeological evidence from the same site has been described as presenting aspects of behavioral modernity. More complete modern human fossils from Qafzeh and Skhul Caves in Israel are dated to around 110,000 years. Environmental evidence has shown that modern humans were present in this region during a warm and wet period, possibly between phases of Neanderthal's occupation. Other Afro-Arabian mammal species are also present in the archaeological deposits from that time and suggest that this was a small-scale migration into the Levant due to favorable climatic conditions that suited the African fauna.

The earliest fossil evidence for morphologically modern humans outside of Africa comes from sites such as Lake Mungo in Australia (<42,000 BP), Niah Cave in Sarawak (<40,000 BP), Tianyuan Cave in China (<40,000 BP), Tam Pa Ling Cave in Laos (~55,000 BP) (Demeter et al. 2015), Ust'-Ishim in Siberia (~45,000 BP) (Fu et al. 2014), and European sites such as Cavallo Cave and Kents Cavern (40–43,000 BP (Benazzi et al. 2011; Higham et al. 2011). Accompanying some of these fossils is evidence of modern human tools and artifacts. The exodus out of Africa is believed to have been firstly via a coastal route into eastern Asia and down into Australasia. Australasia appears to have been a stepping stone for the peopling of some of the other Pacific Islands by 5000 years ago. Northeast Asia served as the gateway to North and South America by 20,000–15,000 years ago. To date, no morphologically modern humans have been well dated outside of Africa to more than 55,000 years ago, apart from those at Skhul and Qafzeh in the Near East, although there are claims for modern human teeth from Fuyan Cave in China dating to at least 80,000 BP.

Genetic Evidence

Until recently, it was impossible to extract intrinsic DNA from fossils. Therefore, until the end of the twentieth century, genetic research in the field of paleoanthropology was limited to the study of modern human and living primate DNA. Modern human diversity in different types of DNA (mitochondrial, Y-chromosome, and nuclear [autosomal] DNA) enables us to look at the demography of humans' ancient ancestors, the size of the ancestral population, and the number of humans that may have left Africa to populate the rest of the world. DNA can also be used to estimate dates for some key events.

Mitochondrial DNA (mtDNA) is found in the mitochondria, which are small organelles that are involved in energy processing inside the cell. mtDNA is inherited by both males and females from their mother's ovum. Mitochondrial DNA does not undergo recombination but can carry a novel mutation in the child. Many of these mutational changes are introduced at a slow but steady rate. Despite its clear signal of ancestry and descent, mtDNA studies have received criticism because they cover a limited amount of genomic coding compared to the whole DNA sequence. At the same time, the small size of the genome and its limited coding means that it is easier to sample and sequence, and mutations can be easily tracked. Results of mtDNA analysis show that

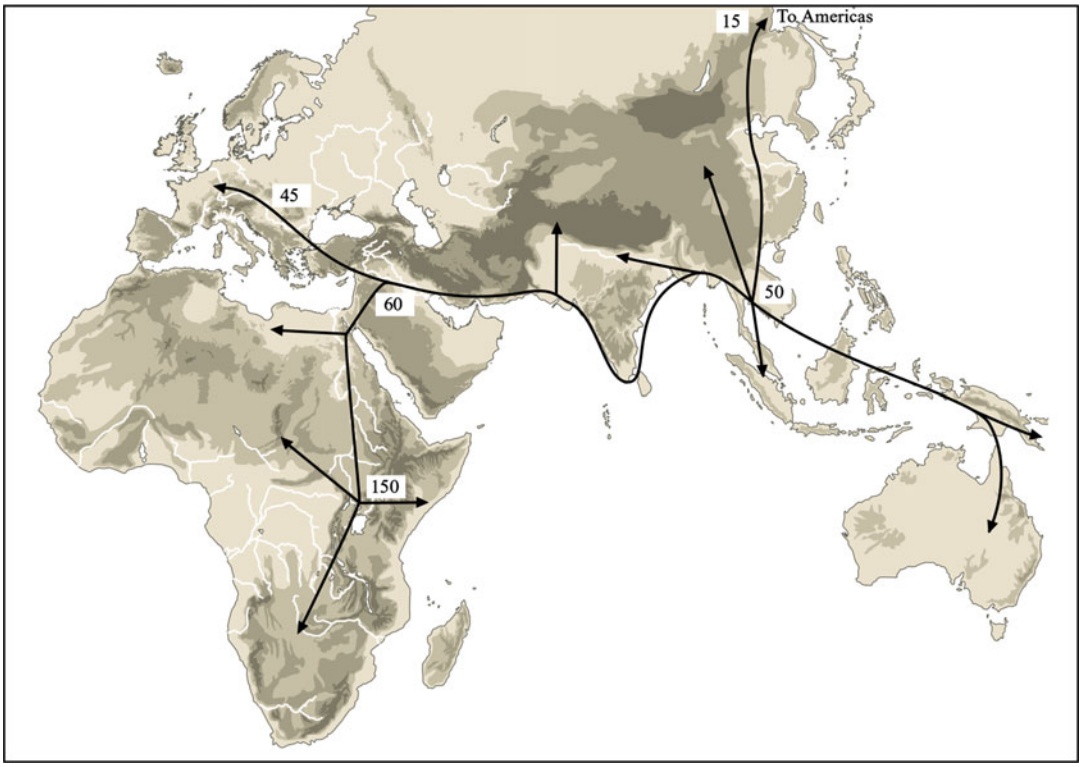

Out-of-Africa Origins, Fig. 2 Map showing the spread of model human groups as traced using mitochondrial DNA (numbers refer to 1000 years ago). Routes shown are notional, not precise. (From The Origin of our Species etc. Credit: Silvia Bello)

the African lineages contain the greatest diversity, indicating that they had the longest time to diverge and are therefore the oldest lineages. This is consistent with Africa being the place of origins of all modern humans. Because the amount of mutation is proportional to time passed, mtDNA can be used to estimate the date when the "mother of all living mtDNA" or "mitochondrial Eve" lived (Fig. 2) and how large the pool of ancestral females was. Although mtDNA mutation rates are not perfectly understood, and therefore dating is still approximate, results from mtDNA studies show that the ancestral population of humans must have been in Africa and perhaps consisted of around 10,000 individuals, with the latest estimate for the mitochondrial origin dating to around 150,000 years (Endicott et al. 2010).

Y-chromosomal DNA is inherited by males from their fathers and carries very few genes. It can only be used to infer the evolutionary history of males. It has received less attention than mtDNA, but in recent years, the Y-chromosomal DNA for a large worldwide sample has been fully sequenced and has yielded some important data on human history. The theoretical "Adam" had been estimated to have lived approximately 70,000 years ago, though recent research has more than doubled that age estimate, and the deepest branches again appear in Africa, supporting an African origin for all modern humans.

The study of autosomal or nuclear DNA has also been used to reconstruct human population history, and analyses of different sequences have largely supported the results from mitochondrial and Y-chromosomal DNA in confirming the same pattern: the greatest amount of variation is present in Africa, and DNA diversity steadily declines with overland distances from Africa. This decline in diversity is also picked up in the morphometry

of skulls in populations from different parts of the world.

In 1997 the first ancient mtDNA was extracted from Neanderthal bone. Since then, some 30 Neanderthal fossils (Green et al. 2008) have been sequenced, showing that mtDNA diversity in Neanderthals was much lower than that of modern humans. In addition, the results strongly indicate that Neanderthals made no lasting contribution to the human mtDNA gene pool. This does not mean, however, that they did not contribute to the nuclear DNA of humans.

In 2010, a nearly complete Neanderthal nuclear genome was published for the first time (Green et al. 2010). That same year, the nuclear DNA of the Denisovans, a previously unknown population that has distinct DNA from modern humans and Neanderthals, was published. This population is known only from a few fossil specimens, but DNA analysis has indicated that this population may have been relatively widespread in Southeast Asia before modern humans migrated into the area, somewhat like Neanderthals were widespread throughout Europe and Western Asia when modern humans arrived there (Slon et al. 2017; Reich et al. 2010).

Contrary to the results of the mtDNA, nuclear genome analysis indicates that humans interbred with both Neanderthals and Denisovans. About 2% of Neanderthal DNA is still present in non-African DNA today, and Denisovan DNA is additionally present in the genome of modern-day Australasians at a level of around 4%. These levels of interbreeding are low but significant, and ongoing analysis is focused on the ways in which these genetic differences between Neanderthals, Denisovans, and modern humans would have manifested phenotypically and how shared DNA might have been advantageous to modern humans (e.g., protection from endemic diseases).

The genomic evidence confirms that humans have a predominantly recent African Origin. Yet, at the same time, it is evident that considered globally, *Homo sapiens* is not entirely Out-of-Africa and that a limited amount of interbreeding with populations outside of Africa had occurred.

Cross-References

- ▶ Archaic *Homo sapiens*
- ▶ Central and West African Middle Stone Age: Geography and Culture
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ Europe: Early *Homo* Fossil Records
- ▶ Fossil Records of Early African *Homo*
- ▶ Fossil Records of Early Modern Humans
- ▶ *Homo heidelbergensis*
- ▶ *Homo neanderthalensis*
- ▶ Human Evolution: Theory and Progress
- ▶ Journal of Human Evolution
- ▶ Pinnacle Point: Excavation and Survey Methods
- ▶ Southern and East African Middle Stone Age: Geography and Culture
- ▶ West and Central Asia: Early Homo Fossil Records

References

Benazzi, S., K. Douka, C. Fornai, C.C. Bauer, O. Kullmer, J. Svoboda, I. Pap, F. Mallegni, P. Bayle, M. Coquerelle, S. Condemi, A. Ronchitelli, K. Harvati, and G.W. Weber. 2011. Early dispersal of modern humans in Europe and implications for Neanderthal behaviour. *Nature* 479 (7374): 525–528.

Demeter, F., L. Shackelford, K. Westaway, P. Duringer, A.M. Bacon, J.L. Ponche, X. Wu, T. Sayavongkhamdy, J.X. Zhao, L. Barnes, and M. Boyon. 2015. Early modern humans and morphological variation in Southeast Asia: fossil evidence from Tam Pa Ling, Laos. *PLoS One* 10 (4): e0121193.

Endicott, P., S.Y.W. Ho, and C. Stringer. 2010. Using genetic evidence to evaluate four palaeoanthropological hypotheses for the timing of Neanderthal and modern human origins. *Journal of Human Evolution* 59 (1): 87–95.

Fu, Q., H. Li, P. Moorjani, F. Jay, S.M. Slepchenko, A.A. Bondarev, P.L. Johnson, A. Aximu-Petri, K. Prüfer, C. de Filippo, and M. Meyer. 2014. Genome sequence of a 45,000-year-old modern human from western Siberia. *Nature* 514 (7523): 445–449.

Green, R.E., A.-S. Malaspinas, J. Krause, A.W. Briggs, P.L.F. Johnson, C. Uhler, M. Meyer, J.M. Good, T. Maricic, U. Stenzel, K. Prüfer, M. Siebauer, H.A. Burbano, M. Ronan, J.M. Rothberg, M. Egholm, P. Rudan, D. Brajkovic, Z. Kucan, I. Gusic, M. Wikström, L. Laakkonen, J. Kelso, M. Slatkin, and S. Pääbo. 2008. A complete Neandertal mitochondrial genome sequence determined by high-throughput sequencing. *Cell* 134 (3): 416–426.

Green, R.E., J. Krause, A.W. Briggs, T. Maricic, U. Stenzel, M. Kircher, N. Patterson, H. Li, W. Zhai, M.H.-Y. Fritz, N.F. Hansen, E.Y. Durand, A.-S. Malaspinas, J.D. Jensen, T. Marques-Bonet, C. Alkan, K. Prüfer, M. Meyer, H.N.A. Burbano, J.M. Good, R. Schultz, A. Aximu-Petri, A. Butthof, B. Höber, B. Höffner, M. Siegemund, A. Weihmann, C. Nusbaum, E.S. Lander, C. Russ, N. Novod, J. Affourtit, M. Egholm, C. Verna, P. Rudan, D. Brajkovic, Ž. Kucan, I. Gušic, V.B. Doronichev, L.V. Golovanova, C. Lalueza-Fox, M. de la Rasilla, J. Fortea, A. Rosas, R.W. Schmitz, P.L.F. Johnson, E.E. Eichler, D. Falush, E. Birney, J.C. Mullikin, M. Slatkin, R. Nielsen, J. Kelso, M. Lachmann, D. Reich, and S. Pääbo. 2010. A draft sequence of the Neandertal genome. *Science* 328 (5979): 710–722.

Higham, T.F.G., T. Compton, C. Stringer, R. Jacobi, B. Shapiro, E. Trinkaus, B. Chandler, F. Gröning, C. Collins, S. Hillson, P. O'Higgins, C. Fitz Gerald, and M. Fagan. 2011. The earliest evidence for anatomically modern humans in northwestern Europe. *Nature* 479 (7374): 521–524.

Hublin, J.J., A. Ben-Ncer, S.E. Bailey, S.E. Freidline, S. Neubauer, M.M. Skinner, I. Bergmann, A. Le Cabec, S. Benazzi, K. Harvati, and P. Gunz. 2017. New fossils from Jebel Irhoud, Morocco and the pan-African origin of Homo sapiens. *Nature* 546 (7657): 289–292.

Kuhlwilm, M., I. Gronau, M.J. Hubisz, C. de Filippo, J. Prado-Martinez, M. Kircher, Q. Fu, H.A. Burbano, C. Lalueza-Fox, M. de La Rasilla, and A. Rosas. 2016. Ancient gene flow from early modern humans into Eastern Neanderthals. *Nature* 530 (7591): 429–433.

Reich, D., R.E. Green, M. Kircher, J. Krause, N. Patterson, E.Y. Durand, B. Viola, A.W. Briggs, U. Stenzel, P.L.F. Johnson, T. Maricic, J.M. Good, T. Marques-Bonet, C. Alkan, Q. Fu, S. Mallick, H. Li, M. Meyer, E.E. Eichler, M. Stoneking, M. Richards, S. Talamo, M.V. Shunkov, A.P. Derevianko, J.-J. Hublin, J. Kelso, M. Slatkin, and S. Pääbo. 2010. Genetic history of an archaic hominin group from Denisova Cave in Siberia. *Nature* 468 (7327): 1053–1060.

Slon, V., B. Viola, G. Renaud, M.T. Gansauge, S. Benazzi, S. Sawyer, J.J. Hublin, M.V. Shunkov, A.P. Derevianko, J. Kelso, and K. Prüfer. 2017. A fourth denisovan individual. *Science Advances* 3 (7): e1700186.

Stringer, C.B., and P. Andrews. 1988. Genetic and fossil evidence for the origin of modern humans. *Science* 239 (4845): 1263–1268.

Further Reading

Stringer, C. 2011. *The origin of our species*. London: Allen Lane.

Overseas Chinese Archaeology

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Introduction

Since its beginnings in the Western USA in the late 1960s, Overseas Chinese archaeology (or Chinese diaspora archaeology) has developed from an uncoordinated collection of primarily descriptive site reports to a rapidly unifying, interdisciplinary, and international field employing sophisticated theoretical approaches in an increasingly contextual and comparative manner. Its significance lies in its potential for addressing themes related to migration, race, and ethnicity, cultural persistence and change, and other topics of wider archaeological relevance.

Definition

Chinese diaspora archaeology focuses on material remains associated with individuals and communities of Chinese descent living abroad, typically in the context of nineteenth- and early-twentieth-century global population movements. It includes both first-generation Chinese immigrants and their naturalized descendants. Studies have been undertaken from a range of theoretical perspectives, and there are currently no dominant research paradigms. To date, research is largely restricted to the USA, Canada, Australia, and New Zealand but could include any country to which Chinese migrated over the past several 100 years or more. Generally excluded are sites not occupied by ethnic Chinese (broadly conceived) but where Chinese-manufactured objects, including coins and export porcelain, have been found. However, the field may encompass the influence of Chinese

migrants and material culture on their non-Chinese neighbors and others with whom they interacted.

Field projects have explored a range of urban and rural contexts, site types, and features. They include industries such as logging, mining, dam and road construction, railroad construction and maintenance, charcoal burning, fish canning, shrimp and abalone harvesting and processing, and market gardening, as well as stores, restaurants, laundries, boarding houses, gambling halls, temples, cemeteries, and cooking features, among others (Fig. 1). Sites are typically identified through historical records or the presence of one or more classes of imported Chinese consumer goods, including ceramic table and storage wares, opium paraphernalia, glass pharmaceutical and beverage bottles, coins, and gaming artifacts. Chinese merchants developed large-scale distribution networks for imported foods and other goods that reached even the most remote labor camps (Fig. 2). Consequently, Chinese sites have been comparatively easy to identify archaeologically, although direct equation of objects with ethnicity remains interpretively problematic and risks overlooking Chinese-occupied sites that lack imported artifacts.

While many studies have been explicitly archaeological, others have drawn together a range of archival, oral history, and archaeological data to develop historical syntheses of individual regions or local communities. Detailed artifact studies have been conducted on Chinese ceramics, opium paraphernalia, coins, and faunal remains, and important work has also been done on standing architecture and in situ collections of objects recovered from such structures.

Historical Background

Overseas Chinese archaeology emerged in the USA in the context of heightened interest in civil rights, social history, multiculturalism, and ethnicity in the 1960s, along with the advent of legally mandated resource management archaeology. Early studies were conducted in the late 1960s and 1970s in the Western USA, including pioneering work on Chinatowns in California, Nevada, and Arizona. Other projects were

Overseas Chinese Archaeology, Fig. 1 Reconstructed Chinese laundry, Barkerville, British Columbia

Overseas Chinese Archaeology, Fig. 2 Cabinets of imported merchandise in a reconstructed Chinese store, Burnaby Village Museum, British Columbia

completed on railroad construction camps in California and Texas, a rural Chinese store and an industrial borax works in California, and a salmon cannery in Oregon. Most work was done in a resource management context, in which Chinese sites were not a self-conscious research objective.

In the 1980s and 1990s, Overseas Chinese archaeology developed into a distinct field of study in the Western USA marked by an increase in the volume and diversity of research, including sophisticated resource management studies and an increasing number of graduate theses (Voss and Williams 2008). Onset of this coalescence is marked by the founding of the Asian American Comparative Collection (AACC) at the University of Idaho in 1982 and publication of two comparative studies of ethnicity incorporating research from Chinese sites (McGuire 1982; Schuyler 1980). The first was an edited volume combining chapters on African and Asian American archaeology, while the second used archaeological data to develop a model of ethnic group formation and change rooted in boundary maintenance. The AACC is a research resource for archaeologists housing an extensive comparative collection of Asian artifacts commonly found on overseas sites plus a sizeable reference library (Fig. 3). It is overseen by volunteer curator Priscilla Wegars, who also edits the AACC's quarterly newsletter.

Throughout this period, most projects continued to be driven by resource management imperatives that included large-scale urban redevelopment projects, although some academic institutions like the Universities of Idaho and Nevada undertook research-oriented excavations. Most studies also focused on descriptive summaries of archaeological findings, including functional artifact typologies. Major resource management projects were undertaken on historic Chinatowns in California, including San Francisco, Sacramento, Oakland, Los Angeles, Riverside, and San Jose, along with Chinatowns in several other states. Work was also done on a range of rural labor camps and related industrial sites across the West but typically on a much smaller scale. Since the 1990s, resource management and academic studies have grown exponentially in quantity and quality, including an expanding volume of published works and a large number of graduate theses.

Early research results were largely contained in unpublished reports and theses, although the 1980s and 1990s saw publication of major monographs on Chinatowns in Los Angeles, Riverside, and Woodland, California (Felton et al. 1984;

Overseas Chinese Archaeology, Fig. 3 Chinese artifacts in the Asian American Comparative Collection, University of Idaho

Great Basin Foundation 1987; Greenwood 1996), along with an edited volume on Overseas Chinese archaeology (Wegars 1993). Wegars' volume addresses rural and urban contexts, work and leisure, analytical techniques, and comparative and theoretical studies. It ranges from local case studies focusing on archival records, rural dwellings and terraced gardens, ethnic boundary maintenance, and the presence of Chinese women to comparative analyses of faunal assemblages and pioneering studies of opium paraphernalia and Asian porcelains. It concludes with a survey and critique of the field by Greenwood. These volumes synthesize large quantities of historical and archaeological data, including numerous individual studies of Chinese traditions and material culture. However, chapters are often compartmentalized rather than building toward an integrated picture of Chinese immigrant life.

Although addressing a range of interpretive themes, much early literature adopted an acculturation paradigm and subscribed to linear, mechanical models of cultural persistence and change that assumed a direct correlation between artifacts and culture. Based on the frequency of imported Chinese artifacts, many studies concluded that Chinese maintained their traditional culture, resisted acculturation, and insulated themselves in ethnic enclaves. Such resistance was interpreted as agency and ethnic boundary maintenance on the part of Chinese immigrants. This approach has been subject to internal critiques beginning in the 1980s (Praetzellis et al. 1987; Voss 2005; Wegars 1993). These critiques have also challenged views of Chinese immigrants as internally homogeneous, when they varied widely in terms of language, class, ethnicity, economic status, and cultural traditions. Subsequently, there has been a gradual interpretive shift toward cultural exchange, fluid and dynamic identities, and strategic adaptation and selective accommodation to local Euro-American culture in particular local contexts.

Mary and Adrian Praetzellis were among the first to argue in favor of a contextual approach (Praetzellis et al. 1987). Their innovative resource management studies of Chinese merchants in Sacramento highlight the active role of material culture in immigrant social strategies. They show how merchants adopted Euro-American material culture while also maintaining homeland practices and manipulated both in their relations with non-Chinese business associates and Chinese laborers. A key observation was that retention of Chinese consumer goods and adoption of Euro-American ones can reflect a variety of factors besides

acculturation, including differential access and power relations. One of their main contributions was to demonstrate that, rather than simply reflecting a static ethnicity, material goods could be actively used to create and transform identities in particular contexts and to serve particular agendas.

Key Issues and Current Debates

The 1990s and Early 2000s

For most of its early history, Overseas Chinese archaeology had little impact on the broader discipline, largely because much of the literature was confined to unpublished reports and theses and remained underrepresented in peer-reviewed journals. Since the 1990s, however, studies of the Chinese diaspora have increasingly addressed core themes in historical archaeology and served as a valuable counterpoint to more established scholarship on the African and European diasporas (Voss and Williams 2008). Such themes include migration, racialization, identity, cultural persistence and change, capitalist economics and labor relations, gender and sexuality, urbanization, and material consumption, among others. In the 2000s, scholars also began incorporating it into disciplinary syntheses and critical overviews of topics like racialization (Orser 2007) and material consumption (Mullins 2011). Asian American archaeology was also spotlighted in a 2004 thematic issue of the SAA Archaeological Record focused on ethnicity. A survey of graduate theses from this same time frame indicates a range of research foci, including acculturation and adaptation, intercultural encounters, material culture preferences, social landscapes and relations, skeletal biology, individual and community identity, globalization, technological change, racialization and discrimination, transnationalism and diaspora, material consumption, and the role of voluntary organizations.

A 2008 thematic volume of *Historical Archaeology* offers a sampling of some of the more sophisticated research that emerged in the USA in the early 2000s (Voss and Williams 2008). The paper by Voss and Allen provides an overview of Overseas Chinese history, historiography, and archaeology and offers critiques of the field and prospects for the future. The volume concludes with critical reflections on the field by Mullins and Yu from an archaeologist's and a historian's perspective. Other papers address immigrant responses to anti-Chinese movements; scales of analysis in Overseas Chinese communities; the lives of a solitary Chinese seaweed gatherer, California farm workers, and Chinatown residents in San Bernardino, California, and Deadwood, South Dakota; an urban Chinese American cemetery in Portland, Oregon; and a plantation cemetery in Hawaii. A particularly groundbreaking paper is Williams' gendered approach to interpreting material culture used by the predominantly male Overseas Chinese population rooted in multiple, competing discourses of masculinity. His work points to the need for a more explicitly gendered approach to the lives of Chinese migrants. In his contribution, Mullins cautions that ghosts of linear and universal models of acculturation still haunt the literature, along with a somewhat static and bounded (essentialist) view of Chinese culture, despite increasing recognition of ethnic identities as fluid and context dependent. He notes that the popular "accommodation" model of culture change differs markedly from the one adopted by archaeologists of African America, rooted in issues of power and inequalities across the color line. He argues that greater attention to the role of racism and race-based exclusion and inequality is needed in archaeological interpretations of Overseas Chinese. Furthermore, the overwhelming focus on migrants' agency and resistance to dominant ideology risks ignoring structural conditions constraining individual choice. Finally, Mullins cautions against overemphasizing the "strange and unusual" aspects of Chinese culture, including opium pipes, Asian ceramics, and gaming pieces, in ways that reify ethnic distinctions and stereotypes (Fig. 4).

In the same volume, Voss and Allen note that most archaeologists studying Overseas Chinese sites have little or no Chinese language training, and few take advantage of the full range of Chinese documents locally or in the homeland. Furthermore, comparative archaeological studies of

nineteenth- and twentieth-century sites in China are rare. They advocate for an overall approach that counters the lingering tendency to perceive Chinese communities as bounded and insular. Such an approach should focus on the interplay within and between ethnic and racialized populations and explore the role of cultural practices in the ongoing negotiation of fluid communities and identities in particular historical contexts, in the way that Praetzellis et al.'s (1987) and Lydon's (1999) pioneering research does.

Overseas Chinese Archaeology, Fig. 4 Chinese gaming pieces recovered from a salmon cannery near Vancouver, British Columbia

Studies increasingly demonstrated that, although they often lived in segregated communities and maintained aspects of homeland culture, Chinese migrants also combined inherited and adopted objects and practices and developed relationships with their non-Chinese neighbors while maintaining distinct ethnic identities. Adopted elements include drinking and dining habits, medicinal remedies, smoking, gaming, and clothing (Fig. 5). Sometimes this involved significant changes to traditional cultural practices but also reuse and recontextualization of non-Chinese objects and behaviors in unique ways. In fact, evidence of non-Chinese artifacts and behaviors has been documented archaeologically from the beginning. However, under the acculturation paradigm, it was largely ignored or rationalized as a product of mixed assemblages or as limited adaptation born of necessity (Voss 2005).

An important development in the 2000s, inspired by Asian American studies, was the emergence of comparative studies within transnational and diasporic paradigms and a shift among many researchers toward referring to the field as Chinese diaspora archaeology. These approaches recognize the significance of multiple simultaneous physical and psychological connections and identities migrants maintain between home

Overseas Chinese Archaeology, Fig. 5 Chinese and non-Chinese kitchen wares in a reconstructed Chinese home, Barkerville, British Columbia

Overseas Chinese Archaeology, Fig. 6 Chinese cemetery in Hilo, Hawai'i

and host countries and with Chinese diaspora communities elsewhere. In Voss and Williams (2008) and in her dissertation, Kraus-Friedberg adopts a transnational approach to interpreting Chinese, Japanese, and Filipino plantation cemeteries in Hawaii. She argues Chinese migrants constructed unique local identities rooted in both home and host countries by adopting and modifying native Hawaiian burial practices. González-Tennant (2011) draws on diaspora studies in calling for comparative research among overseas sites, both with one another and with their home regions in China, to emphasize the heterogeneity of Chinese communities and the diversity of their experiences abroad. As exemplified in Kraus-Friedberg and others' work, increasing attention has also been directed to Chinese cemeteries and funerary rituals, including cultural persistence and transformation, regional origins of particular rituals, the importance of feng shui, the practice of exhuming and returning remains to the homeland, and bioanthropological studies of human remains (Fig. 6). Work has involved excavation, along with analysis of spatial organization and grave markers, emphasizing the retention of Chinese death rituals and the timing and manner with which they were combined with local Euro-American practices (Chung and Wegars 2005).

A major priority of several Chinatown projects since the 2000s has been community involvement and collaboration between disciplines and institutions, including universities, museums, cultural organizations, government agencies, and resource management firms. One of the best examples is the Market Street Chinatown Archaeological Project, directed by Barb Voss at Stanford University, focused on analyzing and publishing a collection of artifacts from San Jose's Chinatown originally excavated in a resource management context in the 1980s. Another increasingly important component of Chinese diaspora archaeology is self-reflexive studies that critically examine the nature of the field in terms of its objectives, standpoints, and agendas, along with biases, power relationships, and the kinds of research questions scholars are asking (or not asking) (e.g., Wegars 1993; Voss 2005). For example, Fong (2007) explores the role of historic stereotypes of Chinese Americans in the development and current practice of Chinese diaspora archaeology. Similar disciplinary critiques have been offered in Australasia.

In Canada, archaeological research on the Chinese diaspora remains limited compared to the USA and is largely restricted to British Columbia and dominated by graduate student research. The most substantial work includes excavations at a Chinese store and society hostel in the gold mining town of Barkerville and an associated regional settlement survey of Chinese mining sites in the broader North Cariboo District (Fig. 7). Another major research project is a comparative study of Chinese and Japanese salmon cannery workers along the lower Fraser River. Substantial studies have also been done at a Chinese mining

Overseas Chinese Archaeology, Fig. 7 Chee Kung Tong benevolent society hall, Barkerville, British Columbia

community and associated cemetery at Wild Horse Creek Provincial Historic Site, twentieth-century urban cemeteries in Vancouver and Victoria, and the D'Arcy Island Leper Colony in the Gulf Islands. There have also been small-scale urban excavations in Vancouver, Victoria, and Nanaimo (Ross 2015).

The Past Five Years

Over the past 5 years or so, archaeological research on the Chinese diaspora has continued to expand and diversify, filling in regional and thematic gaps and addressing some of the critiques and limitations of earlier studies while increasingly adopting transnational, diasporic, and other theoretical approaches. What follows is an overview of the past half-decade of research organized thematically: Chinatowns, rural and industrial sites, comparative studies, cemetery studies, material culture studies, and topical overviews.

The most active urban research is ongoing work on the Market Street Chinatown in San Jose. Especially valuable are recent studies of botanical remains, artifact residues, and wooden artifacts, all understudied in Chinese diaspora archaeology. Voss et al. (2015) analyzed residues from ten glass medicine bottles recovered from Market Street, revealing the presence of mineral-based stone drugs common to traditional Chinese medicine in seven of them, highlighting the importance of such remedies in the healthcare regimens of Chinese migrants. In a broader study, Cummings et al. (2014) report on an intra-site comparison of botanical and other plant-based food remains from merchant households and tenements. Both household types consumed a variety of fresh fruits and vegetables, but there was variability in the variety of cereal grains, legumes, vegetables, fruits, and nuts between households that may relate to social class and/or occupation. Seiter et al. (2015) studied wood artifacts from Market Street, including taxonomic identification to explore trade patterns, analysis of structural timbers to elucidate Chinatown's built environment, and analysis of portable objects to shed light on work, recreation, and dining. In the most wide-ranging study to date, Kennedy's (2016) research combines botanical and faunal data to focus on relationships between food and identity and how food choices connected people to one another and to specific places. He argues that certain shared food practices that crosscut class differences between merchants and laborers aided in combating racist exclusion and promoted community cohesion. Kennedy draws on transnational

approaches to explore how the complex flow of people, goods, and ideas throughout the Pacific influenced food practices and uses faunal data to link Market Street to fisheries across North America and China.

Recent research has also been conducted at several other Chinatowns. Fong (2013) presents a multidisciplinary study of the Chinese community in Isleton, California, drawing on archives, oral histories, and archaeological data, along with an interpretive approach rooted in racial theory and an explicit rejection of assimilation-based interpretive models. Addressing Mullins' call for greater attention to race among archaeologists, Fong's analysis explores everyday life in the community and identifies structural racism in American society rather than assimilation pressure as a key force influencing material practices among community members. Sunseri (2015) presents archaeological data from Chinese and Paiute neighborhoods at Mono Mills in California's mining frontier suggesting evidence for material interactions between ethnic communities. Such evidence includes pine nuts and obsidian, of probable Native American origin, recovered from a Chinese household, and a Chinese porcelain spoon recovered from the Paiute neighborhood. Though the nature of such relationships remains unclear, Sunseri argues that the data provide evidence for agency among marginalized groups in the context of racial discrimination. In contrast, Porcasi (2016) argues that faunal data from a Chinese laundry in Santa Barbara, California, dominated by pork, provides strong evidence for retention of traditional foods and limited assimilation into local society despite the major economic role the laundry played in the wider non-Asian community. Such research highlights the continued role of acculturation narratives in Chinese diaspora archaeology.

Ongoing research has also addressed a series of rural and industrial contexts, including fishing, mining, and railroad camps across the Western USA and Canada. Ross (2013) presents a comparative study of the everyday material lives of Chinese and Japanese salmon cannery workers in British Columbia, using a theoretical approach rooted in the related concepts of transnationalism and diaspora that he argues is broadly applicable to archaeological studies of long-distance population movements. He uses data from these two labor camps, especially evidence for drinking and dining, to examine how displacement associated with overseas migration and ongoing relations between home and host societies shaped consumer habits and identities of both groups of immigrants in unique ways. Braje and Bentz synthesize previous research and present new findings on late-nineteenth- and early-twentieth-century Chinese abalone fishing camps on California's Channel Islands (Braje et al. 2014; Bentz and Braje 2017). They address topics including results of survey and excavation, descriptions of artifacts and features, and detailed contextual information on the geographic origins of the Chinese fishermen, including how they came to control the fishery and how their products became part of the local, regional, and international economies. Some camps were occupied over time by different ethnic groups exploiting a range of marine species, including precontact Chumash and historic Japanese and European immigrants, reflecting changing land use patterns. Springer (2015) presents three case studies of geochemical and macrobotanical analysis from Nevada, including a rural Chinese mining community near Elko, demonstrating the potential for inter-site comparisons to identify regional trends in health and consumer practices. Privy soil from the Chinese settlement indicates residents were exposed to toxic chemicals like mercury and lead, perhaps from patent medicines, while botanical remains provide data on economic status and availability of consumer goods in remote locations. In one of the most comprehensive recent studies, Merritt (2017) presents a historical anthropology of the Chinese in Montana from the 1860s to the 1940s, interweaving archaeological, archival, and oral history data on known and newly documented sites. Merritt seeks to develop a statewide historic and archaeological context for early Chinese immigrants in Montana while also analyzing the internal structure of the Chinese population and highlighting their contributions to the state's infrastructure and economy. Another major publication is an edited volume of

Historical Archaeology featuring the Chinese Railroad Workers in North America Project Voss (2015b). This project, established at Stanford University in 2012, is an interdisciplinary, transnational project involving researchers in the USA and China, focused on documenting the neglected history of Chinese railroad workers. Papers address sites in California, Utah, Montana, Nevada, and other western states and cover topics including pioneering fieldwork on railroad sites in the 1960s, moral discourses on labor relations, comparisons of railroad construction camps, methods for analyzing ephemeral sites occupied for short periods, multiethnic alliances between railroad workers, Chinese inscriptions on sandstone cliff faces, Asian coins and faunal remains recovered from labor camps, healthcare practices among railroad workers, analysis of skeletal remains from a Chinese cemetery along the railroad, and commentaries on the past, present, and future of archaeological studies of Chinese railroad workers.

Rather than focusing on one or the other, some researchers have sought to compare data from urban and rural settings or interrogate the nature of this divide. For example, Dale (2016) compares data on urban and rural Chinese sites in and around Aurora, Nevada, dating from the 1860s to 1920s, including a series of woodcutter camps, to explore factors influencing the material decisions of their occupants on a local and regional scale. She focuses on the concept of agency in examining how forces internal and external to these communities, including culture contact, identity, and economics, played key roles in decision making, drawing on additional comparative data from the Chinatown in Bodie, California.

Two recent cemetery studies include work by Harrod et al. (2012) on human remains from Carlin, Nevada, dating to the late nineteenth and early twentieth centuries, and Gust's (2016) published report on excavation of 73 Chinese graves dating to the mid- to late-1880s in a historic cemetery in Los Angeles. Harrod and colleagues seek to correlate socioeconomic and political inequality between Chinese and other local populations and activity-induced skeletal changes, including pathology and trauma, related to things like physical labor, accidents, and interpersonal conflict. Gust focuses on a combination of skeletal and material culture data, noting the presence of spiritual offerings, evidence for disinterment that typically left such offerings and things like clothes and personal items behind, and confirmation that women and children were also present among the deceased at a time when the immigrant population was dominated by men.

Although not as common as they once were, material culture studies continue to be an important part of the field. For example, a recent study by Choy (2014) revises our understanding of Chinese ceramics commonly found on overseas sites of the nineteenth and twentieth centuries, based on historical research, travel to ceramic museums and production centers in Southern China, and interviews with ceramics scholars in the homeland. Such revisions contribute to our understanding of design elements, manufacturing origins, reign marks, dining habits, and Chinese language terminology used to describe these wares. Likewise, in their archaeological guide to coins found on North American sites, Akin et al. (2016) devote an entire chapter to Asian coins, covering coins from China, Vietnam, Japan, and Korea and address topics including currency systems, physical characteristics, inscriptions, replicas and forgeries, and non-currency uses of coins in overseas contexts.

Finally, some researchers have sought to explore the wider context of Chinese diaspora archaeology, either through literature reviews, critical assessments of interpretive concepts, syntheses of regional archaeological data, or reconceptualization of the field itself. Ross (2015) reviews the history of archaeological research on the Chinese diaspora in British Columbia spanning the 1980s through 2010s and situating it within the context of the wider discipline in western North America. Molenda (2015) reassesses archaeological approaches to feng shui, arguing that it is not a strict set of rules to be followed and cannot be studied using a checklist approach to determine its presence or absence at a particular site. Rather than something that is present or absent, it is a pervasive aspect of the

landscape. Furthermore, while there are regularities to how Chinese craft cultural landscapes, feng shui should be viewed as a dynamic, culturally informed aesthetic approach to organizing space as it is encountered, varying from one place to the next and incorporating multiple solutions for each unique situation. Kennedy (2017) moves beyond his work on food at the Market Street Chinatown in California, discussed above, to shed light on the Chinese fish trade in North America more broadly, combining archival data on Chinese fisheries and archaeological data from Chinese sites across the West. He concludes that Chinese immigrants continued to consume fish species resembling those consumed in the homeland but acquired them from a range of sources in China and throughout western North America. In a major reconceptualization of the discipline, Voss (2015a) seeks to expand Chinese diaspora archaeology beyond its focus on sites and research resources in North America (and other settler societies) into a transpacific archaeology of the modern world that harnesses the potential of transnational and transdisciplinary research between the USA and China. In doing so, she draws on examples from her work with the Chinese Railroad Workers in North America Project, highlighting research resources and complementary scholarship available in homeland regions of China. This approach is also exemplified in ongoing archaeological research by Voss and colleagues at a home village in China's Pearl River Delta.

International Perspectives

Outside North America, substantial Chinese diaspora archaeology has been done in Australia and New Zealand. Much pioneering research in Australasia focused on goldfields in heritage management contexts and was more a product of an interest in mining sites and landscapes than an explicit interest in Chinese heritage (Lawrence and Davies 2011). The earliest Overseas Chinese archaeology was conducted by Ritchie (1986) at a series of Chinese mining-related sites on New Zealand's Otago goldfields from the late 1970s to mid-1980s in conjunction with hydroelectric development. His dissertation and publications contain a wealth of valuable data on Chinese sites and material culture. Likewise, early work in Australia focused on a Chinese market garden on the Palmer River goldfield in North Queensland. Since Ritchie's studies, only limited archaeological research has been done on Chinese sites in New Zealand, including a series of regional surveys and large-scale excavations at Lawrence Chinese Camp in the Otago region. Mining has remained a prominent focus in Australia, comprising regional surveys and excavation since the 1980s, including Smith's (2006) work on Chinese regional settlement systems in New South Wales.

However, increasing urban archaeology in the 1990s uncovered sites associated with Chinese immigrants in neighborhoods of Sydney and Melbourne (Lawrence and Davies 2011). Since then, Chinese diaspora archaeology in Australia has become increasingly research oriented and diverse both thematically and in terms of site types investigated, ranging from market gardens to fish-curing sites. Studies have addressed issues of social and economic organization, hierarchical settlement patterns, trade networks, consumption patterns, comparisons between urban and rural life, relations with non-Chinese, and religious beliefs and rituals. Particular classes of Chinese sites and features have been the focus of considerable attention as central places in Chinese physical, social, and ritual landscapes, including temples, cemeteries, and stone ovens used to prepare communal meals. Themes include the role of feng shui in the location and orientation of sites and structures, architectural and stylistic analysis of temples, types and uses of ovens, and the role of all of these features in settlement networks.

As in North America, most early work was done in conjunction with resource management and emphasized descriptive and typological studies of Chinese sites and material culture. Most studies also adopted theoretical frameworks emphasizing acculturation and situational adaptation, largely arguing in favor of cultural persistence. However, there has been increasing realization that objects like Chinese and

European ceramics were embedded in complex trade networks, social strategies, and relations of power within and beyond the Chinese community. A number of studies have shown how Chinese combined traditional dining and drinking habits with those of the host society, demonstrating a complex combination of continuity and change. For example, like the Praetzellises in Sacramento, Muir (2008) argues that Chinese in Melbourne used English ceramics consciously as a means of gaining access to opportunities in a white-dominated society, and use of Chinese ceramics had as much to do with obligation and reciprocity as a desire to maintain traditional diet.

A landmark work in the region was Lydon's (1999) study of Chinese in the Rocks neighborhood of Sydney, replacing acculturation with a model of cultural entanglement and exchange and of bounded and static ethnicity with multiple fluid and competing identities. Lydon explored the role of material objects in colonial encounters between Chinese immigrants and those of European descent. In her examination of cultural exchanges between these groups, objects and material behaviors comprise a form of communication that draw on elements of both cultures, which she refers to as "pidgin English." The fluidity of identity means that inherited and adopted objects and practices can be complementary and immigrants can hold multiple simultaneous identities as both Chinese and Australian. As part of her study, she also offered a detailed overview and critique of the field in North America and Australasia.

Since the 1990s, scholars and heritage organizations in Australia have developed a series of studies of Chinese heritage resources. These include a thematic survey of Chinese sites in the country that comprised a historical overview, an annotated bibliography, and a state-by-state analysis of recorded sites and investigations, plus a national database of sites and a guide for finding and assessing Chinese heritage places (Casey and Ritchie 2003). Unlike the USA, Chinese diaspora archaeology in Australasia has had a significant influence on the larger discipline with respect to themes like race and ethnicity and is discussed in depth in Lawrence and Davies' (2011) overview of historical archaeology in Australia. Likewise, there has long been a close relationship between archaeologists, historians, museum personnel, and community members, including joint conferences and publications. One such conference resulted in a thematic volume of *Australasian Historical Archaeology* on Chinese sites in Australia and New Zealand (Casey and Ritchie 2003). Besides an overview of the field, it includes papers on identifying Chinese alluvial mining and other sites, along with studies of Chinese ceramics, temples, cemeteries, and a summary of Chinese archaeological sites, artifact repositories, and archives in North America and Australasia.

In the past half-decade, there have been a series of new studies in Australia, and to a lesser degree New Zealand, addressing aspects of Chinese diaspora archaeology in general or presenting individual case studies. Burke and Grimwade (2013) review the history of archaeology of Chinese immigrants in Far North Queensland. They note that much of it has been driven by resource management projects, producing data of variable quality and comparability that is skewed toward urban centers, and recommend more research-oriented studies. Nevertheless, they are able to draw some generalizations relating to drinking and dining behavior, which exhibit a trend toward use of imported Chinese ceramic tableware contrasted with a marked preference for European alcohol. This pattern resembles what Ross (2013) observed for Chinese and Japanese cannery workers in British Columbia, and Burke and Grimwade suggest that this may reflect use of these two material practices in different ways in the construction of individual and collective identities. Byrne (2016) argues in favor of a transnational approach to interpreting the material heritage of Chinese migration to Australia in the nineteenth and twentieth centuries. He proposes the concept of a "heritage corridor" as a more accurate representation of the back and forth movement of people, objects, ideas, and currency than the one-way nation-based narratives of migrant arrival and settlement. He pays close attention to migrants' continued ownership of property in the homeland and the role of

remittances in the construction of homes, schools, temples, infrastructure, and other aspects of the built environment.

Several recent studies in Australia and New Zealand draw on archaeological data to explore the lives of market gardeners. Adamson and Bader (2013) examine how Chinese market gardener Chan Dah Chee, living in Auckland away from established Chinese communities and networks, survived and thrived through strategic use of European material culture in traditional Chinese ways and by creating social and economic bonds with influential non-Chinese families. In this sense, the authors draw from interpretive themes and approaches pioneered by Mary and Adrian Praetzellis in California in the 1980s and 1990s. Similarly, Boileau (2013) focuses on material objects to highlight the daily lives and social interactions of Chinese market gardeners in Australia and New Zealand, but, rather than an entire assemblage of artifacts, focuses on four representative objects. Two of the objects are archaeological, a garden rake and European ceramic tableware, while the other two (an oil engine and a watch chain) are in museum or personal collections. Themes addressed through these items include agricultural practices, labor organization and technological change, and interactions with Europeans. Like Adamson and Bader, Rains (2013) emphasizes social and economic relationships between Chinese and European communities, drawing on data from the frontier community of Cooktown in North Queensland. He shows how Chinese were integrated through a series of complex negotiations into the town's socioeconomic fabric, with both Chinese and European communities controlling key economic niches that made them dependent on one another, rather than antagonistic competitors that relegated Chinese to the margins. This is evident, for example, in archaeological evidence that shows that Chinese residents occupied some of the best gardening sites in town.

Recent years have seen publication of two major monographs on Chinese archaeology in Australia, Esposito's (2014) study of imported Chinese ceramics and Bowen's (2012) research on the Chinese role in Victoria's colonial fishing industry. Esposito compares ceramics from a series of Chinese gold mining camps in New South Wales spanning the mid-nineteenth through early twentieth centuries, focusing on Chinese supply networks, the role of ceramics in everyday life, use of Western-style ceramics by Chinese miners, and comparisons with local non-Chinese sites. Her study includes detailed descriptions of her datasets and innovative compositional (electron microprobe) analysis of Chinese ceramic sherds to identify their manufacturing origins in China. In contrast, while Bowen addresses the wider history of commercial fishing in Australia during the late nineteenth century and the dominant role of Chinese immigrants in this industry, his archaeological analysis focuses on a single Chinese fish-curing camp in Victoria occupied between the 1860s and 1907. His results address Chinese entrepreneurship, interactions between Chinese and Europeans, inequalities between Chinese merchants and laborers, and the structure and internal workings of the camp itself.

Future Directions

To date, most research on Chinese diaspora sites remains centered on the Western USA and Canada, and similar regionalism exists in Australasia. There is considerable need for expansion into other regions and countries in the Americas, Asia, Europe, and Africa where Chinese migrants settled, as well as the homeland itself, as advocated in Voss' transpacific approach. There is also need for more comparative studies of Chinese communities in a range of contexts and with other Asian and non-Asian diasporas and ethnic groups, though recent research is beginning to fill this gap. Detailed comparisons between North America and Australasia would aid in understanding the relationship between local circumstances and broader international patterns of diasporic population dispersal, and continued efforts by Australian researchers to engage the North American literature are a major step in this direction. The field would also benefit by including research on the Asian diaspora more broadly, including migrants from Japan, Korea,

Overseas Chinese Archaeology, Fig. 8 Chinese medicine bottles recovered from a salmon cannery near Vancouver, British Columbia

the Philippines, and elsewhere, all understudied by archaeologists.

Material culture studies have focused primarily on descriptive typologies, and much less attention has been granted to the cultural origins, shifting meanings, and social and economic contexts in which these objects were produced, marketed, and used. More work like Esposito's is also needed on materials analysis like elemental characterization to refine our understanding of the regional origins, manufacturing technologies, dating, and distribution networks of ceramics, bottles, and other artifacts commonly found archaeologically (Fig. 8).

As the field matures, it is necessary to continue pursuing collaborative studies with local communities, organizations, and institutions and with scholars in related disciplines, as active participants in research design, methods, interpretation, and dissemination of results. Research must also continue to integrate oral history, archival research using Asian language sources, and recent developments in Asian diaspora studies with the results of archaeological analysis. For the field to maintain contemporary relevance, archaeologists must be increasingly self-reflexive about the assumptions and agendas underlying their research, along with the interests it serves and its implications for living communities. Of particular value would be more substantial development of relationships with scholars in China, as Voss and colleagues are currently doing, to pursue archaeological and ethnohistorical research on everyday life in the nineteenth and early twentieth centuries. Such data would provide a more nuanced context for interpreting overseas sites similar to ongoing work in Africa and Ireland, not only as a model of life prior to emigration but to understand changes influencing transnational migrants maintaining ongoing relationships with the homeland.

In the 2008 thematic volume of *Historical Archaeology*, Voss and Allen argued that Chinese diaspora archaeology was still an emerging field and faced three major challenges to its further development. They include a continued need to (1) shift from descriptive reporting to problem-oriented research that addresses pluralistic, multiethnic sites and issues of power and race, (2) move away from acculturation and develop alternative models of intercultural contact that account for complex relationships between immigrants and the host society, and (3) overcome the Orientalist tendency to draw fundamental, stereotypical distinctions between Eastern and Western culture that homogenize variability. To meet these objectives, the authors call for research that is multistranded, multisited, multilingual, multi-scalar, and multidisciplinary. These five "m's" encapsulate the future of the field, and with major strides evident in the past decade since this volume was published, it is poised to make a major impact in historical archaeology and the broader discipline as a whole.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Australasian Historical Archaeology
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Community Archaeology
- ▶ Contemporary Past, Archaeology of the
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Global Archaeology
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ Multicultural Archaeology
- ▶ North America (USA): Historical Archaeology

▶ Oceania: Historical Archaeology
▶ Post-Processual Archaeology
▶ Race in Archaeology
▶ Reflexivity in Archaeology
▶ Social Identity in Historical Archaeology
▶ Urban Archaeology

References

Adamson, J., and Hans-Dieter Bader. 2013. Gardening to prosperity: The history and archaeology of Chan Dah Chee and the Chinese market garden at Carlaw Park, Auckland. In *Finding our recent past: Historical archaeology in New Zealand*, ed. M. Campbell, S. Holdaway, and S. Macready, 143–165. Auckland: New Zealand Archaeological Association.

Akin, M., J.C. Bard, and K. Akin. 2016. *Numismatic archaeology of North America: A field guide*. New York: Routledge.

Bentz, L., and T.J. Braje. 2017. Sea of prosperity: Foundations of the California commercial abalone fishery. *International Journal of Historical Archaeology* 21 (3): 598–622.

Boileau, J. 2013. Researching Chinese market gardening: Insights from archaeology and material culture. *Chinese Southern Diaspora Studies* 6: 134–143.

Bowen, A.M. 2012. *Archaeology of the Chinese fishing industry in colonial Victoria*, Studies in Australasian historical archaeology. Vol. 3. Sydney: Sydney University Press.

Braje, T.J., J.G. Costello, J.M. Erlandson, and R. Delong. 2014. Of seals, sea lions, and abalone: The archaeology of an historical multiethnic base camp on San Miguel Island, California. *Historical Archaeology* 48 (2): 122–142.

Burke, H., and G. Grimwade. 2013. The historical archaeology of the Chinese in Far North Queensland. *Queensland Archaeological Research* 16: 121–139.

Byrne, D. 2016. The need for a transnational approach to the material heritage of migration: The China-Australia corridor. *Journal of Social Archaeology* 16 (3): 261–285.

Casey, M. and N. Ritchie. eds. 2003. Archaeology of the Overseas Chinese. *Australasian Historical Archaeology* 21: pp. 1–89.

Choy, P.P. 2014. Interpreting "Overseas Chinese" ceramics found on historical archaeology sites: Manufacture, marks, classification, and social use. SHA Research Resource. Available at: https://sha.org/resources/chinese-ceramics/. Accessed 30 Jan 2018.

Chung, S.F., and P. Wegars, eds. 2005. *Chinese American death rituals: Respecting the ancestors*. Lanham: Rowman & Littlefield.

Cummings, L.S., B.L. Voss, C.Y. Yu, P. Kovacik, K. Puseman, C. Yost, R. Kennedy, and M.S. Kane. 2014. Fan and tsai: Intracommunity variation in plant-based food consumption at the Market Street Chinatown, San Jose, California. *Historical Archaeology* 48 (2): 143–172.

Dale, E.S. 2016. Chinese agency in the era of the Chinese question: Historical archaeology of woodcutting communities in Nevada, 1861–1920. Unpublished PhD dissertation, Department of Anthropology, University of Nevada, Reno.

Esposito, V. 2014. *Rice bowls and dinner plates: Ceramic artefacts from Chinese gold mining sites in southeast New South Wales, mid 19th to early 20th century*, BAR international series. Vol. 2674. Oxford: BAR Publishing.

Felton, D.L., F. Lortie, and P.D. Schulz, eds. 1984. *The Chinese laundry on second street: Papers on archaeology at the Woodland Opera House Site*, California archaeological reports. Vol. 24. Sacramento: Cultural Resource Management Unit, Department of Parks and Recreation.

Fong, K. 2007. Return of the 'Heathen Chinee': Stereotypes in Chinese American archaeology. *Chinese America: History and perspectives* 21: 115–118.

Fong, K. 2013. Excavating Chinese America in the Delta: Race and the historical archaeology of the Isleton Chinese American community. Unpublished PhD dissertation, University of California, Los Angeles.

González-Tennant, E. 2011. Creating a diasporic archaeology of Chinese migration: Tentative steps across four continents. *International Journal of Historical Archaeology* 15: 509–532.

Great Basin Foundation, ed. 1987. *Wong Ho Leun: An American Chinatown*. San Diego: The Great Basin Foundation.

Greenwood, R.S. 1996. *Down by the station: Los Angeles Chinatown, 1880–1933*, Monumenta Archaeologica. Vol. 18. Los Angeles: Institute of Archaeology, University of California.

Gust, S. 2016. Chinese at the historic Los Angeles Cemetery. *Pacific Coast Archaeological Society Quarterly* 52 (2): 49–72.

Harrod, R.P., J.L. Thompson, and D.L. Martin. 2012. Hard labor and hostile encounters: What human remains reveal about institutional violence and Chinese immigrants living in Carlin, Nevada (1885–1923). *Historical Archaeology* 46 (4): 85–111.

Kennedy, J.R. 2016. Fan and tsai: Food, identity, and connections in the Market Street Chinatown. Unpublished PhD dissertation, Department of Anthropology, Indiana University, Bloomington.

Kennedy, J.R. 2017. The fresh and the salted: Chinese migrant fisheries engagement and trade in nineteenth-century North America. *Journal of Ethnobiology* 37 (3): 421–439.

Lawrence, S., and P. Davies. 2011. *An archaeology of Australia since 1788*. New York: Springer.

Lydon, J. 1999. *'Many inventions': The Chinese in the Rocks, Sydney, 1890–1930*. Clayton: Monash University.

McGuire, R. 1982. The study of ethnicity in historical archaeology. *Journal of Anthropological Archaeology* 1: 159–178.

Merritt, C.W. 2017. *The coming man from Canton: Chinese experience in Montana, 1862–1943*. Lincoln: University of Nebraska Press.

Molenda, J. 2015. Rethinking feng shui. In *Historical archaeologies of capitalism*, ed. M.P. Leone and J.E. Knauf, 181–199. New York: Springer.

Muir, A. 2008. Kitchen Ch'ing: Chinese archaeological ceramics in Victoria. Unpublished MA dissertation, La Trobe University.

Mullins, P.R. 2011. *The archaeology of consumer culture*. Gainesville: University Press of Florida.

Orser, C.E., Jr. 2007. *The archaeology of race and racialization in historic America*. Gainesville: University Press of Florida.

Porcasi, J.F. 2016. Persistence of traditional lifeways by early Chinese immigrants: Faunal evidence from the High Lung Laundry (CA-SBA-2752H) Santa Barbara, California. *International Journal of Historical Archaeology* 21 (3): 558–576.

Praetzellis, A., M. Praetzellis, and M. Brown III. 1987. Artifacts as symbols of identity: An example from Sacramento's Gold Rush Era Chinese community. In *Living in cities: Current research in urban archaeology*, Special publication series, ed. E. Staski, vol. 5, 38–47. Tucson: Society for Historical Archaeology.

Rains, K. 2013. Doing business: Chinese and European socioeconomic relations in early Cooktown. *International Journal of Historical Archaeology* 17: 520–545.

Ritchie, N.A. 1986. Archaeology and history of the Chinese in southern New Zealand during the nineteenth century: A study of acculturation, adaptation, and change. Unpublished PhD dissertation, University of Otago.

Ross, D.E. 2013. *An archaeology of Asian transnationalism*. Gainesville: University Press of Florida.

Ross, D.E. 2015. Barkerville in context: Archaeology of the Chinese in British Columbia. *BC Studies* 185: 161–192.

Schuyler, R.L., ed. 1980. *Archaeological perspectives on ethnicity in America: Afro-American and Asian American culture history.* Amityville: Baywood.

Seiter, J.I., M.J. Worthington, B.L. Voss, and M.S. Kane. 2015. *International Journal of Historical Archaeology* 19: 664–685.

Smith, L.M. 2006. Hidden dragons: The archaeology of mid to late nineteenth-century Chinese communities in southeastern New South Wales. Unpublished PhD dissertation, Australian National University.

Springer, I. 2015. Historical archaeology at the microscopic scale: The application of geochemical and macrobotanical analysis. Unpublished MA thesis, Department of Anthropology, University of Nevada, Reno.

Sunseri, C.K. 2015. Food politics of alliance in a California frontier Chinatown. *International Journal of Historical Archaeology* 19: 416–431.

Voss, B.L. 2005. The archaeology of overseas Chinese communities. *World Archaeology* 37: 424–439.

Voss, B.L. 2015a. Towards a transpacific archaeology of the modern world. *International Journal of Historical Archaeology* 20 (1): 146–174.

Voss, B.L., ed. 2015b. The archaeology of Chinese railroad workers in North America. *Historical Archaeology* 49(1).

Voss, B.L., and B. Williams. eds. 2008. The archaeology of Chinese immigrant and Chinese American communities. *Historical Archaeology* 42(3).

Voss, B.L., R. Von Wandruszka, A. Fink, T. Summer, S.E. Harman, A. Shapovalov, M.S. Kane, M. De Loney, and N. Acebo. 2015. Stone drugs and calamine lotion: Chemical analysis of residue in nineteenth-century glass bottles, Market Street Chinatown, San Jose, California. *California Archaeology* 7 (1): 93–118.

Wegars, P., ed. 1993. *Hidden heritage: Historical archaeology of the overseas Chinese*. Amityville: Baywood.

Further Reading

Asian American Comparative Collection. n.d. Available at http://webpages.uidaho.edu/aacc/

Chen, Y. 2001. In the colonies of Tang: Historical archaeology of Chinese communities in the North Cariboo District, British Columbia (1860s–1940s). Unpublished PhD dissertation, Simon Fraser University.

Chinese Railroad Workers In North America Project. n.d. Available at: http://web.stanford.edu/group/chineserailroad/cgi-bin/wordpress/

Greenwood, R.S., ed. 1976. The changing faces of Main Street. Report prepared for the Redevelopment Agency, City of San Buenaventura by Greenwood and Associates, Pacific Palisades.

Hardesty, D.L. 2010. *Mining archaeology in the American West: A view from the Silver State*. Lincoln: University of Nebraska Press.

Hattori, E.M., M.K. Rusco, and D.R. Tuohy, eds. 1979. *Archaeological and historical studies at Ninth and Amherst, Lovelock, Nevada*, 2 vols. Carson City: Nevada State Museum Archaeological Services.

Lister, F.C., and R.H. Lister. 1989. *The Chinese of early Tucson: Historical archaeology from the Tucson Urban Renewal Project*, Anthropological papers of the University of Arizona. Vol. 52. Tucson: University of Arizona Press.

Macgregor, P., ed. 1995. *Histories of the Chinese in Australasia and the South Pacific*. Melbourne: Museum of Chinese Australian History.

Market Street Chinatown Archaeological Project. n.d. Available at: https://marketstreet.stanford.edu/

Orser, C.E., Jr. 2010. Twenty-first-century historical archaeology. *Journal of Archaeological Research* 18: 111–150.

Pastron, A.G., J. Prichett, and M. Ziebarth. eds. 1981. Behind the seawall: Historical archaeology along the San Francisco waterfront, 3 vols. Report prepared for the San Francisco Clean Water Program by Archeo-Tec, San Francisco.

Praetzellis, M., and A. Praetzellis. 1997. Historical archaeology of an overseas Chinese community in Sacramento, California. Report submitted to US General Services Administration, San Francisco by Anthropological Studies Center, Sonoma State University,

Rohnert Park. Available at: http://www.sonoma.edu/asc/publications/sac_hi56/index.html
Praetzellis, M., and A. Praetzellis eds. 2004. Putting the 'there' there: Historical archaeologies of West Oakland. Report prepared for California Department of Transportation by Anthropological Studies Center, Sonoma State University, Rohnert Park. Available at: http://web.sonoma.edu/asc/cypress/finalreport/index.htm
Southern Oregon Digital Archives Chinese Material Culture Collection. n.d. Available at: http://digital.hanlib.sou.edu/cdm/landingpage/collection/p16085coll10

Özbaşaran, Mihriban

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Basic Biographical Information

Mihriban Özbaşaran was born in Turhal, located in Tokat City, Turkey. She graduated from Kadıköy Anatolian High School in 1975 and started her studies at Istanbul University's Classical Archaeology Department in 1975. She graduated with an undergraduate thesis titled "House Types of Continental Greece: Neolithic, Early Hellas, Middle Hellas Ages," supervised by Prof. Dr. Aşkıdil Akarca, while taking the subsidiary certificate programs including prehistory, Greek language, and literature. Özbaşaran finished her M.A. dissertation titled *Structural Characteristics of the Early Chalcolithic Architecture of Tülintepe* in 1984. She was assigned as an assistant in 1985 in the Prehistory Department of Istanbul University. Her Ph.D. studies, which she started in the same year, were finished in 1994 with a dissertation entitled *Place of Tülintepe Architecture in Chalcolithic East and Southeast Anatolia*. Özbaşaran was promoted as Assistant Professor in 2000 and Professor in 2008.

Major Accomplishments

During Özbaşaran's undergraduate studies, she participated in excavations such as those at Perge, led by Prof. Dr. JaleİnAn, in 1977, followed by Aizonai, under the direction of Prof. Dr. R. Naumann from 1978 to1979. Özbaşaran began as a student at Domuztepe, supervised by Prof. Dr. Halet Çambel, and continued her work as an M.A. scholar and then as a Ph.D. scholar.

Özbaşaran served as the field director at the Yarımburgaz excavations led jointly by Prof. Dr. Trust, from the University of California, and Prof. Arsebük. She also participated in the Aşıklı Höyük excavations led by Prof. Dr. Ufuk Esin. Özbaşaran worked as a team member on numerous studies such as the Gournia/Girit Survey Research Project conducted by Prof. Dr. L.V. Watrous from Buffalo University.

Özbaşaran directed excavations in Neolithic Musular in Aksaray, Cappadocia from 1996 to 2004 and Neolithic Akarçay Tepe in Birecik, Urfa, leading international teams consisting of specialists and archaeologists. She also conducted the Istanbul area excavation at Çatalhöyük, under the direction of Ian Hodder from Stanford University, from 2005 to 2008.

Özbaşaran is the leader of the Aşıklı Hoyuk (Aksaray, Central Anatolia) Excavation, Research, Conservation and Exhibition Project, which began in 2006. Her key lecture subjects are the history of archaeology and scientific approaches; theoretical archaeology; experimental archaeology; cultural evolution in prehistory; complex societies; and key concepts of prehistory and prehistoric cultures of Cyprus. Her area of expertise is mostly focused on the neolithization process of central, east, and southeast Anatolia between the ninth and seventh millennia. She continues to study neolithization models, developmental differences, and similarities between the two regions in question.

In recent years, Özbaşaran has been leading the project of Aşıklı Höyük in ethnoarchaeology, experimental archaeology, and cultural heritage management content.

Cross-References

▶ Complex Hunter-Gatherers
▶ Hunter-Gatherers, Archaeology of
▶ Practice Theory in Archaeology

► Processualism in Archaeological Theory
► Social Archaeology

Further Reading

Özbaşaran, M. 1995. The historical background of researches at the Caves of Yarımburgaz. In *Halet Çambeliçin PrehistoryaYazıları*, 27–39. İstanbul: GraphisYayınları.
Özbaşaran, M. 1997. A new pre-pottery Neolithic site in Central Anatolia: Musular. *Neo-Lithics* 1 (97): 5.
Özbaşaran, M. 1998. The heart of a house: The hearth – AşıklıHöyük, a pre-pottery Neolithic site in Central Anatolia. In *Light on top of the Black Hill*, ed. G. Arsebük, M.J. Mellink, and W. Schirmer, 555–566. İstanbul: EgeYayınları.
Özbaşaran, M. 1999a. Musular: A general assessment on a new Neolithic site in Central Anatolia. In *Neolithic in Turkey*, ed. M. Özdoğan and N. Başgelen, 147–155. Istanbul: ArkeolojiveSanatYayınları.
Özbaşaran, M. 1999b. AksarayİIi'nin 8000 YılÖncesi: Musular Mevkii. *Vadiler Kenti Aksaray, Kültür Sanatve Aktüalite Dergisi, sayı* 2: 10–11.
Özbaşaran, M. 2000. The Neolithic site of Musular – Central Anatolia. *Anatolica* XXVI: 129–151.
Özbaşaran, M. 2001. Musular excavations. In *Istanbul University's contributions to archaeology in Turkey (1932–2000)*, İstanbul Üniversitesi Rektörlüğü Yayın 4285, ed. O. Belli, 36–40. İstanbul: İstanbul Üniversitesi.
Özbaşaran, M. 2004. Anadolu'nunKültürveYerleşmeCoğrafyası – 1. Tarihöncesi Dönemlerden Hellenistik Öncesine. In *GençlerİçinÇağdaş Coğrafya*, 118–130. Istanbul: Hachette Livre International-Epsilon Yayıncılık.
Özbaşaran, M. 2006. Hollowed structures in Cappadocia (Central Anatolia, Turkey). Examples from the 8th mill cal BC and present-day. In *Des Trous. Structures en creuxpré-et protohistoriques*, ed. M.C. Frere-Sautot, 431–437. Montagnac: editions moniquemergoil.
Özbaşaran, M. 2007. Kapadokya Yerel Mimarisinde AnakayaİşçiliĝI. Tarihöncesive Günümüz Örnekleri. In *Refik Duru'ya Armağan*, Studies in honour of RefikDuru, ed. G. Umurtak, Ş. Dönmez, and A. Yurtsever, 51–58. İstanbul: Ege Yayınları.
Özbaşaran, M. 2009. Aşıklı Höyük: The oldest settlement of Cappadocia. *Kapadokya Bakış, Emitt İstanbul Özel Sayı* 1 (4): 34–41.
Özbaşaran, M. 2011a. The Neolithic on the plateau. In *The Oxford handbook of ancient Anatolia 10.000-323 B.C. E*, ed. S. Steadmann and G. McMahon, 99–124. Oxford: Oxford University Press.
Özbaşaran, M. 2011b. Anadolu'nunTarih (Yazı) Öncesi Dönemleri. In *Eski Anadolu Tarihi*, Anadolu Üniversitesi yayını 2268, ed. K. Köroğlu, 2–20. Eskişehir.

Özdoğan, Mehmet

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Basic Biographical Information

Mehmet Özdoğan was born in Istanbul, Turkey, in 1943. He graduated from İstanbul University's Faculty of Literature Prehistory Department in 1969. He was awarded his M.A. on the basis of his dissertation, titled *Dating and Evaluation of Pottery and Small Finds of Kumtepe from 1934 Season*, in 1970 and began to serve as an unsalaried assistant with the Department of Prehistory, Istanbul University, until 1975. He became Dr. Assistant in 1979 on the basis of his Ph.D. dissertation titled *Evaluation and Dating Problematic of the Fikirtepe Small Finds from the Years Between 1952 and 1954*. He was promoted to the post of Assistant Professor in 1985 and Professor in 1994. Professor Özdoğan spent many years as Head of the Archaeology Department at İstanbul University. He is a member of numerous scientific institutes and groups and was elected as a foreign member of the American National Academy of Sciences in 2005.

Major Accomplishments

From the beginning of his undergraduate years, Mehmet Özdoğan participated in numerous archaeological excavations and projects, including the Çayönü excavations undertaken by İstanbul and Chicago Universities. In these excavations he worked primarily as field director and later as project director. As well as being the general director of Archaeological Survey Research of Lower Euphrates Project organizing by Middle East Technical University (ODTÜ), Mehmet Özdoğan was the field director of excavations at Keban, Tepecik, Tülintepe, and Degirmentepe.

Mehmet Özdoğan's major fields of study are the origin and diffusion of village, life based on food production in Neolithic period, cultural relations between Southeast Europe, Aegean and Anatolia, geoarchaeology, politics and history of archaeology, and cultural heritage management. His contributions to Turkish archaeology include the development of a new model for archaeological survey research and research investigations into diffusion of the first food-producing groups from Anatolia to Southeast Europe.

Mehmet Özdoğan also made a major contribution to archaeology in Turkey through developing the concept of a cultural sector and by developing cultural inventories for the Turkish Academy of Sciences (TÜBA). In 2001, he directed a pilot project on cultural inventories in the region of Birecik-Suruç, Şanlıurfa, as a part of the TÜBA-TÜKSEK (Turkey's Cultural Sector) Developing with Culture project.

Cross-References

► Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic

Further Reading

Karul, N., Z. Eres, M. Özdoğan, and H. Parzinger. 2003. *Aşağı Pınar, Volume I*, Archäologie in Eurasiens 15, Studien im Thrakien-Marmara Raum Band 1. Mainz: Verlag Phillip von Zabern.

Özdoğan, M. 1999. *Neolithic in Turkey*. İstanbul: Arkeoloji ve Sanat Yay.

Özdoğan, M. 2001. *Türk arkeolojisinin sorunları ve koruma politikaları*. İstanbul: Arkeoloji ve Sanat Yayınları.

Özdoğan, M. 2002a. Çağdaşlaşma ve Türk arkeolojisi. Arkeolojinin görmediğimiz yüzü. *Toplumsal Tarih* 101: 42–45.

Özdoğan, M. 2002b. Yeni binyıl, küreselleşen dünya ve Türkiye'de arkeolojinin geleceği. *Toplumsal Tarih* 108: 2–3.

Özdoğan, M. 2002c. Redefining the Neolithic of Anatolia. In *The dawn of farming in the Near East*, ed. R. Cappers and S. Bottema, 153–159. Ex Oriente.

Özdoğan, M. 2003a. The Black Sea, the Sea of Marmara and Bronze Age archaeology – An archaeological predicament. In *Troia and troad*, ed. G. Wagner, E. Pernicka, and H.P. Uerpmann, 105–120. Berlin: Springer.

Özdoğan, M. 2003b. The prehistory of northwestern Turkey. In *Recent research in the prehistory of the Balkans*, ed. D.V. Gramennos, 329–368. Archaeological Institute of Northern Greece and the Archaeological Receipts Fund.

Özdoğan, M. 2003c. *Güneydoğu Anadolu'nun Kültür Tarihindeki Yerine Farklı Bir Bakış*, TÜBA Akademi Forumu 14. Ankara: Türkiye Bilimler Akademisi.

Özdoğan, M. 2004. Heritage and nationalism in the Balkans and Anatolia or changing patterns, what has happened since Hasluck. In *Archaeology, anthropology and heritage in the Balkans and Anatolia*, ed. D. Shankland, 389–405. ISİS Press.

Özdoğan, M., H. Hauptmann, and N. Başgelen. 2003. *Köyden Kente Yakındoğu'da İlk Yerleşimler (iki cilt)*. İstanbul: Arkeoloji ve Sanat Yayınları.

Özgüç, Nimet

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Basic Biographical Information

Nimet Özgüç was born in Adapazari in 1916. After graduating from Ankara Girls' High School, she was among the first students of the newly established Faculty of Languages, History, and Geography of Ankara University, along with her future husband, Tahsin Özgüç. She studied from 1936 to 1940 and, after completing her education, was assigned to the Archaeology Department as an assistant. After receiving her Ph.D. dissertation titled *Anatolian Stamp Seals* in 1943, she was promoted to assistant professor in 1949 and then professor in the Protohistory and Near Eastern Archaeology Department of Ankara University in 1958.

Major Accomplishments

Nimet Özgüç participated in the excavations of Ankara Roman Bath, Çankırıkapı, and Temple of Augustus carried out by Prof. Dr. H.H. von der

Osten and Prof. R.O. Arık. She was a member of the team which carried out the Dündartepe, Kavak, Kaledoruğu, and Tekeköy excavations in 1941, and the Elbistan Karahöyük excavations and survey studies in Elbistan plain together with Tahsin Özgüç. Her work on the separation and development of Assyrian trade colonies' seals and seal impression styles helped to clarify the development of the art style of Anatolian history of the period, the Mesopotamian Old Assyrian period*s*, and Old Babylonian period.

Nimet Özgüç also participated in the excavations of Kayseri Frakdin in 1954 and Erzincan Altıntepe in 1959. She led the Acemhöyük excavations which she started in 1962 and continued until 1989. During the Acemhöyük excavations, two of the best-preserved monumental palace buildings in Anatolia were revealed, and it emerged that the settlement was the center of a local kingdom in the Assyrian trade colonies period.

Nimet Özgüç investigated the period from the Byzantine to Iron Age within the excavations in Niğde Tepebağları that she led. From 1978 to 1989, as a part of the Middle East Technical University's Lower Euphrates Project, she conducted the Adıyaman-Samsat-Huyuk excavations which were going to be inundated by the Atatürk Dam reservoir. In Samsat, which is one of the largest and highest mounds of Anatolia, she found evidence of a time period ranging from the Chalcolithic to Seljuk. She published papers concerning the Sumeysat of Seljuk period; Hellenistic and Roman periods; Samosata, the capital city of Commagene Kingdom; and Kummaha and Hahhum of the Iron and Bronze Ages.

Nimet Özgüç served as a member of the Ministry of Culture High Council of Real Estate Antiquities and Heritage in 1984. Following her retirement the same year, she continued to work in excavations that she conducted and resumed her scientific activities by publishing books and articles.

Özgüç received awards including the G. Bude Medal of College de France (1980) and the "Woman of the Year" award of the Turkish Women's Union on Science field. She conducted courses and seminars as a guest lecturer at Munich, London, Saarbrücken, Marburg, Princeton, Columbia, Yale Universities, and Bryn Mawr College. In addition, she served as an ordinary member of the German Archaeological Institute (1979), honorary foreign member of the Archaeological Institute of America (1994), honorary member of Turkish Historical Society (1995), and honorary member of Ancient Historical Sciences Istanbul (1995).

Cross-References

► Özgüç, Tahsin

Further Reading

Özgüç, N. 1992a. A lute player from Samsat. In *Sedat Arp'aarmağan, Festschrift für Sedat Alp*, 419–423. Ankara.

Özgüç, N. 1992b. The Uruk culture at Samsat. In *Von Uruk nach Tuttul. Eine Festschrift für Eva Strommenger*, 151–157. *Taf*. 62–9.

Özgüç, N. 1993. An early Bronze Age pot grave of a child from Acemhöyük. In *Between the rivers and over the mountains. Alba Palmieri Dedicata*, 517–520.

Özgüç, N. 1994a. Notes on cylinder seals of level I a-b from Karurn-Kanis. In *Beiträge zur Altorientalischen Archäologie und Altertumskunde. Festschrift für Barthel Hrouda*, 217–220.

Özgüç, N. 1994b. Identical aspects of the cylinder and stamp seal representations of levelIb period. *Istanbuler Mitteilungen* 43: 175–179.

Özgüç, N. 1995. Silver and copper Ingots from Acemhöyük. In *Beiträge zur Kulturgeschichte Vorderasiens. Festschrift für Rainer Michael Boehmer*, 513–519.

Özgüç, N. 1996. Seal impressions on the Kültepe documents notarized by Native rulers. In *Collectanea Orientalia, Histoire, Arts de l'Espace et Industrie de la Terre, Etudes offertes en homage a Agnes Spycket*, 267–278.

Özgüç, N. 1997. The early Hellenistic findings at Samsat. *Istanbuler Mitteilungen* 46: 213–216. *Taf*. 37–38.

Özgüç, N. 1998. Kanis Karumu'ndabulun muşolaneski Assurüslubunda İkisilindir mühür. In *Light on the top of the Black Hill. Studies presented to Halet Çambel Karatepe' dekişık. Halet Çambel' esunulanyazılar*, 611–614.

Özgüç, N. 2001a. Mühürlükilbullalar- sealed clay bullae. In *Kültepe Kanis, mühürlüveyazıtlıkilbullalar.* Türk Tarih Kurumu Yayınları V, ed. N. Özgüç and Ö. Tünca. Dizi- Sayı 48: I-XXXIV, I-253.

Özgüç, N. 2001b. Notes on the bronze vehicle from the Sarıkaya Palace at Acemhöyük. In *Publications de l'Institute historique-archéologique néederlandais de Stanboul, Veenhof Anniversary Volume*, 361–366.

Özgüç, N. 2002a. *Götterprozessionen, Kriegs- und Jagdszenen. Ein Überblick über den Motivreichtum anatolischer Roll- und Stempelsiegel des 20.-18. Jahrhunderts v. Chr*: 234–9. Tanrı Alayları, Savaşve Av Sahneler – M.Ö. 20.-18. Yüzyıllarda Anadolu Silindirve Damga Mühürlerinde Motif Zenginliği.

Özgüç, N. 2002b. Erlesene Werke der Kleinkunst. Anatolische Elfenbeinschnitzereien - *Seçkin Eserler: Anadolu. FildişiYapıtları*, in *Die Hethiter und ihr Reich. Das Volk der 1000 Götter – Hititlerve Hititimparatorluğu* – 1000 Tanrılı Halk: 244–7.

Özgüç, N. 2003. *Hatti Efsanesi Yılan İlluyanka'nın Tasvir Sanatında Yorumu*. Türkiye Bilimler Akademisi Forumu 18. Ankara.

Özgüç, Tahsin

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Basic Biographical Information

Tahsin Özgüç was born in Kýrcaali, Bulgaria, in 1916. He was one of the first students of the newly established Faculty of Languages, History and Geography at Ankara University in Turkey. He studied archaeology, history, dead languages, and their cultures under some of the esteemed scientists of the period such as Şevket Aziz Kansu, Şemsettin Günaltay, Hans Henning von der Osten, Hans Güstav Güterbock, Benno Landsberger, and Georg Rohde. He was awarded a Ph.D. in archaeology in 1942 based on his thesis, which was titled *Anatolian Idols in Prehistory*. He was appointed as an Assistant Professor at Ankara University in 1946 and became a Professor in 1954.

Major Accomplishments

In 1940, Tahsin Özgüç began to carry out excavations which were going to last over 2 years in the Samsun region (Dündartepe, Tekeköyve, Kaledoruðu). This work was conducted with his colleagues Kýlýç Kökten and Nimet Özgüç. In 1945 Özgüç undertook excavations of two tumuli together with Mahmut Akok. These tumuli were in the construction area of the Mausoleum of Mustafa Kemal Atatürk in Anýtkabir. Özgüç was appointed as an Assistant Professor at Ankara University after completing his habilitation thesis titled *Burial Customs of Anatolia in Prehistory* in 1946. In that same year he carried out the excavations of Sivas Maltepe and Sivas Tower.

In 1947 Tahsin Özgüç was elected as a member of the Turkish Historical Society, along with two other important scientists, Aydýn Sayýlý and Halil Ýnalcýk. Dr. Özgüç conducted excavations at Fraktin (Develi, Kayseri) and Karahöyük (Elbistan-Maraş) in the same year. In 1948 he began excavations at Kanis-Nesa (Kayseri). These excavations were to continue over for his lifetime, for 58 years.

After he became a Professor in 1954, Tahsin Özgüç's responsibilities grew. In that year he undertook the Kültepe excavations himself while simultaneously directing other excavations in different settlements. In subsequent years, he examined the different periods of Anatolian cultures and published his evidences in a systematic manner. He undertook excavations at an Early Bronze Age settlement area and cemetery in Horoztepe (Erbaa, Tokat) in 1956; at Altýntepe (Erzincan), which had remarkable architecture and small finds, in 1959–1966; at Kululu (Kayseri), which was the center of one of the Late Hittite kingdoms Tabal with particular sculptures and hieroglyphic-inscribed lead plates, in 1967; at Ma°at Höyük (Zile, Tokat), one of the few cities located outside of the center Boðazköy that had Hittite archives, from 1973 to 1983; and at Kazankaya (Çekerek, Yozgat), at a cemetery of the old Hittite which highlighted the different periods of Anatolia, in 1976.

Tahsin Özgüç was an internationally recognized scholar. He lectured in the Institute for Advance Study, Princeton University, in 1962–1963; Universität des Saarlandes in 1964; and at Universität München in 1975–1976, 1978–1979 and 1980–1981. Dr. Özgüç conducted

seminars and conferences in various universities throughout Europe and the USA. He was awarded the Order of Merit by the Federal Republic of Germany, the Order of the Rising Sun of Japan, the National Order of the Crown of Belgium, and the Collége de France Medal.

Cross-References

- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Late Antique Anatolia, Archaeology of
- ▶ Özgüç, Nimet

Further Reading

Özgüç, T. 1940–1941. Kurs Vücutlu Kültepe Ýdolleri. *DTCF Yýllýk Araþtýrma Dergisi* I: 852–886.

Özgüç, T. 1943. Öntarihte AnadoluÝdollerinin Anlamý. *DTCF Dergisi* II (1): 65–72.

Özgüç, T. 1944. Birinci Truva'yý Kim Kurdu? *DTCF Dergisi* II (5): 697–716.

Özgüç, T. 1948. *Die Bestattungsbräuche im vorgeschichtlichen Anatolien*. Ankara.

Özgüç, T. 1955a. Kültepe Hafriyatý 1954 II. Kat Eserleri/ Excavations at Kültepe level II finds. *Belleten* XIX (76):445–52/453–61.

Özgüç, T. 1955b. Koloni Devrinin Geç Safhasýna Ait (Ib) BirAtölyeHakkýnda/On a workshop of the colony period Ib. *Belleten* XIX (73): 73–80.

Özgüç, T. 1956. Anitta Hançeri. *Belleten* XIX (77): 29–32.

Özgüç, T. 1966. *Altýntepe Mimarlýk Anýtlarýve Duvar Resimleri*. Ankara: Türk Tarih Kurumu Yayýnlarý.

Özgüç, T. 1969. *Altýntepe II. Tombs, storehouse and ivories*. Ankara: Türk Tarih Kurumu Yayýnlarý.

Özgüç, T. 1978. *Maþat Höyük Kazýlarýve Çevresindeki Araþtýrmalar: Excavations at Maþat Höyük and investigations in its vicinity*. Ankara: Türk Tarih Kurumu Yayýnlarý.

Özgüç, T. 1983. Les Cultures Anatoliennes. *Forum Conseil de I'Europe, Civilisations Anatoliennes* V–VII.

Özgüç, T. 1986. *Kultepe-Kanis II. Eski Yakindogu'nun Ticaret Merkezinde Yeni Arastirmalar*. Ankara: Türk Tarih Kurumu Yayýnlarý.

Özgüç, T. 1988. *Ýnandýktepe: An important cult center in the Old Hittite period*. Ankara: Türk Tarih Kurumu Yayýnlarý.

Özgüç, T. 1999. *The palaces and temples of Kültepe – Kanis/Nesa*. Ankara: Türk Tarih Kurumu Yayýnlarý.

Özgüç, T. 2005. *Kültepe Kanis/Nesa, Çeviren: Jale Velibeyoðlu*. Ýstanbul: Yapý Kredi Yayýnlarý.

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Pacific Islands: Finding the Earliest Sites

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Introduction

The character and date of the earliest settlement of the remote Pacific Islands remains an important research objective. Tracing human origins in "Remote Oceania" reveals a series of west-to-east migrations, ultimately from southern coastal China before 6,000 years BP (Bellwood et al. 2011). In the far west of Micronesia, the Mariana Islands have become known as the home of the oldest archaeological sites of Remote Oceania, dated 3,500–3,300 years BP (Fig. 1).

We are only now achieving some clarity on where to find sites, in a manner that conforms to CRM constraints. The local governments consider excavations to be destructive to cultural heritage resources and harmful to the natural environment. Archaeological excavations are therefore undertaken only in strict compliance with government regulations, which are not always conducive to archaeological visibility. The normal procedures use *shovel tests*, holes 10–20 m apart dug the size of a shovel blade and sieved through a 6 mm mesh, to find sites, and *test pits*, 1 × 1 m in plan taken down by trowel, to investigate them. Monitoring of a machine-dug trench has become standard procedure for archaeological resource management in beach settings.

Key Issues/Current Debates/Future Directions/Examples

Survey

Nearly all sites in the Marianas are found through *surface reconnaissance*, walking at close intervals (usually 5 m) through the dense jungle, sometimes augmented by transects of *shovel testing* where the ground visibility is particularly difficult. This approach works well in areas with little or no soil development, where site remnants are easily accessible. In fact, most island terrain fits into this category, bearing perhaps 20–30 cm of rocky silt or clay directly over solid bedrock. Using little or no excavation, this strategy has been successful for mapping and recording sites of the more recent time period, roughly within the last 1,000 years. Megalithic house pillars and capitals (locally called *latte*) mark most residential sites. Broken pottery is littered almost everywhere, along with lesser amounts of stone and shell adzes and other such durable tools.

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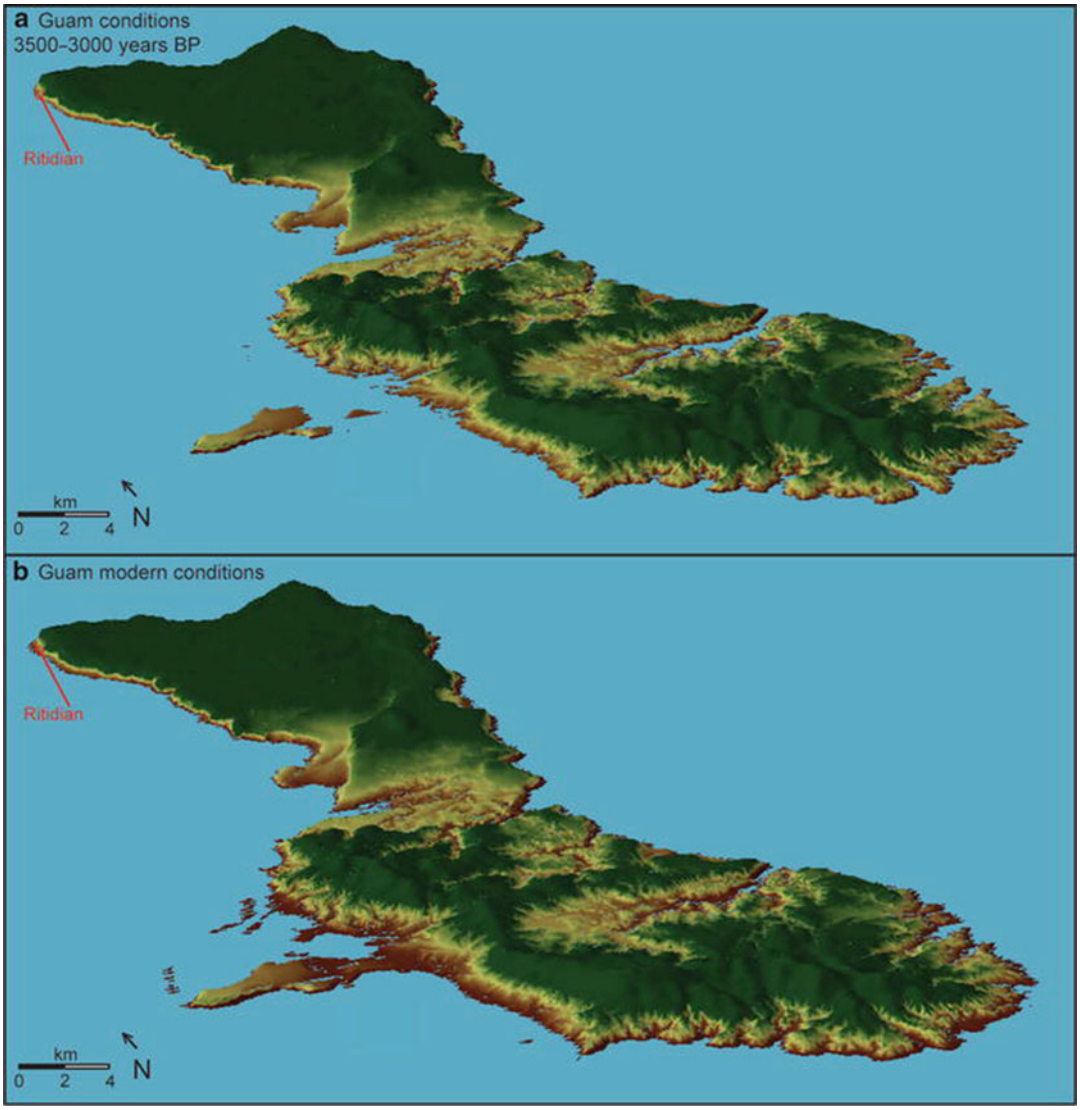

Pacific Islands: Finding the Earliest Sites, Fig. 1 Island-wide terrain model of Guam showing (**a**) conditions 3,500–3,000 years BP and (**b**) modern conditions (Modified from Carson 2011)

For the most ancient sites, dating to 3,500–3,300 years BP, the best chance of finding a preserved archaeological deposit is to search in the beach sand. These locations fortuitously match expectations of where the earliest islanders lived, near productive crop-growing soils and bountiful coral reef ecosystems. The beaches as seen today, however, are recent geological formations. The ancient sea level stood 1.8 m higher than today, plus the earliest sites are at least 1–2 m beneath today's sandy beaches and 100 m or farther inland from modern shorelines. These circumstances teach us two things. First, the coastal terrain has been transformed substantially since the time since the sites were first inhabited. Second,

Pacific Islands: Finding the Earliest Sites, Fig. 2 Setting of 3,500–3,300 years BP beach site at Ritidian, Guam, now more than 100 m from modern shoreline and 2.5 m beneath the surface

exploratory survey for the most ancient sites cannot rely on surface finds, and researchers must dig deeply in locations that may not appear immediately obvious.

Taking into account these formation processes, a paleo-*terrain model* can be used to depict the approximate coastal topography at the time when the oldest sites were inhabited (Carson 2011). The model has been continually refined by *test pits* and trenches that give precise locations, depths, and dates of ancient sedimentary layers, whether or not they contain archaeological materials. The most thorough work has been in Guam, the largest and southernmost of the Mariana Islands.

Excavation

At Ritidian on Guam, dozens of small test pits, each 1 m by 1 m, were dug at 10-m intervals throughout an area targeted by the paleo-terrain model. The most ancient deposit was found only in one of these test pits, meaning that the original site covered a rather small area less than 20 m by 20 m in total. The deepest cultural layer was buried more than 2.5 m deep and more than 100 m from the present shoreline. The ancient shoreline context was dated 3,500–3,300 years BP by radiocarbon. Exceptionally thin (1–2 mm) red-slipped pottery fragments were refitted, representing 10–20% of two different small bowls or jars, plus more than 55% of another shallow open bowl. The oldest site layer at Ritidian was sealed beneath a zone of 1 m of hardened beach sand (calcrete) that solidified after the site had been buried, creating a barrier that few archaeologists would attempt to breach. The excavation required chiseling of large solid blocks of calcrete, later dissolved in mild (5%) acid and sieved through half-mm wire mesh for full recovery of the constituent artifacts and midden. Beneath the calcrete, the loose beach sand was removed by trowel and sieved through half-mm mesh for consistent recovery (Fig. 2).

The most thoroughly studied early period Marianas site has been on the southern coast of Tinian, 100 m inland from the famous megalithic *latte* ruins of the House of Taga. An excavation slightly larger than 90 sq m here proceeded by hand troweling of *stratified layers*, each internally divided into *arbitrary levels* 10 cm thick. This strategy uncovered an arrangement of post-molds, hearths, and other features of an ancient living floor dated about

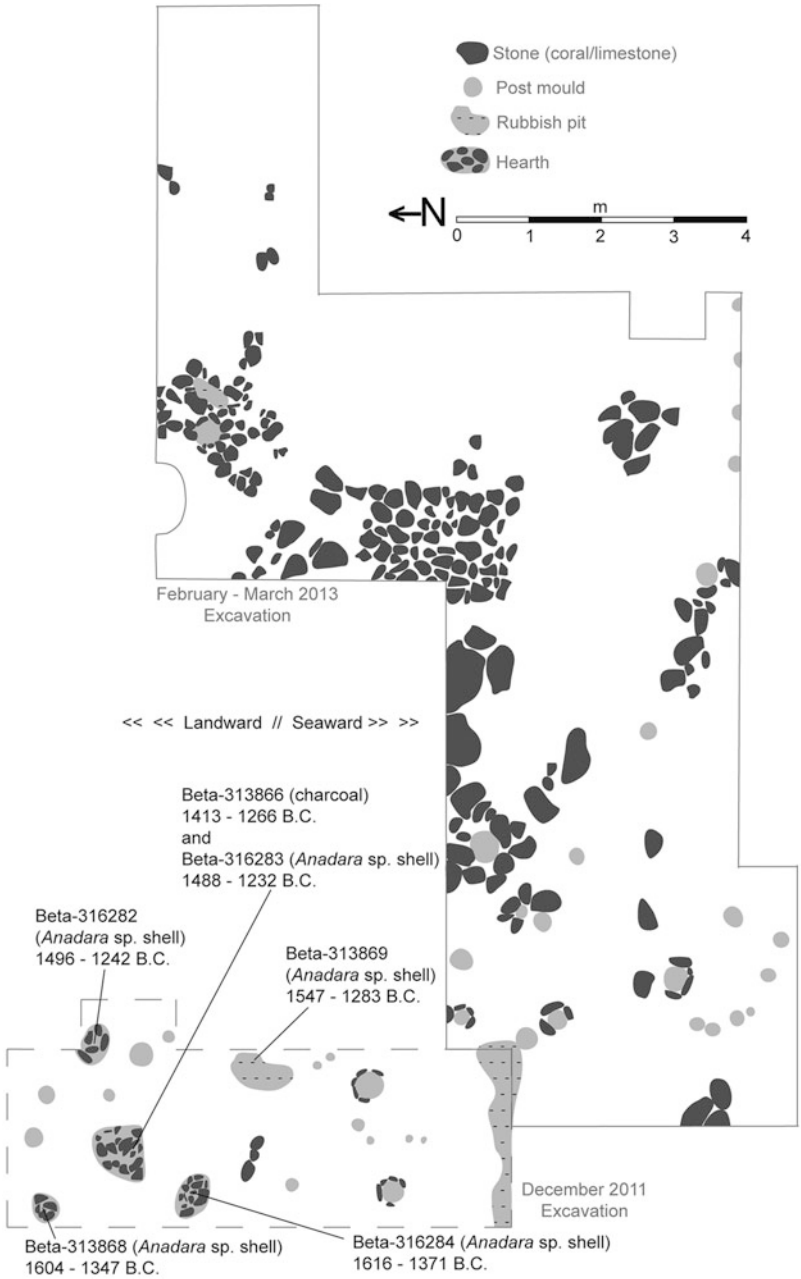

Pacific Islands: Finding the Earliest Sites, Fig. 3 Arrangement of post-molds, hearths, and other features in ancient living floor 3,500–3,400 years BP, 100 m landward from House of Taga, south coast of Tinian (Modified from Carson 2016)

3,500–3,400 years BP (Fig. 3). Among 30,000+ earthenware pottery fragments, more than 150 exhibited finely impressed, stamped, and incised decorations on a red-slipped surface. Chert adzes and flaked tools, shell beads and pendants, fishing hooks, shellfish remains, and bones of fish, turtle, and birds completed the assemblage.

Cross-References

- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Geoarchaeology
- ▶ Landscape Archaeology

References

Bellwood, P., G. Chambers, M. Ross, and H.C. Hung. 2011. Are 'cultures' inherited? Multidisciplinary perspectives on the origins and migrations of Austronesian-speaking peoples prior to 1000 BC. In *Investigating archaeological cultures: Material culture, variability, and transmission*, ed. B.W. Roberts and M. Van der Linden, 321–354. New York: Springer.

Carson, M.T. 2011. Palaeohabitat of first settlement sites 1500–1000 B.C. in Guam, Mariana Islands, western Pacific. *Journal of Archaeological Science* 38: 2207–2221.

Carson, M.T. 2016. *Archaeological landscape evolution: The Mariana Islands in the Asia–Pacific region*. Cham: Springer International.

Pacific Islands: World Heritage

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Introduction

Pacific cultural heritage research has taken an active role in reshaping notions of cultural significance that has been recognized by UNESCO. Acknowledging the importance of associative cultural landscapes, first applied to the Tongariro National Park, New Zealand, in 1993 and Ulu*r*u-Kata Tju*t*a, Australia, in 1994, culminated in the 2008 inscription of the "*Chief Roi Mata's Domain*," Vanuatu, into the World Heritage List (UNESCO 2010).

These advances in Pacific cultural heritage research do not hide the fact that Independent Pacific Island Nations (referred to here as IPIN) are underrepresented on the World Heritage List. The uneven distribution of World Heritage sites globally is exemplified by the presence of only 13 sites in the wider Pacific area and only five sites nominated by IPIN. Below is a list of World Heritage properties located on Pacific Islands (standing 2011).

Key Issues

The strong underrepresentation of cultural sites has been a matter of discussion since the mid-1990s (UNESCO 1994) and resulted in the "Filling the Gaps" – World Heritage Action Plan (ICOMOS 2005) and the World Heritage – Pacific 2009 Programme for capacity building in the region (UNESCO 2004). The plans represent a partial success in that since its launch in 2002, nine of 14 IPIN (including New Zealand and Papua New Guinea) have submitted properties to the World Heritage Commission and in total 39 properties have been registered on the Tentative List. Consequently, there has been an increase in properties inscribed on the World Heritage List; six sites have been inscribed since 2003, although these include the property "*Lagoons of New Caledonia: Reef Diversity and Associated Ecosystem*" in a French overseas territory and the "*Papahānaumokuākea*" property in the US state of Hawaii.

Looking at the representation of cultural sites on the World Heritage List, it is apparent that the usual four-to-one ratio of cultural to natural sites internationally (currently 725 cultural, 183 natural, and 28 mixed properties) is significantly different in the Pacific, where the cultural–natural site ratio is one to four. This ratio might relate to the status of several islands, such as being a territory of one of the Western developed countries USA, UK, or France (Table 1) or being of interest to international nongovernmental organization such as the World Wildlife Fund for Nature and Conservation International, emphasizing on environmental preservation rather than indigenous cultural heritage protection (e.g., "*East Rennell*," Solomon Islands). It has also been argued that the lack of monumental architecture present in the archaeological record of past societies in the Pacific is a factor in the underrepresentation of Pacific cultural heritage on the World Heritage List. Non-monumental cultural heritage is dominant in the Pacific in comparison to the number of built structures in, for example, Europe; however, there are several prehistoric and historic sites with monumental architecture present in the Pacific Islands, such as "*The Ancient Capitals of the Kingdom of Tonga*" in Tonga, "*Nan Madol*" on Pohnpei, the "*Pulemelei Mount and associated stone villages*" in Samoa or the earthwork terraces ("*Ouballang ra Ngebedech*") in Palau, none of which is currently inscribed into the World Heritage List.

Pacific Islands: World Heritage, Table 1 World Heritage properties located on Pacific Islands (until 2011)

Nominating country	Property name[a]	Inscription date
Australia	Lord Howe Island (N)	1982
	Australian Convict Sites (KAVHA, Norfolk Island) (C)	2008
Chile	Rapa Nui National Park (C)	1995
France	Lagoons of New Caledonia: Reef Diversity and Associated Ecosystems (N)	2008
Kiribati	***Phoenix Islands Protected Area (N)***	***2010***
Marshall Islands	***Bikini Atoll Nuclear Test Site (C)***	***2010***
New Zealand	Tongariro National Park (M)	1993
	Te Wahipounamu – South West New Zealand (N)	1990
	New Zealand Subantarctic Islands (N)	1998
Papua New Guinea	***Kuk Early Agricultural Site (C)***	***2008***
Solomon Islands	***East Rennell (N)***	***1998***
United Kingdom	Henderson Islands (N)	1988
United States of America	Hawaii Volcanoes National Park (N)	1987
	Papahānaumokuākea (M)	2010
Vanuatu	***Chief Roi Mata's Domain (C)***	***2008***

[a]*C* cultural site, *N* natural site, *M* mixed site. ***Italic***: properties nominated by Independent Pacific Island Nations (IPIN)

The move by UNESCO to include cultural landscapes into the Outstanding Universal Value (OUV) criteria acknowledges the long-term dominance of monumental sites and the underrepresentation of cultures whose heritage is associated with non-monumental sites on the World Heritage List (Fowler 2003, 2004). This is particularly important for IPIN where a large number of properties (26 out of 52 sites on the WH and Tentative Lists) have a significant cultural landscape component, for example, "*Sigatoka Sand Dunes*" in Fiji, "*Rock Islands – Southern Lagoon Management Area*" in Palau, or "*Manono, Apolima, and Nuulopa Cultural Landscape*" in Samoa. Smith and Jones (2007) and Lilley (2010) recently defined key themes for 13 organically evolved relict and associative cultural landscapes on Pacific Islands in two ICOMOS thematic studies. Early maritime colonization and settlement patterns, social organization of traditional land uses in marginal environments, and seascapes are important research objectives in Pacific archaeology that also have significant cultural heritage values that are frequently "non-monumental."

The two thematic studies also identified a series of properties, including one transboundary (*"Yapese Disk Money Regional Sites*," Federal States of Micronesia/Palau) and one serial site ("*Lapita Pottery Archaeological Sites*"), with OUV in the Pacific. Nonetheless, only three of the properties mentioned in these studies ("*Bikini Atoll Nuclear Test Site*," "*Kuk Early Agricultural Site*," and "*Chief Roi Mata's Domain"*) have been inscribed into the World Heritage List, with multi-jurisdictional difficulties hindering progress in the nomination of transboundary/serial sites.

Current Debates

Seven decades of intensive archaeological research in the Pacific have identified a reasonable number of prehistoric sites with OUV, so why are IPIN underrepresented on the World Heritage List? One major factor in the lack of progress in gaining international recognition for Pacific cultural heritage sites, and consequently their protection, is the limited human resources available in most IPIN for the lengthy and increasingly complicated task of coordinating a successful nomination file for assessment through ICOMOS, IUCN, and UNESCO. It appears that efforts to address the underrepresentation of IPIN sites on the WH List are tempered by a real concern that many IPIN do not have the resources to effectively manage and

protect significant heritage sites. As a result, nomination files submitted by IPIN are likely to be cautiously scrutinized to determine whether the resources and expertise for cultural site management exist. This is appropriate, but an obvious danger is that the desire to reduce imbalance in the WH List by encouraging IPIN to nominate sites is not matched by practical support to increase the heritage expertise of IPIN to a necessary level. Rejection of IPIN WH site nominations due to a perceived absence of heritage capacity would likely result in the skewing of WH site representation in a different direction: a higher representation of sites on the WH List from Pacific Islands which have significant relations with developed nations from their current or former status as an overseas territory/collectivity (France, UK, Australia, Chile), state (US), protectorate (Germany) or free association compact (US, New Zealand). Such a trend is already apparent in the 13 World Heritage properties on Pacific Islands with 62% submitted by developed colonial nations.

In addition to a lack of human resources, many IPIN are still developing their heritage capacity with limited legal protection of heritage sites at the local and national level and incomplete cultural site registers. This is particularly important for the nomination of cultural landscapes which generally cover a large area and include numerous archaeological features many of which have not been surveyed/tested by local and international heritage specialists. This has implications for developing a comprehensive conservation management plan, which is now a standard requirement for the successful nominations of heritage properties.

A way forward for IPIN is to assemble networks of local communities, external and local archaeologists, anthropologists, and other heritage experts. This is likely to be a key strategy for IPIN wishing to produce World Heritage cultural site nominations as shown in the recent successful nominations of three cultural properties from IPIN (Wilson et al. 2009). One positive outcome of such an approach is that it allows knowledge about the *World Heritage Convention* (1972) and WH nomination process to circulate through IPIN government and community organizations and it involves close partnership between the local community and archaeologists/heritage experts.

Participation of local communities and traditional landowners in the nomination process, particularly the provision of traditional knowledge and the management of sites, is actively encouraged by the World Heritage Convention (UNESCO 1972: §14) and by UNESCO (Asia) in the Hoi An Protocols (UNESCO (Asia) 2009). The recognition that many heritage sites in the Pacific are embedded in the cultural traditions of local communities and the relationship between a site and the local community requiring specific consideration in the management plan is an important advance in cultural heritage practice.

UNESCO is by definition an international body of independent nation states, and only federal organizations (State Parties) are able to submit nomination files for inscription. The process of submitting nomination files has significant implications for IPIN where access rights to heritage sites are largely determined through traditional structures. Uncertainty about the impact of World Heritage nomination to access and stewardship of heritage sites occasionally culminates in legal procedures, where traditional owners seek clarification about the ownership of sites. In these cases, external experts can have an important role in mediating conflicting interests for the benefit of conserving heritage sites for future generations. To avoid legal conflict about sites and resources, it is necessary to properly inform local stakeholders about the purpose and effects of property inscription on cultural practices and economic development during the early planning stages of World Heritage nomination. An additional means of informing stakeholder could be the inclusion of local leaders of World Heritage properties as national representatives to annual ICOMOS/IUCN or UNESCO meetings.

Future Directions

World Heritage practice in Pacific Islands is only at its beginning. In the last decade, the exposure of local communities to international cultural heritage concepts and conservation practices has led to the desire to have their cultural heritage

recognized at the international level, which in turn increases the necessity of protecting IPIN heritage sites. This grass roots approach to cultural heritage management deserves to be supported by the international community.

Cross-References

- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Community Engagement in Archaeology
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage and Archaeology
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage Education, Training, and Capacity Building
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Fowler, P.J. 2003. *World heritage cultural landscapes 1992–2002*. World Heritage papers 6. Paris: UNESCO World Heritage Centre.

Fowler, P.J. 2004. *Landscapes for the world: Conserving a global heritage*. Bollington: Windgather Press.

ICOMOS. 2005. *The world heritage list: Filling the gaps – An action plan for the future*. Monuments and Sites XII. Paris: International Secretariat of ICOMOS.

Lilley, I. 2010. *Early human expansion and innovation in the Pacific: ICOMOS thematic study*. Paris: ICOMOS.

Smith, A., and K. Jones. 2007. *Cultural landscapes of the Pacific islands: ICOMOS thematic study*. Paris: International Secretariat of ICOMOS.

UNESCO. 1972. *The World Heritage Convention*. Paris: UNESCO World Heritage Centre.

UNESCO. 1994. *Report of the expert meeting on the 'global strategy' and thematic studies for a representative World Heritage List*. UNESCO Headquarters, 20–22 June. Paris: UNESCO.

UNESCO. 2004. Action plan: World heritage – Pacific 2009 programme. Available at: http://whc.unesco.org/uploads/activities/documents/activity-6-1.pdf. Accessed 11 Apr 2010.

UNESCO. 2010. World Heritage List. Available at: http://whc.unesco.org/en/list. Accessed 11 Apr 2010.

UNESCO (Asia). 2009. *Hoi An protocols for best conservation practice in Asia: Professional guidelines for assuring and preserving the authenticity of heritage sites in the context of the cultures of Asia. Adopted by the Asia-Oceania region at the ICOMOS General Assembly in Xi'an. China in 2005*. Bangkok: UNESCO Bangkok.

Wilson, M., C. Ballard, and D. Kalotiti. 2009. Chief Roi Mata's domain: Challenges for a world heritage property in Vanuatu. *Historic Environment* 22: 1–19.

Further Reading

Smith, A. 2011. East Rennell world heritage site: Misunderstandings, inconsistencies and opportunities in the implementation of the World Heritage Convention in the Pacific Islands. *International Journal of Heritage Studies* 17: 592–607.

Pacific Ocean: Maritime Archaeology

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Introduction

The Pacific Ocean is the largest in the world. Within its vast expanse are thousands of islands which have a rich history of human interaction that stretches back for millennia. Though the distance and the time required for successful crossings created difficulties for seafarers, an understanding of the winds and currents allowed it to be used as a highway (Van Tilburg 2011: 588). Indigenous peoples have inhabited even the most remote parts of the Pacific

for centuries; they constructed villages, navigated and traded between islands, and harvested the marine resources they needed for survival. Europeans and Western cultures used the Pacific Ocean for activities such as exploration, colonization, resource extraction, and trade, each of which has left an indelible mark on the cultures and environment of the region. For many years maritime archaeological projects have been conducted around the Pacific Ocean, and their results have provided unique insights into the human interaction with and within the ocean.

Definition

The area encompassed by the Pacific Ocean is so expansive that geographers use the divisions of South, Central, and North Pacific when discussing the different regions. The greatest density of the islands exists in its central and southern parts, and cultural groups have inhabited these areas for thousands of years. For the purpose of this entry, the area that will be discussed is Oceania. Oceania can be defined as the islands of the southern, western, and central Pacific and includes Melanesia, Micronesia, and Polynesia.

Historical Background

Archaeologists and linguists generally agree that the colonization of the Pacific was a two-pronged movement that began approximately 3,500 years ago (Bellwood 1979: 282; Russell 2009: 63). The first phase involved the settlement of the western Micronesian island groups of Palau, the Marianas, and possibly Yap, and the second involved an easterly movement through Melanesia to western Polynesia, eastern Micronesia, and later the Hawaiian Islands and New Zealand (Russell 2009: 63). Once established on the various islands, complex and distinct cultures developed which were manifested socially, linguistically, and technologically. The connection to the sea was tantamount to these societies, and assemblages of material culture associated with this relationship have been archaeologically documented.

The final phase of Pacific colonization was signaled by the appearance of Europeans within the last 500 years (Lilley 2006: 5). Beginning with the Spanish explorers of the sixteenth century, European contact and colonization had drastic effects on the cultures and islands of Oceania. Spain's success in establishing a trade route across the region led other European countries to explore more regions in the hope of finding new lands and expanding their presence. During the seventeenth and eighteenth centuries, Dutch, French, and British expeditions sailed throughout the region and made significant geographic and scientific discoveries.

Although the Spanish were successful in developing trade routes across the ocean, it was not until the late eighteenth century that extensive trade was established by other nations. At that time the British were focusing their efforts on the colonization of Australia, while American trading vessels from New England were crossing the Pacific and establishing links with China. These voyages allowed traders and colonial powers alike to compile information about available resources of potential commercial interest, and soon stories of sandalwood and significant numbers of seals and whales reached the USA and Britain. This news produced an explosion in the numbers of ships roving the waters of Oceania by the early nineteenth century. The need for freshwater, food, and firewood during these journeys ultimately led to contact with nearly every archipelago, and these interactions had a profound effect on local cultural groups.

From the mid-nineteenth to early twentieth centuries, American and European powers developed their colonial holdings in many areas of Oceania. Initially, they served as supply and transshipment outposts for passing vessels, but soon they realized that the climate and environment of the Pacific islands also allowed for the harvest of guano for use in fertilizers and coconuts for copra. The development of large-scale agricultural production of crops like sugarcane resulted in the construction of colonial government towns and significant maritime infrastructure to assist in navigation and shipping.

The Pacific Ocean was relatively quiet during World War I; Japan and the USA quickly took

control of all German colonies there. At the end of the war, Japanese occupation of nearly all former German territories in the Pacific was formally recognized through the Treaty of Versailles. Japan quickly established administrative centers in many parts of Oceania and increased maritime infrastructure development through the construction of lighthouses and channel markers, as well as port-related facilities. By the 1930s Japanese military infrastructure construction was also increased in preparation for war.

The December 7, 1941 attack by Japan on the US Naval Base at Pearl Harbor in Hawaii had profound effects on Oceania. Many of its island archipelagos became the scene of World War II's Pacific Theater. Prewar occupation of these islands allowed the Japanese military to heavily fortify their installations and establish extensive air bases. Such was the strength of these fortifications that some of the most intense and bloodiest battles of the war were fought on the islands of the Pacific and in the sea and air surrounding them. The results of these battles were devastating and left a permanent mark on the islands.

Archaeology in the Pacific is dominated by two main foci: prehistoric colonization of the islands and the activities of the post-1500 historic period. Due to the number of maritime archaeology projects that have been undertaken in the region and the variety of topics covered, a thematic approach to this discussion is appropriate. The context for each theme, which includes colonization, exploration, European trade, resource extraction, conflict, and warfare, is provided, and examples of archaeological investigations pertaining to each are discussed below.

Colonization

Debates about the post-Pleistocene colonization of the islands and the origin of the first voyagers are ongoing, as research provides new information. According to Ian Lilley (2006: 5), approximately 3,500 years ago seafaring, pottery-making farmers in the Bismarck Archipelago established the "Lapita phenomenon" and were the first people to occupy remote Oceania. The Lapita debate is a major focus for archaeological investigations of coastal sites through Oceania and has taken a central theme in literature relating to Pacific prehistoric archaeology over the past decades. Though these studies attempt to determine the earliest occupation of Oceania through the association of pottery types and other aspects of cultures, no definite remains of the watercraft used by the voyagers to make the long trips between the islands have been identified. The reason for this can be explained by considering the organic nature of such craft and the tropical marine environment of the region. Rough sea conditions quickly break up abandoned or wrecked wooden vessels, and the remaining structure is quickly consumed by tropical wood-boring organisms. As watercraft would have been constructed almost entirely of wood and plant products, this would leave very little evidence aside from stone anchors and any stone implements that were onboard.

Submerged archaeological sites relating to prehistoric occupation include evidence of early seafaring and marine resource extraction. Sites containing stone anchors and fishing implements have been recorded in several areas of Oceania since the 1960s. Examples of archaeological investigations of such sites include those conducted in Hawaii, French Polynesia, and the Federated States of Micronesia (FSM).

Shell fishhooks and scattered basalt artifacts such as stone fishing weights and anchors are abundant in some sites around the island of Oahu in Hawaii. In 1996 archaeologists and students from the University of Hawaii conducted investigations of a scattered collection of lithic artifacts, fish trap weights, and octopus lures directly off of Waikiki (Van Tilburg 2002: 251). The study resulted in the hypothesis that the high-density fishing-related artifacts are found on nearshore-raised reefs due to a greater density of marine life concentrated in the area (Pfeffer 1995; Van Tilburg 2002: 251).

Another significant prehistoric maritime archaeological site is located in Mo'orea, French Polynesia, near Tupaparau Pass in the Afareaitu lagoon. Numerous hewn and worked stone objects have been recorded there; objects identified include stone anchors, fishing weights, finished basalt tools (adzes), and a small number of

domestic objects. Although the function of the site is still unknown, it is significant due to the fact that hundreds of objects are located in one area (L'Hour 2010: 47).

Archaeological evidence of marine resource extraction is common in Oceania. One type of site associated with marine subsistence strategies are fish traps. Such sites are especially abundant in the FSM state of Yap, where local people see their use as a sustainable fishing practice. A comprehensive archaeological survey of fish weirs (locally known as *aech*) was conducted to assist in prioritizing restoration work and to encourage the revitalization of their use. Conducted in association with the *aech* owners, village chiefs, and the Yap Historic Preservation Office (HPO) staff, the survey resulted in the location of hundreds of *aech* and the archaeological recording of a large number of them (Jeffrey and Pitmag 2010; Jeffrey 2011).

European Exploration

Early sixteenth-century Spanish explorers seeking a trade route between Acapulco (Mexico) and Manila (Philippines) were the first known Europeans to enter the Pacific. Once a course was established for what would become known as the Manila Galleon trade, the Spanish established a provisioning entrepôt for their ships at Guam and soon claimed islands in the Carolines, Solomons, and Marquesas. Dutch traders, already long established in Southeast Asia, are also known to have explored parts of the South Pacific in the seventeenth and eighteenth centuries. However, it was not until the eighteenth and nineteenth centuries that French and English expeditions made significant geographic discoveries in the region. By the nineteenth century other nations also explored the Pacific while making circumnavigations of the globe in the name of science.

Several vessels associated with the various expeditions are historically known to have come to grief on the treacherous reefs and in the extreme depths of the Pacific Ocean. An example of a maritime archaeological investigation of lost ships of exploration is that of the French vessels *Astrolabe* and *Boussole* in the Solomon Islands. Explorer Jean-François de Galaup, comte de Lapérouse, was engaged in a scientific and exploratory expedition in the region when the two vessels were lost off the island of Vanikoro in the Santa Cruz group in 1788. Though the sites were first discovered by French explorers in the early nineteenth century, they were not archaeologically investigated until 1986. A multinational research team recorded the wreck sites and also located the remains of associated survivors' camps (Stanbury and Green 2004).

Shipwrecks are not the only archaeological remains of European exploration that have been identified. In many cases ships narrowly escaped wrecking but were forced to sever anchor cables in the process. Thanks to excellent record keeping by expedition leaders and their crews, the approximate locations of many lost anchors from such ships are known and, in some cases, have been archaeologically documented. Examples of these are anchors identified in Tahiti from the late eighteenth-century expeditions of both Captain James Cook of England and Louis Antoine de Bougainville of France (L'Hour 2010: 47–48).

European Trade

While archaeological evidence sheds light on the extensive prehistoric trade networks that existed between the islands, European trade also left identifiable physical impacts. Colonial ports were built throughout Oceania to assist with shipping cargos. Maritime archaeological sites associated with trade include shipwrecked trading vessels, and maritime infrastructure sites have been investigated in nearly every island group.

Of the sites associated with the post-1500 European period are those related to the Manila Galleon trade. Many vessels are known to have been lost over the trade's four-century history, and shipwreck sites could provide a great deal of information about the vessels involved, the cargos that they carried, and the conditions that existed onboard. And while the remains of several Manila Galleons have been located, so far all of them have been claimed and impacted by treasure-hunting companies looking to profit from them. Spanish shipwreck sites located near the main provisioning points of Guam, Rota, and Saipan

have been salvaged by treasure hunters, and as a result valuable archaeological data is lost forever.

Wrecks of merchant vessels propelled by sail, steam, and petroleum have been investigated in waters surrounding nearly every archipelago in Oceania. One example of a wreck associated with the copra trade is that of the hulk *Elsanore* located at the port of Levuka on the island of Ovalau, Fiji. *Elsanore* was loaded with a cargo of 500 t of copra when it was destroyed by fire in 1895. The wreck site was investigated by archaeologists from the Australian National Maritime Museum in 1998 (Hosty and Hundley 1998).

One unique example of a wrecked trading vessel is that of *Lenora*, a brig that belonged to the famous Pacific pirate Bully Hayes. Hayes' story was sensationalized by the popular media of the time which portrayed him to be a shrewd swindler, trader, blackbirder, and bigamist (Russell 1982: 4). Hayes used *Lenora* to engage in the illicit trade known as blackbirding, or kidnapping of islanders and using them as forced labor. In 1981 archaeologists with the US National Park Service (NPS), the Kosrae Historic Preservation Office, and the (then) Office of Historic Preservation, Trust Territory of the Pacific Islands investigated the remains of the wooden brig *Lenora* in Utwe Harbor, Kosrae (Carrell 1991).

Resource Extraction

The marine environment and close proximity to deep water of the islands of Oceania has allowed for the exploitation of both pelagic and shallow water species since initial colonization. And over the past 200 years, European and American interests developed industries related to resource extraction in the region. Such industrial activities include fishing, sealing, whaling, pearling, bêche-de-mer collecting, and guano mining. Archaeological investigations of the remains of the various methods associated with these industries have been carried out in several areas. Of these projects, perhaps the most comprehensive research has been conducted on the archaeology of whaling.

By the late eighteenth century, British and American whaleships rounded Cape Horn and entered the Pacific. There, they found rich, new hunting grounds which soon led increasing numbers of whalers who explored the region in search of their prey. In the nineteenth century, vessels equipped for voyages of several years in length roamed throughout Oceania until they filled their holds with valuable oil. Due to the harsh environmental conditions encountered, many vessels were lost on remote and uncharted reefs. Sites of wrecked whaling vessels have been identified in the waters surrounding the FSM states of Pohnpei and Kosrae, as well as Hawaii. Of the known sites of wrecked whaleships that have been investigated archaeologically, those located in Papahānaumokuākea Marine National Monument (in the northwestern Hawaiian Islands) present a unique opportunity to study contemporary vessels from competing nations and the technological changes that occurred over the industry's peak period. Of the ten British and American whaling vessels that are known to have wrecked within the boundaries of Papahānaumokuākea over the first half of the nineteenth century, five have been archaeologically recorded and are the subject of ongoing research (Raupp and Gleason 2010; Raupp 2015).

Conflict and Warfare

No other post-1500 European activity has added more to the archaeological record of Oceania than warfare. Activities such as prewar military infrastructure development, commerce raiding, weapons testing, and battles on land, in the air, and underwater have all greatly affected the Pacific region. The physical remains of these activities on land include fortified structures, command posts, gun emplacements, storage structures, and airstrips. In the waters surrounding the various island chains exist the remains of wrecked ships, landing craft, assault vehicles, and aircraft deposited either as a result of conflict or in its aftermath. Archaeological sites associated with the US Civil War, World War I, World War II, and post-World War II nuclear weapons testing have all been investigated in Oceania.

Of the warfare-related sites in Oceania, none are more prevalent than those associated with World War II. Clandestine prewar Japanese military buildup began in the 1930s in Oceania, and by the end of the decade, extensive, extremely

well-fortified bases and ports were complete. Japanese assaults in the region set the scene for some of the most intense combat of the war and left battlefields littered with detritus. While in some places lost or abandoned Allied and Axis military craft were often left to deteriorate in situ, in others they were relocated to dumping areas as part of cleanup efforts and the necessary clearance of obstructions to navigation. As a result of such activities, a large number of unique archaeological sites exist in both shallow and deepwater environments.

For many years when such sites were identified, they often only preliminarily surveyed as a result of proposed harbor developments or management planning activities. However, over the past few decades, the significance of these sites and their connection to a shared, global heritage has resulted in an increasing interest among both cultural heritage managers and academic researchers. In that time, archaeological investigations of World War II sites have been undertaken in most of the archipelagos of Oceania, as well as in deepwater locations throughout the Pacific. Beginning with inventories of known sites and surveys at battle locations, research has since flourished, and many innovative projects have been undertaken to better understand the physical and cultural processes that affect sites and in turn how their presence has affected the cultures and environments that surround them. Notable projects include the extensive documentation and interpretation of American vessels and planes sunk as a result of the Japanese attack on Pearl Harbor by the US National Park Service (Lenihan 1990; Rodgers et al. 1998); collaborative efforts by the University of Hawaii, NOAA, and NPS to investigate and develop a long-term management strategy for the remains of a Japanese midget submarine sunk in deep water off of Hawaii (Van Tilburg 2006, 2007); the use of anthropological approaches to understanding the range of values, meanings, and relevance that archaeological sites in Chuuk Lagoon have for different cultural groups and how this knowledge can assist in site management (Jeffrey 2007); and the development of an underwater heritage trail aimed at highlighting the many wrecks associated with the 1944 Battle of Saipan and encouraging site protection and preservation through sustainable, heritage tourism (McKinnon 2011; McKinnon and Carrell 2015).

Key Issues/Current Debates

Many of the key issues faced by maritime archaeological sites in the Pacific are the same as those in other parts of the world. However, issues related to site protection, permitting and access, preservation, and conservation are all compounded by the enormous area in which they exist. The vast distances that must be traversed to access sites make archaeological research and management in many parts of Oceania difficult. The costs associated with accessing these sites are a major limiting factor in the amount of time that can be spent surveying, recording, and/or monitoring them. As such it is possible for unscrupulous visitors and salvage operations to impact the archaeological context of sites without being detected. And as with archaeological sites in other parts of the world, perhaps the most important method for providing protection to archaeological sites in Oceania is through education.

Efforts to increase awareness of the fragile and irreplaceable nature of maritime archaeological sites in Oceania are underway and appear to be achieving success in many areas. An example of such can be seen in attitudes toward World War II shipwreck sites in Micronesia. For decades many of these sites were explored and negatively impacted for subsistence, commercial, and recreational purposes. A common practice the world over, local fishers take advantage of the unique artificial reef habitats created by submerged wrecks; however, the methods used for catching fish can be devastating to both archaeological sites and to the fishers themselves. These same wrecks have long been popular with diving tourists as well, and early diving activities often had detrimental effects on heritage sites through looting of artifacts and structural stress caused by improper anchoring practices. However, for the past 20 years, government agencies throughout the region have increasingly implemented fishing

and diving regulations and educated operators about the need to preserve and protect the integrity of sites. Over time these efforts have succeeded in transforming them into sustainable, heritage tourism ventures.

Future Directions

The large number of sites that exist in the coastal zones and waters of Oceania and the range of time represented by them provide seemingly endless options for maritime archaeology. Research into the many different phases of human interaction with the Pacific Ocean has long been established, and significant advances in knowledge are consistently being made into Indigenous cultural and environmental adaptation, as well as the activities of historic periods.

Future maritime archaeological research and management strategies in the region should employ cost-effective methods to achieve goals that are both culturally and environmentally sensitive. In order to do this, collaboration is the most important key. In times past, inclusion of the various cultural groups of many island communities has often been neglected by researchers, which has resulted in negative impacts upon them and often one-sided interpretations of results. However, recent approaches to archaeological research in the region have focused on inclusive practices and community consultation to ensure that all groups have a voice and local wisdom is respected. In terms of physical characteristics, the environments in which sites exist offer opportunities for collaboration with members of the community that use the sites and scientists from many different disciplines. Such collaboration will lead to a more holistic understanding of how sites have affected the environments in which they were deposited and, in turn, the effects of their presence on those same environments.

Though the vast distances separating Pacific archipelagos have been seen as a major limitation for researchers operating on often unreliable sources of funding, they can also be seen as invisible barriers that provide increased levels of protection to sites. While it is true that for many years sites have been visited, and often negatively impacted, by resourceful divers and relic hunters, the high costs of reaching many areas of Oceania have likely been deterrents to other more destructive commercial ventures like scrap metal operations and large-scale land and port development. As a result, many maritime archaeological sites in Oceania are well preserved and hold great potential to provide insight into human interaction with the world's largest ocean.

Cross-References

- ▶ Atlantic Ocean: Maritime Archaeology
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Oceania: Historical Archaeology
- ▶ Pacific Islands: Finding the Earliest Sites
- ▶ Ship Archaeology
- ▶ War at Sea Archaeology

References

Bellwood, P. 1979. *Man's conquest of the Pacific*. New York: Oxford University Press.

Carrell, T., ed. 1991. *Micronesia submerged cultural resources assessment*, Southwest cultural resources center professional papers 36. Santa Fe: Southwest Cultural Resources Center.

Hosty, K., and P. Hundley. 1998. *Maritime archaeological investigation off the port of Levuka, Island of Ovalau, Fiji*. Report prepared for Fiji Museum, Fiji.

Jeffrey, B. 2007. War graves, munitions dumps and pleasure grounds: A post-colonial perspective of Chuuk Lagoon's submerged World War II sites. Unpublished PhD dissertation, James Cook University.

Jeffrey, B. 2011. Rocks, wrecks and relevance: Values and benefits in maritime and underwater cultural heritage. *The MUA collection*. Available at: http://www.themua.org/collections/items/show/1251. Accessed 5 Jan 2012.

Jeffrey, B., and W. Pitmag. 2010. *The aech of Yap: A survey of sites and their histories*. Colonia: Yap State Historic Preservation Office.

L'Hour, M. 2010. *French Polynesia, in UNESCO Underwater cultural heritage in Oceania*, 47–48. Paris: Secretariat of the Convention on the Protection of the Underwater Cultural Heritage.

Lenihan, D.J., ed. 1990. *Submerged cultural resources study: USS Arizona memorial and Pearl Harbor national historic landmark*. Santa Fe: National Park Service.

Lilley, I. 2006. Archaeology in Oceania: Themes and issues. In *Archaeology of Oceania: Australia and the Pacific Islands*, ed. I. Lilley, 1–28. Malden: Blackwell Publishing.

McKinnon, J.F. 2011. Inclusion and negotiation: Interpreting underwater battlefield sites for the public, *The MUA collection*. Available at: http://www.themua.org/collections/items/show/1251. Accessed 5 Jan 2012.

McKinnon, J.F., and T.L. Carrell, eds. 2015. *Underwater archaeology of a Pacific battlefield: The WWII Battle of Saipan*. New York: Springer Press.

Pfeffer, M.T. 1995. Distribution and design of Pacific octopus lures: The Hawaiian octopus lure in regional context. *Hawaiian Archaeology* 4: 47–56.

Raupp, J.T. 2015. "And so ends this days' work": Industrial perspectives on early nineteenth-century pelagic whaleships wrecked in the Northwestern Hawaiian Islands. Unpublished PhD dissertation, Flinders University.

Raupp, J.T., and K. Gleason. 2010. Submerged whaling heritage of Papahānaumokuākea Marine National Monument. *Bulletin of the Australasian Institute for Maritime Archaeology* 34: 66–74.

Rodgers, B.A., W.M. Coble, and H.K. Van Tilburg. 1998. The lost flying boat of Kaneohe Bay: Archaeology of the first U.S. casualties of Pearl Harbor. *Historical Archaeology* 32 (4): 8–18.

Russell, S.C. 1982. *Of wooden ships and iron men: A historical and archaeological survey of the brig Lenora*. Saipan: Micronesian Archaeological Survey.

Russell, S.C. 2009. Prehistoric settlement and indigenous watercraft of the Northern Mariana Islands. In *Maritime history and archaeology of the Commonwealth of the Northern Mariana Islands*, ed. T. Carrell, 61–94. Saipan: Report for Commonwealth of the Northern Mariana Islands Historic Preservation Office.

Stanbury, M., and J. Green, ed. 2004. *Lapérouse and the loss of the* Astrolabe *and* Boussole *(1788): Reports of the 1986 and 1990 investigations of the shipwrecks at Vanikoro, Solomon Islands* (Australian National Centre of Excellence of Maritime Archaeology, Special Publication 8 & Australasian Institute for Maritime Archaeology Special Publication 11).

Van Tilburg, H.K. 2002. Underwater archaeology, Hawaiian style. In *International handbook of underwater archaeology*, ed. C.V. Ruppé and J.F. Barstad, 247–266. New York: Kluwer Academic/Plenum Publishers.

Van Tilburg, H.K. 2006. Japanese midget sub at Pearl Harbour: Collaborative maritime heritage protection. In *Underwater cultural heritage at risk: Managing natural and human impacts*, ed. R. Grenier, D. Nutley, and I. Cochran, 93–95. Paris: ICOMOS International Secretariat.

Van Tilburg, H.K. 2007. Unseen battlefields: Japanese midget sub at Pearl Harbour. In *Out of the blue: Public interpretation of maritime cultural resources*, ed. J.-H. James and D. Scott-Ireton.

Van Tilburg, H.K. 2011. Historic period ships of the Pacific Ocean. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D. Hamilton, 588–609. Oxford: Oxford University Press.

Paddayya, Katragadda

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Basic Biographical Information

Katragadda Paddayya received his Ph.D. from Poona University (now University of Pune) in 1968, where he studied under Dr. H. D. Sankalia. Sankalia founded the Department of Archaeology at Deccan College Post-Graduate and Research Institute in Pune, India. Paddayya has held a series of positions at Deccan College including Lecturer in European Prehistory, Reader in Field Archaeology, Professor of Geoarchaeology, and Director of the institution. He is currently Professor Emeritus at Deccan College and is on the editorial advisory boards of the *Indian Historical Review* and the *Journal of Social Archaeology*. He is an honorary fellow of the Society of Antiquaries of London, and most recently, in 2012, he was awarded the Padma Shri by the Government of India (a national civilian award granted for exceptional and distinguished service).

Major Accomplishments

Paddayya's fieldwork has been underpinned and shaped by an exploration of archaeological epistemology, including significant engagement with processual archaeology (1990); as significant as his fieldwork have been his explicit discussions of the nature and development of archaeological theory in India (1995). His field research has focused on the archaeology of the Shorapur Doab in northern Karnataka, India, especially the Paleolithic

and Neolithic landscapes of the region. His work, spanning more than 30 years, has made this previously little-known region into one of the best documented through extensive systematic surveys and detailed excavations (Paddayya 1982, 2007a; Paddayya et al. 2000). This research, beginning with his dissertation fieldwork on the Neolithic and subsequent projects on the Paleolithic sites of the Hunsgi and Baichbal basins in the same region, has emphasized contextualizing sites within environmental and cultural landscapes (Paddayya 1982) and the role of formation processes in the creation of the archaeological record (Paddayya 2007b).

Paddayya has consistently argued that questions of chronology and the reconstruction of the paleoenvironment and past lifeways could be better understood through intensive regional surveys and with a landscape and settlement system perspective, marking a significant departure from the way of prehistoric research was being done in India. This shift in research orientation led to the discovery of many Acheulian sites in varied topographic and sedimentary contexts and allowed for a reconstruction of the Paleolithic cultural landscape. Such an approach has helped identify sites like Isampur, an Acheulian quarry site with evidence for various stages of manufacture. At this site he and his colleagues have delineated toolmaking processes and behaviors (Paddayya et al. 2000) and have explored the possibility of understanding hominid cognition (Shipton et al. 2009). He has similarly contextualized the Neolithic ashmounds of the region, arguing that the ashmounds had to be understood as a part of the physical and cultural landscape and in relation to the various contemporaneous settlements that surrounded them (Paddayya 2002).

Paddayya has sought to engage with global archaeological theory and explore its relevance to the Indian context. While acknowledging that archaeology was introduced to India by Europeans, he emphasizes the fact that Indian archaeologists need to grapple with its theoretical apparatus to make it truly productive in India. The uncritical acceptance of archaeological theory would be as problematic as the uncritical rejection of it – rather, there is a space for the development of an Indian archaeological epistemology. For example, in "Theoretical Perspectives in Indian Archaeology" (1995), Paddayya lays out what he calls "indigenous" traditions for studying and understanding the past, such as Hindu and Buddhist historical traditions, and argues that post-processual approaches to the Indian past are possible by being cognizant of the Indian epistemological and philosophical contexts. This engagement with the local context is also seen in his attempts to bring archaeology to the public, either through writing popular articles in English and other Indian languages or the establishment of a museum in the village of Hunsgi and encouraging local schools to visit his archaeological excavations.

Cross-References

- ▶ Indigenous Archaeologies
- ▶ Lithic Technology, Paleolithic
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Site Formation Processes
- ▶ South Asia: Paleolithic

References

Paddayya, K. 1982. *The Acheulian culture of the Hunsgi Valley (peninsular India): A settlement system perspective*. Poona: Deccan College.

Paddayya, K. 1990. *The new archaeology and aftermath: A view from outside the Anglo-American world*. Poona: Ravish Publishers.

Paddayya, K. 1995. Theoretical perspectives in Indian archaeology: An historical review. In *Theory in archaeology: A world perspective*, ed. P.J. Ucko, 109–147. London/New York: Routledge.

Paddayya, K. 2002. The problem of ashmounds of southern Deccan in the light of recent research. In *Recent studies in Indian archaeology*, ed. K. Paddayya, 81–111. New Delhi: Munshiram Manoharlal Publishers.

Paddayya, K. 2007a. The Acheulian of peninsular India with special reference to Hunsgi and Baichbal valleys of the Lower Deccan. In *The evolution and history of human populations in South Asia: Inter-disciplinary studies in archaeology, biological anthropology, linguistics and genetics*, ed. M.D. Petraglia and B. Allchin, 97–119. Heidelberg: Springer.

Paddayya, K. 2007b. Role of formation processes in Indian archaeology. In *Formation processes and Indian*

archaeology, ed. K. Paddayya, R. Jhaldiyal, and S.G. Deo, 23–35. Pune: Deccan College Post-Graduate and Research Institute.
Paddayya, K., R. Jhaldiyal, and M.D. Petraglia. 2000. The significance of the Acheulian Site of Isampur, Karnataka, in the Lower Palaeolithic of India. *Puratattava* 30: 1–27.
Shipton, C., M. Petraglia, and K. Paddayya. 2009. Inferring aspects of Acheulean sociality and cognition from lithic technology. In *Lithic materials and Paleolithic societies*, ed. B. Adams and B.S. Blades, 219–231. Oxford: Wiley-Blackwell.

Further Reading

Paddayya, K. 1977. The Acheulian culture of the Hunsgi valley (Shorapur Doab), peninsular India. *Proceedings of the American Philosophical Society* 121 (5): 383–406.
Paddayya, K. 1978. New research designs and field techniques in the Palaeolithic archaeology of India. *World Archaeology* 10 (1): 94–110.
Paddayya, K. 1993. Ashmound excavations at Budihal, Gulbarga district, Karnataka. *Man and Environment* 18 (1): 57–87.
Paddayya, K., R. Jhaldiyal, and M.D. Petraglia. 2006. Acheulian quarry at Isampur in Lower Deccan, India. In *Axe age: Acheulian toolmaking from quarry to discard*, ed. N. Goren-Inbar and G. Sharon, 45–73. London: Equinox Publishing Ltd.
Petraglia, M.D., C. Shipton, and K. Paddayya. 2005. Life and mind in the Acheulean: A case study from India. In *The hominid in individual context: Archaeological investigations of Lower and Middle Palaeolithic landscapes, locales and artefacts*, ed. C. Gamble and M. Porr, 197–219. London/New York: Routledge.

Paddy Soils: Environmental Analyses

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Introduction

Rice is a major staple crop in the world today. The rice-growing countries are most of Asian countries, parts of Africa, Europe, and America under tropical, subtropical, and temperate climates. Such significance has drawn enormous attention to the agricultural history of rice from an agronomic perspective. Its historical development has been suggested by excavation of ancient paddy fields and ethnoarchaeobotanical research on rice remains and ancient literature studies. However, paddy soil, a type of modified soil by wet rice farming, has been rarely researched regarding its paleoenvironmental conditions and cultivation modes. A limited number of prehistoric and historical paddy fields have been investigated: China, Japan, Korea, and Sri Lanka. Here, some general soil pedogenic processes in paddy soil associated with agricultural regimes and research topics on ancient paddy soils are briefly introduced.

Definition

A paddy field is an artificially submerged habitat of the rice plant created by either using naturally flooded low-lying land or by constructing a bounded field system to keep water with additional irrigation facilities. Human-controlled irrigation schemes were initially determined by local climates and landforms and advanced by technical development in water management over time. Geomorphological settings of paddy fields are generally classified into five types. They include flood-prone, rain-fed lowland, irrigated, rain-fed lowland, and upland. At the micro-topographic level, ground and surface water regimes in wetland paddy cultivation based on longevity of saturation encompass stagnant water, stagnogley, and pseudogley, which significantly affect soil physical alteration as well as cultivation modes. The most general types are irrigated stagnogley- and pseudogley-type paddy soil resulting from submergence and drainage, and their common characteristics observed from buried paddy fields are dark-colored soil with high organic content and precipitated nodules or stains of iron and manganese due to repeated oxidation and reduction processes (Moormann and Van Breemen 1978; Greenland 1997).

Key Issues

Compared to macroremains of rice, recognition of cultivar, and cultivation contexts, employing

genetic markers and morphological variations is relatively standardized for cross-regional comparison; ancient agricultural soils went through more complicated postdepositional processes and tend to be affected by sedimentation after abandonment of the field. Moreover, locally inherited soil properties such as parent material, acidity, and soil texture are highly varied, and their physical and chemical responses to cultivation activities are dynamic. Hence, manifestation of agricultural effects on soil physiochemical alternation is irregular, and choosing parameters to determine land use dynamics of paddy rice farming is problematic. However, despite the roles played by local properties in pedogenesis as well as effects by cultivation, there are a few common features of paddy soils to note.

Changes to the physical properties of soils by cultivation are induced by puddling (wet tillage) and plowing while preparing land turns and mixes, through breaking up of soil aggregates and restructuration. Consequently, it causes a plow pan formation by downward movement of clay, creating impermeable zones and constraining plowing effects within the A horizon. On a microscopic scale, concentration of fine particles such as clay and silt, and formation of anomalous clay pedofeatures, has been observed (Miura et al. 1992; He et al. 2008; Lee et al. 2014; Lee and French 2016). Concurrently, there are some changes in soil microstructure and pore space, depending on local soil composition by wetting/drying processes and puddling (Eickhorst and Tippköter 2009).

A peculiarity of rice paddy cultivation is considered to be its infield irrigation regime, which is comprised of artificial waterlogging and intermittent drainage (De Datta 1981). Frequent submergence and desaturation of the land geared at providing air to rice plant roots, as well as weeding, usually triggered complex redoximorphic features of iron and manganese (including precipitated nodules and formation of iron pan) as well as gleying of soil (which is caused by iron movement in waterlogged soil). As a result of the accumulation of organic matter and repressed anaerobic decomposition processes caused by waterlogging, paddy soil usually exhibits high organic components in various forms including fresh organic residue, DOM (dissolved organic matter), and macro- and micro-charcoals. DOM in paddy field is a major contributor of emitted atmospheric methane, which can be stored in ancient paddy soil (Pfeffer 1995; Kögel-Knabner et al. 2010). On the other hand, burning the field after harvest, as well as applications of fertilizers (such as fermented animal manure, crop residue, and/or modern chemical fertilizers), would result in changes to some soil components such as P and Si. In the case of paddy soil, however, use of conventional techniques to study archaeological cultivated soils, such as measurements of phosphate concentrations and magnetic susceptibility enhancement (the latter employed to detect burning), is problematic due to gleying, leaching, and the fact that relatively high values of phosphate and nitrogen can be attributed to fertilizer usage (Kögel-Knabner et al. 2010).

More intensive paddy rice cultivation is reported to trigger hydromorphic degradation by leaching of iron as well as clay domain alignment changes and chemical components of Si, Al from clay minerals, and various soluble elements, resulting in the formation of an E horizon under the paddy soil (Brinkman 1970; Kyuma 2004). Furthermore, redox processes in wetland likely cause precipitation of minerals such as pyrite and siderite. In arid climatic zone, salinization due to excessive water evaporation by high temperature on irrigated paddy soils generally occurs as a form of land deterioration.

Although a line of conventional agronomic research on physiochemical composition of paddy soil is informative, its resolution is not high enough to reflect such diversified cultivation mode changes in archaeological paddy soils. In addition to inherited environmental conditions, the main variables to determine the productivity of rice yields and reflection of past cultivation techniques are soil fertility, cultivar variety, planting density, weeding, irrigation regimes, and scheduling corresponding to growth of plant. Issues can be extended to recognizing duration of past agricultural land including discontinuance of land use often resulting in preservation of paddy field by abandonment and minor local environmental fluctuations in ancient times through soil analyses. Other associated topics such as

indigenous or lost methods to replenish soil fertility (Barnes 1990), assessing natural soil fertility by parent material and addition of nutrients by regular flooding, crop rotation patterns, multiple croppings per year, and long-term interplay with local environmental changes such as groundwater-level fluctuations and sea level changes (Zong et al. 2007) are rarely studied and expected to be addressed in further ancient paddy soil research.

The recent geochemical and soil micromorphological investigations on ancient paddy soils appear to be able to provide detailed information regarding the earliest forms of rice cultivation and various ancient wet rice farming schemes.

In geochemistry, increase of soil organic matter, movement of iron and manganese, and removal of calcium carbonate in calcareous soil affected by long-term cultivation are noted through examination of a paddy soil chronosequence spanning 1000 years (Chen et al. 2011). Some view the emergence of paddy rice cultivation as a more active form of rice plant use by inferring infield burning through increased micro-charcoal contents coupled with microfossil evidence at the Kuahuqiao site between 7700 and 7550 cal. year BP and at the Tianluoshan site during 5000–2500 BCE, southeast China (Zheng et al. 2006; Zong et al. 2007). In particular, slash-burn management mode as incipient irrigation cultivation system is suggested by fire scar observed in electronic scanning images from the soil sample of the Majiabang period layer at the Choudun site(~6500 year BP) (Hu et al. 2013). Recent investigation of the Huizui site in the Loess Plateau of northern China indicates that the Neolithic Yangshao culture layer dating ca. 6600 cal BP is likely to be the relic of plausibly paddy farming field with a sign of trampling and redoximorphic features as well as the possibility of manuring evidenced by high phosphate contents (Rosen et al. 2017). A series of cultivation activities and their associated pedofeatures such as trace of harvest by uprooting, presumed application of manuring, burning in field, and development of irrigation toward more human water controlling regimes during Liangzhu period (c. 7000–4000 BP) at the Maoshan site near the lower Yangtze region (Zhuang et al. 2014). Noticeably, it is plausible to detect difference between rain-fed and advanced artificial irrigation regimes from prehistoric (c. 1000 BCE) and early historical paddy soils (400–1000 CE) at the Gulhwa and Pyunggeo sites, South Korea, by silty clay concentration pedofeatures exhibiting hydrological alteration and degradation due to irrigation scheme changes (Lee et al. 2014).

However, the complex nature of paddy soil chemistry and pedogenesis requires to examine ancient agricultural soils in further detail due to the complex nature of paddy soil chemistry. Multiple qualitative analytical techniques can be expected to yield more solid results in detecting the evolution of paddy rice farming and its locally diversified trajectories. In particular, geoarchaeological survey allied with archaeoethnobotanical research and archaeological excavation of buried ancient field systems and irrigation facilities is known to be informative.

It is required to building up a dataset of chemical and physical soil alterations associated with agricultural practices based on samples from multiple ancient buried paddy soils. This would serve as a crucial tool to assess early paddy soils in which clear field system features are not usually preserved well to understand paleoenvironmental conditions and cultivation modes. Further research is also needed to identify possible signatures of different paddy cultivation regimes and to shed light on degradation due to excessive land use. Another challenge is to detect the start of dry rice farming (upland rice) and to recognize paleosols under the influence of dry rice farming.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Archaeological Soil Micromorphology Working Group
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Rice: Origins and Development

References

Barnes, G.L. 1990. Paddy soils now and then. *World Archaeology* 22 (1): 1–17.

Brinkman, R. 1970. Ferrolysis, a hydromorphic soil forming process. *Geoderma* 3 (3): 199–206.

Chen, L.M., W.R. Effland, and G.L. Zhang. 2011. Soil characteristic response times and pedogenic thresholds during the 1000-year evolution of a paddy soil chronosequence. *Soil Science Society of America Journal* 75 (5): 1807–1820.

De Datta, S.K. 1981. *Principles and practices of rice production*. Las Banos: International Rice Research Institute.

Eickhorst, T., and R. Tippköter. 2009. Management-induced structural dynamics in paddy soils of south east China simulated in microcosms. *Soil and Tillage Research* 102 (2): 168–178.

Greenland, D.J. 1997. *The sustainability of rice farming*. Wallingford: CABI.

He, Y., C. Huang, X. Xu, Y. Wang, and X. He. 2008. Micromorphological features of Paleo-Stagnic-Anthrosols at archaeological site of Sanxingdui, China. *Journal of Mountain Science* 5 (4): 358–366.

Hu, L., Z. Chao, M. Gu, F. Li, L. Chen, X. Li, Z. Huang, Y. Li, B. Xing, and J. Dai. 2013. Evidence for a Neolithic Age fire-irrigation paddy cultivation system in the lower Yangtze River Delta, China. *Journal of Archaeological Science* 40: 72–78.

Kögel-Knabner, I., W. Amelung, Z. Cao, S. Fiedler, P. Frenzel, R. Jahn, K. Kalbitz, A. Kölbl, and M. Schloter. 2010. Biogeochemistry of paddy soils. *Geoderma* 157 (1): 1–14.

Kyuma, K. 2004. *Paddy soil science*. Kyoto: Kyoto University Press.

Lee, H., and C. French. 2016. Detecting long-term valley fill evolution and rice paddy land use: Ageoarcheological investigation of the Baeksuk valley and the Bronze Age settlement, South Korea. *Catena* 142: 190–205.

Lee, H., C. French, and R. Macphail. 2014. Microscopic examination of ancient and modern irrigated paddy soils in South Korea, with special reference to the formation of silty clay concentration features. *Geoarchaeology* 29: 326–348.

Miura, K., T. Tulaphitak, and K. Kyuma. 1992. Pedogenetic studies on some selected soils in Northeast Thailand. *Soil Science & Plant Nutrition* 38 (3): 485–493.

Moormann, F.R., and N. Van Breemen. 1978. *Rice: Soil, water, land*. Las Banos: International Rice Research Institution.

Rosen, A., R. Macphail, L. Liu, X. Chen, and A. Weisskopf. 2017. Rising social complexity, agricultural intensification, and the earliest rice paddies on the Loess Plateau of northern China. *Quaternary International* 437: 50–59.

Ruddiman, W.F., Z. Guo, X. Zhou, H. Wu, and Y. Yu. 2008. Early rice farming and anomalous methane trends. *Quaternary Science Reviews* 27 (13): 1291–1295.

Zheng, Y., G. Sun, L. Qin, C. Li, X. Wu, and X. Chen. 2006. Rice fields and modes of rice cultivation between 5000 and 2500 BC in east China. *Journal of Archaeological Science* 36 (12): 2609–2616.

Zhuang, Y., P. Ding, and C. French. 2014. Water management and agricultural intensification of rice farming at the late-Neolithic site of Maoshan, Lower Yangtze River, China. *The Holocene* 24: 531–545.

Zong, Y., Z. Chen, J.B. Innes, C. Chen, Z. Wang, and H. Wang. 2007. Fire and flood management of coastal swamp enabled first rice paddy cultivation in east China. *Nature* 449 (7161): 459–462.

Pakistan: Archaeological Museums

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Introduction

A museum is a nonprofitable institution that caters for conservation and exhibition of artifacts of significant value and educates the society about the human past and her environment through material evidence. The objects in a museum relating to ancient cultures and civilizations are organized in such a manner that spectators can conceive the exact picture of the past. The archaeological investigations in Pakistan reveal the earliest human occupation of Soan Valley near Rawalpindi and Sanghao Cave in Mardan since times prehistoric. The prehistoric caves, rockshelters, workshops, and quarries reported in the tribal belt, Mohmand and Bajaur agencies, Rohri Hills, and the Thar Desert further testify the existence of prehistoric occupations in Pakistan. The evidence of the Neolithic Culture Phase dating from the 9th to the 4th millennium BCE comes from the sites of Mehrgarh, Gumla, Jhandi Babar-I, and Sheri Khan Tarakai. The excavations at Kot Diji and Rehman Dheri provide substantial proof of this period in Sindh and

Khyber Pakhtunkhwa, respectively, followed by an urbanized and developed Indus Valley or Harappan Civilization, which was almost contemporary to the Egyptian and Mesopotamian Civilizations, followed by the Gandhara grave culture or protohistoric cemetery sites dating to the 2nd millennium BCE were discovered in Swat, Dir, Malakand, Bajaur-Mohmand, Chitral, Peshawar, and Taxila regions. The Gandhara Civilization existed in this region from sixth century BCE to fifth century CE. The White Huns, Hindu Shahis, Ghaznavids, Mughals, Durranis, Sikhs, and British ruled and left their footprints in this part of the world from sixth to twentieth century CE. Most of the major museums of the world have relics of the Indus Valley and Gandhara Civilizations exhibited therein. The concept of this entry is to highlight the history of archaeological museums in Pakistan from the 1850s to 2012. This report will serve as a documentary proof of the latest development of museums in Pakistan and will make the world aware of the scope of materials available and exhibited in the Pakistani museums.

Key Issues

The development of museums over the land where today Pakistan exists started soon after the establishment of the British Government. The first museum was established in Karachi in 1851, followed by one each in Lahore in 1864, Quetta in 1900, and Peshawar in 1907. All of these were public museums and represented mostly ethnological collections. Besides, a few museums were also constructed in some institutions of Lyallpur (present Faisalabad) in 1909 and Lahore in 1910 (Natural History Museum in Government College) and zoological museums, one each at Islamia College, Peshawar, and Rawalpindi both in 1934 for education and research purposes. As a result of large-scale explorations and excavations, a number of site museums were established at Taxila in 1918, Mohenjo-daro in 1925, and Harappa in 1926. In 1937, a private museum was established at Lahore with the title of "Faqir Khana" (Dar 1981: 13). The Swat Museum in 1959 was founded by the Wali of Swat and Dir Museum in 1969 by the then Governor of the province. A noticeable development in the establishment of museums was observed; six archaeological museums were added to the list in Pakistan during 2002–2006 by the Provincial Directorate of Archaeology and Museums, Government of Khyber Pakhtunkhwa, under the directorship of Prof. Ihsan Ali. Later on, three more museums, two by Hazara University, Mansehra, in 2007–2008 and one by Abdul Wali Khan University, Mardan, in 2012, were established by Prof. Ihsan Ali during his tenures as Vice Chancellor. These museums are located in Gor Khuttree, Peshawar; Pushkalavati Charsadda; Mardan district; Hund, Swabi; Chitral district; Bannu district; Abbottabad district; Hazara University, Mansehra; and Abdul Wali Khan University Mardan. All these museums are functional and represent archaeological and cultural profile of the respective regions of the country.

The Victoria Museum, Karachi

This Victoria Museum (see Fig. 1) was established by Sir Bartle Frere in 1851 in Karachi (Morley 1981: 10). Originally the museum housed objects of both archaeological and ethnological nature and was representing the artistry, archaeology, and natural history of the country. The museum building was later used by the Karachi Municipal Corporation Department in 1870. Likewise in 1908, various alterations and constructions within and the surroundings of Burns Gardens completely lost the originality of this museum in terms of its architecture and use. So due to lack of interest and awareness about the role of museums in societies, this museum remained abandoned since 1870, and the fate of the materials is not known as there is no such record of it.

The Lahore Museum, Lahore

The Lahore Museum (see Fig. 2) previously known as Jubilee Museum, Central Museum, and Punjab Museum was established by the British Government in 1849. This museum was first opened in Wazir Khan Baradari and represented

Pakistan: Archaeological Museums, Fig. 1 The Victoria Museum, Karachi

Pakistan: Archaeological Museums, Fig. 2 The Lahore Museum, Lahore

both archaeological and ethnological cultures of the region. Their antiquities immensely suffered in 1947, when major pieces were shifted to India under an agreement of devolution of cultural properties. Later on the museum building was occupied by the Punjab Public Library. The present Lahore Museum is located near old Food Street in Lahore district, housing rich collection of Buddhist and Islamic art pieces. The fasting Buddha is one among its unique collections. The contributions in the form of explorations, excavations, surveys, and documentations of the Archaeology Department and NCA Department of Punjab University produced valuable antiquities,

which are displayed in the museum representing a complete profile of the regions.

The McMahon Museum, Quetta

The developmental process of this museum was started in 1900 and the museum was formally opened to the public in 1906. Originally the museum housed antiquities of natural history, arts, crafts, and archaeological interest that represented the culture, ethnicity, lifestyle, and traditions of Baluchistan, Afghanistan, Persia, and Arabia. These antiquities were jointly collected by Mr. Hughes Butter and Sir Aurel Stein. In 1935, as a result of a devastating earthquake, most the museum building was damaged. Since then, the museum was shut down and the antiquities were dumped in municipal warehouses. Today, nobody knows anything about the precious antiquities that the museum displayed.

The Taxila Museum

Sir Alexander Cunningham first started archaeological investigations in Taxila during the period 1913–1934 and produced rich material of sculptures, jewelry, and household utensils. Initially these materials were displayed in a temporary hall which was then shifted to the museum. In 1918, the foundation stone of a new building was laid by the then Viceroy of India Lord Chelmsford and it was formally inaugurated as a museum in 1928 (Ashraf and Lone 2005: 41). Currently the museum is located at about 5 km off the main Peshawar-Islamabad G. T. Road, at a distance of 35 km from Islamabad, with a rich collection of Gandharan art, principally coming from the sites of Bhir Mound, Sirkap, Sirsukh, and the Buddhist monasteries and stupas of Dharmarajika, Julian, and Mohra Muradu (see Fig. 3).

The Peshawar Museum, Peshawar

The Peshawar Museum (see Fig. 4) was built in 1906 in the memory of Queen Victoria and formally opened in November 1907. In its early days the Peshawar Municipality ran the Peshawar Museum. In 1917 the building and museum was transferred to Local Government supervision. The superintendent of the Archaeological Survey of India, Frontier Circle, acted as curator of the museum. In 1927, the Frontier Circle Office was shifted to Lahore. A full-time curator was appointed for the Peshawar Museum, and the building along with antiquities was transferred to the Provincial Government.

Often the main hall of the Peshawar museum building was used for investitures, balls, departmental examinations, tea parties, and sessions of the Legislative Council. The museum collections were displayed in the vestibule, side galleries, and upper galleries of the building. The exhibition area covered 4,850 sq. ft. The first session of the Legislative Assembly of Khyber Pakhtunkhwa, the then North-West Frontier Province, was first

Pakistan: Archaeological Museums, Fig. 3 The Taxila Museum

Pakistan: Archaeological Museums, Fig. 4 The Peshawar Museum, Peshawar

time held here on April 19, 1932, inaugurated by the Viceroy of India, Lord Willington (Khan 1972: 3). The Provincial Government fully realized the difficulty and inconvenience caused to visitors to the museum and disallowed the use of the hall for political purposes. After independence, the museum remained under the direct control of the Director of Public Instructions, Government of Khyber Pakhtunkhwa, the then NWFP. In 1971, an autonomous body, under a Board of Governors, headed by the Chief Secretary, was instituted to run the affairs of the museum. In 1992, the Government of Khyber Pakhtunkhwa, the then NWFP, established a Directorate of Archaeology and Museums to ensure better protection, preservation, promotion, and safeguarding of the archaeological and cultural heritage of the province; thus the Peshawar Museum became part of the Provincial Directorate.

The original two-story building, an amalgamation of British and Mughal style architecture, consisted of a main hall and two side aisles on the ground and first floor, surmounted by four elegant cupolas and small pinnacles on all corners. In 1969–1970 on the eastern and western sides of the building, two halls were added in a similar fashion. In 1974–1975, a second story was added to these two side halls. A new block under a project "Extension of Peshawar Museum" was approved in the year 2002 under the supervision of the principal author of this chapter at a cost of Rs. 33.11 million. The project had two components: first, an extension of the museum to construct an Islamic Block with two galleries, a conservation laboratory, two halls for the reserve collection, offices of the Provincial Directorate, and a cafeteria. The second component was a complete remodeling of the existing building including replacement of showcases, lighting, labeling, and display works in all galleries of the existing main building along with refurbishing the floor, ceiling, and structures. When the project was completed, the antiquities were displayed according to international standards.

The museum since its early days housed a rich collection of the Gandhara art pieces, excavated and recovered from the major Gandharan sites like Shah-Ji-Ki-Dheri in Peshawar district; Sahri Bahlol, Jamal Garhi, Shahbaz Garhi, and Takht-i-Bahi in Mardan district; and Aziz Dehri in Swabi and from other Gandharan sites excavated by both British and Pakistani scholars. The main collection includes Gandharan sculptures, coins, manuscripts, and copies of the Holy Qurans, inscriptions, weapons, dresses, jewelry, Kalash effigies, Mughals and later-period paintings, household objects, and local and Persian handicrafts. Today the Peshawar Museum is best known for its collection and is ranked as the largest museum in the world in terms of Buddhist art collections.

The Dir Museum, Chakdara

Dir district in terms of historical and cultural values is one of the most important regions among the districts of Khyber Pakhtunkhwa. Its territories stretched out between 34° 22′ and 35° 50′ north and 71° 02′ and 72° 30′ east and mainly comprised of the terrain drained by the Panjkora River and its tributaries. Dir takes its name from the name of a village, Dir, which served as a capital of the state during the Nawab regimes. It is surrounded by Swat district on the east, Bajaur on the west, Chitral on the north, and Malakand Agency on the south (see map). The archaeological expeditions in Dir district were started by the Department of Archaeology, University of Peshawar, during 1966–1969 and excavated sites like Andan Dheri, Chat Pat, Amluk Darra, Damkot, Balambat, Timargarha, Shah Dheri, Gumbatuna, and Shalkandi. To house the collection from these sites, the State Government of Dir constructed a museum in Chakdara. Capt. Rahatullah Khan Jaral, the then Political Agent of Dir Agency, proposed the Dir Museum and allocated a sum of Rs. 2,50,000 for its construction. The Provincial Government afterward allocated an additional fund of Rs. 4,90,000 for the construction of residential quarters, boundary wall, guest house, storage, and other facilities.

The museum building was designed by Mr. Saidal Khan, Consultant Architect of the Public Works Department (PWD) of Khyber Pakhtunkhwa, the then NWFP. The architect adopted the local style of architecture and constructed the museum with bare stone, called as Malakandi stone. The museum has a fort-like appearance, with a grand facade, consisting of an arched entrance, two square-corner picket towers, and battlements on the parapet (see Fig. 5).

The museum remained as a state museum until 1969, and when the state was merged into the province, the museum was handed over to the Provincial Government. The Provincial Government constituted a Board of Governors under the Provincial Educational and Training Ordinance 1970 to run the affairs of the museum and was formally inaugurated on May 30, 1979, by Lt. General (Rtd.) Fazl-e-Haq, the then Governor of the province (Dar 1981: 17). However, the museum was properly organized in 1979. The purpose of the museum is to exhibit the extensive archaeological, Islamic, and ethnological materials of the area. The materials include Gandharan sculptures, coins, jewelry, and weapons.

Today the museum has a total collection of 2,161 objects, mainly Gandharan sculptures, coins, and ethnological materials. The display of the Gandharan objects, more than 1,444 in

Pakistan: Archaeological Museums, Fig. 5 The Dir Museum, Chakdara

number, revolves around the themes of Buddha's pre-birth and life stories, miracles, worship of symbols, relic caskets, and individual standing Buddha sculptures. The most represented of the pre-birth stories or Jatakas are Dipankara, Maitryakanyaka, Amara, Syama, and Vessantara Jatakas. The most represented scenes from the Buddha's life story include Queen Maya's dream, interpretation of the dream, birth of Siddhartha, bath scene, seven steps, going to school, writing lessons, wrestling matches, palace life, marriage scene, renunciation, great departure, ascetic life, first meditation, demon attacks, attaining enlightenment, first sermon at Sarnath, conversion of Ksyapa, monks, death scene, cremation of Buddha, distribution and guarding of relics, and the construction of stupas on the relics. The miracle of Sravasti and taming of a wild elephant are the two commonly represented miracles, along with different types of the relic caskets and stupa models, along with life-size Buddha statues. Other Gandharan representation comprises of boddhisattvas, atlantes, ichthyocentaurs, cupids, garland bearers, Corinthian, Persipoliton, Indo-Persipoliton pilasters, and decorative architectural fragments. Most of the Gandhara art pieces come from the sites of Andan Dheri, Chat Pat, Baghrajai, Bumbolai, Jabagai, Shalizar, Ramora, Tri Banda, Macho, Amluk Darra, Nasafa, Damkot, Bajaur and Talash, Dir, Malakand, Balambat, Timargarha, Shamlai Graves, Inayat Qila, Shah Dheri Damkot, Gumbatuna, Jandol, Matkani, and Shalkandi.

The Ethnological Gallery of the museum was established in 1977, reflecting on the cultural heritage of the area and presenting a general picture of the life of the people to the visitors. The ethnological material, 498 pieces in all, includes manuscripts, weapons, jewelry, dresses, ceramics, musical instruments, household objects, furniture, and wooden architectural elements.

The City Museum, Gor Khuttree, Peshawar

The City Museum (see Fig. 6) is located in the Gor Khuttree Complex and can be approached either through Chowk Yadgar from the west or Lahori Gate from northeast of the walled city of Peshawar. The complex occupies the highest point center of the city. This site has been identified with the place of Buddhist embellishment relating to "the tower of Buddha's bowl" and with Kanishka Vihara (Dani 1995). Mughal kings like Babur (Beveridge 1975), Akbar, and Jahangir talked about this site in their diaries and referred this site to the settlement and religious place of Hindu Jogis (a place where

Pakistan: Archaeological Museums, Fig. 6 The City Museum, Gor Khuttree, Peshawar

Hindu funeral sacrifices and Sardha ceremonies were held) (Raverty 1852: 22–23; Jaffer 1945: 203–204). It was Jahanara Begum, the daughter of Mughal King Shah Jahan (1050 HA or 1540 CE), who converted this site into a caravanserai and named it as Sara-e-Jehanabad and built a Jamia Masjid (a place where Friday prayers are held) and a Hamam (Jaffer 103–6). Upon the recommendation of Nur Jahan Begum, wife of another Mughal king Jahangir, a network of cells on four sides with lofty turrets at each corner, two high archway gates on the eastern and western sides, and two wells were constructed which covered a total of 700 sq. ft. area and completed the shape of a caravanserai (Ali et al. 2005: 228). Later on from 1838, the Italian General Paolo de Avitabile as Governor/Representative of the Sikh Government made major alterations in the complex. He converted the Jamia Masjid into Gorakhnath Temple and used the cells for official purposes (Jaffer 1945: 103; Durrani et al. 1997: 189). The addition of second storey structure upon the western gate was the alteration he made for public petition and official use (Jaffer 1945: 103). This site remained the focal point of the British Government as well. The 1912 fire brigade building and barracks on the eastern and southeastern corners, respectively, are the alternations they made. Currently, the site is under direct supervision of the Directorate of Archaeology and Museums and Crises Management Unit, Government of Khyber Pakhtunkhwa.

The City Museum was inaugurated on Pakistan Day on March 23, 2006, by the former Chief Minister Mr. Akram Khan Durrani under the leadership of the principal author of this chapter. The archaeological gallery of this museum represents a continuous profile of the Peshawar Valley in the form of excavation material recovered from the site of Gor Khuttree. This excavation was started by Prof. Dr. Ihsan Ali, the then Director of the Directorate of Archaeology and Museums, in 2002 and today the excavation area with a 49-m-deep trench claims the honor of the deepest excavation in the world, testified through the journal *Current World Archaeology* (Selkrik 2006: 20). The second gallery is of ethological culture of Peshawar, where household objects, traditional dresses, armaments, ornaments, musical instruments, arts, and craft objects are displayed. It is worth mentioning that the structural integrity of surviving monuments, museum antiquities, and excavation area within Gor Khuttree Complex produced M. Phil. and Ph. D. scholars at both national and international levels. Dr. Jennifer Campbell from Toronto University, Canada, and Dr. Shah Nazar and Mr. Fazal Sher from Peshawar University are a few scholars whose research was directly based upon the site.

The Pushkalavati Museum, Charsadda

The establishment of this museum (see Fig. 7) is closely linked with the historical background of the region. Pushkalavati, the modern Charsadda district being the first capital of Gandhara, is situated about 30 km to the northeast of Peshawar. The term Pushkalavati is a combination of two Prakrit words *Pushkara*/*Pushkala* and *wati*/*vati*, which, respectively, mean "lotus" and "city." The area is very fertile and has ponds full of lotus flowers. The lotus flower, which also symbolized Buddha in archaic sect, is still grown in Charsadda. The legendary Hariti Devi and Panchika were born here and converted to Buddhism by Lord Buddha. The Siyama Jataka also took place here (Sehrai 1982; Ali 2003). This region is also known as "Hashtnagar" which is a Persian word meaning "eight villages." According to Prof. Dani, this name is the corrupt form of "Astes Nagar," (city or village of Astes) after its ruler Astes who ruled over Gandhara before the onslaught of Alexander the Great (Dani 1966).

Here the remains of the two cities have been exposed at Bala Hisar and Shaikhan Dheri, opposite to each other. The second one is situated on the bank of river Jinde, a stream with its source in Malakand Agency flowing through Charsadda and joining the river Swat. The site of Bala Hisar yielded the material dated to the time of the Achaemenian, Greeks, Scytho-Parthians, and Kushans (Wheeler 1962). Prof. Ihsan Ali's survey conducted in 1993 discovered 144 sites of different types (Ali 1994). The report brought to light a good number of Buddhist stupas and monasteries in this region.

Pakistan: Archaeological Museums, Fig. 7 The Pushkalavati Museum, Charsadda

Keeping in view the historical wealth of the region, Prof. Ihsan Ali, former Director of the Directorate of Archaeology and Museum, initiated a project for the establishment of a museum on the site of Ghani Dheri, aiming to house both archaeological and ethnological material of the area and educate the people about their rich cultural properties. The museum building was completed, but due to departmental issues, this museum is yet to be opened for public.

The Mardan Museum, Mardan

The Mardan Museum (see Fig. 8) was proposed by Sahibzada Riaz Noor, the then Commissioner of Mardan, on December 29, 1990. He constituted a Board of Governors in January 1991 to help the establishment of the museum in Mardan district. The museum started functioning in March 1991, and the display work in the solitary hall, measuring 50 × 22 ft., was completed in April 1991. The Peshawar Museum donated 22 showcases for the display, while the Department of Archaeology, University of Peshawar, rendered technical support. In 1992, with the establishment of the Directorate of Archaeology and Museums, Government of Khyber Pakhtunkhwa, then NWFP, the Mardan Museum came under its administration. The Peshawar Museum provided 137 confiscated antiquities to start display work. Initially the old building of the Mardan Museum had a total collection of 419 artifacts, including 258 Gandharan sculptures; 127 coins of Kushan, later Kushan, Kushano-Sasanian, and Hindu Shahi dynasties; 6 terracotta animal figurines; 5 mercury containers; 10 household objects; and 13 agricultural tools. The subject matter of the Gandharan sculptures in the Mardan Museum of schist stone are Queen Maya's dream; birth of Siddhartha; bathing scene; the great departure; the first sermon at Sarnath; the conversion of Kśyapa; offerings to Buddha; distribution of the relics; worship of the wheel of law; stupa and alm bowl; Buddha with worshippers and monks; Buddha seated in reassurance pose (Abhaya Mudra); garland bearers; Buddha seated under arches in meditation pose (Dhayana Mudra); Corinthian, Persepolitan, and Aśokan capital; broken architectural elements of pillars, pilasters, harmika, dome, yashthi, chitras or umbrellas, spacers, and floral and geometrical decorative elements from votive and large stupas; broken pedestals with Buddha and Bodhisattva feet; broken hands in different postures; figures of sheep, lion, horse, peacock, and ichthyo-centaurs; and a seated figure of Ardoksho. The stucco sculptures include a seated Buddha in meditation pose (Dhyana Mudra), heads of Buddha, Bodhisattva, and common folk.

Though the initial collection of the Mardan Museum is based on the confiscated materials, later the excavated antiquities from Safiabad, Mardan, and Hund, Swabi, were also displayed in

Pakistan: Archaeological Museums, Fig. 8 The Mardan Museum, Mardan

the museum. Confiscated antiquities from Katlang, Rustam, and Baja police stations along with the donated objects were also displayed in the old building of the museum. From 2002 onward, under the leadership of Prof. Ihsan Ali, the then Director initiated a project for the establishment of a big museum because the old building's capacity was not enough to house the objects systematically. So the current Mardan Museum, which is located on Mardan-Charsadda road, was inaugurated by the Chief Minister Amir Haider Khan Hoti in 2008. The material displayed in the old building have been shifted here and displayed along with borrowed antiquities from the Peshawar Museum. Today this museum mainly represents the Buddhist art and architectural elements and educates the nation about the past glory of the region.

The Hund Museum, Swabi

The Hund Museum (see Fig. 9) was established upon the landscape which has been mentioned hundreds of years ago by various scholars, the earliest account of which came from Sarada inscription found at Hund which describes this region as Udabhandapura, meaning "the upper town" or high-altitude landscape (Rahman 1979a). Xuanzang, the Chinese pilgrim, who is also known as Hiuen Tsang in historical accounts, mentioned this site in his autobiography of 644 CE as Wa-to-kia-han-cha. Waihand and Ohanad are also the names used for the present site of Hund (Shakur 1946; Rahman 1979b; Ali 1999; Ali et al. 2005). Keeping in view the historical value of the site, the Directorate of Archaeology and Museums under the leadership of Prof. Dr. Ihsan Ali initiated a project based on various activities. In its first phase, the building for the museum, rest house, cafeteria, and a monumental Corinthian pillar in the memories of Alexander the Great has been completed, while in the second phase systematic excavations, aiming to determine the complete cultural profile of the region, and construction of a bypass road are yet to be completed. The current museum was inaugurated in 2009 by Mr. Sayed Aqil Shah, Sport, Youth Affairs, Tourism, Archaeology and Museum and represents both archaeological and ethnological wealth of the region.

The Bannu Museum, Bannu

Bannu basin is connected to the Gomal Valley and is surrounded by hills and mountains. It is very strategically located between the Balochistan plateau, Central Asia, and the plains of the greater Indus Valley. The area was inhabited in prehistoric

Pakistan: Archaeological Museums, Fig. 9 The Hund Museum, Swabi

times and it is no wonder that a few Neolithic settlements and prehistoric sites were recorded here. The sites of Sheri Khan Tarakai (Khan et al. 1986), Lewan, and Akra were excavated jointly by the University of Peshawar and the Bannu Archaeological Mission including the British Museum, the University of Cambridge, the University College London, and Bryn Mawr College from 1984 to 2001. Bannu, having rich cultural history in the form of material evidence, the Directorate of Archaeology and Museums has established a Museum of Archaeology and Ethnology near Allah Chowk, next to the Agriculture Office at Bannu, inaugurated by Mr. Sayed Aqil Shah, Minister for Sports, Tourism, Archaeology, and Youth Affairs, in 2011 (see Fig. 10).

The Chitral Museum, Chitral

Chitral district is one of the famous regions among the regions of Khyber Pakhtunkhwa and best known for its indigenous culture and quaint beauty. The district lies in the northwestern part of the province, between 71° 12′ and 73° 53′ longitude and between 35° 13′ and 36° 55′ latitude, bounded on the west by the Badakhshan Province of Afghanistan, on the east by the Northern Areas of Pakistan, on the north by the Wakhan Province of Afghanistan, and on the south by Dir and Swat districts (Ali et al. 2002). The altitude of the district from sea level is about 1,129 m at Arandu to 3,658 m at Baroghil (Raza 1994). The landscape is rugged and mountainous, while the

Pakistan: Archaeological Museums, Fig. 10 The Bannu Museum, Bannu

Pakistan: Archaeological Museums, Fig. 11 The Chitral Museum, Chitral

valleys developed in deep narrow and tortuous areas. Natural streams and channels of river Chitral run through all valleys (Dichter 1967). The archaeological expedition to Chitral conducted by Peshawar University; Bradford and Leicester Universities, UK; and the Directorate of Archaeology and Museums, Pakistan, unearthed a number of Gandhara grave culture or protohistoric cemetery sites in the district. The historic-period sites of this district have also contributed to the establishment of cultural profile of the district. Chitral, with its multifaceted culture, history, and archaeology, led the Directorate of Archaeology and Museums under the leadership of Prof. Dr. Ihsan Ali to establish a museum there. This museum was inaugurated by the late Saleh Mohammad, former Director, in 2008. The displayed material include dresses, armaments, ornaments, wooden effigies, household objects, and Gandhara grave culture materials (see Fig. 11).

Pakistan: Archaeological Museums, Fig. 12 The Abbott Museum, Abbottabad

The Abbott Museum, Abbottabad

Prof. Dr. Ihsan Ali as a Vice Chancellor of Hazara University, Mansehra, completed the establishment of this museum which was formally inaugurated by Mr. Nisar Muhammad Khan, the then Federal Minister, on February 22, 2008. The museum represents archaeological profile of the province in general and Abbottabad and Haripur districts in particular. In 2006–2007 the staff of the said museum under the leadership of Prof. Dr. Ihsan Ali initiated archaeological investigations in Hazara division. The surface collection of the survey conducted at Abbottabad and Haripur districts in the form of potsherds, bones, iron and metal objects, and photographs embellished the archaeological gallery of this museum. The material recovered from the pre-Buddhist grave site at Gankorineotek in Chitral district, excavated in 2008 through INSPIRE project, which was jointly run by Hazara University, Mansehra; Abdul Wali Khan University Mardan; British Council, Islamabad; and Leicester University, UK, are displayed in the main hall of this museum which educate the spectator about past glories (Ali et al. 2010). Household objects, armaments, ornaments, wooden furniture, and dresses are the main objects representing the culture and tradition of the area. The representation of Buddha's life story in watercolor painting and images of those political personalities who contributed directly or indirectly into the establishment of Abbottabad town in Burning Artwork in the said museum is the unique idea of Prof. Dr. Ihsan Ali to promote modernized arts and to pave a new way for students of other academia to contribute to archaeology. A beautiful cultural diorama adorned with traditional furniture, household utensils, and colorful arched facade is an eye-catching element of this museum (see Fig. 12).

Hazara University Museum, Mansehra

The establishment of the Hazara University Museum (see Fig. 13) is another achievement of Prof. Dr. Ihsan Ali as a Vice Chancellor. This museum was formally inaugurated by the then Honorable Governor of Khyber Pakhtunkhwa Mr. Owais Ahmad Ghani on February 13, 2008. It houses a diverse collection of archaeological and ethnological materials representing different occupational and cultural background of the region. The materials are either obtained through explorations and excavations or purchase and donation. The excavations at Gandhara grave

Pakistan: Archaeological Museums, Fig. 13 The Hazara University Museum, Mansehra

culture sites in Chitral district (Ibid) and Bedadi site in Shinkiari, Mansehra, revealed a fairly large number of antiquities which are displayed in the museum and give an authentic dataset for educational and research purposes. The material came from the archaeological survey of Mansehra district, conducted by the staff and students of the Archaeology Department under the leadership of Prof. Dr. Ihsan Ali in the form of potsherds, wooden objects, grave headstones, urn burials, and Gandharan stone panels that make up the collection of this museum. The museum also received a lavish donation of 114 relics and 72 coins from the Governor House. Household objects, ornaments, armaments, and Buddha birth scene in watercolor painting and different poses of Buddha in mirror work are of great interest for the spectators.

Museum of Archaeology and Ethnology, Abdul Wali Khan University Mardan

The Museum of Archaeology and Ethnology, Abdul Wali Khan University Mardan (see Fig. 14), is located at the main campus of the university, situated to the north of the Kabul River between 34° 05′ and 34° 32′ north and 71° 49′ and 72° 24′ east in the heart of ancient Gandhara about 64 km from Peshawar. The excavations at Sanghao Cave in Mardan district by Dr. A. H. Dani in 1963 pushed the history of this region back to 40,000 years (Dani 1999). King Asoka (third century BCE) inscribed the creed of Buddhism on the rocks at Shahbaz Garhi in Mardan and popularized the religion of peace and tranquility. During the time of Scytho-Parthians (first century BCE) and Kushanas (first century CE), the real expansion of Buddhism took place and a new era was ushered in. Hundreds of stupas and monasteries were erected for the propagation of the law of Dhamma. Chinese and Korean travelers and pilgrims, who came here, recorded the existence of these sites.

The site of Jamal Garhi, Sahri Bahlol and Shahbaz Garhi including Takht-i-Bahi which is on UNESCO's World Heritage List is located in this district that yielded a great volume of the Gandharan art pieces that are currently on display at Peshawar, Mardan, Lahore, and Karachi museums. Keeping in view the historical and cultural wealth of the area, Prof. Dr. Ihsan Ali, as a Vice Chancellor of the Abdul Wali Khan University Mardan, laid the foundation stone of the

Pakistan: Archaeological Museums, Fig. 14 A 3D view of the proposed Museum of Archaeology and Ethnology at Abdul Wali Khan University Mardan

University Museum of Archaeology and Ethnology on July 20, 2011, and formally inaugurated the museum through Sayed Aqil Shah, Minister for Sports, Tourism, Archaeology, and Museums and Youth Affairs on December 22, 2012. This museum has been established with the main objective to educate and engage staff and students in extramural activities of the university. The students are given an opportunity to improve and demonstrate their knowledge and communication, leadership, and management skills by designating them tasks related to different activities of the museum. This will enable them to improve their level of understanding about past and present glories. Moreover, it will not only change their environment but they can express their aptitude which will certainly help them choose a profession of their interest in the future. The museum is equipped with ethnological materials which are systematically displayed in eight galleries. The first two galleries represent household objects, ornaments, armaments, coins of different periods, and straw-made items mostly purchased and a few donated. The third gallery is a Swat cultural, where a diorama of Swat valley has been established, embellished with wooden art pieces like engraved pillars, doors, and furnitures. The fourth gallery represents Kalash culture, where the Gandhara grave culture objects, traditional Kalash household utensils, dresses, ornaments, and armaments have been displayed. The fifth gallery represents contemporary art gallery, where pieces of wooden, marble, and straw artwork present the artistry of the region. The sixth gallery presents the color of the province in the form of photographic representation, capturing the culture, traditional games, cuisines, built heritage, and beauty of the province. The seventh gallery represents the vision of Islamic art. Calligraphic Qurans, books, objects of wooden block printings, tile work, and decorative household objects are displayed here. The eighth gallery represents traditional dresses and jewelry. The last two galleries are kept vacant for the archaeological material, and it is hoped that archaeological material will soon be arranged via departmental loan act or donation or through excavations. The digitization of the museum artifacts has also been started, and each object is recorded on a database after its physical verification. The detailed description of selected objects like jewelry, Islamic calligraphy, wood art, marble art, and henna art, from barter system to coinage and

Pakistan: Archaeological Museums, Table 1 List of other museums in Pakistan

S_no	Name of museum	City	Province
1.	Sir Sahibzada Abdul Qayum (SSAQ) Museum	University of Peshawar	Khyber Pakhtunkhwa
2.	Swat Museum	Saidu Sharif	Khyber Pakhtunkhwa
3.	Bamburet Museum	Kalash, Chitral	Khyber Pakhtunkhwa
4.	Quaid-e-Azam University Museum	Islamabad	Federal Capital
5.	Lok Virsa Museum	Islamabad	Federal Capital
6.	Islamabad Museum	Islamabad	Federal Capital
7.	Army Museum	Rawalpindi	Punjab
8.	Bahawalpur Museum	Bahawalpur	Punjab
9.	Harappa Museum	Sahiwal	Punjab
10.	Mughal and Sikh galleries	Lahore fort	Punjab
11.	Banbore Museum	Thatta	Sindh
12.	Umarkot Museum	Thar	Sindh
13.	Hyderabad Museum	Hyderabad	Sindh
14.	National Museum	Karachi	Sindh
15.	Shah Abdul Latif University Museum	Khairpur	Sindh
16.	Mohenjo-daro Museum	Larkana	Sindh

Pakistan: Archaeological Museums, Table 2 List of proposed museums

1.	Site Museum at Takht-i-Bahi, UNESCO World Heritage Site	Takht-i-Bahi	Khyber Pakhtunkhwa
2.	Tribal Museum	Khyber Agency	FATA
3.	Museum in each district of the country		

manual plow displayed in various galleries made this museum one of the best in Pakistan in terms of evolutionary descriptions. The distribution of antiquities, systematic display, lighting, and detailed authentic descriptions of objects today educate the students and allow researchers to look at the past through material evidence and evaluate the difference (Tables 1 and 2).

Cross-References

- ▶ Heritage Museums and the Public
- ▶ Regional/Site Museums

References

Ali, I. 1994. Settlement history of Charsadda District. *Ancient Pakistan* 9: 175.

Ali, I. 1999. Urbanization in the Kushan time. *Journal of Asian Civilizations* XXII (1): 1–38.

Ali, I. 2003. Early settlements, irrigation and trade-routes in Peshawar Plain, Pakistan. *Frontier Archaeology* 1: 1–289. Peshawar, Pakistan.

Ali, I., C. Batt, R. Cunningham, and R. Young. 2002. New exploration in the Chitral Valley, Pakistan: An extension of Gandharan grave culture. *Antiquity* 76 (293): 647–653.

Ali, I., M. Zahir, and I. Khan. 2005. Report on the excavations at Gor Khuttree, Peshawar (2003–04). *Frontier Archaeology* 3: 227–276. Peshawar, Pakistan.

Ali, I., I. Shah, A. Hameed, and A. Ahmad. 2010. Gankorineotek (Chitral) excavations, second field season (2008). *Pakistan Heritage* 2: 209–238.

Ashraf, M.K., and A.G. Lone. 2005. *Taxila, home of stucco art*. Islamabad: 786 Printers.

Beveridge, H., trans. 1975. *The Babar Nama [Tuzke Babari]*. Lahore: Panco Press.

Dani, A.H. 1966. Shaikhan Dheri excavation (1963–64). *Ancient Pakistan* 2: 17–24.

Dani, A.H. 1995. *Peshawar, the historic city of frontier*. Lahore: Sang-e-Meel Publications.

Dani, A.H. 1999. Sanghao cave excavation. The first season 1963. *Ancient Pakistan* 1: 1–50.

Dar, S.R. 1981. Development of museums in Pakistan: Prospects and problems. *Journal of Museology and Museum Problems in Pakistan* 19: 13–26.

Dichter, D. 1967. *The north west frontier of Pakistan: A study of regional geography*. Oxford: Clarendon Press.
Durrani, F.A., T. Ali, and I. Rehman. 1997. Excavation at Gor Khuttree, a preliminary note. *Āthāriyyāt (Archaeology)* 1: 185–212.
Jaffer, S.M. 1945. *Peshawar, past and present*. Peshawar: Khan.
Khan, M.A. S. 1972. A short constitutional history of north-west Frontier Province. Peshawar, Pakistan (in Pashto).
Khan, F., J.R. Knox, and K.D. Thomas. 1986. Sheri Khan Tarakai: A new site in the northwest Frontier Province. *Journal of Central Asia* IX (1): 13–34.
Morley, G. 1981. Brief history of museum development in Asia. *Journal of Museology and Museum Problems in Pakistan* 19: 9–12.
Rahman, A. 1979a. Hund slab inscription. *Journal of Central Asia* II (1): 71–18.
Rahman, A. 1979b. *The last two dynasties of the Shahi's*. Islamabad: Centre for the Study of the Civilization of Central Asia, Quaid-e-Azam University.
Raverty, H.G. 1852. An account of the city and province of Peshawar. Translated by the Bombay Geographical Society X.
Raza, M.H. 1994. Mountains of Pakistan. Islamabad.
Sehrai, F. 1982. *The Buddha story in Peshawar museum*. Peshawar: University of Peshawar.
Selkrik, A. 2006. Pakistan, cover story CWA reports on the current excavations and star sites of northern Pakistan. *Current World Archaeology* 16.
Shakur, M.A. 1946. *A hand book to the inscriptions gallery in the Peshawar museum*. Peshawar: Peshawar Museum.
Wheeler, R.E.M. 1962. *Charsadda, a Metropolis of the north-west frontier*. London: Oxford University Press.

Further Reading

Allchin, F.R. 1995. *The archaeology of early historic South Asia: The emergence of cities and states*. New York: Cambridge University Press.
Beal, S., trans. 1957. *Chinese accounts of India*. Calcutta: Susil Gupta.
Campbell, J.L. 2011. Architecture and identity: the occupation, use and reuse of Mughal caravanserais. University of Toronto, unpublished.
Caroe, O. 1962. *The Pathans*. London: Macmillan.
Cunningham, A. 1863. *The ancient geography of India, the Buddhist period*. London: Trubner.
Cunningham, A. 1871. *The ancient geography of India*. London: Trübner.
Das, G. 1874. *Tarikh-i-Peshawar*. Lahore: Sang-e-Meel Publications.
Fazal, A. 1902–1939. *Akbar Nama*. Trans. H. Beveridge. Lahore.
Foucher, A. 1915. *Note on the ancient geography of Gandhara, Calcutta*. Calcutta: Superintendent of Government Printing.
Gazetteer of the Peshawar District, 1897–98. Lahore: Sang-e-Meel Publications.

Palace of the Boyne (Brú na Bóinne)

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Introduction

Large and imposing prehistoric stone monuments never appear to stand in isolation nor are they constructed as a single event. Since the advent of chronometric dating techniques and good systematic fieldwork, archaeologists are beginning to understand the chronology and complex development of burial-ritual monuments and the landscapes they inhabit (e.g., Edmonds 1999; Thomas 1999).

Irish passage tombs (or graves), in use between the fourth and third millennium BCE, form part of a much wider Atlantic sequence that probably has its origins in the Iberian Peninsula (Shee-Twohig 1981; Grogan 1991; Nash 2012). They are arguably the most noticeable Irish monument group and number around 220, although only 50 contain passage grave art (Waddell 2005: 74). They are usually clustered in groups forming cemeteries and are distributed in a distinctive northeast/southwest band across central and Northern Ireland.

Along with the Boyne Valley complex, the two passage tomb clusters at Loughcrew and an array of Neolithic monumentality including the Mound of the Hostages occupy the Hill of Tara (Co. Meath) and make for a busy ritual presence within this part of Ireland (Stout 2003; O'Sullivan 2005). This distinct architectural form usually comprises a circular (sometimes subcircular)

mound which is delineated by a stone kerb. Mounds vary in size, between 10 and 85 m in diameter, and usually cover an east–west oriented passage (ranging between 1 and 40 m in length) that leads from a facade/entrance to a chamber, deep within the heart of the mound. It is on components such as the kerbing, passage, and chamber where a unique prehistoric rock art tradition is engraved, sometimes referred to as *passage grave art* or *megalithic art* (Shee-Twohig 1981; Eogan 1986). This sometimes hidden signature is a non-representational repertoire and comprises geometric and curvilinear motifs such as chevrons, concentric circles, spirals, and zigzags; no two panels across the entire assemblage are the same, each stone reflecting a unique narrative (Lynch 1973; Shee-Twohig 1981; Eogan 1986; O'Sullivan 1986, 1993; Cochrane 2006; Nash 2006). Many motifs present within the larger monuments are distinctively regionalized such as the double and triple spiral and the radial variants found in at Newgrange or the crescents and serpentiniforms from Knowth. Analysis has identified certain areas of the monument that contain either curvilinear or rectilinear motifs (see in particular by Elizabeth Shee-Twohig 1981; George Eogan 1986 and Muiris O'Sullivan 1986, 1993). Closely associated with rock art and the architecture is the way that the dead are brought to the monument and where they are deposited, along with the grave goods that accompany them. Throughout the passage grave tradition where preservation allows, burial rites and symbolic behavior as shown through the artifact assemblages appear to be identical, passage tombs acting as repositories for successive generations of people, each mound representing a periodic corporate act of internment.

Key Issues/Current Debates/Future Directions/Examples

Signaturing Landscape

The 35 Neolithic monuments, standing within a postmedieval agricultural landscape, occupy the northern river terrace gravels (regarded as highpoints within the valley landscape) and ridges of a bend within the Boyne Valley, County Meath, central-eastern Ireland. The bend in the River Boyne, designated a World Heritage Site in 1993 (Referred by UNESCO to as an *Archaeological Ensemble of the Bend of the Boyne*), appears to enclose this landscape of over 785 ha. Here, the course of Boyne appears to physically separate ritual space immediately north of its banks from secular space to the south during a time when the passage tombs are the focus of extraordinary community activity. However, secular monuments in the form of circular stock enclosures and evidence of settlement, located among the ritual monuments, probably represent earlier and later utilization of the landscape before and after passage tombs are in use (Eogan 1991).

The monument group, comprising mainly passage tombs of varying size and clustered into four distinct groups, is one of Western Europe's most concentrated and has as its foci three massive circular or ovoid stone chambered Neolithic passage tombs – Dowth in the east, Knowth in the west, and Newgrange in the central part of the bend (Fig. 1) (O'Kelly 1982a, b; Eogan 1986). Apart from these monuments, this ritual complex is also home to an array of smaller [satellite] passage tombs, monoliths (standing stones), later post-passage grave henges and earthen enclosures (Stout 1991), and evidence of pre- and post-passage grave settlement. Early pre-cairn Neolithic settlement is witnessed with the excavation of longhouses located within the northern part of the Knowth site, dated to around 3900 BCE. Prior to the construction, between 3300 and 2900 BCE, later settlement then shifts to the western part of the site with the construction of further longhouses (Eogan and Roche 1997; Cooney 2000). Concerning the Late Neolithic post-cairn ritual landscape, enclosures and henges would have indelibly stamped their presence on the Late Neolithic landscape.

Establishing Monumentality

The monuments that occupy the northern terracing of the Bend of the Boyne are arranged into four clusters; three of these center around the three large passage tombs, while a fourth linear cluster stands between Dowth and Newgrange.

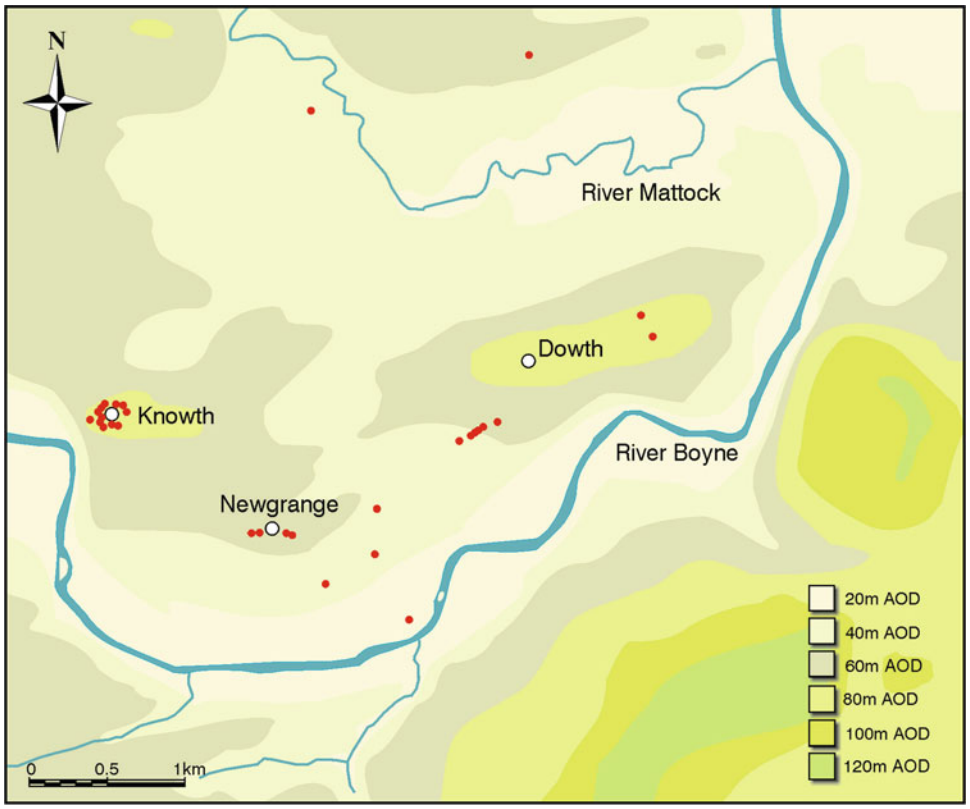

Palace of the Boyne (Brú na Bóinne), Fig. 1 The distribution of the Boyne Valley group of monuments including the passage graves of Newgrange, Knowth, and Dowth

The largest and arguably the most impressive of the three passage tombs is Newgrange (Gaelic: *Sí an Bhrú*). This circular stone, earth- and turf-constructed monument was built between 3295 and 2925 cal BCE, at a time when there were a large number of passage grave monuments being erected around the Neolithic core areas of Atlantic Europe (Grogan 1991: 126). Its dominance, standing on a small ridge along with a series of enclosures, standing stones, and tumuli within the Boyne landscape, would have probably provided the pilgrim with an obvious visual and ritual focus (Fig. 2) (O'Kelly 1982a, b).

The slightly oval mound measures 85.3 m in diameter and stands 12 m, covering a total area of around 0.45 ha. The central section of the cruciform chamber has a corbelled vaulted roof that extends some 3.5 m into the core of the mound, while the roofs of the side chambers have flat slabs. The long passage is constructed of 43 upright stones (21 on along the eastern side and 22 along the western wall); some of these are decorated with carved abstract images. Outside, the mound is delineated by 97 kerb stones made of local grit (graywacke) or slate and each decorated on both the external and internal surfaces with carved rock art. Based on the seminal work of Shee-Twohig (1981), Newgrange has up to ten types of motif that include curvilinear (arcs, circles, cupmarks, cup-and-rings, serpentiniforms, and spirals) and rectilinear forms (chevrons, lozenges, radials, parallel lines, and offsets); Knowth is similarly embellished.

Over its long history, Newgrange underwent a number of phases of use and abandonment. Similar to other passage tombs elsewhere, Newgrange is constructed using a tried and tested blueprint that includes four major architectural elements: circular mound, entrance/facade, passage, and chamber. These primary architectural elements

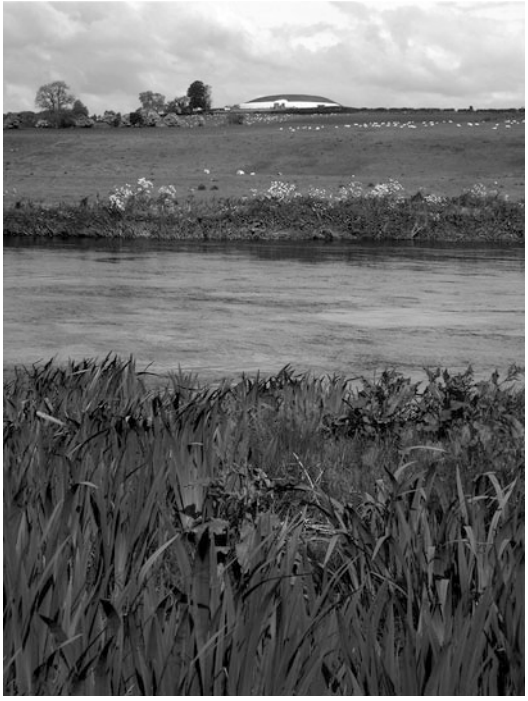

Palace of the Boyne (Brú na Bóinne), Fig. 2 Newgrange from the Boyne. (Image: G.H. Nash)

are arranged in such a way to make the architecture of Newgrange unique (Nash 2006). According to Michael O'Kelly, the archaeologist responsible for excavating Newgrange, some of this architecture is aligned to ritually acknowledge a number of celestial and cosmological events such as the winter solstice. An extensive archaeological excavation of Newgrange revealed a number of unique traits including a roof-box above the main entrance, abstract passage grave rock art both inside and outside the monument, and a 19-m-long east–west passage that was deliberately constructed in such a way to restrict the visual access between the entrance/facade and the cruciform chamber, a trait repeated in passage grave monuments throughout the Neolithic. The roof-box, unique to the European passage grave tradition, was possibly constructed in order to allow a beam of light to penetrate the back of the chamber during the midwinter solstice (Lynch 1973: 152).

One of the earliest detailed archaeological plans of the three passage tombs was made by Welsh antiquarian Edward Lhwyd in 1699. Lhwyd was alerted when farm laborers discovered the entrance at Newgrange when digging the mound for stone, and as a result, he made a detailed plan of the internal arrangement of the passage and chamber areas. Following in the footsteps of Lhwyd were a number of antiquarians who undertook various pieces of work both inside and outside the monument, some suggesting that the monument was constructed during the early medieval period by marauding Vikings; others considered the ancient Egyptians as the builders. Between the time of Lhwyd and until it was taken under the control of the state (then, the United Kingdom of Great Britain and Ireland) in 1882, the monument and the surrounding landscape had been under great threat, mainly the result of vandalism and farming practices. Following statutory protection, Newgrange underwent a significant conservation program in 1890 under the directorship of Thomas Newenham Deane. During the early to mid-twentieth century, Newgrange was investigated a number of times in order to establish its construction methodology and date. It was still considered at this time as a Bronze Age monument rather than Neolithic. Throughout this period and in addition to the intense archaeological activity, the site had become a focus for tourism (e.g., Macalister 1939), and as a result, electric lighting was installed in the passage area during the 1950s. The site also became a local tourist attraction with numerous visitors leaving their mark, usually in the form of graffiti. To some, the entrance became an evocative statement of a bygone megalithic age (Fig. 3). The largest and most comprehensive investigation of the site was undertaken by Michael O'Kelly between 1962 and 1975 where a sporadic sequence of prehistoric activity, from the Late Mesolithic (Residual (disturbed) Late Mesolithic flint tools have been recovered from Bronze Age Beaker context from Newgrange (Cooney 2000: 30) to the Iron Age and beyond, was unearthed.

Following O'Kelly's exhaustive excavation program, the site was controversially restored. During excavation, white quartzite was found in high concentrations around the base of monument, in front of the kerbing, either side of the

Palace of the Boyne (Brú na Bóinne), Fig. 3 Photograph taken by nineteenth-century photographer R. J. Welch of the entrance and the decorative sill stone

façade. O'Kelly considered the white quartzite stones to have originally been fixed to the near-vertical mound walls, and as a result of this, the restoration program fixed a wall of white quartzite stones and river cobbles to a steel-reinforced concrete retaining wall that surrounds the eastern section of the mound, including the area around the façade. This extremely obvious display of this section of the mound arguably contradicts the concept of restricting the visual access of the monument (Nash 2006). Moreover, a similar deposit was found around one of the entrances to Knowth. Eogan, the archaeologist responsible for excavating Knowth, considered the quartzite deposit to be a ritualized pavement (Eogan 1986: 47).

At the extreme east of the bend and standing on a short oval ridge, around 250 m east of the Boyne, is Knowth (Gaelic: *Cnobha*). The ovate-shaped mound measures 81 m by 95 m and is delineated by 127 decorated kerbstones. Unusually for the European passage grave tradition, there are two passages leading to two chambers (entered from the east and west), both discovered through excavation in 1967 and 1968 by George Eogan's team who originally started investigating the site in 1962. (The site was briefly investigated by R.A.S. Macalister in 1941.) Surrounding the monument are at least 18 smaller satellite passage tombs of varying shape and size (Eogan 1986). According to a useful synthesis by Cooney (2000: 83–85) based on investigations by Eogan and Roche (1997), the satellite monuments developed soon after the construction of Knowth, probably around 3000 BCE.

The slightly ovate mound supports two diametrically opposed chamber and passage arrangements, one entering from the eastern side of the mound and the other from the west; both aligned on the March and September equinoxes (Eogan 1986: 178). The eastern chamber is cruciform in plan and is connected by a 35-m-long passage, while the undifferentiated western chamber has a 32-m-long passage. Carved on much of the stone, including those surfaces that face inward toward

Palace of the Boyne (Brú na Bóinne), Fig. 4 Mid-nineteenth-century engraving of Dowth prior to excavation in 1847 by W.F. Wakeman and published in his *Handbook of Irish Antiquities* (1848)

the mound, is an array of passage grave art. Archaeologists have also uncovered a white quartzite pavement around the eastern façade area as well as granodiorite, a phaneritic igneous rock found in other parts of the monument. The visual display of the rock art, the color symbolism of the quartz pavement, and other elements would have carried religious meaning.

Dowth (Gaelic: *Dudhadh*), the least-investigated of the three passage tombs, was probably constructed around 2500 BCE (Fig. 4). The mound, measuring 85 m in diameter and standing over 15 m in height, sits on one of the highest points within the Bend of Boyne's landscape. From the top of the mound, there is clear intervisibility with Knowth and Newgrange. Similar to the other two passage tombs, the mound at Knowth is delineated by a series of kerbstones, some of which are engraved with passage tomb art. Within the vicinity of the entrance and façade is evidence of a white quartzite pavement. The mound was unceremoniously excavated in 1847 under the direction of county surveyor R.H. Frith (on behalf of the Royal Irish Academy), the result being much of the western section of the mound being completely removed, and no official records of the excavation were made. Before work commenced, a curious building known as the *gala music room* was demolished. This building had stood on the summit of Dowth since before 1775 (Harbison 2007) (present on Gabriel Beranger's copy of an engraving of 1775).

Constructing the Boyne Landscape

We are somewhat fortunate that two of the three giant passage tombs within the Bend of the Boyne have been excavated in recent times, both applying modern archaeological excavation techniques. Furthermore, and as a result of these recent excavations, there have been a number of useful discussions concerning their origin, use, demise, and the landscape in which they sit (Cooney 2000). There is a clear chronological development of the secular and ritual landscapes that commence from the Late Mesolithic/Early Neolithic through to the demise of the passage grave tradition during the Late Neolithic. This heavily ritualized landscape is later replaced by a subtle, less commanding landscape of the henge and enclosure. The use of the natural topography along with the physicality of the River Boyne clearly shows an intentionality

to enclose a ritual landscape, possibly separating ritual from secular activity.

The monuments themselves appear to act as a catalyst for ritual and symbolic behavior, the landscape being the backdrop. Both the dead and the living would have each participated in the ritual in and around each monument, the dead as passive participants embarking on a journey to another world. While in the monument, probably the dead would have understood the rock art narrative on each of the kerbstones that faced inward toward the mound, their realm, their art (Nash 2006). The audience located outside the monument, within the facade area, would have caught their last glimpse of the body as it entered the realm of the dead. The passages at Newgrange and Knowth slightly constrict in size in order to restrict the visual access to the ritual activity that would have occurred within the inner passage area, where much of the rock art is engraved, and also to the chamber. Limited archaeological evidence indicates that as the body passed through the passage to its temporary resting place – the chamber – the rock art would have played an integral role in legitimizing the activity within this part of the tomb. Accompanying the body would have been an array of engendered grave goods, some of them prestige items such as mace-heads and axes. These items, along with daily perishable commodities such as food, would have assisted in the successful transition between the liminal world where body has a name and face to a world where only the meta-physical remains can gain access. The ongoing use of each monument over time created an ancestral cult and embodied the legitimacy of each monument and the landscape in which they stand.

Cross-References

► Europe: Paleolithic Art

References

Cochrane, A. 2006. The simulacra and simulations of Irish Neolithic passage tombs. In *Images, representations and heritage: Moving beyond a modern approach to archaeology*, ed. I. Russell, 251–282. New York: Springer-Kluwer.

Cooney, G. 2000. *Landscapes of Neolithic Ireland*. London: Routledge.

Edmonds, M. 1999. *Ancestral geographies of the Neolithic: Landscapes, monuments, and memory*. London: Routledge.

Eogan, G. 1986. *Knowth and the passage-tombs of Ireland*. London: Thames and Hudson.

Eogan, G. 1991. Prehistoric and early historic culture change at Brúgh na Bóinne. *Proceedings of the Royal Irish Academy* 91C: 105–132.

Eogan, G., and H. Roche. 1997. *Excavations at Knowth 2*. Dublin: Royal Irish Academy.

Grogan, E. 1991. Appendix: Radiocarbon dates from Brugh na Bóinne. In *Prehistoric and early historic change in Brugh na Bóinne*, Proceedings of the Royal Irish Academy 91C, ed. G. Eogan, 105–132. Dublin: Royal Irish Academy, 126–127.

Harbison, P. 2007. In retrospect: The Royal Irish Academy's only archaeological excavation: Dowth in the Boyne valley. *Proceedings of the Royal Irish Academy* 107C: 205–213.

Lynch, F. 1973. The use of the passage in certain passage graves as a means of communication rather than access. In *Megalithic graves and ritual: Papers presented at the III Atlantic Colloquium, Moesgård 1969*, ed. G. Daniel and P. Kjærum, 147–161. Copenhagen: Jutland Archaeological Society.

Macalister, R.A.S. 1939. *Newgrange, Co. Meath*. Dublin: Stationery Office.

Nash, G.H. 2006. Light at the end of the tunnel: The way megalithic art was viewed and experienced. *Documenta Praehistorica* XXXIII: 209–228.

Nash, G.H. 2012. Megalithic rock art of the Mediterranean and Atlantic seaboard Europe. In *A companion to rock art*, ed. J. McDonald and P. Veth, 127–142. New York: Blackwell.

O'Kelly, C. 1982a. Corpus of Newgrange art. In *Newgrange: Archaeology, art and legend*, ed. M.-J. O'Kelly, 146–185. London: Thames and Hudson.

O'Kelly, C. 1982b. *Newgrange: Archaeology, art and legend*. London: Thames and Hudson.

O'Sullivan, M. 1986. Approaches to passage tomb art. *Journal of the Royal Society of Antiquaries of Ireland* 116 (68): 68–83.

O'Sullivan, M. 1993. *Megalithic art in Ireland*. Dublin: Town House.

O'Sullivan, M. 2005. *Duma Na Ngiall: The mound of the hostages, Tara*. Bray: Wordwell.

Shee-Twohig, E. 1981. *Megalithic art of western Europe*. Oxford: Clarendon Press.

Stout, G. 1991. Embanked enclosures of the Boyne. *Proceedings of the Royal Irish Academy* 91C: 245–284.

Stout, G. 2003. *Newgrange and the bend of the Boyne*. Cork: Cork University Press.

Thomas, J. 1999. *Rethinking the Neolithic*. Cambridge: Cambridge University Press.

Waddell, J. 2005. *The prehistoric archaeology of Ireland*. Bray: Wordwell.

Palaeopathology: The Study of Ancient Disease in Archaeological Human and Nonhuman Remains

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Introduction and Definition

The World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." This definition has not been amended since 1948 (http://www.who.int/suggestions/faq/en/, accessed July 26, 2017). This of course is a definition that relates to living populations but could be equally applied to the past. Being unhealthy today compromises normal life and the very function of society; this would have been true for our ancestors all over the world.

How can we study our ancestors' health? It is possible to access information pertinent to health and disease in the past by studying historical documents describing disease, and viewing artistic representations of disease in particular periods in time (e.g., Fig. 1). In prehistoric times, these types of evidence are relatively nonexistent and they are more useful for more recent periods, for example, the medieval period in Europe. Our primary form of evidence for disease and injury in the past comes from human remains excavated from cemeteries and other funerary contexts dating from when the earliest humans appeared on the planet (Fig. 2). This study is named "palaeopathology" and is defined as the study of disease in the remains of both human and nonhuman remains, as first defined by Marc Armand Ruffer in 1910 (Aufderheide & Rodríguez Martín Aufderheide and Rodriguez Martin 1998: 5–6). The evidence for human disease is a subdiscipline of "physical or biological anthropology" which, in turn, is a part of the discipline of "Anthropology" (Roberts and Manchester 2010; Buikstra and Roberts 2012). The Paleopathology Association provides the infrastructure for people working in this field, an Association based in the United States that has its origins in 1973 (https://paleopathology-association.wildapricot.org/; accessed July 26, 2017).

Palaeopathology: The Study of Ancient Disease in Archaeological Human and Nonhuman Remains, Fig. 1 Sculpture showing possible tumor on left eye

While most work in the early history of palaeopathological study was on animal remains, now there is much more work focused on humans rather than other animals. Much of the early (human) work concentrated on evidence of disease in individual skeletons ("case studies"), but over the last 50 or so years there has been much more of a trend towards looking at "population" health and the consideration of larger groups of skeletons from specific funerary contexts (e.g., see DeWitte and Bekvalac 2010). However, "case studies" can provide invaluable information about the presence of a disease in a particular geographic context and time period, but the data cannot be applied to understand general population health in that place

Palaeopathology: The Study of Ancient Disease in Archaeological Human and Nonhuman Remains, Fig. 2 Medieval cemetery

and/or time (e.g., see Lefort and Bennike 2007). One quite recent development is more of a focus on the individual and detailed studies of single skeletons or preserved bodies, stimulated by the research of Tilley and the "Index of Care" (Tilley and Schrenk 2017). In more recent times, there has also been a focus on bringing together large amounts of data to study the history of specific diseases, and the application of newly developed methods to diagnosing disease in human remains (see below). Most human remains that palaeopathologists study consist of skeletons, and therefore any disease that only affects the soft tissues of the body will not be seen, unless more advanced analytical techniques are used, for example, ancient pathogen DNA analysis to detect infectious disease. Not only are historical documents and artistic representations in this instance invaluable to access information about diseases that do not affect the skeleton, pathogen DNA analysis is starting to detect those soft tissue diseases.

A key factor to remember in utilizing the evidence of disease in human remains to reconstruct the origin, evolution, and history of disease is to place the data in archaeological context, termed the bioarchaeological approach (Buikstra and Beck 2006). For example, if there is evidence of pathological change on ribs indicating a high rate of respiratory infection in a population then it is essential to explore what type of living conditions the population experienced, how many people lived in the community and its density, and whether the housing conditions would have predisposed to poor air quality, including the possibility that airborne infectious pathogens could be transmitted easily. By using archaeological evidence of settlements and housing, it is possible to assess how living conditions prevented or put at risk the community's inhabitants. Using a bioarchaeological approach is the key to understanding why and when diseases appeared in populations at specific times. It also enables a "themed" approach to be taken, by concentrating on using the pathological evidence to discuss particular "themes" such as diet and economy, work, indoor, and outdoor living environment, access to health care, and the impact of age, sex, gender, ethnicity, social status, migration, and climate on health within those broad themes (Roberts 2009: Chap. 6).

Palaeopathology is a thriving discipline which also has synergy with evolutionary medicine, a growing field (Stearns & Koella 2008). It contributes the time depth to studying disease that medical doctors today cannot hope to achieve when diagnosing and treating patients with disease usually over relatively short time periods. It also provides data on how bones and teeth are affected in disease in people who did not have effective therapies, and sometimes the pathological changes

recognized in skeletal remains are invisible to doctors today because the changes are too subtle to even detect with radiographic techniques (e.g., Lambert 2002).

Key Issues

How Are Pathological Conditions Studied in the Archaeological Record?

The focus now is on skeletal remains. Disease is recognized in the skeleton by bone formation and bone destruction, or a mixture of the two. Teeth may also be destroyed, for example, in dental caries (Fig. 3), and dental disease can be accompanied by bone formation and destruction of the jaw bones. Bone formed may be classified as "woven" or lamellar" (Figs. 4 and 5). In the former, the bone is immature, porous, and disorganized, indicating the disease process was active at the time of death of the person; the latter is smoother and more organized and indicates the person survived for some time with a disease such that the initial woven bone was transformed into healed lamellar bone. Lamellar bone indicates evidence for chronic disease. These changes are recorded for each skeleton and then their distribution pattern considered, bearing in mind that not all skeletons are completely preserved. It is known in the clinical record that diseases affect the skeleton differently. For example, the autoimmune disease rheumatoid arthritis affects the synovial joints of the neck vertebrae, and of the hands, feet, shoulders, elbows, wrists, and knees, symmetrically (Resnick 1995), and in the bacterial infection tuberculosis, destructive lesions of the lower spine, hip, and knee joints are most commonly seen. Differential diagnosis for lesions detected in each skeleton must be discussed because the skeleton can only be affected by disease in a limited number of ways (bone destruction or formation); so several diseases may be possible diagnoses for the bone lesions seen, especially if the skeleton is fragmentary and the total distribution of bone changes cannot be observed. However, while there are clinical data that provide these characteristic bone changes and distributions for each bone disease, it has to be assumed

Palaeopathology: The Study of Ancient Disease in Archaeological Human and Nonhuman Remains, Fig. 3 Dental caries in a molar tooth (Courtesy of Anwen Caffell)

Palaeopathology: The Study of Ancient Disease in Archaeological Human and Nonhuman Remains, Fig. 4 Woven bone formation on calcaneum, or heel bone

Palaeopathology: The Study of Ancient Disease in Archaeological Human and Nonhuman Remains, Fig. 5 Lamellar bone formation on long bone

that the changes and their skeletal distribution have not changed throughout time. Standards for palaeopathological data collection have been developed so that data are collected in the same way by all palaeopathologists; this means that valid comparisons of data can be done (Buikstra and Ubelaker 1994; Brickley and McKinley 2004). Other methods of diagnosing disease in skeletal remains are also used, including histological, radiographic, and biomolecular analyses, and it is the data derived using these methods that are developing more nuanced diagnoses and interpretations that are having an impact on our further understanding of the history of disease.

Following collection of the data, disease frequency rates are produced and, by linking these rates to contextual data from each site, this will show how common or how rare certain diseases were for that population compared to others, perhaps of the same time period and geographic region (and why), but also for different time periods and regions. For example, a study of fractures to bones of people who lived in Medieval British urban contexts varied from 0.3% to 6.1% of the total bones examined for each of six sites, with the highest rate being seen in London and the lowest at a site in Scotland. Thus, it can be seen that, even in the same (urban) context, injury rates can vary and this will be related to similar and different risk factors specific to particular sites and regions. Along with using archaeological data, to interpret the disease patterns seen, contemporary medical historical information may be available. Palaeopathologists are also increasingly using medical anthropological research to inform their findings, medical anthropology being the study of health and disease often in traditional living communities and usually in developing countries. They are also beginning to work alongside scholars from evolutionary medicine (e.g., Trevathan et al. 2008), a discipline that will benefit more and more from the deep time approach of palaeopathology.

What Are the Limitations to Palaeopathology?

Wood and colleagues' "Osteological Paradox" paper (1992) provided an opportunity for palaeopathologists to reflect on their discipline, a paper that is as relevant today as it was in 1992. They highlighted a number of problems with inferring health from the skeleton: the impact of the state of preservation of the skeleton on what can be recorded, the fact that soft tissue diseases cannot be detected, that people may have died before bone changes could occur, that often small samples of skeletons are being studied and their representation of the living population is questionable, and that there was a focus on individual skeletons rather than larger skeletal samples. They also emphasized that those with evidence of disease were the "healthy" people, i.e., those who had survived the acute stages of a disease and lived long enough for bone damage to occur and become "healed". They furthermore pointed out that it was not possible to detect individual variation in risk of disease and death using skeletal samples, and that the sample studied had undergone selective mortality, i.e., they were the dead part of the original living population – so how representative of the living were they? Other factors to be considered was the nonstationary nature of populations (in- and out-migration), the lack of nonadults in most samples (thus negating much inference about the health of that portion of society), the subjective nature of ageing adults and the problem of estimating sex of nonadults, the lack of information about cause of death (it is only usually possible to suggest what people suffered during life), that pathological bones are fragile and may deteriorate in the ground and not be excavated or analyzed, that it was important to be able to detect postmortem changes versus pathological ones, and also that skeletal features may represent normal variation. This long list of challenges perhaps suggests that there is not much point in spending too much time on palaeopathology but, while Wood et al. (1992) is still very current and is required reading for all palaeopathologists, there have been developments that have addressed some of their concerns.

Those developments include emphasizing the importance of providing true prevalence rates for disease, i.e., how many bones or teeth observed have changes attributable to specific disease processes, which can account for poor preservation of skeletal remains. This goes alongside providing

individual frequency rates, i.e., how many skeletons with a particular bone of interest preserved has evidence for disease (see Roberts and Manchester 2010: 9–10). Bayesian analyses are also helping to more accurately reflect the ages of adults as well as produce more realistic frequency rates for disease. The increase in ancient pathogen DNA analysis to detect and diagnose disease in skeletal remains means that soft tissue diseases can potentially be identified. DNA analysis in the living can also provide an indicator of genetic risk of disease; it is anticipated that this is an area that could see development in bioarchaeology. DNA analysis can also be used to estimate the sex of nonadult human remains. Larger sample sizes are also now studied which means that the data on disease are, in theory, more representative of the disease experience of the general population. Furthermore, stable isotope analysis to explore mobility in bioarchaeology will increasingly provide information on how mobile people were in the past and whether that mobility could have potentially affected the demographic and morbidity profiles of the dead population being analyzed. Additionally, there has in recent years been more of a focus on the nonadult part of the archaeological past which has led to the seeking out of cemetery samples that represent that section of society. Better training of bioarchaeologists has further led to the more reliable differentiation of antemortem, perimortem, and postmortem skeletal changes, although poor preservation of pathological and nonpatholoigcal bones remains a challenge.

Past and Current Work, Including Debates

Initially, most work in palaeopathology consisted of "case studies," as discussed above, which is still the case, although population based work is much more common. Some parts of the world have contributed exponentially more information about the history of disease than others, for example, the United States and United Kingdom. "Case" and "Population" studies both have their part to play in palaeopathology, but it is the latter that provides a broader view of past health at the population level. In addition to studies of individual and population health from around the world, there have been some studies of health through time in particular countries or continents. In many of these broader studies there appears to have been a decline in health through time as societies became more complex. Palaeopathological studies now frequently aim to answer specific questions or test hypotheses about health, based on what is known about the prehistory or history of a specific population or place; this might be to consider the effect of a transition such as from hunting and gathering to agriculture or from rural to urban living. Scholars have also focused on specific diseases to explore their origins and histories, often using a range of disciplines to come to conclusions.

Finally, and increasingly, palaeopathologists are using a suite of analytical methods to generate data on health that was simply not possible before these methods were used. For example, as discussed above, ancient pathogen DNA analysis since 1994 has allowed scholars to diagnose soft tissue diseases, diagnose disease when the person died before bone changes could occur, and even more recently explore the origin and evolution of the organism that caused the bone changes. Stable isotope analyses for exploring diet and mobility are also making it possible to link disease with diet and mobility to assess their impacts on whether a person or population contracted disease. Advances in imaging and histological techniques are adding to the methods used for disease diagnosis and, furthermore, palaeopathology now utilizes archaeological and historical contextual data to interpret biological data for disease much more than in its early years. There remain debates about the validity and ethics of doing destructive analyses of precious skeletal remains, whether data emanating from a DNA analyses are verifiable, and about the origin of diseases (e.g., venereal syphilis).

Future Directions

As destructive analyses increase in bioarchaeology while scholars strive to discover more about their ancestors' health, there is increasing repatriation and reburial of skeletal remains

around the world (Roberts 2009: Chap. 2). However, it is without doubt that these destructive techniques will continue to be used, and for ancient pathogen DNA analysis there are now important studies focusing on the evolution of organisms and strains of those organisms (e.g., Bouwman et al. 2012). However, basic macroscopic data collection will remain the mainstay of palaeopathology because, without it, there is no possibility of interpreting the data derived from those destructive analyses. Furthermore, more advanced analytical techniques are expensive, particularly for multiple samples analysis and most scholars do not have access to either the facilities or the money to do such large scale research. Costs will, nevertheless decline as time passes. With increased repatriation and reburial, it is imperative that skeletal collections are used more widely than is currently the case and databases of curated collections should become established to enable scholars to seek out the most appropriate human remains to answer their questions (see Roberts and Mays 2011). It is also without doubt that the trend is to look at the big picture of past health whereby very large datasets are being collected which provide a much more nuanced view of health over long periods of time and large areas of the world, as seen in the Global History of Health Project (http://global.sbs.ohio-state.edu/). Palaeopathology has provided a wealth of information about the health of our ancestors through their remains but there is much more to come in the future.

Cross-References

- ▶ Bioarchaeology: Definition
- ▶ Bone: Chemical Analysis
- ▶ Dental Anthropology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition

References

Aufderheide, A.C., and C. Rodriguez Martin. 1998. *The Cambridge encyclopedia of paleopathology*. Cambridge: University Press.

Brickley, M. & J.I. McKinley. (ed.) 2004. *Guidelines to the standards for recording human remains* (Institute of Field Archaeologists Paper 7). Reading: Institute of Field Archaeologists.

Buikstra, J.E., and L.A. Beck, eds. 2006. *Bioarchaeology. The contextual analysis of human remains*. Oxford: Elsevier.

Buikstra, J.E., and C.A. Roberts, eds. 2012. *A global history of paleopathology: pioneers and prospects*. New York: Oxford University Press.

Buikstra, J.E. & D. Ubelaker. 1994. *Standards for data collection from human skeletal remains* (Arkansas Archeological Survey Research series 44). Fayetteville: Arkansas Archeological Survey.

DeWitte, S., and J. Bekvalac. 2010. Oral health and frailty in the medieval English cemetery of St Mary Graces. *American Journal of Physical Anthropology* 142: 341–354.

Lambert, P.M. 2002. Rib lesions in a prehistoric Puebloan sample from southwestern Colorado. *American Journal of Physical Anthropology* 117: 281–292.

Lefort, M., and P. Bennike. 2007. A case study of possible differential diagnoses of a medieval skeleton from Denmark: Leprosy, ergotism, treponematosis, sarcoidosis or smallpox? *International Journal of Osteoarchaeology* 17: 337–349.

Resnick, D. 1995. *Diagnosis of bone and joint disorders*. Edinburgh: W.B. Saunders.

Roberts, C.A. 2009. *Human remains in archaeology. A handbook*. York: Council for British Archaeology.

Roberts, C.A., and K. Manchester. 2010. *The archaeology of disease*. 3rd ed. Stroud: History Press.

Roberts, C.A., and S.A. Mays. 2011. Study and restudy of curated skeletal collections in bioarchaeology: A perspective on the UK and the implications for future curation of human remains. *International Journal of Osteoarchaeology* 21: 626–630.

Trevathan, W., E.O. Smith, and J.J. McKenna. 2008. *Evolutionary medicine and health. New perspectives*. Oxford: University Press.

Wood, J.W., G.R. Milner, H.C. Harpending, and K.M. Weiss. 1992. The osteological paradox: Problems of inferring prehistoric health from skeletal samples. *Current Anthropology* 33: 343–370.

Further Reading

Aufderheide, A.C. 2003. *The scientific study of mummies*. Cambridge: University Press.

Barnes, I., A. Duda, O.G. Pybus, and M.G. Thomas. 2011. Ancient urbanization predicts genetic resistance to tuberculosis. *Evolution* 65: 842–848.

Bennike, P. 1985. *Palaeopathology of Danish skeletons. A comparative study of demography, disease and injury*. Copenhagen: Akademisk Forlag.

Bouwman, A.S., S.L. Bunning, R. Müller, M. Holst, A.C. Caffell, C.A. Roberts, and T.A. Brown. 2012. The genotype of a historic strain of *Mycobacterium*

tuberculosis. *Proceedings of the National Academy of Science* 109: 18511–18516.
Brown, T., and K. Brown. 2011. *Biomolecular archaeology: An introduction*. Chichester: Wiley Blackwell.
Chemm, R.K., and D.R. Brothwell. 2008. *Paleoradiology. Imaging mummies and fossils*. New York: Springer.
Cohen, M.N., and G. Crane-Kramer, eds. 2007. *Ancient health. Skeletal indicators of agricultural and economic intensification*. Gainesville: University Press of Florida.
Katzenberg, M.A. 2008. Stable isotope analysis: A tool for studying past diet, demography and life history. In *Biological anthropology of the human skeleton*, ed. M.A. Katzenberg and S.R. Saunders, 2nd ed., 413–460. Chichester: Wiley-Liss.
Lewis, M.E. 2007. *The bioarchaeology of children. Perspectives from biological and forensic anthropology*. Cambridge: University Press.
McElroy, A., and P.K. Townsend, eds. 2009. *Medical anthropology in ecological perspective*. 5th ed. Boulder: Westview Press.
Ortner, D.J. 2003. *Identification of pathological conditions in human skeletal remains*. Washington, DC: Smithsonian Institution Press.
Rawcliffe, C. 1997. *Medicine and society in later Medieval England*. Stroud: Sutton Publishing.
Roberts, C.A., and M. Cox. 2003. *Health and disease in Britain. From prehistory to the present day*. Stroud: Sutton Publishing.
Schultz, M. 2001. Paleohistology of bone: A new approach to the study of ancient diseases. *Yearbook of Physical Anthropology* 44: 106–147.
Stearns, S.C., and J.C. Koella, eds. 2008. *Evolution in health and disease*. Oxford: University Press.
Steckel, R., and J.C. Rose, eds. 2002. *The backbone of history. Health and nutrition in the western hemisphere*. Cambridge: University Press.
Tilley, L., and A.A. Schrenk, eds. 2017. *New developments in the bioarchaeology of care: Further case studies and expanded theory*. New York: Springer.
Wilbur, A.K., A.C. Stone, C.A. Roberts, L. Pfister, J.E. Buikstra, and T.A. Brown. 2009. Deficiencies and challenges in the study of ancient tuberculosis DNA. *Journal of Archaeological Science* 36: 1990–1997.

Paleoanthropology Society

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Basic Information and Major Impact

The Paleoanthropology Society was founded in 1991 and held its first annual meeting the following year.

It has twin goals: the first, to foster research which furthers understanding of human evolution and the second, to build an international community of researchers and interested individuals who enjoy collaboration and participation in the creation and advancement of such knowledge.

The society is built on the understanding that multiple factors – biological, behavioral, and environmental – must be taken into account to gain insight into how the human species evolved and that research best proceeds through the interaction of researchers in many disciplines. Biological anthropologists, archaeologists, geologists, paleontologists, and cognitive scientists, as well as other specialists have participated in and contributed to annual meetings which include both posters and oral presentations in nonconcurrent sessions. Abstracts for presentation are evaluated through peer review and submission instructions are included on the Society's open access web site, www.Paleoanthro.org.

The Society publishes an online electronic-only journal, *PaleoAnthro*, which is accessible free of charge through the Society's web site. The society meets annually, normally in alternate years, with the Society for American Archaeology and the American Association of Physical Anthropologists. Membership is open to all interested individuals, the majority of whom consist of graduate students and Ph.D. researchers both within and outside the United States. Annual dues and meeting registration fees are purposely kept low and income above expenses is used to subsidize participant meeting attendance. The Society is incorporated in Washington DC and is recognized under US law as a tax-exempt scientific organization.

Cross-References

▶ American Association of Physical Anthropologists (AAPA)
▶ Society for American Archaeology (SAA)

Further Reading

Paleoanthropology Society. n.d. http://www.Paleoanthro.org.

Paleoart Studies: Scientific Methods

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Introduction

Most of the world's surviving paleoart (art-like productions of preliterate societies) occurs in the form of rock art, which is found in nearly all countries of the world. Its study by scientific methods is a historically recent development, especially of the last three to four decades. In this short time, the scientific methodology applied to rock art has evolved with the help of several disciplines. Foremost among these are nuclear physics, forensic science, geochemistry, geomorphology, conservation science, ethnography, and semiotics, but many others have also contributed. As a result a number of specific approaches have been developed. This emerging methodology is briefly defined here.

Because of the perceived need to integrate rock art in archaeological constructs or narratives, it has long been a high priority to ascertain its age. The archaeologically favored method, excavation and age estimation of sediments concealing rock art, has several limitations. Over the past 120 years, archaeological excavation has succeeded in only 22 instances in providing credible minimum antiquities by this method. The age of a sediment deposited after the creation of rock art can at best offer minimum ages, and these may be very conservative. Moreover, these determinations depend upon a chain of unfalsifiable deductive propositions: that the sediment has not been subjected to disturbance or redeposition; that the dating criterion actually relates to the event of deposition (e.g., charcoal used in radiocarbon analysis may have been dislocated through turbation, quartz grains used in OSL analysis may have been displaced without exposure to light occurring, etc.); and that the dating method has yielded valid results (Bednarik 2001).

One of the rationales of the scientific approach in rock art research is to supplement this indirect dating method with direct methods, which are defined by direct physical relationships of rock art and dating criterion and the formulation of falsifiable propositions concerning this relationship.

Definition

The epistemology of rock art science requires that all propositions be rendered testable and that interpretations not be dependent upon etic assumptions in the absence of emic evidence. This narrows the range of admissible practices and methods, of which those listed below have so far been pursued. Ultimately, most are in some fashion reminiscent of the techniques of forensic science (Montelle 2009) (Fig. 1). This definition excludes, for instance, reliance on interpretations of rock art (on what it supposedly depicts), and on etic taxonomies of it, such as those based on perceived styles, or on the statistical treatment of non-representative samples. Therefore one of the pivotal principles in a scientific paradigm is to treat all rock art as taphonomic residue, whose quantitative properties are determined by taphonomic logic (Bednarik 1994a) rather than by the characteristics inherent in a living tradition.

Key Issues/Current Debates

The demand in direct dating of rock art for secure physical relationship between the rock art and the dating criterion is illustrated by the following example. The bulk radiocarbon content of rock paint residues is in most cases not an acceptable criterion, because all rock surfaces and surface deposits contain organic matter of many different types, as do all mineral accretions over or under petroglyphs. Such dates are only viable if they derive from materials sealed in by impervious deposits (silica or oxalate), or if the analyzed matter is identified at the object or molecular level. The latter condition has only been met once so far (Ponti and Sinibaldi 2005). The most reliable carbon dates are those from beeswax

Paleoart Studies: Scientific Methods, Fig. 1 Example of forensic work: determining the tools used in the creation of deep cupules in a cave (Ngrang Cave, Victoria, Australia; photo by Yann-Pierre Montelle)

figures (so far only reported from northern Australia), followed by charcoal pictograms. Radiocarbon dates from paint residues dominated by mineral pigment are not credible, because the dating criterion's (carbon age of unknown matter, in this case) relationship to the age of the paint cannot be demonstrated.

The nano-stratigraphy of paint residues or mineral accretions is determined by microscopic excavation of very thin layers (Fig. 2), either for chemical analysis of strata or their radiometric dating (Bednarik 1979; Watchman 1992). It has been applied to ferromanganese accretions, carbonates, silicas, and oxalates, providing testable data for age estimation and other scientific information about rock art. Similarly, the analysis of the composition of, and inclusions in, paint residues (such as brush fibers or pollen; Cole and Watchman 1992) can provide a wide range of empirical information about rock paintings and of the circumstances of their production.

The most promising methods of determining the age of petroglyphs utilize variables of geomorphology providing sequential contexts. Each rock panel features numerous forensic traces of events and processes, some of which may be datable, and each rock art motif is situated within a chronological framework they provide. Exfoliation or spalling scars, macro-wanes, fissures, patination, weathering rinds, glacial striae, fluvial or marine wear, and fire or lightning damage are among these traces and need to be recorded, locating the rock art within their relative sequence. Some of these processes, such as rock surface retreat and microerosion, are amenable to quantification. The latter involves microscopic erosion criteria (Fig. 3), including the micro-wanes gradually forming on fracture edges of mineral crystals (Bednarik 1992) or the relative retreat of a more soluble rock constituent (such as the colloid silica cement of sandstone). Both this dating method and the estimation of fluvial degree of erasure of low-grade metamorphics by suspended load in rivers (Bednarik 2009a) have been calibrated against sidereal time, providing sound approximations of petroglyph ages.

Another promising method is colorimetry of ferromanganese accretions on petroglyphs (Fig. 4). The gradual colonization of rock surfaces by patina-forming matter appears to be a relatively constant and regular process as a function of time (Bednarik 2009b). The detection of splattered paint in sediment below rock painting panels or of mineral dust and fractured grains deriving from the production of petroglyphs seem comparatively less promising.

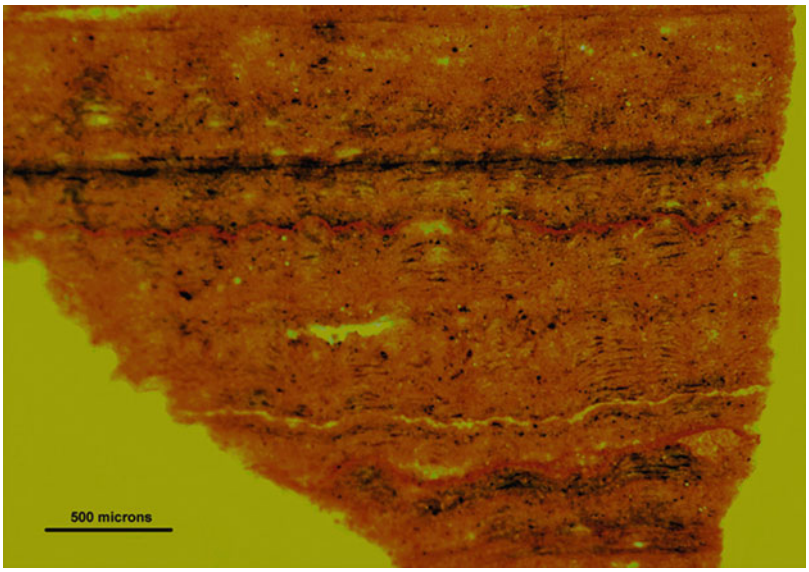

Paleoart Studies: Scientific Methods, Fig. 2 Nanostratigraphic section of mineral accretions of 2.11 mm thickness, containing several paint layers and spanning 26,000 radiocarbon years as determined by ten AMS dates from the section (Walkunder Arch Cave, Queensland, Australia; photo by Alan Watchman)

Paleoart Studies: Scientific Methods, Fig. 3 Microerosion analysis at Penascosa, Côa Valley, Portugal. (Photo by author)

The technology of rock art – how it was made – is an important aspect of rock art science (Bednarik 1998). It proceeds primarily by forensic methods in tandem with replication studies and gestural research (biokinetics). Especially the intensive study of impact or abrasion marks in petroglyphs can lead to propositions about technology that can then be subjected to testing by replicating the traces under controlled conditions. This can yield information about the tools used; the direction and energy of impact or abrasive action; and, in combination with spatial aspects and accessibility of rock panels, about the circumstances of production. Similar considerations apply to rock paintings, drawings, and stencils, albeit to a lesser degree. Replicative studies of considerable variety have been attempted, and they form one of the principal approaches of scientific rock art research.

Paleoart Studies: Scientific Methods, Fig. 4 Calibrated colorimetric study of differences in petroglyph patination indicating differences in age (Najd Sahī, Jabal al-Kaubab East, Saudi Arabia; photo by author)

The discrimination of anthropic from natural rock markings has engendered much confusion in the past. Particularly the separation of petroglyphs from numerous types of natural and even other humanly made rock markings resembling them requires specialist attention, notably when relatively simple markings are involved (Bednarik 1994b). Potholes, sandstone erosion pits, and solution scallops in caves have been mistaken for cupules (Fig. 5); animal scratches and other limestone cave features have been interpreted as cave petroglyphs; and anthropic marks such as bulldozer scrapes, steel cable grooves, and core drill circles were described as open-air petroglyphs and natural coloration of rock surfaces as rock paintings; the latter was even radiocarbon dated in one case. This frequent confusion of natural rock markings with rock art is of concern because there is no value in treating such phenomena as rock art and then inventing meanings for them.

Only a small proportion of surviving paleoart consists of portable material. Some of the methods specifically developed for this corpus, especially traceology (the microscopic study of abraded or incised marks), have been successfully adopted by rock art science; other technological analyses are specific to mobiliary paleoart. Traceology derives from "internal analysis" as developed by Marshack (1972) to examine suspected notations and other incised markings on Paleolithic portable objects. Besides its application to engraved plaques, microscopy also provides the most important analytical tool in the scientific study of beads, pendants, and figurines and is crucial in the detection of fakes and misidentifications. This can include the identification of a wide variety of taphonomic markings, such as those acquired by transport or caused by plant rootlets on carbonaceous materials. In the scientific analysis of portable paleoart, replication is again of particular importance (Bednarik 2001).

Future Directions

The recording of rock art has come a long way since the iconographic, interpretation-driven endeavors of the past. It now involves a rapidly evolving and complex methodology based on state-of-the-art technology (e.g., Plets et al. 2012; López Fraile et al. 2016). To be comprehensive and scientifically relevant, it needs to provide not only the most accurate record of the rock art but also of all other traces preserved on the rock panel (Soleilhavoup 1985). Such detail is required

Paleoart Studies: Scientific Methods, Fig. 5 Pothole surrounded by cupules and other petroglyphs (Bola Chanka, Santivañez petroglyph complex, Bolivia; photo by author)

not only for realistic evaluation and empirically based interpretation but also for the purposes of conservation and preservation science. This field has since the 1980s advanced from a commonsense approach to a scientifically based discipline with its own extensive methodology (Rosenfeld 1985). It is also developing rapidly and is becoming increasingly important in view of the ongoing degradation of all of the world's rock art. Different conservation methodologies are being designed for open-air sites and deep cave sites, because the environmental constraints differ inherently between these two site types.

The scientific study of rock art draws heavily on many of the hard sciences, but it is a relatively new approach and remains in a comparatively embryonic state. Nevertheless, it has emerged as a discipline in its own right and is likely to develop in unexpected directions. Most of the work so far is much in need of refinement and standardization, and a sound epistemology is not sufficient to have a significant practical impact. It needs to be translated into new methods and approaches. Some of the most exciting recent developments are the endeavors to introduce scientific fields such as the cognitive and neurosciences. This approach is likely to center on the role of exograms, the memory traces stored outside the human brain. From a scientific perspective, the most important aspect of paleoart is that it represents the only comprehensive and dependable source of information about the cognitive evolution of hominins. That potential has so far remained almost unexplored. This is one development suggesting that, rather than serving as a source of etic archaeological narrative, rock art and other paleoart need to serve a variety of other disciplines if their full research potential is to be realized.

Cross-References

- ▶ Age Estimation
- ▶ Australian Paleoart
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Techniques in Archaeological Science
- ▶ Geoarchaeology
- ▶ Rock Art Sites: Management and Conservation

References

Bednarik, R.G. 1979. The potential of rock patination analysis in Australian archaeology – Part 1. *The Artefact* 4: 14–38.

Bednarik, R.G. 1992. A new method to date petroglyphs. *Archaeometry* 34: 279–291.
Bednarik, R.G. 1994a. A taphonomy of palaeoart. *Antiquity* 68: 68–74.
Bednarik, R.G. 1994b. The discrimination of rock markings. *Rock Art Research* 11 (1): 23–44.
Bednarik, R.G. 1998. The technology of petroglyphs. *Rock Art Research* 15 (1): 23–35.
Bednarik, R.G. 2001. *Rock art science: The scientific study of palaeoart*. Turnhout: Brepols. (2nd edn 2007, New Delhi: Aryan Books International).
Bednarik, R.G. 2009a. Fluvial erosion of inscriptions and petroglyphs at Siega Verde, Spain. *Journal of Archaeological Science* 36 (10): 2365–2373.
Bednarik, R.G. 2009b. Experimental colorimetric analysis of petroglyphs. *Rock Art Research* 26 (1): 55–64.
Cole, N., and A. Watchman. 1992. Painting with plants: Investigating fibres in aboriginal rock paintings at Laura, north Queensland. *Rock Art Research* 9 (1): 27–36.
López Fraile, F.J., L.M. Gómez García, and A. Caballero Klink. 2016. 3D documentation and use of DStretch for two new sites with post-Paleolithic rock art in Sierra Morena, Spain. *Rock Art Research* 33 (2): 127–142.
Marshack, A. 1972. *The roots of civilization*. New York/London: McGraw-Hill/Weidenfeld & Nicolson.
Montelle, Y.P. 2009. Application of forensic methods to rock art investigations – A proposal. *Rock Art Research* 26 (1): 7–13.
Plets, G., G. Verhoeven, D. Cheremisin, R. Plets, J. Bourgeois, B. Stichelbaut, W. Gheyle, and J. de Reu. 2012. The deteriorating preservation of the Altai rock art: Assessing three-dimensional image-based modeling in rock art research and management. *Rock Art Research* 29 (2): 139–156.
Ponti, R., and M. Sinibaldi. 2005. Direct dating of painted rock art in the Libyan Sahara. *Sahara* 16: 162–165.
Rosenfeld, A. 1985. *Rock art conservation in Australia*, Special Australian heritage publication series 6. Canberra: Australian Government Publishing Service.
Soleilhavoup, F. 1985. Les paysages de l'art rupestre de plein air: vers une normalization des méthodes d'étude et de conservation. *Rock Art Research* 2 (2): 119–139.
Watchman, A. 1992. Repainting or periodic-painting at Australian Aboriginal sites: Evidence from rock surface crusts. In *Retouch: Maintenance and conservation of aboriginal rock imagery*, Occasional AURA publication 5, ed. G.K. Ward, 26–30. Melbourne: Australian Rock Art Research Association.

Further Reading

Clottes, J., M. Menu, and P. Walter. 1990. New light on the Niaux paintings. *Rock Art Research* 7 (1): 21–27.
Lorblanchet, M., M. Labeau, J. Vernet, P. Fitte, H. Valladas, H. Cachier, and M. Arnold. 1990. Palaeolithic pigments in the Quercy, France. *Rock Art Research* 7 (1): 4–20.
Wainwright, I., K. Helwig, D. Rolandi, C. Gradin, M. Podestá, M. Onetto, and C. Aschero. 2002. *Rock paintings conservation and pigment analysis at Cueva de las Manos and Cerro de los Indios, Santa Cruz (Patagonia), Argentina*, 582–588. ICOM Committee for conservation. 13th. Triennial Meeting. Reprints II.

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology

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Introduction

Insects are the most diverse group of animals on the planet and as such are present in a wider variety of habitats than most other complex organisms. This diversity, in addition to a long evolutionary history (Grimaldi and Engel 2005), and together with a propensity to be preserved in both desiccating and anaerobic environments, has provided an excellent tool for the reconstruction of both Quaternary and more immediate archaeological environments. Insect remains often provide proxy environmental information on the immediate context from which the fossils are derived, and as such may be either complementary to the more regional picture provided by palynology or indicate site conditions, such as levels of hygiene and evidence of trading connections, which are rarely available from any other palaeoecological source. They therefore provide information on a broad range of habitats and conditions, on- and off-site, and in addition, in appropriate contexts, also climate. Processing of samples is essentially simple, requiring readily available materials, yet is time consuming, and identification of the usually disarticulated fragments (sclerites) requires diligence and patience and access to well-curated reference collections. Fortunately, abundant literature, computer software, and database tools now exist to aid in their interpretation.

Definition

Paleoentomology is the study of fossil insect remains, often with the intention of examining evolutionary changes, while more specifically Quaternary (paleo-) entomology generally has aims toward understanding environmental, climatic, and/or cultural conditions in the past, from both archaeological and off-site contexts. Just over half of the sites which have been investigated to date (Fig. 1), over 1200 locations, are archaeological contexts. The remainder are Quaternary geological contexts or off-site stratigraphic sequences. Sites examined range from the sub-Antarctic islands of South Georgia and the Falklands to the high Arctic of Greenland and Novaya Zemlya, from mummies in the deserts of Peru and Egypt to the wetlands and waterlogged deposits of urban centers in the British Isles and Canada (Buckland and Buckland 2006; Elias 2010). Insects may also occasionally be preserved by charring in, for example, burnt grain residues, or as impressions in pottery or daub. The application of paleoentomology to archaeology is sometimes referred to as archeoentomology. Site reconstructions are based on an interpretation of the environmental requirements of the species found in each sample, including a collation of their collective habitat data (or traits, see below) and an assessment of the importance of particular indicator species (such as pests or other specialists). The method relies on the concept of species constancy, both in terms of detailed morphology and of habitat. While there is some evidence for morphological change at the species level and probably more at the molecular one, recent work has shown that for some species at least the morphology holds as far back as 20 myr, the early Miocene (Fikáček et al. 2011). Similarly the origins of the tundra and mammoth steppe biomes, expanding at least once relatively rare montane habitats to continent-wide ones during the geologically relatively frequent Quaternary glaciations, provided opportunities which appear largely to have been exploited by shifting geographic range rather than species evolution. For example, the assemblages associated with the oldest Paleolithic material in the British Isles, from sites along the Norfolk coast, probably close to 1 million years old (Ashton 2017; Parfitt et al. 2010), are concordant with those from a modern Palearctic boreal forest. Thus, by identifying the taxa present in a sediment sample by comparison with modern reference material, a picture can be built up of the environment represented in the sediment catchment. In contrast, archaeological contexts may be dominated by insects accidentally incorporated from imported materials rather than those forming the autochthonous assemblage and may occasionally incorporate far-traveled hitchhikers on trade.

Sample size varies depending on the faunal group and context being studied. A single cubic centimeter of lake sediment will often provide an interpretable chironomid (non-biting midge) assemblage (e.g., Brooks 2003), while Quaternary and archaeological sediments for a more diverse range of insects usually rely upon a 5 L sample, although this may be far too large for contexts particularly rich in insect remains, such as wells and cesspits (e.g., Kenward et al. 1986; Buckland et al. 2016). Floor layers may be particularly difficult to interpret, and precise sampling and close integration with the other lines of evidence, particularly field archaeology, are essential, as well as, where possible, recourse to modern near-analogue situations in interpretation (e.g., Forbes et al. 2016). While it may be assumed that the insects represent the results of activities in the room, separation of autochthonous from allochthonous elements may be problematic. Large numbers of ectoparasites, for example, may reflect the traditional primate activity of delousing, or, if of sheep, they might point to wool processing (Buckland and Perry 1989). In house floor faunas, the buildup of twigs, hay, moss, and other materials, each with its characteristic fauna, used to make a habitable surface may also introduce large numbers of fly puparia (with several species of beetle) that are able to exploit the artificially warmed environments created by humans and their domestic stock beyond their natural range. Fecal and carrion communities may also develop in situ. Such often thermophilous faunas die out rapidly when a site is abandoned and are replaced as the "outside moves in" (Panagiotakopulu et al. 2007). To a lesser

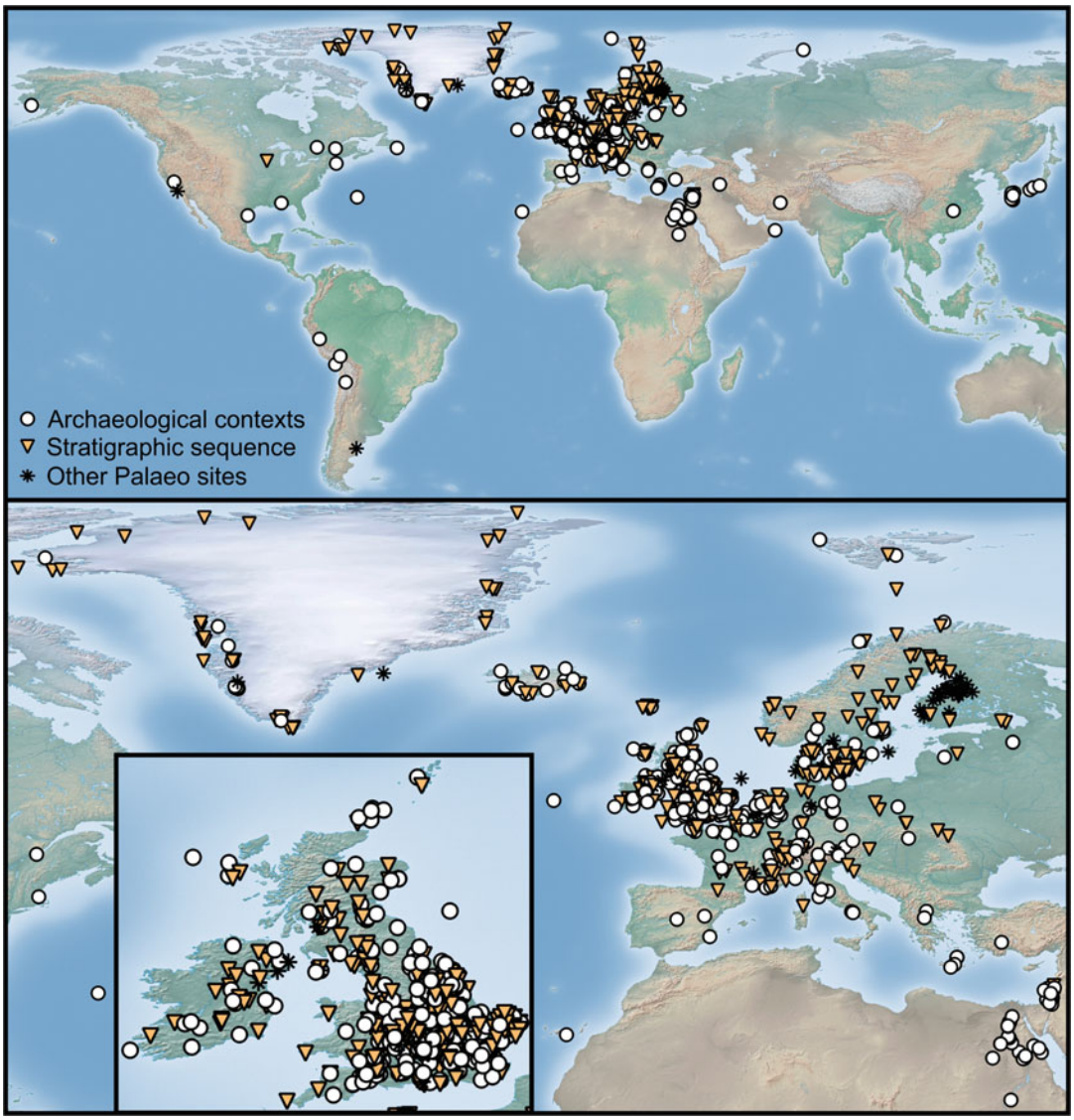

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 1 Map of the >1200 paleoentomological investigations currently stored in the BugsCEP database (Buckland and Buckland 2006) globally and in the database's core areas of Europe and the British Isles. Site symbols indicate the primary research context of the investigation, although some sites have multiple profiles. Note that a number of extra-European (mainly North American, Russian, and Australasian) investigations are not currently stored in the BugsCEP database and so not shown on this map (see Elias (2010a) for details)

extent, casual introductions into a room, for instance, species brought in as a result of human and other animal activities (e.g., in floor material, including fossil material in peat, in fodder, feces, foodstuffs, etc.), may form the more interesting elements in site interpretation, and room and area use may be evident in the distribution of faunas across floors. The interpretation of such layers is far from simple, and a perfect picture of room use should never be expected from the complex web of faunal movements (Fig. 2). Taphonomic processes, such as bioturbation, decay, mixing, and redeposition, can complicate the picture further, and it is essential to use multiple lines of proxy

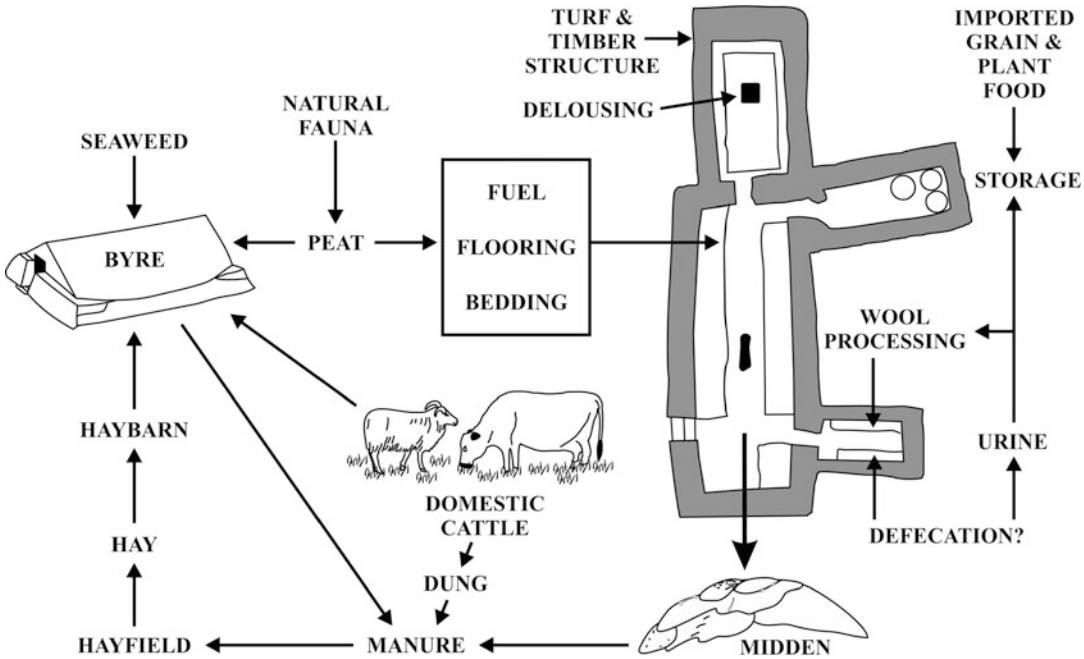

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 2 Insect evidence in a Norse Farm site. Arrows indicate potential movement of deposits containing insects or insect remains. (Modified from Buckland et al. 2004)

evidence, particularly plant macrofossil and sedimentological and other geoarchaeological analyses. While the same samples can be utilized to provide material for most of these, it is useful to have multiple samples both to examine within-context variation and to scan for additional identifiable fragments of rarer insect taxa; surplus material can always be disposed of at the end of a project, while resampling is usually impossible. Precision in sampling may also be problematic. The occasional visit of large herbivores to a waterhole may be evidenced by few dung beetles, and even the decay of large carrion provided by several enmired mammoths may be poorly resolved in the time-averaged samples from an adjacent stratigraphic sequence, even if well represented by the carrion flies in the nostrils (Erzinçlioğlu 2009). In the archaeological record, catastrophic events, from local fires to volcanic eruptions, may provide near instants-in-time but it is more usually difficult to link directly events with faunas. In the more successful multidisciplinary studies, the archeoentomologist has been directly associated with on-site sampling.

Historical Background

The development of both Quaternary entomology and archeoentomology owes much to techniques developed by the late Russell Coope and Peter Osborne at the University of Birmingham, UK, where in the late 1950s examination of samples from two Late Pleistocene sites in the English Midlands, Upton Warren and Chelford, indicated the potential of insect remains for reconstructing past climates and environments (Elias 2010a). This work was built upon that of Dane Kai Henriksen and the Swedish entomologist Carl Lindroth, although identification of insects from archaeological contexts had occasionally taken place over the previous century. The conviction that insects were a rapidly evolving group had led to the description of many new species from Quaternary fossil material, most of which, including that of W. D. Pierce on the Rancho La Brea material, has since been synonymized with extant taxa (Miller 1997). Coope's meticulous morphological work was initially met with skepticism in the entomological community, but Robert Angus'

careful comparison of preserved genital armatures of *Helophorus* with modern material convinced most of the massive range shifts occasioned by Quaternary climate change (cf. Angus 1973), a point finally driven home by the identification of one of the most frequent dung beetle fossils in the British last glacial as the Tibetan "endemic" *Aphodius holdereri* (Coope 1973). The rapidity of late Quaternary climate change apparent in insect faunas changing from arctic to warm temperate conditions in less than the sample resolution has taken longer to be appreciated, and it is only with the ice core data that the aphorism "don't touch that dial" has become widely accepted. The nuances of Holocene climate change, apparent in changing insect faunas, and its impact on human societies, however, are proving more difficult to dissect as the overriding influence on the insect fauna has become human activity.

Key Issues/Current Debates

Methodology

The technique of water sieving over 300 μm, followed by liquid paraffin (kerosene) flotation and sorting under a low-power binocular microscope, was summarized by Coope and Osborne (1968) in a paper on a Roman well, and this established the basic sample processing technique which has essentially remained unchanged to this day. Initially specimens were mounted on card slides with gum tragacanth with the more fragile material supported with a water soluble base, usually DMHF (dimethyl hydantoin formaldehyde) resin, but the sheer volume of material recovered meant that storage unmounted in alcohol has become more usual. Previous work relying on splitting samples along bedding planes or simple disaggregation in water resulted in a significant bias toward the larger taxa, although such material often resulted in the recovery of co-joined insect sclerites, considerably reducing the problems of identification, achieved by close comparison with identified modern material and occasional recourse to keys to the relevant group. This need for access to full reference collections – the UK beetle fauna alone has some 4000 species including incidentals (Duff 2018) – somewhat restricts the wider application of archeoentomology, and there are currently less than 30 active Quaternary entomologists globally, the majority of them based in Europe, although working internationally. Identifications are tabulated as minimum number of individuals (MNI), defined by the most numerous identified sclerite, usually heads, pronota (thoraces), and left or right elytron in terms of adult Coleoptera (beetles). Other groups may be represented by larval fragments, often identifiable to the species level in Trichoptera (caddis flies) or species group in Chironomidae (non-biting midges) and Simuliidae (blackfly), pupal fragments or puparia of Diptera (true flies), or occasionally near-complete individuals or other sclerites of Siphonaptera (fleas) and lice (Anoplura).

Since the earlier work on samples from archaeological contexts, particularly by Osborne, and later Girling, Kenward, and Robinson, perhaps the most significant advancements in archeoentomology have related to closer integration with modern entomological studies, partly stemming from a *caveat* issued by Kenward (1975) concerning the interpretation of urban assemblages. This relates largely to the different questions asked about natural and more strictly anthropogenic assemblages, where in the latter case the field archaeologist may want to know what has taken place on a particular spatiotemporal level, rather than the slightly more regional picture on a broader time plane which a sample from an adjacent peat bog might provide. Such questions usually require asking in the field at the point of sampling rather than post hoc. Attempts at habitat quantification, quantitative climate reconstruction (e.g., MCR – Atkinson et al. 1986), and taphonomic comparisons with modern pitfall and other assemblages (e.g., Smith 1999, 2000) have been integrated into freely available database software (Buckland and Buckland 2006; Buckland 2014). The advent of readily accessible computing power; cheap and user-friendly statistics software, for example, "Past" and "R"; and database management systems has provided the basis for a more complex and detailed handling of

the large amounts of numerical data which can be obtained from fossil and modern insect assemblages. It is not unusual, for example, for a single sample from a man-made pitfall, such as a well, to run to over a thousand individuals of over 200 taxa.

Sampling in the field is, as always, best undertaken by individuals trained either in environmental archaeology or Quaternary studies. The ability to identify, describe, and sample closed contexts is imperative if a reliable interpretation of a site is to be obtained, and while this might seem less of a problem with the more mechanical process of coring lakes and peat bogs, effective logging of stratigraphy in the field often precludes later problems of interpretation. This applies as much to natural contexts as archaeological ones, particularly where the pace of environmental or climate change is singularly rapid, as, for example, during the Lateglacial to Holocene transition, where transition from high arctic to warm temperate conditions takes place in less than a few decades and often defies the sampling interval. The ability of insect assemblages to describe phases of environmental change relies on samples representing as coherent a picture as possible, and large samples covering periods of rapid environmental change will inevitably produce diffuse and less-than-illustrative results. On archaeological sites, where possible, excavation by single context provides the greatest utility for taking samples and providing the entomological results which are most useful during interpretation, and the field archaeologist should be aware of the merits and limitations of the various palaeoecological techniques available. Unfortunately decisions are as likely to be based upon cost as utility – big machines and flashing lights after initial investment are cheaper than the long hours that the paleontologist has to spend at the microscope, and produce rapid if occasionally equivocal results.

Figure 3 shows how insect sample processing fits into the battery of biological proxy analysis methods typically used in archaeological investigations. After disaggregation in running water, followed by drainage of surplus water, liquid paraffin (called *kerosene* in North America, *Steinoliú* in Iceland, and *lysfotogen* in Sweden) is added to the sample retained on the sieve and the material floated with water. The sample is then left to settle for 15 min and the float poured off, a process which is repeated two further times with new water added. This floatation technique has been shown to preferentially concentrate insect remains over the plant and mineral matrix of a washed sample. A standard sieve size of 300 μm is used, although 150 μm may be required where the retrieval of particularly small sclerites, such as those of chironomid larval head capsules, which have a size range of <0.3 mm is intended; normally however, these would be recovered from separate subsamples of a few cubic centimeters. The float is washed in a mild detergent to remove the paraffin and then transferred to a beaker of either distilled water or 70–95% alcohol (Fig. 4). The latter has the advantage of reducing surface tension when sorting, but has disadvantages in terms of smell and evaporating more quickly. It should also be pointed out that paraffin flotation and alcohol storage should not be used if anything in the sample is to be used for radiocarbon dating (Panagiotakopulu et al. 2015). Insect sclerites are extracted into a tube of alcohol or distilled water using forceps, under a low-power binocular microscope. Long-term storage in ~75% ethanol or methanol is not advisable as it progressively results in bleaching and destruction of insect chitin and slightly acidified water may be preferable, although most previous material remains in the former medium, sometimes with glycerin added to reduce the risk of desiccation. Seeds, macroscopic charcoal, and other materials which may aid in interpretation are routinely extracted by most practitioners at this stage, although it should be noted that some seeds, such as those of *Juncus*, will pass through a 300 μm mesh, and the abundance of plant remains may necessitate subsampling. The non-floating residues should always be checked for heavier material such as artifacts, bones, or geologically interesting minerals which could aid interpretation.

Techniques using water and kerosene are not appropriate to the recovery of insect remains from desiccated sediments, where wetting is likely to destroy the remains, and gentle sieving with hand

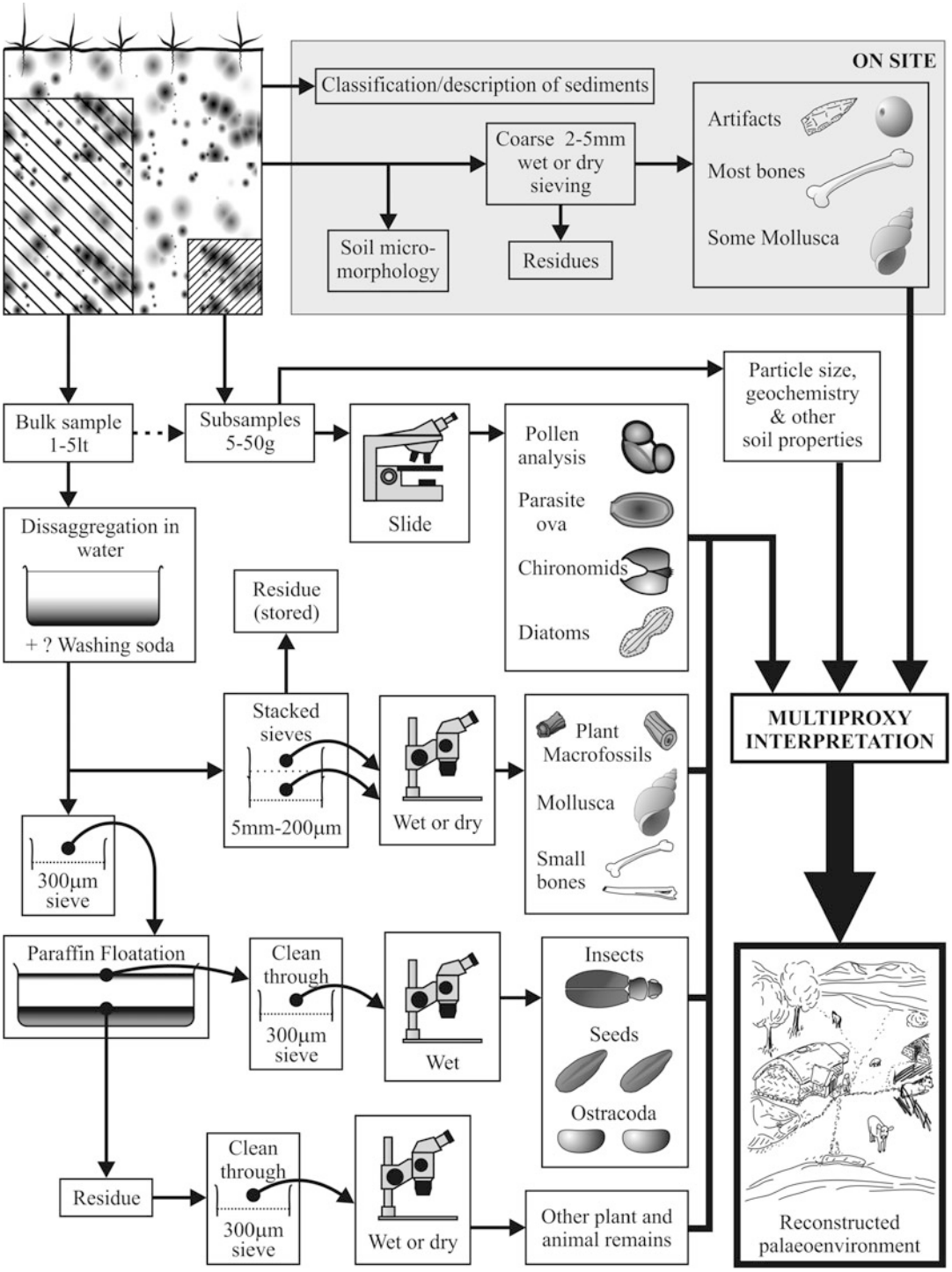

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 3 Paleoentomology is one of many biological proxy methods which can be used to investigate archaeological sites. Standard insect floatation method is illustrated but variations may be applied to cater for particular sediments or other requirements. (Modified from Buckland et al. 2004)

P

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 4 Fossil insect material as part of a float. A binocular microscope and forceps are used to extract the identifiable insect remains from the matrix of amorphous plant materials. The sample comes from a Bronze Age dung pit at Pode Hole, Peterborough, UK, and the metallic black/blue fragments are the remains of dung beetles

picking out of larger debris may precede sorting under a binocular microscope. Put simply, dry material has to be kept dry, while wet can be wetted, but any change between states is likely to be deleterious. This leads to a number of long-term preservation problems. Dry material can be stored in closed glass or plastic tubes, which must be handled with care to avoid fragmentation.

Identification is undertaken by comparing the fossil parts (Fig. 5) with modern reference material (Fig. 6), illustrations, and photographs and through the use of identification keys for modern specimens or the occasionally surviving articulated fossil. It is often advantageous to group fossils by shape on a piece of filter paper, which should be kept damp at all times to prevent sclerites drying out and fracturing. The currently available identification keys are almost entirely based on characters rarely recovered in a fossil context, such as antennal segment lengths, tarsal structure, or genital armatures. The latter have major significance in some genera and have occurred in Quaternary sediments sufficiently frequently to form the basis of major biogeographic and taxonomic studies. Published keys are often more useful for confirming characteristics after identification than the actual process, although Lindroth, perhaps because of his interest in the Quaternary fossil record, often included comments on elytral microsculpture in his carabid keys (e.g., Lindroth 1986). Due to the vast diversity of insects, it is not uncommon for specialists in several groups to cooperate or send specimens to acknowledged experts in particular taxonomic groups.

The stages described above are undoubtedly the most time-consuming part of insect analyses; 5 L of poorly humified peat may take over a week to process, and samples from either remote islands or past and present arctic landscapes may be low in both diversity and numbers of individuals but nevertheless meriting detailed study. Interpretation of species lists relies on a detailed knowledge of general ecology and biology as well as the specifics of individual insect species ecology. Naturally, for archaeological contexts, it also requires an understanding of cultural activities relevant to the investigation, knowledge of the excavation in question, and also any particular questions that the excavator thinks might be answered by study of the insect remains. Here again it needs to be stressed that the best results are obtained by on-site collaboration between field archaeologist and all the relevant paleoecological specialists, something which is as yet unfortunately rarely achieved.

Insects in Archaeology

Although there were earlier studies, the first paper which effectively pointed out the potential of

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 5 Fossil beetle parts (sclerites), primarily carabids (ground beetles), extracted and ready for identification. The sample is from a well excavated in Mårtensby, Vanda, Finland, and dendrochronologically dated to 1776/1777

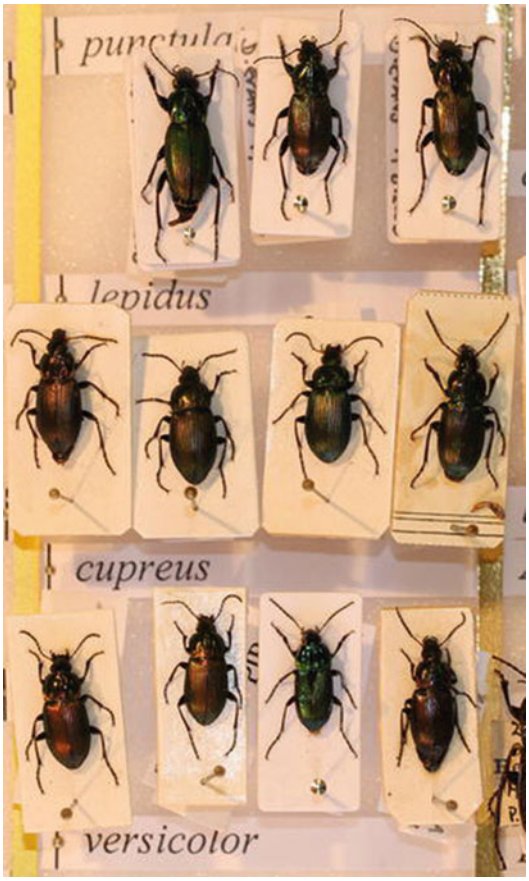

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 6 Reference collections consist of thousands of identified card or pin-mounted specimens. These collections take decades to establish and require curation and periodic treatment for pest infestations. Ironically enough, the pest species are common finds in archoentomology

insects in archaeology was that of Peter Osborne in 1971. Here, in a study of a refuse pit in the small town of Alcester in the English Midlands, he showed not only that the baggage of Roman occupation included an extended fauna of pests of stored products, grain weevils, and the saw-toothed grain beetle but also a longhorn beetle, *Trichoferus fasciculatus*, whose modern distribution suggests that it had arrived in an imported piece of woodwork, presumably furniture from the Mediterranean. Since Osborne's pioneer study, much work has gone into tracking the origins and movement of stored product pests and has included research ranging from the Neolithic and Bronze Age eastern Mediterranean (Panagiotakopulu and Buckland 2017) to post-medieval Québec (Bain et al. 2009). The results extend beyond archaeology. Until Coope and Osborne's find of the saw-toothed grain beetle, *Oryzaephilus surinamensis*, in the Romano-British Barnsley Park well, most entomologists would have regarded the species as a recent introduction from the New World, as the name given by Linnaeus, roughly translated as the rice lover from Surinam, would suggest. Other biogeographic conundra have also been elucidated from the archaeological fossil record. Fleas are not infrequent finds in archaeological contexts, and the origin of the so-called human flea, *Pulex irritans*, as an ectoparasite of a New World rodent, the guinea pig, has been considered (Buckland and Sadler 1989); its dispersal to Western Europe by the Neolithic was probably facilitated by small steps in the gift exchange of furs. This work has

more recently been followed up with DNA studies of fleas from South American mummies (Dittmar et al. 2003). Mummies have also frequently yielded head and body lice, and crab lice, *Pthirus pubis*, also reached the northern frontier of Rome (Kenward 1999), although its pre-Columbian occurrence in South America (Rick et al. 2002) suggests that, like the other human lice, it was an early uninvited guest.

In an early taphonomic study, Osborne (1983) showed that the pests of stored products passed virtually unaltered through the human digestive system when accidentally consumed as the nutty bits in bread made from whole-wheat flour or in porridge. This, as Kenward and Hall (1997, 2012) point out, equally applies to other omnivores and herbivores, and this has led to reinterpretation of some deposits, like the Roman sewer in York, where proximity of granaries is replaced by the more prosaic presence of feces. Other species in the sewer, however, cannot have been consumed, and the abundant small, stinging ant, *Hypoponera punctatissima*, therein again suggests an accidental import from warmer climes much further south, perhaps the Mediterranean (Buckland 1976). Similarly, first recorded in a Chinese tomb of 168 BC, the so-called rice weevil *Sitophilus oryzae* appears in late medieval deposits in Southampton (Grove 1995). Probably reaching the Mediterranean at least by the Roman period, the insects indicate trading connections which might otherwise be unnoticed, but further research on suitable deposits is needed. The equally misnamed *S. zeamais* has been found as impressions in early Neolithic Jomon pottery in Japan (Obata et al. 2011).

Moving away from the directly human, domestic animals may also be indicated by their ectoparasites. Dog, cat, and rat fleas are recorded from a number of sites; the more interesting of the last, *Xenopsylla cheopis*, the vector in bubonic plague, has yet to be found, although there has been interesting speculation on both the flea's and the epidemic's origins (Panagiotakopulu 2004). The ked, a wingless parasitic fly which lives on sheep and the fleece louse are not infrequent finds, although their presence is more likely to indicate wool processing than the animal itself. Its close relative, the deer ked, appears incidentally in the equipment of the late Neolithic "man in the ice" from the Italian Tirol (Gothe and Schöl 1994). There are a few records of goat and cattle lice, and it is worth noting that on sites with acidic sediments, such evidence from insect faunas may survive where animal bone does not. Buildings used to stall and stable animals may preserve other evidence than the rather infrequent ectoparasite in that fodder, litter, and manure have characteristic insect faunas. Stalling of cattle was deduced from the fly puparia associated with Neolithic structures in the Swiss Alps (Nielsen 1989), and there is similar evidence from southern Sweden at Alvastra. The characteristic assemblage of species associated with hay stored as fodder was exported with Norse settlers across the North Atlantic, although interpretation is complicated by the use of peat and turf both as animal litter and for sod walls, which introduce elements from the natural fauna (Fig. 2). The origins of this essentially anthropogenic assemblage have been considered by Kenward and Allison (1994). It extends into urban centers from the countryside, and much of the fauna was a feature of towns, before the demise of the horse as the main means of transport, the disappearance of the backyard pig, and the eclipse of meat supply on the hoof. A similar pattern of species emerges from sites as far apart as Novgorod, Oslo, York, and Dublin. To a certain extent, levels of hygiene can be deduced although there often remains the problem of strict contemporaneity with human occupation. Away from the cleaner areas of the fortress, for example, Roman York looks little different from Anglo-Scandinavian York (cf. Hall and Kenward 1990, 2004). In regions where urban origins go back much further, around the Mediterranean littoral or in the Near and Middle East, there is currently little evidence, and wells which would have acted as pitfalls for the local insect fauna would repay detailed study. The faunas from New Kingdom Amarna in Egypt, preserved by desiccation in deposits between house floors and in a pig pen, hint at conditions not too different from those of peri-urban and rural housing in the Middle East at the present day, with a mix of pests of stored products, probably derived from animal dung, ectoparasites, including bed bugs and flies, and fodder feeders (Panagiotakopulu and Buckland 2010).

While the immediate environment, reconstructed from insect remains, is perhaps of most significance

to the field archaeologist, the regional picture which the insect evidence presents provides detail which is largely unavailable from other sources. Pollen may be interpreted in terms of forest composition in the broadest sense, although the extent of clearings, both natural and anthropogenic in the woodland, is often difficult to see. The insect fossil record for the early to mid-Holocene shows that after initial rapid warming to conditions slightly warmer, or at least more continental than present day, the development of closed forest was fairly rapid, if initially out of step with amelioration – it took time for the trees to catch up and beetles associated with decaying wood and its fungi appear long before their more usual hosts (e.g., Osborne 1974), a feature of the fact that it is often the situation and state of decay which is more important to the insect than the tree species. A similar pattern is evident in the herbivore dung faunas, where situation or substrate is more important than species of origin. There are, however, among the deadwood fauna elements, such as many scolytids, bark beetles, which are more host specific and could have profound impact upon forest composition in both the Old and New Worlds. More has perhaps been written on *Scolytus scolytus*, the elm bark beetle, than any other insect in archaeology (e.g., Clark and Edwards 2004), and its occurrence has been linked with the widespread decline in elm which heralds the Neolithic. Whether human impact is needed is debatable, although increased stress on the forest as a result of domestic grazing pressure at a time of climate stress might be relevant. It is worth noting, however, that a catastrophic mid-Holocene decline in hemlock in North America has been similarly linked to an insect-borne pathogen (Bhiry and Filion 1996). Whatever the cause, from the elm decline onward, forest faunas come under increasing pressure as human impact increases. Of the regional extirpations of species, most easily seen in the offshore island of Britain, roughly 80% of the losses relate directly to the forest and much of the remainder has some association with woodland (Kenward and Whitehouse 2010). As woodland faunas decline, dung faunas increase, and species which are rare in the mid-Holocene become increasingly common; others are fresh introductions, some not seen since the more open landscape of the previous, slightly warmer interglacial, which with elephants, rhinoceros, and hippopotami was curiously lacking in humans in northern Europe. The extinction of the larger herbivores at the end of the last Glaciation had a significant impact on the natural dung fauna, just as the disappearance of mammoth and wooly rhinoceros had on the colder fauna. While the frequent dung beetle in the middle of the last glaciation, *Aphodius holdereri*, found a refuge in yak dung on the high Tibetan Plateau (Coope 1973), the one certain extinction from the Palearctic insect fauna is a botfly, *Coboldia rusanovae*, which was parasitic on mammoths (Grunin 1973).

Quantitative Environmental Reconstruction and Species Habitat Traits

Paleoentomology, as archeobotany, has traditionally relied on qualitative or semi-quantitative analysis of taxa. Indicator species and the subjective expert assessment of the relative ecological implications of taxa have led interpretation, based on extensive knowledge of the relevant entomological sources. This is most likely a result of several factors, including a past lack of easily accessible computing power, an absence of relevant databases, the prevalence of small numbers of fossils in samples, and certain skepticism over the application of techniques from ecology to the inevitably more fragmentary fossil record. The subject has therefore lagged behind palynology in this respect, which has had an active quantification community for many years, even if a considerable body of practitioners prefers to use simple, and often misleading, percentage-based analyses.

A fossil insect assemblage retrieved from a sediment sample is in itself a sample of the population of the environment at the time of deposition. This is the case for any type of deposit, be it archaeological context or lake sediment, and there is significant overlap with forensic entomology and the deposits of a crime scene (cf. Panagiotakopulu and Buckland 2012; Erzinçlioğlu 2009; Smith 1986). By the time a species list has been obtained, however, the sample has been subjected to a number of taphonomic processes which will have reduced its ability to represent fully that insect population. The representivity of the sample, and the resulting interpretation, depends on a number of factors, which collectively come under the banner of taphonomy.

A number of studies have investigated sample representivity at both the individual species and assemblage/community level, and Kenward in particular (e.g., Carrott and Kenward 2001) has looked at the concept of a "death assemblage" in comparison with living populations in environments useful to archaeology. The potential non-analogue problem, where a fossil assemblage has no modern equivalent (see below), is more easily avoided when the ecology of each individual species is treated on its own merit, rather than assuming that the relationships between a *group* of species and a particular habitat are constant.

Although the ecology of insects is complex, the habitat preferences of most species of insect can be summarized in terms of a restricted set of general or specific "traits." In their most reduced form, these may simply be "terrestrial" or "aquatic", or in the archaeological context, "indoor" or "outdoor," but more nuanced terms, including a number of specific indicator groups such as parasites and obligate dung indicators, are more useful for the interpretation of culturally affected deposits and when describing landscape change. Klaus Koch (1989–1992) devised a set of over 120 categories to describe the ecology, habitat, and feeding habits (traits) of thousands of beetle species, although this system is perhaps too comprehensive to allow for an easily understandable overview of environmental change, or the differences between samples, at a site. The BugsCEP software (Buckland and Buckland 2006) implemented a set of 22 traits, based on those of Koch and Robinson (1983), in order to provide for a more manageable, yet useful and reproducible, quantification of the environmental implications of the species found in samples. Quantitative environmental reconstruction can be undertaken by simply tallying the number of species or individuals falling into each category. The results can then be standardized by dividing the numbers for each category and sample by the sum for all categories for each sample, and easily visualized as a bar chart (Fig. 7). Standardization allows for the inter-comparison of results between samples and sites irrespective of variations in sample size (both in terms of volume and biodiversity).

There are, of course, numerous problems with reducing the implications of a set of complex organisms to 22 bar charts, and users of any classification system must be aware of the importance of understanding insect ecology and potential variation in the implications of the categories. Halotolerant species, for example, may either indicate a coastal location, inland saline groundwaters, *or* the plowing up of mineral salts in an arable field of newly exposed raw soils in arctic landscapes. In the context of more immediate archaeological interpretation, buried corpse faunas provide an instructive example. Dominated by beetle predators on maggots, they can show overlap with similarly foul assemblages from other urban contexts, such as cesspits, and the taphonomy may reduce the essential prey, largely phorid fly larvae, to the unidentifiable. Again, the importance of provision of all relevant archaeological information to the specialist is evident. Trait-based reconstruction should always be a tool in the interpretation process and not an end in itself.

Contemporary Biodiversity and Fossil Data Interpretation

As insects are present in every terrestrial and freshwater environment, and many species are highly specialized in their ecological preferences, knowledge of arthropod ecology is essential when reconstructing past environments, climates, and human activities. Disturbances as a result of human activity can be reflected in the degree of openness and structure of woodlands and in turn may reflect the impact of grazing and land management practices, as well as more immediate on-site impacts. Work on modern analogues aims toward understanding how well insect assemblages characterize the surrounding environment, and work has focused on studying how well insects reflect forest structure and landscape openness (e.g., Buckland et al. 2005; Smith et al. 2010). Beetle and true bugs (Coleoptera and Hemiptera) assemblages have been studied from a wide range of modern deposits with varying spatial relationships with respect to woodland and trees. Results indicate that a significant proportion of tree-associated beetles and bugs are to be expected within a woodland area, and that the abundance of tree-associated species will indeed

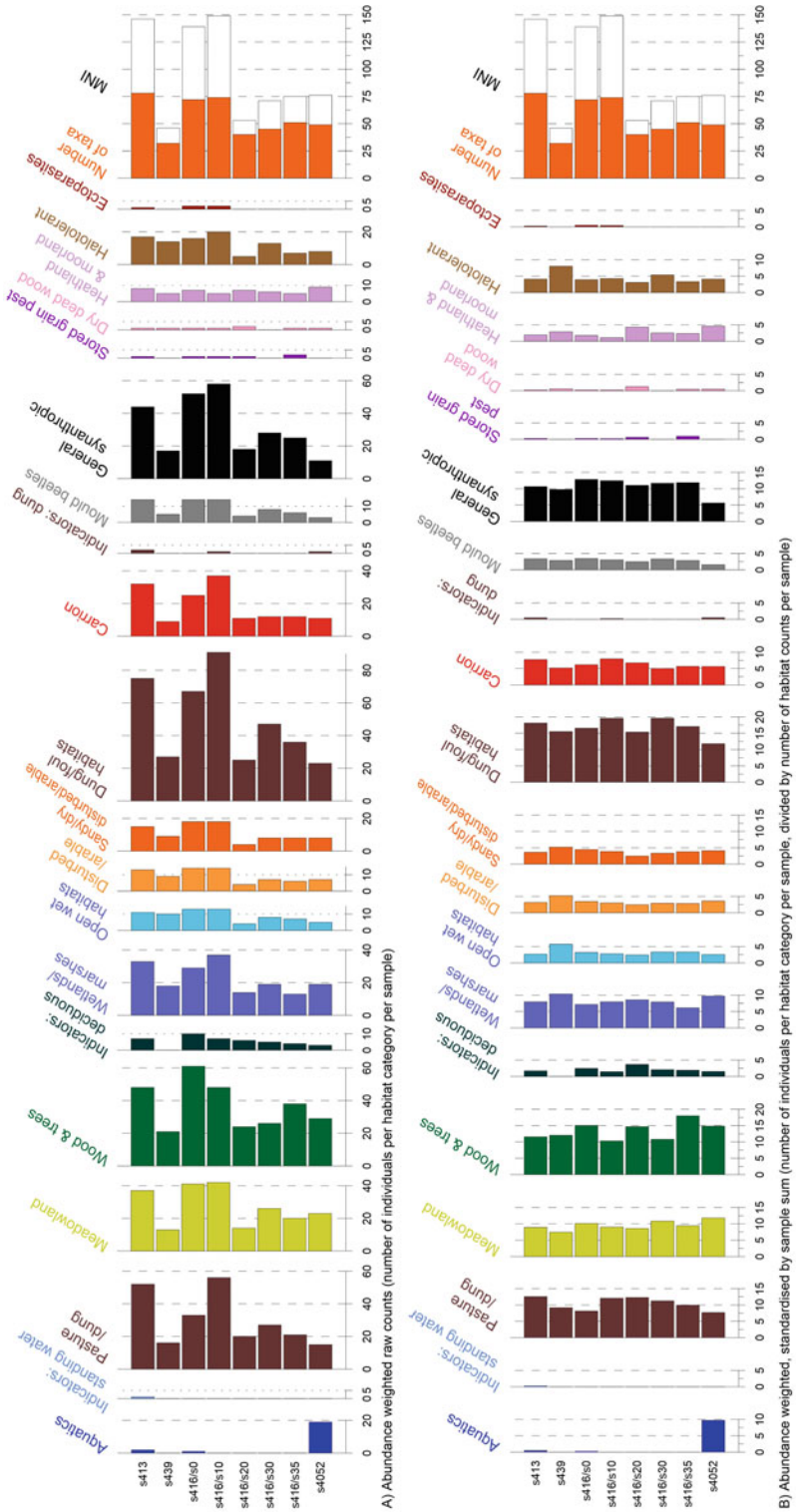

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 7 Habitat diagrams created from results produced using the BugStats tool in the BugsCEP software (see Buckland (2007) for details), showing a sequence of samples taken from an eleventh-century ditch on the border of a deer park at Conisbrough, UK. The upper diagram (**a**) shows bars which are proportional to the number of individuals found in each sample, for each habitat class/trait. The lower diagram (**b**) shows these values standardized by the total number of traits in each sample (a taxon may occur in more than one category, i.e., have more than one trait). Three of the 22 habitats have been omitted for clarity. The chart furthest to the right in each diagram shows the total number of individuals and taxa in each sample. Note that in (**a**), the individual habitat charts more or less mirror the number of individuals per sample chart, making it difficult to understand the relative importance of each habitat between samples. Standardization of these values in (**b**) negates the effect of differing sample richness and biodiversity, allowing us to see that, with the exception of s4052, the samples indicate similar conditions of deciduous trees overhanging a muddy ditch, with decaying vegetative and animal remains nearby. In the background, pasture and meadows are present

rapidly reduce with distance from woodland (Kenward 2006). Similar results are shown in studies in Finland on ground beetles (Carabidae) from pitfall traps along transects running from within a forested area to within open farmland. These concluded that forest ground beetles were abundant within the forest and right up to the forest edge, whereas the number of open-habitat species decreased drastically 5–10 m into the forest edge (Koivula et al. 2004). Buckland (2007) compared the Finnish results using the environmental reconstruction facilities of the BugsCEP software (see below), demonstrating that the latter could be used as a tool for studying modern insect assemblages and environments in order to validate paleoentomological studies and Quaternary environmental reconstructions. When using arthropods to reconstruct the local environment, or the on-site conditions, it is important to understand the spatial representivity of the samples. This is especially important when sampling in natural contexts, or wells/refuse pits which act as pitfall traps, where many of the taxa found are often of natural (non-synanthropic) origin. Smith et al. (2010) examined the degree to which tree-associated beetles and pollen could be used to predict openness in woodland. They suggest that it is possible to use tree-associated beetles to assess the degree of local vegetation openness and the relative intensity of land use by grazing animals within a limited area, roughly within 100–200 m radius of the sampling site. A similar modern study on dung faunas (Smith et al. 2014) was less successful, although this may reflect the limited time window of sampling and the distance between sampling sites.

It is difficult to replicate the taphonomic pathways of fossil assemblages by sampling strategies for modern insect communities, although pitfall trap collections from traditionally managed farms show many similarities with fossil faunas from wells. In terms of species there have been significant recent changes, which make well assemblages from Roman sites more akin to collections made in the early nineteenth century than to those made in the late twentieth, by which time mechanization, herbicides, insecticides, helminthicides, and plowing up of old pasture had driven many close to at least local extinction; the process continues in the present century. Similar *caveat*s apply to woodland assemblages and the medieval town has, perhaps fortunately, no modern analogues. It is unfortunate that earlier studies of insect faunas are rarely quantified beyond a broad very common, common, uncommon, rare, and very rare framework, and more studies are needed, collecting insects with an aim toward improving the interpretation of fossil assemblages. Unfortunately the majority of biodiversity surveys concentrate on specific groups (such as ground beetles or forestry pests), rather than the complete fauna in any location.

Climate Change Studies

Fossil beetles were among the first proxies used to identify the rapid nature of global warming at the end of the last Ice Age, later confirmed by ice core data. The most established methods for climate reconstruction from fossil beetles is the mutual climatic range method (MCR) (cf. Atkinson et al. 1986), available with slight modification in the BugsCEP software (Buckland 2007). MCR is a mathematically simple modern analogue technique, whereby the climate, although not necessarily the geographic locality, in which the majority of the species in a sample live today, is considered the most probable climate represented by the fossils found together in a sample (see Elias 2010a for methodology). Unlike assemblage-based methods, and in common with the trait-based approach described above, MCR does not assume species communities and independently evaluates each species, providing a climatic rather than geographic envelope and then integrating the whole to provide a most probable regime. It therefore avoids issues of non-analogue communities when reconstructing the climates of periods where community structures may have been different from any of those observable today, such as the mammoth steppe which is considered to have covered much of what are now northern temperate regions during the last glaciation (Zimov et al. 2012).

The current MCR calibration dataset includes the temperature requirements of 436 beetle species known fossil from northern Europe, based on several thousand point source and area distribution maps. There is therefore considerable room

for expansion, especially taxa from more continental climates and Mediterranean regions. Beetle MCR results have been shown to slightly underestimate extreme climates, and this may be a reflection of the limits of the calibration data. Updated software utilizing a combination of online biodiversity data collated from museum collections (e.g., GBIF, www.gbif.org) with careful manual quality control of the data will help improve the relevance and accuracy of future MCR calculations, although many data require checking and much remains to be culled from under-researched museum collections.

There are a number of other insect orientated climate reconstruction methods in use, and chironomid-based reconstructions have been used extensively (e.g., Brooks et al. 2012). A number of alternatives to MCR for beetles have also been investigated and the reader is directed toward Elias (2010a) for an overview.

BugsCEP Database and Software

The Bugs Coleopteran Ecology Package (BugsCEP; http://www.bugscep.com; Buckland and Buckland 2006) is currently the only freely available database for fossil and modern insect data (although there are plans to make the same data available online through the SEAD, http://www.sead.se, and Neotoma, http://www.neotomadb.org, research data infrastructures). BugsCEP stores published raw data on the occurrence and abundance of individual taxa, as well as accompanying dating evidence and bibliographic and other site metadata. The system also provides an extensive habitat and geographic database for most taxa, along with software tools for entering new data, analysis, aiding interpretation, and the identification of similar sites. Table 1 summarizes the contents of the database at the time of writing (August 2017). The database is considered as reasonably complete in terms of the published European fossil record, including a large amount of gray literature in unpublished archaeological reports. A large amount of data from studies in Russia are contained in the database of Siberian fossil insects (QUINSIB; Kuzmina 2014), which has yet to be made publicly available (although excerpts are available on request). Further data from North America is currently being ingested into the Neotoma Paleoecology Database (http://neotoma.org), and the merger of these databases would represent a considerable step toward providing a more integrated Holarctic perspective on insect biogeography.

In addition to data browsers and retrieval tools, BugsCEP provides a number of software tools, as the most important of which are outlined in Table 2. These are designed to help in the interpretation of archaeological and natural environments and reduce the time and expertise required for a number of common data-intensive exercises, such as compiling a list of habitat descriptions and references associated with the species found at a site or a bar chart of species habitat traits through a series of samples (Fig. 7).

Future Directions

Paleoentomology can provide an enormous amount of detailed information with regard to past human and natural environments, and it is hoped that its use will only increase in the future as more archaeologists realize this fact. User-friendly database software, online portals, and GIS technology will enable the volume and scope of the all-important reference data to be expanded, also increasing the relevance and applicability of insect data, although access to and maintenance of reference collections will remain a problem. Habitat summary data, modern environment calibration data, and MCR climate reference data are areas which could be expanded upon relatively easily, although the gathering of species collection data is time consuming and difficult to source funding for. The paleoentomological community is, however, small and therefore of limited productivity even if the individuals themselves are not. Increased student recruitment is therefore essential, especially at the postgraduate level, if the community is to grow, and it is hoped that the integration and community-based growth of digital tools will help toward encouraging more students to continue to higher levels.

DNA-based studies, while no replacement for morphology-based identifications (e.g., Will and

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Table 1 Enumeration of the BugsCEP database (as of 10 August 2017), illustrating the nature and extent of the (primarily European) Quaternary fossil insect record. The database is being continually updated, and these figures are thus out of date. Refer to the current version of the database or its website for current information (www.bugscep.com)

Species related	
11,123	Taxa with 6,748 synonyms
932	Species association records (e.g., predator on, predated by, etc.)
1,934	UK Red Data Book rarity records (RDB)
11,770	Size attributes (mainly minimum and maximum sizes)
428	Identification keys to families, genera, and species largely by Peter Skidmore, with some translations into English of French and German sources
Fossil record	
1,283	Sites (geographical locations which may include multiple excavations and datasets)
1,422	Abundance datasets, of which 713 are archaeological and 620 stratigraphic sequences
189,704	Fossil or modern record entries (finds of a particular taxa at a particular site), including 715,261 individual taxon identifications (occurrences)
1,961	Calendar-based dates – specific years or ranges of calendar years Ranging from present day to dendrochronological dates >5,000 BC
7,471	Period date records – encompassing period types from archaeological to vegetation and geological; ranging from Pleistocene to Modern, and used where no more specific data are available
1,315	Radiometric dates – mainly radiocarbon but also Uranium series, OSL, etc. ranging from 370 to 167,500 BP
Bibliography	
5,965	References, of which 11,360 are the dataset sources
Ecology and climate reference data	
436	MCR species thermal envelopes (see "Climate Change Studies")
34,863	Habitat and ecology text abstracts Text concerning the habitat and ecology of a species as described by the cited author
37,955	Distribution text abstracts
	Distribution notes for a species from a cited author
8,997	Bugs ecology code (habitat trait) assignments – classification of species according to a limited set of general habitats and used for rapid environmental reconstruction (see "Quantitative Environmental Reconstruction and Species Habitat Traits")
17,032	Koch ecology code (habitat trait) assignments – classification of species according to an extensive set of habitat and ecology descriptions, based on Koch (1989–1992) with translation and additions (see "Quantitative Environmental Reconstruction and Species Habitat Traits")
9,893	UK adult activity month records

Rubinoff 2004), when used in combination with the methods described above, are likely to play an important role in studying long-term changes in biogeography (cf. Dittmar et al. 2003). In particular, issues of faunal origins and the movement of pest species (cf. Panagiotakopulu and Buckland 2017) are likely to benefit from the molecular approach, especially with its ability to identify genetically similar populations. Fossils and museum specimens of parasitic insects may also prove useful as information stores for the DNA of parasites and pathogens and thus advance the understanding of the spread of insect-borne diseases and past epidemics.

Although all proxy data sources can provide useful information, it has been suggested that the limits of single proxy reconstructions are being reached, and that we gain less and less from each new investigation. If this is true, then multi-proxy integration is the way forward. With the databases now available for several proxies, and an increasing number of multi-proxy databases under construction, there is much scope for integrated environmental and climate reconstructions where the limits of one proxy may be strengthened by the advantages of another. A logical continuation of this would be the integration with an increasingly accessible range of external data sources for

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Table 2 The main tools provided by the BugsCEP software interface deliver the results of complex queries at the click of a mouse, reducing the need for complex query construction in database management software

Tool	Form, purpose and results
Modern habitat and distribution data collation	For any dataset, the fully referenced habitat and broad modern distribution data for each species found can be extracted. This potentially saves hours of literature searching and, along with the environmental and climate reconstructions, provides the foundations for site interpretation
Climate reconstruction	The BugsMCR tool uses the MCR dataset (see "Climate Change Studies") to calculate the most probable thermal regimes represented by the species found in each sample at a site. Jackknifing may be applied to give an indication of the reliability of reconstructions, which generally are related to the number of species in the sample or its temporal resolution. The system can also be used to visualize the species thermal envelopes for any dataset as well as predict which other species could survive in the temperature range tolerated by any single species (see Vickers and Buckland 2015)
Habitat trait based on environmental reconstruction and statistics	The BugStats tool uses the Bugs ecology code system to quantitatively summarize the habitats represented by each sample at a site. The results can be expressed as bar charts (Fig. 7) or a text report, and a variety of pretreatment and standardizations can be applied to improve inter-sample comparability and aid interpretation. Correlation matrices may also be produced comparing the similarity of the assemblage of each sample with every other sample at a site
Search by habitat, distribution, and rarity	The database can be queried for a list of species preferring any single or combination of habitat traits from the BugsCEP or Koch systems or where any specified word is included in their habitat or distribution data. The UK RDB data (see Table 1) may also be queried in the same session and logical operators (AND, OR, NOT) are catered for. Results may be output as species lists or a list of sites containing the species retrieved

ecology, biodiversity, and also ethnography and cultural history. Such inter-archive linking could greatly improve the speed with which basic quantifications and interpretations could be processed and thus leave more time for the more detailed qualitative interpretation of results and their implications.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Environmental Archaeology and Conservation
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data
- ▶ Strategic Environmental Archaeology Database (SEAD)

References

Angus, R.B. 1973. Pleistocene *Helophorus* (Coleoptera, Hydrophilidae) from Borislav and Starunia in the western Ukraine, with a reinterpretation of M. Lomnicki's species, description of a new Siberian species, and comparison with British Weichselian faunas. *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 265: 299–326.

Ashton, N. 2017. *Early humans*. London: William Collins.

Atkinson, T.C., K.R. Briffa, G.R. Coope, J.M. Joachim, and D.W. Perry. 1986. Climatic calibration of coleopteran data. In *Handbook of holocene palaeoecology and palaeohydrology*, ed. B.E. Berglund, 851–858. Chichester: Wiley.

Bain, A., J.-A. Bouchard-Peron, R. Auger, and D. Simoneau. 2009. Bugs, seeds and weeds at the Intendant's palace: A study of an evolving landscape. *Post-Medieval Archaeology* 43: 183–197.

Bhiry, N., and L. Filion. 1996. Mid-Holocene hemlock decline in eastern North America linked with phytophagous insect activity. *Quaternary Research* 45: 312–320.

Brooks, S. J. 2003. Chironomid analysis to interpret and quantify Holocene climate change. In Mackay, A.,

P

Battarbee, R., Birks, J. & Oldfield, F. *Global change in the Holocene*, 328–341. London: Hodder Arnold.

Buckland, P.C. 1976. *The environmental evidence from the church street roman sewer system*. London: Council for British Archaeology & York Archaeological Trust.

Buckland, P.I. 2007. *The development and implementation of software for palaeoenvironmental and palaeoclimatological research: The bugs coleopteran ecology package (BugsCEP). Archaeology and Environment 23*. PhD dissertation. University of Umeå, Sweden.

Buckland, P.C. 2012. (with K. Vickers, E. Panagiotakopulu, J.P. Sadler & P.I. Buckland). Insect remains, In Sveinbjarndardóttir, G, *Reykholt. Archaeological investigations at a high status farm in western Iceland*, 218–241. Reykjavík: Snorrastofa & National Museum of Iceland.

Buckland, P.I. 2014. The bugs coleopteran ecology package (BugsCEP) database: 1000 sites and half a million fossils later. *Quaternary International* 341: 272–282.

Buckland, P.I., and P.C. Buckland. 2006. *BugsCEP Coleopteran Ecology Package. IGBP PAGES/World Data Center for Paleoclimatology Data Contribution Series # 2006-116*. Boulder: NOAA/NCDC Paleoclimatology Program. Available at: http://www.ncdc.noaa.gov/paleo/insect.html and http://www.bugscep.com. Accessed 27 May 2012.

Buckland, P.C., and D. Perry. 1989. Ectoparasites of sheep from Stóraborg, Iceland and their interpretation. Piss, parasites and people, a palaeoecological perspective. *Hikuin* 15: 37–46.

Buckland, P.C., and J. Sadler. 1989. A biogeography of the human flea, *Pulex irritans* L. (Siphonaptera: Pulicidae). *Journal of Biogeography* 16: 115–120.

Buckland P.C., E. Panagiotakopulu, and P.I. Buckland. 2004. What's eating Halvdan the Black?: Fossil insects and the study of a burial mound in its landscape context. In *Halvdanshaugen: arkeologi, historie og naturvetenskap* 353–376. Oslo: University Museum of Cultural Heritage.

Buckland, P.C., P.I. Buckland, and D. Hughes. 2005. Palaeoecological evidence for the Vera hypothesis? In *Large herbivores in the wildwood and modern naturalistic grazing systems*, English Nature Research Report 648, ed. K.H. Hodder, J.M. Bullock, P.C. Buckland, and K.J. Kirby, 62–116. Peterborough: English Nature.

Buckland, P.C., P.I. Buckland, and E. Panagiotakopulu. 2016. Caught in a trap: Landscape and climate implications of the insect fauna from a Roman well in Sherwood Forest. *Archaeological and Anthropological Sciences*: 1–16. https://doi.org/10.1007/s12520-016-0338-8.

Carrott, J., and H.K. Kenward. 2001. Species associations among insect remains from urban archaeological deposits and their significance in reconstructing the past human environment. *Journal of Archaeological Science* 28: 887–905.

Clark, S.H.E., and K.J. Edwards. 2004. Elm bark beetle in Holocene peat deposits and the northwest European elm decline. *Journal of Quaternary Science* 19: 525–528.

Coope, G.R. 1973. Tibetan species of dung beetle from late Pleistocene deposits in England. *Nature* 245: 335–336.

Coope, G.R., and P.J. Osborne. 1968. Report on the Coleopterous Fauna of the Roman Well at Barnsley Park, Gloucestershire. *Transactions of the Bristol and Gloucestershire Archaeological Society* 86: 84–87.

Dittmar, K., U. Mamat, M. Whiting, T. Goldmann, K. Reinhard, and S. Guillen. 2003. Techniques of DNA-studies on Prehispanic ectoparasites (*Pulex* sp., Pulicidae, Siphonaptera) from animal mummies of the Chiribaya culture, southern Peru. *Memórias do Instituto Oswaldo Cruz* 98 (Suppl 1): 53–58.

Duff, A. 2018. *Checklist of beetles of the British Isles* (3rd ed.). Iver: Pemberley Books.

Elias, S.A., 2010a. Advances in quaternary entomology. *Developments in Quaternary Sciences* 12: 1–288.

Erzinçlioğlu, Z. 2009. Fly puparia associated with the Condover mammoths. In *Late-glacial mammoth skeletons (Mammuthus primigenius) from Condover (Shropshire, UK): anatomy, pathology, taphonomy and chronological significance*, ed. A.M. Lister, *Geological Journal* 44: 474–479.

Fikáček, M., A. Prokin, and R.B. Angus. 2011. A long-living species of the hydrophiloid beetles: *Helophorus sibiricus* From the early Miocene deposits of Karteshevo (Siberia, Russia). *Zookeys* 130: 239–254.

Forbes, V., A.J. Dugmore, and E. Ólafsson. 2016. The life and death of barn beetles: Faunas from manure and stored hay inside farm buildings in northern Iceland. *Ecological Entomology* 41: 480–499.

Gothe, R., and H. Schöl. 1994. Deer keds (*Lipoptena cervi*) in the accompanying equipment of the late Neolithic human mummy from the Similaun, South Tyrol. *Parasitology Research* 80: 81–83.

Grimaldi, D., and M.S. Engel. 2005. *Evolution of the insects*. Cambridge, UK: Cambridge University Press.

Grove, K. 1995. A study on insect remains in archaeological deposits. In *The archaeology of Chichester and district 1995*, 39–40. Southern Archaeology & Chichester District Council.

Grunin, K.Y. 1973. First find of the larvae of the mammoth botfly *Cobboldia* (*Mamontia*, subgen. n.) *rusanovi* sp. n. (Diptera, Gasterophilidae). *Entomologicheskoe Obozrenie* 52: 228–230. (Translated into English in *Entomological Review* 52: 228–230).

Hall, A.R., and H.K. Kenward. 1990. *Environmental evidence from the Colonia. Archaeology of York, 14/6*. Council for British Archaeology for York Archaeological Trust.

Hall, A.R., and H.K. Kenward. 2004. Setting people in their environment: Plant and animal remains from Anglo-Scandinavian York. In *Aspects of Anglo-Scandinavian York*, Archaeology of York 8/4, ed. R.-A. Hall, D.W. Rollason, M. Blackburn, D.N. Parsons, G. Fellows-Jensen, A.R. Hall, H.K. Kenward, T.P. O'Connor, D. Tweddle, A.J. Mainman, and

N.S.H. Rogers, 372–426. York: Council for British Archaeology for York Archaeological Trust.

Kenward, H.K. 1975. Pitfalls in the environmental interpretation of insect death assemblages. *Journal of Archaeological Science* 2: 85–94.

Kenward, H.K. 1999. Pubic lice (*Pthirus pubis*) were present in roman and medieval Britain. *Antiquity* 73: 911–915.

Kenward, H. 2006. The visibility of past trees and woodland: Testing the value of insect remains. *Journal of Archaeological Science* 33: 1368–1380.

Kenward, H.K., and E. Allison. 1994. Rural origins of the urban insect fauna. In *Urban-rural connexions: Perspectives from environmental archaeology*, Oxbow monograph, 47, ed. A.R. Hall and H.K. Kenward, 55–78. Oxford: Oxbow Books.

Kenward, H.K., and A.R. Hall. 1997. Enhancing bioarchaeological interpretation using indicator groups: Stable manure as a paradigm. *Journal of Archaeological Science* 24: 663–673.

Kenward, H., and A. Hall. 2012. Dung and stable manure on waterlogged archaeological occupation sites: Some ruminations on the evidence from plant and invertebrate remains. In *Manure matters. Historical, archaeological and ethnographic perspectives*, ed. R. Jones, 79–95. Aldershot: Ashgate.

Kenward, H., and N.J. Whitehouse. 2010. Insects. In *Extinctions and invasions: A social history of British fauna*, ed. T. O'Connor and N. Sykes, 181–189. Oxford: Windgather Press.

Kenward, H.K., A.R. Hall, and A.K.G. Jones. 1986. *Environmental evidence from a Roman well and Anglian pits in the legionary fortress*, Archaeology of York 14/2. York: Council for British Archaeology for York Archaeological Trust.

Koch, K. 1989–1992. *Die Käfer Mitteleuropas. Ökologie*, 1–3. Krefeld: Goecke & Evers.

Koivula, M., V. Hyyryläinen, and E. Soininen. 2004. Carabid beetles (Coleoptera: Carabidae) at forest-farmland edges in southern Finland. *Journal of Insect Conservation* 8: 297–309.

Kuzmina, S. 2014. New approach to the quaternary studies: QINSIB–the database of Siberian fossil insects. *Quaternary International* 341: 283–293.

Lindroth, C.H. 1986. *The Carabidae (Coleoptera) of Fennoscandia and Denmark*. Leiden: E.J. Brill.

Miller, S.E. 1997. Late quaternary insects of Rancho La Brea, California, USA. In *Studies in quaternary entomology– an inordinate fondness for insects*, Quaternary proceedings, ed. A.C. Ashworth, P.C. Buckland, and J.P. Sadler, vol. 5, 185–193. Chichester: Wiley.

Nielsen, B.O. 1989. House fly puparia (*Musca domestica* L.) from a neolithic field in Thayngen-Weier, Switzerland. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 62: 5–8.

Obata, H., A. Manabe, N. Nakamura, T. Onishi, and Y. Senba. 2011. A new light on the evolution and propagation of prehistoric grain pests: The World's oldest maize weevils found in Jomon pottery, Japan. *PLoS One* 6 (3): e14785.

Osborne, P.J. 1971. An insect fauna from the Roman site at Alcester, Warwickshire. *Britannia* 2: 156–165.

Osborne, P.J. 1974. An insect assemblage of early Flandrian age from Lea Marston, Warwickshire and its bearing on the contemporary climate and ecology. *Quaternary Research* 4: 471–486.

Osborne, P.J. 1983. An insect fauna from a modern cesspit and its comparison with probable cesspit assemblages from archaeological sites. *Journal of Archaeological Science* 10: 453–463.

Panagiotakopulu, E. 2004. Pharaonic Egypt and the origins of plague. *Journal of Biogeography* 31: 269–275.

Panagiotakopulu, E., and P.C. Buckland. 2010. The insect remains. In *Busy lives at Amarna: Excavations in the main (city grid 12 and the house of Ranefer, N49.18) 1: The excavations, architecture and environmental remains*, ed. B. Kemp and A. Stevens, 453–471. London: Egypt Exploration Society.

Panagiotakopulu, E., and P.C. Buckland. 2012. Forensic archaeoentomology – An insect fauna from a burial in York Minster. *Forensic Science International* 221: 125–130.

Panagiotakopulu, E., and P.C. Buckland. 2017. A thousand bites – Insect introductions and late Holocene environments. *Quaternary Science Reviews* 156: 23–35.

Panagiotakopulu, E., P. Skidmore, and P.C. Buckland. 2007. Fossil insect evidence for the end of the Western Settlement in Norse Greenland. *Naturwissenschaften* 94: 300–306.

Panagiotakopulu, E., T.F.G. Higham, P.C. Buckland, J.A. Tripp, and R.E.M. Hedges. 2015. AMS dating of insect chitin – A discussion of new dates, problems and potential. *Quaternary Geochronology* 27: 22–32.

Parfitt, S.A., N.M. Ashton, S.G. Lewis, R.L. Abel, G.R. Coope, M.H. Field, R. Gale, P.G. Hoare, N.R. Larkin, M.D. Lewis, V. Karloukovski, B.-A. Maher, S.M. Peglar, R.C. Preece, J.E. Whittaker, and C.B. Stringer. 2010. Early Pleistocene occupation at the edge of the boreal zone in Northwest Europe. *Nature* 466: 229–233.

Rick, F.M., G.C. Rocha, K. Dittmar, C.E.A. Coimbra, K. Reinhard, F. Bouchet, L.F. Ferriera, and A. Araújo. 2002. Crab louse infestation in pre-Columbian America. *Journal of Parasitology* 88: 1266–1267.

Robinson, M.A. 1983. Arable/pastoral ratios from insects. In *Integrating the subsistence economy,* ed. M. Jones, 19–47. British Archaeological Reports S181, Oxford.

Smith, K.G.V. 1986. *A manual of forensic entomology*. London: British Museum (NH).

Smith, D.N. 1999. Analysis of beetles in smoke blackened thatch. In *Smoke blackened thatch; a unique source of late medieval plant remains from southern England*, ed. J.B. Letts, 42–43. London: English Heritage & Reading University.

Smith, D.N. 2000. Detecting the nature of materials on farms from Coleoptera: A number of taphonomic

problems. In *Taphonomy and interpretation*, ed. J.-P. Huntley and S. Stallibrass, 71–84. Oxford: Oxbow Books.

Smith, D.N., N.J. Whitehouse, M.J. Bunting, and H. Chapman. 2010. Can we characterise "openness" in the Holocene palaeoenvironmental record? Modern analogue studies of insect faunas and pollen spectra from Dunham Massey deer park and Epping Forest, England. *The Holocene* 20: 1–22.

Smith, D.N., K. Nayyar, D. Schreve, R. Thomas, and N. Whitehouse. 2014. Can dung beetles from the palaeoecological and archaeological record indicate herd concentration and the identity of herbivores? *Quaternary International* 341: 119–130.

Vickers, K., and P.I. Buckland. 2015. Predicting island beetle faunas by their climate ranges: The tabula rasa/refugia theory in the North Atlantic. *Journal of Biogeography* 42 (11): 2031–2048.

Will, K.W., and D. Rubinoff. 2004. Myth of the molecule: DNA barcodes for species cannot replace morphology for identification and classification. *Cladistics* 20: 47–55.

Zimov, S.A., N.S. Zimov, A.N. Tikhanov, and F.S. Chapin. 2012. Mammoth steppe: A high-productivity phenomenon. *Quaternary Science Reviews* 57: 26–45.

Further Reading

See the online Quaternary Entomology Bibliography for an up to date and comprehensive list of references for the subject: http://www.bugscep.com/qbib.html. The list below provides further reading which either directly relates to the examples used in the text above or provides additional examples or geographic coverage.

Allen, J.R.M., J.D. Scourse, A.R. Hall, and G.R. Coope. 2009. Palaeoenvironmental context of the late-glacial woolly mammoth (*Mammuthus primigenius*) discoveries at Condover, Shropshire, UK. *Geological Journal* 44: 414–446.

Alley, R.B., D.A. Meese, C.A. Shuman, A.J. Gow, K.C. Taylor, P.M. Grootes, J.W.C. White, M. Ram, E.D. Waddington, P.A. Mayewski, and G.A. Zielinski. 1993. Abrupt increase in the Greenland snow accumulation at the end of the younger Dryas event. *Nature* 362: 527–529.

Amorosi, T., P.C. Buckland, K.J. Edwards, I. Mainland, T.H. Mcgovern, J.P. Sadler, and P. Skidmore. 1998. They did not live by grass alone: The politics and palaeoecology of fodder on the North Atlantic islands. *Environmental Archaeology* 1: 41–54.

Andrieu-Ponel, V., P. Ponel, H. Bruneton, P. Leveau, and J.-L. de Beaulieu. 2000. Palaeoenvironments and cultural landscapes of the last 2000 years reconstructed from pollen and coleopteran records in the lower Rhône valley, southern France. *The Holocene* 10: 341–355.

Ashworth, A.C., P.C. Buckland, and J.P. Sadler, eds. 1997. Studies in quaternary entomology – An inordinate fondness for insects. *Quaternary Proceedings* 5.

Barrett, J., A. Hall, C. Johnstone, H. Kenward, T. O'Connor, and S. Ashby. 2007. Interpreting the plant and animal remains from Viking-age Kaupang. In *Kaupang in Skiringssal*, ed. D. Skre, vol. 1, 283–320. Aarhus: Aarhus University Press.

Bresciani, J., N. Haarløv, P. Nansen, and G. Moller. 1989. Head lice in mummified Greenlanders from A.D. 1475. In *The mummies from Qilakitsoq – Eskimos in the 15th century*, eds. J.P. Hart Hansen and H.C. Gulløv, 89–92. Meddelelser om Grønland, Man & Society 12.

Brooks, S.J., I.P. Matthews, H.H. Birks, and H.J.B. Birks. 2012. High resolution Lateglacial and early-Holocene summer air temperature records from Scotland inferred from chironomid assemblages. *Quaternary Science Reviews* 41: 67–82.

Buckland, P.C., M. Parker Pearson, A. Wigley, and M.A. Girling. 2001. Is there anybody out there? A reconsideration of the environmental evidence from the Breiddin Hillfort, Powys, Wales. *Antiquaries Journal* 81: 51–76.

Centeno, N., M. Serrán, J.G. Otero, and N. Weiler. 2009. An ancient assemblage of scavenger insects in Patagonia (Argentina). *Entomologica Americana* 115: 77–80.

Centre for Archaeology Guidelines. 2002. In *Environmental archaeology. A guide to the theory and practice of methods, from sampling and recovery to post-excavation*, ed. D.M. Jones. Swindon: English Heritage.

Chu, H.F., and Wang Ling-Yao. 1975. Insect carcasses unearthed from Chinese antique tombs. *Acta Entomologica Sinica* 18: 333–337. (In Chinese).

Coope, G.R., G. Lemdahl, J.J. Lowe, and A. Walkling. 1998. Temperature gradients in northern Europe during the last glacial-Holocene transition (14-9 14C kyr BP) interpreted from coleopteran assemblages. *Journal of Quaternary Science* 13: 419–434.

Dinnin, M.H., and B. Brayshay. 1999. The contribution of a multiproxy approach in reconstructing floodplain development. In *Floodplains: Interdisciplinary approaches*, ed. S.B. Marriot and J. Alexander, vol. 163, 179–195. London: Geological Society of London Special Publication.

Dussault, F., A. Bain, and G. Lemoine. 2014. Early Thule winter houses: An archaeoentomological analysis. *Arctic Anthropology* 51: 101–117.

Elias, S.A. 2010b. The use of insect fossils in Archeology. In *Advances in quaternary entomology. Developments in quaternary sciences 12,* 89–123. Elsevier.

Elias, S.A., S. Kuzmina, and S. Kiseljov. 2006. Late tertiary origins of the Arctic beetle fauna. *Palaeogeography, Palaeoclimatology, Palaeoecology* 241: 373–392.

Girling, M.A. 1989. Mesolithic and later landscapes interpreted from the insect assemblages of West Heath Spa Hampstead. In *Excavations at the Mesolithic Site on West Heath, Hampstead 1976–1981*, eds. D. Collins and D. Lorimer, 72–89. British Archaeological Reports 217, Oxford.

Greenwood, M.T., P.J. Wood, and M.A. Monk. 2006. The use of fossil caddisfly fauna assemblages in the reconstruction of flow environments from floodplain paleochannels of the River Trent, England. *Journal of Paleolimnology* 35: 747–761.

Gustavsson, G., G. Lemdahl, and M.-J. Gaillard. 2009. Abrupt forest ecosystem change in SW Sweden during the late Holocene. *The Holocene* 19: 691–702.

Hakbijl, T., J.P. Pals, and C.D. Troostheide. 1989. Plant and insect remains from the Late Neolithic well at Kolhorn. *Palaeohistoria* 31: 157–163.

Hall, A.R., and H.K. Kenward. 2015. Sewers, cesspits and middens: A survey of the evidence for 2000 years of waste disposal in York, UK. In *Sanitation, latrines and intestinal parasites in past populations*, ed. P.D. Mitchell, 99–119. Farnham: Ashgate Press.

Hellqvist, M. 2013. The well in the settlement: A water source for humans and livestock, studied through insect remains from southeast Sweden. In *Barely surviving or more than enough? The environmental archaeology of subsistence, specialisation and surplus food production*, ed. M. Groot, D. Lentjes, and J. Zeiler, 151–174. Leiden: Sidestone Press.

Hoganson, J.W., M. Gunderson, and A.C. Ashworth. 1989. Fossil beetle analysis. In *Monte Verde, a late Pleistocene settlement in Chile*, Paleoenvironment and Site Context, ed. T.D. Dillehay, vol. 1, 215–226. Washington, DC: Smithsonian Institute Press.

Holden, A.R., J.R. Southon, K. Will, M.E. Kirby, R.L. Aalbu, and M.J. Markey. 2017. A 50,000 year insect record from Rancho La Brea, southern California: Insights into past climate and fossil deposition. *Quaternary Science Reviews* 168: 123–136.

Huchet, J.-B. 2015. Ectoparasites de l'homme: le regard de l'archéoentomologiste. In *Poux, Puces, Punaises, la Verminede l'Homme, Découverte, descriptions et traitments Antiquité, Moyen Âge, Époque modern*, ed. F. Collard and E. Samama, 45–60. Paris: L'Harmattan.

Kenward, H.K. 1988. Insect remains, in Griffin, K., R.H. Okland, A.K.G. Jones, H.K. Kenward, R.W. Lie & E. Schia, Animal bones, moss, plant, insect and parasite remains: 115–140. Schia E. De arkeologiske utgravninger i Gamlebyen, Oslo 5. Øvre Ervik: Alveheim & Eide.

Kenward, H. 2009. *Invertebrates in archaeology in the North of England. Northern regional review of environmental archaeology*, Environmental studies report. Research department report series 12–2009. London: English Heritage.

King, G.A., A. Bain, and F. Dussault. 2010. *Assessment of insect remains from a colonial well (JR2158; Structure 177) at James Fort, Jamestown, Virginia*, Technical Report. Laboratoire d'Archéologie Environnementale, CELAT. Québec: Université Laval.

Kislev, M.E., A. Hartmann, and E. Galili. 2004. Archaeobotanical and archaeoentomological evidence from a well at Atlit-Yam indicates colder, more humid climate on the Israeli coast during the PPNC period. *Journal of Archaeological Science* 31: 1301–1310.

Lemdahl, G. 1995. Insect remains from the Alvastra pile dwelling. In *Alvastra pile dwelling. Palaeoethnobotanical studies,* ed. H. Göransson, Theses and papers in archaeology, N.S. A6: 97–99. Lund University Press.

Lemdahl, G., M. Söronsson, and L. Hedenäs. 1995. Insekter från ett medeltida handelsfartyg. *Entomologiske Tidskrift* 116: 169–174.

Lockwood, J.A. 2004. *Locust. The devastating rise and mysterious disappearance of the insect that shaped the American frontier*. New York: Perseus Books.

Marra, M.J. 2008. Quaternary fossil beetles from New Zealand. *New Zealand Entomologist* 31: 5–16.

Morgan, A.V. 1997. Fossil Coleoptera assemblages in the Great Lakes region of North America: Past changes and future prospects. In *Past and future rapid environmental changes: The spatial and evolutionary response of terrestrial biota*, ed. B. Huntley, W. Cramer, A.V. Morgan, H.C. Prentice, and J.R.M. Allen, 129–142. Berlin: Springer.

Nielsen, B.O., V. Mahler, and P. Rasmussen. 2000. An arthropod assemblage and the ecological conditions in a byre at the Neolithic settlement of Weier, Switzerland. *Journal of Archaeological Science* 27: 209–218.

Okuno, M., Y. Mori, and T. Nakamura. 2010. Paleoenvironment of medieval archaeological sites in central Japan: Assemblage analysis and ^{14}C dating of insect fossils. *Radiocarbon* 52: 511–519.

Olsson, F., and G. Lemdahl. 2009. A continuous Holocene beetle record from the site Stavsåkra, southern Sweden: Implications for the last 10 600 years of forest and land use history. *Journal of Quaternary Science* 24: 612–626.

Osborne, P.J. 1989. Insects. In *Wilsford Shaft. Excavations 1960–62, 96–99 + fiche C1–7*, ed. P. Ashbee, M. Bell, and E. Proudfoot. London: English Heritage.

Pals, J.P., and T. Hakbijl. 1992. Weed and insect infestation of a grain cargo in a ship at the Roman fort of Laurium in Woerden (Province of Zuid-Holland). *Review of Palaeobotany and Palynology* 73: 287–300.

Panagiotakopulu, E., and P.C. Buckland. 1999. The bed bug, *Cimex lectularius* L. from Pharaonic Egypt. *Antiquity* 73: 908–911.

Ponel, P., and J.-H. Yvinec. 1997. L'archéoentomologie en France. *Les Nouvelles de L'archéologie* 68: 31–44.

Ponel, P., V. Matterne, N. Coulthard, and J.-H. Yvenic. 2000. La Tène and Gallo-Roman natural environments and human impact at the Touffréville rural settlement, reconstructed from Coleoptera and plant macroremains (Calvados, France). *Journal of Archaeological Science* 27: 1055–1072.

Porch, N., G.J. Jordan, D.M. Price, R.W. Barnes, M.K. Macphail, and M. Pemberton. 2009. Last interglacial climates of south-eastern Australia: Plant and beetle based reconstructions from Yarra Creek, King Island, Tasmania. *Quaternary Science Reviews* 28: 3197–3210.

Reilly, E. 2012. Fair and foul: Analysis of sub-fossil insect remains from Troitsky XI–XIII, Novgorod (1996–2002). In *The archaeology of medieval Novgorod in its wider context: A study of centre/periphery relations*, ed. M. Brisbane, N. Makarov, and E. Nosov, 265–282. Oxford: Oxbow Books.

Reilly, E. 2015. The environment of Viking-age settlements: Recent evidence from Ireland to Russia. In *The Vikings in Ireland and beyond: Before and after the battle of Clontarf*, ed. H. Clarke and R. Johnson, 297–324. Dublin: Four Courts Press.

Robinson, M.A. 2002. *English heritage reviews of environmental archaeology: Southern region insects*. Centre for archaeology report 39/2002. English Heritage.
Robinson, M. 2013. Holocene archaeological evidence of extinct and very rare British Scarabaeoidea. *Environmental Archaeology* 18: 143–153.
Schelvis, J. 2003. Archaeological arthropod faunas as indicators of past industrial activities. Species composition, appearance and body part representation. In *The environmental archaeology of industry*, Symposia of the association for environmental archaeology, ed. P. Murphy and P.E.J. Wiltshire, vol. 20, 131–134. Oxford: Oxbow Books.
Schmidt, E. 2006. Insektenreste aus drei römischen Brunnen der Grabung Hambach 512. In *Siedlungsgenese im Bereich des Hambacher Forstes 1.-4. Jh. N. Chr. Hambach 512 und Hambach 516,* ed. T. Kaszab-Olschewski, 153–171. BAR International Series 1585, Oxford.
Skidmore, P. 2000. Diptera analysis. In *The history of a Scottish lowland crannog: excavations at Buiston, Ayrshire,* ed. A. Crone, 252–254. Scottish Trust for Archaeological Research monograph 4. Edinburgh.
Smith, D.N. 2012. *Insects in the city: An archaeoentomological perspective on London's past*. British Archaeological Reports, British Series 561. Oxford.
Smith, D., and H. Kenward. 2011. Roman grain pests in Britain: Implications for grain supply and agricultural production. *Britannia* 42: 243–262.
Walker, M.J.C., G.R. Coope, and J.J. Lowe. 1993. The Devensian (Weichselian) Lateglacial palaeoenvironmental record from Gransmoor, East Yorkshire, England. *Quaternary Science Reviews* 12: 659–680.
Whitehouse, N.J. 2010. Conservation lessons from the Holocene record in "natural" and "cultural" landscapes. In *Restoration and history; the search for a usable environmental past*, ed. M. Hall, 87–97. London: Routledge, Taylor & Francis.

Paleoethnobotany

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Introduction and Definition

From our earliest ancestors through to modern societies, plants have always been of importance to people. They were and remain a crucial element of people's diet, whether their subsistence strategies centered on hunting and gathering or agriculture. Plants also provided fuel, were the basis for most medicines, formed the source of many tools, and were instrumental in building shelter. Further, they were used in a wide range of ceremonies, illustrated in artwork, discussed in early writings, and helped identify and demarcate places of economic and spiritual importance. In short, with few exceptions, they were of fundamental significance to past peoples around the globe.

The study of the interaction and interrelationships between plants and past peoples falls within the realm of paleoethnobotany. More specifically, paleoethnobotany is the study of behavioral and ecological interactions between past peoples and plants, documented through the analysis of plant remains recovered from archaeological sites (Ford 1979; Pearsall 2015). It uses an archaeological and ecological approach to elucidate the nature of human–plant interaction, seeking to understand not only which plants were used in construction and manufacturing, as food or fuel, in religious observation, or as medicines, but how they were used and why some plants had such uses while others did not.

Paleoethnobotany is not about simply cataloguing which plants past peoples used, but rather attempts to better understand the nature of plant–human interdependency. Its scope of investigation ranges dramatically, from, for example, exploring the variety of plant taxa present in an archaeological site and discussing their potential uses, to describing how season of availability of particular resources may have structured past settlement patterns and subsistence practices, to documenting hunter-and-gatherer niche construction, to tracing the transition to food production and the origins of cultivated plants, and to chronicling human construction and management of agricultural landscapes (Pearsall 2015).

To accomplish such research, paleoethnobotany combines two distinct research venues, plant science and archaeology. That the materials of study – plant remains – are recovered from archaeological sites makes paleoethnobotany an essentially archaeological approach. Yet the presence of such remains in a site may or may not

derive directly from human activities. Seeds and pollen recovered from an archaeological site, for example, may relate directly to resource use or may be part of the natural seed or pollen "rain" (Minnis 1981). Recovery of plant materials such as charcoal or charred seeds directly from archaeological features, or starch off of artifacts themselves, often clarifies the relationship, but so too does an understanding of the plant's ecology and resource potential. A paleoethnobotanist, therefore, needs to be able to identify recovered plant remains, understand the ecology of such plants, and recognize their human resource potential.

Plant materials that can be linked to human activity speak directly to the question of plant – human interaction, but plant remains that are "naturally" deposited within an archaeological site also may provide information in regard to the nature of human – plant interrelationships. The recovery of microscopic particles like pollen or phytoliths, particularly in nonfeature contexts, may not be the direct result of human manipulation and use of plants, but their deposition often arises indirectly as a result of human activity and environmental interaction. Land clearance activities associated with agricultural or other activities, for example, will often have a dramatic impact on the "natural" pollen rain. Finally, even in those cases where recovered remains are demonstrably not the product of either direct or indirect human activity, they still provide information in regard to past environmental conditions, and therefore the environmental circumstances under which past peoples lived and adapted.

Plant remains recovered from archaeological sites are also sometimes referred to as archaeobotanical remains, and the study of the archaeobotanical record as archaeobotany. While in practice the terms paleoethnobotany and archaeobotany are often used interchangeably – with North American authors tending to prefer the former and European researchers the latter – separating them can have utility. Ford (1979: 299) noted that the analysis of plant remains from archaeological sites was (and is) useful not only in regard to human–plant interaction, but also toward "problems unrelated to human activities." From this perspective, then, botanical remains recovered from archaeological sites may be used to reconstruct paleobotanical patterns, biological evolution, and paleoecology, to name a few, in addition to human–plant interaction. Thus, Ford (1979: 299) defined archaeobotany "as the study of plant remains from archaeological sites," indicating that it "refers to the *recovery* and *identification* of plants by specialists regardless of discipline," whereas "paleoethnobotany implies their *interpretation* by particular specialists" (emphases in original). The advantage of such a distinction is that it broadens the research potential of plant remains from archaeological sites, rather than simply precluding that such remains are only suitable for providing information on human activities. Paleoethnobotany, then, in relating specifically to the interaction between people and plants, becomes a subdiscipline within archaeobotany. It is important to note, however, that not all or even most researchers make this distinction.

Conversely, the analysis of plant remains from nonarchaeological contexts – the more typical source of paleobotanical and paleoecological data – can be of fundamental importance in addressing past human activity. Analyses of paleobotanical remains allow documentation of diachronic and synchronic environmental variability and how such variability may have affected past subsistence and settlement systems. Such data also provide a baseline (or control) from which to identify behaviorally induced botanical patterns. For example, pollen, phytolith, and microcharcoal derived from lacustrine cores has commonly been used to help address issues relating to human environmental impact and niche construction (e.g., Magyari et al. 2012). Such research is often thought of as paleoethnobotanical, even though the data are not derived from archaeological sites (Pearsall 2015).

Paleoethnobotany is not necessarily just about plant–human interaction, however. Chronology, for example, is generally of considerable archaeological concern. Paleoethnobotanical research can be instrumental in not only identifying those contexts most suitable for chronometric analysis, but will also provide the most appropriate samples. Rather than use of wood for radiometric dating, with its well-documented limitations, the

routine separation, identification, and tabulation of charred annuals provides the ideal specimens for radiocarbon assays. Furthermore, pollen can be radiometrically dated, and pollen analysis would identify those samples, such as ones containing high concentrations of economic plants, most appropriate for dating.

Still, most paleoethnobotanical research tends to revolve around subsistence and settlement. Here, analyses of paleoethnobotanical remains can be expected to identify patterns of utilization and help determine relative emphasis on different subsistence strategies. The relative proportion of remains of domesticates and cultivated plants versus wild and collected plants, for example, allows the paleoethnobotanist to assess the relative importance of cultivated versus collected foods at any given site, and how these reliances differ spatially and temporally. The relative abundance of such plant remains can also inform on occupational intensity. Yet it is nevertheless important to point out that even if the main focus of a given study is on subsistence the differential distribution of floral (and faunal) remains within a site may reveal data on specialized activity loci, functional variability, social hierarchy, or other factors. Further, identification of relationships between artifact types (e.g., spindle whorls) and plant resources (e.g., cotton or agave fibers) can be used to infer local production. And correlation of distribution patterns of botanical remains with those of faunal remains, stone tools, and vessel forms can be used to establish site/feature function. Thus, even if a project is designed specifically toward addressing subsistence, the data obtained can still be used to pursue topics beyond those originally conceived.

While such basic questions in regard to diet and plant use are still of importance, paleoethnobotany has also moved into discussions of status, ethnicity, chronological thresholds, cultural evolution, politics, and ideology, and it has played a prominent role in documenting just how artificial the conceptual divide between hunter-and-gatherers and agriculturalists really is. It also has played a key role in discussion of human environmental impact and adaptation to changing climates.

In her 1999 summary article *Recent Research in Paleoethnobotany*, Christine Hastorf noted almost 20 years ago that there are few if any archaeological questions to which paleoethnobotany cannot make a contribution. This has not changed; indeed, as the scope and complexity of paleoethnobotanical research has increased, so too has its potential.

Historical Background

Scientific research of plant remains from archaeological sites began long before the discipline of paleoethnobotany was defined. Perhaps the first example derives from Egypt with Giuseppe (Joseph) Passalacqua, who lead an excavation of ancient tombs at Dier el-Bahri on the west bank of the Nile, opposite Thebes (Luxor). Among the artifacts he found dried plant remains, which he turned over to botanist C. Kunth, who reported the results of his analysis in Passalacqua's 1826 report. Some decades later but still within the infancy of what we would now call paleoethnobotanical analysis is the work of botanist Oswald Heer, who analyzed waterlogged plant remains from prehistoric village sites in Switzerland in 1866, discovering a range of grains, legumes, fruits and berries, nuts, and various other plant parts. Once pioneers like Kunth and Heer had documented that plant remains could survive in archaeological sites, studies continued in Egypt and at the Swiss lakes, but also expanded into Central Europe, Germany, Italy, Greece, and Anatolia. Most of these studies consisted of taxonomic lists and descriptions of species present at a site, though a few researchers used archaeological materials to study the evolutionary history of particular taxa (Renfrew 1973).

Paleoethnobotany as a discipline derives from ethnobotany which, in general, refers to the scientific study and recording of the interrelationships between plants and people, particularly from the perspective of traditional knowledge of local or indigenous cultures. Stephen Powers can be seen as the grandfather of the discipline publishing, in 1875, an article entitled *Aboriginal Botany*, which he defined as "all the forms of the vegetable

world which the aborigines use for medicine, food, textile fabrics, ornaments, etc." But the term ethnobotany itself did not appear for another two decades, when John Harshberger used it in a lecture he delivered in Pennsylvania in 1895. His subsequent publication, *The Purposes of Ethnobotany* – which, intriguingly, had as its impetus the recovery of (what we would now term) paleoethnobotanical items from Mancos Cañon in Colorado – can be argued to have inaugurated the field of study.

In this and other works, Harshberger emphasized how people *used* plants. As research continued, however, ethnobotany began to move beyond a primary association with plant use to developing a better understanding of the multiple aspects of human plant interaction. Volney Jones, of the Ethnobotanical Laboratory of the University of Michigan Museum of Anthropology, championed this perspective, stating "that ethnobotany should be concerned not only with the uses of plants, but with the entire range of relations between primitive man and plants" (Jones 1941: 219).

In this emphasis on ethnobotany as the study of the interrelations of aboriginal peoples and plants, Volney Jones (1941: 220) specifically noted the bond between plant sciences and anthropology, as ethnobotany drew upon both for "its approach, methods, and data." Jones saw ethnobotanists as working between the fields of anthropology and botany, and therefore presenting data, results, and interpretations of interest to anthropologists, plant scientists, or both. Following Harshberger, he also specifically included the study of plants from archaeological sites within the rubric of ethnobotany, noting that cooperation between archaeologists and botanists had been leading to new discoveries of interest to both. While seeing value in botanists cooperating with archaeologists and anthropologists, he (Jones 1941: 220) also clearly believed that to maximize its research potential, ethnobotanical work would best be accomplished by researchers familiar with the "techniques, methods and approach" of both anthropology and plant science, in other words, dedicated specialists. Problematic to him (Jones 1941: 220) was the fact that "few individuals have given sustained attention to investigations in ethnobotany for its own sake" with much of the research being done as ancillary work to other pursuits within the fields of anthropology, archaeology, and botany, as well as agriculture, history, folklore, medicine, pharmacy, and others.

In addition to being one of the first to call for this more fully interdisciplinary approach, Jones was also among the first to note the ecological relationship between people and plants, a characterization that continues to hold for modern ethnobotanical and paleoethnobotanical research. Thus, Volney Jones can be seen as having substantially influenced the field of ethnobotanical investigation, steering it toward the course it follows today. It is not surprising, therefore, that he has been described as the father of paleoethnobotany (Pearsall 2015: 27).

Ethnobotany and paleoethnobotany originated with the analysis of macrobotanical remains – plant remains large enough to be seen with the naked eye. But around the same time as Jones was calling for more comprehensive ethnobotanical research, pollen research began to be incorporated into archaeological research. Fossil pollen data were used to date the beginnings of the Neolithic period in Denmark, for example, based on the decline of elm (*Ulmus*) pollen, an increase in weedy plants argued to be associated with human environmental disturbance, and the presence of pollen from domesticated plants (cereals).

Paleoethnobotany's emphasis on agriculture was also seen through research locations, with a particular emphasis on the Near East beginning in the 1950s. These studies emphasized the evolution and domestication of major food plants, like wheat, rye, and barley. The most prolific researcher in this regard was probably Danish botanist Hans Helbaek, who not only worked with various leading scholars of the area (Robert Braidwood, Frank Hole, Kent Flannery, and James Mellaart) and published numerous articles and reports on the Near East, but also conducted several studies in Europe. This interest, and emphasis, on the origins and spread of agriculture, employing both macrobotanical and pollen data, has continued through the years and remains an important topic today (Langlie et al. 2014; Magyari et al. 2012).

Though much research that we would call paleoethnobotany was occurring, the term itself was not introduced until 1959, when Hans Helbaek employed it within the context of his research on Old World domestication, including referring to himself as a paleoethnobotanist. Reflecting upon Heer's influence on the development of the analysis of archaeological plant remains, Helbaek refers to Heer as the first paleoethnobotanist (Helbaek 1959). Similar to Jones, Helbaek wrote that paleoethnobotany resulted from the joining of botany and archaeology, but he placed the emphasis on the latter, stating "it is clear that any domesticated plant is an artifact, a product of human manipulation" (Helbaek 1959: 365). Renfrew (1973: 1) took a similar position, defining the discipline "...as the study of the remains of plants cultivated or utilized by man in ancient times, which have survived in archaeological contexts." Like Helbaek, and contra Jones, Renfrew's definition emphasized the archaeological (anthropological) side, placing less emphasis on ecology. Shortly thereafter, however, Richard Ford (1979: 286) defined paleoethnobotany as "the analysis and interpretation of the *direct* interrelationships between humans and plants for whatever purpose as manifested in the archaeological record" (emphasis in original), thus reaffirming the joint ecological and anthropological components previously articulated by Jones.

Around this same time, the International Work Group for Paleoethnobotany (IWGP) was established. The IWGP brought together a group of European and Mid-Eastern paleoethnobotanists at Kacina Castle in Prague in 1968 to share their research and encourage contacts amongst members of what was then a growing but still fairly small group. These meetings have continued at 3-year intervals, and like the discipline itself the IWGP has grown, with the 2016 meeting in Paris having over 100 presentations and about 250 attendees from around 35 countries. Publication of proceedings volumes and bibliographies from these meetings has proven to be of great value to paleoethnobotanists and other interested parties. While the emphasis of the IWGP has remained on the Old World, the Group is not exclusive to the Old World and contributions from the New World have been welcomed.

Research – and the number of researchers – in the New World trailed that of the Near East and Europe, with much of the early work being conducting by European researchers. The earliest such example shortly postdates the beginning of Heer's work in Switzerland and involved the examination of a Peruvian mummy bundle. This was soon followed by an accounting of plant specimens from Ancon and other locations in Peru. Though Europeans and Latin American scholars continued to work in Peru, there was relatively little paleoethnobotanical research conducted elsewhere until after 1900.

The few paleoethnobotanical studies that were conducted outside of Peru were written mainly by botanists, whose interests lay in natural rather than cultural history. With the rise of anthropology and the training of ethnologists in the 1900s, however, research perspectives began to change. The focus of these anthropologists and ethnologists was on the Native American perspective and how plants were integrated into their world. David P. Barrows' 1897 dissertation *The Ethnobotany of Coahuila Indians of Southern California* (University of Chicago) exemplified this approach, stressing the social and religious importance of plants. One of the more intriguing studies was Col. Bennet Young's 1910 publication *The Prehistoric Men of Kentucky* which describes plant materials in human coprolites (fossilized feces) from Salts Cave, Kentucky. Such work also influenced botanists, as they undertook investigations of how aboriginal knowledge of plant use could have utility in the modern world, particularly in regard to medicinal applications.

Ethnobotanical and paleoethnobotanical research in North America increased substantially after Melvin Gilmore's 1930 founding of the University of Michigan's Ethnobotanical Laboratory as part of the Museum of Anthropology. In his role as Director of the Laboratory, he solicited plant remains from archaeological sites across North America, thereby expanding both the scope and availability of paleoethnobotanical analysis in the New World. Working out of this Laboratory, Volney Jones, who began as Gilmore's assistant

and subsequently became his successor, conducted extensive research in paleoethnobotany, with his early work on the study of desiccated plant remains from Newt Kash Hollow rock shelter in Kentucky demonstrating the potential of such work. Rather than presenting a simple taxonomic list, he identified a variety of wild and cultivated plants and discussed how size differences in various seeds (chenopod, marsh elder, and sunflower) might reflect wild versus cultivated plants; he also discussed possible resource use patterns of wild plants and described potential variation in the extent of the native prairie, thus demonstrating not only the wide research potential of such plant remains but also setting a standard for subsequent paleoethnobotanical research (Pearsall 2015).

As with the Old World, there was considerable interest in the origins and spread of New World agriculture, with much of the research oriented toward discovering the origins and spread of the Mesoamerican derived crops of beans, squash, and especially maize. Research into the evolution, domestication, and spread of maize was conducted primarily within Mexico and the American Southwest where arid climates and sheltered contexts enhanced preservation of botanical remains. Two of the earliest and most extensive Southwestern studies were Anderson and Blanchard's 1942 *Prehistoric Maize from Cañon Del Muerto* (Arizona) analysis of 222 ears of ca. 1500 year old maize and Mangelsdorf and Smith's 1949 article *New Archaeological Evidence on Evolution in Maize* describing the results of their analysis of 900 discrete maize specimens from Bat Cave in New Mexico. Mangelsdorf was also instrumental in work being conducted in caves in the state of Tamaulipas, Mexico. Pollen analysis also played a role, as illustrated by Sear's 1932 publication of *The Archaeology of Environment in Eastern North America*, in which he argued that maize expansion in this area was a result of climate shifts that favored its growth. Pollen analysis has also proven useful in identifying evidence for the early cultivation of maize, as have starch grains and phytoliths.

While considerable research was, and continues, to be oriented toward maize, beans, and squash, paleoethnobotanists were also interested in identifying and documenting the use of less well known domesticates. Indeed, the first study of a single crop plant was Volney Jones' study of cotton in the American Southwest. Similar research resulted in discovery of a range of other domesticates, including ragweed, pigweed, sunflower, and may grass in the eastern United States as well as agave, little barley, Mexican crucillo, and amaranth in the Southwest.

As with the Old World, the pace of New World paleoethnobotanical research quickened in the late 1950s and into the 1960s and has continued to remain strong. Texas A&M University paleoethnobotanist Vaughn Bryant, for example, has calculated that between 1876 and 1965 there were about 375 substantive works published on plant remains from New World archaeological sites; today such works number in the thousands. Much of this was a result of the development of New Archaeology and the concomitant increase in attention paid to ecological approaches to analysis and increased emphasis on environment, as well as the growth in archaeological research resulting from legal requirements and the rise of Cultural Resource Management studies. But the increase was also partially technological. Faced with a pit filled with extremely ashy fill, archaeologist Stuart Struever followed the suggestion of botanist Hugh Cutler, and the technique now known as flotation was born. Flotation refers to the gentle agitation of a sediment sample in a water bath so that charcoal and other plant materials float to the surface, where they can be collected. Whether done with a bucket and screen or a standalone high-efficiency closed-system machine, flotation is seen as the single most important technological development in paleoethnobotany (Pearsall 2015). Prior to flotation, the vast majority of analyzed remains were those large enough to be observed, and collected, during the course of an archaeological excavation. Flotation greatly enhances both the concentration and collection of botanical remains over this previous norm of the serendipitous discovery of a charred seed or piece of charcoal. Instead, paleoethnobotanists could now collect sediment and soil samples from which paleoethnobotanical remains could be extracted.

A final factor to this dramatic rise in paleoethnobotanical research was the wider application of archaeological pollen analysis (Dimbleby 1985), the discovery (or, more accurately, the rediscovery) of phytolith analysis, and the incorporation of starch analysis into the paleoethnobotanical repertoire.

Both the range and scope of paleoethnobotanical analysis has continued to grow. In the 3rd edition of *Paleoethnobotany: A Handbook of Procedures*, Deborah Pearsall (2015: 30–31) well illustrates the thematic growth within paleoethnobotany. Her "sampling" of research topics includes (along with accompanying references): advances in identifying cultivated plants; identifying beverages; the use of wild foods by agriculturalists; wood acquisition, use, and environmental impact; plants and political complexity; plants as indicators of ethnicity; fiber and wooden artifacts; spices; plants in ritual; agricultural practices; plants in economic (trade and exchange) systems; and human environmental impacts, management, and land use. As Pearsall (2015: 34) states, "paleoethnobotany is undergoing a period of rapid growth and development, with exciting new areas of research and increasing quality of work in traditional areas of interest."

Data Sources

Four main categories of plant remains are found within archaeological sites: macrobotanical remains, organic residues, phytoliths, and pollen. What is particularly beneficial is the fact that these four data sources are much more strongly complementary in the sorts of information they provide than they are redundant.

The discipline of paleoethnobotany developed around macrobotanical remains, also known as macroremains, and such remains continue to lie at the core of paleoethnobotanical research. Though macrobotanical remains are large enough to be seen by the naked eye, their analysis typically employs microscopy. In the early days of paleoethnobotanical research, such remains were observed and collected during the course of an archaeological excavation. More recently, fine screening and especially flotation of soil and sediment samples have become the primary sources of macrobotanical remains.

While various fibers may be recovered from archaeological sites, macrobotanical remains most commonly consist of wood and seeds (which includes nuts, achenes, and similar plant parts). Most seeds decay within a century or so, even in relatively arid climates, so such remains are typically preserved through desiccation, charring, or waterlogging (Minnis 1981). The dry caves of the American Southwest and Great Basin are well known for the incredible preservation of organic materials, and some amazing results have been derived through the analysis of water logged assemblages – including Heer's pioneering work in Switzerland – but most macrobotanical assemblages consist of charred remains.

In some cases, it may be difficult to readily distinguish between modern and ancient seeds, particularly with desiccated and waterlogged assemblages. Charring is often readily observable, though distinguishing between charred and uncharred examples of black seeds like chenopods and amaranth may be difficult. Consequently, the context of discovery and comparison of recovered seed assemblages to modern vegetation can be of considerable utility in separating ancient from modern assemblages.

Minnis (1981) identified three main sources for seeds in archaeological sites: directly from resource use, indirectly from resource use, and from the natural seed rain. Direct resource use reflects seeds brought into a site to be used. These could be seeds that were themselves the desired product, such as amaranth seeds, or the waste product of resource use, such as fruit pits. Indirect resource use reflects the incorporation of seeds where the desired product was the plant, but not the seed, such as seeds falling from a thatch roof. The use of animal dung for fuel is a particularly interesting case in this regard. Animal dung was an important fuel source in various locations, such as the Great Plains of North America, where wood fuel was relatively scarce. Burning of this fuel in hearths or other thermal features can result in charring of seeds that passed through the digestive tract of the animal and were deposited in the

dung. This is of particular concern as one might reasonably concluded that charred seeds found within a hearth or other thermal feature reflect direct resource use, an erroneous interpretation in this case. Fortunately, experimental and ethnoarchaeological studies have proven to be of considerable aid in addressing this potential problem (Pearsall 2015).

As with seeds, very wet and very dry conditions will preserve wood, but most archaeological wood is preserved through charring; such charred wood is typically referred to as charcoal. Anthracology, or the study of charcoal from archaeological sites, has yielded substantive information on both paleobotany and human–environment interaction. Recovery of charcoal from thermal features provides excellent data on fuel use, how different wood taxa may be favored seasonally or by use, and how these patterns may (or may not) change through time, while charcoal from other contexts provides information on wood used in construction (structural wood) or tool manufacture. Anthracological assemblages have also been used to reconstruct past vegetation patterns, though there is some debate about the accuracy of such research.

Various factors affect charcoal representation, one of the most critical being source plant abundance. Other factors affecting representation include the abundance of dry dead-wood, rate of regeneration following harvesting of living trees, ease of harvesting and processing, the means by which wood is obtained, intended use, burning qualities, as well as cultural beliefs and perceptions about wood use.

In general, in addition to insight into plants that were growing in the area, analysis of macrobotanical remains routinely provides information in regard to plants cultivated, collected, and consumed as well as those used as fuel, in the construction of shelters, for making various types of tools and other artifacts, and for medicinal purposes, as well as possible information on trading patterns and religious observations.

Palynology contributes to a broad range of scientific research, including plant taxonomy, plant evolutionary relationships, forensic science, allergy studies, and archaeology. Its predominant use, however, has been in investigating vegetation history, to reconstruct ancient vegetation patterns and document their change through time and then use such reconstructions as proxy measures of paleoenvironmental and paleoclimatic conditions. But it also has considerable utility for paleoethnobotanical analyses.

Palynology is the study of pollen grains and spores. Spores and pollen grains are both very small, typically between about 20 and 50 μm (microns) in size, roughly half the diameter of a human hair. Spores are produced by nonflowering plants, bacteria, fungi, and algae. Pollen grains are produced by seed plants, or spermatophytes, which are comprised of two groups, angiosperms and gymnosperms. The former are the flowering plants, producing seeds within the female reproductive part of the flower, while seeds of the latter develop inside cones. Pollen grains are roughly homologous to mammalian sperm, and each grain can only successfully achieve its biological function if transported from the anther, the male part of the flower, to the stigma, the female part of the flower, of a conspecific plant where it germinates and subsequently fertilizes an egg. Regardless of the transport mechanism, there is only a very slim chance that any given pollen grain will reach the stigma of a conspecific. Consequently, pollen grains are produced in great abundance, though anemophilous (wind-pollinated) plants produce much more pollen than do zoophilous (animal-pollinated) plants. One cone of *Pinus contorta* (lodgepole pine), for example, contains almost 600,000 grains and a 10-year-old branch system of *Pinus sylvestris* (Scotch pine or Finnish pine) has been estimated to produce about 350 million pollen grains annually. Zoophilous plants generally produce far fewer pollen grains and rely on some animal (bats, birds) or insect (chiefly bees) to transport the pollen from the anther of one flower to the stigma of another. An evolutionary outcome of this presumably more efficient pollination method is decreased pollen production, say approximately 1000 or fewer grains per anther compared to the 10,000 to 70,000 grains per anther with anemophilous plants.

Pollen of anemophilous taxa can be transported and deposited hundreds of meters and

sometimes kilometers or even hundreds of kilometers from their source. Therefore, anemophilous pollen is both much more abundant and much more widely dispersed than zoophilous pollen, although the latter may be occasionally locally abundant in soil samples because of flowers dropping after anthesis. Hence, anemophilous plants stand a far greater chance of being observed in the pollen record of a sediment sample. Consequently, pollens from zoophilous taxa are often poorly represented in a pollen record, even when such taxa dominate the vegetation.

Nevertheless, the fact that pollen grains are abundant and, at least for anemophilous taxa, are widely distributed in the environment is one of the characteristics that makes them so suitable for paleoenvironmental analysis. A second characteristic that makes them of value is that the amounts observed vary with the number and proximity of the source plants. Third, pollen grains are durable, and fourth, they are morphologically distinctive. Finally, and of crucial importance for paleoethnobotanical studies, their amounts are affected by human activity. Thus, in addition to its use in reconstructing past vegetation patterns and inferring past environmental conditions, pollen analysis is well suited to documenting plants cultivated, collected, consumed, or used in rituals. Further, palynology can provide data on plant use not available from the macrobotanical record.

In the American Southwest, for example, cholla cacti were a very important part of the prehistoric diet, but are seldom seen in the macrobotanical record as the desired product – flower buds – are unlikely to be preserved. Instead, unusual frequencies of cholla pollen are required to document cholla use, as harvesting and processing of cholla flower buds often introduces relatively large numbers of cholla pollen grains into cultural settings. Systemic patterns in regard to the distribution and abundance of cholla pollen, and their deviance from those expected as a consequence of natural patterns of pollen production and dispersal, are used to identify unnatural occurrences of such pollen and evidence of resource use. As the quantity and quality of resource-use patterns accumulates, the ability to distinguish between those patterns associated with cultivation and those derived from collection may also become more apparent.

Typically, pollen samples employed in the analysis of past vegetation and for reconstructing paleoenvironmental conditions are obtained from sediment cores collected from lacustrine basins and peat deposits. Such paleovegetation and environmental reconstructions have long been of use to archaeologists as knowing the environment in which people lived is of fundamental importance. Such research has also proven crucial in documenting human impacts on vegetation, particularly land clearance accompanying the introduction of agriculture (Fish 1994; Magyari et al. 2012). However, most paleoethnobotanical applications of pollen analysis involve the analysis of terrestrial samples derived from archaeological sites and features.

Differential preservation and movement of pollen across stratigraphic layers has been raised as a concern in terrestrial pollen analysis. In his classic text on archaeological palynology, Dimbleby (1985) raised dual concerns about pollen downwash through percolation and increased bacterial-induced degradation through time. Therefore, the pollen record of any given stratum was argued to consist of the originally deposited pollen minus pollen more prone to destruction and those transported to greater depths, while being augmented by less fragile pollen transported into the stratum from overlying strata. Total pollen concentration would, therefore, decrease with depth, while the proportion of resistant pollen types increased, such that upper layers would have greater taxa richness than lower ones (Fish 1994: 48; Dimbleby 1985). Dimbleby (1985) also cautioned that soil-mixing organisms such as earthworms could transport significant amounts of pollen. Evaluation of these concerns is warranted, and various researchers have responded to Dimbleby's arguments.

In one of the few systematic evaluations of pollen downwash, however, Davidson et al. (1999: 652) found "no evidence that downwashing of pollen is significant in [five different soil types] despite the soils exhibiting great contrasts in hydrological regime and degree of water-table fluctuation." Further, in a general discussion

of archaeological palynology, Bryant and Holloway (1996) did discuss sediment mixing and its effects on pollen, but primarily by rodents and as a result of cultural activities; downwash was not mentioned. Yet, Kelso et al. (1995) argued that pollen downwashing and destruction was of concern in a seventeenth-century refuse pit, though Fish (1994) argued that such percolation, destruction, and mixing was an extreme case. Nevertheless, given that significant alteration of the pollen record can occur, if rarely, Fish (1994) recommended evaluation on a case by case basis, a perspective subsequently seconded by Pearsall (2015). On the other hand, research has clearly illustrated that earthworms and ground nesting bees may affect pollen records in terrestrial samples (Davidson et al. 1999). Intriguingly, earthworms have also been documented to have potentially serious deleterious effects on the preservation of small (<2 mm) carbonized seeds. Overall, however, while caution need be applied in interpreting terrestrial samples, "a variety of evidence strongly suggests that processes threatening the stratigraphic integrity of pollen assemblages are neither as pervasive nor as serious as Dimbleby's model suggests . . . Indeed, there are few adherents of this [model] among a large body of North American practitioners engaged in archaeological and non-archaeological research" (Fish 1994: 49).

As interest in palynological evidence of landscape conditions and land use patterns has developed during the past several years (Gaillard et al. 1992), it became increasingly evident that pollen analysis of terrestrial samples may offer significant potential for study of prehistoric agriculture. As indicated above for Denmark, European pollen analysts have tended to approach the problem through identification of changes in the temporal and spatial distributions of arboreal versus non-arboreal pollen plus the presence of crop plant and field weed pollen types in sediment cores recovered from lakes and ponds. Fish (1985) developed a more direct approach by determining unique features of samples recovered from prehistoric field contexts themselves. She found that though the pollen taxa recovered from irrigated Hohokam field-deposits were not different from those recovered in samples from Hohokam habitation contexts or modern Sonoran Desert pollen rain, percent values for three taxa were distinctive in irrigated field contexts. She thus recognized a palynological "signature" for this type of cultivation, which may be used to identify such fields in samples from locales where other forms of material evidence may not occur. Fish's palynological signature for Hohokam irrigated fields is quantitatively, rather than qualitatively, unique. Though she did not employ quantitative techniques, Fish's signature constitutes the sort (type) of quantitatively identifiable pattern which is amenable to discovery through application of such techniques. Her research was also at least partially responsible for the development of more intensive and extensive examination of terrestrial deposits associated, or potentially associated, with ancient agricultural practices at a variety of Sonoran desert sites (Fish 1985; Stuart 2007).

While a great deal of pollen analysis in paleoethnobotany has been oriented toward agriculture, pollen analysis can also be of considerable benefit in documenting feature type and use, particularly when combined with other paleoethnobotanical approaches. Further, artifacts themselves are amenable to pollen analysis through pollen washes, that is, the washing of sediment from within the scratches and depressions of an artifact, typically groundstone, into a receptacle and then processing the contents to extract the pollen, and phytoliths as well. While pollen washes of artifacts can be productive, there are a series of variables (plant taxa, storage practices, processing type or stage, tool curation, processing context) that need to be considered during interpretation.

The earliest research on phytoliths from archaeological sites commenced as the nineteenth century gave way to the twentieth and involved identifying cultivated Old World grasses (Netolitzky 1900, 1914 and Schellenberg 1908 cited in Pearsall 2015). Curiously, paleoethnobotanical applications of phytolith research in the New World did not occur until several decades later. The earliest research again occurred in Peru, with the 1960s investigations at the Kotosh site (Matsutani 1972 cited in Pearsall 2015).

Following publication of Rovner's "seminal" article *Potential of Opal Phytoliths for use in Paleoecological Reconstruction* in 1971, however, interest in phytolith research began to expand significantly, roughly contemporaneously with expanding interest in the origins of New World crops and paleoenvironmental reconstruction (Pearsall 2015: 265).

Phytolith research involves the recovery, identification, and interpretation of plant opal silica bodies preserved in archaeological contexts (Pearsall 2015: 253). Phytoliths are microscopic silica bodies that form in many living plants, and many of these forms are morphologically distinctive. There is some redundancy in phytolith form within some families, particularly the grasses, but even within the grasses different subfamilies and classes can be distinguished, which is certainly an improvement over pollen analysis of grasses.

Furthermore, different phytolith forms may arise in different parts of the plant. Phytoliths that form in the roots of maize plants, for example, are morphologically different from those that form elsewhere in these plants; this fact has proven helpful in identifying the location of prehistoric agricultural fields, particularly when such phytoliths are found in conjunction with high concentrations of maize pollen.

In contrast to pollen, phytoliths are not part of the plants' reproductive process and therefore are not dispersed into the environment in the same way as pollen. Though phytoliths do become effectively airborne – Charles Darwin noted their presence in dust collected from the research vessel HMS Beagle – for the most part phytoliths are deposited locally as the source plant decays. Similarly, phytoliths enter an archaeological context through decay or burning of the source plant, but also through a plants consumption and subsequent release (that is, in coprolites or in soil from the abdominal area of a burial). Once deposited, phytoliths usually remain close to the point of deposition, though soil movement and formation processes may have an effect on final placement. As they are inorganic, phytoliths tend to be resistant to decay and therefore may be preserved in circumstances detrimental to organic preservation. Consequently, their study can be quite complementary to pollen and macrobotanical analyses.

Phytoliths can often be extracted from the same sediments used in pollen analysis and as with pollen can provide a range of information of interest to archaeology. Their accumulation in stratigraphic and archaeological deposits provides data on plant-people interaction, paleoenvironmental conditions, and human environmental impact. Isotopic analysis of phytoliths can also aid in reconstructing past vegetation and identifying climate change. Specific to archaeological sites, phytoliths have been used to identify spatial variation in human activities and plant composition of the diet. Phytoliths can be recovered from stone and ceramic artifacts, aiding in discussions of tool function and plant use. Phytoliths can also become incorporated into dental calculus, providing information in regard to diet and dental health. They are also routinely recovered from coprolites providing yet another source of information on diet. Though composed of silica, phytoliths also contain carbon and can be radiocarbon dated, though there has been some concern about the incorporation of ancient carbon into phytoliths resulting in anomalously old dates.

Organic residues include a broad range of materials, and though all are microscopic they range from organic molecules and compounds, through cells, to fragments of bone and wood. Organic residues of both plants and animals are sometimes preserved in sediments and on the surfaces and in the cracks of stone tools and ceramics, where they provide information on resources used and artifact function. Plant residues consist of a wide range of minute particles including proteins, lipids, tannins, raphides, cells and cell fragments, starch grains, fibers, and wood fragments. Though the presence and utility of organic residue research for stone tool analysis was demonstrated in the 1970s, application of organic residue analysis was not common until relatively recently, though incorporation of such studies has since grown rapidly. Though various problems have been encountered in residue analysis, experimental research and incorporation of new methods continually result in improved techniques and results (Pearsall 2015).

Starch grains are tiny granules that are the main energy source for plants, and one of the most commonly studied plant residues. Some starch grains, called storage starch, are quite durable and continue to exist long after the plant itself has died and rotted away. In this regard, they are quite comparable to phytoliths. Starches may be recovered from soil samples, or collected off of artifacts. Contamination issues, however, have been raised in regard to the application of starch research, though research into overcoming these difficulties continues.

As with starch grains, the use of an artifact to process some plant (or animal) resource will result in the transfer of proteins from that resource onto the artifact, and some of that protein may remain preserved on the artifact. Even minute quantities of such protein can be identified, providing important insight into artifact use.

Though not a data source per se, coprolites – often described as fossilized fecal matter though preserved fecal matter might be more accurate – are deserving of particular mention. Human coprolites provide the most direct evidence on diet and health available from the archaeological record. Though the digestibility of different foods influences what passes through the digestive system, they nevertheless provide clear evidence of dietary choices. Further, those choices reflect what was eaten over an archaeologically extremely brief period of time. The short period of time reflected and the clear association with human activity make coprolites a highly unusual archaeological resource.

They are also a rich source of paleoethnobotanical material. Pollen, phytoliths, and seeds have all been recovered from coprolites. Seeds found in coprolites almost certainly reflect conscious choices in regard to diet. While phytoliths can become airborne and therefore may be accidentally ingested, it is more likely that their presence reflects diet, particularly if present at moderate to high concentrations. Pollen may reflect diet, consumption of beverages, or simply the breathing in of pollen grains, but again high concentration values or percentages, particularly of zoophilous taxa, are more likely to reflect intentional ingestion.

Coprolites have been used to evaluate a range of topics, including diet breadth, relative importance of wild versus domesticated foods, medicinal use, season of occupation, mobility patterns, and through the use of fecal steroid analysis even the sex of a site's occupants. Plant remains in nonhuman coprolites can also be quite useful. Akeret et al. (1999), for example, analyzed pollen and macrobotanicals from goat/sheep coprolites to document foddering practices at Arbon Bleiche 3, a Neolithic lake-shore settlement in Switzerland. Such analyses also provide information on animal diet and paleovegetation.

The discovery that DNA may be preserved in the uncharred interior remnants of carbonized plant material, as well as in dried and waterlogged specimens, provides another avenue into the study of paleoethnobotanical remains. Such research could play a critical role in identifying specimens whose morphological characteristics are ambiguous, investigating the evolutionary history of domesticated plants, documenting trading patterns and the introduction of new species, and achieving a better understanding of the process of domestication, among other topics. Similarly, the analysis of ancient environmental DNA collected from terrestrial sediment samples or lake cores has considerable potential for assisting in reconstructing past vegetation patterns and paleoclimatic conditions.

Key Issues

Consistent with other branches of archaeological investigation, a key issue among paleoethnobtanists concerns the representativeness of their samples. While sampling methods have improved to help ensure more uniform coverage and inclusion of all pertinent contexts, concerns over "missing" data still occur. A critical factor to keep in mind in reviewing any paleoethnobotanical analysis is that the plant remains found at a site do not directly reflect all plant use at the site. Similar to other archaeological materials, the plant remains recovered from a site are a biased sample as a result of the vagaries of production, deposition, preservation, and recovery. Though

paleoethnobotanists are well aware of the limitations of their data, such limitations are not always explicitly presented and discussed within the context of a report or published article. Differential preservation as it relates to archaeological palynology was discussed above, but such concerns apply equally to other paleoethnobotanical data sources. Many macrobotanical remains, for example, are more likely to be preserved by charring, but many others are used in circumstances that are less likely to allow for such preservation; roasting of maize enhances the possibility of producing charred remains, boiling a pot of beans does not. Even in those plants for which charring is more likely to occur, there are fine lines between sufficient levels of carbonization to char and therefore preserve a macrobotanical specimen and those that result in either excessive charring leading to destruction or insufficient charring allowing natural degradation.

Paleoethnobotanical remains are also susceptible to postdepositional movement and other taphonomic issues. Assessing these effects has long been of interest, but only recently has experimental research to gain better understandings of the taphonomic processes affecting macro- and microbotanical specimens been conducted (Wright 2010).

Another key issue in paleoethnobotanical research is the source of the plant material and differentiating between natural deposition such as through environmental pollen and seed rain, and anthropogenic deposition. Extramural features, by nature of being outside of structures, likely had greater exposure to and thus greater opportunity for deposition of seeds, pollen, and phytoliths from a variety of native plant species, especially weedy taxa. Inadvertent introductions of plant remains within thermal features and their subsequent charring during feature use may occur; hearth use has also been noted to cause charring to seeds in sediments adjacent to but outside of the feature itself. Although there is no clearly defined procedure to determine whether plant remains entered a deposit through intentional use or accidental incorporation, knowing that both occur tempers conclusions reached. It seems likely, however, that separating anthropogenic from natural depositions of seeds and even phytoliths is less of an issue than differentiating between anthropogenic and natural signatures in pollen assemblages.

While abundant production and widespread distribution of pollen is a key reason that pollen has been used for reconstructing past vegetation patterns, it also means that pollen is routinely and naturally deposited onto archaeological sites and within archaeological features. In cultural settings, however, pollen assemblages are also affected by human activity. Often this activity directly affects the local source vegetation, enhancing and expanding suitable locations for some plants, while degrading and reducing suitable locations for others. Impacts on the vegetation associated with clearing the land for agriculture or construction, the introduction and use of irrigation or other forms of disturbance, and the cultivation – or at least encouragement – of selected native taxa are prime examples. Further, amounts of local pollen, and probably phytoliths, can be augmented and nonlocal pollen and phytoliths introduced through the collection of comestibles, fuel wood, or construction materials or, in the case of historic assemblages, the introduction of exotic nonnative taxa. While of anthropogenic origin, many of these alterations of and additions to the pollen and phytolith records may not necessarily relate directly to activities associated with the feature or structure from which the remains were obtained. Thus, any given sample may contain pollen, and perhaps phytoliths, from the natural pollen (or phytolith) rain, incidental anthropogenic pollen, and phytoliths arising from various activities conducted within the site and surrounding area, as well as anthropogenic pollen and phytoliths deriving directly from activities associated with the location from which a sample was derived. Separating these different components remains an issue for samples from archaeological sites. One manner in which paleoethnobotanists approach the problem is to look for unusually high percentages or concentrations of pollen grains or phytoliths, particularly in taxa of known economic importance. Quantitative analyses, such as correspondence and detrended correspondence analysis, and incorporation of

modern pollen records of known ecological/human context, have also proven useful in this regard (Gaillard et al. 1992; Stuart 2007).

A key means by which one can evaluate and delineate natural from anthropogenic constituents in the paleoethnobotanical record is to look at multiple paleoethnobotanical data sources in combination with the associated archaeological record. While it is a given that various cultural and natural factors produce patterning in paleoethnobotanical assemblages, feature use will be a significant source of such patterning. One would expect, for example, that a roasting pit might have a very different paleoethnobotanical signature than a storage pit or a structure floor because of behavioral differences in how these features were used; empirical research suggests this is indeed the case. It is also desirable to have several samples from similar feature types and depositional contexts, as well as samples from nonfeature contexts, for comparative purposes and to control for stochastic effects.

It is also worth noting that interpretations of paleoethnobotanical data can be enhanced through ethnographic analogy and ethnoarchaeological data, though their application needs be done carefully. Paleoethnobotanists typically use such data to document how plants were used by "traditional" peoples, and then extrapolate such use into the past. Paleoethnobotanists can then turn to other aspects of the archaeological record, such as associations between particular species of seeds and grinding tools, to help confirm or negate these hypothesized uses. Of course, the reverse is also common, where paleoethnobotanists find particular species of seeds in association with grinding tools and then turn to the ethnographic record for documentation supporting a hypothesis of resource use.

Thus, interpretation of paleoethnobotanical assemblages requires accumulating a diverse ecological and archaeological skill set, as was proclaimed by Jones (1941) decades ago. More recently, Bryant and Hall (1993: 279) echoed this perspective, stating that archaeological palynology is "an apprenticeship science where a novice works with and learns from a skilled professional." As Pearsall (2015: 33) indicated even more recently, "this applies to paleoethnobotany as a whole." This apprenticeship is worthwhile, however, as paleoethnobotany is well positioned to address a broad range of questions in regard to settlement and subsistence variability, socio-natural systems, human–environment interaction and impacts, the use of space, social uses of food, economic systems, and a whole host of other topics.

Future Directions

The days of providing a catalogue of plants recovered from an archaeological investigation are long gone. While the basic theme of the interrelationship between people and plants remains, both the data sources and theoretical and methodological aspects of paleoethnobotany have become increasingly sophisticated. Though paleoethnobotany originated with the study of macrobotanical remains, additional forms and types of plant remains began to be recovered from archaeological sites, to the point where paleoethnobotany now includes molecular studies and the analysis of ancient and modern DNA. Simultaneously, increasingly sophisticated techniques both in the field and in the laboratory have resulted in dramatic improvements in our ability to assess morphological changes in ancient and often fragmentary archaeobotanical remains while simultaneously adding in the interpretation of taphonomic processes and context (Langlie et al. 2014: 1601).

This has provided a wealth of information, but has also led to increasing specialization within the field, with pollen analysts, phytolith analysts, starch analysts, macroremain analysts, and more. As Pearsall (2015: 28) noted, it is difficult to master more than one or two of these, and impossible to master them all. Consequently, interaction between paleoethnobotanists – and with geneticists, biochemists, paleobiologists, paleobotanists, and archaeologists – is crucial, and collaborative research is the developing norm. Within paleoethnobotany, macrobotanical and microbotanical research are more and more frequently being employed together (VanDerwarker et al. 2016), a positive trend which is likely to

continue. Results of paleoethnobotanical research and paleoethnobotanical data are also becoming more fully integrated with other data sources. This seems likely to continue as such collaborative research reflects a clear example of the whole being greater than the sum of the parts.

While the ongoing incorporation of new data sources and techniques into the future of paleoethnobotanical research is welcome, some modification of traditional approaches to paleoethnobotanical analysis would also be welcome. While standardization of protocols, rigorous sampling strategies, and quantitative analyses of macrobotanical and microbotanical assemblages continues to improve (VanDerwarker et al. 2016: 155), it is unfortunate that sampling procedures and quantification methods still vary enough from site to site and researcher to researcher to make direct comparison of results sometimes difficult. These problems have long been known, but a definitive means by which to address them has not been forthcoming. Perhaps as research continues to develop, paleoethnobotanists will be able to devise means by which to both improve standardization and use of common protocols, but without stifling innovation.

At least as pressing a problem as greater standardization is the role of the paleoethnobotanist. Or more particularly, at what stage in a research project a paleoethnobotanist is included. While paleoethnobotanists do run their own projects and collaborative research has clearly increased, it still remains the case that quite often, especially within cultural resource management projects, that samples are shipped off to a paleoethnobotanist for analysis without her having been part of the original planning or excavation; indeed, often they are sent without inclusion of information in regard to the research questions and research design. Ideally, "analysts" (and not just paleoethnobotanists) should be involved in all aspects of the project, from formulation, planning and identifying research questions, through excavation, on-site sampling, and subsequent selection of samples for analysis. When involved in a project from the beginning and with greater knowledge of the goals of the project, the better can paleoethnobotanical data be integrated into the project and used to more clearly address questions posed in the research design. Indeed, if integrated into the project from the beginning, the paleoethnobotanist can help formulate and refine the research design and therefore contribute more directly to and facilitate achieving of the project's research goals.

Future developments within paleoethnobotany will also be directed by developments within the broader field of archaeology. One topic of growing interest that has significant potential to affect paleoethnobotany involves human environmental impact and adaptation to changing climates. Humans have been an integral and active component of earth's ecology for many thousands of years. This long history of interaction between humans and their environments has had both deleterious and positive impacts, for us, other species, and the landscape itself. By studying the dynamic ecological role of human society and how humans impacted their environments in the past, we gain a better appreciation of the potential effects of our own activities and their environmental consequences. Many of the processes affecting the planet today are deeply rooted in our past, as many of the actions we see today – deforestation and land clearing, over-grazing, erosion, soil salinization, and loss of fertility, for example – were produced by and had impacts upon past peoples. Often, it was the combination of these human impacts occurring simultaneously with climate change that led to the collapse of past civilizations. Much of the knowledge we have about such cases derives, at least in part, from paleoethnobotanical research. Therefore, paleoethnobotanists have an important role to play as research into coupled socio-natural systems continues to develop and scholars continue to explore how the complex long-term interplay between ecological processes, human institutions, and changing climate affected past societies and their environments. Indeed, this may be one of the more crucial research endeavors to which paleoethnobotanists can contribute. A better understanding of how these situations arose in the past, and the sorts of environmental, political, and social consequences that they had may help us to better discern general principles that continue to operate today, and thus plan toward our future.

References

Akeret, Ö., J.N. Haas, U. Leuzinger, and S. Jacomet. 1999. Plant macrofossils and pollen in goat/sheep faeces from the Neolithic lake-shore settlement Arbon Bleiche 3, Switzerland. *The Holocene* 9: 175–182.

Bryant, V.M., Jr., and S.A. Hall. 1993. Archaeological palynology in the United States: A critique. *American Antiquity* 58: 277–286.

Bryant, V.M., Jr., and R.G. Holloway. 1996. New frontiers in palynology: Archaeological palynology. In *Palynology: Principles and applications*, ed. J. Jansonius and D.C. McGregor, 913–917. Dallas: American Association of Stratigraphic Palynologists.

Davidson, D.A., S. Carter, B. Boag, D. Long, R. Tipping, and A. Tyler. 1999. Analysis of pollen in soils: Processes of incorporation and redistribution of pollen in five soil profile types. *Soil Biology and Biochemistry* 31: 643–653.

Dimbleby, G.W. 1985. *The palynology of archaeological sites*. London: Academic Press.

Fish, S.K. 1985. Prehistoric disturbance floras of the lower Sonoran Desert and their implications. In *Late quaternary vegetation and climates of the American Southwest*, ed. B.F. Jacobs, P.L. Fall, and O.K. Davis, 77–88. Houston: American Association of Stratigraphic Palynologists Foundation.

Fish, S.K. 1994. Archaeological palynology of gardens and fields. In *The archaeology of garden and field*, ed. N.F. Miller and K.L. Gleason, 44–69. Philadelphia: University of Pennsylvania Press.

Ford, R. 1979. Paleoethnobotany in American archaeology. *Advances in Archaeological Method and Theory* 2: 285–336.

Gaillard, M.J., H.J.B. Birks, U. Emanuelsson, and B. E. Berglund. 1992. Modern pollen\land-use relationships as an aid in the reconstruction of past land-uses and cultural landscapes: An example from south Sweden. *Vegetation History and Archaeobotany* 1: 3–17.

Helbaek, H. 1959. Domestication of food plants in the old world. *Science* 130: 365–372.

Jones, V.H. 1941. The nature and status of ethnobotany. *Chronica Botanica* 6: 219–221.

Kelso, G.K., S.A. Mrozowski, D. Currie, A.C. Edwards, M.R. Brown III, A.J. Horning, G.J. Brown, and J.R. Dandoy. 1995. Differential pollen preservation in a seventeenth- century refuse pit, Jamestown Island, Virginia. *Historical Archaeology* 29: 43–54.

Langlie, B.S., N.G. Mueller, R.N. Spengler, and G.J. Fritz. 2014. Agricultural origins from the ground up: Archaeological approaches to plant domestication. *American Journal of Botany* 101: 1601–1617.

Magyari, E.K., J. Chapman, A.S. Fairbairn, M. Francis, and M.D. Guzman. 2012. Neolithic human impact on the landscapes of North-East Hungary inferred from pollen and settlement records. *Vegetation History and Archaeobotany* 21: 279–302.

Minnis, P.E. 1981. Seeds in archaeological sites: Sources and some interpretive problems. *American Antiquity* 46: 143–152.

Pearsall, D.M. 2015. *Paleoethnobotany: A handbook of procedures*. Walnut Creek: Left Coast Press.

Renfrew, J.M. 1973. *Palaeoethnobotany: The prehistoric food plants of the near East and Europe*. New York: Columbia University Press.

Stuart, G.S.L. 2007. Botanical analysis: Economic and spatial patterns. In *Intensive testing for the san Xavier farm rehabilitation project, San Xavier District, Tohono O'odham nation, Pima County, Arizona, chapter 12: Material culture and special analyses*, ed. L.M. Schilling and R.J. Stokes, 376–421. Tempe: Archaeological Consulting Services.

VanDerwarker, A.M., D.N. Bardolph, K.M. Hoppa, H.B. Thakar, L.S. Martin, A.L. Jaqua, M.E. Biwer, and K.M. Gill. 2016. New world Paleoethnobotany in the new millennium (2000–2013). *Journal of Archaeological Research* 24: 125–177.

Wright, P. 2010. Methodological issues in paleoethnobotany. In *Paleoethnobotany: A consideration of issues, methods, and cases*, ed. A.M. Vanderwarker and T.M. Peres, 37–64. New York: Springer.

Paleoindians

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Introduction

Paleoindian (also spelled Paleo-Indian, Palaeo-Indian), or literally "Old" or "Ancient" Indian, is a term widely employed to refer to the archaeological record of the Americas dating to the Late Pleistocene to Early Holocene from as early as perhaps 11,500 ^{14}C years BP to as late as 8,000 years BP in some areas (13,500–8,800 calibrated years BP). The term is often used to distinguish this segment of the archaeological record from that of potentially earlier dating, "Pre-Clovis" peoples, and later-dating, Post-Paleoindian "Archaic" and other peoples. A basic distinction has often been made, particularly in North America, between "Early" Paleoindians (prior to c. 10,400–10,100 BP), who produced distinctive, flaked, lanceolate, stone point tips with grooved or fluted bases (see Fig. 1), and "Late" Paleoindians (after c.10,400–10,100 BP) who made unfluted

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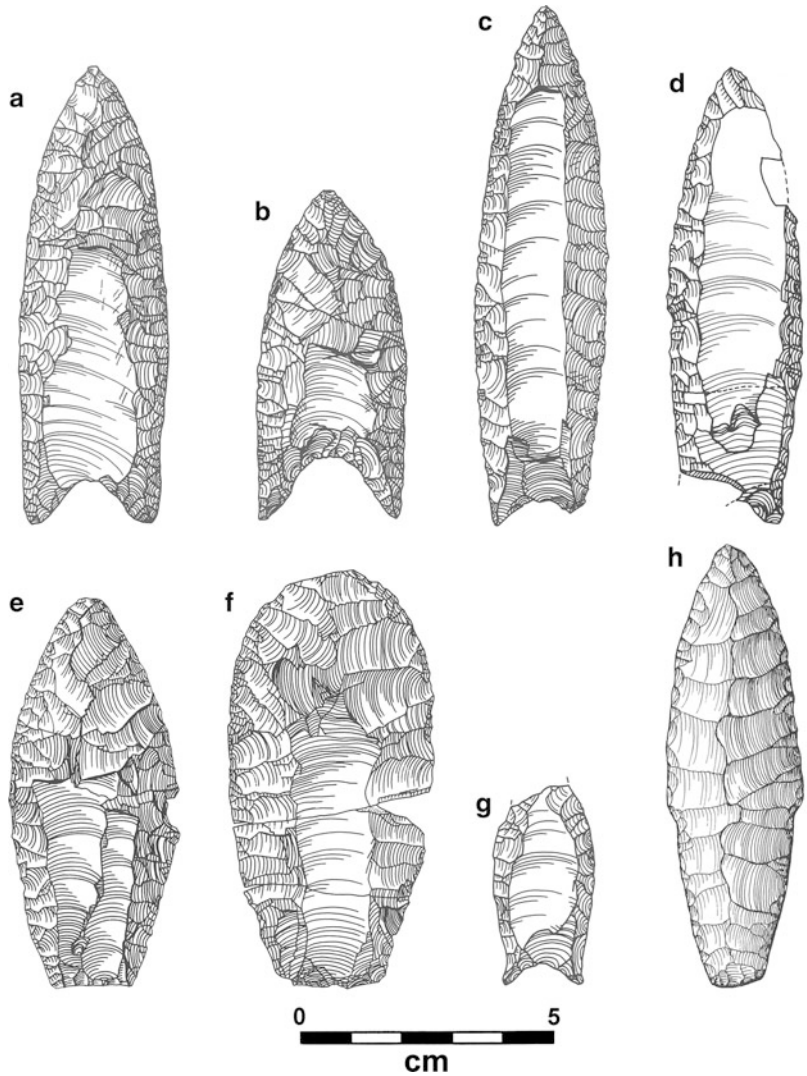

Paleoindians, Fig. 1 Paleoindian stone points and preforms from various sites in Northeastern North America. (**a**–**g**) Early Paleoindian fluted bifaces; (**h**) Late Paleoindian contracting stem biface. (Drawings by Janie Ravenhurst and Ian T. Kenyon)

lanceolate and stemmed points. Many different and finer Paleoindian regional/temporal subdivisions, variously referred to as cultures, complexes, industries, or phases, also have been suggested of which the earliest well-established and most widespread subdivision is Clovis, dated c. 11,000 ^{14}C years BP. Such distinctions have been made primarily on the basis of differences in the stone point assemblages although other, usually more subtle, differences in stone tool kits and production technology are present. For example, only Clovis Paleoindians seem to have employed a true blade technology.

Definition

The term Paleoindian was first used by Frank H. H. Roberts Jr. in the title of a 1940 paper. He did not define the term and only used it once in the text in the last line of that paper. Yet, it was clear that he was using the term in a general sense to refer to any archaeological evidence that existed at that time that seemed to be of considerable antiquity and thus had a bearing on when the Americas were first peopled. This evidence included the famous discoveries of the previous 13 years at sites like Folsom and Clovis, New Mexico, and

Dent and Lindenmeier, Colorado (for a summary, see Wormington 1957), where the distinctive point tips and other exquisitely made stone artifacts had been found in Late Pleistocene contexts, often in kill sites in association with extinct megafauna such as mammoths and large bison species. However, Roberts (1940) also discussed sites that were apparently of some antiquity but yielded less well-made lithic assemblages that often included smaller, non-lanceolate point forms, cruder choppers and scrapers, and even, on occasion, grinding and milling stones.

Only rarely do current researchers use the term in Roberts' (1940) general sense. In most quarters the term has come to be used in more limited and specialized ways. In the 1950s there was an increasing tendency to restrict the usage of the term Paleoindian to assemblages that not only were of some antiquity but also could be separated out from later or even potentially earlier ones in terms of certain characteristics. Particularly stressed were characteristics of the archaeological record itself, such as the kinds of artifacts produced and distinctive aspects of the sites, or in terms of ideas about the lifeways (e.g., subsistence and economic practices) and other aspects of the cultural systems of these groups.

In terms of the artifact record, today's scholars stress the presence of the stone lanceolate or lance-shaped point tips and, particularly in some slightly later-dating assemblages in areas such as the Plains, Great Basin, and South America, stemmed forms – points with side or corner notches for hafting to the weapon shaft are absent; a stone tool kit dominated by more formalized, extensively retouched/resharpened tools such as bifaces, side scrapers, and hafted end scrapers; overall excellence in flint-knapping skill; the selection of only the highest grades of flakeable stone materials ("cryptocrystallines"); a tendency to transport toolstones over long distances; the use of standardized core reduction techniques including true blade industries in the earliest well-established Paleoindian development (e.g., "Clovis") as well as more generally the use of large biface cores; an absence of ground and polished stone tools; and, at least to some (e.g., Krieger 1964), an absence of food-grinding implements used in plant processing. To this list I would add the regular use of thick edges produced by the purposeful snapping or radial breakage of bifaces and flakes, the consistent presence of certain kinds of other distinctive artifacts such as large side scrapers and well-made needlelike micro-piercers and borers ("gravers") (Fig. 2) and, for some reason, a real absence or rarity of fire-cracked/broken rocks used in heating and cooking. The last named is a major contrast with subsequent Archaic and other sites.

Paleoindian sites themselves are seen to contrast with those of their later descendants in that they are rare and ephemeral with little evidence for substantial structures or other features. However, utilitarian, as well as apparently sacred, caches of stone artifacts are proving to be especially common (e.g., Deller et al. 2009). The sacred caches or offerings can be purposefully broken either by heating or by deliberate smashing (e.g., Fig. 3) and some are accompanied by red ochre. Where preservation is suitable, a very few of the sacred caches are accompanying burials but in other cases they are not. Using minimally the presence of the distinctive, well-made stone points as a defining characteristic, Paleoindian sites can be found throughout all of unglaciated North America of the time, both south of the ice sheets and in Alaska, all of Central America, and, more spottily, in areas of South America such as the southern cone and northwest parts of that continent.

The small size and ephemeral nature of most sites, the use of exotic toolstones from distant sources, the employment of standardized core reduction techniques that some have interpreted as resulting in a more efficiently produced and portable tool kit, etc. have often led to the inference that Paleoindians lived in small groups and practiced a highly, mobile lifestyle, moving their camps frequently and over a large area annually. Such characteristics are frequently related to the arguments that Paleoindians were the first major occupants of the area, were involved in colonizing new regions, and lived at low population

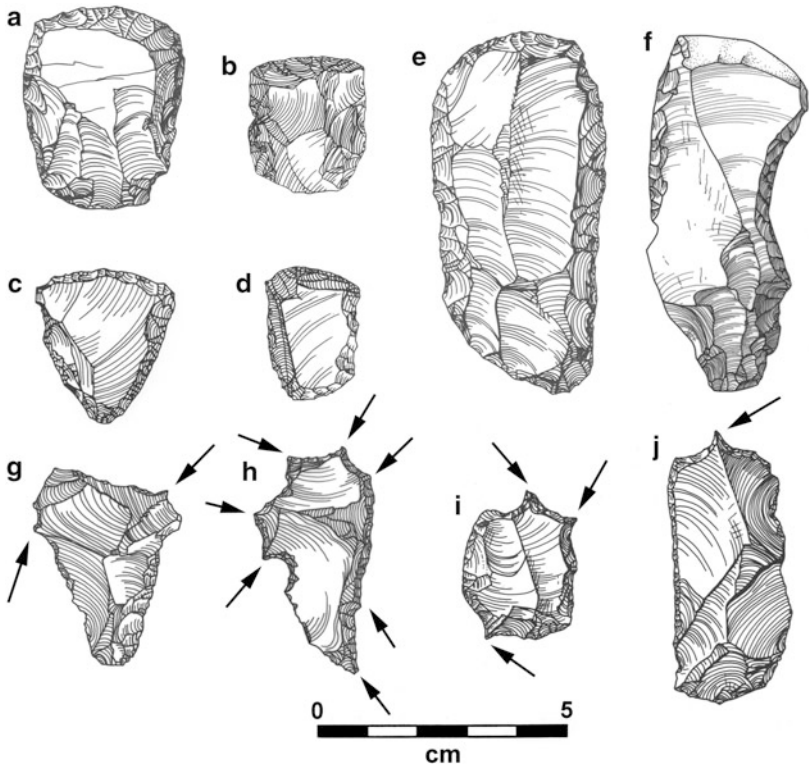

Paleoindians, Fig. 2 Paleoindian unifacial stone tools from various sites in the Province of Ontario and New York State. (**a**–**d**) Trianguloid end scrapers; (**e**) Large end and side scraper; (**f**) Double concave-convex side scraper; (**g**–**j**) Micro-piercers or gravers (*arrows* show spur locations). (Drawings by Janie Ravenhurst)

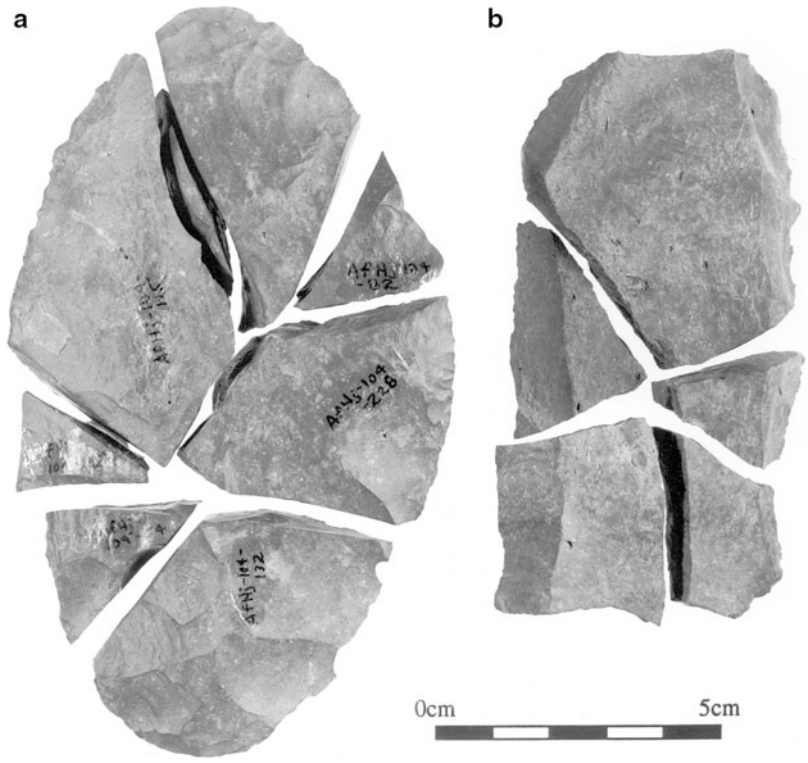

Paleoindians, Fig. 3 Biface (**a**) and large uniface (**b**) purposefully broken by radial breaks from Caradoc Site, Ontario, Canada

densities. Also, as the first reported sites in the Western USA were almost all kill sites of large game, along with an absence of food-grinding implements, it was often inferred that these peoples relied much more on hunting than did later groups such as those of the Archaic (e.g., Mason 1962; Krieger 1964). Some even went so far as to suggest or use alternative terms for Paleoindian such as "Early Hunter" or "Early American Hunters" to reflect this inferred lifestyle.

These definitions based on inferred cultural characteristics such as mobility and subsistence practices, while popular, have been and continue to be problematic, especially when applied at continental scales. For instance, many later Plains Paleoindian groups do not seem to have relied much on exotic stones nor on standardized, purportedly more portable, core forms like bifaces, suggesting they had a less mobile lifestyle (e.g., Bamforth 2002). Also, many have questioned the idea that Paleoindians were primarily big-game hunters, notably in areas such as the American Southeast, the Great Basin, or much of South America. In these cases, there often have been calls to abandon the use of the term Paleoindian to refer to these early peoples. In the Great Basin, for example, while some lithic assemblages seem technologically Paleoindian, settlement pattern data, paleoenvironmental data, and faunal recoveries suggest a broader resource focus leading to investigators calling certain assemblages "Paleoarchaic" (for discussion, see Madsen 2007). In South America, a lack of substantial evidence for a big-game hunting focus in many areas has led some to conclude that Paleoindian is a term that cannot be easily applied there and terms such as "proto-Archaic" have been suggested as alternatives (e.g., Dillehay 2000: 7–8). However, it is worth stressing that there is evidence that does suggest some of these early groups, such as Clovis in the Southwest USA, seem to have relied relatively heavily on larger game such as mammoths (Waguespack and Surovell 2003). Apparently the Paleoindian flaked stone technology was a very flexible one, capable of use in a wide range of subsistence and economic contexts.

Key Issues/Current Debates/Future Directions/Examples

Beyond the long-standing problems of the exact nature of their lifestyle/economic organization and of providing a rigorous, consistent definition, the use of the term "Paleoindian" itself also has become contentious. Some have suggested that these early peoples may have originated in areas such as western Europe rather than as, in the traditional view, east Asia/Siberia (see below). In addition, there have been studies of the limited early skeletal material that suggest the earliest peoples were morphologically different from more recent "Indian" populations. Hence, several recent scholars prefer the term "Paleoamerican" (Meltzer (2009: 175–6, 205) reviews these issues and in agreement with him, I am not impressed with their rationale). Also, the indigenous scholar Eldon Yellowhorn (2003: 62) has argued that the use of the term Paleoindian should be replaced with the term "Paleolithic" to achieve "the objective of placing Aboriginal peoples on an equal basis with other early peoples elsewhere in the World."

Perhaps the most contentious issue in Paleoindian studies concerns the origins of these peoples. The traditional view has been that Clovis Paleoindian peoples were the first inhabitants and this viewpoint is consistent with the widespread distribution of the distinctive Clovis technology over a very large area. Moreover, in the traditional view, Clovis technology is very much like that of the Asian (and European) Upper Paleolithic, notably in the inclusion of a true blade industry, the inclusion of burins (albeit very rarely such that some dispute that the reported Clovis examples are actually purposeful burins), and of similarities in organic technologies including the production of shaft wrenches and cylindrical points having on one basal side a beveled surface incised with cross-hatched lines. The genetic and physical evidence could be and was used to argue specifically for an ultimate origin in the East Asian/Siberian Upper Paleolithic. However, some have argued that more unique aspects of the Clovis archaeological record, such as the production of large bifaces that are thinned by repetitive, stylized

use of "overshot" flaking (e.g., large flake removals that are deliberately carried across the whole biface surface and actually detach a small area of the biface edge opposite the striking platform edge) or the caching of large bifaces, have closer analogs in the Upper Paleolithic of Europe, specifically in the Solutrean of Spain and France. This evidence leads them to argue for a European origin and that people crossed the north Atlantic Ocean along the edge of the ice sheets at the time to reach the Americas (Bradley and Stanford 2004). Needless to say, several scholars have objected to this idea, pointing out, among other things, that Solutrean material dates thousands of years earlier than Clovis and that all known Clovis biface caches are actually in western North America rather than in the presumed point of entry in the east (see Meltzer 2009: 185–8).

There have also long been claims of archaeological finds predating Clovis Paleoindian ones, finds that would undermine the "Clovis first" idea. Many of the earliest claimed sites were characterized by very simple flaked stone technologies that lacked stone projectile points and hence were often referred to a "Pre-Projectile Point" era (see Krieger 1964). However, the vast majority of those sites have been discredited or their status remains unclear. Yet, since the 1970s there have been increasing reports, albeit not undisputed, of Pre-Clovis assemblages dating c. 16,000–11,500 ^{14}C years BP window that do include points including lanceolate as well as smaller triangular forms and some sites are said to also include evidence of blade industries (for a recent summary, see Pitblado 2011) and even, in one case from Texas, the production of radial break and snapped edge tools (Waters et al. 2011). If so, then they might be plausible Clovis and other Paleoindian ancestors – the presence of these points and standardized core working would suggest they can be viewed favorably as Paleoindian per se rather than as simply "Pre-Clovis."

At a theoretical level, there has been a real tendency to explain the Paleoindian archaeological record in more materialist terms. For example, as hinted above there has been a preponderance of arguments that attempt to explain aspects of that record, such as technological characteristics, in terms of simply what Paleoindians were eating and/or how far and how often they moved across the landscape. However, as also indicated above, that viewpoint has become increasingly problematic or at the very least seems oversimplified – Paleoindian groups using similar technologies apparently had a diversity of subsistence and mobility practices. As such, and in line with more general theoretical trends within the discipline as a whole, there have been increasing calls for more people-centered approaches to interpretation that foreground more explicitly these peoples' beliefs, the construction of social identities, and more broadly their histories in order to understand why their archaeological record differs from that of other peoples (e.g., Ellis 2009).

Cross-References

- ▶ Clovis and Folsom, Indigenous Occupation Prior to
- ▶ North American Plains: Geography and Culture
- ▶ North American Terminal Pleistocene Extinctions: Current Views

References

Bamforth, D.B. 2002. High-Tech foragers? Folsom and later Paleoindian technology on the Great Plains. *Journal of World Prehistory* 16: 55–98.

Bradley, B., and D. Stanford. 2004. The North Atlantic ice-edge corridor: A possible Palaeolithic route to the New World. *World Archaeology* 36: 459–478.

Deller, D.B., C.J. Ellis, and J.R. Keron. 2009. Understanding cache variability: A deliberately burned early Paleoindian tool assemblage from the Crowfield site, southwestern Ontario, Canada. *American Antiquity* 74: 371–397.

Dillehay, T.D. 2000. *The settlement of the Americas, a new prehistory.* New York: Basic Books.

Ellis, C. J. 2009. The Crowfield and Caradoc sites, Ontario: Glimpses of Palaeo-Indian sacred ritual and world view. In *Painting the past with a broad brush. Papers in honour of James Valliere Wright*. Mercury series Archaeology Paper 170, ed. D.L. Keenlyside, and J-L. Pilon, 319–52. Gatineau: Canadian Museum of Civilization.

Krieger, A.D. 1964. Early man in the New World. In *Prehistoric man in the New World*, ed. J.D. Jennings and E. Norbeck, 23–81. Chicago: The University of Chicago Press.

Madsen, D.B. 2007. The Paleoarchaic to Archaic transition in the Great Basin. In *Paleoindian or paleoarchaic? Great Basin human ecology at the Pleistocene-Holocene transition*, ed. K.E. Graf and D.N. Schmitt, 3–20. Salt Lake City: The University of Utah Press.

Mason, R.J. 1962. The Paleo-Indian tradition in eastern North America. *Current Anthropology* 3: 227–246.

Meltzer, D.J. 2009. *First peoples in a new world: Colonizing Ice Age America*. Berkeley: University of California Press.

Pitblado, B. 2011. A tale of two migrations: Reconciling recent biological and archaeological evidence for the Pleistocene peopling of the Americas. *Journal of Archaeological Research* 19: 327–375.

Roberts, F.H.H. Jr. 1940. Developments in the problem of the North American Paleoindian. In *Essays in historical anthropology of North America in honor of John R. Swanton in celebration of his fortieth year with the Smithsonian Institution*. Smithsonian Miscellaneous Collections 100, 51–116. Washington, DC: Smithsonian.

Waguespack, N., and T. Surovell. 2003. Clovis hunting strategies, or how to make out on plentiful resources. *American Antiquity* 68: 333–352.

Waters, M.R., S.L. Forman, T.A. Jennings, L.C. Nordt, S.G. Driese, J.M. Feinberg, J.L. Keene, J. Halligan, A. Lindquist, J. Pierson, C.T. Hallmark, M.B. Collins, and J.E. Wiederhold. 2011. The Buttermilk Creek complex and the origins of Clovis at the Debra L. Friedkin site, Texas. *Science* 331: 1599–1603.

Wormington, H.M. 1957. *Ancient man in North America*. Popular series 4. Denver: Denver Museum of Natural History.

Yellowhorn, E. 2003. Regarding the American Paleolithic. *Canadian Journal of Archaeology* 27: 62–73.

Further Reading

Anderson, D., and K.E. Sassaman, eds. 1996. *The Paleoindian and early archaic Southeast*. Tuscaloosa: University of Alabama Press.

Bamforth, D.B. 2011. Origin stories, archaeological evidence, and Postclovis Paleoindian bison hunting on the Great Plains. *American Antiquity* 76: 24–40.

Bever, M.R. 2001. Stone tool technology and the Mesa complex: Developing a framework of Alaskan Paleoindian prehistory. *Arctic Anthropology* 38 (2): 98–118.

Bonnichsen, R., and K. Turnmire, eds. 1999. *Ice-Age peoples of North America*. Corvallis: Center for the Study of the First Americans.

Bradley, B.A., M.B. Collins, and A. Hemmings. 2010. *Clovis technology*. International Monographs in Prehistory, Archaeological series 17. Ann Arbor.

Ellis, C.J., and J.C. Lothrop, eds. 1989. *Eastern Paleoindian lithic resource use*. Boulder: Westview Press.

Fiedel, S.J. 1999. Older than we thought: Implications of corrected dates for Paleoindians. *American Antiquity* 64: 95–115.

Figgins, J.D. 1927. The antiquity of man in America. *Natural History* 27: 229–239.

Frison, G.C., and B.A. Bradley. 1980. *Folsom tools and technology at the Hanson site, Wyoming*. Albuquerque: University of New Mexico Press.

Gillespie, J. 2007. Enculturing an unknown world: Caches and Clovis landscape ideology. *Canadian Journal of Archaeology* 31: 171–189.

Gramly, R.M., ed. 1984. New experiments upon the record of eastern Palaeoindian cultures. *Archaeology of Eastern North America* 12 (whole issue).

Griffin, J.B. 1967. Eastern North American archaeology: A summary. *Science* 156: 175–191.

Hayden, B.D. 1982. Interaction parameters and the demise of Paleo-Indian craftsmanship. *Plains Anthropologist* 27: 109–123.

Haynes, C.V. 1982. Were Clovis progenitors in Beringia? In *Paleoecology of Beringia*, ed. D. Hopkins, J. Mathews, C. Schweger, and S. Young, 383–398. New York: Academic Press.

Kelly, R.L., and L. Todd. 1988. Coming into the country: Early Paleoindian hunting and mobility. *American Antiquity* 53: 231–244.

Kilby, D.H. 2008. *An investigation of Clovis caches: Content, function, and technological organization*. PhD dissertation, Department of Anthropology, University of New Mexico. Ann Arbor: University Microfilms.

Kornfeld, M., M. Harkin, and J. Durr. 1999. Landscapes and peopling of the Americas. In *On being first: Cultural innovation and environmental consequences of first peopling*, ed. J. Gillepsie, S. Tupakka, and C. de Mille, 149–162. Calgary: Archaeological Association of the University of Calgary.

Lynch, T.F. 1991. Paleoindians in South America: A discrete and identifiable cultural stage? In *Clovis origins and adaptations*, ed. R. Bonnichsen and K. Turnmire, 255–359. Corvallis: Center for the Study of the First Americans.

Meltzer, D.J. 1988. Late Pleistocene human adaptations in eastern North America. *Journal of World Prehistory* 2: 1–52.

Meltzer, D.J., and B.D. Smith. 1986. Paleoindian and Early Archaic subsistence strategies in eastern North America. In *Foraging, collecting and harvesting: Archaic period subsistence and settlement in the Eastern Woodlands*. Occasional Paper 6, ed. S.W. Neusius, 3–31. Carbondale: Southern Illinois University at Carbondale, Center for Archaeological Investigations.

Morrow, J.A., and C. Gnecco, eds. 2006. *Paleoindian archaeology: A hemispheric perspective*. Gainesville: University Presses of Florida.

Pearson, G.A. 2004. Pan-American Paleoindian dispersals and the origins of fishtail projectile points as seen through the lithic raw material reduction strategies and tool-manufacturing techniques at the Guardiria site, Turrialba valley, Costa Rica. In *The settlement of the American continents, a multi-disciplinary approach to human geography*, ed. C.M. Barton, G.A. Clark,

D.R. Yesner, and G.A. Pearson, 85–102. Tucson: The University of Arizona Press.
Roosevelt, A.C., J. Douglas, and L. Brown. 2002. The migrations and adaptations of the first Americans: Clovis and Pre-Clovis viewed from South America. In *The first Americans: The Pleistocene colonization of the New World*. Memoirs of the California Academy of Sciences 27, ed. N.G. Jablonski, 159–235. San Francisco: California Academy of Sciences.
Smith, A.G. 1957. Suggested changes in the nomenclature of the major American time periods. *American Antiquity* 23: 169.
Stafford, M.D., G.C. Frison, D. Stanford, and G. Ziemans. 2002. Digging for the color of life: Paleoindian red ochre mining at the Powars II Site, Platte County, Wyoming, U.S.A. *Geoarcheology* 18: 71–90.
Steele, D.G., and J.F. Powell. 2002. Facing the past: A view of the North American human fossil record. In*The first Americans: The Pleistocene colonization of the New World*. Memoirs of the California Academy of Sciences 27, ed. N.G. Jablonski, 93–122. San Francisco: California Academy of Sciences.
Straus, L.G., D.J. Meltzer, and T. Goebel. 2006. Ice Age Atlantis? Exploring the Solutrean-Clovis 'connection'. *World Archaeology* 37: 507–532.
Tankersley, K.B. 2004. The concept of Clovis and the peopling of North America. In *The settlement of the American continents, a multi-disciplinary approach to human geography*, ed. C.M. Barton, G.A. Clark, D.R. Yesner, and G.A. Pearson, 49–63. Tucson: The University of Arizona Press.
Walker, R.B., and B.N. Driskell. 2007. *Foragers of the terminal Pleistocene in North America*. Lincoln: University of Nebraska Press.
Waters, M.R., and T.W. Stafford Jr. 2007. Redefining the age of Clovis: Implications for the peopling of the Americas. *Science* 315: 1122–1126.

Paleolithic Archaeology of Wales: Overview

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Introduction

There are many caves in the Carboniferous limestone bands that stretch across South Wales from Gower to Pembrokeshire and in northeast Wales. Many of these caves have been used for human occupation in the past, and many of them have been investigated, either formally or informally, over the years. The results of this work enable a picture to be drawn together of a human presence in Wales dating back some 225,000 years.

Definition

The Paleolithic occupation of what is now Wales can be seen to span a time period from evolutionary early Neanderthals at Pontnewydd Cave, through the evidence for a true Neanderthal presence at sites that include Coygan Cave to the arrival of evolutionary modern humans at Paviland Cave, Cathole Cave, and Ffynnon Beuno before the Last Glacial Maximum. Humans withdrew from Wales during the coldest time of the Last Glacial to reappear when vegetation and a food source had once again reestablished themselves during the post-Glacial period, around 15,000 years ago. Their presence is not thought to have been continuous, there being a short gap in the sequence of evidence during the Late Glacial Younger Dryas stadial event, with humans reappearing after a gap of around 1000 years, never again to leave Wales.

Key Issues

Pontnewydd Cave, Denbighshire, defines the starting point for a human presence in Wales at around 225,000 BP (see Walker's EGA entry "▶ Paleolithic Archaeology of Wales: Pontnewydd Cave"). Excavations at Pontnewydd Cave have recovered the remains of 16 hominin teeth and one tooth fragment. These represent a minimum of five evolutionary early Neanderthal individuals aged from 8.5 years to mature adult. These hominins left behind over 1284 stone tools, among which is a Levallois technology accompanying Acheulian bifaces and an associated faunal assemblage. The activity at the cave suggests the main hominin activity that took place just outside the cave and that the people were expediently making use of local raw materials for their toolkits. There is no in situ evidence for these

early Neanderthals' presence at the cave. The deposits have all been washed into the cave during a series of debris flow events that took place sometime just before the development of the stalagmite floor. It is this stalagmite and thermoluminescence from burnt flints that date the hominin occupation at Pontnewydd Cave at 225,000 BP (Fig. 1; Green 1984; Aldhouse-Green et al. 2012).

A number of single chance finds, some of uncertain or dubious provenance, make up much of the rest of the evidence for a lower Paleolithic presence in Wales. Among these are single bifaces from reliable provenances from Afon Marlais, Narberth, Pembrokeshire (Green and Walker 1991: 30–31; Walker 2016), and Rhossili, Gower, Swansea (Fig. 2; Green 1981). The number of such finds is, however, small, and sites tend to be single spots where chance losses have been made. These do not provide reliable evidence for their dating but hint at what must have been a more extensive hominin presence in Wales than the single, well-excavated site of Pontnewydd Cave might suggest.

A true Neanderthal presence in Wales is indicated by finds made in excavations at just a small number of sites. The oldest of these is Coygan Cave, a site excavated at various times in the nineteenth and twentieth centuries. The site mainly contained a hyena den assemblage with a middle Last Glacial fauna among which are the heavily gnawed remains of *Mammuthus primigenius*, *Coelodonta antiquitatis*, *Rangifer tarandus*, *Bison priscus*, and *Ursus arctos* (Aldhouse-Green et al. 1995). As well as hyena occupants, a human use of the cave is hinted at through the discovery of three *bout coupé* bifaces and three worked flakes. Two of these bifaces were seemingly cached, having been carefully left together beside the cave wall (Fig. 3). Perhaps it was the Neanderthal's intention to return to the cave to make future use of the tools (White and Jacobi 2002). The dating of the Neanderthal presence at Coygan is currently thought to lie between 66,000 and 38,000 BP, based on redating of associated faunal material by the late Roger Jacobi (*pers. comm.*).

Levallois flakes were discovered during the excavations ahead of the construction of the Second Severn Crossing at Sudbrook, Monmouthshire (Green 1989: 194–196). These also imply a Neanderthal presence in Wales; unfortunately, dating the Sudbrook assemblage is not possible due to the lack of a stratigraphic context for the finds.

Paleolithic Archaeology of Wales: Overview, Fig. 1 The exterior of Pontnewydd Cave, Denbighshire (© National Museum of Wales)

Paleolithic Archaeology of Wales: Overview, Fig. 2 Biface from Rhossili, Gower, Swansea (© National Museum of Wales)

Paleolithic Archaeology of Wales: Overview, Fig. 3 The bifaces found at Coygan Cave, Laugharne, Carmarthenshire (© National Museum of Wales)

Further hints at a Neanderthal presence can be seen in the presence of leaf points at two Welsh cave sites: Ffynnon Beuno, Tremeirchion, Denbighshire, and Paviland Cave, Gower, Swansea (Jacobi and Higham 2010a: 186); there is also a chance find made away from the caves at Goldcliff, Monmouthshire (Walker 2015: 118–119).

The arrival of evolutionary modern humans in Wales appears to have taken place sometime around 36,000 years ago based on dated parallels from elsewhere in the UK (Jacobi and Higham 2010a: 188). There are currently just two sites known from Wales where there is an Aurignacian presence. Paviland Cave, Gower, Swansea, contained the largest assemblage (see Walker's EGA entry ▶ Paleolithic Archaeology of Wales: Paviland Cave). Here, stone tools of diagnostic Aurignacian forms were found. The second site is Hoyle's Mouth Cave, Tenby, Pembrokeshire, from where a single Aurignacian burin busqué is recorded (Green and Walker 1991: 58; Walker 2016: 7).

An early Gravettian presence is demonstrated in Wales by the rich burial of a skeleton within Paviland Cave, Gower, Swansea (also known as Goat's Hole, Fig. 4). The burial has been redated to around 29,000 radiocarbon years BP by Jacobi and Higham (2008), some 34,000 years ago (Dinnis and Stringer 2013). The skeleton, known as the "Red Lady" of Paviland Cave, is that of a young adult male who was buried carefully in a grave with perforated shells, ivory rods, and bracelets. Red ocher was present in the burial (Aldhouse-Green 2000).

Paleolithic Archaeology of Wales: Overview, Fig. 4 The exterior of Paviland Cave, Gower, Swansea (© National Museum of Wales)

A later Gravettian activity is seen by the presence of tanged blades (or font Robert points), the dating of which may be around 28,000

radiocarbon years BP, based on parallels from the site of Maisières-Canal, Belgium (Jacobi and Higham 2010a: 210). These have been found in the assemblage from Paviland Cave and also Cathole Cave, Gower, Swansea, where the context is also not recorded (Garrod 1926: 66–67).

As would be expected, there is no clear evidence for a human presence in Wales during the height of the Last Glacial, and the evidence provided by the recent work of Jacobi and Higham 2010a has pushed the departure of humans from Wales further back than dating evidence from Paviland Cave had previously indicated (Aldhouse-Green 2000). That there was a hiatus in human presence in the country is to be expected, given the proximity of the ice that covered the majority of the country, just stopping short of covering the entirety of Wales.

The new dating of bones from Sun Hole, Cheddar, Somerset, suggests that humans had returned to southern Britain by 12,600 radiocarbon years BP and reached Wales soon afterward (Jacobi and Higham 2010b). The colonization of Britain at this period is thought to be at a time when wild horses were a key part of the fauna and which were very soon joined by red deer and wild cattle. The diversity of a large game fauna may have been the factor that enabled the Wales to be resettled at this time (Jacobi and Higham 2010b: 243). Lithic artifacts from Welsh caves that indicate a human presence are Cheddar points, end scrapers, burins, piercers, and retouched truncations (Fig. 5). The *en éperon* butt preparation technique is also a distinctive indicator for tools of such age (Jacobi and Higham 2010b). In Wales, the evidence for people of this date can be found at Paviland Cave, Gower, Swansea; Worm's Head Cave, Gower, Swansea; Hoyle's Mouth Cave, Tenby, Pembrokeshire; Nanna's Cave, Caldey Island, Pembrokeshire; Cathole Cave, Gower, Swansea; and Kendrick's Cave, Llandudno, Conwy. Finds have also been recovered from a rare open-air site at Cophill Farm, Chepstow, Monmouthshire (Walker 2015). Few of these caves have been subject to full study and dating; most of the evidence available comes from the stone tools found during excavations at the sites.

Paleolithic Archaeology of Wales: Overview, Fig. 5 A Cheddar point from Nanna's Cave, Caldey Island, Pembrokeshire (© National Museum of Wales)

Final Paleolithic sites are characterized by a technology dominated by the presence of penknife points, a tool not seen among the assemblage at Gough's Cave. The dating of sites with penknife points can now be attributed to a time between 11,800 and 10,800 radiocarbon years BP (R.M. Jacobi *pers. comm*. 2005). Caves, including Priory Farm Cave, Pembroke, Pembrokeshire (Fig. 6), and Nanna's Cave and Potters Cave, Caldey Island, Pembrokeshire, all have these distinctive tools among their assemblages.

In Wales, the coldest part of the Younger Dryas started around 11,600 radiocarbon years BP and lasted until c. 10,200 or 10,000 BP based on evidence for bare, stony ground from pollen cores taken at Llyn Gwernan, Ceredigion (Lowe and Lowe 2001: 147–148). During this period, the winter sea ice margin lays just south of Strumble Head, Pembrokeshire. While much of the precipitation fell as snow, there would not have been a good snow cover on the ground because of the effect of very strong winds and the sparseness of the vegetation which prevented such cover developing (Isarin et al. 1998: 451). A consequence of this cold stadial was that people left Wales, only returning once the climate improved sufficiently to sustain life once again.

Paleolithic Archaeology of Wales: Overview, Fig. 6 Penknife points from Priory Farm Cave, Pembroke, Pembrokeshire (© National Museum of Wales)

Cross-References

- ▶ Paleolithic Archaeology of Wales: Paviland Cave
- ▶ Paleolithic Archaeology of Wales: Pontnewydd Cave

References

Aldhouse-Green, S. 2000. *Paviland Cave and the 'Red Lady'*. Bristol: Western Academic Specialist Press.

Aldhouse-Green, S., K. Scott, H. Schwarcz, R. Grün, R. Housley, A. Rae, R. Bevins, and M. Redknap. 1995. Coygan Cave, Laugharne, South Wales, a Mousterian site and hyaena den: a report on the University of Cambridge excavations. *Proceedings of the Prehistoric Society* 61: 37–79.

Aldhouse-Green, S., R. Peterson, and E.A. Walker, eds. 2012. *Neanderthals in Wales: Pontnewydd and the Elwy Valley Caves*. Oxford: Oxbow.

Dinnis, R., and C. Stringer. 2013. *Britain: One million years of the human story*. London: Natural History Museum.

Garrod, D.A.E. 1926. *The Upper Palaeolithic age in Britain*. Oxford: The Clarendon Press.

Green, H.S. 1981. A Palaeolithic flint handaxe from Rhossili, Gower. *Bulletin of the Board of Celtic Studies* 29: 337–339.

Green, H.S. 1984. *Pontnewydd Cave, a Lower Palaeolithic hominid site in Wales, the first report*. Cardiff: National Museum of Wales.

Green, H.S. 1989. Some recent archaeological and faunal discoveries from the Severn Estuary Levels. *Bulletin of the Board of Celtic Studies* 36: 187–199.

Green, S., and E. Walker. 1991. *Ice Age hunters: Neanderthals and early modern hunters in Wales*. Cardiff: National Museum of Wales.

Isarin, R.F.B., H. Renssen, and J. Vandenberghe. 1998. The impact of the North Atlantic Ocean on the younger Dryas climate in northwestern and central Europe. *Journal of Quaternary Science* 13: 447–453.

Jacobi, R.M., and T.F.G. Higham. 2008. The "Red Lady" ages gracefully: New ultrafiltration AMS determinations from Paviland. *Journal of Human Evolution* 55: 898–907.

Jacobi, R.M., and T.F.G. Higham. 2010a. The British earlier Upper Palaeolithic: Settlement and chronology. In *The ancient occupation of Britain*, ed. N.M. Ashton, S.G. Lewis, and C.B. Stringer, 181–222. Amsterdam: Elsevier.

Jacobi, R.M., and T.F.G. Higham. 2010b. The later Upper Palaeolithic recolonisation of Britain: New results from AMS radiocarbon dating. In *The ancient occupation of Britain*, ed. N.M. Ashton, S.G. Lewis, and C.B. Stringer, 223–247. Amsterdam: Elsevier.

Lowe, J.J., and S. Lowe. 2001. Llyn Gwernan. In *The quaternary of West Wales: Field guide*, ed. M.J.C. Walker and D. McCarroll, 132–152. London: Quaternary Research Association.

Walker, E.A. 2015. Scratching the surface: New lateglacial lithic artefacts from southeast Wales. In *No stone unturned: Papers in memory of Roger Jacobi*, ed. N. Ashton and C. Harris, 114–125. London: Lithic Studies Society.

Walker, E.A. 2016. The Palaeolithic and Mesolithic Hunter-Gatherers of Pembrokeshire. In *The Pembrokeshire county history*, vol. 1, 1–54. Haverfordwest: Pembrokeshire County History Trust.

White, M.J., and R.M. Jacobi. 2002. Two sides to every story: Bout coupé handaxes revisited. *Oxford Journal of Archaeology* 21: 109–133.

Paleolithic Archaeology of Wales: Paviland Cave

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Introduction

Paviland Cave (also known as Goat's Hole), Gower, Swansea, Wales, is a cave site with a long history of occupation both before the Last Glacial Maximum and again after it. The cave is famous for the excavation by William Buckland in 1823 of the skeleton of a young adult male with associated grave goods.

Definition

Paviland Cave lies on the southern coast of Gower in South Wales. The cave has been extensively excavated many times since the first discovery of finds within it in 1822. The most recent excavations took place there in 1996. The cave has become well known for the discovery of the skeleton known as the "Red Lady" of Paviland Cave which has been the focus of interest in the site since its discovery over 200 years ago. Now dated to around 34,000 years ago, the "Red Lady" can claim to be one of the oldest burials of an evolutionary modern human anywhere to have been associated with manufactured grave goods.

Key Issues

Excavations first took place in Paviland Cave in 1822 when two Roman coins, and what were recorded as elephant bones, were discovered in the cave (Fig. 1). Early in January 1823, Professor William Buckland visited the cave in the company of Miss Talbot and John Traherne. They undertook a day digging in the cave and the following day were joined by Lewis Weston Dillwyn of Swansea,

Paleolithic Archaeology of Wales: Paviland Cave, Fig. 1 Paviland Cave, Gower, Swansea, Wales (© National Museum of Wales)

during which time they recovered the remains of a partial skeleton which they initially took to be a customs man, thought to have been overcome by smugglers on the Gower coast. On February 15, 1823, Buckland announced the findings in a public lecture given in the Ashmolean Museum, Oxford. Later the same day, Buckland wrote to Lady Mary Cole, the landowner, "the man whom we voted an exciseman, turns out to be a woman, whose history would afford ample matter for a Romance to be entitled the Red Woman or the Witch of Paviland – for some such personage she must have been" (letter from William Buckland to Lady Mary Cole dated 15th February 1823 in the collection of the Department of Natural Sciences, National Museum of Wales NMW 84.20G.D167; North 1942: 108). The interpretation offered by Buckland was that this was the burial of a woman who had lived in the cave during Roman times and was associated with the camp on the hill above the

cave (now known to be an Iron Age promontory fort). The grave goods included ivory bracelets, ivory rods, and perforated shells. The skeleton was also stained red with ocher, all of which led Buckland to infer that the skeleton was that of a female, a woman of loose morals. Buckland illustrated his description of his discoveries in the cave with a reconstruction of what the site might have been like before digging commenced within it (Fig. 2; Buckland 1823).

Since the discovery, the skeleton, now preserved in the collections of the Oxford University Museum of Natural History, has been subject to regular scrutiny and study, including direct dating on four occasions. The first date obtained by Kenneth Oakley in 1968 was of 18,460 ± 340 BP (BM-374; Powell 2000: 272) and caused some consternation, as it falls during the period when the ice would have been at its maximum during the last Glacial. Further dating was undertaken in 1989 on powder remaining from Oakley's date. This resulted in the more believable date of 26,350 ± 550 BP (OxA-1815; Powell 2000: 272). More recently, dates have been obtained on a rib fragment of 28,870 ± 180 BP and 28,400 ± 320 BP (OxA-412; OxA-16,502) and on a scapula fragment 29,490 ± 210 BP and 28,820 ± 340 BP (OxA-16,413; OxA-16,503) (Jacobi and Higham 2008: 904, Table 8). This new dating places the skeleton in the early Gravettian at a time that correlates with a period of interstadial warmth, and as a burial, it is currently among the oldest to be associated with manufactured grave goods (Jacobi and Higham 2010: 206).

Study of the skeleton by Trinkaus and Holliday (2000) concluded that the remains are that of a young adult male, aged in his mid-twenties at death. He was average in body size and generally relatively gracile for an early upper Paleolithic human (Fig. 3). The skeletal evidence shows no evidence for the cause of his death and his bones were generally very healthy. Stable isotope analysis of the "Red Lady" indicates a diet that had some marine content of around 10%. The suggestion is that the individual was highly mobile and that marine foods were exploited opportunistically during his annual movement around the

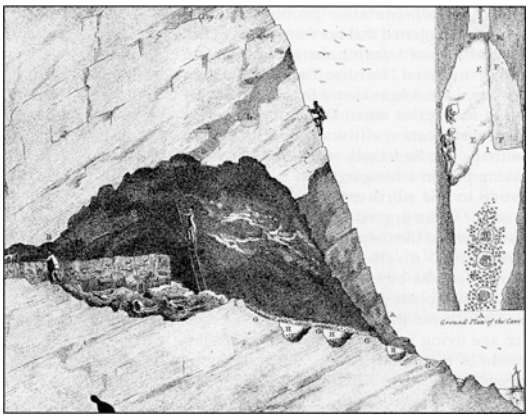

Paleolithic Archaeology of Wales: Paviland Cave, Fig. 2 William Buckland's 1823 reconstruction of the excavation of the "Red Lady" (© National Museum of Wales

Paleolithic Archaeology of Wales: Paviland Cave, Fig. 3 A cast of the "Red Lady" skeleton displayed in the National Museum Cardiff (© National Museum of Wales)

landscape, as opposed to indicating seasonal mobility between inland and coastal zones (Richards 2000). DNA analysis shows the "Red Lady" to match the most common sequence found in modern humans (Sykes 2000: 77).

The grave goods found and associated with the "Red Lady" burial include perforated shell beads of flat winkle, *Littorina littoralis*, of which Buckland recorded finding about "two handfuls" close to the part of the thigh bone where the pocket is usually worn. These may have been worn as beads or sewn onto clothing. The shells would have been available along the contemporary coastline (Aldhouse-Green 2000: 115). Ivory rods and bracelets were also found in the burial. Whether the rods were unused blanks for beads or, as Aldhouse-Green favors, as fragments of magical wands remain unclear. The bracelets are small in size and have been reinterpreted as possible talismans that were hung from clothing rather than for wearing on the wrist (Jacobi and Higham 2010: 204). The red staining of the bones, which has given the "Red Lady" his sobriquet, has been demonstrated to come from ocher, originating from locally obtained hematite that was deliberately emplaced within the grave. How the ocher came to be present remains unclear. The more probable of the theories include the possibilities that it was associated with preservation treatment of clothing or that it was sprinkled over the body in the grave. Parallels for the use of ocher in rich Gravettian burials can be found elsewhere in Europe, and so this is not uncommon (Aldhouse-Green 2000: 239).

Paviland Cave, while often best known for the remains of the "Red Lady," also contained archaeological evidence of other occupations both within the pre- and post-last Glacial periods. Evidence for this comes mainly from the lithic artifacts, which have been subject to study by a number of researchers in recent years. The lithic finds were mainly recovered from excavations which took place in the cave in 1912 by Professor William Sollas. His excavations recovered over 4000 lithic artifacts which today are split between the collections of the National Museum of Wales and the Ashmolean Museum, Oxford (Swainston and Brookes 2000: 31). Analysis of these collections has resulted in various interpretations. The most recent interpretation by Jacobi and Higham (2010: 215–216) suggest that there was a possible very late Neanderthal presence at the site evidenced by nine leaf points in the assemblage (Swainston 2000: 100). Dating at Paviland is hampered by the palimpsest nature of the assemblage, so dating of specific events is dependent on parallels drawn from other UK sites. For blade leaf points, Jacobi and Higham have drawn on the date from Badger Hole, Wookey Hole, Somerset, where a fragment of horse dentary bone, associated with a leaf point, provides a date of 36,000 ± 450 BP (OxA-11,963; Jacobi and Higham 2010: 188). Other dates from hyena dentary fragments from Bench Quarry Tunnel, Brixham, Devon, and from Pin Hole, Creswell Crags, Derbyshire, are slightly older. However, Dinnis and Stringer suggest that this interpretation may be too simplistic. They leave the answer to their question who made the Paviland blade leaf-points open as to whether it was a late Neanderthal or an early modern human (Dinnis and Stringer 2013: 105).

An evolved Aurignacian presence is indicated by a number of key tool forms in the assemblage including burin busqués and what is being termed the "Paviland burin" (Dinnis 2009). Dating of the Aurignacian occupation event is by association with dating for worked antler/bone points from Uphill Quarry, North Somerset; hyena den, Wookey Hole, Somerset; and Pin Hole, Creswell Crags, Derbyshire, all of which fall around 32,000 radiocarbon years BP (Jacobi and Higham 2010: 195). The burial of the "Red Lady" at around 29,000 radiocarbon years BP is a single event that took place in the very early Gravettian period. This was followed by a slightly later use demonstrated by the presence of tanged blades the dating of which may be around 28,000 radiocarbon years BP, based on parallels from the well-dated site of Maisières-Canal, Belgium (Swainston 2000: 108; Jacobi and Higham 2010: 210). A post-last Glacial lithic assemblage includes diagnostic tool forms such as backed blades, Cheddar points, a Creswell point, and a penknife point (Swainston 2000: 108–109). These might suggest a use of the site between around 12,600 BP and 11,600 radiocarbon years BP.

As well as the lithic artifacts, many large mammal bones were recovered during the excavations at the cave. These are also difficult to date with any certainty other than by direct dating through AMS radiocarbon techniques. The Aldhouse-Green report resulted in some 46 dates being generated on species including *Cervus elaphus*, *Ursus arctos*, *Crocuta crocuta*, *Rangifer tarandus*, *Mammuthus primigenius*, *Canis lupus*, *Equus ferus*, *Coelodonta antiquitatis*, *Bison priscus*, and *Megaloceros giganteus* (Pettitt 2000: 64). Several of these dates have now been questioned, following the introduction of ultrafiltration for dating samples, so while it is possible to say with certainty that bones of these species have been found within the deposits of Paviland Cave, their dating is considered to be less accurate than was the case at the time of their publication in 2000 (Jacobi and Higham 2010: 172).

Paviland Cave is therefore demonstrated to be one of the most significant sites of Paleolithic age in Wales. It has the longest recorded sequence of events, which can be elucidated from the lithic and dating records. The discovery of what remains the only formal burial of Gravettian age from the UK also adds to the importance of the discoveries made at this site.

Cross-References

► Paleolithic Archaeology of Wales: Overview

References

Aldhouse-Green, S. 2000. *Paviland Cave and the 'Red Lady'*. Bristol: Western Academic Specialist Press.

Buckland, W. 1823. *Reliquiae Diluvianae*. London: John Murray.

Dinnis, R. 2009. On the technology of Late Aurignacian burin and scraper production, and the importance of the Paviland lithic assemblage and the Paviland burin. *Lithics* 29: 18–35.

Dinnis, R., and C. Stringer. 2013. *Britain: One million years of the human story*. London: Natural History Museum.

Jacobi, R.M., and T.F.G. Higham. 2008. The "Red Lady" ages gracefully: New ultrafiltration AMS determinations from Paviland. *Journal of Human Evolution* 55: 898–907.

Jacobi, R.M., and T.F.G. Higham. 2010. The British earlier Upper Palaeolithic: Settlement and chronology. In *The ancient occupation of Britain*, ed. N.M. Ashton, S.G. Lewis, and C.B. Stringer, 181–222. Amsterdam: Elsevier.

North, F.J. 1942. Paviland Cave, the 'Red Lady, the Deluge and William Buckland. *Annals of Science* 5: 91–128.

Pettitt, P.B. 2000. The Paviland radiocarbon dating programme: Reconstructing the chronology of faunal communities, carnivore activity and human occupation. In *Paviland Cave and the 'Red Lady'*, ed. S. Aldhouse-Green, 63–71. Bristol: Western Academic Specialist Press.

Powell, H.P. 2000. Oxford University Museum of Natural History: summary of sampling of bone for dating. In *Paviland Cave and the 'Red Lady'*, ed. S. Aldhouse-Green, 272–273. Bristol: Western Academic Specialist Press.

Richards, M.P. 2000. Human and faunal stable isotope analysis from Goat's Hole and Foxhole Caves, Gower. In *Paviland Cave and the 'Red Lady'*, ed. S. Aldhouse-Green, 71–75. Bristol: Western Academic Specialist Press.

Swainston, S. 2000. The lithic artefacts from Paviland. In *Paviland Cave and the 'Red Lady'*, ed. S. Aldhouse-Green, 95–113. Bristol: Western Academic Specialist Press.

Swainston, S., and A. Brookes. 2000. Paviland Cave and the 'Red Lady': The history of collection and investigation. In *Paviland Cave and the 'Red Lady'*, ed. S. Aldhouse-Green, 19–46. Bristol: Western Academic Specialist Press.

Sykes, B.C. 2000. Report on DNA recovery from the Red Lady of Paviland. In *Paviland Cave and the 'Red Lady'*, ed. S. Aldhouse-Green, 75–77. Bristol: Western Academic Specialist Press.

Trinkaus, E., and T.W. Holliday. 2000. The human remains from Paviland Cave. In *Paviland Cave and the 'Red Lady'*, ed. S. Aldhouse-Green, 141–204. Bristol: Western Academic Specialist Press.

Paleolithic Archaeology of Wales: Pontnewydd Cave

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Introduction

Pontnewydd Cave, Denbighshire, Wales, contains a unique early Neanderthal site on the northwesternmost edge of the known Paleolithic world.

This cave site is unusual having survived in an area that has experienced a series of glaciations since early hominins made use of the cave 225,000 years ago. As such it makes a significant addition to the limited number of fossil hominin remains so far discovered in the United Kingdom.

Definition

Evolutionary early Neanderthal fossils, associated stone tools, and a contemporary faunal assemblage have all been excavated from deposits within Pontnewydd Cave. Dating back to around 225,000 BP during marine isotope stage 7 (MIS 7), the deposits are not in situ but washed into the cave during debris or mudflows.

Key Issues

Pontnewydd Cave in the Elwy Valley in Denbighshire, northeast Wales, provides evidence for the earliest hominin occupation of Wales. The cave was first mentioned by Reverend Edward Stanley in 1832 who described visiting it when the road was being constructed that today runs downhill from Cefn Meiriadog to Bont Newydd in the valley bottom (Stanley 1832: 42). Stanley described the cave as having great potential, as it was entirely blocked up with soil which might contain important new organic remains. William Boyd Dawkins, Mrs. Williams Wynn, and the Reverend D. R. Thomas, Vicar of Cefn, are the first people recorded to have investigated Pontnewydd Cave at a date sometime prior to 1874. The exact dates and the extent of their excavations are not recorded, but it seems these were extensive as Thomas McKenny Hughes and the Reverend Thomas, who published their own investigations of the cave in 1874, noted that the deposits had already been removed from the first 25 yards into the cave from the entrance (Hughes and Thomas 1874: 388). McKenny Hughes' work revealed a series of crude stone and flint tools, a faunal assemblage which he recorded as including *Hyaena spelaea, Ursus spelaeus, Ursus ferox, Equus caballus, Rhinoceros hemitoechus, Cervus elaphus, Capreolus capreolus, Canis lupus, Canis vulpes, Meles taxus*, and *Homo sapiens*. The human tooth was sent to George Busk for identification, and it was he who recognized it as being larger than any human tooth he had previously seen (ibid: 390). Today, this tooth is currently unlocated, although the stone tools survive in the collection of the Sedgwick Museum of Geology in Cambridge, UK.

Paleolithic Archaeology of Wales: Pontnewydd Cave, Fig. 1 Pontnewydd Cave, Denbighshire, Wales (© National Museum of Wales)

The cave was largely left untouched until 1940 when it was requisitioned for wartime use as a store for land mines and depth charges, during which time the floor was leveled and covered with gravel over which duckboards were placed. Spoil from this work was placed outside the cave entrance, and the entrance was faced with limestone blocks to camouflage it against possible enemy attack (Fig. 1; Green 1984: 19).

In 1978, Stephen Aldhouse-Green, then working for the National Museum of Wales, commenced a research project at Pontnewydd Cave that was to last until 1995 involving some 14 seasons of excavation. An interim report was published in 1984 (Green 1984), and a final monograph of his project published in 2012 (Aldhouse-Green et al. 2012). This work has led to the discovery of some significant new observations at this cave.

The stratigraphic sequence within the cave comprises a lower sands and gravel deposit derived from glacial sediments and brought into the cave in debris flow events. This is overlain by an upper sands and gravel deposit of the same origin. An intermediate complex suggests a temperate stage when soils provided organic matter and stalagmite growth could take place. These sediments contain limestone debris as well as animal bones, some hominin fossils, and stone tools. The overlying lower breccia was formed by a major debris flow event entering the cave which caused disruption to underlying deposits and contained a higher limestone component from the vicinity of the cave. Overlying this was a stalagmite floor with water-lain silt beds formed by water pooling within the cave. A further debris flow event emplaced the upper breccia during MIS 3. This event channeled the lower breccia and intervening deposits reworking them into this deposit. A red cave earth and upper clays and sands overlie the upper breccia, neither containing any archaeological material (Fig. 2). In 1987, a second entrance was uncovered on the hillside outside the cave. This was excavated in order to record the stratigraphic sequence and was found to be approximately 5 m deep. The sequence of deposits has been correlated with those excavated from within the cave and the lower contexts also generated a similar suite of stone tools, animal bones, and one hominin tooth.

One of the first discoveries to be made during recent excavations at the cave in 1980 was a hominin tooth, PN1, a left upper second molar which displays characteristic features of taurodontism (an enlarged pulp cavity and coalesced roots) (Fig. 3). Study of this tooth led to the assertion that Pontnewydd Cave had been used by early Neanderthals (Green 1981). Further hominin finds discovered at the cave have resulted in a total of 16 teeth and 1 tooth fragment confirmed as early Neanderthal in origin (a further metapodial PN14, vertebra PN3, mandible PN2, and a lower right second molar PN8 are now believed to be of Holocene date, due to direct

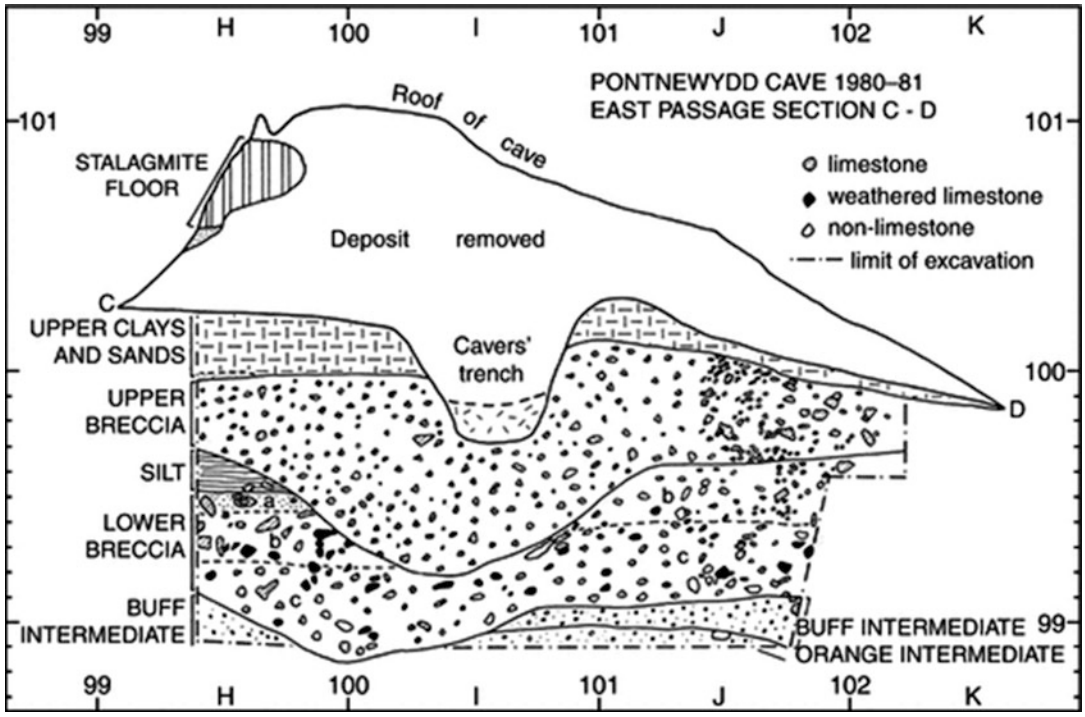

Paleolithic Archaeology of Wales: Pontnewydd Cave, Fig. 2 The main section through the cave deposits at Pontnewydd Cave (© National Museum of Wales)

Paleolithic Archaeology of Wales: Pontnewydd Cave, Fig. 3 Molar PN1 displaying features of taurodontism (© National Museum of Wales)

Paleolithic Archaeology of Wales: Pontnewydd Cave, Fig. 4 PN4, the maxilla fragment of a child aged approximately 8.5 years old. The worn deciduous premolar sits alongside a permanent first molar (© National Museum of Wales)

dating, or originating from disturbed contexts (Aldhouse-Green et al. 1996)). Recent study of the Neanderthal fossil hominins suggests that they represent a minimum of five individuals comprising an 8.5-year-old male, a 9-year-old female, an 11–11.5-year-old male, a young adult male (14–16 years), and a mature adult male. The maximum possible number of individuals represented is 16: 9 juveniles/adolescents and 7 adults. The teeth are predominantly single teeth and mostly have crowns; although a few teeth have roots, many do not. Two teeth are still in position in a right maxillary fragment. These are the remains of the 8.5-year-old male. What is particularly interesting about this individual is that the maxilla contains a heavily worn upper fourth deciduous premolar and a lightly worn upper first molar (Fig. 4). Comparisons have been made with other well-excavated and well-studied early Neanderthal populations from elsewhere in Europe. The sites of Krapina, Croatia, and the Sima de los Huesos (SH) site at Atapuerca, Spain, have some of the closest parallels to the Pontnewydd Cave teeth. Detailed study has been undertaken of the many different dental traits and their comparisons across these and other assemblages of similar and different ages in work done by Compton and Stringer (2012).

As well as hominin fossils, the excavations at Pontnewydd Cave generated a substantial stone tool assemblage. Some 1284 stone tools were recovered and study of the character and taphonomy of the artifact assemblage suggests that the main hominin occupation took place just outside the modern cave system. The raw materials used to make the tools are predominantly hard volcanic rocks with just a small number of flint. The dominant raw materials are ignimbrite and rhyolite as well as a variety of volcanic tuffs. The resulting stone tools are consequently very crude in appearance, the nonconchoidal fracturing of such rocks resulting in laminar fractures and irregular forms. The majority of the raw materials used was available locally and need not have been transported far. Many different debris flow movements have moved artifacts from their original sites of deposition. The assemblage is technologically very consistent and may represent a single extended phase of occupation, or possibly a palimpsest of short occupations. Tool forms include Acheulian bifaces as well as a Levallois technology of prepared cores, flakes, and blades. Retouched tools include

Paleolithic Archaeology of Wales: Pontnewydd Cave, Fig. 5 Stone tools discovered during excavations at Pontnewydd Cave (© National Museum of Wales)

scrapers, knives, and denticulates (Fig. 5). There is no human occupation associated with the MIS 3 fauna in the upper breccia debris flow event.

The faunal assemblage from Pontnewydd Cave has been studied by Andrew Currant formerly of the Natural History Museum, London. The species list for the MIS 7 contexts comprises *Canis lupus, Ursus* sp., *Panthera pardus, Panthera leo, Equus* sp., *Stephanorhinus kirchbergensis, Stephanorhinus hemitoechus, Cervus elaphus, Castor fiber, Arvicola cantiana, Arvicola* sp., *Microtus gregalis*, and birds. The MIS 3 context species list comprises: *Canis lupus, Vulpes vulpes, Ursus arctos, Equus ferus, Rangifer tarandus, Ovibos moschatus, Dicrostonyx torquatus*, and *Lepus timidus*. The assemblage from the intermediate complex and the lower breccia are deemed to be of MIS 7 age with a later MIS 3 faunal accumulation from the upper breccia.

The final report, published in 2012, draws together the information gleaned by these studies and puts them into full context.

Cross-References

► Paleolithic Archaeology of Wales: Overview

References

Aldhouse-Green, S., R. Peterson, and E.A. Walker, eds. 2012. *Neanderthals in Wales: Pontnewydd and the Elwy Valley caves*. Oxford: Oxbow.

Aldhouse-Green, S., P. Pettitt, and C. Stringer. 1996. Holocene humans at Pontnewydd and Cae Gronw caves. *Antiquity* 70: 444–447.

Compton, T., and C. Stringer. 2012. The human remains. In *Neanderthals in Wales: Pontnewydd and the Elwy Valley caves*, ed. S. Aldhouse-Green, R. Peterson, and E.A. Walker, 118–230. Oxford: Oxbow.

Green, H.S. 1981. The first Welshman: Excavations at Pontnewydd. *Antiquity* 55: 184–195.

Green, H.S. 1984. *Pontnewydd cave, a lower Palaeolithic hominid site in Wales, the first report*. Cardiff: National Museum of Wales.

Hughes, T.M., and D.R. Thomas. 1874. On the occurrence of felstone implements of the le Moustier type in Pontnewydd cave, near Cefn, St Asaph. *Journal of the Anthropological Institute* 3: 387–390.

Stanley, E. 1832. Memoir on a cave at Cefn in Denbighshire. *Edinburgh New Philosophical Journal* 14: 40–53.

The Paleolithic in Hungary

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Introduction/Historical Background

Systematic Paleolithic research in Hungary began at the end of the nineteenth century when three bifacial knapped lithic tools were found in Miskolc (northeast Hungary) during building the house of János Bársony (prosecutor of Miskolc) on the right bank of the Szinva Creek in the center of the town. Due to their shapes, Ottó Herman (1835–1914, ornithologist, arachnologist, ichthyologist, ethnographic, and also a politician), the polyhistor of Miskolc, classified the three finds as Paleolithic handaxes, similar to those found in the Somme River terraces in France. Critics doubted the Pleistocene origin of the finds and Herman's claim that humans lived in Hungary during the

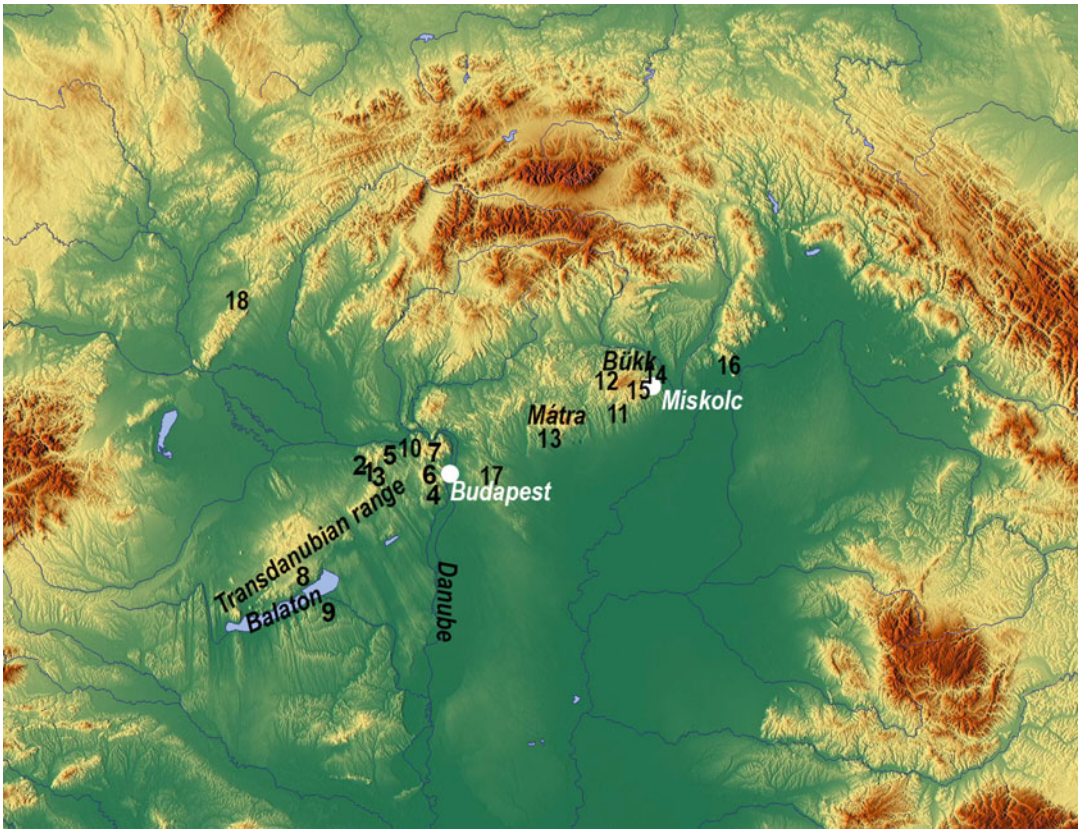

The Paleolithic in Hungary, Fig. 1 Sites mentioned in the text. 1: Vértesszőlős; 2: Tata; 3: Szelim 4: Érd; 5: Jankovich Cave; 6: Remete-Felső Cave; 7: Pilisszántó Rockshelter; 8: Lovas; 9: Ságvár; 10: Esztergom-Gyurgyalag; 11: Subalyuk Cave; 12: Istállóskő Cave and Peskő Cave; 13: Nagyréde; 14: Sajóbábony; 15: Diósgyőr-Tapolca Cave, Görömböly-Tapolca Cave, Szeleta Cave and Balla Cave; 16: Bodrogkeresztúr; 17: Jászfelsőszentgyörgy; 18: Dzeravá skala. Created on OpenStreetMap

Paleolithic. To find solid evidence for the existence of Paleolithic human population in Hungary, Herman took advantage of his political connections in Ignác Darányi (1849–1927), minister of agriculture, who encouraged the Royal Geological Institute of Hungary to launch excavations in the karstic caves of the Bükk Mountains in 1906. This action aimed at finding remains of Palaeolithic human cultures in Pleistocene geological depositional environment. The only person at the Royal Geological Institute of Hungary with an interest in cave excavations was Ottokár Kadić (1876–1957), born to a Hungarian–Croatian family. Kadić graduated as a zoologist specialized in insect anatomy, but also had interest in paleontology and prehistory. The latter field increasingly occupied his scientific interest since he reported upon of the discoveries of Neanderthal remains at Krapina Cave in Croatia in 1899. The first successful excavation in the Bükk Mountains which unearthed lithic tools from within Pleistocene layers was carried out at Szeleta Cave between 1906 and 1913 (Fig. 1). Kadić found the first bifacial laurel leaf point together with cave bear remains in 1907. The Pleistocene age of the assemblage became internationally accepted in 1911 at a paleoanthropological conference held in Tübingen, Germany. After the breakthrough of the Szeleta finds into the international research, Kadić excavated further caves in the Bükk Mountains: Peskő (1912–1942), Büdöspest (1913–1927), Herman Ottó

(1915–1916), and Subalyuk (1932). Jenő Hillebrand (1884–1950), anthropologist, the head of the archaeological division at the Hungarian National Museum, joined Kadić at the Szeleta excavations and then started his own researches in Bükk Mountains at Balla Cave (1909–1913) and Istállóskő Cave (1912–1917), Jankovich Cave (1913–1925), and Kiskevély Cave (1912–1914) in Transdanubia and Dzeravá skala (back then Pálffy Cave) in western Slovakia in the Lesser Carpathians. Further pioneers in Palaeolithic research in Hungary who conducted excavation before World War II (WWII) were Tivadar Kormos (Tata, Pilisszántó I Rockshelter), Andor Saád (Diósgyőr-Tapolca Cave, Szeleta Cave, Istállóskő Cave), Géza Megay (Görömböly-Tapolca Cave), István Gaál (Szelim Cave), and Sándor Gallus (Ságvár). The common in all the researchers active before WWII is that they were self-trained archeologists.

Definition

Lower Paleolithic

The only reliably dated Lower Palaeolithic site of Hungary is located in Vértesszőlős, western Hungary. The human occupations were found in a travertine quarry and the formation of the rock dates back to the Middle Pleistocene. Today the site is located in the open-air exhibition area of the Hungarian National Museum. László Vértes (1914–1968) excavated the site between 1963 and 1968 (Kretzoi and Dobosi 1990) and recovered four loci (sites) within the quarry out of which site I and III were the most abundant in settlement remains. Site I embedded four archaeological layers and site III did five. In the section of site I, layer 3 was covered by loess and layer 4 situated on top of the loess. Besides the archaeological remains, the travertine beds preserved an important set of Middle Pleistocene vegetal imprints and animal footprints. The most important archaeological assemblage from the site, however, consists of five fragments of teeth of a young individual and an occipital bone of an adult nicknamed Sámuel /ʃa:muɛl/. Four teeth fragments were found at site I in layer 1 and the fifth fragment among travertine debris collected from the vicinity of the finding area of the other four fragments. The occipital bone lay eight meters outside of site 1 within the travertine. According to the anatomical features, the occipital bone belongs to a *Homo heidelbergensis* that bore already some characters of the Neanderthals (Kretzoi and Dobosi 1990). The area of the site seems to have been favored by herbivores due to vegetal resources and access to water, and therefore, carnivores and humans could have been attracted by the visits of herbivores. The large mammal remains (bison, horse, rhino, deer) in the archaeological layers were found severely smashed. However, the accumulation of the bones could have only partially been related with human activity. Natural processes were also active in the formation of the archaeological record (Kretzoi and Dobosi 1990). Besides the traces of on bone breakage, the lithic artifacts and burnt bone heaps interpreted as hearths are also clear evidences of human settlements. The human occupations were dated to between ca. 200 and 350 kya with U-Th series (Kretzoi and Dobosi 1990). Recently, the travertine that included the human occipital bone was dated to 315 kya and the earliest cultural layer to 328 kya (Kele et al. 2016). According to the sedimentation in site I, the human occupation started in the OIS 9 warm period and ran into the cold OIS 8. The lithic artifacts were made of small pebbles of radiolarite and quartzite; thus, the toolkit is on average, small ca. 3 cm. Frequent types are choppers, chopping tools, notched and denticulated tools (often pointed), and scrapers. Vértesszőlős hominins utilized a similar pebble technology to the Middle Palaeolithic Neanderthals dated to the OIS 5 at the nearby Tata (Borel et al. 2017). This sliced pebbles to obtain blanks with cortical surfaces and removed flakes in a manner similar to discoid and half discoid debitage. Also, angular fragments were obtained by bipolar flaking.

Middle Palaeolithic

Middle Palaeolithic (MP) sites in Hungary can be divided into three broad cultures: Mousterian, Taubachian, and a bifacial MP.

The Mousterian has two archaeological manifestations: the typical Mousterian and the Quina

type Mousterian. The only site where both types were found in superposition is Subalyuk Cave, Bükk Mountains. The typical Mousterian was recovered from layers 1–7 and the Quina Mousterian from layers 8–14 (Mester and Patou-Mathis 2016; N.B. the numbering of the layers is ordered from bottom to top). Tentatively, layers 1–3 can be dated on the basis of the fauna to OIS 5e, layer 4 to OIS 5b, layers 5–6 to OIS 5a, layers 7–13 to OIS 4, and layer 14 to OIS 3. Zooarchaeological studies illustrated that the cave was periodically used as a den for wolves, hyenas, and cave bears (Mester and Patou-Mathis 2016). Humans occupied the cave rarely but when used, it was occupied seasonally and most archaeological remains were formed during ephemeral visits related to hunting. The typical Mousterian assemblages are accompanied by alpine ibex, chamois, red deer, aurochs, horse, and woolly rhinoceros. The lithic assemblage of the typical Mousterian employed Levallois technology, but flakes were also made using the discoidal method. The toolkit is composed of sidescrapers and Mousterian points and the blanks of the tools are often elongated.

The Quina Mousterian assemblages at Subalyuk Cave are accompanied by the same spectra of herbivores. The lithic tools were mostly made by the discoid and Quina methods, but remnants of Levallois technology were also found. Accordingly, many of the tools were made on thick, wide flakes. Quina type sidescrapers dominate these assemblages. Remarkable finds of the Quina Mousterian are the skeletal remains of two individuals of Neanderthals, an adult female and an infant (Tillier et al. 2006). The adult is represented by the mandible, a few vertebral fragments (atlas in three parts, three bodies, one spine process of a thoracic vertebra), the *manubrium sterni*, the sacrum, the left patella, fragments of a left second metacarpal and left proximal phalanx, the complete right second and left fourth metatarsal and a fragment of right third metatarsal. Compared to western European remains, the Subalyuk Neanderthal adult is less robust. One modern-like feature of the skeleton is the presence of an *incurvatio mandibulae anterior* (Tillier et al. 2006). The juvenile skeletal remains are represented by a cranium with two maxilla and the left nasal bone. Analyses of the human bone deposition supposed that the child was buried and the adult body lay on the cave floor uncovered (Mester and Patou-Mathis 2016).

Further typical Mousterian finds from Hungary are sporadic, but more abundant evidences were found for Quina Mousterian occupations. The largest site after Subalyuk Cave was found at Érd in the Transdanubia, western Hungary, excavated by Veronika Gábori-Csánk (1929–1996) (Mester and Moncel 2006). The site is found in open-air embedded in loess. The human occupations originally were interpreted as a cave bear hunting camps, and zooarchaeological analyses revealed that the site alternatively was occupied by denning cave bears, hyaenas, and humans (Daschek 2015). Besides the wealth of cave bear bones, archaeological remains are knapped quartzite tools made of pebbles. The archaeological finds are found in six levels embedded within three stratigraphic units. The flakes were produced with semi-discoid, discoid, and Quina methods; the tools are most frequently sidescrapers. Two levels were dated with the decay counting radiocarbon method on charcoals, but the dates 35 ka and 44 ka uncal BP seem young compared to the age estimated on the basis of the stratigraphy to the Lower Pleniglacial period ca 60 ka.

The largest site of Taubachian in Hungary is Tata (Borel et al. 2017). Tata, similarly to Vértesszőlős, was also found intercalated by travertine beds. Tata has been excavated since the early twentieth century to present through several campaigns. The fauna consisted mostly of mammoth and horse remains and a remarkable find is a mammoth tooth plate polished and stained with red ochre. The travertine beds delimiting the archaeological layer were dated to 116 kya 3 m below and 76 kya 1 m above with U-Th series; therefore, the archaeological layer is of Early Weichselian age. With this dating, this is the only reliably radiometrically dated MP site in Hungary. The lithic tools were made of small radiolarite pebbles giving the industry a microlithic character. The cores were exploited from two or more striking platforms, and several items showed similarity to discoid and half discoid

method. The technological root of the Taubachian industry was found in the Lower Palaeolithic, for instance, Vértesszőlős site dated to MIS 9. Frequent tool types are sidescrapers, offset points, denticulated flakes, and notches. Bifacial retouching also occurs on a few tools.

The third type of MP human culture produced bifacially shaped lithic tools. Out of the bifacial MP cultures, the earliest could be the Jankovichian. The culture received its name from Jankovich Cave in the Transdanubian Range, Gerecse Mountains. Gábori-Csánk (1993) pointed out that the bifacial tools were similar to those found in the late MP Central European bifacial leaf point industries, today called Micoquian. A striking character of the Jankovichian culture is the bifacial leaf-shaped tool and the presence of Levallois technology. At Remete-Felső Cave, Jankovichian tools were found associated with two incisors and a canine of *Homo*, which do not have distinct features of either Neanderthals or modern humans (Tillier et al. 2006).

Another bifacial phenomenon in the Hungarian MP is called the Bábonyian. Several open-air sites have been found along the eastern margin of the Bükk Mountains though the only excavated one is at the eponymous site in the village of Sajóbábony (Ringer and Adams 2000). The Bábonyian also was defined as a variant of the Central European Micoquian (Ringer 1983). To date, the chronological position of this industry is insecure due to the lack of absolute dating and reliable stratigraphy. Bábonyian lithic tool types are MP type scrapers, bifacial knives, bifacial leaf points, small hand axes, and rarely sturdy blade tools of Upper Palaeolithic (UP) types such as the endscraper. Open-air sites with bifacial tools and solely MP tool types were also recorded from the western half of the North Hungarian Range, but absolute dating has yet to be performed (Markó 2008–2009).

Middle to Upper Palaeolithic Transition

The beginning of the UP in Hungary long has been related with the Szeletian, which is often classified as an MP–UP transitional industry due to that it contains bifacial leaf points, leaf-shaped bifacial scrapers, endscrapers, UP tools made of blades, and retouched and notched flakes (Mester 2014). The eponymous site, Szeleta Cave, located in northeastern Hungary, today is considered inappropriate to represent what the Szeletian is. The main reason is the weak archaeological integrity of most layers that seem to have been reworked by geogenic and biological agents (Lengyel and Mester 2008). Originally, the Szeletian was divided into two phases, the Early and Upper, and Szeleta Cave was the only site in Central Europe to reveal the two phases in superposition. While the dating of the Upper Szeletian layers at Szeleta Cave is insecure (Lengyel and Mester 2008), the Early Szeletian layers at Szeleta Cave were dated to between 46 and 36 ka uncal BP (Hauck et al. 2016).

Upper Paleolithic

The earliest UP archaeological entity in Hungary is the Aurignacian. The first site recovered in Hungary was Istállóskő Cave, Bükk Mountains. Excavations in the 1910s by Jenő Hillebrand unearthed the first lithics and after several campaigns of others (O. Kadić, M. Mottl and A. Saád) László Vértes recovered between 1947 and 1951 the two-fold cultural succession what today is widely known from the site (Vértes 1955). Thus, the archaeological sequence contained Aurignacian I (lower layer) and Aurignacian II (upper layer) occupations. The lower layer yielded about a hundred osseous tools complete and fragmented and a few lithic remains. The split base osseous point was the prime character of this assemblage. In the upper layer, the number of osseous tools dwindled, but the lithics were more numerous. Mladeč points (a broad-based point) characterized this osseous industry. Also, a modern human child tooth (permanent molar) was found in the upper layer by Vértes (Tillier et al. 2006). Direct radiocarbon dates obtained from two antler points (not split-based type) from the lower layer ca 35–33 ka uncal BP (Davies and Hedges 2008–2009) also confirm the Aurignacian chronological position. The upper layer radiocarbon dates 28–30 ka uncal BP on charcoals (Davies and Hedges 2008–2009) are similar to those obtained from

sites yielding broad-based bone points in Moravia, Czech Republic (Wild et al. 2006) and Slovenia (Moreau et al. 2015). Most lithics from the two layers of Vértes are general types such as retouched blades and flakes, end-scrapers, and burins, except a very few bifacially shaped tool fragments, and some backed bladelets in the upper layer (Markó 2015). The presence of bifacially shaped tools was often interpreted as a Szeletian intrusion (Vértes 1955), but the backed bladelets clearly signify a Gravettian occupation at Istállóskő (Markó 2015). The pre-Vértes material, which is merged into the upper layer today (Markó 2015), nevertheless, was attributed to the end of the Middle Aurignacian or Upper Aurignacian by the taxonomy of the 1930s, which is today equivalent of the Gravettian. Besides the dominating cave bear, the fauna of the lower layer consist of chamois, reindeer, ibex, and bison (Vörös 2003–2004). The upper layer shows a similar spectrum of animals with the addition of elk (Patou-Mathis et al. 2016).

Another dated Early Upper Paleolithic site in Hungary is Peskő Cave near Istállóskő. Peskő is also classified among the Aurignacian sites in Hungary, and by 14C dates 33.5–38.3 ka uncal BP obtained from osseous artifacts, this could be the oldest one (Davies and Hedges 2008–2009). However, typologically the osseous tool assemblage is rather undiagnostic, so are the lithic tools that are general UP types lacking any attribute of Aurignacian (Mottl 1942).

The directly dated earliest modern human remain in Hungary that may have belonged to the Aurignacian population was found at Görömböly-Tapolca Cave in Bükk Mountains by G. Megay. The human remain is an occipital bone (Tillier et al. 2006) dated to 30.3 ka uncal BP (Davies and Hedges 2008–2009). The small lithic assemblage recovered together with the occipital bone is typologically undiagnostic; therefore, the cultural affiliation of the site remained unclear.

Characteristic Aurignacian lithic assemblages were reported only from open-air sites yet unexcavated in eastern Hungary, for instance, Nagyréde near Mátra Mountains (Chu 2018; Chu et al. 2018; Lengyel et al. 2006). Typologically, the carinated endscraper, nosed endscraper, carinated burin, busked burin, and retouched blades are clear characters of the Aurignacian.

The Middle UP (MUP) archaeological record in Hungary begins with the Gravettian. The earliest Gravettian occupations were claimed to be as old as 28–26 ka uncal BP and classified Pavlovian or Old Blade Gravettian (Dobosi 2009). The Pavlovian was described as a blade technology that produced mostly burins, end-scrapers, and retouched blades. Backed blades and bladelets and Gravette/microgravette points compose the minority of the tools. Mammal species from the sites were the reindeer, elk, mammoth, and horse. A prominent site from this period is Bodrogkeresztúr in north eastern Hungary.

The Late UP (LUP) period is coeval with the Last Glacial Maximum (LGM) and the subsequent deglaciation period between 21 and 12 ka uncal BP (Dobosi 2009). The human settlements belong to the Ságvárian and Epigravettian cultures. People of both cultures hunted reindeer and horse.

A widely known LGM site in Hungary is Ságvár (the eponym for Ságvárian) where Miklós Gábori (1925–1996) recovered remains of two huts. The Ságvárian culture dated to between 20 and 17 ka uncal BP was characterized by the use of fine grained radiolarite pebbles to obtain UP type tools; therefore, a synonym for the Ságvárian was the Pebble Gravettian. The tool types are similar to those found in the Pavlovian, including the backed bladelets. The Epigravettian was defined in Hungary as a descendant of the Gravettian on the basis of the blade technology and the lack of pebble processing in lithic technology (Dobosi 2009). Opposed to the Ságvárian, Epigravettian sites were dated to the end of the LGM and to the whole post-LGM period until the terminal Pleistocene. The Epigravettian 18 and 12 ka BP was divided into two phases (Dobosi 2009): expedient lithic industries between 18 and 16 ka BP, for example, the site of Jászfelsőszentgyörgy, and backed bladelet dominated industry between 16 and 12 ka BP after Esztergom-Gyurgyalag site. Both Epigravettian phases lack the pebble raw material use and the tool types of the Pavlovian characterized the Epigravettian. A frequently used synonym for the Epigravettian is the Young Blade Gravettian.

During the terminal UP period, Hungary seems to have been rarely populated because the only site is Lovas near Lake Balaton (Sajó et al. 2015). Lovas, dated to ca 11.5–12.0 ka uncal BP, was a mineral dyes extraction site that preserved several mining tools made of elk bone. Since the lithic tools are undiagnostic, it is insecure to culturally classify the site.

Key Issues/Current Debates

Many of the key Paleolithic cave sites of Hungary were excavated in the first half of the twentieth century often without producing useful documentation. Also, the large portion of the sediments were removed at these sites and no complete stratigraphic sequences are available to study today. This issue greatly supports debates over the interpretation of their archeological assemblages.

Emerged from this situation, an intensive debate was formulated over Jankovich Cave. The assemblage has a dual character. On the one hand, it contains bifacial leaf tools which match the Late MP (LMP) chronological position and, on the other hand, there is an osseous point component of the assemblage, which generally is related with EUP. These two components of the archaeological record were recently claimed to have been formed together by LMP Neanderthal technology (Markó 2013).

The Jankovich case further touches upon the interpretation of the Istállóskő Cave Aurignacian occupations, where the lithic industries of both layers lack Aurignacian character. Due to the absence of Aurignacian lithic tool types, Markó (2015) found no evidence to classify the lower layer as Aurignacian and instead suspected a similarity with Jankovich Cave's LMP assemblage containing both bifacial leaf tools and osseous points. Opposed to this, Patou-Mathis et al. (2016) claimed Istállóskő Cave lower layer is Early Aurignacian since split base points were never found associated at sites having good archeological integrity with cultures other than Aurignacian. The zooarchaeology study by Patou-Mathis et al. (2016) emphasized that the osseous hunting weaponry and the lack of diagnostic Aurignacian lithic tools refer to differences in site function between caves and open-air sites of Aurignacian in Hungary. Istállóskő Cave upper layer, according to Patou-Mathis et al. (2016), is most likely also Aurignacian, based on those few diagnostic artifacts, while Markó (2016) claimed this is the only well-dated assemblage where leaf shaped tools and Gravettian artifacts were found together.

After several revisions on the archeological sequence at Szeleta Cave, the eponymous site of the Szeletian culture still seems to be inappropriate to represent what Szeletian is. Most likely, the Early Szeletian at Szeleta Cave (layers 3–4) represent the Szeletian of Central Europe (Mester 2014). But, due to the presence of other cultural remains interstratified such as Aurignacian and Gravettian, also to dating anomalies (Lengyel and Mester 2008; Markó 2016), the assemblages of layers 3 and 4 are most likely impure for technological considerations. The bifacial leaf point collection of the Szeleta Cave layers 3–4 was found similar with Jankovich Cave bifacials and therefore there might be a possibility that the Szeletian is an LMP industry (Mester 2017). The Upper Szeletian assemblages (layers 5–6), which contain backed bladelets and Gravette/microgravette points were classified as an industry contemporaneous with the Late Gravettian directly preceding the Last Glacial Maximum (Lengyel et al. 2016). Concerning the putative chronological position of these layers, Markó (2016) found no reason to date these artifacts to the Late Gravettian.

Another debate goes on over the classification of the MUP and LUP in Hungary. The latest research on the lithic assemblages from the period between 28 and 12 ka uncal BP proposed that the first Gravettian settlements can be dated to the Late Gravettian period 25-21 ka uncal BP on the ground of typological similarities with dated sites in Slovakia, Poland, Czech Republic, and Austria (Lengyel 2016). Main arguments for a new taxonomy were the lack of Pavlovian artifacts in the assemblages called Pavlovian and the low integrity of the radiocarbon dating results which did not

support the claimed chronological position of the Pavlovian assemblages. Concerning the LUP, Lengyel (2016) further proposed to call all LGM sites Early Epigravettian and abandon the term Ságvárian, and reclassified sites dated after the LGM under the term Late Epigravettian.

International Perspectives and Further Directions

As far as the Hungarian Paleolithic research is concerned, the number of projects and the international dissemination of the results is less intense in comparison with other countries of Europe. An important task for the Hungarian research is to enlarge the number of researches with involving wider spectrum of scientific analytical methods for maximizing the quality of the achievements. The territory of Hungary possesses only a fragment of the archaeological record of each Paleolithic hunter-gatherer society in this region. The most effective way, therefore, to study and interpret the archaeological record of Hungary is in collaborations with other countries situated on the same foraging territory of Paleolithic hunter-gatherers.

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References

Borel, A., V. Dobosi, and M.H. Moncel. 2017. Neanderthal's microlithic tool production and use, the case of Tata (Hungary). *Quaternary International* 435 (A): 5–20.

Chu, W. 2018. The Danube corridor hypothesis and the Carpathian Basin: Geological, environmental and archaeological approaches to characterizing Aurignacian dynamics. *Journal of World Prehistory* 31 (2): 117–178.

Chu, W., G. Lengyel, C. Zeeden, A. Péntek, L. Kaminská, and Z. Mester. 2018. Early upper Paleolithic surface collections from loess-like sediments in the northern Carpathian Basin. *Quaternary International* 458: 167–182.

Daschek, É.J. 2015. *Étude archéozoologique des grands mammifères du gisement Paléolithique moyen d'Érd (Hongrie)*, BAR international series 2694. Oxford: Archaeopress.

Davies, W., and R. Hedges. 2008–2009. Dating a type site: Fitting Szeleta cave into its regional chronometric context. *Praehistoria* 9–10: 35–45.

Dobosi, V.T. 2009. Constancy and change in upper Palaeolithic, Hungary, In *Le concept de territoires dans le Paléolithique supérieur européen. 15th international congress of prehistoric and protohistoric sciences (15th: 2006: Lisbon, Portugal), Proceedings of the XV world congress (Lisbon, 4–9 September 2006),* BAR International Series 1938, ed. F. Djindjian, J. Kozłowski, and N. Bicho, 123–133. Oxford: Archaeopress.

Gábori-Csánk, V. 1993. *Le Jankovichien: Une Civilisation Paléolithiques en Hongrie*. Vol. 53. Liège: ERAUL.

Hauck, T.C., J. Richter, W. Chu, O. Vogels, J. Rethemeyer, P. Rentzel, P. Schulte, F. Lehmkuhl, S. Heinze, and Á. Ringer. 2016. Neanderthals or early modern humans? A revised 14C chronology and Geoarchaeological study of the Szeletian sequence in Szeleta cave (Kom. Borsod-Abaúj-Zemplén) in Hungary. *Archäologisches Korrespondenzblatt* 46: 271–290.

Kele S., A. Markó, J. Cseh, Ch.–Ch. Shen, Ch.-Ch. Wu, and S.M. Bernasconi. 2016. Dating and clumped iso based temperature of the Vértesszőlős travertine and Early Man site (Hungary). In *Lost worlds of the stone age in travertine. Abstract book of the 5th geological-palaeontological-archaeological discussion*, ed. M. Sabol and O. Žaár, 14.

Kretzoi, M., and V.T. Dobosi, eds. 1990. *Vértesszőlős, Man, Site and Culture*. Budapest: Akadémiai Kiadó.

Lengyel, G. 2016. Reassessing the middle and late upper Palaeolithic in Hungary. *Acta Archaeologica Carpathica* 51: 47–66.

Lengyel, G., and Z. Mester. 2008. A new look at the radiocarbon chronology of the Szeletian in Hungary. *Eurasian Prehistory* 5 (2): 73–83.

Lengyel, G., S. Béres, and L. Fodor. 2006. New lithic evidence of the Aurignacian in Hungary. *Eurasian Prehistory* 4 (1–2): 83–89.

Lengyel, G., Z. Mester, and P. Szolyák. 2016. The late Gravettian and Szeleta cave, Northeast Hungary. *Quaternary International* 406 (A): 174–183.

Markó, A. 2008–2009. Raw material use at the middle Palaeolithic site of Vanyarc (Northern Hungary). *Praehistoria* 9–10: 183–194.

Markó, A. 2013. On the middle Palaeolithic industry of the Jankovich cave (Northeastern Transdanubia). *Archaeológiai Értesítő* 138: 7–28.

Markó, A. 2015. Istállóskő revisited: Lithic artefacts and assemblages, sixty years after. *Acta Archaeologica Academiae Scientiarum Hungaricae* 66: 5–38.

Markó, A. 2016. Considerations on the lithic assemblages from the Szeleta cave. *Communicationes Archaeologicae Hungariae* 2015–2016: 5–44.

Mester, Z. 2014. Le Szélétien. In *Néandertal / Cro-Magnon – La Rencontre*, ed. M. Otte, 149–188. Arles: Éditions Errance.

Mester, Z. 2017. Considérations sur le Szélétien en Hongrie: la relation du Jankovichien au Szélétien ancien. *Anthropologie: International Journal of the Science of Man* 55 (1–2): 75–92.

Mester, Z., and M.-H. Moncel. 2006. Le site paléolithique moyen d'Érd (Hongrie): nouvelles données sur les chaînes opératoires et résultats morpho-fonctionnels de la production. *Anthropologie: International Journal of the Science of Man* 44 (3): 221–240.

Mester, Z., and M. Patou-Mathis. 2016. Nouvelle interprétation des occupations néanderthaliennes de La grotte Subalyuk (Hongrie du nord). *Acta Archaeologica Carpathica* 51: 7–46.

Moreau, L., B. Odar, A. Horvat, T. Higham, P. Turk, and D. Pirkmaier. 2015. Reassessing the Aurignacian of Slovenia: Lithic techno-economic behaviour and direct dating of osseous projectile points. *Journal of Human Evolution* 78: 158–180.

Mottl, M. 1942. Das Aurignacien in Ungarn. *Quartär* 4: 82–108.

Patou-Mathis, M., C. Vercoutère, G. Lengyel, P. Szolyák, and Z. Mester. 2016. New interpretation of the upper Palaeolithic human occupations at Istállóskő cave (Bükk Mountains, Hungary). *Eurasian Prehistory* 13 (1–2): 77–90.

Ringer, Á. 1983. *Bábonyien: Eine mittelpaläolitithische Blattwerkzeugindrustrie in Nordost-Ungarn*. Budapest: Eötvös Loránd Tudományegyetem.

Ringer, Á., and B. Adams. 2000. Sajóbábony-Méhésztető, eponymous site of the middle Paleolithic Bábonyian industry: Microwear studies made on tools found at the site during the 1997 excavation. *Praehistoria* 1: 117–128.

Sajó, I.E., J. Kovács, K.E. Fitzsimmons, V. Jager, G. Lengyel, B. Viola, S. Talamo, and J.-J. Hublin. 2015. Core-shell processing of natural pigment: Upper Palaeolithic red ochre from Lovas, Hungary. *PlosOne* 10 (7): e0131762.

Tillier, A.-M., Z. Mester, D. Henry-Gambier, I. Pap, Á. Ringer, and G. Gyenis. 2006. The middle-upper Palaeolithic transition in Hungary: An anthropological perspective. In *En el centenario de la Cueva de El Castillo: el ocaso de los Neandertales: Actes du Colloque international*, ed. V. Cabrera Valdés, F.B. de Quirós Guidotti, and J.M. Maíllo Fernández, 89–106. Santander: Centro Asociado a la Universidad Nacional de Educación a Distancia en Cantabria.

Vértes, L. 1955. Neuere Ausgrabungen und paläolithische Funde in der Höhle von Istállóskő. *Acta Archaeologica Academiae Scientarium Hungaricae* 5: 111–131.

Vörös, I. 2003–2004. Stratigraphy and biostratigraphy of Istállóskő cave. *Praehistoria* 4-5: 33–76.

Wild, E.M., M. Teschler-Nicola, W. Kutschera, P. Steier, and W. Wanek. 2006. 14C dating of early upper Palaeolithic human and faunal remains from Mladeč. In *Early modern humans at the Moravian gate, the Mladeč caves and their remains*, ed. M. Teschler-Nicola, 149–158. Wien: Springer.

Paleonutrition and Bioarchaeology: Ethical Perspectives

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Introduction

The development of bioarchaeology through the study of ancient populations at large and their contextual data in particular has contributed to the emergence of many subdisciplines, for example, paleonutrition, paleopathology, paleoparasitology, paleoepidemiology, and palaeogenetics. However, key issues have often emerged from paleonutrition, as this area covers both nutrition (nutrients provided by food) and diet (food consumed by humans). These two themes are essential for bioarchaeologists who explore the evolution of human societies. When we ask about what people ate in the past, it is a way of approaching the notion of identity of a population and its adaptation to an environment through the adoption of an economic strategy. Eating behaviors (food consumption and cooking practices) are cultural characteristics that may reflect a biological identity; however, this is not always so, because culture is not simply equal to biology. Thus, paleonutritional reconstructions contribute indirectly to stimulate current ethical debates in bioarchaeology, especially when analyzing human remains that are ancestors to descendant communities today.

Definition

As a participant to a holistic and scientific approach based on the study of sites, bioarchaeology integrates various cultural (history, archaeology) and biological data (demography, health, diet, origins). Two notions are central to this approach which originates from the New Archaeology and Anthropology: that of

"population" in evolutionary terms but also that of "society." The goal is thus to attempt to reproduce both biological but also social history (way of life in the past) for a past group and to explore their relationship with their environment (Larsen 1999). The subdiscipline of paleonutrition, although focusing on past eating behaviors and their evolution through time, concerns many other aspects, including the study of ancient diseases and mortality issues (Steckel and Rose 2002). Indeed, the specific sanitary and epidemiological conditions of a group can be explained by many factors (genetic and environment) and, moreover, are not necessarily directly linked to the diet consumed. After the development of archaeological sciences and of paleoenvironmental studies, bioarchaeology and consequently paleonutrition now rely on a wide range of data, from soil to ecofacts, artifacts, and bones.

Key Issues

Firstly, major advances in paleonutrional studies are largely dependent on the type of data analyzed. Previously, these studies were mainly based on the analysis of artifacts, fauna, and plants, in order to explore diet and nutrition. Currently, all of the results already obtained have been clarified, thanks to the analysis of stable isotopes (on elements such as carbon and nitrogen) (Katzenberg 2008). Chemical analyses performed on plant and animal remains provide us with direct information on the type of food consumed during life. However, there are well-known biases in relation to various factors: climate, diagenesis, variable remodeling of the bone, and the influence of food on the marine carbon isotopic signatures. Although this approach cannot reveal the nature and quantity of nutritional intake as precisely as studies on living populations, it may suggest the main food groups consumed in the past and their position in the food chain. The analysis of stable isotopes of carbon and, in particular, the different photosynthetic modes (C_4 et C_3) observed in wild and domesticated plants allows us to identify the emergence of agriculture and imported foods in different regions of the world (corn in the Americas, millet in Europe, and sorghum in Africa). The nitrogen isotopes were also very useful to distinguish between marine and terrestrial resources in food intake. Thus, they have helped to develop interpretations of differential access to protein-rich resources and the socioeconomic stratification within a society.

Consequently, paleonutritional studies that use isotopic signatures help us to better understand the concept of identity or cultural affiliation and its evolution through time. They differ from forensic anthropology, which emphasizes the biological identity of an individual. Their approach is closely related to social archaeology, where the social dimension (position of the individual within society) is predominant. Within the goal to better understand the notion of past identity, recent research tends to combine even more methods and various data (historical records, archaeology, funerary archaeology, diet, mobility). Certain regions in the world, such as South Africa, whose peoples are differentiated by a long, diverse, and complex history, are a source of inspiration for bioarchaeological research (Cox et al. 2001; Ribot et al. 2010). With the development of agriculture, newcomers settled in areas and displaced others who were already there or they came into conflict with them. All this led to cultural and biological changes, such phenomena having occurred not necessarily in a continuous fashion in time and space. To understand these events, food reconstructions combined with other data (material culture, morphology, ancient DNA) can help us identify these past populations "in transition," exposed to various gene flows. In the case of communities of the Iron Age (AF) in KwaZulu-Natal (RAS), data on diet and morphology showed no significant change over time (Ribot et al. 2010). Thus, the hypothesis has been proposed, of a gradual assimilation of hunter-gatherers ancestral to the Khoesan, by Bantu farmers. However, elsewhere, on more recent sites associated to the period of slavery (Americas, the Caribbean, Africa), the question of identity in the broadest sense becomes a more complex concept difficult to define. Indeed, various groups of people, individuals from forced diasporas, or slaves were moved from various

regions and then intermixed with local groups, sharing with them cultural and/or biological aspects (traditions, culinary practices, languages, genes) (Larsen 1999; Cox et al. 2001).

In exploring the history of past populations as well as their identity, does paleonutrition contribute to the promotion of descendant communities as well as a recognition of their identity? The answer is positive, as a cultural affiliation can be suggested from what people eat, and thus contributes finer detail to other sources of data based on biological affiliation criteria (ancient DNA, morphology). Museums all around the world have accumulated thousands of ancestral skulls from diverse descendant communities (Native Americans, Australian Aborigines, Khoesan South Africans), often without any ethical concern. These collections were often acquired before the period of independence, while the European colonial powers dominated the world. The thinking at that time focused on the classification and definition of race. Following these events, current communities required spiritual repair and appropriate reburial of their ancestors. In the USA, the NAGPRA ("Native American Graves Protection and Repatriation Act") was established in 1990, in order to return human remains to descendant communities (Larsen 1999). Following this, a systematic process of recognition of cultural and biological identity of human remains of Native Americans has been set up and is ongoing even now in the USA, its impact even being carried out in Canada. As a result of NAGPRA legislation, bioarchaeological studies including paleonutritional analyses have multiplied exponentially, even though the scientific value of the collections are still debated and threatened by reburial (Williamson and Pfeiffer 2003). Questions of this type are also raised in South Africa in this post-apartheid era. Ethical guidelines for the management of human remains are not yet totally in place, and access to osteological collections, ancestral to current descendant communities, is more restricted than ever before (Sealy 2003).

The historic graves of slaves are sites which have recently raised a number of ethical questions, given that the descendants are often present in contemporary societies. This is, for example, the case in Cape Town, where the awareness of the collective heritage is in a process of transformation (Shepherd 2007). Debates have emerged around the complex identity of these ancient slave populations, which became more and more mixed over time. The study by Cox et al. (2001) on the skeletons found at Cobern Street, in particular, was able to reveal aspects of the life trajectory of each individual, because it combines isotopic analysis with diverse data (general history, archaeology funeral, dental changes). The level of carbon and nitrogen obtained from bones and teeth has enabled the identification of diverse groups within the cemetery, such as foreigners (consumption of C_4 plants during childhood) and natives (plants C_3). These ideas and approaches used by Cox et al. (2001) have provided a model for many other isotopic studies on slave cemeteries (Schroeder et al. 2009).

Future Directions

Recent paleonutritional studies involving food reconstructions, combined with several other approaches and advances in the area of isotopic studies, are very useful tools for researching the identity of a group. By analyzing the diet, diverse knowledge can be acquired, notably on the environment (plants, wildlife) and the period under study (economics, resource use, cultural practices). It thus brings us in a more subtle and critical way toward a better understanding of the human identity of the past and, in particular, for the groups which have been neglected throughout the past and poorly documented in historical archives. However, when human remains are discovered, the major difficulty is around ethical questions (not only in relation to reburial), which are discussed between scientists and indigenous communities. Indeed, these two groups often have in mind very different interests and priorities concerning human remains. The scientists focus on scientific merit. By contrast, some indigenous groups today lean more on the spiritual value and the memory of their ancestors or some are even very concerned about the profanation of the remains of their ancestors. These questions are

essential for our postcolonial, post-apartheid societies, and they have lead to a renaissance in the identity of indigenous populations. This process began in South Africa after 1994 (Shepherd 2007) and can be considered as a model for other countries, in particular North America, as it forces us to rethink the concepts and methods used in our very own different disciplines! For the future, it nevertheless remains to develop the inclusion of indigenous people in bioarchaeological projects, so that the acquisition of scientific knowledge can benefit these communities directly.

Cross-References

- ▶ American Anthropological Association (AAA) and Ethics
- ▶ Ancestry Assessment
- ▶ Bioarchaeology: Definition
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone Chemistry and Ancient Diet
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Ethnic Identity and Archaeology
- ▶ Foraging to Farming Transition: Global Health Impacts, Trends, and Variation
- ▶ Heritage Museums and the Public
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Human Remains in Museums
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Isotope Geochemistry in Archaeology
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ South Africa: Heritage Management

References

Cox, G., J. Sealy, C. Schrire, and A.G. Morris. 2001. Stable carbon and nitrogen isotopic analyses of the underclass at the colonial Cape of Good Hope in the eighteenth and nineteenth centuries. *World Archaeology* 33 (1): 73–97.

Katzenberg, A. 2008. Stable isotope analysis: A tool for studying past diet, demography, and life history. In *Biological anthropology of the human skeleton*, ed. M.A. Katzenberg and S.R. Saunders, 413–441. Hoboken: Wiley-Liss.

Larsen, C.S. 1999. *Bioarchaeology. Interpreting behavior from the human skeleton*. Cambridge: Cambridge University Press.

Ribot, I., A.G. Morris, J.C. Sealy, and T. Maggs. 2010. Population history and economic change in the last 2000 years in KwaZulu-Natal, RSA. *Southern African Humanities* 22: 89–112.

Schroeder, H., T.C. O'Connell, J.A. Evans, K.A. Shuler, and R.E.M. Hedges. 2009. Trans-Atlantic slavery: Isotopic evidence for forced migration to Barbados. *American Journal of Physical Anthropology* 139: 547–557.

Sealy, J. 2003. Managing collections of human remains in South African museums and universities: Ethical policy-making and scientific value. *South African Journal of Science* 99: 238–239.

Shepherd, N. 2007. Archaeology dreaming Post-apartheid urban imaginaries and the bones of the Prestwich Street dead. *Journal of Social Archaeology* 7 (1): 3–28.

Steckel, R.H., and J.C. Rose. 2002. *The backbone of history: Health and nutrition in the western hemisphere*. Cambridge: Cambridge University Press.

Williamson, R.F., and S. Pfeiffer. 2003. *Bones of the ancestors: The archaeology and osteobiography of the Moatfield Ossuary*. Mercury series Archaeology Paper. Washington, DC: University of Washington Press.

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Basic Biographical Information

Marilyn Palmer is a British industrial archaeologist and educator and a fellow of the Society of Antiquaries of London. She received her undergraduate degree in modern history from St. Anne's College Oxford in 1965 and a

postgraduate certificate of education from Leicester University in 1966. She was awarded an Oxford master of arts degree in 1969. Professor Palmer began her professional career as a history teacher at Loughborough High School and then began lecturing in history at the Loughborough College of Education. Building upon her amateur interest in industrial archaeology, she enrolled in a 4-year part-time certificate in British archaeology program at Leicester University, which she completed in 1973. Between 1977 and 1988, Marilyn Palmer was employed in the History Department of Loughborough University, rising through ranks from lecturer to senior lecturer to head of department. In 1988, she took up a post as senior lecturer at Leicester University, dividing her time equally between the History and Archaeology departments. In 1998, she moved fully into the School of Archaeological Studies, and in 2000 she was promoted to professor of industrial archaeology. From 2000 to 2006, she served as head of the School of Archaeology and Ancient History at the University of Leicester. In 2005, she received an Award of Merit from the Society for Historical Archaeology, in recognition of her many contributions to the advancement of industrial archaeology. She retired in 2008 but remains very research active.

Major Accomplishments

Marilyn Palmer's most significant achievement has been in leading the transformation of industrial archaeology from an amateur pursuit to a professional and academic discipline. She has spearheaded the integration of industrial archaeology into the broader discipline of historical archaeology, as exemplified by her founding role in the establishment of the Centre for Historical Archaeology at the University of Leicester in 2009. Her joint publications with the late Peter Neaverson (Palmer and Neaverson 1992, 1995, 1998, 2005) provided a needed methodological and theoretical dimension to the practice of industrial archaeology. Professor Palmer's research has long stressed the importance of examining the social dimensions of industrial workplaces. To that end, she has produced landmark studies examining the experiences of textile workers in South West England (e.g., Palmer and Neaverson 2005). While strongly advocating industrial archaeology as an academic pursuit, Professor Palmer has always stressed the importance of the contributions made by amateur enthusiasts in both researching and conserving industrial heritage.

Marilyn Palmer has been active in the Association for Industrial Archaeology (AIA) since its establishment in 1973, serving the organization twice as its chairperson, as joint editor for its journal *Industrial Archaeology Review*, and as honorary president. Through her AIA activities in particular, she brought together a diverse group of interested amateurs and scholars from a range of disciplines including history, archaeology, and engineering. She has also worked in an advisory capacity with the National Trust, English Heritage, and the Council for British Archaeology. She currently chairs the Buildings Archaeology Group for the Institute for Archaeologists, serves as a member of the National Trust Archaeology Panel, is vice-president and trustee for the Council for British Archaeology, and is on the English Heritage Industrial Archaeology Advisory Committee.

Marilyn Palmer's publications include both academic contributions and publications designed for the general reader. She has published on a range of industries, from lime production to iron manufacturing to lead and tin mining to the textile and hosiery industries. She has also been active in producing strategy documents as well as basic guides for interested readers. Her most influential work is *Industrial Archaeology*: *Principles and Practices* (1998), coauthored with Peter Neaverson. With David Gwyn, she coedited *Understanding the Workplace*: *A Research Framework for Industrial Archaeology in Britain* (Palmer and Gwyn 2006), a special issue of the Industrial Archaeology Review which strongly advocated taking a social approach in industrial archaeology. In so doing, it opened up new fields of enquiry and encouraged considerable discussion within and beyond the field of industrial archaeology (see Palmer 2008).

Since retiring from the University of Leicester in 2008, she has been researching the range of technological innovations adopted by country house owners from the eighteenth to early twentieth centuries. Her project, the Country House Technology Project (http://www2.le.ac.uk/departments/archaeology/research/centre-for-historical-archaeology/research-1/country-house-technology), is funded by the Leverhulme Trust.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Avocational Archaeology
- ▶ Buildings Archaeology
- ▶ Council for British Archaeology (CBA)
- ▶ Industrial Archaeology
- ▶ Industrial Heritage in Archaeology

References

Palmer, M. 2008. Industrial archaeology: Constructing a framework of reference. In *Industrial archaeology: New directions*, ed. E. Casella and J. Symonds, 59–76. New York: Plenum.

Palmer, M., and D. Gwyn, eds. 2006. *Understanding the workplace: A research framework for industrial archaeology in Britain*, special issue industrial archaeology review. Vol. 27. Leeds: Maney.

Palmer, M., and P. Neaverson. 1992. *Industrial landscapes of the East Midlands*. London: Phillimore.

Palmer, M., and P. Neaverson, eds. 1995. *Managing the industrial heritage*, Leicester archaeology monographs. Vol. 2. Leicester: Leicester University Press.

Palmer, M., and P. Neaverson. 1998. *Industrial archaeology: Principles and practice*. London: Routledge.

Palmer, M., and P. Neaverson. 2005. *The textile industry of south-west England: A social archaeology*. Stroud: Tempus.

Further Reading

Horning, A., and M. Palmer, eds. 2009. *Crossing paths or sharing tracks? Future directions in the archaeological study of post-1550 Britain and Ireland*, Society for post-medieval archaeology monograph series. Vol. 4. Woodbridge/Suffolk: Boydell and Brewer.

Palmer, M., M. Nevell, and M. Sissons. 2012. *Industrial archaeology: A handbook*. York: Council for British Archaeology.

Palmyra, Archaeology of

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Introduction and Definition

In the first three centuries CE, Palmyra could be compared with the largest and most influential cities in the eastern part of the Roman Empire. It was a prosperous caravan city on the route between the Indian Ocean and the Mediterranean Sea. At the end of the third century, the legendary queen Zenobia controlled larger parts of the eastern empire, but after her fall the city was transformed to a military stronghold within a smaller area and surrounded by a new defensive wall (Fig. 1).

From 1920 to about the 1970s, the main effort of the archaeological investigations was concentrated on the Roman period up to the end of the third century within the walls of the late Roman city. The eastern part of the great colonnaded street, the tetrapylon, the temples of Bel and Baal-Shamin, the theater, and the agora with annex were cleared down to the level of the Roman period without any documentation of the later periods, and thereafter partly restored, together with the Diocletian's camp and the temple of Allath in the western part of the city (Schmidt-Colinet 1995; Delplace and Feydy 2005).

Key Issues/Current Debates/Future Research

Center of Palmyra

Since then there has been a growing awareness that the city of Palmyra covered a much larger area and that other periods need more attention. Recent investigations south of the later Roman city have revealed a large quarter with houses, an official building, and broad streets leading

Palmyra, Archaeology of, Fig. 1 Aerial view of Palmyra from the NW. (Photo J.C. Meyer)

toward the temple of Bel (al-Asʿad and Schmidt-Colinet 2006–2007) (Fig. 2). The earliest layers can be dated to the Hellenistic period, and the area was abandoned at the end of the third century CE, when the settlement was confined within the new defensive walls to the north. In the northeastern part of the city, a market has been excavated (Delplace 2006–2007), and an amphitheatre has been identified from old aerial photographs, probably from the late Roman period (Hammad 2006–2007). Excavations west and northwest of the tetrapylon have brought to light remains of several public and private buildings from the first century CE to the early Islamic period (Gawlikowski 2007) (Fig. 3). Some of the buildings were destroyed in the middle of the second century CE when the great colonnaded street was constructed, which changed the city plan of central Palmyra. Other large houses, originally for the well-to-do, were constructed in the second century CE, but in the sixth and seventh century, they were modified into several dwellings of more rural character as centers of production, probably reflecting changes in the position of Palmyra in the Byzantine era and forth (Gawlikowski 2007).

In the fifth and sixth century, three Christian churches were built north of the colonnaded street (Gawlikowski 2003; Majcherek 2009). Two of them, one with a baptistery, were still in use in the Umayyad period, but converted into habitation or a craft center in the ninth and tenth century, during the Abbasids. Another Christian basilica (Gawlikowski 1998) was probably constructed as late as the Umayyad period, and they all testify to the existence of two parallel Christian and Islamic communities in the early Islamic period. During the Umayyads the great colonnaded street was also transformed into a large market street consisting of a suq with small shops in the street between the columns (al-Asʿad and Stępniowski 1989), and a small mosque was constructed within earlier Roman buildings (Genequand 2008) (Fig. 4). The city area was finally abandoned in the ninth century, when the population of Palmyra was confined to the precinct of the temple of Bel.

The new investigations have emphasized that Palmyra had a long and very complex history. It stayed an important center also after the end of the third century, even if the habitation was confined to a smaller area within new defensive walls. It became a main garrison city of the eastern border, and later a bishopric. In the Umayyad period, when large "desert castles" or palaces were constructed in the region (Qasr al-Heir al-Sharqi and Qasr al-Heir al-Ghabi), it was still a thriving regional center with both a Christian and Islamic

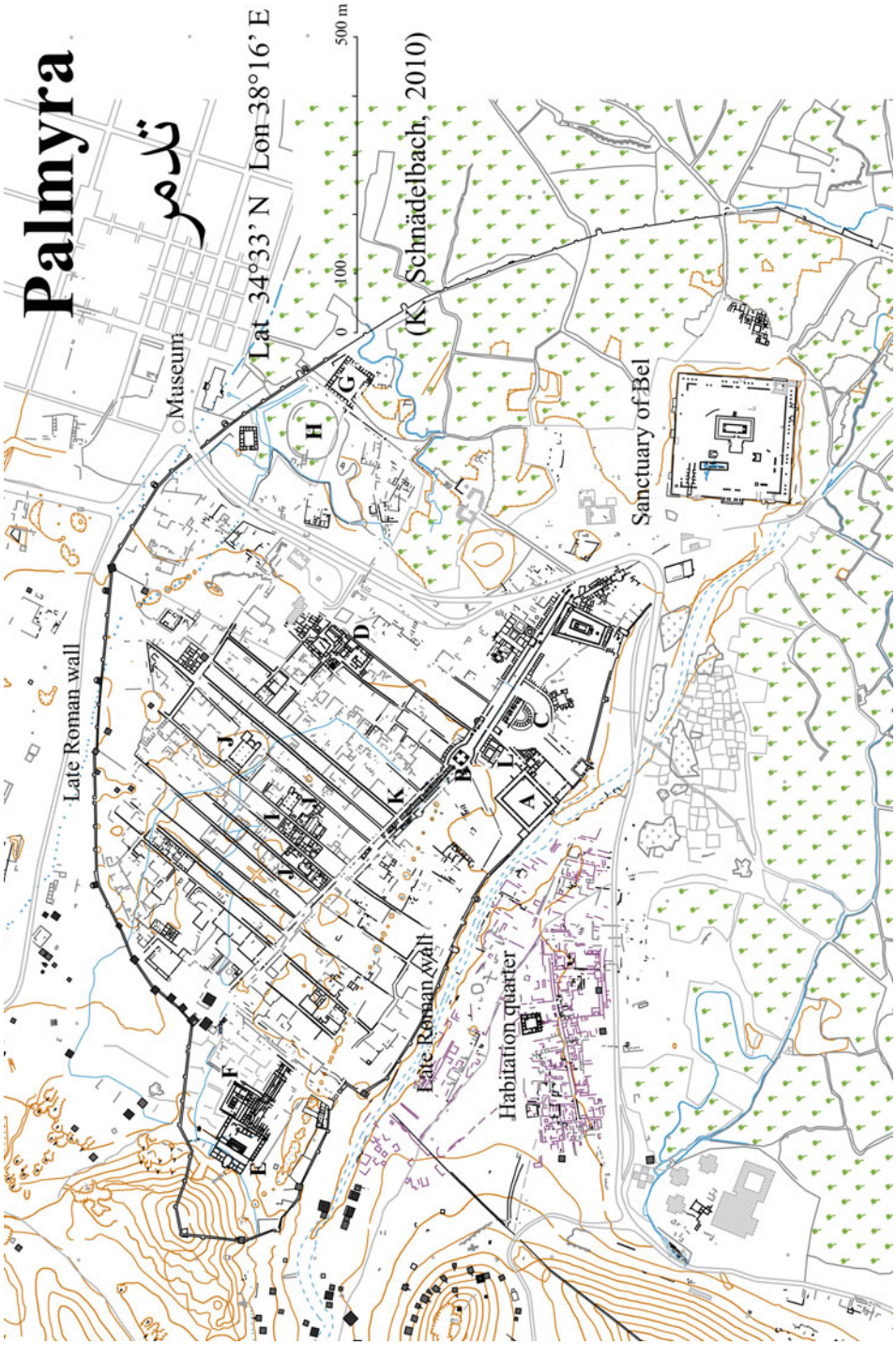

Palmyra, Archaeology of, Fig. 2 Map of the central part of Palmyra. *A*: Agora. *B*: Tetrapylon. *C*: The theater. *D*: Baal-Shamin. *E*: Diocletian's camp. *F*: Temple of Allath. *G*: Market. *H*: Amphitheatre. *I*: Habitation quarter. *J*: Christian basilicas. *K*: Umayyad suq. *L*: Mosque

Palmyra, Archaeology of, Fig. 3 Habitation quarter NW of tetrapylon. (Photo Jørgen Christian Meyer)

Palmyra, Archaeology of, Fig. 4 Umayyad suq inside the great colonnaded street. (Photo Jørgen Christian Meyer)

population (Genequand 2008). However, the finds from the pre-Roman period are still scanty. The Hellenistic finds are few, and virtually nothing is known about the oasis in the prehistoric periods and the Iron Age. Palmyra (Tadmor) is mentioned briefly in Bronze Ages sources, but the oasis does not contain any large tell which can be compared with Ebla, Mari, or Qatna. The location of Bronze Age Palmyra is supposed to be beneath the temple of Bel. Excavations here, however, have only revealed a few shards. New stratigraphical excavations are needed in the oasis, also to clarify the extension and character of the habitation in the Roman period before the end of the third century CE. How much of the city area, which covered an area of twenty square kilometers within the farthest walls, was occupied by gardens, open spaces, and buildings? This is of great importance for any attempt to estimate the population of the city, which has ranged from 30,000 to 200,000.

The Hinterland of Palmyra

Whereas the prehistoric finds from Palmyra itself are insignificant, the finds from the hinterland north and southeast of Palmyra testify to an intensive exploitation during the PPN (Pre-Pottery Neolithic: c. 9.500–5.500 BCE), when the climate was moister and the fauna and vegetation was different (Anfinset and Meyer 2010; Morandi Bonacossi et al. 2012). The sites are located close to former fresh water lakes and wadi outlets, and they seem to be related to seasonal hunting. In addition several kites, or large hunting traps, are a common phenomenon. Unfortunately their dating is still controversial, and some of them probably belong to much later periods. The relation to the oasis of Palmyra is not clear, and it is possible that the sites are more related to the early farming communities to the north and the east. They may also be related to the early domestication of animals and the development of early pastoralism.

From the end of the Pre-Pottery Neolithic until the beginning of the early Bronze Age not much is known about the use of the steppe. In the early Bronze Age (c. 2500) at the latest, when the climate became drier, several hundred cairns were erected in the landscape (Anfinset and Meyer 2010; Morandi Bonacossi et al. 2012). Generally they are located along major tracks and mountain ridges, visible at long distances, marking the territory and the main communication lines, which is common also in other Bronze Age societies in Jordan and the Arabian Peninsula. As there are no major Bronze Age sites within the area, they probably belonged to a pastoral nomadic population, which lived in symbiosis with the agricultural societies and early cities in other parts of Syria. The exact dating of the cairns (C14 and OSL dating is awaited) and the relation to the oasis of Palmyra still need to be clarified.

In the historical period, the oasis of Palmyra with its springs could not have supported a large city with foodstuff. Palmyra needed more stable sources of nutrition within its own territory. Daniel Schlumberger was the first scholar to carry out more detailed investigations of the hinterland from 1933 to 1935. In the mountains north of Palmyra, he documented several smaller forts and 15 settlements in the tableland of Jebel Chaar, which he dated to the three first centuries CE. Most scholars have classified the settlements as pastoral holdings, as centers of stock raising, camel herding, or horse breeding.

Recent surface surveys north of Palmyra have given a much better understanding of the potential of the hinterland for production of foodstuff (Meyer 2012) (Fig. 5). Normally the area is called a desert, but it rains every year (average annual precipitation 125 mm), and it is more correct to classify it as a dry steppe. Traditional agriculture with barley is a very risky business, but by employing different kinds of water management, the fertility of the soil can be exploited. Small dams, cross-wadi walls, and cisterns with elaborate catch arm systems led the surplus water to the fields as a supplement to the annual rain. Agriculture and horticulture in semidesert areas, based on proper water management, are much more resistant to drought and minor fluctuations in the climate than their counterparts in regions with higher precipitation, and it is also known in The Negev desert, Jordan, and North Africa. The new surveys have also increased the number of known settlements dramatically in the mountain areas, which were covered by trees until recently, and have demonstrated a very dense settlement pattern, which makes more sense in connection with agriculture and horticulture, not pastoralism alone. The chronology of the sites must also be revised. Nothing can be dated to the Iron Age or the Hellenistic period, but late Roman, Byzantine, and Umayyad pottery are found in large numbers at almost all sites. This conclusion fits well with the recent excavations in Palmyra itself. The history of Palmyra did not stop after Palmyra lost its position as a major caravan city at the end of the third century. However, the chronological distribution of the surface finds cannot reveal fluctuations in the intensity of human activities at the sites. This issue can only be resolved by excavating sites with deep cultural layers. Schlumberger also investigated one of the largest dams in antiquity about 100 km southeast of Palmyra, the Harbaqa Dam near Qasr al-Heir al-Gharbi. Until recently the project has been dated to the early Roman period, later improved by the Umayyads, but some scholars now date the

construction to the Umayyad period (Genequand 2006). The site needs to be reinvestigated.

The greatest challenge for further research, apart from establishing a more precise chronology for the sites, is to correlate the settlements with the different phases in Palmyra itself and put Palmyra into a larger interregional context. We are dealing with a very long time span, covering over 800 years. Was the relationship between city and hinterland the same throughout the period and how do the later Umayyad castles fit into the picture? It has been suggested that the both the rise and fall of Palmyra and the extensive exploitation of the hinterland coincided with major climatic changes, but nothing seems to indicate that the climate of the dry steppe was markedly different from the Ottoman period or that the pre-Roman period was drier. Rather the intensive exploitation of the dry steppe seems to depend on a heavy investment in water-management systems and a high degree of political and military control. The Romans and the Umayyads were willing and able to guarantee that. Hereafter a Bedouin strategy of survival, with low degree of central control and low population density slowly took over, and Palmyra was reduced to a small oasis village in the shadow of its former greatness (Fig. 5).

Cross-References

- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Islamic Archaeology
- ▶ Landscape Archaeology
- ▶ Rural Life in Islamic Archaeology
- ▶ Surface Survey: Method and Strategies

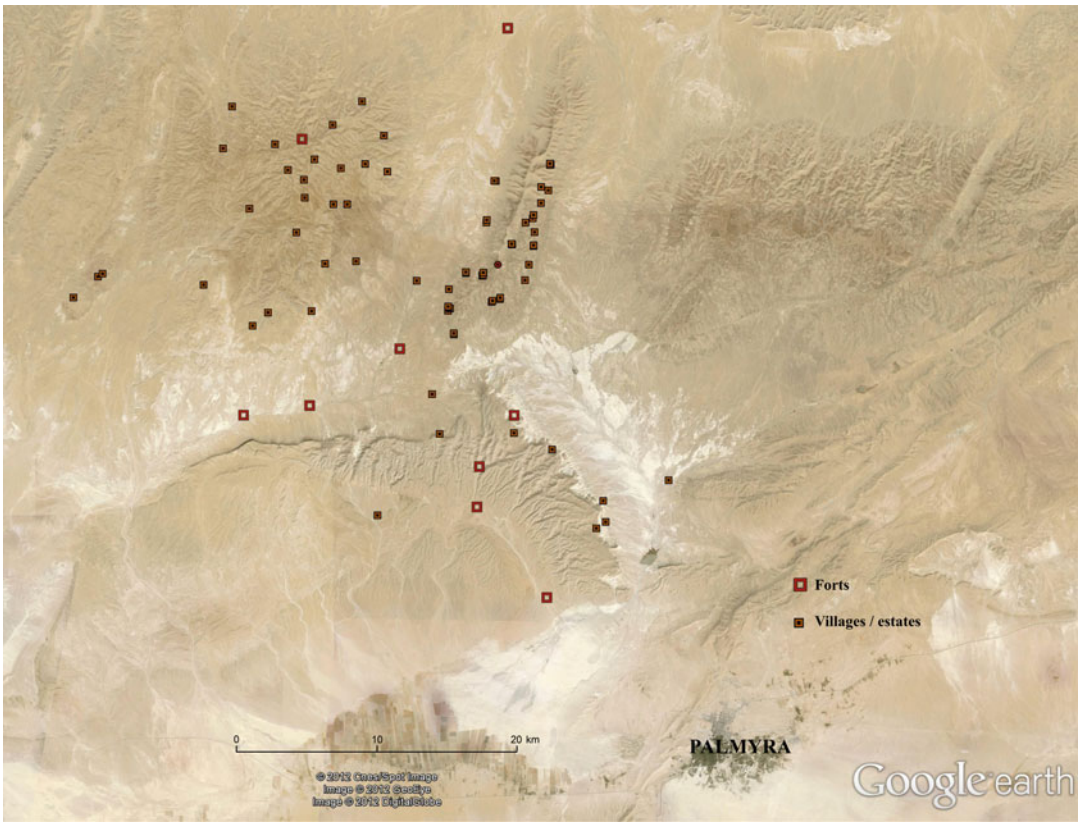

Palmyra, Archaeology of, Fig. 5 Villages/estates and forts north of Palmyra

References

al-Asʿad, W., and A. Schmidt-Colinet. 2006–2007. The Syro-German/Austrian archaeological mission at Palmyra in 2007. *Les annales archéologiques arabes syriennes. Revue d'archéologie et d'histoire* 49–50: 75–86.

al-Asʿad, K., and F.M. Stępniowski. 1989. The Umayyad Suq in Palmyra. *Damaszener Mitteilungen* 4: 205–223.

Anfinset, N., and J.C. Meyer. 2010. The hinterland of Palmyra. *Antiquity* 84 (324). Available at: http://antiquity.ac.uk/projgall/anfinset324/

Delplace, C. 2006–2007. La fouille du marché suburbain de Palmyre (2001–2005). Relation préliminaire. *Les annales archéologiques arabes syriennes. Revue d'archéologie et d'histoire* 49–50: 91–111.

Delplace, C., and J. Dentzer-Feydy. 2005. *L'agora de Palmyre, sur la base des travaux de Henri Seyrig, Raymond Duru et Edmond Frezouls*. Bibliothèque archéologique et historique 175. Bordeaux-Beirut: Institut Ausonius, Institut francais du Proche-Orient.

Gawlikowski, M. 1998. Palmyra, excavations 1997. *Polish Archaeology in the Mediterranean* 9, *Reports 1997*: 197–211.

Gawlikowski, M. 2003. Palmyra, season 2002. *Polish Archaeology in the Mediterranean* 14, *Reports 2002*: 279–90.

Gawlikowski, M. 2007. Beyond the colonnades: Domestic architecture in Palmyra. In *From Antioch to Alexandria. Recent studies in domestic architecture*, ed. K. Gabor and T. Waliszewski, 79–93. Warsaw: Institute of Archaeology, University of Warsaw.

Genequand, D. 2006. Some thoughts on Qasr al-Hayr al-Gharbi, its dam, its monastery and the Ghassanids. *Levant* 38: 63–83.

Genequand, D. 2008. An early mosque in Palmyra. *Levant* 40: 3–15.

Hammad, M. 2006–2007. Découverte d'un amphithéâtre à Tadmor-Palmyre. *Les annales archéologiques arabes syriennes. Revue d'archéologie et d'histoire* 49–50: 87–90.

Majcherek, G. 2009. 47th season of excavations – Basilica IV. *Polish Centre of Mediterranean Archaeology of the University of Warsaw. Newsletter 2008*. Available at: http://www.pcma.uw.edu.pl/index.php?id=247%26L=2

Meyer, J.C. 2012. City and hinterland. Villages and estates north of Palmyra. New perspectives. (Forthcoming in *Proceedings of the Conference "Palmyra – Queen of the Desert." 50 years of Polish excavations in Palmyra 1959–2009*). Warsaw.

Morandi Bonacossi, D., M. Iamoni, and M. al-Maqdissi. 2012. The early history of the western Palmyra desert region. In *The change in the settlement patterns and the adaptation of subsistence strategies to encroaching aridity: A first assessment of the desert-kite and tumulus cultural horizons*. Studia: Orontica.

Schmidt-Colinet, A., ed. 1995. *Palmyra. Kulturbegegnungen im Grenzbereich*. Antike Welt. Zeitschrift für Archäologie und Kulturgeschichte 26, Sondernummer. Mainz am Rhein: Verlag Philipp von Zabern.

Further Reading

al-Maqdissi, M. 2009. Notes d'archéologie Levantine XV. Le bronze ancien à Palmyre. *Al-Rāfidān* 30: 23–33.

Anfinset, N. 2009. *Palmyrena. Palmyra and the surrounding territory. Joint Syrian-Norwegian project. Surface survey north of Palmyra, April and May 2009.* Preliminary Report, prehistoric periods. Bergen. Available at: http://www.org.uib.no/palmyrena/documents/2009_II.pdf

Bounni, A. 1995. Vierzig Jahre syrische Ausgrabungen in Palmyra. In *Palmyra. Kulturbegegnungen im Grenzbereich*. Antike Welt. Zeitschrift für Archäologie und Kulturgeschichte 26, 1995, Sondernummer, ed. A. Schmidt-Colinet, 12–20. Mainz am Rhein: Verlag Philipp von Zabern.

Bounni, A., and K. al-Asʿad. 2000. *Palmyra. History, monuments and museum*. 4th ed. Damascus.

Gawlikowski, M. 1992. Palmyra 1991. *Polish archaeology in the Mediterranean* 3, *Reports 1991*: 68–76.

Gawlikowski, M. 1995. Tempel, Gräber und Kasernen. Die polnischen Ausgrabungen im Diokletianslager. In *Palmyra. Kulturbegegnungen im Grenzbereich*. Antike Welt. Zeitschrift für Archäologie und Kulturgeschichte 26, 1995, Sondernummer, ed. A. Schmidt-Colinet, 21–27. Mainz am Rhein: Verlag Philipp von Zabern.

Gawlikowski, M. 1996. Palmyra, excavations 1995. *Polish Archaeology in the Mediterranean* 7, *Reports 1995*: 139–46.

Genequand, D., and Abd al-Razzaq Moaz. 2009. The new urban settlement at Qasr al-Hayr al-Sharqi: Components and development in the Early Islamic Period. In *Residences, castles, settlements. Transformation processes from Late Antiquity to Early Islam. Proceedings of the International Conference held at Damascus, 5–9 November 2006*, ed. K. Bartl and B. as-Sham, 261–285. Rahden: Verlag Marie Leidorf.

Grassi, M.T. 2009. Il "progetto Palmira" (Syria). *LANX* 2: 194–205.

Meyer, J.C. 2008. Surface survey between Palmyra and Isriye. April 2008. Joint Syrian-Norwegian project. Preliminary report. Bergen. Available at: http://www.org.uib.no/palmyrena/documents/Survey2008.pdf

Meyer, J.C. 2009. Palmyrena. Palmyra and the surrounding territory. Joint Syrian-Norwegian project. Surface survey north of Palmyra, April and May 2009. Preliminary Report, historical period. Bergen. Available at: http://www.org.uib.no/palmyrena/documents/2009_I.pdf

Palmieri, L. 2010. Étude préliminaire sur les stucs trouvés dans le "Bâtiment à Péristyle" du quartier sud-ouest de Palmyre (PAL.M.A.I.S. – Fouilles 2008–2009). *LANX* 6: 175–186.

Schlumberger, D. 1951. *La Palmyrène du nord-ouest. Villages et lieux de culte de l'époque impériale. Recherches archéologiques sur la mise en valeur d'une région du désert par les Palmyréniens*. Paris: Librairie orientaliste Paul Geuthner.

Schmidt-Colinet, A., K. al-Asʿad, and W. al-Asʿad. 2008. Zur Urbanistik der hellenistischen Palmyra. Zweiter Vorbericht. *Zeitschrift für Orient-Archäologie* 1: 452–478.

Schmidt-Colinet, A., K. al-Asʿad, and W. al-Asʿad. 1986. *Qasr el-Heir el Gharbi*. Paris: Librairie orientaliste Paul Geuthner.
Syrian-Norwegian Project north of Palmyra: City, hinterland and caravan trade between orient and occident. Available at: http://www.org.uib.no/palmyrena/
Polish Centre of Mediterranean Archaeology. n.d. Available at: http://www.pcma.uw.edu.pl/index.php?id=10&L=2
Żuchowska, M. 2003. Test trench in the street of the Great Colonnade. *Polish Archaeology in the Mediterranean* 14, *Reports 2002*: 291–4.
Żuchowska, M. 2006. Palmyra. Excavations 2002–2005 (Insula E by the Great Colonnade). *Polish Archaeology in the Mediterranean* 17, *Reports 2005*: 439–50.

Pälsi, Sakari

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Basic Biographical Information

Sakari Lemmitty Pälsi (July 9, 1882–April 22, 1965) played a major role in the formation of Finnish archaeology in the early 1900s (Fig. 1).

Pälsi, Sakari, Fig. 1 Sakari Pälsi in 1932 (Photograph: Johan Emil Roine, Studio Alppila. Hannu Pälsi Collection/ Sakari Pälsi Society)

Pälsi studied in the Imperial Alexander University in Finland (now the University of Helsinki), majoring in archaeology from 1903 to 1908. He finished his Ph.D. dissertation on Finnish Stone Age in 1915, and took part in the Doctoral Promotion in 1936 to earn the title of Doctor of Philosophy. Pälsi worked all his career (1908–1946) at the Commission for Ancient Research (*Muinaistieteellinen toimikunta*; now the National Board of Antiquities) in Helsinki, and became the head of its Prehistory Department in 1938. Besides Finland and Russian Karelia, Pälsi carried out archaeological and ethnological fieldwork in Mongolia (1909), eastern Siberia (1917–1919), and Canada (1927), and traveled widely in Europe. He was one of the founding members of the Ethnological Film Ltd. (*Kansatieteellinen Filmi Oy*), in 1936, and the Peasant Culture Foundation (*Talonpoikaiskulttuurisäätiö*), in 1938.

Major Accomplishments

Sakari Pälsi was astonishingly multidisciplinary and multitalented in his research contributions. He advocated, already in his Ph.D. dissertation (Pälsi 1915), the use of ethnological (anthropological) analogies for interpreting the Stone Age remains, to acquire "both the skeleton sketched by the prehistoric studies and the muscles integrated by the ethnology" (Pälsi 1939:5). His dissertation was the second dealing with the Finnish Stone Age, and presented the first intensive landscape study in Finnish archaeology. He pioneered the use of experimental archaeology and natural scientific analyses, and used intuitive functionalism in his interpretations (Nordqvist 2017). Pälsi was especially fascinated by the "primitive technology" and the origins of art. He was also the first to suggest fishing as the main subsistence base for the Finnish Stone instead of big game, which understanding still prevails, and indeed one of the first in the world to emphasize the importance of the aquatic livelihoods in prehistory, and discussed the relativity of environmental perception (Pälsi 1916: 120, 136–137). However, some of his (mis)interpretations, for example, about the

Stone Age dwellings, continued to haunt the understandings in both Finnish and Estonian archaeology until the twenty-first century.

Pälsi started developing his photography and fieldwork skills on a seminal expedition to Mongolia in 1909 with Finnish linguist G.J. Ramstedt (Seitsonen 2017). On this archaeological, ethnological, and linguistic expedition, he became the first archaeologist to document khirigsuurs, the renowned burial monuments of the Mongolian Bronze Age, and many other archaeological remains, such as rock art. Some of the sites he documented have been visited by archaeologists again only in the 2000s. Pälsi also carried out important early anthropological and photographic documentation of the Mongolian life, and collected ethnological objects. As an example, his photographs of the Mongolian shaman Ötšir-böö have become world famous (Fig. 2). Unfortunately, the scientific manuscript from the 1909 expedition, written in German, was never published; it was rediscovered in the 1980s and published posthumously in the centennial of Pälsi's birth (Halén 1982). On the other hand, the Mongolian expedition had a strong effect on Pälsi's personal worldview and later work (Seitsonen 2017).

During his early fieldwork in the 1910s, Pälsi developed vigorously the archaeological excavation and documentation methods, for instance, different photography and mapping techniques. The precision of documentation that Pälsi achieved by the mid-1910s was reached again in Finnish archaeology only decades later. Pälsi also carried out the first bog excavations in Finland in 1914 at Antrea (Vuoksenranta) Korpilahti (nowadays Russia), uncovering the remains of one of the world's oldest known fishing nets, dated to 9140 ± 135 BP (Hela-404) (Pälsi 1920; Seitsonen et al. 2012).

Just before the outbreak of the Russian revolution in 1917 Pälsi took off on his most famous expedition, to the Chukchi and Kamchatka Peninsulas in easternmost Siberia. He was looking for anthropological analogies for the Finnish Stone Age lifeways, but owing to the turn of political situation this trip became essentially one of survival. He subsisted for the next years, as a fur hunter and trader, and visited both Japan and Alaska during his stay in eastern Siberia (Fig. 3). In 1919, Pälsi finally made his way home to the

Pälsi, Sakari, Fig. 2 Mongolian shaman Ötšir-böö in the Bajan-gol Valley in 1909 (Photograph: Sakari Pälsi 1909, National Board of Antiquities VKK156:6, CC BY 4.0)

Pälsi, Sakari, Fig. 3 Chukchi boy in his summer clothes (Photograph: Sakari Pälsi 1917–1919, National Board of Antiquities VKK157:146, CC BY 4.0)

newly independent state of Finland, by boat via India, Suez Canal, and United Kingdom. Unfortunately, this long expedition resulted only in popular articles and travel monographs, and the scientific results were never published, like for most of his later career.

After the Siberian experience, Pälsi shifted from archaeology towards ethnology, participating, for example, in the work of the Ethnological Film Ltd. He had experimented with ethnological filming already on the Siberian expedition; these films were found posthumously in 1975, and digitally restored in 2015. Besides Finland and Russian Karelia, Pälsi also carried out ethnological work amongst the Finnish immigrants in Canada in 1927.

Pälsi took part as a war correspondent on the Finnish military expedition of 1921–1922 to Soviet Union, and again during the Second World War in 1940–1942, despite being already 60 years old at that time. He also conducted his last excavations during the war in 1944, under Soviet artillery fire; this became the last excavation directed by Finnish archaeologists until the 2000s in the so-called Ceded Karelia (nowadays Russia), the birthplace of the Finnish Stone Age studies (Nordqvist 2017).

Pälsi was also one of the early members in the Social Democratic Association of the University Students (YSY), founded in 1905, and was a national activist during the "years of oppression" by the Tsarist Russia in the turn of 1900s. As an example, in 1906, he acted as a sleigh driver smuggling the famous Russian dissident Maksim Gorki out of Finland (then part of Russia). Pälsi advocated through his life an "idealistic socialism," which worldview also colored his academic research and interpretations (Seitsonen 2017).

Besides being a skillful and innovative archaeologist, who strongly developed the fieldwork methods and the use of anthropological analogies, Pälsi was also an adept photographer and cinematographer, an ethnologist, and a productive popular writer. He popularized both archaeology and ethnology, and wrote, for instance, the first popular synthesis of the Finnish Stone Age (Pälsi 1916), and the first Finnish archaeological fieldwork manual (Pälsi 1939). In his later life, Pälsi became publicly renowned for his popular travel writing and photography. On top of this, he authored several children's books and wrote also the first Finnish palaeo-fiction novel, founded on his decades-long archaeological and ethnological expertise (Pälsi 1950).

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Archaeology and Anthropology
- ▶ Archaeology as Anthropology
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ European Mesolithic: Geography and Culture
- ▶ Interpretation in Archaeological Theory
- ▶ Mongolia: Archaeological Heritage
- ▶ Mongolia: Paleolithic
- ▶ Scandinavia: Field Methods

References

Halén, H., ed. 1982. *Memoria saecularis Sakari Pälsi. Aufzeichnungen von einer Forschungsreise nach der nördlichen Mongolei im Jahre 1909: nebst Bibliographien. Kansatieteellisiä julkaisuja X*. Helsinki: Suomalais-Ugrilainen Seura.

Nordqvist, K. 2017. "Sekä muinaistutkimuksen hahmottelemaa luustoa että kansatieteen liittelemää lihaksistoa" – Sakari Pälsi ja Karjalankannaksen arkeologia. In *Sakari Pälsi. Elämä ja työt. Legendaarinen tutkimusmatkailija, arkeologi, kirjailija ja kuvaaja*, ed. M. Metsola and J. Relas, 147–166. Helsinki: Into.

Pälsi, S. 1915. Riukjärven ja Piiskunsalmen kivikautiset asuinpaikat Kaukolassa. Doctoral dissertation, University of Helsinki; Also published in 1920 as Suomen Muinaismuistoyhdistyksen Aikakauskirja XXVIII(1).

Pälsi, S. 1920. Ein steinzeitlicher Moorfund bei Korpilahti im Kirschspiel Antrea, Län Vyborg. *Suomen Muinaismuistoyhdistyksen Aikakauskirja* XXVIII 2.

Pälsi, S. 1916. *Kulttuurikuvia kivikaudelta*. Otava: Helsinki.

Pälsi, S. 1939. *Esihistorian tutkimuskentiltä. Kaivauksia ja tuloksia*. Jyväskylä: Gummerus.

Pälsi, S. 1950. *Kova Mies ja Nimetön. Romaani vuosituhansien takaa*. Helsinki: Otava.

Seitsonen, O. 2017. Sakari Pälsi Mongolian aroilla. In *Sakari Pälsi. Elämä ja työt. Legendaarinen tutkimusmatkailija, arkeologi, kirjailija ja kuvaaja*, ed. M. Metsola and J. Relas, 112–137. Helsinki: Into.

Seitsonen, O., K. Nordqvist, D. V. Gerasimov, and S. N. Lisitsyn 2012. The good, the bad, the weird: Stone Age and Early Metal Period radiocarbon dates and chronology from the Karelian Isthmus, North–West Russia. Geochronometria 39(2): 101–121.

Further Reading

Metsola, M., and J. Relas, eds. 2016. *Sakari Pälsi. Elämä ja työt. Legendaarinen tutkimusmatkailija, arkeologi, kirjailija ja kuvaaja*. Into: Helsinki.

Panamá Viejo (Old Panama) Archaeological Site

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Historical Context of Panamá Viejo Site

A few years after Vasco Núñez de Balboa arrived in the South Sea (1513), and around a quarter of a century from the Spanish conquest of America, the city of Panama was settled in 1519. This was preceded, in what was called Tierra Firme, by a few settlements in the Atlantic watershed. It must be highlighted that, among them, Santa María la Antigua del Darién was the first city to be formally entitled in 1510. Indeed, the city of Panama results from Pedrarias Dávila's transfer of that settlement to the Pacific coast to a coastal village governed by Chief Cori.

From 1516, the Spanish presence on the Pacific watershed was overwhelming, although it was not until 1522 that the foundation of the city of Natá de los Caballeros was formalized (in the present-day province of Coclé, Panama Republic). In the second decade of the sixteenth century, the Spanish arrived in Peru as explorers, and from 1534, when an expedition of conquest captured the Inca emperor, Panama City acquires an important role in the colonial economic system becoming the first European port in the Pacific slope of the American continent, connecting the precious metal deposits of the Andean zone with the metropolis (Mena García 1992). The establishment of the crossing axis from Panama to Nombre de Dios (the latter was replaced by Portobelo by the end of the sixteenth century) constituted a very powerful driving force for social and economic transformation: fundamental protagonist of the Atlantic commercial circuit constitution and a starting point, for better or for worse, of the current world system.

The destruction of this city, and therefore the need for its relocation, came in 1671, when the English corsair Sir Henry Morgan attacked and sacked it. This relocation was included in the plans of the groups of power due to the evident vulnerability of the location. Register of such concern is found in Bautista Antonelli's plan (1586) which, in addition to presenting significant information about the urban layout, shows a proposal for a fortification that never came to fruition (Fig. 1).

The relocation of the site known at present as Casco Antiguo de Panama or San Felipe takes place in 1673. From then on, old Panama in ruins became a quarry for the new city and began to be invaded by the jungle. Jesuit Bernardo Recio's testimony (mid-eighteenth century) is eloquent:

> I was able to come to know what it was like since I have had the opportunity to visit that site many times because, as in the last years, I was in charge of the school of Panama, in whose new church I was engaged, *I used to go there for the same purpose other many neighbours went, that is, to remove materials from its ruins for the new Construction, buildings or structures*. I confess that these walks were for me great recreation and I relieved my spirit with pleasure walking through a plain and peaceful way, and finding myself in that solitude, I was moved to many affections: terror, admiration and mostly pity to see such a magnificent city destroyed, as it was shown by such beautiful stones and columns that we took out and by some buildings still so tall and half kept together, since, apart from the main church, which showed greatness and the houses of the city, which boasted magnificence; some paintings, which still adorned its walls were seen here in the church of Santo Domingo; a beautiful arch and in some parts great traces and relics of the old greatness were seen in the church of the Conception nuns. . . . (Taken from Mena García 2007)

A Great Demographic Transformation

Although the demographic information for pre-Hispanic times in America is based on more or less credible estimates, there is no doubt that

Panamá Viejo (Old Panama) Archaeological Site, Fig. 1 Plano de la ciudad de Panamá, de Bautista Antonelli (1586). (Biblioteca del Museo Naval, Ministerio de Defensa, Madrid, España)

the indigenous population declined dramatically throughout the region as a consequence of the Spanish conquest of the Panama Isthmus. From paleoecology, the analysis of sediment columns obtained both in the east and in the center of the country provides information about the history of human alteration of local vegetation, indicating the recovery of the forests from the sixteenth century, a reflection of a depopulation process (Cooke and Sánchez 2004).

Indirect evidence of the demographic collapse is the regular expeditions carried out as far away as Nicaragua, with the objective of capturing natives to be employed in forced labor, until this practice was explicitly prohibited by the crown in 1532. There is no doubt that in different parts of the isthmus, some indigenous populations survived, in refuge areas, far from the centers of labor exploitation. The descendants of these populations are the members of seven native linguistic groups that currently inhabit the Panamanian territory.

The data on the city's population, although scarce, are illustrative. In 1533, approximately 500 Indians resided in the urban area or its surroundings; this number declined to 120 in 1544 and to 100 in 1547. By 1603, only 70 indigenous people remained in the "district of Panama," living in very precarious conditions in San Cristóbal de Chepo, about 30 km to the east, and on the islands of the Panamá Bay (Taboga and Isla del Rey). In the "Description of Panama" of 1607, it is mentioned that 24 indigenous people lived in the city of Panama (13 men and 11 women) (Mena García 1984: 82).

The drastic reduction of the autochthonous population that too early deprived the colonial enterprise of its labor force was soon remedied as the slave trade provided a profitable business by importing large numbers of African slaves. The

first of a long list of "importations" occurred in 1532. As an illustration of the ethnic composition of Panama City, Alonso Criado de Castilla offers in 1575 detailed information on the slave population: there were about 800 Europeans and 1,600 Africans employed in domestic tasks and other urban services. This author also mentions the existence of more than 3,000 slaves working in the trans-isthmian traffic, cattle rising, agricultural activities, and pearl fishery in the jurisdiction of the Panama Audiencia (Ward 1993).

Castillero (2006), based on diverse sources, suggests that the city had hardly surpassed 7,500 inhabitants. Of these, the "neighbors," that is, the elite of Spanish origin, would reach the number of 500 or 600 between 1620 and 1630, and then it was reduced to around 300, a figure that would remain until its relocation.

The Site of Old Panama in the Construction of the National Imaginary

In Romantic Europe, travel books were one of the most fertile literary genres. The qualifier "picturesque" was incorporated into the titles of many publications that, from 1830 and during the following four decades, were widely spread. Most of the authors of these works, mostly, were eccentric aristocrats who enjoyed economic surpluses to undertake these escapes from "civilization" and face the exotic "nature" that embodied both "savagery" and "paradise."

The travellers who left testimony of nineteenth-century Panama were fundamentally North American, and their arrival on the isthmus did not obey the romantic impulse to know other horizons; the reasons were much more prosaic, linked to the interventionist policy of the United States in New Granada, legitimized by the Mallarino-Bidlack Treaty. Their views of the Panamanian society were mixed, as was the case of their European contemporaries around other horizons, by the vision of progress as the imposition of humanity on nature. The approximation to local landscapes and customs was saturated with exoticism. The arrival in Panama produced in them the sensation of crossing borders, the confrontation between the "American" way of life and that of the tropics (with its ingredients of sensuality, laziness, and disorder). It is not uncommon, however, that they succumbed to "barbarism," which in occasions seemed full of charms.

Among the travellers who visited the ruins of Panama la Vieja, Robert Tomes was one of the numerous travellers invited by the Railway Company to the inaugural journey from "ocean to ocean," in 1855. The past of the city *founded by Balboa* (sic), now covered in vegetation, with large trees and vines, was almost dreamlike for him: "the houses (. . .. . .) where built of cedar, very curious and magnificent, and richly adorned, especially with hangings and paintings, much gold and silver" (Tomes 1855: 208). New York publisher Harper's Brothers published several of Tomes' journalistic works in the mid-nineteenth century, surely a good reader, quotes long paragraphs from the "bestseller of piracy": *History of the Buccaneers of America de Exquemelin* (English version of 1741), abounding in details of the attack on Panama and the consequent looting. The city in ruins appears then as real scenery of pirate and corsair incursions: perhaps the prevailing narratives of the global world perspective of the nineteenth century. Let us remember, for example, that Emilio Salgari (1862–1911), an epigonic romantic and one of the most widely read adventure writers of the pre-television era, a permanent seeker of imaginary horizons, wide in time and space, could not prevent succumbing to old Panama landscape (which perhaps did not know personally) using it as the setting for some of the episodes of *Yolanda, The Daughter of the Black Corsair*, in love, for more details, of tender and protective Henry Morgan (Salgari 1977).

It is in the reading of Oran's *Tropical Journeyings* published in Harper's New Monthly Magazine in 1859, illustrated with superb drawings that show the site of Panama Viejo as a ruined city, partially invaded by the tropical forest, where we find, besides the romantic narrative, a vision from the bottom (Oran (Pseudonym) 1859). Indeed, Oran recounts a visit to the site of the ruins, where he and his companions were guided by Marco Segundo, who was inhabitant of one of

the three existing huts in the vicinity of the old Cathedral. This person, native of a nearby town of around 70 years of age, sought refuge, according to his own words "from bad companies." Contrary to the romantic spirit, the temporary escape from "civilization," in search of the exotic, there is here a decision of estrangement, of escaping from marginality, from misery, perhaps from the law. He obtained money by selling the vegetable fiber ropes he made, which he sold sporadically in Panama City, although his economy was basically subsistence. From Oran's story, we could point at Marco Segundo as the most remote predecessor of the tourist guides of Panama la Vieja, thinking that the habit of outing to places near the city seems to have been institutionalized after the second half of the nineteenth century, due to the influence of the American presence on the isthmus. At that time, historical, cultural, and ethnic tourism began to develop in Europe (along with health tourism) but was not shaped with a clearly mercantilist orientation until well entered the twentieth century. From then on, tourism crystallized some of its characteristic features, which, with few exceptions, are still typical of this activity: spectacularity, superficiality, decontextualization, and emphasis on exoticism associated with an ethnocentric vision of the others.

When the national state was constituted, in the year 1903, Panama Viejo begins to arouse interest as an emblem of the newly inaugurated country. The vestiges of the colony served the purpose of demonstrating the existence of a defined identity from a long time ago, and that it was not merely a creation of the United States. The first historical investigations are carried out, some of them promoted by the atmosphere that surrounded the celebrations of the fourth centenary of its foundation in 1919.

The site or some of its elements have been incorporated from the constitution of the Panamanian state to a large repertoire of communicative and expressive actions (in multiple supports): coat of the national police, money paper, stamps, painting of buses, letters of *boleros*, poetry, and diverse crafts (including *molas*). Even in the ephemeral urban graffiti "paintings," the emblematic element has been and is the tower of the Cathedral, massive and of medieval airs. Seen from the sea, it suggests that defensive functions as the watchtower were added to the fact that it was an important reference in navigation. Some travellers' comments seem to reinforce this idea. At the beginning of the nineteenth century, Baleato (Cuervo 1892) says the following about the hydrology of the "inlet" (sic) of Panama and the recommended routes to enter Perico anchorage:

> . . . The entrance to Perico anchorage, with favourable wind, is checked, if one wants to, up to 2 cables to the East of the Farallón and continuing at the same distance on its part to the North. To give anchorage as planned (13): but when it is taken onto the bottom, which usually happens at the North's breeze station, the bottom-down of the outside or Meros will be protected, and the padlock or Panama La Vieja, whose markings are as follows:
> [. . . . . .]
> Bajo del Candado or Panama, La Vieja
> Tower of Panama la Vieja N. 3° O.
> Punta de Paitilla N. 75° O.
> Medianía of the towers of the Panama Cathedral S. 78° O.
> Islita Flamenco S. 30° O.

Suggestively, in 1863, two North American captains say that "the tower is still, in the afternoon, a remarkable object from the anchorage" (Parker King and Fitzroy 1949, cited by Guzmán Navarro 2001: 35).

From the constitution of the Panamanian state to the fiftieth anniversary of the nation-state (1903–1953), many more efforts were devoted to the conservation of the Hispanic heritage than to the pre-Hispanic one. The colonial and post-colonial referents were symbolically more powerful in the construction of the national identity (the first rules for the preservation of the "historical monuments" date back to these years). By then, and consistent with world currents, the conservation of architectural monuments occupied a central place during the first half of the twentieth century, a situation that then begins to change slowly, when the delineation of goods considered in the category of heritage begins to expand.

"History" and "archaeology" were two separate worlds. The patrimonial rhetoric, as a reinforcement of patriotism, only included the first. The archaeological remains were associated

with the pre-Hispanic, while the vestiges of the colony constituted distinctly "historical" events. Therefore, Panama Viejo was not perceived as an archaeological site, but as a historical site. This panorama is modified from the second half of the twentieth century, moment that corresponds, in the international arena, to the configuration of the so-called new archaeology.

On the other hand, Panama Archaeological Society, created in 1949, is constituted and operates intensely, in great part of the territory, but basically in the canal strip. It is an association of archaeology amateurs formed by residents of the Canal Zone, who without due training or professional advice devoted themselves for two decades to the search and non-systematic excavation of archaeological sites (1984: 17).

In spite of this, the activities of this association highlighted the pre-Hispanic occupation of Panama Viejo site, through Leo Biese's work (1964), and also gave rise to the knowledge of the sixteenth and seventeenth centuries ceramic complex, which a number of investigators such as Rouse, Goggin, Long, and Cruxent would begin to be in charge from then onward and would mark the entrance of Panama to the field of historical archaeology. The inclusion of Panamanian majolicas in Goggin's emblematic book (1968) could be considered as a foundational milestone in Panamanian historical archaeology.

In the 1970s and 1980s, there began to be official concern on the part of the Panamanian Tourism Institute and the National Institute of Culture, to promote the touristic use of the site; in order to do so, the carrying out of several plans of action is hired, but they are not enhanced.

From 1989 (post-invasion), a new trend in the management of cultural resources begins to be defined, which, although legally under the ultimate responsibility of the state, proposes that they be administered through non-governmental or mixed associations such as foundations or patronages.

Within the framework of this trend, the Panamá Viejo Patronato (Board) is created in 1995, an institution of mixed private-state and nonprofit regime that administers the 28 protected hectares that make up the monumental complex. Its basic objectives are focused on the conservation, protection, promotion, development, and enhancement of the site. In 2003, the Patronato's dedicated work made it possible for Panama Viejo to obtain the declaration of UNESCO World Heritage Archaeological Site.

Panama Viejo Archaeological Project: Scope and Achievements

In accordance with the normative framework of the agreed master plan of interventions, the setting up a comprehensive program of archaeological investigations is created, with the aim of regulating the excavations and the registration method. In 1996, the first steps were taken to structure a permanent program of archaeological interventions (Martín and de Arango 2013). In this way the Archaeological Project of Panama Viejo began, consolidated by Beatriz Rovira (2000) and currently coordinated by Mirta Linero Baroni (2014), which to the present has become a model for the archaeology of the country and the region. This is even more significant due to the lack of institutional spaces and cultural policies in the Panama Republic that effectively promote this type of research aimed at the preservation of historical heritage, and which are not usually considered priorities in the instances of planning and decision-making at a national level.

From the beginning, the Panamá Viejo Patronato's archaeological program has developed research lines from rescue projects or articulated with architectural interventions. The recovery of the urban layout (blurred by the different natural and anthropic variables responsible for the formation of this site) and its interpretation were based in part on the results of excavations.

Besides, the understanding of built spaces (religious, administrative, and domestic), about which written information is scarce, made it possible to register archaeological contexts of different ages. The analysis of the information thus collected generated multiple lines of research, which account for several master's and doctoral theses written by local students and various international academic institutions, as well as multiplicity of articles published in specialized

journals. Since 2006, the Board of Panamá Viejo has its own annual scientific journal, *Canto Rodado*, which serves to the purpose of spreading heritage issues in the academic sphere.

Although the site has been patrimonialized for its values related to the Hispanic heritage, the history of its human occupation dates back to pre-Hispanic times. One of the merits of the archaeological project has been precisely to substantially expand the range of these values. Upon the arrival of the conquistadores, the isthmian territory was structured in flexible political entities of the chieftainship type, with dense populations in the estuaries of the rivers. Panamanian pre-Hispanic archaeology is one of the most advanced in the region; however, there is not enough information available about the eastern part of the country. Incursions in the levels of pre-Hispanic occupation of Panama Viejo contributed significantly to supply this deficiency.

As for the colonial archaeological component, even though the availability of written documents has sometimes led to underestimate the importance of the material remains to know that period, research has revealed unknown aspects of everyday life in the city, especially from the documentation of the rich ceramic collection obtained.

It is interesting to mention, perhaps because it is a general problem in the practice of archaeology in monumental sites, that the overwhelming presence of construction remains initially generated, in the decision instances, the vision of archaeological work as merely technical, oriented to the recovery of buried architectural features and subordinated to the work of architectural intervention. Little by little and largely due to the incorporation of professionals trained in interdisciplinary perspectives, such narrow conception evolved toward integrating positions.

The contributions of archaeology were, in addition, important factors for that perception to be transformed and placed as a central element of the site's patrimonial activation, especially in the museographic and spreading strategies. Regarding the investigation, some of the most significant contributions are summarized below:

Archaeology of the Site's Architecture

The information provided by the two historical maps available, one from 1580 (by Bautista Antonelli) and the other from 1609 (by Roda; Fig. 2), and a drawing from the Casas Reales

Panamá Viejo (Old Panama) Archaeological Site, Fig. 2 Plano e la ciudad de Panamá, de Cristóbal de Roda (1609). (Archivo General de Indias, Sevilla, España)

(Royal houses) of 1590 (Archivo de Indias, Sevilla, MP Panamá 236) was an important starting point. The data obtained from the observations of the existing structures and archaeological excavations were added to it. The site had been intervened in the 1950s of the twentieth century on the occasion of the celebration of the fiftieth anniversary of the republic. Of these works, the existing documentation is almost none; so one of the archaeological challenges was to discern between original pavements and those laid during these works. Not always the presence of artifacts allowed an approximation to the age of the traits. However, as the work progressed, it was possible to establish a constructive typology that made it possible to discriminate between the two, revealing an intention to make the distinction possible in the future. This episode is interesting, especially because of the fragility of the historical memory in the country so strongly impacted by the crossing function and by a deep-rooted short-termism.

Several sesaons of electrical resistivity prospection contributed to guide the archaeological work carried out to solve some questions about the streets' layout and in relation with some of the buildings' floors. The importance of interdisciplinary perspectives, the results of research aimed at interpreting the urban layout, the spatial organization of the ruins of San Francisco convent (Löbbecke and Tejeira 2007), the Nuns of the Conception Convent (Fig. 3), Santo Domingo Convent (Fig. 5) (Linero Baroni and Muñiz Álvarez 2016), of the Cathedral (Fig. 4) and of the so-called Casa de los Genoveses (Gaitán Ammann 2012) are interesting examples. Archaeologically speaking, documenting the floor and other construction features of wooden houses was enhanced. The collection of metallic construction materials constitutes a valuable source that has contributed to the knowledge of early architectural techniques (Meza and Linero 2016: 65–84).

Panamá Viejo (Old Panama) Archaeological Site, Fig. 3 Ruinas del Convento de las Monjas de la Concepción. (Proyecto Arqueológico Panamá Viejo, 2017)

Panamá Viejo (Old Panama) Archaeological Site, Fig. 4 Vista de la torre de la Catedral. (Proyecto Arqueológico Panamá Viejo, 2017)

Panamá Viejo (Old Panama) Archaeological Site, Fig. 5 Excavaciones en el Convento de Santo Domingo (Fase arqueológica del proyecto SENACYT FID 14-127. Conjunto Conventual Santo Domingo, 600N-1100E)

Indigenous Population of Panama Viejo

The first inhabitants of the isthmus, more than 10,000 years ago, have left tangible footprints in different parts of the country, especially in the Chagres River basin, where projectile points used for hunting were found. More than 5000 years ago, the populations had started cultivation practices of a variety of plants. This activity, complemented with hunting and fluvial and maritime fishing of a multiplicity of species, made it possible to sustain societies that over time were incorporating new techniques and modifying their patterns of social organization. The great biodiversity favored exchanges and constituted the fundamental pillar of the economy.

A few centuries before the Christian era, the Panamanian population was grouped into village settlements with houses adapted to the tropical environment, and they produced objects that arouse admiration for their technique and aesthetics (such as the case of polychrome or modelled pottery and goldsmithing). Upon the arrival of the conquerors, a time when written documentation began to be available, the larger populations were located in estuaries and lower courses and some of the main rivers, structuring the space in relatively flexible chieftdom territories.

In general terms, the pre-Hispanic archaeology of the Republic of Panama is one of the most developed in the Central American area. However, the eastern part of the country, for multiple reasons (it is a sparsely populated area, somewhat marginal in the country's economy), has been relegated to the background. The archaeological program of Panama Viejo constitutes an opportunity to overcome this shortfall. In effect, the colonial foundation was carried out in a territory occupied by indigenous inhabitants, although a short time later, as mentioned before, this population practically disappears from the city.

As it was pointed out, the first news about pre-Hispanic finds on the site dates back from the 1960s (Fig. 6), when a series of earth movements to level the surface of a modern cemetery situated in an area adjacent to the protected area exposed a dense concentration of material remains.

Panamá Viejo (Old Panama) Archaeological Site, Fig. 6 Vasija prehispánica. Museo Antropológico Reina Torres de Araúz, Panamá

A series of excavations carried out within the framework of the Panama Viejo archaeological project has enabled to propose an absolute chronology for the pre-Hispanic component of the site, which is concentrated between 859 and 1250 AD, with a range that goes from the year 500 until the time of the Spanish conquest. The promotion of the pre-Hispanic archaeology of Panama Viejo site has special importance for ancient Panamanian history. The possibility of locating pre-Hispanic deposits (unthinkable in the rest of the densely occupied metropolitan area) enables the projection of a regional perspective. In fact, due to the tourist enterprises of the Las Perlas archipelago, archaeological investigations have been carried out that indicate around 5000 years back as the oldest date of these islands' occupation. For this reason, the connections between the mainland along the Pacific coasts of Eastern Panama and with northwestern Colombia, an area known as Gran Darién, are emerging as an important research topic in the immediate future.

A discussion of the ceramic and lithic materials found in several excavation campaigns carried out since 1996 and their regional correlations with both the Gran Darién (Panamanian east and northwestern Colombia) and with the central region of the country can be found in Martín (2006–2007) and Pearson (2006). The pottery is predominantly unslipped or red paint; in some cases the vessels feature anthropomorphic and zoomorphic modelled ornaments. There are frequent pieces

similar to those corresponding to the styles called Cubitá and Conte Temprano of the central region of the country, as well as ceramics located chronologically at the time of the conquest. It is possible that these are local versions that emerged as a result of the intense contacts and exchanges that existed between the coastal communities of the Panama Bay, which included, as we said, Las Perlas archipelago populations (Cooke and Sánchez 2004; Martín and Sánchez 2007).

The sample of pre-Hispanic lithic materials (about 500 specimens) was studied typologically and technologically. There is an industry of flakes, another of blade points, and a third of polished stone. The general characteristics of this set include unifacial flaking, opportunistic flake industry, production of thick flakes, points on blades well elaborated from cores with opposite platforms, and possible existence of carving specialists. While most of these features are typical of the Panamanian lithic industry of the ceramic period in general, it is observed that a very skilled manufacture of points on blades is a distinctive element in the whole of Panama Viejo (Pearson 2006).

Of the scarce information about houses' remains recovered in the field of pre-Hispanic archaeology of the country, it corresponds to Panama Viejo the evidence of two circular structures, one defined by post holes and the other by pebbles, and for these contexts, calibrated radiocarbon dates (880–1020 AD and 990–1260 AD) are available (Martín 2006).

Daily Life Things of the Colony

The collection of colonial artifacts is very broad, and an intense work is carried out in its conservation, cataloguing, and documentation. On the one hand, they nourish the museum exhibitions, and on the other hand, they constitute the platform for the development of specific research lines.

The study of colonial ceramics has been perhaps the most dynamic up to the present; it has been possible to characterize the assemblages corresponding to two moments in the history of the city: broadly speaking, the end of the sixteenth century and the seventeenth century. Unfortunately, no earlier contexts have been found, although we know their composition partially from very preliminary investigations carried out in older colonial settlements in the Isthmus of Panama (mainly Nombre de Dios).

For example, until the end of the sixteenth century, ceramic sets for domestic use have very high percentages of European majolica (around 80%), despite the high costs of trans-isthmus freights, and, of course, the fragility of this merchandise would complicate its transportation. Tastes and preferences undoubtedly qualified the cost-benefit equation. The tin-glazed ceramic collection includes pieces with blue-on-blue decoration, a Genoese (Ligurian) style, polychrome with Italian reminiscences, and austere pieces of Moorish tradition. It also highlights the very early presence of Chinese porcelain. The habits of consumption of goods manufactured in the city have a global air; on the contrary, at the start of the seventeenth century, the largest proportion of ceramic artifacts seems to be locally produced, while, for example, 20% of tableware is still imported. Outstanding in this period is the so-called Panamanian majolica (Fig. 8, 9 and 10), mentioned in literature since the 1960s. Originally considered Peruvian production (Goggin 1968), it was associated with Panamanian workshops accidentally found and destroyed in 1958. Unfortunately there are no photographs, no drawings, and no report describing this finding, so their status as data was waiting for decades for the possibility of confirmation. For those dates, however, the finding of trivets, nails, and refractory boxes or blankets was recorded and published, considered as conclusive proof of the existence of local majolica production. Other indirect evidence of the presence of workshops that strengthened the idea of a local manufacturing is that such ovens were reported near the course of the Rio Abajo River, north of the site, a propitious location for pottery for its access to water, and also because it is an area close to Santa Ana chapel. This location was revealing if we take into account that, at least in Seville, the members of the potters' guild had their brotherhood in a chapel of the Santa Ana Church in the suburb of

Triana. Very recently, during rescue archaeology work carried out in the sector, Tomás Mendizábal (personal communication, 2016) identified the structure of two ovens, which would close the chapter on doubts about the origin of Panamanian majolica. The following types are usually distinguished, which present particular frequencies according to the chronology of the deposits: Panama Plain, Panama Blue on White (Fig. 8), and Panama Polychrome (Fig. 7 and 9).

From the Panama Viejo archaeological project, contributions were made about its chemical characterization through the use of neutron activation (Rovira et al. 2006), its distribution (Rovira 2001), and around its aesthetic patterns (Rovira and Mojica 2007).

There are still many questions about this production, mainly the lack of documentary support written about the Panamanian majolica production. This surprises greatly, since the operation of workshops would require (this is also suggested by the homogeneity of the sample) the existence of a guild with its standards, such as those of Puebla, referred to by Lister and Lister (1984). We can undoubtedly say that up to now, Panama potters guild is invisible in the documentary archives. It should be taken into account here that the absence of references in this regard could be due to the low social prestige that potters probably enjoyed in medieval and post-medieval times and, the very general allusions about pottery, that in most the cases prevent relating an artifact or a particular group of them to the written testimonies. It can also obey the social value that Panamanian production had, in the context of the Spanish colonial world, as it will be discussed later.

Several findings in American sites have revealed a wide geographic dispersion of Panamanian majolica, mainly in localities along the South American Pacific coast, although its presence in the state of Chiapas has also been reported. The area of fundamental dispersion however as initially visualized by

Panamá Viejo (Old Panama) Archaeological Site, Fig. 7 Mayólica panameña policromada, siglo XVII. (Colección de referencia del Patronato Panamá Viejo, sub colección cerámica)

Panamá Viejo (Old Panama) Archaeological Site, Fig. 8 Mayólica panameña decorada en azul sobre blanco, Siglo XVII. (Colección de referencia del Patronato Panamá Viejo, sub colección cerámica)

Panamá Viejo (Old Panama) Archaeological Site, Fig. 9 Mayólica panameña policromada, Siglo XVII. (Colección de referencia del Patronato Panamá Viejo, sub colección cerámica)

Lister and Lister (1976) has been that of the viceroyalty of Peru. According to the extent that the study materials of the colonial period in different parts of South America become important, new records will undoubtedly be added. Such is the case of some Panama Polychrome sherds found in Cayastá (Santa Fe la Vieja, Argentina) and in Buenos Aires. Some Panamanian majolica sherds have also been recognized in Popayán (Colombia) in surface recollections made on monuments affected by an earthquake.

INAA analyses of pastes have shown a great homogeneity in the composition of the sample of Panama Viejo and some sherds classified as Panamanian majolica found in Cuenca (Ecuador). It is interesting to mention that a group of ceramics called Redware also presents a chemical composition similar to that of Panamanian majolica. From these data the idea of the existence of a diversified pottery production in Panama begins to take shape.

As for the chromatic spectrum used in the painted decoration of the Panamanian majolica, we can say that it was small, unlike the production of other centers in which the Italian influence with its profuse polychrome is evident (Talavera, Seville, Mexico, among others). As in the European medieval ceramics and in that inscribed to a Mudejar tradition (which was still prevailing in Valencia and Aragon), the use of green, magenta, and blue stands out. There are no zoomorphic or anthropomorphic motifs, heraldic, allegorical, or religious shields, only in truly exceptional cases.

One group of ceramics of global dispersion found on the site is very fine, red, and burnished which has been associated with vessels called in the specialized literature as the Guadalajara *búcaros* or *barros* of the Indies, bucarine mud, of great interest because of the abundance of data concerned with its social meanings: its connection with the bucarophagia, its articulation to the world of baroque collecting, its profuse mention in Spanish literature of the Golden Age, and its representation both in European painting of the seventeenth century and in the famous caste paintings of the following century (Fig. 10). Panama is a scenario with the potential to continue studying these materials, of which there were several manufacturing foci both in Europe and in America: the available historical documentation mentions the manufacturing center of Natá, in the central region of the country, as one of the production centers (Rovira and Gaitán 2010).

Innumerable objects that made up the cultural landscape of the site, among which are accessories of clothing and personal adornments; objects of various functions, such as rituals (medals and amulets); and those related with commercial activities (coins, lead seals, weights, among many others), are part of the collection of colonial artifacts.

Studies of Biological Remains

The analysis of animal and botanical remains has played an important role in the generation of knowledge about cultural practices (feeding, obtaining food, rituals, and funerary objects,

Panamá Viejo (Old Panama) Archaeological Site, Fig. 10 Pieza de cerámica roja fina, correspondiente a los denominados "búcaros de Indias", siglo XVII. (Colección de referencia del Patronato Panamá Viejo, sub colección cerámica)

among others) as well as about paleopathological and paleoecological aspects.

Some interesting considerations are derived from the identification of the domestic fauna, such as the large size of beef cattle, contrary to what common sense could indicate based on the characteristics of climate and soils, and of the non-domestic fauna analysis of a sealed context dated between 1580 and 1617, which made it possible to infer fishery practices and observe the considerable exploitation of terrestrial native species in spite of the development of livestock as evidenced by the abundance of deer, *saínos* (peccaries, *Tayassu tajacu*), and iguanas.

The comparison between samples of molluscs (bivalves and gastropods) of pre-Hispanic and colonial age clearly illustrates the changes in the diversity of species used. While before the Spanish occupation different ecological niches were exploited, the catches in the colonial era were limited to practically a few species of the intertidal zone (Martín and Rodríguez 2006).

In a recent paper, Aceituno and Martín (2017) present the results of the analysis of a type of botanical evidence little used, the analysis of starch grains. The material was extracted from lithic instruments from the colonial era, and the result was the identification of starch from cassava, corn, and beans, which illustrates the rapid adoption of local plants in the city inhabitants' diet.

As far as bioanthropology is concerned, the potential of interpretative possibilities offered by the excavation of funerary contexts is very broad. From contributions to the knowledge of conceptions about death as a biocultural phenomenon in general, paleopathological considerations and contributions to the history of medical practices, as well as studies on genetic variability that make it possible to venture not only to population origins but also to the way that conceptions about the racial, were socially and culturally constructed. The samples obtained in several archaeological contexts of Panama Viejo gave rise to this potential in part. Such is the case of those recovered at the San Juan de Dios Hospital (Scholkmann et al. 2006; Martin et al. 2009; Rojas-Sepúlveda et al. 2011 among others). A wide collection of burials excavated in the nave and atrium of the Cathedral are objects of Iosvany Hernández's PhD research, within the framework of the project "An Artery of Empire. Conquest, Commerce, Crisis, Culture and the Panamanian Junction (1513–1671)," of the Pablo de Olavide University (UPO), financed by the European Research Council within the framework of Horizon 2020 (ERC CoG 648535), directed and coordinated by Bethany Aram. This is a program that takes over an interdisciplinary perspective, integrating the analysis of archaeological, historical, and archaeometric data.

Projection

Since its inception, the Panama Viejo archaeological project has incorporated into its activities a wide range of initiatives that contribute not only to the generation of knowledge but also to its socialization, committing to dissemination work through diverse channels and training of human resources. Museum proposals, publications, and academic efforts occupied an important place in planning (Rovira and Martín 2008; Martín and Rovira 2012).

From the point of view of training, the modality of conducting short seminars on specific topics in which particular aspects of the interventions on the site, from an interdisciplinary perspective, has been motivating. Such is the case of the seminar that took place in 2015, about the experiences in the

cloister of Santo Domingo Convent, whose objective was to discuss the possibilities and achievements of the geophysical prospecting techniques, specifically the electrical resistivity tomography, the results of archaeological research, the contributions of the landscape perspective, as well as the interpretative relevance for the study of the historical evolution of the ruins and the use of new three-dimensional modelling tools.

In addition, the archaeological project develops an intense work, in association with different universities and research institutions. It is worth mentioning the realization of archaeological field schools, with the participation of students and young professionals, national and foreign, interested in specializing in the area of historical archaeology. The schools include archaeological excavations, complemented by workshops and conferences of researchers affiliated to different universities and research centers. Out of these experiences, five undergraduate, one master's, and four doctoral theses have been developed in the framework of academic programs of different universities in the country and abroad (University of Panama, University of Huelva, University College of London, University from Tübingen, Columbia University, and University of the Andes of Colombia, among others).

In 2005, the archaeology team of the Patronato Board of Trustees proposed the publication of a magazine in which the complex field of heritage from its multiple perspectives would be discussed, which would make room for the scientific production of the institution but which also included international contributions. In this way, *Canto Rodado* starts its publication, uninterrupted until now, with an annual frequency, but with the challenge of increasing its frequency in the future and consolidating itself as an inter- and multidisciplinary dissemination organ.

References

Aceituno, Francisco J., and Juan G. Martín. 2017. Plantas amerindias en la mesa de los primeros europeos en Panamá Viejo. *Latin American Antiquity* 28 (1): 127–143.

Castillero, Alfredo. 2006. *Sociedad, economía y cultura material. Historia urbana de Panamá La Vieja*. Panamá: Patronato Panamá Viejo.

Cooke, Richard, and Luis A. Sánchez. 2004. Las sociedades originarias. In *Historia General de Panamá*, ed. Alfredo Castillero, Tomo 1, 3–46. Panamá: Comité Nacional del Centenario de la República de Panamá.

Cuervo, Antonio B. Trans. 1892. *Colección de documentos inéditos sobre la historia de Colombia*. Sección primera, Geografía y viajes, Tomo 2 (Costa pacífica, provincias litorales y campañas de los conquistadores). Bogotá: Casa editorial de J. J. Pérez.

Gaitán Ammann, Felipe. 2012. *Daring trade: An archeology of the slave trade in late seventeenth century Panamá (1663–1674)*. Tesis doctoral, Columbia University, Departamento de Antropología.

Goggin, John. 1968. *Spanish majolica in the new world: Types of the sixteenth to eighteenth centuries*. New Haven: Yale University Press.

Guzmán Navarro, Arturo. 2001. *Origen y evolución del modelo de desarrollo de la barriada de Panamá La Vieja durante el período 1930–1999*. Tesis de maestría, Universidad de Panamá, Departamento de Historia.

Linero Baroni, Mirta. 2014. Proyecto arqueológico Panamá Viejo. *Canto Rodado* 9: 67–84.

Linero Baroni, Mirta, and Juan Ramón Muñiz Álvarez. 2016. Ruinas de la Iglesia de Santo Domingo, Panamá Viejo. *Canto Rodado* 11: 159–167.

Lister, Florence, and Robert Lister. 1976. *A Descriptive Dictionary for 500 Years of Spanish Tradition Ceramics (13th Through 18th Centuries)*. Society for Historical Archaeology, Special Publications, No. 1. Glassboro, New Jersey.

Lister, Florence, and Robert Lister. 1984. The potter's quarter in colonial Puebla, México. *Historical Archaeology* 18: 87–102.

Löbbecke, Frank, and Eduardo Tejeira. 2007. El convento de San Francisco en Panamá Viejo. Investigaciones arqueológicas y arquitectónicas. *Canto Rodado* 2: 101–123.

Martín, Juan Guillermo, and Julieta de Arango. 2013. Panamá Viejo: A successful experience about cultural heritage management. *Revista de Estudios Sociales* 45: 158–169.

Martín, Juan G., and Félix Rodríguez. 2006. Los moluscos marinos de Panamá Viejo. Selectividad de recursos desde una perspectiva de larga duración. *Canto Rodado* 1: 85–100.

Martín, Juan G., and Beatriz Rovira. 2012. The Panama Viejo archaeological project: More than a decade of research and management of heritage resources. *Historical Archaeology* 46 (3): 16–26.

Martín, Juan G., and Luis A. Sánchez. 2007. El istmo mediterráneo: intercambio, simbolismo y filiación social en la bahía de Panamá, durante el período 500–1000 D.C. *Arqueología del Área Intermedia* 7: 113–122.

Martin, Juan G., Javier Rivera, and Claudia Rojas-Sepúlveda. 2009. Bioarqueología. Su aporte al Proyecto Arqueológico Panamá Viejo. *Canto Rodado* 4: 117–146.

Mena García, Carmen. 1984. *La sociedad de Panamá en el siglo XVI*. Excma. Diputación Provincial de Sevilla. Sección Historia, Quinto Centenario del Descubrimiento de América, Sevilla.

Mena García, Carmen. 1992. *La ciudad en un cruce de caminos: Panamá y sus orígenes urbanos*. Sevilla: Escuela de Estudios Hispano-Americanos.

Mena García, Carmen. 2007. Traslado y reconstrucción de la nueva ciudad de Panamá (1673). Navarro Antolín. Fernando (coord.). Orbis incognitvs: avisos y legajos del Nuevo Mundo. *Homenaje al profesor Luis Navarro García*, 2: 385–396.

Oran (pseudonym). 1859. Tropical journeyings. *Harper's New Monthly Magazine* 19,112: 433–454.

Parker King, Phillip, and Robert Fitzroy. 1949. La ciudad de Panamá en 1863. *Revista Lotería* 92: 23–26. Panamá, enero.

Pearson, George. 2006. La industria lítica prehispánica de Panamá Viejo. Hacia una caracterización tipológica y tecnológica. *Canto Rodado* 1: 133–156.

Rojas-Sepúlveda, Claudia, Javier Rivera-Sandoval, and Juan G. Martín. 2011. Paleoepidemiology of pre-Columbian and Colonial Panamá Viejo: A preliminary study. *Bulletins et Mémoires de la Société d'Anthropologie de Paris* 23 (1): 70–82.

Rovira, Beatriz. 2000. Alcanzando el pasado. El proyecto arqueológico Panamá Viejo. *Revista Lotería* 432: 47–55.

Rovira, Beatriz. 2001. Presencia de mayólicas panameñas en el mundo colonial. Algunas consideraciones en torno a su distribución y cronología. *Latin American Antiquity* 12 (3): 291–303.

Rovira, Beatriz, and Felipe Gaitán. 2010. Los búcaros. De las indias para el mundo. *Canto Rodado* 5: 39–78.

Rovira, Beatriz, and Juan Guillermo Martín. 2008. Arqueología Histórica de Panamá. La experiencia en las ruinas de Panamá Viejo. *Vestigios* 2 (1): 7–33.

Rovira, Beatriz, and Jazmín Mojica. 2007. Encrucijada de estilos. La mayílica panameña. Gustos cotidianos en el Panamá colonial (Siglo XVII). *Canto Rodado* 2: 69–99.

Rovira, Beatriz, James Blackmann, Lambertus van Zelst, Ronald Bishop, Carmen Rodríguez, and Daniel Sánchez. 2006. Caracterización química de cerámicas coloniales del sitio de Panamá Viejo. Resultados preliminares de la aplicación de activación neutrónica instrumental. *Canto Rodado* 1: 101–131.

Salgari, Emilio. 1977. *Yolanda, la hija del corsario negro*. Barcelona: Editorial Molino.

Scholkmann, Barbara, Reiner Schreg, Aline Kottmann, Ilda Martínez, and Annette Zeischka. 2006. El Hospital San Juan de Dios, Panamá Viejo. Nota preliminar acerca de las excavaciones arqueológicas. *Canto Rodado* 1: 65–83.

Tomes, Robert. 1855. *Panamá in 1855. An account of the Panama rail-road, of the cities of Panama and Aspinwall, with sketches of life and character on the Isthmus*. New York: Harper and Brothers Publishers.

Ward, Christopher. 1993. *Imperial Panamá: Commerce and conflict in Isthmian America*. Albuquerque: University of New Mexico Press.

Further Readings

Arango, Julieta de la G. de. 2006. El sitio de Panamá Viejo. Un ejemplo de gestión patrimonial. *Canto Rodado* 1: 1–15.

Arroyo, Silvia. 2010. El plan maestro del conjunto monumental histórico de Panamá Viejo. Diez años después. *Canto Rodado* 5: 185–212.

Arroyo, Silvia. 2015. Panamá Viejo después de su destrucción. *Canto Rodado* 10: 11–37.

Baker, Henry. 1968. *Actuales excavaciones en Panamá La Vieja*. Actas del Primer Symposium Nacional de Arqueología y Etnohistoria, Centro de Investigaciones Antropológicas, Universidad de Panamá.

Biese, Leo. 1964. *The prehistory of Panamá Viejo*. Bulletin 191, Anthropological papers 68. Washington, DC: Smithsonian Institution, Bureau of American Ethnology.

Campos, Juan, and Félix Ardila. 2006. La traza urbana colonial de Panamá Viejo. Su recuperación. *Canto Rodado* 1: 41–64.

Cooke, Richard. 1984. *El rescate arqueológico en Panamá: Historia, análisis y recomendaciones*. Colección El Hombre y su Cultura. Panamá: Instituto Nacional de Cultura.

Cruxent, José María. 1979. *Elementos decorativos de la mayólica colonial panameña, reconstrucción tentativa (siglos XVI a XVIII)*. Panamá: Memoria del curso de restauración de bienes muebles especializado en ceramología histórica OEA/INAC.

Deagan, Kathleen. 1987. *Artifacts of Spanish colonies of Florida and the Caribbean (1500–1800)*. Vol. 1. Washington, DC/Londres: Smithsonian Institution Press.

Durán, Félix. 2014. El conjunto monumental histórico de Panamá Viejo. *Canto Rodado* 9: 51–66.

Exquemelin, Alexander. 1969 [1678]. *The buccaneers of America*. Baltimore: Penguin Books.

Inanez, Javier G., Jeremy J. Bellucci, Juan Guillermo Martín, Richard Ash, William F. McDonough, and Robert J. Speakman. 2016. Pb isotopic composition of panamanian colonial majolica by LA-ICP-MS. In *Recent advances in laser ablation ICP-MS for archaeology*, 343–358. Berlin/Heidelberg: Springer.

Jamieson, Ross. 2001. Majolica in the early colonial Andes. *Latin American Antiquity* 12 (1): 45–58.

Jamieson, Ross, and Ronald Hancock. 2004. Neutron activation analysis of colonial ceramics from southern highland Ecuador. *Archaeometry* 46 (4): 569–583.

Law Environmental Caribe. 1999. *Plan maestro de la puesta en valor del Sitio Monumental de Panamá Viejo*. Panamá: Informe inédito presentado al Patronato Panamá Viejo.

Linero, Mirta. 2001. Cerámica criolla: muestra excavada en el pozo de las casas de Terrin. *Arqueología de Panamá la Vieja. Avances de investigación. Época colonial* 1: 149–163.

Linero, Mirta. 2013. Bajíos del Rey de Panamá Viejo. Caracterización preliminar de un abandonado suburbio de la ciudad colonial. *Canto Rodado* 8: 75–93.

Linero, Mirta, and Juan Ramón Muñiz. 2015. Aportaciones arqueológicas al arte decorativo en Panamá durante el siglo XVII. *Canto Rodado* 10: 73–94.

Lister, Florence, and Robert Lister. 1987. *Andalusian ceramics in Spain and New Spain. A cultural register from the third century BC to 1700*. Tucson: The University of Arizona Press.

Long, George. 1964. Excavations at Panamá Vieja. *The Florida Anthropologist* XVI: 2.

Long, George. 1967. *Archaeological investigations at Panama La Vieja*. Tesis de maestría, Departamento de Antropología, Universidad de Florida, Gainesville.

Martín, Juan. 2006. *Arqueología de Panamá La Vieja: del asentamiento a la ciudad colonial*. Tesis de doctorado, Departamento de Historia, Universidad de Huelva.

Martín, Juan G., Annette ZeischkaKenzler, Hans Mommsen, and Aline Kottmann. 2008. Gres: la sutil presencia alemana en el Panamá colonial. *Canto Rodado* 3: 65–94.

Martín-Rincón, Juan. 2002. Panamá la Vieja y el Gran Darién. In *Arqueología de Panamá la Vieja: avances de investigación*, 230–250. Panamá: Patronato Panamá Viejo.

Martín-Rincón, Juan. 2007. La cerámica prehispánica del parque Morelos, Panamá Viejo. *Canto Rodado* 2: 45–68.

Meza Suinaga, Beatriz, and Mirta Linero Baroni. 2016. Herrajes constructivos en Panamá colonial. *Canto Rodado* 11: 65–84.

Myers, Emlen, Fernando de Amores Carredano, Jacqueline Olin, and Alfonso Pleguezuelo Hernámdez. 1992. Compositional identification of Sevilla majolica at overseas sites. *Historical Archaeology* 26: 131–147.

Osorio, Katti. 2012. Los atributos del valor universal excepcional de una propiedad considerada Patrimonio Mundial. El caso del sitio arqueológico de Panamá Viejo y Distrito Histórico de Panamá. *Canto Rodado* 7: 1–27.

Patzel, Arno, Aline Kottmann, and Martín Waldhör. 2007. Prospección Geoeléctrica en la ciudad colonial de Panamá Viejo. Técnicas, mediciones y Primeros resultados de las excavaciones. *Canto Rodado* 2: 23–43.

Pereira, Grégory. 2002. Análisis de un entierro encontrado en la iglesia del Convento de las monjas de la Concepción de Panamá la Vieja. In *Arqueología de Panamá La Vieja. Avances de investigación*, 104–112. Panamá Viejo: Patronato Panamá Viejo.

Rivera, Javier. 2012. Aproximaciones a la concepción del cuerpo durante el período colonial. Evidencias arqueológicas de las prácticas quirúrgicas en dos hospitales de la orden de San Juan de Dios. *Canto Rodado* 7: 85–112.

Rosenfeld, Linda. 2008. La porcelana china kraak en Panamá. Documentación de una muestra arqueológica de los siglos dieciséis y diecisiete. *Canto Rodado* 3: 1–15.

Rovira, Beatriz. 1997. Hecho en Panamá. La manufactura colonial de mayólica. *Revista Nacional de Cultura* 27: 67–85.

Rovira, Beatriz. 2002. Paredes no tan desnudas. . .La muestra de azulejos sevillanos del sitio de Panamá Viejo. In *Arqueología de Panamá La Vieja. Avances de investigación*, 167–183. Panamá Viejo: Patronato Panamá Viejo.

Rovira, Beatriz. 2014. Arqueología en la ciudad colonial: Panamá Viejo y el distrito histórico de la ciudad de Panamá. In *Arqueología de los primeros asentamientos urbanos españoles en la América Central y Meridional. Actas del I Seminario Internacional RII_UC*, 195–209. Madrid: Universidad Politécnica.

Schreg, Rainer. 2010. Panamanian coarse handmade earthenware. A melting pot of African, American and European traditions? *Post Medieval Archaeology* 14 (1): 135–164.

Suárez, Loreto. 2013. Convento de las Monjas de la Inmaculada Concepción. Una propuesta de formación. *Canto Rodado* 8: 1–16.

Panhellenism

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Introduction

The *Oxford English Dictionary* defines panhellenism as patriotism based on the concept of Greece as a whole. This broad understanding of the term has been much in vogue since its invocation in the nineteenth century by early historians of Greece, like G. Grote and John Fiske, who sought to emphasize the reality of an ancient, panhellenic, "united" Greece in response to current political events, particularly the struggle for Greek independence and a "return" to a united, panhellenic, Greece (cf. Mitchell 2007: xv–xxii).

Matching the modern term panhellenism (let alone its meaning) to the ancient Greek world has, however, proved more difficult: there is no example of the use of *panhellenismos* or other term specifically for the phenomena of panhellenism in the ancient sources. Scholarship has concentrated instead on finding references to terms that allude to such a concept.

The most obvious is in the Roman world, with the advent of Hadrian's *Panhellenion* (Hadrian's union of Greek poleis within the Roman province of Achaia) in the second century CE. The

Panhellenion sought to place emphasis on kinship and cultural Greek ties and sparked a wider use of the term, for example, the panhellenic games in Athens. Yet even this *Panhellenion* was not panhellenic in the sense that it included all parts of a united Greek world but was rather focused on the metropoleis of old Greece and their overseas colonies (cf. Spawforth and Walker 1985: 81–2).

In the archaic and classical Greek world, scholars have pointed to the (rare) use of "panhellenes" and to calls for (different kinds of) Greek unity in different ancient authors (discussed below). Scholars have also occasionally used the concept of panhellenism to argue for the wider existence of particular genres of artistic creation, such as tragedy (e.g., Taplin 1999), and the similarity of "Greek" material culture across its different poleis, thus by extension minimalizing the "uniqueness" of Athenian art (e.g., Morris 1998). The most important application of panhellenic to archaeological material and sites, however, has been as a description for a group of important Greek sanctuaries: Olympia, Delphi, Isthmia, and Nemea (those which hosted the "crown games" and were part of the "periodos" circuit). As a result of this label, it has often been assumed that the function and effect of these sanctuaries was to host and foster "panhellenic unity" through the different activities on offer at each site.

Recent scholarship, however, has continued to re-investigate the appropriateness of the term panhellenism and its meaning as "a union of all Greeks" to the ancient reality (and even ideal) in both literature and material culture. As a result, its current definition in the *Oxford Classical Dictionary* evokes a subtle move away from the earlier blanket concept of unity towards a comparative idea focused around similarity and difference. Panhellenism is "the idea that what the Greeks have in common as Greeks, and what distinguishes them from barbarians, is more important than what divides them" (Hornblower and Spawforth 2003: 1106).

Definition

Use of the ancient Greek term "panhellenes" is rare before the Roman period. Early examples are Hom *Il*. 2.530; Ar. *Peace* 292, 302; Pind. *Isthm*. 2.38, 4.29; and *Pae*. 6.60 (fr.52f = D6Ruth). Nor do all these examples necessarily mean "all the Greeks." Hall in fact argues that the term "hellenes" actually began as "panhellenes" (cf. *Iliad* 2.530), meaning not "all of the Greeks," but the "the most Greek of the Greeks" (Hall 2007: 272–4). Much more frequent, of course, are what have been termed "appeals" to concepts of panhellenism, all with reference to different types of community. The most famous is that of Herodotus (8.144.2), in which Greek kinship is based on common language, blood, sanctuaries, sacrifices, and common ways of life; but other such definitions of community can be found in, for example, Hdt. 7.132; 8.121; 9.81 and in inscriptions like Meiggs and Lewis (1988) no. 24 (line 4). Scholarship has occasionally emphasized the very explicit political opportunism of such appeals, particularly by Athens (e.g., Perlman 1976). Yet as a result of widening the net for panhellenism, many scholars have felt the necessity to add descriptive adjectives to narrow down the vagueness of panhellenism, such as "functional" and "true" panhellenism (Neer 2007: 226) and "strong" and "weak" panhellenism (Mitchell 2007: xviii). Such a widening net has also meant increasing overlap with scholarship on differing concepts of "hellenism," to the extent that the necessity and value of the term panhellenism as distinct from hellenism have been questioned ('what is so "pan" about "panhellenism"?).

In its application to sanctuaries, and particularly Olympia, Delphi, Isthmia, and Nemea, there has also been increasing scholarly uncertainty. This has focused firstly around the date at which each of these sanctuaries can be said to have acted as "panhellenic" entities. Snodgrass, for example, claimed that Delphi was acting out a panhellenic role from the eighth century BCE (Snodgrass 1986), yet Morgan has argued that no such role can be envisaged before the seventh century BCE (Morgan 1993). Scott has continued that line of enquiry, by questioning the role of Olympia and Delphi as always places for all Greeks into the classical period (Scott 2010). Secondly, scholars have criticized the distinction of these four sanctuaries as panhellenic and thus different from others: they were not, as has been claimed, in

receipt of unique services, the only sanctuaries that attracted large panhellenic crowds, nor the only ones which were open to all Greeks (cf. Scott 2010: 257). Thirdly, scholars have noted a wide range of differences in activities, ownership, and audience between the four panhellenic sanctuaries themselves (cf. Neer 2007: 226). Equally, other scholars have rejected the usefulness of the term panhellenic as a group description at all, with more recent surveys of these sanctuaries speaking of them as "interurban" rather than panhellenic.

Key Issues/Current Debates/Future Directions/Examples

While the use of panhellenism as a blanket term meaning "the unity of all the Greeks" to describe the reality of ancient Greece has faded, as well as its use as a distinguishing term for a collective grouping of particular sanctuaries, the scholars have rightly continued to consider moments, genres, places, and ways in which notions of (different kinds and levels of) Greek unity may have had value in the ancient world as ideal and/or reality. In terms of chronology, most scholars agree that the acme for sentiments of panhellenism during the archaic and classical periods was in the aftermath of the Persian wars (Mitchell 2007: xvi). These events also gave a particular flavor to the concept of Greek unity as something conceived in opposition to what it was not: Persian/barbarian (see the *OCD* definition above). This was reinforced in the late classical period, when several ancient authors refer to the post-Persian wars (and the anti-barbarian Greek unity that came with it) as a "golden era," which their worlds should seek to emulate (e.g., Gorgias, Isocrates, Demosthenes, cf. Low 2007), and when Philip based his Hellenic league loosely around the same aim (attacking Persia). In terms of place, though the description of the periodos sanctuaries as panhellenic has been deservedly recognized as problematic, no one denies that there were panhellenic (as well as equally un-panhellenic) aspects to their activities, audience, and reputation, both of which often existed simultaneously and which were constantly changing over time. This increasing recognition of the dynamic and multiplicitous perception and experience of sanctuaries continues to provoke new insights into the complex and crucial place of sacred spaces in ancient society and their frequently oscillating importance within the wider landscape (such as the recent examinations of the early panhellenic outlook of the sanctuary of Kalapodi as on par with that of Olympia and Delphi: Felsch 2007: 227). As such, concepts of panhellenism continue to find their place within the wider spectrum of hellenism, not as a static construct of unity but as an evolving part of the polyvalent discourse of Greek identity.

Cross-References

- ▶ Classical (Greek) Archaeology
- ▶ Polis
- ▶ Religion, Greek, Archaeology of

References

Felsch, R.C.S. 2007. *Kalapodi II: Ergebnisse der Ausgrabungen im Heiligtum der Artemis und des Apollon von Hyampolis in der antiken Phokis*. Mainz: von Zabern.

Hall, J.M. 2007. *A history of the archaic Greek world c. 1200–479 BCEE*. Oxford: Blackwell.

Low, P. 2007. *Interstate relations in classical Greece: Morality and power*. Cambridge: Cambridge University Press.

Meiggs, R., and D. Lewis. 1988. *A selection of Greek historical inscriptions to the end of the fifth century BCE*. Oxford: Oxford University Press.

Mitchell, L. 2007. *Panhellenism and the Barbarian in archaic and classical Greece*. Swansea: Classical Press of Wales.

Morgan, C. 1993. The origins of panhellenism. In *Greek sanctuaries: New approaches*, ed. N. Marinatos and R. Hägg, 45–61. London: Routledge.

Morris, I. 1998. Beyond democracy and empire: Athenian art in context. In *Democracy, empire and the arts in fifth-century Athens*, ed. D. Boedeker and K. Raaflaub, 58–86. Cambridge, MA: Harvard University Press.

Neer, R. 2007. Delphi, Olympia and the art of politics. In *Cambridge companion to archaic Greece*, ed. H. Shapiro, 225–264. Cambridge: Cambridge University Press.

Perlman, S. 1976. Panhellenism, the polis and imperialism. *Historia* 25: 1–30.

Scott, M. 2010. *Delphi and Olympia: The spatial politics of panhellenism in the archaic and classical periods*. Cambridge: Cambridge University Press.
Snodgrass, A. 1986. Interaction by design: The Greek city-state. In *Peer-polity interaction and socio-political change*, ed. C. Renfrew and J. Cherry, 47–58. Cambridge: Cambridge University Press.
Spawforth, A., and S. Walker. 1985. The world of the Panhellenion I: Athens and Eleusis. *Journal of Roman Studies* 75: 78–104.
Taplin, O. 1999. Spreading the world through performance. In *Performance culture and Athenian democracy*, ed. S. Goldhill and R. Osborne, 33–57. Cambridge: Cambridge University Press.

Further Reading

Hornblower, S., and A. Spawforth. 1996. The Oxford classical dictionary, 3rd revised ed. Oxford: Oxford University Press.

Paper: Preservation and Conservation

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Introduction

Paper is one of the oldest man-made materials which origin is conventionally dated to 105 CE when paper was described for the first time by a Chinese script (Hunter 1978). From its invention, paper has been used for many applications, mainly as a material on which art was created and documents written. The container and packaging industry relies on paper. Clothing, umbrellas, and a variety of daily accessories made of paper point to a multitude of paper uses. Each application requires different optical, physical, and chemical properties to meet the users' expectations. Properties of paper, longevity and response to adverse conditions, rely on properties of fibers that compose paper, process which fibers undergo, and characteristics of additives. Understanding the materials and basic principles of paper manufacturing serves as basis for designing a long-term preservation and conservation strategies.

Although its use is ubiquitous, paper is prone to warping, tearing, and staining as a result of mishandling, exposure to light, or changes in temperature and humidity in the environment. Although not all these processes governing chemical and physical changes in paper are fully understood, recognizing that there is a relationship between the environment and paper alteration guides principles of preventive conservation. Conservators are capable to reverse only some of the deterioration processes aiming to stabilize paper and regain aesthetic enjoyment of art and artifacts made on paper.

Definition

Paper is a web of fibers, sizing, and fillers assembled with a great degree of heterogeneity in distribution, shape, and chemical composition. Paper is a three-dimensional structure of fibers and voids between them (Bristow 1986). Surface of paper has different properties than bulk. Smoothness or roughness of the paper surface is imparted by application of sizing (or its absence) and different methods of flattening, while paper pliability, rigidity, density, or weight are engineered during paper processing. Fiber composition, additives, and manufacture of paper have impact on longevity of artifacts made of paper (Szczepanowska and Cavaliere 2012; Szczepanowska et al. 2012).

Preservation and conservation are activities ensuring that cultural, artistic, and historic material is passed on to future generations serving as a testimony of previous generations' ways of living. Preservation and conservation activities cannot be properly implemented without understanding the physical and chemical makeup of artifacts.

Key Issues

Paper components and manufacture, an overview:
Paper can be described based on:

- Fiber composition, as rag or wood-base paper
- Manufacture, as machine or hand-made paper
- Western or Oriental, based on the geographical location of paper manufacturing and type of raw material used as paper fiber

- Sizing, based on the presence or absence of sizing as sized or unsized paper

Paper Fibers

Fibers used in papermaking are of plant origin. Commercial papers use primarily wood-origin fibers and dominate today's market, while artists' papers are made from cotton and linen (flex) fibers derived from rag; such paper is often referred to as "rag paper." The main difference is their chemical content; wood fibers contain more lignin and hemicelluloses, while cotton papers consist of nearly pure cellulose and no hemicelluloses (Rance 1980). All plants that contain lignin also contain hemicelluloses, whereas cotton and other lignin-free fibers lack hemicelluloses. Rag fibers contain the highest percentage of cellulose; thus, papers they produce are more durable and of higher quality. Because of their higher lignin content, wood-pulp papers are of lesser quality and more easily deteriorate.

Rags and later wood pulp were the main raw materials in Western papermaking. Paper made in the Far East, known as Oriental paper, utilizes mitsumata or mulberry paper (common name: kozo) fibers, harvested from the inner bark of shrubs. Paper therefore can be described as Western or Oriental, depending on the geographical location and associated type of the raw material used in its manufacture.

Cotton used for papermaking is derived from new textile cuttings, old rags, and linters. Linters are the shortest fibers in the cotton-harvested lot, varied in a range of 12–64 mm in length long and 20 μm in width. Cotton is almost pure cellulose with a small percentage of protein, pectic substances (congealed gum-like carbohydrates) ash, and wax. Characteristic twist of flattened fiber is a diagnostic morphological feature of cotton fibers.

Flax fibers are used in textile and in fine papers (rag papers). The fibers are formed in the stem of the flax plant (*Linum usitatissimum*). Chemically, flax is the same as the cotton polymer in that they are both cellulose polymers. Physically, the flax polymer differs from the cotton polymer in the degree of polymerization. Morphologically, characteristic nodules on the flax fibers serve as diagnostic feature in a microscopic examination of paper content.

Oriental Paper Fibers

Fibers of mulberry paper (common name: kozo) and mitsumata are bast fibers, and similarly to flax derive from the inner part, under the bark of plants or shrubs. These fibers are used in the Oriental handmade papers producing strong and permanent papers. Besides showing thick walls, the fibers do not have very distinctive morphological features therefore are not easily identified microscopically. Paper mulberry may show a transparent membrane in some places along the fiber wall while Mitsumata shows broader portion in the central part of the fibers (Ilvessalo-Pfaffli 1995).

Paper Manufacture

The *paper-making processes* serve as one of the broad criteria in describing paper as hand- or machine- made and laid or wove paper. The processing of paper has a direct impact on paper's longevity and susceptibility to deterioration. The principles of papermaking are essentially the same in all regions. Fibers are macerated, suspended in water, and retrieved by sieve-like mould to form a sheet. The changes in the manufacturing processes followed modernization and technical inventions in other fields. The growing needs for variations in paper's properties lead to broadening the array of additives and finishing processes.

Formation of Paper Sheets

Macerated fibers (or pulp) are suspended in water slurry. A mould is dipped into the vat of macerated pulp, and a layer of the wet, fibrous material is brought to the surface. When the paper sheet is formed on the mould made of bamboo or grass, horse hair or metal, sieve-like lattice, less fibers are gathered in areas where vertical and horizontal strains of the lattice are intersecting, thus forming so-called chain and laid lines and refer to laid paper. Wove paper is usually produced in a machine-made process and does not have chain and laid lines, but a uniform, cloth-like appearance.

Hand and machine processes produce different papers, the quality of which is determined by retention of the original features of the fibers. Long fibers are undamaged in hand processing; short fibers indicate machine production. The quality of the fibers has a direct impact on paper longevity; longer fibers,

less damaged during processing, are less susceptible to mechanical breaking and chemical and microbiological attack. The strongest and best quality papers are made by hand; the poorest are machine produced. A great variety of papers fall between these two extremes. The manual process ensures even dispersion of fibers in slurry (fibers suspension in water) and retains fibers' length, strength, and luster. Fiber flocks are almost completely avoided in a sheet (flocculation is a process in which particles aggregate into small lumps).

Paper Sizing

The purpose of adding sizing to paper is to modify its resistance to water; it is necessary for the ink to remain on the surface. Gelatin and starch were historically used as paper sizing. Gelatin is made of animal skin shavings, bone or tendon therefore is of protenacious base. Starch is a polysaccharide derived from plants. It is estimated that on a commercial level, starch sizing was abandoned ca fourteenth century in favor of gelatin (Clapp cited in James 1978). However, both are being used in individual, small production paper mills until today. For example, watercolor papers are traditionally sized, meaning additives are applied to reduce the paper sheet absorbency and making it hydrophobic (i.e., repelling water). Filter paper, such as Whatman papers, are unsized, because their purpose is to let the water freely flow during filtration processes.

Internal sizing is added to the paper pulp before it is cast in the paper mould; external sizing is applied to the paper surface after the paper has dried. Other traditional sizing included gum Arabic or rosin (Hunter 1978; Emeryton 1980). These substances bond with cellulose via hydrogen bonding and have film-forming propensity on the surface of fibers, thus modifying the paper surface.

Rosin-Alum Sizing

Alum rosin has been known and used since the nineteenth century. Rosin is a resin extracted from the pine tree, composed of several resinous acids. Alum is a salt, aluminum sulfate. A combination of rosin and alum results in production of sulfuric acid; pH drops to 4.5–5. The invention of rosin-alum sizing aimed to act as retardant of microbial and fungal growth in wet paper pulp. However, high acidity of the sizing resulted in rapid discoloration of paper and disintegration of fibers.

Causes of Paper Deterioration Paper is a stable material when properly cared for, as exemplified by archival collections of manuscript and art on paper dating several hundred years back and found in different parts of the world (James et al. 1997). However, paper can deteriorate easily when proper conditions are not met.

The causes of paper deterioration fall into three categories:

1. Inherent, contained in paper: fiber content (cellulose or lignin), introduced during manufacture, such as rosin-alum sizing or applied as acidic inks and paint, such as iron gall ink and verdigris (copper green paint).
2. Environmental, induced by exposure to environmental factors (light, humidity, temperature), contact with acidic material on exhibit or in storage enclosures, or effects of natural or man-made disasters such as floods and hurricanes, fires recovery or war conflicts. Microbiological deterioration falls into this broad category.
3. Negligence of handlers, resulting in damage, such as breakage, tearing or staining, and poor housekeeping, such as unattended pests and insects in collections.

Paper-based museum collections include not only flat sheets of paper, such as documents and art, but also bound books or pamphlets, three-dimensional objects, such as globes or papier-mâche sculptures, hats, kites, advertising balloons, and unusual objects such as large balloons carrying incendiary booms during the World War II. Those artifacts contain other materials such as wood, metal, printing inks, artistic media applied on the surface, adhesives, or other additives. Each additional material or alteration of paper dictates a different set of handling and care procedures.

Based on the paper objects' structure and nature of deterioration, two main types of deterioration can be discussed:

1. Mechanical
2. Chemical

So-called "mechanical deterioration" usually refers to physical alterations of an artifact, such as deformations (creases, folds, undulations), structural separations (tears, losses), punctures, skinning of surface, or abrasions. Mechanical type of deterioration often results from breakdown of paper on molecular level (Fig. 1).

"Chemical deterioration" indicates alterations of paper on molecular level. These changes may be induced by light (photochemical damage, as seen on Fig. 3) (Feller 1975; Feller and Johnston-Feller 1978; Feller 1994, Whitmore 2002) acidity (Figs. 4 and 5) or chemical interaction of applied additives, for example, sticky pressure tape. Bio-deterioration caused by fungi alters chemical makeup of papers that contain fillers, causes staining of paper and in conditions favorable to fungal development leads to structural disintegration of paper (Fig. 6) (Szczepanowska and Lovett 1992; Szczepanowska and Cavaliere 2000; Szczepanowska and Moomaw 1994).

Acidity is particularly detrimental to longevity of papers because even the most chemically resilient cotton fibers are weakened and destroyed by acids. Sources of acidity in paper-based museum objects can be identified as inherent, resulting from chemical alterations of paper or caused by off-gassing emitted by the most immediate environment such as enclosures (on exhibit, storage, framing) or polluted environment. The source of paper acidity may be internal, such as the high lignin content in wood-pulp papers. Lignin, an intercellular tissue of the wood, is primarily responsible for rapid degradation of papers made of wood pulp. Another source of paper acidity could be the presence of alum-rosin sizing or acidic paint. One of the visible signs of acidic deterioration of paper is yellowing and brittleness.

Preservation Principles

Preservation guidelines for paper-based artifacts in archives and museum setting are based on the understanding of the physicochemical makeup of paper, structure of artifacts made of paper, and factors which may cause deterioration of paper. The purpose for which the artifacts were collected and are used influences the preservation guidelines. Flat documents will require different handling and supports than three-dimensional globes or hats. The latter, in particular, will need supports

Paper: Preservation and Conservation, Fig. 1 Early, twentieth century photograph portrait mounted onto acidic wood-pulp board. Oval, size: 19 ¾″ × 13 ½″. (**a**) Mechanical type of deterioration manifested itself as breakage of the board and tearing of the photograph. Highly acidic and poor quality board lost its strength to support the photograph. (**b**) After conservation. The photograph was separated from the source causing deterioration, an acidic backing board. Torn fragments were assembled, aligned, and mended on reverse with Japanese tissue, as seen on Fig. 2

Paper: Preservation and Conservation, Fig. 2 Reverse of the photograph seen on Fig. 1 illustrating one of the methods used by conservators in assembling and aligning paper fragments. Once aligned, the paper fragments are mended with Japanese mulberry paper using as adhesive archival quality paste

to maintain their three-dimensional form. Preservation may be discussed in two categories as *preventive preservation* (before any deterioration occurs) and *active preservation*, such as conservation (when damage has occurred and intervention is needed).

Preventive preservation focuses on:

1. Providing proper environment for collections on exhibit and in storage. That means stable temperature (T), relative humidity (RH), and light (L) from which UV portion is filtered out. Although the values of recommended range of RH are shifting when more research reveals an intricate relationship between materials and environment, generally, according to the Smithsonian Institution, the acceptable range is from 37% to 53% (Mecklenburg et al. 2004). The most important is to avoid fluctuations of the environmental parameters (RH and T) over longer periods of time.
2. Good housekeeping, meaning ensuring insect and rodent-free environment.
3. Using acid-free materials in the construction of storage enclosures and exhibit supports. Close proximity of artifacts with these materials needs to ensure that no acidity is transferred to the original objects.
4. Handling policies, loan, transport, packing guidelines, handling and training workshops are the backbone of preventive, long-term collections care.

Conservation can be considered an active form of preservation. It requires an interaction with the objects' fabric; therefore, each step has to be carefully reviewed and planned. Any interaction with the original material leaves an irreversible mark on the original fabric; therefore, conservation should be undertaken only by trained conservators.

Knowing that acidity is detrimental to longevity of millions of archival collections, paper engineers and chemists along with archives' custodians have been engaged for years in finding solutions to prevent and retard that irreversible acidification of paper. The process of neutralizing acidity in paper is called deacidification. *Deacidification* involves introducing to paper alkaline material such as calcium or magnesium carbonates or calcium hydroxide through aqueous methods (water is the carrier) of nonaqueous (organic solvents are the carrier). Deacidification with aqueous and non-aqueous solutions has been experimented with on large quantities of books. However, there are other composite materials in books, such as bindings, adhesives, and printing media which often reacted with chemicals used in the deacidification processes; therefore, that method not always could be applied to rare and valuable collections.

Definition of conservation, according to the American Institute of Conservation reads: [*Conservation*] "The profession devoted to the preservation of cultural property for the future. Conservation activities include examination, documentation, treatment, and preventive care, supported by research and education" (AIC Directory 2012). Conservation of paper-based artifacts

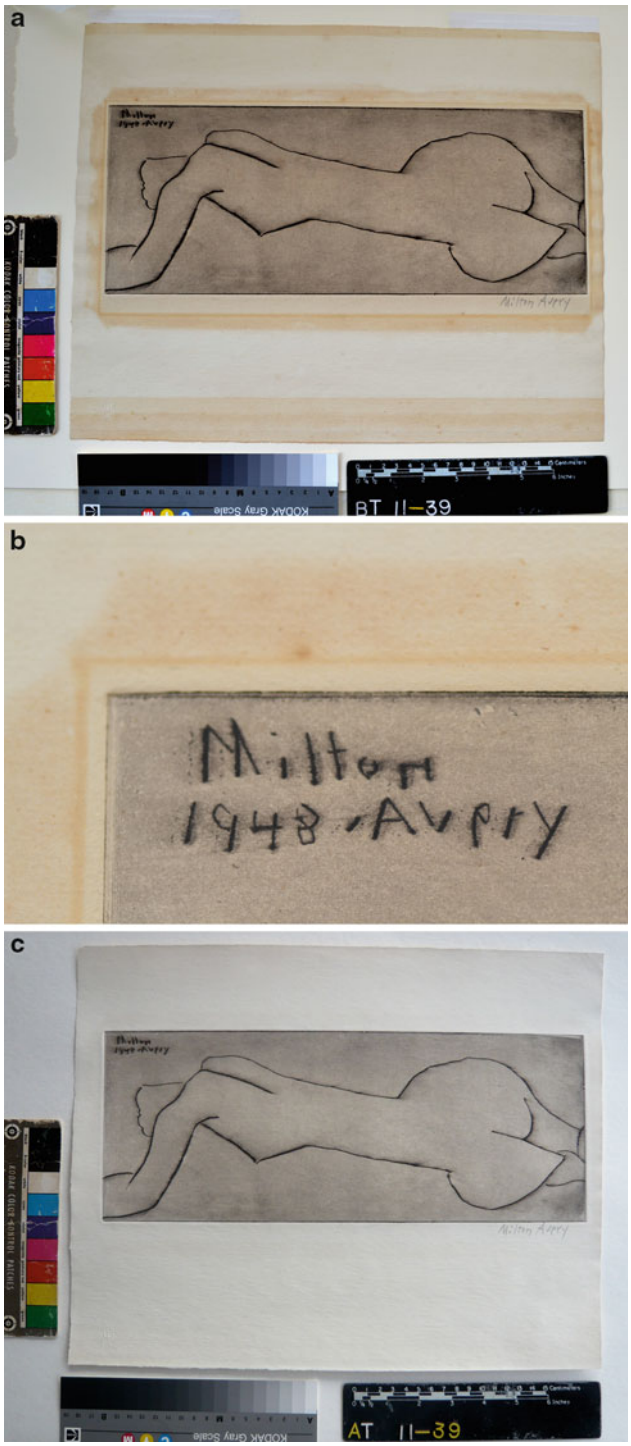

Paper: Preservation and Conservation, Fig. 3 A 1948 etching on paper; artist: Milton Avery; title: "Nude with Long Torso"; size: 13″ × 16 ¼″. (**a**) Discoloration of the edges and perimeter of the image indicated, based on their pattern, contact with acidic material used by a framer. Discoloration is one of the indicators that paper became acidic. (**b**) Detail of the etching, showing impression of folds imprinted on paper. It is a typical example of acid migration by contact with inferior material. (**c**) After conservation work. Discoloration caused by migration of acids from framing material was removed in a series of treatment processes, with organic solvents, washing and chemical local reduction of stains

may involve structural repairs, minor stabilization, such as tear mending (Fig. 2) or flattening of folds, and aesthetic treatment aiming to regain visual and artistic integrity of an artifact or artwork. Decisions leading to undertaking conservation often involve input from collections

Paper: Preservation and Conservation, Fig. 4 A 1842 watercolor by D. Burgdorfer; size: 17 7/8″ × 14″. (**a**) The overall discoloration of this watercolor was caused by synergy of light effect on paper and acid migration from the backing board. The details and colors of the image were obscured by this severe discoloration. (**b**) After conservation treatment. The watercolor was separated from the board, which was one of the sources of deterioration and washed with water and organic solvents

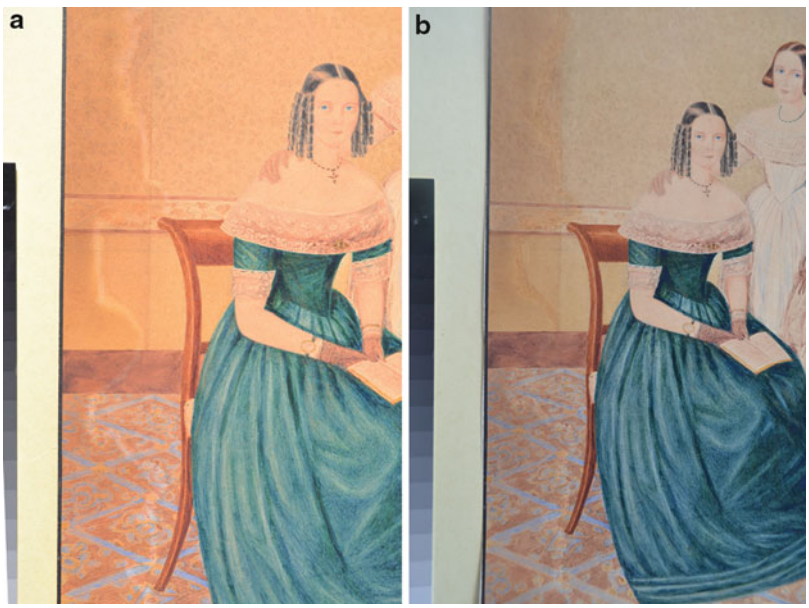

Paper: Preservation and Conservation, Fig. 5 A detail of the watercolor shown on Fig. 4, (**a**) before and (**b**) after conservation. Through the conservation process, the original colors and details were regained

custodians/owners and curators. Conservation of spiritual collections, that is, objects that are believed to have spiritual significance or power follows rules specific to the culture that produced those artworks, objects, or documents.

Cross-References

- ▶ Archaeological Archives
- ▶ Archaeological Record
- ▶ Canada: Cultural Heritage Management

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Paper: Preservation and Conservation, Fig. 6 A black and white print of Degas, Nude, exemplifying severe biodeterioration. Pigmented fungal deposits stained the paper, and in other areas, fungi digested paper resulting in losses. Paper lost its structural integrity

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Museums
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Management: Project Management
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Experiencing Cultural Heritage
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ International Council of Museums (ICOM)
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Material Culture and Education in Archaeology
- ▶ Recording in Archaeology
- ▶ SAFE/Saving Antiquities for Everyone

References

Bristow, J.A. 1986. The pore structure and the sorption of liquids. In *Paper structure and properties*. International Fiber Science and Technology series 8, ed. J.A. Bristow and P. Kolseth, 183–199. New York/Basel: Mercel Dekker.

Clapp, A. 1978. *Curatorial care of works of art on paper*. Oberlin: Intermuseum Conservation Association.

Feller, R. 1975. *Studies on photochemical deterioration. Preprints of the 4th Triennial Meeting*. Venice: ICOM Committee for Conservation.

Feller, R. 1994. *Accelerated aging, photochemical and thermal aspects*. Research in Conservation. Los Angeles: Getty Conservation Institute.

Feller, R., and R. Johnston-Feller. 1978. *Use of the international standards organization's Blue-Wool Standards for exposure to light, I: Use as an integrating light monitor for illumination under museum conditions*, 73–80. Originally printed in Preprints of papers presented at the 6th Annual Meeting, Forth Worth, TX. Washington, DC: American Institute for Conservation.

Hunter, D. 1978. *Papermaking: The history and technique of an ancient craft*. New York: Dover.

Ilvessalo-Pfaffli, M. 1995. *Fiber atlas: Identification of paper making fibers*. Springer series in Wood Science. Berlin: Springer.

James, C., C. Corrigan, M.C. Enshaian, and M.R. Greca. 1997. *Old master prints and drawings, a guide to preservation and conservation*. Amsterdam: Amsterdam University Press/Colophon.

Mecklenburg, M., C. Tumosa, and D. Erhardt. 2004. New environmental guidelines at the Smithsonian Institution. *Papyrus, International Association of Museum Facility Administrators* 5 (3): 16–17.

Rance, H.F., ed. 1980. *The raw materials and processing of papermaking. Handbook of paper science*. Vol. 1. New York: Elsevier.

Szczepanowska, H., and A.R. Cavaliere. 2000. *Fungal deterioration of 18th & 19th century documents: A case study of Tighlman Family Collection. Wye House*. International Biodeterioration and Biodegradation 46, 245–49. Easton: Elsevier.

Szczepanowska, H., and A.R. Cavaliere. 2012. Conserving our cultural heritage: The role of fungi in biodeterioration. In *Bioaerosols, fungi, bacteria, mycotoxins, in indoor and outdoor environments and human health*, ed. E. Johanning, P. Morey, and P. Auger, 293–309. Albany: Fungal Research Group Foundation.

Szczepanowska, H., and W. Lovett. 1992. A study of the removal and prevention of fungal stains on paper.

Journal of the American Institute for Conservation 31: 147–160.
Szczepanowska, H., and W. Moomaw. 1994. Laser stain removal of fungus induced stains from paper. *Journal of the American Institute for Conservation* 33: 25–32.
Szczepanowska, H.M., T.G. Mathia, and P. Belin. 1994. Surface metrology of dynamic interfaces of fungal stains on paper. Proceedings of International Conference on Surface Metrology, Annecy 21–23, March, 2012.
Whitmore, P.M. 2002. Pursuing the fugitive: Direct measurement of light sensitivity with micro-fading tests. In *The broad spectrum, studies in the materials: Techniques, and conservation of color on paper*, ed. H.K. Stratis and B. Salvesen. London: Archetype.

Further Reading

Bradley, S. 2003. Preventive conservation: The research legacy. In *Conservation science 2002*, ed. J.H. Towsend, K. Eremin, and A. Adriens. London: Archetype.
Corr, S. 2000. *Caring for collections: A manual of preventive conservation*. Dublin: The Institute for Conservation and Preservation of Artistic and Historic Works in Ireland, The Heritage Council.
Emeryton, H.W. 1980. The fibrous raw materials of paper. In *The raw materials and processing of papermaking. Handbook of paper science*, ed. H.F. Rance, vol. 1, 91–137. New York: Elsevier.
Fellers, C., H. Anderson, and H. Hollmark. 1986. The definition and measurement of thickness and density. In *Paper structure and properties*. International Fiber Science and Technology series 8, ed. J.A. Bristow and P. Kolseth, 152–160. New York/Basel: Mercel Dekker.
Gilroy, D., and I. Godfrey, eds. 1998. *A practical guide to the conservation and care of collections*. Perth: Western Australian Museum.
Norman, B. 1986. The formation of paper sheets. In *Paper structure and properties*. International Fiber Science and Technology series 8, ed. J.A. Bristow and P. Kolseth, 123–150. New York/Basel: Mercel Dekker.
Salmen, L. 1986. The cell wall as a composite structure. In *Paper structure and properties*. International Fiber Science and Technology series 8, ed. J.A. Bristow and P. Kolseth, 51–71. New York/Basel: Mercel Dekker.
Szczepanowska, H. 2012. *Conservation of cultural heritage: Key principles and approaches*. London/New York: Routledge.
Westman, L., and T. Londstrom. 1981. Swelling and mechanical properties of cellulose hydrogels. II. The relationship between the degree of swelling and the creep compliance. *Journal of Applied Polymer Science* 26 (8): 2533–2544.
Whitmore, P.M., X. Pan, and C. Bailie. 1999. Predicting the fading of objects: Identification of fugitive colorants through direct non-destructive lightfastness measurements. *Journal of the American Institute for Conservation* 38 (3): 395–409.

Papyrology in the Greco-Roman World

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Introduction

Papyrology, the study of day-to-day documents from the ancient world, provides a rather direct and sometimes intimate look into everyday life in the Greek and Roman Mediterranean. By studying and analyzing the documents actual people left behind, if possible in tandem with the archaeological remains, scholars can arrive at a much more detailed analysis than looking at literary texts or archaeological remains alone.

Definition

Papyrology is the field of scholarship that deals with texts written on papyrus and other perishable writing materials from the ancient world (potsherds, wood, wax tablets, linen). Papyrus was used as a writing surface from the middle of the third millennium BCE until the introduction of paper at the end of the first millennium CE.

The writing material papyrus was made from the papyrus sedge (*Cyperus papyrus*) that grew abundantly along the banks of the river Nile. The person making papyrus would take the stem of the papyrus and peel it. He would then cut strips along the length of the stem and place one layer of these strips closely together horizontally and another vertically on top. Pounding the strips resulted in bringing out the juices that would ensure the strips stayed together to form a sheet. Twenty of such sheets would be joined to form a roll. The inside of the roll would be the side where the fibers ran horizontally, the outside, vertically, allowing for easy rolling of the papyrus, without breaking it.

The writing materials that form the object of papyrological scholarship were used all over the Mediterranean world. Their organic nature,

however, has caused them to survive, with few exceptions, only in the dry sands of Egypt. Among the more notable exceptions are the carbonized papyri from Herculaneum (Italy) and Petra (Jordan), the wooden tablets from Hadrian's Wall, and a number of caches of documents found in caves in Israel (including the Dead Sea Scrolls). Potsherds with writing (*ostraca*, singular *ostracon*) have survived in bigger quantities as is witnessed by their presence on the Greek mainland and islands (Crete and Rhodes), North Africa, and elsewhere (Bagnall 2011).

Within Egypt, papyrus and other writing materials survive largely from arid, upland portions of the country. There are, for example, only a handful texts that survive from Alexandria, Egypt's capital in the Greek and Roman periods, because of the location of this city in the Nile Delta – and these only survive because they were removed from the city. Within sites at higher elevations, texts are found as part of the archaeological record in inhabited spaces and in refuse collections (Cuvigny 2009). However, texts that were found in one particular location in Egypt may derive from another location, within Egypt itself, or even in the Mediterranean world at large. Thus, there are several letters written outside of Egypt to addressees living in Egypt, often by soldiers serving in the Roman army. P.Mich. 8.490–491, for example, were written by a recruit who had just arrived in Rome, and P.Mich. 3.203 (114–116 CE) was written by a Roman soldier stationed in Pselkis in Nubia. Both men sent letters home to their family in Karanis, Egypt, where the letters from Rome were actually found during the University of Michigan excavations (the letter from Nubia was purchased on the antiquities market).

Historical Background

Papyri and other writing materials from Egypt have been the object of archaeological investigation since the early 1880s (Cuvigny 2009). Initially, papyri were the prime objective of these activities, searching for the remains of classical and early Christian texts. In the course of the twentieth century, the focus changed to papyri as part of the archaeological record in an attempt to analyze the lives of the people of Greek and Roman Egypt. In addition to this organized archaeological activity, papyri have also been discovered during clandestine excavations. These made it to the antiquities market and were purchased by the major collections in the Western world. Precise archaeological proveniences for these papyri are often unknown. Such trade has been illegal since the 1972 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property came into force.

The writing materials from Egypt preserve all languages that were in use during Egypt's history. There are documents in the various Egyptian scripts (Hieroglyphs, Hieratic, Demotic), Aramaic, Greek, Latin, Coptic, Arabic, and smaller samples of other language communities that were present in Egypt at one time or another. Historically, the scholarly world has divided the various languages between different fields with Egyptian texts falling under Egyptology and Greek and Latin under Classical studies, often with such division that bilingual texts on the same piece of papyrus were published in separate installments. More recently, the growing interest of historical studies in the papyri from Egypt has given rise to more encompassing studies of Greek and Roman Egypt using both textual documents (whatever the language) and archaeological data (e.g., Wendrich et al. 2003).

Key Issues/Current Debates

The contents of papyrological texts are diverse and varied (Bagnall 2009). They include everything from works of literature to small receipts for the payment of taxes. The works of literature include both those that are known from the medieval manuscript tradition as well as those that were lost during that process. Among the known works, Homer is the most popular author in terms of surviving fragments, partly because of the importance of this author in education (Cribiore 2001). Among the authors whose work can now be glimpsed from papyri is Menander, as well as

several poets from the archaic period like Simonides, Sappho, and Alcaeus. Literary papyri are very important in understanding and analyzing literary culture, especially during the Roman Empire (Johnson 2010).

A large portion of the surviving texts from Egypt illustrates the activities of the state, both when Egypt was an independent kingdom under the Ptolemies and later when part of the Roman, then Byzantine Empire. There are several directives from the reigning monarchs, both decrees of the Ptolemaic kings (Lenger 1980) and edicts of the Roman emperors (Oliver 1989). More numerous are texts from the lower ranges of the bureaucracy to various higher state agencies. These include census declarations, various reports about the use of land and livestock, and so on. Taken together, papyri allow for a vivid picture of Egyptian state government at work in various historical periods. The surviving documents from Greek and Roman Egypt also include many financial documents, allowing for detailed debates about the workings of the ancient economy (Manning 2007; Rathbone 2007). There are numerous documents of sale, loan, and lease, as well as numerous accounts that allow for the reconstruction of the workings of, for example, large estates in Roman Egypt (Rathbone 1991; Hickey Forthcoming).

Although found in Egypt, papyri often illustrate matters concerning the ancient Mediterranean world at large. One text from the Michigan collection, for example, provides a list of boats that arrived at the Alexandrian harbor. The text, P. Bingen 77 (=P. Mich.inv. 5760), dates to the second century C.E. and gives a list of the boats with their tonnage, their names, the harbor from which they sailed, and their cargo (largely wine). This text gives a firsthand account of what trade in the Roman Empire was all about.

Future Directions

One of the more intriguing historical questions in dealing with Egypt's relatively rich textual sources is whether or not the arising picture is representative for other parts of the Mediterranean world. In this respect, there are two interesting tendencies in modern scholarship. The first is, for the Hellenistic period, a drive towards seeing Ptolemaic Egypt principally as a representative of Egyptian, not Hellenistic history (Manning 2010), though the everyday writing culture in Egypt may be representative for large parts of the Hellenistic world (Bagnall 2011). The second tendency is the growing awareness among historians of the Roman world that Egypt is in many (but certainly not all) respects a typical province of the empire (Lewis 1984).

Cross-References

► Hellenistic and Roman Egypt, Archaeology of

References

Bagnall, R.S., ed. 2009. *The Oxford handbook of papyrology*. Oxford: Oxford University Press.

Bagnall, R.S. 2011. *Everyday writing in the Graeco-Roman East*, Sather classical lectures. Vol. 69. Berkeley: University of California Press.

Cribiore, R. 2001. *Gymnastics of the mind: Greek education in Hellenistic and Roman Egypt*. Princeton/Oxford: Princeton University Press.

Cuvigny, H. 2009. The finds of papyri: The archaeology of papyrology. In *The Oxford handbook of papyrology*, ed. R.-S. Bagnall, 30–58. Oxford: Oxford University Press.

Hickey, T. forthcoming. *Wine, wealth, and the state in late antique Egypt: The House of Apion at Oxyrhynchus*. Ann Arbor: University of Michigan Press.

Johnson, W. 2010. *Readers and reading culture in the high empire: a study of elite reading communities*. Oxford: Oxford University Press.

Lenger, M.T. 1980. *Corpus des Ordonnances des Ptolémées (C.Ord.Ptol.)*. Brussels: Academieroyale de Belgique.

Lewis, N. 1984. The Romanity of Roman Egypt: A growing consensus. In *Atti del XVII Congresso Internazionale di Papirologia*, ed. M. Gigante, 1077–1084. Naples: Centro Internazionale per lo Studio dei Papiri Ercolanesi.

Manning, J.G. 2007. Hellenistic Egypt. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 434–459. Cambridge: Cambridge University Press.

Manning, J.G. 2010. *The last Pharaohs: Egypt under the Ptolemies, 305–30 BC*. Princeton/Oxford: Princeton University Press.

Oliver, J.H. 1989. *Greek constitutions of early Roman emperors from inscriptions and papyri*. Philadelphia: American Philosophical Society.

Rathbone, D. 1991. *Economic rationalism and rural society in third-century A.D. Egypt: The Heroninos archive and the Appianus Estate*. Cambridge: Cambridge University Press.

Rathbone, D. 2007. Roman Egypt. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 698–719. Cambridge: Cambridge University Press.
Wendrich, W.Z., et al. 2003. Berenike crossroads: the integration of information. *Journal of the Economic and Social History of the Orient* 46: 46–87.

Further Reading

Bagnall, R., and D. Rathbone. 2004. *Egypt from Alexander to the early Christians. An archaeological and historical guide*. London/Los Angeles: Getty Publications.
Papyri.info. n.d. Available at www.papyri.info.
Trismegistos. n.d. Available at: www.trismegistos.org.

Paracas, Geography and Culture of

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Introduction

Often difficult to understand through the filter of Western thought, ancient Andean societies developed along their own unique historical trajectories that have long intrigued both professional archaeologists and the general public alike. Sometimes classified as societies without "writing," without a "State," or without "urbanism," these Andean – and in particular pre-Huari and pre-Inca – populations in fact created their own representations of the conceptual and material worlds. An abundance of archaeological evidence bears witness to the historical depth that the Andean area shares with the rest of the world. It can therefore not be confined to a "prehistory" that would only come to an end with the arrival of the Spaniards. It is from this perspective and in light of recent archaeological evidence that we will here approach Paracas culture in a way that will not reduce it to a single style of ceramic and textile crafts.

Paracas: Attempt at a Definition

On old maps from the middle of the seventeenth century, such as Johannes de Laet's, *Paracca* appears as a place name designating the desert peninsula located on the Peruvian south coast between the Pisco and Ica Valleys. *Paracas* is also the name of a wind that affects this area during the southern winter months. This name is thought to be derived from the Quechua words *para* or *paray* (rain) and *acco* or *aco* (sand): "rain of sand."

In the scholarly literature, however, the term Paracas refers to one of the most distinctive ancient Peruvian cultures. Named as Paracas after the discovery of spectacular mummies on the eponymous peninsula, this culture's area of distribution actually encompasses a large part of the southern coast of Peru (Fig. 1). This territory forms a narrow strip crossed by the rivers Cañete, Chincha, Pisco, Ica, Río Grande de Nazca, and Acarí, which flow perpendicularly to the coast, with the exception of the Ica River, whose watershed is transverse. Glacial meltwaters and torrential highland rain falls feed the coastal aquifers and rivers that flow into the Pacific.

The Paracas chronology essentially spans the period archaeologists call the Early Horizon or the Formative. The Paracas period is commonly subdivided into three epochs, namely, early (900–600 BC), middle (600–400 BC), and late Paracas (400 BC to AD 50/100).

The name "Paracas" evokes the technical and aesthetic originality of magnificent polychrome textiles and highly sophisticated ceramics (Fig. 2). The Paracas were also the creators of ingenious works of architecture – pyramids, platforms, and temples – from simple materials such as unbaked adobe bricks and hardened sedimentary clay blocks. They also left geoglyphs in the Pisco, Ica, and Palpa Valleys that predate the famous Nazca geoglyphs (0–600 AD). Another characteristic trait of Paracas culture was medical procedures, in particular cranial trepanning. Like many other Amerindian populations, they also practiced cranial deformation.

Historical Background

The initial discovery of the Paracas culture goes back to Julio Caesar Tello's archaeological work at Cerro Colorado. There, between 1925 and

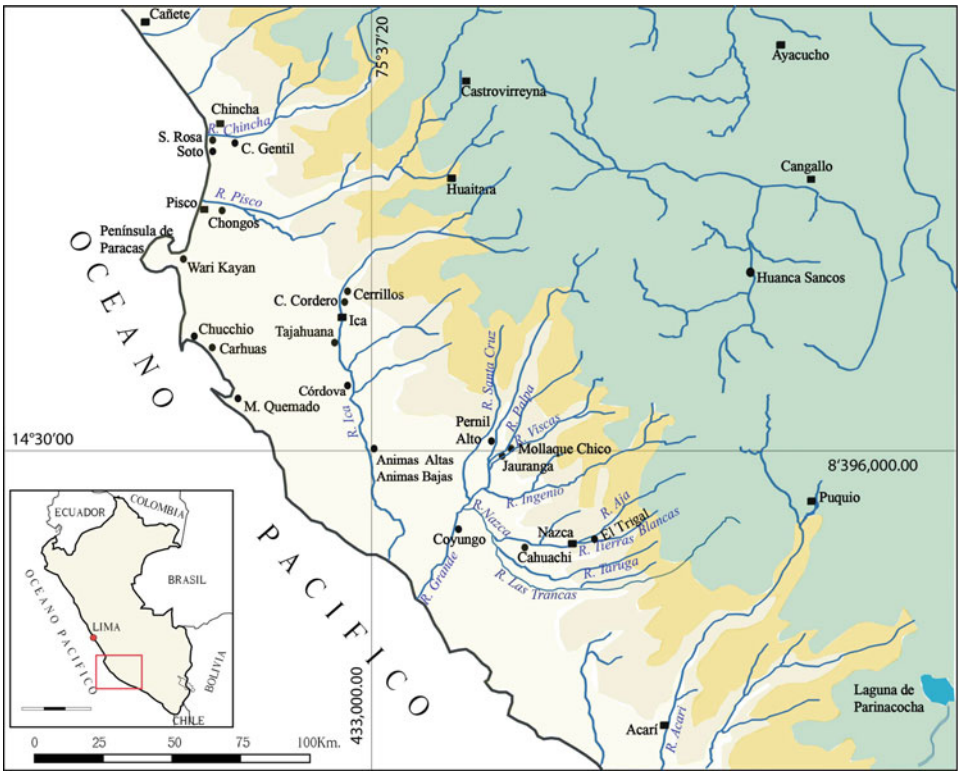

Paracas, Geography and Culture of, Fig. 1 Map showing the location of the south coast of Peru

1927, Tello and his team exposed a terraced burial area with deep bottle-shaped pits in each of which multiple individuals had been buried. Tello labelled this cultural complex "Paracas Cavernas." Some individuals had been wrapped in simple cotton fabrics and were accompanied by few offerings (bowl, gourd, etc.), whereas others were accompanied by rich offerings of ceramics, pyro-engraved gourds, shells, food, etc. Bodies buried in textiles decorated with geometric motives were associated with incised polychrome ceramics, painted with postfire pigments. Paracas Cavernas burials display a type of cranial deformation known as "cuneiform" (Tello and Mejía 1979).

In 1927, Tello's excavations produced a remarkable discovery, in fact, one of the most spectacular discoveries in the history of Peruvian archaeology: the famed Paracas *fardos* (Fig. 2). From a number of collective burials at Wari Kayan, on the north flank of Cerro Colorado, facing the ocean, Tello's team recovered 429 funeral *fardos*, most of which were 1.5 m in height and 1.5 m in diameter. They are wrapped in fine polychrome textiles employing sophisticated weaving techniques and embroidered with brilliant figures, which have given rise to the name "Paracas Necropólis." These *fardos*, accompanied by diverse funerary offerings, are associated with a monochrome pottery, sometimes red or cream slipped and pumpkin-shaped that stands in contrast to the polychromy of the textiles and of Paracas Cavernas pottery. The cranial deformation is described by Tello as elongated, quasi-cylindrical (*cabeza larga*) (Tello 1959; Tello and Mejía 1979).

Conceived by Tello as two phases or two cultural groups, the terms Paracas Cavernas and Paracas Necrópolis continue to be widely used by archaeologists. However, it is necessary to bear in mind that this chronological division strictly applied to the micro-region of the peninsula and to the later part of the Paracas period. Therefore, it cannot adequately capture the

Paracas, Geography and Culture of, Fig. 2 Paracas ceramics discovered at León Dormido 3 (Photo: Balbuena); funerary bundle *fardo* Paracas Necropólis 290 (Aponte reconstruction); Paracas textile found at Animas Altas (Photo: Bachir Bacha)

spatiotemporal complexity of the Paracas. However, Tello approached material culture within its wider context, inviting other specialists (geologists, botanists, zoologists, etc.) to conduct research, thereby giving a multidisciplinary dimension to archaeology.

For specialists, another crucial chronology is the typo-stylistic Ocucaje sequence (Menzel et al. 1964), even though it is regarded as incomplete by its creators, given that it is restricted to the Ica Valley. This sequence is divided into ten phases (Ocucaje 1–10), based exclusively on the analysis of fine pottery. These objects essentially come from burial contexts, uncovered by looters, who for decades have been suppliers to both private collectors and Western museums. The lack of stratigraphic evidence demonstrating recurrent succession of the proposed phases and the absence of systematic confirmation through radiometric dating, as well as the coexistence of various phases within the same context, prevent the validation of the Ocucaje sequence for the whole of the Paracas area.

From the 1980s onward, new works began to appear that, still without shedding the notion of style, began to consider additional aspects of material culture and to extend the area of study. These were based upon fieldwork focused on changes in settlement location and organization. Eventually, some studies included radiometric dating, although in small numbers (Massey 1986; García and Pinilla 1995; Deleonardis 1997; Cook 1999).

Surveys and excavations conducted since the 2000s at various sites from Cañete to Nazca have painted a more complete picture of the Paracas culture. Supported by increasingly detailed series of scientific dates (Kaulicke et al. 2009; Dulanto 2013; Tantaleán et al. 2013; Reindel and Isla 2013) and systematic excavation of key sites, Paracas studies are no longer restricted to burial contexts and objects of "aesthetic" value according to Western canons (Bachir Bacha and Llanos 2013). Recent work has focused on territorial organization, the emergence of the "urbanism," the dynamics of inter- and extra-regional interactions, long-distance exchange, and the circulation of prestige goods (Kaulicke et al. 2009; Bachir Bacha and Llanos 2013; Balbuena 2013; Canziani 2013; Dulanto

2013). The typo-chronological narrative built around ceramics and textiles is being questioned; and the heterogeneity of material culture is approached from a perspective of social and territorial dynamics (Bachir Bacha and Llanos 2013).

Key Issues/Current Debates

Geographic Framework

The south coast of Peru, home to the development of the Paracas, is one of the driest deserts on earth with almost no rainfall. Inland life is only possible along intermittent watercourses. Because of the large, high plateaus (>1000 m), known as *tablazos*, these rivers must flow through narrow gorges across the desert, before flowing into the ocean or seeping into the groundwater and forming oases where the water table is close to the surface. Confronted with such extreme environmental conditions and hazards (El Niño, drought, earthquakes), the Paracas managed to "domesticate" this territory and adapt to the constraints of a difficult natural environment, making the most of its resources.

In the agricultural realm, people devised ingenious irrigation systems. They selected a number of useful plants (food, medicinal, textile). They wisely exploited wetland systems (*hoyas de cultivo* or *campos hundidos*, *puquiales*) and tapped into the groundwater. Their intimate knowledge of their environment led them to create a veritable "civilization" of the *huarango*. This endemic tree has many virtues: it acts as a natural fertilizer by fixing nitrogen, it can desalinize the soil, it plays a role in preventing erosion, it provides a quality hardwood and nutritious fruits, and finally its foliage provides shade in which crops can be grown, especially as it maintains a certain humidity in the ground (Beresford-Jones et al. 2009; Salomon 2013). In addition, eolian fertilization (loess) regularly regenerated the cropland (Salomon 2013).

In spite of the dry environment, agriculture thus played a vital role, supplemented by animal husbandry (camelids, guinea pigs). The valleys were home to fields where a wide variety of plants were cultivated, *pallar* (a variety of broad bean), beans, corn, peanuts, gourds, hot pepper, *chirimoya*, *pacae*, *achira*, *jíquima*, and *lúcuma*, but also cotton for the manufacture of textile fabrics. Archaeological excavations carried out at various Paracas sites have turned up a wealth of remains of these plants.

Paracas subsistence also depended on other resources. Near the coast, fogs (*garúas*) caused by the upwelling current of nutrient-rich, cold deep seawater provide vital humidity. Thanks to this current, the coast offers a diverse range of marine resources, fishing, and shellfish gathering. The periodic El Niño phenomenon causes a temporary rise of sea surface temperatures, resulting in precipitation that supports patches of vegetation. These *lomas* contain a varied flora and fauna. This ecosystem is suitable for hunting, gathering *lomas* snails and grazing camelids.

The availability of resources such as clay and mineral pigments in the surrounding mountains allowed the development of monumental architecture and the manufacture of ceramics and textiles of great technological and aesthetic diversity. Remains of all of these raw materials have been discovered in archaeological contexts, at Animas Altas/Animas Bajas in the Ica Valley also as offerings.

It is noteworthy that prestigious Paracas pottery has been found far from the heartland of its distribution, bearing witness to long-distance exchange activities. This suggests that the Paracas economy also relied on trade. This activity was apparently well developed from early Paracas times, judging by the discovery at the site of Puerto Nuevo of pottery from northern valleys (Jequetepeque, Zaña Lambayeque; Dulanto 2013). The great Chincha traders were in all likelihood the heirs of the Paracas.

The Extension of Paracas Territory

The extension of Paracas territory is subject of debate. Although its focal point remains in the Ica Valley, numerous Paracas remains – including important politico-religious centers, residential sites, and cemeteries – have come to light in the Chincha and Pisco Valleys but also in the Paracas Peninsula and in Bahía de Independencia. These discoveries demonstrate that the distribution of

Paracas material culture extends beyond its territory of origin. To the north, Paracas pottery has been found in the Topará and Cañete Valleys. To the south, fine pottery and, to a lesser extent, textiles and other materials such as rock paintings and geoglyphs displaying Paracas iconography have been found in the Palpa Valley and the Río Grande de Nazca Basin.

These findings suggest the distinction of a principal area composed of two core zones (Chincha-Pisco and Ica) from a secondary one, with two peripheral areas (Topará-Cañete to the north and Palpa-Nazca to the east and south). These peripheral areas are the interfaces, respectively, with the central coast, the adjacent highlands, and the valleys located south of Nazca.

Beyond the south coast, it is mainly fine Paracas ceramics that have been found at highland sites in Ayacucho and Huancavelica. On the central coast, its traces are found in Mala and Lima. Farther south of Palpa and Nazca, Paracas pottery fragments have been collected at sites in the Acarí Valley.

These finds are testament to the supra-regional circulation and spread of Paracas symbolism, conveyed on prestige items. These objects reflect the prestige enjoyed by the large politico-religious Paracas centers located in the coastal valleys but also economic activities linked to trade and exchange. The peripheral territories played an important role in these interactions.

Based solely on the presence of Paracas pot sherds, it seems difficult to claim a Paracas occupation, *stricto sensu* in these regions far from the core areas and their peripheries. Indeed, Paracas style items appear mixed with other styles of textiles, pottery, and architecture. Moreover architecture in the highlands generally adopts a circular form.

Paracas Settlement Patterns

The Paracas archaeological record offers proof of a settlement hierarchy indicative of social division and stratification among their occupants. This hierarchy is evident both within and across valleys. It manifests itself in settlement location, architectural size, and complexity, as well as in the nature of the material discovered there.

In terms of land use, Paracas settlements are set back from waterways, on the one hand, so as not to encroach on the alluvial plain suitable to agriculture and, on the other, to be protected from flooding.

Civic-ceremonial architecture is present from the early Paracas period. The most characteristic example is the first temple of Cerrillos (Splitstoser et al. 2010). However, the majority of remains date to the middle and late Paracas periods, pointing to significant population growth. It was the ruling elite, in constant interaction with other specialized groups, who lived at and managed these large centers.

The large pyramid complexes of Chincha (Huaca Santa Rosa, 430 m long and 25 m high) oriented east-west, at right angles to the coastline, were composed of superimposed platforms with sunken patios. Other sites (Cerro del Gentil, 70 × 30 m; El Mono, 4 m-high mounds) in the middle valley display the same type of architecture but at less impressive scales (Canziani 2013; Tantaleán et al. 2013).

In the lower Ica Valley, the archaeological complex of Animas Altas/Animas Bajas on the Pampa del Cacique extends over more than 100 ha. It consists of some 100 mounds with buildings oriented along a southeast-northwest axis (ca. 30° of deviation) and the most important up to 190 m long, 80 m wide, and 7 m high. There are several groups of monuments composed of a main pyramid overlooking a system of platforms. Between the mounds, open spaces appear to form plazas and paths. The basic architectural unit of all buildings (civic-ceremonial, residential, and/or work spaces, funerary) is the pyramid associated with enclosures, closed patios, or open plazas (Fig. 3; Bachir Bacha and Llanos 2013: Figs. 4, 13, 15, and 23). In addition, there are pyramidal buildings and high-status tombs with walls covered in carved friezes (Figs. 4 and 5). Recent excavations have revealed platforms and low terraces and roofed enclosures associated with numerous artifacts employed in domestic and productive activities (manufacture of textiles and pottery, clay figurines, jewelry; objects used in hunting, fishing, gathering, food preparation, etc.). Plazas, open and exposed spaces, suited for

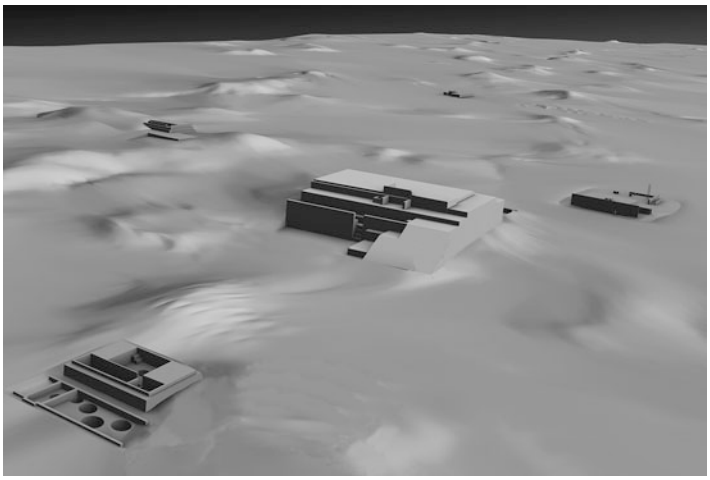

Paracas, Geography and Culture of, Fig. 3 North sector of Animas Altas (3D reconstruction: Animas Altas Archaeological Program)

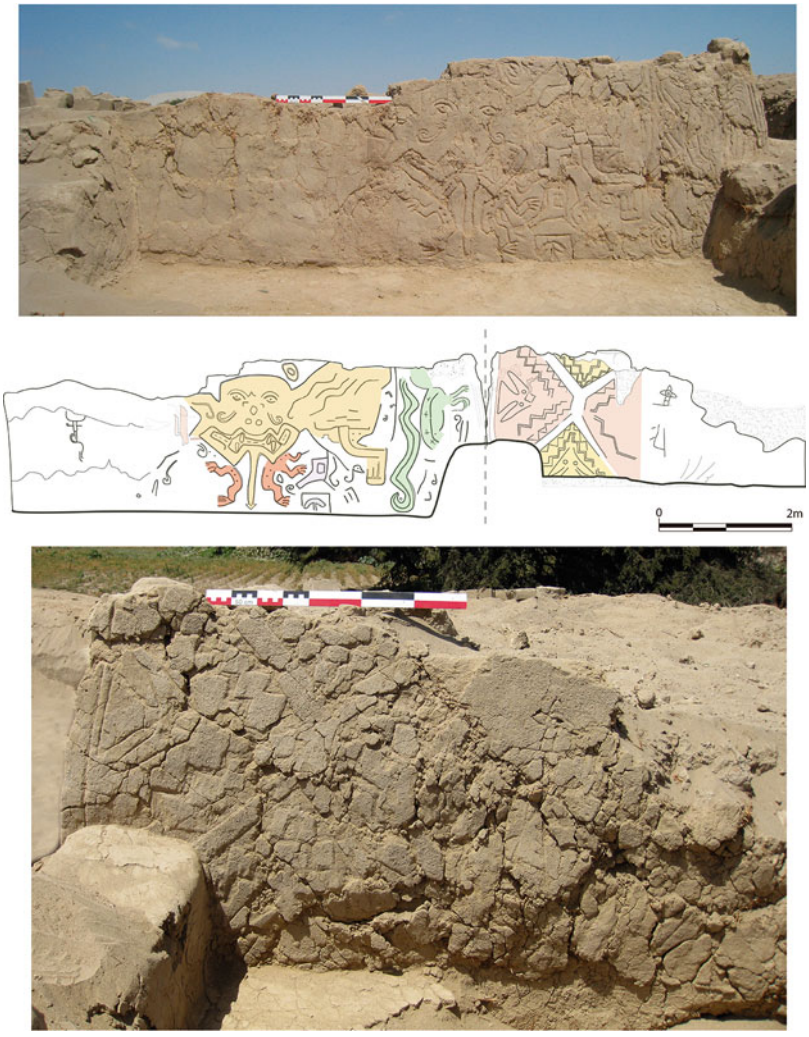

Paracas, Geography and Culture of, Fig. 4 Friezes associated with a Paracas mausoleum discovered at Animas Altas (Photo: Bachir Bacha)

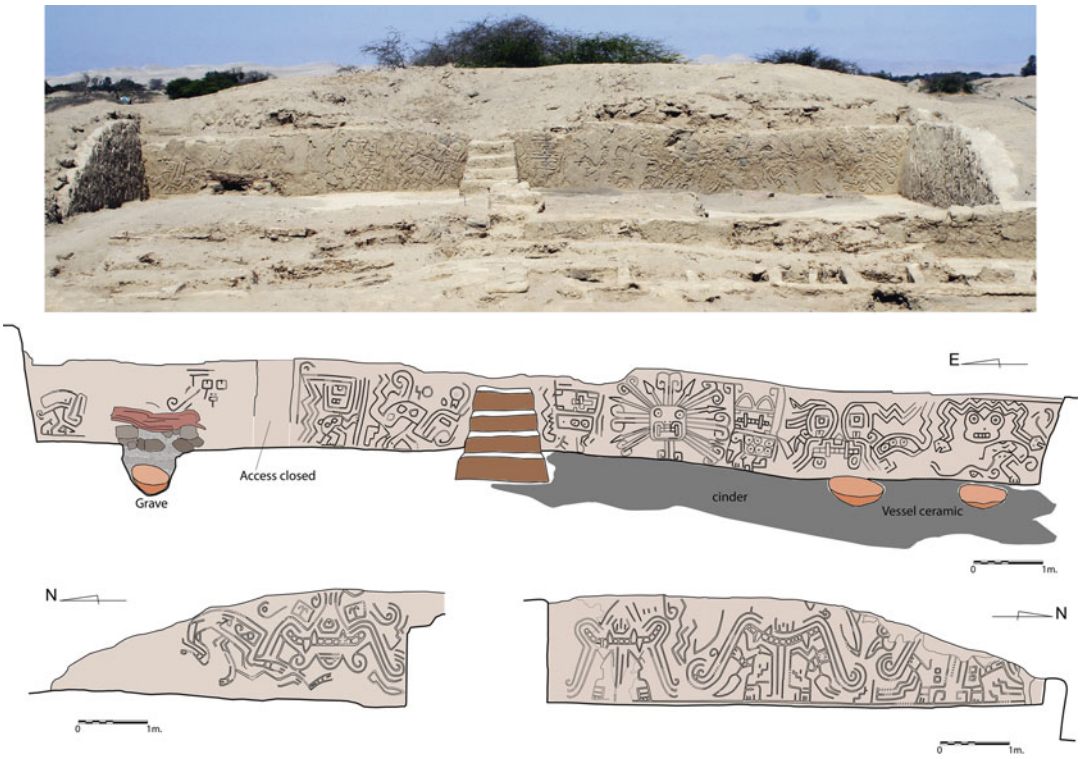

Paracas, Geography and Culture of, Fig. 5 Excavations and preservation of Mound 1, "Temple of friezes." Animas Altas Archaeological Program, Ica, Peru (Photo, Bachir Bacha; drawing, Llanos)

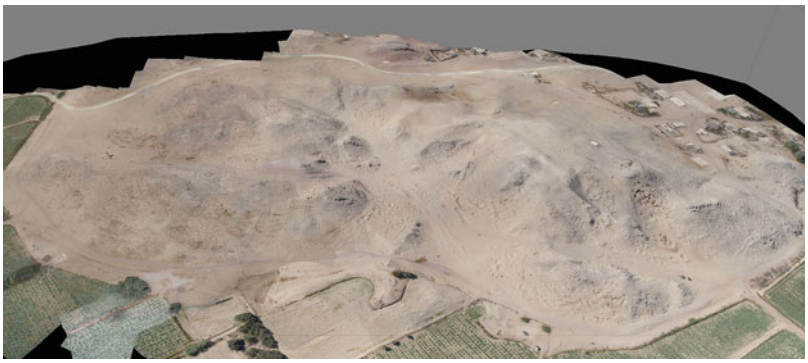

Paracas, Geography and Culture of, Fig. 6 The archaeological complex of Cerro Córdova (3D reconstruction: Animas Altas Archaeological Program/Arqueosystems)

feasts and public gatherings, stand in contrast to closed spaces on top of the platforms of pyramids equipped with benches and reserved for activities invisible from the outside (Bachir Bacha and Llanos 2013).

In Ocucaje, the site of Córdova (Cerro Max Uhle) appears as a complex of terraces (Fig. 6). The principal characteristic of its internal organization is the intertwining of domestic and/or work spaces with other spaces such as quarries and burial places. Judging by its material culture, Córdova may be identified as a diversified economic center initially dependent on Animas before entering the Nazca orbit.

Villages, hamlets, and necropolises, located near the ocean and on the edges of fertile valleys and interacting with the settlements cited above, were home to an essentially rural population of

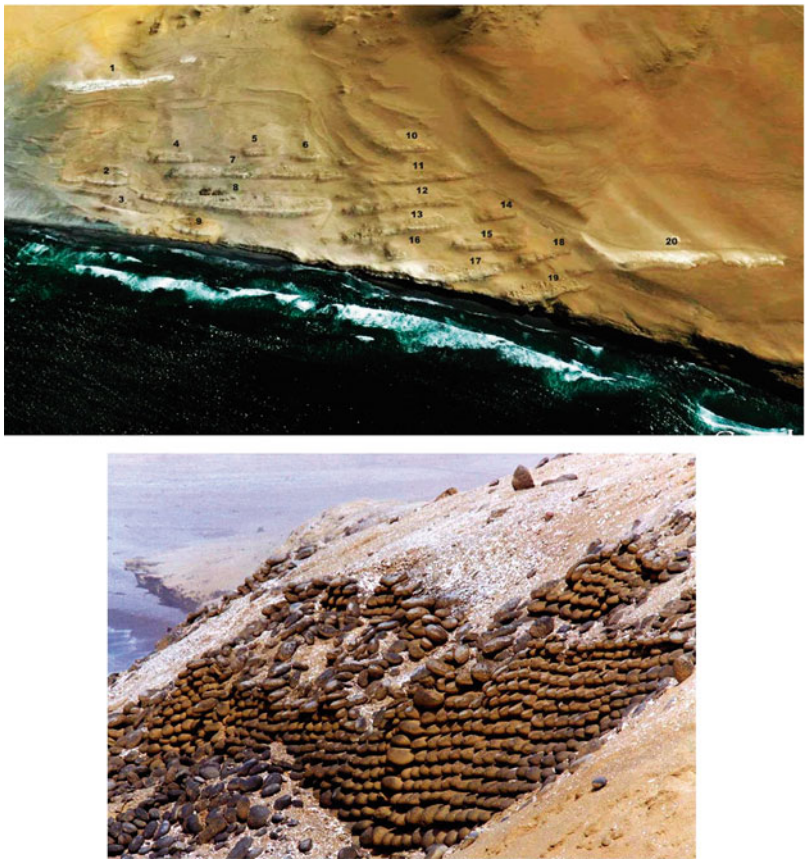

Paracas, Geography and Culture of,
Fig. 7 Mounds and retaining wall at the Chucchio site (Photo: García 2010)

fishermen and probably some craftsmen. Close to the shoreline, at Bahia de Independencia, pebble retaining walls support residential terraces (Morro Quemado), while big mounds of marine waste (Chucchio) (Fig. 7) contain interconnected quadrangular rooms associated with ventilation shafts. In the desert areas that separate the coast from the valleys, a series of *conchales* (shell mounds) and shelters testify to constant communication between the two areas (García 2010).

In the Chincha Valley, extensive and dense rural settlements are found on top of the desert plateaus (*tablazos*) that dominate valleys and irrigation canals that run around them (Canziani 2013: Fig. 6). In the upper Ica Valley, steep desert slopes (Cerro Cordero, Tajahuana) reveal gridded or linear units of terraces as well as fortified villages (Williams 1980).

In the lower Ica Valley, sites of domestic character are widely distributed over flat plains. They present a number of refuse strata containing malacological remains, in particular *lomas* snails, cotton tufts, textile fragments, and grinding equipment, while their architecture, as far as visible, is restricted to modest, small structures made of clay blocks. Traces of hearths and presumably domestic pottery, as well as some diagnostic Paracas pottery, have also been found. Further south, in Palpa (Jauranga), the remains of several superimposed enclosures, built with small adobes and very solid clay walls, have been uncovered (see Fig. 5: Reindel and Isla 2013).

Architecture

At the Chincha Valley sites, adobes are predominantly corn grain or wedge shaped, whereas in the buildings of Cerrillos (upper Ica Valley), loaf-shaped adobes are the most common. However, adobes were not the only construction material used by the Paracas. The walls of the monuments at Animas were built with blocks of clay sediment extracted from quarries located at the site or in its

surroundings. These blocks are cut to a semi-rectangular shape with rounded corners. Arranged in rows, they are bound together by a mortar made from clay, straw, and sand with varying proportions; consistency and finish vary (Fig. 8). Plaster, of rustic appearance in some places and finely finished in others, covers walls, benches, and floors.

It is the retaining walls and their up to 4 m-high embankments that lend both monumentality and strength to Paracas buildings. The embankments thus define the volume of platforms and terraces. They cover up preceding structures and at the same time form the basis of new ones. At Animas, we spotted a compact embankment built essentially with sods of earth. Another one is composed of a series of intercalated layers of earth, soil clods, and plant material tied up in bundles (*totora*, corn, *grama salada*) (Fig. 8; Bachir Bacha and Llanos: Figs. 8 and 16). In some buildings the plant materials are braided and twisted into boot shapes. Some embankments have relatively thin retaining walls, thus forming some sort of compartments. Other structures such as the benches are nothing but embankments covered by thick layers of finely coated clay.

The structures of the site of Córdova were built with a unique type of retaining walls composed of structural cob made from horizontally laid bundles of twisted and folded plant stalks. Their surface was then coated with a thick but smooth layer of clay (Fig. 8).

Remains of domestic structures are rare in the archaeological record. We often find no more than the foundations of walls made of *quincha* or other perishable materials, as well as post holes. The structures of Chucchio (Bahia de Independencia de Paracas) were built with blocks of encrusted earth or saltpeter (*tierra encalichada* or *salitrosa*) mixed with seaweed (*sargasso*). Whale bones form the structural frames, whereas roofs are made of mats, sea lion skins, or reeds (García 2010).

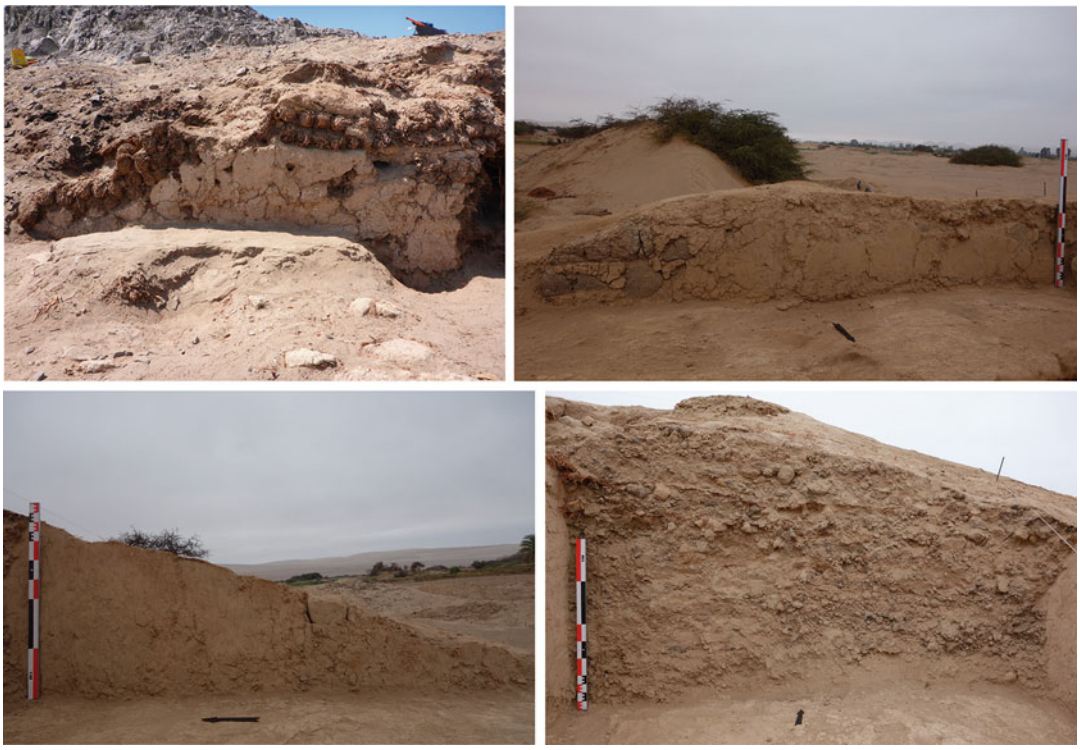

Paracas, Geography and Culture of, Fig. 8 Paracas architecture uncovered at Cerro Córdova and Animas Altas (Photos: Bachir Bacha)

International Perspectives, the Point of View of the Author

The dynamics of the politico-religious centers, particularly during the late Paracas period, attest to the presence of true "Andean cities" whose organization differs from Old World urbanism.

Paracas settlements were undoubtedly conditioned by environmental and technical factors as explained above, but the territory is truly a cultural and political creation. The distribution of settlements is in osmosis with their environment, and it is the sacred landscape that forms its foundation. Settlements are anchored by capturing "natural" elements (the wild) inside "the artificial," i.e., the constructed (the anthropocentric). Representative examples include the dunes that are incorporated as a natural substratum of construction into the architecture of Animas and hill flanks that form the basis of buildings at Córdova. This manner of occupying a place, far from being an expression of the naturalism that sometimes has been attributed to the pre-Hispanic world, is a symbolic act that materializes the appropriation of the territory.

The occupied space is also in a homothetic and symbolic relationship to its sacred geography. The pyramids of Animas replicate the hills that were sacred places (*huacas*), and the seemingly random orientations of buildings in fact follow "natural" features such as hills, dunes, and rivers. The landscape, socialized because it is sacred, is also an important economic resource.

The territory of Paracas politico-religious centers is not confined to their monumental cores. It also forms the heart of a network that also incorporates satellite settlements located on the valley terraces, near *lomas*, on the coast and along the roads leading to the ocean, as well as important outlier sites in other valleys or other ecological zones. The desert pampas, constantly crisscrossed and exploited in ancient times, also formed an integral part of their territory. This is evidenced by numerous remains of screens, shelters, and geoglyphs pointing toward the hills and settlements. As a result, as geographically and symbolically heterogeneous as the territory of the centers may be, it also constitutes a coherent whole whose components are articulated by notable flows of economic and symbolic exchanges.

It is also worth pointing out that the large Paracas centers are far from being dedicated exclusively to ceremonial activities. Within them, politics, religion, and economy were inextricably intertwined. The archaeological record reveals traces of ceremonies and rituals linked to the construction, renovations, and abandonment of monuments, which in some instances incorporate elite tombs (Fig. 5; Bachir Bacha and Llanos 2013: Fig. 15). These dynamics are linked to the elite's cycles of life and death. Some members of the elite turn into venerated ancestors, and it is in the monuments that the memory of the ancestors is preserved. In their construction and use, the identity of the ruling group is fashioned. The deposits could also house or be used as graves for high-ranking individuals and possibly of craftsmen, as illustrated by the tombs excavated at Animas (Bachir Bacha and Llanos 2013: Fig. 19).

The unfailing presence of offerings (including human sacrifices) in the heart of every building (at Animas) constitutes more than a propitiatory act (Bachir Bacha and Llanos 2013: Figs. 14 and 18). On the one hand, it sanctifies the foundation and renovation of buildings and at the same time justifies the transcendence of the power of the ancestors through the ruling elite. In this way, it expresses a political pact between people and land, between the rulers and the ruled.

The archaeological data collected indicates that multiple groups occupied the Paracas politico-religious centers. The "stylistic" heterogeneity of certain aspects of material culture supports this proposition. A case in point are the friezes discovered at Animas whose iconography both makes use of distinctive Paracas icons such as the *Ser Oculado* and simultaneously displays northern, Cupisnique Chavin influence in the representation of fanged felines. If this heterogeneity does not reflect diachronic change, it might have another explanation.

The iconography of the friezes could express a historic and territorial discourse. It relates both the present (Paracas icons) and the distant past, harking back to the founders, to the origins, or to a cultural heritage (icons with Cupisnique and Chavín features), both the local and neighboring

and distant lands. Fan, knife, and the flying position of the feline (Fig. 4) are elements shared by Paracas and Nazca cultures, while the "radiant face" (*cara radiante*) with darts is reminiscent of Altiplano iconography but also found on Paracas and Nazca textiles (Fig. 5). These friezes are found in the same archaeological contexts as late Paracas textiles and pottery, which in and of themselves display technological variation and "substyles."

This aspect of material culture also allows us to hypothesize that the elites of Animas had the capacity to unite diversified groups whose identities derived from professional specializations (fishermen, farmers, craftsmen, merchants), places of residence (*ayllus*, cosmogonical moieties, basins, valleys, etc.), or ethnolinguistic origins. Through diverse politico-religious strategies, Paracas leaders were able to build and reproduce sociopolitical entities and maintain sovereignty over a territory, its resources, and its inhabitants for a lengthy period of 400–500 years. The realm of the religious involves rites and ceremonies worshipping ancestors who were thought to participate through the protagonists of the rites. The religious always has a political dimension as rituals legitimize power and the order of society ruled by its elites.

Insofar as it relates historic and sociopolitical facts, Paracas iconography functions as a full-blown communication system. Its structural principles make it an ideographic writing system, often combining icons and glyphs.

Indeed, a figure may assemble heterogeneous elements, deliberately juxtaposed, sometimes superimposed, or merged. An image may blend the bodies of various animals, objects, and abstract motives (bars, circles, points, squares, etc.) or combine the human and the nonhuman (Figs. 4 and 5). There is undoubtedly a logic linking these components, and the resulting composite image has semantic value. Generally speaking, the succession of icons inserted into incised frames of Paracas pottery displays symmetry, inversion, and rupture, which suggest graphic encoding. This is amply illustrated by the iconography of Paracas Cavernas pottery (Ocucaje) (Fig. 2; see Figs. 10, 11, and 20: Balbuena 2013; Figs. 32 and 46; Menzel et al. 1964).

Future Directions

The reading of this iconography clearly remains fragmentary, and one can only comprehend general aspects of its contents. Nevertheless, primary archaeological contexts must form the basis of any attempt at interpreting its ideographic content and its intrinsic meaning. The use of comparisons, starting from the regional cultural phylum (south coast) and branching out to the Andean region and beyond, would enliven interpretation in that it would draw on the shared cultural roots of pre-Hispanic America.

References

Bachir Bacha, A., and O.D. Llanos Jacinto. 2013. ¿Hacia un urbanismo Paracas en Ánimas Altas/Ánimas Bajas (Valle de Ica)? In *Paracas: nuevas evidencias, nuevas perspectivas*, Boletín de Arqueología PUCP, ed. A. Bachir Bacha and J. Dulanto, vol. 17, 169–204. Lima: Fondo Editorial, Pontificia Universidad Católica del Perú.

Balbuena, L. 2013. Evidencias paracas en los valles de Pisco y Mala. In *Paracas: nuevas evidencias, nuevas perspectivas*, Boletín de Arqueología PUCP, ed. A. Bachir Bacha and J. Dulanto, vol. 17, 57–75. Lima: Fondo Editorial, Pontificia Universidad Católica del Perú.

Beresford-Jones, D.G., H.A. Lewis, and S. Boreham. 2009. Linking cultural and environmental change in Peruvian prehistory: Geomorphological survey of the Samaca Basin, Lower Ica Valley, Peru. *Catena* 78 (3): 234–249. Amsterdam.

Canziani, J. 2013. Arquitectura, urbanismo y transformaciones territoriales del periodo paracas en el valle de Chincha. In *Paracas: nuevas evidencias, nuevas perspectivas*, Boletín de Arqueología PUCP, ed. A. Bachir Bacha and J. Dulanto, vol. 17, 9–29. Lima: Fondo Editorial, Pontificia Universidad Católica del Perú.

Cook, A. 1999. Asentamientos Paracas en el valle bajo de Ica. *Gaceta arqueológica andina* 25: 61–90. Lima.

Deleonardis L. 1997. *Paracas settlement in Callango, Lower Ica Valley, 1st Millennium B.C., Peru*. PhD Dissertation, Department of Anthropology, School of Arts and Sciences of the Catholic University of America, Washington, DC.

Dulanto, J. 2013. Puerto nuevo: redes de intercambio a larga distancia durante la primera mitad del primer mileno antes de nuestra era. In *Paracas: nuevas evidencias, nuevas perspectivas*, Boletín de Arqueología PUCP, ed. A. Bachir Bacha and J. Dulanto, vol. 17, 103–132. Lima: Fondo Editorial, Pontificia Universidad Católica del Perú.

García, R. 2010. La ocupación paracas en la Bahía de la independencia de Paracas. In *Arqueología y desarrollo, experiencias y posibilidades en el Perú*, ed. Luis Valle Álvarez, 53–66. Trujillo: SIAN.

García, R., and J. Pinilla. 1995. Aproximación a una secuencia de fases con cerámica temprana de Paracas. *Journal of the Steward Anthropological Society* 23 (1–2): 43–81. Urbana.

Kaulicke, P., L. Fehren Smitz, M. Kolp-Gpdoy, P. Landa, O. Loyola, M. Palma, E. Tomasto, C. Vergel, and B. Vogt. 2009. Implicancias de un área funeraria del Periodo Formativo Tardío en el departamento de Ica. In *El periodo Formativo: enfoques y evidencias recientes. Cincuenta años de la Misión arqueológica japonesa y su vigencia. Segunda parte*, Boletín de Arqueología PUCP, ed. P. Kaulicke and Y. Onuki, vol. 13, 289–322. Lima: Fondo Editorial, Pontificia Universidad Católica del Perú.

Massey, S. 1986. *Sociopolitical change in the upper Ica Valley, B.C. 400 to 400 A.D.: Regional States on the South Coast of Peru*. PhD Dissertation, Department of Archaeology, University of California, Los Angeles.

Menzel, D., J.H. Rowe, and L. Dawson. 1964. *The Paracas pottery of Ica: A study in style and time*, University of California Publications in American Archaeology and Ethnology. Vol. 50. Berkeley: University of California Press.

Reindel, M., and J. Isla. 2013. Jauranga: una aproximación a la ocupación paracas en los valles de Palpa. In *Paracas: nuevas evidencias, nuevas perspectivas*, Boletín de Arqueología PUCP, ed. A. Bachir Bacha and J. Dulanto, vol. 17, 231–262. Lima: Fondo Editorial, Pontificia Universidad Católica del Perú.

Salomon, J.N. 2013. Rapport de mission effectuée dans le "Valle de Ica" présenté au Programme archéologique Animas Altas, Ica, Pérou. 53 p. 136 photos.

Splitstoser, J., D.D. Wallace, and M. Delgado. 2010. Nuevas evidencias de textiles y cerámica de la época Paracas Temprano en Cerrillos, valle de Ica, Perú. In *El Período Formativo: enfoques y evidencias recientes: cincuenta años de la Misión Arqueológica Japonesa y su vigencia. Segunda Parte*, Boletín de Arqueología PUCP, ed. P. Kaulicke and Y. Onuki, vol. 13, 209–235. Lima: Fondo Editorial, Pontificia Universidad Católica del Perú.

Tantaleán, H., C. Stanish, M. Zegarra, K. Pérez, and B. Nigra. 2013. Paracas en el valle de Chincha: nuevos datos y explicaciones. In *Paracas: nuevas evidencias, nuevas perspectivas*, Boletín de Arqueología PUCP, ed. A. Bachir Bacha and J. Dulanto Brescia, vol. 17, 31–56. Lima: Fondo Editorial, Pontificia Universidad Católica del Perú.

Tello, J.C. 1959. *Paracas I Parte*. Lima: Gráfica T. Scheuch.

Tello, J.C., and T. Mejia. 1979. *Paracas II parte: Cavernas y Necrópolis*. Lima: Universidad Nacional Mayor de San Marcos.

Williams, C. 1980. Arquitectura y urbanismo en el antiguo Perú. In *Historia del Perú*, Perú republicano T, ed. J. Mejía Baca, vol. VIII, 367–594. Lima: Juan Mejía Baca.

Further Reading

Bachir Bacha, A., and O.D. Llanos Jacinto. 2011. Arqueología e iconografía de los textiles Paracas descubiertos en Animas Altas, Ica, Perú. In *Actas de las V Jornadas internacionales sobre textiles precolombinos*, ed. V. Solanilla, 211–230. Barcelona: Universidad Autónoma de Barcelona, Publicaciones del Grup d'Estudis Precolombins 6.

Paranthropus

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Introduction

The genus name *Paranthropus* was created by R. Broom (1938) for a partial cranium, right mandibular corpus, and isolated teeth from Kromdraai near Sterkfontein, South Africa. The fossil had been found by a schoolboy, Gert Terblanche. Broom noted that it not only had large molars and premolars but that, if a ruler was placed across the cheekbones, the nasal region was behind the ruler. It was clear that it possessed a naturally dished face, unlike *Australopithecus* from Taung and Sterkfontein. Thus, Broom considered it a new genus of ape-man, parallel to man (*Paranthropus*), with robust jaws and teeth. He therefore gave it the species name *Paranthropus robustus*.

Key Issues/Current Debates/Definition

In 1948, Broom and his assistant, John Robinson, found similar fossils at Swartkrans Cave also near Sterkfontein and named a second species *Paranthropus crassidens*. Swartkrans proved to be a prolific source of *Paranthropus* fossils including crania (Fig. 1, right), mandibles (Fig. 2), two proximal femora, a partial pelvis, and isolated teeth. They ranged from infants to elderly and provided much information on *Paranthropus* morphology (Broom and Robinson 1952).

***Paranthropus*, Fig. 1** *Paranthropus robustus* cranium SK 48 from Swartkrans (*right*) and *Paranthropus boisei* cranium OH 5 from Olduvai (*left*), with reconstructed mandible

***Paranthropus*, Fig. 2** *Paranthropus* mandibles from Swartkrans

The dished face resulted from the cheekbones having moved forward to make space behind them for the massive temporal muscles that, in males and occasionally in females, were anchored to a sagittal crest. Such muscles were necessary to operate the heavily built mandibles that contained huge molars and premolars with low bulbous cusps that wore down to a flat surface in older individuals. By contrast, the canines and incisors were small and cramped into a small space. This emphasis on heavy grinding dentition led Robinson to advance a dietary hypothesis suggesting that *Paranthropus* was a specialized vegetarian. Because of the small size of the canines and incisors, *Paranthropus* could not have used these front teeth for tearing vegetation and opening hard fruit casings, as in the great apes. The greatly reduced size of the canines and incisors relative to the premolars facilitated the side-to-side grinding motion needed to process tough, low-quality foods, particularly at times when other preferred food sources were unavailable.

Another locality rich in *Paranthropus* fossils, including a complete female skull, was discovered by André Keyser (2000) at Drimolen Cave some distance from, but in the same general area as, Swartkrans. All of these fossils, together with a few from Cooper's Cave, Sterkfontein Caves, and

Gondolin, date to around two million years ago, and the genus continued until about 1 Ma, which is the youngest date for *Paranthropus* at Swartkrans (Gibbon et al. 2014). Associated fauna include more open grassland species than that of *Australopithecus africanus*, along with woodland and wetland species (Brain 1993). It is now generally accepted that only one South African species, *Paranthropus robustus*, is represented.

On the 17th of July 1959, Mary Leakey discovered, eroding out of Bed I deposits at Olduvai Gorge, Tanzania, a cranium with colossal cheek teeth, small cramped incisors and canines, a sagittal crest, dished face, and gutter running from the maxillary clivus into the floor of the nose (Fig. 1, left). Louis Leakey named it *Zinjanthropus boisei*, but it is clearly a massive East African form of *Paranthropus*. Phillip Tobias, who published a monograph on this cranium (Tobias 1967), did not recognize the generic distinction of *Paranthropus* and so classified the Olduvai fossil as *Australopithecus boisei*. Others before him had also considered that *Paranthropus* should be classed as *Australopithecus*. John Robinson, however, argued from his experience as both zoologist and paleontologist that because *Paranthropus* could be distinguished clearly from *Australopithecus* on both crania and postcrania, it deserved generic recognition. He was supported in this view by Clarke (1996), and now, with the very large inventory of fossils of several species of *Australopithecus* and three species of *Paranthropus*, many more researchers have accepted the generic distinction. The Olduvai cranium was given an age of 1.75 million years by potassium-argon dating of the layer in which it occurred. In subsequent years, some more fragmentary fossils, including isolated teeth of *Paranthropus boisei*, have been found in Olduvai Beds I and II.

In 1964, Kimoya Kimeu on an expedition to West Lake Natron, Tanzania, run by Richard Leakey and Glynn Isaac spotted a mandible high up in an exposure of sediments at Peninj. When he retrieved the fossil, it proved to be a *Paranthropus* in excellent condition with all teeth preserved. Particularly noticeable were the small sizes of the canines and incisors crowded in front of the huge premolars. Although similar to mandibles from Swartkrans, the Peninj jaw had teeth even bigger, of the size that would fit the Olduvai *Zinjanthropus* cranium. This mandible is classified also as *Paranthropus boisei*.

Many more fossils of this species were later recovered from similar-aged sediments on the east side of Lake Turkana (formerly Lake Rudolf), Kenya. These included some mandibles even more massive than that of Peninj, as well as crania. One magnificent cranium, KNM-ER 406, was found lying in a dry riverbed by Richard Leakey in August, 1969, i.e., 10 years after the discovery of *Zinjanthropus*. Although the teeth had been weathered away, the cranial architecture exhibited classic *Paranthropus* morphology, similar to that of *Zinjanthropus*, with a dished face, extreme postorbital constriction leaving ribs of bone above the orbits, a sagittal crest, and widely flaring zygomatic arches leaving a large space for the temporal muscles. The discovery of a smaller, less muscular cranium, KNM-ER 732, showed typical *Paranthropus* morphology and thus represented a female, contrasting greatly in size with the males KNM-ER 406 and *Zinjanthropus* (OH 5).

A partial cranium containing some well-preserved teeth including a tiny canine was found under a thorn tree at Chesowanja, near Lake Baringo, Kenya, in 1970 (Carney et al. 1971).

Beginning in 1967, several *Paranthropus* mandibular fossils and numerous isolated teeth were recovered in the Omo region of southern Ethiopia by a joint French and American expedition directed by C. Arambourg, F. C. Howell, and Y. Coppens. One very massive mandible (L7-A-125) dates between 2.15 and 2.25 million years. It is thus much older than the *Zinjanthropus* cranium or the other *Paranthropus boisei* fossils from East Lake Turkana. However, it has been generally assumed to belong to *Paranthropus boisei* (Howell 1978).

Another Omo mandible without teeth was derived from an even older horizon dating to about 2.6 million years. This mandible (Omo 18–1967-18) was made the type specimen of a new genus and species *Paraustralopithecus aethiopicus* (Arambourg and Coppens 1968). It

is now, however, classified as *Paranthropus aethiopicus*. Creation of a new species on the basis of this poorly preserved mandible was debatable, but a subsequent discovery of a cranium from West Lake Turkana provided support. The cranium KNM-WT 17000 was found in 1985 at Lomekwi and dated to 2.5 million years ago. Because of its color, it was known as the "Black Skull." Its significant differences from *Paranthropus boisei*, coupled with its early date and features shared with *A. afarensis*, prompted Kimbel et al. (1988) to place it in *Australopithecus aethiopicus* (i.e., *Paranthropus aethiopicus*). Its discoverers had considered it to be an ancestral form of *A. boisei* (i.e., *P. boisei*) (Walker et al. 1986).

Although the Black Skull has cranial architecture typical of *Paranthropus*, i.e., a broad, dished face, extreme postorbital constriction, widely flaring zygomatics, nasal gutter, inflated mastoids, wide supramastoid shelf, prominent sagittal crest, and bases of massive cheek teeth, it has some differences from *Paranthropus boisei* and *Paranthropus robustus*. The anterior dentition occupied a wide space, and the endocranial capacity was only 410 cc compared to the 530 cc of *Zinjanthropus*. The facial profile exhibits a pronounced anterior slope, contrasting with the typically much more vertical profile of *Paranthropus boisei* and *Paranthropus robustus*.

The first known cranium with associated mandible (KGA 10–525) of *Paranthropus boisei* was found in 1993 at Konso, Ethiopia (Suwa et al. 1997). The skull and eight other *Paranthropus* fossils were recovered from deposits well dated between 1.4 and 1.5 million years. They are associated with dry grassland fauna.

A very weathered maxillary fragment with damaged first and second molars (RC 911) was found in 1996 in the Chiwondo Beds of Malema in Malawi. The fossil was provisionally dated at 2.4 million years and assigned to *Paranthropus boisei* by Schrenk et al. (1997).

Paranthropus was a widespread African genus of massive-jawed ape-man extending from South Africa to Ethiopia and covering a period of 1.5 million years. It is not known outside of Africa. John Robinson had considered that the heavily built mandible of *Meganthropus* from Java was a *Paranthropus*, but the teeth are morphologically distinct from that genus, and it seems probable that it is an Asian representative of *Homo habilis*, as observed by Phillip Tobias and Ralph von Koenigswald (see "▶ *Homo habilis*").

Although *Paranthropus* has often been found in areas where there are Oldowan and Early Acheulean stone tools, it is not generally thought that *Paranthropus* was responsible for making them. *Homo habilis* and *Homo ergaster* also occur in the same areas, and it is believed that *Homo* with its much larger brain was the toolmaker, while smaller-brained *Paranthropus* relied on its specialized dentition for processing plant foods. Because of the massive teeth and jaws with associated strong musculature, *Paranthropus* is often referred to as a "robust australopithecine." This term can however be misleading because some of the so-called gracile australopithecines, i.e., members of the genus *Australopithecus*, often have large teeth and robust jaws that can exceed those of many *Paranthropus* individuals. *Australopithecus prometheus* and *Australopithecus garhi* in particular exhibit large "robust" cheek teeth.

Cross-References

▶ Australopithecines
▶ *Homo habilis*
▶ Leakey Family
▶ Olduvai Gorge Archaeological Site
▶ Tobias, Phillip V.

References

Arambourg, C., and Y. Coppens. 1968. Decouverte d'un australopithecien nouveau dans les gisements d 'Omo (Ethiopie). *South African Journal of Science* 64: 58–59.
Brain, C.K., ed. 1993. *Swartkrans: A cave's chronicle of early man*. Pretoria: Transvaal Museum.
Broom, R. 1938. The Pleistocene anthropoid apes of South Africa. *Nature* 142: 377–379.
Broom, R., and J. Robinson. 1952. *Swartkrans ape-man*. Museum Memoir No. 6, Pretoria: Transvaal Museum.

Carney, J., A. Hill, J.A. Miller, and A. Walker. 1971. Late australopithecine from Baringo District, Kenya. *Nature* 329: 111–112.
Clarke, R.J. 1996. The genus *Paranthropus*: what's in a name? In *Contemporary issues in human evolution*, memoir, ed. W.E. Meikle, F.C. Howell, and N.G. Jablonski, vol. 21, 93–104. California: Academy of Sciences.
Gibbon, R.J., T.R. Pickering, M.B. Sutton, J.L. Heaton, K. Kuman, R.J. Clarke, C.K. Brain, and D.E. Granger. 2014. Cosmogenic nuclide burial dating of hominin bearing Pleistocene cave deposits at Swartkrans, South Africa. *Quaternary Geochronology* 24: 10–15.
Howell, F.C. 1978. Overview of the Pliocene and earlier Pleistocene of the lower Omo basin, Southern Ethiopia. In *Early hominids of Africa*, ed. C. Jolly, 85–130. London: Duckworth.
Keyser, A. 2000. The Drimolen skull. *South African Journal of Science* 96: 189–193.
Kimbel, W.H., T.D. White, and D.C. Johanson. 1988. Implications of KNM-WT 17000 for the evolution of 'robust' Australopithecus. In *Evolutionary history of the 'robust' australopithecines*, ed. F.E. Grine, 259–268. New York: Aldine de Gruyter.
Schrenk, F., et al. 1997. Geologie, Paläontologie und Paläoanthropologie des Malawi-Rift. *Cour. Forschungsinstitut Senckenberg* 201: 409–419.
Suwa, G., B. Asfaw, et al. 1997. The first skull of *Australopithecus boisei*. *Nature* 389: 489–492.
Tobias, P.V.T. 1967. *Olduvai Gorge, volume 2: The cranium and maxillary dentition of Australopithecus (Zinjanthropus) boisei*. Cambridge: Cambridge University Press.
Walker, A.C., R.E. Leakey, J.M. Harris, and F.H. Brown. 1986. 2.5-Myr *Australopithecus boisei* from west of Lake Turkana, Kenya. *Nature* 322: 517–522.

Further Reading

Arambourg, C., and Y. Coppens. 1967. Sur la découverte, dans le Pléistocène inférieur de la vallée de l'Omo (Ethiopie) d'une mandibule d'Australopithécien. *Comptes Rendus de l'Académie des Sciences, Paris, Série D* 265: 589–590.
Broom, R., and G.W.H. Schepers. 1946. *The South African fossil ape-men: the Australopithecinae*. Museum Memoir No. 2, Pretoria: Transvaal Museum.
Grine, F. 1989. Evolutionary history of the 'robust. In *Australopithecines*. New York: Aldine de Gruyter.
Kaszycka, K. 2002. *Status of Kromdraai (Cahiers de Paléoanthropologie)*. Paris: CNRS Editions.
Reader, J. 2011. *Missing links*. Oxford: Oxford University Press.
Robinson, J.T. 1972. *Early hominid posture and locomotion*. Chicago: University of Chicago Press.
Schwartz, J.H., and I. Tattersall. 2005. *The human fossil record, volume 4: Craniodental morphology of early hominids (genera Australopithecus, Paranthropus, Orrorin), and overview*. New Jersey: Wiley-Liss.

Parchment: Preservation and Conservation

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Introduction

It is believed that processed animal hides were first used as writing materials in Egypt, in the Fourth Dynasty – 2700–2500 BCE (Ryder 1964). The processed hide-parchment-grew in popularity because of the high cost and growing scarcity of papyrus. Its use spread across the empires of the Babylonians and Assyrians (2300 BCE) and is reported in inscriptions on stone tablets found from the Seleucid era (311 BCE–600 CE); KUSH-SAR appears, meaning "skin writer," and this is contrasted with DUB-SAR meaning "tablet writer."

Parchment was in many respects an ideal writing material because of the practicality of transporting parchment documents, the superior handling qualities, and its durability. It was most commonly used for sacred documents which were likely to endure much use and consultation. Although papyrus was undoubtedly the most common writing medium in the Egyptian empire, by the first century CE parchment had surpassed papyrus in popularity. Parchment sheets were often stitched together to form parchment notebooks which were used for accounts, drafts, and letters. Evidence for this use is provided by the poet Martial, who refers to the availability of parchment codices for use by travelers (Epigrams 1.2 and XIV.184–92) (Reed 1972).

Parchment documents reporting our history are culturally important; they describe – in part – the development of civilization and our progress over time. Using historical documents, we have been able to investigate the important aspects of our ancestors and the origin and attributions of divinity to humans in the ancient world. Some of the most important parchment documents ever discovered, namely, the Dead Sea Scrolls, have contributed significantly to the divine ideology.

Parchment can also provide information about how the methods of producing documents and processing animal hides have developed over the centuries. Furthermore, provenance of parchments provides information about the growth of cities, trade routes, and its economic and social importance in relation to local communities. Preserving such documents is therefore an important undertaking if we are to keep our cultural heritage intact, and parchment research is vital if we are to improve our knowledge of preservation treatments and store these precious documents for future generations.

Definition

The processing of hides into parchment involves treatments to remove a majority of the non-collagenous components such as hair and fat. The most common hides used to make parchment are those from cattle, calves, sheep, and goats. The practice of processing animal hides for the use of written documents has evolved over the last 4000 years; the main points of the manufacturing processes are well known. There are various forms of parchment, and they depend upon the manner in which the animals were killed. Most hides come from animals slaughtered in abattoirs, whereby the animal is thoroughly bled. The draining of blood allows the fine dermal blood vessels to become colorless, making them difficult to visualize in the flayed skin. If the skin is not drained of blood, the iron compounds present in the heme group react with the liming solutions and can form dark stains which are difficult to remove. If the animal has not been slaughtered in an abattoir and killed by a hunter or died of natural causes, blood often remains in the blood vessels and the parchment appears "veined," although this may not be desirable for documents, it is often used to produce decorative book bindings. Most parchments are manufactured from young animals, between 8 and 12 months old; however, occasionally much older animals may be used. The type of parchment from older animals is instantly recognizable, in that it is thick in substance.

The most revered parchments are those manufactured from kidskin and calfskin, which are made from very young animals; these are some of the finest parchments available. The skins are superior in strength and have very smooth grains. The hair follicle markings are exceptionally weak because the blood vessels have not fully developed, and their appearance is fine and hardly visible with the naked eye (Reed 1975).

The strength and durability of parchment is attributed to its main structural component collagen. Collagen is a protein made from polypeptide chains, which are linear polymeric sequences of amino acids. Collagen has a specific rigid configuration of local ordering (and in some cases long range ordering) of polypeptides chains. Collagen polypeptide chains have an obligate sequence based upon the multiple repetitive amino acid tri sequence Glycine-X-Y, where X and Y are frequently proline and hydroxyproline (imino acids). The small glycine amino acid affords the tight turn of the helical structure and its intimate relationship with two neighboring polypeptide chain sequences to form a triple helix. This metastable entity is well recognized in many tissues of the extracellular matrix. It can be described as a structural motif that polypeptide chain sequences rich in glycine and amino acids can lock into. Furthermore, the strong ropelike structure has to be perturbed significantly in order to push the local conformational stability toward a more global entropically stable state – gelatine. More detailed descriptions of collagen structures at a variety of architectural levels have been documented by Wess in (Fratzl 2008).

In skin (hide) and subsequently parchment, the fibril-forming type I and type III collagens are present. The structure of the collagen hierarchy for fibril-forming collagen types from the triple helix to the fibril and thence fiber has been widely investigated and its mechanical properties reported. Collagen polypeptide chains wind into a triple helix to form a collagen molecule, collagen molecules are then consecutively arranged to form a fibril, fibrils are arranged into bundles to form fibers, and fibers are arranged to form a collagen tissue.

The collagen triple helix is "locked" into its rope like structure. The stability of the triple helix and the collagen tissue is the result of extensive intramolecular and intermolecular bonds. The triple helical collagen molecule is stabilized by intramolecular bonding between the amide group of the glycine residues and the carboxyl group of the proline residue and water mediated hydrogen bonds. Additional stability of the collagen hierarchical assembly and aggregation of the collagen fibril is conferred to further intermolecular bonding such as cross-linking at the terminal ends of collagen molecules. There are several factors that also contribute to triple helix stability and these are well documented.

The loss of structural integrity and subsequent fragmentation of parchment are attributed to the loss of the structural order of the parchment's collagen component. When collagen molecules lose their characteristic triple helix motif, they tend to adopt a random geometry, producing a disordered structure – gelatine.

The denaturation and unfolding of the collagen triple helix post mortem requires two components: firstly, an agent to break molecular bonding and perturb the structure and secondly, water to cause osmotic swelling and force the polypeptide chains apart from one another. The agents that can cause molecular bond disruption are numerous. They include high and low pH, UV irradiation, and heat. In parchment, the measurement of degradation has been widely investigated (Gonzalez and Wess 2008).

The absence of the hierarchical structural organization and random chain conformation in gelatine means that the mechanical properties of gelatine are different to the parent collagen. The change in the mechanical properties is brought about because the random chain conformation exposes more sites for ionic and covalent molecular bonding to occur. When dry, gelatine is more resistant to deformation than the parent collagen tissue, and when wet, it has the potential to hold more water than the parent collagen tissue (Yakimets et al. 2007). This means that parchments can hold different amounts of water at the same relative humidity, depending upon their relative proportions of collagen and gelatine.

Key Issues and Future Directions

Preserving Parchment Artifacts

Archives and institutions that house parchments manage their collections to make the parchments available for use. Parchments are incredibly stable materials and when well preserved can survive for thousands of years. However, the continual problem archives face is that parchments change over time; they can, for example, discolor, fragment, tear, curl, and become brittle. The change of parchment artifacts can occur very slowly, and this can be – in part – controlled by the environment that the parchment is housed in; for example, storage rooms can have their temperature, relative humidity, and amount of light controlled. Further preservation can be enhanced by conservation treatments and the way the documents are handled (Larsen 2007). The care taken when handling documents is focused upon preventing damage as the objects are moved and read. For example, books should never be pulled from the shelf by their spine using fingernails as this could cause scratches to the covering material. It is also recommended that a hand be placed over the cover of the book and to gently slide the book forward until it can be grasped securely to remove it.

Managing the "change" of parchment collections is a difficult task because it requires a balance between making parchments available to users and protecting the integrity of the object. The array of factors that cause degradation has subsequently led to a growing need to understand how to prevent deterioration and how to store documents more effectively. The macroscopic properties of parchment have been used extensively as a qualitative means of identifying degradation of parchment. Parchment research over the last two decades has developed significantly by providing quantitative evidence of degradation within parchment; this has been through spectroscopic, thermal, and structural analysis, which has in turn informed management of collections and the effectiveness of conservation treatments (Larsen 2002). The next section provides a brief overview of how these different parchment research areas and how they have contributed to our current knowledge of parchment and the best methods for preservation.

What Do We Need to Understand to Provide the Best Preservation and Conservation for Parchments?

In the last 20–30 years, the availability of scientific techniques to the field of conservation has meant that new understandings of the parchment material and how it behaves have led to more evidence-based decisions. In this time it has been possible to work toward defining the chemical and structural changes within parchment that contribute toward the overall change of a parchment manuscript. To aid in the preservation and conservation of parchment, the following (among many) research questions can be addressed:

What Is the Structural Composition of Parchment?

Parchment as a form of treated dried skin can be analyzed using techniques that have evidenced the molecular hierarchical organization of many biological tissues. Here, the production process and subsequent storage or treatment can cause alteration in the molecular structure of the material as well as influence the differential hierarchical and stratigraphic nature of parchment. Microscopic evaluations of parchment tend to mostly be qualitative and examine textural differences within specific sites of parchment samples; electron microscopy by transmission or scanning modes also tends to have a more qualitative view of the hierarchical organization and nanostructure of fibrils being evidence or otherwise (Kautek et al. 2000). X-ray diffraction has provided a more robust way of furnishing structural information about parchment since the diffraction signal for collagen is relatively well characterized and very strong in terms of biomaterials. The intensity of the diffraction pattern and the changes that occur due to increased disorder in the sample and the presence of the lipid and mineral can all be captured in the same diffraction images (Kennedy et al. 2002). The potential to evidence the presence of gelatine in the parchment is more challenging due to the ill-defined structural basis by which gelatine is characterized as opposed to collagen. However, the ability for X-ray diffraction to collect the contribution made from several billion molecules simultaneously can provide a statistically useful qualitative analysis of the structural composition. This can be further aided by an analysis of the structural heterogeneity within the parchment from the flesh to grain side by the use of Microfocus X-ray diffraction. Typically, X-ray beams used are of the order 100–200 μm in diameter; taking thin sections of parchment samples, an X-ray beam can be used to selectively scan the parchment thin section from the flesh to grain side; this can reveal the stratigraphy of the parchment and allows the possible effects of ink penetration to be evaluated. Spectroscopy can also be used as an efficient way of examining molecular change within parchment and is especially useful where the penetration of the probing radiation such as infrared can be limited to the first few microns on the surface of an object.

How Does Parchment React with Relative Humidity?

Having defined parchment as a composite hierarchical material with a stratigraphic variation in composition and organization from flesh to grain size, it is likely that such material has a complex relationship with thermal changes and relative humidity. Although it may be attractive to imagine that parchment may behave differentially in thermal and humid settings, the quantitative evidence of this has been challenging. Thermal studies of parchment are often used to monitor the melting of collagen fibers to detect the susceptibility of parchment to be compromised by any storage or treatment strategy. Quantitative studies have been used to detect the fire damage that a parchment may have been exposed to (Fessas et al. 2000). Systematic studies where changes in relative humidity have been used to see if a lasting imprint is made on parchment have been more challenging. Few studies have been conducted in this area, and the results are difficult to interpret in terms of providing evidence regarding the best possible storage conditions for parchment documents (Hansen et al. 1992; Dernovskova et al. 1995).

What Are the Degradation Processes Within Parchment and How Can We Measure Them?

The main considerations of change in parchment are those that affect the functionality of a document, that is, the contrast with which it can be read and the ability for it to be handled. The change from

collagen to its entropically stable partner end state of gelatine leads to fragility; however, the relationship between macroscopic behavior such as cocking and tearing has been difficult to correlate causally with molecular change. Discoloration of parchment as a significant factor of change needs to be considered; although this has for some time been believed to be related to the presence of gelatine, this has more recently been shown to not be correlated to other physical changes, and the mechanism of discoloration possibly resided in more complex chemistries involving lipid and sugar residues (Gonzalez et al. 2012).

How Do Conservation Treatments Affect Parchment?

The development of intervention strategies for conservation of materials has to be approached with caution. There are several causes where strategies for conservation have caused more damage than good. Strategies for deacidification (especially in papers) and lamination of both paper and parchment have both produced unintended and damaging consequences. The potential for new developments in conservation treatment and the efficacy of established treatments can be assessed in the light of analysis of the integrity of the parchment in terms of surface and substructure. A good example is the use of X-ray diffraction to examine the potential damage through laser cleaning of parchment objects (Kennedy et al. 2004). Results showed that the collagen within parchment remained intact after laser cleaning, but parchment collagen could be damaged by exposure of laser cleaning using dwell times for cleaning longer than those advised or used routinely.

Can We Advise on a Strategy for Storage?

The scientific evidence described above can be used to inform strategies for conservation and storage. More work will have to be done in terms of longitudinal studies that will monitor and provide numerical analyses of the effects of different parchment storage environments. In terms of work conducted so far, it must once again be stressed that parchment is a stratigraphic material and that the structurally most vulnerable part of the parchment is the gelatine component and the collagen component that is predisposed to denaturation. Techniques therefore need to identify the most vulnerable parchments in collections and also be useful in identifying the region of the parchment most at risk. For example, a future phased conservation strategy may use our scientific knowledge to prioritize the parchments that have the highest gelatine content for storage under more stringent conditions and for the parchments with the highest collagen contents to be exposed to a more relaxed and cost-efficient variable RH and temperature regime.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management: Cost and Benefit of Change
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology

References

Dernovskova, J., H. Jirsova, and J. Zelinger. 1995. An investigation of the hygroscopicity of parchment subjected to different treatments. *Restaurator* 16: 31–44.

Fessas, D., A. Schiraldi, R. Tenni, L. Vitellaro Zuccarello, A. Bairati, and A. Facchini. 2000. Calorimetric, biochemical and morphological investigations to validate a restoration method of fire injured ancient parchment. *Thermochimica Acta* 348: 129.

Fratzl, P., ed. 2008. *Collagen: Structure and mechanics*. New York: Springer.

Gonzalez, L.G., and T.J. Wess. 2008. Use of attenuated total reflection – Fourier transform infrared spectroscopy to measure collagen degradation in historical parchments. *Applied Spectroscopy* 62: 1108–1114.

Gonzalez, L.G., M. Wade, N. Bell, K. Thomas, and T.J. Wess. 2012. Using Attenuated Total Reflection-Fourier Transform Infrared Spectroscopic (ATR-FTIR) to study the molecular conformation of parchment artifacts in different macroscopic states. *Applied Spectroscopy*.

Hansen, E.F., S.N. Lee, and H. Sobel. 1992. The effects of relative humidity on some physical properties of modern vellum. Implications for the optimum relative humidity for the display and storage of parchment. *Journal of American Institute of Conservation* 31: 325–342.

Kautek, W., S. Pentziena, M. Rölliga, P. Rudolpha, J. Krügera, C. Maywald-Pitellos, H. Bansab,

H. Grösswang, and E. Königd. 2000. Near-UV laser interaction with contaminants and pigments on parchment: Laser cleaning diagnostics by SE-microscopy, VIS-, and IR-spectroscopy. *Journal of Cultural Heritage* 1: 233–240.
Kennedy, C.J., J.C. Hiller, M. Odlyha, K. Nielsen, M. Drakopoulos, and T.J. Wess. 2002. Degradation in historical parchments. *Papier Restaurierung* 3: 23–30.
Kennedy, C.J., M. Vest, M. Cooper, and T.J. Wess. 2004. Laser cleaning of parchment: Structural, thermal and biochemical studies into the effect of wavelength and fluence. *Applied Surface Science* 227: 151–163.
Larsen, R., ed. 2002. *Microanalysis of parchment*. London: Archetype Publications.
Larsen, R. 2007. Introduction to damage and damage assessment of parchment. In *In improved damage assessment of parchment*, ed. R. Larsen, 17–21. Brussels: Office for the Official Publication of the European Communities.
Reed, R. 1972. *Ancient skins, parchments and leathers*. New York: Seminar Press.
Reed, R. 1975. *The nature and making of parchment*. Leeds: Elmete Press.
Ryder, M.L. 1964. Parchment: Its history, manufacture and composition. *Society of Archivists* 2: 391–399.
Yakimets, I., S.S. Paes, N. Wellner, A.C. Smith, R.H. Wilson, and J.R. Mitchell. 2007. Effect of water content on the structural reorganization and elastic properties of biopolymer films: A comparative study. *Biomacromolecules* 8: 1710–1722.

Parker, Arthur Caswell

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Basic Biographical Information

Arthur Caswell Parker (1881–1955) was the first Native American to become a professional archaeologist. He led an often contentious but ultimately successful career as an archaeologist and museologist in New York for more than five decades.

Born on the Cattaraugus Reservation in western New York, Parker firmly considered himself to be a Seneca Indian of the Iroquois (Haudenosaunee) nations. However, Parker's mother, Geneva Hortense Griswold, was originally from Connecticut and of English and Scottish ancestry. In 1879, Geneva married Arthur's father, Frederick Ely Parker, who was descended from a line of prominent Senecas, though his own mother was also Anglo. As a result, Parker's identity was ambiguous because the Seneca trace descent matrilineally while the US government traces descent patrilineally, although Parker was formally adopted into a clan and given the name Gawasowaneh in 1903.

Parker lived on the Cattaraugus Reservation until 1892, when his family moved to White Plains, a suburb of New York City. Eventually, Parker found his way to the American Museum of Natural History, where he befriended Frederic W. Putnam, then one of the luminaries of American anthropology. Parker became one of the "Putnam Boys" – which also included M. Raymond Harrington, Alanson B. Skinner, and John W. Fenton – a handpicked group of promising young students. In 1899, Parker was hired on an occasional basis at the American Museum as an "archaeological assistant." In 1903, Putnam invited him and Harrington to lead an archaeological expedition under the auspices of the Peabody Museum at Harvard University. As codirectors, Parker and Harrington productively excavated the Silverheels Site on the Cattaraugus Reservation. This experience led Parker to quit college at Dickson Seminary, to pursue a career in archaeology.

After several difficult years of temporary jobs, Parker became the first New York State archaeologist in 1906. In this role, he published widely on Iroquois ethnography (e.g., Parker 1910, 1923) but also conducted original archaeological research, focusing principally on developing a culture history of New York. Parker greatly expanded the collections of the New York State Museum and produced one of the first major scientific compendiums of the state's ancient past (Parker 1922). Parker was also involved during this period in political advocacy, campaigning for a pan-Indian nationalism, through the Society of the American Indian (Berg 2000). In 1924, Parker resigned from his state position and became the director of the Rochester City Museum. He thrived in this position, remaking the institution into the Rochester Museum of Arts and Sciences, although his administrative duties required that he reduce fieldwork and archaeological research. Parker retired in 1945, but continued writing and publishing (e.g., Parker 1952). He died in 1955, suddenly, from a heart attack.

Major Accomplishments

Although Parker did make noteworthy contributions to the archaeology of New York (Sullivan 1992), he is principally known today for his accomplishments as a museum archaeologist, a passionate advocate for scientific archaeology, and a promoter for the protection of archaeological resources. His early diorama exhibits were long considered as setting the standard for the industry, and he is credited with coining the term "museology." Parker often directly involved the public in research activities, shared the results of archaeology with the public, and published for myriad public audiences, including children (e.g., Parker 1928). Parker was also intensely involved in protecting archaeological sites, particularly from looters and casual avocational excavators (e.g., Parker 1938).

Parker's other major accomplishment was his novel ability, as a self-identified Native American, to have a fruitful career in archaeology during a period in which few ethnic minorities could participate in the sciences. Despite the bias and bigotry he faced, Parker reached some of the highest offices in the field: Parker served as vice president of the American Association of Museums (1927) and president of the New York State Archaeological Association (1932), Society for American Archaeology (1935), and New York State Historical Association (1945). He became a fellow of the Royal Society of Arts and also the American Association for the Advancement of Science and received numerous awards and honorary degrees. Parker's successes as a professional archaeologist demonstrated more than a century ago that Native Americans could contribute, significantly, to the field.

Cross-References

- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Indigenous Archaeologies
- ▶ Heritage Museums and the Public
- ▶ North America (USA and Canada): Museums
- ▶ Society for American Archaeology (SAA)

References

Berg, S.C. 2000. Arthur C. Parker and the Society of the American Indian, 1911–1916. *New York History* 81: 237–246.

Parker, A.C. 1910. Iroquois uses of maise and other food grains. *New York State Museum Bulletin* 144.

Parker, A.C. 1922. *The archaeological history of New York*. Albany: University of the State of New York.

Parker, A.C. 1923. *Seneca myths and folk tales*. Buffalo: Buffalo Historical Society.

Parker, A.C. 1928. *Rumbling wings and other Indian tales*. Garden City: Doubleday.

Parker, A.C. 1938. Indians versus pot-hunters. *American Antiquity* 3: 267–268.

Parker, A.C. 1952. *Red Jacket, last of the Seneca*. New York: McGraw-Hill.

Sullivan, L.P. 1992. Arthur C. Parker's contribution to New York state archaeology. *The Bulletin: Journal of the New York State Archaeological Association* 104: 3–8.

Further Reading

Colwell-Chanthaphonh, C. 2009. *Inheriting the past: The making of Arthur C. Parker and indigenous archaeology*. Tucson: University of Arizona Press.

Hertzberg, H.W. 1979. Nationality, anthropology, and pan-Indianism in the life of Arthur C. Parker (Seneca). *Proceedings of the American Philosophical Society* 123: 47–72.

Porter, J. 2001. *To be Indian: The life of Iroquois-Seneca Arthur Caswell Parker*. Norman: University of Oklahoma Press.

Zeller, T. 1987. Arthur C. Parker: A pioneer in American museums. *Curator* 30: 41–62.

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Parks Canada: Historical Archaeology

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State of Knowledge and Current Debates

Parks Canada Agency is the primary institution conducting historical and underwater archaeology

E. Gwyn Langemann has retired.

in Canada. It has been honored by the Society for Historical Archaeology for single-handedly establishing the discipline of historical archaeology for an entire nation. Parks Canada is the federal government agency responsible for the extensive system of national parks (NP), national historic sites (NHS), and national marine conservation areas throughout Canada. Historical archaeological research, on land and underwater, supports cultural resource management (CRM) and interpretation at historic sites within the national parks and at operating NHS. Parks Canada is the operational arm of the Historic Sites and Monuments Board of Canada (HSMBC), the federal advisory board responsible for identifying places, persons, and events of national historic significance.

This survey looks at the development of a historical archaeology program in Parks Canada and highlights projects that have taken place across the country. It considers the challenges that face a national program in such an extensive country, where archaeology takes place in the context of developing and managing a system of national historic sites and national parks, and considers the way in which archaeology has integrated Indigenous participation.

The first national park in Canada, now known as Banff, was established in 1885 and the first NHS at Fort Anne in Nova Scotia in 1917. With the creation of the Dominion Parks Branch in 1911, Canada was the first country to establish an agency devoted to managing its system of national parks. In the 1960s, a growing public interest in matters of archaeology and heritage led to the passage of legislation in all provinces and territories regarding heritage preservation. Archaeological sites within the federally owned national parks and NHS, however, remain outside of provincial and territorial jurisdiction and are the responsibility of Parks Canada. There is no overriding national archaeology legislation. In the more recent national park reserves in the northern territories and on the Pacific coast, established under the modern Indigenous treaty process, archaeological sites and artefacts are often managed in a formal cooperative manner with the First Nations. Matters of cultural heritage and archaeology are explicitly covered in many of the modern treaties. NHS may also be UNESCO World Heritage Sites, so there can be many layers of significance and mandate responsibility at an archaeological site.

A Parks Canada historical archaeology unit was set up in Ottawa in 1961, to inform an ambitious program of restoration and reconstruction at national historic sites such as the eighteenth-century Fortress of Louisbourg in Nova Scotia. By the early 1980s, separate archaeological units were established in regional offices, where archaeologists had wide-ranging responsibility for both historical and precontact archaeology, in both the national parks and the NHS. In 2012, a much-reduced archaeological staff was again centralized in the national office. Today, the majority of fieldwork is done by contract archaeologists, and Parks archaeologists are developing a regulatory and reviewing role for themselves. A separate marine archaeology unit has a primary focus on historic wrecks and still maintains a strong field research program.

Parks Canada also has a strong national presence in precontact period archaeology, and often the line between historical and precontact archaeology is not clear. This is particularly true in parks established under modern Indigenous treaty provisions, where traditional land use continues, and CRM is a joint responsibility with First Nations. In all the national parks, archaeology is integrated with an array of resource management interests. Human presence in the landscape and human resource use is understood as one component of an ongoing ecological relationship; historic sites are only the most recent layer. In some northern parks, the management plan explicitly says that there can be no ecological integrity without the ongoing presence of people and their traditional practices.

Parks Canada archaeologists have the advantage of being part of a larger agency. Archaeological evidence is just one part of the team effort needed to pull off the successful restoration or reconstruction of an historic structure. Within Parks, an archaeologist has the opportunity to work in a sustained relationship with colleagues who are historians, conservators, or skilled tradesmen with experience in restoring historic masonry

Parks Canada: Historical Archaeology, Fig. 1 View along the top of a series of newly re-pointed masonry piers that supported the original 1885 Canadian Pacific Railway track high above the Illecillewaet River, on the approach to Rogers Pass in Glacier NP. The elevated grade lengthened the approach in a series of loops, allowing a more gradual grade on the steep approach to the summit. In order to avoid the avalanche dangers at the pass, the Connaught tunnel was built in 1919, and the aboveground grade abandoned. (Parks Canada, J. Porter, 411 T-28E)

(Fig. 1) or log structures or the masonry of historic canal and lock systems. A restoration architecture unit is part of the cultural heritage team based at the Winnipeg office. Parks archaeologists also have the opportunity to work with their colleagues in the national parks or NHS, who are charged with the operational responsibilities of preserving and interpreting the archaeological sites for the public benefit and for the long term. The opportunity to work on an archaeological site for many years, to get a thorough understanding of it, and to know that you are contributing to its preservation is seldom found in the consulting archaeology world. Similarly, there is the opportunity to work in a park for a sustained period and gain a deep understanding of the patterns left by people moving in the landscape over time, on a regional basis.

The challenges facing Parks Canada archaeologists today come from many directions. The network of protected areas is extensive, and parks and sites are found in every possible ecological setting. The logistics of getting to a remote site and mounting a field project can be daunting. Sites are being damaged by melting permafrost, shoreline erosion, catastrophic floods and rock falls in the mountains, wildfire, the pressure of infrastructure developments, and the ongoing impact of severe Canadian weather. Budgets and changing government priorities are always an issue. There are always questions of triage in such an extensive system. Archaeological work that focuses on salvage and preservation may take priority over a research project, but sometimes even salvage work is left undone at one site because of an urgent need elsewhere.

The historic sites managed by Parks Canada include such a wide variety of site types, from so many time periods, that it is difficult to make any summary statements. Canada is a very large country. Historic sites range from the bleak stone fortress at Prince of Wales Fort on the tundra shore of Hudson Bay, the wooden shacks used by Arctic explorers at Fort Conger on Ellesmere Island, and the gold rush towns in the Yukon, to the early farmsteads at Point Pelee NP in the southernmost point of Canada. The Maritime Provinces in Atlantic Canada have a large number of military sites related to the colonial battles between France and England and the later conflicts with America in the War of 1812. Historic sites in southern Ontario and Québec relate to the early settlement and industrial development of Canada, including

extensive canal and lock systems, and include major complexes of urban fortifications and housing such as the Fortifications of Québec NHS. Fur trade forts, coal mines, ranches, and farmsteads are found in the Prairie Provinces. Fisgard Lighthouse and Fort Rodd Hill NHS are on the southern tip of Vancouver Island, a naval establishment that guarded Victoria and the Pacific coast right up to the Second World War. The large national parks in the western provinces, including the contiguous block of four parks in the Rocky Mountains (Banff, Jasper, Yoho, and Kootenay), contain many small historic sites related to early railway exploration, mining (Fig. 2), and logging. These parks were established early in the history of Canada as a nation, before there was much settlement, and so the archaeological emphasis in these extensive parks has been on the precontact period. There are fewer and smaller national parks in Eastern Canada, and most of these were established long after the areas had been settled, so they include the remains of established farms and industrial activities within the modern park boundaries. In Eastern Canada, the archaeological emphasis has been on historical projects. In the new parks in Northern Canada, established within the treaty process, the boundary between historical and precontact archaeology is blurred indeed, and archaeologists work with the Indigenous community to record archaeological and traditional use sites.

Like any federal department, Parks Canada has lived through periods of expansion and generous funding and periods of restraint and challenge. Parks Canada has been housed in a number of ministries, including Indian and Northern Affairs, Canadian Heritage, and Environment. Currently, it is housed in Environment and Climate Change Canada and has a strong mandate for fostering Indigenous relationships. The larger mandate of the ministry has some impact on the nature and scale of the archaeological projects that Parks Canada is able to implement. Parks, however, has always had a strong sense of its core values, rooted in the physical reality of the parks it is entrusted with. The department is referred to as "Parks Canada" throughout this review, although the formal name of the agency has changed over time.

First Phase: Applied Archaeology on Big Reconstruction Projects

There have been three main phases in the practice of historical archaeology within Parks Canada. First, a dedicated unit was based in Ottawa to

Parks Canada: Historical Archaeology, Fig. 2 A cabin structure at the hard rock mine adits at the tree line on Protection Mountain, high above Lake Louise in Banff NP. The mines are from the early 1880s (Parks Canada, G. Langemann, 124R-26E)

practice applied research, to be the handmaid of historians in the reconstruction and furnishing of historic sites where the public could experience living history. Second, a much expanded archaeological staff and conservation laboratory capability was spread across the country in regional offices, practicing historic and precontact archaeology and providing CRM and interpretive advice as needed. A dedicated historical material culture research unit was maintained in Ottawa, but they did little fieldwork. Third, the archaeological staff has recently been reduced to a largely review and advisory presence in the regional offices, and the current plan is to centralize all of the lab and collections facilities.

At the beginning of the formal archaeological program in Parks Canada, historical archaeology was quite deliberately separated from precontact period archaeology. Organizationally, archaeology has always been housed in the National Historic Sites Directorate within Parks Canada, rather than in the National Parks Directorate. Practically, this separation became less meaningful over time, particularly when site inventories in the large western and northern national parks recorded thousands of archaeological sites representing a 13,000-year span of time. In 1961, however, Parks Canada felt that the expertise needed for precontact archaeology could be found in the university departments, and much of the early survey work in the large national parks of the west and the Rocky Mountains was in fact done by academic archaeologists (Langemann 2011). An expertise in historical archaeology was not so readily available in Canada, and so a dedicated unit was formed within Parks Canada, with a mission-oriented focus (Swannack 1975; Rick 1970).

The HSMBC was formed in 1919. The early historic site commemorations were chosen by the Board to promote moral values of patriotism and duty and to mark the birth of a nation; they focused on themes of French and English settlement, the loyalist defense of Upper Canada from American invasion, discovery and exploration, and the advancement of science. In Western Canada, fur trade posts and Treaty signing sites were chosen, because they fit the exploration theme and marked the expansion of the geopolitical boundaries of Canada. The HSMBC concerned itself with identifying geographical locations and marking them with formal cairns and plaques but did not investigate them further. An interest in developing the historic sites for heritage interpretation emerged in the 1950s (Taylor 1990; Klimko 1998). This was the result of several factors, including a growing sense of national pride and identity, a booming post-war economy, and the recommendations of the Massey Commission in 1951 about federal measures that could promote a unifying sense of Canadian culture. At the same time, there was an emerging sense that the regional interests needed to be better represented and a vocal interest in preserving examples of regional architectural heritage. The practical implementation of this greater federal emphasis on interpretation and architectural preservation fell to the HSMBC and to the Parks Branch that was charged with implementing the recommendations of the HSMBC. J. D. Herbert became Head of Research in the National Parks and Historic Sites Division in 1959, and he came from a background of archaeological work at fur trade sites in Saskatchewan and at Rocky Mountain House in Alberta. Herbert promoted the concept of living museums, where posts were reconstructed exactly as they were at a given point in time. To achieve this goal, archaeology was needed to fill in the gaps of a history that never could provide those small, telling details.

Historical archaeology at Parks Canada began in 1961, when Herbert created a staff archaeologist position in the National Historic Sites Service, filled by John Rick. Rick then built up an archaeological staff in Ottawa to fill the need for the applied research behind an ambitious program of restoration and interpretive project in an expanding NHS system. A separate Fortress of Louisbourg restoration section was also created to support the monumental reconstruction of the eighteenth-century fortified townsite and port as it would have been in the 1740s (Fry 1984). From its origin in 1713, Louisbourg served as an important fishing port for the French. The townsite and harbor were fortified at enormous expense and guarded the entrance to the St. Lawrence River and the colonies of New France. The Fortress of

Louisbourg changed hands several times in the eighteenth-century battles between French and English, before its capture and demolition by the English in 1758. Louisbourg remains the most extensive reconstruction project that Parks ever undertook, and Louisbourg is still the only NHS with its own archaeological lab and collections facility.

Canada's centennial in 1967 was a time of optimism and economic growth. This was a time of big projects that lasted for years, in both federal and provincial heritage programs. The visual impact of a big historic reconstruction allowed the visitor to feel a strong emotional connection to the tangible past. Many of the sites were chosen for development not necessarily because they were the most historically significant sites but taking into account the advice of regional heritage groups and the needs of local politics. The excavation and restoration projects of the 1960s and 1970s were at NHS across the country, chosen to reinforce national identity, create employment in the regions, and support a historical narrative of social and economic progress (Klimko 1998). For example, Castle Hill, the Halifax Citadel, Fort Beausejour, and Fort Lennox spoke to the battles of the colonial period between the French and English. Les Forges du Saint-Maurice spoke to early industrial history and Fort Wellington to the War of 1812. Lower Fort Garry, Rocky Mountain House, and Fort Langley (Fig. 3) spoke to the expansion of the fur trade into Western Canada. The Nuu-chah-nulth village of Yuquot on Vancouver Island spoke to the first contacts between Captain Cook and a thriving First Nation in the late 1700s. The excavations at L'Anse aux Meadows on the northern tip of the island of Newfoundland confirmed the presence of a gateway Viking settlement dating to 1000 AD (Wallace 2006).

These big restoration projects firmly established the requirement for archaeology as part of any NHS development team. Archaeologists were needed for the excavations but also to work directly with engineers and architects and to catalogue and analyze the vast piles of artefacts that resulted. A full-time archaeology team meant that thoughtful reports could be written, and the time could be taken to develop an expertise in historic sources and material culture relevant to each site.

The team of historic archaeologists rapidly developed research skills and material cultural expertise that were not found elsewhere in the country. An authentic reconstruction demanded a detailed level of knowledge; these were not meant to be generic sites but sites that were furnished and interpreted in as accurate and authentic a manner as possible for a chosen time period, based on the specific archaeological evidence. As excavations proceeded, a reference collection of artefacts for material culture research was established in Ottawa, and identification manuals were published that became standards in the field. Specialist researchers published on items as diverse as glass trade beads (Karklins 1985), trade goods used as ornamentation by Indigenous people (Karklins 1992), shoes, china, lighting devices, gun parts, military headgear, and glass (Jones and Sullivan 1989). Archaeological research also provided an understanding of the buildings themselves, both the construction techniques used, and the evolution of domestic and military structures over time. Even though managers in Ottawa saw the historical archaeology as mission-oriented applied research, the archaeologists managed to undertake problem-oriented work as well. This was the time of the new processual archaeology; archaeologists were trying to answer questions about the dynamics of social relationships within the barracks, as well as discovering the architectural details and recovering enough artefacts for the interpretive displays.

Second Phase, Regional Offices and Cultural Resource Management

By the early 1980s, responding to the wide regional scale of work, specialist archaeological, curatorial, and conservation staff were stationed not only in the national capital at Ottawa and Gatineau but also in the four regional service centers and at the Fortress of Louisbourg NHS. The service center offices housed a variety of professional and technical staff that served the national parks and national historic sites in

Parks Canada: Historical Archaeology, Fig. 3 Fort Langley NHS. All buildings are reconstructions except for the white structure on the left which is the only original building at the site (a storehouse from the 1840s). Archaeological excavation was done at each location before rebuilding. (Parks Canada, J. Porter, 2 T-234E)

Western and Northern Canada (out of offices in Vancouver, Victoria, Calgary, and Winnipeg), in Ontario (out of Cornwall), in Québec (out of Québec City), and the Atlantic provinces (out of Halifax).

However, the 1980s was a time of economic contraction, and the era of big reconstruction projects was ending. Instead, Parks Canada responded to the same growing public interest in matters of heritage conservation that had led to new provincial legislation across the country, beginning with the *Alberta Heritage Act* in 1970, and to a corresponding increase in CRM consulting archaeologists needed to address the legislative requirements. In Parks Canada too, archaeologists were responsible for carrying out an expanded range of archaeological heritage resource management needs. They did primary survey, impact assessment and CRM work, research excavations, and public presentation, for both precontact and historic sites. The regional offices were the repositories for artefacts and records, and artefact reference collections were established from work in the local parks, including precontact artefacts and lithic type collections. These were used by academic and consulting archaeologists.

Since the days of the large historic restoration projects, NHS commemoration has changed in emphasis from reconstructing buildings as the centerpiece of a relict landscape, frozen at one point in historic time, to valuing structures and artefacts for their witness to the evolution of a cultural landscape over time. This changed along with the recognition that archaeological and historical data and interpretations are not inherently value-free and neutral and that there must be room in a site presentation and interpretation for multiple points of view.

In 1992, Parks Canada formalized an innovative CRM Policy. Recognizing that there were phases of evolution over time represented at a national historic site, the CRM Policy asked historians and archaeologists to determine whether the resources (artefacts, structures, features, elements of the natural setting of the site) were directly related to the reason the site was commemorated as being of national significance, in which case they were assigned a Level 1 value. Resources not directly related were Level 2; these were still of archaeological or historic value and may even be of high regional or local value, but if push came to shove, they received less attention than the Level 1 resources. A team of park operational managers, archaeologists, historians, and architectural specialists came together to consider all the resources at a NHS thoughtfully, to determine their value and to write a Commemorative Integrity Statement spelling out the factors that defined the heritage character of each NHS and the actions needed to preserve and to promote

them. The CIS provided direction for archaeological research and for management actions.

If the story of designation, development, and management of any particular NHS is considered over time, it will have responded to changing views about what is appropriate. For example, Fort Walsh NHS in the Cypress Hills of southwest Saskatchewan was designated for its importance as the North-West Mounted Police headquarters in the 1870s and the role it played in bringing the rule of law to the west. But there are also structures and archaeological remains present at the site relating to precontact use, to the American whisky traders that the Mounties suppressed, to a massacre of Indigenous people by some of these traders, to the encampment of Sitting Bull and the Lakota who sought refuge in Canada in 1876 after the Little Bighorn, and to later ranching in the area after the Mounties left. If the parks policy of earlier days had been followed to the letter, the structures from all these secondary themes would have been at best ignored, and at worst destroyed, and only the NWMP fort preserved. Today, archaeologists have investigated all these other themes, and their interpretation is an integral part of telling the complete Fort Walsh NHS story. Recent archaeological work has used ground-penetrating radar to survey palisade lines at the whisky trading post and features at the NWMP cemetery. Sometimes it is a good thing that Parks Canada is chronically short of the funds and staff needed to fully implement their policy.

New Park Establishment and Baseline Inventory

Parks Canada has a systems plan to guide the establishment of new national parks, with the goal of ensuring that all ecological regions in the country will eventually be represented by a protected area. As new national parks are added to the national parks system, funds are made available for an inventory of the archaeological sites, in the same way that baseline inventories are made of the natural resources. Historic and precontact sites are dealt with together in such work. For example, in the 1990s, surveys in Grasslands NP in southern Saskatchewan recorded hundreds of stone tipi circles and bison drive lane features but also historic ranching settlement features such as barns dug into the creek banks. Gwaii Haanas National Park Reserve is jointly managed with the Haida Nation. New park establishment surveys identified a wide range of sites, from cave sites from the early postglacial period to village midden sites along the intricate coastline. The protected area at Gwaii Haanas includes a marine component, and the historic sites inventory includes many shipwreck sites. Efforts have also been made to identify early archaeological sites that were submerged by rising postglacial sea levels.

National historic sites are also brought into the Parks Canada system according to a plan and on the recommendation of the HSMBC. In the early years of the national historic sites program, most sites were considered individually or opportunistically. Later, the HSMBC considered thematic groups of commemorations, based on comprehensive historical research papers, and sites were brought into the system to represent themes such as the prairie settlement patterns of different ethnic communities, industrial and mining sites, or significant precontact period archaeological sites such as Head-Smashed-In Buffalo Jump in Southern Alberta. Over the last 20 years, there has been an emphasis on bringing in sites that speak to Indigenous history and values, the experience of different ethno-cultural communities, and women's history. Nominations for these sites come out of a program of community consultations and workshops.

Where the newly designated sites are owned and operated by Parks Canada as a national historic site, a baseline archaeological inventory is made, and archaeological excavation is done as needed during the process of building restoration and construction of interpretive facilities for the public. For example, the Bar U Ranch NHS in the Southern Alberta foothills came into the system in the early 1990s. A complex of wooden structures on sandstone footings all needed to be lifted before restoration could take place. Archaeology was done at each structure, by Parks Canada archaeologists (Fig. 4), and as part of a university

Parks Canada: Historical Archaeology, Fig. 4 The 2008 excavation in the collapsed root cellar of the Bar U Ranch NHS, before it was reconstructed. (Parks Canada, uncatalogued photo, W. Perry)

archaeological field school. Some of this work was explicitly a public archaeology program, and the excavations were built into the daily program of school tours and public interpretation offered by the Bar U Ranch staff.

At the Bar U Ranch NHS, precontact sites were also found and excavated. It is often the case that historic structures are built on top of precontact sites; many of the same features that made a location desirable for Indigenous use made it attractive to settlers. In the early days of the historical archaeology program, the historic structures alone were the focus of the excavations. For example, the 1970s excavations of the late eighteenth century and early nineteenth-century fur trade forts at Rocky Mountain House NHS went down to the base of the wooden palisade walls and cellar features and no further. Recent pipeline impact assessment work at Rocky Mountain House NHS has discovered 5000-year-old precontact period sites, more deeply buried than the base of the historic features. Today, an archaeologist working at a historic site would make sure that the ground was tested to the base of the postglacial soil deposits, so that any earlier phases of use of the area were found. The whole story of human use of an area over time is important; we cannot assume we know everything about a site just because there has been historic archaeological work done in the past.

Cultural landscapes are an important part of archaeological interpretation today. Structures and artefacts are important on their own but also as part of a pattern of landscape use. The distribution of sites over the landscape and how those patterns have changed over time, the ways in which human use has altered the physical landscape, or the plant and animal resources present have created cultural landscapes. The elements that define the heritage character of a national historic site often include such things as archaeological features that bear witness to the evolution of a site over time or to less tangible things such as the viewscapes and surrounding vegetation. Some NHS have been commemorated entirely based on their cultural and spiritual significance to an Aboriginal community. For example, the Sahoyue-Edacho or Scented Grass Hills and Grizzly Bear Mountain NHS on Great Bear Lake in the Northwest Territories is commemorated as an associative cultural landscape. Here, landscape features embody the history of the Sahtugotine Dene people as a mnemonic device; each time someone travels the trails and recites the stories that are linked to particular landscape features, the culture history is reinforced and transmitted. The land is alive with stories that blend

the natural and spiritual worlds. How does the work of an archaeologist help with this kind of a historic site? It can record the physical traces left by people using the trail over the millennia, at the established campsites along the way, but there is little that the usual archaeological practice can do to identify the intangible associative values. Archaeologists must use their anthropological skills here, the skills of listening to community members, of being out on the land in their company, of transcribing oral history, and of linking human actions to traces and features on the landscape. These skills are applicable to both historical and precontact archaeology and to working with modern communities whether Indigenous communities that preserve a traditional ecological knowledge or the descendants of settlers who brought their own traditions to a new world.

Rouge National Urban Park is currently being established in the Rouge River watershed within the greater Toronto area, providing a national park experience for Canada's largest metropolitan area. Within the park boundaries, there are working farms as well as a rare example of the Carolinian forest in what is otherwise a heavily industrialized and settled area. Previous archaeological work here has been done under provincial regulation, and a variety of precontact period and historic sites have been recorded. Here, there has not so far been funding for a new park-wide survey, but the provincial site registry is being consulted and the existing information entered into the parks system. Parks Canada archaeologists are currently doing an impact assessment for the parks Welcome Centre, which is being built at the former site of a mid-nineteenth-century post office in the small settlement of Mongolia.

The new park establishment program has funded some excellent and extensive archaeological inventory and research excavation projects. One consequence of that, because there is only so much money, is that field and research work in the already established parks and sites can be neglected. Park managers may consider that the archaeology has been "done" at the established sites, that the history is well understood, and that there is no need for further work. Research marches on, however, and our understanding evolves. Historians find new documents that show our previous understanding of a historic site to be incomplete or mistaken, and the discipline of history develops new approaches and insights, as does archaeology. History is not something you do once and then it's done. Neither is the historic archaeology that works hand in hand with historic research. For example, the extensive archaeology backing the restoration project in the 1970s at Ft. Beauséjour, in New Brunswick on the Bay of Fundy, was geared to understanding its development as a French fort in the colonial wars, up to 1758. The fort was rebuilt and renamed as Fort Cumberland by the British and played a role repelling American troops in 1776, but there has been little research on the features related to that period or to the evolution of the whole site over time. At Fort Gaspareaux in New Brunswick, which has not been reconstructed and is purely an archaeological site, it was recently discovered that management actions have been based on a misreading of the document plans of the site. It had always been assumed there were no resources left on the east side of the fort, but shore erosion has exposed archaeological remains, and it is now clear that the management approach has unwittingly left the archaeological resources exposed and uninvestigated.

Visitor Experience, Public Education, Site Salvage, and Ecological Restoration

Historical archaeology projects emphasize visitor experience and public education, as well as research. An excavation under the Dufferin Terrace, in the heart of the World Heritage district near the Québec Citadel, exposed the Saint-Louis Forts and Châteaux, the seat of the colonial governors between 1620 and 1834. This was a highly visible excavation, in progress during the 400th anniversary celebration of the founding of Québec City in 2008, and visitors came in their thousands. Today visitors walk through the stabilized foundations in a crypt exhibit below the restored boardwalk of the Dufferin Terrace. Public archaeology projects have run for several years at the Acadian farmsteads of Beaubassin, at Louisbourg, and at the fur trade forts of Rocky Mountain House.

Sometimes it is impossible for visitors to come to a site. A 3D laser scan of the entire site of Fort Conger NHS, at the northern tip of Ellesmere Island in Quttinirpaaq NP, provided a detailed virtual rendering, so the public can experience an otherwise inaccessible site. The scan also provided a baseline recording for scientific and management purposes and provided an opportunity for the University of Calgary archaeologists to refine the laser scan technology (Fig. 5). This site has intermingled remains of multiple occupations from British and American exploration parties in the heroic age of north polar exploration in the late nineteenth century, as well as twentieth-century Canadian, British, and Danish expeditions. The structures include huts built by Admiral Peary's party in 1900, to a design influenced by the northwest Greenland Inughuit members of the party. Construction of the huts used remnants of a station originally constructed by Lieutenant Adolphus Greely in 1881 to house the Lady Franklin Bay Expedition, making scientific observations for the First International Polar Year of 1882–1883.

Work at historic sites is often salvage in nature, responding to threats of erosion from changes in sea level on subsiding coastlines (e.g., at the Fortress of Louisbourg) or from melting permafrost and riverbank erosion (York Factory and Prince of Wales Fort on Hudson Bay). In a country with as much coastline as Canada, shoreline erosion is a major problem. York Factory was used by the Hudson's Bay Company as the principal northern fur trade depot between 1684 and 1957, the shipping gateway to all of Rupert's Land at the mouth of the Hayes and Nelson Rivers on Hudson Bay, in Northern Manitoba. There have been many successive phases of building here, including an early stone and brick fortification, but this construction method did not last well in the permafrost, and later structures were wood. Regular monitoring shows that the Hayes riverbank is receding at 0.5 m a year, with localized recessions that are much deeper. This is having a severe impact on archaeological structures and features, and recent archaeology programs have focused on the complex of drainage features between the still-standing main wooden depot structure and the shoreline, in the area most immediately threatened. Drainage and erosion have always been an issue at York Factory, and the same natural processes that the original inhabitants had to deal with are now threatening the survival of the site. This is accelerated by warming and melting permafrost, and the park is evaluating measures such as installing insulation below the historic

Parks Canada: Historical Archaeology, Fig. 5 Still from the 3D laser survey of Fort Conger NHS, showing the remains of the 1881 station built by Greely to house the Lady Franklin Bay Expedition on Ellesmere Island, Quttinirpaaq National Park. (Photo courtesy of M. Bertulli (Parks Canada); P. Dawson and R. Levy (University of Calgary), and C. Tucker (Point Geomatics Ltd.)

structures to preserve the ice floor. Ultimately, however, this and many other sites along the Arctic shoreline are severely threatened, and a series of salvage excavations may be the only possible answer. But choosing which of the many threatened sites can be adequately salvaged is an unwelcome and difficult exercise.

The nearby Prince of Wales Fort NHS at Churchill, on the shore of Hudson Bay, is a star-shaped stone fort built on the tundra by the Hudson's Bay Company between 1731 and 1771, a time of conflict between France and England. The masonry walls are 4 m thick and still support a battery of cannons. The integrity of the masonry is severely threatened by freeze-thaw cycles, melting permafrost, and water infiltration. Archaeological excavations have taken place to aid in understanding the original construction, as an impact assessment before modern drainage measures were installed, and to inform a multi-year maintenance program, as well as to provide an understanding of the material culture and human life at the fort.

A recent example of historic archaeology responding to coastal erosion is the salvage in 2016 by Parks Canada archaeologists of graves that were eroding into the St Lawrence River, on the Cap-des-Rosiers, in Forillon NP. The graves are presumed to be those of Irish immigrants travelling on the *Carricks*, shipwrecked off the Gaspė coast in 1847, and physical anthropological work by the University of Montreal supports this interpretation. The tragic incident has a vivid place in the oral history of the Gaspė inhabitants. The archaeological work was linked to an ecological restoration project, designed to protect the beach at Cap-des-Rosiers.

Precontact archaeological research has contributed to the ecological restoration goals of the national parks. For example, zooarchaeological research in Banff and Waterton Lakes NPs has contributed to our understanding of the distribution and population structure of bison in the past, as park managers restore bison to the landscape (Langemann 2004). For an extirpated species, analysis of the remains of bison in dated archaeological contexts provides one avenue to understanding their past distribution, diet, population structure, and the way in which humans have used them over time (Fig. 6). Excavation of a garbage disposal pit at Jasper House NHS, a fur trade post that supplied the Columbia district, uncovered a large sample of butchered mountain sheep bones, including dozens of mandibles. Not only could these speak to the diet of the fur traders but they also have zoological value. They provide a sample of a single population from a narrow moment in

Parks Canada: Historical Archaeology, Fig. 6 The damage done by a spring flood at Pekisko Creek in the middle of the Bar U Ranch NHS. In 2 days, the high water carved a new bend 100 m back from the previous channel edge, exposing a bison kill and processing site in the north pasture. (Parks Canada, B. Himour, 1670R-593E)

time before the wildlife in the Athabasca River valley were extensively disturbed by settlement. Samples of elk bone from both precontact and historic archaeological contexts in Alberta were used in a mtDNA genetic diversity study, designed to aid modern wildlife managers by establishing the distribution of elk subspecies in the past (Speller et al. 2014).

Historical archaeological sites can also play a role in understanding landscape change. Between 2013 and 2016, an archaeological survey of logging features in La Mauricie NP, between Montreal and Québec City, took place as part of a project to restore lake levels and enhance fish habitat. The nineteenth and early twentieth-century logging industry had changed the landscape not only by the extensive logging but also through building a system of dams, weirs, and bridges on the lakes. Here, the question for park managers is one of balancing the interests of restoring a natural ecological system, with preserving the remains of the cultural landscape. Some disturbance to the cultural features will be needed to restore a natural water flow, but it will be minimized, and interpretive trails are planned to showcase the logging features (Fig. 7).

Third Phase, Archaeologists as Regulators

In 2012, Parks Canada began a significant reorganization and downsizing. Regional offices were eliminated as an independent administrative level, although a reduced staff presence is maintained in the regional cities. There were draconian cuts to archaeological staff and facilities, and the cultural services function was centralized in Ottawa. Service centers in the regional offices used to have their own budget envelope to support archaeological work. With this budget gone, most fieldwork has to be fully supported by the individual parks and sites, and the parks of course are juggling many other operational and research priorities. The labs in Vancouver and Victoria were closed, and only two senior archaeologists were left in each of the remaining regions. Conservators and historians remain in the offices outside of Ottawa, but the long-term plan is to centralize all of the repository collections as well as the conservation labs in Ottawa and Gatineau. The closure of regional artefact storage facilities is facing considerable opposition in Dartmouth, where a state-of-the-art conservation lab and storage facility was only opened in 2009. Protests against its

Parks Canada: Historical Archaeology, Fig. 7 Removing a wood sample for dendrochronological dating, from a 19th C dam at the outlet of Lac Dauphinais, La Mauricie NP. (Parks Canada, 1052G, M. Bernier)

closure are coming from professional archaeologists in Atlantic Canada, Indigenous and Acadian groups, and the local Member of Parliament; they protest the waste of closing such a new facility, the loss of artefacts from the territory where they were found, and the difficulties of travelling so far away to access them for study. Concerns about fiduciary responsibility for artefacts in treaty situations have in the past prompted Parks Canada to come to agreements with local repositories; for example, artefacts from excavations in Gwaii Haanas are stored at the Haida Heritage Centre in Skidegate, K̲ay Llnagaay, rather than in Winnipeg with the rest of the artefacts from the west. It may be that similar pressures ensure that some regional artefact collections are maintained closer to where they were found.

This reorganization had a significant effect on the nature of archaeological work undertaken by Parks Canada. Archaeologists currently undertake much less in the way of primary research or field survey and spend much more of their time in a regulatory job. Any large-scale fieldwork is undertaken by archaeological contractors now, and Parks Canada staff are developing processes to administer and review the work of contractors in a manner analogous to the long-established provincial and territorial archaeological regulatory bodies.

Since 2015, the federal government has funded an intensive and wide-scale program of much-needed infrastructure works in the parks system. This has funded repair work at large masonry structures such as the fortifications of Québec, at the masonry and lock structures on the canals of the Trent Severn and Rideau waterways, and at concrete structures such as the military barracks at Fort Rodd Hill NHS. Infrastructure funding is twinning major highways, developing a 270-km-long bicycle trail beside the Icefields Parkway in Banff and Jasper NPs and a bicycle trail along the coast of Pacific Rim NPR. These travel through areas of high site concentration. Infrastructure development on this scale has not been seen since the heady days of historic site reconstruction in the 1960s and 1970s. However, the management response then was to build up a team of archaeologists and historians. Today, it has been a challenge for a much-reduced staff to meaningfully participate in the environmental impact assessment work necessary to respond to massive infrastructure developments in a short time frame. For example, in the western mountain parks, the Trans-Canada highway follows the route of linear sites such as the Kicking Horse Pass NHS in Banff NP and Yoho NP and Rogers Pass NHS in Glacier NP. In both of these cases, from one end of the NHS to the other, the extensive road work is disturbing historical archaeological remains and a cultural landscape related to construction of the Canadian Pacific Railway in the 1880s (Fig. 8). How does a historic archaeologist prioritize the salvage and recording of massive industrial scale features and artefacts, in a constrained mountain pass landscape, where the working season is only a few months long? Archaeological excavation prior to the infrastructure work was not possible. The response has involved coordinating a number of simultaneous contract archaeology projects, developing a site monitoring and accidental finds collection protocol with resource conservation staff from the national park who are continually on the ground, and recording the extant cultural landscape through videos and architectural drawings, with the help of Public Works architectural expertise, before construction alters it.

On the other hand, infrastructure work has sometimes allowed archaeologists to make new discoveries. In 2014 and 2015, a repair of the masonry escarpe walls at the Fortifications of Québec NHS meant that large stretches of the defensive walls were fully exposed (Fig. 9). This presented an opportunity for archaeologists to record in detail the evolution of the wall structures over time, in a sort of dirtless vertical archaeology. The original components of the wall could be linked to documentary evidence and the work of known eighteenth-century military engineers. New discoveries were also made. At the casemate of the Glacière of the Québec citadel, originally built in 1749, stages in the evolution of the structure could be tied to functional changes over time in the defensive features and the barracks. A series of stone survey markers had been built into the wall, and many of these were a style that had not previously been documented. An excavation this extensive for purely research purposes would not have been possible.

Parks Canada: Historical Archaeology, Fig. 8 Foundations of Glacier House, 1886–1925, at the summit of Rogers Pass NHS, within Glacier NP, British Columbia. Glacier House was a Canadian Pacific Railway hotel built at the foot of the Illecillewaet Glacier, to provide facilities for tourists and alpinists in what was at the time considered to be a wilderness. Excavations here uncovered vast quantities of the material culture associated with the transcontinental CPR operation. (Parks Canada, J. Porter, 22 T-11E)

Parks Canada: Historical Archaeology, Fig. 9 A portion of the massive fortifications at the citadel of Québec, exposed during infrastructure repairs in 2016. (Parks Canada, 31G, P. Cloutier)

Similarly, at the Carleton Martello Tower NHS overlooking the harbor in Saint John, New Brunswick, no archaeological work had ever been done before an infrastructure project to stabilize the tower masonry. The stone tower was built during the war of 1812 and went through cycles of military use and abandonment right up through the Second World War. A staging area for the construction project was needed, and in order to clear this and mitigate the impact of any damage from the construction to buried resources, a contract excavation took place at the site of the

adjacent 1826 Signalman's House. This produced structural evidence, as well as an abundance of domestic artefacts illustrating the mid-nineteenth-century occupation.

The distinction between historical and precontact period archaeology is not always clear or even a useful distinction to make. In 2017, a project in the Gulf Islands National Park Reserve, an archipelago on the Pacific coast between Vancouver Island and the mainland, has focused on investigating and restoring a series of clam gardens in the face of a rising sea level. These are Indigenous stone wall features built in the intertidal zone, designed to enhance and enlarge habitat suitable for edible clams by trapping sediment behind them, protecting the beach from being scoured by tides, and creating gently sloping beach sediments on rocky shores where there was no suitable habitat before (Fig. 10). Dates from the barnacle scars on the rocks show the rock walls can date from 2000 years ago, some of them continuously maintained up to historic times (Neudorf et al. 2017). These features have only recently been recognized by coastal archaeologists, but once people started looking for them, they are finding them in many places. The Gulf Islands NPR project is a partnership between Parks Canada archaeologists, parks ecological staff, the Hul'qumi'num and W̱sáneć First Nations, and archaeologists from the Hakai research institute. It is an opportunity for park staff and Indigenous people to learn from each other, for elders to teach youth, and for ecological restoration. Is this historical archaeology? Not in the usual sense, which in Canada has meant the archaeology of the colonial settlers, but it is in the sense that it is the archaeology of the community currently living in the area and their deep history. In this case, as in any other historical archaeology project, archaeological methods provide a way for the current community to learn something about their past ways of life and for the traditional knowledge of the current community to elucidate the meaning of the archaeological remains and features.

Marine Archaeology

Parks Canada has an internationally renowned underwater archaeology unit. Since 1965, marine archaeologists have undertaken a wide range of inventory, CRM, and research projects. Their primary focus is on historic wrecks, but they have also recorded 5000-year-old submerged Indigenous fishing weirs at Atherley Narrows in Mnjikaning Fish Weirs NHS and submerged townsite features in the Lake Minnewanka reservoir in Banff NP. The most extensive excavation began in 1978 at the sixteenth-century Basque whaling settlement at Red Bay NHS, on the

Parks Canada: Historical Archaeology, Fig. 10 Rock wall forming an intertidal clam garden feature, Gulf Islands. (Parks Canada, W. Perry)

south coast of Labrador. After the investigation of four whaling galleons and four smaller whaling craft, the ships were reburied in situ (Grenier et al. 2007). Land excavations at the Red Bay settlement were done by Memorial University. In recent years, the challenging but successful search in high Arctic waters for the *Erebus* and *Terror*, the lost ships of the Franklin expedition, has preoccupied the marine archaeology team and fascinated the nation (Geiger and Mitchell 2015). In the process, they also discovered McClure's *Investigator*, abandoned in 1853 during the search for Franklin. Parks marine archaeologists used their considerable research and technical skills and the ever more powerful abilities of remote sensing technology, but the project succeeded because of the contributions of land archaeologists from the Northwest Territories, Inuit who brought their local knowledge, and a partnership with the Royal Canadian Geographical Society and the Canadian Navy. Beginning in 2017, Inuit guardians will be camping near the site of the *Erebus* during the season it is accessible, to keep an eye on the site and to provide interpretation to visitors. This is analogous to the established Haida watchman program, where members of the Haida nation camp at the isolated Ninstints NHS in Gwaii Haanas NPR for the same purposes. Both are isolated sites, and the cultural knowledge of the watchmen adds a vital dimension to the experience of a visitor. In a way, this is a return to the "living history" site concept that was promoted at the very beginning of the Parks Canada archaeology program.

Future Directions for Historical Archaeology

Parks Canada archaeologists are still refining their role as a regulatory body. The federal infrastructure funding will continue for a few years, necessitating a high number of archaeological projects as part of the environmental impact assessment and mitigation process. The procedures for permitting, supervising, and reviewing the work of contracting archaeologists, and integrating the results into the Parks Canada site and collections databases, have been worked out on the fly during this extremely busy time. Contractors are used to following the regulations of the various provinces and territories, which differ in some important regard from the processes used by Parks Canada archaeologists. Although the sheer volume of work will diminish as the infrastructure program winds up, there are so few Parks Canada staff archaeologists that contracting archaeologists, or academic partners, will still be needed to carry out any substantial archaeological field project. Some of these partnerships have been extremely fruitful. In the past, however, some academic researchers have been reluctant to comply with Parks Canada permitting and reporting processes, and oversight would be required with any research partner.

In the longer term, Parks Canada archaeologists will continue to carry out smaller-scale field projects, provide advice to the operational managers and interpreters at the individual parks and sites, and participate in environmental assessment reviews. They will continue to provide advice and research as needed for the work of the HSMBC: contributing to background papers and community consultations for new site nominations and contributing to preparation of the Commemorative Integrity Statements that guide the management and interpretation. They will continue to participate in the site inventory needed for new park and site establishment.

Parks Canada archaeologists will be working with Indigenous communities. A collaborative relationship is well established in the new northern parks that came into the system as part of the modern treaty process and the park reserves on the Pacific coast, established in a province where treaties have not yet been signed. In these cases, park management is often explicitly a co-management or consensus process, and archaeologists do their fieldwork along with Indigenous colleagues from the park staff or knowledgeable community members. In Gwaii Haanas NPR, where the park has been cooperatively managed right from its inception, the information that archaeology can contribute is seen by the Haida as making important parts of their culture and history visible to the Haida and their youth and to the world. In 2013, a new totem

pole was raised at Windy Bay in Gwaii Haanas NPR, to honor the agreement between the Haida and Parks Canada and to tell the story of the park. Jaalen Edenshaw, Tyler York, and Gwaii Edenshaw carved the Legacy Pole, the first to be erected here in 130 years, and included figures in the pole design explicitly recognizing archaeological findings and an archaeologist.

In the southern parks and sites, this level of collaboration is not yet well established, but it is a goal. For example, research and management issues in the new Rouge National Urban Park are considered by an Indigenous advisory circle, with representatives from ten First Nations with interests in the park area. Members from these communities monitor and review archaeological projects, whether they concern historical or precontact archaeology, and may choose to participate more fully in the actual fieldwork. The Rocky Mountain national parks, parks that were established long ago in areas where there already were treaties, have less formally structured relationships with the surrounding communities. Relationships are well established for some management and resource access purposes, but the communities may not always consider archaeological matters as the most important aspect of their relationship with the park. However, it is becoming increasingly common to alert the First Nations of pending projects and provide the opportunity for comment or participation, in the same way that consulting archaeologists are required to do in many provinces and territories.

Another kind of archaeological research that is becoming important is developing formal monitoring protocols and techniques at threatened sites. Whether sites have historic or precontact structures and features, they are being damaged by erosion, weather, and neglect. Archaeologists are beginning to work with park operational staff to define monitoring procedures that non-archaeological staff can use. This involves such new and noninvasive technology as drone overflights, side-scan sonar, or digitally stitching together photographs to produce a 3D version of an eroding riverbank. Staff have developed expertise in using noninvasive geophysical survey methods such as ground-penetrating radar, so that an area can be surveyed without actually digging and disturbing the resources and any excavation work can be most efficiently targeted. A still expensive technique is a complete 3D laser scan of the structures at a site, which produces a highly detailed volumetric record of the entire site, but this will surely come down in price as technology develops.

The public dissemination of research results continues to be a challenge. Archaeologists produce excellent and detailed reports on their work, but as is the case with many government documents, it is gray literature. Formal publication in Canada of a government document requires translation and publication in both French and English. In the early days, Parks Canada published a series of monographs for external use on the architectural history and built heritage of the NHS reconstruction projects, called Studies in Archaeology, Architecture, and History. This included monographs on a particular material culture, such as a classification of historic trade beads that remains a standard reference (Karklins 1985). Many research reports were internally published in a Manuscript Report Series, in the language of their author, which later became the Microfiche Report Series. Short project summaries were externally published in the Research Bulletin series. Both of these series were discontinued in the early 1990s, and the dedicated editorial unit in Parks Canada disbanded. For several years in the mid-1990s, the Western Region published a Research Updates bulletin for external distribution. Libraries in the regional offices were disbanded in 2012, and external researchers now must work through the central Parks Canada library to obtain access. Archaeologists continue to publish their results in professional conferences and journals, but the majority of their research and project results are produced in internally distributed reports and remain in the gray literature.

Another opportunity to disseminate archaeological research is provided by staff training. Each year, archaeologists and historians participate in the seasonal interpretive staff training and prepare background resources so that interpreters base their programs consistently on the most up to date and accurate research. Winnipeg historians

have for a long time prepared an online resource package that includes archaeological and historical research papers, images, and key archival documents for each of the operating NHS in their region. Archaeologists present talks at the summer campground lecture series and participate in "antique road shows." For many years Banff NP has run a lecture series, to update the town on the full range of natural and cultural research projects taking place in Banff. These are great fun to be a part of, and the archaeologists always learn something too from the well-informed and well-travelled audiences.

What will surely continue into the future, what attracts archaeologists to work with Parks Canada, is the sense that no matter what the challenges and frustrations are, archaeologists know they are making a contribution to the understanding and preservation of significant archaeological sites and protected heritage areas. They are working as part of a team of colleagues from many disciplines, toward the same admirable long-term goals, spelled out in the mandate of Parks Canada: to protect and present nationally significant examples of Canada's natural and cultural heritage and foster public understanding, appreciation, and enjoyment in ways that ensure ecological and commemorative integrity of these place, for present and future generations.

Cross-References

- ▶ Canada: Cultural Heritage Management
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canada: World Heritage
- ▶ Indigenous Archaeologies: North American Perspective

References

Fry, B.W. 1984. *"An appearance of strength": The fortifications of Louisbourg*, (2 vols). Studies in archaeology, architecture, and history. Ottawa: Parks Canada.

Geiger, J., and A. Mitchell. 2015. *Franklin's lost ship: The historic discovery of HMS Erebus*. New York: HarperCollins Publishers.

Grenier, R., M.-A. Bernier, and W. Stevens, eds. 2007. *The underwater archaeology of Red Bay: Basque shipbuilding and whaling in the sixteenth century* (5 vols). Ottawa: Parks Canada.

Jones, O., and C. Sullivan. 1989. *The Parks Canada glass glossary, for the description of containers, tableware, flat glass, and closures*, Revised edition, Studies in archaeology, architecture and history. Ottawa: National Historic Parks and Sites, Canadian Parks Service, Environment Canada. Available online at https://sha.org/bottle/pdffiles/GlassGlossary.pdf.

Karklins, K. 1985. *Glass Beads: The Levin catalogue of mid-19th century beads, a sample book of Venetian beads, and guide to the description and classification of glass beads. Revised edition*, Studies in archaeology, architecture and history. Ottawa: National Historic Parks and Sites Branch, Parks Canada, Environment Canada. Available online at http://parkscanadahistory.com/series/saah/glassbeads.pdf.

Karklins, K. 1992. *Trade ornament usage among the Native Peoples of Canada: A source book*, Studies in Archaeology, Architecture and History. Ottawa: National Historic Sites, Canadian Parks Service, Environment Canada. Available online at https://sha.org/assets/documents/Trade%20Ornament%20usage%20Among%20the%20Native%20Peoples%20of%20Canada%20-%20A%20Source%20Book%20-%20English.pdf.

Klimko, O. 1998. Nationalism and the growth of fur trade archaeology in western Canada. In *Bringing back the past: Historical perspectives on Canadian archaeology*, Archaeological survey of Canada, mercury series, ed. P.J. Smith and D. Mitchell, vol. 158, 203–213. Hull: Canadian Museum of Civilization.

Langemann, E.G. 2004. Zooarchaeological research in support of a reintroduction of Bison to Banff National Park, Canada. In *The Future from the past: Archaeozoology in wildlife conservation and heritage management*, eds. Lauwerier R.C.G.M., and Plug I., 79–89. Proceedings of the 9th conference of the international council of archaeozoology, Durham, August 2002, Umberto Albarella, Keith Dobney and Peter Rowley-Conwy, Series Editors. Oxford: Oxbow Books.

Langemann, E.G. 2011. Archaeology in the Rocky Mountain national parks. In *A century of Parks Canada, 1911–2011*, ed. C.E. Campbell, 303–332. Calgary: University of Calgary Press. http://press.ucalgary.ca/books/9781552385265.

Neudorf, C.M., N. Smith, D. Lepofsky, G. Toniello, and O.B. Lian. 2017. Between a rock and a soft place: Using optical ages to date ancient clam gardens on the Pacific northwest. *PLoS One* 12 (2): e0171775. https://doi.org/10.1371/journal.pone.0171775.

Rick, J. 1970. Archaeological investigations of the National Historic Sites Service, 1962–1966. In *Canadian historic sites: Occasional papers in archaeology and history*, vol. 1, 10–42. Ottawa: National Historic Sites Service, National and Historic Parks Branch, Department of Indian Affairs and Northern Development.

Speller, C.F., B. Kooyman, A.T. Rodrigues, E.G. Langemann, R.M. Jobin, and D.Y. Yang. 2014. Assessing prehistoric genetic structure and diversity of North American elk (*Cervus elaphus*) populations in Alberta, Canada. *Canadian Journal of Zoology* 92: 285–298.

Swannack, J.D. 1975. Mission-oriented agencies: Means and ends of historic sites archaeology. *Historical Archaeology* 9: 81–82.

Taylor, C.J. 1990. *Negotiating the past; the making of Canada's national historic parks and sites*. Montreal/Kingston: McGill-Queen's University Press.

Wallace, B.G. 2006. *Westward Vikings: The saga of L'Anse aux Meadows*. St. John's: The Historic Sites Association of Newfoundland and Labrador.

Further Reading

Details of the individual national historic sites can be found through the Parks Canada web pages, including histories, photos, maps, and management plans. www.pc.gc.ca/en/lhn-nhs

http://parkscanadahistory.com/books/index.htm. A page linking you to publications about the history of different national parks and national historic sites.

http://www.canadianmysteries.ca/sites/franklin/archive/archiveTextDiaryIndex_en.htm contains a virtual archives of the search for Franklin and his ships, including video of the underwater archaeology side-scan sonar search in 2014.

Lothian, W.F. 1987. *A brief history of Canada's National Parks*. Ottawa: Minister of the Environment, Minister of Supply and Services.

Parks Canada Archaeology. Available and periodically updated at www.pc.gc.ca/en/culture/arch. Aussi disponible en français. www.pc.gc.ca/fr/culture/arch

Parthenon (Elgin) Marbles: Case Study

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State of Knowledge and Current Debates

Introduction

The Parthenon (Elgin) Marbles are a group of marble sculptures from the Athenian Acropolis owned since 1816 by the British Museum. They have gained twofold significance, as pieces that encompass the glory of Classical Greece and as perhaps the most famous case related to the issue of repatriation of material culture up to now. For more than 200 years, they have been appropriated as signifiers of identity by Britain and Greece and have been one of the most pervasive national claims by the Greek governments, setting the scene for Greek cultural diplomacy, especially after the inauguration of the New Acropolis Museum in June 2009.

Definition

The "Elgin Marbles," as the British Museum is obliged by statute to refer to this group of artefacts since their acquisition in 1816 (Hitchens et al. 1997, pp. viii, 17, 43), or the "Parthenon Marbles" as the Greek official national rhetoric addresses them (Yalouri 2001, pp. 97–98), is a group of marble sculptures, statues, inscriptions, and architectural members that, between 1801 and 1802, were removed from the Athenian Acropolis, at the time under Ottoman occupation, by the Seventh Earl of Elgin, Thomas Bruce (Greenfield 1996, p. 330; Hitchens et al. 1997; Hamilakis 2007).

The most renowned group of these artefacts is the ensemble of the marble sculptures which belonged to the fifth-century BC Parthenon Temple that depict mostly scenes from the Greek mythology. Almost half of its sculptures are currently displayed in the British Museum and the other half in New Acropolis Museum of Athens. In addition, fragments from the Parthenon sculptures can be found also in other museums, in France, Denmark, Germany, Austria, France, and Italy (Greenfield 1996). The monument's fragmentation has been the issue of intense ongoing debates, and the Parthenon (Elgin) Marbles are firmly entangled with the demand of the repatriation of cultural heritage.

Key Issues/Current Debates

Repatriation of cultural heritage is not an easy to tackle issue, as it is connected to the question "who owns cultural heritage?" Is it the nation and its subjects? Is it individual collectors? Is it local communities? Museums? Humanity at large? Or is it about a monument's integrity and intactness? The answer is rather complicated, especially because in the case of the Parthenon

(Elgin) Marbles the international conventions for the protection of cultural heritage (The Hague Convention of 1954, the UNESCO Convention of 1970, and the UNIDROIT Convention of 1995) do not apply, as the Parthenon (Elgin) Marbles were acquired before the conventions' inception. Therefore, it is necessary to look into the historical dimensions of the debate, especially the context of the Marbles' removal from the Athenian Parthenon in the era of British colonialism, and reflect on the history of collecting which formed the modus operandi of many contemporary world museums (Curtis 2006, p. 118).

Classical art offered to the British Empire a sense of rebranding through culture (Rose-Greenland 2013) because the aesthetic values through which it was viewed were thought to signify harmony, morality, and excellence, virtues that perfectly suited upper-class Britain. Thomas Bruce, as the British Ambassador to the Ottoman Empire (1799–1803), benefitted from the auspicious British-Ottoman political relationships that were developed during the French-Turkish War, when Britain became an ally of the Ottoman Empire rivaling France on a political, military, and cultural level (Greenfield 1996, p. 335). The acquisition of the Elgin marbles, with a controversial permit obtained from the Ottoman administration, was for the British a matter of power and authority vested with cultural connotations. British imperialism was thus ascertained through the projection of Britain as the successor of classical Athens that managed to rescue the classical material culture from destruction (Greenfield 1996, p. 337).

The fact that a foreign culture was being appropriated by the British imperialist narrative did not seem to be at odds with the national and supranational sentiments at the time (Rose-Greenland 2013). That is exactly because the Parthenon (Elgin) Marbles were deemed as pre-national, having been created prior to nation-states by a culture with a sociopolitical formation different to that of the nation (Rose-Greenland 2013). Hence, the Parthenon (Elgin) Marbles were considered cultural products of a long-lost civilization, the remnants of which were only ruins found in the then Ottoman-occupied Athens. This ambiguous state of being enabled them to acquire a dual subsistence by belonging to no one in particular and simultaneously to everyone.

This universalist approach is in absolute synch with the concept of the *universal museum*, that is, the *encyclopedic museum*, which presents itself as a representative of the whole humanity (Cuno 2006, 2011). Encyclopedic museums, the British Museum among them, are thought to promote diversity of world cultures and the "spectacular" art that is mankind's common heritage. As stated in the website of the British Museum: "the Museum is a unique resource for the world: the breadth and depth of its collection allows a world-wide public to re-examine cultural identities and explore the complex network of interconnected human cultures. The Parthenon Sculptures are a vital element in this interconnected world collection. They are a part of the world's shared heritage and transcend political boundaries" (The British Museum n.d.).

Supranational narratives are the core of the encyclopedic museums, which are rendered world museums. Regarding the Parthenon (Elgin) Marbles, the British Museum shapes its argument by drawing on the fact that their fragments exist divided in museums of eight countries in total (Hitchens et al. 1997, pp. 109–115; Hamilakis 2007; Rose-Greenland 2013), which supposedly enables different stories to be told. This argument reproduces the nineteenth-century British narrative and colonial ideas about the universalism of culture, while it adeptly overcomes the issue of the monument's fragmentation. Nonetheless, the Marbles also elevate the position of the British Museum as a world museum, where high art can be admired by visitors from all over the world, art with no nationality but with supranational world significance.

That is precisely the argument employed against the Greek state's claims for the repatriation of the Parthenon (Elgin) Marbles, as the term "world heritage" is supposed to overrule any Greek claims of ownership and repatriation, thus validating the Parthenon (Elgin) Marbles retention in the British Museum (Simpson 2005, pp. 253–254).

Yet, Greek's claims for the repatriation of the Parthenon (Elgin) Marbles were expressed

right after the formation of the independent Greek nation-state, in 1830, striving to confirm homogeneity and continuity between ancient and modern Greece. In this process, classical antiquities acquired nationality and were the driving force toward the construction of a coherent national identity. The assertion of direct lineage with classical Greece allowed Greek governments to demand the exclusive ownership of antiquities, the materiality of which provided the newly founded nation-state with strong visual images, recognizable among the European elites.

The repatriation of the Parthenon (Elgin) Marbles was officially placed for the first time as a political and diplomatic demand in 1982 by the then Greek minister of culture, Mrs. Melina Mercouri, at the World Conference on Cultural Policies (Mexico City, 29 July 1982) organized by UNESCO (http://melinamercourifoundation.com/unesco%CE%BC%CE%B5%CE%BE%CE%B9%CE%BA%CF%8C-29-7-1982/). She stated in her speech: "You must understand what the Parthenon Marbles mean to us. They are our pride. They are our sacrifices. They are our noblest symbol of excellence. They are a tribute to the democratic philosophy. They are our aspirations and our name. They are the essence of Greekness" (http://melinamercourifoundation.com/en/oxford-union-june-12-1986/).

Eventually, the Acropolis was inscribed on the world heritage list in 1987, described as "Illustrating the civilizations, myths and religions that flourished in Greece over a period of more than 1,000 years, the Acropolis, the site of four of the greatest masterpieces of classical Greek art — the Parthenon, the Propylaea, the Erechtheum and the Temple of Athena Nike — can be seen as symbolizing the idea of world heritage" (UNESCO 1988).

Over the years, the demand for the Marbles' repatriation resurged in various occasions, such as the 2004 Olympic Games which were hosted in Greece and the inauguration of the New Acropolis Museum in 2009. As Plantzos notes (2009, p. 14), "the majority of the Greek Press, part of the international Press, as well as the public seem to support that the New Acropolis Museum [. . .] can act as a lever for new claims of national importance, as it has a clear political dimension." Thus, in 2012, the Ministry of Culture and Tourism established an Advisory Committee in order to proceed with a planning strategy toward the return of the Parthenon Marbles and the fulfillment of this national goal (Greek Ministry of Culture n.d., 19/09/2012).

Apart from the claims of ownership, another powerful argument is the unification of the monument itself, the cultural biography of which continues being fragmented. The fact that the Parthenon (Elgin) Marbles, if ever returned to Greece, will be put on display in the New Acropolis Museum and not on the Parthenon itself does not weaken the sense of the monument's reunification, as the visual contact and proximity of the sculptures to the monument would create a materially contingent ensemble. This desire for reunification is clearly expressed within the New Acropolis Museum, where the demand for the repatriation of the Parthenon (Elgin) Marbles is transformed into a physical experience, as the visitor is called to engage with the notion of void and absence. Empty spaces are left to indicate the missing pieces, most of which are displayed in the Duveen Gallery of the British Museum.

On Absence

The New Acropolis Museum has, by definition and by intention, been identified with the negotiation of absence (Beresford 2016; Bounia 2012; Lending 2009; Plantzos 2009, 2011a, b, c; Hamilakis 1999, 2011), as, according to Plantzos (2009, p. 14), "the building seems to have been made to house some of the absent exhibits rather than the existing ones." From an ontological point of view, absence and the understanding of it is a complex phenomenon that causes emotions such as embarrassment and anxiety, which is why it raises a variety of human reactions (Anagnostopoulos 2014, p. 64), something that is also evident in the rhetoric which surrounds the New Acropolis Museum. Negotiation of absence here is twofold: on the one hand, absence is regarded not just as merely an abstract concept inherent in archaeological practice but as a factual situation associated with the absent Parthenon (Elgin) Marbles. As stated by Mr. Pantermalis, the director of the New Acropolis

Museum, in 2007 "The Museum clearly presents the problem of the Parthenon Marbles. There is no need to say anything, it is clear, and the public will understand it" (Leoudaki 2007). On the other hand, absence is experienced on a symbolic level as part of the missing national soul. As stated by Mr. Antonis Samaras, minister of culture, during the opening of the New Acropolis Museum in 2009, "What you will see [in the New Acropolis Museum] are not just a part of our history. They are part of ourselves. [. . .] And more of a part of our soul, are those that are missing" (Chouzouri 2014).

Absence, then, is rendered a physical experience, as the visitor is called to negotiate actively with void space. The presence of absence and its constant reminder create and communicate the feeling of an indefinable nostalgia "for the whole" (Hamilakis 2012), for something that is considered as granted even if it is not associated with direct, primary memories of modern subjects. Through this interplay of presence and absence, the New Acropolis Museum successfully manages to display a collection which it does not possess (Lending 2009, p. 572). It, thus, states at the level of international relations and cultural diplomacy not only the resilience of the demands for the return of the Parthenon (Elgin) Marbles but also specific political realities, such as the competing nationalisms involved in claiming the Parthenon (Elgin) Marbles; the interplay between imperial, colonial, and national practices; and the interplay of the local and the global in the field of cultural economy (Hamilakis 2012, p. 274).

On Trauma

In this light, absence has to do with loss, with the cessation of "having," with death, drama, and deprivation, and is, therefore, directly related to the concept of trauma. Thus, absence is not just spatially denoted inside the museum but also discursively constructed:

> As the then prime minister of Greece stated during the New Acropolis Museum's inauguration in June 2009 "The new museum is not a museum of deprivation, but a top museum despite the wounds" (http://www.minpress.gr/minpress/index/information/acropolis_inauguration.htm). In a similar spirit, the president of the Democracy at the time, Mr. Karolos Papoulias, supported that "It is time to heal the wounds of the monument by returning the marbles that belong to them" (http://www.minpress.gr/minpress/index/information/acropolis_inauguration.htm). Likewise, as stated in the Greek press around the time of the New Acropolis Museum's inauguration, "The tour in the exhibition hall of the Parthenon Marbles is [. . .] a cry for the fragmented sculptures. On the ancient marbles, the wounds from Elgin's tools are still visible" (Eleftheros Tyops tis Kyriakis, 21/7/2009, p. 39/7).

The aforementioned statements are only a few, indicative of the dozens of articles published in the national and international press, which render the Acropolis apart from a key monument of Western civilization a wounded monument (Liakos 2011). Accordingly, the New Acropolis Museum becomes internationally the guardian of this open trauma, which does not heal until the Parthenon (Elgin) Marbles are returned, essentially becoming a metonym of trauma through loss (Liakos 2011). Trauma, in the case of the Parthenon (Elgin) Marbles, is twofold: on the one hand, it is a national, historical, cultural, and collective trauma expressed through the loss of the Parthenon (Elgin) Marbles and, on the other hand, it is a kind of an embodied and experienced trauma, as the Marbles acquire human qualities and appear to speak, scream, hurt, and demand (Hamilakis 2012; Stefanou 2014).

The national cultural trauma is linked to a historical event fundamental to national culture and collective identity (Yair and Odom-Weiss 2014, p. 3), that of the removal of the Parthenon Marbles by Lord Elgin. Despite the distance from the event itself and the absence of lived memories, trauma appears as an integral part of a felt experience that reflects the social construction and ideology of the dominant culture (Gurevich 2016, p. 6). The traumatic event is recorded in the collective subconscious through the creation of national narratives and performative acts (Alexander 2012), prompted not only by the institutional administrators of memory but also by citizens' movements, individuals, etc. Thus, trauma cannot be forgotten as its emotional weight is not removed but is constantly emphasized through absence, whether it is in the permanent exhibition of the museum, the rearticulating of the repatriation demands, or through the media

discourses. Thus, the notion of trauma is very powerful precisely because it is a constantly experienced situation. De-traumatization cannot occur nor can reconciliation be realized until the demands of the Greek state have been satisfied.

In the case of the embodied trauma, museum exhibits are attributed human feelings and qualities such as pain, sadness, nostalgia, disappointment, longing, deprivation, physical pain, speech, voice, etc. Hence, objects are perceived as living organisms, as soulful beings who speak the same language as the visitors and feel the same feelings with them. The dialectical relationship that develops between the objects and the public is mediated through the notion of trauma and the process of victimization, as the exhibits appear to be carrying wounds, to be broken and dismembered, alone, and imprisoned in the British Museum, a status that preserves difficult-to-manage feelings and charges the inter-historical communication of the public with the past (Stefanou 2011). As Plantzos points out (2011a, p. 27), it is through this process that the objects undertake independent action and acquire agency, speaking to the public as autonomous subjects and not as museum exhibits that mediate messages and symbolisms.

Invoking the traumatic works successfully because of its directness and immediacy to touch universal human values such as mourning and death, loss and pain, freedom, and the need for vindication, which when it comes it will mark the reconciliation with historical trauma as well as the fruitful transnational co-operation.

On Kinship

The Parthenon (Elgin) Marbles are often thought as the next of kin. As a young visitor of the New Acropolis Museum stated: "I miss them. It is as if they took away my family. They may not want to give them back to us, but we will insist, and we will succeed" (http://www.ethnos.gr/politismos/arthro/ta_marmara_kaloun_ta_marmara-4236889/). Likewise, on the national press after the New Acropolis Museum's inauguration, it was stated that "The five stars of the Museum [...] wait for their sixth sister from London" (Eleftheros Typos tis Kyriakis, 21 Ιουλίου 2009, p. 10/82). In the same vein, the south African Nobel Prize winner writer, Nadine Gordimer, stated that "The Parthenon Marbles are part of the artistic DNA of the Greeks and they belong there" (http://www.parthenonuk.com/bcrpm-latest-news/300-remembering-nadine-gordimer-supporter-for-the-reunification-of-the-parthenon-marbles).

These statements are only three among the many expressed during the New Acropolis Museum's inauguration. They are indicative of the way in which material culture is understood through the lens of both biological and cultural determinism in discourses about the Parthenon (Elgin) Marbles and the role of the New Acropolis Museum (Stefanou 2011) in keeping "our" relatives safe. In this context, the concept of direct affinity with classical civilization is thought to be one of the basic components of modern Greek national identity. Affinity, here, is not just expressed by the public, i.e., the people of Greece, the museum's visitors, the supporters of the Parthenon (Elgin) Marbles' return, etc., but it also appears to be invoked by the material culture and by the museum exhibits themselves, which, as already mentioned, acquire a soul and now also function themselves as subjects, having acquired agency.

It is almost an animist approach through which material objects acquire social identities and develop social relationships with the people that surround them (Sillar 2009, p. 369). They are considered part of an extended family, that of the nation-state, and these ties act as catalysts in stimulating national imagination regarding kinship, blood, DNA, and, hence, indissoluble national continuity. As Sillar (2009, p. 28) points out, material culture can raise a variety of human reactions, but the extent to which objects are perceived as carriers of agency derives from how the subjects themselves, humans, consciously make meaning of the material culture. In the case of the Parthenon (Elgin) Marbles, the meaning-making process takes place in the framework of kinship and family ties.

Although family functions as a cultural metaphor here, family ties are considered as de facto unbreakable, and therefore, at a level of cultural

diplomacy, they can form an argument that may be stronger than the traditional approaches to national identity. Given that the members of a functioning family protect one another and pursue its prosperity, the argument of family ties is the culmination of the hitherto established historical-political perceptions of identity, with the New Acropolis Museum being the family home.

The ancestral and fraternal relationship that develops between modern citizens and the material culture of the classical past strengthens the validity of the demands for the return of the Parthenon (Elgin) Marbles, wherever they derive from. At the same time, this rhetoric emphasizes on the ecumenical dimension of the Greek classical culture, the New Acropolis Museum, the Parthenon (Elgin) Marbles, and the Greek nation itself, for family here is perceived as a supranational guardian of universal values all encompassed in the New Acropolis Museum.

On Debt

The universal values and family ties promoted by the New Acropolis Museum through the Parthenon (Elgin) Marbles are directly linked to the concept of debt, which here acquires a dual content: on the one hand, it is linked to the cultural and moral debt of the West toward modern Greece and, on the other hand, to the economic crisis and financial debt of the Greek state. As Hamilakis (2016, pp. 27–28) states, the debt to ancient ancestors is juxtaposed with the modern financial debt and the Greek financial crisis provides a platform for various actions with archaeological-political content. In this case, the Parthenon (Elgin) Marbles are a symbol of pillage, not only of the one that Greece and its antiquities suffered by the Europeans in the nineteenth century but also of the pillaging that is currently undergoing amidst the economic crisis, privatization, unemployment, etc.

This belief is clearly expressed through various protest events organized in relation to the Parthenon (Elgin) Marbles: in 2015, the international campaign against debt, the *Jubilee Debt Campaign*, in collaboration with the international organization for social justice, *Global Justice now*, organized a protest of solidarity at the Duveen Hall of the British Museum, where the Parthenon (Elgin) Marbles are housed (http://www.globaljustice.org.uk/news/2015/jul/3/elgin-marbles-targeted-greek-solidarity-protest-british-museum and http://www.economicvoice.com/elgin-marbles-targeted-in-greek-solidarity-protest-in-british-museum/). They raised a banner that read *OXI No – No More Looting – Support Greece*, obviously referring to the imminent referendum of the 5th day of July 2015, but also linking their protest with the Parthenon (Elgin) Marbles both spatially and verbally by using the word looting.

A member of the Jubilee Debt Campaign, Mr. Stevenson, who was present in the protest, stated that "the Parthenon Marbles are the international symbol of the Greek pillage. We are here today to say not to the modern despair of the Greek state through the imperative austerity [. . .]. Just as with marbles, the modern looters primarily serve their own interests while claiming that they do it for the good of Greece." Earlier this year, on the 25th day of April, a team of Greek archaeologists and students along with members of the *Coalition of Resistance* and the *Greek Solidarity Campaign* organized a protest in the same hall of the British Museum with a banner that stated "Cannot pay. Will not pay. Solidarity with Greece" (http://www.keeptalkinggreece.com/2012/04/25/solidarity-with-greece-protest-inside-the-british-museum/).

Although the issue here is the modern financial debt of the Greek state, the Parthenon (Elgin) Marbles provide the framework on which similar actions and protests are built, precisely because they are considered to show the greatness of Greece due to its classical culture, which is diametrically opposed to the current image of Greece that Europe holds today (Plantzos 2012, pp. 159–160). The struggle for the restructuring of the Greek debt is considered as fair as the struggle of the New Acropolis Museum and the Greek state for the return of the Parthenon (Elgin) Marbles. The seminal difference between the two debts is that while the financial debt can potentially be repaid, the moral debt to the ancestors is never repaid (Hamilakis 2016). Thus, on the one hand, the Greek state and New Acropolis Museum bear the moral duty of preserving and promoting

the universal values of classical culture in Europe and the world, and on the other hand, Europe seems to have a moral debt to Greece precisely because it has built its modern ideals, democracy, speech, beauty, freedom, and morality on the classical culture (Plantzos 2012; Yalouri 2001). This view has the effect of reversing the roles of the lender and the borrower: while Greece is a modern European borrower, Europe must, in turn, repay its huge cultural debt to Greece, from which it borrowed the values of its own existence and the core of its constitution.

"Bottom-Up" Interpretations of the Parthenon (Elgin) Marbles

What the four axes that were analyzed so far, namely, that of absence, trauma, kinship, and debt, have in common is that the rhetoric expressed around them does not exclusively stem from the institutional administrators of the classical past, but it also comes from various groups of the Greek and foreign public who consider it a duty, a craving, a need, or a debt to protest, each one of them in a less or more ingenuous way, for the return of the Parthenon Marbles. In this case, there is no conflict between the "bottom-up" voices with the dominant national narrative, as these are in harmony with and reproduce the national rhetoric about cultural heritage, the classical past, and national identity. However, this reproduction is not neutral nor is a mere repetition of the national narrative. On the contrary, precisely because the groups of people who identify with the issue of the Parthenon (Elgin) Marbles return vary, their actions, the voices, the campaigns, etc. are also varied, without, of course, avoiding historical anachronisms, simplifications, populism, banal nationalism, and historical gaps.

Here, an important role for the performative dimensions of national identity and for the reproduction of the national discourse is, as already mentioned, played by *habitus*, which as a collective principle produces and builds cultural practices and cultural representations (Bourdieu 1977, p. 72, in Csordas 1990, p. 11). Habitus also exists at national level as the so-called national habitus (Loyal and Quilley 2004, pp. 130 and 138; Pickel n.d., pp. 4–5), stating the ideological practices that allow the verbal or tangible reproduction of national messages and connotations by the subjects (Billig 1995, p. 6). Events such as memorial practices, performances, celebrations, etc. promote the social cohesion of the national subjects and the desired cultural homogeneity. Especially through national cultural traumas, and the extraction of the Parthenon (Elgin) Marbles is such a collective trauma, narratives are created that are adopted by the subjects through socialization techniques and mnemonic politics. In this way, cultural trauma becomes part of the national habitus. Thus, a set of situations, behaviors, and practices, the so-called banal nationalism by Billig (1995), are formed and are not separate from the daily routine of the subjects but endemic to it, as the nation is indicated, performed, and signified daily through them in the life of its citizens (Billig 1995, p. 6).

In this context, as mentioned above, there is a plethora of national and international committees for the reunification of the Parthenon and for the return of the Parthenon (Elgin) Marbles (see for example the International Association for the Reunification of the Parthenon Marbles http://www.parthenoninternational.org/), as well as independent citizens' movements, some of them are individually organized and some others take the form of information and protest campaigns. Among the prominent ones is the *Bring Them Back* campaign for the return of the Parthenon (Elgin) Marbles. Arguing for the reunification of the monument, the campaign hosts a directed video (http://www.bringthemback.org/) on its website where, in a supposed news bulletin, a well-known Greek journalist interviews a middle-aged gentleman who bears the surname Elginiadis and appears to have removed the top of the Big Ben tower in London and have taken it to his home. The allegory is obvious, as are the arguments that follow from both sides, that of the interviewer and of the interviewee, and resemble those of the British Museum. The style of the video changes completely when a well-known Greek journalist who lives outside Greece appears extremely well dressed inside the New Acropolis Museum and presents in a scientific but simple way the issue of the return of the Parthenon (Elgin) Marbles.

The same campaign on its Facebook page hosts a video shot by the students of the 9th Primary

School of the district of Agios Dimitrios, Attica. A group of children wearing t-shirts with the *Bring Them Back* campaign logo is singing (https://www.facebook.com/BringThemBack/) for the return of the Parthenon (Elgin) Marbles to the rhythm of Tanita Tikaram's song *Twist in my Sobriety.* The adapted lyrics, in a very upfront manner, serve the national imagination as they adopt religious terms (resurrection) but also terms of romanticism (attic light): "In the museum we clearly demand/to be returned to the light of Attica/to be once again resurrected the Parthenon's marbles/to be returned into the light", perceiving history in the familiar linear way: "history is a river and time is flowing."

Another independent, voluntary campaign for the repatriation of the looted Greek antiquities, the so-called I AM GREEK AND I WANT TO GO HOME campaign, was initiated by the photographer and musician Mr. Kalogeropoulos (http://www.dinfo.gr/i-am-greek-and-i-wanna-go-home/), who created a series of photographs and videos, where different sculptures and reliefs speak to the viewer in first person asking them to return to their homeland: "You can steal a statue, but you cannot steal my place of origin. I am Greek, and I want to come home", "I was born in Greece, my sisters are there. I am Greek, and I want to go home", "Citizens of the world, I am being held hostage. Help me get home, in Greece." The appeal to the emotion is evident and is successfully achieved precisely because of the personalized, almost animistic, approach of material culture which shares with the public feelings of sadness, nostalgia, and injustice under the sounds of epic, dramatic music.

On the 7th day of July 2014, a group of artists organized a short performance in the British Museum. The conductor Mr. Orphanides, the composer Mr. Pavlidis, the soprano Ms. Theodoridou, and six women "six beautiful Greek women dressed in white as 'other' Caryatids, entered the British Museum looking for their lost 'sister' [. . .]. The team [. . .] began to search for the lost Caryatid in the museum. When they found her, their emotions were indescribable" (https://goo.gl/FWlNMr).

This initiative communicates feelings of despair, sorrow, indignation, and distress to the international audience through a physical performance that invokes family ties and doesn't avoid reproducing traditional schemes of interpretations of the past.

These bottom-up actions shed light to "informal" aspects of the personal relationship between subjects, archaeological objects, and the past, thus expanding the concept of cultural diplomacy and its practices through embodied, multisensory, and participatory ways. Hamilakis (1999, p. 304) rightly points out that "bottom-up" approaches illuminate the complex processes of the production of archaeological discourses, and through the negotiation of social roles and identities, it can be a useful tool compared to legal processes, institutions, and the official frameworks for cultural heritage management.

Epilogue

At the level of cultural diplomacy in relation to the repatriation of the Parthenon (Elgin) Marbles, it is noted that the rhetoric of both the Greek state and the informal voices has begun to be differentiated and to take into account other parameters as arguments of claim. As stated by Hamilakis (2007), since the early 1990s, the Greek government and recently the New Acropolis Museum have put less emphasis on the argument of ownership of the Parthenon (Elgin) Marbles, which is based on claims of national continuity, and promote the argument of the reunification of the monument as a symbol of world heritage and the imperative need for the Parthenon (Elgin) Marbles to be returned as the landmarks of Western civilization.

Respectively, the arguments that relate to cultural diplomacy and focus on the New Acropolis Museum are expressed by informal actors and individual "bottom-up" initiatives seeming to have embraced the aforementioned change with enough originality. Thus, cultural diplomacy in relation to the return of the Parthenon (Elgin) Marbles seems to escape the traditional forms of linguistic, religious, and racial perceptions of identity and, instead, to include new, expanded identity approaches that are articulated in psychological, social, biological, and behavioral terms. It is in this context that the Parthenon (Elgin) Marbles are ascribed human qualities.

The sculptures appear to talk, to cry out, to yearn, to hurt, and to call their abducted siblings in London, in an obvious attempt to "speak the same language" as the public, the national subjects, the modern "Philhellenes," the diplomatic communities, and the visitors to both the British Museum and the New Acropolis Museum. The personification of antiquities and the attribution of human characteristics and emotions to the Parthenon (Elgin) Marbles facilitate the process of familiarizing subjects and objects, a process which consolidates their meanings to the point of idealization. Unification demands are further reinforced through the sense of victimization and trauma, since the Parthenon (Elgin) Marbles are perceived as wounded humans. Words such as fragmented, dismembered, wounds, and references to destruction, looting, and rape emotionally charge the communication between the public and the past, emphasizing on the unfulfilled claim for the Parthenon (Elgin) Marbles' repatriation (Stefanou 2011).

Through these cultural and embodied constructions, the boundaries, the practices, and the ways of communication of cultural diplomacy are expanded: they include a variety of ways for transmitting messages; they utilize modern means of communication and social networking to be heard; they involve more subjects/actors who identify with the issue of the return of the Parthenon (Elgin) Marbles and shape their own rhetoric; they invoke human emotions by speaking directly to the thymic and the volitional parts of their audiences' soul; and they draw directly from the current sociopolitical circumstances, offering new readings of the past and its material culture.

Therefore, these new formations of cultural diplomacy around the Parthenon (Elgin) Marbles, within and outside the New Acropolis Museum, function successfully both at national and supranational levels, as they are informal attempts to manage archaeological remains, promote an expanded, all-inclusive discourse about the past, and show a more personal, embodied, and performative relationship with the material culture and the museum space. The main issue at stake now is whether the Parthenon (Elgin) Marbles should continue being on display in the universal British Museum, treated as aestheticized masterpieces of world art, or whether they should be recontextualized by returning to Athens in order to be displayed in the New Acropolis Museum.

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Classical (Greek) Archaeology
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Greece: Cultural Heritage Management
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Houses, Archaeology of
- ▶ Heritage and Archaeology
- ▶ Heritage and Society
- ▶ Heritage Museums and the Public
- ▶ Heritage: History and Context
- ▶ Religion, Greek, Archaeology of

References

Alexander, J.C. 2012. *Trauma: A social theory*. Malden: Polity.

Anagnostopoulos, A. 2014. Varieties of nothingness: Absence, materialism and ontology in two Greek cases. In *Social matter(s): Anthropological approaches to materiality*, ed. T. Bampilis and P. ter Keurs, 61–87. Berlin/Zurich: LIT.

Beresford, J.M. 2016. The Caryatids in the New Acropolis Museum: Out of sight, out of light, out of mind. *Journal of Conservation and Museum Studies* 14 (1): 1–16.

Billig, M. 1995. *Banal nationalism*. London/Thousand Oaks/New Delhi: Sage.

Bounia, A. 2012. Cultural policy in Greece, the case of the national museums (1990–2010): An overview. In *Museum policies in Europe 1990–2010: Negotiating professional and political utopia*, ed. L. Eilertsen and A.B.. Amundsen, 27–156. Linkoping: Linköping University Electronic Press. http://liu.diva-portal.org/smash/get/diva2:557284/FULLTEXT01.pdf.

Bourdieu, P. 1977. *Outline of a theory of practice*. Cambridge: Cambridge University Press.

Chouzouri, K. 2014. Genethlia gia to Mouseio tis Akropolis [Birthday for the Acropolis Museum]. Pemptousia, http://www.pemptousia.gr/2014/06/genethlia-gia-to-mousio-tis-akropolis/.

Csordas, T.J. 1990. Embodiment as a paradigm for anthropology. *Ethos* 18 (1): 5–47.

Cuno, J. 2006. View from the universal museum. In *Imperialism, art, and restitution*, ed. J.H. Merryman, 15–36. Cambridge: Cambridge University Press.

Cuno, J. 2011. *Museums matter: In praise of the encyclopaedic museum*. Chicago: The University of Chicago Press.
Curtis, N.G.W. 2006. Universal museums, museum objects and repatriation: The tangled stories of things. *Museum Management and Curatorship* 21 (2): 117–127.
Greek Ministry of Culture. n.d.. http://www.yppo.gr/2/g22.jsp?obj_id=51873.
Greenfield, J. 1996. *The return of cultural treasures*. Cambridge: Cambridge University Press.
Gurevich, D. 2016. Literature as trauma: The post-modern option –Franz Kafka and Cormac Mccarthy. In *Interdisciplinary handbook of trauma and culture*, ed. Y. Ataria, D. Gurevich, H. Pedaya, and Y. Neria, 3–26. New York: Springer.
Hamilakis, Y. 1999. Stories from exile: Fragments from the cultural biography of the Parthenon (or "Elgin") marbles. *World Archaeology* 31 (2): 303–320.
Hamilakis, Y. 2007. *The nation and its ruins: Antiquity, archaeology, and national imagination in Greece*. Oxford: Oxford University Press.
Hamilakis, Y. 2011. Museums of oblivion. *Antiquity* 85: 625–629.
Hamilakis, Y. 2012. Are we postcolonial yet? Tales from the battlefield. Archaeologies: Journal of the World Archaeological Congress 8: 67–76.
Hamilakis, Y. 2016. Some debts can never be repaid: The archaeo-politics of the crisis. *Journal of Modern Greek Studies* 34 (2): 27–64.
Hitchens, S.C., R. Browning, and G. Binns, eds. 1997. *The Elgin Marbles: Should they be returned to Greece?* London: Verso.
International Association for the Reunification of the Parthenon Marbles. n.d. http://www.parthenoninternational.org/.
Lending, M. 2009. Negotiating absence: Bernard Tschumi's New Acropolis Museum in Athens. *The Journal of Architecture* 14 (5): 567–589.
Leoudaki, Z. 2007. To Nēo Mousīo Acrōpolis kai o cōsmos (The New Acropolis Museum and the world). *The voice of America (VOA): News in Greek*. http://www.hri.org/news/agencies/voa/2007/07-11-12.voa.html.
Liakos, A. 2011. To Nēo Mousīo Acrōpolis sto Trigono Istorīas, Ideologīas, kai Apōlafsis. s [The New Acropolis Museum in the Athens Sunday Press]. In *Proceedings of the international symposium "Museums 11: Acropolis Museum, ideology, museology, architecture"*. http://www.blod.gr/lectures/Pages/viewlecture.aspx?LectureID=60.
Loyal, S., and S. Quilley. 2004. *The sociology of Norbert Elias*. Cambridge: Cambridge University Press.
Pickel, A. n.d. The habitus process: A biopsychosocial conception. Working Paper, Centre for the Critical Study of Global Power and Politics, Trent University, Peterborough. https://www.trentu.ca/globalpolitics/documents/Pickel051.pdf.
Plantzos, D. 2009. I Kivotos kai to Ethnos: ena sholio gia tin ypodohi tou Neou Mouseiou Acropolis. *Sygxrona Themata* 106: 14–18.
Plantzos, D. 2011a. 'Il n'y a pas de hors-texte': to Mouseio tis Acropolis kai ta Aponera tou Idealismou. *Tetradia Mousieologias* 7: 23–29.
Plantzos, D. 2011b. To Neo Mouseio Akropolis kai I Elginiopoiisi ton Marmaron toy Partheona. In *Proceedings of the international symposium "Museums 11: Acropolis Museum, ideology, museology, architecture"*.
Plantzos, D. 2011c. Behold the raking geison: The new Acropolis Museum and its context-free Archaeologies. *Antiquity* 85: 613–625.
Plantzos, D. 2012. The glory that was not: Embodying the classical in contemporary Greece. *Interactions: Studies in Communication & Culture* 3 (2): 147–171.
Rose-Greenland, F. 2013. The Parthenon Marbles as icons of nationalism in 19th century Britain: From pre-national to supranational. *Nations and Nationalism* 19 (4): 654–667.
Sillar, B. 2009. The social agency of things? Animism and materiality in the Andes. *Cambridge Archaeological Journal* 19 (3): 369–379.
Simpson, M. 2005. Museums, world heritage, and interpretation: The case of the Parthenon Marbles. In *Greek research in Australia: Proceedings of the biennial international conference of Greek studies, Flinders University April 2003*, ed. E. Close, M. Tsianikas, and G. Frazis, 241–262. Adelaide: Flinders University Department of Languages – Modern Greek.
Stefanou, E. 2011. To Neo Mouseio Akropolis ston Kyriakatiko Athinaiko Typo [The New Acropolis Museum in the Athens Sunday Press]. In *Proceedings of the international symposium "Museums 11: Acropolis Museum, ideology, museology, architecture"* (in press).
Stefanou, E. 2014. Parthenon (Elgin) Marbles: Case study. In *Encyclopedia of global archaeology*, ed. C. Smith. New York: Springer.
The British Museum. n.d.. http://www.britishmuseum.org/about_us/news_and_press/statements/parthenon_sculptures.aspx.
United Nations Educational, Scientific, and Cultural Organization. 1988. Inscription: The Acropolis, Athens (Greece). 11COM VIIIA. Paris, 20 Jan 1988. http://whc.unesco.org/en/decisions/3727.
Yair, G., and S. Odom-Weiss. 2014. Israeli diplomacy: The effects of cultural trauma. *The Hague Journal of Diplomacy* 9: 1–23.
Yalouri, E. 2001. *The Acropolis: Global fame, local claim*. Oxford: Berg.

Further Reading

Challis, D. 2006. The Parthenon sculptures: Emblems of British national identity. *British Art Journal* VII (1): 37–43.
Hamilakis, Y. 1999. Stories from exile: Fragments from the cultural biography of the Parthenon (or 'Elgin') marbles. *World Archaeology* 31 (2): 303–320.
Hitchens, C. 2008. *The Parthenon Marbles: The case for unification*. London: Verso.
Merryman, J.H. 2009. *Thinking about the Elgin Marbles: Critical essays on cultural property, art, and law*. The Hague: Kluwer Law International.

Pathological Conditions and Anomalies in Forensic Contexts

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Introduction

Bone pathology is a basic tool for understanding the epidemiology of archaeological populations and the natural history of different diseases. Osteopathological analysis may also be helpful in forensic cases where identification is an issue. Bone pathology may be of use in the positive identification of individuals because pathology, in general, constitutes crucial individual characteristics (Maples 1984; Rodríguez-Martín et al. 2005). In exceptional cases, some pathological conditions can be the only guide to identification (Rogers 1987).

Stewart (1958) was one of the first to introduce the forensic implications of skeletal pathology (degenerative disease) to diagnose age and Reichs (1986a, b) to diagnose sex and ancestry. Other studies have contributed to expand the field: some diseases cause alterations in the personal appearance that can help in identifying a person (Pickering and Bachman 1997). Comparison between lesions observed in the osseous tissue and antemortem radiographs or medical records may also be extremely useful (Krogman and Iscan 1986). When examining and interpreting bony changes, it is important to consider differential diagnoses: similar bony changes can be produced by different agents. Alternatively, similar events may produce different conditions in different persons or at different time of their lives (Ubelaker 1989; Burns 1999).

While bone pathology is widely studied, it is important to note that the majority of diseases do not affect the skeleton: most diseases need a long time to develop (chronicity), and very few are a direct cause of death. The study of skeletal lesions is widely based on macroscopic analysis, but certain cases need other diagnostic methods (radiography, computed tomography, microscopy, chemical analysis, or DNA).

Examples

Metabolic Disturbances

Scurvy (Deficiency of Vitamin C or Ascorbic Acid)

Ascorbic acid is required for collagen synthesis. Therefore, a deficit may lead to subperiosteal hemorrhage (the most important sign) causing hematoma that is calcified, separation of the epiphyses, osteoporosis, and joint disturbances by hemorrhage. Scurvy is typically classified in two types: infantile, showing most of the skeletal changes, and adult showing mostly osteopenia (lower bone mineral density).

Rickets and Osteomalacia (Deficiency of Vitamin D)

A deficit of vitamin D can be produced by a failure of its intake or a renal failure leading to mineralization alterations. If this occurs in subadults, it is called rickets and in adults osteomalacia.

The condition of rickets shows widespread skeletal deformities: cranial thinning and softening with bulging fontanels; rachitic rosary; enlargement of wrists, knees, and ankles, by widening of the epiphyses; marked curvature of the long bones; and spinal kyphosis, scoliosis, and increased lumbar lordosis which contribute to decreased stature.

Osteomalacia can be the consequence of rickets perpetuated into adulthood, but it is mostly acquired (Aufderheide and Rodríguez-Martín 1998). Most individuals do not show skeletal deformities, only osteopenia.

Osteoporosis

Osteoporosis is said to be present when there is loss of 30% or more of bone mass. There are different types of osteoporosis: infantile–juvenile, traumatic, post-pregnancy, and aging-related (postmenopausal (55 years, rapid, 6 times more frequent in females) and senile (>70 years, slow, females twice affected)). The typical changes in

osteoporosis are thinning of cortical bone, generalized rarefaction of the skeleton, and compression (codfish vertebra) and pathological fractures.

Joint Diseases

Degenerative Joint Disease (DJD) (Osteoarthritis)

DJD involves diarthrodial joints. When spinal bodies (not diarthrodial joints) are affected, the condition is known as spondylosis. DJD may be acquired (e.g., through trauma or strong physical activity) and age-related (usually generalized). The most prominent features are osteophyte formation at the joint margins, increased porosity and formation of subchondral cysts on the joint surface, and later eburnation and deformity of the whole joint. Spondylosis also shows vertical disk hernia (Schmorl's nodes).

Rheumatoid Arthritis (RA)

RA is a chronic, inflammatory, systemic, and nonsuppurative disease of the synovial joints and connective tissue that causes the ultimate destruction of the joint. A probable autoimmune nature is suspected. Females are two to three times more affected than males, and its onset typically commences between the fourth and sixth decades. Hands and feet are commonly involved. The changes are polyarticular, bilateral, and symmetrical involvement of the joints; *pannus* (inflamed synovium) formation producing marginal erosions and destruction of the joints; and little, if any, reparative activity. No osteosclerosis is detected in the radiographs. The consequences are subluxation and dislocation of the joints.

Ankylosing Spondylitis (Bechterew or Marie-Strümpell Disease)

Ankylosing spondylitis is a chronic, inflammatory, progressive, and systemic disease linked to the antigen HLA-B-27. Males (whites and adolescent–young adults) are more affected than females. Its clinical picture consists mainly in spinal changes and disk disease, fusion of the sacroiliac joints (first sign), ossification of the anterior and posterior ligaments of the spine, and increased kyphosis and decreased lordosis (an inward curvature of a portion of the lumbar and cervical vertebral column). Peripheral joint involvement (hips, knees) is almost identical to RA (see above).

Diffuse Idiopathic Skeletal Hyperostosis (DISH) (Forestier-Rotés Querol Disease)

DISH consists of ankylosing hyperostosis of the spine due to ossification of the anterior longitudinal ligaments without inflammatory changes. The disk is not involved. Older males are predominantly affected.

Gout

This disease is an inflammatory arthritis, usually monoarticular, by chalky deposits (urate) due to primary or secondary (most common) hyperuricemia. Gout typically presents in the periphery of the joint causing erosions that create a punched out appearance. Reactive sclerosis is observed and osteoporosis is not present. It is more common in adult males.

Hematological Disorders

Iron Deficiency Anemia

This condition can be produced by one of the following causes: decreased intake, blood loss, or bad absorption of iron. Women are more affected.

Sickle Cell Anemia

Alterations in the B-hemoglobin chains produce deformed red cells that lead to increased hemolysis with ultimate bone marrow hyperplasia. The typical changes are osteopenia (by increased bone marrow) and then osteoporosis responsible for vertebral collapse and kyphoscoliosis, bone infarction (femoral head and spine) (Steinbock 1976), and possible osteomyelitis (mostly by salmonella).

Thalassemia

Thalassemia is produced by alterations in hemoglobin chains. It may be *major* (homozygous) and *minor* (heterozygous, with lesser bone alterations). Thalassemia is most prevalent in individuals from the Mediterranean. There is great and severe anemia with big marrow hyperplasia

causing severe osteoporosis in the skull ("hair-on-end"), appendicular skeleton ("honey comb"), and axial skeleton (kyphoscoliosis).

Porotic Hyperostosis and Cribra Orbitalia

Most types of anemia show skeletal changes in subadults, especially on the cranial vault (porotic hyperostosis) or orbits (*cribra orbitalia*). Porotic hyperostosis is characterized by lytic lesions, symmetrically distributed, in the parietals and frontal bones and in lesser degree in the occipital, showing thickening with porosity of the overlying outer table that exposes the diploe. *Cribra orbitalia* shows a similar pattern.

Multiple Myeloma (Kahler's Disease)

This is an aggressive plasma cell dyscrasia affecting persons >50 years of age. The disease is usually located in the spine and associated with possible pathological fractures; the skull and pelvis may show round lytic defects without sclerotic reaction, and more rarely osteopenia.

Infections: Nonspecific Bacterial Infections

The skeletal changes produced by nonspecific bacteria are indistinguishable.

Osteomyelitis (OM)

OM is an inflammation of bone and marrow. It is important to note that 30% of acute OM (hematogenous or by direct infection) become chronic.

Hematogenous OM

Hematogenous OM predominantly affects children (>3 years old). It is uncommon at other ages but can affect adults with chronic diseases, debilitated elders, or drug addicts. *S. aureus* is the usual germen responsible. Defects are usually located in the distal femur, proximal tibia, proximal femur, or distal radius.

Direct Infection

Puncture wounds, accidents, and iatrogenic infection are the most common causes of direct infection. It is usually polybacterial and typically involves the tibia and femur. The infection produces a defective blood supply leading to bone necrosis (*sequestrum*) that is surrounded by a shell of new bone (*involucrum*). Cloacae are also present to drain pus and detritus.

Infections: Specific Bacterial Infections

The changes produced by every bacterium are specific.

Tuberculosis

Mycobacterium tuberculosis (Koch bacillus) is the responsible bacteria. Approximately 1% of cases of tuberculosis observed in developing countries show skeletal changes. Tuberculosis affects persons of <25 years of age. The skeletal changes are produced by metastatic spread or continuity and affect the spine (vertebral collapse causes severe kyphosis or Pott's disease) and knee in children, and knee and hip in adults. Other changes include osteoporosis; marginal erosions; destruction of subchondral bone, with little bone reaction; and bony ankylosis of the sacroiliac joint (Ortner and Putschar 1985).

Leprosy

Leprosy is caused by *Mycobacterium leprae* (Hansen bacillus). It may be tuberculoid (TT), showing more skeletal changes, and lepromatous (LL). While there is evidence of leprosy in antiquity worldwide, today it predominantly occurs in tropical areas. Skeletal changes are due to direct extension more than hematogenous spread. Skeletal alterations include rhinomaxillary syndrome (*Facies leprosa*) showing erosion of the nasal margins with destruction of the maxillary area and the nasal spine along with nummular palatal perforation and loss of the upper central incisors; periostitis of the long bones; and changes due to peripheral neuropathy and anesthesia (trauma creates an infection – OM and septic arthritis – with bone destruction and marked periostitis) (Charcot's joint).

Treponematosis

It is very difficult to perform a diagnosis of each of the treponematosis without knowing the origin of the sample.

Yaws or Frambesia

Yaws or frambesia is a nonvenereal disease caused by *Treponema pertenue*. Geographically,

the disease has been observed in Africa, Latin America, Southeastern Asia, and Southern Pacific. Only 1–2% of the cases show skeletal changes: dactylitis of the hands, saber shin tibia or boomerang leg, gummatous OM of long bones without prominent periostitis, gangosa (extensive destruction of the nasal area), Goundou or "big nose" in children, and uncommon joint involvement. Spontaneous healing is usual.

Bejel, Nonvenereal Syphilis, or Endemic Syphilis

Nonvenereal and caused by *Treponema pallidum endemicum*, it is an acute children's disease of the Eastern Mediterranean and Southwestern Asia. 1–5% show skeletal changes: saber shin tibia, gummatous destruction, and nasal–palatal destruction similar to gangosa. Spontaneous healing is usual.

Venereal Syphilis

Venereal syphilis is caused by *Treponema pallidum* pallidum and may be acute, subacute, and chronic. It predominantly affects young people and occurs worldwide. The skeletal lesions include gummatous lesions that appear in advanced stages involving skull (parietal, frontal, and nasal–palatal involvement) and tibia showing the pattern of the skull (thickened cortex and rough surface). Although less frequently, other bones are also involved. Gummatous arthritis is rare.

Nongummatous lesions show periostitis, especially at the metaphysis, leading to cortical thickening and deformation causing narrowing of the medullary cavity and saber shin tibia.

Neurosyphilis: Charcot's joint in large joints.

Congenital Syphilis

Congenital syphilis is caused by *Treponema pallidum pallidum*. There are two types: early or infantile showing osteochondritis at the epiphysis and metaphysis plus diaphyseal osteitis and periostitis, and late with gummatous and nongummatous OM or periostitis with diffuse hyperostosis, dactylitis, and Clutton's joints (more in knee and bilateral) and teeth anomalies (Hutchinson's teeth and Moon's molars).

Congenital Malformations: Cranial Malformations

Craniosynostosis

Craniosynostoses are the most common form of cranial malformations and are the result of the earlier closure of a cranial suture. The most clinically significant are scaphocephaly (sagittal suture closure causing hyperdolicocephaly), plagiocephaly (asymmetrical suture closure), turricephaly (coronal suture producing a tower-shaped skull), trigonocephaly (metopic suture giving a triangle-shaped skull), and triphyllocephaly (multiple closure resulting in a trilobular skull).

Congenital Malformations: Spinal Malformations

Atlas Assimilation

Atlas assimilation refers to the partial or total fusion between the atlas and the skull base. One percent of the population is affected, and around 50% show C2–C3 fusion.

Spina Bifida

Spina bifida is the most common of all spinal malformations, consisting of incomplete bony closure of the neural arches, especially at the sacrum. It may be aperta (very severe condition in which meninges are not protected by skin, muscle, or bone) or occulta (the most common form).

Transitional Vertebrae at the Lumbosacral Level

There are two types: sacralization of L5 (the sacrum appears with six segments) and lumbarization of S1 (the sacrum shows four segments only). Both can be complete or partial.

Vertebral Block

Vertebral block refers to the fusion of two, three, or more vertebrae in a block that may involve spinous and transverse processes.

Spondylolysis and Spondylolisthesis

This is a failure of ossification in the pars interauricularis producing separation of the vertebra in two parts, one anterior and other posterior,

that can be displaced (spondylolisthesis). Minor trauma plays an important role in its origin.

Thoracic Malformations

Cervical Ribs

It is an elongation of the transverse process of C7 becoming a rib with head, neck, and body but very rarely reaches the sternum.

Pelvic Malformations

Congenital Dislocation of the Hip

This condition is based on the loss of the normal relationship between the femoral head and the acetabulum. If not treated, the result is a dysplastic acetabulum, deformed and flattened head, and formation of a false acetabulum (neoacetabulum). It seems to be hereditary, and there are examples of familial cases. In general, there is a considerable population variation. Frequency: 1 to 15–20 per 1000 of live births worldwide (Aufderheide and Rodríguez Martín 1998). 25–50% of the cases are bilateral, being the left side more affected in the rest. Females are more affected than males (5–8: 1).

Limb Malformations

Upper Limb Anomalies

Madelung's deformity Seventy percent of the cases show bilateral involvement with shortening and bowing of the distal radial third that due to the difference in length with the ulna leads to congenital subluxation of the wrist.

Carpal Blocks This is a relatively uncommon diseases characterized by fusion of two or more carpal bones.

Lower Limb Anomalies

Developmental Coxa Vara Both sexes are equally affected. The changes are short femoral neck and an angle of less than 120°, osteoporotic head and elevated greater trochanter producing short limb (>5 cm), and degenerative joint disease in adulthood.

Tarsal Blocks The most common are talocalcaneal, calcaneonavicular, and talonavicular coalition.

Skeletal Deformities

Scoliosis

This anomaly is based in the lateral curvature of the spine with rotation of the vertebrae and spinous processes toward the concavity where the ribs are approximated among them, being pedicles and laminae thinner and shorter than normal. There is a cuneiform aspect of the vertebra. Several types are observed: the idiopathic type is the most common (80%) appearing at 10–12 years and being inherited and familial (30% of the cases), followed by the paralytic type that is commonly located at the thoracic–lumbar level. The less frequent type is the secondary to localized spinal malformations.

Bone Tumors

A tumor is a cellular proliferation without the control of normal growth-regulating mechanism. Benign tumors show limited growth potential, meanwhile malignant neoplasms manifest much greater growth autonomy and this leads to invasion of other organs.

Benign Bone Tumors

Osseous Origin Button osteomata are solitary, slow-growing tumors of compact bone, usually involving the cranial vault but may involve sinuses and orbit. Adult males are more affected.

Ossifying fibroma typically affects adolescents and young adults. Jaws and, uncommonly, diaphyses and metaphyses of long bones (tibia, showing anterior bowing) are the most involved bones (the epiphyses are spared). Osteolysis and cortical thinning and expansion are the typical features (Aufderheide and Rodríguez-Martín 1998).

Osteoid osteomata affect children and adolescents and are relatively common. Males are twice as likely to be affected. Osteoid osteomata tend to be small and have solitary foci involving the end of diaphyses of the bones of the lower limb, within the cortex, showing peripheral sclerosis.

Vascular Origin Hemangiomas are tumors that affect middle-aged individuals and involve the vertebrae and the skull. The lesions are cystic cavities showing thickened vertical trabeculae.

Fibrous Origin Nonossifying fibroma (fibrous cortical defect) affects children. The skeletal changes include a solitary, eccentric, and well-demarcated lesion at the metaphysis of the femur and tibia which produce cortical erosion with sclerotic margins. Pathological fractures can occur.

Cartilage Origin Osteochondroma (exostosis). This lesion accounts for almost half of all benign bone tumors, affecting individual under 30 years. It is usually located on metaphyses of the lower femur and upper tibia, as a projection of the bone surface with a core of trabecular bone continues with that of the metaphysis and covered by normal cortex. The size varies and the shape may be sessile or pedunculated.

Enchondromas are common tumors involving short bones as an intramedullary lytic lesion. Although the cortex is usually spared, pathological fractures can occur.

Miscellaneous Tumors

Giant cell tumor appears in the third to fourth decades like a locally aggressive lesion (lytic and eccentric, without sclerosis), located at the epiphyseal end and at the metaphyses of long bones.

Primary Malignant Tumors

Osseous Origin Osteosarcomas (osteogenic sarcomas) are the most common primary neoplasm of bone (20% of all bone tumors) and affect children, adolescents, and young adults (mostly males). 50% are osteoblastic, being central or parosteal (periosteal and intracortical are very rare), and the metaphyses are usually affected. The common pathological findings are "sunburst" pattern, Codman's triangle, and certain degree of sclerosis.

Cartilage Origin Chondrosarcomas are the second most common malignant primary tumor of bone and involve the medullary cavity of the femur and tibia at the metaphysis showing defects with scalloped and poorly defined inner cortex. Adults are most commonly affected.

Metastatic Tumors

Most malignant skeletal lesions are metastases, appearing in individuals over 40–50 years. The most metastasizing are prostatic carcinoma and breast carcinoma, and the most involved bones are vertebrae, pelvis, ribs, major limb bones, sternum, and skull. The lesions are usually osteolytic, while most prostatic metastases are osteoblastic.

Circulatory Disturbances of Bone

Osteochondritis Dissecans (König Disease)

This condition affects males more than females, at 10–25 years. Its etiology is not completely known (idiopathic, vascular factor, trauma). It is a benign, noninflammatory condition of the diarthrodial joints (especially femoral condyle, talus, and elbow), showing foci of skeletal necrosis being the cartilage spared. The typical feature is a craterlike lesion which may range from several millimeters to centimeters in size. The lesions are most commonly unilateral and sporadic although familial cases have been observed (probably CE).

Osteochondrosis

Osteochondrosis affects individuals of less than 10 years, mainly males. The etiology is varied (trauma, steroid therapy, idiopathic). It is a benign and noninflammatory condition of the apophysis and epiphysis. Multiple involvements may occur. The typical lesion shows increased bone density at the beginning and then subchondral radiolucency leading to the collapse of the articular surface and joint fragmentation producing joint deformity.

Cross-References

- ▶ Bone, Trauma in
- ▶ Children in Bioarchaeology and Forensic Anthropology
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Imaging Techniques in Bone Analysis
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology

References

Aufderheide, A.C., and C. Rodríguez-Martín. 1998. *The Cambridge encyclopedia ofhuman paleopathology*. Cambridge: Cambridge University Press.

Burns, K.R. 1999. *Forensic anthropology training manual*. Upper Sadle River: Prentice Hall.

Krogman, W.M., and M.Y. Iscan. 1986. *The human skeleton inforensic medicine*. 2nd ed. Springfield: Thomas.

Maples, W.R. 1984. The identifying pathology. In *Human identification*, ed. T.A. Rathbun and J.E. Buikstra, 363–370. Springfield: Thomas.

Ortner, D.J., and W. Putschar. 1985. *Identification of pathological conditionsin human skeletal remains*. Washington (DC): Smithsonian I.P.

Pickering, R.B., and D.C. Bachman. 1997. *The use of forensicanthropology*. Boca Ratón: CRC.

Reichs, K.J. 1986a. Forensic implications of skeletal pathology: Sex. In *Forensic osteology*, ed. K.J. Reichs, 112–142. Springfield: Thomas.

Reichs, K.J. 1986b. Forensic implications of skeletal pathology: Ancestry. In *Forensic osteology*, ed. K.-J. Reichs, 196–217. Springfield: Thomas.

Rodríguez-Martín, C., M. Martín Oval, and A. Patiño. 2005. Patología ósea en el abuso y maltrato físicos. *ERES-Serie de Arqueología-Bioantropología* 13: 37–53.

Rogers, S.L. 1987. *Personal identification from humanremains*. Springfield: Thomas.

Steinbock, R.T. 1976. *Paleopathological diagnosis and interpretation*. Springfield: Thomas.

Stewart, T.D. 1958. The rate of development of vertebral osteoarthritis in American whites and its significance in skeletal age identification. *The Leech* 28: 144–151.

Ubelaker, D.H. 1989. *Human skeletal remains*. 2nd ed. Washington: Taraxacum.

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Basic Biographical Information

Anthropologist, social theorist, and activist-critic, Thomas Carl Patterson was born on November 5, 1937, in Rutland, Vermont. He received his B.A. in Anthropology from the University of California, Riverside (1960), and his Ph.D. in Anthropology from the University of California, Berkeley (1964). He held teaching positions at Berkeley, briefly, and then at Harvard, Yale, and Temple Universities before joining the faculty at the University of California, Riverside, in 2000. During field research in Peru in the 1960s, civil unrest paralleling events at home in the United States led him to question mainstream approaches to understanding social order and change. Reading Marx opened what Patterson found more effective lines of thinking, and since then, his writings and activism have reflected his commitment to social justice, informed by a profoundly Marxist perspective. A critical autobiographical statement (Patterson 2003: vii–xvi) gives a fuller account, complemented by a thoughtful perspective from Latin America (Tantaleán 2011).

Major Accomplishments

Patterson's initial research addressed socioeconomic, demographic, and environmental topics in ancient South America, drawing on settlement patterns, pottery, and stone tools as primary evidence (1971). In the first decade of his career, publications ranged widely in context, from earliest human occupation through Inca times, and across Andean South America's coast and highlands. His analytic and reporting skills emerged in his earliest publications, including his dissertation on the Miramar and Lima pottery styles of Peru's central coast (1966); analyses reported therein are

fundamental reference points today. His research is so solid that, in 1971, for the South America volume of a landmark synthesis of American archaeology, Gordon R. Willey cited Patterson's unpublished, preoral reviews of South American research as key sources.

Patterson's methods and interpretations fit comfortably in archaeological frames of the time, showing little yet of the theoretical and political transformations he was experiencing. Through the late 1970s, Patterson worked out his new ways of thinking largely in teaching, not publications (personal communication). Classroom settings have often inspired his subsequent writing, in textbooks and other venues (1983b, 1997a). His attentive mentoring has boosted countless students and colleagues, including the 30-plus whose dissertations he has supervised through 2010.

By the early 1980s, transformations in his thinking were rendered firmly in print. He openly challenged positivist, ahistorical approaches to past societies, arguing that historical materialism yielded deeper, more compelling insights about people's lives. This standpoint was first explicit in writings on class and state formation in Peru (1983a), interpretations that coalesced in his book on *The Inca Empire* (1991), and a cross-cultural, edited volume of concepts, processes, and case studies (Patterson and Gailey 1987). He has since pursued such analysis in other settings as well (1997b).

Also in the 1980s, Patterson embarked on critical social histories of theory and practices in archaeology and anthropology, especially in the USA and Latin America (1989). His work in this domain accelerated in subsequent decades (1994, 2001), especially as he wrote more about social inequalities of race, class, gender, and other forms of social diversity (Patterson and Spencer 1994; Patterson 1995, 1997a; Susser and Patterson 2001). He remains deeply concerned with the intersection of such unequal positions and the politics in which they are embedded, including challenges to free speech and academic freedom, and the politics of knowledge production. He has been active in civil rights and antiwar demonstrations at home, solidarity with oppressed peoples abroad, and labor unions, supporting strikes and rights to organize. Patterson participated as well in actions giving rise in 1986 to a newly independent World Archaeological Congress (WAC), the aftermath of conflicts over including South African scholars and protesting apartheid. Theory and praxis are inseparable for him.

Patterson has continued critical consideration of theoretical trends in archaeology, placing in historical contexts the provisions of and tensions among such perspectives as processualism, post-processualism, and postcolonialism (2008a). He frequently critiques archaeologists' failure to recognize the widespread political and economic change wrought by capitalism and their use of interpretive models based in capitalist experience to interpret pre- or noncapitalist situations (2008b). In counterpoint, he applauds the union of theory and praxis in Latin American social archaeology (1994; Tantaleán 2011) and other expressions of social engagement, including Indigenous, feminist, and Marxist archaeologies.

As a social theorist, Patterson seeks to articulate archaeology more firmly with history, economics, and other social scientific and humanistic disciplines, beyond its home in the USA within anthropology (2008b). He also believes firmly in an integrated anthropology, of which archaeology is only one part. At the same time, he advocates and embodies moving beyond one's country, culture, and language of origin, connecting with diverse scholars and intellectual traditions. Increasingly his attention overtly encompasses explanations for social order and change today, expanding on early concerns for historical inclusiveness; *Change and Development in the Twentieth Century* (1999), for example, evaluates perspectives on this very recent period based in works of Weber, Durkheim, and Marx.

Combining social theory, archaeology, and his historical sensibilities, Patterson has turned to examining intellectual biographies of scholars he views as fundamental contributors. He began with Marx, with whose ghost whom Patterson (2003) contended archaeologists hold continuing conversations. In 2004, Patterson and Charles Orser reproduced select writings of V. Gordon Childe,

who, as a scholar-activist, intellectual, and Marxist, became "one of the most eminent archaeologists in the twentieth century" (p. 1).

Fittingly, Patterson (2009) returned to Karl Marx, assessing what the latter thought about nascent anthropological ideas and findings and what his legacies to today's discipline are. Archaeology takes backstage in this book, but from the preface on, it reveals much about Patterson and the integration of his archaeological and anthropological thinking.

In research, teaching, and publication, Patterson keeps expanding themes established at varied points in his career. He works on projects as varied as race and the history of anthropology, class conflict and state formation in archaeology contexts, and from the deep past to the present, changing political economy in southern California's Inland Empire. He continues confronting inequities, through practices in archaeology, anthropology, and daily life. His is truly a life unified in theory and praxis.

Cross-References

- ▶ Activism and Archaeology
- ▶ Critical Theory in Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ Inca State and Empire Formation
- ▶ Labor Archaeology
- ▶ Latin American Social Archaeology
- ▶ Marx, Karl
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Nationalism and Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Race in Archaeology
- ▶ Social Archaeology

References

Patterson, T.C. 1983a. The historical development of a coastal Andean social formation in central Peru, 6000 to 500 B.C. In *Investigations of the Andean past: Papers from the First Annual Northeast Conference of Andean Archaeology and Ethnohistory*, ed. D.H. Sandweiss, 21–37. Cornell Latin American Studies Program: Ithaca.

Patterson, T.C. 1991. *The Inca empire: The formation and disintegration of a pre- capitalist state*. Rev. ed. 1992. Oxford: Berg Publishers.

Patterson, T.C. 1994. Social archaeology in Latin America: An appreciation. *American Antiquity* 59 (3): 531–537.

Patterson, T.C. 1997a. *Inventing Western civilization*. New York: Monthly Review Press.

Patterson, T.C. 2001. *A social history of anthropology in the United States*. Oxford: Berg.

Patterson, T.C. 2003. *Marx's ghost: Conversations with archaeologists*. Oxford: Berg.

Patterson, T.C. 2009. *Karl Marx, anthropologist*. Oxford: Berg.

Patterson, T.C., and C.W. Gailey, eds. 1987. *Power relations and state formation*. Washington, DC: Archeology Section, American Anthropological Association.

Further Reading

Patterson, T.C. 1966. *Pattern and process in the early Intermediate period pottery of the central coast of Peru*. University of California Publications in Anthropology 3. Berkeley: University of California Press.

Patterson, T.C. 1971. The emergence of food production in central Peru. In *Prehistoric agriculture*, ed. S. Struever, 181–208. Garden City: American Museum Sourcebook, Natural History Press.

Patterson, T.C. 1983b. *The theory and practice of archaeology: A workbook*. Rev. ed. 1994, 2005. Englewood Cliffs: Prentice-Hall.

Patterson, T.C. 1989. Political economy and a discourse called Peruvian archaeology. *Culture and History* 4: 35–64.

Patterson, T.C. 1995. Archaeology, history, indigenismo and the state in Peru and Mexico. In *Making alternative histories: The practice of archaeology and history in non-Western settings*, ed. P. Schmidt and T.C. Patterson, 69–85. Santa Fe: School of American Research Press.

Patterson, T.C. 1997b. *Las sociedades nucleares de Mesoamérica*. Caracas: Historia General de America, Academic de Historia Nacional.

Patterson, T.C. 1999. *Change and development in the twentieth century*. Oxford: Berg.

Patterson, T.C. 2008a. A brief history of postcolonial theory and its implications for archaeology. In *Archaeology and the postcolonial critique*, ed. M. Liebmann and U.Z. Rizvi, 21–34. Lanham: AltaMira/Roman & Littlefield.

Patterson, T.C. 2008b. Archaeological representations of the economy. In *Economic representations: Academic and everyday*, ed. D.F. Ruccio, 139–153. London/New York: Routledge.

Patterson, T.C., and C.E. Orser, eds. 2004. *Foundations of social archaeology: Selected writings of V. Gordon Childe*. Walnut Creek: AltaMira Press.

Patterson, T.C., and F. Spencer. 1994. Racial hierarchies and buffer races. *Transforming Anthropology* 5 (1-2): 20–27.

Susser, I., and T.C. Patterson, eds. 2001. *Cultural diversity in the United States: A critical reader*. Oxford: Blackwell.

Tantaleán, H. 2011. El arqueólogo militante: Thomas Patterson y la práctica de la arqueología social. In *La arqueología social latinoamericana: de la teoría a la praxis*, ed. H. Tantaleán and M. Aguilar, 29–36. Bogotá: Editorial de la Universidad de los Andes.

Peabody Museum of Archaeology and Ethnology (Harvard University)

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Introduction

The Peabody Museum of Archaeology and Ethnology is one of the oldest anthropology museums in the world and the oldest anthropology museum in the United States. It is located in Boston, Massachusetts, and was founded on October 6, 1866, after philanthropist George Peabody gave a modest gift of $150,000 to Harvard University in support of a museum and a professorship of American archaeology and ethnology (Putnam 1898). Peabody was inspired to do this after his nephew, soon to be Yale Professor of Paleontology O. C. Marsh, approached him in 1865 about his avocational interests in the nascent field of American archaeology (Putnam 1898).

The museum holds around 10 million items. About 2.5 million items, roughly one quarter of the museum's collection, are from North America (Peabody Museum of Archaeology and Ethnology 2013). Perhaps one of the most celebrated parts of the North American materials is the largest surviving collection of objects from the Lewis and Clark expedition. The museum's Central American collections include an impressive array of Mayan and Aztec artifacts and monument casts. The South American collection contains items from the Amazon basin, Bolivia, and Peru, including an impressive array of Peruvian textiles and quipus. (Peabody Museum of Archaeology and Ethnology 2013). This collection also includes materials from Asia, Africa, Oceania, and Europe. The museum's archives are also rich and include 500,000 historical photographs, hundreds of paintings and drawings, and numerous research records. Today, much of the Peabody Museum's collection can be accessed and viewed online.

Key Issues

The museum's first curator was Dr. Jeffries Wyman, who graduated from Harvard College in 1833 and Harvard Medical School in 1837, and was appointed as curator in 1866. Wyman, who had also served as the Hersey Professor of Anatomy at Harvard College since 1847, held both positions until his death in 1874. As the first curator, Wyman worked diligently to grow the museum's collections, which had grown to some 8000 items by the time of his death (Browman 2002). He accepted donations from scholars and colleagues, including Harvard University's Louis Agassiz, Alexander Agassiz, and Henry David Thoreau. Wyman also purchased thousands of artifacts from Europe and led several expeditions throughout Maine, Massachusetts, and Florida to collect his own specimens as well (Browman 2002). These first collections were initially assembled in Wyman's laboratory in Harvard's Boylston Hall and then in the Anatomical Museum, until construction of the Peabody Museum was completed in 1878.

Frederic Ward Putnam, a former student of Wyman's and Agassiz's, was appointed the second curator shortly after Wyman's death and a brief interim curatorship by Asa Gray. Putnam held this position from 1874 until 1909. Called the father of American archaeology by his contemporaries, Putnam worked to establish the Peabody Museum as more broadly focused on archaeology, physical anthropology, and ethnology (Browman 2002). Under Putnam's guidance, Ohio's Serpent Mound was purchased and Serpent Mound Park was established (Putnam 1898). It was not until 1886 that the professorship was actually established, which was filled initially by Putnam (Putnam 1898). Less than a decade later, Putnam helped create a series of exhibits for the

1893 World's Colombian Exposition in Chicago, where Franz Boas served as one of his assistants. Under Putnam's guidance, the artifact collections and library holdings expanded at such a fast rate that by 1889 an addition was built that more than doubled the museum's square footage. Immediately prior to the close of the century in 1897, the Peabody Museum officially merged with Harvard University.

Frederic Putnam facilitated the establishment of the Peabody Museum Press in 1888, which continues to publish monographs, reports, and other papers (Peabody Museum of Archaeology and Ethnology 2013). These include the *Papers of the Peabody Museum of Archaeology and Ethnology*, which has highlighted many of the 800 expeditions that the museum has supported across the globe (Spencer 1997). Through the Peabody Museum and their Central American Expedition Fund, some of the earliest research was conducted on sites such as Copan (1891–1900), Seibal (1895), and Chichén Itzá (1904–1910). Gordon Willey, who joined the Peabody Museum in 1950, continued to explore some of these earlier sites in the Yucatan.

The museum's first ethnological expedition took place in Peru and Bolivia between 1906 and 1909, led by William Curtis Farabee. Decades later the museum supported John Marshall's ethnographic research in the Kalahari Desert from 1950 to 1961 (Peabody Museum of Archaeology and Ethnology 2013). This research inspired John Marshall and Robert Gardner to found the Harvard Film Studies Center through the Peabody Museum in 1957. Some of the earliest ethnographic films produced here include classics like John Marshall's *The Hunters* (1957) and Robert Gardner's *Dead Birds* (1963).

Current Debates

After the 1990 passage of the Native American Graves Protection and Repatriation Act (NAGPRA), the Peabody Museum founded a repatriation office that has been working to repatriate human remains, funerary objects, sacred objects, and objects of cultural patrimony. This has been an ongoing task, considering that the museum's collection included roughly 22,000 sets of human remains (Bethell et al. 2004). Not all remains fall under the jurisdiction of NAGPRA, as the Peabody Museum's osteological collection originates from more than eighty countries and six continents (Peabody Museum of Archaeology and Ethnography 2013).

The Peabody Museum currently supports three research labs: the Gordon R. Willey Laboratory for Mesoamerican Studies, the Paleoanthropology Lab, and the Zooarchaeology Lab (Peabody Museum of Archaeology and Ethnology 2013). Current projects include a 3D scanning project on Mayan monuments (started in 2007), the Corpus of Maya Hieroglyphic Inscriptions Program (started in 1968), the Harvard Yard Archaeology Project (started in 2005), and excavations at Magdalena de Cao Viejo (started in 2004) (Peabody Museum of Archaeology and Ethnology 2013). In 2012, the Peabody Museum became part of the Harvard Museums of Science and Culture consortium, which includes six other Harvard University museums.

Cross-References

- ▶ Heritage Museums and the Public
- ▶ Human Remains in Museums
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ North America (USA and Canada): Museums

References

Bethell, J.T., R.M. Hunt, and R. Shenton. 2004. *Harvard A to Z*. Cambridge: Harvard University Press.

Browman, D.L. 2002. Frederic W. Putnam, and the rise of U.S. anthropology, 1866–1903. *American Anthropologist* 104 (2): 508–519.

Peabody Museum of archaeology and Ethnology. 2013. Available at https://www.peabody.harvard.edu/. Accessed 26 Apr 2013.

Putnam, F.W. 1898. *Guide to the Peabody Museum of Harvard University, with a statement relating to instruction in anthropology*. Salem: The Salem Press Company.

Spencer, F. 1997. *History of physical anthropology: An encyclopedia*, volume 1, A-L. New York: Taylor and Francis.

Peach: Origins and Development

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Basic Species Information

Peaches (including nectarines), *Prunus persica* (L.) Batsch. syn (*Amygdalus persica* L.), are the edible fruit of a deciduous tree belonging to the subfamily Prunoideae (family Rosaceae), which also includes apricots, cherries, plums, and almonds. Some taxonomists maintain peaches and almonds are very closely related within the genus *Amygdalus*. The name peach derives from the Greek *Persikon malon* for "Persian apple" into Latin *malum Persicum*, which became *pêche* in French and peach in Middle English. Although first cultivated in China, the name *persica* stems from the pre-nineteenth-century European belief that this tree originated in Persia (Bassi and Monet 2008). Nectarines are smooth-skinned hairless varieties of peach (*Prunus persica* (L.) Batsch var. *nucipersica* (Suckow) C. K. Schneid.), and they might have originated more than once as a mutant within peach groves. Nectarine stones are indistinguishable from other peaches, meaning that archaeobotanically their origins cannot be traced, but some early written sources have been interpreted as indicating the presence of nectarines as early as 2,000 years ago in the Mediterranean.

Major Domestication Traits

Wild forms of peach grow in central and eastern Asia and these are interfertile with cultivars (Zohary et al. 2012). Self-compatibility seems associated with cultivation. All related species are self-incompatible (Ladizinsky 1998), while under cultivation selfing assures higher fruit production rates. It is likely that the peach arrived in the Mediterranean, represented in Greek texts from Persia before 300 BCE (Zohary et al. 2012), having spread from Central Asia and northwest India earlier still. Peaches were then spread more widely in Europe by the Roman army.

The earliest diploid *Prunus* probably arose in Central Asia splitting into the ancestral species of *P. persica*, which then evolved in north and northwest China (Bassi and Monet 2008). True wild peaches are generally regarded as native to northern China (Lu and Bartholomew 2003), but the progenitor populations of cultivars may be extinct given the massive anthropogenic transformation of the Chinese landscape. Some authorities point to *Prunus davidiana* (Carr.) as the closest wild relative (e.g., Scorza and Okie 1990), and this species is prominent in breeding research to improve peaches. *P. davidiana* occurs in middle elevation thickets throughout the hills of northern, western, and southwestern China (Lu and Bartholomew 2003). Wild peaches *P. persica* are also reported as "escapees" from cultivation especially in northwest China.

There is vast diversity within the modern cultivars (Bassi and Monet 2008). Most peach subspecies have a chilling requirement of between 600 and 1,000 h and require heat to mature the crop so their range is limited to warm temperate, continental regions, or high altitudes. They are found just above 3,000 m in parts of the Himalayas. The trees can tolerate low temperatures (to −30 °C) but the buds and flowers are susceptible to frost.

The fruit is a drupe with a soft mesocarp and pubescent, velvety (peach), or smooth (nectarine) exocarp. The endocarp is lignified and corrugated with deep furrows and pits on the outer surface (Fig. 1). The patterning on this, including deep double groves near the suture of the endocarp's two halves, allows relatively small fragments to be identified. There is a pronounced ridge along the ventral suture and sometimes a very acute tip at the apex. Inside this hard shell is the starchy kernel. The seed can contain high levels of hydrogen cyanide. Nevertheless, with detoxification it is likely that these kernels were food resources in parts of Neolithic China (Hosoya et al. 2010).

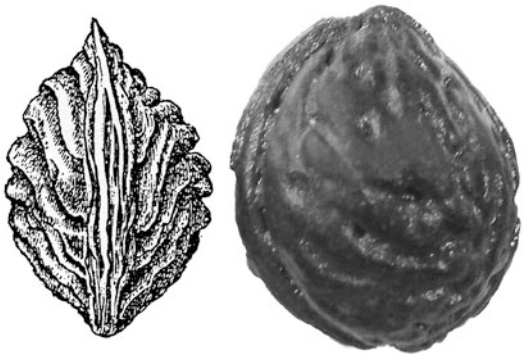

Peach: Origins and Development, Fig. 1 At the *left* is a drawing of a peach endocarp, showing the distinctive longitudinal furrows. (After Darwin 1868), at the *right* is a photograph of a Neolithic waterlogged peach stone (*P. persica/davidiana* type from Tianluoshan, Zhejiang (6500–7000 BP)) (Photo by DQ Fuller)

Timing and Tracking Domestication

While there has been documentary evidence for peach cultivation in China for over 3,000 years (Bassi and Monet 2008), archaeological evidence is even earlier. Determining, however, when wild gathering turned to propagation remains a challenge. Sites in the middle and lower Yangtze regions (extending back to 7000–8000 BP) have peach stone finds (of either *P. persica* or *P. davidiana*), such as Bashidang, Hunan (7000–6000 BP); Chengtoushan, Hunan (4500–4000 BCE); Kuahuqiao, Zhejiang (6000–5400 BCE); and Hemudu and Tianluoshan, Zhejiang (4900–4600 BCE) (Table 1 Hosoya et al. 2010). Peaches also occur in central China, along the Yellow River region from the Yangshao period onwards (about 6000 BP), but with more frequency from c. 5000 BP. It may be that systematic cultivation only began at this time. However, reports of peach from a Jomon site in Japan (Kiriki, Nagasaki) dating to 5500–6000 BP (D'Andrea 2007) could point to an earlier period of propagation and translocation.

There can be no doubt that by 4000 BP peaches were cultivated, as it is around this time that they are first introduced to northwest India. Here, they are reported from late Neolithic Kashmir and together with apricots can be attributed to a "Chinese horizon" of crops introduced via Central Asia at this period (Boivin et al. 2012).

The introduction further west into Persia remains to be better documented, but classic written sources from the fourth century imply that it was already well established there. In the Mediterranean the earliest finds are from the seventh-century BCE Heraion, Samos (Zohary et al. 2012). By the first century BCE, Romans were cultivating peaches in southern Europe, Israel, and Egypt. During the Roman period Pliny (CE 79) describes how the peach had recently been imported into Europe from Persia and Egypt from Rhodes (Bassi and Monet 2008). Peach is recorded at 32 Roman period sites in Europe, most in the south. The northern sites are military settlements so it is likely any peaches were imports (Bakels and Jacomet 2003). A second route to Europe could have been via the Black Sea and Danube. By the Middle Ages France had become a major producer and the peach reached the Americas by the first half of the sixteenth century (Bassi and Monet 2008). The earliest mention of nectarine varieties is in the fourteenth century CE.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Apricot: Origins and Development
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Bakels, C., and S. Jacomet. 2003. Access to luxury foods in central Europe during the Roman period: The archaeobotanical evidence. *World Archaeology* 34 (3): 542–557.

Bassi, D., and R. Monet. 2008. Botany and taxonomy. In *The peach: Botany, production and uses*, ed. D.R. Layne and D. Bassi, 1–30. Wallingford: CAB International.

Boivin, N., D.Q. Fuller, and A. Crowther. 2012. Old World globalization and the Columbian exchange: Comparison and contrast. *World Archaeology* 44 (3): 452–469.
D'Andrea, C.A. 2007. The dispersal of domesticated plants into north eastern Japan. In *The emergence of agriculture: A global view*, ed. T. Denham and P. White, 154–173. Oxford: Routledge.
Darwin, C. 1868. *The variation of animals and plants under domestication*. London: John Murray.
Hosoya, L.A., M. Wollstonecroft, D. Fuller, and L. Qin. 2010. Experimental pilot study of peach/apricot kernel detoxification: For reconstruction of Chinese early rice farmers broad spectrum subsistence strategy. In *Studies of landscape history of East Asian inland seas*, ed. K. Makibayayashi and M. Uchikado. Kyoto: Neomap Project, Research Institute for Humanity and Nature (RHIN).
Ladizinsky, G. 1998. *Plant evolution under domestication*. Dordrecht: Kluwer Academic Publishers.
Lu, L., and B. Bartholomew. 2003. Amygdalus. In *Flora of China*, ed. Z.Y. Wu and P.H. Raven, vol. 9, 391–395. St. Louis: Missouri Botanical Garden.
Scorza, R., and W.R. Okie. 1990. Peaches. In *Genetic resources of temperate fruit and nut crops*, ed. J.R.B. J.N. Moore, 117–231. Wageningen: International Society of Horticultural Science.
Zohary, D., M. Hopf, and E. Weiss. 2012. *Domestication of plants in the Old World*. Oxford: Oxford University Press.

Pedra Furada, Archaeology of

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Introduction

The peopling of America is still one of the most controversial issues of world prehistory, regarding its chronology, number and routes of population waves, and palaeoanthropology. As well as some other case studies, the "question" is the result of (seldom undeclared) contentions in different domains, such as methodological perspectives, intrinsic data limitations and – finally – academic traditions and relationships. From 1927 onward, when the discovery at Folsom (New Mexico, USA) of a lithic spearpoint plunged into the ribs of an extinct bison symbolically launched the acceptance of Paleo-Indian peopling of North America, many sites have been proposed as much older than the limit between Pleistocene and Holocene, conventionally fixed at 12 ky BP. Few of them, nevertheless, have survived careful revision and screening of their evidence, for chronological, taphonomic or strictly archaeological reasons (Dillehay and Meltzer 1991; Dillehay 2010).

Definition

Pedra Furada (the abbreviation of Toca do Boqueirão da Pedra Furada) is a sandstone rockshelter in the southeastern portion of Piaui state, North-Eastern Brazil (8°50′ 09" South, 42°33′20 West), 30 km northeast of the town of São Raimundo Nonato (Fig. 1). The relevance of the site is due to its very old dates, spanning from 5 to at least 60 ky BP for a sequence of occupation layers and stone tools, and to the consequent debate issued about the chronology of first peopling of the Americas. The site is very well dated by a coherent radiocarbon sequence, but it did not provide human fossil remains, so the burden of proof of the consistence of the human presence leans entirely on the cultural origin of archaeological structures, hearths and lithic industries, just the matter of contention. The site has been excavated first by Niéde Guidon between 1978 and 1987, and then by Fabio Parenti from 1987 to 1988 (ongoing report in Guidon and Delibrias 1986; Delibrias et al. 1988; Parenti et al. 1990; Bahn 1993), and entirely published by the latter (Parenti 2001); new researches are still (2012) underway by a French–Brazilian team led by Eric Boeda.

Historical Background

Pedra Furada, as well as many important sites in South-Eastern Piaui, was discovered in the seventies by a French–Brazilian team led by Niéde Guidon, a former student of André Leroi-Gourhan, sponsor of the *Serra da Capivara* National Park (http://www.brasil.gov.br/localizacao/

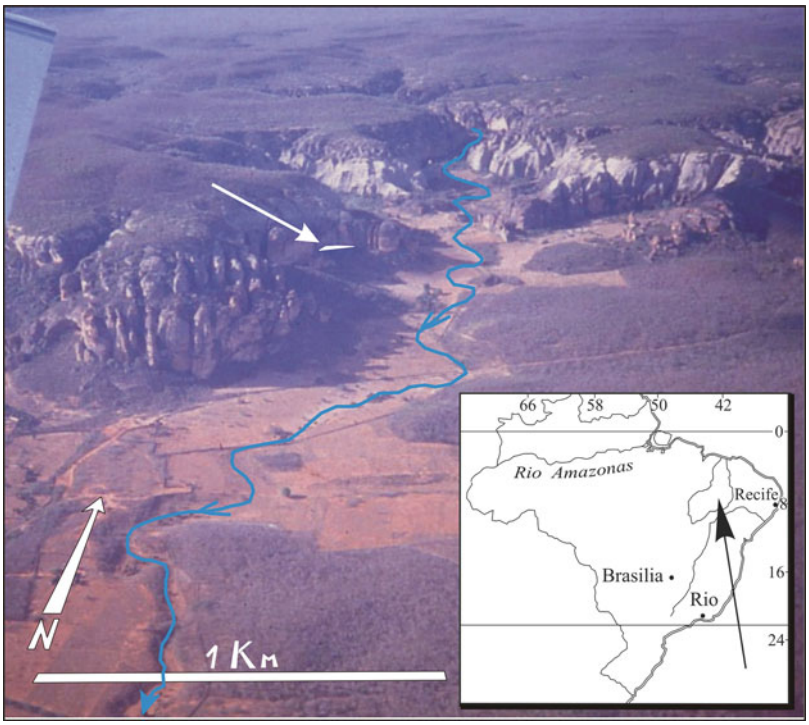

Pedra Furada, Archaeology of, Fig. 1 Aerial view of *Baixão* da Pedra Furada, looking North. The canyon is entailed in the Devonian *Serra Grande* formation. *White arrow* pointing to shelter. The total height of *cuesta* is about 150 m. (Modified from Parenti 2001)

parques-nacionais-e-reservas-ambientais/parque-nacional-serra-da-capivara-pi%20) and responsible from 1987 onward for the *Fundação Museu do Homem Americano*, an important international resea rch center in São Raimundo Nonato (www.fumdham.org). The team was, at that time, surveying the a rea of the Siluro-Devonian sandstone *cuesta* of southern Piaui, where many painted shelters had been signaled by local authorities. Some of them were tested, in search for a firm chronology of figurative and geometric prehistoric paintings and engravings, so richly diffused in brazilian *Planalto*, Amazon and *Nordeste* regions. Pedra Furada itself was first tested in 1978 and 1980, obtaining surprisingly old (final Pleistocene) radiocarbon dates from charcoal and *cuvette* fireplaces. Regular excavations took place in 1982, 1984, 1985, and 1987 in the western portion of the shelter (grossly 30% of the whole filling), under the direction of Niéde Guidon, a nd from 1987 to 1988, Fabio Parenti led excavations on the remaining 60% of the eastern side.

During the 10 years of excavation process at Pedra Furada, some important changes took place, both in American prehistory itself, such as the research in Monte Verde (Chile) (Meltzer et al. 1997) and the contention on some "robust" Pre-Clovis sites as Meadowcroft (USA), and in methodological and technical terms: a more generalized adoption of middle-range strategy in South American archaeology and the diffusion of thermoluminescence (TL) and accelerator-mass-spectrometry (AMS) dating. For almost 10 years, Pedra Furada has been the spear point of the oldest South American sites challenging the Clovis-first model for the peopling of Americas, but today its informative potential is largely underestimated, both because of its uniqueness in South American archaeological context, but also because of the intrinsic nature of the debate on antiquity of peopling, with an exhausting succession of announcements and dismissals, and the lack of fully Pleistocenic human remains in Americas.

Key Issues/Current Debates

The sheltered area (around 700 m^2) is located at bottom of a sandstone overhang, 70 m high, composed by cross-stratified estuarine sandstone of *Serra Grande* Formation of the Piaui-

Maranhão basin. The site, facing South, is quite open to sunshine during November and December, but gently shadowed in the rest of the year, providing a remarkable standpoint at the entrance of one of main canyons of the region (*Boqueirões*), as proven by number of archaeological sites upstream (Fig. 1). The shelter is surrounded, East and West, by two waterfalls, still active today, eroding the uppermost conglomerate of the cliff (Fig. 2). The eastern waterfall, the highest, at the bottom of which there is a talus of quartz cobbles, is the main source of raw material (and geofacts)both in Pleistocene and lower Holocene times, and this is what led to the dismissal of the oldest archaeological units by many authors. The features of gravitative fracture occasionally observed on some pebbles and cobbles have been measured both on western and eastern waterfalls on a sample of 2000 stones >32 mm, and applied to the selection of purported lithic industries (details in Parenti 2001: 135–150). It resulted that the waterfalls produced no cobbles with more than three clear flake-scars >10 mm, no bifacial trimmed pieces, nor uncortical butts on pseudo-flakes.

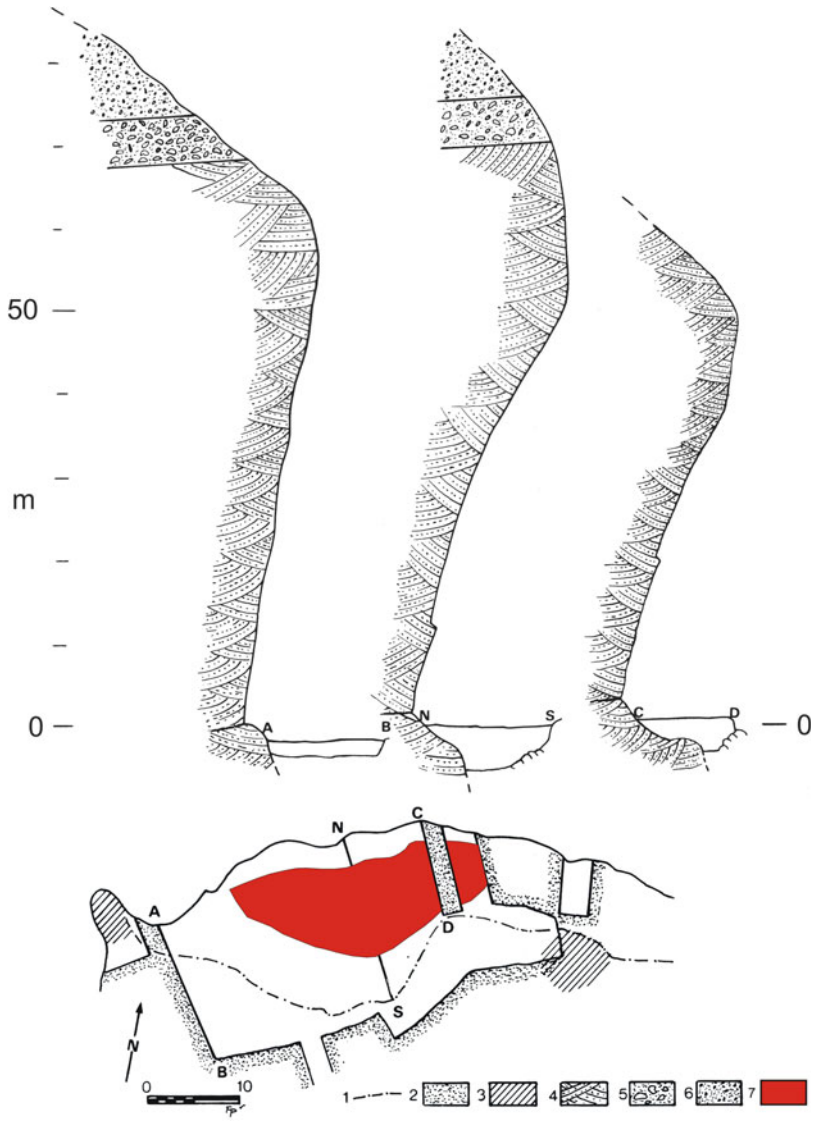

Pedra Furada, Archaeology of, Fig. 2 Wall sections and position of waterfalls: (*1*) dripline; (*2*) unexcavated deposit (1988); (*3*) top surface interested by waterfalls; (*4*) Devonian cross-stratified sandstone of *Serra Grande* formation; (*5*) conglomerate with quartz cobbles; (*6*) conglomerate with quartz pebbles; (*7*) maximum occupied surface in *Pedra Furada* phase (Pleistocene), as defined by structures and hearths. (Modified from Parenti 2001)

The filling of the shelter, as is usual in the evolution of sandstone walls in tropical climate, has been allowed by repeated block collapses barring and protecting endogenous and anthropic sediment from erosion. The first are composed by disaggregating sand and sandstone slabs from the roof and by quartz cobbles from uppermost conglomerate layers; the last, anthropic component is made from cobbles and pebbles for stoneworking and boarding of fireplaces, selected on the talus or transported from outside, and the mineral fraction of past organic components such as plant or animal remains. Because the very acid siliceous sediment did not allowed conservation of bone remains older than 6–8 ky BP, we do know anything about Pleistocene fauna in this site, which makes correlation with opposite, fossiliferous, limestone caves (1.5 km) essential.

The whole archaeological sequence is contained in the 5 m of sediment fill, with an average East to West dip of 10° and a slight concavity in the middle (Fig. 3). The sandy and gravelous sedimentary matrix contains several charcoal lenses derived from the gentle slopewash of fireplaces, the stony boarders of which have sometimes been partially removed but mainly preserved in the uppermost eastern side.

Excavation technique from 1982 onward has been by "natural layers", i.e., simply paying careful attention to sedimentary structures and strata formation, at that time quite an innovative strategy in the context of Brazilian archaeology. A total of 2050 m^3 of sandy and gravelous sediments were removed, leaving a bulk for future research and specific analysis that was partly excavated by Boeda's team in 2010 but is still unpublished. Sediment inside the drip-line was dry-sieved (1 mm mesh) and every macroscopic remain was collected, mainly for the recovery of the overabundant charcoal fragments, both for dating and anthracological purposes. Basic sedimentological analysis was performed by Joel Pellerin (Centre National de la Recherche Scientifique, Caen, France) on the main section, and a detailed study of the remaining eastern block was conducted in 1996 by Evelyne Débard (Centre National de la Recherche Scientifique, Lyon, France), but it is still unpublished.

The chronology of the site was established on the basis of 55 (14 Holocene, 41 Pleistocene)

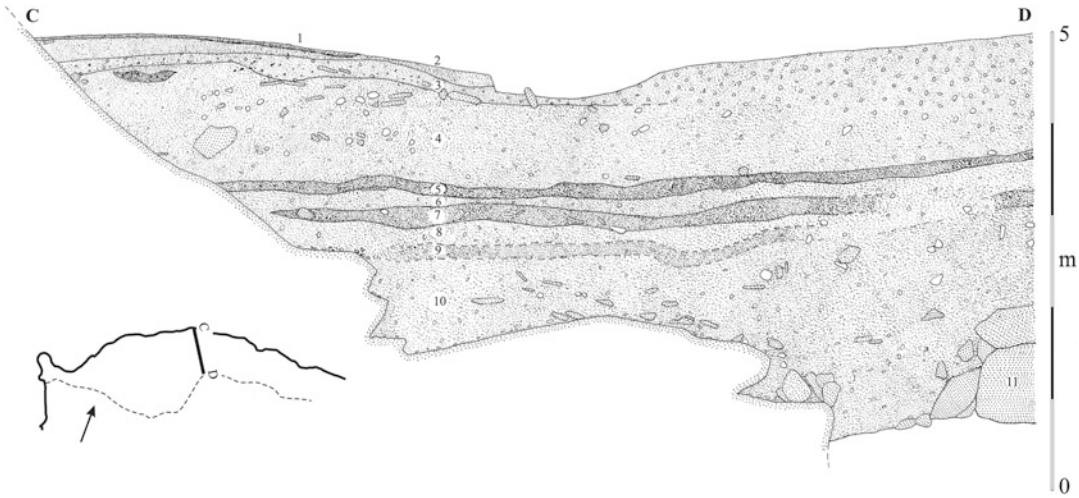

Pedra Furada, Archaeology of, Fig. 3 Western face of preserved block: (*1*) fine sand with ashes, charcoal and botanical macroremains (historical period); (*2*) fine sand, incised on the southern side by a channel dug in 1982; (*3*) medium sand with ashes and charcoal, with termite galleries; (*4*) medium sand with gravels; (*5*) charcoal lens in fine and medium sandy matrix; (*6*) medium sand with gravel; (*7*) charcoal lens in fine and medium sandy matrix, Southern limit is blurred; (*8*) medium sand with gravel; (*9*) sandy lens with charcoal, less than upper units, with blurred limits; (*10*) medium sand with some quartz pebbles in southern part, sandstones slabs; (*11*) bottom sandstone block collapse. *Vertical scale* refers to the whole height of the deposit. (Modified from Parenti 2001)

coherent radiocarbon dates by five different laboratories with standard 14C, AMS with acid-base-acid (ABA) and acid-base-wet (ABOX) pretreatments for samples older than 35 ky (Santos et al. 2003). The whole sequence is presented in Fig. 4. Moreover, 39 dates have been performed on heated quartz pebbles of the lowermost units of the eastern sector, yielding ages comprised between 35 and 150 ky BP (Valladas et al. 2003). The units dated both by radiocarbon and TL show an acceptable concordance, but the lowermost TL dated samples, reaching 160 ky, have been skeptically considered by the authors themselves because of possible reworking of the lower deposit or natural origin of fires. In sum, the Pedra Furada sequence is fully upper-Pleistocene and chronology is not a matter of contention per se, but the cultural content of it has been regarded as a fanciful conjecture by some colleagues (Meltzer et al. 1994), and, despite detailed reply (Parenti et al. 1996), the site is still waiting for full acceptance by archaeological literature.

Adopting the minimum duration for the total sequence (55 ky), we can roughly evaluate an average sedimentation rate of about 1 mm per 10 years, a serious challenge for any reasonable

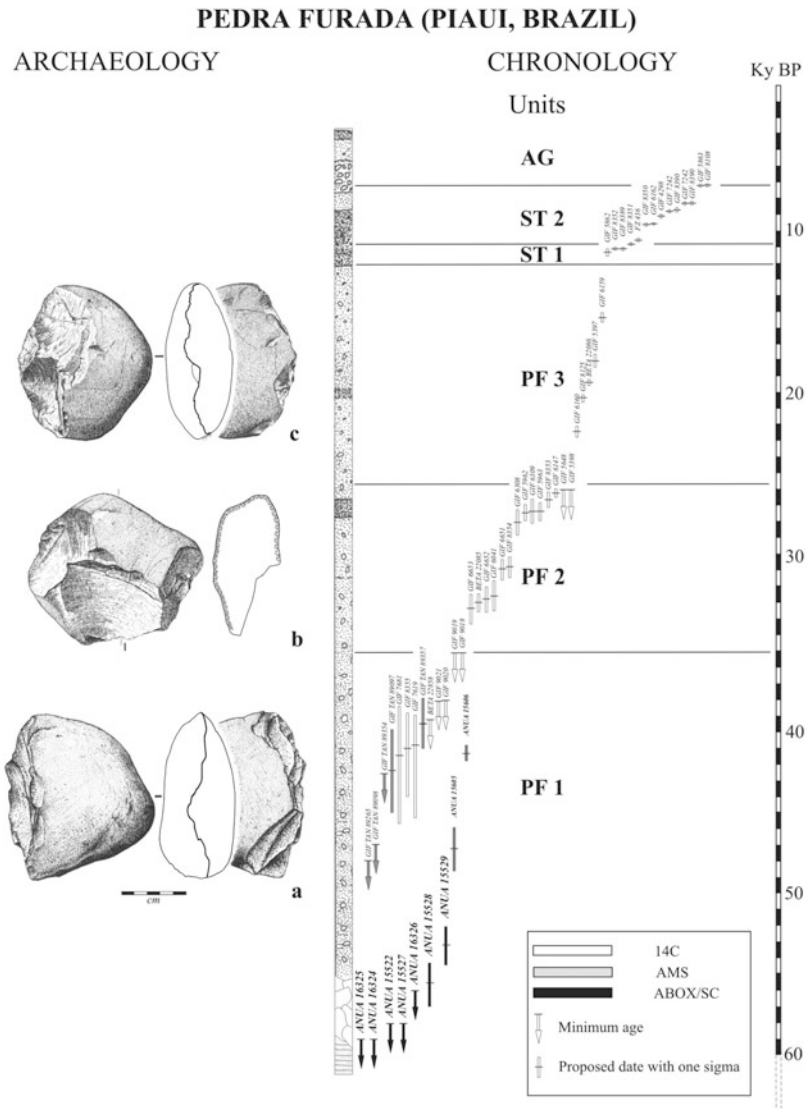

Pedra Furada, Archaeology of, Fig. 4 Uncalibrated radiocarbon chronology, cultural phases and sedimentary column. Note main hiatuses: 10.4–14.3 ky BP, 22–25 ky BP. Sedimentological symbols refer to main, central, and section. Artifacts are described in detail in Parenti 2001: Plates 54, 83, 94. (**a**) 18,637: bifacial trimmed pebble, quartzite; (**b**) 17,090: centripetal core, quartzite; (**c**) 15,778: bifacial trimmed pebble, quartzite. (Reprinted from Santos et al. 2003, with permission from Elsevier)

P

attempt of reconstructing "past behaviors" or similar paleoethnological mirages in this kind of deposit, which is, at least in the Pleistocene, a cumulative palimpsest (*sensu* Bailey) of probably occasional, episodic, visits for raw material procurement, or a temporary camp for other (archaeozoologically) unknown purposes; in the Holocene, the site became a more substantial "central place" in the context of ecotone landscape of sandstone *cuesta*, as strongly indicated by structured stratified hearths, lithic complex reduction sequences and art depiction.

On the basis of radiocarbon chronology, the position and correlation of sedimentary bodies, the sequence was subdivided in six units (Fig. 4), three for the upper Pleistocene, named *Pedra Furada* (PF) 1–3 layers, two for the lower *Serra Talhada* (ST) 1–2 and one for middle Holocene *Agreste* (AG). For the Pleistocenic phase (PF), this is partly an arbitrary subdivision, because the main sedimentological and cultural traits do not show relevant changes, either in lithic tradition or regarding the general pattern of site exploitation (Fig. 5).

Archaeological features have been described and interpreted on the basis of a morphological and technical analysis of their conservation and construction. In fact, the main goal at the time of the excavation was twofold: firstly, the distinction between anthropic and natural (sedimentary) origin in the disposition of structures (i.e., arrangement of cobbles, pebbles and sandstone slabs); secondly, the identification of the agents responsible for combustion. Bush fires in tropical landscape, both semi-arid as today, or wetter as in final Pleistocene, are trivial and we cannot exclude them at all; but they usually leave homogeneous combustion traces on the uppermost soil, at fairly low temperature. Moreover, the average 10° dip of the eastern talus of Pedra Furada caused episodic scour of smaller or lighter sedimentary particles, such as charcoal. In fact, the highest density of charcoal remains was recovered in the middle, lowest, portion of the site and so the observed, apparently "unheated", upstream structures could have perfectly pertained to fireplaces. Because of these taphonomic problems, we paid special attention to the position of heated stones all over the excavations; this led to the publication of an ongoing report (Parenti et al. 1990) in which, thanks to the contribution of TL techniques, we were able to demonstrate the non-chaotic position of heated elements of some of the oldest hearths of Pedra Furada 1 layer, i.e., their anthropic origin. On this basis, the following study (Parenti 2001: 109–132) of the whole body of identified structures (156, 86 of which were in *Pedra Furada* phase) was classified mainly on physical (presence of heated elements or clearly associated charcoal or both) and morphological (form, depth, number and contiguity of elements) criteria.

For many stone features, TL samples showing no clear macroscopic evidence of fire (reddish cobbles or concentrated charcoal) were not available, so they can be arranged both in the fireplaces or simple, apparently unheated, structures categories. However, in some cases, well-defined stone circles have also been observed in *Pedra Furada* layers, such as the astonishing stone ellipse in Fig. 6, well far away from the talus slope and just close to the most protected area of the site, excluding fancy interpretation about its "natural" origins. This structure has not been directly dated because of the absence of charcoal inside, but it pertains to the PF2 layer, with an approximated age of 30 ky BP.

The spatial distribution of structures, both heated and not, shows a clear concentration in the easternmost sector, just below the best preserved painted panels of *Nordeste* (lower Holocenic) figurative "tradition". Because the resolution potential of the site is very weak (a feature of 10 cm height could have taken an average thousand years to be covered and sealed!), it is impossible to determine the duration or the contemporaneity of the elements of some heaps of structures as, for example, that of Fig. 6. Density of structures at Pedra Furada is measured as total surface/time and changes along time, not only for obvious taphonomic causes (the younger the layer the richest the content of preserved structures), but also for (unknown) cultural and ecological reasons. In the PF phase, all over the second half of upper Pleistocene, density is higher in the PF2 layer, and not at the beginning (PF1) nor at the Pleistocene-Holocene transition (PF3), when the

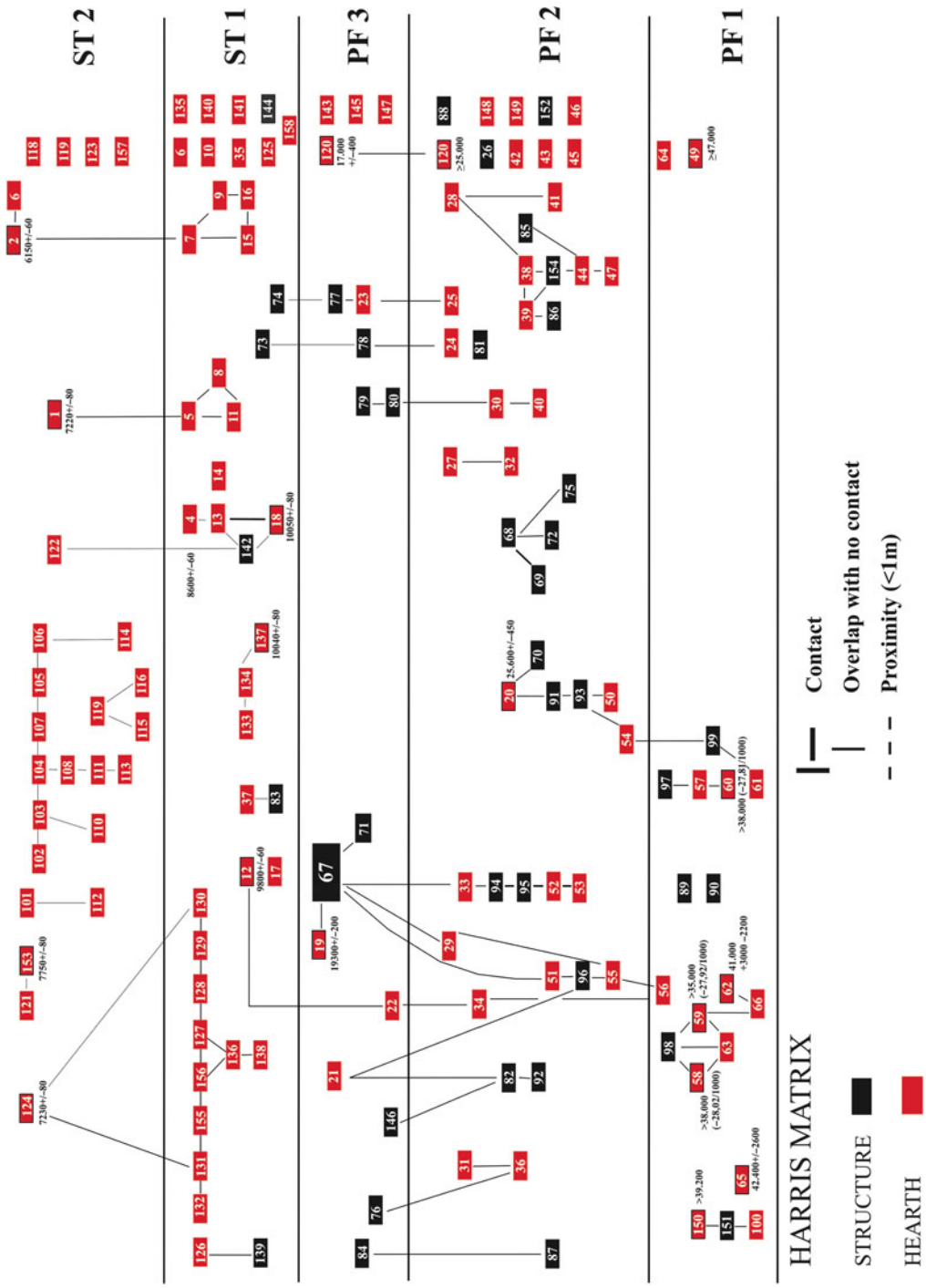

Pedra Furada, Archaeology of, Fig. 5 Simplified matrix of relative chronology and position of structures and hearths. (Modified from Parenti 2001)

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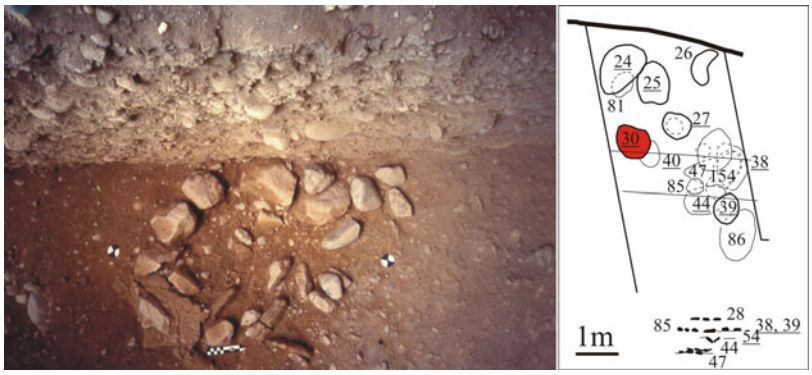

Pedra Furada, Archaeology of, Fig. 6 *Left*: hearth N 30, boarded by sandstone fragments and quartz cobbles, Trench 6; note the fine gravelly matrix of the sediment. *Top right*: position of structures in Trench 6, phase PF 2, between 25 and 33 ky BP. Hearth N 30 in *red*. *Bottom right*: vertical situation along the 1 m band. (Modified from Parenti 2001)

site seems almost abandoned or very rarely frequented (cumulative distribution of PF phase in Fig. 2: 7). The same is true for Holocene layers (*Serra Talhada* and *Agreste* phases), when the shelter, undoubtedly, had a more permanent and, maybe, ritual function in the context of a dense settlement system of the whole *Nordeste:* in the lower Holocene (*Serra Talhada*), density is higher than in middle Holocene (*Agreste*) when a critical decrease both in demographic and cultural terms seems to have affected the whole central Brazil, as already pointed out by Araujo et al. (2005).

Stone tools at Pedra Furada in Pleistocenic layers are the core of contention. After having been identified as such on the basis of a detailed study of natural forces acting on the talus cobbles from waterfalls, 595 stone artifacts from quartz and quartzite cobbles and pebbles have been described in *Pedra Furada* phase, subdivided as follows: 196 in PF1, 273 in PF2 and 126 in PF3. Among them, some are undoubtedly trimmed with unifacial or bifacial technique (Figs. 4, 7 and 8), but many others – possibly geofacts – exibit at least clear relevant macrowears (Parenti 2001: Plates 74, 75, 92, 93, 97).

Quartzitic cobbles have been flaked, mainly in order to obtain expedient cutting edges or cores, but intensity of raw material exploitation changes throughout both the *Pedra Furada*, *Serra Talhada* and *Agreste* phases, as shown by the ratio of the number of flake scars >10 mm to weight (kg), which is as follows: PF1: 7.5; PF2: 6; PF3: 5.8; ST1: 10; ST2: 15: AG: 8. These data point to a lesser exploitation of local low material in both of the last layers of each phase: PF3 and AG. The ratio of bifacial to unifacial core tools obtained from local raw material decreased constantly from Pleistocene to Holocene (Table 1), with a slight increase in the ST2 layer, when the shelter probably gained its maximum population density.

In spite of the ambiguous nature of some naturally trimmed (but probably used) flakes or fragments, the only retained by some hasty critics, many artifacts from Pleistocenic layers show clear evidence of technically coherent trimming sequences, such as the examples exposed in Figs. 7 and 8. Many others are exposed in detail in Parenti (2001, plates 53-55, 57, 60, 62, 65, 67, 71, 73, 81, 83, 87). For the whole *Pedra Furada* phase, from a strictly typological point of view – perhaps scarcely useful in the case of informal tools – the toolkit is composed by choppers and chopping-tools, cores, simple scrapers and trimmed flakes, with some notched pieces and denticulates.

After a chronostratigraphic or archaeological gap between 14.3 and 10.4 uncal. ky BP in the first half of Holocene (i.e., Paleoindian and Archaic period in cursory subdivision of Brazilian prehistory), the groups of *Serra Talhada* and *Agreste* phases, although maintaining the exploitation of local cobbles for the obtention of cores

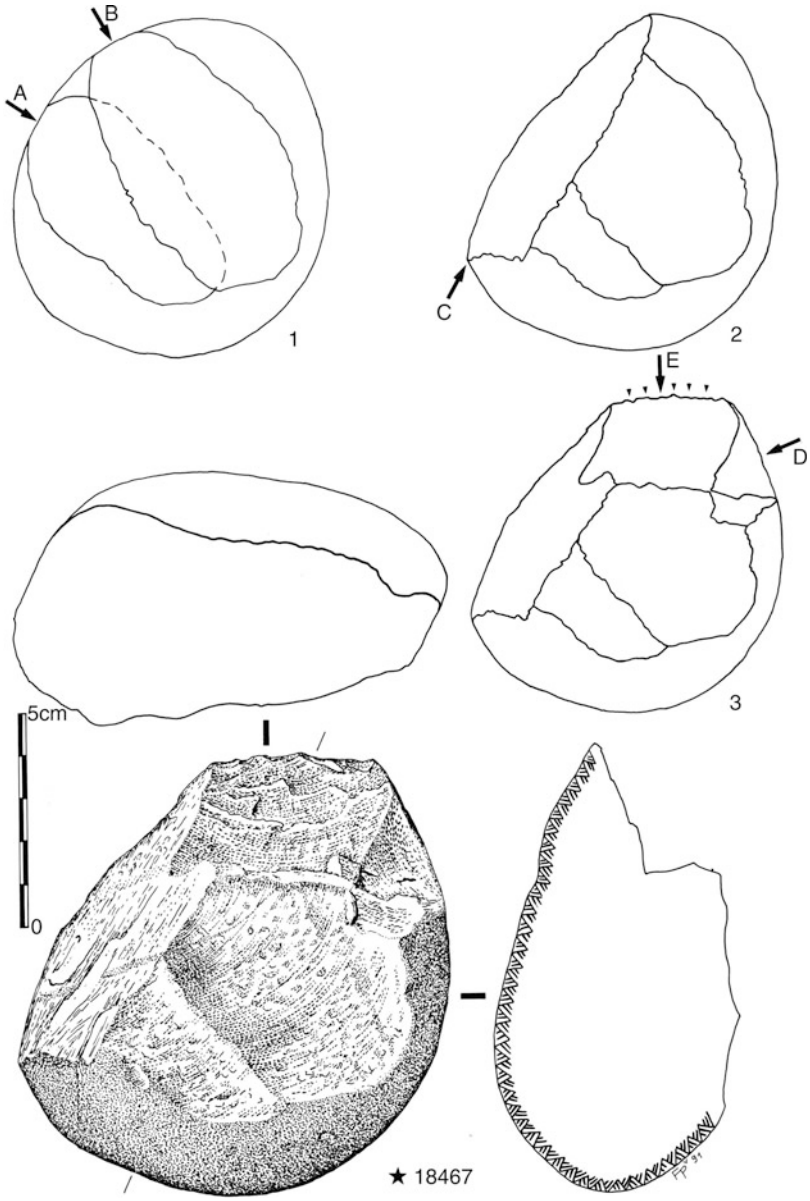

Pedra Furada, Archaeology of, Fig. 7 PF1 multi-purpose artifact, 18,467: unifacially trimmed quartzite pebble, with flaking sequence: (*1*) two parallel flake-scars A and B; (*2*) longitudinal splitting C, because of its use as hammer; (*3*) centripetal flake-scars *D* and retouch macrowears on distal cutting edge *E*. (Modified from Parenti 2001)

and heavy-duty tools, shifted to a more complex lithic technology, integrating different raw materials with more intense core reduction sequences; this led to a true *débitage*, especially on exogenous brown chert, for the obtention of a typical unifacial toolkit: scrapers, *limaces*, and end-scrapers, some of which have been thermally treated (Parenti 2001, Pl. 100). The persistence of a cruder tool manufacture with local raw material has been often observed in brazilian prehistory until very recent times, and is documented also in the nearby shelter of Sitio do Meio (Parenti et al. in print).

Some 950 red and white figures are painted on Pedra Furada sandstone wall, apparently spatially uncorrelated with the archaeological features below. In other sites of the area, figures of the same "style" or "tradition" have been dated, for the most, at the first half of Holocene, a very rich period for central and Northeastern Brazil from a

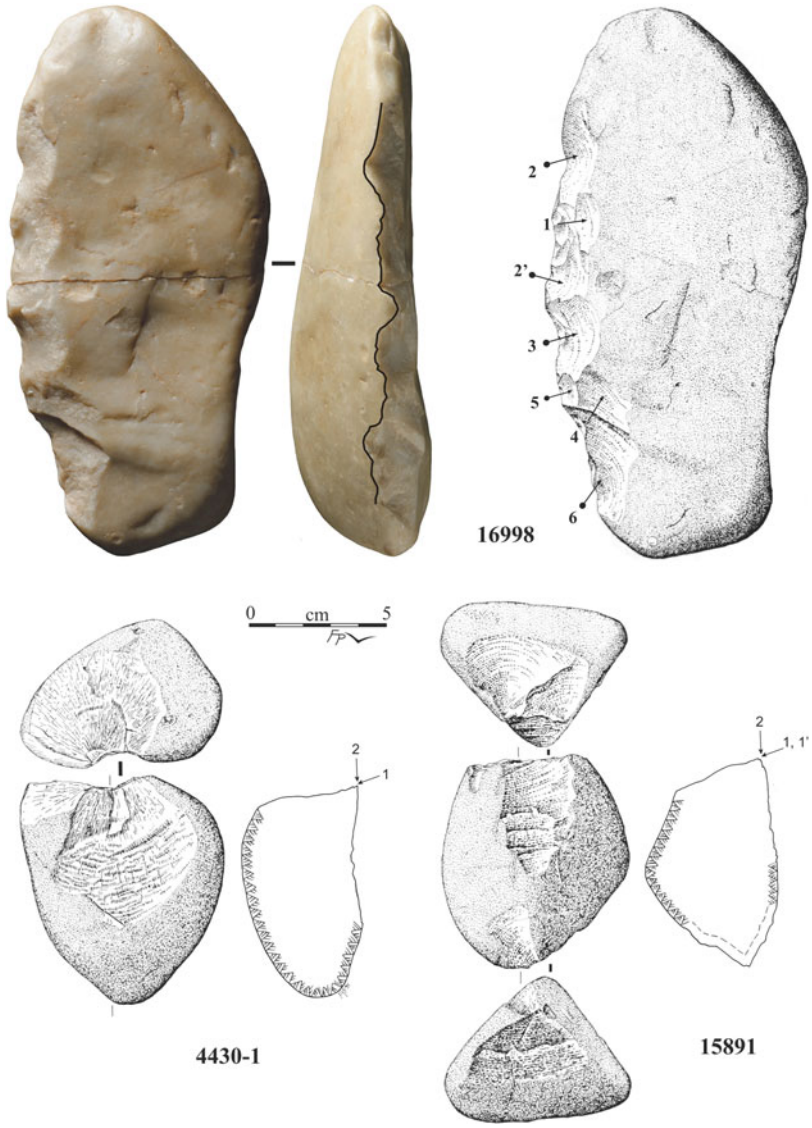

Pedra Furada, Archaeology of, Fig. 8 *Top*: PF2, 16,998: unifacially trimmed quartzite pebble, probably a core. Average flaking angle of 70°; cortical portion preserved in the middle; the flaking sequence has been established on the basis of the disposition both of flake-scars and visible *lancettes* inside them; bottom: two PF2 cores; both have been obtained by the same trimming sequence. 4430–1: orthogonal core on quartz cobble. 15,891: orthogonal core obtained on quartzite cobble; lower view: double, synchronous, split fracture, due to percussion. (Modified from Parenti 2001)

demographic and cultural point of view, just before the so called "archaic gap" of Brazilian prehistory (Araujo et al. 2005).

Organic remains have been recovered only in Holocenic deposits, because of the acidic (Ph4) siliceous sediment. In *Agreste* e *Serra Talhada* phases, scanty bone fragments of medium to small extant *taxa* are documented, but a rich coprolite assemblage (both animal and human) has been recovered, providing precious insights about lower Holocenic vegetation, archaeobotanic practices (Chaves and Renault-Miskowsky 1996; Chaves 2000) and palaeoparasitology (Araujo et al. 2008). This last, particularly, has (indirectly) proved the existence of at least two maritime migration waves to Americas in the early lower Holocene, because Helminths eggs recovered in human coprolites from ST2 layer cannot have been survive in cold Beringian climate (Montenegro et al. 2006). Charcoal remains from fireplaces, or purported natural fires or both, have been entirely collected from top to bottom of *Pedra Furada* layers and their anthracological study (under the responsibility of Rita Scheel, *Museu Nacional*, Rio de Janeiro) will provide one of the most long lasting palaeobotanical sequences in the Neotropic.

Pedra Furada, Archaeology of, Table 1 Ratio of bifacial to unifacial trimmed pebbles on local raw material along time

	UNIF.	BIF.	TOT. CORE TOOLS	BIF./ UNI.	% BIF.
AG	6	1	7	0.17	14
ST 2	33	10	43	0.30	23
ST 1	35	7	42	0.20	17
PF 3	15	5	20	0.33	25
PF 2	30	17	47	0.57	36
PF 1	26	21	47	0.81	45

Unif.: unifacial; Fof: bifacial; tot. Core tools: total core tools; Bif./Uni: Bifacial to unifacial; % Bif.: percentage of bifacial

In the context of Brazilian archaeology, Pedra Furada evidence has been received with skepticism by many scholars, for pure academic reasons, but also because the majority of them lack familiarity with the Northeastern landscape and geoarchaeology. In any case, between the end of excavations (1988) and the final report (2001), Pedra Furada gained useful complementary information from some other important sites in the region, especially from close limestone caves and fossil-bearing deposits, such as Toca da Barra do Antonião, Serrote do Artur, Serrote do Sansão, Garrincho (Guérin and Faure 2008). In this last site, some 20 km SW from Pedra Furada, human fossilized remains (one parietal fragment, one lower incisive and a fragment of jawbone with an upper molar) were recovered below a calcitic duricrust dated at 10,020 ± 290 uncal. Years BP (GIF 9335), along with a rich Pleistocene megafauna directly dated at 12,170 ± 40 uncal. Years BP (BETA 136204) (Guidon et al. 2000). They pertain to *Homo sapiens*, but their "archaic"–quite robust traits – according to the authors, point to a local development of prior populations derived from the ancestral stock that firstly peopled the region.

International Perspectives

Today (2012), the whole issue of the Pleistocene peopling of the America is quite "frozen" in mainstream literature, and this is not, in my opinion, an unfavorable situation for the progress of a "normal" science in Kuhn's terminology. In South America and Brazil, particularly, prehistoric research with a more prominent palaeoenvironmental and geoarchaeological tone is finally on the way, which is of crucial relevance because of the overabundant attention paid to more visible phenomena (such as rock art or formal lithic typology) in the past decades. Peda Furada has been of great importance for the debate of the antiquity and modalities of peopling of South America, and still holds consistent potential as a reference site for eastern Brazilian lowlands. With its continuous paleobotanic and well dated record, the shelter can fill the geographic gap in paleoclimatic sequence of tropical South America, between the better studied areas of the Amazon basin and Southern Brazil. From a strictly anthropic point of view, Pedra Furada – besides being a reference at regional scale – can be integrated in a true global debate about (dis)continuity and gaps in the archaeological record of many area of the world, such as South Africa, central Asia, northern Europe and many others.

Future Directions

Pedra Furada has not yet definitely and fully been accepted in archaeological literature, and it will probably remain in this limbo situation until the discovery of robust and dated palaeoanthropological evidence in the region. Nevertheless, it is worth noting that the site has produced some true testable hypotheses about palaeoenvironments and regional settlement systems, as follows: (1) a clear cultural discontinuity between upper Pleistocene and lower Holocene, as suggested by lithic traditions; (2) the existence of a humid phase between 10 and 9 uncal. Ky BP, as suggested by gravel lens of unit 3 (Fig. 3) and by the erosion and falling rock at nearby shelters of Perna, Sitio do Meio and Antoniao; (3) weak interaction between man and megafauna, the former being in no way responsible for the (mostly Holocenic) disappearance of the latter; (4) Pleistocenic groups had, on the whole, a weak territoriality, probably correlated with the very low demographic density, indicated by the scanty site occupation in this period, the absence of an intra-site web system, and the weak transport

of lithic products outside the shelter; (5) the (rare) Pleistocene sites of the region could have a lesser proportion of core-tools, because these latter are overabundant at Pedra Furada, given the proximity of *cuesta* cliff; (6) the absence of chert and calcedony in the PF phase is due to its non visibility for pedogenetic reasons or for cultural causes (see point 4) or both; (7) the bimodal distribution of structure dimension in Pleistocene layers is due to functional reasons: the smaller could have been combustion structures, while the larger probably served as contention, space arrangement or pavement structures; (8) at the very beginning of Holocene a true regional integrated system is in place, in which some sites have specialized functions as quarry or ritual place; (9) in lower Holocene, local quartzite has been heath-treated for the making of some formal tools; and (10) rock art of *Nordeste* tradition (lower Holocene) is not specially bound to a specific site function.

New research based on the relevant Pedra Furada archaeological sequence will be useful and fully acknowledged only if it is truly interrelated with palaeoenvironmental studies in a continental perspective.

Cross-References

- ▶ Archaeobotany
- ▶ Bones: Preservation and Conservation
- ▶ Charcoal: Preservation and Conservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Dating Techniques in Archaeological Science
- ▶ First Australians: Origins
- ▶ Haynes, Jr., C. Vance
- ▶ Hrdlička, Aleš
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Meadowcroft: Geography and Culture
- ▶ Monte Verde, Archaeology of
- ▶ North American Megafauna Extinction: Climate or Overhunting?
- ▶ Paleoindians
- ▶ Peopling of the Americas
- ▶ Serra Da Capivara National Park
- ▶ South America: Lithic Industries
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Araujo, A.M., K. Reinhard, L.F.M. Ferreira, and S.L. Gardner. 2008a. Parasites as probes for prehistoric human migrations? *Trends in Parasitology* 693: 9–16.

Araujo, A.G.M., S.W.A. Neves, L.B. Pilo, and J.P.V. Atui. 2005. Holocene dryness and human occupation in Brazil during the "Archaic gap". *Quaternary Research* 64: 298–307.

Bahn, P.G. 1993. 50,000-year-old Americans of Pedra Furada. *Nature* 362: 114–115.

Chaves, S.A.M. 2000. Estudo palinológico de coprólitos pré-históricos holocenos coletados na Toca do Boqueirão do Sitio da Pedra Furada—Contribuições paleoetnológicas, paleoclimáticas e paleoambientais para a região sudeste do Piaui – Brasil. *Revista de Arqueolgia e Etnologia* 10: 103–120.

Chaves, S.A.M., and J. Renault-Miskovsky. 1996. Paléoethnologie, paléoenvironnement et paléoclimatologie du Piauí, Brésil: apport de l'étude pollinique de coprolithes humains recueillis dans le gisement préhistorique de "Pedra Furada". *Comptes Rendus de l'Académie des Sciences de Paris* 322 (IIa): 1053–1060.

Delibrias, G., N. Guidon, and F. Parenti. 1988. *The Toca do Boqueirão do Sítio da Pedra Furada: Stratigraphy and chronology*, S3–S11. Archaeometry: Australasian Studies.

Dillehay, T.D. 2010. Early population flows in the western hemisphere. In *A companion to Latin American history*, ed. T.H. Holloway, 10–27. Malden: Blackwell Publishing.

Dillehay, T.D., and D. Meltzer, eds. 1991. *The first Americans: Search and research*. Boca Raton: CRC Press.

Guerin, C., and M. Faure. 2008. La biodiversité mammalienne au Pléistocène supérieur—Holocène ancien dans la Région du Parc National Serra da Capivara (SE du Piauí, Brésil). II Simposio internacional "O povoamento das Américas", 16–21 déc. 2006, *FUMDHAMentos*. *Revista da Fundação Museu do Homem Americano* 7: 80–93.

Guidon, N., and G. Delibrias. 1986. Carbon-14 dates point to man in the Americas 32,000 years ago. *Nature* 6072: 769–771.

Guidon, N., E. Peyre, C. Guerin, and Y. Coppens. 2000. *Resultados da datação de dentes humanos da Toca do Garrincho, Piauí – Brasil. Anais da X Reunia Cientifica da Sociedade de Arqueologia Brasileira* (Clio, Sèrie Arqueologica 14): 75–86.

Meltzer, D.J., J.M. Adovasio, and T.D. Dillehay. 1994. On a Pleistocene human occupation at Pedra Furada, Brazil. *Antiquity* 68: 695–714.

Meltzer, D.J., D.K. Grayson, G. Ardila, R.A.W. Barker, D.F. Dincauze, C. Vance Haynes, F. Mena, L. Nunez, and D.J. Stanford. 1997. On the Pleistocene antiquity of Monte Verde, southern Chile. *American Antiquity* 62 (4): 659–663.

Montenegro, A., A. Araujo, M. Eby, L.F. Ferreira, R. Hetherington, and A.J. Weaver. 2006. Parasites, paleoclimates and the peopling of the Americas. Using the hookworm to time the Clovis migration. *Current Anthropology* 47 (1): 193–200.

Parenti, F. 2001. *Le gisement quaternaire de la Pedra Furada (Piaui, Brésil). Stratigraphie, chronologie, evolution culturelle*. Paris: Editions Recherechs sur le Civilisations.

Parenti, F., R. Mercier, and H. Valladas. 1990. The oldest hearths of Pedra Furada, Brasil: Thermoluminescence analysis of heated stones. *Current Research in the Pleistocene* 7: 36–38.

Parenti, F., M. Fontugne, and C. Guerin. 1996. Pedra Furada in Brazil, and its "presumed" evidence: Limitations and potential of the available data. *Antiquity* 70: 416–421.

Parenti, F., G. Aimola, C. Andrade, and L. Mota. In print. Late Pleistocene and early Holocene at Sitio do Meio (southern Piaui, Brazil): A revision of stratigraphy and comparison with Pedra Furada. Paper presented at XVI UISPP Congress, Florianópolis, 2011.

Santos, G.M., M.I. Bird, F. Parenti, L.K. Fifield, N. Guidon, and P.A. Hausladen. 2003. A revised chronology of the lowest occupation layer of Pedra Furada rock shelter, Piaui, Brazil: The Pleistocene peopling of the Americas. *Quaternary Science Reviews* 22: 2303–2310.

Valladas, H., N. Mercier, M. Michab, J.L. Joron, J.L. Reyss, and N. Guidon. 2003. TL age-estimates of burnt quartz pebbles from the Toca do Boqueirão da Pedra Furada (Piaui, northeastern Brazil). *Quaternary Science Reviews* 22: 1257–1263.

Further Reading

Araujo, A., K. Reinhard, L.F.M. Ferreira, and S.L. Gardner. 2008b. Parasites as probes for prehistoric human migrations? *Trends in Parasitology* 693: 9–16.

Barnosky, A.D., and E.L. Lindsey. 2010. Timing of Quaternary megafaunal extinction in South America in relation to human arrival and climate change. *Quaternary International* 217 (1–2): 10–29.

Bryan, A.L., and R. Gruhn. 2003. Some difficulties in modeling the original peopling of the Americas. *Quaternary International* 109–110: 175–179.

Guidon, N., A.M. Pessis, F. Parenti, C. Guerin, E. Peyre, and G.M. Dos Santos. 2002. Pedra Furada, Brazil: Paleoindians, paintings, and paradoxes. *Athena Review. Journal of Archaeology, History, and Exploration* 3 (2): 42–52.

Hubbe, M. 2007. Early Holocene survival of megafauna in South America. *Journal of Biogeography* 34: 1642–1646.

Rioda, V., F. Candelato, L. Mota, and F. Parenti. 2011. Jazidas de rochas silicosas na área do Parque Nacional Serra da Capivara (Piauí, Brasil): primeiros dados geoarqueológicos. *Revista do Museu de Arqueologia e Etnologia* 21: 103–113.

Peiligang: Agriculture and Domestication

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Basic Site Overview

Peiligang (2 ha) is an early Neolithic site, located near the Peiligang village in Xinzheng county, Henan Province. It was first discovered in the 1960s, and subsequently excavated in four seasons during the 1970s. Its cultural deposits measured 1–2 m in depth, and within the excavated area of 2,615 m^2, archaeologists found 22 ash pits, one kiln, and 114 burials. The site dates to c. 6200–5600 BCE (Kaifeng 1978; Institute of Archaeology 1984, 2010: 126–141).

After these excavations, more sites sharing similar material assemblages with Peiligang were discovered in central Henan, and collectively named the Peiligang culture. To date more than 100 Peiligang culture sites have been identified, distributed over a large area of the middle Yellow River valley, including mainly the Huanghuai Plain in central Henan and the Yiluo basin in western Henan.

Peiligang sites can be classified into two types in terms of their environmental settings: those on the alluvial plains and those on hilly areas. Sites of the former type (lowland) tend to be larger in size, with thicker deposits and more elaborate material assemblages, such as Jiahu (5 ha) in Wuyang county and Tanghu (30 ha) in Xinzhengcounty. On the other hand, sites of the latter type (upland) appear to be smaller in size, with thinner deposits,

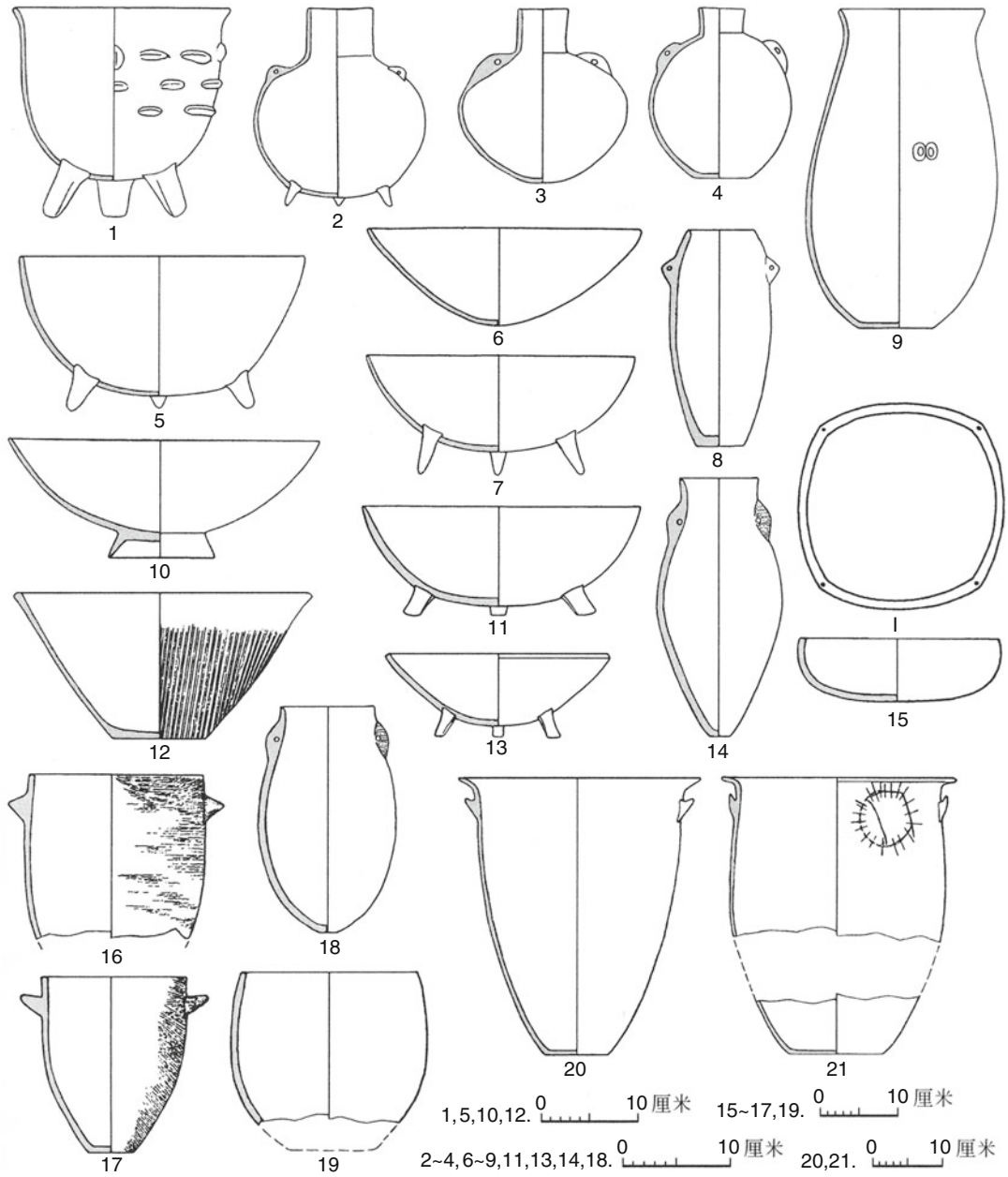

Peiligang: Agriculture and Domestication, Fig. 1 Peiligang culture pottery. (After Institute of Archaeology 2010: Fig. 3–10)

less variety among artifacts, and pottery vessels of simpler form, made more crudely. These contrasting traits may reflect different subsistence-residential strategies and various levels of social complexity. The sites on alluvial plains may have had higher levels of sedentism and more complex social organization, while some of those in hilly areas are likely to have been seasonal camp sites or small villages (Liu and Chen 2012: 141–150).

Peiligang culture sites are further divided into two regional variants based on their geographical distribution and material remains; these are the

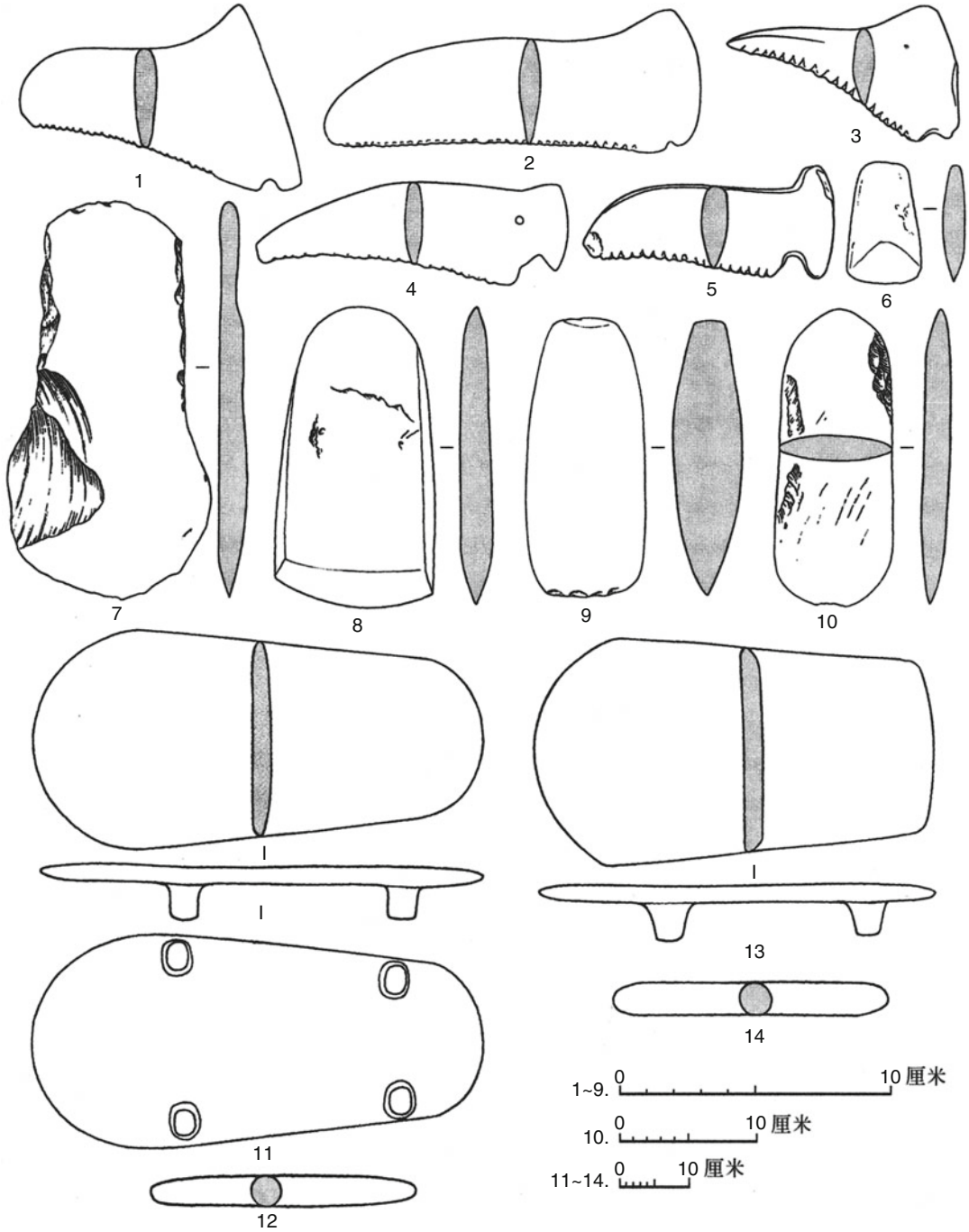

Peiligang: Agriculture and Domestication, Fig. 2 Peiligang culture stone tools. (After Institute of Archaeology 2010: Fig. 3–11)

Peiligang type in the north and the Jiahu type in the south. Some 40 radiocarbon dates from ten sites show that most Peiligang sites date to c. 6200–5500 BCE, although the earliest phase at the Jiahu site dates to as early as 7000 BCE (Institute of Archaeology 2010: 126–141).

Pottery of the Peiligang culture is characterized by various functional types, distinguishable as cooking, serving, and storage vessels, many of which are customarily referred to as tripods, due to their three-legged design (Fig. 1). Lithic implements include both chipped and ground tools, and the latter are morphologically classified to axes, adzes, chisels, spades, sickles, and knives. Microliths have also been found. Grinding stones made of sandstone, including slabs and elongate handstones, have often been uncovered from burials (Fig. 2).

Most dwellings were small semi-subterraneous houses, normally less than 10 m^2 in size. They were round, oval, square, or irregular in shape. Deceased were often buried in cemeteries, separated from residential areas. Tombs were rectangular shafts with single interment, but some secondary burials with multiple interments have also been found. A majority of tombs was associated with grave goods, including pottery vessels and stone tools, which seem utilitarian in nature. The quantities of grave goods vary among tombs, ranging between one and a dozen in most cases. At Jiahu, however, some tombs were furnished with ritual objects, such as bone flutes and turtle shell implements, a phenomenon rarely seen in other sites.

Evidence of Early Agriculture

Several Peiligang culture sites have revealed millet remains (*Setaria italica*), and Jiahu has revealed rice remains (*Oryza* sp.). These are among the earliest domesticated cereals in North China. Floral remains recovered from Peiligang sites, however, are more heavily weighted toward wild plants (e.g., soybean, acorns, walnuts, hazelnuts, jujube, plums, and water caltrops) than toward cultigens (rice and millet) (Table 1). The importance of wild plants in the Peiligang subsistence is supported by functional study of grinding stones, which occupy substantially high proportions of the Peiligang culture toolkits. Starch and usewear analyses of grinding stones from Egou and Shigu indicate that they were used for processing acorns, beans, tubers and millet (Liu et al. 2010).

Dog and pig were domesticated, while a wide range of wild animal species was hunted, such as deer, wild boar, raccoon dog, and rabbit. Fishing was also a part of subsistence economy (Henan 1999).

Peiligang: Agriculture and Domestication, Table 1 Plant remains from major Peiligang culture sites (Liu and Chen 2012)

Site	Cultigen	Wild plants
Jiahu	Rice	Wild rice, acorn (*Quercus* sp.), water caltrop, tubers, lotus root, walnut, wild grape, soybean
Peiligang	Possible foxtail millet	Walnut, Plum, jujube
Shawoli	Possible millet	Walnut, jujube
Egou		Acorn (*Q. acutissima*), walnut, jujube
Shigu		Hazelnut, walnut, jujube, elm fruit
Shuiquan		Acorn (cf. *Q. variabilis*), walnut (*Juglansmandshurica*), jujube (*Zizyphus jujube*)
Tieshenggou		Fruits and nuts
Wuluo Xipo	Foxtail millet	Nuts, foxtail grass, Panic, mannagrass
Fudian	Foxtail millet	

Peiligang culture has long been regarded as having achieved a substantial level of agriculture, but the archaeological record shows that the people actually practiced broad-spectrum subsistence strategies, in which food production was only a minor component of the economic system.

Cross-References

► Chinese Field Methods
► Jiahu: Agriculture and Domestication

References

Henan Institute of Cultural Reliscs and Archaeology, ed. 1999. *Wuyang Jiahu*. Beijing: Science Press.

Institute of Archaeology, Chinese Academy of Social Sciences. 1984. 1979 nian Peiligang yizhi fajue baogao [Report of excavation at the Peiligang site in 1979]. *Kaogu Xuebao* 1: 23–52.

Institute of Archaeology, Chinese Academy of Social Sciences, ed. 2010. *Zhongguo Kaoguxue: Xinshiqi Juan [Chinese archaeology: Neolithic volume]*. Beijing: Chinese Social Sciences Press.

Kaifeng Bureau of Cultural Relics Management. 1978. Henan Xinzheng Peiligang xinshiqi shidai yizhi [The Neolithic site at Peiligang in Xinzheng, Henan]. *Kaogu* 2: 73–79.

Liu, L., and X. Chen. 2012. *The archaeology of China: From the late Paleolithic to the early Bronze Age*. Cambridge: Cambridge University Press.

Liu, L., J. Field, R. Fullagar, S. Bestel, X. Ma, and X. Chen. 2010. What did grinding stones grind? New light on early Neolithic subsistence economy in the Middle Yellow River Valley, China. *Antiquity* 84: 816–833.

Further Reading

Lee, Gyoung-Ah, G.W. Crawford, L. Liu, and X. Chen. 2007. Plants and people from the early Neolithic to Shang periods in North China. *Proceedings of the National Academy of Sciences of the United States of America* 104: 1087–1092.

Peking Man

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Introduction

Peking Man (*Homo erectus pekinensis*) is an example of *Homo erectus*. The first evidence for Peking Man was discovered in 1921 by Austrian paleontologist Otto Zdansky who found a single hominin molar within a deposit at a quarry near the Chinese town of Zhoukoudian (then Chou K'ou Tien) approximately 30 miles (around 48 km) from Beijing (formerly Peking) (Reader 1988: 94). Further evidence of Peking Man came in 1927 when a third tooth (Zdansky had found another while sorting the excavated material (Reader 1988: 99)) was discovered by Swedish researcher Dr. Birger Böhlin. This tooth was turned over to Canadian anatomist Davidson Black for study (Conroy 1997: 303). Black considered the tooth to belong to a previously unknown species of hominin, the oldest discovered on the Asian mainland, which he named *Sinanthropus pekinensis* (Black 1927). The first Peking Man skull was discovered by Chinese paleontologist, archaeologist, and anthropologist Whenzong Pei on the 2nd of December 1929. This skull revealed that, despite slightly different dentition, Peking Man was not in fact a member of a new genus but rather an example of *Homo erectus* and very similar to Java Man (formerly *Pithecanthropus erectus* now *Homo erectus erectus*) (Reader 1988: 106). By 1937 fourteen skulls, eleven mandibles (lower jaws), and 147 teeth, along with seven femurs (upper leg bones), two humeri (upper arm bones), a possible clavicle (collarbone), and a single carpal (wrist) bone belonging to *Homo erectus pekinensis*, had been discovered at Zhoukoudian (Reader 1988: 107). Excavation was halted by the outbreak of the Second Sino-Japanese War and the subsequent Japanese invasion in 1937; however, the Peking Man fossils remained safely stored in Zhoukoudian at the Cenozoic Research Laboratory until 1941 when, due to growing American-Japanese tensions during World War Two, the bones were packed for shipment to America. Sometime in late 1941 all the Peking Man fossils, except for the few teeth discovered by Zdansky, vanished and have not been seen since (Conroy 1997: 304). A number of drawings, photographs, and a full set of casts did make it to America, however, in the hands of the head of the Cenozoic Research Laboratory, Franz Weidenrich (Reader 1988: 108). Excavation at Zhoukoudian resumed in 1949 and has continued periodically since, uncovering a number of cranial and postcranial bones (Reader 1988: 109). The most recent excavations at Zhoukoudian, beginning in 2009, have revised previous dating of the site and of Peking Man (Shen et al. 2009).

Definition

Peking Man is the common name of a collection of fossilized specimens first discovered in Zhoukoudian, China, in 1921 and known scientifically as *Homo erectus pekinensis* (Reader 1988; Conroy 1997). In the 1970s Peking Man was dated to around 230–500 kyr (1000 years)

based on fission-track dating of Locality 1, layer 10 (the lowest level to contain hominin fossils) and $^{230}Th/^{234}Ur$ (thorium/uranium) dating of layers 1–3. These dates were supported by later electron spin resonance and $^{231}Pa/^{235}Ur$ (protactinium/uranium) and have been generally accepted as correct (Shen et al. 2009: 198). However, more recent work conducted at Zhoukoudian has offered an older date range of around 680–780 kyr based on $^{26}Al/^{10}Be$ (aluminum/beryllium) dating methods (Shen et al. 2009).

Key Issues/Current Debates/Future Directions/Examples

The Use of Fire

A number of thick ash layers have been identified at Zhoukoudian, some being up to 6 m in depth (Conroy 1997: 316), which indicate extended periods of burning. This has commonly led to the conclusion that Peking Man had the ability to create and manage fire even from its earliest occupation and continued this practice for long stretches of time. While Peking Man's use of fire is generally accepted within the scientific community, some have argued against this view. In 1985 Lewis Binford and Chuan Kun Ho argued that while there was certainly evidence of burning at Zhoukoudian, the ash layers were most likely not hearths as they were far too thick and spread out. Instead, Binford and Ho argued that the "ash" layers were probably the result of burning guano deposits (most likely owl droppings) which either spontaneously combusted or were ignited by an outside source (Binford and Ho 1985: 429), as evidenced by the large number of rodent bones and comparative lack of hominin remains associated with the deposit. While this theory has its supporters, many continue to believe in Peking Man's use of fire at Zhoukoudian.

The Use of Stone Tools

Many thousands of individual stone artifacts made of sandstone, flint, and quartz (Conroy 1997: 310) have been discovered at Zhoukoudian, some in direct association with hominin remains, many not (Binford and Ho 1985: 429). Nevertheless, artifacts discovered as deep as layers 8–11 (Locality 1) indicate that Peking Man was utilizing stone tools from as early as 460–420 kyr (Conroy 1997: 313). Tool types discovered at Zhoukoudian include points, burins (chisel-like artifacts), scrapers, and choppers, many of which display evidence of retouching (Conroy 1997: 313) and at least three different techniques (anvil percussion, direct percussion, and bipolar percussion) for making the tools seem to have been employed. Over time Peking Man's toolkit appears to have improved and evolved; tools recovered from the earliest occupation layers are generally larger and are made using all three techniques, while those from higher levels (dated to around 300–230 kyr) are smaller and more refined, and the bipolar percussion method is most common (Wu and Lin 1983). In general the stone artifacts discovered at Zhoukoudian provide greater evidence for evolution adaptation and change in Peking Man over time than the fossilized hominin remains.

Peking Man's Diet

While few of the stone tools found in association with Peking Man could be directly considered as weapons, there is a general assumption that *Homo erectus pekinensis* was both a hunter and a gatherer. Indeed the large amount of faunal remains – including wild pig, mouse, rat, frog, bat, hare, hedgehog, bear, horse, a huge amount of deer, and a number of other animals (Chia 1975: 42) – seem to suggest that some sort of predator was utilizing the caves at Zhoukoudian; whether this predator was human, however, is often debated. A large number of hyena bones have also been found at Zhoukoudian, and the guano deposits indicate that owls also made a home in the caves. Binford and Ho (1985: 425) have suggested that the composition of the faunal remains, including the parts and types of animals heavily represented (most notably the deer), and their location in dark parts of the caves, suggests that their accumulation at Zhoukoudian is more likely due to hyena activity than it is an indication of hominin hunting. However, some burned remains and some hominin modified antlers (Chia 1975: 31) discovered in the deposit do suggest that Peking Man was utilizing the local fauna, though whether this was through hunting or

simply scavenging is unclear. Floral remains at Zhoukoudian are far less common. A number of hackberry seeds have been discovered at the site, but it is hard to determine if they are an indication of Peking Man's diet or if they simply fell, through sinkholes, into the caves.

Cannibalism

There has been some suggestion, since the discovery of Peking Man, that cannibalism may have occurred at Zhoukoudian. This conclusion of cannibalism is based mainly on the longitudinal splitting of a few postcranial bones, the burning of a very small amount of hominin remains, the breakage pattern displayed in the mandibles (lower jaws), the lack of facial regions among the skulls, and some fractures, groves, and abrasions on a number of the skulls (Binford and Ho 1985: 414). While the theory of cannibalism continues in some texts and the popular media, it has generally been discounted among the scientific community as the damage to the bones can be explained by either common taphonomic processes or the actions of other, nonhominin, predators.

Evolution of People in Asia?

From discovery to the present day, a number of the debates regarding Peking Man have linked to the evolution and dispersal of humans throughout the world. While the majority of the international scientific community supports what is popularly known as the "out of Africa" hypothesis – the idea that modern humans (*Homo sapiens*) evolved from a small population in East Africa and only began to move throughout the world within the last 100,000 years, replacing previous populations of *Homo erectus* and other hominin genera as they spread – the official view in China is for a rather different method of human evolution. Chinese scientists generally advance a more "sinocentric" (Sautman 2001: 99) view on evolution, suggesting that the earliest hominids evolved within modern Chinese borders and that modern humans developed independently in Asia several hundred thousand years before they did elsewhere. This belief in multiregional evolution posits that modern humans evolved from various pre-*Homo sapiens* populations around the world (Howells 1983: 298), the Chinese from Peking Man, Australian aboriginals from Java Man, and Europeans from Neanderthals (Sautman 2001: 100) due to unique morphological features which persist throughout certain region's populations. Some Chinese scholars still support the idea posited by Franz Weidenrich in the 1930s that Peking Man was a direct ancestor to modern Chinese people and that *Homo erectus pekinensis* proves that Chinese people have existed since the very earliest stages of humanity (Sautman 2001: 97). At present fossil, genetic and linguistic evidence supports the "out of Africa" hypothesis much more firmly than the "sinocentric" viewpoints (Sautman 2001: 98).

Cross-References

- ▶ Black, Davidson
- ▶ *Homo erectus*
- ▶ Java Man
- ▶ Weidenreich, Franz
- ▶ Zhoukoudian, Archaeology of

References

Binford, L.R., and C.K. Ho. 1985. Taphonomy at a distance: Zhoukoudian, "The cave home of Beijing Man"? *Current Anthropology* 26 (4): 413–442.

Black, D. 1927. *On a lower molar hominid tooth from the Chou Kou Tien deposit*. Peking: Geological Survey of China.

Chia, L.P. 1975. *The cave home of Peking Man*. Peking: Foreign Languages Press.

Conroy, G.C. 1997. *Reconstructing human origins: A modern synthesis*. New York: W.W. Norton & Company, Inc.

Howells, W.W. 1983. The origins of the Chinese people: Interpretations of the recent evidence. In *The origins of Chinese civilisation*, ed. D.N. Keightley, 297–321. Berkeley: University of California Press.

Reader, J. 1988. *Missing links: The hunt for earliest man*. London: Pelican Books.

Sautman, B. 2001. Peking Man and the politics of palaeoanthropological nationalism in China. *The Journal of Asian Studies* 60 (1): 95–124.

Shen, G., X. Gao, B. Gao, and D.E. Granger. 2009. Age of Zhoukoudian *Homo erectus* determined with $^{26}Al/^{10}Be$ burial dating. *Nature* 358: 198–200.

Wu, R., and S. Lin. 1983. Peking Man. *Scientific American* 248: 86–94.

Further Reading

Day, M.H. 1986. *Guide to fossil man*. London: Cassell.
The Peking Man World Heritage Site at Zhoukoudian. n.d. http://www.unesco.org/ext/field/beijing/whc/pkm-site.htm

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Basic Biographical Information

André Penin Santos de Lima (1976–2012) (Figs. 1 and 2) was a Brazilian archaeologist, born in São Paulo in 1976. He graduated from law school at the Pontifical Catholic University of São Paulo in 1998, but it was at the University of São Paulo that he pursued his career in archaeology. He graduated in history (2000) before achieving a Master's degree (2005) and Ph.D. (2010) in archaeology at the Museum of Archaeology and Ethnology.

In 2009 André Penin became a professor of archaeology with the Archaeology Department at the Federal University of Rondônia, near the Brazilian frontier with Bolivia. He was also affiliated as a professor at the State University of Amazonas and a member of the editorial board of the *Veredas Amazônicas* Journal.

Professor Penin's main areas of interest were heritage, archaeology, and cultural resources management. He was an active and engaged member of the forums regarding those subjects, as well as on the national meetings of the archaeological community, where he was always posing questions and presenting works regarding the political background of the Brazilian archaeological scenario. He was engaged in the three domains in which archaeology takes place in Brazil: the academy, cultural resources management and "the other side of the desk" – as he used to say – as he spent time as a technician at the Institute for National Artistic and Historical Heritage (IPHAN), in the states of the São Paulo and Santa Catarina.

André Penin died tragically at the beginning of 2012.

Major Accomplishments

At the beginning of his career as an archaeologist, Penin focused on the lithic industry and shell mounds of the southern and southeastern Brazilian coast. It was these subjects that he pursued his

Penin, André, Fig. 1 André Penin at Santa Catarina, Santa Marta's sambaquis, 2008

Penin, André, Fig. 2 André Penin, in his office at the University of Rondonia, 2009

thesis, titled *Analysis of the Formative Processes of Capelinha Archaeological Site – Setting up a Microregional Context*.

In 2005, André Penin started to work at IPHAN, first at São Paulo and later at Santa Catarina. It was within this scenario that he was able to draw on his background as a lawyer and engage in the politics of Brazilian archaeology. This experience was later translated into his dissertation in 2010, *Academic, Contract and Heritage. Different Views of the Same Discipline: Archaeology* (Penin 2010), in which he analyzed the practical consequences that the law has on archaeological practice in addition to conducting a legal analysis of the legislation concerning archaeology.

In 2009 he finally became a professor fulfilling his desire to teach – an activity that he carried out with the same commitment and engagement that he displayed in the other domains of Brazilian archaeological practice. His early and tragic death greatly affected the archaeological community in Brazil. Though he was young, he left a legacy in terms of his professional conduct and commitment to ethics in Brazilian archaeology and through his passion for teaching and research, which has inspired others to follow in his footsteps.

Cross-References

- ► Cultural Heritage Management Quality Control and Assurance
- ► Cultural Heritage Protection: The Legal Sphere
- ► Ethics of Commercial Archaeology: Brazil
- ► South America: Lithic Industries

References

Penin, A. 2010. Academic, contract and heritage. Different views of the same discipline: Archaeology. Unpublished PhD dissertation, University of São Paulo, Brazil.

Further Reading

Penin, A., C.A. Zimpel, and V.F. Silva. 2011. O curso de Bacharelado em Arqueologia na Fundação Universidade Federal de Rondônia (UNIR), archaeology graduation at UNIR (Federal University of Rondônia). *Arqueologia em Debate – Jornal da SAB* 3: 23–26.

People as Agents of Environmental Change

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Introduction

When archaeologists consider people as agents of environmental change, they open a group of related discussions, some of which have been going on as long as archaeology has been recognized as a discipline. These same issues are becoming more important to wider audiences, and archaeologists now have opportunities to contribute to conversations in other disciplines, as well as to decisions made in the public sphere. As archaeologists study relationships between people and the environment in their efforts to study the past, categories such as "nature" and "culture" can be seen as terms used to achieve political and economic goals. Those who have a stake in whether and how people change the environment will always be interested in the answers to these questions.

Historical Background

People value environmental knowledge because they construct their economic lives out of it. Before considering whether people changed the environment, it seems clear that people can change themselves, into a spectacular variety of different ways of interacting with the environment, at every scale. Fishers, farmers, nomads, urbanites, traders, and crafters are a few of the distinctive ways to make a living from the environment. This diversity of human activity is impossible to separate from its corresponding range of relationships that people have with the environment.

Study of the environment in archaeology is integral to the discipline. Archaeology was born in the realization that geological strata were correlated with different categories of artifacts. The three-age classification (Stone, Bronze and Iron Ages) was closely related to the development of stratigraphy as a tool in geology. Archaeologists and paleoecologists used pollen to reconstruct past vegetation, analyzed glaciers to understand the geological past, and then used those reconstructed environments as context for the evidence of prehistoric life. Reconstruction of the environment has always been a part of archaeology. In broad strokes, this historical context is an ecology or an interaction between three distinct kinds of ideas. These three categories make a tidy set, but just as with any classification, the phenomena in question (the practices of different researchers) in fact combine features of all three.

The first is the founding ideas of the biological and historical sciences, dating to the nineteenth century. After Darwin and Wallace put forward the idea of natural selection, nature was thought of as a variable, rather than a constant. Without this insight, archaeology (and coincidentally, anthropology) would not be recognizable. Because people were seen as part of the universe described by natural selection, the question of how human societies came to be was reopened. This question would be answered against the backdrop of environmental processes that had operated throughout the history of the earth, and even the solar system. In this view of environment, and its relationship with humans, the tools of biological science, chemistry, physics, and geology are used to better understand the current environment and its history through the operation of these universal processes. This powerful mode of thought lies behind the development of all the historical sciences, and accounts for much of the relevant research today.

Individuals are hard to distinguish in the archaeological record, and archaeologists interested in environment generally focus on communities or societies. Ideas about the most useful way of thinking about communities of people vary widely. American archaeology (via its disciplinary roots in anthropology) often views groups of people as having culture, a set of ideas that has influences or perhaps determines how they interact with the environment. Archaeology in Europe (and the UK) is perhaps more oriented toward the idea of society; it is less concerned with ideas that people might share, and more with how groups of people are organized and how they function.

The second idea that contributes to archaeological understanding of the environment dates to roughly the middle of the twentieth century, in conjunction with many significant advances in biology, cybernetics, and ecology. Translated into anthropology (or at least American anthropology), this resulted in a surge of interest in cultural evolution, ecology, and human ecology. The environment is conceived as constantly changing, but perhaps predictable as it follows feedback loops to maintain key variables (population, for example) within sustainable bounds. For example, populations of deer and wolves might vary, but because they are mutually dependent, they oscillate around a stable mean value. This idea is perhaps equally influential as the first, and certainly has resulted in useful research on how human communities relate to the environment in complex ways, whether through rituals associated with sweet potato gardening and raising pigs, or relationships between population and resource among nomadic peoples, or intensive farmers. Ecological points of view often emphasize balance between people and the environment, but people often fail to maintain such relationships.

The third type of idea acknowledges that nature is changing, but because of the efforts of field ecologists (Botkin 1990), it seems that self-regulating, equilibrium relationships do not often manifest themselves outside the laboratory. Instead, ecologists and interested social scientists have converged on a combination of ecology with history, often termed historical ecology. Ecological relationships are still central, as the inputs and outputs of any part of a system impact all the other parts, but the historical contingency of these relationships becomes the center of attention (Crumley 1994). In this point of view, nature or environment is seen in intimate connection with people, but large patterns are difficult to discern. The way to build such understandings is taken from history, and archaeologists and biologists alike study the local contexts and interactions between people and the environment to build larger theories.

The interplay between these three categories leads to the examination of issues of agency and scale. The idea of agency raises the question of whether intentionality is important to anthropogenic environmental change. For these purposes, anthropogenic change need not be intentional in order to qualify as environmental change. Agency refers to how humans cause change, whether or not they know what they are doing. For example, examining changes in soils over time through the addition of organic inputs like charcoal, it may not be clear whether the changes were intentional or not. Intentionality can also be difficult to define in the archaeological record, when juxtaposed with the different groups of people that might be associated with aspects of the archaeological record. Archaeologists are often more comfortable with what happened in the past than with what people in the past thought was happening.

The question of scale is crucial to describing change and its significance. Archaeologists are concerned with longer periods of time, so that often a change that takes less than a generation is instantaneous. On the other hand, archaeological evidence can establish the presence and importance of long-term trends, over generations, centuries, and millennia. One key question that runs through the history of archaeology, historical sciences, and history is how different scales relate to one another, especially whether causes can be found more at one scale than at the others.

Key Issues

We can define environment as the geological, climatological, biological setting within which people act. The question could then be whether people are capable of moving the scenery around on the stage on which they find themselves. Making this strong distinction between people and the environment as actors and scenery allows an argument to go forward, but the dichotomy itself is part of the theoretical discussion. Different people think of the relationship between people and the environment in very different ways. Because archaeologists and other scholars are also people, they are trapped within this frame of reference. Anthropologists have described many individuals and groups of people who do not draw the line between people and animals in the same place as many westerners. Case studies of how people have changed the environment have made it clear that the distinction between nature and culture is not easy to maintain. What follows is a set of examples in rough chronological order, from human ancestors to the archaeology of the current global political economy.

People use fire to clear grasslands, cook food, warm houses, and hunt animals. Thought of as a technology, the control of fire changes human ecologies tremendously in and of itself, and also as the prerequisite for other technologies: pottery and metallurgy, for example. Although the earliest use of fire has been a controversial topic, recent research suggests that the use of fire predates the human species, as usually defined. If fire was in use by human ancestors and then humans for one million years or more (or perhaps 40,000 generations), then the environment and human communities have been in complex relationships for long enough time to affect both human and landscape evolution. Acting directly on plants and animals, fire is used to favor savanna and fire-tolerant or dependent plants over other forests, to hunt animals on a larger scale, and to open up new sources

People as Agents of Environmental Change, Fig. 1 Large pre-Columbian raised fields near Santa Ana del Yacuma in the Bolivian Amazon. The differences in color are caused by the effects of burning the savanna. Individual fields average about 20 m by 200 m

of food through cooking (Fig. 1; Pyne 2001). Indirectly, the use of fire for other purposes, from cooking to making pots to keeping warm, results in demands for fuel that have further effects, and create processes that generate their own momentum (Bateson 1972). No other process or tool is easier to use and still produces such a dramatic range of profound changes in the environment.

A broad category of interactions includes those by which humans domesticate plants, animals, and landscapes. Domestication is a process that changes both humans and other species biologically, geographically, socially, and culturally. Over the course of several thousand years, corn (*Zea mays*) went from an unassuming tropical grass to a hybridized monster that cannot survive outside a complex, industrialized agriculture integrating genetic engineering, chemical fertilizers, herbicides, world markets, and land-grant universities (Piperno and Pearsall 1998). The changes in the human consumers of corn are equally startling. Among animals, the changes in domesticated animals can be seen through faunal analysis, as these species are also integrated into specialized ecologies. But even among animals that are not changed genetically by farmers, the movements and migrations of species that are hunted by humans, used as pets, or who follow human settlement have tremendous effects around the world. This effect is particularly visible on islands, but was by no means limited to them (Kirch and Hunt 1997). Humans also move earth and manipulate fire and water to favor some ecological communities over others. Realizing that fish are trapped in an oxbow lake, or that animals are limited to high ground during a flood season, allows people to predict and take advantage of regularities in the environment, without expending the effort to domesticate plants and animals at the genetic level.

In many cases, these manipulations of the environment, at many different levels, led groups of people to create and maintain ecologies that are usefully thought of as common pool resources (Ostrom 1990). Forests, often greatly modified and managed by people, are the result of practices like pollarding, coppicing, selecting for particular trees, harvesting firewood, fruits, and managing populations of animals. Some landscapes have documented histories of hundreds or even thousands of years (Rackham 1989). The scale of this management, especially in the tropics, is potentially very large (Balée 1998). Another group of managed resources are fisheries, both fresh and salt water. One of the first topics of research for the anthropologists, historians, and social scientists who study the management of common pool resources: Fisheries are amenable to archaeological research through the analysis of paleodiet

combined with settlement archaeology to study changes in population over time.

The often-arid landscapes of the Near East have been the stage for human history for many tens of thousands, and perhaps hundreds of thousands of years (Wilkinson 2003). The Near East is a palimpsest of landscape features that were built and used over thousands of years. Irrigation channels, threshing floors, roads, caves, tells, trails, and paths, all "written" on top of each other and then rewritten. Many of these landscape features also contain historical and cultural significance for their creators and descendants. These links and these relationships are very important today, and presumably also in the past. If a group of people can change the landscape by piling rocks into a monument, that act can have consequences over the long term that are belied by the simplicity of its immediate consequences. Again, the link between what people think about the environment, and how they relate to one another within the environment, is of first importance. Historical examples like irrigation systems in eastern Spain provide evidence about how human institutions and landscapes are related, over many generations. Archaeologists have uncovered widespread evidence of how pre-Columbian peoples built terraces, raised fields or chinampas, causeways, canals, geoglyphs, zoomorphic figures, mounds, paths, roads, dams, artificial channels, a huge range of direct modifications of the landscape that in turn shape the flows of fire, water, plants and animals, and permanently change the geography of the places where people live (Doolittle 2000; Lentz 2000; Denevan 2001; Whitmore and Turner 2001; Balée and Erickson 2006). The terraced landscapes of Southeast Asia and South America demonstrate how people invested their labor over centuries to make the landscape more productive, and increase the return on their time. Archaeologists have the resources and expertise to determine, not if a resource or a way of life is sustainable, but whether it was in fact sustained.

Many archaeologists have studied the interactions between people and the environment, not as examples of how people have built complex landscapes, or domesticated huge catalogs of plants and animals, but as explanations for drastic changes that are seen in the archaeological record (Redman 1999). The decisions that humans made about the environment, whether the consequences were foreseen or not, have been used to explain changes, usually in complex societies or "civilizations" around the earth. The collapse of the Maya, or the Tiwanaku, or Indus Valley civilization, to take three examples, is taken to be the result of overpopulation, overexploitation of resources, or of limited flexibility in the face of environmental changes such as drought. Many technological processes require large inputs of resources. Using wood and charcoal for fuel may have led to the local extinction of algarrobo trees on the Peruvian coast. Using wood or charcoal to fire adobe into bricks may have been an important limitation on the construction of Harappan cities in the Indus Valley. And the use of resources on Easter Island is an important issue in debates between Diamond and his critics regarding the fate of the people who lived there before the arrival of Europeans. Examining these ideas brings together natural and social scientists in productive ways, because although geologists or climate scientists might have insight into long-term changes in precipitation, archaeologists or historians might have insight into how societies interact with seasonal and long-term changes.

Are the fates of human societies governed by unchangeable environmental (geographic, biological, climatological) parameters, or is it possible for humans to change the environment, or change the rules? It is possible for humans to farm even on another planet, if they invested enough resources in the effort. Likewise, a swampy environment could be unlivable to one group of people, while at the same time being an ideal place for another group. Such differences might be in part preferences, as when someone would rather have warm weather year-round than cope with ice and snow, but such choices are also always interwoven with economic and political choices. James Scott argues that some societies "took to the hills" and moved to remote mountain environments to avoid the predation of lowland kingdoms (Scott 2011). These cultural ideas are as important as environmental limitations.

A very powerful way of thinking about the creation of systems within groups of people that

relate to the environment is the idea of "second nature" (Cronon 1991). When ideas about nature acquire importance and value separate from the aspects of the nonhuman world, they purport to describe or organize, a second nature is established. When corn, timber, or cotton becomes a commodity instead of a crop, the difference between the plants grown by two different farmers in two different places is flattened out. Trade and interaction between people over grain futures becomes more important than interaction between people over grain, or even between people and plants themselves. Farmers make decisions not based on any local factors that concern plants, animals, labor, or inputs, but based on a market in corn futures that they might never see, but whose effects they feel through subsidies or fluctuating prices. Cronon's insight raises the question of whether there might be other kinds of "second nature" that are not tied to the historical and geographic context of nineteenth century Chicago. Such disconnections between decision makers and the environment certainly occurred elsewhere. In addition to looking for the evidence of environmental change in lake cores or glacier cores, archaeologists might also look ideas about how "natural" things are brought into more and more abstract contexts.

The long-term history of commodities and political economy brings archaeology into contact with history, economics, and sociology, among other fields (Hornborg and Crumley 2007). Historical archaeology, which some have defined as the archaeology of the world through the development of industrial capitalism, has a great deal to offer to the study of environmental change. Industrial processes can be studied using historical documents, but archaeological evidence multiplies the value of historical sources. In the Amazon, for example, a historical archaeology of the many efforts to colonize, develop, and modernize the Amazon would include the story of Jesuit missions, connected to a global effort to establish an explicitly Christian utopia, the story of rubber exploitation, with a network of ports and company establishments, ranging from the empires of rubber barons in Peru and Bolivia, to Fordlandia, the company town established to oversee industrial cultivation of latex, and the construction of the Madeira-Mamoré railroad, intended to circumvent the non-navigable rapids and bring Bolivian rubber to the international market. Archaeology of the past 500 years around the world will be indispensable to understanding how industrialization changed the environment, both in the industrializing core, and the distant peripheries of the world economic system. Finally, the intentionality of pre-Columbian peoples is directly tied to one of many ideas that have been projected from the western imagination onto indigenous peoples. That Native Americans should be Noble Savages, counterexamples to the squalor and desperate violence of the fifteenth and sixteenth centuries in Europe, was perhaps an inevitable story. That the idea of native Americans as counterexample to the environmental destruction of multinational corporations and modern nation states is a new variation on an old idea. This idea allows intentionality to modern people, but denies it to pre-Columbian (and contemporary) indigenous communities. It also can be used against indigenous groups when they fail to live up to an imagined standard of behavior, instead choosing to follow their own self-interest.

International Perspectives

Archaeologists of South America, from around the world, and from South America itself, have a unique take on people and the environment. This stems from the unique relationships that pre-Columbian South Americans had with the environment, and with a recent history of interaction between ideas from different schools of thought from a variety of traditions. South American archaeologists have long been interested in the connections between pre-Columbian people and their shaping of the landscape from the terraces that gave the Andes Mountains their name, to raised fields that seem to correlate with widespread intensive agriculture across the continent, to concepts about nature and the place of people in it, deriving from the increasingly detailed ethnographic literature.

Environment is a habitat where people interact with other nonhuman factors and create a wide spectrum of adaptations to those factors. This is a

line of thinking that is as old as South American archaeology, and the application of a host of new techniques is making it more and more productive. For example, the application of faunal, botanical, and environmental analyses of early sites has shown that before 12,000 years ago, and perhaps much earlier, groups of people in South America were pursuing a wide variety of ways of life. This has upended previous interpretations of the importance of Clovis peoples in the peopling of the New World, not only through the earlier dates, but more importantly through the documentation of ways of life that are manifestly unrelated to Clovis big-game hunters. The refinement of techniques to better recover and analyze faunal and botanical remains has made these developments possible. Advances of equal importance are being made across the continent, showing that the deep histories of the areas outside the focal Andean region are equal partners in any account of continental archaeology.

Many archaeologists are also aware of the debates in cultural anthropology about the relationships between indigenous South Americans (especially Amazonians) and the natural world. Many of these relationships may have parallels in other parts of the world, and they certainly have profound consequences for how archaeologists interpret their evidence to stand for pre-Columbian ways of life. For the Huaorani in eastern Ecuador, trees are at the same time ancestors, links to historical knowledge, and part of the living environment where people spend their lives (Rival 2002). If individual trees, kinds of trees, and groves of trees can all have these meanings for Huaorani, then archaeologists have to consider that botanical remains of trees represent more than resources that people consumed. Cormier shows how people and monkeys are categories that blend together, as women nurse baby monkeys, and monkeys are accorded many of the statuses of humans (Cormier 2003). This is a pattern of interaction with animals that holds for many other species, although the social relationships differ. A strong thread in Amazonian cultural anthropology leads through the ideas that relationships between humans and the nonhuman world are social relations, rather than inert instrumental relations. In short, indigenous South Americans draw the line between humans and nonhumans in a different place, if indeed they draw that line at all.

And finally, archaeologists are reckoning with the understanding that the earth itself is a living thing. This is true at the level of soil science, where recent studies have focused on the question of how Amazonians manipulated soil properties to create new kinds of soil that have long-lasting properties, thereby changing the plant and animal communities based on those soils (Glaser and Woods 2004). These studies go to the heart of the question of agency – whether pre-Columbian communities created ADE soils intentionally or as the by-product of occupation. Such soils, known since the nineteenth century, are now being studied as a possible development alternative, and as a key to the puzzle of pre-Columbian economies, both along the main rivers, and in areas far removed from them. The agency attributed to South American mountains and constructed mounds is a remarkable example of complex relations between humans and the environment (Dillehay 2007). Social relationships between people and mountains, or between people and constructed monuments (which are also archaeological sites), are key to living in the right way.

South American archaeologists and anthropologist come to the idea of people as agents of environmental change by choice, but also by necessity. From what we now know of the long-term history of people on the South American continent, it would be difficult to understand from any one theoretical perspective, much less one which does not account for the social relationships between people and trees, animals, and the earth. There is little agreement on a larger framework for fitting these ideas of the environment into a larger story about the South American past, but the analysis of people as agents of environmental change is now well established in the field.

Future Directions

Changes in the technology of archaeological research are a trend that will influence future

studies. Archaeologists work hard for their data in the field, and while this will always be true, new techniques in remote sensing, recovery techniques, and management of data will plunge archaeologists into increasingly deep seas of data. Although shovels remain the same, archaeologists in 2012 derive chronological information from a wide range of recovered materials: scrape botanical information from artifact surfaces, and model hydrological or ecological processes in great detail over very large areas.

At the same time, the integration of local stakeholders in archaeological decision making will certainly have an equal impact. For many, the distinction between archaeology and ecology might not be all that important, as long as they bring in tourists or scientific and development grants. For others, archaeology has the potential to focus international attention (and funding) on issues of cultural identity that have always been important, but now are positioned to gain influence.

Finally, the environmental change that is underway in the twenty-first century will certainly influence the practice and interpretation of research. For example, some cultural resources will be destroyed by sea levels, but perhaps others will become available as different parts of the globe become more accessible. Some assumptions about the inevitable course of environmental change (such as deforestation) require greater scrutiny (Fairhead and Leach 1996). More significantly, the course of environmental change in the twenty-first century will likely influence strongly the goals and prejudices of archaeologists and stakeholders. Research may come to focus on case studies of environmental disaster in the past, and on examples of sustained societies as well. Although this trajectory cannot be separated from the arena of conflicting ideas in the present, the study of changing societies and environments in deep history is a question that combines archaeology, ecology, environmental reconstruction, history, geology, botany, geography, and other fields to inform decision makers at all scales, from descendant communities to state bureaucracies, to multinational companies.

Today, many are convinced that people change the environment, from a local to a global scale. However, environmental change in the twenty-first century is a divisive political and economic issue. Establishing connections between how people relate to the environment today, and how they did so in the past, can be a powerful rhetorical strategy. To see societies in the past as examples of sustainable ways of life, or as cautionary tales of mismanagement and ignorance, is a powerful argument when buttressed by archaeological data. Likewise the past 100 years have been described as "Something new under the sun," another strong position in current debates over environmental issues (McNeill 2001). Archaeology is more than political rhetoric, however, and research and analysis suggest that in fact, people have been agents of environmental change for many millennia, over most of the surface of the earth, and into oceans, rivers, and the atmosphere.

If people were agents of environmental change for centuries or millennia, this adds a crucial dimension to our understanding of societies in the past. Arguments over how and why civilizations "rose" and "fell" are often made using reconstructions of past environments, and the further study of these relationships is critical. But it also puts today's debates about environment and society into an important perspective. The world today, whether thought of as social, natural, or something else, is affected by processes that have operated for many generations. The accumulated changes of generations of artificial selection have changed corn from a tropical grass to a commodity. In a similar way, the accumulated labor of generations of farmers has produced irrigation ditches, terraces, raised fields, and other agricultural infrastructure, which is crucial to modern agricultural successes. The study of people as agents of environmental change must change several fields, by demonstrating that ancient environments, ancient societies, and the relationship between society and the environment today are all conditioned by these important historical contexts, whether or not the analysis of these case studies yields any kind of universal history or model.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agriculture: Definition and Overview
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Maize: Origins and Development

References

Balée, W., ed. 1998. *Advances in historical ecology*. New York: Columbia University Press.

Balée, W., and C.L. Erickson, eds. 2006. *Time, complexity and historical ecology*. New York: Columbia University Press.

Bateson, G. 1972. *Steps to an ecology of mind*. Chicago: University of Chicago Press.

Botkin, D.B. 1990. *Discordant harmonies: A new ecology for the twenty-first century*. New York: Oxford University Press.

Cormier, L. 2003. *Kinship with monkeys: The Guaja foragers of eastern Amazonia*. New York: Columbia University Press.

Cronon, W. 1991. *Nature's metropolis: Chicago and the great West*. New York: W. W. Norton.

Crumley, C.L., ed. 1994. *Historical ecology: Cultural knowledge and changing landscapes*. Santa Fe: School of American Research Press.

Denevan, W.M. 2001. *Cultivated landscapes of Native Amazonia and the Andes*. Oxford: Oxford University Press.

Dillehay, T.D. 2007. *Monuments, empires and resistance: The Araucanian polity and ritual narratives*. New York: Cambridge University Press.

Doolittle, W.E. 2000. *Cultivated landscapes of Native North America*. Oxford: Oxford University Press.

Fairhead, J., and M. Leach. 1996. *Misreading the African landscape: Society and ecology in a forest-savanna mosaic*. Cambridge: Cambridge University Press.

Glaser, G., and W.I. Woods. 2004. *Amazonian Dark Earths: Explorations in space and time*. Berlin: Springer.

Hornborg, A., and C.L. Crumley. 2007. *The world system and the earth system: Global socioenvironmental change and sustainability since the Neolithic*. Walnut Creek: Left Coast Press.

Kirch, P.V., and T.L. Hunt. 1997. *Historical ecology in the Pacific Islands: Prehistoric environmental and landscape change*. New Haven: Yale University Press.

Lentz, D.L., ed. 2000. *Imperfect balance: Landscape transformations in the Precolumbian Americas*. New York: Columbia University Press.

McNeill, J.R. 2001. *Something new under the sun: An environmental history of the twentieth century world*. New York: W. W. Norton.

Ostrom, E. 1990. *Governing the commons: The evolution of institutions for collective action*. New York: Cambridge University Press.

Piperno, D.R., and D.M. Pearsall. 1998. *The origins of agriculture in the lowland Neotropics*. San Diego: Academic Press.

Pyne, S.J. 2001. *Fire: A brief history*. Seattle: University of Washington Press.

Rackham, O. 1989. *The last forest: The story of Hatfield Forest*. London: J. M. Dent & Sons, Ltd.

Redman, C. 1999. *Human impact on ancient environments*. Tucson: University of Arizona Press.

Rival, L. 2002. *Trekking through history: The Huaorani of Amazonian Ecuador*. New York: Columbia University Press.

Scott, J.C. 2011. *The art of not being governed: An anarchist history of upland Southeast Asia*. New Haven: Yale University Press.

Whitmore, T.M., and B.L. Turner II. 2001. *Cultivated landscapes of Middle America on the eve of conquest*. Oxford: Oxford University Press.

Wilkinson, T.J. 2003. *Archaeological landscapes of the Near East*. Tucson: University of Arizona Press.

P

Further Reading

Diamond, J. 2004. *Collapse: How societies choose to fail or succeed*. New York: Viking.

Flenley, J., and P. Bahn, eds. 2003. *The enigmas of Easter Island*. Oxford: Oxford University Press.

Ingold, T. 2000. *The perception of the environment: Essays in livelihood, dwelling and skill*. New York: Routledge.

Mann, C.C. 2005. *1491: New revelations of the Americas before Columbus*. New York: Alfred A. Knopf.

Mann, C.C. 2011. *1493: Uncovering the New World Columbus created*. New York: Alfred A. Knopf.

McAnany, P.A., and N. Yoffee, eds. 2009. *Questioning collapse: Human resilience, ecological vulnerability, and the aftermath of empire*. Cambridge: Cambridge University Press.

Politis, G. 2007. *Nukak: Ethnoarcheology of an Amazonian people*. Walnut Creek: Left Coast Press.

Woods, W.I. 2008. *Amazonian Dark Earths: Wim Sombroek's vision*. New York: Springer.

Peopling of the Americas

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Introduction

The antiquity of humankind in the Americas has been a recurring theme in popular and scholarly thought since the spurious discovery of the hemisphere by southern Europeans. Virtually as soon as Cristoforo Columbo set foot on San Salvador (or Samana Cay) to encounter its native people and future victims, a lengthening chain of questions about the indigenes were posed by the explorers themselves, civil and religious bureaucrats, military men, mercantilists, and the inevitable crass opportunists. Who might these people be? From whence did they come? How did they get here? How long have they been here? Scholars, following the very early lead of Spanish Jesuit missionary and naturalist José de Acosta, eventually came to inquire into the everyday lives of the New World's peoples and how they might have lived. The answers to some of these questions have proven to be resolutely intractable or highly problematic as of this writing, despite a number of significant field and laboratory discoveries.

Historical Background

Examination of the timing, methods of movement, routes, and geographic and genetic origins of human migration into the hitherto unpopulated Western Hemisphere has engaged archaeological inquiry for over 150 years. The last of the Pleistocene migrations by fully modern humans, and arguably the last of the great earthbound human migrations, this journey covered thousands of kilometers over the course of several 1000 years, well after the movement of anatomically modern *Homo sapiens sapiens* out of Africa (ca. 100,000 BP) and central and eastern Asia (ca. 45,000–40,000 BP). Upon their arrival, these first migrants then appear to have quickly spread throughout the entire (and then completely unknown) hemisphere relatively quickly, adapting to a complex and variable array of local climates, landscapes, and biota while also exhibiting concomitantly diverse technologies and lifeways on the landscape in very widely distributed locations.

Scholarly answers to the questions surrounding this migration have achieved varying levels of resolution and consensus, but some aspects – most notably, the physical homeland(s) and specific genetic forbears as well as the timing of the event(s) – have, as noted above, remained intractable and unresolved. It is generally agreed, for example, that the earliest inhabitants of the Americas were at first northeastern Asians. Resolution and consensus begin to break down, however, once one starts specifying precisely where in northeast Asia, as well as the timing (pre- versus post-Last Glacial Maximum [LGM]) and routes of the migration (coastal vs. interior, or both?). Considerable lacunae continue to exist in our understanding of late Pleistocene lifeways in the Americas, moreover, hinging as it does on quite variable data from far-flung sites that are often relatively small, poorly preserved, and ephemeral compared to later (and sometimes overlapping) cultural manifestations.

The confirmation of a deep human antiquity in Europe by a delegation of British geologists and antiquarians visiting the excavations of Jacques Boucher de Crèvecœur de Perthes in the Somme valley of northern France in 1859 soon filtered across the Atlantic. This, in turn, stimulated American academicians to naively seek phenomena of comparable antiquity in the Americas. The ensuing "American Paleolithic" debate would foreshadow later, persistent disputes about the timing of the arrival of the hemisphere's first colonists. The question of an American Paleolithic would temporarily be resolved by the turn of the twentieth century, when – thanks largely to the insistence on rigorous standards of evidence

by Aleš Hrdlička, William Henry Holmes, and others – all claims for an Ice Age human presence in the Americas had been dashed (Meltzer 2015). Prior to the 1920s, the received wisdom was that no humans had entered the hemisphere before the final retreat of the glacial ice and the subsequent inundation of Beringia.

This almost universally accepted position would ultimately be dismantled by another delegation of experts which, in 1927, confirmed Jesse Dade Figgins' claimed association of an extinct species of bison (*Bison antiquus*) with artifacts of indisputable human manufacture in an unambiguous stratified context. The artifact suite notably included delicately made projectile points with bilateral channel flakes or flutes, which were named Folsom after the locus of the discovery. This seminal research not only established that humans were in the Americas sometime before the end of the last Ice Age, but also that they were living among and preying upon extinct Pleistocene fauna.

Four years later, two other discoveries, one near Dent, Colorado, and the other at Blackwater Draw, south of Clovis, New Mexico, revealed more evidence of the apparent hunting of extinct Pleistocene megafauna, in these cases, mammoth (*Mammuthus columbi* or *Mammuthus primigenius*). Associated with these remains was a robust form of bi-channel flaked point which subsequent excavations demonstrated was stratigraphically deeper and thus older than the bison-associated Folsom point. Named Clovis after the nearby community, these points were subsequently reported from much of unglaciated North America as well as portions of Central and South America. Within a few decades, these forms and a suite of loosely associated artifacts came to be regarded as the material culture signature of the hemisphere's initial colonists and were considered to be emblematic of a highly specialized, big-game focused lifeway pursued by rapidly moving spear-wielding hunters.

With the advent of radiocarbon dating in the late 1940s and early 1950s, the Clovis "horizon" was initially fixed at ca. 13,500–13,000 calibrated radiocarbon years before present (cal BP). By the late 1960s, a peopling scenario that held Clovis as the hemisphere's initial colonizing pulse was widely accepted by a great majority of North American scholars and the lay public. Called "Clovis First" in more recent times, its proponents concluded that sometime shortly before 13,500 cal BP, a small group of Paleoindians crossed the Bering Platform dry-shod (as postulated by d'Acosta in 1590), passed through unglaciated Beringia, and then rapidly moved south through the narrow corridor between the waxing and waning Cordilleran and Laurentide ice sheets. Following their transit through the ice-free corridor, these putative first inhabitants of the Americas were then presumed to have spread throughout the entire hemisphere in the span of only about 500 radiocarbon years. Either shortly before, or perhaps during this dispersal, they were also presumed to have invented the fluting of projectile points and used these allegedly lethal weapons to more or less synchronously dispatch some 35 genera of late Pleistocene fauna. This "blitzkrieg" dispersal, as it came to be known, was championed by the late Paul Martin (1967). A crucial corollary to this scenario was the contention that Clovis technology was ancestral to all other lithic tool kits in the entire hemisphere. Although not without its critics, especially in Europe and South America, the Clovis First model became further entrenched by the repeated failure to identify bona fide sites predating Clovis and the apparent support provided by the limited physical anthropological and linguistic data available at that time.

Despite its inherent weaknesses, especially the existence of roughly contemporaneous lithic industries that are clearly technologically distinct from Clovis, the Clovis First paradigm did not begin to unravel until the early 1970s with the discovery of several sites that seriously challenged the Clovis First model. The most frequently cited localities that have precipitated a general acceptance of the existence of pre-Clovis populations in the Americas are Monte Verde in Chile (Dillehay 1989, 1997) and Meadowcroft Rockshelter in southwestern Pennsylvania (Adovasio et al. 1984, 1985, 1990; Carlisle and Adovasio 1982). These two localities yielded durable and perishable artifacts of indisputable

anthropogenic origin in well-defined stratigraphic contexts that were tightly bracketed by multiple internally consistent radiocarbon determinations. Despite continued criticism from some scholars, these two sites nonetheless definitively established a human presence in the Americas at least 1,000–2,500 radiocarbon years before the Clovis First model's presumed crossing of the Bering Strait.

Although Meadowcroft was discovered and documented first, Monte Verde is widely considered to be the first site to have decisively broken the Clovis First peopling scenarios. Located on a small tributary stream, Chinchihuapi Creek, about 20 km northeast of the Gulf of Ancud on the west coast of Chile, Monte Verde is currently the southernmost pre-Clovis site in the hemisphere. Several cultural components have been identified at Monte Verde. The oldest of these components, MV-I, was until recently only known from a very circumscribed deep excavation. As originally defined (Dillehay 1997), the MV-I component consisted of three possible anthropogenic features, eight "scatters" of charcoal, and a suite of some 26 lithic artifacts. Originally thought to date to as early as 38,800–36,620 cal BP, recent re-excavations conducted in 2013 suggest that the age of this occupation, or series of occupations, is probably ca. 18,500–15,000 cal BP in age (Dillehay et al. 2015).

The 2013 excavations yielded additional charcoal, thermally altered bone fragments, and lithic artifacts, with some of the latter sourced to distant quarries. Despite the potentially profound implications of the earlier posited date range for MV-I, which would make this site penecontemporaneous with the earliest generally accepted penetration of modern humans into Siberia, the excavators continue to be very cautious about the age of the first visitation/utilization of the Monte Verde locality (Dillehay et al. 2015). As a result, far more attention has focused on the much more extensively and intensively investigated MV-II component, which is securely dated by well over a dozen conventional and AMS assays on various substrates to ca. 14,800–13,800 cal BP.

Significantly, Monte Verde's MV-II component appears to reflect a semi-sedentary, broad-spectrum adaptation that is fundamentally different in all respects from that modeled for later Clovis populations. As a stream-side residential site that is sealed beneath a postoccupational peat mantle, the component's principal habitation area lies north of the stream and is composed of the structural remains of 12 rectangular, hut-like dwellings made of wood elements and covered with plant material and/or the skins or hides of animals like paleo-llama (*Llama glama glama*). Associated with these structures were four workshop areas, a midden concentration, and a variety of hearths and pits. Excavations in the residential area yielded lithic, bone, wood, and fiber artifacts as well as the remains of more than 70 taxa of plants, including local as well as exotic edible and medicinal varieties. Remarkably, actual specimens of animal tissue and hide were recovered in addition to abundant faunal remains, notably including fragmented, burned, and unburned bones and ivory of a mastodon cousin, the gomphothere (*Cuvieronius* sp.). Directly to the west of the hut complex was another structure with a wishbone-shaped foundation and extensive associated refuse (Dillehay 1997:49).

Collectively, the material inventory from Monte Verde indicates a semi-sedentary subsistence regime that included the exploitation of small game, paleo-llama, and, potentially, larger animals like gomphothere as well as a wide diversity of local and nonlocal plant foodstuffs. The toolkit is dominated by perishable artifacts with a lithic industry that is remarkable only for its expedient character and general lack of temporal diagnostics. Indeed, with the exception of three projectile point fragments with apparent affinities to the Paleoindian El Jobo type, the majority of the durable tool kit can only be called depauperate, with few curated tools and a virtual absence of formalization. Most of the igneous raw materials employed in the production of the MV-II stone toolkit derive from locally abundant glacio-fluvial gravels with fewer than 15% coming from nonlocal sources. In sum, the evidence from Monte Verde indicates an adaptation completely inconsistent with the Clovis First paradigm in chronological, technological, and behavioral terms. The majority of the North American scholarly

community accepts the antiquity of the MV-II occupation at Monte Verde.

More than 10,000 km north of Monte Verde is Meadowcroft Rockshelter, a deeply stratified south-facing rockshelter located on a minor tributary of the Ohio River in southwestern Pennsylvania (see Meadowcroft Rockshelter, this volume). The 11 strata at this site have yielded the longest occupational sequence from eastern North America and one of the longest in the Americas. The site's upper strata (Upper IIa–XI), whose temporal provenance has never been seriously disputed, span the entire Holocene with a terminus ad quem dating to just before the American Revolutionary War (AD 1775–1783). The lower culture bearing strata (Middle and Lower IIa) and their attendant radiocarbon dates, however, have been the subject of four decades of vigorous debate and controversy. Continued criticism has pivoted around alleged contamination of only the 11 oldest radiometric determinations from the site, along with the absence of a final report.

No evidence of any form of contamination has ever been demonstrated despite extensive publication on stratigraphy and the dating issue. As recently noted by Adovasio and Pedler (2013:514), applying the most conservative interpretation of the available chronometric data, the latest or most recent age for the presence of human populations in this portion of the Ohio River basin is in the range of 13,870–12,660 cal BP. Radiometric dates on charcoal from a series of firepits identified in lower Stratum IIa range from 20,476–18,110 cal BP to 16,565–14,085 cal BP. If the six deepest dates at Meadowcroft Rockshelter which are unequivocally associated with cultural material are averaged, then humans were definitely present at Meadowcroft between 17,500 and 16,750 cal BP. The oldest date from lower Stratum IIa that was run on a carbonized bilaterally cut fragment bark-like material is 26,212 cal BP. The configuration of the dated specimen is fully consistent with plaiting strips employed in later Meadowcroft basketry and *may* be a fragment of a basket wall. In any case, it is anthropogenically altered and suggests that the earliest Meadowcroft visitation may have occurred even earlier than 16,750 cal BP. It should be noted, however, that this date as well as a second one (21,000 cal BP) not on cut bark were both obtained from very small diluted samples and both are non-AMS assays with high standard deviations.

The lithic artifact assemblage associated with the earliest Meadowcroft populations is relatively small (ca. 700 specimens) but sufficient to characterize the industry. The Meadowcroft lithic debitage sample reflects secondary and tertiary core reduction and biface thinning from late-stage manufacture as well as the refurbishing of finished implements. The essentially curated tool kit notably includes an unfluted lanceolate bifacial point (the Miller point), and small prismatic to triangular (in cross section) blades struck from small prepared cores. Additionally, bone, wood, and plant fiber artifacts were also recovered from the site's pre-Clovis levels. These include plaited basketry, a bone punch, bone awl fragments, and a bipointed wooden tool, all apparently made by generalized foragers who exploited white-tailed deer (*Odocoileus* sp.) and smaller game along with hickory nuts (*Carya* sp.), walnuts (*Juglans* sp.), and hackberries (*Celtis* sp.), during the predominately short-term fall visits.

Sites and Chronology

The publication of the initial series of radiocarbon dates from Meadowcroft in the mid- to late 1970s, arguably when the Clovis First paradigm was at its zenith, constituted the first serious challenge to the Clovis First paradigm and was immediately met with acute skepticism and withering criticism. The intervening years, however, have witnessed the gradual unraveling of Clovis First in the face of mounting evidence to the contrary, both in the form of newly discovered Clovis contemporaries and/or pre-Clovis sites (which as of this writing number at least 35) and more subtle strains of evidence marshaled through advances in analytical techniques, multidisciplinary research initiatives, and innovative approaches. Molecular genetics, bioanthropological research, and historical linguistics, for example, have been enlisted in

the search for the points of departure for the early colonizers of the Americas. Unfortunately, although a northeast Asian origin is virtually universally confirmed, a geographically and genetically specific homeland/population cannot be specified. Moreover, continued archaeological research and refinements in historical geology, historical glaciology, and geomorphology have permitted a better understanding of prior population movements through the Russian Arctic and Siberia and an exploration of their implications for human subsistence and adaptability as well as the timing and route(s) of entry. Freedom from the strictures of received wisdom has also permitted the consideration of factors and approaches which might have previously been ruled out, such as the possibility of coastal (or even maritime) routes of entry to the Americas.

Pre-Clovis Sites

Perhaps the most important development has been the archaeological discovery of a growing number of far-flung localities in North and South America. These include sites which are clearly older than the Clovis horizon and/or penecontemporaneous and, hence, unrelated in any descendent way. Among the older sites is Cactus Hill in Virginia, a stratified, multicomponent, open site situated in an approximately 1.8 m thick aeolian dune deposit adjacent to the Nottoway River on the interior Coastal Plain of Virginia. The site was investigated by two independent groups, one directed by J. McAvoy (McAvoy et al. 2000; McPhail and Mcavoy 2008) and the other by M. Johnson (2012, 2013).

The occupational sequence at Cactus Hill is roughly confined to the upper 1 m of the site's dune deposit, but, like Meadowcroft, it extends from before Clovis times to the Historic period. In several sections of the site, a Clovis occupation has been identified beneath which lies a thinly, but clearly separated pre-Clovis component. The Clovis occupation is dated to ca. 13,300–12, 370 cal BP on the basis of firepit-derived charcoal. The pre-Clovis component has a series of radiocarbon and complementary OSL determinations. Notable are dates of 18,530–18,080 cal BP from a probable hearth and 21,930–18,490 cal BP from a charcoal concentration beneath a lithic tool cluster. A second date of 20,610–20,230 cal BP appears to confirm the other dates as do the OSL assays. Collectively, the data suggest one or more earlier than Clovis occupations dating ca. 20,000 cal BP.

Lithic analysis of the approximately 70 flaked stone tools from the pre-Clovis component (s) reflects a core and blade technology with two different kinds of small cores (conical platform cores with and without faceting and thick, chopper-like cores). The locally obtained quartzite cores were flaked with soft stone hammers or hardwood billets thought to have been prepared elsewhere then brought to the site for blade or blade-flake production. Also represented are at least two thin subtriangular to lanceolate unfluted bifaces. The excavators suggest that the blade and biface technology was employed by generalized foragers, not specialized big-game hunters. Additionally, the resemblance of the early Cactus Hill toolkit to its counterpart at Meadowcroft is readily apparent in all but raw material choices.

Interestingly, a generally similar toolkit with small prismatic blades, polyhedral blade cores, and unfluted lanceolate to triangular projectile points has been reported from Oyster Cove, Miles Point, and Cators Cove in the Chesapeake Bay region (Lowery 2007, 2010; Lowery and Wah 2011). At Miles Point, luminescence and radiocarbon dates suggest an age greater than 25,600 cal. BP, while Oyster Cove has yielded a date of 30,000 cal. BP. Though this toolkit *is* consistent with those recovered from lower and middle Stratum IIa at Meadowcroft and the deeper horizons at Cactus Hill, unresolved questions remain about the antiquity and geoarchaeological contexts of these materials in the Chesapeake region.

Although a uniform consensus exists for none of them, several other sites in North America are often cited as older than Clovis: Paisley Five Mile Point Caves in Oregon, Page-Ladson in Florida, the Schaefer and Hebior sites in Wisconsin, and the Deborah L. Friedkin and nearby Gault localities in central Texas.

The Paisley Five Mile Point Caves, which were initially investigated in the late 1930s, are a

complex of eight closed loci in south-central Oregon that were carved by wave action from basalts, volcanic tuffs, and breccias. Research at Paisley Five Mile Point Cave 5 (Jenkins 2007) has yielded durable and perishable artifacts, cultural features, late Pleistocene faunal remains, and putative human coprolites in apparent association within deeply buried stratigraphic contexts. Seven of the coprolites have been directly dated by radiocarbon assay, yielding ages ranging from 14,860–14,140 cal BP to 12,720–12,540 cal BP. Five of the dated coprolites have yielded human DNA and human protein residue and are often cited as among the oldest directly assayed evidences of a human presence in North America. Despite fanciful efforts to challenge the anthropogenic origin of the coprolites, many scholars accept these materials as demonstrating a pre-Clovis presence in the Pacific Northwest.

Page-Ladson is a sinkhole in the submerged bed of the Aucilla River in the Big Bend area of Florida (Dunbar 2006). Excavations in the deepest levels at this locus have produced lithic debitage, at least one unequivocal uniface, and apparent anthropogenically modified bones and ivory in apparent association with late Pleistocene megafauna including mammoth (*Mammuthus primigenius*), mastodon (*Mammut americanum*), horse (*Equus* sp.), ground sloth (*Megalonyx* sp.), and paleo-llama (*Llama glama glama*). A series of radiocarbon dates from these levels range from 16,360–15,100 cal BP to 13,770–13,440 cal BP. Limited re-excavations at Page-Ladsen have confirmed the original age assessments and suggest that Native Americans had arrived in northern Florida by ca. 14,400 cal. BP (Halligan et al. 2016).

More or less contemporaneous are a few sites that have been ascribed to the Chesrow complex, defined on the basis of 35 localities west of Lake Michigan in southeastern Wisconsin (Overstreet 2005). The Chesrow Complex includes both habitation and mammal kill/processing localities. The Chesrow artifact suite as derived from numerous sites includes unfluted lanceolate to basally thinned concave base points, other weakly stemmed points, bifaces, cores, utilized flakes, and hammer stones made largely from locally available quartzite cobbles. Two of the kill/processing sites, Schaefer and Hebior, have produced radiocarbon determinations from alleged associations with artifacts and extinct fauna. Schaefer yielded 15 dates ranging from as early as 15,150–14,630 cal BP to as late as 14,630–14,030 cal BP. Hebior yielded three dates ranging from as early as 15,170–14,670 cal BP to as late as 15,040–14,270 cal BP. At both sites, the principal associated fauna is mammoth (*Mammuthus jeffersoni*). Two additional Chesrow Complex sites, Mud Lake and Penske, have also yielded apparently butchered mammoths but without artifact associations. Mud Lake yielded four dates ranging from 16,520–16,100 cal BP to 16,380–15,950 cal BP, and Penske produced two dates of 16,490–16,070 cal BP and 16,420–16,010 cal BP.

Debra L. Friedkin and Gault are deeply stratified open sites in central Texas on the alluvial flood plain of Buttermilk Creek, a tributary stream in the Lower Brazos–Little Brazos watershed (Waters et al. 2011). Separated by less than 250 m, it is probable that both sites are part of the same very extensive series of seasonal residential occupations. Deep excavations at these localities have yielded long occupational sequences which include Late Prehistoric; Late, Middle, and Early Archaic manifestations; and the entire Paleoindian sequence, notably including well-defined (and in the case of Gault, very large) Clovis components. Beneath the Clovis layers at both sites is an extensive manifestation that is older than Clovis. At Friedkin, more than 15,000 artifacts have been recovered from the pre-Clovis levels, a total that includes 12 bifaces, 23 utilized flakes, 19 whole or fragmentary blade or blade flakes, gravers, at least one core, and one piece of polished hematite. The bifaces include unfluted lanceolate forms and exhibit varying thicknesses. A generally similar assemblage was recovered form Gault, specifically including fragments of two very small, expanding stem unfluted projectile points and at least one unfluted lanceolate biface. Gault also yielded a pre-Clovis stone pavement which may be part of an anthropogenically created dwelling or structure floor.

Optically stimulated luminescence dates suggest that the pre-Clovis occupation at Debra L. Friedkin ranges 15,500–13,200 cal BP, with a

similar estimate for Gault. It should be stressed that the Clovis occupation at Gault is far and away the most extensive ever recorded in North America. Stretching over a minimum of 12 ha, the Clovis component at Gault has produced more than 600,000 Clovis-age lithic artifacts from excavations covering less than 3% of the site's total surface area. Virtually all of the lithic artifacts recovered from both sites derive from extensive local outcrops of Edwards Plateau chert, which appears to have been a major attraction to populations visiting both sites throughout their occupational trajectories. Interestingly, the pre-Clovis technology at both sites shares certain attributes not only with later Clovis-age materials, but also with the pre-Clovis technology exhibited at such far-flung localities as the Chesrow Complex sites, Meadowcroft Rockshelter, and Cactus Hill. It is also significant that the excavators believe that the Clovis occupations at Gault and Debra L. Friedkin are probably both longer term and suggest a more broadly based subsistence lifestyle than that posited for this time period by the Clovis First paradigm.

Finally, recent excavations at Huaca Prieta, Peru, have revealed an intermittent human presence at around 15,000–8,000 cal. BP, well before the celebrated multistage mound was erected at this locality (Dillehay et al. 2017). Once again, the lithic tool kit is based on minimally worked unifaces, and the recovered dietary elements suggest the broad-spectrum exploitation of multiple environmental niches.

Clovis Contemporaries: Diversity and Dissimilarity from Clovis

As damaging as the evidence from the pre-Clovis sites summarized above is to the integrity of the Clovis First model, data from penecontemporaneous sites and/or complexes to which Clovis cannot possibly be ancestral are equally compelling. As with pre-Clovis manifestations, a significant number of sites, site complexes, and tool industries that have been identified across the length and breadth of the Americas have yielded bona fide artifacts and tool kits reflecting lifestyles that are sharply at variance with the putatively typical Clovis patterns. In far western North America, such phenomena notably include the Western Stemmed Tradition (WST) sites in the Great Basin and immediately contiguous areas (Beck and Jones 2010, 2013). Noteworthy among the WST sites are Smith Creek Cave in Nevada (with its Mt. Moriah points, gravers, and unifaces), Danger Cave in Utah, Connley Cave #5 in Oregon, Cooper's Ferry on the lower Salmon River in Idaho, Clarks Flat on the western flank of the Sierra Nevada Mountains in California, and Dietz in Oregon. While the deepest and oldest dates at several of these localities have been challenged and claims have been made that Clovis pre-dates the WST, it is generally accorded that in technological and behavioral terms these sites significantly differ from and are fundamentally unrelated to Clovis.

Far to the north at the eastern end of the Bering Platform are the central Alaskan sites of the Nenana complex: Dry Creek, Walker Road, Mock Creek, and Panguingue Creek in the Nenana Valley; Owl Ridge in the neighboring Teklanika Valley; and penecontemporaneous localities like Broken Mammoth, Swan Point, and Mead in the Tanana Valley (Goebel and Buvit 2011; Potter et al. 2013; Powers and Hoffecker 1989). Excavations at all of these open sites have produced generally similar lithic assemblages that include Chindadn points (an unfluted lanceolate to sub-triangular to teardropped form) and high frequencies of end and side unifaces (or scrapers), other unifacial and bifacial forms, a few true burins, and extensive debitage. Also present at most sites are small to medium-sized blades, blade cores, and tools made on blades (Powers and Hoffecker 1989). Once thought to represent a potential ancestor to Clovis, the Nenana complex is now viewed as a Clovis contemporary, dating to as early as 13,420–12,900 ca. BP at Walker Road and 13,498–13,305 at Dry Creek, with presently unpublished data from Swan Point suggesting that its lowermost cultural zone may be several 100 years older. Though sharing some broadly similar technological attributes with Clovis, Nenana is clearly not a descendant complex.

Farthest afield and, not surprisingly, evidencing the least technological or behavioral

resemblance to Clovis are a number of South American sites whose ages are either clearly earlier or broadly contemporary with Clovis. These include Lapa do Boquete, Lapa dos Bichos, and Grande Abrigo de Santana do Riacho in Brazil; Fell's Cave, Tagua-Tagua, Quebrada Santa Julia, and Quebrada Jaguay in Chile; Tibitó in Columbia; Cerro Tres Tetas, Cueva Casa del Minero, and Piedra Museo in Argentina; and Taima-Taima in Venezuela. Most of these sites have yielded undiagnostic flake tools as well as a minority of bifacial elements. A few, like Fell's Cave and Piedra Museo, have produced distinctive Fish Tail points once thought to be Clovis derivatives. Though many of these sites are only partially reported and few have multiple, internally consistent chronometric ages, the inescapable fact remains that their lithic industries are quite different from Clovis (or, indeed, any other North American industries) and are clearly not descended from them. Though this elemental lack of technical relationships has long been cited by South American archaeologists, it has been casually dismissed or ignored by some North American scholars.

Efforts to dismiss many of the early South American sites (including Monte Verde) are often centered on the nature of the associated lithic toolkits. Many of the South American sites lack typologically standardized bifaces and are, instead, focused on superficially simple, seemingly ad hoc unifacial technology. This unifacial technology is often derided (especially by North Americans) as "primitive" or "crude" and the unifacial toolkits recovered from some sites have even been attributed to nonhuman artificers in the form of capuchin monkeys!

Discussion

Just as the Clovis First model appeared to be consistent with and thereby supported by the extant linguistic and biological data of the 1950s–1970s, so also now does the pre-Clovis paradigm appear to be corroborated, however imperfectly, by more modern data from these same disciplines. Although space precludes in-depth discussion of recent genetic, bioanthropological, and linguistic scholarly efforts to address or establish the timing of the arrival(s) of the first humans into the Americas, suffice to note that virtually all of the available genetic, morphological, dental, and linguistic data continue to consistently and overwhelmingly point to an East Asian origin for Native Americans. Despite this fundamental consensus, however, some scholars suggest that at least one of the colonizing lineages (i.e., the X haplogroup) may derive from Iberia, not Siberia, while others advance the possibility of a Sub-Saharan African homeland for some native South Americans.

Any consensus on the number and/or timing of population pulses into the Americas based on nonarchaeological evidence is far more tenuous. Some geneticists and linguists favor a single movement, while others advocate two, three, or more population spreads. Some suggest an entry before the Last Glacial Maximum (LGM) now fixed between ca. 20,000–19,000 BP and 16,500 BP, others maintain a post-LGM entry, and others still postulate multiple movements before and after the LGM, occasionally with possibility of failed migrations. Likewise, various models have been offered to simulate rapid population expansion, slower spreading rates, and even very slow movements north to south. None of these models has achieved general or even limited acceptance, and the present state of knowledge unfortunately does not appear to permit the definitive establishment of a chronology for either the first or subsequent entradas. Indeed, Meltzer (2009:133) may well be correct that the ephemeral signature of the very first colonists on the American landscape will never be found.

If there is considerable disagreement over the timing and/or number of separate entradas into the Americas based on genetic or linguistic data, there is perhaps even greater dispute over the route or routes of entry. Some authorities still support the traditionally recognized entry route through the unglaciated interior of Beringia into the unglaciated Bering Refugium and thence down the ice-free corridor. In order to explain a very early human presence in archaeological localities situated over 5,000 km to the south – and, in the

case of Monte Verde in southern Chile, over 15,000 km to the south – a decades-old coastal migration hypothesis has been resurrected by recent scholars. Initially advanced by Simon Fraser University archaeologist K. Fladmark (1979), the notion that humans moved rapidly along the Siberian coasts, thence along the southern margins of Beringia and down the Pacific Coast to the northwestern United States and points south, has long been endorsed by archaeologists A. Bryan (1980, 1988), R. Gruhn (1994), and J. Dixon (1999), among others, and has been promoted most-recently by University of Oregon archaeologist J. Erlandson (2013) and his colleagues (2007). This postulated movement is thought to have involved both limited pedestrian traverse and the extensive use of watercraft.

Several variations on the theme of coastal migration have also been proposed. Archaeologist D. Anderson of the University of Tennessee, for example, has suggested that migration into interior North America first involved a southward coastal movement along the southern margins of Beringia to the tip of Baja California, followed by either a waterborne journey across a presumably narrow portion of the Gulf of California to mainland Mexico or a northward pedestrian movement up the east coast of Baja to the mouth of the Colorado River (Anderson 2013; Anderson et al. 2013). In either case, subsequent migration into different portions of the North American interior could have been facilitated. Alternatively, it has also been proposed that the coastal migration proceeded as far south as the Isthmus of Panama, which was then crossed at its narrowest point, followed by a northward movement along the Texas Gulf Coast and a bifurcation east to present-day Florida or northward through the Mississippi Valley. Of course, there is a distinct possibility that any combination of these routes could have been used simultaneously or sequentially by different pulses of colonists.

Perhaps the most controversial colonization scenario yet offered is the trans-Atlantic hypothesis championed by Stanford and Bradley (2012), which posits that maritime-adapted Solutreans emanating out of the Atlantic coast of southern Europe and traversing the North Atlantic in umiak-style watercraft. Upon arriving in the Americas, they are speculated to have introduced elements of Solutrean technology which ultimately gave rise to Clovis in the American Southeast. Stanford and Bradley cite the occurrence of the X haplogroup in Western Europe as well as a claimed series of congruencies between Solutrean and later Clovis technology, which they believe cannot be coincidental or reflect convergent evolution. They also cite very recent excavations on the mid-Atlantic coast as well as a series of offshore and terrestrial artifact recoveries of putative Solutrean implements to buttress their claims. Furthermore, to fill the chronological hiatus between Solutrean and Clovis, as currently dated, Stanford and Bradley pose Meadowcroft and Cactus Hill as transitional industries. No consensus has been achieved for this scenario to date, and initial scholarly reaction has ranged the gamut from scornful rejection to enthusiastic acceptance (cf., Straus et al. 2005; Meltzer 2009).

Whatever the plausibility of the trans-Atlantic theory, Stanford and Bradley have correctly stressed the fact, as did Dixon (1999), that scholars have collectively ignored the role of boats, water transport, and maritime adaptations in virtually all peopling scenarios for North America. Likewise, until recently, the inundated continental shelf on both the east and west coasts has never been systematically mapped or studied for the presence of early now inundated sites. This lacuna is now being addressed in both the Gulf of Mexico (Hemmings and Adovasio 2014), along various points of the Atlantic seaboard (Bailey et al. 2017), in the Gulf of California (Gusick and Davis 2010), and along the Pacific coast (Mackie et al. 2013).

Despite a sometimes-profound lack of resolution to the various issues surrounding the peopling of the Americas, however, several aspects of the debate that were once rejected out of hand by the scholars of the 1960s and 1970s have achieved widespread acceptance by the scholarly community. Based on Monte Verde *alone*, it is clear that humans entered the Americas well before the appearance and proliferation of Clovis technology. Furthermore, when other early sites and site complexes – such as Meadowcroft, Cactus Hill, Huaca Prieta, the Buttermilk Creek Complex, the Chesrow Complex, the Paisley Five Mile Point

Caves, and Page-Ladson – are considered along with penecontemporaneous sites/complexes like Nenana, the WST, and the flake-oriented industries of South America, the case for an earlier-than-Clovis presence is overwhelming. The diversity of the tool kits and attendant lifestyles at many of these sites points toward multiple movements by different groups at different times via different routes from East Asia.

References

Adovasio, J.M., and D.R. Pedler. 2013. The ones that still won't go away: More biased thoughts on the pre-clovis peopling of the New World. In *Paleoamerican odyssey*, ed. K.E. Graf, C.V. Ketron, and M.R. Waters, 511–520. College Station: Center for the Study of the First Americans, Department of Anthropology, Texas A&M University.

Adovasio, J.M., J. Donahue, R.C. Carlisle, K.A. Cushman, R. Stuckenrath, and P.W. Wiegman. 1984. Meadowcroft Rockshelter and the Pleistocene/Holocene Transition in Southwestern Pennsylvania. In *Contributions in quaternary vertebrate paleontology: A volume in memorial to John E. Guilday*, Special publication, ed. J.H. Genoways and M.R. Dawson, vol. 8, 347–369. Pittsburgh: Carnegie Museum of Natural History.

Adovasio, J.M., R.C. Carlisle, K.A. Cushman, J. Donahue, J.E. Guilday, W.C. Johnson, K. Lord, P.W. Parmalee, R. Stuckenrath, and P.W. Wiegman. 1985. Paleoenvironmental Reconstruction at Meadowcroft Rockshelter, Washington County, Pennsylvania. In *Environments and extinctions: Man in Late Glacial North America*, ed. J.I. Mead and D.J. Meltzer, 73–110. Orono: Center for the Study of Early Man, University of Maine.

Adovasio, J.M., J. Donahue, and R. Stuckenrath. 1990. The Meadowcroft Rockshelter radiocarbon chronology 1975–1990. *American Antiquity* 55: 348–354.

Anderson, D.G. 2013. Paleoindian archaeology in Eastern North America: Current approaches and future directions. In *Eastern fluted point tradition*, ed. J.A.M. Gingerich, 371–403. Salt Lake City: University of Utah Press.

Anderson, D.G., T.G. Bissett, and S.J. Yerca. 2013. The late-pleistocene human settlement of interior North America: The role of physiography and sea-level change. In *Paleoamerican odyssey*, ed. K.E. Graf, C.V. Ketron, and M.R. Waters, 183–203. College Station: Center for the Study of the First Americans, Texas A&M University.

Bailey, G., J. Harff, and D. Sakellariou, eds. 2017. *Under the sea: Archaeology and paleolandscapes of the continental shelf*. New York: Springer.

Beck, C., and G.T. Jones. 2010. Clovis and western stemmed: Population migration and the meeting of two technologies in the intermountain west. *American Antiquity* 75: 81–116.

Beck, C., and G.T. Jones. 2013. Complexities of the colonization process: A view from the North American West. In *Paleoamerican odyssey*, ed. C.E. Graf, C.V. Ketron, and M.R. Waters, 273–291. College Station: Center for the Study of the First Americans, Department of Anthropology, Texas A&M University.

Bryan, A.L. 1980. The stemmed point tradition: An early technological tradition in Western North America. In *Anthropological papers in memory of Earl H. Swanson, Jr*, ed. L.B. Harten, C.N. Warren, and D. Tuohy, 77–107. Pocatello: Idaho State Museum of Natural History.

Bryan, A.L. 1988. The relationship of the stemmed point and fluted point traditions in the Great Basin. In *Early human occupation in far Western North America: The clovis-archaic interface*, Anthropological papers, ed. J.-A. Willig, C.M. Aikens, and J.L. Fagan, vol. 21, 53–74. Carson City: Nevada State Museum.

Carlisle, R.C., and J.M. Adovasio, eds. 1982. *Meadowcroft: Collected papers on the archaeology of meadowcroft rockshelter and the Cross Creek Drainage*. Pittsburgh: Department of Anthropology, University of Pittsburgh.

Dillehay, T.D. 1989. *Monte Verde: A late pleistocene settlement in Chile*. Vol. 1. Washington, DC: Smithsonian Institution Press.

Dillehay, T.D. 1997. *Monte Verde: A late pleistocene settlement in Chile, volume 2. The archaeological context and interpretation*. New York: Smithsonian Books.

Dillehay, T.D., C. Ocampo, J. Saavedra, A.O. Sawakuchi, R.M. Vega, M.Pino, M.B. Collins, L. Scott Cummins, I. Arregui, X.S. Villagran, G.A. Hartmann, M. Mella, A. Gonzalez, and G. Dix. 2015. New archaeological evidence for an early human presence at Monte Verde, Chile. *PLOS ONE*. 18 Nov 2015. Electronic document available at http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0131923

Dillehay, T.D., S. Goodbred, M. Pino, V.F. Vasquez Sanchez, T. Roseales Thom, J. Adovasio, M.B. Collins, P.J. Netherly, C.A. Hastorf, K.L. Chiou, D. Piperno, I. Rey, and N. Velchoff. 2017. Simple technologies and diverse food strategies of the late Pleistocene and early Holocene at Huaca Prieta, coastal Peru. *Science Advances* 3 (5): e1602778. https://doi.org/10.1126/sciadv.1602778.

Dixon, E.J. 1999. *Bones, boats and Bison: Archeology and the first colonization of Western North America*. Albuquerque: University of New Mexico Press.

Dunbar, J.S. 2006. Paleoindian archaeology. In *First Floridians and last mastodons: The page-ladson site in the Aucilla River*, ed. S.D. Webb, 403–425. Dordrecht: Springer.

Erlandson, J.M. 2013. After clovis-first collapsed: Reimagining the peopling of the Americas. In *Paleoamerican odyssey*, ed. K.E. Graf, C.V. Ketron, and M.R. Waters, 127–132. College Station: Center for the Study of the First Americans, Texas A&M University.

Erlandson, J.M., M.H. Graham, B.J. Bourque, D. Corbett, J.A. Estes, and R.S. Steneck. 2007. The kelp highway

hypothesis: Marine ecology, the coastal migration theory, and the peopling of the Americas. *The Journal of Coastal and Island Archaeology* 2 (2): 161–174.

Fladmark, K.R. 1979. Routes: Alternative migration corridors for early man in North America. *American Antiquity* 44: 55–69.

Goebel, T., and I. Buvit. 2011. *From the Yenisei to the Yukon: Interpreting Lithic Assemblage Variability in Late Pleistocene/Early Holocene Beringia*. College Station: Texas A&M University Press.

Gruhn, R. 1994. The pacific coast route of initial entry: An overview. In *Method and theory for investigating the peopling of the Americas*, ed. Robson Bonnichsen and D. Gentry Steele, 249–256. Corvallis: Center for the Study of the First Americans, Oregon State University.

Gusick, A.E., and L.G. Davis. 2010. Exploring Baja California's submerged landscape. *Journal of California and Great Basin Anthropology* 30: 35–49.

Halligan, J.J., M.R. Waters, A. Perrotti, I.J. Owens, J.M. Feingerg, J.D. Bourne, b. Fenerty, B. Winsborough, D. Carlson, D.C. Fisher, T.W. Stafford Jr., and J.S. Dunbar. 2016. Pre-Clovis occupation 14,550 years ago at the page-Ladson site, Florida, and the peopling of the Americas. *Science Advances* 2 (5): e1600375. http://advances.sciencemag.org/content/2/5/e1600375.

Hemmings, C.A., and J.M. Adovasio. 2014. Inundated landscapes and the colonization of the northeastern Gulf of Mexico. In *Pre-clovis in the Americas*, International science conference proceedings, ed. D.S. Stanford and A. Stenger, 16–31. Washington, DC: Smithsonian Institution.

Jenkins, D.L. 2007. Distribution and dating of cultural and paleontological remains at the paisley five mile point caves in the northeastern Great Basin: An early assessment. In *Paleoindian or Paleoarchaic? Great Basin human ecology at the Pleistocene/Holocene transition*, ed. K.E. Graff and D.N. Schmitt, 57–81. Salt Lake City: University of Utah Press.

Johnson, M.F. 2012. Cactus Hill archaeological site. In *Encyclopedia of Virginia*. Charlottesville: The Virginia Foundation for the Humanities.

Johnson, M.F. 2013. *Cactus Hill, Rubis-Pearsall and Blueberry Hill: One is an accident; Two is a coincidence; three is a pattern – Predicting "old dirt" in the Nottoway River Valley of Southeastern Virginia, U.S. A*. Unpublished PhD dissertation, Archaeology Department, University of Exeter, Exeter.

Lowery, D. 2007. Phase I archaeological investigations at miles point in Talbot County, Maryland: Chesapeake Watershed. Easton: Archaeological Research Foundation report.

Lowery, D. 2010. Geoarchaeological Investigations at Selected Coastal Archaeological Sites along the Delmarva Peninsula: The Long-Term Interrelationship between Climate, Geology, and Culture. Ph.D. dissertation, Department of Geology, University of Delaware, Newark.

Lowery, D., and J. Wah. 2011. *Phase I Terrestrial Archaeological Survey of the Maryland broadband cooperative chesapeake bay fiber optic cable crossing sites at Taylor's Island in Corchester County and at cove point in Calvert County, Maryland*. Crownsville: Manuscript prepared for G4S Technology, LLC, on file at the Maryland Historical Trust.

Mackie, Q., L. Davis, D. Fedje, D. McLaren, and A. Gusick. 2013. Locating pleistocene-age submerged archaeological sites on the Northwest Coast: Current status of research and future directions. In *Paleoamerican odyssey*, ed. K.E. Graf, C.V. Ketron, and M.R. Waters, 133–147. College Station: Center for the Study of the First Americans, Texas A&M University.

Martin, P.S. 1967. Pleistocene overkill. *Natural History* 76 (10): 32–38.

Mcavoy, J.M., J.C. Baker, J.K. Feathers, R.L. Hodges, L.J. Mcweeney, and T.R. Whyte. 2000. *Summary of research at the cactus hill archaeological site, 44SX202, Sussex County, Virginia: Report to the National Geographic Society in Compliance with Stipulations of Grant #6345-98*. Sandston: Nottaway River Survey.

McPhail, R., and J. Mcavoy. 2008. A micromorphological analysis of stratigraphic integrity and site formation at Cactus Hill, an early Paleoindian and hypothesized Pre-Clovis occupation in South-Central Virginia, USA. *Geoarchaeology* 23 (5): 675–694.

Meltzer, D.J. 2009. *First peoples in a new world: Colonizing ice age America*. Berkeley: University of California Press.

Meltzer, D.J. 2015. *The great Paleolithic war: How science forged an understanding of America's ice age past*. Chicago: University of Chicago Press.

Overstreet, D.F. 2005. Late-glacial ice-marginal adaptation in southeastern Wisconsin. In *Paleoamerican origins: Beyond Clovis*, ed. R. Bonnichsen, B.T. Lepper, D. Stanford, and M.R. Waters, 183–195. College Station: Texas A&M University Press.

Potter, B.A., C.E. Holmes, and D.R. Yesner. 2013. Technology and economy among the earliest prehistoric foragers in interior Eastern Beringia. In *Paleoamerican odyssey*, ed. K.E. Graf, C.V. Ketron, and M.R. Waters, 81–103. College Station: Center for the Study of the First Americans, Texas A&M University.

Powers, W.R., and J.F. Hoffecker. 1989. Late pleistocene settlement in the Nenana Valley, Central Alaska. *American Antiquity* 54: 263–278.

Stanford, D.J., and B.A. Bradley. 2012. *Across Atlantic ice: The origin of America's Clovis culture*. Berkeley: University of California Press.

Straus, L.G., D.J. Meltzer, and T. Goebel. 2005. Ice age atlantis? Exploring the Solutrean-Clovis "connection". *World Archaeology* 37 (4): 507–532.

Waters, M.R., S.L. Forman, T.A. Jennings, L.C. Nordt, S.G. Driese, J.M. Feinberg, J.L. Keene, J. Halligan, A. Lindquist, J. Pierson, C.T. Hallmark, M.B. Collins, and J.E. Wiederhold. 2011. The Buttermilk Creek complex and the origins of Clovis at the Debra L. Friedkin site, Texas. *Science* 331 (6024): 1599–1603.

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Basic Biographical Information

Edithe Pereira is a Brazilian researcher and archaeologist at the Emilio Goeldi Museum. She was born in the city of Belém, in the state of Pará, which is located in the Amazon region. She graduated from the Federal University of Pará in 1982 with a degree in history and began her career in archaeology in 1983, as a trainee at the Goeldi Museum under the supervision of Dr. Mário Simões. In 1988, Edithe Pereira joined the research framework of this institution, and in the same year, she started a master course in history at the Federal University of Pernambuco, intending to study Amazon ceramics. Instead, she was drawn to the research being done in Piauí by Dr. Niéde Guidon and her team, on what was what to become her greatest interest: rock art. Under the guidance of Dr. Anne-Marie Pessis, she wrote *As Gravuras e Pinturas Rupestres no Pará*, *Maranhão e Tocantins*: *Estado atual do Conhecimento e Perspectivas*, obtaining a master's degree in 1990. She then earned her Ph.D. at the University of Valencia, Spain, in 1996, with a thesis entitled *Las Pinturas y los Grabados Rupestres del Noroeste de Pará – Amazônia – Brasil*, directed by Prof. Dr. Valentín Villaverde Bonilla. As a dedicated researcher, Edithe Pereira has made rock art in the Amazon a lifelong project and has coordinated projects that include Survey of Sites in the Lower Amazon Rupestres Records (1990–1993), Rock Art and Archaeological Context in the Lower Region/Middle Araguaia (1999–2000), Arraias Stone to the Cadena Lajedo – the Characterization of Rock Carvings in Southern Pará (2000–2006), Rock Art of Monte Alegre – Dissemination and Memory of Archaeological Heritage (2012–2014), Rock Art and Archaeological Context in the Caves of Rurópolis (2012–2014), and the Pre-Colonial Occupation of Monte Alegre (2012–2014). She has also coordinated projects pertaining to contract archaeology, including the preventive archaeology program in the area of Serra do Sossego (2001–2006) and the archaeological survey in the area of the Belo Monte hydroelectric (1999–2000). Recently, Edithe Pereira began acting in the area of archaeological tourism, in partnership with the Instituto do Patrimônio Histórico e Artistico Nacional (IPHAN), on a pioneering project that aimed for the musealization of archaeological sites in the Amazon. She has organized archaeological tourism events; among these are the first and second Debate Forum in Archaeology and Tourism in the Amazon in 2005 and 2008, respectively, as well as the Symposium on Tourism, Archaeology of Research and Planning Methodologies (2008), and the International Tourism Workshop on Archaeological and Heritage Management (2009). The result of her involvement with this issue culminated in the book, *Turismo e Gestão do Patrimônio Arqueológico*, edited together with Silvio Figueiredo and Marcia Bezerra and released in 2012.

In 2016, archaeological research in the region of Carajás, southeast of Pará, coordinated by Marcos Pereira Magalhães revealed the existence of ancient paintings in a cave. It is the first site with rock art in this region, and the study of the paintings was by Edithe Pereira.

Also, since 2016, she has been part of an extension project called "Arqueologia nas escolas – histórias da Amazônia," whose objective is to disseminate the knowledge produced by archaeological research in the regions of Monte Alegre and Santarém, in Pará, through the elaboration of textbooks to the purpose of valorizing the Brazilian archaeological heritage and the history of the different peoples in the Amazon. As a curator, Edithe Pereira was responsible for the exhibitions "Visões – arte rupestre de Monte Alegre" (2013–2015) and "Origens – a Amazônia cultivada" (2016 until today), the latter in partnership with Cristiana Barreto. Another important project that has been carried out, as a productivity fellow of the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) (2017), is the study of the Protásio Frikel

collection resulting from its research in the Amazon in the 1950s and still unpublished.

Major Accomplishments

Edithe Pereira has contributed decisively to Amazonian archaeology, particularly in relation to her dedicated research on rock art. In the late 1980s when her history as an eminent researcher began, the landscape of rock art studies on Amazon was negligible compared to ceramic studies. All reconstructions of prehistoric occupation of the Amazon hitherto considered the occupation of the potter to be primary. To cope with this approach, Pereira's research associates a detailed survey of source tales, spatial distribution, visual documentation, and systematic analysis of rock motifs. From the results of this competent and meticulous work emerged the strong potential that studies of rock art in the Amazon have as another important area of knowledge in the reconstruction of the prehistoric Amazon. The bibliographic record on the subject deserves highlights: (1) the article "Testimony in Stone: Rock Art in the Amazon" (2001), which provides a summary of research conducted on the Amazon so far; (2) the book *Arte Rupestre na Amazônia – Pará* (2003), which finds, describes, and classifies information about each site and addresses issues such as the diversity of Amazon rock art and the problems of dating and archaeological context (it also sounds an alert on the issue of preservation of these sites, and the Academy of History Paulistana gave this book the CLIO award of History (2005)); (3) the book *Petróglifos Sul-Americanos* of Koch-Grünberg (2010), whose translation into Portuguese was organized by Edithe Pereira; and (4) the articles "Historia de la investigación sobre el arte rupestre en la Amazonía brasileña" (2006) and "Histoire, territorialité diversité et dans l'art de l'rock Amazonie brésilienne" (2011).

In 2008, Pereira Edithe coordinated the First International Meeting of Archaeology Amazon, based in Belém do Pará in an embodiment of the Goeldi Museum, in partnership with the IPHAN and the State Secretary of Culture for the State of Pará. This event fostered discussion on archaeological research conducted in the Amazon over the past 20 years, discussing topics related to the ancient settlement of this region, coastal occupations, domestication of plants, climate change, expanding linguistic, social complexity in ancient Amazonia, historical archaeology, transformations in the landscape, paleogenetic paleodemography, art and archaeology in the pre-colonial Amazon, and heritage education.

The book *Arqueologia Amazônica* (2010), co-edited by Edithe Pereira and Vera Guapindaia, presents the outcome of this meeting in two volumes that demonstrate the undeniable growth of different theoretical and methodological approaches in the study of prehistory Amazon (Whitehead 2011). Edithe Pereira continues to undertake her career as a researcher, producing knowledge that resulted in the recent book publication of *A Arte Rupestre de Monte Alegre* (2012). As the fruit of her research in Monte Alegre and aiming at the formation of new generations, she has published a children's book titled *Itaí – A carinha pintada* (2012), authored by Juraci Siqueira and illustrated by Mario Baratta, and has produced a documentary about the rock art of Monte Alegre (2012). Edithe Pereira is also a talented photographer taking most of the photos contained in her books and having published a book of photographs titled *Poemas deMiriti*, with Luiz Carlos França's poetry.

In the period from 2012 to 2015, he carried out research in the region of Rurópolis, in the southwest of the state of Pará, where he documented, studied, and published information and analysis on various sites including Cave of Hands – an unprecedented case in South American archaeology. Paintings and rock engravings in an aphotic zone in the deep interior of the cave.

Cross-References

► Heritage Tourism and the Marketplace
► Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

References

Pereira, E. 2003. *A arte rupestre da Amazônia – Pará*. São Paulo: Unesp; Belém: Museu Paraense Emílio Goeldi.

Pereira, E. 2012. A arte rupestre de Monte Alegre, Pará, Amazônia, Brasil. Belém: Museu Paraense Emílio Goeldi.

Pereira, E., and V. Guapindaia, eds. 2010. *Arqueologia Amazônica*. Belém: MPEG, IPHAN, SECULT.

Pereira, E., and E. Silva. 2014. Da penumbra à escuridão – a arte rupestre das cavernas de Rurópolis, Pará, Amazônia, Brasil. *Rupestreweb*: Arte rupestre en América Latina. http://www.rupestreweb.info/cavernasruropolis.html.

Pereira, E., A.R. Py-Daniel, H.F. Nascimento, C.A.P. Barbosa, and V. Honorato. 2016. Possíveis práticas rituais em sítios com arte rupestre nas cavernas de Rurópolis, Pará. *Habitus* 4: 5–20.

Pinheiro, R.V.L., C.W. Maurity, and E. Pereira. 2015. Cavernas em arenito da província espeleológica Altamira-Itaituba: dados espeleogenéticos com base no exemplo da Caverna das Mãos (PA), Amazônia, Brasil. *Espeleo-Tema (São Paulo)* 26: 5–18.

Whitehead, N. 2011. Arqueologia Amazônica (Resenha). *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas Belém* 6 (2): 613–616.

Pérez Gollán, José Antonio

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Basic Biographical Information

Jose Antonio Pérez Gollán (1937–2014) was a prominent Argentinean archaeologist who has made a main contribution to the archaeology of the southern Andes. Born in the city of Córdoba, Pérez Gollán was educated in history at the National University of Córdoba, earning a B.A. in History in 1965 with a thesis on *Peopling Patterns of Northwestern Argentina*. That same year, he became a fellow of the newly created National Council of Scientific and Technical Research (CONICET), and 2 years later, he became a teaching assistant in anthropology at the National University of La Plata. In 1969 he became a researcher at CONICET, and in 1971 he was appointed professor at the National University of Córdoba.

In 1977 Pérez Gollán obtained a doctoral degree from the National University of Cordoba with a thesis entitled *Analysis of Archaeological Ceramics at the Site of Ciénaga Grande (Tumbaya Department, Jujuy Province)*. Immediately after this, he went into exile in Mexico because of the dangerous situation generated by the military dictatorship installed in Argentina in March 1976. In 1979, Perez Gollán was appointed professor and chair of Andean Ethnohistory at the National School of Anthropology and History and researcher of the National Institute of Anthropology and History, Mexico. Once constitutional order in Argentina was restored in 1983, he returned home to Argentina in 1987 and was reinstated and promoted at CONICET. In the same year, he became director of the Ethnographic Museum of the University of Buenos Aires. In 2005 he left that position to assume the direction of the National Historical Museum, where he served until 2013.

Perez Gollán has received throughout his career many honors, such as the First Prize (in collaboration) to the Regional Scientific Production (Central Zone), 1966–1967 of the Secretary of Culture of the Nation (Argentina); the Prize for Scientific and Technological Research of the Secretary of Science and Technology of the University of Buenos Aires (three times, in 1992, 1993, and 1994); the Critics Award 2004 of the Argentinean Association of Art Critics; the Marta Wegier Prize in 2005; the Konex Award 2006; and the Merit Diploma and Gratia Artis Award 2012 of the National Academy of Arts (Argentina).

Major Accomplishments

Pérez Gollán undertook his first archaeological experiences as a student at sites in the province of Córdoba, Argentina. From excavations in Los Molinos, he obtained the first radiocarbon dating of the province. Later he devoted his efforts to study of the formative period in the Humahuaca

Valley, in northwestern Argentina, developing a chronology of "La Isla" pottery, through cross-referencing information from sites in Jujuy with evidence from mortuary contexts of San Pedro de Atacama in northern Chile.

Between the late 1960s and early 1970s, Pérez Gollán published in collaboration with Alberto Rex González (Fig. 1) several works of synthesis on ceramic times in northwestern Argentina. One of them, *Indigenous Argentina. Eve of the Conquest* (González and Pérez 1972), remains to date the most widespread book on Argentine pre-Hispanic past, widely trespassing the boundaries of academia.

In the early 1970s, Pérez Gollán opened up new areas of research in partnership with his colleague and friend Osvaldo Heredia, another of González's disciples from the University of Córdoba. Together, these two investigated the little known area of Cafayate, in Salta, and then Ambato Valley, in the province of Catamarca. In the latter area, they made a transcendent discovery in the history of archaeological research in Argentina: the site of La Rinconada, also known as "Iglesia de los Indios," is the first known ceremonial center of the La Aguada culture (see Pérez Gollán et al. 1997). This archaeological culture had been defined by González a decade before, extending the proposals of Max Uhle, but until then no site assigned to that culture had been found. La Rinconada, subsequently investigated by González and then by Gordillo (see González 1998 for synthesis), provided extensive information on the middle period and on the social organization of sedentary populations in the northwest of Argentina.

In 1975, Pérez Gollán attended the famous meeting "Reunión de Teotihuacan," in which a group of Latin American archaeologists drafted the key document of the Marxist-inspired Latin American Social Archeology trend. During that trip, Pérez Gollán made contacts that would allow him to settle in Mexico 2 years later, in order to be safe from political persecution in Argentina by the military government. During his exile, he conducted several field projects and also began to investigate the history of archaeology, around the figure of Vere Gordon Childe. Pérez Gollán's (1981) book about Childe was the clearest demonstration of a theoretical commitment to leftist thinking by an Argentine archaeologist until that time. However, by then Pérez Gollán had begun to distance himself from the more orthodox and reductionist positions that flourished in the context of Latin American Social Archeology. His teaching work in Mexico put him in contact with Andean chronicles, in which he learned to investigate the symbolic meanings of pre-Columbian iconography. His interpretations of the iconography of Lafone Quevedo Disk (corresponding to the Aguada culture) are a milestone in terms of the development of an original form of hermeneutical studies of Andean indigenous material culture

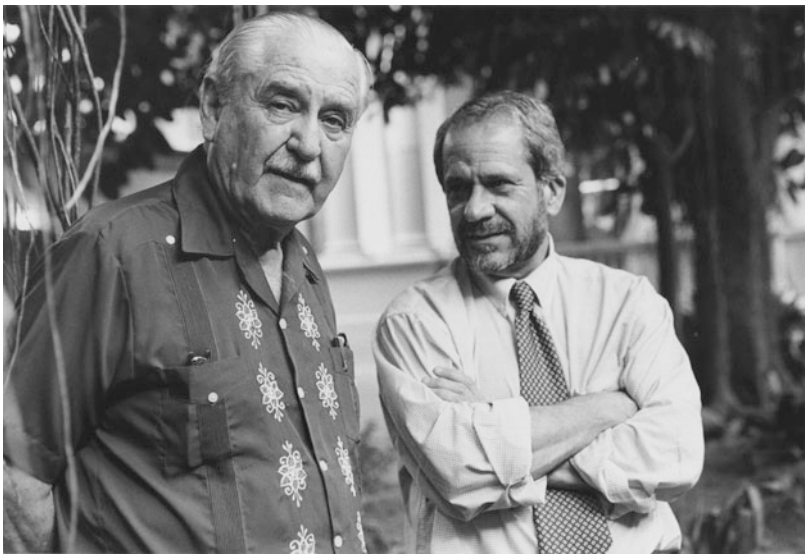

Pérez Gollán, José Antonio, Fig. 1 José Pérez Gollán (at the right) with his master Alberto Rex González at the Ethnographic Museum of Buenos Aires in 1999. (Courtesy of Pérez Gollán)

Pérez Gollán, José Antonio, Fig. 2 Bronze plaque known as "Lafone Quevedo Disk," whose iconography was studied in detail by Pérez Gollán. (Taken from González 2007)

Pérez Gollán, José Antonio, Fig. 3 Facade of the Ethnographic Museum of the University of Buenos Aires. (Photo by Javier Nastri)

(Pérez Gollán 1986). On a similar vein, he produced a new interpretation of the artifacts known as "pleadings" (*suplicantes*): small stone sculptures of high artistic value, corresponding to the formative period of the Argentine Northwest (Pérez Gollán 2000) (Figs. 2 and 3).

During the 1990s, Pérez Gollán resumed fieldwork in Ambato, Argentina, with colleagues from the National University of Córdoba, revealing ceremonial and habitation sites of the Aguada culture. He conducted then a "rethinking" of that culture, proposing to redefine the middle period as the "Regional Integration Period." Questions like this gave a strong impetus to research on the topic, which crystallized even in specific conferences on the issue. After that, Pérez Gollán's research has focused on the study of the late period at Ambato Valley, about which very little is known until now.

In addition to his archaeological fieldwork, Pérez Gollán is widely recognized for his work as a director of major museums. He introduced modern standards of preservation and exhibition of collections, refurbishment of infrastructure, repatriation of remains, and publishing catalogues during his periods as director at both the Ethnographic Museum of the University of Buenos Aires (Fig. 3) and at the National History Museum of Argentina.

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Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Andes: Prehistoric Period
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Childe, Vere Gordon (Theory)

References

Bianciotti, A. 2005. Alberto Rex González: la imagen y el espejo. *Arqueología Suramericana* 1 (2): 155–184.

González, A.R. 1998. *Cultura La Aguada. Arqueología y diseños*. Buenos Aires: Filmediciones Valero.

González, A.R. 2007. *Arte, estructura, arqueología*. Buenos Aires: La Marca Editora.

González, A.R., and J.A. Pérez. 1972. *Argentina indígena. Vísperas de la conquista*. Buenos Aires: Paidós.
Pérez, J.A. 1981. *Presencia de Vere Gordon Childe*. México: Instituto Nacional de Antropología e Historia.
Pérez Gollán, J.A. 1986. Iconografía religiosa andina en el Noroeste Argentino. *Boletín del Instituto Francés de Estudios Andinos* 15 (3–4): 61–72.
Pérez Gollán, J.A. 2000. Los suplicantes: una cartografía social. *Temas de la Academia Nacional de Bellas Artes* 2: 21–48.
Pérez Gollán, J.A., M. Bonnin, A. Laguens, S. Assandri, L. Federici, M. Gudemos, J. Hierling, and S. Juez. 1997. Proyecto Arqueológico Ambato: un estado de la cuestión. *Shincal* 6: 115–124.

Further Readings

Bonnin, M. 2010. Osvaldo Heredia: los proyectos de investigación, el aula y otros contextos de instrucción en la arqueología de los '60 y '70. *Revista del Museo de Antropología* 3: 195–204.
Pérez Gollán, J.A., and M. Dujovne. 2002. De lo hegemónico a lo plural: un museo universitario de antropología. *Entrepasados* 20 (21): 197–208.
Politis, G., and J.A. Pérez Gollán. 2004. Latin American archaeology, from colonialism to globalization. In *A companion to social archaeology*, ed. L. Meskell and R. Preucel, 353–373. London: Blackwell.

Periodization in Japanese Prehistoric Archaeology

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Introduction

It is possible to apply European periodization to Japanese history: prehistory, protohistory, Ancient, Medieval, Early Modern, and Modern. In this entry, I suggest that Ancient period is from 593 to 1192, Medieval from 1192 to 1573, Early Modern from 1573 to 1868, and Modern from 1868 onwards. The prehistoric period consists of the Paleolithic, *Jomon*, and *Yayoi* periods, and protohistory is virtually equal to the *Kofun* period. The Ancient period is composed of the *Asuka*, *Nara*, and *Heian* periods, and the Medieval period is composed of the *Kamakura* and *Muromachi* periods. The Early Modern period consists of the *Azuchi-Momoyama* and *Edo* periods. The name of a period from Ancient to Early Modern signifies the location of either the capital or the governmental office at that time.

The European periodization based upon the 3-age system is not suitable to the case of Japan. While the Paleolithic period in Japan had stone axes with ground edges, and the Stone Age is followed by the Iron Age, the Bronze Age is absent. Instead, pottery/ceramics can be used for marking boundaries in time scales, though certain changes in ceramics in the historical period do not necessarily correspond with an epoch-making event of history in cultural, political, or economical terms, other than in a few exceptional cases, such as the start of production of porcelain which occurred immediately after the dawn of *Edo* period. Especially after the introduction of kiln firing, in the middle of the *Kofun* period, the sequence of diagnostic pottery types can be a chronological measure that can mark off every one-fourth or one-fifth century. Even before kiln firing, in spite of its long duration over 14,000 years, pottery is effective in providing precise relative dating. This is because of the huge number of prehistoric sites excavated so far to produce the archaeological data, including pottery that is regarded as time sensitive. The period before the invention of pottery manufacturing is called the "Paleolithic," though it is sometimes alternatively called the "preceramic" period. In terms of periodization in archaeology, the following paragraphs focus on pre- and protohistory – the Paleolithic, *Jomon*, *Yayoi*, and *Kofun* periods.

Key Issues and Current Debates

Most archaeologists now assume that the first occupation in the Japanese archipelago can be traced back to around 30,000 BP, though they once accepted that this phenomenon could have happened even much earlier. Artifacts dated to about 30,000 BP are often called Middle Paleolithic, though they are not necessarily similar in form to artifacts from the European or Continental Middle Paleolithic.

The first discovery of Paleolithic stone tool, in 1949, was long after pottery in Jomon period was

recognized as the oldest ceramics in Japan. The most common kinds of stone are obsidian, sanukite, and flintlike silica shale, all of the three also common in Jomon and Yayoi periods. After two decades, the quantity of preceramic artifacts became sufficient to consider a sequence for the Japanese Paleolithic. During the 1970s, before the famous fabrication by Mr. Fujimura (SICPEMP 2003), Professor Sosuke Sugihara, who was one of the two leading scholars in Paleolithic studies, first proposed the subdivision of the Paleolithic into four stages: (1) axe tool, (2) blade tool, (3) point tool, and (4) microlithic. Professor Chosuke Serizawa, the other leading Paleolithic scholar, had pursued studies of the old Paleolithic, which would be comparable to the Early or Middle Paleolithic in the continent, for the latter half of his lifetime. He tried, on the one hand, to distinguish stone tools from eoliths by microscopic use-wear analysis that he introduced to Japanese archaeology and on the other, to pay attention to the different kinds of stone, particularly of chert.

The Paleolithic period is the age of the forager. There are dozens of examples of house structures from this period. However, they are considered to have been a beehive and to have functioned as temporary accommodation. The Paleolithic period ends with the appearance of pottery, and the Jomon period starts. However, the invention of pottery is now recognized to have happened within the last glacial period, rather than being the result of adaption to a post-Pleistocene environment. When Paleolithic stone tools are found with pottery, they are regarded as belonging to the Jomon period. This is one of the reasons why some archaeologists still use the term "preceramic."

The Jomon period is the time of fisher-hunter-gatherers with pottery, ranging from 15,000 to about 2500 BP. During the 1930s, the Jomon period was divided into five main stages according to the relative balance in numbers of pottery types in each stage: initial, early, middle, late, and final. By the 1960s, the incipient stage was added to the division as the first stage. Dr. Sugao Yamanouchi proposed the basic framework for this chronological division of the sequence of Jomon pottery. In some areas where the archaeological materials are rich, there are more than 60 subdivided periods of time, indicated by differences in pottery types. Jomon is originally the consolidated term, *Jo-mon*, for describing a decoration made by a cord-mark; *Jo* means a cord or a string, and *mon* means a figure or a pattern.

Between the final Paleolithic and the incipient Jomon, stone industries are not distinguished in practice by archaeologists; bifacial points or microblades are associated with potsherds in some cases, and not in other. However, at around 10,000 BP at the latest, a sedentary lifestyle was set up, indicated by pit-dwelling house structures and the appearance of the concept of a burial area, as well as by a broad spectrum of subsistence strategies suggested by storage pits, shell middens, saddle querns, and so forth. Such Jomon collectors often occupied a large area for their settlement, which would lead to a circular village. They produced a large number of objects and features, such as clay figurines, phallic stones, pottery embedment into the earth's surface, and stone circles, all of which show their religious customs and beliefs, though the meaning of this is too difficult for us to access.

The Jomon period ended with the establishment of the systematic cultivation of rice, and the Yayoi period began. Until the 1920s, rice cultivation was believed to have been introduced with metal use into Japan. However, domestication in itself now can be recognized in the Jomon period. In terms of animals, dogs must have been domesticated much earlier, based on the evidence of their burials. In terms of plants, various types of millet are thought to have been introduced by the late Jomon. As Dr. Yamanouchi's pioneer study (1925) pointed out, rice is also likely to have existed in the final Jomon period at the latest, as evidenced by rice impressions in the textile of, and on the surface of, pottery.

Yayoi is named after the type-site in Tokyo where the first Yayoi pottery was found in 1884. This pottery was recognized as different from Jomon pottery in textile and color. Until the 1930s, differences between the Jomon and Yayoi pottery were generally considered, by almost all

leading scholars including Ryuzo Torii and Kosaku Hamada, to have been due to the differences in the people who produced the respective pottery. By the 1940s, Dr. Yukio Kobayashi (1943) completed the framework of the relative dating by pottery in Japan. The Yayoi period, from the middle of the first millennium BCE to the early third century CE, is classified by the design of pottery into three main stages: early, middle, and late. Pottery of the beginning of the early Yayoi period can be distinguished from that of the Jomon period in many areas not only by the materials used but also by production technique.

The Yayoi period is also marked by the introduction of metal use. Although bronze did not replace stone as the main sharp-edged tool, it served as a ritual good from the early Yayoi period. Stone as a sharp-edged tool was almost fully replaced by iron by the late Yayoi period. Such metallurgy was diffused from the continent through the Korean peninsula, as was the new technology for manufacturing pottery.

Yayoi farmers conducted mixed farming with pigs and rice and often built a settlement enclosed by a causeway in which towers, storage buildings, and a shrine were accompanied by normal pit-dwelling houses. These settlements formed a large and complex network of information and exchange not only within the Japanese archipelago but also stretching to the Korean peninsula as indicated by the similarities in pottery, polished stone swords, house plans, and so forth. Moreover, the network was connected with the Chinese continent, as evidenced by imported prestige materials such as bronze mirrors.

Yayoi farmers were usually buried in a cemetery, and some of them were deliberately interred in a specific individual grave, within coffins made of wood or cist stone along with other grave goods such as beads, bracelets, swords, and imported mirror. These individual burials were sometimes surrounded by ditches of square shape in the early Yayoi and of circular shape in the late Yayoi. They strongly suggest the appearance of chiefdoms. By the end of the late Yayoi period, some of these delimited graves increased the volume of burial mounds into barrows, in several parts of Japanese main islands. This phenomenon might well point to the appearance of elites and the affiliation of them as well. When the area for mortuary ceremony attached to a barrow within the inside of the ditch, the barrow in turn became a Kofun tumulus.

The Kofun period, from the middle third century to the early seventh century, is characterized by the overwhelming vogue to construct tumuli and is divided into three stages: early, middle, and late. The difference between a Yayoi barrow and a Kofun tumulus is subtle. As for the barrow of elites, the mortuary ceremony area was enlarged, and the barrow took a keyhole shape. However, the normal individual burial did not change virtually. However, pottery at the beginning of the Kofun period, called "Furu" type, is easy to distinguish from Yayoi pottery because it has a distinctive feature in the profile of its rim. It also has a wider distribution in many areas. Thus, although there are a number of archaeological sites of this period without a tumulus, such as settlements and ritual sites, they can be dated by the Furu-type pottery. The early Kofun period is also defined as the advent of Haniwa, which was a large ceramic object of various shapes which was placed in line(s) on the surface of tumulus for external decoration. Some of the largest tumuli in the early Kofun period are located in the Kinki region. This fact may support the argument for Yamatai-koku, which was recorded as one of the supreme chiefdoms dominated by the queen named *Himiko* within the Japanese archipelago in the imperial chronicle of the *Wei* dynasty in ancient China and which is deeply rooted in the identity of modern-day Japanese people.

The middle Kofun period is identified by the introduction of *Sue* pottery, which was the first pottery to be fired in kilns in the history of ceramics in Japan. As for tumuli, the middle Kofun period is also distinguished by the introduction of specific grave goods, other than Sue pottery – a set of harness. This means that the horse was introduced at around this time. These innovations were due to the influence of an immigrant population from Korean peninsula.

The distinction between the middle Kofun period and the late Kofun is rather arbitrary, based on a gradual change in form of the various objects in material culture as well as in both the scale and shape of tumuli. The most important characteristic of the late Kofun period is the introduction of

Buddhism, dated to 552 or 538. Buddhism became popular with elites, who replaced the Kofun tumulus with a Buddhist temple, which was a different form of monument to their power. By the end of the sixth century, the emperor established his/her power at the pinnacle of hierarchical society in the main lands of Japan and constructed the capital in Asuka area, resulting in the birth of the state of Japan. In terms of archaeological objects, the latter half of the late Kofun period, or Asuka period, is characterized by the appearance of roof tiles engendered by the adoption of Buddhism, though roof tiles were only used in Buddhist temples and in the capital at this time.

The age from the late Yayoi period to the end of the Kofun period is so called the time of the "state formation process." This process has been well studied by many scholars including historians, along with the everlasting controversy in the identification of the location of Yamatai-koku (Saeki 2006, as an example). In terms of archaeological contributions to the study, barrows and tumuli have long been intensively researched by many archaeologists, for example, Professor Yoshiro Kondo (1983, as an example) and Professor Hiroshi Tsude (2005, as an example), while the long history of thorough investigation of not only other features and monuments, including causewayed settlements, shrines, and temples, but also artifacts such as bronze mirrors, iron tools, and *Sue* pottery should not be underestimated.

Cross-References

- ▶ Hamada, Kosaku
- ▶ Kondo, Yoshiro
- ▶ Torii, Ryūzō
- ▶ Tsude, Hiroshi
- ▶ Yamanouchi, Sugao

References

Kobayashi, Y. 1943. Yayoi-shiki doki sairon. [A detailed discussion on the Yayoi pottery.]. In *Yamako Karako Yayoi Iseki no Kenkyu. [Studies on the Yatoi site at Karako in the Province of Yamato]*, ed. S. Umehara, Y. Kobayashi, and K. Fujioka, 95–143. Kyoto: The Kyoto Imperial University (in Japanese).

Kondo, Y. 1983. *Zempo-koen-fun no jidai. [The age of the keyhole-shaped tumulus.]*. Tokyo: Iwanami-shoten (in Japanese).

Saeki, A. 2006. *Yamatai-koku Ronso [Controversy over Yamatai-koku.]*. Tokyo: Iwanami-shoten (in Japanese).

SICPEMP (The Special Inspection Committee for the Problem on the Early and Middle Palaeolithic, The Japanese Archaeological Association). 2003. *Inspection of the early and middle Palaeolithic problem in Japan: Final report*. Tokyo: The Japanese Archaeological Association.

Tsude, H. 2005. *Zempo-koen-fun to shakai. [Keyhole-shaped tombs and society.]*. Tokyo: Hanawa-shobo (in Japanese).

Yamanouchi, S. 1925. Sekki jidai nimo ine ari. [There existed rice in the Stone Age.]. *Jinruigaku-zasshi [The Journal of the Anthropological Society of Tokyo]* 40 (5): 181–184 (in Japanese).

Further Reading

Habu, J. 2004. *Ancient Jomon of Japan*. Cambridge: Cambridge University Press.

Imamura, K. 1996. *Prehistoric Japan: New perspectives on Insular East Asia*. Honolulu: University of Hawaii Press.

International Christian University Hachiro Yuasa Memorial Museum. 1993. *An introduction to Japanese archaeology and the sites in the ICU campus*. Tokyo: Beniya Press.

Ishino, H., T. Iwasaki, K. Kawakami, and T. Shiraishi, eds. 1990–93. *Kofun jidai no kenkyu. [The studies of Kofun period.]*. Vol. 1–13. Tokyo: Yuzan-kaku (in Japanese).

Itasaka, G., ed. 1996. *Japanese history: 11 experts reflect on the past*. Tokyo: Kodansha International.

Kanaseki, H., and M. Sahara, eds. 1985–89. *Yayoi bunka no kenkyu. [The studies of Yayoi culture.]*. Vol. 1–10. Tokyo: Yuzan-kaku (in Japanese).

Kondo, Y., K. Yokoyama, K. Amakasu, S. Kato, M. Sahara, M. Tanaka, and M. Tozawa, eds. 1985–86. *Iwanami koza: nihon kokogaku. [The Iwanami's academic courses: Japanese archaeology.]*. Vol. 1–9. Tokyo: Iwanami-Shoten (in Japanese).

Kosugi, Y., Y. Taniguchi, Y. Nishida, K. Mizunoe, and K. Yano, eds. 2007–10. *Jomon jidai no kokogaku. [Archaeology on Jomon period.]*. Vol. 1–12. Tokyo: Dosei-sha (in Japanese).

Mizoguchi, K. 2002. *An archaeological history of Japan, 30,000 B.C. to A.D. 700*. Pennsylvania: University of Pennsylvania Press.

Pearson, R., ed. 1986. *Windows on the Japanese past: Studies in archaeology and prehistory*. Ann Arbor: Center for Japanese Studies, the University of Michigan.

Reischauer, E.O., and I. Kato, eds. 1993. *Japan: An illustrated encyclopedia*. Tokyo: Kodan-sha.

Tanaka, M., and M. Sahara, eds. 1996–98. *Rekishi hakkutsu. [Excavating the history.]*. Vol. 1–12. Tokyo: Kodan-sha (in Japanese).

Wieczorek, A., and W. Steinhaus, eds. 2004. *Zeit der Morgenröte: Japans Archäologie und Geschichte bis zu den ersten Kaisern*. Mannheim: Reiss-Engelhorn-Museen.

Permafrost Digging

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State of Knowledge and Current Debates

Introduction

For archaeological sites and materials, especially the most ancient ones, permafrost conditions have a dualistic character. On the one hand, they promote preservation of non-durable artifacts that would have been seriously damaged or completely destroyed outside the permafrost context. Temperatures below 0 °C, fluctuating little over time, and anaerobic conditions allow for preservation of various substances and organic remains, like biological materials from archaeological excavations, including aDNA and sedDNA (Hollesen et al. 2018).

However, even in permafrost conditions, artifacts may be destroyed as a result of the growth of subsurface ice and cryoturbation, due to mechanic (breaking and splitting) and biogeochemical impacts (Pitulko 2007). The latter has a special effect on preservation of artifacts made of osseous materials, archaeological wood, and other organic matter in cases when artifacts and other evidence of past human activities are located on the permafrost table and remain there long enough prior to the final transfer into permafrost. Biogeochemical processes, which we can generally classify as in situ chemical weathering complicated by microbial activity and root etching, are most active near the seasonally thawed layer base because the latter acts as a water table as well. Multiple repeating freezing/melting cycles unfavorably affect water-saturated artifacts. Nevertheless, in general, permafrost conditions are more favorable than harmful for artifact preservation.

On the other hand, permafrost conditions seriously limit the in situ artifact position in the cultural layer and this layer's integrity. Under certain conditions, they can promote fundamental transformation of the original contexts and even create secondary ones, which, after a while, would become frozen and might be mistakenly interpreted as the original context. Besides, frost deformation of deposits, or cryoturbation, causes errors in evaluating deposit chronometry (Pitulko and Pavlova 2016).

The abovementioned potential errors are most probable in areas where currently there is no permafrost, but it was well developed there in relatively recent times (Vandenberghe et al. 2014). Finally, permafrost conditions significantly obstruct archaeological excavations and, especially, site prospecting, because they limit the ability to lay out and excavate test pits. Cryogenic features of deposits containing the cultural layer of an archaeological site fully dictate the strategy and tactics of working there.

Archaeologists exploring the coastal zones of arctic Eurasia and North America (Friesen and Mason 2016) and Arctic islands (Pitulko and Makeyev 1991), including Greenland (Grønnow 1994), are typically most often involved with permafrost excavations. The culture-bearing deposits of such sites, though perennially frozen, have been in this condition since relatively recent times, as their age is less than 9000 years.

Under the conditions of continuous permafrost, difficulties in arranging excavations increase massively. Most frequently, accounts of such fieldwork say that when excavation reached the permafrost level, researchers stopped because it was impossible to work further, even though sterile levels had not been reached yet and cultural material continued down. Judging by descriptions, the limited excavations conducted by Mochanov (1977) at the Berelekh site in the early 1970s were exceptionally labor-consuming. Basic problems in such fieldwork are slow melting of the frozen cultural horizon, loss of the melted deposit volume, landslides, ability of thawed deposits to flow, and abundance of water causing drainage problem.

The most successful were extensive excavations performed in the continuous permafrost zone at the Zhokhov (Pitulko 2013; Pitulko et al. 2015) and the Yana sites (Pitulko et al. 2013). The experience excavating these sites formed a

specialized expertise (Pitulko 2007) presented below and preceded by necessary information on peculiarities of perennially frozen deposits.

Permafrost Basics

Permafrost, or perennially frozen ground, is the Earth material that remains below 0 °C for at least 2 years. Permafrost is characterized by humidity exceeding that of unfrozen/bound water under the given temperatures and ice that cements mineral particles and fills cavities, pores, and fissures in rocks. Frozen deposits are exceptionally varied (e.g., Romanovskiy 1993; Yershov 1998; French and Shur 2010). They include both dispersed deposits (debris, sand, clay, turf) and fissured weathered magmatic, metamorphous, and cemented sedimentary rocks. Ground (river, lake, sea, glacier) and underground (buried, wedge, injection, segregation, sheeted) ice and snow accumulations are considered monomineral rocks, while ice is recognized as a specific mineral (Yershov 1998: 11).

Areas of perennially frozen sediments form the *cryolithozone* defined as the Earth crust where all rocks have negative temperatures irrespective of the availability and phase of water in it. The cryolithozone consists of frozen, frosted, and chilled rocks (Romanovskiy 1993). By their existence in the frozen condition, all sediments and rocks are divided into diurnal, seasonally frozen, and perennially frozen, and they all form via lithosphere *cryogenesis*, one of the fundamental processes occurring repeatedly throughout the geological time.

Cryogenesis is defined as a complex of processes and phenomena in the upper lithosphere horizons, both in formed rocks of various age and/or composition and in accumulated sediments. These processes are determined by freezing and melting of rocks and sediments, by their chilling and heating, and by changes in pressure (Romanovskiy 1993). Thus, cryogenesis is a complex interplay of processes and phenomena whose development determines exogenetic dynamics, structural features of upper rock horizons, and the topography inside the cryolithozone. Perennial freezing of rocks and sediments determines their specific features – such as their cryogenic structure, i.e., the availability of subsurface ice and its distribution in rock masses.

Geographically, permafrost is classified as subaqueous, subglacial, and subaerial. The latter is the most widespread type and thus the most important for archaeological studies. In the Northern Hemisphere, permafrost underlies approximately 22.79×10^6 km^2 or 23.9% of the exposed land. It is a trans-zonal natural phenomenon spread in the Arctic and the moderate climatic belt within a few landscape zones. The largest permafrost areas are the Asian (~13×10^6 km^2) and the North American (~7.2×10^6 km^2); they spread from the shores of the Arctic Ocean far southward, deep into the continents (Fig. 1).

In Northern Eurasia, cryolithozone extends down to 45°N, while in the northern North America, its uneven southern boundary fluctuates between ~52°N and 56°N. The permafrost area in Eurasia is significantly larger than its North American areal. This difference between the continents and the differences in physical characteristics of permafrost conditions observed there are of a fundamental character due to their geological history, specifically, their glaciation history (Romanovskiy 1993: 13–23).

Subaerial permafrost is divided into two basic zones, northern (continuous) and southern (sporadic); they are separated by a transitional area of discontinuous permafrost. Continuous permafrost is located in the northern part of the Asian and North American permafrost areas. Perennially frozen sediment and rock in the continuous permafrost area in Northern Eurasia is tens to hundreds of meters thick; the known maximum thickness is about 1500 m. In the North American continent, frozen rocks are significantly thinner.

Based on long-term observations, it has been established that the typical mean annual temperature range for perennially frozen rocks is –(3 ÷ 9)°C in the area of their continuous spread. The lowest temperature of –(12 ÷ 14)°C is recorded on the coast of the Laptev Sea. In the southern area of sporadic permafrost, these values range within 0°÷(−2)°C. In the transition zone, where permafrost is discontinuous, mean annual temperatures of perennially frozen rocks vary from −1 °C to −3 °C.

In any part of the world, permafrost areas are most frequently sparsely populated and difficult to

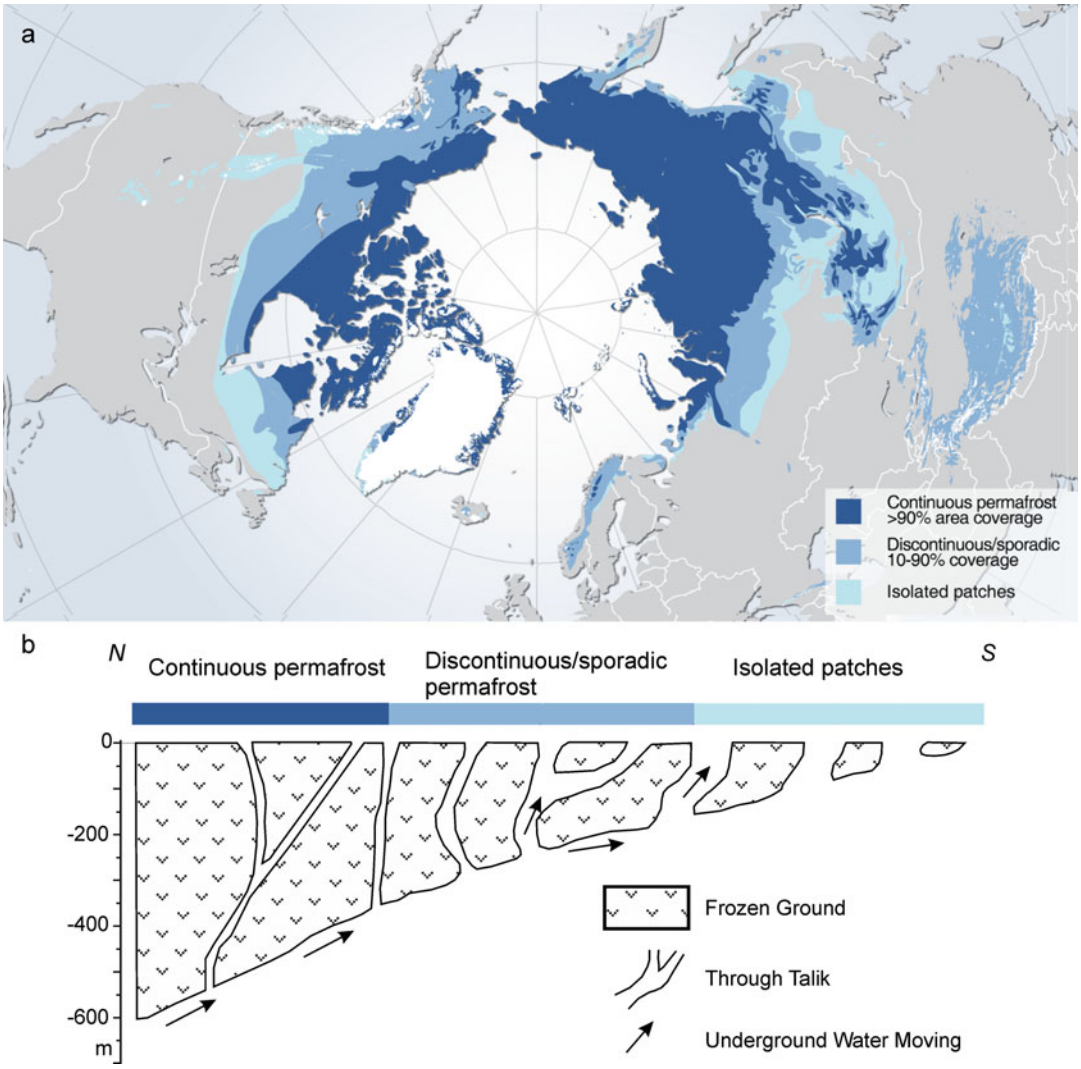

Permafrost Digging, Fig. 1 Permafrost distribution in the Northern Hemisphere (**a**) and schematic vertical profile of the permafrost from North to South in Northern Eurasia (**b**) based on the NASA image (www.climate.nasa.gov)

access, with poorly developed infrastructure and, as a result, high logistical costs. Archaeological surveys in those areas are currently conducted with low intensity. However, in the nearest future, archaeological investigations in permafrost regions are expected to accelerate.

Formation of the Cryolithic Zone

Cryolithic zone formation is a long-term cyclic process, which results from complex interaction of primarily climatic factors, mainly (1) mean annual $t < 0$ °C; (2) cold winters with little snow, providing deep freezing of the rocks from the surface; and (3) short and/or cold summers, during which frozen deposits cannot completely thaw.

Significant cooling events that caused temporary spread of permafrost occurred many times throughout the Earth history. Paleogeographic events recorded within the depths of perennially frozen or completely thawed deposits reveal the genesis of perennially frozen formations and allow researchers to establish the connection of frozen deposit formation with paleoclimatic and

paleogeographic events. Studying such sequences is the subject of cryostratigraphy, an important instrument of Quaternary geology (French and Shur 2010) and geoarchaeology (see, e.g., Amirkhanov et al. 2009; Velichko et al. 1997; Pitulko et al. 2013; Todisco et al. 2009).

Besides glacial formations in Antarctic and Greenland, reliable traces of the latest planet-wide cryogenic event are found in Quaternary deposits. Over the last 2.5 Ma, four stages are distinguished in the cryolithic zone development (Romanovskiy 1993); they differ in length and in formation conditions. The first stage includes the Early and Middle Pleistocene; the second, the Late Pleistocene–Early Holocene; the third, the Middle Holocene; and the fourth, the Late Holocene. The oldest permafrost, which is quite rare, is known mostly in Northeast Siberia (Romanovskiy 1993; Yershov 1998); however, the younger the geological age of such deposits, the more obvious and various the evidence of cryogenesis that formed the modern cryolithic zone.

Archaeological record for human habitation in the permafrost regions largely coincides with the development of cryolithic zone during stages two, three, and four. On the geological time scale, it has several maxima that correspond to the cold events of the last cycle of the Quaternary glaciation, which includes the penultimate interglacial (~130,000–115,000 yrs. B.P., MIS 5e, Eemian), the last glaciation (~114,000–11,700 yrs. B.P., from MIS 5a-d to MIS 2, Last Glacial Period, or Weichselian), and the last interglacial (~11,700 yrs. B.P. to present, MIS 1, Holocene). The Last Glacial Period was structurally complex, represented by several large divergent events, three glaciation stages (MIS 5a-d, Early Weichselian; MIS 4, Middle Weichselian; MIS 2, Late Weichselian), separated by relative warmings. The last stage of the Weichselian glaciation (~28,000–19,000 years ago) was the coldest and is referred to as the Last Glacial Maximum, a period during which permafrost distribution reached its maximum (Velichko and Nechaev 1992; Vandenberghe et al. 2014).

The second stage in the cryolithic zone development (~130,000–8000 years ago) is characterized by especially severe geocryological conditions in a significant part of North Eurasia and North America. On the East European Plain, the cryogenesis evidence has been described as far south as 47–48° N; further to the East, the southern boundary of the cryolithic zone might have been shifted somewhat to the south (Romanovskiy 1993; Yershov 1998).

On the North American continent, permafrost formed only in the ice-free area in the northeast of the continent; its entire north portion was occupied by the Laurentide Ice Sheet (Wisconsin glaciation), with the maximum extent in its eastern part as far south as ~38° N (Stokes 2017), which implies only limited subglacial permafrost. Thus, in most permafrost areas of North America, conditions suitable for its formation emerged only in Holocene, after deglaciation. In contrast, in the iceless northwest region of the North American continent, permafrost-forming conditions similar to the Ice Complex deposits in East Siberia existed throughout the entire Pleistocene (Kanevskiy et al. 2011).

In Northern Eurasia, the magnitude of the Late Pleistocene glacial events (middle and later stages of the Weichselian glaciation) was smaller than those of the Middle Pleistocene glaciation and significantly smaller than the Wisconsin glaciation in North America. Throughout MIS 4 and MIS 2, there had been extremely favorable conditions within the entire ice-free North Eurasia for permafrost development; for the increase in the cryolithic zone extent, including the increase due to the freezing of arctic sea shelves, exposed by the sea level regression; for the increase in permafrost thickness; and for the development of multi-layered permafrost. The cryolithic zone extent in Pleistocene is believed to have exceeded the current permafrost range by approximately 20%.

In East Siberia, several generations of multi-layered permafrost formed (Romanovskiy 1993; Nikolskiy and Basilyan 2003; Schirrmeister et al. 2013; Saito et al. 2014). For the East European Plain, several horizons of paleocryogenesis have been described (Velichko 1973). During these roughly 120,000 years, cryogenic processes alternated: periods of permafrost growth were followed by periods of degradation, by partial or complete thawing of frozen deposits (Baranova

and Biske 1964; Kaplina 1981, 2009), by the development of thermokarst and other thermo-denudation processes observed in the stratigraphic records as erosive and thermoerosive unconformities, and by active permafrost growth. An abrupt intense cooling event, which took place in the entire Northern Hemisphere 8200 years ago due to the Laurentide Ice Sheet breakdown, should probably be considered the boundary between the second and the third stage of the cryolitozone development.

The third stage of the cryolitozone development dates to the Middle Holocene, in general to the timeframe of about 8000–5000 years ago. During this time, permafrost degradation occurred widely. The permafrost boundary shifted 1000–2000 km to the north; in the European part of the continent, it retracted to the Arctic Circle; in West Siberia it stopped along ~68° N and in East Siberia, along ~60° N (Romanovskiy 1993). By the end of the Holocene climatic optimum, frozen masses in the south had thawed completely, and to the north, permafrost had thawed from the surface, while the seasonal thawing depths increased. In some areas, isolated masses of relic permafrost remained; in the northern part of the cryolithic zone, lake thermokarst was actively developing. These processes continued the large-scale transformation of the topography and the landscape in Northeast Siberia called thermoplanation (Baranova and Biske 1964) that had started at the end of the second stage of the cryolithic zone development.

Finally, the fourth stage of the cryolithic zone development dates to the second half of the Holocene (from ~5000 years BP to the present). It is characterized by climatic and geocryologic conditions more severe than those of the previous stage. This caused aggradation of the permafrost and some shift of the cryolithic zone boundaries to the south. Areas previously freed from glaciers froze; secondary freezing took place in the previously thawed deposits that often crown the profiles of frozen deposits in the southern part of the northern geocryologic zone. In the northern part of the cryolithic zone, the growth of underground ices resumed, and the most recent generations of polygonal ice veins formed. Frozen sediments, which formed in Late Holocene, comprise the southern geocryologic zone, characterized by mostly discontinuous, massive-sporadic, and sporadic permafrost distribution.

Thus, the current distribution of perennially frozen rocks had formed (Fig. 1). However, it underwent noticeable transformations in the historic period, including after the scientific research of this natural phenomenon began.

Basic Types of Permafrost According to Freezing Conditions

By freezing conditions, frozen sediments are divided into epicryogenic and syncryogenic; however, thick polygenetic frozen sediments containing both epigenetic and syngenetic permafrost are most common. Epigenetic permafrost includes deposits of various composition, genesis, cryogenic structure, ice content, and age. The cryogenic age of these rocks, i.e., time of their transition to perennially frozen state, which has existed continuously to the present, varies from Early Pleistocene to Late Holocene. The geological age of epicryogenic rocks always exceeds their cryogenic age. The time lag between the formation of deposits and their transition to perennially frozen state can be hundreds, thousands, or millions of years.

Unlike epicryogenic formations, syncryogenic deposits are formed in the process of simultaneous accumulation of sediments and their freezing. Thus, the geological age of syncryogenic deposits approximately coincides with their cryogenic age. This difference is fundamental; however, equally important is the accumulation history of frozen sediment: if the epigenetic permafrost thickness grows due to the deepening of the perennially frozen base, the syncryogenic deposit thickness grows due to the upward migration of the permafrost table, as a portion of water-logged sediment at the bottom of the seasonally thawed layer (STL) freezes to the permafrost deposits. As a part of this process, ice belts of various thickness (ice *schlieren*) form due to separation of water from unconsolidated rocks that constitute STL and since the permafrost table acts as the impermeable layer.

Thus, the ability to distinguish epi- and syncryogenic deposits appears quite important for

investigating traces of former human activities (archaeological remains) within frozen deposits. Perennial frost conditions per se do not assume an unchanged primary archaeological context. For instance, cultural remains enclosed in epigenetic frozen deposits can often be redeposited, while archaeological materials within syngenetic frozen deposits are guaranteed to be in situ and should match, in both geological and geocryological age, the matrix sediments and be in agreement with their stratigraphic position.

Syncryogenic deposits are spread from the surface and associated only to accumulative forms of the relief. They always form on a frozen substrate, i.e., on epicryogenic perennially frozen sediments. By origin, they are mostly continental deposits, alluvial, lacustrine-alluvial, proluvial, aeolian, and glacial of different ages, from Early Pleistocene to Holocene. They form and exist in the cryolithic zone conditions, with higher ice content and specific cryogenic structure significantly dependent on the time of their formation. Such deposits are primarily subject to thermokarst and long-term thawing in the periods of climate warming, which results in their transformation into *taberal* deposits (perennially frozen deposits that experienced thawing – some completely thawed – having lost their cryogenic structure, as well as thawed and refrozen deposits as defined by Kaplina 1981). These processes are important factors of geoarchaeological research in the cryolithic zone.

Syncryogenic deposits are the most characteristic group of unconsolidated rocks in the cryolithic zone. By conditions of accumulation and primary diagenetic transformations when freezing, they are subdivided into subaqual, subglacial, and subaerial. The latter are most important archaeologically as they are most widespread and include deposits that became perennially frozen while the sediment accumulation surface was in contact with the air. Syngenetic freezing is most completely expressed in formation of floodplain, delta, shoal, slope (delivual and solifluctional), and aeolian deposits.

Such deposits often contain remains of plant root systems, organic interbeds, bone remains, and corpses of Pleistocene animals. They can also contain archaeological materials, both dispersed cultural remains and horizons of archaeological materials formed on the ancient day surface (faunal remains of human prey, artifacts and their production waste, trash, and other material traces of human activity). As the deposit thickness grows, such horizons turn into culture-bearing deposits generally referred to as "the cultural layer."

This is a slow process, during which the sediment is accumulated on the day surface and deposits of the lower part of the seasonally thawed layer turn to permafrost. The transition occurs not annually but intermittently (in rhythms), causing the syncryogenic sediments to often have clearly visible rhythmic structure, with various proportions of organic-mineral components and schlierens (subhorizontal interbeds) of almost pure ice. Therefore, the rhythmic (stratiform and lenticular) organization of cryogenic structures observed in frozen deposit sections is typical for syngenetically frozen deposits. It also testifies to in situ conditions of the materials.

As a rule, syngenetically frozen deposits consist of the finely grained fraction: they are pulverscent/silty/dust loess-like sediments (icy aleurites). In weakly lithified perennially frozen deposits of East Siberia, the volume share of ice can easily exceed 50 percent, changing zonally.

Extreme pulverescence typical for such deposits is due to the multiple repeating of freezing/melting cycles affecting sediment particles while they are located at the STL boundary. These are, basically, the clay particles which constitute the main frozen deposit component in the cryolithic zone.

It has been demonstrated experimentally that after only 50 freeze-thaw cycles, active dispersion and degradation of clay particles occur (Konishchev and Rogov 2008). The lowest number of such cycles, after which the finely dispersed varieties of STL sediments would turn into a syncryogenic frozen deposit, is estimated to be in the hundreds to thousands (Yershov 1998).

Cultural material in the STL boundary will be damaged by the same processes, as well as being actively weathered chemically and biologically, until it becomes permafrost. Examples of such impact are clearly seen on materials from the Yana site (Burshneva and Pitulko 2014).

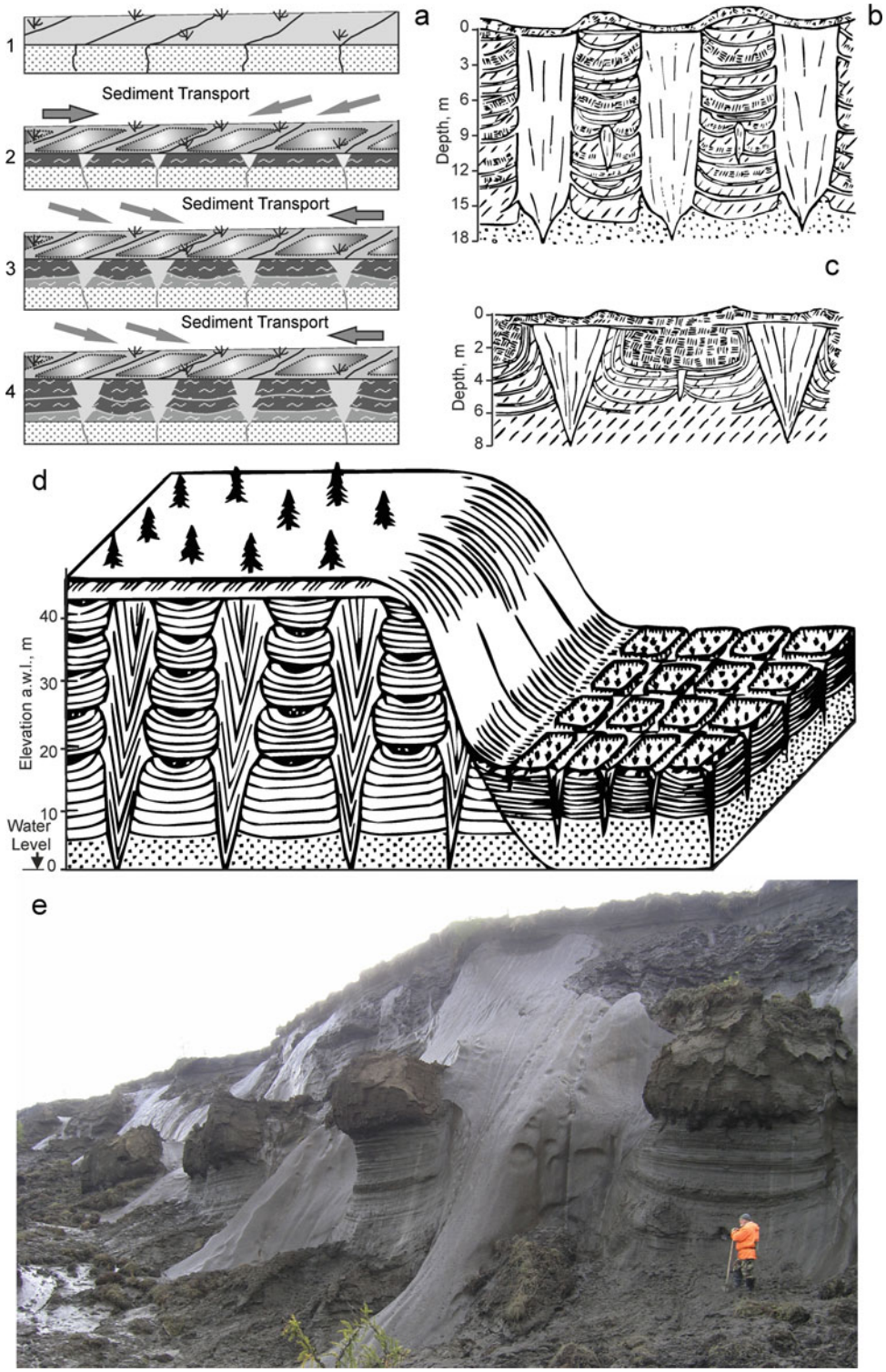

Permafrost Digging, Fig. 2 (continued)

Fine-grained sediments are extremely favorable for the formation of various ice structures due to freezing from the surface. Ice participating in permafrost formation, in any of its varieties, can be both epigenetic and syngenetic. In frozen deposits, it is available in three basic forms: vein ice, pore ice, and segregation ice. Relative location of ice and sediment forms specific cryogenic textures that characterize structures of frozen deposits and reflect their formation conditions. There are several classifications of cryotextures based on various principles (French and Shur 2010).

Despite their complexity and variety, cryotextures are an important diagnostic sign of deposit freezing conditions. Syngenetically frozen deposits are mostly characterized by lenticular, stratified, and stratified-reticulate cryotextures. Reticulate cryotexture is characteristic for epigenetic permafrost; in taberal deposits, most common is the cellular cryotexture. Massive cryotextures often emerge in deposits thawed in situ, but it can also occur in deposits formed in extremely dry frosty conditions. Understanding these differences is important for evaluating geological conditions of archaeological material deposition.

Frost cracking is an important cryogenic process (Yershov 1998: Table 14.1). It is associated with the mechanism of forming polygonal vein structures (Fig. 2a), which are a significant characteristic of permafrost. Frost cracking is a process of temperature-caused deformation of frozen sediments: cracks appear on the surface and penetrate quite deeply into the deposit (3–4 m and deeper, depending on the frozen sediments temperature: the lower the temperature, the deeper the fissure). As the crack fills with ice, snowmelt water, sand, and silt, ice wedges form; repeated cracking results in the wedge-like stratified ice bodies with a varying mineral component (sand, loam, and silt aleurites), organized in a polygonal system.

Multiple iterations of this process lead to formation of cryogenic structures and specific topographic forms (Fig. 2a). In deposits of homogeneous composition and mechanic properties, rectangular crack networks are formed; in heterogeneous deposits, more sophisticated polygonal patterns with five or more sides form. The network of cracks is oriented parallel to any open vertical surface (e.g., scarp, cliff, or another crack of any origin or erosional channel).

As a result of frost cracking, polygonal ice wedges form (Fig. 2a, d, e); they are a network of linearly elongated ice-saturated lodes with the insides composed of frozen deposit (ground columns or polygons). Polygonal lode formations are subdivided into four types: ice wedges (wedge-shaped ice bodies with a varying mineral component), originally sediment-filled cracks, primary sand-filled veins, and casts or pseudomorphs (cavity left by thawed ice wedge and back-filled with secondary deposits).

Ice wedges can form in previously deposited sediments as a result of postdepositional freezing due to increasing climate harshness, and thus epigenetic ice wedges form. Alternatively, they may grow simultaneously with deposit accumulation as a result of sediment freezing resulting in syngenetic ice wedges (Fig. 2d). The syngenetic ice wedges have greater vertical formation thickness than the epigenetic ones and can form multilayered structures measuring tens of meters vertically.

Epigenetic ice veins are short (generally, their height does not exceed the depth of annual temperature fluctuations) and symmetrically triangular in section, with a clear wedge end (Fig. 2c), while syngenetic veins in section rather resemble

Permafrost Digging, Fig. 2 Permafrost deposits and cryogenic structures. A, development of syncryogenic (Ice Complex) deposits: frost cracking (1), development of polygonal structures (2); sediment accumulation with simultaneous freezing and ice-wedge growing (3, 4), based on illustration by Schirrmeister et al. (2011); (**b**) and (**c**), ice wedges shown in schematic profile, syngenetic ice wedges (**b**), epigenetic ice wedges (**c**), after Romanovskiy (1993); D, spatial relationship between deposits with old (syngenetic) and modern (epigenetic) freezing in land forms, alluvial terrace and flood plain surface, respectively, after I. (**d**). Danilov (1990); (**e**), Ice Complex deposits in the northern Yana-Indighirka coastal plain, Yana 195 km (Snotty Mount) reference section, left river bank exposure of the Yana River I its low reaches. (Photo credit: Elena Pavlova)

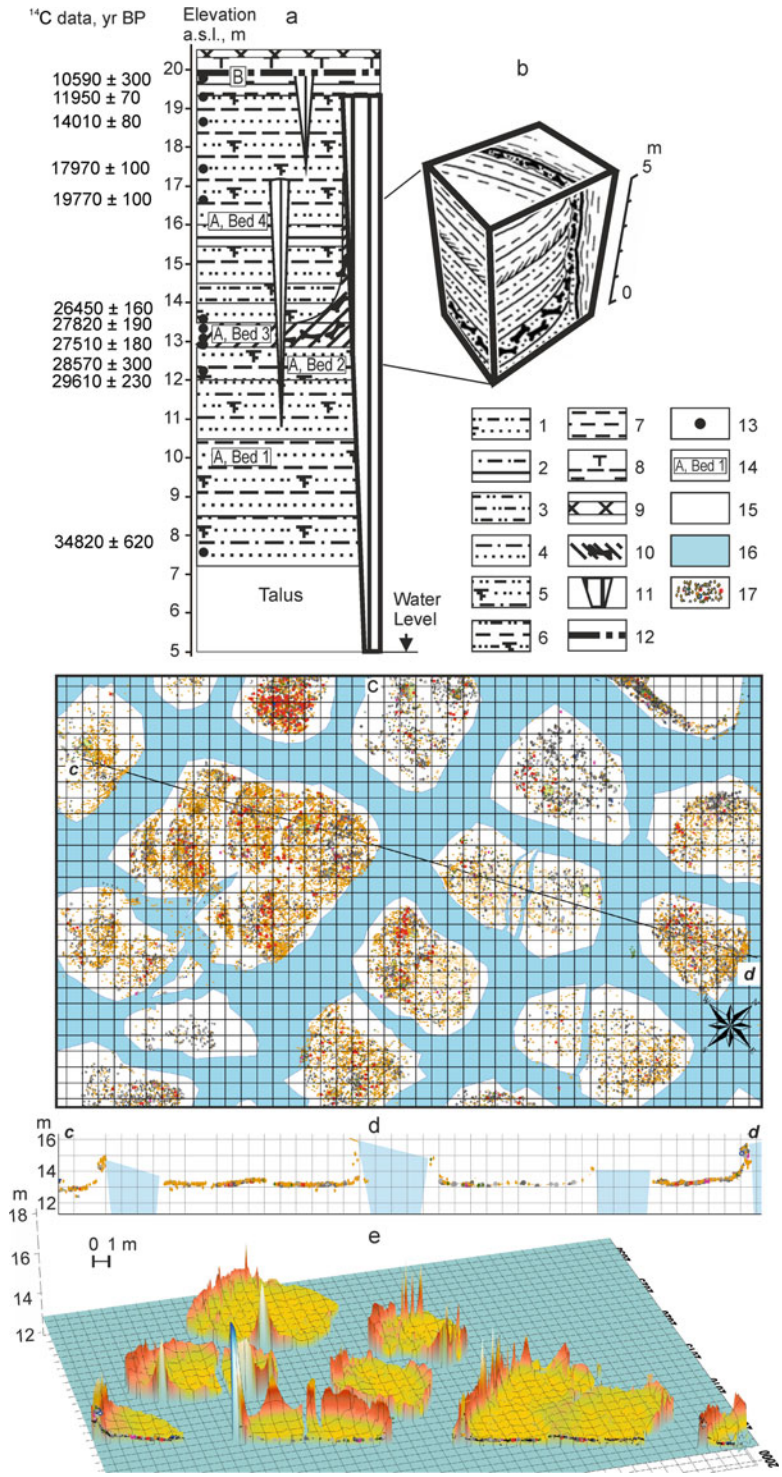

Permafrost Digging, Fig. 3 (continued)

a column with a gradually thinning bottom turning into the residual part of the elementary ice vein (Fig. 2b).

Originally sediment-filled cracks and primary sand-filled veins basically serve as an indicator of severe climatic conditions (cold and arid/hyperarid) in which frozen sediments formed. They do not strongly affect the position of archaeological materials enclosed in the deposits.

The entire set of abovementioned cryogenic characteristics is most expressive in the area of low-temperature, mostly subaerial syncryogenic deposits, namely, the *Ice Complex deposits* (Soloviev 1959). They are common in northern East Siberia mostly in the vast coastal lowlands but also known in the Central Yakutian lowland (Romanovskiy 1993; Schirrmeister et al. 2013,), in the northeast North America (Kanevskiy et al. 2011), and in the intermountain basins of Northeast Russia (Soloviev 1959).

Ice Complex deposits are represented by ice-rich silt sandy loams, clay loams, and sands penetrated by syngenetic wedge ice (Fig. 2e). These deposits are polygenetic in nature both in terms of cryogenic characteristics and in terms of deposit genesis. These deposits include alluvial, lacustrine, slope, and aeolian sediments that accumulated in Middle and Late Pleistocene in the conditions of extracold, mostly arid, sharply continental climate with low-temperature frozen substrate present. Total ice content in the complex deposits is very high and changes zonally, from 50% to 70% in the Central Yakutian lowland to 80–95% on the northern coast of the Yana-Indigirka lowland and the New Siberian Islands. The thickness of the Ice Complex deposits reaches 60 m or more.

The development of syngenetic permafrost plays as important impact factor on archaeological contexts that form within this depositional environment. It is well studied at the **Yana site** (71° N) excavations in the northern Yana-Indigirka lowland (Pitulko 2007; Pitulko et al. 2013). The cultural layer occurs approximately in the middle of the second alluvial terrace of the Yana River at 7.5 m above the water level. Ice-rich sediments hosting the cultural remains are typical Ice Complex deposits (Pitulko and Pavlova 2016). The terrace body consists of two members of bedded structure (Fig. 3a) which are penetrated by three generations of the ice wedges. The oldest one is of Karginian (MIS 3) age, smaller veins of the second generation date to LGM, and the youngest generation formed in the Holocene.

Processes involved in syngenetic ice-wedge formation have the greatest impact on the properties of the cultural layer especially on hypsometric position of some portions of the cultural layer and its artifacts (Pitulko and Pavlova 2016). As mineral sediments accumulate simultaneously with the increase in the volume of the ice wedge, some archaeological material that belongs to the deposits next to the contact between the ice wedge and the polygon body gradually becomes displaced as it moves up together with the matrix deposit due to the ice-wedge growth. As a result, in the vicinity of the contact, the cultural layer curls sharply upward (Fig. 3a through e).

This often leads to the frost-mechanical destruction of the artifacts but also causes potential problems with radiocarbon dating and the microfossil record research. Because of this upward move of both the material and the matrix sediment at the

Permafrost Digging, Fig. 3 Cryogenic deformations in layered frozen deposits due to the formation of syngenetic ice-wedges: generalized lithostratigraphic sequence of Quaternary deposits for the Northern Point locality of the Yana site complex (**a**); schematic block diagram for cryogenic deformations of the culture-bearing layer caused by development of syngenetic ice vein (**b**); spatial distribution of in situ mapped cultural material of the Northern Point locality, excavation map (**c**); hypsometric profile along (*c-d*) line within 13 to 16 m elevation in absolute marks viewed from South (**d**); spatial distribution chart for archaeological material along (*c-d*) line viewed from North (**e**). Legend for lithology sequence and for the cultural layer chart: 1, sandy silt; 2, clayey-sandy silt; 3, sandy-clayey silt; 4, clayey-sandy silt; 5, sandy and clayey-sandy silt; 6, sandy-clayey silt; 7, clayey silt; 8, interbedded clayey and sandy-clayey silt with bands and lenses of peat; 9, soil-plant layer; 10, cultural layer in situ; 11, ice wedges; 12, seasonally thawed layer (STL) boundary; 13, location of ^{14}C sample together with the date value; 14, stratigraphic bed number; 15, polygon ground body deposits; 16, ice wedge; 17, cultural material. (After Pitulko and Pavlova 2016)

margins of the polygon ground body, which can be >1 m wide, the material for ^{14}C dating and the dispersed sediments containing pollen grains and other microfossils are moved to levels where they are asynchronous to sedimentation.

Notably, they formally preserve characteristics of in situ condition, being located in permafrost deposits at a significant distance from the ice-wedge margin and depth from the surface as the culture-bearing horizon at Yana site occurs at about 7.5 m depth. If ^{14}C dated, such materials return ages of 28,000 ^{14}C years BP and provoke erroneous conclusions on the age of the deposits, which in fact are twice as young. Then it should be realized that the same regularities in vertical matter redistribution work within polygonal ice-wedge structures everywhere, affecting individually deposited objects as well, if they are close to the polygon boundary.

The same cryogenic bulge which moves the materials away from its original position inside the frozen deposits participates in formation of material concentrations when frozen deposits thaw. As a result, secondary concentrations of the material may appear both below and above the original cultural layer (Fig. 4) having the same age as the source horizon. Such concentrations have some formal signs of a cultural layer but are formed entirely by cryogenic processes. Understanding such patterns can help correctly evaluate dating results from permafrost deposit sections and cultural remains distribution in archaeological sites (Pitulko and Pavlova 2016).

The growth of syngenetic ice veins can lead to disconnection of single horizon of culture-bearing deposits by several meters and formation of distinct cultural layer fragments, enclosed within a ground body of the permafrost polygon. In this case, the cultural layer present within an individual polygon usually continues in adjacent polygons (Fig. 3c–e). Thus, an anthropogenic structure (e.g., a residential area) can be divided into several fragments by the ice vein growth.

In the process of epigenetic vein growth, culture-bearing deposits are moved laterally within narrow areas (up to 0.5 m wide) when the vein penetrates below the cultural layer level. Vertical movement of the material along the contact with the vein generally remains insignificant.

Pseudomorphs, or ice-wedge casts, form when frozen deposits thaw, resulting in through-like depressions. They are filled with various loose deposits containing, among other things, faunal remains and artifacts, which were previously held by the permanently frozen culture-bearing deposits. Under certain circumstances, such concentrations can be mistakenly accepted as in situ materials, leading to misconceptions (Velichko et al. 1997).

Although not many of archaeological sites are known within the Ice Complex extent (Pitulko et al. 2016a; Pitulko et al. 2017), the potential of this area, considering how little of it has been studied, is immense. Due to the permafrost conditions, informational value of each site is extremely high.

Basic Destructive Processes Transforming Frozen Deposits

Since cryogenesis of the lithosphere is a complex interplay of various processes associated with phase transformations of moisture in rocks, their cooling (sediment freezing, permafrost aggradation) and warming (thawing, permafrost degradation), it naturally involves a number of destructive processes that transform frozen deposits. The Ice Complex deposits discussed above are especially sensitive to changes in heat energy influx and to the impact of a combination of erosion processes due to the highest ice content.

The principal destructive factor affecting perennially frozen deposits is thermokarst, which, as a consequence of thermal conversion of ice-rich permafrost, results in the formation of negative relief forms: depressions, lake basins, and *alases*, or flat-bottom lake basins of drained lakes, where peat bogs develop. Permafrost degradation causes significant surface subsidence due to the loss of the frozen deposit volume from thawing and packing of thawed original deposits, as they become taberal (thermokarst) deposits.

Formation of thermokarst lake basins is associated with thawing out of the upper part of ice veins, under the influence of atmospheric heat and local hydrology. On the geologic time scale, thermokarst development positively correlates with warming events and raising annual

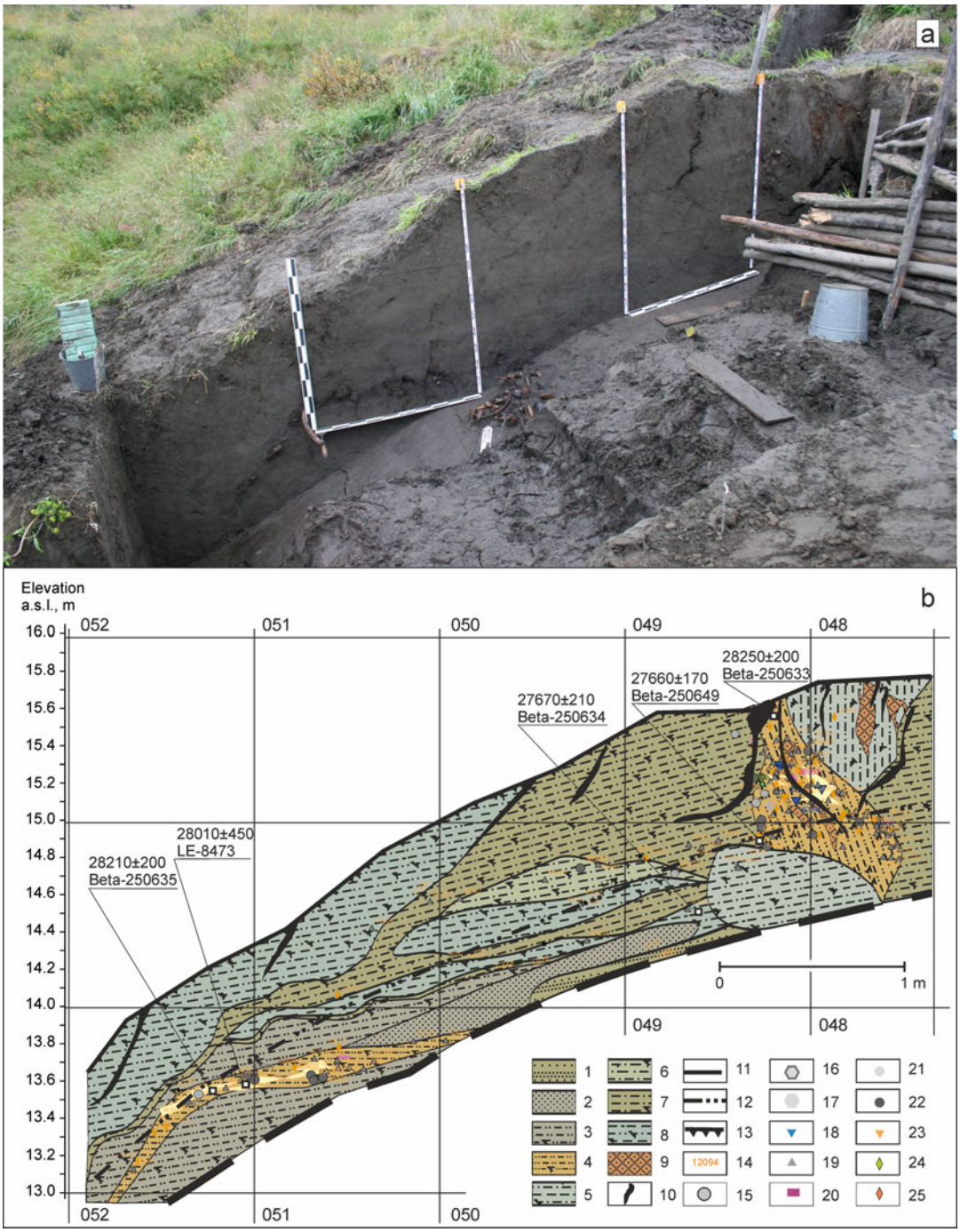

Permafrost Digging, Fig. 4 Yana site complex, Yana B area, testing trench on the river bank slope at Dvoinoy polygon unit (**a**) and lithology sequence observed in NE excavation wall at grid line Q6F052 - Q6F049 (**b**). Legend: 1, unsorted sand of brownish-gray color; 2, fine-grained sand of gray color; 3, sandy silt of gray color; 4, sandy silt of brown color; 5, silt of gray color; 6, sandy-clayey silt of brownish-gray color; 8, clayey silt of light gray color; 9, peat lenses; 10, drying fissure; 11, profile bottom; 12, STL boundary; 13, profile edge; 14, artifact number; 15, lithic side scraper; 16, core; 17, blank; 18, lithic tool; 19, flake; 20, blade; 21, pebble; 22, burnt rock; 23, bone tool; 24, mammoth ivory fragment; 25, fauna remains. (After Pitulko 2019)

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precipitation. Water is the most important agent of this process due to its potential for erosional activity, heat accumulation, and transport.

Extensive permafrost degradation and thermokarst development are accompanied by widespread thermodenudation, which combines the cryogenic destruction of sediments on the surface and the transportation of its products to lower elevations. Thermodenudation of frozen deposits is accompanied by a whole variety of slope processes (water gravitational and gravitational). The most noticeable contribution in thaw transformation of frozen deposits is made by landslide (defluction, cryogenic creep) and solifluction processes (Fig. 4). The specific process occurring depends on the water saturation degree, the speed of deposit movement, and the steepness of the surface where it takes place.

Solifluctional and other slope processes can participate in the formation of the primary archaeological context at the base of a slope as well as in the secondary transformations of the cultural horizon formed in situ. A characteristic example of the former comes from geoarchaeological studies of the Paleoeskimo at the Tayara Site on Qikirtaq Island in the Canadian Arctic. As the site is formed, cultural remains got buried in the deposits resulting from cover solifluction reworking glacial-marine deposits. This process buried the northern part of the site. The speed of solifluctional deposit flow is estimated around 1.68 to 2.86 cm/yr for approximately 350 years. As a result, three successive cultural horizons were formed (Todisco et al. 2009). Remarkably, postdepositional process did not change features of spatial distribution of the material associated with human activities, as confirmed by statistical analysis of stone artifact concentrations. At the same time, researchers found that the orientation of bone remains partially changed due to the impact of low-energy surface runoff (Todisco et al. 2009).

The impact of slope processes on culture-bearing deposits can be significantly higher, as evident at such Paleolithic sites of the Russian Plain as Kostenki (Holliday et al. 2007), Khotylevo (Gavrilov 2015), and Zaraysk (Amirkhanov et al. 2009), where changes in culture-bearing deposits were most likely caused by cryogenic creep. Today there is no permafrost at or around these sites, but it existed here during the LGM. Despite slower flow speeds (measured in mm/yr), the long-term character of this phenomenon is apparent in significant changes of culture-bearing horizons, specifically in vertical distribution of material. Consequently, false sequences can appear, as the deposit moves without losing structural integrity. If locally developed cracks open slowly and gradually fill with materials from the culture-bearing horizon, material concentrations not associated with human activities, similar to those found in the Zaraysk site excavations (Amirkhanov et al. 2009), can form.

An important result of frozen deposit transformation when thawing is the formation of pseudomorphs within ice wedges (Figs. 5 and 6). These are secondary polygonal structures resulting from ice veins thawing out and gradually filling with sediments. It is easy to imagine that archaeological material present higher in the profile (or to the side of the thawing vein) will inevitably be enclosed in the body of such formation. They are widely represented, for example, in Quaternary deposits in Central and East Europe, where permafrost is not currently present, and within the current cryolithic zone. Along with other signs of the paleo cryogenesis, ice-wedge pseudomorphs were noted in the profiles of some Paleolithic sites (Khotylevo, Yudinovo, Zaraysk, Kostenki, Eliseevichi, and many others).

Under certain conditions, the cultural material of the site can be completely moved into depressions formed by thawing of the ice wedges, with no material left in the original position and then with no signs for presence of near-horizontal culture-bearing layer. The Zhokhov site (Pitulko 2013) is one of the best examples of such circumstances.

The **Zhokhov site** (76° N, Zhokhov Island, New Siberian Islands) is one of the northernmost archaeological sites in the world and the oldest reliably documented evidence for human habitation in the High Arctic about 9000 years ago. The total excavated area at the Zhokhov site is 571 m^2, which is estimated to constitute approximately 10% of the total area of culture-bearing deposits.

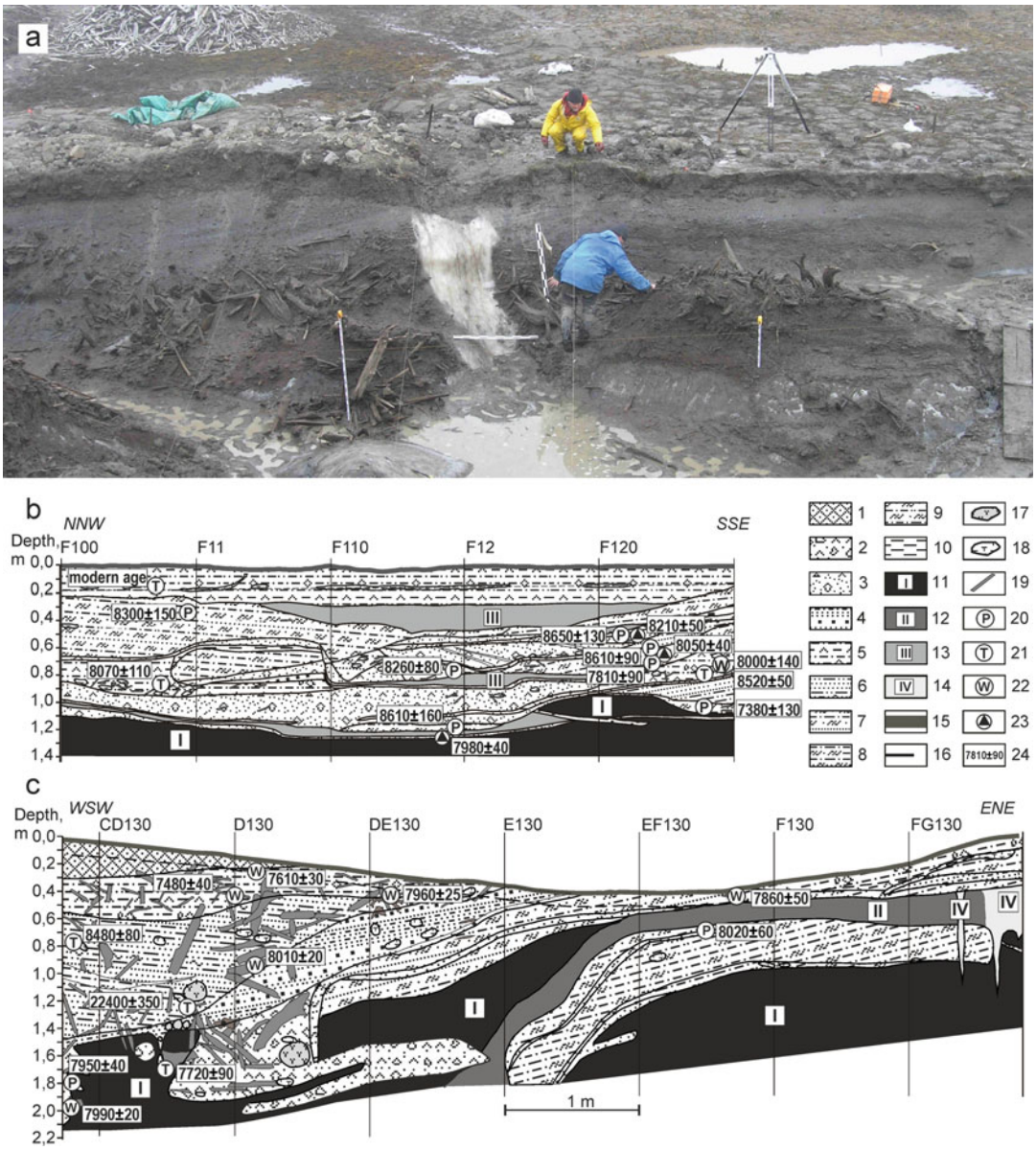

Permafrost Digging, Fig. 5 Excavations in permafrost, Zhokhov site, New Siberian Islands. (**a**), Ll line profile viewed from South, in which ice-saturated deposits broken by epigenetic Holocene ice wedge are exposed underlaied by eroded surface of frozen Pleistocene deposits containing ice wedges, excavations of 2005; (**b** and **c**), stratigraphic profiles of the Zhokhov site from area 1, excavated in 2000–2005: (**b**) profile LZ2-7S along the line F100-F13 and (**c**) profile LZ3–130-4 along the line CD130-G130. Legend: 1, 1990 backfill; 2, coarse material composed of scree, gruss, and angular, coarse-grained sand; 3, coarse sand with gruss and scree; 4, unsorted sand with thin silty sheets; 5, loam with gruss and scree; 6, unsorted sand with thin sheets of aleurite and plant detritus; 7, interbedding of different sediment fractions, silt sheets, sheets of rounded, fine-grained sand, and water-sorted plant remains; 8, lamination of pure silt sheets with silt sheets, saturated with plant remains; 9, interbedding of silt sheets and plant remains; 10, clayey silt; 11, old (Late Pleistocene) wedge ice; 12, Holocene-aged thermokarst ice; 13, originally surface-formed buried Holocene-age pond ice; 14, Holocene ice wedge; 15, top-soil; 16, active layer boundary; 17, tuff lava cobbles; 18, peat inclusions; 19, archaeological wood chips and fragments, location and material of samples for dating; 20, plant remains; 21, peat; 22, wood; 23, charcoal; 24, ^{14}C date values. (After Pitulko et al. 2015)

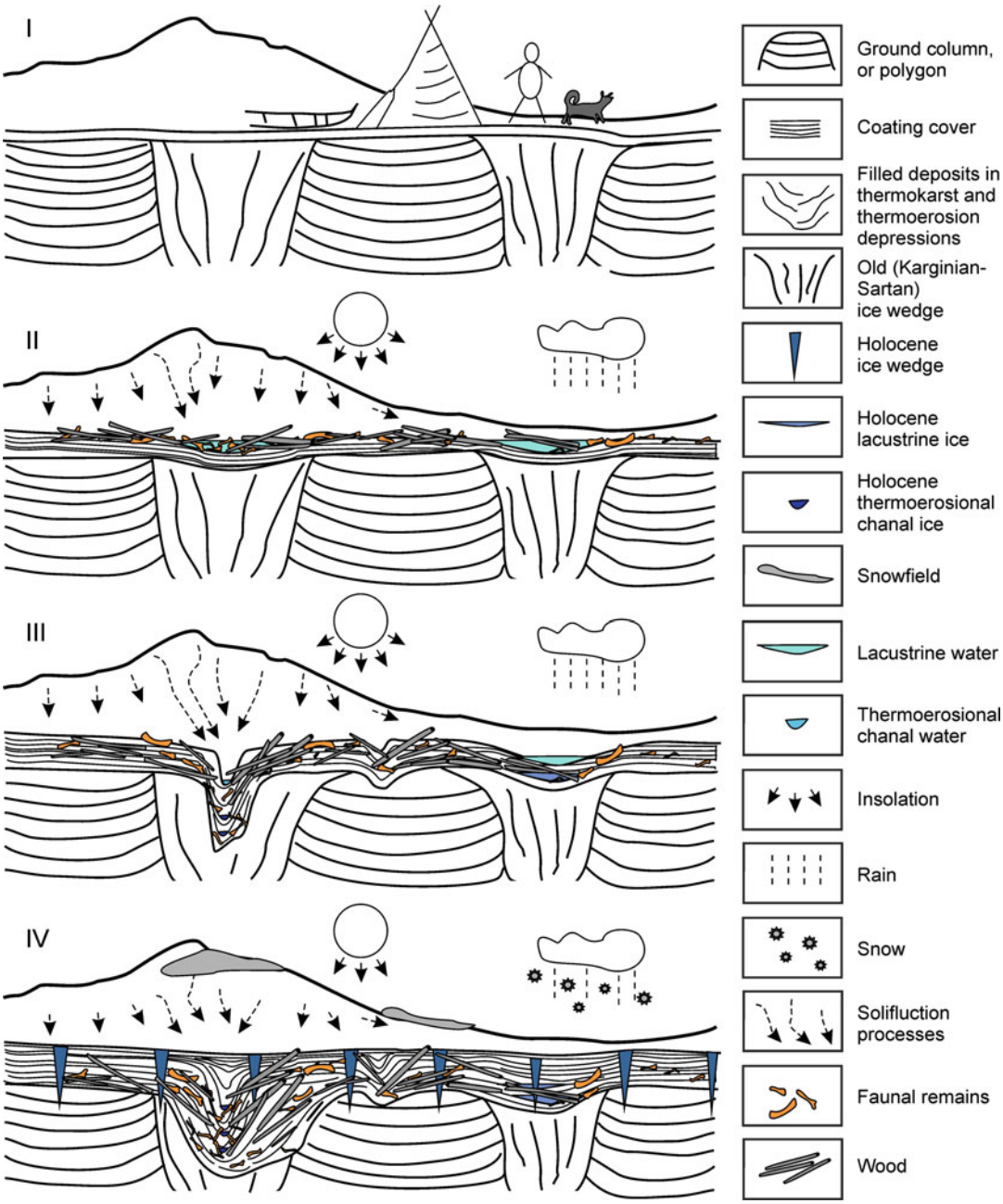

Permafrost Digging, Fig. 6 Accumulation model for frozen culture-bearing deposits of the Zhokhov site, New Siberian Islands, from the artifact and bone rain evolved due to human habitation, to ice-wedge casts filled with cultural material together with matrix sediments

It yielded a large collection of organic and lithic artifacts, faunal remains, and the oldest human remains in the Arctic (Pitulko 2013; Pitulko et al. 2015).

The site is located on the accumulative denudation plain, developed on the Ice Complex deposits (*yedoma)* represented by syngenetically frozen, horizontally wavy layered clay-sandy and

sand-clayey aleurites with a small admixture of gravel and gruss, containing occasional thin plant roots. Thick syngenetic ice wedges developed in these deposits, which formed at the end of Late Pleistocene.

Originally, cultural material from several habitation events was deposited on some near-horizontal, slightly elevated and dry portion of the yedoma plain surface. This plain was subject, at least twice, to the impacts of thermokarst processes caused by warmings in Early (around 96000 years ago) and Middle Holocene (ca. 7000–6500 years ago). A comprehensive study of the Zhokhov site's geological structure has shown that its culture-bearing deposits have a complex cryolithologic structure characterized by varied sediments and genetically heterogeneous underground ice types (Pitulko and Pavlova 2015).

Numerous artifacts and a large amount of faunal remains occur in lithologically varied layers virtually throughout the whole depth (up to 2 m) of excavated deposits; some are scattered, but more often they form large concentrations of cultural material (Fig. 5). The cultural remains deposition indicates a brief rewashing by surface and ground waters, in addition to the slope sediments coming from the outside. At the same time, despite obvious traces of the water flow affecting the artifact-bearing deposits formation, there are no signs of long-distance transport of cultural material.

The site's geological structures, granulometric sediment composition, and radiocarbon dates show that the currently observed artifact-bearing deposits started to form ~7380 ^{14}C years BP as a result of active thermokarst, thermoerosion, and slope (primarily solifluction) processes supplemented by abundant surface water. Their impact caused the top of the Pleistocene Ice Complex deposits to thaw in some areas (probably the ones most utilized by people beforehand), and thus ice wedges started thawing from the top. As a result, spacious cavities, pockets, thermal wells, and channels were developed in ice-wedge bodies and consequently filled with large amounts of cultural layer material mixed with coarse debris from the above slope and proluvial deposits (Figs. 5 and 6).

Spatial distribution analysis of ^{14}C dates, obtained from various materials (wood, peat, plant remains, bones, and charcoal) within the excavated part of the Zhokhov site, has showed that the excavated deposits contain date series with inversions (Fig. 5b, c) and that more often, younger dates lie below the older ones (Pitulko and Pavlova 2015). This is important evidence of the cultural layer gradually sliding into surface depressions: younger deposits shifted down into the lower part, while the older ones would follow them with the next portion of material to settle above the younger ones. Cultural material was buried by slope deposits in several stages with diminishing intensity and refroze soon after redeposition.

As a result, the archaeological material preserved in secondarily concentrations as artifact-bearing masses filled thermokarst and thermoerosional depressions of the landscape. Nevertheless, cultural remains maintain general elements of the original spatial structure of the site and were not influenced by long-distance material redeposition, as confirmed by the spatial distribution pattern of the most numerous categories of finds (in the tens of thousands; Pitulko et al. 2015). Instead, it is demonstrated that the distance covered by the artifacts due to gravity and/or water transport probably does not exceed 10 m relative to their original position. In fact, original cultural layer of the site, along with sediment particles coming from the polygon body deposits, was transformed into ice-wedge pseudomorph filling (Fig. 6). The thawed top of the vein has been stripped in the lower part of the section. The plane position of material concentrations within the Zhokhov site excavation repeats the polygonal ice-wedge pattern (Pitulko et al. 2015).

Most likely, the Zhokhov site case is a single known example of complete demolition of the original archaeological context followed by its reburial in the ice-wedge casts and refreezing. At the same time, ice-wedge casts as evidence of paleocryogenesis and geological features are well-presented in the profiles of Quaternary deposits which contain archaeological materials.

Pseudomorph formation can cause faunal remains and artifacts to group into concentrations

that can be mistakenly assigned to past human activity. For example, the spatial arrangement of mammoth remain concentrations and profile elements at the Timonovskaya and Eliseevichi sites had been described as human-made "dugouts" or semisubterranean Upper Paleolithic dwelling structures (Krainov 1956). These so-called dwelling structures are actually large ice-wedge casts (Velichko et al. 1997). In their fill, there was archaeological material from the overlying

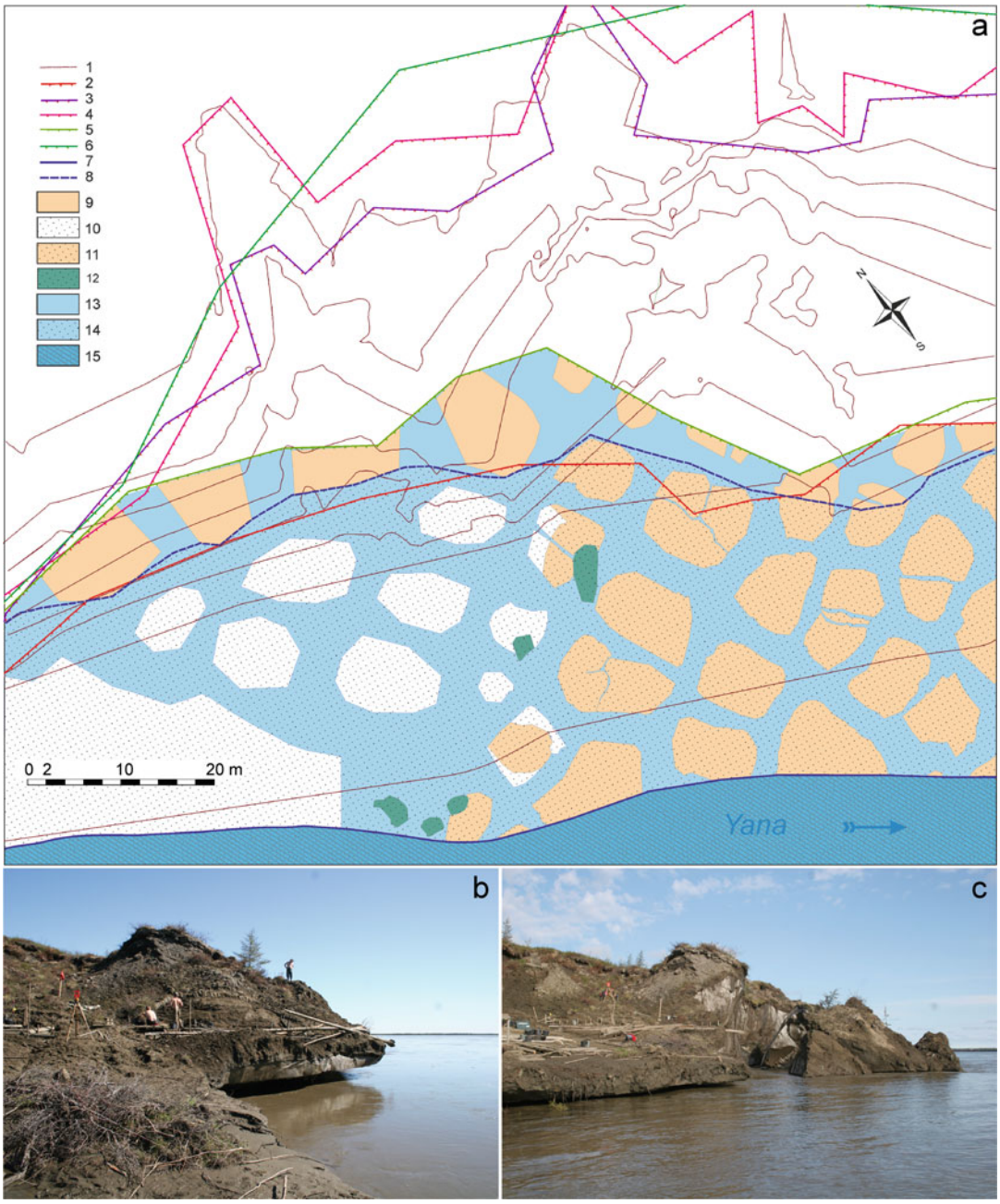

Permafrost Digging, Fig. 7 (continued)

culture-bearing in situ horizon. These features reflect postglacial permafrost degradation in the Russian Plain paleopermafrost zone (Vandenberghe et al. 2014).

Within the modern permafrost zone, especially on the Arctic sea shorelines and islands, and in river valleys, thermoabrasion and thermoerosion contribute greatly to the Ice Complex destruction (Are 1980; Gavrilov et al. 2006; Overduin et al. 2014). Thermoabrasion causes destruction, including sudden and quick, of a large number of archaeological sites – mostly sites of the arctic sea mammal hunters, located directly on the coastline (Hollesen et al. 2018). Wave action results in intensive retreat of sea cliffs built from frozen deposits. The coastal erosion rate averages 10–12 m/yr. but can be significantly higher, reaching 50–60 m/yr. under certain conditions. Thermoerosion of riverbanks in their concave portions also frequently develops dramatically, at high rates (Fig. 7). According to long-term observations around the Yana site, the average rate of bank retreat is ~6 m/yr.; however, during some seasons it reaches 20–30 m (Pitulko and Pavlova 2016).

High retreat rates for riverbanks built from frozen deposits are observed everywhere in Siberia, as well as in Alaska, where the retreat of a frozen cliff on the Itkillik River was studied. Over the observation period (2007–2011), on one of the sections of this cliff, the average speed of retreat was 45.4 m/yr., with the maximum of 81.1 m/yr. recorded on one of the bank segments (Kanevskiy et al. 2016).

The mechanism of these processes includes the repeated formation of a deep erosion niche, deeply cut into frozen deposits of the bank basement, and the fall of frozen deposit blocks after the tensile strength limit is reached (Fig. 7). The resulting vertical frozen walls actively retreat under the impact of termodenudation processes and the slumping of the upper cliff deposits. Thus, over a short time, entire bank segments are massively destroyed, and the river further reworks frozen deposit blocks.

For archaeological research, such destructive processes are important because they can result in natural destruction of archaeological sites before they are studied or even found. Besides, such falls can move artifacts and bone remains to the present river deposits, or archaeological material can get enclosed in deposits that do not correlate with them by age. Meanwhile, not only individual artifacts that have completely lost spatial relations but also whole blocks of the cultural layer can be buried in the modern river deposits. These blocks could be undisturbed (partly or completely thawed), with fully preserved attributes of the intact layer or even the structure as well as spatial relationships of artifacts (Fig. 8). Ignoring such possibilities inevitably results in erroneous interpretations of the material.

Frozen deposits were completely lost or significantly transformed in a large portion of the former permafrost distribution. For instance, in the north of East Siberia, active development of lake thermokarst during the postglacial, about 13,000–12,000 years BP (Kaplina 2009), leads to the relief transformation of vast areas of coastal lowlands with the formation of numerous lakes and the alas deposit complex. By 11,000–10,000 yrs. BP, lacustrine sedimentation had been replaced by palustrine, and the *alas* topography formed. Throughout the Holocene,

Permafrost Digging, Fig. 7 Thermoerosional destruction on the left river bank of the Yana River in the Northern Point area of the Yana site complex: (**a**), instrumental recorded dynamics of the bank erosion in the western part of the excavation area: 1, topography of the area with 2 m height step contour lines; 2 to 6, terrace edge position recorded in different years of observation (2, September of 2007; 3, September 2013; 4, September 2014; 5, June of 2016; 6, September 2016); 7, the lowest water stand in 2016; 8, the highest water stand in 2016; 9, ground polygons that contain cultural layer; 10, modern alluvium covering thawed (thermoeroded) polygons; 11, modern alluvium covering polygons in which cultural layer was excavated in 2003–2015; 12, collapsed frozen blocks with cultural layer which was excavated in 2016 after collapsed blocks were discovered after the water drop; 13, ice wedges in bank exposures; 14, thawed ice-wedge body covered by modern alluvium; 15, channel alluvium. Mechanism of thermoerosion process: formation of deep niche cut by water in frozen deposits at the Northern Point excavation area (**b**) and catastrophic collapse of large frozen blocks that led to loss of the part of the area prepared for excavation (**c**). (Photo credit: Elena Pavlova)

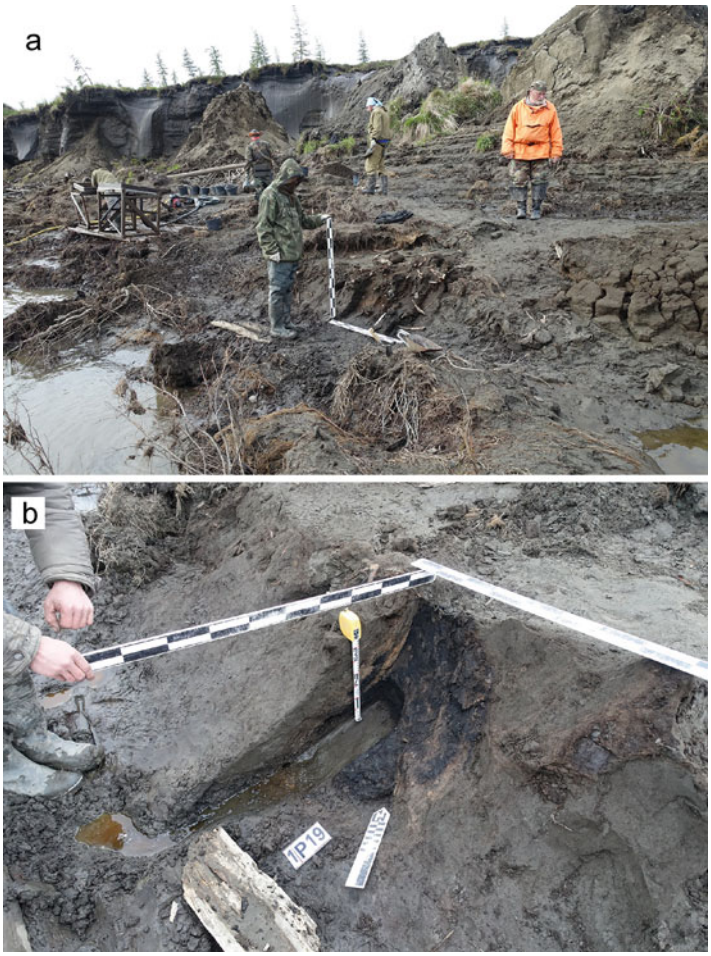

Permafrost Digging, Fig. 8 Yana site complex, excavations at the Northern Point area. Excavations of collapsed block frozen deposits that contained a portion of cultural layer (**a**) and a hearth structure discovered in this block remnant (**b**). (Photo credit: Elena Pavlova)

activation of thermokarst processes was observed ~9000, ~4000, and ~2000 yrs. BP, with the most intensive peak at 9000 yrs. BP. This process is often considered a special variant of peneplanation, called thermoplanation (Baranova and Biske 1964).

As the upper part of perennially frozen masses undergoes thermal transformation, they can be completely lost in significant expanses and to a significant depths. For instance, the depth of large thermokarst basins (*alases*) can reach 20 m and more (in case of inherited development of the lake and significant thickness of deposits). Their area can reach tens of square kilometers. Mass permafrost degradation has resulted in the loss of a significant part of the Ice Complex deposits.

Evidence of such degradation was found at **Urez-22** location (MKR/UR22) in the northern Yana-Indighirka lowland (Fig. 9). This part of the lowland has experienced mass thermokarst transformation in the Holocene. The site is situated in the upper reaches of the Bulchug-Yuryuete Creek, a small left tributary to the Maksunuokha River. Its coordinates are 71°42'44.5" N and 141°12'48.4" E. In the area of interest, the creek runs from southwest to northeast. This site provided an experience of investigating an archaeological object that originally contained mammoth bone remains and a microblade lithic industry but then had completely lost its original structure and spatial integrity (Pitulko et al. 2016a).

The postdepositional history and chronology of the archaeological material from Urez-22 (MKR/U22) were reconstructed based on field observations, evaluation of the relationships among the modern landscape elements, geology of the site, and the assessment of relationships

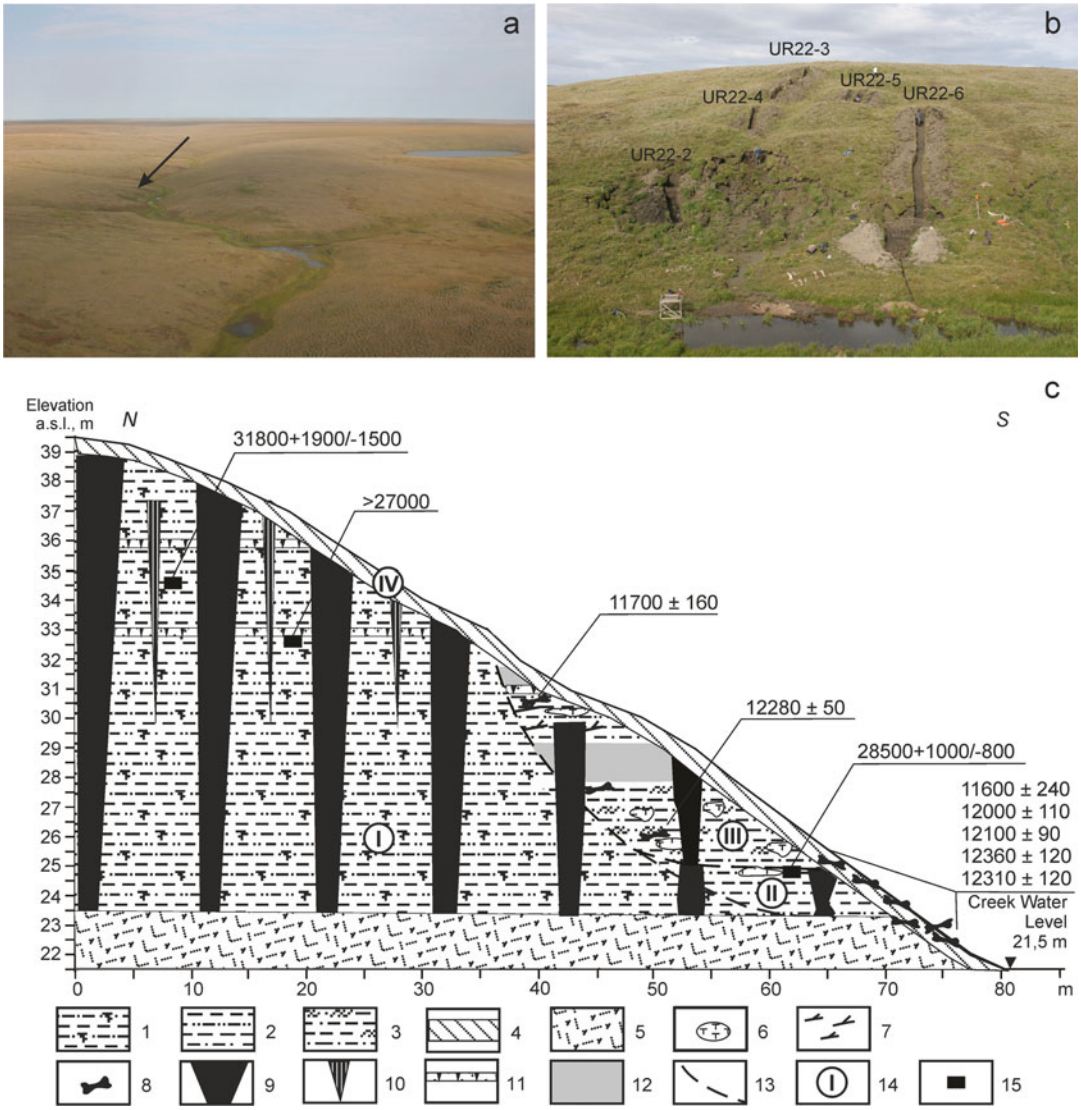

Permafrost Digging, Fig. 9 Site Urez-22 (MKR/UR22). (**a**), the view from the west from the side of the helicopter; (**b**), exposures on the left bank of the Bulchug-Yuryuete Creek; (**c**), lithostratigraphy chart for the location. Legend: 1, Ice Complex deposits (syngenetically frozen sandy silt and clayey silt with plant roots on growing position); 2, taberal deposits (thawed and refrozen Ice Complex deposits, fine-grained silt with organic stains); 3, lake bog deposits (ice-saturated fine-grained silt with organics and interbeds of plant remains, peat lenses, brush twigs and roots); 4, solifluction sediments (clayey and sandy silt with organic stains and peat lenses); 5, unexposed portion of the cut; 6, peat lenses; 7, shrub branches and roots; 8, faunal remains; 9, first-generation ice wedge; 10, second-generation ice wedge; 11, horizon with tiny ice veins; 12, paleolake ice; 13, reconstructed position of paleo thaw lake bottom; 14, facies number; 15, radiocarbon date. (After Pitulko et al. 2016a)

among the site's structural elements supported by dating results. There are four members of Quaternary deposits, each corresponding to a certain stage of natural development of the area.

The oldest syngenetic permafrost deposits of Member I formed in rather severe but stable conditions of the watershed surface in the second half of Late Pleistocene, as indicated by the development of

thick first-generation ice wedges. The second-generation ice wedges formed during the Sartan glaciation (MIS 2). Based on the available dates from mammoth bone remains, human activity episode here presumably took place 12,500 yrs. ago.

The development of thermokarst processes at the Pleistocene-Early Holocene boundary lead to the active destruction of thick permafrost deposits (Member I), thawing of the Ice Complex deposits and formation of the thermokarst deposits (Member II), and formation of a thaw lake reservoir. Bone remains of mammoths and lithic artifacts were reburied in the basin of this reservoir (Member III). Quite recently, it was followed by the formation of erosional channels providing drainage for this area and stabilizing the development of thermokarst processes. The reburied archaeological material, which had been brought into the seasonally thawed layer by solifluction processes, gradually moved down the slope, forming secondary concentrations in crossings of the ice wedges forming permafrost polygons. Repeated many times, this process resulted in material concentration at the base of the slope, in Member IV deposits.

Based on this reconstruction, the original position of the artifact-bearing horizon cannot be established, as it ceased to exist 11,700 radiocarbon years ago, in the final Pleistocene, at the early stage of permafrost transformation by thermal processes. In the Holocene, the deposits enclosing the redeposited archaeological material formed.

Based on the fieldwork experience, we can note that many sites of that time and slightly older, dating to the postglacial time, probably suffered a similar destructive thermokarst impact. This is supported, in particular, by the data from the Achchagyi-Allaikha bone bed in the lower reaches of the Indighirka River, where the primary concentration of mammoth bone remains and occasional artifacts was redeposited by a similar scenario (Nikolskiy et al. 2010).

In the archaeological record of arctic East Siberia, sites dating to the Pleistocene-Holocene boundary are most common. Cultural deposits of all known sites had been significantly transformed due to permafrost degradation of the area, marked by the *alas* complex development 13,000–8000 years BP. Many sites of that age may have been lost due to mass thermokarst processes and landscape reconstruction during the Pleistocene-Holocene boundary. Thus, there are reasons to consider the observed breaks in the archaeological record and/or the small number of known sites, dating to various intervals, a taphonomic gap determined by degradation of permafrost deposits.

Finally, it is notable that, in the area studied, there are no archaeological objects from the middle or the second half of Holocene. In many permafrost regions in Eurasia (Northeast European Russia, Taymyr, and Chukotka), the number of archaeological objects of the second half of Holocene greatly exceeds that of earlier ages. The degrading permafrost of the arctic Northeast Siberia and the development of thermokarst with formation of lakes and alases could have limited the presence and activity of human populations in the area, causing people to completely or partially leave in the middle of the Holocene.

Thus, within the present permafrost zone and in the area of its former spread, thermokarst is the leading relief-forming factor among the destructive processes of frozen sediment transformation. As a taphonomic factor, it impairs the adequacy of the archaeological record. Destructive thermal and cryologic processes impact the integrity of primary (in situ) archaeological contexts, drive the formation of secondary (redeposited) archaeological contexts, and effect the integrity of archaeological materials through the risks of mechanic (frost weathering), chemical (chemical weathering), and biological degradation.

Excavating Permafrost Archaeological Contexts

The Yana-Indighirka and the Kolyma coastal lowlands in East Siberia are lake-alluvial plains built from the surface by syngenetically frozen aleurites, including numerous structures of polygonal vein ice, that is, Ice Complex deposits. These deposits contain the cultural layers of archaeological sites in the area. A total of 17 archaeological sites are currently known, most of which (n = 15) date to MIS 3 and 2 (Pitulko et al. 2017), while only two of them date to the first half of the Holocene.

Experience of archaeological excavations in this specific environment was received first in Zhokhov Island during the investigations of Zhokhov site in 1989 and 1990 (Pitulko 2013) and then at the Yana site since 2001 (Pitulko 2007). It was further developed in a number of survey and excavation projects in the northern Yana-Indighirka lowland performed within the past 20 years. Although excavation technology and strategy has to be adopted to every particular site, based on the local geological structure and topography, there are basic principles, which are presented below on the Yana site example.

The Yana site locates on the left riverbank in the low reaches of the Yana River, about 100 km inland from the Arctic coast. Its coordinates are 70° 43' N and 135° 25' E. The site has a complex spatial structure (Pitulko et al. 2013). The Northern Point locality is the most studied part of the site, where total investigated area of the cultural layer exceeds 3500 m^2. It occurs about 7.5 m above the water level in the middle of the river terrace which is formed by ice-rich deposits penetrated by three generations of ice wedges.

These features make excavations at the Yana site quite labor-consuming, but the excavation technique can be summarized as a simple set of procedures (Pitulko 2007). Since the whole mass of the terrace is frozen and STL thickness does not exceed 0.7–0.8 m, excavations cannot be fast.

Areas suitable for cultural layer excavation are prepared by removing overlying deposits in a stairway fashion. The area is limited by the polygon body size, while the number of areas being prepared is determined by the number of investigators. It is advantageous to perform simultaneous removal of overlaying deposits and excavations within several polygons, as well as the initial stripping.

Excavations of the cultural layer are performed within strips of the polygon body, up to 1–1.5 m wide and 2 to 6–8 m long. These strips successively uncover the cultural layer, as the "frontal" excavation moves toward the inside of the polygon body. Exceptionally rarely, it is possible to obtain a larger section. Before uncovering each strip, the overburden above is removed as described.

Most generally, the methodology of excavating the Yana site is as follows:

1. Step-wise removal of overburden to organize the work area (Fig. 10a).
2. Mounting special scaffolding along the front of the prepared area of the layer for occupational safety (Fig. 10b).
3. Hand troweling the cultural layer within the 1 × 1 m grid to the depth of daily thaw, stopping at the frozen level; matrix sediment is collected into buckets within each 1 × 1 m excavation unit (Fig. 10c, d).
4. Screening the removed sediment to collect the missed smaller cultural material by using a 2 mm zinc-coated screen and any low-pressure gasoline pump (Fig. 10e).
5. Photographing and recording the in situ layer material with any suitable total station, numbering, and bagging the finds (Fig. 10f).
6. Removal of the backdirt pile, along with products from brows and side surfaces collapse of exposed ground parts of permafrost polygons that are delivered naturally over the ice veins.

Backdirt and these visco-liquid deposits are removed by runoff channels, built along ice veins, with the help of water delivered by a portable fire pump capable of producing pressure of 5–6 ATM. Runoff channels have to be maintained primarily for removing the large amounts of water entering the excavation due to the natural thawing of deposits located in the upper part of the slope; the runoff measures in thousands of cubic meters daily.

Drainage is universally important in all permafrost excavations. Considering this, excavation areas should be arranged down the slope in order to provide natural runoff or to prepare collection areas, from which the incoming water can be pumped. Water collectors should be located in areas with no cultural layer or where it has been excavated; a good option is creating a caisson inside thick ice veins or in pseudomorphs, provided there is no cultural material in them.

If the frozen front has retreated far inside the bank, several rows of polygons have been

Permafrost Digging, Fig. 10 Excavation technology based on the experience of archaeological work in the permafrost environment, on the example of the Yana site project 2001–2018: removing of the overlaying deposits by the method of lateral steplike digging (**a**), preparation of one-meter-wide strip of the cultural layer for excavations along the ground polygon body side (**b**), excavation of the cultural layer by 1 × 1 m units, the matrix sediment has to be collected by buckets and then transported for screening station to be screened for small artifact fraction (**c** and **d**), recording the artifacts with total station (**e**), water screening of the matrix sediment on 2 mm mash with low-pressure water pump (**f**). (Photo credit: Elena Pavlova)

prepared and stabilized, drainage has been arranged, and the area being investigated is optimal in configuration and size, it is better not to wash away the backdirt. Instead, the backdirt material helps stabilize thawing, which can be excessive. In other words, in any situation when the deposit washing can be avoided, one should not use water to dispose of the removed overburden.

Scaffolding is a crucial component of fieldwork, which prevents sliding of the investigated areas, establishes crash barriers against mudflows, and, as roads and bridges, arranges a washing area for water screening and working with the cultural material. To

construct these, a 1.5–1.7 kWt rotary hammer and a generator of at least 2 kWt power are needed as well as chainsaw, axes, and hammers. The same tools are used to create stabilizing constructions to prevent sliding when excavations stop. These operations are labor-consuming but inevitable.

Despite some unique aspects, the excavation described above differs little from the routine procedures well known to any field archaeologist. However, the strategy of such works is different in its core: researchers are basically organizing controlled erosion in the area of interest and manipulating it to their benefit. We should stress that such investigations cannot be planned for one season; a 3- to 5-year cycle is required.

Handling the Excavated Materials

Accelerated thawing methods can be considered when extracting materials from the layer but generally should be avoided for various reasons. In cases when their use is inevitable (e.g., to expedite the extraction of an item which could be lost or damaged otherwise), the most harmless method is watering *the matrix sediment* from a household water sprayer and removing thawing sediment particles with a fine-tip tool.

Soaking the item itself should be prevented with the help of some isolating cover, because excessive moisture leads to the item salinization, which can damage it while drying. Using hot water is strictly forbidden: the temperature of the water used in such cases has to be as close to that of the layer as possible. Alternatively, one could use a heat gun or a similar machine. In this case, however, the item being extracted should be covered with a moist mat to prevent its fast and uneven drying.

In case a bone, tusk, or wooden item is large in linear sizes and therefore cannot be extracted quickly (it is easy to imagine a situation when it is being extracted over a few days or even weeks), it is necessary to isolate its exposed part from the environment to avoid its uneven drying. Bandages of mica-coated paper, which prevent formation and expansion of cracks and facilitate slow drying, should be used.

Archaeological items extracted from excavations in the cryolithic zone have to be dried at temperatures maximally close to those of the deposit. If this operation is performed in the open air, it should be done in the shadows to prevent discoloration. Indoor drying is preferable; this is a slow process, and air circulation is very important here. A household fan can easily do the job, but it has to be placed some distance from the artifacts to prevent fast drying.

Dried organic items can be wrapped in paper or put in perforated ziplock bags for continued evaporation. Long-term storage of packed materials in airtight boxes is undesirable: it will inevitably cause rotting. For this reason, boxes with materials prepared for transportation should only be closed at the last moment. If items are stored in cardboard, ventilation holes should be cut in boxes. Ideal containers for field storage and transport of these artifacts, including faunal collections, are ventilated plastic boxes (e.g., ones used commercially for storing and transporting produce).

Items in poor condition and requiring professional restoration have to be packed, at the very minimum, with bandages of medical gauze or mica-coated paper saturated with ethanol. An item prepared in this way has to be placed in a spacious ventilated bag (double ziplock); its bandage should periodically be resaturated with alcohol. One should not try to glue or saturate the item because this will complicate restoration and can have undesirable consequences for the item itself (Burshneva and Pitulko 2014).

Bone, antler, and mammoth ivory artifacts, prone to deforming when dried, should dry in gypsum containers, made according to the artifact size. For organic items, an antiseptic treatment is recommended to prevent microbial degradation of the material.

Materials extracted from permafrost deposits should be stored at temperatures maximally close to the layer temperature, ideally in a cryostorage arranged for this purpose. At the very minimum, they should be placed in a controlled environment (both temperature and humidity).

Conclusions

We have summarized information on permafrost deposits, their emergence, current spread, and peculiarities. Clearly, these deposits make a rather unique and irregular environment for archaeological excavations. Each permafrost site has features mostly determined by genesis and time when

deposits enclosing and capping cultural remains were formed as well as by thickness of the latter, as it is shown on several practical examples. Besides, excavations are greatly impacted by the exposure of the study area and the current state of the surface, including its inclination, STL thickness, and the presence of erosional landscape features.

Studying Pleistocene archaeological sites with a thick overburden is technically very complicated. Excavations of Holocene-age geoarchaeological objects appear less complicated due to relatively thin overburdens. Unlike with Pleistocene sites, here excavations can be carried out over large areas. To increase efficiency, it is feasible to apply a three-stage organization of the excavation, when one part of the area is cleared to frozen ground for thawing, another is drying, and the third is being actively excavated. The main problem of arranging excavations in the cryolithic zone is water drainage.

Thawing should not be accelerated artificially, since the consequences of that are hard to predict and overcome. Any attempt to melt permafrost will lead to the formation of a growing water-filled hollow.

The most important drawback of artificially accelerated thawing is the excessive dampening of the cultural layer, which turns into a slurry when water runoff and evaporation are too slow. With natural thawing, this problem is minimal. Thus, control of the thawing process is a defining feature for excavating cultural layers in permafrost conditions.

All stripping operations in permafrost sites should be done by hand, as thawing allows. To remove backdirt, various construction instruments, including pumps, can be used. Sediment stripping and, of course, cultural layer excavations by water washing are unacceptably destructive.

Elsewhere in permafrost regions, erosion fights against permafrost. For this reason, to preserve information from archaeological objects within its boundaries, archaeologists should be systematically surveying and excavating sites. It is important to work ahead of perspective commercial exploration, since excavating in permafrost conditions is a prolonged and labor-consuming process.

Practical recommendations for working in permafrost conditions consist of using straightforward procedures, machines, and instruments, mentioned and discussed in detail above. Success of excavations in the permafrost deposits completely depends on the degree of preparation, technical equipment, and the researchers' knowledge of permafrost characteristics and specific features of permafrost deposits at the site.

Cross-References

- ▶ Archaeology and Geography
- ▶ Excavation Methods in Archaeology
- ▶ Extreme Environments Archaeology: Climate
- ▶ Field Method in Archaeology: Overview
- ▶ Provenance Studies in Archaeology
- ▶ Siberia: Paleolithic
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Spatial Analysis in Field Archaeology

References

Amirkhanov, Khizri A., Natalia B. Akhmetgaleeva, Aleksandra P. Buzhilova, Natalia D. Burova, Sergey Y. Lev, and Evgenii N. Mashchenko. 2009. *Investigation of the Paleolithic in Zaraisk*, 1999–2005. Moscow: Paleograf.

Are, Felix E. 1980. *Thermal abrasion of sea coasts*. Moscow: Nauka.

Baranova, Yulia P., and Sergei F. Biske. 1964. *The history of development of the relief of siberia and the far east. The northeast of the USSR*. Moscow: Nauka.

Burshneva, Svetlana G., and Vladimir V. Pitulko. 2014. Field conservation of archaeological artifacts made of mammoth ivory (based on the materials of the Yana site). In *Archaic and traditional art: Problems of scientific and artistic interpretation*, ed. Vyacheslav I. Molodin, 130–133. Novosibirsk: Institute for Archaeology and Ethnography SB RAS.

French, Hugh, and Yuri Shur. 2010. The principles of cryostratigraphy. *Earth-Science Reviews* 101 (3–4): 190–206. https://doi.org/10.1016/j.earscirev.2010.04.002.

Friesen, Max T., and Owen K. Mason, eds. 2016. *The Oxford handbook of the prehistoric Arctic*. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199766956.001.0001.

Gavrilov, Konstantin N. 2015. The archaeological context of the new radio-carbon datings of the Khotylevo 2 - point B (V) site. In *Ancient cultures of the Eastern Europe:*

Important sites and reference complexes in the context of modern archaeological research, ed. Gennadii Khlopachev, 103–112. St. Petersburg: Peter the Great Museum.

Gavrilov, Anatolii V., Nikolai N. Romanovskii, and Hans-Wolfgang Hubberten. 2006. Paleogeographic scenario of the postglacial transgression on the Laptev Sea shelf. *Earth Cryosphere* 10: 39–50.

Grønnow, Bjarne. 1994. Qeqertasussuk—The archaeology of a frozen Saqqaq site in Disko Bugt, West Greenland. In Threads of Arctic prehistory: Papers in honour of William E. Taylor, Jr, ed. David A. Morrison and Jean-Luc Pilon, 197–238. Hull/Quebec: Canadian Museum of Civilization.

Hollesen, Jørgen, Martin Callanan, Tom Dawson, Rasmus Fenger-Nielsen, T. Max Friesen, Anne M. Jensen, Adam Markham, Vibeke V. Martens, Vladimir V. Pitulko, and Marcy Rockman. 2018. Climate change and the deterioration of the Arctic's archaeological and environmental archives. *Antiquity* 92: 574–587. https://doi.org/10.15184/aqy.2018.8.

Holliday, Vance T., John F. Hoffecker, Paul Goldberg, Richard I. Macphail, Steven L. Forman, Mikhail Anikovich, and Andrei Sinitsyn. 2007. Geoarchaeology of the Kostenki-Borshchevo sites, Don river valley, Russia. *Geoarchaeology* 22: 181–228. https://doi.org/10.1002/gea.20163.

Kanevskiy, Mikhail, Yuri Shur, Daniel Fortier, M. Torre Jorgenson, and Eva Stephani. 2011. Cryostratigraphy of late Pleistocene syngenetic permafrost (yedoma) in northern Alaska, Itkillik River exposure. *Quaternary Research* 75: 584–596. https://doi.org/10.1016/j.yqres.2010.12.003.

Kanevskiy, Mikhail, Yuri Shur, Jens Strauss, Torre Jorgenson, Daniel Fortier, Eva Stephani, and Alexander Vasiliev. 2016. Patterns and rates of riverbank erosion involving ice-rich permafrost (yedoma) in northern Alaska. *Geomorphology* 253: 370–384. https://doi.org/10.1016/j.geomorph.2015.10.023.

Kaplina, Tatiana N. 1981. Late Cenozoic development of frozen deposits in northern Yakutia. In *Permafrost development in Eurasia (based on examples of specific regions)*, ed. Grigorii D. Dubikov and Vladimir V. Baulin, 153–181. Moscow: Nauka.

Kaplina, Tatiana N. 2009. Alas complex of north Yakutia. *Earth Cryosphere* 13: 3–17.

Konishchev, Vyacheslav N., and Victor V. Rogov. 2008. The influence of cryogenesis on clay-type minerals. *Earth Cryosphere* 12: 51–58.

Krainov, Dmitrii A. 1956. Dwelling structures of Timonovka Paleolithic site (based on the excavations by V. A. Gorodtsov). *Soviet Archaeology* 25: 13–34.

Mochanov, Yuri A. 1977. *Drevneishie etapy zaseleniya chelovekom Severo-Vostochnoi Azii*. Novosibirsk: Nauka. [Published in English as *The Earliest Stages of Settlement by People of Northeast Asia*. Transl. R.L. Bland. Anchorage, Alaska: Beringian Shared Heritage Program, National Park Service. 2009].

Nikolskiy, Pavel A., and Alexander E. Basilyan. 2003. Svyatoy Nos cape – The key section of the Quaternary deposits on the northern Yana-Indigirka lowland. In *Natural history of Russian East Arctic in Pleistocene and Holocene*, ed. Pavel A. Nikolskiy and Vladimir V. Pitulko, 5–13. Moscow: GEOS.

Nikolskiy, Pavel A., Alexander E. Basilyan, Leopold D. Sulerzhitsky, and Vladimir V. Pitulko. 2010. Prelude to the extinction: Revision of the Achchagyi-Allaikha and Berelekh mass accumulations of mammoth. *Quaternary International* 219: 16–25. https://doi.org/10.1016/j.quaint.2009.10.028.

Overduin, Paul P., Mateusz C. Strzelecki, Mikhail Grigoriev, Nicole Couture, Hugues Lantuit, Dominique St-Hilaire-Gravel, Frank Günther, and Sebastian Wetterich. 2014. Coastal changes in the Arctic. In *Sedimentary coastal zones from high to low latitudes: similarities and differences*, Special Publications, ed. Ireneo P. Martini and Harold R. Wanless, vol. 388, 103–129. London: Geological Society.

Pitulko, Vladimir V. 2007. Methods of excavating stone age sites associated with permafrost. *Archaeology, Ethnology & Anthropology of Eurasia* 3: 29–38.

Pitulko, Vladimir V. 2013. *The Zhokhov Island site and ancient habitation in the Arctic*. Vancouver: Archaeology Press/Simon Frazer University.

Pitulko, Vladimir V., and Vyacheslav M. Makeyev. 1991. Ancient Arctic hunters. *Nature* 349: 374.

Pitulko, Vladimir V., and Elena Y. Pavlova. 2015. Experience of mass radiocarbon dating of culture-bearing deposits of the Zhokhov site. *Transactions of the Institute for the History of Material Culture* 12: 27–55.

Pitulko, Vladimir V., and Elena Y. Pavlova. 2016. *Geoarchaeology and radiocarbon chronology of stone age Northeast Asia*. College Station: Center for the Study of the first Americans, Texas A&M University Press.

Pitulko, Vladimir, Pavel Nikolskiy, Alexander Basilyan, and Elena Pavlova. 2013. Human habitation in the Arctic Western Beringia prior the LGM. In *Paleoamerican odyssey*, ed. Kelly Graf, Caroline V. Ketron, and Michael R. Waters, 13–44. College Station: Center for the Study of the First Americans, Texas A&M University Press.

Pitulko, Vladimir V., Varvara V. Ivanova, Aleksey Kasparov, and Elena Y. Pavlova. 2015. Reconstructing prey selection, hunting strategy and seasonality of the early Holocene frozen site in the Siberian high Arctic: A case study on the Zhokhov site faunal remains, De Long Islands. *Environmental Archaeology* 20: 120–157. https://doi.org/10.1179/1749631414Y.0000000040.

Pitulko, Vladimir, Elena Pavlova, and Pavel Nikolskiy. 2017. Revising the archaeological record of the upper Pleistocene Arctic Siberia: Human dispersal and adaptations in MIS 3 and 2. *Quaternary Science Reviews* 165: 127–148. https://doi.org/10.1016/j.quascirev.2017.04.004.

Romanovskiy, Nikolai N. 1993. *Fundamentals of Cryogenesis of lithosphere*. Moscow: Moscow University Press.

Saito, Kazuyuki, Sergei Marchenko, Vladimir Romanovsky, Amy Hendricks, Nancy Bigelow, Kenji

Yoshikawa, and John Walsh. 2014. Evaluation of LPM permafrost distribution in NE Asia reconstructed and downscaled from GCM simulations. *Boreas* 43: 743–749. https://doi.org/10.1111/bor.12038.

Schirrmeister, Lutz, Duane Froese, Vladimir Tumskoy, Guido Grosse, and Sebastian Wetterich. 2013. Yedoma: Late Pleistocene ice-rich syngenetic permafrost of Beringia. In *The encyclopedia of quaternary science*, ed. Scott A. Elias, vol. 3, 2nd ed., 542–552. Amsterdam: Elsevier.

Soloviev, Piotr A. 1959. *Cryolithic zone of the northern Lena-Amga interfluve*, 1959. Moscow: AN SSSR.

Stokes, Chris R. 2017. Deglaciation of the Laurentide ice sheet from the last glacial maximum. *Cuadernos de Investigación Geográfica* 43: 377–428. https://doi.org/10.18172/cig.3237.

Todisco, Dominique, Najat Bhiry, and Pierre M. Desrosiers. 2009. Paleoeskimo site Taphonomy: An assessment of the integrity of the Tayara site, Qikirtaq Island, Nunavik, Canada. *Geoarchaeology* 24: 743–791. https://doi.org/10.1002/gea.20285.

Vandenberghe, Jef, Hugh M. French, Aldar Gorbunov, Sergei Marchenko, Andrei A. Velichko, Huijun Jin, Zhijiu Cui, Tingjun Zhang, and Xudong Wan. 2014. The last permafrost maximum (LPM) map of the northern hemisphere: Permafrost extent and mean annual air temperatures, 25–17 ka BP. *Boreas* 43: 652–666. https://doi.org/10.1111/bor.12070.

Velichko, Andrei A. 1973. *Natural process in the Pleistocene*. Moscow: Nauka.

Velichko, Andrei A., and Victor P. Nechaev. 1992. Cryogenic regions during the last glacial maximum (permafrost). In *Atlas of paleoclimates and paleoenvironments of the Northern hemisphere. Late Pleistocene – Holocene*, ed. Burkhard Frenzel, Marton Pecsi, and Andrei A. Velichko, vol. 108–109, 108–109. Budapest-Stuttgart: Gustav Fisher Verlag. https://doi.org/10.1594/PANGAEA.58194.

Velichko, Andrei A., Ludmila V. Grekhova, Yuri N. Gribchenko, and Elena I. Kurenkova. 1997. *Early man in the extreme environmental conditions*, 1997. Moscow: Institute of Geography RAS.

Yershov, Eduard D. 1998. *General geocryology*, Studies in polar research series. Cambridge/New York/Melbourne: Cambridge University Press. First published in Russian as Obshchaya Geokriologiya by Nedra, 1990.

Further Reading

Books

Danilov, Igor D. 1990. *The Underground Ice [Podzemnye l'dy]*. Moscow: Nedra.

Davis, T. Neil. 2001. *Permafrost: A guide to frozen ground in transition*. Fairbanks: University of Alaska Press.

French, Hugh M. 2007. *The periglacial environment*. 3rd ed. Chichester: Wiley.

Stanford, Dennis J. 1976. *The Walakpa Site, Alaska [Smithsonian contributions to anthropology 20]*. Washington: Smithsonian Institution Press.

Washburn, Albert L. 1979. *Geocryology*. London: Edward Arnold.

Washburn Albert, L. 1980. *Periglacial processes and environments*. New York: Wiley.

Williams, Peter J., and Michael W. Smith. 1989. *The frozen earth: Fundamentals of geocryology*. Cambridge: Cambridge University Press.

Articles

Biagini, Philippe, Catherine Thèves, Patricia Balaresque, Annie Géraut, Catherine Cannet, Christine Keyser, Darya Nikolaeva, Patrice Gérard, S. Sylvie Duchesne, Ludovic Orlando, Eske Willerslev, Anatoly Alekseev, Philippe de Micco, Berthrand Ludes, and Eric Crubézy. 2012. Variola virus in a 300-year-old Siberian mummy. *New England Journal of Medicine* 367: 2057–2059. https://doi.org/10.1056/NEJMc1208124.

Bourgeois, Jean, Alain De Wulf, Rudi Goossens, and Wouter Gheyle. 2007. Saving the frozen Scythian tombs of the Altai Mountains (Central Asia). *World Archaeology* 39: 458–474. https://doi.org/10.1080/00438240701504585.

Britton, Kate, Ellen McManus-Fry, Olaf Nehlich, Mike Richards, Paul M. Ledger, and Rick Knecht. 2018. Stable carbon, nitrogen and Sulphur isotope analysis of permafrost preserved human hair from rescue excavations (2009, 2010) at the precontact site of Nunalleq, Alaska. *Journal of Archaeological Science: Reports* 17: 950–963. https://doi.org/10.1016/j.jasrep.2016.04.015.

Elberling, Bo, Henning Matthiesen, Christian Juncher Jørgensen, Birger Ulf Hansen, Morten Meldgaard, Claus Andreasen, Bjarne Grønnow, and Shfaqat Abbas Khan. 2011. Paleo-Eskimo kitchen midden preservation in permafrost under future climate conditions at Qajaa, West Greenland. *Journal of Archaeological Science* 38: 1331–1339. https://doi.org/10.1016/j.jas.2011.01.011.

Gorbunov, Aldar P., Sergey S. Marchenko, and Eduard V. Severskyi. 2004. The thermal environment of blocky materials in the mountains of Central Asia. *Permafrost and Periglacial Processes* 15: 95–98. https://doi.org/10.1002/ppp.478.

Grønnow, Bjarne. 1991. Om permafrost og bevaringsforhold. *Grønland* 4-5-6-7: 142–143.

Gusev, Sergey. 2010. Siqluk – "Whale alley": Past, present, future (eastern Chukotka). In *Studia Anthropologica. A festschrift in honour of Michael Chlenov*, ed. Olga V. Belova, 486–512. Moscow/Jerusalem: Gesharim.

Hebsgaard, Martin B., M. Thomas P. Gilbert, Jette Arneborg, Patricia Heyn, Morten E. Allentoft, Michael Bunce, Kasper Munch, Charles Schweger, and Eske Willerslev. 2009. 'The farm beneath the sand'—An archaeological case study on ancient 'dirt' DNA. *Antiquity* 83: 430–444. https://doi.org/10.1017/S0003598X00098537.

Lee, Ester J., David Andrew Merriwether, Aleksey K. Kasparov, Valery I. Khartanovich, Pavel A. Nikolskiy, Fyodor K. Shidlovskiy, Andrey V. Gromov, Tatiana A. Chikisheva, Vyacheslav

G. Chasnyk, Valery B. Timoshin, Elena Y. Pavlova, and Vladimir V. Pitulko. 2018. A genetic perspective of prehistoric hunter-gatherers in the Siberian Arctic: Ancient DNA analysis of human remains from 8,000 years ago. *Journal of Archaeological Science: Reports* 17: 943–949. https://doi.org/10.1016/j.jasrep.2016.06.001.

Matthiesen, Henning, Jørn Bo Jensen, David Gregory, Jørgen Hollesen, and Bo Elberling. 2014. Degradation of archaeological wood under freezing and thawing conditions - effects of permafrost and climate change. *Archaeometry* 56: 479–495. https://doi.org/10.1111/arcm.12023.

Molodin, Vyacheslav I., and Natalia V. Polosmak. 2000. Grave sites of the Pazyryk culture on the Ukok plateau. *Archaeology, Ethnology and Anthropology of Eurasia* 4: 66–87.

Morgenstern, Anne, Mathias Ulrich, Frank Günther, Sebastian Roessler, Irina V. Fedorova, Natalia A. Rudaya, Sebastian Wetterich, Julia Boike, and Lutz Schirrmeister. 2013. Evolution of thermokarst in east Siberian ice-rich permafrost: A case study. *Geomorphology* 201: 363–379. https://doi.org/10.1016/j.geomorph.2013.07.011.

Moulin, Bernard, and Yvon Csonka. 2002. The erosion front at Ekven site: Comparisons with data from Alaska. In *The Erosion front at Ekven: A stratigraphic and Geoarchaeological approach. In archaeology in the Bering Strait region: Research on two continents*, ed. Don E. Dumond and Richard L. Bland, vol. 59, 227–259. Eugene (Oregon): University of Oregon Anthropological Papers.

Murton, Julian B., and Hugh M. French. 1994. Cryostructures in permafrost, Tuktoyaktuk coastlands, western Arctic Canada. *Canadian Journal of Earth Sciences* 31: 737–747. https://doi.org/10.1139/e94-067.

Niu, Fujun, Guodong Cheng, Yonghong Niu, Mingyi Zhang, Jing Luo, and Zhanju Lin. 2016. A naturally-occurring 'cold earth' spot in northern China. *Scientific Reports* 6: 34184.

Pitulko, Vladimir V. 2014. Permafrost digging. In *Springer encyclopedia of global archaeology*, ed. Clair Smith, 5889–5891. New York: Springer Science+Business Media. https://doi.org/10.1007/978-1-4419-0465-2_1513.

Pitulko, Vladimir V. 2019. Yana B area of the Yana site: Some observations done during the excavations of 2015 through 2018. *Prehistoric Archaeology. Journal of Interdisciplinary Studies* 1: 64–91. https://doi.org/10.31600/2658-3925-2019-1-64-91.

Pitulko, Vladimir V., and Elena Y. Pavlova. 2012. Permafrost as an archaeological environment. In *Geomorphic Processes and Geoarchaeology: from Landscape Archaeology to Archaeotourism. International conference held in Moscow-Smolensk, Russia, August 20–24, 2012. Extended abstracts*, ed. Maria Bronnikova and Andrey Panin, 224–227. Moscow/Smolensk: Universum.

Pitulko, Vladimir V., Elena Y. Pavlova, and Alexander E. Basilyan. 2016a. Mass accumulations of mammoth (mammoth 'graveyards') with indications of past human activity in the northern Yana-Indighirka lowland, Arctic Siberia. *Quaternary International* 406: 202–217. https://doi.org/10.1016/j.quaint.2015.12.039.

Pitulko, Vladimir V., Aleksey N. Tikhonov, Elena Y. Pavlova, Pavel A. Nikolskiy, Konstantin E. Kuper, and Roman N. Polozov. 2016b. Early human presence in the Arctic: Evidence from 45,000-year-old mammoth remains. *Science* 351: 260–263. https://doi.org/10.1126/science.aad0554.

Ran, Youhua, Xin Li, Guodong Cheng, Tingjun Zhang, Qingbai Wu, Huijun Jin, and Rui Jin. 2012. Distribution of permafrost in China: An overview of existing permafrost maps. *Permafrost and Periglacial Processes* 23: 322–333. https://doi.org/10.1002/ppp.1756.

Rasmussen, Morten, Yingrui Li, Stinus Lindgreen, Jakob Skou Pedersen, Anders Albrechtsen, Ida Moltke, Mait Metspalu, et al. 2010. Ancient human genome sequence of an extinct Palaeo-Eskimo. *Nature* 463: 757–762. https://doi.org/10.1038/nature08835.

Schirrmeister, Lutz, Viktor Kunitsky, Guido Grosse, Sebastian Wetterich, Hanno Meyer, Georg Schwamborn, Olga Babiy, Alexander Derevyagin, and C. Christine Siegert. 2011. Sedimentary characteristics and origin of the late Pleistocene ice complex on north-east Siberian Arctic coastal lowlands and islands - a review. *Quaternary International* 241: 3–25. https://doi.org/10.1016/j.quaint.2010.04.004.

Schirrmeister, Lutz, Georg Schwamborn, Pier P. Overduin, Jens Strauss, Margaret C. Fuchs, Mikhail Grigoriev, Irina Yakshina, Janet Rethemeyer, Elisabeth Dietze, and Sebastian Wetterich. 2017. Yedoma ice complex of the Buor Khaya Peninsula (southern Laptev Sea). *Biogeosciences* 14: 1261–1283. https://doi.org/10.5194/bg-14-1261-2017.

Sharkhuu, Natsagdorj, and Anarmaa Sharkhuu. 2012. Effects of climate warming and vegetation cover on permafrost of Mongolia. In *Pastoral degradation of steppe ecosystems in central Mongolia*, ed. Marinus J.A. Werger and Marja A. van Staalduinen, 445–472. Dordrecht: Springer. https://doi.org/10.1007/978-94-007-3886-7_17.

Smith, Michael W., and Daniel W. Riseborough. 2002. Climate and the limits of permafrost; a zonal analysis. *Permafrost and Periglacial Processes* 13: 1–15. https://doi.org/10.1002/ppp.410.

Todisco, Dominique, and Najat Bhiry. 2008. Palaeoeskimo site burial by Solifluction: Periglacial Geoarchaeology of the Tayara site (KbFk-7), Qikirtaq Island, Nunavik (Canada). *Geoarchaeology* 23: 177–211. https://doi.org/10.1002/gea.20217.

Van Vliet-Lanoë, Brigitte, Jacques Brulhet, Philippe Combes, Cédric Duvail, Frédéric Ego, Stéphane Baize, and Isabelle Cojan. 2017. Quaternary thermokarst and thermal erosion features in northern France: Origin and palaeoenvironments. *Boreas* 46: 442–461. https://doi.org/10.1111/bor.12221.

Wetterich, Sebastian, Vladimir Tumskoy, Natalia Rudaya, Andrei Andreev, Thomas Opel, Hanno Meyer, Lutz

Schirrmeister, and Matthias Hüls. 2014. Ice complex formation in arctic East Siberia during the MIS3 interstadial. *Quaternary Science Reviews* 84: 39–55. https://doi.org/10.1016/j.quascirev.2013.11.009.

Zhang, Tingjun, J. Alan Heginbottom, Roger Graham Barry, and Jevron Brown. 2008. Further statistics on the distribution of permafrost and ground ice in the northern hemisphere. *Polar Geography* 24: 126–131. https://doi.org/10.1080/10889370009377692.

Peru: Cultural Heritage Management and Education

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Introduction

The Peruvian Cultural Heritage

Peru's cultural heritage includes the legacy, tangible and non-tangible, of its pre-Hispanic cultures, those belonging to Colonial and Republican periods, present-day cultural manifestations, either urban or rural, the culture of native communities in the tropical forest and the highlands, besides the Africans, Asians and Europeans who also brought distinctive cultural customs either in colonial times or later. In fact, all of them have created what Peru is today, and as in the past, we are part of a multicultural country. However, there have been diverse opinions about what cultural heritage is, and on occasions, it has been controlled by the interests of particular dominant groups or social classes that have the political and economic power in Peru.

During the Colonial period, such designation for the Spaniards was related to the idea of valuable antiquities, relics, and monuments. For example, H. Cortés said, "I came looking for treasures, not to cultivate the land as a peasant" (Ravines 1986: 147). Even at that time, governments attempted to protect antiquities of new world conquered nations, as testified by Leyes de Indias y la Política Indiana (Indian laws and Indian Politics) published by Solorzano and Pereyra (Ravines 1986: 148).

Additionally, the division into the "Republic of Spaniards" and the "Republic of Indians" during the Colonial period, in which the former was related to a civilized way of life and the latter to a primitive one, helped to develop an incorrect idea about the past based on values such as grandeur and appearance that encouraged the prejudices of people with different cultural patterns. Even though such division disappeared after the Peruvian independence, social exclusion continued, and the dominant social class that inherited the ideology of the first group built its own parameters about the past based on the criteria of monumentality and aesthetics.

Such discourse admired past and present cultural manifestations as isolated events not necessarily associated with the history and the creativity of people from whom Peruvians descend. Therefore, very little effort was devoted to learning and valuing past and present cultural manifestations.

Definition

Types of Peruvian Cultural Heritage

The Peruvian cultural heritage has been divided based on physical features (monumentality of buildings), fragility (documentary data, pieces of textiles, and organic materials), and time period (pre-Hispanic, Colonial, and Republican epochs); on the other hand, according to its bylaw of Organization and Functions (Supreme Decree 001-2011-MC, May 13, 2011), the Ministry of Culture (Law 29565, 1910) not only recognizes present-day Peruvian cultural diversity but also has also created several departments in order to manage culture. Heritage is divided into Archaeological Heritage, Contemporaneous Nonmaterial Heritage, Colonial and Republican Historic Heritage, and Cultural Landscape. Therefore, the Peruvian cultural heritage includes the following:

Monumental

This may be defined based on size and aesthetic features and includes monuments of pre-Hispanic times (a domestic settlement or the city of Chan Chan), apart from Colonial and Republican buildings (the Church of San Francisco and the

Oquendo or the Osambela Residence). According to Article 21 of Peru's Political Constitution enacted in 1993, in order to become a cultural heritage, it must be declared as such through a Ministerial Resolution.

Documentary Data

This is an endangered type of heritage given its fragility and includes all kinds of texts and documents written in Panama even before the Tawantinsuyu Empire was conquered in 1532 (Varon 1986). Among other texts is one which describes how much gold and silver Inca Atahualpa gave for his freedom and how gold and silver were distributed among the conquerors. Means of conservation for this documentary evidence are mainly devoted to preserving only those documents considered as valuable; however, due to lack of funds and other factors, case preservation within Peru is very difficult. For example, the Independence Act of 1821 was sent to the Vaticano archive for treatment.

Arts and Crafts: Folklore

This cultural expression persists within the context of the modernity and globalization. A large portion of this heritage originates from craftsmanship composed of objects made out of clay, wood, metal, timber, textiles, etc., and vernacular music. According to Oliva (1986), this cultural expression was influenced by the indigenous movement that began in the 1920s, and its demand by tourists and Lima's middle class in the 1960s and 1970s increased its production. As a result, quality of handmade crafts was poor, and in several cases, the tendency was to impose other nontraditional decorative motifs. Craftsmen's reaction was to return to their home to produce with freedom and complete autonomy.

Oral Tradition

According to Millones (1986), it includes life stories, ritualism, songs, legends, and fairy tales and is extremely relevant for Peruvians since the written words did not exist before the Spanish conquest. This heritage is transmitted orally, from generation to generation; makes part of the collective memory of the community; and represents belief systems, values, and the spirituality of a nation; therefore, oral communication is more important than written communication.

Key Issues/Current Debates/Future Directions/Examples

The Role of Education in Peru: Points of View and Controversy

Peruvian educational goals have been a topic of debate since the nineteenth century. Such debate focused on how education should help to integrate and develop the country, and while a group supported its elite character, another group proposed that education should attempt to liberate and redeem the natives. This latter group declared that education had to do with the "Indian Problem," which became a part of a larger dilemma since it would have first been necessary to change the political and economic structure of Peru in order to improve the education (Ames 2005: 358).

At present, studies about the role of education in Peru show that it is just one way of improving social position, obtaining social mobility, and improving living conditions. In other words, education seems to be within a developmental project designed to promote change and modernity. This assumption is supported by data collected by E. Vasquez in the 1950s at Vicos, a community in the northern highlands. Similar results from communities of Lampián, Huayopampa, and Pacaraos, in the Peruvian central coast Chancay River Valley, were recovered by F. Fuenzalida and Carlos Iván Degregori in the 1960s and 1970s (Ames 2005: 360–362).

However, there are different perspectives on this issue. Montoya states that education contributes to losing "cultural identity" because its goal is progress. Formal education does not consider native values and emphasizes western society models. For example, Montoya (2011) remarked that the Summer Institute of Linguistics in the jungle of Peru provided topics with religious orientation. Therefore, Montoya names it "education's contemporaneous myth" (Ames 2005: 365). From the native's point of view, education scares native children since attending class means

ending the relationship between man and nature. According to Ames, Peruvian modern education "leads to the ignoring or destroying of peasant culture and to the acceptance of the dominant ideology" (Ames 2005: 362).

Peruvian cultural diversity has been seen as a disadvantage when it came to the purposes of educational projects, since traditional communities of the highlands and tropical forest seem to be conservative when faced with new cultural patterns. With regard to whether we only need to study cultural diversity or if it is also necessary to apply educational and developmental programs, many questions arise. How should this situation be approached? What is best for these communities? Who decides what is best for everybody?

As previously indicated, scholars differ on these topics. Heise et al. (1994: 14) say, "We disagree with the position of intellectuals who approach the study of traditional cultures with the interest that they remain static, and impose the conservation of their traditions and past. . ." Therefore, the issue of cultural heritage implies a theoretical elaboration, especially if an educational program has to be developed.

Assuming that cultural heritage expresses specific features of a shared social custom of a human group that coexists with other cultural customs, it is necessary to identify and treat all of them equally, since together, they represent the identity of a given society. In other words, the cultural diversity of a country should not be arranged into rating scales because each specific cultural manifestation has its own material representation and way of thinking.

Why shall we consider such a premise? Simply because culture is social, and when an individual permanently socializes, he engages in several interactions, including educational ones. Also, a dialogue involving distinct social actors is opened, and with this interacting process, it is possible to understand the other social actors and to discover that common interests do exist.

Given the fact that in Peru several cultural expressions exist, an intercultural process has been proposed (Zúñiga and Ansión 1997). What is this intercultural process? Scholars concur that it is where populations practicing distinctive cultural patterns share and make their lives. For example, the recent Peruvian and US Treaty for Free Commerce has propitiated intense relationships between particular cultural patterns that influence one another mutually, no matter if one of them plays a dominant role in the relationship. What is important to note here is that both of them have their own cultural patterns and traditions.

However, although interculturality exists in Peru, it requires long-term state support and community participation. In fact, Montoya (2011: 420) believes that its application is still a dream because "cultural conflict" persists, and it is far from being solved since natives are excluded from development and social programs.

Additionally, it has been observed that intercultural processes are sometimes so complex and profound that they are difficult to identify. For example, to what extent did native Mesoamerican and Andean food staples influence North America? Mexican chili, corn, and the Peruvian tomato are just a few. Also, we may ask what highland influences are observed among modern creole populations in the Peruvian coast; for example, the "causa" dish (potato and chili) is well known in Lima, but we do not know when and how it was introduced into the main menu of coastal cities.

Legal System and Education of Cultural Heritage

The political constitution of 1993 not only establishes respect for people's identity but also proposes bilingual and intercultural education based on regional characteristics in order to preserve Peruvian cultural manifestations and meet cultural integration. However, archaeological heritage, Historic period relics and monuments, and archive documents receive a somewhat distinctive treatment since it is first necessary to nominate them as cultural heritage before they are registered in the Peruvian cultural heritage records (Article 21; Article 58, items i, m, r of bylaw of Organization and Functions of the Ministry of Culture).

The General Law of Peruvian Education states that education should be formulated based on

Peruvian diversity, taking into account interculturality and respecting the environment (Articles 7, 8). Consequently, education must affirm national identity without neglecting Peru's cultural, ethnic, and linguistic diversity (Article 9). In order to achieve this commitment, education in native communities should apply special curricula (Article 19), although a common curriculum should be implemented for the entire country (Article 13, item b). Clearly, with this plan, education must be offered in Spanish and in other native languages spoken in the highlands (Quechua, Aymara) or in the Amazon basin.

Actually, intercultural processes need to be implemented in Peru in consideration with its cultural diversity. By 1999, 45 native languages existed in Peru, apart from Quechua and Aymara groups; there were 42 communities and 16 linguistic families in the jungle, 18 of which may soon disappear. Although the 1993 Census registered 3,177,938 Quechua-speaking people, research by anthropologists indicates that 4,500,000 people spoke Quechua by 1999. With the addition of Quechua speakers in the Amazon, the total is 5,700,000 individuals (Montoya 2011: 423, 424, 515).

According to the spirit of both the Political Constitution and the General Law of Education, the Ministry of Culture has approved several guidelines through its bylaw of Organization and Functions. This document recognizes cultural diversity and proposes to support cultural development through intercultural projects. In fact, the goal behind this plan is to affirm Peruvian national identity, sustain its social inclusion, and shape an intercultural citizenship (Sections 3.3.2.1, 3.3.2.2, items f, Article 12, item b).

The bylaw encourages training in the area of cultural management and implementing a network of research and data collecting of present-day cultural manifestations, including traditional native knowledge (Article 12, item h; Article 64, item j; Article 71, item n). With regard to archaeological remains, the office of the Director of Archaeology will propitiate the creation of site museums and centers of interpretation at archaeological settlements so that the visitors understand the significance of past remains (Article 54, item f). Additionally, the office of the Director of Museums will coordinate with university research and data collecting about current cultural manifestations (Article 56, item d).

As stated previously, the Ministry of Culture is supposed to manage all past and present cultural manifestations, besides ethnic and cultural pluralism of Peru, since the state is responsible for policies regarding cultural issues. The Political Constitution of Peru indicates that education should emphasize the progress and development of the country; this goal should be pursued with an open spirit in its citizens which will enable them to participate in this process (Art. 3, Section 3.2, items h, j, also Section 3.3.1, item e).

In addition, recommendations about formation on cultural topics as part of the national educational system will be formulated (Art. 3.3.1, item g), apart from implementing cultural programs through mass-media systems (Art. 3.3.1, item m). In fact, there are already several TV programs portraying different cultural expressions. However, even though it is still early for an appraisal of how educational plans on cultural heritage will be eventually implemented, it appears that the law emphasizes its economic benefits. The expression "cultural industries" (see, e.g., Section 3.2, item h, Section 3.3.1, item f) seems to point towards improving infrastructure (roads, hotels, flying routes, etc.). Interestingly, this law seems to prefer homogeneity rather than diversity, as may be interpreted from its plan of "integrating all the Peruvians" (Section 3.3.1, item m).

On the other hand, promotion of tourism only considers the Ministry of Foreign Commerce and Tourism's participation, but not that of the universities (Section 3.3.1, item p). Why should universities be consultants? The answer is simple; several universities, public and private, have schools of Archaeology, Anthropology, and Tourism. In addition, pre-Hispanic cultural heritage is at least 12,000 years old, in comparison to the Colonial and Republic periods which together are only 519 years old, if we consider the discovery of America as a chronological reference. Needless to say, tourists visit Peru because of its long history and its biodiversity.

Concluding Remarks

The education of Peruvian cultural heritage is the responsibility of both the state and the community. The participation of all social actors may prevent inappropriate decisions that may not be part of long-term cultural plans, such as those archaeological discoveries governments took for granted right after the media pointed out their importance to the country. For example, the royal tombs of Sipan in the mid-1980s, the mummy Juanita found on the Ampato snow-covered peak in the 1990s, and the attention paid to the Amazon native communities at the beginning of this century. However, the positive reactions of people are spontaneous and temporary; they disappear when the political agenda changes.

Establishing educational programs about cultural heritage in Peru implies the consideration of regional particularities since each region contains customs, monuments, and relics that have become icons. Therefore, an intercultural approach is recommended. For example, while the people of Ica, located in the southern coast of Peru, have a historical link with the Nasca culture, the people of the Callejon de Huaylas have a connection with the Recuay culture and the nearby snow-covered mountains of Huascaran and Huandoy. In both of these cases, the creation of specific symbolic meanings refers to concrete relationships established through myths, natural components, buildings, and objects. Peruvian culture, past and present, is the coalescence of those manifestations, and education programs should not neglect them. In other words, the Amazon basin and Machu Picchu form part of this old natural and cultural legacy of the Andean universe.

It is recommended that a bilingual intercultural approach be taken with regard to present-day native communities for educational purposes in order to avoid cultural shock between traditional values and occidental external components which usually represent the dominant culture. By this process, natives increase their knowledge about the exterior world which is unavoidably present in the everyday life of the population. To pretend that people ignore such external knowledge is to deny them their cultural rights to survive and face the world. In other words, people should learn how to live with other cultural components without denying their own cultural patterns.

Cross-References

- ▶ Australia: Cultural Heritage Management Education
- ▶ Brazil: Cultural Heritage Management Education
- ▶ Canada: Cultural Heritage Management Education
- ▶ China: Cultural Heritage Management Education
- ▶ Heritage and Higher Education
- ▶ Japan: Cultural Heritage Management Education
- ▶ Kyrgyzstan: Cultural Heritage Management
- ▶ United States: Cultural Heritage Management Education

References

Ames, P. 2005. La escuela es progreso? Antropología y educación en el Perú. In *No hay país más diverso. Compendio de antropología Peruana*, ed. C.I. Degregori, 356–391. Lima: PUCP.

Heise, M., F. Tubino, and W. Ardito. 1994. *Interculturalidad un desafío*. Lima: Centro Amazónico de Antropología y Aplicación Práctica.

Millones, L. 1986. Rescate de la tradición oral: tarea inmediata. In *Patrimonio cultural del Perú. Balance y perspectivas*, ed. FOMCIENCIAS, 125–129. Lima: FOMCIENCIAS.

Montoya, R. 2011. *Porvenir de la cultura quechua en Perú. Desde Lima, Villa El Salvador y Puquio*. Lima: Fondo Editorial Universidad de San Marcos.

Oliva, F. 1986. Testimonio de un artista. In *Patrimonio cultural del Perú. Balance y perspectivas*, ed. FOMCIENCIAS, 93–115. Lima: FOMCIENCIAS.

Ravines, R. 1986. Comentarios y sugerencias por panelistas a esta primera parte de la Reunión-seminario. In *Patrimonio cultural del Perú. Balance y perspectivas*, ed. FOMCIENCIAS, 144–152. Lima: FOMCIENCIAS.

Varon, R. 1986. Preservación y promoción del patrimonio documental de la nación. In *Patrimonio cultural del Perú. Balance y perspectivas*, ed. FOMCIENCIAS, 75–92. Lima: FOMCIENCIAS.

Zúñiga, M., and J. Ansión. 1997. *Interculturalidad y educación en el Perú*. Lima: Foro Educativo. Available at: www.concytec.gob.pe/foroafroperuano/interculturidad.htm

Further Reading

Centro de Desarrollo Etnico-Cedet, ed. 2011. *Desde adentro. Etnoeducación e interculturalidad en el Perú y América Latina*. Lima: Centro de Desarrollo Etnico.

Degregori, C.I., ed. 2005. *No hay país más diverso. Compendio de antropología Peruana*. 2nd ed. Lima: Pontificia Universidad Católica del Perú, Instituto de Estudios Peruanos.

Essomba, M.A. 1999. *Construir la escuela intercultural. Reflexiones y propuestas para trabajar la diversidad étnica y cultural*. Barcelona: Editorial GRAO, de Serveis Pedagógies.

Heise, M., ed. 2001. *Interculturalidad: creación de un concepto y desarrollo de una actitud*. Programa FORTE-PE. Lima: Convenio Unión Europea-República del Perú. Ministerio de Educación.

Messenger, P.M. 1995a. Commentary: Public education initiatives. In *Ethics in American archaeology: Challenges for the 1990s*, Special report, ed. M. Lynott and A. Wylie. Washington, DC: SAA.

Messenger, P.M. 1995b. *Archaeology and public education: A communication tool across disciplines.* Paper presented in a symposium on the SAA public committee at the 1995 Chacmool Conference. Archaeology for the 21st Century: Public or Perish. Calgary: University of Calgary.

Messenger, P.M., ed. 1999. *The ethics of collecting cultural property: Whose culture? Whose property?* 2nd ed. Albuquerque: University of New Mexico Press.

Messenger, P.M., and W.W. Enloe. 1991. The archaeologist as global educator. In *Protecting the past*, ed. G.-S. Smith and J. Ehrenhard, 157–166. Boca Raton: CRC Press.

Messenger, P.M., and K.C. Smith. 1995. Archaeology and public education. *Quarterly Publication of the SAA* 5 (4).

Messenger, P., and G. Smith, eds. 2010. *Cultural heritage management. A global perspective*. Gainesville: University Press of Florida.

Piscoya, L. 2011. *A dónde nos llevan nuestras universidades?* Lima: Fondo Editorial Universidad Inca Garcilaso de la Vega.

Santa Cruz, M. 2009. *La identidad nacional desde las Aulas Universitarias*. Lima: Garden Graf SRL.

Shackel, P. 2010. Series foreword. Global perspective and world heritage. In *Cultural heritage management. A global perspective*, ed. P. Messenger and G. Smith, viii–viix. Gainesville: University Press of Florida.

Silva, J. 1996. Arqueología en el Perú: Por qué, para qué? *Universidad y Sociedad* 6: 38–40.

Silva, J. 1997. Algunas reflexiones sobre la arqueología en el Perú. In *Nueva Síntesis 4, Year IV*, ed. L. Arana, 27–35. Lima.

Silva, J. 2010. Heritage resource management in Peru. In *Cultural heritage management. A global perspective*, ed. P. Messenger and G. Smith, 124–135. Gainesville: University Press of Florida.

Smith, G.S., and J.E. Ehrenhard, eds. 1991. *Protecting the past*. Boca Ratón: CRC Press.

Smith, G.S., and F.P. MacManamon. 1988. Archaeology and the federal government. *CRM Bulletin* 11 Special Issue.

Smith, K.C. 1995. SAA public education committee: Seeking public involvement on many fronts. *CRM: Archaeology and the Public* 18: 25–28.

Stone, P. 2010. Foreword. In *Cultural heritage management. A global perspective*, ed. P. Messenger and G. Smith, x–xii. Gainesville: University Press of Florida.

Zariguey, R., ed. 2003. *Realidad multilingue y desafío intercultural. Ciudadanía, política y educación. Actas del V congreso Latinoamericano de educación intercultural bilingüe*. Lima: Pontificia Universidad Católica.

Petra National Trust and the Challenge of Site Management at Petra

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Introduction

The site of Petra is one of the most spectacular sites in the Near East, Petra has long attracted travelers and explorers, and archaeological investigations have been conducted in the area since the 1930s. Late in 1985, UNESCO inscribed Petra on the UNESCO World Heritage List on the basis of its "Outstanding Universal Values." On four occasions thereafter, Petra was placed on the "World Monuments Fund's 100 Most Endangered Sites". On July 7, 2007, Petra was selected as one of the "New 7 Wonders of the World".

Petra is located halfway between the Red Sea and the Dead Sea in Jordan (Fig. 1) and has been inhabited for more than 200,000 years. Traditionally the tribes were shepherds and farmers. Today people in the area live in modern hillside towns and villages and Bedouin encampments. The park is surrounded by six main towns, and they are, from north to south, Beidha, Um Seyhun, Wadi Musa, Taybeh, Rajef, and Dlagha (Fig. 2). In recent years, with the arrival of tourists, the inhabitants have moved closer to the archaeological site and earn a living by working on excavations and guiding tourists.

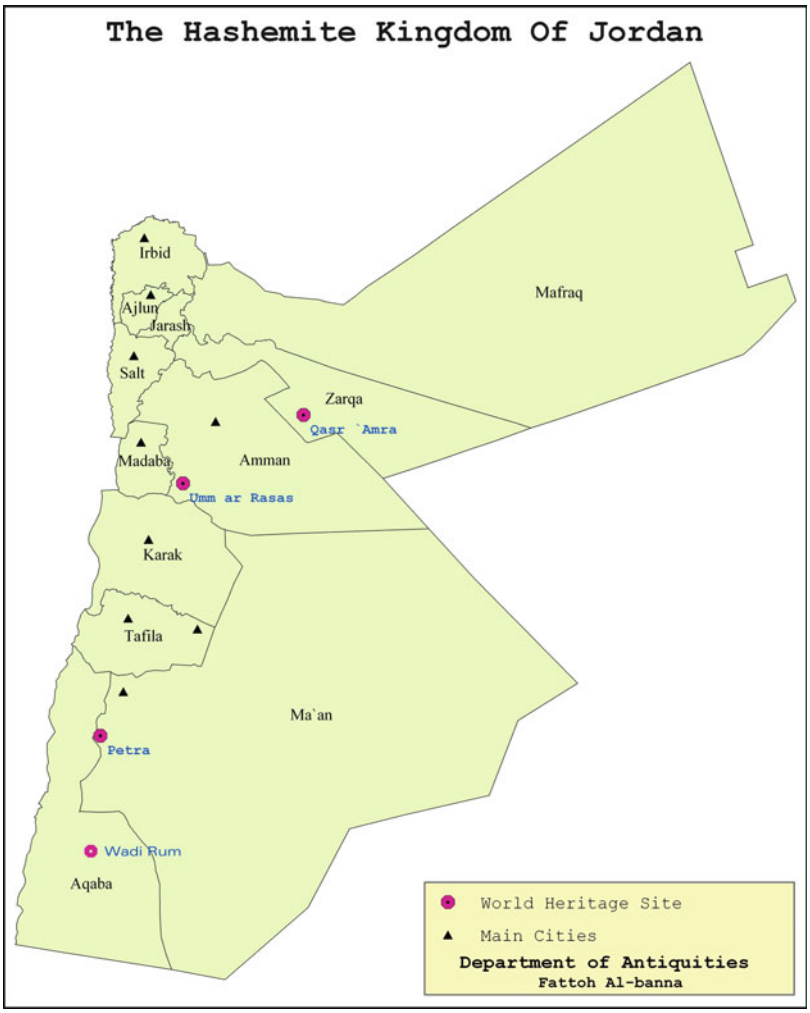

Petra National Trust and the Challenge of Site Management at Petra, Fig. 1 Map of Jordan

Definition

Petra National Trust (PNT) is a Jordanian non-governmental organization (NGO) dedicated to the preservation and protection of the World Heritage Site of Petra. Since its inception in 1989, PNT has worked to bring together people in Jordan and abroad who are committed to that same goal. The Trust is the pioneer NGO in the field of archaeological, natural, and cultural heritage preservation in Jordan. PNT does not set policy but works with the policy makers in the government of Jordan and with other NGOs to achieve its objectives. HRH Prince Raad bin Zeid, as president of the Board of Trustees, oversees the Trust's activities and guides PNT in the implementation of its mission and the fulfillment of its vision.

PNT implements its mission through conducting preservation projects and by raising awareness. PNT was instrumental in 1993 in the creation of the Petra Archeological Park (PAP), a protected area covering 264 m^2. With the aim of decentralizing the management of Petra, in 1995, PNT played a pivotal role in the establishment of a single body, the Petra Regional Planning Council (PRPC), to govern the Petra Region that later came to be known as the Petra Regional Authority (PRA). This authority evolved into the Petra Development Tourism Regional Authority (PDTRA). The role of all these bodies, present and past, is to coordinate the efforts of the many

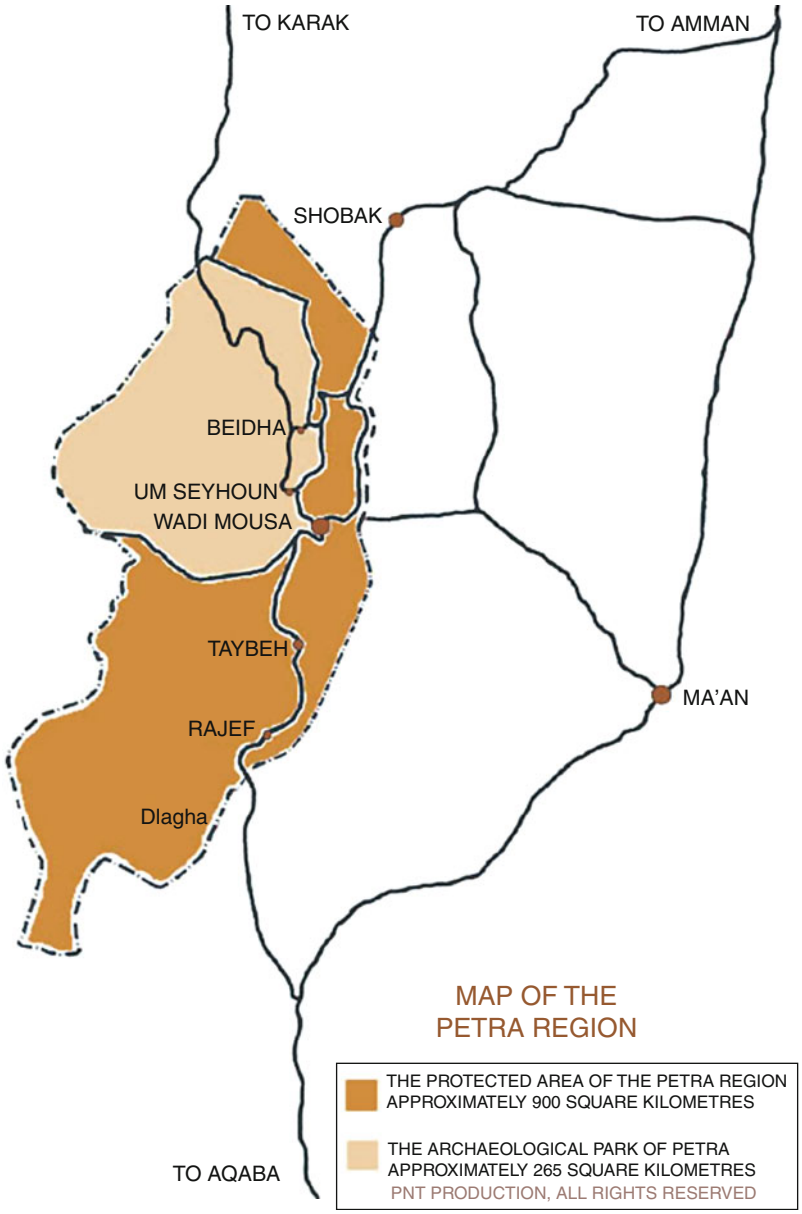

Petra National Trust and the Challenge of Site Management at Petra, Fig. 2 Map of the PAP, showing the main towns surrounding the PAP

Jordanian governmental departments and other institutions involved within the Petra region to maintain a balance between heritage preservation and tourism development and to promote responsible tourism.

In all its activities, PNT cooperates closely with the Ministry of Tourism & Antiquities (MoTA), the Department of Antiquities (DoA), the PAP, and the PDTRA. PNT is a member of the Advisory Committee of the PDTRA that oversees the management and developments within the PAP and its buffer areas. In its role as an advocate for the preservation of the park, PNT addresses the threats, partly natural and partly human, and alerts the governmental bodies responsible for the management of the site, UNESCO, and other international heritage organizations.

In addition to its advocacy role, and with the support of private Jordanian and international corporations, government institutes, international

diplomatic missions, and private donations, PNT has to date raised funds and implemented 22 projects in the areas of preservation, biodiversity, site management, community and awareness, and tourism.

Key Issues/Current Debates/Future Directions/Examples

Jordan has undertaken a number of measures to resolve the confusion in responsibilities and chain of command of the management of Petra, and in 2009 established PDTRA. PDTRA manages the entire Petra Region of 755 km^2 including the PAP which covers a protected area of 264 km^2. Historically, the PAP was managed by DoA, a subordinate department of MoTA. However, the management of the park now falls under the responsibility of the PAP management body, a subordinate organization that reports to PDTRA. PDTRA reports directly to the Prime Minister and is headed by a Chief Commissioner who is assisted by four deputy Commissioners. The deputy commissioners make up a council called "Commissioners Council" that manage the authority and oversee its affairs.

PDTRA's role is the development of the Petra Region economically, capitalizing on its potentials in tourism. It also plays a role in local community development, infrastructure development, heritage management, and the environment. Jurisdiction over archaeological research, conservation, restoration, and preservation, however, lies with DoA.

Challenges and the Impact of Growth

Site management has been a concern in Petra for at least the last four decades. In the beginning, tourism was minimal and, in general, limited to the most adventurous souls. The inscription of Petra on the UNESCO World Heritage List, however, rendered it incumbent on Jordan to protect and preserve it for the enjoyment, scholarship, and pride of future generations. Yet this sparked the surge in the number of visitors; from 93,000 visitors in 1985, it increased to almost a million in 2010. The sudden increase in numbers of visitors, spurred by the peace agreement with Israel in 1994, abruptly brought to the surface the issue of site management. This situation was compounded by the declaration of Petra as one of the "New 7 Wonders of the World" in 2007. DoA, whose primary concern had been archaeological research, found itself unprepared to effectively manage Petra.

In recognition of the need to protect and preserve this outstanding example of national heritage, as well as the importance of the site for economic advancement, both the government and donor agencies invited international organizations to prepare management plans on five occasions. The first of these plans was prepared as early as 1968 and the latest in 2011. The plans assessed the state of conservation of the park and provided guidelines for the use, development, interpretation, presentation, zoning, protection, and general administration the park.

There is a basic consensus among the plans on the type of management structures and interventions needed for Petra. The approach toward the implementation of the recommendations proposed, however, has been fragmented over the years. Instead of adopting a holistic approach to the recommendations delineated in the plan in their entirety, subprojects were selected for implementation, leading to the imbalance witnessed today. This is due to a number of reasons, which include inadequate participation by related organizations and stakeholders in the planning process resulting in a lack of commitment and follow-up, an insufficient understanding and appreciation of the site values and their potential that leads to an unbalanced approach to development, inexperience in the management of cultural heritage sites, and frequent changes in government management.

The Role of NGOs in Site Management

NGOs have been in existence in Jordan since 1966. The focus then was on natural heritage, and the first NGO established for this purpose was the Royal Society of Conservation (RSCN). It, in contrast to all other NGOs, owns and manages six natural parks successfully. Twenty-three years later, in 1989, the first national NGO, whose focal point was archaeological heritage preservation, was established as PNT. The Friends of Archaeology & Heritage (FOAH) was established in 1990 in Amman, and it focused on awareness

and introducing Jordanian and non Jordanians to the archaeological heritage of the country. It, however, did not work in Petra Archaeological Park, PAP. The NGO "Bait al-Anbat" based in the Liwa of Petra was established in 1997, and its focus is "the development of cultural life in Jordan, to raise awareness of cultural heritage and to develop improved dialogue among civilizations." There are numerous other NGOs working in the field of socioeconomic development, education, special education, handicrafts, and others in Petra. With the exception of PNT, most of these NGOs work independently of the PDTRA and the PAP.

Whereas, there is some recognition by the government for the need to explore innovative approaches to site management and to allow NGOs to participate; it has in effect been inconsistent in its approach. This, to a great extent, is due to the traditional centralized modus operandi of the government bureaucracy coupled with a lack of understanding of the role of NGOs in heritage management. The advocacy role of NGOs is perceived as threatening which exacerbates the situation further. A better understanding of the roles of each of these two stakeholders with the aim of achieving a more complementary partnership in the field of site management is the most effective way forward. NGOs, unlike the government, are in the unique position of being nonprofit and, therefore, not motivated by economic gain; at the same time, they are not overburdened by bureaucracy, which gives them the ability to operate effectively.

Conclusion and the Way Forward

For Petra to be preserved, it must be understood in its totality. A clear-cut strategy for the conservation and management of the site must be developed. The impacts of management decisions on the site's values must be clearly identified and appreciated by the decision makers and stakeholders working together as one team. Only in this way will viable site management plans that are relevant to local conditions be adhered to and implemented with success. Petra is a result of many layers of accumulated historical heritage that needs to be managed and presented in a manner that does not encourage further deterioration. Consolidation of the studies and their recommendations with emphasis on the values that set Petra apart from any other heritage site, using an integrated approach with the participation of those having a stake in Petra, is the shortest and most effective way to achieve this objective.

Cross-References

- ▶ Akrawi, Aysar
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ Petra, Archaeology of

Further Reading

Akrawi, A. 2000. Petra, Jordan. In *Management planning for archaeological sites*, ed. J.M. Teutonico and G. Palumbo, 98–112. Los Angeles: The Getty Conservation Institute and Loyola Marymount University.

Akrawi, A. 2003. NGO and government collaboration in archaeological site management: The case of Petra, Jordan. In *Of the past, for the future: integrating archaeology and conservation*, ed. A. Neville and B. Janet, 29–34. Washington: The Getty Conservation Institute.

Akrawi, A. 2009. Issues at world heritage sites: Petra case study. In *Studies in the history and archaeology of Jordan X*, ed. F. Al-Khraysheh, 53–59. Amman: Jordan Department of Antiquities.

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Petra, Archaeology of

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Introduction

The ancient city of Petra, in southwest Jordan, is among the most widely recognizable archaeological sites in the world. The city was inscribed as a UNESCO World Heritage Site in 1985 and has more recently been popularly elected to a list of the "New Seven Wonders of the World".

Originally constructed by the Nabataeans in the late first millennium BCE and later annexed by the Roman Empire, this ancient trading hub features stunning monumental architecture, much of which is carved directly into the red sandstone cliffs for which the site is widely known. The architecture of Petra features a combination of local and classical forms (McKenzie 1990), many of the latter manifested as elaborately carved facades for cave structures in the cliffs that enclose the city. Such is the case for the numerous tombs found within the boundaries of the city, including the widely recognizable "Treasury" (Al Khazneh), which has been featured in several films including *Indiana Jones and the Last Crusade* (1989). The city center also exhibits large freestanding structures, including a colonnaded street, temples, civic administration buildings, and a varied range of domestic structures. The rich religious life of Petra's inhabitants is evident throughout the site. Numerous rock-cut shrines and thousands of relief steles (*betyls*), cultic niches, altars, and inscriptions can be seen carved in the cliff faces in the maze of mountains and valleys surrounding Petra (Wenning 2001, 2010). Petra is also known for an elaborate water management system that once sustained an estimated urban population of 20,000 or more. This system included numerous channels, dams, pipes, cisterns, and storage tanks, as well as pools and gardens (Bedal 2003; Ortloff 2005). Water management features such as dams and cisterns can be found not only within the city but throughout its hinterland as well.

Petra may now be entered by two primary approaches. The *Siq* entrance to the east is taken by most visitors to the site and is by far the more dramatic of the two approaches. This passage through a long, narrow gorge (1.2 km in length and as narrow as 3 m in some areas) through the surrounding sandstone cliffs ends at the iconic Al Khazneh tomb (the "Treasury") which boasts what is arguably the city's most spectacular and well-preserved facade (Fig. 1). A less spectacular northern approach is today used primarily as a utility road. Historically the city was approached by a number of routes from the north and west, as well as from the south, via a main route that passed Jabal Haroun (Aaron's Mountain).

In addition to its Nabataean and Roman history (on which most historical and archaeological attention has been focused), the site also saw prehistoric and Iron Age occupations and boasts later activity by Christian and Muslim populations alike. The Byzantine period is well represented today by three churches in the city center and a monastery complex on Jabal Haroun (Fiema and Frösen 2008). These include the cathedral of the Petraean see, the bishop of which participated in a number of history's important doctrinal councils (Fiema et al. 2001). Still later periods of occupation and use of the site are represented by two

Petra, Archaeology of, Fig. 1 At the end of the *Siq* visitors are greeted with a stunning view of the "treasury" (Al Khazneh)

crusader castles, a Mamluk period *weli* (shrine) to the Prophet Aaron on Jabal Haroun, a late medieval/early modern Islamic village at Bayda, and traces of Ottoman period habitation in the ancient tomb complexes. The areas surrounding Petra also boast a much broader history with evidence of activity from three hominid species extending as far back as the Paleolithic, as well as Neolithic and Bronze Age settlements (Kirkbride 1968; Byrd and Field 1989; Lindner & Genz 2000; Lindner et al. 2001; Jansson 2002; Vella et al. 2012).

Definition

Petra refers to an archaeological site in southwest Jordan that consists of an ancient city and its hinterland. The Nabataean people utilized the Petra valley from at least the mid-first millennium BCE prior to the full sedentarization of their culture. The earliest constructions in what would become the city of Petra likely began in the mid- to late third century BCE as the Nabataeans gained increasing control of the overland trade routes between the Arabian peninsula and the Mediterranean Sea. Petra became an important hub for ancient trade under the Nabataeans and continued in this role after the Roman annexation in CE 106. With the eventual collapse of the ancient trade networks that once sustained Petra's prosperity, the city became less prominent, and its character altered. Occupation at Petra continued following the Nabataean and Roman periods, including activity in the Byzantine and Islamic periods as well as a later Bedouin presence which lasted until quite recently. Archaeological evidence also suggests that prior to the monumentalization of Petra proper, human activity in the area extended well into prehistory.

Key Issues/Current Debates/Future Directions/Examples

Current Research and Future Directions

Since its reidentification by Swiss explorer Johann Ludwig Burckhardt in 1812, Petra has been the subject of many archaeological investigations. Excavations began at the site in 1930 and continue today, but the types of archaeological research have become much more diverse, expanding to include landscape surveys, geophysical investigations, GIS mapping, laser and photogrammetric documentation methods, and the development of conservation and preservation intervention strategies to help protect this fragile site and its environment. Following are examples of some of the major academic research projects active at the site today.

A number of interesting and important projects are affiliated with the Association for the Understanding of Ancient Cultures (AUAC), a nonprofit organization based in Basel, Switzerland. The International Umm al-Biyara Project, directed by Stephan G. Schmid (Humboldt University, Berlin) and Piotr Bienkowski (Manchester, U.K.), is a multidisciplinary exploration of the Nabataean monumental architectural remains on the summit of the flat-topped Umm al-Biyara mountain, which has sometimes been described as the "acropolis" of Petra. Several seasons of mapping and test excavations have demonstrated that these are possibly the remains of a royal or other elite complex situated to overlook the Petra city center. The International Aslah Project (IAP), directed by Robert Wenning (University of Münster) and Laurent Gorgerat (Antikenmuseum Basel und Sammlung Ludwig), is investigating one of the most important rock-cut cultic areas in Petra. The research area is focused around the monument known as the Aslah Triclinium, which contains what may be the oldest, dated Nabataean inscription known at present. Employing both survey and excavation methods, the project has yielded one of the best data sets yet available to help understand the role and functions of the many shrine installations found around the ancient city. The North-Eastern Petra Project (NEPP), directed by Stephan G. Schmid, Zbigniew T. Fiema, and Bernhard Kolb, is a landscape and architectural survey that began recently of an important but largely unexplored sector of the city center near the monument known as the "Palace Tomb." This project is undertaking a detailed mapping of the freestanding architectural remains in the area, employs some geophysical investigations, and hopes to eventually excavate some of the features.

Several projects are currently working to expand our understanding of the funerary

landscape of Petra which, although seemingly apparent due to the prevalence of the tomb façades, actually remains quite obscure. Two projects directed by Lucy Wadeson (Oxford University) and affiliated with the AUAC, the International Khubtha Tombs Project (IKTP) and the Funerary Topography of Petra Project (FTPP), both seek to elucidate aspects of the funereal practices in the city. The IKTP is scientifically excavating the areas inside and outside selected tombs and the FTPP is investigating the possible functional relationships between these spaces. Another set of tomb excavations directed by Isabelle Sachet and Natalie Delhopital, in association with the mission archéologique français de Pétra (MAFP) of the Centre national de la recherche scientifique (CNRS), have yielded additional information about funerary spaces and, most importantly, uncovered some of the first stratified burial deposits to augment the limited data from previous excavations in disturbed tombs (Bikai and Perry 2001).

The Petra Garden and Pool Complex (PGPC), directed by Leigh-Ann Bedal (Pennsylvania State University – The Behrend College, Erie, PA), has been investigating a unique set of water installations and gardens that are situated in the heart of the city center (Bedal 2003; Bedal et al. 2007). The results from this project have contributed to a better understanding of the central urban fabric of the city and raised intriguing questions about the possible symbolic roles played by the control and display of water in this arid landscape.

Brown University in Providence, RI (USA), has sponsored two major field projects. The first is directed by Martha Sharp Joukowsky at the "Great Temple" complex in the city center (Joukowsky 1998, 2007). The second, the Brown University Petra Archaeological Project, directed by Susan E. Alcock and Christopher A. Tuttle, is aimed at gaining a diachronic understanding of the relationship of the city to its hinterland. This project is composed of several different components, including limited excavation and geophysical prospection in the city center itself. The bulk of this project's activity, however, has focused on the site's hinterland to the north, through a combination of highly intensive pedestrian survey, architectural recording and mapping, geophysics, and strategic excavation probes, as well as more extensive excavation at the Islamic village at Bayda. Results point to an enormously rich artifactual landscape and one much modified, over the millennia by human activity (Alcock and Knodell 2012).

The major long-term project of the MAFP, directed by Christian Augé (CNRS), is the investigation of the "Qasr al-Bint," a Nabataean temple in the city center, which is the only freestanding building to survive largely intact to the present day. This French project has produced the definitive architectural study of this important building and, through excavations in its precinct, has elucidated different aspects about the uses of civic cultic space in the city throughout different historical periods.

The search for "Early Petra" is a major research initiative involving a number of different projects. These efforts are seeking evidence of the earliest Nabataean-constructed environment in the Petra valley, hints of which were first revealed by excavations in the 1950s (Parr 1957, 1960). The Hellenistic Petra Project, directed by David Graf (Miami University) and Stephan G. Schmid (Humboldt University, Berlin) has conducted several seasons of excavation in areas adjacent to Parr's original trenches in order to verify and elucidate the original published data (Graf et al. 2005, 2007). Additional work on "Early Petra" has been undertaken as part of the MAFP, also in the vicinity of the Qasr al-Bint (Mouton et al. 2008). These projects have collectively now proven that there was a constructed environment in the mid- to late Hellenistic period in the Petra city center, although a complete understanding of the full nature and extent of these constructions still awaits additional research.

Despite the nearly 200 years of documentation now completed in Petra, potential for future research in the archaeological park remains enormous. Technology has offered exciting ways to investigate Petra and further our understanding of this important site. The trend in archaeology toward nondestructive investigations has taken hold in the ancient city. For example, the use of geophysical and remote sensing techniques has

already started to tell us more of what lies beneath the accumulations of time (Conyers et al. 2002; Urban et al. 2012). We can anticipate that through the judicious employment of both new and old methods, the wonders of Petra will continue to astound for many generations to come.

Threats

As with many World Heritage Sites, Petra's popularity has been a mixed blessing, with tourists making substantial contributions to the host economy but also posing a serious threat to the preservation of the site (see Comer 2012). The sprawling site is difficult to police, and visitors routinely climb and walk on architectural features and remove artifacts as souvenirs. The Bdoul Bedouin tribe that once resided inside Petra and many of its monuments was ejected in the 1980s as part of the process for establishing the World Heritage Site and associated park. Many were displaced to the nearby village of Umm Seyhoun. Many Bedouin now earn a living providing guide services and running small tourist shops in the city center. Others have found work with archaeological teams providing field assistance and logistical support to research at Petra. There also seems to be a general problem with looting, with artifacts spanning the full occupational history of the region readily available for sale to tourists at the shops. While necessary for sustaining the economic survival of the local Bedouin, these different types of engagements with the archaeological park also create threats to the site as the result of inadequate management and mitigation strategies. Efforts are presently underway to develop appropriate and sustainable strategies that will hopefully ameliorate some of these potential threats.

In addition to human pressures, Petra also faces much natural erosion due to the action of wind and water. Recently, for example, a Byzantine church in Petra's city center has sustained water damage to its floor mosaic (Fig. 2). Some of the most significant threats faced by Petra are those related to conserving and preserving the monuments carved and constructed from the fragile sandstone. All of the monuments are endangered through human and animal interactions, water, wind, solar radiation, and salt efflorescence from the building materials themselves. Neither a coherent conservation management plan nor a trained team of conservation technicians exist in the park to undertake sustainable preservation interventions. Despite these limitations, substantial progress in improving the situation has been made in the past several years.

The UNESCO office in Amman, Jordan, in partnership with the Petra Development and Tourism Regional Authority (PDTRA) has recently completed the definitive GIS mapping of the Petra Archaeological Park boundaries, which encompass some 264 km^2. This effort has also

Petra, Archaeology of, Fig. 2 The Byzantine Church in Petra's city center exhibits spectacular floor mosaics which are presently threatened by water damage

produced a proposal for the creation of the associated buffer zone that is required for a World Heritage Site. The UNESCO team also pioneered a new methodology for risk mapping and categorizing, assessing, and prioritizing the various threats to the site.

Several current projects are aimed at addressing the need for developing sustainable conservation capacity and practices. The Petra Archaeological Park is presently designing a conservation management plan that will define priorities and lay the foundation for establishing a set of policy and procedural standards. The Petra National Trust is undertaking the Wadi al-Jarra Dam Restoration Project that is working to rehabilitate ancient Nabataean water management installations to help control flood waters near the Al Khazneh monument. The American Center of Oriental Research (ACOR) is executing two major preservation projects, the Petra Church Maintenance and Restoration Project and the Temple of the Winged Lions Cultural Resource Management Initiative. Both of these projects are designed to implement urgent interventions to preserve the respective monuments but also involve technical capacity building in the local communities as a means of creating a trained workforce to facilitate making future conservation initiatives sustainable.

Cross-References

► Joukowsky, Martha Sharp
► Petra National Trust and the Challenge of Site Management at Petra

References

Alcock, S.E., and A. Knodell. 2012. Landscapes north of and nearby Petra: The Petra Area and Wadi Silaysil survey (Brown University Petra Archaeological Project, 2010–2011). *Supplement to Proceedings of the Seminar for Arabian Studies* 42: 5–16.

Bedal, L.-A. 2003. *The Petra pool-complex. A Hellenistic paradeisos in the Nabataean capital*. Piscataway: Gorgias Press.

Bedal, L.-A., K.L. Gleason, and J.G. Schryver. 2007. The Petra garden and pool complex, 2003–2005. *Annual of the Department of Antiquities of Jordan* 51: 151–176.

Bikai, P.M., and M. Perry. 2001. Petra North Ridge Tombs 1 and 2: Preliminary report. *Bulletin of the American Schools of Oriental Research* 324: 59–79.

Comer, D.C., ed. 2012. *Tourism and archaeological heritage management at Petra: Driver to development or destruction?* New York: Springer.

Conyers, L.B., E.G. Ernenwein, and L.-A. Bedal. 2002. Ground penetrating radar discovery at Petra, Jordan. *Antiquity* 76: 339–340.

Fiema, Z.T., and J. Frösen. 2008. *Petra – the Mountain of Aaron: The Finnish archaeological project in Jordan, volume 1: The church and the chapel*. Helsinki: Societas Scientiarum Fennica.

Fiema, Z.T., C. Kanellopoulos, T. Waliszewski, and R. Schick. 2001. *The Petra church*. Amman: American Center of Oriental Research.

Graf, D.F., L.-A. Bedal, and S.G. Schmid. 2005. The Hellenistic Petra project: Excavations in the civic center, preliminary report of the first season, 2004. *Annual of the Department of Antiquities of Jordan* 49: 417–441.

Graf, D.F., S.G. Schmid, and E. Ronza. 2007. The Hellenistic Petra project: Excavations in the Qasr al-Bint Temenos Area: Preliminary report of the second season, 2005. *Annual of the Department of Antiquities of Jordan* 51: 223–238.

Kirkbride, D. 1968. Beidha: Early Neolithic village life south of the Dead Sea. *Antiquity* 42: 263–274.

Lindner, M., and H. Genz. 2000. Five early Bronze Age sites north of Petra (Jordan) discovered in 1993–1997. In *At the crossroads: Essays on the archaeology, history and current affairs of the Middle East*, ed. H.D. Bienert and B. Muller-Neuhof, 47–85. Amman: German Protestant Institute of Archaeology in Amman.

Lindner, M., U. Hubner, and H. Genz. 2001. Early Bronze Age settlement on Umm Saysaban north of Petra (Jordan) and its topographical context: Report on the 1998/1999 survey. *Annual of the Department of Antiquities of Jordan* 45: 287–310.

McKenzie, J. 1990. *The architecture of Petra*. Reprinted 2005. Oxford: Oxford University Press.

Mouton, M., F. Renel, and A. Kropp. 2008. The Hellenistic levels under the Temenos of the Qasr al-Bint at Petra. *Annual of the Department of Antiquities of Jordan* 52: 51–71.

Ortloff, C.R. 2005. The water supply and distribution system of the Nabataean city of Petra (Jordan), 300 BC – AD 300. *Cambridge Archaeological Journal* 15: 93–109.

Parr, P.J. 1957. Recent discoveries at Petra. *Palestine Exploration Quarterly* 89: 5–16.

Parr, P.J. 1960. Excavations at Petra, 1958–59. *Palestine Exploration Quarterly* 92: 124–135.

Urban, T.M., S. Alcock, and C. Tuttle. 2012. Virtual discoveries at a wonder of the world: Geophysical investigations and ancient plumbing at Petra, Jordan. *Antiquity* 85 (331). Available at: http://antiquity.ac.uk/projgall/urban331/

Vella, C., T. Urban, E. Bocancea, C. Tuttle, and S. Alcock. 2012. Discovery and integrative documentation of early Bronze Age Jabal al-Qarn (Petra). *Antiquity* 86.

Wenning, R. 2001. The betyls of Petra. *Bulletin of the American Schools of Oriental Research* 324: 79–95.
Wenning, R. 2010. The Petra Niches Project (PNP). *Annual of the Department of Antiquities of Jordan* 54: 271–281.

Further Reading

American Center of Oriental Research (ACOR). n.d. Available at: http://acorjordan.org
Association for the Understanding of Ancient Cultures (AUAC). n.d. Available at: http://auac.ch
Augé, C., and J.-M. Dentzer. 2000. *Petra: Lost city of the ancient world*. New York: Abrams.
Bessac, J.-C. 2007. *Le travail de la pierre à Pétra. Technique et économie de la taille rupestre*. Paris: Éditions Recherche sur les Civilisations.
Brown University Petra Archaeological Project (BUPAP). n.d. Available at: http://proteus.brown.edu/bupap/Home
Byrd, B.F., and J. Field. 1989. *The Natufian encampment at Beidha: Late Pleistocene adaptation in the southern Levant*. Aarhus: Jutland Archaeological Society.
Crawford, G.A. 2003. *Petra and the Nabataeans: A bibliography*. ATLA Bibliography series 49. Lanham: Scarecrow Press.
Jansson, J. 2002. From the Acheulean to Aretas: The Petra area in prehistoric times. In *Petra: A city forgotten and rediscovered*, ed. J. Frösén and Z.T. Fiema, 33–43. Helsinki: Amos Anderson Art Museum.
Joukowsky, M.S. 1998. *Petra Great Temple: Brown University excavations 1993–1997*. Providence: Brown University Petra Exploration Fund.
Joukowsky, M.S. 2007. *Petra Great Temple, Volume II: Archaeological contexts of the remains and excavations*. Providence: Brown University Petra Exploration Fund.
Kanellopoulos, C. 2004. The temples of Petra: An architectural analysis. *Archäologischer Anzeiger* 1: 221–239.
Markoe, G., ed. 2003. *Petra rediscovered: The lost city of the Nabataeans*. New York: Harry N. Abrams in association with the Cincinnati Art Museum.
Petra: lost city of stone. n.d.. American Museum of Natural History. Available at: www.amhn.org/exhibitions/petra
Petra National Trust. n.d. Available at: http://petranationaltrust.org
Politis, K.D., ed. 2007. *The world of the Nabataeans. volume 2 of the International Conference on The World of the Herods and the Nabataeans held at the British Museum, 17–19 April 2001*. Oriens et Occidens 15. Stuttgart: Franz Steiner.
Rababeh, S.M. 2005. *How Petra was built: An analysis of the construction techniques of the Nabataean free-standing buildings and rock-cut monuments in Petra, Jordan*. British Archaeological Reports International series 1460. Oxford: Archaeopress.
Roche, M.-J. 2009. *Pétra et les Nabatéens*. Paris: Les Belles Lettres.
Schmid, S.G. 2000. The 'Hellenistic' tomb façades of Nabataean Petra and their cultural background. *Graeco Arabica* 7–8: 485–509.
Schmid, S.G. 2001. The Nabataeans: Travelers between lifestyles. In *The archaeology of Jordan (Levantine Archaeology 1)*, ed. B. MacDonald, R. Adams, and P. Bienkowski, 367–426. Sheffield: Sheffield Academic Press.
Taylor, J. 2005. *Petra and the lost kingdom of the Nabataeans*. London: The Folio Society.
Weber, T., and R. Wenning (ed.). 1997. *Petra: antike Felsstadt zwischen arabischer Tradition und griechischer Norm*. Mainz am Rhein: P. von Zabern.

Petrie, William Matthew Flinders

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Basic Biographical Information

William Matthew Flinders Petrie was born on 3 June 1853 in Kent, England. The only child of a middle-class Victorian family, his father William Petrie was an inventor and surveyor, while his mother Anne was the only daughter of famed explorer and navigator, Matthew Flinders. After a severe childhood illness almost claimed his life, Petrie's parents were advised to restrict his contact with other children to avoid any further risks to his health. As a result, Petrie never attended a formal school and was instead homeschooled by his mother; by 10, Petrie had taught himself chemistry and minerology (Drower 1985: 15–17). As a child and young teenager, his parents took him on many family holidays to measure and survey ancient British monuments, and this provided Petrie with a solid foundation in surveying and recording techniques. In 1874, Petrie and his father surveyed Stonehenge for the first time and completed the study by June 1877; after which young Petrie set off alone to survey British ancient earthworks between 1875 and 1880, developing a survey methodology he would employ for the

rest of his life (Drower 1995: 22–24). At the age of 24, Petrie undertook his only formal education with a university extension course in algebra and trigonometry (Drower 1985: 18). In 1880, he began his survey of the pyramids at Giza in Egypt. For the next 44 years, Petrie continued his work in Egypt, accompanied by his wife Hilda, whom he had married in 1896. In 1923, Petrie was honored with a knighthood for his services to the field of archaeology. In 1927, he moved his excavation efforts across the Egyptian border into Palestine. He continued this work for a further 11 years. Flinders Petrie died in the British Mandate of Palestine on 28 July 1942, at the age of 89.

Major Accomplishments

Flinders Petrie pioneered many revolutionary techniques in the field. He is often referred to as the "Father of British Egyptology" (Persson 2012: 9). Petrie's exposure to rigorous surveying methods as a child is evident in his later career as an archaeologist. His first expedition to Egypt (1880) was to begin his detailed measurement and survey of the pyramids at Giza. At Tanis (1884), Petrie implemented his new, systematic approach to excavation. He instructed his team to excavate the site in a systematic fashion, focusing on the various layers within the site and their relationship to each other (Encyclopedia of World Biography 2004). This was an approach that was not utilized by other archaeologists at the time. Rather, Petrie's contemporaries would extract the interesting or unique pieces that they found with no reference to the chronology of the site or the context of the find.

Throughout his extensive career, Petrie discovered some extraordinary Egyptian artifacts, such as a collection of jewelry dating to the twelfth dynasty. Furthermore, Petrie uncovered the physical records of the first two dynasties of the Egyptian civilization, which had originally been thought to be mythical, as well as inscriptions of an early alphabet in a Middle Kingdom temple and the famed Merneptah Stele near Thebes, discovered in 1896 (Drower 1995: 221; Drower 2012: 3–4). Petrie also had the honor of discovering the Greek colony of Naukratis in Egypt in 1885 near Giza (Petrie 1990). Despite these great discoveries, at sites Petrie also insisted on recording and excavating more mundane objects, particularly sherds of undecorated pottery, that were previously ignored in the search for rare and exotic artifacts. This practice allowed Petrie to develop the concept of "sequence dating," a method also known as "seriation." He further extended this by developing a "cross-dating" technique that facilitated the use of Egyptian artifacts to date strata at other sites outside of Egypt (The Columbia Encyclopedia 2012). Moreover, he strongly believed that assemblages uncovered together had to remain together as he regarded splitting them as destroying essential contextual information that a full assemblage provided (Sparks 2013: 157).

Petrie's greatest contributions to the discipline of archaeology were made in the field. As well as systematic excavation techniques and seriation, Petrie was known for his obsessive recording of detail, a practice that stemmed from his adherence to the concept of scientific observation. Petrie also argued that records should be supplemented with pictures, diagrams, and plans to make sites easier to study, especially if they were destroyed during the excavation (Petrie 1904: 114). Moreover, he stated that it was an "unpardonable crime" in archaeology to excavate carelessly and not make written records and plans of the excavation (Petrie 1904: 48). While his field methods were heralded as revolutionary for his time, Petrie's theoretical interpretations of the results he obtained were (and in some cases, still are) considered to be highly controversial. His theories on the origins and development of the alphabet were strongly opposed by his contemporaries, while his connection to noted eugenicist Francis Galton has drawn criticism from subsequent generations of archaeologists (Encyclopedia of World Biography 2004; Sheppard 2010). Moreover, he was criticized for creating an "impossibly long" chronology for ancient Egypt as well as applying eugenics theory to that work (Drower 2012: 5; Sheppard 2010: 19–20, 22). In contrast to his expertise in excavation and classification, his survey techniques were considered by his peers to be rudimentary

(Gardiner 1942: 204). However, Petrie's shortcomings have been defended as he "[fought] with the weapons that he knew or himself invented" (Wheeler 1953: 91). It should be remembered that when Petrie began his work in the 1880s, very few of his contemporaries were as committed to detail or interested in the things which are considered essential today.

Despite having had very little formal education, Petrie's academic career was outstanding. In 1892, he was made the first Edwards Professor of Egyptology at University College London (UCL). He retained this position until 1933, and the Egyptian Archaeology Museum at UCL is named in his honor. Additionally, his career in the field was extensive. Beginning in 1875 in Britain, he began his work in Egypt in 1880. He continued there until 1924, and in 1927 he moved his excavations across the border in to Palestine. His work in Palestine continued until 1938, and he remained in the country until his death 4 years later. Obituaries and postmortem accounts of his life highlight a pioneer of modern, scientific archaeological methods (Gardiner 1942: 204; Wheeler 1953). Arguably, the best summation of Petrie's career is that he "found Egyptology a treasure hunt, and left it a science" (Drower 2012: 5).

Cross-References

- ▶ British Pioneers and Fieldwork Traditions
- ▶ Excavation Methods in Archaeology
- ▶ Stratigraphy in Archaeology: A Brief History

References

Drower, M.S. 1985. *Flinders Petrie: A life in archaeology.* London: Victor Gollancz Ltd.

Drower, M.S. 1995. *Flinders Petrie: A life in archaeology.* Madison: University of Wisconsin Press.

Drower, M.S. 2012. Petrie, Sir (William Matthew) Flinders. In *Oxford dictionary of national biography.* Oxford: Oxford University Press.

Encyclopedia of World Biography. 2004. Sir William Matthew Flinders Petrie. https://www.encyclopedia.com/people/social-sciences-and-law/archaeology-biographies/sir-william-matthew-flinders-petrie. Accessed 25 Mar 2013.

Gardiner, A.H. 1942. Sir William Matthew Flinders Petrie, F.R.S., F.B.A. *Nature* 150: 204.

Persson, H. 2012. Collecting Egypt. *Journal of the History of Collections* 24: 3–13.

Petrie, W.M.F. 1904. *Methods and aims in archaeology.* London: Macmillan.

Petrie, W.M.F. 1990. Naukratis: 1885: The discovery of the earliest Greek colony in Egypt. *The Classical Bulletin* 66 (1): 3–7.

Sheppard, K.L. 2010. Flinders Petrie and eugenics at UCL. *Bulletin of the History of Archaeology* 20: 16–29.

Sparks, R.T. 2013. Flinders Petrie through word and deed: Re-evaluating Petrie's field techniques and their impact on object recovery in British mandate Palestine. *Palestine Exploration Quarterly* 145 (2): 143–159.

The Columbia Encyclopedia. 2012. Petrie, Sir William Matthew Flinders, 6th ed. http://www.encyclopedia.com/people/social-sciences-and-law/archaeology-biographies/sir-william-matthew-flinders-petrie. Accessed 25 Mar 2013.

Wheeler, M. 1953. Adventure and Flinders Petrie. *Antiquity* 27: 87–93.

Further Reading

Drower, M.S., ed. 2004. *Letters from the desert: The correspondence of Flinders and Hilda Petrie*. Oxford: Aris & Philips.

Petrie, W.M.F. 1932. *Seventy years in archaeology.* New York: H. Holt and Company.

Uphill, E.P. 1972. A bibliography of Sir William Matthew Flinders Petrie (1853–1942). *Journal of Near Eastern Studies* 31: 356–379.

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Phenomenology in Archaeology

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Introduction

Phenomenology in archaeology refers to an interpretive method and associated theoretical stance developed by British post-processualists. Most phenomenological research focuses on investigations of past landscapes. Phenomenological archaeology draws its theoretical position and its inspiration from the existential philosophy of Edmund Husserl and Martin Heidegger. It is based on the assumption that there are universal

similarities in human spatial perception. Because all human bodies share the same configuration, we can assume that all humans have generally similar spatial perceptions of such body-relevant experiences as directionality and scale. The human body organizes spatial experiences into up and down, front and back, and left and right. And, like us, past subjects constructed their spaces to create and reflect aspects of their habitus. If we accept these premises, then a phenomenological approach can give us insights into the ways in which prehistoric peoples experienced, perceived, and represented the spatial world. Phenomenological archaeologists work from the starting point of contemporary bodies in the same spaces, moving through ancient landscapes and architecture as prehistoric peoples did. Proponents assert that the judicious employment of phenomenological methods aids archaeological investigations of past meanings, worldviews, and emotions. Phenomenology helps humanize the past and has inspired new research into the senses and the body. Critics focus on empirical as well as epistemological issues, contending that phenomenological approaches do nothing to advance archaeological knowledge. The debate is itself a healthy development for the discipline.

Historical Background

Phenomenology in archaeology derives from phenomenology in existential philosophy. Gosden (1994), Casey (1996), and Thomas (1996) all provide good reviews of this intellectual history. Existential philosophy addresses the realism v. idealism conundrum that Western philosophers have pondered since Plato. Paradoxically, we know the world by separating ourselves from it, but at the same time, we can only understand ourselves in relation to the world. So, to what extent is the world "real," and to what extent is it a construct of our consciousness? Rene Descartes' (1641) solution was "I think, therefore I am." Immanuel Kant (1781) distinguished between the "phenomenal" world, or the world as our consciousness apprehends it through the filters of our senses, and the "noumenal" world, or an objective reality that remains beyond the grasp of our imperfect bodies and minds. Following these thinkers and the work of the nineteenth-century philosophers Søren Kierkegaard and Friedrich Nietzsche, existentialism posits that we bridge the distance between objective reality and our subjective consciousness through existence or daily experiences and participation in the world. Phenomenology – one branch of existentialism – emerged in the twentieth century through the works of Edmund Husserl (1931), Martin Heidegger (1927), and Maurice Merleau-Ponty (1962).

Husserl argues that we know the world not through pondering it (à la Descartes) but rather through daily life, experience, and perception. Conscious, intentional, bodily engagement with the physical world is the starting point for all knowledge. Husserl is an idealist – for him, understanding the world hinges around these shared, conscious *perceptions* of experience. Heidegger, a student of Husserl, moved the conversation away from epistemology (the study of how we know what we know) towards ontology (the study of being or existence). Like Husserl, Heidegger sees the human body as the point of dialectical mediation between consciousness and the physical world, subject and object. However, for Heidegger, bodily experience takes precedence over ideals and intentions, because experience creates the context in which all else takes place. Existence involves a mesh of contingent relationships with other beings and objects in both a spatial and temporal dimension. Place has a critical part to play for Heidegger – all bodily experiences are spatially situated. This is explored in Heidegger's concept of *Dasein*, translated as being-in-the-world or dwelling (see Thomas 1996 for a good discussion). Maurice Merleau-Ponty (1962) further elaborated upon these ideas, focusing on the intersections between the body, perception, consciousness, and place.

Phenomenology resonates well with practice theory, as both are concerned with breaking down a subject/object or actor/structure dichotomy, refocusing attention on the ways in which understandings, meanings, and actions are mutually constitutive. Bourdieu's concept of habitus has synergy with Heidegger's *Dasein*, as

meanings arise through lived, daily, bodily experiences. The hermeneutic or dialectical aspects of these approaches have common Marxian roots (see Gosden 1994: 113–122). Both phenomenology and practice theory contributed to the development of humanistic geography, with its focus on place and landscape (see Tuan 1974, 1977; Cosgrove 1984; Jackson 1984; Lefebvre 1991; Casey 1996, 1997, 2001; Soja 1996).

Archaeological Cases

Given this history, it should come as no surprise that existential philosophy, practice theory, and humanistic geography have contributed to the emergence of a landscape archaeology that sees place as a mutually constitutive part of the social and spiritual world rather than as a set of resources to be objectively exploited (see, e.g., Bender 1993; Bradley 1998; Ashmore and Knapp 1999). However, not all landscape archaeology is phenomenological nor is all phenomenological archaeology focused on landscape. All phenomenological archaeologists share the view that we make sense of the world by experiencing it. Some go further to contend that their own bodily perceptions can provide a means for learning about the past. By the early 1990s, British archaeologists began to explicitly explore the relevance of Heidegger's phenomenology for archaeology (Ingold 1993; Gosden 1994; Tilley 1994; Thomas 1996).

Tim Ingold (1993) starts from Heideggerian *dwelling-in-the-world* to build his concept of *taskscape*, which adds temporality and practice to the spatial study of landscape. Ingold points out that people are never disembodied, but move seamlessly through the world and through time. Meaning is created and sustained through cross-cutting fields of relationships among people, objects, and places that gradually unfold. *Tasks* – the practical activities carried out by people on a daily basis – are the constitutive acts of dwelling. The *taskscape*, then, is an inherently social array of spatially and temporally related activities.

Thomas (1996) employs Heidegger in a sophisticated critique of archaeological practices that are, he contends, mired in Descartian dichotomies. Archaeologists tend to objectify the material record as a target of study, or we try to read it as a text, but neither really works. We need to break down the false separation between human existence and the material. *Dasein*, or being-in-the-world, encourages us to think of objects, meanings, places, and people as continually, mutually constitutive, flowing into one another across time. Thomas illustrates the differences between phenomenological and objectifying approaches using three British Neolithic case studies, each at different scales. For example, objectifying approaches interpret a chambered tomb in Wales as a transcendental expression of structural meaning. From a dwelling perspective, by contrast, the chambered tomb is one in a chain of performative events linked with recent and older ideas and practices.

In *A Phenomenology of Landscape*, Christopher Tilley (1994) set forth a program for phenomenological landscape archaeology that has inspired a host of emulators and has sparked energetic critique. Archaeologists, Tilley argued, generally objectify landscapes, viewing places as empty, abstract containers for resources and actions. Tilley contrasted this "space as container" perspective with the human, bodily experience of places as meaningful, spiritual, temporal, and corporeal. He grounded his theoretical position in Heidegger's concept of dwelling and then tied phenomenology into concurrent, overlapping development in practice theory, humanistic geography, and Native American cultural landscapes (see, e.g., Basso 1996; Cosgrove 1984). Following Merleau-Ponty and de Certeau, Tilley is interested in how people construct and experience places by moving through them; he defined landscape as relational places linked by paths. Tilley believes that archaeologists' own bodily experiences as they walk through landscapes can be a source of information about the past. He expanded phenomenology from a philosophical framework for interpretation to a methodological approach.

Tilley carried forward his ideas through a series of case studies. The second half of his 1994 book featured narratives about Tilley's phenomenological perambulations through the British prehistoric countryside, conveyed through thick description and photographs. He focused on the

viewsheds of high places and monuments and on the order in which places are experienced as a walker moves among them. He is also interested in the ways built places can evoke natural features and the ways in which topographies affect bodily experience (such as difficulties in climbing steep hills). Tilley followed *A Phenomenology of Landscape* with additional volumes (Tilley 2004, 2008, 2009) in which he further developed his philosophical position and presented additional case studies. In these works, Tilley moved beyond the British Isles to investigate Breton menhirs, Maltese temples, and Scandinavian rock art. He expanded his solitary musings to incorporate the observations of earlier researchers, and he argued for synesthesia, or the involvement of all the senses in bodily experiences. For example, on Malta, Tilley (2004) suggested particular limestones were associated with honey and the sweet smell of death, while other limestones were associated with ochre and the living. Tilley's work has inspired a small but enthusiastic cadre of phenomenological practitioners in archaeology.

Among the best known of these is the work of Vicky Cummings and colleagues on the megalithic landscapes of Neolithic Wales (Cummings et al. 2002; Cummings and Whittle 2004). Like Tilley, Cummings et al. adopted an explicitly phenomenological framework and focus on the role of vision in the perception of place. Cummings et al. conveyed the bodily, experiential qualities of Neolithic tombs and monuments using thick descriptions of the features in their topographic settings, supplemented by photographs. The authors wanted their observations to be replicable, and so they made considerable effort to systematically record their visual observations, drawing and photographing 360° panoramas around each monument, and employing GIS to explore viewsheds. Cummings et al. argued that Neolithic monuments in Wales both concealed and emphasized particular vistas and topographic features. Chamber tombs, for example, are situated at places where viewsheds change. Ultimately, the authors used their phenomenological observations to bolster structuralist interpretations. For example, they argued that chamber tombs spatially evoked a transition from symmetry to asymmetry and back to symmetry, mimicking three stages of a human body as a living entity, a decomposing corpse, and a set of skeletal remains.

Similarly, Van Dyke (2007, 2011) conducted a phenomenological analysis of the monumental landscape of Chaco Canyon in the Southwest United States. Focusing on viewsheds and visibility, Van Dyke walked ancient routes into Chaco Canyon, using a video recorder, still photographs, and thick description to convey her bodily experiences. Van Dyke found a series of nested dualisms or oppositions illustrated by monumental architecture and by the placement of these buildings in dramatic topographic settings. She argued that Chacoan builders intentionally designed a spatial experience to legitimate their power for pilgrims to this "center place." Van Dyke supported her essentially structuralist interpretations with indigenous Pueblo ethnography and ethnohistory.

Hamilton and Whitehouse (2006) were among the first to move phenomenological work beyond visual perception and monumental architecture. They investigated Neolithic sites identifiable as artifact scatters in plowed fields in northeast Italy. Hamilton and Whitehouse incorporated sound, smell, and gendered bodily differences into their research. They worked to develop explicit, replicable phenomenological methods. Like Cummings and her colleagues, they drew 360° panoramas from the center of each site, recording near and distant landmarks and horizons. Hamilton, Whitehouse, and their team systematically walked out and back from sites over set periods of time, periodically recording observations. They conducted experiments to identify distances for different kinds of intervisible interactions (e.g., signaling v. presence of a human form) and vocal interactions (normal speech v. shouting). Hamilton and Whitehouse noted gendered differences along all of these dimensions. Their work is a significant contribution towards a phenomenological methodology.

Current Debates

Human beings do not experience spaces as abstract, empty containers. Phenomenology in archaeology arose as one way to transcend the

sterile, objectifying, treatment of landscapes in more traditional methods such as settlement pattern analysis or catchment analysis. Advocates contend that phenomenological approaches help archaeologists to think about past peoples' meaningful, memory-laden, emotional, sensory, and metaphorical connections with their surroundings. For archaeologists using practice theory, in which people and their worlds are mutually, continually engaged, phenomenology provides a method for investigating those reflexive constructions.

Nonetheless, the critics of phenomenology in archaeology are many and vocal. Major appraisals to date include Joanna Brück's (2005) measured assessment, Andrew Fleming's (1999, 2005, 2006) scathing dismissals, and John Barrett and Ihlong Ko's (2009) philosophical analysis. Criticisms may be roughly grouped into two categories – those that focus on faulty or incomplete methods and analyses and those that revolve around larger questions of ontology and epistemology. In the first set of criticisms, scholars have argued that phenomenological archaeology lacks replicability and methodological rigor, fails to contend with past/present environmental differences, ascribes a monolithic universality to bodily experience, fails to acknowledge that experience is culturally constructed, privileges the visual, and emphasizes description at the expense of power relations. In the second group of criticisms, scholars have pointed out that phenomenological archaeology has a tendency to devolve into structuralism, represents a misuse of Heidegger (who was, furthermore, a Nazi sympathizer), conflates association and causation, and lacks epistemological legitimacy. Many of these critical points – particularly those in the first batch – have merit and should lead phenomenological archaeologists towards stronger interpretations. Other criticisms – particularly those in the second group – are grounded in fundamental epistemological differences among researchers and, thus, are unlikely to be resolved.

Faulty or Incomplete Methods and Analyses

Phenomenological interpretations originate with the subjective experience of the researcher. The researcher's bodily experience is meant to provide her with insight into the intentions of past builders. But in order for a credible body of knowledge to be constructed, the subjective researcher's bodily experience should be replicable by others. Fleming revisited some of Cummings and Whittle's megalithic sites and did not see what they saw, leading him to conclude that phenomenology does not constitute a legitimate epistemological method. Rather, Fleming argues that phenomenologists produce nothing more than the researchers' own contemporary, romantic perceptions of contemporary landscapes. Hamilton and Whitehouse concurred with Fleming that phenomenology needs replicability and methodological rigor. They developed a set of standardized forms for researchers to use in recording phenomenological observations, and they carried out work in teams rather than as solitary walkers.

Clearly, the archaeological landscapes of today are not identical to the cultural landscapes of the past, even when there is relatively good architectural preservation. Phenomenologists should take into account changes in vegetation, weather, seasons, and architecture. Nonetheless, past landscapes no longer exist – contemporary landscapes can only provide researchers with partial, distorted experiences. Just as the landscape is not constant, neither is the human body. Phenomenology proceeds from the assumption that bodily experiences of landscape are to some extent universal, but bodily experiences surely would have been dissimilar for individuals of different ages, genders, and social standings. Hamilton and Whitehouse engaged with this point through their work on Neolithic ditched enclosures in Italy. Rather than assuming a universal (and by default, male) human body, they explicitly incorporated and recorded gendered differences in bodily movement and perception.

But even if bodies, topographies, and features could be held constant, spatial experiences are – as Bourdieu has taught us – culturally constructed. Although human bodily configurations are to some extent always shared, past sensual perceptions were culturally situated and might be quite different from our own. For example, phenomenological accounts are often written from the

perspective of the solitary walker encountering the past for the first time – but past meanings were created and negotiated by people as participants in social worlds engaged in repeated, multiple encounters with places.

Although phenomenologists claim to engage with bodily experience, in practice their work has focused almost exclusively on the sense of vision, revolving around intervisibilities among monuments, or shifting visual perceptions along routes of movement. This is shifting somewhat – Tilley's more recent work incorporates smell and touch. Hamilton and Whitehouse carried out a series of acoustic experiments using different sounds and less systematically noted the presence of various smells. New work in sensory archaeology (e.g., Hamilakis et al. 2002; Day 2013) moves well beyond the visual, monumental landscapes favored in early case studies.

Phenomenological explanations essentialize description to the detriment of explanation, privileging the sensory over the political (Smith 2003: 67–68). Phenomenologists often argue that buildings or landscape elements represent certain ideas, for example, but fail to give their attention to the social and political processes through which these symbols were negotiated. Although power may be an underdeveloped dimension of some phenomenological studies, researchers are well aware that spaces are political (e.g., Tilley 1994: 20–21). Van Dyke, for example, explicitly argued that spatial experiences on the Chacoan landscape were meant to legitimate the power of ritual elites.

Finally, critics contend that phenomenologists lack the means to distinguish between association and causation. Phenomenologists may observe sensory regularities (such as intervisibility with a particular mountain peak), and those observations may be replicable, but this association does not demonstrate that the regularities were meaningful to ancient people. Mountain peaks are tall and are visible from many places. This methodological problem is closely tied with a larger, epistemological issue.

Ontological and Epistemological Objections

The descriptive cast of many phenomenological interpretations emerges from a latent structuralism common to most analyses, including those of Tilley, Cummings, and Van Dyke. Fleming considers that the ancient dualisms identified by phenomenologists are created by the scholars' own modernist worldviews. But even if past peoples did situate architecture to embody structural dualisms, to what extent were these meaningful? Were they intentional? Is a transcendental, abstract, structuralist perspective at odds with a philosophy that posits meaning as created through immediate, participatory, bodily experiences? At the crux of this group of criticisms are fundamental anthropological and philosophical questions about the nature of social meaning and the construction of knowledge. One question has to do with Heidegger's politics.

Heidegger was a member of the Nazi party from 1933 to 1945. For many scholars, this does not detract from the power of his ideas, whereas for others, it is a damning indictment that renders his work ethically unpalatable. Some archaeologists contend that because a scholar's ideology is not separable from his/her thoughts and writings, Heidegger's work is not separable from the fascist ideals he believed in. However, the phenomenological issues Heidegger investigated are part of a philosophical tradition that transcends Nazism. Husserl – his mentor and a major phenomenological philosopher – was, in fact, a Jew by birth, who lost his academic position under the Nazi regime.

Barrett and Ko's (2009) address another problem with archaeologists using Heidegger. Barrett and Ko contend that phenomenological archaeologists have misread the philosopher and would do better to ground their work in Husserl. Their argument may be summarized as follows. For Heidegger, human understanding of the world arises through subjective, experiential encounters, or *zuhanden*. Humans can also construct knowledge through *vorhanden*, or intentional, objectifying inspection, but *zuhanden* creates the context of knowledge and thus must come first. Husserl, by contrast, contends that humans must detach from the world in order to learn about it. Husserlian phenomenology emphasizes conscious and intentional experience. Barrett and Ko (2009) point out that British phenomenologists assume an ahistorical, transcendental vantage point. They treat the

knowing subject as conscious and objectifying, thereby privileging *vorhanden* rather than *zuhanden*. Thus, phenomenology as practiced by such scholars as Tilley, Cummings, and Whittle is really Husserlian rather than Heideggerian.

Barrett and Ko argue that Tilley, Cummings, and Whittle's works contain unstated, problematic premises about ancient builders' intentions. Phenomenological archaeologists have assumed that human action is goal oriented and that monument builders sought to ensure certain visual consequences. Thus, the archaeologists believe the monuments allow them to access the builders' motivations. However, for Heidegger, landscapes and monuments do not inscribe a cultural order – rather, dwelling is an act of engagement with the world, and order is emergent. Top-down structural analyses would appear to be at odds with *Dasein*.

So, are contemporary archaeologists' experiences a legitimate source for interpretations about the past? Barrett and Ko argue that they cannot be, unless we invoke the transcendental universals that are anathema to a Heideggerian phenomenology. Barrett and Ko are correct that analyses that offer nothing more than structuralist descriptions are incomplete and more Husserlian than Heideggerian. But this does not negate the value of phenomenological studies for identifying sensory patterns in the material world. This criticism is really a restatement of a fundamental anthropological question about the relationship of agency and structure.

Barrett and Ko conflate the identification of transcendental patterns with the investigation of a deeper question – to what extent are these patterns intentionally constructed, agenda-driven order, and to what extent are they emergent, nondiscursive properties? The relationship between agency and structure is important for understanding ancient political and social order. But before archaeologists can interpret past social worlds, they must first identify patterns that allow them to build interpretations. Phenomenological archaeology provides one means for identifying sensory patterns that may be both discursive and nondiscursive in origin.

Those researchers who do not consider interpretive approaches as valid pathways to archaeological knowledge see phenomenology as at best naïve, at worst a threat to archaeological authority. For archaeologists such as Tilley who consider the past to be constructed within a political present, this is less of an issue. All we have, ultimately, is our own culturally situated understandings of the past – we cannot "access" the "true" past. However, this position threatens the authority of archaeologists as singular arbiters of knowledge about the past, leading some to consider phenomenology as quite dangerous (witness the vitriol in Fleming's attacks). The crux of the dispute is epistemological – what are the acceptable avenues by which we can construct knowledge? Philosophers have been struggling with this question from Plato and Aristotle onwards, so it is unlikely that archaeologists will resolve it any time soon.

Future Directions

The full potential of phenomenology in archaeology has yet to be realized. The introduction of explicitly phenomenological approaches in archaeology is giving rise to several positive developments. In general, there is more of a concern with visual perception and meaning than there has been in the past. Archaeologists are likely to think about lines of visibility from shrines on high places to dramatic, distant peaks, and they are likely to ask questions about whether these connections could have been meaningful in the past (e.g., Boivin 2004). Following Hamilton and Whitehouse, archaeologists are more aware of gendered and other bodily differences in spatial experience, and they are likely to think about how bodies experience movement across different kinds of topographies (e.g., Scarre 2002). They are conducting systematic experiments to assess differences in movement, sound, or sight across landscape. Increased methodological rigor should help to bolster the perceived legitimacy of phenomenological approaches in the eyes of some critics. These explorations are connected to a burgeoning interest in sensory and haptic archaeologies concerned not just with the visual but also with sound, touch, taste, and smell (see, e.g.,

Gosden 2001; Watson and Keating 1999; Hamilakis et al. 2002; Day 2013). Finally, a great value of phenomenological archaeology is that it challenges scholars of all theoretical persuasions to engage with deeper ontological and epistemological questions.

Cross-References

- ▶ Landscape Archaeology
- ▶ Post-Processual Archaeology
- ▶ Practice Theory in Archaeology

References

Barrett, J.C., and I. Ko. 2009. A phenomenology of landscape: A crisis in British landscape archaeology? *Journal of Social Archaeology* 9 (3): 275–294.

Bender, B., ed. 1993. *Landscape: Politics and perspectives*. Oxford/New York: Berg.

Brück, J. 2005. Experiencing the past: The development of a phenomenological archaeology in British prehistory. *Archaeological Dialogues* 12 (1): 45–72.

Casey, E.S. 1996. How to get from space to place in a fairly short stretch of time: Phenomenological prolegomena. In *Senses of place*, ed. S. Feld and K.H. Basso, 13–52. Santa Fe: School of American Research Press.

Cummings, V., and A. Whittle. 2004. *Places of special virtue: Megaliths in the Neolithic landscapes of Wales*. Oxford: Oxbow.

Cummings, V., A. Jones, and A. Watson. 2002. Divided places: Phenomenology and asymmetry in the monuments of the Black Mountains, Southeast Wales. *Cambridge Archaeological Journal* 12 (1): 57–70.

Day, J., ed. 2013. *Making senses of the past: Toward a sensory archaeology*. Carbondale: Center for Archaeological Investigations, Southern Illinois University.

Fleming, A. 1999. Phenomenology and the megaliths of Wales: A dreaming too far? *Oxford Journal of Archaeology* 18: 119–125.

Fleming, A. 2005. Megaliths and post-modernism: The case of Wales. *Antiquity* 79 (4): 921–932.

Fleming, A. 2006. Post-processual landscape archaeology: A critique. *Cambridge Archaeological Journal* 16 (3): 267–280.

Gosden, C. 1994. *Social being and time*. Oxford: Blackwell.

Hamilton, S., and R. Whitehouse. 2006. Phenomenology in practice: Towards a methodology for a "subjective" approach. *European Journal of Archaeology* 9 (1): 31–71.

Heidegger, M. 1962/1927. *Being and time*. Trans. J. Macquarrie and E. Robinson. Oxford: Blackwell.

Husserl, E. 1960/1931. *Cartesian meditations: An introduction to phenomenology*. Trans. D. Cairns. Boston: Kluwer.

Ingold, T. 1993. The temporality of the landscape. *World Archaeology* 25 (2): 152–174.

Merleau-Ponty, M. 1981/1962. *Phenomenology of perception*. Trans. C. Smith. London: Routledge and Kegan Paul.

Smith, A.T. 2003. *The political landscape: Constellations of authority in early complex polities*. Berkeley/Los Angeles: University of California Press.

Thomas, J. 1996. *Time, culture, and identity*. London: Routledge.

Tilley, C. 1994. *A phenomenology of landscape*. Oxford/Providence: Berg.

Tilley, C. 2004. *The materiality of stone: Explorations in landscape phenomenology*. Oxford/Providence: Berg.

Van Dyke, R.M. 2007. *The Chaco experience: Landscape and ideology at the center place*. Santa Fe: School for Advanced Research Press.

Van Dyke, R.M. 2011. Materialities of place: Ideology on the Chacoan landscape. In *Contemporary archaeologies of the Southwest*, ed. W.H. Walker and K. Venzor, 13–48. Boulder: University Press of Colorado.

Watson, A., and D. Keating. 1999. Architecture and sound: An acoustic analysis of megalithic monuments in prehistoric Britain. *Antiquity* 73: 325–336.

Further Reading

Ashmore, W., and B. Knapp, eds. 1999. *Archaeologies of landscape*. Oxford/Malden: Blackwell.

Basso, K.H. 1996. *Wisdom sits in places: Landscape and language among the Western Apache*. Albuquerque: University of New Mexico Press.

Boivin, N. 2004. Landscape and cosmology in the South Indian Neolithic: New perspectives on the Deccan Ashmounds. *Cambridge Archaeological Journal* 14 (2): 235–257.

Bradley, R. 1998. *The significance of monuments*. London/New York: Routledge.

Casey, E.S. 1997. *The fate of place: A philosophical history*. Berkeley: University of California Press.

Casey, E.S. 2001. Between geography and philosophy: What does it mean to be in the place-world? *Annals of the Association of American Geographers* 91 (4): 683–693.

Cosgrove, D. 1984. *Social formation and symbolic landscape*. Totowa: Barnes and Noble.

De Certeau, M. 1984. *The practice of everyday life*. Trans. S. Rendall. Berkeley/Los Angeles: University of California Press.

Gosden, C. 2001. Making sense: Archaeology and aesthetics. *World Archaeology* 33 (2): 162–167.

Hamilakis, Y., M. Pluciennik, and S. Tarlow, eds. 2002. *Thinking through the body: Archaeologies of corporeality*. New York: Kluwer Academic/Plenum Press.

Jackson, J.B. 1984. *Discovering the vernacular landscape*. New Haven: Yale University Press.

Lefebvre, H. 1991. *The production of space*. Trans. D. Nicholson-Smith. Cambridge, MA: Basil Blackwell.
Scarre, C. 2002. Coast and cosmos: The Neolithic monuments of northern Brittany. In *Monuments and landscape in Atlantic Europe*, ed. C. Scarre, 84–102. London/New York: Routledge.
Soja, E.W. 1996. *Thirdspace*. Oxford: Blackwell.
Thomas, J. 2004. *Archaeology and modernity*. London: Routledge.
Tilley, C. 2008. *Body and image: Explorations in landscape phenomenology 2*. Walnut Creek: Left Coast Press.
Tilley, C. 2009. *Interpreting landscapes: Geologies, topographies, identities: Explorations in landscape archaeology 3*. Walnut Creek: Left Coast Press.
Tuan, Y.-F. 1974. *Topophilia*. Englewood Cliffs: Prentice-Hall.
Tuan, Y.-F. 1977. *Space and place: The perspective of experience*. Minneapolis: University of Minnesota Press.
Van Dyke, R.M. 2008. Visual perception in Chaco Canyon, New Mexico: Some phenomenological observations. In *Archaeology and the politics of vision in a post-modern context*, ed. V.O. Jorge and J. Thomas, 278–291. Cambridge: Cambridge Scholars Publishing.

Phillips Spring: Agriculture and Domestication

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The Phillips Spring site (23HI216), discovered in 1973, is within the Pomme de Terre River valley in northern Hickory County, Missouri. The drainage is part of the larger middle Osage River basin that empties into the Missouri River. The Pomme de Terre is familiar to Quaternary specialists as the location of Albert C. Koch's 1840 excavation of the American mastodon and its claimed association with artifacts. More recent investigations, beginning in the mid-1960s, have reevaluated Koch's find as well as examined deeply buried, multilayered sites, among them Rodgers Shelter and Phillips Spring. Systematic excavations of Phillips Spring, an active artesian spring, began in 1974 and continued in the years 1976–1978. The initial investigation (Chomko and Crawford 1978) attempted to locate another late Pleistocene (ca. 40,000–11,700 calendar year b2 k [before AD 2000]) or Holocene (since 11,700 calendar year b2 k [before AD 2000]) (Walker et al. 2009) palynological record that might coincide with the prehistoric habitations in the valley and to provide direct evidence of middle Holocene environmental and climatic conditions in the western Ozark Highland. Ultimately, these goals were largely satisfied. Along the way, even more impressive discoveries were made, including that of potential ancient cultigens (*Cucurbita pepo* [pepo "squash"] and *Lagenaria siceraria* [bottle gourd]). The unimpeachable, deeply stratified contexts of these Phillips Spring discoveries extended the record of plant husbandry for the Archaic of the Eastern Woodlands of North America to a date earlier, in radiocarbon years, than 2250 B.C. (4200 years B.P.). One pepo seed fragment came from alluvium dating about 7000 radiocarbon years ago (5050 B.C.); however, the earliest pepo and bottle gourd seed and rind concentration is younger and dates in radiocarbon years from 3050 to 2250 B.C. (5000–4200 B.P.). These discoveries were a catalyst in reformulations of the Archaic as a period of dynamic adaptation and experimentation with both exotic and local plant resources.

The site is now recognized as the earliest (Smith 1992, 2011) of the Eastern Agricultural Complex (EAC) of North America and the first example of domestication of pepo squash dating to at least 5000 calibrated radiocarbon years ago. Other early EAC representatives are Napoleon Hollow in west Central Illinois, Riverton in east Illinois, Cloud Splitter and Newt Kash in northeast Kentucky, Hayes in Central Tennessee, and Marble Bluff in Northwest Arkansas. Phillips Spring shares with Napoleon Hollow a general cultural identity as part of the Sedalia, Titterington, and, in the Kansas City area of Missouri, Nebo Hill complexes. Explanations of the EAC as an independent center of plant domestication divide into landscape constraints on plant domestication and human population pressure (Smith 2011; Weitzel and Codding 2016). Their physiology, prodigious seed production potential, and ability to propagate without much if any

human intervention (Smith 2011) may well have favored cucurbits to early domestication, especially when combined with moist habitats near active artesian springs. Population pressure is not inconsistent with this notion either, as early to mid-Holocene archaeology records a progressive increase likely causing greater stress on natural food resources (Weitzel and Codding 2016). Under such conditions gardening cucurbits would have been a low-risk/high-return strategy. Undoubtedly, these and other theories will continue to be assessed, as they have now assumed a life of their own.

Phillips Spring is a deep, finely stratified archaeological site with exceptional preservation of normally perishable, not carbonized plant remains. Under these sediments is an equally important, older alluvial record for the late Pleistocene and early Holocene that contains scattered pollen layers. Its remarkable organic preservation stems from the anaerobic environment created by the spring itself. The site contains the best-defined, radiocarbon-dated sequence of Holocene alluvial cut-and-fills in the valley. Just above bedrock is a Late Wisconsin Boreal Forest assemblage dominated by jack pine that dates to ca. 25,350 R.C.Y.B.P. (23,400 B.C.). Unlike other artesian springs in the valley (Haynes 1985), Phillips does not contain a Pleistocene bone bed.

The archaeology of Phillips Spring is dominated by Late Archaic Sedalia phase (ca. 2550–650 B.C. or 4500–2600 years B.P.) encampments that probably represent base camps (Haynes 1985; Kay 1983, 1986; Kay et al. 1980). Subterranean food storage facilities were dug, and large, oval basins were used as steaming pits for communal cooking. The most common food species represented are pepo and the exotic tropical cultigen, bottle gourd, plus native plants among which walnut, hickory, and oak acorns figure prominently (King 1985; see also Chomko and Crawford 1978; Monaghan et al. 2006). Most of these species would have been grown, collected, and stored during the summer and into the fall. Seed and rind morphology of pepo and bottle gourd suggests their growing may have been either for their seeds, as containers, or both. Storage pit construction and use was mainly a summer-fall operation, which could well have continued into the winter or early spring. Adzes dominate the tool assemblage, but simple groundstone tools and a variety of hafted chipped-stone points are present, too. The adzes have been referred to as "Sedalia diggers," but they are clearly heavy-duty woodworking tools. At least one broken Nebo Hill lanceolate of seemingly nonlocal material (presumably from the Nebo Hill region around Kansas City, Missouri) was found along with an occasional wooden tool. Subsequent habitations include Middle and Late Woodland encampments that generally have larger-sized storage pits containing the same suite of plant foods as for the Sedalia phase; one well-defined oval house and a distinctively local, hematite-tempered ceramic are present.

The Phillips Spring site is now beneath the waters of Harry S. Truman Lake, a federal impoundment.

References

Chomko, S.A., and G.W. Crawford. 1978. Plant husbandry in prehistoric eastern North America: New evidence for its development. *American Antiquity* 43: 405–408.

Haynes, C.V., Jr. 1985. *Mastodon-bearing springs and late Quaternary geochronology of the lower Pomme de Terre Valley, Missouri*, Special Paper no. 204. Boulder: Geological Society of America.

Kay, M. 1983. Archaic period research in the western Ozark Highland, Missouri. In *Archaic hunters and gatherers in the American Midwest*, ed. J.L. Phillips and J.A. Brown, 41–70. New York: Academic.

Kay, M. 1986. Phillips Spring: A synopsis of Sedalia Phase settlement and subsistence. In *Foraging, collecting, and harvesting: Archaic period subsistence and settlement in the Eastern Woodlands*, Occasional Paper no. 6, ed. S.W. Neusius, 275–288. Carbonadale: Center for Archaeological Investigations, Southern Illinois University.

Kay, M., F.B. King, and C.K. Robinson. 1980. Cucurbits from Phillips Spring: New evidence and interpretations. *American Antiquity* 45: 806–822.

King, F.B. 1985. Early cultivated cucurbits in Eastern North America. In *Prehistoric food production in North America*, Anthropological Paper no. 75, ed. R.I. Ford, 73–98. Ann Arbor: Museum of Anthropology, University of Michigan, P. 73–97.

Monaghan, G.W., W.A. Lovis, and K.C. Egan-Bruhy. 2006. Earliest Cucurbita from the Great Lakes, Northern USA. *Quaternary Research* 65: 216–222.

Smith, B.D. 1992. *Rivers of change: Essays on early agriculture in Eastern North America*. Washington, DC: Smithsonian Institution Press.

Smith, B.D. 2011. The cultural context of plant domestication in Eastern North America. *Current Anthropology* 52 (S4): S471–S484. The Origins of Agriculture: New Data, New Ideas (October 2011).

Walker, Mike, Sigfus Johnsen, Sune Olander Rasmussen, Trevor Popp, Jørgen-Peder Steffensen, Phil Gibbard, Wim Hoek, John Lowe, John Andrews, Svante Björck, Les C. Cwynar, Konrad Hughen, Peter Kershaw, Bernd Kromer, Thomas Litt, David J. Lowe, Takeshi Nakagawa, Rewi Newnham, and Jakob Schwander. 2009. Formal definition and dating of the GSSP (Global Stratotype Section and Point) for the base of the Holocene using the Greenland NGRIP ice core, and selected auxiliary records. *Journal of Quaternary Science* 24 (1): 3–17.

Weitzel, E.M., and B.F. Codding. 2016. Population growth as a driver of initial domestication in Eastern North America. *Royal Society Open Science* 3: 160319. https://doi.org/10.1098/rsos.160319.

Phon, Kaseka

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Basic Biographical Information

Kaseka Phon graduated from the Faculty of Archaeology, Royal University of Fine Arts in Phnom Penh, Cambodia, in 2000. He is currently Director of the Archaeology Department at the Royal Academy of Cambodia, as well as a Ph.D. candidate at the same institution.

Major Accomplishments

He has extensive archaeological research experience across Cambodia. His research on the Cheung Ek archaeological site began in 2002. In 2002 he worked on "The East Cambodia Archaeological Survey" organized by the NAGA Research Group. In 2003–2004, he worked at the site of Phnom Borei, Takeo province, exploring its relationship with the nearby site of Angkor Borei. In 2004–2005, he began site survey and mapping at Cheung Ek with support from the NAGA Research Group. In 2005–2006, he worked on a site-mapping project in Ang Snoul district. Fieldwork at Cheung Ek continued in 2007 with a project of archaeological investigation and CRM supported financially by the US Embassy. In 2007, he conducted survey and mapping in Baray district, Kampong Thom province, as well as directing the Sre Ampil Archaeological and Conservation Project supported by the Center for Khmer Studies (CKS). In 2008, this project was expanded into a theoretical and practical training workshop in order to develop a coherent research and teaching program in the field of archaeology at the site of Sre Ampil. The CKS Junior Faculty Training Program (JFTP) as well as the Scaler Foundation and the Rockefeller Foundation jointly funded the project. In 2009, he trained site guardians at Prasat Banteay Chmar in a project funded by the Friends of Khmer Culture. That same year, he participated in the Industries of Angkor Project (INDAP), directed by Dr. Mitch Hendrickson at Preah Khan of Kompong Svay, Preah Vihear province. In 2011 and 2012, Kaseka Phon directed two projects supported by the Royal Academy of Cambodia. The first involved site survey and mapping in Trapeang Prasat district, Udor Mean Chey province. The second project involved survey and mapping of Buddhist Vihara Mounds at Udong and Lovek Cities. Most recently, he has returned to do fieldwork at the site of Cheung Ek, examining ceramics kilns and temple foundations in this area, as well as creating a ceramic typology. To date (August 2012), 61 pottery kilns and 11 temple foundations have been recorded. The survey and upcoming excavation is supported by the Friends of Khmer Culture. He also has been involved in many translation projects including *Early Cultures of Mainland Southeast Asia* by Dr. Charles Higham (funded by the Luce Foundation), a guidebook entitled *Guidelines for Stone Conservation and Preservation in Angkor* (funded by German Apsara Conservation Project) and *Archaeometallurgy* (funded by the Center for Khmer Studies).

Cross-References

► Cambodia: Cultural Heritage Management
► Post-Khmer Rouge Cambodia, Archaeology in

Further Reading

Coe, M.D. 2003. *Angkor and the Khmer civilization*. New York: Thames and Hudson.
Higham, C. 2001. *The civilization of Angkor*. Berkeley: University of California Press.

Phytolith Analysis on Soil and Ceramic Thin Sections

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Introduction

Opal phytoliths basically make up a kind of puzzle of inorganic bodies accumulating within different plant organs (such as leaves, inflorescence bracts, fruits, and seeds) and tissues (such as the epidermis, the vascular, or the parenchymatic tissues) of many plants. Such a puzzle is often composed of many different shapes or morphotypes, a phenomenon called multiplicity (Rovner 1971). Similar morphotypes can also occur within related and unrelated plant taxa, a phenomenon called redundancy (Rovner 1971). Therefore opal phytolith analysis and their botanical identification are a complex matter. As they accumulate within plant tissues and organs, any opal phytolith signature in soils and sediments implies depositional processes that include the decomposition of organic matter. In the past, it has been assumed this decomposition occurs in situ and as such captures a signature of the local vegetation.

In relation to the botanical identification of phytoliths, the potential of morphometry, the measurement of sizes and shapes, was explored to deal with the multiplicity and redundancy issues. While collecting reference data does not compose a major problem for such studies, applying these data to archaeological material appears more problematic. Without considering the fact that a statistically valid set of measurements needs to be achieved, one needs also to be sure that all the measured phytoliths not only derive from the same plant but also from the same plant organ. Only some specific contexts such as the content of former jars (see, e.g., Berlin et al. 2003) provide such secure sources of phytoliths.

Traditionally, phytolith studies of soils and archaeological deposits involve the taking of bulk samples and placing the material into plastic bags. In the laboratory, the samples are put into various solutions and vigorously stirred to extract the phytoliths. As a consequence, the original distribution (e.g., the puzzle-like structure) of the phytoliths within the soil or sediment is lost ending up in a systematic mixing of phytoliths deriving potentially from different plant organs of different specimen of several plant taxa. This approach thus presumes that all phytoliths within a sample share the same depositional history. In archaeological contexts this is not necessarily the case. Consequently, besides mixing phytoliths with different botanical origin, the classical methods for phytolith analysis also potentially mix phytoliths with different depositional histories, thus creating an artificial signature which amplifies the multiplicity and redundancy issues. This is at the origin of several problematic issues (for a review of some of these issues, see Shillito 2013 and Vrydaghs et al. 2016). Integrating phytolith analysis with micromorphology, the study of sediments and soils in thin sections, composes a useful alternative to the more destructive and disruptive extraction methods commonly used for the analysis of phytoliths in soil and sediments (Vrydaghs et al. 2016).

Definition

Phytolith analysis on soil thin sections is a technique that inventories the distribution patterns of the phytoliths within soils and sediments as well as the phytoliths composing each of these distribution patterns. This allows a better understanding of the origin and depositional history

of the phytoliths. In contrast with classical phytolith studies performed on bulk samples, thin sections preserve the relative distribution of the phytoliths and their relation to other components. By documenting such relationships, classical but still problematic phytolith issues can be addressed, the major ones being their taphonomy and botanical identification.

Historical Background

Phytoliths are frequently reported within soil thin sections of archaeological deposits, being it cave or open-air contexts, from prehistoric to recent periods (Vrydaghs et al. 2017b).

Bullock et al. (1985) present phytoliths as part of the inorganic residues of biological origin. Stoops (2003) is the first to elaborate on a two-dimensional analytical and descriptive system of phytoliths within soil thin sections. It considers shape (angular versus rounded) and surface roughness. As such, this system is relevant for performing morphotypological analysis. He also recommends to note the distribution of the phytoliths while specifying they appear mainly in groundmass and infillings (Stoops 2003: 73–74).

More recently, several studies associating phytolith analysis and micromorphology were conducted (Shahack-Gross et al. 2005; Albert et al. 2008; Barczi et al. 2009; Madella and Lancelotti 2012; Shillito and Ryan 2013; Polo-Díaz et al. 2016). Most of these contributions can be ranged under two broad categories:

- Documenting the presence of phytoliths within archaeological units
- Documenting the phytolith distribution within archaeological units

These studies typically do not attempt to identify or quantify the phytoliths observed in the thin sections.

Since 2000, the phytolith analysis of soil thin sections is part of the routine analysis of urban Dark Earth units in Brussels (Belgium) (Devos et al. 2011). These Dark Earths are thick, dark-colored, homogeneous deposits covering large surfaces often encountered in urban contexts (Nicosia and Devos this volume). The purpose of these analyses is to present a comprehensive account of the phytoliths and their distribution patterns recorded during the scanning of the soil thin sections. Such an approach does not only allow the morphological identification of the opal phytoliths composing the distribution patterns but also to decipher their distribution within the archaeological units. As such, it informs about the processes leading to their incorporation within archaeological deposits. The results underline the potential of phytolith analysis on soil thin sections of archaeological deposits to identify the processes behind the formation of archaeological processes and the identification of several activity areas.

While the observation of opal of biological origin within petrographic thin sections is not uncommon, the systematic examination of phytoliths in ceramic thin sections is rare (Delhon 2005–2006) and presently restricted to a few case studies. To date besides an extensive study of material from the Arabian Gulf (site of Ed-Dur, Umm al-Quwain, UAE) (De Paepe et al. 2003; Vrydaghs et al. 2014), phytoliths have been recorded within thin sections of ceramics from Europe and Central Africa.

Key Issues/Current Debates

A first key issue concerns the taphonomical history of the phytoliths within archaeological deposits. In archaeological research, opal phytoliths are traditionally viewed as indicators of on-site plant use. The basic paradigm of the phytolith taphonomy states that they tend to be released through "decay in place" mechanisms. However, in archaeological contexts, a great variety of agents such as fire (Madella 2003), dung deposition and/or decomposition (Shahack-Gross 2011), and plant processing (Harvey and Fuller 2005) can be at the origin of phytolith deposition. In case the decay takes place after the burial of the plant fragment, the relative distribution phytoliths had within the plant tissues should be preserved

provided the soil or sediment has not been affected by post-burial perturbations. Following their incorporation into the sediment, fossil diagenesis (sensu Madella and Lancelotti 2012) can occur leading to specific (combinations of) distribution patterns within the sediments. The reconstruction of the depositional history as well as the fossil diagenesis of the phytoliths composes a major contribution of the study of phytoliths in soil thin sections.

In order to gain robust phytolith data from the analysis of soil thin sections, the micromorphological study needs to be conducted first. This allows to better understand the taphonomical history of the elements, including phytoliths. Once the taphonomical history is evaluated and described, the phytolith analysis of the soil thin sections can be conducted. The data are obtained through the scanning of zones selected by the micromorphologist. It consists of a three-step approach, namely:

1. A systematic recording of each distribution pattern
2. The subsequent inventory of the phytoliths from each distribution pattern
3. The counting of each phytolith type from each distribution pattern to gain semi-numerical data

So far, three basic distribution patterns of opal phytoliths have been recorded within soil thin sections of archaeological units: isolated, clusters, and articulated.

– Isolated phytoliths are totally disarticulated and widely separated phytoliths (Fig. 1). As their origin cannot be confirmed, they could be viewed as regional paleoenvironmental markers.
– A phytolith cluster consists of a group of disarticulated phytoliths wherein not all phytoliths are necessarily of the same type or share the same orientation (Fig. 2). The clusters are understood as the typical markers of postdepositional perturbations, the physical reworking of the archaeological units being a typical illustration of it.

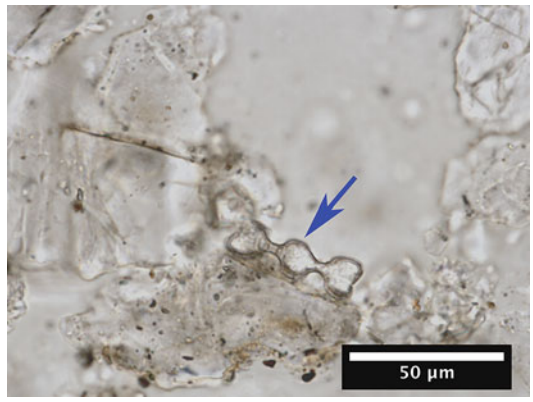

Phytolith Analysis on Soil and Ceramic Thin Sections, Fig. 1 Microphotograph showing an isolated trilobate phytolith (plain polarized light, site of Grote Markt, Lier, Belgium)

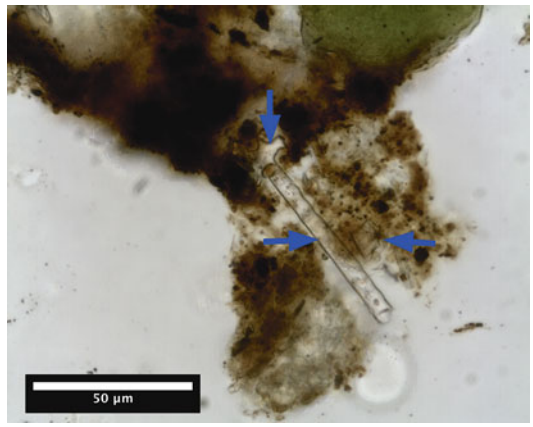

Phytolith Analysis on Soil and Ceramic Thin Sections, Fig. 2 Microphotograph showing a cluster of different morphotypes (plain polarized light, site of Petite Rue des Bouchers, Brussels, Belgium)

– The articulated phytoliths are those that appear to have maintained the relative distribution they had within the plant tissues in which they were produced (Fig. 3). Because this original distribution is largely preserved, scholars have confidence that all these phytoliths share a common botanical origin but also that the plant material was buried and then decayed in situ with no or minimal post-decay disturbance.

The phytolith analysis and description of a single archaeological deposit can record a combination of several patterns with varying

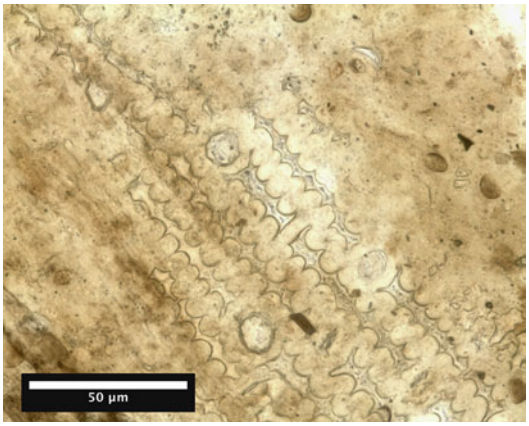

Phytolith Analysis on Soil and Ceramic Thin Sections, Fig. 3 Microphotograph showing an articulated system composed of different morphotypes (plain polarized light, site of Petite Rue des Bouchers, Brussels, Belgium)

frequencies. The combination (or absence of combination) of patterns provides significant criteria to discriminate archaeological layers. Additionally, according to the considered units, the varying frequencies of each pattern provide additional information to discriminate the different units of an archaeological site. These are consequences of the distribution of the phytoliths within the plant tissues and the deposition and decomposition processes of the botanical material as well as post-decay events.

As phytoliths are plant microfossils, their study allows to gather data on past plant communities (for illustration see Piperno 2006). Hence emerges the second key issue: the contribution of phytolith analysis of soil thin sections to archaeoenvironmental and/or archaeobotanical studies. As any phytolith signature is potentially a mixture resulting from human and natural processes, the processes responsible for their incorporation into the archaeological deposits should be identified. Taking into consideration the distribution patterns and their meaning allows to discriminate these processes and, subsequently, to identify a relevant and secure source of data according to the addressed research topic. One of the issues related to the reconstitution of the vegetation relates to the minimal phytolith count size for statistical confidence. Specialists traditionally count between 200 and 400 phytoliths within bulk samples. Recently, for archaeological purposes, a count size of 250 phytoliths was recommended (Zurro et al. 2016). In case of rare but significant phytoliths, this counting must be complemented by a scanning at magnification ×250. Available semi-numerical data point that comparable count sizes of isolated phytoliths can also be achieved by the analysis of soil thin sections (Vrydaghs et al. 2017). This has the advantage, in contrast to the study of the bulk samples, that the depositional history can be taken into account.

Articulated phytoliths in soil thin sections are mainly observed as contiguous or silica skeletons. Regarding the latter ones and again according to the research topics, traditional phytolith analysis advocates the counting of 1 to 200 of them, without clarifying if this means a total of 1 to 200 silica skeletons or a sum of 1 to 200 individual phytoliths being interlocked. The only clear precision comes from research concerned by the search for evidence of agricultural practices involving irrigation. In such cases 300 articulated phytoliths are recommended (Rosen and Weiner 1994).

Morphometric analysis of articulated systems can provide adequate data for the botanical identification with greater reliability than the analysis of isolated phytolith assemblages. Indeed, with articulated phytoliths scholars are confident these phytoliths share a common botanical origin. Typically when trying to discriminate between phytolith assemblages produced by closely related taxa, one must rely on significant differences in the mean morphometries of the taxa. The latter are only reliable if they are calculated from an adequately large sample size. Previous calculated minimal count size for the morphometrical analysis of archaeological phytoliths equals 50 with 4 types of phytoliths being measured, implying that the morphometrical analysis of archaeological material relies on a total of 200 phytoliths (Berlin et al. 2003). For the dendritics, it has been established that with eight articulated phytoliths, the minimum adequate sample size requirements for the morphometry being used to discriminate among the cultivated taxa is already reached (Ball et al. 2017). Compared to previous

approaches, it does not only rely on a consistently smaller adequate sample size but also considers one single type of phytoliths. Integrating phytolith analysis with micromorphology has thus the potential to broaden the perspectives for morphometrical analysis of archaeological phytoliths, provided that reference collections are developed accordingly. Such an effort is currently undertaken for the phytolith deriving from the inflorescence of cereals, the so-called dendritics (Ball et al. 2017).

A third issue concerns the development of the study of phytoliths within ceramic thin sections. Pioneering phytolith studies establish that phytoliths observed within the mineral fabric help refining the source of clay identified by the petrographic analysis. As for those occurring within the voids, experiments indicate they derive from the plant material used as temper (Petö and Vrydaghs 2016). And as the occurrence of phytoliths within voids results from the oxidation of plant material used as temper, it can be assessed that all the phytoliths within a single void share a common botanical origin. This provides an additional source for botanical identification of opal phytoliths. Therefore, specific attention needs to be payed to the distribution of the opal phytoliths, namely, within the mineral fabric or the voids.

International Perspectives

So far, the application of phytolith analysis of soil thin sections from archaeological deposits as described within this entry primarily focuses on the study of Roman and Medieval urban Dark Earth from Northwestern Europe with a major emphasis on contexts from Belgium and Northern France. Recent studies performed on soil thin sections from Çatal Höyük (Shillito 2016) show that these studies can also be applied in older urban contexts.

As for the ceramics, phytolith analysis of soil thin sections have been performed on materials from different periods, originating from different continents (Africa, Asia, and Europe).

Future Directions

Attendance to various international workshops on the micromorphology of archaeological deposits highlights the record of opal phytoliths within soil and sediments thin sections is not restricted to the ones of urban contexts. Thin sections from other contexts with various geographical origins for different time periods, ranging from prehistory to modern times, are also characterized by a phytolith content. This is not surprising considering the huge occurrence of phytoliths within archaeological contexts. So if phytolith analysis of urban contexts, typically having a complex formation history, could be achieved by the means of the analysis of soil thin sections, it implies that it could also be accomplished for other archaeological units with less complex formation processes where the mixing of the material is less marked if not absent. This could consistently enlarge and enrich the contribution of opal phytoliths to archaeological research not only by deciphering their depositional histories but also through their botanical identification.

As ceramics are among the most frequent remains unearthed during excavations, expending the phytolith analyses of petrographic thin sections composes certainly another very large field of investigations. It suggests also that phytolith analysis could be expanded to the study of most of other earthen-based building materials (e.g., beaten floors, daub, and bricks).

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeobotany
- ▶ Archaeological Soil Micromorphology
- ▶ Archaeological Soil Micromorphology Working Group
- ▶ Ceramics: Scientific Analysis
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Phytolith Studies in Archaeology

▶ Phytoliths in Archaeology: Chemical Aspects
▶ Phytoliths in European Archaeological Research
▶ Taphonomy of Plant Micro-remains in Environmental Archaeology
▶ Taphonomy: Definition
▶ Urban Archaeology
▶ Urban Dark Earth

References

Albert, R.M., R. Shahack-Gross, D. Cabanes, A. Gilboa, S. Lev-Yadun, M. Portillo, I. Sharon, E. Boaretto, and S. Weiner. 2008. Phytolith-rich layers from the Late Bronze and Iron ages at Tel Dor (Israel): Mode of formation and archaeological significance. *Journal of Archaeological Science* 35: 57–75.

Ball, T.B., L. Vrydaghs, T. Mercer, M. Pearce, S. Snyder, Z. Liszytes-Szabo, and Á. Petö. 2017. A morphometric study of variance in articulated dendritic phytolith wave lobes within selected species of *Triticeae* and *Aveneae*. *Vegetation History and Archaeobotany* 26 (1): 85–97.

Barczi, A., A.A. Golyeva, and Á. Petö. 2009. Palaeoenvironmental reconstruction of Hungarian kurgans on the basis of the examination of palaeosoils and phytolith analysis. *Quaternary International* 193: 49–60.

Berlin, M., T.B. Ball, R. Thompson, and S.C. Herbet. 2003. Ptolemaic agriculture, "Syrian wheat", and *Triticum aestivum*. *Journal of Archaeological Science* 30: 115–121.

Bullock, P., N. Fedoroff, A. Jonguerius, G. Stoops, and T. Tursina. 1985. *Handbook for soil thin section description*. Wolverhampton: Waine Research Publications.

De Paepe, P., K. Rutten, L. Vrydaghs, and E. Haerinck. 2003. Petrographic, chemical and phytolith analysis of late pre-Islamic ceramic from ed-Dur, Um el-Kawein (U.A.E.). In *Archaeology of the United Arab Emirates. Proceedings of the First International Conference on the Archaeology of the United Arab Emirates*, ed. D. Potts, H. Hasan Al Naboodah, and P. Hellyer, 207–229. London: Trident Press Ltd.

Delhon, C. 2005-2006. Potentiel de l'analyse des phytolithes contenus dans les pâtes céramiques et les matériaux de construction. *Cahier des thèmes transversaux ArScAn* 7: 86–93.

Devos, Y., L. Vrydaghs, A. Degraeve, and S. Modrie. 2011. Unravelling urban stratigraphy. The study of Brussels' (Belgium) Dark Earth. An archaeopedological perspective. *Modern and Medieval Matters* 2: 51–76.

Harvey, E.L., and D. Fuller. 2005. Investigating crop processing using phytolith analysis: The example of rice and millets. *Journal of Archaeological Science* 32: 732–752.

Madella, M. 2003. Investigating agriculture and environment in South Asia: Present and future contributions from opal phytoliths. In *Indus ethnobiology: New perspectives from the field*, ed. S. Weber and W. Belcher, 199–249. Lanham: Lexington Books.

Madella, M., and C. Lancelotti. 2012. Taphonomy and phytoliths: A user manual. *Quaternary International* 275: 76–83.

Nicosia, C., and Y. Devos, this volume. Urban Dark Earth.

Petö, Á., and L. Vrydaghs. 2016. Phytolith analysis of ceramic thin-sections. First taphonomical insights from experiments with vegetal tempering. In *Insight from innovation. New light on Archaeological ceramics. Papers presented in honour of Professor David Peacock's, contributions to archaeological ceramic studies*, Southampton monographs in archaeology new series, ed. E. Sibbesson, B. Jervis, and S. Coxon, 57–73. Southampton: The Highfield Press.

Piperno, D.R. 2006. *Phytoliths: A comprehensive guide for archaeologists and Paleoecologists*. Lanham: Altamira Press.

Polo-Díaz, A., M. Alonso Eguíluz, M. Ruiz, S. Pérez, J. Mújika, R.M. Albert, and J. Fernandez Eraso. 2016. Management of residues and natural resources at San Cristóbal rock-shelter: Contribution to the characterisation of chalcolithic agropastoral groups in the Iberian Peninsula. *Quaternary International* 414: 202–225.

Rosen, A.M., and S. Weiner. 1994. Identifying ancient irrigation: A new method using opaline phytoliths from emmer wheat. *Journal of Archaeological Science* 21: 125–132.

Rovner, I. 1971. Potential of opal phytoliths for use in palaeoecological reconstruction. *Quaternary Research* 1 (3): 345–359.

Shahack-Gross, R. 2011. Herbivorous livestock dung: Formation, taphonomy, methods for identification, and archaeological significance. *Journal of Archaeological Science* 38: 205–218.

Shahack-Gross, R., R.M. Albert, A. Gilboa, O. Nagar-Himan, I. Sharon, and S. Weiner. 2005. Geoarchaeology in an urban context: The uses of space in a Phoenician monumental building at Tel Dor (Israel). *Journal of Archaeological Science* 32: 1417–1431.

Shillito, L.M. 2013. Grains of truth or transparent blindfolds? A review of current debates in archaeological phytolith analysis. *Vegetation History and Archaeobotany* 22: 71–82.

Shillito, L.-M. 2016. Simultaneous thin section and phytolith observations of finely stratified deposits from Neolithic Catalhöyük, Turkey: Implications for paleoeconomy and Early Holocene paleoenvironment. *Journal of Quaternary Science* 26 (6): 576–588.

Shillito, L.M., and P. Ryan. 2013. Surfaces and streets: Phytoliths, micromorphology and changing use of space at Neolithic Çatalhöyük (Turkey). *Antiquity* 87: 684–700.

Stoops, G. 2003. *Guidelines for analysis and description of soil and regolith thin sections*. Wisconsin: Soil Science Society of America.

Vrydaghs, L., P. De Paepe, K. Rutten, and E. Haerinck. 2014. Regional exchanges in southeastern Arabia

during the Late Pre-Islamic period phytolith analysis of ceramic thin sections from ed-Dur (UAE). In *Ancient plants and people. Contemporary trends in archaeobotany*, ed. M. Madella and M. Savard, 26–46. Tucson: Arizona University Press.

Vrydaghs, L., T.B. Ball, and Y. Devos. 2016. Beyond redundancy and multiplicity. Integrating phytolith analysis and micromorphology to the study of Brussels Dark Earth. *Journal of Archaeological Science* 68: 79–88.

Vrydaghs, L., J.L. Slachmuylders, T.B. Ball, and Y. Devos. 2017a. Does phytolith analysis of archaeological soil thin sections account for regional and local archaeobotanical data? The example of Brussels (Belgium). *Workshop on integrated microscopy approaches in archaeobotany*. University of Reading, 25–26 Feb, 6.

Vrydaghs, L., Y. Devos, and A. Peto. 2017b. Opal phytoliths. In *Archaeological soil and sediment micromorphology*, ed. C. Nicosia and G. Stoops, 155–163. Hoboken: Wiley.

Zurro, D., J.J. Garcia-Granero, C. Lancelotti, and M. Madella. 2016. Directions in current phytolith research. *Journal of Archaeological Science* 68: 112–117.

Phytolith Studies in Archaeology

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Introduction

Phytolith analysis is a micro-botanical technique used in archaeology to study ancient plant remains. Phytoliths are opaline silica bodies formed during the lifetime of a wide variety of plant taxa within and between certain cells. These micro-remains can provide insight into ancient diet, the non-food uses of plants (such as for fuel or weaving), spatial arrangements of plant use and discard across settlements, agricultural practices, and seasonality of pre-agrarian site occupations. The durability of these micro-remains makes them particularly valuable at archaeological sites where preservation conditions are not suited to the survival of charred, desiccated, or waterlogged macro-remains. Phytoliths provide both complementary and unique information about plant use at sites where charred macrobotanical remains (cereals, seeds) are present since these datasets preserve information about different suites of plant parts and enter the archaeological record through different taphonomic routes. Outside the field of archaeology, phytoliths from soils and sediments are frequently used to reconstruct vegetation and climate histories.

Definition

The term phytolith derives from the Greek for plant "phyton" and stone "lithos." The term phytolith is most commonly used to discuss silica particles within plants, especially within archaeological studies, but does also refer to other types of mineral deposits. Only silica particles are discussed here. Phytoliths are formed when monosilicic acid (H_4SiO_4), present within groundwater, is taken up by various plant families and deposited as opaline silica within or between certain plant cells. Phytoliths are generally silt sized and have a refractive index of 1.41–1.47 and a specific gravity between 1.5 and 2.3. These microfossils are formed in different plant parts, depending on the taxa, and most commonly within epidermal cells of aerial structures (such as leaves, stems, seed bracts, and fruit rinds) but also sometimes within wood, mesophyll, and roots. Silica deposition can be both actively controlled by plants through physiological and genetic mechanisms and in relation to specific cells and passive potentially leading to silicification of a more variable range of cells and areas of plant tissue. For example, the production of grass "short cells" (rondels, saddles, bilobes, and crosses) is considered to be genetically controlled (Fig. 1), but levels of phytolith production and the range of silicified cells can be enhanced by environmental conditions that influence water uptake and soluble silica levels in groundwater (Mithen et al. 2008; Madella et al. 2009). Areas of epidermal tissue can become silicified, and these conjoined phytoliths are commonly referred to as silica skeletons (Fig. 1) (Rosen 1992). Sometimes, silica skeletons can be macroscopically visible; at Çatalhöyük, evidence for

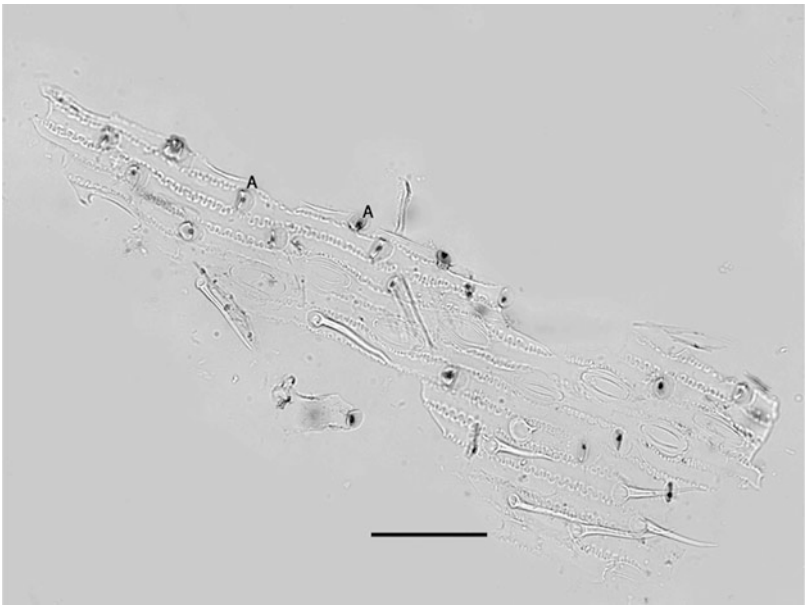

Phytolith Studies in Archaeology,
Fig. 1 Silica skeleton from *Triticum dicoccoides* leaf (wild emmer wheat), including rondel phytoliths (*A*); scale bar, 100 μm. (Image: PL Ryan; copyright Trustees of the British Museum)

basketry and brick temper survives as whitish traces of whole plant parts (Ryan 2011).

Historical Background

Phytolith research emerged in the early nineteenth century, and there are several distinct periods of phytolith research (Piperno 2006). In the 1830s, Christian Gottfried Ehrenberg coined the term "phytolitharia" and famously recognized these fossilized plant cells in dust samples collected by Darwin on the HMS Beagle voyage. From the end of the nineteenth century through to the mid-1930s, a phase of botanical studies was centered around Germany, and also during this time frame, cereal phytoliths were first recognized at archaeological sites. A broader range of botanical and ecological studies, including paleobotanical research, began from the 1950s, and in 1971, Irwin Rovner published a key article about the use of phytoliths in paleobotanical studies (Rovner 1971). From the end of the 1970s, large-scale research projects began to investigate vegetation histories and prehistoric plant use in the New World lowland tropical forest, as well as elsewhere in the Americas (Piperno 2009). Dolores Piperno (1988) published the first major book dedicated to phytolith research. Numbers of phytolith studies increased substantially during the 1990s and dramatically from 2000 onward.

Key Issues/Current Debates

Research questions addressed with phytolith analysis include the study of ancient diet, plant domestication, crop processing, non-dietary uses such as for fuel, spatial arrangements of plant use at archaeological sites, and the identification of ancient field systems. There are interpretative considerations specific to different geographic regions, for instance, concerning the degree of taxonomic information that relevant taxa can provide. Different site types, such as caves, shell middens, and urban settlements, also necessitate particular approaches. Ongoing investigation to establish phytolith identification criteria and to understand taphonomic factors remains important fields of research for phytolith studies both within and outside of archaeology.

Taphonomic Considerations

There are many factors to be considered when interpreting the phytolith record, including phytolith formation within plants, the cultural pathways

of plants into the archaeological record, and post-depositional factors. A recent review of pre- and postdepositional processes can be found in Madella and Lancelotti (2012). Phytoliths are released into soils when plants decay or are burnt, and for the most part, those in archaeological sediments will act as good indicators of on-site plant use (Piperno 2006: 105). In general, phytoliths are not transported over long distances with some exceptions, such as dust or sandstorms. The potential impact of factors such as soil formation and bioturbation may vary by region and site type. Although very robust, phytoliths can be destroyed in very alkaline soils (above pH 9). The shape and chemical properties of individual phytoliths can variably impact rates of dissolution (Piperno 2006: 108, 123). Phytoliths can also be mechanically damaged, for instance, through trampling or sweeping in antiquity. Different laboratory processing methods will also affect numbers of conjoined cells in silica skeletons (Jenkins 2009).

Sampling and Archaeological Questions

Sampling strategies will vary depending upon site type, for instance, between tell sites, shell middens, or caves. Samples should be taken, when possible, from tightly defined features likely to contain concentrated plant remains, such as storage areas, hearths, and ash lenses, as phytolith data may then reveal information about the specialized functions of certain areas (Piperno 2006: 83). In sites (or areas of sites) where no clear features are apparent, samples can be taken at regular intervals across surfaces or vertically between site levels. Control samples from sterile layers or off-site sediments are also important. Most samples are taken in the field, but samples of micro-lenses can also be taken from micromorphological blocks in the laboratory (Madella and Lancelotti 2012).

Sediment samples taken for phytolith analysis can be taken at two scales of analysis: at the scale of the excavation unit defined by site excavators and from smaller "spot" samples within these units. These "small-scale contexts" can be used to examine microdistribution patterns (Rovner 2001). Spot samples can be taken across horizontal surfaces, for example, across floors within buildings. Spot samples can also be taken vertically from micro-lenses within sections, for instance, through floors or rubbish deposits to investigate specific depositional events. Alternatively, for contexts such as rubbish deposits, subsamples from bulk sediments (at the scale of the excavation unit) may be useful for analyzing temporal and spatial trends by enabling a greater number of archaeological contexts to be studied. Such bulk samples are also directly comparable with macrobotanical or faunal datasets in terms of scale. If macroscopically visible silica skeletons are present, these are best sampled with a scalpel and placed in a small glass vial, as the individual signature of the plant will be lost if the silica skeleton disintegrates into surrounding sediments (Ryan 2011). Phytolith samples can also be taken from objects such as grinding stones (Radomski and Neumann 2011) or dental calculus (Henry and Piperno 2008).

Processing and Analysis

Phytoliths are typically extracted from sediments and soils through a series of laboratory steps. Usually around 0.5–2 g of sediment is processed, depending upon phytolith densities within sediments. Processing methods vary between researchers (Albert and Weiner 2001; Rosen 2005; Piperno 2006: 90–92), for instance, organics can be removed through chemical digestion or through ashing in a muffle furnace at 500 °C. Other processing steps include carbonate removal using a 10% solution of hydrochloric acid, clay removal through a settling process and the use of a 5% solution of sodium hexametaphosphate (Calgon) as a clay deflocculant, and a flotation stage using a heavy-density liquid such as sodium polytungstate made to a specific gravity of around 2.35 g/cm ^{3}. Phytoliths can be mounted onto slides using a suitable permanent fixative such as Entallin. Alternatively a liquid mounting medium like immersion oil is useful for studying the three dimensionalities of phytolith forms. Slides are scanned and counted using a light-transmitting microscope at around × 400 magnification. The amount of forms counted by researchers varies but commonly falls within

200–400 phytoliths and partly depends upon the frequency of rare types. Absolute counts (which are a measure of phytolith density) can be calculated per gram of sediment or (depending on processing methods) to the sediment's acid-insoluble fraction (AIF) (Albert and Weiner 2001; Rosen 2005). Relative abundances (percentages) among phytolith categories can also be calculated. There are advantages and biases inherent in using both absolute counts and relative abundances. Relative abundances (%) are useful for comparing phytolith assemblages from varying context categories with different types of sediments but can be problematic when a plant produces extremely large quantities of phytoliths as the variability among other lower phytolith-producing taxa among samples may be obscured. Phytolith images can be taken using a camera attached to a light-transmitting microscope, a scanning electron microscope (SEM) to examine three-dimensional form, or a variable pressure scanning electron microscope (VP-SEM) which enables imaging of cell wall patterning and phytoliths in their anatomical location (Ryan et al. 2012).

Several classification schemes exist for phytolith description. The International Code for Phytolith Nomenclature 1.0 (Madella et al. 2005) aims to create an internationally accepted protocol to describe and name individual phytoliths. Silica skeletons can consist of many types of plant cells arranged in their original anatomical location, and studies by grass systemists such as Metcalfe (1960) can aid identifications.

Key Phytolith Types

Phytoliths provide varying levels of taxonomic information. Some morphologies can be identified to family, subfamily, genus, and more occasionally to species. The greatest quantities and categories of taxonomically identifiable phytoliths are produced by monocotyledonous plants, especially grasses (Poaceae) and also by palms (Arecaceae), sedges (Cyperaceae), and the banana family (Musaceae). Phytoliths are also formed within many dicotyledonous woody tree and shrub plant families. Piperno (2006) provides an extensive review of phytoliths produced by different plant groups.

Grasses produce multiple phytolith forms providing varying levels of taxonomic information. Several important cereals (discussed below) and wild grasses produce diagnostic morphologies identifiable to genus level and more occasionally species. These diagnostic forms are most frequently from grass husks (seed bracts), but sometimes phytoliths from other plant parts are identifiable to genus level, for instance, *Phragmites* sp. (common reed) has recognizable leaf and stem multicell phytoliths (Fig. 2). With notable exceptions, less diagnostic cell types include various types of long cells, hairs, stomata, and bulliforms. Some phytoliths provide anatomical information, for instance, most commonly bulliform cells are associated with leaves and dendritic long cells with husks.

Grass "short cells" can broadly distinguish among several major grass subfamilies (Twiss 1992). The basic groupings are rondel forms (most common in the Pooideae, which includes wheat and barley), bilobe and cross forms (most common in the Panicoideae), and saddle-shaped forms (mostly found within the Chloridoideae subfamily). Pooid grasses have C3 photosynthetic pathways and are common in temperate climates and high altitudes, and chloridoid grasses and most panicoid grasses usually have C4

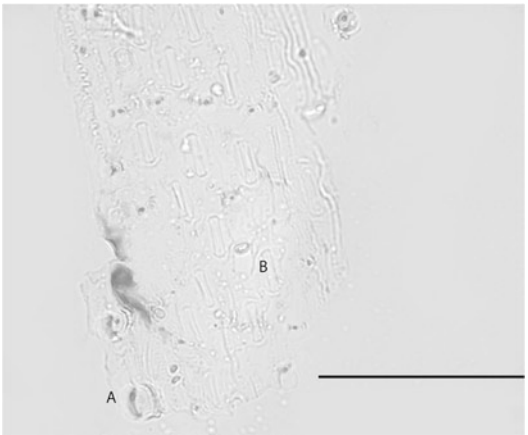

Phytolith Studies in Archaeology, Fig. 2 Multicell phytolith from *Phragmites australis* (common reed) leaf, showing saddle (**a**) and stomata (**b**) phytoliths; scale bar, 100 μm. (Image: PL Ryan; copyright Trustees of the British Museum)

photosynthetic pathways and are common in hotter environments, while chloridoid grasses are usually associated with aridity. There are exceptions; for instance, the saddle-producing chloridoid grass *Aeluropus* spp. grows in wetland habitats spanning arid to temperate climates. Also, some short cell types are present within more than one subfamily, for instance, in the Arundinoideae subfamily rondels and "saddle-topped short trapezoids" are found within *Phragmites australis* (common reed) (Fig. 2) (Ollendorf et al. 1988).

Phytoliths are also abundantly produced by sedges (wetland plants that superficially resemble grasses: family Cyperaceae). The most distinctive "cones" often derive from achenes and achene bracts, while less potentially distinguishing cone forms are also produced in leaf/stem areas (particularly leaves), as well as sometimes other cell types including stomata, hairs, bulliforms, and various types of long cells (Figs. 3 and 4). Phytoliths are also abundant in palms. Genus-level identification is problematic but depends on the range of regional palm genera. In the Near East, "spherical echinate" forms from date palms (*Phoenix dactylifera*) (Fig. 5) can be potentially distinguished from doum palm (*Hyphaene thebaica*) phytoliths that are generally larger and fall into two size groups (Rosen 1992).

Phytolith Studies in Archaeology, Fig. 3 Multicell phytolith from *Carex divisa* inflorescence bracts (sedge); scale bar, 100 μm. (Image: PL Ryan; copyright Trustees of the British Museum)

"Polyhedral," "jigsaw," and hair phytoliths (Fig. 6) are formed in certain dicotyledonous tree or shrub leaves (Bozarth 1992). Phytoliths can also be present within wood and bark, although up to 20 times lower than grasses and absent in some taxa (Albert and Weiner 2001). Silica deposits can be present in parenchyma, in axial parenchyma cells, in fibers, and in vessels (Metcalfe and Chalk 1983: 93). Phytoliths in bark may be secondarily deposited (for instance, from leaves). Phytoliths from woody plants are generally of irregular morphology (Albert and Weiner 2001). Phytolith forms can also derive from outer layers of certain dicotyledonous seeds and nuts, including *Celtis* sp. (hackberry).

Selected Phytolith Studies by Region and Crop Type

Many cereals and other crops have taxonomically diagnostic phytoliths that can be used to investigate plant diet and agriculture. Crop taxa have often been most intensively studied in regions where they were originally domesticated and where preservation of plant macro-remains has been poor – for instance, in lowland tropical areas or at pre-agrarian Epipalaeolithic sites in the Levant.

Phytoliths have been used to study wheat (*Triticum* spp.) and barley (*Hordeum* spp.) agriculture particularly in the Near East, where they were domesticated, and now increasingly in other areas including parts of Europe, Central Asia, and North Africa. The analysis of silica skeletons from Near Eastern cereal crops was pioneered by Arlene Rosen (1992), who outlined several criteria for identifying husks from wheat (Fig. 7), barley, and three wild grasses from the Pooideae subfamily: oat grass (*Avena* spp.), rye grass (*Lolium* spp.), and goat grass (*Aegilops* spp.). Identification criteria are yet to be defined for husk silica skeletons from many Pooideae grasses but can sometimes still be identified as "wild grass husk" (Fig. 8). Key identifying features include the undulating wave patterning created particularly by the dendritic cell walls and the shape and ornamentation of papillae cells (Fig. 7). Individual papillae cells can differentiate between wheat and barley at genus level as well as among

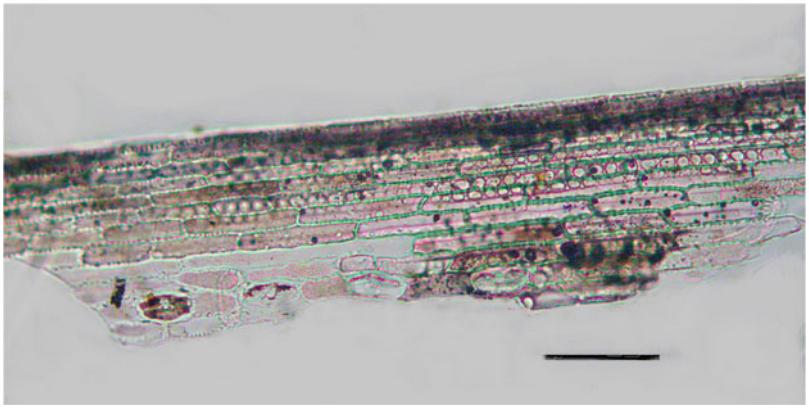

Phytolith Studies in Archaeology, Fig. 4 Multicell phytolith from *Cyperus* sp. leaf (sedge); scale bar, 100 μm. (Image: PL Ryan; copyright Trustees of the British Museum)

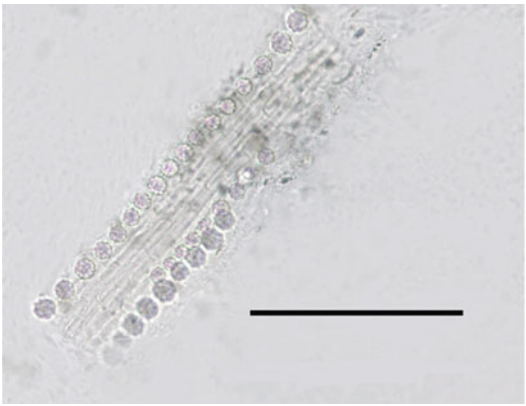

Phytolith Studies in Archaeology, Fig. 5 Globular echinate phytoliths from *Phoenix dactylifera* leaf (date palm); scale bar, 100 μm. (Image: PL Ryan; copyright Trustees of the British Museum)

Phytolith Studies in Archaeology, Fig. 6 Multicell dicot phytolith including hair from *Buglossoides tenuiflora* leaf (gromwell); scale bar, 100 μm. (Image: PL Ryan; copyright Trustees of the British Museum)

certain species (Tubb et al. 1993). Ball et al. (1999) used computer-based scanning software to study the morphometrics of individual husk cells from several wheat and barley species and, from this, developed a classification key as well as discriminant function tests that were able to distinguish among these taxa (confidently to genera and often to species depending on the method). Morphometric analysis of single cells can be applied to sample contexts where phytolith assemblages are likely to contain husks from cereals rather than a wide range of grasses, as other Pooideae grasses may have overlapping cell measurements (Ball et al. 1999).

Archaeological applications of phytoliths in the Near East have been increasingly applied across a wide range of periods and settlement types. For instance, phytoliths have been used to study pre-agrarian shifts toward wild grass exploitation at late Natufian Levantine settlements (Rosen 2010), early agriculture and plant use at Neolithic sites such as Çatalhöyük (Rosen 2005; Ryan 2013), and urban centers such as Bronze Age Tel Dor (Albert et al. 2008). Studies from cave sites including from Middle Paleolithic through to Natufian levels have revealed information about plants used for fuel (Albert and Weiner 2001) as well as about possible Neanderthal wild grass husk exploitation (Madella et al. 2002). Other studies have investigated wheat and barley phytoliths as indicators of crop-growing conditions. A pioneering study by Rosen and Weiner (1994) showed numbers of conjoined cells in

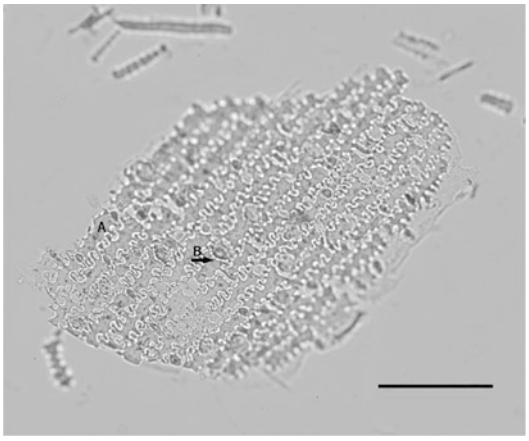

Phytolith Studies in Archaeology, Fig. 7 Silica skeleton from *Triticum durum* husk (durum wheat), including dendritic (**a**) and papillae (**b**) phytoliths; scale bar, 100 μm. (Image: PL Ryan; copyright Trustees of the British Museum)

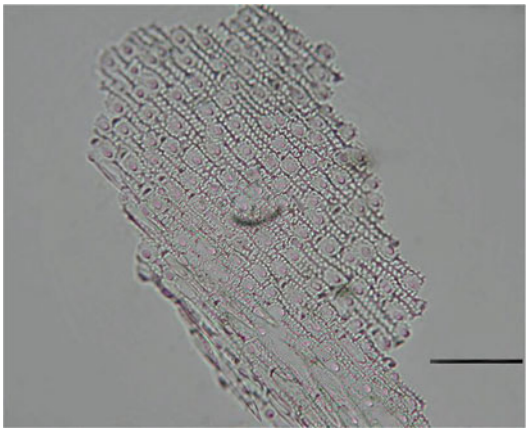

Phytolith Studies in Archaeology, Fig. 8 Silica skeleton from *Bromus* sp. husk (bromegrass); scale bar, 100 μm. (Image: PL Ryan; copyright Trustees of the British Museum)

cereal husk silica skeletons increased with irrigation. Madella et al. (2009) have shown the ratio of short cells and long cells from leaves, and stems can act as an indicator of water availability, while Jenkins et al. (2011) have outlined a further method using the ratio of short cells to dendritic long cells from cereal husks.

New World crop phytoliths, especially maize (*Zea mays*), have a long history of research. Large-scale modern reference studies led by Dolores Piperno and Deborah Pearsall since the late 1970s and centered around the lowland Neotropics have enabled size and morphological criteria to be developed to identify particular cross-shaped phytoliths from maize leaves and to distinguish these from wild grass populations (see references in Piperno 2009). Studies from the subtropical panicoid grasslands of southern South America have shown the criteria hold elsewhere (Iriarte 2003). Distinctive phytoliths within maize cobs were recognized from the mid-1980s in studies by Susan Mulholland and Steven Bozarth in North America (for references see Piperno (2009)). Large-scale reference studies of cob and fruit-case phytoliths have been carried out; maize and its wild ancestor Balsas teosinte (*Zea parviglumis*) can be distinguished, with wavy top rondels diagnostic of maize cobs and ruffle top rondels identifiable at the *Zea* genus level (Pearsall et al. 2003; Piperno 2009). Other well-studied New World crop phytoliths include distinctive scalloped phytoliths from the fruit rind of the *Cucurbita* genus, first recognized by Steven Bozarth in the 1980s, which have been used to study the history of domestic squashes and gourds and sometimes to distinguish between wild and domesticated species (Piperno 2009). Archaeological applications have included investigations of sediments from prehistoric settlement sites and agricultural terraces, as well as of residues from grinding stones and other food-related artifacts including pottery (Piperno 2006, 2009).

The potential of rice phytoliths to investigate the origins of Asian rice agriculture is also well established. Large reference studies of rice and related wild grasses from southern China have been undertaken and phytolith identification criteria established (Pearsall et al. 1995; Zhao et al. 1998). The *Oryza* genera can be identified from double-peaked hair cells (from husks), and further characteristics have been suggested to differ between wild and domestic species, although these remain controversial (Fuller et al. 2010). Other cell types identifiable to the rice genus are keystone bulliforms with flared edges. These show differences between *indica* and *japonica* subspecies of rice, although this variation is also found in wild populations, making application of this useful in regions like Japan without wild rice (Zheng et al. 2003).

Millet phytoliths have seen comparatively less focus. Foxtail and common millet were staple foods across the Far East and also important across Eurasia. Modern phytolith reference studies have defined identification criteria for common millet (*Panicum miliaceum*) and foxtail millet (*Setaria italica*) based on several characteristics of husk silica skeletons including the undulated patterns of epidermal long cells (Lu et al. 2009). Similar criteria have also been developed to distinguish foxtail millet, the predominant Neolithic crop in northern China, from its wild ancestor green foxtail (*Setaria viridis*) (Zhang et al. 2011). The potential of phytoliths for identifying several other millet species is demonstrated by Madella et al. (2013). Harvey and Fuller (2005) investigated how crop-processing models can inform analysis of millet and rice phytoliths and applied their model to a Neolithic site in India.

There have been comparatively few phytolith studies of African crops and archaeological settlements. A recent study has examined inflorescence phytoliths from wild and domesticated West African grasses and applied this to the analysis of phytoliths from archaeological grinding stones in the Eastern Sahara and Western Sahel savannah (Radomski and Neumann 2011). Findings included that certain cross and bilobe phytoliths could be used to group some grasses within the Paniceae tribe and that *Digitaria* (which includes the crop fonio) was distinguishable due to papillae density, while sorghum husks had distinctive bilobes and dendritic long cells. Many Panicoideae grass genera are known, such as *Panicum* and *Sorghum*, to potentially produce husk silica skeletons (Fig. 9), and further identifications of African millet grasses may be possible with multicell identification methods analogous to those applied to common and foxtail millet (above). However, the applicability of this method will depend on the presence of silica skeletons in archaeological samples as opposed to predominantly single cells, which may vary in likelihood among genera and be influenced by plant-growing conditions such as water availability in very dry environments (as well as post-taphonomic factors). Madella et al. (2013) show the potential of husk long cell phytoliths (in single and multicell form) for identifying millet species, including *Sorghum bicolor* and *Pennisetum glaucum* (pearl millet). Phytoliths of bananas (*Musa* sp.) have been shown to differ from those of indigenous African *Ensete* (Vrydaghs et al. 2003). Archaeological applications of phytolith analysis in Africa span vastly contrasting landscapes, time frames, and settlement types, including early modern human plant exploitation from cave sites (Albert and Marean 2012), equatorial forest sites during the Late Stone Age (Mercader et al. 2000) to Late Holocene settlements such as a Numidian site in Tunisia (Portillo and Albert 2011), and the New Kingdom colonial town of Amara West in northern Sudan (Ryan et al. 2012).

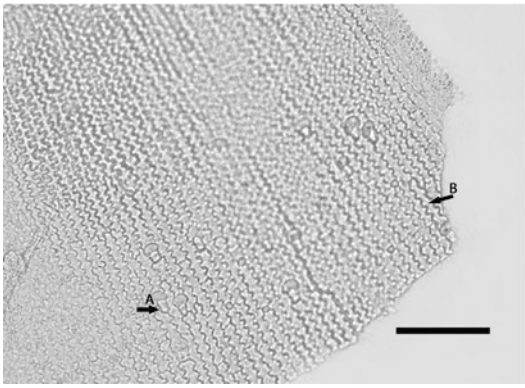

Phytolith Studies in Archaeology, Fig. 9 Silica skeleton from *Sorghum bicolor* husk (sorghum), including sorghum-type bilobe (**a**) and dendritic-type phytoliths (**b**); scale bar, 100 μm. (Image: PL Ryan; copyright Trustees of the British Museum)

For studies from other areas of the world, including Australia, New Zealand, and Central Asia, see references in the further reading section (below).

Patterns of Plant Use, Processing, and Disposal at Archaeological Sites

Phytolith categories found on archaeological sites can provide important information about agricultural practices, habitats exploited, wild plant foods, and non-dietary plant uses. Phytoliths from woody species, palms, grasses, and sedges may provide important information about plants burnt for fuel, while the presence of sedges and reed phytoliths provides information about

wetland exploitation. Phytoliths can potentially be used to study spatial arrangements of plant use and discard across archaeological settlements. Locations of plant use may be suggested through quantified "peaks" of certain phytoliths across surfaces or features studied. It is often possible to identify phytoliths from different plant parts, enabling investigation of crop-processing practices (Harvey and Fuller 2005), as well as the use of leaves and stems in basketry, building materials, and fuel. Distributions of cereal husk or straw phytoliths can be studied to investigate spatial arrangements of cereal storage, processing (such as dehusking), crop by-product disposal, as well as the secondary use of crop-processing by-products.

Different input sources can be explored by investigating a wide range of archaeological contexts and materials. Analysis of varied sample categories at Neolithic Çatalhöyük in Central Anatolia (including storage bins, ovens, fire spots, floors, mudbricks, basketry, and dung pellets) enabled detection of spatial patterns of plant use, processing, and disposal (Rosen 2005, Ryan 2013). Large quantities of plant materials were incorporated into raw materials such as mudbricks, including cereal chaff and wetland plants (Ryan 2011). Samples from storage bins provided information about storage, and locations of cereal dehusking were identified within buildings. Phytoliths from bulk sample analyses (from middens) spanning over 1000 years of site occupation enabled detection of long-term changes in plants present (Ryan 2013), while phytolith samples from micro-lenses from particular midden sequences provided perspectives on discrete episodes of plant deposition (Shillito 2011; Ryan 2013). Animal dung can be an important route for phytoliths into archaeological contexts, for instance, through stabling or the use of dung as fuel, and analysis of calcareous spherulites can be analyzed as a proxy for herbivore dung (Portillo and Albert 2011). At sites where dung pellets are present, phytoliths can be extracted from dissected pellets and may provide perspectives on foddering or grazing practices.

Regionally relevant ethnographic and ethnobotanical studies can provide useful analogies about certain plant uses, such as for food or fuel, and about their processing and disposal. Harvey and Fuller (2005) showed how crop-processing models (derived from ethnographic studies of traditional farming) could be applied to the analysis of millet and rice phytoliths, in terms of interpreting which phytoliths derive from by-products produced by specific processing stages, and this approach is also applicable to other cereals. Prior to storage, crop-processing stages include threshing, winnowing, and sieving. Some cereals, such as glume wheat, require an extra processing stage (potentially post storage) to remove husks. Different by-products created during each stage may potentially be collected for use as fuel or fodder or may become incorporated into other materials such as temper in dung cakes or in building materials. There have been a small number of ethnoarchaeological phytolith studies, such as Tsartsidou et al. (2008), which involve taking samples from present-day or recently abandoned settlements to investigate phytolith signatures from different types of site area or deposits.

Integrating Botanical Datasets

Charred macro-remains and phytoliths can provide unique and complementary data through offering information about different plant parts and by surviving through different taphonomic processes (Bates et al. 2017; Harvey and Fuller 2005; Ryan et al. 2016). Charred macro-remains can identify a wider range of taxa than phytoliths; however, phytoliths will provide information about plant parts that do not frequently survive charring, such as leaves and stems, and about plants present in ashy contexts where charred macros are entirely destroyed by high temperatures. Phytoliths may also provide separate categories of information about plant use in non-burnt site areas or materials. Some studies have also combined starch and phytolith results, especially in the case of samples taken from artifacts or dental calculus and also particularly in studies from the Americas (Henry and Piperno 2008; Madella et al. 2014; Piperno 2009). Starch will provide information about non-phytolith-producing plant parts, including cereal grains and tubers.

International Perspectives

Phytolith research is a worldwide discipline, with two major international conferences. The International Meeting on Phytolith Research (IMPR) is convened by the Society for Phytolith Research. The South American Meeting on Phytolith Research (Encuentros de Investigaciones FitolÃšticas (EIF)) is convened by the Grupo de Estudios FitolÃšticos Aplicados del Cono Sur (GEFACS).

Research trajectories can often be regional, especially when investigating early agriculture. However, many crops have wide geographic distributions in later time periods and are increasingly studied across different continents within phytolith research. Many non-dietary phytolith-producing plants also have wide geographic distributions (such as reeds) and thus relevance to researchers, especially when considering identifications at genus or plant family level. Discussions of approaches to studying phytoliths from certain types of archaeological sites can also have cross-regional relevance, while other research questions pertain to regionally specific cultural or environmental settings.

Future Directions

Certain regions and time periods are less well studied than others, with areas of major crop domestications having the most extensive history of research. There are a number of phytolith-producing crops that have so far seen little/emerging research, such as African cucurbits and various African, southern Indian, and southeast Asian millet grasses (Piperno 2006: 79). Ethnoarchaeological phytolith research projects in contemporary or abandoned settlements offer another new area of emerging research as so far there have only been a handful of research projects using this approach. Future directions could also include further integration between phytolith, charred seed, and charcoal datasets at archaeological sites to provide complimentary datasets from both the same sediment samples as well as comparing overall results. Comparing starch and phytolith results, especially from artifact residues, is a well-established technique in some regions such as the Neotropics (Piperno 2009) and less frequently applied in other areas such as the Near East.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Andes: Origins and Development of Agriculture
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Maize: Origins and Development
- ▶ Millets: Origins and Development
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Paleoethnobotany
- ▶ Phytoliths in Islamic Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Rice: Origins and Development

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References

Albert, R.M., and C.W. Marean. 2012. The exploitation of plant resources by early *Homo sapiens*: The phytolith record from pinnacle point 13B cave, South Africa. *Geoarchaeology* 27: 363–384.

Albert, R.M., and S. Weiner. 2001. Study of phytoliths in prehistoric ash layers using a quantitative approach. In *Phytoliths: Applications in earth sciences and human history*, ed. J.D. Meunier and F. Colin, 251–266. Lisse: A.A. Balkema Publishers.

Albert, R.M., R. Shahack-Gross, D. Cabanes, A. Gilboa, S. Levyadun, M. Portillo, I. Sharon, E. Boaretto, and S. Weiner. 2008. Phytolith-rich layers from the late bronze and Iron ages at Tel dor (Israel): Mode of formation and archaeological significance. *Journal of Archaeological Science* 35: 57–75.

Ball, T.B., J.S. Gardner, and N. Anderson. 1999. Identifying inflorescence phytoliths from selected species of wheat (*Triticum monococcum*, *T. dicoccon*, *T. dicoccoides*, and *T. aestivum*) and barley (*Hordeum vulgare* and *H. spontaneum*) (Gramineae). *American Journal of Botany* 86: 1615–1623.

Bates, J., R.N. Singh, and C.A. Petrie. 2017. Exploring Indus crop processing: Combining phytolith and macrobotanical analyses to consider the organisation of agriculture in Northwest India c. 3200–1500 BC. *Vegetation History and Archaeobotany* 26: 25–41. https://doi.org/10.1007/s00334-016-0576-9.

Bozarth, S.R. 1992. Classification of opal phytoliths formed in selected dicotyledons native to the great plains. In *Phytolith systematics: Emerging issues*, ed. G. Rapp Jr. and S.C. Mulholland, 193–214. London: Plenum Press.

Fuller, D.Q., Y.-I. Sato, C. Castillo, L. Qin, A.R. Weisskopf, E.J. Kingwell-Banham, J. Song, S.-M. Ahn, and J. van Etten. 2010. Consilience of genetics and archaeobotany in the entangled history of rice. *Archaeological and Anthropological Sciences* 2: 115–131.

Harvey, E.L., and D.Q. Fuller. 2005. Investigating crop processing through phytolith analysis: The case of rice and millets. *Journal of Archaeological Science* 32: 739–752.

Henry, A.G., and D.R. Piperno. 2008. Using plant microfossils from dental calculus to recover human diet: A case study from tell al-Raqa'i, Syria. *Journal of Archaeological Science* 35 (7): 1943–1950.

Jenkins, E.L. 2009. Phytolith taphonomy: A comparison of dry ashing and acid extraction on the breakdown of conjoined phytoliths formed in *Triticum durum*. *Journal of Archaeological Science* 36 (10): 2402–2407.

Jenkins, E.L., K. Jamjoum, and S. Nuimat. 2011. Irrigation and phytolith formation: An experimental study. In *Water, life and civilization: Climate, environment and society in the Jordan Valley*, ed. S.J. Mithen and E. Black, 347–372. Cambridge/New York: Cambridge University Press/UNESCO.

Iriarte, J. 2003. Assessing the feasibility of identifying maize through the analysis of cross-shaped size and three-dimensional morphology of phytoliths in the grasslands of southeastern South America. *Journal of Archaeological Science* 30 (9): 1085–1094.

Lu, H., J. Zhang, N. Wu, K.B. Liu, D. Xu, and Q. Li. 2009. Phytoliths analysis for the discrimination of foxtail millet (*Setaria italica*) and common millet (*Panicum miliaceum*). *PLoS One* 4: 1–15.

Madella, M., and C. Lancelotti. 2012. Taphonomy and phytoliths: A user manual. *Quaternary International* 275: 76–83.

Madella, M., A. Alexandre, and T. Ball. 2005. International code for phytolith nomenclature 1.0. *Annals of Botany* 96: 253–260.

Madella, M., M.K. Jones, P. Goldberg, Y. Goren, and E. Hovers. 2002. The exploitation of plant resources by Neanderthals in Amud Cave (Israel): The evidence from phytolith studies. *Journal of Archaeological Science* 29: 703–719.

Madella, M., M.K. Jones, P. Echlin, A. Powers-Jones, and M. Moore. 2009. Plant water availability and analytical microscopy of phytoliths: Implications for ancient irrigation in arid zones. *Quaternary International* 193: 32–40.

Madella, M., C. Lancelotti, and J.J. García-Granero. 2013. Millet microremains–an alternative approach to understand cultivation and use of critical crops in prehistory. *Archaeological and Anthropological Sciences* (published online February 2013). https://doi.org/10.1007/s12520-013-0130-y.

Madella, M., J.J. Garcia-Granero, W. Out, P. Ryan, and D. Usai. 2014. Microbotanical evidence of domestic cereals in Africa 7000 years ago. *PLoS One*. https://doi.org/10.1371/journal.pone.0110177.

Mercader, J., F. Runge, L. Vrydaghs, H. Doutrelepont, C.E.N. Ewango, and J. Juan-Tresseras. 2000. Phytoliths from archaeological sites in the tropical forest of Ituri, Democratic Republic of Congo. *Quaternary Research* 54 (1): 102–112.

Metcalfe, C. 1960. *Anatomy of the monocotyledons I. Gramineae*. London: Oxford University Press.

Metcalfe, C.R., and L. Chalk. 1983. *Anatomy of the dicotyledons, volume II: Wood structure and conclusion of the general introduction*. Oxford: Oxford University Press.

Mithen, S., E. Jenkins, K. Jamjoum, S. Nuimat, S. Nortcliff, and B. Finlayson. 2008. Experimental crop growing in Jordan to develop methodology for the identification of ancient crop irrigation. *World Archaeology* 40 (1): 7–25. https://doi.org/10.1080/00438240701843561.

Ollendorf, A.L., S.C. Mulholland, and G. Rapp Jr. 1988. Phytolith analysis as a means of plant identification: Arundo donax and Phragmites communis. *Annals of Botany* 61: 209–214.

Pearsall, D.M., D.R. Piperno, E.H. Dinan, M. Umlauf, Z. Zhao, and R.A. Benfer Jr. 1995. Distinguishing rice (*Oryza sativa* Poaceae) from wild oryza species through phytolith analysis: Results of preliminary research. *Economic Botany* 49 (2): 183–196.

Pearsall, D.M., K. Chandler-Ezell, and A. Chandler-Ezell. 2003. Identifying maize in neotropical sediments and soils using cob phytoliths. *Journal of Archaeological Science* 30: 611–627.

Piperno, D.R. 1988. *Phytolith analysis: An archaeological and geological perspective*. San Diego: Academic Press.

Piperno, D.R. 2006. *Phytoliths: A comprehensive guide for archaeologists and paleoecologists*. Lanham: Alta Mira Press.

Piperno, D.R. 2009. Identifying crop plants with phytoliths (and starch grains) in Central and South America: A review and an update of the evidence. *Quaternary International* 193: 146–159.

Portillo, M., and R.M. Albert. 2011. Husbandry practices and livestock dung at the Numidian site of Althiburos (el Médéina, kef governorate, northern Tunisia): The phytolith and spherulite evidence. *Journal of Archaeological Science* 38 (12): 3224–3233.

Radomski, K.U., and K. Neumann. 2011. Grasses and grinding stones: Inflorescence phytoliths from modern West African Poaceae and archaeological stone artefacts. In *Windows on the African past: Current*

approaches to African archaeobotany, ed. A.G. Fahmy, S. Kahlheber, and A.C. D'Andrea, 153–166. Frankfurt: Africa Magna Verlag.

Rosen, A. 2010. Natufian plant exploitation: Managing risk and stability in an environment of change. *Eurasian Prehistory* 7 (1): 117–131.

Rosen, A.M. 1992. Preliminary identification of silica skeletons from Near Eastern archaeological sites: An anatomical approach. In *Phytolith systematics: Emerging issues*, ed. G. Rapp Jr. and S.C. Mulholland, 129–148. New York: Plenum Press.

Rosen, A.M. 2005. Phytolith indicators of plant and land use at Çatalhöyük. In *Inhabiting Çatalhöyük, reports from the 1995–99 seasons*, ed. I. Hodder, 203–212. Cambridge: London, McDonald Institute for Archaeological Research, British Institute of Archaeology at Ankara.

Rosen, A.M., and S. Weiner. 1994. Identifying ancient irrigation: A new method using opaline phytoliths from emmer wheat. *Journal of Archaeological Science* 21: 132–135.

Rovner, I. 1971. Potential of opal phytoliths for use in paleoecological reconstruction. *Journal of Ethnobiology* 1 (3): 343–359.

Rovner, I. 2001. Cultural behaviour and botanical history: Phytolith analysis in small places and narrow intervals. In *Phytoliths: Applications in earth sciences and human history*, ed. J.D. Meunier and F. Colin, 119–128. Lisse: A.A. Balkema Publishers.

Ryan, P. 2011. Plants as material culture in the Near Eastern Neolithic: Perspectives from the silica skeleton artifactual remains at Çatalhöyük. *Journal of Anthropological Archaeology* 30 (3): 292–305.

Ryan, P. 2013. Plant exploitation from household and landscape perspectives: The phytolith evidence. In *Humans and landscapes of Çatalhöyük: reports from the 2000–2008 seasons: Chapter 9*, ed. I. Hodder, vol. 8. Los Angeles: Cotsen Institute of Archaeology Press at UCLA.

Ryan, P., C.R. Cartwright, and N. Spencer. 2012. Archaeobotanical research in a pharaonic town in ancient Nubia. *British Museum Technical Research Bulletin* 6: 97–106.

Ryan, P., C.R. Cartwright, and N. Spencer. 2016. Charred macroremains (seeds, fruits) and phytoliths from villa E12.10 at Amara West, a pharaonic town in northern Sudan. In *News from the past: Progress in African archaeobotany*, ed. U. Thanheiser, 95–114. Groningen: Barkhuis Publishing.

Shillito, L.M. 2011. Simultaneous thin section and phytolith observations of finely stratified deposits from Neolithic Çatalhöyük, Turkey: Implications for paleoeconomy and early Holocene paleoenvironment. *Journal of Quaternary Science* 26 (6): 576–588.

Tsartsidou, G., S. Lev-Yadun, N. Efstratiou, and S. Weiner. 2008. Ethnoarchaeological study of phytolith assemblages from an agro-pastoral village in northern Greece (Sarakini): Development and application of a Phytolith difference index. *Journal of Archaeological Science* 35 (3): 600–613.

Tubb, H.J., M.J. Hodson, and G.C. Hodson. 1993. The inflorescence papillae of the Triticeae: A new tool for taxonomic and archaeological research. *Annals of Botany* 72: 537–545.

Twiss, P.C. 1992. Predicted world distribution of C3 and C4 grass phytoliths. In *Phytolith systematics: Emerging issues*, ed. G. Rapp Jr. and S.C. Mulholland, 113–128. New York: Plenum Press.

Vrydaghs, L., R. Swennen, C. Mbida, H. Doutrelepont, E.D. Langhe, and P.D. Maret. 2003. The banana phytolith as a direct marker of early agriculture: A review of the evidence. In *Phytolith and starch research in the Australian-Pacific-Asian regions: the state of the art (Terra Australis 19)*, ed. D.M. Hart and L.A. Wallis, 177–185. Canberra: Pandanus Books.

Zhang, J.H. Lu, N. Wu, X. Yang, and X. Diao. 2011. Phytolith analysis for differentiating between foxtail millet (*Setaria italica*) and green foxtail (*Setaria viridis*). *PLoS One* 6 (5): e19726.

Zhao, Z., D. Pearsall, R. Benfer, and D. Piperno. 1998. Distinguishing rice (*Oryza sativa* Poaceae) from wild *Oryza* species through phytolith analysis, II finalized method. *Economic Botany* 52: 134–145.

Zheng, Y., Y. Dong, A. Matsui, E. Udatsu, and H. Fuijiwara. 2003. Molecular genetic basis of determining subspecies of ancient rice using shape of phytoliths. *Journal of Archaeological Science* 30: 1215–1221.

Further Reading

Archaeobotany Wiki. n.d. Available at: http://archaeobotany.dept.shef.ac.uk/wiki/index.php/Main_Page

Grupo de Estudios FitolÃsticos Aplicados del Cono Sur GEFACS. http://www.santafe-conicet.gov.ar/gefacs/indexeng.html.

Hart, D.M., and L.A. Wallis, eds. 2003. *Phytolith and starch research in the Australian-Pacific-Asian regions: the state of the art (Terra Australis 19)*. Canberra: Pandanus Books.

Hodson, M. n.d. Phytolith homepage. Available at: http://www.hodsons.org/MartinHodson/phytohome.htm

Madella, M., and D. Zurro. 2007. *Plants, people and places – recent studies in phytolith analysis (oxbow monograph)*. Oxford: Oxbow Books.

Meunier, J.D., and C. Fabrice Colin, eds. 2001. *Phytoliths: Applications in earth sciences and human history*. Lisse: A.A. Balkema Publishers.

M. Blinnikov's Phytolith Gallery. n.d. Available at: http://web.stcloudstate.edu/msblinnikov/phd/phyt.html

Old World Reference Phytoliths Version 1.3. n.d. Available at: http://www.homepages.ucl.ac.uk/~tcrndfu/phytoliths.html

Pearsall, D. M. 2011. Phytoliths in the flora of Ecuador. University of Missouri Online Phytolith Database. Available at: http://phytolith.missouri.edu.

Rapp, G., Jr., and S.C. Mulholland, eds. 1992. *Phytolith systematics: Emerging issues*. New York: Plenum Press.

Rosen, A.M. 2007. Phytolith remains from final Natufian contexts at Mallaha/Eynan. *Journal of the Israel Prehistoric Society* 37: 340–355.

The Colonial Williamsburg website. n.d. Available at: http://research.history.org/archaeological_research/collections/collarchaeobot/phytolithSearch.cfm.
The Phytolitharien: Bulletin of the Society for Phytolith Research.
The Society for Phytolith Research. n.d. Available at: *http://www.phytolithsociety.org/*

Phytoliths in Archaeology: Chemical Aspects

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Introduction

Phytoliths have now become almost a routine aspect of many archaeological investigations. They are very widely used in many contexts to gain information about the plant species grown by or associated with humans in the past. Up until relatively recently most workers have used phytolith morphology to investigate archaeological contexts, and still the majority of papers published take that approach. However, there is increasing interest in using the chemical or even isotopic makeup of phytoliths to provide more information than is available merely from using morphology. The second key area where phytolith chemistry is important in archaeology is taphonomy. In particular, phytoliths with different chemistries might be expected to degrade in soils or sediments at different rates, and soil chemical conditions may also affect degradation. Both these factors could seriously impact on the interpretation of phytolith results from archaeological contexts.

Philippa Ryan wrote an excellent overall introduction to the use of phytoliths in archaeology for the *Encyclopedia of Global Archaeology* (Ryan 2014), but of necessity the coverage of the more chemical aspects of phytoliths and their potential for use in archaeology was brief. Although the number of archaeological investigations that have made direct use of phytolith chemistry is so far relatively small, the potential for the future is huge. Chemical aspects can also have potentially large effects on the taphonomy of phytoliths. In this entry I will outline the progress in these areas so far.

Definition

Ryan (2014) gave an overall definition of what phytoliths are in her paper and, like her, I will also only consider siliceous structures. From a purely chemical point of view phytoliths are deposits of amorphous silica that are formed within some plant cells. Other compounds and elements are often included in their structures, and these will be discussed below.

Historical Background

Phytoliths have been studied since the nineteenth century, but it is not easy to say when investigations of their chemistry began. However, it was undoubtedly Jones and Beavers (1963) who produced the first detailed chemical work. They carried out x-ray diffraction, infrared absorption, differential thermal analysis, specific gravity, and refractive index measurements on phytoliths. Another key figure in the early chemical work on phytoliths was François Bartoli whose work on crystallochemistry was seminal, and is still much cited (Bartoli 1985). In more recent times Carole Perry has been a leading figure in research into the chemistry of phytoliths (Currie and Perry 2007).

Key Issues/Current Debates

Phytoliths are found in leaves, flowers, seeds, stems, and roots in many different cell types. So, unlike the situation with pollen grains, a single plant species can produce many different morphological types of phytoliths. This has its challenges for phytolith analysts, but advances in image analysis and statistical techniques are steadily improving our ability to identify species from the mixture of phytolith types often found in archaeological

samples. It is less well recognized that because phytoliths form in different environments in the plant, they are not just morphologically different but chemically heterogeneous. Kumar et al. (2017) assessed the variation between different cell types in grass species. The main deposition sites observed were in the endodermis of the roots, the epidermis of the leaves, and the outer epidermis of the inflorescence bracts. Lesser amounts have been detected in other locations such as the brush hairs at the ends of some cereal grains. There are two main locations where silica deposition leads to formation of phytoliths: the cell wall and the cell lumen. The authors postulated three deposition mechanisms: passive cell wall silicification, controlled cell wall silicification, and deposition in silica cells where the phytolith develops on the external side of a functional plasma membrane. As phytoliths are formed in many different locations in the plant and the mechanisms of their formation are thought to vary, it should not be too surprising that their chemistries differ.

Silica

The silica deposited in phytoliths is amorphous with no order down to the level of 10 Å (Currie and Perry 2007; Hodson 2016b), and has the general formula $[SiO_{n/2}(OH)_{4-n}]_m$, where $n = 0$ to 4 and m is a large number. Occasional reports of crystalline material are probably either due to contamination or the silica being laid down on ordered cellulose molecules. The silica within cell walls is likely to differ markedly from that laid down in the lumen. Where silica is deposited in cell walls, it is laid down onto a carbohydrate matrix. When it is deposited in the cell lumen, the silica would not be expected to contain as much carbohydrate but might well contain the breakdown products of the protoplast: proteins, lipids, and nucleic acids among them. So the silica structure itself will vary depending on the matrix onto which it is laid down. The carbon within phytoliths has received much recent attention. The two other elements in phytoliths that have gained some interest are aluminum and nitrogen. Stable isotopes of silicon, oxygen, and carbon have all been suggested as potential proxies for use in archaeological work, and radiocarbon dating of phytoliths with ^{14}C has been widely used. All of these parameters could be useful in providing information beyond morphological analysis.

Carbon

Jones and Beavers (1963) were the first to measure carbon in phytoliths, estimating that those isolated from a Cisne silt loam had 0.86% C. They suggested that this carbon might be occluded within the phytolith and protected from oxidation (so-called phytolith occluded carbon). Since then there have been many attempts to measure carbon in phytoliths. Acid digestion, heating in a muffle furnace at 450 °C or more, and microwave digestion are the three most usual methods. The results vary depending on the methodology employed from 0.1% to 6.0% C or more (Hodson 2016b). Perhaps surprisingly, this has caused one of the major current controversies in phytolith research. For quite some time, researchers around the world have been interested in whether phytoliths might have the potential to sequester substantial amounts of carbon, and thus contribute to the fight against global warming. The percentage of carbon in phytoliths determined in laboratories using different techniques then has a major influence on the amount of carbon that is thought to be sequestered in soil phytoliths at an ecosystem or even a global scale. Song et al. (2017) consider that very low carbon concentrations are due to extreme preparatory techniques causing the disintegration of the phytoliths. Others have suggested that high carbon concentrations are unrealistic as much of the carbon measured will be labile, easily degraded in the soil, and therefore not strongly sequestered. My concern (Hodson 2016a) is that none of the methodologies used necessarily give good estimates of the carbon present in soil phytoliths. This topic might be considered tangential to archaeological concerns, but the carbon concentration of phytoliths in soils or sediments may be a factor in how quickly they degrade (see "Taphonomy" below).

What form does the carbon take in phytoliths? In cell wall phytoliths, such as those considered by Currie and Perry (2007), carbohydrates are

major components with smaller amounts of protein and amino acids. The type of carbohydrate present has a significant effect on the morphology of the silica produced. Rather less is known about lumen silica deposits, but it is likely that they are much lower in carbohydrates and potentially higher in lipids from the breakdown of membranes and possibly nucleic acids.

Other Elements in Phytoliths

Elements other than silicon, oxygen, and carbon have also frequently been found in phytoliths (Hodson 2016b), and there has been some interest in their use as potential markers in archaeological contexts, but so far I am unaware of any publications that have taken this idea forward.

Bartoli (1985) was among the first to work on aluminum in phytoliths. He found that phytoliths from conifers had a higher aluminum content than those from deciduous trees. Most of the aluminum seemed to be present on the surfaces of the phytoliths, and conifer phytoliths were significantly less soluble as a result. Unlike many other elements, it is possible for aluminum to substitute for silicon in the structure of a phytolith, isomorphous substitution. Carnelli et al. (2002) conducted a survey of 20 species growing in the Valaisan Swiss Alps. They confirmed that phytoliths isolated from woody taxa were higher in aluminum than those of monocotyledons and suggested that this could be used as a marker for woody taxa in paleoecological studies. However, aluminum concentration in phytoliths does not only depend on whether a species is woody but also whether the soil in which the parent plants are growing is acidic and has high available aluminum for uptake (Hodson 2016b).

Nitrogen was first reported in phytoliths at low concentrations by Jones and Beavers (1963). In wheat, Hodson et al. (2008) found between 0.01% and 0.06% N, depending on the organ that the phytoliths were isolated from. Findings like these suggest that amino acids, proteins, and nucleic acids could be among the nitrogenous compounds sequestered in phytoliths. Alexandre et al. (2015) used nanoSIMS to analyze individual wheat phytoliths and observed that both carbon and nitrogen appeared to be distributed throughout these structures and at an N/C ratio of 0.27. As the authors point out this suggests that amino acids are present. The one major attempt to isolate DNA from phytoliths was not successful, but glycoproteins were found (Elbaum et al. 2009). I suspect that as techniques for the detection of DNA get better and better there will be further attempts at isolating it from phytoliths. Success would revolutionize archaeobotany.

Stable Isotopes

There has been considerable interest in using stable isotopes in biogeochemical investigations and some work on isotopes in plant silica and phytoliths. The elements that have been investigated so far in phytoliths are silicon, oxygen, and carbon.

There are three stable isotopes of silicon, ^{28}Si, ^{29}Si, and ^{30}Si, with ^{28}Si being the most common in the environment. The ratios of these isotopes to each other are relatively constant but change when Si is deposited as a solid from a solution, a so-called fractionation event. In some situations the heavier isotopes come out of solution quicker leaving the solution with a greater proportion of lighter isotopes. However, it appears that in flow through situations the lighter isotopes come out of solution faster, leaving the heavier isotopes at greater concentrations in the solution (Hodson 2016b). So in wheat (Hodson et al. 2008), and all other plant species so far investigated, the heavier isotopes are concentrated higher up the shoot and further along the transpiration stream. This is an interesting and highly consistent observation that could eventually have uses in archaeology, as it suggests a method for distinguishing between stem and leaf phytoliths or stem and inflorescence phytoliths. As yet, however, there have been no such applications. Hodson et al. (2008) concluded "At present, then, we feel that the fractionation of heavy Si isotopes into the upper parts of plants is a finding that is awaiting an application." That remains the case.

There are three naturally occurring stable isotopes of oxygen, ^{16}O, ^{17}O, and ^{18}O, and the former is by far the most common in the environment. Because it is lighter, ^{16}O, when present in water molecules, is slightly more likely to evaporate than the heavier isotopes. This has led to many applications in geochemistry, and there

has been some interest in attempting to relate oxygen isotopes in phytoliths to the environments in which plants are growing (Hodson 2016b). However, there are many factors that influence evaporation of water from plants, and these tend to complicate the oxygen signal derived from actively transpiring tissues such as leaves. This led Alexandre et al. (2012) to investigate wood phytoliths in tropical forest trees in Queensland, Australia, that were growing along altitudinal gradients. These phytoliths should not be influenced by evaporation, and Alexandre et al. found that wood phytolith oxygen isotope signatures were related to mean annual soil water isotopic values and to mean annual temperature.

There are two stable isotopes of carbon, ^{12}C and ^{13}C, with the former being more common. These isotopes are important in paleoecology and archaeology as they can be used to distinguish between plants showing C3 and C4 photosynthesis. C3 plants generally prefer more mesic conditions, while C4 plants are better at surviving dry conditions. So the balance between C3 and C4 plants can give an indication of the aridity of the environment. Plants all discriminate against the ^{13}C isotope when it is taken up as carbon dioxide in photosynthesis, but C3 plants do so more than C4 plants. This means that C3 plants such as beans, rice, and wheat have markedly different isotopic signatures to C4 plants such as maize and sugar cane. This isotopic signal is then passed on to animals, including humans that have eaten either C3 or C4 plant products. Not surprisingly there has been some interest in measuring stable carbon isotopes in phytoliths. In general, this work has been successful and, for example, wheat phytoliths showed carbon isotopic signatures within the expected range for C3 plants (Hodson et al. 2008). However, there have been some problems with phytolith carbon signatures not matching those of the whole plant (Hodson 2016b), and this phenomenon has been even more pronounced with work on ^{14}C.

The Controversy Over ^{14}C

When they discovered that carbon was occluded within phytoliths, Jones and Beavers (1963) pointed out that it might be possible to use this in dating. Trace amounts of the radioactive isotope ^{14}C occur naturally in the environment with a half-life of 5700 years, and this is used routinely in dating of all types of materials. From the late 1960s onwards the technique was quite widely used on phytoliths and seemed to give good results. However, in recent years there have been a number of anomalous results reported where phytolith ^{14}C determinations were giving results that were hundreds or even thousands of years older than they were known to be (Piperno 2016). Phytoliths isolated from some modern plant material seem to give much older dates than the plants themselves. This finding has caused a great controversy, and sometimes a heated one, and as I write in 2017 there is still no definitive answer to the problem.

It is generally recognized that most of the carbon in phytoliths originates from photosynthetic carbon uptake. However, Santos et al. (2012) proposed that "old carbon" taken up by plant roots from the soil is transported through the plant and is incorporated into phytoliths, thereby making the phytoliths apparently older than the rest of the plant. They reviewed the evidence that a small amount of carbon is taken up by plants in this way and that it joins the much larger pool of photosynthetic carbon. My question concerning the "old carbon" hypothesis is the mechanism whereby transport of old carbon is focused towards the phytoliths. This would be required if they were to be apparently older than the plants from which they are derived (Hodson 2016b). I suggested that depletion of ^{14}C in lipids within phytoliths might be a possible explanation for the results.

Piperno (2016) analyzed phytoliths isolated from herbarium specimens of neotropical plants collected between 1964 and 2013. She found that the dates obtained were post-bomb ^{14}C dates, reflecting collection of the samples after 1955 after the beginning of thermonuclear testing. There was no suggestion of dates being older than expected, except for one sample which had originally been treated with organic chemicals made from fossil fuels that were radiocarbon dead. Piperno suspects that many of the problems arise from the methodologies used and that surface contamination with old carbon is a major difficulty.

The search for a reliable methodology was the focus of Asscher et al. (2017). They dissolved silica from phytoliths using mild conditions and released insoluble fractions which gave reliable radiocarbon dates. They compared their phytolith dating results with those for seeds from the same contexts at the archaeological site of Bet Shemesh in Israel. For insoluble material that was extracted from phytoliths where the percentage carbon was greater than 40%, the dating results were identical with the seeds. The authors also compared the percentage of modern carbon in phytoliths extracted from wheat plants (97.76%), from cellulose extracted from the plant (99.78%), and from the soil in which the plants were growing (72.53%). They suggested that the lowered modern carbon in the phytoliths was due to uptake of old carbon from the soil.

The importance of carbon dating of phytoliths is well illustrated by the work of Zuo et al. (2017). They used the technique to take the date of rice cultivation in China back to the beginning of the Holocene period between 9000 and 9400 cal year B.P., the earliest dates seen so far. The authors validated these dates by comparing them with other dated materials from the same level or context. The dates observed were apparently not affected by "old carbon." Zuo et al. concluded, "We find no evidence to support arguments from a few investigators that old carbon absorbed from soils bias phytolith dates."

Clearly, we have a major problem here with researchers split into those favoring the "old carbon" hypothesis, and those who think that the difficulties largely arise from methodology. Some look to fractionation events within the plant to explain the phenomenon, and yet others seem to be largely ignoring the issue. Carbon dating of phytoliths is a fundamental issue for many of their applications in archaeological science, and this disagreement needs resolution soon. It seems that the technical problems in obtaining clean samples have largely been overcome, but the problems arising from the "old carbon" hypothesis remain. Why do some researchers find carbon dating of phytoliths is unreliable, but others seem to find no problems? How does "old carbon" from the soil get concentrated into phytoliths? Are other processes within the plant responsible for the observed results? The answers to these questions require detailed investigations of the processes involved in phytolith formation.

Taphonomy

Phytoliths with a variety of chemistries are produced by plants, and these find their way into different archaeological contexts. Many are incorporated into the soil after the plant dies. Some plant parts will be harvested and either eaten or used in other ways. Phytoliths can be found associated with human or animal teeth. Sometimes the plant material will be burnt, leaving the phytoliths in the ash. In all of these situations the chemistry of the phytoliths involved will interact with the chemistry of the environment. In some cases the phytoliths will be highly resistant to dissolution and degradation, while in others they will soon disappear from the archaeological record. So the phytoliths remaining in a sample for morphological analysis will be affected to a considerable extent by chemistry.

Some soil conditions are known to increase the dissolution and breakdown of phytoliths, for example, high soil pH and temperature. Prentice and Webb (2016) investigated a pH range from 4.0 to 10.0, and temperatures between 4.0 °C and 44.0 °C and found that dissolution increased with higher pH and temperature. The authors also took this work a stage further by looking at changes in the isotopic composition of phytoliths during dissolution. In the early stages of dissolution the lighter isotopes ^{28}Si and ^{16}O were preferentially removed from the phytoliths leaving them enriched in heavier isotopes. However, once the surrounding solution reached 30–40% saturation, then precipitation of new silica onto the phytoliths began, and lighter isotopes were redeposited. This study suggests that changes in the isotopic composition of phytoliths after they are deposited in soils or sediments need to be taken into account, and that the complexities in using isotopes resulting from processes within the plant are exacerbated in the post-depositional environment.

Bartoli (1985) determined that aluminum deposited within phytoliths decreased their

solubility. As we noted above, conifer phytoliths are particularly high in aluminum provided that the trees producing them are growing in acidic soils with reasonably available aluminum. So we might expect that conifer phytoliths would dissolve more slowly than those from other species (e.g., grasses) and so might be overrepresented in the depositional environment.

Another factor that is likely to affect the solubility of phytoliths and how quickly they break down in soils or sediments is their organic matter content. When they are lost from the host plant, cell wall phytoliths will have a higher organic content (principally cellulose and other carbohydrates) than lumen phytoliths. I previously assessed the evidence that when this organic matter is lost from the phytolith, either through acid digestion, burning, or degradation in the soil, the remaining silica is fairly porous (Hodson 2016b). Thus, cell wall phytoliths may well be more susceptible to dissolution and breakdown within the soil. More work is undoubtedly needed in this area.

Osterrieth et al. (2009) investigated the taphonomical factors affecting phytoliths deposited in the loess sediments of the Argentinian Pampas. They considered that the moderately alkaline pH of the loess was a major factor in phytolith dissolution. However, they also recognized that the surface/volume ratio of the phytolith type, the amount of impurities within the silica, and the degree of silicification of the original plant cell were also important. Smaller phytoliths have less surface area when compared to their volume, and the authors noted that small rondel and trapezoid phytoliths have less surface pitting than elongates or bulliforms. The most detailed work so far on phytolith taphonomy was conducted by Cabanes and Shahack-Gross (2015). They investigated dissolution of phytoliths isolated from both four modern plant species and archaeological sediments. The phytolith morphotype assemblages from modern plants subjected to controlled partial dissolution were significantly changed from the original assemblages. So different types of phytolith dissolved at different rates and the principal factor involved seemed to be geometric surface area to bulk ratio. These results have major implications for those wishing to use phytolith analysis on archaeological samples. If some phytolith types disappear from the assemblages over time, this could markedly skew interpretation of the data obtained. In conclusion, it appears that even archaeological work focused on using phytolith morphology needs to take the chemistry of the environment and of the phytoliths into account.

International Perspectives

The work outlined in the present entry is of a very interdisciplinary nature, and it is published in a very wide range of journals by scientists from many countries. Unlike many areas within archaeology there is less limitation set by location, and researchers can be anywhere provided that they have a reasonably well-equipped laboratory. There are a number of international meetings where work on the chemistry of phytoliths is discussed. At the latest International Meeting on Phytolith Research (IMPR) held in Aix-en-Provence, France, in 2016, the keynote speaker on phytolith chemistry was Carole Perry. The Integrated Microscopy Approaches in Archaeobotany (IMAA) meeting held in Reading, UK, in February 2017 had many presentations including phytolith work, and mine looked specifically at phytolith development and chemistry. The meetings of Isotopes in Biogenic Silica (IBiS) often feature relevant work, particularly on isotopes, and the most recent meeting was in Girona, Spain, in June 2017.

Future Directions

It has become very clear that phytoliths are deposited in plants in many different locations and that these provide very different chemical environments for deposition (Hodson 2016b; Kumar et al. 2017). Just as the morphology of phytoliths varies within the plant so does the chemistry. Plant scientists are only now beginning to understand this variation. At present our incomplete understanding of the processes involved in phytolith formation is holding up progress in using

phytolith chemistry as a proxy in archaeological contexts. This has even recently affected confidence in dating with ^{14}C. With all isotopes we need a better understanding of partitioning between the phytolith and the rest of the plant. Almost certainly phytoliths in soil and sediments will degrade at different rates depending on their chemistry, but again our knowledge in this area is far from complete. What is really needed is a resurgence in interest among plant scientists and chemists in working out the deposition process in plants and how that affects phytolith heterogeneity. As I write in 2017 it appears that this may be beginning to happen, but time will tell.

Cross-References

- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Dating Techniques in Archaeological Science
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Isotope Geochemistry in Archaeology
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Paleoethnobotany
- ▶ Phytolith Studies in Archaeology
- ▶ Phytoliths in Islamic Archaeology
- ▶ Taphonomy: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology

References

Alexandre, A., J. Crespin, F. Sylvestre, C. Sonzogni, and D.W. Hilbert. 2012. The oxygen isotopic composition of phytolith assemblages from tropical rainforest soil tops (Queensland, Australia): Validation of a new paleoenvironmental tool. *Climate of the Past* 8: 307–324. https://doi.org/10.5194/cp-8-307-2012.

Alexandre, A., I. Basile-Doelsch, T. Delhaye, D. Borshneck, J.C. Mazur, P. Reyerson, and G.M. Santos. 2015. New highlights of phytolith structure and occluded carbon location: 3-D X-ray microscopy and NanoSIMS results. *Biogeosciences* 12: 863–873. https://doi.org/10.5194/bg-12-863-2015.

Asscher, Y., S. Weiner, and E. Boaretto. 2017. A new method for extracting the insoluble occluded carbon in archaeological and modern phytoliths: Detection of 14C depleted carbon fraction and implications for radiocarbon dating. *Journal of Archaeological Science* 78: 57–65. https://doi.org/10.1016/j.jas.2016.11.005.

Bartoli, F. 1985. Crystallochemistry and surface properties of biogenic opal. *Journal of Soil Science* 36: 335–350. https://doi.org/10.1111/j.1365-2389.1985.tb00340.x.

Cabanes, D., and R. Shahack-Gross. 2015. Understanding fossil phytolith preservation: The role of partial dissolution in paleoecology and archaeology. *PLoS One* 10 (5): e0125532. https://doi.org/10.1371/journal.pone.0125532.

Carnelli, A.L., M. Madella, J.-P. Theurillat, and B. Ammann. 2002. Aluminum in the opal silica reticule of phytoliths: A new tool in palaeoecological studies. *American Journal of Botany* 89: 346–351. https://doi.org/10.3732/ajb.89.2.346.

Currie, H.A., and C.C. Perry. 2007. Silica in plants: Biological, biochemical and chemical studies. *Annals of Botany* 100: 1383–1389. https://doi.org/10.1093/aob/mcm247.

Elbaum, R., C. Melamed-Bessudo, N. Tuross, A.A. Levy, and S. Weiner. 2009. New methods to isolate organic materials from silicified phytoliths reveal fragmented glycoproteins but no DNA. *Quaternary International* 193: 11–19. https://doi.org/10.1016/j.quaint.2007.07.006.

Hodson, M. 2016a. Carbon concentrations in phytoliths and carbon sequestration in soil. *Journal of Brief Ideas*. http://beta.briefideas.org/ideas/c2ee0d247f8fc516a87f2b0f385c6031.

Hodson, M.J. 2016b. The development of phytoliths in plants and its influence on their chemistry and isotopic composition. Implications for palaeoecology and archaeology. *Journal of Archaeological Science* 68: 62–69. https://doi.org/10.1016/j.jas.2015.09.002.

Hodson, M.J., A.G. Parker, M.J. Leng, and H.J. Sloane. 2008. Silicon, oxygen and carbon isotope composition of wheat (*Triticum aestivum* L.) phytoliths: Implications for palaeoecology and archaeology. *Journal of Quaternary Science* 23: 331–339. https://doi.org/10.1002/jqs.1176.

Jones, R.L., and A.H. Beavers. 1963. Some mineralogical and chemical properties of plant opal. *Soil Science* 96: 375–379.

Kumar, S., M. Soukup, and R. Elbaum. 2017. Silicification in grasses: Variation between different cell types. *Frontiers in Plant Science* 8: 438. https://doi.org/10.3389/fpls.2017.00438.

Osterrieth, M., M. Madella, D. Zurro, and M.F. Alvarez. 2009. Taphonomical aspects of silica phytoliths in the loess sediments of the Argentinean Pampas. *Quaternary International* 193: 70–79. https://doi.org/10.1016/j.quaint.2007.09.002.

Piperno, D.R. 2016. Phytolith radiocarbon dating in archaeological and paleoecological research: A case study of phytoliths from modern neotropical plants and a review of the previous dating evidence. *Journal of Archaeological Science* 68: 54–61. https://doi.org/10.1016/j.jas.2015.06.002.

Prentice, A.J., and E.A. Webb. 2016. The effect of progressive dissolution on the oxygen and silicon isotope composition of opal-A phytoliths: Implications for

palaeoenvironmental reconstruction. *Palaeogeography, Palaeoclimatology, Palaeoecology* 453: 42–51. https://doi.org/10.1016/j.palaeo.2016.03.031.
Ryan, P. 2014. Phytolith studies in archaeology. In *Encyclopedia of global archaeology*, ed. C. Smith. New York: Springer. https://doi.org/10.1007/9781441904652_2258.
Santos, G.M., A. Alexandre, J.R. Southon, K.K. Treseder, R. Corbineau, and P.E. Reyerson. 2012. Possible source of ancient carbon in phytolith concentrates from harvested grasses. *Biogeosciences* 9: 1873–1884. https://doi.org/10.5194/bg-9-1873-2012.
Song, Z., H. Liu, C.A.E. Strömberg, X. Yang, and X. Zhang. 2017. Phytolith carbon sequestration in global terrestrial biomes. *Science of the Total Environment* 603–604: 502–509. https://doi.org/10.1016/j.scitotenv.2017.06.107.
Zuo, X., L. Houyuan, J. Leping, J. Zhang, X. Yang, X. Huan, K. He, C. Wang, and N. Wu. 2017. Dating rice remains through phytolith carbon-14 study reveals domestication at the beginning of the Holocene. *Proceedings of the National Academy of Science, USA* 114: 6486–6491. https://doi.org/10.1073/pnas.1704304114.

Phytoliths in European Archaeological Research

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Introduction

Phytoliths are now used in archaeological research around the world. Europe was somewhat slow to take this up, but now phytoliths feature in many archaeological investigations. Ryan (2014) provides a good overall introduction to the topic of phytoliths, but here we will expand on her work and look specifically at Europe, where phytoliths are employed in a broad range of archaeological contexts. We will first assess paleoenvironmental studies and particularly those concerned with the development of agriculture. Then we will focus on ethnoarchaeological studies, an important area where phytoliths are now increasingly being used, with the aim of providing a framework for interpreting archaeological phytolith assemblages. We will then move on to consider open-air sites and cave sites, both sites of past human occupation. Finally, we will consider residue studies, assessing recent work on phytoliths on the surface of pottery, in tooth calculus, and associated with lithics (grinding stones, blades, and threshing sledges). We cannot give a full review of all this material but will provide a snapshot of phytolith research in Europe as it stands in 2018.

Definition

We will follow Ryan (2014) in only considering siliceous phytoliths. These can be defined as deposits of amorphous silica that are formed within some plant cells. In our review, we will consider all of the countries that are usually included within Europe, including Russia, but excluding Turkey and the Middle East.

Historical Background

Studies of phytoliths began in the 1800s, but their use in archaeological contexts in Europe is relatively recent. Powers (1992) wrote an excellent history of phytolith research in Europe up until that time. She reported that fairly little archaeological work had happened by 1992 and that was concentrated in three institutions: the Institute of Archaeology in London, the University of East Anglia, and the University of Sheffield. Archaeological work in Europe lagged some way behind that in America, but over the last 25 years, this situation has changed, with a move toward phytoliths being used as a standard archaeobotanical tool.

Key Issues/Current Debates

Studies involving phytoliths in European archaeological research have markedly increased. In many modern investigations, phytoliths are just one of a range of proxies used to investigate past

cultural contexts. Here we will consider the variety of phytolith studies that have been attempted in Europe.

The Paleoenvironment and Anthropized Contexts

Phytolith analyses are systematically used for reconstructing ancient landscapes both in paleoenvironmental and archaeological research. In the past much of Europe was covered by forest, but a large percentage of this has now been removed to make way for agriculture. When land is converted from forest to agricultural use, considerable changes in the plants, the soils, and in the phytolith assemblages are likely to happen. Deák et al. (2017) recently reviewed the changes that occur in soils as they are converted to agriculture and anthropization of the landscape occurs. Among the major changes that have immediate effects are the uprooting of trees, the burning of vegetation, and the disturbance of the soil profile. There follow changes in vegetation with the introduction of crops, plowing, and potentially compaction of the soil as machinery moves over it. All of these factors will affect the phytolith assemblage found in the soil. Therefore, and as a consequence of the increasing importance of concepts such as the Anthropocene in archaeological research, studies on anthropogenic soils that might not enter within a traditional definition of what is an archaeological deposit are also becoming relevant. That is the case with studies of arable fields but also for other realities such as middens, for instance. Here we will consider some contrasting examples of work in this area that illustrate the kind of investigations that can be undertaken.

Verdin et al. (2001) investigated the historical agrosystems in the Rhône mid-valley of southern France, analyzing phytoliths and other proxies in the infilling sediments of field ditches. Using this approach, they were able to observe changes in the vegetation from the Iron Age up until modern times. In this case, it was possible to detect changes in hydrology and climate as well as agricultural practices. Agriculture was evident from 2000BP at the beginning of the Roman conquest until 200BP and modern times, but there was a long gap during the Dark Ages.

Our second example comes from a very different context, medieval Brussels (Vrydaghs et al. 2007). This investigation was carried out as part of an interdisciplinary research program at Treurenberg Gate in the northeastern part of the city. The authors looked at both bulk samples and soil thin sections, which were mostly located across boundaries in the soil profile, and focused on a black horizon believed to originate around the twelfth and thirteenth centuries. They found dendriform phytoliths from barley, oats, and possibly wheat, giving direct evidence of crop cultivation. Micromorphological investigations suggested that this soil horizon had been homogenized, indicating plowing and other types of soil disturbance. Chemical analysis found a high organic matter content of the soil, probably due to intentional fertilizer additions. Physical analysis indicated that several of the soil horizons had a common sedimentary origin. Taken together, all these analyses suggest that this black horizon represented plowed land. This site is unusual as it is now very urban but was once used for agriculture. The work is also a good illustration of the advantages of using phytoliths in combination with other techniques.

In Eastern Europe, there has been a robust pedological tradition, and, accordingly, several phytolith pieces of research have been focused on the study of paleosoils associated with human occupations and on the formation processes of archaeological deposits. Together with these studies, we also find those related to the evolution of local landscapes. In this sense, anthropization of landscapes is a central topic of research, where processes of deforestation take place in parallel to plowing of new areas and the formation of agricultural soils. These changes can be identified by differences in the proportions of coniferous phytoliths (Engovatova and Golyeva 2012). To a great extent, these studies have been devoted to understanding one of the principal archaeological features of Eastern European landscapes: ancient burial mounds that are known as kurgans (Barczi et al. 2009). Our most recent example of work in this area comes from Golyeva and Svirida (2017) who worked on agricultural soils at Myakinino, near Moscow in Russia. The authors studied two

soils, one from beneath an 800-year-old burial mound and one from nearby. It was suggested that when the land is under arable usage, the phytoliths are concentrated along the plow line as they tend to gradually move down the profile over time. While many of the chemical and physical aspects of the soil plow layer had changed over the 700 to 800 years since the soil was buried, the distribution of the phytoliths was similar to the modern soil. This and the presence of dendritic phytoliths from cereal crops in the upper layer of the buried soil were clear signs of previous cultivation.

Ethnoarchaeological Studies

Despite existing debates about the different possible roles of ethnoarchaeology, we can distinguish two specific approaches. Firstly, an approach, which is often known as living archaeology, aims at understanding and studying the material culture and remains of nonindustrial societies. The second approach is a research tool that builds frames of reference (models) that allow the interpretation of the archaeological record. The construction of these models is not only achieved through the study of living societies but also by using different types of documents, being either written sources, figurative representations, or anthropological photographs. These realities and also materials, when used as references, allow the development of hypotheses that address the archaeological inquiry, that is, designing a specific sampling strategy but also choosing the proper techniques that will allow identification of the materials that are considered necessary to answer the selected research questions.

There are several archaeobotanical research programs that have been carried out with this approach and that have been extremely useful in advancing the interpretation of the archaeological record. Given the importance of agricultural societies within archaeological research, the development of archaeobotanical proxies related to the different specific steps of agricultural tasks (such as harvesting, threshing, or pounding) produced a before and after situation. The work started by G. Hillman in the 1970s on carpological assemblages gave us the basis for distinguishing these steps. Therefore, agricultural tasks can also be identified through phytolith analysis as their morphology is very often "tissue dependent." For instance, in the case of cereals (either wild or domesticated), phytoliths from the inflorescences (spikes) can be easily distinguished from those of the stems or the leaves. Ruiz-Pérez et al. (2016) analyzed the results from threshing carried out in a small village in Catalonia (Spain). A specific sampling strategy was designed to identify not only the phytolith assemblages produced by this activity but also their spatial distribution.

As part of this ethnoarchaeological approach, within the Mediterranean basin, several projects have taken advantage of the fact that there are locations in which communities still have a traditional way of life. In Greece, G. Tsartsidou and colleagues are a paradigmatic example of this approach. They recorded phytolith assemblages of an agropastoral community in order to build a reference collection that could reflect the spatial organization of the village. For this purpose, they sampled and studied different areas such as animal enclosures, floors from living areas, storage areas, hearths, and also open areas between structures. They used the information obtained to identify diagnostic features for each of the areas based on phytolith morphotypes and richness, among other features (see Tsartsidou et al. (2009) and Friesem et al. (2014)).

More recently, we are witnessing the development of the concept of anthropic markers. These can be defined as the models based on ethnographic information that address archaeological reality through a multiproxy approach, mostly referring to materials that are non-visible to the naked eye. With this method, phytolith analyses often appear combined with other analyses such as those for organic matter content, multielement analyses, chemical residues, or other archaeobotanical remains. Beyond the application of the anthropic marker concept, multiproxy approaches in which phytolith analyses play a pivotal role are becoming widespread (mostly within prehistorical archaeology).

Finally, experimental archaeology also aims at creating frames of reference for understanding the

transformation of materials through work investment. One of the most important features that we find in archaeological sites is fireplaces. To correctly interpret possible changes in phytoliths caused by burning as well as composition of the phytolith assemblages, controlled experiments have been carried out (Albert and Cabanes 2007). Phytolith analysis is a useful tool to understand the proportion of wood versus other plant material present and that were also used as fuel. Therefore, possible different functions of hearths which were used not only to produce heat, but light or smoke, or to clean surfaces, can be identified.

Open-Air Sites

Open-air sites include a wide range of different archaeological contexts, from Paleolithic campsites to sources of raw materials, past agricultural terraces, or urban villages, among others. Consequently, the questions related to plant management that can be addressed are multiple.

From what we know of history and ethnography, human communities impact their surrounding environments beyond the use of dwellings and their adjacent spaces and the production of agricultural landscapes (see section "The Paleoenvironment and Anthropized Contexts"). For the identification of these areas, the study of organic matter and plant remains becomes essential. That is the case for Birka, a Viking town that existed between AD 750 and 975 on the Baltic Sea (Risberg et al. 2002). In this site, the authors studied a midden area and expected this refuse area to be formed by "(. . .) latrine cleanings, cuttings of shore vegetation, cleaning of ditches and storage areas, and domestic animal dung." To carry out this study, multiproxy research, including phytolith analysis, was designed.

Regarding campsites and villages, which constitute the vast majority of open-air archaeological sites, the use of phytolith analysis as a proxy for distinguishing the use of spaces is the major trend. Within open-air sites, several archaeological features that are found in caves are also present, such as hearths or pits. However, in these contexts, very often there is an obvious structuring of space as remains or whole pieces of pavements and architectural elements are preserved. In specific contexts, walls or even whole villages and different types of buildings are also evident, and entire ancient cities can be studied. In this case, phytolith analysis is used to study features that can be explained as part of plant management dynamics, such as those regarding cereal storage or processing or their appearance in graves, for instance (Hansson and Bergström 2002). But there are also explorative analyses that aim at understanding how space was used, trying to link particular activities to specific spaces or areas of the sites. This can be done at different scales of analysis, which range from habitation units such as rooms (intra-site analysis) to the macroscale (at site level). All these different scenarios imply different sampling strategies that need to be specifically designed to reveal the variability (regarding both richness and distribution) present in that reality under study.

In European archaeology, these studies still remain at an explorative level, in which phytolith analysis is tested and applied mostly:

– To understand specific features (frequently hearths in ancient contexts and structures related to cereal storage for later periods) (Braadbaart et al. 2012; Balbo et al. 2015).

– To carry out controlled sampling: these strategies are devoted to understanding whether phytolith assemblages coming from those specific features or as residues from artifacts are somehow background noise of the site or can be interpreted as specifically linked to activities carried out in concrete locations with specific artifacts (see Tsartsidou et al. 2015).

– As a tool used across single spaces in which we expect plants to play an important role, so that activities can be identified and spaces tagged regarding their socioeconomic function (see Milek and Roberts 2013)

In this last case, open surfaces can be sampled following different strategies that may unveil the spatial patterns from plant processing, matting, and cattle housing or from remains from collapsed roofs, among others. These sampling strategies are still being tested, and the extent to which uncertainty is managed through them still needs to be developed and properly understood.

Cave Sites

The study of human occupation in caves is paramount for the understanding of European prehistory. In central Europe as well as in the Mediterranean basin, caves are a common element within the landscape. Both caves and shelters have been used by human populations for millennia for different purposes, which might include not only habitation but the use of caves as spaces for storage, as barns, for ritual activities, or as spaces for inhumation. Therefore, a variety of archaeological materials may be found in caves, and these activities are often much greater than those that archaeological studies usually record. Besides, the reoccupation of caves has produced long and complex stratigraphic sequences that might span from the middle Paleolithic to Medieval or even later times.

Compared to open-air sites, caves are closed contexts, so the archaeological approach toward them is slightly different than that for open-air sites, and they are usually considered anthropic spatial units per se. In spite of this, non-anthropic sedimentation and plant input also occur, so caves are often not only the record of past human history but can also be explored as archives of environmental and climatic change. However, there has been much debate about using phytolith assemblages from caves as the basis for paleoenvironmental reconstructions. In archaeological sites, part of the plant input constitutes a filtered selection from what there is in the landscape. That means that the anthropic contribution adds to an existing baseline of phytoliths (as a background noise) that is part of preexisting sediments. Therefore, in spite of being closed contexts, in cave archaeology it also becomes paramount to distinguish anthropogenic versus non-anthropogenic phytolith assemblages. The proportion of phytoliths per gram of sediment or AIF (the phytolith richness) can be used in some contexts as a proxy of human occupation. In ancient contexts where little evidence about plant use may be found, such as those corresponding to or before Upper Paleolithic times, the study of diagenesis becomes essential as it affects the calculations that produce a phytolith per gram figure. The investigation of diagenesis allows for understanding of the mineralogical composition of the deposits that would produce changes in the soil (see Karkanas et al. 2002).

Phytolith analysis has been used within cave archaeology to accomplish different aims, the primary focus being the identification of plant input of anthropic origin. This becomes especially relevant to hunter-gatherer occupations in which no other archaeobotanical remains might have been found. Even though until now most phytolith analyses have addressed phytolith preservation and diachronic changes through time, spatial patterning is gaining weight. In these cases, the study of bedding layers as well as the study of fireplaces and general sediments has gained much interest during the last few years (see Cabanes et al. 2010). For later periods, the study of caves as livestock enclosures and phytolith analyses of manures carried out together with spherulite and multielement analysis are throwing much light on changes in animal grazing through time (Alonso-Eguíluz et al. 2017).

Residue Studies

Phytoliths are often found in residues associated with human activities. Three commonly investigated residues are found on the surfaces of pottery, included with calculus on teeth, and associated with implements such as lithics or macrolithics. While most residue studies on teeth and lithics have been carried out in Africa, Australia, America, and the Middle East, in Europe residue studies have mostly involved pottery. However, in this section we will provide European examples from all three contexts as it is quite likely that work in the less popular areas will increase over time.

When people cook in pots, phytoliths may be left behind in the residue. Sometimes plant material is boiled, and sometimes it may be burnt. In many cases phytoliths will be concentrated in the residue which are then found in the carbonized food deposits coating the pots. Even apparently unpromising materials with low phytolith concentrations can provide information when the phytoliths are concentrated. So Hodson et al. (2001) were able to obtain phytoliths from pasta by boiling large amounts in acid. They were then

able to determine that the phytoliths originated from durum wheat (*Triticum durum*) rather than bread wheat (*Triticum aestivum*), as the papilla phytoliths of the latter are larger. Although not in an archaeological context, this is an analogous situation and illustrates the point that phytoliths can be concentrated from food in which they are low in concentration. In archaeological work, Saul et al. (2013) provide a good example of the use of phytolith analysis on residues from pots used in cooking from a number of sites in the western Baltic. They were particularly interested in the spread of spice usage across Europe and found phytoliths from carbonized food deposits on prehistoric pottery dating from 6100 cal BP to 5750 cal BP. The phytolith morphologies were identified as coming from modern garlic mustard seed (*Alliaria petiolata*). The authors considered that this was the first evidence for the spicing of food in European prehistory.

Dental calculus forms at the base of teeth along the gum line in animals and humans. It mostly consists of calcium phosphate but also contains bacteria, remains of food, and other compounds. It is hard and durable, constituting a sealed context where no contamination can take place and has been found to contain phytoliths. Much of the work on phytoliths in dental calculus has occurred outside Europe, but Power et al. (2015) provide a good example of what is possible. They worked on human dental calculus isolated from the teeth of an individual known as the "red lady" who was buried in El Mirón Cave in Northern Spain. The phytoliths found in the calculus included long-cell psilates, cylindroid psilates, hairs, and a mesophyll form. Some of these appeared to be from monocots. The calculus was unusual in that it also contained a variety of unsilicified plant cells, starch grains, fungi, and pollen. The authors suggested that the stability of the calculus microenvironment was probably responsible for the increased variety of findings, as usually only starch grains and phytoliths are found. It was concluded that the "red lady" had a diet that included plant material during the Magdalenian period in Northern Iberia, and this was not confined to meat obtained from hunting.

For many years, Patricia C. Anderson has pioneered work on phytoliths and cutting instruments such as stone blades and threshing sledges. In some cases, phytoliths become attached to the stone blades as cereals are cut, and continual cutting can give the blades a gloss. The use of threshing sledges (tribula) to cut straw leads to the production of silica skeletons (groups of phytoliths that keep their original anatomical connection) that have distinctive cut edges. Much of that work has focused on the Middle East and North Africa, but Anderson has also applied her techniques to European contexts. Anderson and Whittaker (2014) review this work, concentrating most attention on Mesopotamia but also including archaeological investigations in Bulgaria, Cyprus, France, Spain, and Turkey. A considerable amount of Anderson's work has been experimental, cutting modern plant material with newly fashioned stone blades and constructing tribula or finding places where these threshing sledges are still used and obtaining samples from these sites. Using these techniques Anderson and her co-workers have been able to show how agricultural practices diffused from their origins in Mesopotamia into Europe in the Neolithic period.

International Perspectives

Despite a relatively slow start (Powers 1992), the use of phytoliths in archaeological research in Europe has grown rapidly in the last 25 years. The first International Meeting on Phytolith Research (IMPR) was held in Madrid in 1996, and of ten meetings so far, eight have been held in Europe (two each for Spain, France, and Belgium and one each in the United Kingdom and Russia). The last meeting took place in Aix-en-Provence, France, in September 2016. Arising from these meetings, three edited books and three special editions of the journal *Quaternary International* have appeared (see Further Readings). The Integrated Microscopy Approaches in Archaeobotany (IMAA) meetings held in Reading, UK, in 2016 and 2017 had many presentations including phytolith work, and further meetings are planned.

Future Directions

There are many issues that need to be further developed in phytolith research. These include the development of methods aimed at understanding anthropic versus natural input in archaeological contexts. We also need to disentangle which plants were used as raw materials and with which tools (when analyzing phytoliths as residues). Another question relates to the differential production of phytoliths in dicots versus monocots and how to eliminate this bias and standardize data.

When considering Europe, there is a specific need for creating reference collections regarding the use of plants other than cereals in the past. These would include those wild species that are usually gathered and that mostly appear in pre-agricultural contexts but also several other species that have been extensively used for basketry, textiles, and other items. Therefore, there is the need to create ad hoc reference collections for European contexts, which include a wide chronology and several different landscapes and plant resources, ranging from the Arctic to the Mediterranean basin.

Finally, deforestation of Europe during the extension of agricultural practices has been mainly addressed until now through anthracological and palynological studies, and we still need to understand if phytolith analyses will be able to offer new insights into this deep anthropization of European landscapes. This may happen either through identifying phytoliths whose presence or absence might be a diagnostic of this process or through the creation of indices as has been done in other areas of the world to understand changes in vegetation cover.

Cross-References

- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Paleoethnobotany
- ▶ Phytolith Analysis on Soil and Ceramic Thin Sections
- ▶ Phytolith Studies in Archaeology
- ▶ Phytoliths in Archaeology: Chemical Aspects
- ▶ Phytoliths in Islamic Archaeology
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Taphonomy: Definition

References

Albert, R.M., and D. Cabanes. 2007. Fire in prehistory: An experimental approach to combustion processes and phytolith remains. *Israel Journal of Earth Sciences* 56: 175–189.

Alonso-Eguíluz, M., J. Fernández-Eraso, and R.M. Albert. 2017. The first herders in the upper Ebro basin at Los Husos II (Álava, Spain): Microarchaeology applied to *fumier* deposits. *Vegetation History and Archaeobotany* 26: 1–15. https://doi.org/10.1007/s00334-016-0590-y.

Anderson, P.C., and J.C. Whittaker. 2014. Blades, sickles, threshing sledges and experimental archaeology in Northern Mesopotamia. In *Exploring and explaining diversity in agricultural technology*, EARTH, ed. A. van Gijn, J.C. Whittaker, and P.C. Anderson, vol. 2, 161–168. Oxford: Oxbow Books.

Balbo, A.L., D. Cabanes, J.J. García-Granero, A. Bonet, P. Ajithprasad, and X. Terradas. 2015. A microarchaeological approach for the study of pits. *Environmental Archaeology* 20 (4): 390–405. https://doi.org/10.1179/1749631414Y.0000000044.

Barczi, A., A.A. Golyeva, and Á. Pető. 2009. Palaeoenvironmental reconstruction of Hungarian kurgans on the basis of the examination of palaeosoils and phytolith analysis. *Quaternary International* 193: 49–60. https://doi.org/10.1016/j.quaint.2007.10.025.

Braadbaart, F., I. Poole, H.D. Huisman, and B. van Os. 2012. Fuel, fire and heat: An experimental approach to highlight the potential of studying ash and char remains from archaeological contexts. *Journal of Archaeological Science* 39 (4): 836–847. https://doi.org/10.1016/j.jas.2011.10.009.

Cabanes, D., C. Mallol, I. Expósito, and J. Baena. 2010. Phytolith evidence for hearths and beds in the late Mousterian occupations of Esquilleu cave (Cantabria, Spain). *Journal of Archaeological Science* 37: 2947–2957. https://doi.org/10.1016/j.jas.2010.07.010.

Deák, J., A. Gebhardt, H. Lewis, M.R. Usai, and H. Lee. 2017. Micromorphology of soils disturbed by vegetation clearance and tillage. In *Archaeological soil and sediment micromorphology*, ed. C. Nicosia and G. Stoops, 233–264. Oxford: Wiley-Blackwell.

Engovatova, A., and A. Golyeva. 2012. Anthropogenic soils in Yaroslavl (Central Russia): History, development, and landscape reconstruction. *Quaternary International* 265: 54–62. https://doi.org/10.1016/j.quaint.2012.02.039.

Friesem, D.E., G. Tsartsidou, P. Karkanas, and R. Shahack-Gross. 2014. Where are the roofs?

P

A geo-ethnoarchaeological study of mud brick structures and their collapse processes, focusing on the identification of roofs. *Archaeological and Anthropological Sciences* 6: 73–92. https://doi.org/10.1080/14614103.2017.1299908.

Golyeva, A., and N. Svirida. 2017. Quantitative distribution of phytoliths as reliable diagnostical criteria of ancient arable lands. *Quaternary International* 434: 51–57. https://doi.org/10.1016/j.quaint.2015.12.062.

Hansson, A.M., and L. Bergström. 2002. Archaeobotany in prehistoric graves - concepts and methods. *Journal of Nordic Archaeological Science* 13: 43–58.

Hodson, M.J., J. Westerman, and H.J. Tubb. 2001. The use of inflorescence phytoliths from the Triticeae in food science. In *Phytoliths – applications in earth science and human history*, ed. J.D. Meunier and F. Colin, 87–99. Lisse: A.A. Balkema.

Karkanas, P., J.P. Rigaud, J.F. Simek, R.M. Albert, and S. Weiner. 2002. Ash bones and guano: A study of the minerals and phytoliths in the sediments of Grotte XVI, Dordogne, France. *Journal of Archaeological Science* 29: 721–732. https://doi.org/10.1006/jasc.2001.0742.

Milek, K.B., and H.M. Roberts. 2013. Integrated geoarchaeological methods for the determination of site activity areas: A study of a Viking age house in Reykjavik, Iceland. *Journal of Archaeological Science* 40 (4): 1845–1865. https://doi.org/10.1016/j.jas.2012.10.031.

Power, R.C., D.C. Salazar-García, L.G. Straus, M.R. Gonzalez Morales, and A.G. Henry. 2015. Microremains from El Mirón cave human dental calculus suggest a mixed plant-animal subsistence economy during the Magdalenian in northern Iberia. *Journal of Archaeological Science* 60: 39–46. https://doi.org/10.1016/j.jas.2015.04.003.

Powers, A.H. 1992. Great expectations: A short historical review of European phytolith systematics. In *Phytolith systematics*, ed. G. Rapp Jr. and S.C. Mulholland, 15–35. New York: Plenum Press.

Risberg, J., S. Karlsson, A.M. Hansson, A. Hedenström, J. Heimdahl, U. Miller, and C. Tingvall. 2002. Environmental changes and human impact as recorded in a sediment sequence offshore from a Viking age town, Birka, southeastern Sweden. *The Holocene* 12: 445–458. https://doi.org/10.1191/0959683602hl558rp.

Ruiz-Pérez, J., C. Lancelotti, B. Rondelli, M. Madella, J.J. García-Granero, and L. Peña-Chocarro. 2016. Sickles and forks: Traditional rural knowledge of agricultural practices and its possible applications in archaeology. In *The intangible elements of culture in ethnoarchaeological research*, ed. S. Biagetti and F. Lugli, 241–252. New York: Springer.

Ryan, P. 2014. Phytolith studies in archaeology. In *Encyclopedia of global archaeology*, ed. C. Smith. New York: Springer. https://doi.org/10.1007/9781441904652_2258.

Saul, H., M. Madella, A. Fischer, A. Glykou, S. Hartz, and O.E. Craig. 2013. Phytoliths in pottery reveal the use of spice in European prehistoric cuisine. *PLoS One* 8 (8): e70583. https://doi.org/10.1371/journal.pone.0070583.

Tsartsidou, G., S. Lev-Yadun, N. Efstratiou, and S. Weiner. 2009. Use of space in a Neolithic village in Greece (Makri): Phytolith analysis and comparison of phytolith assemblages from an ethnographic setting in the same area. *Journal of Archaeological Science* 36: 2342–2352. https://doi.org/10.1016/j.jas.2009.06.017.

Tsartsidou, G., P. Karkanas, G. Marshall, and N. Kyparissi-Apostolika. 2015. Palaeoenvironmental reconstruction and flora exploitation at the Palaeolithic cave of Theopetra, Central Greece: The evidence from phytolith analysis. *Archaeological and Anthropological Sciences* 7 (2): 169–185. https://doi.org/10.1007/s12520-014-0183-6.

Verdin, P., J.-P. Berger, and J.-A. Lopez-Saez. 2001. Contribution of phytolith analysis to the understanding of historical agrosystems in the Rhône mid-valley (southern France). In *Phytoliths - applications in earth science and human history*, ed. J.D. Meunier and F. Colin, 155–171. Lisse: A.A. Balkema.

Vrydaghs, L., Y. Devos, K. Fechner, and A. Degraeve. 2007. Phytolith analysis of ploughed land thin sections. Contribution to the early medieval town development of Brussels (Treurenberg site, Belgium). In *Plants, people and places. Recent studies in phytolith analysis*, ed. M. Madella and D. Zurro, 13–27. Oxford: Oxbow Books.

Further Readings

Albert, R.M., and M. Madella, eds. 2009. Perspectives on phytolith research: 6th international meeting on Phytolith research. *Quaternary International* 193 (1-2): 1–192. https://www.sciencedirect.com/journal/quaternary-international/vol/193/issue/1.

Chevalier, A., L. Vrydaghs, and K. Neumann, eds. 2017. 9th international meeting of Phytolith research (IMPR). *Quaternary International* 434 (Part B): 1–180. http://www.sciencedirect.com/journal/quaternary-international/vol/434/part/PB.

Madella, M., C. Lancelotti, and M. Osterrieth, eds. 2013. Comprehensive perspectives on phytolith studies in quaternary research. *Quaternary International* 287: 1–180. http://www.sciencedirect.com/journal/quaternary-international/vol/287.

Madella, M., and D. Zurro, eds. 2007. *Plants, people and places. Recent studies in phytolith analysis*. Oxford: Oxbow Books.

Meunier, J.D., and F. Colin, eds. 2001. *Phytoliths - applications in earth science and human history.* Lisse: A.A. Balkema.

Pinilla, A., J. Juan-Tresserras, and M.J. Machado. 1997. *The State-of-the-art of Phytoliths in Soils and Plants. Monografía 4 del Centro de Ciencias Medioambientales*. Madrid: CSIC.

Rapp, G., Jr., and S.C. Mulholland, eds. 1992. *Phytolith systematics: Emerging issues*. New York: Plenum Press.

Phytoliths in Islamic Archaeology

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Introduction

The study of Islamic rural history and archaeology is a fast-growing focus for archaeological science. Despite efforts by many researchers to incorporate environmental studies, such as archaeobotanical analysis, into their methodological framework, these studies are limited and non-systematic. Information regarding local economic decisions, independent from state control, which represent the local resilience of medieval subsistence farmers, is missing. It is therefore important to develop a better understanding of shifts in agricultural investment and intensification of production, and the life of subsistence farmers in relation to environmental, political, and economic change during the early, middle, and late Islamic periods.

Definition

Sediment analysis for phytolith extraction can be used to inform the issue of agricultural systems during the Islamic periods and to reveal risk-minimization strategies adopted by medieval peasants as mitigating factors against political and environmental turmoil. The adaptive decisions of peasants can be investigated using micro-botanical data deriving from different environmental regions and multi-temporal Islamic archaeological sites. It is important that data for the purposes of this analysis be derived from different environmental zones. Without downplaying the political economic forces that shaped the social and ecological history of the Islamic periods, the role of regional agricultural and pastoral production for state profit and for local subsistence can be assessed with the use of phytolith data. Such research considers regional agricultural practices adopted during and after the agricultural revolution of the early Islamic period (Watson 1983) and aims to investigate what happened in the periods following these important changes to the Islamic agrosystem.

Key Issues

Phytoliths are particles of amorphous silica that are formed with the absorption of ground water by the plants when living. Silica (opal) is deposited in the cells of plant epidermal tissue, and the shapes of these cells define the phytoliths' morphology. For the purposes of archaeological analysis and interpretation, the recovery and identification of two major types of phytoliths is necessary: single-cell and multi-cell phytoliths. Single-cells are individual cells formed within the plant, and multi-cell phytoliths are conjoined single-cells that form silica skeletons of adjacent cells of the epidermal tissue of grasses (Rosen and Weiner 1994). In order to assess the issue of agricultural production during the Islamic period, the identification of particular phytolith morphotypes is used for interpretation. First, plant families and subfamilies are identified using single- and multi-cells, with the identification down to genus of major economic plants using multi-cell phytoliths. Second, the identification of different plant parts is used in order to identify by-products associated with different crop-processing stages following the conclusions of ethnographic work conducted by Hillman on macro-botanical remains (Hillman 1984) and the study of Harvey and Fuller (2005) on the identification of crop-processing stages through macro- and micro-botanical remains. Phytoliths can in this way offer information on agricultural activities and processing by-products and allow the exploration of agricultural and pastoral pursuits.

Phytoliths' direct deposition in sediments makes them excellent proxy data for archaeobotanical analysis. As inorganic matter, their persistence against destruction in different environments such as temperate, cool climates, and arid and semiarid conditions increases the possibility of their preservation when other

archaeobotanical and paleoecological evidence may decay unless charred (Rosen 1999; Piperno 2006). However, not all plants produce diagnostic phytoliths. Many families and species share morphological characteristics making their identification through the phytolith record difficult or impossible. For the purposes of archaeological analysis and interpretation, emphasis has been given to the study of the identification of major economic plants and crops such as maize (Piperno and Flannery 2001) and others useful for the purposes of the study of the Islamic periods: Poaceae family cereals, some wild cereals and dates (Rosen 1992, 1999; Rosen and Weiner 1994), rice (Pearsall et al. 1995; Harvey and Fuller 2005), millets (Harvey and Fuller 2005), Cucurbitaceae family plants (Piperno et al. 2000), and a number of Cyperaceae family plants (Ollendorf 1992). Dicotyledonous plants (woody trees and shrubs) offer limited identification potential (Bozaarth 1992), while phytoliths in fruits and pulses likewise present limited possibilities for identification.

Current Debates

Phytolith data from selected Islamic archaeological sites can produce a better understanding of the historical ecology and agricultural practices adopted during the Islamic periods. More specifically, micro-botanical analysis can assess the intensity in habitation and land use through identification of agricultural and pastoral pursuits or intensification of agriculture through irrigation signals and diversification (Rosen and Weiner 1994). Experimental work done on phytoliths of Emmer wheat has explored the possibility of using phytoliths as evidence of past irrigation systems. Counts of more than 10 and 100 conjoined single-cells were formed in irrigated planted cereals (Rosen and Weiner 1994). Since then, further work has been done to explore further planting and growing conditions of cereals and the effect of irrigation and rain water on the formation of phytoliths (Mithen et al. 2008). Experimental studies supported the results of Rosen and Weiner, but yet posed questions of how soil chemistry, evapotranspiration rates, and sub-, optimal, and over-optimal irrigation affect phytolith formation in wheat and barley species and in different parts of the plant. Phytolith data can provide information for local practices, subsistence, identification of activity areas such as for crop processing, animal husbandry practices, and other cultural activities and aspects of the medieval economy (Rosen 1999; Piperno 2006). Once more data are produced from medieval Islamic sites in different regions, phytoliths may shed light on similarities and/or differences in subsistence, economy, settlement cycles, and microenvironments of sites from different geographic regions and environmental zones.

Phytolith data that derive from medieval Islamic centers and villages seek to test two hypotheses. First is to trace the continuity of the early Islamic agricultural revolution, or "Green Revolution," as defined by Watson (1983) regarding agricultural intensification through the production of major cash crops and other crops during the periods of study. This can be done through the identification of phases of agricultural intensification of production. Do we see the peak and decline of agricultural intensification after the period of the Green revolution? The idea of an Islamic agricultural revolution that happened with the beginning of the Islamic era was proposed by Watson. Watson claimed that the early Islamic world contributed to the global history of agriculture (700–1,100 CE). He suggested that the Middle East, North Africa, and Spain underwent an agricultural revolution. This period brought two major changes in agricultural and landscape history. One was the intensification of production through the spread and cultivation of new major cash and staple crops. Most of these crops came from East or South Asia, and they were not known in the Middle East and/or the Mediterranean. The example of sugarcane is crucial and has been central to historic and archaeological studies trying to trace its diffusion, production, and state or domestic use (Watson 1983). Like sugarcane, rice diffusion and intensive cultivation during the Islamic period is of great interest.

Intensification of production did not come only from intensified agriculture of cash crops, such as

sugar, cotton, and rice, but also with the rise in varieties of crops and diversification of production. Watson (1983) lists 18 crops, which he claims were incorporated into the economy and diet of the Middle East and the Mediterranean due to Islam, although most of the crops existed before the period of the Green Revolution. The new crops were diffused from tropical climates of the East and incorporated into the production economy of the Middle East. A second change resulting from the Islamic agricultural revolution was the shift to double cropping and the introduction of highly irrigated summer crops. Of course, the increased need for water by these new crops led to extensive investment and reuse of existing irrigation systems. Watson claimed that crops were diffused from India and Southeast Asia, through a huge connection network relating to maritime trade, along with the "manuals" and knowledge for their cultivation. In addition, emphasis was given to the expansion of free-threshing durum wheat and drought-resistant sorghum that changed the production and diet of the medieval period. However, Watson based his thesis on textual evidence and theories of diffusion, and although his conclusions are impressive and rational, his thesis should be supported through archaeobotanical evidence along with the study of medieval texts and has thus been reevaluated (Butzer 1985).

Secondly, phytolith data can be used to suggest the resilience of subsistence farming by local people during the Islamic periods, during and after the period of the Islamic agricultural revolution using samples from different sites in different geographical regions. This method offers the opportunity to compare pastoral and peasant land use and subsistence among the areas under study. Thus, phytolith data can offer a different insight into adaptations to different environmental zones during periods of climatic and political turmoil during the Islamic periods and a new insight into the resilience strategies of medieval farmers in different regions of Jordan at that time. Identification of single-cell phytoliths that represent subfamilies of the Poaceae family, Pooideae, Chloridoideae, and Panicoideae (Twiss 1992) and plants of the Cyperaceae family, can be used for the description of sites' microenvironments and to show whether local environmental conditions favored crop production. In general, C3 plants are indicative of more moderate climatic conditions and produce rondel-shaped short cells. Panicoid grasses generally grow in warm and humid environments and produce bilobes and cross-shaped phytoliths. Chloridoideae, which indicate dry land grasses and warm and dry habitats, create saddle-shaped short cells (Twiss 1992; Piperno 2006). Looking at phytolith densities of C3 versus C4 grasses present on sites during the Islamic periods could shed light on this direction of research.

Also, phytolith data from Islamic sites aim to identify two major economic plants, wheat and barley, given that identification is possible using specific morphological criteria of multi-cell phytoliths (Rosen 1992). As they are main staples, and in the case of wheat, cash crops of the period of study, their identification is crucial for describing the continuity of agricultural production. They can be identified securely as they have been well studied by phytolith scientists (see Rosen 1992) and can contribute to the identification of these major economic plants of the medieval period and trace irrigation signals. Husk and stem phytoliths can be counted and used as indicators of the by-products of crop-processing stages in order to explore whether the sites under study produced their own crops or imported grains or other crops (Hillman 1984; Harvey and Fuller 2005).

In addition, phytolith and macro-botanical data acquired from multi-temporal medieval sites of different environmental zones, from a variety of contexts with an expected high yield of phytoliths (Rosen 1999), can shed light on the subsistence economy characterizing different regions. Information about the main agricultural crops produced in the sites under study in different regions during the Islamic periods can be provided, in addition to whether crop selection changed through time.

The Social Significance of Phytoliths for Islamic Archaeology and the Importance of an Interdisciplinary Approach to Rural Islamic History and Archaeology

The state-controlled agricultural economy and the subsistence economy of a site can be reflected in

the phytolith record based on the sampling strategy adopted. Samples may derive from both state-controlled buildings and subsistence farmers' buildings. Thus, phytolith data can be used as indicators for state-controlled access to irrigated crops, as well as for a more opportunistic agriculture adopted by subsistence farmers. An example of such a site is Tell Hisban, Jordan, where the villagers' farmhouses and animal pen, as well as the fourteenth-century governor's storeroom and sixteenth-century governor's house courtyard, were sampled for phytoliths. At Tell Hisban, both domestic and administrative-related buildings have been excavated and sampled for phytolith analysis, shedding light on the political ecology of the period of study, but such contexts are not always available. Thus information from medieval texts becomes invaluable.

Walker (2011) investigates and explains parameters of medieval society in Jordan that emphasize the regionally distinct character of its districts and the selective investment and decisions of the Mamluk state. She suggests that local histories should be reconstructed in order to understand the forces that shaped the socioeconomic transformation that took place between the fourteenth and sixteenth centuries. First, she addresses the issue of Jordanian tribes as a political force. The Mamluk state aimed for strong ties with and allies within the local tribes, and this was ensured with sultanic visits and assimilation, tactics that were not always successful in controlling local rebellions and complaints especially during periods of environmental and economic stress. Local tribal history constitutes one aspect of regional histories affecting the relationship of the state with its provinces and by extension Mamluk investment in the peripheral state of Jordan. The different political, cultural, and environmental regions of Jordan, where the Jordanian people/tribes resided, are described according to their urban character through information from Mamluk *waqfiyyat*, court documents (*shari'ah*), and sixteenth-century tax registers along with their agricultural and pastoral potential and production. The rural character of the country is dominant in the description of these texts, and the concept of a city is absent for Mamluk and Ottoman South Syria, apart from the castle-towns. However, Walker presents archaeological work and the results of surveys that have been employed in order to understand the nature and extent of the "villages" of Mamluk and Ottoman Jordan mentioned in *waqfiyyat*. Most importantly, the archaeological work she supports will help to reconstruct the everyday life of commoners, in addition to information from medieval court documents, something that is missing from the contemporary administrative, economic, and legal sources. The focus of political economic history is now shifting towards the investigation of local environmental parameters, such as the quality of agricultural land, soil properties, local rainfall variations, and local land-use changes as found in the archaeological record. Syrian chronicles and Ottoman registers are also used in order to reconstruct peasants' lives, agricultural history, and how the rural history of the middle and late Islamic periods in Jordan can shed light on the issue of demographic decline by the end of the Mamluk Era. Walker's work takes an interdisciplinary approach to this phenomenon of "decline" that emphasizes the regional character of Jordanian society as shaped by its political, ecological, and economic environment. The analysis of phytolith data is another strand that can and should be added to this multidisciplinary research.

Future Directions

It is necessary to incorporate the study of phytoliths into research that uses archaeobotanical analysis for identifying the everyday life practices of peasants. Walker (2011) offers an interesting approach, which combines archaeological work conducted on the major cities and villages accounted in registers and waqfiyyat of the Mamluk period, as well as in Ottoman tax registers of the early sixteenth century, in order to investigate the regional implications of administrative control over local production.

In sum, phytoliths can provide an innovative contribution to the study of Islamic rural history and archaeology. Future research will shed light on the investigation of local agricultural regimes

as key factors transforming regional social, demographic, and ecological history with the use of multiple lines of evidence alongside phytolith analysis and interpretation, such as archaeological, environmental proxy data, as well as documentary data such studies are under way (Cordova et al. 2005; Lucke et al. 2012). A systemic analysis of all these sources can inform land-use change and environmental and climatic histories of the medieval Islamic periods.

Cross-References

▶ Paleoethnobotany
▶ Plant Processing Technologies in Archaeology

References

Bozaarth, S. 1992. Classification of opal phytoliths formed in selected dicotyledons native to the Great Plains. In *Phytolith systematics: Emerging issues*, ed. G. Rapp and S.C. Mulholland, 193–214. New York: Plenum Press.

Butzer, K.W. 1985. Irrigation agrosystems in eastern Spain: Roman or Islamic origins? *Annals of the Association of American Geographers* 75 (4): 479–509.

Cordova, C.E.F., et al. 2005. Landforms, sediments, soil development and prehistoric site settings on the Madaba – Dhiban Plateau, Jordan. *Geoarchaeology* 20 (1): 29–56.

Harvey, E., and D.Q. Fuller. 2005. Investigating crop processing through phytolith analysis: The case of rice and millets. *Journal of Archaeological Science* 32: 739–752.

Hillman, G. 1984. Interpretation of archaeological plant remains: The application of ethnographic models from Turkey. In *Plants and ancient man*, ed. W. van Zeist and W. Casparie, 1–41. Groningen: Balkema.

Lucke, B., M. Shonnag, et al. 2012. Questioning Transjordan's historic desertification: A critical review of the paradigm of empty lands. *Levant* 44 (1): 101–126.

Mithen, S.J., E.L. Jenkins, K. Jamjoum, S. Nuimat, and B. Finlayson. 2008. Experimental crop growing in Jordan to develop a methodology for the identification of ancient crop irrigation. *World Archaeology* 40 (1): 7–25.

Ollendorf, A.L. 1992. Towards a classification scheme of sedge (Cyperaceae) phytoliths. In *Phytolith systematics: Emerging issues*, ed. G. Rapp and S.C. Mulholland, 99–111. New York: Plenum Press.

Pearsall, D.M., D.R. Piperno, E.H. Dinan, M. Umlauf, Z. Zhao, and R.A. Benfer. 1995. Distinguishing rice (*Oryza sativa* Poaceae) from wild Oryza species through phytolith analysis: Results of preliminary research. *Economic Botany* 49: 183–196.

Piperno, D.R. 2006. *Phytoliths: A comprehensive guide for archaeologists and palaeoecologists*. Lanham: AltaMira Press.

Piperno, D.R., and K.V. Flannery. 2001. The earliest archaeological maize (*Zea mays* L.) from highland Mexico: New accelerator mass spectrometry dates and their implications. *Proceedings of the National Academy of Science USA* 98: 2101–2103.

Piperno, D.R., T.C. Andres, and K.E. Stothert. 2000. Phytoliths in *Cucurbita* and other neotropical Cucurbitaceae and their occurrence in early archaeological sites from the lowland American tropics. *Journal of Archaeological Science* 27: 193–208.

Rosen, A.M. 1992. Preliminary identification of silica skeletons from Near Eastern sites: An anatomical approach. In *Phytolith systematics: Emerging issues*, ed. G. Rapp and S.C. Mulholland, 129–147. New York: Plenum Press.

Rosen, A.M. 1999. Phytolith analysis in Near Eastern archaeology. In *The practical impact of science on Aegean and Near Eastern archaeology*, ed. S. Pike and S. Gitin, 86–92. London: Archetype Press.

Rosen, A.M., and S. Weiner. 1994. Identifying ancient irrigation: A new method using opaline phytoliths from Emmer wheat. *Journal of Archaeological Science* 21: 125–132.

Twiss, P.C. 1992. Predicted world distribution of C3 and C4 grass phytoliths. In *Phytolith systematics: Emerging issues*, ed. G. Rapp and S.C. Mulholland, 113–128. New York: Plenum Press.

Walker, B.J. 2011. *Jordan in the late Middle Ages. Transformation of the Mamluk frontier*. Chicago: Middle East Documentation Centre.

Watson, A.M. 1983. *Agricultural innovation in the early Islamic world*. Cambridge: Cambridge University Press.

P

Pickersgill, Barbara

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Basic Biographical Information

Barbara Pickersgill is a British horticultural botanist and geneticist. She was born on 13 May 1940 and raised in Yorkshire, England, and obtained her B.Sc. degree in Horticultural Botany from the University of Reading in 1962. Immediately

thereafter she pursued her Ph.D. in Botany at Indiana University, Bloomington, under the supervision of Charles B. Heiser, Jr., with a thesis entitled *The Variability and Relationships of Capsicum chinense* Jacq. that she defended in 1966. Upon her return to England, she was appointed lecturer in the Department of Agricultural Botany at the University of Reading, UK. She retired in 2005.

Barbara Pickersgill's work with *Capsicum chinense* stimulated a lifelong interest in determining the origins and dispersals of Neotropical crops, later expanded to the rest of the world with her numerous students. Her interests in the use and conservation of crop genetic resources also involved her with the International Board for Plant Genetic Resources, now Bioversity International. She participated in expert consultations, funded by the Board, to plan and execute *Capsicum* collection, characterization, evaluation, and use strategies for collections held at both the Centro Agronómico Tropical de Investigación y Enseñanza, Turrialba, Costa Rica, and the Centro Nacional de Recursos Genéticos, Brasília, Brazil.

Soon after returning to Reading, she was invited to act as botanist for the Ayacucho Archaeological-Botanical Project, Peru (1969–1971), and later for the Cuello Early Maya Archaeological Project, Orange Walk Town, Belize (1979). These activities introduced her to many of the Neotropical archaeologists working with crop origins and dispersals and involved her in numerous symposia over the next decades.

While based at the University of Reading, Barbara Pickersgill was appointed by the Royal Society to be a visiting professor at the Departments of Agriculture and Biology of the University of Papua New Guinea, Port Moresby, in 1978. She was also invited to offer undergraduate or postgraduate courses in Italy, Spain, the Netherlands, and Cuba. She also acted as external examiner for Ph.D. theses at eight British and one Irish universities.

In 1993, Barbara Pickersgill was awarded the Linnean Gold Medal for Botany, became a Fellow of the Linnean Society of London, and was elected a Fellow of the Institute of Biology. She was later elected President of the Society for Economic Botany (2000–2001).

Major Accomplishments

Barbara Pickersgill's early work with the cytogenetic and morphological variation in *Capsicum* complemented work by Charles B. Heiser, Jr., her doctoral supervisor, and W. Hardy Eshbaugh, another Heiser student, and was instrumental in delimiting species and species complexes within the genus, as cytogenetics is a much more precise technique for species analysis than is morphology, especially in such morphologically variable domesticates as *C. annuum* and *C. chinense*. Heiser and his group confirmed that Native Americans domesticated five *Capsicum* species and distributed three of them widely. The three widely distributed species, *Capsicum annuum*, *C. chinense*, and *C. frutescens*, form a complex, because their probable wild ancestor is also widely distributed. The group confirmed that *C. annuum* originated in Mexico and was distributed southward, while *C. chinense* originated in Amazonia and was distributed northward; *C. frutescens* is less well understood, although its distribution is nearly as wide. *Capsicum baccatum* originated in the low-level Andes of Bolivia and Peru and was distributed northward to Colombia and southward to the warm temperate areas of the southern cone, while *C. pubescens* originated in the higher Andes. These studies were immediately relevant to archaeologists, since they may allow species-level identification by the combination of seed, fruit, and fruitstalk morphology and known distributions and provide criteria for distinguishing domesticated from wild peppers (Pickersgill 1969a, b).

During the 1960s and 1970s, the taxonomy of cultivated plants was often confused, because taxonomy was based primarily on morphology. With the inclusion of cytogenetics, the taxonomy of crops could be clarified (Pickersgill 1977), allowing curators of collections of genetic resources and archaeologists to work with better information. Since then, molecular genetic techniques have become powerful tools in taxonomy and domestication studies (Pickersgill 2007).

With her students, Barbara Pickersgill has delved into the origin and dispersal of the common bean (Chacón et al. 2005, 2007), peanut,

and the domestication process in Mexican cacti (Casas et al. 1997), as well as into Paleotropical crops, such as winged bean and bananas. This wide range of studies has given her a privileged view of crop domestication, which has resulted in recent reviews of Neotropical crops (Pickersgill 2007) and of the domestication process itself (Pickersgill 2009). Even after retirement, her collaboration with her Mesoamerican students has resulted in further publications on *Capsicum* (Pickersgill 2016a, b), domestication in the Neotropics (Pickersgill 2016c, d), and an important review of the genomics of parallel versus convergent evolution in Neotropical crops (Pickersgill 2018). During her career, she published more than 60 papers and book chapters, many of which are widely cited by archaeologists, as well as plant breeders and curators of crop genetic resources.

Cross-References

- ▶ Andes: Origins and Development of Agriculture
- ▶ Capsicums/Chiles: Origins and Development

References

Casas, A., B. Pickersgill, J. Caballero, and A. Valiente-Banuet. 1997. Ethnobotany and the process of domestication in the xoconochtli *Stenocereus stellatus* (Cactaceae) in the Tehuacán Valley and La Mixteca Baja, Mexico. *Economic Botany* 51: 279–292.

Chacón, S.M.I., B. Pickersgill, and D.G. Debouck. 2005. Domestication patterns in common bean (*Phaseolus vulgaris* L.) and the origin of the Mesoamerican and Andean cultivated races. *Theoretical and Applied Genetics* 110: 432–444.

Chacón, S.M.I., B. Pickersgill, D.G. Debouck, and J. Salvador Arias. 2007. Phylogeographic analysis of the chloroplast DNA variation in wild common bean (*Phaseolus vulgaris* L.). *Plant Systematics and Evolution* 266: 175–195.

Pickersgill, B. 1969a. The archaeological record of chili peppers (*Capsicum* spp.) and the sequence of plant domestication in Peru. *American Antiquity* 34: 54–61.

Pickersgill, B. 1969b. The domestication of chili peppers. In *The domestication and exploitation of plants and animals*, ed. P.J. Ucko and G.W. Dimbleby, 443–450. London: Duckworth.

Pickersgill, B. 1977. Taxonomy and the origins and evolution of cultivated plants in the New World. *Nature* 268: 591–595.

Pickersgill, B. 2007. Domestication of plants in the Americas: Insights from Mendelian and molecular genetics. *Annals of Botany* 100: 925–940.

Pickersgill, B. 2009. Domestication of plants revisited – Darwin to the present day. *Botanical Journal of the Linnean Society* 161: 203–212.

Pickersgill, B. 2016a. Chile peppers (*Capsicum* spp.). In *Ethnobotany of Mexico: Interactions of people and plants in Mesoamerica*, ed. R. Lira, A. Casas, and J. Blancas, 417–437. New York: Springer.

Pickersgill, B. 2016b. Ajíes or Chile peppers (*Capsicum* spp.): History and biology. In *Domesticación en el continente Americano*, Investigación para el manejo sustentable de recursos genéticos en el Nuevo Mundo, ed. A. Casas, J. Torres-Guevara, and F. Parra, vol. 2, 177–191. Lima: Universidad Nacional Agraria La Molina.

Pickersgill, B. 2016c. Domestication of plants in Mesoamerica: An archaeological review with some ethnobotanical interpretations. In *Ethnobotany of Mexico: Interactions of people and plants in Mesoamerica*, ed. R. Lira, A. Casas, and J. Blancas, 207–231. New York: Springer.

Pickersgill, B. 2016d. Plant domestication in tropical America: Where, when and, most particularly, how. In *Domesticación en el continente Americano*, Manejo de biodiversidad y evolución dirigida por las culturas del Nuevo Mundo, ed. A. Casas, J. Torres-Guevara, and F. Parra, vol. 1, 225–251. Lima: Universidad Nacional Agraria La Molina.

Pickersgill, B. 2018. Parallel versus convergent evolution in domestication and diversification of crops in the Americas. *Frontiers in Ecology and Evolution* 6: 56.

P

Pig: Domestication

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Basic Species Information

Pigs belong to the genus *Sus*, the family Suidae, and the order Artiodactyla, which are even-toed ungulates (hoofed mammals). Unlike other domestic ungulates such as sheep, goats, cattle, and llamas, pigs are opportunistic omnivores that feed primarily by rooting and scavenging. Wild pigs easily adapt to new environments and inhabit a wide variety of habitats and ecosystems (Groves and Grubb 1993).

Other common names for pig include *swine* and *hog*:

Boar: male pig
Sow: female pig
Piglet: baby pigs

The common domestic pig is a domesticated form of the Eurasian wild boar (*Sus scrofa* sp. Linnaeus, 1758). *Sus scrofa* sp. is divided into four distinct groups (the Western, Indian, Eastern, and Indonesian/Sundaic races) and consists of up to 17 subspecies (Groves and Grubb 1993). *S. scrofa* is one of the most widespread and numerous mammals in Eurasia, and its natural geographic range covers most of the Eurasian continent stretching from West and Central Europe (including Scandinavia and the UK, where it has been reintroduced after extinction) and North Africa in the West to Eastern Siberia, Malaysia, and the Indonesian Islands in the East (Fig. 1) (Groves and Grubb 1993).

Feral or wild pigs are often found outside the native range of *S. scrofa* as a consequence of human agency (translocations of wild or domestic pigs). Large feral pig populations are particularly common in South and North America (where it is known as the *razorback*), Papua New Guinea, New Zealand, Australia, Sardinia, and Corsica (Albarella et al. 2009).

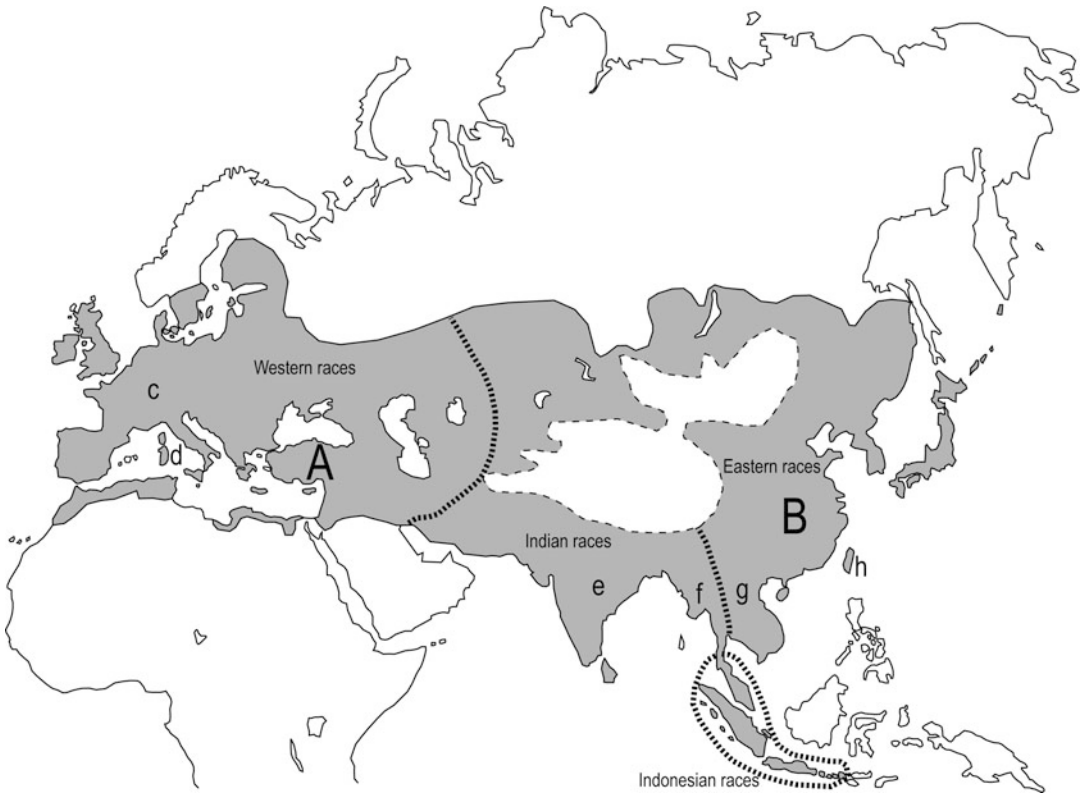

Pig: Domestication, Fig. 1 A simplified depiction of the native distribution of *S. scrofa* (*light gray*) across Eurasia (Redrawn from Groves and Grubb (1993) and Larson et al. (2011)). Uppercase letters depict the two major centers of independent pig domestication in Eastern Anatolia and East Asia (**A** and **B**, respectively). Lowercase letters (**c**–**h**) indicate putative domestication centers where it remains unclear to which degree domestication was independent (**c**: Europe, **d**: Italy, **e**: South Asia, **f**: Peninsular Southeast Asia, **g**: Southern Yunnan Province, Northern Vietnam, Northern Laos, **h**: Lanyu off the coast of Taiwan). Thick dashed lines highlight the four major groups of *S. scrofa* subspecies and their approximate geographic distribution. Thin dashed lines across Central Asia depict an area where *S. scrofa* is rare or absent

Domestic pigs display a large variety of morphological and behavioral traits compared to their wild predecessor. The most prominent characteristics include changes in the reproductive cycle, reduced brain size, floppy ears, shortening of the snout and tooth-row, general reduction in size (although both giant and dwarf variants occur), a large variety of coat colors, wavy and curly hair (see the curly coated pig breed Mangalitsa), and rolled or curly tails (Groves 1999; Albarella et al. 2009).

Morphological changes in teeth and long bones are good markers for identifying domestication in archaeozoological materials. Measurements of the M2 and M3 are particularly useful for telling apart wild and domestic pigs (Albarella et al. 2009).

The relationship between humans and pigs extends back more than 10,000 years (Larson et al. 2011). Many pig populations and especially prehistoric ones are difficult to define as either fully domesticated or completely wild. This is due to the fact that humans have managed and controlled morphologically and behaviorally wild populations and kept domestic pigs under varying degrees of control since at least the Early Holocene (Albarella et al. 2009; Larson et al. 2011). Modern anthropological data from Papua New Guinea reveal that humans both manage and control both wild and domestic populations simultaneously. The morphological and biometric differences between these populations have been substantially reduced because people often breed their domestic pigs with wild boar (Redding and Rosenberg 1998).

Despite methodological difficulties, archaeological and genetic data clearly demonstrate that pig domestication occurred independently in at least two major geographic regions: West Eurasia and East Asia (Fig. 1) (Larson et al. 2005), though pigs may have been domesticated up to nine times across Eurasia during the Holocene (Fig. 1) (Larson et al. 2011). The extent to which these domestication processes were truly independent, and to which extent they represent wild-domestic hybridization, remains uncertain (Larson et al. 2011).

Pig domestication was integral to the Neolithic revolution. The earliest archaeozoological evidence of pig domestication in West Eurasia comes from several archaeological sites in the Near East and dates to approximately 10,000 BP (Fig. 1) (Larson et al. 2007). Archaeozoological and genetic data show that domestic pigs possessing genetic signatures previously endemic to the Near East were introduced to Europe at least 7,500 BP. Once introduced to Europe, local domestication or extensive introgression gradually replaced the genetic signature from the Near East with those of the local European wild boar. The introgression appears to have been widespread as domestic pigs possessing haplotypes endemic to Italy and the northern Adriatic coast appear in the archaeological record subsequent to the earliest introduction from the Near East (Larson et al. 2005, 2007).

In East Asia, archaeozoological and genetic data reveal complex patterns of local domestication. The earliest evidence of pig domestication comes from archaeological sites along the Yellow River (and to some extent the Yangtze River) in Central China dated to approximately 10,000–9,000 BP. Unlike the patterns of genetic turnover in Europe and the Near East, ancient and modern genetic data suggests long-term genetic continuity between early and modern domestic pigs (Larson et al. 2010, 2011).

The remaining putative domestication centers (Fig. 1) have been identified primarily through modern genetics (but also through the combination of geometric morphometrics and genetics). In many cases, modern genetic data reveal unique genetic signatures possessed by both local domestic pigs and local wild boar (Larson et al. 2010). These include several locations in Europe (see above), Peninsular Southeast Asia, and surrounding areas in southern China, Northern Vietnam and Northern Laos, South Asia (Indian subcontinent), and the Lanyu islet off the coast of Taiwan. Until ancient DNA becomes readily available from these locations, the demographic history of these populations remains hypothetical (Larson et al. 2011).

Cross-References

- ▶ Darwin, Charles R.
- ▶ Genetics of Animal Domestication: Recent Advances

References

Albarella, U., K. Dobney, and P. Rowley-Conwy. 2009. Size and shape of the Eurasian wild boar (*Sus scrofa*), with a view to the reconstruction of its Holocene history. *Environmental Archaeology* 14 (2): 103–136.

Groves, C. 1999. The advantages and disadvantages of being domesticated. *Perspectives in Human Biology* 4 (1): 1–12.

Groves, C., and P. Grubb. 1993. Eurasian Suids Sus and Babyrousa. In *Pigs, peccaries, and hippos: Status, survey and conservation action plan*, ed. W.L.R. Oliver, 107–121. Gland: International Union for the Conservation of Nature and Natural Resources. Species Survival Commission.

Larson, G., K. Dobney, U. Albarella, M. Fang, L. Matisoo-Smith, J. Robins, S. Lowden, H. Finlayson, T. Brand, E. Willerslav, P. Rowley-Conwy, L. Andersson, and A. Cooper. 2005. Worldwide phylogeography of wild boar reveals multiple centers of domestication. *Science* 307: 1618–1621.

Larson, G., U. Albarella, K. Dobney, P. Rowley-Conwy, J. Schibler, A. Tresset, J.-D. Vigne, C.J. Edwards, A. Schlumbaum, A. Dinu, A. Bălăçsescu, G. Dolman, A. Tagliacozzo, N. Manaseryan, P. Miracle, L. Van Wijngaarden-Bakker, M.G. Masseti, D. Bradley, and A. Cooper. 2007. Ancient DNA, pig domestication, and the spread of the Neolithic into Europe. *Proceedings of the National Academy of Sciences of the USA* 104: 15276–15281.

Larson, G., R. Liu, X. Zhao, J. Yuan, D. Fuller, L. Barton, K. Dobney, Q. Fan, Z. Gu, X.-H. Liu, Y. Luo, P. Lv, L. Andersson, and N. Li. 2010. Patterns of East Asian pig domestication, migration, and turnover revealed by modern and ancient DNA. *Proceedings of the National Academy of Sciences of the USA* 107: 7686–7691.

Larson, G., T. Cucchi, and K. Dobney. 2011. Genetic aspects of pig domestication. In *The genetics of the pig*, ed. M.-F. Rothschild and A. Ruvinsky, 14–37. Oxon: CAB International.

Redding, R., and M. Rosenberg. 1998. Ancestral pigs: A New (Guinea) model for pig domestication in the Near East. *MASCA Research Papers in Science and Archaeology* 15: 65–76.

Further Reading

Cucchi, T., A. Hulme-Beaman, J. Yuan, and K. Dobney. 2010. Early Neolithic pig domestication at Jiahu, Henan Province, China: Clues from molar shape analyses using geometric morphometric approaches. *Journal of Archaeological Science* 38: 11–22.

Dinu, A., D. Meiggs, A. Balasescu, A. Boroneant, D.A. Soficaru, and N. Miritoiu. 2006. On men and pigs: Were pigs domesticated at Mesolithic iron gates of the Danube? Part one: Teeth metrics. *Studii de Preistorie* 3: 77–98.

Ervynck, A., H. Hongo, K. Dobney, and R. Meadow. 2001. Born free? New evidence for the status of *Sus scrofa* at Neolithic Cayönü Tepesi (southeastern Anatolia, Turkey). *Paléorient* 27 (2): 47–73.

Groves, C. 1981. *Ancestors for the pigs: Taxonomy and phylogeny of the genus Sus*, Technical Bulletin 3. Canberra: Department of Prehistory, Research School of Pacific Studies Australian National University; SOCPAC Printery.

Jing, Y., and R. Flad. 2002. Pig domestication in ancient China. *Antiquity* 76: 724–732.

Larson, G., T. Cucchi, M. Fujita, E. Matisoo-Smith, J. Robins, A. Anderson, B. Rolett, M. Spriggs, G. Dolman, T.H. Kim, N.T.D. Thuy, E. Randi, M. Doherty, R.A. Due, R. Bollt, T. Djubiantono, B. Griffin, M. Intoh, E. Keane, P. Kirch, K.T. Li, M. Morwood, L.M. Pedrina, P. Piper, R.J. Rabett, P. Shooter, G. Van den Bergh, E. West, S. Wickler, J. Yuan, A. Cooper, and K. Dobney. 2007. Phylogeny and ancient DNA of Sus provides insights into Neolithic expansion in Island Southeast Asia and Oceania. *Proceedings of the National Academy of Sciences of the USA* 104: 4834–4839.

Peters, J., D. Helmer, A. von den Driesch, and M. Saña Segui. 1999. Early animal husbandry in the northern Levant. *Paléorient* 25 (2): 27–48.

Peters, J., A. Von Den Driesch, and D. Helmer. 2005. The upper Euphrates-Tigris basin: Cradle of agropastoralism? In *The first steps of animal domestication: New archaeological approaches*, ed. J.-D. Vigne, J. Peters, and D. Helmer, 96–124. Oxford: Oxbow Books.

Redding, R. 2005. Breaking the mold: A consideration of variation and evolution in animal domestication. In *The first steps of animal domestication: New archaeological approaches*, ed. J.-D. Vigne, J. Peters, and D. Helmer, 41–49. Oxford: Oxbow Books.

Rosenberg, M., R.W. Redding, R. Nesbitt, and B.L. Peasnall. 1998. Hallan Çemi, pig husbandry, and post-pleistocene adaptations along the Taurus-Zagros Arc (Turkey). *Paléorient* 24: 25–41.

Vigne, J.-D., A. Zazzo, J.-F. Saliège, F. Poplin, J. Guilaine, and A. Simmons. 2009. Pre-Neolithic wild boar management and introduction to Cyprus more than 11,400 years ago. *Proceedings of the National Academy of Sciences of the USA* 106: 16135–16138.

Pigeon Pea: Origins and Development

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Basic Species Information

Pigeon pea (*Cajanus cajan* L. Millsp.), also known as *toor*, red gram, Congo pea, no-eye

pea, *kadios*, and tropical green pea, is a legume grown in tropical and semitropical regions across the Old and New Worlds. While New World cultivation is relatively recent, pigeon pea is a traditional crop of South Asia and western and central Africa and an African diaspora in the Caribbean. It is grown as a food and/or fodder crop and has additional use as a green manure crop.

Pigeon pea can grow up to around 4 m in height. It is a drought-tolerant crop and can grow with less than 300 mm annual rainfall due to its long tap roots, although it prefers 600–1,000 mm. The ideal temperature range for pigeon pea is 18–30 °C; however it can resist temperatures over 35 °C. It is therefore a crop particularly suited to the drier tropics. It can be grown at altitudes of up to approximately 2,000 m, as long as the temperature is not too low. The plant takes between 6 and 11 months to reach maturity usually, but some newer varieties take only 3–4 months. Pigeon pea is rarely grown as a primary crop and is often cultivated alongside grain crops such as millet, sorghum, or rice (Kachroo and Arif 1970).

The crop can be harvested as either green pods, which can be used as fresh vegetables, or dry, just before the mature pods shatter. Rather than being fully non-dehiscent, domesticated forms have delayed dehiscence. Harvesting dry pods tends to be done with a sickle in large areas of both Asia and Africa. The plant is then left to dry further in the sun before threshing is carried out. It is then winnowed and the clean peas are collected (Fuller and Harvey 2006). This simple process means that the peas are less likely to appear in the archaeological record than crops which require extended processing sequences. Splitting the peas, however, may increase their chances of preservation as waste from milling (including fractured peas) may be burnt. Split pigeon peas are a popular pulse in India, used to make *toor dal*. Aside from its use as a food crop, the plant can be used as a host for lac-producing scale insects (Krishna 2010). Lac, a red resinous substance which can be used as a dye or as a varnish, is predominantly produced in South and Southeast Asia.

Major Domestication Traits

Identification of pigeon pea seeds can be quite straightforward. The split peas often show a distinctive apostrophe-shaped shoot bud within the embryo (Fig. 1). Whole peas range in shape, from more rounded to fairly square, but all tend to be flat on the hilum end. The distinction between

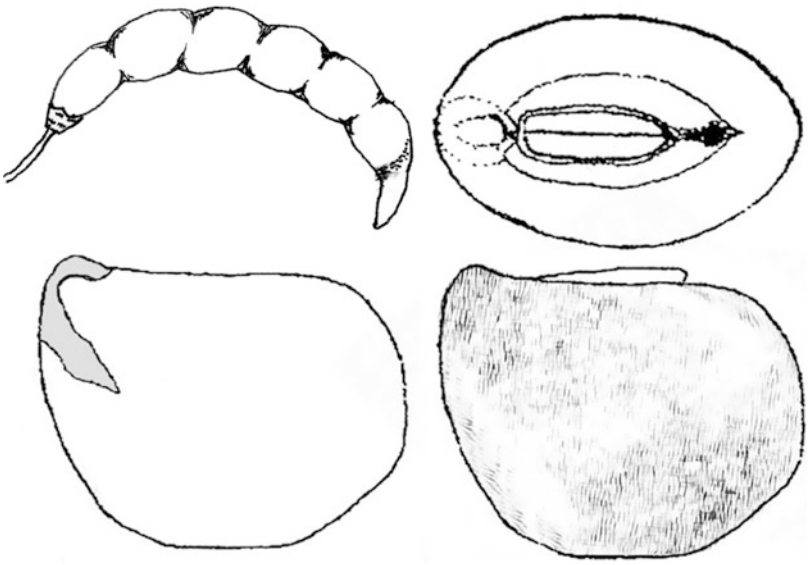

Pigeon Pea: Origins and Development, Fig. 1 *Line drawings* of pigeon pea pod and seed, clockwise from *top left*: pod; basal view showing hilum, including internal anatomy such as distinctive plumule; lateral view with protruding strophiole of hilum visible above; and cross section showing embryo plumule shaded

wild and domesticated peas is difficult. However, wild peas tend to be slightly smaller and flatter than the domestic species. In addition, wild species have a greatly increased appearance of a raised ring around the hilum (Fuller and Harvey 2006).

Timing and Tracking Domestication

Pigeon pea was domesticated from *C. cajanifolia*, populations of which occur across eastern Peninsular India (Fig. 2; see discussion in Fuller and Harvey 2006; Kassa et al. 2012). While reported finds of

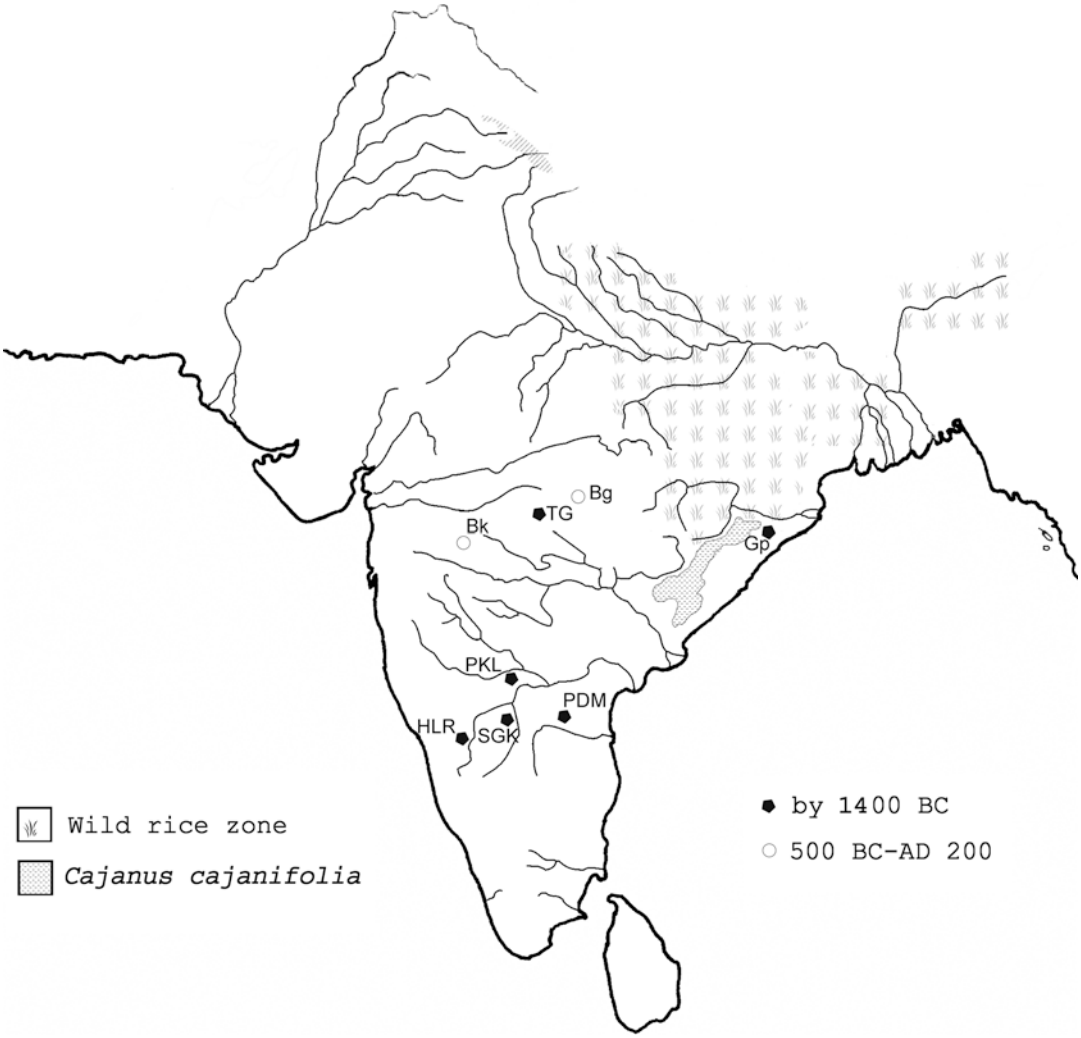

Pigeon Pea: Origins and Development, Fig. 2 Distribution map of wild *Cajanus cajnifolia* together with archaeobotanical finds of pigeon pea in India. The location of wild pigeon pea at the southern margins of the wild rice zone are indicated, as this may suggest domestication by early rice cultivators in eastern India. Site names abbreviated: *Bk* Bhokardan (Early Historic, 300 BCE–CE 300), *Bg* Bhagimohari (Iron Age, 1000–300 BCE), *Gp* Gopalpur (Late Neolithic, 1500–1200 BCE), *HLR* Hallur (Late Neolithic, 1500–1200 BCE), *PKL* Piklihal (Late Neolithic, 1500–1200 BCE), *PDM* Peddamudiyam (Late Neolithic, 1500–1200 BCE), *SGK* Sanganakallu (Late Neolithic, 1500–1200 BCE), *Tg* Tuljapur Garhi (Chalcolithic, 1500–1200 BCE)

pigeon pea are few and far between in India, "*Cajanus* sp." peas have been identified at Tuljapur Garhi and Sanganakallu in the Deccan Plateau and date to 1500–1000 BCE (Fuller et al. 2004). These sites are situated in an area with no wild populations of *Cajanus*, suggesting that these finds derive from domesticated crop plants. Direct dates for *Cajanus* peas come from Gopalpur and Golbai Sasan, Orissa; the dates of 1400–1300 BCE are the earliest for pigeon pea and come from sedentary settlement sites with established agriculture (Harvey et al. 2006). The natural distribution of the wild progenitor of pigeon pea includes Orissa, suggesting that the pea may have been domesticated there. Pigeon pea appears to be a relatively late domesticate in terms of global agricultural history, at around 1500 BCE. Recent archaeobotanical research in southern Thailand (see Castillo and Fuller 2010) indicates that like other pulses of Indian origin, this species arrived in mainland Southeast Asia, perhaps by sea trade links, before 2,000 years ago (C. Castillo, unpublished data).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Castillo, C., and D.Q. Fuller. 2010. Still too fragmentary and dependent upon chance? Advances in the study of early Southeast Asian archaeobotany. In *50 years of archaeology in Southeast Asia: Essays in honour of Ian Glover*, ed. B. Bellina, E.A. Bacus, O. Pryce, and J. Weissman Christie, 91–111. Bangkok/London: River Books.

Fuller, D.Q., and E. Harvey. 2006. The archaeobotany of Indian pulses. *Environmental Archaeology* 11 (2): 219–246.

Fuller, D.Q., R. Korisettar, P.C. Venkatasubbaiah, and M.K. Jones. 2004. Early plant domestications in southern India: Some preliminary archaeobotanical results. *Vegetation History and Archaeobotany* 13: 115–129.

Harvey, E.L., D.Q. Fuller, R.K. Mohanty, and B. Mohanta. 2006. Early agriculture in Orissa: Some archaeobotanical results and field observations on the Neolithic. *Man and Environment* 31 (2): 21–32.

Kachroo, P., and M. Arif, eds. 1970. *Pulse crops of India*. New Delhi: Indian Council for Agricultural Research.

Kassa, M.T., R.V. Penmetsa, N. Carrasquilla-Garcia, B.K. Sarma, S. Datta, et al. 2012. Genetic patterns of domestication in pigeonpea (*Cajanus cajan* (L.) Millsp.) and wild Cajanus relatives. *PLoS One* 7 (6): e39563. https://doi.org/10.1371/journal.pone.0039563.

Krishna, K.R. 2010. *Agro-ecosystems of South India: Nutrient dynamics, ecology and productivity.* Boca Raton: Universal Publishers.

Pigeons: Domestication

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Basic Species Information

Domesticated from the rock pigeon (*Columba livia*), the domestic pigeon is an Old World pigeon that, along with over 300 other pigeon and dove species, comprises the family Columbidae, in the order Columbiformes. Although fossil evidence suggests that rock pigeons evolved in Southern Asia, today the natural habitats of the wild rock pigeon are open and semi-open environments across Europe, North Africa, and Western Asia, with a preference for cliffs and rock ledges for breeding. Domestic pigeons, however, and their feral descendants have spread across all permanently inhabited regions of the world.

Pigeons exhibit variations in more traits than any other bird species (Price 2002). Although first domesticated as a source of food, the later spread of the chicken diminished their importance and thus most domestication traits present in modern birds were explicitly selected for exhibition, or to

improve racing speed and homing ability. As a result, the different breeds show dramatic variations in craniofacial structures, color and pattern of plumage pigmentation, feather placement and structure, number and size of axial and appendicular skeletal elements, vocalizations, and flight behaviors (Figs. 1 and 2). This variation is so great that Charles Darwin, the father of modern evolutionary thought, noted that based on morphology alone, a taxonomist might be tempted to classify different breeds as completely different genera (Darwin 1868). Despite their remarkable divergence, pigeon breeds are so obviously unified in their descent from a single ancestral species, that Darwin used them as a key example to illustrate his ground-breaking ideas about natural selection. In particular, he saw pigeons as a striking exemplar of how continual selection can lead to significant, and rapid, morphological and behavioral variations from a single ancestral type (Darwin 1859).

Although pigeons are among the earliest domestic birds and one of the earliest domestic animals (Hansell 1998), relatively little is known about their initial domestication. The rock pigeon today consists of many subspecies spread across Eurasia and North Africa, but exactly which subspecies was the ancestor of domestics, when,

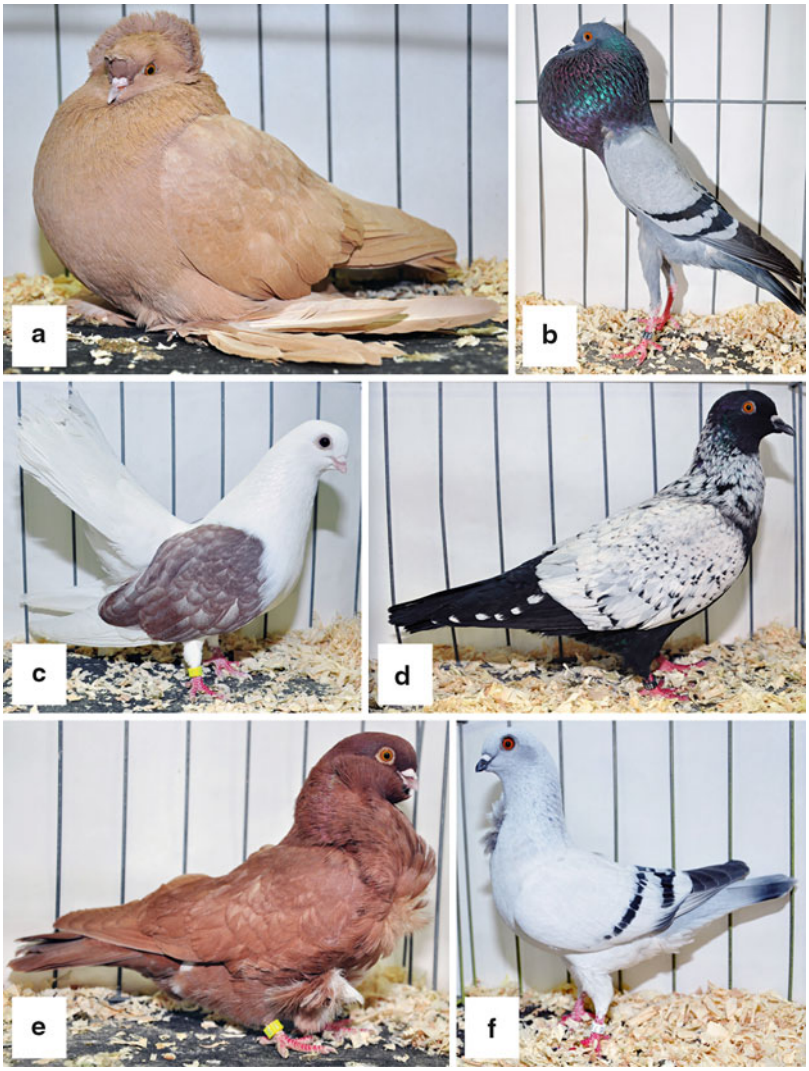

Pigeons: Domestication, Fig. 1 Variations in body shape, posture, and plumage color among domestic pigeon breeds. (**a**) English trumpeter. (**b**) Brunner pouter. (**c**) Taganrog tumbler. (**d**) Starling. (**e**) Chinese owl. (**f**) Italian Owl. (Also see Fig. 2c. Photo credit: M.D. Shapiro)

Pigeons: Domestication, Fig. 2 Variations in other traits among domestic pigeon breeds. (**a**, **b**) Extreme beak differences between the Scandaroon (**a**) and Old German owl (**b**) breeds. The Old German owl also has a crest of reversed feathers on the back of its head, a trait present in many domestic breeds but not in the ancestral rock pigeon. (**c**) Fantail breed with supernumerary and elevated tail feathers. (**d**) Cropper breed with a greatly enlarged and inflated crop, an outpocketing of the esophagus. (**e**, **f**) Variation in epidermal structures on the lower hind limb of domestic pigeon breeds. Feathers grow from the skin of the tarsus and foot of some breeds (**e**), while most breeds retain the ancestral trait of scales on the lower limb. (Photo credits: M.D. Shapiro (**a** and **c**-**f**) and S.A. Stringham (**b**))

where, and how many times domestication occurred, and how domestics spread over the majority of their history are largely unknown. Most of the available information comes from written accounts rather than archaeological remains, probably due to both the problem of morphologically discriminating between wild rock pigeons and the earliest ferals and domestic strains, and their relatively fragile bones, which could bias against long-term survival in the archaeological record.

Pigeons are first mentioned in Mesopotamian records over 5,000 years ago, and are documented in most subsequent developed cultures of the region (Johnson and Janiga 1995). The pigeon played a range of important roles in ancient cultures, including messenger, food, pet, religious icon, medicine, and navigation aid. We also know that, in some cultures, the scale of their domestication was immense – ancient Egyptians retained massive populations (as they did with other domesticates such as cats and dogs), sacrificing as many as tens of thousands in single ceremonies. More recently, Akbar of India regularly traveled with a menagerie of thousands of pigeons. As with other domesticated animals (e.g., dogs and cats), interest in fancy breeds increased in the eighteenth century and continues today.

In contrast to the paucity of information about the earliest phase of their domestication, their relatively recent interest to breeders and hobbyists provides historical accounts that help trace the origins of modern breeds. Nevertheless, the diversification of domestic pigeons has received surprisingly little attention from a genetics perspective although recently Stringham et al. (2012) analyzed microsatellites from a broad sample of domestic breeds and found that while it was not possible to recover a well-resolved phylogeny describing the relationships among breeds, pigeons can be loosely subdivided into two ancestral clusters. Furthermore, while pigeons exhibit substantial genetic differentiation at the breed level, a phylogeny was difficult to resolve probably due to the reticular history of many breeds. As with other domesticates such as dogs and chickens, pigeon breeds were (and are) continually hybridized throughout their history in order to modify or add traits. Each of the two ancestral clusters encompasses remarkably different morphologies, with the first principally containing the pouters and croppers, fantails, and mane pigeons, and the second consisting predominantly of the tumblers (the most breed rich group) as well as the owl, wattle, and homing breeds (the latter containing the modern racing homer pigeon, which itself is a hybrid of several ancient breeds).

No discussion of domestic pigeons is complete without mentioning their feral descendants – feral pigeon populations are found in almost all human inhabited locations and, in terms of numbers, represent one of the world's most successful feral animals. In North Africa and Western Asia, feral populations are probably as old as domesticates themselves. The natural homing response of pigeons would have enabled domestics to be released to fly free during the day before returning to man-made lofts, thus providing plenty of opportunity for birds to go feral. The extent of this feralization has been so great, and the opportunities for hybridization between domestic and free-living populations so numerous, that truly wild rock pigeons might be on the verge of genotypic extinction. The chronic genetic contamination of wild populations greatly complicates attempts at resolving exactly when, and where, the original domestication processes occurred. In other regions, the feralization is likely contemporaneous with the introduction of the domestic breeds. For example, pigeons were introduced ~400 years ago in North America by European colonizers. In contrast to the tremendous morphological variations observed among pigeon breeds, the morphology of feral pigeons is remarkably homogenous, with close similarities to racing breeds. Genetic analyses of some feral populations support this association, with feral and racing pigeons being only minimally genetically differentiated (Stringham et al. 2012). This is not surprising given the widespread global interest in racing pigeons, often over long distances and with release from locations unfamiliar to the birds. Racing birds sometimes do not successfully return to their home lofts, and those that survive likely add to the feral pigeon population and gene pool.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

References

Darwin, C. 1859. *On the origin of species by means of natural selection*. London: John Murray.

Darwin, C. 1868. *The variation of animals and plants under domestication*. Vol. 1. London: John Murray.

Hansell, J. 1998. *The pigeon in history*. Bath: Millstream Books.

Johnson, R.F., and M. Janiga. 1995. *Feral pigeons*. Oxford: Oxford University Press.

Price, T.D. 2002. Domesticated birds as a model for the genetics of speciation by sexual selection. *Genetica* 116: 311–327.

Stringham, S.A., E.E. Mulroy, J. Xing, D. Record, M.W. Guernsey, J.T. Aldenhoven, E.J. Osborne, and M.D. Shapiro. 2012. Divergence, convergence and the ancestry of feral populations in the domestic rock pigeon. *Current Biology* 22: 302–308.

Further Reading

Shapiro, M.D., Z. Kronenberg, L. Cai, E.T. Domyan, H. Pan, M. Campbell, H. Tan, C.D. Huff, H. Hu, A.I. Vickrey, S.C.A. Nielsen, S.A. Stringham, H. Hu, E. Willerslev, M.T.P. Gilbert, M. Yandell, G. Zhang, and J. Wang. 2013. Genomic diversity and evolution of the head crest in the rock pigeon. *Science* 339: 1063–1067.

Pigment Analysis in Archaeology

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Introduction

Pigments are a common decorative component found in many archaeological and cultural contexts from around the world. The term "pigment" can be applied to materials that are used to color. Pigment analysis provides data that are valuable in interpreting cultural heritage.

Definition

Pigment analysis has been applied to a variety of materials, including pigments, paints, dyes, and inks. The color properties can arise from either inorganic (mineral pigments) or organic (dyes) materials or, in some cases, a combination of both. Depending on the chemical composition of the pigment and its binder, a variety of destructive and nondestructive techniques can be used to analyze the pigment.

Key Issues/Current Debates/Future Directions/Examples

The analysis of pigment materials has provided an important venue for understanding the cultural heritage as well as the technical qualities of the material itself. Pigments are found in rock art, frescoes, fabric, ceramic slips, manuscripts, body decoration, and virtually the majority of cultural heritage material categories.

Pigment analysis allows insights into the material composition of pigments, which facilitates a more comprehensive understanding of pigment technologies and application processes. In addition, chemical analysis provides insights into the origins of the original source materials. The statistical analysis of samples from sources and objects can provide information on the cultural exchange of pigment materials. In both cases, the appropriate analytical method must be chosen in terms of both the limitations of the technology as well as the potentially destructive effects to the cultural material. For example, a mass spectrometry study of organic components would not be appropriate to analyze the inorganic compounds in pigments. In addition, the resulting data must be interpreted carefully for both cultural context and scientific value. This entry covers some methods most commonly encountered in the literature; however, there are many more analytical

techniques utilized for pigment analysis, and many authors apply a combination of techniques toward understanding specific cases.

In the most ancient contexts, pigments refer to inorganic minerals that are easy to mine and prepare artwork and cultural application. An example of this from the earliest human societies is ochre (Fe-oxide-based minerals) for rock art pictographs (Henshilwood et al. 2001). As a whole, ochre is used nearly universally by early cultures for a variety of applications from burial contexts to paintings and continues into the present. Other ancient pigments included the uses of charcoal or soot for contrast in artwork using black lines and designs. Later Mediterranean and European cultures added to mineral palettes with the addition of pigments such as cinnabar (HgS) and white lead [$(PbCO_3)_2 \cdot Pb(OH)_2$]. During the Renaissance, such pigments as Naples yellow [$Pb(SbO_3)_2$/ $Pb_3(Sb_3O_4)_2$] and ultramarine ($Na_{8\text{-}10}$-$Al_6Si_6O_{24}S_{2\text{–}4}$) were introduced. In the Americas, Maya blue (a mixture of indigo and palygorskite clay) was used extensively since about 800 A.-D. until the sixteenth century. With various technological advances since the early nineteenth century, new pigments based on cobalt and chromium were developed (such as cobalt blue [$CoAl_2O_4$] and chrome yellow [$PbCrO_4$]). Other organic-based pigments were also derived in the twentieth century, although these and other modern pigments since the nineteenth century are of interest to archaeology and conservation more so for detecting forgeries or for conservation of archaeological examples. An exception to this is Egyptian blue, ($CaCuSi_4O_{10}$), synthesized in ancient Egypt from approximately 2500 BCE to the fourth century CE (Doménech-Carbó et al. 2013).

One of the historic challenges of pigment analysis is the destructive nature of sampling, whether it is physical or chemical. In many cases, the need for further data and information necessitates the destruction of a small amount of pigment sampled by a skilled conservator, and the data obtained outweighs the insignificant damage to the object. In other cases, sampling is not possible for a variety of reasons, and analysis is limited only to nondestructive techniques. In the majority of cases, if nondestructive techniques are available and provide the same quality or quantity of data, these methods are preferred, but they are not always applicable due to the complexity of the object. For such techniques as neutron activation analysis (NAA), or various forms of mass spectrometry (MS), a small sample on the order of milligrams is required, whereas techniques such as Raman spectroscopy are generally nondestructive provided that the object can fit into the instrumentation. Recent technology in spectroscopic techniques such as Raman and IR spectroscopy has allowed portable instrumentation with fiber-optic probes that can provide data on pigment composition without contact with the object. Many museums and archaeological expeditions also have been using handheld portable X-ray (PXRF) instrumentation that provides qualitative information on elemental composition of the pigments and substrate, depending on the thickness and composition of the pigment (Frahm and Doonan 2013). Quantitative analysis of pigments by portable instrumentation is often hindered by surface effects and nonuniform coverage of pigments, as well as the shape of the original object. Under controlled conditions, these effects can be minimized for quantitative analyses.

Raman spectroscopy has found significant advantage in pigment identification due to its nondestructive qualities, while also providing reproducible data with high sensitivity. Given the appropriate equipment, the analyses can also be performed in situ, which is a significant advantage in the museum or archaeological site context. The authors L. Burgio and R.J.H. Clark have published significantly in this area, primarily on European works, but also on objects from stuccos, papyri pigments, and Asian manuscripts. The authors have also compiled a comprehensive database of spectra of FT-Raman spectra of interest to cultural heritage (Burgio and Clark 2001). Edwards et al. recently published a book on the applications of Raman spectroscopy to archaeological contexts, including several chapters that were concerned with pigment applications (Edwards and Jaan 2009).

As mentioned earlier, XRF (X-ray fluorescence spectroscopy) instrumentation has been

used increasingly worldwide for the elemental identification of pigments. The majority of applications are of PXRF (portable X-ray fluorescence spectroscopy) through the use of a battery-operated handheld instrument. Bonizzoni et al. recently completed a study to evaluate the advantages and limitations of investigating pigment layering using PXRF and UV-visible spectroscopy (Bonizzoni et al. 2008). This study determined that a combination of methods was effective for the identification of two layers, but in examples with more than one layer, qualitative data could be used on elemental identification. Another recent study investigated Hellenistic plasters by PXRF, among other methods (Aquilia et al. 2012). A recent manuscript reviews the applications of PXRF to archaeology in the literature, including pigment applications (Frahm and Doonan 2013). X-ray fluorescence spectroscopy has also found use in archaeological materials, with the capabilities to measure spot sizes down to 5 μ. While requiring a synchrotron facility, this capability allows elemental mapping and quantification of pigment composition which cannot be achieved with the larger spot sizes of lab-based instrumentation (Popelka-Filcoff et al. 2016; Bergmann et al. 2012).

While the majority of studies on pigments have investigated composition, some recent works have also studied pigments as indicators of cultural exchange in a similar manner to materials such as obsidian and ceramics. These studies are based around the framework that trace compositions of the materials are indicators of the origins of the pigment materials. Duwe and Neff use laser ablation inductively coupled mass spectrometry (LA-ICP-MS) to investigate the recipes and exchange of paints on Pueblo ceramics from Arizona (Duwe and Neff 2007). Popelka-Filcoff and Eiselt et al. have also applied this concept to the provenance of ochre pigments in North America and Australia (Eiselt et al. 2011; Popelka-Filcoff et al. 2012).

In addition to the identification of pigment components, the identification of the pigment binder has also proven useful in archaeological studies. Binders often contain additional information on the pigment application technique as well as information on cultural trends. Separation techniques for the identification of binders include varying forms of gas chromatography as the most common technique (Bocchini and Traldi 1998; Casoli et al. 1996). As with other analytical studies, methodologies from other fields have been adapted for cultural heritage use as in the use of immunodetection of proteins in binders (Cartechini et al. 2010).

While the identification of pigments often reveals information on the pigment composition, other techniques can provide data on the age of the pigments. In the case of prehistoric pigments made of soot (carbon based), in some cases, the carbon in the pigment can be dated. Originally developed at Texas A&M University, this technique uses sub-milligram quantities of carbon to date rock art. An example of this work is the dating of rock art from Guatemala (Armitage et al. 2001).

In addition to methods that are relatively well established in the literature, new methodologies from analytical chemistry are finding applications in pigment analysis. A recent example of methodologies adapted from nanotechnology is SERS (surface-enhanced Raman spectroscopy), where the technique realizes enhanced Raman signal through the application of molecules on the pigment surface. A recent study by Brosseau et al. demonstrates use of the direct, non-extraction, technique on artist media. Casadio et al. describe the application of SERS to organic dyes from several cultural applications (Casadio et al. 2010). In addition, varying types of mass spectrometry have demonstrated use in pigment analysis. For example, DeRoo and Armitage recently published a manuscript on the use of DART (direct analysis in real time) mass spectrometry for organic dye compounds (Selvius DeRoo and Armitage 2011). While several established and commercially available methods are used routinely in laboratories and museums worldwide, the literature has many examples of adapting non-conventional analytical methods to understand pigments (e.g., voltammetry and electrochemical microscopy, among others) (Doménech-Carbó et al. 2013).

Pigment analysis by a variety of methods provides data and cultural interpretations of materials

from the inorganic, organic, and binder components of pigments from a variety of cultures and applications. While new technologies offer innovative ways to investigate pigments, care must be taken in the application of these methods and in the subsequent interpretation of data and cultural analysis in order to produce a meaningful archaeological science study.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ Dating Techniques in Archaeological Science
- ▶ Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology
- ▶ Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Neutron Activation Analysis (NAA): Applications in Archaeology
- ▶ Proton-Induced X-Ray Emission Spectroscopy (PIXE): Applications in Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Technological Studies in Archaeological Science
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Aquilia, E., G. Barone, V. Crupi, F. Longo, D. Majolino, P. Mazzoleni, and V. Venuti. 2012. Spectroscopic analyses of Hellenistic painted plasters from 2nd century B.C., Sicily (South Italy). *Journal of Cultural Heritage* 13 (2): 229–233. https://doi.org/10.1016/j.culher.2011.09.006.

Armitage, Ruth A., James E. Brady, Allan Cobb, John R. Southon, and Marvin W. Rowe. 2001. Mass spectrometric radiocarbon dates from three rock paintings of known age. *American Antiquity* 66 (3): 471–480.

Bergmann, U., P.L. Manning, and R.A. Wogelius. 2012. Chemical mapping of paleontological and archeological artifacts with synchrotron X-rays. In *Annual review of analytical chemistry*, ed. R.G. Cooks and E.S. Yeung, vol. 5, 361–389. Palo Alto: Annual Reviews.

Bocchini, Paola, and Pietro Traldi. 1998. Organic mass spectrometry in our cultural heritage. *Journal of Mass Spectrometry* 33 (11): 1053–1062. https://doi.org/10.1002/(sici)1096-9888(1998110)33:11<1053::aid-jms745>3.0.co;2-g.

Bonizzoni, L., S. Caglio, A. Galli, and G. Poldi. 2008. A non invasive method to detect stratigraphy, thicknesses and pigment concentration of pictorial multilayers based on EDXRF and vis-RS: In situ applications. *Applied Physics A: Materials Science & Processing* 92 (1): 203–210.

Burgio, L., and R.J.H. Clark. 2001. Library of FT-Raman spectra of pigments, minerals, pigment media and varnishes, and supplement to existing library of Raman spectra of pigments with visible excitation. *Spectrochimica Acta – Part A Molecular and Biomolecular Spectroscopy* 57 (7): 1491–1521.

Cartechini, Laura, Manuela Vagnini, Melissa Palmieri, Lucia Pitzurra, Tommaso Mello, Joy Mazurek, and Giacomo Chiari. 2010. Immunodetection of proteins in ancient paint media. *Accounts of Chemical Research* 43 (6): 867–876. https://doi.org/10.1021/ar900279d.

Casadio, Francesca, Marco Leona, John R. Lombardi, and Richard Van Duyne. 2010. Identification of organic colorants in fibers, paints, and glazes by surface enhanced Raman spectroscopy. *Accounts of Chemical Research* 43 (6): 782–791. https://doi.org/10.1021/ar100019q.

Casoli, Antonella, Patizia C. Musini, and Gerardo Palla. 1996. Gas chromatographic-mass spectrometric approach to the problem of characterizing binding media in paintings. *Journal of Chromatography A* 731 (1–2): 237–246. https://doi.org/10.1016/0021-9673(95)01194-3.

Doménech-Carbó, Antonio, María Teresa Doménech-Carbó, Francisco López-López, Francisco Manuel Valle-Algarra, Laura Osete-Cortina, and Estrella Arcos-Von Haartman. 2013. Electrochemical characterization of Egyptian blue pigment in wall paintings using the voltammetry of microparticles methodology. *Electroanalysis* 25 (12): 2621–2630. https://doi.org/10.1002/elan.201300417.

Duwe, Samuel, and Hector Neff. 2007. Glaze and slip pigment analyses of pueblo IV period ceramics from east-central Arizona using time of flight-laser ablation-inductively coupled plasma-mass spectrometry (TOF-LA-ICP-MS). *Journal of Archaeological Science* 34 (3): 403–414. https://doi.org/10.1016/j.jas.2006.06.001.

Edwards, Howell G.M., and Laane Jaan. 2009. Raman spectroscopy in art and archaeology: A new light on historical mysteries. In *Frontiers of molecular spectroscopy*, 133–173. Amsterdam: Elsevier.

Eiselt, B. Sunday, Rachel S. Popelka-Filcoff, J. Andrew Darling, and Michael D. Glascock. 2011. Hematite sources and archaeological ochres from Hohokam and O'odham sites in Central Arizona: An experiment in type identification and characterization. *Journal of Archaeological Science* 38 (11): 3019–3028. https://doi.org/10.1016/j.jas.2011.06.030.

Frahm, Ellery, and Roger C.P. Doonan. 2013. The technological versus methodological revolution of portable XRF in archaeology. *Journal of Archaeological Science* 40: 1425. https://doi.org/10.1016/j.jas.2012.10.013.

Henshilwood, C.S., J.C. Sealy, R. Yates, K. Cruz-Uribe, P. Goldberg, F.E. Grine, R.G. Klein, C. Poggenpoel, K. Van Niekerk, and I. Watts. 2001. Blombos cave, southern cape, South Africa: Preliminary report on the 1992–1999 excavations of the middle stone age levels. *Journal of Archaeological Science* 28 (4): 421–448.

Popelka-Filcoff, Rachel, Claire Lenehan, Michael Glascock, John Bennett, Attila Stopic, Jamie Quinton, Allan Pring, and Keryn Walshe. 2012. Evaluation of relative comparator and k0-NAA for characterization of aboriginal Australian ochre. *Journal of Radioanalytical and Nuclear Chemistry* 291 (1): 19–24. https://doi.org/10.1007/s10967-011-1236-2.

Popelka-Filcoff, Rachel S., Claire E. Lenehan, Enzo Lombi, Erica Donner, Daryl L. Howard, Martin D. de Jonge, David Paterson, Keryn Walshe, and Allan Pring. 2016. Novel application of X-ray fluorescence microscopy (XFM) for the non-destructive micro-elemental analysis of natural mineral pigments on Aboriginal Australian objects. *Analyst* 141 (Emerging Investigators Issue): 3657–3667. https://doi.org/10.1039/C5AN02065D.

Selvius DeRoo, Cathy, and Ruth Ann Armitage. 2011. Direct identification of dyes in textiles by direct analysis in real time-time of flight mass spectrometry. *Analytical Chemistry* 83 (18): 6924–6928. https://doi.org/10.1021/ac201747s.

Pikirayi, Innocent (Historical Archaeology)

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Basic Biographical Information

Professor Innocent Pikirayi was born in 1963 in Masvingo, Zimbabwe. He obtained a BA (honors) degree in history (1985) and an MA in African history (1987) from the University of Zimbabwe, where he received training from archaeologists such as Peter Garlake and Robert Soper. He combined his interests in history and archaeology in further studies, receiving his Ph. D. in historical archaeology from the University of Uppsala where his dissertation was entitled *The Archaeological Identity of the Mutapa State: Towards an Historical Archaeology of Northern Zimbabwe* (Pikirayi 1994). Pikirayi began his teaching career in archaeology at the University of Zimbabwe in 1988, attaining the rank of senior lecturer in archaeology in 2001. In 2004 he joined the staff of Midlands State University (Zimbabwe) as senior lecturer in archaeology and executive dean of the Faculty of Arts. In 2005 he relocated to South Africa to work at the University of Pretoria where, in May 2010, he became a full professor of archaeology and head of department of the Anthropology and Archaeology Department (Pikirayi pers. comm.).

Major Accomplishments

Pikirayi has made a substantive contribution to the archaeology of the southern African later Iron Age, especially to the archaeology of the Great Zimbabwe period (c. 1290–1450) and the post-Great Zimbabwe or Khami-era (c. 1450–1835). Theoretically, his interest has been in furthering understanding of how sociopolitical complexity originated, developed, and eventually declined at the site of Great Zimbabwe and its surrounds. Pikirayi has published extensively on this both singly (Pikirayi 2001) and in tandem with other Zimbabwean scholars, including a prizewinning *Antiquity* article in 2008 (Chirikure and Pikirayi 2008). More recently, he has turned his attention to Mapungubwe and other archaic states in southern Africa and the factors that may have led to their rise and demise (Pikirayi 2017). The study of the regional and spatial contexts of these states, including Great Zimbabwe and Mapungubwe, forms part of his participation in the larger "Urban Mind" project, led by scholars based at the University of Uppsala (Pikirayi pers. comm.).

Pikirayi has long been interested in exploring different aspects of public archaeology and the relevance of archaeology and heritage in post-colonial Africa. His participation in the University of Pretoria Mapungubwe Committee, tasked with the repatriation and restitution of cultural and skeletal remains from the site of Mapungubwe,

led him to further consider the role of public archaeology and the relevance of archaeological practice to descendant communities in South Africa and to publish his book *Tradition, Archaeological Heritage Protection and Communities in the Limpopo Province of South Africa* in 2011. He has strongly advocated for the need to decolonize the discipline of archaeology within the African continent by developing theories and practices relevant to and emanating from the local African context (Pikirayi 2015).

He has advanced the field of historical archaeology in the southern African subcontinent in his historical archaeological investigation of the Mutapa State (1450–1900). This work was important not only for yielding valuable data about the post-Great Zimbabwe period but also for increasing academic understanding of African-European interactions, colonialism, and conflict. In particular, he used archaeological data to contest written Portuguese accounts of the political status quo in the Mutapa State (Pikirayi 2009). Pikirayi is a specialist in the analysis of archaeological ceramics and has conducted ethno-archaeological research on pottery production, distribution, and use in Swaziland and eastern and northern South Africa and has written on the relationships between group identity and ceramics (Pikirayi 2007).

He has played an important role in furthering cultural heritage management in Zimbabwe serving as vice-president of the International Council on Monuments and Sites (ICOMOS), Zimbabwe, from 1997 to 2003 and as president from 2003 to 2004. During that time he headed up the ICOMOS-Zimbabwe evaluation mission for the nomination of the Matobo Hills to the World Heritage List (Pikirayi pers. comm.).

Cross-References

- ► Colonial Encounters, Archaeology of
- ► Oral Sources and Oral History
- ► Society for Historical Archaeology (SHA) (Modern World Archaeology)
- ► Southern Africa: Historical Archaeology
- ► Zimbabwe: Cultural Heritage Management

References

Chirikure, S., and I. Pikirayi. 2008. Inside and outside the dry stone walls: Revisiting the material culture of Great Zimbabwe. *Antiquity* 82: 976–994.

Pikirayi, I. 1994. *The archaeological identity of the Mutapa state: Towards an historical archaeology of northern Zimbabwe*. Uppsala: Department of Archaeology and Ancient History.

Pikirayi, I. 2001. *The Zimbabwe culture: Origins and decline of southern Zambezian states*. Walnut Creek: AltaMira Press.

Pikirayi, I. 2007. Ceramics and group identities: Towards a social archaeology in southern African Iron Age ceramic studies. *Journal of Social Archaeology* 7: 286–301.

Pikirayi, I. 2009. Palaces, Feiras and Prazos: An historical archaeological perspective of African-Portuguese contact in Northern Zimbabwe. *African Archaeological Review* 26: 163–185.

Pikirayi, I. 2011. *Tradition, archaeological heritage protection and communities in the Limpopo Province of South Africa*. Addis Ababa: OSSREA.

Pikirayi, I. 2015. The future of archaeology in Africa. *Antiquity* 89: 531–541.

Pikirayi, I. 2017. Trade, globalisation and the archaic state in southern Africa. *Journal of Southern African Studies* 43 (5): 879–893.

Further Readings

Pikirayi, I. 1999. Taking southern African ceramic studies into the 21st century: A Zimbabwean perspective. *African Archaeological Review* 16: 185–189.

Pikirayi, I. 2000. Wars, violence and strongholds: An overview of fortified settlements in northern Zimbabwe. *Journal of Peace, Conflict and Military Studies* 1: 1–12.

Pikirayi, I. 2006a. Gold, black ivory and houses of stone: Historical archaeology in Africa. In *Historical archaeology*, ed. M. Hall and S. Silliman, 230–250. Oxford: Blackwell.

Pikirayi, I. 2006b. The kingdom, the power and forevermore: Zimbabwe culture in contemporary art and architecture. *Journal of Southern African Studies* 32: 755–770.

Pikirayi, I. 2009. What can archaeology do for society in southern Africa? *Historical Archaeology* 32: 125–127.

Pikirayi, I., and G. Pwiti. 1999. States, traders and colonists: Historical archaeology in Zimbabwe. *Historical Archaeology* 33: 73–89.

Schmidt, P., and I. Pikirayi, eds. 2016. *Community archaeology and heritage in Africa: Decolonizing practice*. London: Routledge.

Pikirayi, Innocent (Indigenous Archaeology)

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Basic Biographical Information

Born in 1963, Innocent Pikirayi grew up in Zimuto, a district in Masvingo (formerly Victoria) Province of Zimbabwe (Fig. 1). His father was a carpenter in the Public Works Department in the then Rhodesia from which he resigned following the intensification of the liberation war in the late 1970s. His mother was a stay-at-home mum who engaged in subsistence farming and largely saw the children through to school. A practicing Catholic, Innocent Pikirayi is married to Susan Philistus Muzivi, and they have two daughters and a son. The fifth born in a family of seven, he attended local schools run by missionaries and later a multiracial school in the same province before heading for the University of Zimbabwe (UZ) for his undergraduate studies where he developed an interest in archaeology.

Pikirayi, Innocent (Indigenous Archaeology), Fig. 1 Innocent Pikirayi

Innocent entered university in 1983, just after Zimbabwe's independence. Many archaeologists who had worked in Zimbabwe had left after the fall of a Rhodesian government that had declared unilateral independence from the United Kingdom in 1965. There was therefore an urgent need to train indigenous archaeologists who would "correct" the biased archaeology that had developed under a nationalist settler government. He is therefore one of the first indigenous Zimbabweans to receive training in Archaeology.

His encounter with archaeology was at 2nd year level at university (1984), where he had already enrolled as an honors student in history. Two people influenced his decision to take up archaeology: Professor Vella, a classicist from Malta, and Dr. Peter Garlake, whose presence at UZ in 1983 and 1984 is instrumental in his decision to take up archaeology as a career. The subsequent arrival of Robert Soper and Gilbert Pwiti at UZ, the introduction of archaeology as a degree, and the SIDA-SAREC-funded research project *Urban Origins in Eastern and Southern Africa* (coordinated by Uppsala University and the Swedish National Board of Antiquities) saw Innocent Pikirayi embarking on Ph.D. studies in 1988. His doctoral thesis was shaped by this project and resulted in a monograph on the historical archaeology Mutapa State (CE 1450–1900) in northern Zimbabwe. Paul Sinclair from Uppsala University was Innocent's supervisor and mentor for his Ph. D., which was completed in 1992. Since then, he has embarked on a program of research and publication, focusing on the origins, development and decline of state societies on the Zimbabwe plateau, the development of African ceramic traditions during the last 2000 years, as well as archaeology in contemporary politics and society.

Currently, Innocent Pikirayi holds the position of Chair in the Department of Anthropology and Professor in Archaeology at the University of Pretoria, South Africa. In 2009, he was appointed Docent in Archaeology by the Department of Archaeology and Ancient History at Uppsala University. Previously he has worked as a Dean and Senior Lecturer in Archaeology in the Faculty of

Arts at Midlands State University in Zimbabwe. He has also worked as Lecturer and Senior Lecturer at the University of Zimbabwe. In 2000 he was a Visiting Commonwealth Fellow and Scholar at the Pitt Rivers Museum, Oxford University.

He has mentored many of the second-generation indigenous archaeologists who have worked and continue to work for the National Museums and Monuments of Zimbabwe (NMMZ) and the two universities teaching archaeology in Zimbabwe, viz, the University of Zimbabwe and Midlands State University. He has worked closely with NMMZ in the development of management plans for Zimbabwe's World Heritage Sites and played a huge role in the organization of the ICOMOS 14th General Assembly and Scientific Symposium which was held in Victoria Falls in 2003. A jovial character who is always happy to assist peers and students, Professor Pikirayi is highly respected in archaeology circles in his native Zimbabwe, Africa, and the world.

Major Accomplishments

Professor Pikirayi's research interests are in the late farming communities of southern Africa. He has published widely and consistently on the Zimbabwe culture as well as on ceramic traditions of southern Africa for the past 25 years. Professor Pikirayi has written and edited books and articles on the rise, development, and decline of the Zimbabwe culture. His major scientific contribution however has been in ceramic studies, and his in that area has illuminated the prehistory of Zimbabwe and southern Africa. Currently, Professor Pikirayi is researching on archaeological and ethnographic ceramics in southern Africa, examining issues in the production, distribution, use, and relationships between ceramic remains and group identity. He has also developed an interest in public archaeology especially in understanding how indigenous communities can participate and engage with Archaeology as well as conservation of archaeological sites.

Innocent Pikirayi has contributed tremendously to the understanding of the second millennium in Zimbabwe and adjacent regions. His book, *The Zimbabwe Culture* (Pikirayi 2001) has become one of the most important texts for students studying later farming communities and complex societies of southern Africa. This book combined oral traditions, archaeology, and archival documents to produce a synthesis of the history of Zimbabwe and adjacent areas in the second millennium. The book analyzed new evidence on the origin, development, and decline of an extraordinary culture, the Zimbabwe culture (1050–1850). It also discusses the early Zimbabwe phase of Mapungubwe and shows how it contributed to the development the Great Zimbabwe and Khami phases. *The Zimbabwe Culture* discusses the later periods in which the latter states had contacts with the Portuguese as well as the colonial interface with the British and other European countries. One of his recent articles (in collaboration with one of his former student, Shadreck Chirikure) on the use of space at Great Zimbabwe was published by Antiquity in 2009 and was judged the best article for the year by the same journal (Chirikure and Pikirayi 2008). Professor Pikirayi has served as a reviewer and advisor for the National Research Foundation, South Africa, and is also an editorial board member for *Azania:* the *Journal of African Archaeological Research* and the *African Archaeological Review*. He was also editorial advisor for the *Encyclopedia of Precolonial Africa: Archaeology, History, Language, Cultures, and Environments* published by Altamira Press in 1997 and reviewer of the UNESCO General History of Africa volumes which were published in 2010.

Cross-References

► Pikirayi, Innocent (Historical Archaeology)
► Zimbabwe: Cultural Heritage Management
► Zimbabwe's World Heritage Sites

References

Chirikure, S., and I. Pikirayi. 2008. Inside and outside the dry stone walls: Revisiting the material culture of Great Zimbabwe. *Antiquity* 82: 1–18.

Pikirayi, I. 2001. *The Zimbabwe culture: Origins and decline in southern Zambezian states*. Walnut Creek/New York/Oxford: Altamira.

Further Reading

Lindahl, A., and I. Pikirayi. 2010. Ceramics and change: An overview of pottery production techniques in northern South Africa and eastern Zimbabwe during the first and second millennium AD. *Archaeological and Anthropological Sciences* 2 (3): 133–149.

Pikirayi, I. 1993. *The archaeological identity of the Mutapa state: Towards an historical archaeology of northern Zimbabwe*, Studies in African Archaeology. Vol. 6. Uppsala: Societas Archaeologica Upsaliensis.

Pikirayi, I. 1999. Research trends in the historical archaeology of Zimbabwe. In *Historical archaeology: Back from the edge*, ed. P.P.A. Funari, M. Hall, and S. Jones, 67–84. London: Routledge.

Pikirayi, I. 2006. Gold, black ivory and houses of stone. In *Historical archaeology*, Blackwell Studies in Global Archaeology: A Prospectus, ed. M. Hall and S. Silliman. Oxford: Blackwell Publishing.

Pikirayi, I. 2009a. The archaeology of sub-Saharan Africa: An overview. In *The Oxford handbook of archaeology*, ed. B. Cunliffe, C. Gosden, and R.A. Joyce, 723–762. Oxford: Oxford University Press.

Pikirayi, I. 2009b. The past within the present: The contemporary uses of Mapungubwe. In *Mapungubwe remembered*, ed. S. Tiley-Nel, 250–258. Johannesburg: Chris Van Rensburg Publications Pty (Ltd).

Pilar Luna Erreguerena

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Basic Biographical Information

Pilar Luna Erreguerena (1944) was born in the port of Tampico, in the state of Tamaulipas, México. In 1982, she obtained her Bachelor in Archaeology at the National School of Anthropology and History (ENAH) and her Master in Anthropological Sciences at the National Autonomous University of Mexico (UNAM). She was in charge of Section 3 of the important diggings of the Aztec Main Temple, downtown Mexico City, where in 1978 she discovered the famous pink stone shell sculpture exhibited now at this site museum. This was her last work as a land archaeologist. Since she was a student she had wondered about the cultural heritage underwater. Searching at the National Museum of Anthropology's library, she found only one book regarding this topic, authored by Dr. George F. Bass – considered as "the father of underwater archaeology." In 1979 she invited him to impart the core of the first underwater archaeology course ever given in Mexico, at the end of which, Dr. Bass invited her to Turkey to participate in the last field season of the excavation of a 1025 Byzantine shipwreck known as the Glass Wreck. In February 1980, after a long struggle headed by Luna Erreguerena, the National Institute of Anthropology and History (INAH) created an underwater archaeology division (Luna 2002:272). She was appointed as head of that area, where she served for more than 37 years, until April 2017 when she semi-retired to be dedicated mainly to the *Underwater Archaeological Project Hoyo Negro, Tulum, Quintana Roo*, which in December 2017 received the SAF (Shanghai Archaeological Forum) Field Discovery Award, given by the Institute of Archaeology at the Chinese Academy of Social Sciences, for the finding of the most complete skeleton ever recovered in the Americas, belonging to a female who was between 15 and 17 years old and lived in the Yucatan Peninsula between 13,000 and 12,000 cal BP, as well as an important deposit of extinct megafauna (Chatters et al. 2014:753). In 2014, the discovery of the human skeleton, known as Naia, was considered among the ten most important ones in the world by the North American magazines *Discover* and *Archaeology*.

Major Accomplishments

Pilar Luna is considered the pioneer of underwater archaeology in Mexico and has supported this discipline in other Latin American countries. Since the beginning, her priorities always were the training of underwater archaeologists and the development of projects both in marine and

Pilar Luna Erreguerena, Fig. 1 Pilar Luna facing the sea in Veracruz. (Credit: Canal Once México)

continental waters with a multidisciplinary, multi-institutional, and international approach. The generous support of colleagues, mainly from the United States and Canada, has been vital in the unfoldment of Mexican underwater archaeology. She is also recognized for her strong position defending Mexico's underwater cultural legacy against treasure hunters and played an important role in the elaboration of the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage (Luna Erreguerena 2011a:985). In 2010 she coordinated the course "Underwater and Maritime Archaeology Research and Management," organized by INAH and UNESCO: 27 students from 14 countries of Latin America and the Caribbean participated (Luna Erreguerena 2011b:34). Archaeologist Pilar Luna Erreguerena has received national and international recognitions such as the Award of Merit "for pioneering in the recognition, exploration and preservation of the underwater archaeological heritage of Mexico" in 1997 and the J.C. Harrington Medal "for Her Lifetime Contributions and Dedication to Historical and Underwater Archaeology" in 2011, both presented by the Society for Historical Archaeology (SHA). She was the first Latin American woman and the second underwater archaeologist, after Dr. Bass, to receive this medal. The most recent recognition was the Investigation Award given by the Spanish Geographic Society in 2016 in Madrid. She is one of the best known and respected figures in underwater archaeology in the world. However, her major accomplishment is the nobility and kindness of her heart and the delicacy and respect to treat others (Figs. 1 and 2).

Pilar Luna Erreguerena, Fig. 2 Pilar Luna near the entrance of the Hoyo Negro site, Quintana Roo. (Credit: Roberto Chávez Arce, SAS/INAH)

Cross-References

- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ Peopling of the Americas
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Underwater Archaeology

References

Chatters, J.C., D.J. Kenneth, Y. Asmeron, B.M. Kemp, V. Polyak, A. Nava Blank, P.A. Beddows, E. Reinhardt, J. Arroyo-Cabrales, D.A. Bolnick, R.S. Malhi, B.J. Culleton, P. Luna Erreguerena, D. Rissolo, S. Morell-Hart, and T.W. Stafford Jr. 2014. Late Pleistocene human skeleton and mtDNA link paleoamericans and modern native Americans. *Science* 344: 750–754.

Luna Erreguerena, P. 2002. Mexico: A country with a rich underwater legacy. In *International handbook of underwater archaeology*, ed. C.V. Ruppe and J.F. Barstad, 269–278. NY: Kluwer Academic Plenum Publishers.

Luna Erreguerena, P. 2011a. The growth of maritime archaeology in Mexico: A case study. In *Oxford handbook of maritime archaeology*, ed. Alexis Catsambis, Ben Ford, and Donny L. Hamilton, 967–988. New York: Oxford University Press.

Luna Erreguerena, P. 2011b. Underwater archaeology in Mexico: From the bottom of the sea to the crater of a Volcano. In *Proceedings of the Asia Pacific regional conference on underwater cultural heritage,* ed. M. Staniforth, J. Craig, S. C. Jago-On, B. Orillaneda. and L. Lacsina, 25–38. Manila.

Further Reading

Arroyo-Cabrales, J., P. Luna, J. C. Chatters, D. Rissolo, R. Chávez Arce, A. Nava Blank, and H. Barba. 2015. Underwater archaeology and prehistory: The case of the Cenotes in Mexico. UNESCO, HEADS 5, vol. 2, 44–50.

Chatters, J.C., D. Rissolo, J. Arroyo-Cabrales, T.W. Stafford Jr., B.M. Kemp, A. Álvarez, A. Nava Blank, P.A. Beddows, E. Reinhardt, S. Kovacs, S. Collins, S. Morell-Hart, R. Chávez Arce, S. Bird, and P. Luna. 2017. Hoyo Negro: Tapping the paleoanthropological and paleoecological potential of a deeply submerged underground chamber on the Yucatan Peninsula, Mexico. In *The archaeology of underwater caves*, ed. P.B. Campbell, 119–129. Southampton/USA: Highfield Press/Oxbox Books Ltd. Chapter 6.

Kovacs, S.E., E.G. R einhardt, J.C. Chatters, D. Rissolo, H.P. Schwarcz, S.V. Collins, S.T. Kim, A. Nava Blank, and P. Luna Erreguerena. 2017. Calcite raft geochemistry as a hydrological proxy for Holocene aquifer conditions in Hoyo Negro and Ich Balam (Sac Actun Cave System), Quintana Roo, Mexico. *Quaternary Science Reviews* 175: 97–111.

Luna Erreguerena, P. 2008. The foundations of underwater and maritime archaeology in Latin America and the Caribbean. In *Underwater and maritime archaeology in Latin American and the Caribbean*, One world archaeology series, ed. M.E. Leshikar-Denton and P. Luna Erreguerena, vol. 56, 25–53. Walnut Creek: Left Coast Press.

Luna Erreguerena, P. 2010. Mexico: A leader in ratification of the UNESCO Convention on the Protection of the Underwater Cultural Heritage. *Journal of Maritime Archaeology* 5 (2): 143–152. Springer, New York.

Luna Erreguerena, P. 2014. Challenges as stepping stones: Mexico's experience in maritime heritage interpretation. In *Meeting challenges in the public interpretation of maritime cultural heritage – Between the devil and the deep*, Where the land meets the sea series, ed. Della Scott-Ireton, 189–196. New York: Springer.

McDonald, G.H., J.C. Chatters, and T.J. Gaudin. 2004. A new genus of megalonychid ground sloth (Mammalia, Xenarthra) from the late Pleistocene of Quintana Roo, Mexico. *Journal of Vertebrate Paleontology* 37: e1307206. https://doi.org/10.1080/02724634.2017.1307206 (14 pages), Society of Vertebrate Paleontology. ISSN: 0272-4634 (Print) 1937-2809 (Online) Journal homepage: http://www.tandfonline.com/loi/ujvp20.

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Pile Dwellings or Stilt Houses in Prehistory of Brazil

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Introduction

Around the 1950s, an American archaeologist, Betty J. Meggers, penetrated the Amazonian tropical forest, together with her husband, Clifford

Evans, placing the Amazon in the spotlights of South American Archaeology (Meggers 1954). Due to their orientations in ecological determinism, the researchers in question explained that the known vestiges of complex societies are derived from peoples coming from the Andes. Their argument was that the acid ground of the Amazonian region, created by abundant rains, removed the minerals, disabling, this way, the success of agriculture that, at that time, was considered the main cultural factor in civilization development (Meggers and Evans 1957). In this interpretation, it was impossible that a civilization could have developed in this inhospitable environment. The Amazon was, therefore, the illusion of a paradise, an epithet that even became the title of one of Betty Meggers' books (1987).

In the 1960s, the Evans couple led the PRONAPA (National Program of Archaeological Research) in Brazil, with other Brazilian and foreign archaeologists as Hilbert (1962) and Simões (1981), who corroborated in the studies using the archaeological record of Central Amazon to create a typology that found an allochthonous origin, external to the human groups in precolonial Amazon. Also other American and Brazilian researchers saw these same records as evidence of processes of local social transformation (Lathrap 1970; Brochado 1984).

However, at the beginning of the 1980s, archaeologist Anna C. Roosevelt internationalized the archaeological research in Amazon (Roosevelt 1980, 1989). From the experience acquired in the region of the Orinoco River, Venezuela, this researcher demonstrated, mainly in her excavations in Marajo Island, that the societies that had established in the estuary of the Amazon River, as well as those that settled along the margins, and up the river, were of local origin (Roosevelt 1991). Although the Amazonian high ground really is barren, it has many alluvial floodplains, and also there is a man-made soil known as black earth; it was in these types of earth that such Amazonian societies gained much of their economic sustenance. In this sense, the Amazonian societies developed from the culture of maize and others crops (corn) in these anthropocentric lands, and this would explain the emergence of complex societies in the Amazonian basin. The Indians lived in large settlements that were linked to cultural and political territories ruled by overlords they believed were was of divine origin. They developed complex earthworks, by modifying the environment, as the mound buildings in Marajo Island; they were sometimes bellicose and expansionist societies (Roosevelt 1991). In this way, the basin Amazon's studies by Roosevelt was corroborated by subsequent fieldwork (Porro 1992; Balée 1994; Denevan 2001; Schaan 2004; Petersen et al. 2003; Heckenberger 2005; Hornborg 2005; Neves 2008; Rostain 2010; Gomes 2012).

The project we develop is placed in the context of the theoretical discussions concerning the development of past societies in the lowlands of South America, in this case, the Brazilian Amazon. The project has 4 years to be developed (2015–2018). In this article, we present the preliminary results from 2 years of research. If nowadays there is a reasonable knowledge about the cultural picture of precolonial Amazonian societies, on the other hand, very little is known about an important type of human settlement in the southeast of this region, where these sites are located.

What Are Pile Dwellings?

The region where the pile dwellings (estearias) occur is the Maranhão's state in northwest of Brazil (Baixada Maranhense) (Figs. 1 and 2). It is a microregion situated to the west and southeast of the island of Maranhão; it comprises an area of approximately 20,000 km^2 inside of Legal Amazon, a region that contains more than 500,000 inhabitants (census IBGE 2006). It is a very poor territory, with the lowest HDI not only of the State of Maranhão but of all Brazil, whose population lives out of the subsistence of traditional agriculture, fishing, raising of small animals, and vegetal extractivism, especially of the babaçu coconut. The main cities of this area are Penalva, Pinheiro, Viana, and Santa Helena (Navarro 2014, 2016). We are studying the sites located in Santa Helena city on the Turiaçu River.

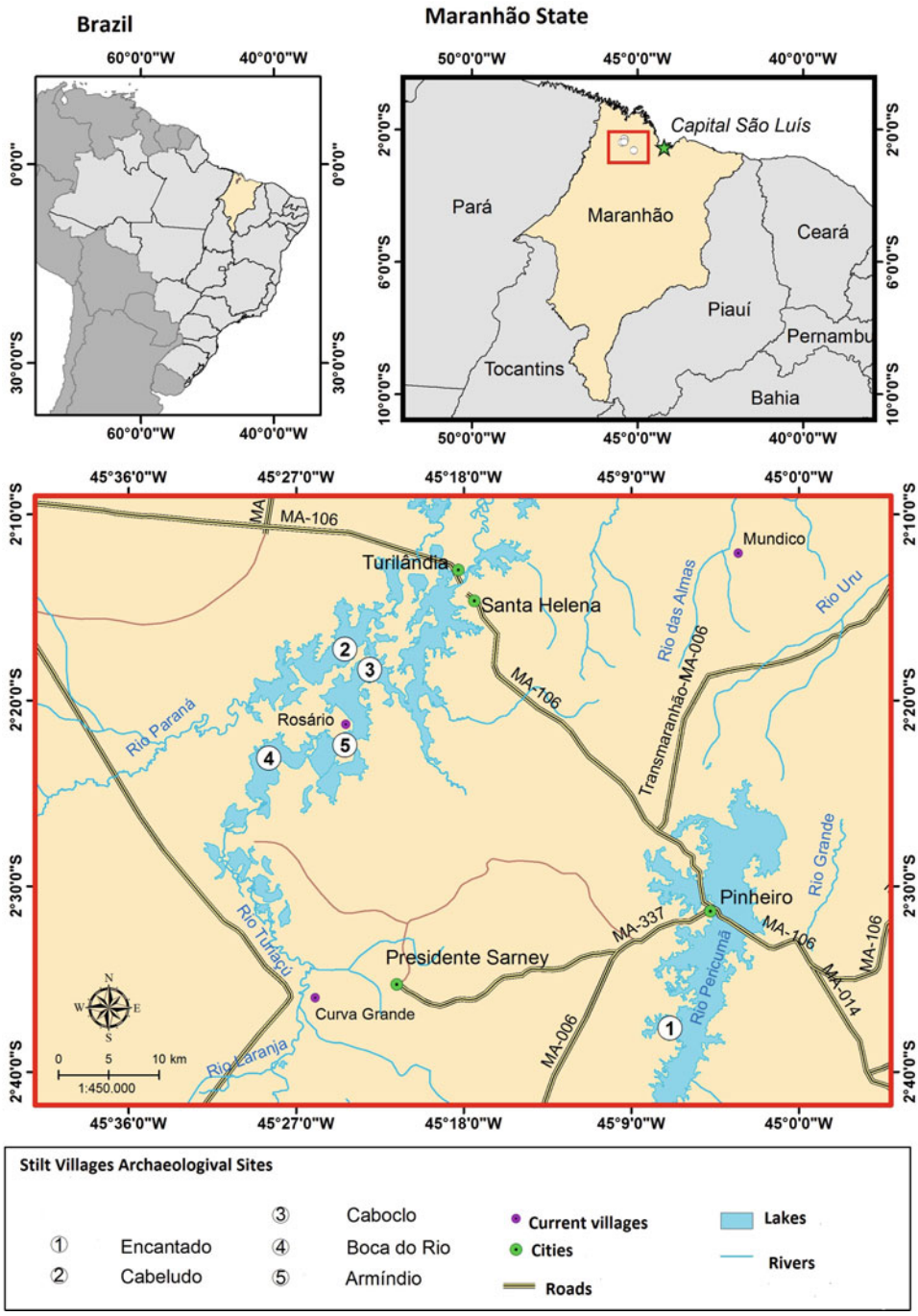

Pile Dwellings or Stilt Houses in Prehistory of Brazil, Fig 1 Maps of the pile dwellings' localization

The pile dwellings were lacustrine housings constructed with wooden pillars (stumps or trunks of trees) which served as sustentation for the superior constructions, originating, thus, its villages or the prehistoric palafittes (Raimundo Lopes 1916; Correia Lima and Lima Aroso 1989;

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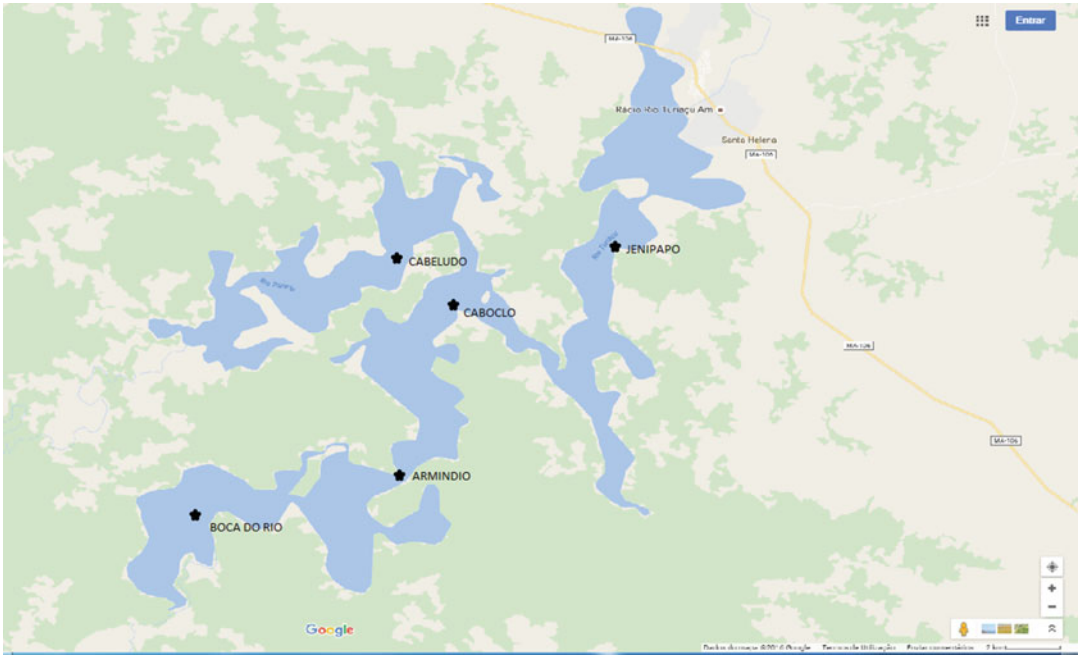

Pile Dwellings or Stilt Houses in Prehistory of Brazil, Fig. 2 Maps of the pile dwellings' localization

Leite Filho 2010) (Fig. 3). This type of archaeological site appears in isolated cases in South America, as in Vespucius' stories of 1499 about communities that lived in palafittes in the Venezuelan coast. However, pile dwelling sites existing in many places, including Marajo, today, may have been more common in prehistoric times.

In Brazil, several authors consider that the pile dwellings are the least known archaeological sites in the national territory (Prous 1992; Martin 1996). Even though reports by palafitte dwellers in the upper Amazon River described by the expeditions of Ursúa and Aguirre (1516) and Porro (1992) and of stories by Frenchmen from the seventeenth century of communities living in palafittes in regions that correspond to where the States of Para and Maranhão are today (D'Abbeville 2008 [1614]; D'Evreux 2008 [1615]; João Daniel 2004 [1757–1776]), the pile dwellings of Maranhão are the only ones with known material vestiges in the present time. The main importance of studying these sites is their favorable preservation condition. The aquatic environment preserved them in an unparalleled way, in such a way that the paintings on the artifacts, as well as the material made of wood and even the hut's straw, are well conserved.

The pile dwellings are located throughout the diverse lakes that are characterized by the formation of a water system composed of rivers, flooding fields, and lakes of various sizes that are defined by the seasonality of the climate (floodings occur in the first semester of each year) (Franco 2012). The lakes of Maranhão lowlands have recent geological origin, Pleistocene, and are characterized by periodic floodings in the rainy season, because they end up receiving pluvial waters and receiving, in addition, the waters of the rivers in the region when they overflow, such as the Pindaré, Pericumã, and Turiaçu (Corrêa et al. 1991; Ab' Sáber 2006). They belong, also, to a typical biome of the Amazonic region which is characterized by fertile valley fields.

Pile Dwellings or Stilt Houses in Prehistory of Brazil, Fig. 3 The pile dwellings in the dry season

Current archaeological research carried through in the Amazon region demonstrates that the fertile valleys of the rivers in the region were densely populated by societies of the chiefdom type in Amazonian prehistory (Roosevelt 1980; Heckenberger 2005; Neves 2008). We can affirm, in hypothetical level, that, in principle, the existence of abundant feeding in these lakes could favor sedentary habitation of the human groups that occupied the region.

Although it is still very incipient to infer the type of social organization of the pile dwellings, it is important to highlight that the aquatic biome and the ideal conditions of food attainment are similar to the ones in the Amazonian fertile valleys, which makes us infer that this rich environment was paramount to the development of the palafitte dwelling societies. The evidence of this adaptation is supplied by the description by Simões (1981) who measured one of the pile dwellings and could delimit its area to 2 km, therefore a site of considerable dimensions.

On the other hand, he still does not answer who were these lacustrine communities. For Raimundo Lopes (1916), they are delayed populations of Amazonian filiation that are migrating into the lowland region. For Correia Lima and Lima Aroso (1989) they are Arawak groups that have been expelled, later, by the Tupiguarani occupation. For Leite Filho (2010: 255), the estearias were formed by "intrusive groups in the region that organized themselves in independent villages or inversely in a set of habitations with some political bond among them, given their cultural homogeneity and contemporaneity."

Discussion

Ethnohistorical reports of the sixteenth century AD, mainly by the priests Claude D' Abbeville, D'Evreux, and João Daniel, are an important information corpus concerning the Indians who inhabited Maranhão in the period of the Conquest. However, the majority of reports narrate the Tupi-Guarani occupation in the island of São Luís. These historical documents narrate several aspects of aboriginal daily life, as space organization, war, and the way they fed (Porro 1992).

With regard to the pile dwellings of the lowlands, there are no reports of the construction of palafittes in precolonial Maranhão, but there are mentions in the region of where is the State Pará today and in the Highlands, Amazon region. The best example of these reports the expedition of Ursúa and Aguirre in the High Amazon when they got in touch with the Omágua, aboriginal group

Pile Dwellings or Stilt Houses in Prehistory of Brazil, Fig. 4 The mapping poles were carried through with total station and satellite georeferencing (GPS and GIS)

that lived in palafittes, indicating that these lacustrine housings could have been fortified:

> We went down the river for five or six days (...) *We arrived at some strong houses that the Indians have there, made of jirau, high and surrounded by boards of palm tree and (that) have, up in the building, small windows for shooting arrows, and from up there, the Indians wounded four of five Spaniards*, with twenty that had themselves in advance with a chief, and had made them withdraw; when the armada arrived at this house the Indians had run away… When we wanted to leave this place, appeared in the river many canoes and Indians, which, according to some, could be more than 100, with many Indians of war. (Porro 1992: 95)

In the eighteenth century AD, the Jesuit João Daniel wrote the following on the palafitte dwelling peoples of the Amazon, inferring a possible meaning of these types of constructions:

> Many nations live on lakes, or among them, where they have, over the water, their houses made of the same sort, only with the amend of being out of hay, that they erect with poles, and palm tree branches, and in them they live joyfully, like fish in the water. One reason they manufacture in the lakes their populations and housings is the great abundance of turtles, marine oxen, and more fish in them, other reason is for them to be safe from their enemies' assaults. (Daniel 2004: 280)

So far, our team mapped the archaeological sites of Armindio, Caboclo, Encantado, and Boca do Rio. The mapping was carried through with total station and satellite georeferencing (GPS and GIS). Considering that the riverbeds go through a strong silting process, besides the fact that the sand forms a layer on the poles, hindering their identification, the most adequate method was the following: through rafts, we identified each pole manually and marked them, locating, this way, the delimitation of the sites as well as the majority of the poles that could be referenced by the total station. We must take into consideration, on the other hand, that this method also has margin for imperfection, given that some poles may have been left unseen by one of the team members. However, it is considered that the highest number of poles was mapped satisfactorily, once that the form of the villages was visibly identified (Fig. 4).

Eloquent results were obtained. The biggest mapped site is Encantado, with an extension of 13 ha and 171 visible poles, being that, according to locals, a third of the poles were destroyed for attainment of the wood used in local activities, as the erection of fences. On the other hand, the Boca do Rio site, of only 1 ha, presented the highest number of poles: a total of 1100 (Figs. 5 and 6).

Given the subaqueous nature of the sites, systematic collections were also performed in the drought season, when fluvial deposits lower their

Pile Dwellings or Stilt Houses in Prehistory of Brazil, Fig 5 The Boca do Rio site, of only 1 ha, presented the highest number of poles: a total of 1100

level (50 cm of water), but do not dry out, a situation that led to the collections. This way, the sites were divided on a Cartesian plane with randomly selected points of 1 × 1 and, from this, the superficial archaeological materials correspondent to each one of these points were removed. Among the several collected materials, both entire and broken ceramic artifacts are found, being painted and not painted: many figurines; lithic material and wooden pieces, as the helve of an axe; spindle stems; and supposedly one oar (and/or borduna?).

Regarding chronology, six radiocarbon dates from woods have been carried through for the sites, as can be observed on the table below (the dates are calibrated) (Table 1). The majority of the sites are contemporary, and the fact that they were constructed between the eighth and tenth centuries correspond to complex relation of societies that occupied the Amazon in the precolonial period, establishing direct and indirect contact with them.

Spatial analysis evidences elliptical or circular villages built in the center of the rivers or lakes, whose function is still unknown, but it possibly has to do with the attainment of food or for defense purposes. There is an architectural construction hierarchy, where the highest amount of poles is located in the central part of the villages, and, further from the center, there is a gradual reduction of wooden sticks, until they disappear. This hierarchy also promotes the concentration of groups of poles in different places of the sites, which may mean that they had been linked by bridges (Willey and Philips 1958; Shanks and Tilley 1987; Hodder 1994; Ucko 1995). Spatial

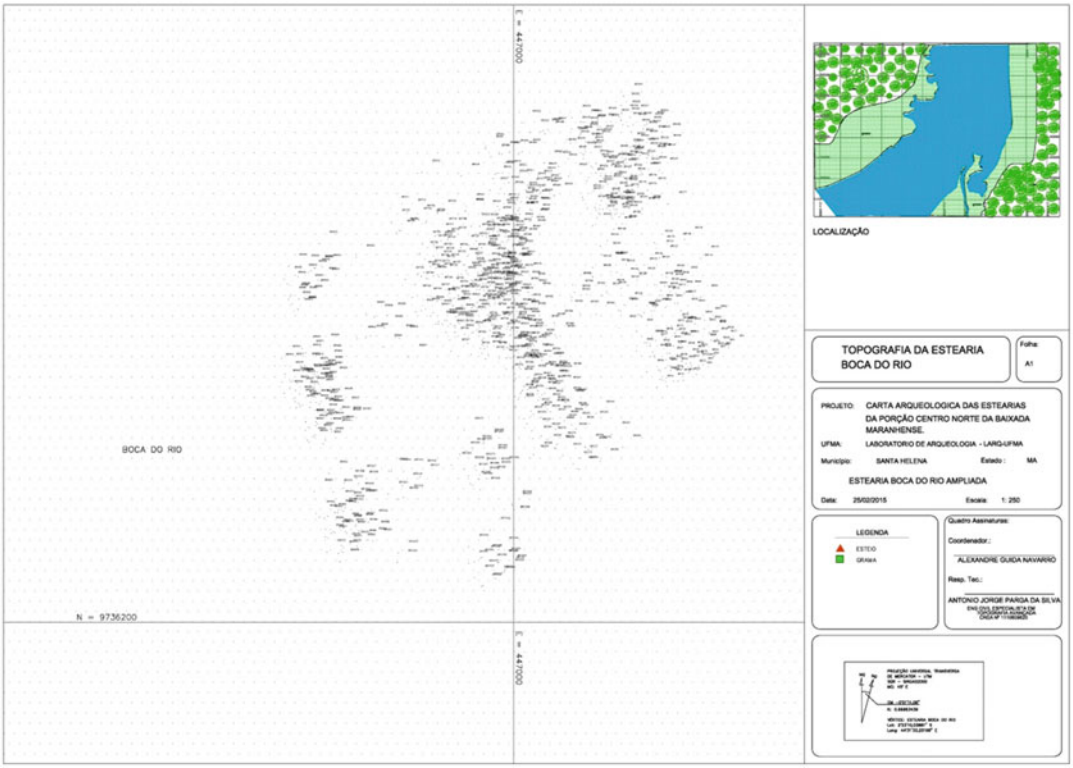

Pile Dwellings or Stilt Houses in Prehistory of Brazil, Fig. 6 The Boca do Rio site, of only 1 ha, presented the highest number of poles: a total of 1100

Pile Dwellings or Stilt Houses in Prehistory of Brazil, Table 1 Radiocarbon dates

Armindio site	Encantado site	Boca do Rio site	Caboclo site	Jenipapo site	Cabeludo site
930 ± 30 BP	1230 ± 30 BP	1150 ± 30 BP	1130 ± 30 BP	1210 ± 30 BP	1160 ± 30 BP
Beta-404757	Beta-406837	Beta-406836	Beta-406835	Beta-406834	Beta-430864
Wood	Wood	Wood	Wood	Wood	Wood

associations with anthropo-zoomorphic figurines, one of whose main characteristics is the representation of the navel, evidence a magical-religious character for some sites that are located precisely in the center of the lakes or rivers. The association of the figurines' navels with the spatial localization of the village in the center of the rivers could be symbolic evidence of hierarchic societies that saw themselves as axis mundi, that is, that they were located in the center of the universe (Sahlins 1968; Reichel-Dolmatoff 1971; Geertz 1973; Roe 1982; Renfrew 1986; Earle 1990; Vidal 1992; Velthem 1992; Gell 1998; Lagrou 2007).

Corroborating these data, ceramic statuettes from the sites indicate the presence of ritual in these palafitte dwelling societies. They are characterized by representation of animals, mainly the owl, the monkey, the turtle, and the frog (Fig. 7). Some of them are anthropo-zoomorphic, being the zoomorph form most recurrent. The majority of them follow a sculptory standard: the legs are

open forming a half-moon shape, and some of them have the feminine genitalia exposed. The profusion of the feminine statuettes with the female genitalia may be evidence of some sort of ritual associated with fertility or puberty, mainly because many of them show evidence of having had their heads broken (Schaan 2004; Barreto 2008; Gomes 2012) (Fig. 8).

Pile Dwellings or Stilt Houses in Prehistory of Brazil, Fig. 7 Owl anthropo-zoomorphic figure

One of them, especially, evokes the question of the Amerindian perspectivism (Viveiros de Castro 2002) in the art of these peoples: in lying position, it is a frog; standing, it is an owl with a human trunk, in addition to the arms, also human. Almost all of them feature another important trace: the designing of the navel that, as told previously, is associated with the way these societies see the world (Eliade 1969). The spindles, discs in ceramic with punctures, are also an important type of device found in the pile dwellings, and in different sizes, and indicate the activity of weaving (Fig. 9).

The ceramic artifacts were classified according to a typology that obeyed the following categories: flat form (plate), vessels of the half-calotte type, spherical vessels with appliqués, hemispheric vessels, figurines, and spindles. A characteristic of the collection is the presence of small ceramic vessels that probably served for storing very controlled amounts of liquid in its interior or seeds for plantation, as indicated by Burke et al. (1971). Some of them have incisions on the edges; others are painted, normally of red and black, without the presence of engobe. The plates are plane utensils, and they present marks of straw mats, being the tressed pattern the most frequent.

Pile Dwellings or Stilt Houses in Prehistory of Brazil, Fig. 8 Feminine statuette or figurine with the genitalia

Pile Dwellings or Stilt Houses in Prehistory of Brazil, Fig. 9 A frog-man figurine evokes the question of the Amerindian perspectivism

The main manufacture techniques observed in the vessels are coiling and molding. As far as the antiplastic, cauixi predominates (a fresh water sponge), appearing, also, grog, minerals (in special quartz grains), coal, sometimes, caraipé (tree bark ashes). The appliques, glued to the side of the vessels, are another diagnostic characteristic of the pile dwellings devices. In general, they are breast-shaped, and sometimes, zoomorphic. Other devices that appear less frequently are vessels with handles and vases with necks.

With regard to the iconography, it is highlighted the geometric traces in the stylistic composition of the vase: they are grecas or spiral lines that surround the interior of the parts. The predominant colors are red and black. Probably, many feature drawings of motifs that represent the animal skins, as on a sample, in which we can notice the marks of the turtle carapace or the skin of a surucucu snake *(Lachesis muta)*, which was common in the region of Maranhão lowlands.

The most important discovery of the research is the *muiraquitã* representing a frog (Fig. 10).

Pile Dwellings or Stilt Houses in Prehistory of Brazil, Fig. 10 The green stone nephrite muiraquitã

The piece of green stone (nephrite), which was found in the pile dwellings of Boca do Rio, is the first such artifact collected in a systematic way, except at Santarem, since the findings of Raimundo Lopes, 100 years ago. The mineralogical analysis was carried through by Pará Federal

University, evidencing that the specimen is of green nephrite, confectioned from the minerals tremolite/actinolite. The piece is 2.8 cm in height by 1.8 cm in length, having two lateral punctures and marks of the retouching of the chipping and burnishing on the back. As far as style, it is hybrid, because the abdomen and paws are identical to traditional Amazonian *muiraquitãs*, mainly to the ones from Santarem on the Tapajos River. However, the bipartite head sometimes resembles Caribbean traces (Venezuela, Guianas, and Caribbean Islands) and sometimes resembles the symmetries of Andean South America (the quadrangular eyes), such as the Tolima culture of Colombia (Boomert 1987; Rodríguez Ramos 2013).

Ornaments in green stone are also characteristic of the Isthmus-Antilles region, suggesting that the connections between the Mesoamerica and the Caribbean were much more active than what Kirchhoff imagined when considering different cultural areas for distinct geographic regions (Kirchhoff 1960; Boomert 1987; Domínguez and Funari 2012). Recent archaeological discoveries in Amazonia of bird-shaped pendants (as the condor, typical Andean bird) and images of reptiles and batrachians adornments, show evident interaction among the human groups that inhabited the Antilles and the region of Colombia, covering an area that extends from the northwest of Venezuela to the occidental portion of the Honduras.

In the highlands and lowlands of South America, this type of archaeological material, even though commonly found, still is little studied. Rostain (2010) associates the manufacture of *muiraquitãs* to an activity of specialization directed toward the long-distance commerce in societies of the chiefdom type. This researcher relates the production of green rock with a complex system of interchange between Arauquinoid societies that inhabited the mounds typical of the coasts of Guiana. Since rocky outcropping is rare in this region, mainly in the coast, the green rocks were probably imported from somewhere else.

Conclusion

The pile dwellings (estearias) or palafitte sites are a unique type of archaeological site in the context of Brazilian prehistory. These sites possess abundant and well-preserved objects. Little were they studied, and they did not receive the due attention on the part of the archaeologists, mainly due to absence of systematic research in Maranhão. The Laboratory of Archaeology of the Federal University of Maranhão (LARQ/UFMA) comes to fill up this gap.

For being well conserved, in aquatic environment, they are an important certification of the societies that inhabited this Amazonian region. The analysis carried out until the moment evidences the research potentiality of these sites. In them it is possible to find paleobotanical (remaining portions of seeds), architectural (pile dwellings arrangement), ceramic (with complex geometric motifs), and lithic (as the axes) vestiges.

The analysis of the ethnohistorical sources evidenced scarce information concerning these populations, revealing that these groups are considerably old, in such a way that, to the time of the Conquest, the Indians did not preserve in their memories stories concerning these societies. It is very likely that the aboriginal groups of the period of the Conquest in the sixteenth and seventeenth centuries AD settled in areas of palafitte occupation, coming from more distant regions, being, therefore, allochthonous in the area. More focused studies in this direction still need to be carried through.

With regard to muiraquitã made of nephrite, we can infer that it is an evidence of a complex society. This rock is rare in Brazil, being possible that its arrival to the pile dwellings occurred through long-distance commerce with peoples of the Caribbean or Colombia, places where these minerals are more abundant. Although we do not know the real meaning of these lithic materials, through comparative analogy to the cultures of the Mesoamerica, i.e., Mayan, it is very probable that

they are amulets and that certainly they belonged to the heads of the villages and was a power symbol acknowledged by everyone.

Regarding these peoples' political organization, their form of government is yet to be elucidated, if they were more complex societies or seasonal sites due to the aquatic environment. The current state of research shows that there were sites more ritualistic, as the Armíndio, where the concentration of figurines is great, in detriment of the others.

Evidences of the great territorial area occupied by these societies associated with the long time they were occupied indicate that these human groups were very well adapted to the environment. Moreover, the architectural complexity of the sites and the great number and arrangement of the pile dwellings evidence a construction guided according to center-periphery direction principle. The inferior detrition of these pile dwellings indicate that they had been lapidated for better fixing in the riverbed. A homogeneity of the material culture, as it is evident in the ceramic types and their symbolic message, is presented by paintings of the vessels and figurines, majorly predators as snakes, in addition to the cosmological representation of the *axis mundi* through the navel. Finally, it has to be considered that the contemporaneity of the sites (the majority between 930/1260 $\pm$ 30 BP), indicating a cultural homogeneity of these societies that were well adapted to the aquatic environment, leads to think about chiefdoms of great regional scale between the eighth and tenth centuries AD, coinciding, therefore, with the peak of precolonial Amazonian societies.

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References

A'bsáber, A.N. 2006. *Brasil: paisagens de exceção: o litoral e o pantanal matogrossense: patrimônios básicos*. Sao Paulo: Ateliê Editorial.

Balée, W. 1994. *Footprints of the forest: Ka'apor ethnobotany – the historical ecology of plant domestication by an Amazonian people*. New York: Columbia University Press.

Barreto, 2008. Cristiana Nunes Galvão. Meios místicos de reprodução social: arte e estilo na cerâmica funerária da Amazônia Antiga. PhD thesis. Sao Paulo: Universidade de Sao Paulo.

Boomert, A. 1987. Gifts of the Amazon: green stones pendants and beads as item of ceremonial exchange in Amazonia and the Caribean. *Antropologica* 67: 33–54.

Brochado, J. P. 1984. An ecological model of the spread of pottery and agriculture into Eastern South America. PhD thesis. Ann Arbor: University of Illinois at Urbana Champain.

Burke, C., J. Ericson, and D. Read. 1971. Research design: the relationships between the primary functions and the physical properties of ceramic vessels and their implications for ceramic distributions on a archaeological site. *Anthropology UCLA* 3: 84–95.

Corrêa, Conceição G., Ana Lúcia Machado, Daniel F. Lopes. 1991. As estearias do lago Cajari-Ma. *Anais do I simpósio de pré-história do Nordeste brasileiro*, Clio série arqueológica, n. 4, 101–103. Recife: UFPE.

Correia Lima, Olavo, and Olir Correia Lima Aroso. 1989. *Pré-história maranhense*. Sao Luis: Instituto Histórico e Geográfico do Maranhão.

D'Abbeville, C. 2008. [1614]. *História da missão dos padres capuchinhos na ilha do Maranhão e terras circunvizinhas*. São Paulo: Itatiaia/EDUSP.

D'Evreaux, Yves. 2008 [1615]. *Continuação da História das coisas mais memoráveis acontecidas no Maranhão nos anos 1613 e 1614*. Brasília: Senado Federal.

Daniel, João. 2004 [1757–1776]. *Tesouro descoberto no Máximo Rio Amazonas: 1722–1776*. Vol. 1. Rio de Janeiro: Contraponto.

Denevan, W.M. 2001. *Cultivated landscapes of native Amazonia and the Andes. Oxford geographical and environment studies*. Oxford: Oxford University Press.

Dominguez, L., and P.P.A. Funari. 2012. O Caribe intangível. In *Cronistas do Caribe*, ed. L. Karnal, L. Domínguez, L. Kalil, and L. Fernandes, vol. 1, 11–18. Campinas: IFCH Campinas.

Earle, Timothy. 1991. *Chiefdoms: power, economy, and ideology*. Cambridge: Cambridge University Press.

Eliade, Mircea. 1969. *O mito do eterno retorno*, 70. Lisboa: Edições.

Franco, José Raimundo Campelo. 2012. *Segredos do rio Maracu. A hidrogeografia dos lagos de reentrâncias da Baixada Maranhense, sítio Ramsar, Brasil*. Sao Luis: EDUFMA.

Geertz, Clifford. 1973. *The interpretation of cultures*. New York: Basic Books, Inc..

Gell, Alfred. 1998. *Art and agency: An anthropological theory*. Oxford: Clarendon Press.

Gomes, Denise Maria Cavalcante. 2012. O perspectivismo ameríndio e a ideia de uma estética americana. *Boletim do Museu Paraense Emílio Goeldi* 7 (1): 133–159. Belem.

Heckenberger, M. 2005. *The ecology of power: Culture, place, and personhood in the southern Amazon, A.D. 1000–2000*. New York: Routledge.

Hilbert, P. P. 1962. New stratigraphic evidence of culture change on the middle Amazon (Solimões). *Akten des 34° Internationalen Amerikanistenkongresses*, 471–476.

Hodder, Ian. 1994. *Interpretación en Arqueología. Corrientes actuales*. Barcelona: Crítica.

Hornborg, A. 2005. Ethnogenesis, regional integration, and ecology in prehistoric Amazonia: Toward a system perspective. *Current Anthropology* 46 (4): 589–620.

IBGE. 2006. Census.

Kirchhoff, Paul. 1960. Mesoamérica: Sus Límites Geográficos, Composición Étnica y Caracteres Culturales. In *Suplemento de la Revista Tlatoani*. Mexico: Escuela Nacional de Antropología e Historia.

Lagrou, Els. 2007. *A fluidez da forma: arte, alteridade e agência em uma sociedade amazônica (Kaxinawa, Acre)*. Rio de Janeiro: Topbooks.

Lathrap, D.W. 1970. *The upper Amazon. Ancient peoples and places*. Southampton: Thames & Hudson.

Leite Filho, D. 2010. Ocupações pré-coloniais no litoral e nas bacias lacustres do Maranhão. In *Arqueologia amazônica*, Orgs. E. Pereira, and V. Guapindaia, 2 vol, 743–773.

Lopes, Raimundo. 1916. *O Torrão Maranhense*. Rio de Janeiro: Typographia do Jornal do Commercio.

Martin, Gabriela. 1996. *Pré-história do Nordeste brasileiro*. Recife, Editora Universitária da UFPE.

Meggers, B.J. 1954. Environmental limitations on the development of culture. *American Anthropologist* 56 (5): 801–824.

Meggers, B.J. 1987. *Amazônia: a ilusão de um paraíso*. Sao Paulo: Edusp.

Meggers, B.J, and C. Evans. 1957. Archeological investigations at the mouth of the Amazon. Smithsonian institution bulletin No 167. *Bureau of American ethnology.* Washington, DC: Smithsonian Institution Press.

Navarro, A.G. 2014. O projeto arqueológico acadêmico carta arqueológica da estearias da porção centro-norte da Baixada Maranhense. In Bandeira, A., and Brandi, R. (eds) *Nova Luz sobre a Arqueologia do Maranhão*, 133–148. Sao Luis: Brandi & Bandeira.

Navarro, A. G. 2016. O complexo cerâmico das estearias, Maranhão. In Pinto, Helena L., Barreto, C., and Betancourt, Carla J. (eds) *Cerâmicas arqueológicas da Amazônia: rumo a uma nova síntese*, vol. 1, 158–169. Belem: Museu Emilio Goeldi e IPHAN.

Neves, Eduardo G. 2008. Ecology, ceramic chronology and distribution, long-term history, and political change in the Amazonian foodplain. In *Handbook of South American archaeology*, ed. H. Silverman and W. Isbell, 359–379. London: Springer.

Petersen, J., E. Neves, R. Bartone, and C. Silva. 2003. Historical and socio-cultural origins of Amazonian dark earths. In *Amazonian dark earths: Origin, properties, management*, ed. J. Lehmann, D. Kern, B. Glaser, and W. Woods, 1–45. Dordrecht: Kluwer Academic Press.

Porro, A. 1992. *As crônicas do rio amazonas. Notas etno-históricas sobre as antigas populações indígenas da Amazônia*. Petrópolis: Vozes.

Reniel Rodríguez Ramos. 2013. Isthmo-Antillean engagements. In *The Oxford handbook of Caribbean archaeology*, Orgs. W. Keegan, C. Hofman, and R. Rodríguez Ramos, 155–170. Oxford: Oxford University Press.

Reichel-Dolmatoff, G. 1971. *Amazonian Cosmos*. Chicago: University of Chicago Press.

Renfrew, C. 1986. Introduction: Per polity interaction and socio-political change. In *Peer polity interaction and socio-political change*, ed. C. Renfrew and J.F. Cherry, 1–18. Cambridge, UK: Cambridge University Press.

Roe, P.G. 1982. *The cosmic zygote: Cosmology in the Amazon basin*. New Brunswick: Rutgers University Press.

Roosevelt, A.C. 1980. *Parmana: Prehistoric maize and manioc subsistence along the Amazon and Orinoco*, Studies in Archaeology, 320. New York: Academic. Monograph.

Roosevelt, A.C. 1989. *Lost civilizations of the lower Amazon*, Natural History, 74–83. New York: American Museum of Natural History.

Roosevelt, A.C. 1991. *Mound-builders of the Amazon: Geophysical archaeology on Marajo Island, Brazil*, Studies in Archaeology, 515. San Diego: Academic. Monograph.

Rostain, Stéphen. 2010. Cacicazgos guyanenses: mito o realidad? In *Arqueologia Amazônica*, ed. E. Pereira and V. Guapindaia, vol. 1, 169–192. Belem: MPEG, IPHAN, SECULT.

Sahlins, Marshall D. 1968. *Tribesman*. Englewood Cliffs: Prentice-Hall.

Schaan, Denise P. 2004. The Camutins Chiefdom. Rise and development of complex societies on Marajó Island, Brazilian Amazon. Ph.D. thesis. Pittsburgh University.

Shanks, M., and C. Tilley. 1987. *Re- constructing archaeology.* Cambridge, UK: Cambridge University Press.

Simões, M. F. 1981. As pesquisas arqueológicas no Museu Paraense Emílio Goeldi (1870–1981). *Acta Amazonica*, Manaus 11(1). Suplemento.

Ucko, Peter. 1995. *Theory in archaeology. A world perspective*. Londres: Routledge.

Van Velthem, Lucia Hussak. 1992. Das cobras e lagartas: A iconografia Wayana. In *Grafismo indígena*, ed. Lux Vidal. Sao Paulo: Studio Nobel/FAPESP/EDUSP.
Vidal, Lux. 1992. A pintura corporal e a arte gráfica entre os Kayapó-Xikrin do Cateté. In *Grafismo indígena*, ed. Lux Vidal, 143–189. Sao Paulo: Studio Nobel/FAPESP/EDUSP.
Viveiros de Castro, Eduardo. 2002. *A Inconstância da alma selvagem*. São Paulo: Cosac & Naify.
Willey, G., and P. Phillips. 1958. *Method and theory in American archaeology*. Chicago: University of Chicago Press.

Pinnacle Point: Excavation and Survey Methods

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Introduction

The transdisciplinary project centered on Pinnacle Point (the South African Coast Paleoclimate, Paleoenvironment, Paleoecology, and Paleoanthropology Project-SACP4) has as its primary goal to develop an integrated paleoclimate, paleoenvironmental, and paleoanthropological record for the south coast of South Africa spanning 400 to 30 ka, a time that spans the origins of modern humans. The African Middle Stone Age (MSA), a Middle and Late Pleistocene stone tool phase, dominates the majority of this time span. The MSA in South Africa has gained increasing attention in debates about the antiquity of modern human behavior; some researchers arguing that the South African evidence suggests an early origin of modern behavior, while others suggesting a late origin. Resolution of these debates relies on two advances: improvements in our theoretical approach and an improvement of the empirical record in Africa. Fieldwork was initiated at Pinnacle Point (Mossel Bay, South Africa) to improve the empirical record (Marean et al. 2004).

Key Issues/Current Debates/Future Directions/Examples

Strategy

The field strategy uses state-of-the-art excavation and survey methods and techniques to obtain precise and accurate data, relying as much as possible on digital data acquisition integrated into 3D models of the "paleoscape." The paleoscape is a seamless model of land and sea that projects hunter-gatherer food resources at different climate states. We model that paleoscape with integrations of sea level and coastline change joined to species distribution modeling. A specific part of the transdisciplinary strategy is to use speleothem records to generate long, continuous, and tightly dated paleoclimatic and paleoenvironmental sequences for the MSA combined with other techniques (e.g., faunal change, phytoliths, magnetics) that enrich the environmental reconstructions.

Survey Method and Program

Pedestrian and mountain-climbing reconnaissance techniques revealed sites along the cliffs at Pinnacle Point. Today, wooden staircases and walkways provide access to most of the sites (Fig. 1). We use total stations to map all sites and landscape features, coding all visible features directly to handheld computers using drop-down menus programmed into survey software. Using both RTK GPS and direct total station measurements, all coordinates are translated directly into the South African National Coordinate (SANC) reference system (Marean et al. 2004, 2010). The data is integrated into a GIS using ArcGIS, and a 3D paleoscape model is created.

Excavation Methods and Program

Our excavation recording system is designed so that every measurement made on-site of artifacts,

Pinnacle Point: Excavation and Survey Methods, Fig. 1 Pinnacle Point landscape. The wooden walkway leads to the entrance of cave PP13B

Pinnacle Point: Excavation and Survey Methods, Fig. 2 Excavation in progress at cave PP13B. (Photographs courtesy of SACP4)

features, sections, surfaces, and everything else is recorded by total station directly to handheld computer (Fig. 2). Total stations give all finds a 3D provenience, and finds are given a unique barcode number and assigned to a square, quadrant, and stratigraphic unit. Bar code scanners are connected to handheld computers through USB cables, requiring little to no typing of specimen numbers or other observations. This significantly reduces the transcription errors that plague field

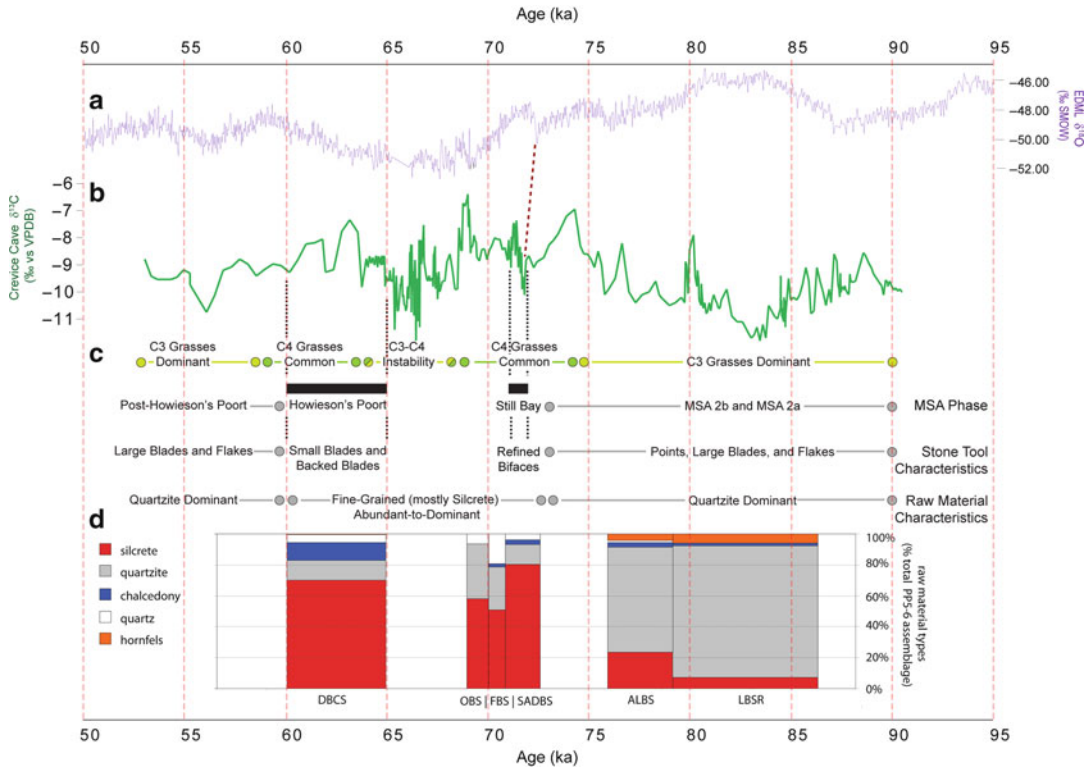

Pinnacle Point: Excavation and Survey Methods, Fig. 3 The inferred vegetation sequence from the Crevice Cave speleothem relative to southern hemisphere temperature change and major phases in the production of stone tools and use of raw materials in the southern Cape of South Africa. (**a**) The EPICA EDML d18O record (EPICA Community Members, 2006), (**b**) the Crevice Cave (Pinnacle Point) d13C (*green*) records with inferred grass regimes, (**c**) the major changes in stone tool phase, stone tool type, and raw material abundance in the southern Cape, and (**d**) the raw material abundances at archaeological site PP5-6 (Bar-Matthews et al. 2010: Fig. 11)

recording (Dibble et al. 2007). We record both ends of elongated artifacts by total station to calculate orientation and slope of artifacts within stratigraphic aggregates. We use artifact orientation to gain knowledge about site taphonomy (Bernatchez 2010). All non-plotted materials are gently wet sieved with fresh water through a nested 10-3-1.0 mm sieve (Marean et al. 2010).

We excavate within 50 cm quadrants within squares, naming them by their bearing: NE, NW, SE, and SW. Excavations within these quadrants are conducted following natural stratigraphic units (StratUnits: layers, features, etc.). These StratUnits are grouped into larger stratigraphic aggregates (layers) in the field and then checked with 3D GIS analysis. All excavator accounts of StratUnits are recorded to forms (supplemented by notebooks) and then typed into a form-based database system. Sediment volume is measured during excavation and sediment samples are taken from every StratUnit. Subsamples of the sediment samples are used to measure magnetic susceptibility (MS) used to identifying evidence for human occupation, mainly due to the use of fire at archaeological sites (Herries and Fisher 2010).

Section drawings are created by combining regular graph paper drawing with dense

measurements of all stratigraphy and features using a total station directly to handheld computer, which links the section drawing to true grid space. We then digitally rectify all our section drawing and photographs (Bernatchez and Marean 2011) to true grid space, which allows us to plot on those photographs all artifacts, dating samples, stratigraphic boundaries, and anything else removed from site (Marean et al. 2010). On-site checking of field-acquired data eliminates most potential errors.

Analysis

Optically stimulated luminescence dating (OSL), TT-OSL, and U-Th dating (also known as uranium series, U-series, 230Th/U) are used to maintain chronological control (Bar-Matthews et al. 2010; Jacobs 2010; Marean et al. 2010). Most OSL ages come from locations where we also conduct micromorphology. Micromorphology significantly enhances our ability to understand sedimentary processes that are potentially problematic for OSL. Pinnacle Point research employs micromorphology regularly, as a foundation to stratigraphic analysis in complex depositional contexts (Marean et al. 2010; Karkanas and Goldberg 2010). We rely heavily on 3D GIS integration of all data and using ages, micromorphology, and stratigraphy to develop "life histories" of the caves (Fig. 3).

Assessment of Success

Fieldwork at Pinnacle Point has yielded the earliest evidence for human exploitation of marine resources, earliest securely dated use and modification of pigment, early use of bladelet stone tool technology at PP13B by ~164 ka, and early evidence for heat treatment of lithics at sites PP13B and PP5–6 (Marean et al. 2007; Brown et al. 2009; Thompson et al. 2010; Watts 2010). We have published, to date, the highest resolution speleothem record for Africa for the MSA for the time span 90–53 ka, which provides us with an unprecedented understanding of changes in rainfall and vegetation (Bar-Matthews et al. 2010). In addition, our tightly collaborative research has allowed us to detect correlations between the coastline distances, strontium isotope ratios in the speleothems, and the abundance of shellfish in coastal sites (Fisher et al. 2010; Jerardino and Marean 2010). We attribute a portion of our success to the reliance on digital acquisition of data, which allows fast- and high-quality analysis of field data, and the synergy created by our transdisciplinary approach, which allows quick insights that cross the traditional boundaries of science.

Cross-References

- ▶ African Stone Age
- ▶ Dating Techniques in Archaeological Science
- ▶ Field Method in Archaeology: Overview
- ▶ Human Evolution: Theory and Progress
- ▶ Human Evolution: Use of Fire
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Hunting and Hunting Landscapes
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Lithic Technology, Paleolithic
- ▶ Out-of-Africa Origins
- ▶ Southern and East African Middle Stone Age: Geography and Culture
- ▶ Stratigraphy in Archaeology: A Brief History

References

Bar-Matthews, M., C.W. Marean, Z. Jacobs, P. Karkanas, E.C. Fisher, A.I.R. Herries, K. Brown, H.M. Williams, J. Bernatchez, A. Ayalon, and P.J. Nilssen. 2010. A high resolution and continuous isotopic speleothem record of paleoclimate and paleoenvironment from 90 to 53 ka from Pinnacle Point on the south coast of South Africa. *Quarternary Science Review* 29: 2131–2145.

Bernatchez, J.A. 2010. Taphonomic implications of orientation of plotted finds from Pinnacle Point 13B (Mossel Bay, Western Cape Province, South Africa). *Journal of Human Evolution* 59: 274–288.

Bernatchez, J.A., and C.W. Marean. 2011. Total station archaeology and the use of digital photography. *SAA Archaeological Record* 11 (3): 16–21.

Brown, K.S., C.W. Marean, A.I.R. Herries, Z. Jacobs, C. Tribolo, D. Braun, D.L. Roberts, M.C. Meyer, and J. Bernatchez. 2009. Fire as an engineering tool of early modern humans. *Science* 325: 859–862.

Dibble, H., C.W. Marean, and S.P. McPherron. 2007. The use of barcodes in excavation projects. *SAA Archaeological Record* 7: 33–38.

Fisher, E.C., M. Bar-Matthews, A. Jerardino, and C.W. Marean. 2010. Middle and late Pleistocene paleoscape modeling along the southern coast of South Africa. *Quaternary Science Reviews* 29: 1382–1398.

Herries, A.I.R., and E.C. Fisher. 2010. Multidimensional GIS modeling of magnetic mineralogy as a proxy for fire use and spatial patterning: Evidence from the Middle Stone Age Bearing Sea cave of Pinnacle Point 13B (Western Cape, South Africa). *Journal of Human Evolution* 59: 306–320.

Jacobs, Z. 2010. An OSL chronology for the sedimentary deposits from Pinnacle Point Cave 13B – A punctuated presence. *Journal of Human Evolution* 59: 289–305.

Jerardino, A., and C.W. Marean. 2010. Shellfish gathering, marine paleoecology and modern human behavior: Perspectives from cave PP13B, Pinnacle Point, South Africa. *Journal of Human Evolution* 59: 412–424.

Karkanas, P., and P. Goldberg. 2010. Site formation processes at Pinnacle Point Cave 13B (Mossel Bay, Western Cape Province, South Africa): Resolving stratigraphic and depositional complexities with micromorphology. *Journal of Human Evolution* 59: 256–273.

Marean, C.W., P.J. Nilssen, K. Brown, A. Jerardino, and D. Stynder. 2004. Paleoanthropological investigations of Middle Stone Age sites at Pinnacle Point, Mossel Bay (South Africa): Archaeology and hominid remains from the 2000 field season. *PaleoAnthropology* 14–83.

Marean, C.W., M. Bar-Matthews, J. Bernatchez, E. Fisher, P. Goldberg, A.I.R. Herries, Z. Jacobs, A. Jerardino, P. Karkanas, T. Minichillo, P.J. Nilssen, E. Thompson, I. Watts, and H.M. Williams. 2007. Early human use of marine resources and pigment in South Africa during the Middle Pleistocene. *Nature* 449: 905–908.

Marean, C.W., M. Bar-Matthews, E. Fisher, P. Goldberg, A. Herries, P. Karkanas, P.J. Nilssen, and E. Thompson. 2010. The stratigraphy of the Middle Stone Age sediments at Pinnacle Point Cave 13B (Mossel Bay, Western Cape Province, South Africa). *Journal of Human Evolution* 59: 234–255.

Thompson, E., H.M. Williams, and T. Minichillo. 2010. Middle and late Pleistocene Middle Stone Age lithic technology from Pinnacle Point 13B (Mossel Bay, Western Cape Province, South Africa). *Journal of Human Evolution* 59: 358–377.

Watts, I. 2010. The pigments from Pinnacle Point Cave 13B, Western Cape, South Africa. *Journal of Human Evolution* 59: 392–411.

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Basic Biographical Information

Boris Borisovich Piotrovsky (1908–1990) was a famous Soviet Russian academic, historian, orientalist, and archaeologist who studied the ancient civilizations of Urartu, Nubia, and Scythia. He is well known as a key investigator in the study of the Urartian civilization of the southern Caucasus. Boris B. Piotrovsky's main works are devoted to the history, culture, and art of the Caucasus and the Ancient East, in particular the states of Urartu, and to questions of the origin and development of the ancient history of Armenian people. For most of his life, Boris Piotrovsky had connections with the State Hermitage Museum in Saint Petersburg. From 1964 until his death, he was director of this museum.

Piotrovsky was born in Petersburg in 1908. In 1929, being the student of a last year of historical and linguistic faculty of the Leningrad State University, B. B. Piotrovsky went to work in academy of history of material culture (Institute of Archaeology of the Academy of Sciences), in the sector of language, which academic N.Ya.Marr directed at that time. In 1930, B. B. Piotrovsky graduated from the university, and a year later he began to work in the hermitage as a scientific fellow.

Piotrovskyspecialized in the history and archaeology of the Caucasus region, and in the beginning of the 1930s, he began to acquaint

himself with Urartian civilization. Thanks to the long-term (from 1939 to 1971) joint excavations of the Academy of Sciences Armenian Soviet Socialist Republic and State Hermitage under the supervisor of B. B. Piotrovsky, the ancient city of Teyshebaini was studied. This site is one of the most interesting and most comprehensively studied monuments of Urartian civilization.

From 1953 to 1964 B. B. Piotrovsky was the leader of the Leningrad Department of the Institute of Archeology of Academy of Sciences of the USSR, and in 1964 he became the director of the State Hermitage. He remained in this position for 26 years until his death. Boris Piotrovsky combined scientific activity and administrative work with pedagogical and public work. From 1966 until his death, he was head of the Department of the Ancient East at Faculty of Eastern Studies in Leningrad State University.

Major Accomplishments

Since his student years, B.B. Piotrovsky took part in various archaeological expeditions in the North Caucasus. Archaeological study of the complex analysis and historical reconstruction of Urartu's monuments for many years becomes the main direction of his scientific activity.

The sphere of scientific interests of B. Piotrovsky was extraordinarily wide and various: archaeology and the Ancient East, questions of social and cultural history, the history and collections of the Hermitage, and the people who have made a significant contribution to creation of the museum.

Piotrovsky was director of the 1939 excavations that uncovered the Urartian fortress of Teishebaini in Armenia. The antiquity was hidden for many centuries under "a red hill" and now is one of the most interesting and most comprehensively studied monuments of Urartian civilization. Karmir Blur means "red hill" or "red fortress" (Armenian: Կարմիր բերդ meaning "red fortress"). It is a fortified Urartian settlement, which was destroyed in the beginning of sixth century BCE. Evidence found there has been a key to understanding the Urartian civilization. His well-known excavation of a fortress on a hill Karmir Blur about Yerevan opened to the world the new ancient state of Urartu and was a great discovery.

The results of expeditions were described in detail by B. B. Piotrovsky in his scientific works – archaeological reports on Karmir Blur's excavation (1950, 1952, 1955) and monographs: *History and Culture of Urartu* (1944), *Karmir Blur* (1950–1955), and *Art of Urartu by the Eighth–Sixth Centuries BC* (1962).

Since the beginning of the Great Patriotic War in 1941–1942, B. B. Piotrovsky wrote in Leningrad the book *History and Culture of Urartu*, which was published in 1944. For this work he was awarded the scientific degree of the doctor of historical sciences (1944) and the State Prize of the USSR (1946).

After the Great Patriotic War, Piotrovsky continued research in Karmir Blur, and in 1956 he had an opportunity to visit Egypt. Later, in 1961–1963, he headed the work of the International Archaeological Expedition to Nubia, in the territory flooded by waters of the Aswan Dam under construction.

The name of B. B. Piotrovsky has entered into the Soviet and world historical science about the ancient world. Boris B. Piotrovsky possesses numerous works on ancient history, archaeology, art of Transcaucasia, the North Caucasus, Central Asia, and also on history and culture of ancient Egypt, finding the deserved recognition as in Russia and abroad. Experience and knowledge allowed B. B. Piotrovsky to carry out more than 50 scientific archaeological expeditions fruitfully. The scientific results of excavations at Urartian fortress on a hill Karmir Blur in Armenia, near Yerevan, which passed from 1939 to 1941, were especially significant.

These were not Piotrovsky's sole contributions to the field of archaeology, however. Piotrovsky worked elsewhere in the Caucasus, especially on the Scythian culture. In 1961, he became the head

of an expedition of the USSR Academy of Sciences to study Nubian monuments in Egypt.

B.B. Piotrovsky was elected as a full member of Academy of Sciences of the USSR on Department of History (History of Culture) in 1970, was a full member of Academy of Sciences Armenian Soviet Socialist Republic in 1968, and a member correspondent of the Bavarian Academy of Sciences, the British Academy of Sciences, Royal Academy of Morocco, and an honorary member of fifteen other foreign academies and scientific societies.

In his lifetime, B.B. Piotrovsky published more than 200 works in the fields of archaeology, history, and art.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Early Regional Centers: Evolution and Organization
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ Museums and Memory Experiences
- ▶ Russia: Management of Archaeological Heritage
- ▶ Urartu, Archaeology of

Further Reading

Areshyan, G. 1983. «Պիոտրովսկի» (Piotrovsky). In *Soviet Armenian encyclopedia, Volume IX*: 302. Yerevan, Armenian SSR: Armenian Academy of Sciences.

Piotrovsky, B.B. 1963. Wadi Allaki — der Weg der Alten zu den Goldminen Nubiens. Moskau.

Piotrovsky, B.B. 1967. *Urartu. The kingdom of Van and its art*. London: Evelyn, Adams and Mackay.

Piotrovsky, B.B. 1969a. *The ancient civilization of Urartu*. New York: Cowless Book Co.

Piotrovsky, B.B. 1969b. *Urartu*. London: Cresset Press.

Piotrovsky, B.B. 1975. *Urartu*. Roma: Nagel.

Piotrovsky, B.B. 1979. *Les échanges d'expositions: Phénomène important de l'époque contemporaine. Museums and cultural exchange-Musées et échanges culturels: The papers from the Eleventh General Conference of ICOM, Moscow 23–29 May 1977*. Oxford.

Piotrovsky, B.B. 1980. *Hermitage. History and collection*. Leningrad: Iskusstvo (in Russian).

Piotrovsky, B.B. 1987. *Scythian art*. Leningrad/Oxford: Aurora/Phaidon.

The Art and Culture of the Peoples of the Caucasus: 1100 B.C. –19th century. n.d. Available at: http://www.hermitagemuseum.org/html_En/index.html.

The New York Times. Boris B. Piotrovsky, archeologist; Director of the Hermitage was 82. 17 October 1990.

The State Hermitage Museum. n.d. The Hermitage Readings in memory of Boris Piotrovsky (1908–1990). Available at: http://www.hermitagemuseum.org/html_En/index.html. Accessed 22 July 2008.

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Basic Biographical Information

Michèle Pirazzoli-t'Serstevens (1934–2018) was the first professor of Chinese archaeology in Western Europe and the author of several important works on China's archaeology.

Born in France, of a prominent Franco-Belgian family, she lived most of her life in Paris. At university she studied Oriental languages (1956–1957), principally Vietnamese and Chinese, but also Japanese, Hindi, and Tamil. She went on to study Indian and East Asian art at the École du Louvre (1957–1960) during which time she started work at France's Museum of Asian Arts, the Musée Guimet. She spent a year at Peking University (1964–1965), returning to the Guimet as an assistant curator (1965–1969) and then curator (1969–1977). After some time in Tokyo (1974–1975), she was also appointed curator of the Musée d'Ennery, a Parisian house museum with a substantial collection of eighteenth- and nineteenth-century Japanese decorative arts.

In 1971 she completed a PhD thesis on China's Dian culture. She was by then married and had taken the name of her husband, the geomorphologist Paolo Pirazzoli (1939–2017). She taught at the École du Louvre (1968–1977) and in 1977 took up the newly created chair of Chinese archaeology at

the École Pratique des Hautes Études (EPHE) at the Sorbonne, where she remained until 2002.

As an archaeologist Pirazzoli-t'Serstevens undertook fieldwork in Cambodia, at the pre-urban site of Mimot and at an early royal capital at Sambor Prei Kuk (1961–1962). In later years she worked with French excavation teams in Bahrain (1978), Oman (Suhar 1982), the United Arab Emirates (Ras al Khaimah/Julfar 1994), and Brunei (1998), analyzing the Chinese export ceramics found there.

Michèle Pirazzoli-t'Serstevens published numerous works on Chinese archaeology and was for over 30 years on the editorial board of the journal *Arts Asiatiques*. She received two national honors, Chevalier de l'Ordre National du Mérite (for civil achievement) and Officier dans l'Ordre des Palmes Académiques (for academic distinction) and two book prizes, Prix Delalande-Guérineau (1976) for her book on Dian and the Prix Giles (2009) for *Giuseppe Castiglione*, about the Jesuit artist working at the court of the Qing emperors.

Major Accomplishments

Michèle Pirazzoli-t'Serstevens was a writer of impeccable scholarship and noted for the clarity of her writing. She made Chinese scholarship accessible to Western archaeologists through her teaching, writing, and the works she reviewed. She had a particular understanding of connected histories and of the interactions between China and its neighbors and demonstrated these connections through many studies of art and artifacts, extending her inquiry to the broader context of cultural exchange over the past 2000 years (1994, 2007, 2008, 2011).

Chinese archaeology was beginning to intensify in the 1960s when Pirazzoli-t'Serstevens was a student in Beijing. This meant that she was well placed to evaluate the astonishing early-historic finds of the 1970s: the tombs of Han princes at Mancheng, Hebei (1968), of the Marquis of Dai at Mawangdui, Changsha (1972–1974), of the Terracotta Warriors at Xian, Shaanxi (1974), of Queen Fuhao at Anyang, Henan (1976), and of the Marquis Yi at Leigudun, Hubei (1978). Her doctoral thesis was about a minority group, the Dian of Yunnan, whose bronze-rich cemeteries were excavated from 1956 on.

Pirazzoli-t'Serstevens worked principally on the archaeology of the Han (206 BCE–220 CE), an empire which vastly expanded China's territory and, briefly, held power over eastern Uzbekistan, northern Vietnam, and northern Korea. Despite that empire's collapse, trade and cultural relationships were maintained over the millennia.

The lack of congruence between the historical and archaeological records became a key point in Pirazzoli-t'Serstevens' work, and she often stressed the value of archaeology as a corrective to the acceptance of historical records, using evidence from thousands of Han-period tombs to demonstrate the gap between practice and prescription (Pirazzoli-t'Serstevens 2009). Her research was valuable not only for its content but as methodogical example for archaeologists working in other time periods and in other parts of the world.

Cross-References

- ▶ Archaeology and Antiquarianism in China
- ▶ Ceramics, Southeast Asian and Chinese Trade
- ▶ Chinese Archaeology in the Twenty-First Century
- ▶ Dian Culture of Yunnan

P

References

Pirazzoli-T'Serstevens, M. 1974. *La civilisation du royaume de Dian à l'époque Han d'après le matériel exhumé à Shizhai shan*. Paris: École Française d'Extrême-Orient.

Pirazzoli-t'Serstevens, M. 1982. *La Chine des Han*. Paris: Presses Universitaires de France. Translated as *The Han Dynasty.* New York, Rizzoli and *China zur Zeit des Han-Dynastie*. Fribourg: Office du Livre.

Pirazzoli-t'Serstevens, M. 1994. Pour une archéologie des échanges. Apports étrangers en Chine – Transmission, réception, assimilation. *Arts Asiatiques* 49: 21–33. Available at: www.persee.fr/collection/arasi. Accessed 1 Oct 2018.

Pirazzoli-t'Serstevens, M. 2007. *Giuseppe Castiglione, 1688–1766: Peintre et architecte à la cour de Chine*. Paris: Thalia Édition.

Pirazzoli-t'Serstevens, M. 2008. Inner Asia and Han China: Borrowings and Representations, In *New*

frontiers in global archaeology: Defining China's ancient traditions, ed. T. Lawton. International Sackler Symposium, AMS Foundation for the Arts, Sciences and Humanities. Available at: http://ephe.academia.edu/PirazzolitSerstevensMichèle pdf. Accessed 1 Oct 2018.

Pirazzoli-t'Serstevens, M. 2009. Death and the dead: Practices and images in the Qin and Han. Translated by Margaret McIntosh in in J. Lagerwey and M. Kalinowski (eds) *Early Chinese Religion. Part one: Shang through Han*. Leiden: Brill. Available at: http://ephe.academia.edu/PirazzolitSerstevensMichèle pdf. Accessed 1 Oct 2018.

Pirazzoli-t'Serstevens, M. 2010. Two Eastern Han sites: Dahuting and Houshiguo. Urbanism. Translated by Margaret McIntoshin M. Nylan and M. Loewe (eds) *China's early empires: A re-appraisal,* 83–113 and 169–185. Cambridge: Cambridge University Press.

Pirazzoli-t'Serstevens, M. 2011. The Brunei Shipwreck: A witness to the International Trade in the China Sea around 1500. *The Silk Road* 9: 5–17. Available at: http://ephe.academia.edu/PirazzolitSerstevensMichèle pdf. Accessed 1 Oct 2018.

Further Readings

Bujard, M., and M. Pirazzoli-T'Serstevens. 2017. *Les dynasties Qin et Han: Histoire générale de la Chine (221 av. J.-C.-220 apr. J.-C.)*. Paris: Les Belles lettres.

Ebrey, P.B. 2010. The creation of the bureaucratic empire: The Qin and Han dynasties. In *The Cambridge illustrated history of China*, 2nd ed., 60–85. Cambridge: Cambridge University Press.

Pitt Rivers Museum

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The Pitt Rivers Museum of the University of Oxford was founded in 1884 to exhibit the anthropological collections of Augustus Lane Fox Pitt-Rivers (1827–1900).

Today the Museum possesses well over half a million objects, photographs, and manuscripts from all over the world ranging in date from prehistoric times to the present day. It is also a leading international center for research in social and cultural anthropology, and the history, theory, and practice of museum curatorship.

The Pitt Rivers Museum is noteworthy for its preserving the original arrangement and display of its possessions according to Pitt-Rivers's "typological" system of organization (Pitt-Rivers 1891, 115–116).

Pitt-Rivers was inspired by Darwin to think that human cultural history was subject to evolution in ways analogous to Darwin's theory of the evolution of animal and plant life. Hence when gifting his collections to the University of Oxford, Pitt-Rivers specified that they be exhibited and conserved in a purpose built building on the basis of their function rather than their community and place of origin, as is the curatorial norm today. His reasoning was that by arranging artifacts from different social contexts and times that were reported to be used for much the same purposes, the gradual evolutionary trajectory of objects from primitive "type" through progressively more sophisticated forms could be clearly seen.

In achieving this aim, Pitt-Rivers enjoyed the support of Edward Burnett Tylor (1832–1917), the keeper of Oxford's University Museum since 1883, and also Henry Nottidge Moseley (1844–1891) who as professor of human and comparative anatomy was responsible for the ethnographic collections at the University Museum. Tylor played a major part in the disciplinary coalescence of anthropology in Britain. He was instrumental in creating the anthropological section of the British Association, and in 1884 served as its first president. The year after his appointment as keeper of the University Museum, Tylor became Oxford's first reader in anthropology, having won a substantial reputation as a leading figure in European anthropological circles, largely on the basis of his greatly influential two-volume work, *Primitive Culture: Researches into the*

Development of Mythology, Philosophy, Religion, Art, and Custom (1871).

Tylor, however, differed from Pitt-Rivers and Moseley in more cautiously accepting Darwin's argument for man's evolutionary descent from earlier biological forms. He believed, unlike Pitt-Rivers, that cultural beliefs and practices were not necessarily subject to tests of fitness comparable to the operation of natural selection. Tylor believed that aspects of culture could survive long beyond whatever contribution they may have once made to the cohesion and advancement of a society was exhausted. Also, unlike Pitt-Rivers, Tylor was open to the possibility that aspects of culture could be the result of exchanges of people, ideas, and technologies, rather than autochthonous evolutionary processes.

The influence of Pitt-Rivers's collections on the exhibition of ethnological artifacts actually dates from before the Museum was first opened (in part) to the public in early 1887. When studying at Oxford in 1885, Walter Baldwin Spencer (1860–1929), who was to become internationally known by the turn of the twentieth century as the foremost authority on the anthropology of Indigenous Australia, spent a month unpacking and arranging Pitt Rivers's collection under the supervision of Moseley and Tylor. Another important figure in the history of Australian anthropology who was influenced by assisting in the transfer of Pitt Rivers's collections to Oxford was Walter Roth (1861–1933), who was to produce the most significant body of ethnographic reportage on Indigenous people in Northern and Western Queensland at the turn of the twentieth century.

Pitt-Rivers's collections served as an important resource for the teaching of both anthropology and archaeology at Oxford until the early decades of the twentieth century. Henry Balfour (1863–1939), who was appointed curator in 1890, used the collection extensively in publishing many scholarly articles tracing the "evolutionary development" through history and across different culture of particular objects. Balfour also actively solicited donations to the collections from past students who became colonial administrators in various parts of the British Empire. Likewise, Robert Marrett (1866–1943), who, on the retirement of Tylor in 1910, was appointed reader in social anthropology and was to be acting professor of social anthropology until the late 1930s, equally encouraged Oxford graduates to help enlarge the museum's holdings.

After the end of the Second World War, the evolutionary paradigm finding concrete expression in the organization of the museum's collections came to be challenged by younger anthropologists for whom the prime goal of the discipline was to understand through fieldwork how particular social systems were sustained and reproduced, and regularities might be observable in social change across societies. Even so, the collections of the Pitt Rivers museum continue to this day to be arranged by types of object, albeit with an emphasis on the different cultural contexts in which specific items serving similar social ends have been created.

References

Bowden, M. 2009. *Pitt Rivers: The life and archaeological work of lieutenant-general Augustus Henry Lane Fox Pitt Rivers*. Cambridge: Cambridge University Press.

Bradley, R. 1983. Archaeology, evolution and the public good: The intellectual development of general Pitt Rivers. *Archaeological Journal* 140: 1–9.

Chapman, W.R. 1985. Arranging ethnology: A. H. L. F. Pitt Rivers and the typological tradition. In *Objects and others: Essays on museums and material culture*, ed. G.W. Stocking. Madison: University of Wisconsin Press.

Mulvaney, D.J., and J.H. Calaby. 1985. So much that is new. In *Baldwin Spencer: A biography*. Melbourne: Melbourne University Press.

Pitt-Rivers, A. Lane-Fox. 1887–98. *Excavations in Cranborne chase*, 4 vols. Privately Printed.

Pitt-Rivers, A. Lane-Fox. 1891. Typological museums. *Journal of the Society of Arts* 40: 115–116.

Pitt-Rivers, A. Lane-Fox. 1906 [1875]. On the evolution of culture. *The evolution of culture and other essays*, ed. J. L. Myres, 20–44. Oxford: Clarendon Press. Available http://darwin-online.org.uk/

Thompson, M.W. 1977. *General Pitt-Rivers: Evolution and archaeology in the nineteenth century*. Bradford-on-Avon: Moonraker Press.

Tylor, E.B. 1871. *Primitive culture: Researches into the development of mythology, philosophy, religion, art, and custom*, 2 vols. London: John Murray.

Pitt-Rivers

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Pitt-Rivers was an early convert to Darwin's evolutionary vision of nature and fascinated by its implications for understanding human societal and cultural development. His prime contribution to the fields of anthropology and archaeology was the creation of collections of ancient and contemporary weapons, tools, and other artifacts which he saw as illustrative of the evolution of human culture.

"Collecting is an hereditary disease, and I fear incurable," humorously observed by Augustus Wollaston Franks, founder of the British Museum's famed ethnographic collections in 1866 (Caygill and Cherry 1997, 318). Pitt-Rivers was similarly moved to jocularly describe his lifelong devotion to collecting objects of esthetic and cultural as an affliction or madness. In his case, the impulse to collect was gratified by the acquisition of historic firearms during his service in the Grenadier Guards, which saw his appointment in 1835 as an instructor at the newly established Hythe School of Musketry. By the time Darwin published his *Origin of Species* in 1859, Pitt-Rivers had actively collected other kinds of weaponry and tools.

Reading Darwin and Herbert Spencer's writings on social evolution, Pitt-Rivers was convinced that human culture had become progressively more sophisticated in ways comparable to the emergence by evolution of more complex life-forms. This conviction thereafter was the intellectual bedrock of his anthropological and archaeological research. Indeed, Pitt-Rivers can be said to have been truer to Darwin's "long argument" for evolution by natural selection than many of Darwinians in that he followed the naturalist in believing that the evolution of life-forms was slow and linearly incremental. This was in mark contrast to other leading followers of Darwin, such as Thomas Henry Huxley, for example, who believed it to be possible that environmental forces could affect organisms so as to cause radical changes in morphology and physiology.

Even so, Pitt-Rivers had none of Darwin's reticence when it came to drawing analogies between biological and cultural evolution. He also thought, like the Darwinian anatomists George Rolleston and Alexander Macalister, that evolution is a "purposeful," teleological process. As he observed in a lecture he delivered at the Royal Institution of Great Britain in 1875, "...the highest achievements of science, even the highest practical achievements, would never have been reached by the mere utilitarian. There is a force within us by which we are moved in the direction of acquiring knowledge for its own sake and for the sake of truth, regardless of any material advantage to be derived from such knowledge" (Pitt-Rivers 1906, 21).

Pitt-Rivers stood with Herbert Spencer in the founding of an influential tradition of viewing humanity through the lens of purposeful cultural evolutionism. However, Pitt-Rivers's contribution was primarily his museology rather than his writings.

His rationale for making his collections publicly viewable, starting with the loan of objects to Bethnal Green Branch of the South Kensington Museum in 1874, was that the path to achieving true social and moral progress was by enhancing public understanding of humanity's evolutionary history, and he believed that a particularly effective way of doing this was by museums displaying artifacts so as to illustrate the emergence and gradual improvement of the human condition. Pitt-Rivers's evolutionary museology was also

inflected by his social conservatism. As he observed in 1891, "The law that Nature makes no jumps, can be taught by the history of mechanical contrivances, in such a way as at least to make men cautious how they listen to scatter-brained revolutionary suggestions" (1891, 116).

In arranging his collections for research and display, Pitt-Rivers's evolutionism led him to develop what he termed a "typological" system of organization (1891, 115–116). This involved associating ethnographical and archaeological artifacts on the basis of function rather than their community and place of origin, as is the curatorial norm today. Hence when Pitt-Rivers displayed artifacts, for example, weapons, he placed them in a series which he saw as showing their gradual linear evolution from an earliest known primitive "type" through ever more sophisticated forms. And as we can now clearly see, what Pitt-Rivers and fellow sociocultural evolutionists regarded as illustrative of the history of particular technologies served to implicitly privilege Eurocentric perceptions of human diversity and the legitimacy of contemporary colonial ambitions.

After inheriting valuable agricultural lands in 1880, Pitt-Rivers established a museum on his estate in Farnham, Dorset. The following year, he began negotiations with the University of Oxford that eventually saw his collections held by the South Kensington Museum transferred to a purpose-built museum that was fully open to the public in 1892.

By the 1880s, Pitt-Rivers was also well known for his archaeological research. His surveys of the prehistoric sites, the first of which he completed during military service in Ireland, secured his election as a fellow of the Society of Antiquaries in 1864. Thereafter he surveyed and excavated sites in various parts of England, notably discovering implements together with animal bones of the Paleolithic era in gravel deposits in the Thames Valley. In 1871, he was elected president of the Society of Antiquaries and made a fellow of the Royal Society in 1876. Such was his reputation in contemporary scientific circles that he was appointed as the first Inspector of Ancient Monuments in 1883 after John Lubbock, 1st Baron Avebury, persuaded the United Kingdom's Parliament to give prehistoric and other ancient structures legal protection.

While active as Inspector of Ancient Monuments, Pitt-Rivers also investigated sites on his own property lands in Dorset and Wiltshire. His wealth enabled him to undertake systematic excavations of prehistoric, Romano-British, and medieval sites on his Cranborne Chase estate. Many of the artifacts from these excavations were displayed in his Farnham museum.

Pitt-Rivers's cultural evolutionism led him to record the findings of his excavations in what, during the late Victorian era, was unusually close attention to contextual detail. It also gave rise to his drawing on his vast knowledge of the construction and uses of contemporary artifacts in interpreting the many implements and other prehistoric objects found in the course of his archaeological investigations. By the 1920s, his evolutionism was viewed by many in anthropological and archeological circles as explanatorily crude.

References

Bowden, M. 1991. *Pitt Rivers: The life and archaeological work of Lieutenant-General Augustus Henry Lane Fox Pitt Rivers*. Cambridge, UK: Cambridge University Press.

Bradley, R. 1983. Archaeology, evolution and the public good: The intellectual development of general Pitt Rivers. *Archaeological Journal* 140: 1–9.

Caygill, M. Cherry, J. eds., 1997. A.W. Franks: Nineteenth-century collecting and the British museum. London: British Museum Press.

Chapman, W.R. 1985. Arranging ethnology: A. H. L. F. Pitt Rivers and the typological tradition. In *Objects and others: Essays on museums and material culture*, ed. G.-W. Stocking. Madison: University of Wisconsin Press.

Pitt-Rivers, A. Lane-Fox. 1887–98. *Excavations in cranborne chase*, 4 vols. Privately Printed.

Pitt-Rivers, A. Lane-Fox. 1891. Typological museums. *Journal of the Society of Arts* 40: 115–116.

Pitt-Rivers, A. Lane-Fox. 1906 [1875]. On the evolution of culture. In *The evolution of culture and other essays*, ed. JL Myres, 20–44. Oxford: Clarendon Press. Available http://darwin-online.org.uk/

Thompson, M.W. 1977. *General Pitt-Rivers: Evolution and archaeology in the nineteenth century*. Bradford-on-Avon: Moonraker Press.

Plain of Jars Archaeological Landscape

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Introduction

The remote plateau of Xieng Khouang in Laos is home to one of the most enigmatic and fascinating archaeological landscapes in Southeast Asia. Clusters of megalithic jars, ranging in size from 1 to 3 m in height and diameter, dot the lower foot slopes and surround the central plain. The limited archaeological research carried out to date indicates that the stone jars were part of Iron Age burial practices which occurred and evolved at the crossroads of the two major eco-cultural systems of Iron Age Southeast Asia: the Mun-Mekong System and the Red River/Golf of Tonkin System.

The strategic importance of the Plain of Jars in the region was highlighted during the Siamese-Dai Viet conflicts of the late eighteenth to late nineteenth century and again during the Indochina Wars. It was during the Second Indochina War that the United States carpet bombed Xieng Khouang and left a deadly legacy of unexploded ordnance (UXO). UXO has been the main cause of poverty in the province as it severely hampers economic development; it has also resulted in limited archaeological research.

A UNESCO-Lao government initiative called *Safeguarding the Plain of Jars Project*, which commenced in 1998, has compiled a Geographical Information System database of 89 sites within Xieng Khouang province (www.unescobkk.org/culture/pdj/). The database provides information on location, form, material, and conservation status for each individual jar, as well as overall site descriptions and information on 7 or 8 locations regarded as jar quarry and manufacturing sites. The identification of multiple sites allowed researchers to develop a better understanding of the locations chosen and the technical know-how behind jar production (Baldock and Van Den Bergh 2009). The project was set up as a comprehensive effort to rehabilitate the Plain of Jars, and initially, with the financial assistance of the New Zealand government (NZAID), seven jar sites were cleared of UXO and prepared for community-led heritage management and tourism development.

Definition

Plain of Jars is an organically evolved archaeological landscape in the central east of Lao PDR. The landscape consists of clusters of megalithic jars and associated features which are thought to reflect ancient beliefs in birth, life, death, and rebirth. The typical attributes of a jar site comprise stone jars, stone disc-shaped grave markers, stone lids, and secondary burials with pottery, stone, bronze, or iron grave goods. The latter components, together with the site locations, decorative expressions, and limestone cave at site 1 and quarries, form the Plain of Jars Archaeological Landscape.

Although the jars are largely undecorated, the range of jar forms and modifications in manufacturing process may indicate either individualistic expressions of the carvers or simply changing needs, that is, a transition from ritual excarnation to cremation. Among the few decorations adorning jars and stone discs are human and animal *bas-relief* figures, including monkeys, tigers, and possibly frogs.

The secondary burials surrounding the stone jars are typically simple with plain urns, some stone tools, stone beads, plain or incised pottery, and a few metal artefacts such as bronze bells, bronze or iron wire bracelets, and iron knives.

Historical Background

Investigation History

The first systematic archaeological investigations at the Plain of Jars were conducted in 1931–1933

by Madeleine Colani under the auspices of the Ecole Française d'Extrême Orient in Hanoi. She recorded around 20 sites, excavated a number of them, and published two volumes with her findings a few years later (Colani 1935).

No further academic research was conducted until November 1994 when Professor Eiji Nitta of the Kagoshima University in collaboration with Lao Archaeologist Thongsa Sayavongkhamdy excavated, surveyed, and mapped the main site at Ban Ang (Nitta 1996). Mr. Sayavongkhamdy then continued to excavate several trenches at sites 1–3 in 1996 (Sayavongkhamdy and Bellwood 2001).

Limited archaeological investigation led by Ms. Van Den Bergh and Mr. Samlane Luangaphay took place as part of the unexploded bomb clearance of the seven jar sites in 2004–2005 and 2007. During such work, a methodology for archaeological data retrieval during UXO clearance was developed in collaboration with UK-based charity Mines Advisory Group. The methodology allows for safe information gathering during excavation for unexploded bombs (Rogers and Van Den Bergh 2008).

Excavation results since the 1930s have contributed only modestly to the further interpretation of Plain of Jars as a collection of Iron Age burial sites. Recent archaeological work has confirmed the presence of secondary burials surrounding the jars and also proved that the stone jars are contemporary with the burials. The dating of the Plain of Jars remains in question as the few AMS and C14 dates so far obtained fall outside of the accepted Southeast Asian Iron Age range (Sayavongkhamdy and Bellwood 2001: 108; Van Den Bergh 2007: 5), while the net-patterned pottery and human decorative *bas-relief* motifs are similar to fifth-century BCE to third-century CE examples from southern China. Although an Iron Age date for the Plain of Jars is generally accepted, Nitta suggested the resin covered urns should be dated to the end of the first millennium CE (Nitta 1996: 17).

A working hypothesis put forward by Dr. Pamela Rogers and Dr. Richard Engelhardt (2003) proposed that the stone jars functioned as "distilling" vessels for human corpses. The ritual decomposition was then followed by secondary burial. Traditional Southeast Asian royal mortuary practices provide modern parallels that symbolize the transition of the deceased into the spiritual world. The hypothesis is supported by the secondary burials found around the base of stone jars and scant evidence of human bone and teeth inside the jars recorded by Colani.

Legislative Framework and Protection Mechanisms

The Plain of Jars was put forward by the Lao Government in 1992 as a tentative UNESCO World Heritage Site. The government recognized the site as a national heritage in 1993 after its registration by the Provincial Department of Information and Culture, and its protection status was thus defined and subsequently enshrined in the Heritage Law of 2005.

Key Issues/Current Debates

The key issue for the Plain of Jars is to put in place mechanisms to ensure the protection of this vast, complex, but little understood landscape in the context of a poor, predominantly rural, developing country (Van Den Bergh 2011). Currently the 3 main sites are managed by local provincial and district governments, and these are the only jar sites that generate limited income from tourist entrance fees. The one euro entrance fee covers the services of a ticket seller and basic maintenance of the site (s) by the community. The central or provincial governments lack sufficient funds to provide dedicated protection for the numerous sites.

A further constraint is the obvious imbalance between the Lao PDR's small number of national archaeologists, and the human resources actually needed to deal with the complex, widespread, and often remote Plain of Jars sites. Community-based heritage management is a significant step forward in front line protection, but the training of competent personnel at provincial and district level is crucial if sustainable management and periodic monitoring of sites are to be ensured.

The Plain of Jars Archaeological Landscape has a high level of integrity with the sites having suffered mainly from benign neglect – the obvious exception being the carpet bombing of the province during the Second Indochina War. The end of the first decade of the twenty-first century has, however, been marked in Xieng Khouang province by the accelerated development of agriculture, road networks, and mining exploration. Development without thought for the preservation of the entire archaeological landscape may save the most famous and accessible sites at the cost of losing the very essence of the Plain of Jars: an archaeological landscape reflecting the extensive and elaborate mortuary practices of a long-disappeared civilization with strong cultural exchanges evidenced in the form and location of jar sites across its entire extent.

International Perspectives and Future Directions

Megalithic jars are not unique to Laos and the Plain of Jars. In 1929 Mils and Hutton (as cited in Colani 1935: 223–236) recorded four stone jar sites in the Cachar Hills of Northeast India, and "stone vats" have been recorded in the valleys of Bada and Besoa, Central Sulawesi, and Bima, Sumbawa Island in Indonesia. Nevertheless, when considered collectively, the well-understood strategic importance of the plateau, the integrity, authenticity of the landscape, and the resulting high research values make the Plain of Jars Archaeological Landscape a good candidate for UNESCO World Heritage Listing.

In addition to contributing to our understanding of Southeast Asian prehistory, the sites have great potential for education and the development of community-led heritage tourism, which was recognized by UNESCO, the Lao government, and NZAID in Phase IV of Safeguarding the Plain of Jars Project 2006–2010.

The UXO problem, however, must be acknowledged, and bomb removal efforts should continue to focus on sustainable heritage development.

Cross-References

- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Poverty
- ▶ Laos: Cultural Heritage Management
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ UNESCO's World Heritage List Process
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Baldock, J., and J. Van Den Bergh. 2009. Geological mysteries at the Plain of Jars begin to unravel. *Geology Today* 25: 145–150.

Colani, M. 1935. *Megalithes du Haut Laos*, Publication de l'École française d'Extrême-Orient XXV-XXVI. Paris: École française d'Extrême-Orient.

Nitta, E. 1996. Comparative study on the jar burial traditions in Vietnam, Thailand and Laos. *Historical Science Reports, Kagoshima University* 43: 1–19.

Rogers, P., and J. Van Den Bergh. 2008. Legacy of a secret war: archaeological research and bomb clearance in the Plain of Jars, Lao PDR. In *Interpreting Southeast Asian's past. Monument, image and text. Selected Papers from 10th Conference of EASAA 2*, ed. E. Bacus, I. Glover, and P. Sharrock, 400–408.

Rogers, P., R. Engelhardt, P. Box, J. Van Den Bergh, S. Luangaphay, and C. Chantavong. 2003. The UNESCO project: Safeguarding the plain of jars. In *Fishbones and glittering emblems: Southeast Asian archaeology 2002*, ed. A. Karlström and A. Källén. Stockholm: Museum of Far Eastern Antiquities.

Sayavongkhamdy, T., and P. Bellwood. 2001. Recent archaeological research in Laos. *Bulletin of the Indo-Pacific Prehistory Association* 19: 101–110.

Van Den Bergh, J. 2007. Safeguarding the Plain of Jars, an overview. In *New research on Laos-Recherches nouveles sur le Laos*, Etudes thematiques 18, ed. Y. Goudineau and M. Lorrilard. Vientiane: Ecole Française d'Extrême-Orient.

Van Den Bergh, J. 2011. Managing a complex archaeological landscape, Plain of Jars, Lao PDR. In *International conference on the Bujang Valley and early civilizations in Southeast Asia 3–7 July 2010*.

Further Reading

Box, P. 2000. Overview mapping using GIS. In *UNESCO plain of jars cultural heritage documentation*

project, ed. R.A. Engelhardt. UNESCO Regional Advisor for Culture in Asia and the Pacific: Bangkok.
Box, P. 2001. Mapping megaliths and unexploded ordnance. In *UNESCO plain of jars cultural heritage documentation project*, ed. R.A. Engelhardt. Bangkok: UNESCO Regional Advisor for Culture in Asia and the Pacific, Bangkok.
Box, P. 2003. Safeguarding the plain of jars: Megaliths and unexploded ordinance in the Lao People's Democratic Republic. *ESRI, Journal of GIS in Archaeology* 1: 92–102.

Plant Domestication and Cultivation in Archaeology

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Introduction

Plant domestication and cultivation are key concepts for archaeologists who study food-producing societies. Food production takes many forms, ranging from behaviors such as controlled burning that increase harvest yields to highly integrated agricultural systems supporting large populations. Dependence on food production has implications that ramify throughout sociocultural systems and played a key role in the development of corporate land tenure, social mechanisms for control of food surplus, and social hierarchies worldwide. In addition to its cultural significance, plant domestication is the ultimate basis for many of the human behaviors that have modified ecosystems on a global scale.

Definition

Most broadly, plant domestication can be defined as evolution under human management. By definition, then, domestication involves some change in gene frequencies within the population in question. Gene frequencies change because the phenotypic traits they express – such as unusually large seeds – are favored by selection in the modified habitats created by human activity. Domestication is sometimes perceived as purposive, but in fact it can be initiated as a result of human modification of the environment without any conscious planning. Phenotypic change within domesticated populations may be visible in the archaeological record, depending on the plant tissues affected and their likelihood of preservation. The study of ancient DNA has made it possible to pinpoint significant mutations and track their history in some taxa.

Domestication represents a continuum, and scholars have acknowledged this fact by using such terms as "semidomesticated," "fully domesticated," and "initial stages of domestication." Morphological departures from the state characteristic of natural populations provide one set of indicators that domestication was underway. However, human management does not always leave such clear morphological signals.

Whereas domestication is a particular type of evolution in which selection under human influence plays a major role, cultivation encompasses a suite of behaviors involved in managing plant resources, including but not limited to clearing, burning, plowing, selective breeding, planting, and harvesting. Domestication is an evolutionary process or relationship, whereas cultivation is a type of human activity. The two are closely related and often co-occur, but they are clearly different types of phenomena. There is more ambiguity regarding the difference between the two when "domesticated" and "cultivated" are used as modifiers, as in "domesticated plant." Archaeobotanists usually distinguish between cultivated plants, which are tended by humans but may or may not have undergone selection as a result, and domesticated ones, which must meet the additional criterion of having been morphologically and genetically altered from the wild state.

Domestication is seldom viewed today as an intentional, goal-directed form of technology in which humans impose their will on plants and animals to create new, culturally modified forms. Instead, domesticated species are recognized to be active participants in a mutualistic relationship that has evolutionary consequences for both

partners. Highlighting and reinforcing this view is the recognition that humans are not the only organisms that domesticate, as research on social insects has revealed (Rindos 1984). The nature of the domesticatory relationship in terms of human control, the degree of phenotypic modification of the domesticate, and the significance of evolutionary and environmental constraints upon the coevolutionary process vary considerably depending upon the species involved.

Historical Background

Historical Geography and Evolution of Domesticates: The Nineteenth Century

The first in-depth scientific studies of plant and animal domestication were undertaken in the nineteenth century. Most famously, Charles Darwin used the development of distinct varieties of domesticates as an analogy for natural selection (Darwin 1859). He skillfully took the reader through the argument, which provided familiar points of reference from animal breeding – the breeder's decisions to enhance some traits and suppress others, the principle of inheritance (by which like produces like) and the appearance of "sports" (unusual phenotypes). By the time he deftly replaced the pigeon fancier with nature as the selecting agent, the basic elements of the principle of natural selection had been presented, accompanied by a body of supporting evidence. Darwin subsequently published a two-volume treatise in which he explored the causes of phenotypic variation in domesticated animals and plants (Darwin 1868).

Darwin relied for much of his data on the work of Alphonse de Candolle, who aimed to identify the geographical origins of crop plants based on their then-current geographical distributions, historical information, languages, and archaeology. First published in 1855, his major work predated the publication of Darwin's *Origin* by several years. However, even the later (substantially revised) 1888 edition (De Candolle 1886) has little to say about the evolutionary processes by which plants become domesticated. De Candolle did, however, have a keen interest in the archaeological record as a source of evidence for ancient crops and their history. He knew of the excavations of Oswald Heer at the Swiss lake dwellings and was acquainted with the desiccated seeds and other plant parts that had been discovered in Egyptian tombs (De Candolle 1886: 11). Archaeobotany was still a young discipline, but in the years to come, archaeologists would begin to appreciate its potential for documenting domestication.

Archaeology and Plant Domestication: The Early Twentieth Century

One of the first archaeologists to take an explicit interest in plant domestication and agricultural origins was Rafael Pumpelly, whose excavations at Anau in Turkey investigated climate change in relation to early food production (Zeder et al. 2006a). Archaeological research in the Near East has been, and continues to be, a major source of paleoenvironmental and archaeobotanical data on plant domestication.

With the realization that even minute plant parts such as seeds could be recovered from archaeological soils, archaeobotanists began looking more closely at the distinctive morphological traits that differentiated domesticated plants from their wild relatives. The University of Michigan Museum of Anthropology's Ethnobotany Laboratory made major contributions to the metric study of the seeds and fruits of native eastern North American domesticates, such as the sunflower (*Helianthus annuus* L.) and marsh elder (*Iva annua* L.). This work, begun by Melvin Gilmore and his student Volney Jones, was carried on by subsequent generations of ethnobotanists. This Michigan school of paleoethnobotany was influenced by the work of botanist Edgar Anderson, whose 1952 book *Plants, Man, and Life* presented what came to be known as the "dump-heap theory" of plant domestication (Smith 1992). Anderson recognized that human activity enriched soils and disturbed vegetation in ways that encouraged the colonization of campsites by weeds, many of which were cultivated as food sources. Many later archaeologists and

archaeobotanists were to find this model useful in explaining how and why domestication began. Anderson's vision of domestication as a purely incidental consequence of unplanned environmental modification by humans was to become an appealing alternative to the idea that domestication was a calculated innovation.

In plant science, the work of Vavilov (1992) in the early part of the twentieth century was an important foundation for later studies of the geographical origins and dispersal of cultivated plants. Vavilov proposed that geographical origins of crop species could be pinpointed by looking for high levels of diversity in inherited traits. Although the center of diversity/point of origin correlation has not held up well over subsequent years, Vavilov's work continues to be a point of comparison for geneticists and archaeologists currently examining crop origins.

Ecological Approaches: The 1960s and 1970s

Human ecology and systems theory were attractive paradigms for archaeologists working on the origins of agriculture. These approaches informed the work of North American archaeologists such as Kent Flannery, who initiated multidisciplinary projects that laid the groundwork for the scientific study of plant domestication in both Mexico and the Near East. Across the Atlantic, the economic prehistory school was flourishing, producing data-rich and theoretically informed studies of ancient plant domestication. Flotation recovery of archaeological plant remains using fine screens was yielding assemblages of unprecedented size and quality, stimulating archaeobotanists to investigate the morphological correlates of domestication by measuring seeds and fruits. In eastern North America, this work led to widespread recognition that the domestication of native plants had preceded by at least two millennia the introduction of maize from Mexico (Smith 1992, 2006; Zeder et al. 2006a).

In agricultural sciences, Jack Harlan revived Vavilov's centers of domestication, modifying the original model to acknowledge the true complexity of crop origins and dispersals by recognizing primary and secondary centers of domestication as well as noncenters (Harris 2007). Harlan along with colleagues in botany and crop sciences began to define the effects of cultivation on natural selection in plant populations. A rigorous model of the "adaptive syndrome" of domestication in seed crops was beginning to crystallize (Harlan et al. 1973).

Domestication as Coevolution: The Late Twentieth Century

By the 1980s, archaeologists and archaeobotanists had embraced an explicitly evolutionary understanding of domestication. Multidisciplinary approaches to domestication origins and processes were widespread and gaining momentum. Researchers interested in the question of morphological change under domestication turned increasingly to metric analysis of seeds and fruits, an effort fueled by the accelerated recovery of plant remains by flotation. In eastern North America, Bruce Smith demonstrated that goosefoot (*Chenopodium berlandieri* L.) was a domesticate by applying the evolutionary understanding of selection under domestication previously developed by Harlan et al. (1973). His work exemplifies the synthesis of new methods (such as scanning electron microscopy and direct accelerator dating of plant material) with evolutionary and ecological theory (specifically, the adaptive syndrome of domestication and Anderson's dump-heap model). Smith applied his understanding of plant domestication as coevolution to explain archaeological patterns in eastern North American riverine environments of the middle Holocene (Smith 1992). Coevolution became an influential concept in many regions as archaeologists grappled with the problem of how and why plant domestication emerged from straightforward predation. The continuum of human-plant interaction envisioned by David Harris and revised over several decades continues to influence theories of plant domestication (Fig. 1). In light of this ethnographically informed view of the broad spectrum of human behaviors affecting plant populations, the dichotomy separating domesticated from wild was increasingly untenable.

The theory of plant domestication as coevolution was systematically set out in a monograph by

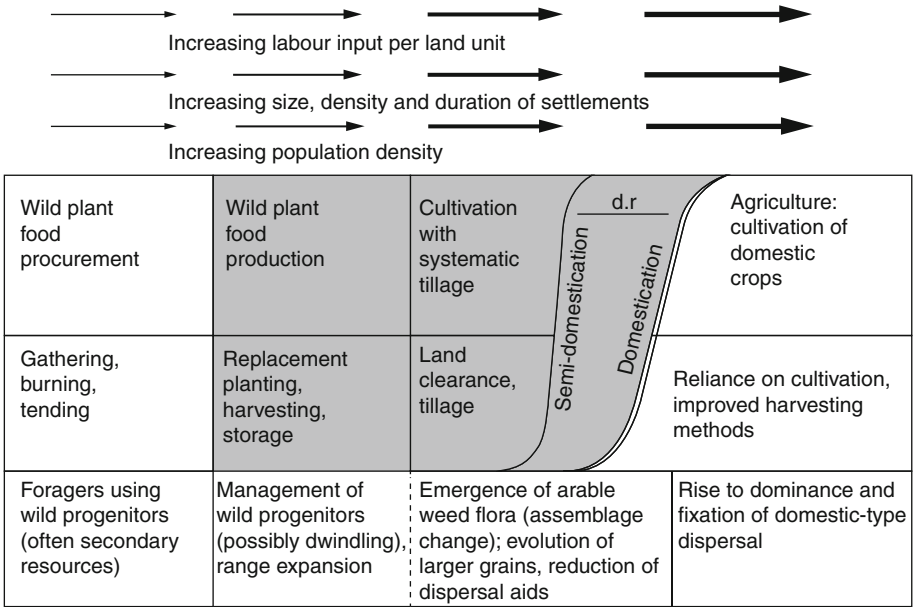

Plant Domestication and Cultivation in Archaeology, Fig. 1 A model of the foraging-to-agriculture continuum developed by David Harris and modified by Fuller (2007). *Shaded areas* represent stages of pre-domestication cultivation. The *bottom row* indicates archaeobotanical signatures associated with each stage (Creative Commons Attribution Non-Commercial License (http://creativecommons.org/licenses/by-nc/2.5/))

David Rindos, an American scholar with a diverse background including a Ph.D. in Anthropology and Evolutionary Biology and an M.S. in Botany, both from Cornell. Rindos' 1984 book (Rindos 1984) was read with great interest by many archaeologists and ethnobotanists. Its influence was not universal, in part due to his insistence that human intention was not a proper ingredient in an evolutionary theory of domestication. He emphasized instead the mutualism that develops when animals become dispersal agents for plants. His model of agricultural expansion was largely ignored. However, Rindos forced researchers to question many of their assumptions about domestication, including its definition in terms of morphological and genetic markers. He did this by stretching the definition of domestication to its breaking point, including every instance of animal/plant mutualism, including ant "agriculture." Rindos' view of the continuum from generalized to specialized to agricultural domestication was not widely adopted in its original form. However, his contention that initial domestication did not require explanation because it was a natural outgrowth of evolved dispersal relationships seems to have struck a chord with many researchers.

Domestication in Twenty-First-Century Archaeology: A Prologue

A number of trends and issues can be identified in the contemporary study of plant domestication and cultivation in archaeology. Morphology is losing its status as the sine qua non of plant domestication; researchers realize that the diverse trajectories of domestication demand flexible criteria that may include landscape modification and dispersal of domesticates into new habitats and regions. Genetic studies have become key tools for tracing crop origins and dispersals. Starch grains and phytoliths offer new opportunities for documenting ancient domesticates. Current debates over explanation center on the choice of appropriate models and frameworks from evolutionary ecology, niche construction theory, and developmental biology.

Key Issues/Current Debates

Documentation of Domestication in the Archaeological Record

For annual seed crops, the adaptive syndrome of domestication has stood the test of time. Morphological criteria that can be securely linked with selection under domestication continue to have great value, particularly when macrobotanical remains are the target of study. For example, an increase in seed and fruit size has long been known as a response to intentional selection of seed stock but can also occur by way of seedling competition in modified soils (Table 1). Size can easily be assessed with simple measurements of length, width, and thickness. Indicators of the loss of germination dormancy may be more difficult to observe. In *Chenopodium*, thick seed coats that inhibit germination tend to be reduced or lost under domestication. Measurements of seed coat thickness must be done using high-resolution, high-magnification microscopy. The trait of shattering to disperse seeds is qualitative rather than quantitative. For example, in cereals the abscission layer that permits the ripe seed cluster (spikelet) to fall from the parent plant is lost. The resulting pattern of breakage – across the rachis, the stalk that anchors the grass seed cluster to the parent plant – is archaeologically distinctive (Pickersgill 2007; Fuller et al. 2012).

Comparisons designed to differentiate domesticated from non-domesticated populations (or semidomesticated ones) should be made between populations or samples, since variants exhibiting domesticated-type morphology may be present at low frequencies even in wild stands. Simultaneous ripening, for example, might be assessed by measuring variability in seed size within a single context or on a bundle of infructescences (fruit clusters) harvested together and preserved in a cave or rock-shelter.

For plants that are cultivated for their underground storage organs (USOs), documentation of domestication can be difficult. These plants are propagated clonally, with some sexual reproduction to maintain variation. The parts consumed are nonreproductive tissue consisting mainly of starch. Fortunately, the size and morphology of starch grains and phytoliths have the potential to reflect selection under domestication, although it is not always clear that these phenotypic changes have a genetic basis (Smith 2006).

Recently, morphology has been joined by genetic analysis as a method of documenting the appearance of domesticate phenotypes. This exciting development involves the study of quantitative trait loci (QTLs) that code for specific phenotypic traits. In maize, for example, domestication-related genes for plant architecture, storage protein synthesis, and starch production have been identified and their distribution studied using ancient DNA (aDNA) (Jones and Brown 2007). The locus controlling for starch quality was found to be different in aDNA from 4000-

Plant Domestication and Cultivation in Archaeology, Table 1 Selection pressures under a regime of harvesting and replanting of stored seed (the adaptive syndrome of domestication)

Specific behaviors	Selective pressure	Trait associated with domestication	Archaeobotanical signature
	Intensified seedling competition favoring rapid germination	Loss or reduction of germination inhibitors	Seed coat thin or lacking
Habitat disturbance, tilling	Intensified seedling competition favoring vigorous seedlings	Increase in food reserves for seedling growth	Larger seeds
Whole-plant harvesting	Competitive advantage of non-shattering type	Loss/reduction of dispersal mechanisms	Non-shattering spikelet morphology
Seed-beater harvesting	Competitive advantage of shattering trait	Dispersal mechanisms retained	Shattering spikelet morphology (abscission layer intact)
	Selection favoring seeds that are mature when harvested	Synchronous maturation of seeds	Low variance in seed size/few immature seeds

Sources: Harlan et al. (1973), Smith (1992), and Pickersgill (2007)

year-old cobs from the Ocampo caves in Mexico (a soft type preferred for making tortillas) as compared to 1000–2000-year-old maize from Tularosa Cave in New Mexico (a hard-kernelled form) (Zeder et al. 2006b).

With this kind of data, both morphological and genetic, accumulating from many world regions, it has become necessary to reassess the validity of phenotypic markers as the sole or primary criterion for plant domestication. Morphological change is not necessarily the "leading edge" of domestication but in some cases represents a much later outgrowth of pre-domestication cultivation (Zeder et al. 2006a; Harris 2007; Jones and Brown 2007). Domestication might also precede cultivation in the strict sense, due to unconscious forms of selection (Rindos 1984).

In light of the great variability of ecological situations that give rise to human-plant coevolution, researchers have called for a richer and more nuanced treatment of domestication. This newer view acknowledges that phenotypic and genotypic changes do not universally characterize the mutualisms between human and plant populations (Zeder et al. 2006b). To understand how these mutualisms develop, it is necessary to look beyond seed measurements and view plant management in its cultural context. Landscape management and archaeological occurrence of a plant outside of its known wild range are other non-morphological indicators of domestication in this broad sense (Zeder et al. 2006a). Plant domestication may be seen as one aspect of niche construction, by which organisms modify their environments in ways that affect the reproductive success of their offspring (Zeder 2016).

Rates of Domestication

In the view of nineteenth-century social evolutionists, agriculture was a precondition for civilization, and domestication of animals and plants was the brainchild of human ingenuity. Today, scholars recognize the importance of unconscious selection as well as selective breeding, and therefore that rapid transitions should not be expected. The domesticated vs. wild dichotomy has been largely replaced by a continuum in which coevolutionary relationships are fluctuating and sensitive to environmental and cultural influences rather than heading inevitably toward agriculture. However, questions still remain about the rate of domestication and how that rate varies between species. Are single mutations responsible for most domesticated phenotypes, or are they often influenced by multiple loci? What is the role of genes of large effect, such as regulatory genes that control growth and development? Can plastic responses to novel environmental conditions "jump start" the domestication process by revealing cryptic genetic variation? Do some harvesting methods accelerate domestication?

For a brief period, rapid rates had considerable support from harvest experiments that suggested that domestication of wild wheat and barley could have been accomplished in a matter of decades (Allaby et al. 2008). Also contributing to the rapid transition model for the Near East was the apparently sudden appearance of intensively harvested wild cereals in the early Holocene. However, accumulating archaeobotanical data indicate a much longer period of domestication, beginning with intensive seed harvesting some 20,000 years ago and continuing with pre-domestication cultivation by 13,000–12,500 BP, with the fixation of the domestication syndrome perhaps taking several thousand more years (Allaby et al. 2008). Possible reasons for the length of this process include relatively weak selection and ongoing gene flow from wild populations. The latter barrier could sometimes be removed only by removing the plant from its original range. The full spectrum of domestication syndrome traits for a species does not necessarily form a "package"; instead, changing harvesting practices or economic strategies shift selection so that different traits emerge at different times (Allaby 2010). In rice and other cereals, for example, changes in grain size and shape preceded the loss of the shattering trait; in legumes, cultivation was practiced for thousands of years before larger seeds developed (Fuller 2007). Another variable that may speed the rate of domestication is developmental plasticity, which allows for phenotypic variation without corresponding changes in the genome. In a stable environment, over time, such traits may become less responsive to

environment and become genetically fixed or "assimilated" (Piperno et al. 2017).

Although the protracted model of domestication is currently ascendant, there is some dissent on the grounds of parsimony (Abbo and Gopher 2017). There is reason to believe rapid, gradual, and punctuated scenarios are possible. A better understanding of the key genetic, environmental, and socioeconomic variables that distinguish these pathways is emerging from analysis of large data sets and formal models (Freeman et al. 2015; Gerbault et al. 2014; Ullah et al. 2015.

Single vs. Multiple Origins of Crop Plants

Since Vavilov's centers of domestication, new evidence has revealed a much more complex picture of crop origins. Modern cultivars frequently show the influence of multiple lineages from different geographical areas. Single origins for important crops have been proposed based on phylogenies that are monophyletic (possessing a single lineage). However, the interpretation of monophyly as indicating a single origin rests on the assumption of a rapid process of domestication. Allaby et al.'s (2008) simulation of evolution under domestication, however, indicated that sample size and the number of generations over which evolution occurred had strong effects on phylogenetic outcomes. Thus, monophyly is a poor indicator of single origins. The histories of many crop plants remain to be worked out, but close collaboration between archaeologists, archaeobotanists, geneticists, and other specialists has produced impressive results so far and promises to continue to do so in the future.

Explanation and the Role of Evolutionary Theory

Collaborative research and the great variability in pathways to domestication have stirred up theoretical debates as well. Recognition of this diversity has led some researchers away from generalizing explanations that frame domestication and agriculture primarily as predictable behavioral responses to the natural environment. However, there remains a keen interest in applications of evolutionary theory to explain both initial domestication and the intensification of production that sometimes follows. Debates regarding the role of evolutionary theory in agricultural origins research revolve around the importance of particular processes (such as niche construction and developmental plasticity) and the value of formal models derived from behavioral ecology (Gremillion et al. 2014). Although niche construction and models of optimal choice are both grounded in natural selection theory, some continue to insist that the latter approach is fatally flawed, among other things by its failure to acknowledge human intentionality as a causal factor (Zeder 2016). However, the field appears to be moving toward a consensus that the two approaches are complementary rather than contradictory (Stiner and Kuhn 2016; Zeanah 2017).

A key concept in evolutionary developmental biology, plasticity, is emerging as a potentially major factor in the domestication process because it can reveal cryptic genetic variation that, once expressed in the phenotype due to an environmental trigger, becomes subject to selection (Piperno et al. 2017). For example, the domesticated form of the weedy annual erect knotweed of eastern North America originated in the differential expression of genes controlling germination dormancy (Mueller 2016), and early Holocene temperatures and atmospheric conditions may have triggered changes in gene expression important in the evolution of maize from teosinte (Piperno et al. 2017).

There is also a tension between comparative and contextual approaches to domestication and agricultural origins. The comparative perspective seeks common processes and causes and attempts to generalize across diverse cultural and environmental contexts. In contrast, the contextual approach recognizes the diffuse and mosaic character of domestication and the importance of understanding its sociocultural context. It advocates strong attention to historical details, the actions of self-aware agents, and local environments as a bridge to broader forms of explanation (Vrydaghs and Denham 2007).

International Perspectives

Historical differences in the development of archaeology in North America and the UK

influence approaches to domestication. North American archaeology has been closely associated with cultural anthropology and human evolutionary studies. In the UK, prehistoric archaeology was more closely affiliated with geology and paleontology. Today, collaboration has erased or blurred these distinctions and opened up new opportunities for multidisciplinary research that takes advantage of many lines of evidence. An example of this trend is the integration of molecular approaches into the study of domestication history.

Until recently, archaeological research on plant domestication has been dominated by relatively few regions; among them are temperate North America, Western Europe, the Near East, and those parts of Mesoamerica and South America that gave rise to urbanism. Efforts are now underway to include the domestication histories of regions formerly marginalized, such as the humid tropics of Africa and the Americas, Southeast Asia, and the Pacific Islands. Integration of this new information highlights the global variability of human-plant interactions, leading to calls for each region to be understood on its "own terms" (Vrydaghs and Denham 2007: 11). Former colonies of Western nations are producing archaeologists whose worldviews are strongly influenced by awareness of indigenous perspectives on the plant world.

Future Directions

The past two decades have yielded a multitude of innovative techniques and approaches to plant domestication and cultivation in prehistory. The next two decades promise to be similarly productive, quite possibly in unanticipated ways. Based on current trends and gaps in knowledge, the following developments seem likely:

1. *Increased attention to the cognitive basis of decision-making and proximal mechanisms involved in plant use and management*. Archaeology has access to the material residues that document such decisions but lacks direct empirical evidence of the thought processes that motivated prehistoric people. However, cognitive science continues to yield insight into how the human mind works, in some cases documenting species-wide strategies such as rapid, intuitive decision-making and persistent biases. There is also much to be learned from studies of contemporary peoples who manage plants on a daily basis using traditional systems of knowledge. Their decisions are based both on socially learned information (culture) and their own experiences.
2. *Further exploration of biomolecules, especially aDNA, to document the history and spread of domesticated plants*. This research effort continues to expand to encompass more species and has moved beyond analysis of selectively neutral loci to the identification of loci known to regulate the phenotypic traits associated with domestication. Much continues to be learned from modern plant populations about their ancient predecessors, but aDNA will yield more opportunities for pinpointing key events in crop history. Judging by progress over the last decades, methods for analyzing aDNA will continue to be refined and improved in the years to come.
3. *More frequent application of models, particularly simulation models, to important questions about the process of domestication*. Modeling is a crucial analytic tool for understanding evolution in the case of prehistoric populations, which are imperfectly documented in the material record. Models permit the manipulation of numerous variables, such as population size, mutation rates, and rates of cultural transmission, under conditions that cannot be replicated in the real world. Their results enhance understanding of how variables are interrelated and provide a framework for interpretation of archaeological and genetic evidence (Allaby et al. 2008; Freeman et al. 2015; Gerbault et al. 2014; Ullah et al. 2015).
4. *Investigation of the domestication of nonfood plants*. Food plants, especially cereals, have been the focus of much domestication research because of their impact on human population

growth, social organization, mobility, and other sociocultural phenomena of interest to prehistorians. Fiber plants and fruit trees have received some attention, as have some psychoactive plants. Studies of major crops will continue, but innovations in residue analysis (for identification of lipids, alkaloids, and other biomolecules), fiber identification, and perhaps high-power microscopy of plant tissues will continue.

5. *Eventually evolutionary theory will be fully integrated with the study of plant domestication in prehistory.* Domestication is now widely accepted as an evolutionary process in which plants and humans both participate as coevolutionary partners, yet the processes that operate to bring about change on the human side of the equation remain poorly understood and undertheorized. Despite the discomfort of some researchers with the heuristic reductionism of behavioral ecology models, these models continue to yield insights into human decision-making. However, they represent only one strategy for advancing knowledge of plant domestication and agriculture in the past. Models of complex systems also have much potential, especially when combined with empirical testing, and both niche construction theory and developmental biology offer useful frameworks that will continue to guide research in the near future (Piperno et al. 2017).

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Darwin, Charles R.
- ▶ Foraging to Farming Transition: Global Health Impacts, Trends, and Variation
- ▶ Organic Residue Analysis in Archaeology
- ▶ Phytolith Studies in Archaeology

References

Abbo, S., and A. Gopher. 2017. Near eastern plant domestication: A history of thought. *Trends in Plant Science* 22: 491–511.

Allaby, R.G. 2010. Integrating the processes in the evolutionary system of domestication. *Journal of Experimental Botany* 61: 935–944.

Allaby, R.G., D.Q. Fuller, and T.A. Brown. 2008. The genetic expectations of a protracted model for the origins of domesticated crops. *Proceedings of the National Academy of Sciences of the United States of America* 105: 13982–13986.

Darwin, C. 1859. *The origin of species*. New York: Random House.

Darwin, C. 1868. *The variation of animals and plants under domestication*. Baltimore: Johns Hopkins University Press.

De Candolle, A. 1886. *Origin of cultivated plants*. New York: Hafner.

Freeman, Jacob, Matthew A. Peeples, and John M. Anderies. 2015. Toward a theory of non-linear transitions from foraging to farming. *Journal of Anthropological Archaeology* 40: 109–122.

Fuller, D.Q. 2007. Contrasting patterns in crop domestication and domestication rates: Recent archaeobotanical insights from the old world. *Annals of Botany* 100: 903–924.

Fuller, D.Q., E. Asouti, and M.D. Purugganan. 2012. Cultivation as slow evolutionary entanglement: Comparative data on rate and sequence of domestication. *Vegetation History and Archaeobotany* 21: 131–145.

Gerbault, Pascale, Robin G. Allaby, Nicole Boivin, Anna Rudzinski, Ilaria M. Grimaldi, J. Chris Pires, Cynthia Climer Vigueira, Keith Dobney, Kristen J. Gremillion, and Loukas Barton. 2014. Storytelling and story testing in domestication. *Proceedings of the National Academy of Sciences* 111: 6159–6164.

Gremillion, Kristen J., Loukas Barton, and Dolores R. Piperno. 2014. Particularism and the retreat from theory in the archaeology of agricultural origins. *Proceedings of the National Academy of Sciences* 111: 6171–6177.

Harlan, J.R., J.M.J. De Wet, and G.E. Price. 1973. Comparative evolution of cereals. *Evolution* 27: 311–325.

Harris, D.R. 2007. Agriculture, cultivation, and domestication: Exploring the conceptual framework of early food production. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T. Denham, J. Iriarte, and L. Vrydaghs, 16–35. Walnut Creek: Left Coast Press.

Jones, M., and T. Brown. 2007. Selection, cultivation and reproductive isolation: A reconsideration of the morphological and molecular signals of domestication. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T. Denham, J. Iriarte, and L. Vrydaghs, 36–49. Walnut Creek: Left Coast Press.

Mueller, Natalie G. 2016. Documenting domestication in a lost crop (*Polygonum erectum* L.): Evolutionary bet-hedgers under cultivation. *Vegetation History and Archaeobotany*. https://doi.org/10.1007/s00334-016-0592-9. Published online 26 October 2016.

Pickersgill, B. 2007. Domestication of plants in the Americas: Insights from Mendelian and molecular genetics. *Annals of Botany* 100: 925–940.

Rindos, D. 1984. *The origins of agriculture: An evolutionary perspective*. New York: Academic.

Smith, B.D. 1992. The floodplain weed theory of plant domestication in eastern North America. In *Rivers of change*, ed. B.D. Smith, 19–34. Washington, DC: Smithsonian Institution Press.

Smith, B.D. 2006. Documenting domesticated plants in the archaeological record. In *Documenting domestication. New genetic and archaeological paradigms*, ed. M.A. Zeder, D.G. Bradley, E. Emshwiller, and B.D. Smith, 15–24. Berkeley: University of California Press.

Stiner, Mary C., and Steven L. Kuhn. 2016. Are we missing the "sweet spot" between optimality theory and niche construction theory in archaeology? *Journal of Anthropological Archaeology*. https://doi.org/10.1016/j.jaa.2016.07.006.

Ullah, I.I., I. Kuijt, and J. Freeman. 2015. Toward a theory of punctuated subsistence change. *Proceedings of the National Academy of Sciences of the United States of America* 112: 9579–9584.

Vavilov, N.I. 1992. *Origin and geography of cultivated plants*. Cambridge, UK: Cambridge University Press.

Vrydaghs, L., and T. Denham. 2007. Rethinking agriculture: Introductory thoughts. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T. Denham, J. Iriarte, and L. Vrydaghs, 1–15. Walnut Creek: Left Coast Press.

Zeanah, David W. 2017. Foraging models, niche construction, and the Eastern Agricultural Complex. *American Antiquity* 82: 3–24.

Zeder, Melinda A. 2016. Domestication as a model system for niche construction theory. *Evolutionary Ecology* 30: 325–348.

Zeder, M.A., D.G. Bradley, E. Emshwiller, and B.D. Smith. 2006a. Documenting domestication: Bringing together plants, animals, archaeology, and genetics. In *Documenting domestication. New genetic and archaeological paradigms*, ed. M.A. Zeder, D.G. Bradley, E. Emshwiller, and B.D. Smith, 1–14. Berkeley: University of California Press.

Zeder, M.A., E. Emshwiller, B.D. Smith, and D.G. Bradley. 2006b. Documenting domestication: The intersection of genetics and archaeology. *Trends in Genetics* 22: 139–155.

Further Reading

Choi, J.Y., A.E. Platts, D.Q. Fuller, Y.I. Hsing, R.A. Wing, and M.D. Purugganan. 2017. The rice paradox: Multiple origins but single domestication in Asian rice. *Molecular Biology and Evolution* 34: 969–979.

Dewet, J.M.J. 1975. Evolutionary dynamics of cereal domestication. *Bulletin of the Torrey Botanical Club* 102: 307–312.

Harris, D.R. 1969. Agricultural systems, ecosystems, and the origins of agriculture. In *The domestication and exploitation of plants and animals*, ed. P.J. Ucko and G.W. Dimbleby, 3–15. London: Duckworth.

Harris, D.R. 1989. An evolutionary continuum of people-plant interaction. In *Foraging and farming, the evolution of plant exploitation*, ed. D.R. Harris and G.C. Hillman, 11–26. London: Unwin Hyman.

Jaenicke-Despres, V., E.S. Buckler, B.D. Smith, M. Thomas, P. Gilbert, A. Cooper, J. Doebley, and S. Paabo. 2003. Early allelic selection in maize as revealed by ancient DNA. *Science* 302: 1206–1208.

Meyer, R.S., and M.D. Purugganan. 2013. Evolution of crop species: Genetics of domestication and diversification. *Nature Reviews. Genetics* 14: 840–852.

Mueller, Natalie G., Gayle J. Fritz, Paul Patton, Stephen Carmody, and Elizabeth T. Horton. 2017. Growing the lost crops of Eastern North America's original agricultural system. *Nature Plants* 3: 17092.

Piperno, Dolores R., Anthony J. Ranere, Ruth Dickau, and Francisco Aceituno. 2017. Niche construction and optimal foraging theory in Neotropical agricultural origins: A re-evaluation in consideration of the empirical evidence. *Journal of Archaeological Science* 78: 214–220.

Terrell, J.E., J.P. Hart, S. Barut, N. Cellinese, A. Curet, T. Denham, C.M. Kusimba, K. Latinis, R. Oka, J. Palka, M.E.D. Pohl, K.O. Pope, P.R. Williams, H. Haines, and J.E. Staller. 2003. Domesticated landscapes: The subsistence ecology of plant and animal domestication. *Journal of Archaeological Method and Theory* 10: 323–368.

Yarnell, R.A. 1978. Domestication of sunflower and sumpweed in eastern North America. In *The nature and status of ethnobotany*, ed. R.I. Ford, 289–300. Ann Arbor: Museum of Anthropology, University of Michigan.

Plant Micro-remains in Dental Calculus

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Introduction and Historical Background

Different types of analysis provide data on diet and subsistence patterns of ancient groups,

Plant Micro-remains in Dental Calculus, Fig. 1 Dental calculus deposits on teeth from an individual that was buried in the site Jabuticabeira II (2880 ± 75–1805 ± 65 BP), a shell mound from the southern coast of Brazil. (Photo: Célia Boyadjian)

contributing to the study of former ways of life. However, most of them are based on indirect evidence. The recovery of remains directly linked to diet is possible through the analysis of coprolites and gut contents, which are rare in many archaeological contexts. Luckily, another source of direct remains of food was discovered: the dental calculus (Fig. 1).

In contrast to coprolites, dental calculus is not rare. It is commonly found in teeth from humans and other species from different sites regardless of their location or context. The remains that are typically recovered from the dental calculus are botanical particles such as starch grains, phytoliths (biogenic silica particles), pollen, fibers, and tissue fragments, and they give us knowledge about plants that were eaten in the past. This is extremely valuable in contexts where plant material is rarely preserved.

But more than food remains, recent studies have shown that dental calculus can also store evidence from non-dietary activities, providing important information about habits and behavior. In fact, the analysis of calculus contents has proven to be very efficient and informative, which explains why this line of research has gained strength and relevance over the last decades.

First Studies

Before the development of the studies into its contents, dental calculus had already been used by bioanthropologists to investigate the oral health of past populations, since its growth is associated with the development of periodontal disease. In this approach, the deposits are macroscopically analyzed according to protocols established to evaluate calculus extent and severity (Dobney and Brothwell 1987).

The frequency and severity of calculus were also used to infer subsistence patterns of past human populations (Lieverse 1999). The problem with this type of analysis stems from the fact that different dietary patterns, as well as non-dietary factors, are associated with high levels of calculus formation (Lieverse 1999).

The first studies to promote calculus demineralization and microscopic analysis in search of direct evidence of diet were undertaken on animal samples (Armitage 1975; Dobney and Brothwell 1988; Middleton and Rovner 1994). The pioneer study on plant micro-remains from dental calculus dates back to the 1970s, when Armitage (1975) recovered phytoliths from samples from ungulates from British archaeological sites. About a decade later, Dobney and Brothwell (1988) were able to detect various types of plant, as well as animal remains, and preserved microbes in calculus of humans and domestic animals.

Just as in the animal studies, the first microbotanical studies on human calculus were also focused on the recovery of phytoliths (e.g., Lalueza Fox et al. 1996). But soon, the potential of the starch grain analysis was recognized (Boyadjian et al. 2007; Piperno and Dillehay 2008; Henry and Piperno 2008; Hardy et al. 2009). This was because this remnant is the direct evidence of the consumption of starchy food and enables the detection of plant items that are essential in the human diet such as roots and tubers, storage organs that generally do not preserve in archaeological contexts (Hardy et al. 2009).

Besides the aim of dietary reconstruction, during the 2000s many studies still had a more experimental character. Different research groups tested protocols and published exploratory studies, providing the general guidelines for calculus research

(e.g., Reinhard et al. 2001; Boyadjian et al. 2007; Henry and Piperno 2008; Hardy et al. 2009; Wesolowski et al. 2010).

After the publication of the pioneer studies, there were many advances in the field; however, it was only in the first decade of the new century that it began to expand more rapidly. In the last few years, the number of studies has grown significantly, and they included the analysis, not only of plant micro-remains but also of debris from different sources. The technique has been applied to human and other animal samples from the most diverse sites around the world, from contexts as old as 2 Myr (Henry et al. 2012) until the present day (Leonard et al. 2015). Some examples are presented in a later section of this chapter.

State of Knowledge and Current Debates

Formation and Composition

Dental calculus is formed by the mineralization of the dental plaque, a biofilm composed of microorganisms of the oral microbiome and proteins, which covers the surfaces of teeth and gums (Hillson 1996). The process of calculus formation is still not totally understood. However, it is known that the calculus accumulates during the whole life of the individual, in a continuous and incremental process, forming layers of deposition on the teeth (Hardy et al. 2012).

At first, the saliva and gingival crevicular fluids form an organic pellicle on the teeth surface, which becomes colonized by microorganisms, especially bacteria, forming the dental plaque (Hillson 1996; Lieverse 1999). Then, ions of calcium phosphate from these fluids precipitate in the dental plaque, mineralizing it, and forming the calculus deposits (Warinner et al. 2015). The calcium phosphate crystals occupy irregularities on the teeth surface as the plaque mineralizes, strongly attaching the calculus deposits to the teeth (Warinner et al. 2015). The layer of calculus formed has a rough surface, which favors microbial activity and, subsequently, the formation of plaque over it (Hardy et al. 2012). When the mineralization process of the inner layer of calculus is finished, dental plaque starts to form again and later mineralizes, forming another layer of calculus and so on (Hardy et al. 2012).

The dental calculus matrix is composed of organic and inorganic elements. The organic components include proteins, amino acids, carbohydrates, and lipids. The main inorganic components are calcium and phosphorus, while elements such as aluminum, magnesium, silicon, sodium, and manganese also appear in lower quantities (Hillson 1996; Jin and Yip 2002; Power et al. 2014). Hydroxyapatite, whitlockite, octacalcium phosphate, and brushite are the predominant crystalline forms of calcium phosphate in dental calculus (Hillson 1996; Lieverse 1999). The proportion of each crystal phase also varies in different deposits, which is related to the calculus maturation (Lieverse 1999). As the calculus matures, its crystallinity increases. Since brushite crystals tend to form first, they are more abundant in younger deposits, while mature deposits (up to 6 months) have more high-crystallinity phases of calcium phosphate crystals such as hydroxyapatite (Lieverse 1999; Jin and Yip 2002). Therefore, the more mature inner layers of calculus are, the more highly crystalized than the outer layers (Warinner et al. 2015).

The deposits are classified in two types: supragingival calculus, the deposits that form above the gum margin, on the tooth enamel; and subgingival calculus, formed below the gum margin on the tooth neck (Hardy et al. 2009). In spite of the similarities in the appearance and formation of both types of deposits, they have different structures and inorganic compositions, which are possibly related to the different microenvironments where they are formed and to the dental plaque associated with each type of deposit (Lieverse 1999). The supragingival calculus tends to accumulate on the buccal surface of molars and premolars from the maxilla and on the lingual surfaces of anterior teeth from the mandible, close to the location of the salivary ducts, while there appears to be no difference in the distribution of subgingival calculus (Lieverse 1999; Jin and Yip 2002).

The calculus composition is different among species. In fact, even among individuals from the same species, or the same group, there are not

only differences in the composition but also in the rate of calculus formation and extent of the deposits. That is because the calculus formation is influenced by multiple factors like the oral pH, salivary flow, genetic predisposition, age, oral hygiene, and masticatory disorders (Lieverse 1999). Diet is also one of the factors that is associated with the calculus formation, although how much it can affect it is not totally clear. For example, a protein-rich diet can increase the alkalinity of the oral pH, increasing the precipitation of the minerals of the oral fluid, thus promoting the calculus accumulation, but at the same time, a diet rich in carbohydrates promotes the plaque accumulation, indirectly influencing the calculus formation (Hillson 1996; Lieverse 1999).

During the feeding process, microscopic remains of the chewed plants are retained in the dental plaque. While the plaque mineralizes and the calculus deposits are formed, they get trapped in its matrix. Since the calculus matrix is very resistant, these particles are protected from diagenesis and can be recovered and analyzed even after thousands of years. In fact, while dentine and cementum suffer degradation after death, ancient calculus samples seem to suffer little alteration (Warinner et al. 2015). As many of these particles escape the action of digestive enzymes and microorganisms, hence preserving their features and morphology and thus allowing taxonomic determination, it is possible to identify the plants that were consumed.

Activities other than feeding can also leave remains in the dental calculus. It can happen, for example, when the teeth are used as tools to hold, scrape, soften, and break plant material to produce artifacts such as baskets, nets, tapestry, and so on (Hardy et al. 2009; Boyadjian et al. 2016; Radini et al. 2017). But besides plant remains, fragments of animal tissues and hair, sponge spicules, diatoms, parasites, bacteria from the oral microbiome, and others can also become preserved and identified (Fig. 2). Potentially, everything that was inside somebody's mouth can be detected through its traces left in the dental calculus.

Thus, the analysis of the dental calculus content is a powerful tool for dietary reconstruction but also provides data for environmental studies and for the investigation of other aspects of life in the past, including evidence of medicinal use of plants, artifact production, food preparation processes, inhaled or unconsciously ingested

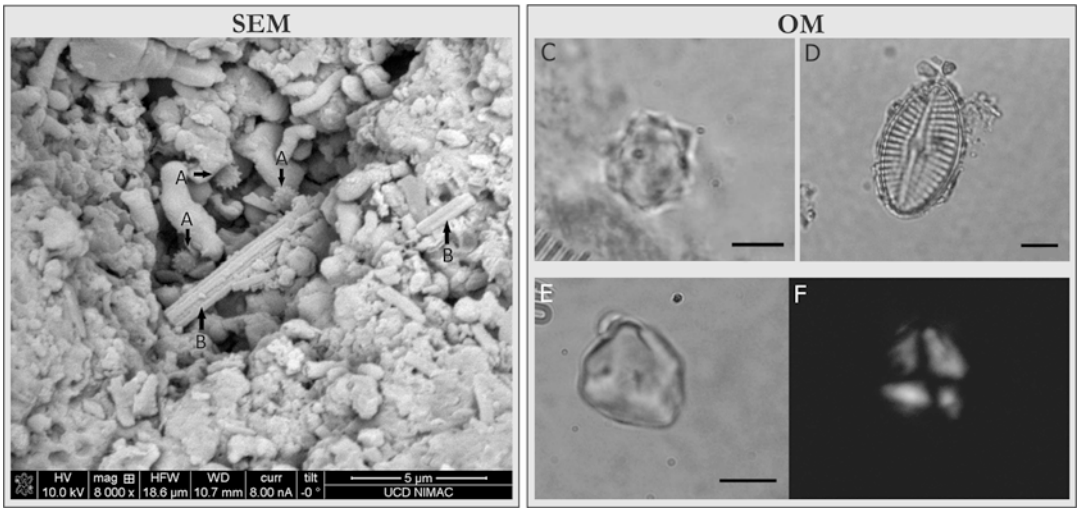

Plant Micro-remains in Dental Calculus, Fig. 2 Examples of micro-remains that can be found in dental calculus: SEM image showing pollen grains (**A**) and sponge spicules (**B**) trapped in a calculus fragment from Camino del Molino, Spain. OM pictures from a phytolith (**C**), a diatom (**D**), and a starch grain (**E** and **F**) recovered from calculus samples from Jabuticabeira II, Brazil. (Scale bars from OM pictures are 10 µm. SEM picture reproduced from: Power et al. 2014)

material, sources of potable water and aquatic resources, and health conditions.

Processing and Analysis

There are various protocols for the microscopic analysis of dental calculus contents. Most of them consist of the decalcification of the calculus matrix in order to release the trapped microparticles and permit their proper visualization. However, there is still no consensus on which protocol is the most appropriate because of (a) differences in the nature of the samples themselves, which makes necessary the adaptation of the protocols for each site, and (b) the remaining gaps in our understanding about calculus formation and the incorporation and preservation of the microparticles.

Thus, different methods have been tested to evaluate, for example, what type of information this material is able to provide or the potential damage each technique has on the micro-remains or the teeth. Examples of methodological tests can be found in the literature (Lalueza Fox et al. 1996; Boyadjian et al. 2007; Henry and Piperno 2008; Hardy et al. 2009; Wesolowski et al. 2010; Power et al. 2014, 2015b; Leonard et al. 2015; Tromp et al. 2017).

Before being extracted from the teeth, the dental calculus deposits should be photographed, and its characteristics (such as extent and location) should be registered according to established methods (Dobney and Brothwell 1987) to prevent loss of information that can be important for bioanthropological studies.

Then, with sterilized curettes, calculus fragments are detached carefully in order to not damage the teeth surface. The fragments are collected, weighed, and transferred to sterile microcentrifuge tubes where they will be decalcified. Hydrochloric acid (HCl) is most commonly used for decalcification, but other chemicals such as EDTA (as described below) have also been tested.

Depending on the type and concentration of the solution used, the decalcification can take from a few minutes to days. When completed, the samples are centrifuged, and the supernatant is discarded. Distilled or ultrapure water is added, the samples are homogenized and centrifuged, the supernatant is discarded again, and these steps are repeated a few more times before the pellet is used to mount the microscope slides. Ethylic or isopropyl alcohol can be added to the precipitate so the samples can be stored before the analysis (Boyadjian et al. 2007; Wesolowski et al. 2010; Tromp and Dudgeon 2015). The final residue can also be dried at 40 °C to be weighed before mounting (Madella et al. 2014). Details on different protocols and steps not described here can be found elsewhere (Lalueza Fox et al. 1996; Henry and Piperno 2008; Hardy et al. 2012, 2017; Afonso-Vargas et al. 2015; Leonard et al. 2015; Weber and Price 2015; Power et al. 2015b).

When the calculus deposits are too faint to be mechanically detached, an alternative technique called "dental wash" was proposed (Boyadjian et al. 2007). It consists of the immersion of the tooth crowns into a weak solution of HCl (4%) to dissolve the remaining calculus, releasing the microparticles. Although the method efficiently recovers micro-remains and provides similar results to those obtained with the regular treatment, it can severely damage the teeth and should be avoided (Boyadjian et al. 2007).

There has also been concern about undesired effects of the HCl. It is suspected that it could damage remains like starch grains, which are a priori more fragile, preventing their identification and even detection. Considering this, methods that are supposedly less destructive have also been proposed. Some of them even exclude the decalcification. The calculus can be scraped off of the teeth directly onto the slide and mounted to be analyzed immediately (Piperno and Dillehay 2008). Alternatively, calculus fragments can be transferred to microtubes with glycerol and gently macerated (Power et al. 2014, 2015a). These methods can be challenging, however, because dense calculus fragments can prevent the proper visualization of some of the micro-remains (they can "hide" inside or behind chunks of calculus matrix). Also, when mounting the samples, large calculus particles can make it difficult to correctly place the coverslip on the slide.

More recently, the use of EDTA was proposed as an alternative to HCl for the calculus decalcification (Tromp et al. 2017), based on a protocol established for aDNA extraction (Warinner et al.

2015). The calculus fragments are immersed in a solution of EDTA 0.5 M and are left overnight in a rotator/nutator. If the decalcification is not efficient after that, the remaining big fragments should be crushed with a micro-pestle before proceeding. The samples are then left in the EDTA solution and periodically checked until decalcified. Similarly to the HCl protocols, the samples are then centrifuged, the supernatant is removed, and the pellet is rinsed with ultrapure water. This process is repeated three times.

Tromp and colleagues (2017) have tested both solutions with calculus samples equally subdivided and have recovered more micro-remains, especially starch, from the ones treated with EDTA. They suggested that the higher efficiency of the EDTA could be related to a gentler decalcification when compared to the HCl, what would be less damaging for the microparticles. However, there are studies that tested the effects of native (modern and archaeological) starch grains exposure to a low concentration of HCl at room temperature and did not find damage (Henry and Piperno 2008; Leonard et al. 2015). In any case, the authors argue that more tests are required to better compare both methods, but they suggest the use of EDTA when the microscopic analysis is associated with genomic and proteomic analysis (Tromp et al. 2017).

After the processing, the final solution obtained from each calculus sample proceeds to a typical micro-botanical analysis. Microscope slides are mounted with an aliquot of the solution and a drop of a mounting medium that permits the rotation of the micro-remains, which is essential for their description and identification. Glycerol is commonly used because its refractive index allows for the observation, in the same slide, of different types of microparticles. The amount of solution and glycerol mounted on each slide varies depending on the protocol and the amount of solution obtained after the extraction, but they should be transferred to the slides preferably with a micropipette for more precision.

The material mounted is covered with a glass coverslip, and its edges are sealed (usually with nail polish) to avoid dehydration. The slide is then analyzed with a transmitted light microscope equipped with polarized filters because the birefringence is an important feature of some particles, especially starch grains. It is scanned under 200x magnification to detect the micro-remains, which are then documented under 400x or 630x magnification for description, identification, and counting. Microparticles are described according to international codes (Madella et al. 2005; ICSN 2011) and classified into morphotypes based on shared morphometric attributes. The types observed are compared with micro-remains from reference collections of modern and/or archaeological plants securely identified and pictures and descriptions available on published literature. Identification keys and classification systems of microparticles from the studied region are consulted when available. Whenever possible, the micro-remains are assigned to plant part and taxon (species, genus, tribe, or, at least, family).

It is also possible to use scanning electron microscopy (SEM) instead of optical microscopy (OM) to analyze the dental calculus contents. Some studies combined both.

The preparation of each sample for the SEM usually consists of mounting on a stub followed by coating with gold or carbon "to prevent surface charging by the electron beam" (Power et al. 2014). Before preparing the samples, some research groups also perform the decalcification of the calculus fragments. Details on the SEM analysis of calculus can be obtained in the literature (Dobney and Brothwell 1988; Lalueza Fox et al. 1996; Dudgeon and Tromp 2012; Power et al. 2014, 2015a; Tromp and Dudgeon 2015).

Compared to the OM, the SEM has a higher depth of view and is particularly useful for the examinations of particles like phytoliths or diatoms, where the details of the surface are important (Dudgeon and Tromp 2012). These remains, unlike starch grains, do not require the examination of internal diagnostic features for classification and identification. On the other hand, to detect starch grains trapped in calculus, the use of SEM-EDX for elemental testing was proposed (Power et al. 2014). However, scanning electron microscopes are not always available; the analysis can be costly and time-consuming. For a more detailed discussion on the suitability of the SEM for the dental calculus

analysis, please see research by Dudgeon and Tromp (2012) and Power et al. (2014).

Contamination Considerations

The possibility of contamination of archaeological samples by particles from the modern environment, especially starches, is a matter of concern (e.g., Haslam 2004; Crowther et al. 2014). The mineralized matrix of the dental calculus deposits protects its contents; however, contamination of samples during their processing in the laboratory is possible. For this reason, from the calculus removal from teeth to the preparation of slides, all the steps of the protocol used should be performed in the cleanest conditions possible.

The calculus treatment should be performed in a controlled environment, ideally a positive-pressure laminar flow hood inside a clean room facility with sealed windows, controlled airflow, and restricted access. However, this type of lab is not always available. In any case, it is very important to thoroughly clean the lab surfaces and tools used and perform control tests periodically. The benches and tools can be cleaned with chemical solutions that are capable of destroying the contaminants, like sodium hydroxide (caustic soda). Non-disposable tools can also be autoclaved or boiled. Every item, from the soap used to clean tools and glassware, to the microscope slides, should be tested for contaminants. Protocols for the cleaning and detection of contaminants in the lab used for micro-botanical analysis can be found in the literature (e.g., Crowther et al. 2014; Henry et al. 2014; Power et al. 2015a, b).

The surface of the calculus deposits, and the teeth where they are attached, should ideally be cleaned before the removal of the samples. This prevents contamination by micro-remains not only from the environment but also from the sediment from the site, which can still be attached to the teeth. Thus, it is important to collect samples of sediment, either adjacent to the tooth or directly from the site, to perform comparative analysis (Middleton and Rovner 1994). New soft toothbrushes (one for each sample) and distilled or ultrapure water are used for the cleaning (Middleton and Rovner 1994). Some authors also apply a gentle chemical pre-treatment on the already detached calculus fragments to eliminate superficial contamination (Hardy et al. 2012; Tromp et al. 2017).

During the processing of each batch of calculus samples, it is advisable to include negative controls (Wesolowski et al. 2010; Tromp et al. 2017). They must be processed and analyzed the same way the calculus fragments are, to verify possible contaminants that can enter the experimental samples during any step of the protocol.

Key Dental Calculus Studies

There are many interesting studies published on the microscopic analysis of dental calculus. Some examples are presented below.

Early Hominins

Some of the key researches on plant micro-remains from calculus were applied to the study of early hominins. They were undertaken to investigate the feeding ecology of *A. sediba*, a fossil from South Africa dated from ca. 2 Myr ago (Henry et al. 2012) and the diet and habits of one of the oldest (*ca* 1.2 Myr) hominins from Europe (Hardy et al. 2017). However, most were carried out with Neanderthals (e.g., Henry et al. 2011, 2014; Hardy et al. 2012). Some of these studies also combined the examination of calculus micro-remains with other types of analysis.

Henry and collaborators (2011) were the first group to publish a study of this nature with Neanderthals. They analyzed samples from caves from Iraq and Belgium and were able to recover phytoliths and an abundance of starch grains as direct evidence of diet. Their data demonstrated that those Neanderthals probably consumed a variety of plant foods, including items that are common in recent diets and items that are costly to exploit, like grass seeds, contradicting the idea that they were mainly "meat-eaters" with a restricted "menu" (Henry et al. 2011). They also reported starch with signs of damaging from cooking, showing that those groups also processed some of the plants they ate, increasing their nutritional quality. Thus, the authors argue that the dietary adaptations that were believed to have been developed by early modern humans in

fact already existed by the Late Middle Paleolithic.

Later the authors expanded their analysis comparing the data obtained (starch and phytoliths) from calculus and lithic instruments from 30 populations of Neanderthals and early modern humans from Europe, Africa, and the Near East (Henry et al. 2014). They examined 209 samples and performed quantitative and qualitative analysis in the biggest large-scale sampling strategy to date for this type of study. Their data indicates that "both species consumed a similarly wide array of plant foods" and the dietary ecology of Neanderthals was more complex than previously thought (Henry et al. 2014).

Another example is the research carried out on samples from Neanderthals from El Sidrón Cave, Spain (Hardy et al. 2012). This research was the first to perform the analysis of chemical compounds from dental calculus and also to combine it with the morphological examination of microparticles (using SEM and OM techniques). From the microscopic analysis, they obtained mostly starches (only one phytolith), indicating the consumption of starchy food. From the chemical compounds of some samples, they obtained evidence of the ingestion of cooked carbohydrates and of wood-fire smoke inhalation. This, together with the starches with sings of cooking that were found, was interpreted as food preparation with fire and repeatedly exposure to wood smoke. The chemical compounds also indicated the ingestion of non-nutritional plants (such as yarrow and chamomile), which was interpreted as being deliberately consumed as medicine (Hardy et al. 2012).

Food Production

Going further on dietary investigation, some studies have also discussed the subsistence patterns of pre-agrarian populations, the early use of major food crops, and the beginnings of food production in different regions of the world through data from dental calculus (e.g., Piperno and Dillehay 2008; Mickleburgh and Pagan-Jimenez 2012; Chinique de Armas et al. 2015; Madella et al. 2014).

Piperno and Dillehay (2008), for example, analyzed micro-remains from dental calculus from sites of the Ñanchoc Valley, Northern Peru. Their data indicated that, by approximately 8000 year BP, there were effective food production systems in the region and the diet was diverse and stable and already included important cultivated plants from the late Andean agriculture (squash, peanuts, beans, and inga). Intriguingly, they did not find phytoliths in their samples, just starch grains. This was attributed to "the fact that the plants evidenced on the teeth and many others that were potentially available in the study region do not produce phytoliths in their edible parts" (Piperno and Dillehay 2008).

In Brazil, Wesolowski et al. (2010) published a very detailed methodological study, the first with a larger sample size compared to what was typically analyzed at the time. They worked with samples from archaeological sites known as *sambaquis*, the Brazilian shell mounds, from different periods from the Holocene and found an abundance of micro-remains, mostly starch and phytoliths, but also micro-charcoal and mineral particles. They noticed that starch was the most abundant microparticle and was present in all samples. Some of the grains were also damaged which, together with the presence of micro-charcoal, was suggested as evidence of food preparation practices. However, they did not discard the possibility that the charcoal fragments were the result of contamination.

It is currently accepted that the subsistence of the *sambaqui* groups was heavily dependent on fish (and complemented with shellfish), and until recently, the information about plant use was very limited. This research, together with data from the study of Boyadjian et al. (2016), has provided essential direct evidence of the plants that were eaten, and possibly cultivated, by Brazilian shell mound builders, reinforcing the results of the pioneer anthracological studies by Scheel-Ybert that demonstrated the importance of plants in their daily life (see chapter "▶ Landscape and Plants Use in Brazilian Shell Mounds" for a detailed discussion on this subject).

In another example from the Neotropics, Mickleburgh and Pagan-Jimenez (2012) studied starchy food consumption in the pre-Columbian insular Caribbean. They were interested in

investigating the use of cultigens by precontact groups in the region, and their data confirmed the importance of maize for these populations. Additionally, the authors of the study found starch grains with signs of damage and argued that maize was consumed ground and baked as bread. Other plants were also identified, indicating that the diet was broad, with a variety of root crops as staples, and varied locally (Mickleburgh and Pagan-Jimenez 2012).

Outside of the Americas, Madella and colleagues (2014) investigated the use of plants by Neolithic communities from the Nile Valley whose economy was supposedly pastoral. The knowledge about the processes related to the transition to agriculture in the region was restricted because of the scarcity of direct data on plant macro-remains. However, the authors reported starch grains and phytoliths from the calculus samples analyzed from two cemeteries from Central and Northern Sudan. They also recovered phytoliths from pillow-like structures that were found behind the skull inside the graves.

Their data indicated that these groups were consuming Near East domestic cereals such as wheat/barley, millets, and wild local grasses, legumes, and non-identified starchy plants, including probably local tubers. They also systematically used grass inflorescences as grave goods. Despite being considered mainly pastoralists, theses societies exploited a variety of plant resources and cultivated cereal crops. The evidence also indicates that Near East domestic cereals were available in Northern Africa earlier than previously thought, confirming "an earlier spread of the Near East type of agriculture towards the South" (Madella et al. 2014).

Dental calculus studies focused on diet, and investigation of plant-based subsistence strategies and development of agriculture were also undertaken on Asian archaeological sites. Tao and colleagues (2015), for example, carried out this type of research on Gouwan, a site in the Yellow River Valley, China, also from the Neolithic (Yangshao period: 5000–3000 BC). The data from the starch grains recovered by them indicated that a variety of plants, including not only domestic cereals but also wild gathered plants, were consumed. Apart from millet and possibly rice, they recovered starch from roots and tubers, wild grasses from the wheat tribe, acorns, and job's tears, plants that were not present among the macro-botanical remains recovered in previous studies.

In the middle Yellow River basin, the economy pattern was millet agriculture (Tao et al. 2015). In fact, the evidence of millet and rice from the calculus samples and from the macro-remains record points to cereal cultivation in Gouwan site. However, the low frequency and density of charred cereal remains and previous data from stable isotopes, together with the presence of micro-remains from gathered plants from the study of Tao et al. (2015), suggest that millet agriculture was not the basis of the economy in Gouwan. The authors argue that the role of gathered plants during the Yangshao period, when the agriculture was already developing, should be reconsidered.

Animals and Modern Samples

Recently, interest in the analysis of plant remains from ancient nonhuman animal calculus was renewed, but the researches are not only focused on phytoliths and have a different approach from the pioneer studies (e.g., Power et al. 2015b; Weber and Price 2015).

For example, Weber and Price (2015) show the potential that dental calculus analysis has on the understanding of past human-animal interaction. They investigated ancient pig husbandry through the analysis of dietary remains from samples from Mesopotamian sites (from tenth to third Millennium BC), the region where this animal was first domesticated. The data from starch grains and phytoliths showed that the pigs were eating domestic cereals, grasses, wild tubers, and acorns. They also reported the presence of damaged cereal starch in the samples of the sixth millennium pigs and some wild boars, indicating they were eating processed and cooked food from household refuse. This data is evidence of a dietary shift of pigs at this period and of close association between wild boars and human settlements in the Neolithic (Weber and Price 2015).

Lately, modern samples from both humans and other animals were also included in the studies of

plant micro-remains from calculus. The aim of these studies was to examine samples obtained from groups with a well-documented diet, to verify how precisely the food consumed is represented by these remains.

Leonard and colleagues (2015) analyzed samples from a living population of forager-horticulturalists from Namibia and were the first group to test how well the phytoliths and starch grains from calculus can reflect the plant foods eaten. They found out that, while the micro-remains can give a good idea of the plant consumption of the population as a whole, they do not precisely represent the diet of each individual. They noticed a lot of individual variation in the plants represented by the micro-remains, which they believe is related to differences among individuals in the calculus formation and, thus, in the preservation of micro-remains.

The authors also argue that the analysis of micro-remains from dental calculus works well for identifying specific plant *taxa* in the diet but is not adequate for investigating the intensity of consumption. For example, while maize was intensively consumed by the population, maize starch was present in only 30% of samples (Leonard et al. 2015). In the case of maize, they believe it could be partially explained by food processing which would have heavily damaged the starch grains, reducing their abundance and thus its presence in the calculus record.

In another research, microparticles from dental calculus of modern chimpanzees were studied as a model for understanding diet and events of life history (Power et al. 2015b). The team aimed to investigate the capacity of calculus to capture diet composition by analyzing samples from individuals with a long-term behavior documentation (over 20 years of records).

The authors noticed that, in contrast to what was reported previously in some studies on human calculus, the phytoliths are abundant in the chimpanzee's samples. They attributed this to the differences in the diet of both species and the nature of the samples (they are modern and, supposedly, less affected by diagenesis). On the other hand, starch grains were underrepresented. According to their data, the micro-remains from dental calculus represent a "long-term dietary signal" and can provide interesting insights into diet, behavior, and life history. They also conclude that the phytolith abundance in the calculus reflects the dietary breadth of the chimpanzees, but the starch record is more uncertain.

Other Micro-remains

Besides microparticles from plants, the dental calculus deposits contain other types of debris from many different sources. These botanical and non-botanical remains can come from the food itself, but they can also be unconsciously ingested together with food and water. They can also become trapped in the calculus after being inhaled or during different activities such as oral hygiene and the use of the teeth as tools. A few examples of non-botanical remains that can be found in calculus are presented below, but for more details on non-dietary debris, see Radini et al. 2017.

Interested in the subsistence practices of the ancient Rapanui, Dudgeon and Tromp (2012) studied micro-remains from calculus of skeletons (dated between AD 1330 and 1900) from different regions of the Easter Island. They focused on the biogenic silica, reporting a huge amount of phytoliths and diatoms, something unusual for most studies (Dudgeon and Tromp 2012). Since they analyzed a large sample (114 in total), they were able to statistically test the micro-remains' distribution by age, sex, dental element, and geographic region of the skeletons but did not find significant differences by age, sex, and dental element. The proportion of diatoms, however, was significantly higher in the samples from the southern region of the island, and the authors believe it could be related to the access to different sources of drinking water.

Almost 95% of the phytoliths found were palm phytoliths. However, the presence of so many palm remnants in the calculus of the analyzed individuals could not be successfully explained mainly because it seems that the species of palm native to the island was nearly extinct when they were alive (Dudgeon and Tromp 2012). To understand this result, they published a second study, this time also interested in starch grains (Tromp

and Dudgeon 2015). The starch grains recovered were consistent with sweet potato, and palm starch was not found. The authors argue that the skin of sweet potato can incorporate phytoliths available in the soil during the roots development. So, the phytoliths detected in the calculus were interpreted as remains left by the consumption, not of palms, but of sweet potato that grew in the soil where the extinct native palms had previously grown.

Their research is interesting because it was one of the few calculus studies to use a large-scale sampling strategy. Also, although other studies had previously reported diatoms in dental calculus (e.g., Middleton and Rovner 1994; Boyadjian et al. 2007), they were the first to propose interpretations based on this class of remain. Later, Boyadjian and colleagues (2016) were the first to perform the taxonomic identification of diatoms from calculus. They identified five types of diatoms found in samples from a Brazilian coastal shell mound, and through this finding, they were able to support the hypothesis that the aquatic resources consumed by the group was obtained in the paleolagoon near the site, not in the open sea.

Fungal spores are another example of non-botanical remains that can be recovered from dental calculus. During the 2000s, Afonso-Vargas performed methodological tests and applied the developed protocols on calculus samples from precontact and historical sites from the Canary Islands (Afonso-Vargas et al. 2015). Interestingly, besides plant remains, an abundance of fungal spores were found in samples from two individuals from the historical site.

Recently, his findings were reconsidered aiming for the identification of the spores, and the data indicated that they came from a parasitic corn fungus (Afonso-Vargas et al. 2015). Comparing the results obtained from the calculus with the data from sediment samples from the site where the remains were buried, the hypothesis that the spores were result of contamination was ruled out. Additionally, the identification of the spores, together with the data from starch and phytoliths, enabled them to conclude that the consumption of corn increased during the eighteenth century, bringing dietary changes to the population of the island.

Fungal remains were also reported in a microscopic study of calculus from El Mirón Cave, a site from the Magdalenian period in Cantabria, Spain (Power et al. 2015a). The analysis indicated that they originated from species that produce mushrooms and could represent its intentional ingestion (Power et al. 2015a). In fact, the authors noticed a much more diverse micro-remains assemblage in their calculus samples than usually reported for other contexts, including fungi, plant (starch, phytoliths, and unsilicified fragments), animal, and mineral remains. Other studies show that the Cantabrian Magdalenian diet depended on animal foods, but these findings reveal other components of the dietary spectrum in El Mirón (Power et al. 2015a). According to the authors, this points to a mixed subsistence pattern, where the consumption of animal resources was complemented by various plant foods (including seeds and underground storage organs) and potentially mushrooms.

Future Directions

In addition to the microscopic analysis, other techniques have been recently developed for accessing the dental calculus contents: stable isotope studies, analysis of chemical compounds, and studies of proteins and DNA. Although the first one is still controversial (Salazar-García et al. 2014), the other techniques have been applied to different contexts and have brought very interesting results about diet, food processing, medicinal use of plants, evolution of the oral microbiome, ancestry, health, and behavior (e.g., Hardy et al. 2012; Warinner et al. 2014, 2015; Weyrich et al. 2015). Combined with the traditional methods, they are opening an exciting new line of research in archaeology.

The first studies undertaken with these new techniques were published at the beginning of the present decade, and they are very rapidly expanding. Hardy and collaborators (2012) were the first group to explore the use of thermal desorption-gas chromatography-mass spectrometry (TD-GC-MS) and pyrolysis-gas chromatography-mass spectrometry (Py-GC-MS) to characterize organic

compounds from dental calculus samples identifying the sources of these compounds. As already mentioned in a previous section of this chapter, with this technique they obtained very interesting results about Neanderthal diets and habits, including the first direct evidence of the use of medicinal plants (Hardy et al. 2012).

Another example is the research by Buckley and colleagues (2014). Interested in investigating the use of plants by pre-agrarian and agrarian groups and the ecological knowledge in prehistoric times, they carried out a combined study of chemical compounds and micro-remains from calculus samples from Al Khiday, a Central Sudanese site. Since this is a multi-period site in the Sahara region, they were also able to verify the long-term preservation of calculus contents in an extreme climate but did not find differences.

They were not able to identify most of the starch grains found. However, evidence from the chemical analysis indicated that *Cyperus rotundus*, a carbohydrate-rich plant that can also be used as medicine, was consumed during the pre-agricultural and agricultural periods of the site. The authors show that, despite being currently considered one of the world's worst weeds, it was an important food item for different cultures around the world and was also broadly used for non-nutritional purposes. Also, since this plant has the ability to inhibit *S. mutans*, the unexpected low caries prevalence reported during the agricultural period could be explained by its use (Buckley et al. 2014). They also find evidence of smoke inhalation in all the samples analyzed for chemical compounds, indicating the use of fire during all periods of occupation of the site. Cooking by roasting and heating in water were also proposed. Finally, fibers, possibly from the stem of monocots, were also found, indicating that the groups from Al Khiday could have used the teeth as tools to process plant material.

The analysis of ancient DNA (aDNA) and proteins from dental calculus has been applied only during the last few years. It has already provided remarkable data about diet and health, but there are still unexplored applications with the potential to bring outstanding results for archaeology and paleoanthropology (Weyrich et al. 2015).

Warinner and collaborators (2014) published one of the first studies of this nature. They carried out shotgun DNA sequencing on samples from individuals with severe periodontal disease from a medieval site from Germany and modern samples of individuals with non-dental history. They were able to characterize 40 opportunistic pathogens involved in oral pathologies as well as systemic diseases and also detected antibiotic-resistant genes, showing that they were present in the human microbiome before the use of these medicines. They also reconstructed the genome of an important periodontal pathogen and showed that the "red complex pathogens" were already associated with the periodontal disease since the Middle Ages.

The authors of the research also obtained biomolecular evidence of food resources and validated their findings with other paleodietary studies including micro-remain analysis. They detected boar/pig, wheat, and crucifer, and from the modern samples, they identified a protein from milk. The micro-remain analysis revealed fragments of animal tissue, plant fibers, unidentified phytoliths from monocots, and starch grains from the same taxonomic group as the wheat and from the Fabaceae family. These results show that both methods can be used together to complement dietary data from the same samples.

Final Considerations

The studies described here demonstrate how valuable the dental calculus deposits are. They show how the analysis of its contents can provide interesting insights into different aspects of life in the past, like diet, habits, behavior, health, and technology.

This line of research has particular importance in archaeological contexts where information about plant use is absent or incomplete. Dental calculus provides precious data about sites from which archaeobotanical remains have not been recovered and new excavations are no longer possible, reinforcing the need for optimal osteological material curation in museums. Additionally, the dental calculus analysis has shed light in the

role of plants in the life of early hominins and pre-agrarian populations. It has provided unequivocal evidence of the use and consumption of plants by groups that were previously considered mainly "meat-eaters" (e.g., Henry et al. 2011; Power et al. 2015a; Boyadjian et al. 2016). Apart from diet, the analysis of micro-remains from calculus can reveal evidence of other activities such as food preparation, oral hygiene, and use of the teeth as tools (Radini et al. 2017). It can also reflect the unintentional ingestion of debris from various sources and provides data that can help us understand human-animal interactions (Weber and Price 2015; Radini et al. 2017). Last, but not least, since the micro-remains are protected by the mineralized layers of calculus, it is one of the safest and most reliable sources of information (Power et al. 2014; Hardy et al. 2009). This is firstly because even particles that are organic and normally fragile, like starch grains, can be protected and preserved inside these deposits for thousands of years. But also, since these particles are encapsulated in the calculus matrix, if the samples are processed in controlled conditions in a clean laboratory, the chance of modern contamination is low.

Of course, we have to take into account that, as with any other technique, it has its limitations. For example, the studies with modern samples demonstrated that starch grains and phytoliths from calculus are not precise indicators of the dietary breadth at the individual level, although it is possible to estimate the range of plants in the diet of the population (Leonard et al. 2015; Power et al. 2015b). Also, the dietary reconstruction based solely in phytoliths and starch grains from calculus is limited because these remains are only partially representative (Mickleburgh and Pagan-Jimenez 2012; Leonard et al. 2015; Power et al. 2015b). Plants that do not produce starch and phytoliths will be invisible in the calculus record through this kind of analysis. Even the plants that produce these microparticles are not necessarily represented in the calculus deposits. For example, plants that are intensively consumed but have a low starch content, or plants that are highly processed, causing significant degradation to the starches, might not be represented (Leonard et al. 2015). Thus, it is also problematic to predict the frequency of plant consumption.

In order to have an optimal picture of diet, health and way of life, interdisciplinary studies must be performed. The analysis of micro-remains should be combined with the new techniques developed for the analysis of chemical compounds and biomolecular markers from calculus, as well as with analysis of dental wear, stable isotopes, dental and paleopathologies, and coprolites.

Cross-References

- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Micro-botanical Analysis
- ▶ Bone Chemistry and Ancient Diet
- ▶ Dental Anthropology
- ▶ Landscape and Plants Use in Brazilian Shell Mounds
- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ Paleoethnobotany
- ▶ Phytolith Studies in Archaeology
- ▶ Phytoliths in European Archaeological Research
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Taphonomy of Plant Micro-remains in Environmental Archaeology

References

Afonso-Vargas, J., I. La Serna-Ramos, and M. Arnay-de-la-Rosa. 2015. Fungal spores located in 18th century human dental calculi in the church "La Concepción" (Tenerife, Canary Islands). *Journal of Archaeological Science: Reports* 2: 106–113.

Armitage, P.L. 1975. The extraction and identification of opal phytoliths from the teeth of ungulates. *Journal of Archaeological Science* 2: 187–197.

Boyadjian, C.H.C., S. Eggers, and K. Reinhard. 2007. Dental wash: A problematic method for extracting

microfossils from teeth. *Journal of Archaeological Science* 34: 1622–1628.

Boyadjian, C.H.C., S. Eggers, and R. Scheel-Ybert. 2016. Evidence of plant foods obtained from the dental calculus of individuals from a Brazilian shell mound. In *Wild harvest: Plants in the hominin and pre-agrarian human worlds*, ed. K. Hardy and L.K. Martens, 215–240. Oxford: Oxbow books.

Buckley, S., D. Usai, T. Jakob, A. Radini, and K. Hardy. 2014. Dental calculus reveals unique insights into food items, cooking and plant processing in prehistoric Central Sudan. *PLoS One* 9 (7): e100808. https://doi.org/10.1371/journal.pone.0100808.

Crowther, A., M. Haslam, N. Oakden, D. Walde, and J. Mercader. 2014. Documenting contamination in ancient starch laboratories. *Journal of Archaeological Science* 49: 90–104.

Dobney, K., and D. Brothwell. 1987. A method for evaluating the amount of dental calculus on teeth from archaeological sites. *Journal of Archaeological Science* 14: 343–351.

Dobney, K., and D. Brothwell. 1988. A scanning electron microscope study of archaeological dental calculus. In *Scanning electron microscopy in archaeology*, BAR International Series. ed. S. Olsen, 452: 372–385. Oxford, UK: BAR Publishing.

Dudgeon, J.V., and M. Tromp. 2012. Diet, geography and drinking water in Polynesia: Microfossil research from archaeological human dental calculus, Rapa Nui (Easter Island). *International Journal of Osteoarchaeology* 24: 634–648.

Hardy, K., T. Blakeney, L. Copeland, J. Kirkham, R. Wrangham, and M. Collins. 2009. Starch granules, dental calculus and new perspectives on ancient diet. *Journal of Archaeological Science* 36: 248–255.

Hardy, K., S. Buckley, M.J. Collins, A. Estalrrich, D. Brothwell, L. Copeland, A. Garcia-Tabernero, S. Garcia-Vargas, M. de la Rasilla, C. Lalueza-Fox, R. Huguet, M. Bastir, D. Santamaria, M. Madella, J. Wilson, A.F. Cortes, and A. Rosas. 2012. Neanderthal medics? Evidence for food, cooking, and medicinal plants entrapped in dental calculus. *Naturwissenschaften* 99 (8): 617–626.

Hardy, K., A. Radini, S. Buckley, R. Blasco, L. Copeland, F. Burjachs, J. Girbal, R. Yll, E. Carbonell, and J.M.B. de Castro. 2017. Diet and environment 1.2 million years ago revealed through analysis of dental calculus from Europe's oldest hominin at Sima del Elefante, Spain. *Science Nature* 104: 2. https://doi.org/10.1007/s00114-016-1420-x.

Henry, A.G., and D.R. Piperno. 2008. Using plant microfossils from dental calculus to recover human diet: A case study from Tell al-Raqa'i, Syria. *Journal of Archaeological Science* 35: 1943–1950.

Henry, A.G., A.S. Brooks, and D.R. Piperno. 2011. Microfossils in calculus demonstrate consumption of plants and cooked foods in Neanderthal diets (Shanidar III, Iraq; Spy I and II, Belgium). *Proceedings of the National Academy of Sciences of the United States of America* 108: 486–491.

Henry, A.G., P.S. Ungar, B.H. Passey, M. Sponheimer, L. Rossouw, M. Bamford, P. Sandberg, D.J. De Ruiter, and L. Berger. 2012. The diet of Australopithecus sediba. *Nature* 487: 90–93.

Henry, A.G., A.S. Brooks, and D.R. Piperno. 2014. Plant foods and the dietary ecology of Neanderthals and early modern humans. *Journal of Human Evolution* 69: 44–54.

Hillson, S. 1996. *Dental anthropology*. Cambridge University Press, Great Britain.

ICSN. 2011. *The International Code for Starch Nomenclature*. www.fossilfarm.org/ICSN/Code.html. Accessed Jan 2018.

Jin, Y., and H. Yip. 2002. Supragingival calculus: Formation and control. *Critical Reviews in Oral Biology and Medicine* 13(5): 426–441.

Lalueza Fox, C., J. Juan, and R.M. Albert. 1996. Phytolith analysis on dental calculus, enamel surface, and burial soil: Information about diet and paleoenvironment. *American Journal of Physical Anthropology* 101: 101–113.

Leonard, C., L. Vashro, J.F. O'connell, and A.G. Henry. 2015. Plant microremains in dental calculus as a record of plant consumption: A test with Twe forager-horticulturalists. *Journal of Archaeological Science: Reports* 2: 449–457.

Lieverse, A.R. 1999. Diet and the aetiology of dental calculus. *International Journal of Osteoarchaeology* 9: 219–232.

Madella, M., A. Alexandre, and T. Ball. 2005. International code for phytolith nomenclature 1.0. *Annals of Botany* 96: 253–260.

Madella, M., J.J. Garcia-Granero, W.A. Out, P. Ryan, and D. Usai. 2014. Microbotanical evidence of domestic cereals in Africa 7000 years ago. *PLoS One* 9 (10): 110177. https://doi.org/10.1371/journal.pone.0110177.

Mickleburgh, H.L., and J.R. Pagan-Jimenez. 2012. New insights into the consumption of maize and other food plants in the pre-Columbian Caribbean from starch grains trapped in human dental calculus. *Journal of Archaeological Science* 39: 2468–2478.

Middleton, W.D., and I. Rovner. 1994. Extraction of opal phytoliths from herbivore dental calculus. *Journal of Archaeological Science* 21: 469–473.

Piperno, D.R., and T.D. Dillehay. 2008. Starch grains on human teeth reveal early broad crop diet in northern Peru. *Proceedings of the National Academy of Sciences of the United States of America* 105: 19622–19627.

Power, R.C., D.C. Salazar-García, R.M. Wittig, and A.G. Henry. 2014. Assessing use and suitability of scanning electron microscopy in the analysis of micro remains in dental calculus. *Journal of Archaeological Science* 49: 160–169.

Power, R.C., D.C. Salazar-García, L.G. Straus, M.R.G. Morales, and A.G. Henry. 2015a. Microremains from El Miro n Cave human dental calculus

suggest a mixed plant–animal subsistence economy during the Magdalenian in Northern Iberia. *Journal of Archaeological Science* 60: 39–46.

Power, R.C., D.C. Salazar-Garcia, R.M. Wittig, M. Freiberg, and A.G. Henry. 2015b. Dental calculus evidence of Tai Forest Chimpanzee plant consumption and life history transitions. *Scientific Reports* 5: 15161. https://doi.org/10.1038/srep15161.

Radini, A., E. Nikita, E. Buckley, L. Copeland, and K. Hardy. 2017. Beyond food: The multiple pathways for inclusion of materials into ancient dental calculus. *American Journal of Physical Anthropology* 162: 71–83.

Reinhard, K.J., S.F.M. Souza, C. Rodriguez, E. Kimmerle, and S. Dorsey-Vinton. 2001. Microfossils in dental calculus: A new perspective on diet and dental disease. In *Human Remains: Conservation, retrieval and analysis*, ed. E. Williams, 113–118. Oxford: British Archaeological Report S934.

Salazar-García, D.C., M.P. Richards, O. Nehlich, and A.G. Henry. 2014. Dental calculus is not equivalent to bone collagen for isotope analysis: A comparison between carbon and nitrogen stable isotope analysis of bulk dental calculus, bone and dentine collagen from same individuals from the Medieval site of El Raval (Alicante, Spain). *Journal of Archaeological Science* 47: 70–77.

Tao, D., J. Zhang, W. Zheng, Y. Cao, K. Sun, and S. Jin. 2015. Starch grain analysis of human dental calculus to investigate Neolithic consumption of plants in the middle Yellow River Valley, China: A case study on Gouwan site. *Journal of Archaeological Science: Reports* 2: 485–491.

Tromp, M., and J.V. Dudgeon. 2015. Differentiating dietary and nondietary microfossils extracted from human dental calculus: The importance of sweet potato to ancient diet on Rapa Nui. *Journal of Archaeological Science* 54: 54–63.

Tromp, M., H. Buckley, J. Geber, and E. Matisoo-Smith. 2017. EDTA decalcification of dental calculus as an alternate means of microparticle extraction from archaeological samples. *Journal of Archaeological Science: Reports* 14: 461–466.

Warinner, C., J.F.M. Rodrigues, R. Vyas, C. Trachsel, N. Shved, J. Grossmann, A. Radini, Y. Hancock, R.Y. Tito, S. Fiddyment, C. Speller, J. Hendy, S. Charlton, H.U. Luder, D. Salazar-Garcia, E. Eppler, R. Seiler, L.H. Hansen, J.A. Samaniego Castruita, S. Barkow-Oesterreicher, K.Y. Teoh, C.D. Kelstrup, J.V. Olsen, P. Nanni, T. Kawai, E. von Willerslev, C. Mering, C.M. Lewis Jr., M.J. Collins, M.T.P. Gilbert, F. Rühli, and E. Cappellini. 2014. Pathogens and host immunity in the ancient human oral cavity. *Nature Genetics* 46: 336–344. https://doi.org/10.1038/ng.2906.

Warinner, C., C. Speller, and M.J. Collins. 2015. A new era in palaeomicrobiology: Prospects for ancient dental calculus as a long-term record of the human oral microbiome. *Philosophical Transactions Royal Society B* 370: 20130376.

Weber, S., and M.D. Price. 2015. What the pig ate: A microbotanical study of pig dental calculus from 10th– 3rd millennium BC northern Mesopotamia. *Journal of Archaeological Science* 6: 189–827.

Wesolowski, V., S.M. Ferraz Mendonca de Souza, K.J. Reinhard, and G. Ceccantini. 2010. Evaluating microfossil content of dental calculus from Brazilian sambaquis. *Journal of Archaeological Science* 37: 1326–1338.

Weyrich, L.S., K. Dobney, and A. Cooper. 2015. Ancient DNA analysis of dental calculus. *Journal of Human Evolution* 79: 119–124. https://doi.org/10.1016/j.jhevol.2014.06.018

Further Readings

Adler, C.J., K. Dobney, L.S. Weyrich, J. Kaidonis, A.W. Walker, W. Haak, C.J.A. Bradshaw, G. Townsend, A. Sołtysiak, K.W. Alt, J. Parkhill, and A. Cooper. 2013. Sequencing ancient calcified dental plaque shows changes in oral microbiota with dietary shifts of the Neolithic and industrial revolutions. *Nature Genetics* 45: 450–455.

Asevedo, L., G.R. Winck, D. Mothé, and L.S. Avilla. 2012. Ancient diet of the Pleistocene gomphothere Notiomastodon platensis (Mammalia, Proboscidea, Gomphotheriidae) from lowland mid-latitudes of South America: Stereomicrowear and tooth calculus analyses combined. *Quaternary International* 255: 42–52.

Barton, H., and R. Torrence. 2015. Cooking up recipes for ancient starch: Assessing current methodologies and looking to the future. *Journal of Archaeological Science* 56: 194–201.

Blatt, S.H., B.G. Redmond, V. Cassman, and P.W. Sciulli. 2011. Dirty teeth and ancient trade: Evidence of cotton fibres in human dental calculus from Late Woodland, Ohio. *International Journal of Osteoarchaeology* 21: 669–678.

Boyadjian, C.H.C., and S. Eggers. 2014. Micro-remains trapped in dental calculus reveal plants consumed by Brazilian shell mound builders. In *The cultural dynamics of shell-matrix sites*, ed. M. Roksandic, M. Burchel, S. Eggers, D. Klökler, and S. Mendonça de Souza, 279–288. Albuquerque: University of New Mexico Press.

Brothwell, D.R. 1981. *Digging up bones*. 3rd ed. Ithaca: Cornell University Press.

Buck, L.T., and C.B. Stringer. 2014. Having the stomach for it: A contribution to Neanderthal diets? *Quaternary Science Reviews* 96: 161–167.

Charlier, P., I. Huynh-Charlier, O. Munoz, M. Billard, L. Brun, and G.L.D.L. Grand-maison. 2010. The microscopic (optical and SEM) examination of dental calculus deposits (DCD). Potential interest in forensic anthropology of a bio-archaeological method. *Legal Medicine* 12: 163–171.

Chinique de Armas, Y., W.M. Buhay, R. Rodríguez Suarez, S. Bestel, D. Smith, S.D. Mowat, and M. Roksandic. 2015. Starch analysis and isotopic evidence of consumption of cultigens among fisheregatherers in Cuba: The archaeological site of Canímar Abajo, Matanzas. *Journal of Archaeological Science* 58: 121–132.

Cristiani, E., A. Radini, M. Edinborough, and D. Bori. 2016. Dental calculus reveals Mesolithic foragers in the Balkans consumed domesticated plant foods. *Proceedings of the National Academy of Sciences of the United States of America* 113 (37): 10298–10303.

De La Fuente, C., S. Flores, and M. Moraga. 2013. DNA from ancient human bactéria: A novel source of genetic evidence from archaeological dental calculus. *Archaeometry* 55 (4): 766–778.

Gobetz, K.E., and S.R. Bozarth. 2001. Implications for late Pleistocene mastodon diet from opal phytoliths in tooth calculus. *Quaternary Research* 55: 115–122.

Haslam, M. 2004. The decomposition of starch grains in soils: Implications for archaeological residue analyses. *Journal of Archaeological Science* 31: 1715–1734.

Hillson, S. 1979. Diet and dental disease. *World Archaeology* 11: 147–162.

Horrocks, M., M.K. Nieuwoudt, R. Kinaston, H. Buckley, and S. Bedford. 2013. Microfossil and fourier transform InfraRed analyses of Lapita and post-Lapita human dental calculus from Vanuatu, Southwest Pacific. *Journal of the Royal Society of New Zealand* 44: 17–33.

Kucera, M., D. Pany-Kucera, C.H. Boyadjian, K. Reinhard, and S. Eggers. 2011. Efficient but destructive: A test of the dental wash technique using secondary electron microscopy. *Journal of Archaeological Science* 38: 129–135.

Lazzati, A.M.B., L. Levrini, L. Rampazzi, C. Dossi, L. Castelletti, M. Licata, and C. Corti. 2016. The diet of three medieval individuals from Caravate (Varese, Italy). Combined results of ICP-MS analysis of trace elements and phytolith analysis conducted on their dental calculus. *International Journal of Osteoarchaeology* 26: 670–681.

Li, M.Q., X.Y. Yang, H. Wang, Q. Wang, X. Jia, and Q. Ge. 2010. Starch grains from dental calculus reveal ancient plant foodstuffs at Chenqimogou site, Gansu Province. *Science China: Earth Sciences* 53: 694–699. https://doi.org/10.1007/s11430-010-0052-9.

Musaubach, M.G. 2012. Potencialidad de estudios arqueobotânicos sobre tartaro dental de cazadores recolectores de la provincia de La Pampa, Argentina. *Revista Argentina de Antropologia Biologica* 14: 105–113.

Piperno, D.R. 2006. *Phytoliths: A comprehensive guide for archaeologists and paleoecologists*. Lanham: AltaMira Press.

Reinhard, K.J., and V.M. Bryant Jr. 2008. Pathoecology and the future of coprolite studies. In *Reanalysis and reinterpretation in southwestern bioarchaeology*, ed. A.W.M. Stodder, 199–216. Tempe: Arizona State University Press.

Scott Cummings, L., and A. Magennis. 1997. A phytolith and starch record of food and grit in Mayan human tooth tartar. In *The state-of-the-art of phytoliths in soils and plants*, ed. A. Pinilla, J. Juan-Tresserras, and M.J. Machado, 211–218. Madrid: Monografías del Centro de Ciencias Medioambientales 4.

Torrence, R., and H. Barton, eds. 2006. *Ancient starch research*. Walnut Creek: Left Coast Press.

Zucól, A.F., and D.M. Loponte. 2008. Comparative analyses of phytolith extraction methods and phytolith abundance in human dental tartar samples from archaeological sites in Buenos Aires province, Argentina. In *Matices interdisciplinarios en estudios fitolíticos y de otros Microfósiles,* BAR International Series S1870, eds. M.A. Korstanje and M.D.P. Babot, 4: 39–45.

Plant Processing Technologies in Archaeology

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Introduction

Agriculturally produced plant seeds, tubers, and stems form the core of food systems for the vast majority of the world's population. Today, as in the past, effective use and consumption of these foods relies on processing technologies. Ever improving archaeological science techniques and improved collection strategies from archaeological sites are greatly increasing the temporal and geographical range of material evidence for past plant processing technologies. A wider frame of ethnographic and experimental reference is also improving the ability of researchers to interpret those traces. The key role of processing technologies in the long-term development of agricultural systems and in the domestication process itself is now well established, and higher-quality evidence from Paleolithic sites is now demonstrating the preagricultural presence of plant food processing in several regions over at least the last

30,000–50,000 years. Evidence now suggests that while processing is important for the evolution and adoption of domesticates, specific technological advances in processing were not the key triggers of domestication itself.

Definition

Plant food processing refers to a wide range of activities that ultimately have one aim: to extract edible foodstuffs from the inedible. Most plant tissues, with the exception of some soft fruits, are not edible or provide at best meager food value to human digestive systems without some form of processing. This includes a large number of foods that are routinely eaten today and are the focus of agricultural production systems around the world, including the edible grains, legumes, and many tubers. Without processing grains pass through the digestive system largely undigested; while without cooking, grinding, or leeching, many forms of legumes (e.g., grass pea (*Lathyrus sativus*) and chickpea (*Cicer arietinum*)) and some tubers (e.g., bitter cassava (*Manihot esculenta*)) are lethal. Inedibility results from a number of protective features of plant physiology and chemistry, in part prompted by evolutionary pressures from potential predators, including humans (Stahl 1984; Jones 2009). Most directly, plants may encase edible parts, such as seeds, in some form of protective coating, such as nutshells or grass-seed husks (chaff), which deter predation. In other cases the deterrent may be chemical compounds, ranging from relatively benign chemicals that reduce digestibility or cause a bitter taste to life-threatening compounds such as the arsenic-containing amygdalins of wild almonds, which poison the consumer (Martinoli and Jacomet 2004). Also of relevance are fibrous structures in plant leaves and stems which may hinder the mastication and digestion of otherwise nutritious plant foods.

While plants are relatively easy to locate and harvest compared to hunted animals, these protective features provide a series of challenges which must be overcome if plants are to make a contribution to the human diet. The solutions require the investment of significant time, energy, and equipment in a wide range of technological responses to the challenges of plant inedibility; they include a range of implements and techniques in many cases forming elements of quite complex multiple-step processing sequences (Hillman 1981; Jones 2009). Harvesting may include simple collection of plant resources from the ground, or more involved use of harvesting devices, such as sickles and digging sticks. Releasing the edible foodstuffs from nutshells, seed coats, husks, or fibers may involve pounding, cutting, or grinding combined with winnowing, sieving, and soaking. Detoxifying foods of chemical compounds may include pounding, leeching toxins with water, grinding, and heating, which may also be employed to break up larger plant structures – such as grass seeds – into smaller more digestible particles, such as grits and flour. Perhaps the best-studied multiple-step processing sequence is that of the Old World cereal crops, which in ancient glume wheat species (e.g., einkorn (*Triticum monococcum*) and emmer (*Triticum dicoccum*)) includes harvesting, threshing to separate the cereal spikelets from the straw, winnowing to remove the chaff, pounding to release the grains from the chaff, and various stages of sieving and hand sorting to remove the weed seeds, straw nodes, and remaining chaff before the grain is milled and eaten. This process can be undertaken using a range of tools and spaces and results in the production of a range of products and by-products which may be identified in archaeobotanical assemblages.

These processing techniques are found in many plant procurement systems, whether using wild resources or domesticates. They leave a range of potential archaeological traces, including the tools used to process the plants, such as grinders, pounders and blades, processing installations and even the residues of the processed plants themselves. The scale and organization of plant processing varies in different societies, depending on their economic emphasis and structure, as reflected in the number, size, and organization of processing facilities. Settlement remains from small-scale societies commonly preserve the remains of grinding stones distributed through

dwellings or in communal areas, such as threshing floors, while urban societies may see the development of specialist processing facilities for production of food (e.g., centralized bakeries as seen in Classical cities) or production of foodstuffs as commodities. Archaeological study of food processing thus illuminates not only nutrition but also the socioeconomic aspects of food production. Only in recent years have archaeologists fully realized the potential of this material archive to allow the study of plant processing systems. Of particular importance in studying plant processing technologies has been the development of plant residue analysis, especially of starches, which has broadened the range of contexts from which plant remains are recovered and greatly expanded the geographical range of those studies, as has the development of high-powered microscopy of tuber and other macrofossil remains.

Key Issues/Current Debates/Future Directions/Examples

It is fair to say that recent decades have seen revolutionary advances in the archaeological *identification of processing technologies and sequences* which have caused major reevaluations of the economic conditions and food systems of past societies. While at one time the function of processing-related artifacts – such as pots, stone tools, and grinders – could only be inferred from sometimes contradictory ethnographic analogues, residue and use-wear analysis are now providing increasingly accurate and widespread tools to identify directly traces of past artifact function. Residue analysis identifies the traces of past use of artifacts and installations through identification of plant, animal, and mineral substances adhering to or absorbed into their surfaces, including starches, phytoliths, and chemical biomarkers. Analysis of starch residues and phytoliths has been particularly effective in identifying plant-related processing tools. In the Asia-Pacific region, such studies have not only demonstrated tuber and seed exploitation 40,000–50,000 years ago (Barton 2005; Summerhayes et al. 2010) – among the earliest in the world – but have confirmed the use of tubers in the independently evolved early agricultural systems of highland New Guinea (Denham et al. 2003) and the evolution of intensive nut exploitation in Holocene Australia (Cosgrove et al. 2007). These examples serve to illustrate the fact that archaeological understandings of plant use in the tropical zone have been disproportionately improved by starch and residue research – a fact that has perhaps gone relatively unnoticed in the traditional Old World centers of archaeobotanical research – in great part because food production systems in the wet tropics are often focused on otherwise poorly preserved tuber, leaf, and fruit crops. Another region which has undergone this revolution is tropical America, which now has a rapidly developing prehistory of crop use supported by microfossil research extending into the earlier Holocene (e.g., Perry et al. 2007).

Use-wear analysis, which aims to identify traces of use via the abrasion patterns found on tools, is a particularly promising area of research for understanding past food technologies. It has been useful for identifying processing artifacts, including both stone blades and grinding stones, though difficulty still persists in unambiguously separating the wear traces from different activities (Goodale et al. 2010). Sickle wear – the glossy sheen on stone blades caused by cutting grasses, including cereals – has long been used as an indicator of cereal use at Natufian and early farming sites, though it is very difficult to separate the harvest of cereals from other grasses, such as reeds. Recent studies of Natufian sites have used experimental references to identify not only an increased focus on plant processing over time but also a great increase in the diversity of processing activities during this period.

Use-wear analysis is strongly dependent on *experimental archaeology* – in which ancient practices are replicated or reconstructed through a controlled series of steps – as a source of analogues. This approach has a long pedigree with pioneering studies by Jack Harlan first demonstrating the potential of wild cereals as a sustainable source of food in Southwest Asia. It also has been of great importance for understanding the techniques and effects of plant food processing

worldwide (see other references in this section). A particularly important set of harvesting experiments established that sickle harvesting positively encouraged the development of domestic traits in Old World cereal crops by selecting for non-shattering crop phenotypes and its introduction could lead to domestication in a few generations (Hillman and Davies 1990). This observation helped refocus archaeobotanical studies on how different crop processing practices could effect and even trigger the trajectories of domestication. Interestingly archaeobotanical studies have demonstrated domestication in seed crops to have actually taken millennia (for a detailed discussion, see Fuller 2007). Beyond Southwest Asia, recent research has used replicative experiments to help identify nut processing techniques from the fracture patterns on the remains of the nuts themselves as a means of testing earlier models of intensive plant exploitation (Asmussen 2010).

Experimental studies have commonly been used in combination with *ethnographic studies*, namely, accounts of actual food processing behavior in societies around the world. Such studies have been important for understanding both the range of food processing techniques and their ubiquity across the occupied continents in very different societies. As noted above, ethnographically informed models of crop processing sequences in Southwest Asia transformed the ability of archaeologists to understand how people processed plant foods in the past by providing the means to directly identify them in ancient datasets and understand some of the variations such processes cause in the archaeobotanical record, thus helping to refine interpretations of harvest and other activities. Such an approach demonstrated that the cultivation of low-return small-seeded grasses in North America may have been adopted as they could be processed in the winter when lack of other tasks meant the return was worthwhile (Gremillion 2004).

More importantly ethnographic and ethnohistorical studies have also extended our knowledge of how foragers utilize and process seeds and other plant resources and have contributed to the *reconceptualization of agricultural origins*. Of special interest are the accounts of foraging behavior in Indigenous Australia, the American northwest, and parts of the Americas, which have shown a close similarity between many "non-agricultural" plant harvesting and processing activities and those of agriculturalists (see papers in Denham et al. 2009a). For example, studies in Australasia demonstrate the relatively late focus on intensive seed and tree-nut exploitation – enabled by the grinding and detoxification of seeds and toxic species – in the case of the Atherton Tablelands within the last 2000 years (Cosgrove et al. 2007). It is increasingly clear that intensive use of seeds, tree nuts, and tubers, including the tending and even replanting of favored food-producing species, as well as storage, detoxification, and grinding, is undertaken by foragers. The distinction between a non-agriculturalist and an agriculturalist is often quite arbitrary and in many cases comes down to the presence or absence of morphologically domestic taxa. This insight is largely derived from work in the Americas, Australia, and parts of Africa and East Asia but has veracity for understanding the transition to sedentary farming lifeways in Southwest Asia and other classic agricultural hearths, where once simple binary transitions from forager to farmer can now be challenged on the basis of ever more detailed archaeological evidence (Zohary et al. 2012).

Within the *narrative of ancient agricultural origins and sedentism*, food processing technologies have a central role. To put it simply, the long-term sustenance of large groups of people living together in a restricted space – as we find in farming societies – in most cases outstrips the capacity of environments to provide it. Sedentary societies are prone to food shortages because they are unable or unwilling to adopt residential mobility as a means of overcoming shortages in foods caused by seasonal cycles of abundance or less predictable factors such as loss due to fire or pests. As noted above, processing techniques are a means of unlocking the nutrients in potential foods that may be available but otherwise unused to thereby increase the dietary potential and – in ecological terms – the effective carrying capacity of those environments. Processing of otherwise inaccessible foods lies at the core of seed-based agriculture in the Old World, China, and parts of the Americas

and Africa and when combined with storability accounts for their prevalence among societies in need of vegetable foods.

Extracting the nutritional value requires considerable energy expenditure in grinding or other forms of processing. The question must arise: why bother? For high-density populous societies such processing of seeds and other crops may be the only means of supplying core calories for people and their animals. For earlier societies, especially late foragers, the question is very pertinent. Recent archaeological research – in great part fuelled by the methods summarized above – has shown that increased reliance on plant processing as a subsistence strategy emerges in the later millennia of the Paleolithic era. We know that nut cracking predates the evolution of *Homo sapiens* – and may be an ancient ancestral behavior as chimpanzee populations also use this practice. However, use of complex processing and a wider range of resources, including tubers and toxic seeds, is seen in parts of Europe, Southeast Asia, and Sahul dating from 30,000 to 50,000 years ago (Barton 2005; Revedin et al. 2010; Summerhayes et al. 2010). In the higher latitudes during the cooler periods of the Pleistocene, the answer is not simply one of supplying base calories. Meat-focused diets can lead to nitrogen poisoning and a significant plant food dietary input (in most places 25%) is required to buffer the nitrogen input from meat (Jones 2009). In highly seasonal environments, nuts, fruits, seeds, and tubers provide highly abundant and widespread potential sources of such foods, as long as appropriate processing methods are applied. Once considered a late Pleistocene development as part of the preagricultural "broad-spectrum revolution," the exploitation of a wide range of plants may have been a key human adaptive strategy for many millennia and contributed to the successful colonization of the world by early human populations. Processing techniques and sequences in all their complexity and diversity were part of that adaptive range of skills and were fundamentally important in realizing the nutritional potential of exploitable plants in those regions.

Intensive use and eventual domestication of plant species seems to have emerged from this long tradition of plant exploitation in some regions, perhaps as a result of specialization in plant subsistence practices on a narrow range of exploitable resources (see Denham et al. 2009b). As greater evidence emerges of the antiquity and scope of plant food processing and the extended period of domestication itself becomes clear, it is less and less easy to identify processing activities as a trigger for the domestication process, though some new technologies may have increased the chances of domestication happening. Rather, processing activities allowed much greater effective use to be made of a wider range of plant foods, which perhaps empowered communities to experiment with and find plants that could provide the reliable, bulk sources of calories on which sedentary subsistence could be based and that eventually were domesticated and farmed. Processing technologies thus provided the means by which plant selection and domestication could become possible, but their development does explain neither why domestication itself happened nor why the cultivation of domesticates became the chosen means of exploiting plant species for many societies around the world.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Bananas: Origins and Development
- ▶ Capsicums/Chiles: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Ethnoarchaeology
- ▶ Human Evolution: Use of Fire
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Maize: Origins and Development
- ▶ Niah Caves: Role in Human Evolution
- ▶ Paleoethnobotany
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Squash: Origins and Development
- ▶ Taro: Origins and Development
- ▶ Wheats: Origins and Development

References

Asmussen, B. 2010. In a nutshell: The identification and archaeological application of experimentally defined correlates of *Macrozamia* seed processing. *Journal of Archaeological Science* 37: 2117–2125.

Barton, N. 2005. The case for rainforest foragers: The starch record at Niah Cave, Sarawak. *Asian Perspectives* 44: 56–72.

Cosgrove, R., J. Field, and Å. Ferrier. 2007. The archaeology of Australia's tropical rainforests. *Palaeogeography, Palaeoclimatology, Palaeoecology* 251: 150–173.

Denham, T.P., S.G. Haberle, C. Lentfer, R. Fullager, J. Field, M. Therin, N. Porch, and B. Winsborough. 2003. Origins of agriculture at Kuk Swamp in the highlands of New Guinea. *Science* 301: 189–193.

Denham, T., R. Fullager, and L. Head. 2009a. Plant exploitation on Sahul: From colonisation to the emergence of regional specialisation during the Holocene. *Quaternary International* 202: 29–40.

Denham, T., J. Iriarte, and L. Vrydaghs. 2009b. *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*. Walnut Creek: Left Coast Press.

Fuller, D.Q. 2007. Contrasting patterns in crop domestication and domestication rates: Recent archaeobotanical insights from the Old World. *Annals of Botany* 100: 903–924.

Goodale, N., H. Otis, W. Andrefsky, I. Kuijt, B. Finlayson, and K. Bart. 2010. Sickle blade life-history and the transition to agriculture: An early Neolithic case study from Southwest Asia. *Journal of Archaeological Science* 37: 1192–1201.

Gremillion, K.J. 2004. Seed processing and the origins of food production in eastern North America. *American Antiquity* 69: 215–233.

Hillman, G.C. 1981. Reconstructing crop husbandry practices from charred remains of crops. In *Farming practice in British prehistory*, ed. R. Mercer, 123–162. Edinburgh: Edinburgh University Press.

Hillman, G.C., and M.S. Davies. 1990. Domestication rates in wild-type wheats and barley under primitive cultivation. *Biological Journal of the Linnean Society* 39: 39–78.

Jones, M. 2009. Moving North: Archaeobotanical evidence for plant diet in Middle and Upper Paleolithic Europe. In *The evolution of hominin diets: Integrating approaches to the study of palaeolithic subsistence*, ed. J.J. Hublin and M.P. Richards, 171–180. London: Springer.

Martinoli, D., and S. Jacomet. 2004. Identifying endocarp remains and exploring their use at Epipalaeolithic Öküzini in southwest Anatolia, Turkey. *Vegetation History and Archaeobotany* 13: 45–54.

Perry, L., R. Dickau, S. Zarrillo, I. Holst, D.M. Pearsall, D.R. Piperno, M.J. Berman, R.G. Cooke, K. Rademaker, A.J. Ranere, J.S. Raymond, D.H. Sandweiss, F. Scaramelli, K. Tarble, and J.A. Zeidler. 2007. Starch fossils and the domestication and dispersal of chili peppers (*Capsicum* spp. L.) in the Americas. *Science* 315: 986–988.

Revedin, A., B. Aranguren, R. Becattinia, L. Longoc, E. Marconid, M. Lippie, N. Skakunf, A. Sinitsynf, A. Spiridonovag, and J. Svobodah. 2010. Thirty thousand-year-old evidence of plant food processing. *Proceedings of the National Academy of Sciences (PNAS)* 107: 18815–18819.

Stahl, A.B.. 1984. Human dietary selection before fire. *Current Anthropology* 25: 151–168.

Summerhayes, G.G., M. Leavesley, A. Fairbarn, H. Mandui, J. Field, A. Ford, and R. Fullagar. 2010. Human adaptation and plant use in Highland New Guinea 49,000 to 44,000 years ago. *Science* 330: 78–81.

Zohary, D., M. Hopf, and E. Weiss. 2012. *Domestication of plants in the Old World*. 4th ed. Oxford: Oxford University Press.

Plantation Archaeology

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Introduction

The post-Columbian expansion of European colonial interests into the Americas, Africa, Oceania, Indonesia, and Southeast Asia resulted in the development of a number of strategies both for the settlement of European colonials and for the exploitation of natural resources, both endemic and introduced. Among these strategies was the development of large-scale monocrop agricultural establishments that produced tropical and subtropical agricultural commodities for the European and colonial markets. By the early seventeenth century, these establishments became widely known in the English-speaking world as "plantations." Having used a variety of labor extraction strategies to produce a variety of crops, many plantations were abandoned, or their landscapes transformed, by the early twentieth century, resulting in a rich archaeological record that has been systematically explored since the early 1970s. The scope of plantation archaeology extends from the US South through

the Caribbean, the Atlantic and Indian Ocean islands, East Africa, and the Pacific.

Definition

Plantation archaeology is a somewhat difficult term to define, largely because the definition of "plantation" is itself somewhat ambiguous. In common practice, a plantation is a large-scale monocrop agricultural estate, generally worked by resident labor. However, the term "plantation" has historically been used to define vanguard colonial settlements, which may or may not focus on the production of agricultural commodities and which may include towns, farms, seignories, and other settlement forms. Hence, the sixteenth-century English settlement of lands escheated in Southwestern Ireland from the rebellious Earl of Desmond and his confederates was known as the Munster Plantation, the goal of which was to "plant" loyal English subjects into a hostile Irish landscape (Delle 1999), while the early seventeenth-century Ulster Plantation brought "British" subjects, both Scottish and English, to the northern counties of Ireland (see Lyttleton and Rynne 2009). The same concept of plantation informed the early English settlement of the New World, including the Plantation of Virginia and Plymouth Plantation; to this day the US state of Rhode Island is officially named the State of Rhode Island and Providence Plantations.

The concept of plantation as colony was similarly transferred to the initial British occupation of the Caribbean island of Barbados, which began in 1627. During the early seventeenth century, the British settlement of Barbados roughly followed the models established in Ireland, Virginia, and New England, inasmuch as the settlement of the island was marked by the establishment of relatively small farms, worked primarily by British yeomen and indentured servants, assisted by a relatively limited number of enslaved Africans. In the 1640s, large-scale sugar production was introduced to Barbados. Based on antecedents in Dutch-controlled Brazil and the Atlantic islands (Madeira, the Azores, and Cape Verde islands), the introduction of sugar cane production to Barbados resulted in the development of the plantation system, worked primarily with enslaved African laborers and their descendants. By the end of the eighteenth century, the term "plantation" would lose its sixteenth-century connotation and would primarily be used to describe a large, privately held estate, worked by coerced labor, and that produced agricultural commodities for export back to Europe.

While some work has been done on the earliest "plantation" sites in Ireland (Lyttleton and Rynne 2009), Virginia (e.g., Noël Hume 1982), and New England (e.g., Deetz 1996), the majority of work defined as plantation archaeology has focused on the later manifestation of the plantation system and includes excavations and analyses of plantation great houses, overseers' houses, industrial works, and the quarters and villages of enslaved and other coerced workers.

Historical Background

Although plantations in the US South were the focus of archaeology as early as the 1930s (e.g., Ford 1937; Noël Hume 1963), much of this early work was focused on reconstructing architectural details of the grand houses of elite plantation owners and rarely if ever considered the plantation as a unit of analysis (see Singleton 1985). The genesis of what is currently referred to as plantation archaeology can be traced to two projects, one conducted in the US South in the late 1960s and early 1970s, the other on the island of Barbados in the early 1970s. In the former, Charles Fairbanks led a team in the excavation of slave housing at Kingsley Plantation in northeastern Florida (Fairbanks 1974), in the latter, Jerome Handler and Frederick Lange led an archaeological investigation of the Newtown Plantation on Barbados (Handler and Lange 1978). In both projects archaeologists sought to understand the nature of the lives of the workers enslaved on the plantations within the context of the global commodities markets of which they were a part. In the case of the Kingsley Plantation site, Fairbanks and his students excavated slave quarter

sites. On the Newtown Plantation site, Handler and Lange concentrated their efforts on analyzing the skeletal remains and material culture recovered during the excavation of a slave-period cemetery. In both cases, the archaeologists analyzed material culture to determine the degree that African cultural traits survived in the New World and in both cases appear to have been surprised that no discernible pattern of survival could be detected archaeologically.

In the later 1970s and into the 1980s, an increasing number of plantation sites were excavated, particularly in the US South. Due in large measure to heritage management laws being passed by both the United States government and by the governments of its constituent states, large development projects in the US South began to incorporate archaeological investigations into preconstruction impact reports filed with various government agencies. Several important archaeological studies resulted from what was generally referred to as cultural resource management (CRM) studies on former plantations. Even where excavations were not mandated, thoughtful landowners occasionally funded excavations before destroying plantation sites.

Among the first plantations to be systematically excavated and analyzed was the Cannon's Point Plantation, the focus of a dissertation project in the early 1970s. The project, led by Fairbanks's student John Solomon Otto, was conducted on one of the barrier islands off of the coast of Georgia; the site was threatened by a planned subdevelopment on the island (Otto 1984). Rather than try to identify continuities with African antecedents, Otto focused his study on examining the plantation as a manifestation of complex society. Understanding that the hierarchical nature of the plantation economy would likely be reflected in the material culture of those who lived and worked on the estate – because plantation society was structured by both race and class – Otto hypothesized that status differentiation should be visible between the planters and overseers, and the overseers and slaves. Although status differentiation could be inferred based on the economic class of the parties involved, Otto's greater contribution was in his methodology which considered the plantation as an integrated system that included a number of cultural and physical features.

Practically simultaneous to Otto's study in Georgia, William Kelso began a series of salvage excavations on the site of the former Kingsmill Plantations near Williamsburg, Virginia. Reportedly as part of a purchase agreement through which the Anheuser-Busch Corporation acquired the land from the Colonial Williamsburg Foundation, the corporate owners of the Kingsmill tract agreed to fund archaeological investigations ahead of brewery, theme park, and upscale gated community development. Over the course of several years in the early 1970s, Kelso excavated 15 sites on the sprawling Kingsmill property that ranged in date from the early seventeenth through the late eighteenth century. The Kingsmill project succeeded in documenting how plantation landscapes had changed during the crucial moment when colonial investors shifted their strategies from rent extraction from tenant farmers to tobacco plantation production using enslaved African labor. At Kingsmill, Kelso was able to document how architectural styles and technologies changed during the seventeenth and eighteenth centuries. Notably, Kelso's project was among the first to identify "root cellars" in slave quarter sites, a feature now commonly recognized in earthfast structures associated with African descent people in Virginia (Kelso 1984). As had been the case with Otto's study, Kelso had the great advantage of examining numerous components of the site and thus contributed to the developing methodology of plantation archaeology, particularly concerning diachronic changes in plantation landscapes. In a similar project, Wheaton and Garrow analyzed material culture from two plantation sites known as Yaughan and Curribbo in the low country of southeastern South Carolina. By comparing assemblages from three slave quarters from the two plantation sites, the archaeologists focused on interpreting how enslaved populations adapted to their conditions of plantation life and labor, using the processual concept of acculturation to frame their analysis.

Changes in plantation landscape and social organization in the United States did not end

with the abolition of slavery following the cessation of the US Civil War. In another landmark plantation study funded by virtue of heritage management legislation, Charles Orser documented the transformation of the plantation landscape of Millwood Plantation, once the property of the Calhouns, one of South Carolina's wealthiest and most powerful families. In his study of post-emancipation Millwood, Orser used archaeological evidence to analyze how both emancipated workers and their former slave masters adjusted to the conditions of the postbellum south and how the material realities of plantation life were transformed in such a way as to reinforce the existing plantation social hierarchy through the agency of tenant farming and sharecropping. Orser's remains one of the few studies of an America plantation to focus specifically on post-emancipation social structures; his study is also notable for being among the first plantation studies to break from the constraints of the methodologies and theoretical constructs of processual archaeology, using a Marxian framework to understand the material record of economic and social constructs (Orser 1988).

The practice of plantation archaeology has not been restricted to the United States. Inspired by the success of plantation archaeology in the US Southeast, several archaeologists subsequently conducted archaeological projects on Caribbean plantation sites. In the early 1980s, Douglas Armstrong undertook the archaeological investigation of Drax Hall, a late seventeenth−/early eighteenth-century Jamaica sugar plantation. Armstrong's study was notable for recognizing the importance of house yards to enslaved African-Jamaican plantation workers, as well as for his theoretical approach which sought to understand how plantation culture was transformative for all those enmeshed within it (Armstrong 1990). In a later study at Seville Plantation, Armstrong and his students were able to document variation in the spatial layout of temporally distinct slave villages within the same site (Armstrong and Kelly 2000). Barry Higman, an Australian historian who lived and worked in Jamaica for several decades, simultaneously excavated a plantation site at Montpelier Plantation.

In Montserrat, the social geographer Lydia Pulsipher collaborated with the archaeologist Mac Goodwin to study historic land use patterns at Galways Plantation. Pulsipher and Goodwin's work was notable as it incorporated the study of provision gardens into plantation archaeology. In much of the English Caribbean, particularly Jamaica, enslaved workers were required to provide food for themselves, which was generally grown both in kitchen gardens found in house yards and on small farms which they maintained in peripheral areas of plantations known as provision grounds. Pulsipher and Goodwin's work was among the first to archaeologically explore this element of the plantation landscape (see Pulsipher and Goodwin 1999).

By the 1990s many plantation archaeologists accepted that individual plantations were systems integrated into wider global socioeconomic systems. Following the political economic turn in anthropology that was then current, studies like that conducted by James Delle on coffee plantations in the Blue Mountains of Jamaica took a regional approach to the archaeological analysis of plantation landscapes. Delle (1998) argued that plantation landscapes were multi-scalar phenomena that could and should be analyzed at several scales, including the individual household, the village of which households were a component part, the plantation, and the region, defined either geographically or socially (Delle 1999, 2002, 2011). Similar studies were conducted on the Caribbean islands of St. Eustatius and Tobago (see section "Further Reading").

Key Issues

Over the years, a number of key issues have been raised in plantation archaeology. Among the earliest and most persistent is the search for African "survivals," sometimes called Africanisms, cultural traits that survived the middle passage over the Atlantic and that are represented in the material culture of enslaved populations. Early archaeologists were perplexed as to why African cultural traits were so rarely found on plantation sites; some early archaeologists concluded that the

process of culture change, initially framed as acculturation, was rapid indeed. By the mid-1990s many plantation archaeologists abandoned the search for African survivals, and those still interested in the concept of culture change began to reimagine plantation communities as creolized communities, the process of creolization being one of ethnogenesis emerging from multiple antecedents and resulting in multiple local variants.

Among the most fascinating of creolized material culture are a variety of low-fired earthenwares recovered from diverse plantation communities throughout the Caribbean and North America. Initially recognized as being produced by indigenous communities in the US Southeast, these ceramics were initially referred to as "Colono-Indian Ware" but were later recognized as having been produced, at least in part, by enslaved Africans and their descendants on southern plantations (Ferguson 1992). Similar ceramics have been identified and analyzed on multiple islands in the Caribbean including Jamaica (where they are called "yabba"), Guadeloupe, St. Eustatius, and Nevis. That some of the ceramics have been found in unusual contexts (like the bottom of rivers) and with unusual markings have led some archaeologists to conclude that these ceramics were sometimes used in syncretic rituals by enslaved Africans and their descendants (Ferguson 1992).

In both Caribbean and US plantation contexts, low-fired, locally produced earthenwares shift from being dominant in seventeenth- and early eighteenth-century assemblages to nearly disappearing by the opening decades of the nineteenth (Higman 1998). This recurring phenomenon has led archaeologists to explore the degree to which enslaved plantation communities exerted some level of economic sovereignty through the establishment of modes of exchange that existed beyond the control of the plantation owners and their white managers, using such exchange systems to purchase refined earthenwares imported from Europe (see section "Further Reading"). In the postcolonial context, phenomena such as this have resulted in some reconsideration of the nature of colonial enterprises and the inherent social relationships that existed on plantations as integrated components of those colonial realities.

One of the key issues facing plantation archaeology is the degree to which plantation landscapes are preserved, and how such preserved landscapes are used to create historical interpretations about the plantation past. Private and public entities in the United States have gone to great lengths to preserve, restore, and interpret houses and landscapes associated with past American presidents. By historical coincidence, seven of the first ten American presidents (Washington, Jefferson, Madison, Monroe, Jackson, Harrison, Tyler) either grew up on or owned slave-based plantations as adults. Each of these houses has been preserve and is open to the public; at some of the houses, notably Washington's Mt. Vernon, Jefferson's Monticello, Madison's Montpelier, and Jackson's Hermitage, archaeology of the quarters of the enslaved has been incorporated into the historical interpretation of the houses and the early decades of US history. Presenting the issue of slavery to the public at such venues remains a difficult and sometimes controversial task.

Like much historical archaeology practiced throughout the world, plantation archaeology has increasingly incorporated local descendant communities and other stakeholders into the excavation, analysis, and interpretation of plantation sites. Among the most notable of such public archaeology programs is the long-term project conducted at the Levi Jordan Plantation in Texas (McDavid 1997). Again, like many different archaeologies now being practiced, plantation archaeology has increasingly been addressing issues of concern to local populations, including the difficult topics of race and racism, gender and sexuality, and power and resistance which are so deeply imbedded in the history and archaeology of plantations (see section "Further Reading").

International Perspectives

Plantation archaeology is, by its nature, an international pursuit. While plantation archaeology may have begun in the US South, it has been

conducted on a number of Caribbean islands including Jamaica, Dominica, St. Croix, Cuba, the Bahamas, Guadeloupe, and Martinique. In recent years plantation archaeology has also been initiated in East Africa and Brazil and at Mexican *haciendas* in the Yucatán and Guerrero, among other localities (see section "Further Reading"). With several notable exceptions, particularly from Great Britain and France, the majority of plantation archaeology projects are still being conducted by historical archaeologists either born in the United States or now living there.

Future Directions

While the future is difficult to predict, there are several directions that plantation archaeology might take. Clearly, the public interpretation of enslavement on plantations will continue to be refined. The scope of plantation archaeology can likewise be expanded; again with some notable exceptions of projects conducted on coffee plantations in the Caribbean (Singleton 2001; Delle 2011; Reeves 2011) and clove plantations in East Africa, the majority of projects have been conducted on sugar, tobacco, and cotton plantations, primarily in the Atlantic Basin, and primarily worked by enslaved African laborers and their descendants. As plantation archaeology moves forward, more sites in the Indian Ocean, Central and Southern America, the Pacific Islands, and the former French Indochina will likely open new avenues for interpretation. Similarly, as the breadth of commodity production expands to, for example, bananas, pineapples, rubber, sisal, and citrus, our understanding of the material life of the plantation will undoubtedly become broader.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Agrarian Landscapes of the Historic Period
- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Ceramics: Colonoware
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Community Archaeology
- ▶ Consumption, Archaeology of
- ▶ Cultural Heritage and Communities
- ▶ Deetz, James (Historical Archaeology)
- ▶ Engendering Historical Archaeology
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Ferguson, T. J.
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historic Site and Historic Building Preservation: Overview
- ▶ Historical Archaeology in Latin America
- ▶ Mexico: Historical Archaeology
- ▶ Noël Hume, Ivor
- ▶ North America (USA): Historical Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Plimoth Plantation: Public Archaeology
- ▶ Sugarcane: Origins and Development

References

Armstrong, D.V. 1990. *The old village and the great house: An archaeological and historical examination of Drax Hall plantation, St. Ann's Bay, Jamaica*. Urbana: University of Illinois Press.

Armstrong, D.V., and K.G. Kelly. 2000. Settlement patterns and the origins of African Jamaican society: Seville plantations, St. Ann's Bay, Jamaica. *Ethnohistory* 47: 370–397.

Deetz, J. 1996. *In small things forgotten: An archaeology of early American life*. 2nd ed. New York: Anchor Books.

Delle, J.A. 1998. *An archaeology of social space: Analyzing coffee plantations in Jamaica's Blue Mountains*. New York: Plenum Press.

Delle, J.A. 1999. The landscapes of class negotiation on coffee plantations in the Blue Mountains of Jamaica, 1797–1850. *Historical Archaeology* 33: 136–158.

Delle, J.A. 2002. Power and landscape: Spatial dynamics in early nineteenth-century Jamaica. In *The dynamics of power*, Center for archaeological investigations, occasional paper, ed. M. O'Donovan, vol. 30, 341–361. Carbondale: Southern Illinois University.

Delle, J.A. 2011. The habitus of Jamaican plantation landscapes. In *Out of many, one people: The historical archaeology of colonial Jamaica*, ed. J.A. Delle, M.W. Hauser, and D.V. Armstrong, 122–143. Tuscaloosa: University of Alabama Press.

Fairbanks, C. 1974. The Kingsley slave cabins in Duval County, Florida, 1968. *The Conference on Historic Sites Archaeology* 7: 62–93.

Ferguson, L. 1992. *Uncommon ground: Archaeology and early African America, 1650–1800*. Washington: Smithsonian Institution Press.

Ford, J.A. 1937. An archaeological report on the Elizafield ruins. In *Georgia's disputed ruins*, ed. E.M. Coulter, 193–205. Chapel Hill: University of North Carolina Press.

Handler, J.S., and F. Lange. 1978. *Plantation slavery in Barbados: An archaeological and historical investigation*. Cambridge, MA: Harvard University Press.

Higman, B.W. 1998. *Montpelier, Jamaica: A plantation community in slavery and freedom, 1739–1912*. Mona: Press University of the West Indies.

Kelso, W.M. 1984. *Kingsmill plantations, 1619–1800: Archaeology of country life in colonial Virginia*. New York: Academic.

Lyttleton, J., and C. Rynne, eds. 2009. *Plantation Ireland: Settlement and material culture, c. 1550–1700*. Dublin: Four Courts Press.

McDavid, C. 1997. Descendants, decisions, and power: The public interpretation of the archaeology of the Levi Jordan plantation. *Historical Archaeology* 31: 114–131.

Noël Hume, I. 1963. *Here lies Virginia: An archaeologist's view of colonial life and history.* Charlottesville: University Press of Virginia.

Noël Hume, I. 1982. *Martins Hundred*. New York: Alfred Knopf.

Orser, C.E., Jr. 1988. *The material basis of the Postbellum Tenant plantation: Historical archaeology in the South Carolina Piedmont*. Athens: University of Georgia Press.

Otto, J.S. 1984. *Cannon's Point plantation, 1784–1860: Living conditions and status patterns in the Old South*. Orlando: Academic.

Pulsipher, L.M., and C.M. Goodwin. 1999. Here where the old time people be: reconstructing the landscapes of the slavery and post-slavery era on Montserrat, West Indies. In *African sites: Archaeology in the Caribbean*, ed. J.B. Haviser, 9–37. Kingston/Princeton: Ian Randle/Markus Weiner.

Singleton, T.A., ed. 1985. *The archaeology of slavery and plantation life*. Orlando: Academic.

Further Reading

Armstrong, D.V. 2011. Reflections on Seville: Rediscovering the African Jamaican settlements at Seville plantation, St. Ann's Bay. In *Out of many, one people: The historical archaeology of colonial Jamaica*, ed. J.A. Delle, M.W. Hauser, and D.-V. Armstrong, 77–101. Tuscaloosa: University of Alabama Press.

Camposeco González, J.R. 2003. Estudio arqueológico sobre el origen étnico y residencia de la fuerza de trabajo durante los primeros años del México independiente en el ingenio azucarero de "San Nicolás de Ayotla", Oaxaca, México. Unpublished BA dissertation, Escuela Nacional de Antropología e Historia.

Clement, C.O. 1997. Settlement patterning on the British Caribbean island of Tobago. *Historical Archaeology* 3: 93–10.

Croucher, S.K. 2007. Clove plantations on nineteenth century Zanzibar: Possibilities for gender archaeology in Africa. *Journal of Social Archaeology* 7: 302–324.

Dawdy, S.L. (ed.). 2000. Creolization. Special issue. *Historical Archaeology* 34(3).

Deetz, J. 1993. *Flowerdew Hundred: The archaeology of a Virginia plantation, 1619–1864*. Charlottesville: University of Virginia Press.

Delle, J.A. 1994. The settlement pattern of sugar plantations on St. Eustatius, Netherlands Antilles. In *Spatial patterning in archaeology: Selected studies of settlement*, ed. D.W. Robinson and G.G. Robinson, 33–61. Williamsburg: King and Queen's Press.

Delle, J.A. 2000. Gender, power and space: Negotiating social relations under slavery on coffee plantations in Jamaica, 1790–1834. In *Lines that divide: Historical archaeologies of race, class and gender*, ed. J.A. Delle, S.A. Mrozowski, and R. Paynter, 168–201. Knoxville: University of Tennessee Press.

Delle, J.A. 2009. The governor and the enslaved: An archaeology of colonial modernity at Marshall's Pen, Jamaica. *International Journal of Historical Archaeology* 12: 488–512.

Delpuech, A. 2001. Historical archaeology in the French West Indies: Recent research in Guadeloupe. In *Island lives: Historical archaeologies of the Caribbean*, ed. P. Farnsworth, 21–59. Tuscaloosa: University of Alabama Press.

Epperson, T.W. 1990. Race and the disciplines of the plantation. *Historical Archaeology* 24: 29–36.

Fennell, C. 2003. Group identity, individual creativity, and symbolic generation in a BaKongo diaspora. *International Journal of Historical Archaeology* 7: 1–31.

Hauser, M.W. 2008. *An archaeology of black markets: Local ceramics and local economies in eighteenth-century Jamaica*. Gainesville: University Press of Florida.

Hauser, Mark W., and D.V. Armstrong. 2012. Archaeology of being ungoverned: A comparison of two settlements and their economic networks in the eastern Caribbean. *Journal of Social Archaeology* 12: 1–24.

Kelly, K.G. 2008. Creole cultures of the Caribbean: Historical archaeology in the French West Indies. *International Journal of Historical Archaeology* 12: 388–402.

Lenik, S. 2008. Considering multiscalar approaches to creolization among enslaved laborers at Estate Bethlehem, St. Croix, US Virgin Islands. *International Journal of Historical Archaeology* 13: 12–26.

Murrieta Flores, P.A. 2008. El proceso productivo del azúcar en época colonial y sus materiales arqueológicos: El caso de la Hacienda de Tecoyutla, Guerrero. *Arqueología* 38: 90–111.

Reeves, M. 2011. Household market activities among early nineteenth century Jamaican slaves: An archaeological

case study from two slave settlements. In *Out of many, one people: The historical archaeology of colonial Jamaica*, ed. J.A. Delle, M.W. Hauser, and D.-V. Armstrong, 183–210. Tuscaloosa: University of Alabama Press.
Samford, P. 2007. *Subfloor pits and the archaeology of slavery in colonial Virginia*. Tuscaloosa: University of Alabama Press.
Singleton, T.A. 2001. Slavery and spatial dialectics on Cuban coffee plantations. *World Archaeology* 33: 98–114.
Singleton, T.A., and M.A.T. de Souza. 2009. Archaeologies of the African diaspora: Brazil, Cuba and the United States. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 449–469. New York: Springer.
Sweitz, S.R. 2012. *On the periphery of the periphery: Household archaeology at Hacienda San Juan Bautista Tabi, Yucatán, Mexico*. New York: Springer.
Wheaton, T.R., and P.H. Garrow. 1985. Acculturation and the archaeological record in the Carolina Lowcountry. In *The archaeology of slavery and plantation life*, ed. T.-A. Singleton, 239–260. Orlando: Academic Press.
Wilkie, L.A. 2001. Methodist intentions and African sensibilities: The victory of African consumerism over plantation paternalism at a Bahamian plantation. In *Island lives: Historical archaeologies of the Caribbean*, ed. P. Farnsworth, 272–300. Tuscaloosa: University of Alabama Press.
Wilkie, L.A., and P. Farnsworth. 2005. *Sampling many pots: An archaeology of memory and tradition at a Bahamian plantation*. Gainesville: The University of Florida Press.

Plimoth Plantation: Public Archaeology

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Introduction

Plimoth Plantation, a living history museum located in Plymouth, Massachusetts, is one example of public and publicly experimental archaeology in a museum setting. This museum is dedicated to the story of the seventeenth-century *Mayflower* passengers, later called the Pilgrims, and their Wampanoag neighbors who have lived in the area for millennia. Its key exhibits include a reconstructed Seventeenth-Century English Village and Wampanoag Homesite, a reproduction of the *Mayflower*, a Craft Center displaying traditional Native and European crafts, and a reconstruction of Plymouth's first 1636 mill, the Plimoth Grist Mill. Since its inception in 1947, Plimoth Plantation has relied on a combination of archaeological and documentary evidence to inform its exhibits, programs, and new research, all of which offer the public a way to engage with the Pilgrim and Wampanoag stories as well as archaeological and documentary research techniques.

Definition

The phrase "public archaeology" has been and continues to be defined in multiple ways. For some, it might mean conducting archaeological research that includes and engages a public audience, while for others it could be allowing the community of stakeholders to have some degree of control in the project (Society for American Archaeology n.d.). It could also include those who strive to increase awareness of archaeological resources and heritage through advocacy, political lobbying, journalism, and educational work. Yet another definition includes those who reenact historic events or time periods and experiment with traditional activities (Catling and Bahn 2009, 241, 246–247).

Public archaeology at Plimoth Plantation fits several of these definitions. It is perhaps best known for its reconstructed seventeenth-century Native and English structures where staff members experiment with historical lifeways and traditional activities, including cooking, animal husbandry, art, domestic activities, and building. Because much of our knowledge about this period comes from archaeological data, the Museum also offers ways for guests to explore local archaeological excavation and lab work and learn about previous excavations in the area. These guests range from professional archaeologists on vacation to young children who are experiencing their first introduction to the field, a range which offers multiple avenues for engaging the public.

Historical Background

Public archaeology has long been part of Plimoth Plantation. The Museum's founder, Henry "Harry" Hornblower II (1917–1985), was an avid amateur archaeologist who began excavating and exploring sites near his family's summer home in Plymouth, Massachusetts, as a teenager. This passion led him to study anthropology and archaeology at Harvard University under Professor John Otis Brew and put him in contact with other well-known archaeologists of the time, including Ripley P. Bullen and J. C. "Pinky" Harrington. Despite his training and excellent potential, Hornblower did not become a professional archaeologist, instead serving in the Armed Forces during World War II and ultimately joining the family's investment firm (Gomes 1985; Beaudry et al. 2003).

His love of archaeology and history never left him, however, and he became a trustee of the Pilgrim Society of Plymouth after returning from military service. By 1946, he began looking for ways to reconstruct the village erected by the English men and women who arrived aboard the *Mayflower* in 1620 so that the information gleaned from archaeological and historical research could be more accessible to the general public. In 1947, his project began to take shape when Plimoth Plantation, Inc., was established and a prototype "first house" was erected in downtown Plymouth. The Museum grew in 1953, when it opened a reconstructed fort-meetinghouse near the "first house." In June of 1957, the *Mayflower II*, a full-scale reconstruction of the famous ship, arrived in Plymouth and still further expanded Plimoth Plantation's mission (Gomes 1985).

By 1959, the Museum moved from downtown Plymouth to the Hornblower family's former summer estate, where it built a full-scale reconstruction of the original seventeenth-century village. This exhibit relied heavily on information from archaeological excavations and local restoration projects. When completed, the houses in this newly constructed village were furnished with antiques and populated with mannequins, giving Museum guests a static idea of how the houses might have appeared in the 1620s.

Also in 1959, Hornblower hired Dr. James "Jim" Deetz, a young archaeologist from Harvard University, to assist in creating the Wampanoag Homesite exhibit, which was in itself a prime example of experimental archaeology in that it included stone tool-making demonstrations and a reconstructed bark house. Shortly after his arrival, Deetz excavated his first colonial site, the Robert Bartlett Site, at Hornblower's urging. This site fascinated Deetz who began to focus on the then-new field of historical archaeology and include his students in his work. Throughout the 1960s and 1970s, Deetz and his students, many of whom are still active historical archaeologists today, excavated dozens of colonial sites in Plymouth and neighboring towns, all of which helped refine today's understanding of seventeenth-century life in Plymouth Colony. The data from these sites became the basis for some of the foundational texts in historical archaeology, including Deetz's well-known work *In Small Things Forgotten: The Archaeology of Early American Life* (Deetz 1977).

The artifacts from these sites, in turn, became the basis of Plimoth Plantation's extensive archaeological collections. Today, the Museum holds over 50,000 archaeological artifacts from over a dozen sites in Plymouth and nearby towns. The artifacts range in date from ca. 8000-year-old stone tools to twentieth-century pottery and household trash, all of which offer information on centuries of daily life in the area. While only a small portion of the artifacts are currently on display at the Museum, exciting new initiatives are underway which will allow more of them to be accessible by both the public and researchers in a variety of digital, online formats.

While Deetz and his students were building the archaeology collections through their excavations, Plimoth Plantation introduced a different aspect of public archaeology when, in the late 1960s and early 1970s, it removed the antiques and mannequins from the Seventeenth-Century English Village and added reproduction furniture, animals, and live, costumed interpreters portraying the roles of actual residents of Plymouth Colony in the early 1620s.This transition to "living history" gave guests the chance to interact

with the objects and animals while also letting Museum staff experiment with historical lifeways, such as cooking, woodworking, harvesting, and animal husbandry (Fig. 1).

The Museum's exhibits expanded yet again in 1973 when it opened the Wampanoag Homesite (Fig. 2) where staff demonstrate traditional Wampanoag lifeways, including cooking, farming, boat building, house construction, and games. Unlike the Seventeenth-Century English Village, where some staff are "in character" as specific historical figures, staff in the Wampanoag Homesite interact with guests as modern Native people who are eager to share their culture and traditional lifeways and talk about Wampanoag history.

Thanks to this experimental approach in both exhibits and on the *Mayflower II*, staff and guests gain deeper insights into historical daily activities.

Plimoth Plantation: Public Archaeology, Fig. 1 Guests enjoying Plimoth Plantation's Seventeenth-Century English Village

Plimoth Plantation: Public Archaeology, Fig. 2 Plimoth Plantation's Wampanoag Homesite

By using reproductions of historical objects, we are now able to better understand details like how dishes were used and broken, the ways in which clothing impacted movement and work, and how traditionally constructed buildings and ships aged and settled. This information, in turn, has the potential to offer new insights and possible interpretations for archaeological artifacts.

The experimental and experiential nature of the exhibits expanded, while the Museum's field archaeology program slowed down in the late 1980s and staff began to focus more on existing collections. New research projects involved reexamining the collections and material from earlier excavations, including ones done by Hornblower in the early 1940s (Beaudry and George 1987; Beaudry et al. 2003). While this work is still ongoing, the findings from these projects prove that the collections continue to have research potential and merit revisiting as we continue to learn more about the area and the period.

In 2014, Plimoth Plantation began supporting active fieldwork again when it partnered with Drs. David Landon and Christa Beranek of the University of Massachusetts Boston's Andrew Fiske Memorial Center for Archaeological Research to support a field school, Project 400, in downtown Plymouth. This continuing project includes a public dig in the heart of downtown Plymouth that has yielded the first evidence of the original 1620s colonial settlement as well as a better understanding of historical environmental change in the area and new insights into Native-colonial interactions. In addition to the excavation, field school students and instructors participating in Project 400 wash, sort, and create a preliminary artifact catalog in the Museum's ArchLab, a public archaeological lab space set up in its Visitor Center gallery.

Today, archaeology remains a prominent and public focus for Plimoth Plantation. Its archaeological collections continue to be reevaluated and examined by new scholars in light of recent findings, and its living history exhibits are regularly updated to reflect new discoveries. When the field school is in session, guests can meet and interact with students and participants in the ArchLab, and Museum members can take walking tours of the site with the Museum's curator and archaeologist. During October, Massachusetts' Archaeology Month, Plimoth Plantation offers numerous events designed to highlight archaeology, field work, lab work, and the Museum's collections. In keeping with the various definitions of public archaeology and its original mission, the Museum continues to offer a mixture of experimenting with historical technology and lifeways in the living history exhibits and opportunities to learn about ongoing excavations and new research.

Key Themes

Informing Living History Exhibits

Since its beginning, the Museum has relied on archaeological research to inform its living history exhibits. The 1972 excavation of the Allerton Site in Kingston, Massachusetts, for example, resulted in the first archaeological evidence of earthfast construction in New England (Deetz and Deetz 2000, 229). Using this data, architectural historian Henry Glassie designed a building in 1973 for the Museum's Seventeenth-Century English Village exhibit. This structure, known as the Billington House, was the first earthfast building in the village and marked a turning point in the exhibits as the Museum continues to use earthfast construction as a technique when building certain new structures in this exhibit.

Similarly, archaeological data helps determine how the houses are furnished. While texts and surviving/extant period objects serve to flesh out the archaeological record by offering details about items that do not survive in the ground, archaeological data is key for identifying the more ubiquitous items that are infrequently documented or preserved, such as pottery. Plimoth Plantation potters working in the Museum's Craft Center often rely on extant pottery examples to determine vessel shapes, sizes, and decorations. In 2016, for instance, staff potters examined two storage jars in the Museum's collections to get measurements, glaze details, and other information regarding the manufacture of these common utilitarian vessels. These potters then produced several dozen reproduction

jars that continue to be displayed and used in the Village. Other similar projects have resulted in reproduction slipware dishes that depict historical motifs and are used in the village or sold in Plimoth Plantation's museum shops.

Archaeology is equally important in the Wampanoag Homesite, where it provides information regarding both the physical layout and interpretation of the exhibit. The current configuration of the site reflects archaeological evidence from local sites that indicates that the Wampanoag people typically lived near the ocean during the summer months and further inland during the winter. Because the exhibit is located near several archaeological sites, the staff take care to preserve existing sites and teach the public about archaeology. The recent construction of two new *wetus*, or Native houses, in 2016 and 2017, involved small-scale archaeological testing, which was done in front of the public as an opportunity to teach about archaeological methods. When the houses were being built, staff put a new penny from the year of construction at the bottom of each posthole to prevent confusing modern and historical postholes. This process offered many opportunities to explain to guests the importance of protecting archaeological sites as well as the benefits of experimental archaeology, such as replicating historical construction techniques.

Interpretation and activities in the Wampanoag Homesite are also guided by archaeological evidence. When identifying materials to use in traditional crafts such as beading, staff often look to seventeenth-century sites with evidence of trade to ensure that they use accurate materials. Similarly, activities such as planting crops in the cornfield include burying fish with the seeds to act as a fertilizer, a method found at precontact Wampanoag sites and discussed by Native historian Nanepashemet (Assonet Wampanoag, 1954–1995) and substantiated by Pilgrim texts (Heath 1963, 81–82).

Thanks to ongoing research and excavations like Project 400, Plimoth Plantation continues to reevaluate and change its exhibits to ensure they are authentic. While excavations at other seventeenth-century sites in Europe, Virginia, and elsewhere in New England provide information regarding what was available to seventeenth-century consumers, Project 400's discovery of the original 1620s village in downtown Plymouth has yielded invaluable information about what the first European colonists actually owned and brought with them. The evidence of German stoneware and Native pottery at this site has emphasized historical Plymouth's involvement in the broader global economy and led the Museum to look for ways to express this trade in its living history exhibits.

Educating and Including the Public

Hornblower's and Deetz's early excavations could also be considered examples of public archaeology. Work at the William Bradford II Site in Kingston, Massachusetts, resulted in a 25-min long film that explains the excavation process and findings to a nonspecialist audience. While modern viewers might not consider the film *Colonial Six* to be an accurate representation of archaeological method, it offers an interesting and easily accessible description of the excavation and how the data it generated was used by Plimoth Plantation.

In addition to developing films, at least one of Deetz's digs was featured in an article in the popular *Yankee Magazine* that included a solicitation for volunteers at other upcoming digs. This call for assistance was answered by over a dozen letters from individuals who were interested in participating, many of whom were teenagers who wished to get experience excavating prior to deciding on future courses of studies.

Plimoth Plantation continues to support budding archaeologists in multiple ways. Its education department regularly includes archaeology and archaeologists in its teacher training workshops and offers programs geared toward helping scout troops earn their archaeology badges. The Museum's internship program also regularly includes at least one position for an advanced undergraduate or graduate student to help with the Museum's archaeological collections. In some cases, these interns also help develop educational programs and small exhibits to explain their work, the collections, or the history of archaeology at Plimoth Plantation.

In addition to engaging future generations of archaeologists, the Museum works to increase public awareness of archaeology by educating guests and volunteers about archaeological resources and methods. Walking tours of downtown Plymouth and the Museum's campus regularly discuss local archaeological resources and the role they play in studying the past. Similarly, the public-oriented ArchLab in the Visitor Center is set up to teach guests about what happens to the artifacts (and archaeologists) after the excavation is completed. It offers a behind-the-scenes glimpse into how artifacts get washed, sorted, and cataloged in the lab while also giving summer guests an opportunity to engage with those participating in the Project 400 field school.

When the field school is not in session, this work is continued by volunteers who help to catalog and digitize Plimoth Plantation's archaeology collections. In most cases, these volunteers have no prior archaeological experience and are therefore given basic training about archaeological methods, artifact identification techniques, and collections management. Some of them work in public areas where they interact with museum guests and share this information. Others work behind the scenes to put the training to use in working with the Museum's archaeological artifacts to help develop online resources that make the collections more broadly available to a digital audience.

During the month of October, Massachusetts' Archaeology Month, Plimoth Plantation sponsors numerous public archaeology programs, including a weekly lecture series featuring local archaeologists who share their latest findings. In 2016 and 2017, Museum staff and interns performed small-scale archaeological testing in one area of the Wampanoag Homesite exhibit to prepare for the construction of a new *wetu*. By virtue of being conducted in front of the public, it offered numerous opportunities to teach archaeological methods to visitors. In 2017, the two fall archaeology collections interns designed and implemented a series of pop-up programs that allowed visitors to learn about organic versus inorganic remains, create their own "grave rubbings," and piece together a broken reproduction pottery vessel. Throughout these programs, the interns were keen to explain how archaeologists use the techniques, what skills were required, and how to protect and preserve archaeological heritage.

International Perspectives

The story Plimoth Plantation tells is, by nature, an international one. It includes people from England, individuals who spent significant time in Amsterdam and Leiden, Holland, and the Wampanoag people of New England. People from other indigenous Nations, including the Narragansett, Massachusetts, and Pequot as well as French, Dutch, and Portuguese sailors and fishermen also crossed this landscape in the seventeenth century. In addition, all of these people were part of widespread trade networks that included various parts of the Americas, Europe, and Asia. As a result of this global story, public archaeology at Plimoth Plantation necessarily includes an international scope. While current projects are continuing to expand our understanding of the period and global interactions, the Museum is actively engaging with this research and including it in the living history exhibits.

Similarly, Plimoth Plantation caters to a modern international audience as guests to the Museum include individuals and families from throughout Europe, the Americas, and Asia. To help support this diverse market, the Museum has begun incorporating more text panels for visitors who prefer to read English or are more visually oriented, as well as increasing its online presence. This digitally global outreach includes ongoing work to digitize the Museum's collections and therefore make it available to scholars and guests who are interested in the story of seventeenth-century New England and archaeology but might not be able to visit in person.

Future Directions

The digital initiative is one exciting example of the future of public archaeology at Plimoth Plantation. By creating digital "exhibits" for non-archaeologists to see the archaeological collections, learn about specific sites, and explore

archaeological method and data, the Museum aims to expand its reach beyond those who are physically able to come to Plymouth. In addition, the Museum intends to support future research by making more technical databases of the collections available online for scholars and those interested in exploring beyond the public-oriented exhibits. These two resources will include textual data, such as finding aids and object descriptions as well as digital images and three-dimensional scans of selected objects – all of which have the potential to open new doors for research both about Plymouth and ways of sharing archaeology with the public.

For those who can visit the Museum in person, Plimoth Plantation continues to offer archaeology-themed activities, walking tours, lectures, re-created environments, and opportunities to experiment with historical lifeways. Visitors can see reconstructions of both seventeenth-century English and Wampanoag life and learn how archaeological data has contributed to our ability to build these exhibits. They can interact with Project 400 participants in the Museum's ArchLab and learn about its archaeology collections in the Visitor Center gallery. It is an exciting time for public archaeology at Plimoth Plantation as the Museum leverages new discoveries and technology to further its founder's vision of using historical archaeology to study, explain, and present the seventeenth century to a modern audience.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Early Excavations Around the Globe
- ▶ Museum Education and Archaeology
- ▶ Public Archaeology, The Move Towards

References

Beaudry, Mary, and Douglas George. 1987. Old data, new findings: 1940s archaeology at Plymouth reexamined. *American Archeology* 6: 20–30.

Beaudry, Mary, Karin Goldstein, and Craig Chartier. 2003. Archaeology of Plymouth Colony in Massachusetts. In Tuck, James A. and Barry Gaulton, eds. *Avalon Chronicles: The English in America 1497–1696*, 8: 155–186.

Catling, Christopher, and Paul Bahn. 2009. *The complete practical encyclopedia of archaeology*. London: Hermes House.

Deetz, James. 1977. *In small things forgotten: The archaeology of early American life*. New York: Anchor Books.

Deetz, James, and Patricia Scott Deetz. 2000. *The times of their lives: Life, love, and death in Plymouth Colony*. New York: W. H. Freeman and Company.

Gomes, Peter J. 1985. Henry Hornblower II. *Proceedings of the Massachusetts Historical Society* 97: 157–160.

Heath, Dwight B., ed. 1963. *Mourt's Relation: A Journal of the Pilgrims at Plymouth*. Bedford: Applewood Books.

Society for American Archaeology. n.d. Public archaeology. http://www.saa.org/ForthePublic/ForArchaeologists/PublicArchaeologyis/tabid/261/Default.aspx. Accessed 29 Jan 2018.

Poland: Cultural Heritage Management

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Introduction

Polish archaeology belongs to the Central European school of archaeological thought (e.g., Härke 2002; Marciniak 2006). It is a specific version of the culture-historical school characterized by diffusion and migration as major causative factors of culture change, spatial and temporal dimensions of material culture presented in the form of archaeological cultures and research strategies applying principles of inductionism and empiricism and concentrated upon describing and cataloguing empirical material, typological methods, and relative chronology. It has deliberately avoided any substantial theoretical debate.

Historical Background

Archaeology practiced in communist-governed Poland (1945–1989) was a state-funded discipline divided into four sectors with clearly defined roles and duties. These comprised (1) the Polish

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Academy of Sciences in charge of conducting research and setting up academic standards, (2) university departments responsible for education supplemented by research activities, (3) museums aimed at handling collections and presenting them to the public, and (4) a state heritage body known as the Centers for Monument Protection to protect and manage archaeological materials and conduct small-scale rescue excavations. Protection of archaeological sites and objects was regarded as a relatively unproblematic and straightforward enterprise but treated with little esteem by the archaeological community, the politicians, and the general public alike.

Polish archaeology as well as cultural and archaeological heritage management policies and practices changed dramatically over the last two decades following the collapse of the Iron Curtain and the Poland's ascension to the European Union. This period has been marked by the implementation of European regulations and development of a new doctrine of archaeological heritage. It is further characterized by greater destruction of this heritage due to unprecedented large-scale large investments, intensive agriculture, commercialization, and new dimensions of public engagement (see also Lozny 1998; Kobyliński 2001a: 17). These developments led to the replacement of the hierarchical system of practicing archaeology by the application of neoliberal solutions in the archaeological heritage sector (Marciniak 2011). Investors became major sponsors of archaeological works and the market became a driving force in the archaeological practice.

Key Issues

Cultural and Archaeological Heritage Management

The idea of cultural heritage management was introduced in the post-1989 period following a steady move of funding responsibilities from the state to private developers. The concept of "management" implies decision making regarding the aims and means of attaining certain goals, selection of priorities, and a holistic approach to the research process. Managerial decisions based on argued presentation and justification has led to important changes in capturing archaeological data and assessing their significance and value. It also brought about new concerns regarding professional standards and accountability.

One of major developments in this period was increasing awareness of rapid destruction of archaeological sites and objects. Archaeologists have slowly become aware of their own responsibility to protect them (Kobyliński 2001a: 19). This has resulted in departing from hitherto used term "archaeological record" and replacing it by "archaeological heritage." It has been defined by as a finite nonrenewable physical and material resource. Each element of this heritage arguably possesses a unique value and collectively contributes to the cultural richness of the country and increasing understanding and knowledge of past societies. Consequently, archaeological substance has shifted from the scientific to the public domain and has been ascribed its cultural and social significance (Kobyliński 2001b: 77). Archaeology as a discipline began to be perceived and practiced as a public service. Protection and management of archaeological heritage is then no longer a matter of concern of the academic community but the public at large.

Legal Framework of Protection and Management of Archaeological Heritage in Poland

The last decade of the twentieth century brought about the emergence of a number of significant charters and conventions dealing with the conservation and preservation of cultural heritage issued by ICOMOS and the Council of Europe. They offered responses to emerging conservation and heritage issues. The questions they raised had a profound impact upon establishing a new doctrine of archaeological heritage in Poland as well as across Europe more generally. Particularly important were the 1990 ICOMOS *Charter for the Protection* and Management of the Archaeological Heritage (Lausanne Charter) and the European Convention on the Protection of the Archaeological Heritage of 1992 (Malta Convention). They defined policies for the protection of the

archaeological heritage as constituting an integral component of policies relating to land use, development, and planning as well as of cultural, environmental, and educational policies at international, national, regional, and local levels. Less influential proved to be the 2000 Council of Europe's European Landscape Convention addressing protection, management, and enhancement of the European landscape.

Implementation of numerous issues advocated by these conventions has significantly broadened and strengthened the goals of archaeology to include, alongside research and valorization, also the integrated management, protection, and promotion of common shared archaeological heritage. Sites need be integrated within the historic landscape, viewed holistically and not any longer perceived as consisting of only monumental objects. This approach can be seen as an outline of the new Polish doctrine of archaeological heritage.

These issues were combined in new legislation known as the Protection of Monuments and the Guardianship of Monuments Act, which was passed by the Polish parliament in 2003. The provisions of the Act stipulate that all archaeological sites regardless their quality and significance are protected by law. Investors have been officially obliged to cover all costs of preventive archaeological works including excavations, documentation, analysis, and publication of the results. Their research standards should remain identical to that of research projects. It is required that excavated materials are professionally analyzed and preferably published. They need to undergo proper conservation, whenever needed. A legislative framework for large-scale rescue projects is provided by the Space Management and the Building and Construction Act as well as the Law for Highway Constructions in Poland, both passed in 1994.

Institutional Framework of Protection and Management of Archaeological Heritage in Poland

The new legislation led to considerable changes in the organizational structure of institutions responsible for protection and management of archaeological heritage, in particular in the context of the dynamically growing number of preventive archaeology projects. This structure, however, has been in a constant flux resulting from different solutions put forward by subsequent governments. Consequently, an effective administrative system in this domain is still lacking. At present, there are two major institutions responsible for protection and management of cultural and archaeological heritage operating within two different administrative contexts.

The National Heritage Board of Poland is the state agency responsible for the national heritage. The office reports directly to the Minister of Culture and National Heritage. It is officially responsible for implementing the State's policy in the domain of national heritage. Its major objectives comprise setting up standards in the protection of national heritage, recording, documenting, and maintaining this heritage, and presenting it to the public.

At the same time, protection and management of cultural and archaeological heritage is the sole responsibility of the offices of the Provincial Conservator of Monuments operating in each of the country's 16 country provinces. They are responsible to the Provincial Governor, who himself is responsible to the Prime Minister. These offices are in charge of preparing and implementing the system of protection of culture heritage in their regions, collecting and archiving information about this heritage, monitoring existing cultural resources and integrating cultural heritage with natural landscape, spatial planning, and urban development. They are also responsible for issuing excavation permits and supervising all archaeological works.

Two contradictory solutions were also proposed in regard to management of large-scale preventive excavation projects. The first model assumed a leading role for a special institution operating under the auspices of the Ministry of Culture and National Heritage. It was in charge of selecting the contractor for archaeological works and their subsequent control. The provincial conservator offices were only responsible for issuing formal permits and remained in fact excluded from the decision making regarding other

elements of the project. The second model allocated a leading role in these projects to the provincial conservation offices. In both models, some degree of professional control over standards and quality of preventive works was retained.

The current situation is considerably different. A special central governmental body responsible for large-scale preventive works no longer exists. The National Heritage Board of Poland in fact decided to withdraw from this duty leaving a vacuum with no independent quality control of works conducted during large-scale infrastructure projects by any external professional body. Selecting the contractor for archaeological work is now exclusively in hands of the investor. Controlling and reviewing responsibilities of such work are conducted by the investor-appointed committees made up of investor-employed administrative staff, including archaeologists. This obviously rules out objectivity and neutrality of quality control.

Preventive Archaeology in Large-Scale Infrastructure Projects

The last 20 years were marked by huge infrastructure projects that demanded large-scale preventive excavations in association with pan-European and national investments. In particular, these comprised the pipeline from Siberia to Western Europe and the network of highways and expressways.

Preventive excavations related to the construction of the gas pipe in the early 1990s was the first major undertaking in the post-1989 period. It was carried out under the legal provisions established during the communist period but the wealthy Polish-Russian investor – EuroPolGaz – expressed good will and agreed to finance all archaeological works. The inception of gas pipeline preventive excavation projects initiated serious discussions on legal, organizational, and methodological standards of fieldwork and their implementation in practice. More generally, they set a precedent for the formulation of a new doctrine for the conservation and protection of archaeological heritage in the country. After some modifications, it was later implemented during highways projects.

The Polish highway program was passed in June 1995 and has been aimed at construction of 2,300 km of highways along with numerous expressways. Archaeological preventive excavations have been conducted in a strip of 80–100 m wide and have been pursued continuously since 1997. This huge undertaking involves a complex program which aims to detect, investigate, and document archaeological sites threatened by adverse effects due to scheduled constructions.

Large-scale infrastructure projects associated with these investments, built mainly by public and private investors largely in the Build-Operate-Transfer system, demanded preventive excavations and contributed to the commercialization of archaeological activities. This shift is manifested in the emergence of a large number of private archaeological companies, a tendency reported also in other countries of the region.

Major Challenges in Protection and Management Archaeological Heritage in Poland

Large infrastructure projects demanding archaeological works of unprecedented scale has rapidly and significantly reshaped Polish archaeology and created many unforeseen consequences. The discipline has been confronted with a huge number of excavations to be conducted at a fast pace and at a scale never experienced before. As a result, the vast majority of archaeological fieldwork in present-day Poland is almost exclusively carried out within the framework of preventive archaeology before the planned infrastructural projects. This includes survey, evaluation, recording, non-invasive prospection, and excavations.

One of the consequences of these developments is commercialization of the archaeological profession. The demand for contract work led to the setting up of numerous private archaeological firms and the emergence of a new and previously unknown category of professional group on the market. This move can undoubtedly be regarded as almost "revolutionary," especially considering the previously dominant model of small, almost "family" excavations.

With the advent of free-market regulations, the contractor is now being chosen on a commercial

basis in a system of tendering in which the decisive factor is exclusively the proposed price. Offers proposed by private firms are commonly chosen due to their lower costs and possibility to complete allocated tasks in increasingly shorter time slots. Academic institutions are slowly being removed from this market.

The increasingly tight financial conditions and extremely short periods for preventive archaeology work make it clear that an implementation of the standard research routines is difficult to achieve. For example, in one of the 2009 tenders for archaeological works, the investor required excavations of 25 ha be completed in a period of 3 months. In September 2008, in order to speed up the construction of highways in Poland, the General Directorate for National Roads and Motorways – the major investor – passed a law requiring a decision of the placement of any highway or expressway be linked with the permission for its construction. This means that all stages of archaeological works (e.g., survey, evaluation, legal and administrative procedures, as well as excavations) are to inevitably coincide with construction works.

To comply with increasingly tight requirements and lower tenders offered by the contractor, archaeological firms reduce a number of professional analyses they do and lower the standards of scientific documentation in order to accelerate the archaeological works and maintain the same level of income. Consequently, the quality of some of these works is below acceptable standards. Another unacceptable practice involves a deliberate falsifying of archaeological documentation to report an incorrect number of features. This situation led also to a growing number of unpublished archaeological data obtained during these excavations (see also Kobyliński 2006: 229–230). Unfortunately, neither the National Heritage Board of Poland nor provincial conservation offices have the necessary tools and resources to stop unethical and illegal practices.

The last two decades also marked the use of archaeological evidence for the creation of collective memories of local communities but in a manner different from past uses when archaeology was used to justify nationalistic claims. The public has become increasingly recognized as a stakeholder in the decision-making process regarding heritage management and its role as a consumer of the products of archaeological activity is apparent. Advances in information technology have enforced greater openness of archaeological activities and resulted in the breakdown of the previously dominant elitist attitudes of the professional archaeological circles.

This tendency has been manifested in a rapidly growing number of popular open-air festivals and fairs. The largest of them takes place annually in Biskupin, the icon of Polish archaeology, and has become a model for similar events organized by local museums across Poland. The first festival in Biskupin was organized in 1995 and was attended by c. 50,000 visitors (Brzeziński 1998: 499), and the number of spectators in succeeding years increased. The festivals proved to be commercially successful, though their anticipated educational functions have largely remained unmet. In order to attract visitors there is a tendency to create a mélange of various episodes from the past. Thus, the ancient Egyptians interact with the Slavs reenacting their medieval appearance, who themselves stand next to the prehistoric flint knappers. Serious public outreach projects do not exist.

Future Directions

Developments in protection and management of cultural and archaeological heritage are very dynamic in Poland. These processes have been recently further shaped by the global crisis and its consequences. Its impact on archaeology in Poland to date has not been as significant as in other countries in Europe and worldwide. Its effects has been diminished by a large number of continuing highway and expressway projects in relation to the Euro 2012 soccer tournament as well as a relatively good situation in the housing construction sector and real estate market.

Rapid changes in the last two decades led to absolute domination of private firms on the market of preventive archaeology contracts. Academic archaeology has had to accept that a vast majority of field activities has already been

undertaken beyond its control. This milieu needs to work out an efficient strategy of accommodating the rapidly growing number of archaeological materials that need to be systematically studied, published, and properly stored.

In overall, the last two decades in protection and management of cultural and archaeological heritage in Poland have been characterized by emergence of new challenges solutions but also by a series of unresolved problems and issues. The legal and organizational framework remains imprecise and malfunctioned in places. There is no professional institution in charge of setting up, effectively controlling and enforcing standards of preventive works, and public procurement law and free-market regulations are unclear contributing to lowering standards and quality of archaeological works.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ European Association of Archaeologists (EAA)
- ▶ Heritage Theory
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ Nationalism and Archaeology: Overview
- ▶ Stakeholders and Community Participation
- ▶ UNESCO (1972) and Malta (1992) Conventions

References

Brzeziński, W. 1998. Museum archaeology and the protection of the archaeological heritage in Poland. In *Theory and practice of archaeological research, Volume III: Dialogue with the data. The archaeology of complex societies and its context in the '90s*, ed. W. Hensel, S. Tabaczyński, and P. Urbańczyk, 496–503. Warsaw: Institute of Archaeology and Ethnology Polish Academy of Sciences.

Härke, H. 2002. The German experience. In *Archaeology, ideology and society. The German experience*, ed. H. Härke, 2nd rev. ed., 13–40. Frankfurt am Main: Peter Lang.

Kobyliński, Z. 2001a. Quo vadis archaeologia? Introductory remarks. In *Quo vadis archaeologia? Whither European archaeology in the 21st century?* ed. Z. Kobyliński, 17–20. Warsaw: Institute of Archaeology and Ethnology Polish Academy of Sciences.

Kobyliński, Z. 2001b. Archaeological sources and archaeological heritage. New vision of the subject matter of archaeology. In *Quo vadis archaeologia Whither European archaeology in the 21st century?* ed. Z. Kobyliński, 76–82. Warsaw: Institute of Archaeology and Ethnology Polish Academy of Sciences.

Kobyliński, Z. 2006. Protection, maintenance and enhancement of cultural landscapes in changing social, political and economical reality in Poland. In *Landscapes under pressure. Theory and practice of cultural heritage research and preservation*, ed. L. Lozny, 207–236. New York: Kluwer/Plenum.

Lozny, L. 1998. Public archaeology or archaeology for the public? In *Theory and practice of archaeological research, Volume III: Dialogue with the data. The archaeology of complex societies and its context in the '90s*, ed. W. Hensel, S. Tabaczyński, and P. Urbańczyk, 431–459. Warsaw: Institute of Archaeology and Ethnology Polish Academy of Sciences.

Marciniak, A. 2006. Central European archaeology at the crossroads. In *A future for archaeology. The past in the present*, ed. R. Layton, S. Shennan, and P. Stone, 157–171. London: UCL Press.

Marciniak, A. 2011. Contemporary Polish archaeology in global context. In *Comparative archaeologies. A sociological view of the science of the past*, ed. L.R. Lozny, 179–194. New York: Springer.

Further Reading

Barford, P.M. 2002. East is East and West is West? Power and paradigm in European archaeology. In *Archaeologies of Europe. Histories, methods and theories*, ed. P.-F. Biehl, A. Gramsch, and A. Marciniak, 77–97. Münster: Waxmann Verlag.

Barford, P.M., and Z. Kobyliński. 1998. Protecting the archaeological heritage in Poland at the end of the 1990s. In *Theory and practice of archaeological research, Volume III: Dialogue with the data. The archaeology of complex societies and its context in the '90s*, ed. W. Hensel, S. Tabaczyński, and P. Urbańczyk, 461–482. Warsaw: Institute of Archaeology and Ethnology Polish Academy of Sciences.

Biehl, P.F., A. Gramsch, and A. Marciniak. 2002. Archaeologies of Europe: Histories and identities. An introduction. In *Archaeologies of Europe. Histories, methods and theories*, ed. P.F. Biehl, A. Gramsch, and A. Marciniak, 25–31. Münster: Waxmann Verlag.

Lech, J. 1997/1998. Between captivity and freedom: Polish archaeology in the 20th century. *Archaeologia Polona* 35–36: 25–222.

Marciniak, A., and M. Pawleta. 2010. Archaeology in crisis: The case of Poland. In *Archaeology and the global economic crisis. Multiple impacts, possible*, ed. N. Schlanger and K. Aitchison, 87–96. Tervuren: Culture Lab Editions.

Polar Expeditions (South) in Archaeology

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Introduction

The extreme isolation, hostile environment, and the lack of human native population were factors that contributed to the understanding of Antarctica as a distant, inaccessible space empty of people and things. However, since its discovery in the early nineteenth century, expeditions were sent from different continents aimed at geographical exploration as well as commercial exploitation of its maritime resources. Archaeological sites on the continent and its surrounding islands are relatively recent and widely scattered and often relate to a single purpose use at a single point in time. They represent the remains of the limited range of human activities developed in Antarctica such as exploration, sealing, whaling, and scientific research. The conservation of historic sites, such as building, shipwrecks, and artifacts of the polar expeditions were a matter of concern since the signature of the Antarctic Treaty in 1959. Archaeology began in the late 1970s with a focus on the conservation of huts left by the expeditions associated to the Heroic Era of Antarctic Exploration. Since the 1980s, the South Shetland Islands region has shown a diversification of topics of interest including the study of the nineteenth-century sealing and whaling expeditions. Those research projects framed in academic research designs, and not driven by the needs of practical conservation, have moved archaeology into theory-driven research questions and multidisciplinary approaches. Archaeological research has been part of the complex heritage making process in Antarctica.

Definition

Antarctica is a vast continent managed and protected by the Antarctic Treaty. The Antarctic Treaty, signed in 1959 and entered into force in 1961, regulates international relations with respect to land and ice shelves located south of 60° S. Measures, decisions, and resolutions, which are adopted at the Antarctic Treaty Consultative Meetings (ATCMs) by consensus of the signatory states, give effect to the principles of the Antarctic Treaty and provide regulations and guidelines for the management of the Antarctic Treaty area.

Antarctica is the earth's only continent without native population, and human presence in Antarctica has been limited to the last 200 years. Because of this, human activities there have been centered around "expeditions," generally understood as journeys undertaken by a group of people with a particular purpose. Since the discovery of Antarctica in the early nineteenth century, expeditions have been sent there with multiple purposes, such as geographical exploration, scientific research, or commercial exploitation. Currently, under the agreements of the Antarctic Treaty System, the continent is devoted to peace and science, and expeditions are mainly either part of research actions organized by national programs or part of tourism activities. Due to its extreme climate, isolation, and distance, all – past and present – human activities in Antarctica face logistical and technical challenges.

Archaeology of polar expeditions involves a planned process of research, conservation, and management, led by professional archaeologists. Predominantly, it is focused on terrestrial sites that are expensive to study, given their isolated location, difficult access, and climatic conditions. Archaeology as an academic and professional field is very closely connected to material culture studies, historical research, architectural and naval history, and heritage studies. Archaeological practices are also associated with heritage

practices used to ascribe meaning and significance to human history in the polar regions.

Historical Background

Antarctic History

At the beginning of nineteenth century, explorers' descriptions of the Southern Seas aroused interest in the potential exploitation of their marine resources. Sealing and preindustrial whaling expeditions were sent by companies based in Australia, Europe, North America, and South America that contributed to the discovery of the South Shetland Islands in 1819. Since that moment, exploration campaigns organized by different governments were sent with the main purpose of performing geographical surveys. Cap. Thaddeus von Bellingshausen, who commanded Russia's first government-sponsored Antarctic expedition, reported significant discoveries on the Antarctic Peninsula area in 1819–1821. Other national exploratory expeditions were simultaneously launched by France, Great Britain, and the United States in the late 1830s. The expeditions of Capt. Jules Dumont D'Urville, Capt. James Clark Ross, and Capt. Charles Wilkes, who spent between two and three austral seasons in their voyages, continued making scientific observations and contributing to the charting of the Antarctic coastline.

Exploration and exploitation were often hand in hand, as expeditions that combined geographical discoveries and commercial interests were not uncommon. During the 1820s, many expeditions visited Antarctica such as those led by Capt. Benjamin Pendleton, Capt. Nathaniel Palmer, and Capt. James Weddell who inaugurated the involvement of the Samuel Enderby & Sons whaling and sealing company, which continued throughout the 1830s. The German expedition under the command of Capt. Eduard Dallmann in the 1870s was a later example of combining sealing with exploration.

Although the nineteenth century is often recognized mainly as a period of early exploration and coastal recognition, groups of sealers also landed and built their camps and shelters on the shore during the summer season at that time. Their ships were present in Antarctica during most of the nineteenth century until the end of 1880, with an uncertain starting date for this activity.

The 1890s marked the beginning of the Heroic Era of Exploration, a period of extensive Antarctic exploration sponsored by scientific societies. After the resolution adopted in the Sixth International Geographical Congress (London, 1895), exploring expeditions from nine different countries were sent to the continent. These expeditions were based on international cooperation and included researchers and explorers from different countries in a party. They had to work with complex logistics involving leaving parties that wintered in the Antarctic mainland. At that time, Antarctica was explored by Lt. Adrien de Gerlache (1897–1899) from Belgium, the British Southern Cross Expedition led by Carsten E. Borchgrevink (1898–1900), the German South Polar Expedition by Prof. Erich von Drygalski (1901–1903), the Swedish South Polar Expedition under Dr. Otto Nordenskjöld (1901–1904), the Scottish National Antarctic Expedition led by Dr. William S. Bruce (1902–1904), and two French Antarctic Expeditions led by Dr. Jean Baptiste Charcot (1903–1905 and 1908–1910). Other expeditions included the Japanese Antarctic Expedition under Lt. Nobu Shirase (1911–1912), the second German Antarctic Expedition led by Dr. Wilhelm Filchner (1911–1912), and the Australasian Antarctic Expedition by Douglas Mawson (1911–1914) (Headland 1989).

The early twentieth century was characterized by long island journeys, and several expeditions set their eyes on the objective of reaching the South Pole. Captain Robert F. Scott led the National Antarctic Expedition (1901–1904) and Lt. Ernest H. Shackleton the British Antarctic Expedition (1907–1909). The goal was finally achieved by the Norwegian Antarctic Expedition (1910–1912) commanded by Roald Amundsen, and the British Antarctic Expedition (1910–1913) led by Capt. Robert Falcon Scott. Symbolically, the arrival at the South Pole, and the failed Imperial Trans-Antarctic Expedition (1914–1917) under the command of Ernest Shackleton, marked the end of the Heroic Era of Antarctic Exploration. The stories of this period

involved a number of people of many countries not only the crews of the national and scientific expeditions but also those of the rescue expeditions which were sent from countries such as Argentina and Chile when the parties encountered problems to come back from Antarctica.

The most widely spread versions of the history of Antarctica focus their attention on this Heroic Era. Nevertheless 1890s is also the starting point of the industrial whaling exploitation in Antarctica, when Norwegian and Scottish whaling firms, with the contribution and investment of capitalists from different countries, sent ships to investigate the possibilities of whaling around the Antarctic Peninsula. This marked the beginning of a new period of exploitation – industrial whaling – that had a great impact on the Antarctic environment, including the settlement of a permanent factory in the South Shetland Islands (Fig. 1). The data officially registered mention imposing figures regarding the facilities in Antarctica, including floating factories, shore factories, and factory ships and catchers, as well as the number of whales hunted from 1906 to 1930.

During the twentieth century, technological innovation permitted different ways of exploring Antarctica and reaching remote locations such as the first flight to the South Pole and back launched by the American naval officer Richard Byrd in 1929. After the Second World War, scientific research and exploration of the Antarctic continent increased, and other activities such as tourism and modern fishing and whaling began. The exploitation of marine resources continued unhindered until the restrictions and regulations established by several conventions of the Antarctic Treaty that started limiting these activities in the late 1970s and the early 1980s. As a result of the International Geophysical Year (1957–1958), a great number of research expeditions were organized, and more than 50 stations were established. Since then, the development of scientific programs has been growing, spreading, and diversifying as well as the human presence and the material infrastructure required for supporting them.

Antarctic Archaeology

Many of the expeditions sent to Antarctica during the nineteenth and twentieth centuries left material remains that could be studied from archaeological research perspectives. The conservation of historic sites, such as building, shipwrecks, and artifacts of the polar expeditions, were a matter of concern of the Antarctic Treaty. When the Treaty was signed, some particular sites and artifacts were considered to have significant heritage values and different countries committed to

Polar Expeditions (South) in Archaeology, Fig. 1 Remains of the Hektor whaling station at Whalers Bay, Deception Island, South Shetland Islands. (Photo Maria Ximena Senatore 2004)

preserve and manage them. As a result, in 1972, the list of Antarctic Historic Sites and Monuments (HSMs) was created, and any party of the Antarctic Treaty could propose a historic site to be listed. The number of sites included, as well as the legal framework and criteria set to designate and manage them, has been modified following the agreements achieved on the Antarctic Treaty.

In the context of the awareness of the need of preserving historical sites, archaeology began in the late 1970s with a focus on the conservation of huts associated with the Heroic Era of Exploration. Before that, archaeological techniques were used for helping in the process of identification and conservation of historic buildings, as well as in the recovery of artifacts for museum collections (Fig. 2). Pearson has characterized the beginning of archaeology in Antarctica as "The Hut Caretaker Era" in which the vast bulk of the archaeological work has been undertaken in relation to "the removal of ice from inside and around historic buildings, and the excavation, often through ice, of accumulated material inside huts, as well as of stores boxes and caches outside huts" (Pearson 2011: 29).

In the Ross Sea region, New Zealand began actions in the 1960s on the Scott's Discovery Hut, the Scott's Cape Evans Hut, and the Borchgrevink's Hut at Cape Adare with emphasis on restoration for exhibition (Harrowfield 1992). In 1977, artifacts were removed from ice Scott's Huts with the purpose of conservation In the 1980s the first major systematic professional archaeological excavation in the Ross Sea region was undertaken by Neville Ritchie and Nelson Cross at Cape Evans in 1987–1988 and 1988–1989. They introduced new technologies for archaeological excavations on ice. Since 2006 the conservation-related work continued throughout the present led by the New Zealand Antarctic Trust developing a comprehensive monitoring and maintenance program of work in place. Over 60 international heritage and conservation specialists have been engaged in the conservation of four historic bases, and more than 18,000 artifacts found there (i.e., Shackleton's 1908 base, Scott's last expedition base at Cape Evans, Scott's first expedition base at Hut Point, and Hillary's Hut at Scott Base).

In the Commonwealth Bay region, the removal of ice and reparation of the Douglas Mawson's Hut began in 1978 with no archaeologist in the party (Ledinghan 1979). In the mid-1980s, the Project Blizzard – a private party – carried out two expeditions to the site, in 1984–1985 and 1985–1986. In the first one, their work involved recording of structures by surveyors, architects, archaeologists, and a material conservator. Project

Polar Expeditions (South) in Archaeology, Fig. 2 Snow Hill Hut used by the Swedish South Polar Expedition under Dr. Otto Nordenskjöld (1901–1904). (Photo Maria Victoria Nuviala 2008)

Blizzard continued with the removal of ice from the hut and inaugurated for the first time in Antarctica the combination of archaeology and conservation in the same team – archaeologists Estelle Lazer and Angela McGowan and conservation specialist Janet Hughes – with methodological innovations that were appropriate to the extreme environment (McGowan 1987). In 1986–1987 the archaeologist Michel Pearson undertook recording work at the site for the Australian Heritage Commission leading the first conservation management plan for the Mawson's Hut site in 1991. The Mawson's Hut Foundation, in cooperation with the Australian Heritage Commission and the Australian Antarctic Division, funded several conservation expeditions to Cape Denison. In this context, noninvasive techniques were conducted such as terrestrial ground-penetrating radar and magnetometer surveys in 2009 and 2010 for the localization of specific artifacts (Henderson 2010). As a result of the research process, the management plan of the area has been regularly updated.

In the Antarctic Peninsula region, "The Hut Caretaker Era" began in the late 1970s with actions of reparation of the buildings and the retrieval of artifacts left by the Swedish South Polar Expedition under Otto Nordenskjöld. The actions began in 1979–1980 in the Snow Hill Hut (Comerci 1983) and later extended to Paulet Island stone shelter and Hope Bay stone shelter. The projects were developed by the Instituto Antártico Argentino with no archaeologist involved at all on it for more than 20 years. In the late 2000s, a conservator and the archaeologist Victoria Nuviala visited the Snow Hill Hut for the first time to organize an inventory and develop in situ preventive conservation of the artifacts collected previously and stored at the hut. The professional work finished and the reports of it were presented in the frame of the ATCM in 2010.

In the South Shetland Islands region, archaeological research has shown a diversification of topics of interest and ways of understanding archaeology. The research projects developed there were focused on the expeditions sent to Antarctica for commercial interest as sealing and whaling. In Livingston Island geologists Ron Lewis Smith and Hugh Simpsom recorded sites and collected artifacts belonging to sealing expeditions from 1950 to 1980 (Lewis Smith and Simpson 1987). It was the first notice of the identification of sealing huts settled along the South Shetland coastline, but archaeologists were not involved in this work. In the 1990s Hacquebord surveyed the whaling station at Whalers Bay in Deception Island that was in use in the first decades of the twentieth century and contributed to the elaboration of a management plan (Hacquebord 1992).

Archaeological research focused on nineteenth-century sealers-whalers' occupation in the South Shetland Islands framed in academic research designs not driven by the needs of practical conservation has been developed for the last three decades. The excavations of the Chilean archaeologist Ruben Stehberg began in the 1980s and were the first professional archaeological work in the Antarctic Peninsula sector (Stehberg 2003). In the 1990s the Spanish archaeologist Manuel Martin Bueno joint the Stehberg project in the South Shetland Islands to search unsuccessfully the remains of the Spanish Navio San Telmo that went missing in 1819 crossing the Cape Horn. Since then, no underwater archaeological investigation has yet taken place.

The work of the Argentinian archaeologists Maria Ximena Senatore and Andres Zarankin in the 1990s has moved archaeology into theory-driven research questions (e.g., Zarankin and Senatore 2005). Subsequently Stehberg joint the Australian archaeologist Michael Pearson and began a period of international cooperation with Senatore and Zarankin sharing information, databases, publications, and fieldworks organized by the Instituto Antártico Chileno (e.g., Pearson et al. 2008). During that period more than 30 of these sites have been found and marked along the coasts of the South Shetland Islands (Fig. 3). Some of these have been excavated and studied in more detail providing information about sealer's everyday experiences in land and the connections between sealing-whaling expeditions to capitalism expansion (e.g., Pearson and Stehberg 2006; Stehberg 2003; Zarankin and Senatore 2005). In the 2010s several fieldworks began to be organized by Programa Antártico Brasileiro and new lines of research in archaeology

Polar Expeditions (South) in Archaeology, Fig. 3 Excavated archaeological site belonging to nineteenth century sealers' hut in Peninsula Byers, Livingston Island, South Shetland Islands. (Photo Maria Ximena Senatore 1996)

and anthropology arose led by the Universidade Federal de Minas Gerais. Some of the sites recorded and surveyed in the 1990s and 2000s were excavated. Pioneering site recording laser scanning methods began to be used (Zarankin et al. 2011) and perspectives that combined interpretative archaeology and hermeneutic approaches to the sealing life on the camps were developed (Zarankin and Salerno 2016). The archaeological samples that have been collected along the three decades have been studied by associated researchers as part of zooarchaeological studies (e.g., Cartajena and Labarca 2007; Muñoz 2000), geoarchaeology (e.g., Villagran and Schafer 2011), and other artifacts studies (e.g., Moreno 2000; Stehberg et al. 2009).

Collectively, archaeological research in the South Shetland Islands has contributed to the understanding of the nineteenth century in Antarctica in a global, regional, and local scale (i.e., the effects of the process of capitalism expansion to remotes and unknown places, the role of sealing and whaling in the early exploration of Antarctica, and the everyday life in the sealing camps). For an overview of the academic production and data published on the sealing archaeology in the islands and the contribution that archaeological studies offered for the characterization of the sealing strategies during the nineteenth century, see Senatore (2018). In the 2000s, the conservation and management of nineteenth century archaeological sites have become a matter of concern for the scientific teams involved, as none of the sealing archaeological sites have been designated among the HSMs in the frame of the Antarctic Treaty (e.g., Pearson et al. 2010; Senatore and Zarankin 2011).

Key Issues/Current Debates

Key issues with archaeology of polar expeditions are linked to the role that archaeology and material culture studies are playing in the Antarctic heritage making process and the development of academic archaeology in Antarctica.

Heritage making process in Antarctica is a complex process that involves multiple levels (i.e., international, national, individual) and context (e.g., policy-making, tourism, scientific research). The Antarctic Treaty System, based on international agreements, offers the main context in which heritage-making occurs. Policies on heritage management and protective mechanisms available have been applied on the basis of the assessment of heritage values to sites and artifacts. In this context, archaeology has long been a valuable tool in the conservation of Antarctic heritage sites, especially in the sites associated to the Heroic Era of Exploration. However "the extent to which academically oriented archaeological research might further enhance the understanding

of the importance of the heritage sites has yet to be clearly demonstrated as so little academic work has been carried out to date" (Pearson 2011: 30).

The "rubbish or artefact dilemma" (Pearson 2004) was an example that expressed the concern of archaeologists about the negative impact that the measures taken under the Antarctic Treaty System could have in the material culture of Antarctica (Evans 2011; Roura 2008). In the late 1990s when Annex III of the Madrid Protocol entered into force, the Parties committed to removing wastes from Antarctica, and the remains of past activities not protected were subject to be removed. The "Guidelines for Handling of Pre-1958 Historic Remains whose existence or present location is not known" has provided interim protection of artifacts/sites predated 1958 until the Parties have had time to assess their significance and consider their inclusion into the protection system. In 2002 the Annex V on Area Protection and Management of The Madrid Protocol entered into force as the legal framework for the protection of Antarctic historic sites. Later, more specific criteria for the designation of sites were established by the "Guidelines for the designation and protection of Historic Sites and Monuments" in Resolution 3 (2009).

Even though the designation of HSM is aiming at the conservation of the common inheritance of all nations, this protective mechanism could be used as a way of asserting national interest on the continent. Antarctic heritage discourses and practices are part of a complex political negotiation process in which the uses of material culture in the present have political consequences. Archaeologist and other social scientists are developing perspectives to study the meaning that material culture has in the context of the Antarctic Treaty System and in relation to nationalist discourses (e.g., Avango 2016).

Archaeological studies in Antarctica have made interesting contributions questioning dominant narratives of Antarctic history. There is a conceptualization of History in terms of exploration versus exploitation, even though they were connected. The narratives associated with exploration definitely play the leading role whereas those related to the exploitation of sea resources are subdued or simply omitted. They are often organized as a sequence of facts related to well-known characters at precise dates, and linked to national identity implications. In contrast sealing and whaling expeditions of anonymous characters, no precise dates or no memorable events, are not being link to national identities. Antarctic HSMs could be understood as a material dimension of the dominant narratives of Antarctic history. These selected remains, with a great emphasis on the huts of the Heroic Era, are considered to have heritage values as they represent the most valuable period of the Antarctic History. Their conservation has been, in consequence, naturally assumed as a duty. In contrast to this, the widely dispersed material remains linked to past exploitation activities of whaling and sealing are only scarcely considered in the conservation agenda of the Antarctic Treaty. Despite historic sealers and whalers' sites and remains not being included in the scope of Antarctic Heritage in the frame of the Antarctic Treaty, they have been focus of archaeological academic research in the South Shetland Islands since 1980s (Fig. 4). Archaeologists are proposing that the heritage values of oldest archeological sites are associated to being an irreplaceable part of the research process. Their conservation is needed for current and future studies about the human past in Antarctica. From that perspective, archaeologists are offering different basis for the assessment of heritage values to sites and artifacts.

International Perspectives

Under the Antarctic Treaty System, the Antarctic continent is internationally legislated and managed. In this frame, international cooperation is essential in developing and maintaining standards in the research and management of sites. In accordance with the Treaty, archaeology undertaken in Antarctica is a scientific activity with all results being open-source data. Some agreements among scientific teams are being settled to build shared databases and to design future archives of documentation produced during the development of the research projects on the sites. Finally, since

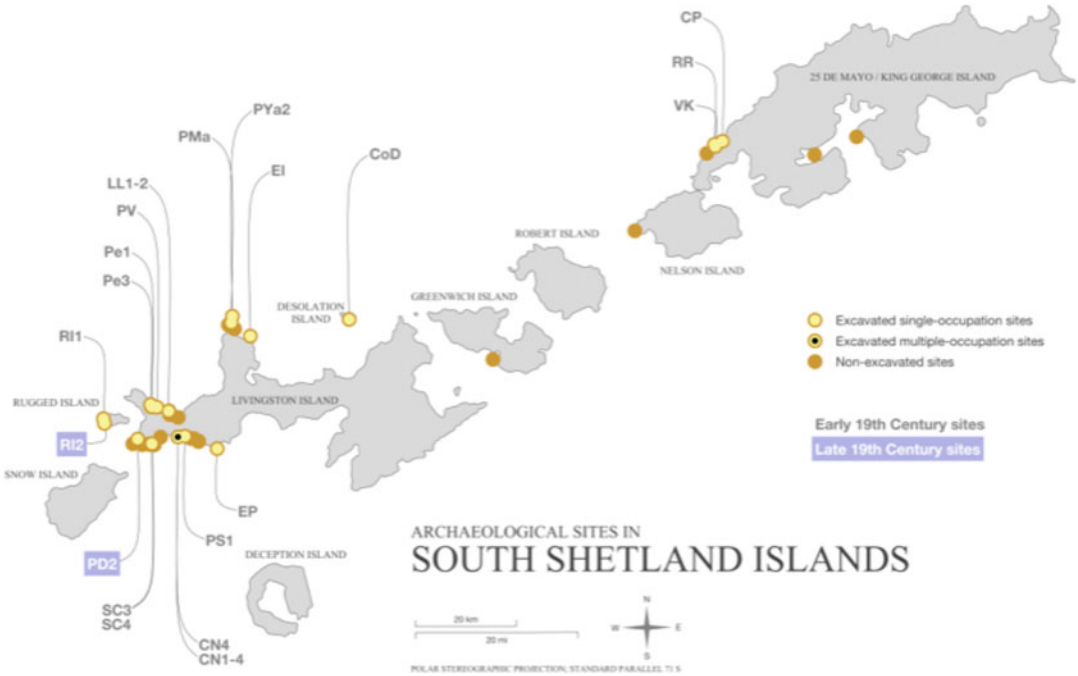

Polar Expeditions (South) in Archaeology, Fig. 4 Map of localization of the archaeological nineteenth-century sealing-whaling sites under research in the South Shetland Islands

the legal framework of the Antarctic Treaty involving research and management of heritage sites is a dynamic process, archaeologists have joint multidisciplinary groups of experts in Polar Heritage to help inform policy-making in Antarctica on heritage-related considerations. The ICOMOS International Polar Heritage Committee (IPHC) has been elaborating guidelines for the management of the archaeological heritage in Antarctica. The IPHC also provides guidelines for ongoing planning for the protection of sites where climate change may have an impact. For current work, see the IPHC website (www.iphc.icomos.org).

Future Directions

The development of academic archaeology projects will result in new perspectives of theoretically informed and science-based archaeological research. This will also drive the increasing of multidisciplinary approaches and the application of scientific techniques to the analysis of archaeological materials. Archaeological research will also continue current trends toward the use of technologies that minimize the impact on the sites, (e.g., ground-penetrating radar, laser scanning, photogrammetry) and reduce the high economic cost and time required to the development of archaeological survey, recording, and excavation in Antarctica (e.g., aerial and satellite remote sensing in archaeology). All this will have a positive impact on the development of new topics of research, especially those of underwater archaeology and contemporary archaeology.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Antarctica: Historical Archaeology
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Contemporary Past, Archaeology of the

▶ Heritage and Archaeology
▶ Modern World: Historical Archaeology
▶ Southern Ocean and Antarctic Maritime Archaeology

References

Avango, D. 2016. Acting artefacts: On the meaning of material culture in Antarctica. In *Antarctica and the humanities*, ed. P. Robert, A. Howkings, and L.-M. van der Watt. London: Palgrave, Macmillan.

Cartajena, I., and R.E. Labarca. 2007. Patrones históricos de cuereo en lobos marinos: la evidencia de los abrigos 1 y 2 de playa Yámana (Isla Livingston, Antártica chilena). *Magallania* 35 (1): 95–105.

Comerci, S. 1983. *Arqueología Antártica. Los trabajos del la República Argentina en la Isla Cerro Nevado durante las campañas antárticas 1979–1980 y 1980–1981*, Contribución 291. Buenos Aires: Dirección Nacional del Antártico, Instituto Antártico Argentino.

Evans, S.L. 2011. Icy heritage: Managing historic sites in the Antarctic. Pristine wilderness, anthropogenic degradation or cultural landscape. *The Polar Journal* 1 (1): 87–100.

Hacquebord, D.L. 1992. Hector station on deception island (South Shetland Islands, Antarctica). An environmental assessment study of a whaling station. *Circumpolar Journal* 7 (1–2): 72–97.

Harrowfield, D.L. 1992. Archaeology of Borchgrevink's stores hut, Cape Adare Antarctica. *New Zealand Journal of Archaeology* 13: 177–197.

Henderson, C. 2010. The search of the Mawson's air tractor. *Australian Antarctic Magazine* 18: 30–32.

Ledinghan, R.B. 1979. Expedition to renovate the 1912–2013 Australian Antarctic expedition base hut. *Polar Record* 19 (122): 485–492.

Lewis Smith, R.I., and H.W. Simpson. 1987. Early nineteenth century sealers' refuges on Livingston Island, South Shetland Islands. *British Antarctic Survey Bulletin* 74: 49–72.

McGowan, A. 1987. Archaeology from the ice: Excavations methods in frozen hut. *Australian Historical Archaeology* 5: 49–53.

Moreno, P. 2000. *Botellas de la peninsula Byers, I. Livingston, Shetland del Sur*, Actas del Congreso Argentino de Americanistas, 207–228. Buenos Aires: Liga Naval.

Pearson, M. 2004. Artefacts or rubbish. A dilemma for Antarctic managers. In *Cultural heritage in Antarctic and Antarctic Regions*, eds. S. Barr and P. Chaplin, 39–43. Norway: IPHC-ICOMOS.

Pearson, M. 2011. Polar heritage conservation and archaeology. In *Polar settlements – location, techniques and conservation*, ed. S. Barr and P. Chaplin, 24–34. Norway: IPHC-ICOMOS.

Pearson, M., and R. Stehberg. 2006. Nineteenth century sealing sites on Rugged Island, South Shetland Islands. *Polar Record* 42: 1–13.

Pearson, M., R. Stehberg, A. Zarankin, M.X. Senatore, and C. Gatica. 2010. Conserving the oldest historic sites in the Antarctic: The challenges in managing the sealing sites in the South Shetland Islands. *Polar Record* 46 (1): 57–64.

Roura, R. 2008. Antarctic research stations: Environmental and cultural heritage perspectives 1983–2008. In *Historical polar bases preservation and management*, Historical Polar Bases Preservation and Management, Monuments and Sites XIV Special Issue, ed. S. Bar and P. Chaplin, 38–50. Lorenskog: IPHC- ICOMOS.

Senatore, M.X. 2018. Antarctic historical sealing industry and material things. In *Historical Antarctic sealing industry*, Scott Polar Research Institute, Occasional Publication, ed. R. Headland, 61–71. Cambridge, UK: Cambridge University.

Senatore, M.X., and A. Zarankin. 2011. Widening the scope of the Antarctic heritage archaeology and the ugly, the dirty and the evil in Antarctic history. In *Polar settlements – location, techniques and conservation*, ed. S. Barr and P. Chaplin, 51–59. Norway: IPHC-ICOMOS.

Stehberg, R.L. 2003. *Arqueología Histórica Antártica: Aborıgenes sudamericanos en los mares subantárticos en el siglo XIX*. Chile: Centro de Investigaciones Diego Barros Arana.

Stehberg, R., M. Pearson, R. Blanchette, and J.A. Jurgens. 2009. A further note on a sealer's sledge, discovered on Livingston Island, South Shetland Islands. *Polar Record* 45 (3): 275.

Villagran, X.S., and Carlos E.G.R. Schaefer. 2011. Geoarqueologia das primeiras ocupaçones na Antártida. *Vestigios, Revista Latinoamericana de Arqueologia Histórica* 5 (2): 115–136.

Zarankin, A., and M. Salerno. 2016. In *So far, so close. Approaching experience in the study of the encounter between sealers and the South Shetland Islands (Antarctica, nineteenth century), Antarctica and the humanities*, ed. P. Roberts, L.M. van der Watt, and A. Howkins, 79–104. London: Palmgrave Macmillian.

Zarankin, A., and M.X. Senatore. 2005. Archaeology in Antarctica: Nineteenth-century capitalism expansion strategies. *International Journal of Historical Archaeology* 9: 43–56.

Zarankin, A., S. Hissa, M. Salerno, Y. Froner, G. Radicchi, L.G. Resende de Assis, and A. Batista. 2011. Paisagens em branco: Arqueologia e Antropologia Antárticas Avanços e desafios. *Vestigios, Revista Latinoamericana de Arqueologia Histórica* 5 (2): 11–51.

Further Readings

Avango, D. 2017. Remains of industry in the polar regions: Histories, processes, heritage. *Entreprises et Histoire* 87: 133–149.

Harrowfield, D.L. 2005. Archaeology in Antarctica. *New Zealand Journal of Archaeology* 26: 5–28.

Headland, R. 1989. *Chronological list of Antarctic expeditions and related historical events*. Cambridge, UK: Cambridge University Press Studies in Polar Research.

Lucero, V., and R. Stehberg. 1996. Arqueología Histórica Antártica: relevamiento y excavación de sitios de cazadores de lobos del siglo pasado. Islas Shetland del Sur. *Historical Archaeology in Latin America* 14: 99–106.

Muñoz, A.S. 2000. Arqueofaunas de la isla Livingston, Shetland del Sur. Un estudio exploratorio de los restos de mamíferos recuperados en la península Byers. *Archaeofauna* 9: 39–57.

Oliva, M., J. Ruiz-Fernández, A. Zarankin, A. Casanova-Katny, and J. Nofre. 2016. Geoecology and historical heritage in the ice-free area of elephant point (Antarctica). Proposal for future environmental protection. *Geoheritage*. https://doi.org/10.1007/s12371-016-0184-1.

Pearson, M., R. Stehberg, A. Zarankin, M.X. Senatore, and C. Gatica. 2008. 'Sealer's sledge excavated on Livingston Island, South Shetland Islands. *Polar Record* 44: 362–364.

Roura, R. 2017. Antarctic cultural heritage: Geopolitics and management. In *Handbook on the politics of Antarctica*, ed. K. Dodds, A.D. Hemmings, and P. Roberts, 468–484. Cheltenham: Edward Elgar Publishing Ltd Elgaronline.

Senatore, M.X., and A. Zarankin. 1999. Arqueologıa histórica y expansión capitalista. Prácticas cotidianas y grupos operarios en Peninsula Byers, Isla Livingston de Islas Shetland del Sur. In *Sed Non Satiata. Teoría Social en la Arqueología Latinoamericana Contemporánea*, ed. A. Zarankin and F. Acuto, 171–188. Buenos Aires: Ediciones del Tridente.

Senatore, M.X., and A. Zarankin. 2012. *Tourism and the invisible historic sites in Antarctica. Heritage as a driver to development, part III development as tourism*, 592–601. Paris: ICOMOS.

Senatore, M.X., and A. Zarankin. 2014. Against the domain of master narratives: Archaeology and history in Antarctica. In *Against the typological tyranny in archaeology: A view from South America*, ed. C. Gnecco and C. Langebaek, 121–132. New York: Springer.

Senatore, M.X., A. Zarankin, M. Salerno, I.V. Valladares, and M.J. Cruz. 2008. Historias bajo cero. Arqueología de las primeras ocupaciones humanas en Antártida. In *Arqueología del Extremo Sur de Sudamérica*, ed. L. Borrero and N. Franco, 117–130. Buenos Aires: DIPA-IMHICIHU-CONICET.

Stehberg, R., and A. Cabeza. 1987. Comienzos de la Arqueología Histórica Antártica en el Sitio Cuatro Pircas. *Revista Chilena de Antropología* 6: 83–111.

Stehberg, R., and V. Lucero. 1996. Excavaciones arqueológicas en Playa Yámana, Cabo Shirreff, Isla Livingston, Antártica. *Serie Científica Instituto Antártico Chileno* 46: 59–81.

Stehberg, R., M. Pearson, A. Zarankin, M.X. Senatore, and C. Gatica. 2008. Protection and preservation of the oldest sites of the Antarctic: The case of Fildes Peninsula and Byers Peninsula in the South Shetlands Islands. In *Historical polar bases preservation and management, monuments and sites XIV special issue*, ed. S. Bar and P. Chaplin, 80–94. Lorenskog: IPHC- ICOMOS.

Stehberg, R., M. Pearson, R. Blanchette, and J.A. Jurgens. 2009. A further note on a sealer's sledge, discovered on Livingston Island, South Shetland Islands. *Polar Record* 45(3): 275.

Zarankin, A., and M.X. Senatore. 2007. *Historias de un pasado en blanco: Arqueología Histórica Antártica*. Belo Horizonte: Argumentum.

Polar Exploration Archaeology (North)

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Introduction

Archaeological work on polar exploration of the north is focused in the Arctic region and the Arctic Circle. The first exploration of the Arctic is debatable, with some sources indicating the earliest being around 320 BCE. It was not until the mid-nineteenth century that exploration in the region was at its height. The search for a Northwest Passage, which would open a trade route linking the Atlantic and the Pacific, was the goal for most of the explorers at the time. Men such as John Franklin and his crew aboard the HMS *Erebus* and HMS *Terror* in 1845 set sail to find the passage, only to never be seen again. The many men who ventured into this region also left behind material culture, remnants of the age of exploration that today can help in the understanding of how other men survived such a harsh environment and how some men succumbed to it. Archaeology in the region to date is helping in solving how Franklin and his men all perished during their expedition, being used in locating the HMS *Erebus* and HMS *Terror*, and helping to understand how

exploration expeditions operated at the time and how it can help in the preservation of the Arctic's heritage.

Definition

The archaeology of polar exploration in the north is focused more in the Arctic region or the Arctic Circle which today consists of the Arctic Ocean and parts of Russia, Norway, Iceland, Greenland, Finland, Sweden, and Alaska. Archaeology of exploration is focused on expeditions in locating the Northwest Passage and the North Pole. Exploration in the Arctic can be dated back to the classical period of Ancient Greece up until present times.

Key Issues/Current Debates/Future Directions/Examples

The Northwest Passage Expedition of 1845, led by Sir John Franklin with 129 men onboard the ships HMS *Erebus* and HMS *Terror*, was one of the worst disasters in exploration history with all men supposably perishing (Bertulli et al. 1997). Search and rescue parties found material, remains, and graves of the crew at King William Island and Beechey Island. Personal accounts with the Inuits in the area confirmed the last survivors died from starvation (Bertulli et al. 1997; Rondeau 2010).

Owen Beattie, a professor of anthropology at the University of Alberta, led a team to excavate sites on King William Island and Beechey Island with the aim to find artifacts and skeletal remains of the 129 men from Franklin's doomed expedition. The "Franklin Expedition Forensic Anthropology Project" ran for 10 years; investigations at King William Island led to the discovery of archaeological artifacts and human remains. The human remains showed signs of scurvy and further examination showed signs of cannibalism (Beattie and Geiger 1987).

It was on Beechey Island that Beattie and his team investigated the graves of John Torrington, John Hartnell, and William Braine, all were crew members of the Franklin expedition. Their bodies were remarkably preserved due the conditions of the region and being buried under permafrost for over a 100 years. Autopsies were carried out on Torrington and found that lead poisoning had led to possible mental and physical illness, weakening his body before dying of pneumonia (Beattie and Geiger 1987). The source of the lead poisoning was first linked to poorly made food cans (Farrer 1993), and most recently, a probable cause was linked to the use of a unique water system onboard both ships that was poorly made and resulted in lead poisoning of the crew (Battersby 2008).

To date the wreckage of these ships have never been found but are the first and only designated historic site(s) of Canada that have yet to actually be found (Parks Canada 2012). As of 2012, Parks Canada in association with the Underwater Archaeology Service is resuming their search for the HMS *Erebus* and HMS *Terror* using remote sensing techniques and site excavations (Parks Canada 2012). Inuit knowledge of the wreck is crucial to the investigations; rescue parties in the search for Franklin and his men communicated with local Inuit people who claimed to have seen some of the men whom all later starved to death. Using oral history that has been passed down from generation to generation could hold the key to discovering the wrecks (Parks Canada 2012).

The lost Franklin expedition and its archaeological research background is one example of a current issue of polar exploration archaeology. Expeditions to the North Pole were also common at the time. The Ziegler polar expedition of 1903–1905 was a failed attempt to reach the North Pole. Unlike the fateful Franklin expedition, the expedition team led by Anthony Fiala were rescued with the loss of only one life (Capelotti 2011). In attempting to reach the pole, Fiala left supply caches at their base camp on Rudolf Island to their main base camp from a previous Ziegler expedition from 1901 to 1902. Very little is known about these sites, but their potential to provide new sources of archaeological data to study American polar ambitions at the turn of the twentieth century (Capelotti 2011). Research into the supply trail suggests that the supply route, which stretches 160 km, is a

potential archaeological piece of evidence of American polar exploration in the Arctic. The research also revealed the potential danger of the sites being damaged by unsuspecting tourists, altering the character of the sites and making any archaeological studies problematic (Capelotti 2011). Svalbard, a popular tourist destination in the Arctic region, with cultural and natural heritage sites, is an example of polar tourism's footprint in archaeological and heritage sites. It was up until the 1970s that the collection of artifacts was common in Svalbard. Looting has since become a offense and is policed but, unintentional damage such as trampled surfaces around historic sites with archaeological potential to rock cairns being made by visitors, although it can be argued that it erases some traces of past activities and replacing them with new traces and new narratives of the site (Roura 2011).

Unlike Antarctica, the Arctic region is not defined by a land mass and is mainly a body of water. Under international law, the North Pole and the Arctic waters cannot be claimed by any nation. With reports suggesting that the Northwest Passage is navigational than it has been since the 1970s, Canada has made its claim to the waters as part of their territory (European Space Agency 2011). What this means for the historical and archaeological sites in this region remains unclear and if any mining to the area could cause damage to the sites. The opening of the Northwest Passage as a possible shipping and trade route also allows places like King William Island and Beechey Island to be easily accessible to people for the first time but also means previously unreachable sites could now be explored by researchers.

In 2007 in a meeting of heritage organizations, it was declared that

> "the Arctic region is important for global processes and is to be considered as precious heritage for humankind. The region includes a number of unique and outstanding natural and cultural heritage places which require protection, improved management and international recognition due to their vulnerability" (Nordic World Heritage Foundation et al. 2007).

The archaeology of Arctic exploration and the heritage of sites relating to exploration efforts in the Arctic is becoming increasingly popular among researchers and towards tourists. The opening the Northwest Passage and the thawing of ice will make the area more navigational for both archaeologists and tourists. These sites will have to be continually monitored with information signs explaining their archaeological significance and their heritage value.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Canada: World Heritage
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Ethics of Collecting Cultural Heritage
- ▶ European Convention on the Protection of Archaeological Heritage (1992)
- ▶ Heritage and Archaeology
- ▶ Heritage Areas
- ▶ Heritage Tourism and the Marketplace
- ▶ Historical Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Modern World: Historical Archaeology
- ▶ Polar Exploration Archaeology (South)
- ▶ Site Visitation and Interpretation: Management
- ▶ Vandalism and Looting (Ethics)

References

Battersby, W. 2008. Identification of the probable source of the lead poisoning observed in members of the Franklin expedition. *Journal of the Hakluyt Society.*

Beattie, O., and J. Geiger. 1987. *Frozen in time: the fate of the Franklin expedition. Owen Beattie and John Geiger published*. London: Bloomsbury.

Bertulli, M., H. Fricke, and A. Keenleyside. 1997. The final days of the Franklin expedition: New skeletal evidence. *Arctic* 50 (1): 36–46.

Capelotti, P.J. 2011. The 'American supply trail': Archaeological notes on the remains of the Ziegler polar expedition in Zemlya Frantsa-Iosifa, 1903–1905. *Polar Record* 47: 193–201.

European Space Agency. 2011. Arctic shipping routes open. Available at: http://www.esa.int/esaEO/SEMT7TRTJRG_index_0.html. Accessed 31 Oct 2012.

Farrer, K.T.H. 1993. Lead and the last Franklin expedition. *Journal of Archaeological Science* 20: 399–409.

Nordic World Heritage Foundation, UNESCO World Heritage Centre, and Prince Albert of Monaco Foundation.

2007. World heritage and the Arctic: International expert meeting. Available at: http://www.grida.no/files/publications/world-heritage-arctic-report_oct10.pdf. Accessed 19 Oct 2012.
Parks Canada. 2012. Available at: http://www.pc.gc.ca. Accessed 29 Oct 2012.
Rondeau, R.M. 2010. The wrecks of Franklin's ships *Erebus* and *Terror*; their likely location and the cause of failure of previous search expeditions. *Journal of the Hakluyt Society.*
Roura, M.R. 2011. *The footprint of polar tourism: tourist behaviour at cultural heritage sites in Antarctica and Svalbard*. Meppel: Ten Brink.

Polar Exploration Archaeology (South)

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Introduction

Archaeology in Antarctica has its routes in the work of whaling sites, some of the first examples of human occupation on the continent. In recent times, there has been a focus on the history of polar exploration in the region, most notably exploration during the heroic age from the end of the nineteenth century up until the early 1920s. This age saw a race to the South Pole, the exploration of resources and exploration in the name of science by men of the likes of Roald Amundsen, Robert Scott, Ernest Shackleton, and Douglas Mawson. Their pursuits in Antarctica left behind cultural material, archaeological, and heritage sites in the forms of graves, huts, monuments, and personal items that today are a link and physical reminder of our past in Antarctica.

Definition

The archaeology of polar exploration in Antarctica covers the heroic age of exploration from the end of the nineteenth century to the early 1920s, with further exploration expeditions continuing up until the 1950s. The sites themselves consist mainly of the material culture left behind by the expeditions that came to the continent, such as huts, monuments, graves, and material culture such as equipment and supplies. The sites are well known and well documented in Antarctica, with the main body of archaeological work involving conservation work and the protection of these sites.

Key Issues/Current Debates/Future Directions/Examples

The preservation of huts built and used by explorers and researchers is an issue in the archaeology and heritage in Antarctica. These huts were used as research bases for polar exploration teams from all over the world, mainly from the United Kingdom, Australia, New Zealand, the United States, and Norway. Archaeologically speaking, the surviving huts give Antarctica the attribute of being the only continent where the original human habitation may be seen today (Headland 2010). Of the 22 known sites, including the huts from the heroic age, only seven remain relatively intact, while four have become roofless ruins and ten have become nothing more than fragments (Headland 2010). The huts that remain intact contain many artifacts that relate to the heroic age of polar exploration. These artifacts range from food cans, personal items, lanterns, books, and research equipment. In Mawson's huts, for example, most of these items are literally frozen in time as heavy snow and ice has formed over some of the artifacts (McGowan 1987). The preservation of the huts has become a key issue in archaeology in Antarctica and Antarctic heritage. The huts were merely meant to last for as long as the expedition was to last. However, the huts that have survived did so due to numerous factors, including their location, climate, and the effects of human interference. Yearly, conservation groups assess the decay of the huts and help repair and conserve them from further damage. Conservation teams like the team of "Project Blizzard" visited the Mawson huts in the summers of 1984–1985 and 1985–1986 where

some of the first archaeological work in Antarctica begun as well as pioneering survey methods that were suitable to the environment (McGowan 1987).

The huts in recent times have had conservation work done by groups such as the "Mawson's Huts Foundation" (Mawson's Huts Foundation 2012). The huts built by Mawson during the Australian Antarctic Expedition from 1911 to 1914 numbered four in total, later three when two were merged into one hut. The huts included a magnetograph hut, used to measure variations in the south magnetic pole; an absolute magnetic hut, which was used as a reference point for studies in the magnetograph hut; and the transit hut for astronomical observations (Department of the Environment, Water, Heritage and the Arts 2012).

In January 2010, conservationists from the Antarctic Heritage Trust excavated a cache of Scotch whisky belonging to Sir Ernest Shackleton's failed expedition of 1907–909 (Antarctic Heritage Trust n.d.). These bottles, still containing the whiskey, were carefully thawed and examined in the UK by museum staff before three of the bottles were sent to the current owners of the Scotch whiskey for testing to help replicate the recipe that has since been lost (Antarctic Heritage Trust n.d.). Although the Scotch was later returned to the Antarctic to be reburied, there have been cases of artifacts being removed from site by private collectors. In January 1999, items taken from Robert Scott's Cape Evans Hut were returned 40 years after they were taken by a Royal New Zealand Air Force pilot when he was working in the region. The items were to be sold at Christie's auction house; when the New Zealand government raised the issue to the pilot, they were later given to the Antarctic Heritage Trust and returned to the hut by officials of the British government (Arthy 1999).

The unintentional destruction of sites and archaeological deposits is an important issue that needs to be addressed. "The Madrid Protocol" generated an urgency to clean up the Antarctic environment and, in doing so, increased the risk of the destruction of historic sites. Although the protocol in Annex III states that the cleanup should not damage historic sites or monuments, there was a lack of definition as to what constituted as a site, especially in regard to archaeological deposits scattered around historic sites and monuments (Evans 2007). The debate for "rubbish or relic" still continues; guidelines have been set up. Cleanups in Antarctica sites that date up to and/or before 1958 are protected by law. All artifacts located in these sites are to be disturbed as little as possible until properly recorded and evaluated (Evans 2007).

Antarctica's heritage sites and monuments are protected by numerous acts, one such act is the Antarctic treaty of 1994. The Antarctic treaty of 1994 protects the continent from mining minerals; it also lists all historic sites and monuments as protected, any disruption, looting, or intentional damage under Part II section nine of the treaty.

The archaeology of polar exploration in Antarctica will continue in the conservation and the investigations of the explorers' huts. Their conservation is important as they stand as a physical link to our past on the continent. Issues such as what counts as heritage in the region and the definition of archaeological deposits in Antarctica (i.e., relic or rubbish argument) will have to be settled before further damage to sites deteriorates their potential for archaeological research. The material remains in Antarctica narrate the history of past events in the region. When tourists set foot on these sites, they are helping in maintaining the memory of what happened there. However, tourist behavior may erase some of these traces and replace them with new traces. It must be made aware that the sites in Antarctica are not "frozen in time" but are used for a range of purposes and are transformed as a result (Roura 2011).

Cross-References

- ▶ Antarctica: Historical Archaeology
- ▶ Authenticity in Archaeological Conservation and Preservation

▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
▶ Ethics of Collecting Cultural Heritage
▶ European Convention on the Protection of Archaeological Heritage (1992)
▶ Heritage and Archaeology
▶ Heritage Areas
▶ Heritage Tourism and the Marketplace
▶ Looting and Vandalism (Cultural Heritage Management)
▶ Modern World: Historical Archaeology
▶ Polar Exploration Archaeology (North)
▶ Site Visitation and Interpretation: Management
▶ Southern Ocean and Antarctic Maritime Archaeology
▶ Vandalism and Looting (Ethics)

References

Antarctic Heritage Trust. n.d. Available at: http://www.nzaht.org/AHT/TheGreatWhiskyCrateThaw/ (accessed 29 October 2012).

Arthy, S. 1999. *Artifacts taken from historical sites returned*. The Royal Society of New Zealand, 26 January. Available at: http://www.royalsociety.org.nz/1999/01/26/artifacts-taken-from-historical-sites-returned/ (accessed 25 October 2012).

Department of the Environment, Water, Heritage and the Arts. 2012. Australian Heritage Database. Available at: http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place_detail;place_id=105713 (accessed 25 October 2012).

Evans, S.L. 2007. *Heritage at risk: Cultural heritage management in the Antarctic*. A paper presented ICOMOS 2007 Extreme Heritage Conference. Available at: http://www.aicomos.com/wp-content/uploads/sherrieleeevans.pdf (accessed 20 October 2012).

Headland, B. 2010. *Historic huts of the Antarctic from the heroic age*. Antarctic Heritage Trust. Available at: http://www.nzaht.org/content/library/Historic_Huts_of_the_Antarctic_from_the_Heroic_Age_B_Healand.pdf (accessed 20 October 2012).

Mawson's Hut Foundation. 2012. Available at: http://www.mawsons-huts.org.au/conservation/ (accessed 29 October 2012).

McGowan, A. 1987. Archaeology from the ice: Excavation methods in a frozen hut. *Australian Historical Archaeology* 5: 49–53.

Roura, M.R. 2011. *The footprint of polar tourism: Tourist behaviour at cultural heritage sites in Antarctica and Svalbard*. Meppel: Ten Brink.

Polis

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Introduction

The polis (or "city-state") was a characteristic polity of archaic (c. 700–c. 490) and classical (c. 490–323 BCE) Greece. The ancient Greek philosopher Aristotle said in the Politics (1253ᵃ2-4 = 1.1.9) "man is by nature a creature of the polis, and a man. . . without a polis is either subhuman or divine." Through a powerful if discontinuous tradition, the Greek polis set up the artistic and intellectual limits within which western civilization has framed its project.

Definition

Debate surrounds the appropriateness of translating polis (pl. poleis) as "city-state," but as long as the possibility of confusion with other city-state cultures is recognized, the term is adequate. In the classical period, "polis" had four basic connotations. First, a fortified settlement on a height, a sense that may extend back to the terminology of the Greek-speaking Late Bronze Age predecessors of the historical Greeks, still current into the classical period. Related to this locative sense was a second meaning, a nucleated settlement that controlled its agricultural hinterland. The third sense indicates this surrounding territory, though other words (*chora, gē*) differentiated this from the town itself. Finally, polis meant a political community.

Diachronically, its form contrasts both with the Mycenaean palace economies alluded to above and with the cities of the Hellenistic (323–30 BCE) period. Synchronically, it can be contrasted with the *ethnos* (pl. *ethnē*), the other primary category of Greek political organization,

which took root mostly in the NW and W of Greek-speaking lands. In *ethnos* regions, urban settlements did not emerge at all or emerged later in the historical period; when they did, they were often bound politically to larger regional associations. It is now understood that *ethnē* developed not before the poleis in a remote prehistoric past, but during the archaic period, subject to forces that caused the polis to rise (Hall 2002, 2007).

The lie of the land in Greece, small plains between often difficult mountains and hills, and inlets and islands, provided the geophysical mold that produced a patchwork of relatively isolated conurbations and likewise a great variety of social, political, and economic regimes. Yet, patterns can be discerned that cut through this diversity, and it is possible to establish at least three key attributes of the polis. First, political autonomy (*autonomia*) was at least a desideratum, even if a community's need for external military or economic assistance could make it impossible in practice. Second, poleis were generally small compared with other ancient polities (empires and federal states) and modern nation states. Some poleis had large territories (Athens, Sparta), but the average has been reckoned at 25–100 km^2, and while demography is murky throughout our period, only about 10% had populations greater than 10,000 in the classical period. Third, a sense of civic identity was characteristic. This was bound up with an (often imagined) sense of shared ancestry and with locality, as linguistic habits demonstrate. Polis dwellers referred to themselves as *Athenaioi* or *Korinthioi*, deriving their identity from an urban center (*Athenai*, *Korinthos*) in contrast with *ethnē*, the populations of which took their names (*Boiotoi*, *Thessaloi*) from the regions in which they lived (*Boiotia* and *Thessalia*). Thus, while some poleis could imagine being without land, territory was virtually a rule for polis status.

Historical Background

The Mycenaean and Hellenistic periods are not entirely arbitrary chronological limits. That poleis as such existed in the "Dark Ages," the period following the collapse of the Mycenaean world and constituting the Early Iron Age (c. 1150–700 BCE) in Greece, is doubtful, but the roots of the polis system should be traced into this period. The poleis did not disappear when the Macedonians assumed control at the end of the fourth century BCE and Greek cities flourished well into the Roman period. Nevertheless, since autonomy was a characteristic condition for the polis, ending an account with the classical period is justifiable.

The sophisticated apparatus of the Mycenaean palace-based economies collapsed in the decades following 1200 BCE. A period of unsettled life, depopulation, and radical loss of technologies, notably the Mycenaean administrative script (never widespread), followed. While recent archaeological work has relit this period, it seems to confirm a picture of isolation, stagnation, and poverty, though there are signs of recovery by the end of the tenth century. Continuities between Mycenaean Greece and the archaic period other than basic religious and agricultural forms are obscure, but it is notable that Mycenaean centers were roughly coterminous with regions where the polis emerged (Snodgrass 1980). It was also an age of poorly understood migrations, within the mainland and from the mainland to areas in the eastern littoral of Anatolia, where the major linguistic groupings (Aiolic, Doric, and Ionic) mirror mainland patterns. Whether the ethnic identities attaching to these linguistic groups, clearly marked by the classical period, were originally present is more doubtful (Hall 2002, 2007).

Archaic Period (c. 700–c. 490) The eighth century BCE saw further recovery, not least in the adoption of Phoenician symbols to create regional Greek alphabets (from mid-eighth century), material growth, and apparently a significant increase in population. Attica was seen as representative (Snodgrass 1977), but it is now questionable if the increase was as great as once believed, and likewise a question throughout Greece whether the signs of recovery indicate the presence of poleis.

Poleis in the political sense may have developed slowly. Burials may not correlate directly to population, and urbanism is not pronounced until

the following century. One way of tracking urbanization is through *synoikismos* (lit. "living together"), attested by classical writers about their ancient past. A notable example is Thucydides' notice (2.15.1-2) about the mythic Theseus' consolidation of Attica. His account of an original complex of small rural communities brought together politically without settlement change is unlikely in the long term: archaeology indicates a more complex process.

Another important phenomenon was colonization. The sending out of subsidiary settlements from "mother cities" was accomplished in waves beginning in the late eighth century, first westward to S Italy and Sicily, then in the seventh century toward the Black Sea and N Africa, with streams W again as far as Spain. This movement should be distinguished from modern colonization, inasmuch as it was not conducted by an empire to control a large territory with a lasting military presence. Ventures were instead small, and while ties remained with the metropolis, the *apoikia* was largely on its own. Hunger for new land should no longer be seen as the dominant cause; rather, trade, adventure, and personal enrichment should all be considered. Nor were the early colonies strictly a polis affair: Achaia, in the archaic period low on poleis, was a major colonizer (Hall 2007), and emphasis on individual founders points to private enterprise and loose organization, a picture confirmed by ceramic and mortuary evidence. This increase in mobility is part of general outward push by the Greeks, manifested in renewed contacts with Egypt and the Near East during an "orientalizing" century (750–650), with profound effects in art and other aspects of material culture.

Warfare was part of this expansion. Greek mercenaries, acting independently of their home political communities, fought in the East from the beginning of the eighth century BCE and imported objects and ideas from overseas. At home, apart from certain regions where terrain invited it, poleis were deficient in cavalry. The important soldier was the *hoplitēs* or hoplite, a heavy-armed infantryman who fought in open ground in a close-order formation known as the phalanx. The hoplite was clad in bronze helmet and plated body armor and carried a thrusting spear as his primary weapon; the most important defensive item was the shield, which dictated phalanx tactics. Physical evidence for the earliest hoplites comes as burials with arms and then from c. 700 as arms dedications at sanctuaries. The political importance of the hoplite is harder to judge. Aristotle believed that the hoplites became politically important with the support of the tyrannoi (see below), and early archaeological analyses used Aristotle's assessment to postulate a "hoplite revolution" in the early seventh century. This is now doubtful, but the evidence still leaves questions. As for public control, poleis may not have organized armies on a widespread basis until c. 600.

Fortification walls should be a secure index for the presence of a polis and theoretically provide a register for settlement size. Yet only 11 poleis were walled by c. 600, and since walls are notoriously hard to date, even this figure demands caution, though the prevalence of mud-brick construction and destruction by later occupation could obscure early walls. Recognizably civic architecture did not appear until the beginning of the sixth century. Nor can rule of law necessarily be inferred for the early archaic period. Recent research has shown that laws inscribed on stone (as opposed to later literary accounts) were mostly procedural and not the sweeping codes we might expect for a movement away from the vendetta toward a centralized legal system (Hölkeskamp 1992).

Monumental building was usually religious building, and such building, particularly the Greek temple, is intimately bound with the polis. The Dark Age saw religious activity centered on settlements, but the temple as such is difficult to discern. There are early expressions of the Doric order as early as the mid-seventh century, but fully stone temples do not appear till early in the next century. Some seventh-century projects were large (the Temple of Hera at Argos the largest at 15.1 × 46.6 m) and must have required considerable cost and a strong authority, but it is not clear that this authority was yet the polis. Tyrannoi (see below) were associated with building projects from the mid-seventh century, but it is not until the sixth century that monumentality becomes an

obsession – efforts such as the Temple of Artemis at Ephesos were already testing the limits of Greek building techniques by midcentury, and Sicilian buildings are sometimes staggering. The poleis had begun to make their land- and cityscapes grand with projects that suggest unprecedented central control and overall wealth.

Religion also encouraged interaction between poleis. One avenue was the international festival. Tradition held that games began at Olympia in 776 BCE, but whatever the accuracy of this date, it was not until the sixth century that the Olympic model could be reproduced elsewhere. Three major "panhellenic" games were inaugurated in the second and third decades of the sixth century, at Nemea, Delphi, and Isthmia. The circuit of games was fixed in a 4-year sequence, and the fact that the festivals were staggered so that they could be held in concert with the Olympics implies sophisticated interstate planning. Another avenue was the oracular sanctuary. Although Delphi acquired games in the early sixth century, here the oracle attracted attention, muttering prophecy not to predict the future but to provide mantic sanction for major decisions, both for poleis and individuals. After modest eighth-century beginnings, the Pythia (oracle of Apollo) soon gained great repute, as the attentions of Midas of Phrygia and Gyges of Lydia illustrate.

Political authority is key to tracking the genesis and development of the polis: "politics" means at its root the things of the polis. But when did the robust, variegated political lives of the poleis begin? Anthropological analysis has provided important cues and identified in the "kings" in Homeric epic an example of the "big man," a leader whose authority is achieved rather than ascribed. If we accept an evolutionary model, the next step should be the chieftain, the exemplar of ascribed authority in the nascent state. The Greek picture is complicated by the fact that later classical theorizing postulated a period of royal rulership in the period before the advent of aristocracy, but this was mostly invented tradition (Drews 1983). The phenomenon of tyrannoi (not to be confused with modern "tyrants") shows that rule by warlords was still a part of early archaic political life. The first of these dynastic rulers were the Kypselids of Corinth, beginning in the middle of the seventh century. Recent work has shown that tyrannoi were not necessarily "unconstitutional" rulers, rather one of many elite groups vying for political control (Anderson 2005). A controversial inscription from Dreros in Crete involving magistrates called kosmoi has been dated to the mid-seventh century. Yet early to mid-sixth century Argos is chronologically more typical. The relevant Argive inscriptions list officers (*damiorgoi*), and their language demarcates public and private spheres clearly, indicating central control and civic institutions.

A fundamental question is whether the archaic Greek economy was different in kind from modern economies or only in degree. Embedded in social and cultural milieux (von Reden 1997), the polis economy was unlike the autonomous modern market yet possessed familiar mechanisms such as coined money and even, in the classical period, rudimentary banking. Given its agrarian nature, questions about the character of farming are paramount. The idea that most agricultural producers were yeoman farmers representative of a "middling ideology" has been challenged (Hall 2007). It may be more appropriate to think instead of peasants of varying statuses focused on survival and powerful elite landowners. Nor should the importance of trade be neglected. The earliest Greek expeditions abroad (emporia), at Al Mina in the N Levant and Pithekoussai N of the bay of Naples, were similar to colonies but lacked settlements. Archaic Greek trade abroad culminated at Naukratis, a multiethnic Greek polis dedicated to trade established in the Nile Delta c. 600. Around the same time, the first coins appear at Ephesos. Probably originally a Lydian invention, coinage was at any rate perfected by the poleis, and by the end of the archaic period, nearly all the major poleis were producing coinage with distinctive obverse types.

Classical Period (c. 490–323) The full flowering of polis culture. It begins with the Persian Wars, military efforts that fostered a sense of shared identity among the poleis, at least as defined against a Persian enemy. The canons of architecture, politics, and thought fundamental to western culture find full expression in Periclean

Athens in the second quarter of the fifth century. Yet considered over the long run, this efflorescence was brief, with increased fragmentation in the later fifth century and fourth century giving way to the political overlordship of Macedon. Nonetheless, there is no discounting the period's achievements. The movement toward Hellenistic cosmopolitanism should not be seen as inevitable or a decline.

The necessities of agricultural production shaped settlement, but settlement was also intertwined with politics and culture. The general intensification of agricultural exploitation was uneven, with areas showing different patterns at different times. Methana (NE Peloponnesos) seems to have been settled more thickly in the fifth century after the buildup of an urban center, yet declined in the fourth century, and Boiotian Thespiai followed a similar pattern. On the other hand, the S Argolid retains its archaic settlement pattern until the fifth century, when many more rural sites appear (Mee 2011). Other than the larger poleis like Athens, most apparently concentrated their populations in urban centers – it is estimated that rural sites made up only 5% of the population of the S Argolid in the classical period. While colonization continued, its aims were now different, with larger poleis infringing on the territory or sovereignty of less powerful ones, a pattern visible into the Macedonian period.

War was endemic. The period begins with the surprising success of the Greeks against Persia and ends with the less surprising victory of Philip over a Greek coalition at Chaeronea in 338. In the interim was the Peloponnesian War (431–404), pitting an imperial Athens against a Spartan-led alliance. The traditional pattern, citizen phalanxes fighting small-scale battles in the plains, campaigns limited by agricultural demands, changed significantly. While short of modern total war, the new strategies expanded the arenas traditionally deemed acceptable for fighting. Warfare now clashed with the tempos of the agricultural year and involved more light-armed troops and mercenaries. Defense of both city and countryside became important, and fortification received greater attention, with more completely stone masonry, as opposed to walls of mud-brick socles with only upper courses in stone. Fourth-century walls used terrain contours to provide complete protection, with a concomitant extension of circuit length: the perimeter of the excellent fortifications at Messene ran 9 km. They could be equipped with sally ports, flanking towers, overlapping gates, and buttressed parapets. The formal ephebeia, citizen youths passing into soldiering adulthood, was first instituted at Athens in the second half of the century, its members given non-hoplite duties such as garrisoning border forts.

Political authority was now more centralized, expressed in monumental civic architecture and urban planning. An example of the latter was the template attributed to Hippodamos of Miletus. In Athens' port, the Piraeus, his ideas are manifested in a systematic accommodation for military installations, public services, and commercial facilities. A selective account of excavations in the Athenian Agora reveals an intense concern with civic building (full coverage: Camp 2001). After the democratic reforms of Kleisthenes (late sixth century) had transformed the political structure of Attica by emphasizing membership in artificial civic kinship groups over traditional regional loyalties, the Agora, transferred from an original location to the E, was made into Athens' civic center. A *bouleutērion* or council house accommodated the new democratic council, and boundary stones delineated public from private. On a ridge SW of the Agora, a facility (the Pnyx) to accommodate the citizen assembly was constructed with room for 8,000–12,000. After Persian destruction, the Agora was rebuilt and reorganized. Included now were *stoai*, multipurpose public porticoes. A round dining hall for the presidents of the council was built, doubling as a receptacle for Athenian weights and measures. During the Peloponnesian War, the Athenians added a new *bouleutērion* on the W side. The Pnyx was altered at the end of the fifth century: at least according to a later literary source, the aristocratic regime of the Thirty Tyrants reoriented the speaker's platform, which previously looked seaward, to face inland because they thought farmers were more sympathetic to oligarchy than members of Athens' powerful

fleet. A fourth-century (second quarter) refurbishing of the Pnyx was left incomplete. In the Agora, the temple of Ancestral Apollo took its present form around the same time, perhaps as a part of a larger civic renewal program centered on the figure of Lykourgos. A long base with statues of the Eponymous Heroes of the ten Kleisthenic tribes was set up on the W side, a fitting monument to the complexities and energy of the fourth-century Athenian democracy.

Greek religion was at its heart polis religion, a community of celebrants performing its two essential components, animal sacrifice and ritual. Monumental religious building ranged from borderland temples to the great urban complexes epitomized in the Athenian Acropolis building program (fifth century, second half). But it also included roadside shrines, peak and cave sanctuaries, and shrines attached to springs. Despite commonalities, the religious calendars for festivals celebrated by individual poleis expressed the variety of polis religion. These festivals provided a chance for the community to bond with commensality and competition. Originally a complex derived from annual agricultural changes, from a structuralist perspective (Osborne 1987), the changing nature of sanctuary dedications over the period indicates that worship became increasingly divorced from the springs of agricultural life – land outside the walls was seen as wild and opposed to the civic life of the urban center.

The environment and agricultural life was no less important to patterns of political authority. Agricultural involvement and individual modes of civic life influenced political arrangements (*politeiai*), with complex results (Osborne 1987). As Thucydides noted, the architectural grandeur of Athens belied military inferiority to Sparta, which remained an unwalled collection of villages into the fourth century. Sparta's citizens resided here, insulated from work. Brutal control of the serf-like helots' agricultural production allowed complete dedication to warcraft. Despite living in the town(s), they were nevertheless dependent on subjected labor in the countryside for sustenance. Even among poleis of similar regimes, town-country relations differed. Arkadian Orchomenos, an oligarchic ally of Sparta, had a fortified urban center with some amenities, but residence was largely extramural and included politically dependent surrounding communities, an arrangement suggesting a political sphere divorced from daily life. A variety of countryside-town relations also shaped democratic regimes. Elis had a loose political organization even after consolidation of its major territorial divisions in the early fifth century. Here were robustly independent outlying communities, and exceptionally, these villages could themselves support tiny outlier communities. Athens was early on populated from an urban center. The resultant system of villages (*dēmoi* or "demes") was after Kleisthenes' reforms made part of a complex system of political interdependence, with linking among demes, of demes to artificial tribes and of demes and tribes to citizen assembly. The city's civic, commercial, and religious facilities attracted resident aliens and its own hinterland population. Thus, Athens was like Elis in terms of the independence of its villages, but unlike in terms of the villages' relations to the political center, with the Attic demes much more tightly linked. Athens also stood apart with the buildup of its "empire" during the fifth century. As a result of the Persian Wars, Athens gained control the anti-Persian coalition. Allies weakened from tribute-paying and when they revolted were reduced by Athens' mighty navy. By midcentury, Athens had gained control of the alliance's treasury, parading its might in long tribute lists inscribed on huge stelai on the Acropolis and in the Panathenaic procession. Athenian hegemony deeply affected coastal and island poleis, often dependent on Athenian assistance but always subject to depredation by the Athenian fleet.

The independent smallholder became more prevalent by the fourth century. His private regime was limited in scope (polyculture was predominant) but could be complex in arrangement (Osborne 1987). A farmer might exploit various interests with differing intensity – flocks, arable land with slaves, a house and garden, and a rural tower where servants worked. Agriculture was preeminent, but trade also flourished, particularly as inter-polis bonds grew. Athenian mining operations at Laurion in S Attica exemplify

nonagricultural exploitation (Mee 2011). Production here had started in the Bronze Age, with lead ore exploited for its silver. Early efforts were aimed at exposed deposits, but eventually small tunnels ran to subsurface layers. The discovery of a vein early in the fifth century brought technological and commercial development to the fore. Vertical shafts were set in (some to more than 100 m) with adjoining galleries. Ore was processed in nearby workshops, and the washeries suggest considerable outlay. Working conditions were appalling, but the efforts allowed the Athenians to strike silver coins and fund the navy that built their hegemony. The state benefitted mostly, but powerful individuals were not without interests. The fourth century saw another boom in production, testified in Agora inscriptions set up by magistrates to record leases: while the state retained control, individual contractors made large profits.

Key Issues

Prehistoric Aegean archaeologists were traditionally more receptive to theories and methods from world archaeology, and increased exchange between the prehistoric and classical archaeologist is yielding fruitful results for the study of the polis. Increased emphasis on survey archaeology is one such development, which has been useful for tracking population shifts and land use strategies. Relations between Greece and the Near East, especially in the Early Iron Age and archaic periods, are a fertile field of study, but the classical period is also benefitting from new work on the Achaemenid Empire.

Current Debates

Arising from some 500 years of antiquarian, historical, philological, numismatic, epigraphic, papyrological, art historical, and archaeological work, debates about aspects of the polis are innumerable. Limiting them to some themes addressed above, the question how dark the "Dark Age" remains open. The question of a historical Homeric society is an unfinished chapter: to what extent do social, military, and economic literary episodes correspond with material culture? Snodgrass's pioneering synthetic methods on the eighth century (Snodgrass 1977, 1980) have been adopted for the archaic period. Early tyrannoi have been contextualized as a phenomenon not of unconstitutional monarchs but competitive elites (Anderson 2005), but the military side of the early tyrannoi needs more attention. Archaic coinage remains controversial, and the possibility that small denominations were more prevalent than previously thought has been a stimulus (Kim 2001). Near Eastern connections have been investigated for most aspects of the early poleis, and while there has been good work on mercenaries in the Near East (Luraghi 2006), resistance to the idea of eastern influence on the hoplite phalanx is perhaps conditioned by overreliance on the Homeric poems. De Polignac's landmark study (de Polignac 1995) on border sanctuaries argued that monumental sanctuaries were sited to mark out territory from other poleis, a thesis challenged on various grounds, but probably still valid for the late archaic period. Survey archaeology has proved a great tool for investigating the poleis' hinterlands and will continue to be invaluable, though particularly in demographic analyses, its limitations should be remembered. These are generally useful and meet the prerogatives of recent historical methods, but should be applied carefully, with the caveat that we will never be as sure about even late classical populations as we are of, e.g., the early modern period. Inscriptional evidence continues to be indispensable, with particular growth for the later poleis of Asia Minor. Dating of inscriptions by letter forms is also controversial, with recent opinion urging caution and favoring a downdating of fundamental inscriptions from imperial Athens. Ethnicity is an exciting field and has benefited from important recent studies, particularly Hall (2002) and Morgan (2003) (building on Roussel 1976). Economic history is well served in particular by the work of A. Bresson (2007–2008) and looks for ways to add to and advance past the fundamental contribution of M. Finley (1973) and the primitivist/modernist and substantivist/

formalist debates. Study of the role of women in the polis is hampered by dismal coverage in contemporary literary sources, but great strides have been made of late, with exemplary efforts at synthesis such as Connelly 2009 for women in polis religion.

International Perspectives

Since 1993 and culminating in the monumental Inventory of Archaic and Classical Poleis (Hansen and Nielsen 2004), the work of the Copenhagen Polis Centre has used both new and traditional approaches and a wide variety of categorizing rubrics to subject the Greek poleis (1,035 communities are included) to massive scrutiny. This is an invaluable resource, with contributions from a host of international scholars. Large international undertakings whether adaptations of venerable projects (e.g., SEG: epigraphy, Brill's New Pauly: all aspects of antiquity) or newer enterprises (e.g., PHI: epigraphy, The Ancient World Mapping Center: historical geography) and myriad recurring conferences and open-access journals supply grounds for international collaboration on polis research at a level unthinkable even a generation ago.

Future Directions

Continued cooperation between historians, classical archaeologists, and prehistoric Mediterranean archaeologists is welcome and will provide new syntheses. Willingness from prehistoric specialists to learn from ancient historians and those of more recent periods may advance study of the protohistoric polis. Classical archaeologists and historians will continue to benefit from cross-fertilization with anthropology and world archaeology and should be willing to let go of too rigid philologically based categorization if necessary. Likewise, excavators and surveyors could do well to learn from traditional ancient historical methods such as source criticism. Survey archaeology methodology and concentration on the Greek countryside will yield stimulating results, as will technological applications such as GIS, which holds great potential for studying all manner of polis developments.

Cross-References

- ▶ Agora in the Greek World
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Emporion
- ▶ Religion, Greek, Archaeology of
- ▶ Urban Planning in the Greek World

References

Anderson, G. 2005. Before turannoi were tyrants. Rethinking a chapter of early Greek history. *Classical Antiquity* 24: 173–222.

Bresson, A. 2007–2008.*L'économie de la Grèce des cités (fin VIe-Ier siècle a.C.)*, 2 vols. Paris: Colin.

Camp, J. McK. 2001. *The archaeology of Athens*. New Haven/London: Yale University Press.

Connelly, J.B. 2009. *Portrait of a priestess. Women and ritual in ancient Greece*. Princeton: Princeton University Press.

De Polignac, F. 1995.*Cults, territory and the origins of the Greek city-state*. Translated by J. Lloyd. Chicago: University of Chicago Press.

Drews, R. 1983. *Basileus. The evidence for kingship in geometric Greece*. New Haven: Yale University Press.

Finley, M.I. 1973. *The ancient economy*. Berkeley: University of California University Press.

Hall, J.H. 2002. *Hellenicity. Between ethnicity and culture*. Chicago: University of Chicago Press.

Hall, J.H. 2007. *A history of the archaic Greek world, c. 1200–479 BCE*. Malden: Blackwell.

Hansen, M.H., and T. Nielsen. 2004. *An inventory of archaic and classical poleis. An investigation conducted by the Copenhagen Polis Centre for the Danish National Research Foundation*. Oxford: Oxford University Press.

Hölkeskamp, K.J. 1992. Written law in archaic Greece. *Proceedings of the Cambridge Philological Society* 38: 87–117.

Kim, H.S. 2001. Archaic coinage as evidence for the use of money. In *Money and its uses in the ancient Greek world*, ed. A. Meadows and K. Shipton, 7–21. Oxford: Oxford University Press.

Luraghi, N. 2006. Traders, pirates, warriors. The protohistory of Greek mercenary soldiers in the eastern Mediterranean. *Phoenix* 40: 21–47.

Mee, C. 2011. *Greek archaeology. A thematic approach*. Malden: Wiley-Blackwell.

Morgan, C. 2003. *Early Greek states beyond the polis*. London: Routledge.

Osborne, R. 1987. *Classical landscape with figures. The ancient Greek city and its countryside*. London: G. Philip.
Roussel, D. 1976. *Tribu et cité. Études sur les groupes sociaux dans les cités grecques aux époques archaïque et classique*. Paris: Les Belles lettres.
Snodgrass, A. 1977. *Archaeology and the rise of the Greek state*. Cambridge: Cambridge University Press.
Snodgrass, A. 1980. *Archaic Greece. The age of experiment*. Berkeley/Los Angeles: J.M. Dent.
von Reden, S. 1997. Money, law and exchange. Coinage in the Greek polis. *Journal of Hellenic Studies* 117: 154–176.

Further Reading

Goette, H.R. 2001. *Athens, Attica, and the Megarid: An archaeological guide*. London: Routledge.

Polish Pioneers and Traditions

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Brief Definition of the Topic

In Poland, as elsewhere, excavations in the nineteenth century were conducted unsystematically and hastily, with the aim of acquiring interesting finds. Exceptional was Kalikst Jagmin's dig of 1873 at Łęgonice (central Poland) where a large barrow was sectioned along a W-E axis in order "...to uncover the very base of the mound and to expose a section which, showing the layout and quality of layers, would produce a visible proof of the manner in which this grave-mound was raised" (Jagmin 1876: 83). This isolated experiment produced one of the world's earliest examples of the relatively detailed observation and documentation of stratigraphy (Fig. 1). The first excavation manual published in Poland stressed that when digging multilayered mounds, "it is necessary to recognize... the height of every layer above ground level" (Majewski 1902: 195). Innovatory was Leon Kozłowski's method of excavating cemetery in Iwanowice by sequentially opening squares of 10 × 10 m (Kozłowski 1917: 2). Careful stratigraphic analysis is testified by multi-strata profiles of a cave site published by Stefan Krukowski (1921: 3–5 and Figs. 3 and 4).

In 1928 and 1930, Józef Kostrzewski explored a stronghold in Jedwabne with two small trenches. There he discerned nine layers which served to build the first relative chronology of medieval pottery (Kostrzewski 1931: 6, Fig. 2a, b). At Biskupin ca 3,000 m^2 were uncovered during the 1934 and 1935 seasons, and the five identified culture layers were defined using small tools only (Kostrzewski 1936: 11). Soil was sieved and overhead photography (from planes and balloons) was employed. Experimentally, finds from a limited surface were all recorded three dimensionally (Kostrzewski 1950: 5, 12). In 1936–1937, another 3,400 m^2 were excavated using 10 cm thick arbitrary layers (spits) which were recorded on plans at 1:10. on which all important finds were marked. A geologist analyzed 80 m of profiles (Kostrzewski 1938: 4. 9, 69, 132–9, Tables LXIX and LXX). This promising development was halted in 1939.

The handful of archaeologists who survived the War were confronted with the practical and theoretical problems posed by vast areas that the war destruction suddenly "opened" for

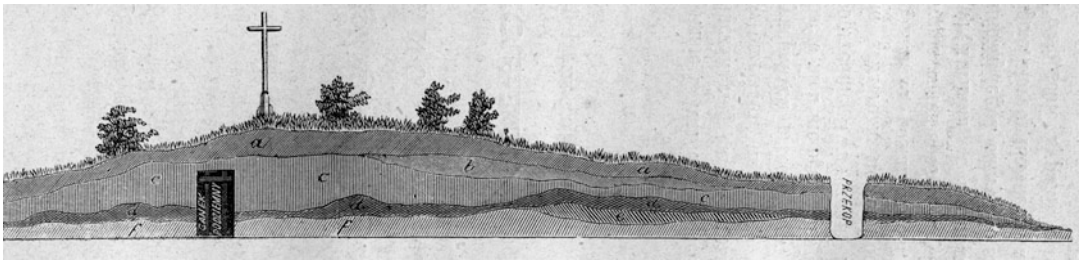

Polish Pioneers and Traditions, Fig. 1 A profile cut by Kalikst Jagmin in 1873 across a barrow in Łęgonice

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archaeological investigation. The theoretical dilemma and the rapid development of unusually sophisticated responses are recorded in the dialogue between the two innovative archaeologists Tadeusz R. Żurowski and Włodzimierz Hołubowicz. In 1947, Hołubowicz stated the principle that "during excavation there are no less or more valuable layers, they are all equally important" (Hołubowicz 1947: 37). Digging and recording of a multilayer site must be based on a system of contiguous squares, so that "...it should be possible to reconstruct the system of layers with every item precisely localized..." (Hołubowicz 1947: 34). Żurowski had already written down many of his ideas in 1939, but they were not to appear in print until after the war. He maintained that a "culture layer is also a monument of the past (*zabytek*), even when it does not contain any finds of the material culture" (Żurowski 1949). He emphasized that "naturally formed layers may be interlaced with culture layers" (Żurowski 1947: 138) and thus urged the sampling of "every cultural and geological layer" (Żurowski 1947: 140) in order "to execute detailed geological, palaeobotanical, palaeontological, anthropological and other analyses" (Żurowski 1947: 137). He also believed that "topography is best reflected by contour-lines," the principle of his "topographico-stratigraphic" method of excavating and recording that was to ensure "reconstruction of the configuration of the surface in the moment of starting the excavation and of the every lower layer in sequence – period after period backwards" (Żurowski 1947: 137). "This means that we will always be able to show three-dimensionally or by contour-lines a given surface in its shape before so and so many thousand years" and "from the layout of contour-lines we can cut sections in any directions and we can draw profiles" (Żurowski 1947: 138). If we note also that all finds must be recorded "according to precise instrumental measurements" (Żurowski 1947: 137) and that "the interrelation of characteristic points at a drawing must be precise enough to make possible, even after several years, to impose the same measurement system and to achieve the same results in an unquestionable way" (Żurowski 1947: 137), we can see that there was a powerful guide to excavation method.

Hołubowicz in turn published an attack on the technique of "arbitrary levels" (spits) for exploring complex stratigraphic structures, which may be "...studied correctly only by defining cultural layers" (Hołubowicz 1948: 38, 40). Żurowski criticized Hołubowicz's zealotry but he made it clear that "exploration by arbitrary layers without discerning culture layers may lead to serious mistakes... because finds from very recent and very old culture layers may fall in the same arbitrary layer" (Żurowski 1949: 427). He illustrated this with clear drawings (Fig. 2) showing the fallacy of

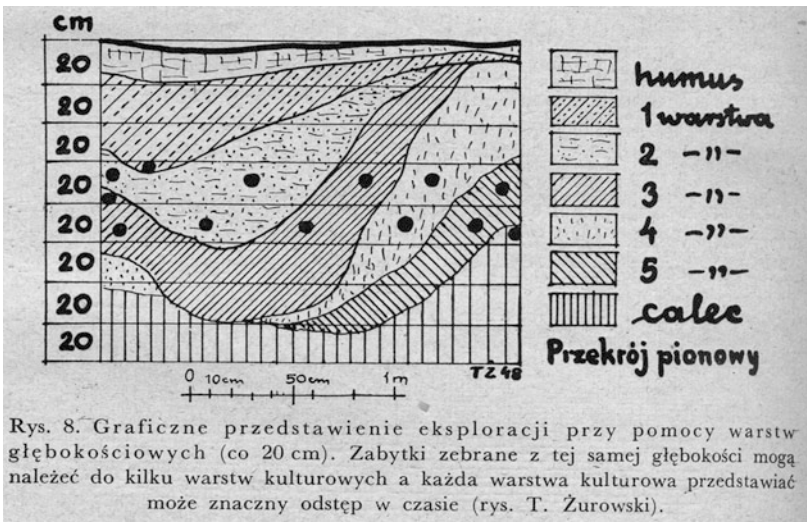

Polish Pioneers and Traditions, Fig. 2 Graphic presentation of the fallacy of the exploration of complex stratigraphy by arbitrary levels (Żurowski 1949, Fig. 8)

what he called "the most primitive method" (Żurowski 1949: 462). He argued that "all finds must be localised in relation to a culture layer and not an arbitrary layer" (Żurowski 1949: 458). Such an attitude imposed treatment of every part of a site with equal piety, reinforced by the fact that the site "usually undergoes total destruction" (Zurowski 1949: 413).

Unfortunately, this promising "brain storm" died out quickly because almost all Polish archaeological "manpower" became engaged in the extensive "millennial" program which preceded celebrations of the millennial anniversary of the origins of Polish state in 1966. Numerous medieval towns and strongholds were excavated (c. 25 large sites a year), and the results were studied by multidisciplinary teams of archaeologists, architects, ethnographers and historians, which was called the "history of material culture." There was simply no time for discussions that did not offer immediate solutions to daily problems. Polish archaeologists became again very "practical," which meant that effectiveness counted higher than methodological rigor. Methods of excavation and recording that seemed too sophisticated were openly questioned (e.g., Dembińska 1954: 97). Very few archaeologists tried to follow the standards that had been set during the postwar decade, and Poland's important contribution to excavation methodology remains largely obscure despite attempts at its promotion (e.g., Urbańczyk 1999, 2004). The lack of theoretical discussion and of progressive methodology promotion resulted in stagnation. Digging in arbitrary levels found common acceptance (e.g., Mazurowski 1996: 4) and dominates until today.

Quick economic development after the political transformation of 1989 resulted in extensive investments in production and transport infrastructure, which made necessary to excavate huge areas. Again town centers and hectares of fields have been being excavated to free space for factories, habitation quarters, highways, and pipelines. Only some outsiders lucky to have a chance to dig slowly (usually abroad) have experimented, for example, with new methods of electronic recording (e.g., Urbańczyk 2002, 2011) (Fig. 3). Thus, 65 years later, we may recall Żurowski's bitter observation that "some prehistorians consider excavation technique too easy to learn it. Such attitudes, based on ignorance, inhibit progress. . ." (Żurowski 1947: 136).

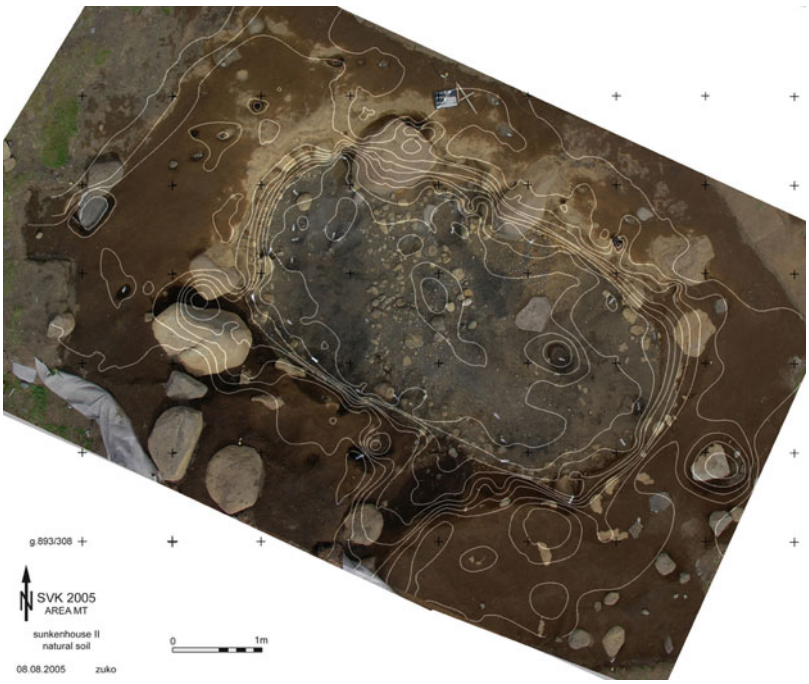

Polish Pioneers and Traditions, Fig. 3 Orthophoto map of a sunken house excavated by P. Urbańczyk in North-East Iceland in 2002–2005

Cross-References

- ▶ Archaeological Record
- ▶ British Pioneers and Fieldwork Traditions
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ France: Field Method Origins
- ▶ Publication in Field Archaeology
- ▶ Recording in Archaeology
- ▶ Scandinavia: Field Methods
- ▶ Stratigraphy in Archaeology: A Brief History

References

Dembińska, M. 1954. Dyskusja w sprawie metody wykopaliskowej. *Wiadomości Archeologiczne* 20 (1): 97–98.

Holubowicz, W. 1947. O metodzie badania grodów. *Z Otchłani Wieków* 16 (3–4): 33–37.

Holubowicz, W. 1948. *Studia nad metodami badań warstw kulturowych w prehistorii polskiej* [Studies on methods of culture layers studying in Polish prehistory]. Toruń.

Jagmin, K. 1876. Opis mogiły (kurhanu) pod Łęgonicami i wydobytych z niej przedmiotów. *Wiadomości Archeologiczne* 3: 83–94.

Kostrzewski, J. 1931. Grodzisko w Jedwabnie w pow. toruńskim. Przyczynek do relatywnej chronologii ceramiki pomorskiej okresu wczesnohistorycznego. *Slavia Occidentalis* 10: 244–273.

Kostrzewski, J., ed. 1936. *Osada bagienna w Biskupinie w pow.* Poznań: Żnińskim.

Kostrzewski, J. 1938. *Gród prasłowiański w Biskupinie w pow.* Poznań: Żnińskim.

Kostrzewski, J. 1950. *III sprawozdanie z prac wykopaliskowych w grodzie kultury łużyckiej w Biskupinie w pow. Żnińskim za lata* 1938–1939 i 1946–1948. Poznań.

Kozlowski, L. 1917. Badania archeologiczne na górze Klin w Iwanowicach, powiatu Miechowskiego. Warszawa.

Krukowski, S. 1921. Badania jaskiń pasma Krakowsko-Wieluńskiego w 1914 r. Archiwum Nauk Antropologicznych 1(1).

Majewski, E. 1902. Jak rozkopywać kurhany? *Światowit* 4: 193–200.

Mazurowski, R. 1996. *Założenia i wskazówki metodyczne dla archeologicznych badań ratowniczych wzdłuż Trasy gazociągu tranzytowego*. Poznań: EuRoPol GAZ s.a.

Urbańczyk, P. 1999. Teoria i praktyka badań wykopaliskowych Tadeusza R. Żurowskiego [Tadeusz R. Żurowski's theory and practice of excavations]. In *Tadeusz R. Żurowski i konserwatorstwo archeologiczne w Polsce XX wieku*, ed. Z. Kobyliński and J. Wysocki. Warszawa: SNAP.

Urbańczyk, P. 2002. Sveigakot 2001. Area T – pit house. In *Archaeological investigations at Sveigakot 2001*, ed. O. Vesteinsson, 29–49. Reykjavik: The Icelandic Institute of Archaeology.

Urbańczyk, P. 2004. Excavation methodology in post-war Poland: The forgotten revolution. In *Digging in the dirt*, ed. G. Carver, 111–114. Oxford: Tempus.

Urbańczyk, P. 2011. Skonsvika and experiments with digitalised recording system. In *Hybrid spaces. Medieval Finnmark and the archaeology of multi-room houses*, ed. B. Olsen, C. Amundsen, and P. Urbańczyk, 169–177. Tromsø: IFSK.

Żurowski, T. 1947. Pomiar w technice wykopaliskowej [Surveying in excavation technique]. *Z otchłani wieków* 16 (5–6): 136–141.

Żurowski, T. 1949. Uwagi na marginesie 'Studiów nad metodami badań warstw kulturowych w prehistorii polskiej' Włodzimierza Hołubowicza [Remarks on studies on methods of culture layers studying in Polish prehistory" by Włodzimierz Hołubowicz]. Światowit 20: 411–480.

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Basic Biographical Information

Gustavo Gabriel Politis (Fig. 1) is an Argentine archaeologist. He was born in 1955 at Buenos Aires, but he grew up in Necochea, a city 500-km south of Buenos Aires in the Argentine plains or Pampas. In 1978, he graduated as an anthropologist from the Facultad de Ciencias Naturales de la Universidad Nacional de La Plata, where he also made his postgraduate studies. He received a Ph.D. in 1984 on the basis of his dissertation about the archaeology of the "*interserrana*" area (the plains between the Tandilia and Ventania hill ranges) of Buenos Aires province. After his graduation, as a postdoctoral fellow (1984–1985), he stayed at the Department of Anthropology of the University of Kentucky, and was a Visiting Scientist at the Smithsonian Institution's National Museum of

Politis, Gustavo G., Fig. 1 Gustavo Politis

Natural History, and Visiting Scholar at the Center for the Study of Early Man at the University of Orono, Maine.

Before that, he held a fellowship of the National Research Council of Argentina (1979–1984) while he began his career in the teaching of archaeology. He was Assistant Professor (1980–1984) at the Facultad de Ciencias Naturales of the Universidad Nacional de La Plata, Argentina, where he taught American Archaeology and was Associate Professor (1987–1989) at the Universidad Nacional del Centro de la Provincia de Buenos Aires. Since 1993, he has held a tenured post at the same institution teaching American hunter-gatherers, while at the Universidad Nacional de La Plata, he continued as Professor teaching Method and Technics in Archaeology. He taught at different universities abroad as Visiting Professor as well, such as the Universidad Nacional de Colombia (1991, 1992), University of Cambridge (1991), University of Southampton (1992–1993), and Stanford University (2001).

In 1987, Gustavo Politis became researcher at the National Research Council of Argentina, where he developed his professional career, progressing up the hierarchies to his current position (2010) as Senior Research Fellow, the highest one. His main research activities were carried at the Museo de La Plata of the Universidad Nacional de La Plata and at the Núcleo de Investigación INCUAPA (*Investigaciones Arqueológicas y Paleontológicas del Cuaternario Pampeano*) of the Universidad del Centro de la Provincia de Buenos Aires (UNICEN), where he still develops his research and is Director. His work at the University also entailed active participation as academic councilor and later as Dean (1989–1992) of the Facultad de Ciencias Sociales (UNICEN), where he also promoted the foundation of the INCUAPA (1995). There he created the Doctorate in Archaeology (2005), where he currently is the Director. As professional archaeologist, he was President of the Sociedad Argentina de Antropología (2006–2009) and Editor of *Relaciones de la Sociedad Argentina de Antropología*, the most important academic journal in anthropology at Argentina.

Major Accomplishments

Through his research, Dr. Politis promoted a renewed emphasis on study of the archaeology of the Pampas, an area traditionally undervalued. From the beginning of his work in the area at the end of the 1970s, he demonstrated the importance of this region in the early peopling of the continent, and renewed discussions on human and megafauna coexistence (Politis 1984). Thanks to his encouragement, new projects and lines of research were opened in the region, and at the present time, many research teams are making important contributions, while recognizing its historical importance.

Particularly interested in hunter-gatherers, Politis spent long seasons between 1990 and 1996 at the Colombian Amazonas forest conducting ethnoarchaeological research among the Nukak, a recently contacted hunter-gatherer group. There he tested many assumptions about forest hunter-gatherers and developed models in relation to settlement and mobility, as well as advanced new insights in relation to subsistence

and material culture (Politis 1996). This experience was continued in his ethnoarchaeological research among the Hotï at Venezuelan Amazonia in 2002–2003, and among the Awá, at Brazil, which led him between 2005 and 2009 to make new ethnoarchaeological studies in an international project with Spanish and Brazilian colleagues.

Theory and the history of archaeology have been other major concerns and contributions by Dr. Politis. Within a perspective of the history of archaeology both in relation to theory and to politics, he made many important contributions that placed South American archaeology in the international arena. He was particularly interested in the sociopolitical contexts of knowledge production (e.g., Politis 1995, 2001; Politis and Curtoni 2011) and the positioning of South American archaeology in relation to global counterparts, colonialism, and world theoretical context (e.g., Politis and Alberti 1999; Politis 2003). His experience as an ethnoarchaeologist has informed theoretical considerations of this topic, especially in terms of its ethical implications (Politis 2001).

Gustavo Politis' research with Indigenous people is characterized by his commitment to the people with whom he works and a reflexive stand on the social role of archaeologists. He had an active and conspicuous participation in the first restitution of an Indigenous ancestor at Argentina ordered by law in 1994. This was particularly significant and symbolic as it was about a highly respected chief, Inakayal, who had resisted the advance of the State in nineteenth century over their territories at Patagonia and been kept at the National Museum as a specimen. This first repatriation had deep impact on native peoples, vindicating their struggles, as well as on scientists and ordinary people.

Dr. Politis has received numerous awards for his contributions to the profession including one of the most important recognitions in science at Argentina, the Premio Nacional de Ciencia "Bernardo Houssay" of Argentina, with which he honored twice both as junior (1987) and senior (2003) researcher. In 2003, he was distinguished by a John Simon Guggenheim Fellowship. He was invited as distinguished Lecturer, banquet speaker and to plenary lectures at international congresses in many opportunities. His book *Ethnoarchaelogy of an Amazonian People* (Politis 2007) was chosen by *Choice*, a premier source for reviews of academic books in the USA, as one of the outstanding academic titles of 2008.

Cross-References

- ▶ Ethnoarchaeology
- ▶ Latin American Social Archaeology
- ▶ South American Archaeology: Postcolonial Perspectives

References

Politis, G. 1984. Investigaciones arqueológicas en el Area Interserrana Bonaerense. *Etnia* 32: 3–52.

Politis, G. 1995. The socio politics of the development of the archaeology in Hispanic South America. In *Theory in archaeology. A world perspective*, ed. P. Ucko, 197–235. London: Routledge.

Politis, G. 1996. Move to produce. Nukak mobility and settlement patterns in Amazonia. *World Archaeology* 27: 492–510.

Politis, G. 2001. On archaeological praxis, gender bias, and indigenous peoples in South America. *Journal of Social Archaeology* 1: 90–107.

Politis, G. 2003. The theoretical landscape and the methodological developments of archaeology in Latin America. *American Antiquity* 68: 247–272.

Politis, G. 2007. *Nukak. Ethnoarchaeology of an Amazonian people*. Walnut Creek: Left Coast Press.

Politis, G., and B. Alberti. 1999. *Archaeology in Latin America*. London: Routledge.

Politis, G., and R. Curtoni. 2011. Archaeology and politics in Argentina. The last fifty years. In *Comparative archaeologies. A sociological view of the science of the past*, ed. L.R. Lozny, 495–526. New York: Springer.

Further Reading

Endere, M.L. 2011. Cacique Inakayal. La primera restitución de restos humanos ordenada por ley. *Corpus. Archivos virtuales de la alteridad americana* 1. http://ppct.caicyt.gov.ar/index.php/corpus/article/view/320/102. Accessed 22 Apr 2013.

Pompeii

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Introduction

The archaeological site of the Roman town of Pompeii is located in Campania, Southern Italy, 8 km southeast of the apex of Mount Vesuvius. Pompeii as well as the nearby towns of Herculaneum, Stabiae and Oplontis were destroyed and buried when Mount Vesuvius erupted in 79 CE. In 1997, Pompeii, Herculaneum, and Torre Annunziata were declared World Heritage sites by UNESCO because they "provide a complete and vivid picture of society and daily life at a specific moment in the past that is without parallel anywhere in the world" (UNESCO 2019).

In ancient times Pompeii was situated on a low hill at the mouth of the Sarno River, about nine kilometers south of Mount Vesuvius. Both the river port and the shallow bay to the south were filled in by volcanic deposits during the 79 CE eruption which pushed the coastline outwards by more than 1 km. This was a total disaster for the inhabitants, but they have not been forgotten, because the 4-m-thick layer of volcanic debris preserved the city and most of its material goods.

The area was settled during the sixth century BCE by Greek traders coming from either Cumae, the first Greek colony in Italy, or from its subcolony Parthenope, later known as Neapolis ("New Town"), now Naples (Descœudres 1994, p. 5). Little is left of the Greek town, which lies beneath the Roman-period remains, but it was likely laid out along the principles developed by the Greek architect Hippodamos of Miletos (498–408 BCE) with an open plaza at the center, surrounded by a geometric grid of streets. Gates on each of the four sides gave access to nearby towns and ports. Remains of the Doric Temple built in the sixth century BCE still exist beside the later Roman Forum.

The town was enclosed by walls in the 470s BCE to protect the population from external threats, but walls did not deter the Samnites who in the 420s BCE swept down from the mountains and took over most of the coastal towns, except Naples. Pompeii was greatly enlarged, to its final size of 64 hectares, surrounded by a city wall pierced by seven gates. Solidly built Samnite houses, such as the core of the House of Sallust, survived over 400 years till the time of the volcanic eruption and the Samnite language, Oscan, was still occasionally used in graffiti. By then, however, the whole of Campania had been conquered by Rome and formal inscriptions were in Latin, as were most of the graffiti.

In 80 BCE, Pompeii became a Roman *colonia,* a town where veterans were resettled, which greatly increased the population. Public buildings were created or enlarged and included the Forum, a concert hall, baths, a theatre and amphitheater, and several temples. The city was divided into rectangular blocks or *insulae*, "islands," by a street system of north-south *cardines* and east-west *decumani*. The two main longitudinal streets, today called Via dell'Abbondanza (Street of Abundance) and Via di Nola, are crossed at right angles by the Via Stabiana. The *insulae* consist of a mix of large houses surrounded by smaller dwellings, shops, artisan workshops and a great many eateries.

Although Pompeii was not a city of any great political significance, it was wealthy and some of the private houses were enormous – the House of the Coloured Capitals, for instance, covers 2000 square meters, is beautifully decorated with frescoes and mosaics and encloses a courtyard and two gardens. The Villa of the Mysteries, a suburban villa just outside the walls, was partly a working farm, with a wine press and stables, but its dining hall has on its walls a magnificent continuous fresco, 17 m long and 3 m high, generally considered to be a masterpiece of Roman art.

The whole coastline was prone to earthquakes and two reliefs in the House of Lucius Caecilius

Jucundus show their effects: in one, the Temple of Jupiter in the Forum is toppled; in the other, the Vesuvius Gate collapses (Berry 2007, p. 237). In 62 CE, there was a catastrophic earthquake which almost totally destroyed neighboring Herculaneum while many buildings were damaged within Pompeii itself. Repairs were ongoing and costly: an inscription in the Temple of Isis records it was restored and enlarged at private expense after the earthquake (Berry 2007, p. 236). Restorations were still being undertaken at the time of the pyroclastic disaster that destroyed the town in 79 CE.

The main primary source for the volcanic eruption is the first-hand account by Pliny the Younger written as a recollection about 25 years after the event. In two letters to his friend the historian Tacitus, Pliny describes the progress of the eruption he witnessed as a 17-year-old while he was staying on the other side of the bay at his uncle's villa at Misenum. In the first letter, he describes the heroic deeds of his uncle Pliny the Elder, naturalist, writer, and commander of the Roman fleet who ordered warships to be launched with the aim of rescuing as many people as possible. Sadly, Pliny the Elder's rescue mission was cut short when he died in the arms of his slaves on the beach at Stabiae as a result of breathing the thick smoke from the eruption (Pliny the Younger, n.d.).

The current estimate for the population of Pompeii at the time of the volcanic eruption is of about 12,000 people (Lidz 2019), perhaps only half of the population at the time of the earthquake 17 years earlier. While archaeological evidence indicates that people remained in, or retuned to, the city after the earthquake, to repair their houses and public buildings such as the Forum and the Stabian Baths, some parts of the city may have been sparsely inhabited. For instance, only 22 bodies were found within the Insula of the Menander, a city block between Via dell'Abbondanza (Street of Abundance) and the Via Stabiana. This *insula* included four large houses and a dozen smaller establishments and should normally have housed a great many more people. Fifteen of the bodies were found in a group on the stairs of the largest house, the House of the Menander, and are presumed to have been fleeing together; they wore noticeably little jewelry and carried no money – unlike the adult and the teenager found in one of the bedrooms with bags of coins and silver objects (Allison 2006, p. 401, 405). One can speculate that the people on the stairs were servants, while those in the bedroom were members of the householder's families. It is the human drama of such discoveries that has made Pompeii so well-known worldwide.

Well before archaeology had been developed as a scientific discipline, the earliest known "digging" at Pompeii was done in the early 1700s for the purpose of extracting works of art for the villas and palaces of wealthy aristocrats. The lost city was not identified until 1763 when an architectural block bearing the inscription *res publica Pompeianonorum* (State of the Pompeians) was uncovered (Descœudres 1994, p. 42).

Shortly after, more systematic excavation began in 1765 when Spaniard Francesco la Vega became director of excavations. His method was to clear the rooms of each building to floor level and leave the excavated buildings in full view for the public to see. He also established the first overall plan of the excavations (Etienne 1992). The Temple of Isis was discovered in 1765 during his directorship. It contained human remains and objects from the ancient Egyptian religion which later fired the imagination of Edward Bulwer-Lytton (1803–1873), author of the highly successful novel *The Last Days of Pompeii*, published in 1834. During the era of the "Grand Tour," Pompeii became a popular destination as wealthy aristocrats, writers, artists, and architects from Britain and European countries developed a passion for travel to Greece and Italy to see the "birthplaces" of European art and culture.

One of the most important contributions was made by Giuseppe Fiorelli, director of excavations at Pompeii and Herculaneum 1863–1875. Fiorelli was an ardent Italian nationalist and creative thinker who introduced many new excavation techniques. With considerable foresight, he decided not to dig below the first-century levels, (which has probably preserved pre-Roman material) and established the system still in use of dividing the old city into nine "regions" (I–IX), which are then subdivided into their various

components. For instance, the House of the Coloured Capitals is VII,4,31 meaning house 31 in *insula* 4 of *Regio* VII.

Fiorelli's most spectacular innovation, however, was to fill with plaster the empty spaces left by bodies that had decayed in the solidified ashes. The results are the profoundly moving Pompeii casts which provide visitors with a vivid reminder of the human tragedy caused by the eruption. More recently, Fiorelli's plaster method has been replaced by techniques that use resin or liquid fiber glass to enable bones and other artifacts to become visible within the transparent cast.

Another archaeologist who made a significant contribution to the interpretation and display of Pompeii to the public was Amedeo Maiuri, director from 1924 to his retirement in 1961. Maiuri was the first to examine Pompeii's pre-79 CE history by excavating below floor levels in houses such as the House of the Surgeon. Maiuri aimed to showcase everyday life as it was in Pompeii at the time of the eruption by reconstructing streetscapes, walls, roofs, and interiors of houses and by restoring the vivid images of Pompeian life such of those in the wall paintings of the Villa of the Mysteries. The restoration of Pompeii has been influenced by the energies, visions, and strengths of the many archaeologists who have worked there. In addition, a growing awareness of advances in archaeological research among the current population of the modern city increases the chances of discovering more about the events in Pompeii's history.

State of Knowledge and Current Debates

More than 200 years of excavation at Pompeii have revealed the rich history of a vibrant community that expanded and evolved over four centuries. By the second century CE, Pompeii had become a prosperous city that had hundreds of grand residences, such as the well-known House of the Faun, House of Vettii, House of Julia Felix, and House of the Surgeon, as well as many public spaces such as *thermae* (bath houses) amphitheater, two theaters, and a *palaestra* (open area for exercise). Until recently those who studied Pompeian houses tended to focus on analyzing architectural details and styles. Rooms were identified and described with little understanding of their use by the people who lived in them. New work has sought to investigate what the houses reveal about how the spaces were used. For example, Andrew Wallace-Hadrill (1994) interprets the private spaces of luxury houses as a reflection of Roman public life where the *pater familias*, head of the household, also exerted power and control in the public spaces of business and politics.

The center of Pompeian life was the Forum where the most important social, financial, political, and business activities took place. Pompeians could relax and socialize in one of the large *thermae* in the town. There they could exercise, purchase food, get a massage, or engage in sexual activities, as evidenced from the graffiti and erotic paintings on the walls of the Suburban Baths. Manufacturers and retailers ran businesses from shops in the front of their homes that opened onto the street and displayed their saleable goods or services, such as shoes and leather work.

Pompeii was a cultural and trading center and a significant contributor to ancient Rome's increasing economic prosperity. The Campanian region was famous for its wine which was exported to Rome, southern France, Spain, and North Africa. The writer Florus tells us that the surrounding mountains were planted with vineyards and a wall painting uncovered in the *lararium* of the House of the Centenary shows Mount Vesuvius situated in a landscape covered with grapes. Pliny the Elder complained that Pompeian wines were notorious for causing headaches that could last until the following day.

Wool and textile production were another industry in Pompeii. Sheep were bred in the Vesuvius area and Pompeii was a regional center for cloth making and dyeing. Wool was processed and dyed for textiles and a cleaning service for togas was provided at the Fullery of Stephanus, excavated in 1911. However, the longstanding interpretation by Walter O. Moeller (1976) which proposed that Pompeii was the center of the wool industry was challenged by Dutch scholar Willem Jongman (1988) who argued that

Moeller's interpretation was overly influenced by his knowledge of the medieval wool trade and cloth guilds of northern Europe. Jongman suggests that the local wool trade was only small and that the cultivation and sale of crops were far more important to the local economy.

Art and architecture also provide an insight into the opulence surrounding some of its inhabitants' lifestyles. Wall paintings and portraiture in marble and bronze suggest a community with sophisticated appreciation of art, nature, and aesthetics. Pompeian wall painting was classified into the so-called Four Pompeian Styles by German art historian Augustus Mau in 1882 (Mau and Kelsey 1907). Mau attributed all the styles to foreign origins, but subsequent studies demonstrated that the distinctive styles of Pompeian wall painting were developed by Roman artists (Descœudres 1994, p. 152). One of the greatest, ongoing challenges in the recovery of Pompeian wall paintings has been their preservation. In 2013, conservators used modern technologies and scientific techniques to painstakingly repair and conserve the so-called Dionysian wall paintings in the Villa of the Mysteries to restore them to their original magnificence (Lobell 2014).

Many examples of graffiti were found on the walls of houses and shop fronts on main streets and around busy intersections. Most were political slogans and endorsements of candidates in upcoming elections. But other graffiti, such as those roughly etched onto the walls of the Gladiators' Barracks, tell us of other more personal preferences: that the "girls' heart-throb," Thracian gladiator Celadus, "fought 3 and won 3" (Cooley 2004, p. 66). Some of the gladiators will have been Samnites, descendants of Pompeii's first invaders, for they had invented a sort of war game which eventually evolved into the formal gladiatorial games of which the Romans were so fond.

During the early excavations at Pompeii, the skeletons of victims were removed from where they were found and stored in various places across the site, such at the Sarno Baths. Here they became disarticulated and the bones were mixed up. These bones can now only be studied individually rather than as complete skeletons. For a long time, scholars believed that women and children, the elderly, and the disabled were the most common victims of the eruption. This was proven incorrect by an extensive study conducted by Estelle Lazer in the 1990s. Lazer's study was based on a sample of about 300 skulls and a smaller number of bones such as skulls, teeth, arms, legs, and pelvis. Other bones that were useful for analysis were those that displayed distinctive features of trauma, such as fractures and disease. Lazer's study revealed that there were roughly equal numbers of adult males and females in the sample of victims, and they were of varying ages. She found it difficult, however, to estimate the number of children who died because very few skeletons of young children were preserved in the archaeological record.

Lazer also concluded that asphyxiation or thermal shock were the main causes of death (Lazer 2009). In their research paper, "Lethal Thermal Impact at Periphery of Pyroclastic Surges: Evidences at Pompeii," Mastrolorenzo, Petrone, Pappalardo, and Guarino, however, argue that pyroclastic surges were "the main cause of death of people" in Pompeii rather than asphyxiation (Mastrolorenzo et al. 2010).

Other scientific studies have revealed many things about the people of Pompeii, including the presence of diseases (such as malaria, tuberculosis, arthritis, and tooth decay), ages, occupations, and diets. It has even been possible to extract some mitochondrial DNA from skeletons, which in one case shows that six of the 13 individuals recovered from the House of C. Julius Polybius were "closely related" to one another (Di Bernardo et al. 2009). Analyses of the remains of foodstuffs excavated from the tables, such as bread, figs, walnuts, and pomegranates provide insights into the diets of the people of Pompeii (Berry 2007, p. 30). The contents of excavated shops, such as the Bakery of Modestus, the Bars of Asellina and Salvius, and dozens of *thermopolia* (food outlets) also revealed what the people of Pompeii were eating, drinking, and purchasing.

Scholars have long assumed Pliny the Younger's statement that Mount Vesuvius erupted on 24 August 79 CE was correct, but a graffito discovered in 2018 by Italian archaeologists

challenges this date. Scrawled in charcoal onto a wall of a house in *Regio* V, the inscription is dated (in the Roman calendar) to 16 days before the "calends" of November – which is 17 October in our modern dating system. It is now estimated that the eruption happened in the second half of October (Lidz 2019).

Future Directions

Today Pompeii bears the scars of archaeology (both legal and illegal) and tourism. In 2018, 3.5 million tourists visited Pompeii, making it one of Italy's, if not the World's, most popular tourist attractions. It is also a popular topic on the Internet, with 3D reconstructions, videos, virtual tours, and searchable maps freely available online (e.g., sites.google.com). While tourism helps support the economy of the surrounding town of twenty-first century Pompeii, one of the authorities' greatest challenges is the conservation and preservation of the site.

A Presidential Decree of the Italian Council of Ministers on 4 July 2008 declared a State of Emergency due to the hazardous conditions of the ruins. The crisis was brought to global public attention in the media with the collapse of the Gladiators Barracks in 2010 and the House of Loreius Tiburtinus in 2011. This prompted a formal agreement between the United Nations Educational, Scientific and Cultural Organization to better conserve the site (UNESCO 2012, 2013).

In January 2014, a Special Superintendency for the Archaeological Heritage of Pompeii, Herculaneum, and Stabiae was formed. In 2016, it was renamed the Superintendency of Pompeii and in 2017 became known as the Archaeological Park of Pompeii, thus adjusting to international standards for cultural institutions and sites (Pompeii 2019). The Archaeological Park of Pompeii is an autonomous body of the Ministry of Cultural Heritage and Activities and Tourism and is aimed at the preservation, conservation, and promotion of public use of the archaeological site.

The Great Pompeii Project was initiated by the Italian government in 2012 with the aim of protecting the archaeological area of Pompeii by developing a special urgent program of conservation, maintenance, and restoration. It is supported by the European Union with funding of 105 million euros between the European Regional Development Fund and the Italian government. The main areas of intervention include: reduction of the hydrogeological risk by securing the unexcavated embankments; securing the *insulae*; consolidation and restoration of masonry; consolidation and restoration of decorated surfaces; protecting buildings from weather exposure; increasing the number of areas that can be visited; and strengthening of the video-surveillance system. The project is supported by a plan for scientific and technical study aimed at diagnosis, expansion of scientific knowledge, and providing operational direction.

In 2018, to celebrate the 270th anniversary of the discovery of Pompeii, authorities announced that new excavations would begin in *Regio* V, an area positioned between the House of the Silver Wedding and the House of Marcus Lucretius Fronto, which has not been investigated since World War II. The area forms part of The Great Pompeii Project, the largest intervention which aims to stabilize around 22 ha of the unexcavated area of Pompeii over a period of 2 years, at a total cost of around 8.5 million euros. Excavations have already revealed some remarkable works of art, such as frescoes of Narcissus and Leda and the Swan in one of the houses, now called the House of Leda. There have also been proposals to use state-of-the art techniques to reexamine the existing collections and to carry out DNA tests to try to determine family relationships (Lidz 2019).

It is worth noting that the catastrophic eruption that destroyed Pompeii and surrounding areas is a recurring event. Scientists have dated the pumice deposits found beneath the material deposited by the 79 CE pyroclastic eruption of Mt Vesuvius to 1780 BCE. Mastrolorenzo, Petrone, Pappalardo, and Sheridan's research paper indicates that another major Vesuvius eruption could be imminent (Mastrolorenzo et al. 2006). This prediction should be considered when deciding the direction of future archaeological work as well as during the planning of restoration programs being undertaken in and around Pompeii.

Pompeii's discovery and excavation has enabled unique insights into a way of life centuries ago because of the effects of a devastating natural disaster. Even given the considerable amount of archaeological investigation already undertaken, there is still great potential for new knowledge to emerge, especially given the continued advances in investigative and conservation techniques.

Cross-References

- ▶ Disaster Response Planning: Earthquakes
- ▶ Fiorelli, Giuseppe
- ▶ Herculaneum
- ▶ Maiuri, Amedeo
- ▶ UNESCO World Heritage Convention (1972)
- ▶ Volcanic Activity

References

Allison, P.M. 2006. *The Insula of the Menander at Pompeii. Volume III: The finds, a contextual study*. Oxford: Clarendon Press. Searchable database. https://www.le.ac.uk/archaeology/menander/. Accessed 3 Sept 2019.

Berry, J. 2007. *The complete Pompeii*. London: Thames and Hudson.

Cooley, A.E. 2004. *Pompeii: A sourcebook*. London: Routledge.

Descœudres, J.-P., ed. 1994. *Pompeii revisited: The life and death of a Roman town*. Sydney: Meditarch.

Di Bernardo, G., et al. 2009. Ancient DNA and family relationships in a Pompeian house. *Annals of Human Genetics*. https://doi.org/10.1111/j.1469-1809.2009.00520.x. Accessed 4 Sept 2019.

Etienne, R. 1992 [1986]. *Pompeii: The day a city died*. London: Thames and Hudson.

Jongman, W. 1988. *The economy and society of Pompeii*. Amsterdam: J.C. Gieben.

Lazer, E. 2009. *Resurrecting Pompeii*. Abington/New York: Routledge.

Lidz, F. 2019. The new treasures of Pompeii. Smithsonian Magazine, September. https://www.smithsonianmagazine.com/history/new-treasures-pompeii-180972829/. Accessed 3 Sept 2019.

Lobell, J.A. 2014. Saving the Villa of the Mysteries: Beneath the surface of Pompeii's most famous house. *Archaeology*. Archaeological Institute of America. March/April. https://www.archaeology.org/issues/124-1403/features/1813-pompeii-saving-the-villa-of-the-mysteries. Accessed 7 Nov 2019.

Mastrolorenzo, G., P. Petrone, L. Pappalardo, and M. Sheridan. 2006. The Avellino 3780-yr-B.P. catastrophe as a worst-case scenario for a future eruption of Vesuvius. *Proceedings of the National Academy of Sciences of the United States of America* 103 (12): 4366–4370. https://doi.org/10.1073/pnas.0508697103.

Mastrolorenzo, G., P. Petrone, L. Pappalardo, and F. Guarino. 2010. Lethal thermal impact at periphery of pyroclastic surges: Evidences at Pompeii. *PLoS One* 5 (6): e11127. https://doi.org/10.1371/journal.pone.0011127. Published online 2010 June 15.

Mau, A., and F.W. Kelsey. 1907. *Pompeii: Its life and art*. New York: Macmillan. Translated and revised edition of 1882 German-language original. https://www.questia.com/library/1453554/pompeii-its-life-and-art. Accessed 3 Sept 2019.

Moeller, W.O. 1976. *The wool trade of ancient Pompeii*. Leiden: Brill.

Pliny the Younger. n.d. Letters of Pliny, online at http://www.gutenerg.org/ebooks/2811. Letters LXVand LXVI.

UNESCO. 2012. Towards a governance system for coordinating the updating and the implementation of the management plan of the archaeological areas of Pompeii, Herculaneum and Torre Annunziata. http://whc.unesco.org/en/news/966. Accessed 1 June 2013.

UNESCO. 2013. Archaeological areas of Pompeii, Herculaneum and Torre Annunziata. http://whc.unesco.org/en/list/829. Accessed 1 June 2013.

UNESCO. 2019. Archaeological areas of Pompeii, Herculaneum and Torre Annunziata. http://whc.unesco.org/en/list/829. Accessed 1 Sept 2019.

Wallace-Hadrill, A. 1994. *Houses and Society in Pompeii and Herculaneum*. Princeton: Princeton University Press.

Popular Culture and Archaeology

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Introduction

Popular media has influenced the public view of archaeology for over a century. Before the genesis of digitally based mass media, popular culture as it related to archaeology was based on the accounts of travelers and other print-based media. In the modern age, motion pictures, television shows, print media, and video games have all served to

bring archaeology to the masses. Unwittingly, these forms of media often misrepresent the methodological and theoretical underpinnings of the field in favor of adventure and glamour. *King Solomon's* Mines (1950 and 2004), *Indiana Jones* (1981–2008), *Laura Croft*: *Tomb Raider* (2001), and the *Stargate SG-1*(1997–2007) series are just a few examples of how simplistic views of archaeology have been popularized in the mass media. These portrayals of archaeologists in action promulgate a romanticized and adventure-based view of the discipline, a view that frequently overshadows archaeology's scientific goals and practices. In addition to influencing how archaeology is viewed as a discipline, popular culture has an effect on how the public regards archaeological resources and associated geographic areas.

Definition

Archaeology as displayed in movies, television, fictional novels, and other popular media focuses on adventure and ignores the technical and practical elements of archaeological fieldwork while creating a new identity for archaeologists as adventurers and cultural connoisseurs. Additionally, these media also neglect to include the research and preparation necessary to undertake before entering the field. The analysis of data and the ethical implications of research are wholly ignored, leaving these elements of archaeology as a science a mystery to the public who consumes this image of the discipline. Though archaeologists in the field are prone to consider actual archaeological research as absent from the minds of those who produce popular forms of media, those who develop these forms of entertainment – in all actuality – rely on archaeological work for the production of stories for the interested public. Without the archaeologist, popular representations of past cultures – and the way in which they are accessed – would be produced based on pure fantasy and speculation, rather than simply lacking in detail and scientific veracity. Moreover, the many attitudes and ideals that are fueled by popular media have a direct effect on how the cultural patrimony of the world is guarded and understood. However, it is necessary to remember that archaeologists are the primary source of public discourse with the past, and ultimately the interest in these areas on the part of archaeologists is the catalyst for the emphasis on various time and regions – such as ancient Egypt, the classical Mediterranean, or the biblical Near East – in popular media (Kroshus Medina 2003).

Key Issues/Current Debates/Future Directions/Examples

Beyond representations of archaeology and uncovering the past in cinematic formats, there is now an excess of television shows that focus on popular notions of uncovering the past. In some cases, like that of the show *American Digger* on Spike TV, what is shown can hardly be called archaeology. An unknowing public may take it as such an endeavor and absorb messages that are much more harmful to the archaeological record and the image of the discipline than seeing an archaeologically based adventure film. Despite this fact, archaeology is not without hope in the public eye. As long as there have been television programs and movies for the archaeologist at heart, there have also been publications such as *National Geographic* or *Archaeology* magazine to temper fiction with fact. Thus, while many in the profession may ultimately fess up to being drawn to archaeology by films such as *The Mummy* (1932 and 1999), pop culture does more for the field than lure unsuspecting adventurers into the clutches of scientific rigor.

The placement of archaeology in such a romantic and unscientific light can elicit a trend in response that tends towards a condemnation of these representations as false or misleading (McGeough 2006). However, researchers such as Vergil E. Noble (2007) have pointed out that the way the story is told does not always change the message. Although Hollywood representations of past stories may not be entirely accurate or show the archaeologists as a treasure-hunting adventurer, the reverence and awe of the past that drives so many professionals to enter the field is

undoubtedly present. While the public may come away confused as to certain technical elements of the discipline, the basis of their desire to engage with archaeology in cinematic form is not to have a formal lesson on excavation. Rather, they are there to be entertained, and what is deemed entertaining is often a reflection of public interest rather than a choice on the part of the producer. A public interest in archaeology and the past is absolutely vital to the promulgation of the discipline beyond pure academic interest (Sabloff 1999). If people were to stop seeing the past as interesting and exciting, the drive to preserve, protect, and engage with it would ultimately diminish and with it the professional ability to act as stewards of the past (SAA Principles of Archaeological Ethics). Movies, television, video games, and even popular books by authors such as Dan Brown or Steve Berry – authors of *The Da Vinci Code* and *The Alexandria Link*, respectively – all serve to peak public interest in the past and hopefully drive people to learn more about the archaeology of their own areas or the discipline as a whole.

Also at issue here is the perception that archaeology can only happen when artifacts are excavated and removed from their context into a laboratory or museum setting. Professional issues such as curation, the acquisition of permits, and the rights of cultural groups to the protection of their ancestral heritage are not addressed in the popular media. This results in an enthusiastic public that does not fully grasp the destructive nature of archaeology or the importance of the life of the artifacts themselves. Rather than condemning filmmakers for the popularized view of archaeology they have put forth, the discipline should thank them for acting as an inspiration to so many in the field and in the public. Both the Society for American Archaeology (SAA) and the Archaeological Institute of America (AIA) have sought to do this within their respective organizations. In 1996, the SAA recognized the producers of *Star Trek: Voyager* and *Star Trek*: *Next Generation* for their portrayal of archaeology, and in 2008 the *Indiana Jones* star Harrison Ford was elected to the board of directors for the AIA and awarded for his contributions to the public presence of archaeology (Aldenderfer 1996; AIA News 2008). Furthermore, it should be taken on as professional responsibility to find ways to educate the public beyond television and movies so that they may come to know the science of archaeology and the important issues archaeologists deal with when they are not fighting to rescue the past they so eagerly strive to protect (Sabloff 1999). To this end, the AIA and many scholars in the field have worked towards addressing issues of accuracy in popular historical representations such as *Troy* (2004) or Mel Gibson's 2006 film *Apocalypto*. In order to satisfy the public's interest in history and the truth of the past, the AIA and SAA have also made an effort to disseminate scientific evaluations of popular movies and television shows (Waldbaum 2004; Dixon Renoe and Jeppson n.d.).

Though the real world of archaeology may not seem as exciting on the surface as it is in the movies, archaeologists should – and certainly do – strive to make it important and exciting in their own communities. Indeed, Jeremy Sabloff (1999) cogently illustrates how the professional structure of archaeology has prohibited the communication of archaeological practices and findings to the public in popular formats. In recent years, this disconnect between archaeologist and the public they serve has begun to shrink with the expansion of public archaeology and an ethical imperative to make research and results accessible to communities (SAA Ethics in American Archaeology Committee 1996). Professional archaeologists in the popular media are still underrepresented however and are thus inaccessible to the general population. The absence of professional archaeology from these popular formats opens the door for misinterpretation and furthers the glamorous view of archaeology through misguided interpretations of the past and a reliance on famous historical enthusiasts (Sabloff 1999). Archaeology can only benefit from a deeper involvement in the popular presentation of the subject. Only when there are real, accessible, examples to follow will the public form their opinions of archaeologists and their duties on reality rather than the archetypes transmitted through popular culture.

The representation of archaeology in popular media greatly influences the public perception of

the discipline. Although there are issues with the way archaeology and archaeologists are depicted in movies, books, and on television, the real issue lies in the general public consensus that has been fueled by these images of the archaeologist as adventurer. Many of the misconceptions that are held about archaeology and those who work in the field are not limited to a single geographical region. In his 2006 article, "Out of the Box: Popular Notions of Archaeology in Documentary Programs on Australian Television", Stephen Nichols summarizes popular misconceptions held in Australia, the United States, and Canada. With the widespread consistency of archaeologists being considered as connoisseurs of all pasts, diggers of dinosaur bones and ancient treasure, and academics with no relevance in today's world, it begs the question of how this global attitude towards archaeology developed and how those in the field can work to address these issues on a global scale.

Cross-References

- ▶ Advertising and the Appropriation of Culture
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Outreach
- ▶ Film, Archaeology in
- ▶ Media and Archaeology
- ▶ Stewardship, Concept of

References

AIA News. 2008. Harrison Ford elected to AIA Board. Available at: http://www.archaeological.org/news/aianews/282. Accessed 28 Sept 2012.

Aldenderfer, M., ed. 1996. 1996 SAA award recipients. *SAA Bulletin* 14(3).

Dixon Renoe, S., and P.L. Jeppson. n.d. Movies & TV. Available at: http://www.saa.org/ForthePublic/FunforAllAges/MoviesTV/tabid/95/Default.aspx. Accessed 28 Sept 2012.

Kroshus Medina, L. 2003. Commoditizing culture: Tourism and Maya identity. *Annals of Tourism Research* 30 (2): 353–368.

McGeough, K. 2006. Heroes, mummies, and treasure: Near Eastern archaeology in the movies. *Near Eastern Archaeology* 69 (3): 174–185.

Nichols, S. 2006. Out of the box: Popular notions of archaeology in documentary programmes on Australian television. *Australian Archaeology* 63: 35–46.

Noble, V.E. 2007. When the legend becomes fact: Reconciling Hollywood realism and archaeological realities. In *Box office archaeology: Refining Hollywood's portrayals of the past*, ed. J.M. Schablitsky, 223–224. Walnut Creek: Left Coast Press.

SAA Ethics in American Archaeology Committee. 1996. SAA principles of archaeological ethics. Available at: http://www.saa.org/AbouttheSociety/PrinciplesofArchaeologicalEthics/tabid/203/Default.aspx. Accessed 24 Sept 2012.

Sabloff, J.A. 1999. Distinguished lecture in archaeology: Communication and the future of American archaeology. *American Anthropologist* 100 (4): 869–875.

Waldbaum, J.C. 2004. The silver screen: What to believe, what not to believe. *Archaeology*. July/August 4.

Further Reading

Holtorf, C. 2007. *Archaeology is a brand! The meaning of archaeology in contemporary popular culture*. Walnut Creek: Left Coast Press.

Port of Alexandria: Underwater Archaeology

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Introduction/Definition

Founded by Alexander the Great in the western Nile Delta in 331 BCE, Alexandria developed over several centuries as a result of specific geomorphological features and the systematic development of its coastline. The Pleistocene sandstone bedrock provided a stable foundation for the construction of buildings, while also serving as a quarry. An inland lake was located behind the city, and across from it was an island. This island, named *Pharos* by the Greeks, was connected to

Alexandria early on in the Hellenistic period by means of a 1,200-m causeway or *Heptastadium* that created a dual harbor complex, with the port of *Eunostos* to the west and *Megas Limèn-Magnus Portus* (or *Portus Magnus*) to the east. The objective of the research project launched in 1992 by the *Institut Européen d'Archéologie Sous-Marine* (IEASM) in cooperation with the Supreme Council for Antiquities of Egypt (SCA) was to determine the precise ancient topography of the eastern port of Alexandria now underwater (Goddio and Darwish 1998: 1–52; Fabre and Goddio 2010). This study has included both the geodynamic research of natural and anthropic features and the analysis of the coevolution of ancient society and the coastal area of the western Nile Delta.

The scientific approach to the study of the *Portus Magnus* was designed to utilize the full range of geomorphological and archaeological data, as well as literary, epigraphic, and iconographic sources. Extensive historiographical knowledge of the accounts of the first explorers was also essential to the study. This data has provided a crucial link between the monuments from antiquity that were still visible when the early travelers' reports were written and the area under examination, which covers 400 ha of the present day eastern port (Fig. 1).

The scientific approach to the investigation of the *Portus Magnus* has taken into account the specific topography of the areas studied. However, the simple observation of the current state of the seafloor using geophysical and geological prospecting instruments also failed to provide full insight into the ancient topography. One effective method of locating underwater archaeological ruins covered in sediment was to use sensitive nuclear magnetic resonance magnetometers to create a very high-definition magnetic map. This indicates the location of the buried archaeological ruins by continuously measuring the absolute value of the magnetic field, with a sensitivity of about 1/100 gamma. An electronic image of the seafloor has also been created by means of scanning with a side-scan sonar and, more recently, a multi-beam sonar, which has revealed items protruding from the sediment.

The results of this work demonstrate that the sites were subject to both long-term subsidence of

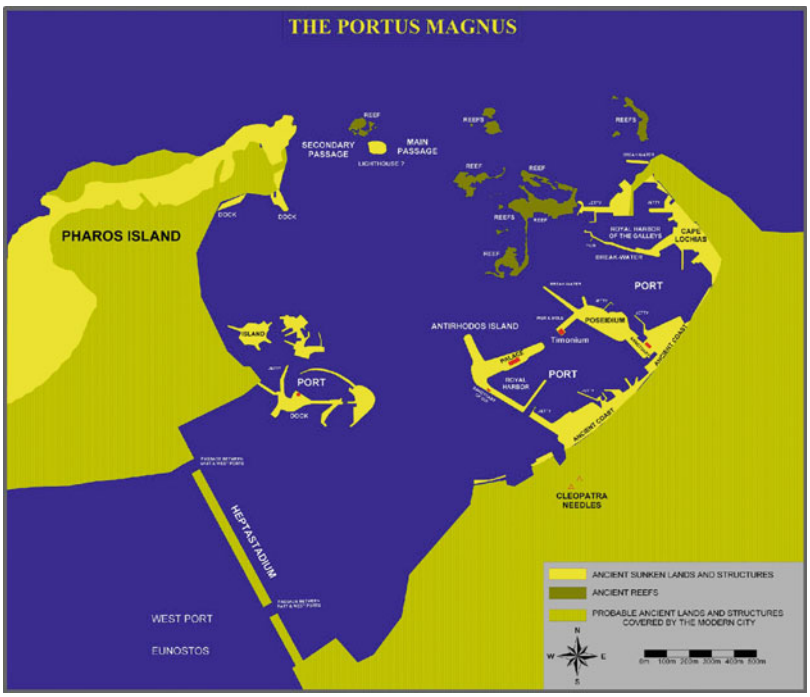

Port of Alexandria: Underwater Archaeology, Fig. 1 The ancient topography of the *Portus Magnus* of Alexandria. (Photo: Franck Goddio ©Franck Goddio/ Hilti Foundation)

the land that commonly affects this section of the southeastern basin of the Mediterranean as well as short-term cataclysmic sediment failure. These factors, which may have operated independently or together, would have caused considerable destruction and explain the submergence of the *Portus Magnus* as well as other large parts of the Canopic region (Goddio 2007; Stanley 2007). All of the evidence has shown that regular subsidence and the rising sea level – observed since ancient times – contributed significantly to the submergence of the *Portus Magnus*. It is generally acknowledged that the sea level in Alexandria has risen by 1–1.5 m, and the land level has dropped by 5–6 m over the last 2,000 years. The southern coast of the eastern Mediterranean has also been subject to various forms of tectonic movement due to the subduction of the African plate under the Anatolian plate. Ancient texts give accounts of earthquakes and tsunamis affecting the region, especially the tsunami of 21 July 365, which affected southeastern Mediterranean coasts, and an earthquake in the mid-eighth century.

Key Issues/Current Debates

An Overview of the Hellenistic and Roman Topography of Alexandria's *Portus Magnus*: Texts Versus Archaeology

While geophysical prospection in the Port of Alexandria and subsequent underwater excavations has failed to reveal the splendor of the palaces of Alexandria, they have generated excellent cartographic details of the eastern port and its surroundings. The research has allowed the contours of the former land surface to be traced with a certain degree of accuracy and in some cases has provided information on the structures and buildings which once stood near the palaces, such as the royal ports, the *Poseidium* peninsula, and the island of *Antirhodos*, as well as the *Basileia* – a seafront palace complex containing a series of government buildings and cultural institutions. The study of the harbors has focused on determining their depths and sedimentation type, identifying shipwrecks, and tracing the plan of the docks (Figs. 2 and 3). The numerous architectural elements

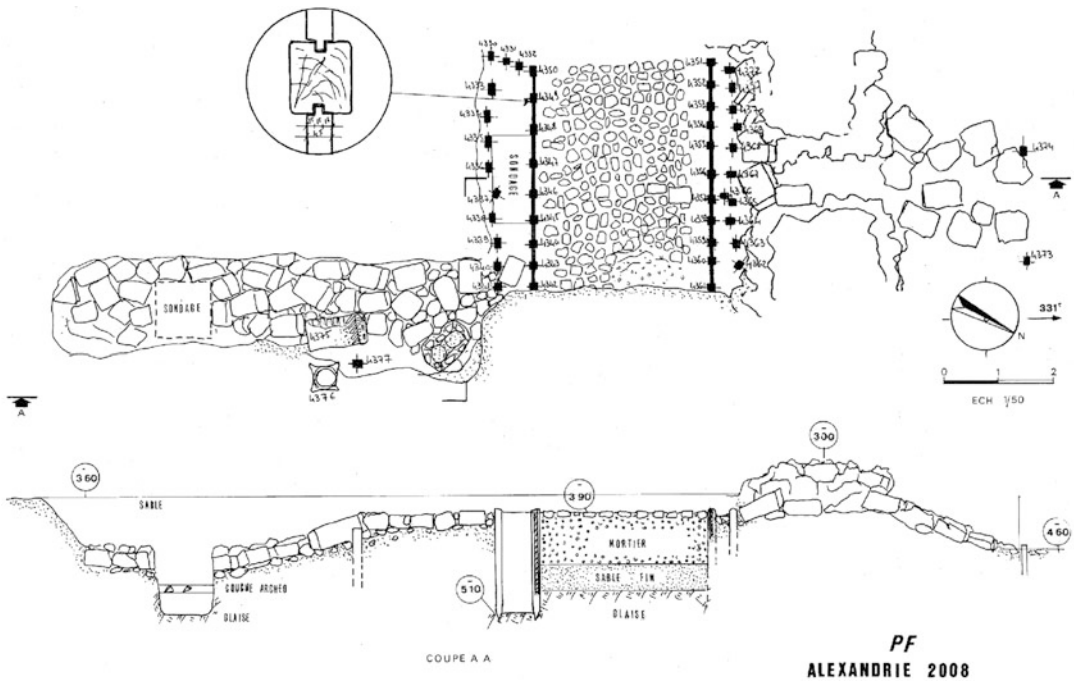

Port of Alexandria: Underwater Archaeology, Fig. 2 Port structures assembled from piles and wood planks that support a structure made of limestone blocks, PF sector, northeastern of the Poseidium peninsula. (Drawing: Patrice Sandrin ©Franck Goddio/Hilti Foundation)

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Port of Alexandria: Underwater Archaeology, Fig. 3 Port structures assembled from piles and wood planks that support a structure made of limestone blocks, PF sector, northeastern of the Poseidium peninsula. (Photo: Christoph Gerigk ©Franck Goddio/Hilti Foundation)

covering the palace area were identified and studied, and limited excavations were carried out to determine the timeline of the development, abandonment, and destruction of the sites. The layout of the ports turns out to be more technically coherent than previously believed.

More precisely, two channels leading to the large port have been mapped. The main channel, toward the middle of the harbor, was bordered to the west by a large submerged rock. The narrower minor channel allowed ships to pass between this rock and the island of Pharos. The famous lighthouse must have stood nearby. Considering the topographical and geological results along with the literary evidence, and in the absence of archaeological proof showing another position, it is reasonable to posit at this point that the lighthouse was located on the rock situated between the two channels. Nothing visible remains today of this prestigious monument that was a wonder of its day. Its remains are probably hidden by the enormous mass of the current western breakwater, which links Fort Qaitbey to the great central rock, now submerged and mostly covered by the blocks of the modern structure (Goddio et al. Forthcoming, *contra* Empereur 1998 for which the lighthouse was situated on the site of the medieval Fort Qaitbey).

Recent archaeological work has identified built-up areas to the west of the "royal port" (in the central area of the Bay of Alexandria), highlighting the complexity of the *Portus Magnus'* infrastructure. While it remains unclear as to exactly how such structures were organized, the results shed light on the navigable routes inside the *Portus Magnus*, confirming that it was "wonderfully concealed" (Strabo, 17.28; Charvet 1997). The eastern part of the great port is, in fact, delimited by a large stretch of land, now underwater, which formed part of the ancient Cape Lochias. Appreciably wider and extending over 450 m west-northwest of present day Cape Silsileh, it provided considerable natural protection for the *Portus Magnus*.

A very sheltered port was established in Cape Lochias, with two docks and a surface area of approximately 7 ha. Jetties, quays, and seawalls combined to form a well-concealed port almost inserted into Cape Lochias. Since the large central reef had to be navigated to enter the port, only rowing boats like galleys would have been able to enter easily. The discoveries here correspond to ancient texts. According to Strabo, "Above these buildings (in Cape Lochias) lies a concealed man-made port, private property of the kings" (Strabo, 17.1.6-10; Charvet 1997). The author of *The Alexandrian War* wrote: "This area of the city (where Caesar was entrenched) contained a small part of the royal palace where he himself had been brought to lodge on arrival, and the theater, adjacent to the palace, which served as a citadel and provided access to the port and the royal shipyards" (*Bellum Alexandrinum*, 1; Andrieu 1954).

A large port was established between the southwestern jetty of the inner port and the Poseidium peninsula, measuring approximately 15 ha. The remains of a temple from the Roman period have been excavated where the peninsula meets the ancient shoreline. At the end of a wall of the peninsula, extending toward the center of a port basin, excavations have revealed foundations dating from the end of the first century BCE and redevelopments from the period of the Antonines. The identity of the ruins is not certain, but we know, thanks to Strabo, that Marcus Antonius built the *Timonium*, a small palace retreat at the end of a wall of the Poseidium. He wanted to retreat there and live in seclusion after his defeat at Actium by his rival Octavian. Could the ruins from the end of the Ptolemaic period be those of the famous Roman general's retreat? Excavations in progress may reveal this.

The island of *Antirhodos*, 350 m long by 70 m wide, is located off the southwestern tip of the *Poseidium* peninsula and may be divided into three sections. The main section, with a southeast to northeast orientation, is aligned with the seawall and the pier extending from the tip of the peninsula and lies parallel to the ancient coast. Research has shown that this island had probably been developed before the founding of Alexandria (cf. *infra*) and that extensive work was executed there later, toward the middle of the third century BCE until the Roman period. A large seawall protrudes from the northwestern end of the island, 340 m long by 30 m wide, forming a second section. Recent fieldwork conducted on this area has confirmed the presence of large size buildings characterized by limestone blocks, fragments of wall covering, mosaics, and friezes. The information indicates the collapse of a building, probably in correspondence with the destruction of the eastern part of *Antirhodos*. This is the same area from which the statue of a priest carrying a Canopic jar (Goddio and Fabre 2008: 161) was found along with sphinxes (Fig. 4). Among these finds was a statue of Ptolemy XII, the father of Cleopatra VII (Goddio and Fabre 2008: 356–357), suggesting the site of a temple dedicated to Isis. At the end of the third section, oriented northwest to southeast, a jetty built from limestone blocks protrudes northeast, forming with the island a small haven fully sheltered from swells and waves, which may correspond to the "small port" described by Strabo: "... private property of the kings, as is *Antirhodos*, the island located before the man-made port, containing a royal palace and a small port" (Strabo, 17.1.6-10; Charvet 1997). Here, the remains of a ship lie some 5 m deep and spread over a surface of about 350 sqm. The ship seems to have been free of any cargo. Nevertheless, the items found on board and in the sealing layer above the wreck, the details of the ship's architecture, and radiocarbon dating results suggest that the ship sank sometime between the end of the first century BCE and the first century CE. Its approximate dimensions (30–31 × 10–11 m) – representing a coefficient of elongation of about 2.7 – correspond to the dimensions of commercial ships of the Roman period (Sandrin et al. 2012).

The ruins of quays and piers were also identified during prospecting on the "ancient coast" (Fig. 5). This alone shows that nineteenth- and twentieth-century reclamation work encroaching on the sea with landfills did not entirely conceal the area that subsidence and land collapse had previously submerged. Visible along the entire eastern part of the *Portus Magnus*, this ancient

Port of Alexandria: Underwater Archaeology, Fig. 4 Priest bearing in his veiled hands an Osiris-Canopus jar. Roman period. Granodiorite. H. 122 cm. (Photo: Christoph Gerigk ©Franck Goddio/Hilti Foundation)

coast is sometimes paved and contains numerous architectural remains and beautiful remnants of statuary, among which was a colossal head of Caesarion (Goddio and Fabre 2008: 357).

The research carried out in the western part of the *Portus Magnus* reveals the complex organization of the Port of Alexandria. After describing the

Port of Alexandria: Underwater Archaeology, Fig. 5 Ruins of quays or esplanade identified during prospecting on the "ancient coast." (Photo: Christoph Gerigk ©Franck Goddio/Hilti Foundation

royal quarter and port and moving from east to west, Strabo continues to examine this area: "Next comes the *Caesareum*, then the *Emporium* and the warehouses followed by the arsenals, extending as far as the *Heptastadium*" (Strabo, 17.50.9; Charvet 1997). Facing the *Heptastadium*, a port protected this long causeway (Fabre and Goddio 2010). It featured basins ideally suited to receive ships waiting to go from the eastern port to the western port that gave access to Egyptian domestic traffic. Indeed, according to the texts (Strabo, 17.1.6; Caesar, *Bellum Civile*, 3.312), two openings were constructed in this seawall and controlled by forts, allowing passage from one port to another.

Development and Operation of the Port

The discoveries in the eastern Bay of Alexandria show that the entire port infrastructure was

designed to optimize the natural environment. Nevertheless, beginning in the Hellenistic period, harbor construction and urban development resulted in dramatic changes to the coastline. This forces us to consider the logic behind transforming an enclosed natural bay into a series of harbors.

Maritime dynamics also hint at the historical workings of the *Portus Magnus*. The map of the submerged port structures in the eastern port of Alexandria suggests a vast bay surrounded by a group of similarly sized harbors. J.-Ph. Goiran correctly notes: "Due to the specific organization of the bay, initially too vast to provide natural shelter, a group of small harbors was needed along the far end of the bay [. . .]. The purpose of these was to break up the coastline as seen in modern marinas" (Goiran 2001: 140). Alexandria's *Portus Magnus* benefited from its specific geography. The archaeological structures found are cut out of the substrate or constructed in the form of straight or curved seawalls. Similarly, the extremely developed coastline has been somewhat artificially extended. Diodorus of Sicily notes: "They [Alexander's successors] enhanced it, some building magnificent palaces, others constructing arsenals and ports, others adding religious monuments and magnificent buildings, so that in the eyes of most people it was the first or second city of the inhabited world" (Diod. Sic., 1.50.7; Vernière 1993). The Romans more than likely optimized the structures of the port and made proactive adjustments to what the Ptolemies had initiated.

It is not completely possible to establish a convincing parallel between the eastern port of Alexandria and the classical port models, such as the ports with merging lagoons or *cothon*-type port. At most, very general similarities may be found with the Port of Tyre (Bernand 1998: 47; Marriner et al. 2008). Yet the Port of Alexandria forms part of a series of major port developments which began in the sixth century BCE and may be attributed to maritime projects and ambitions of great tyrants. The Greek approach was applied to the Bay of Alexandria, by which a man-made port was created or a natural port was enlarged using jetties to provide shelter from the winds, to facilitate landing and to protect the ships. The jetties were often curved in such a manner as to form a port. In some cases, an islet in the bay was used as the base for a single large seawall: Alexandria's *Heptastadium* is the best preserved example of this. By Greek standards, these structures alone constituted a "man-made port." But there were also ports dug by hand, at least in the Hellenistic period. Such was the case, in Alexandria, of the port known as the "box" (*kibôtos*) in the western harbor (Fraser 1972: n. 182; Tkaczow 1993: 58 n. 6; McKenzie 2007: 176).

Pharaonic Egypt does not seem to have had "constructed" ports on its shores. At most there would have been landing piers and/or anchorage points (Fabre 2004: 19–35), with the exception of the ports in coastal lakes of the Nile Delta. Does this mean that the Port of Alexandria was developed *ex nihilo*? A number of converging factors suggest that the Bay of Alexandria was developed before the arrival of Alexander. The wooden port structures (quays and jetties) discovered in the axis of the eastern – and main – section of the island of *Antirhodos* have been dated as pre-Ptolemaic (Goddio and Darwish 1998: 31). The data should be correlated with recent analyses of the lead contained in the sedimentary archives for the harbors in the eastern Bay of Alexandria, which contradicts the notion that Alexandria was constructed *ex nihilo* (Goiran 2001: 223–224; Véron et al. 2006; Stanley and Landau 2010). These results corroborate certain accounts in the ancient texts, which state that the Bay of Alexandria offered an anchorage point well known to sailors (Homer, *Od*. 4.354-69).

Alexandria obeyed an economic and political logic that had gradually developed over the centuries to become "the largest *emporium* of the inhabited world" (Strabo, 17.1.13; Charvet 1997). Alexandria inherited the administrative and economic structures of Thonis-Heracleion (Pseudo-Aristotle, *Economics*, 2.33e). This locality was the border crossing, customs post, and *emporium* through which Greek imports passed on their way to the trading posts of Naukratis

(Fabre 2008). Due to its population size and its activities, Alexandria quickly attracted a large share of Mediterranean and Eritrean trade. Alexandria was a center of eastern navigation in the Hellenistic period, and its commerce benefited from the state organization of the Ptolemaic economy. Later, during the Roman period, Egyptian grain shipped from Alexandria was used as a genuine political weapon by emperors and claimants to the imperial throne alike. This would have required substantial port infrastructure, and thus the port was well equipped with harbors, quays, warehouses, and water supply points (Fabre and Goddio 2010) (Fig. 5).

These zones of the *emporium* of Alexandria, as well as the royal ports, military ports, and shipyards were designed as places of transit and transfer and are distinguished by their technical, political, and economic dimensions. The research currently being completed should provide clues as to the layout of these areas crossed by ancient ships. We should also gain insight into the cultural organization or implicit hierarchies in the *Portus Magnus*. From a technical viewpoint, the results of topographical work in the *Portus Magnus* of Alexandria raise questions regarding the port layout while also taking navigating conditions (winds and swells) and the types of vessels accommodated (sailing ships or row boats) into consideration. From a theoretical viewpoint, the zones of the eastern port are at the core of more general questions regarding the major political and economic intermediary players in the organization, regulation, and administrative and legal structures that served to define the harbor and its integration into the city.

Cross-References

► Hellenistic and Roman Egypt, Archaeology of
► Mediterranean Sea: Maritime Archaeology

References

Andrieu, J. 1954. *César. La guerre d'Alexandrie*. Paris: Budé.

Bernand, A. 1998. *Alexandrie la Grande*. Paris: Hachette.

Charvet, P. 1997. *Strabon. Le voyage en Égypte: un regard romain*. Paris: Ed. du Nil.

Empereur, J.-Y. 1998. *La Phare d'Alexandrie, la merveille retrouvée*. Paris: Gallimard.

Fabre, D. 2004. *Seafaring in ancient Egypt*. London: Periplus.

Fabre, D. 2008. Heracleion-Thonis: Customs station and *emporion*. In *Egypt's sunken treasures, catalogue of the exhibition*, ed. F. Goddio and D. Fabre, 219–234. Munich: Prestel.

Fabre, D., and F. Goddio. 2010. The development and operation of the *Portus Magnus* in Alexandria: An overview. In *Alexandria and the north-western Nile Delta – Joint Conference Proceedings of Alexandria: City and Harbour (Oxford 2004) and Trade, Topography and Material Culture of Egypt's North-Western Delta (Berlin 2006)*, ed. A. Wilson and D. Robinson, 53–74. Oxford: Oxford Centre for Maritime Archaeology.

Fraser, P.M. 1972. *Ptolemaic Alexandria*. Oxford: Clarendon.

Goddio, F. 2007. *Topography and excavation of Heracleion-Thonis and East Canopus (1996–2006): Underwater archaeology in the Canopic region in Egypt*, Oxford Centre for Maritime Archaeology Monograph. Vol. 1. Oxford: Oxford Centre for Maritime Archaeology.

Goddio, F., and I. Darwish. 1998. Topographie des quartiers royaux submergés du Port Est d'Alexandrie. In *Alexandrie. Les quartiers royaux submergés*, ed. F. Goddio et al., 1–52. London: Periplus.

Goddio, F., and D. Fabre, eds. 2008. *Egypt's sunken treasures, catalogue of the exhibition*. Munich: Prestel.

Goiran, J.-P. 2001. *Recherches géomorphologiques dans la région littorale d'Alexandrie en Égypte*. Unpublished Ph.D. dissertation, Universite Aix-Marseille.

Marriner, N., J.-P. Goiran, and C. Morhange. 2008. Alexander the Great's tombolos at Tyre and Alexandria, eastern Mediterranean. *Geomorphology* 100: 377–400.

McKenzie, J. 2007. *The architecture of Alexandria and Egypt c. 300 BC to AD 700*. New Haven/London: Yale University Press.

Sandrin, P., A. Belov, and D. Fabre. 2012. The Roman shipwreck of Antirhodos Island in the *Portus Magnus* of Alexandria, Egypt. *International Journal of Nautical Archaeology* 363: 1–16.

Stanley, J.-D. 2007. *Geoarchaeology. Underwater archaeology in the Canopic region in Egypt*, Oxford Centre for Maritime Archaeology Monograph. Vol. 2. Oxford: Oxford Centre for Maritime Archaeology.

Stanley, J.-D., and E.A. Landau. 2010. Early human activity (pre-332 BC) in Alexandria, Egypt: New findings in sediment cores from the Eastern Harbour. In *Alexandria and the north-western Nile Delta - Joint Conference Proceedings of Alexandria: City and Harbour (Oxford 2004) and Trade, Topography and Material Culture of Egypt's North-Western Delta (Berlin 2006)*, ed. A. Wilson and D. Robinson, 35–52. Oxford: Oxford Centre for Maritime Archaeology.

Tkaczow, B. 1993. *Topography of ancient Alexandria, an archaeological map*, Travaux du Centre d'Archéologie Méditerranéenne Polonaise des Science. Vol. 32. Warsaw: Éditions Scientifiques de Pologne.

Vernière, Y. 1993. *Diodore, Bibliothèque historique*. Paris: Budé.

Véron, A., J.P. Goiran, C. Morhange, N. Marriner, and J.-Y. Empereur. 2006. Pollutant lead reveals the pre-Hellenistic occupation and ancient growth of Alexandria, Egypt. *Geophysical Research Letters* 33: 1–4.

Further Reading

Goddio, F., and D. Fabre, eds. Forthcoming. *Alexandria. The topography of the Portus Magnus. Underwater archaeology in the eastern port of Alexandria in Egypt*, Oxford Centre for Maritime Archaeology Monograph. Oxford: Oxford Centre for Maritime Archaeology.

Goiran, J.-P., and C. Morhange. 1999. Nouvelles données sédimentologiques et biologiques sur le tombolo et dans le port antique d'Alexandrie, Égypte. *Bulletin de Correspondance Hellénique* 123: 560–566.

Goiran, J.-P., N. Marriner, C. Morhange, M.M. Abd el-Maguib, K. Espic, M. Bourcier, and P. Carbonel. 2005. Évolution de la géomorphologie littorale à Alexandrie (Égypte) au cours des six derniers millénaires. In *Environnements littoraux méditerranéens. Héritage et mobilité.* ed. J.-P. Goiran, C. Morhange, and N. Marriner. *Méditerranée. Revue géographique des pays méditerranéens* 104: 61–64.

Hesse, A., P. Andrieux, and M. Atya. 2002. L'Heptastade d'Alexandrie Alexandrina 2. *Études Alexandrines* 6: 191–273.

Portable Art Recording Methods

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Introduction

Although much less well known than rock or cave art, Paleolithic portable art is comprised of graphic and symbolic manifestations represented on objects and on portable raw materials in contrast with parietal or wall art, which is, by definition, "immobile"), which were left by human groups during the Upper Paleolithic period (between 45,000 cal BP and 15,000 cal BP in Europe). The first European portable art was recovered in the 1860s, very early in the history of prehistoric archaeology. Some pieces, such as the mammoth engraved on ivory at La Madeleine (Dordogne, France), played a determining role in the debate on the existence of an "antediluvian" art. For nearly a century, discoveries proceeded at a steady pace, enriching public and private collections; however, the excavation methods often practiced at that time rarely took into account the archaeological contexts of the objects. Documentation is often reduced to the object itself and any new study must begin with a search of the archives regarding the site or the excavator, whenever these are available.

Although the total number of pieces discovered in Europe is unknown (there is no international data base on this topic), it can be estimated to be in the tens of thousands with concentrations at sites in the southwest of France, Spain and northern Italy, central Germany, Slovakia, and the Czech Republic. The distribution of sites having yielded portable art is much greater than that of cave art. However, the number of pieces per site varies considerably; there are sometimes isolated pieces such as at Etiolles (Essonne, France) (Fritz and Tosello 2011), a set of several dozen *decorated* objects such as at Altamira (Cantabria, Spain) (Barandiaran Maestu 1973), Romanelli (Puglia, Italy), and Duruthy (Landes, France), and up to a corpus of several thousand objects such as those found in deposits in El Parpalló (Valencia, Spain) (Villaverde 1994), Gönnersdorf (Rhineland-Palatinate, Germany) (Bosinski and Fischer 1974; Bosinski et al. 2001; Bosinski 2008), or La Marche (Vienne, France) (Pales and Tassin 1969).

The materials are of great diversity: bone, ivory, antler, shells, and marine fossils, including also limestone, shale, and sandstone. The term portable art applies to objects as diverse as a reindeer antler spear point decorated with crossed line patterns, a flat bone pierced and carved in the

Portable Art Recording Methods, Fig. 1 Limeuil (Dordogne, France). Perforated baton decorated with three reindeer, a salmon, and a horse (coll. Musée d'Archéologie Nationale). (Photos G. Tosello)

shape of a horse head, a statuette of a woman in soapstone, or a limestone slab sculptured into a bison. Typology, combined with experimentations have made it possible to classify these objects into three main categories (Leroi-Gourhan 1965).

The first category includes weapons, domestic tools, and all the objects for which their function determines the morphology. Thus, a perforated baton has a shaft, more or less cylindrical, and an expanded top with a perforation. Consequently, the decorations fit these constraints (Figs. 1, 2, and 3).

A second category includes set of ornaments in the broadest sense of the term. The presence of a suspension system (e.g., a pierced hole) is the common attribute to group together seashells, animal teeth, small flat bones cutout (in disc form, zoomorphic silhouette), fragments of rare materials (lignite, amber, fossil tooth), animal or human statuettes or figurives, which are thought to have adorned the body or clothing.

Finally, the third category consists of bones and stones of all sizes, which are engraved or carved into three dimensions. At some sites engraved stones, commonly called "plaquettes" number in the hundreds, even thousands, and whose social functions remain enigmatic (Pales and Tassin 1969; Bosinski and Fischer 1974; Villaverde 1994; Tosello 2003).

However, this classification should be regarded as only a first approach. There are many pieces of portable art that are "unclassifiable," especially those which were transformed or reused, and not even considering certain objects or weapons

Portable Art Recording Methods, Fig. 2 Limeuil (Dordogne, France). Perforated baton in reindeer autler; from *top* to *bottom*, details of two reindeer, a horse, and a salmon (coll. Musée d'Archéologie Nationale). (Photos G. Tosello)

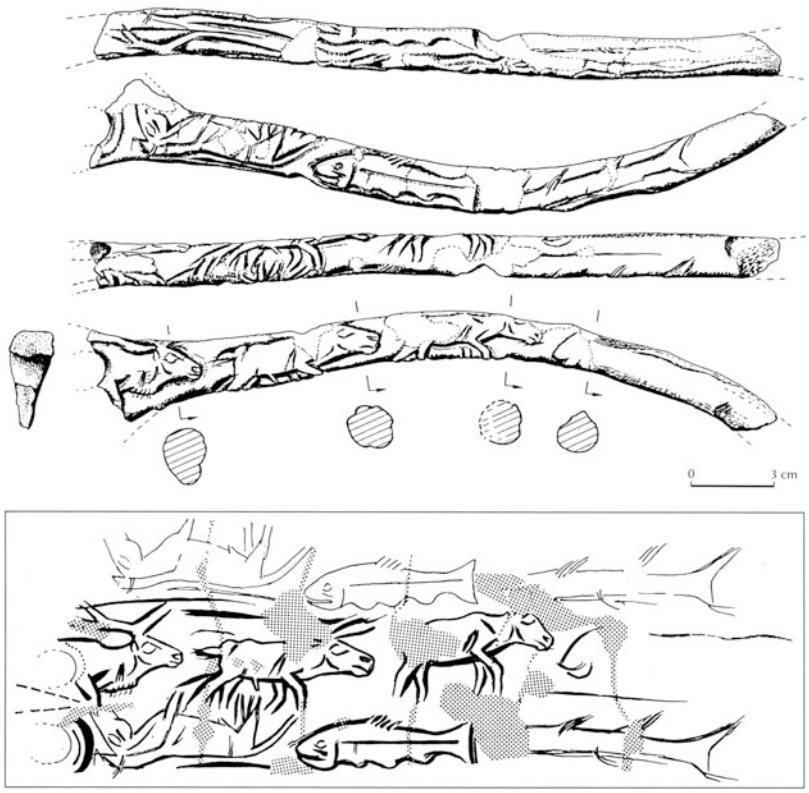

Portable Art Recording Methods, Fig. 3 Limeuil (Dordogne, France). Perforated baton in reindeer autler tracing of the cylindrical decorated shaft and "flattening" of the engraving. (Tracing G. Tosello)

Portable Art Recording Methods, Fig. 4 Parpalló Cave (Valencia, Spain). Plate No. 16061A. Photograph of a detail of a figure of a black-painted doe with an overlay of a carved horse. *Right*, a tracing of the plate. (Photo and tracing V. Villaverde)

whose actual function has not been established with certainty. The diversity and difficulty of classifying such archaeological materials show that above all the artistic and symbolic practices of these prehistoric hunter-gathers permeated their activities.

Definition

The organic or inorganic (i.e., mineral) nature of the raw material has important consequences for the study of the objects and the techniques used. Contrary to what one might think, stone materials (limestone, sandstone, schist) are often in poorer condition than organic materials. Indeed, the latter, and bone in particular, because of its fibrous and compact structure, offer a high degree of

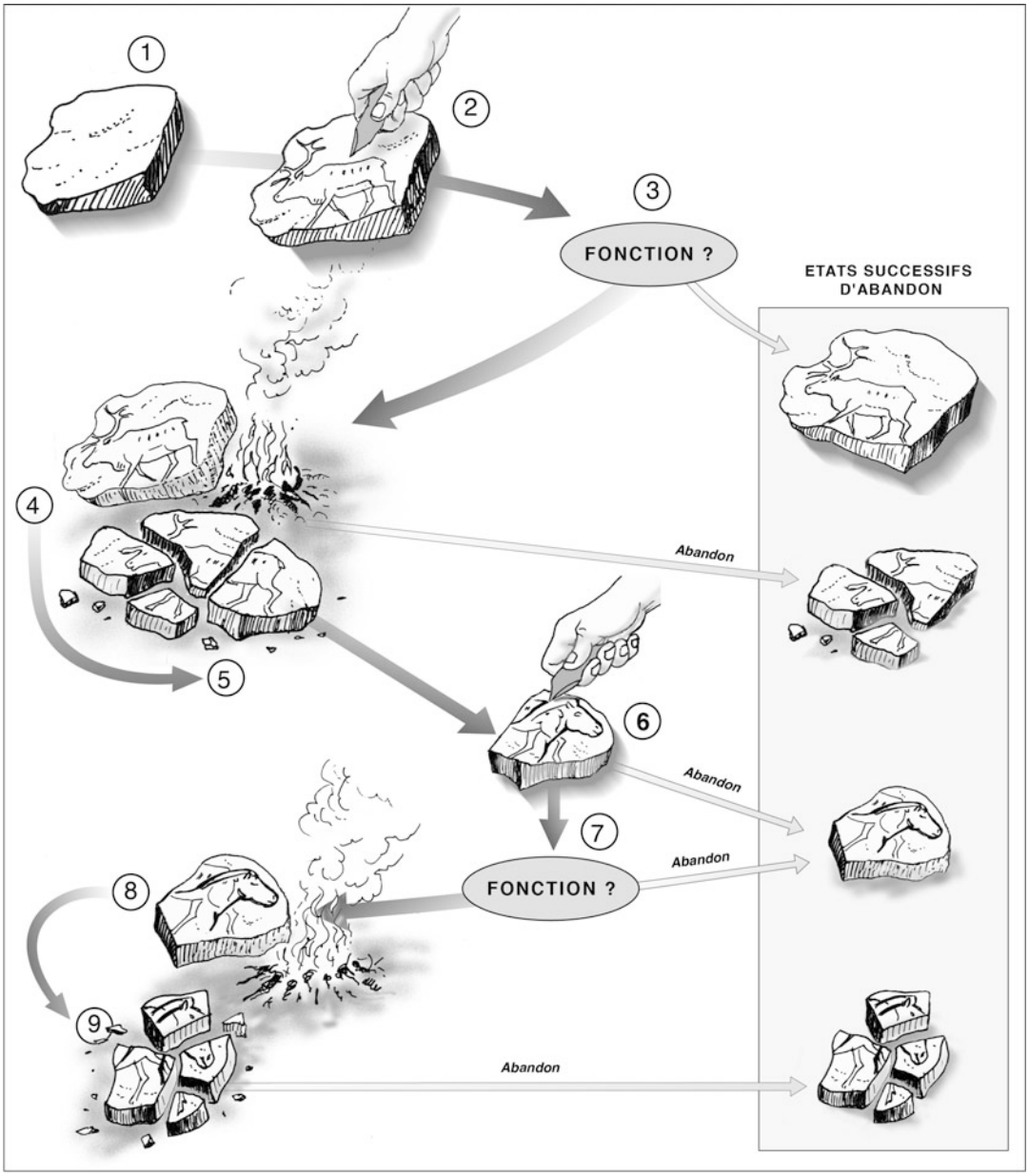

Portable Art Recording Methods, Fig. 5 Theoretical scenario of a "cycle" of an engraving which helps explain the high level of fracturing that affects the engraved plaguettes in Europe, particularly in the Upper Magdalenian. (G. Tosello scheme based on site data from Limeuil)

Portable Art Recording Methods, Fig. 6 Gourdan Cave (Haute-Garonne, France). Engraved plaquettes in schist (No. 47264 collection Musée d'Archéologie Nationale). (Photos C. Fritz)

conservation of engravings and traces from shaping (Fritz 1999a). By contrast, the surfaces of sedimentary stones have often suffered from chemical damage or carbonate deposits during their long deposition within archaeological layers. The engraved features, clearly legible in prehistoric times, are now weathered and difficult to read; only the use of lateral lighting close to the rock can reveal them. Painted objects are very rare, because the colors are not retained; nevertheless, some pieces with traces of pigment, or even identifiable figures, have survived and prove that portable art was also colorful (Villaverde 1994) (Fig. 4).

Portable art is affected by a very high level of fragmentation; whole pieces are rare, because they suffered conditions of burial in the ground or they were damaged during the excavation: some were intentionally damaged by prehistoric peoples.

Whatever the nature of the raw material, one of the first stages of research (if not the first) is to estimate the state of conservation of the object, determining whether it is "complete" (or almost) and if this is not the case, identifying the origin or origins of fragmentation. While studying pieces from old excavations, it is important to ensure that there are no other fragments of that same piece to be studied. This reconstruction of the pieces is essential when studying engraved or sculptured stone materials, plaquettes, slabs, and blocks. It can often complete figures, which will confirm or modify the zoological identification, for example. By observing the nature of the fractures (modern or ancient), we can begin to reconstruct the life cycle of the object from its origin to its current state (Fig. 5).

The next step in the research is to establish a graphic copy (or "relevé"). All of the traces observed on a surface must be reproduced objectively. The tracing phase is critical for subsequent syntheses of observations, such as the themes depicted; besides being a document for analysis, the tracing becomes a substitute for the object, particularly at the time of publication. The different readings of the same object made by different researchers generally show minor variations, which may sometimes be significant, showing that objectivity remains an elusive goal.

Tracing techniques fall into two categories: contact and non-contact tracing techniques. Known for a long time, contact tracing techniques are intuitive and easy to implement. A very fine and perfectly translucent plastic film (of the polythene variety) is placed over the surface; a raking light, moved from time to time as work progresses, can help identify engravings, or any other information, which are then transferred onto the film using thin-tipped markers. This technique offers some advantages: it is cheap, easy to use, and very adaptable on rough stone surfaces and poses little danger to the original.

When the dimensions of the object are small (only a few cm^2), direct transfer becomes impossible, especially if the incisions are very thin (Fig. 6). It then becomes necessary to work on photographic enlargements; one puts a transparent film on the printed photo, and all that is needed is to replicate the rendition of the photo, constantly checking against the original.

The difference between the original engraving and the photo transfer on a different scale is a mental challenge. A variant of this technique is

to trace the lines on a photo of the piece displayed on the computer screen, with the aid of graphics software. In cases where the engravings are not located on a flat surface but on three-dimensional surfaces, it is necessary to test which method is best suited, for example, through a deconstruction of the piece see (Fig. 3). When the engravings are very dense, the process of selecting layers for tracing can isolate each one of them (Fig. 7).

Each of these procedures presents specific advantages: drawing directly on the film covering the object allows, through the reproduction of the same lines, a very close approximation of the prehistoric engraver's gestures. On the other hand, the magnification of engravings through photography (printed or displayed on the screen) provides a stable base for the copy, which thus avoids a sometimes too ephemeral observation of the original piece. On miniature works, the enlargement can reveal minutiae that are almost imperceptible to the naked eye.

When it comes to publication, the tracing plays a major role: it represents the synthesis of the decipherment done by the researcher that is

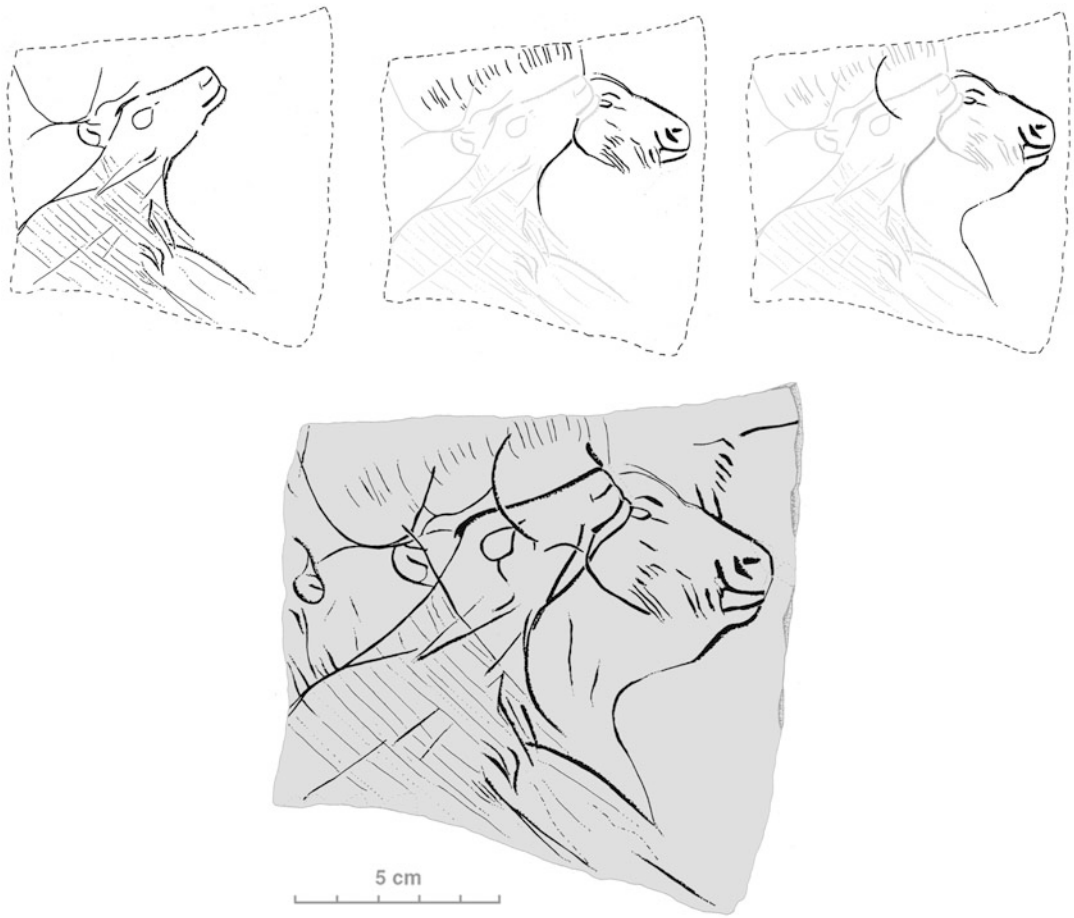

Portable Art Recording Methods, Fig. 7 Gourdan Cave (Haute-Garonne, France). Engraved plaquette in schist No. 47264. Complete tracing of the engraved sen face and selective tracings of three animal heads in the order of superposition: reindeer, horse, and aurochs (?). (Tracings C. Fritz)

his/her interpretation of the object. The temptation is often great to reproduce as much information as possible (differential readability of the engravings, state of the surface, natural cracks in the rock, traces of shaping, concretions, etc.) which has led in the past to codification charts inspired by geology or cartography (Delluc and Delluc 1984). In our opinion, the use of complex graphic charts should be reduced because it only complicates the reader's task of "decoding" the published tracing. It should focus on the anthropogenic aspects of these objects, which in our eyes is their major interest.

Photography is an indispensable tool in any research on portable Paleolithic art. A long and delicate operation, photographing engravings is performed like deciphering, with a raking light, or of minimum incidence, applied closely. The photographic shot is important as it often provides the opportunity, through the search for optimal lighting, to confirm or reject a hypothetical reading. Photography is thus fully involved in the progress of the analysis while providing a part of the iconography.

For publication, only the photos have the power to evoke in every detail the appearance of decorated surfaces; this is an important point because if the graphic tracings seek to comprehend and try to make sense of documents, photography undoubtedly gives a more objective vision. Conversely, the publication of portable art photos, particularly of engraved plaquettes without their tracing, is an error in method and in communication (Chollot 1964); generally the reader cannot successfully isolate the figures or motifs mentioned in the text. Ideally, each piece of portable Paleolithic art should be illustrated by one or more tracings accompanied by one or more photographs to enable the reader to find how the photos and the tracings can be correlated (Figs. 8, 9, 10). The main obstacle is of course the cost of printing, especially when there are many pieces.

In this case, we must focus on publishing the most comprehensive record of the corpus (Sieveking 1987; Villaverde 1994; Tosello 2003)

Portable Art Recording Methods, Fig. 8 La Madeleine (Dordogne, France). Engraved slab in limestone. (Photo G. Tosello/coll. Musée d'Archéologie Nationale)

and avoid publishing only the pieces deemed "major" or which concern specific topics (see, e.g., at La Marche, felines and bears: Pales and Tassin 1969) which gives a truncated depiction of the site's corpus.

When the studied objects have preserved traces of paint (associated or not associated with the engraving), imaging processing techniques that are commonly used for rock art, provide an important contribution to the tracing work.

Key Issues/Current Debates/Future Directions/Examples

Since the late 1980s, the constant improvement in the performance of optical observation instruments (binocular magnifying lens, microscopes) has led to dramatic advances in the precision of

Portable Art Recording Methods, Fig. 9 La Madeleine (Dordogne, France). Tracing of the engraved limestone slab. (G. Tosello Tracing)

information, opening new avenues of interpretation (D'Errico 1995).

On bone, ivory, or antler, the observation of drawings by scanning electron microscopy (SEM) has revealed a rich source of information (Fritz 1999a). The SEM technique involves taking impressions using silicones; the resin replica, obtained from the silicon mold, is covered by a very thin film of gold or carbon to improve the electrical conductivity. Observation by SEM, even at low magnification (× 20 × 50), reveals microscopic marks (*stigmates*) left by flint tools at the base of the incisions, some of which are invisible to the naked eye (Fritz 1999b). These marks may contain mechanical information, such as the direction of movement of the tool, the inclination of the active part relative to the surface of the object, and the number of passes made by the tool in the incision. The study of the engravings can also describe the engraver's hand, to evaluate their skill or clumsiness (Fig. 11). Multiple analyses of pieces from the same archaeological layer and also from contemporary sites has helped identify local and regional "know-how", and the existence of experienced engravers and "apprentices", which also brings up the question of how technical knowledge was transmitted in the traditions of these societies.

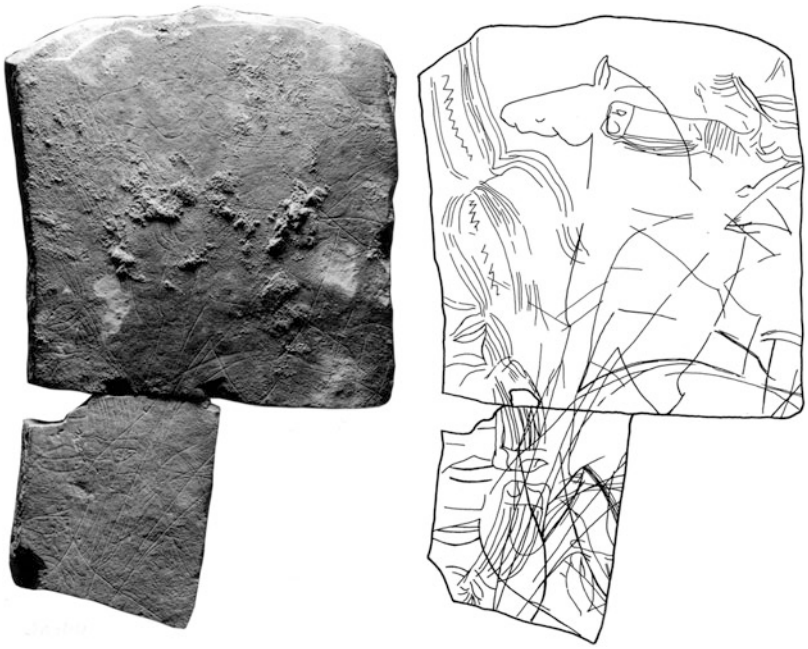

Portable Art Recording Methods, Fig. 10 Parpalló Cave (Valencia, Spain). Plaquette No. 20044. Photo and tracing of the motifs; a horse, three aurochs, an ibex, and various signs from the Upper Magdalenian period. (Photo and tracing V. Villaverde)

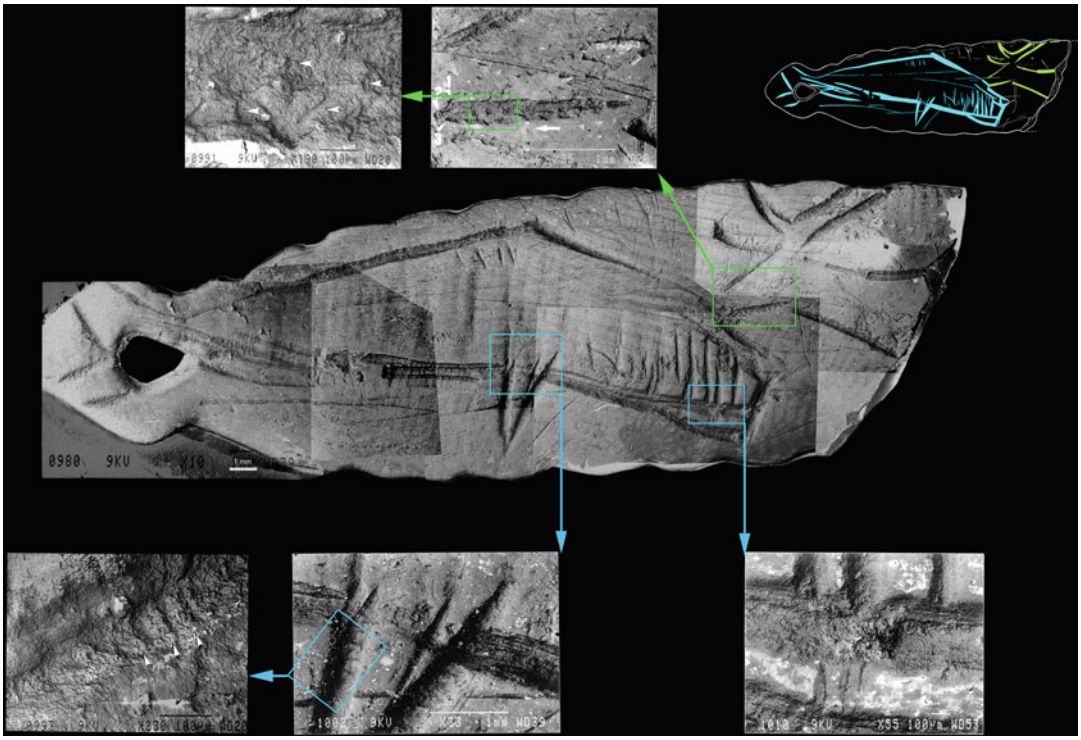

Portable Art Recording Methods, Fig. 11 The contribution of microscopic analysis to study engravings on bone. Various technical features stigmas observed at high magnification can help reproduce the direction of movement of the tool and the number of passes of the tool in the engravings or the chronology of superpositions, especially when the object is miniature (2.9 cm for this engraved bone, Arancou, Pyrenees Atlantiques, France; micrographs C. Fritz coll. MNP)

Over the past 15 years, three-dimensional technologies have been used to research prehistoric parietal and portable art. The results obtained in caves have opened up the possibility for the reconstitution of decorated objects in 3D. 3D recording of an object with fine engravings is no longer an insurmountable obstacle, but does remain a major challenge; in fact, the fineness of the engravings (often submillimeter) often approaches or exceeds the maximum resolution for 3D laser scanners. Other solutions such as microtopography exist, which is a complex system of analysis and 3D restoration based on the use of a confocal microscope (Melard 2010). The resulting images are of very high precision (up to 0.1 μm), which enables the visualization of engravings and their relative chronology, thanks to the tridimensional restitution of their triangulation. The main obstacles to microtopography remain its limitations as to the scope of analysis (20 cm diameter); it requires the object to be moved to the laboratory and extends the length of data acquisition, which can take as long as several hours for a small surface.

Thanks to their high resolution, the 3D readings of engraved surfaces make it possible to obtain measures of the depth of incisions at the microscopic level, allowing the resolution of complex superimpositions of engravings (Güth 2012). On engraved plaquettes that were often reused, we can thus determine the relative chronology of different themes and compositions.

However, these methods are constantly changing, just like the processing power of computers. Similarly for digital photography, applications in archaeology continue to diversify. Among them, photogrammetry (a long standing technique used particularly in cartography and architecture) is experiencing a revival, which is particularly promising for the study of portable art. High-definition shots of the object are taken from different angles, with overlapping margins, thus forming a mosaic, from which it is possible to generate a point cloud, and then a 3D model that correlates to the photos. So, for the piece thus reproduced, it is possible to vary the lighting, zoom in, and view the details. Together, these operations can be done using free or inexpensive software, which is obviously a huge advantage for the student or researcher. For museography, the quality of the 3D photo documentation meets the needs of broadcast media and avoids unnecessary handling of original pieces.

The beginning of our third millennium is marked by a constant and dramatic evolution in techniques for analysis and restoration in all fields of science and communication. It is difficult to predict what the recording methods and study of Paleolithic portable art will involve in the near future. Because it approximates human vision in three dimensions and meets the challenges posed by prehistoric decorated objects, we believe that 3D technology (without knowing in what form (s) exactly) will become more commonly used; traditional recording or tracing techniques will gradually disappear, and online publications will increase the quantity and quality of iconography, offering the Internet user the possibility to manipulate the object virtually, offering sequences for animation or modelling, etc.

However, make no mistake: despite the advantages offered by this technology, these high-tech devices are yet another supplementary tool for the researcher and will not replace direct observation of original pieces, which remains the foundation for research.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Art, Paleolithic
- ▶ Mobiliary Art, Paleolithic
- ▶ Pigment Analysis in Archaeology
- ▶ Scanning Electron Microscopy (SEM): Applications in Archaeology
- ▶ Switzerland: Upper Paleolithic Living Floor Investigations

References

Barandiaran Maestu, I. 1973. *Arte mueble del Paleolitico Cantabrico*. Monografias arqueologicas, XIV. Zaragoza: Universidad de Zaragoza.

Bosinski, G. 2008. *Tierdarstellungen von Gönnersdorf: Nachträge zu Mammut und Pferd sowie die übrigen Tierdarstellungen*. Monographien des Römisch-Germanischen Zentralmuseums, Band 72. Mainz: Verlag des Römisch-Germanischen Zentralmuseums.

Bosinski, G., and G. Fischer. 1974. Die Menschendarstellungen von Gönnersdorf der Ausgrabung von 1968. In *Der Magdalénien-Fundplatz Gönnersdorf, Band 1*. Wiesbaden: Franz Steiner Verlag.

Bosinski, G., F. D'Errico, and P. Schiller. 2001. Die Frauendarstellungen von Gönnersdorf. In *Der Magdalénien-Fundplatz Gönnersdorf, Band 8*. Stuttgart: Franz Steiner Verlag.

Chollot, M. 1964. *Musée des Antiquités nationales: Collection Piette, art mobilier préhistorique*. Paris: éditions des Musées nationaux, Ministère des Affaires culturelles.

D'Errico, F. 1995. *L'art gravé azilien. De la technique à la signification*. XXXI Supplément à Gallia-Préhistoire. Paris: CNRS Éditions.

Delluc, B., and G. Delluc. 1984. Lecture analytique des supports rocheux gravés et relevé synthétique. *L'Anthropologie* 88 (4): 51–529.

Fritz, C. 1999a. *La gravure dans l'art mobilier magdalénien.* Documents d'Archéologie Française 75. Paris: La maison des sciences de l'homme.

Fritz, C. 1999b. Towards a rebuilding of the Magdalenian artistic processes: The use of microscopic analysis in the field of miniature art. *Cambridge Archaeological Journal* 9 (2): 189–208.

Fritz, C., and G. Tosello. 2011. Exceptional evidence for Palaeolithic art in the Paris Basin: The engraved pebble from Étiolles (Essonne). *Bulletin de la Société préhistorique française* 108 (1): 27–46.

Güth, A. 2012. Using 3D scanning in the investigation of Upper Palaeolithic engravings: First results of a pilot study. *Journal of Archaeological Science* 39: 3105–3114.

Leroi-Gourhan, A. 1965. *Préhistoire de l'art occidental*. Paris: Mazenod.

Melard, N. 2010. L'étude microtopographique et la visualisation 3D dans l'analyse de gravures préhistoriques – L'exemple des pierres gravées de La Marche. *In Situ, revue des patrimoines [en ligne]* 13. Available at: http://www.insitu.culture.fr/article.xsp?numero=&id_article=melard-1424

Pales, L., and M. Tassin de Saint-Péreuse. 1969. *Les gravures de la Marche 1: Félins et Ours*. Publications de l'Institut de Préhistoire de l'Université de Bordeaux 7. Bordeaux: Delmas.

Sieveking, A. 1987. *A catalogue of Palaeolithic art in the British Museum*. London: British Museum Publications.

Tosello, G. 2003. *Pierres gravées du Périgord magdalénien: art, symboles, territoires.* XXXVI Supplément à Gallia Préhistoire. Paris: CNRS Éditions.

Villaverde, V. 1994. *Arte paleolítico de la Cova del Parpalló*. Valencia: Servicio de Investigación Prehistórica de la Diputación de Valencia.

Portuguese Faience and Historical Archaeology

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Introduction

Portuguese faiança or faience (majolica) can be found in colonial contexts in those parts of the New World, Northern Europe, and the coastal ports of Africa and Asia, where Portuguese goods were traded.

Until quite recently this ware was misinterpreted and classified as either Dutch or Italian ceramics in Europe and as the Spanish ceramic-type "Ichetucknee Blue on White" in the New World. Recent LA-ICP-MS (laser ablation inductively coupled plasma mass spectrometry) analyzes evidence that some of these ceramics were produced in Portugal (Casimiro et al. Forthcoming). The lack of publications concerning Portuguese ceramics published in other languages rather than Portuguese delayed for many years the correct identification of Portuguese faience (Casimiro 2011a).

There were two types of production in post-Medieval times. Between the 1550s and the late 1700s, it was produced in workshops. Starting in the 1760s, it began to be produced in factories. This entry focuses exclusively on faience, made in workshops in three different production centers: Lisbon, Coimbra, and Vila Nova (Fig. 1).

Definition

Portuguese faience is a soft-bodied, light buff- or pinkish-paste earthenware covered with a tin-based, lead glaze and normally decorated painted in blue or in blue and an additional color.

Portuguese Faience and Historical Archaeology, Fig. 1 Map of Portugal with the places mentioned in the text

Key Issues/Current Debates/Examples

Shapes and Function

Form variation is limited for Portuguese faience from the sixteenth to late eighteenth century. The variability was essentially in the decoration. Plates and bowls are clearly the most common shape, followed by bottles.

Faience objects would serve fundamentally at the table, for personal hygiene, and in pharmacies, plates and bowls being the most abundant. In the second half of the seventeenth century, archaeological records show that many vessels with the same decoration appear together, sometimes as complete table sets. Bowls, plates, and platters exhibit similar decorations and were certainly used together at the table during meals.

However, there are certain vessels that due to its physic and decorative attributes were not designed for their use in daily activities but as household ornaments. The objects found abroad, especially in Northern Europe or in English colonies are always of a finer quality and would certainly serve display purposes.

The 1572 potters' regulations register the production of many forms such as cylindrical pharmacy jars, plates of diverse sizes, pots, and jars. Other shapes, not mentioned in the document, are however known such as plates, bowls, tureens, tea pots, chargers, basins, pots, jars, bottles, boxes, lids, handled bowls, cups, chamber pots, holy water stoups, barbers bowls, spice containers, pitchers, aquamaniles, inkstands, figurines, funnels, candlesticks, and pharmacy pots discovered in archaeological contexts (Casimiro 2011a: 129).

Decorative Grammar

One of the most important characteristics of Portuguese faience is its decoration, reflecting the consumer tastes in Portuguese and European societies. Although some decorations and decorative techniques can be considered to be exclusive to each production center, in general, all three tended to use the same designs.

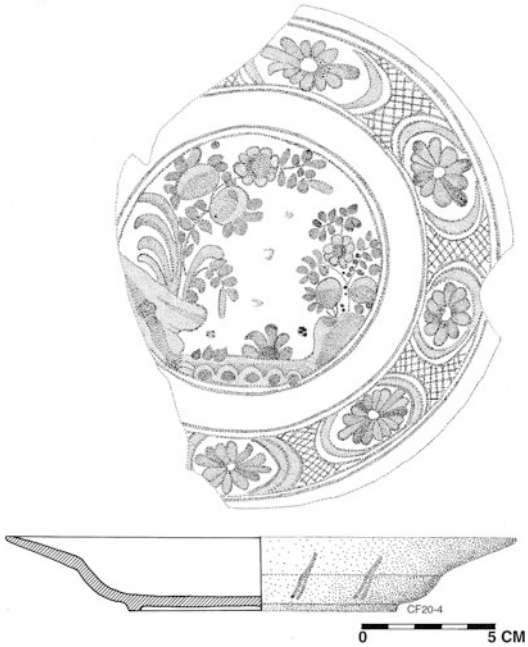

Portuguese Faience and Historical Archaeology, Fig. 2 Portuguese faience plate found in Carrickfergus. (Drawn by T. Casimiro)

Foreign influences, especially from Spain and Italy, can be seen from the beginning. The first faiences were clearly an imitation of Sevillian majolicas, especially the plain white plates and carinated bowls known as Columbia Plain. This imitation was so good that until quite recently the Portuguese products had been identified as Spanish (Barbosa et al. 2008). Decorative influences from Spain can be seen in designs that include small spirals inside geometric panels.

Italian influences came from Montelupo, Liguria, and Deruta, with the introduction of mythological images such as Venus and Fortunes presented as central plate designs. In the mid-seventeenth century, lace decoration started to appear. It has yet to be determined if this was a Portuguese creation or if it was inspired by the peacock feathers used to decorate Italian majolica in the late sixteenth century (Calado 2005).

The most significant foreign influences came from China (Fig. 2) through Portuguese maritime trade with the Far East. Chinese porcelain occupied an important role in Portuguese domestic environments, not only in palaces and convents, but also in more modest homes (e.g., Casimiro 2011b).

Lisbon's potters knew that Chinese Wanli patterns were much desired in Europe. In the 1619 *Corpus Christi* festival, potters in Lisbon presented faience vases in perfect imitation of Chinese porcelain (Calado 2005).

It is not known exactly when Portuguese potters started to use Chinese motifs, but it is believed to have been within the last two decades of the sixteenth century (Casimiro 2011a). One of the most significant decorative patterns is the division of the plate rim into panels, each filled with chrysanthemums and fruits, such as peaches and pomegranates, typical of coeval Kraak porcelain.

Around 1610, one of the most typical decorations of faience appeared: the *aranhões* or "big spiders." In Chinese porcelain, artemisia leaves, fans, gourds, sounding stones, and paper rolls were always surrounded by strings ending in tassels. These became key elements of Portuguese *aranhões*, which changed their original meaning and adapted them to a new European style. Other decorations of Chinese influence were also used, such as the beads or *desenho miúdo* (fine drawn) (Calado 1992).

Noble and wealthy families in Portugal and in other parts of Europe frequently requested faience vessels decorated with their respective coat of arms. These particular vessels were symbols of social status both in Portugal and elsewhere.

Chinese and European influences coexisted in Portuguese faience production.

In addition to the display of foreign influences, faience presents decorations that were developed by Portuguese potters, such as the numerous floral designs used essentially from 1635 onwards (Fig. 3). This seems to be the case with the garlands decorating plate rims, known as "baroque strip." Ferns and large leaves were also used to decorate faience plates and bowls up until the end of the seventeenth century (Fig. 4).

Portuguese Faience and Historical Archaeology, Fig. 3 Portuguese faience bowl found in the Low Countries. (After Claeys et al. 2010)

Production Centers

Lisbon

Lisbon was the first city in Portugal where faience production started in mid-sixteenth century, with

Portuguese Faience and Historical Archaeology, Fig. 4 Portuguese faience from Silves. (Photo by T. Casimiro)

workshops in the Santos-o-Velho and Santa Catarina areas (Carmona and Santos 2005).

Archaeological investigations have uncovered a half-dozen workshop sites, namely, in Rua de Buenos Aires, Largo de Santos, Largo de Jesus, Tercenas, Rua das Madres, and Museu Nacional de Arte Antiga. In 1672 there were 11 workshops in the Santos-o-Velho area (Mangucci 1996; Sebastian 2010).

Lisbon's fine-quality faience has a light buff fabric, while low-grade faience tends to have a pinkish one. In both cases, it is fairly homogenous and compact, and the number of inclusions is rather small.

The thick enamel is of excellent quality, indicating a high percentage of tin oxide in the glaze. There are some examples, however, with low-quality enamels, obviously made for domestic consumption, since rarely are they found in overseas contexts.

The percentage of mineral oxides used in the preparation of colors was probably a little less than in Coimbra or Vila Nova (discussed below) since the fired colors are lighter than in those centers. However, a vessel made in Lisbon can present different shades of blue.

Coimbra

The earliest document mentioning faience production in Coimbra dates to 1608, when Pedro Fernandes receives a letter allowing him to produce white pottery from Talavera (*malga branca de Talaveira*), although probably this was already in production for some years at this time (Carvalho 1921: 125).

The craft was well organized in the potters' quarter and had other ordinances besides the one indicating that no craftsmen, including potters, could open a workshop without a proper, lifetime license from the municipal council, signed by the craft's judges (Carvalho 1921:120).

In Coimbra, ceramic fabrics are pinkish or reddish, resulting from the low quality of local white clay, compelling potters to add red clays in order to strengthen fired vessels. Inclusions are very frequent with the existence of quartz and ceramic grog. The enamel presents a low percentage of tin oxide, making it thinner and less white than in Lisbon. Coimbra's blue decoration is darker and with fewer shades than the blues of Lisbon and Vila Nova. No evidence of the use of yellow has been found in the workshop excavations, although there are some investigators who believe that the yellow used in Coimbra should be darker, almost orange (Pais et al. 2007).

Vila Nova

The first reference to a kiln in this area dates to 1605, when Cristovão Fonseca sells to Manuel Gonçalves a house and a potter's kiln (Leão

1999). In 2000, an excavation exposed the remains of a workshop dating to the second half of the seventeenth century. They included a kiln, a dumpster, tanks, and an area to grind the clay. The pottery artifacts were essentially fragments of biscuit and finished products (Almeida et al. 2001).

Vila Nova did not have nearby white-clay sources. The white clay used was bought in Lisbon (Leão 1999) and possibly from Coimbra (Sebastian 2010).

The ceramic fabrics are very similar to Lisbon's: very homogenous and hard with some natural quartz and micaceous inclusions. Light buff fabrics are the most frequent although sometimes they have a pinkish tone, probably due to the use of some red clay.

The enamel is of a high quality with an elevated percentage of tin, very thick, white, and shiny. Blue decorations tend to be slightly darker than those from Lisbon and Coimbra, which may imply different ways of production or even variations in the kiln temperature. The use of yellow is not very frequent in Vila Nova productions. Although the decorations are a clear imitation of those produced in Lisbon and Coimbra, the decorative technique can be different from those centers: some vessels have a "relief" decoration.

World Distribution

Portuguese faience is regularly found across the world, especially in Atlantic coastal shores. This distribution cannot, however, have the same interpretation in all these places.

Portuguese colonies such as Brazil, Cape Verde, Goa, or even Madeira and the Azores were considered to be an extension of Portuguese territory. In this sense, the types of pottery found in such places are similar to those found in mainland Portugal ranging from high-quality vessels used by political and religious elites to lower-quality ones used in domestic contexts (Fig. 5).

This business was operated by Portuguese merchants as documented by port books. Pottery occupied just a small amount of space in the ships' cargo list. This was in fact a regular trade with several ships taking pottery around the year towards these colonies (e.g., Gomes et al. 2012).

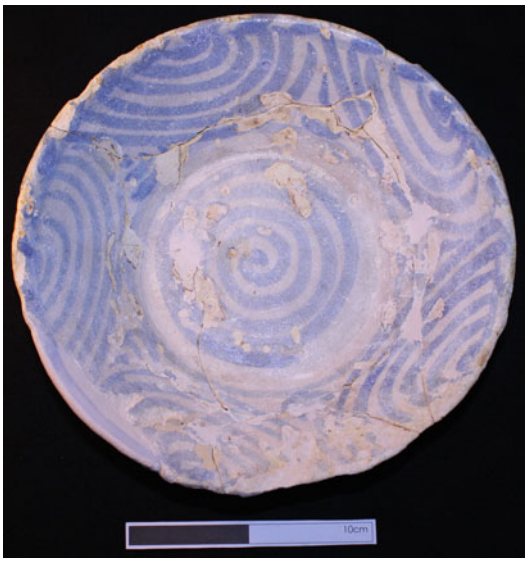

Portuguese Faience and Historical Archaeology, Fig. 5 Portuguese faience plate found in Cape Verde. (Photo by T. Casimiro)

Although less frequent, the presence of Portuguese faience in Spanish colonies cannot be ignored. Portugal and Spain were united under one crown from 1580 until 1640, one of the most productive periods for Portuguese faience. The presence of such wares in places such as Florida, the Dominican Republic, and even Argentina and Uruguay is recurrent.

Considerable quantities of Portuguese faience have been found in England and in its colonies in the North Atlantic, such as Newfoundland, Massachusetts, and Maine, and further south in Virginia and Barbados (Pendery 1999; Straube 2001). At some sites it represents the second largest ceramic import after English wares (Pendery 1999). References to it as "Lisbon ware" can be found in probate inventories (Wilcoxen 1999).

English planters would like to maintain a similar lifestyle to what they had in their home country. In this sense they would import every commodity which allowed the maintenance of their social status, namely, furniture, textiles, pottery, and even food (Pendery 1999; Wilcoxen 1999). Faience was not an everyday export as one can see in England, Ireland, Spain, France, Denmark, Sweden, and Germany. An interesting exception is the pottery found in the Low

Countries where the presence of several merchants with Portuguese family backgrounds can in fact support such theory (Bartels 2003).

Future Directions

The occurrence of Portuguese faience in the world has to be considered in diverse perspectives. The evidence found in Portuguese colonies is easy to comprehend and interpret. Portuguese settlers took Portuguese faience with them continuing to use what were their daily ceramic commodities. Spanish colonies, bearing in mind their political proximity to Portugal during six decades, were also privileged in the knowledge and use of Portuguese wares, acquiring easily and transmitting the idea of European and Eastern merchandises.

As for English colonies, the presence of Portuguese faience is related to the ability to acquire a high-quality good, produced in Europe, that could help European settlers to maintain a European lifestyle.

Lisbon was the most preferable workshop and most archaeological samples found in overseas contexts were in fact produced there. Nevertheless, one cannot underestimate Coimbra and Vila Nova since many plates and bowls produced in these workshops were in fact recovered in places such as Ferryland in Newfoundland and Devon in England.

Even though these ceramics are present in large amounts in other countries, it is believed that these were just a complement of a larger trading system involving wine, sugar, and olive oil but where all sorts of products were traded from food stuff to clothes, furniture, and of course pottery, among many other things.

Archaeometric studies are required to provide information to determine the extent of trade and consumption of Portuguese faiences in Europe, Africa, Asia, and the Americas.

Cross-References

- ▶ Archival Research and Historical Archaeology
- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Ceramics: Scientific Analysis
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Colony of Avalon Archaeological Site
- ▶ Post-medieval Archaeology (Europe)

References

Almeida, M., M. Neves, and S. Cavaco. 2001. Uma oficina de produção de faiança em Gaia nos séculos XVII e XVIII. Itinerário da Faiança de Porto e de Gaia: 144–145.

Barbosa, T.M., T.M. Casimiro, and R. Manaia. 2008. A late medieval household pottery group from Aveiro. *Medieval Ceramics* 30: 119–138.

Bartels, M. 2003. A cerâmica Portuguesa nos países baixos (1525–1650): Uma análise sócio-económica baseada nos achados arqueológicos. *Estudos/Património* 5: 70–82.

Calado, R. 1992. *Faiança Portuguesa, sua evolução até ao início do século XX*. Lisboa: Correios de Portugal.

Calado, R. 2005. *Faiança Portuguesa. Roteiro Museu Nacional de Arte Antiga*. Lisboa: Instituto Português dos Museus.

Carmona, R., and C. Santos. 2005. *Olaria da Mata da Machada. cerâmicas dos séculos XV–XVI*. Barreiro: Câmara Municipal do Barreiro.

Carvalho, J. 1921. *A Cerâmica Coimbrã no século XVI*. Coimbra: Imprensa da Universidade.

Casimiro, T.M. 2011a. *Portuguese faience in England and Ireland*, British archaeological reports international series. Vol. 2301. Oxford: Archaeopress.

Casimiro, T.M. 2011b. Estudo do espólio de habitação setecentista em Lisboa. *Arqueólogo Português* 1 (5): 689–726.

Casimiro, T.M., R.V. Gomes, and M.V. Gomes. Forthcoming. Portuguese faience trade and consumption across the world (16th–18th centuries). In *Global pottery. First international congress on historical archaeology & archaeometry for societies in action*, ed. J. Bauxeda et al. Spain: Universitat de Barcelona.

Claeys, J., N.L. Jaspers, and S. Ostkamp. 2010. *Vier eeuwen leven en sterven aan de Dokkershaven in Vlissingen*, ADC-Monografie. Vol. 9. Netherlands: Amersfoort.

Gomes, M.V., T.M. Casimiro, and J. Gonçalves. 2012. *Espólio do naufrágio da Ponta do Leme Velho – Ilha do Sal, Cabo Verde*. Lisboa: Instituto de Arqueologia e Paleociências da Universidade Nova de Lisboa.

Leão, M. 1999. *A cerâmica em Vila Nova de Gaia*. Vila Nova de Gaia: Fundação Manuel Leão.

Pais, A., A. Pacheco, and J. Coroado. 2007. *Cerâmica de Coimbra*. Coimbra: Inapa.

Pendery, S. 1999. Portuguese tin-glazed earthenware in seventeenth century New England: A preliminary study. *Historical Archaeology* 33: 58–77.

Sebastian, L. 2010. A produção oleira de faiança em Portugal (séculos XVI-XVIII). Unpublished Ph.D. dissertation, Universidade Nova de Lisboa.

Straube, B. 2001. European ceramics in the New World: The Jamestown example. In *Ceramics in America*, ed. R. Hunter, 47–71. Hanover/London: University Press of New England.

Wilcoxen, C. 1999. Seventeenth-century Portuguese faiança and its presence in colonial America. *Northeast Historical Archaeology* 28: 1–20.

Further Reading

Calado, R.S. 1993. A porcelana chinesa como fonte de inspiração da decoração da faiança portuguesas do século XVII. *Oceanos* 14: 76–83.

de Albuquerque, P.T.S. 2008. A faiança portuguesa: Demarcador cronológico na arqueologia brasileira. In *Actas das 4as Jornadas de Cerâmica Medieval e Pós-Medieval*, ed. J.M. Diogo, 221–270. Portugal: Câmara Municipal de Tondela.

dos Santos, R. 1956. A faiança do século XVI nos primitivos Portugueses. *Panorama* 4: 1–8.

dos Santos, R. 1960. *Faiança Portuguesa, Séculos XVI e XVII*. Porto: Galaica.

dos Santos, R. 1970. *Oito séculos de arte Portuguesa, História e espírito*. Lisboa: Empresa Nacional de Publicidade.

Etchevarne, C. 2003. A reciclagem da faiança em Salvador: Contextos arqueológicos e tipos de reutilização. *Cliometrica* 16 (1): 103–118.

Falk, A. 2007. Portugiesische Fayencen in Lübeck. In *Archäologie der frühen Neuzeit*, Mitteilungen der Deutschen Gesellschaft für Archäologie des Mittelalters und der Neuzeit, vol. 18, 93–100. Paderborn: Deutsche Gesellschaft für Archäologie des Mittelalters und der Neuzeit.

Fraga, T.M. 2008. Santo António de Tanná: Story, excavation and reconstruction. In *Edge of empire*, ed. F. Vieira de Castro and K. Custer, 201–213. Portugal: Caleidoscópio – Edição e Artes Gráficas, SA.

Fusco-Zambetogliris, N. 2003. Un diálogo con la cerámica portuguesa de la Colonia del Sacramento. *Revista de Arqueología Americana* 22: 43–62.

Garlake, P.S. 1968. The value of imported ceramics in the dating and interpretation of the Rhodesian Iron Age. *The Journal of African History* 9 (1): 13–33.

Gomes, M.V., and R.V. Gomes. 2007. Escavações arqueológicas no Convento de Santana em Lisboa. *Olissipo* 27 (2): 75–92.

Jaspers, N.L., and S. Ostkamp. 2006. Het aardewerk uit de opgraving. In *Bodemvondsten uit de Boerenhoek Enkhuizen, opgraving "De Baan" (fase 2)*, ADC ArcheoProjecten Rapport, ed. P.C. de Boer, vol. 452, 21–35. Netherlands: Amersfoort.

Kelso, W.M., and B. Straube, eds. 2008. *2000–2006 Interim report on the APVA excavations at Jamestown, Virginia*. Virginia: The Association for the Preservation of Virginia Antiquities, Jamestown Rediscovery.

Lane, P.L. 2012. Maritime and shipwreck archaeology in the western Indian Ocean and southern Red Sea: An overview of past and current research. *Journal of Maritime Archaeology* 7: 9–41.

Mangucci, A. 1996. Olarias de louça e azulejo da freguesia de Santos-o-Velho dos meados dos séculos XVI aos meados do século XVIII. *Almadan*: 155–168.

Orser, Ch.E., Jr. 2002. Portuguese colonialism. In *Encyclopedia of historical archaeology*, ed. C.E. Orser Jr., 490–494. London/New York: Routledge.

Queiroz, J. 1948. *Cerâmica Portuguesa e outros Estudos*. Lisboa: Editorial Presença.

Sandão, A. 1965. *Faiança Portuguesa dos séculos XVIII e XIX*. Lisboa: Civilização.

Sassoon, A. 1981. Ceramics from the wreck of a Portuguese ship at Mombasa. *Azania* 16: 98–130.

Sassoon, A. 1991. The Portuguese fayence. *Institute for Nautical Archaeology Newsletter* 18 (2): 22–24.

Schavelzon, D. 2001. Catálogo de cerámicas históricas de Buenos Aires (siglos XVI–XX). Buenos Aires: Fundación para la Investigación del arte argentino/Telefónica/FADU. Available at: https://docs.google.com/file/d/0B94K_VGTFmtzNzc1NGI1N2MtNzQ5MS00ZDViLWI5MGYtZjAxYzU3ODA2ZmFl/edit?hl=es&pli=1. Accessed 10 Oct 2012.

Stoddart, E. 2000. Seventeenth-century tin-glazed earthenware from Ferryland, Newfoundland. Unpublished Master's dissertation, Memorial University of Ferryland.

Zorzi, F. 2011. Mayólica Colonial en Buenos Aires. Trayectoria social de un conjunto cerámico de los siglos XVII y XVIII. Unpublished BA dissertation, Universidad de Buenos Aires.

Portuguese Redwares and Coarse Wares in Historical Archaeology

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Introduction

Portuguese coarse wares (*cerâmica comum*) were the daily ceramic objects used in Portuguese households in medieval and postmedieval

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 1 Map of Portugal with the places mentioned in the text

times (thirteenth to nineteenth century). It is an unfortunate, nonspecific term that does not take into account regional production differences or the differences between the very fine, thin-walled cups and the rough cooking pots (Fig. 1).

Definition

The term refers to ceramic objects produced with brown, black, red, and orange fabrics tempered with quartz and micaceous inclusions. The types of surface treatment include simple smoothing with a wet cloth, burnishing, and coating with a clay slip. Although coarse wares appear in many different colors, redwares were the most common. All were wheel-thrown. Closed vessels show regular and deep potter's finger marks on their interior surface.

Key Issues/Current Debates/Future Directions/Examples

The Search for a Name: International Discussion

Portuguese coarse wares have been recovered in many countries and former colonies although, until recently, they were given other names by non-Portuguese archaeologists. The most famous designation was Merida-type ware, assigned by John Hurst in the 1960s thinking that this was, in fact, a Spanish product that maintained the Roman tradition of the *sigillatas* from the Merida region. Hurst recognized his error some years later (Hurst et al. 1986), but by then the name had already been adopted in English archaeological literature.

Portuguese ceramics were first identified outside Portugal in 1854 when in England reference was made to *cerâmica empedrada*, or stone inlaid pottery, from the Estremoz region (Hurst 2000: 24). For many years, it was considered to be made exclusively in High Alentejo, Estremoz, where there was an important postmedieval production center. However, it is now evident from the finds being made outside Portugal that they were not exclusively manufactured in that area. Production was certainly more widespread (see Martin 1979: 291).

Alexandra Gutierrez (2007) was the first to define the Merida-type ware as "Portuguese coarse ware" as a result of studying hundreds of shards found in a single site in Southampton, England. Gutierrez was unable to establish secure production centers, but today the vessel shapes presented in the study indicate Lisbon, Aveiro, and possibly Coimbra as three very likely production areas.

In 2008, Sarah Newstead also used the same designation when studying large amounts of Portuguese coarse wares found in Newfoundland, which were also made in different areas of Portugal.

However, other names have been given to these wares. Ian Baart (1992) published some Low Countries finds as *sigillata* from Estremoz, although in this designation he included not only burnished ceramics but also fairly common wares sometimes decorated with embedded small white quartz and feldspar stones (Fig. 2).

Examples of Portuguese coarse ware have been found in New World colonies where it is called feldspar-inlaid redware and orange micaceous ware (Deagan 1987: 40–41), although micaceous pottery was also native to the New World.

The variety of Portuguese productions was such that coarse wares once found outside Portugal were called by very different names. In this

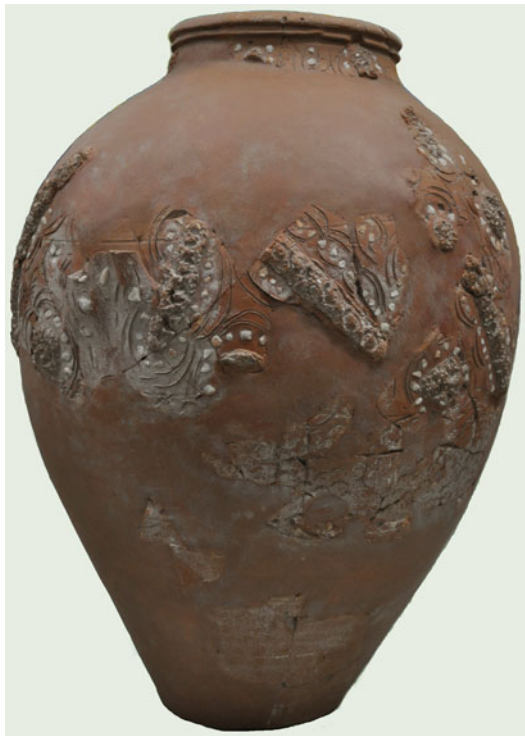

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 2 Pot with small quartz-stone decoration found in Azenha de Santa Cruz, Torres Vedras by G. Cardoso and I. Luna. (A) 50 cm. (Photo by G. Cardoso)

sense, what has been designated so differently in English literature was mainly produced in Lisbon, Coimbra, Aveiro, Porto, Estremoz, Lagos, and possible other Algarve cities such as Silves.

Shapes and Function

Portuguese coarse wares appear in many shapes for daily household activities, for industrial processes, and for commercial activities.

Domestic vessel forms include cooking pots (*panelas, frigideiras, caçoilas*), often with their respective lids (*tampas, testos*); cups (*púcaros*); plates and bowls (*pratos, taças*); bottles and jars (*garrafas, jarros*); costrels (*cântaros, cantis*); large flared dishes (*alguidares*); funnels; chamber pots; and chafing dishes. For industrial use, there were sugar cones (*formas de açúcar*) and syrup pots. For commercial use, there were olive jars (*anforetas*).

Cooking pots used to boil, fry, or stew occur in various sizes that present globular or hemispherical shapes with convex bases, everted plain rims, and horizontal, vertical, or even triangular handles (Fig. 3). The countersunk lids with knob handles are frequent and easily recognizable finds.

Thin-walled cups (*púcaros*) with burnished exteriors, sometimes decorated with vertical lines, finger impressions, and appliqué are some of the most recognizable Portuguese coarse wear products (Fig. 4).

Bowls vary in shape: hemispherical, convex, or slightly carinated. They can have a concave, recessed base or a foot ring. On the exterior wall just below the plain everted rim, there may be a decoration of incised lines (Fig. 5).

Flared-rim plates, with the same types of bases as bowls, usually have a burnished interior.

Jars and bottles, used to store and serve liquids such as water, wine, and olive oil, have narrow flat bases and straight necks terminating in a multiplicity of rim forms.

Rilled, tall-neck, globular costrels served as water containers and are also frequent finds in archaeological excavations.

Large, flared bowls with everted or plain rims served a variety of functions from food preparation to laundry and dish washing. Their diameters range from 30 to 80 cm. Most are burnished but some examples present an interior yellow and green lead glaze. These might have been expensive items since evidence of repairs when broken is frequent.

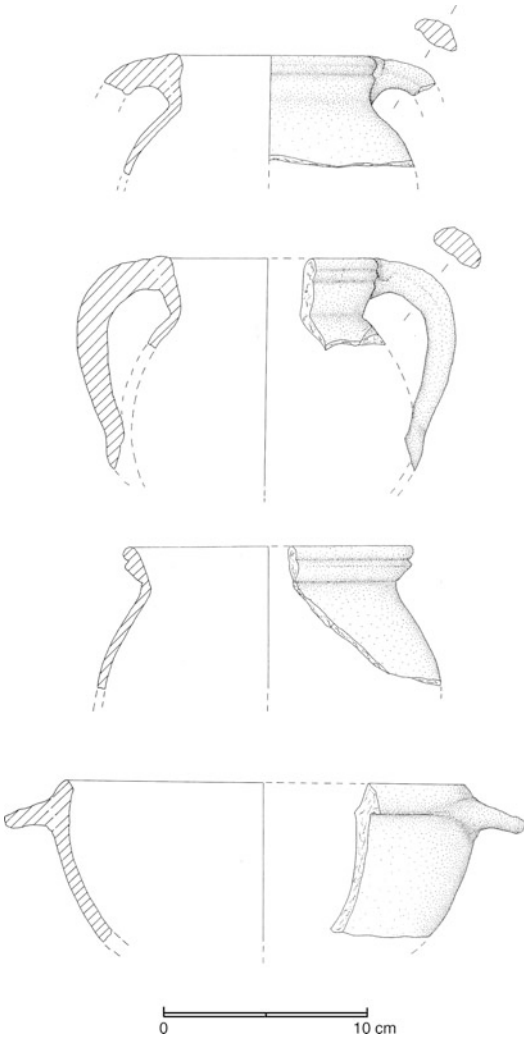

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 3 Cooking pots found in Rua Homem de Cristo Filho, Aveiro. (After Barbosa et al. 2008: 127)

Funnels, with a wide round top and a narrow tube coming out at the bottom, were used for pouring liquids into containers. Though extremely functional, it is not a common artifact in Portuguese archaeological sites.

Chamber pots were fundamental objects in every fifteenth- and sixteenth-century house and are usually recovered in every domestic site, though their frequency increases in later chronologies. Characterized by their flat bases, tall

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 4 *Púcaros* and Chinese porcelain dishes found in Convento de Santana, Lisboa. (After Gomes and Gomes 2007: 85)

cylindrical bodies, everted rims, and usually large flat or concave handles, they can be found glazed or unglazed.

Chafing dishes were used in association with cooking pots to heat and cook food. Their sizes are as variable as those of cooking pots.

Sugar cones and syrup pots were used by the industry and are frequently found across Portugal but especially in the areas around Lisbon and Aveiro where these were produced for local consumption and to the cclones for export.

International literature has often classified olive jars as exclusively Spanish products. Nevertheless, nowadays it has been established that these were made in other countries such as Portugal and some New World settlements. Although earlier vessels usually presented a flat bottom, a narrow neck, and two small handles, from the mid-sixteenth century onward, the shape is rather similar to Spanish olive jars, but the paste is definitely Portuguese.

Although diverse shapes are known, Portuguese workshops tended to produce similar objects, and one can find straight similarities between Algarve, Lisbon, or Aveiro productions and sometimes for long periods of time.

Production Centers

Coarse wares were made in almost every city in Portugal. Kilns are not frequent finds in archaeological excavations, and only about half-dozen have been identified in postmedieval contexts. Nevertheless, large ceramic assemblages have been found in major cities, which in some cases, especially where written evidence (such as charters, wills, and price lists) is available, almost certainly point to the existence of potters and production sites (Fernandes 1999).

In 1980, a rectangular kiln, dating from the mid-sixteenth century, was found in Mata da Machada (Barreiro). Although many types of pottery were found at the site, from coarse wares to lead- and tin-glazed ceramics, the coarse-ware evidence indicates the production of sugar cones, and several domestic shapes such as cooking pots, cups, plates, bottles, and others, and also small vessels decorated with inlaid quartz stones, a decorative style thought for many years to be exclusive to the Estremoz area.

News of kiln sites in Lisbon is not rare but no evidence of a postmedieval kiln has been published. Nevertheless, Lisbon must have been one of the largest production centers in Portugal, producing for local consumption and for export. In 1552, for example, there were about 60 kilns producing redwares (*louça vermelha*), mostly in the medieval potter's quarter (Casimiro 2011b) (Fig. 6).

No kiln has been found in Estremoz. Nevertheless, ceramic products from that area were

famous in the early modern era among rich and poor, and written evidence confirms this. In the 1610 book *Descrição de Portugal*, Duarte Nunes de Leão mentions that fine and thin Estremoz cups were appreciated across the entire kingdom. This author also refers to similar products in Lisbon, Pombal, and Montemor-o-Novo. In this last site, there was a special type of production. The fabric was full of very small, white, quartz stones. Examples have been identified in Amsterdam and London. Once, during a dinner, King Sebastião drank from an Estremoz cup, while all the guests used silver and gold vessels, claiming that he enjoyed its "earthen" taste, and several members of the Iberian royal family appreciated these cups (Vasconcellos 1921: 32). Moreover, in 1687 two ships set sail from Lisbon to England, and among the diverse cargo there were two boxes of Estremoz pottery (Casimiro 2011a: 181). The Estremoz' kilns produced mostly cups, bottles, jars, and bowls with burnished surfaces and stamped or small, white, inlaid quartz-stone decorations.

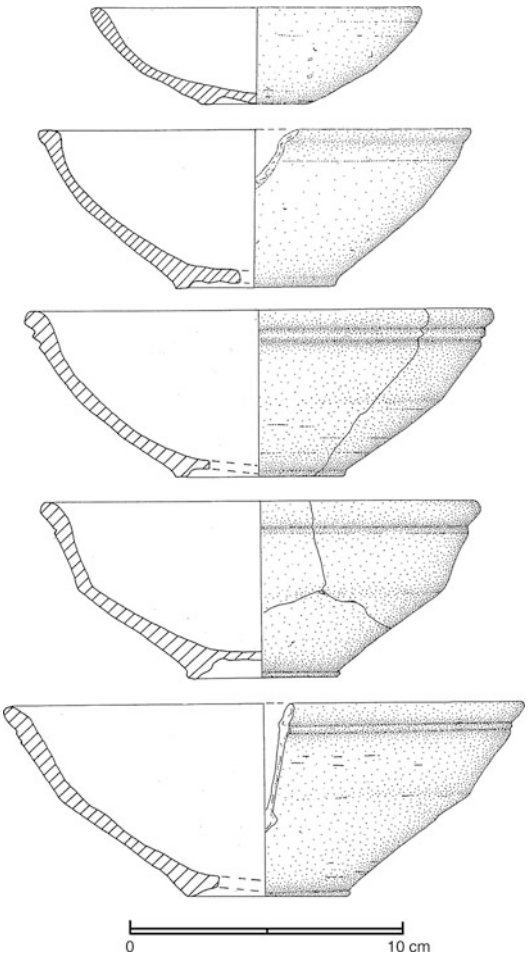

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 5 Bowls found in Rua Homem de Christo Filho, Aveiro. (After Barbosa et al. 2008: 124)

One of the most important northern production centers was Aveiro. No kiln has been found there, but several terrestrial and underwater archaeological excavations have revealed a rich production area. The coarse-ware vessels present orange micaceous fabrics and often burnished decoration with vertical lines. One of the most important excavations is that of the shipwreck Aveiro A, where an immense pottery cargo was recovered giving an idea of the type of shapes produced and their similarity to many finds made inside the city walls (Alves et al. 1995; Bettencourt and Carvalho 2008; Barbosa et al. 2008).

Many other towns in Portugal produced pottery, for example, Coimbra, Palmela, Porto, and Lagos.

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 6 *Púcaros* with modeled decoration found in Convento de Santana, Lisboa. (After Gomes and Gomes 2007: 85)

P

One specific type of Portuguese coarse ware is the so-called black pottery (*cerâmica negra*), traditionally made in the northern part of the country in centers such as Tondela or Bisalhães, among others. It does not seem to have had an important international distribution. Only two vessels are known abroad, in London and Amsterdam, two cities that had commercial relations with Portugal.

A kiln found in Silves (Algarve) in 2002 revealed the production of thin-walled cups, believed for many years to be exclusive to production sites in the center of the country, and other less-fine vessels (Gomes 2008) that tend to give insight into the difference between kitchenware and tableware.

World Distribution

Portuguese coarse wares, with a variety of shapes and decorations, from simple vessels to richly decorated ones, have been found in many countries around the world: England, Ireland, Scotland, the Low Countries, Denmark, Iceland, Germany, Canada, the USA, Brazil, and several African locations (e.g., Hurst et al. 1986; Baart 1992; Orser 2002; Gutierrez 2007).

It is believed that these vessels reached their destinations with two purposes: as household wares and as shipping containers for Portuguese produce. Portuguese ship registers reveal the export of many types of household coarse ware pottery, as can been seen in the lists of goods leaving Porto and sailing to England, Newfoundland, New England, Brazil, and Africa, carrying Estremoz, Aveiro, and even Northern pottery (Barbosa et al. 2008: 134).

The evidence of containers for the shipment of Portuguese commodities such as olive oil, olives, sweets, marmalade, and other items can also be seen in ship registers (Casimiro 2011a: 184).

It is not easy to infer from these documents the major production center for exported Portuguese ceramics, but the archaeological evidence outside the country suggests Lisbon, Coimbra, Aveiro, and Estremoz as four of the major production areas.

Portuguese coarse wares due to their color, micaceous aspect, shape, and decoration are a recognizable product in European, African, and New World settlements. This is confirmed, in part, in paintings by Portuguese and European artists such as Josefa de Óbidos, Velasquez, Frans Francken, among many others, in which Portuguese coarse wares appear (Vasconcellos 1921: 13).

It was on everyone's table in Portugal, used by rich and poor, as shown by written evidence. It was available in foreign countries and far away colonies as indicated by the archaeological evidence.

Cross-References

- ▶ Archival Research and Historical Archaeology
- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Colony of Avalon Archaeological Site
- ▶ Deagan, Kathleen A.
- ▶ Historic Jamestowne
- ▶ Post-medieval Archaeology (Europe)

References

Alves, F., P. Paulo, C. Garcia, and M. Aleluia. 1995. A Cerâmica dos destroços do navio dos meados do século XV Ria de Aveiro A e da zona da Ria de Aveiro B Aproximação tipológica preliminar. In *Actas das 2as Jornadas de Cerâmica Medieval e Pós-Medieval*, 185–210. Tondela: Câmara Municipal de Tondela.

Baart, J. 1992. Terra Sigilatta from Estremoz, Portugal. In *Everyday and exotic pottery from Europe, c. 650-1900. Studies in honor of John G. Hurst*, ed. D. Gaimster and M. Redknap, 273–278. Exeter: Oxbow Books.

Barbosa, T.M., T.M. Casimiro, and R. Manaia. 2008. A late medieval household pottery group from Aveiro. *Medieval Ceramics* 30: 119–138.

Bettencourt, J., and P. Carvalho. 2008. The cargo of the ship Ria de Aveiro A (Ílhavo, Portugal): A preliminary approach to its historical-cultural significance. *Cuadernos de Estudios Borjanos L-LI*: 257–290.

Casimiro, T.M. 2011a. *Portuguese faience in England and Ireland*, British archaeological reports international series. Vol. 2301. Oxford: Archaeopress.

Casimiro, T.M. 2011b. Estudo do espólio de habitação setecentista em Lisboa. *Arqueólogo Português* 1: 689–726.

Deagan, K. 1987. *Artifacts of the Spanish colonies of Florida and the Caribbean, 1500–1800, Volume I: Ceramics, glassware and beads*. Washington, DC: Smithsonian Institution Press.

Fernandes, I. 1999. Do uso das peças: Diversa utilização da louça de barro. In *Actas do IV Encontro de Olaria Tradicional de Matosinhos*, 12–39. Matosinhos: Câmara Municipal de Matosinhos.

Gomes, M.V. 2008. Dois fornos de cerâmica de Silves (Secs XVI–XVII) – Notícia preliminar. In *Actas das 4as Jornadas de Cerâmica Medieval e Pós-Medieval, Métodos e Resultados para o seu Estudo*, 271–292. Tondela: Câmara Municipal de Tondela.

Gutiérrez, A. 2007. Portuguese coarsewares in early modern England: Reflections on an exceptional pottery assemblage from Southampton. *Post Medieval Archaeology* 41: 64–79.

Hurst, J. 2000. Imported ceramic studies in Britain. *Medieval Ceramics* 24: 23–30.

Hurst, J.G., D. Neal, and H.J.E. van Beuningen. 1986. *Pottery produced and traded in north-west Europe 1350–1650*. Rotterdam: Foundations 'Dutch Domestic Utensils': Museum Boymans.

Martin, C. 1979. Spanish Armada pottery. *The International Journal of Nautical Archaeology and Underwater Exploration* 8: 279–302.

Newstead, S. 2008. Merida no more: Portuguese redware in Newfoundland. Unpublished Master's dissertation, Memorial University, Newfoundland.

Orser, Charles E., Jr. 2002. Portuguese colonialism. In *Encyclopedia of historical archaeology*, ed. C.E. Orser Jr., 490–494. London/New York: Routledge.

Vasconcellos, C. 1921. *Algumas palavras a respeito dos púcaros de Portugal*. Coimbra: Impressa da Universidade.

Further Reading

Ashdown, J. 1972. Mewstone Ledge Site B. oil jars. *International Journal of Nautical Archaeology* 1: 147–153.

Beltrán de Heredia Bercero, J., and N. Miró I. Alaix, eds. 2010. El comerç de ceràmica a Barcelona als segles xvi-xvii: Itàlia, França, Portugal, els tallers del Rin i Xina. *Quarhis* 6: 14–91.

Etchevarne, C. 2006. Aspectos da cerâmica colonial do século XVII, em Salvador, Bahia. *Clio Arqueológica* 20: 53–79.

Gaulton, B., and C. Mathias. 1998. Portuguese Terra Sigillata earthenware discovered at the 17th-century colonial site in Ferryland, Newfoundland. *Avalon Chronicles* 3: 1–17.

Gomes, M., and R. Gomez. 2007. Escavações arqueológicas no Convento de Santana, em Lisboa – Resultados preliminares. *Olisipo* 2 (27): 75–92.

Gutiérrez, A. 2000. *Mediterranean pottery in Wessex households (13th to 17th centuries)*, British archaeological reports british series. Vol. 306. Oxford: Archaeopress.

Gutiérrez, A., D. Williams, and M.J. Hughes. 2003. A shipwreck cargo of Sevillian pottery from the Studland Bay wreck, Dorset, UK. *International Journal of Nautical Archaeology* 32: 24–41.

Kelso, W.M., and B. Straube, eds. 2008. *2000–2006 Interim report on the APVA excavations at Jamestown, Virginia*. Virginia: The Association for the Preservation of Virginia Antiquities, Jamestown Rediscovery.

Kirkman, J. 1974. *Fort Jesus: A Portuguese fortress on the East African coast*. Oxford: Clarendon Press.

Marken, M.W. 1994. *Pottery from Spanish shipwrecks, 1500–1800*. Gainesville: University Press of Florida.

Mehler, N. 2004. Die mittelalterliche Importkeramik Islands. In *Current issues in Nordic archaeology. Proceedings of the 21st conference of nordic archaeologists, 6–9 Sept 2001, Akureyri, Iceland*, ed. G. Guðmundsson, 167–170. Reykjavik: Society of Icelandic Archaeologists.

Parvaux, S. 1968. *La céramique populaire du Haut Alentejo*. Paris: Presses Universitaires de France.

Rodríguez Aguilera, A. 2000. Excavación arqueológica en el Carmen de la Concepción (Albaicín, Granada). *Datos para una polémica. Arqueología y Territorio Medieval* 7: 137–156.

Rodríguez Santamaría, A., and A. Moraleda Olivares. 1997. La cerámica bucarina en Talavera de la Reina (s. XVI–XVII). *Revista de estudios humanísticos de Talavera y su antigua tierra* 5: 21–35.

Rovira, B., and F. Gaitán. 2010. Los búcaros. De las Indias para el mundo. *Canto Rodado* 5: 39–78.

Schavelzon, D. 2001. Catálogo de cerámicas históricas de Buenos Aires (siglos XVI–XX). Buenos Aires: Fundación para la Investigación del arte argentino/Telefónica/FADU. Available at: https://docs.google.com/file/d/0B94K_VGTFmtzNzc1NGI1N2MtNzQ5MS00ZDViLWI5MGYtZjAxYzU3ODA2ZmFl/edit?hl=es&pli=1. Accessed 10 Oct 2012.

Sousa, E. 2006. A Cerâmica do Açúcar das cidades de Machico e do Funchal. Dados Históricos e Arqueológicos para a Investigação da Tecnologia e Produção do Açúcar em Portugal. In *A Cerâmica do Açúcar em Portugal na Época Moderna*, ed. E. Sousa, 10–31. Centro de Estudos de Arqueologia Moderna e Contemporânea: Lisboa/Machico.

Veeckman, J. 1994. Iberian unglazed pottery from Antwerp (Belgium). *Medieval Ceramics* 18: 9–18.

Portuguese Tiles (Sixteenth to Eighteenth Century)

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Introduction

One of Portugal's most impressive ceramic productions was tiles. Although floor tile production is known in medieval times, wall tiles were only manufactured since the mid-sixteenth

century. These are square ceramic plaques – although other shapes are known – the majority of times produced with light buff fabrics, covered with glazes and creating patterns or a scene with the objective of covering walls. From geometric motifs, which are combined to create patterns, to figurative tiles telling stories, this is one of the most important architectonic features in early modern Portugal. The earliest known production site in Portugal is in south bank of the River Tagus in Santo António da Charneca, producing in the mid-sixteenth century. At the same time, Lisbon was also producing tiles. By the early seventeenth century, the production was already spread to other parts of the country, namely, Coimbra and Vila Nova (Porto). Although tiles are a wide generalized production, they were used essentially in the decoration of the inner walls of churches, convents, and palaces and occasionally fountains and gardens.

No floor tile production kiln or workshop is known in Portugal so far. However, a research project about medieval floor tiles with archaeometric analysis concluded that the tiles in Alcobaça were in fact produced in Portugal (Trindade 2018). These followed the style of the Cistercian tile, a European tendency developed during the life of Bernard Clairavaus (Cothren 1982). In Alcobaça, in the second half of the thirteenth century, there are white and turquoise blue floor tiles as well as incised decorations (Trindade 1998). This is the period when other church and palace floors are also covered with similar tiles such as the ones found in the National Palace of Sintra (King Dinis palace), the chapel of Estevão Domingues and his wife (1305) in Lisbon cathedral, as well as the King João I palace in Coimbra dated from the late thirteenth century (Trindade 2007). In the National Palace of Sintra, the floor of a room built in the late fourteenth century (where later in the seventeenth century King Afonso VI is going to be imprisoned) reveals a different pattern and probably already a transition to a *mudejar* taste (Silva 1995). The late fourteenth century is the moment when floor tiles start to be used in walls (Trindade 2007), something that continued in the fifteenth century. It is quite likely that tile makers existed in Lisbon during the middle ages; however, it is only in the late fifteenth century that documents attest the presence of a tile maker with a Moorish name *Alle Azuleiro*, possibly producing similar objects to the ones imported from southern Spain (Trindade 2007).

Arista, Cuerda Seca, and Historiated Tiles (Sixteenth Century)

Medieval thirteenth- and fourteenth-century buildings had impressive tile floors; however, during the late fifteenth and sixteenth century, a general taste of covering the walls of important buildings with tiles develops in Portugal, mostly inspired by Islamic traditions still surviving in southern Iberia. The majority of the tiles used in Portugal in the early sixteenth century seem to have been made in Seville, and at least three surviving documents support their origin. The tiles found in Portugal and made in southern Spain correspond essentially to *alicatados*, *enxaquetados*, cuerda seca, and arista tiles.

This fourth technique, supposedly invented by Niculoso Pisano, an Italian potter settled in Seville (Pleguezuelo Hernandez 2007) is going to be rather successful allowing for a huge increase in production. If in the cuerda seca tiles a mixture of grease and manganese was used as an outline of drawings to separate colors, in the arista case, wooden molds with carved drawings would be used as molds to produce hundreds of similar tiles. The reliefs impressed in the clay would avoid that different glazes mixed. These were painted with lead or tin glazes. Their production technique developed a standardized product with the manufacture of thousands of similar objects (Pleguezuelo Hernandez 2007, 365).

The import of such tiles was so frequent that this could have been the reason which made Portuguese potters start to produce tiles using the similar techniques.

It is difficult to define when was this tile production made for the first time in Portugal; however, the oldest archaeological evidence was found in a mid-sixteenth-century workshop found

in Santo António da Charneca, in the south bank of the River Tagus.

The excavation discovered a kiln and some wasters where the tiles, in biscuit and already glazed were found (Cardoso et al. 1997). This was in fact a big novelty since these types of tiles, although some researchers already suspected a Portuguese production (Trindade 2007), had no hard evidence and the majority of tiles were suspected to have been made in Seville and imported into Portugal.

This production is not only confirmed by the archaeological record but also by archaeometric analysis (Fig. 1) (Ferreira et al. 2014). The tiles found in this excavation are decorated with floral and geometric patterns and glazed painted with white, green, brown, and yellow, creating patterns. As for the cuerda seca, although no tiles were ever found associated to production sites, once again archaeometric analysis made in tiles found in the Monastery of Santa Clara-a-Velha, in Coimbra, and their technical differences when compared with Seville and Toledo products suggest that these were also made in Portugal (Coentro et al. 2014). The investigation concerning this Portuguese production is still scarce, and most of the tiles found in archaeological contexts are still usually characterized as Spanish although that assumption might need some revision in the near future (Fig. 1).

Portuguese Tiles (Sixteenth to Eighteenth Century), Fig. 1 Arista tiles manufactured in Santo António da Charneca (after Trindade 2008, 160)

In spite of this evidence, arista and cuerda seca tiles were seldom produced, and in fact, the majority of tiles continued to be imported until the late sixteenth century.

There is still no evidence that *enxaquetados* were produced in Portugal although the pastes from the tiles found in Lisbon seem quite similar to Lisbon pottery productions and their amount in archaeological excavations suggests this production. This technique corresponds to the use of very small tiles, glazed with different colors which are combined in order to form geometric patterns. Their use in Portugal is frequent since the late fifteenth century, especially in churches and palaces. As for *alicatados*, very small tiles shaped as stars and diamonds, used to form compositions, they are so rare that it is almost impossible to have been produced in Portugal (Casimiro and Sequeira 2018).

This type of tiles known as *hispano-mourisco* or *mudejar* is going to get direct influences from the still surviving influences of centuries of Islamic presence in southern Iberia with geometric and phytomorphic motifs creating geometric symmetries. Many buildings in Portugal had their walls covered with these tiles. Some of the most outstanding examples can be found in the National Palace of Sintra. Originally built in medieval times, this building is going to be highly refurbished in the early sixteenth century and a large portion of its inner rooms decorated with cuerda seca and arista tiles. These have many different decorations ranging from the traditional floral and geometric pattern combined in large compositions to tiles with the arms of King Manuel, a royal demand to decorate the palace. One of the largest archaeological collections of *hispano-mourisco* tiles ever found was also associated to a palace, owned by the Penafiel Counts in Lisbon, where hundreds of these tiles were found and believed to form the decoration of the first floor (Bargão et al. 2017). Although the authors sustain, based on style, that these tiles were all imported from Seville, this attribution cannot be certain without further work. Many other places are known in the Lisbon area or up the Tagus River although only occasionally published (Casimiro and Sequeira 2018).

Churches and monasteries were also large consumers of these arista tiles. In Portugal, some of the most iconic religious buildings, as tiles are concerned, are located in Coimbra, where the cathedral still conserves part of its walls covered with this decorative solution, mostly likely of Seville production based on a large quantity of tiles bought from that Spanish city in 1503 (Goulão 1986), although a large portion of the tiles in this building were removed in the twentieth century.

This type of tiles was in fact the most recurrent in Portugal, although certainly not the only production. Following the Italian, Flemish, and Spanish style, some tile producers are going to paint *historiados*. This type of polychromous panels uses colors such as green, yellow, brown, and blue on a white background to actually tell a story, most of the times inspired by classic mythology or biblical tales. The technique is the same as tin glaze production which paints a colorful scene over a white tin glaze layer. It is said it was Niculoso Pisano who introduced this technique in the Iberian Peninsula.

Some of the most well-known examples are conserved in Quinta da Bacalhoa, a large estate owned in the sixteenth century by Brás de Albuquerque, an important figure of Portuguese nobility and an admirer of Renaissance style and architecture. The most famous panels are a representation of Susanna and the Elders and Abduction of Europa (Fig. 2), possibly made by a Flemish tile maker who settled in Seville named Frans Andries (Pais et al. 2015). However, other examples are known in the Lisbon area such as a panel in one of the São Roque church chapels or the Senhora da Vida panel, today kept at the Lisbon tile museum yet made for the Santo André Church around 1580 (Morais 2012). These tiles were clearly being made in Lisbon, and two of the most distinguishable craftsmen were Marçal de Matos and Francisco de Matos, probably relatives, who must have been active somewhere between 1560 and 1590 and actually signed and dated a few of their panels (Fig. 2). Some other tile craftsmen are known such as the Flemish João de Gois and Filipe de Gois, possibly relatives. Until recently they were only known from written

Portuguese Tiles (Sixteenth to Eighteenth Century), Fig. 2 *Historiado* tiles with the biblical tale of Susanna and the Elders from Quinta da Bacalhoa

documents; however, a few years ago, a panel in Graça Gurch has a signature recognized as the initials of João de Gois (Pais et al. 2015) revealing how multicultural tile production was in Lisbon in the late sixteenth century.

The style of these tiles can in fact be followed all the way into Italy where ceramic artists were painting such scenes in walls and smaller objects such as ceramic vessels.

Pattern Tiles (Seventeenth Century)

If the sixteenth century combines different styles and decorations, the seventeenth century is going to be dominated by pattern tiles, sometimes also called repetition or "carpet tiles." These are replication tiles permeated by decorative influences from the Arabic, Flemish, and Far Eastern traditions, which were meant to cover a large surface in a relatively cheap and easy way. They follow the tradition of the *hispano-mourisco* tiles from the previous centuries, with its symmetry, geometry, and rhythm.

If only one production center is securely known for earlier periods, from the early seventeenth century onward, there are three production centers, namely, Lisbon, Coimbra, and Vila Nova de Gaia. These are the same centers which produced tin-glazed wares (Portuguese faience), since these two productions shared similar techniques and, thus, were fired in the same kilns and possibly made in the same workshops. In Coimbra, this production is still not archaeologically attested, although tin-glazed wares are documented there since 1603 and in Vila Nova de Gaia since 1605 (Gomes et al. 2013).

There are some differences between tiles from these three locations, allowing a more or less accurate macroscopic distinction. Lisbon tiles are slightly larger, measuring 14 cm on each side, while the others show 13 or 13.5 cm. On the other hand, the colors are darker in Vila Nova de Gaia (particularly the yellow tones, which are more brown than golden, as some yellows are meant to represent gold or other metals (Pais 2012b) and Coimbra; only Lisbon uses green and manganese purple. Given that both tiles and faience were produced with the same "recipes" for glazes and fabrics, the glaze from Coimbra has a rougher appearance and a yellowish tone (Meco 1989) (Figs. 3 and 4).

Portuguese Tiles (Sixteenth to Eighteenth Century), Fig. 3 Pattern tiles. Campo de Santana Convent, Lisbon (after Almeida et al. 2018, 264)

Portuguese Tiles (Sixteenth to Eighteenth Century), Fig. 4 Pattern tiles. Campo de Santana Convent, Lisbon (after Almeida et al. 2018, 264)

There are different types of patterns, depending on how many tiles it takes to create the repetition element 2 × 2/1, 2 × 2/2, 4 × 4/2, 4 × 4/4, 6 × 6, and 12 × 12. The simplest patterns (2 × 2) are obtained through the rotation of one tile. The decoration of the tiles is as if unfinished and contains continuity elements, creating a design through the continuous interconnection of ornaments. By adding tiles, the pattern can be extended infinitely, adapting to the size of each wall (Meco 1989; Simões 1997).

The larger patterns were meant to occupy wider areas. The most frequent ones are the smaller patters of 2 × 2, which are also the most numerous; the larger patterns have a smaller variation of designs, but their simplicity makes them quite common. The largest pattern conceived by the Lisbon workshops displays 12 tiles on each side, so with 144 tiles per module, called "Marvila" pattern (Meco 1989; Simões 1997; Pais 2012a).

Patterns are always limited by tile frames which follow the same rules. There are three types – *Friso* (frieze), *Cercadura* (frame), and *Barra* (bar) – with half, one, and two tiles in height, respectively. These could be used alone or together, often following an arrangement with all three, from smaller to larger. To obtain a *friso*, a normal-sized tile is produced, with two similar designs subsequently cut in half. *Cercaduras*, with one tile in height, have two clear horizontal edges, often dissimilar, to limit the decoration. *Barras* also present edges, and by having two tiles in height, they present an internal horizontal axis where the upper tile mirrors the other. These last two types both present corner and countercorner elements (Simões 1997).

The colors used are mainly blue, yellow, and white, with some details in green and orange until the third quarter of the seventeenth century and only in blue and white until the end of the use of patterns, something which occurs in the first decade of the eighteenth century. Purple was introduced in the second half of 1600s and was mainly used on figurative compositions.

As for decorations, we can generically group them into four different periods. The first ones appear still in the last decade of the sixteenth century and go on until around 1630, they follow the older "*caixilho*" simpler monochrome geometrical compositions and add polychromous tiles in the places once occupied by white elements, and these did not permit lateral decoration connections, with only one tile or four tiles with only one rotation axis. The most famous pattern of this period is called "*ponta de diamante*" (diamond heads), where the lateral designs are intricate geometrical designs which frame the central motif.

A second period, from around 1630 to 1650, sees a proliferation of patterns, with influences from the Sevillian tiles, Italian and Flemish decorations, and Far Eastern textiles and tapestries. This period, which roughly corresponds to the last decade of the Iberian Union and the first one of the Restauration, is marked by a difficult economic juncture which partially explains the popularity and spread of pattern tiles, since they are cheaper and easier to apply. It is also the period when the cobalt used to create the color blue is more diluted since it was very expensive (Pais 2012a). Patterns can be grouped into "families" where a recurrent central popular theme is altered but maintains an element of recognition, the most popular ones being corncobs, camellias/roses, vine/acanthus leaves, palmettes, and ropes/lacework. Each had multiple variations though the first two were especially proliferous.

A third period, from approximately 1650 to 1680, which roughly comprises the reign of King Afonso VI, is marked by the definite end of the war and the beginning of an economic recovery, as well as the rise of a new nobility which felt the need to assert their power and influence. This period is characterized by more intricate new designs, with less occurrences, sometimes only made for specific orders, which coexist alongside the older designs with new variations. The color orange disappears, and the manganese purple arises, along with a tendency toward a whiter background. Flower elements emerge in the wake of other emergent decorative styles: single figure and altar fronts.

The fourth and last period of pattern tiles took place from 1680 to 1700, approximately the reign of King Pedro II, when the peace with Spain was

completely set. The economic environment and the newly established nobility were favorable to the consumption of foreign luxury goods, such as Dutch tiles and Chinese porcelains, with their aesthetic that deeply influenced the Portuguese ceramic production. Pattern tiles were reduced to a blue and white palette, although with the same designs and a dominance of the larger patterns of 4 × 4 and 6 × 6 (Monteiro 2007; Pais 2012a).

Small panels with religious symbols complement the pattern tiles in churches, being particularly common from 1645 to 1670 and usually presenting an inscription with the name of the donor and a religious quotation. One of the most usual compositions shows a central monstrance surrounded by two praying angels, often holding thuribles. Other symbols are also usual, such as the emblems of religious orders or allegories.

There are also panels depicting saints, the most common of which are the Virgin Mary, John the Baptist, the Holy Family, and Saint Anthony. Other less popular saints were also painted (Almeida et al. 2018).

Also found in churches decorated with pattern tiles are altar fronts (Fig. 5). As the name suggests, these were meant to cover the part of the altars which faces the congregation and replaced the rich and intricate textile altar cloths, although heavily influenced by and often copying them, as clearly indicated by the golden painted fringes on the edges of the compositions, and mingling the decorative influences of Far Eastern models with catholic imagery. As for chronology, these compositions were created from approximately 1650 to 1680.

The iconography of these panels comprises a strip of land on the bottom with animals (deer, gazelles, lions, etc.) and vegetation (palm trees, rose bushes, and various undefined others) which branch out into an upper level representing the sky or paradise, filled with fruits, flowers, and birds (eagles, peacocks, swallows, and diverse birds of paradise). Sometimes the center presents emblems from religious orders or coats of arms (Meco 1989; Curvelo 2012a).

As for nonreligious tile panels from the seventeenth century, they were less numerous, and the ones who still survive came from the noble houses around Lisbon. These panels are polychromous and fall mainly into three categories: nature, mythology/allegories, and social representation. The first, much like the decoration of altar fronts, presents vegetation and wild animals inspired by Far Eastern textiles, as well as animals from

Portuguese Tiles (Sixteenth to Eighteenth Century), Fig. 5 Altar front panel, Quinta do Bairro, Vila Nova de Famalicão

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the America (mainly exuberant birds) and Africa (such as camels or leopards).

The second theme comprises mythological depictions, which will continue to exist throughout the centuries. Classical gods, muses, and other characters are featured, and most of these compositions were based on engravings by foreign authors, mainly Italians at this stage. As for allegories, we find depiction of the zodiac signs, months, seasons, or continents. There was also what is usually called *macacaria* or *singerie*, which has a clear satirical nature and places animals in human costumes and situations with a moral undertone, much like with fables. The most famous of these compositions is called "the chicken marriage," now in the National Tile Museum, where a chicken is transported in a carriage with a parade of music-playing monkeys. Indeed, the monkeys are constant feature of this genre, and it is where it takes its name from, since monkey = macaco (pt.) = singe (fr.).

The third category comprises scenes that range from everyday life and/or court compositions, such as hunting or dinning, to battles of the Portuguese Restoration War. The best example of tile panels in civil architecture with nonreligious themes comes from the marquises of Fronteira Palace in Lisbon, where the estate and gardens are profusely decorated with tiles depicting the family's lineage, detailed accounts of the battles of the Restoration War, as well as gallant and hunting scenes. Portuguese and Dutch tiles stand side by side in this palace, in a display of wealth and status for a noble family who rose to power in the wake of that conflict.

One very popular design, inspired by Flemish compositions, called *Albarrada*, comprises a large decorated vase filled with flowers surrounded by birds (the most common are parrots or peacocks) (Fig. 6). The first examples, dated from the late seventeenth century, are larger than their eighteenth-century counterparts and started out as colorful, following the overall chromatic tendencies. The designs became more stereotyped, smaller and repeated horizontally, occasionally with angels holding the vases, now sometimes baskets, and the birds might become dolphins or dragons. The use of *Albarradas* almost disappears in the Rococo period, with sporadic appearances with a much simpler design after 1755 which can be found until the nineteenth century (Meco 1989).

The seventeenth century also marked the expansion of Portuguese tiles throughout the world, even though there were already late sixteenth-century Portuguese arista tiles and geometric compositions in the Atlantic islands of Azores, Madeira, and Cape Verde (Meco 1998;

Portuguese Tiles (Sixteenth to Eighteenth Century), Fig. 6 Albarrada. Campo de Santana Convent, Lisbon (after Gomes and Casimiro 2007, 28)

Evans et al. 2017). The tiles were taken to the Portuguese territories of Africa and America, with smaller sets in places such as Cape Verde (Almeida 2018a), the city of Goa in India (Curvelo 2012b), and Macao (Meco 1998).

Brazil holds an impressive amount of Portuguese tiles, second only to Portugal itself, with more than 136 sets for the seventeenth and eighteenth centuries (Simões 1965). For that reason, Brazil deserves a special mention due to the high number of cases. There are no pattern tiles prior to 1630–1640, the penetration of which began in the northern states like Bahia. The Rio de Janeiro region began using them around 1660 onward, while the southern states and the São Paulo area only received tiles from 1680 to 1690, reflecting the settlement and type of occupation of the Brazilian territory. There were no special patterns created specifically for the Brazilian market, nor did all of the ones used in Portugal were used, the polychromous compositions are scarce and so are altar fronts (Simões 1965). Even though there was not a special production being manufactured only for this colony, there certainly was a Brazilian taste, explaining the presence, absence, and preference of certain motifs and types of tiles (Senos 2012).

As also happens with pattern tiles, the other seventeenth-century compositions were polychromous and became blue on white around 1670, although maintaining for the most part a manganese purple outline until 1680–1690. Around that time, other changes occur; the blue pigment began being diluted, creating gradients in order to suggest depth; and the contour becomes thinner and also blue (Meco 1989).

The Cycle of Masters (Eighteenth Century)

One of the first productions entirely with one color is called single figure (Fig. 7). These were directly inspired by Dutch single-figure tiles, although without their minutia and detail, since they were considered a lesser job and performed mostly by apprentices. The Portuguese production began in the third quarter of the seventeenth century and had a round edge to the central motif, afterward that is lost, and by the beginning of the eighteenth century, they gain their characteristic corner element, a stylized and simplified flower. Single-figure tiles show only one design at the center, with wide brushstrokes. The decorations are stylized, fairly simple, and highly repetitive, falling into some main themes: animals (birds and mammals), flowers and fruits, boats and buildings, landscapes, angels, humans, and sarcastic images (such as large-breasted women or drunken monks) (Simões 2010; Castro and Sebastian 2003). Although this type of tiles was also used in churches, as the case of São João de Tarouca where many single-figure tiles were retrieved from the archaeological intervention (Castro and Sebastian 2003), they were mainly used in kitchens and infirmaries prior to the 1755 earthquake and afterward were placed in secondary spaces such as corridors or passages (Meco 1989).

Portuguese Tiles (Sixteenth to Eighteenth Century), Fig. 7 Single-figure tiles Quinta de Santo António (Vila Franca de Xira, Portugal)

In the last decade of the seventeenth century, Gabriel del Barco (1648–1703?) began its career as a tile painter after years as ceiling painter and would became a reference in a transition period which would pave the way to the "the cycle of the masters." His works were much larger than previously, with a progressive complexity of the

compositions but keeping the relatively straightforward one or two tile frames (Meco 1989).

Soon after other names joined him, with a scholarly artistic formation, able to compete with Dutch tiles and thus fulfilling a market failure. The most famous were Manuel dos Santos (active between 1702 and 1730), António de Oliveira Bernardes (1660?–1732), and the unnamed painter known as P.M.P. (active between 1717 and 1730). They brought the baroque aesthetic to the compositions, with large scenic depictions, expressive actions and characters; they also overcame the previous problems of scale and perspective in order to create optical illusions and *trompe-l'œil*, which did not exist before.

All of the masters produced large figurative panels, with interconnected scenes in order to create a coherent narrative (Figs. 8 and 9). The commissions were mainly for religious environments, and, therefore, with religious themes, the exception comes from P.M.P., the one with the largest secular body of work in palaces and noble houses throughout the Lisbon area.

The most famous panel of this period is the panel known as the "Great Panorama of Lisbon," with 1376 tiles in total, which belonged to the Palace of the Counts of Tentúgal, Lisbon, and is now a part of the Museu Nacional do Azulejo collection. It was probably painted by Gabriel del Barco, albeit with contributions from other painters, around 1698–1699. This view of the city from the river, as if the observer is partaking on a cruise downstream, is quite rigorous in the depiction of the main buildings and water front but somewhat more stylized in the urban neighborhoods. It spans almost 14 km, from the Jamor Valley in the west to Xabregas on the east side (Meco 1985; Flor et al. 2014).

The work of these painters was very individualized, sometimes enabling an identification when not signed, which at this point was rare, unlike the seventeenth century where all production is anonymous.

This period lasted until approximately 1725, paving the way to the next generation of tile painters collectively known as the "Great Joanine Production" which lasted roughly until 1755 and is named after King John V (r. 1706–1750).

This period is marked by the incoming flow of gold and gemstones from Brazil, first discovered in 1697, and the increase of grandeur and sumptuous lifestyle of the king and court. Lavish new buildings were being constructed, decorated with a combination of tiles and gilded woodcarving.

Portuguese Tiles (Sixteenth to Eighteenth Century), Fig. 8 São Vicente de Fora Monastery, Lisbon

Portuguese Tiles (Sixteenth to Eighteenth Century), Fig. 9 São Lourenço Church, Almancil

The demand for tiles created a production of serial figurative compositions, most of them based on French or Dutch engravings, putting an end to the previous individualism. The important features of this period's taste were the theatricality and the amount of decoration on each panel. The backgrounds and landscapes also receive a great deal of detail, with the correct representation of shading and proportions of trees, fountains, or buildings. The cobalt blue is now watered down to create multiple shades, and multiple brushstrokes are overlapped to achieve a deeper tone, creating a dynamic effect.

The frames of figurative compositions suffered an evolution in the 1730s, with the inclusion of baroque motifs and style, with seraphs in tunics, the illusions of architecture and stage settings given by valances, fringes, flying cherubs, and pilasters, greatly influenced by the Italian opera.

Despite the standardization characteristic of this period, particularly in its beginning, which leads one author to call it the "period of the anonymous workshops" (Simões 2010), some painters are known for their individual work, since they kept signing their compositions. The most prolific and famous were Teotónio dos Santos (1688–?), Valentim de Almeida (1692–1779), Policarpo de Oliveira Bernardes (1695–1778, son of the previously mentioned António de Oliveira Bernardes), and Nicolau de Freitas (1703–1765).

The best examples from this period can be found in the Convent of São Vicente de Fora, Lisbon; the Colégio do Espírito Santo, Évora (formerly a Jesuit seminary and now the University of Évora); or the cloisters of the Porto Cathedral.

The themes displayed are vast and therefore hard to catalogue. They range from religious depictions of the lives of saints, Jesus, and the Virgin Mary, scenes from the Old Testament, classical mythology, and more worldly themes such as landscapes, banquets, parties, hunting, and leisure scenes, placed on the palaces of the nobility. Most panels were painted after published foreign engravings, spanning all mentioned themes (Simões 2010).

This period also sees the beginning of a typically Portuguese type of tiles called invitation figures, which spanned chronologically until the nineteenth century. These are full-scale cut around

compositions showing male human characters that were placed at the entrance of great halls or meeting rooms, so that they were not seen from the outside. The first invitation figures were made by master P.M.P and were placed outside the chapter house of the University of Évora and until the reign of João V were restricted to the palaces of the top nobility and clergy. The characters depicted were firstly doormen or servants dressed in livery and halberdiers guarding the rooms, all portrayed with expressions and actions indicating an invitation to come in, reflecting the baroque ceremonials and theatricality, both religious and profane. After that period, invitation figures spread to the houses of the rich bourgeoisie and a second order of nobility. These have a more elaborate composition, frequently with a *trompe l'oeil* or an optical illusion, found in other spaces like staircases and hallways. Other characters are introduced at this stage, such as equipped soldiers, women, Turkish soldiers, and gentlemen, and musicians were hosted later on the nineteenth century. Invitation figures followed the tile aesthetic of each period (Arruda 1993, 2014).

A new introduction of color, with the emergence of the Rococo aesthetic, takes place around 1745 and becomes more widespread from the 1755 earthquake onward, coexisting with blue and white compositions for the next few decades. Yellow was the first color to be reintroduced, with notes in the compositions to create the illusion of gold, metal, or the sun, and the others followed suit. Manganese, since it can be diluted in water, started being used to create multiple shades of purple and the main part of the composition. It should be noted that the use of polychromy was restricted to the edges and ornaments which surround the main arrangement, frequently these continued to present *trompe-l'oeil* illusions to resemble stone architectural elements as well as metal decorations. The center continued to be painted only with one color, blue or purple, creating a contrast between them (Meco 1989).

After the earthquake of 1755, the demand for construction materials signified an increase of tile production, as the new houses were rebuilt and refurbished. A new period started with that natural event that lasted until approximately 1780, usually called *Pombalino*, after the Marquis of Pombal (1699–1782), minister to King Joseph I (r. 1750–1777) and the main actor of the reconstruction of Lisbon. The Rococo tendencies continued, with the polychromy on the edges and blue or purple in the central composition, side by side with blue only panels. New decorative elements and techniques were introduced at this stage; shell-like- and bat-wing-like decorations lined the edges of the compositions which are now somewhat asymmetric. As for techniques, sponges soaked with paint and applied over the tile were used, either to create the effect of clouds or tree tops or covering the entire tile and used as fringes to fill gaps between the tiles and other elements, another new effect was introduced, with large erratic brushstrokes in one or two colors, creating a marbled look (Meco 1989).

The themes displayed in figurative tiles remained roughly the same, with two distinct spheres: religious depictions of the Old and New Testaments and profane tiles with serial subject matters such as the four seasons, the elements, the months, or the star signs, as well as scenes presenting hunting, social gatherings and intimacy, dancing and music playing, and landscapes (Simões 2010; Câmara 2005). The new introduction is the compositions called chinoiserie, popular on the second half of the eighteenth century, so-called because they used Far Eastern and Chinese motifs such as landscapes and Asian daily life scenes, which fulfilled a European curiosity with the exotic east, mostly fueled by engravings published by Jesuit priests (Câmara 2005; Correia 2013).

A religious type of tile called *registos*, which already existed approximately since the 1740s in low numbers but gained a new dimension as a consequence of the climate of fear and religious fervor experienced in the wake of the 1755 earthquake, can be seen in the most affected cities like Lisbon, Setúbal, or Santarém and continued until the definite establishment of liberalism. These reflect a popular devotion to saints' protectors of the house and family, as well as those who offer protection against forces of nature. These can be divided into two categories: family protector

saints – the Virgin Mary, the Holy Family, and Saint Anthony (1195–1231) – and the saints that protect against natural disasters, Saint Martial (third century) and Saint Francis Borgia (1510–1572). Although we can make this distinction of intentions, these elements can be combined in the same registo. The *registos* are usually placed on the façade, over the door or windows after the reconstruction. Non-habitable structures such as mills, fountains, bridges, and cemeteries were also covered with protection. Usually these panels are indented, varying in size, with compositions of a single saint or two and more, sometimes one of them being put in a prominent place. Many times a votive inscription or a date is painted (Almeida 2018a).

Another type of *registo*, a more naïve arrangement, is the *Alminhas*, which can complement bigger compositions like the basis of a cross of large dimensions. These can be composed of several tiles, but the majority are single tiles. These are more modest demonstrations of faith and devotion, since most are of one or four tiles only. The number of souls in these representations may vary but is usually two – a man and a woman. They are placed in the center of the composition, emerging from the flames of Purgatory (Simões 2010) with their hands raised in worship. Only painted in blue, with a highlight of orange/yellow in the flames, these compositions usually have no frame or it consists on a straight simple line and occupies the entire area of the tile. The great majority of *alminhas* have a caption, usually only the initials to save space: PNAM – *Padre Nosso Ave Maria*, PA – *Pelas Almas*, and OPN – *Ora Pro Nobis* (Almeida 2018b).

Pattern tiles made a comeback in the late 1740s, slowly at first and only in the Lisbon region, gaining a more widespread use after 1755 since there was a huge demand for tiles at that point. These new patterns follow the same logic of lateral connections and rotation axes as their seventeenth-century counterparts, but they are slender in design, with a pronounced white background, combining small flowers and other phytomorphs with geometric elements, and they have a suggestion of shading given by darker tones to the colors in use and a diagonal flow to the overall scheme. The colors used were blue and purple at first, but polychromy was afterward the staple, and the frames used with them are frequently a variation of the main theme and follow the same color scheme.

These patterns were an early manifestation of the neoclassical taste and thus continued to be used throughout the eighteenth and into the nineteenth century (Correia and Silva 2004).

The 1770s see yet another change in taste and tile decoration, with the neoclassical style, which would last until the first decades of the nineteenth century. The new period marked the definite end of the blue only tradition and the complete establishment of polychromy, although the central composition of figurative tile panels remained only in blue or purple.

Neoclassical tiles were heavily influenced by the Louis XVI style and the discovery of Pompey and its wall paintings. The central compositions became increasingly small, encapsulated in round, oval, or square medallions, some of which even looking like cameos. The decoration has an intense polychromy, with a prominent white background and sometimes imitating wallpaper. The new iconographic repertoire includes plumes, flying birds, peacock feathers, branches, ribbons, and urns. The painting is less dense, with the loss of heavy-looking volumes, seeking a watercolor effect, with scrapings particularly in the yellow color to convey a sense of lightness (Pereira 1998; Câmara 2005).

At this point, tiles were integrated in a wider decoration scheme which involved painting, elaborated plaster works, and frescos, so they would sometimes not be the main focus. Chronologically, this style comprises the reigns of Queen Mary I (r. 1777–1816) and the early reign of John VI (r. 1816–1822), and since he assumed the regency in 1792, the period is also known as Regency style. Geographically the Lisbon area was the one with the most tiles, still in the wake of the reconstruction effort, with the best example being the tile panels of the Royal Palace of Queluz. Brazil also holds important examples, especially since the Portuguese court moved to Rio de Janeiro in 1807 following the French invasions (Pereira 1998).

Adding to the Lisbon cantered distribution of these tiles is the establishment of the first pottery factory by the Marquis of Pombal in 1767, the Real Fábrica de Louça do Rato (eng. Royal Factory of Rato). Its production was not prolific in tiles in a first stage until 1771 when the management fell on Sebastião de Almeida, son of Valentim de Almeida the tile painter we have already mentioned. For the most part, the factory produced the pattern tiles mentioned above. It is very hard to distinguish between the early factory tiles and the traditionally made ones since the technique and technology were roughly the same, with the names of Francisco de Paula e Oliveira and Francisco Jorge da Costa as the most prolific and important tile painters of the period (Meco 1989; Câmara 2005).

Conclusion

The first tile production context ever found in Portugal can be dated from the mid-sixteenth century, and, although this paper focuses exclusively on sixteenth- to eighteenth-century productions, tile production started much earlier in the thirteenth century and subsists until today. Tiles are decorated during this period with different styles, and despite the chronological organization, a new tendency does not annul the previous immediately, and we assist to a progressive change of style. However, older tiles are frequently replaced by newer ones, and this is one of the reasons why it is difficult to find well preserved sixteenth-century tiles.

The expansion of the type of building decoration followed the Portuguese around the globe, and, as aforementioned, they are everywhere to be found in Portuguese former colonies such as Cape Verde and Brazil. However, there are documental and archaeological evidence that these were exported to other countries such as England. London port books reveal the entrance of tiles from Lisbon, Vila Nova, and Coimbra during the seventeenth century revealing that these were in fact appreciated, although it is impossible to actually know what type of decoration was appreciated. The only Portuguese tile found in this country is a pattern tile.

These were frequent decorative solutions in palaces, churches, and convents; however, they could have been used in smaller houses as well, although archaeological evidence is not enough to conclude to what extent was a middle-class house decorated. How did people react to them when they entered a building with all the walls covered by polychromous pattern or a tale told in blue on white figures? Understanding the impact these tiles had in the daily life of Portuguese populations in Portugal and abroad is the next step.

Cross-References

► Portuguese Faience and Historical Archaeology

References

Almeida, M. 2018a. The 17th-century tile panorama in the island of Santiago, Cabo Verde: A first approach to a work in progress. In *GlazeArt international conference glazed ceramics in cultural heritage*, 283–297. Lisbon.

Almeida, M. 2018b. Post 1755 Lisbon earthquake tiles as signs of popular devotion. *Medieval Ceramics* 37–38: 53–63.

Almeida, M., R.V. Gomes, and M.V. Gomes. 2018. A first approach to the tile collection from the Convento de Santana (Lisbon, Portugal). In *GlazeArt international conference glazed ceramics in cultural heritage*, 251–267. Lisbon.

Arruda, L. 1993. *Azulejaria barroca portuguesa: figuras de convite*. Lisbon: Inapa.

Arruda, L. 2014. Figuras de Convite. In *A herança de Santos Simões: Novas perspectivas para o estudo da azulejaria e da cerâmica*, ed. S. Flor, 239–246. Lisbon: Edições Colibri.

Bargão, A., S. Ferreira, and R. Silva. 2017. Policromias e Padrões: azulejos de aresta e de corda-seca do palácio dos condes de Penafiel, Lisboa (séculos XV–XVI). In *Arqueologia em Portugal, o Estado da questão*, 1781–1794. Lisbon: AAP.

Câmara, M. 2005. *"A arte de bem viver" A encenação do quotidiano na azulejaria portuguesa da segunda metade de setecentos*. Lisbon: Fundação Calouste Gulbenkian.

Cardoso, G., L. Barros, and A. Gonzalez. 1997. Primeira notícia do forno de Santo António da Charneca – Barreiro. In *Actas das 3. as Jornadas de Cerâmica*

Medieval e Pós Medieval, 295–307. Tondela: Câmara Municipal de Tondela.

Casimiro, T.M., and J.L. Sequeira. 2018. Dois conjuntos de azulejos Hispano-Mouriscos. O Tejo e a Igreja do Senhor da Boa Morte (século XVI). *Cira Arqueologia* 6: 243–253.

Castro, A., and L. Sebastian. 2003. Mosteiro de São João de Tarouca – a faiança de revestimento: séculos XVII e XVIII (intervenção arqueológica 1998–2001). *Património Estudos* 4: 168–179.

Coentro, S., R. Trindade, J. Mirão, A. Candeias, L. Alves, R. Silva, and V. Muralha. 2014. Hispano-Moresque ceramic tiles from the Monastery of Santa Clara-*a*-Velha (Coimbra, Portugal). *Journal of Archaeological Science* 41: 21–28.

Correia, A. 2013. Chinoiseries, Chinese things and azulejos with Chinese: Models and sources of inspiration. In *The Exotic is never at home? The presence of China in the Portuguese faience and azulejo (17th–18th centuries)*, ed. M. Matos, 111–124. Lisbon: Museu Nacional do Azulejo.

Correia, A.P., and C.N. Silva. 2004. Azulejaria de interior na Baixa Pombalina: um contributo para o seu estudo. *Monumentos* 21: 184–195. Lisbon.

Cothren, M. 1982. *Cistercian art in architecture*, vol. I. Michigan: Meredith P. Lillich.

Curvelo, A. 2012a. Frontais de altar. In *Um gosto português. O uso do azulejo no século XVII*, ed. M. Matos, 282–287. Lisboa: Museu Nacional do Azulejo.

Curvelo, A. 2012b. O uso do azulejo e a presença portuguesa na Ásia no século XVII. In *Um gosto português. O uso do azulejo no século XVII*, ed. M. Matos, 335–348. Lisbon: Museu Nacional do Azulejo.

Evans, C., M.L. Sørensen, M. Allen, J. Appleby, T.M. Casimiro, C. French, S. Inskip, J. Lima, R. Newman, K. Ritcher, and R. Scaife. 2017. Finding Alcatrazes and early Luso-African settlement on Santiago Island, Cape Verde. *Antiquity* 91 (358): 1–9.

Ferreira, L.F.V., T.M. Casimiro, D.S. Conceição, D.P. Ferreira, L.F. Santos, and I. Machado. 2014. Portuguese 16th century tiles from Santo António da Charneca's kiln: A spectroscopic characterization of pigments, glazes and pastes. *Journal of Raman Spectroscopy* 45 (7): 838–847.

Flor, P., M.J.P. Coutinho, S. Ferreira, and S.V. Flor. 2014. Grande panorama de Lisboa em azulejo. Novos contributos para a fixação da data, encomenda e autoria. *Revista de História de Arte* n° 11: 87–107.

Gomes R.V., T.M. Casimiro. 2013. Post-Medieval Archaeology in Portugal. *Journal of Post-Medieval Archaeology* 47(1): 17–34.

Gomes, R.V., M.V. Gomes, T.M. Casimiro, R. Trindade, and L. Sebastian. 2013. Production centres. In *On the world routes. Portuguese faience (16th–18th centuries)*, ed. M.V. Gomes and T.M. Casimiro, 19–56. Lisbon: Instituto de Arqueologia e Paleociências da Universidade Nova de Lisboa.

Goulão, M.J. 1986. Alguns problemas ligados ao emprego de azulejos "mudéjares" em Portugal nos séculos XV e XVI. In *Relaciones artísticas entre Portugal y España*, 129–154. Valladolid: Junta de Castilla y Leon.

Meco, J. 1985. *Azulejaria Portuguesa*. Lisbon: Bertrand Editora.

Meco, J. 1989. *O Azulejo em Portugal*. Lisbon: Publicações Alfa.

Meco, J. 1998. A expansão da Azulejaria Portuguesa. *Oceanos* 36/37: 8–19.

Monteiro, J.P. 2007. A classificação da azulejaria portuguesa dos séculos XVII e XVIII. In *João Miguel dos Santos Simões (1907–1972)*, ed. P. Henriques, 155–168. Lisbon: Instituto dos Museus e Conservação.

Morais, B. 2012. *Museu Nacional do Azulejo: Incorporação e Programação Expositiva de um Painel de Azulejos Proveniente da Quinta de Santo António da Bela Vista, Pragal.* Unpublished MA dissertation, NOVA Universitu of Lisbon, Lisbon.

Pais, A. 2012a. Padrões (ainda) imprecisos. A azulejaria de repetição no século XVII. In *Um gosto português. O uso do azulejo no século XVII*, ed. M. Matos, 83–96. Lisbon: Museu Nacional do Azulejo.

Pais, A. 2012b. Enxaquetados. In *Um gosto português. O uso do azulejo no século XVII*, ed. M. Matos, 132–143. Lisbon: Museu Nacional do Azulejo.

Pais, A., J. Mimoso, C. Dumortier, M.L. Esteves, M.A. Silva, and S. Pereira. 2015. Graça Church revisited. In GlazeArch2015. *International conference glazed ceramics in architectural heritage*, Lisbon: LNEC. 35–40.

Pereira, J. 1998. Azulejos Neoclássicos. *Oceanos* 36/37: 211–232.

Pleguezuelo Hernandez, A. 2007. Ceramica de Sevilla (1248–1841). In *Summa Artis. Historia General del Arte, Cerámica Española*, ed. Sanchez Pacheco, vol. XLII, 343–386. Madrid: Espasa Calpe.

Senos, N. 2012. Azulejaria seiscentista no Brasil. In *Um gosto português. O uso do azulejo no século XVII*, ed. M. Matos, 349–356. Lisboa: Museu Nacional do Azulejo.

Silva, J.C. 1995. *Paços Medievais Portugueses*. Lisbon: IPPAR.

Simões, J. 1965. *Azulejaria Portuguesa no Brasil (1500–1822)*. Lisbon: Fundação Calouste Gulbenkian.

Simões, J. 1997. *Azulejaria em Portugal no século XVII*. Lisbon: Fundação Calouste Gulbenkian.

Simões, J. 2010. *Azulejaria em Portugal no século XVIII*. Lisbon: Fundação Calouste Gulbenkian.

Trindade, R. 1998. Identificação de Azulejos Figurativos em Técnica de Linha Incisa na Abadia de Santa Maria de Alcobaça. *Olaria* 2: 144–148.

Trindade, R. 2007. *Revestimentos Cerâmicos Portugueses. Meados do Século XIV a primeira metade do século XVI*. Lisbon: Colibri.

Trindade, R. 2018. Ceramic flooring from the Cistercian Abbey of Santa Maria de Alcobaça, Portugal (13th and 14th centuries). *Medieval Ceramics* 37–38: 78–88.

Posnansky, Merrick

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Basic Biographical Information

Merrick Posnansky's impacts on archaeology are numerous and enduring. His holistic, pragmatic, and inclusive initiatives helped to foster archaeology in Africa (Posnansky 1966a, b, 1969a; Posnanksy and DeCorse 1986) and in the Caribbean (Posnansky 1984). Posnansky's approaches to archaeology "prefigured the thrust of many postprocessual analyses of the 1980s and 1990s" (DeCorse 2004: 4). Since the late colonial era, Posnansky worked to enable university archaeology programs and to treat and reorient museums in Africa, making them living institutions with a mandate to serve the public. Posnansky's professional contributions in 11 countries have been recognized with numerous accolades, including the J.C. Harrington Medal in Historical Archaeology from the Society of Historical Archaeology. He is a Fellow or Honorary Fellow of the Society of Antiquaries in London, the British Institute in Eastern Africa, and Rotary International.

Born in Bolton, England, in 1931, Posnansky grew up in a small Jewish community during the interwar era. As a young man, he developed an interest in ancient coins. At age 18, Posnansky won an Open Scholarship to attend the University of Nottingham. After graduating, he completed a Diploma Course in Prehistoric Archaeology at Cambridge University. And, in 1956, Posnansky earned a Ph.D. in History from the University of Nottingham, under the supervision of the distinguished geologist H.H. Swinnerton. During his training and early in his career, Posnansky excavated prehistoric and medieval period sites in England, Wales, and France with archaeologists of renown, including Glynn Daniel and André Leroi-Gourhan. In 1956, Posnansky accepted an offer by Louis Leakey to work as the Warden of Prehistoric Sites in the Royal National Parks of Kenya.

Since the late 1950s, Posnansky's work focused on African archaeology, museums, and heritage education. After two years in Kenya, he transitioned to Kampala as Curator of the Uganda Museum and Head of Uganda's Department of Antiquities. In 1959, he was the first archaeologist in sub-Saharan Africa to take African university students on excavations. After a period as Assistant Director of the British Institute in Eastern Africa, Posnansky joined Makerere University College then affiliated with the University of London. In 1962, he taught the first university classes in African archaeology. A founding figure in historical archaeology, Posnansky integrated oral traditions into interpretations of Bweyorere and Bigo, ancient capital sites in Uganda (Posnansky 1966a, 1969b). In 1967, he and his wife, Eunice, left Uganda, fleeing the political turmoil caused by Idi Amin. At his next job post as Professor of Archaeology at the University of Legon in Ghana, Posnansky developed the first full academic program (B.A. to Ph.D.) in African Archaeology. He further launched an ethnoarchaeological study of a historical village in Ghana (Posnansky 2004) and completed numerous museum and cultural heritage projects in West Africa. In 1977, Posnansky joined the History Department at UCLA. He subsequently served as Chair of the Archaeology Program and Director of UCLA's Center for African Studies, the latter for 13 years. While at UCLA, his research expanded to Togo, Benin, and the Caribbean. Posnansky is a founding figure in African diaspora archaeology (Posnansky 1984).

Major Accomplishments

Posnansky's publications on urbanization, trade, oral traditions, art, museums, and education in Africa helped to reshape informed representations of Africans. His devotion to building culture histories where none previously existed; attending closely to cultural context; recognizing, valuing, and valorizing oral traditions; and applying

multiple sources to solve scholarly questions mark Posnansky as visionary. In his capacities as a curator and administrator, Posnansky developed archaeology programs at universities and trained African and American archaeologists. Professor Posnansky retired from UCLA in 1998 but remains active in the archaeology community, as he continues to write about and promote Africa, Africans, and their pasts.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ East Africa: Museums
- ▶ Field Schools, Archaeological
- ▶ Historical Archaeology
- ▶ Leakey Family
- ▶ Oral Sources and Oral History
- ▶ West and Central Africa: Historical Archaeology

References

DeCorse, C.R. 2004. J.C. Harrington medal in historical archaeology: Merrick Posnansky, 2003. *Historical Archaeology* 38: 1–6.

Posnanksy, M., and C.R. DeCorse. 1986. Historical archaeology in sub-Saharan Africa: A review. *Historical Archaeology* 20: 1–14.

Posnansky, M. 1966a. Kinship, archaeology, and historical myth. *Uganda Journal* 30: 1–12.

Posnansky, M., ed. 1966b. *Prelude to east African history.* London: Oxford University Press.

Posnansky, M. 1969a. *Myth and methodology: The archaeological contribution to African history.* Accra: Ghana Universities Press.

Posnansky, M. 1969b. Bigo bya Mugenyi. *Uganda Journal* 33: 125–150.

Posnansky, M. 1984. Toward an archaeology of the Black Diaspora. *Journal of Black Studies* 15: 195–205.

Posnansky, M. 2004. Processes of change: A longitudinal ethno-archaeological study of a Ghanaian village, Hani, 1970–98. *African Archaeological Review* 21: 31–47.

Further Reading

Posnansky, M. 2009. *Africa and archaeology: Empowering an expatriate life*. London: Radcliffe.

Walz, J.R. 2010. An interview with Merrick Posnansky. *African Archaeological Review* 27: 177–210.

Postcolonial Archaeologies

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> Cruso raised his head and cast me a look full of defiance. "I will leave behind my terrace and walls," he said.
> "The will be enough. They will be more than enough." And he fell silent again. As for myself I wondered who would cross the ocean to see terraces and walls, of which we surely had an abundance at home; but I held my peace. (Coetzee 1986)

Introduction and Definition

> The past is never dead. It's not even past.
> (William Faulkner, Requiem for a Nun)

Since the 1960s, closely linked to the struggles of national liberation, anticolonialism, civil rights, and student uprisings, there has been a growing concern with the politics of domination in the West's liberal project of academic and intellectual production (Foucault 1980). Specifically in anthropology, and archaeology, this was marked by the presence of (so-called) natives in the subject-production of the discipline, natives which until then had been completely excluded from this noble enterprise other than as objects (and not subjects, creators) of knowledge. This particular political process highlights anthropology's origin as a colonial enterprise. In varied manners, the disciplines of anthropology and archaeology are still essentially invested in reproducing global knowledge in ways that structure us and others. In the process, such reproduction of global knowledge reconstitutes the West as the arbiter of world knowledge (Baldwin 1984).

The postcolonial enterprise marked less the inclusion of natives as the recognition of the central role that these marginalized groups (and identifications) had already played in the excavation (both literally and intellectually) of the past. This postcolonial reconfiguration had dif-

fering embodiments throughout the globe, from a politically combative Archaeology as social science tradition in Latin America, the political power of original populations communities from Polynesia to the Americas, and even the creation of the World Archaeological Congress to better represent archaeology as a real global endeavor.

Historical Background

One of the biggest impacts in the development of postcolonial archaeologies is the successful struggle of large indigenous communities throughout the world. Indigenous peoples of many nation-states have reached a new level of political discourse that demanded a shift in the conceptualization of traditional Indian identity, offering a more autocritical definition of themselves (Varese and Kearney 1995). This trend is related to the globalization processes affecting the world in general, particularly what Escobar (1995) has called the post-developmental phase of history. Post-development economies are based on flexible manufacturing and service industries organized on a global scale to take advantage of the most competitive source of supplies labor and market. Not surprisingly, workers in these economies receive low wages, no benefits, and no job security, all factors which contribute to an increasing informal economy.

One of the key components of these economies is transnational corporations that make of the international arena their economic playground. They expand the multinational corporation's role to retrieve raw materials and labor from third-world nations, reaching into the least unexplored regions of the world. It was precisely these marginalized regions to which the indigenous populations had been pushed into during the initial development period of the 1950s and 1960s. This new transnational influx into regions, such as the tropical forests of the Amazon, as well as those in Asia and Africa, has made many indigenous groups into a type of "development refugees." Faced with no alternative areas into which to retreat, indigenous group have been more willing than ever to go on the offensive and assert their rights.

Transnational corporations are highly influential in modern economies, but they are not the only transnational characteristics present. For instance, many indigenous populations do not live in a single nation-state, but rather occupy regions that crosscut two or more countries. The globalization process and the new forms of postmodern capitalism have also produced a long-term migration of indigenous people into urban centers of both their native countries or major industrialized nations like the USA and Europe (e.g., there are large-scale migration of indigenous populations from Mexico living in the United States today). The fact that today indigenous communities' main antagonist are transnational forces, outside of the control of national governments, has forced many indigenous groups to work with transnational sectors from the first world as well.

All of these globalization processes, such as flexible capital, increase of informal economy, transnational corporations, and the internationalization of social movements, have contributed to the reworking of indigenous identities that go beyond any previous traditional or strictly modern categorization. Varese and Kearney (1995: 219) point out that Indian communities

> who were formerly marginalized are now actively engaged in establishing a transnational civil society in an effort to bypass state mediation and to situate themselves in a global civil society while maintaining strong ethnic, cultural, and local loyalties that contest their own nation-state authority and hegemony.

In archaeology, this native conundrum was marked by a significant paradigmatic shift, away from the (now) traditional postulates of the new archaeology and towards a more relative understanding of the study of the past marked by a post-processual archaeology. As a postmodern enterprise, post-processual archaeology was an umbrella term that marked a host of interests, endeavors, and claims that differ significantly but still vehemently share a more complex understanding of the past than its positivistic ancestors. In this manner, archaeology, as part of the Western academy, had made way for numerous groups of

third-world scholars that no longer could be kept to the margins of intellectual production and many times marked the pace of new Western fields of knowledge (e.g., Said 1989; Spivak 1999).

This allowed for many to enunciate the postcolonial project as that of the simplistic inclusion of "native" scholars to the Western enterprise of archaeological research. Although more inclusive than its previous Western embodiments, this project of inclusion fails in quite an essential manner. This cultural undertaking elided the greater paradigmatic implication that it was less about opening spaces to native scholars in as much as the fact that these (supposedly) non-Western scholars had already erupted in a central manner into the scene. Perhaps more importantly, it further overlooked the fact that natives had always played a fundamental role in the production of the world's past, not only as creators of the archaeological sites and making up most of the crews that excavated any of the sites, but also that even in these reified Western territories, the past had always been about natives, elusive natives, that were erased from the intellectual landscape as fast as they were hailed at conferences, international exhibitions, and museums.

Key Issues/Current Debates

But no doubt, one of the more complex findings of postcolonial archaeologies was that the postcolonial project meant recognizing that the colonizer's past is also always that of the colonized, and vice versa. The intellectual commitment of postcolonial archaeologies is, therefore, not only about, literally, excavating a buried past of one oppressed group or community but rather to understand how that past, buried and later reconfigured, is an essential part of everybody's past and history. It is this particular kind of political commitment of third-world archaeologists and the uprising of native communities (and/or original population) all over the world that marked two very different postcolonial ways of connecting to the past, while still highlighting archaeology's essential political enterprise.

At a very basic intellectual level, these postcolonial approaches marked an opening to reidentify the archaeological landscape in the continent with markers of gender, sexuality, race, and class in ways that had not been possible before (Silverblatt 1987; Trexler 1995; de la Cadena 2000). But this new way of envisioning the past also manifested a renewed interest in colonial archaeology, again, not just for the reproduction of a European other but rather as a detailed study of the hybrid consolidation of the different original nation-states (Hall 1987).

This development of historical archaeology highlighted another area of postcolonial focus, the indivisible fusion of native and other, European, Arabs, and Africans (among many other groups), in the reproduction of new populations. This particular historical archaeology approach marks one of the, or even perhaps the, most interesting areas of contemporary research, one of ideological discursive practice.

As mentioned above, the postcolonial archaeological project was not content with merely including natives into the research enterprise, recognizing the political commitment of archaeological discourse, or even the political emancipation of historically oppressed racialized groups but rather the recognition how all of these elements are caught within the web of our own global historical production. That is, we are historical subjects in the making that are fed by continuous discursive practices about the past that can never fully escape our ideological repositioning. In this manner, one of the greater contributions of a postcolonial enterprise is to actively shy away from images of well-intentioned natives or native-saving agents and rather to recognize the global (neocolonial) landscape in which we all work and live in.

In the archaeological landscape, this postcolonial tradition was marked by new journals and publications that looked to reconfigure the manner of reproducing archaeological knowledge no longer as a nostalgic look to the north but one embodied with complete agency from the south (see Van Broekhoven 2010). This same ideal is behind cultural projects at many archaeological sites that are interested in furthering interdisciplinary research by incorporating the native other. And yet, these archaeological projects have

attempted to be necessarily aware that even these new postcolonial conundrums could not fully escape the historical conditions of our times, a history not of our making but ours nonetheless. And rather that these new re-foundational shifts about the other are necessarily responding to a global market that looks to reify difference as the essential cultural commodity of the twenty-first century (Hall 1987).

Unlike previous schemes of global domination, the transnational forces at work today are less about eradicating difference (at least no longer in explicit genocidal fashions) but rather about transnational capital essentializing cultural difference as a mechanism of maintaining similar forms of racial differentiation and hierarchies. In the archaeological landscape, this development imperative (to support and funds natives throughout the world) has quite complicated configurations. In this regard, postcolonial archaeologists have to not only seriously contend with transnational forces (e.g., oil, NGOs, transnational companies) that weigh in multiple ways upon their understanding of the past but also quite uniquely understand themselves as a social and political embodiments of these greater global forces at work.

International Perspectives

In Latin America, the postcolonial configuration meant the powerful commitment to an explicit political identification with the archaeologist's role of researching the past was no longer contained within an academic heading but rather marked a direct manner to connect to the Indian and colonial legacy of the American continent's history. Excavating the Latin American past was directly connected to challenging the neocolonial conditions of the present. In that sense, one now excavates one's own past, a past that had been dutifully denied and repressed by the Western-inspired national governments and the "objective" national histories of each of nation-state (see Lumbreras 1981; Vargas 1990).

As an example of a postcolonial archaeology, there are two initial factors on which this Latin American social archaeology approach is based: the first is the strong social and political commitment that an archaeologist, as a social scientist, feels towards the community; the second factor is the historical materialist paradigm that many archaeologists embrace as a tool to analyze and understand history (Bate 1977, 1978). These two factors enable the social archaeologists to reconstruct history and see its continuity and value in contemporary society. This alternative form of archaeology proposes to destroy the false theory-praxis and science-advocacy dichotomies and argues that the archaeologist has an important responsibility and plays a pivotal part in situating historical knowledge at the center of the continent's social struggle. In essence, social archaeology proposes a more political and socially relevant way of addressing our inquiries into the past.

Furthermore, social archaeologists engaged in this approach see themselves linked to the past that they are interpreting. Rather than seeing themselves removed from their research, they see themselves as the end product of this historical process. Not only does this not interfere in the study of the past due to some limited, ethnocentric, or nationalistic claim, but rather, it demands an even more objective understanding of it. This objectivity is of utmost importance because the past is directly tied to whom we are as a people, and this knowledge is needed for the historical construction of the continent's present and future.

Another explicit postcolonial engagement with the past is the "alternative" national history proposed by the single most powerful social movement today in Ecuador and largely represented by the CONAIE (*Confederación de Nacionalidades Indígenas del Ecuador*), which has been able to bring together the majority (although not all) of the Indian community in their collective grievances and struggle against the Ecuadorian state. These grievances range from land claims to controversial constitutional amendments. This

discussion is mainly interested in the CONAIE's own reading of the pre-Hispanic past which legitimizes its struggle and has visibly contributed to it becoming a viable political force in the country.

The two most important claims by the CONAIE that constitute a counter hegemonic discourse to the official history are its demand for territorial self-determination for each Indian nationality and a multinational state. The demand for territorial self-determination relates to both differing understanding of the land, nationalism, and economic development. As Karakras (1990: 5 and 20) explains:

> We are peoples, we are nationalities, we have our own national processes. . . . The Indian peoples are interested in making the proclamation of auto-determination a reality and in taking their historical destiny into our own hands.

The land is seen as an integral part of Indian culture and essential for constructing an independent livelihood, just as a mother is essential for the nurturing of her children. The regaining of the land itself is essential to maintain their culture and developing it, it is a vital necessity (Karakras 1990). This is why the CONAIE presents its claim for the land as an integral part of their demands, reaffirming that the land.

In contrast, the present Ecuadorian state strives to continue its century-long project of constructing a single homogenous Ecuadorian nationality and to locate all the nation's natural and commercial resources under a central state authority that will oversee its development. The Indian proposal presents opposite demands – it wants to preserve native lands, customs, and environment from any outside exploitation, including from that of the central state. It in no way shares the dominant view of capitalist production as the way to prosperity but rather sees it as further contributing to the destruction of their lands and cultures. For the CONAIE, only a communal and autonomous self-government would contribute to the improvement of each national group and, therefore, of the central state (CONAIE 1989).

The second demand of the CONAIE for a multinational state entailed a reform of Ecuador's constitution and defined the state as plurinational in character. According to the CONAIE, this was necessary because each Indian community is a nationality in its own right, with its own culture, heritage, traditions, and language. This constitutional reform, in this manner, did not only benefit the Indian nationalities but also other oppressed groups like Afro-Ecuadorians that could gain from the restructuring of a more pluricultural and democratic state apparatus (CONAIE 1998).

This proposal is a reformed position from previous Indian stances because it recognizes the reality of the Indian nationalities caught within the Ecuadorian nation-state. It also recognizes the complex makeup of the country and the presence of other ethnic and racial groups. In contrast to earlier positions, it appropriates Western concepts to serve Indian interests. A multinational state also inherently speaks to the right of each nationality to autonomous self-determination (CONAIE 1989, 1997). This self-determination is understood as permitting legal control over their own societies within the structure of a single more representative and democratic state: "that is, you can be of a different nationality but belong to the same state" (Karakras 1990: 23).

Both of the CONAIE's main demands are potentially counter hegemonic, yet it is clear that the state and transnational forces will always be striving to neutralize each of these radical changes, or even worse reincorporate them into their own redefinition of the global landscape.

Future Directions

> To overhaul a history, or to attempt to redeem it – which effort may or may not justify it – is not at all the same thing as the descent one must make in order to excavate a history. To be forced to excavate a history is, also to repudiate the concept of history, and the vocabulary in which history is written; for the written history is, and must be, merely the vocabulary of power, and power is history's most seductively attired false witness. (Baldwin 1990)

The contemporary setting highlights processes where interest groups like oil companies decimate

contemporary Indian communities while being forced to invest in recuperating their ancestral pasts or quite similarly the support of environmental and other NGOs that coincidentally continue to reify racial hierarchies in ways that can no longer be deemed innocent or well intentioned. One of the greater contributions of a postcolonial archaeological enterprise is to actively shy away from images of well-intentioned natives or native-saving agents and rather to recognize the rocky boat (or ship of fools) that we are all equally members of. That is why new concerns of the past, such as the *Taller Etnohistórico Andino* in Bolivia or the CONAIE's lack of concern with direct ancestral claims to archaeological site, are both equally valid manners to recognize the complex manner in which we are one and the other, Western and not, at one and the same time (Kincaid 1997).

In the same token, it is this necessity to recognize that any active refusal to accept our complicity in this pervasive Western discourse of differentiation could only continue the geno- and ethnocidal paths that have brought us to reflect at this place (Malkki 1995). Perhaps it is the recognition that we are one and the same, from an "odd mixture of continents and blood, of here and there, of belonging and not" that may provide the most singular forms of transient agency (Kureishi 1990: 3). As James Baldwin (1990: 481) states: "Our history is each other. That is our only guide. One thing is absolutely certain: one can repudiate, or despise, no one's history without repudiating or despising one's own." And the postcolonial archaeologies' mind-set means recognizing that the colonizer's past is also one's own and that the opposite is true as well.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Popular Culture and Archaeology
- ▶ Post-Processualism, Development of
- ▶ Practice Theory in Archaeology
- ▶ Professionalization: Archaeology as an "Expert" Knowledge
- ▶ Race in Archaeology
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation: Overview
- ▶ Social Archaeology
- ▶ South Africa: Heritage Management
- ▶ South American Archaeology: Postcolonial Perspectives

References

Baldwin, J. 1984. *Notes of a Native son*. Boston: Beacon Press.

Baldwin, J. 1990. *Just above my head*. New York City: Laurel Press.

Bate, L.F. 1977. *Arqueología y materialismo histórico*. Mexico: Editorial Nueva Imágen.

Bate, L.F. 1978. *Sociedad, formacion económico-social y cultura*. Mexico: Editorial De Cultura Popular.

Coetzee, J.M. 1986. *Foe*. New York: Viking Press.

Confederación de Nacionalidades Indígenas del Ecuador (CONAIE). 1989. *Las Nacionalidades Indígenas en el Ecuador: Nuestro Proceso Organizativo*. Quito: Ed. TINCUI-CONAIE and Abya-Yala.

Confederación de Nacionalidades Indígenas del Ecuador (CONAIE). 1997. *Proyecto Político de la CONAIE*. Quito: CONAIE.

Confederación de Nacionalidades Indígenas del Ecuador (CONAIE). 1998. *Las Nacionalidades Indígenas y el Estado Plurinacional*. Quito: CONAIE.

De La Cadena, M. 2000. *Indigenous mestizos: The politics of race and culture in Cuzco, Peru, 1919–1991*. Durham: Duke University Press.

Escobar, A. 1995. *Encountering development: The making and unmaking of the Third World*. Princeton: Princeton University Press.

Foucault, M. 1980. *Power and knowledge: Selected interviews and other writings 1972–1977*. New York: Pantheon Books.

Hall, S. 1987. The local and the global: Globalization and ethnicity. In *Culture, globalization and the world-system: Contemporary conditions for the representation of identity*, ed. A. King. Minneapolis: University of Minnesota Press.

Karakras, A. 1990. *Las Nacionalidades Indias y el Estado Ecuatoriano*. Quito: Editorial TINCUI-CONAIE.

Kincaid, J. 1997. *My brother*. New York: Farrar, Straus and Giroux.

Kureishi, H. 1990. *The Buddha of suburbia*. Kent: Faber and Faber.

Lumbreras, L. 1981. *La arqueología como ciencia social*. Lima: Ediciones Histar.

Malkki, L. 1995. *Purity and exile: Violence, memory, and national cosmology among Hutu refugees in Tanzania*. Chicago: University of Chicago Press.

Said, E. 1989. Representing the colonized: Anthropology's interlocutors. *Critical Inquiry* 15: 205–225.

Silverblatt, I. 1987. *Moon, sun, and witches: Gender ideologies and class in Inca and colonial Peru*. Princeton: Princeton University Press.
Spivak, G. 1999. *A critique of postcolonial reason: Toward a history of the vanishing present*. Cambridge: Harvard University Press.
Trexler, R. 1995. *Sex and conquest: Gendered violence, political order, and the European conquest of the Americas*. Ithaca: Cornell University Press.
Van Broekhoven, L. 2010. Sharing knowledge and cultural heritage: First nations of the Americas. In *Studies in collaboration with indigenous peoples from Greenland, North and South America*, ed. L. Van Broekhoven, C. Buijs, and P. Hovens. Leiden: Sidestone Press.
Varese, S., and M. Kearney. 1995. Latin America's Indigenous peoples: Changing identities and forms of resistance. In *Capital, power, and inequality in Latin America*, ed. S. Halebsky and R. Harris, 207–231. Boulder: Westview Press.
Vargas, I. 1990. *Arqueología, ciencia, y sociedad*. Caracas: Editorial Abre Brecha.

Post-Khmer Rouge Cambodia, Archaeology in

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Introduction

Archaeology in Cambodia has grown exponentially since the end of the Khmer Rouge period and the establishment of the Paris Peace Agreement of 1991. Several institutions are responsible for overseeing this growth including the APSARA Authority, the Ministry of Culture and Fine Arts (MOCFA), the Royal University of Fine Arts (RUFA), and more recently the Royal Academy of Cambodia (RAC). This entry discusses the roles these institutions have played in the revival of archaeological research in Cambodia, Cambodian perspectives on the advance of archaeology in their country, and suggestions for future goals of archaeological research in Cambodia.

Historical Background

Cambodian arts and culture were reinvigorated in 1953 when Cambodia received independence. One focus of this period was an attempt to understand and define "modern Khmer culture" (Daravuth and Muan 2001). In 1965, the Royal University of Fine Arts (RUFA) was established in Phnom Penh as the first truly Cambodian university and included a Faculty of Archaeology staffed by Cambodian instructors that had studied and trained in France (Daravuth and Muan 2001). By 1971, plans were made for the construction of a large conference hall and space for a library, classrooms, and research center on an expanded Royal University of Fine Arts campus (Key 2001 [1971]). Unfortunately, these plans were not implemented due to the civil war and the fall of Phnom Penh to Khmer Rouge soldiers in 1975. Only three Cambodian archaeologists in Cambodia survived the Khmer Rouge period (Griffin et al. 1999).

Key Issues

As archaeology in Cambodia was reestablished, it was recognized that government bodies overseeing archaeological patrimony were needed. Additionally, training of new archaeologists was necessary to provide human resources for these institutions.

Archaeological Patrimony: The APSARA Authority

The APSARA (Authority for the Protection and Safeguarding of the Angkor Region) Authority was born out of a need to protect and conserve the sites in the Angkor region following the Khmer Rouge period (for a detailed history on the formation of APSARA, see Choulean et al.

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1998; Chau Sun 2006). Just 1 year following the signing of the Paris Peace Agreements, the Angkor region was conditionally inscribed on the UNESCO World Heritage List. The sites within the "Perimetre de Protection" included Angkor Wat, the Bayon, Roluos, Banteay Srei, and others. The listing was provisional provided that Cambodia meet several conditions. These were fulfilled in 1995, and Angkor was inscribed permanently on the World Heritage list. In the same year, the APSARA Authority was established by royal decree and was tasked with the management and protection of the region of Angkor and Siem Reap. As Angkor was becoming a major tourist destination, APSARA primarily focused on preventing illegal construction projects. However, it was also important that APSARA become increasingly autonomous, in order to provide "the institutional structure vital for nurturing the Cambodian expertise required for managing the site over the longer term" (Winter 2007: 51).

Currently, the APSARA Authority describes their mission as "Protecting, maintaining, conserving, and improving the value of the archaeological park, the culture, the environment, and the history of the Angkor region as defined on the World Heritage List" (APSARA Authority 2005). The APSARA Authority contains several departments that oversee these various concerns. These include two departments dealing with Monuments and Archaeology, the Department of Angkor Tourism Development, the Department of Urbanization and Development of the Siem Reap and Angkor region, a Department of Demography and Development, and a Department of Water and Forest Management. Archaeological research and conservation of monuments is undertaken collaboratively between the APSARA Authority and various international organizations. All international projects must include training of Cambodian students as part of their project as well as collaboration with APSARA staff and experts.

As Cambodia's popularity as a tourist destination increases, APSARA has had additional challenges in managing tourism and development in Siem Reap, as well as interacting with the local population, while also following their initial goal of protecting and conserving sites. Recent archaeological research shows that the Greater Angkor Region is approximately 1000 sq. km, much larger than the initial zones included in the World Heritage listing (Fletcher et al. 2007). These additional archaeological features, which include mounds, channels, and water features, are often found in rural areas where people live and work. Several thousand people also live and work within the archaeological park itself. The rapid expansion of Siem Reap as a tourist center has also had environmental consequences especially relating to water management, which has become a new priority (Munthit 2008). Growing numbers of tourists are increasing the wear and tear on the stone and brick monuments, which has led to the closing off of some areas of temples. As tourist numbers increase, the APSARA Authority will continue to see their responsibilities grow. In turn they will have to balance protection, conservation, and research of the archaeological sites under their purview while also managing the needs of the local community and facilitating the needs of tourists, whose dollars are so crucial for the Cambodian economy.

Archaeological Patrimony: The Ministry of Culture and Fine Arts (MOCFA)

The Ministry of Culture and Fine Arts is the other main body responsible for the protection and research of archaeological sites in Cambodia. MOCFA was established by royal decree in January 1996, and its primary responsibilities include the development of culture and fine arts as well as promoting Cambodia's diverse cultural heritage. Archaeological oversight falls under the General Department of Cultural Heritage and four subdepartments: Archaeology and Prehistory, Antiquities, Museums, and Preservation and Conservation of Ancient Monuments. MOCFA is responsible for all archaeological sites in Cambodia except for the sites located in Siem Reap province and the sites located in the region controlled by the National Authority of Preah Vihear in Preah Vihear province. These include archaeological sites such as temples, and pagodas, as well as ancient mounds, bridges, canals, water reservoirs, and roads.

One of the primary goals of the MOCFA is the broad promotion of archaeological research.

Local archaeologists are encouraged to collaborate with foreign institutions and researchers to conduct survey, excavation, and restoration and preservation projects. The MOCFA is also concerned with documenting all archaeological sites on land, as well as those underground and underwater, in order to highlight their importance for Cambodia's national cultural heritage. Recently, more than 4000 archaeological sites have been documented, mapped, and zoned in a collaborative project between MOCFA and the École Française d'Extrême-Orient (EFEO) (Bruguier et al. 2007). Some of these sites have also been excavated or restored in collaborative projects with local experts and international researchers through external financial support. Prior to starting such projects, MOCFA requires the collaborative organizations to create an agreement clarifying the project plan, its schedule, and budget. The MOCFA also emphasizes the importance of heritage education, as the education of local people, officials, police, monks, and students is key to protecting cultural heritage in Cambodia. In this vein, some sites are slated for development as tourist attractions, and the MOCFA intends to open as many provincial museums as possible.

In addition to these smaller sites, the MOCFA is currently preparing documents for UNESCO and the World Heritage Commission to submit Sambor Prei Kuk to be included on the list of World Heritage sites. If accepted, a Sambor Prei Kuk Authority would be created as a separate unit within the MOCFA. Other sites slated to be nominated for World Heritage status include the Banteay Chhmar temple complex, the temple of Preah Khan of Kompong Svay, Beng Mealea and Koh Ker temples, Phnom Chisor temple, and the site of Angkor Borei. While the MOCFA does not have direct control over the other World Heritage sites of Angkor and Preah Vihear temple, it does work closely with both APSARA and the National Authority of Preah Vihear.

Despite the progress made in recent years, the MOCFA still has many challenges related to the destruction of archaeological sites and illicit trafficking of cultural property. Recently, the acquisition of land by powerful businessmen and institutions has caused the destruction of many archaeological sites. Furthermore, local people often do not understand the importance of preserving sites, which can also lead to looting. Unfortunately, the MOCFA does not have enough resources to address all of these problems or investigate crimes. Additional difficulties include assessment and cultural valuation of various art objects, as there is not enough equipment to appraise the materials. Looting, stealing, and illegal trafficking of art objects in Cambodia are problems that make the protection and conservation of sites and objects complicated.

Archaeological Training: The Royal University of Fine Arts (RUFA)

The Royal University of Fine Arts (RUFA) has played a central role in producing new archaeologists, both before and after the Khmer Rouge period. Although RUFA was reopened in 1980, the first courses offered were only in the School of Fine Arts. It was not until 1989 that RUFA was awarded its full university status and the Department of Archaeology was reopened by its surviving alumni, including professors Chuch Phoeurn and Pich Keo. However, the department faced a great challenge due to limited human resources. The curriculum was based on prewar coursework, which included classes on Khmer history, epigraphy, art history, ethnology, and archaeology. Other courses were focused on civilizations and cultures directly related to Cambodia, such as Indian classical languages and art history, and other Southeast Asian cultures and civilizations including the Cham, Javanese, Burmese, and Thai. Also critical to the curriculum were study trips to major archaeological sites, consultation with national and international experts, as well as internships with various conservation organizations and archaeological institutions.

With funding from the Toyota Foundation via UNESCO from 1995 to 2002, the Department of Archaeology drastically improved its human resources by adding national and international experts to the faculty (UNESCO 2002). Graduates of the 1994 RUFA class and junior faculty members were assigned as teaching assistants for each major topic. It was hoped that these teaching assistants and junior scholars would gradually replace their international professors and reduce the department's reliance on foreign assistance.

However, this hope was not realized, as the department lacked funding to maintain a large faculty after UNESCO ended their assistance in 2002. Fortunately, one unexpected and positive outcome of the project was the production of a series of highly competent Cambodian archaeologists, who were students of the UNESCO-funded faculty. Students who earned their degrees from 1995 to 2002 have filled positions in most of the cultural resource management institutions in Cambodia, such as MOCFA, the APSARA Authority, the Royal Academy of Cambodia, and other archaeological and conservation projects. Additionally, several students have continued their education by earning doctoral degrees at institutions in Cambodia and abroad.

Currently, RUFA is beginning to renovate and expand their existing facilities in order to provide more classroom, lab, and library space. Additionally, a group of scholars are working to develop a core curriculum for archaeology students. Despite these developments, RUFA continues to struggle with a lack of funding to support faculty and provide resources for students. Many RUFA alumni have volunteered to offer part-time classes or conference talks to current students. Despite the efforts of dedicated faculty, staff, volunteers, and alumni, RUFA needs additional financial support in order to provide adequate resources for its students and teachers. In spite of these challenges, a new generation of archaeologists has gradually increased and is able to respond to the demand for archaeologists and conservators in institutions such as the MOCFA, APSARA, and Preah Vihear authorities. Since the opening of the twenty-first century, more and more Cambodian archaeologists have gradually risen from field workers and trainees to become collaborators and colleagues in various international institutions in Cambodia and abroad.

Archaeological Training: The Royal Academy of Cambodia (RAC)

In addition to RUFA graduates, Cambodian scholars with advanced degrees are needed to train, teach, and lead research projects. With this goal in mind, the first government-sponsored master's and doctoral degrees were established in 2002 in the Department of Archaeology in the Institute of Culture and Fine Arts at the Royal Academy of Cambodia (RAC) in 2002. The goals of the program include the management and development of archaeological research, the collection and preservation of research finds, the documentation and distribution of research findings, and the expansion of cooperative relationships with other institutions, ministries, and national and international organizations related to archaeological research. During the first phase of this program, five master's and doctoral candidates were selected for training after a rigorous examination.

The program has now moved into the second phase, in which graduates of the program will focus on research with government support. One graduate has already completed his Ph.D. and two others are Ph.D. candidates. Several research projects have already been completed, including the Sre Ampil project (discussed below), mapping and excavation at the Choeung Ek Kiln Site, and most recently a project entitled "Archaeology Research and Management at Prasat Trapeang Prasat" funded by the Royal Government (Fig. 1). Conservation work is currently being conducted at Trapeang Prasat, an important yet unstudied temple located near the Dangrek Mountains in Udor Meanchey province, to preserve the historical and archaeological integrity of the site for future generations (Fig. 2). Conservation of this site will hopefully increase national and international tourism to the region and will provide an important benefit for the local economy.

Since 2002 RAC has organized national and international conferenc es with the joint support of the Royal Government and international institutions. In 2014, RAC, in collaboration with the MOCFA, the APSARA Authority, the National Authority of Preah Vihear, the National Committee of World Heritage, and other NGOs, will host the 20th Indo-Pacific Prehistory Association Congress in Siem Reap. In the future, the Institute of Culture and Fine Arts at the RAC will extend its research projects by seeking funding from both the Royal Government and other resources and expand its international relationships with joint research projects and additional international conferences.

Post-Khmer Rouge Cambodia, Archaeology in, Fig. 1 Cambodian archaeologists working at the Choeung Ek Kiln site. (Photo by Kaseka Phon)

Post-Khmer Rouge Cambodia, Archaeology in, Fig. 2 Cambodian archaeologists from the Royal Academy of Cambodia working at the temple of Trapeang Prasat. (Photo by Kaseka Phon)

International Perspectives

Currently, Cambodian archaeologists are working to define their role in shaping archaeological research in their country. Since Cambodia has reopened for archaeological research, there have been many international research institutions working in Cambodia. Cambodian archaeologists have had many opportunities to join these projects and gain experience for their future careers. However, these projects are often run and directed by foreigners, and Cambodians are often only hired as research assistants. In many cases, the research findings, archaeological materials, and results remain under the control of the director of the project. Under these circumstances, Cambodian archaeologists are not always equal collaborators.

It is for this reason that opportunities for Cambodian-led research projects and in-country

training, such as the RAC advanced degree program discussed above, are so important. One successful Cambodian-led project is the Sre Ampil project, a 2-year program funded by the Center for Khmer Studies with archaeologists and students from RUFA and RAC. Cambodian archaeologists and students conducted excavations at the site of Sre Ampil and worked with local villagers to construct a site museum, which includes both artifacts from excavations and objects donated by villagers (Fig. 3). The Sre Ampil archaeological site will also be used as a permanent field training site for RUFA archaeology students and possibly for students in anthropology and tourism studies from other universities (see Phon and Phon 2009). Another step forward in the process of increasing indigenous archaeological research is the establishment of the Khmer Archaeological Society (www.khmeras.org). This Cambodian-led NGO established by Mr. Phon Kaseka seeks to preserve past and present cultural heritage, including the heritage of minority groups such as the Cham and Kuoy. In this way, Cambodians are beginning to take a leadership role in the practice of archaeology in their country.

Post-Khmer Rouge Cambodia, Archaeology in, Fig. 3 Cambodian archaeologists examining a temple foundation at the site of Sre Ampil. (Photo by Kaseka Phon)

Future Directions

Archaeological research in post-Khmer Rouge Cambodia has made great strides since the country reopened for archaeological research in the 1990s. Nevertheless, there are still several areas where improvements can be made. First, it is recognized that many archaeological sites in Cambodia are still vulnerable to looters or development. Cultural resource protection and education and implementation of heritage law is lacking in Cambodia. Therefore, a focus on archaeological site preservation and salvage excavations is needed. Furthermore, local involvement and education is a crucial aspect in protecting against site destruction. As part of this goal, it is important to continue with the construction of site museums for the display of artifacts collected at the site. Retention of cultural treasures by the communities in which they are found is good for reinforcing cultural identity, local morale, the economy, and the education of villagers and tourists who will jointly support the museums. This is currently an important goal of the MOCFA, and several local site museums have already been constructed. Site museums and the recognition of important sites outside the Angkor region would also reduce problems related to over-visitation of the principal sites in Angkor. Tour agencies currently neglect other areas in the country where there is tourism potential. Tourism development at these would attract national and international visitors to spend time in other parts of Cambodia beyond Angkor and increase tourist dollars. It is also hoped that training programs for students at RUFA, RAC, and other universities would allow them additional opportunities to practice their skills and assist with job placement after graduation. Lastly, it is essential that Cambodian

archaeologists continue to develop relationships with other international scholars, especially those in other Southeast Asian countries. Hopefully, with increased in-country education and training, Cambodian archaeologists, in partnership with foreign collaborators, can lead the way toward achieving many of these objectives.

Cross-References

► Cambodia: Cultural Heritage Management

References

Apsara Authority. 2005. History and organization. Available at: http://www.autoriteapsara.org/en/apsara/about_apsara/history_organization.html. Accessed 29 May 2011.

Bruguier, B., N. Phann, C. Chrin, C. Chamroeun, and S. Chan. 2007. *Carte archéologique du Cambodge*. (23 maps). Phnom-Penh: Ministry of Culture and Fine Arts/Paris: École française d'Extrême-Orient.

Chau Sun, K. 2006. Angkor sites, cultural world heritage. In *Art and cultural heritage: law, policy, and practice*, ed. B. Hoffman, 148–156. Cambridge: Cambridge University Press.

Choulean, A., E. Prenowitz, and A. Thompson, eds. 1998. *Angkor: a manual for the past, present, and future*. Phnom Penh: APSARA/UNESCO.

Daravuth, L., and I. Muan. 2001. *Cultures of independence: an introduction to Cambodian arts and culture in the 1950's and 1960's*. Phnom Penh: Reyum.

Fletcher, R., I. Johnson, E. Bruce, and K. Khun-Neay. 2007. Living with heritage: Site monitoring and heritage values in Greater Angkor and the Angkor World Heritage Site, Cambodia. *World Archaeology* 39: 385–405.

Griffin, P.B., J. Ledgerwood, and C. Phoeurn. 1999. The royal university of fine arts, east-west center, and university of Hawai'i program in the archaeology and anthropology in the kingdom of Cambodia, 1994–1998. *Asian Perspectives* 38: 1–6.

Key, P. 2001. [1971] L'Université des Beaux-Arts, in L. Daravuth & I. Muan (ed.) Cultures of independence: an introduction to Cambodian arts and culture in the 1950's and 1960's: 342-357. Phnom Penh: Reyum.

Munthit, K. 2008, 17 February. Saving ancient Angkor from modern doomsday. *The San Francisco Chronicle*, p. A-19.

Phon, K., and C.K. Phon. 2009. Sre Ampil museum. Available at: http://khmeras.org/index.php?option=com_content&view=article&id=55:sre-ampil-museum&catid=34:museum&Itemid=37. Accessed 25 Aug 2011.

Unesco. 2002. Reinforcing national capacity for the conservation of cultural monuments: the project of assistance to the Royal University of Fine Arts. Available at: http://portal.unesco.org/es/ev.php-URL_ID=9778&URL_DO=DO_PRINTPAGE&URL_SECTION=201.html. Accessed 8 Mar 2011.

Winter, T. 2007. *Post-conflict heritage, postcolonial tourism*. New York: Routledge.

Post-Medieval Archaeology

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Brief Definition of the Topic

Post-Medieval Archaeology is the journal of the Society for Post-Medieval Archaeology, founded in the UK in 1966. The Society takes a lead in promoting postmedieval archaeology in Britain and advises government and other national bodies. The journal publishes an annual roundup of fieldwork undertaken in the UK and an annual report of significant finds recorded by the Portable Antiquities Scheme. In addition, the biannual journal aims to publish a diverse range of articles and shorter notes on both British and international archaeology. Its scope is the material evidence of European society, wherever it is found throughout the world, in a period that saw the transition from medieval to industrial society and the foundation of the modern world on new Renaissance and Reformation values, marked by the shift from collective to individual mentalities; increasing social segregation; new notions of privacy, family, gender, and space; global expansion; and revolutions in the modes and scales of production. The journal fosters a multidisciplinary approach to the past, encouraging use of material, textual, iconographic, and scientific evidence, as well as engaging in the latest theoretical debate. Its chronological remit extends right up to the present day. The European Reference Index for the Humanities (ERIH), published by the European

Science Foundation in 2007, places *Post-Medieval Archaeology* in its category "A": high-ranking international publications with a very strong reputation among researchers of the field in different countries, regularly cited all over the world. Details on submission procedures can be viewed on the Society's website at http://www.spma.org.uk/journal.php.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Contemporary Past, Archaeology of the
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Irish Post-Medieval Archaeology Group (IPMAG)
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Society for Industrial Archeology (SIA)

Further Reading

The Society for Post-Medieval Archaeology. n.d. Available at: http://www.spma.org.uk/journal.php.

Post-Medieval Archaeology (Europe)

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Introduction

Post-medieval archaeology is the term commonly used in Europe for the study of post-CE-1500 society, although there remains debate over the chronological definition of the subject at both its beginning and end points. The archaeology of post-medieval Europe is potentially a vast subject, encompassing a huge variety of material remains across a remarkably diverse linguistic, political, and cultural environment. It is a relatively young branch of archaeology, only really emerging as a distinct field of practice in Britain in the decades after the Second World War. Here, it is now a well-established feature of academic research, national and regional heritage management policy, and developer-funded commercial archaeology. On the Continent, post-medieval archaeology developed as a natural progression from the study of medieval archaeology, and it is only since the 1970s that archaeological investigations of post-CE 1500 remains have been regularly undertaken and published, most notably in Northern and Western Europe. There are still very few academic posts dedicated to post-medieval archaeology on the Continent, and most post-medieval archaeological research is conducted within the context of development projects. In Central and Eastern Europe and the Mediterranean countries, post-medieval archaeology remains underdeveloped as a distinct subdiscipline, although this is now beginning to change. Cross-European and global perspectives are increasing within the subject, and a wider range of methodological and interpretive approaches are being advocated by leading practitioners in both Britain and the Continent.

Definition

Both the chronological start and end points of the term "post-medieval" have been the subject of widespread debate in European archaeology. The term is used by European archaeologists for the study of post-CE-1500 material remains. It is often used in contrast to the term "historical archaeology," which was first developed in the USA for the investigation of sites of European colonial settlement. The latter term is now widespread internationally and used in two overlapping senses: firstly, as a definition for the archaeology of European settler societies in New World contexts (including North and South America and Australasia) as well as their interaction with and impact on indigenous peoples and, secondly, as a catch-all term for the archaeology of

the last 500 years. Many accounts maintain that this period is dominated by European imperialism and the spread of global capitalism and that archaeologists should seek out these phenomena in specific local contexts. However, European archaeologists often counter that both the term "historical archaeology" and the interpretive focus on colonialism and capitalism are inappropriate for their area of study because widespread historical documentation exists for many European countries from the medieval period as well as the classical past, and because colonialism and capitalism were experienced in very different ways in Europe compared to the brutal colonization of New World territories. Anders Andrén has argued that post-medieval archaeology is one branch of a wider "historical archaeology" that encompasses the archaeological study of all literate societies (Andrén 1998). This too has its problems, given that many recently literate societies have well-established traditions of oral history, for example, in sub-Saharan Africa.

These debates highlight the distinctive intellectual traditions from which European post-medieval archaeology emerged. In contrast to American archaeology, which is based within the discipline of anthropology, in Europe the archaeological study of the more recent past emerged gradually from the study of Roman and medieval archaeology, with strong connections to the disciplines of history, art-and-architectural history, and historical geography. On the Continent, the vibrant field of folk studies or "European ethnology" had an equally powerful effect on the early development of the discipline, manifested by the establishment of regional folk-life museums and collections of preserved historic buildings and implements (e.g., the open-air museum at Skansen in Stockholm (Sweden), founded in 1891) (Fig. 1). The growth of social history and the Annalés historical school in the mid-twentieth century, with its emphasis on the material realities of everyday life and the *longue durée* of landscape and cultural change, was a significant influence. This reflects the genuine continuity of the historical and archaeological record between the medieval and post-medieval periods. European rural landscapes and urban centers often have long histories stretching back to prehistoric, Roman, or medieval times, and many aspects of the post-medieval archaeological record, from material culture types to plans of buildings, actually originate in the preceding centuries. This means that European archaeologists often work across the medieval and post-medieval periods and are specialists in particular types of archaeological evidence (such as ceramics, glass, or buildings) rather than period specialists. However, the term

Post-Medieval Archaeology (Europe), Fig. 1 Reconstructed nineteenth-century buildings at Skansen living history museum, Stockholm, Sweden. (© Paul Courtney)

post-medieval was first used for the study of the sixteenth to eighteenth centuries only and is arguably less relevant to the growing focus on nineteenth-, twentieth-, and twenty-first-century archaeology. Some European scholars have advocated that "post-medieval" should be abandoned in favor of the more commonly accepted global terminology. They recognize that there is a need to investigate the dramatic changes occurring in post-medieval Europe while avoiding totalizing grand narratives which obscure the complexities of local, regional, national, and global cultures and connections (Hicks 2005).

While post-medieval is the term used by archaeologists, historians more commonly use the terms "early modern" for the period from the sixteenth to the eighteenth centuries and "modern" for the nineteenth century to the present day. The historiographical divide between the "medieval" and "post-medieval" or "early modern" period is a long-standing one in European historical and political thought. It reflects a widespread conception that the sixteenth century witnessed major transformative changes which clearly separate a traditional, feudal medieval past from the development of modern European society. These can be summed up as a series of large-scale historical processes and cultural watersheds, many of which would be expected to have archaeological expressions. Most notable among these could be considered the "Renaissance" of classical literature and art in fifteenth- and sixteenth-century Italy, the dramatic impact of the European Protestant Reformation from the second decade of the sixteenth century which saw the breakup of the unified Roman Church, the European discovery of the New World in 1492 and the establishment of European global empires, the early modern "scientific revolution" and the spread of Enlightenment philosophy and democratic politics, and, in the realm of the economy, the ascendancy of capitalism through agricultural and urban expansion, global trade, and the impact of eighteenth- and nineteenth-century industrialization. However, it must be recognized that these large-scale processes are essentially modern historiographical constructions which arguably have limited importance for many aspects of the archaeological and historical record. The start date of c. CE 1500 is an arbitrary convention which can conceal important elements of continuity within European social, economic, and religious life.

"Europe" is also a contested concept for this period. In the sixteenth century, Europe consisted of multiple fragmented polities and regional societies, containing a huge variety of languages and cultures. While there were certainly many connections between different areas of Europe, stimulated by trading networks and the important role of the Roman Church, it is debatable whether ordinary people would have shared many cultural affiliations with even regional neighbors, let alone any kind of pan-European identity. The early modern period saw the creation of the nation-states of contemporary Europe, which were in part shaped by new material and architectural expressions such as fortifications and nationalistic symbols. It is vital to remember that large-scale historical processes such as the Reformation or the rise of capitalism affected different regions and communities in different ways and at very different speeds, some being imposed from above, while others emerged organically from small-scale changes in everyday economic and social practices. Furthermore, because the development of post-medieval archaeology has been led by Britain and Northern and Western Continental Europe, there has been a tendency to marginalize the archaeology of other regions of Europe. For instance, in Eastern Europe and Russia, the Orthodox Church remained a major unifying force at the same time as Western European Christendom was becoming fragmented into Catholic and Protestant realms, while a major portion of Southeastern Europe and the Eastern Mediterranean remained part of the Islamic Ottoman Empire throughout the post-medieval period, drawing significant cultural influences from North Africa and the Middle East.

If c. CE 1500 is a widely shared start point for European post-medieval archaeology, there is much greater variety in when the period is considered to have ended. The first practitioners of the discipline tended to focus on the early post-medieval centuries. In Britain, the Society for Post-Medieval Archaeology was founded in 1966, emerging from the Post-Medieval Ceramic Research Group which had been established three

years previously, and the first issue of its journal *Post-Medieval Archaeology* appeared in 1967. The Society originally defined its remit as the archaeology of the period from c. CE 1500 to c. CE 1750, arguing that the mid-eighteenth century saw profound changes in the development of industry and society which made a natural cutoff point. At the same time, industrial archaeology had emerged as a distinct subdiscipline in the 1950s, with the Association of Industrial Archaeology being established in 1973. Many early advocates of industrial archaeology had a narrow focus on questions of technological development and the economic impact of industry, but there was a growing concern to record the ordinary experiences of industrial workers, and some advocated that industrial archaeology should be seen as the archaeology of the totality of society in the eighteenth and nineteenth centuries (Nevell 2006). The first synthesis of post-medieval archaeology in Britain by David Crossley concentrated on the early period, covering urban and rural landscapes, building types, material culture, and the evidence of early industrial production (Crossley 1990). In the past two decades, there has been much greater emphasis on the archaeology of the eighteenth and nineteenth centuries, in part stimulated by the influence of historical archaeology in the USA and Australasia, and this is reflected by the content of the most recent survey of post-medieval archaeology in Britain which continues to c. CE 1900 (Newman 2001). The Irish Post-Medieval Archaeology Group was established in 1999 and has published work on both early modern "plantation-era" archaeology and more recent industrial and urban sites. In Britain there has also been increased emphasis on developing archaeological studies of the recent past. This was initially stimulated by the recording of the First World War and Second World War military heritage and, since the late 1990s, has been extended to the study of Cold War sites and the application of archaeological approaches to contemporary (late twentieth and twenty-first century) material remains including council houses, tower blocks, protest camps, and graffiti (Buchli and Lucas 2001). The recently formed Contemporary and Historical Archaeology in Theory (CHAT) group provides a focus for this work. Recognizing these broad shifts in the methodological and thematic coverage of the discipline, in 2006 the Society for Post-Medieval Archaeology officially extended its remit to incorporate the archaeology of the period from c. CE 1500 to the present day.

Key Issues/Current Debates/Future Directions/Examples

The early focus within post-medieval archaeology in Britain was on developing typological studies of specific material culture categories (such as ceramics, glass, and clay pipes), which could be used for dating excavated sites and for studies of technology and production, and the publication of excavations, especially urban sites and industrial production (kiln or furnace) sites. The 1970s and 1980s saw the growth of "rescue" archaeology within the UK as urban centers were extensively redeveloped, and while much attention was focused on Roman and medieval remains, some important post-medieval sequences were excavated in towns such as London, Norwich, and Exeter. The 1982 televised raising of Henry VIII's flagship *The Mary Rose* from the Solent channel, and the public interest in the wealth of well-preserved organic material culture from the wreck, showed that post-medieval archaeology could be as highly valued as earlier periods, a point which was reinforced in 1989 during the major public controversy over the threatened destruction of the remains of the Elizabethan "Rose Theatre" on London's South Bank. In the mid-1990s, new legislation provided protection for both buried archaeology and listed buildings (Planning Policy Guidance Notes 15 and 16). This has had a dramatic impact on the study of post-medieval remains in Britain, which are now increasingly excavated and published as important parts of the archaeological sequence in their own right rather than being seen as later "disturbance." The study of post-medieval buildings was already well developed as an important subdiscipline following the foundation of the Vernacular Architecture Group in 1952, with the first issue of the journal *Vernacular Architecture* appearing in 1970. Studies of rural landscapes

and buildings have increased in number and scope, with a focus on the impact of the enclosure of medieval agricultural landscapes and shifts in settlement patterns in the eighteenth and nineteenth centuries (Newman 2001) (Fig. 2). Within Britain, there is now a strong conception that the "historic environment" encompasses the archaeology, buildings, and landscapes of all periods of the past, which should be protected and adapted to provide a meaningful "sense of place" for contemporary communities, although this is not always applied rigorously to later post-medieval structures which are often undervalued or taken for granted.

Since the early 1990s, a small number of post-medieval academic posts have been established in British universities, and scholars have advocated the integration of explicit archaeological theory and a greater plurality of interpretive approaches within the subject. Rather than seeing post-medieval archaeological remains primarily in terms of technological or economic change, they argue that material culture should be seen as meaningful within social relationships and social identities in the past – for instance, in terms of class, gender, ethnicity, or religion. One major area of focus for both academic and museum-based archaeologists is on the transition between the medieval and post-medieval periods. Studies of a wide range of material culture types including buildings, fortifications, ceramics, dress fittings, and metal toys show that there were significant elements of continuity as well as change in people's material environment. A focused study on the archaeology of the Reformation highlighted that religious change in sixteenth-century Europe involved both top-down and bottom-up transformations in belief and practice and that much older medieval religious culture was incorporated into new Protestant and Catholic religious cultures (Gaimster and Gilchrist 2003). Matthew Johnson studied changes in vernacular farmhouses, material culture, and the enclosure of rural landscapes in sixteenth-century Suffolk, England, arguing that they reflected the transformation of the social order through the rise of privacy and commodification, revealing the spread of capitalist socioeconomic relations (Johnson 1996). More recently, Sarah Tarlow has examined the material remains of eighteenth- and nineteenth-century Britain and argued that rather than simply reflecting capitalism, they are also a product of changing ideologies such as the widespread idea of "improvement," which stimulated new farming practices, the rebuilding of town centers, and the creation of institutions of "moral reform" such as workhouses and prisons (Tarlow 2007) (Fig. 3).

Post-Medieval Archaeology (Europe), Fig. 2 Excavations of eighteenth- and nineteenth-century farm buildings at Henllys Farm, Pembrokeshire, Wales. (© Harold Mytum)

In Continental Europe, post-medieval archaeology emerged more recently than in the UK and currently retains a focus on the immediate post-Reformation centuries. There are few dedicated academic posts in the subject, mainly concentrated in Germany and Scandinavia, and most post-medieval archaeological research is undertaken by archaeologists connected to urban municipalities, state heritage or archaeological services, or museums, within the context of development projects. In Germany, the subject was stimulated by the excavation of well-preserved

Post-Medieval Archaeology (Europe), Fig. 3 The Workhouse, Southwell, Nottinghamshire. Built in 1824 as a new type of institution within a reformed system of poor relief, it was designed to classify, segregate, and punish the "undeserving" poor. (© Chris King)

archaeological sequences from Hanseatic towns including Lubeck and Duisburg in the 1970s and 1980s (Krause 1992). The German Society for Medieval Archaeology *(Deutsche Gesellschaft für Archäologie des Mittelalters)*, which was founded in 1975, extended its remit to cover *Neuzeit*, or "the archaeology of the modern period," in 1990. In 2009 a new German and English open-access journal *Historische Archäologie* was established covering the archaeology of both early modern and more recent periods. Large-scale urban excavations have also taken place in Scandinavian cities including Lund (Sweden), Trondheim (Norway), and Copenhagen (Denmark) (Gaimster 2005) and in many cities in the Low Countries, notably Amsterdam (the Netherlands) and Antwerp (Belgium) (Bartels 1999). In France, post-medieval sites are excavated by the state archaeology service, but there is also a strong tradition of regional rural landscape and vernacular architecture studies. In Eastern Europe, post-medieval archaeology has developed from a strong tradition of ethnology and material culture studies as well as the large-scale urban excavations which have taken place since the collapse of Communism; David Gaimster has suggested that the European Council's funding of archaeology within medieval and post-medieval towns in the former eastern bloc has been a way of reemphasizing older shared traditions in the new Europe (Gaimster 2005). Italy has a dedicated research journal for the subject, *Archeologia Postmedievale* (founded in 1997); there has been extensive work on post-medieval ceramics and glass, reflecting the interest in the material culture of the Renaissance. Spain has seen only limited research on post-medieval archaeology, and in both Italy and Greece, there has been some recent work on post-medieval landscape surveys and vernacular architecture studies (Milanese 1997) (Fig. 4).

In Continental Europe, then, the major focus has been on the excavation and publication of early post-medieval urban sites and their rich material culture assemblages, with more limited work on rural landscapes and buildings. The archaeology of the household and domestic life has been a significant recent area, highlighting the potential for complex social and cultural analyses of material culture drawing on historical documents such as wills and probate inventories of household goods, as well as artistic depictions of early modern domestic interiors. One example of this is David Gaimster's study of the stoneware ceramic industries of the Rhineland, which developed in the fourteenth century and whose products were exported all over Northern Europe, Britain, and the European colonies in North America. Gaimster is able to bring together varied sources to show shifts in patterns of production,

Post-Medieval Archaeology (Europe), Fig. 4 The mercury distillation plant at Almadén, Castilla La Mancha, Ciudad Real, Spain. Mercury (from the mineral cinnabar) was essential to the expanding silver economy of the Spanish New World, and the mines at Almadén were a major state-owned concern. (© Marilyn Palmer)

trade, and consumption of this distinctive form of ceramic tableware, highlighting its role in new rituals of dining and the display of wealth and culture in middle-class European households (Gaimster 1997).

There remain significant challenges facing the development of post-medieval archaeology in Europe. As the majority of research is undertaken in the context of developer-funded projects, fostering a coordinated research framework is problematic, and the sheer scale and diversity of the material and built archaeology of the last 500 years create huge challenges in terms of management, publication, and archiving strategies. This is compounded by the natural tendency of each European country to publish in its own national language, making synthesis difficult to achieve. Only a few explicitly transnational studies have been undertaken for post-medieval object types, but these highlight the necessity to consider cross-European exchange of material culture in this period (Gaimster 1997; Veeckman 2002). British archaeologists, influenced by global historical archaeology, have pioneered the study of the eighteenth and nineteenth centuries and have recently highlighted the need for an archaeological approach to the material remains of twentieth-century and contemporary society. In contrast, there has been only very limited research on this later period on the Continent, largely through industrial archaeology and studies of buildings and landscapes, while archaeological excavations of twentieth-century material happen only occasionally, usually through the archaeological or forensic study of modern warfare and sites of atrocities. Many people still question the usefulness of archaeology for the study of a period with rich historical and visual records, but archaeologists have successfully demonstrated that the material remains of the recent past can provide unique and valuable insights into the dramatic social, economic, and political transformations which created, and continue to operate within, our present-day world.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Buildings Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Central–Eastern Europe: Historical Archaeology
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: European Cream to Whitewares in the USA
- ▶ Ceramics: Stonewares

- ▶ Clay Pipes in Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Consumption, Archaeology of
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Contemporary Past, Archaeology of the
- ▶ Deutsche Gesellschaft für Archäologie des Mittelalters und der Neuzeit e.V. (DGAMN)
- ▶ Estate Landscapes in Historical Archaeology
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Industrial Archaeology
- ▶ Industrial Heritage Association of Ireland (IHAI)
- ▶ Johnson, Matthew (Historical Archaeology)
- ▶ Medieval Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ Ottoman Empire: Historical Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Tarlow, Sarah
- ▶ Western Europe: Historical Archaeology

References

Andrén, A. 1998. *Between artifacts and texts: Historical archaeology in global perspective*. New York: Plenum.

Bartels, M. 1999. *Steden in scherven. Cities in sherds 1 and 2. Finds from cesspits in Deventer, Dordrecht, Nijmegen en Tiel (1250–1900)*, 2 vols. Amersfoort: Stchting Promotie Archaeologie, Zwolle and Rijksdienst voor het Oudheidkundig Bodemonderzoek.

Buchli, V., and G. Lucas, eds. 2001. *Archaeologies of the contemporary past*. London: Routledge.

Crossley, D. 1990. *Post-medieval archaeology in Britain*. Leicester: Leicester University Press.

Gaimster, D. 1997. *German stoneware 1200–1900: Archaeology and cultural history*. London: British Museum Press.

Gaimster, D. 2005. A parallel history: The archaeology of Hanseatic urban culture in the Baltic c. 1200–1600. *World Archaeology* 37: 408–423.

Gaimster, D., and R. Gilchrist, eds. 2003. *The archaeology of reformation 1480–1580*, Society for post-medieval archaeology monograph. Vol. 1. Leeds: Maney.

Hicks, D. 2005. Places for thinking' from Annapolis to Bristol: Situations and symmetries in 'world historical archaeologies. *World Archaeology* 37 (3): 373–391.

Johnson, M. 1996. *An archaeology of capitalism*. Oxford: Blackwell.

Krause, G., ed. 1992. *Stadtarchäologie in Duisburg 1980–1990*. Vol. 38. Duisburg: Duisburger Forschungen.

Milanese, M., ed. 1997. *Archeologia post-medievale: Società–ambiente–produzione. L'esperienza Europa e L'Italia*. Florence: All'Insegna del Giglio.

Nevell, M. 2006. The 2005 Rolt memorial lecture: Industrial archaeology or the archaeology of the industrial period? Models, methodology and the future of industrial archaeology. *Industrial Archaeology Review* XXVIII (1): 3–15.

Newman, R. 2001. *The historical archaeology of Britain, c.1540–1900*. Stroud: Sutton.

Tarlow, S. 2007. *The archaeology of improvement in Britain, 1750–1850*. Cambridge: Cambridge University Press.

Veeckman, J., ed. 2002. *Maiolica and glass: From Italy to Antwerp and beyond. The transfer of technology in the 16th-early 17th century*. Antwerp: Stad Antwerpen.

Further Reading

Baram, U., and L. Carroll, eds. 2000. *A historical archaeology of the Ottoman empire: Breaking new ground*. New York: Kluwer Academic/Plenum.

Bowsher, J. 2012. *Shakespeare's London theatreland: Archaeology, history and drama*. London: Museum of London Archaeology.

Dalglish, C. 2003. *Rural society in the age of reason: An archaeology of the emergence of modern life in the southern Scottish Highlands*. New York: Kluwer Academic/Plenum.

Egan, G., and R.L. Michael, eds. 1997. *Old and new worlds: Historical/post-medieval archaeology papers from the societies' joint conferences at Williamsburg and London 1997 to mark thirty years of work and achievement*. Oxford: Oxbow.

Gaimster, D., and P. Stamper, eds. 1997. *The age of transition: the archaeology of English culture 1400–1600*, Society for medieval archaeology monograph. Oxford: Oxbow.

Horning, A., R. Ó Baoill, C. Donnelly, and P. Logue, eds. 2007. *The post-medieval archaeology of Ireland*. Bray: Wordwell.

Horning, A., and M. Palmer, eds. 2009. *Crossing paths or sharing tracks? Future directions in the archaeological study of post-1550 Britain and Ireland*, Society for post-medieval archaeology monograph. Vol. 5. Woodbridge: Boydell.

Majewski, T., and D. Gaimster, eds. 2009. *The international handbook of historical archaeology*. New York: Springer.

Mientjes, A., M. Pluciennek, and E. Giannitrapani. 2002. Archaeologies of recent rural Sicily and Sardinia: A comparative approach. *Journal of Mediterranean Archaeology* 15: 139–166.

Nordin, J.M. 2012. Embodied colonialism: The cultural meaning of sliver in a Swedish colonial context in the seventeenth century. *Post-medieval Archaeology* 46 (1): 143–165.

Palmer, M., and P. Neaverson. 1998. *Industrial archaeology: Principles and practice*. London/New York: Routledge.

Penrose, S., ed. 2007. *Images of change: An archaeology of England's contemporary landscape*. London: English Heritage.
Tarlow, S., and S. West, eds. 1999. *The familiar past: Archaeologies of later historical Britain*. London/New York: Routledge.
Vionis, A.K. 2005. Domestic material culture and post-medieval archaeology in Greece: A case-study from the Cyclades Islands. *Post-medieval Archaeology* 39 (1): 172–185.

Post-Processual Archaeology

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Introduction

Post-processual archaeology stemmed from critical debates about the nature of archaeology in the 1980s in Britain, Scandinavia, and the United States leading to much controversy in the 1980s and 1990s and often dividing the discipline into two camps, processual and post-processual. During the first decade of the twenty-first century, the debate has settled down, and many archaeologists attempt to integrate divergent perspectives within the discipline or pick and choose between them.

Definition

Post-processual archaeology began in the 1980s as a reaction to processual archaeology, and it came to be used as an umbrella term covering a wide range of approaches that engage with contemporary social theory and acknowledge the historical dimensions of knowledge production. These approaches have included discussions of power and ideology, feminism, shifts to and from the notion that material culture can be read as a text, phenomenology, accounts of agency, landscape, the body, memory, materiality, the links between archaeology and heritage, indigenous rights, and ethics.

Historical Background

In the early 1980s post-processual archaeology identified a series of oppositions that were not being debated within the discipline as a result of the approaches followed by processual archaeology. These were as follows:

System and structure: By focusing on variability in adaptive responses to environments as the main locus of cultural change, processual archaeology seemed to reject those large parts of anthropology and the social sciences and humanities which explored underlying structures (especially structures of power and structures of meaning).

Behavior and agency: Similarly by focusing on how humans responded to environments in predictable ways, and by focusing on material culture as an adaptive tool, processual archaeologists gave little import to the ways in which human agents actively used material culture to transform social worlds.

Anthropology and history: By espousing the view that archaeology was anthropological, comparative, and generalizing, processual archaeologists seemed to deny the validity of theories of history and the long tradition, at least in Europe, of linking archaeology with history.

Object and subject: By adopting a stringent view of science as following the hypothetico-deductive method, processual archaeologists used an outdated view of science that did not engage with a wide range of post-positivist philosophies and could not accommodate multiple conflicting perspectives.

In developing this critique, post-processual archaeologists had a number of influences. There were certainly some historical antecedents within archaeology, including the European tradition of linking archaeology with history seen, for example, in the work of Collingwood and Childe (Hodder and Hutson 2003). In North America some have suggested a precursor in the work of Walter Taylor, and Bruce Trigger and James Deetz were also influential. But the main influences were from outside archaeology.

In Britain and Europe these were from social and cultural anthropology (Edwin Ardener, Ernest Gellner, Mary Douglas, Clifford Geertz, Victor Turner, Marshall Sahlins) but mainly from Pierre Bourdieu and the Cambridge sociologist Anthony Giddens. In the United States important influences were from Marxism and critical theory, particularly in the context of historical archaeology, and from feminism and indigenous archaeology.

In the late 1970s and early 1980s in Cambridge, a group of graduate students and professors influenced by these ideas including Ian Hodder, Paul Lane, Danny Miller, Henrietta Moore, Mike Parker Pearson, and Chris Tilley organized seminars and a conference attended by Meg Conkey, Susan Kus, Marke Leone, and Alison Wylie. At the same time ethnoarchaeological research (e.g., by Hodder, Miller, and Moore) demonstrated ways in which the broad theoretical interests could be explored in relation to material culture.

In the resulting publications (e.g., Hodder 1982a, b; Leone 1982; Miller and Tilley 1984; Shanks and Tilley 1987a, b; Hodder and Hutson 2003) a number of themes were apparent. The first was that material culture is meaningfully constituted. This was a response to the ecological and adaptive emphases of processual archaeology, and it involved the analysis of structures of meaning and symbolism (see section "Key Issues" below). Another theme was that material culture is active not passive. This was a reaction to the functionalism and behaviorism of processual archaeology. Within both these themes, there was in the European debates a simultaneous rejection of structuralism and an embrace of the work of Bourdieu and his notion of habitus and of Giddens and his notion of structuration. These approaches seemed particularly appropriate for archaeology because they dealt with practice (how rules and structures are played out in the practices of daily life – including in the material objects and residues visible to archaeologists) and with the transformation of structures (how societies change through practice – again the approaches seemed relevant to a discipline dealing with long-term change). Various forms of post-structuralist critique were incorporated into publications and debates.

These changes in perspective within archaeological theory were not produced by a particular book, person, group, or movement. Rather they were made possible by a general change in archaeology that happened in response to wider shifts in related disciplines and in society at large. The main contributing influences were Marxism, structuralism and the post-structuralist critiques, feminist archaeology, postcolonial and indigenous archaeology, and post-positivist debates within the philosophy of science.

Marxism had long been an important component of theoretical debate in archaeology as a result of the work of Childe, but the specific impetus influencing the emergence of post-processual archaeology in Europe was the structural-Marxism of Godelier and Meillassoux and the archaeology of Rowlands and Friedman in which evolutionary change was dependent on specific historical interactions between the forces and relations of production. But it was the Marxist critique of theory and science that had most influence through the work of Mark Leone in the United States and particularly his work in the public archaeology project at Annapolis. As already noted, in addition to Marxist notions of structure, semiotics, structuralism, and post-structuralism (as in the work of Saussure, Lévi-Strauss, Derrida) all played their role in encouraging a more complex discussion in archaeology of the ways in which material culture is patterned and organized.

Early post-processual archaeology had an ambiguous relationship with feminist archaeology. As noted above, Moore, Conkey, and Wylie played significant early roles, but there was soon criticism of a lack of concern with feminist issues in, for example, the early writing of Shanks and Tilley (Engelstad 1991). It was not until 1990 that the first explicitly feminist archaeology emerged in volume form (Conkey and Gero 1990), and since then there have been many developments in feminist and gender archaeology dealing with issues close to those discussed in post-processual archaeology such as knowledge construction, context, ideology, reflexivity, identity, agency, and materiality (e.g., as seen in the work of Rosemary Joyce). Recent definitions of feminist archaeology overlap considerably with post-processual archaeology.

There is some debate about relationships between the growth of postcolonial and indigenous archaeologies and post-processual archaeology. There is a wide recognition in archaeology today that archaeology was historically aligned with nationalist, colonial, and imperial projects that separated many communities from their pasts and wrote the histories and prehistories of others in ways that reinforced dominant narratives (Trigger 1984, 2006). In its critique of processual archaeology's associations with particular forms of dominant discourse in science, post-processual archaeology was aligned to those groups claiming rights and identity to the material past. For example, the African Burial Ground project in New York has empowered contemporary descendants by giving them tangible, material evidence of their heritage and of the contributions and suffering of their once ignored, silenced, and disenfranchised ancestors (Blakey 1998). The passing of NAGPRA in the United States attempted to safeguard the interests of Native Americans with regard to their heritage. This has led to closer cooperation between archaeologists and Native Americans and to changes in archaeological method which involve Native American oral traditions and ritual observances within the scientific process (Watkins 2001; Wilcox 2009). The collaborative methods that have developed in North America as well as in Australia and other parts of the world parallel those developed in post-processual and reflexive archaeology (see below under section "Key Issues"). These indigenous and postcolonial archaeologies were not the product of post-processual archaeology, but they did create an environment in which post-processual theories could become salient.

Another important influence on the emergence of post-processual archaeology was debates within the philosophy of science that critiqued methods embraced by processual archaeology. Over many decades, philosophers of science have demonstrated the ways in which scientific knowledge production is situated historically. In cultural anthropology debates emerged about the ways in which ethnography involved complex interactions between observer and observed. But processual archaeology in the United States, perhaps because of its colonial context, rejected these post-positivist, interpretive, and reflexive moves. Initially some post-processual archaeologists took a strongly constructivist position although tempered with detailed empirical and quantitative research. Gradually through time various types of middle ground have been found between objectivist and constructivist positions (see section "Key Issues" below).

It is important to recognize the different contexts of post-processual archaeology in Europe (especially in Britain) and the United States. In Europe archaeology had always been linked to history, and so it responded less enthusiastically to processual archaeology and was consequently more ready to engage in its critique; this was especially true of Britain but also of Scandinavia. The major influences on post-processual archaeology in Britain were Bourdieu and Giddens and the post-structuralist debate. But in the United States, the major influences were feminism and Marxism, and the main initial impact was in historical archaeology. The archaeology of early societies and hunter-gatherers remained very tied to a universalizing approach. When cultural anthropology in the United States took a turn toward meaning, history, and reflexivity in the 1970s and 1980s, archaeologists shied away and took their own path, reinforcing a belief in behavioral universals and a restricted form of positivism. Cut off in this way from the intellectual trends that were influencing the growth of post-processual archaeology, the reaction in the United States was initially very strident. Even today, post-processual archaeology in the United States is usually seen as an accompaniment to a continuing processual archaeology, whereas in Britain the two approaches remain thought of as separate and opposing theoretical movements.

As a result of its complex and contested history, post-processual archaeology today can be defined in two rather different ways. For some it remains a term used to describe the more constructivist positions championed by Shanks and Tilley in 1987and more popular in Britain and Europe. For others, and this is the way the term is used here, it has a broader definition incorporating a wide range of perspectives including feminism, Marxism, heritage, and indigenous

archaeologies, as well as the variety of approaches to be discussed below. These approaches are held together loosely by their dialogue with contemporary social theory and by their acknowledgement of the historical dimensions of archaeological knowledge production.

Key Issues

As already noted, key early issues were that material culture is meaningfully and actively constituted. Semiotic, structuralist methods allowed archaeologists to explore the ways in which material culture has a meaning which goes beyond the physical properties and adaptive functions of an object and derives from the network of social strategies within which the object is embroiled. It is used by agents intentionally pursuing strategies and monitoring outcomes – even if the intentions are often not consciously understood and even if much material practice is routinized and produced by nondiscursive daily practices. The development of this perspective was heavily influenced by the "practice" and "structuration" theories developed by Bourdieu and Giddens where structure is the medium and the outcome of action. The emphasis on material culture being actively manipulated in order to legitimate or transform society was also found in Marxist-inspired archaeological studies in prehistoric Europe and in historical archaeology in the United States as well as in feminist archaeology.

If material culture is always meaningfully constituted, then perhaps it can be seen as a text that is read (Hodder 1986 in Hodder and Hutson 2003). This idea has several attractive aspects. It puts the emphasis on the reader – on the notion that meaning does not reside in the object itself but in the way that the reader makes sense of that object. The "reader" here is both the past social actor and the present archaeologist. The reading metaphor foregrounds the fact that different people will read the same data differently, a tendency for which there is much historical evidence. The text metaphor encourages us to focus on context – "with text." Rather than studying pottery and animal bones separate from each other and from their find context, the emphasis is placed on looking at pottery and animal bones and find circumstance in relation to each other. In each context there may be distinct or subtle changes of meaning. The text metaphor thus invites us to make use of the world of semiotics – the study of signs and the systems in which they are embedded.

But there are also difficulties with the text metaphor when applied to material culture. In particular the meanings of material things are rarely arbitrary; they are usually grounded in the material and practical experience of the world. For example, the symbolism of gold is tied to its rarity and the effort needed to obtain it, as well as to its durability. In the 1990s, post-processual archaeologists began to react against the textual metaphor (see Hodder et al. 1995) and to explore the ways in which material meanings were practically engaged, embodied, and experienced. Again the influences were from theories of practice, but they also derived from the phenomenology of Heidegger and Merleau-Ponty, very successfully taken up in archaeology by Chris Gosden, Julian Thomas, Chris Tilley, and Bjørnar Olsen.

Heidegger's aim, writing mainly in the first half of the twentieth century, was to get away from the long tradition in philosophy and Western thought in which reality is some kind of substance that is approached by detached theoretical reflection. He wanted to get away from a perspective in which things were seen as separate from humans and instead wanted to start in the very midst of practical daily activities, hammering in a nail, pouring water from a jug, and so on. Heidegger emphasized the practical everyday-ness of human existence by using the term "Dasein" (being there) instead of "human subject." He also used the hyphenated phrase "being-in-the-world" to point to the ways in which humans are situated in and inseparable from the world that is around them and into which they are thrown and dwell.

An important and highly influential use of phenomenology was Tilley's (1994) work on landscape. He argued that our own embodied experiences of landscapes and monuments today must reveal to us something of the experiences of the people who once inhabited those same places in the past. The approach, as also in the work of

Thomas and Barrett, has been very fruitful in encouraging archaeologists to explore how monuments and landscapes were made meaningful through their practical use. There are dangers since our responses as we walk through landscapes today are situated within our own beings-in-the-world. The approach asks archaeologists to consider how people moved round monuments and landscapes and how architecture and dwelling were embodied. Related issues deal with cultural and historical variation in how bodies, selves, and individuals are understood (Fowler 2004). For example, it is important to recognize that the atomized individual self is a Western product. Conceptions of individuals and body boundaries and the relationship between self and environment vary through time and space.

Another important aspect of the involvement of material culture in our experience of the world is in memory construction (Van Dyke and Alcock 2003). Archaeologists often observe evidence of the holding on to objects (heirlooms) over long periods of time. They have evidence of people reusing earlier settlements, burial locations, or ritual spaces. They have evidence of people digging up earlier remains and commemorating events or erasing monuments. In all these ways archaeologists have access to the ways in which people have remembered or forgotten their pasts. Such engagements with the archaeology of memory today have special salience in contexts in which contemporary societies use archaeology itself to deny histories or to foreground memories as part of post-conflict reconciliation and healing, whether in South Africa, Bosnia, or Argentina.

Another key recent theme has been the focus on materiality. This derives partly from the approaches identified above but also from engagement with a wide range of material culture studies within anthropology, including the work of Miller, Gell, and Ingold. The emphasis remains on the constitution of self and identity, but the focus shifts to how things act in the world. There is much recent work that explores how materials are construed in different social settings and historical contexts (Joyce 2005). Things, matter, fluids, life, and death – all these are construed differently in different historical contexts. The study of materiality explores these cultural relationships, and the biographies of objects are pursued through varying social contexts. Meskell (2004: 7) notes how in Egypt past and present "persons exist and are constituted by their material world: subjects and objects could be said to be mutually fashioning and dependent."

Running through all these discussions in post-processual archaeology about the ways in which things have meaning and play roles in social lives is the issue of agency. As noted above, the notion that material culture was actively used by people in pursuing discursive or nondiscursive strategies was a key early theme in post-processual archaeology, in reaction to the behaviorism of processual archaeology. The issue of agency has grown to be one of the central themes of post-processual debate, and indeed it has come to be an important bridging concept to other approaches in the discipline (Dobres and Robb 2000).

Agency is itself a complex process that needs to be broken down into its component parts. Different authors in archaeology refer to different aspects of agency. For example, Barrett (1994) mainly discusses the context for action – the fact that the actor has to be situated in relation to power/knowledge in order to have knowledge and resources to act. He discusses the mobilization of space and resources in prehistoric monuments in Britain in these terms. Many authors focus on the resources needed for a social person to act in the world.

A rather different approach argues that there is an intentionality to agency and that this intentionality cannot be reduced to the context for action. Of course, some intentions may be nondiscursive in the sense that actors may not be fully consciously aware of their motivations. Intentions need, therefore, to be interpreted. Archaeologists routinely make these interpretations. When claiming that a ditch is defensive or that a large wall around a settlement was built to provide prestige, intentions are imputed. The defensive nature of the ditch may be determined from its shape and size and position and from evidence of warfare and so on. The prestigious nature of the

wall may derive from its nondefensive nature (in terms of construction material or location or effectiveness). Another form of intentional social action is resistance to dominant groups. Many archaeologists have sought to demonstrate that subordinate groups use material culture to counteract dominant forms of discourse.

Any act can have intended and unintended consequences. Indeed another approach to agency takes the focus away from intentionality and focuses more closely on the impact of action on others and on the material world. In addition, the overall attention to the active components of material culture in phenomenology, memory, material culture, and materiality approaches has led to the notion that things too can have agency in the sense of having impact. Things can clearly act in the sense that a door closer closes the door after we have opened the door and walked through, as described by Bruno Latour. But they can also act in the sense that humans often give things powers, whether these powers be apotropaic, religious or spiritual, or involved in memory.

It is important to return to the question of method. Many positivist archaeologists adhere to some notion of objective data and hypothesis testing because they fear that the only alternative is a form of relativism in which "anything goes." In other words, they fear that if there is no possibility of objective testing, then anyone's statement about the past is equally as good as anyone else's. I know of no post-processual archaeologist who would take this line. There are various forms of relativism, and most archaeologists would accept that archaeological interpretation is and should be answerable to data. The question is really just a matter of "how."

Archaeology is not for the most part an experimental science in which variables can be held constant. Rather, it is, like geology, a historical science that works by fitting lots of different types of data together as best it can in order to make a coherent account (Hodder 1999). This emphasis on fitting rather than testing is at the heart of the hermeneutic or interpretive approach. Theories of interpretation place emphasis on making sense of the event in relation to what is going on around it while recognizing that generalizations have to be used. In the hermeneutic approach, it is recognized that the researcher comes to the data with much prior knowledge and prejudgments. The data are perceived within these prejudgments. The researcher then works by fitting all the data together so that the parts make up a coherent whole. The interpretation that works best both fits our general theories and prejudgments, and it makes most sense of more data than other interpretations. The process is not circular – that is, one does not just impose one's prejudgments on the data. The objects of study can cause us to change our ideas, but never in a way divorced from society and from perspective. There is thus a dialectical (dialogical) relationship between past and present and between object and subject. There is never a socially neutral moment in the scientific process, but equally, socially biased accounts can be transformed by interaction with objects of study.

Thus, like most archaeologists today, we have employed a broad battery of scientific techniques at Çatalhöyük (Hodder 1999). We are trying to do good science at Çatalhöyük and use a wide range of natural science techniques. We build arguments by using as many different crosscutting techniques as we can. But we are also aware of the ways in which our arguments are embedded in our own assumptions and starting points; we always have to be careful and vigilant about where our ideas are coming from. And we also have to be aware that our assumptions and starting points may exclude the interests of others who come to Çatalhöyük with different perspectives.

Early post-processual archaeology paid scant attention to method, and many post-processual archaeologists have continued to excavate and do research employing field methods developed in the heyday of processual archaeology. But in the late 1990s, a debate began to emerge about using field methods that were developed specifically for interpretive research. These reflexive methods (Hodder 1999) focus on encouraging multivocality, collaboration between different interest or stakeholder groups, and the documentation of the documentation process. By the latter

is meant the recording of the assumptions and methods involved in research so that future researchers can return to the data and understand their conditions of production. Provision of such secondary documentation opens up the archaeological process to later critique and reanalysis.

The embedding of archaeological science within the contemporary social process has been the most important aspect of post-processual archaeology. It has occurred at a time when archaeology has come to critique its dominant starting points and assumptions, for example, in response to feminism. During recent decades archaeology has also come to play an important role in postcolonial contexts as previously marginalized and dominated groups have used the past to regain rights to land and to legal existence. As noted above, post-processual archaeology is not the cause of these developments, but it has proved an effective ally for those seeking alternative pasts and for those wishing to break away from dominant narratives. The new collaborative methods employed in postcolonial, indigenous, and Native American archaeology are close to those used within this wider sphere.

Post-processual archaeology has played a central role in the emergence of a theoretical heritage discourse. The past is often contested, and the material past is often key to the assertion of rights to land and recognition, as already noted. More widely, material heritage has been involved in conflicts throughout the world from the destruction of the Bamiyan Buddhas to the destruction of the Mostar Bridge in Bosnia to the competing claims to the religious monuments in Jerusalem. In many countries, dealing with heritage has been central to post-conflict healing and reconciliation, as in South Africa after the end of apartheid. In all these cases the universal values of heritage (e.g., as defined by UNESCO) have to be weighed against local understandings and valences. The different interests of stakeholders have to be evaluated, and ethical positions debated. Increasingly the language of cultural rights and human rights in relation to heritage has been used. In all these ways, a post-processual approach has been active in this area (Smith 2004; Meskell 2009).

Current Debates/Future Directions

Many of the key issues identified above are currently debated within archaeology, particularly the relevance of phenomenology, different approaches to agency, discussions of landscape, the body, memory, materiality, the links between archaeology and heritage, indigenous rights, and ethics. But there are increasingly attempts made to bridge the divide between processual and post-processual archaeology. Several authors over the past two decades have argued for some blending of processual and post-processual approaches (e.g., Pauketat 2001). Today many people consider the processual/post-processual debate largely as historical, and they pick and choose between them pragmatically as seems appropriate.

As a result one can today say that it is difficult to place many forms of archaeology firmly on one side of the debate rather than the other. Thus, one might argue that on the whole, cognitive processual approaches in archaeology as well as behavioral archaeology, human behavioral ecology, and evolutionary and complexity theory approaches tend to derive their heritage mainly from processual archaeology. On the other hand, a post-processual heritage is dominant for materiality studies, phenomenology, postcolonial and indigenous archaeologies, and in critical heritage discourse. In practice each approach today borrows from or reacts to developments within other approaches. Links are recognized between complex systems and the historical contingencies described in much post-processual archaeology. Cognitive processual and phenomenological approaches seem equally engaged in problems of mind, perception, and materiality. Agency is a clear linking domain, central to materiality and postcolonial and indigenous archaeology as much as it is to complex systems, agent-based modeling, and evolutionary archaeology.

Many archaeologists are increasingly concerned with one of the key issues of our time – the relationships between culture and biology – and their relative importance. Many try to find some integration, arguing that culture and biology are both central to the project of being human. Such developments are

found, for example, in the dual inheritance approach within evolutionary archaeology but also within discussions of embodiment, materiality, and landscape. Both sides of the debate in archaeology increasingly aim to allow the play of biological processes within culture and society and within social change.

International Perspectives

As noted above, post-processual archaeology originated in Europe, especially in Britain and Scandinavia, and in the United States, especially in historical archaeology. It is clearly a Western discourse, tied to Western social theorists. On the other hand, its critique of the "one science" model and its recognition of the situated and historical dimensions of knowledge construction have meant that it has seemed relevant to archaeology in many parts of the world. A consideration of the wide global range of articles published in the Journal of Social Archaeology, or in Archaeologies, the journal of the World Archaeological Congress, demonstrates the wide global reach and diversity of interests encompassed by post-processual archaeology.

There are, however, regional variations in the debates regarding post-processual archaeology, and I have identified above the important differences between the development of the perspective in Europe (especially Britain) and in the United States. In the United States post-processual and processual archaeologies are often seen as accompanying each other, whereas in Britain post-processual archaeology is often seen as dominant and opposed to other approaches. Another regional difference occurs in Latin America and in parts of Spain where materialist, Marxist approaches have dominated theoretical debate for some time. Here aspects of post-processual archaeology have often been folded into an archaeology already socially and politically engaged. In other parts of the world too, post-processual perspectives have often become relevant in varied forms as part of postcolonial, indigenous, and political movements. The success of the World Archaeology Congress has demonstrated the need for broad theoretical debate on a global scale.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Critical Theory in Archaeology
- ▶ Engendered Archaeologies
- ▶ Hodder, Ian (Theory)
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Indigenous Archaeologies
- ▶ Landscape Archaeology
- ▶ Phenomenology in Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Post-Processualism, Development of
- ▶ Social Memory in Archaeological Theory

References

Barrett, J. 1994. *Fragments from antiquity: An archaeology of social life in Britain, 2900–1200 B. C*. Oxford: Blackwell.

Blakey, M.L. 1998. The New York African Burial Ground Project: An examination of enslaved lives, a construction of ancestral ties. *Transforming Archaeology* 7: 53–58.

Conkey, M., and J. Gero, eds. 1990. *Engendering archaeology*. Oxford: Blackwell.

Dobres, M.-A., and J. Robb, eds. 2000. *Agency in archaeology*. London: Routledge.

Engelstad, E. 1991. Images of power and contradiction: Feminist theory and post-processual archaeology. *Antiquity* 65: 502–514.

Fowler, C. 2004. *The archaeology of personhood: An anthropological approach*. London: Routledge.

Hodder, I. 1982a. *Symbols in action*. Cambridge, UK: Cambridge University Press.

Hodder, I., ed. 1982b. *Symbolic and structural archaeology*. Cambridge, UK: Cambridge University Press.

Hodder, I. 1999. *The archaeological process*. Oxford: Blackwell.

Hodder, I., and S. Hutson. 2003. *Reading the past. Current approaches to interpretation in archaeology*. Cambridge, UK: Cambridge University Press.

Hodder, I., M. Shanks, A. Alexandri, V. Buchli, J. Carman, J. Last, and G. Lucas, eds. 1995. *Interpreting archaeology*. London: Routledge.

Joyce, R.A. 2005. Archaeology of the body. *Annual Review of Anthropology* 34: 139–158.

Leone, M. 1982. Some opinions about recovering mind. *American Antiquity* 47: 742–760.
Meskell, L. 2004. *Object worlds in ancient Egypt: Material biographies past and present*. Oxford: Berg.
Meskell, L. 2009. *Cosmopolitan archaeologies*. Durham: Duke University Press.
Miller, D., and C. Tilley, eds. 1984. *Ideology, power and prehistory*. Cambridge, UK: Cambridge University Press.
Pauketat, T.R. 2001. Practice and history in archaeology. An emerging paradigm. *Anthropological Theory* 1: 73–98.
Shanks, M., and C. Tilley. 1987a. *Re-constructing archaeology*. Cambridge, UK: Cambridge University Press.
Shanks, M., and C. Tilley. 1987b. *Social theory and archaeology*. Cambridge, UK: Polity Press.
Smith, L.-J. 2004. *Archaeological theory and the politics of cultural heritage*. London: Routledge.
Tilley, C. 1994. *A phenomenology of landscape: Places, paths and monuments*. London: Berg.
Trigger, B. 1984. Alternative archaeologies: Nationalist, colonialist, imperialist. *Man* 19: 355–370.
Trigger, B. 2006. *A history of archaeological thought*. 2nd ed. Cambridge, UK: Cambridge University Press.
Van Dyke, R., and S.E. Alcock, eds. 2003. *Archaeologies of memory*. Oxford: Wiley-Blackwell.
Watkins, J. 2001. *Indigenous archaeology*. Walnut Creek: Altamira.
Wilcox, M. 2009. *The pueblo revolt and the mythology of conquest: An indigenous archaeology of contact*. Berkeley: University of California Press.

Further Reading

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2004. *The collaborative continuum: Archaeological engagements with descendent communities*. Thousand Oaks: Altamira Press.
Hodder, I., ed. 2012. *Archaeological theory today*. Cambridge, UK: Polity Press.
Hodder, I., and S. Hutson. 2003. *Reading the past*. Cambridge, UK: Cambridge University Press.
Johnson, M. 2010. *Archaeological theory: An introduction*. Oxford: Blackwell.
McGuire, R. 2008. *Archaeology as political action*. Berkeley: University of California Press.
Meskell, L., and R. Preucel, eds. 2004. *Companion to social archaeology*. Oxford: Blackwell.
Preucel, R.W. 2006. *Archaeological semiotics*. Oxford: Blackwell.
Preucel, R., and S. Mrozowski, eds. 2010. *Contemporary archaeology in theory: The new pragmatism*. Oxford: Blackwell.
Ucko, P. 1995. *Theory in archaeology: A world perspective*. Oxford: Routledge.
Wylie, A. 1989. Archaeological cables and tacking: The implications of practice for Bernstein's 'Options beyond objectivism and relativism'. *Philosophy of Social Science* 19: 1–18.

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Introduction

Post-processual archaeology initially developed in the 1980s in Britain, Scandinavia, and the United States as a response to processual archaeology and in particular in reaction to the lack of engagement of processual archaeology with contemporary social theory and the critique of positivism. After a period of controversy between processual and post-processual approaches in the 1980s and 1990s, many archaeologists have attempted to integrate aspects of both programs in their research. However, the epistemological differences remain and have led to the development of post-processual methods such as reflexive archaeology.

Definition

Post-processual archaeology began in the 1980s as a reaction to processual archaeology, and it came to be used as an umbrella term covering a wide range of approaches that engage with contemporary social theory and acknowledge the historical dimensions of knowledge production. These approaches have included discussions of power and ideology, feminism, shifts to and from the notion that material culture can be read as a text, discussions of phenomenology, accounts of agency, landscape, the body, memory, materiality, the links between archaeology and heritage, indigenous rights, and ethics.

Post-processual archaeology can be defined in two rather different ways. For some it was a term used to describe the more constructivist positions championed by Shanks and Tilley in 1987 and more popular in Britain and Europe. For others,

and this is the way the term is used here, it has a broader definition incorporating a wide range of perspectives including feminism, Marxism, heritage, and indigenous archaeologies as well as the variety of approaches to be discussed below. These approaches are held together loosely by their dialogue with contemporary social theory and by their acknowledgement of the historical development of archaeology as a scientific discipline.

Early Development

In the early 1980s, post-processual archaeologists identified a series of issues that were being debated in anthropology, the social sciences and humanities but that had been closed off from archaeological discussion by processual archaeology. These issues concerned structures of power and structures of meaning, the role of agency, the central importance of history, and epistemological questions concerning the relationships between subjects and objects. The main influences were from social theory, debates concerning Marxism and structuralism, feminism, indigenous archaeology, and postcolonial critiques of western archaeology (Hodder 1982a, b; 1986 [Hodder and Hutson 2003]; Leone 1982; Miller and Tilley 1984; Shanks and Tilley 1987a, b). For a description of the early development of and influences upon post-processual archaeology, see "Post-Processual Archaeology" entry in Preucel and Gnecco.

Post-processual archaeology developed differently in Europe (especially in Britain) and the United States. In Europe archaeology had always been linked to history and so it responded less enthusiastically to processual archaeology and was consequently more ready to engage in its critique; this was especially true of Britain but also of Scandinavia. The major influences on post-processual archaeology in Britain were Bourdieu and Giddens and the poststructuralist debate. But in the United States, the major influences were feminism and Marxism, and the main initial impact was in historical archaeology. The archaeology of early societies and hunter-gatherers remained very tied to a universalizing approach. When cultural anthropology in the United States took a turn toward meaning, history, and reflexivity in the 1970s and 1980s, archaeologists shied away and took their own path, reinforcing a belief in behavioral universals and a restricted form of positivism. Cutoff in this way from the intellectual trends that were influencing the growth of post-processual archaeology, the reaction in the United States was initially very strident. Even today, post-processual archaeology in the United States is usually seen as an accompaniment to a continuing processual archaeology, whereas in Britain the two approaches remain thought of as separate and opposing theoretical movements.

Post-processual archaeology has often developed differently in different parts of the world. Another regional difference occurs in Latin America and in parts of Spain where materialist, Marxist approaches have dominated theoretical debate for some time. Here aspects of post-processual archaeology have often been folded into an archaeology already socially and politically engaged. In other parts of the world too, post-processual perspectives have often become relevant in varied forms as part of postcolonial, indigenous, and political movements. The success of the World Archaeology Congress has demonstrated the need for broad theoretical debate on a global scale.

Developments in the 1990s

An early post-processual tenet was that material culture is meaningfully and actively constituted. Semiotic, structuralist methods allowed archaeologists to explore the ways in which material culture has a meaning which goes beyond the physical properties and adaptive functions of an object and derives from the network of social strategies within which the object is embroiled. Material culture is used by agents intentionally pursuing strategies and monitoring outcomes – even if the intentions are often not consciously

understood and even if much material practice is routinized and produced by nondiscursive daily practices. The development of this perspective was heavily influenced by the "practice" and "structuration" theories developed by Bourdieu and Giddens where structure is the medium and the outcome of action. The emphasis on material culture being actively manipulated in order to legitimate or transform society was also found in Marxist-inspired archaeological studies in prehistoric Europe and in historical archaeology in the United States as well as in feminist archaeology.

If material culture is always meaningfully constituted, then perhaps it can be seen as a text that is read (Hodder 1986 [Hodder and Hutson 2003]). This idea has several attractive aspects. It puts the emphasis on the reader – on the notion that meaning does not reside in the object itself, but in the way that the reader makes sense of that object. The "reader" here is both the past social actor and the present archaeologist. The reading metaphor foregrounds the fact that different people will read the same data differently, a tendency for which there is much historical evidence. The text metaphor encourages us to focus on context – "with text." Rather than studying pottery and animal bones separate from each other and from their find context, the emphasis is placed on looking at pottery, animal bones, and find circumstance in relation to each other. In each context there may be distinct or subtle changes of meaning. The text metaphor thus invites us to make use of the world of semiotics – the study of signs and the systems in which they are embedded.

The early development of post-processual archaeology had focused on the critique of processual archaeology. But in the 1990s, attempts began to be made to focus on the productive components of the theories being used and to offer a more coherent perspective in place of the diversity of views initially expressed. The emphasis on the interpretation of meaning allowed the label "interpretive archaeology" (Hodder et al. 1995). But the use of this term was short-lived as it quickly became apparent that there are difficulties with the text or reading metaphor when applied to material culture. In particular the meanings of material things are rarely arbitrary; they are usually grounded in the material and practical experience of the world. For example, the symbolism of gold is tied to its rarity and the effort needed to obtain it, as well as to its durability. In the 1990s, post-processual archaeologists began to react against the textual metaphor and to explore the ways in which material meanings were practically engaged, embodied, and experienced. Again the influences were from theories of practice, but they also derived from the phenomenology of Heidegger and Merleau-Ponty, very successfully taken up in archaeology by Chris Gosden, Julian Thomas, Chris Tilley, and Bjørnar Olsen.

An important and highly influential use of phenomenology was Tilley's (1994) work on landscape. He argued that our own embodied experiences of landscapes and monuments today must reveal to us something of the experiences of the people who once inhabited those same places in the past. The approach, as also in the work of Thomas and Barrett, has been very fruitful in encouraging archaeologists to explore how monuments and landscapes were made meaningful through their practical use. There are dangers since our responses as we walk through landscapes today are situated within our own beings-in-the-world. The approach asks archaeologists to consider how people moved round monuments and landscapes and how architecture and dwelling were embodied. Related issues deal with cultural and historical variation in how bodies, selves, and individuals are understood (Fowler 2004). For example, it is important to recognize that the atomized individual self is a western product. Conceptions of individuals and body boundaries and the relationship between self and environment vary through time and space.

Early post-processual archaeology paid scant attention to method, and many post-processual archaeologists continued to excavate and do research employing field methods developed in the heyday of processual archaeology. But in the late 1990s, a debate began to emerge about using field methods that were developed specifically for post-processual research. These reflexive methods (Hodder 1999) focus on encouraging multivocality, collaboration between different

interest and stakeholder groups, and the documentation of the documentation process. By the latter is meant, the recording of the assumptions and methods involved in research so that future researchers can return to the data and understand their conditions of production. Provision of such secondary documentation opens up the archaeological process to later critique and reanalysis.

The embedding of archaeological science within the contemporary social process has been the most important aspect of post-processual archaeology. It has occurred at a time when archaeology has come to critique its dominant starting points and assumptions, for example, in response to feminism. During recent decades, archaeology has also come to play an important role in postcolonial contexts as previously marginalized and dominated groups have used the past to regain rights to land and to legal existence. Post-processual archaeology is not the cause of these developments, but it has proved an effective ally for those seeking alternative pasts and for those wishing to break away from dominant narratives. The new collaborative methods (Colwell-Chanthaphonh and Ferguson 2004) employed in postcolonial, indigenous, and Native American archaeology are close to those advocated in reflexive archaeology.

Developments in the 2000s

Another important aspect of the involvement of material culture in our experience of the world is in memory construction (Van Dyke and Alcock 2003). Archaeologists often observe evidence of the holding on to objects (heirlooms) over long periods of time. They have evidence of people reusing earlier settlements, burial locations, or ritual spaces. They have evidence of people digging up earlier remains and commemorating events or erasing monuments. In all these ways, archaeologists have access to the ways in which people have remembered or forgotten their pasts. Such engagements with the archaeology of memory today have special salience in contexts in which contemporary societies use archaeology itself to deny histories or to foreground memories as part of post-conflict reconciliation and healing, whether in South Africa, Bosnia, or Argentina.

Another key recent theme has been the focus on materiality. This derives partly from the approaches identified above but also from engagement with a wide range of material culture studies within anthropology, including the work of Miller, Gell, and Ingold. The emphasis remains on the constitution of self and identity, but the focus shifts to how things act in the world. There is much recent work that explores how materials are construed in different social settings and historical contexts (Joyce 2005). Things, matter, fluids, life, death – all these are construed differently in different historical contexts. The study of materiality explores these cultural relationships, and the biographies of objects are pursued through varying social contexts. Meskell (2004: 7) notes how in Egypt past and present "persons exist and are constituted by their material world: subjects and objects could be said to be mutually fashioning and dependent."

Post-processual archaeology has played a central role in the emergence of a theoretical heritage discourse. The past is often contested, and the material past is often key to the assertion of rights to land and recognition. More widely, material heritage has been involved in conflicts throughout the world from the destruction of the Bamiyan Buddhas to the destruction of the Mostar Bridge in Bosnia to the competing claims to the religious monuments in Jerusalem. In many countries, dealing with heritage has been central to post-conflict healing and reconciliation, as in South Africa after the end of apartheid. In all these cases, the universal values of heritage (as defined, e.g., by UNESCO) have to be weighed against local understandings and valences. The different interests of stakeholders have to be evaluated and ethical positions debated. Increasingly the language of cultural rights and human rights in relation to heritage has been used. In all these ways, a post-processual approach has been active in this area (L-J Smith 2004; Meskell 2009).

Increasingly attempts are being made to bridge the divide between processual and post-processual archaeology. Certainly different traditions of research have been sustained. Thus one

might argue that on the whole cognitive processual approaches in archaeology as well as behavioral archaeology, human behavioral ecology, and evolutionary and complexity theory approaches tend to derive their heritage mainly from processual archaeology. On the other hand, a post-processual heritage is dominant for materiality studies, phenomenology, and postcolonial and indigenous archaeologies and in critical heritage discourse. Indeed it is possible to argue that the genealogies of current approaches can be traced to three general perspectives: culture history, processual, and post-processual. Despite some blending and slippage to be discussed below, in origin each theoretical position seems to see itself as largely in one or other of these camps. By culture history I mean approaches in archaeology that are concerned with the descent and affiliation of ceramic and other types through time. The differences between processual and post-processual archaeology have increasingly become aligned with the wider divisions within contemporary intellectual life between universal rationalism and positivism on the one hand and contextual and critical reflexivity on the other (Fig. 1).

Many approaches in archaeology are less clearly assignable to one approach or the other. For example, while feminist, Marxist, and indigenous archaeologies can be claimed to be part of post-processual archaeology (Hodder and Hutson 2003), others argue for independent positions for these perspectives (Moss 2005). However one cuts the cake, most archaeologists are aware of deep differences between approaches in which actors act rationally according to universal principles (optimizing or minimizing) and those in which activity is meaningfully and socially produced in complex historical and cultural contexts; and they equate the former with positivism and hypothesis testing and the latter with some form of critical reflexive science.

These different perspectives and their multiple subdivisions are linked to different sites of the production of archaeological knowledge. There are clear underlying differences between the types of interests and questions of those using general evolutionary approaches and those concerned with history and agency. Evolutionary and human behavioral ecology tend to focus on less complex societies including hunter-gatherers and fishers. Issues of power and agency are most easily dealt with in more complex and historical societies. Theories of memory construction and cultural rights to the past most readily engage materiality and heritage studies. Phenomenological approaches seem easiest to apply in prehistoric landscape studies. More generally, colonial archaeologies as in the United States seem most wedded to universalizing behavioral approaches, while postcolonial contexts, as in the rise of indigenous archaeology in the United States and elsewhere, readily lead to critical, historicizing, and collaborative perspectives.

Despite these differences, several authors over the past two decades have argued for some

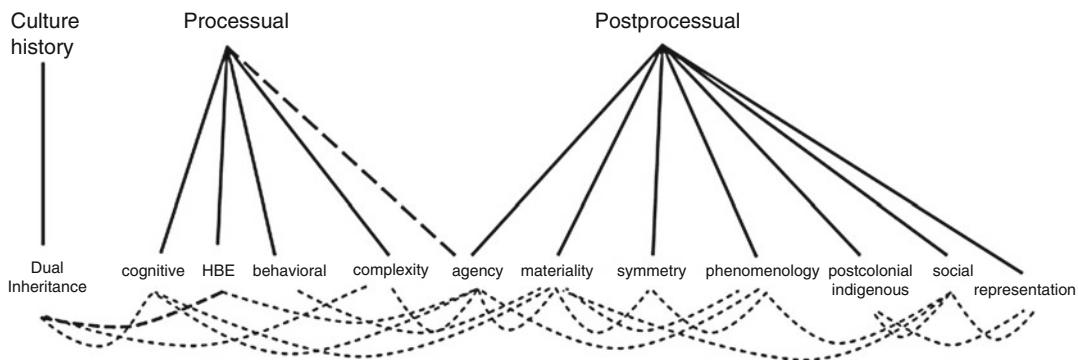

Post-Processualism, Development of, Fig. 1 One possible view of the historical relationships between some of the current theoretical approaches in archaeology

blending of processual and post-processual approaches (e.g., Hegmon 2003; Pauketat 2001; Wylie 1989) though not without critique (Moss 2005). Today many archaeologists consider the processual/post-processual debate largely as historical, and they pick and choose between them pragmatically as seems appropriate. Renfrew (1994) has talked of reaching an accommodation between processual and post-processual archaeology in cognitive processual archaeology. Kohler (2012) suggests that current approaches to complex systems incorporate critiques of a simple positivism, and he refers to Bintliff's (2008) argument that complexity theory integrates culture historical, processual, and post-processual perspectives. Schiffer (2010: 154) says that in the 1990s, he and others "sought to revitalize the behavioral program by adopting some post-processual research questions." This task was approached by applying the behavioral approach to ritual and religion, symbolic behavior, social power, and landscapes. For example, Walker (1995) examined the material and behavioral practices of ritual rather than the belief systems involved. The life histories of ritual artifacts were seen as leading to particular modes of deposition.

In practice today, each approach borrows from or reacts to developments within other approaches. Links are recognized between complex systems and the historical contingencies described in much post-processual archaeology. Cognitive processual and phenomenological approaches seem equally engaged in problems of mind, perception, and materiality. Agency is a clear linking domain, central to materiality and postcolonial and indigenous archaeology as much as it is to complex systems, agent-based modeling, and evolutionary archaeology.

Many archaeologists are increasingly concerned with one of the key issues of our time – the relationships between culture and biology and their relative importance. Many try to find some integration, arguing that culture and biology are both central to the project of being human. Such developments are found, for example, in the dual inheritance approach within evolutionary archaeology but also within discussions of embodiment, materiality, and landscape. Both sides of the debate in archaeology increasingly aim to allow the play of biological processes within culture and society and within social change.

Remaining Epistemological Differences

Despite all the evidence of increased interaction and accommodation between those approaches with processual and post-processual affinities, an apparent epistemological and methodological divide remains. Most of those in the United States who remain uncomfortable with the social theoretical questions posed in various forms of post-processual archaeology do so because they believe that post-processual archaeology threatens science in some way. Thus, Schiffer (2010, 155) argues that many behavioral archaeologists have adopted the research foci of post-processual archaeology and that they will place them "on a scientific foundation." Renfrew's concern in developing a cognitive processual archaeology resulted from similar fears.

What, then, are these key epistemological differences? Most processual archaeologists espouse some version of positivism and adhere to some notion of objective data and hypothesis testing because they fear that the only alternative is a form of relativism in which "anything goes." In other words, they fear that if there is no possibility of objective testing, then anyone's statement about the past is equally as good as anyone else's. I know of no post-processual archaeologist who would take this "anything goes" line. There are various forms of relativism, and most archaeologists would accept that archaeological interpretation is and should be answerable to data. The question is really just a matter of "how."

Archaeology is not for the most part an experimental science in which variables can be held constant. Rather, it is, like geology, an historical science that works by fitting lots of different types of data together as best it can in order to make a coherent account (Hodder 1999). This emphasis on fitting rather than testing is at the heart of the hermeneutic or interpretive approach. Theories of interpretation place emphasis on making sense of the event in relation to what is going

on around it while recognizing that generalizations have to be used. In the hermeneutic approach, it is recognized that the researcher comes to the data with much prior knowledge and pre-understandings. The data are perceived within these pre-understandings. The researcher then works by fitting all the data together so that the parts make up a coherent whole. The interpretation that works best both fits our general theories and pre-understandings, and it makes most sense of more data than other interpretations. The process is not circular – i.e., one does not just impose one's pre-understandings on the data. The objects of study can cause us to change our ideas but never in a way divorced from society and from perspective. There is thus a dialectical (dialogical) relationship between past and present and between object and subject. There is never a socially neutral moment in the scientific process, but equally, socially biased accounts can be transformed by interaction with objects of study.

But is there a real difference in practice between the processual positivist approach and the post-processual critical, dialectic, or hermeneutic approach? Is there any real difference between hypothesis testing and the hermeneutic spiral? The positivist view of science is that hypotheses are tested against data and they are confirmed or contradicted by the data, leading to new hypotheses which are themselves open to scrutiny and testing in the same way. In the hermeneutic spiral, the archaeologist starts with pre-understandings, evaluates the data to see how much fit there is, recognizes that the data do not all fit, and accommodates understandings, leading to new evaluations of fit. In practice these two approaches seem identical, except that the terms fit and test, understanding, and hypothesis are different.

So is all the fuss about nothing? Is the difference between the two approaches really about the choice of words and about how science is described? Both approaches claim to be scientific, so are the differences just about how science is understood? In many ways the differences have been overdrawn in the archaeological debate over recent decades. In many discussions the use of analytical or natural science techniques has been associated with positivist science, even though many historians of science would today argue against a positivist account of science. Post-processual archaeologists have used scientific techniques without adhering to a positivist framework.

But apparent differences remain. Within a positivist hypothesis testing framework, the main emphasis is placed on the role of objective and independent data. Wherever the hypothesis comes from, the data will allow the selection of the hypothesis that best fits. But within a hermeneutic framework, the pre-understandings play a significant role. They determine how the data are seen in the first place. However, much fitting/testing is carried out; the pre-understandings exert an influence. A clear example is the way in which Neolithic polished stone axes were for centuries thought to be thunder bolts. Within such a pre-understanding, it was not possible to develop hypotheses about how effective the "thunderbolt" was in woodworking. Such a hypothesis could only be entertained when the pre-understanding shifted and the "thunderbolt" was seen as an axe. Many pre-understandings derive from specific historical contexts of the production of knowledge. It is necessary for these pre-understandings to be critiqued at the same time as fitted to/tested against data. As a result differences remain between the social engagement of post-processual archaeology and the trust in a distanced objective science in processual archaeology.

Conclusion

Like most archaeologists today, we have employed a broad battery of scientific techniques at Çatalhöyük (Hodder 1999). We are trying to do good science at Çatalhöyük and use a wide range of natural science techniques. We build arguments by using as many different cross-cutting techniques as we can. But we are also aware of the ways in which our arguments are embedded in our

own assumptions and starting points; we always have to be careful and vigilant about where our ideas are coming from. And we also have to be aware that our assumptions and starting points may exclude the interests of others who come to Çatalhöyük with different perspectives.

So, in the end, despite the attempt by many to argue that processual and post-processual archaeology are developing close ties and common research questions, there remain important differences in terms of the role of the archaeologist in society. Although there are exceptions, on the whole the approaches identified as processual, remain committed to the analytical process as the sole sphere of a scientific process. On the other hand, those approaches identified as post-processual tend to be more ready to describe the scientific process as both analytical and at the same time responsive to critical reflection.

References

Bintliff, J. 2008. History and continental approaches. In *Handbook of Archaeological Theories*, ed. R.A. Bentley, H.D.G. Maschner, and C. Chippindale, 147–164. Lanham: Altamira.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2004. *The Collaborative Continuum: Archaeological Engagements with Descendent Communities*. Thousand Oaks: Altamira Press.

Fowler, C. 2004. *The Archaeology of Personhood: An Anthropological Approach*. London: Routledge.

Hegmon, M. 2003. Setting theoretical egos aside: issues and theory in North American archaeology. *American Antiquity* 68 (2): 213–243.

Hodder, I. 1982a. *Symbols in Action*. Cambridge: Cambridge University Press.

Hodder, I., ed. 1982b. *Symbolic and Structural Archaeology*. Cambridge: Cambridge University Press.

Hodder, I. 1999. *The Archaeological Process*. Oxford: Blackwell.

Hodder, I., and S. Hutson. 2003. *Reading the Past. Current Approaches to Interpretation in Archaeology*. Cambridge: Cambridge University Press.

Hodder, I., M. Shanks, A. Alexandri, V. Buchli, J. Carman, J. Last, and G. Lucas, eds. 1995. *Interpreting archaeology*. London: Routledge.

Joyce, R.A. 2005. Archaeology of the body. *Annual Review of Anthropology* 34: 139–158.

Leone, M. 1982. Some opinions about recovering mind. *American Antiquity* 47: 742–760.

Meskell, L. 2004. *Object Worlds in Ancient Egypt: Material Biographies Past and Present*. Oxford: Berg.

Meskell, L. 2009. *Cosmopolitan Archaeologies*. Durham: Duke University Press.

Miller, D., and C. Tilley, eds. 1984. *Ideology, Power and Prehistory*. Cambridge: Cambridge University Press.

Moss, M.L. 2005. Rifts in the theoretical landscape of archaeology in the United States: a comment on Hegmon and Watkins. *American Antiquity* 70 (3): 581–587.

Pauketat, T.R. 2001. Practice and history in archaeology. An emerging paradigm. *Anthropological Theory* 1: 73–98.

Renfrew, C. 1994. Towards a cognitive archaeology. In *The Ancient Mind, Elements of Cognitive Archaeology*, ed. C. Renfrew and E.B.W. Zubrow, 3–12. Cambridge: Cambridge University Press.

Schiffer, M.B. 2010. *Behavioral Archaeology. Principles and Practice*. London: Equinox.

Shanks, M., and C. Tilley. 1987a. *Re-constructing Archaeology*. Cambridge: Cambridge University Press.

Shanks, M., and C. Tilley. 1987b. *Social Theory and Archaeology*. Cambridge: Polity Press.

Smith, L.-J. 2004. *Archaeological Theory and the Politics of Cultural Heritage*. London: Routledge.

Tilley, C. 1994. *A Phenomenology of Landscape: Places, Paths and Monuments*. London: Berg.

Van Dyke, R., and S.E. Alcock, eds. 2003. *Archaeologies of Memory*. Oxford: Wiley-Blackwell.

Walker, W.H. 1995. Ceremonial trash? In *Expanding Archaeology*, ed. J.M. Skibo, W.H. Walker, and E.E. Nielson, 67–79. Salk Lake City: University of Utah Press.

Wylie, A. 1989. Archaeological cables and tacking: The implications of practice for Bernstein's 'Options Beyond Objectivism and Relativism'. *Philosophy of Social Science* 19: 1–18.

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Further Readings

Hodder, I., and S. Hutson. 2003. *Reading the Past*. Cambridge: Cambridge University Press.

Hodder, I., ed. 2012. *Archaeological Theory Today*. Cambridge: Polity Press.

Johnson, M. 2010. *Archaeological Theory: An Introduction*. Oxford: Blackwell.

Meskell, L., and R. Preucel, eds. 2004. *Companion to Social Archaeology*. Oxford: Blackwell.

McGuire, R. 2008. *Archaeology as Political Action*. Berkeley: University of California Press.

Preucel, R.W. 2006. *Archaeological Semiotics*. Oxford: Blackwell.

Preucel, R., and S. Mrozowski, eds. 2010. *Contemporary Archaeology in Theory: the New Pragmatism*. Oxford: Blackwell.

Ucko, P. 1995. *Theory in Archaeology: A World Perspective*. Oxford: Routledge.

Post-Second Temple Judaism Archaeology

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Introduction

Post-Second Temple Archaeology emerged as a result of early twentieth-century discoveries. Prior to that time, the scholarly consensus followed the traditional view that with the destruction of Jerusalem in 70 CE, the Jewish people were scattered among the nations and ceased to be an archaeologically relevant group in ancient Palestine. Early archaeological surveys by European scholars brought to light a wealth of evidence suggesting that Jews continued to thrive as cohesive communities, especially in the northern part of the country, that is, Galilee and the Golan Heights. Survey evidence appeared in the form of synagogue structures, architectural fragments decorated with Jewish motifs, and inscriptions in Hebrew, Aramaic, and Greek. In addition, important discoveries at sites such as Beth She'arim, Beth Alpha, Hammath Tiberias, and Dura-Europos in Syria paved the way for a new field of Jewish Archaeology (Fine 2005). Often considered a subfield of Roman and Byzantine Archaeology, Art History, or Jewish Studies, the archaeology of post-70 Judaism typically has been approached either through the lens of other cultures (Roman and Byzantine Christian) or within the framework of Jewish history.

Definition

The Second Temple period effectively ended with the destruction of Jerusalem in 70 CE. Although a few post-70 events, such as the siege of Masada, are treated as part of Second Temple Archaeology, the capture of Judaism's capital and holy city, as well as the destruction of the Jewish Temple, brought the First Jewish Revolt against the Romans (66–70 CE) to a close. The end of political autonomy for the Jews and the loss of Judaism's central religious institution mark a watershed in Jewish history that according to the traditional view inaugurated the Rabbinic period. As a result of discoveries relating to the Second Jewish or Bar-Kokhba Revolt (132–135 CE), some archaeologists and historians have reassessed this periodization, suggesting that 135 CE was a greater turning point in the history of the Jewish people.

The use of the term "Rabbinic period" presupposes the rise and ultimate hegemony of the rabbinic class in Jewish society. Rabbis are commonly understood as religious scholars and teachers. The theological precepts of the ancient rabbis are known through their extensive corpus of religious literature composed, edited, and redacted between the end of the Second Temple period and the medieval period. The earliest post-70 rabbis are known as *Tannaim*, and so their works, written primarily in Hebrew, are known as "Tannaitic" literature. The most important Tannaitic work is the Mishnah, edited in the early third century. The second and third centuries are often referred to therefore as the Mishnaic or Tannaitic period by historians, rabbinicists, and archaeologists. The successors of the *Tannaim* are referred to as the *Amoraim*, and their works, written primarily in Aramaic, are known as "Amoraic" literature. The most important Amoraic work is the Gemara, a detailed commentary on the Mishnah. These two works together comprise the Talmud. The fourth and sixth centuries are occasionally referred to as the Amoraic period. More often, the entirety of this period between the second and sixth centuries is termed the "Talmudic period."

The Rabbinic or Talmudic period corresponds with the nebulous term Late Antiquity. In Palestine, these centuries include the Late Roman period (mid-second to mid-fourth centuries) and the Byzantine period (mid-fourth to early seventh centuries). Some Late Ancient studies of Jews in Palestine include the beginning of the Early Islamic period as well. The Early Islamic period in Palestine is sometimes divided into the

Umayyad period (mid-seventh to mid-eighth centuries) and the Abbasid period (mid-eighth to mid-ninth centuries).

The geographic scope of Judaism in the post-70 period is fairly broad. The homeland of the Jewish people was ancient Palestine, alternatively known as the Land of Israel or Judea, depending on the source. By the late Hellenistic period (second century BCE), Jews had begun to emigrate to lands all over the Mediterranean and Near East. Writing in the years following the First Jewish Revolt, Flavius Josephus indicates that Jews inhabited virtually every major city of the Roman Empire. It is traditionally assumed that the failure of the First Jewish Revolt exacerbated the dispersion of Jews beyond Palestine, although some now believe that the failure of the Bar-Kokhba Revolt 65 years later played a greater role. Archaeologically, Diaspora Judaism is best attested by a dozen or so synagogues and burials throughout the Mediterranean Basin (see below), with very little material remains from the large communities in Babylonia known from the historical sources.

Historical Background

In 70 CE, the Roman army, under the command of Flavius Titus, besieged and ultimately captured Jerusalem, officially ending the First Jewish Revolt. The city's Temple, which served as the religious and political epicenter of Judaism, was destroyed in the process. To suppress further flares of insurrection, the Tenth Roman Legion (Fretensis) encamped on the ruins of the city, expelling all inhabitants.

This loss was detrimental to Jewish society. Not only did Jerusalem serve as the political and cultural capital, but, as the home of the only Jewish Temple, it was the sole locus of worship, that is, sacrifice, to the God of Israel. Scholars traditionally have maintained that the Jerusalem priesthood, which enjoyed religious and political hegemony in Judaism, ceased to function in its official capacity, since sacrifices could no longer be made. Recent scholarship though has considered a possible reemergence or continuation of the priesthood in a more authoritative capacity beyond 70 CE than has been assumed (see below).

As a consequence of the revolt, the Romans established the province of Judea, thereby introducing permanently stationed troops into the country and direct administration by the Roman military. The end of Jewish political autonomy in part led to a second revolt, led by Simeon bar Kosiba, known by the messianic title Bar-Kokhba (or "Son of a Star") in 132–135 CE The literary sources for the Bar-Kokhba Revolt are very meager, especially compared to the detailed accounts of the First Jewish Revolt. Most information has been gleaned from numismatic evidence and correspondence documents uncovered in the rebels' refuge caves in the Judean Desert (Yadin 1971). Some scholars believe that the Jewish rebels succeeded in capturing Jerusalem during the revolt, a presumed goal, although the evidence is not conclusive. In any case, the revolt was finally suppressed in 135 or 136. As punishment, Hadrian forbade Jews to inhabit the region surrounding Jerusalem, refounding the city as the Greco-Roman polis of Aelia Capitolina. In addition, the province was renamed Palaestina following the term used by the Greek historian Herodotus, based on the biblical Philistines who lived along the southern coast and western lowlands of the country during the Iron Age.

Following the two failed revolts, the majority of the Jewish population migrated northward to Galilee. With the loss of the Jerusalem Temple, Judaism faced a theological dilemma of how and where to worship. By most accounts, Jewish religious life became increasingly centered around the synagogue, or "meeting house," for communal worship (Levine 2005). While the primary means of Jewish worship during the Second Temple period was sacrifice in the Jerusalem Temple, personal and communal liturgy and Torah reading became increasingly important and standardized in the post-70 era. It was during this time that rabbinic literature flourished as the written records of debates surrounding the proper means (*halakhah*) of observing each biblical

commandment (*mitzvah*). Over the following centuries, these works were edited and embellished with commentary and tangential anecdotes (*haggadah*), thus providing perspectives on Jewish life. Unfortunately, the highly redacted rabbinic documents amount to a tangled web of details from different lands over the course of a half-millennium, and so they are highly problematic sources for historically reliable information.

The difficulty of the historical sources muddles our picture of Jewish society somewhat during Late Antiquity. One area of perennial debate among scholars is the extent and definition of the "rabbis." The most traditional view is that the rabbis comprised a class of religious scholars and sages who effectively led Jewish society. Critical views, however, contest that this group was marginal in reality and that they merely portray themselves as authoritative in their literary works (Schwartz 2001; Levine 2011). Similarly, recent studies have questioned what role Jewish priests may have played in this period, especially since archaeological discoveries point to priestly and Temple-related concerns in Late Ancient synagogues (see below). Rabbinic literature further attests to the existence of a Jewish Patriarch, seated in the urban centers of Lower Galilee until the early fifth century. While the role of this figure has been debated, it is generally believed that this official facilitated interaction between the Roman government and Jewish populace with a tenuous sanction by prominent rabbis.

Another recurrent theme in the study of post-70 Judaism is interaction with non-Jews. The proliferation of Greco-Roman culture in Palestine from the first century onward was conceived by many ancient authors as a challenge to the traditional observance of Judaism. However, as archaeological discoveries and critical readings of the rabbinic texts have shown, Jews found themselves increasingly comfortable with displays of figural art, Roman civic institutions, and even the worship of polytheistic deities by non-Jews within their cities. The rise of Christendom in the fourth century posed a new challenge by a faith that claimed the same biblical tradition as the Jews. Between the fourth and seventh centuries, Palestine underwent a demographic shift that brought the majority of inhabitants under a single religious identity. The heretofore neglected province was thrust onto the international stage, as royal endowments catalyzed the construction of churches and monasteries, as well as an influx of pilgrims to the "Holy Land." Despite the theological and social challenge of Christianity, Jews apparently flourished amid the resulting economic boom, building the most elaborate synagogues the country had ever seen or would again until the modern era.

Palestine's prosperity flagged with the Byzantine wars against the Sassanian Persians in the early seventh century. The weakened political and economic circumstances set the stage for the relative ease of the Islamic Conquest of Palestine (636–640). Evidence from several synagogues in both Galilee and the southern part of the country suggests that Jews continued to live in Palestine much as they had under Byzantine Christian rule. While there is little evidence to support the notion that Jews faired any worse under the Umayyad or Abbasid caliphates, the archaeological evidence suggests that the boom of synagogue construction seen in the Byzantine period had come to an end.

Key Issues/Current Debates

There can be little doubt that synagogue studies dominate the archaeology of post-70 Judaism. Between 60 and 70 individual synagogue buildings dating to the Late Roman and Byzantine periods have been identified in Palestine and the Diaspora. Additional evidence in the form of decorated architectural fragments and inscriptions removed from context attests to dozens, if not hundreds, more synagogues that existed in antiquity (Milson 2007). (Several Samaritan synagogues have also been uncovered, though despite their similarity in form to Jewish synagogues, they remain part of a distinct religious tradition).

Considerable debate has erupted over the past few decades concerning the dates of the earliest post-70 synagogues. Rabbinic literature attests to the existence of the synagogue as an institution during the second–third centuries, but there is

very little archaeological evidence of synagogues prior to the fourth century (Gal 1995; Ma'oz 1999; Magness 2001; Milson 2007: 22–30). The apparent gap in the archaeological record of the second–third-century synagogue is most likely due to the nature of the building during the Late Roman period. That is to say, synagogues probably were modest and unimposing structures, in the style known from Second Temple period sites such as Masada and Gamla. As a result, they are difficult to find in the archaeological record. The only example with an uncontested mid-third-century date comes from Dura-Europos, where a synagogue was modified from a private home rather than a purpose-built monumental structure and preserved due to an unusual set of circumstances (see below). In any case, the height of monumental synagogue building in Palestine appears to begin in the fourth century and continue into the sixth century, although many synagogues remained in use into the seventh century or later (Milson 2007).

Some synagogues were built as Roman basilicas, with an internal colonnade and triportal façade on the Jerusalem-oriented wall. This type of synagogue is sometimes referred to as the "Galilean" type, after its primary region of occurrence. Important examples of Galilean-type synagogues include the sites of Capernaum, Bar'am, Meiron, Arbel, Gush Halav, Chorazin, and Nabratein (Kohl and Watzinger 1916; Corbo et al. 1972–2007; Meyers et al. 1981; Meyers et al. 1990; Yeivin 2000; Meyers and Meyers 2009). These synagogues were typically paved with flagstones and decorated with stone relief work. Alternatively, during this same period, Jews constructed synagogues that resembled church architecture more closely, often laid out as a colonnaded hall with an apse on the Jerusalem-oriented wall and preceded by a narthex and atrium, most of which was paved in decorative mosaics. Important examples of this type of synagogue include Beth Alpha in Lower Galilee and Na'aran in the lower Jordan Valley (Sukenik 1932).

Most synagogues, however, did not follow a standard layout, a point which has been underscored through discoveries and studies over the past few decades. Despite early attempts by archaeologists to create a synagogue typology and identify standardized architecture (Avi-Yonah 1978), less regularly planned synagogues such as at Hammath Tiberias, Khirbet Shema', En-Gedi, Sepphoris, and elsewhere have demonstrated the diversity of synagogue architecture (Dothan 1983–2000; Meyers et al. 1976; Barag 1993; Weiss 2005). These synagogues included apses and niches, courtyards and forecourts, or mosaics and relief works as the local communities and architects saw fit. In this way, the overall picture differs somewhat from the more standardized church architecture of Byzantine Palestine, perhaps a reflection of the decentralization of post-70 Judaism.

The synagogue discoveries of the early twentieth century uncovered an unexpected wealth of Jewish art. The earliest finds by the German survey team of Heinrich Kohl and Carl Watzinger in 1905–1906 showed that Jews decorated their buildings with stone relief using some of the same motifs and styles as Classical architecture (Kohl and Watzinger 1916). Likewise, the discoveries at Dura-Europos, Na'aran, and Beth Alpha demonstrated the breadth of Jewish representational art in the form of wall paintings and mosaic pavements (Sukenik 1932; Kraeling 1956). Again, these works utilized Greco-Roman and Byzantine motifs and styles, including animal representation, the Zodiac cycle, and even depictions of the sun god, Helios. Alongside non-Jewish or religiously neutral themes were biblical scenes and motifs referencing Jewish liturgical practices and sacred occasions, such as the ram's horn (*shofar*) used in the celebration of the New Year (Rosh Hashanah), the bound branches and citron (*lulav* and *etrog*) used during the Festival of Tabernacles (Sukkot), and the Torah Shrine façade depicting the elaborately decorated closet in which the synagogue's biblical scrolls were stored. (Alternatively, some have interpreted the Torah Shrine façade as a representation of the Jerusalem Temple, while others have argued that it is a symbolic reference to both the Torah and the Temple at the same time, Hachlili 1988: 272–80).

The most important Jewish motif used during this period was the seven-branched candelabrum

or *menorah*. Based on the decorative furniture described in the Bible and later used in the Jerusalem Temple, the *menorah* became a symbol of Judaism in Late Antiquity. Although a few depictions of the *menorah* appear as early as the late Second Temple period, the use of the motif as an ethnic identifier and Jewish symbol became widespread in the fourth century, coinciding with the rise of the cross as the identifying mark of Christianity (Hachlili 2001).

Among the most important testaments to the wealth of synagogue art comes from Syria, at the site of Dura-Europos on the Euphrates River (Kraeling 1956). The building itself is rather unremarkable, but the interior walls were richly decorated with wall paintings depicting a variety of biblical scenes. The walls in the Dura-Europos synagogue were preserved because the building was filled with earth as a defense measure during the city's siege by the Persians in the mid-third century. The scenes depict figures and scenes from the Hebrew Bible, melding Late Roman and Persian styles.

Beyond the synagogue, Jewish art found an important outlet in funerary contexts. The most notable Jewish cemetery is the necropolis of Beth She'arim in Galilee, where Jewish burials of the third–sixth centuries were identified on the basis of inscriptions in Hebrew, Aramaic, and Greek (Mazar et al. 1973–76). Relief carvings on sarcophagi and tomb walls include Jewish symbols, such as the *menorah*, as well as animals, human faces, and even a scene from Greco-Roman mythology. The inscriptions identify several of the interred as rabbis and indicate that some came from the Diaspora.

These archaeological discoveries of Jewish art came as a surprise to scholars of rabbinics and Jewish history in the early and mid-twentieth century. The rabbinic treatment of the Second Commandment (Ex. 20: 4–6) suggests that Jews adhered to a strict forbiddance of figural imagery, that is, representations of living creatures, especially the human form (Fine 2005; Levine 2011). Depictions of animals, biblical scenes, and Greco-Roman mythological beings would seem to contradict the traditional view of ancient Judaism. Archaeologists and historians have grappled with this dilemma for a century. Among the most thorough studies was that of E. R. Goodenough. Based in part on the richly decorated walls of the Dura-Europos synagogue, Goodenough proposed that a form of "Hellenistic Judaism," running counter to rabbinic traditions, was responsible for such lavish decoration (Goodenough 1953–65).

Although few scholars accepted Goodenough's overall thesis, the notion that alternative forms of Judaism existed in the ancient world was intriguing. The representations of liturgical paraphernalia – such as the *lulav*, *etrog*, and *shofar* (see above) – led some to identify deliberate references to the Jerusalem Temple. Archaeological evidence has been cited to demonstrate that the Temple's former priesthood, once the dominant religious group in Jewish society, became influential in the synagogue during Late Antiquity. The priestly connection is supported by several inscriptions citing donations made by priests and two plaques listing the priestly courses (*mishmarot*) known from the biblical book of Chronicles.

On the other hand, there is evidence that rabbinic attitudes toward figural imagery adjusted to accommodate the realities of their world. Scholars have pointed to rabbinic expositions of biblical texts that incorporate the meanings expressed in the artistic traditions of the synagogue. Other studies have interpreted artistic programs – that is, individual panels or units in a building's art that are "read" as a unified message – in synagogue art through the lens of rabbinic literature. The most detailed example of this method comes from the final report of the Sepphoris synagogue (Weiss 2005). These studies favor a maximalist position regarding rabbinic participation in the synagogue. More telling, however, is the Rehov synagogue, where an extended inscription – the longest ever found in a synagogue – quotes a passage known from rabbinic literature. The passage concerns the agricultural regulations pertaining to tithing and the Jewish seven-year sabbatical cycle.

Over the last decade, an important challenge to the traditional history of Jewish society in the post-70 era was proposed by Seth Schwartz. Schwartz suggested that Judaism all but collapsed

in the wake of the failure of the Bar-Kokhba Revolt (132–135 CE), and Jewish society succumbed to the Greco-Roman cultural matrix, abandoning the religious practices developed over the course of the Second Temple period. According to Schwartz, Judaism reemerged in the mid-fourth century, as Christianity became dominant in Palestine and forced a more exclusive form of worship than its polytheistic predecessor (Schwartz 2001).

As many critics have pointed out, the wealth of rabbinic literature from the second to fourth century poses a particular difficulty for Schwartz's thesis. From the perspective of archaeology, Schwartz's case is supported by the redating of many synagogues, especially the Galilean-type buildings, once thought to be Late Roman, but now generally considered products of the fourth century and later. In addition, Schwartz points to figural imagery on city-coins and other finds from Sepphoris and Tiberias in Lower Galilee to suggest that these were typical Greco-Roman cities in the Late Roman period, inhabited by Jews but indistinguishable from their non-Jewish neighbors and suffused with "pagan" culture. By the mid-fourth century, however, the Christianization of the Roman world marginalized and excluded Jews, forcing them back into the ancestral religion and culture that had been preserved tenuously by a small group of rabbis.

Schwartz's overall thesis is not generally accepted, but like Goodenough's study, it has posed an important challenge to the field, forcing scholars to rethink approaches to the archaeological evidence. For example, does the general absence in the archaeological record of the second- and third-century synagogue in Palestine indicate that Jews did not build synagogues – or even practice Judaism – at that time? Or does it suggest that the synagogue took a wholly different form than archaeologists and historians expect? Or, conversely, are there other processes – such as preservation or the reuse of sites and building materials – at play that might obscure the remains? As a result of Schwartz's study, a reconsideration of how the material evidence should be used in historical reconstruction alongside literary sources has characterized much of the research in the past decade.

Archaeology has made an especially significant contribution to the study of Diaspora Judaism in the post-70 era. A dozen or so ancient synagogues are known from the Roman and Byzantine world outside of Palestine, including examples from Italy, North Africa, Greece, Albania, Bulgaria, Turkey, and Syria. In addition to the third-century building from Dura-Europos (see above), excavations in the synagogue of Ostia near Rome have shown that the building was used for Jewish liturgy from at least the fourth century onward, and perhaps earlier. At Sardis in Turkey, a great hall attests to the largest synagogue known from the ancient world. Interestingly, the building originally was part of the civic center but apparently was acquired by the Jewish community and converted into a synagogue in Late Antiquity, suggesting that Jewish communities enjoyed a high socioeconomic status as late as the sixth century, despite literary sources that attest to occasional persecution.

International Perspectives

As with most subfields in the study of ancient Palestine, the archaeology of post-70 Judaism is fraught with controversies over the cultural heritage. Many of the relevant sites are located in the contested territories of the West Bank and the Golan Heights. As a result, questions surrounding the ownership of sites and finds have played an occasional role in the negotiations between the State of Israel and the Palestinian National Authority and the politics of the region.

Future Directions

Recent and new excavations in Late Ancient Jewish cities and villages over the past decade or two continue to fuel the study of post-70 Judaism. As the results of excavations at Sepphoris and Khirbet Qana during the 1990s and early 2000s emerge, evidence of city and village life for Jews during the Late Roman period will come to light, thereby addressing in part the challenge of Seth Schwartz's thesis (see above). In addition, new

synagogue excavations have begun over the past few years at Khirbet Wadi el-Hammam and Huqoq, both in Galilee. Both have incorporated into their project goals a study of the associated village in addition to the site's synagogue. The results will provide fresh perspectives on Jewish life beyond monumental and religious architecture.

Cross-References

- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Israel: Museums
- ▶ Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of
- ▶ Second Temple Judaism Archaeology

References

Avi-Yonah, M. 1978. Synagogues. In *The encyclopedia of archaeological excavations in the Holy Land*, ed. M. Avi-Yonah and E. Stern, vol. 4, 1129–1138. Israel Exploration Society & Massada Press.

Barag, D. 1993. En-Gedi: The synagogue. In *The new encyclopedia of archaeological excavations in the Holy Land*, ed. E. Stern, vol. 2, 405–409. Jerusalem: Israel Exploration Society.

Corbo, V., S. Loffreda, A. Spijkerman, E. Testa, and B. Callegher. 1972–2007. *Cafarnao*. Vol. 1–9. Jerusalem: Franciscan Press.

Dothan, M. 1983–2000. *Hammath Tiberias*, 2 Vols. Jerusalem: Israel Exploration Society.

Fine, S. 2005. *Art and Judaism in the Greco-Roman world: Toward a new Jewish archaeology*. New York: Cambridge University Press.

Gal, Z. 1995. Ancient synagogues in the eastern Lower Galilee. In *Ancient synagogues: Historical analysis and archaeological discovery*, ed. D. Urman and P.V.M. Flesher, 166–173. Leiden: Brill.

Goodenough, E.R. 1953–65. *Jewish symbols in the Greco-Roman period, Volumes I–XIII*. New York: Pantheon.

Hachlili, R. 1988. *Ancient Jewish art and archaeology in the Land of Israel*. Leiden: Brill.

Hachlili, R. 2001. *The menorah, the ancient seven-armed candelabrum: Origin, form and significance*. Leiden: Brill.

Kohl, H., and C. Watzinger. 1916. *Antike Synagogen in Galilaea*. Leipzig: J.C. Hinrichs'sche Buchhandlung.

Kraeling, C.H. 1956. The synagogue. In *The excavations at Dura-Europos conducted by Yale University and the French Academy of Inscriptions and Letters, final report VIII, part I*. New Haven: Yale University Press.

Levine, L.I. 2005. *The ancient synagogue: The first thousand years*. 2nd ed. New Haven: Yale University Press.

Levine, L.I. 2011. Synagogue art and the rabbis in late antiquity. *Journal of Ancient Judaism* 2: 79–114.

Ma'oz, Z.U. 1999. The synagogue at Capernaum: A radical solution. In *The Roman and Byzantine Near East: Some recent archaeological research*, ed. J.H. Humphrey, vol. 2, 137–148. Portsmouth: Journal of Roman Archaeology.

Magness, J. 2001. The question of the synagogue: The problem of typology, and a response to Eric M. Meyers and James F. Strange. In *Judaism in late antiquity, Part 3. Where we stand: Issues and debates in ancient Judaism. volume 4: The special problem of the synagogue*, ed. A.J. Avery-Peck and J. Neusner, 1–48, 79–91. Leiden: Brill.

Mazar, B., M. Schwabe, B. Lifshitz, and N. Avigad. 1973–76. *Beth She'arim, Volumes I–III*. New Brunswick: Rutgers University Press.

Meyers, E.M., and C.L. Meyers. 2009. *Excavations at ancient Nabratein: Synagogue and environs*. Winona Lake: Eisenbrauns.

Meyers, E.M., A.T. Kraabel, and J.F. Strange. 1976. *Ancient synagogue excavations at Khirbet Shema', Upper Galilee, Israel 1970–1972*. Durham: Duke University.

Meyers, E.M., J.F. Strange, and C.L. Meyers. 1981. *Excavations at ancient Meiron, Upper Galilee, Israel: 1971–72, 1974–75, 1977*. Cambridge, MA: American Schools of Oriental Research.

Meyers, E.M., C.L. Meyers, and J.F. Strange. 1990. *Excavations at the ancient synagogue of Gush Ḥalav*. Winona Lake: Eisenbrauns.

Milson, D. 2007. *Art and architecture of the synagogue in late antique Palestine: In the shadow of the church*. Leiden: Brill.

Schwartz, S. 2001. *Imperialism and Jewish society, 200 BCE to 640 CE*. Princeton: Princeton University Press.

Sukenik, E.L. 1932. *The ancient synagogue of Beth Alpha*. Jerusalem: Jerusalem University Press.

Weiss, Z. 2005. *The Sepphoris synagogue: Deciphering an ancient message through its archaeological and socio-historical contexts*. Jerusalem: Israel Exploration Society & Hebrew University.

Yadin, Y. 1971. *Bar-Kokhba: The rediscovery of the legendary hero of the Second Jewish Revolt against Rome*. New York: Random House.

Yeivin, Z. 2000. *The synagogue at Korazim: The 1962–1964, 1980–1987 excavations*. Jerusalem: Israel Antiquities Authority.

Further Reading

Avi-Yonah, M. 1976. *The Jews of Palestine: A political history from the Bar Kokhba war to the Arab conquest*. Oxford: Blackwell.

Potato: Origins and Development

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Basic Species Information

The potato (*Solanum tuberosum* L.) is one of the most significant food crops cultivated globally. From initial domestication in the central Andean region, potatoes have spread across the world to become the dominant tuberous crop in temperate climates. In contrast to many root crops, several major volumes have been published on the history of potato domestication and cultivation (e.g., Salaman 1949; Hawkes 1990).

The potato (*Solanum tuberosum*) is a flowering plant of the Solanaceae family, which includes several other domesticated plants such as tomato (*Solanum lycopersicum*), aubergine (*Solanum melongena*), and tobacco (*Nicotiana tabacum*). The potato produces stolons (or underground stems) that under certain environmental conditions enlarge to form tubers (the Potato Genome Sequencing Consortium 2011). Potatoes are propagated vegetatively through the transplantation of "seed potato," namely, the swollen stolon or tuber. The plant is predominantly grown as a source of starch, although it provides some protein, vitamins, and other nutrients.

Major Domestication Traits

Although there is only one domesticated species (*Solanum tuberosum*), there are thousands of cultivated varieties which display considerable genetic and morphological variation. Human selection under cultivation has favored size, shape, color, texture, and taste, including the reduction of bitter glycoalkaloids.

There is considerable diversity in the number and range of wild *Solanum* species in the Americas, many of which are tuber-bearing. However, the greatest diversity of potato cultivars is found in the central Andean zone of Peru and Bolivia. Indeed, the plant is generally considered to have been domesticated in the temperate climates of the central Andes (Harlan 1971; Brush et al. 1981; Hawkes 1990; Vavilov 1992; Spooner et al. 2005).

Although various hypotheses have been proposed, all suggest domestication from a group of morphologically similar, wild tuberous *Solanum* species – referred to as the *Solanum brevicaule* complex in the central Andes (extending from Peru to Argentina). The specifics of the hypotheses vary: most suggest multiple domestications from different members of the *Solanum brevicaule* complex across the central Andean region (e.g., Hawkes 1990), whereas others suggest a single domestication or monophyletic origin in Peru (e.g., Spooner et al. 2005). Potato is generally considered to be a cultigen, namely, it was domesticated through the introgression or cross-fertilization between two species rather than being descended from a single precursor.

The oldest archaeological evidence for potato domestication comes from the central Andean region. Macrobotanical finds of potato tuber fragments at Tres Ventanas caves in Chilca Canyon of coastal Peru have been claimed to date to the early Holocene, perhaps to 10,000 years ago (Engel 1970; Pickersgill and Heiser 1977). Given the morphological range in tuber-bearing *Solanum* species, some of these identifications may require more detailed analysis to determine species and domestication status more precisely. Perhaps tellingly, potato remains are almost absent from the archaeobotanical record from the central Andean region for the following 5,000 years or so; the next oldest sites yielding evidence of potatoes date to c. 4,500–4,000 years ago (see review in Hastorf 2007). Evidence for the likely cultivation of potatoes becomes more common from c. 4,000 to 3,500 years ago in the Casma Valley of Peru (Ugent et al. 1982; Ugent and Peterson 1988), tentatively identified at Waynuna in southern Peru (Perry 2007), as well as at other sites.

Potatoes are depicted on ceramics of Andean cultures dating to the last 2,000 years or so.

Over the last 500 years, potato has been distributed widely across the globe to be grown predominantly in temperate climates (Salaman 1949). Initially, only a narrow genetic range of cultivated potatoes was moved to Europe, but this has been deliberately expanded since the nineteenth century. The infamous Irish potato famine of the mid-nineteenth century was caused by blight (*Phytophthora infestans*), which in part was so pernicious due to a narrow genetic stock of potatoes cultivated at that time. The dependence of the Irish population on potatoes led to the major famine with potentially up to a million people dead and a larger number migrating overseas. Given the global significance of the crop, a recent international effort has been focused on sequencing the potato genome with a view of crop improvement to resist blight and other diseases (the Potato Genome Sequencing Consortium 2011).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Tomatoes: Origins and Development
- ▶ Vegeculture: General Principles

References

Brush, S.B., H.J. Carney, and Z. Huamán. 1981. Dynamics of Andean potato agriculture. *Economic Botany* 35: 70–88.

Engel, F.A. 1970. Explorations of the Chilca Canyon, Peru. *Current Anthropology* 11: 55–58.

Harlan, J.R. 1971. Agricultural origins: Centers and noncenters. *Science* 174: 468–474.

Hastorf, C.A. 2007. Cultural implications of crop introductions in Andean prehistory. In *The emergence of agriculture: A global view*, ed. T.P. Denham and P. White, 106–133. Abingdon: Routledge.

Hawkes, J.G. 1990. *The potato: Evolution, biodiversity and genetic resources*. London: Belhaven Press.

Perry, L. 2007. Starch remains, preservation biases and plant histories: An example from highland Peru. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T.P. Denham, J. Iriarte, and L. Vrydghs, 241–255. Walnut Creek: Left Coast Press.

Pickersgill, B., and C.B. Heiser. 1977. Origins and distribution of plants domesticated in the New World tropics. In *Origins of agriculture*, ed. C.A. Reed, 803–835. The Hague: Mouton.

Salaman, R.N. 1949. *The history and social influence of the potato*. Cambridge: Cambridge University Press.

Spooner, D.M., K. McLean, G. Ramsay, R. Waugh, and G.J. Bryan. 2005. A single domestication for potato base on multilocus amplified fragment polymorphism genotyping. *Proceedings of the National Academy of Sciences of the USA* 102: 14694–14699.

The Potato Genome Sequencing Consortium. 2011. Genome sequence and analysis of the tuber crop potato. *Nature* 475: 189–195.

Ugent, D., and L.W. Peterson. 1988. Archaeological remains of potato and sweet potato in Peru. *Circular (International Potato Center)* 16: 1–10.

Ugent, D., S. Pozorski, and T. Pozorski. 1982. Archaeological tuber remains from the Casma Valley of Peru. *Economic Botany* 36: 182–192.

Vavilov, N.I. 1992. *Origin and geography of cultivated plants*. Trans. and ed. D. Löve. Cambridge: Cambridge University Press.

The Potter's Wheel

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Introduction

The potter's wheel was invented in the 5th millennium BC in the Near East and spread across the Mediterranean into southern and eastern Europe during the late Bronze and early Iron Ages before also reaching Asia and, finally, the American

continent. The potter's wheel utilized new technological principles, namely, rotational kinetic energy (RKE) combined with manual force, to shape vessels. Initially, however, it seems that the wheel was only used to throw small shapes and medium or large-sized pots were made in stages using hybrid techniques. When utilized to its full potential, this invention has the ability to speed up production considerably. It remains a mystery why ethnographic studies consistently show that the potter's wheel is almost exclusively associated with male potters.

Definition

Scholars have conventionally defined potter's wheels either by placing greater emphasis on the device's design (Childe 1954; Evely 2000; Franken 1971; Holthoer 1977; Saraswati and Behura 1966; Streily 2000; Wood 1990) or on the speed/length of rotation that can be achieved (Arnold and Bourriau 1993; Foster 1959a; Rice 1987; Roux 2019; Scheans 1965; Thér et al. 2017). In reality, most scholars recognize that the two aspects need to be considered together as unaided rotation requires a stable and smoothly running flywheel.

Potter's wheels are traditionally divided into two categories: simple and double (or kick) wheels (Holthoer 1977) (Figs. 1 and 2). Both can reach a maximum speed of 220–230 rotations per minute (rpm), though most potting activities will fall within a range of 50–120 rpm. The simple wheel consists of one single, heavy wheel that serves both as the flywheel and the potting surface. It is activated by stick or by hand – either by the potter or an assistant. The momentum is stored in the heavy wheel which will gradually slow down as the potter works. A pivoting axis is set in the ground and, depending on its length, may also need stabilizing higher up. To achieve the necessary weight, they are normally made of stone or clay, though wood can also be used. The simple wheel can be constructed at any height, and potters may sit, squat, or stand to work on it. The double wheel is constructed of a light round upper throwing surface and a heavy flywheel below which are connected by a fixed vertical axis. The advantage of the double wheel is that potters themselves can adjust its speed seamlessly by kicking the flywheel at the bottom while constructing the pot on the small throwing surface on the top.

Potter's wheels need to be distinguished from rotary devices and turntables (or *tournettes*).

The Potter's Wheel, Fig. 1 Simple wheel from India. (Wikimedia commons; accessed 12/9/19)

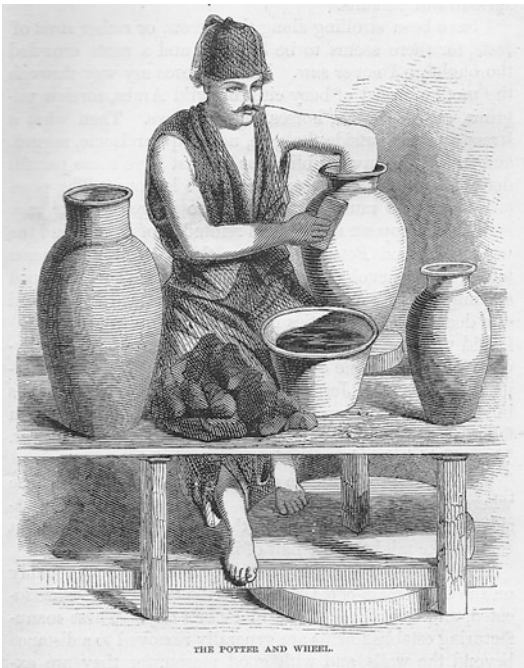

The Potter's Wheel, Fig. 2 Kick wheel, Jaffa, Palestine, 1859. (Wikimedia commons; accessed 12/9/19)

A rotary device is not mounted on an axis and hence does not generate any rotational momentum. A rotary device might be a wooden or clay plate, bat, or a large clay sherd upon which a pot is being constructed. Early Bronze Age "mats" from Crete are good examples of this type (Evely 2000: 271–273 (Type 1)). A turntable is a device mounted on an axis which the potter or an assistant can rotate, but any momentum generated slows down quickly and does not allow the creation of an entire vessel. Turntables can be made of wood, clay, or stone. Roux considers prehistoric Mesopotamian and Palestinian stone-pivot arrangements to fall into this category (2019: 50; Roux and de Miroschedji 2009) (Fig. 3). The division of devices into rotary devices, turntable, and wheel is based on the assumption that only wheels can achieve sufficient rotational kinetic energy that would allow the wheelhead to spin for long periods of time despite the weight of the flywheel itself, the weight of the clay, and the pressure exerted by the potter while making the pot. However, in reality, the distinction between the different potting devices is rather fluid and imprecise.

Several physical phenomena impact on a vessel as it is being thrown on the wheel. These are the rotational kinetic energy (expressed in terms of angular velocity and the moment of inertia), as well as manual pressures. Angular velocity is the amount of rotation the wheel undergoes based on its speed and direction. The moment of inertia is the distribution of mass around an axis of rotation and refers to the opposition of the device to changes in speed of rotation. Calculations may include, for example, its weight, dimensions, and morphology. Hence, rotational kinetic energy is the rotational energy that the wheel exerts bearing in mind the speed of rotation and opposition to this rotation. Manual pressures are vertical and horizontal pressures of the potter's hands in relation to the malleable clay as she/he pulls up the vessel, thins the walls, and molds its shape by pushing inward or outward with one or both

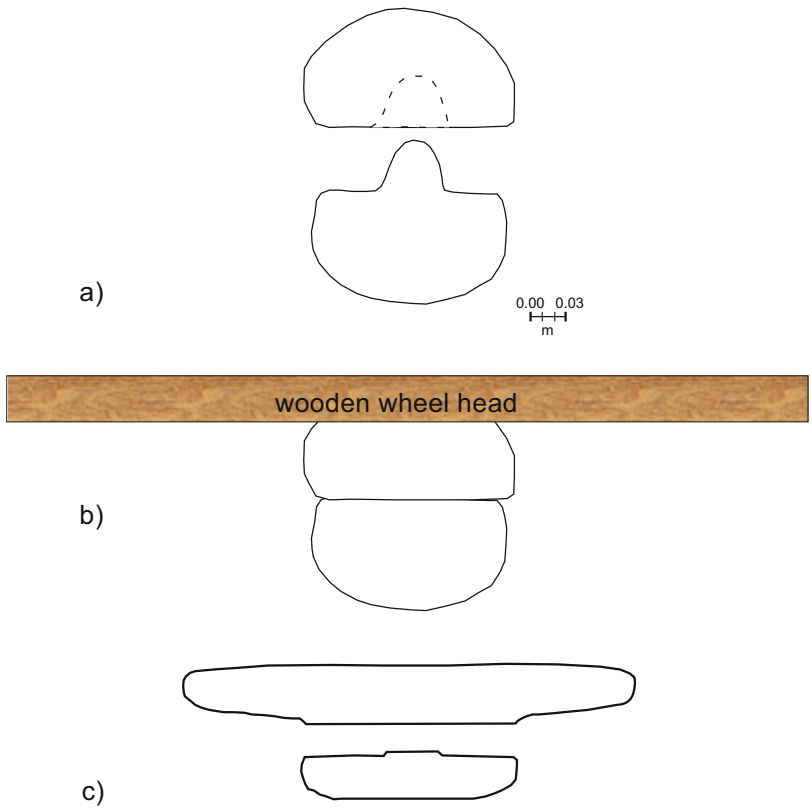

The Potter's Wheel, Fig. 3 Levantine and Egyptian potter's wheels. (**a**) Canaanite-Israelite and Egyptian stone socket/pivot arrangements. (After Amiran and Shenhav 1984; Powell 1995); (**b**) Reconstruction of Canaanite-Israelite and Egyptian potter's wheel. (After Amiran and Shenhav 1984; Powell 1995); (**c**) Levantine stone potter's wheel. (After Roux and de Miroschedji 2009). To scale

hands. In contrast to common perception, centrifugal force – which exerts pressure toward the outside – does not play an active role in raising a vessel up; it only contributes negatively or positively by making inward movement harder or by supporting outward movement (Roux 2019: 76–83). A similar argument can be made about gravity which could also be considered a passive force in that it attracts a material toward the center of the earth and thus exerts downward pressure on the clay mass, but does not impact positively on the upwards throwing motion of a potter.

Excavations do not necessarily reveal potter's workshops or evidence of potter's wheels and archaeologists therefore must rely on macroscopic and microscopic traces on the pots themselves to deduce the use of a potter's wheel (Evely 2000: 269; Van As and Jacobs 2014: 89). There are several of these marks or traces.

The first of the macroscopic marks is the base (or central) spiral. This spiral is created when the potter applies first downward and then outward pressure with their fingers to open the clay ball and to create the base width of the vessel. It quite often leaves a raised central "pimple." Because the wheelhead of the potter's wheel offers solid resistance, the base spiral is normally well pronounced (Fig. 4a). The second feature is throwing grooves, also called rilling, on the outside and/or inside of the vessel wall. Rilling marks are best observed on the interior of restricted vessels. They can be shallow or deep and horizontal, concentric, or spiraling depending on the pressure, direction, and speed applied by the potter. The more even and continuous these grooves, the more likely they are made by throwing (Fig. 4b). Uneven or discontinuous rilling may hint at forming techniques that only utilize rotation for part of the manufacturing sequence (Courty and Roux 1995). When pots receive secondary treatments like smoothing, scraping, burnishing, or turning, rilling marks may be obliterated entirely. Thirdly, there are diagonal compression ridges in the neck region which occur when rotating clay is being pushed inward to create a neck. The fourth mark is the spiral cut-off pattern on the underside of the base. When the wheel is rotating while the potter is cutting the pot off with a string or wire, this action leaves a characteristic decentralized spiral pattern on the underside of the base (Fig. 4c). Stationary vessels leave linear marks. Cutting marks are often removed by subsequent treatment. Finally, there is a gradual thinning of the wall from the base to the rim. Unlike handmade pots which can display the same wall thickness from base to rim, wheel-thrown vases normally show a gradually reducing thickness as the lower section would otherwise collapse under the weight of the upper section (Fig. 4d).

While all these marks and features are clear evidence of the utilization of some rotating device at a particular stage during the making of a vessel (e.g., the base, the neck, or removal of the pot), none of these marks are incontrovertible or unambiguous evidence of throwing as turning devices can leave similar patterns nor do they confirm that the entire pot has been made on the wheel. Absence of distinct traces of hand-forming techniques, such as coil seams, mold seams, or uneven wall thickness as a result of paddle and anvil action, can aid our interpretation.

In addition, there are further – more subtle – macroscopic indicators of wheel-throwing. Firstly, there is the pot's symmetry. Handmade pots can take on any shape, regular or irregular. In contrast, pots thrown on a wheel are, by the very nature of the device, symmetrical and regular in shape. Secondly, as wheel-throwing requires clay to be wet in order to make it malleable, this can lead to unintended stretching of the clay which is visible as small cracks in the wall. Finally, the existence of self-slip is indicative of the use of water during the manufacture which creates a very thin layer of liquid clay that settles on the walls of the vessel. It may be removed by subsequent surface treatment or decorating.

Most of these indicators are polysemic and can be the result of entirely different forming techniques. However, the most reliable ones for throwing are the base spiral and reducing thickness between the base and rim as they are less likely to stem from other manufacturing techniques.

Microscopic investigations, while time-consuming, costly, and limited in sample size,

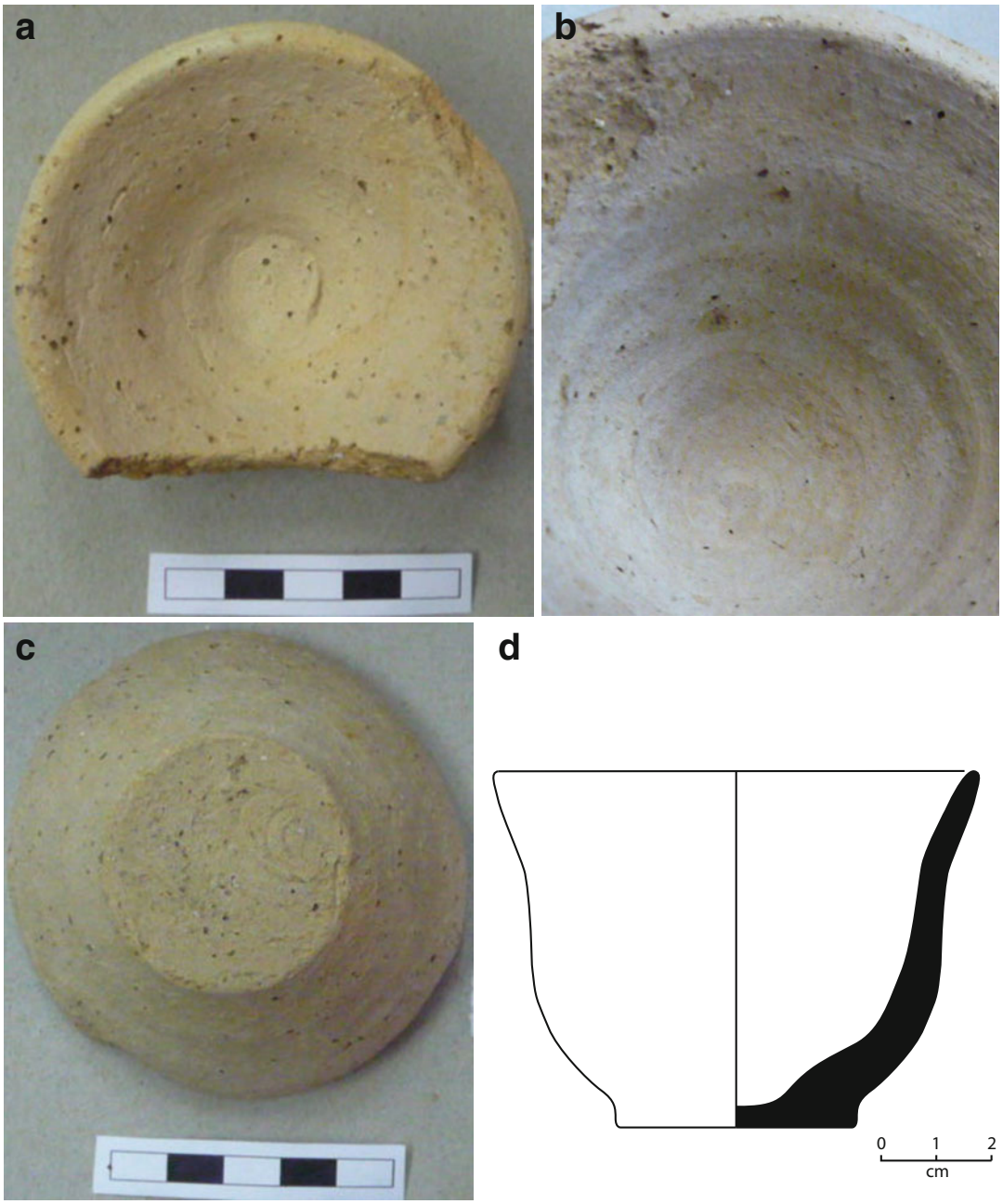

The Potter's Wheel, Fig. 4 (**a**) Base spiral. (**b**) Rilling. (**c**) Cut-off spiral pattern. (**d**) Gradual thinning of wall from base to rim

can be very helpful in determining whether or not a pot was wheel-thrown by evaluating porosity (volume, size, orientation, frequency, distribution and degree of connection with other pores) and inclusions/temper (orientation and distribution of elongated inclusions or temper). Porosity is impacted by the amount of water and temper/inclusions used, the type of temper/inclusions, the content of the clay matrix, kneading, preparation and firing – as a consequence, porosity is a

good indirect indicator of forming technique. Petrography, X-radiography, and, most recently, high-resolution X-ray microtomography have shown that handmade and wheel-thrown vessels can be confidently identified based on the above criteria and that distinction between different wheel-utilizing techniques and wheel-throwing is also often possible (Berg 2008; Karl et al. 2013; Pierret et al. 1996; Thér 2016).

Scholars have identified the speed (in rpm) and/or the duration of unaided rotation (often called the "momentum") as key characteristics of a true potter's wheel leading to a supposed division of wheels into "slow" and "fast" types (Holthoer 1977; Roux and de Miroschedji 2009; Orton et al. 1993: 120–125; Rice 1987: 132–135; Childe 1954), with "slow" wheels not considered proper potter's wheels. The assumption is that rotational kinetic energy (some scholars mistakenly identify it as centrifugal force) only starts acting upon a vessel when the wheel reaches a particular speed (rpm) and that pots made at slow speeds therefore are not "thrown." The minimum speed required to attain RKE has not yet been demonstrated experimentally or theoretically. Various speed ranges for throwing pots are mentioned in the literature but normally lie around 80–150 rpm (Childe 1954; Amiran and Shenhav 1984: 108; Doherty 2012: 17; Evely 1988: 118; Roux 2010). However, experiments have demonstrated that pots can indeed be thrown at very low speeds and hence that rotational kinetic energy acts upon clay at all speeds: 36 rpm was sufficient to throw a 10 cm tall cup (Berg 2013: 116); 15–20 rpm were used to form a small pot (Doherty 2012: 17); and a medium-sized vessel was thrown at 60 rpm (Foster 1959b: 62) even when the potters themselves consider the task time consuming, more laborious or boring. The presumption of a minimum speed at which rotational kinetic energy jumps into action also ignores the reality of potting, whereby the potter will vary the wheel speed depending on the stage of the throwing process and the size of the vessel: centering is done at higher speeds than pulling up or shaping; and the larger the vessel and the greater the clay mass, the slower the speeds (Gandon et al. 2011).

The second assumption is that a wheel has to spin for a considerable amount of time to throw a pot. However, ethnographic data have shown that, for example, experienced potters only need approximately three and half minutes to complete a pot of 47.5 cm × 20 cm × 22.5 cm (Saraswati and Behura 1966: 54). A household factory potter in Spain could throw 100 small items in an hour and a Mexican potter could make one food bowl every 47 s on average (Arnold 1985: 208, 244–245). Thus, when high speeds can be obtained, the necessary duration of unaided rotation to complete a pot is considerably shorter than standard accounts seem to imply. Where the moment of inertia is too great, the use of an assistant who keeps the wheel in motion can be used to overcome any disadvantages.

Finally, we must discard the common assumption that the potter's wheel is exclusively associated with wheel-throwing. As the case studies below demonstrate, a wide range of hybrid forming techniques combine handmade techniques with the wheel at different stages of the forming process (Courty and Roux 1995). All of these may utilize the potter's wheel as a device, but do not necessarily use it to its full potential. Instead, they may use it more like a turntable by using it at lower speeds or for shorter periods of rotation.

Historical Background and Future Directions

From the 1950s to the 1990s ethnographic studies of traditional potters were at the forefront of researchers' endeavors. We now possess a very comprehensive library of worldwide case studies (Arnold 1985; Foster 1959a, b; Kramer 1997; Saraswati and Behura 1966), and there is a sense that additional examples will not dramatically change our existing knowledge base. Experimental archaeology was another valued avenue of exploration, much of it focusing on reconstructing potter's wheels to understand their design features, physical potential, and limitations (Arnold and Bourriau 1993; Roux and Corbetta 1989). We have now acquired a solid understanding of these

factors and, thus, experimental work has changed direction to helping us understand the very essentials that underpin the utilization of the potter's wheel, such as the nature of the physical forces acting upon the wheel and establishing the level of skill potters have, and how this impacts on their use of the wheel (Roux 2019; Gandon and Roux 2019; Gandon et al. 2011). Despite decades of research into the potter's wheel, there is still much that is unknown about the very core forces and aspects, and it is in this subject area where future contributions to knowledge will have the greatest impact on our understanding. With finds of potter's wheel relatively rare but pots abundant, another strand with great future potential are investigations into the features encoded into pots that were made on the wheel to see whether we can work backward from the product to the device (e.g. Berg 2008; Choleva 2018; Jeffra 2013; Thér et al. 2017). Again, experimental archaeology will take a leading role here by working with replica control groups before applying the findings to ancient material. All of this will, of course, involve a multitude of scientific and social science disciplines that will make key contributions to our overall comprehension of the device.

Key Issues/Current Debates

Emergence of Innovation

It is commonly assumed that there was an evolutionary progression from rotating devices to turntables to the wheel, as potters gradually acquired the skill to harness rotational kinetic energy ever more effectively. The eventual invention of the potter's wheel is traditionally linked to the onset of mass production, with the wheel specifically acting as a device to speed up production and produce standardized shapes (Childe 1954; Nissen 2006; Saraswati and Behura 1966: 16). However, while scholars recognized that the wheel does of course speed up production (Arnold 1985: 208), recent work in Egypt and the Near East has shown prestige and technical exclusivity – rather than speed – to have been the driving forces for the emergence of the wheel (see also Thér et al. 2017 for central Europe and Crewe and Knappett 2012 for Cyprus; Choleva 2018 for mainland Greece; Berg 2007 for Melos). The marketization of speed and commercialization of the wheel are later developments (Foster 1959a; Streily 2000: 233).

Evidence of the social context of the emergence of the potter's wheel in Egypt has been collated by Doherty (2012). The earliest credible scenes of potters using potter's wheels can be found in the Tomb of Ty at Saqqara (Fig. 5) and Tomb of Ptahshepses at Abu Sir dated to the 5th Dynasty of the Old Kingdom (ca. 2500–2300 BC). Statuettes, models, and written manuscript also date back to this period and, together, indicate that these potters were under the control of Egyptian royalty and nobility. First evidence of wheel-thrown pottery is linked to the 4th–5th dynasties (2600–2300 BC) when it became popular for Pharaohs to build monumental pyramids which incorporated chapels dedicated specifically to the nourishment of their spirit (*ka*) in the afterlife. Daily liquid and solid offerings to the Pharaoh's *ka* were made in miniature, wheel-thrown cups produced in vast amounts. Prior to the introduction of the potter's wheel, specialist potters already produced standardized funerary vessels at a large scale mainly using the mold technique. Increasing the production could easily have been achieved by adding more workers. In contrast, the first pottery produced on the wheel consisted of shapes exclusively used for the Pharaoh's funerary state-controlled activities before gradually being disseminated into private elite contexts. The elite meaning associated with the potter's wheel is further encapsulated by the use of basalt in the construction of the wheel bearings, a prestigious and rare stone requiring the expertise of stone masons and previously exclusively used in the manufacture of religious statuary.

An exclusive elite craft context for the use of the wheel is also observed in the southern Levant where the potter's wheel is first used during the Late Chalcolithic (4500–4000 BC) for the manufacture of V-shaped bowls, small ceremonial bowls used in ritual activities. Knowledge of the potter's wheel ceased immediately following the collapse of the societies, and the technology only

The Potter's Wheel, Fig. 5 Tomb of Ty, Saqqara, Egypt, showing potter working on a wheel (c. 2450–2300 BC). (Doherty 2012: Fig. 2.2. *Image reproduced courtesy of S. Doherty*)

reemerges centuries later (Baldi and Roux 2016; Roux 2003). Mass production does not appear to have played a role either in northern Mesopotamia where wheelmade bowls make up less than 1% during Late Chalcolithic 2 (3900–3800 BC) at Tell Feres al-Sharqui. Similar to the Levant and Egypt, most of the bowls were found in a central elite building, Importantly, these bowls were made in by wheel-coiling rather than wheel-throwing (Baldi and Roux 2016).

Adoption of Invention and Transmission of Technology

Invention of a product or devices does not automatically guarantee its successful transmission. This also applies to the potter's wheel where scholars have observed both the disappearance of the technology after initial use and widespread adoption. The former scenario is exemplified by the abovementioned Late Chalcolithic ceremonial V-shaped bowls from the southern Levant. When these Chalcolithic cultures collapsed in Early Bronze I (4th mill BC), wheelmade pottery also vanished. It only reemerged in Early Bronze II–III (3rd mill BC), though only a small number of vessels were made with this technique and there is no spread of the technique beyond the confines of a restricted set of specialists. At the end of the 3rd millennium BC (Early Bronze IV), cities collapsed and wheelmade pottery disappears again, only to reappear a few centuries later to establish itself as the dominant pottery forming technique by Middle Bronze II (mid-2nd mill. BC) (Roux 2010).

Invention of the potter's wheel followed by keen widespread adoption is visible on Bronze Age Crete (Fig. 6). Here, experimentation with the potter's wheel in Early Minoan III/Middle Minoan IA leads to its adoption in Middle Minoan IB where it is used in the making of cups, in particular. The initial use is widespread and immediate, extending to palatial and non-palatial sites across the entire island, although it takes several centuries for potters to acquire the necessary

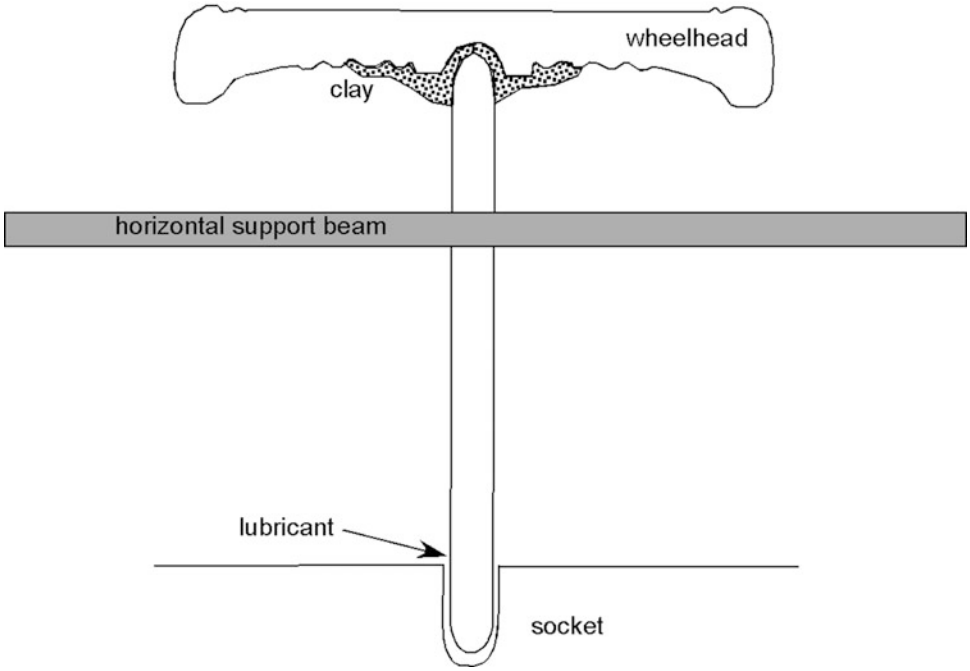

The Potter's Wheel, Fig. 6 Reconstruction of Minoan potter's wheel. (After Evely 2000; Morrison and Park 2007/8)

know-how to also make large pots on the wheel (Crewe and Knappett 2012).

As these two case studies show, adoption scenarios of the wheel can range from widespread to aborted. Roux (2010) offers an explanatory framework which examines to what degree innovation systems are fragile/robust or closed/open. She argues that the transmission of an innovation is, in part, dependent on the size of the network, skill level and production context of the craftspeople involved. Fragile technological systems are restricted in the number of participants and therefore cannot withstand transformations of the societal structure. In contrast, robust systems have transmission networks sufficiently large to weather any socioeconomic storms. Closed systems have a strong relationship between the producers and the technological task, but do not interact with other production units. Open systems are characterized by transfer and borrowing between production groups.

In the context of V-shaped bowls, specialists were few in numbers, highly skilled, attached to elites, and producing pots specifically for elite consumption. When these elites collapsed, so did the production of the special function V-shaped bowls, leading to the disappearance of the potter's wheel. The system here was fragile and closed, leading to an interrupted development. In contrast stands Minoan Crete where the skills were widespread among a highly skilled, large potting community that served both palatial and non-palatial consumers. As a consequence, the potter's wheel flourished. The Cretan scenario is thus representative of a robust, open system with a linear pattern of transmission.

A number of additional factors have been referenced to explain the failure of adoption of the wheel in various contexts across the world. Arnold, for example, recounts the efforts of the Mexican government to increase the efficiency and quality of pottery production in the town of Ticul in the 1930s (2008: 238–242; also Arnold 1985: 222–223). At this time, local potters were using the k'abal, a traditional turntable, to make pots. Despite sending an experienced potter who ran a workshop with five kick wheels for 4 or 5 years, the potter's wheel was not adopted by

the local community of potters. The disadvantages highlighted were (a) the price of the wheel which was well beyond the reach of a local potter's income, (b) the local clay was considered too coarse and unsuitable, (c) potters were used to working barefoot which resulted in abrasions and injuries of their feet when kicking the flywheel, and (d) the wheel was incompatible with existing motor skills and used different muscle groups. In addition, the organizational setup, including the sexual division of labor, may be inconsistent with the new technique. For example, the introduction of the potter's wheel in Guatemala was unsuccessful, argues Arnold (1985: 222–223), because pots had traditionally been made by women on a part-time basis alongside other household activities. When the wheel was introduced, it led to no change among women potters. Instead, the wheel became an entirely separate craft sphere performed by men. Strict social sanctions against innovation can also prevent change. Such sanctions were observed in Chinautla, Guatemala, between the 1950s and 1970s and led to a strict replication of the traditional pottery repertoire and strict prohibitions on innovations. Unfavorable industrial conditions may also make adoption less likely – Rajasthan potters mentioned the frequent power cuts that interfered with the use of their electric wheels (Kramer 1997: 62).

However, the potter's wheel, when used for proper wheel-throwing, can also bring many advantages. It produces even and symmetrical vessels, it allows the production of a vessel in a matter of minutes and can thus maximize turnover, and it speeds up mean production times – Arnold (2008: 244) estimates that a wheel can make production between twice and five times faster than a turntable or mold – although this theoretical increase in production speed must be weighted against a greater time investment at other points during the manufacturing sequence, such as collection and preparation of finer clay. Most importantly, however, for an adoption to be successful, the motor habits and work position must be compatible with previous practices. Foster therefore notes that it is often easier to train non-potters in a new technique than converting experienced potters from a traditional technique to wheel-throwing (1959a). In addition, Thér and his colleagues have highlighted the performative aspects of wheel-throwing, such as the rotation of the wheel, the gradual shaping of the vessel, the obvious grooves on the surface, which can appear highly attractive, if not magical, to the non-specialist when watching the manufacturing process or when touching the final product (2017).

The advantages of the potter's wheel are less clear-cut when the power of rotational kinetic energy is not understood or when RKE is not used to its full potential, for example, when the wheel is used more like a smoothly running turntable or when pots are created in stages, as is typical for wheel-coiling (Foster 1959a: 100–109; Arnold 2008: 242–243) (Fig. 7). The use of the potter's wheel for wheel-coiling is a common phenomenon in the Old World where scholars have argued that the first use of the wheel was actually to make wheel-coiled vessels rather than wheel-thrown ones (Choleva 2018 for prehistoric Greece; Thér et al. 2017 for Iron Age Europe; Jeffra 2013 for Minoan Crete; Roux 2010 for the Near East). Roux (2010) conceptualizes the emergence of the potter's wheel in two stages: its initial use was for wheel-coiling and, later, for wheel-throwing. Because the potter's wheel, even when used incompletely for wheel-coiling, introduces an entirely new physical principle, it represents a jump in the history of innovations. It is a "discontinuous innovation" because potters would have to acquire an entirely new set of motor skills to use a device that retains RKE for long periods of time using entirely different hand motions (Roux 2010). Because new motor skills need to be developed, scholars have stressed the importance of a face-to-face interaction to ensure complete transmission of the innovation – learning how to throw sections of a pot, even if they were coiled first, requires the acquisition of cumulative bimanual skills (Roux and Corbetta 1989) through a lengthy apprenticeship. Being a highly complex skill, developing a high level of expertise in wheel-throwing is estimated to take up to 10 years (Ericsson and Lehmann 1996). On the positive side, when an experienced wheel-throwing potter is confronted with a

Common Forming Techniques

Type	Name	Definition
Handmade *Pots made without the help of rotational kinetic energy*	Pinching	Squeezing a clay ball between fingers and thumb, and then thinning the walls. Mostly used for small open vessels; can also be used to begin the base of larger vessels or as a finishing technique to even out walls.
	Drawing	Starting from a lump of clay, the walls are pulled or squeezed upwards with the hands to create the desired shape. Frequently combined with coiling where coils are pulled up in stages.
	Coiling	Rolls of uniform thickness are created and then used to build up the vessel shape. The pot may vary in wall thickness along the horizontal and/or vertical axis and coil seam junctures. Often combined with other techniques, such as drawing or wheel throwing.
	Slab building	A vessel built up of joined flat slabs. Particularly suitable for large vessels.
	Molding	A flat 'pancake' of clay is prepared and placed into a plain or decorated mold. As the clay shrinks away from the mold, it retains the desired shape.
	Wheel coiling	Rotational kinetic energy (RKE) is applied to a vessel originally made of coils and can be introduced at different stages of the forming process. At its most basic, pots are made by coiling and then thinned or smoothed on the potter's wheel. At its most advanced, a coil is added and 'thrown'. Common features mirror those of wheel-thrown pots, but are less continuous and regular.
Wheelmade *Manufacture involves the use of rotational kinetic energy*	Wheel throwing	The potter's wheel runs at speeds sufficiently high to develop RKE which is used by the potter to pull up and shape the clay with bilateral movements.

The Potter's Wheel, Fig. 7 Common forming techniques with and without use of rotational kinetic energy

different wheel or new shapes, they are able to adjust to these challenges easily by applying and, if necessary, modifying existing hand positions (Gandon and Roux 2019). Wheel-coiling skills, in contrast, are less demanding but may still require a lengthy period of direct interaction between expert and learner.

If we accept that the first potter's wheels were not exploited to their full potential, then this realization provides additional support that the introduction of the wheel was unrelated to the desire for mass production or a more standardized product – both of which require that the potter's wheel was utilized to its greatest potential. Thus, as Foster (1959a: 104, 109) would argue, it was not the wheel itself that brought about technological or social change, but rather acted as a device that could be utilized to implement change already in motion.

International Perspectives

The potter's wheel can be found in all corners of the world. The specific design may vary, but the

applied principles remain recognizable. As we have seen above, it was invented in the 5th millennium BC in the Near East (Roux 2010) and spread across the Mediterranean and north and eastern Europe during the Bronze and early Iron Ages (Thér et al. 2017; Crewe and Knappett 2012; Doherty 2012). It is widespread in Asia, though the precise date of introduction is unclear. In the Americas, the wheel was first introduced by the Spanish (Arnold 2008: 238).

Scholars normally assume that wheel was introduced in a supposed evolutionary sequence from bat to pivoted turntable to simple wheel to double wheel. However, it has become amply clear that the wheel often was not immediately used to its full potential, and hence the period of initial innovation and stage of widespread use do not typically overlap. Likewise, it is commonly observed that the different devices are used simultaneously within the same cultural setup.

As Foster (1959a: 116) already recognized some time ago, one of the great mysteries of history is the potter's wheel's well-established correlation with male potters. Worldwide ethnographic studies have shown that 80% of traditional potters are female. Nevertheless, the introduction of the wheel almost always leads to the involvement of male potters with women continuing to manufacture vessels by traditional hand-forming methods in the home. When women use the wheel, it is for wheel-coiling only (Vincentelli 2003). The proverbial exception to the rule are female potters from El Porvenir in Honduras who – due to limited agricultural potential, men's long absences from the community, and easy access to potting resources – took up wheel-throwing commercially to ensure the financial survival of their households (Mouat and Arnold 1988). Whether the typical gender division also applies to prehistoric potters is a matter of speculation. Foster (1959a: 116) hypothesizes that this may be due to the physical strength that is required to set and keep the wheel spinning and throwing heavy clay. However, given the evidence of modern female artisan potters, the involvement of women in many other physically strenuous stages of the pottery production, and women's general participation in demanding tasks, such as agriculture, textile manufacture, and childcare, this argument seems unviable (Rice 1987; Kramer 1985). Instead, Kramer (1985) suggests that economic aspects interact with religious or ideological traditions, such as supply and demand patterns, employment types, household organization, access to raw material resources, capital and time, apprenticeship patterns, or the need for mobility and visibility of potters. Arnold (1985: 99–108), in contrast, draws attention to the strong relationship between men and agricultural activities, arguing that, when this link is broken, men will turn to alternative income-generating resources, such as wheel-throwing, while women remain associated with household tasks and handmade production which are more easily scheduled around agricultural and childcare tasks.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology: Learning from Potters in Gilund
- ▶ Experimental Maritime Archaeology
- ▶ Technological Studies in Archaeological Science

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References

Amiran, R., and D. Shenhav. 1984. Experiments with an Ancient Potter's Wheel. In Rice, P.M. (Ed.) Pots and Potters. Current Approaches in ceramic archaeology. Los Angeles: Institute of Archaeology, UCLA, pp. 107–112.

Arnold, D.E. 1985. *Ceramic theory and cultural process*. Cambridge: Cambridge University Press.

Arnold, D.E. 2008. *Social change and the evolution of ceramic production and distribution in a Maya community*. Boulder: University of Colorado Press.

Arnold, D., and J. Bourriau. 1993. *An introduction to ancient Egyptian pottery*. Mainz: Philip von Zabern.

Baldi, J., and V. Roux. 2016. The innovation of the potter's wheel: A comparative perspective between Mesopotamia and the southern Levant. *Levant* 48 (3): 236–253.

Berg, I. 2007. Meaning in the making: The potter's wheel at Phylakopi, Melos (Greece). *Journal of Anthropological Archaeology* 26: 234–252.

Berg, I. 2008. Looking through Pots: Recent advances in ceramics X-radiography. *Journal of Archaeological Science* 35: 1177–1188.

Berg, I. 2013. The potter's wheel in Mycenaean Greece: A re-assessment. In *Philiki Synaulia. Studies in mediterranean archaeology for Mario Benzi*, BAR international series, ed. G. Graziadio, R. Guglielmino, V. Lenuzza, and S. Vitale, vol. 2460, 113–122. Oxford: Archaeopress.

Childe, V.G. 1954. Rotary motion. In *A history of technology*, ed. C. Singer, E.-J. Homyard, and A.R. Hall, 187–215. Oxford: Clarendon Press.

Choleva, M. 2018. Craft behaviours during a period of transformations. In *Technology in crisis. Technological changes in ceramic production during periods of trouble*, Aegis, ed. I. Caloi and C. Langohr, vol. 16, 45–74. Brussels: Presses Universitaire de Louvain.

Courty, M.-A., and V. Roux. 1995. Identification of wheel throwing on the basis of ceramic surface features and microfabrics. *Journal of Archaeological Science* 22: 17–50.

Crewe, L., and C. Knappett. 2012. Technological innovation and island societies: Wheel made pottery on Bronze Age and Iron Age Crete and Cyprus. *British School at Athens Studies*: 175–185.

Doherty, S.K. 2012. *The origins and use of the potter's wheel in Ancient Egypt.* Unpublished Ph.D. thesis, Cardiff University.

Ericsson, K.A., and A.C. Lehmann. 1996. Expert and exceptional performance: Evidence of maximal adaptation to task constraints. *Annual Review of Psychology* 47: 273–305.

Evely, D. 1988. The Potters' Wheel in Minoan Crete. *Annual of the British School at Athens* 83: 83–126.

Evely, R.D.G. 2000. *Minoan crafts: Tools and techniques*. Vol. 2. Jonsered: Aströms.

Foster, G.M. 1959a. The potter's wheel: An analysis of idea and artifact in invention. *Southwestern Journal of Anthropology* 15 (2): 99–119.

Foster, G.M. 1959b. The Coyotepec molde and some associated problems of the potter's wheel. *Southwestern Journal of Anthropology* 15 (1): 53–63.

Franken, H.J. 1971. Analysis of methods of potmaking in archaeology. *Harvard Theological Review* 64: 227–255.

Gandon, E., and V. Roux. 2019. Cost of motor skill adaptation to new craft traits: Experiments with expert potters facing new vessel shapes and wheels. *Journal of Anthropological Archaeology* 53: 229–239.

Gandon, E., et al. 2011. Regulating rotation speed in wheel throwing: Effects of mass and shape. In *Studies in perception and action IX*, ed. E.P. Charles and L.J. Smart, 196–201. New York: Psychology Press.

Holthoer, R. 1977. *New Kingdom pharaonic sites: The pottery.* Lund: The Scandinavia Joint Expedition to Sudanese Nubia Publications.

Jeffra, C. 2013. A re-examination of early wheel potting in Crete. *Annual of the British School at Athens* 108: 31–49.

Karl, S., D. Jungblut, and J. Rosc. 2013. Berührungsfreie und nicht invasive Untersuchung antiker Keramik mittels industrieller Röntgen-Computertomographie. In *Corpus Vasorum Antiquorum. Österreich, Beiheft 1. Interdisziplinäre Dokumentations- und Visualisierungsmethoden*, ed. E. Trinkl, 73–114. Wien: Austrian Academy of Sciences Press.

Kramer, C. 1985. Ceramic ethnoarchaeology. *Annual Review of Anthropology* 14: 77–102.

Kramer, C. 1997. *Pottery in Rajasthan: Ethnoarchaeology in two Indian cities*. Washington/London: Smithsonian Institution Press.

Morrison, J.E., and D.P. Park. 2007–2008. Throwing Small Vessels in the LM IB Mochlos Potter's Pit, Kentro. *The Newsletter of the INSTAP Study Center for East Crete* 10: 6–10.

Mouat, L., and D.E. Arnold. 1988. Ceramic ecology and pottery production in El Porvenir Honduras. In *A pot for all reasons: Ceramic ecology revisited*, ed. C.C. Kolb and L. Lackey, 239–261. Philadelphia: Laboratory of Anthropology, Department of Anthropology, Temple University.

Nissen, H.J. 2006. Die gelagerte Achse. Technologieschub vor 6000 Jahren im alten Mespotamien. In *Mittel und Wege. Zur Bedeutung von Material und Technik in the Archäologie*, ed. A. Dostert, 3–10. Arnsberg: Bibliopolis.

Orton, C., P. Tyers, and A. Vince. 1993. *Pottery in archaeology.* Cambridge: University of Cambridge.

Pierret, A., C.J. Moran, and L.-M. Bresson. 1996. Calibration and visualization of wall-thickness and porosity distributions of ceramics using X-radiography and image processing. *Journal of Archaeological Science* 23: 419–428.

Powell, C. 1995. The Nature and Use of Ancient Egyptian Potter's Wheels, In B.J. Kemp (ed.). *Amarna Reports VI* (Occasional Publications 10), London: Egypt Exploration Society, pp. 279–308.

Rice, P.M. 1987. *Pottery analysis. A sourcebook*. Chicago: University of Chicago Press.

Roux, V. 2003. A dynamic systems framework for studying technological change: Application to the emergence of the potter's wheel in the Southern Levant. *Journal of Archaeological Method and Theory* 10: 1–30.

Roux, V. 2010. Technological innovations and developmental trajectories: Social factors as evolutionary forces. In *Innovation in cultural systems. Contributions from evolutionary anthropology*, ed. M.-J. O'Brien and S.J. Shennan, 217–233. Cambridge: MIT Press.

Roux, V. 2019. *Ceramics and society. A technological approach to archaeological assemblages*. Cham: Springer.

Roux, V., and D. Corbetta. 1989. *The potter's wheel. Craft specialization and technical competence*. New Delhi/Bombay/Calcutta: Oxford & IBH Publishing Company Private Limited.
Roux, V., and P. de Miroschedji. 2009. Revisiting the history of the potter's wheel in the Southern Levant. *Levant* 41: 155–173.
Saraswati, B., and N.K. Behura. 1966. *Pottery techniques in peasant India*. Calcutta: Anthropological Survey of India.
Scheans, D.J. 1965. The evolution of the potter's wheel: The Philippines data. *American Anthropologist* 67 (6): 1527–1529.
Streily, A.H. 2000. *Bronzezeitliche Töpferwerkstätten in der Ägäis und in Westanatolien*. Unpublished Ph.D. thesis, University Mannheim.
Thér, R. 2016. Identification of pottery-forming techniques using quantitative analysis of the orientation of inclusions and voids in thin sections. *Archaeometry* 58: 222–238.
Thér, R., T. Mangel, and G. Milos. 2017. Potter's wheel in the Iron Age in Central Europe: Process or product innovation? *Journal of Archaeological Method and Theory* 24: 1256–1299.
Van As, A., and L. Jacobs. 2014. The Babylonian potter. In *Mespotamian pottery. A guide to Mespotamian tradition in the 2nd mill BC*, ed. J.A. Armstrong and H. Gasche, 75–93. Belgium: University of Ghent/Oriental Institute of the University of Chicago.
Vincentelli, M. 2003. *Women potters. Transforming traditions*. London: A&C Black.
Wood, B.G. 1990. *The sociology of pottery in Ancient Palestine: The ceramic industry and the diffusion of ceramic style in the Bronze and Iron Ages*. Sheffield: Sheffield Academic Press.

Further Reading

Arnold, D.E. 1985. *Ceramic theory and cultural process*. Cambridge: Cambridge University Press.
Childe, V.G. 1954. Rotary motion. In *A history of technology*, ed. C. Singer, E.-J. Homyard, and A.R. Hall, 187–215. Oxford: Clarendon Press.
Foster, G.M. 1959. The potter's wheel: An analysis of idea and artifact in invention. *Southwestern Journal of Anthropology* 15 (2): 99–119.
Roux, V., and D. Corbetta. 1989. *The potter's wheel. Craft specialization and technical competence*. New Delhi/Bombay/Calcutta: Oxford & IBH Publishing Co. PVT LTD.
Roux, V. 2019. *Ceramics and Society. A technological approach to archaeological assemblages*. Cham: Springer.
Van As, A., and L. Jacobs. 2014. The Babylonian potter. In *Mespotamian pottery. A guide to Mespotamian tradition in the 2nd mill BC*, ed. J.A. Armstrong and H. Gasche, 75–93. Belgium: University of Ghent/Oriental Institute of the University of Chicago.

Poverty Point, Archaeology of

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Introduction

The Poverty Point site in northeastern Louisiana is famous for the largest known monuments built by hunter-gatherers. Designated a UNESCO World Heritage landmark in 2014, Poverty Point is a 3-square-kilometer earthwork complex of two massive mounds, several conical and flat-topped mounds, and six elliptical ridges enclosing a 17.4-hectare plaza where numerous circles of large wooden single-set posts are buried beneath cultural fill (Fig. 1). The Late Archaic Poverty Point culture of the lower Mississippi River Valley (c. 2050–1150 cal. BCE) exhibited an unprecedented form of social organization indicated by the accumulation of exotic lithic material measured by metric ton and the construction of extraordinary monumental architecture at a scale that surpasses most monuments built by agriculturalists in North America. Subsistence studies demonstrate that the inhabitants of Poverty Point and contemporary sites were entirely dependent on the consumption of wild plants, animals, and fish. These qualities set Poverty Point and related sites apart from other Late Archaic contemporary sites in eastern North America.

Definition

The term Poverty Point culture (Webb 1982) has been applied to sites dating to the same time period in the Mississippi Valley from southeastern Missouri to the Gulf Coast. Poverty Point "culture" refers to the use of common material traits, most notably clay cooking balls and certain forms of hafted knives or projectile points. Although the

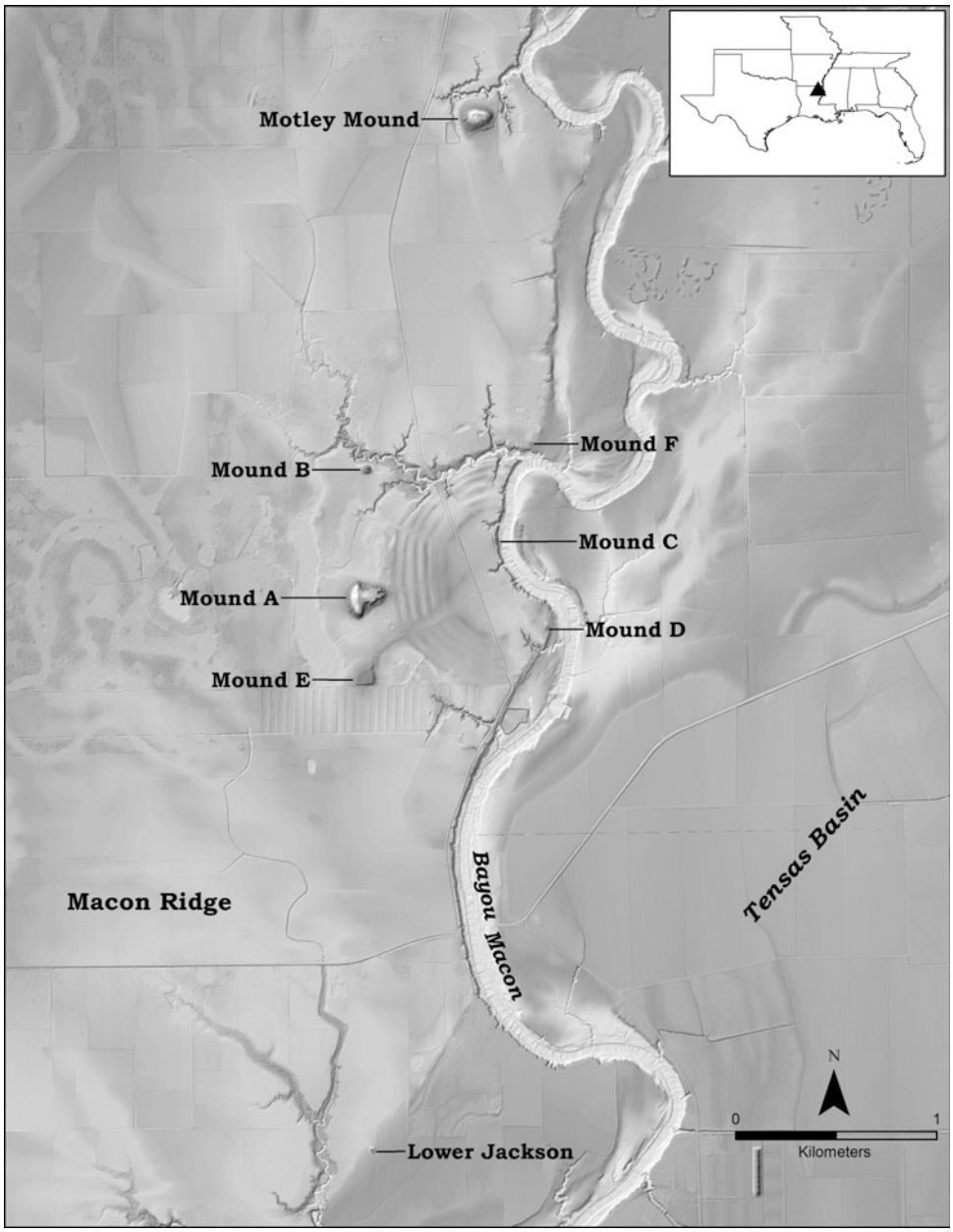

Poverty Point, Archaeology of, Fig. 1 LiDAR-derived DEM showing Poverty Point earthworks

Poverty Point type site is centrally located among Poverty Point culture settlements within the region, we suspect that political, social, and linguistic relations were complex, fluid, and not dependent on political direction or control from the Poverty Point site itself.

Key Issues/Current Debates/Future Directions

Poverty Point culture is entirely unique for any point in American Indian history. On a global scale, the people who constructed and inhabited

the type site stand out for building the largest hunter-gatherer settlement anywhere, for erecting what in context was massive monumental architecture, and for participating in a complicated and well-established long-distance exchange network that spanned much of eastern North America resulting in the accumulation of tons of foreign raw material (in fact, all lithics found at the site must be imported, because there are no naturally occurring lithic sources within 50–75 km). We suspect the movement of exotic materials was coordinated among Poverty Point-affiliated settlements within the valley and along its edges. Spatial analysis of the settlement plan shows a multi-tiered distribution of site sizes organized around the centrally located type site. In these regards, the organization of networks that integrated culturally diverse populations and materials over such a large geographic area is considered unique among hunter-gatherer groups.

Jaketown and Other Poverty Point Culture Sites

Although much of the focus has been on Poverty Point, there are a number of contemporary communities of varying sizes located in and around the floodplain of the lower Mississippi River Valley. Although no other site within the regional network is even half the size of Poverty Point, Jaketown, Claiborne, and Neimeyer-Dare stand out as considerably larger than the majority of all known Poverty Point sites (Fig. 2). These larger sites are hypothesized as distributional centers that mediated the flow of goods and people inward

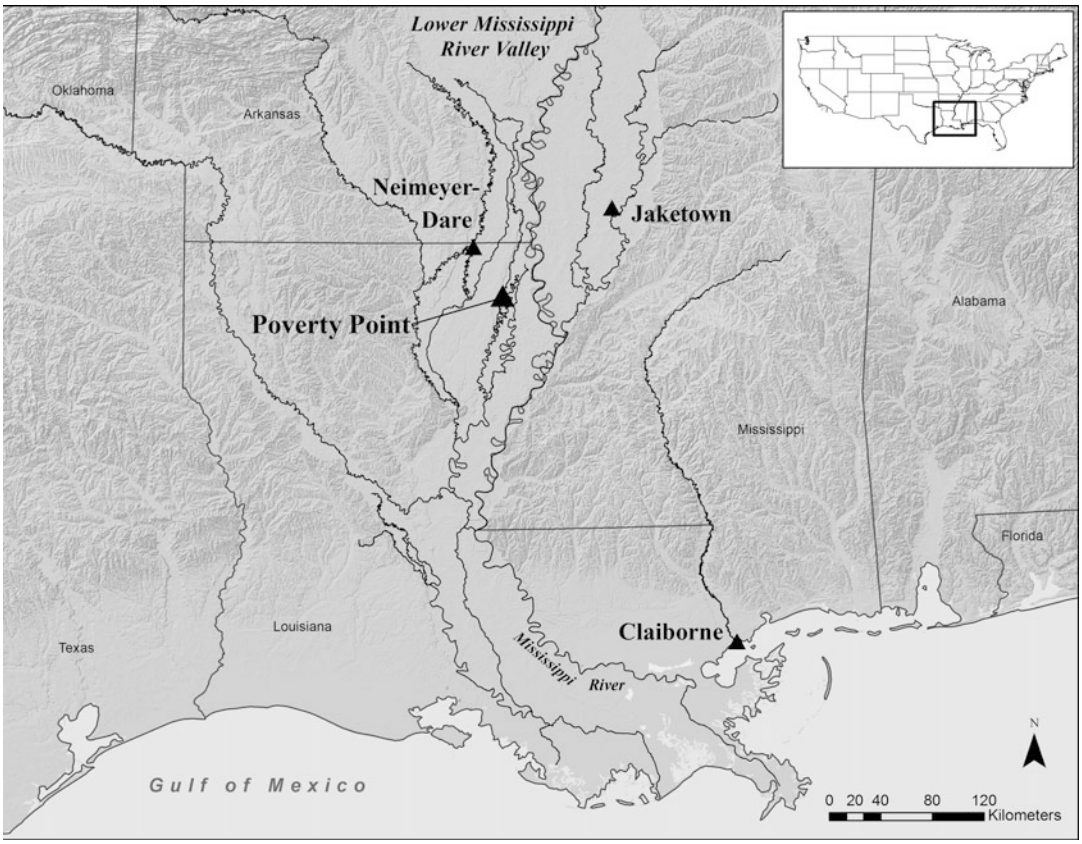

Poverty Point, Archaeology of, Fig. 2 Map of the lower Mississippi River Valley region showing the location of Poverty Point and distributional centers

through the valley and toward Poverty Point. The Jaketown site in west-central Mississippi is the earliest securely dated Poverty Point settlement, having been established c. 2050 cal. BCE. The material culture assemblage in the early deposits at Jaketown contains all of the hallmarks of Poverty Point culture: baked-clay objects, lithic raw material from a wide trade network, lapidary art, and distinctive narrow-necked projectile points. Between c. 1550 and 1450 cal. BCE and before the massive earth-moving events took place at Poverty Point, the inhabitants of Jaketown were building earthen mounds and had constructed the second largest contemporary Poverty Point monuments in the lower Mississippi Valley. The Claiborne site near the mouth of the Pearl River also has very early radiocarbon dates, but from poorly defined stratigraphic contexts. However, this site has classic Poverty Point material culture and was arguably a distributional center for importing goods flowing east to west along the Gulf Coast.

Many small Poverty Point sites have been explored, but few are in great detail. These sites are assumed to be residential communities. At the Copes site in northeastern Louisiana, only 14 km southwest of Poverty Point, faunal and floral evidence indicates that the occupants lived at the site all four seasons of the year (Jackson 1986). The occupants were consuming a variety of wild foods, notably fish and deer, as well as collecting acorn and especially pecan, and unidentified grasses. At Copes and other small residential sites throughout the lower Mississippi Valley, the inhabitants were participating in the long-distance exchange network that is one of the hallmarks of Poverty Point culture. At many small sites, nonlocal lithics coming from distances of more than 100 km make up 50% or more of the total assemblage.

The Poverty Point Site

The Poverty Point site is located on the eastern edge of Macon Ridge, a 5-m-high Pleistocene terrace overlooking the Holocene floodplain of the Mississippi River (Fig. 1). Bayou Macon, a small local drainage, is located at the base of the terrace and forms the eastern boundary of the site. To the north, west, and south lies a flat to undulating terrace surface broken by small streams and some ponds. The site is composed of a c. 1000-ha. core area of dense habitation remains, earthen ridges, and mounds with contemporary settlement debris in concentrated patches spread over 6–7 km^2. The southern and northern boundaries are marked by earthen mounds, but these mounds were either built at an earlier date (lower Jackson Mound on the southernmost end of the site was built c. 3000 cal. BCE) or a later date (the Jackson Place Mound group to the immediate south was likely built between 1000 and 1200 CE), or their age of construction is unclear (Motley Mound on the northern end is assumed to have been built during the Poverty Point-era occupation but has never been directly dated). Smaller settlements – presumably villages – with direct evidence of contemporary occupation are found to the east along the banks of sluggish bayous draining the Mississippi River floodplain and more rarely to the west, north, and south along the terrace surface. Contemporary settlements are found in an area encompassing roughly 2000 km^2 around the Poverty Point site, and sites of the same age with some evidence of Poverty Point cultural affiliation are located at greater distances within the Mississippi River embayment and along its tributaries.

The core area of occupation is marked by the presence of six "C-shaped" concentric earthen ridges with their ends facing east leaving a large open area (often referred to as a plaza). These ridges averaged 2–3 m tall and were approximately 30–40 m wide at their base. Five mounds are found in the core area. The largest, Mound A, stands 21 m tall at its summit and slopes down to a flat terrace 10 m above the surrounding terrain. The mound is roughly "T-shaped" and measures 211 m north to south along the top of the T and 207 m east to west. To the north of Mound A is Mound B, a conical mound some 5–6 m tall with a base roughly 55 m in diameter. Mound C is located within the open area or plaza along the edge of the terrace, and today the apex is conical and stands only 2–2.5 m tall. This mound is elongated on its north-to-south axis, but much of the

eastern side of the mound may have been lost to erosion. Mound D rises 2 m above the plaza and is located along the terrace on the south edge of the open plaza area. Mound E is located due south of Mound A and is a 3-m-high rectangular platform with a flat summit. Mound F, which was only recently recognized, is a low conical earthwork 1.5 m tall located along the eastern edge of the terrace just north of the earthen ridges.

Mounds A, B, C, and F are dated and were built during the Poverty Point-era occupation. Mound D was likely built by historic Euro-American settlers as the platform for nineteenth-century burials. Mound E is not yet dated but based on soil profile development could date before the Poverty Point-age occupation, although a contemporary occupation cannot be ruled out.

As befits a large site, Poverty Point has a complicated occupation history. Surface-collected artifacts show that the earliest occupation within the site area goes back to the Paleo-Indian period (c. 11,000–8000 BCE), and there are modest quantities of Early (c. 8000–5000 BCE) and Middle (c. 5000–2000 BCE) Archaic remains scattered across the eastern edge of Macon Ridge. During the late Middle Archaic and early Late Archaic periods, there is an apparent occupational hiatus c. 2800–1500 cal. BCE. Beginning c. 1500 cal. BCE, a substantial Poverty Point culture-affiliated occupation occurred across much of the core area of the site, most notably along and near the eastern edge of Macon Ridge. At this time of initial occupation, the construction of earthen monumental architecture was limited. So far, only Mound B has been dated to this initial occupation period. Recent geophysical survey and limited test excavations in the open plaza area indicate that the earliest inhabitants were erecting large 25–65-m-diameter circular structures made up of 60–70-cm-diameter single-set posts. Based on their size and the absence of support posts within the circles, it is unlikely these were roofed structures. These features were eventually dismantled and the posts removed. The function of these features is unknown, but their size and the use of large posts indicate a considerable investment in labor. These can be considered monumental architecture, especially in the context of a purely hunting, fishing, and gathering subsistence lifestyle.

This initial occupation episode is widespread, and contemporary remains are found beneath the plaza and under what would become the ridges. Limited radiocarbon dating of these remains suggests the occupation lasted some 200 years, from c. 1500 to 1300 cal. BCE. At present, it is unclear if this was a permanent village or if these remains mark repeated visits to the site over the duration of the dated occupation span. Early inhabitants are notable for making and using a distinctive Poverty Point material culture, including the ubiquitous baked-clay cooking balls ("Poverty Point objects" or PPOs), hafted knives or projectile points, microlithic tools, and lapidary items such as beads and bannerstones. The site's inhabitants were importing lithic materials from very long distances at this time. One of the most prominent lithic raw material types in these early deposits is Burlington chert, sourced to the central Mississippi River area around modern St. Louis, Missouri, nearly 700 km to the north of Poverty Point. One study found that in seven test pits that penetrated to the earliest occupation zone, Burlington chert remains (tools and debitage) from the initial occupation levels weighed nearly 16,000 g. In contrast, only 4000 g of the so-called local pebble chert, which is derived from basal gravels along the edges of the Mississippi Valley 50–75 km distant from Poverty Point, was recovered from the same contexts. At the time of initial occupation, other lithic sources were being tapped but in much smaller quantities. Still, the network of chert imported to the site encompassed a good deal of the Mississippi Valley and its tributaries.

Beginning c. 1300 cal. BCE, the site underwent a dramatic transformation. The most notable occurrence was the construction of the six earthen ridges and some of the mounds. Associated with these physical changes are shifts in material culture use and alteration of the raw material resource network. Although the data should be understood as provisional, because there are relatively few radiocarbon dates, the sequence of events leading to the radical reconfiguration of the site appears to begin with the termination of Mound B and the dismantling

of the single-set post structures within the area known as the plaza. Mound B, which had begun its life as a flat-topped platform mound, was covered with a thick mantle of earth, and the mound and its immediate surroundings seem to have been abandoned and never used again. Similarly, the single-set post features were carefully taken apart and the postholes filled.

Following these terminations, several important additions occurred. One is the beginning of the use of Mound C. Here, a series of thin (usually only a few cm thick) use or occupation surfaces were created, briefly used for unknown purposes, and then capped with carefully selected fills. This process of construction-use-fill was repeated multiple times creating a low rise (the shape is not currently known because of erosion on the east side of the mound). Mound C began as a low rise (possibly a platform) and was used for perhaps 100 years before being capped by the addition of a conical mass of earthen fill that covered the underlying use surfaces. This fill was peculiar in that it was not midden-stained or organically enriched but nonetheless contained abundant artifacts.

At the same time that Mound C was being erected and used, the concentric ridges were being built. The precise chronological relationships among these ridges are not clear at present – they may have been built in some order or may have been constructed more or less at the same time. In any case, they were built quite quickly, most likely within a generation. They were created by borrowing earth from areas immediately adjacent to the ridges, creating a shallow ditch between each ridge. The ridges are assumed to have been built to support houses or structures on their surfaces, but modern agriculture and over 3000 years of erosion and soil development have obliterated any obvious evidence of habitations – although some features, notably fire pits and earth-oven cooking pits, are known to occur. Artifacts are common on the ridges, their flanks, and the ditches at their bases. The surface of the site today is densely covered with artifacts, and a longtime collector amassed a surface collection in excess of 50,000 items that are provenienced by ridge and sector. Spatial analysis of this material demonstrates clear differences in the distribution of artifacts, and these differences appear to map onto the ridge and sector built environment. The spatial distribution of particular artifact classes further suggests that social differences among the inhabitants, or perhaps activity areas, were organized by the pattern of ridges and sectors. At roughly the same time as the ridges were being built, and after the initial surfaces of Mound C were deposited, the inner or plaza part of the site was covered with up to 75 cm of fill, creating a level surface and burying the post features previously erected on the ground surface.

Of the final construction activities at the site, the erection of Mound A is the most impressive. This mound, which is the second largest earthen monument in the United States, was built at the western edge of the outermost ridge. Excavations and coring of the mound demonstrate that much of it was constructed over a seasonally wet, swampy depression roughly 1–2 m deep. There is a clear sense of the construction sequence for Mound A. First, the vegetation of the swampy depression was burned, and then immediately after, a 5–15-cm-thick layer of tan to white fine silt was deposited across the swampy depression. The mound was then erected very rapidly. We believe that the western conical portion of the mound was built first. This part was built on the western edge of the swampy depression, and only part of it covers this feature. The western cone was constructed with distinctive, fairly homogenous soils that appear mined or borrowed from the surface or near the surface of Macon Ridge. The platform along the east end of the mound was then added on. Here, the soils are more heterogeneous and appear to come from contexts deeper within Macon Ridge. Shallow depressions to the north and to the west of the mound are likely borrow areas. Once the cone and platform were built, a ramp was added to join the two earthen features.

Three radiocarbon dates from short-lived plant charcoal, and a buried root at the base of the

platform dates the onset of construction to a mean age of 1252 cal. BCE. Our data indicate the mound was built very rapidly. Once construction started, there is no evidence it ceased until the mound reached its full form. There are no cultural stages, natural soil horizons, or erosion features within the mound except at the base of the ramp joining the cone to the platform. The absence of erosion features is especially notable, because the mound is made of reworked loess, which is especially susceptible to erosion, and the site is located in a humid-temperate region where rainfall is abundant, even in the driest months. We suspect the mound was built in as little as 3 months to probably not much more than a year. It certainly was not erected over multiple years or generations. With a volume of about 238,500 m^3, this duration of construction implies a workforce ranging from c. 1000 to 3000 laborers plus families. The function of the mound has never been established. The surface of the mound and its flanks are nearly devoid of artifacts, suggesting that if the mound was used for some purposes, the inhabitants were careful not to leave behind material culture residues.

The Poverty Point site was abandoned not long after the construction of Mound A. By c. 1150 cal. BCE, there were no longer any inhabitants who were leaving traces of occupation. The abandonment of the site coincides with an apparent decline in occupation intensity throughout the lower Mississippi Valley. Similar population declines are noted across much of eastern North America, and there is a large-scale transformation of cultures from Late Archaic to Early Woodland. Climate change and associated flooding throughout the Mississippi Valley are hypothesized to account for the apparent demise of Poverty Point and the so-called Poverty Point culture (Kidder 2006).

Most explanations for Poverty Point's genesis and reproduction share the underlying assumption that the site exists to fulfill an economically utilitarian function. The dominant assumption is that Poverty Point is an oversized town that takes its economic utility from the need to import lithics into a region where no lithics exist. Alternate models have posited that the site served to facilitate the exchange of economically valued goods among far-flung communities. The earthworks of Poverty Point have similarly been situated in a utilitarian framework. For Gibson (2000), the mounds represent physical manifestations of magic that buffer against a metaphysical but potentially real threat to the health and wellness of the community. To Hamilton (1999), on the other hand, the construction of mounds diverts human energy from reproduction to production and thereby acts to prevent overpopulation in the face of uncertain economic returns. Another perspective (Greenlee 2013) claims the Poverty Point earthworks were built as a costly signaling expression to communicate ownership of resources between competing groups.

The actions of the people who inhabited or visited Poverty Point, however, defy purely rational economic models related to lithic procurement and/or resource-buffering scenarios. Functionally unnecessary exotic lithics were imported in vast quantities when local stone was available within a more reasonable distance; steatite vessels were brought in when local pottery was available and nonlocal pottery when local pottery and/or steatite was accessible. The production of nonutilitarian items (e.g., beads, quartz crystals, oversized bifaces, and bannerstones) indicates behavior beyond economic rationale that has been ignored or undervalued. Compared to the amount of material imported to Poverty Point sites, little tangible is exported; thus, Poverty Point appears to be drawing large numbers of people and material to the site from across the Southeast.

Earthwork construction was functionally "nonutilitarian" as well. Most Poverty Point-age mounds did not support structures, burials, or the accumulation of post-construction occupation debris flanking or atop the construction stages. Instead, we suspect that building activities were highly ritualized events involving extremely complex construction techniques, including the mining and use of sediments of different colors, the mixing of distinct materials prior to deposition,

and the preparing of submound surface. The rapid yet structurally ordered events at Poverty Point implies a high level of labor investment and social organization, especially for hunter-gatherer peoples, and we suspect that the act of building these earthworks was itself imbued with ritual-religious meaning.

The material culture is one of the most typologically and geographically diverse assemblages in the Eastern Woodlands and points to visitation by people of highly diverse backgrounds. Kidder (2011) and Spivey et al. (2015) hypothesize that the massive construction projects undertaken at Poverty Point after c. 1400 cal. BCE were about creating and recreating a new shared cosmology or cultural narrative to accommodate intensifying social complexities brought on by episodic pilgrimage visits by participants with varied geographic, ethnic, and social origins. Thus, rather than considering Poverty Point as an outsized village different from contemporaries across the Southeast only in size and quantity of imported goods, it is better to consider Poverty Point a religious or ritual center of congregation, what Renfrew (2001) has called a Location of High Devotional Expression akin to Chaco Canyon or Stonehenge.

The idea that Poverty Point is a ritual center is alien in this relatively early North American context, because hunter-gatherers – even complex ones – are not given credit for these behaviors. Traditional models suggest they do not have complex ritual behavior or elaborate religious practices, because they are busy eking out an existence in the face of uncertain circumstances. However, new data from Poverty Point provides an opportunity to reframe the debate from the presumption that economic imperatives must be the sole driver of hunter-gatherer social change. People living at Poverty Point-era sites did not need to trade vast distances to get their basic tool stone. From a wholly utilitarian position, in fact, the idea that people should go hundreds of kilometers out of their way to get raw material – some of which is of dubious quality – is preposterous. We argue instead that economic interactions were trailing behind more ritual-religious processes. Imagining this sort of complexity for Poverty Point may seem extreme, in part because defining why ritual-religious events occurred is exceedingly difficult; the reasons may be wholly idiosyncratic or based on the emergence of prophetic persons or theophanies whose manifestations are archaeologically difficult to recover or even intangible. Christian ritual, after all, is based on miracle births, visions, acts of healing, and apparitions. At this point, proving the cause for the structure of Poverty Point and its associated sites is difficult. However, it is clear that the explanation for the production and reproduction of Poverty Point communities lies in understanding the complex histories of these remarkable sites.

References

Gibson, J.L. 2000. *The ancient mounds of poverty point: Place of rings*. Gainesville: University Press of Florida.

Greenlee, D.M. 2013. *Monumental earthworks of Poverty Point. Nomination to the World Heritage List by the United States of America*. (Preparer on behalf of the United States Department of the Interior).

Hamilton, F.E. 1999. Southeastern archaic mounds: Examples of elaboration in a temporally fluctuating environment? *Journal of Anthropological Archaeology* 18: 344–355.

Jackson, E.H. 1986. *Sedentism and hunter-gatherer adaptations in the lower Mississippi Valley: Subsistence strategies during the poverty point period*. Unpublished Ph.D. dissertation, Department of Anthropology, Department of Anthropology, University of Michigan, Ann Arbor, Ann Arbor.

Kidder, T.R. 2006. Climate change and the archaic to woodland transition (3000–2600 cal. B.P.) in the Mississippi River basin. *American Antiquity* 71: 195–231.

Kidder, T.R. 2011. Transforming hunter-gatherer history at poverty point. In *Hunter-gatherer archaeology as historical process*, ed. K.E. Sassaman and D.H. Holley Jr., 95–119. Tucson: Amerind Foundation and University of Arizona Press.

Spivey, et al. 2015. Pilgrimage to poverty point. In *The archaeology of events: Cultural change and continuity in the Pre-Columbian southeast*, ed. Z.I. Gilmore and J.M. O'Donoughue, 141–159. Tuscaloosa: University of Alabama Press.

Renfrew, C. 2001. Production and consumption in a sacred economy: The material correlates of high devotional expression at Chaco canyon. *American Antiquity* 66: 14–25.

Webb, C.H. 1982. *The poverty point culture (Geoscience and Man 17)*. 2nd ed., revised. Baton Rouge: Geoscience Publications, Department of Geography and Anthropology, Louisiana State University.

Power and Knowledge in Archaeology

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Introduction

Presently, the study of power dynamics and the constitution of knowledge and its multiple connections has a relevant place in social sciences. Much of this discussion is indebted to the work of the French philosopher Michel Foucault (1926–1984). Foucault is frequently defined as a poststructuralist, along with other major references such as Gilles Deleuze, Jean-François Lyotard, and Jacques Derrida. Although he rejected an explicit adscription to this movement, his studies adopted some of its basic ideas (including an interest in discourse and history). Foucault attempted to understand some of the features of modernity, discussing those which were perceived as natural or obvious. He considered that the past was the key to analyze the conditions for the formation and transformation of subjects, objects, and its constituent relationships. He believed that these conditions were necessary to establish a certain regime of truth and social order at a given moment. Foucault developed a critical history of thought, which should not be confused with a history of the ideas.

Archaeology and genealogy were Foucault's particular ways of engaging with the past (Guting 2011). The archaeological method intended to be a critique to traditional history. While the latter approach relied on individual consciousness, Foucault's archaeology insisted that thought was governed by unconscious rules. These rules were present in discourse, in other words, a set of statements that produced knowledge. Foucault intended to recognize different discursive formations in the history of Western civilization. He eventually found out that the modern way of understanding the world was contingent (not an absolute or ultimate truth). The archaeological method did not provide sufficient tools to account for the transformation of discursive formations. Genealogy proved to be a more diachronic tactic (Foucault 1980). It was based on some ideas proposed by the German philosopher Friedrich Nietzsche. And it considered the way in which certain discourses had given way to what constituted the present. In the genealogical analysis, power became a relevant concept (Bapty and Yates 1990).

Key Issues/Current Debates/Future Directions/Examples

Foucault confronted previous understandings of power. The case of Marxism is particularly illustrative. Marxism understood that social classes in the capitalist mode of production were defined by ownership, and that ownership invested the members of a certain class (the capitalists) with power over the rest of society. Power relationships were thus rooted in economy, and politics (mainly the state) served the purpose of protecting the interests of the owners (Shackel 1993). This had a negative impact on the less privileged classes, which were kept under control through mystification and repression. Foucault believed that power was decentered. It was not something that people could either possess or lack. Power "[was] exercised through a net-like organi[z]ation" (Foucault 1980: 98). Every member of society took part in the network, and most people could simultaneously exercise and be the target of power. Discourses and power were inextricably connected, as power was both the product and producer of truth and knowledge.

In the modern world, power discourses were not limited to coercion. They also relied on discipline (Foucault 1975). Discipline was a key concept in Foucault's work. It referred to a wide range of techniques which sought to control people's

actions through time, space, and movement segmentation. Disciplines acted on the material body and generated specific gestures. They had two goals: increase body utility and docility. Disciplinary success depended on surveillance. Surveillance used the gaze as a means to control bodies. Surveillance techniques materialized in space, and panoptical architecture (where people could be watched without knowing exactly when) was an example of that. Information obtained through surveillance encouraged a sanction-gratification system that expected to correct deviations. According to Foucault, discipline participated in the construction of individuals. In this respect, it is important to note that discipline did not act globally. On the contrary, it separated (individuated) people in order to become effective. The construction of individuals relied on an additional factor: the recognition of people's own subjectivity. This went hand in hand with an introspective view, a self-awareness which facilitated the internalization of discourses (as people considered these discourses to have positive effects on their lives).

Foucault argued that discipline sought to create an economy of power (Foucault 1975). Power should be distributed homogeneously, so it was not too disperse or concentrated. Power should be present everywhere in a continuous though subtle way. From a Foucauldian perspective, the analysis of power needed to consider the role of institutions (as they were effective means to distribute power). Modern states helped to control several aspects of life through an ever increasing number of formal institutions. Foucault was famous for his analysis of the disciplinary character of prisons, schools, hospitals, asylums, military organizations, etc. These institutions inculcated norms of behavior, distinguished between the normal and the deviants, and corrected the inclinations of the latter. Some organizations were also important in the consolidation of what Foucault termed biopower: the control of bodies and populations justified on an alleged protection of life. But state institutions were not the only ones that produced and reproduced the knowledge-power discourses of modernity. Other entities, though smaller and less formally regulated, helped in the process. Among them, it is worth mentioning the family, workplaces, etc.

In studying power, Foucault coined the term governmentality. Governmentality involved a conjoint analysis of the government and the particular modes of thought (historical discourses) which were connected to it. In Foucault's work, the government was understood in a broad sense. It did not only include politics and the state but also other realms of social life (for instance, the household). Furthermore, it did not only entail control over other people but also over oneself. Foucault asserted that in the modern world the development of the sovereign state coincided with the birth of the individual (Lemke 2001). The idea of governmentality eventually gathered the technologies of domination and the technologies of the self. Although most of Foucault's studies focused on the first topic, some of his later works considered the importance of the second. In general, the technologies of the self were defined as a series of operations that individuals effected on their bodies and souls with an aim to achieve a certain state (such as happiness) (Foucault 1988).

Archaeology, not necessarily in a Foucauldian sense, but as a discipline deeply concerned with the study of social life and material culture, did not escape Foucault's influence. After what is usually termed the postprocessual or postmodernist turn in archaeology, some scholars became interested in his work (as well as in the work of other social theorists). Although some archaeologists dealing with premodern settings include Foucauldian concepts in their investigations, most researchers citing Foucault are currently interested in the modern world. This is not surprising, as Foucault devoted an important part of his efforts to understand the dynamics of modern society (and its genealogy in Western civilization). Taking this into consideration, it is clear why some of his concepts cannot be easily applied to any historical context. Just to give an example, discipline, panopticism, and individualism cannot be universalized as they are connected to a particular regime of power-knowledge (that of capitalism).

The works of Matthew Johnson and Martin Hall reflect Foucault's relevance in historical

archaeology. Johnson (1996) stressed that historical archaeologists should focus on capitalism, as it was the leading force behind a series of significant changes from the Late Middle Ages onward. Individuality, segmentation, and standardization were key concepts in Johnson's research. These ideas – although not in an explicit manner (Leone 2009) – had several connections with Foucault's understanding of power (its mechanics and outcomes). Martin Hall (2000) insisted that Foucauldian statements could be the building blocks of historical archaeology, as they allowed connecting things (the remains found in archaeological contexts) and words (mainly historical documents). Statements had multiple and changing meanings, giving archaeologists the opportunity to reinterpret the past in the present (and the present through the past). Following Hall, the articulation of statements in discourses (which made social practices regular) was a crucial step in studying the relationship between different scale units. In this way, he thought it was possible to connect local statements and global discourses.

Historical archaeologists also turn to Foucault in order to approach specific problems and case studies. In this context, it is worth mentioning the analysis of etiquette, institutions, the state, etc. The analysis of etiquette frequently considers the role of personal discipline. Just to give an example, Paul Shackel (1993) and Mark Leone (1999) discussed the multiple ways in which institutions and people themselves produced and reproduced certain practices and ideas which encouraged individualism and social difference (mainly in Annapolis and its surroundings). The study of institutions often considers the role of materiality in the construction of power relationships. Panopticism and disciplinary practices thus appear as relevant issues. Lu Ann de Cunzo (2006) made a review on total institutions and asserted that archaeological works on the issue should include prisons, schools, hospitals, almshouses, and workplaces in different geographical contexts. Some other studies focus on state intervention on different aspects of social life and the discipline. Matthew Palus (2011) used the concept of governmentality to understand how the life of citizens was "colonized" and regulated through the material presence of infrastructure. Meanwhile, Palus et al. (2006) referred to different situations where governmentality could explain the control of the archaeological practice (and the restrictions to critical analysis).

Some fields of study (whether or not connected to historical archaeology) accept the theoretical importance of the author. This is the case of postcolonial studies and the archaeologies of gender and the body. Foucault's influence on postcolonial studies was connected to the imprint he made on postcolonial theorists such as Edward Said (Gosden 1999). According to Said, the concepts of discourse and power were relevant to promote a solid critique to the way in which the West traditionally understood the East (and more generally, other cultures). Western discourses (including state and scientific discourses) represented the East as being the contrary to the West (inferior, passive, irrational). These assertions were seen as natural and materialized in a series of actions which ended up in the domination of the East. Gender archaeologies recognized Foucault's impact on third-wave feminism (Gilchrist 1994). In this particular case, the concepts of discourse and power were relevant to discuss the social construction of femininity and masculinity. Finally, the archaeologies of the body insisted that some Foucauldian notions such as discipline, biopower, and biopolitics could be useful to understand the multiple ways in which power and discourses constitute the materiality of our own bodies and gestures (Hamilakis et al. 2002).

It is important to note that although many archaeologists refer to Foucault and highlight the potential of his work, they do not use any of his concepts in dealing with their own research problems. In general, if somebody compares Foucault's influence with that of other social scientists in contemporary archaeology (for instance, of Marx or Bourdieu), he or she will realize that it is minor. Some scholars suggest that this situation is connected with Foucault's limitations to account for resistance and agency (two hot spots in the discipline) (Meskell 1996). Here it is important to make some things clear. First, although Foucault placed much attention on dominance, his netlike conception of power admitted the

possibility of response. Second, his later works opened up an avenue to study individual expression through the concept of "techniques of the self." Third, the work of Foucault can engage in a dialogue with the work of other theorists enriching archaeological analysis. The works of Shackel (1993), Leone (1999), and others are just examples. It would be interesting that in the near future, more and more archaeologists could take advantage of Foucault's insightful ideas.

Cross-References

- ▶ Chronopolitics and Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ Global Archaeology
- ▶ Local Discourses in Archaeology
- ▶ Nationalism and Archaeology
- ▶ Postcolonial Archaeologies

References

Bapty, I., and T. Yates. 1990. Introduction. In *Archaeology after structuralism: Post-structuralism*, ed. I. Bapty and T. Yates, 1–34. London: Routledge.

De Cunzo, A. 2006. Exploring the institution. Reform, confinement, social change. In *Historical archaeology*, ed. M. Hall and S. Silliman, 167–189. Malden: Blackwell.

Foucault, M. 1975. *Discipline and punish: The birth of the prison*. New York: Penguin.

Foucault, M. 1980. Two lectures. In *Power/knowledge: Selected interviews and other writings 1972–1977*, ed. C. Gordon, 78–108. New York: Pantheon Books.

Foucault, M. 1988. Technologies of the self. In *Technologies of the self: A seminar with Michel Foucault*, ed. L. Martin, H. Gutman, and P. Hutton, 16–49. Amherst: The University of Massachusetts Press.

Gilchrist, R. 1994. *Gender and the material culture: The archaeology of religious women*. London: Routledge.

Gosden, C. 1999. *Anthropology and archaeology: A changing relationship*. London: Routledge.

Guting, G. 2011. Michel Foucault. In *The Stanford encyclopedia of philosophy,* ed. E.N. Zalta. Available at: http://plato.stanford.edu/archives/fall2011/entries/foucault. Accessed 25 July 2011.

Hall, M. 2000. *Archaeology and the modern world: Colonial transcripts in South Africa and the Chesapeake*. London: Routledge.

Hamilakis, Y., M. Pluciennik, and S. Tarlow. 2002. Introduction. Thinking through the body. In *Thinking through the body: Archaeologies of corporeality*, ed. Y. Hamilakis, M. Pluciennik, and S. Tarlow, 1–21. New York: Kluwer/Plenum.

Johnson, M. 1996. *An archaeology of capitalism*. Oxford: Blackwell.

Lemke, T. 2001. The birth of bio-politics: Michael Foucault's lectures at the College de France on neo-liberal governmentality. *Economy and Society* 30 (2): 190–207.

Leone, M. 1999. Ceramics from Annapolis, Maryland: A measure of time routines and work discipline. In *Historical archaeologies of capitalism*, ed. M. Leone and P. Potter, 195–216. New York: Kluwer/Plenum.

Leone, M. 2009. Making historical archaeology post-colonial. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster, 159–168. New York: Springer.

Meskell, L. 1996. The somatization of archaeology: Institutions, discourses, corporeality. *Norwegian Archaeological Review* 29 (1): 1–16.

Palus, M. 2011. Infrastructure and the conduct of government: Annexation of the Eastport community into de City of Annapolis during the twentieth century. In *The archaeology of capitalism in colonial contexts*, ed. S. Croucher and L. Weiss, 269–293. New York: Springer.

Palus, M., M. Leone, and M. Cochran. 2006. Critical archaeology: Politics past and present. In *Historical archaeology*, ed. M. Hall and S. Silliman, 84–104. Malden: Blackwell.

Shackel, P. 1993. *Personal discipline and material culture. An archaeology of Annapolis, Maryland, 1695–1870*. Knoxville: The University of Tennessee Press.

Practice Theory in Archaeology

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Introduction

Practice theory represents one of the most influential bodies of thought in contemporary anthropological archaeology. First incorporated into archaeological circles with postprocessual critiques of the 1980s (e.g., Hodder 1982), it has remained a hallmark of archaeological theory over the past three decades and continues to inform current debates over agency, identity, and materiality. Although definitions and applications vary

between practitioners, all practice approaches share common interests in action (or agency), context, and history. When considered in terms of the structural-functional and evolutionary frameworks of processual archaeologies, these practice-based foci challenge archaeologists to look beyond large-scale cultural processes to consider the role that individuals played in reproducing their respective social and cultural milieus. At the heart of all practice-based approaches lies a fundamental acknowledgement of the recursivity of social life, an invitation to explore the roles that different social entities – both human and nonhuman – played in reifying, shaping, and even challenging the structures of society. In this entry, I provide basic definitions for practice theory and several other closely related concepts. I trace their historical genesis and impacts in the field of archaeology and outline key issues and debates, including those related to power, agency, identity, cultural interaction, and the dynamism of cultural continuity and change.

Definition

In many ways practice theory defies definition. It is a body of thought first developed in sociology and cultural anthropology. It builds upon Marxist notions of *praxis* – putting ideas and theories into action – and serves as a general critique of both functionalism and structuralism in the social sciences. Yet it lacks the predictive and law-generating components of other theories employed in archaeology (e.g., cultural evolution), resembling a loose collection of possibilities rather than a deterministic and universalized model for how societies and cultures work, persist, and transform across time and space. Those archaeologists influenced by practice theory focus on the recursive ties between individuals and their surroundings – including other individuals, collectivities, and material culture. These interconnections shape individuals' choices, actions, and representations (*practices*). Because they are recursively entangled, however, there is a "duality of structure" (Giddens 1979): social contexts influence practices, just as practices influence the social contexts in which they occur. Practice approaches thus strive to locate and study the roles that individuals, material culture, and other social entities play within processes of cultural reproduction (and transformation). According to the practice theorists discussed below, the things that people do and the representations that they produce are not mindless behavioral responses following broad-scale evolutionary schemes of adaptation nor are they passive reflections of the cultural laws and regulations nested in actors' heads. On the contrary, they are the active, meaningfully constituted loci of social and cultural reproduction, the dynamic and improvised interplay of individuals and their surroundings, and the arenas in which cultural change and continuity take form.

Historical Background

During the 1970s and 1980s anthropologist Pierre Bourdieu and sociologist Anthony Giddens each produced comprehensive theories of practice, both of which proved foundational for all subsequent practice-based approaches (see also de Certeau 1984, Sahlins 1985, and Butler 1993 for examples of other influential theories of practice in the social sciences). Each model focused on the recursive interconnections between individuals and their surroundings, framing practices (or actions) as "prime movers" in processes of social and cultural reproduction. Although Bourdieu and Giddens employed different concepts in their respective theories, each strove to explore the roles that individuals (not just charismatic "Big Men") played in the reification of social structures through time and across space. Ian Hodder and his students at Cambridge later turned to the work of these thinkers in efforts to address issues of action, context, and history via the archaeological record. Such questions had been overlooked or rendered insignificant within the structural-functionalist frameworks of processual archaeology and thus came to play an important part in the emergence of postprocessual archaeology. Twenty years after these initial postprocessual critiques, Timothy Pauketat (2001a)

proposed a move towards *historical processualism*, his term for an integration of processual and postprocessual archaeologies, also rooted firmly in practice theory. I explore each of these innovations below in order to better contextualize the origins and uses of practice in archaeology.

Pierre Bourdieu actually began his career as a structuralist. He conducted ethnographic fieldwork in Algeria among the Kabyle, subsequently publishing his oft-cited description of the organizing principles of opposition inherent in Kabyle households (quoted at length in Bourdieu 1977 and reprinted in Bourdieu 1990). Of note, this analysis first appeared as a chapter in an edited volume dedicated to the work of structuralist Claude Lévi-Strauss. In the initial publication, Bourdieu discussed the sets of homologous oppositions ordering Kabyle households, such as female/male, dark/light, and low/high. Unlike other structuralists of the time that focused primarily on identifying such underlying organizational schemes and treated such patterns as *direct reflections* of the cultural principles stored in people's minds, Bourdieu began to consider the significance of social practices, situated between thoughts and things. In contrast to standard structural approaches, he came to focus on the dynamic and dialectical relationships between objectification (e.g., the physical structure of the Kabyle house) and embodiment (e.g., bodily experience of the house) as a key component of social reproduction. In his own words:

> The house, an *opus operatum*, lends itself to deciphering, but only to a deciphering which does not forget that the "book" from which the children learn their vision of the world is read with the body, in and through the movements and displacements which make the space within which they are enacted as much as they are made by it. (Bourdieu 1977: 90)

Published in French in 1972 and translated to English in 1977, Bourdieu's *Outline of a Theory of Practice* addressed these issues for anthropology and for social theory in general. According to Bourdieu's theory of practice (1977, 1990), cultural reproduction takes place unconsciously in the mundane details of everyday life. These processes operate within the recursive connections between individuals and their surroundings. The things that individuals do and the representations that they produce simultaneously take shape from the practices and representations of others around them while also influencing future practices. Bourdieu (1977: 72) described this feedback loop as follows:

> The structures constitutive of a particular type of environment (e.g. the material conditions of existence characteristic of a class condition) produce *habitus*, systems of durable, transposable *dispositions*, structured structures predisposed to function as structuring structures, that is, as principles of the generation and structuring of practices and representations which can be objectively "regulated" and "regular" without in any way being the product of obedience to rules, objectively adapted to their goals without presupposing a conscious aiming at ends or an express mastery of the operations necessary to attain them and, being all this, collectively orchestrated without being the product of the orchestrating action of a conductor.

For Bourdieu, the stability of social structures and the endurance of societies' schemes of classification and regimes of power are wholly dependent upon an assumed natural order, unquestioned beliefs in the way that things have "always" worked. The arbitrary (and inorganic) nature of certain structures is only brought into focus and questioned when an alternative way of life presents itself, introducing the possibility for practices to become politicized and for social transformation to occur. Bourdieu (1977: 164) used the term *doxa* to refer to this phenomenon. If some component of social life is *doxic*, it is taken to carry no political connotations since there is literally no conceivable alternative way of doing (Silliman 2001: 194). Once questioned and dissolved, doxas are subsequently reestablished through orthodoxy or continually challenged through heterodoxy. Archaeology is particularly well positioned to address issues of doxa given its long-view perspectives on human history (Loren 2001; Silliman 2001, see also Smith 2001 for a critique of doxa in archaeology). For example, archaeologist Stephen Silliman (2001) used this concept to interpret colonial interactions between Native Americans and colonialists in nineteenth-century California. He

framed colonialism and its introduction of novel forms of material culture as a break in the doxa of pre-colonial North American societies.

Bourdieu's theory also rests upon the concept of *habitus*, a term that he appropriated from the work of Marcel Mauss. Recursively linked to its surrounding structures, habitus is an individual's embodied predisposition to act in certain ways. The habitus is a durable *but transposable* set of dispositions amalgamated from a person's life experiences and cultural repertoires, simultaneously structur*ed* and structur*ing*. In Bourdieu's (1977: 78) words:

> The habitus, the durably installed generative principle of regulated improvisations, produces practices which tend to reproduce the regularities immanent in the objective conditions of the production of their generative principle, while adjusting to the demands inscribed as objective potentialities in the situation, as defined by the cognitive and motivating structures making up the habitus.

Although similar in some manners to the concept of culture, habitus adds a degree of fluidity and flexibility to processes of social and cultural reproduction. Habitus is "regulated" and "tends to reproduce" regularities, but it is also improvised and context dependent. In contrast to previous understandings of culture in anthropology, practitioners taking influence from Bourdieu "assume that society and history are not simply sums of ad hoc responses and adaptations to particular stimuli" (Ortner 1984: 148). Practice-based approaches thus acknowledge the ever-present possibility of structural transformation from within.

Sharing many qualities with Bourdieu's theory of practice, sociologist Anthony Giddens' (1979, 1984) theory of *structuration* represents a middle ground between objectivism and subjectivism in the social sciences. On the one hand, Giddens critiqued functionalism and structuralism for their *objectivist* emphases on the social whole over its parts (individuals). On the other hand, he framed hermeneutics and interpretive sociologies as *subjectivist* in their sole focus on the experiences of individuals. Giddens (1984: 2) sought to establish a theory of practice situated between these two extremes, making the basic domain of study in the social sciences "social practices ordered across space and time." Like Bourdieu, he identified practices as the loci of social reproduction by virtue of their recursive connections to systems of social structures. From this perspective, there is a *duality of structure* for Giddens (1979: 5): "structure is both medium and outcome of the reproduction of practices."

In the most basic sense, Giddens (1984: 17) conceptualized structure as the rules and resources that make it possible for similar social practice to exist across spans of time and space. As social practices are reproduced across space-time, they take on increasingly systematic forms. For Giddens (1984: 25):

> Analyzing the structuration of social systems means studying the modes in which such systems, grounded in the knowledgeable activities of situated actors who draw upon rules and resources in the diversity of action contexts, are produced and reproduced in interaction.

According to the theory of structuration, social reproduction occurs as individuals make choices and engage in practices, many of which operate on the level of what Giddens (1984: 6–7) calls *practical consciousness*, a concept sharing several parallels with Bourdieu's ideas of habitus and doxa (see above). This realm of human awareness and belief exists between discursive consciousness – in which people have the ability to explain and express their motivations for acting in a certain way and not another – and unconscious motivations, of which individuals are unaware. Practical consciousness thus encompasses the reasons "behind" all practices that people engage in, of which they are aware, but cannot explain discursively. In other words, as people go about their daily lives, much of the work that they do in recasting social structures takes place beyond the realm of language (including "secondary rationalizations"). Of note, Giddens also recognizes the permeability and context-dependent nature of the divide between practical and discursive forms of consciousness.

With this facet of structuration, Giddens (1984: 9) also offered a broad definition of agency as the capability of doing things: "Agency concerns events of which an individual is the perpetrator, in the sense that the individual could, at any phase

in a given sequence of conduct, have acted differently." This definition overlooks the agency that other theorists like Alfred Gell and Bruno Latour attribute to material culture (discussed further below).

In 1982, Ian Hodder outlined the potential of practice theory for archaeology in his edited volume *Symbolic and Structural Archaeology*. In the introductory chapter, Hodder (1982) proposed a shift towards structuration as a means of critiquing the then-dominant strains of functionalism and structuralism in archaeological theory. He saw structuration as a move towards a contextual and cultural archaeology focused largely on "the role of material culture in the reflexive relationship between the structure of ideas and social strategies" (Hodder 1982: 1). The structural-functional frameworks of the New Archaeology (i.e., processual archaeology) operated on analogies between social and organic life à la Radcliffe-Brown (Hodder 1982: 2–6). These approaches focused heavily upon adaptation and systems theory in efforts to uncover and identify the laws governing cultural processes. According to Hodder, such approaches also operated on universalizing assumptions that change *always* emanated from outside the system (usually in the form of environmental transformations) and that material culture passively reflected the cultural system of which it was a part. Hodder critiqued these emphases on function and utility as inadequate for explaining cultural change, calling attention to the New Archaeology's skewed focus on universalized cultural "laws" over specific historical contexts and its privileging of collectivities over their constituents (e.g., individuals, material culture, space).

Hodder (1982: 7–9) found similar flaws in structuralism, which he again remedied with reference to practice theory. Structuralists fixated upon the codes and rules of culture and society situated in people's heads. They assumed that the regularities of these codes and rules manifested themselves in observable patterns of interrelations in the world like the polarities of the Kabyle household described by Bourdieu. Echoing Bourdieu's critiques, Hodder found structural approaches inadequate due to their lack of a theory of practice, their inability to explain change across space or time, and their disregard for the individuals of which the observed collectivities were comprised. For Hodder, structuration offered a means of challenging the assumed reflective relationships between thoughts and things while acknowledging the ways in which symbols, actions, and materials were meaningfully constituted and active in societies.

In 2001 Timothy Pauketat (2001a) reiterated the importance of practice theory in archaeology by identifying it as the core component of *historical processualism*, what he saw as an emergent paradigm. Pauketat described historical processualism as a reconciliation of processual and postprocessual archaeologies. This new approach shied away from earlier archaeologies' foci on behavior and evolution to consider the importance of context and history via theories of practice (Pauketat 2001a: 73). He framed these new foci in stark contrast to previous generations' interests in behavior and evolution:

> The critical distinction boils down to the fact that behavior (abstract, goal-oriented human activity) is not practice (homologous actions and representations that vary between contexts or events even in the routinized forms – say cooking in pots – seem to remain the same). From a practice perspective, the locus of microscale and macroscale change is people acting out or representing their dispositions in social contexts.

Pauketat reviewed three current approaches in archaeology – neo-Darwinism, cognitive-processualism, and agency theory – in order to demonstrate their shared focus on issues of practice and history. Following thinkers like Bourdieu, Pauketat (2001a: 74) pointed out that practices are loci of change. In contrast to earlier approaches in archaeological theory based upon functionalism and systems theory, cultural practices *are* cultural processes rather than their consequences. Although the term *historical processualism* never fully caught on, practice-based approaches and the cross-fertilization of both processual and postprocessual archaeologies now represent major components of archaeology in the twenty-first century.

Key Issues/Current Debates

In this section I discuss four reoccurring themes studied and debated among archaeologists taking influence from practice theory: (1) power and agency, (2) identity, (3) cultural interaction, and (4) cultural continuity and change.

Issues of *power and agency* loom large in all considerations of practice. Archaeologists often disagree on the potential that actors have to transform the social structures around them. On one extreme are those that see the overarching structures of society – constantly reproduced by the individuals enmeshed within – as rigidly deterministic; these thinkers portray actors as essentially power*less* in relation to the surrounding collectivity or environment. On the other extreme are those that treat actors as all knowing and ever capable of transforming social structures according to their specific intentions and goals (see Joyce and Lopiparo 2005: 366). Although some archaeologists read these extremes (typically the former) in the theories of practice presented by Bourdieu and Giddens (e.g., Hodder and Hutson 2003: 93), most place Bourdieu's recursivity and Giddens' duality of structure on a middle ground, recognizing the inextricable nature of agency and structure (Jones 1997: 89–90). In addition to these theories, a third and surprisingly underutilized model of practice for archaeologists comes from the work of social theorist Michel de Certeau (1984). His concept of *tactics* emphasizes the recursive relationship between individuals and social structures, acknowledging the roles that individuals play in manipulating and shaping the system while still addressing limitations and unintended outcomes of action.

At the heart of each of these approaches lies the issue of agency (Giddens 1984; Dobres and Robb 2000; Joyce and Lopiparo 2005), or the ability of individuals, groups, and even material cultural to act upon and shape society. Archaeologists often use this concept to address the roles that social entities play in processes of cultural continuity and change (discussed further below). It should be noted that agentive action – both a structured structure and a structuring structure from Bourdieu's perspective – has the potential to result in *both* stability and/or transformation. Although Bourdieu, Giddens, and de Certeau each positioned agency within processes of cultural reproduction in a distinct manner than the next, all emphasized the *simultaneity* of structure and agency. On a similar note, Rosemary Joyce and Jeanne Lopiparo (2005: 365) point out the interpretive dangers of treating agency and structure as intermittent, "as an alternation of moments of the exercise of agency in an otherwise continuous flow of structure," rather than as constant and seamless.

The second theme, *social identity*, represents another key area of study in contemporary archaeology. Practice-based approaches often focus on the ways in which individuals and groups construct and negotiate their identities via the material world. For example, Siân Jones (1997) employed Bourdieu's theory of practice in her considerations of ethnic identity and material culture, while Diana DiPaolo Loren (2001) used the concept of doxa in her study of dressing practices and their roles in both French and Native American identity construction within the colonial politics of seventeenth- and eighteenth-century North America.

Similar to the perspectives it offers identity studies, practice theory also sheds new light on the dynamism of *cultural interaction*, particularly in instances of cultural contact and colonialism. For example, Kent Lightfoot, Antoinette Martinez, and Ann Schiff (1998) used a practice-based approach in their analysis of cultural admixture in interethnic households of the Native Alaskan neighborhood at Colony Ross, a nineteenth-century Russian fur-trading settlement in northern California. The neighborhood was composed of households, usually occupied by couples of Native Alaskan men and local Kashaya Pomo women. Lightfoot et al. (1998: 209–15) found that domestic routines of households usually followed Kashaya Pomo traditions, while the overall village structure was based upon traditional Native Alaskan ordering schemes. In this instance, both Kashaya Pomo women and Native Alaskan men reproduced "traditional" forms of their culture, making their interethnic households *hybrid* in nature (see also Silliman 2001 and 2009

for examples of practice-based approaches to colonialism in North America).

The fourth theme, *cultural continuity and change*, connects closely with all of the themes discussed above. Given this theme's centrality in all forms of archaeology, it may represent the most influential and productive application of practice theory in the field. Tim Pauketat (2001b) frames the insights that practice theory sheds on issues of cultural continuity and change in terms of *traditions*. In contrast to earlier generations of archaeologists that treated traditions as conservative and resistant to change, Pauketat (2001b: 2) views traditions as practices brought from the past into the present. Instead of approaching traditions as the constant variables of culture, Pauketat takes a contextual practice-based approach and frames traditions as arenas of cultural transformation. As individuals and groups "replicate" the traditional practices of their ancestors, they always introduce some degree of change (e.g., invoking these traditions in new temporal, spatial, and social contexts). Stephen Silliman (2009) takes this general idea one step further by arguing that cultural continuity and change are inseparable, forever fused to one another within the seamless whole of cultural reproduction.

Future Directions

Although not always directly tied to thinkers like Bourdieu or Giddens, contemporary interests in material culture theory embody the recursive spirit of practice theory. The last 15 years or so represent an important stage for the interdisciplinary study of material culture as evinced by the founding of the *Journal of Material Culture* in 1996 and a recent proliferation of books, journal articles, edited volumes, and conference papers addressing the interconnectedness of material culture and social relations. This trend fostered a notable fluorescence of studies that make use of the term "materiality" in fields as diverse as anthropology, archaeology, design studies, history, human geography, museology, philosophy, and sociology. Most thinkers making use of the term "materiality" are dedicated to moving beyond the dichotomous legacies of the Cartesian divide of mind and body which permeates much of social science, cleaving the material and the immaterial, nature and culture, and the object and the subject. In light of the dialectical (and recursive) pull that exists between people and things, thinkers such as Alfred Gell and Bruno Latour recognize that agency is not limited to humans alone.

Archaeologists following in these directions note that the things they excavate and analyze were deeply embedded in past societies and cultures (or networks à la Latour) in relationships far more complicated than mere reflection. By continuing to recognize that humans and objects are dialectically bound and thus inseparable in terms of social analysis, archaeologists have begun to explore the culturally specific manners in which the material world participates in past social relations. This participation hinges upon the recursive interconnections pointed out in Bourdieu's practice theory, Giddens' theory of structuration, and the many iterations of practice theory employed in contemporary archaeology.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Ethnic Identity and Archaeology
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of
- ▶ Power and Knowledge in Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Structural Archaeology

References

Bourdieu, P. 1977. *Outline of a theory of practice*. Trans. R. Nice. Cambridge: Cambridge University Press.

Bourdieu, P. 1990. *The logic of practice*. Trans. R. Nice. Stanford: Stanford University Press.

Butler, J. 1993. *Bodies that matter: On the discursive limits of "sex"*. New York: Routledge.

de Certeau, M. 1984. *The practice of everyday life*. Trans. S. Rendall. Berkeley: University of California Press.

Dobres, M., and J. Robb, eds. 2000. *Agency in archaeology*. New York: Routledge.

Giddens, A. 1979. *Central problems in social theory: Action, structure, and contradiction in social analysis*. London: MacMillan Press.

Giddens, A. 1984. *The constitution of society: Outline of a theory of structuration*. Cambridge: Polity Press.

Hodder, I. 1982. Theoretical archaeology: A reactionary view. In *Symbolic and structural archaeology*, ed. I. Hodder, 1–16. Cambridge: Cambridge University Press.
Hodder, I., and S. Hutson. 2003. *Reading the past: Current approaches to interpretation in archaeology*. 3rd ed. Cambridge: Cambridge University Press.
Jones, S. 1997. *The archaeology of ethnicity: Constructing identities in the past and present*. New York: Routledge.
Joyce, R.A., and J. Lopiparo. 2005. Postscript: Doing agency in archaeology. *Journal of Archaeological Method and Theory* 12 (4): 365–374.
Lightfoot, K.G., A. Martinez, and A.M. Schiff. 1998. Daily practice and material culture in pluralistic social settings: An archaeological study of cultural change and persistence from Fort Ross, California. *American Antiquity* 63 (2): 199–222.
Loren, D.D. 2001. Orthodoxies and practices of dressing in the early colonial Lower Mississippi Valley. *Journal of Social Archaeology* 1 (2): 172–189.
Ortner, S.B. 1984. Theory in anthropology since the sixties. *Comparative Studies in Society and History* 26 (1): 126–166.
Pauketat, T.R. 2001a. Practice and history in archaeology: An emerging paradigm. *Anthropological Theory* 1 (1): 73–98.
Pauketat, T.R. 2001b. A new tradition in archaeology. In *The archaeology of traditions: Agency and history before and after Columbus*, ed. T. Pauketat, 1–16. Gainesville: University Press of Florida.
Sahlins, M. 1985. *Islands of history*. Chicago: University of Chicago Press.
Silliman, S.W. 2001. Agency, practical politics and the archaeology of culture contact. *Journal of Social Archaeology* 1 (2): 190–209.
Silliman, S.W. 2009. Change and continuity, practice and memory: Native American persistence in colonial New England. *American Antiquity* 74 (2): 211–230.
Smith, A.T. 2001. The limitations of doxa: Agency and subjectivity from an archaeological point of view. *Journal of Social Archaeology* 1 (2): 190–209.

Practices and Techniques of Roman Centuriation

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Definition

The term centuriation as it is commonly used today describes the practice of the Roman state to divide and allocate agricultural land. Actually, the *centuriatio* is inscribed, along with other rules of ground subdivision within a broader disciplinary scope. The *limitatio* was the technique of delimitating and subdividing space which was achieved by tracing the *limites* or boundaries. Together, these two practices constitute the most characteristic elements of centuriation.

Centuriation consisted mainly of the measurement of public land and its subdivision for the purpose of an agrarian assignment in regular plots (the centuries), usually squares of 20 *actus* (*actus* = an area of 14,400 ft^2) per side and therefore with an area of 200 *iugera* (1 *iugerum* = 2 square *actus* (240 × 120 ft) = 28,800 ft^2 = 0.252 ha); two *iugera* comprised a *heredium* (0.504 ha). The model would have derived its name, *centuria*, originally because the land was assigned to 100 owners to each of whom they assigned a *heredium*, which became private property *optimo iure* (Varro *Res Rusticae* 1, 1, 2; Columella, *Res Rusticae* 5, 1, 2; Fest 53).

The fencing arose from the orthogonal intersection of various dividing lines (*limites*), materialized in various ways on the ground. The *limites* had an amplitude that varied according to their location within the grid and therefore to the role played within the system. Most of them consisted of streets. The lines, with reference to the general orientation of the centuriation, took the name of *cardo* and *decumanus*, respectively. The east-west-oriented *limites* were called *decumani*, those orthogonal to the previous ones were, from the north to the south, called *cardines*. The lines whose tracing on the ground gave origin to the grid were called, respectively, *decumanus maximus* and *cardo maximus*. Both in theory and in practice, this general approach knew many variations.

This redefinition of an agricultural space that made it rationally functional to the political, administrative, and economic activities of a settlement was mostly part of more complex territorial planning operations implying extensive plumbing, deforestation, the creation of a road network, and the establishment or renovation of inhabited towns.

The structural elements of the ancient Roman agrarian structures (networks of roads and canals,

signs of division of land, rows of trees, trees, hedges, ruins, devotional places at intersections) are still recognizable today in various ways on the ground and in the landscape even though there have been many alterations to the original forms (AA.VV. 1983; Talbert 2000). They can be defined as a whole, as Tozzi wrote, "the most impressive archaeological document of Roman civilization" (Tozzi 1974).

The Sources

The sources are numerous and varied. They include textual sources, i.e., inscriptions and literary texts and manuscripts (the writings of the Roman land surveyors), as well as surviving monuments that remain, and the very persistence of ancient cadastral surveys and assets in the landscape itself. The main written sources for the study of the centuriation and of the activities carried out by the Roman land surveyors, the *agrimensores* or *gromatici*, are collected in the *Corpus Agrimensorum Romanorum*. This compilation of Latin texts was probably assembled during the fourth or fifth century E and includes material from earlier periods and contains both legal and technical content. The works are fragmentary, with innumerable textual variants. Some of them contain miniaturistic illustrations, sometimes colored, which demonstrate that the texts were to be used as manuals and, therefore, had to be didactic. The most important manuscripts are the two (*Arcerianus A* and *B*) kept in the Herzog August Bibliothek in Wolfenbüttel and another in the Vatican Libraries (manuscript known as *Palatinus Vaticanus Latinus*).

Until the nineteenth century, there were few scholars who took an interest in the Corpus. Among them was Abbot Gerbert of Aurillac who became Pope Sylvester II. Then in the nineteenth century, F. Blume, K. Lachmann, and A. Rudorff completed an edition that was published in two volumes between 1848 and 1852 under the title *Die Schriften der römischen Feldmesser* and better known as *Gromatici Veteres* (Lachmann 1848). C. Thulin later partially republished these texts in the Teubner series in 1913 (Thulin 1913). Among the most important writings, the collection includes those from Frontinus, generally identified with Sextus Iulius Frontinus, the Balbus treaty titled *Expositio et ratio omnium formarum*, which provides a reliable model of the type of geometric work that surveyors had to learn to do. The collection also hosts writings attributed in the Corpus to the freedman of Caesar Augustus Gaius Julius Hyginus, librarian of the Palatine library (*De limitibus*, *De condicionibus agrorum*, *De generibus controversiarum*), and the work *De condicionibus agrorum* by Siculus Flaccus (perhaps third century CE). To an author identified as Hyginus Gromaticus, to differentiate him from the other Hyginus, the Corpus attributes the writing *De limitibus constituendis*, very important for the knowledge of Roman centuriation, among the clearest in the collection. With the title of *Libri coloniarum*, the Corpus also includes two catalogues of the colonies. In addition to these texts, the collection includes other disparate, sometimes incomplete, works, concerning extracts of laws, quotations from edicts, legal extracts, a treatise (*De sepulchris*) dedicated to places used for burials, various manuals, a treatise on the gemstones, catalogues of land holdings of the imperial period, *Casae*, and concludes with excerpts from the *Originum* of Isidorus Hispalensis concerning the lands and the measurements, weights, and measures and extracted in Latin from the Euclidean geometry (Campbell 2000).

The Illustrations

Only the *Arcerianus A*, the *Palatinus*, and its derivative *Gudianus* contain the complete series of gromatic illustrations, related to many topics in the texts and perhaps already present in the original texts of the surveyors. The miniatures contained in the *Arcerianus* appear to be more accurate and sober and only in some cases are similar to those contained in the *Palatinus*. O.A.W. Dilke classified the illustrations in the following categories: (a) generic detection techniques; (b) detection techniques, which concern orientation; (c) illustrations, which refer to boundary and boundary stones; (d) plants of surrounding cities and lands; (e) drawings of maps;

(f) illustrations of legal definitions; and (g) theoretical instruction (Dilke 1967).

The simplest drawings, the geometric ones, are monochromatic, light brown. In the most elaborate illustrations, the colors that are used seem to respect conventional codifications like those related to the roads for which red or brown is used, sometimes green, or blue or bluish green for water, and light brown, yellow, or gray for buildings with the use of red for roofs.

History of Studies

It was B.G. Niebhur who first outlined a perspective to study Roman centuriation at the beginning of the nineteenth century. According to the German scholar, the study of the texts of the *gromatici* had to go hand in hand with the investigations on the ground. A few years later, Christian Tuxen Falbe, formerly a ship captain and later consul general of Denmark in Tunisia, a keen lover of archaeological studies, while he was performing difficult surveys in the territory of ancient Carthage, noted the presence in the plain of El Mersa of a network of squares of 708 m per side. Falbe correctly identified them as an intervention of Roman agrarian subdivision, and based on the reading of Appian (*Bellum Civile* 1.3.24), he hypothesized a dating of the colony's *limitatio* at the time of Julius Caesar and Augustus.

During the same period, there came an increasing perfection of cartographic science which made it possible to acquire further acquisitions. Other recognitions of Roman centurial structures were in fact made in the first half of the nineteenth century in the Po Valley thanks to the surveys carried out by the Military Geographical Institute of the Austrian General Staff. Pietro Kandler from Trieste, an epigraphic scholar, recognized the centuriation of Pola, Trieste, and Aquileia already in 1848. In 1857, after similar discoveries in Lesina and Zara, he also identified the centuriated *ager* of Padua (Padova). To him we owe the definition of a method of study that enabled the integration of inscriptions, toponyms, excerpts from the works of the *gromatici*, the cartography, and the direct recognition on the ground.

At the end of the nineteenth century, the respected German topographer Schulten made the most important contribution on the centuriation which manages to physically link technical texts, toponymy, and analysis of cartography. It was not until the 1930s that the studies of Plinio Fraccaro furthered advanced this knowledge. To him we owe the first overall representation of the centuriation in Italy that brought our attention to the relevance of the phenomenon of the *limitationes* of northern Italy. A first complete inventory of surviving evidence was prepared.

In the second half of twentieth century, many scholars have made significant advances in the studies using archaeology, aerial photography, remote sensing, and Geographic Information Systems (GIS) (AA.VV. 1983; Castagnoli 1958; Chouquer et al. 1987). Remote sensing has allowed scholars to grasp traces and elements in the landscape not taken into consideration by the process of cartographic abstraction (Bradford 1957; Fasolo 2006; Schmiedt 1989).

The Procedures of Centuriation

The territories conquered, confiscated, or purchased by the Roman state were included in the *ager publicus populi romani* (land owned by the Roman state). One of the major uses of the *ager publicus* was for colonial foundations, the so-called *deductiones*. The colonies (a community of settlers established by the Roman state) that the Romans founded could be of one of two types: Latin or Roman. Among the various characteristics, the Latin colonies had their own laws and the capability to mint coins, but they could not carry out an independent foreign policy, as they had the obligation to supply military contingents to Rome. Roman colonies were instead formed of Roman citizens with full legal rights, and as such they were an integral part of the Roman state. Colonists often were veteran soldiers.

The *ager publicus* could also be granted to private individuals upon the payment of a fee for its usage in cultivation and pasturage. The wealthy Roman and Italic classes availed themselves of this possibility on the wave of conquests

to establish ever-larger farms for the production of goods for the market and export and to develop migratory breeding. This determined the crisis of small peasant property and the proletarianization of the peasantry. Tiberius Gracchus opposed this, in order to recover the arable *ager publicus* occupied by the wealthy private persons beyond the limits permitted by the law and to redistribute it in small lots to the proletarians in an attempt to recreate the social class of the small peasant proprietors from whom soldiers were traditionally drawn. Large areas of central-southern Italy were recovered following this policy through a restructuring process of the land survey.

The *Adsignatio*

In Roman public law, *adsignatio*, the prerogative of the central power, was the institution through which state lands (*publici agri*) of any origin and in whatever condition they found themselves, passed from the dominion of the state to that of private individuals who acquired full ownership of them. Rome could organize the assignees in communities with administrative autonomy (*coloniae*, *municipia*, *praefecturae*) or continue to keep direct administrative links with them (so-called viritane assignments).

The assigned lands became private property *optimo iure*, a *heredium* of which the private individual had the right freely to dispose of it, giving it as an inheritance, dowry or pledge, and the obligation to reveal it in the census.

During Rome's regal period, the king was in charge of the *adsignatio* (Varro, *de re rustica*, 1.10.2; Cicero, *de re publica*, 2.14.26). In the republican period, the prerogative passes to the Roman citizens, *populus romanus* who decide by voting in the popular assemblies (*comitia centuriata*, *comitia tributa*) or in the *plebis* council a law presented by a magistrate who could be the *consul*, the *praetor*, or the *tribunus plebis* and who could in turn act on his own initiative or pushed by the senate or even as it often happened from the third century BCE onward against the will of the senate.

The law, often called agrarian, identified the territory to be assigned, the extent of the intervention, the number of assignees, and the methods of distribution. In the case of colonial assignments, a further law was necessary that established the order of the colony defining the religious, administrative, and building structures (e.g., the *Lex coloniae Genitivae Iuliae* of 44 BCE for the Urso colony in Spain).

Each law foresaw the modalities of execution delegating them to a commission of magistrates of which it established the number. Generally, there was a triad (*tresviri agris dandis adsignandis*), but it could also be comprised of up to 20 members. A time period, biennial, 3-year, or even 5-year deadline was also envisaged, in which the commission had to exhaust its mandate. To carry out its tasks, the commission used surveying technicians. In the late republican period, this type of procedure began to fail, and land distributions were passed without approval by the *comitia* but by simple act of the extraordinary magistrate under the legal authority that had given him exceptional powers and constituents. In the imperial period, the power to dispose them was taken directly by the *princeps*. The sources report a very few data regarding the costs of *adsignationes*.

The Operations

The *limitatio* started on the ground with a ceremony in which, in the presence of the founder of the colony (*conditor*) or a representative of his, the *auspicia* were taken from the *augur*. The gods were invoked to guarantee property rights and relations. If the interpretation that resulted was favorable, the founder gave permission to start the work.

The Orientation

Then the specific technical operations were carried out, the first of which consisted in choosing the orientation to be imposed on the *limitatio*. The theory suggested was to follow astronomically, *secundum coelum*, by tracing the *maximus decumanus* from the east to west (Front., *de limit*. 27, 28, 31. Hyg. Grom., *de limit. const.*, 167; Lachmann 1848). However, in the writings preserved in the *Corpus*, all the cardinal points are taken into consideration. The authors of the

treatises contained in the *Corpus Agrimensorum,* consider as valid reasons to dispense from the theoretical approach of the axes different factors: the opportunity to make the *decumanus maximus* coincide with a great way of communication that innervates the territory or the morphological arrangement of the land that is required to establish the *maximus decumanus* along the main axis of the territory to be assigned, *longitudinem agri secuti* or the presence of the sea or mountains that advised the use of the natural margins that delimited them as a basis for orientation (Hyg. Grom., *de limit. const.*, 170; Lachmann 1848).

As a matter of fact, on the ground, the studies have found the most disparate orientations, imposed by this type of opportunity. In many cases, a determining factor has proven to be the slope of the ground that was taken into account to achieve optimal water flow systems.

The Determination of North

The determination of the north was carried out using a sundial gnomon. One of the possible procedures has been handed down to us by Hyginus Gromaticus. A circle will have been placed on the flat surface of the ground; the *gromaticus* will have placed the gnomon at the center. Then the points of entry and exit of the shadow of the gnomon were noted during the day on the circumference. The two points of intersection were linked with a straight line and then a line was drawn perpendicularly, starting from the middle of the straight line passing through the center of the circumference. This line coincided with the north-south direction. Another version of the same procedure is also reported to us by Vitruvius (Vitruvius, *de architectura* 1.6.6–7).

The Creation of the Squaring

Then the *gromaticus* fixed the orientation, and the point was chosen in which to place the *groma*, *posita auspicaliter* (Hyg. Grom., *de limit. const.*, 170; Lachmann 1848). He then proceeded to originate the grid by tracing two lines that crossed strictly at right angles. The optimal theoretical rule that wanted this point coincided with the center of the *pertica* (the total area of land measured and allocated) and perhaps with the center of the urban structure of the colony in which the territory belonged to (*constituendorum limitum ratio pulcherrima*, Hyg. Grom., *de limit. const.*, 180; Lachmann 1848), but in reality, a series of exceptions occurred due to the presence of natural impediments and obstructions.

The originating axes of the centuriation could coincide with pre-existing road routes or created simultaneously with the operations of territorial planning. The most relevant example is in *Aemilia regio* where the *decumanus maximus* is the Via *Aemilia* and the *cardo maximus* from the various and most important routes that connected the Italian Apennines to the lowlands. There are cases in which the roads are independent from the agrarian arrangements (e.g., the Via *Mediolanum-Ticinum* which does not agree with the centuriation of *Pavia*). Roads were soon abandoned when they were no longer linked to the centuriation.

The Establishment of *Limites*

Once the orientation and the point originating from the place were established, the various parallel straight lines began to materialize on the ground, starting with the *decumanus maximus* and then moving on to the *cardo maximus* and the other boundaries. In this way, a predetermined module was reproduced in the whole area subject to boundaries and subdivision.

The *groma*, an instrument for surveying, was similar to the Greek gnomon. It was planted in the ground so that the center of the cross was plumb with the point chosen as the center of the *pertica*. Then the *groma* was rotated until its two arms coincided with the predetermined orientation. From the plumb line (*perpendiculum*) that hung from one of these two arms, the opposite correspondent was scored and proceeded to insert on the ground along the alignment in succession at regular distances poles (*metae*) until reaching a pre-established length. In the case of the creation of canonical centuries of 20 *actus* per side (2,400 ft or 70,968 m), the *groma* was then transported to this point, and we went on to trace, repeating the process, an orthogonal line perpendicular to the previous one in order to define the second side of the centurial module, which could

be a square or a rectangle. Once the square was completed, rigorous control measures were carried out to avoid the accumulation of errors. To measure distances, ten-foot long intervals called *decempedae* (equal to 10 Roman feet or 2,956 m) were used.

The *limites* were named differently and had different widths. For this reason, the *limites* that fell at every fifth interval were called *quintarii* or *actuarii* with reference to the *actus*, the right of passage, as they were accessible public ways. The *quintarii* constituted a term for the verification of the distances (Hyginus Gromaticus, *de limitibus constituendis*). The other *limites* were called generically linear, consisting of simple boundary lines, but they were known as *subruncivi* in Italy where they were cleaned with the billhook or brush axe (Hyg. Grom., *de limit. const.*, 168; Lachmann 1848). The name of this *limes* literally means weeded. To divide internally the centuries into the single allocation rates were then *limites* called *rigores* or *intercisivi* (literally paths that separate). It is not infrequent that centuries are internally divided into four squares of 50 *iugera* each.

The *limites* were named by numbering them starting from the *decumanus maximus* and from the *cardo maximus*, excluded from the computation, with reference to the quadripartition of the space that the intersection at right angles of the *decumanus maximu*s and the *cardo maximus* determined. That is, compared to the *decumanus maximus*, in the context determined by the general orientation of the centuriation, the space was divided into *pars dextra* or *dextrata* and in left or left pars and compared to the *cardo maximus* in *pars citrata* (or *postica*) behind this and *ultrata* (or *antica*) in front of it. The relative indications were reported with the relative roman numbers together with one of the four possible abbreviations: *DD, Dextra Decumanum, SD, Sinistra Decumanum, KK, Kitra Kardinem, UK,* and *Ultra Kardinem*. These indications were coupled with the centurial coordinates with which each single century was indicated within the system.

The prescriptions provided that only the *decumanus maximus* and the *cardo maximum* as well as the *quintarii* were roads, public, or private for public use. The width of the *limites* (*latitudes*) ranged from 40 ft that a law of the Augustan period foresaw the *decumanus maximus* to the 20 expected for the cardo *maximus* and was reduced to 12 ft for the quintari and eight for the *subruncivi*. Both the *Lex Manilia* and *Lex Ursonensis* recall the *fossae limitales* (man-made ditches) that ran adjacent to the limits.

The Markers and Boundary Stones Used to Demarcate the Fields

After the alignment operations which divided the land were completed, Roman surveyors moved to the laying of the intersections (*in mediis tetrantibus*) of the *limites*, of markers called *termini* (*cippi*) that the *Lex Mamilia* sanctioned as inviolable. The shapes, dimensions, and the materials used were varied. According to the Augustan prescription, they had to be made of flint or other stone of not inferior quality *ex saxo silice aut molari* (Hyginus Gromaticus, *de limit. const.*, 194; Lachmann 1848), and they went to every intersection stuck in the ground for at least two and a half feet remaining out of it for a foot and a half. This Augustan in practice must have been disregarded given the very limited number of stones that has come down to us. It is likely that reference was made to wooden stakes, in oak, juniper, or olive.

The upper base of the *cippus* was engraved with the *decussis*, a cross that reproduced the direction of the *limites*. Each stone also had engraved an indication of the couple of centurial coordinates that identified the position of the stone in space with respect to each axis originating the implant. The most consistent group of *cippi* found is that of the Gracchan period, mostly coming from the *ager Campanus* in south Italy. The laying of the stones took place in the context of particular ceremonies that expressed their sacrosanctity, as boundaries were sacred and honored as divinities. On February 23 of each year, the *Terminalia* took place in honor of the god *Terminus* whose cult was said to go back to the institution founded by King Numa. These boundaries had religious significance, and the displacement of a boundary stone

was considered a sacrilege. In coincidence with the intersections, sometimes the temples called *Compita* could be erected where *Compitalia* was celebrated at the end of December or at the beginning of January.

The Drawing of Lots

The *limitatio* started toward the conclusion with the division of the *centuriae* into lots. The parcels pertaining to each assignee could be located separately in more than one *centuriae* or extend over the course of them. The lots were called *sortes* or *acceptae* because they proceeded to assign them, at least from the Gracchi forward, by drawing lots, with two officials handing down the origin, while maintaining the possibility of receiving a nomination appointment. During the imperial period, the best was reserved for the emperor.

Registration of the Allocation and Drafting of Cadastral Maps

The deed of delivering the lot to the assignee was simultaneously registered in a special ledger. The operations then concluded with the drafting of a cartographic representation of the stacking, a cadastral map, called the shape, and more rarely *typus* or *pertica* or, destined to be authentic in the case of the occurrence of disputes. It was arranged in two copies, one of which was bronze displayed in the colony and a second perhaps in canvas sent to Rome where it was kept in the *Tabularium*. No extant copy of a cadastral map is available to us. The fragments of the maps that were reproduced for tax purposes on marble at a scale of maybe 1:50 *actus* with the partitions of the ancient *Arausio, Colonia Iulia Firma Secundanorum* (Orange in the south of France), in 35 BCE, discovered in the mid-nineteenth century, give us an idea of the original form of these types of documents.

The *Gromatici*

The prominent figures of the subdivision operations were technicians from the nineteenth century generally named *gromatici* or surveyors (Behrends and Capogrossi Colognesi 1992; Dilke 1971). They were specialized in the task of surveying measurement operations. In the Latin lexicon, we find a series of possibilities of more precise definition of the single professional figures that composed the category of the *gromatici* through terms that refer to the activity concretely carried out as well as the instrument mainly used. If *mensor* is the generic measurer, the *finitor* is the one who defines the boundaries (Non., *de comp. doctr.*, 11.24; Plaut., *Poenulus*, 48–49), and the *agrimensor* more intensely measures the cultivable fields. Sources also speak of *metatores* or of workers at the pole, of *decempedatores,* or of those who maneuver the ten-foot long rods and finally of the real *gromatici* or of those who, using the surveyor's surface, performed and directed the fundamental operations of measurement on the ground.

In the imperial period, the term *gromaticus* begins to become more prevalent. The profession becomes a prerogative as indicated by the epigraphic testimonies of the class of freedmen. Whether it was the military or civilians, their cultural and educational cradle was in any case the Roman army camp and in particular genius. Also in the imperial period, the *agrimensores* were framed as officials of the state in special colleges with salaries and training schools. The fundamental subject was cosmology and earth physics, whose knowledge allowed the surveyor to master the orientation on the ground. Hence, the geometry applied to the measurement of distances and areas (Cic., *Tusculan disputations* 1.5). The jurisprudence that allowed the surveyor to extricate himself in the delicate terrain of the juridical condition of the soils and of the controversies that arose there was a secondary matter. In fact, the land surveyor did not carry out arbitrary tasks other than jurisdictional matters limited to disputes concerning the land and always that the matter of contention did not fall outside its own geometric competencies in which case the judgment had to be transferred to the *ius ordinarium*. The classes and passing of exams promoted the student to a professional level with permission to be a surveyor. It was illegal to divide the land

without having obtained such authorization; severe penalties were imposed in the case of counterfeit or unfaithful measurements.

Instruments

In Pompeii, in the workshop of the toolmaker Verus, in 1912, a series of instruments used by the *gromatici*, including *a groma* and a sundial, were found. To these instruments must be added *chorobates*, *libella*, and *dioptra*.

References

AA.VV. 1983. *Misurare la terra: centuriazione e coloni nel mondo romano*. Modena: Franco Cosimo Panini.

Behrends, O., and L. Capogrossi Colognesi, eds. 1992. *Die romische Feldmesskunst: Interdisziplinare Beitrdge zu ihrer Bedeutung fùr die Zivilisationsgeschichte Roms*. Gottingen: Vandenhoeck & Ruprecht.

Bradford, J. 1957. *Ancient landscapes. Studies in field archaeology*. London: Bell.

Campbell, B. 2000. *The writings of the Roman land surveyors*. London: The Society for the Promotion of Roman Studies.

Castagnoli, F. 1958. *Le ricerche sui resti della centuriazione*. Roma: Edizioni di Storia e Letteratura.

Chevallier, R. 1962. Notes sur trois centuriations romaines: Bononia, Ammaedara, Vienna. In *Hommages à A.Grenier*, Collection Latomus, ed. AA.VV, Vol. 58, 403 ff. Bruxelles: Latomus.

Chouquer, G., M. Clavel-Lévèque, F. Favory, and J.-P. Vallat. 1987. *Structures agrarie en Italie Centro-Mèridionale. Cadastres et paysage ruraux*, Collection de l'Ècole Française de Rome. Vol. 100. Rome: EFR.

Dilke, O.A.W. 1967. Illustrations from Roman surveyors' manuals. *Imago Mundi* 21: 9–29.

Dilke, O.A.W. 1971. *The Roman land surveyors. An introduction to the agrimensores*. Newton Abbot: David & Charles.

Fasolo, M. 2006. *Antichi paesaggi agrari d'Italia nelle Banche Dati dell'Agea*. Roma: Agea.

Lachmann, K. 1848. *Schriften der Römischen Feldmesser (Gromatici Veteres ex recensione Caroli Lachmanni)*. Berlin: Georg Reimer.

Schmiedt, G. 1989. *Atlante aerofotografico delle sedi umane in Italia III. La centuriazione romana*. Firenze: Istituto Geografico Militare.

Talbert, R.J.A., ed. 2000. *The Barrington atlas of the Greek and Roman world*. Princeton: Princeton University Press.

Thulin, C. 1913. *Corpus Agrimensorum Romanorum*. Lipsia: Teubner.

Tozzi, P. 1974. *Saggi di Topografia storica*. Firenze: La Nuova Italia.

Pragmatism in Archaeological Theory

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Introduction

Over the past 25 years, the dual nature of archaeology has been widely recognized and accepted by scholars working within the field. On the one hand, archaeology is a rigorous search for truth about the ancient past. On the other, it is a political dialogue with the present. This accepted fact has been accompanied by a sea change in philosophy and theory. A number of important critiques by scholars located worldwide have moved archaeology away from empiricist and positivist epistemologies to various "realist" alternatives. These alternatives (1) appreciate that knowledge is constructed and produced from particular social standpoints; (2) support, because of standpoint sensitivity, theoretical inquiries into gender, race, class, and other structuring relationships in human life; (3) recognize that, even though empirical reality constrains what we can say about the past, there is still lots of room for interpretation; and (4) incorporate, because of theory's inevitable underdetermination by data, broader criteria of evaluation beyond an interpretation's correspondence with archaeological facts and its logical coherence. The influence of the "postmodern" turn in intellectual life is evident here, but so are influences emanating from many other "post-positivist" philosophies of science.

These philosophical commitments come together in what has been promoted as a *social archaeology* (e.g., contributors to Meskell and Preucel 2004). Social archaeology is focused on how different people inscribe meaning in space and time and, through these processes of inscription, construct themselves. It looks to engage multiple interests in the past, especially those of historically disenfranchised groups. These include all those indigenous and descendant populations marginalized by expanding

capitalism and who have been famously described as "people without history" (Wolf 1982). Social archaeology is thus a more inclusive, democratic practice that appreciates "the multiple entailments of our being-in-the-world" (Meskell and Preucel 2004: 3). This is not simply politics by other means; rather, it is good science. Our ability to grasp and learn from the otherness of the past can be enhanced by an engagement with traditional knowledges. In Bernstein's (1988) words, "it is only by the serious encounter with what is other, different, and alien that we can hope to determine what is idiosyncratic, limited, and partial." While serious engagement with stakeholders located outside the academic realm offers particular frustrations and challenges in reconstructing the past, it nonetheless makes us aware of silences that we have been creating and opens up new research directions. Such engagement is right at home in an archaeology that not only seeks to explain but also emancipate, that is, to foster critical thought about the contemporary human condition in hopes of impelling positive social change (Saitta 2008).

Definition

Pragmatist philosophical principles are especially compatible with, and indeed crucial for advancing, a critical social archaeology. Preucel and Mrozowski (2010: 28) define pragmatism as the "distinctive American philosophy that holds that the meaning of ideas or action can be determined by considering what idea or action it routinely generates, that is to say, its practical consequences." They note that pragmatism has never been, and is not today, a unified approach. There are many debates about what the founders of pragmatism (Charles Sanders Pierce, William James, John Dewey) meant and about the accuracy of various contemporary interpretations (e.g., those of Richard Bernstein and, especially, Richard Rorty). Preucel and Mrozowski briefly review some of the ways that pragmatism has been employed by archaeologists. This entry focuses on the influences of Dewey and Rorty.

John Dewey captures the essence of the approach with his notion that pragmatism turns from the "problems of philosophy" to the "problems of men" (Dewey 1917). That is, it applies itself less toward knowing or "getting things right" (in terms of capturing some final transcendental truth) than toward living or "making things new" (Rorty 1989). For pragmatists, making things new requires that we improve our ability to respond to the views, interests, and concerns of ever larger groups of diverse human beings – to expand the scope of who counts as "one of us" (Rorty 1989).

Thus, pragmatism seamlessly dovetails with the kind of sensibility that equips practitioners for using the *craft* of archaeology (sensu Shanks and McGuire 1996: a "unified practice of hand, heart, mind" and "emotion, need, desire") to address human needs. Pragmatism does so without abandoning time-honored and still useful concepts of truth, experience, and testing. Instead, it reformulates these concepts in a way more sensitive to meeting human need. In so doing it responds more directly – and perhaps more coherently and honestly – to the widespread consensus that archaeological work occurs in a political context, and that we must therefore be aware of how the results of our inquiries are used within that context. A brief summary of core pragmatist philosophical commitments follows.

The first core commitment is to an anti-foundational notion of truth – the idea that there are no fixed, stable grounds on which knowledge claims can be established. Truth is not an accurate reflection of something nonhuman; rather, it is a matter of intersubjective consensus among human beings, one mediated by currently available theories, methods, and data. This notion produces a warrant for aggressively experimenting with theory and method in order to arrive at historical truth. Experimentation is crucial for improving and expanding the conversation between and among interested parties of scientists and citizens. It is the vitality of this conversation that moves archaeology and its constituencies toward the sorts of "usable truths" that can serve human need. So understood, pragmatism moves us in directions other than those stipulated by the earliest commentators on archaeology's social relevance. The "New Archaeology" that burst upon the scene in the 1960s sought to establish such relevance when it explicitly cast archaeology as a

science and argued "it is anthropology or nothing." However, advocates like Ford (1973) still saw the "indiscriminant publication of unverified hunches" as an obstacle to archaeology's ability to serve humanity. Today, liberal production and publication of such hunches is seen as critical for advancing archaeology's explanatory and emancipatory project.

The second core commitment is to the idea that truth claims must be evaluated against a broader notion of experience. Specifically, they must be evaluated in terms of their concrete consequences for life today – for how we want to live as a pluralistic community. Instead of simply asking whether a claim about the past is empirically sufficient in light of available data, pragmatism asks *what difference the claim makes to how we want to live*. What are the implications of theoretical claims from evolutionary archaeology, interpretive archaeology, post-colonial archaeology, or indeed any other current framework for understanding society and history for how we think about, and how we might intervene in, human social life? To what extent does a truth claim expeditiously meet the human needs at stake in, say, reburial or repatriation controversies; that is, to what extent does it facilitate putting human souls to rest and human minds at ease? "Experience," in this view, is relational, interactive, and creative. It acknowledges our status as social and historical beings and thus is self-consciously reflexive. Defining experience in this way means that we must subsume the usual realist "criterial" rationality for judging truth claims (i.e., criteria emphasizing logical coherence and correspondence between theory and data) under something that is still broadly criterial but much more qualitative and humanistic – what Rorty (1989) has termed "fuzzy" rationality.

A third commitment is to a particular notion of "testing," specifically as it relates to the evaluation of truth claims produced by different standpoints, perspectives, and cultural traditions. As noted, especially germane to archaeology these days are those truth claims that divide scientific and various descendant community knowledges of the past, including indigenous, immigrant, working class, and other "folk" knowledges. Many have argued that within archaeology, there is no clear epistemology for uniting descendant community and mainstream scientific understandings of the past. Several scholars have advocated a rethinking of epistemology now that previously disenfranchised groups have places at the table. In contrast to the mainstream scientific view where competing ideas are tested against each other in light of the empirical record, pragmatism stipulates that we test the ideas of other cultures and descendant communities by "weaving" them together with ones we already have (Rorty 1989). Testing is a matter of interweaving and continually reweaving webs of belief so as to increasingly expand and deepen community and, perhaps, create new fields of action. Pragmatism prescribes a "measured relativism" that balances a commitment to evaluation with the parallel belief that cultural pluralism is our best recipe for civil cohesion. Latour (1999: 4) captures the same basic idea with his notion of a "sturdy relativism" in which science allows us to be sure of many things but also seeks to make better connections with the wider social collective. For Latour, this relativism is not one that capitulates to "anything goes" or, in his words, to the "frantic disorderly mob."

The specter of *objectivity* haunts these core philosophical commitments. What does objectivity mean in this context? And do we abandon all hope of attaining it by embracing a pragmatist orientation? The notion of objectivity endorsed by pragmatists, as alluded to above, is one that can be described as *dialectical*. Dialectical objectivity takes a particular stance toward the subjectivity of the knower. Whereas other kinds of objectivity seek either to exclude subjectivity (absolute objectivity) or contain it (disciplinary objectivity), dialectical objectivity adopts a positive attitude toward subjectivity. Subjectivity is seen as indispensable to the constituting of objects, as in fact *necessary* for objectivity. As Heidegger (1927) notes, objects first become known to us through action in the world. Knowing is thus acting, and human acting is always acting in company (Fabian 1994). These arguments close the loop to a concept of "objective truth" as a matter of intersubjective consensus – or solidarity – among human beings, rather than as a

matter of accurate reflection of something nonhuman.

This pragmatist notion of objectivity differs a bit from realist notions that are still widely invoked in contemporary archaeology. Realist objectivity stipulates that there is an independent reality, that alternative accounts map it differently, and that, while hope and bias complicate the picture, systematic exploration of similarity and difference can establish credible knowledge claims and produce more complete understandings of the past. Binford (1982) famously characterized this kind of objectivity as "operational objectivity." This qualified notion of objectivity has been endorsed by archaeologists working across the paradigmatic spectrum. Thus, processual archaeologists have called for a "mitigated objectivity," contextualists a "guarded" or "modified" objectivity, and feminists an "embodied objectivity."

The rub is that such notions of objectivity, no matter how well qualified, still might not be best for regulating a more democratic, inclusive, and critical social archaeology. Pragmatism's commitment to "testing" the beliefs of other cultures by interweaving and continually reweaving them with beliefs that we already have best supports an integrative approach to settling differences between indigenous and scientific knowledges. The navigational guide in these encounters is something fully human – wider, deeper, stronger, and better community – rather than some socially independent object that we seek to accurately represent in theory.

Key Issues/Current Debates

How can a pragmatist archaeology concretely serve this enlargement of community, especially when many public constituencies are still utterly indifferent to whether archaeology exists or not? How can we find some measure of integration in the new, post-colonial world?

One obvious way is through the production of knowledge that takes stock of neglected peoples and histories and that focuses on questions other than the kinds of "origins questions" – about the evolution of humanity, agriculture, and civilization – that have traditionally anchored archaeology's more popular writing. Of interest are questions about the "lived experience" of everyday life – its conditions, variations, rhythms, and disjunctions – with answers developed in such a way that they are accessible to those living peoples having a stake in the interpretations. This ambition is only realizable if those whose lives are affected are directly involved in the research enterprise as partners and collaborators, instead of just subjects or informants. Archaeology has been making good progress in reaching out to these groups. New understandings of the past are being developed by the "subaltern" archaeologies of women and racialized others, and by anti- and post-colonial archaeologies focused on indigenous peoples and their histories.

Efforts to develop a "working class" archaeology in the United States are cut from similar cloth (e.g., Saitta 2007; Shackel 2009). Archaeologies of labor are gaining increasing visibility in the States and catching up with those that have been developed elsewhere. A critical history of early twentieth-century coal miners in southern Colorado (Saitta 2007) is one that has been offered as an antidote to *official* histories of the American West. Official histories – especially in the West – are nationalist, progressive, and triumphal, emphasizing social unity and continuity of the existing social order and its institutions (Bodnar 1992). They gloss over periods of transformation and rupture or spin those ruptures (e.g., the American Civil War) as always having produced a better society, "a more perfect union." Alternatively, critical histories deal with context, transformation, and rupture, addressing both the historical process and different narratives about that process. Both kinds of history often conflict with *vernacular* (Bodnar 1992) histories of the past. Vernacular histories are local histories derived from the first-hand, everyday experience of those people who were directly involved with history's events. They are "passed around the kitchen table," conveying "what social reality feels like rather than what it should be like" (Bodnar 1992: 14). Vernacular histories threaten the sacred and timeless nature of official history, just as critical history threatens vernacular history.

Archaeological work in the American West has produced useful, mutually beneficial dialogue with people steeped in vernacular history, such as trade unionists. The vast majority of these people have never had much use for archaeology, realist, or otherwise. Others in the same unionist company, however, are keenly aware that history is complicated and can be written in a lot of ways, all of them deeply political. The gulf between academic and working class cultures, no matter where it is found around the world, is still palpable. We may or may not need a working class archaeology, but it certainly seems that we need a different way of *justifying* it. A key to narrowing the cultural gulf is to appreciate that sites of industrial and class struggle are part of a living history and long commemorative tradition and often considered sacred ground by descendant communities.

Progress is also being made in coping with the other, arguably more difficult conflicts in archaeological interpretation, such as surround compliance with the United States' Native American Graves Protection and Recovery Act (NAGPRA). These conflicts, especially, beg for pragmatic interventions more attuned to "living" than "knowing." By law, NAGPRA compliance is governed by a realist, criterial rationality. The success of a claim for cultural affiliation depends on whether it is supported by most of the available biological, linguistic, archaeological, and documentary evidence. In this scheme native oral traditions are assigned an evidentiary status equal to other kinds of scientific evidence. However, NAGPRA's "preponderance of evidence" criterion remains deeply problematic, both because of the elastic nature of evidence in archaeology (resulting from the particular quality of archaeological data combined with the fact that such data only become "evidence" in light of theory) and because of the often deep contentiousness of tribal oral traditions.

Given this situation, a realist, criterial rationality may not be the most appropriate or productive. Instead, we might follow the lead of those pragmatist philosophers and Native Americans who suggest that a more important and relevant criterion is the consequences of knowledge claims for everyday life: for how we want to live, and for the building of a genuinely pluralist community characterized by mutual understanding and respect. In the American Southwest, for example, Pueblo Indian tribal representatives implicitly endorse pragmatist evaluative criteria where they argue, in so many words, that history is less important than survival and the maintenance of harmonious relationships among the tribes. Survival is understood broadly as political, economic, *and* cultural. Naranjo (1996: 249) takes such a stand where she asserts that, in her view, the Pueblo Indian's primary concern is with "the larger issues of ¼ breathing and dying," rather than with the specific details of knowing that focus scientific world views. This concern for the present as well as the past – for living as well as knowing – represents a significant convergence between pragmatist and tribal epistemologies that is worth exploiting for its unifying potential. But this unity can only be established if we are willing to rethink the usual scientific criteria – that is, empirical and logical sufficiency – for judging and integrating knowledge claims.

Other convergences are apparent in the realm of methodology. Speaking at a conference dedicated to the topic of "Indigenous People and Archaeology," Lomaomvaya and Ferguson (2003) note that:

> In Hopi culture, what stands the test of time is substantive information about the past. Collection and analysis of data requires theory, but for Hopi it is the Hopi past itself that is most important, not what we think this past means for the world beyond Hopi.

This primary interest in archaeological "thick description" of a particular past converges with the pragmatist belief that human solidarity is best achieved not by those disciplines – theology, science, and philosophy – charged with "penetrating behind the many private appearances to the one general common reality" but rather by those which sensitize humans to the experience of diverse "others" through exploration of the private and idiosyncratic. Rorty (1989: 94) notes that "novels and ethnographies" are especially well suited to building this kind of solidarity.

Archaeological narratives attuned to human cultural variability across space and time, and developed via more reflexive and hermeneutic methodologies, can be just as useful.

Despite its critique of criterial rationality and preference for "thick description" over nomothetics, the pragmatist alternative need not be anti-science. This is a perennial criticism of scholars involved in building a critical archaeology. In the pragmatist view, and all things being equal, science is an excellent model of human community and solidarity (Rorty 1989: 15). But, unfortunately, all things are rarely equal. Where compromises are required, it is science that must lead the way, since it has for too long (and as a consequence of unequal power relationships in society) dominated and silenced other ways of knowing. In his *Federalist Paper No. 10*, the American founder James Madison noted the threat to community presented by "majority factions." For Madison, the best corrective to the majoritarian threat was enlarging the scope of community, that is, the number of interests represented at the table of democracy. To the extent that mainstream, realist science is a majority faction in American archaeology, it poses the greatest threat to the project of reconciling competing knowledges and expanding community. Archaeologists and subaltern "others" alike tend to cringe at any call for compromise in the service of reconciliation and stronger community. But Rorty (1998: 52) provides some comfort when he reminds us that, in democratic societies, "you often get things done by compromising principles in order to form alliances with groups about whom you have grave doubts."

Future Directions

Pragmatism emphasizes ways of living instead of rules for knowing, the "weaving together" of knowledges instead of their "validation against" experience, and the social utility of narratives instead of the absolute truth of laws and theories. These governing ideals neither forsake reality nor undermine the possibilities for learning, nor capitulate to relativism in the way that term is usually understood. Pragmatism subsumes Enlightenment criterial rationality and nomothetics to more humanistic – but no less explicit and compelling – regulative ideals. In so doing, it converges with the epistemologies of subaltern groups – native peoples and working classes – for whom the social causes and consequences of scientific knowledge claims can be of great concern. This in turn promises a more collaborative and democratic, and less authoritarian, archaeology.

At the same time, pragmatism usefully breaks with both the analytical (empiricist, positivist) and continental (post-positivist) philosophical traditions that so many around the world have found wanting as underpinnings for contemporary archaeological practice. The desirable outcome of pragmatism's advocacy of these particular notions of truth, experience, and testing is stronger community – richer and better human activity – rather than some singular, final truth about the past or some imagined "more comprehensive" or "more complete" account of history. The loyalty in pragmatism is to other human beings struggling to cope rather than to the realist hope of getting things right; the desire is for *solidarity* rather than *objectivity.*

Pragmatist philosophy is thus fully compatible with the theoretical interests of an archaeology of collective action. It also meets those criteria enunciated by scholars seeking a more *ethical* practice (e.g., contributors to Lynott and Wylie 2000). These include the need to be self-conscious of one's subjectivity, accountable for one's presuppositions and claims, and responsive to the various constituencies having an interest in the past. Pragmatism's ethical imperatives dovetail especially nicely with archaeologies of civic engagement and those that employ "service learning" as a pedagogical tool (e.g., Nassaney 2004) whereby we, as contributors to public knowledge, use our knowledge to serve the public good – whatever we take "public good" to mean.

Whether these ethical principles are best theorized as universal (good for all times and places) or situational (a matter of comparing time and

space-bound practices with each other) is subject to debate. Rorty's (2001) position that community-building is best served by situationalism or, in his terms, "ethnocentrism" is particularly useful: that there is more to be gained by replacing the Enlightenment rationalist commitment to universal moral obligations with the rather more modest idea that we – as Westerners, intellectuals, archaeologists, or whatever – merely have some instructive and possibly persuasive stories to tell that might help to build trust across the boundaries that divide us from others. On this view, moral and ethical progress is viewed as an expansion in the number of people among whom unforced agreement can be established through free and open encounters (Rorty 1991).

Pragmatism's emphasis on narrative and conversation is perhaps its greatest gift to a discipline like archaeology. Indeed, these commitments fit well with those who see archaeology today – given the diversity of theories, methods, and voices that have come to characterize it – as less a well-defined, bounded discipline than a fluid set of negotiated interactions, as less a "thing" than a "process." This "community of discourses" (Hodder 2001), while threatening what some might see as an unproductive dispersion of scientific energy, is mostly to the good if it stimulates imagination and experimentation, sustains intellectual vitality, and produces better understandings of the past as well as better and stronger community.

Cross-References

- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Post-Processual Archaeology
- ▶ Social Archaeology

References

Bernstein, R. 1988. *The new constellation*. Cambridge: MIT Press.

Binford, L.R. 1982. Objectivity – Explanation – Archaeology, 1981. In *Theory and explanation in archaeology*, ed. C. Renfrew, M. Rowlands, and B. Segraves, 125–138. New York: Academic.

Bodnar, J. 1992. *Remaking America: Public memory, commemoration, and patriotism in the twentieth century*. Princeton: Princeton University Press.

Dewey, J. 1917. The need for a recovery of philosophy. In *Creative intelligence: Essays in the pragmatic attitude*, 3–69. New York: Henry Holt.

Fabian, J. 1994. Ethnographic objectivity revisited: From rigor to vigor. In *Rethinking objectivity*, ed. A. Megill, 81–108. Durham: Duke University Press.

Ford, R. 1973. Archaeology serving humanity. In *Research and theory in current archaeology*, ed. C. Redman, 83–93. New York: Wiley.

Heidegger, M. 1927. *Being and time*. San Francisco: Harper.

Hodder, I. 2001. Introduction: A review of contemporary theoretical debates in archaeology. In *Archaeological theory today*, ed. I. Hodder, 1–13. Cambridge: Polity Press.

Latour, B. 1999. *Pandora's hope: Essays on the reality of science studies*. Cambridge: Harvard University Press.

Lomaomvaya, M., and T.J. Ferguson. 2003. Hisatqatsit Aw Maamatslalwa – Comprehending our past lifeways: Thoughts about a Hopi archaeology. In *Indigenous people and archaeology*, ed. T. Peck, E. Siegfried, and G. Oetelaar, 43–51. Calgary: The Archaeological Association of the University of Calgary.

Lynott, M., and A. Wylie, eds. 2000. *Ethics in American archaeology*. Washington, DC: Society for American Archaeology.

Meskell, L., and R. Preucel, eds. 2004. *A companion to social archaeology*. Oxford: Blackwell Publishing.

Naranjo, T. 1996. Thoughts on migration by Santa Clara Pueblo. *Journal of Anthropological Archaeology* 14: 247–250.

Nassaney, M. 2004. Implementing community service learning through archaeological practice. *Michigan Journal of Community Service Learning* 10 (3): 89–99.

Preucel, R., and S. Mrozowski. 2010. The new pragmatism. In *Contemporary archaeology in theory: The new pragmatism*, ed. R. Preucel and S. Mrozowski, 1–50. Maiden: Wiley-Blackwell.

Rorty, R. 1989. Science as solidarity. In *Dismantling truth: Reality in the postmodern world*, ed. H. Lawson and L. Appignanesi, 6–23. New York: Martin's Press.

Rorty, R. 1991. *Objectivity, relativism, and truth*. Cambridge: Cambridge University Press.

Rorty, R. 1998. *Achieving our country: Leftist thought in twentieth century America*. Cambridge: Harvard University Press.

Rorty, R. 2001. Justice as a larger loyalty. In *Richard Rorty: Critical dialogues*, ed. M. Festenstein and S. Thompson, 223–237. Oxford: Blackwell.

Saitta, D.J. 2007. *The archaeology of collective action*. Gainesville: University Press of Florida.

Saitta, D.J. 2008. Ethics, objectivity, and emancipatory archaeology. In *Archaeology and capitalism: From ethics to politics*, ed. P. Duke and Y. Hamilakis, 267–280. Walnut Creek: Left Coast Press.

Shackel, P. 2009. *The archaeology of American labor and working-class life*. Gainesville: University Press of Florida.
Shanks, M., and R. McGuire. 1996. The craft of archaeology. *American Antiquity* 61: 75–88.
Wolf, E. 1982. *Europe and the people without history*. Berkeley: University of California Press.

Prehistoric Human Footprint Sites

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Introduction

Human footprints were once thought to be rare in the geological record, freak occurrences of sedimentary preservation (Fig. 1). This has changed over recent years with a plethora of discoveries (Bennett and Morse 2014). To give a flavor in 2016, we saw the publication (Masao et al. 2016) of additional footprints at the famous 3.66 million year old footprint site at Laetoli in northern Tanzania first reported in 1979 by Leakey and Hey (1979). Gierliński et al. (2017) reported some potential hominin tracks even older at 5.7 million years old on the island of Crete. There has been new data and interpretations (Hatala et al. 2016; Roach et al. 2016) emerging from the 1.5 million year tracks at Ileret in northern Kenya first reported by Bennett et al. (2009). On the shores of Lake Natron, a late Pleistocene footprint site has been reported with hundreds of visible tracks (Balashova et al. 2016; Liutkus-Pierce et al. 2016). In 2018, the publication of children's footprints in association with butchered hippo carcasses was reported from Ethiopia (Altamura et al. 2018), and there are reports of human tracks in association with giant ground sloth in North

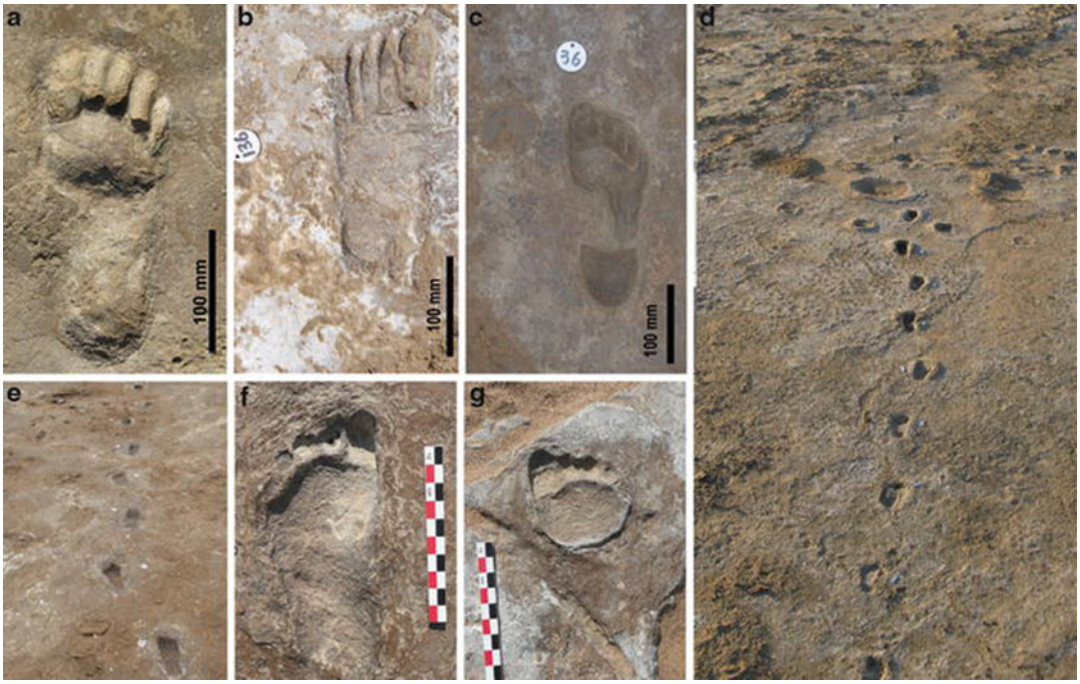

Prehistoric Human Footprint Sites, Fig. 1 Examples of human footprints preserved in Holocene silts and fine sands from Walvis Bay, Namibia. (**a**) Right adult footprint. (**b**) Left adult footprint showing slippage of the toes. (**c**) Right adult footprint with good anatomical preservation in fine sand and silt. (**d**) Trail of prints traversed left to right by an elephant and bovid trail. (**e**) Human footprint trail. (**f**) Child footprint showing detailed preservation including skin texture. (**g**) Child footprint with preservation of the forefoot and toe pads only

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America (Bustos et al. 2018). Footprints preserved in peat have been found on the Pacific Coast of Canada (McLaren et al. 2018), and a new footprint site in South Africa is reported by Helm et al. (2018).

This surge of discoveries is perhaps not surprising when you consider just how many footprints the average person makes in their life. Today the average moderately active person takes around 7500 steps a day, and if maintained over a lifetime of 80 years, then they will have left the order of 216,262,500 steps with each step having a potential for preservation. Contrast this with the 206 bones in the human body, and it is not surprising that we frequently uncover fossil footprints.

Issues of Preservation and Analysis

Footprint sites can be classified in a variety of ways but tend to fall into one of two broad types:

Congregation sites occur where humans, and/or other animals, gather at a focal point within a cave, around a source of shelter, or more commonly around a water source. Here, the print density is often high with a large amount of overprinting and taphonomic modification of prints and with intimate association of human and animal footprints. Footprint trackways are relatively rare and when present tend to be short in length.

Transit sites occur where humans, and/or other animals, are moving across a surface forming well-defined trails. It is often easier to make biomechanical inferences at such sites since the trackways tend to be longer and the density of prints and associated overprinting is often lower, although the number of prints can often be relatively small such as the case at Laetoli.

Footprints are preserved in any soft-sediment environment but are typically found in low-energy depositional environments where there is (1) rapid still water sedimentation post-imprinting, for example, caused by the transgression of turbid lake/sea water, or low-velocity flood waters; (2) rapid cementation by fine-grained debris/mud flows such as lahars or fine-grained ash flows; (3) pulses of airborne ash fall; (4) rapid post-imprinting lithification of sediment via desiccation and/or salt cementation of silt/clay, as well as the chemical cementation of volcanic ash; and (5) avalanching and/or settling of dry aeolian sediment. Greater knowledge and exploration of these types of environments within the depositional record will increase the number of known human footprint sites as illustrated in the discoveries of recent years. While tracks may be preserved in a wide variety of sedimentary environments, molding of fine anatomical detail tends to be favored by fine-grained substrates (Fig. 1), which need to be sufficiently dry to have the necessary bearing capacity to hold the weight of the individual print maker and sufficient strength so that they do not collapse as the foot is withdrawn. This is often favored by thinly bedded muds and fine sands which provide a relatively firm, free-draining substrate, but with good molding properties. The typology of footprints varies with substrate moisture content within fine-grained sediments as shown in Fig. 2.

The traditional method of preservation and analysis involve the description of individual tracks and casting with either plaster or more commonly some form of resin. Manual photogrammetry was used at Laetoli (Leakey and Harris 1987), a process which has now been revolutionized by digital photogrammetry (Falkingham 2012; Bennett and Budka 2018). There is an increasing range of sophisticated analytical tools available to examine this three-dimensional data. Not least of which are methods of "whole foot" analysis which allow mean footprints to be determined from trails, allowing more objective hypothesis testing (Belvedere et al. 2018; Bennett and Budka 2018). For example, Fig. 3 shows a mean print of a 14-print Holocene trackway from Walvis Bay in Namibia. The individual prints show considerable typological variation due to subtle variations in substrate properties, but by examining the mean, one is able to remove this noise and make anatomical and biomechanical

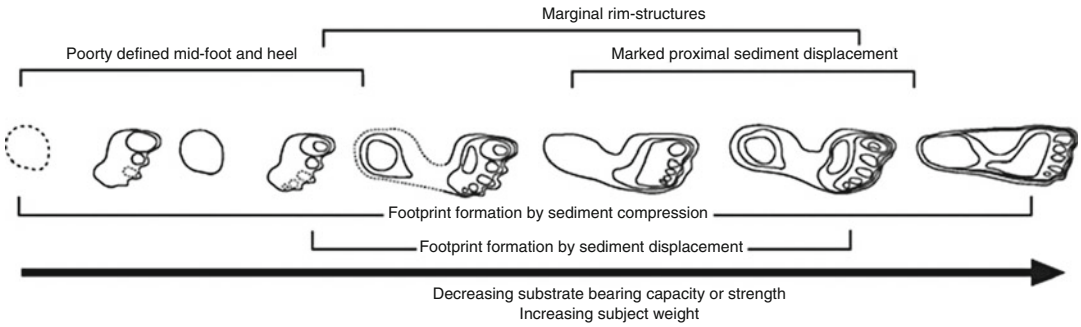

Prehistoric Human Footprint Sites, Fig. 2 Model of the typological variation in footprints with changes in substrate properties

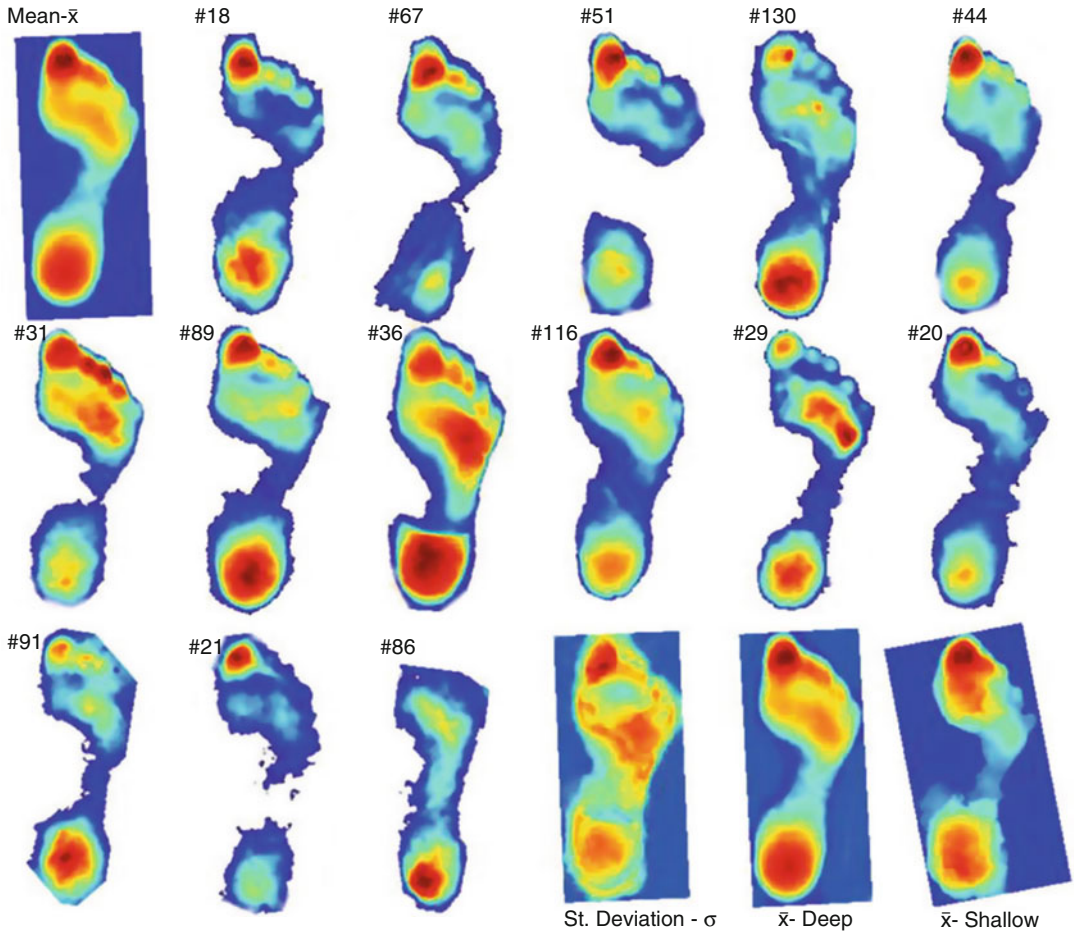

Prehistoric Human Footprint Sites, Fig. 3 Illustration of the typological variation in human footprints within a single trail due to variation in substrate. Using a "whole foot" analytical approach, it is possible to calculate a mean and standard deviation for this trail

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inferences with a greater degree of certainty. This approach has been successfully applied to the Lateoli prints recently (Crompton et al. 2012; Bennett et al. 2016).

Inferences from Tracks

Fossil footprints can provide evidence of (1) human presence at a point in space and time; (2) they can provide us with biomechanical information about the track-maker, for example, comparing the locomotive behavior of *Homo sapiens* with earlier hominins; (3) they can provide kinematic information about speed and style of locomotion (e.g., running versus walking); (4) ecological information where nonhuman tracks are present; and (5) they can tell us about behavior ecology and the interaction of one track-maker with another. Fossil footprints can provide evidence of (1) human presence at a point in space and time; (2) they can provide us with biomechanical information about the track-maker, for example, comparing the locomotive behavior of *Homo sapiens* with earlier hominins; (3) they can provide ecological information where nonhuman tracks are present; and (4) they can tell us about behavior ecology and the interaction of one track-maker with another.

Whatever analytical approach is used, footprints and trails can be used to infer a range of information about the print maker. In Morton's (1935), seminal work on the human foot, he established a basic anatomical ratio of foot length to stature or approximately 15% (1:15). This has been refined into a range of empirical relationships which link foot length to subject height and weight (e.g., Webb et al. 2006; Bennett and Morse 2014). While these relationships provide an approximation for *Homo sapiens*, their applicability to our earlier ancestors is debatable. Inferences on walking speed can be made from step and stride length in trails given an estimate of a subjects leg length (Alexander 1984), although these are again limited by the availability of such information or the assumptions made in deriving plausible input data for extinct hominins. Human footprints also commonly occur in association with animal prints, providing information about the ecological community in which our ancestors lived, although issues of substrate sampling may bias the nature of this record (Falkingham et al. 2011).

In summary, human footprints are preserved in a variety of depositional settings and have much to offer both the archaeological and paleoanthropological community. The foot is a complex structure of 22 bones held in place by a lattice of soft tissue. It interfaces with the ground to create pressures which decelerate, balance, and accelerate the body during walking and running. Human footprints provide a record of these forces, a record of "fossilized motion," and a record of the forces our forebears applied to the ground to balance and propel their bodies.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Archaic *Homo sapiens*
- ▶ Australopithecines
- ▶ Fossil Records of Early Modern Humans
- ▶ Geoarchaeology
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
- ▶ *Homo habilis*
- ▶ *Homo heidelbergensis*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Italy, Sicily, Malta, and the Lipari Islands: Prehistory
- ▶ Neanderthals and Their Contemporaries
- ▶ Stature Estimation
- ▶ Taphonomy in Human Evolution

References

Alexander, R.McN. 1984. Stride length and speed for adults, children and fossil hominids. *American Journal of Physical Anthropology* 63: 23–27.

Altamura, F., M.R. Bennett, K. D'Août, S. Gaudzinski-Windheuser, R.T. Melis, S.C. Reynolds, and M. Mussi. 2018. Archaeology and ichnology at Gombore II-2, Melka Kunture, Ethiopia: Everyday life of a mixed-age hominin group 700,000 years ago. *Scientific Reports* 8: 2815. https://doi.org/10.1038/s41598-018-21158-7.

Balashova, A., H.B. Mattsson, A.M. Hirt, and B.-S. Almqvist. 2016. The Lake Natron Footprint Tuff (northern Tanzania): Volcanic source, depositional processes and age constraints from field relations. *Journal of Quaternary Science* 31: 526–537.

Belvedere, M., M.R. Bennett, D. Marty, M. Budka, S.-C. Reynolds, and R. Bakirov. 2018. Stat-tracks and mediotypes: Powerful tools for modern ichnology based on 3D models. *PeerJ* 6: e4247. https://doi.org/10.7717/peerj.4247.

Bennett, M.R., and M. Budka. 2018. *Digital technology for forensic footwear analysis and vertebrate ichnology.* Dordrecht: Springer.

Bennett, M.R., and S.A. Morse. 2014. *Human footprints: Fossilised locomotion?* Dordrecht: Springer.

Bennett, M.R., J.W.K. Harris, B.G. Richmond, D.R. Braun, E. Mbua, P. Kiura, D. Olago, M. Kibunjia, C. Omuombo, A.K. Behrensmeyer, D. Huddart, and S. Gonzalez. 2009. Early hominin foot morphology based on 1.5 million year old footprints from Ileret, Kenya. *Science* 323: 1197–1201.

Bennett, M.R., S.C. Reynolds, S.A. Morse, and M. Budka. 2016. Footprints and human evolution: Homeostasis in foot function? *Palaeogeography Palaeoclimatology Palaeoecology* 461: 214–223.

Bustos, D., J. Jakeway, T.M. Urban, V.T. Holliday, B. Fenerty, D.A. Raichlen, M. Budka, S.C. Reynolds, B.D. Allen, D.W. Love, V.L. Santucci, D. Odess, P. Willey, G. McDonald, and M.R. Bennett. 2018. Footprints preserve terminal Pleistocene hunt? Human-sloth interactions in North America. *Science Advances* 4: eaar7621. https://doi.org/10.1126/sciadv.aar7621.

Crompton, R.H., T.C. Pataky, R. Savage, K. D'Aout, M.R. Bennett, M.H. Day, K. Bates, S.A. Morse, and W.I. Sellers. 2012. Human-like external function of the foot, and fully upright gait, confirmed in the 3.66 million year old Laetoli hominin footprints by topographic statistics, experimental footprint-formation and computer simulation. *Journal of the Royal Society Interface* 9: 707–719.

Falkingham, P.L. 2012. Acquisition of high resolution three-dimensional models using free, open-source, photogrammetric software. *Palaeontologia Electronica* 15 (1): 15. Available at: www.palaeo-electronica.org/2011-techinal-articles-issue1/92-3d-photogrammetry

Falkingham, P.L., K.T. Bates, L. Margetts, and P.L. Manning. 2011. The 'Goldilocks' effect: Preservation bias in vertebrate track assemblages. *Journal of the Royal Society Interface* 8: 1142–1154.

Gierliński, G.D., G. Niedźwiedzki, M.G. Lockley, A. Athanassiou, C. Fassoulas, Z. Dubicka, A. Boczarowski, M.R. Bennett, and P.E. Ahlberg. 2017. Possible hominin footprints from the late Miocene (c. 5.7 Ma) of Crete? *Proceedings of the Geologists' Association* 128 (5): 697–710.

Hatala, K.G., N.T. Roach, K.R. Ostrofsky, R.E. Wunderlich, H.L. Dingwall, B.A. Villmoare, D.J. Green, D.R. Braun, and B.G. Richmond. 2016. Footprint reveal direct evidence of group behavior and locomotion of *Homo erectus*. *Scientific Reports* 6: 28766. https://doi.org/10.1038/srep28766.

Helm, C.W., R.T. McCrea, H.C. Cawthra, M.G. Lockley, R.M. Cowling, C.W. Marean, G.H. Thesen, T.S. Pigeon, and S. Hattingh. 2018. A new Pleistocene hominin tracksite from the Cape South Coast, South Africa. *Scientific Reports* 8: 3772. https://doi.org/10.1038/s41598-018-22059-5.

Leakey, M.D., and J.M. Harris. 1987. *Laetoli: A Pliocene site in northern Tanzania*. Oxford: Clarendon Press.

Leakey, M.D., and R.L. Hay. 1979. Pliocene footprints in the Laetoli beds at Laetoli, northern Tanzania. *Nature* 278: 317.

Liutkus-Pierce, C.M., B.W. Zimmer, S.K. Carmichael, W. McIntosh, A. Deino, S.M. Hewitt, K.J. McGinnis, T. Hartney, J. Brett, S. Mana, and D. Deocampo. 2016. Radioisotopic age, formation, and preservation of late Pleistocene human footprints at Engare Sero, Tanzania. *Palaeogeography Palaeoclimatology Palaeoecology* 463: 68–82.

Masao, F.T., E.B. Ichumbaki, M. Cherin, A. Barili, G. Boschian, D.A. Iurino, S. Menconero, J. Moggi-Cecchi, and G. Manzi. 2016. New footprints from Laetoli (Tanzania) provide evidence for marked body size variation in early hominins. *eLife* 5. https://doi.org/10.7554/eLife.19568.

McLaren, D., D. Fedje, A. Dyck, Q. Mackie, A. Gauvreau, and J. Cohen. 2018. Terminal Pleistocene epoch human footprints from the Pacific coast of Canada. *PLoS One* e0193522. https://doi.org/10.1371/journal.pone.0193522.

Morton, D.J. 1935. *The human foot*. Columbia: Columbia University Press.

Roach, N.T., K.G. Hatala, K.R. Ostrofsky, B. Villmoare, J.S. Reeves, A. Du, B.R. Braun, J.W.K. Harris, A.K. Behrensmeyer, and B.G. Richmond. 2016. Pleistocene footprints show intensive use of lake margin habitats by *Homo erectus* groups. *Scientific Reports* 6: 26374. https://doi.org/10.1038/srep26374.

Webb, S.M., L. Cupper, and R. Robins. 2006. Pleistocene human footprints from the Willandra Lakes, south eastern Australia. *Journal of Human Evolution* 50: 405–413.

Further Reading

Bennett, M.R., and M. Budka. 2018. *Digital technology for forensic footwear analysis and vertebrate ichnology.* Dordrecht: Springer.

Bennett, M.R., and S.A. Morse. 2014. *Human footprints: Fossilised locomotion?* Dordrecht: Springer.

Prehistory of Southern Central America

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State of Knowledge and Current Debates

Introduction

The definition of southern Central America used here includes the territory of Panama, Costa Rica, Nicaragua, Honduras, and (eastern) El Salvador while making brief mention of Colombia. Central America typically also includes Guatemala, Belize, and the western part of El Salvador, but the archaeology of these territories is tied more strongly to discussions on the Mesoamerican culture area. The prehistory of southern Central America comprises the Terminal Pleistocene and the Holocene period, from initial peopling of the region up to the period of European colonization in the first half of the sixteenth century. With some frequency, the region is defined as a corridor for human, animal, and plant dispersal. For the earliest Paleoindian period (11500–10,000 BP), the preceramic period (10000–4000 BP), as well as more recent prehistoric times, southern Central America is considered a key area for understanding human mobility, environmental adaptation, and long-distance exchange in the Americas and indeed from a global archaeology perspective.

With the exception of multidisciplinary work in Panama between archaeology and paleoecology, the Paleoindian period is lacking robust chronological control throughout much of the region, the principal exception being central Panama. The long process of plant domestication was introduced, altering the overall vegetation, and around 4000 BP horticultural and agricultural practices were beginning to define the landscapes of both Pacific and Caribbean Central America. During the first decade of the sixteenth century, Spanish colonizers arrived on the Caribbean coast of Panama, going across the continental divide to reach the Pacific and quickly moving northward via the Pacific coast, thereby abruptly ending the prehistoric developmental trajectory, although some indications point to the effective continuation of indigenous lifeways over various decades before the impact of Spanish colonization becomes visible archaeologically. The first half of the sixteenth century left indigenous societies decimated in size and forced surviving groups to seek refuge in difficult to penetrate interior mountainous and tropical forest regions.

The region lacks a singular unifying macroregional narrative, partly due to an overall geography that is varied in nature, caused by a complex geological history including volcanism and active tectonic conditions on the Pacific coast. On the whole, geographical contrasts are somewhat more pronounced in Honduras, Nicaragua, and northern Costa Rica than is the case for central and eastern Panama. Most poignantly, southern Central America is described as a mixture of isthmian and insular forms of landscapes (Cooke 2005).

The prehistory of southern Central America is marked by a history of definitional debates on external and internal spatial boundaries, predominantly in relation to its position to Mesoamerica and parts of northwestern South America. Until recently, the overall area nomenclature was subject to change, with earlier literature invoking area concepts such as "Lower Central America" and "Intermediate Area." Apart from some of these area container concepts receiving critique for their essentially negative definition (Sheets 1992), others only outline those parts of Central America not deemed to show Mesoamerican traits, such as the "Chibchan tradition" (Kirchhoff 1943) or the "Isthmo-Colombian Area" (Hoopes and Fonseca 2003). It's fair to say that this debate is not concluded, with current interpretive emphases shifting to socially informed network perspectives over culture areal discussions. For this entry, the definition of southern Central America is principally geographical and in acknowledgment of the heuristically complex relation to the Mesoamerican culture area. It includes brief references to parts of Mesoamerica,

as well as encompassing those societies displaying forms of relatedness further south, into northwestern Colombia, extending into western Venezuela.

Area Definition

Spatial boundaries recognized in archaeology are always conditioned by time and tend to be uninformative for archaeological reconstructions of prehistoric life, making their definition inherently problematic. Similar problems are encountered in the choice of terms for these regions, all of which carry their own set of implied comparative assumptions. Lastly, when southern Central American subareas are defined, then it is generally only for materials and cultural patterns from 500 BC and later, with an emphasis from AD 600 to 1500, when sociopolitical formations develop and material culture further diversifies in southern Central America. Despite Spanish reports discussing political landscapes in considerable detail, they are difficult to observe archaeologically in southern Central America for most periods, including the last centuries before the Spanish colonization, with exceptions in central Panama and Caribbean Costa Rica.

The northwestern edges of southern Central America are defined by periods of frequent interaction with the southern extension of Mesoamerica. This includes the Maya region, marked by the linguistic spread of Mayan languages into western Honduras and El Salvador, in combination with the presence of stone carved hieroglyphs from about AD 250. This zone is geographically defined to run along the central valleys of Honduras, geologically formed by the Comayagua graben, trending north-south through the country. On the Pacific side, in eastern El Salvador, the regional dynamics are more complex to the point of becoming unclear. Eastern El Salvador, covering about one-third of the national territory, is formed by the course of the Lempa River (Longyear 1966), and this region, together with the adjacent Gulf of Fonseca, presents varied cultural characteristics through time, featuring both localized and Mesoamerican elements. More recent discussions frame this lack of clear patterning as indications of periodic links across cultural boundaries (Sampeck 2014). Following the Pacific coast further south, Greater Nicoya includes the Pacific regions of Nicaragua and the Nicoya peninsula of Costa Rica and was defined originally as a cultural subarea of Mesoamerica, emerging around AD 800, although discussions on this regional perspective are now relying less on historical references to human migratory movements and pushing for more critical and localized archaeological understandings of Greater Nicoya (McCafferty et al. 2012). Greater Nicoya is more clearly supported by archaeological evidence in Pacific Nicaragua and Nicoya, than it currently is for the wider tri-national area around the Gulf of Fonseca.

The southern extremity of southern Central America is particularly challenging to address, as numerous historically deep linguistic and genetic ties exist with parts of contemporary northwest and Caribbean Colombia, and interaction networks were likely frequent and long term, especially from AD 0 onward. A strong ecological continuity between eastern Panama and the Colombian Chocó region as well as around the Gulf of Urabá into the Caribbean plains further strengthens such a hypothesis. Cultural exchanges with parts of Colombia are amplified further by a comparable semiotic corpus materialized in classes of objects, prominently including decorated pottery, metal objects, ground stone sculpture, particular forms of green stone pendants, as well as practices of shell carving. Such exchange and transfer of ideas and practices eventually connected the most northerly stretches of the Andes, the Sierra Nevada de Santa Marta, to parts of Panama and Costa Rica, even though objects chemically sourced to have traversed such distances remain scarce as a result of the lack of analysis. Beyond this, comparisons have also been drawn between the sculptural practices of southern Central American and those of the Cauca Valley in southern Colombia. In short, there is no agreement on where to draw a southern boundary for the prehistory of southern Central America, even if only for heuristic purpose, but it is likely that this boundary not to be sought in Panama but in fact somewhere in northwest South America.

Overall, southern Central America is defined by starkly contrasting geographies, consisting of a combination of tropical highlands and lowlands, each having their own climate and vegetative characteristics (Coates and Obando 1996). Trade winds pushing weather systems into eastern parts of southern Central America influence this geography, leading to more temperate zones on the Pacific side and at times featuring a transitional central highland zone as a third major geographical component. As such the geographical contrast extends to form quite divergent climates on the Caribbean and Pacific coast; the former featuring moist rainforests and the latter defined by drier conditions and a less pronounced hydrology. In Nicaragua, this contrast is influenced by the two large freshwater lakes, geologically formed by the Nicaraguan depression. The larger of the two, Lake Cocibolca (or Lake Nicaragua), drains into the Caribbean Sea by way of the San Juan River, thereby forming the only straightforward connection between Pacific Nicaragua and the Caribbean. In the low-lying grasslands where the lakes are situated, a front arc of active stratovolcanoes is a further main geographical feature. With numerous historically recorded eruptions, this volcanism played a crucial role in later prehistoric periods as well, resulting in abrupt shifts in, for example, settlement pattern and pottery technology. The presence of the two freshwater lakes and the fertile soils generated by the volcanic ash deposits presented favorable conditions in Pacific Nicaragua for early prehistoric settlement.

The eastern region of Honduras, extending northeast of the capital Tegucigalpa toward the Caribbean coastline, comprises an expansive zone of tropical forest, the largest surviving continuous one in Central America today. Rugged terrain and high precipitation make for a challenging environment for archaeological research, and accordingly regional data resolution is still unsatisfactory. The eastern portion of Honduras, crossing the Nicaragua and Honduras border along the Caribbean Sea, is referred to as *La Mosquitia.* This region of grassy savannas, pine forests, marshes, and tidal lagoons is ecologically similar to the Caribbean coastline of Nicaragua. The extensive river deltas and shallow offshore waters that mark this Miskito or Mosquito Coast in Nicaragua are at the root of the isolation these coastal regions have experienced, being largely cut off from the interior regions of Nicaragua and its Pacific coast. In central regions of Nicaragua, there are some archaeological indications of periodic exploitation of Caribbean maritime resources.

The remoteness of the Nicaraguan Caribbean was a likely determinant of regional interaction in prehistory, as it was during Colonial times and in part still is today. These Caribbean coasts run south to eastern Panama, cut by the estuaries of a few major rivers such as the San Juan and the Reventazón River in Costa Rica. Horticultural activities in the Caribbean probably took the form of small gardens near houses, planted with species with an array of purposes. Cultivated flora included plants known for medicinal qualities and those suitable for construction purposes. There are also early historical Spanish references to plantations of peach-palm trees. Finally, in southern Costa Rica, the Caribbean coast is defined by lowland plains where the terrains narrow, giving way to the highlands of the Cordillera de Talamanca that approach the Caribbean coast toward the border with Panama. The Caribbean regions of eastern Honduras, Nicaragua, and Costa Rica are often compared and presented in a joint analysis, sometimes highlighting their "wedged" position alongside the Pacific and central regions, but considerable linguistic and style differences were also present.

Archaeological studies generally focus on sites or natural units of analysis in either the Caribbean lowlands, the Pacific coast, or central valleys or plateaus at somewhat higher elevations. The geography generally facilitates human mobility parallel to the coastlines, and specific cultural and linguistic clustering from AD 600 to 800 onward seems to be loosely correlated to such geographies. That said, the cultural links in the geographically diverse south of Costa Rica and west of Panama provide a counterexample. One element that is a prominent feature in Central America is the range of active volcanoes running from Guatemala all the way into western Panama, interrupted only by the mostly metamorphic

Cordillera de Talamanca. Beyond the numerous prehistoric and recorded historic eruptions, volcanism, and the tectonics underlying their existence, has given rise to highlands, lakes, and extensive lands covered by ash lenses, creating fertile grounds along the Pacific coasts. Alongside the effects on prehistoric subsistence strategies (Sheets and McKee 1994), the highly visible presence of volcanoes is also discussed in terms of how they are rendered in prehistoric indigenous interpretive landscapes.

Southern Costa Rica and western Panama include the Osa Peninsula, and it encompasses the Diquís valley as well as the provinces of Chiriquí and Bocas del Toro. Many river valleys and plains characterize this region, creating a fragmented topography. This nowadays bi-national subarea of Greater Chiriquí is generally treated as a single archaeological unit of analysis, given the already mentioned significant overlap in prehistoric practices and styles visible between them. The Cordillera de Talamanca mountain range separates this region from the Caribbean coast, but there are archaeological indications of comparable cultural developments between the Pacific and Caribbean. Further east, the central provinces of Panama are marked by a combination of stretches of savannas as well as tropical forest zones, a narrow central mountain range of reaching to some 200 meters above sea level, broad coastal bays, and the central lowland zone of the Panama Canal. The distance between Caribbean Sea and Pacific is at times as little as 70 kilometers here. Various rivers discharge into the Pacific Ocean here, creating wide deltas, and in the Gulf of Panama, a number of islands are found that potentially played a role in shell trade along the Pacific littoral. Interestingly, islands are otherwise fairly scarce along the coasts of Central America. Of note are those in the Gulf of Fonseca, in the Gulf of Nicoya, a small spread off the Pacific coast of Chiriquí, the San Blas Islands of Caribbean Panama, and the Pearl Islands of the Pacific Panama. When archaeologically investigated, all exhibited traces of prehistoric habitation or exploitation of maritime resources. This nearshore prehistoric activity is a defining feature for the prehistory of southern Central America, as it features a relatively high coastline-to-land area ratio.

Finally, the eastern third of Panama encompasses the Darien, a region about which systematic regional archaeological knowledge is still very limited, apart from a handful of studies and recent paleoecological investigations. It is a densely forested region, enveloping the entire land area from the Caribbean to the Pacific coast, with hills of modest height near the Caribbean coast, creating wider plains on the Pacific than elsewhere in Panama and covered with subtropical forests. This vegetation is, as mentioned earlier, comparable to the Chocó region environment across the Colombian border. Similar to other examples in southern Central America, here also, contemporary nation state borders complicate regional analysis.

Scholarly Background

Through a combination of historical circumstances and an aesthetically pleasing material culture, the beginnings of systematic archaeology in southern Central America coincide with some of the earliest archaeological studies in the Americas. Historical reasons for this were both US and European economic exploitation in southern Central America through banana and coffee plantations alongside the extraction of various precious metals, further amplified by the establishment of railroads across difficult terrain and repeated efforts to establish a transcontinental canal (initially proposed for Nicaragua, and later for central Panama). These nineteenth- and early twentieth-century conditions resulted in a substantial presence of foreign cartographers, engineers, and travelers, observing on the archaeological remains they encountered. During the first three decades of the twentieth century, a small number of studies were undertaken to explore the indigenous prehistory based on museum collections and field research aimed at assembling archaeological, linguistic, and ethnographic observations. In terms of field archaeology, Carl Hartman's early work on a number of monumental sites in Caribbean and Pacific Costa Rica stands out for its meticulous approach and reporting in this early period of research (e.g.,

Hartman 1901, 1907). Ironically, these early studies were followed by a long period of relative paucity of advancements in the understanding of prehistoric developments, while neighboring regions, prominently Mesoamerica, saw a stark increase in the volume of field projects and overall academic study.

During the second half of the twentieth century, national archaeologies gradually developed, though not necessarily in a comparable way throughout southern Central America. In this same period, from the 1950s onward, a number of archaeological studies followed by scholars based in the USA and Europe. Central to this renewed investigative focus were the argued links between parts of Mesoamerica and coastal South America. Such links, fundamental under the proposed notion of "Nuclear America" (Willey 1955), naturally called for viewing southern Central America as a developmental "axis" between parts of Mexico and its links to the central Andes of Ecuador and Peru. Consequently, a number of archaeological surveying and test excavations were set up along the Pacific coast (overview in Healy 1980). One of the results of research in this period is the observation that earlier indigenous societies on the Pacific coast of Nicaragua and northwest Costa Rica showed Central American characteristics, whereas during later periods, a Mesoamerican influence becomes noticeable. Primarily, these projects obtained a set of markers for macro-regional spatiotemporal control, in many cases the first of its kind in the respective parts of southern Central America.

Later work, during the later 1960s and 1970s, continued to build on existing chronological sequences, expanding on the knowledge of ceramic styles and also outlining regional subsistence strategies and settlement patterns in both the Pacific and Caribbean sides of southern Central America. During this period, the first synthetic publications began to appear, some contained in handbooks, or as monographs (Baudez 1970; Stone 1972), others as standalone articles, such as Olga Linares's still remarkably fresh views (Linares 1979). Studies also sought to address the question of the nature of crop domestication and dispersal and the transfer of particular technologies such as metallurgy across the Americas.

By the 1980s, archaeological research was beginning to grow more substantially, but this was per Central American country highly dependent on political development, causing, for example, a marked difference in research activity between the stable democracy of Costa Rica and the civil war-torn conditions of Nicaragua and El Salvador. In Panama, the establishment of the Smithsonian Tropical Research Institute in 1966 (with historical roots in the Panama Canal project) provided a major push in studies on human-environment relations, paleoecological reconstructions, and the initial period of human settlement of southern Central America. Since then, the volume of archaeological work has steadily increased, helped by the presence of several local institutes and a combination of both US or European field research by dedicated archaeologists and their students as well as multiple edited volumes published between the 1980s and now.

Human Adaptation and Mobility

A returning theme of interest for research is the role of human mobility in the prehistory of southern Central America. Depending on the period under discussion, tropes such as colonization, dispersal, and migration are introduced in the different national archaeologies. Such archaeological discussions receive additional input from genetics, linguistics, and observations found in early Colonial period historical documents. While several decisive occurrences mark the long period from 11,500 BP onward, the events around AD 300–600 (cf. Hoopes 2005) impacted the cultural landscape of the southern Central America, and the social dynamics that have underlain such changes have received the bulk of archaeological study. The most important sources of information that support such migrations are linguistic and ethnohistoric in nature, with supporting indications coming from changes in the decorative style of polychrome pottery. Archaeological research focused on ethnic identification, and the direct sourcing of materials involved in such human mobility has, however, produced mixed results, highlighting the complex relation between historical writings (based on

indigenous oral history) and the traces of human action as recovered archaeologically.

A second focus on human mobility argues for back migrations (after initial dispersal) from northwest South America into Panama, Costa Rica, and further along the Caribbean side of Central America, including the Honduran Mosquitia region. This argument gives rise to the mentioned Isthmo-Colombian or Chibchan archaeological area thesis (Fonseca 1994; Hoopes and Fonseca 2003), and its formulation resides principally on contact deduced from shared material culture, motifs, and technology and later also combined with common linguistic roots and mitochondrial DNA studies. This thesis rests in part on certain iconographic foci depicted on objects fashioned out of gold, ceramics, ground stone, and lustrous jade-like polished stone and including a regional preference to depict double spirals, crocodilian motifs, and humans in a state of transformation. The ample archaeological relations to parts of South America help to illustrate the definitional complexity of an archaeology of southern Central America.

Paleoindian Period

The record for the earliest evidence of human activity in southern Central America does not allow for a regional reconstruction of sufficient detail, keeping in mind that securely dated South American Pleistocene sites such as Monte Verde have yielded dates of 14,500 BP with even earlier dates still possible (Dillehay et al. 2015). In general, the peopling of the Americas remains a highly debated research focus, with different views on initial points in time, routes, and chronological development. For southern Central America, the most substantial data set able to contribute to this debate come from Panama, where the earliest traces of human-induced vegetation changes and documented artifacts date to approximately 11,500 BP (Cooke et al. 2013). These would have been small and highly mobile hunter-gatherer groups, occupying rock-shelters for habitation and roaming between coastal and more highland regions, hunting for large fauna. Water locked in land ice resulted in lowered sea levels by as much as 100 meters relative to current levels before the end of the Late Glacial Maximum (13,000 BP). Significant areas of land were left exposed, greatly changing the coastlines of southern Central America. One example of this would be the entire Bay of Panama, which was a plain covered with deciduous vegetation. Climatological conditions were also different from later Holocene averages (which stabilized to current values around 8000 BP), with mean temperature dropping several degrees centigrade, and precipitation levels also lower compared to today. Toward 10,000 BP, the dwindling numbers of large game, combined with the warming trend, probably gave rise to a focus on biota consisting of smaller animals and a greater diversity of edible plants in the diet.

Preceramic Period

At the onset of the Holocene around 10,500 to 10,000 BP, the technologies used for fashioning lithic tools are still firmly based on flaking in order to produce for example unfluted and fluted projectiles, but this period now also sees the emergence of ground stone tools, indicative of the increased processing of plants. Outside of Panama, convincing data from other southern Central American regions remains very spotty, although it can be assumed with some confidence that small groups accessed all geographical regions of Central America right from the outset of the Holocene, including the Caribbean lowlands and highland mountain ranges. Thick volcanic deposits along the Pacific coast, obscuring preceramic sites, likely play a role in this as well. In the case of central Panama, groups appear to become more selective in choosing locations for habitation, and there is evidence for clearing of forests by burning. Further insights gained primarily from coring lakebeds point to the first indications of root crop domestication between 9000 and 8000 BP (Piperno et al. 1991). The intensity of human activity further increases in central Panama toward 7000 BP, with more extensive evidence for forest clearings, accompanied by the occasional traces of habitation in rock-shelters. Also, maize appears for the first time in the paleoecological microfossil record around 7600 BP, and it is likely that the adoption of maize cultivation is causally related to the observed further decrease in

primary forest. Domesticated in the southwest Mexican state of Guerrero around 10,000 BP, maize dispersed rapidly through southern Central America and into South America, but how it did so remains another widely debated and researched topic. Reliable data for following this dispersal trajectory is found in central Panama and Costa Rica, with little excavation data coming from elsewhere in southern Central America. Similar to later data from parts of Caribbean regions, palm nuts and other types of fruit-bearing trees also form part of the diet during this period.

First Pottery

There is convincing evidence for early pottery outside of southern Central America, from the San Jacinto site in the foothills of northwest Colombia (5900–5300 cal BP), but the earliest forms of pottery in Central America are presumed to be independent inventions (Hoopes 1994). Such pottery may have initially served for storage purposes alongside natural gourd containers or possibly also for competitive feasting (Hoopes 1995). Alongside pottery, the first traces of refuse piles, including shell mounds, are known from Pacific coastal bay areas in central Panama, and traces of early domestic structures are documented at the Tronadora Vieja site around the Arenal Volcano in Costa Rica around 3800 BP.

Around 5500 cal BP, the first traces for pottery manufacture appear in the archaeological record of southern Central America. This data comes from coastal and inland sites in Panama, including Monagrillo (5470–3250 cal BP). Somewhat later are ceramic deposits from northwest Costa Rica (4000–2500 cal BP). This Tronadora-style pottery from northwest Costa Rica, though rare in occurrence, may be indicative of materials found along the wider Pacific coast further north toward Nicaragua and south toward western Panama and into the Caribbean lowlands. The developed technology of this pottery, however, suggests even earlier, as yet unidentified, forms (Corrales 2000).

Though based on a fragmentary data set, the last two millennia BC show a pattern of rising human impact on the environment with coring data showing further decreasing primary forest taxa and an increased reliance on domesticates such as maize, manioc, squash, and sweet potato. Simple fishing in tidal pools is beginning to expand to more advanced shoreline fishing technology, documented in the Parita area at the Bay of Panama, involving nets and possibly using simple canoes or other forms of flotation. For southern Central America in general, it can be assumed that the adoption of a more agricultural lifestyle, including the production of pottery, took place over a long timeframe, with groups living in tropical montane regions continuing a foraging subsistence strategy while those in seasonally drier environments relying more on cultivated staple crops. From around 500 BC onward, the archaeological record becomes far more varied across southern Central America, with production and exchange in material culture increasing and the first patterns in settlement location becoming apparent. It is also this period (500 BC–AD 1520), upon which the majority of past and current archaeological investigations are focused. Such investigations invariably are contained to one country, as reflected in the country discussions below.

Honduras

With Maya societies living in the extreme western regions of Honduras, the main central, northern, and eastern parts of the country reveal a complex zone of communities interacting to various levels from approximately 1000 BC onward. Most of these early sites are situated in various Honduran intermontane valleys, such as Ulúa, Lake Yojóa, Naco, and Comayagua. Already at this relatively early stage, communities were taking part in interregional interaction networks reaching into Mesoamerica, as evidenced by pottery made locally but stylistically reminiscent of Olmec objects. This is perhaps unsurprising given the macroregional importance of the regionally unique source of jadeite in the Motagua Valley of Guatemala and the role of cacao as a product from the tropical regions of Honduras, sought after in societies far beyond local cultural horizons (Healy 1984). During this first half of the last millennium BC, we also see the first evidence for mound and raised platform construction (Joyce 2004).

Following these early expressions of monumentality is the advent of the hallmark Usulután

ceramic style, spreading through much of Honduras and El Salvador from the latter half of the last millennium BC and in use up to roughly AD 400. Due to its distinctive orange and cream appearance, combined with resist decoration, and a specific range of rather fine pastes, Usulután ceramics are the most highly diagnostic ceramic ware in Honduras during this period. While for a long time considered a trade ware, more recent neutron activation and petrographic studies are changing this view, pointing instead to various local production points. Usulután wares are documented in most of the sites excavated in the mentioned Honduran valleys, with the exception of the northeastern region where it is noticeably absent. The advent of Usulután is accompanied by increases in site density and overall contacts between and beyond these regions.

During the centuries after this, up to about AD 1000, mound and platform construction continues to intensify, introducing ball courts (typical for Mesoamerica) into both central and eastern Honduras, expanding ceremonial mound-lined plazas and showing signs of possible site ranking in two or three levels. New earthworks are added to those at previously occupied sites, not infrequently obscuring earlier constructions. Apart from this steady intensification of building activity, this period is signaled archaeologically by the appearance of the so-called Ulúa-Yojoa polychrome wares and interaction with the major Maya settlement of Copán. The Ulúa-Yojoa polychromes, a broad category of decorated pottery, including flat-bottomed cylindrical vessels, has a long history in the archaeology of Honduras and is documented stylistically in excavations in Nicaragua, El Salvador, and even Guatemala (Joyce 2017). Alongside this polychrome group, the second defining object class is a small but distinctive corpus of cylindrical vessels sculpted in marble, produced in limited numbers at a specific workshop at the center of Travesía in the Ulúa Valley, and appearing in sites in the Maya lowlands and Pacific Nicaragua. Both the increase in monumental architecture and the evidence for craft specialization may help in arguing the stability of the communities responsible for this activity. While authors have argued for the emergence of incipient chiefdoms in his period, there is little evidence, for example, from funerary settings, for any form of chiefly elite, leaving open the alternative explanation by means of heterarchical cooperative structures.

The period from AD 1000 onward shows a decrease in building activity in many of the Honduran valleys. A straightforward link to the population decline is observed at Copán a century or two prior to this period, invoked by the so-called Maya Collapse. Although the intensity and velocity of this decline is the topic of ongoing debate, it is likely that any mayor change would have entailed consequences for other Honduran regions. Although there is a decrease in the previously seen rise in sites and possibly also in population density, it is not a period of sharp shifts in settlement patterns. Numerous sites continue to be occupied after AD 900, including Las Vegas and Los Naranjos, and Copán itself continues to show some activity. The Naco Valley is one of the best studied areas for this period. Sites there are known to have played a central role in coastal trade networks reaching from the coasts of Honduras, across the Yucatán peninsula, to the Gulf of Mexico. Recent research in the Naco Valley sites highlight the negotiation of authority and local political hierarchies, using networks of exchange to bring in exotic materials (Schortman and Urban 2011). Interaction networks to other parts of southern Central America are also evidenced by moderate amounts of Greater Nicoya white-slipped polychrome decorated pottery at sites in central Honduras as well as elements of styles from Honduras, Nicaragua, and Costa Rica. Contacts toward Mesoamerican subregions are indicated by the presence of small amounts of copper objects and a few instances of the trade ware ceramic-type Tohil Plumbate from El Salvador at Copán and on the Bay Islands off the Caribbean coast.

In the northeastern region, site surveying and mapping has produced evidence for substantial habitation after AD 1000. Numerous sites, some of which in defensible locations, show considerable elongated mound-plaza architecture, exceeding sites from previous periods in size and planning. Overall, these sites still do not adhere

to a self-evident orthogonal layout, instead combining architectural elements depending on local topography, drainage, and vantage points, but the increase in overall planning is evident. In terms of material culture, there is a noteworthy orientation toward the Caribbean lowlands of Nicaragua and Costa Rica, with a tradition emerging of sculpting stone monoliths and fashioning elaborate milling stones. Most recently, an investigation into coastal sites was initiated to better understand existing local typologies and regional relations. Despite this work, and its being one of the largest regions in Honduras, the northeast remains one of the archaeologically least-known parts of southern Central America.

The archaeology of Honduras reveals connections of stylistic forms and materials to Central American regions further south. Furthermore, there is a relation of selective exchange through the network node of Copán and beyond this to trade routes from more central parts of Mesoamerica. From the last millennium BC onward, and continuing into the last centuries before the Spanish Conquest, such networks, while subject to periodic change, remained a constant feature, evidenced primarily through the trade in rare commodities. Simultaneously, site layouts and structures, and more regional level settlement patterns, seem to have maintained a certain level of resilience in their trajectories within the multiple valleys that mark the cultural landscape of Honduras. While major macroregional changes like the Maya Collapse during the ninth century AD were certainly not without their effect, complete ruptures of past cultural patterns and connections seem to not have occurred. In fact, northeast Honduras saw an increase in activity and the proliferation of material practices, possibly intensifying ties with Caribbean regions further south.

The Gulf of Fonseca and Eastern El Salvador

The Gulf of Fonseca is shared by eastern El Salvador, southern Honduras, and northwest Nicaragua. This is one of the most particular coastal features of southern Central America, marked by extensive mangrove forests and tidal flats, alongside delta-like mud plains. A number of islands dot the Gulf, and numerous rivers discharge their water coming from the valleys of central Honduras. The Gulf is a product of active tectonics, leading to faulting and volcanism occurring along the wider Pacific coastline. There is considerable uncertainty about the archaeology of this region, even though it is likely to have featured substantially as an area of fishing in prehistoric times. In macroregional perspectives, the Gulf is typically seen as a waypoint in the networks of exchange that are argued to have existed along the Pacific coast. For AD 800 and later, it forms an as yet unresolved nexus between more southern Central American-oriented communities and those more strongly resembling Mesoamerican cultural patterns. Notwithstanding this regional uncertainty, substantial archaeological work done on the Gulf region is lacking, with past research documenting several small settlements and salt-making sites on the Honduras side of the coast with human activity going back to AD 300 and continuing until the arrival of the Spanish (Baudez 1976). Despite this dearth of research, there are indications that the Gulf filled an important role in interzonal economic exchange between local coastal communities and those further toward the interior in the surrounding valleys. Such "vertical" interaction merits more scholarly attention, as southern Central America overall is a region with an above-average amount of coastal zones relative to inland surfaces.

Starting west of the gulf and naturally bounded by the Lempa River, eastern El Salvador demonstrates connections to the material culture of southern Central America by means of contemporaneous presence of certain ceramic types or trade wares during the last millennium BC and the first millennium AD. Especially widely recorded Usulután-style pottery appears in significant quantity at eastern El Salvadoran sites such as Chalchuapa and Usulután (the site after which the ware is named). Between AD 1000 and 1200, the presence of Papagayo Polychrome pottery, having its origin in Pacific Nicaragua (see below), is indicative of connections of eastern El Salvador with more southern regions. In the regional perspective, the archaeology of eastern El Salvador is a crucial connection in evaluating the changes in relations between southern Central

America and more northern regions, such as the Maya lowlands, the Gulf Coast of Mexico, and southern parts of Mexico. The more prolonged studied site Quelepa provides strong evidence for such diachronic shifts in macroregional connections (Andrews 1976), which, perhaps remarkably, appear to exclude the Maya center of Copán.

Pacific Nicaragua and Northwest Costa Rica

Around 1000 BC, the earliest traces of habitation are documented in parts of Pacific Nicaragua and northwest Costa Rica in the form of shell middens and hearths associated with diagnostic incised and striated monochrome and bichrome ceramic wares. Funerary practices are varied in form, including both secondary urn burials and primary extended interments, the latter often with three- or four-legged grinding stones or stools present, on which the deceased is sometimes placed. Further grave goods can include polished stones made of jadeite or visually similar materials and ground stone mace heads. While archaeological data remains scarce for this period, it is accepted that it continues to up to around AD 500, when polychrome pottery types appear and there is a subsistence shift to include exploitation of maritime resources. From AD 800 onward, the material culture in Pacific Nicaragua shows strong resemblances to that found in northwest Costa Rica (principally the Nicoya Peninsula), and this similarity in pottery is the background for the notion of the Greater Nicoya archaeological region. As with most other regions of southern Central America, its boundaries are only approximately defined, but it is generally understood to envelop the shores of both Lake Xolotlán and Lake Cocibolca and the foothills of central Nicaragua, as well as reaching up to the Gulf of Fonseca. For northwest Costa Rica, the Nicoya peninsula and the Tempisque River Valley are the primary features, with the Tilarán mountain range forming a natural southeastern extremity.

In contrast to the other regions discussed here, Greater Nicoya was originally defined to denote an extension of the Mesoamerican culture area (Lange 1984). This initial proposal was motivated by ethnohistoric similarity to Mesoamerica (Kirchhoff 1943), later evidenced by a combination of regionally shared changes in pottery, including motifs and symbols appearing on polychrome ceramics in the region, alongside developments in lithic technology, and ethnohistoric references to migration of Mesoamerican language speakers into the region sometime around AD 800 (Norweb 1964). By now, Greater Nicoya is recognized as a region with strong local cultural dynamics, even when exhibiting a relatively high amount of identical ceramic types when compared with surrounding archaeological regions of Central America (Healy 1980). Compared to other regions of southern Central America, several parts of Pacific Nicaragua and northwest Costa Rica are at least to some degree known archaeologically, with several projects taking place since the 1960s. Prior to AD 900, there is considerable uncertainty about the archaeology in this region, and it may well have shared cultural patterns with the Caribbean regions of Nicaragua and Costa Rica. Similar to patterns in central Honduras, the first examples of exchange with Mesoamerica date back to at least 500 BC, with early pottery forms showing resemblances to other types found along the Pacific coast toward Guatemala and southern Mexico. Intensity and continuity of these connections, however, remain poorly understood. From 500 BC onward, Usulután-style ceramics also appears in parts of Greater Nicoya, possibly made in local workshops.

In addition to the proposed cultural affiliation to Mesoamerica, the notion of Greater Nicoya also rests on geographical features, perhaps more so than other southern Central American archaeological regions. Chance events, such as volcanic eruptions, had immediate and long-term effects on the development of pre-Hispanic communities in Greater Nicoya. The coastal regions of Nicaragua are defined by the two freshwater lakes and a strip of land separating Lake Nicaragua from the Pacific Ocean by as little as 19 km at one point. This corridor-like geography was likely a preferred route for down-the-line exchange networks throughout the pre-Hispanic sequence, and excavated settlements in Pacific Nicaragua dating to AD 300 show the movement of materials such as obsidian from other parts of southern Central

America, including the central valleys of Honduras and parts of eastern El Salvador.

Possibly tied with migratory movements from Mesoamerica, a series of changes in regional settlement patterns, funerary practices, and material technologies occurs around AD 600 (Hoopes 2005). From this moment on, up to the arrival of the Spanish, pottery finishing shows innovations and changes that have enticed scholars to argue a scenario in which Greater Nicoya took part in a macroregional exchange network, involving the transfer of materials and symbolism. The latter is principally argued through the growing presence of polychrome ceramics in combination with the appearance of new motifs and innovations in finishing techniques, including distinctive white-slipped ceramics in Pacific Nicaragua and orange-slipped types in northwest Costa Rica. Attesting such migrations, as a direct cause of the changes in material culture, however, has proven elusive (McCafferty 2015). Instead, based on earlier foundational studies, the increased comparative stylistic study and technological sourcing of such pottery is placing greater emphasis on more localized production processes. The current understanding is that pottery production is largely a local process, within and between the northern and southern parts of Greater Nicoya, and appears less significantly linked to exchange beyond Greater Nicoya itself.

Apart from the archaeologically challenging topic of Pacific coastal migration from Mesoamerica into Greater Nicoya, the period from AD 600 and the increased connections of Greater Nicoya to southern Central America developed into that of a node in the long-distance trade of social valuables produced in parts of Panama and Costa Rica. Although not overwhelming in number, hammered gold disks do show up in various late contexts in the Maya region and the central highlands of Mexico. Metal objects are far from ubiquitous in archaeological contexts of Greater Nicoya, and it is an unresolved question how the itinerant presence of such novel shiny objects would have impacted on societies in Greater Nicoya. Any increase in connections between both regions opens up the question of what the probably quite different human relations to exotic materials could have been, keeping in mind that stylistic comparability need not indicate shared ideas and the new materials and styles would have been perceived as new possibilities and extending ideas on the nature of the wider southern Central American world. Notwithstanding such a wider role for Greater Nicoya, it is one of the archaeological regions in southern Central America where continuity and stability of both population density and organization, as well as practices of pottery production, are most remarkable.

Beyond the immediate Pacific coastal areas of Greater Nicoya, the variable topography, soils, and microclimates make for a more challenging comparison to other parts of this region traditionally considered to skirt Greater Nicoya. The numerous islands in the two lakes principally include Ometepe, Zapatera, and the Solentiname archipelago, with considerable indications of human use, but overall there are several hundred smaller ones, all of which feature at least some form of archaeological traces of prehistoric habitational, funerary, or ceremonial activity. Across from Lake Cocibolca, the expansive and loosely defined region of central Nicaragua represents the transitional zone toward the Caribbean lowlands and with intense building of mound-like surface structures, both adapted to local topographies as well as built to form the large ceremonial complex of Aguas Buenas (Geurds and Terpstra 2017). This region, and others connecting Greater Nicoya to central mountainous and Caribbean geographies, harbors the potential to provide further detail to how indigenous communities were enmeshed in relations around natural features such as the mentioned lakes.

Caribbean Nicaragua and Costa Rica

The Caribbean coastline of Nicaragua and Costa Rica is a region of dense tropical forest cut by numerous rivers. In recent decades, significant deforestation resulted in barely connected pockets of forest in the midst of grasslands used as cattle pasture. Partly as a consequence of the impenetrable character of the region, combined with the high degree of precipitation, the archaeological narrative here is still largely relying on individual

site excavations or valley-based surveying, and a detailed understanding of diachronic developments is unavailable. What can be reported is more often than not based on single finds, often the product of salvage interventions, than being the product of long-term archaeological research projects.

Research on the central Caribbean coast of Nicaragua points to the exploitation of marine resources, as evidenced by substantial shell middens documented near the modern town of Bluefields. These sites, lacking in surface domestic architecture, are identified as temporary camps used for fishing, harvesting gastropods, and catching turtles, all possibly for eventual transport and distribution upriver by canoe. Farther inland, the scant archaeological data points to communities relying primarily on agriculture. This appears to have been based on maize, given the abundant presence of grinding stones. This model may in fact not diverge much from the abovementioned subsistence strategies deployed at the Gulf of Fonseca and provide one more example of the attention needed for human adaptations to coastal-inland subsistence strategies.

A second study in Caribbean Nicaragua has documented an example of public ceremonial architecture and the use of stone sculpture (Geurds in press). At the El Gavilán site, just east of the modern town of El Ayote, a site featuring numerous low clay mounds as well as a few considerably higher ones is complemented by two square platforms. These platforms are directly associated to a large cluster of carved and uncarved monolithic sculptures, up to 2 meters tall. This high degree of sculpting activity echoes finds from parts of Caribbean Costa Rica in also being focused on representing human bodies, although it is technologically distinct. The site is situated directly at the confluence of two rivers, placing El Gavilán at an advantageous location for regional gatherings. The monumental layout of the site possibly created a spatial context for conducting public activities involving communities from both up- and downriver. Moreover, the required practices of selection, extraction, transportation, and carving of these monoliths indicate a highly skilled and organized activity. While hypothetical, such a role for establishing and confirming social ties would have been beneficial to the communities in the wider surroundings. A monumental location such as El Gavilán provides rare insight into the conditions needed for the reproduction of shared histories among those participating in its construction, as regional community ties were cemented and maintained in the process. Similar to the studies arguing for river transport for subsistence practices, the location of this ceremonial site also underscores the importance of rivers as expedient ways of transport, highlighting the rivers role as facilitator of contact in southern Central America.

For parts of the lowlands of Caribbean Costa Rica, south of the San Juan River, the data resolution is better. At the relatively early date of approximately 100 BC, settlements begin to emerge, typically situated in valleys with alluvial deposits, practicing both seed and root crop agriculture. What is remarkable about the material culture of the excavated sites from this period is not so much the domestic or public architecture but the extensive funerary customs, specialized working with lapidary materials (including serpentinite, chalcedony, and other silicate rocks optically similar to jadeite), and a developing practice of fashioning ground stone objects. Overall, the early rise in cultural activity in Caribbean Costa Rica may be related to wider macroregional interaction networks, evidenced again by Olmec style objects (Snarskis 1984). Determining the routes along which such networks may have been established and maintained is a function of defining features in the geography of southern Central America. As such, connections from southern Honduras and perhaps the Gulf of Fonseca, along possibly either side of Lake Nicaragua, into northwest Costa Rica, would have been favored, and from there on forking along the central mountains toward the Caribbean and the Pacific coastal area of Costa Rica.

From AD 400, further noticeable changes occur in Caribbean Costa Rica, with earlier sites showing continued occupation and additional settlements being established in this second half of the first millennium AD. Gold objects become more visible in the archaeological record, and jade-like

materials decrease markedly – a process seen more widely in southern Central America in this period. Circular house areas become the norm over the previously seen rectangular footprint, and the use of wide cobblestone paths and pavements is common. Sites such as Guayabo de Turrialba and Nuevo Corinto are prime examples of such forms of housing and also provide indications for chiefly or communal residences. Funerary practices revolve around stone cist structures in a variety of shapes and include the use of flagstones for retaining walls, top cover, and even laying out the tomb floors. A specialized practice of highly decorated and distinctive ceremonial grinding stones is also found from this moment on, as well as various forms of human sculpture, either seated or standing and displaying themes related to warrior identity and trophy heads (Hoopes 2007). Again, it has been argued that these changes in Caribbean Costa Rica are caused by long-distance contacts, more specifically a change from Mesoamerican trade routes, to strengthening southern connections into the Greater Chiriquí and other parts of Panama and into northwestern Colombia.

Southern Costa Rica and Western Panama

Parts of southern Costa Rica and western Panama, respectively, known as the Diquís Delta and the province of Chiriquí are collectively referred to as the Greater Chiriquí archaeological region. This concept was originally proposed exclusively for the Pacific coastal slopes of both countries (Haberland 1976) but was expanded to include the Caribbean side of this part of southern Central America as well (Haberland 1984), with the Cordillera de Talamanca as a central geographical separation. While useful as a general frame of reference, the Greater Chiriquí regional definition remains ambiguous on several sides. Uncertainty continues to exist about its northeast boundary, toward the central coastal parts of Costa Rica, as well as regarding the western boundary toward the central Panamanian Greater Coclé region. Additionally, the exact cultural relation of the Caribbean region in the Greater Chiriquí remains under debate. The fragmented geography in this region, consisting of a diverse set of river basins, bay areas, coastal plains, and highlands, may eventually lead to the definition of further cultural subdivisions. While some patterns in ceramic styles and site characteristics referred to as the Aguas Buenas Period are discernible from AD 300 onward, how far back in time this extends is again subject to discussion, with dates as early as 1500 BC also being considered (Corrales 2000), and archaeological patterns varying considerably throughout the region. Integration of communities at the regional level was seemingly limited until AD 800, despite similar ceramic types being spread across the region. In response to this uncertainly, archaeological research has proposed several more localized sequences for the period before AD 800, perhaps indicative of the substantial cultural diversity in the Greater Chiriquí before this date (Corrales 2000).

Cultural developments from AD 300 up to the arrival of the Spaniards are marked by one generally recognized period break around AD 600. From this moment onward, settlements become more complex in their composition and are associated with alluvial plains, and their locations are increasingly co-dependent on access to marine resources (Drolet 1988). In fact, given the varied topography and vegetation, it is assumed that settlements will have had access to multiple food sources, alongside what was being cultivated. Similar to other regions of southern Central America, communities were often composed of both ordinary domestic residences as well as public spaces such as communal plazas and stone monuments, including a unique tradition of fashioning large spheres out of gabbro or limestone, declared UNESCO World Heritage in 2014. Graves were placed on hilltop settings, or in mounds near domestic spaces, with grave goods prominently including distinctive peg-based stone sculptures. Rounded river stones were used for the construction of raised platforms, and served in laying out planned pavements and causeways, comparable to those described for Caribbean Costa Rica. The constructing of mounds was not as ubiquitous as it was in parts of central Nicaragua, with mounds being restricted to certain locations in settlement. Given their increased dimensions and elaboration, they are presumed to have served a more exclusive purpose for the community's leadership and their families. There

is ample evidence of maize processing previous to AD 600, but this further intensified after this date (Horn 2006), possibly causally linked to the mentioned marked shifts visible in material culture and community organization. Although gold metallurgy first appears as early as AD 200, an additional defining feature of the period after AD 600 is the expansion of metallurgical production, with especially gold being mined and worked in different parts of the Greater Chiriquí. As different as they will have seen the southern Central American world once they had arrived there, accounts by the Spanish also provide fairly detailed reports on the territorial organization of parts of the Greater Chiriquí region, highlighted by the presence of chiefs and multiple political boundaries in the region, as well as references to the frequency of intercommunity conflict about territory, goods, and captives (Corrales and Badilla 2018).

In the Panamanian province of Chiriquí, there are strong indications of communities gradually developing a certain level of institutional leadership. This is evidenced through specialization in tool production activities in multiple villages, the manufacture of monumental stone objects, including human sculpture. The site of Barriles is one of the more cited examples of the rise in arguing sociopolitical complexity in the Chiriquí. Barriles in fact consists of two related sites and is located in the proximity of the Barú volcano which has a wider set of settlement on its outskirts (Linares and Ranere 1980). Early research at the site yielded a massive four-legged ceremonial grinding stone, several meters in length, and lined with sculpted human heads. Another unique object category is the stone barrel-shaped objects, after which the site is named. Although the cultural sequence at Barriles goes back to at least AD 300, the further development of Barriles, and possible other sites of this magnitude, is linked to population growth made possible by an increasing reliance on maize agriculture after AD 600. Whether the advent of intensive maize cultivation is directly causally related to population growth and the emergence of chiefly territorial leadership or if the two developments proceeded in a rather parallel dynamic is debated (Hoopes 2005). Similar to other studied archaeological sites in coastal Pacific Central America, the occupation of Barriles was influenced by a substantial volcanic eruption. This eruption left a clear mark on the stratigraphy, but its dating to around AD 600 is now considered problematic. Accordingly, an active local exchange network was maintained featuring pottery, stone, salt, and staple foods. Overall, from AD 600 onward, the Greater Chiriquí thrived as a region with a diverse settlement pattern, connected to regional trade routes linking Greater Nicoya and central Panama.

Central Panama

East of the Greater Chiriquí region, central Panama has revealed the temporally deepest archaeological sequence of southern Central America. As discussed above, the first data on human activity in central Panama dates back to the Terminal Pleistocene and become more detailed leading up to approximately 500 BC, with patterns of human adaptation to the environment enveloping both the Pacific and Caribbean sides of the region. A rich data set attesting the development from hunting and gathering to include fishing and the adoption of agriculture is evidenced. Between 500 BC and AD 0, settlement locations and agricultural activities shift from foothill areas down to lower alluvial river valleys nearer to the coast. Approximately from this moment onward is when prehistoric activities in this region are referred to as the Greater Coclé tradition (Cooke et al. 2000).

Two parallel developments beginning around AD 200 define the emergence of the Greater Coclé tradition: the development of a number of highly distinctive trichrome and polychrome pottery styles, accompanied by the arrival of metalworking practices having their direct origin in Colombia. The tri- and especially polychromes ceramic types form one of the most ornate and richly decorated pottery styles in southern Central America, perhaps together with the Greater Nicoya polychromes. Coclé-style motifs include supernatural creatures, a range of geometric and organically shaped designs, and various animal depictions as part of other forms of decoration. The practice of trichrome painting on pottery begins around 200 BC and that of polychromes around AD

700 and runs diachronically, through individual styles all the way to the arrival of the Spanish, each style spanning several centuries. Metalwork motifs overlap to some degree with these polychrome styles. How this tradition was organized territorially is the subject of some discussion, with the Pacific coast of Central Panama serving as an oft-cited comparative case study of social hierarchy and chiefly leadership in the Americas. The emergence of such chiefly polities was possibly related to the increasing reliance on maize in the diet of communities in Central Panama. Even though wild fruits and palm nuts are still used, the prominence of maize is shown archaeologically both in starch analyses on grinding stones as well as through stable isotope signals in human bone.

Spanish references frequently mention chiefs and the territory they occupy in Central Panama. These descriptions provide tantalizingly precise observations, many times difficult to verify archaeologically. It is fair to assume that communities featured at least some level of sociopolitical stratification and they were organized based largely on kinship relations. Not every community or settlement will have participated in this political landscape in the same way. In this Pacific coastal environment, the site of Sitio Conte has stood out given the lavish graves dated to AD 700–900. More recently, the site of El Caño, previously only known for its alignment of carved monoliths, has revealed burials of similar complexity and elaboration (Mayo and Mayo 2013). The sumptuary goods found in these funerary settings are some of the most diverse and impressive known for southern Central America, in spectacular nature rivaling those found in parts of Mesoamerica and the Middle Andes. The leadership authority implicated in such grave finds appears to accord with traditional definitions of chiefly ranked societies, but if this site – identified by its excavators as a necropolis – was in fact an interterritorial burial ground or situated in a single political territory remains unresolved.

The archaeology of Central Panama contributed to comparative analyses on the origins of chiefly leadership, also beyond southern Central America. One argument has recognized the link to individual performance in episodes of conflict between societies and the ability to control and interpret exotic goods, exchanged or personally procured beyond societal horizons. This developed notion on the social and political value of esoteric knowledge forms a widely cited study on elite strategies of wealth and authority (Helms 1979), stressing the importance for chiefly legitimation of having access to the acquisition and interpretation of exotic valuables. A substantial body of research into the development of subsistence strategies in central Panama, however, argues for a more local sociopolitical dynamic whereby technological changes in food procurement and preparation, as well as increasing use of gold ores, are the source of differential access to and control over these resources, leading to wealth and display of authority.

Eastern Panama

Eastern Panama is simultaneously one of the archaeologically least known and most relevant regions to discuss. It is culturally part of what is referred to as the Greater Darien (Cooke 1984), including the northwestern Colombian region around the Gulf of Urabá, the Atrato River, and parts of the Chocó department running along the Pacific coast of Colombia. As mentioned, it has some of the earliest documented pottery traditions in the Americas and also was the avenue through which metalworking made its way north into Central America. Metallurgical knowledge was probably in place in parts of Colombia around at least 500 BC, with examples from central Panama following around AD 500, and then developing into a wide variety of styles, and further technological specializations to fashion ornate gold or *tumbaga* (copper-gold alloy) objects, including pendants, breastplates, and ear and lip plugs. The modern national boundary now obscures what was the environmental continuity of eastern Panamanian rain forests and those on the other side of the Colombian boundaries in the Chocó region and also along the Caribbean coast of the Gulf of Urabá. As Bray argues (1984), eastern Panama likely constituted a single cultural region from around AD 0 onward, defined by the use of tumbaga

pendants featuring a complex iconography and an equally specialized metalworking knowledge. Archaeological data in Greater Darien rely on the excavation of a very limited number of sites, prominently including Momil near the Caribbean coast of northwest Colombia. How the communities were organized in eastern Panama is empirically not well established, but the pattern of chiefdom level societies, as described in Spanish sources, is assumed to come into existence around AD 500. The indigenous societies of Greater Darien were to witness the first Spanish settlement in the mainland Americas in AD 1510.

Summary

Similar to other regions of the world, the prehistory of southern Central America is defined by cycles of transformation as well as a marked stability in how its societies defined themselves and related to others. Regional containers such as southern Central America and all the subareas described above are archaeologically useful heuristic devices, but not very informative on social realities and how human action shaped that what is now called the prehistory of southern Central America. Archaeological evidence indicates that communities roamed, changed, and settled the diverse landscapes of this American isthmus and in the process created a long-term dynamic of adaptation and mobility. Such patterned action is, in turn, recognized archaeologically, albeit with different resolutions across Central America. What marks this area region from a global archaeology standpoint are two main points: the extraordinary position in the midst of two continental landmasses and because of this, the unique role played by southern Central America in the initial human colonization of the Americas, perhaps globally late but with great velocity, and second, the remarkable stability of social life (as seen also in genetic and linguistic data) in the midst of forming part of macroregional exchange networks that saw jadeite, gold, and copper objects, among various other forms, spread through and across the region.

Steadily, archaeology is beginning to reveal that different forms of cultural expression from the earliest periods of human presence down to the advent of European colonization revolved around the indigenous communities' concerns of how to successfully negotiate regional cultural, linguistic, and social differences as well as the geographical character of the area. Such concerns were in part surely unconscious but in part also active decisions, as shown, for example, in the spread of certain pottery styles. All this resulted in communities, with a range of densities and forms of organization that existed contemporaneously and with extraordinary stability, until the sixteenth century.

After Christopher Columbus explored the Caribbean coasts of southern Central America during his fourth voyage in 1502, the period of Spanish incursions into Central America is a history of frequent violence and massive death. These events effectively ended the prehistoric period, even though for the vast majority of elements that defined indigenous life in southern Central America no historical writings would ever become available. Notwithstanding the cataclysmic changes occurring in the sixteenth century, indigenous settlement continued in certain areas until well after colonial administration of the region had begun. Evidence from sites such as Paso Real in the foothills of the Diquís region of Costa Rica, for example, shows European glazed ceramic wares and glass beads to be present in indigenous graves. However fragile, such continuity seems to mostly appear, perhaps predictably, in areas of very low population density and poor infrastructure.

Cross-References

- ▶ Central America: Historical Archaeology of Early Colonial Urbanism
- ▶ Classic Maya Collapse: An Alternative View
- ▶ Joyce, Rosemary
- ▶ Maize: Origins and Development
- ▶ Mesoamerica in the Classical Period
- ▶ Mesoamerica's Archaic Period
- ▶ Metallurgy
- ▶ Monte Verde, Archaeology of
- ▶ Olmec: Geography and Culture

▶ Paleoindians
▶ Peopling of the Americas
▶ Reichel-Dolmatoff, Gerardo
▶ Willey, Gordon Randolph

References

Andrews, E.W. 1976. *The archaeology of Quelepa, El Salvador*. New Orleans: Middle American Research Institute, Tulane University.

Barnett, W., and J.W. Hoopes. 1995. *The emergence of pottery: Technology and innovation in ancient societies*. Washington, DC: Smithsonian Institution Press.

Baudez, C.F. 1970. *Central America*. New York: Barrie & Jenkins.

Baudez, C.F. 1976. Llanura costera del Golfo de Fonseca, Honduras. *Vínculos* 2 (1): 15–23.

Bray, W.M. 1984. Across the Darién Gap: A Colombian view of isthmian archaeology. In *The archaeology of lower Central America*, ed. F.W. Lange and D.Z. Stone, 305–338. Albuquerque: University of New Mexico Press.

Coates, A.G., and J.A. Obando. 1996. The geologic evolution of the central American isthmus. In *Evolution and environment in tropical America*, ed. J.B.C. Jackson, A.F. Budd, and A.G. Coates, 21–56. Chicago: University of Chicago Press.

Cooke, R.G. 1984. Archaeological research in central and eastern Panama: A review of some problems. In *The archaeology of lower Central America*, ed. F.W. Lange and D.Z. Stone, 263–302. Albuquerque: University of New Mexico Press.

Cooke, R.G. 2005. Prehistory of native Americans on the Central American land bridge: Colonization, dispersal, and divergence. *Journal of Archaeological Research* 13 (2): 129–187.

Cooke, R.G., A. Ranere, G. Pearson, and R. Dickau. 2013. Radiocarbon chronology of early human settlement on the Isthmus of Panama (13,000-7000 BP) with comments on cultural affinities, environments, subsistence, and technological change. *Quaternary International* 301: 3–22.

Corrales, F.C. 2000. An evaluation of long term cultural change in southern Central America: The ceramic record of the Diquís archaeological subregion, southern Costa Rica. Unpublished PhD dissertation, University of Kansas.

Corrales, F.C., and A. Badilla. 2018. Sociedades jerárquicas tardías en el delta del Diquís, sureste de Costa Rica. *Cuadernos de Antropología* 28 (2): 1–23.

Dillehay, T.D., C. Ocampo, J. Saavedra, A. Oliveira Sawakuchi, R.M. Vega, M. Pino, M.B. Collins, L. Scott Cummings, I. Arregui, X.S. Villagran, G.A. Hartmann, M. Mella, A. González, and G. Dix. 2015. New archaeological evidence for an early human presence at Monte Verde, Chile. *PLoS One* 10 (11): e0141923.

Drolet, R. 1988. Emergence and intensification of complex societies in Pacific Southern Costa Rica. In *Archaeology and art in Costa Rican prehistory*, ed. F.-W. Lange, 163–188. Boulder: University of Colorado Press.

Fonseca, O. 1994. El concepto de Área de Tradición Chibchoide y su pertinencia para entender Gran Nicoya. *Vínculos* 18: 209–228.

Geurds, A. in press. Monumental stone sculpture in central Nicaragua. In *Toward an Archaeology of "Greater" Central America*, ed. C. McEwan, B. Cockrell, and J.W. Hoopes. Washington, DC: Dumbarton Oaks.

Geurds, A., and D. Terpstra. 2017. Circular reasoning in mound building? Large- scale planned construction patterns at the Aguas Buenas site (A.D. 400–1525). In *War & Peace: Conflict and Resolution in Archaeology*, Proceedings of the 45th annual Chacmool archaeology conference, ed. A.K. Benfer, 47–59. Calgary: University of Calgary.

Haberland, W. 1976. Gran Chiriqui. *Vinculos* 2: 115–121.

Haberland, W. 1984. The archaeology of greater Chiriquí. In *The archaeology of lower Central America*, ed. F.W. Lange and D.Z. Stone, 233–262. Albuquerque: University of New Mexico.

Hartman, C.V. 1901. *Archaeological researches in Costa Rica*. Stockholm: Ivan Hægg Strömes Boktryckeri.

Hartman, C. V. 1907. *Archeological Researches on the Pacific Coast of Costa Rica*. Pittsburgh: Carnegie Institute.

Healy, P.F. 1980. *Archaeology of the Rivas region, Nicaragua*. Waterloo: Wilfred Laurier Press.

Healy, P.F. 1984. The archaeology of Honduras. In *The archaeology of lower Central America*, ed. F.W. Lange and D.Z. Stone, 113–164. Albuquerque: University of New Mexico Press.

Helms, M.W. 1979. *Ancient Panama: Chiefs in search of power*. Austin: University of Texas Press.

Hoopes, J.W. 1995. Interaction in hunting and gathering societies as a context for the emergence of pottery in the Central American isthmus. In *The emergence of pottery: Technology and innovation in ancient societies*, ed. J.W. Hoopes, 185–198. Washington, DC: Smithsonian Institution.

Hoopes, J.W. 2005. The emergence of social complexity in the Chibchan world of southern Central America and northern Colombia, AD 300–600. *Journal of Archaeological Research* 13 (1): 1–47.

Hoopes, J.W. 2007. Sorcery and the taking of trophy heads in ancient Costa Rica. In *The taking and displaying of human body parts as trophies by Amerindians*, ed. R.J. Chacon and D.H. Dye, 444–480. Boston: Springer.

Hoopes, J.W., and O.M. Fonseca. 2003. Goldwork and Chibchan identity: Endogenous change and diffuse unity in the Isthmo-Colombian area. In *Gold and power in ancient Costa Rica, Panama, and Colombia*, ed. J.W. Hoopes, O.M. Fonseca, and J. Quilter, 49–89. Washington, DC: Dumbarton Oaks.

Horn, S.P. 2006. Pre-Columbian maize agriculture in Costa Rica: Pollen and other evidence from lake and other sediments in. In *Histories of maize in Mesoamerica: Multidisciplinary approaches*, ed. J. Staller, R. Tykot, and B. Benz, 367–380. London: Elsevier.

Joyce, R.A. 2004. Unintended consequences? Monumentality as a novel experience in formative Mesoamerica. *Journal of Archaeological Method and Theory* 11 (1): 5–29.

Joyce, R.A. 2017. Painted Pottery of Honduras: Object lives and itineraries. In *The early Americas: History and culture*, The early Americas: History and culture 6. Leiden: Brill Publishers.

Kirchhoff, P. 1943. Mesoamérica. *Acta Americana* 1 (1): 92–107.

Lange, F.W. 1984. The greater Nicoya archaeological subarea. In *The archaeology of lower Central America*, ed. F.W. Lange and D.Z. Stone, 165–194. Albuquerque: University of New Mexico Press.

Linares, O.F. 1979. What is lower central American archaeology? *Annual Review of Anthropology* 8 (1): 21–43.

Linares, O.F., and A.J. Ranere, eds. 1980. *Adaptive radiations in prehistoric Panama*. Boston: Peabody Museum of Archaeology and Ethnology, Harvard University.

Longyear, J.M., III. 1966. Archaeological survey of El Salvador. In *Handbook of middle American indians, volume 4: Archaeological frontiers and external connections*, ed. R. Wauchope, 132–156. Austin: University of Texas Press.

Mayo, J., and C. Mayo. 2013. The discovery of an elite cemetery at El Caño: Traces of a mortuary pattern in Río Grande valley, Coclé, Panama. *Arqueología Iberoamericana* 20: 3–27.

McCafferty, G. 2015. The Mexican legacy in Nicaragua, or problems when data behave badly. *Archaeological Papers of the American Anthropological Association* 25: 110–118.

McCafferty, G., F.E. Amador, S. Salgado, and C.L. Dennett. 2012. Archaeology on Mesoamerica's southern frontier. In *The Oxford handbook of Mesoamerican archaeology*, ed. D.L. Nichols and C.A. Pool, 83–105. Oxford: University of Oxford Press.

Piperno, D.R., M.B. Bush, and P.A. Colinvaux. 1991. Paleoecological perspectives on human adaptation in Central Panama. II the Holocene. *Geoarchaeology* 6 (3): 227–250.

Sampeck, K. 2014. Ancient Quelepa, colonial San Miguel: Shifting cultural frontiers and rogue colonialism in eastern El Salvador. In *The Maya and their central American neighbors*, ed. G. Braswell, 76–102. London: Routledge.

Schortman, E., and P. Urban. 2011. Power, memory, and prehistory: Constructing and erasing political landscapes in the Naco Valley, northwestern Honduras. *American Anthropologist* 113 (1): 5–21.

Sheets, P.D. 1992. The pervasive pejorative in Intermediate Area studies. In *Wealth and Hierarchy in the intermediate Area*, ed. F.W. Lange, 15–41. Washington, DC: Dumbarton Oaks.

Sheets, P.D., and B.R. McKee, eds. 1994. *Archaeology, volcanism, and remote sensing in the Arenal region, Costa Rica*. Austin: University of Texas Press.

Snarskis, M.J. 1984. Central America: The lower Caribbean. In *The archaeology of lower Central America*, ed. F.W. Lange and D.Z. Stone, 195–232. Albuquerque: University of New Mexico Press.

Stone, D.Z. 1972. *Pre-Columbian man finds Central America: The archaeological bridge*. Washington, DC: Peabody Museum of Archaeology.

Willey, G.R. 1955. The prehistoric civilizations of nuclear America. *American Anthropologist* 57 (3): 517–593.

Further Reading

Braswell, G.E., S. Salgado González, L.A. Fletcher, and M.D. Glascock. 2002. La antigua Nicaragua: la periferia sudeste de Mesoamérica y la región maya: interacción interregional (1-1522 d.C.). *Mayab* 15: 19–39.

Carmack, R.M., and S. Salgado González. 2006. A world-systems perspective on the archaeology and ethnohistory of the Mesoamerican/lower Central American border. *Ancient Mesoamerica* 17 (2): 219–229.

Constenla Umaña, A. 1995. Sobre el estudio diacrónico de las lenguas chibchenses y su contribución al conocimiento del pasado de sus hablantes. *Boletín del Museo del Oro* 38/39: 13–56.

Cooke, R.A. 1998. Human settlement of Central America and northernmost South America (14,000–8000 BP). *Quaternary International* 49: 177–190.

Cooke, R.G., L.A. Sánchez Herrera, and K. Udagawa. 2000. Contextualized goldwork from 'Gran Coclé', Panama: An update based on recent excavations and new radiocarbon dates for associated pottery styles. In *Precolumbian gold: Technology, style, and innovation*, ed. C. McEwan, 154–176. Chicago: Fitzroy Dearborn Publishers.

Cooke, R.G., L.A. Sánchez Herrera, D.R. Carvajal, J. Griggs, and I.A. Isaza. 2003. Los pueblos indígenas de Panamá durante el siglo XVI: transformaciones sociales y culturales desde una perspectiva arqueológica y paleoecológica. *Mesoamérica* 45: 1–34.

Corrales, F. 2000. An evaluation of long-term cultural change in southern Central America: The ceramic record of the Diquís archaeological subregion, Costa Rica, Unpublished PhD dissertation, University of Kansas, Lawrence.

Creamer, W. 1987. Mesoamerica as a concept: An archaeological view from Central America. *Latin American Research Review* 22 (1): 35–62.

Dennett, C.L. 2016. The ceramic economy of pre-Columbian Pacific Nicaragua (AD 1–1250). Unpublished PhD dissertation, University of Calgary.

Donner, N.R., A. Arteaga, A. Geurds, and K. van Dijk. 2018. Preliminary characterization of archaeological sites in the Mayales River subbasin, Chontales Department, Nicaragua. *Cuadernos de Antropologia* 28: 1–26.

Gónzalez Fernández, V., ed. 2012. *Arqueología en el Área Intermedia*. Bogotá: Instituto Colombiano de Antropología e Historia.

Healy, P.F. 1978. Excavations at Rio Claro, Northeast Honduras: Preliminary report. *Journal of Field Archaeology* 5 (1): 15–28.

Holmberg, K. 2009. Nature, material, culture, and the volcano: The archaeology of the volcán Barú in highland Chiriquí, Panamá. Unpublished PhD dissertation, Columbia University.

Hoopes, J.W. 1994. Ford revisited: A critical review of the chronology and relationships of the earliest ceramic complexes in the New World, 6000–1500 B.C. *Journal of World Prehistory* 8 (1): 1–50.

Lange, F.W. 1979. Theoretical and descriptive aspects of frontier studies. *Latin American Research Review* 14 (1): 221–227.

Lange, F.W. 1984. Cultural geography of pre-Columbian lower Central America. In *The archaeology of lower Central America*, ed. F.W. Lange and D.Z. Stone, 34–60. Albuquerque: University of New Mexico Press.

Lange, F.W., V. Canouts, and S. Salgado. 1992. The greater Nicoya ceramic database: Development and application. In *Chemical characterization of ceramic pastes in archaeology*, Monographs in world archaeology 7, ed. H. Neff, 171–187. Madison: Prehistory Press.

Lothrop, S.K. 1942. *Coclé: An archaeological study of Central Panama*. Boston: Peabody Museum of Archaeology and Ethnology, Harvard University.

Luke, C., and R.H. Tykot. 2007. Celebrating place through luxury craft production: Travesía and Ulua style marble vases. *Ancient Mesoamerica* 18 (2): 315–328.

Magnus, R.W. 1978. The prehistoric and modern subsistence patterns of the Atlantic coast of Nicaragua: A comparison. In *Prehistoric coastal adaptations: The economy and ecology of maritime coastal middle America*, ed. B.L. Stark and B. Voorhies, 61–80. New York: Academic Press.

Newson, L.A. 1987. *Indian survival in colonial Nicaragua*. Norman: University of Oklahoma Press.

Norweb, A. 1964. Ceramic stratigraphy in southwestern Nicaragua. In *Proceedings and transactions of the 35th international congress of Americanists*, vol. 1, Mexico City 551–561.

Palumbo, S.D. 2009. The development of complex society in the Volcán Barú region of western Panama. Unpublished PhD dissertation, University of Pittsburgh.

Ranere, A.J., D.R. Piperno, I. Holst, R. Dickau, and J. Iriarte. 2009. The cultural and chronological context of early Holocene maize and squash domestication in the Central Balsas River Valley, Mexico. *Proceedings of the National Academy of Sciences* 106 (13): 5014–5018.

Reich, D., N. Patterson, D. Campbell, A. Tandon, S. Mazieres, N. Ray, M.V. Parra, W. Rojas, C. Duque, N. Mesa, L.F. García, O. Triana, S. Blair, A. Maestre, J.C. Dib, C.M. Bravi, G. Bailliet, D. Corach, T. Hünemeier, M.C. Bortolin, F.M. Salzano, M.L. Petzl-Erler, V. Acuña-Alonzo, C. Aguilar-Salinas, S. Canizales-Quinteros, T. Tusié-Luna, L. Riba, M. Rodríguez-Cruz, M. López-Alarcón, R. Coral-Vázquez, T. Canto-Cetina, I. Silva-Zolezzi, J.C. Fernandez-López, A.V. Contreras, G. Jiménez-Sánchez, M.J. Gómez-Vázquez, J. Molina, A. Carracedo, A. Salas, C. Gallo, G. Poletti, D.B. Witonsky, G. Alkorta-Aranburu, R. Sukernik, L. Osipova, S.A. Fedorova, R. Vásquez, M. Villena, C. Moreau, R. Barrantes, D. Pauls, L. Excoffier, G. Bedoya, F. Rothhammer, J.M. Dugoujon, G. Larrouy, W. Klitz, D. Labuda, J. Kidd, K. Kidd, A. Di Rienzo, N.B. Freimer, A.L. Price, and A. Ruíz-Linares. 2012. Reconstructing native American population history. *Nature* 488: 370–374.

Reindel, M., P. Fux, and F. Fecher. 2017. Guadalupe, Honduras. Kulturelle Interaktion und vorspanische Siedlungsgeschichte im Nordosten von Honduras. Die Arbeiten der Jahre 2016 und 2017. *E-Forschungsberichte* 2: 89–92.

Snarskis, M.J. 1992. Wealth and hierarchy in the archaeology of eastern and Central Costa Rica. In *Wealth and hierarchy in the intermediate area*, ed. F.W. Lange, 141–164. Washington, DC: Dumbarton Oaks.

Steinbrenner, L.L. 2010. Potting traditions and cultural continuity in Pacific Nicaragua, AD 800–1350. Unpublished PhD dissertation, University of Calgary.

Van Broekhoven, L.N.K. 2002. *Conquistando lo invencible: fuentes históricas sobre las culturas indígenas de la región central de Nicaragua*, CNWS Publications 31. Leiden: CNWS Publications.

Preservation Paradigm in Heritage Management

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Introduction

The idea of preservation is the basic paradigm of all heritage management, including archaeological heritage management. Heritage experts often take for granted that remains of the past are inherently valuable and deserve to be maintained in perpetuity. A common slogan thus proclaims the need to "preserve the past for the future" (cf. Spennemann 2007). Therefore, archaeologists and other heritage experts do their best to preserve sites, objects, and the information they contain for the future. Archaeological preservation involves either the conservation of heritage in physical

terms ("preservation in situ," "stewardship") or, in case a given site or object cannot be preserved physically, it involves recording and archiving the information it contains ("preservation by record"; "rescue archaeology").

The contemporary conservation ethos in cultural heritage is firmly situated in a specific historical and cultural context of European civilization of the past few centuries. The French architectural historian Françoise Choay (2001 [1992]: 139–142) used the phrase "Noah complex" and referred to "the religion of heritage," "the cult of the historical monument," and widely practiced "rites of an official cult of historic heritage." This was echoed by economic historian Svante Beckman (1998: 32–39) who observed a peculiar "sacredness of cultural heritage" (my translation) in society, evoking piety and reverence, and by historical geographer David Lowenthal (1996: 1) who in his book on *The Heritage Crusade* described the cult of heritage as a popular faith in which the world has now started to rejoice: "heritage [has] become a self-conscious creed, whose shrines and icons daily multiply and whose praise suffuses public discourse."

References to a Noah complex and a semireligious cult of heritage point to that aspect of the contemporary concept of heritage that is most notorious and that, in a future perspective, is likely to become most noteworthy: the obsession with conservation, preservation, and protection. According to some commentators, conservation and preservation issues have taken over nearly the entire range of legitimate ways of being interested in the past. This is, for example, the main thrust of David Lowenthal's study (1996) in which he argues that the lure of a heritage to be conserved now outpaces all other modes of relating to the past including tradition, memory, myth, memoir, and history. And in the words of archaeologist Graham Fairclough (2009: 158), one might add that

> [t]he obsession with physical conservation became so embedded in twentieth century mentalities that it is no longer easy to separate an attempt to understand the past and its meaning from agonising about which bits of it to protect and keep. It is almost as if one is not allowed to be interested in the past without wanting to keep or restore . . . the remains of the past, which seem to exist only to be preserved. The wide range of how the past is used by society has been reduced to the literal act of preserving its fabric. In that sense, history has been subsumed into heritage, scarcely having any independent existence.

Current Debates

The logic of the preservation paradigm of heritage insists that what is valuable deserves to be protected and preserved by stewards for the benefit of future generations. Lately, this logic has however rightly attracted criticism (e.g., Hollowell 2009; Holtorf 2015).

Preservation is sometimes presented as practiced from a position that is located outside history and based on experts assessing changes over time rather than their judgments manifesting such changes. But from a life-history perspective of monuments and landscapes, heritage preservation can be considered as one major way of reinterpreting and reusing a given site or landscape in our age. This history of a site and the story heritage can tell are enriched by additional layers of meaning and their physical manifestations, e.g., related to contemporary heritage tourism. This includes even destructive processes such as erosion or vandalism, which raises a series of important questions. Given the way in which archaeological preservation and destruction are often entangled at the moment of discovery, when heritage is presented to various audiences and through the act of visiting and studying it, how can we separate one from the other? Are there conditions under which loss of heritage can be beneficial for future generations? How significant are stories about the past told by vandalized or obliterated heritage? Can the consumption and use of heritage for present benefits be more important than its preservation for the future? Does an obsession with preservation and stewardship of archaeological heritage prevent us from making informed decisions that are in the best interest of a majority of living people? Whom are the stewards

of heritage actually accountable to and on what grounds? Do we have to distinguish benefits for different groups of people? When will the future arrive in which the heritage can be consumed? If it never arrives, why preserve? Is not cultural heritage and its management inevitably subject to historical change over time and eventually bound to be overcome?

It is far from certain whether or not preservation is contributing to shaping a future we want to live in. In an interesting debate on BBC News (2009), triggered by a recent cash crisis at the site of Auschwitz, the question raised was "Should Auschwitz be left to decay?" Historian Robert Jan van Pelt argued that once the last survivor has died, the site as such will have little to tell to future visitors and should therefore be closed and peacefully left to decay out of respect to all those who died there. **Władysław** Bartoszewski, Chairman of the International Auschwitz Council, on the other hand, suggested that the site should continue to be preserved as a burning wound, to bear witness to the tragedy that happened there and as a future warning against all forms of contempt for mankind. Who is to say whether or not Auschwitz in 100 years from now will still be preserved and appreciated in ways we would approve of?

The present concern for future generations in the heritage sector (as elsewhere) is neither a matter of altruistic self-sacrifice for the welfare of future human beings nor one of intergenerational equity. As the past and its remains are continuously growing every day, future generations cannot run out of past, and there will always be plenty of cultural heritage to study and enjoy. Given the changing notions of authenticity and fast-developing techniques of copying and reconstructing, it is also dubious whether the values of archaeological heritage are really nonrenewable (Holtorf 2005: Chaps. 7 and 8). Indeed, it may be counterproductive to become too good at conserving heritage. Since future generations may perceive as less valuable what is common, they might become less appreciative and careful toward abundant heritage than they would otherwise have been – effectively rendering our own conservation efforts meaningless.

Archaeological heritage managers do not professionally engage with the question which future they are working for and how their work will impact on that future (Högberg et al. 2017). Arguably, the obsession with preserving heritage during the twentieth and early twenty-first centuries is more about ourselves than about benefits for future generations. As Lowenthal (2005) indicated, the existing concern for the future in heritage management has been "a matter of enriching our own life with depth and purpose." As mortal human beings, we pursue meaningful purposes that survive ourselves. Arguably, the widespread desire to protect and preserve heritage is nothing but one outcome of a strong human desire to obtain a sense of purpose by caring for something profound, whether that may be the ozone layer and global climate, homeless people and the fight against poverty, tigers and the protection of biodiversity or Stonehenge, and other cultural heritage sites. We never asked which role we can expect heritage to play in the *actual* future which will differ from the present and thus require new policies and practices.

Looking at the preservation of heritage from this perspective emphasizes its cultural and historical specificity and thus the realization that the current preservation paradigm will not be forever. Future historians and archaeologists, perhaps looking for explanations to the excessive desire to preserve in our age, will be able to draw on a rich material record of reconstructed buildings, restored artefacts, and archived reports (Fairclough 2009). Quite possibly, these future generations will appreciate conserved buildings and sites not so much because it allows them to remember the past (when the structures were built) but because it allows them to remember remembering the past (when the structures were saved). This raises the intriguing and somewhat paradoxical question whether future generations may appreciate the heritage of heritage (Holtorf 2012). Alternatively, as the social anthropologist Tim Ingold (2010) figured in an intriguing future

scenario of the year 2053, archaeologists will appreciate things in terms of persistence rather than preservation. Persistent things originate continuously and like natural processes they carry on growing or decaying. By then, heritage experts no longer take for granted that remains of the past are inherently valuable and deserve to be maintained in perpetuity. There will be no need to "preserve the past for the future" anymore.

Cross-References

► Archaeology and the Future

References

BBC News. 2009. Should Auschwitz be left to decay? Available at http://news.bbc.co.uk/2/hi/7827534.stm. Accessed 27 Jan 2009; accessed again 30 Jan 2018, title has been changed.

Beckman, S. 1998. Vad vill staten med kulturarvet? [What does the state want heritage for?]. In *Kulturarvets natur*, ed. A. Alzén and J. Hedrén, 13–49. Stockholm: Symposion.

Choay, F. 2001. *The invention of the historic monument* [1992]. Trans. L.M. O'Connell. Cambridge: Cambridge University Press.

Fairclough, G. 2009. Conservation and the British. In *Defining moments: Dramatic archaeologies of the twentieth-century*, BAR international series 2005, ed. J. Schofield, 157–164. Oxford: Archaeopress.

Högberg, A., C. Holtorf, S. May, and G. Wollentz. 2017. No future in archaeological heritage management? *World Archaeology* 49 (5): 639.

Hollowell, J. 2009. Standpoints on stewardship in a global market for the material past. In *Ethnographies and archaeologies: Iterations of the past*, Cultural heritage studies series, ed. L. Mortensen and J. Hollowell, 218–239. Tallahassee: University Press of Florida.

Holtorf, C. 2005. *From Stonehenge to Las Vegas. Archaeology as popular culture*. Lanham: Altamira.

Holtorf, C. 2012. The heritage of heritage. *Heritage & Society* 5 (2): 153–173.

Holtorf, C. 2015. Averting loss aversion in cultural heritage. *International Journal of Heritage Studies* 21 (4): 405–421.

Ingold, T. 2010. No more ancient; no more human: The future past of archaeology and anthropology. In *Archaeology and anthropology*, ed. D. Garrow and T. Yarrow, 160–170. Oxford: Oxbow.

Lowenthal, D. 1996. *The heritage crusade and the spoils of history*. London: Viking.

Lowenthal, D. 2005. Stewarding the future. *CRM: The Journal of Heritage Stewardship* 2 (2). Available via http://crmjournal.cr.nps.gov/.

Spennemann, D.H.R. 2007. The futurist stance of historical societies: An analysis of position statements. *International Journal of Arts Management* 9 (2): 4–15.

Preserving Heritage: The Role of the Media

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Introduction

Ever since the modern science of archaeology began to develop from its earlier antiquarianism, there has been a role for the media – from book publishing to newspaper journalism's coverage of discoveries to the depiction of archaeology in various visual arts – in shaping both the profession's and the public's awareness and desire to preserve the world's archaeological and cultural heritage. Then, beginning in the late nineteenth century, electric media began to more rapidly and widely disseminate information for and about archaeology (particularly the more spectacular finds) first through telegraphs and telephones, then in the twentieth century through movies, radio, and television, and, most recently, through the computer and the Internet.

Presently, archaeologists use all of the various types of artistic, broadcast, electronic, and print media to more widely and rapidly promote the documentation and preservation of the many international cultural heritage sites at risk from neglect, war, vandalism, misuse, land development, agriculture, looting, and artificial and natural alterations and disasters. Archaeologists have consistently adapted to the introduction of new technologies that have applications to help better advance the study and preservation of the world's

heritage sites. Most recently, the use of "social media" – whereby usually small amounts of information on a variety of topics are shared and disseminated quickly through the electronically linked networks of persons using computers, mobile telephones, and other devices with Internet accessibility – provides a new arena for the evolution of the role of the media in assisting the archaeological community in calling the public's attention to the need to understand, conserve, protect, and document the cultural heritage of the people of all nations.

Definition

The role of the media in preserving cultural heritage can be defined as the use of the full range of journalistic, artistic, print, electronic, and broadcast mass communications to inform the professional archaeological community and the general public on the many methods, activities, and plans for encouraging the understanding, protection, conservation, and documentation of the world's archaeological, historical, artistic, and cultural patrimony for the present and future generations.

Historical Background

The first mass communication medium to be used to promote the preservation and understanding of archaeological and cultural heritage was *book publishing*. For instance, as early as 1482, the work *Romae instauratae* ("Rome Restored"), written by the Italian humanist, historian, and "father of archaeology," Flavio Biondo (1388–1463), was the first book on archaeology to be published on the recently invented *printing press with movable type*. This and other works of Biondo's were printed posthumously by his sons less than 20 years after the German inventor Johannes Gutenberg's printing press was first brought into Italy around 1464 and only about 30 years after Gutenberg first prepared his famed eponymous bible using this device.

In the Renaissance, encouraged by the more widespread dissemination of information – particularly a better knowledge of classical antiquity based in large part by the revolution in mass book printing and book selling – scholars such as the English antiquarian and historian William Camden (1551–1623) undertook writing about the ancient histories of their own nations, especially those places that were once linked to the Roman Empire. In his work, *Britannia* – first published in 1588 in Latin and then in subsequent English editions – Camden recognized the association between archaeological finds (particularly ancient coins) and an area's history. In writing on the history of Kent, for example, he was observant in noting the existence of crop marks in fields upon the former locations of buildings and the coins that turned up in plowing:

> When the *Romans* govern'd here, the City was exceedingly Famous; from thence they commonly set sail from *Britain* to the Continent: But now Age has eras'd the very Tracts of it, and to teach us, that Cities die as well as Men, it is at this Day a Common Field, wherein, when the Corn is grown up, one may observe the Draughts of Streets crossing one another, for where they gone, the Corn is thinner. Nothing of the City now remains, but some ruinous Walls of rough Flints, and long *British* Bricks, the Cement of which is as hard as Stone. But the Plot of the City, now plough'd, has often cast up the Marks of its Antiquity, Gold and Silver Coins of the *Romans*. . . (Camden 1701).

Notably, despite recognizing the significance of these sites and their relationship to the past, Camden does not advocate for their preservation in his writing.

With a palpable interest being encouraged through literature in understanding the ancient past, more people began visiting the sites described in the various published histories – the early modern version of what we call today "cultural tourism." Artists such as the Venetian Giovanni Battista Piranesi (1720–1778), who had himself been first trained as an architect, began producing for sale to these tourists a series of printed etchings that showed the ancient ruins of Rome. These artistic "views," as they were called, depicted the city's archaeological landmarks and helped to popularize the knowledge of archaeology to both locals and visitors alike and to further spur a revival in the use of the

classical orders in Western architecture based upon these images and the increased appreciation of these ruins.

Toward the end of the eighteenth century, the first scientific excavation of an archaeological site was undertaken by the American politician, scientist, and Enlightenment polymath Thomas Jefferson. Described in his now renowned book, *Notes on the State of Virginia*, which was first published in French in 1785 and then in English in 1787, Jefferson fairly systematically undertook a stratigraphic excavation of a Native American burial mound (or barrow) in 1783, correctly hypothesizing that the origins of the mounds were aboriginal in origin and of great age. Importantly, Jefferson also set the standard for publishing his findings relatively quickly (Jefferson 1787).

A few years after Jefferson's book was published, the American naturalist and scientist *William Bartram* (1739–1823) – a close friend of Jefferson – published his own keen observations of ancient Native American archaeological sites based upon his travels throughout the American Southeast in the mid-1770s. Bartram's publication of his famous book, *Travels through North and South Carolina, Georgia, East and West Florida*, in Philadelphia in 1791 led to a further increased awareness of the antiquity of aboriginal culture in North America from comments laced throughout his famous work, such as his observation that "amongst the shells of the conical mounds, fragments of earthen vessels, and of other utensils, the manufacture of the ancients . . ." (Bartram 1791).

These books, along with writings published by a number of other eighteenth- and early nineteenth-century scholars in Europe, such as the Germans Johann Winckelmann (1717–1768) and Alexander von Humboldt (1769–1859), helped to construct an intellectual foundation for a more widespread appreciation for the artistry, diversity, and antiquity of human cultures in the Old and New Worlds. Then, combining the media of book publishing and fine art printing, a multitude of richly illustrated multivolume books – such as von Humboldt's *Voyage aux regions equinoxiales du Nouveau Continent* (Paris 1807), the French Commission des Sciences et des Arts' *Description de l'Egypte* (Paris 1809), and, later, the acclaimed *Incidents of Travel in Central America, Chiapas and Yucatan* (New York 1841) by the American diplomat, explorer, and writer John Lloyd Stephens (1805–1852) as illustrated by English artist and architect Frederick Catherwood (1799–1854) – began to regularly appear to the delight and astonishment of the reading public with visually informed descriptions of the archaeological wonders of the world's past civilizations.

The efforts of those studying archaeology and history in Europe and the Americas, however, did not prevent the widespread destruction of many of these sites within their own communities. There remained the need to develop and inculcate a widespread *conservation ethic* in societies as a whole, to develop an appreciation for what American preservationist and architectural historian James Marston Fitch (1909–2000) would later call – in our modern age of industrialized duplication and facsimilitude – the need to "preserve the prototype" (Fitch 2001). There was, of course, a bias inherent in much of what was being viewed by those doing the viewing and the studying toward those sites with physical remains that were permanent and monumental which we recognize today that went largely without comment at the time.

For an ethic of heritage preservation to diffuse and become instilled in societies across the world, there was required a medium of communication that could carry its *ideas* and the *idioms*. Also, at a time with high rates of illiteracy and poverty, even for those people who could read, the common media for transmitting ideas of heritage conservation – books and art – were expensive and intellectually detached from the lives of most people. Other avenues of instruction were needed.

One development was the recognition of the growing public interest and comprehension of archaeology from book publishing and artistic printing, particularly among the growing mercantile classes with some measure of disposable income and education. Hence, the establishment in the eighteenth century of the modern *museum* provided a forum for the public to view and discuss the exhibits of objects of cultural and natural heritage in their most tangible form. For instance,

William Bartram's Philadelphian friend, the artist and naturalist Charles Willson Peale (1741–1827), established his *Philadelphia Museum* as North America's first public museums in 1786. Though other museums – such as the Vatican Museums in Rome and the Ashmolean Museum in Oxford – had opened to limited numbers of the social elite ("the public") in the fifteenth to seventeenth centuries, Peale's museum was envisioned as a more truly democratic institution, open to people of all classes of society, as most museums are throughout the world today.

Peale conceived of his museum's spaces – such as the "Antique Room" along with other galleries that displayed artifacts and ethnographic objects from throughout the Americas, the Pacific, East Asia, and Europe that were tangibly and closely present to visitors – in a way that most people were previously unable to experience. A widely recognizable image is Peale's 1822 self-portrait painting, *The Artist in His Museum*, in which he is depicted lifting the curtain to reveal to the viewer a space of row upon row of his wondrous array of fossils, mounts, objects, and artwork unlike almost anything seen anywhere else in the world up through that time except by a small number of the very rich.

Peale also recognized the power of promoting his museum through the use of *newspapers*. Long one of the most influential of the communication media, newspapers were the ubiquitous lifeblood of information in the mercantile ports, city streets, and country shops of the Americas and Europe in the eighteenth and nineteenth centuries. Peale's desire was that his museum would serve to educate and entertain both rich and poor about the diversity of the world's cultural and natural heritage (Hansen 2008), and newspapers made it affordable to promote this idea to a mass audience through their articles and advertisements.

Print journalism became one of the more vital media in the early efforts for decrying the destruction of cultural heritage and in the advocacy for the preservation of sites. Notably, one of the first heritage landmarks to be saved from destruction was Pennsylvania's Old State House, best known now as *Independence Hall* and the site of the signing of the Declaration of Independence in 1776 and other momentous events in America's early national history. Transferred from state custody to that of the City of Philadelphia in 1812, the city had proposed demolishing the building and selling off the land for development, but a public outcry to such an action led by the community's newspapers succeeded in ensuring the preservation the building in 1816 (Nash 2006). Notably, Peale's museum was a tenant of the building's second floor.

Another significant development that aided in the development of media networks for the spread of information – regarding cultural heritage or any other subject through the mail and newspapers – was the creation of national *postal services* with uniform, affordable mail delivery rates and the coeval creation of reliable post roads throughout these countries. Thus, the formation of national postal service and post road systems, along with the technological development of steamboats and railroads in the early nineteenth century, created *national transportation and communication networks* that facilitated the ability to send current news, information, and publications to people throughout the nations of Europe and the Americas and elsewhere which coincided with the growing awareness of preserving heritage sites and the creation of national identities. For example, the national postal and transportation system created in the United States allowed Ann Pamela Cunningham (1816–1875), the founder of the Mount Vernon Ladies' Association, to successfully manage a network of supporters across America for soliciting contributions for the purchase and preservation of George Washington's former estate of *Mount Vernon* in Virginia from 1853 to1858 (Murtagh 2006). Her work is considered a watershed event in the preservation movement in North America.

As other technological developments related to communications media occurred, these were also incorporated into the archaeological and heritage conservation tool kit. The advent of *photography* in 1826, and its subsequent improvement by the French photographic pioneer Louis-Jacques-Mande Daguerre (1787–1851) in 1839, permitted

detailed imagery of actual archaeological sites to be composed and transmitted more quickly and accurately than drawings or paintings to persons anywhere. In producing these early images, it was not uncommon to photograph a scene that contained a site of archaeological interest which was incidental to the original purpose of the photograph. Many of these early pictures document in great detail the contemporary surroundings and conditions of individual landmarks and remain of great interest to archaeologists, architectural historians, and others interested in the details of a site. A historic image of a landmark can be juxtaposed with a modern photograph – such as a picture of the Roman Colosseum in the 1860s and an image of the same view in the present – to gain a detailed perspective and insight into the changes that have taken place over time (D'Orazio 2004).

The use of photography as a medium of communication within archaeology coevolved with the discipline in the nineteenth century as archaeologists sought to use images to convey the sense of place of the sites they were studying and to document the artifacts that were recovered. During this period, the French army officer, travel writer, and photographer Maxime du Camp (1822–1894) was among the first photographers to incorporate images of archaeological sites – such as those in Egypt – into books, such as his *Égypte, Nubie, Palestine et Syrie* (1852), which further whetted the popular interest in the past using the new medium. The Greek photographer Dimitrios Constantinou (fl. 1850s–1870s), better known in English as "Dimitris Constantine," is recognized as the second professional photographer in Greece and whose work stands out for being conducted specifically for the Greek Archaeological Society in recording excavations and archaeological sites, as well as for its quality.

The German architect and archaeologist Ernst Emil Herzfeld (1879–1948) was among the first professional archaeologists to systematically use photography as a tool of study and documentation. Herzfeld participated in and later led expeditions in Iraq, Iran, Syria, and Turkey from 1903 to 1934, and his photographs of early western Asian civilizations richly inform his writings and those of his German friend and colleague Friedrich Sarre (1865–1945), director of the Islamic Museum in Berlin (Bloom and Blair 2009). His extensive photographic collection of nearly 4,000 glass negatives from his work forms part of the "Ernst Herzfeld Papers, 1899–1962" of the Freer Gallery of Art and Arthur M. Sackler Gallery Archives of the Smithsonian Institution in Washington.

One of the earliest and best known deliberate uses of photography to document and exploit the popular image of the "romance" of exotic archaeological excavations was by the American archaeologist and explorer Hiram Bingham (1875–1956). In his 1911 expedition to the "Lost City of the Incas," Macchu Picchu, while high in the Peruvian Andes he wrote, "Would anyone believe what I had found? Fortunately, in this land where accuracy in reporting what one has seen is not a prevailing characteristic of travelers, I had a good camera and the sun was shining" (Bingham 1996).

Following photography, the ability to quickly share information about a major discovery or even plan or maintain the mundane logistics of a long-distance expedition to an archaeological site was aided greatly by the independent development of the first commercially practical application of the *electrical telegraph* in both Britain and the United States in 1837. Several decades later, British architect and archaeologist John Turtle Wood (1821–1890), for example, summarized how telegraphic communications could combine with the other technological innovations of the time to aid him in his excavations at Ephesus. Although appended with a personal critique of the waste of resources on less important subjects than archaeology – a refrain still common today in the field – he wrote:

> The explorers of half a century ago had neither steam to convey them to distant coasts, nor the practical knowledge of archaeology which we now possess to guide their researches, nor photographers to record their discoveries, nor an electric telegraph wherewith to maintain communication with a distant base of operations. We, with all of these appliances, and with boundless wealth at the command of individuals, if not of governments, grudge to these great enterprises the money which is daily wasted on trivial and ignoble objects (Wood 1877).

Although telegraph communications would be supplemented by the end of the nineteenth century by the *telephone* and eventually replaced by it in the twentieth century, these two media exponentially increased the ability of archaeologists to communicate their work both within and without the profession.

By the late nineteenth century, another communication medium had developed and was stirring the popular imagination regarding archaeology and heritage sites around the world: the *novel*. One of the most influential novelists was the English author Sir Henry Rider Haggard (1856–1925), creator of the Allan Quatermain character and considered the first to write in the "Lost World" genre of fiction. His first book, *King Solomon's Mines* (London 1885), was inspired by both Robert Louis Stevenson's *Treasure Island* (London 1883) and by the archaeological discoveries of the day. The character of the dashing explorer-archaeologist, itself inspired by a number of seemingly larger-than-life figures of the nineteenth century – such as the Italian adventurer in Egypt Giovanni Battista Belzoni (1778–1823) and the British explorer, archaeologist, and statesman Sir Austen Henry Layard (1817–1894) – would itself further inspire future generations of students of archaeology and even more fictional characters in both twentieth century literature, such as in the writings of English author Agatha Christie (1890–1976), herself married to an archaeologist, but especially in the new cinematic art of *motion pictures*.

Movies have arguably been the medium that has had the most influence on the popular view of archaeology and cultural heritage. Among the first *silent films* to depict archaeologists – particularly those afflicted with tomb curses and avenging mummies – were *The Vengeance of Egypt* (French, 1912), *When Soul Meets Soul* (American, 1912), and *The Wraith of the Tomb* (British, 1915), among others. Subsequent *talking films* have continued using archaeology as a plot device for cinematic adventure up to the present, from *The Mummy* (1932) to the Indiana Jones character films, beginning with *Raiders of the Lost Ark* (1981) to *National Treasure* (2004) and others. Apparently, after more than a century's worth of books, news articles, artwork, museum exhibitions, and novels, a near universal understanding of the intersection between archaeology and adventure has been created in the popular imagination.

This is not to say that archaeologists themselves have not used the medium of film for more academic purposes. Archaeologists began capturing their field excavations on *documentary films* as early as the 1920s, but the content of these first works was haphazard and the quality often uneven. In 1937, the *Tennessee Valley Authority* in the United States produced a film, *Shell Mounds in the Tennessee Valley*, which was among the first to have a soundtrack and set a high standard for future documentary films for the public. Since that time, with the cost of filming over the years steadily declining and, most recently, the appearance of relatively simple and inexpensive digital handheld cameras, the ability to film excavations and document sites is quite literally within the grasp of virtually any project team to bring its work to the public's attention.

Documentary filming in some contexts, however, remains a significant challenge, particularly in the realm of submerged archaeological sites. Among the earliest underwater archaeology films was *Epaves* ("Shipwrecks," 1943) by the French explorer, marine conservationist and filmmaker Jacques-Yves Cousteau (1910–1997), many of whose later films were made for broadcast for *television*.

In the case of life imitating art, both Cousteau and the American marine geologist and archaeological oceanographer Robert Duane Ballard (b. 1942) are said to have been inspired by the novel *20,000 Leagues Under the* Sea (Paris 1870) by French author Jules Verne (1828–1905). In 1985, in his own version of Verne's fictional submarine, *Nautilus*, Ballard discovered the site of the famed wreck of the *HMS Titanic*. The disclosure of the wreck's location – from which Ballard refused to remove anything from because of his belief that it should be protected as a maritime gravesite – led to it being salvaged by a for-profit the year after Ballard broadcast footage of the discovery to the awe of millions of television viewers in 1986 (Ballard 2010). Then, coming

full circle, a fictional maritime archaeological discovery of the wreck was later depicted in the immensely successful film *Titanic* (1997).

In the second half of the twentieth century, imagery and sounds related to archaeological endeavors have been regularly broadcast by *radio* and *television* media. Among the most important and prolific promoters of archaeology through the broadcast media (as well as in print) was the Scottish military officer and archaeologist Sir Mortimer Wheeler (1890–1976) and the Welsh archaeologist Glyn Daniel (1914–1986), both of whom often worked closely together on BBC radio and television programs in the 1950s. In fact, Wheeler became "Television Personality of the Year" in 1954 on the BBC (Noel Hume 2010).

In recent years, archaeology-themed documentaries have become a staple of television. They have, however, been criticized for presenting content that is not very relevant to the audience to which they are being shown. An Australian study showed that most of the content for local audiences was produced by foreign production companies (such as the BBC) about sites in other countries and were not reflective of the diversity of their audiences (Nichols 2006).

These documentaries, however, are not to be confused with the *reality television* genre that has arisen in recent years. Shows such as *Extreme Archaeology* and *Digging for the Truth* – which focus more on attractive participants (many not even trained in archaeology) in contrived, sensationalized "searches" for information – are becoming ever more commonplace as pay-television broadcasting seeks more "content" to fill its "air time" (Nicholas 2005).

Nonetheless, the prints, paintings, photographs, films, and television imagery of archaeology and heritage sites of the last 200 years have thoroughly prepared the groundwork for the completely visually oriented society that exists today. Contemporary popular culture is infused with and accepting of imagery of past cultures as a result of the role of mass media. Combined with this, the technological and information revolution brought about since the 1960s in the use of *computers* and the role of the *Internet* over the last 20 years has brought information about archaeology and cultural heritage – in all forms, such as in advertising and *computer games* – to homes in every part of both the developed and developing world. The mass media has made the imagery of archaeology, through its replication and application in all forms, completely ubiquitous.

The use of computers and the Internet has greatly expanded the reach of all media and the ability of information on archaeological site preservation to reach a variety of audiences. Researchers and the public can readily access books, articles, and studies online from the comfort of their own homes. Publications and archival documents and photographs once available from a small number of research collections and usually only used or visited by a small number of researchers are now regularly being reproduced in a digital format and made available to anyone. *Aerial photography* and *satellite imagery*, both long part of the archaeological toolkit for teasing out the possible locations of sites, are now openly viewed on websites offering free map services to the public. In Ireland, as elsewhere, the use of computer-aided Internet tools such as *Google Earth* has made possible the finding of archaeological sites by both professional archaeologists and the public alike (Darby 2007).

Additionally, among the field of archaeology's oldest and most effective forms of media are *magazines* and *scholarly journals*. Journals and magazines, like their cousin the newspaper, have been around quite a long time with some of the earliest that were devoted exclusively to archaeology and heritage arising as publications of local history and antiquarian societies formed in the mid-eighteenth through nineteenth centuries, such as the Society of Antiquaries' *Archaeologia* (1770), the British Archaeological Association's *The Archaeological Journal* (1845), and the Norfolk and Norwich Archaeological Society's *Norfolk Archaeology* (1847) in Britain. The enormous popularity of both the scientific journal and popular magazine format – often accompanied by illustrations, photographs, maps, and figures – is attested by the hundreds of publications produced around the world in most major languages that can inform both professional and nonprofessional

alike of current developments in the field, work that is the culmination of years of research and other news of note, including training and educational conferences.

A clear consequence of the mass media's promotion of archaeology is the greater sense of shared history and interest in cultures that now exists across the globe. The discovery of a significant site in a remote part of eastern Asia or the Australian outback is nearly as likely to make the headlines in Rome or New York as one found in more familiar places, such as Europe, Mexico, or the Near East. The increased attention provided to the preservation of heritage lends widespread appreciation and support for the use of national parks and local landmarks and museums. There is recognition among archaeologists and other preservationists of the professional need and responsibility to better engage the public to achieve the support needed for public funding of research and site protection, to instill a cultural desire to preserve cultural heritage, and to prevent depredations, looting, and vandalism to archaeological sites and other monuments. A 1999 survey in Canada shows that the public is very interested in archaeology and is supportive of preserving heritage sites but has a limited understanding of archaeological interpretation and heritage site protection laws (Pokotylo and Guppy 1999).

Key Issues/Current Debates

Over the past century and still in the present, there exists a debate within archaeology over the depiction of both archaeologists and the field of archaeology in the media. This is not a new debate: it is one that pits the common conception of the field as filled with romance and adventure against that of archaeologist as out-of-touch scientists who are absentmindedly lost in the past. It is a product of two centuries of conflicting media exposure, both fictional and not.

Addressing this is largely a matter of public relations and public archaeology. Unfortunately, there has been very little written in the professional journals about conducting "good PR" that helps to dispel misconceptions of the field and instill a better understanding of the profession in preserving shared cultural heritage with rare exception. McManamon (1991) challenged archaeologists more than 20 years ago to do a better job of engaging and educating the public about the goals and roles of archaeology in preserving heritage.

The ease of access to heritage sites and the information about them also has a more troubling aspect. Archaeological site looting, or pot-hunting as it has long been called, has long been a problem for the field. But the same modern tools, equipment, and access to information that have made work for professional archaeologists better have also made it easier for looters to damage sites as well, usually for profit. The misunderstanding fostered by "reality" television shows has not helped distinguish professional archaeologists from those that are little more than looters. So, amid protests by professionals, it was not unexpected that recent "reality" television programming in the United States, such as the National Geographic Channel's *Diggers* or Spike TV's *American Digger*, disregards the contextual, informational, and conservation goals of archaeology and, instead, focuses narrowly on the potential monetary reward of site destruction and the "adventure" of the find (Kloor 2012). The field of archaeology – keeping in mind its ethical responsibilities to its work and the conservation of sites – has a great opportunity here to do better and offer better programming that is engaging, audience focused, and accurate in its scope.

All of this serves to illustrate that although public-focused archaeology that relies on the media to assist in presenting its message has expanded greatly in much of the developed world, much more still needs to be done and it is a continual process of effort. One example of the successful establishment of a public program is in Florida, where the state legislature established the Florida Public Archaeology Network (FPAN) in 2004 with a headquarters and eight regional offices staffed by professionals who develop local public programming and assist local governments.

Just as the public has found great benefit in having better digital access to formerly difficult to

obtain information, there is still a great need for the profession to make use of the millions of archive records, photographs, and artifacts from prior excavations of the past 200 years. The diminishing numbers of certain types of cultural sites due to rapid urbanization in many parts of the world demand that archaeologists use the media available to conserve finite cultural and financial resources.

One of the benefits of the digitization projects is the great availability of digital resources, both in finding specific collections and in accessing difficult-to-find information. As the use of photography in archaeological excavation and for the documentation of sites was well established by the first half of the twentieth century, there are vastly underutilized photographic archives in universities and museum holdings around the world. Yet, there remains a great need to catalog and make accessible these valuable resources, particularly in countries and places where resources are scarce. For example, the Smithsonian has recently undertaken efforts to digitize the thousands of images created by Herzfeld in his work in the Near East, but thousands upon thousands of photographs from other sites – such as those from nearly a decade of work at Dura-Europos in Syria from 1928 to 1937 – remain largely unpublished and inaccessible (Baird 2011).

International Perspectives

Given the recent conflicts in Syria and the overthrow of governments in North Africa, coupled with the current political instability in the Near East where archaeological tremendous study has taken place for generations, the preserved collections that exist outside these areas take on an added and special importance to both scholars and the public for understanding human history and culture.

Training programs for archaeological and heritage professionals have been sponsored by institutions in North America and Europe for some time in these areas, to better establish a cadre of local professionals that are part of the local community. Foreign government agencies, such as the US Agency for International Development (USAID), recognize that providing local communities with stable sources of income and education helps deter looting, promotes understanding of indigenous cultures among both locals and visitors, and provides a source of income for cultural tourism (Amin and Jones 2008). However, recent events in the civil unrest for the governments of Libya, Egypt, and Syria have put such programs on hold, have led to reports of the damage to or looting of sites, and undermine or eliminate progress in heritage conservation that has taken years to establish.

Another important development is the recognition throughout the profession worldwide that there is a need to better and more formally teach archaeological practitioners how to communicate to divergent public audiences through the audio-visual media. At the University College London's Institute for Archaeology, for example, there has recently been established the *Centre for Audio-Visual Study and Practice in Archaeology* (CASPAR) which seeks to "promote research into the relationship between audio-visual media and archaeology" and to "enable inventive and creative use of audio-visual media by archaeologists" among it several aims.

To spread such information, many of the world's national and international non-governmental heritage preservation organizations, such as the *International Council on Monuments and Sites* (ICOMOS), rely heavily on the use of electronic media to quickly and cost-effectively reach local and international audiences. The efficiency of the new Internet and social media in reaching large numbers of archaeological and other heritage professionals, interested members of the public, and elected decision makers has made their incorporation into most NGOs communications strategies a prerequisite. For instance, when a rebel military force overran the ancient scholarly city of *Timbuktu* in Mali in the spring of 2012, the international archaeological community and relief NGOs quickly became aware of the threats to the city's ancient mud-brick shrines, libraries, and other structures within days as computer and mobile telecommunication devices were able to send

messages, photographs, and video images out of the city despite its occupation.

Similarly, a number of governmental organizations, such as the US military's *Joint Prisoner of War/Missing in Action Accounting Command* (JPAC) which is based in Hawaii, have also taken to the use of the new media formats to disseminate information about their missions. Composed of interdisciplinary teams of archaeologists, historians, forensic anthropologists, and active-duty military, JPAC sends its members around the world to recover the remains of military service members from sites where they died overseas in battle, but who were never brought back for burial in the United States. JPAC works closely with foreign governments in its fieldwork in other countries and communicates the results of its activities to the public through an effectual media relations program of emails, blog posts, web pages, video links, and other electronic and social media formats that builds support for its work.

As the world becomes increasingly "smaller" through the use of communications media, the opportunities to better understand the archaeology of cultures, such as China, which have heretofore been largely inward looking, become markedly improved. There is a great need in the developed world to better understand the developing world, as the issues of one nation rarely stay confined within its actual – or even "digital" – borders any longer.

Future Directions

Understanding the role that communications media holds in modern society is crucial and unavoidable in modern archaeology and heritage site preservation. Archaeologists and preservationists at all levels must develop a keen awareness of all media in developing plans for the study and conservation of sites and expect to be engaged with the public's appreciation for the past and heritage conservation. Professional archaeologists – who have readily adopted new technologies for communicating their work throughout the history of archaeology – have been much slower to recognize the necessity of public engagement with the field. The rapidity and ubiquity of communications media require the profession to see the great opportunity that now exists to dispel misconceptions about the field, to readily involve the interested public about its work, to lobby for changes in legislation for the better protection and conservation of sites and artifacts from illegal looting or trade, and to inspire people of all backgrounds to use the communications media at their disposal to take an active role in preserving the world's shared cultural heritage.

Cross-References

- ▶ Advertising and the Appropriation of Culture
- ▶ Cultural Heritage in the Digital Age
- ▶ Film, Archaeology in
- ▶ Internet, Archaeology of the
- ▶ Publication in Field Archaeology
- ▶ Television and Archaeology: Views from the UK and Beyond

References

Amin, N., and M. Jones. 2008. Site management and training at Medinet Habu. *Conservation* 23: 16–17.

Baird, J.A. 2011. Photographing Dura-Europos, 1928–1937: An archaeology of the archive. *American Journal of Archaeology* 115: 427–446.

Ballard, R. 2010. *Robert Ballard's Titanic: Exploring the greatest of all lost ships*. Aurora: Black Walnut/Madison Press.

Bartram, W. 1791. *Travels through North and South Carolina, Georgia, East and West Florida, the Cherokee country, the extensive territories of the Muscogulges or Creek confederacy, and the country of the Choctaws*. Philadelphia: James and Johnson.

Bingham, H. 1996. Adventure at Macchu Picchu. In *Eyewitness to discovery: First-person accounts of more than fifty of the world's greatest archaeological discoveries*, ed. B.M. Fagan. Oxford: Oxford University Press.

Bloom, J.M., and S.S. Blair, eds. 2009. *Herzfeld, Ernst (Emil). The grove encyclopedia of Islamic art and architecture*, 3 vols. Oxford: Oxford University Press.

Camden, W. 1701. *Camden's Britannia abridged; with improvements, and continuations, to this present, volume 1*. London: Joseph Wild.

D'Orazio, F. 2004. *Rome then & now*. San Diego: Thunder Bay Press.

Darby, C.J. 2007. Googling the landscape: Discovering a prehistoric landscape in west Wicklow. *Archaeology Ireland* 21: 20–23.
Fitch, J.F. 2001. *Historic preservation: Curatorial management of the built world*. Charlottesville: University Press of Virginia.
Hansen, L. 2008. Philadelphia Museum shaped early American culture. Weekend edition Sunday, National public radio, 13 July 2008, 3 p. Available at: http://www.npr.org/templates/story/story.php?storyId=92388477
Jefferson, T. 1787. *Notes on the State of Virginia*. London: John Stockdale.
Kloor, K. 2012. Archaeologists protest 'glamorization' of looting on TV. *ScienceInsider*, March 1. Available at: http://news.sciencemag.org/scienceinsider/2012/03/archaeologists-protest-glamorizan.html
McManamon, F.P. 1991. The many publics for archaeology. *American Antiquity* 56: 121–130.
Murtagh, W.J. 2006. *Keeping time: The history and theory of preservation in America*. Hoboken: Wiley.
Nash, G.B. 2006. *First city: Philadelphia and the forging of historical memory*. Philadelphia: University of Pennsylvania Press.
Nicholas, G.P. 2005. Editor's notes: On "reality archaeology". *Canadian Journal of Archaeology/Journal Canadien d'Archaeologie* 29: iii–vi.
Nichols, S. 2006. Out of the box: Popular notions of archaeology in documentary programmes in Australian television. *Australian Archaeology* 63: 35–46.
Noel Hume, I. 2010. *A passion for the past: The odyssey of a Transatlantic archaeologist*. Charlottesville: University of Virginia Press.
Pokotylo, D., and N. Guppy. 1999. Public opinion and archaeological heritage: Views from outside the profession. *American Antiquity* 64: 400–416.
Wood, J.T. 1877. Wood's discoveries at Ephesus. *Littell's Living Age* (5th Ser.) XVII: 626–638.

Further Reading

Alanen, A.R., and R.Z. Melnick, eds. 2000. *Preserving cultural landscapes in America. Foreword by D. Hayden*. Baltimore: The Johns Hopkins University Press.
Ascher, R. 1960. Archaeology and the public image. *American Antiquity* 25: 402–403.
Beale, T.W., and P.F. Healy. 1975. Archaeological films: The past as present. *American Anthropologist (New Series)* 77: 889–897.
Bohrer, F.N. 2011. *Photography and archaeology*. Exposures series. London: Reaktion Books.
Clack, T., and M. Brittain, eds. 2007. *Archaeology and the media*. Walnut Creek: Left Coast Press.
De Groot, J. 2009. *Consuming history: Historians and heritage in contemporary popular culture*. Oxford: Routledge.
DeCicco, G. 1988. A public relations primer. *American Antiquity* 53: 840–856.
Holtorf, C., and E.H. Cline. 2008. TV archaeology is valuable storytelling (with response). *Near Eastern Archaeology* 71: 176–179.
McGeough, K. 2006. Heroes, mummies, and treasure: Near Eastern archaeology in the movies. *Near Eastern Archaeology* 69: 174–185.
Schablitsky, J.M., ed. 2007. *Box office archaeology: Refining Hollywood's portrayals of the past*. Walnut Creek: Left Coast Press.
Strongheart, N.T. 1954. History in Hollywood. *The Wisconsin Magazine of History* 38 (10–16): 41–46.
Trigger, B. 1990. *A history of archaeological thought*. Cambridge: Cambridge University Press.
Van Dyke, R.M. 2006. Seeing the past: Visual media in archaeology. *American Anthropologist (New Series)* 108: 370–375.
Vermeule, C. 1976. Classical archaeology and French painting in the seventeenth century. *Boston Museum Bulletin* 74: 94–109.

Preucel, Robert W.

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Basic Biographical Information

Robert W. Preucel (Fig. 1) is an anthropological archaeologist who is a leading voice in many areas of archaeological theory and practice, from Native North American archaeology to problems of philosophy and epistemology, to the engagement with Native communities in archaeological practice and academia more generally. He received his B.A. in anthropology in 1978 from the University of Pennsylvania. Having interests in both North American and Near Eastern archaeology, Preucel subsequently took a Master's degree (1979) at the University of Chicago where he studied at the Oriental Institute. While at Chicago, he became interested in archaeological method and theory, in particular processual archaeology, and so from there embarked on a Ph.D. (1988) in archaeology at UCLA, where he studied processualist methods and Puebloan archaeology under the guidance of James N. Hill.

Preucel, Robert W., Fig. 1 Robert Preucel

After graduating from UCLA, Preucel was awarded a postdoctoral fellowship at the Center for Archaeological Investigations at Southern Illinois University, Carbondale (1988–89), where he organized a conference on the Processual-Postprocessual debate (Preucel 1991a). In 1989, he joined the faculty of Harvard University as an Assistant Professor of Anthropology and Assistant Curator of North America at the Peabody Museum. He was later promoted as Associate Professor and Associate Curator (1993–1995). In 1995, he returned to the University of Pennsylvania, this time as Associate Professor of Anthropology and Associate Curator of the American Section of the University Museum. He was promoted to Professorship in 2007 and two years later made the Sally and Alvin V. Shoemaker Professor of Anthropology and the Gregory Annenberg Weingarten Curator-in-Charge of the American Section of the University Museum. He served as the Chair of the Department (2009–2012) and the Director of the Center for Native American Studies (2007–2013). In 2013, he was appointed as the Director of the Haffenreffer Museum of Anthropology and Professor of Anthropology at Brown University.

Major Accomplishments

Robert Preucel has made and continues to make significant contributions to several different arenas of scholarship and practice, most notably archaeological theory, Puebloan archaeology, and engagement with Native American communities. His interest in archaeological theory and epistemology drew him first to study Processual approaches and then consider its critiques over the course of his doctoral studies. While a graduate student, he coauthored an important essay on those debates with Tim Earle entitled "Processual Archaeology and the Radical Critique" (Earle and Preucel 1987). Subsequently, the conference he organized as a postdoctoral scholar at Carbondale resulted in one of the most important volumes on this debate (Preucel 1991a), with his essay "The Philosophy of Archaeology" (Preucel 1991b) remaining a key distillation of the core components of archaeological reasoning. In 1996, he collaborated with Ian Hodder to write the first incarnation of *Contemporary Archaeology in Theory* (Preucel and Hodder 1996), a reader on archaeological method and theory that was as valuable for the short introductory essays that Preucel and Hodder wrote as for the readings it contained.

During his time at Harvard, Preucel had the opportunity to expand his interest in philosophy through interaction with colleagues such as Terry Deacon, David Rudner, and Rosemary Joyce, and at the Peirce Sesquicentennial International Congress at Harvard University in 1989, he first encountered the semiotic writings of American philosopher Charles Sanders Peirce, whose work focused on the production of meaning and the logic of inferences about the world. Preucel felt that Peirce's model, notably being non-foundational and an alternative to both positivist and non-positivist approaches, might be especially productive for archaeological inquiry and its problem of verifiability. He laid out and tested this framework in a series of essays (Preucel and Bauer 2001; Capone and Preucel 2002; Ferguson and Preucel 2005), culminating in his 2006 book *Archaeological Semiotics* (Preucel 2006). Preucel continues to

explore Peirce's ideas and in particular the utility of pragmatism generally as a way to produce a more inclusive and ethically engaged archaeology (Preucel and Mrozowski 2010), particularly with respect to bridging Native and indigenous ways of knowing the world with Western scientific approaches.

Preucel has had a long-standing research engagement with the Puebloan communities of the southwest United States. Since 1995, he has collaborated with Cochiti Pueblo in New Mexico on the Kotyiti Research Project, a multidimensional study of an ancestral Cochiti village from the time of the Pueblo Revolt, incorporating archaeological survey, mapping, oral history study and interviews with elders from Cochiti, and museum and historical analysis. This project seeks to address questions about the links between past and present identities as well as what constitutes responsible and ethical collaboration. Engagement with the Cochiti community is a central pillar of this project and it includes the active participation of Cochiti elders as well as youth through an internship program. Both in the Kotyiti Research Project and in his collaborations with T.J. Ferguson and his former students, Preucel has sought to understand the ways in which Puebloan identity and ideology was expressed materially during the period of the Pueblo Revolt and since (Preucel 2002, 2006; Liebmann and Preucel 2007).

Preucel's involvement with Native Americans and concerns about ethical academic practice have not been limited to his own research agendas, but have guided much of his work at the University of Pennsylvania Museum and in the University as a whole. At the University Museum, he has facilitated collaborative relationships with many Native American communities, and has provided important examples of how NAGPRA works at its best. He has also been active in increasing Native American participation and enrollment at Penn through serving on university-wide committees on diversity outreach, minority recruitment, and pushing to establish the Center for Native American Studies. Through this work, and in complement to his academic research goals, Preucel has sought to increase the visibility of Native Americans in academia and raise the profile of topical concerns of Native peoples more generally.

Cross-References

- ▶ Earle, Timothy
- ▶ Hodder, Ian (Theory)
- ▶ Indigenous Peoples, Working with and for
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Post-processual Archaeology
- ▶ Pragmatism in Archaeological Theory
- ▶ Processualism in Archaeological Theory
- ▶ Semiotics in Archaeological Theory
- ▶ Theoretical Archaeology Group (TAG)

References

Earle, T., and R.W. Preucel. 1987. Processual archaeology and the radical critique. *Current Anthropology* 28: 501–538.

Capone, P., and R.W. Preucel. 2002. Ceramic semiotics: Women, pottery, and social meanings at Kotyiti Pueblo. In *Archaeologies of the Pueblo Revolt: Identity, meaning and renewal in the Pueblo world*, ed. R.W. Preucel, 99–113. Albuquerque: University of New Mexico Press.

Ferguson, T.J., and R.W. Preucel. 2005. Signs of the ancestors: An archaeology of the Mesa villages of the Pueblo Revolt. In *Structure and meaning in human settlement*, ed. J. Rykwert and T. Atkin, 185–207. Philadelphia: University Museum.

Liebmann, M., and R.W. Preucel. 2007. The archaeology of the Pueblo Revolt and the formation of the modern Pueblo world. *Kiva* 73: 197–219.

Preucel, R.W., ed. 1991a. *Processual and postprocessual archaeologies: Multiple ways of knowing the past*, Southern Illinois University at Carbondale occasional paper. Vol. 10. Carbondale: Center for Archaeological Investigations.

Preucel, R.W. 1991b. The philosophy of archaeology. In *Processual and postprocessual archaeologies: Multiple ways of knowing the past*, Southern Illinois University at Carbondale occasional paper, ed. R.W. Preucel, vol. 10, 17–29. Carbondale: Center for Archaeological Investigations.

Preucel, R.W., ed. 2002. *Archaeologies of the Pueblo Revolt: Identity, meaning and renewal in the Pueblo world*. Albuquerque: University of New Mexico Press.

Preucel, R.W., ed. 2006. *Archaeological semiotics*. Oxford: Blackwell.

Preucel, R.W., and A.A. Bauer. 2001. Archaeological pragmatics. *Norwegian Archaeological Review* 34: 85–96.
Preucel, R.W., and I. Hodder, eds. 1996. *Contemporary archaeology in theory*. Oxford: Blackwell.
Preucel, R.W., and S.A. Mrozowski, eds. 2010. *Contemporary archaeology in theory: The new pragmatism*. 2nd ed. New York: Wiley-Blackwell.

Further Reading

Leone, M.P., and R.W. Preucel. 1992. Archaeology in a democratic society: A critical theory approach. In *Quests and quandaries: Visions of archaeology's future*, Southern Illinois University, occasional paper, ed. L. Wandsnider, vol. 20, 115–135. Center for Archaeological Investigations: Carbondale.
Liebmann, M., T.J. Ferguson, and R.W. Preucel. 2005. Pueblo settlement, architecture, and social change in the Pueblo Revolt era, A.D. 1680–1696. *Journal of Field Archaeology* 30: 1–16.
Meskell, L., and R. Preucel. 2006. *A companion to social archaeology*. Oxford: Blackwell.
Preucel, R.W. 2012. Indigenous archaeology and the science question. *Archaeological Review from Cambridge* 27: 121–141.
Preucel, R.W., and L.F. Williams. 2005. The centennial Potlach. *Expedition* 47 (2): 9–19.
Preucel, R.W., L.F. Williams, S.O. Espenlaub, and J. Monge. 2003. Out of heaviness, enlightenment: NAGPRA and the University of Pennsylvania Museum. *Expedition* 45 (3): 21–27.

Privatization, Public-Private Partnerships, and Innovative Financing for Archaeology and Heritage

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Introduction

Managing and maintaining cultural heritage is expensive and growing more so. A common perception encouraged by economists is that cultural resources are "public goods" that merit funding support from governments. In practice, the role of governments in heritage management has been diminishing in much of the world, even as the drivers of demand for robust heritage management – migrations to urban areas, infrastructure construction, tourism, and the like – progress unabated. The matter of who can and should pay for heritage management, and how that financing should be generated, is a matter of practical concern within the discipline. Government funders simply do not have the capacity to serve fully the needs of the heritage management sector. Increasingly, and despite misgivings among heritage professionals, private sector actors are assuming leading roles in heritage management. This entry will address the issues arising from the challenge of financing archaeology and cultural heritage at a time when heritage management has been transformed into a global commercial endeavor and popular activity that is inextricably implicated with capitalist development and the private sector.

To be clear from the outset, the subject matter of this entry is diverse and nomenclature is problematic. The entry addresses the role of private sector financing, in various forms, across a broad swathe of heritage-related activity. For simplicity, albeit perhaps unconventionally, the term "heritage management" will be used throughout to encompass academic archaeological field research and conservation; the programming, curation, and management of museums; work in commercial enterprises by professional archaeologists and other specialists; and the activities of conservation specialists in urban redevelopment. The entry will present an overview of the privatization phenomenon in heritage management from a theoretical, historical, and international perspective. The issues are complex and nuanced, and the objective here is to frame those issues for the uninitiated reader and point them and others toward relevant resources and scholarship. Because academic research into these matters is limited, this entry also may suggest an agenda for future research and exploration into private sector involvement in archaeology and cultural heritage.

Definition

Privatization may best be defined by what it is not: it is the absence of complete government control and responsibility for a sphere of public activity.

Instead, the provision of some or all of an activity ordinarily assigned to a government agency becomes the responsibility of a non-governmental entity. Although privatization has a long history, more recent privatization trends reflect neoliberal efforts to reverse the accumulation of responsibilities in the hands of governments, especially national governments.

Privatization has been employed across the full range of government functions, from national defense to health care and social services, road building to water supplies, public transportation to the management of prisons (Farquharson et al. 2011; Yescombe 2007). Privatization takes a variety of forms (Hodge and Greve 2016; Linder 1999), including outright divestiture of government operations, transformation of state organizations into independent or quasi-independent structures, agency agreements in which private actors substitute for government bureaucracies without taking ownership, outsourcing of specialized functions to private contractors, the use of volunteers to perform work once performed by public employees, or simply the use of private financing, including charitable gifts, user fees, or revenues from ancillary businesses. In some countries, nonprofit organizations and "social enterprises" deliver a variety of social and cultural services, often partially facilitated by public financial support. A variety of incentives encourage private commercial development in most countries. Depending on the country, these policies are variously labelled as privatization, *désétatisation*, autonomization, or more commonly public-private partnerships (PPPs). PPPs are in particular vogue at the moment, though their forms are so varied and their results so controversial that generalizations about their consequences are highly problematic.

By whatever name and in whatever form, privatization is deeply embedded in cultural heritage practice (Macdonald and Cheong 2014; Boorsma et al. 1998). Privatized heritage management is evident in the global commercial cultural heritage management (CHM) sector that delivers contract excavation and consulting services to contractors and government agencies. Nonprofit organizations that rely primarily on earned revenues and philanthropy manage the majority of cultural institutions in the United States and the United Kingdom and increasing numbers throughout Europe and elsewhere. Particularly at larger museums and heritage sites, at least some business operations such as retail shops, food services, or security are routinely outsourced to private contractors. NGOs work internationally to support community development and archaeological resource preservation, while many government-owned museums that receive government grants also solicit private philanthropic support. Private developers and some non-governmental organizations (NGOs) are leading the resurrection of urban cores and historical structures. Although rare, even a few archaeological sites have been turned over to public-private ventures or regional or local governments. Public archaeology programs and field schools, even if directed by academic scholars, increasingly are managed by private operations. There is, in other words, no escape from the private sector in heritage management.

Historical Background

Private financing and management of public services originated with canals constructed in France in the seventeenth century, with bridge and road construction in the United Kingdom during the eighteenth and nineteenth centuries, and with nineteenth century in projects like toll roads or the Brooklyn Bridge in the United States (Yescombe 2007, 5). Indeed, private parties have been suppliers of goods, services, and financing to central governments from time immemorial. The most recent drive toward privatization, however, has its roots in the late twentieth century, especially in the United States and the United Kingdom in the 1980s, when hyperinflation and recession brought to power neoliberal skeptics who questioned the capacity of governments and favored market-based solutions to public challenges. The effort, which came to be known as the "New Public Management," espoused holding government agencies accountable for results and transferring operational responsibilities to profit-driven, private sector providers (Yescombe 2007; Boorsma et al. 1998).

Promoters of privatization seek to introduce substantive expertise and management experience from the private sector into government agencies thought to be lacking in both and to promote competition among private providers and government agencies. The hope is that competition and private sector expertise will improve service quality, reduce costs to taxpayers, increase program flexibility and innovation, and shift financial and operational risks from taxpayers to private enterprises. Moreover, by relying on specialist providers, proponents argue, governments can exploit those companies' economies of scale and accumulated expertise to obtain better results less expensively. In some countries, particularly the United States and the United Kingdom, there also was a moral overtone: transferring responsibility from national to regional governments, and especially to the private sector, would reduce State power and replace paternalistic government programs with the personal freedom and self-reliance deemed to be ethical goals in neoliberal thought.

Private sector actors long ago stepped in to fill voids in heritage management, starting with privately supported museums and, later, commercial archaeology businesses. Where neoliberal economic and political initiatives took hold in the 1980s, with the United Kingdom as the leading example, politicians restructured government departments and cultural institutions to attract non-government funding and promote efficiency through competition and outsourcing of everything from excavation services to museum management. The need for private resources only intensified after the Great Recession of 2007–2009 as austerity imposed by government action and international creditors pitted funding for cultural activities against urgent and equally imperiled social programs. However, other factors also have been behind the increasing privatization of heritage management. Three examples may illustrate the key forces propelling the private sector role in the field.

- Private philanthropy and nonprofit organizations in the United States play a leading role in financing and performing tasks elsewhere assigned to government agencies. Most of the country's museums and other cultural institutions survive with private sector financing. This model, which grew out of a long tradition in the United States of self-reliance and suspicion of government, has been influential. The legal structures and financial instruments that promote and subsidize non-governmental activity have inspired the emergence of philanthropic trusts, nonprofit organizations, and NGOs around the world. The UK's long history of philanthropy and private activity in the museum sector also has provided alternative models to which countries facing budget austerity have begun to look for ways to fund heritage management.
- An unintended consequence of archaeologists' success in promoting national cultural preservation legislation has been the rapid expansion of the commercial CHM industry. Laws enacted in the United States and Europe in the decades after World War II require preparation of Environmental Impact Assessments that describe impacts on the archaeological record and may require salvage, or rescue, excavation before construction begins. Such laws spread throughout the developed world and have been injected into emerging economies through the policies of the World Bank Group and other development banks (Fleming 2014). The resulting steady and dramatic increase in demand from private contractors and government agencies for salvage excavations soon outstripped the capacity of government agencies or seasonally active academic archaeologists to respond, leading to the emergence of commercial CHM companies (Demoule 2012; Wheaton 2008). Similarly, legislation to list and protect built heritage, from monuments to private homes, has called forth a burgeoning volume of evaluation, conservation, and construction work for the private sector (Macdonald and Cheong 2014). Today, in much of the world, more archaeologists work in the private sector than in government and academic posts.
- The costs to maintain and operate the world's inventory of museums, monuments,

archaeological parks, and heritage sites exceed the fiscal capacity of governments. This is an old problem becoming more severe, as may be seen through the lens of museum commercialization in the United Kingdom (Larkin 2016). British Museum and heritage site retail shops had their beginnings selling collection catalogs to visitors as a part of their educational missions in the nineteenth century, about the same time US museums introduced retail operations. But by the 1960s, before the widespread privatization of the Thatcher era, the UK government already was encouraging museums to increase their revenues from shops, admission fees, and other sources of earned revenue in order to reduce demands for government funding. The United Kingdom's innovations, such as admission fees that shift the cost of operations from the taxpaying public to private consumers (except in national museums), the use of ancillary sources of funding (such as retail shops, wedding rentals, or restaurants), and particularly the sophistication and quality of its merchandising, have been emulated worldwide. Today, some form of gift shop and dining facility, however rudimentary, is standard at any serious museum and many archaeological sites. Even more ambitious UK privatization experiments, discussed below, are now underway in the heritage sector.

These vignettes illustrate three dynamics internal to the sector propelling private sector involvement in heritage management. First, the scale of need in heritage is vast. Nation-building governments and communities desiring to promote local narratives and places have produced heritage sites, national and local museums, and ecomuseums (Davis 2011) throughout the world that depend for survival on local support, user fees, and income earned from tourism. Second, even if "the polluter pays," the large scale of commercial excavation and conservation activity required by law in urban and rural settings necessitates a vibrant commercial CHM sector. Third, heritage services are highly exposed to government budget austerity, making linkages with the private sector essential, either as a source of cost savings or as an alternative source of financing.

These examples also illustrate the carrots (incentives) and the sticks (disincentives) used by governments to promote private sector operational and financial involvement in cultural heritage. Incentives to encourage involvement include cash subsidies, which are widely available from most national and subordinate governments, even in the United States. Tax incentives that encourage charitable contributions, pioneered in the United States, are now established in the United Kingdom and recently expanded in Italy. Museums operating as trusts or nonprofits typically are exempt from income taxation and, in some countries, even public museums or historical sites are permitted to retain their earnings from entry fees, shops, rentals, and other ancillary activities. Governments often offer relief from regulatory restrictions in order to promote development in historically sensitive areas. Disincentives also are important, although their enforcement can be challenging. Steep penalties protect listed buildings and landscapes, compelling owners or developers to spend heavily on archaeological and conservation services, usually from the private sector. Around the world, national legislation requires strict oversight of properties that are owned, financed, or regulated by national governments (although destructive activities on private lands are less well protected in most countries). Development banks also can withhold funding for violations of preservation rules.

Key Issues/Current Debates

Debates continue about the desirability, the feasibility, and the effectiveness of private engagement in heritage management. Concerns about privatization involve five issues: the success of privatization in practice, distributional inequities that arise from privatization, the consequences for employees, the replicability of the US/UK philanthropic funding model, and ethical concerns about archaeology's embrace of capitalism.

On a practical level, public-private partnerships that appropriately allocate costs, benefits,

and risks turn out to be difficult to implement (Hodge and Greve 2016; Farquharson et al. 2011; Yescombe 2007). Government officials with little experience often are pitted against specialist corporate lawyers and executives in negotiations to define the project costs, performance goals and metrics, and risk-allocation mechanisms. Recent assessments of the performance of PPPs generally (European Court of Auditors 2018; Hodge and Greve 2016; Hall 2015) have highlighted the consequences of limited negotiating experience and weak technical capacity in government agencies as a reason for the failure of PPPs to perform as hoped. Moreover, anticipated cost savings and performance improvements in many sectors have not materialized. Avoiding these types of problems and achieving close alignment between public and private partners have been key to successful PPPs in heritage management (Macdonald and Cheong 2014, Part II).

Privatization also is criticized for inequitable distortions of government spending (Hodge and Greve 2016). Contracting companies that have easy political access and economic power, perhaps aligned with bureaucrats pursuing personal priorities, may corrupt the contracting process, which may result in a perverse redistribution of wealth from taxpayers to private companies with no social gain. Even honestly administered PPPs and outsourcing projects may have undesirable distributional consequences. By financing major projects "off-balance sheet," governments may deliver projects faster but are able to mask their true costs to taxpayers by transferring accounting liabilities, but not actual legal or financial risks, to the private sector. The result is both a loss of transparency into the true costs of projects and, potentially, distortion of government spending toward projects that are most easily financed by private enterprises. This "crowding out" may particularly affect cultural heritage-related projects whose smaller and uncertain revenue streams are unappealing to commercial partners and require public support.

Commercial archaeology is a target of criticism for its effects on archaeologists themselves (Hamilakis 2015; Everill 2012). Concerns include relatively low salaries, temporary or seasonal work with little long-term job security, and working conditions that undervalue their expertise. Although commercial archaeologists contend the opposite (Wheaton 2008), critics worry that cost consciousness in commercial CHM impairs the quality of research, increases actual costs, and compromises traditions and local artistic development. Salvage excavations, often focused primarily on documenting findings, have been criticized as atheoretical and scientifically unsound. The difficulty of accessing the "grey literature," where such findings are published, elicits further complaints.

Heritage management by nonprofit organizations has been successful in a few countries, prominently in the United States, Europe, and parts of the Middle East where philanthropic giving is culturally embedded. However, private philanthropy is not a universal value. To some, it is especially suspected if donations are promoted by incentives such as income tax reductions that can be perceived as windfall benefits for the wealthy. As will be discussed below, experiments underway in the United Kingdom and in Italy are testing the degree to which philanthropic models can be exported to other countries, with as yet unknown results.

Finally, some archaeologists, particularly those influenced by Marxist theorizing, raise broader ethical concerns about the interaction of archaeologists and capitalist actors (Hamilakis 2015; Hamilakis and Duke 2007; González-Ruibal et al. 2018; Smith 2004). Such critics argue, inter alia, that privatization programs undermine the rights of local communities and indigenous peoples to control their own heritage. Instead, governments have appropriated national patrimony to serve a global tourism-driven market that generates jobs and profit in the private sector, or to privilege "authorized" narratives about history and culture, often colonialist or class- or race-biased, over the complex, multivocal reality of history in most parts of the world. From this critical perspective, engagement with the forces of capitalism in any fashion may contribute to the

subjugation of disempowered people, reinforcement of a repressive political system, and the debasement of archaeology.

International Perspectives

A limited number of scholars have conducted research touching on aspects of the private sector role in heritage management (Aitchison et al. 2014; Messenger and Smith 2010; Wheaton 2008; Smithuijsen 1998). What emerges from these studies is a picture of policies, values, and instruments that vary widely across the world and feature mosaics of international, national, regional, and local rules that often are inconsistent or uncoordinated. To survey a topic of this complexity, one digestible approach is to consider practices on a sectoral basis: archaeological practice, museum and heritage site practice, and built heritage conservation.

Archaeological Practice

The degree of privatization in archaeological practice is highly diverse. The United States and the United Kingdom, the two countries most deeply committed to privatized archaeological enterprise, have the most comprehensive data on the sector. The commercial CHM market approaches $1 billion annually in North America and €1 billion in Europe, conducts 80–90% of all excavation work, and dwarfs the funds allocated to the academic field research each year (Aitchison 2015; Ferris and Welch 2015, 74). Most of that funding comes either from private contractors, under the "polluter pays" model for private construction activities, or from government agencies complying with national heritage protection legislation. Of the estimated 6120 anthropologists and archaeologists at work in the United States in 2017, three-fifths work in the private sector positions including CHM and engineering companies, while 31% work in government roles, 7% in academia, and 2% in recreational roles (USBLS 2018). The structure is similar in Britain, where again three-fifths work for commercial organizations (Aitchison and Rocks-Macqueen 2013). Often, the United States and the United Kingdom consulting firms also deliver CHM work required in internationally funded development projects in emerging countries, funding for which may come from either private developers or governments.

At another extreme sits Denmark. There, all archaeological research is conducted under the aegis of the national government through authority delegated to the national museum, 31 regional museums, and the 2 Danish universities (Anderson et al. 2014). Developers are obliged to pay for archaeological excavations necessitated by their construction work, but the work is performed only by museum archaeologists. There were about 450 archaeologists working in all fields in Denmark in early 2014, and most were employed by the museums authorized to conduct excavations in the country. Other countries sit on a continuum of privatization and commercialization between these extremes. Surveys to date of global CHM practices suggest that commercial involvement in the CHM process, with inevitable national nuances, is evident in Australia, Brazil, Canada, Ireland, Japan, South Africa, Spain, and Portugal. On the other hand, France, Argentina, Mexico, Panama, Poland, Russia, Thailand, and the Scandinavian countries have more government centric systems, although some private CHM work occurs in those countries. China maintains strict control over heritage management but has devolved most responsibility for CHM activities to provincial and local governments. India also retains central control over archaeological practice but has encouraged involvement by NGOs in public-private partnerships to preserve its heritage.

Museum and Historical Site Practice

While comprehensive global studies remain to be conducted, private sector actors are imbricated throughout the museum and historical site sector in ways that defy generalization. Virtually every country in the world has placed some national parks and seminal historical structures under some form of public ownership. National, regional, and local listing of historical buildings,

which are then subject to protective regulation, is commonplace globally. Museums displaying the archaeological and historical patrimony of countries are typically under national government control, even in the United States, but landscapes, museums, and historic properties often are owned privately.

The United States has perhaps the least "nationalized" heritage sector. There are more than 33,000 museums and related organizations in the United States (IMLS 2018), yet the Smithsonian Institution museums are the only ones to receive routine Federal government financial support, which totals less than $200 million annually. The National Park Service owns and manages 417 properties, about half of which are historical sites, with an additional 49 National Heritage Areas that are public-private partnerships of state, local, and private sector entities that manage historical landscapes and buildings (NPS n.d.). Most of the remaining museums and sites in the United States tend to rely on nonprofit organizations to finance and manage their operations, even though some act as agents for local or State governments who are the legal owners. Altogether, museums and heritage sites generate over $15 billion in annual revenue in the United States (BOC 2018), but the best estimates are that only between 15% and 25% of those revenues are provided by governments.

The most comprehensive study of the UK museum sector (Larkin 2018), still in progress, has identified around 2500 museums, including some archaeological sites, in 2017 (J. Larkin, Pers. Comm, 3 July 2018). The largest national museums in the United Kingdom operate as non-departmental public bodies (NDPBs) that are subject to oversight by a government department that provides their core funding, although they also are mandated to raise funds from commercial and philanthropic sources. In a significant experiment, the agency formerly known as English Heritage, which owns 400 of the United Kingdom's most important monuments, including Stonehenge, other archaeological sites, and some "stately homes," was restructured in 2014 into a trust structure and directed to transition by 2023 from government funding to private financing. UK national and regional governments provide some financial support to other museums and heritage sites, but the vast majority of museums opened in the 1960–1990 period were independent organizations that received no state support. The leading source of financing for projects that fall outside conventional government support is Britain's Heritage Lottery Fund (HLF), a unique NDPB that distributes about one quarter of the net proceeds of Britain's national lottery to local governments, non-governmental museums, and community groups to fund heritage-related projects.

Italy has a constellation of more than 4500 archaeological sites, monuments, and museums (Dicorato n.d.), about one third of which are privately owned, usually by nonprofit foundations. The remainder are managed by municipal governments, except for about 400 museums and sites under national government control. At least until the banking crisis after 2007, many of those projects were funded by foundations associated with Italy's banks, which are required to dedicate a portion of their profits to philanthropic undertakings. Austerity policies following the Great Recession sharply reduced funding for heritage in Italy and have encouraged experiments such as devolution of financial and operational management to local sites, as briefly occurred at Pompeii; encouragement of private foundations to fund conservation, as at Herculaneum; encouragement of national museums to seek outside funding; and acceptance of private funding to restore iconic structures, such as a controversial project at the Colosseum. A generous new tax incentive to encourage private support of heritage was made permanent in 2017.

Hybrids of devolved public and private finance, ownership, and management of museums and heritage sites are evident in other countries. The Netherlands is well known for its policy of "autonomization" of its national museums. In Mexico, where the central government has a near monopoly over cultural heritage, community-owned museums that rely on outside funding to present local cultural and historical material emerged in Oaxaca and spread elsewhere in the country (Robles García and Corbett 2010). On the other hand, China's museum structure is

devolved to local governments (Zan 2014), an approach that is perhaps necessary in a country with several hundred thousand sites and museums and limited enthusiasm for a privatized heritage management sector.

Built Heritage Conservation

Built heritage is threatened by rapid urbanization, which increases demand for up-to-date commercial and residential structures, but nurtured by a tourism industry that depends on preserving the aesthetic, historical, and romantic appeal of old buildings. Public-private partnerships with developers have become the go-to standard for reviving urban cores and historical building throughout the United States, Europe, and much of the Western world (Macdonald and Cheong 2014).

Government-managed lists of historical buildings and critical urban areas, which are common globally, define the agenda and regulatory context for potential partnerships, but the structure of those partnerships varies dramatically. Private parties may merely provide building maintenance and management services for a fee, or they may offer financing to government agencies, or they may assume complete responsibility to invest in the conservation, reuse, ongoing maintenance, and management of structures in return for a profitable revenue stream. Governments may offer regulatory relief, cash or tax subsidies, or direct support such as building road and utility infrastructure required for property development. Government practice varies among countries, but not as dramatically as in other areas of heritage management. In most of the world, residential and commercial properties are privately owned and operated, even when subject to protective listing and regulation. As a result, private sector resources, given the right incentives and disincentives, may be mobilized. Regulatory regimes, and the degree to which they are enforced, do vary widely, but private sector involvement in built heritage preservation is nearly universal.

NGOs also collaborate extensively with local governments, businesses, and communities to preserve heritage sites. They do so through grants, training, and direct intervention. For example, The Aga Khan Trust for Culture (AKTC) has played a leading role in revitalizing urban centers in the Islamic world and in preserving and presenting tangible and intangible Islamic culture. AKTC projects are conducted in conjunction with national and local governments and local community institutions. The Indian National Trust for Art and Cultural Heritage and smaller NGOs work on similar projects on the Indian subcontinent. The World Monuments Fund partners with governments, private companies, and local communities to preserve threatened historical landmarks and cultural sites throughout the world. Other NGOs, such as the Global Heritage Fund or the Sustainable Preservation Initiative, work with governments, NGOs, and community groups on heritage conservation projects worldwide. International governmental organizations (IGOs), including the United Nations-related agencies or the affiliates of the World Bank, collaborate directly with governments and others to provide financing, technical advice, substantive expertise, and training for projects, such as the restoration of urban centers, and deliver targeted training for heritage managers and conservators in emerging economies.

Future Directions

Setting aside policies in China and a few other countries, governments around the world cannot meet the need for heritage management without private assistance. Thus, an initial trend to expect in future government policy is further experimentation. Countries may seek to adopt nonprofit funding models, as is taking place in Italy or with the United Kingdom's restructuring of English Heritage. To do so, legislation to facilitate the formation of nonprofits will need to become commonplace, and tax or other incentives to promote private philanthropy will need to be implemented. There also is growing interest in corporate philanthropy, known as corporate social responsibility (CSR), whereby corporations donate to organizations in regions where they identify governments or communities that are important to their business interests. CSR donations are driven as much by marketing priorities as

by eleemosynary considerations, but CSR has the potential to dramatically increase resources for heritage management. However, CSR and individual philanthropy can only thrive if the public and governments accept the legitimacy of private charitable giving. Vilification of private donors, as has occurred in Italy in recent years around the privately financed conservation of public buildings, is counterproductive.

Quasi-governmental financing also may come into play. The UK's Heritage Lottery Fund, a backbone of support for culture and heritage in Britain, is a model for utilizing revenues derived from human foibles for public good. Critics may argue that government lotteries both encourage behaviors that are damaging to individuals and families and constitute a form of revenue generation that is highly regressive, drawing proportionately more from individuals in lower-income categories. Furthermore, recent declines in lottery sales forced a contraction in HLF spending, a reminder that even gambling is affected by economic conditions. Nonetheless, other countries have contemplated creating HLF-like structures, and perhaps more will do so.

Crowdfunding of heritage projects has been viewed as a potential way to tap the resources of passionate members of the public. Experience to date (Bonacchi et al. 2015), however, suggests that resources available from crowdfunding are both limited in amount and highly dependent on the ability of organizations to create a sustainable and engaged community of donors. Crowdfunding experiments using general-purpose Internet platforms have not been successful, and with rare exceptions, even specialized sites focused on heritage management have been unable to raise funds consistently. While crowdfunding may be a vehicle for the future, it is unlikely for some time to be more than a niche source of funding.

A problematic trend in financing for culture generally is the increasing interest in the social impact of both government and philanthropic spending. To some degree, the impact movement reflects a merger of neoliberal concern for efficiency with a philosophical school, known as effective altruism, which insists money should be spent where it will do the most social good. When this view is harnessed to government agencies that seek to ensure they get the most value for the taxpayer dollar, the result is new demands by governments and private philanthropists for concrete evidence that spending is having clear impact on individual lives or the economy in general and that programs in place are the most cost-effective vehicles to achieve those effects. This approach is widespread in the United States and in Europe in social welfare, health care, and other social program areas and is making its appearance in cultural heritage. The EU, for example, has funded a study entitled Cultural Heritage Counts for Europe (CHCfE 2015), which attempts to make the impact case for heritage management. If positive impacts can be demonstrated to reduce government costs, for example, by improving educational outcomes, proponents of impact-based philanthropy also suggest that projects delivering those results may be financed through "impact bonds" that would yield higher returns to investors if desired impacts are demonstrated in practice. However, universally accepted metrics for the impact of heritage management activities and reliable data demonstrating those impacts are not yet available.

Cross-References

- ▶ Archaeological Resource Management: The Changing Role of the State
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Economic Valuation of Heritage
- ▶ Heritage Areas
- ▶ Heritage and Public Policy
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ Public Involvement in the Preservation and Conservation of Archaeology

References

Aitchison, Kenneth. 2015. Professional archaeology in the UK in 2015. *Cultural Trends* 24 (1): 11–14.

Aitchison, Kenneth, and Doug Rocks-Macqueen. 2013. *Archaeology labour market intelligence: Profiling the profession*. Sheffield: Landward Research, Ltd..

Aitchison, Kenneth, Efthymia Alphas, Vera Ameels, Martin Bentz, et al. 2014. *Discovering the archaeologists of Europe 2012–2014: Transnational report*. York: York Archaeological Trust.

Anderson, Anette K., Jeanette Skaarup, Ulla Odgaard, and Jette Rostock. 2014. *Discovering the archaeologists of Denmark 2012–2014*. København: Foreningen af Fagarkæologer.

BOC. 2018. *Time series/trend charts*. Washington, DC: US Department of Commerce/Bureau of the Census.

Bonacchi, Chiara, Daniel Pett, Andrew Bevan, and Adi Keinan-Schoonbaert. 2015. Experiments in crowdfunding community archaeology. *Journal of Community Archaeology & Heritage* 2 (3): 184–198.

Boorsma, Peter B., Annemoon van Hemel, and Niki van der Wielen, eds. 1998. *Privatization and culture: Experience sin the Arts, Heritage and Cultural Industries in Europe*. Boston/Dordrecht/London: Kluwer.

CHCfE. 2015. *Cultural heritage counts for Europe*. Krakow: CHCfE Consortium.

Davis, Peter. 2011. *Ecomuseums: A sense of place*. 2nd ed. New York/London: Continuum International Publishing Group.

Demoule, Jean-Paul. 2012. Rescue archaeology: A European view. *Annual Review of Anthropology* 41: 611–626.

Dicorato, Luigi Maria. n.d. *Museums in Italy*. Brescia: Brescia Museums Foundation. https://www.britishcouncil.org.br/sites/default/files/apresentacao_luigidicorato.pdf. Accessed 9 September 2018

European Court of Auditors. 2018. *Public private partnerships in the EU: Widespread shortcomings and limited benefits*. Luxembourg: European Union.

Everill, Paul. 2012. *The invisible diggers-a study of British commercial archaeology*. 2nd ed. Oxford: Oxbow Books.

Farquharson, Edward, Clemencia Torres de Mästle, E.R. Yescombe, and Javier Encinas. 2011. *How to engage with the private sector in public-private partnerships in emerging markets*. Washington, DC: The World Bank.

Ferris, Neal, and John Welch. 2015. New worlds: Ethics in contemporary North American archaeological practice. In *Ethics and archaeological praxis*, ed. Cristóbal Gnecco and Dorothy Lippert, 69–94. New York/Heidelberg/Dordrecht/London: Springer.

Fleming, Arlene K. 2014. Archaeology and economic development: Commitment and support from the World Bank Group. *Public Archaeology* 13 (1–3): 135–150.

Robles García, N.M. and Jack Corbett. 2010. Archaeological heritage management in Mexico. In *Cultural heritage management: A global perspective*, ed. Phyllis Mauch Messenger and George S. Smith, 111–123. Gainesville: University of Florida Press.

González-Ruibal, Alfredo, Pablo Alonso González, and Felipe Criado-Boado. 2018. Against reactionary populism: Towards a new public archaeology. *Antiquity* 92 (362): 507–515.

Hall, David. 2015. *Why public-private partnerships don't work: The many advantages of the public alternative*. Greenwich: Public Services Research Unit, University of Greenwich and Public Services International.

Hamilakis, Yannis. 2015. Archaeology and the logic of capital: Pulling the emergency break. *International Journal of Historical Archaeology* 19 (4): 721–735.

Hamilakis, Yannis, and Philip Duke, eds. 2007. *Archaeology and capitalism*. Walnut Creek: Left Coast Press.

Hodge, Graeme A., and Carsten Greve. 2016. On public–private partnership performance: A contemporary review. *Public Works Management & Policy* 22 (1): 55–78. https://doi.org/10.1177/1087724X16657830.

IMLS. 2018. Museum universe data file FY 2015 Q3. Institute of Museum and Library Services. https://data.imls.gov/Museum-Universe-Data-File/Museum-Universe-Data-File-FY-2015-Q3/ku5e-zr2b?_ga=2.114761287.1310902752.1531247392-1834181705.1530131341. Accessed 10 July 2018.

Larkin, Jamie. 2016. Trading on the past: An examination of the cultural and economic roles of shops at museums and heritage sites. PhD, Institute of Archaeology, University College London.

Larkin, Jamie. 2018. Mapping Museums: Preliminary results on UK museum closure, 1960–2017. *Mapping Museums*, 1 June. http://blogs.bbk.ac.uk/mapping-museums/2018/02/23/museum-closure-pre-findings/

Linder, Stephen H. 1999. Coming to terms with the public-private partnership: A grammar of multiple meanings. *American Behavioral Scientist* 43 (1): 35–51.

Macdonald, Susan, and Caroline Cheong. 2014. *The role of public-private partnerships and the third sector in conserving heritage buildings, sites, and historic urban areas*. Los Angeles: The Getty Conservation Institute.

Messenger, Phyllis Mauch, and George S. Smith, eds. 2010. Cultural heritage management: A global perspective, ed. Paul A. Schackel, Cultural heritage studies. Gainesville: University Press of Florida.

NPS. n.d. National park system. U.S. Department of the Interior/National Park Service. https://www.nps.gov/aboutus/national-park-system.htm. Accessed 10 July 2018.

Smith, Laurajane. 2004. *Archaeological theory and the politics of cultural heritage*. London: Routledge. Reprint, Not in File.

Smithuijsen, Cas. 1998. De-monopolizing culture: Privatization and culture in 23 European countries. In

Privatization and culture, ed. Peter B. Boorsma, Annemoon Van Hemel, and Niki van der Wielen, 82–94. Boston/Dordrecht/London: Kluwer.
USBLS. 2018. Occupational employment and wages, May 2017: 19-3091 anthropologists and archaeologists. U.S. Department of Labor/Bureau of Labor Statistics. https://data.bls.gov/cgi-bin/print.pl/oes/current/oes193091.htm. Accessed 10 July 2018.
Wheaton, Thomas R. 2008. Private sector archaeology: Part of the problem or part of the solution? In *Landscapes under pressure*, 191–211. New York: Springer.
Yescombe, E.R. 2007. *Public-private partnerships: Principles of policy and finance*. Burlington/Oxford: Butterworth-Heinemann.
Zan, Luca. 2014. Cultural heritage in China: Between policies, development, professional discourse and the issue of managing. *Public Archaeology* 13 (1–3): 99–112.

Processual Archaeology and Art Studies

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Introduction and Definition

As a reaction to traditional normative approaches and as a product of a specific sociopolitical context – the heyday of modernity (Criado 2012) – processual archeology posited itself as the necessary change toward more rigorous and sophisticated analytical methods. This epistemological reorientation entailed drastic changes. The normative definition of culture, perhaps systematized by the processual archaeologists themselves (Lyman and O'Brien 2004), was substituted by a functional definition treating cultures (i) as vast information systems, made up of several functionally integrated subsystems, and (ii) as an extrasomatic means of adaptation to the environment. Therefore, culture involved practice and had adaptive functions to deal with the restrictions of their ecological contexts (see the entry on "▶ Archaeology of Art: Theoretical Frameworks" in this encyclopedia).

In this new scenario, the focus of archaeological research was the cultural process and the explanation of the identified regularities in the cultural systems (Binford 1965, 1983). Changes in the aspects of cultural systems were interpreted as adaptive responses to alterations occurring in the environment or in adjacent and competing cultural systems. Hence, human innovation and inventiveness were excluded as forces capable of triggering change, a change that used to be explained as a result of external factors (Trigger 1992).

These profound conceptual changes are derived from a set of methodological innovations, many of which currently continue to define the archaeological research: (i) the systemic conception of culture and the recognition that cultural systems always operate at a regional level implied the development of regional research strategy in field investigations taking into account not only the system components but also surrounding environmental and social milieu; (ii) the introduction of quantitative analysis in order to identify regularities in archaeological record and, as a result, to infer similarities and differences among cultural systems; (iii) the recognition of the relevance of probability sampling and (iv) the multidisciplinary efforts; and (v) the application of hypothetico-deductive epistemology.

Although the analysis of visual manifestations was not a main concern, the conceptual and methodological changes carried forward by processualists are derived in a particular way to look at the material culture and therefore had great influence on art studies. Positioned from a critical perspective to previous normative studies, the processual approaches to art are very tied to style concept which involves diverse aspects of image making and display (see the entry on "▶ Style: Its Role in the Archaeology of Art" in this encyclopedia). Archaeologists following this perspective begin to relate the different artistic manifestations with the societies that produced them using more refined analytical techniques. There is an interest in the quantification and the demonstration or

refutation of specific hypotheses, and the adaptive and functional aspect of art as a cohesive element of human groups and as the material correlate of their ethnic identities is highlighted.

Their new objective (to explain the cultural process) led to emphasize the primacy of objects, conceived as cultural products in the sense of being adaptive component of the cultural system in operation and pattern recognition (Conkey 1990). Therefore, the analysis of the variety of forms, designs, compositions, and techniques deployed over fix or portable mediums has been interpreted as a key evidence through which it identifies group identities, constructs models of social organization, measures levels of social interaction, and defines alliances, networks, and information channels between them. Although there were qualitative and quantitative analyses over rock art (Jochim 1983; Keyser 1977; Schaafsma 1985), engraved bones, and lithic figurines (Gamble 1982; White 1992), the main focus was the definition and comparison of variation in portable art, particularly in the study of decorative and morphological variation in pottery (Deetz 1965; Hill 1970; Conkey 1980; Sackett 1977, among others).

Academic involvement in rock art research, at least in North America, has been sporadic, infrequent, or marginal (Francis 2005) as a result of processual insistence on the study of ecological adaptations at the expense of historically specific artistic traditions (Trigger 1992) and due to the difficulty in reliably dating the images (Klassen 2005). In South America, there has been prolific and solid academic analytical tradition of rock art study which generated specific conceptual perspectives oriented to local problems that either anticipate or adapt in novel ways, elements of theoretical frameworks developed in academically hegemonic countries (Fiore and Hernández Llosas 2007; Troncoso et al. 2017). Then, although rock art research remained peripheral to mainstream archaeology, the emphasis on quantification and description reflects the influence of the theoric and methodological premises of this framework to the analyses conducted during this period (Klassen 2005).

Historical Background

Prior to the shift in the research program and the development of the problem oriented and generalizing approach of processual archaeology, the emphasis was placed upon chronologically diagnostic artifacts and their movements through time and space (see the entry on "▶ Processualism in Archaeological Theory" in this encyclopedia).

The new objectives defined by processual archaeologists are derived, specifically, in the field of artistic studies, in the approach of peculiar themes through the implementation of specific methodologies. Although it was not one of its central focus, the analysis of visual manifestations, particularly those deployed on pottery, was considered as a way of interpreting variability in terms of those facets that coincided with its ontological, epistemological, and conceptual positioning (Fiore 2009).

Perhaps what best sums up their research intentions is the tracking and identification of the adaptive functions of visual manifestations. Therefore, initially (in the middle of the 1960s), these studies will put them at the service of defining bounded space and temporary distribution in order to infer or to construct models of social organization and tend to focus on the role visual designs play in contexts of interaction, exchange, establishment of alliances, craft specialization, etc. (Plog 1978).

These data were contextualized by their environmental setting to characterize the natural and social context in which these "adaptive strategies" were operating. These studies tended to see art production and use as a means of overcoming environmental stress and potential competition for resources triggered by environmental changes and/or demographic pressure by creating and reinforcing social bonds.

Some of the first art studies derived from the processual framework resulted in the use of ceramic design analyses to infer residence models of prehistoric communities and to measure levels of social interaction (Plog 1990). It was supposed that, if women produced the ceramic vessels for their families and being this knowledge transmitted from mothers to daughters, design

characteristics should tend to be homogeneous in matrilocal communities and random in the patrilocal ones (Deetz 1965). These approaches excluded the possibility that some of the ceramic styles documented could be not locally manufactured and the result of, for example, interregional exchange (Trigger 1992).

As time goes by, it began to be recognized that pattern tracing had to be sought at multiple levels, and thus the explanations of its causes became more complex and richer, giving rise to the belief that certain types of attributes differ in different ways than others and thus may be affected by different factors (Conkey 1990). In this context, specific functions began to be assigned to the different elements that define the visual manifestations that started to be conceived as a means of communicating, transmitting, and exchanging cultural information and establishing and maintaining social boundaries (Wobst 1977; Plog 1980; Flannery 1976). Thus, motifs, compositions, and forms displayed in diverse media were considered as ethnic, social, and territorial markers, as a means of differentiation of status or gender operating in specific contexts (Conkey 1990; Sackett 1977).

A different approach was developed by Dunnell (1978) who considers that although there are explainable behaviors in evolutionary terms through mechanisms such as natural selection, there are others that must be explained in terms of stochastic processes because they are adaptive and neutral. In this context, he sustained that "many specific trait forms may lack adaptive value, but a reservoir of variability, some of which may ultimately acquire adaptive value with changing conditions" (Dunnell 1978: 199). In this context styles, including image making and display within them, will continue to be useful tools for chronology, and defining spatial interaction meanwhile will be the functional elements which can be explained with evolutionary processes.

Within the line that tends to assign specific functions to visual manifestations (or artworks) are included the works of Sackett (1977, among others) who considers that the style that acquires the archaeological record of each society results from the choices taken within a broad range of equally valid alternatives. Those elections will be specific to a social group at a particular time and will be socially transmitted. However, they are continually reviewed from changes in social interaction with other groups and by permanent exposure to alternative isochrestic options. This variety, resulting from the series of decisions equivalent in terms of use taken by the artisan, is defined by tradition and therefore has diagnostic value in the archaeological identification of cultural traditions and is directly related to the amount of social interaction between individuals, groups, or villages. This type of approach assumes that ceramic morphology is determined by utilitarian functions, while decoration adds additional nonfunctional variation through which certain kind of social information is expressed (Sackett 1977). Consequently, each group will possess its own style, and the degree of stylistic similarity represented in the material culture of two groups can be understood as a direct expression of their ethnic relationship. Sackett argues that the iconic properties of style constitute the ethnic message generated by the conscious, deliberate, and premeditated behavior of artisans, with the intention of identifying and maintaining boundaries between social groups. "Any class of objects is dualistic in nature, and whether it assumes its functional or stylistic mode depends on the context in which it is viewed" (Sackett 1990: 41).

Within this same spectrum but moving away from the idea of image making as a by-product or passive reflection of culture systems or individual motor habits (Plog 1983) are inserted the works that emphasize the importance of the stylistic variation in the exchange of nonverbal information with functional and adaptive content (Wobst 1977). Thus, stylistic variation may be used in certain contexts to communicate information about the identity of the maker or user, about his social group membership, status, wealth, religious beliefs, and political ideology. Then, by assigning to visual manifestations the concrete adaptive function of constituting means through which messages could be encoded in the absence of receivers and then decoded in the absence of emitters, the style/function opposition is

challenged. However, Wobst (1977) suggests that these kinds of messages tend to be less effective with increasing social distance between the sender and receiver. Thus, the variation of visual manifestations would be expected to be used in information exchange only under specific social conditions (Plog 1983). From this point of view, the study of visual manifestations can provide us with information about human groups and their interactions and relations between individual and society (Berrocal 2005). Although the concept of residual and nonfunctional style was replaced, adaptive thinking persisted.

In the bounds of this same framework, Schiffer (1972) developed its flow model that had a crucial effect to archaeological interpretation of the archaeological record in general and had concrete applications in art studies. His proposal is aimed at explaining the various processes of procurement, manufacture, use, maintenance, and discard in which artifacts take part, entering the archaeological record at many points through this life history. In this line, he highlighted the need to understand the natural and cultural processes that create and transform the archaeological record before the archaeologists analyze it for reconstructing past human behavior. In tune with this proposal, theoretical models were elaborated anchored in the development and study of the operational chain to produce portable art and the resulting pattering, explicitly the Aurignacian material representation (White 1992) and rock art (Aschero 1988). These proposals far exceed the objectives of the processual framework allowing to approach these materials from diverse theoretical perspectives (see the entry on "▶ Archaeology of Art: Theoretical Frameworks" in this encyclopedia). Specifically in the case of the model generated to analyze rock art's sequence of production, it involves the development of conceptual tools to approach the types of residue left by each stage in the archaeological context including concepts related to the context of signification, conformed by the functional context of execution and the thematic context of representation (Aschero 1988). His proposal made it possible to expand the focus from art's ideological elements to the technological ones (see the entry on "▶ Archaeology of Art: Theoretical Frameworks" in this encyclopedia) and was exceptional for the way in which rock art was approached in South America (Fiore and Hernández Llosas 2007).

Key Issues/Current Debates

As every theoretical framework, processual archaeology, its objectives and main focus, should be analyzed in the specific historical-academic contexts in which it was developed, taking into account the other frameworks with which it was dialoguing and discussing and from which it was trying to differentiate. Within this line, it is interesting to note that, despite the rupture sustained with traditional archeology, at least in the field of artistic studies, certain aspects of normativism prevailed (Conkey 1990). Some authors have even suggested that many of the normative propositions were crystallized when they were explicitly used in the interpretations of the data generated by the processual archaeologists who analyze ceramic designs and tend to explain their similarities using arguments analogous to the basic assumptions which archaeologists always have used in defining culture areas (Lyman and O'Brien 2004; Flannery 1976).

Within the processual framework, material record was conceived as coded information about variability and the functioning of past cultural systems to be read by archeologists. Pattern recognition was a priority, and visual expressions were initially a residual kind of formal variation that the latter was conceived to be a functional component of cultural system analyzed (Conkey 1990). Then, although there is much diversity in these approaches and there have been changes in them over time, the core of their main proposals was severely challenged because of (i) its *ecological determinism*; (ii) its *conception of culture as a means of adaptation*, which leaves aside "non-adaptive" uses of art; (iii) its *instrumental view* of visual expressions as fulfilling a function for a culture conceived as a homeostatic system which paid little attention to its internal contradictions; (iv) its *search for regularities* tending to ignore the contextual particularities; and (v) its use of

inexplicit, intuitive criteria for isolating the analytical units, lack of replicability, or equivalency (Plog 1978; Hodder 1990; Weissner 1990; Pauketat 2001, among others).

Although the complex causes of variation in the design of visual expressions demand to contemplate different materials and types of artifacts, processual approaches, in spite of the exceptional analysis of other mobile and fixed media, tended to focus the analysis on the variety registered in ceramic vessels (Plog 1983). Within this framework, the design similarities tend to be still explained in terms of cultural traditions that result from the passive expression of group or individual identity (Weissner 1990), assuming that these decorative regularities, in the morphological, decorative, and technical aspects, exist because they fulfill a specific function: the communication of that identity (Jones 1997). Even if the normative ontology of the traditional approaches to art was challenged by the ecological and functionalist ontology generated by the influence of processualism, it was not fully replaced (Fiore 2006). At some point, the main, and not least important, divergence from normativists lies in the diversification of social sources capable of producing those patterns, but they retain their function as a monitor of the degree of cultural affinity between social groups (Berrocal 2005). In this way, "the complexity of the relationship between stylistic variation and social, religious, economic, and demographic factors has often been overly simplistic" (Plog 1978: 128), and the capacity of art tended to be reduced to the social functions of transmission of information related to membership (Hodder 1990).

New archeology's insistence on the recognition of regularities meant that the concrete contexts in which variation took place, the way artworks had been used and participated in the production of meaning, were ignored (Pauketat 2001). It is interesting to note that this priority of pattern recognition to be explained in terms of ecological determinism constrained the study of the diversity of causes and factors that model human actions. Visual expressions, its uses, its similarities, and changes should be contextually analyzed and are often the result of multiple factors that cannot be reduced exclusively to the ecological ones (Trigger 1992). The new archeology that "began to speak of societies, social processes, systems and adaptations did not say much about man, woman and the human" (Criado 2012: 41).

However, just as normative archeology was a logical prelude to the systematic study of culture from the processual and functional perspective proposed by new archaeologists (Trigger 1992), the conceptual and methodological development elaborated within this framework was fundamental to anchor the new questions, the criticisms, and the later syntheses. In fact, these critics derived in the hermeneutic turn that defined the post-processual archaeology and in the theoretical turn to study the symbolic dimension of reality, within the same processual framework, the so-called cognitive archaeology (Criado 2012).

International Perspectives and Future Directions

There is a general agreement with respect to which processual archeology represented a reorientation of our perception of the material record in methodological and technical domain more than in theoretical ones (see the entry on "▶ Processualism in Archaeological Theory" in this encyclopedia). Beyond the sharp criticisms and questions to which their interpretations have been subjected, the core methodological procedures introduced by processual archeology are still at the basis of any archaeological research program:

i. The search for regularities without losing views of the particularities continues to be central for archeological investigation.
ii. The efforts to explicitly define the analytical categories (i.e., type of motifs, size, color, spatial composition, and techniques, among others) and the methodological strategies employed in order to allow its replicability.
iii. The use of quantitative methods for the initial and exploratory ordering of the recorded variability.

iv. The inter-site, interregional, and intermedia comparisons are still useful initial steps to locate similar visual designs relatively in time, location that should be complemented and corrected through direct dating.

As Criado (2012) proposes, it is time to reconcile the theoretical currents that constitute the basis of the archaeological tradition, a tradition oriented roughly to the definition of forms, functions, or meanings of material records. These views do not have to be necessary incompatible since the incompatibility lies specifically in the conditions of production and reproduction of knowledge and academic life. It is possible to construct an integrative perspective that accounts for the archaeological record and visual manifestations as form, function, sense, and entity to be managed (Criado 2012). Maybe today it is not about thinking in terms of surpassed phases but in terms of internally consistent approaches that allow crossings and combinations between diverse inquiries and interpretations with rigorous methodologies which allow us to account for the complexity of the practices behind the production of the objects, designs, images, and colors that circulated being part of the multiple domains of the life of our ancestors.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art Studies: Normative Approaches
- ▶ New Archaeology, Development of
- ▶ Processualism in Archaeological Theory
- ▶ Style: Its Role in the Archaeology of Art

References

Aschero, C. 1988. Pinturas rupestres, actividades y recursos naturales; un encuadre arqueológico. In *Arqueología Contemporánea Argentina. Actualidad y Perspectivas*, ed. H. Yacobaccio, 109–142. Buenos Aires: Ediciones Búsqueda.

Conkey, M. 1990. Experimenting with style in archaeology, some historical and theoretical issues. In *The uses of style in archaeology*, ed. M. Conkey and C. Hastdorf. Cambridge,UK: Cambridge University Press.

Deetz, J. 1965. The *dynamics of stylistic change in Arikara ceramics*. Illinois Studies in Anthropology No. 4, Urbana.

Dunnell, R. 1978. Style and function a fundamental dichotomy. *American Antiquity* 43 (2): 192–202.

Gamble, C. 1982. Interaction and alliance in Palaeolithic society. *Man* 17: 92–107.

Hill, J.N. 1970. Prehistoric social organization in the American Southwest: Theory and method. In *Reconstructing prehistoric Pueblo societies*, ed. W.A. Longacre, 11–58. Albuquerque: University of New Mexico Press.

Jochim, M. 1983. Palaeolithic cave art in ecological perspective. In *Hunter-gatherer economy in prehistory. New directions in archaeology*, ed. G. Bailey, 212–219. Cambridge, UK: Cambridge University Press.

Keyser, J. 1977. Writing-on-stone: Rock art on the Northwestern plains. *Canadian Journal of Archaeology* 1: 15–80.

Klassen, M. 2005. Áísínai'pi (writing-on-stone) in traditional, anthropological, popular thought. In *Discovery North American rock art*, ed. Loendorf, Chippindale, and Whitley, 1–50. Tucson: University of Arizona Press.

Lyman, R.L., and M.J. O'Brien. 2004. A history of normative theory in Americanist archaeology. *Journal of Archaeological Method and Theory* 11 (4): xxx.

Plog, S. 1978. Social interaction and stylistic similarity: A reanalysis. *Advances in Archaeological Method and Theory* 1: 143–182.

Plog, S. 1980. *Stylistic Variation in Prehistoric Ceramics*. New York: Cambridge University Press.

Plog. 1990. Sociopolitical implications of stylistic variation in the American southwest. In *The uses of style in archaeology*, ed. M. Conkey and C. Hastorf, 61–72. Cambridge, UK: Cambridge University Press.

Sackett, J. 1977. The meaning of style in archaeology: A general model. *American Antiquity* 42: 362–380.

Sackett, J. 1990. Style and ethnicity in archaeology: A case for isochrestism. In *The uses of style in archaeology*, ed. M. Conkey and C. Hastorf, 32–43. Cambridge, UK: Cambridge University Press.

Schaafsma, P. 1985. Form, content and function: Theory and method in North American rock art studies. *Advances in Archaeological Method and Theory* 8: 237–277.

Troncoso, A., Armstrong, F., Basile, M. 2017. Rock art in Central and South America: Exploring its diversity and social life. In *The Oxford handbook of archaeology and anthropology of rock art,* ed. B. David and I. J. McNiven. Oxford: Oxford University Press. Online publication. https://doi.org/10.1093/oxfordhb/9780190607357.013.53

Weissner, P. 1990. Is there a Unity to Style? In *The Uses of Style in Archaeology*, ed. M. Conkey and C. Hastorf,

105–112. Cambridge, UK: Cambridge University Press.
White, R. 1992. Beyond art: Toward an understanding of the origins of material representation in Europe. *Annual Review of Anthropology* 21: 537–564.
Wobst, H.M. 1977. Stylistic behavior and information exchange. In *Papers for the director: Esearch essays in honor of J.B. Griffin*, Anthropological Papers, ed. C. Cleland, vol. 61, 317–342. Ann Arbor: University of Michigan, Museum of Anthropology.

Further Readings

Berrocal, M.C. 2005. Del estilo en el arte rupestre pospaleolítico levantino. *TAPA: Traballos de Arqueoloxía e Patrimonio* 33: 151–164. Santiago de Compostela.
Binford, L. 1965. Archaeological systematics and the study of cultural process. *American Antiquity* 31: 203–210.
Binford, L. 1983. *In pursuit of the past: Decoding the archaeological record*. Berkley/Los Angeles/London: University of California Press.
Conkey, M. 1980. The identification of prehistoric huntergatherer aggregation sites: The case of Altamira. *Current Anthropology* 21 (5): 609–630.
Criado, B.F. 2012. *Arqueológicas: la razón perdida: la construcción de la inteligencia arqueológica*. España: Edicions Bellaterra.
Fiore, D. 2006. Comentario al trabajo "The theoretical landscape and the methodological development of archaeology in Latin America" de G. Politis. *Revista de Arqueologia Suramericana* 2 (2): 188–190.
Fiore, D. 2009. La materialidad del arte. Modelos económicos, tecnológicos y cognitivo-visuales. In *Perspectivas Actuales en Arqueología Argentina*, ed. R. Barberena, K. Borrazo, and L.A. Borrero, 121–154. Buenos Aires: CONICET-IMIHICIHU.
Fiore, D., and M.I. Hernández Llosas. 2007. Miradas rupestres. Tendencias en la investigación del arte parietal en Argentina. *Relaciones de la Sociedad Argentina de Antropología* 32: 217–242.
Flannery, K. V. 1976. Analysis of stylistic variation within and between communities. K. V. Flannery The early Mesoamerican Village,. 25–54. New York: Academic.
Francis, J. 2005. Pictograph, petroglyphs and paradigms: Rock art in North American archaeology. In *Discovery North American rock art*, ed. Loendorf, Chippindale, and Whitley, 1–50, 181–195. Tucson: University of Arizona Press.
Hodder, I. 1990. Style as historical quality. In *The uses of style in archaeology*, ed. M. Conkey and C. Hastorf, 44–51. Cambridge, UK: Cambridge University Press.
Jones, S. 1997. *The archaeology of ethnicity. Constructing identities in the present and the past*. New York: Routledge.
Pauketat, T. 2001. Practice and history in archaeology: An emerging paradigm. *Anthropological Theory* 1 (1): 73–98.
Plog. 1983. Analysis of style in artifacts. In *Annual review of anthropology*, ed. B. Siegel, vol. 12, 125–142. Palo Alto: Annual Reviews.
Schiffer, M.B. 1972. Archaeological context and systemic context. *American Antiquity* 37: 156–165.
Trigger, B. 1992. *Historia del pensamiento arqueológico*. España: Editorial Crítica.

Processualism in Archaeological Theory

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Introduction

For approximately 20 years during the 1960s to the 1980s, lively discussion about theoretical and methodological issues characterized Euro-american archaeology. Much of the debate centered upon an approach called New Archaeology or processual archaeology that originated in the United States. In this entry we provide our perspectives upon the mid-twentieth-century controversies about the nature and goals of archaeology and make reference to some of the more prominent subsequent developments.

Definition

We use the phrases "New Archaeology" or "processual archaeology" to mean a problem-oriented, generalizing rather than a particularizing approach toward archaeological data, with the goal of advancing knowledge about social, cultural, and political processes characterizing past human societies. This view derives from the development of anthropology within the United States during the first few decades of the twentieth century as a holistic study of humankind from origins to the present day. Anthropology was

conceived as a social science wherein archaeologists, ethnographers, linguists, and physical anthropologists carried out worldwide comparative cross-cultural research on humankind, past and present, wherever relevant evidence could be found.

Historical Background

Prior to the rise of processual archaeology, however, Americanist archaeologists of the early to mid-twentieth century focused quite narrowly upon chronology and comparative typology. There was such a heavy emphasis upon chronologically diagnostic artifacts and their travels through time and space that the phrase "time-space systematics" was and still is often used to describe 1930s–1950s Americanist archaeology. Although efforts were made during this period by a few archaeologists to broaden the scope of archaeology in the USA, these had no discernible effect. Neither did a closely reasoned, strongly argued, book-length critique that appeared shortly after World War II (Taylor 1948; see Maca et al. 2010). During the early 1960s, however, Lewis Binford began to attract considerable attention to his views concerning anthropological archaeology. Binford's program for change (Binford 1962, 1964, 1965) was labeled "processual archaeology" by many of its advocates (e.g., Flannery 1973) and instigated considerable methodological and theoretical ferment. In his initial manifesto, Binford (1962) begins by quoting the well-known statement of Gordon Willey and Phillip Phillips that "American archaeology is anthropology or it is nothing." He then proceeds to assess the performance of Americanist archaeology with respect to supporting the aims of anthropology as the integrated discipline it was supposed to be. He defines those aims as explicating and explaining "the total range of physical and cultural similarities and differences characteristic of the entire spatial-temporal span of man's existence," notes that while major contributions have been made by archaeologists to explication of past cultural systems, they have done virtually nothing about explanation of those past cultures as functioning systems. Binford's definition of explanation is:

> . . .simply the *demonstration* of a constant articulation of variables within a system and the measurement of the concomitant variability among the variables within the system. Processual change in one variable can then be shown to relate in a predictable and quantifiable way to changes in other variables, the latter changing in turn relative to changes in the structure of the system as a whole. This approach to explanation presupposes concern with process, or the operation and structural modification of systems. (Binford 1962: 217, italics in original text)

He goes on to declare with Leslie White that culture is "the extrasomatic means of adaptation for the human organism" to the total physical and social environment (Binford 1962: 218) and that the "formal structure of artifact assemblages together with the between element contextual relations should and do present a systematic and understandable picture of *the total extinct* cultural system" (Binford 1962: 219, italics in original text). Binford notes that all cultural systems are made up of three subclasses of material culture. These are the technomic, which have "their primary functional context in coping directly with the physical environment"; the socio-technic, which are "the material elements having their primary functional context in the social subsystems of the total cultural system"; and the ideo-technic, which have "their primary functional context in the ideological component of the social system" (Binford 1962: 219).

Binford's subsequent research and publications, however, as distinct from this initial programmatic essay, centered so heavily upon the technomic aspects of past cultures that one of his peers aptly characterized Binfordian processual archaeology as "econothink" (Hall 1977). There were also significant differences in emphasis among processualists about the ultimate goals of their endeavor (Flannery 1973; Watson et al. 1984), but there was general agreement upon the importance of explicitly problem-oriented, hypothesis-testing research designed to secure knowledge of the human past that would advance the goals of archaeology conceived as social science.

Thus, the original debate centered upon archaeology as a very narrow kind of history vs. archaeology as (social) science, but more was at issue than just the difference between particularistic and generalizing goals. It was thought that prehistorians concentrating upon time-space systematics attempted to document the archaeological facts accurately but that they explained those facts by appeals to common knowledge. That is, they relied upon explanations that were untested, and therefore not scientific. A classic example is the issue of migration. Obviously, there have been many migrations in the past, a proposition no reasonable person would deny. To invoke migration as an *explanation* for cultural change, however, is problematic. What is the evidence that there actually was a migration? That is, how does an archaeologist establish that a migration happened at the time and place in question? Even if there is convincing evidence for such a migration, what further evidence indicates that this migration caused the change under investigation rather than some alternative or additional causal event or process? *Why* was there a migration? Binford and other advocates of the processual approach insisted that archaeologists could and should do much more than simply documenting cultural change in the archaeological record, saying a migration caused it, and leaving it at that. Peter Bellwood (2009) provides a good recent example of the alternative approach advocated by Binford as he attempts to understand why farmers migrated successfully under some circumstances but not others.

Another objection to archaeology practiced as narrowly focused cultural history was that the cultural historians were content simply to describe past objects and events with little or no attempt to understand the configurations they were describing. Trait listing and time-space systematics seemed to be the primary goals of archaeological endeavor. Hence, the main point the processualists were making was not that cultural history is bad per se but rather that it differs significantly from the broader approach they proposed and that it has far less scientific value.

The cultural history vs. cultural process debate – as it took shape in the 1970s – seems to be over. Most archaeologists understood the differences just described, and many broadened their approaches to include explicit problem definition prior to fieldwork as well as formulation of testable hypotheses concerning the expected results of that fieldwork. Even those who continued to be particularistic cultural historians became more careful about the basis for their interpretations of the past.

Processual archaeology was eagerly embraced by most younger Americanist practitioners. By the late 1970s, processual archaeology was so widely accepted in the USA that NSF peer review panels for archaeological proposals, for example, required clearly defined and justified anthropologically significant research problems with clearly defined research designs specifying expectations (hypotheses) to be tested by the proposed fieldwork. One 1970s observer – Robert C. Dunnell – did voice some serious qualms, however:

> The rapid development of CRM has to a certain degree upset the normal progress of disciplinary development (in Americanist archaeology) because it threatens to make permanent the condition of the discipline at a time in which rigidity is least warranted. (Dunnell 1979: 449)

As he makes clear, Dunnell's reservations derived in large part from his concern about the impact of Cultural Resource Management in the USA subsequent to the 1974 addition (via what was known at the time as the Moss-Bennett Bill or the Archeological Data Preservation Act) of archaeological remains to federal environmental impact legislation. Fortunately, Dunnell's worst fears did not come to pass, thanks to strenuous and unremitting efforts by both academically based and CRM archaeologists working with each other and with American Indian groups as well as other local communities and stakeholders. Such efforts continue to the present time and have caused significant alterations in the scope and practice of archaeology in the USA, the great majority of which is now CRM archaeology.

While CRM legislation was transforming the organization of archaeology in the USA, however, a different set of powerful challenges to the

theoretical core of processualist Americanist archaeology arose in England and Western Europe (Hodder 1982; Shennan 1986). In one of the first formal accounts of major disagreement with the processualist agenda, Ian Hodder (1985) used the term "postprocessualism," which is still a convenient label for the wide array of anti-processualist as well as non-processualist perspectives that emerged within Euroamerican archaeological discourse during the 1980s and after.

As noted above, in Binford's first call to reform Americanist archaeology (1962), he refers to potential recovery from the archaeological record not only of technomic but also socio-technic and ideo-technic data enabling inferences about ancient sociocultural and cognitive systems. Many early processualist studies were well conceived and well executed, and several made careful use of ethnographic data (e.g., see Hill 1970). Moreover, some archaeologists undertook archaeologically relevant ethnographic fieldwork themselves in aid of specific archaeological projects (Binford 1978, and see David and Kramer 2001). The great majority of research by processualists, however (especially that of Binford, the primary role model), centered upon relations among the subsistence-settlement systems of ancient communities and their ecological contexts.

Hence, although many 1960s–1970s processualist efforts were very successful, they were also quite narrowly focused, leaving the practitioners vulnerable to critiques by post-processualists who pointed out the general lack of attention by processualists not only to what Binford had called socio-technic and ideo-technic realms of culture and society but also to the socio-political contexts of archaeology as a disciplinary community and of individual archaeologists operating within contemporary nation-states. By the mid-1980s, one European archaeologist confidently stated that the center of gravity for theoretical archaeology had shifted from the USA to Europe and that "the days when keen young undergraduates and research students eagerly awaited the next issue of *American Antiquity* are long gone" (Shennan 1986: 327).

Key Issues/Current Debates

As outlined above, key issues for processualist archaeologists initially were definition of significant, anthropologically relevant research goals and the best means for reaching them via scientific methods. In fact, however, most early processualist studies were focused upon investigating past physical and biological environments of archaeological sites and regions with emphasis upon subsistence regimes and settlement systems characterizing communities that once inhabited those ancient environments. Early advocates of New Archaeology or processual archaeology were more intent upon scientific method than upon social theory, more upon epistemology than ontology. Methodological reform of traditional time-space systematics archaeology was certainly warranted, but just as that reform became widely accepted, the narrowness of the original processualist program was vigorously attacked by archaeologists in England and continental Europe who were not committed to archaeology as anthropology or archaeology as science vis-a-vis archaeology as traditional cultural history or art history. They were also conversant with large bodies of literature on social theory that were not then present in the scholarly backgrounds of most Americanist archaeologists.

The initial postprocessualist impact during the 1980s and 1990s was the entering wedge for an enormously broadened scope of archaeological debate well beyond that defined during the 1960s–1970s by processualist archaeologists. A vastly wider array of orientations and goals was strongly advocated, ranging from symbolic-structuralism and other paleo-cognitive orientations to latter-day Marxian and post-colonialist perspectives. There was considerable emphasis upon issues of gender, both past (i.e., seeking evidence of gender-based activities in the archaeological record) and present (e.g., recognizing gender-based differences in contemporary beliefs about appropriate education for male vs. female student archaeologists). Much concern was also directed toward descendant communities and indigenous groups, to contemporary processes of

domination and resistance in colonial situations or totalitarian nation-states, and to the political uses of archaeology. Postprocessualists urged archaeologists to practice their profession as self-aware and socially responsible citizens of the modern world.

International Perspectives

Processual archaeology was a mid-twentieth-century development, created and initially promulgated by anthropological archaeologists in the United States. The wide array of orientations and approaches loosely grouped under the rubrics of postprocessual (and by now *post*-postprocessual) archaeology is primarily a product of European archaeologists drawing upon European social theory and philosophical systems. The original global forum for archaeological research, the International Union of Pre- and Protohistoric Sciences, was founded in 1931. The heavily Eurocentric IUPPS was a scholarly organization overtly disengaged from nationalist and global political venues. In 1986, the IUPPS was challenged by a new international organization: World Archaeological Congress (Ucko 1987; Gero 2008). Although the two were originally hostile, even antithetical, at present they are more or less complementary. Whereas the IUPPS maintains much of its original scholarly character, WAC is not only global and cosmopolitan but is also socially responsible, activist, and engaged. The WAC membership is dedicated to what is sometimes called value-committed archaeology, which Gero (2008) says is the archaeology of the future.

Future Directions

New technologies now accessible to archaeologists offer great promise for learning about the past. Perhaps the most spectacular of these is being use of ancient DNA to track specific prehistoric human populations (e.g., the peopling of Asia and Australia, Rasmussen et al. 2011) and interbreeding, or lack thereof, between Neanderthals and archaic *Homo sapiens* (Currat and Excoffier 2011), as well as the histories of domesticated plants and animals (e.g., Marshall and Hildebrand 2002; Zeder et al. 2006). Another fruitful trajectory is the application of techniques long in use, such as obsidian sourcing, to provide empirical means of delineating evidence for ethnogenesis in the archaeological record (Scheiber and Finley 2011: 376–77). Yet another very promising development builds upon the original central concern of processualist archaeologists: interaction between past human communities and their environments. Archaeological data from several locales in the Americas and elsewhere on long-term patterns in human/environment relations are now sufficiently detailed to provide important information that can and should be used to influence national and international policy makers (Fisher et al. 2009; Miller et al. 2011).

For the foreseeable future, WAC will continue to be a global forum for activism by archaeologists everywhere. Such a forum is especially important considering the hard fact – and the commitment necessary to do everything possible to mitigate that fact – of rapid catastrophic destruction of the archaeological record by development of all kinds throughout the world. This includes continuously expanding urbanization; continuously expanding agricultural systems; continuously expanding transportation networks; and increasingly intensive exploration for and exploitation of oil, gas, and coalfields. Concomitantly, there is the equally catastrophic disappearance of once highly diverse traditional lifeways around the globe in the face of increasingly powerful (monolithic, multinational corporate) socioeconomic forces operating everywhere on our planet.

In addition to all the above, myriads of archaeological sites are being and will continue to be damaged or destroyed as will museums, cultural heritage locales, and materials in areas where regional conflict destroys cities, towns, and landscapes. Systematic destruction of the Bamiyan Valley Buddhas is one of the best-known modern examples, but there are a great many more. It appears that both short-term emergency archaeological salvage and long-term restoration of items and institutions pertaining to cultural heritage are permanent necessities in the modern world.

Finally, there will continue to be considerable diversity in the goals of people doing archaeology and, therefore, in the actual practice of archaeology internationally. But the core methodological procedures of processual archaeology are basic to all empirically oriented archaeological endeavors and will remain so far as long as the discipline survives.

Cross-References

- ▶ Binford, Lewis R. (Theory)
- ▶ New Archaeology, Development of
- ▶ Watson, Patty Jo
- ▶ Wylie, Alison

References

Bellwood, P. 2009. The dispersals of established food-producing populations. *Current Anthropology* 50: 621–626.

Binford, L.R. 1962. Archaeology as anthropology. *American Antiquity* 9: 208–219.

Binford, L.R. 1964. A consideration of archeological research design. *American Antiquity* 29: 425–451.

Binford, L.R. 1965. Archaeological systematics and the study of cultural process. *American Antiquity* 31: 203–210.

Binford, L.R. 1978. *Nunamiut ethnoarchaeology*. New York: Academic.

Binford, S., and L.R. Binford, eds. 1968. *New perspectives in archaeology*. Chicago: Aldine.

Currat, M., and L. Excoffier. 2011. Strong reproductive isolation between humans and Neanderthals inferred from observed patterns of introgression. *Proceedings of the National Academy of Sciences* 108 (37): 15129–15134.

David, N., and C. Kramer. 2001. *Ethnoarchaeology in action*. Cambridge: Cambridge University Press.

Dunnell, R.C. 1979. Trends in current Americanist archaeology. *American Journal of Archaeology* 83: 437–449.

Fisher, C.T., J.B. Hill, and G.M. Feinman, eds. 2009. *The archaeology of environmental change: Socionatural legacies of degradation and resilience*. Tucson: University of Arizona Press.

Flannery, K.V. 1973. Archaeology with a capital S. In *Research and theory in current archaeology*, ed. C.-L. Redman, 47–53. New York: Wiley.

Gero, J. 2008. The history of the World Archaeological Congress. Available at: http://www.worldarchaeologicalcongress.org/about-wac/history/146-history-wac

Hall, R.L. 1977. An anthropocentric perspective for Eastern U.S. prehistory. *American Antiquity* 42: 499–518.

Hill, J.N. 1970. *Broken K Pueblo: Prehistoric social organization in the American Southwest*, Anthropological Papers of the University of Arizona. Vol. 18. Tucson: University of Arizona Press.

Hodder, I. 1982. Theoretical archaeology: A reactionary view. In *Symbolic and structural archaeology*, 1–16. Cambridge: Cambridge University Press.

Hodder, I. 1985. Postprocessual archaeology. In *Advances in archaeological method and theory*, ed. M. Schiffer, vol. 8, 1–26. New York: Academic.

Maca, A.L., J.E. Reyman, and W.J. Folan, eds. 2010. *Prophet, pariah, and pioneer: Walter W. Taylor and dissension in American archaeology*. Boulder: University Press of Colorado.

Marshall, F., and E. Hildebrand. 2002. Cattle before crops: The beginnings of food production in Africa. *Journal of World Prehistory* 16: 99–143.

Miller, N.F., K.M. Moore, and K. Ryan, eds. 2011. *Sustainable lifeways: Cultural persistence in an ever-changing environment*. Philadelphia: University Museum of Archaeology and Anthropology.

Rasmussen, M., et al. (29 additional co-investigators) 2011. An aboriginal Australian genome reveals separate human dispersals into Asia. *Science* 334(6052): 94–98.

Shennan, S. 1986. Towards a critical archaeology? *Proceedings of the Prehistoric Society* 52: 327–356.

Taylor, W.W. 1948. *A study of archeology*, American Anthropological Association Memoir. Vol. 69. Menasha: American Anthropological Association.

Watson, P.J., S.A. LeBlanc, and C.L. Redman. 1984. *Archeological explanation: The scientific method in archaeology*. New York: Columbia University Press.

Zeder, M.A., D.G. Bradley, E. Emshwiller, and B.D. Smith, eds. 2006. *Documenting domestication: New genetic and archaeological paradigms*. Berkeley: University of California Press.

Further Reading

Agbe-Davies, A.S., ed. 2011. Special forum: Archaeology and anthropology: A view from the AAA. *SAA Archaeological Record* 11: 21–47.

Binford, L.R. 2001. *Constructing frames of reference: An analytical method for archaeological theory building using hunter-gatherer and environmental data sets*. Berkeley: University of California Press.

Colwell-Chanthaphonh, C., T.J. Ferguson, D. Lippert, R.H. McGuire, G.P. Nicholas, J.E. Watkins, and L.J. Zimmerman. 2010. The premise and promise of indigenous archaeology. *American Antiquity* 75: 228–238.

Hodder, I., and S. Hutson. 2003. *Reading the past: Current approaches to interpretation in archaeology*. 3rd ed. Cambridge: Cambridge University Press.

Johnson, A.L. 2008. Processual archaeology. In *Encyclopedia of archaeology*, ed. D.M. Pearsall, 1894–1896. Oxford: Academic, Elsevier.

King, T.F. 2008. *Cultural resource laws and practice*. Lanham: AltaMira Press.

Kohl, P.L., and C. Fawcett, eds. 1995. *Nationalism, politics, and the practice of archaeology*. Cambridge: Cambridge University Press.
Longacre, W.A., ed. 1991. *Ceramic ethnoarchaeology*. Tucson: University of Arizona Press.
Redman, C.L., S.R. James, P.R. Fish, and J.D. Rogers, eds. 2004. *The archaeology of global change: The impact of humans on their environment*. Tucson: University of Arizona Press.
Sabastian, L., and W.D. Lipe, eds. 2011. *Archaeology and cultural resource management: Visions for the future*, School for Advanced Research Advanced Seminar series. Santa Fe: School of Advanced Research.
Scheiber, L.L., and J.B. Finley. 2011. Obsidian source use in the greater Yellowstone area, Wyoming basin, and central Rocky Mountains. *American Antiquity* 76 (2): 372–394.
Schiffer, M.B. 2011. *Studying technological change: A behavioral approach*. Salt Lake City: University of Utah Press.
Ucko, P. 1987. *Academic freedom and apartheid: The story of the World Archaeological Congress*. London: Duckworth.
Watson, P.J. 1992. Explanation in archaeology: Reactions and rebuttals. In *Metaarchaeology: Reflections by archaeologists and philosophers*, Boston Studies in the Philosophy of Science, ed. L. Embree, vol. 147, 121–140. Dordrecht: Kluwer Academic Publishers.
Watson, P.J. 2008. Processualism and after. In *Handbook of archaeological theories*, ed. R.A. Bentley, H.D.-G. Maschner, and C. Chippindale, 29–38. Lanham: AltaMira Press.
Watson, P.J. 2009. Archaeology and anthropology: A personal overview of the past half-century. *Annual Review of Anthropology* 38: 1–15. Palo Alto: Annual Reviews.

Professionalization: Archaeology as an "Expert" Knowledge

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Introduction

Archaeology as a professionalized practice – with accredited specialists, institutional support, defined methodologies, and a coherent knowledge base – has a convoluted history. By some accounts, that history extends back no more than a half century, to the post-World War II era and, in particular, to the 1960s and 1970s. By other accounts, it stretches across multiple centuries (if not millennia), with a range of interested individuals and materials converging at various times and places in the making of archaeological expertise. Typical reviews of such disciplinary development tend to emphasize intellectual progression or the role of a select number of notable people in creating a professional archaeological environment. Iconic publications such as Trigger's (2006) *A History of Archaeological Thought* and Daniel's (1981) *A Short History of Archaeology* bear witness to these tendencies, compiling the rise of different modes of thinking at the hands of a series of heroic-seeming figures (e.g., the United Kingdom-based V. Gordon Childe or the Swedish archaeologist Oscar Montelius) into a cohesive narrative of the discipline's evolution.

Increasingly, however, fine-grained oral historical research and institutional analyses hint at the more or less unquantifiable, broadly informed, and always changing nature of the field. Herein, archaeology's professional culture is shown to be not so easily contained, having long been built up and molded out of methodologies and contributors from different areas of practice. These include both academic and nonacademic specialists engaging with a range of different modes of labor and publicity – from exhibitions to site visits, magazines and public lectures – that go far beyond traditional excavation and artifact studies alone.

The following entry outlines a history of archaeology that acknowledges the variety of experts and forms of expertise that have manifested in professional archaeological work. It builds upon sociological and anthropological scholarship on professionalization and the constitution of expertise (e.g., Carr 2010) and, in so doing, speaks not so much to the conceptualization of the archaeological record, but to the manner by which people and objects have come together to naturalize these acts of conceptualizing.

Definition

While the history of archaeology has been told by many scholars – both historians and

archaeologists themselves – the specific means by which individual interests in old objects were formalized into an internationally recognized speciality legitimated by the university system are less clear. This process of professionalization is typically appreciated as a cumulative and iterative exercise, as people came together through shared concerns and then began to articulate distinctive social and behavioral identities (both spoken and unspoken) linked to specific environments (both formal and informal) that ultimately worked to determine and advance future membership in the group.

Few archaeologists have meaningfully interrogated such exercises in disciplinary formation, but where so, they have tended to draw upon sociological scholarship or social and historical studies of science (e.g., by Pierre Bourdieu, Michel Foucault, Antonio Gramsci, T. Lenoir, J.B. Morrell, Steven Shapin) to define their dimensions (e.g., Moser 1995; Patterson 1999; Smith 2009; Perry 2011). According to this literature, professional culture tends to entail a learned jargon, standard methodologies and conceptual models, recognized spaces of learning (e.g., the field site or laboratory), clear means to disseminate ideas and research results (e.g., publication channels and pedagogical programs), and sustained infrastructure for financing and otherwise supporting these exploits. Smith's (2009) critical reflections on the components of professionalization go further to suggest that student creativity, collegiality, and informal places of knowledge exchange (e.g., tea rooms) are also among those traits crucial to the construction and perpetuation of worlds of expertise.

While the exact "ingredients" for disciplinary success vary by field of practice, as Moser (1995) outlines, the professionalization process – as applied to archaeology in particular – appears to follow a clear trajectory. In the first instance, a body of foundational knowledge is generated by various individuals who come to interact with one another through their common interests. The practice of knowledge creation leads naturally into the demarcation of specific methodologies and terminologies, which then become increasingly refined and embellished through application in the field. Participating in this process thus works to elaborate a particularized cognitive base, increasing its complexity to the point where instructional manuals and formal means of conveying methods, concepts, and interpretations become necessary to sustain development.

So too does it formalize a community of practice around which a sense of expert identity begins to manifest. Participation effectively becomes a rite of passage, socializing individuals and denoting their belonging and inclusion in a now otherwise exclusive group. These individuals are trained by people who are understood to demonstrate competence in the field and that training tends to be oriented towards advancing specific agendas related to such preexisting competencies. But the fluid and social nature of tuition means that, in its very enactment, students begin to generate new networks, procedures, pupils, and associated outputs that further extend the nature of the practice. They then become key to maintaining and furthering the institutional infrastructure required to prop up the many facets of this work. As per Christensen (2011: 9 citing Larson 1977: 17), it is in this moment when "the production of knowledge and the production of producers are united into the same structure" (and that structure is supported by paid labor) that a profession comes into being.

Together, such activities, products, and people constitute what Moser (1995) calls a disciplinary culture – a community subscribing to an interlinked and self-reinforcing set of cognitive and cultural identities. Such a community holds the monopoly over a body of knowledge and methodologies: its members read similar things, participate in similar pursuits, speak a similar language, cite one another's works, and collectively respond to the needs of a wider public. At once, they exclude this wider public via their apparent solidarity and, in so doing, demonstrate the simultaneously "repressive and productive" Foucauldian power dynamics regularly observed in the manifestation of expertise (see Carr 2010: 18).

Indeed, definitions of professionalization often also revolve around amateur/expert status distinctions, where less-knowing dilettantes or hobbyists are seen to be slowly pushed aside by more

informed and "qualified" workers. Such a perspective tends to denigrate or entirely dismiss the contributions of so-called amateurs to the overall institutionalization of archaeology. At the same time, it often separates amateurs out as a self-defined, self-segregating body of individuals who do not make their living via archaeological knowledge making, but who engage in aspects of its practice purely for leisure's sake. It is in these very processes of ostracizing such people from the production of valid knowledge that professionals come to invent themselves as the keepers of expertise. Yet archaeology's professional status depends upon a range of participants – with their differing skillsets and specialties – to sustain itself today. As Carr (2010) notes, on the ground, expertise is born out of its enactment – in its gestures, its spoken words, its apprenticeship of new workers, its engagements with people outside the institution, its application of different forms of specialized media, etc. In other words, it is always in a state of evolution.

Historical Background

To tell the history of archaeology's professionalization is to trace back to the first recorded instances of collecting practice, where individuals begin to gather demonstrably old objects with an eye towards establishing their age, interpreting their function, and placing them on display (either for personal or wider consumption). Some date such practice to at least 2000 BCE in Egypt, Mesopotamia, and China and suggest that it was often accompanied by attempts at excavation work (Schnapp 2002). The unearthing of unexpected assemblages from prehistoric sites has led to further speculation that humans across time and space have always had a tendency to invest in collecting activities (Schnapp 2002). Others, writing more targeted, method- and region-specific histories of archaeology, situate the earliest excavations in Britain, for instance, to Medieval times (c. 1190) as devotees sought to substantiate the presence of saints or confirm Arthurian mythology. However, it is collecting and work with collections, above any recognizable form of fieldwork, that became the breeding ground for archaeology's emergence (also see Lucas 2001).

In all cases, these activities were pursued by varied individuals not discernable as modern-day archaeologists. Indeed, the entire conceptual and methodological basis for, as an example, prehistoric archaeology arguably derived from heterogeneous practitioners (e.g., clerics) and cognate fields – geology, anthropology, and paleontology (which were themselves all in a state of emergence) – especially across the nineteenth century. Hence, the concept of a professionalized prehistoric archaeology was effectively nonexistent until approximately 100 years ago. However, what is critical is that the roots of such professionalism lie in the systematization and relationships between people and things that grew out of the earliest collecting activities. While these activities might be poorly documented in terms of their initial scope, by the time of the Renaissance, they had begun to proliferate in conjunction with growing trade, travel to the Western Hemisphere, more broadscale appreciation of history and artistic trends, and increasing pressure for individuals to conspicuously display their connections to such pursuits. A unique collection could testify to one's status, education, and networks of affiliation, with the consequence that collecting became a means of affirming the identities of a growing portion of the population.

The resultant assemblages of objects tended to be fairly encyclopedic in terms of their spread. They often included a range of specimens from around the world, some with medicinal or therapeutic properties, some Classical relics, and some purely curious, but all "valued for their intrinsic rarity, for the romantic echoes of the far-away and strange with which they tantalized the imagination, and, sometimes, for their aesthetic virtue and workmanship" (Pearce 1990: 20). Significantly, it was generally in grouping together these objects for showcasing in private spaces that they then became the testing grounds for systematic comparison, theory building, and explanation about the natural and cultural worlds. They were increasingly subject to labelling and categorization, usually according to the prevailing

conceptual paradigms of the time (e.g., animal-vegetable-mineral, earth-air-fire-water). From at least the sixteenth century onwards, concerted intellectual work on such collections expanded to the extent that some were supplemented with guidebooks or human guides in an effort to manage viewers' understandings of the materials. Similarly, some were moved out of single, private study rooms into larger galleries – what we might now identify as museum spaces – to allow more considered attention to the presentation and accessibility of the objects.

Concurrent with changes to this physical staging of collections, dissemination beyond the display space itself gained ground via the production of manuals, atlases, and catalogues of objects (e.g., Schnapp 2002; Moser 2013). Indeed, collectors began to invest in artists to record their own personal collections, document other collections of interest, or copy from preexisting collections in manuscripts. That illustrative practice itself was then increasingly refined, with depicted materials becoming more abstract and standardized to allow comparison and structured evaluation. In this sense, early gallery/museum work and illustrative work (circulated via published sources) ran in parallel, feeding back into one another as regards the construction of object types and the articulation of basic schemas for making sense of artifactual and other materials.

Publication is credited by many as the transformative force in crystallizing professional growth. As per Schnapp (2002: 137), it "provided the means of social and intellectual visibility of the antiquarian discipline." Arguably, however, this emphasis on publication perpetuates the long-lived tension in historically oriented studies to privilege textual outputs above material remains (for a recent discussion of this tension see Lucas 2012). At the same time, it distracts from the many related activities that fed into the building of archaeological communities. Where archaeology finds its bearings is in its privileging of the material, its attention to objects themselves, and in the collectivities (people and other artifacts) that form around these objects. Some see such focusing of attention on artifacts above text as a patently strategic move by interested individuals looking to carve out a distinct niche of practice (e.g., Lucas 2012: 22). Regardless of the intentionality behind it, from the seventeenth century onwards, propelled by Renaissance and emerging Enlightenment developments, an observable shift in concern towards material sources (away from purely literary sources) manifested itself (Moser 2013). More collecting led naturally into more contemplation of those finds; and opportunities for conversation about them were facilitated by the foundation of key learned societies (e.g., the Royal Society in 1660; the Society of Antiquaries of London in 1707) and the first public museums (see Diaz-Andreu 2007; Pearce 2007).

The latter are particularly important as they tended to be characterized by the movement of previously private collections into university or nationally sponsored galleries, making them accessible on a larger scale. Accordingly, these new spaces (e.g., the Ashmolean – the earliest public museum in the world – which opened in 1683 in Oxford, UK) became home to the same mixture of exotic specimens and antiquities once so integral to individual identity building. However, such collections continued to operate here in a similar fashion as before, yet at a larger scale – as resources for study *and* affirmations of institutional and national status. Classical objects, in particular, suggested a direct connection to revered cultures of the past, and as their institutional showcasing coincided with major colonizing activities around the world, we see these original collections expanded often as a result of federally sanctioned missions to elaborate them. Antiquities hence became embroiled in a nationalistic enterprise as states and major organizations sought to legitimate their standing (Diaz-Andreu 2007). This, in turn, fuelled further collecting and dedicated excavation work.

In concert with such institutional development, learned societies continued to grow. Despite their often ephemeral nature, these societies were indispensable to the cultivation of knowledgeable antiquarians, and they are now appreciated by some as the lynchpins of disciplinary development (e.g., Sweet 2004). They provided forums for individuals with shared interests to meet, correspond, exchange transactions, view objects (either

physically on display in meetings or illustrated in society publications), avail themselves of associated libraries, and otherwise generally "participate in the wider world of learning" (Sweet 2004: 81). Their networks were wide, spreading across Europe and European colonies into the Americas and Asia (Sweet 2004; Diaz-Andreu 2007). Some such societies were implicated in the establishment of the first major public museums (e.g., the Museum of the Society of Antiquaries of Scotland founded in 1780). However, they also manifested, for instance, in Britain from the early 1800s, in smaller literary and philosophical societies and county archaeological societies, where individuals who perhaps did not have the means to journey abroad (but who nevertheless shared the epistemological impulse to observe, explain, situate themselves in, and order the world around them) sought out local antiquities for their collections (Pearce 1990). Together, these societies helped to propel a trade in artifacts; and at the same time, they facilitated discussion about both the nature of the artifacts themselves and the most systematic means for acquiring them. As such, they were among the "circulation systems" (also including auction houses and dealers) key to supplying the material remains around which archaeology emerged (after Gosden and Larson 2007: 49, 52). Their interests fed into barrow digging and an increase in excavation activities, and their collections became showpieces for the wave of new museums that opened in the mid-nineteenth century. That wave (evident across Europe) was prompted in part by state concern to educate (and, arguably via such education, placate) citizens and in part by the success of great international expositions (Pearce 1990; Diaz-Andreu 2007). In Britain, for instance, such museums and related exhibitions promised a platform for "social reform and industrial progress," and their viewing became part of the recreational endeavors of middle class individuals (Gosden and Larson 2007: 37). On the ground, though, they were the seedbeds for honing the archaeological eye – that is, for breeding public recognition of an emerging field of artifactual study and for acting as convergence points for those articulating that study.

What is critical is that these museums often assumed a role equivalent to the scientific laboratory, with curators sometimes explicitly acknowledging their lab-like possibilities – where "ideas could be developed, tested, or discarded" (Gosden and Larson 2007: 63, in reference to the curator Henry Balfour's perception of the Pitt Rivers Museum). Like the manuals of antiquities published from the sixteenth century, museums offered room to experiment with concepts, refine categories, and literally institutionalize ways of thinking about the past based on observable materials. Such is true in the broader sciences as well, with some arguing that investment in scientific laboratories actually *followed* that of museums as sites for knowledge making. Either way, they seem to have provided the earliest solid infrastructure for archaeological work, with some claiming that the first dedicated chairs of archaeology were specifically employed with an aim towards training for museum, library, and archival work (Diaz-Andreu 2007). The Peabody Museum of Archaeology and Ethnology in the USA established in 1866, for example, has been credited with crafting "an institutional framework within which scholars could do scientific work" (Christensen 2011: 13). These spaces effectively set in place the first meaningful homes for archaeology, and it is significant that some of the most paradigmatic shifts in archaeological thinking came about via museum-based activities (see below).

While the earliest university post in archaeology is attributed to Uppsala in 1662, such positions were incredibly limited, and their holders tended to simultaneously occupy most other related posts in a given country (e.g., museum, governmental, and university-based) (Kaeser 2006; Diaz-Andreu 2007). In other words, these first professionals were often working in some isolation on all aspects of the antiquarian pursuit at once. Arguably, it was only as museums (and associated cultural institutions) exploded in the mid-nineteenth century that a genuine lack of sufficient specialists to fill related positions exposed itself, and hence, attention to formal means of outputting a competent workforce began to grow (Kaeser 2006). As Browman (2002) has noted, individuals such as the

American Frederic Ward Putnam (1839–1915), who held or established many of the foundational disciplinary appointments in the USA, were trained in a bespoke, apprentice-like fashion and tended to replicate such training in their own early practice. Here, again, the museum (the Peabody) was the staging ground for capacity building, and in conjunction with expansion of the museological collections, but without a formal student body for support, Putnam sought out connections with interested people around the USA via correspondence (Browman 2002). Akin to (if not indivisible from) the circulation systems of learned societies, this "correspondence school" of archaeology (Browman 2002: 219 citing Hinsley 1999: 144) allowed for exchanges of ideas and methods of collecting, recruitment of new people onto excavation expeditions to expand the collections, and acquisition of other personal collections. However, it also helped to demarcate the institution as the arbiter of knowledge making, as individuals then began to turn to institutionally sited practitioners to validate their finds and seek out further training. The advantage, as has been noted for prehistoric archaeology, was that these sites provided an opportunity to "put an end to the previous epistemological confusion," fostering common methodologies and harnessing the seeming authority of the institutional structure to "lay down the heuristic frameworks of the prehistoric science to come" (Kaeser 2006: 153).

Around Europe, the museum was long a driving force in the conceptual solidification of archaeology, as its collections offered the comparative materials necessary to think through chronologies and typologies, which themselves then supplied the fabric for pursuing further intellectual work. Base epistemological frames for archaeological thinking, such as Danish C.J. Thomsen's Three-Age System, were developed and elaborated specifically in the museum environment on collections that were then put on display for visitors and, in their showing, thereby subject to more interrogation. The British-based General Pitt Rivers' typological-evolutionary take on human history and the contrasting culture-historical approach of the US-based Franz Boas (Gosden and Larson 2007) were similarly articulated and debated through active negotiation of collections in museological/display spheres. These same museums often stood as the first lecture spaces for concerted teaching of archaeology, and as per above, their growth in numbers over the course of the nineteenth century subsequently led to a demand for qualified practitioners to take over new managerial and curatorial posts. In tandem with museum work, related heritage institutions began to spread across Europe in the mid-to-late nineteenth century – part of the same ideological drive to unite and propagate identity on a national and regional level (Kaeser 2006). The British predicament, where "demonstration of a preservation ethic came to be seen as a hallmark of a 'civilized' nation" (Emerick 2003), had currency abroad as well, leading to the establishment of governmental posts and associated protective legislation for historical places and monuments and further pushing on the demand for qualified workers (Kaeser 2006). This meant that institutional attention then began to be turned towards producing such workers, leading to the articulation of university-based accreditation in archaeology around the turn of the twentieth century (see below).

From the perspective of professionalization, therefore, it is at this point that archaeology had the scaffolding in place to elaborate a disciplinary culture. Indeed, it follows a general trend evident across the sciences in the late nineteenth century towards increasingly professionalized practice. By this time, foundational concepts had been articulated, some basic procedures for studying material culture were under development, and an authoritative base centered especially in the museum was in place to support the ongoing activities of the community. Expertise in the methodology of excavation itself arguably played a marginal role in the beginnings of archaeology (Lucas 2001), as it tended to be from the observation and handling of objects (directly or indirectly through visualizations), site visits, conversation and sharing of resources, and subsequent intellectual exercises in classification and schema construction using collected materials that the basic infrastructure for the discipline emerged.

While institutionally recognized "professionals" were few and their activities extensive, their connections to learned societies and other productive people, places, and materials (e.g., collections) together created the architecture for the professionalization of the field. These same individuals were often directly linked to the development of the first discipline-specific periodicals and to major congresses and conferences that brought interested people together under increasingly formalized circumstances. Some such circumstances, such as the International Congress of Anthropology and Prehistoric Archaeology (*Congrès international d'anthropologie et d'archéologie préhistoriques*), founded in the 1860s, were among the earliest transcontinental networking spaces, where hundreds of individuals with varying levels of expertise could gather every year or so to discuss emerging knowledge and techniques. With such communities of practitioners thus in place, it was with the ensuing development of a rigorous educational structure (for outputting sufficient workers to satisfy demand) that the professional archaeological industry coalesced.

Key Issues/Current Debates

It is the twentieth century and beyond that perhaps represents the most controversial stage in archaeology's solidification, arguably because consideration of this timeframe has been less concerted and consistent. There is general agreement that it is distinguished by the emergence of university-based expertise, which effectively sets in place a self-perpetuating cycle for the discipline – yielding students specifically trained in "archaeology" who then seek archaeological employment at organizations which scout out that very brand of institutionally sanctioned archaeological knowledge. Some see this period as the second phase in the institutionalization process (Kaeser 2006) – wherein the ensconcing of archaeology in academia provides for its "anchoring in the long term," apart from the often ephemeral constitution of societies, congresses, journals, and even museological institutions in the nineteenth century and before. As per above, scholarly departments of archaeology sometimes evolved out of preexisting museum spaces, at the hands of enterprising specialists, and/or even out of the remnant collections of international expositions (e.g., see Browman 2002). But the growth of the archaeological education business is subject to debate, with suggestions that for most of the early twentieth century, student numbers were minute and employment opportunities comparable. Emerging research hints that the situation was more complex and that the tendency to reduce twentieth-century archaeology to academia alone deserves to be questioned. In Britain, for instance, 1 year after its official launch in 1937, London University's Institute of Archaeology was outputting upwards of 100 students per year in a rigorous, laboratory-oriented archaeological style taught by many of the leading practitioners of the time (Perry 2011). This institution was simultaneously invested in the design and dissemination of major archaeological exhibitions, which were advertised across the country, attracting a viewership that numbered, in some cases, in the thousands. It is also linked to the earliest British television broadcasts of archaeology, which evolved over time to become crucial means of publicizing, attracting support for, and recruiting new pupils into the discipline. Even in the late 1920s, individual archaeology classes run through University College London saw registration of c. 20 students each (predominantly, if not fully, female); and major excavations at sites such as Maiden Castle in the 1930s embraced 100 or more students and assistants per year, with thousands of visitors and tens of thousands of related souvenirs and publications sold (Perry 2011). Moreover, extramural education in British archaeology had its origins as early as the 1940s, and dedicated excavation training schools are documented from at least the 1930s.

Across Europe and North America, such disciplinary growth continued, propelled in particular by the Depression and World War II. In the USA, the former led to government investment in archaeological practice to assist with job creation, thereby fuelling a need for trained workers (Patterson 1999). In Europe, the latter resulted in regeneration efforts (both historical and industrial), ultimately manifesting in documentation work and rescue archaeology that demanded the

labor of dedicated commercial archaeological units and associated volunteers (Roskams 2001), again fuelling university enrollment numbers. What is critical for professionalization is that, in all cases, post-WWII is marked by increasing specialization within the discipline as the nature of practice extended itself; an escalating codification of such practice, with the publication of further manuals and textbooks and the drafting of the first codes of ethics; growth in the number and variety of professional organizations, which carry on the networking and convergence functions of earlier learned societies and which themselves continue to contribute to disciplinary codification and publication; greater legal and legislative attention to the nature of archaeology owing to its ballooning relationship to city planning and industrial development; and heightening stratification within the archaeological workforce, generating a full spectrum of laborers – from itinerant fieldworkers to interested volunteers, to full-time unionized staff, office-based professionals, academic elite and transient lecturers (Patterson 1999; Roskams 2001).

Importantly, then, the makeup of the discipline is seemingly no more uniform today than formerly; and the long-standing argument that so-called amateurs have been displaced from archaeology is highly debatable. Key museological collections have been birthed out of, and continue to be amplified by, donations from a range of contributors (both accredited specialists and not) (e.g., Gosden and Larson 2007); excavations still rely on volunteer efforts; and funding for practice is often tied directly into broader public impact. Many people, sites, and materials have always and collectively been indispensable to the cycle of disciplinary knowledge construction. What has changed over time, therefore, is arguably no more than the number of people and things involved and the means by which they are organized and classified.

International Perspectives

Outside of Euro-America, the professionalization process for archaeology has followed a similar path, although there is evidence from both Japan and China that robust antiquarian enquiry and publication (e.g., in the form of antiquities manuals) might have emerged much earlier than in Europe (Schnapp 2002; Lozny 2011). Critically, however, from approximately the nineteenth century onwards, a general trend presented itself of concepts and methodologies spreading from Euro-American institutions abroad, either via movement of Euro-American-trained practitioners to foreign locations (not infrequently in association with colonization ventures) or via training of foreigners at Euro-American institutions followed by their return home to apply such training domestically (see contributions in Lozny 2011). Regardless of the direction of their movement, once ensconced internationally, these various practitioners participated in the production of region-specific terminologies and typologies, societies, journals, and all those related disciplinary constituents that come to form the anatomy of a distinctive professional culture. Their links to Euro-America also worked to facilitate wider exposure for local research and to cultivate systems of patronage on a worldwide scale, which, in turn, fed back into the ongoing validation and scaffolding of archaeological practice overall.

Future Directions

Professionalization is an ever-evolving process, meaning that its study is continuously open to elaboration. Indeed, focused attention on the professionalization process in archaeology is still rare, making the scope for further enquiry relatively vast. Growing attention to institutional histories has been among the catalysts for reconsideration of the constitution of expertise in archaeology (e.g., see Kaeser 2006; contributions in Pearce 2007). This work is complemented by recent fine-grained oral historical research (e.g., interviews with current and retired practitioners), as well as gender-oriented studies of the discipline, and concerted interest in all those "forgotten" participants in archaeological knowledge making whose contributions have played into the everyday articulation of the field of practice, yet whose names have generally been eclipsed by the "great" archaeologists

documented in typical disciplinary histories (Smith 2009). Those elements of archaeology that make it seem a coherent subject matter – that supply it with a professional air and an expert identity – are similarly seeing greater deliberation, including research into how archaeologists dress, observe the world around them, and speak and conduct themselves in the field.

As noted by Gosden and Larson (2007: 151), the term "discipline" "implies an attempt to contain and control something that is essentially unrestrained." Such has always been the nature of archaeology: a multipronged, composite pursuit that now stands apart as an accredited profession but that has always impinged upon other specialty areas, drawn on methods from a variety of fields, attracted contributors from comparably varied spheres of interest, and attended to materials from all times and places of human existence. Accordingly, perhaps the most productive line of study today is research into the networks and movements of people and things across the boundaries of archaeological practice – i.e., enquiry into precisely that set of messy connections and exchanges that has rendered the discipline into something recognizable (e.g., Gosden and Larson 2007). Archaeology, as it is advocated today, is not only a specialist intellectual endeavor but so too a platform for transferable skill development applicable to a range of other fields. In this respect, the boundaries of the professional community are ever-swelling, and the individuals and objects that come together to make it possible and legitimate are likely to continue to challenge its dimensions. Thus, while diverse concerns for the human past may have been consolidated over time into a distinct form of expertise, the professionalization process itself suggests that the nature of that expertise will never be stable.

Cross-References

- ▶ Archaeology in the Enlightenment
- ▶ Archival Research and Historical Archaeology
- ▶ British Pioneers and Fieldwork Traditions
- ▶ Encyclopedic Museum
- ▶ Heritage Museums and the Public
- ▶ Oral Sources and Oral History
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ United Kingdom: Archaeological Museums

References

Browman, D.L. 2002. Frederic Ward Putnam: Contributions to the development of archaeological institutions and encouragement of women practitioners. In *New perspectives on the origins of Americanist archaeology*, ed. D.L. Browman and S. Williams, 209–241. Tuscaloosa: University of Alabama.

Carr, E.S. 2010. Enactments of expertise. *Annual Review of Anthropology* 39: 17–32.

Christenson, A.L. 2011. Who were the professional North American archaeologists of 1900? Clues from the work of Warren K. Moorehead. *Bulletin of the History of Archaeology* 21: 4–23.

Diaz-Andreu, M. 2007. *A world history of nineteenth-century archaeology: Nationalism, colonialism, and the past*. Oxford: Oxford University Press.

Emerick, K. 2003. *From frozen monuments to fluid landscapes: The conservation and presentation of ancient monuments from 1882 to the present*. Unpublished Ph. D. dissertation, University of York.

Gosden, C., and F. Larson. 2007. *Knowing things: Exploring the collections at the Pitt Rivers Museum 1884–1945*. Oxford: Oxford University Press.

Hinsley, C.M. 1999. Frederic Ward Putnam. In *Encyclopedia of archaeology, part 1: The great archaeologists*, ed. T. Murray, vol. 2, 141–174. Santa Barbara: ABC-Clio.

Kaeser, M.-A. 2006. The first establishment of prehistoric science: The shortcomings of autonomy. In *The beginnings of academic pre- and protohistoric archaeology (1890–1930) in a European perspective*, ed. J. Callmer, M. Meyer, R. Struwe, and C. Theune, 149–160. Stellerloh: Verlag.

Larson, M.S. 1977. *The rise of professionalism: A sociological analysis*. Berkeley: University of California Press.

Lozny, L.R., ed. 2011. *Comparative archaeologies: A sociological view of the science of the past*. New York: Springer.

Lucas, G. 2001. *Critical approaches to fieldwork: Contemporary and historical archaeological practice*. London: Routledge.

Lucas, G. 2012. *Understanding the archaeological record*. Cambridge: Cambridge University Press.

Moser, S. 1995. *Archaeology and its disciplinary culture: The professionalisation of Australian prehistoric archaeology*. Unpublished Ph.D. dissertation, University of Sydney.

Moser, S. 2013. Making expert knowledge through the image: Connections between antiquarian and early modern scientific illustration. *Isis*. In press.

Patterson, T.C. 1999. The political economy of archaeology in the United States. *Annual Review of Anthropology* 28: 155–174.
Pearce, S. 1990. *Archaeological curatorship*. London: Leicester University Press.
Pearce, S., ed. 2007. *Visions of antiquity: The Society of Antiquaries of London 1707–2007*. London: Society of Antiquaries of London.
Perry, S.E. 2011. *The archaeological eye: Visualisation and the institutionalisation of academic archaeology in London*. Unpublished Ph.D. dissertation, University of Southampton.
Roskams, S. 2001. *Excavation*. Cambridge: Cambridge University Press.
Schnapp, A. 2002. Between antiquarians and archaeologists – Continuities and ruptures. *Antiquity* 76: 134–140.
Smith, P.J. 2009. *A 'splendid idiosyncrasy': Prehistory at Cambridge 1915–50*, British Archaeological Reports British series. Vol. 485. Oxford: Archaeopress.
Sweet, R. 2004. *Antiquaries: The discovery of the past in eighteenth-century Britain*. London: Hambledon and London.
Trigger, B.G. 2006. *A history of archaeological thought*. 2nd ed. Cambridge: Cambridge University Press.

Further Reading

Adadia, O.M. 2010. Beyond externalism. Exploring new directions in the history of archaeology. *Archaeological Dialogues* 17: 215–236.
Briggs, C.S. 2011. Some notable British excavations before 1900. In *Great excavations: Shaping the archaeological profession*, ed. J. Schofield, 12–24. Oxford: Oxbow.
Chapman, W. 1989. The organizational context in the history of archaeology: Pitt Rivers and other British archaeologists in the 1860s. *Antiquaries Journal* 69: 23–42.
Chester, H.L. 2002. Frances Eliza Babbitt and the growth of professionalism of women in archaeology. In *New perspectives on the origins of Americanist archaeology*, ed. D.L. Browman and S. Williams, 164–184. Tuscaloosa: University of Alabama.
Cooper, A., and T. Yarrow. 2012. The age of innocence: Personal histories of the 1960s digging circuit in Britain. *International Journal of Historical Archaeology* 16: 300–318.
Daniel, G. 1981. *A short history of archaeology*. London: Thames and Hudson.
Eskildsen, K.R. 2012. The language of objects: Christian Jürgensen Thomsen's science of the past. *Isis* 103: 24–53.
Goodwin, C. 1994. Professional vision. *American Anthropologist* 96: 606–633.
Gräslund, B. 2006. Academic archaeology in Sweden up to 1930. In *The beginnings of academic pre- and protohistoric archaeology (1890–1930) in a European perspective*, ed. J. Callmer, M. Meyer, R. Struwe, and C. Theune, 179–184. Stellerloh: Verlag.
Holtorf, C. 2007. An archaeological fashion show: How archaeologists dress and how they are portrayed in the media. In *Archaeology and the media*, ed. T. Clack and M. Brittain, 69–88. Walnut Creek: Left Coast Press.
Hudson, K. 1981. *A social history of archaeology: The British experience*. London: Macmillan Press.
Kaeser, M.-A. 2002. On the international roots of prehistory. *Antiquity* 76: 170–177.
Moser, S. 2007. On disciplinary culture: Archaeology as fieldwork and its gendered associations. *Journal of Archaeological Method and Theory* 14: 235–263.
Pickstone, J.V. 2000. *Ways of knowing: A new history of science, technology and medicine*. Manchester: Manchester University Press.
Schlanger, N. 2003. The Burkitt affair revisited. Colonial implications and identity politics in early South African prehistory research. *Archaeological Dialogues* 10: 5–26.
Schofield, J. 2012. The best degree? *Current Archaeology* 270: 48–49.
Sheperd, N. 2003. State of the discipline: Science, culture and identity in South African archaeology, 1870–2003. *Journal of Southern African Studies* 29: 823–844.
Soffer, R.N. 1982. Why do disciplines fail? The strange case of British sociology. *English Historical Review* 97: 767–802.
Speight, S. 2002. Digging for history: Archaeological fieldwork and the adult student 1943–1975. *Studies in the Education of Adults* 30: 68–85.
Taylor, B. 1995. Professionals and the knowledge of archaeology. *British Journal of Sociology* 46: 499–508.

Prospection Methods in Archaeology

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Introduction

The Third Age of Discovery that helps define our modern era is based on remote sensing and the geophysical inventory of earth largely made possible by advancing technologies (Pyne 1988: 190, 1998: xi). This includes much of

the new territory archaeology explored in the late twentieth and early twenty-first centuries. However, it is important to note that for all the technical innovations of geophysical method and satellite imagery, archaeology remains a discipline of and about people. Archaeology is about understanding what it means to be human and increasingly about marshaling the record of tens of thousands of years of human decision-making to deal with the challenges we face today. But this requires that archaeologists be able to look beyond the obvious and not be limited to what is apparent on the surface – by any definition. What the new technologies of prospection have added to archaeology's repertoire is a glimpse into the "inhuman geography" (Pyne 1998: xi) of our human past, the places where we cannot go or where experience indicates that we defer going by more traditional methods like excavation. Necessarily, these technologies have evolved alongside dramatic increases in readily available computer power that allow us to process and find the meaningful patterns among incoming multitudes of new information.

Data collection continues to be the most straightforward element of archaeological prospection with days often required to process the data collected in a few well-spent hours (Conyers 2010: 122). The published record is noticeably weighted toward case studies demonstrating a particular method's applicability and use, although a trend toward case studies applying archaeological prospection techniques directly to test hypotheses of human behavior has increased since c. 2000. This is tempered by the fact that archaeological prospection is still largely the realm of geophysicists rather than archaeologists per se and that results are perhaps too frequently presented in geophysical rather than archaeological terms. High initial cost relative to traditional forms of archaeological survey plays a major role in determining whether prospection can be included in a project (Jordan 2009). Nevertheless, the results of archaeological prospection, in all its forms, are becoming "a primary data source from which to study the human past" (Conyers 2010: 119).

Definition

Remote sensing began as a collective description referring to both geophysical and imaging techniques. That usage continues (e.g., see papers in Johnson 2006a). With the introduction of *Archaeological Prospection* in 1994 as a peer-reviewed journal covering "the use of a wide range of prospecting techniques, including remote sensing (airborne and satellite), geophysical (e.g. resistivity, magnetometry) and geochemical (e.g. organic markers, soil phosphate)" (Archaeological Prospection 2011), archaeological prospection became the preferred collective term. Remote sensing explicitly refers to satellite and other forms of reflective imagery (e.g., infrared spectral analysis). As geophysical methods become familiar fixtures in the journal literature, they are named and recognized outright by the specific technique employed (e.g., ground-penetrating radar, cesium magnetometer, etc.).

Key Issues

Archaeological Prospection Methods

The four most widely applied techniques of geophysical prospection are ground-penetrating radar, electromagnetics, magnetics, and earth resistance (Conyers and Leckebusch 2010: 117).

Ground-Penetrating Radar

Ground-penetrating radar (GPR) uses nondestructive electromagnetic waves to locate buried targets or interfaces (Daniels 2005: 1833). A GPR transmits a regular sequence of low-power packets of electromagnetic energy into the material or ground and receives and detects the weak reflected signal from the buried target. Under most conditions, ground-penetrating radar is capable of measurements up to a few meters deep. However, specially adapted systems operating in optimal circumstances can sometimes penetrate up to hundreds of meters. Unlike atmospheric radar, the signal from ground-penetrating radar is subject to being absorbed as it travels down and back through sediment layers. Although the method works well in some solids like granite and ice, it

cannot be used effectively in clays with a high salt content, or even saltwater, because these materials drain the signal's electromagnetic energy (Daniels 2005: 1833).

Ground-penetrating radar is especially valuable in deeply buried and stratigraphically complex contexts because it can discriminate important layers and map only specific levels or horizons. This type of complex stratigraphic analysis is usually impossible using other geophysical techniques (Conyers 2010: 183). Results from ground-penetrating radar are compatible with data from more traditional archaeological methods. Such data lend themselves well to a quantitative and scientific approach for understanding the human past.

Electromagnetics

Electromagnetic surveys are a quick way to locate and map large earth features such as leveled mounds and refilled ditches. They work especially well where the surface soil is dry, hard, or rocky or where the vegetation is moderately dense. As in all geophysical techniques, for electromagnetic surveys to be successful, it is necessary that the archaeological features sought are different enough from the surrounding terrain to register (Bevan 1983).

Electromagnetic instruments use conductivity measures that quantify how materials react when exposed to an electromagnetic field (Bevan 1983; Conyers et al. 2008). The method can be used to explore a range of depths; however, with the instrument carried at about hip height, sensitivity to materials suspended in sediment layers is generally most accurate down to 1.5 m. Depending on field conditions, useful readings are possible from about 1.5 m to about 5 m and then decreases until it is no longer within the instrument's depth range, about 5–6 m (Conyers et al. 2008). There have been claims that electromagnetic instruments can produce independent readings from multiple depths, but to date, these readings have not proved reliable in field tests (Conyers et al. 2008). Soil moisture, stratum thickness, geochemical variation, and changes in the amount of organic material present can all affect electromagnetic readings. Portability in the field and accuracy within its optimal parameters continue to make electromagnetics a favored geophysical method for archaeologists. In experienced hands, it is possible to obtain high-resolution electromagnetic survey data as fast as a person can walk in the field (Wynn 1986).

Magnetics

Magnetometry is one of the most productive and certainly one of the most often applied geophysical methods in archaeology. "(I)t is almost as if nature designed archaeological sites to be made visible by the magnetic variations they exhibit" (Kvamme 2003: 441). Primary among these magnetic variations are:

Soil heated past the Curie temperature – the point at which magnetic materials undergo a sharp change in their magnetic properties (beginning at about 570 °C for the mineral magnetite). Hearths, earthen ovens, kilns, and structure fires can disrupt the spontaneous arrangement of elements in rocks, minerals, and sediments, replacing it with a more general magnetic behavior. The resulting intensified magnetic field is restricted to the heated area. Magnetometry identifies this localized, burned zone. Archaeologists still must ascertain whether the heat source was natural or the result of human behavior.

Fired artifacts, especially ceramics, adobe bricks, and fire-hardened daub, create an identifiably intense magnetic field in the same way as discussed above for natural materials.

Magnetic susceptibility can also be a natural occurrence created by the inclusion of magnetizable materials in the composition of soils, sediments, rocks, etc.

Long-term human occupations of an area can increase the magnetic readings of surface layers when compared to underlying natural layers. The same discard behaviors that help create the archaeological record also introduce fired materials (i.e., ceramics) into the upper soil layers of a site. Such magnetic readings can be a way of locating midden areas. Reverse processes that remove magnetically enhanced upper layers in identifiable patterns, digging ditches or pit houses, for example, provide equally valuable data for archaeologists to analyze.

In the case of sites with coursed wall architecture that has become buried over time, magnetometry readings can identify building materials that are either more or less magnetic than the natural layers of overburden and surrounding sediments.

And the process of smelting metal artifacts, as well as the metal artifacts themselves, produces identifiable anomalies in the surrounding natural layers.

Magnetometry is most successful in locating identifiable anomalies in the first two meters of sediments or soils. However, larger objects (a stone building foundation as opposed to a ceramic sherd) emitting a stronger signal can be detected at lower depths. Magnetometry is "the work-horse of European archaeo-geophysics" (Kvamme 2003: 441).

Earth Resistance

In an earth resistance survey, electrical current is emitted into the ground; as it radiates out in an even wave, any inclusions interrupting the relative uniformity of the sediment layer will alter the resistance to current patterns in measurable ways. Mapping these variations by stratum can help locate buried archaeological remains (Schmidt 2009: 67), although cultural features must still be separated from natural features using another means, like excavation.

When electrical current travels through copper wiring, the charge is carried by freely moving electrons. Since these electrons are traveling in a closed circuit, they neither deplete nor accumulate – the electrons constantly flow through the circuit loop. However, electrical current traveling through natural soils is carried by ions, not electrons. These charged particles are created when salt crystals in the ground break down in the presence of water. Any obstacles to the movement of these ions in the ground that cause a weakening of the current are called the soil's electrical resistively (Schmidt 2009: 68). Ultimately this electrical resistivity is a function of the amount of salts in the soil. There are some salts in all soils, which makes the method viable, but the concentration of salts (and therefore the conductivity/resistivity available to carry the current and be measured at the surface) varies by soil type. Moreover, electrical resistivity depends on the presence of water in the soil to dissolve the salt crystals and transport the residual ions (Schmidt 2009: 68). Resistivity decreases as water becomes ice or soils dry out in arid conditions. The presence and position of water in the soils depends on the size of sediment grains and the spaces between the grains. Water is needed to dissolve the salts into their constituent ions.

Resistivity is the opposite of conductivity (see "Magnetics" above). Earth resistance methods are sensitive to subsurface contrasts caused by resistant natural rock formations and by resistant cultural formations like stone walls. They also can note less obvious variations in soil and sediment layers (Kvamme 2003: 441–2). Soil resistivity is measured through contact probes spaced from 0.25 to 2 m. The spacing between probes controls prospecting depth beneath the surface. When several depth settings are employed within the same area, three-dimensional data acquisition and volumetric computer imaging are possible (Noel 1992; Szmanski & Tsourlos 1993; Walker 2000 – as cited in Kvamme 2003: 442). Magnetometry (conductivity) and earth resistance methods are popular in European archaeology.

Metal Detectors

The most controversial issue concerning geophysical technology for archaeological purposes is the use of metal detectors by interested amateurs, who are often well-intentioned, but sometimes not. In archaeology, the value of artifacts is based on the information they provide. The problem with metal detectors arises when they are used to pull artifacts from the past we hold in common to be sequestered in private collections or when the value of artifacts is based solely on the money they may bring in exchange. Metal detector use is a complex issue that involves property rights, antiquity statutes, and international laws.

Great Britain has the most experience with interactions between research archaeologists, cultural resource managers, and metal detector enthusiasts. A 1995 survey by the Council for British Archaeology found that of the thousands

of artifacts recovered by metal detector enthusiasts each year, only a fraction was reported to museums in England. Between 1988 and 1995, illicit metal detector use damaged some 188 archaeological sites that were protected by law (Hunt 2011), and three-quarters of the archaeological excavations in England had experienced "raids" by metal detector users (Hunt 2011).

What appears to offer the most success in resolving this dilemma is a training program that gives interested enthusiasts a way of contributing to the greater body of archaeological research as avocational archaeologists. They agree to follow a code of conduct in return. It is not a perfect system – ethical questions still exist about "whether it is right to amass personal collections of material inaccessible to more detailed research, or to sell such collections on the open market" (Hunt 2011). There are also concerns that the payment of rewards for "treasure" finds sends the wrong message. Including a place at the table for trained avocational archaeologists may help abate at least one of the modern threats to the archaeological record.

Satellite Imagery

Satellite imagery is the latest incarnation of aerial photography, which is reputed to have started with Gaspard-Félix Tournachon, a French photographer, who took pictures of Paris from a balloon in 1858. By World War I, aerial photography was being used by the military to map battlefields and to gather information.

Space-based images of our Earth also began with military applications and as a means of information gathering – in this case highly classified information gathering for intelligence agencies. As the existence of satellite images became more widely known, and as their availability became less exclusive, applications widened to include tracking global weather patterns, tectonic activity, surface vegetation, ocean currents and temperatures, polar ice fluctuations, pollution, and eventually archaeology during the concluding decades of the twentieth century. Archaeologists are still finding new ways to use the full range of analytical tools available for assessing satellite image data of the earth's surface and subsurface (Parcak and Mumford 2011). Decreasing costs, increasing image resolution, and on-line Internet availability are speeding this process along.

Satellites collect images from hundreds of miles above the Earth's surface. The altitude from which an image is taken, and the physical characteristics of the sensor used, determine the amount and the type of detail available from a satellite image (United States Geological Survey [USGS] 2011). For example, color-infrared images record energy from portions of the electromagnetic spectrum not visible to the human eye. Near-infrared light reflected from the recorded scene appears as red, red appears as green, green as blue, and blue as black. As a result, color-infrared can differentiate between types of vegetation and bodies of water (United States Geological Survey [USGS] 2011). Importantly for archaeologists, it can also penetrate the atmospheric haze that has become a defining characteristic of modern urban areas.

Much of the credit for first recognizing the potential of multispectral imagery in archaeology goes to George Gumerman and Theodore Lyons (Parcak 2009). Their 1971 paper Archaeological Methodology and Remote Sensing (*Science* 172 [3979]: 126–132) moved the state of the art beyond identification and simple interpretation to the types of pattern recognition that are the basis for what has come to be called satellite archaeology (Parcak 2009). Even at an early date in the use of enhanced imagery, Gumerman and Lyons noted what has become axiomatic today: each archaeological site will have its own spectral properties, and, therefore, archaeological prospecting can rely on no single imagery format (Parcak 2009).

In 1972, one year after Gumerman and Lyons' groundbreaking publication, the United States launched its first Earth Resources Technology Satellite, ERTS-1, later renamed Landsat 1 (United States Geological Survey [USGS] 2011). The Landsat series gathered data from sensors measuring a range of wavelengths of electromagnetic energy reflected or emitted from earth – and demonstrated the actual potential satellite imagery holds for archaeology. Landsats 1–5 carried the multispectral scanner (MSS) sensor with a

resolution of about 80 m (260 ft). In 1984, the year NASA launched Landsat 5, the United States Congress directed the National Oceanic and Atmospheric Administration (NOAA) to find a commercial vendor for its Landsat 6 project. That satellite, developed by the Earth Observation Satellite Company (EOSAT) under a U.S. Commerce Department contract, failed at launch in 1993 (National Aeronautics and Space Administration [NASA] 2011a: NOAA press release 95–13). The launch program returned to NASA, and Landsat 7 successfully lifted off in 1999. The last of the series, Landsat 7, carried the Enhanced Thematic Mapper Plus sensor that replicated the capabilities of the successful Thematic Mapper instruments on Landsats 4 and 5, and included features for global change studies, land cover monitoring, and mapping larger areas than its predecessors (National Aeronautics and Space Administration [NASA] 2011b).

As this is written, "(t)he evolution of satellite image technology is. . .enabling the manipulation of a greater range of data contained in increasing types of satellite images (e.g., Aster; Corona; Landsat TM, etc.): archaeologists can now examine a broad spectrum of reflectivity signatures and bands within and between archaeological sites, including both surface and sub-surface features" (Parcak and Mumford 2011). For example, combining multiple analytical techniques to detect the vegetation signatures within a satellite image of the El-Markha Plain on the Sinai Peninsula of the Middle East made it possible to identify and isolate water sources within the overall arid environment of Sinai, which in turn revealed potential archaeological sites for surface assessment (Parcak and Mumford 2011). Multispectral satellite data have also allowed archaeologists to model dynamic landscape processes in the Mediterranean Basin (Barton 2004) as well as define survey areas in Spain and statistically eliminate areas of erosion from the survey area (Barton et al. 2002, 2004).

Tools and datasets like Blue Marble from the National Oceanographic and Atmospheric Administration (NOAA) (see http://sos.noaa.gov/datasets/Land/bluemarble.html) and the multiple platforms of Google Earth™ (see http://www.google.com/earth/index.html) have helped to demystify satellite imagery for non-specialists.

Light Detection and Ranging

Light detection and ranging (LiDAR) represents something of a return to the aerial photography origins of remote sensing – with important differences. LiDAR scans the land surface from an airplane or helicopter with a high-frequency pulsed laser beam. By timing the laser signal from transmitter to receiver, LiDAR can determine distance and thus take rapid measures of surface elevation. When combined with Global Positioning System (GPS) coordinates and an inertial navigation system (INS) to account for airplane movement and hold the airborne transmitter constant, LiDAR readings produce high-resolution digital elevation models (DEMs; see geographic information systems [GIS]) of the landscape below (Hesse 2010). What sets LiDAR apart is that its laser signal can be filtered to record only the last return pulse of the laser beam, making it possible to create DEMs of the landscape underneath a rainforest canopy of vegetation (Hesse 2010; Chase et al. 2011). LiDAR-derived data accurately portray not only the topography of the landscape but also structures, causeways, and agricultural terraces with a low relief of 5–30 cm (Chase et al. 2011: 387). Large-scale mapping projects in archaeology have always been costly and time-consuming when using traditional methods. This is especially true in off-the-beaten-track locations and rugged terrain where the modern world has tended to leave viable archaeological sites undestroyed if only rarely untouched. In such conditions, swath mapping with LiDAR (overlapping flight paths that can be integrated together) is a powerful and cost-effective tool.

International Perspectives

Although geophysical and satellite imagery as methods of archaeological prospection are used nearly everywhere in the world where archaeology is a recognized discipline, not all working archaeologists have a positive view of such

means. Nor should archaeologists be expected to hold generally uniform views. The modern practice of archaeology lies at the nexus of the social, natural, and physical sciences – with archaeologists varying the degree of emphasis in their approach between the three. Philosophical and operational tensions in the sciences are often beneficial. Thomas Kuhn, the historian of science who introduced the concept of "paradigm" into post-1960s discussions of science (Kuhn 1962/1970), considered such friction to be the essential tension (see essays in Kuhn 1977) that led to scientific accomplishment and greater understanding of the world around us.

Reservations about technological prospection in archaeology include the expensive cost of the instruments and software necessary to collect and process data; the additional training demands and access to that training, both of which can restrict availability in some cases; and a less than full understanding of the conditions under which the various instruments are likely to produce useful results (Johnson and Haley 2006: 35). Opinions vary as to whether we always apply the most applicable methods for each set of circumstances or whether we tend to rely on the methods we know. Archaeologists understand that geophysical and remote sensing are part of the hard work of gathering data and learning what the data may tell us about the human career. Our level of understanding may not always keep pace with the technology we are able to produce, and archaeologists constantly remind themselves that while new methodology often helps us to see in more detail, actual understanding remains grounded in our traditional commitment to hard work. Archaeology is deeply rooted in a profound respect for the men and women who created the past that has made our moment possible.

It is natural for observers interested in archaeology to wonder whether what may seem like a sudden burst of emphasis on remote sensing could be adding to a sense of remoteness from the humanness of the people who lived the past. "Spectacular images... may convey the impression that most 'good' geophysical surveys... leave little to the imagination.... In fact, well-executed surveys often yield useful results that are not immediately interpretable by many archaeologists" (Hargrave 2006: 269).

Data fusion (Kvamme 2006; Ernenwein 2009) is one of the most important concepts to develop from our growing body of experience with geophysical methods. Data fusion integrates the outcomes of multiple geophysical methods in one study area and applies their combined potential toward an improved understanding of the subsurface. As noted above, each individual survey method comes with its own strength and weaknesses. Integrating information from a number of methods allows the strength of one method (or methods) to compensate for any shortcomings in another. Integrated data can show the relationships between conductive, resistant, magnetic, and thermal noted subsurface anomalies and use this multiple recognition to enhance overall interpretations (Kvamme 2006: 15).

Excavating offers archaeologists a tactile perception of the artifacts in an assemblage. Data fusion offers a roughly similar multisensory insight into an entire subsurface region while including and preserving the surrounding context that we lose in excavation. It is an iterative process. The more often research programs include data fusion, the better at it we become. Integration can yield an end understanding beyond the capability of any discrete method alone (Kvamme 2006: 15). Applying multiple methods of data gathering also results in a broader array of data presentation – some of which are more visual and some more quantitatively interpretive or predictive. All of which, when fused together, offer a more complete understanding of the archaeological record without altering or destroying any irreplaceable part of that record.

Among the great challenges of archaeology, as usually practiced, is the pressure to get everything right the first time. Excavation is the best-known and most frequently employed means of gathering archaeological data. Archaeological excavation, digging, destroys the context that helps confer meaning to artifacts as it proceeds. "(T)he value of archaeogeophysical methodology with its inherently nondestructive nature speaks for itself. Researchers... now have the potential to recover detailed archaeological information from sites –

small and large – without destroying them" (Lockhart and Green 2006: 29). Archaeological prospection offers a way to assess the information value of subsurface material and factor it into a decision of whether or not to dig. We can make informed choices to leave non-threatened archaeological material in the ground and reserve it for future archaeologists whose methodology, presumably, will be even better than ours. Cultural resource managers can potentially use geophysical methods to mitigate the presence or absence of subsurface archaeological material for entire swaths of the right-of-way for pipelines, roadbeds, etc., as opposed to relying on surface surveys with test pits or backhoe trenches to sample the subsurface strata, although it must be noted that the effectiveness of geophysical methods in archaeology has not yet been "fully acknowledged in the laws, regulations, and standards that guide cultural resource management practices and excavation strategies" (Lockhart and Green 2006: 17).

Future Directions

The equipment used in geophysical applications was not developed with archaeology in mind. The satellites gathering multispectral imagery of earth were not funded by archaeology, nor were they launched at the request of archaeologists. As is vital for a constantly evolving discipline at the nexus of the social, natural, and physical sciences, archaeologists are adept at making use of the tools available. It seems reasonable that future developments are more likely to come in the form of increasingly sophisticated data-analysis techniques than in the data gathering equipment we have borrowed from other fields. Hopefully, the staged iteration wherein remote sensing results guide excavation results and excavation results help to refine the remote sensing (Johnson 2006b: 316) will increase in pace.

It is a near certainty that the pace of construction development will continue to impact the archaeological record; the questions we ask of the past will increase in complexity as we continue to look for ways of "treating the world as if we intended to stay" (Gray et al. 1993: 280); and the funding dedicated to archaeological research will continue to vary in amount and priority as a function of economic considerations in the immediate present. All of which make developing effective and efficient methods of archaeological discovery, definition, and analysis increasingly imperative (National Park Service – National Center for Preservation Technology and Training [NPS NCPTT] 2007). In this context, the time and energy archaeologists are devoting to geophysical and imagery-based methods of archaeological prospection seem more well spent all the time.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Metal Detecting in Archaeology
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Surface Survey: Method and Strategies

References

Archaeological Prospection. 2011. Overview. Available at: http://onlinelibrary.wiley.com/journal/10.1002/%28ISSN%291099-0763. Accessed 16 July 2011.

Barton, C.M. 2004. Mediterranean landscape dynamics: Land use and landscape socioecology in the Mediterranean Basin. A laboratory for the study of the long-term interaction of human and natural systems. Available at: http://www.asu.edu/clas/shesc/projects/medland/. Accessed 16 July 2011.

Barton, C.M., J. Bernabeu, J.E. Aura, O. García, and N. La Roca. 2002. Dynamic landscapes, artifact taphonomy, and land use modeling in the western Mediterranean. *Geoarchaeology* 17: 155–190.

Barton, C.M., J. Bernabeu, J.E. Aura, O. García, L. Molina, and S. Schmich. 2004. Historical contingency, nonlinearity, and the neolithization of the western Mediterranean. In *Current issues in Mediterranean landscape archaeology*, ed. L. Wandsnider and E. Athanassopoulos, 99–124. Philadelphia: University of Pennsylvania Press.

Bevan, B.W. 1983. Electromagnetics for mapping buried earth features. *Journal of Field Archaeology* 10: 47–54.

Chase, A.F., D.Z. Chase, J.F. Weishampel, J.B. Drake, R.L. Shrestha, K.C. Slatton, J.J. Awe, and W.E. Carter. 2011. Airborne LiDAR, archaeology, and the ancient Maya landscape at Caracol, Belize. *Journal of Archaeological Science* 38: 387–398.

Conyers, L.B. 2010. Ground-penetrating radar for anthropological research. *Antiquity* 84: 175–184.

Conyers, L.B., and J. Leckebusch. 2010. Geophysical archaeology research agendas for the future: Some

ground-penetrating radar examples. *Archaeological Prospection* 17: 117–123.
Conyers, L.B., E.G. Ernenwein, M. Grealy, and K.M. Lowe. 2008. Electromagnetic conductivity mapping for site prediction in meandering river floodplains. *Archaeological Prospection* 15: 81–91.
Daniels, D.J. 2005. Ground penetrating radar. In *Encyclopedia of RF and microwave engineering*, ed. K. Chang, 1833–1846. Hoboken: Wiley.
Ernenwein, E.G. 2009. Integration of multidimensional archaeogeophysical data using supervised and unsupervised classification. *Near Surface Geophysics* 7: 147–158.
Gray, R., J. Bebbington, and D. Walters. 1993. *Accounting for the environment*. New York: M. Wiener Publishers.
Hargrave, M.L. 2006. Ground truthing the results of geophysical surveys. In *Remote sensing in archaeology: An explicitly North American perspective*, ed. J.K. Johnson, 269–304. Tuscaloosa: University of Alabama Press.
Hesse, R. 2010. LiDAR-derived local relief models – A new tool for archaeological prospection. *Archaeological Prospection* 17: 67–72.
Hunt, A. 2011. Archaeology and metal detecting. Available at: http://www.bbc.co.uk/history/ancient/archaeology/metal_detect_01.shtml. Accessed 16 July 2011.
Johnson, J.K., ed. 2006a. *Remote sensing in archaeology: An explicitly North American perspective*. Tuscaloosa: University of Alabama Press.
Johnson, J.K. 2006b. A comparative guide to applications. In *Remote sensing in archaeology: An explicitly North American perspective*, ed. J.K. Johnson, 305–319. Tuscaloosa: University of Alabama Press.
Johnson, J.K., and B.S. Haley. 2006. A cost-benefit analysis of remote sensing application in cultural resource management archaeology. In *Remote sensing in archaeology: An explicitly North American perspective*, ed. J.K. Johnson, M. Giardano, and K. Kvamme, 33–45. Tuscaloosa: University of Alabama Press.
Jordan, D. 2009. How effective is geophysical survey? A regional review. *Archaeological Prospection* 16: 77–90.
Kuhn, T.S. 1962/1970. *The structure of scientific revolutions. Originally published as an entry in the International encyclopedia of unified science, Volume II, 2*. Chicago: University of Chicago Press.
Kuhn, T.S. 1977. *The essential tension: Selected studies in scientific tradition and change*. Chicago: University of Chicago Press.
Kvamme, K.L. 2003. Geophysical surveys as landscape archaeology. *American Antiquity* 68: 435–457.
Kvamme, K.L. 2006. Integrating multidimensional geophysical data. *Archaeological Prospection* 13: 57–72.
Lockhart, J.J., and T.J. Green. 2006. The current and potential role of archaeogeophysics in cultural resource management in the United States. In *Remote sensing in archaeology: An explicitly North American perspective*, ed. J.K. Johnson, M. Giardano, and K. Kvamme, 17–32. Tuscaloosa: University of Alabama Press.
National Aeronautics and Space Administration (NASA). 2011a. NOAA press release 95–13: Landsat 6 failure attributed to ruptured manifold. Available at: http://landsat.gsfc.nasa.gov/about/landsat6.html. Accessed 13 July 2011.
National Aeronautics and Space Administration (NASA). 2011b. Landsat 7. Available at: http://landsat.gsfc.nasa.gov/about/landsat7.html. Accessed 13 July 2011.
National Park Service – National Center for Preservation Technology and Training (NPS NCPTT). 2007. Advancing remote sensing technologies in the discovery, analysis, and preservation of cultural resources. Abstract. Symposium presented at the 72nd Annual Meeting of the Society for American Archaeology. Austin, 25–29 April 2007.
Parcak, S.H. 2009. *Satellite remote sensing for archaeology*. London: Routledge.
Parcak, S.H., and G. Mumford. 2011. Satellite image interpretation. Available at: http://www.deltasinai.com/image-00.htm. Accessed 11 July 2011; see also: http://ccrs.nrcan.gc.ca/resource/tutor/fundam/index_e.php. Accessed 11 July 2011.
Pyne, S.J. 1988. Space: A third great age of discovery. *Space Policy* 4: 187–199.
Pyne, S.J. 1998. *The ice: A journey to Antarctica*. Originally published 1986. Iowa City: University of Iowa Press. Seattle/London: University of Washington Press.
Schmidt, A. 2009. Electrical and magnetic methods in archaeological prospection. In *Seeing the unseen. Geophysics and landscape archaeology*, ed. S. Campana and S. Piro, 67–81. London: Taylor & Francis Group.
United States Geological Survey (USGS). 2011. Aerial photographs and satellite images. Available at: http://egsc.usgs.gov/isb/pubs/booklets/aerial/aerial.html. Accessed 13 July 2011.
Wynn, J.C. 1986. A review of geophysical methods used in archaeology. *Geoarchaeology* 1: 245–257.

Proton-Induced X-Ray Emission Spectroscopy (PIXE): Applications in Archaeology

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Introduction

With the advent of nuclear-based analytical methods in the last 50 years, particle induced X-ray emission (PIXE) has established a role in the elemental analysis of archaeological material

and cultural heritage. PIXE is a technique with a diverse array of applications in biology, geology, materials science, and others and has found valuable wide-ranging applications in archaeology and cultural heritage research. Such applications for archaeology and museum work generally fall into the categories of compositional analysis, provenance, understanding surface treatments and changes, and conservation and restoration.

Definition

The general definition of PIXE is "particle-induced X-ray emission" although this is often synonymous with "proton-induced X-ray emission," which is a specific type of PIXE. Charged particles typically used in PIXE include both protons (p) and α-particles (He^{+2}). Protons are produced in particle accelerators such as Van de Graff instruments, whereas radioactive sources produce α-particles for PIXE (Johansson and Campbell 1988).

Most laboratories use an accelerator to create a beam of high-energy (1–4 MeV) particles. The sample is bombarded by a beam of these particles, resulting in ejection of inner-shell electron in the sample, followed by the de-excitation of the ion. Electron rearrangements then occur within the atom to fill the resulting vacancies, resulting in emitted X-rays and Auger electrons. The emitted X-rays have specific energies particular to energy transitions in a specific element; the number of X-rays emitted is proportional to the original concentration of the element of interest in the sample. Detection and energy sorting of the X-rays is primarily done using energy dispersive systems with semiconductor detectors and multichannel analyzers (MCAs) (Ehmann and Vance 1991).

Some advantages of PIXE for art and archaeology include its nondestructive elemental analysis capabilities with appropriate experimental setup, and simultaneous elemental analysis. PIXE has a large dynamic range from parts per million to percent range, and therefore is capable for trace, minor, and major elemental analysis. Elemental characterization of samples provides data for interpretation on artifact composition, technology, and origins. The technique has high sensitivity (1–10 ppm) for elements with atomic numbers in the ranges $11 < Z < 32$ and $75 < Z < 85$ (Johansson and Campbell 1988). In addition to trace analysis, PIXE is also capable of measuring major elements in the sample (up to percent levels). PIXE is a near-surface analytical method that analyzes the first 1–10 μm of a sample, which makes it ideal for analysis of thin layers of pigments or other surface treatments on artifacts. Depending on the experimental setup, it is also possible to collect data on depth profiling of elements in the sample using a related method, Rutherford backscattering (RBS). As compared to XRF, PIXE generally has a higher rate of data collection and less background spectral effects, due to lower Bremsstrahlung interactions and Rayleigh and Compton scattering. The technique is regarded to have high precision and reproducibility. PIXE often has relatively quick analyses times on the order of minutes (Johansson et al. 1995; Taylor et al. 1994).

PIXE was first developed in the 1970s. Over the next decades, the technique developed along with accelerator facility and electronics technology and is now a mature radioanalytical method with applications in many fields. Sample types in the early uses of the technique included ceramics and metals and have since expanded into varied artifact types such as glasses and pigments.

The majority of PIXE analyses are performed in the external beam configuration. Many standard PIXE systems produce a beam of around 1 mm diameter. Some modern systems now have the capability of micro-PIXE through beams 1 micron in diameter, which allows for spatial resolution analysis over small areas by rastering the beam over the sample. Micro-PIXE may also be used to analyze single spot areas or crystals in a sample.

Most facilities perform PIXE under vacuum; therefore the sample must fit in the dimensions of the vacuum chamber. However, extraction of the beam from the accelerator allows in-atmosphere PIXE analysis, which is advantageous for samples that otherwise may not be placed under vacuum.

Several facilities routinely perform PIXE. The major laboratories in this area are AGLAE in the

Louvre, (Paris, France), the STAR accelerator facility at ANSTO (Australian Nuclear Science and Technology Organisation) (Lucas Heights, Australia), and the University of Guelph, (Guelph, Canada) and the University of Kentucky (Lexington, Kentucky, USA), as well as others worldwide. More recently, the COBRA project in Italy has developed a 3–7 MeV pulsed proton beam towards the analysis of ancient artifacts (Vadrucci et al. 2017) Of these, AGLAE in France is the only facility dedicated to analysis of cultural heritage materials (Calligaro et al. 2003; Dran et al. 2004).

Recently, the PIXE technology has been adapted to portable technology (Pappalardo et al. 1996, 2003). These systems use radioactive sources to irradiate the sample with alpha particles and Peltier-cooled detectors. These systems allow the instrument to travel to the sample, which is advantageous where an archaeological object may not be able to travel to a laboratory due to size or fragility or other restrictions.

Key Issues/Current Debates/Future Directions/Examples

Within the area of archaeological and cultural heritage applications, several classes of material have had successful PIXE analysis and data interpretation. These include metals, obsidian, pigments, paintings, glass, ceramics, and other inorganic materials. A recent review article covers many of these materials and their analysis by PIXE (Beck 2014).

Ceramics are one of the first archaeological materials investigated by PIXE and have since expanded into archaeometric studies and applications worldwide. Some of the initial studies focused on bulk composition of ceramics and provenance studies. While provenance studies are still an important application of PIXE, some current papers are focusing more on surface applications and micro-PIXE of ceramic surfaces. An example of this is a recent paper by Polvorinos et al. that explores the application of PIXE understanding fourteenth- to eighteenth-century lustre glazes on Spanish ceramics including analysis of ceramic surfaces (Polvorinos et al. 2011).

PIXE has been applied to many types of archaeological metals, with coins and metal implements being the most common. There are many examples of compositional analysis of coins from many parts of the world and from many archaeological and historical periods. A recent article by Ben Abdelouahed et al. demonstrates the types of studies, analytical capabilities, and statistical analysis for coin analysis by PIXE (Abdelouahed et al. 2010).

Due to its near-surface capabilities, PIXE has been used widely in paint and pigment analysis. Neelmeijer et al. describe a combination XRF and PIXE methodology for studying the paint layers in modern sample as a case study for artworks. The authors use both methods for elemental analysis and depth profiling of the paint layers (Neelmeijer et al. 2000). PIXE analysis in this case offers valuable information on depth profiling by variation of the incident energy of the particle beam. Another recent study on pigment investigated the chemical composition of prehistoric pigments from Abri Pataud, France. The authors cite the nondestructive capabilities of PIXE as valuable for this application to rare prehistoric objects (Beck et al. 2011).

PIXE has also been applied to the characterization of archaeological obsidian objects. Composed of volcanic glass, obsidian can be characterized by its trace elemental signature, which reflects the material's origins. Other techniques such as NAA (neutron activation analysis) provide similar elements; however, the technique is usually destructive to the object as a sample must be cut from the original object. In contrast, PIXE can provide elemental data in a nondestructive method to the artifact. PIXE has been successfully used by Gazzola et al. to identify the original sources of obsidian found in Teotihuacan through elemental data and statistical interpretation (Gazzola et al. 2010). Berlot-Gurlet et al. provide a comprehensive comparison between PIXE, ICP-AES, and ICP-MS for the characterization of obsidian artifacts in a case study (Bellot-Gurlet et al. 2005).

A related application of PIXE to glass materials includes the analysis of archaeological and historical glasses. Elemental analysis by PIXE can be used to determine the major composition, and therefore, the original recipe of the glass. Trace elemental analysis can also be used to determine the provenance of the material. Calligaro presents a case study of archaeological and historical glasses, as well as the use of PIXE to study the surface modifications on glass (Calligaro 2008).

Recent advents in micro-PIXE have allowed insights into archaeological materials on much smaller scales than previously achieved by broader-beam PIXE instruments. While the technique allows higher spatial resolution, the time per analysis is longer due to the smaller beam size. Recent updates in technology have allowed micro-PIXE for use in extracted-beam setups as well. Torkiha et al. describe a laboratory set up of external micro-PIXE and its use on archaeological ceramics (Torkiha et al. 2010). The AGLAE facility at the Louvre routinely uses micro-PIXE for object analysis.

In the past decade, a group in Catania, Italy, has been developing a series of portable PIXE instruments based on polonium-210 radioactive sources for alpha particles. These instruments have been demonstrated on ceramics, coins, statuary, and other applications (Pappalardo et al. 2003; Rizzo et al. 2011). The portable capabilities of these instruments allow analysis of objects as well as frescoes and other materials that cannot travel.

Future developments include advances in instrumentation and electronics. Micro-PIXE analysis allows analysis on small scales previously not achievable with larger-beam diameters and the possibility of elemental "mapping" of an object surface. Coupled with external-beam facilities, this instrumentation allows microanalysis of objects without vacuum conditions, allowing analysis of objects of varied sizes and composition. PIXE in combination with Rutherford backscattering (RBS) analysis also offers information on the structure of the sample. REnct work describing a new system with a large solid angle improves the quantification of data obtained by PIXE (Pallon et al. 2017).

Faster and more compact electronics and detectors as well as alpha-source technology have allowed the expansion of portable PIXE technologies. Developments in this area will make portable PIXE instruments more widely available for archaeological and cultural heritage applications.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ Dating Techniques in Archaeological Science
- ▶ Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology
- ▶ Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Neutron Activation Analysis (NAA): Applications in Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Technological Studies in Archaeological Science
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Abdelouahed, H. Ben, F. Gharbi, M. RoumiÈ, S. Baccouche, K. Ben Romdhane, B. Nsouli, and A. Trabelsi. 2010. PIXE analysis of medieval silver coins. *Materials Characterization* 61 (1): 59–64. https://doi.org/10.1016/j.matchar.2009.10.008.

Beck, Lucile. 2014. Recent trends in IBA for cultural heritage studies. *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms* 332: 439–444. https://doi.org/10.1016/j.nimb.2014.02.113.

Beck, L., M. Lebon, L. Pichon, M. Menu, L. Chiotti, R. Nespoulet, and P. Paillet. 2011. PIXE characterisation of prehistoric pigments from Abri Pataud (Dordogne, France). *X-Ray Spectrometry* 40 (3): 219–223.

Bellot-Gurlet, Ludovic, GÈrard Poupeau, Joseph Salomon, Thomas Calligaro, Brice Moignard, Jean-Claude Dran, Jean-Alix Barrat, and Laurent Pichon. 2005. Obsidian provenance studies in archaeology: A comparison between PIXE, ICP-AES and ICP-MS. *Nuclear Instruments and Methods in Physics Research B* 240 (1–2): 588.

Calligaro, T. 2008. PIXE in the study of archaeological and historical glass. *X-Ray Spectrometry* 37 (2): 169–177. https://doi.org/10.1002/xrs.1063.

Calligaro, T., J.C. Dran, and M. Klein. 2003. Application of photo-detection to art and archaeology at the C2RMF. *Nuclear Instruments and Methods in Physics Research A* 504 (1–3): 213–221.

Dran, Jean-Claude, Joseph Salomon, Thomas Calligaro, and Philippe Walter. 2004. Ion beam analysis of art works: 14 years of use in the Louvre. *Nuclear Instruments and Methods in Physics Research B* 219–220: 7–15.

Ehmann, William D., and Diane E. Vance. 1991. In *Radiochemistry and nuclear methods of analysis*, Chemical analysis: A series on monographs on analytical chemistry and its applications, ed. J.D. Winefordner and I.M. Kolthoff, vol. 116. New York: Wiley.

Gazzola, J., M. Sánchez Del Río, C. Solís, and T. Calligaro. 2010. Particle-induced X-ray emission (PIXE) analysis of obsidian from teotihuacan. *Archaeometry* 52 (3): 343–354.

Johansson, Sven A.E., and John L. Campbell. 1988. *PIXE: A novel technique for elemental analysis*. Chichester: Wiley.

Johansson, Sven A.E., J.L. Campbell, and Klas G. Malmqvist, eds. 1995. *Particle-induced X-ray emission spectrometry (PIXE)*, Chemical analysis: A series of monographs on analytical chemistry and its applications, ed. J.D. Winefordner, vol. 133. New York: Wiley.

Neelmeijer, C., I. Brissaud, T. Calligaro, G. Demortier, A. Hautojarvi, M. Mader, L. Martinot, M. Schreiner, T. Tuurnala, and G. Weber. 2000. Paintings-a challenge for XRF and PIXE analysis. *X-Ray Spectrometry* 29 (1): 101–110.

Pallon, Jan, Nathaly De La Rosa, Mikael Elfman, Per Kristiansson, E.J. Charlotta Nilsson, and Linus Ros. 2017. A new quantitative X-ray system for micro-PIXE analysis. *X-Ray Spectrometry* 46 (5): 319–324. https://doi.org/10.1002/xrs.2779.

Pappalardo, G., J. de Sanoit, A. Musumarra, G. Calvi, and C. Marchetta. 1996. Feasibility study of a portable PIXE system using a 210Po alpha source. *Nuclear Instruments & Methods in Physics Research, Section B: Beam Interactions with Materials and Atoms* 109/110: 214–217.

Pappalardo, L., F.P. Romano, S. Garraffo, J. De Sanoit, C. Marchetta, and G. Pappalardo. 2003. The improved LNS PIXE-alpha portable system: Archaeometric applications. *Archaeometry* 45 (2): 333–339.

Polvorinos, A., M. Aucouturier, A. Bouquillon, J. Castaing, and J. Camps. 2011. The evolution of lustre ceramics from Manises (Valencia, Spain), between the 14th and 18th centuries. *Archaeometry* 53: 490–509. https://doi.org/10.1111/j.1475-4754.2010.00552.x.

Rizzo, F., G.P. Cirrone, G. Cuttone, A. Esposito, S. Garraffo, G. Pappalardo, L. Pappalardo, F.P. Romano, and S. Russo. 2011. Non-destructive determination of the silver content in roman coins (nummi), dated to 308-311 A.D., by the combined use of PIXE-alpha, XRF and DPAA techniques. *Microchemical Journal* 97 (2): 286–290. https://doi.org/10.1016/j.microc.2010.09.017.

Taylor, Larry, Richard B. Papp, and Bruce D. Pollard. 1994. *Instrumental methods for determining elements*. New York: VCH.

Torkiha, M., M. Lamehi-Rachti, O.R. Kakuee, and V. Fathollahi. 2010. An external sub-milliprobe optimized for PIXE analysis of archaeological samples. *Nuclear Instruments and Methods in Physics Research B* 268 (9): 1522.

Vadrucci, M., G. Bazzano, F. Borgognoni, M. Chiari, A. Mazzinghi, L. Picardi, C. Ronsivalle, C. Ruberto, and F. Taccetti. 2017. A new small-footprint external-beam PIXE facility for cultural heritage applications using pulsed proton beams. *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms* 406: 314–317. https://doi.org/10.1016/j.nimb.2017.02.045.

Proulx, Donald

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Basic Biographical Information

Donald A. Proulx (Fig. 1) (born 27 May 1939 [Milwaukee, WI, USA]) is an American anthropological archaeologist specializing in the art and

Proulx, Donald, Fig. 1 Donald A. Proulx (Credit: D. A. Proulx)

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material culture of the ancient complex societies that developed in the Central Andes, in particular that of the Nasca society that emerged on the south coast of Peru. His fieldwork has mainly involved systematic surface surveys of the Nepeña and Nasca valleys, while his analyses and writings have emphasized cultural historical reconstructions, settlement patterns, ancient pottery, and visual arts.

Proulx's interest in archaeology and Native American cultures developed at an early age during visits to the Milwaukee Public Museum and through reading books during his teenage years at Marquette University High School. After a stint in engineering, he enrolled in anthropology at the University of Wisconsin-Milwaukee (1959–1961). During his undergraduate years, Proulx participated for the first time in archaeological fieldwork at Point of Pines, a thirteenth-century AD pueblo site where the University of Arizona held its field school under the direction of Emil Haury and Raymond Thompson. In Wisconsin, he volunteered at the Milwaukee Public Museum and worked in the anthropology section under the guidance of Lee Parsons and Robert Ritzenthaler. At the museum, Proulx first got acquainted with Peruvian artifacts and became particularly intrigued with Paracas and Nasca vessels from the south coast of Peru.

Upon graduating with a BS in anthropology in 1961, Proulx was admitted into the graduate program at the University of California, Berkeley. There he benefited from the mentorship of leading Andeanist John H. Rowe. Proulx first visited Peru in 1963 when he assisted Rowe in the field in the Ica Valley on the south coast as well as at Chavín de Huántar in the north central highlands. Back in Berkeley, he studied Nasca pots in the Max Uhle collection (Proulx 1970). Proulx also visited the Field Museum in Chicago to analyze Peruvian pots collected by Alfred Kroeber. In 1965, Proulx defended his dissertation on "Local Differences and Time Differences in Nasca Pottery" in which he inferred Nasca sociopolitical organization based on the seriation of pottery from Phases 3 and 4 of the Nasca style from two different south coastal valleys (Ica and Nasca) (Proulx 1968a). During his years at Berkeley, Proulx was influenced by several key figures in anthropology including J. Desmond Clark, John Graham, Sherwood Washburn, Theodore McCown, Eugene Hammel, Gerald Berreman, Robert Murphy, Dell Hymes, Lawrence Dawson, and Dorothy Menzel.

Proulx joined the anthropology faculty at the University of Massachusetts Amherst in 1965 where he taught until his retirement in 2002. At Amherst, he taught a variety of courses on archaeology, pottery analysis, Andean ethnohistory, and South American prehistory. Proulx also advised both undergraduate and graduate students and held various administrative positions including Chair of the Department of Anthropology (1975–1978, 1999–2000) and Director of the Latin American Studies Program (1980–1992).

Proulx returned to Peru in 1967 to initiate the first systematic survey of the Nepeña Valley on the north central coast (Fig. 2). The surface inventory was originally to be part of a broader archaeological initiative planned by Junius B. Bird of the American Museum of Natural History which aimed at excavating the monumental center of Pañamarca. While this large-scale excavation project never materialized, Proulx continued the Nepeña research during the years 1967, 1971, and 1979. During the latter year, he conducted research with his graduate student Richard E. Daggett. Daggett continued Proulx's pioneering study in 1980–1981 which resulted in

Proulx, Donald, Fig. 2 Donald A. Proulx during his 1971 survey of the Nepeña Valley (Credit: D. A. Proulx)

his 1984 PhD dissertation entitled "Early Horizon Occupation of the Nepeña Valley, North Central Coast of Peru." In total more than 360 archaeological sites were documented by Proulx and Daggett. This work helped establish the first cultural and chronological sequence for this important valley, and it resulted in a series of important publications (Daggett 1987; Proulx 1968b, 1973, 1982, 1985).

Proulx returned to the field between 1996 and 1998, when he directed survey operations in the lower Nasca Valley on the south coast. Following his retirement in 2002, he was named Professor Emeritus and continued working on publications and as a consultant for a Nasca exhibit in Tokyo, Japan, in 2006.

Major Accomplishments

Proulx's main contributions to Andean archaeology are in the realm of cultural history, systematic surface surveys, as well as the study of Nasca pottery and its imagery (Proulx 1968a, 1994, 2000, 2006). While his interest was sparked during his undergraduate years in Wisconsin, he began to systematically analyze Nasca pottery as part of his PhD dissertation work. Proulx analyzed pots from the Nasca Phases 3 and 4 of the Dawson's sequence. He refined Dawson's Phase 3 and classified it into four sub-phases. The comparative study of vessels from the Ica and Nasca valleys was used by Proulx to argue for the emergence of a centralized political entity during Phase 3 and centered at Cahuachi. This inference was based on the shift from regional homogeneous style during Phase 3 to an increased stylistic diversity during Phase 4, suggesting the loss of centralized authority at Cahuachi during Phase 4.

Since his original seriation work, Proulx has worked on building a "Nasca Archive" based on the model of the Moche Archive (see Christopher B. Donnan this volume). Proulx photographed Nasca pots in Peru, the USA, Germany, and the UK. To date the archive counts 10,000 slides representing 600 vessels. After digitization, the Nasca Archive now has 24,000 images representing pieces from over 150 museums and private collections. In 2017, this archive was donated to Dumbarton Oaks in Washington, DC, where it is available for research. In addition to a series of articles and book chapters on Nasca art, Proulx's research culminated in the publication in 2006 of *A Sourcebook of Nasca Ceramic Iconography.* He subsequently produced a series of manuscripts on Nasca visual arts and iconographies which he made available to interested scholars on an individual basis. The papers survey various topics including authenticity, human representations, monkeys, trophy heads, violence, and warfare more generally.

As a field archaeologist, Proulx is best known for his systematic surface surveys of the Nepeña and Nasca regions. In Nepeña, his pioneering work between 1967 and 1979 followed the famous excavations of Julio C. Tello in the 1930s at the ceremonial complexes of Punkurí and Cerro Blanco. Proulx's efforts were the first to yield a cultural sequence for Nepeña at a time when only the Virú Valley had been systematically surveyed. With the exception of his collaboration with Daggett in 1979, Proulx worked alone in Nepeña and did so with limited resources. The result is a testament to his diligence. In Nasca, Proulx surveyed previously undocumented portions of the lower valley. Proulx initiated preliminary surveys in 1996 and 1997 and obtained funding from the Heinz Foundation. He spent 3 months in 1998 surveying and recording 128 sites (Fig. 3).

Between 1996 and 2000, Proulx collaborated with David Johnson, a teacher, videographer, and independent scholar from Poughkeepsie, NY, on a project studying the spatial relationships between Nasca geoglyphs and sources of subterranean water. The project was funded through a grant from the National Geographic Society awarded to Johnson and involved a team of geologists and archaeologists. While the team is credited with identifying several previously unknown geoglyphs and collecting valuable geological and hydrological data, some questions remain regarding the relationship between the geological faults associated with water sources and the location of the geoglyphs.

Proulx, Donald, Fig. 3 Donald A. Proulx (left) and Richard E. Daggett (right) in Nasca (1998) (Credit: R. E. Daggett)

Cross-References

► Donnan, Christopher

References

Daggett, Richard E. 1987. Toward the development of the state on the north central coast of Peru. In *The origins and development of the Andean state*, ed. Jonathan Haas, Shelia Pozorski, and Thomas Pozorski, 70–82. Cambridge: Cambridge University Press.

Proulx, Donald A. 1968a. *Local differences and time differences in Nasca pottery, University of California Publications in anthropology 5*. Berkeley: University of California Press.

Proulx, Donald A. 1968b. *An archaeological survey of the Nepeña Valley, Peru, research report 2*. Amherst: Department of Anthropology, University of Massachusetts.

Proulx, Donald A. 1970. *Nasca Gravelots in the Uhle collection from the Ica Valley, Peru, research report 5*. Amherst: Department of Anthropology, University of Massachusetts.

Proulx, Donald A. 1973. *Archaeological investigations in the Nepeña Valley, Peru, research report 13*. Amherst: Department of Anthropology, University of Massachusetts.

Proulx, Donald A. 1982. Territoriality in the Early Intermediate Period: The case of Moche and Recuay. *Ñawpa Pacha: Journal of Andean Archaeology* 20: 83–96.

Proulx, Donald A. 1985. *An analysis of the early cultural sequence in the Nepeña Valley, Peru, research report 25*. Amherst: Department of Anthropology, University of Massachusetts.

Proulx, Donald A. 1994. Stylistic variation in proliferous Nasca pottery. *Andean Past* 4: 91–107.

Proulx, Donald A. 2000. Nasca ceramic iconography: An overview. *The Studio Potter* 29 (1): 36–43.

Proulx, Donald A. 2006. *A sourcebook of Nasca ceramic iconography: Reading a culture through its art*. Iowa City: University of Iowa Press.

Further Reading

Proulx, Donald A. 1993. The Nepeña Valley survey: A retrospective view. In *Ela'Qua: Essays in honor of Richard B. Woodbury*, ed. Dorothy Krass, R. Brooke Thomas, and John W. Cole, 225–236. Amherst: Department of Anthropology, University of Amherst.

Prous, André

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Basic Biographical Information

Born in France in 1944 and living in Brazil since 1971, the professional performance of André Prous is intertwined with the history of academic archaeology in Brazil. With a B.A. and M.A. in history from the University of Poitiers, he started his Ph.D. in prehistory in 1970 at the University of Paris I (Pantheon-Sorbonne), participating in field activities coordinated by Leroi-Gourhan and attending seminars on American settlements by his mentor Annette Laming-Emperaire at the Ecole Pratique des Hautes Études. His academic career in 1960s Paris was marked by the exchange with a first generation of Brazilian students seeking training in archaeology abroad and whom later became part of the professional staff of the leading universities in Brazil. Through a technical cooperation agreement between France and Brazil,

André Prous was hired in 1971 by the University of São Paulo to teach Prehistoric Archaeology in Department of History. That same year also began his first field activities in Brazil as part of the Franco-Brazilian Mission at Lagoa Santa (Minas Gerais State), coordinated by Annette Laming Emperaire. They excavated the site Lapa Vermelha IV until 1977 which featured buried rock panels, human burials, and datings around 9,000 years, indicating the high potential that studies of rock art in this new region could provide. In 1975, facing the possibility of returning to France to work in a center for archaeological research that was being assembled in Valbonne, Prous chose to settle down permanently in Brazil at the invitation of the Federal University of Minas Gerais, where in 1976 he founded the Archaeology Division in the Natural History Museum where he still lectures, as a full professor in the Department of Anthropology. His professional activities at this university influenced the constitution of a new generation of Brazilian researchers, especially his studies of rock art and ceramic and lithic technology, emphasizing the practice of experimental archaeology, analysis of chaîne opératoire, and functional studies. In addition, Dr. Prous was against the division of Brazilian archeology into theoretical subgroups, arguing in favor of a dialogue between the different theoretical and methodological schools (mainly of European and North American origin) which formed the pillars of archaeological science in the country. In 1981 Prous began coordinating the Franco-Brazilian Mission in Minas Gerais and has since conducted extensive archaeological survey projects in different regional contexts of Minas Gerais State such as the Serra do Cipó and regions of the upper and middle São Francisco River, the Doce River Valley, and the upper Jequitinhonha River, resulting in the identification of hundreds of sites with rock art dating back to the early Holocene.

Major Accomplishments

Interested in the meanings of the stylistic variations of Brazilian prehistoric art, André Prous developed his Ph.D. thesis, submitted in 1974, on the zoomorphic sculptures associated with funerary contexts at the southern Brazilian coast (sambaquis), conducting extensive surveys in institutional and private collections. The results of this research are published in *Les sculptures zoomorphes du Brésil et de l'Uruguay* (1977). From the stylistic comparison of sculpted art, he demonstrated the existence of regional variations also reflected in the lithic and bone industries, contributing to discussions on territoriality and the emergence of complex social contexts for hunter-gatherers specialized in the exploitation of coastal resources dating from 5,000 to 2,000 years BP. Studies by André Prous about the variety, complexity, and abundance of rock art in Minas Gerais State have shown that regional theme variation correlates with regional sequences of human occupation, providing methodological support for the establishment of complex chrono-stylistic sequences for the region. Comparisons between Brazilian regional rock art styles are among the main contributions of Prous, being its results systematized in the book *Brasil Rupestre* (2007). Also a noteworthy contribution is his *Arqueologia Brasileira* (1992), the first attempt to synthesize the Brazilian prehistory, taking as reference the contemporary research in the country conducted by different teams. Currently, André Prous has focused his interests on prehistoric art to the iconographic study of the Tupi pottery, contributing to the theoretical and methodological development and innovation in this field in Brazil.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ South American Rock Art
- ▶ Style: Its Role in the Archaeology of Art

References

Jorge, M., A. Prous, and L. Ribeiro. 2007. *Brasil Rupestre: arte pré-histórica Brasileira*. Curitiba: Zencrane Livros.

Prous, A. 1977. Les sculptures zoomorphes du sud Brésilien et de l'Uruguay. *Cahiers d'Archaeologie d'Amerique du Sud* 5: 1–177.
Prous, A. 1992. *Arqueologia Brasileira*. Brasília: Editora da UNB.

Further Reading

Prous, A. 1994. L'art rupestre du Brésil. *Bulletin de la Société Préhistorique de l'Ariège* 49: 77–144.
Prous, A. 2005. Stylistic units in prehistoric art research: Archaeofacts or realities? In *Global archaeological theory: Contextual voices and contemporary thoughts*, ed. P.P. Funari, A. Zarankin, and E. Stovel, 283–296. New York: Springer.
Prous, A. 2007. *Arte pré-histórica do Brasil*. Belo Horizonte: Editora Com Arte.
Prous, A. 2010. A pintura na cerâmica Tupiguarani. In *Os ceramistas Tupiguarani*, ed. A. Prous and T.A. Lima, vol. 2, 113–215. IPHAN: Belo Horizonte.
Ribeiro, L., and A. Prous. 2009. Rock art research in Brazil, 2000–2004: A critical evaluation. In *Rock art studies: News of the world III*, ed. P. Bahn, N. Franklin, and M. Strecker, 294–308. Oxford: Oxbow Books.

Provenance Studies in Archaeology

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Introduction

A primary objective in the study of ancient artifacts is to discern where they were produced. When archaeologists, other scientists, students, the public, or children inquire about an object – "Where is it from?" – there are, of course, two answers. One is the place or location at which the object was found or discovered, for example, the context of its finding, and second, a more difficult question, what is the source of the object. The latter entails a diagnosis of the origin of the materials that comprise the object, the location, or site where it was produced or fabricated, who made it, and why and for what purposes. A related set of questions, often with complex answers, is how the object was relocated from its place of origin to location at which it was recovered. In archaeology, these questions apply as much to the composition of a pottery vessel as they do to a lithic tool or stone ornament but also to glass, metals, and textiles as other major artifact classes. To answer these questions, investigators employ tools and techniques borrowed from geology and geochemistry, particularly petrography, physicochemical studies, and stable isotope analyses. A majority of archaeological sourcing studies are devoted to earthenware ceramics, pottery, porcelain, and related objects made from clay as well as stone or lithic materials, notably obsidian, marble, chert, flint, and steatite. Notable achievements have been made in the analysis of glazes and glass, but there has been limited success in sourcing of other materials such as metals and especially organic substances including textiles, plant fibers, dyes, pigments, oils, tars, protein residues, amber, jet, and bone.

Definition

Provenance (noun, "origin," plural provenances), from the Middle French word *provenant*, present participle of *provenir* ("to come from" or "arise"), ultimately from the Latin *provenio* (to come forth), denotes the origin or source of an object or idea or may indicate its history of ownership. The term was originally used in art history and antiquities to designate the ownership of artworks but is now employed in similar senses in a wide range of fields, including science, computing, and archaeology.

Historical Background

The concept of provenance has been employed in archaeological research for more than 160 years and originally connoted an object's "findspot" or to indicate the source of raw materials or the location of the manufacture of an object, such as in a workshop (Wilson and Pollard 2001: 507).

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Pioneering research by European chemists led to the acceptance of the concept that some chemical property of an inorganic archaeological artifact could be considered characteristic of the raw material source of the object; hence, the concept of "chemical fingerprinting" was born. Beginning in the 1960s, the chemical provenance of ceramics and other inorganic materials and some organic raw materials were analyzed and aided by the mathematical treatment of data sets and the manipulation of multivariate data. Professional archaeologists embraced fingerprinting as a major analytical tool as they had Willard Libby's radiocarbon dating five decades ago.

In the archaeological literature, the terms provenance and provenience are sometimes used interchangeably, but this is not always the case. Price and Burton (2011: 213–214) oversimplify it, suggesting provenience as "birthplace" and provenance as "resume." Historical archaeologists designate provenance as "the source of geological materials" and provenience as "the location where an artifact was recovered" (Hauser 2008: 162). There are potential semantic differences as, for example, the spelling of the term "archaeology" is used predominantly in the English-speaking world including North American academic institutions, but the term "archeology" tends to be a post-World War II spelling found in more recently established universities and publications oriented to anthropological archaeology. Provenance is used in the United Kingdom and much of the Old World to mean "place of origin."

In North America, provenience has largely replace provenance because for former is restricted to in situ location at the time of the discovery rather that the historical chain (origin to the present) employed by art historians and museums. Provenance may be used to explicate any artifact recovered archaeologically or any fossil recovered by paleontologists and in computer processing to indicate the history of data in a database record. In a review of nearly 700 articles on "provenance" appearing in the British journal *Archaeometry* (1957–2011), one finds the use of archaeology/archeology as well as provenance/provenance; some North American authors employ both spellings, archaeology or archeology, while provenience tends to be employed by North American scholars to mean either the artifact's context or location or its history. A review of a similar set of more than 250 articles on "provenance" in the *Journal of Archaeological Sciences* (1974–2011) and nearly 50 in the *American Journal of Archaeology* (examined 1960–2011) reveals a mixed use of "provenance" to mean origin of raw materials and/or the location where an object was found.

In archaeological and ethnographic studies in North America, the term provenience is used somewhat similarly to "provenance," but readers are advised to determine if an author uses the terms as synonyms or differentiates them by employing provenience to describe the context in three-dimensional space in which an artifact was recovered and using provenance to designate the source(s) or raw materials used in making the artifact and the object's documented history. The "provenience postulate" (Weigand et al. 1977: 24), initially suggested in a study of turquoise sources, is a significant element in the study of the origin of archaeological materials and states that chemical differences within a single source of material must be less than the differences between two or more sources of the material if they are to de differentiated. This means that if a source is determined to be chemically distinct, materials from it that have been moved some distance from that source would share the same chemistry and can be determined. Ideally, this would (1) involve a natural material that has not been altered after extraction from the source, (2) that there are a small number of potential sources, (3) that the investigator has adequate samples from each source to be able to assess compositional variability, and (4) that there are one or more elements or compounds adequately distinguishes the sources. Hence, obsidian is a more "ideal" material than pottery clays, glass, and metals, since clays can be mixed with other clays, glass cullet (broken recycled glass) and metals – particularly copper, silver, and gold – can be mixed with like materials from widely different sources during remanufacturing processes, and metals can be mixed to produce alloys such as bronze. In addition, comparative

techniques, expert opinions, and the results of other scientific analyses may also be used to support the history of an object, but establishing provenance is essentially a matter of documentation.

Archaeological Research

Archaeological research entails the documentation of the precise location of sites, architecture, artifacts, and raw material sources. Placing these in a three-dimensional context and relating the coordinates to a master datum and the use of Cartesian coordinate were traditional practices now supplanted by GPS and GIS. The Global Positioning System (GPS), a space-based global navigation satellite system (GNSS), provides location and time information anywhere on the Earth, while a geographic information system (GIS) also known as a geographical information system or geospatial information system is a merging of cartography, statistical analyses, and database technology that is designed to capture, store, manipulate, analyze, manage, and present a variety of geographically referenced data. Precise locational data for artifacts and raw material resources have become a hallmark of modern archaeology and is a form of "provenance."

The Provenance Hypothesis

The traditional way of determining the geographical source of ancient pottery has been to map the spatial occurrences of pottery styles. For the historic eras, this poses minimal difficulty because historical and archival documents may locate kiln sites or production areas, but for much of prehistory information on production locales, the types of pottery fabricated there and the sociocultural and economic parameters associated with production are elusive. The criterion of abundance, gravity model, or other paradigms have provided assistance, but for the past seven decades, methodologies derived from geology and petrography and a variety of physicochemical approaches have been employed to locate potential places of origin by characterizing the composition of the artifacts with known sources of the raw materials used to fabricate the objects. Provenance studies on pottery, obsidian, turquoise, steatite, chert, and jade have been especially valuable but rest upon assumptions in the "provenance postulate" which is normally formulated in terms of chemical composition. Simply put, the postulate assumes that differences between distinct sources of raw materials may be recognized analytically and that the compositional variations will be greater between the sources than within the sources. Rice (2015: 342–347) provides a valuable, in-depth, and well-documented discussion of ceramic provenance and reviews chemical and petrographic methods, the creation of reference groups, the use of instrumentation and statistics, the selection of elements for analysis, and comparing sherds and clays. In a more widespread treatment of the topic, Sayre (2000) discusses structure, raw materials and inclusions, multivariate statistical analysis, and characterization through ratios of stable isotopes.

Alice Hunt in her assessment of "provenance" (Hunt 2012) points out that the multidisciplinary nature of the archaeological sciences "inevitably leads to an incomplete understanding or misunderstanding of the technical, theoretical, and methodological limitations of the parent fields" (physical, social, and earth sciences). An imperfect understanding of these limitations may lead to the misinterpretation and miscommunication of scientific data because of the lack of a unifying vocabulary. She goes on to differentiate provenance as currently used in archaeology, the geological sciences, and the archaeological sciences. Using ceramic manufacture as an example, Hunt contends that the geological sciences are concerned with "origins or sources of sediments and detrital materials," while archaeological sciences focus on the "raw material used to manufacture artifacts." *Archaeometric sciences* could be a synonym for either or both in locating the sources of materials and creation of material culture.

Wilson and Pollard (2001: 507–508) indicate that scientific provenance studies rest on six basic assumptions (presented in abbreviated form here): (1) that some chemical or isotopic characteristic of

the geological raw materials is carried through unchanged into the finished object, (2) that the fingerprint varies between potential geological sources available in the past and that this variation can be related to geographical occurrences of the raw material, (3) that such characteristic fingerprints can be measured with sufficient precision in the finished artifacts to enable discrimination between competing potential sources, (4) that no "mixing" of raw materials (before or during processing) or that the mixing can be accounted for adequately, (5) that postdepositional processes either have a negligible effect or that the alteration can be detected, and (6) that any observed patterns of exchange or trade of the finished products are interpretable in terms of human behavior.

Provenance Studies of Archaeological Materials (Raw Materials and Finished Products)

Provenance studies on stone, ceramics, and metals account for the vast majority of all archaeological provenance analyses:

- *Lithics/stone: raw materials*. Lithic raw materials may occur in outcrops or geological beds or as nodules in stream beds. Provenance studies have been undertaken on a wide variety of raw materials and artifacts including alabaster, basalt, chert, chlorite, flint, granite, greenstone (jadeite and nephrite), hematite, limestone (blocks and plaster), magnetite, marble, obsidian, quartzite, rhyolite, sandstone, schist, steatite (soapstone), and turquoise. Because the extraction and fabrication techniques of lithic production do not alter significantly the chemical composition, lithics provide the best material by which to test the provenience hypothesis. Artifact reuse, exposure to heat, postdepositional processes, and storage in archaeological repositories or museums are not likely to modify the bulk chemical composition; hence, stone is theoretically an "ideal" material for provenance assessment. Lime plaster, cement, and concrete derive from rock sources and present complicating issues in provenance studies but not as complex as ceramics (Wilson and Pollard 2001; Tykot 2004; Lambert 2005).
- *Ceramics/pottery: finished products*. Provenance studies have been conducted on earthenware, stoneware, protoporcelain, and porcelain which may occur in various types and classes of ceramic materials: domestic/utilitarian and ritual pottery containers, figurines, spindle whorls, earspools, and other objects. Unlike stone sources or outcrops of source materials, clay is a complex product of rock mineralogy and subject to weathering and found in a variety of locations worldwide. Hence, few chemical studies have directly linked pottery vessels with specific clay sources. Clays being transported long distances from sources may contain naturally occurring organic or inorganic aplastics or tempers, or organic or inorganic materials may be introduced purposefully or by accident during the preparation of the clay. Heterogeneous clays from different sources may be mixed, levigated, and wedged, and pottery may be hand-built or wheel-thrown. The size and complexity of the manufacturing process – household production by one fabricator versus creation by multiple artisans each responsible for one step in a multiphase process versus a factory or industrial level of fabrication – complicate the ability to precisely define ceramic provenance (Tykot 2004; Kolb 2008, 2011; Reedy 2008; Rice 2015; Marlowe 2016).
- *Glass: finished products*. Products that have been studied for provenance include beads, containers and other vessels, faience, glazes, ingots, ornaments, tesserae, and window glass. Glass may have been a by-product of the technology of either glazed ceramics or metals. Ancient pyrotechnologies were unable to reach silica melting temperatures so that a modifier or flux derived from plant or animal sources was employed to lower melting points. Like ceramics, the composition of glasses and other vitreous silicates affects provenance because of the heterogeneous nature of the original raw materials used in production, the use of cullet, the addition of colorants or decolorants, and that containers used to hold

molten glass is itself subject to flux and add impurities. As a result, the scientific assessment of glass provenance has had mixed success (Wilson and Pollard 2001; Lambert 2005; Paynter and Dungworth 2011).

- *Metals: raw materials*. These include native copper, copper alloys, gold, lead, silver, and tin. Metals were among the earliest materials submitted for scientific provenance analyses but, like glass, suffer from the same issues of heterogeneous raw material origins, recyclability, purposeful or accidental mixing, and the creation of desired alloys, as well as high temperatures that alter trace element compositions and the discard of unwanted material removed as slag. In addition, fabrication procedures – cold hammering, annealing, joining, and casting – provide additional issues for determining provenance (Wilson and Pollard 2001; Tykot 2004; Lambert 2005).
- *Other materials: raw materials and finished products*. The sources of amber, antler, bitumen, bone, dyes, horn, ivory, jet, pitch, resin, tar, and various organics such as hair and fibers have been analyzed. Baltic amber was characterized in the 1980s and can be distinguished from non-Baltic sources and imitations. Varying degrees of success have been reported with the studies of jet and ivory, while analyses of human bone and teeth have been useful in determining human migrations, and the assessment of herd animals (particularly sheep, goat, and cattle) has also focused on animal origins and movements. In addition, provenance studies of woolen textiles have increased dramatically during the past decade (Wilson and Pollard 2001; Lambert 2005).

Analytical Methods (Thin-Section Petrographic Analysis, Optical Mineralogy, or Optical Petrography)

The macroscopic analysis of lithics, ceramics, and other clay objects is the initial step in analysis, closely followed by binocular and petrographic thin-section microscopy, derived from the geological sciences or materials science, which has been used for more than seven decades. Petrographic analyses in the 1920s led to the identification of stone sources used at Stonehenge. The technique remains an especially viable tool in the assessment of paste characteristics and ceramic provenance, playing a "crucial role" in provenance studies. The earliest research on pottery dates to Anna Shepard in 1932. Thin-section petrographic analysis (T-S-P), optical mineralogy (OM), and optical petrography (OP) are flexible techniques that can assist in characterizing textural aspects of clays, vessel, and/or sherds from the analysis of thin sections. Raw clays may naturally contain organic and/or inorganic aplastics, or temper may have been added during processing and/or by the potter during the mixture of different clays. These cultural factors complicate T-S-P and other physicochemical analyses such as INAA (Neff 1992, 1998). Petrographic microscopy is the only technique that can describe individual mineral grains within a vessel or sherd. On the basis of cost-effectiveness, ease of sample preparation, and simplicity of analytical procedure, the petrographic microscope offers the best method for identifying and classifying mineralogical compositions of ceramic pastes and relating these to their respective potential aplastics, especially those of inorganic origins. The thin sectioning of sherds or portions of ceramic artifacts (vessels and figurines) and the study of prepared specimens by petrographic microscopy have been demonstrated to be especially useful when the clay minerals and aplastics of a limited geological or geographical distribution are identifiable within the clay body. In these instances, it is a relatively easier task to locate an area or areas from which, based on clay and/or aplastic and/or mineral temper components, a particular ceramic artifact is most likely to have originated. Reedy (2008) has written the most recent salient assessment on thin-section petrography. Drawbacks include that the technique is destructive of the original object since the analysis of ceramics or lithic material requires a thin section of at least 1 cm^2 for analysis. In addition, there are limitations on mineral

identification, notably that minerals <100 μm in diameter cannot be readily identified, and there are difficulties identifying opaque minerals. However, the procedure has been useful in characterizing ceramic types and wares especially in contexts where comparative petrographic data are lacking – such as in Central Asia (Kolb 2008).

A Summary of Major Provenance Methods

The summary format derives from Tykot (2004) and methodological data from Cilberto and Spotto (2000), Glascock and Neff (2003), Goffer (2007), Hunt, ed. (2017), Lambert (2005), Pollard et al. (2007), Pollard and Heron (2008), and Wilson and Pollard (2001) as well as from a review of provenance studies reported in *Archaeometry* (1957–2017), *Journal of Archaeological Sciences* (1974–2017), and *American Journal of Archaeology* (1960–2017). Other relevant journals that publish provenance studies include *Geoarchaeology: An International Journal* and *Journal of Archaeological Research*.

Examples from the literature are noted.

- *AAS*: Atomic Absorption Spectroscopy or *OES*
  - Materials: stone, ceramics, glass, metals. Analyte: solution.
  - Bulk chemistry: good; trace elements: very good (70+ elements).
  - Superseded in the last decade by XRF.
  - Examples: prehistoric pottery from Oklahoma; Maya ceramics from Guatemala.
- *EPMA*: Electron Probe Microanalysis
  - Materials: stone, ceramics, glass, metals. Analyte: solid.
  - Bulk chemistry: excellent (surface); trace elements: low sensitivity.
  - Similar to SEM which has a higher sensitivity.
  - Examples: stone ballast to elucidate Mediterranean Sea trade routes; vitrified Peruvian wares; ancient Sudanese ceramics; Etruscan pottery.
- *FTIR*: Fourier Transform Infrared Spectrometry
  - Materials: stone, ceramics, glass, metals, organics, burned bone. Analyte: solid.
  - Bulk chemistry: good; trace elements: very good.
  - Examples: southern Ontario chert sources; dyes used on silk (Prussian blue); dyes used on Greek ecclesiastical textiles (sixteenth to nineteenth century); differentiating Italian and Baltic sources of amber; sources of fats and oils used in Greek perfumes; wine residues in amphorae.
- *GC*: Gas Chromatography, *HT-GC* (High Temperature GC), *HT-GS-MS* (HT-MS with Mass Spectrometry)
  - Materials: organics (hair, fur), resins, oils, fats, lipids, esters. Analyte: gas.
  - Some gas chromatographs can be connected to a mass spectrometer which acts as the detector.
  - Examples: sheep hair/wool discerning Scandinavian origins; terpenoid resins identifying Yemeni trade routes; pine resins on Great Basin pottery; Mediterranean Bronze Age perfumes; beeswax in Greek ceramics; bitumen sources used by the Mesoamerican Olmec (1200 BCE); sources of jet artifacts in the United Kingdom.
- *ICP-AES*: Inductively Coupled Plasma (Spectroscopy)-Atomic Absorption Spectroscopy
  - Materials: stone, ceramics, glass, metals, wine. Analyte: solution.
  - Bulk chemistry: very good; trace elements: excellent (a large number of elements).
  - Examples: Aegean obsidian; Nuzi ware from Syria.
- *ICP-MS*: Inductively Coupled Plasma-Mass Spectroscopy
  - Materials: stone, ceramics, glass, metals, serum blood, urine. Analyte: solution.
  - Bulk chemistry: very good; trace elements: excellent (50+ elements); it is replacing INAA.
  - Examples: steatite sources in Crete; Egyptian ceramics; sources of French porcelains; copper alloy artifacts from Tepe Yahya, Iran; Sassanian glass vessels from Iraq.

- *ICP-OES*: Inductively Coupled Plasma-Optical Emission Spectrography
  - Materials: stone, ceramics, glass, metals. Analyte: solution.
  - Bulk chemistry: very good; trace elements: very good.
  - Examples: third millennium BCE Iberian ceramics; East Asian storage jars.
- *INAA/NAA*: Instrumental Neutron Activation Analysis
  - Materials: stone, ceramics, glass, metals, amber. Analyte: solid/powder
  - Bulk chemistry: very few elements; trace elements: excellent.
  - Since 1967 it has been commonly used in provenance analyses and is a powerful quantitative analytical technique with application in a broad range of disciplines including agriculture, archaeology, geochemistry, health and nutrition, and environmental monitoring. Because of its sensitivity, great accuracy and precision, and versatility, the technique is a suitable method for analyzing many different types of samples (Glascock and Neff 2003: 1516; Neff (ed.) 1992). Thousands of analyses have been undertaken on lithics, ceramics, and metals.
  - Examples: widespread use on obsidian artifacts and sources in Mexico, Guatemala, Peru, central and eastern Europe, the Aegean Islands, Sardinia, Turkey, New Zealand, and New Guinea; North American pipestone artifacts; chert sources in Belize; Samoan basalt; Etruscan marble. Commonly used since 1957 in ceramic and clay figurine analyses in the Mediterranean region (e.g., Tarsus, Rhodes, Corinth, Mycenae, Cyprus, and Italy); Samian ware; Basin of Mexico ceramics; Yuan Dynasty porcelains. Sourcing Sassanian silver in Southwest Asia; European blue glass trade beads in Ontario, Canada (c. 1660 CE); pigments in oil paintings (Rembrandt, Vermeer, and Van Dyck).
- *LA-ICP-MS*: Laser Ablation-Inductively Coupled Plasma (Spectroscopy)-Mass Spectrometry, *TOF-LA-ICP-MS* (Time-of-Flight LA-ICP-MS)
  - Materials: stone, ceramics, glass, metals. Analyte: solution.
  - Bulk chemistry: very good; trace elements: excellent, high sensitivity (70+ elements).
  - Requires small samples and leaves minimum scarring on the artifact; see Dusseubieux et al. (eds.) (2016) for details.
  - Examples: used since 2002 to analyze Aegean obsidian artifacts and architectural limestone used in Classic period Teotihuacan, Mexico (200–600 CE). In ceramics: Colonial Mexican pottery; Samoan wares; differentiating Hohokam and Patayan pottery in Arizona. Glass: Near Eastern bead sources (Mesopotamia, Egypt, and Greece); Italian glass mosaic tesserae. Metals: copper alloys at Tepe Yahya, Iran; production loci of Roman coins in Europe.
- *LC*: Liquid Chromatography, LC-MS (LC with Mass Spectrometry)
  - Materials: resins, dyes, sera, blood, oils, fats, lipids, esters, wine. Analyte: liquid.
  - Examples: ancient dyes from the eastern Mediterranean (Tyrian purple from *Murex* sea snails); textile dyes from Southwest Asian Bronze and Iron Ages; the Shroud of Turin; beeswax in the Aegean. LC-MS is effective in characterizing wine residues in Egyptian pottery and beer residues from Southwest Asian ceramics.
- *M/S*: Mössbauer (German: Mößbauer) Spectroscopy
  - Materials: stone, ceramics, glass, metals. Analyte: solid/powder.
  - Similar to NMR spectroscopy, M/S probes minute changes the energy levels of atomic nuclei.
  - Examples: Peruvian ceramics (Moche, Nazca, and Inka).
- *OCL*: Optical Cathodoluminescence
  - Materials: stone, ceramics. Analyte: solid/powder.
  - Bulk chemistry: good; trace elements: very good.
  - Examples: differentiating local from imported Neo-Assyrian palace ware

(934–610 BCE) based on quartz grain analysis.

- *OES*: Optical Emission Spectroscopy or **AES**
  - Materials: metals. Analyte: solid/powder.
  - Bulk chemistry: very few elements; trace elements: fair/good.
  - Examples: copper alloys in Mesopotamia; steel and cast iron in European artifacts.
- *PIXE/PIGME*: Proton Induced X-Ray/Gamma Ray Emission
  - Materials: stone, ceramics, glass, metals, organics. Analyte: solid.
  - Bulk chemistry: very good (surface analysis); trace elements: fair/good
  - Examples: gold and silver coins from Southwest Asia; East Asian storage jars; obsidian from Chiapas, Mexico; South African ostrich eggshell.
- *R/S*: Raman Spectroscopy
  - Materials: stone, ceramics, glass, metals, liquids, gases. Analyte: solid, liquid, gas.
  - Examples: clay types in Argentinian pottery (900–1200 CE).
- *SEM*: Scanning Electron Microscopy, *SEM-EDS* (SEM with X-ray Detector), *SEM-WDS* (SEM with Wavelength Dispersive X-ray Detector)
  - Materials: stone, ceramics, glass, metals, textiles. Analyte: solid.
  - Bulk chemistry: good (semiquantitative); trace elements: none.
  - SEM-EDS has low sensitivity but identifies small inclusions <10 μm in diameter; higher sensitivity with SEM-WDS.
  - Examples: microstructural, microtextual, and sintering analyses of Iberian ceramics (third millennium BCE); Nuzi ware distribution (1600–1200 BCE); origins of sheep hair/wool (Scandinavia and New Zealand).
- *SIRA*: Stable Isotope Ratio Analysis
  - Materials: marble, metal, bone, teeth, organics, lead-based pigments. Analyte: solid/gas.
  - Isotope ratios: C, N, O, S, H, He.
  - Examples: Italian marbles and Aegean sculptural stone.
- *SIR*: Strontium Isotope Ratios
  - Materials: organics, textiles, leather, bone, teeth, shell. Analyte: solid.
  - Isotopes: $^{87}Sr/^{86}Sr$ ratios.
  - Important in reconstructing human and animal migration routes.
  - Examples: sheep hair/wool (Scandinavia); Oaxacan and Gulf Coast migrants to Teotihuacan, Mexico (200–600 CE).
- *TIMS*: Thermal Ionization Mass Spectrometry
  - Materials: stone, metals, glass, bone. Analyte: solid/gas
  - Heavy elements: Pb, Sr, Nd.
  - Examples: Byzantine and early Islamic glass sources (Egypt, Syria, and Palestine).
- *XRD*: X-Ray Diffraction
  - Materials: stone, ceramics, glass, metals. Analyte: solid/powder.
  - Bulk chemistry: excellent (surface analysis); trace elements: very good.
  - Examples: ceramics: Asia Minor terra-cotta figurines; Iranian, Iberian, and Etruscan pottery; Chinese porcelains.
- *XRF*: X-Ray Fluorescence, *ED-XRF* (Energy Dispersive-XRF)
  - Materials: stone, ceramics, glass, metals. Analyte: solid/powder.
  - Bulk chemistry: excellent (surface analysis); trace elements: excellent.
  - Hundreds of studies have been undertaken on lithics, ceramics, glass, and metals. High-precision XRF analysis does not require a nuclear facility and is preferable to INAA in terms of the ease of sample preparation and analytical procedure. The greater effectiveness of high-precision XRF than INAA in this provenance study is a result of the different array of elements measured and the higher precision obtained for certain elements by XRF. Portable (or handheld) X-ray fluorescence (pXRF) spectrometry has become common for the geochemical characterization of obsidian artifacts and ceramics; see Shackley (ed.) (2011) for details.
  - Examples: lithics: andesite (Mid-Atlantic region of the United States); basalt (Neolithic to Roman era millstones in the Mediterranean region); jasper (Japan and

Mid-Atlantic region of the United States); limestone and plaster (Mesoamerican Classic period Teotihuacan and Postclassic Mexica Aztec); obsidian (New Mexico and the Basin of Mexico). Ceramics (since 1999): Tikal, Mexico; southwestern Iran; Attic coral red slips; Rio Grande glaze paint pottery trade; French white earthenwares (1755–1820). Glass: Mesopotamia; Roman glass in Britain; medieval blue soda glass. Metals: Athenian coins; Roman coins in the United Kingdom; cold-worked copper in Upper Great Lakes North America; pewter flatware in Europe (thirteenth to sixteenth century); Ife and Benin West African bronzes; differentiating native North American from European imported copper.

- *XRPD*: X-ray Powder Diffraction
  - Materials: stone, ceramics, glass, metals. Analyte: solid/powder.
  - Bulk chemistry: excellent (surface analysis); trace elements: very good.
  - Examples: crystalline phases of ceramics during firing (Balearic Islands, 1700–850 BCE).

Key Issues and Future Directions

Early provenance studies focused on the use of one or two methods in combination, such as thin-section petrography (T-S-P) and INAA. The literature review indicates that currently up to a half-dozen methods may be employed in combination to answer a variety of questions. A few characterization examples:

- Flint by ICP–SFMS and MC-ICP-MS
- Marble by T-S-P, PIXE, EMPA, and SIRA
- Lime plaster by T-S-P, SEM-EDS, XRF, and LA-ICP-MS
- Clay cooking vessels by T-S-P, XRF, INAA, XRD, and SEM. XRF, ICP-MS, XRD, and EPMA. ICP-AES, SEM, and XRD. T-S-P, SEM-EDS, INAA, R/S, and X-ray (vessel structure) plus replication studies
- Amphorae by T-S-P, XRD, XRF, and EPMA
- Ceramic crucibles by binocular microscopy, T-S-P, XRD, ICP-MS, ICP-AES, SEM
- Organic dyes by SEM-EDX and HT-GC-MS

T-S-P with computerized point counts and SEM-EDS or XRF correlated with pottery forms, surface treatments, and construction methods create a holistic approach to the thin-section analysis. The goal is to understand the advancement of manufacturing techniques, which are built upon the technical discoveries of individual potters and driven by changes in socio-cultural practices, mortuary traditions, and economics (Kolb 2011).

T-S-P is advancing through the scanning of the thin sections and sherd surfaces and adding images to searchable databases. An advantage is that these images include the entire area of the thin section (under low magnification) rather than just a single field of view as under a microscope, facilitating macrotexture studies. An advantage is that the time and expense of thin-section cutting, mounting, and grinding are eliminated, allowing data to be collected on even larger numbers of specimens for rapid characterization (Reedy 2008).

Future refinements are expected in LA-ICP-MS and XRF and work advances on new topics such as characterizing slag inclusions in iron artifacts and distinguishing sources of alloys in metal and constituents in glass. Greater precision is accompanied by the troublesome question: After great time and expense in provenance studies, do scientists provide appropriate and relevant data for archaeological interpretation? Some contend that there is too much data or too precise information (Wilson and Pollard 2001: 515).

Networking sites for scientists and researchers may also be consulted for "provenance in archaeology": *Academia.edu*, *ResearchGate.net*, and *Google Scholar* – <https://www.academia.edu/>, <https://www.researchgate.net/>, and <https://scholar.google.com/>. Current contents (July 2017) list 540, ca. 500, and 101,000 citations, respectively.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry Laboratory at the University of Missouri Research Reactor (MURR)
- ▶ Archaeometry: Definition
- ▶ Bone: Chemical Analysis
- ▶ Ceramics: Scientific Analysis
- ▶ Dating Techniques in Archaeological Science
- ▶ Ethnoarchaeology
- ▶ Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology
- ▶ Geoarchaeology
- ▶ International Symposium on Archaeometry
- ▶ Laboratory for Archaeological Chemistry (University of Wisconsin)
- ▶ Modern Material Culture, Archaeology of
- ▶ Organic Residue Analysis in Archaeology
- ▶ Proton-Induced X-Ray Emission Spectroscopy (PIXE): Applications in Archaeology
- ▶ Scanning Electron Microscopy (SEM): Applications in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Society for Archaeological Sciences (SAS)
- ▶ Textiles and Fabrics: Conservation and Preservation
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Cilberto, E., and G. Spotto. 2000. *Modern analytical methods in art and archaeology*, Chemical analysis series. Vol. 155. New York: Wiley.

Dussubieux, L., M. Golitko, and B. Gratuz. 2016. *Recent advances in laser ablation ICP-MS for archaeology.* Berlin/Heidelberg: Springer.

Glascock, M.D., and H. Neff. 2003. Neutron activation analysis and provenance research in archaeology. *Measurement Science and Technology* 14: 1516–1526.

Goffer, Z. 2007. *Archaeological chemistry*, Chemical analysis. Vol. 170. 2nd ed. Hoboken: Wiley-Interscience.

Hauser, M.W. 2008. *An archaeology of black markets: Local ceramics and economies in eighteenth-century Jamaica*. Gainesville: University Press of Florida.

Hunt, A. 2012. On the origin of ceramics: Moving toward a common understanding of "provenance". *Archaeological Review from Cambridge* 27 (1): 85–97.

Hunt, A., ed. 2017. *The Oxford handbook of archaeological ceramic analysis*. Oxford: Oxford University Press.

Kolb, C.C. 2008. Petrographic analysis of Afghanistan ceramics: Neolithic through the Iron Age. In *Materials issues in art and archaeology VIII*, Symposium proceedings, ed. P. Vandiver, F. Casadio, B. McCarthy, R.H. Tykot, and J.L.R. Sil, vol. 1047, 147–174. Pittsburgh: Materials Research Society.

Kolb, C.C. 2011. *Chaîne opératoire* and ceramics: Classifications and typology, archaeometry, experimental archaeology, and ethnoarchaeology. In *Archaeological ceramics: A review of current research*, British Archaeological Reports international series, ed. S. Scarcella, vol. S-2193, 5–19. Oxford: Archaeopress.

Lambert, J.B. 2005. Archaeological chemistry. In *Handbook of archaeological methods*, ed. H.D.G. Maschner and C. Chippindale, 478–500. Lanham: AltaMira Press.

Marlowe, E. 2016. What we talk about when we talk about provenance: A response to Chippindale and Gill. *International Journal of Cultural Property* 23: 217–236.

Neff, H., ed. 1992. *Chemical characterization of ceramic pastes in archaeology*, Monographs in world archaeology. Vol. 7. Madison: Prehistory Press.

Neff, H. 1998. Units in chemistry-based ceramic provenance investigations. In *Unit issues in archaeology: Measuring time, space, and material*, ed. A.F. Ramenofsky and A. Steffen, 115–127. Salt Lake City: University of Utah Press.

Paynter, S., and D. Dungworth. 2011. *Archaeological evidence for glassworking: Guidelines for best practices*. Swindon: English Heritage. Available at http://www.english-heritage.org.uk/publications/glassworkingguidelines/

Pollard, A.M., and C. Heron. 2008. *Archaeological chemistry.* 2nd ed. Cambridge: Royal Society of Chemistry Publishing.

Pollard, A.M., C.M. Batt, B. Stern, and S.M.M. Young. 2007. *Analytical chemistry in archaeology*, Cambridge manuals in archaeology. Cambridge/New York: Cambridge University Press.

Price, T.D., and J.H. Burton. 2011. Provenience and provenance. In *An introduction to archaeological chemistry*, ed. T.D. Price and J.H. Burton, 213–241. New York: Springer.

Reedy, C.L. 2008. *Thin-section petrography of stone and ceramic cultural materials*. London: Archetype Publications.

Rice, P.M. 2015. *Pottery analysis: A sourcebook*. 2nd ed. Chicago/London: University of Chicago Press.

Sayre, E.V. 2000. Determination of provenance. In *Science and technology in historic preservation*, Advances

in archaeological and museum science, ed. R.A. Williamson and P.R. Nickens, vol. 4, 143–169. New York: Kluwer Academic/Plenum Publishers.
Shackley, M.S., ed. 2011. *X-ray fluorescence spectrometry (XRF) in geoarchaeology*. New York: Springer.
Tykot, R.H. 2004. Scientific methods and applications to provenance studies. In *Proceedings of the international school of physics "Enrico Fermi", course CLIV*, ed. M. Martini, M. Milazzo, and M. Piacenti, 407–432. Amsterdam: IOS Press.
Weigand, P.C., G. Harbottle, and E.V. Sayre. 1977. Turquoise sources and source analysis: Mesoamerica and the southwestern U.S.A. In *Exchange systems in prehistory*, ed. T.K. Earle and J.E. Ericson, 15–34. New York: Academic.
Wilson, L., and A.M. Pollard. 2001. The provenance hypothesis. In *Handbook of archaeological sciences*, ed. D.R. Brothwell and A.M. Pollard, 507–517. Chichester: Wiley.

Public Archaeology and Education: Present Relevance to the Past

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Introduction

Public archaeology can take many forms and, in its most popular ones, aims to bridge the distance between archaeology and people who are not trained in or have had exposure to archaeological practices and their subjects. Within this interaction, education takes center stage, as it is often the goal of such interactions to educate (and at the very least satisfy the curiosity of) the public. In this entry, we will explore several ways in which education is enmeshed in public archaeology, some current debates, as well as potential future directions.

Definition

Public archaeology is any archaeological practice which involves (at the receiving end) audiences and practitioners other than trained and qualified archaeology specialists (cf. the similarly broad definition in Schadla-Hall 1999: 147). This usually (but not always) means that experts create opportunities for or invite collaborations with nonspecialists, not the other way round (i.e. it is usually a top-down approach). I take education to mean here any action which leads a person or group to acquire more knowledge than he/she/they possessed prior to the action and, as is often the case, to consequently change their understanding of a topic or even their worldview and practices. I therefore take public archaeology and education to be the relationship and entanglement of these two types of action (Franklin and Moe 2012 summarize this, helpfully in my opinion, as "archaeological literacy"; and Bartoy 2012 as "teaching *through* archaeology").

Historical Background

Archaeology as a discipline started, to a certain extent, as an educational endeavor. From their very early days, collections of archaeological (together with other) artifacts served to primarily showcase the social and cultural capital of their owners. However, archaeology's first disciplinary steps as the practice of collecting and exhibiting past material were already permeated by a desire to educate either the collector/patron about the past or his/her equals and then wider publics. Such material collections were eventually gradually configured into the holdings of public, private, and university museums. In addition, this desire did not arise only because these publics were thirsty for knowledge themselves but also because collectors and patrons, and eventually local and national governments, saw the public's education in archaeology as a service which they were morally obliged to provide and portrayed themselves as suitable to facilitate or impart it.

In time, this type of public archaeology, largely driven by museum education, diversified. It also began to include volunteering opportunities in the museum sector, public talks, and exhibitions based on public interest (e.g. in nationalist content, seasonal relevance, etc.), as well as

volunteering opportunities in the field, from site tours and community events to excavation participation. Over time, the demographic of the involved publics also broadened. Originally, only the affluent upper and aspirational middle classes entertained archaeological interests in the intellectual context of the museum or the site visit (even the Grand Tour), the latter facilitated by the "great man" or (more seldom) the "great woman." At the same time, the lower classes were engaged with archaeology in either more practical ways (e.g. as excavation workers) or in folkloric practices (e.g. using sites for pasture, local festivities or even worship, cf. Hamilakis 2009). Gradually, however, there was a general tendency for the "opening up" of museums, excavations and archaeological practice more generally on particular occasions or seasons. There was also a tendency for a better public understanding of and desire for heritage to become more widely accessible than it had been previously (for a very good overview, see Schadla-Hall 1999; Bartoy 2012; also Kehoe 2012).

This gradual "democratization" was precipitated by profound political, social, and economic events, which created the right environment for such changes. For example, the nineteenth-century nationalism and state formation in a number of locations worldwide fostered a larger appetite for new excavations, museum exhibitions, talks, and public debate about the past of these territories. Similarly, the two World Wars of the twentieth century C.E., the sociopolitical events of the 1960s and 1970s, the proactive introduction of conservation legislation, and the advent of postmodernism had an immense impact on the (sometimes radical) reconfiguration of national and community identities and especially class systems. They also created new needs and opportunities for education through public archaeology (also see discussion of the North American *Education and Archaeology Work Group* and its agenda in Franklin and Moe 2012).

At the same time, the economics of archaeological research changed significantly. In its early days (but also to some extent until now), archaeology as a discipline was sponsored, much like the arts, by wealthy patrons or governments which saw it as a sociopolitical investment, in the context of the "public service" described above. As both archaeological and public spending paradigms shifted, e.g. due to the different priorities for education, training, and public investment after especially World War II, the patron system largely migrated to the university, museum, charity and local government sectors. It also diversified to operate within a complex network of funding schemes for humanities in general, where archaeology had (and still has) to compete with a number of other "causes." Consequently, public archaeology, apart from its public service persona, had to adapt to a new role: that of a fundraiser in the age of consumerism. In other words, engaging and educating the publics became fundamental to the very existence of archaeological practice, because it meant that educational, humanitarian, and even recreational outputs needed to be seen as worthy of monetary contributions and, conversely, that the public money spent on these now demanded public accountability (cf. Schadla-Hall 1999: 152–153). This shift is also connected to a great degree to the development of mass tourism (cf. discussions in Silberman 2007; Kouri 2012). This directly funds archaeology in a number of ways, as we will see below, and so making the past relevant to the present through public archaeology education ensures the survival of both the artifacts as the subjects of research and of the discipline itself.

Key Issues/Current Debates

Archaeology engages and educates the public in diverse ways. One of those is through experts enabling people outside the archaeological and museological sector to volunteer in e.g. excavations, museum curation, open days, etc. (cf. Bridge Farm [a Romano-British site] excavation open day, Council for British Archaeology 2019). In these cases, the nonspecialists provide help as unskilled resources for the specialists, and, in return, they are trained in (often transferrable) archaeological and museological skills. They also connect with other like-minded people. This is a type of engagement which may be invited by experts, but is more proactively pursued by non-experts.

Another way in which educational engagement happens is through the organization of public talks, excavation and site tours, and school visits, as well as the creation of materials by museum professionals and excavation project directors offline (e.g. site information panels) or online (e.g. websites). In these cases, public archaeology education is actively initiated and pursued by archaeology experts with the intention of communicating their latest finds and research, or little known information, to wider audiences. This might be, as suggested above, in order to raise funds, to provide a public service, or to inspire new generations. Related to this is the presence of archaeology in the current school curriculum in any one country. It can be argued that this is a type of public archaeology education on the basis that it devolves archaeological knowledge to non-experts with the explicit purpose of educating them and of making the past relevant to their present realities. For example, the recent synergy of the Ministry of Culture and the Ministry of Education in Greece (see below) saw the involvement of several experienced archaeology specialists in the composition of high-quality heritage materials for the primary education curriculum, which was conceived (and to some extent implemented) within an interdisciplinary framework. Another example is the community archaeology outreach of Surrey County Council, which enmeshes archaeology into the (UK) national curriculum by going beyond archaeological/historical subjects, e.g. by using it in Math, English, Science, etc. (Surrey County Council 2019).

Public archaeology can also take the form of media presence, including the contribution to or even creation of documentaries, interviews to the press (e.g. local newspapers), social media presence, etc. (cf. Richardson 2013). There may be several reasons for this, and, as such, the educational outcome of this type of engagement is variable. For example, in the case of a heritage interview (cf. Cameron 2014), the educational purpose of the archaeological outreach is more explicit. In contrast, a newspaper interview might involve an archaeologist writing a column about an archaeological matter, offering a public announcement on a current excavation season or reporting on the retrieval of looted antiquities. Although these are less explicit ways in which education is imparted by the act of an archaeologist addressing the public, they do serve to create new knowledge and perhaps attitudes (e.g. about the local historical event, the excavation results, or the ethics of looting archaeological artifacts; cf. discussion on UK legislation and action in Schadla-Hall 1999: 153).

Other ways in which the public face of archaeology might educate in a top-down approach include the opportunities for the public to bring to experts found or inherited artifacts for valuation (several museums and archaeological authorities around the world hold such scheduled or ad hoc sessions). There may also be archaeologist-run workshops on subjects such as pottery dating, archaeological law (e.g. regarding metal detecting practices), and the like. They may even include the involvement of local publics in archaeological bureaucracy (e.g. when acquiring permits for building, collecting, etc.). This, of course, is not necessarily a positive educational experience, and it almost invariably alienates citizens from their archaeological authorities, especially if the bureaucracy involved is cumbersome. However, although it might be considered as perverse to consider archaeological bureaucracy as public archaeology education, I would very much argue in favor of this. Such processes do indeed educate the publics regarding the legal and ethical status of antiquities, as well as invite them to reflect on their own legal, historical, and intellectual relationship with them.

Moving toward less top-down approaches but those still involving archaeological initiative, one may observe that public educational engagement in archaeology can occur in more subtle ways which infiltrate the everyday life of the publics when the latter are not necessarily deliberately seeking archaeological education. Such initiatives might include the exhibition of artifacts, stratigraphy, etc. in public places other than museums, e.g. in the walls and rooms of the Athens Metro (Fig. 1). Urban excavation, very common in big cities with building works (see the recent example of the excavation for the HS2 rail line in London,

Public Archaeology and Education: Present Relevance to the Past, Fig. 1 Archaeology in public spaces. Archaeology (exhibits and stratigraphy) in the Athens Metro, Athens, Greece, June 2009. (All photography by and © of the author, 2009)

UK, Gov.uk 2018), can also be considered as in situ public archaeology education and sensitization of publics regarding history, archaeological method and conservation. Professionally conducted experimental archaeology is another type of such public education. One relevant commendable example has been the recent experimental archaeology carried out in Ukraine regarding the building and especially the experimental burning of the replica of a Neolithic house in the village of Nebelivka (Johnston et al. 2018; Chapman et al. in press [I thank the authors for sharing this]; Chapman and Gaydarska *pers. comm.*). In this particular case, the fieldwork, while primarily archaeological in character, incorporated a multitude of ways in which the local community interacted with the project, its researchers and its activities. Consequently, the local community was involved, and educated, in intentional, unintentional, and definitely meaningful ways.

Museums, galleries, and sites may also be used for non-archaeological reasons, such as hiring for private events (e.g. wedding receptions at the Roman Baths site and museum in Bath, UK) or concerts (e.g. at the galleries of the Acropolis Museum, Athens, Greece). In such cases these publics may also be incentivized to attend such

venues in future on their own and to seek more archaeological information. They certainly learn, in subtle ways, that these museums, galleries, and sites make the past relevant to the present by putting it in the service of modern events of personal or collective importance. Therefore, these heritage venues entwine the lives of modern people with the past in ways which are meaningful beyond the formalized circumstances of an expert-non-expert relationship. The counter-argument, of course, involves ethics and capitalism. Especially in more conservative heritage environments like Greece, antiquities are venerated to an extent (e.g. Hamilakis and Yalouri 1999) as "public right" relics and the fact that museums and archaeological services are in these cases being potentially sacrilegious is problematic. In addition, the use of antiquities as backdrops to (private) economic or other activities can be taken as a prime example of the way in which archaeology is instrumentalized for purely capitalist purposes which are irrelevant to education or heritage (cf. extensive discussions and contributions in Hamilakis and Duke 2007). We should therefore consider what social, ethical, and other repercussions this type of private capitalist normalization of public goods affords.

Public archaeology, and education within it, can additionally happen in the form of adaptations of the past by non-archaeologists, with or without the guidance of experts, i.e. where the initiative lies with the public. One obvious case is that of archaeological educational initiatives undertaken by local archaeological, heritage, educational or other associations and bodies or even by driven individuals. In these cases, education through public archaeology takes place not only in museums, sites, etc., but also in experimental environments (e.g. workshops), public events, invited lectures, the local press, theme parks, etc. (see, e.g., Cretan Thematic Park 2019). However, this type of engagement and education can often produce tensions between the expert and non-expert stakeholders, even though all sides might be well-intentioned. One common reason is that the knowledge produced and consumed under these circumstances is often not controlled or regulated by experts, resulting in competing interpretations of the past, usually utilizing different methodologies. For example, an experimental attempt at (re)creating a Bronze Age boat in Crete, Greece, a few years ago met with controversy between the project leaders (non-archaeologists attempting experimental archaeology) and archaeologists (not consulted and critical of the methods, interpretations, and results of the project; see Simandiraki 2005 for a fuller description; Fig. 2).

More "extreme" cases of archaeological educational initiatives are the public adaptations of what is often termed "fringe archaeologies" (cf. Schadla-Hall 1999: 154–155; Simandiraki-Grimshaw and Stefanou 2012). This is the use and interpretation of archaeological elements (usually artifacts and monuments) by nonspecialists for professional, personal, social, religious, and other reasons. Such practices involve some familiarity with, through study of, the material, but may significantly deviate from official interpretations and uses. These practices may range from the private collection of artifacts (e.g. through metal detecting) and neo-pagan worship (e.g. in archaeological sites or through replicas of ancient artifacts, e.g. Rountree 2006) to conspiracy theories (e.g. alien or ultra-nationalistic interpretations of material culture). Consequently, these types of knowledge, although potentially categorized as public archaeology education (insofar as they constitute archaeological knowledge arrived at by publics who self-educate), often pose a direct threat to the kinds and methods of education that the official gatekeepers of the discipline (certified professionals) espouse and impart.

Other types of adaptations might involve artistic interpretation: an artist or artistic collective may study archaeological artifacts and sites in a more or less systematic way and may thus inform their artistic practice and outputs, in which these archaeological elements are reproduced through particular filters. In this vein, we could consider high-end artistic outputs for art audiences and institutions (e.g. works by Giorgio de Chirico, Fig. 3a) or even more functionalist artistic adaptations, such as imitations of archaeological reconstructions in buildings for official (e.g. Fig. 3b, cf. Σωτηρίου and Πλιάτσικα 2015) or commercial (e.g. Fig. 3c) use.

Public Archaeology and Education: Present Relevance to the Past, Fig. 2 Archaeological initiatives. (**a**) The "Minoa" ship afloat, Chania, Crete, Greece, August 2006; (**b**) the "Minoa" ship in its ship shed (left), together with pupil interpretations of it (right), Chania, Crete, Greece, May 2005. Photography of (**a**) by and © of T. Grimshaw 2006, reproduced here with permission; photography of (**b**) by and © of the author, 2005

Finally, we might consider the educational tropes encountered in public archaeology for public consumption, from state adaptations and uses of material culture to wider commercial goals. For example, in several cases the state issues official documents, such as money or stamps, based on

Public Archaeology and Education: Present Relevance to the Past, Fig. 3 Archaeological adaptations. (**a**) "Piazza Italia," oil on canvas, Giorgio de Chirico, 1913, Art Gallery of Ontario, Toronto, Canada; (**b**) the façade of the Nafplion branch of the National Bank of Greece, Nafplion, Greece, March 2010; (**c**) one of the balconies of the "Platanias Pallas" [sic] restaurant in Platanias, Crete, Greece, June 2004 ((**b**, **c**) both imitate the reconstructed concrete columns from the archaeological site of Knossos, Crete, Greece). Image rights for (**a**) US public domain; photography for (**b**) by and © of the author, 2010; photography for (**c**) by and courtesy of "Platanias Pallas," 2004

archaeological artifacts (Fig. 4a). This practice is the outcome of a process whereby archaeological knowledge is passed onto the people commissioned to make these devices (and therefore affiliated to the state sector in some way), followed by a top-down decision of what

Public Archaeology and Education: Present Relevance to the Past, Fig. 4 Archaeology and public consumption. (**a**) Greek 500 drachma note, 1968 issue, Greece, depicting artifacts from the Eleusis (recto) and Knossos (verso) archaeological sites in Greece, author's personal collection; (**b**) supermarket shelf with "Knossos" ouzo bottles, Chania, Crete, Greece, the label depicting archaeological reconstructions in concrete from the site of the Palace of Knossos, May 2005; (**c**) souvenir shop front, displaying mostly Minoan pottery high-end replicas, Heraklion, Crete, Greece, June 2005. All photography by and © of the author, 2005

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archaeological images and therefore ideas and identities to put in circulation, ultimately followed by the artifacts concerned infiltrating the public domain and eliciting query and interpretation. This process can have multiple aims and outcomes: from the state using official documents to create or enhance its own identity, to the public welcoming the use of (images of) its heritage as presently relevant educational nodes, inviting discussion, appreciation and further study.

Examples of chiefly commercial adaptations of archaeology include (but are not limited to) mass tourism and popular culture. We saw above that public archaeology education happens, among other places, in museums and archaeological sites, where people go voluntarily for education, recreation, edification, socialization, etc. Commercially speaking, this practice is inextricably linked to tourist sales (hotel bookings, travel tickets), heritage ticket sales (museums and sites admissions), the souvenir trade, etc. (cf. Silberman 2007: esp. 181–182). But how do public archaeology and education fit with these? One useful lens through which we can approach these is branding (cf. Holtorf 2007). Archaeology often attracts its publics through public outreach and brands itself as the authoritative provider of associated education and entertainment. By providing information (just facts or more educational opportunities) on websites, tourist guides, advertising, etc., it creates incentives for people to directly or indirectly partake in this type of education. Tourist bookings, which, e.g., take the initiative of including site and museum visits in package holidays even if some of their customers would not automatically do this, deliver such audiences to the archaeology sector. The latter benefits from selling tickets, souvenirs, and other materials to these audiences, directly or indirectly educating them. The local product and souvenir industries provide these audiences with artifacts which are artistic adaptations of differently digested public archaeology education (Fig. 4b, c). These industries benefit from the education of such publics when the latter buy local products and souvenirs invariably not only as recreational artifacts but mainly as tangible aide-memoirs, often for explicitly educational purposes (e.g. to build a collection). An often hidden aspect of this interdependence of sectors is the (sometimes substantial) fee that the makers of souvenirs, guidebooks, tours, alcoholic spirits, etc. must contribute to the heritage sector for the use and, to some extent, interpretation of the relevant material culture. These funds, in turn, are fed into public archaeology education in the form of updated displays, workshops and other events, curriculum provision, tourist advertising, etc. (cf. discussion in Silberman 2007).

As the outputs of all the aforementioned types of public education archaeology can serve different purposes, which may or may not be archaeological, they are not usually judged by how accurately (according to the specialists) they have reproduced the archaeological knowledge gained, but by how they have interpreted the *spirit* of the artifacts, monuments and sites they have used, and so how they contribute to an aesthetic and humanistic dialogue between past and present.

International Perspectives

The author's specialization lies in Greek (especially Bronze Age) archaeology. My experience is also principally rooted in the archaeology, museum and education sectors of Greece and the UK. Consequently, I have been actively involved in practices and debates regarding public archaeology education in both countries. I have also been informed by examples from other countries and heritage sectors through collaborative and research work. From my point of view, therefore, there are a number of examples (in addition to the aforementioned ones) of how the past can or may be made relevant to the present.

As mentioned above, one such example was the recent synergy between the Ministry of Culture and the Ministry of Education in Greece. This was called the "Melina Educational Programmes" (after the late Melina Mercouri, actress, activist and politician). It aimed at a more holistic redesigning of the curriculum, in which archaeological education per se, and as contributions to other subjects, played a vital role. Similar

archaeological education initiatives include educational materials created and events run by museums and archaeological projects with the intention of being integrated to the current school curricula (e.g. the Ashmolean Museum, Oxford, UK; the Acropolis Museum, Athens, Greece; Stonehenge, UK). The educational tropes, approaches and interpretations in such public archaeology pedagogies may be different, depending on the country's archaeological and educational traditions and practices (cf. discussion in Kehoe 2012: esp. 548). For example, there is a clear difference of approach between Greece and the UK in how local heritage is communicated, taught and interpreted. More emphasis is given to local identity in Greece and to multicultural/multitemporal perspectives in the UK. For nonschool learners, public archaeology education in Greece is (or at least has the semblance of) a more top-down process: the heritage sector either imparts knowledge (lectures, guided tours, excavation open days, etc.) or brands such knowledge as the aspirational goal of those who want to be educated archaeologically (e.g. through specialist language in museum displays and media releases). Public archaeology education in the UK is (or at least has the semblance of) a more grassroots process: the heritage sector either aligns itself more often with contemporary topics, especially in order to attract funding from funding bodies, or projects a more "industrialized" image of archaeological practice (cf. contract archaeology), designed to instill in the public a sense of education acquired through scientific labor. In fact, a more integrated heritage-tourism-education model can be discerned in the case of the UK rather than that of Greece (cf. in-depth policy discussion in Kouri 2012), especially as far as funding, cultural sustainability and conservation are concerned.

There are several issues which arise from the educational interaction between archaeology and its publics, and these precisely concern if and how the past is made relevant to the present (cf. McManamon 1991; McGill 2010). These issues, of course, are encountered in a number of countries around the world, but my examples here concern the two countries I am most familiar with. One such issue is whether archaeological educational intentions can (or should) be disentangled from non-archaeological (e.g. political) agendas. The Parthenon/Elgin Marbles, a set of sculptures from the Parthenon in Athens, Greece, is a very famous and still highly controversial example (see "▶ Parthenon (Elgin) Marbles: Case Study", in the entry by Stefanou) which involves the heritage (and politics) sector of Greece and the UK. The two countries have opposing views as to the legal status and therefore rightful home of the artifacts, and so the public educational provision in both countries (museum spaces, school materials, public talks, guidebooks, events, etc.) is skewed toward each country's interpretation.

Another such issue is how publics are educated about or even allowed to shape the relevance of the past to the present. In the case of Greece, excavations or (more seldom) artifacts processed and communicated by archaeology professionals in specific disciplinary ways are taken up and often radically reinterpreted by their publics, creating types of knowledge which directly affect e.g. the site's funding, security, political and social role. This has been the case with the excavation of the site of Amphipolis in Northern Greece. The public education attempts by its archaeologists (in the form of talks, interviews, media releases, high-level site tours, etc.) have fueled a range of public receptions and understandings, almost none of which might have been intended by the experts: the politicization of the site in the Greece-FYROM/North Macedonia debate, its use by ultra-nationalist groups as a banner of Greekness and its (mis)interpretation as a potential burial place for Alexander the Great.

Similarly, in both countries, there have been long-term tensions between the archaeological and religious use of non-Christian monuments, e.g. at Stonehenge (UK) or at the Temple of Olympian Zeus (Athens, Greece). In such cases, the past is made relevant or irrelevant to the present, depending on the site's sociohistorical circumstances. It can be made relevant by agreeing concessions between interpretational disagreements: e.g. the archaeological interpretations of the use of Stonehenge are not necessarily those held by its druids. It can also be made irrelevant by

banning conscious efforts at mutual education: e.g. the archaeologists ignore and condemn neo-pagan worship at the Temple of Olympian Zeus.

Future Directions

The aforementioned examples and discussion raise several questions, which ultimately affect the ways in which we can conceptualize potential future directions of public archaeology education. On the one hand, we would have to survey the desires, goals, and needs of archaeology's stakeholders; on the other hand, we could conceive possible directions which might incur collective benefits.

In order to do this, we first need to ask who owns and can control archaeological knowledge in the case of public archaeology, which, in turn, directly or indirectly funds archaeology as a discipline. An easy answer, especially a few decades ago, would have been "the professionals," perceived to be the experts in what the public (singular) needs. As we have seen in this entry, however, this is no longer a tenable position: there is no such thing as a single public, and the professionals may be aware of (and indeed constrained by) their own methodologies, but they are in need of constant dialogue, especially in this postmodern, pluralistic age. Indeed, a considerable source of tension currently seems to be that the archaeological educational relevance advocated by specialists through official publications, events and outreach (e.g. press releases, site tours) may not necessarily be the relevance desired by publics in *topoi* such as social media, public activities and public debate (e.g. press articles, marches and demonstrations). In addition, is public archaeology and its educational provision always voluntary, or can it also be an involuntary action, and should the latter be regulated? The issue here is really whether the education imparted is distorted or used for different agendas and, consequently, whose standards are being followed (the specialists' or the funding publics'). If we are able to answer these questions, then we will be able to reflect as to the makeup of the body (co) creating educational opportunities, as well as the nature of these opportunities. And if we want to progress public archaeology education in meaningful ways, a more inclusive and interactive synergy is needed, through ethnographic research, consultation, co-curation, etc. (e.g. Bezerra 2005; McGill 2010), without necessarily falling into the trap of relativism or dissolution of archaeological method.

Second, we need to reflect on the goals of public archaeology education. As we have seen above, they can be very varied, depending on how heritage is perceived and legislated, as well as how archaeology and education are practiced around the world. One of the goals is the physical and notional sustainability, stewardship and conservation of archaeological sites and materials. Another is the financial and professional sustainability of the archaeology sector. Yet another is the political instrumentalization of archaeology in the public domain (e.g. in nationalism, activism, etc.). Consequently, is public archaeology education more about manipulated information (i.e. facts and figures) or about pedagogy (i.e. the cultivation of attitudes)?

A number of voices, including this author's, as well as a number of examples discussed above, suggest that the overarching educational desideratum in most cases seems to be how to make the past relevant to the present. There are many ways in which this is currently being implemented, which can be enhanced in the future: outreach, inclusive events, curriculum design, site protection and education about this, new technologies, and reconceptualization of publics and communities (online, cf. Richardson 2013, and offline). Such educational opportunities create local and regional pride, connect people's lives to the past in meaningful ways, build communities, and often change people's worldviews. The latter, I believe, is the most important future direction of public archaeology education. Through informed and collaborative provision (e.g. community service learning, cf. Nassaney 2012, etc.), public archaeology and its pedagogies can truly be forces for social change (cf. Silberman 2007: 190; Little 2012: 405–407). In a world of

social and economic upheaval, "post-truths," and disenfranchisement, an informed and multi-sited archaeological education has the power to provide valuable service. "Archaeological literacy," as Franklin and Moe (2012) put it, can empower us collectively toward critical thinking and historical insights (Batroy 2012: 564), toward an understanding of the human condition, and toward community building, inclusivity and pluralism (social, national, cultural, etc.). It can thus enable us to safeguard our past, comprehend our present, and plan for our future.

Cross-References

► Parthenon (Elgin) Marbles: Case Study

References

Bartoy, K.M. 2012. Teaching *through* rather than *about*: Education in the context of public archaeology. In *the Oxford Handbook of Public Archaeology*, ed. R. Skeates, C. McDavid, J. Carman, and B. Little, 552–565. Oxford: Oxford University Press.

Bezerra, M. 2005. Make-believe rituals: Reflections on the relationship between archaeology and education through the perspective of a group of children in Rio de Janeiro, Brazil. *Archaeologies: Journal of the World Archaeological Congress* 1 (2): 60–70.

Cameron, A. 2014. Working as a finds liaison officer for South and West Yorkshire – An interview with Amy Downes. *The Post Hole* 38: 13–17.

Chapman, J., Gaydarska, B., Nebbia, M. and S. Johnston. in press. A good death: the life and times of an experimental Neolithic house and its reception in the village of Nebelivka, Co. Kirovograd, Ukraine.

Council for British Archaeology. 2019. Festival of archaeology, Bridge Farm excavation open day. https://festival.archaeologyuk.org/events/bridge-farm-excavation-open-day-1552575826. Accessed 26 Mar 2019.

Cretan Thematic Park. 2019. http://www.cretanthematicpark.com/about-us/information.aspx. Accessed 28 Mar 2019.

Franklin, M.E., and J.M. Moe. 2012. A vision for archaeological literacy. In *The Oxford Handbook of Public Archaeology*, ed. R. Skeates, C. McDavid, J. Carman, and B. Little, 566–580. Oxford: Oxford University Press.

Gov.uk. 2018. HS2 begins archaeology work exploring over 10,000 years of British history. https://www.gov.uk/government/news/hs2-begins-archaeology-work-exploring-over-10000-years-of-british-history. Accessed 11 Nov 2018.

Hamilakis, Y. 2009. Indigenous Hellenisms/indigenous modernities: Classical antiquity, materiality, and modern Greek society. In *The Oxford Handbook of Hellenic Studies*, ed. B. Graziosi, P. Vasunia, and G. Boys-Stones, 19–31. Oxford: Oxford University Press.

Hamilakis, Y., and P. Duke, eds. 2007. *Archaeology and Capitalism: From Ethics to Politics*. Walnut Creek: Left Coast Press.

Hamilakis, Y., and E. Yalouri. 1999. Sacralising the past: Cults of archaeology in modern Greece. *Archaeological Dialogues* 6 (2): 115–135.

Holtorf, C. 2007. *Archaeology Is A Brand! The Meaning of Archaeology in Contemporary Popular Culture*. Oxford: Archaeopress.

Johnston, S., A. Diachenko, B. Gaydarska, M. Nebbia, P. Voke, K. Bondar, V. Litkevych, and J. Chapman. 2018. The experimental building, burning and excavation of a two-storey Trypillia house. In *Materiality and Identity in Pre- and Protohistoric Europe, Homage to Cornelia-Magda Lazarovici*, ed. S. Țurcanu and C.E. Ursu, 397–434. Suceava: The Bucovina Museum, Suceava, Karl A. Romstorfer Publishing House.

Kehoe, A.B.. 2012. Public education in archaeology in North America: The long view. In *The Oxford Handbook of Public Archaeology*, ed. R. Skeates, C. McDavid, J. Carman, and B. Little, 537–551. Oxford: Oxford University Press.

Kouri, M. 2012. Merging culture and tourism in Greece: An unholy alliance or an opportunity to update the country's cultural policy? *The Journal of Arts Management, Law, and Society* 42: 63–78.

Little, B.J. 2012. Public benefits of public archaeology. In *The Oxford Handbook of Public Archaeology*, ed. R. Skeates, C. McDavid, J. Carman, and B. Little, 395–413. Oxford: Oxford University Press.

McGill, D. 2010. The public's archaeology: Utilizing ethnographic methods to link public education with accountability in archaeological practice. *Archaeologies: Journal of the World Archaeological Congress* 6 (3): 468–484.

McManamon, F. 1991. The many publics for archaeology. *American Antiquity* 56 (1): 121–130.

Nassaney, M.S. 2012. Enhancing public archaeology through community service learning. In *The Oxford Handbook of Public Archaeology*, ed. R. Skeates, C. McDavid, J. Carman, and B. Little, 414–442. Oxford: Oxford University Press.

Richardson, L. 2013. A digital public archaeology? *Papers from the Institute of Archaeology* 23(1).10: 1–12.

Rountree, K. 2006. Performing the divine: Neo-pagan pilgrimages and embodiment at sacred sites. *Body & Society* 12 (4): 95–115.

Schadla-Hall. 1999. Editorial: Public archaeology. *European Journal of Archaeology* 2 (2): 147–158.

Silberman, N.A. 2007. 'Sustainable' heritage? Public archaeological interpretation and the marketed past. In *Archaeology and Capitalism: From Ethics to*

Politics, ed. Y. Hamilakis and P. Duke, 179–193. Walnut Creek: Left Coast Press.
Simandiraki, A. 2005. Minoan archaeology in the Athens 2004 Olympic Games. *European Journal of Archaeology (EJA)* 8 (2): 157–181.
Simandiraki-Grimshaw A., and E. Stefanou, eds. 2012, *From Archaeology to Archaeologies: The 'Other' Past*. British Archaeological Reports (BAR) International Series 2409.
Surrey County Council. 2019. How archaeology fits into the National Curriculum. https://www.surreycc.gov.uk/culture-and-leisure/archaeology/education-and-archaeology/how-archaeology-fits-into-the-national-curriculum. Accessed 26 Mar 2019.
Σωτηρίου, Θ.Θ., and Β. Πλιάτσικα. 2015. Η επίδραση της μινωικής και μυκηναϊκής τέχνης στο έργο του αρχιτέκτονα Νικόλαου Ζουμπουλίδη. *Ιστορία της Τέχνης* 4: 66–83.

Public Archaeology, The Move Towards

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Introduction

One of the most evident changes brought by the reflexive turn in archaeology is perhaps the move towards public archaeology. Although in its inception public archaeology was primarily related to educational concerns and efforts to attain public outreach (McGimsey 1972; Stone and Molyneaux 1994; Jameson 1997), in recent years it has become more complex to define. This slipperiness has to do with the fact that, as an umbrella term, public archaeology now encompasses a wide array of concepts and purposes (Schadla-Hall 1999; Merriman 2004a; Matsuda and Okamura 2011). This turn towards public archaeology, thus, can be better characterized by a gradual and explicit involvement of archaeology practitioners in different and intertwined levels of educational, political, governmental, and ethical issues. In this sense, it relates to and involves concepts such as development, heritage, applied archaeology, and community archaeology.

Definition and Historical Background

The term public archaeology attained recognition in the early 1970s with Charles R. McGimsey's publication with this very title (McGimsey 1972). Then, it was mainly meant to address the dangers of destruction of archaeological remains, raise broader awareness about this problem, and support legislative efforts aimed at protecting them (Schadla-Hall 1999). The increasing pressures of development, observed mainly in the United States and European countries, posed a challenge to professionals and state institutions as they were increasingly confronted with the destruction and loss of historical and archaeological heritage. The rise of independent archaeological contractors, as well as the participation of some universities in the development process, provided some means to mitigate such destruction and gave rise to Cultural Resource Management (CRM) or contract archaeology. Known also as heritage management and archaeological resource management, one of the main tenets of CRM archaeology was the preservation of past remains, conceived as a resource belonging to societies (MacManamon and Hatton 2000). The past, henceforth, came to be seen as a public right pertaining to the interests of the whole society (Carman 2002; Merriman 2004b). As observed by Smith (2004: 6), although the equal accessibility and significance to all comers implied by the term "resource" was subsequently challenged, the prolific efforts to develop outreach and educational programs and prevent the destruction of archaeological remains also contributed to make the subject relevant to a broader audience. Additionally, scholars drawing from critical theory emphasized that a reflexive stand oriented to reinforce stakeholder communities' civic and proactive engagements with the past should be paramount to public archaeology (Leone et al. 1995; Little and Shackel 2007).

In any case, the term public archaeology began to take its current shape with the involvement of archaeology in public debates, traversing the borders of traditional academic archaeology, to respond to public interests about the past. The rationalist and political neutrality of scientific discourse, prevalent in the discipline during most of

the 1960s and 1970s, was fiercely challenged in the early half of the 1980s. Theoretically, factions of the post-processual movement in archaeology, strongly influenced by feminist and Indigenous discourses, challenged the authority and ethics of representation of the "other" and echoed the cultural critique about the hegemony of the Western academy (Wylie 1982; Hodder 1986; Pels 1999); most of these critiques called for a more inclusionary archaeological interpretation, in which Indigenous peoples and different local communities and stakeholders could participate (Layton 1989; Hodder et al. 1995). Following the controversies that arose as a result of the creation of the World Archaeology Congress (WAC) in 1986, a much more politicized world emerged for archaeology (Ucko 1987; Shanks 2004).

Authors such as Michael Shanks and Christopher Tilley (1992) and Mark Leone and colleagues (Leone et al. 1987, 1995), for example, emphasized the need for a critical appraisal of the interrelationship between archaeology and politics and to understand the power relations established discursively through historical and archaeological knowledge (see also McGuire 2008). Advocating for an inclusion of the different emerging voices, then, these contributions set an interpretive movement that came to call into question the prevalent authority over the past held by the discipline. With the advent of politics of identity and recognition, the past became a realm of contestation in which a variety of contemporary interests became interweaved. Thus, steering public archaeology in new directions, the reflexive turn established by an overt critique to objectivity, rationalism, and scientific archaeology coalesced with the politics of cultural recognition and provided the basis for a more inclusive debate, raising issues and categories such as identity, ethnicity, and so forth.

Key Issues/Current Debates

The move towards public archaeology has brought a new array of themes and topics to the discussion about archaeological practice and theoretical consideration. Prominent in the current debate related to this recent turn in the archaeological inquiry are the discussions about transnationalism, tourism, sustainable development, commodification of cultural resources, and global–local relationships (Smith 2006). The impact that this reflexive trend had on archaeological practice can be scrutinized at least in two interrelated aspects: collaboration and heritage. On the one hand, emanating from various angles, critiques to academic authority pushed archaeologists to reconsider their position as the only stewards of the past and prompted them to engage in collaborative programs with a wide array of Indigenous and local communities (Faulkner 2000; Colwell-Chanthaphonh and Ferguson 2010; Gnecco and Ayala 2011). Thus, a more nuanced perspective about public archaeology, although still involving educational and legislative aspects, now incorporates ethical concerns and acknowledges that the practice of "scientific archaeology" can no longer be the only authoritative voice about the past. Moreover, in investigating the past, archaeologists need to be aware about social, "racial," political, and other tensions emerging from dissonant interpretations of the past; the practice of public archaeology, therefore, also incorporates components of ethics and socio-political accountability.

On the other hand, although still concerned about protecting the past, public archaeology now actively engages in issues related to the management of sites through a nuanced understanding of cultural and archaeological heritage. Heritage, as a concept, has recently made its way to the core of archaeological theory. Closely related to the politics of recognition mentioned above, the concept of heritage has recently opened a new and vigorous debate, expanding the considerations of what constitutes the public and, therefore, what public archaeology or archaeological practice should entail. The involvement of different communities of stakeholders that stepped forward to express interests or concerns about archaeological sites and archaeological discourse constituted a new challenge for the discipline (Russell 2006; Smith 2006). Barbara Bender's (1998) seminal work about the emblematic archaeological site of Stonehenge provides an exemplary approach to

the analysis of the historically dynamic contexts that stakeholders (including archaeologists) can become involved in. Eluding the essentialist thought that commonly portrays Indigenous peoples and descendant communities as the only "other voices" that come forward to question archaeology, Bender's work also reflects on the formation of new groups of stakeholders and the politics that surround them. By the same token, critical awareness about the decisions, interpretation, and management of cultural and archaeological heritage acquired global connotations through the increasing myriad of stakeholders as well as a burgeoning tourist industry related to the consumption of the past.

This global trend of cultural consumption closely relates to a process of shrinking of distances which – fueled by a burgeoning and constant flux of peoples, goods, information, and capital – consolidated globalization as a phenomenon with a wide array of economic, cultural, and political implications worldwide. For many, globalization meant the standardization of culture as well as economics, with the consequent establishment of a single dominant and global cultural order; however, contradicting the fears of homogenization predicted as part of the effects of globalization, the blooming of cultural diversity set under the auspices of multiculturalism amounted to define tourism as one of the key themes in archaeological theory (Merriman 2002; Meskell 2005). Consequently, archaeologists have started to turn their attention to the relationship of the discipline with the heritage and tourism industries. Related to this current trend, tourism and cultural recreation have become central to archaeologists as the public increasingly demands the articulation of new narratives about the past (Holtorf 2005).

As heritage or cultural tourism consolidates as one of the most important global industries (Urry 2002), the interest in archaeological heritage has gradually increased over the last few decades. With a burgeoning demand of cultural consumption fostered by an exponentially increasing flux of capital and peoples, tourism promoted archaeological heritage to new dimensions. Additionally, the gradual involvement of different stakeholders and local communities in heritage issues brought up several concerns regarding property and propriety of heritage. Archaeologists, in this sense, have been pushed to explore ever more complex and intertwined relationships involving individuals, communities, states, and global agencies at different scales. Local understandings of heritage values, however, as demonstrated by different scholars, can differ significantly from those parameters conceived as universal. The past, once aptly depicted as a "foreign country" (Lowenthal 2003), became the arena in which active – and sometimes dissonant – social constructions continuously take place through heritage and tourism and, therefore, have opened new lines of debate regarding its ownership and stewardship (Smith 2006).

International Perspectives

Arguably, then, heritage tourism has become one of the most profitable industries of recent decades and a global force that increasingly extends its branches throughout the world (Hoffman et al. 2002; Higueras 2008). As part of this global trend in which archaeological heritage is now involved, the heritage industry included in the core of developmental policies of global organizations such as the World Bank has been endowed a reputation of being a determinant factor for economic growth, especially for developing countries (Meskell 2005; Lafrenz 2008). Whereas it is often argued that heritage can play a significant role in overcoming economic adversities, less is said about its detrimental effects on local communities. While some argue for the necessity of making useable pasts, as something that can be assessed to provide economic profitability, others question the beneficiaries of these profits (Lafrenz 2009). As the expectations of tourism and heritage industries have risen, the attempts to attain the inscription of sites in the prestigious World Heritage Site list by different country parties have also escalated. A large percentage of recent nominations, related to the aforementioned search for economic growth, have to do with the fact that the attempt to gain such a reputable designation

will help to promote heritage sites as marketable tourist sites.

In this sense, with an exponential number of new local sites and museums that now compete to attain some recognition while others focus on maintaining their high profiles and well-preserved statuses, the values and principles for such recognitions and other tenets heralded by global organizations are being called into question. Questioning the set of values that have commonly been used to define cultural and archaeological heritage, some archaeologists now actively work to emphasize local views and values regarding the past (Faulkner 2000). Challenging previous top-down perspectives that were mainly concerned with a rather monumental and conservationist view of archaeological heritage, the intervention of new stakeholders established the need for archaeologists to understand the emergence of new relationships between local interests and global demands (Hodder 2003). Whereas international agencies and organizations such as UNESCO, ICOMOS, and WHC had advanced important contributions to deal with issues deeply affecting cultural heritage, such as looting and trafficking of archaeological remains, a new approach to heritage also emphasizes ethical concerns pertaining to cultural property and human rights (Brodie et al. 2000; Brodie and Walker 2002; Silverman and Fairchild Ruggles 2007).

In this scenario, as heritage has become the axis where these contemporary social understandings and active constructions of the past come together, public archaeology confronts a wide array of challenges in its efforts to engage with different communities and stakeholders. Related to this, by drawing away from conservative approaches to heritage, public archaeology has also highlighted the importance of including different criteria and considerations, other than those defined by the World Heritage Convention in the definition of valuable heritage sites (Cleere 1996; Lafrenz 2008). As a result, heritage organizations and state agencies have been compelled to take into consideration a more dynamic and diversified understanding in which cultural and heritage value could be also related to political restitution or economic leverage and well-being. Nonetheless, although different countries have adopted the globally sponsored efforts towards the recognition of their Indigenous peoples, for many of these populations, to attain such recognition implies a compliance with guidelines of authenticity in order for them to prove cultural and genealogical continuity so that they may be conferred with the rights to cultural ancestry (Clifford 1988; Hale 1999).

Thus, some of the questions still to be addressed regarding the intersection of public archaeology and tourism are related to the new power relationships and cultural dynamics provoked by the commodification of cultural heritage. For instance, the demand for authentic experiences related to this global trend of cultural consumption has commonly driven heritage managers, cultural planners, and tourism-related policy makers to resort to the use of archaeological discourse to recast "authentic" – or rather essentialist – views of culture (Castañeda 1996; Benavides 2004; Hamilakis 2008). This is particularly the case for Indigenous peoples and other historically marginalized communities that, related to their cultural and political struggle, opt or are compelled to resort to heritage and cultural tourism as strategies to boost their economies (Meskell 2005; Lafrenz 2008); in this sense, Indigenous peoples remain commonly represented as passively reproducing a colonial imaginary in the realm of heritage. Furthermore, it has been generally the case that most of the countries whose archaeological heritage is administrated by state and centralized agencies not only tend to emphasize its economic importance for local development, as part of their policies, but also – and primarily – to reify it as the legitimate roots of nationhood (Rowan & Baram 2004; Hamilakis 2008). Therefore, despite the fact that these strategies have prompted a successful public recognition of multiple ethnic groups, which is one of the reasons why they became widely adopted as part of different state policies, they also exert powerful constrains and fixities determined by the very demands posed by consumption.

Different collaborative projects between local communities and archaeologists have, therefore,

been caught up in a series of paradoxes. On the one hand, collaborative projects struggle to protect archaeological sites and to confront the destructive threats of development and sometimes, ironically, even harmful effects of tourism; as it was noted, "cultural tourism can pose a significant challenge to the management of heritage sites, as visitors can have positive and negative impacts, and increased visitation means increased responsibility, especially in terms of on-site safety" (Smith & Burke 2007: 239). On the other hand, public archaeology projects that involve working with economically disadvantaged communities often involve efforts relating to political empowerment and identity issues as well as attempting to orient their efforts to promote heritage tourism opportunities as part of these communities' social and economic sustainability. In that sense, the move towards public archaeology needs to be understood as an ongoing process in which the practice of archaeology itself becomes reconfigured. It comes as no surprise that public archaeology, as part of its response to these new challenges, has adopted and stressed the importance of a rather involved take on the politics surrounding the conceptualization of the audiences towards whom our work is directed, which – at its turn – implies a strong reflexive slant towards ethics.

Future Directions

The objectives of public archaeology largely remain framed within the original goals, namely, committed to reaching broader and more diverse audience whose needs and demands regarding the past can be advanced and supported by the work of archaeologists. As part of this, public archaeology is still concerned with the protection and preservation of archaeological heritage and seeks to provide adequate management plans to respond to tourism global needs, for instance, while keeping the balance between tourism expectations and the carrying capacity of archaeological sites. Nonetheless, public archaeology is also becoming increasingly involved in collaborative efforts to yield more inclusive considerations of local perceptions of the past, as part of the categorization of archaeological sites as global tourist destinations. Practitioners involved in public archaeology are also aware that such categorization cannot be fulfilled by any standardized set of practices nor unique codes or universal paradigms. Arguably, the present times are characterized by highly politicized contexts in which claims to heritage and identity, however controversial, are part of a struggle for power and still rely very heavily on discourses about the past. Regardless of the aforementioned paradoxes, or perhaps precisely because of them, public archaeology is gradually moving to include developers and tourist operators, as well as state agencies, educational partners, and legislators as part of the equation (Hoffman et al. 2002: 31). Therefore, it can be said that what public archaeology now faces is an urgent need to reconsider previous notions of what has been understood by "the public," in order to achieve even wider conceptualizations.

In this sense, if one contends that public archaeology is mainly meant to take care of the public interest in the past, then it will also be necessary to acknowledge the impossibility of considering a general, single, and homogeneous public (McGuire 2008: 86–7). It follows from here that archaeologists need to keep considering who this public is – or rather, who the different audiences we are addressing and responding to are – and the ways in which it/they become constituted, as well as to recognize the effects, influences, and contentions fostered by a burgeoning process of globalization upon the public's interests in the past. It is crucial, therefore, to take into account the power relationships displayed between micro and macro levels (stakeholder communities, state agencies, and global organizations or corporations) and the way national or global entities' decisions and actions equally impact archaeological resources and upon the different audiences' criteria of value and importance of the past. In order to advance its goals and attain a fully fledged engagement of archaeology with the different stakeholders and constituencies interested in the past, it will be necessary to weave all those parameters into some of the common

themes that have, thus far, characterized public archaeology. Then, any education outreach projects oriented to the valuing of the past (and its preservation), as well as any attempt to use archaeology as an effective way to overcome economic imbalances or prompt political action by lobbying for recognition of previously disenfranchised communities, will need to make sense of the conditions and differences in which these activities are going to be carried out as part of this engagement.

Cross-References

- ▶ Community Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values and Education
- ▶ Heritage: Public Perceptions
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ "Public" and Archaeology
- ▶ Public Humanities and Cultural Heritage
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management
- ▶ World Heritage and Human Rights

References

Benavides, H. 2004. *Making Ecuadorian histories: Four centuries of defining power*. Austin: University of Texas Press.

Bender, B. 1998. *Stonehenge. Making space*. Oxford/New York: Berg.

Brodie, N., J. Doole, and P. Watson. 2000. *Stealing history. The illicit trade of cultural material*. Cambridge: MacDonald Institute for Archaeological Research.

Brodie, N., and K. Walker, eds. 2002. *Illicit antiquities. The theft of culture and the extinction of archaeology*. London: Routledge.

Carman, J. 2002. *Archaeology and heritage: An introduction*. London: Continuum.

Castañeda, Q. 1996. *In the museum of Maya culture. Touring Chichén Itzá*. Minneapolis: University of Minnesota Press.

Cleere, H. 1996. The concept of 'outstanding universal value' in the World Heritage Convention. *Conservation and Management of Archaeological Sites* 1: 227–233.

Clifford, J. 1988. *The predicament of culture: Twentieth-century ethnography, literature, and art*. Harvard: Harvard University Press.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2010. *Collaboration in archaeological practice*. Lanham: Altamira Press.

Faulkner, N. 2000. Archaeology from below. *Public Archaeology* 1 (1): 21–33.

Gnecco, C., and P. Ayala, eds. 2011. *Archaeology and indigenous peoples in Latin America*. Walnut Creek: Left Coast Press.

Hale, C. 1999. Travel warning. Elite appropriations of hibridity, mestizaje, antiracism, equality, and other progressive sounding discourses. *The Journal of American Folklore* 112 (445): 297–315.

Hamilakis, Y. 2008. The nation and its ruins. In *Antiquity, archaeology, and national imagination in Greece*. Oxford: Oxford University Press.

Higueras, A. 2008. Cultural heritage management in Peru. Current and future challenges. In *Handbook of South American archaeology*, ed. H. Silverman and B. Isbell, 1073–1088. New York: Springer.

Hodder, I. 1986. The politics and ideology in the World Archaeological Congress 1986. *Archaeological Review from Cambridge* 5: 113–118.

Hodder, I. 2003. Archaeological reflexivity and the "local" voice. *Anthropological Quarterly* 76 (1): 55–69.

Hodder, I., M. Shanks, A. Alexandri, V. Buchli, J. Carman, J. Last, and G. Lucas, eds. 1995. *Interpreting archaeology. Finding meaning in the past*. London: Routledge.

Hoffman, T., M. Kwas, and H. Silverman. 2002. Heritage tourism and public archaeology. *SAA Archaeological Record* 2 (2): 30–32,44.

Holtorf, C. 2005. *From Stonehenge to Las Vegas*. Walnut Creek: Altamira.

Jameson, J. 1997. *Presenting archaeology to the public: Digging for truths*. Walnut Creek: Altamira Press.

Lafrenz, K. 2008. Value and significance in archaeology. *Archaeological Dialogues* 15 (1): 71–97.

Lafrenz, K. 2009. Trajectories of development. International heritage management of archaeology in the Middle East and North Africa. *Archaeologies: Journal of the World Archaeology Congress* 5 (1): 68–91.

Layton, R. 1989. *Conflict in the archaeology of living traditions*. London: Unwin Hyman.

Leone, M., P. Potter, and P. Shackel. 1987. Toward a critical archaeology. *Current Anthropology* 28 (3): 283–302.

Leone, M.P., M. Creveling, L. Hurst, B. Jackson-Nash, H. Jones, H. Jopling, G. Logan Kaiser, and M. Warner. 1995. Can an African-American historical archaeology be an alternative voice? In *Interpreting archaeology. Finding meaning in the past*, ed. I. Hodder, M. Shanks, A. Alexandri, V. Buchli, J. Carman, J. Last, and G. Lucas, 110–124. London: Routledge.

Little, B., and P. Shackel. 2007. *Archaeology as a tool of civic engagement*. Lanham: Altamira Press.

Lowenthal, D. 2003[1985]. *The past is a foreign country*. Cambridge: Cambridge University Press.
MacManamon, F., and A. Hatton, eds. 2000. *Cultural resource management in contemporary society. Perspectives on managing and presenting the past*. London: Routledge.
Matsuda, A., and K. Okamura. 2011. Introduction: New perspectives in global public archaeology. In *New perspectives in global public archaeology*, ed. K. Okamura and A. Matsuda, 1–18. New York: Springer.
McGimsey, R.C., III. 1972. *Public archaeology*. New York and London: SPCK Publishing.
McGuire, R. 2008. *Archaeology as political action*. Berkeley: University of California Press.
Merriman, N. 2002. Archaeology, heritage and interpretation. In *Archaeology. The widening debate*, ed. B. Cunliffe, W. Davis, and C. Renfrew, 541–566. Oxford: The British Academy.
Merriman, N. 2004a. Introduction. Diversity and dissonance in public archaeology. In *Public archaeology*, ed. N. Merriman, 1–17. London: Routledge.
Merriman, N., ed. 2004b. *Public archaeology*. London: Routledge.
Meskell, L. 2005. Sites of violence: Terrorism, tourism, and heritage in the archaeological present. In *Embedding ethics*, ed. L. Meskell and P. Pels, 123–146. Oxford: Berg.
Pels, P. 1999. Professions of duplexity. *Current Anthropology* 40 (2): 101–136.
Rowan, Y., and U. Baram, eds. 2004. *Marketing heritage: Archaeology and the consumption of the past*. Walnut Creek: Altamira Press.
Russell, I., ed. 2006. *Images, representations and heritage: Moving beyond modern approaches to archaeology*. New York: Springer.
Schadla-Hall, T. 1999. Editorial: Public archaeology. *European Journal of Archaeology* 2 (2): 147–158.
Shanks, M. 2004. Archaeology/politics. In *The Blackwell companion to archaeology*, ed. J.L. Bintliff, 490–508. Oxford: Blackwell.
Shanks, M., and C. Tilley. 1992. *Re-constructing archaeology. Theory and practice*. 2nd ed. London: Routledge.
Silverman, H., and D. Fairchild Ruggles, eds. 2007. *Cultural heritage and human rights*. New York: Springer.
Smith, C., and H. Burke. 2007. *Digging it up down under. A practical guide to doing archaeology in Australia*. New York: Springer.
Smith, C., and H. Burke. 2004. *Archaeological theory and the politics of cultural heritage*. London: Routledge.
Smith, L. 2006. *Uses of heritage*. London: Routledge.
Stone, P., and B. Molyneaux, eds. 1994. *The presented past. Heritage, museums, and education*. London: Routledge – English Heritage.
Ucko, P.J. 1987. *Academic freedom and apartheid: The story of the World Archaeological Congress*. London: Duckworth.
Urry, J. 2002. *The tourist gaze*. 2nd ed. London: Sage.
Wylie, A. 1982. The interpretive dilemma. In *Symbolic and structural archaeology*, ed. I. Hodder, 18–27. Cambridge: University of Cambridge Press.

Further Reading

Baram, U., and Y. Rowan. 2004. Archaeology after nationalism: Globalization and the consumption of the past. In *Marketing heritage: Archaeology and the consumption of the past*, ed. Y. Rowan and U. Baram, 3–24. Walnut Creek: Altamira Press.
MacManamon, F., A. Stout, and J. Barnes, eds. 2008. *Managing archaeological resources: Global context, national programs, local actions*. Walnut Creek: Left Coast Press.
Okamura, K., and A. Matsuda, eds. 2011. *New perspectives in global public archaeology*. New York: Springer.
Schadla-Hall, T. 2006. Public archaeology in the twenty-first century. In *A future for archaeology: The past in the present*, ed. R. Layton, S. Shennan, and P. Stone, 75–82. London: Cavendish Publishing Limited.
Stottman, M.J., ed. 2010. *Archaeologists as activists: Can archaeology change the world*. Tuscaloosa: The University of Alabama Press.

Public Education and Archaeology: Disciplining Through Education

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Introduction

In 1994, Brian Molyneaux suggested that one of the most obvious, yet critical, functions of archaeology for society was education (Molyneaux 1994: 3; see also Stone 2004; Willcock 2004). Since then, the pairing of archaeology with education has gained considerable ground; so much so that while the term "public education" may not necessarily come to mind for all scholars and practitioners working within the field, most will hold an implicit familiarity with its central tenets via their connections to outreach, community archaeology, social inclusion, or public participation. This is because all of these concepts – and the practices they reflect – emerged out of a broader social movement that prompted archaeologists to start thinking about, reflecting upon, and dealing with the complex relationships between "the

discipline" and "the public." As with other attempts to engender public participation and support, education operates as a powerful point of connection between scholars, practitioners, politicians, and a vast variety of stakeholders and interest groups. A useful consequence of this arrangement has been the burgeoning of a range of learning tools, public presentations, "archaeology weeks," festivals, and volunteering opportunities. Yet despite the proactive language often used to describe this area of development, it is important to remember that it can play out in a number of ways, not all of which are positive.

Definition

Archaeology can tell people a great deal not only about human experiences in the past but in the present, too (Henson 2011). It is, by its very nature, educative. Despite this, not a great deal of critical attention has been channeled towards archaeological education as a subject of enquiry in and of itself – with the exception of sustained work by Don Henson, John H. Jameson, Peter Stone, and, more recently, Yannis Hamilakis. What, then, is implied by the heading "Archaeology within Public Education?" To be clear, in this context, the term "public education" does not refer in any way to the classification of a school as it might in the UK, the USA, or Australia. Rather, it refers to the intersection of a broad spectrum of educative activity with the general public. The term "education" can loosely be described as a process of producing and disseminating knowledge. More sharply defined, it denotes a number of different types of learning, beginning with compulsory schooling, vocational learning, and further education, all of which are captured by the category *formal education* and take place within schools, colleges, and universities. To this can be added *extra-formal learning*, which refers to those who opt to extend their knowledge by participating in less formal classes and courses offered by learning institutions. In the UK alone, Don Henson (2011: 219) estimates that there are somewhere in the region of 15,000 people enrolled in these sorts of formal or extra-formal archaeology courses.

Despite these numbers, the forms of learning most commonly associated with the term "public education" in archaeology are those that fall into the categories of *informal learning*, *non-vocational learning*, and *lifelong learning*, which are united in their association with a "practical knowledge tradition which stresses direct experience" (Livingstone 2001: 3). This is the nub of archaeology within public education. Although the most stereotypical example undoubtedly remains the on-site excavation, these categories of learning produce a plethora of educative experiences, including guided walks, school visits, live interpretation, outreach, storytelling, landscape assessments, artifact handling, work placements, popular publications, programs designed to accommodate public participation, public presentations, heritage open days, fairs, historical societies, and collaborative projects. Recent additions to the fold are things like museum displays and their interpretation, which have come to be envisaged as powerful learning tools in recent museology literature. Less likely to spring to mind when one thinks about public education are self-directed activities such as volunteering; though not obvious, these sorts of activities are nonetheless important learning experiences within the field. Brenner (2016: 6), for example, recognizes experiential pedagogic practices to be an area where around 70% of effective learning is done, compared to only 30% in classroom or mentor-based education. Like formal education, at the core of these activities is the production and dissemination of knowledge.

There is, however, a second, more muted, aspect to education – both formal and informal – that must also be accommodated within its definition; that is, knowledge, once produced and disseminated, goes on to perform particular social, cultural, political, religious, or economic roles in wider social life, based upon how it fits with different identities and their respective access to power and resources. Education, whether public or otherwise, is thus also political. Whether one is referencing high school curricula or a program of lifelong learning, it is always possible to peel away the initial layers concerned with course outlines, content, timetabling, assessment, or delivery and glimpse the deeper ideological currents.

Indeed, as Yannis Hamilakis (2004: 295) points out, choices are made, and those choices say something about issues of power, value, and assumption, all of which in turn are revelatory of a society's underlying social structures and the political persuasions of the day. These sorts of arguments are applicable not only in countries where a form of repressive government might already be anticipated but in progressive and democratic countries, too. In the UK, for example, archaeological- and heritage-based public education outlets may have embedded within them assimilatory messages that align with either New Labour's agenda of social inclusion or the more recent Conservative government's attempts to foster national cohesion, both of which are implicitly fuelled by a fear of difference (Waterton 2010). In this scenario, particular narratives of the past, along with their associated cultural symbols, may be foregrounded in museum displays or other interpretative devices because of their ability to facilitate national identity formation and thus support a certain kind of citizenship. At the same time, other educational institutions may bend the same narratives in such a way as to inspire emancipatory thinking. Either way, the point here is that public education cannot simply be accepted as universal, stable, or, indeed, always necessarily "good" (Lewis 2009).

Historical Background

Countries such as the UK and the United States have a relatively long history of promoting archaeology within public education, a point best explained by the arrival of an ethically engaged program of stewardship in both countries in the 1960s and 1970s, which is today associated with the terms "archaeological heritage management" in the UK and "cultural resource management" in the USA. An important and lasting consequence of this has been the conceptual and theoretical shift felt within the archaeological discipline, which led to a questioning of the legitimacy of its assumed claims to knowledge and control over the past. This, along with the growing intensity of market-driven policies and tropes of accountability, triggered an increase in the acknowledgment of the public's right to be consulted and involved.

In the USA, where archaeology is strongly influenced by anthropological traditions, the relationship between the two was cemented at the governmental level, with the US National Park Service, the US Bureau of Land Management, the US Department of the Interior, and the US Army Corp, for example, all implementing programs or projects aimed at developing public involvement in archaeological activity. A useful example of one such project is that of *Project Archaeology*, a collaboration of the US Department of the Interior, Bureau of Land Management and Montana State University, which is an education program for "everyone interested in learning or teaching about our nation's rich cultural legacy and protecting it for future generations to learn from and enjoy" (*Project Archaeology* website). A focus upon archaeology's educative capacity developed in the 1970s and, as Laurajane Smith (2004: 90) points out, can be attributed to a number of concerns. First and foremost, however, American archaeologists at that time were troubled by the public image of archaeology and sought to redefine the discipline (Smith 2004). From early on in the USA, public archaeology has manifested a reflexive and self-aware ethics towards Indigenous rights and the capacity of education to empower (Richardson and Almansa-Sánchez 2015). From this emerged an emphasis on notions of "common" heritage and public "good," to which archaeological scholars responded by highlighting the discipline's need for a duty of care and responsibility towards a range of publics. As Matsuda and Okamura (2011: 2) have pointed out, this impetus was heavily influenced by debates between processual and postprocessual thinking in North American archaeological circles at the time.

The Council for British Archaeology, founded in 1944 with the slogan "archaeology for all," is a prime example of historical agitation for archaeological education at the institutional level in the

UK, evidenced particularly by the establishment of the Young Archaeologists' Club in 1973 (Henson 2011: 220). Since then, a range of reports and policy documents have emerged that foreground education within the sector, including *A Common Wealth: Museums in the Learning Age* (1997) and *Opening Doors: Learning in the Historic Environment* (2004). It is important to acknowledge the political climate that continues to surround such developments in the UK, particularly the influence of the New Labour government (1997–2010) and their policy platform of social inclusion. Here, the turn to ideals of public value, issues of access, and a democratization of learning had a powerful effect on the way archaeology was conceptualized at the governmental level, evidenced in part by conferences such as *Heritage for All* and *Capturing the Public Value of the Past* and in policy position papers such as *The Historic Environment: A Force for Our Future*. In turn, these policies, specific to archaeology, heritage, museums, or the historic environment, can be traced to a broader impulse within the UK towards learning, as captured by documents such as *Learning Works: Widening Participation in Further Education* (1997), *Further Education in the New Millennium* (1998), and *Learning for the 21st Century* (1997).

At the more global level, a historical injunction towards public education can be traced through a number of policies and publications. The European Convention on the Protection of the Archaeological Heritage (Valetta Convention), revised in 1999, is a case in point, as illustrated by Article 9, "Promotion of Public Awareness," which explicitly references education and public opinion. Likewise, the Ename Charter of 2002 highlights the importance of interpretation at cultural heritage sites as an educational resource. Finally, a third example can be drawn from the more recent European Landscape Convention (2004), widely referenced by archaeologists and heritage scholars working across Europe, which prioritizes education and public awareness in Chap. II, Article 6 of the Convention. All three can be intertextually linked to broader European Union initiatives, such as the Lifelong Learning Programme: Education and Training Opportunities for All, established in 1997 by the European Commission, and the Strategic Framework for European Cooperation in Education and Training 2020, developed in 2009. Finally, it is worth noting that the World Heritage Centre also operates an educative strand, which includes the international network, Forum UNESCO: Universities and Heritage, and the World Heritage Education Programme, launched in 1994 (for further information on the World Heritage Education Programme, please visit http://whc.unesco.org/en/wheducation/). These have culminated more broadly in a 2015 priority area for the United Nations International Commission on Financing Global Education Opportunity, which seeks to widen participation for the "Learning Generation" in order to reduce the skills gap between low-income and high-income countries around the world.

Key Issues/Current Debates

Although many of the debates and issues observed within the arena of public education have much in common with those that surround "community archaeology," "ethics," and the "politics of display," they are worth reiterating here as education is one of the most public and – importantly – authoritative domains through which archaeological knowledge is communicated (Hamilakis 2004: 296). A key reason for its prevalence in these debates is that "education" is often argued to be a vital avenue through which particular messages about the past are passed onto the public, thus touching upon topics of power, control, and authority (see Smith and Waterton 2009; Waterton 2010). A number of commentators have created models that capture the way education figures within the wider remit of archaeology, such as Nick Merriman and Cornelius Holtorf, though it should be noted that their explanations are aimed at public archaeology more generally. For example, Merriman (2004) introduces the

"deficit model" and the "multiple perspectives model," with public education playing a significant role in the former by virtue of its ability to *inform*. The "deficit model" foregrounds the role of the expert in encouraging public understanding of a scientifically endorsed past, while the "multiple perspectives model" recognizes that public experiences of their past should guide the archaeologist to augment the stimulation and enrichment that heritage already offers the public. This roughly accords with Holtorf's (2007) "education model" and "public relations model," both of which similarly rest upon a unidirectional flow of information from archaeologist to public. Quite distinct from these essentially closed processes are Merriman's "multiple perspective model" and Holtorf's "democratic model," both of which open up the dialogical relations such that communication – between archaeologists and the public – becomes two way. As Matsuda and Okamura (2011: 13) have recently argued,[f]rom this viewpoint, archaeological education does not differ much from engagement with different pasts, in that both approaches need and encourage dialogues between archaeologists and members of the public.

That said, there is still a tendency to assume an educational stance that veers closer to the "deficit model" or "public relations model" within the archaeological discipline. Certainly this is the case at the policy level, although these days there are an impressive array of case studies that can be drawn upon to suggest otherwise, some of which are detailed below. Those case studies aside, it can be argued that at the broader level, individuals and groups that stand outside of the discipline are rarely given a role in defining messages about the past; rather, they are seen as recipients of said information. Public education, in this guise, becomes something that is done *for* the public instead of something that is done *with* them. Holtorf, building upon an argument originally posited by John Cole in 1980, remarks that this sort of approach to teaching people about the past becomes little more than a branding exercise, through which the fostering of a belief in the necessity of its preservation in turn fosters a belief in the necessity of the discipline itself (Holtorf 2007: 155; see also Simpson 2009). Nowhere has this been more powerfully argued than in Denis Byrne's article *Buddhist Stupa and Thai Social Practice*, in which he states:

[t]he call for public education has been a recurrent theme in the literature of archaeological heritage management (Byrne 1991), where both Western and non-Western archaeologists see it as an antidote to 'indifference' and 'apathy' towards the fate of archaeological sites. Posited here, implicitly, is an infantile condition: prior to education a void exists in the public's mind where knowledge of and respect for the material past should be (Byrne 1995: 278).

As Byrne (1995: 278) goes on to argue, "multiple and mature discourses on the material past already exist in the space archaeology depicts as a void. What archaeology intends, really, is not education but re-education."

Current debates about public education in archaeology are thus inclined to push for the development of alternative ways of thinking about this relationship. Here, in particular, overlaps between education debates and those occurring in broader public archaeology debates can be seen. Like Holtorf's (2007) "democratic model," for these debates the trick lies with changing the channels of communication and inserting the notion of "politics" into the equation. As Matsuda and Okamura (2011: 10) point out, the process becomes less about moving clusters of information from one domain into the next and more about appreciating that the past is understood – and *used* – differently by different social groups. What this means in practice is that there can never be one single education model and certainly not one that attempts to impose ideas onto the public. Indeed, in some scenarios, social groups will seek out archaeological education because understanding the past is central to a larger social justice claim. Here, the role of education would be a collaborative one, geared towards facilitating social, cultural, or political recognition and, perhaps, access to particular social or political resources. In other scenarios, social groups may be seeking a relaxing day out, a pleasurable experience far removed from those struggles for identity that often characterize social justice claims.

Here, the role of education may well be an instructive one, which brings with it an increased awareness of a particular aspect of the past. Either way, the role of education is a powerful one, and the archaeological discipline must remain mindful and respectful of that.

International Perspectives

Despite the above concerns, a number of useful and positive examples from the United Kingdom and Europe can be showcased here. A wealth of archaeological digs and training programs are offered across Europe (e.g., in Spain, Greece, Italy, Macedonia, Portugal, Cyprus, and the Netherlands), many of which encourage participation from not only those enrolled in formal education but also those engaged in practices of informal and self-directed learning. Biskupin, an Iron-Age reconstruction site in Poland, is a good example of the utilization of archaeology for public education. The archaeological museum associated with the site offers a range of lessons and experimental opportunities for interested parties and organized school visits, as well as both smaller- and large-scale festivals. In Norway, a process of informal education is undertaken by participants associated with local history societies, who develop and maintain signposted cultural landscape trails that detail archaeological features (Jones 2007). These same societies are also involved in the formulation of local history walks, such as the Heimdal Local History Society in Trondheim, which arranges an annual walk that showcases the memories and experiences of older and long-established residents in the area (Jones 2007). A particularly fascinating example of the educative benefits of archaeology are highlighted by *Operation Nightingale*, a military initiative coordinated by the *Defence Archaeology Group* (DAG) to aid in the rehabilitation of injured service-people. This initiative has conducted a number of projects, including the Barrow Clump project and the Marne Barracks excavation (see Sherlock 2017). While the communality of archaeological fieldwork is one important way to reduce isolation, Winterton (2014) reflects that learning the meticulous practice of excavation also brings therapeutic benefits, supports aspiration, and resituates curiosity in activities that complemented a military skillset.

A range of government institutions have a vested interest in the issue of public education in the UK, too, such as the Department for Culture, Media and Sport, the Department for Education and Skills, the Commission for Architecture and the Built Environment, the National Trust, English Heritage, the Portable Antiquities Scheme, and the Council for British Archaeology. In the UK context, it is possible to see clearly the interrelations between broader social policy and archaeology, particularly if one looks at the influence of the various permeations of policies aimed at alleviating disadvantage, such as the Educational Priorities Areas instigated in the UK in the 1960s, which can be glimpsed in the more recent policies of social exclusion (Smith et al. 2007). These were a form of "positive discrimination" aimed at prioritizing areas characterized by economic depression and associated issues of social exclusion. An area targeted by this and similar policies is Moston in Greater Manchester, an outcome of which has been the "I Dig Moston" archaeology project, which began in July 2005 and is now often referred to as "Dig Manchester." This runs in conjunction with the University of Manchester and Manchester Museum and was initially initiated by a local archaeological and local history group. It is supported by the Heritage Lottery Fund and the Manchester City Council. In terms of public education, this initiative extends to school groups, community groups, and the general public and includes archaeological training in excavation techniques, finds analysis, geophysical survey, family history, and heritage trails (for further information on the Dig Manchester project, please visit http://www.digmanchester.org.uk/). More than this, the project aims at tackling deeper structural politics and realizing positive change. More recently, the Shoreditch Park community archaeology excavation, funded by the Big Lottery Funds' "Their Past Your Future" program and managed by the Museums, Libraries and Archives Council, the Hackney Council, and Shoreditech Trust, provided opportunities for lifelong learners

and schools to engage with WWII, local history, and the practices of archaeology (Simpson and Williams 2008).

In wider, non-Anglophone regions, archaeology and public education debates have often been entangled in the politics of postcolonialism and Indigenous self-determination, development, and heritage tourism. In Afghanistan, for instance, the National Museum in Kabul is playing an educational role in public diplomacy, with an awareness among practitioners that culture and history are indispensable in moving towards social and political unification and the formation of a peaceful identity (Remsen and Tedesco 2015). Here, education through the museum must carefully plot a course between building a national identity and representing volatile and politically diverse identities. The museum exhibition is also a forum for health education, as illustrated by the example of participatory exhibition development in Malawi, a country where the effectiveness of hospital attendance suffers from negative public perceptions. McKew (2015) worked with local communities near the Queen Elizabeth Hospital in Blantyre (Malawi) during workshops to assess the needs and perceptions of the hospital environment and to share their knowledge and interests around themes such as blood, diseases, drugs, vaccines, and DNA. A hands-on, interactive exhibition was designed around seven questions that participants had asked, such as how a vaccination works and malaria facts. In this instance, such collaborative educational exercises witnessed an improvement in perceptions about the approachability of hospitals for participants. But beyond development, museums have also become sites of cross-cultural reconciliation, spurred by critical postcolonial aims. An excellent example is the Museum of Kapuas Raya in Indonesia, which Van Hout (2015) describes as having an "in-betweenness" to its exhibition which emerges as a kind of hybrid, a careful conversation between Indonesia's colonial past with the Netherlands and its contemporary identity politics. What this means, therefore, is that the educational capacities of the museum, as it explores this postcolonial dialogue, are inherently dynamic.

Future Directions

Although research and commentary papers on the role of education in archaeology have started to emerge, there still remains a dearth of literature that critically and specifically engages with this topic. This is particularly the case outside the Anglophone sphere of Europe, Australia, and the United States (Almansa-Sánchez 2015). Not only are the formal institutions that offer archaeology education ripe for inspection but so too are the ways in which the discipline is spliced together with the public. Never has this been clearer than in today's rapidly changing social and political climate. Add to this the new roles played by the Internet and other technologies such as interactive multimedia, video, animation, virtual reality, simulations, and computer-mediated communication – what opens up is thriving intellectual space for innovative, challenging, and sustained dialogue about the place and shape of archaeology within public education.

Cross-References

► Community Archaeology
► Public Archaeology, The Move Towards

References

Brenner, L. 2016. *Driving career results: How to manage self-directed employee development*. Old Tappan: Pearson Education.

Byrne, D. 1995. Buddhist stupa and Thai social practice. *World Archaeology* 27 (2): 266–281.

Byrne, D. 1991. Western hegemony in archaeological heritage management. *History and Anthropology 5*: 269–76.

Hamilakis, Y. 2004. Archaeology and the politics of pedagogy. *World Archaeology* 36 (2): 287–309.

Henson, D. 2011. The educational purpose of archaeology: A personal view from the United Kingdom. In *New perspectives in global public archaeology*, ed. K. Okamura and A. Matsuda, 217–225. New York: Springer.

Holtorf, C. 2007. Can you hear me at the back? Archaeology, communication and society. *European Journal of Archaeology* 10: 149–165.

Jones, M. 2007. The European landscape convention and the question of public participation. *Landscape Research* 32: 613–633.

Lewis, N. 2009. Education. In *International encyclopaedia of human geography*, ed. R. Kitchin and N. Thrift, 389–395. Oxford: Elsevier.
Livingstone, D.W. 2001. Adults informal learning: Definitions, findings, gaps and future research (WALL working paper 21). Available at: https://tspace.library.utoronto.ca/bitstream/1807/2735/2/21adultsinformallearning.pdf. Accessed 7 Jan 2012.
Matsuda, A., and K. Okamura. 2011. Introduction: New perspectives in global public archaeology. In *New perspectives in global public archaeology*, ed. K. Okamura and A. Matsuda, 1–18. New York: Springer.
McKew, R. 2015. Health education and participatory exhibition development in Malawi. In *Museums, heritage and international development*, ed. P. Basu and W. Modest, 211–228. London: Routledge.
Merriman, N. 2004. Introduction: Diversity and dissonance in public archaeology. In *Public archaeology*, ed. N. Merriman, 1–17. London: Routledge.
Molyneaux, B. 1994. Introduction: The represented past. In *The presented past: Heritage, museums and education*, ed. P. Stone and B. Molyneaux, 1–13. London: Routledge.
Remsen, W.C.S., and L.A. Tedesco. 2015. US cultural diplomacy, cultural heritage preservation and development at the National Museum of Afghanistan in Kabul. In *Museums, heritage and international development*, ed. P. Basu and W. Modest, 96–121. London: Routledge.
Richardson, L.-J., and J. Almansa-Sánchez. 2015. Do you even know what public archaeology is? Trends, theory, practice, ethics. *World Archaeology* 47 (2): 194–211.
Sherlock, S.J. 2017. Excavations at Marne Barracks, Catterick, North Yorkshire, SE 254 970. *Yorkshire Archaeological Journal* 89 (1). https://doi.org/10.1080/00844276.2017.1333350.
Simpson, J. 2009. Community archaeology under scrutiny. *Conservation and Management of Archaeological Sites* 10 (1): 3–16.
Simpson, F., and H. Williams. 2008. Evaluating community archaeology in the UK. *Public Archaeology* 7 (2): 69–90.
Smith, L. 2004. *Archaeological theory and the politics of cultural heritage*. London: Routledge.
Smith, L., and E. Waterton. 2009. *Heritage, communities and archaeology*. London: Duckworth.
Smith, G., T. Smith, and T. Smith. 2007. Whatever happened to EPAs? Part 2: Educational priority areas – 40 years on. *Forum* 49 (1 & 2): 141–156.
Stone, P. 2004. Introduction: Education and the historic environment into the twenty-first century. In *Education and the historic environment*, ed. D. Henson, P. Stone, and M. Corbishly, 1–10. London: Routledge.
Van Hout, I. 2015. Museum Kapuas Raya: The in-between museum. In *Museums, heritage and international development*, ed. P. Basu and W. Modest, 170–187. London: Routledge.
Waterton, E. 2010. *Politics, policy and the discourses of heritage in Britain*. Basingstoke: Palgrave Macmillan.
Willcock, D. 2004. Kilmartin house trust. In *Education and the historic environment*, ed. D. Henson, P. Stone, and M. Corbishly, 213–219. London: Routledge.
Winterton, S. 2014. From the army medical centre to operation nightingale: My entry into archaeology. *Journal of Community Archaeology and Heritage* 1 (3): 245–247.

Further Reading

Henson, D., P. Stone, and M. Corbishly, eds. 2004. *Education and the historic environment*. London: Routledge.
Holtorf, C. 2007. Can you hear me at the back? Archaeology, communication and society. *European Journal of Archaeology* 10: 149–165.
Jameson, J.H., ed. 1997. *Presenting the archaeology to the public: Digging for truths*. Walnut Creek: Altamira Press.
Little, B.J. 2002. *Public benefits of archaeology*. Gainsville: University of Florida Press.
Merriman, N. 2004. *Public archaeology*. London: Routledge.
Okamura, K., and A. Matsuda, eds. 2011. *New perspectives in global public archaeology*. New York: Springer.

Public Humanities and Cultural Heritage

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Brief Definition of the Topic

Public humanists – public historians, oral historians, folklorists, curators and museum educators, public art administrators, cultural media producers, and cultural policy planners, as well as cultural heritage workers – encourage the public's participation in the creation of meaning about history, art, and culture. They do this in many ways: sometimes as mediators between the academy and the public, interpreting the work of scholars for the public, sometimes as facilitators of public engagement with culture, and sometimes

producing cultural work on behalf of communities. Public humanists work with academic humanists, communities, community cultural organizations, and individuals to explore, preserve, understand, and make use of cultural heritage, values, beliefs, knowledge, and traditions, promoting a shared examination of culture, art, and history to encourage civic engagement.

Public humanists, like workers in the cognate fields of public anthropology and public sociology, strike a balance between serving as translators for the work of academic humanists, on the one hand, and as the spokespeople for the cultural work of communities, on the other. The work of translation (or serving as public intellectuals themselves) represents a traditional approach to the field. Serving as spokespeople for communities, or in Gramsci's term, as organic intellectuals, represents the other end of the spectrum. Most public humanists position themselves somewhere in between these extremes, preferring words like "engagement" to describe their interaction with the public. They provide ways to connect academic and public knowledge, thus creating new understandings.

Public humanities provides a theoretical framework for work in cultural heritage and an expertise useful for balancing and merging academic, community, and personal cultures. Its focus on community serves to put the work of cultural heritage into a larger context by framing heritage as part of the ongoing, contested, creation of meaning about the past and about contemporary culture. It connects cultural heritage to the lives and memories of community members and to community institutions, as well as to academic work. It can open up discussion of community, too often taken as given in cultural heritage work, by asking questions about the nature of community and the relationship of community and culture.

Public humanities can also provide a broader understanding of culture, allowing for greater integration of intangible and tangible cultural heritage with current concerns by subsuming heritage under the heading of community cultural production. Its focus on public engagement and on sharing authority with communities grounds cultural heritage work in cultural policy and ongoing cultural production. And its insistence on the role of community institutions encourages community building that creates longer-term sustainability for cultural heritage work.

Cross-References

► Cultural Heritage and Communities
► Cultural Heritage and the Public
► Heritage and Public Policy
► Public Archaeology, The Move Towards

References

Bate, J., ed. 2010. *The public value of the humanities*. London/New York: Bloomsbury Academic.

Commission on the Humanities. 1980. *The humanities in American life: Report of the commission on the humanities*. Berkeley: University of California Press.

Hylland Eriksen, T. 2006. *Engaging anthropology: The case for a public presence*. Oxford/New York: Berg.

Sommer, D. 2014. *The work of art in the world: Civic agency and public humanities*. Durham: Duke University Press.

Public Involvement in the Preservation and Conservation of Archaeology

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Introduction

In the 1970s and 1980s, archaeology began to enlist the knowledge and interest of the public. Today, community participation in archaeological activities and engaging the interest of the public is widely seen as a necessary and useful way to enhance preservation and protection of historical resources and to generate enduring public support for archaeology. Involvement of the non-professional public as participants and volunteers in background and archival research, survey, and excavation and as oral history/local knowledge

informants, spokespersons, and youth and school program facilitators is widespread, and there is an understanding in the discipline that the goals of public involvement in archaeology can be guided to the best effect by professional archaeologists.

Since archaeological resources cannot by their nature "belong" to a living person and because most projects are supported by public funds, archaeologists have a duty to make discoveries available to the public in museums and other venues such as on-site tours, television, newspaper and magazine articles, movies, blogs, and websites, as well as actively engaging the public in hands-on activities when possible.

Definition

Public archaeology is archaeology undertaken with, for, and, or about the general populace. A. Matsuda and K. Okamura aptly define public archaeology as a "subject that examines the relationship between archaeology and the public, and then seeks to improve it" (2011: 4). Within the ever-expanding definition of public archaeology, there are many subfields: archaeological investigations undertaken for the public, archaeological investigations undertaken with the support of the public, archaeological policies, public education and archaeology, politics and archaeology, archaeology and the antiquity market, ethnicity and archaeology, public involvement in archaeology, archaeology and the law, the economics of archaeology, and cultural/heritage tourism and archaeology (Merriman 2004: inside cover). Involving the public(s) in all aspects of the archaeological process enriches the archaeological study and the public(s). It is thus a reflexive process and one that ultimately can make archaeology more relevant to the public.

Key Issues/Current Debates/Future Directions/Examples

The Global Emergence of Public Archaeology

In the United States, the *Antiquities Act of 1906* ensured that archaeological materials on lands under the stewardship of the federal government would provide public benefit by requiring that all artifacts located on public land be donated to a museum. *The National Historic Preservation Act of 1966 (NHPA)*, the *National Environmental Policy Act of 1969 (NEPA)*, and the *Native American Grave Protection and Repatriation Act (NAGRPA)* each contain a legal requirement for public involvement. Prior to the 1970s, however, archaeologists themselves generally avoided public involvement in excavation and interpretation. In 1972, Charles McGimsey coined the term "public archaeology" stating that there is no such thing as "private archaeology" (1972: 5). Beginning in 1975, the city of Alexandria, Virginia became the first US municipality to establish a city archaeology program, and in 1977 Pamela Cressey became city archaeologist. Alexandria archaeology has from its early days included the public in all aspects of excavation and interpretation including public participation through volunteer work, education in the museum, and outreach activities (Cressey 2005: 22).

In 1981, University of Maryland archaeologist Mark Leone began Archaeology in Annapolis, a public archaeology program and field school which incorporated public archaeology training into the traditional field school format for the first time. Field school students were taught to give tours and interpret findings to the public as a routine part of their training (Leone and Potter 1984).

In 1983, Baltimore Mayor William Donald Schaefer, realizing that archaeology could be used as a powerful tool to bring tourists to a struggling city neighborhood, utilized archaeology as community political activism for the first time. The author, a city archaeologist, hired a theater director to teach crewmembers how to script and present tours to the public. Volunteers of all ages were welcomed and trained to excavate as well as participate in all aspects of the investigation. Press events including in-flight magazine articles, almost daily newspaper articles and television news coverage, a daily radio show, and a front page article in the *Wall Street Journal* (Lubin 1985) brought public archaeology to a heretofore unknown level of exposure and spawned similar

programs across the country (Comer 1998: 12). Thirty years later public involvement in the archaeological process is considered essential. By the fourth quarter of the twentieth century, countries such as Britain, Canada, and Australia were following a parallel course, adding their own innovations. In 1993, Britain's Channel 4 began airing *Time Team*, a weekly series following a team of archaeologists digging a different site each week. The series attracted a large and passionate audience in the UK and overseas. In Australia, the movement toward greater public involvement in archaeology moved to the forefront of archaeological issues (MacKay and Karskens 1999: 110).

As one might expect, "public archaeology has developed neither uniformly nor equally in every country" (Matsuda and Okamura 2011: 7). Around the world, archaeologists are linking what had been a purely academic field to the fascination that the general public has with the past. In some countries, archaeology has become well integrated with the general education provided to students. For example, in Japan, the public, and especially school students, enthusiastically participate in activities at on-site visitors centers, which include opportunities for students to make a replicas of artifacts and contribute to the interpretative process.

Archaeologists throughout the world are innovating, devising and testing methods to involve the public. Public archaeology is thus "a commitment made by archaeologists to making archaeology more relevant to contemporary society" (Matsuda and Okamura 2011: 4). Public archaeology provides a unique opportunity for non-archaeologists to connect with the past. Successful public archaeology programs have demonstrated broad appeal in various age groups and ethnicities (Cressey 2005; Leone and Potter 1984; Comer 1998). It is clear that public archaeology programs can develop local, regional, national, and international constituencies for archaeology and deepen an understanding of the need to protect archaeological sites through conservation and preservation.

Cross-References

- ▶ Avocational Archaeology
- ▶ Community Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Heritage Outreach
- ▶ Heritage Tourism and the Marketplace
- ▶ Leone, Mark P.
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ McGimsey III, Charles R.
- ▶ Plimoth Plantation: Public Archaeology
- ▶ "Public" and Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Public Humanities and Cultural Heritage

References

Comer, E. 1998. Politics, publicity and the public: Urban archaeology in the public eye. In *Young hands on the past – Archaeology education for grades K-12*, ed. K. Smardz and S. Smith. New York: AltaMira Press.

Cressey, P. 2005. Community archaeology in Alexandria, Virginia. In *Unlocking the past: Celebrating historical archaeology in North America*, ed. L.A. De Cunzo and J.H. Jameson Jr., 1–17. Gainesville: University of Florida Press.

Leone, M., and P. Potter. 1984. *Archaeological Annapolis: A guide to seeing and understanding three centuries of change*. Annapolis: Historic Annapolis Foundation.

Lubin, J. 1985. Archaeologist digs in Baltimore, helps city unearth its past. *Wall Street Journal*, 25 February 1985, D1, D22.

MacKay, R., and G. Karskens. 1999. Historical archaeology in Australia: Historical or hysterical? Crisis or creative awakening? *Australasian Historical Archaeology* 17: 110–115.

Matsuda, A., and K. Okamura, eds. 2011. *New perspectives in global public archaeology*. New York: Springer.

McGimsey, C.R. 1972. *Public archaeology*. New York: Seminar Press.

Merriman, N., ed. 2004. *Public archaeology*. New York: Routledge.

Further Reading

Little, B., ed. 2002. *The public benefits of archaeology*. Gainesville: University of Florida Press.
Moshenska, G., and S. Dhanjal, eds. 2011. *Community archaeology: Themes, methods and practices*. Oxford: Oxbow Books.
North, M. 2007. Protecting the past for the public good: Archaeology and Australian heritage law. Unpublished Ph.D. dissertation, University of Sydney.
Sabloff, J. 2008. *Archaeology matters: Action archaeology in the modern world*. Walnut Creek: Left Coast Press.
Schadla-Hall, T., ed. 2000 – present. *Public Archaeology* (journal). Leeds: Maney Publishing.
Simpson, F., and H. Williams. 2008. Evaluating community archaeology in the UK. *Public Archaeology* 7: 69–90.
Zimmerman, L. 2003. *Presenting the past*. Lanham: AltaMira Press.

"Public" and Archaeology

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Introduction and Definition

Construction works appeal people all over the world. In Mediterranean Europe, a typical image is that of a group of old people organizing improvised gatherings to talk behind the fence that protects public works. This kind of works is called "public" because they are funded by the money contributed by citizens, that is, society. Yet they are also public because these activities have their public, as any artistic performance or installation that takes place in the space of sociability par excellence of modernity: the street. The prevalent notion of public has much to do with this image: a passive audience, who is separated from the events by a visible or invisible barrier and is happy consuming whatever is offered to them. However, one of the meanings of "public," according to the Oxford English Dictionary, has deeper implications: "*concerning* the people as a whole."

Key Issues

From Spectator to Stakeholder

From Renaissance antiquarianism, archaeology has traveled a long way to become a scientific discipline and to accept that it has a responsibility toward its public. Thus, during the phase of institutionalization of archaeology as an academic discipline during the second half of the nineteenth century, an elite of intellectuals contributed, from universities and museums, to legitimize the bourgeois nation-state through teaching, writing scholarly books and articles, and developing regional and national museums. During this period, archaeology's main strategy of communication with society was the so-called educative model (Holtorf 2007a: Chapter 6, 2007b). This model was based on the communication of the results of scientific research to a learned public, which was knowledgeable about the subject. The purpose was to educate patriot-citizens, so that they would see the past in the same terms as archaeologists.

During the first decades of the twentieth century, this model continued to be in force. Experts and bureaucrats appropriated archaeological information for themselves, acted as custodians of the archaeological heritage, and adopted a paternalistic attitude, disregarding the interests of a budding civil society. The end of the Second World War and the consolidation of the Welfare State would provide the material and ideological conditions needed to insert archaeology in the dynamics of mass media. The dissemination of archaeological knowledge started to be considered as a basic function of the management of archaeological heritage. This change is epitomized in the figure of Sir Mortimer Wheeler, whose frequent appearances on TV evinced a novel compromise with the general public. However, this compromise still had its limits. The pioneer book by Charles R. McGimsey *Public Archaeology* (1972) was addressed only to professional archaeologists, heritage managers, and citizens interested in protecting archaeological remains in their neighborhoods. The immense majority of society still

remained on the other side of the fence, as a passive observer of archaeological projects. In addition, the New Museology and the growing offer of archaeological sites open to the public provided only closed narratives that were simply consumed by a certain kind of public (Merriman 1991). It is important to remember, also, that most countries continued to be entrenched in the classic model of academic communication – by archaeologists for archaeologists (Venclová 2007).

The transition from the educative model to the democratic model had its origins in the 1970s in the United Kingdom, with a remarkable development later in the United States, Canada, and Australia, where there was already an important sensibility toward the interpretation and promotion of cultural and natural heritage (McManamon 1991). During the 1970s and 1980s, the scope of interaction between archaeology and the public broadened to include all sectors of society and to actively involve amateurs in the archaeological research process. It is in this context where public archaeology, as we understand it today, emerged (Schadla-Hall 1999; Ascherson 2000; Merriman 2004; Moshenska 2009).

During the 1980s and 1990s, archaeology became public spectacle, a resource to transform depressed regions, a tool for the promotion of tourism, and a privileged arena to perform "living history." Following the technical language adopted by heritage managers, the *potential public* of these attractions is identified with the tourist/amateur who spends money to achieve enjoyable experiences set in a (pre)historic scenario (Stone and Planel 1999). This potential public is the one who crosses over to the other side of the fence for a reasonable price. However, this archaeology still does not "concern the people as a whole." The development of post-processual theory added cultural relativism, new ethical requirements, and multivocality to the agenda, as well as the de facto integration of society in all its complexity into the archaeological discourse (Hodder 2008). This brought a radical qualitative change in contemporary social archaeology: A globalized, multicultural, and complex society encompasses different publics and different approaches to heritage (McManamon 1991; Hamilakis 2011; Pyburn 2011). The generalization of the Internet during the 1990s and the emergence of social networks in the 2000s helped channel the global demand for cultural heritage by different and ever-growing social groups (Matsuda and Okamura 2011). This context partially explains the expansion of public archaeology, materialized in the creation of an international journal (*Public Archaeology*) and postgraduate courses. Public archaeology today is also influenced by the post-modern end of grand narratives, and the subsequent popularization of microhistory, cultural history, and "history from below." In the same line, the "archaeology from below" (Faulkner 2000) has evolved to overcome the unidirectional character of the discipline, which has been rooted hitherto in a noninclusive communication model. The conventional approach considers the interaction with the public an area of expertise within archaeology an optional component in scientific projects, rather than an integral part of the discipline. An archaeology from below, on the contrary extends the social relations of archaeology by involving all publics in the process of knowledge production from the beginning.

These publics include now different stakeholders, local communities, and indigenous groups who have an intimate and long-standing concern for specific archaeological artifacts, sites, and landscapes. Some of these publics, such as indigenous groups in the Americas, are very vocal and critical and directly question archaeologists and heritage managers. Grassroots movements of political dissent, such as those that agitated Spain in 2011, are also an index of the changing attitude of the public: People revolt against the passive role (as consumers of politics, industrial products, or culture) to which they have been relegated by the hegemonic capitalist order. New concepts, such as archaeological ethnography (Hamilakis 2011) or community archaeology (Marshall 2001), intend to express a more active and democratic way of dealing with these stakeholders. There is no longer a target public for archaeological knowledge, but communities, both real and virtual, rooted and global (Matsuda and Okamura 2011). From this perspective, it is assumed that archaeologists have to relinquish partial control of

their projects (Marshall 2001) and accommodate the demands of the groups with which (sometimes for which) they are working. Of course, this attitude does not prevent tensions between archaeologists and public/stakeholders to happen. These, however, existed also before, but were negated or unacknowledged. These tensions are not necessarily negative: They can be productive as well and lead to new perceptions of the past and new modes of engagement (Witmore 2009). In fact, the new understanding of "public" also entails a new notion of site: Hamilakis (2011: 406) regards archaeological sites as "a perfect borderland and an ideal zone of contact," which can lead to conflict and confrontation, "but also to detailed, sensitive, ethnographic discourses and perhaps subsequent dialogues and collaborations."

From Stakeholder to Witness

It is widely admitted today that granting public access to historical knowledge is rarely neutral and risk-free: Politics is always involved to some extent and conflict is always a possibility. This is particularly the case when archaeology delves into a dark past that has been concealed for political reasons. By making (hidden) things public, archaeology can destabilize hegemonic discourses that distort the way in which history is told. This meaning of "public" has become increasingly relevant in archaeology during the last two decades, with the growing awareness of the role played by the discipline in conflict and post-conflict situations (cf. Starzmann 2008). In countries that have suffered from war, civil and ethnic conflict, dictatorship or colonialism, it is not enough with doing research that increases social knowledge about the past. It is important to confront recent history critically and provide the tools so that people can see the past in a different way. Making a dark past public is not an easy task: Some people may not want it to be studied because they are related to the perpetrators, because it brings up memories that are too fresh and painful, or because they do not want to abandon the safety of sanitized official narratives. Archaeologists working in places of conflict and trauma have to be ready to face a divided community and to take sides. Even when people widely agree that dealing with a negative past is necessary, controversies always arise regarding how to investigate it, how to display it publicly, and how to tell the story.

In the archaeology of older periods or less controversial issues, to become part of the audience or not is to a large extent optional. However, this is not the case with the archaeology of contemporar violence. People feel addressed and their beliefs questioned. This is because collective traumas are public in the first OED sense: They concern the people as a whole. It could be argued that by unveiling the traces of atrocities, archaeology forces us to become witnesses by proxy. In that, the discipline works like what has been called "art of witness" or "testimonial art" (MacLear 1999). This is not only the art produced by witnesses themselves, but also by artists after traumatic events with the purpose of manifesting the unsayable. By forcing people to look, testimonial art and archaeology produce the same effect: They transform the public into a kind of witness – a public, therefore, with a moral responsibility. In recent decades, archaeology has become a sort of "art of witness" in different contexts. Three of the most interesting are Germany in relation to the Nazi past; Spain and the legacy of the civil war; and Argentina and the "dirty war" waged by the military. Despite being recent historical episodes, archaeology has played an outstanding role in exposing mass violations of human rights and bringing to the public arena what used to be concealed or restricted to academic debates.

Germany was one of the first countries where archaeology was put at the service of making a difficult past visible. After a generation of silence, the children of the Nazi generation decided to break the veil of silence that covered the fascist period and began a movement of recovery of historical memory which has had lasting effects in the country (Koshar 2000). Many of the popular history projects had an important archaeological component: the documentation, in everyday spaces, of traces of Nazism that had been rendered socially or physically invisible. One of the landmarks in this process was the excavation in 1987 of the former Gestapo headquarters in the heart of Berlin (Bernbeck and Pollock 2007), which had

passed virtually unnoticed in a vacant lot. The excavations, originally carried out by amateurs, captured wide public attention and provoked intense political debates. Since then, other traces of the Nazi past have been investigated in Berlin and identified with signs, so that people can be aware of this hidden layer of the city's history (Braun 2002). The goal of the project is not just to make things public, but to *keep* them so. The question is: How to sustain public attention in a traumatic past?

In Argentina, the search for the 30,000 *desaparecidos* ("disappeared") during the military regime started only 2 years after the end of the dictatorship (1976–1982). Forensic work has been later complemented with other initiatives, such as the archaeological investigation of clandestine detention centers, the study of the material culture associated to the *desaparecidos*, and the public display of sites of torture and prisons (see examples in Funari et al. 2010). All these projects have made the crimes of the dictatorship public, but they have also been fraught with controversy: whether to recover or not buried human remains (Crossland 2000), how to turn detention centers into museums, what narrative has to be offered (Parsons 2011), etc. These are debates in which archaeologists and other scholars have just one voice among many others (victims, relatives, authorities, and associations). The Argentinian case poses questions that are pertinent for public archaeology as a whole: Who has the right to decide how to make the past public? How can a dark past be made public without trivialization? What kind of public is a victim or a victim's relative?

If the Germans had to wait for a generation to make a painful history public and the Argentineans only a few years, the delay in Spain has been much greater: Three generations passed since the beginning of the war (1936–1939) for the Spaniards to be capable to fully address the legacy of war and dictatorship. As in the other two cases, it was grassroots associations that took the initiative and since 2000, they have excavated – with the help of archaeologists and forensic scientists – around a thousand unmarked graves, mostly containing the remains of some of the 150,000 people assassinated by the supporters of General Franco (Ferrándiz 2006; Renshaw 2011). Exhumations were part of a renewed interest in the history of the conflict and the dictatorship. Thus, in addition to the recovery of buried bodies, different projects have been developed on concentration camps, prisons, monuments, and battlefields (González-Ruibal 2007). The process has led to a significant shift in the collective memory of Spaniards and has triggered important political and legal changes at the national level. It has also produced a greater awareness of the (material) legacy of the dictatorship. Although archaeologists, as in the German case, have not been the protagonists, they have decisively contributed to making things public, by bringing in scientific methods and modes of dissemination. The exhumation of mass graves and other activities have not been free of bitter controversies, but these have also helped to clarify the political panorama of Spain, by revealing the extent to which the dictatorial past still conditions the democratic present.

Future Directions

Despite great advances during the last three decades, academic traditions continue to privilege the educative model in archaeology, whose discourses are neither directed to the general public or local communities. The same can be said of different projects devised from above (such as those promoted by administrations), in which the public is conceived as the human resources needed to fill cultural containers. From these parameters, it is difficult that a public archaeology (sensu Shadla-Hall 2006), and even less a community archaeology (sensu Marshall 2001), can be consolidated. Besides, the privatization of archaeology at a global scale promotes commercial archaeology, which is more profitable, but does not usually take into account amateurs and citizens in the process of archaeological research.

However, if we have learnt something in recent years, it is that publics can be very active and take the initiative in process that involves historical memory or the assertion of cultural rights: The

things that concern the people as a whole elicit passionate responses. This has been proved in the three cases mentioned here: the archaeology of dictatorship in Germany, Argentina, and Spain. With the global spread of democracy and minority rights, publics are more varied and vocal than ever. Instead of feeling threatened by them, archaeology should face the challenge of engaging in social debates and political controversies. The alternative to this is remaining in an ivory tower and become less and less socially relevant.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Community Archaeology
- ▶ Public Archaeology, The Move Towards

References

Ascherson, N. 2000. Editorial. *Journal of Public Archaeology* 1 (1): 1–4.

Bernbeck, R., and S. Pollock. 2007. Grabe, wo du stehst! An archaeology of perpetrators. In *Archaeology and capitalism. From ethics to politics*, ed. Y. Hamilakis and P. Duke, 217–234. Walnut Creek: Left Coast Press.

Braun, M.S., ed. 2002. *Spuren des Terrors. Traces of terror. Stätten national-sozialistischer Gewaltherrschaft in Berlin*. Berlin: Braun.

Crossland, Z. 2000. Buried lives. Forensic archaeology and the disappeared in Argentina. *Archaeological Dialogues* 7 (2): 146–159.

Faulkner, N. 2000. Archaeology from below. *Journal of Public Archaeology* 1: 21–33.

Ferrándiz, F. 2006. The return of civil war ghosts: The ethnography of exhumations in contemporary Spain. *Anthropology Today* 22 (3): 7–12.

Funari, P.P., A. Zarankin, and M. Salerno, eds. 2010. *Archaeology of repression and resistance in Latin America*. New York: Springer.

González-Ruibal, A. 2007. Making things public: Archaeologies of the Spanish civil war. *Public Archaeology* 6 (4): 203–226.

Hamilakis, Y. 2011. Archaeological ethnography: A multitemporal meeting ground for archaeology and anthropology. *Annual Review of Anthropology* 40: 399–414.

Hodder, I. 2008. Multivocality and social archaeology. In *Evaluating multiple narratives beyond nationalist, colonialist, imperialist archaeologies*, ed. J. Hab, C. Fawcett, and J.M. Matsunaga, 196–200. New York: Springer.

Holtorf, C. 2007a. *Archaeology is a brand. The meaning of archaeology in contemporary popular culture*. Oxford: Archaeopress.

Holtorf, C. 2007b. Can you hear me at the back? Archaeology, communication and society. *European Journal of Archaeology* 10 (2–3): 149–165.

Koshar, R. 2000. *From monuments to traces. Artifacts of German memory (1870–1990)*. Berkeley: University of California Press.

MacLear, K. 1999. *Beclouded visions. Hiroshima-Nagasaki and the art of witness*. Albany: SUNY Press.

Marshall, Y. 2001. What is community archaeology? *World Archaeology* 34 (2): 211–219.

Matsuda, A., and K. Okamura. 2011. Introduction: New perspectives in global public archaeology. In *New perspectives in global public archaeology*, ed. K. Okamura and A. Matsura, 1–18. London/New York: Springer.

McGimsey, C. 1972. *Public archaeology*. New York: Seminar Press.

McManamon, F.P. 1991. The many publics for archaeology. *American Antiquity* 56 (1): 121–130.

Merriman, N. 1991. Beyond the glass case. In *The past, the heritage and the public in Britain*. Leicester: Leicester University Press.

Merriman, N. 2004. Introduction: Diversity and dissonance in public archaeology. In *Public archaeology*, ed. N. Merriman, 1–18. London: Routledge.

Moshenska, G. 2009. What is public archaeology? *Present Pasts* 1: 46–48.

Parsons, E. 2011. Espacio para el recuerdo: memoria colectiva y reconfiguración del disputado espacio de la ESMA de Argentina. *452°F: revista de teoría de la literatura y literatura comparada* 4: 29–51. Available at: http://www.raco.cat/index.php/452F/article/view/243579/326331.

Pyburn, K.A. 2011. Engaged archaeology: Whose community? Which public? In *New perspectives in global public archaeology*, ed. K. Okamura and A. Matsuda, 29–41. London/New York: Springer.

Renshaw, L. 2011. *Exhuming loss: Memory, materiality and mass graves of the Spanish civil war*. Walnut Creek: LeftCoast.

Schadla-Hall, T. 1999. Editorial: Public archaeology. *Journal of European Archaeology* 2 (2): 147–158.

Schadla-Hall, T. 2006. Public archaeology in the twenty-first century. In *A future for archaeology: The past in the present*, ed. R. Layton, S. Shennan, and P.G. Stone, 75–82. London: UCL Press.

Starzmann, M.T. 2008. Cultural imperialism and heritage politics in the event of armed conflict: Prospects for an 'activist archaeology'. *Archaeologies* 4 (3): 368–389.

Stone, P.G., and G. Planel, eds. 1999. *The constructed past: Experimental archaeology, education and the public*. London/New York: Routledge.

Venclová, N. 2007. Communication within archaeology: Do we understand each other? *Journal of European Archaeology* 10 (2–3): 207–222.

Witmore, C. 2009. Prolegomena to open pasts: On archaeological memory practices. *Archaeologies* 5 (3): 511–545.

Further Reading

Colwell-Chanthaphonh, J.S., and T.J. Ferguson, eds. 2008. *Collaboration in archaeological practice: Engaging descendant communities*. AltaMira Press.

Derry, L., and M. Malloy, eds. 2003. *Archaeologist and local communities: Partners in exploring the past*. Washington, DC: Society for American Archaeology.

Hidalgo, E.B. 2012. Argentina's former secret detention centres: Between demolition, modification and preservation. *Journal of Material Culture* 17 (2): 191–206.

Matsuda, A. 2004. The concept of the "public" and the aims of public archaeology. *Papers from the Institute of Archaeology* 16: 66–76.

Okamura, K., and A. Matsuda, eds. 2011. *New perspectives in global public archaeology*. London/New York: Springer.

Smith, C., and H.M. Wobst, eds. 2004. *Indigenous archaeologies: Decolonising theory and practice*. London: Routledge.

Smith, L.J., and E. Waterton. 2009. *Communities and archaeology*. London: Duckworth.

Publication in Field Archaeology

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Introduction and Definition

Every publication in any field is designed for the people who are intended to read it. Archaeological fieldwork is carried out for different sectors and sponsors and it therefore generates a variety of output. A recent overview proposed eight different modes of publication designed to serve eight different types of "consumer" (Fig. 1).

Key Issues

The preparation of a *field record* (no. 1) is a primary duty of the fieldworker, whether engaged in CRM or research. These records are generally stored in an archive within the museum that retains the assemblages of artifacts and biota. In principle, records and assemblages are public property and remain accessible in perpetuity. In practice museums often find this difficult to achieve but hope to make the material available to researchers and special interest groups. The increasing range of records and material retained by excavators combined with the enormous quantity of material generated by CRM is creating a major problem of long-term storage for industrialized countries. This is one reason for the development of the online *lab report* (or Field Report) (no. 2), which sets out to present a complete account of the main discoveries from fieldwork in a digital form. This will include summaries of the primary records, an album of selected photographs, an atlas of the main spatial form and relationships, site journals and interpretations made on site, and analyses made in the laboratory after fieldwork was completed. These analyses may include studies of stratigraphy, artifacts, animal bones, plant remains, and scientific dating. In many cases the specialist reports in their original form may appear only in this medium, their essence being summarized for printed forms. The *Archaeological Data Service* (http://ads.ahds.ac.uk) is a major service provider in this field, hosting online archives for research projects as well as many thousands of client reports from CRM operations which are otherwise inaccessible.

The production of a *Client Report* (no. 3) is normally a condition of contract for the CRM firm that undertakes fieldwork in advance of development. The "client" is the organization that paid for the archaeological work. In regulated countries this is often local or national government. In deregulated countries it is more usually the organization that is undertaking the development; archaeology is included in its costs. In both cases, the clients or their consultants provide strict instructions about the content of the report and the timetable for its delivery. These contents include details of the location, the work done there, the methods used, and the discoveries made. In the current profession, many of the methods are standardized and repeated in successive client reports.

MODE	CONTENTS	MEDIUM	CLIENTS
1. Field Records	Site records, primary data	Hard copies	Sponsor, Other researchers
2. Lab Report	Commissioned studies and analyses	e-repository	Sponsor, other researchers
3. Client Report	Description of the investigation and results	Hard copy with limited distribution ["grey literature"]	Sponsors
4. Research Report	Description of the investigation, findings, their interpretation and context	Article (hard copy or on-line), monograph with multiple distribution	Researchers
5. Popular book	Abbreviated research report	book	The public
6. Popular output	Selected significant aspects	Magazine articles, site guide, TV programmes	The public
7. Display	Selected significant aspects	Exhibitions in museums,	The public
8. Presentation/ Interpretation	The site and its surviving parts; local trails	Conserved monuments; display panels;AV	The public

Publication in Field Archaeology, Fig. 1 Modes of publication. (After Carver 2009: 316)

The value of the archaeological discoveries themselves is expressed in terms of their *significance*, a measure of how far they have added to knowledge. However, CRM projects rarely include research time, and so client reports can rarely expect to explore this significance in the wider context of modern research. For this reason, the majority of client reports remain as "grey literature" delivered to the client or at best placed in an online archive where it is generally accessible (see above).

Research Reports (no. 4) are intended to report the most significant new discoveries of the day. They are, accordingly, selective in two senses: first, only fieldwork productive of important research is eligible for consideration, and of that, only carefully selected data and succinct argument are appropriate for publication. Research publication is subject to peer review, undertaken on behalf of publishers to ensure the highest standards of integrity and reasoning. The criteria for acceptance usually run along the lines: "Was there a research question?" "Did it need to be addressed?" "Are the results clearly presented, validated, and discussed?" and "Is the conclusion credible?" There have always been numerous other forms of open-ended, unspecific, imaginative, and non-scientific writing about the past, but few have been successfully applied to the publication of results of fieldwork.

The current research community in archaeology overwhelmingly prefers paper-copy publication in journals or monographs over data-rich digital repositories. Research publication is therefore expensive, another reason that it remains competitive and selective. It should also be noted that the main beneficiary of such selectivity is the reader. By filtering the mass of information and opinion that is generated by the archaeological community, the publishing industry hopes to select the fieldwork of most significance and most lasting value at the least cost to researchers and other readers.

The content of a research report will include the basic information about the purpose of the project, the research questions that were addressed, where it took place, the theoretical basis for the design, the methods used, and the results obtained. A site model is argued on the basis of selected analyses of assemblage, space and sequence, and a free-ranging account of its context and wider significance presented in a discussion section. The conclusion assesses the success in answering the questions expressed in the

original Project Design, presents new ones, places the fieldwork results in history or prehistory, and announces the planned future of the archive, the site, and its environs.

Members of the public, and indeed students when they are starting out, may not have the background to appreciate or assess research reports. If a field project has become well known, it may become the subject of a range of more general outputs. "Popular" books (no. 5) attempt to place the archaeological discoveries in the mainstream. Commercial publishers do a wonderful job here, usually ensuring good quality and taking the financial risk on themselves. Mainstream publishers may produce a range of summaries and pictures in magazines, newspapers, and on TV (no. 6) over which the field archaeologist generally has less control but may still welcome them on the basis that "there is no such thing as bad publicity."

Direct communication with the public is available in two other media. In exhibitions (no. 7), the findings of fieldwork may find vivid expression in a museum, where artifacts and structures and their sequence are brought together. Some sites, particularly those which have been the subject of research projects (less so those excavated in advance of development), are still conserved and may be visited by members of the public. The art of presenting sites (sometimes known as "interpretation") is to explain to visitors what they can still see and relate what was found and what it might mean (no. 8). This is undoubtedly a form of publication and a special one since it takes place in the landscape, that historic environment which field method sets out to enhance.

Cross-References

► Excavation Methods in Archaeology
► Field Method in Archaeology: Overview

References

Carver, M. 2009. *Archaeological investigation*. London: Routledge.

Pueblo Bonito

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Introduction

Located in Chaco Canyon, in northwest New Mexico, Pueblo Bonito is the greatest of the Chacoan "great houses" (Fig. 1). A massive stone structure built in a "D" shape, Pueblo Bonito consisted of terraced rooms reaching four or five stories tall at the rear and stepping down to a large, divided central plaza. It is known not only for its architectural beauty (*Pueblo Bonito* means "pretty town" in Spanish) but also for the wealth of exotic artifacts found within its rooms – an abundance unparalleled at any other site in the northern Southwest. Pueblo Bonito has been extensively studied for over a century. The Hyde Exploring Expedition (1896–1899) led by George Pepper (1920) and the National Geographic Society Expedition (1920–1927) led by Neil Judd (1954, 1964) excavated almost the entire ruin, revealing the architectural history of the site and recovering hundreds of thousands of artifacts. Archaeologists since then have made comprehensive use of Pepper's and Judd's work in numerous books and articles (see Neitzel 2003 for a recent compendium).

Construction began at Pueblo Bonito in the mid-ninth century and continued through the middle of the twelfth century (Lekson 1986; Windes and Ford 1996). During much of this period, Chaco Canyon was a place of extraordinary power, the focus of a large social and political system that encompassed much of the northern Southwest (northwest New Mexico, southwest Colorado, southeast Utah, and northeast Arizona) and was characterized by widely scattered great houses and their surrounding communities (Lekson 2006, 2009). Prehistoric roads radiated out across this landscape, leading into and out of great houses, suggesting an unprecedented level of connection and hierarchy in the Ancestral Pueblo world.

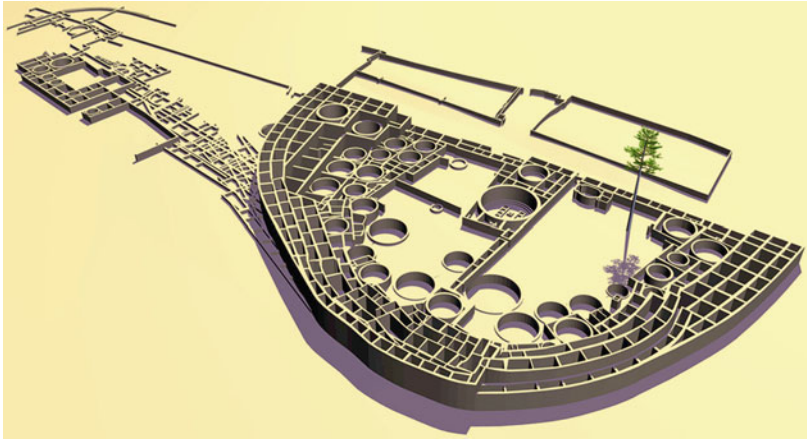

Pueblo Bonito, Fig. 1 Reconstruction of Pueblo Bonito. Note the platform mounds in front of the building and the large ponderosa pine tree in the plaza. The tree was apparently an important element of plaza space at Pueblo Bonito. (Courtesy of Dennis R. Holloway, Architect)

The American Southwest is an arid region, but Chaco Canyon is especially dry and treeless. Why it was selected for monumental construction of great houses is a subject of extreme interest to scholars today. The Chaco Wash only occasionally contains water, although a slightly more favorable climate may have made the Canyon more inviting when Pueblo Bonito was first constructed. However, Chaco Canyon *is* one of the most conspicuous landforms in the relatively flat central region of the San Juan Basin.

Pueblo Bonito was not the only great house in the Canyon. It is one of almost a dozen that were built along the north side of the Canyon bottom or on the mesa to the north of the Canyon. Pueblo Bonito and other great houses, both inside and outside Chaco Canyon, are argued to have been the homes of powerful leaders, while ordinary people lived in small hamlets surrounding the great houses. In Chaco Canyon with its many great houses, this pattern is expressed in a linear pattern with the homes of ordinary residents located primarily along the south side of Chaco Canyon, opposite Pueblo Bonito and the other great houses.

Definition

The sheer northern walls of Chaco Canyon provide a dramatic backdrop for Pueblo Bonito. It was built facing "South Gap" a break in the south Canyon wall that allowed visitors a dramatic view of this impressive building. It was the first of what eventually became a cluster of great houses in the central part of the Canyon that has been called "Downtown Chaco." From the cliff-top above, the entire building appears in plan view and is still an awe-inspiring place, even though it now lies in ruin. In facing Pueblo Bonito toward the southeast, its builders were following normal Puebloan siting practices that maximized solar energy during the cold winter months. Backed up against the Canyon wall, the building was also protected from northerly winter winds. Oddly, the structure was built under an enormous but precariously balanced pillar of sandstone that had split from the Canyon wall. Called "Threatening Rock" by modern visitors, the distinctive rock formation was apparently an important part of the siting of the building (Stein et al. 2007).

Pueblo Bonito comprised as many as 600 rooms built of finely shaped and chinked sandstone masonry. It was more than 150 m long and 100 m wide, covering almost a hectare. The final form evident today was the result of more than 300 years of construction and remodeling (Lekson 1986). The original building, constructed between about A.D. 860 and the early 900s, was in the style of normal domestic buildings of the time, a southeast-facing arc of rooms fronted by a series of round rooms. Only this original core of rooms was a "scaled-up" version of normal Puebloan architecture: rooms were two to four times as big as normal Puebloan rooms and

included some of the earliest multistoried buildings in the Southwest (Lekson 1986). This part of the building was used for burial of high-status individuals, apparently sacred space around which the rest of Pueblo Bonito was constructed (Plog and Heitman 2010). Around A.D. 1020 when the rear wall of the original building began to collapse, an enclosing wall of improved masonry was built around it to ensure that it continued to stand (Lekson 1986:132–134).

Subsequent construction continued until the mid-1100s with extensive construction episodes in the A.D. 1040s and 1080s (Lekson 1986; Windes and Ford 1996). This construction expanded the original D-shape of the building, adding rows of rooms adjacent to the plaza (covering some of the original round rooms), extending the "wings" of the D, and enclosing the plaza with a narrow wall of rooms. Pueblo Bonito was never a static structure but an active and a living part of Puebloan construction whose intended trajectory from creation through normal processes of decline and decay has only been arrested by modern institutional efforts at preservation.

Most of the rooms that composed Pueblo Bonito were square or rectangular, but some were round. Round rooms were generally located close to the plaza or in the plaza adjacent to the main building. Round rooms were likely the major living spaces for the leaders who inhabited Pueblo Bonito (Lekson 1986; these rooms are called "kivas" by some scholars who imply a religious use). Rectangular rooms were very large, ranging from 10 to almost 50 m^2, with some variation corresponding to the distance of the room from the plaza (Lekson 1986: 51). These rooms often formed suites, indicated by positioning and connecting doorways. The presence of hearths in some plaza-facing rooms suggests that they may also have been the principal living rooms. Rooms in the rear and lower stories would have been dark and airless and may have been used for storage of food and the quantities of exotic material that apparently poured into this settlement. Some rooms have the remains of large platforms that might have served as storage shelves (Lekson 1986: 46–48). But archaeologists have found very little direct evidence of what might have been stored.

The straight side of Pueblo Bonito's "D" was formed by a narrow block of rooms that made the plaza into an enclosed space. Inside the plaza, large subterranean round rooms (13 to almost 16 m in diameter) called "great kivas" housed ceremonial activities. Great kivas were already important ceremonial buildings long before the construction at Pueblo Bonito began but developed a distinctive Chacoan form in Chaco Canyon during the eleventh century (Van Dyke 2007). As many as four great kivas may have been built in Pueblo Bonito's plaza at various times during its history, two or three of which may have been in use at one time. They were built on either side of a north-south wall that divided the plaza into eastern and western halves, a duality that has other manifestations in the Chacoan world. Van Dyke (2007: 117–121) explores the ceremonial activities that may have taken place in Chaco Canyon's great kivas (others were found at other great houses or away from great houses in other parts of the Canyon).

In front of the plaza are two large walled mounds built up of trash and other materials and separated by a road or pathway that may have led directly to an opening into the plaza wall (Fig. 1). These trash mounds may have served as ceremonial platforms, as they were covered with a plaster surface at least during part of their use life (Lekson 1986: 143–144; Windes and Mathien 1987: 618–634)

As part of Downtown Chaco, Pueblo Bonito was surrounded by an extensively built landscape that included not only other great houses but also roads, staircases, earthen causeways, and other features (Lekson 2007, 2009, 2015; Stein et al. 2007). Prehistoric roads led from a great house on top of the mesa north of Pueblo Bonito (called Pueblo Alto), descending into the Canyon at a wide formal staircase just around the corner from Pueblo Bonito. Other roads descended from the north mesa at other points on the north Canyon wall or entered Downtown Chaco from the south. Stein et al. (2007) have identified an earthen platform constructed at the base of Threatening Rock behind Pueblo Bonito,

a possible elevated road surface extending from the east end of the eastern platform mound, as well as other earthen features.

Key Issues/Current Debates/Future Directions/Examples

An animated debate surrounds the function of Chacoan great houses. Pueblo Bonito is central to this debate. Pueblo Bonito is the archetypical great house but is also in many ways unique in the Puebloan world. The debate can be briefly summarized as a series of questions: How many people lived in Pueblo Bonito? Who were they and what did they do there? What was the connection between the people who lived in Pueblo Bonito and other Chaco Canyon buildings to the great house communities spread out across the northern Southwest? Although consensus on these questions has not been reached by Chaco scholars, a review of contrasting interpretations highlights the distinctive role Pueblo Bonito played in the Chacoan world.

The number of people inhabiting Chaco Canyon and its great houses has been a topic of discussion from the very first archaeological investigations there. Initial estimates in the tens of thousands have been revised downward to as few as 1000 (Windes and Mathien 1987: 383–406). Recently Pueblo Bonito's momentary population has been assessed at only 12 households or 70 residents (Bernardini 1999). Such a small population in Pueblo Bonito's vast architectural space implies that only special people resided here, but what they did there is also a point of contention. One group of scholars argues that great houses, especially Pueblo Bonito, were elite residences and that Chaco Canyon was the center of a hierarchical political system that covered much of the northern Southwest during the tenth and early eleventh centuries (Lekson 2006, 2009, 2015; Sebastian 2006). Other scholars see a much more egalitarian structure in Chaco Canyon with priests serving as ritual leaders and a hinterland that emulated Chacoan practices but was not controlled by Canyon ritual leaders (Kantner and Kintigh 2006; Mills 2002).

The evidence on which this argument turns includes Chacoan architecture, burials, and imported goods, each of which is most remarkable at Pueblo Bonito. Pueblo Bonito is the largest of the great houses, and most scholars agree that great houses can be considered monumental architecture, in other words, large-scale public construction projects. However, some scholars argue that the variability in great house construction outside Chaco Canyon demonstrates the independence of outlying Chacoan communities from Canyon control (Kantner and Kintigh 2006). Other scholars counter that Chaco Canyon itself includes a high degree of architectural variability including considerable change through time in construction methods especially at the longest-lived great house, Pueblo Bonito (Lekson 2006, 2015). Contrasting views of the existence of hierarchy in Chaco Canyon also extend to the labor force that built great houses: Were laborers coerced by leaders who lived in these "palaces"? Or were they voluntary laborers who converged on the Canyon periodically to build great houses under the direction of benign priests?

Pueblo Bonito has a set of extraordinarily rich burials, unparalleled in the Puebloan world, which have been central to discussions concerning Chacoan complexity. Akins (2003) has identified 131 burials at Pueblo Bonito, most located in two clusters of rooms in the oldest part of the building that she terms family burial facilities. But these were no ordinary families. At least one of these sets of burial rooms also functioned as a repository for elaborate ceremonial paraphernalia. Arguments about the nature of hierarchy in Chaco Canyon have focused on the two richest burials, Burials 13 and 14, two males who were found in Room 33 beneath a carefully constructed plank floor and were accompanied by more than 30,000 objects, including 25,000 pieces of turquoise (mostly beads), more than from all other Southwestern sites combined (Plog and Heitman 2010: 19622). Cylinder jars, wooden ceremonial sticks, a shell trumpet, turquoise- and shell-encrusted baskets, and wooden flutes were also found here. Additional burials continued to be placed above the plank floor and in immediately adjacent rooms, perhaps as secondary burials, into

the late eleventh or early twelfth century; these adjacent rooms were also full of exotic goods.

Scholars who see political hierarchy in Chaco Canyon have argued that these two individuals were powerful political leaders (Lekson 2006; Sebastian 2006). Other scholars have pointed to the fact that these two males, thought to have been deposited in the early eleventh century, were the only evidence of elite rulers in the over 300 years of Chaco's existence. This argument has been recently addressed by Plog and Heitman (2010) who present startling new data about the Pueblo Bonito burials. They obtained C-14 dates on human remains found here and confirm that these internments were actually some of the earliest activities at the site, dating perhaps to the late ninth century. They suggest that these two males could have been among the founders of Pueblo Bonito, beginning a tradition of social differentiation that continued into the late eleventh or early twelfth century. Even more startling, a recent DNA study revealed that at least some of the burials in Room 33 were part of a multi-generational matrilineal descent group of related mothers and daughters, grandmothers, and grandsons (Kennett et al. 2017). Pueblo Bonito, then, functioned at least partly as a long-lived sepulcher where only the most powerful members of Chacoan society were buried.

Evidence of the high status of the residents of Pueblo Bonito is also apparent in the exotic goods found there, both with burials and in other parts of the site. These objects were in some cases unique and, in others, occurred in quantities far in excess of those found at any other sites in Chaco Canyon or indeed the entire Ancestral Pueblo world. Much of this material was imported from a considerable distance (Toll 2006): turquoise from mines 100 miles to the east, shell (including shell trumpets) from the Pacific Ocean, macaws, copper bells, and cacao from Mesoamerica. Cacao may have been made into a frothy chocolate drink served in cylinder jars that have been found almost exclusively at Pueblo Bonito (Crown and Hurst 2009; see also Crown et al. 2015). Macaw feathers may have been made into elaborate "badges of office" distributed to leaders from distant great house communities who visited Chaco Canyon (Lekson 2015).

For more than 300 years, Pueblo Bonito was the most important building in the northern Southwest. This elaborately built structure was home to a small population of people who have been variously described as powerful political leaders or less powerful ritual specialists. Ceremonial activities certainly took place in Pueblo Bonito, both in the central plaza, atop the platform mounds, and in the great kivas located in the plaza. Other ritual activities apparently involved the internment of powerful individuals in a mortuary crypt located in the oldest part of the building. During the many centuries of its use, Pueblo Bonito was a living entity, growing and changing with each generation. Pueblo Bonito was not just another great house; it was "the" great house, the center of the Chacoan regional system. Although Chacoan scholars may continue to debate the nature of that system, few will deny Pueblo Bonito's centrality.

Cross-References

- ▶ Chaco Canyon, Archaeology of
- ▶ Southwest United States and Northwestern Mexico: Geography and Culture

References

Akins, N.J. 2003. The Burials of Pueblo Bonito. In *Pueblo Bonito: Center of the Chacoan World*, ed. J.E. Neitzel, 94–106. Washington, DC: Smithsonian Books.

Bernardini, W. 1999. Reassessing the scale of social action at Pueblo Bonito, Chaco Canyon, New Mexico. *Kiva* 64: 447–470.

Crown, P., and W.J. Hurst. 2009. Cacao use in the Prehispanic American southwest. *Proceedings of the National Academy of Sciences* 106: 2110–2113.

Crown, Patricia L., Gub Jiyan, W. Jeffrey Hurst, Timothy J. Ward, Ardith D. Bravenec, Syed Ali, Laura Kebert, Marlaina Berch, Erin Redman, Patrick D. Lyons, Jamie Merewether, David A. Phillips, Lori S. Reed, and Kyle Woodson. 2015. Ritual drinks in the pre-Hispanic US southwest and Mexican northwest. *Proceedings of the National Academy of Sciences* 112: 11436. https://doi.org/10.1073/pnas.1511799112. www.pnas.org/cgi.

Judd, Neil M. 1954. *The material culture of Pueblo Bonito*, Smithsonian miscellaneous collections no. 124. Washington, DC: Smithsonian Institution.
Judd, Neil M. 1964 *The Architecture of Pueblo Bonito*. Smithsonian miscellaneous collections no. 147(1). Washington, DC: Smithsonian Institution.
Kantner, J., and K. Kintigh. 2006. The Chaco World. In *The archaeology of Chaco Canyon: An eleventh-century Pueblo regional center*, ed. S.H. Lekson, 153–188. Santa Fe: School of American Research Press.
Kennett, Douglas J., Stephen Plog, Richard J. George, Brendan J. Culleton, Adam S. Watson, Pontus Skoglund, Nadin Rohland, Swapan Mallick, Kristin Stewardson, Logan Kistler, Steven A. LeBlanc, Peter M. Whiteley, David Reich, and George H. Perry. 2017. Archaeogenomic evidence reveals prehistoric matrilineal dynasty. *Nature Communications* 8. https://doi.org/10.1038/ncomms14115.
Lekson, S.H. 1986. *Great Pueblo architecture of Chaco Canyon*. Albuquerque: University of New Mexico Press.
Lekson, S.H. 2006. Chaco matters: An introduction. In *The archaeology of Chaco Canyon: An eleventh-century Pueblo regional center*, ed. S.H. Lekson, 3–44. Santa Fe: School of American Research Press.
Lekson, S.H., ed. 2007. *The architecture of Chaco Canyon, New Mexico*. Salt Lake City: University of Utah Press.
Lekson, S.H. 2009. *A history of the ancient southwest*. Santa Fe: School for Advanced Research Press.
Lekson, S.H. 2015. *Chaco Meridian*. Lanham: Rowman & Littlefield.
Mills, B.J. 2002. Recent research on Chaco: Changing views on economy, ritual, and society. *Journal of Archaeological Research* 10 (1): 65–117.
Neitzel, Jill E., ed. 2003. *Pueblo Bonito: Center of the Chacoan World*. Washington, DC: Smithsonian Books.
Pepper, George R. 1920. *Pueblo Bonito*. Anthropological papers of the American Museum of Natural History no. 27. New York.
Plog, S., and C. Heitman. 2010. Hierarchy and social inequality in the American southwest, A.D. 800–1200. *Proceedings of the National Academy of Sciences* 107 (46): 19619–19626.
Sebastian, L. 2006. The Chaco synthesis. In *The archaeology of Chaco Canyon: An eleventh-century Pueblo regional center*, ed. S.H. Lekson, 392–422. Santa Fe: School of American Research Press.
Stein, J.R., R. Friedman, and T. Blackhorse. 2007. Revisiting downtown Chaco. In *The architecture of Chaco Canyon, New Mexico*, ed. S.H. Lekson, 199–224. Salt Lake City: University of Utah Press.
Toll, H.W. 2006. Organization of production. In *The archaeology of Chaco Canyon: An eleventh-century Pueblo regional center*, ed. S.H. Lekson, 117–152. Santa Fe: School of American Research Press.
Van Dyke, R.M. 2007. Great Kivas in time, space, and society. In *The architecture of Chaco Canyon, New Mexico*, ed. S.H. Lekson, 93–126. Salt Lake City: University of Utah Press.
Windes, T.C., and D. Ford. 1996. The Chaco wood project: The chronometric reappraisal of Pueblo Bonito. *American Antiquity* 61 (2): 295–310.
Windes, T. C. and F. J. Mathien, ed. 1987. *Investigations at the Pueblo Alto complex*, vols. I and II. Santa Fe: Publications in Archaeology 18F, Chaco Canyon Studies, National Park Service.

Further Readings

Chaco Research Archive: http://www.chacoarchive.org/cra/

Puna, Archaeology of

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Introduction

The Andean Mountains are a formidable chain of mountains that form the backbone of South America. They range over 6000 m in elevation and consist of a succession of mountain ranges and plateaus, generally in a N-S direction, with the exception of a southeastward bulge that forms in southern Peru and northern Bolivia. The different environmental zones that characterize the Andes are mostly defined in terms of elevation, rainfall, and latitude and include coastal deserts, forests, highland scrub, and grasslands, also known as *Puna*, which lies above 3000 masl.

Late Pleistocene hunter-gatherers began exploring the Puna approximately 12.8 ka and faced the challenges that characterize extremely high altitudes: cold temperatures and hypoxia. Notwithstanding, these populations adapted culturally and biologically to these conditions and very early on began exploiting two important natural resources – wild camelids and obsidian. The increasingly arid conditions that prevailed in the Puna during the mid-Holocene ca. 8 ka drove some populations away from marginal areas. However some populations, like those in the southern range of the Puna, engaged in the early

phases of camelid domestication and in a two-way interaction with populations living in the lowlands to the east of the Andes, as social relations with those ecozones would have allowed Puna foragers to call on neighbors in times of need. This interaction lasted throughout the Formative and the Late periods.

Definition

The Puna, a *Quechua* word meaning high peaks and grasslands of the Andes, is a high elevation region that lies between 3000 and 4800 masl, between 10° and 27° latitude South, and covers regions of central and southern Peru, western Bolivia, northern Chile and northwestern Argentina. It extends north to south for approximately 2000 km and about 250 km east to west. The Puna includes the Altiplano of Bolivia and southern Peru. It is characterized by low humidity, with estival rainfall varying between 800 and 50 mm annually. Rainfall decreases in a N-S and E-W gradient, and some of the driest regions in the Puna lie in its SW corner. In general, productivity is low. Atmospheric pressure is low and temperature has a wide daily range. The average annual temperature is 9 °C, with a strong diurnal and seasonal variation. Given the rainfall gradient, the Puna is traditionally divided into three zones: Wet Puna (with the highest rainfall), Dry Puna and, Salt or Desert Puna (with the lowest rainfall). Each of these environmental zones constitute long and narrow strips that extend roughly in a N-S direction from Central Peru to NW Argentina and northern Chile. The Wet Puna is the easternmost strip and includes the area of Lake Titicaca on the Peru-Bolivia border, the Salt Puna is the southernmost and westernmost strip and includes the arid areas dotted with saltpans (*salares*), and the Dry Puna lies between both (Fig. 1). Rainfall in the Dry and Salt Puna is very low – annually below 250 and 50 mm, respectively. Further, there are areas in the Salt Puna that do not see any rain in 10 years, and thus it constitutes a doubly extreme environment given its great elevation and aridity.

The focus of this entry is on the Argentine Puna. (For entries on the archaeology of Southern Bolivia, the Atacama Desert, and the Central Andes, see "Cross-References" section.) This region is a high intermontane plateau and an endorheic basin that extends from the border with Bolivia (latitude 22°S) to approximately latitude 27°S and from the Cordillera de Los Andes on the border with Chile to the chains of mountains that conform the eastern Puna rim.

Vegetation varies with elevation and is marked by the presence of shrub steppes (*Adesmia*, *Fabiana*, *Baccharis*, and *Parastrephia* genera) at elevations below 3900 m and grasslands (*Festuca*, *Stipa*, and *Azorella* genera) at elevations above 3900 m. Around rivers, streams, lakes, and saltpans (*salares*), there are wetlands (*vegas*) that are characterized by soft grasses dominated by Juncaceae and Cyperaceae families.

Faunal communities include vicuñas (*Vicugna vicugna*), which mainly graze in the *pajonal* grasslands, and domesticated llamas (*Lama glama*), which mostly feed off wetland grasses. Large rodents (Chinchillidae family) are found in *quebrada* rockeries, whereas birds (*Rhea pennata*, Phoenicopteridae family) are common around water sources. Foxes (*Pseudalopex culpaeus* and *P. griseus*) and pumas (*Puma concolor*) are the main predators.

Historical Background

Traditionally, research in the Argentine Puna has focused on three main regions: (a) the Salt Puna in the province of Catamarca; (b) the Dry Puna in the province of Jujuy, and (c) the transitional area between the Dry and Salt Puna, often referred to as the Puna of Salta, in the province of Salta.

The Salt Puna

The decade of the 1950s marked the beginning of archaeological research in this region, when Pedro Krapovickas led archaeological surveys and excavations in the area of Salar de Antofalla, at Tebenquiche Chico. This research continued several decades later, under the direction of Alejandro Haber, who also conducted research in the Archibarca area (Haber 2009). Archaeological surveys were also carried out in the Antofagasta

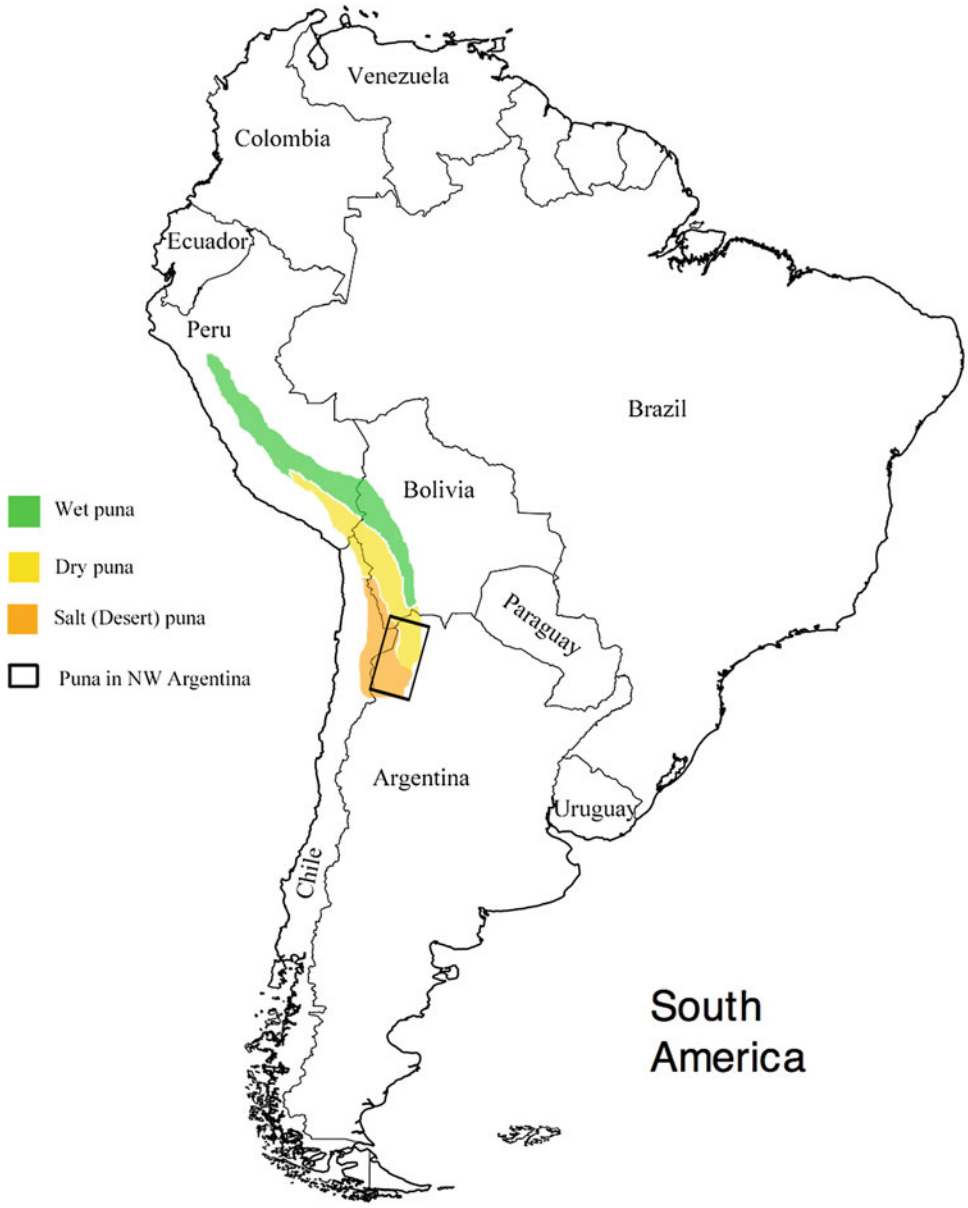

Puna, Archaeology of, Fig. 1 The Wet Puna, Dry Puna, and Salt Puna in South America

de la Sierra area, in the 1970s, at La Alumbrera site and were followed in the 1980s by Carlos Aschero's work in the Laguna de Antofagasta basin, specifically at a deeply stratified site – Quebrada Seca 3 – and other rock-shelters, such as Cueva Salamanca 1, Peñas de la Cruz 1, and Peñas de las Trampas sites. Together with a team of students, this research continued in the 1990s and 2000s at several rock-shelters and open-air sites (Fig. 2), which resulted in the construction of a 10,000-year-old chronological sequence of human occupation beginning with the earliest date of 12.4 ka at Peñas de las Trampas 1 site (Aschero 2014).

The Dry Puna

The 1970s also marked the initiation of systematic research on the eastern rim of the Dry Puna at several rock-shelters in the Quebrada de Inca Cueva – namely, Inca Cueva 4 site (3500 m), one of the oldest sites in the Puna region, dated to 12.7 ka. This research was soon followed in the 1980s and 1990s by a series of other discoveries of sites with equal or slightly greater antiquity, such as Pintoscayoc, Huachichocana, and Yavi ca. 12.8 ka. More recently, there has been in the area of Susques, at the Hornillos 2 site (Fig. 2) (Yacobaccio et al. 2017).

The Puna of Salta

In the Puna of Salta, archaeological research began in the 1990s in the San Antonio de Los Cobres area and continued in Salar de Pastos Grandes, at Alero Cuevas, a site with a deep chronology began in the 2000s. More recently, the Abrigo Pozo Cavado site has been excavated in the Salar de Pocitos (Fig. 2) (López et al. 2013; Muscio and López 2016).

Key Issues/Current Debates

Timing of the First Puna Occupations and Strength of the Archaeological Signal

The earliest sites in NW Argentina are located in the Dry and Salt Puna, at elevations ranging 3500–3800 m. Around 12.8–12 ka, that is, within 2000 years of the earliest, well-established dates for human occupation in South America (ca. 14.5–15 ka) such as those from Monte Verde and Huaca Prieta sites, and during a period of wetter and warmer conditions of the Coipasa paleoclimatic event, small populations of foragers

Puna, Archaeology of, Fig. 2 Areas of study and archaeological sites: (1) the Dry Puna (Quebrada de Humahuaca and Susques), (2) the Puna of Salta (Pastos Grandes and Salar de Pocitos), and (3) the Salt Puna (Antofagasta de la Sierra). Obsidian sources: (Z) Zapaleri, (V) Caldera Vilama 1 and 2, (T) Alto Tocomar, (R) Ramadas, (Q) Quirón, (A) Archibarca, (O) Ona, (SH) Salar del Hombre Muerto, (C) Laguna Cavi, (P) Cueros de Purulla-Chascón, (VA) Valle Ancho

carried out the initial exploration and colonization of these high elevations. It would take another millennia for foragers to establish repeated occupations at elevations above 4000 m – at sites such as Hornillos 2 and Quebrada Seca 3, both at 4100 m, and Alero Cuevas site at 4400 m (11.2 ka) (Fig. 2). A recent time series analysis of radiocarbon dates suggests that during the early millennia of this colonization process, there were fluctuating periods of dispersion and retraction of populations, but overall there was a successful establishment of human populations in the Puna that paralleled those of the Chilean Puna (Muscio and López 2016; Yacobaccio 2017).

The presence of human occupations ca. 12.8 ka in the Argentine Puna, which is on the eastern slope of the Andes, implies that if migration routes proceeded in a north-south direction and along the Pacific coast, as is generally accepted, there must be evidence of human activity at earlier sites in the Atacama Desert and the Bolivian Altiplano. A survey of sites and their associated radiocarbon dates, however, shows that the earliest non-coastal sites in Chile are coetaneous with sites the Argentine Puna – Quebrada Maní 12 site (1200 m) in the Pampa de Tamarugal (Latorre et al. 2013) with dates that span 12.8–11.7 ka – as well as sites such as Tuina and San Lorenzo in the Salar de Atacama region and Salar de Punta Negra site (3000 m) ca. 12.6–10.2 ka – and one site in the Bolivian Altiplano – Cueva Bautista (3900 m) 12.8 ka (Capriles et al. 2016). Therefore, it is reasonable to expect even earlier sites either west or north of the Dry and Salt Puna in NW Argentina, unless the entry route into the Argentine Puna was from the mountain forests (*yungas*) to the east, as the very early presence of plant species from this ecozone at Dry Puna sites suggests (Yacobaccio 2017).

Interaction with the Eastern Lowlands

There is plenty evidence of contact between Puna hunter-gatherers and foragers inhabiting the South American eastern lowlands, as well as with the Pacific coast. This is particularly revealed, in the Salt Puna, in: (a) archaeological contexts ca. 10–6 ka that include spear shafts made of wooden canes (*Rhipidocladum newmannii*, *Salix humboldtiana*, *Chusquea lorentziana* Griseb.), grinding stones with *Acrocomia aculeata* palm starch residues, and *Trichocereus pasacana* cactus thorns, and (b) funerary contexts ca. 9.5–1 ka with marine and freshwater shells, cords of *Acrocomia* sp. and *Bromelia* sp. fiber and ceramic containers that resemble eastern lowland styles (López Campeny et al. 2017; Martínez 2014). The natural habitats of these perishable materials are the eastern lowlands, mountain forests (*yungas*) and even the Chaco plains distant up to 450 km. These great distances indicate that some degree of contact between these different ecozones was well established by 10 ka, that is, within a few millennia after the initial colonization process of the Puna (Pintar and Rodríguez 2015). The presence of these allochthonous materials reveals that forager lifeways were part of a much larger macro-regional open system.

The issue of complementarity (direct access, exchange, mutualism, and/or buffering) is difficult to assess archaeologically, given the overlapping signals of each of these possibilities. On the one hand, it is possible that nonlocal elements were acquired through the existence of wide social networks extending up to 450 km that facilitated the circulation and exchange of plants, animals, and genes through reciprocity between foragers in the Puna and those in the eastern lowlands, Pacific coast, and Atacama basin. On the other hand, high degrees of mobility could also have enabled foragers in the Puna to procure resources from neighboring ecological zones through logistical mobility. When climate and environment became increasingly unpredictable during the arid mid-Holocene, inter-regional contacts probably increased between Puna and lowland foragers. So by establishing and maintaining social relations with their lowland neighbors – in the form of kinship ties, trade partnerships, alliances, and inter-regional reciprocal gift giving of tokens and non-subsistence raw materials – Puna foragers would have been able to call on those neighbors and eventually been granted access to resources in times of need (Aschero 2014; Pintar and Rodríguez 2015).

Research in the lowlands to the east of the Argentine Puna (Infiernillo, Tucumán province) has recently commenced, and the discovery of

projectile points made of Puna vulcanite and obsidian at Taller Puesto Viejo 1 site, east of the Santa María river, reveals a two-way interaction mechanism that was already in place by ca. 10 ka (Martínez et al. 2013).

Obsidian Use and Exchange Networks

Provenience studies carried out in the Argentine Puna over the last 15 years have identified 12 obsidian sources that extend 600 km in a N-S axis, from the trilateral border between Argentina, Bolivia, and Chile to the south end of the Argentine Puna. These sources include Zapaleri, Vilama 1 and 2, Alto Tocomar, Quirón, Ramadas, Archibarca, Ona-Las Cuevas, Salar del Hombre Muerto, Cueros de Purulla-Chascón, Valle Ancho, and Laguna Cavi (Fig. 2), all of which are located between 3600 and 4600 m.

The geochemical identification of artifacts found at sites in the Dry and Salt Puna has revealed the use of different sources, suggesting a geographic restriction of hunter-gatherer mobility within possible territorial ranges that did not overlap. The obsidian sources at Archibarca, Ona, Salar del Hombre Muerto, Laguna Cavi, and Cueros de Purulla-Chascón were used by groups of hunter-gatherers inhabiting sites in the Salt Puna throughout the Early and Middle Holocene period and indicate a regional circumscription of their territorial ranges (Pintar et al. 2016). However, hunter-gatherers that occupied sites in the Puna of Salta and the Dry Puna used sources such as Quirón, Tocomar, Ramadas, Vilama, and Zapaleri (López et al. 2013; Yacobaccio et al. 2013).

The pattern of Early and Middle Holocene obsidian use by foragers in the Salt Puna appears to have laid the foundation of one of two mutually exclusive obsidian distribution spheres that were established by sedentary communities dependent on agriculture and camelid pastoralism ca. 2.3 ka in NW Argentina. Obsidian predominantly from Ona and to a lesser extent Cueros de Purulla circulated along the southern part of the Argentine Puna and the valleys to the east with a range of 350 km. A second obsidian distribution sphere, centered on the Zapaleri source, has been identified in the Dry Puna (Escola et al. 2016). These studies suggest that obsidian procurement and exchange networks in NW Argentina, which relied on llama caravan traffic beginning in the Formative and lasting into the Late period as suggested by petroglyphs (Martel et al. 2017), have a long tradition, the roots of which are traced back to the mid-Holocene, a period of extreme aridity in the Puna as a whole (Pintar et al. 2016). Additionally, during this time period and the early Late Holocene (ca. 5–4 ka), the obsidian sources represented in the Puna of Salta have been identified as the local Quirón source. Further, the production of blade technology in this region, which might have been used as a form of territorial identity, suggests a lower residential mobility and a greater spatial circumscription in this region that could have resulted from population aggregation (López et al. 2013).

Llama Domestication and Habitat Fragmentation During the Mid-Holocene

For thousands of years, camelids have been an integral part of the lives of Andean people. Although the debate surrounding the origins of camelid domestication goes back several decades, there is agreement at a macro-regional level that it occurred during the mid-Holocene, ca. 7.4–4 ka. Recent isotopic analyses on camelid bones in the Dry Puna suggest the presence of a "llama-sized" camelid at Hornillos 2 site ca. 7.4 ka, whereas the analyses of camelid fleeces reveal fibers corresponding to a "llama pattern" ca. 5.6 ka, and finally, osteometric analyses in the Puna of Salta and in the Salt Puna show the presence of *Lama glama* ca. 4 ka (Aschero et al. 2014; López and Restifo 2014; López et al. 2013; Reigadas 2014; Yacobaccio et al. 2013).

Moreover, a detailed study of NISP values from 27 sites/levels and diversity indices suggest a specialization in camelids ca. 6.2 ka, which coincides with the late mid-Holocene (or mid-Holocene II). Yacobaccio (2013, 2017) suggests that protective herding of camelids – protection from nonhuman predators and access

to pastures, which would allow habituation and specialized hunting – began during the most arid phase in Puna as a result of fragmentation of the environment that was amplified by habitat loss during this dry phase, a time that also saw a decrease in the anthropogenic signal (Muscio and López 2016) and the appearance of blade technology in the Dry Puna (but not Salt Puna) (Yacobaccio et al. 2017).

Further, there is consensus among Argentine archaeologists that the process of domestication was the result of an intensified relationship between foragers and camelids that began in the Early Holocene, and which allowed for the increased use of all camelid parts, not only meat but bones, grease, marrow, sinew, hides, and fleeces as well (Mondini and Elkin 2014).

Domestication of Plants

Most archaeologists agree that the transition from hunting and gathering to a mixed economy that included food production occurred during the second half of the mid-Holocene and early part of the Late Holocene, ca. 6–4 ka. The intimate knowledge of the landscape and their neighbors that foragers gained during the end of the Pleistocene and first half of the Holocene paved the way for an agropastoral society several thousand years later. This complex issue has been addressed in the Salt Puna by focusing on the study of edible plant microfossils – starch grains and phytoliths – associated with grinding stones, knives, and projectile points found in foraging contexts dating ca. 5.5 ka, as well as very large knives and scrapers dating to ca. 1 ka (Escola et al. 2013). Residues and phytoliths akin to amaranth (*Amaranthus caudatus/A. mantegazzianus*), algarrobo (*Prosopis* sp.), walnut (*Juglans australis*), canna (*Canna edulis*), cactus (*Opuntia* sp.) and pseudocereals such as quinoa and *kañiwa* (*Chenopodium quinoa* and *Ch. pallidicaule*) and maize (*Zea mays L.*) have been identified. Although the latter originated in warmer ecological zones, quinoa was locally produced and harvested, as shown by the remains of quinoa stalks dating ca. 3.6 ka. In the Puna of Salta and the Dry Puna in Jujuy, quinoa microfossils ca. 3 ka have been identified on grinding stones. Archaeological evidence shows that quinoa was present first in the Puna and later spread to the lower valleys (Babot and Hocsman 2015; Babot et al. 2012).

Future Directions

Archaeologists working in the Argentine Puna continue to make great strides in their research by interacting with professionals in the Americas and Europe, teaching seminars, publishing papers in international journals, attending international conferences to disseminate results, and training young graduates who will become the next generation of specialists. Multidisciplinary approaches are becoming more common, as these studies have gained momentum in the last 5 years, particularly paleoenvironmental analyses that aim at understanding broad-scale environmental changes. By examining multi-proxy records – including sediment, pollen, and diatoms of alluvial deposits – in several localities, archaeologists have identified environmental conditions in the Puna that, in general, coincide with records at a macro-regional scale in the Central Andes: more humid conditions during the Early and early Mid-Holocene and an arid Mid-Holocene. Moreover, carbon isotope composition analyses of peat deposits are enabling a better understanding of the relationship between environmental and climatic variability, animal and human diet, and mobility patterns (Morales et al. 2016; Tchilinguirian and Morales 2013; Tchilinguirian et al. 2012). Finally, new lines of research are focusing on ancient DNA of archaeological Chenopodium seeds and stalks, as well as of human bones, teeth, and hair. On the one hand, it is hoped that results will provide insight regarding the process of domestication of quinoa. On the other hand, results will shed light on the prehistoric haplogroups and specific lineages of human populations that inhabited this high altitude region and lend support to either a

coastal migration along the Pacific or an inland migration within South America during the end of the Pleistocene.

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Altitude Environments in Archaeology
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Central Andes: Prehispanic Hunter-Gatherers
- ▶ Early Peopling of the Atacama Desert
- ▶ Núñez, Lautaro
- ▶ Santoro, Calogero M.

References

Aschero, Carlos. 2014. In *Hunter-gatherers from a high-elevation desert: People of the Salt Puna (Northwest Argentina)*, BAR international series 2641, ed. Elizabeth L. Pintar, 25–42. Oxford: Archaeopress.

Aschero, Carlos, Andrés Izeta, and Salomón Hocsman. 2014. New data on South American camelid bone size changes during middle-late Holocene transition: Osteometry at Peñas Chicas 1.5 (Antofagasta de la Sierra, Argentinian Puna). *International Journal of Osteoarchaeology* 24: 492–504.

Babot, María del Pilar, and Salomón Hocsman. 2015. Quinoa: A millenary grain in northern Argentina. In *Encyclopaedia of the history of science, technology, and medicine in non-western cultures*, 1–16. Dordrecht: Springer Science.

Babot, María del Pilar, Salomón Hocsman, Romina E. Piccón Figueroa, and María Cecilia Haros. 2012. Recetarios prehispánicos y tradiciones culinarias. Casos de la Puna argentina. In *Las manos en la masa. Arqueologías, Antropologías e Historias de la Alimentación en Suramérica*, ed. María del Pilar Babot, María Marschoff, and Francisco Pazzarelli, 235–269. Córdoba: Museo de Antropología, Universidad Nacional de Córdoba.

Campeny, López, M.L. Sara, Andrés Romano, M. Fernanda Rodríguez, Mariano H. Corbalán, and Alvaro R. Martel. 2017. De lazos familiares a redes sociales: nuevos aportes para la discusión de interacciones entre poblaciones de la puna y las tierras bajas orientales. In *Arqueología de la Vertiente Oriental Surandina. Interacción Macro-regional, Materialidades, Economía y Ritualidad*, ed. Beatríz N. Ventura, Gabriela Ortíz, and María Beatríz Cremonte, 359–381. Buenos Aires: Sociedad Argentina de Antropología.

Capriles, José M., Juan Albarracin-Jordan, Umberto Lombardo, Daniela Osorio, Blaine Maley, Steven Goldstein, Katherine Herrera, Michael D. Glascock, Alejandra Domic, Heinz Veit, and Calogero Santoro. 2016. High-altitude adaptation and late Pleistocene foraging in the Bolivian Andes. *Journal of Archaeological Science: Reports* 6: 463–474.

Escola, Patricia S., Salomón Hocsman, and María del Pilar Babot. 2013. Entre las residencias y los campos de cultivo. Aportes de los cuchillos/raederas de módulo grandísimo a la cuestión del laboreo agrícola en Antofagasta de la Sierra (Puna de Catamarca) durante el primer milenio dC. *Relaciones*. *Revista de la Sociedad Argentina de Antropología* 38 (1): 83–110.

Escola, Patricia S., Salomón Hocsman, and María del Pilar Babot. 2016. Moving obsidian: The case of Antofagasta de la Sierra basin (southern Argentinean Puna) during the late Middle and Late Holocene. *Quaternary International* 422: 109–122.

Haber, Alejandro. 2009. Animism, relatedness, life: Post-western perspectives. *Cambridge Archaeological Journal* 19 (3): 418–430.

Latorre, Claudio, Calogero M. Santoro, Paula C. Ugalde, Eugenia Gayó, Daniela Osorio, Carolina Salas-Egaña, Ricardo De Pol-Holz, Delphine Joly, and Jason A. Rech. 2013. Late Pleistocene human occupation of the hyperarid core in the Atacama Desert, northern Chile. *Quaternary Science Reviews* 77: 19–30.

López, Gabriel E.J., and Federico Restifo. 2014. Procesos de diversificación, intensificación y domesticación durante el Holoceno en las tierras altas del norte de Argentina y Chile: aportes desde la puna de Salta. *Comechingonia* 18: 95–116.

López, Gabriel E.J., Federico Coloca, and Juan Pablo Orsi. 2013. Human occupations during the Middle Holocene and beginning of the Late Holocene in the Pocitos basin, Puna of Salta, Argentina: New research and regional comparison. *Quaternary International* 307: 50–57.

Martel, Álvaro R., Diego Zamora, and Matías Lepori. 2017. Tráfico y movilidad caravanera en la puna catamarqueña. Una mirada intermodal. *Estudios Atacameños* 56: 197–223.

Martínez, Jorge Gabriel. 2014. Contributions to the knowledge of natural history and archaeology of hunter-gatherers of Antofagasta de la Sierra (Argentine South Puna): The case of Peñas de las Trampas 1.1. In *Hunter-gatherers from a high-elevation desert: People of the Salt Puna (Northwest Argentina)*, BAR international series 2641, ed. Elizabeth L. Pintar, 71–93. Oxford: Archaeopress.

Martínez, Jorge Gabriel, Eduardo P. Mauri, Cecilia Mercuri, Mario A. Caria, and Nurit Oliszewski. 2013. Mid-Holocene human occupations in Tucumán (Northwest Argentina). *Quaternary International* 307: 86–95.

Mondini, Mariana, and Dolores Elkin. 2014. Holocene hunter-gatherers in the Puna. Integrating bones and other zooarchaeological evidence in Antofagasta de la Sierra (Argentina). In *Hunter-gatherers from a high-elevation desert: People of the Salt Puna (Northwest Argentina)*, BAR international series 2641, ed. Elizabeth L. Pintar, 117–124. Oxford: Archaeopress.

Morales, Marcelo R., Malena Pirloa, and Celeste Samec. 2016. Patrones en la composición isotópica del carbono de turbas holocénicas en la Puna argentina: implicaciones paleoambientales y paleoecológicas. *Estudios sociales del NOA* 16: 69–86.

Muscio, Hernán J., and Gabriel E.J. López. 2016. Radiocarbon dates and anthropogenic signal in the South-Central Andes (12,500–600 cal. years BP). *Journal of Archaeological Science* 65: 93–102.

Pintar, Elizabeth, and María Fernanda Rodríguez. 2015. Understanding foraging radius and mobility in a high desert. *Journal of Archaeological Science* 59: 142–158.

Pintar, Elizabeth, Jorge Martínez, Carlos Aschero, and Michael D. Glascock. 2016. Obsidian use and mobility during the Early and Middle Holocene in the Salt Puna, NW Argentina. *Quaternary International* 422: 93–108.

Reigadas, María del Carmen. 2014. The exploitation and use of faunal resources. The role of Quebrada Seca 3 and Cueva Cacao 1A (Antofagasta de la Sierra, Catamarca, Argentina). In *Hunter-gatherers from a high-elevation desert: People of the Salt Puna (Northwest Argentina)*, BAR international series 2641, ed. Elizabeth L. Pintar, 125–144. Oxford: Archaeopress.

Tchilinguirian, Paul, and Marcelo Morales. 2013. Mid-Holocene paleoenvironments in northwestern Argentina: Main patterns and discrepancies. *Quaternary International* 307: 14–23.

Tchilinguirian, Paul, Marcelo R. Morales, Brenda Oxman, Liliana C. Lupo, Daniel E. Olivera, and Hugo D. Yacobaccio. 2012. Early to Middle Holocene transition in the Pastos Chicos record, dry Puna of Argentina. *Quaternary International* 330: 171–182.

Yacobaccio, HD. 2013. Towards a human ecology for the Middle Holocene in the Southern Puna. *Quaternary International* 307: 24–30.

Yacobaccio, Hugo. 2017. Peopling of the high Andes of northwestern Argentina. *Quaternary International* 461: 34–40.

Yacobaccio, Hugo D., Marcelo R. Morales, Patricia Solá, Celeste T. Samec, Rodolphe Hoguin, and Brenda I. Oxman. 2013. Mid-Holocene occupation of the Dry Puna in NW Argentina: Evidence from the Hornillos 2 rockshelter. *Quaternary International* 307: 38–49.

Yacobaccio, Hugo D., Marcelo R. Morales, and Rodolphe Hoguin. 2017. Habitats of ancient hunter-gatherers in the Puna: Resilience and discontinuities during the Holocene. *Journal of Anthropological Archaeology* 46: 92–100.

Pwiti, Gilbert

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Basic Biographical Information

A jack of two trades and master of both is a befitting statement to introduce Gilbert Pwiti. This biographic entry outlines the illustrious career of the exceptional academic and pioneer of modern archaeological and heritage management research in southern Africa and Zimbabwe in particular. Zimbabwe has enjoyed a comparatively long history of archaeological research starting from the early twentieth century. However, most of the initial archaeological investigations were done by expatriate professional archaeologists of European and American descent, including David Randall-MacIver, Gertrude Caton-Thompson, Roger Summers, Peter Garlake, Tom Huffman, and Robert Soper. It is against this background that we have to assess and appreciate the enormous contributions of Gilbert Pwiti to the archaeology and management of heritage in Zimbabwe.

Gilbert Pwiti was born in 1958 in Mazoe in the then Federation of Rhodesia and Nyasaland that comprised three British colonies, namely, Nyasaland (now Malawi), Northern Rhodesia (now Zambia), and Southern Rhodesia (now Zimbabwe). Twenty-two years later he successfully completed the Bachelor of Arts Dual Honors in History and African Languages at the University of Zimbabwe (*hereafter* UZ). At the same time Zimbabwe was emerging as a new country following a decade of protracted war against minority white regime. The new country, like any other newly independent African country, was in dire need of restoring pride by rewriting its history that was distorted by a century of British colonization. Naturally archaeology was one of the ways to rewrite the precolonial past, a period notable for

its lack of written documents. With his passion for history, Gilbert was among the first generation of indigenous historians to receive archaeological training abroad in the postcolonial period. In 1983 he left for Europe to read for an M.Phil. in Archaeology at the University of Cambridge. Upon his return from Cambridge after 2 years of training, he found himself faced with the task of setting up an archaeology unit, the first one in Zimbabwe, within the Department of History at UZ. He was instrumental in introducing archaeology and prehistory courses to undergraduate students who were majoring in History. By 1990 the first fully fledged archaeology degree program began to be offered at UZ as a result of the commitment to teaching by Gilbert Pwiti and his colleagues, Peter Garlake and Robert Soper (Pwiti 1994). Gilbert was subsequently awarded a Ph.D. in Archaeology by the University of Uppsala in 1996 for his research on the early farming communities and complex societies of northern Zimbabwe (Pwiti 1996a). In 2000 he was once again instrumental in the establishment of the Master of Arts degree in Heritage Studies at UZ. Beyond UZ Gilbert has also assisted his former colleagues and students to establish archaeology and cultural heritage degree programs at Midlands State University (MSU) and Great Zimbabwe University (GZU). Today Zimbabwe has hundreds of professional archaeologists and heritage managers practicing their trade in the country while several have been "exported" to neighboring countries.

Major Accomplishments

During the formative years of his career, he largely focused on the archaeological *terra incognita* regions that included northern Zimbabwe, and more recently he has shifted his attention to unexplored parts of eastern Zimbabwe. Prior to his investigations, archaeological research tended to be much more limited in terms of geographical coverage with most studies concentrating on Great Zimbabwe and the surrounding areas. His research in the mid-Zambezi Valley, a region perceived as marginal for agropastoral pursuits and thus neglected by archaeologists, documented the appearance of the earliest farmers in southern Africa (Pwiti 1996a). His archaeological investigations at Kadzi documented the occurrence of farming communities in the fifth century CE, at least three centuries earlier than previously assumed. The end result of his research was the revision of the cultural sequence of northern Zimbabwe together with the modification of the purported Bantu population movements that supposedly took place at the beginning of the first millennium CE. His focus on second millennium CE farming communities in the same area broadened our understanding of the complex transformation of non-stratified communities to more complex systems (Pwiti 2004). He also questioned the existence of the second wave of Bantu migrations that had been thought to have occurred at the beginning of the second millennium CE. His research findings on this issue refuted the idea that only population movement could account for the sociopolitical changes that occurred in southern Africa. These conclusions challenged racially biased migration theories that were always used to explain sociopolitical changes in African archaeology in favor of autochthonous developments resulting from changes in economy and ideology (Pwiti 2005).

His research on the archaeology of farming communities subsequently resulted in the development of a sustained interest in the management of cultural resources. He has since extensively published on the inadequacies of heritage management policies and the need to revise statutory instruments that were enacted during the colonial period which still guide the protection and preservation of cultural resources in postcolonial Africa. He initiated a number of innovative concepts that ought to be the guiding principles for heritage managers in postcolonial African countries. He was among the first scholars to advocate for the recognition of the importance of intangible aspects of heritage, reconciliation of modern and traditional heritage management approaches, and

championed community participation (Pwiti 1996b, 1997b; Pwiti and Mvenge 1996). His work on heritage management practice in southern Africa highlights how colonization alienated the colonized from their heritage physically and culturally (Pwiti and Ndoro 1999; Ndoro and Pwiti 2001). Colonial land resettlement policies and private land holding rights saw the forced removal of people from their immovable heritage, while the education system and churches were used as vehicles to make people despise their own heritage. Vast tracts of land were designated nature reserves, game sanctuaries, and commercial farms. As a result ancestral grave yards, religious centers and shrines became out of bounds since indigenous populations were denied access. It has been Gilbert's agenda to "restore lost cultural values and pride" so that the once colonized people can appreciate their own heritage and eventually participate in its management. The implementation of some of his proposed concepts particularly community participation in heritage management has not been without challenges. The recent stocktaking of heritage management practice in postcolonial Africa has highlighted a new set of challenges that come with the concepts that he prescribed initially (Chirikure and Pwiti 2008; Chirikure et al. 2010). In some cases it has proved difficult for heritage managers to identify "communities," "indigenous groups," and "traditional custodians." In principle, professionally trained heritage managers and policy makers now recognize the importance of involving traditional custodians in the management of heritage resources, but the implementation and particularly the identification of legitimate custodians is easier said than done.

Gilbert Pwiti has (co)edited and (co)authored several seminal publications that focus on a range of aspects on African archaeology and heritage management (Pwiti 1997a; Ndoro and Pwiti 2005). In 2001 he teamed up with his colleagues in East Africa to launch a publication series entitled *Studies in the African Past*. This series has since been the outlet to showcase recent and ongoing research in eastern and southern Africa. To date Gilbert Pwiti has held several administrative positions at UZ, and beyond the university he has acted as an advisor for matters of heritage management. In spite of the demands of these administrative jobs and research commitments, he has never stopped lecturing. He is an outstanding and eloquent teacher with a lot of enthusiasm in the African prehistory and heritage management. His commitment to the archaeology unit he founded at the university has seen him staying put even in the most difficult times when others went in search of greener pastures. His publications are very useful, but we should acknowledge that they will not always stand the test of time as such may one day become outdated. Having said that, it is through his contribution to the teaching and training of more archaeologists that Gilbert sows the seeds of knowledge that will last forever. He has been instrumental as a mentor of many professional archaeologists and heritage managers in Zimbabwe. Apart from UZ he has been able to share his experience as a visiting professor and external examiner at several leading archaeology institutions and departments in Africa and abroad. This international exposure has allowed him to secure funding for his students who have furthered their archaeological studies at leading archaeological institutions and departments in Africa and Europe. Through his commitment to the training of indigenous archaeologists Gilbert has shown that the economic theory of "kicking away the ladder" once one climbs to greater heights has no place in the world of academia. The present and future generations of archaeologists and heritage managers in Zimbabwe are therefore indebted to him. For his contributions and service to his country and southern Africa, it is not surprising that Gilbert Pwiti became the first professor of Archaeology in Zimbabwe. His services to global archaeology were acknowledged when he was elected the acting president of the World Archaeological Congress (1998–2000). On the final analysis of his career to date, Gilbert has demonstrated that for one to be an archaeologist, one has to be a versatile and passionate researcher, supervisor, and teacher.

Cross-References

▶ Ndoro, Webber
▶ Zimbabwe: Cultural Heritage Management

References

Chirikure, S., and G. Pwiti. 2008. Community involvement in archaeology and cultural heritage management. *Current Anthropology* 49: 467–485.

Chirikure, S., M. Manyanga, W. Ndoro, and G. Pwiti. 2010. Unfulfilled promises? Heritage management and community participation at some of Africa's cultural heritage sites. *International Journal of Heritage Studies* 16: 30–44.

Ndoro, W., and G. Pwiti. 2001. Heritage management in southern Africa: Local, national and international discourse. *Public Archaeology* 2: 21–34.

Ndoro, W., and G. Pwiti, eds. 2005. *Legal framework for the protection of immovable cultural heritage in Africa*. Rome: ICCROM.

Pwiti, G. 1994. Prehistory, archaeology and education in Zimbabwe. In *The presented past: Heritage, museums and education*, ed. P.G. Stone and B.L. Molyneaux, 338–348. London: Routledge, Taylor & Francis Group.

Pwiti, G. 1996a. *Continuity and change: An archeological study of farming communities in northern Zimbabwe AD 500-1700*, Studies in African Archaeology. Vol. 13. Uppsala: Societas Archaeologica Upsaliensis.

Pwiti, G. 1996b. Let the ancestors rest in peace? New challenges for cultural heritage management in Zimbabwe. *Conservation and Management of Archaeological Sites* 1: 151–160.

Pwiti, G. 1997a. *Caves, monuments and texts: Zimbabwean archaeology today*, Studies in African Archaeology. Vol. 14. Uppsala: Department of Archaeology and Ancient History.

Pwiti, G. 1997b. Taking African cultural heritage management into the twenty-first century: Zimbabwe's masterplan for cultural heritage management. *African Archaeological Review* 14: 81–83.

Pwiti, G. 2004. Economic change, ideology and the development of cultural complexity in northern Zimbabwe. *Azania* 39: 265–282.

Pwiti, G. 2005. Southern Africa and the East African Coast. In *African archaeology: A critical introduction*, ed. A.B.. Stahl, 378–391. Malden: Blackwell Publishing.

Pwiti, G., and G. Mvenge. 1996. Archaeologists, tourists and rainmakers: Problems in the management of rock art sites in Zimbabwe, a case study of Domboshava national monument. In *Aspects of African archaeology: Papers from the 10th Congress of the Pan-African Association for Prehistory and Related Studies*, ed. G. Pwiti and R. Soper, 817–824. Harare: University of Zimbabwe Publications.

Pwiti, G., and W. Ndoro. 1999. The legacy of colonialism: Perceptions of cultural heritage in southern Africa, with special reference to Zimbabwe. *African Archaeological Review* 16: 143–153.

Further Reading

Chami, F., and G. Pwiti, eds. 2002. *Southern Africa and the Swahili world*, Studies in the African Past. Vol. 2. Dar es Salaam: Dar es Salaam University Press.

Chami, F., G. Pwiti, and M.D.C. Radimilahy, eds. 2001. *People, contacts and the environment in the African past*, Studies in the African Past. Vol. 1. Dar es Salaam: Dar es Salaam University Press.

Chami, F., G. Pwiti, and M.D.C. Radimilahy. 2003. *Climate change, trade and modes of production in sub-Saharan Africa*, Studies in the African Past. Vol. 3. Dar es Salaam: Dar es Salaam University Press.

Chami, F., G. Pwiti, and M.D.C. Radimilahy. 2004. *The African archaeological network: Reports and a review*, Studies in African Past. Vol. 4. Dar es Salaam: Dar es Salaam University Press.

Pwiti, G., S. Macamo, and M.D.C. Radimilahy, eds. 2009. *Dimensions of African archaeology*, Studies in the African Past. Vol. 7. Dar es Salaam: E & D Vision Publishers.

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Basic Biographical Information

Anne Pyburn is Professor of Anthropology at Indiana University where she is Director of the Center for Archaeology in the Public Interest (CAPI). She is the Director of the Chau Hiix Project in Belize, Director of Community Cultural Resource Management for the Silk Road Project in Kyrgyzstan, and Director of the MATRIX Project for educational development in archaeology.

Major Accomplishments

Dr. Pyburn's interests include archaeological research ethics, heritage and globalization,

gender, early cities, the ancient Maya, and the growing emphasis on heritage and national identity in Kyrgyzstan. She is currently serving as Chair of the International Scientific Committee for the seventh meeting of the World Archaeological Congress (WAC-7).

Cross-References

- ▶ Ethics in Archaeology
- ▶ Kyrgyzstan: Cultural Heritage Management
- ▶ Mundo Maya
- ▶ Stakeholders and Community Participation
- ▶ World Archaeological Congress (WAC)

Further Reading

Colwell-Chanthaphonh, C., J. Hollowell, and D. McGill. 2008. Ethics in action. In *Case studies in archaeological dilemmas*. Washington, DC: Society for American Archaeology.

Pyburn, K.A. 2007. Archaeology as activism. In *Cultural heritage and human rights*, ed. H. Silverman and D.F. Ruggles, 172–183. New York: Springer.

Pyburn, K.A., and R.W. Wilk. 1995. Responsible archaeology is applied anthropology. In *Ethics in American archaeology: Challenges for the 1990s*, ed. M.J. Lynott and A. Wylie, 71–76. Washington, DC: Society for American Archaeology.

Vitelli, K.D., and C. Colwell-Chanthaphonh, eds. 2006. *Archaeological ethics*. 2nd ed. Lanham: AltaMira.

Zimmerman, L.J., K.D. Vitelli, and J. Hollowell-Zimmer. 2003. *Ethical issues in archaeology*. Walnut Creek: AltaMira.

Q

Qhapaq Ñan Program

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From the mid-fifteenth century of our era, the *Qhapaq Ñan* or "Great Road" was the complex road system formally used by the Incas to promote the development of their multiethnic political project that has maintained a remarkable force as an articulating element of diverse Andean peoples located in the present countries of Colombia, Ecuador, Peru, Bolivia, Chile, and Argentina. This road network was built on the roads and road systems of previous civilizations, which were integrated into a defined political project. The connection of these populations with this ancestral road network is not limited only to the memory of a glorious pre-Hispanic past but to an effective means to achieve points of encounter, exchange, and communication between regions and diverse geographies in every sense.

The Archaeological *Qhapaq Ñan*

Thanks to archaeological and historical studies, we now know that the road system of *Qhapaq Ñan* had its starting point in the place called by the Incas *Haucaypata*, where today the main square of Cusco City is located, in the southern hill range of Peru, from where a planned organizational strategy was designed for the four cardinal points of the Andean territory: *Chinchaysuyu* (north), *Collasuyu* (south), *Antisuyu* (east), and *Contisuyu* (west). It thus covered almost the entire Peruvian territory; Archaeologists such as John Hyslop (1992) have estimated its size in 25,000 kilometers or more, considering the Main Road and secondary or transverse roads. Clearly, current studies have been focused on highlighting the administrative facilities of the road network, overemphasizing the adaptive/functional component of this network. These explanations based on the emphasis of an administrative logic overshadow the recognition of other meanings linked to the presence of Inca constructions in the landscape, such as the role of the communities' perceptions over space when establishing interregional relations. The network of Inca roads or *Qhapaq Ñan* should not be understood only as an administrative network of exchange or circulation of raw materials, manufactures, and manpower at the service of the Empire but also as a way of relating to the environment.

The *Qhapaq Ñan* as Transformer of the Territory

It is now recognized that the crossing of the road through certain spaces or certain snowed peaks could have repercussions on how social relations

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were established in the interior of group or the adjacent groups, as well as in their interactions. The location of these shrines seems to have been important or more important to the Inca society than to reach an administrative center or a *tambo* (an enclosure located next to a main road, used as a shelter and sometimes as a collection center). In this alternative view, roads are not only state administrative tools, they are also present in daily life and in the interaction of man with his environment. That is why, even when the Inca imperial administrative centers collapsed after the collapse of the *Tahuantinsuyu*, some of the functions of the road as the link between the centers and *tambos* disappeared, but the local populations continued using it, causing the road to continue fully valid, at least as an axis of movement in the Andes up to the present. This vision of a living and active *Qhapaq Ñan*, transverse to Peruvian history, is based on the incorporation of concepts such as anthropology of movement, territory, and landscape to the archaeological analysis of the road and its heritage management. Thus, the enormous potential of *Qhapaq Ñan* is evident. Being the path that links the past and its present, it allows us to move away from exclusive patrimonial schemes. Likewise, being the route that manifests the spatial diversity, it has the potential to communicate our particularities. Therefore, the management of the road as patrimonial good should aim at making it an active vehicle of development, improvement in the living standards, and social inclusion.

The *Qhapaq Ñan* Project of the Peruvian State

Since 2001, through the Supreme Decree No. 031–2001-ED and the subsequent Law No. 28260, the Peruvian Government declared preferential interest in the investigation, identification, registration, protection, conservation, and value-added of the Inca road network or *Qhapaq Ñan* throughout the national territory. That was why a National Commission was created. The Commission, from that date to the present, has been implementing the *Qhapaq Ñan* Project, which, through a series of specific projects and various activities, has been carrying out interventions in a sustained manner throughout the entire road network in the country with the purpose and following the mandate of the regulations provisions. The *Qhapaq Ñan Project* is developed by the Vice Ministry of Cultural Heritage and Cultural Industries of Peru's Ministry of Culture, and it implements actions under three strategic lines (*Qhapaq Ñan* Project's 5-year plan 2016–2020. Ministry of Culture, Lima):

1. Promote research, protection, conservation, and social use of the Inca Trail, as well as its associated cultural heritage and landscapes, in a process of agreement with the social actors involved in each area of intervention within the national territory.
2. Promote communication mechanisms, which aim, on the one hand, to build knowledge and shared action in local and regional areas in relation to the related cultural heritage and, on the other hand, to spread all aspects of *Qhapaq Ñan* in different national and international spheres.
3. Strengthen the institutional framework of the *Qhapaq Ñan* Project, within the framework of the decentralization process of the culture sector, optimizing the resources and processes in the achievement of the purposes for which it has been created.

Over the years, to the present, the *Qhapaq Ñan* Project has managed to identify and record 14,781.07 km of linear extension between the main road and secondary roads; besides, the registration of 2010 archaeological sites linked to the road and the Inca presence at national level has successfully been achieved. The results of this systematic work have constituted a database scientifically verified, rectified, and updated by specialized professionals and technical teams of field and cabinet, in order to achieve greater precision in its future use in the framework of specialized studies. (This information, open to the public, can be found now in the Ministry of Culture's web page, www.cultura.gob.pe, *Qhapaq Ñan* link.)

Contemporary Management of the Past

As has been defined above, the *Qhapaq Ñan* is a living path, part of our past and present history, therefore, its patrimonial management, imposed by national law, obliges us to take care of the path not only as a trace of the Inca past but also as an actor who has meaning and function for modern populations. That is why it is necessary to develop forms of heritage management that include people, landscapes, and material heritage. The case of the *Qhapaq Ñan* is especially interesting in this respect, since the heritage is conceptually between the local and the national (and even the international), between the rural and the urban, between the traditional and the modern, and between the preservation and the change.

The *Qhapaq Ñan* Project of the Ministry of Culture uses two concepts for the patrimonial management of the road: territorial management and social use. Territorial management is expressed by placing the path in its natural and social context, where interventions must be linked in all aspects and caring that any measure on heritage does not affect the other constituent elements of the territory. This territorial management forces us to change the conception of what the management unit should be. The program has opted for a management that is not focused on archaeological sites but in parts or segments of the road, as this allows us to plan long-term actions in an integral way, besides constituting a more adequate scale of patrimonial management to integrate the landscape and the people. In this territorial management, we consider it is very important that the rebirth of the road as a heritage does not end up dispossessing the local people of land and their own cultural manifestations, in a context where national and international forces strive to appropriate it.

The second guiding concept is that of participatory management, which we have promoted by rethinking the concept of "social use" that has been used for some years in a rather confusing way. The *Qhapaq Ñan* Project understands the social use of cultural heritage "as a dialogical and democratic process that seeks to protect, conserve and promote material and immaterial cultural assets in a participatory manner, seeking its reconstitution as a transcendent element for the sustainable development of communities" (Marcone and Ruiz 2014). Following this concept, our role as cultural managers is not to favor one group or another of social actors acting and negotiating around the *Qhapaq Ñan* but to ensure the conditions so that no group would be excluded from this negotiating space because they have no economic power or political force, as it has happened many times in the past.

In the light of these concepts, the *Qhapaq Ñan* Project proposes lines of action that make the road management participatory and facilitates its integral territorial management (Marcone and Ruiz 2014: photos 17a and 17b). These lines could be summarized in four: (1) to generate dialogue processes to recognize common interests and establish consensus, so that the populations have an active participation in decision-making; (2) to develop a participatory planning process for the development of joint actions, where local communities and local stakeholders are directly involved in the planning and execution of our actions; (3) to implement an agreed management process for sustainable development, where heritage is not an end but an element that contributes to improving the living standards of the associated populations; and (4) to generate an appropriation of the heritage returning its significance in the local area in the day-to-day.

Qhapaq Ñan as World Heritage Recognized by UNESCO

Due to its features, *Qhapaq Ñan* fulfills the requirements set by UNESCO for its recognition as a World Heritage. It presents the criterion of Exceptional Universal Value by representing a masterpiece of the human creative genius that attests an exchange of influences at an architectural, technological, landscape, and administrative level. It also provides the unique testimony of a cultural tradition or a living civilization, being an exceptional example of traditional settlement, use of natural resources, and interaction with the

environment, being directly associated with events and living traditions.

Considering all this, in May 2001, the Government of Peru took the initiative to register the *Qhapaq Ñan-Andean Main Road* on the World Heritage Tentative List. Subsequently, in 2003, representatives of Peru, Argentina, Chile, Colombia, Bolivia, and Ecuador attended meetings, first in Lima and then in Cusco, to outline the basis of the current process. Subsequently, with the same objective, meetings continued in other countries, to continue building the application file. The Candidature File was officially presented by the six countries involved in the process on the first day of February 2013 to the World Heritage Center. The Andean road system was included in the World Heritage list in June 2014. The prepared dossier consists of chapters detailing the technical characteristics of the good that it intends to nominate, such as identification of the good, description of the good, state of conservation, justification of the registration, database, legal matrix, management plan, and a voluminous cartographic atlas.

This process is unique, because it symbolizes the unity of six countries, which came together to develop a dossier. This unit is the result of intense coordination – where concepts, methodologies, and legislation of each country have been harmonized and persisted even during armed conflicts. This is a worldwide example of interregional unity and collaboration. This process is also a global milestone, since *Qhapaq Ñan* is the largest monumental asset to be presented to UNESCO to be included on the World Heritage List. Its magnitude represents a series of challenges for its management and preservation, forcing us to rethink methodologies and concepts. Thus, *Qhapaq Ñan* is called to become the model example of the concept of "Cultural Itinerary," a concept of heritage management that links monuments, landscape, and people.

Obtaining the title of World Heritage entails a series of responsibilities of the States Parties with the aim of protecting and preserving it for future generations. It also brings advantages that could benefit the following depending on the level of management:

(A) Belonging to an international community that appreciates and is interested in goods of universal value that represent a set of exceptional examples of cultural diversity and natural wealth.
(B) The nominated good acquires international recognition.
(C) Opening possibilities for the signing of international conventions for the protection and conservation of the good.
(D) It increases the flow of visitors interested in knowing the good and dynamizes the local, regional, and national economy of a country through tourism.
(E) It commits all State authorities to protect, conserve, and manage the good in a sustainable way.
(F) It allows the access to the Fund of the Humanity Heritage Conservation.
(G) It receives emergency assistance for damage caused by natural and man-made disasters.
(H) It benefits from the development and implementation of a comprehensive Management Plan that proposes adequate preservation measures as well as monitoring mechanisms.
(I) Therefore, it brings greater public awareness in favor of it and its exceptional values.

References

Hyslop, John. 1992. *Qhapaq Ñan: The Inka road system*. Lima: Instituto Andino de EstudiosArqueológicos y Petroperú.

Quebec Archaeology

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Introduction

With its distinctive culture, language, history, and institutions, the Province of Quebec occupies a unique position in the archaeological landscape

of Canada and North America. Within Canada, only Quebec's territory includes temperate, boreal, and arctic ecological zones, respectively home to Iroquoian, Algonquian, and Inuit cultures (Fig. 1). These indigenous peoples, along with the French and British colonists who arrived much later, had to learn to coexist through a long and difficult history, occasionally marked by political and cultural clashes. As a result of these particular conditions, archaeology as a discipline did not develop in Quebec quite like it did elsewhere on the continent.

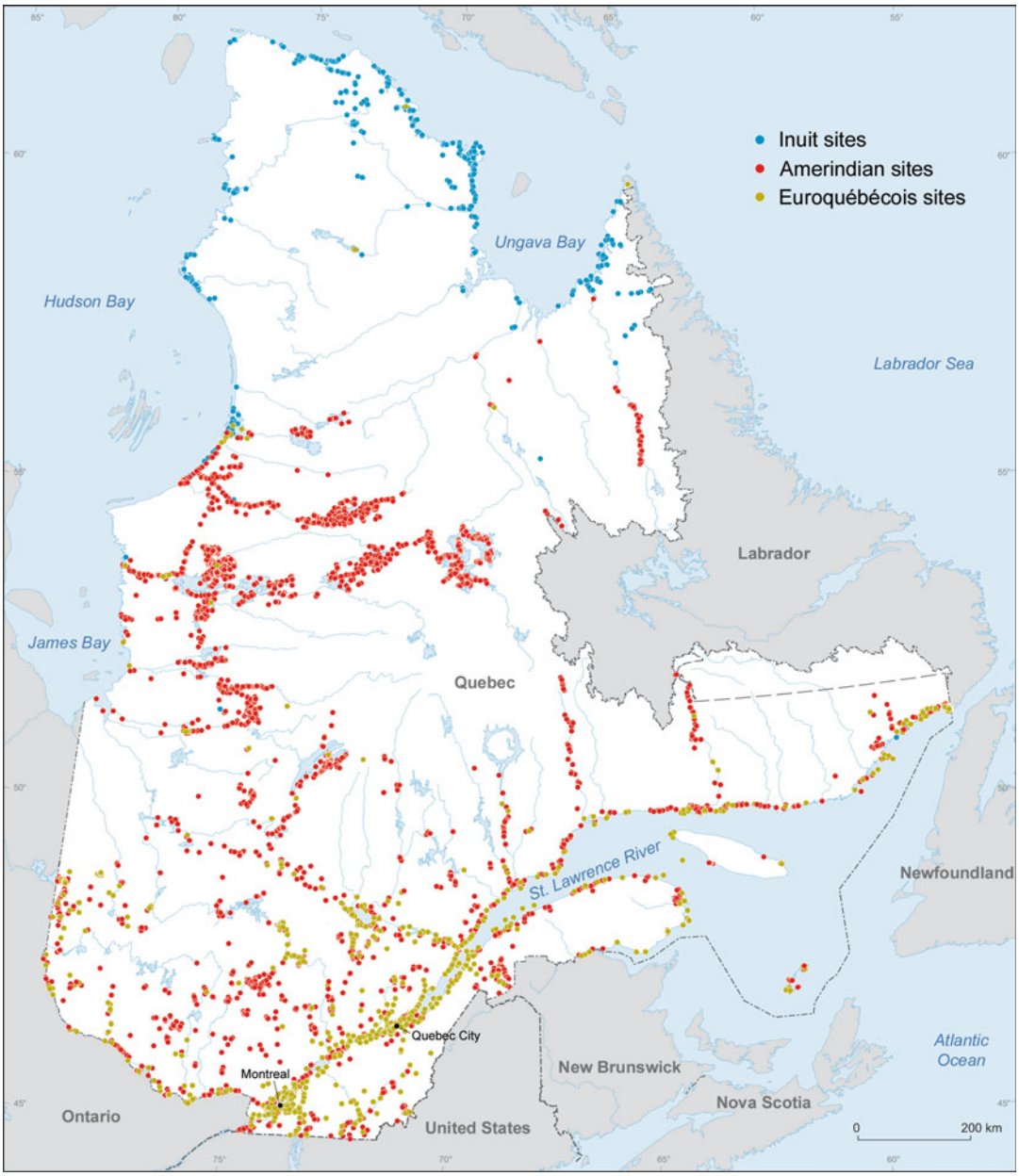

Quebec Archaeology, Fig. 1 Location of the known Inuit, Amerindian and Euroquébécois archaeological sites in Quebec. (Modified from Pintal et al. (2015). © Andrée Héroux, Pointe-à-Callière, Cité d'archéologie et d'histoire de Montréal)

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The general history of archaeology in Quebec has already been the subject of other publications (Clermont 1999, 2001; Martijn 1998). This entry emphasizes the sociopolitical and sociocultural context of the development of archaeology in the province, as well as considering contemporary issues and debates (see also Zorzin and Gates St-Pierre 2017). This short summary of Quebec archaeology is relevant in the context of an increasingly globalized, decolonized, non-hierarchical, and inclusive archaeological praxis, where regional histories and developments can inform, or even lead, discussions on more global issues. Many academics and professionals now have an interest in contrasting national and regional archaeologies. The former have become less hegemonic than before, while the latter are increasingly encouraged to expose and share their visions and experiences, their failures and successes. The contemporary organization and praxis of archaeology in other regional archaeological perspectives, as well as national and international ones, can benefit from this comparative work. Fostering this discourse is an objective shared by global organizations such as the World Archaeological Congress, as well as by many conferences and publications, including the present Encyclopedia of Global Archaeology. In such venues, local and regional archaeologies are valued, compared, and presented to a wider, global audience. Quebec is only one example of "glocalization": a regional archaeology evolving in an increasingly globalized world, yet maintaining its distinctiveness.

Inauspicious Beginnings

Although the first attested archaeological discovery in Canada took place in Bécancour in 1700 AD (Gates St-Pierre 2016: 18–20), archaeology as a profession and discipline was slow to develop in the province, leading American anthropologist Frank G. Speck to assert that "no region of such size on the continent has been less explored" (Speck 1951: 21). Before the 1960s, archaeology in Quebec consisted in either fortuitous finds by amateurs and laypeople, or projects conducted by archaeologists from various institutions outside the province. For example, when the Dawson site, a large sixteenth century Iroquoian village, was accidentally discovered in 1859 during road works near the present-day campus of McGill University (Pendergast and Trigger 1972), the discovery was reported to John W. Dawson, a geologist and Principal of what was then McGill College. Dawson, accompanied by a few members of the anglophone elite of the time, conducted further excavations, as well as collecting surface artifacts. This was one of the first archaeological rescue projects in Canada (McCaffrey and Jamieson 1992). William J. Wintemberg of the National Museum of Man in Ottawa conducted several explorations and excavations along the north shores of the St. Lawrence River Valley, from Lanoraie to Brador, during the early twentieth century. During the 1940s and 1950s, archaeologists and anthropologists such as Valerie Burger, Edward S. Rogers (Royal Ontario Museum), and Frank G. Speck (University of Pennsylvania) surveyed the boreal forest, collecting large numbers of prehistoric artifacts. William E. Taylor (National Museum of Man) pioneered archaeological research in Nunavik, the arctic region of Quebec. Gordon G. Lowther was the first archaeologist to teach that discipline in the province, at McGill University, from 1954 to 1964, when he was replaced by Bruce G. Trigger (Martijn 1998).

Over about the same time period, rural areas were also the scene of surface artifact collection and improvised, small-scale excavations by clergymen. Abbé René Lévesque was one such prominent figure in the early history of archaeology in Quebec (Lévesque 1962). In a province where education was still largely controlled by the Catholic Church, priests and abbots were among the few French-speaking people of the time who were aware of, and were interested in the archaeological past. It would take a revolution, though a "quiet" one, to give a new direction to both Quebec society and Quebec archaeology.

The Awakening

Quebec's Quiet Revolution (*Révolution tranquille*) unfolded in the 1960s as social movement aiming at modernizing and secularizing teaching in the province, as well as increasing francophone control over the province's economy and policy. Among many tangible consequences was the creation of a *ministère des Affaires culturelles* (MAC) in 1961 and a *ministère de l'Éducation* in 1964. In turn, these fostered the creation of the first department of anthropology in the province, at Université de Montréal (1961), and a second one at McGill University (1968). The MAC was very active in organizing the practice of archaeology in the province. Of particular significance was the adoption, in 1972, of both the *Loi sur les Biens culturels* (Cultural Property Act), and the *Loi sur la qualité de l'environnement* (Environmental Quality Act). These laws protect the cultural heritage of Quebec, including archaeological sites and collections. A province-wide site inventory and salvage programme followed, as well as the adoption of the *Règlement sur la recherche archéologique* (in 1973), a provincial regulation that sets the conditions and standards of conduct for archaeological research.

Many developments that were foundational to the practice of archaeology in Quebec emerged during the vibrant period of 1960s and 1970s. The first francophone association of archaeologists, the *Société d'archéologie préhistorique du Québec* (SAPQ), appeared in 1965, to be replaced by the present *Association des archéologues du Québec* (AAQ) in 1979. The province's first archaeology museum opened in Trois-Rivières in 1963. The first archaeology journals published in French included the *Cahiers d'archéologie québécoise* (1964), *Recherches amérindiennes au Québec* (1971), *Études Inuit Studies* (1977), as well as the *Paléo-Québec* (1974), *Dossiers* and *Cahiers du Patrimoine* series (1975). Archaeology was first taught at both Université du Québec à Montréal (UQAM) and Université Laval in Québec City in 1971. The academic study of archaeology at that time was inspired and influenced by Anglo-Saxon and French thinking alike.

In 1963, the provincial government nationalized the production and distribution of electricity through the Hydro-Québec public utility. Large-scale hydropower construction projects ensued, especially in the James Bay area. Those projects needed to comply with new laws mentioned above, which meant conducting salvage archaeology projects in anticipation of the huge amount of land that was to be flooded to create hydropower reservoirs. As the *Service d'archéologie et d'ethnologie* of the MAC alone could not meet the demand for surveys and excavations (Martijn 1998), this triggered the formation of the first contract firms in the domain of cultural resource management (CRM) in the 1970s. Thus, the nationalization of electricity production indirectly led to the privatization of salvage archaeology. While the nationalization of electricity was carefully planned, the privatization of salvage archaeology through CRM firms was a serendipitous development, but one that was here to stay.

Consolidation and Ideology

The 1980s and 1990s were years of consolidation and increased professionalization of archaeology as a discipline and profession: the Ostéothèque de Montréal was founded in 1982 by Quebec's first generation of zooarchaeologists; an archaeology laboratory was created at Université du Québec à Chicoutimi in 1984; the first PhDs focused on Quebec archaeology were granted in 1980s; the academic journal *Archéologiques*, the *Signes des Amériques series* and the *Cahiers d'archéologie du Célat* were launched in 1987, 1982, and 1998, respectively. A number of new museums were founded, such as the Musée québécois d'archéologie at Pointe-du-Buisson (1986), the Canadian Museum of Civilization in Gatineau (founded in 1989 as the successor of the National Museum of Man), the Pointe-à-Callière Museum in Montreal (1992), and numerous local or regional archaeology museums and interpretation centers across the province. The Laboratoire et Réserve d'archéologie du Québec and the Centre de Conservation du Québec, which together

provide artifact storage, restoration, and conservation services, were founded in 1989 in Quebec City. The ministère des Transports, the City of Montreal and the City of Quebec all hired full-time staff archaeologists, while academic and CRM projects, including field schools, were being conducted in almost every part of the province, providing field experience to countless students and young professionals.

These years of archaeological expansion had their downsides, however. It was difficult for archaeologists to explore the huge territory of the province (1,667,000 km^2), and some areas were improperly documented, and remain so to this day. Despite its professionalization, the practice of archaeology remained a commodified, precarious, and often unrewarding activity to the eyes of many practitioners, who would eventually leave archaeology for better professional horizons in other domains (Martijn 1998; Zorzin 2010). Some also lamented the lack of interest in theory among Quebec archaeologists (Dumais 1994; Martijn 1998), a situation that has not significantly improved since then (Gates St-Pierre 2009). Although AAQ meetings have always been a forum for debate, most discussions have revolved around the practice of archaeology as a profession, eschewing theoretical and reflexive debates.

Moreover, nationalistic ideology occasionally impacted archaeology, one example being the restoration of Place Royale in Quebec City's Old Town. This project began in 1967 and continued through the 1970s and 1980s, with the district being declared a UNESCO World Cultural Heritage Site in 1985. The aim of the restoration was to recreate the postulated "Golden Age" of the French Regime (1534–1760) right in the cradle of New France (Auger and Moss 2001). The archaeology of Place-Royale during the 1970s was thus entirely focused on this specific period, to the exclusion of all others; later buildings erected on Place-Royale were simply demolished or torn down. The result was a homogenized and idealized re-creation, verging towards disneyfication. A lack of knowledge about the nineteenth-century occupations of Place Royale and Old Town is a lasting consequence of this approach. It is also regrettable that such an ideologically driven project necessitated the expropriation and relocation of most of the residents who would therefore not benefit from the project, contrary to the tourists and shop owners.

Nationalism also influenced the vision and actions of the Parks Canada Agency, which was established by the Canadian federal government in 1911 as the world's first national park service. With a mandate to commemorate places of "national historic significance", Parks Canada's archaeology was clearly a "mission-oriented" enterprise (Fry 1986). The agency's archaeologists unquestionably contributed to the advancement of historical, industrial, and underwater archaeology in Quebec through large-scale projects at the Forges du Saint-Maurice, for example. However, Parks Canada also deliberately propagated a sense of national unity and identity through the historic sites it managed. Their national unity agenda developed partially as a reaction to the Quebec sovereignty movement, which advocates secession from Canada. By trying to impose its own vision of the nation's history from coast to coast, Parks Canada's agenda frequently suppressed local interests and regional perspectives on the past. This form of cultural colonialism was a way to strengthen the power of the federal government within Quebec (Craig-Dupont 2011) during a period of high political tension between the federalist and sovereignist movements. Moreover, Parks Canada's "nationalist-conservationist narrative" often impeded indigenous people's appropriation of their history and territories (Wright 2014). A more recent example of the impact of nationalism on archaeology is the 2013 renaming of the former Canadian Museum of Civilization, now the Canadian Museum of History, located in Gatineau (near Ottawa), and the reduction of its mandate to focus on national history and prehistory, to the detriment of the world-wide perspective previously employed (Aronczyk and Brady 2015).

Until recently, Parks Canada was the single largest employer of archaeologists in the country. However, the neoliberal ideology of austerity and privatization of state services carried out by the federal government during the early 2010s

resulted in the nearly total dismantling of the archaeological services at Parks Canada. Thus, all but one of the archaeologists working for Parks Canada in Quebec were suddenly and irrevocably laid off in 2012. The Quebec archaeological community thereby lost a large number of highly qualified archaeologists possessing unique and internationally recognized expertises. Moreover, many national historic sites were left without archaeologists to document, interpret, and showcase the archaeological value of these sites. Finally, all regional collections of artifacts belonging to Parks Canada are to be relocated in a single warehouse in the Ottawa area, depriving or limiting access to the archaeological heritage of Canadians in most regions of this vast country, including Indigenous peoples. All this in the name of the short-sighted, neoliberal dogma of rationalization and the ideology of centralization.

The Quebec government, sharing a similar ideology (Gattinger and Saint-Pierre 2010), adopted a disengagement policy whereby many provincial responsibilities towards the province's archaeological heritage are being transferred to towns and cities. Unfortunately, most of these lower level administrations lack the experience and financial resources necessary to act as responsible stewards of archaeological sites and collections. Likewise, the present version of the Cultural Property Act (*Loi sur le patrimoine culturel*, as revised in 2012) now allows real-estate promoters and developers to hold an archaeological permit, whereas previously these permits were only granted to qualified archaeologists. This opens the door to intervention into archaeological decision-making by actors with possible conflicts of interest, with all the possible negative outcomes that implies. It is interesting to note that while the Quebec government's stated rationale for this modification is that it will make land owners and entrepreneurs act more responsibly in their handling of archaeological sites, it does so by relegating the government's own responsibilities as steward of the province's archaeological heritage. Moreover, this is one more step towards the gradual privatization of heritage and archaeology in Quebec, with its inherent ethical and professional consequences (Zorzin 2010, 2011; Zorzin and Gates St-Pierre 2017). The situation is exacerbated by the fact that in Quebec the archaeological sites and artifacts legally belong to the owner (whether private or public) of the land where they are found (Dominique 1981), in contrast to other Canadian provinces, such as Ontario, where they are, by law, state possessions. In addition, the *ministère de la Culture et des Communications* have asserted that it no longer has any responsibility towards archaeologists, but only towards the archaeological heritage and the public. Through that ideological stand, they have abandoned, without any justification, one of the "trinity of accountabilities" adopted by most archaeologists' ethics codes around the world: accountability to the archaeological record, to the public, and to other archaeologists. Finally, while the ministry's regulation establishes minimal requirements in field archaeology, it contains no similar provisions regarding analysis and publication, which have frequently been neglected in the context of salvage or contract archaeology (Desrosiers 2017). The situation has improved in recent years, however.

Current Issues and Future Directions

Archaeology in Quebec is now a mature and diversified discipline. Despite its late emergence and its sociocultural and linguistic specificities, it is not evolving in isolation. Today's Quebec archaeologists are more connected and have a greater mobility; they increasingly obtain their degrees from foreign universities and establish collaborations with archaeologists and scientists from other disciplines and from every continent. They publish in French, English, Spanish, or other languages in international academic journals (Gates St-Pierre 2009). In 2016, the first bilingual field school in Quebec was conducted at the Nivard site in Montreal, a collaboration of archaeologists and students from McGill University and Université de Montréal. This is also illustrative of the rising rate of interuniversity collaborations, overriding linguistic obstacles and sociohistorical divides.

Bilingualism is actually one of the greatest assets of Quebec archaeology. As a phenomenon

which emerges out of necessity, it can be observed in many other regions of the world, but not so much in North America. In fact, the bilingual or trilingual advantage can also be a dilemma for many. On the one hand, there is a pressure for archaeologists, especially young academics, to publish in international journals with high impact factors. This also supports the righteous goal to share knowledge with the largest audience possible. The result is a general propensity to choose English as the preferred language of communication and dissemination. On the other hand, French-speaking archaeologists often strive to maintain and promote regional communities of archaeologists working and publishing in their native language. Moreover, if we collectively aim at a truly globalized archaeology, one that promotes diversity, multivocality, and inclusiveness, it then becomes imperative to resist the imperialism of the scientific lingua franca and to avoid homogenizing the communication styles and languages found in publications, conferences, and other dissemination activities (Gates St-Pierre 2009; Holtorf 2008).

Some of the current challenges for Quebec's archaeological community are economic. Post-boomer generations of archaeologists in Quebec and elsewhere are now facing a slowdown of archaeological activities resulting from the 2008 economic crisis and its long-lasting effects, including a shrinking job market and increasingly precarious work conditions, especially in the private sector. Many among the younger generation of archaeologists working in the CRM industry are now getting organised through an ad hoc committee that contests this status quo and asks for better working conditions: decent salaries, improved security and health protections, more stable working schedules, etc. Other challenges are more political and ethical in nature. There is a need to establish better collaborations with Quebec's First Nations and to build an archaeological praxis through which they can reappropriate their own past, and which respects their traditions, values, motivations, and interpretations. As in many other regions and countries, Native Americans living in Quebec have long been marginalized or excluded from archaeological research projects conducted on their ancestral lands to research their direct ancestors. For a long time, their past was perceived as a less interesting, nonevolving one, especially for those groups in the boreal forest (Bracewell 2015). The situation is improving, however. Today, the Cree Nation Government hires archaeologists to conduct research and salvage archaeology on the territory of Eeyou Itsche (James Bay) it administers, for example (Fig. 2). The Avataq Cultural Institute undertakes similar projects in Nunavik. Corporation Archéo-08, an archaeological nonprofit

Quebec Archaeology, Fig. 2 Archaeologist David Denton working with Cree elders from Eeyou Istchee (James Bay), in northern Quebec. (© Grand Council of the Crees)

organization working in the Abitibi-Témiscamingue region, has a long history of collaboration with members of the Anishinaabe indigenous people. Archéo-Mamu, also nonprofit, is co-managed in equal parts part by Innu and non-Native people, aiming to research, promote, and protect the archaeological heritage of both Native and White inhabitants of the North Shore of the Gulf of St. Lawrence and its estuary. Finally, an agreement was recently passed between Université Laval and the Huron-Wendat community of Wendake, near Quebec City, to develop research projects and academic programs for Huron-Wendat students in archaeology and anthropology, among other disciplines. Other institutions such as Université de Montréal have developed academic programs in First Nations Studies, which often include courses in Quebec, Arctic, or North American archaeology. Archaeologists at the Université de Montréal also have projects that are, or will be developed and managed in collaboration with Mohawk and Abenaki communities.

Despite this move towards greater collaboration between Quebec's archaeologists and indigenous peoples, opposed visions are sometimes more difficult to reconcile, especially regarding the study of human remains, the ownership of artifact collections, or the interpretation of indigenous people's ancient history (Denton and Duguay 1993; Martijn 1998). For example, archaeological narratives about the St. Lawrence Iroquoians are sometimes contested by Mohawks and Huron-Wendats, for whom the St. Lawrence Iroquoians never existed as a distinct ethnic group. Using oral traditions, they assert that St. Lawrence Iroquoians were ancestral Mohawks and/or Huron-Wendats, claiming the St. Lawrence River Valley as their ancestral territory. On the other hand, historical, linguistic, and archaeological evidence indicates that both groups originated elsewhere, in New York State and Ontario respectively, and migrated to the Montreal and Quebec City areas during the seventeenth and early eighteenth centuries AD (Tremblay 2006). Confronting, comparing, and integrating evidence derived from sources as diverse as archaeology, history, linguistics, oral traditions, traditional ecological knowledge (TEK) and genetics, will be a demanding, yet fascinating challenge to take up in the future. Better collaborations and mutual understandings will hopefully ensue.

Archaeology in Quebec is becoming more relevant not only to indigenous peoples, but also to the general public. This was one of the aims of the Archéo-Québec Network (*Réseau Archéo-Québec*) when it was founded in 1999 by a group of archaeologists interested in disseminating archaeological knowledge. The Quebec archaeological community is now benefiting from the long-term efforts of the network, and archaeology has become a topic regularly covered in the media. Archaeology Month, held in August of each year, is a highly popular event where members of the public can participate in over a hundred archaeology-related activities throughout the province (Fig. 3). The province also boasts world-class archaeology, such as the

Quebec Archaeology, Fig. 3 Public archaeology at the Droulers site, located beside a reconstructed Iroquoian village from the 15th century AD. (© Christian Gates St-Pierre)

Pointe-à-Callière Museum in Montreal, which educates visitors through high-quality exhibits and public activities. The production of outreach publications in increasing, which also contributes to making archaeology more accessible and relevant to the public (see Bélanger and Balac 2016; Pothier 2016; Tremblay 2006, for example). The *ministère de la Culture et des Communications*, the City of Montreal and other institutions are working on facilitating access to grey literature, while other administrations are now making special efforts to publish the findings resulting from CRM projects (see Bibeau et al. (2015) for a recent example). The end result is a greater public support for funding programs that document, study, protect, and showcase the archaeological heritage of the province.

Quebec archaeologists are also addressing, at a regional or national level, issues of present global significance, such as adaptations to climate change, the development of social complexity and social inequalities, human migrations, etc. (Kintigh et al. 2014). Archaeology must also become socially, environmentally, and economically sustainable for present and future generations, an important issue that is only beginning to be addressed in this province (Desrosiers 2016). Now that Quebec archaeology sits on a solid base, its future depends on its ability to embrace new interdisciplinary, theoretical, reflexive, inclusive, community-based, socially relevant, sustainable, and globalized perspectives, without losing its distinctive character. This challenge will be a great one, in every sense of the word.

Cross-References

- ▶ Archaeology and Politics
- ▶ Canada: Cultural Heritage Management
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canadian Archaeological Association (CAA)
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Ethnic Identity and Archaeology
- ▶ Fort Odanak Archaeological Project
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Local Populations and Global Heritage
- ▶ Nationalism and Archaeology
- ▶ Parks Canada: Historical Archaeology

References

Aronczyk, M., and M.J. Brady. 2015. Branding history at the Canadian museum of civilization. *Canadian Journal of Communication* 40: 165–184.

Auger, R., and W. Moss. 2001. The archaeology of physical and social transformation: High times, low tides and tourist floods on Quebec City's waterfront. In *The archaeology of urban landscapes: Explorations in slumland*, ed. A. Mayne and T. Murray. Cambridge: Cambridge University Press.

Balac, A.-M., and F.C. Bélanger. 2016. *Lumières sous la ville: quand l'archéologie raconte Montréal*. Montréal: Recherches amérindiennes au Québec.

Bibeau, P., D. Denton, and A. Burroughs. 2015. *Ce que la rivière nous procurait: Archéologie et histoire du réservoir de l'Eastmain-1*. Gatineau: Musée canadien de l'histoire et Presses de l'Université d'Ottawa.

Bracewell, J. 2015. The infertile crescent revisited: A case (study) for the history of archaeology. *Bulletin of the History of Archaeology* 25(2): art. 3, 1–9.

Clermont, N. 1999. La préhistoire québécoise. In *Québec 2000: Multiples visages d'une culture*, ed. R. Lahaise, 57–74. Montréal: Hurtubise HMH.

Clermont, N. 2001. Quebec. In *Encyclopedia of archaeology: History and discoveries*, ed. T. Murray, vol. 3, 1079–1083. ABC-Clio: Santa Barbara.

Craig-Dupont, O. 2011. Hunting, timber harvesting, and Precambrian beauties: The scientific reinterpretation of La Mauricie National Park's landscape history, 1969–1975. In *A century of parks Canada, 1911–2011*, ed. C.E. Campbell, 179–204. Calgary: University of Calgary Press.

Denton, D., and F. Duguay. 1993. *Atelier: L'archéologie et les Premières Nations/Archaeology and first nations: A workshop*. Montréal: Association des archéologues du Québec.

Desrosiers, P. 2016. Archéologie et développement durable au Québec. *Archéologiques* 29: 66–88.

Desrosiers, P. 2017. Les firmes d'archéologie au Québec. *Archéologiques* 30: 71–92.

Dominique, R. 1981. La propriété des biens archéologiques dans le contexte de la Baie James et du nord québécois. *Recherches amérindiennes au Québec* 10 (4): 276–277.

Dumais, P. 1994. Bilan critique de la recherche en archéologie préhistorique au Québec (1979–1994). *Archéologiques* 8: 40–44.

Fry, Bruce W. 1986. The digger vs the bureaucrat: Archaeology's role in parks Canada. *Bulletin of the*

Association for Preservation Technology International 18 (1–2): 38–41.
Gates St-Pierre, C. 2009. A critical review of the last decade of prehistoric archaeology in southern Quebec. In *Painting the past with a broad brush: Papers in honour of James Valliere Wright*, Mercury series, archaeology paper no 170, ed. D.L. Keenlyside and J.-L. Pilon, 103–141. Gatineau: Canadian Museum of Civilization.
Gates St-Pierre, C. 2016. La plus ancienne découverte archéologique du Canada. In *Fragments d'humanité: Pièces de collections*, ed. L. Pothier, 18–20. Montréal: Éditions de l'Homme and Pointe-à-Callière, Cité d'archéologie et d'histoire de Montréal.
Gattinger, M., and D. Saint-Pierre. 2010. The "neoliberal turn" in provincial cultural policy and administration in Québec and Ontario: The emergence of "quasi-neoliberal" approaches. *Canadian Journal of Communication* 35: 279–302.
Holtorf, C. 2008. The cunning means of domination. *Archaeologies: Journal of the World Archaeological Congress* 4 (1): 190–200.
Kintigh, K.W., et al. 2014. Grand challenges for archaeology. *American Antiquity* 79 (1): 5–24.
Lévesque, R. 1962. *Les richesses archéologiques du Québec*. Sherbrooke: Société d'archéologie de Sherbrooke.
Martijn, C.A. 1998. Bits and pieces, glimpses and glances: A retrospect on prehistoric research in Quebec. In *Bringing back the past: Historical perspectives on Canadian archaeology*, Mercury series, archaeology paper no 158, ed. P.J. Smith and D. Mitchell, 163–190. Gatineau: Canadian Museum of Civilization.
McCaffrey, M.T., and B. Jamieson. 1992. The Dawson archaeological site: An overview. In *Wrapped in the colours of the earth: Cultural heritage of the first nations*, ed. M.T. McCaffrey et al., 41–51. Montreal: McCord Museum of Canadian History.
Pothier, L. (ed.). 2016. *Fragments d'humanité: Pièces de collection*. Montréal: Éditions de l'Homme and Pointe-à-Callière, cité d'archéologie et d'histoire de Montréal.
Pendergast, J.F., and B.G. Trigger. 1972. *Cartier's Hochelaga and the Dawson site*. Montreal/London: McGill-Queen's University Press.
Pintal, J.-Y., J. Provencher, and G. Piédalue. 2015. *Air: Territoire et peuplement. Coll. Archéologie du Québec*. Montréal: Éditions de l'Homme & Pointe-à-Callière, Cité d'archéologie et d'histoire de Montréal.
Speck, F.G. 1951. The Montagnais-Naskapis. In *Encylopedia Arctica*, ed. V. Stefannson, vol. VIII, 202–249. Hanover: Dartmouth College.
Tremblay, R. 2006. *The St. Lawrence Iroquoians: Corn people*. Montréal: Éditions de l'Homme and Pointe–àCallière, Cité d'archéologie et d'histoire de Montréal.
Wright, E. A. 2014 Consuming indigenous space, producing Canadian place: Mobilizing nationalism towards Canada's national parks. Unpublished M.A. Dissertation, Faculty of Sociology and Anthropology, University of Ottawa.
Zorzin, N. 2010. Archéologie au Québec: portrait d'une profession. *Archéologiques* 23: 1–15.
Zorzin, N. 2011. Contextualizing contract archaeology in Quebec: Political-economy and economic dependencies. *Archaeological Review from Cambridge* 26 (1): 119–135.
Zorzin, N., and C. Gates St-Pierre. 2017. The sociopolitics of archaeology in Quebec: Regional developments within global trends. *Archaeologies* 13 (3): 412–434.

Quinoa: Origins and Development

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Basic Species Information

One of the indigenous staple crops of Andean South America is the pseudocereal quinoa (*Chenopodium quinoa* Willd.). It is a tall, little branched shrub that produces thousands of seeds in a large, exserted panicle (Fig. 1). There are many varieties that are primarily distinguished based on the color of both the plant and seed. Quinoa varieties range in color from white, yellow and red to purple. Taxonomists continue to debate whether it should be placed in the Chenopodiaceae or Amaranthaceae families (Kadereit et al. 2003).

Quinoa continues to be an important food in indigenous communities throughout the Andean highlands of Peru, Bolivia, and parts of Southern Colombia, Northern Chile, and Western Argentina (Fig. 2). It is a hardy crop well-adapted to dry, cold Andean climates (Risi and Galwey 1984). Recently, it has gained popularity around the world as a "superfood" because it is gluten-free and high in protein. UNESCO (General Assembly Resolution 66/221) declared in 2013 the International Year of Quinoa because of its unique heritage and potential for improving global food security. Quinoa's growing importance in modern food systems further emphasizes the need for understanding the processes by which it was domesticated and diversified in the Andes (Bazile et al. 2015).

Quinoa: Origins and Development, Fig. 1 Field of quinoa growing near Lake Titicaca, Bolivia

Major Domestication Traits

Through artificial selection by Andean hunter-gatherers – who collected, managed, and eventually cultivated wild *Chenopodium* stands – the plant, and particularly its seeds, underwent several morphological changes. Domesticated *Chenopodium quinoa* plants have larger, more-compact inflorescences than their wild counterparts, and the seeds do not easily disperse. While whole plants do not commonly preserve in the archaeological record, carbonized seeds are very common. The seed underwent several changes that archaeobotanists can observe using a combination of standard microscopy with 5–100× magnification and scanning electron microscopy (SEM) with magnifications of between 500 and 5000×. The standards for identifying differences in wild and domesticated *Chenopodium* populations were first established by researchers who studied *Chenopodium* domestication in Eastern North America (Fritz et al. 2017). Andean archaeobotanists consider a suite of traits to identify domesticated quinoa: seed diameter, seed coat thickness and texture, and margin configuration (Bruno 2006; Lopez et al. 2015). Some also examine beak prominence (Langlie et al. 2011). It appears to be a trait that varies among quinoa varieties but is not useful for differentiating wild versus domesticated species; therefore, it is not discussed in detail here.

Seed Diameter

Like other grain crops, the seeds of domesticated quinoa tend to be larger (1.0–3.0 mm) than the seeds of its wild counterparts (1.0–1.9 mm) as humans select for larger food packages. There is, however, significant overlap in diameter; thus, archaeobotanists consider other traits to determine if a prehistoric sample is a domesticated seed (Fig. 3).

Seed Coat Thickness

As mentioned above, the domesticated varieties of quinoa tend to have light colors such as white, yellow, red, and even purple, while the wild species, often referred to as *quinoa negra*, have black seeds. The lighter color of the domesticated quinoa species is due to a thin seed coat or testa (Fig. 3). The testa is very small and can only be

Quinoa: Origins and Development,
Fig. 2 Estimated past and present quinoa cultivation. (Based on Risi and Galwey 1984)

measured using SEM. Domesticated quinoa seeds have very thin testa ranging between 1.25 and 3.75 μ; in contrast, wild *quinoa negra* testa are thick, ranging between 22 and 55 μ. Archaeological quinoa can have testa thickness up to 18 μ thick, but is thinner than *quinoa negra*, which is generally >30 μ (Eisentraut 1998; Bruno and Whitehead 2003).

Seeds with a thinner testa were likely selected because they germinate more quickly and reliably. The wide range of colors and varieties may have been selected for other reasons such as taste, texture, or resistance to climatic variation (rainfall, frost, pests, etc.). Researchers are just beginning to study the morphometric differences among quinoa varieties that may shed light on these selection processes in the past (Langlie et al. 2011).

Seed Coat Texture

In addition to testa thickness, domesticated and wild quinoa are also distinguished by the patterning found on their surfaces. Like other wild species of the Cellulata section, *quinoa negra* has a reticulate seed coat patterning. This patterning is lost in the thinner-seeded domesticated seeds resulting in a smooth surface. This trait is easily recognizable under both high and low magnification.

Margin Configuration

Examination of the cross section of seeds reveals differences in overall shape. Wild seeds tend to be biconvex, while domesticated seeds are more rounded to truncate. With a thinner testa, the rounded shape of the perisperm and radical are more prominent (Fig. 3).

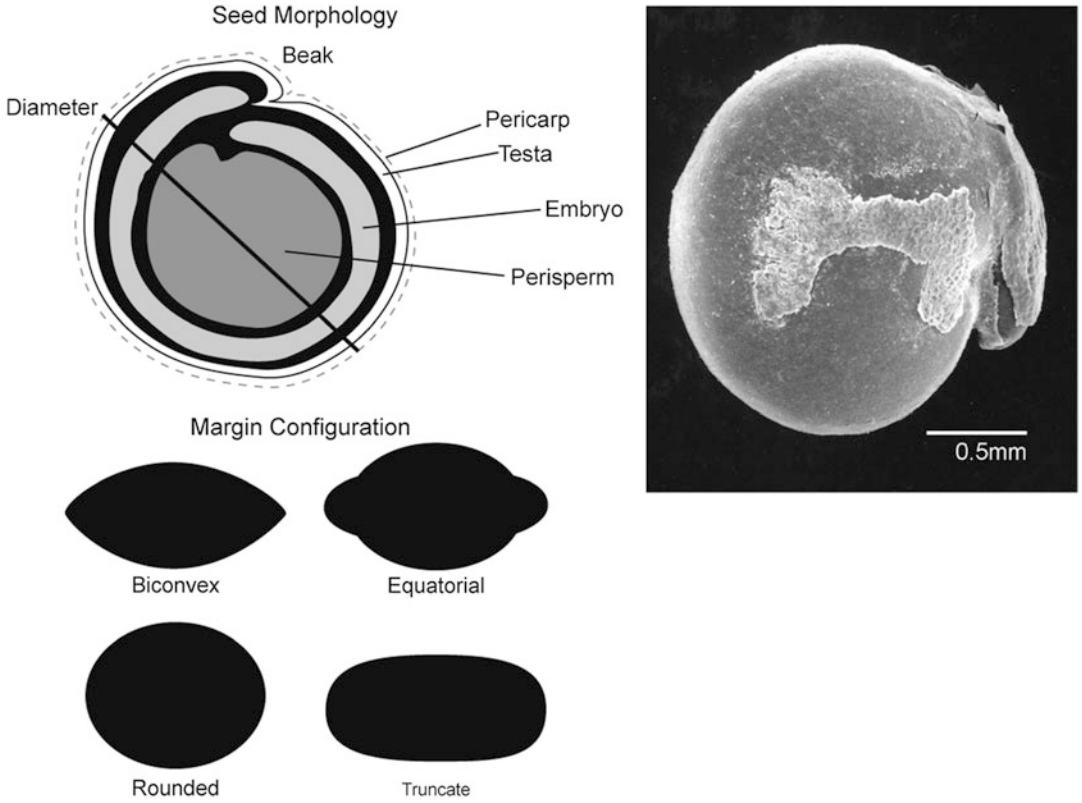

Quinoa: Origins and Development, Fig. 3 *Chenopodium* seed morphology, margin configuration forms, and an SEM image of a modern quinoa seed. Note the smooth seed coat surface and very thin testa peeling back near the beak. (Based on Bruno 2008)

Timing and Tracking Domestication

The history of quinoa's domestication is still being determined through a combination of botanical, genetic, and archaeological approaches.

Genetic Evidence

The wild progenitor of quinoa has not yet been definitively identified, but recent genetic studies are providing important advances (Bazile et al. 2014; Fritz et al. 2017). The most commonly recognized wild *quinoa negra* species associated with the crop are *Chenopodium quinoa* var. *melanospermum* Hunziker and *C. quinoa* spp. *milleanum* Aellen. They share the same distribution as quinoa but are not the progenitors. Rather, these are companion weeds that evolved alongside the domesticate. The mostly likely progenitor is another black-seeded, wild species *Chenopodium hircinum* Schrader, which today is distributed along the eastern slopes of the Andes, valleys of Paraguay, Uruguay, and Argentina (Wilson 1990). Recent sequencing suggests that two ecotypes of quinoa, one highland and one coastal, were independently domesticated from *C. hircinum* (Jarvis et al. 2017). Further work is needed, however, to clarify this and archaeological investigations are key.

Archaeological Evidence

Over the past 20 years, improved recovery methods for archaeological plant remains have added to our knowledge of when, where, and in what social context quinoa may have been

domesticated. Chenopod remains have been recovered from sites throughout the Andes associated with contexts as early as 6000 BC (see Planella et al. 2014 for a thorough review). The ideal protocol for documenting domesticated quinoa specimens is via SEM analysis of their morphology, as described above, coupled with direct AMS radiocarbon dating of seeds with domesticated traits.

SEM studies have been conducted on samples from central Peru (Panalauca and Panaca Caves), the Lake Titicaca basin (Taraco Peninsula, Quelcatani Cave, Jiskairumoko), Southern Bolivia (La Barca), and Central Chile (El Plomo). The seeds from the central Peruvian caves have associated dates of about 3000 BC. Direct dates from the sites in the Lake Titicaca basin all cluster around 1500 BC. Direct dates on quinoa identified with light microscopy in Central Chile have dates of approximately 1000 BC (Planella et al. 2005). In the Ñanchoc Valley of Northern Peru, researchers have identified quinoa seeds with light microscopy that are associated with a house floor containing wood charcoal radiocarbon dated to between 6000 and 5500 BC (Dillehay et al. 2007). It is important to note that the specimens from Quelcatani Cave had associated dates of around 3000 BC, but directly dated seeds from the same contexts were younger (Eisentraut 1998). This difference highlights the importance of direct AMS dating since these small seeds can readily move vertically through the profile via postdepositional processes. Given the available information, it is clear that domesticated quinoa was being cultivated by 1500 BC, in what is known as the Early Formative period, the phase associated with the earliest farmers of the south-central Andean regions; however, it is likely that the process of domestication began earlier, with a conservative estimate around 3000 BC but possibly as early as 6000 BC.

It is hypothesized that the process of domesticating quinoa began in the Late Archaic period possibly by early camelid pastoralists in the central or south-central highlands. Chenopods are quite common in disturbed habitats and may have been particularly adapted to the camps and corrals being created by seminomadic foraging groups. Quinoa seeds have been found in both modern and archaeological camelid dung samples suggesting a coevolutionary relationship between this crop, camelids, and humans (Kuznar 1993). Continued efforts to recover, document, and date sites spanning the Late Archaic-Early Formative transition are essential to furthering our understanding of the domestication of this important Andean staple.

References

Bazile, D., D. Bertero, and C. Nieto, eds. 2015. *State of the art report of quinoa in the world in 2013*. Santiago de Chile/Montpellier: FAO/CIRAD.

Bruno, M.C. 2006. A morphological approach to documenting the domestication of *Chenopodium* in the Andes. In *Documenting domestication: New genetic and archaeological paradigms*, ed. D.B. Melinda, A. Zeder, Eve Emshwiller, and Bruce D. Smith, 32–45. Berkeley: University of California Press.

Bruno, M.C., and W.T. Whitehead. 2003. *Chenopodium* cultivation and formative period agriculture at Chiripa, Bolivia. *Latin American Antiquity* 14 (3): 339–355.

Bruno, M.C. 2008. Waranq Waranqa: Ethnobotanial Perspectives on Agricultural Intensification in the Lake Titicaca Basin (Taraco Peninsula, Bolivia). PhD Thesis. Department of Anthropology, Washington University in St. Louis.

Dillehay, T.D., J. Rossen, T.C. Andres, and D.E. Williams. 2007. Preceramic adoption of peanut, squash, and cotton in northern Peru. *Science* 316 (5833): 1890–1893.

Eisentraut, P.J., 1998. Macrobotanical remains from southern Peru: A comparison of late archaic-early formative period sites from the puna and suni zones of the western Titcaca Basin. PhD Thesis, Department of Anthropology, University of California, Santa Barbara.

Fritz, G. J., Bruno, M. C., Langlie, B. S., Smith, B. D., & Kistler, L. 2017. Cultigen Chenopods in the Americas: A Hemispherical Perspective. In *Social Perspectives on Ancient Lives from Paleoethnobotanical Data*, ed. M.P. Sayre and M.C. Bruno, 55–75. Cham, Switzerland: Springer.

Jarvis, D.E., Y. Shwen Ho, D.J. Lightfoot, S.M. Schmöckle, B. Li, T.J.A. Borm, J. Ohyanagi, K. Mineta, C.T. Mitchell, N. Saber, N.M. Khabatia, R.R. Rupper, A.R. Sharp, N. Dally, B.A. Boughton, Y.H. Woo, G. Gao, E.G.W.M. Schijlen, X. Guo, A. Momin, S. Negrão, S. Al-Babili, C. Gehring, U. Roessner, C. Jung, K. Murphy, S.T. Arold, T. Gojobori, C.G. Linden, E.N. Loo, E.N. Jellen, and

M. Tester. 2017. The genome of *Chenopodium quinoa*. *Nature* 542 (7641): 307–312.
Kadereit, G., T. Borsch, K. Weising, and H. Freitag. 2003. Phylogeny of Amaranthaceae and Chenopodiaceae and the evolution of C_4 photosynthesis. *International Journal of Plant Science* 164 (6): 959–986.
Kuznar, L.A. 1993. Mutualism between *Chenopodium*, herd animals, and herders in the south central Andes. *Mountain Research and Development* 13 (3): 257–265.
Langlie, B., C.A. Hastorf, M.C. Bruno, M. Bermann, R.M. Bonzani, and W. Catellón Condarco. 2011. Diversity in Andean *Chenopodium* domestication: Describing a new morphological type from La Barca, Bolivia, 1300–1250 B.C. *Journal of Ethnobiology* 31 (1): 72–88.
Lopez, M.L., M.C. Bruno, and M.T. Planella. 2015. El género *Chenopodium*: metodología aplicada a la identificación taxonómica en ejemplares arqueológicos. Presentación de Casos de Estudio de La Región Sur-Andina. In *Avances y desafios metodológicos en arqueobotánica: miradas consensuadas y diálogos compartidos desde Sudamérica*, Monografías Arqueológicas, Facultada Patrimonio, Cultura, y Educación, ed. C. Belmar and V. Lema, 89–192. Chile: Universidad SEK.
Planella, M.T., L.E. Cornejo, and B. Tagle. 2005. Alero Las Morrenas 1: Evidencias de cultígenos entre cazadores recolectores de finales del período arcaico en Chile central. *Chungará (Arica)* 37 (1): 59–74.
Planella, M.T., M.L. Lopez, and M.C. Bruno. 2014. La Domesticación y Distribución Prehistórica. In *State of the art report of quinoa in the world in*, ed. D. Bazile, D. Bertero, and C. Nieto, vol. 2013, 33–48. Santiago de Chile/Montpellier: FAO/CIRAD.
Risi, J., and N.W. Galwey. 1984. The *Chenopodium* grains of the Andes: Inca crops for modern agriculture. *Advances in Applied Biology* 10: 145–216.
Wilson, H.D. 1990. Quinua and relatives (*Chenopodium* sect. *Chenopodium* subsect. Cellulata). *Economic Botany* 44 (Suppl): 92–110.

Further Reading

Advisory Committee On Technology Innovation. 1989. *Lost crops of the Incas: Little-known plants of the Andes with promise for worldwide cultivation*. Washington, DC: National Academy Press.
Fritz, G.J., and B.D. Smith. 1988. Old collections and new technology: Documenting the domestication of *Chenopodium* in eastern North America. *Midcontinental Journal of Archaeology* 13: 3–27.
Pearsall, D.M. 1992. The origins of plant cultivation in South America. In *The origins of agriculture: An international perspective*, ed. W. Cowan and P.J. Watson, 173–205. Washington, DC: Smithsonian Institution Press.
Raus, P.M., Alejandro Bonifacio, Claudete F. Ruas, Daniel J. Fairbanks, and W.R. Andersen. 1999. Genetic relationship among 19 accessions of six species of *Chenopodium* l., by random amplified polymorphic DNA fragments (rapd). *Euphytica* 105: 25–32.

Quiroga, Adán

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Basic Biographical Information

Adán Quiroga (San Juan 1863–Buenos Aires 1904) died at the age of 41, without having assumed the position of Sub-Secretary of the Interior Ministry of the Argentine Republic for which he had been appointed. He had previously held various positions in the Judiciary and had been the mayor of San Fernando del Valle de Catamarca. A trained lawyer (Ph.D. in law with a thesis on *Crime and Punishment*, 1887, University of Córdoba) and poet (*Flowers of the Air*, 1893), Quiroga was known for his studies on archaeology, history, and *Calchaquí* folklore (*Calchaquí*, 1897, *The Cross in America* (Quiroga 2004 [1901]), and *Calchaquí Folklore*, 1897 (Quiroga 1992),are his major works). He lived in a time when these disciplines were being formed; there were no clear boundaries among them, and their respective objects and methods were being defined. Quiroga participated in formative discussions of archaeology in Argentina with original positions and different proposals. The discipline, once formed and institutionalized, forgot him. This short biographical note, which brings him back, is also a reconstruction of his oblivion.

Major Accomplishments

In the last quarter of the nineteenth century, the Argentine national state was consolidating, in a process that was marked by the construction of a political and cultural hegemony of elites linked to foreign trade, over the enormous mass of southern European immigrants. The native inhabitants of the ancient provinces of the territory's interior inherited from the Spanish Empire, indigenous populations of the Chaco, the Pampas and

Patagonia (which had been defeated by the army, massacred, dispossessed from their lands, and confined to reservations), and the yearning for autonomous development of the weaker neighboring countries (which, as in the case of the Republic of Paraguay, were the object of genocide by the armies of the Triple Alliance formed by Argentina, Brazil, and Uruguay). As the core of the nationality construction policy, free, basic, general, and state education spread over the whole country becoming a real hegemonic citizenship production machine. In turn, the elites devoted huge efforts to the demarcation of a canonical historiography of Argentina. General Bartolomé Mitre, for example, was the leader of Buenos Aires' elite, commanded troops against the indigenous and against Paraguay, and was one of the leading historians; thus, he was a history protagonist performing historical deeds and writing about them.

Joaquín, Quiroga's father, was appointed Federal Judge in Catamarca by Mitre, and Adán accompanied the Mitrist party all through his life. However, his texts on archaeology and history, and his positions regarding the indigenous, were very different from what the Mitrist canon sought to establish. Bartolomé Mitre himself acknowledges his book *The Cross in America* with a laconic appreciation and a critique of Quiroga's elaborate and passionate prose.

To Quiroga, the Calchaquíes, protagonists of armed resistance to European conquest for nearly a century and a half, were worthy of admiration rather than condemnation or stigma. Quiroga proposed an Argentine nationalism that would seek its basis in the history of resistance that the Calchaquíes led for the love for their land, choosing death when they were defeated by the Spanish military superiority. To Quiroga, the "Calchaquí epic" was the emotional mobilizing force for the feelings of the fatherland; in this, he was clearly different from the Europeanized elite, which did not hesitate in pedagogically focusing on European history at the moment of shaping the new citizenship. In the same way that Indigenism would later propose in Mexico, to Quiroga, archaeology had the value of providing a national epic. At the same time, other leading academics proposed that archaeology should be limited to recover, preserve, and classify remains and to display them in museums, so that citizens would be educated about how the original inhabitants "that became extinct in this land" had been like (as Francisco Moreno expressed). In Argentine archaeology, one of the oldest institutionalization in the Americas, positions such as Quiroga's were discarded and forgotten, and positivist proposals, like Moreno's, prevailed.

Quiroga's archaeology was interested in the interpretation of symbols in rock art and ceramics, which referred to Calchaquí deities of rain and storm, wind and earth. Geography imprinted its most remarkable characters in the town: the language, the gods, symbols, and the Calchaquí's personality were definitely influenced by the landscape. There were no ruptures between the creators of the great artistic and architectural works discovered by archaeology and the Calchaquíes of the epic resistance to the conquest. But Quiroga was not, however, an advocate for the rights of their descendants. He regarded the indigenous as minors, not punishable and deserving protection. Their history had epic value for the whole nationality, but there was no continuity between their history of resistance appraisal and their rights' restoration.

Quiroga moved away from both his Hispanist contemporaries, who valued the conquest and eluded its traumatic effects, and from positivists, who valued the indigenous only as a scientific object to classify and describe. Notwithstanding, Quiroga's indigenous nationalism was not offered in opposition to liberal hegemonic projects. He himself was a notorious politician and a Mitrist intellectual, who, at the same time that he offered alternative content for the national citizenship construction project, did not question the hegemonic sense of that project.

In Quiroga's project, archaeology acquired a very relevant and different position from that his contemporaries had relegated it. To Hispanists it was a lesser form of entertainment dealing with history without indigenous interest, whereas for positivists, archaeology was a discipline cut according to natural history model, concerned with the classification and description of extinct races' remains. Quiroga's archaeology made in advance a project which would acquire

physiognomy decades later in Indigenism – notably the case of Mexico. But Argentina's cultural and political winds, whose Europeanized elite had already committed cultural decisions, were unfavorable to indigenous nationalism. Ricardo Rojas resumed Quiroga's legacy posthumously, but the influence of his work was progressively diluted. Quiroga's work and that of his contemporary scholars from the country's interior (Lafone Quevedo, the first Ambrosetti, Toscano, etc., encompassed as "historian philologists") were excluded from the pantheon of archaeology and anthropology classics by disciplinary historiographies. It was not until the 1990s that texts began to appear returning to Quiroga, awakening interest in his work and life.

Quiroga is a pioneer forgotten by Argentine disciplinary historiography, in itself marginal to historiographical narrative hegemonized by European authors. This biographical note on Adán Quiroga cannot end without stressing the contextual bias of the ways in which the discipline is self-narrated. The narratives of the past seem to have as many voices as silences.

Cross-References

- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Indigenous Archaeologies
- ▶ Latin America: Indigenous Peoples' Rights
- ▶ Power and Knowledge in Archaeology

References

Quiroga, A. 1992. *Calchaquí*. Buenos Aires: TEA.

Quiroga, A. 2004. [1901]. *La cruz en América*. Catamarca: Ediciones municipales.

Further Reading

Fernández, J. 1982. *Historia de la Arqueología Argentina*. Mendoza: Asociación Cuyana de Antropología.

Haber, A.F. 1995. Supuestos teórico-metodológicos de la etapa formativa de la arqueología de Catamarca (1875–1900). *Publicaciones Del CIFFyH (Arqueología)* 47: 31–54.

Instituto Nacional de Antropología. 1963. Bibliografía antropológica de Adán Quiroga. *Cuadernos del Instituto Nacional de Antropología* 4: 25–27.

Márquez Miranda, F. 1963. Adán Quiroga, el arqueólogo poeta y el folklorista. *Cuadernos del Instituto Nacional de Antropología* 4: 29–34.

Nastri, J. 2003. Aproximaciones al espacio calchaquí. *Anales Nueva Época* 2003: 99–125. Instituto Iberoamericano, Universidad de Gotemburgo.

Olmos, R.R. 1963. La personalidad de Adán Quiroga. *Cuadernos del Instituto Nacional de Antropología* 4: 17–23.

Raffino, R.A. 1992. Adán Quiroga: el hombre y su tiempo. In *Calchaquí*, ed. A. Quiroga, 3–9. Buenos Aires: Tipográfica Editora Argentina.

Rojas, R. 1929. Prólogo. *Folklore Calchaquí*, *Revista de la Universidad de Buenos Aires* VI (V).

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Race in Archaeology

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Introduction

The explicit archaeological interest in race as a topic of inquiry only developed in the 1990s. Before this, but only beginning in the 1980s, many historical archaeologists investigated ethnicity rather than race, seeking to develop ways to use excavated artifact assemblages to identify members of historically known ethnic groups. The goal of much of this research was to correlate specific objects or kinds of objects with certain peoples. Accordingly, for example, many archaeologists equated white clay smoking pipes decorated with shamrocks with Irish men and women. By the 1990s, many historical archaeologists had decided that this sort of easy correlation neither matched the complexities of daily life nor reflected the ways in which perceived personal characteristics created social hierarchies. As a result, some archaeologists began to think explicitly about race rather than ethnicity as a focus of examination.

Definition

Diverse studies by anthropologists have proven that only one human race exists. The physical variations apparent in the world's peoples result from myriad genetic adaptations rather than the presence of true races. The biological fallacy of race, however, does not mean that racial theory has not been a continual force in modern history or that the perception of race has not had consequences, as more powerful groups have used their ideas about racial difference to cement their authority and power. The appearance and application of racial theory has meant that people identified as belonging to an inferior "race" could be justifiably denigrating and discriminated against. People seeking to create or maintain strict social hierarchies used the pseudo-science of racial theory to reinforce their claims of inferiority and superiority, claims that placed them at the top and those they despised at the bottom.

The attribution of racial designation is usually a byproduct of relations of power, and so many scholars find it useful to speak of "racialization" rather than race per se. Racialization is a process of "assigning men and women to essentialist groups, based upon physical appearance or some other readily identifiable characteristics, that

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allow them to be perceived as biologically inferior or socially unequal" (Miles 1989: 73). This means that people in power can use cultural elements – patterns of dress, language, dialect, religious belief – to assign whole groups of people to a inferior "race" in addition to, or even exclusive of, their physical appearance. Nonetheless, much racial theory rests on physical characteristics that may be real or imagined.

The racial assignment that results from the process of racialization comes from outside the group being so designated. Racialization allows those classified as members of a specific "race" to be held in contempt by members of the defining group. Those creating and enforcing the classification may believe that their system reflects biological reality, when in truth racialization results from the mere perception of biological reality without genetic substance. The establishment of a social hierarchy is the practical outcome of the process of racialization because racialization creates superior and inferior "races." The creation of races, however, is based upon historically relevant criteria. Racial assignment at one point in history may be based on skin color, but at another time – but in the same setting – the assignment may rest on cultural tradition. In other cases, it may be based on both.

Unlike race, ethnicity – the assignment of ethnic affiliation – is an internal designation, meaning that people in an ethnic group self-identify as belonging to that group. The presence of ethnic groups within a society need not create a social hierarchy. Rather, the various ethnic groups can be viewed as simply working to maintain their own self-contained traditions, customs, and habits based on genealogy.

An ethnic group can be assigned a racial categorization. Most of the immigrant groups that traveled to the United States in the nineteenth century underwent the process of racialization at some point in their collective history. In the late nineteenth century, Italian immigrants faced the same denigration and discrimination that many Irish immigrants had experienced a few decades earlier. Later, at the beginning of the twentieth century, Eastern Europeans faced similar situations and many Mexican immigrants confront the process today.

The process of dividing peoples into disparate groups has occurred throughout human history, but historians who have examined racialization generally agree that its strongest expressions correspond with European global expansion and the rise of the worldwide reach of capitalist economics. As such, "Race is one of the central conceptual inventions of modernity" (Goldberg 1993: 3). At the very least, the subject of race is unavoidable in the United States, South Africa, and other nations where the perceived racial differences between peoples have had a long, antagonistic, and often violent history.

Our vantage point from the early twenty-first century makes it clear that the modern-world historical archaeology is the proper intellectual site from which an archaeological understanding of the racialization process must come. The subject is too important to believe otherwise.

Key Issues and Future Directions

One of the key issues in the archaeological investigation of race rests upon the identification of the material characteristics of racial assignment. Scholars from almost every discipline in the humanities and the social sciences have studied race from many theoretical perspectives using various sets of empirical evidence. The breadth of their studies reveals the complexities of race as a historical element, but they generally shed little or no light on the materiality of racial identification. As a result, archaeologists face significant challenges when attempting to observe the materiality of race in archaeological deposits and artifact collections. The historical mutability of race is a compounding problem. People racialized in one epoch may not be racialized (or may be racialized differently) in another epoch. For example, plantation owners living during in the United States' earliest colonial era often distinguished between "Negroes" and "Christians." This system of designation, which racialized the enslaved as non-Christian and inferior and the free as

Christian and superior, was relevant when the proportion of Christianized slaves was small. As the number of enslaved men and women who had adopted some form of Christianity grew, the old system of racial separation was no longer applicable. As a result, the designations "white" and "black" became more relevant as racial descriptors. From an archaeological standpoint, an archaeologist investigating racialization in colonial America would have to understand the historical mutability of racialization and work to devise ways to perceive its many permutations through time. This is a decidedly difficult project, but its intricacy does not negate the need for sustained archaeological analysis. On the contrary, the persistence of racial categorizations through time mandates serious archaeological examination.

Many ways undoubtedly exist to examine the historical characteristics of racialization using archaeological methods and perspectives. The ways to investigate the racialization process will certainly grow as increasing numbers of historical archaeologists decide to focus on its many historical dimensions. An approach that now appears to offer interpretive promise involves three related elements: the understanding of modern-era artifacts as commodities, the role that spatial practice plays in signaling racial affiliation, and the interaction between commodities and place.

Commodities are things created specifically for exchange. Commodities have assumed an increasing role in most people's lives since about 1500 CE, to the extent that most of us today purchase everything we use. Most of the world's peoples no long make their own material possessions but instead purchase them from commercial retailers and merchants. Historical archaeologists have long appreciated the importance of viewing modern-era artifacts as commodities and considerable literature exists. Regarding race specifically, archaeological analysis has demonstrated the complex linkage that occurs between racial categorization and the availability of commodities through time (e.g., Mullins 1999). Studies such as these, albeit complicated and necessarily site specific, indicate that racialized consumers could combine their need for physical things with a desire to make symbolic statements about their right to personal possessions. Within this perspective, the act of purchasing commodities is simultaneously perceived as an economic imperative and a political statement. Thus, the ownership of a toothbrush might be seen as representing the simple need of dental hygiene combined with an overt statement that by owning a toothbrush, a person racialized as inferior has the same right to hygiene as someone at the top of the racial hierarchy.

Spatial practice refers to the ways in which a particular social setting configures and promotes space both as a physical reality and as the ways in which humans manipulate, use, and recreate life and social relations within physical reality (Lefebvre 1991). Spatial practice thus includes the layouts of towns, villages, houses, rooms, roads, lanes, pathways, and everything else in the built and natural environments and the ways in which residents and visitors use and perceive them. Spatial practice is culture specific: Each culture understands its own space and perceives it as right and proper. Thus, for example, it was customary for medieval Roman Catholics to situate their cathedrals in highly visible, prominent locations because such placement was proper.

Like commodities, spatial practice can have a racialized character. The most obvious expression of racialized spatial practice can be observed in the physical segregation of people of color, immigrants, and others deemed inferior in less-than-desirable settlement areas. For example, mid-nineteenth century Irish immigrants and other financially disadvantaged people in the United States were usually relegated to flood-prone and overcrowded urban zones because they were deemed inferior by society's elite rulers. Spatial segregation is a physical reminder that space is entwined with the relations of power that are created and enforced within a society.

Archaeologists can gain insights into the presence and operation of racialization in particular social environments by combining the analysis of commodities with their spatial appearance. An artifact collection by itself may not be especially expressive of racial assignment, but it may

become meaningful when combined with its place of discovery. In other words, the presence and absence of certain commodities in only one place in a settlement may relate to the way in which people in that environment were racialized. The distribution of commodities within a complex society, such as nineteenth-century America or England will also reflect class distinctions. At present, the relationships between race and class – and their archaeological interpretation – have yet to be worked out to the satisfaction of most researchers, and future historical archaeologists will undoubtedly follow this important line of investigation in years to come.

Cross-References

- ▶ African Diaspora Archaeology Network (ADAN)
- ▶ Ethnic Identity and Archaeology
- ▶ Indigenous Archaeologies
- ▶ Multicultural Archaeology
- ▶ Multivocality and Archaeology
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Overseas Chinese Archaeology
- ▶ Plantation Archaeology
- ▶ Social Identity in Historical Archaeology

References

Goldberg, D.T. 1993. *Racist culture: Philosophy and the politics of meaning*. Oxford: Blackwell.

Lefebvre, H. 1991. *The production of space*. Trans. D. Nicholson-Smith. Oxford: Blackwell.

Miles, R. 1989. *Racism*. London: Routledge.

Mullins, P.R. 1999. *Race and affluence: An archaeology of African America and consumer culture*. New York: Kluwer Academic/Plenum Press.

Further Reading

Orser, C.E., Jr. 2004. *Race and practice in archaeological interpretation*. Philadelphia: University of Pennsylvania Press.

Orser, C.E., Jr. 2009. *The archaeology of race and racialization in historic America*. Gainesville: University Press of Florida.

Radiocarbon Dating in Archaeology

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Introduction

Radiocarbon (^{14}C) dating is an isotopic or nuclear decay method which can determine an age for once-living organic materials. The technique provides a common chronometric time scale of worldwide applicability on a routine basis in the age range from ~250 to 300 years to between 50,000 and 60,000 years. With isotopic enrichment and larger sample sizes, ages up to 75,000 years have been measured. Also, in some limited situations, ages less than ~250–300 years can be obtained (Taylor 2001; Taylor and Bar-Yosef 2014).

Radiocarbon measurements can be obtained on a wide spectrum of once-living carbon-containing samples including charcoal, wood, marine shell, and bone. For sample sizes of between 1 and 10 g of carbon, conventional decay or beta counting can be employed. Decay counting technology can be employed to measure ^{14}C concentrations by measuring ^{14}C decay events in samples and comparing those count rates with those of known ^{14}C age standards. Accelerator mass spectrometry (AMS) direct counting technology permits ^{14}C measurements to be obtained routinely on much smaller size samples. For example, samples sizes of 0.5–1 mg of carbon – and with additional effort on as little as 20 μg of carbon – can be measured. For details of how decay and AMS counting technologies are used to measure natural levels of ^{14}C in samples, see Taylor and Bar-Yosef 2014: Chapter 4.

The ^{14}C technique is widely viewed as the geochronological "gold standard" from the perspective of its potential ability to provide generally accurate and relatively precise chronometric age assignments for terminal late Pleistocene and Holocene organics (Pollard 2009). It was developed at the University of Chicago (USA) immediately following World War II by Willard F. Libby (1908–1980) and his collaborators James R. Arnold (1923–2012) and Ernest C. Anderson (1920–2013). Libby received the Nobel Prize in chemistry in 1960 for the development of the method (Taylor 2014).

Basics

Carbon-containing compounds in a wide variety of forms are distributed throughout the earth's atmospheric, terrestrial, and hydrological (primarily marine) environments**.** These compounds are cycled through various exchanging carbon reservoirs on different time scales by a variety of physical or chemical mechanisms. These carbon cycle processes are dominated by the operation of two major intersecting and interacting physical and geochemical systems.

The first involves the cycling of various chemical species – including dissolved inorganic carbon (DIC) in the form of carbon dioxide, carbonates, bicarbonates, and dissolved and particulate organic carbon (DOC) – primarily between the oceans and atmosphere. The second involves photosynthetic cycles utilizing several complex biochemical pathways involving the fixation of atmospheric carbon dioxide (CO_2) in plant materials, an incorporation of a small portion of plant biomass into animal tissue, and subsequent decomposition with the release of carbon dioxide (CO_2) and methane (CH_4) back into the atmosphere. Various chemical and physical processes including the deposition of carbonates in terrestrial and oceanic sediments and volcanic activity are also involved in the operation of the carbon cycle on much longer geologic time scales (Trumbore 2000; Schuur et al. 2016).

Carbon which becomes an active part of the earth's carbon cycles contains three *naturally occurring* isotopes, two of which are stable (^{12}C, ^{13}C) and one (^{14}C) which is, at the nuclear level, naturally unstable or radioactive. The natural radioactive isotope of carbon, or *radiocarbon*, decays with a half-life of ~5700 years. This half-life is significantly in excess of what would be expected from a comparison with isotopes with similar decay energy characteristics (Currie 2004).

The basis of the use of ^{14}C as a dating isotope is illustrated in Fig. 1 in terms of its *production*, *distribution*, and *decay*. The production of natural ^{14}C is a secondary effect of cosmic-ray interactions with the nuclei of atmospheric gas molecules. Primary cosmic rays are mostly composed of protons (hydrogen nuclei) and helium nuclei which have been accelerated to extremely high energies in intergalactic space. Because they are charged particles, many are deflected by the various components of the magnetic field of our sun and then by the dipole magnetic field of our planet. However, a small percentage of these particles, many of which continue to possess very high energies, reach the top of the earth's atmosphere. These primary particles produce a cascade of secondary particles. Collisions of both primary and secondary particles in the stratosphere with the nuclei of atmospheric gas molecules yield a range of what are termed spallation products which include free neutrons.

These free neutrons continue to interact with other particles losing energy in the process. As these particles reach appropriate energies, they can react with the nucleus of ^{14}N to form ^{14}C. This natural cosmogenic (cosmic-ray formed) ^{14}C is then rapidly oxidized by OH^- (hydroxide ion), initially to form mostly molecules of ^{14}CO (carbon monoxide), and then rapidly, these ^{14}CO molecules are, in turn, oxidized to $^{14}CO_2$ (carbon dioxide). Even though ^{14}C production at the geomagnetic poles is about five times that at the geomagnetic equator, cosmic-ray produced ^{14}C becomes generally well-mixed by the time ^{14}C-tagged CO_2 molecules reach the planetary surface and become incorporated into various forms of terrestrial biota or in the surface of the world's oceans (Cook et al. 2010).

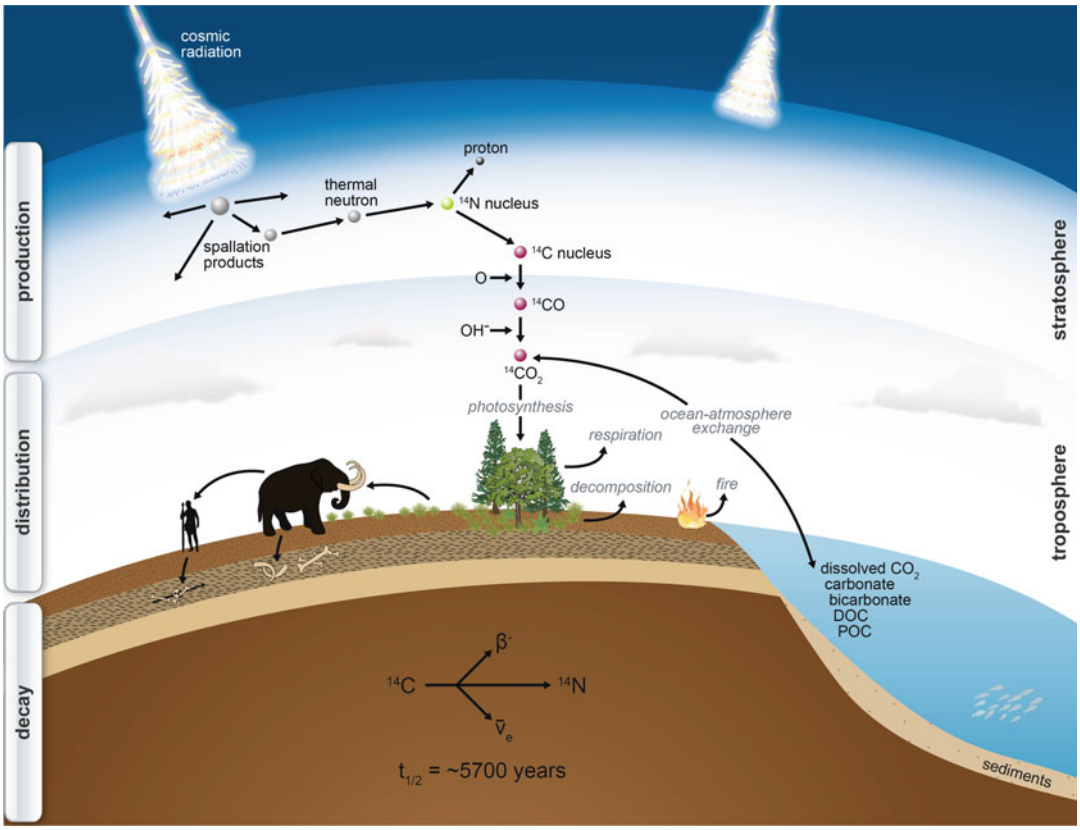

Radiocarbon Dating in Archaeology, Fig. 1 Radiocarbon dating model: production, distribution, and decay of ^{14}C (Source: Taken from Fig. 1.1 in Taylor and Bar-Yosef 2014. Graphics by Annett Baermer, Max-Planck Institute for Biogeochemistry, Jena, Germany, through the kind assistance of the Direct, Susan Trumbore)

Because oceans comprise almost three-quarters of the earth's surface, the largest percentage of ^{14}C is found in marine environments as dissolved inorganic carbonates (DIC) such as CO_2, or in the form of carbonates or bicarbonates. The majority of this marine ^{14}C is found in the deeper parts of the world's oceans. A relatively small percentage of the earth's ^{14}C inventory becomes part of the terrestrial biosphere, first by being incorporated into plant biomass by means of several photosynthetic pathways, then into organisms which depend on various plant communities for food, and then up the entire food chain. Thus all terrestrial living plant and animal communities, which are, directly or indirectly, dependent on plants as a food resource, are tagged with ^{14}C (Usoskin and Kromer 2005).

While individual ^{14}C atoms will decay back into ^{14}N, in living organisms they are continually being replaced through the intake of plant or animal biomass and the physiological processing of this biomass. These metabolic processes in most *living* terrestrial organisms maintain the ^{14}C content in *approximate* equilibrium with atmospheric ^{14}C concentrations. However, once metabolic processes cease, as, for example, because of the death of a plant or animal, the amount of ^{14}C begins to decrease in that organism by negative beta (β^-) decay at a rate characterized by its decay constant or half-life.

The half-life ($t_{½}$) of any radioactive isotope expresses the time interval during which that isotope will decrease by a one-half or 50%. For every subsequent half-life interval, its concentration will

decrease by a factor of 2. In large part because of the very high energies involved in binding atomic nuclei together, the rate of decay of radioactive isotopes are highly stable and, with relatively rare exceptions (e.g., at most, a few percent variations for electron-capture mechanisms), cannot be altered by ordinary physical or chemical processes operating in any natural environment which exists on our planet. Since ^{14}C exhibits a half-life of ~5700 years, the amount of ^{14}C contained in a carbon-containing sample will decrease by 50% during every approximately 5700 year interval following its withdrawal from an active carbon reservoir as at death, unless one or more contaminating process causes carbon-containing compounds exhibiting different ^{14}C concentrations to be added to the sample matrix.

If all of the assumptions of the ^{14}C dating model as summarized in the next section are fulfilled for a given organic sample, a measurement of its residual ^{14}C concentration can be used to infer an accurate age for that sample. However, there are many factors that can impinge on the ^{14}C activity measured in a carbonaceous sample and thus the degree to which that ^{14}C concentration can be used directly to infer accurately and precisely the age of that sample (Taylor 2001; Taylor and Bar-Yosef 2014).

Assumptions

The ^{14}C age of a given sample is inferred primarily based on a measurement of its residual ^{14}C content. To be able to infer an accurate age based on that measurement at a useful level of precision, a set of major assumptions must hold within relatively narrow limits. These assumptions can be briefly summarized as follows (Stuiver and Polach 1977):

1. The concentration of ^{14}C in each carbon reservoir has remained constant at least over the last 100,000 years.
2. Complete and rapid mixing of ^{14}C throughout the various carbon reservoirs is achieved on a world-wide basis on a time scale of less than a few decades.
3. Carbon isotope ratios in samples have not been altered except by ^{14}C decay since these sample materials ceased to be an active part of one of the carbon reservoirs, as at the inactivation of metabolic or physiological processes, i.e., as at the death of an organism.
4. The half-life of ^{14}C is accurately known to an appropriate level of precision.
5. Natural levels of ^{14}C can be accurately measured to appropriate levels of precision.

An additional requirement for a critical utilization of the ^{14}C method is that there is a firmly documented and explicit physical contextual relationship established between a well-characterized organic sample whose ^{14}C concentration is to be measured and some specific event or phenomenon to be dated. The various factors involved in causing violations of these assumptions to varying degrees are the subject of continuing study by ^{14}C researchers. Satisfactory fulfillments of contextual requirements are in the hands of field archaeologists and geologists collecting and submitting samples for ^{14}C measurement.

Accuracy and Precision

In this discussion, *accuracy* refers to the process of obtaining a valid or correct age while *precision* refers to the degree of uncertainty within which a given value is expressed. In ^{14}C dating studies, what might be considered as an *overall* level of accuracy and precision for a given sample depends on a range of factors. It needs to be emphasized that the *measurement precision*, which is typically based primarily on measurement or counting statistics, should be regarded as providing the basis of defining a *minimum* age interval associated with that single sample. This is the "±" value that is associated with most published ^{14}C age expressions.

By international agreement among ^{14}C dating researchers, the "±" expression is cited at the level of $\pm 1\sigma$, where σ is an abbreviation of "sigma." This expression is derived from the fact

that any *measurement* of ^{14}C concentrations must take into consideration well-understood statistical concepts. This statistically based information is expressed in a standardized format in terms of sigma range values. For a brief review of what statistical concepts and information are encoded in sigma values, please refer to Taylor and Bar-Yosef 2014: 144–149.

A realistic estimate of the *overall* accuracy and precision of *individual* ^{14}C values involves a consideration of the interaction of multiple factors. When the entire range of relevant data is evaluated critically, a review of these factors often results in increasing the age range that should be cited with a given ^{14}C value and thus decreasing its overall *effective* precision**.**

One cannot over emphasize the importance of keeping the entire range of relevant variables in mind if one wishes to evaluate critically any single or suite of ^{14}C age estimates to define the effective accuracy and precision of one or more ^{14}C age determinations. Such a consideration highlights the value of duplicate and multiple ^{14}C determinations to increase the quality of ^{14}C evidence used to provide a valid chronometric temporal assignment for a given feature, stratigraphic level, artifact or cultural context.

Calibrated Radiocarbon Ages

A *calibrated radiocarbon age* takes into consideration the observation that ^{14}C activity in living or zero age organisms *on a worldwide basis* have not remained constant. Assumption 1 listed above has been demonstrated to have been violated to varying degrees over almost the entire ^{14}C time scale. Fortunately, the magnitude of the effects of such violations has been measured and appropriate measures can be taken to mitigate their effects by a process referred to as *calibration.*

The offsets between ^{14}C time and true solar or calendar time are sometimes referred to as representing *secular variation* in the ^{14}C time scale (Suess 1965). These offsets are viewed as being composed of two major components: long-term or major trends and shorter-term higher frequency offsets. The shorter-term perturbations are often referred to as de Vries effects, referring to the Dutch scientist, Hessel de Vries (1916–1959), who was one of the first to focus attention on them. The shorter-term perturbations are also sometimes referred to as "wiggles" or "warps" in the ^{14}C time scale.

The long-term variations in ^{14}C concentrations have been determined to have been caused primarily by changes in the intensity of the earth's dipole magnetic field. The primary causes of the shorter-term de Vries effects have been traced to changes in components of the sun's magnetic field together with variations in various carbon cycle parameters such as alternations in exchange rates between carbon reservoirs.

Because of these various offsets, "radiocarbon years," as expressed in conventional ^{14}C age expressions, and solar years – "real time" – are not of equal duration for most periods. Various terms for "real" time (e.g., solar, sidereal, calendar, or calibrated time) have tended to have been used interchangeably. While in this discussion we will use "calendar" or "calibrated" to designate "real time," some have argued that the term "solar" years would be more appropriate, since, strictly speaking, there are and have been various types of calendars in use, not all of which used solar years as the basis of recording the passage of time (Stuiver and Suess 1966).

Calibrated ^{14}C values were initially obtained by consulting tables or plots of relationships between ^{14}C and dendrochronologically (tree-ring) dated samples to determine the amount of offset between ^{14}C and calendar time for different periods. With the increasing precision of the calibration datasets, initially for the Holocene and now increasingly for the terminal Late Pleistocene as well, together with the widespread availability of microcomputers and the Internet, a number of computer/web site-based approaches to the calibration process are now available.

Figure 2 is a plot of the offset (in years) between calendar time and ^{14}C time for the period from 0 to 15,000 calendar years using the

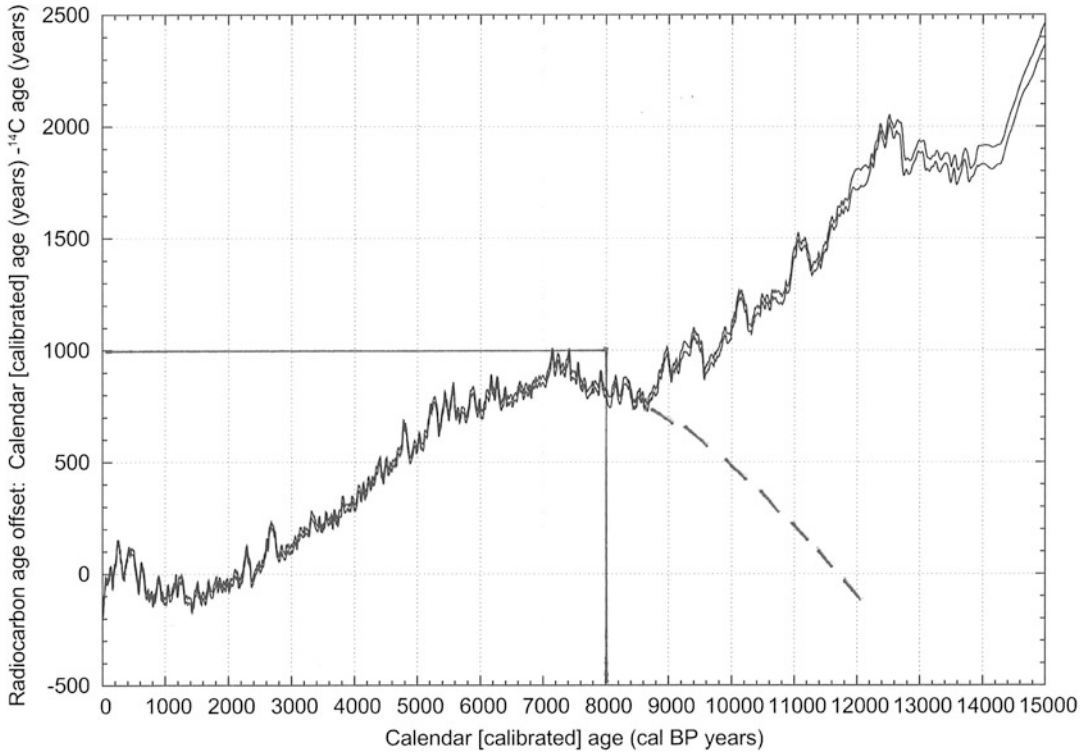

Radiocarbon Dating in Archaeology, Fig. 2 Amount of deviation (in years) between ^{14}C ages and calibration sample ages taken from IntCal13 for the period: 0–15,000 cal BP (Reimer et al. 2013). The area enclosed in the lower left quadrant of the figure represents the time period documented by the first comprehensive comparison of ages tree-ring-dated and ^{14}C date wood samples from the Bristlecone pine published in 1970 (Suess 1970). The dotted line presents the expectation of a decrease in the amount of ^{14}C/tree-ring offset. The remainder of the comparison data from 8000 to 15,000 BP years represents that results of the expanded tree-ring/^{14}C comparisons and other data obtained from non-tree-ring-based temporal proxy data incorporated into the internationally agreed upon calibration data sets such as IntCal13. See text for explanation (Source: Taken from Taylor and Bar-Yosef 2014, Fig. 2.9. Original plot provided by PF Reimer and R. Reimer, Queen's University Belfast, personal communication, 2013)

currently (2018) internationally accepted calibration dataset referred to as IntCal13 (Reimer et al. 2013). This plot summarizes the evolution of understandings of the magnitude of the offsets between ^{14}C and calendar time. The first lengthy data set used to calibrate ^{14}C ages employed a series of tree-ring-dated wood samples from the Bristlecone pines from the White Mountains of east central California. The lower-left quadrant of this figure represents the plot of the relationship between the ages assigned on the basis of ^{14}C measurements and that obtained on the basis of dendrochronology on the White Mountains Bristlecone pine samples (Suess 1970). The assumption is that the ages obtained from dendrochonological study will provide the "true" or calendar ages of each annual segment of the sequence of tree-ring wood samples.

That plot revealed that the main trend ^{14}C values obtained on tree-ring-dated wood for about the last 2500 years was generally stable with de Vries deviations varying offset values during this period by a few hundred years. For a short period of time during that period, ^{14}C values were up a century or so "too old" with regard to "real time." However, focusing on the longer term

variations, the data points could be viewed as clustering around the "0" ^{14}C age offset.

However, between about 2500 years before present (BP) and about 7500 years BP, there was a continuous general increase in the offset values. By 7500 years BP, the tree-ring ages/^{14}C ages offset values based on the Bristlecone pine samples indicated that ^{14}C age values were about 1000 years *too young* with regard to calendar dates. At that point in the plot and lasting from about 7500 to 8500 years BP, the amount of offset slightly decreased. On the basis of these results, during the early 1970s, there was a hopeful expectation among some researchers that the magnitude of the tree-ring-based/^{14}C-based age offsets would decrease when additional tree-ring-dated wood became available on which ^{14}C measurements could be made. This expectation is represented by the dotted line reflecting the projected anticipated decrease in the offsets values.

Regretfully for these expectations, beginning about 8500 years BP, additional tree-ring-based calibration data documented that the magnitude of the offset values between ^{14}C and calendar time resumed their steady increase so that at about 12,500 years BP, the offset value stood at about 2000 years. This meant that, by this time, ^{14}C values were about 2000 years *too young*. From about 8500 years BP to about 12,550 years BP, the offset values were calculated based on multiple segments of dendrochronologically (tree-ring) dated species of wood primarily from German pines and oaks as well as on oak samples from the Netherlands and Ireland. The interval from 12,550 to 15,000 years BP was calibrated on the basis of ^{14}C dates on varved lake sediments, as well as paired ^{14}C/uranium-thorium measurements cave speleothem samples as well as on coral and foraminifera obtained from marine cores.

Figure 3 plots the offset from 0 to 50,000 years using the same calibration data set used to produce Fig. 2 (Reimer et al. 2013). The time period covered by Fig. 2 is indicated by the rectangle in lower left quadrant of Fig. 3. The offset values have been calculated for the period from 15,000 to 50,000 years BP based on data obtained from a complex set of temporal proxies already noted combined to form the most recent internationally agreed upon calibration data set. Based on this data, we can see in Fig. 3 that a ^{14}C age determination of 25,000 years BP is considered to be about 4000 years "too young" and almost 5000 years BP "too young" at about 40,000 years BP when compared with assumed "real" or calendar time.

Figures 2 and 3 illustrate both the long-term or major trends in ^{14}C secular variation offsets as well as the shorter-term, rapidly changing "warps" in the ^{14}C time scale. The implications for calibration of ^{14}C values due to the magnitude of some shorter-term variations are illustrated in Fig. Fig. 4a and b. Calibration of the conventional ^{14}C value of 2450±15 years BP is illustrated in Fig. 4a while calibration of 2300±15 years BP is presented in Fig. 4b.

We have already noted that all properly cited ^{14}C age values include a term that states the statistically based precision of a ^{14}C age expression. We also stated that this term is expressed in terms of a statistical concept of sigma (σ). On the vertical axis of both Fig. 4a and b, the ^{14}C ages of two examples are plotted in terms of their $\pm 1\sigma$ (dark shaded area), $\pm 2\sigma$ (dark and lighter shaded areas), and $\pm 3\sigma$ (the entire area under the curve) values on the vertical axis. The dark shaded irregular, ribbon-like, plot of varying width running generally in a diagonal direction through these plots – sometimes referred to as the "calibration curve" – represent the relationship between the ^{14}C ages and the known ages of the series of samples used for the current ^{14}C calibration data set, IntCal13. The varying widths of this plot provide the $\pm 2\sigma$ precision of the calibration data at each particular point along the calibration curve (Stuiver and Reimer 1993).

Because of the variable or "accordion-like" characteristics of the plot of relationship between ^{14}C time and solar time as illustrated in this mid-first Millennium BC period, the calibration of these two values only 150 ^{14}C years apart reveals that the "real-time" equivalents of these two ^{14}C ages produce significantly different results. The calibration data associated with the 2300±15 BP ^{14}C-content inferred age value reflects a period when the contemporary ^{14}C activity in the

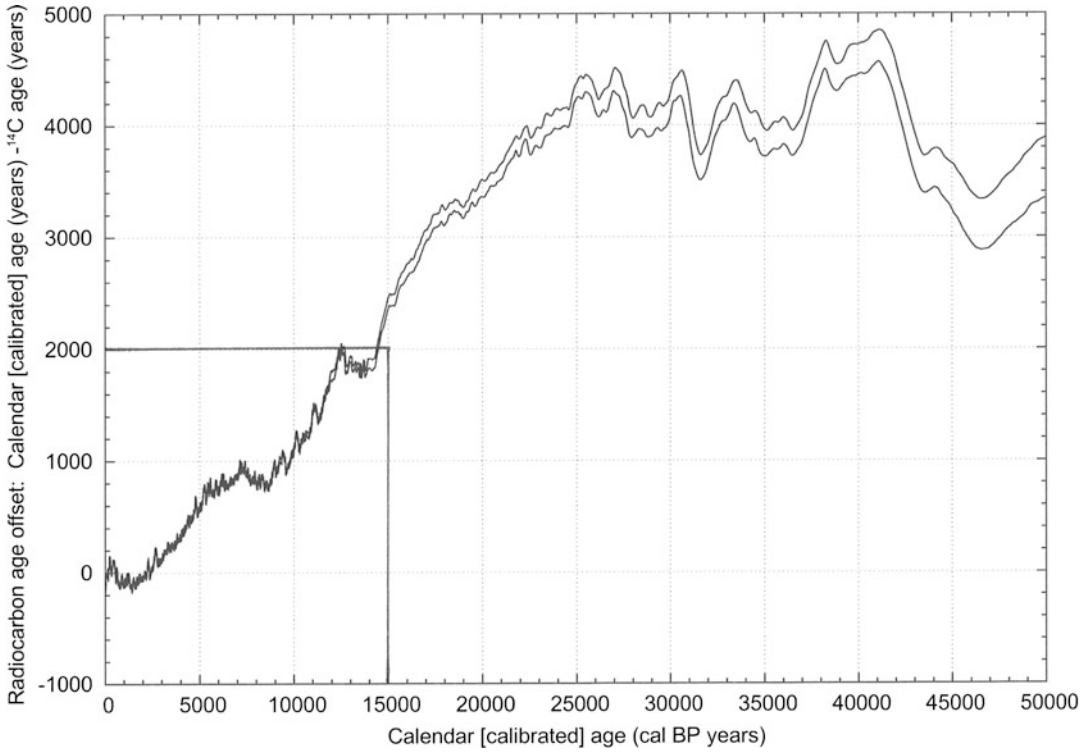

Radiocarbon Dating in Archaeology, Fig. 3 Amount of deviation (in years) between ^{14}C ages and calibration sample ages used in IntCal13: 0–50,000 cal BP (Reimer et al. 2013). The area enclosed by lines in the lower left quadrant represents the time period calibrated using tree-ring data as plotted in Fig. 2. The remainder of the plot represents the results of comparisons of ^{14}C values with non-tree-ring dating proxy data incorporated into the international agreed upon calibration data sets. See text for explanation (Source: Taken from Taylor and Bar-Yosef 2014, Fig. 2.10. Original plot provided by PF Reimer and R. Reimer, Queens's University Belfast, personal communication, 2013)

atmosphere was undergoing rapid change. This allows a much more precise resolution of the real time equivalents of a given ^{14}C concentration measured in a sample which had been living during this time period. As plotted on the horizontal axis of Fig. 4a, the $\pm 2\sigma$-based calibrated range for 2300±15 years BP ranges over a 30 year spread from 400 to 370 BC.

In contrast, the calibration data associated with the ^{14}C age of 2450±15 BP falls on a lengthy plateau in the ^{14}C time scale. In this case, the ^{14}C activity in calibration samples range over about a 350 year period. This data indicate that, during that interval, the ^{14}C time scale is "warped" or significantly spread out, i.e., the ^{14}C content of samples, on a decade by decade and century by century basis, had not been changing as rapidly as it had only a 150 years previously. In Fig. 4b, the plotted ^{14}C value intercepts at multiple points at varying levels of statistical significance, the calibration data over almost the entire 350 year time span of this plateau. Thus the calendar age equivalents of this particular ^{14}C value as expressed at various levels of statistical significance range over the 350 year spread from about 750–400 BC.

In this discussion, we have expressed ^{14}C values – both conventional and calibrated – using the phrase "years BP" meaning "years before present." In most sources, standard or conventional ^{14}C values are typically expressed by simply stating the age followed by "BP," i.e., 2000±35 BP meaning "2000±35 years before the present." Calibrated ^{14}C ages are typically cited in terms of "cal BP" meaning "calibrated

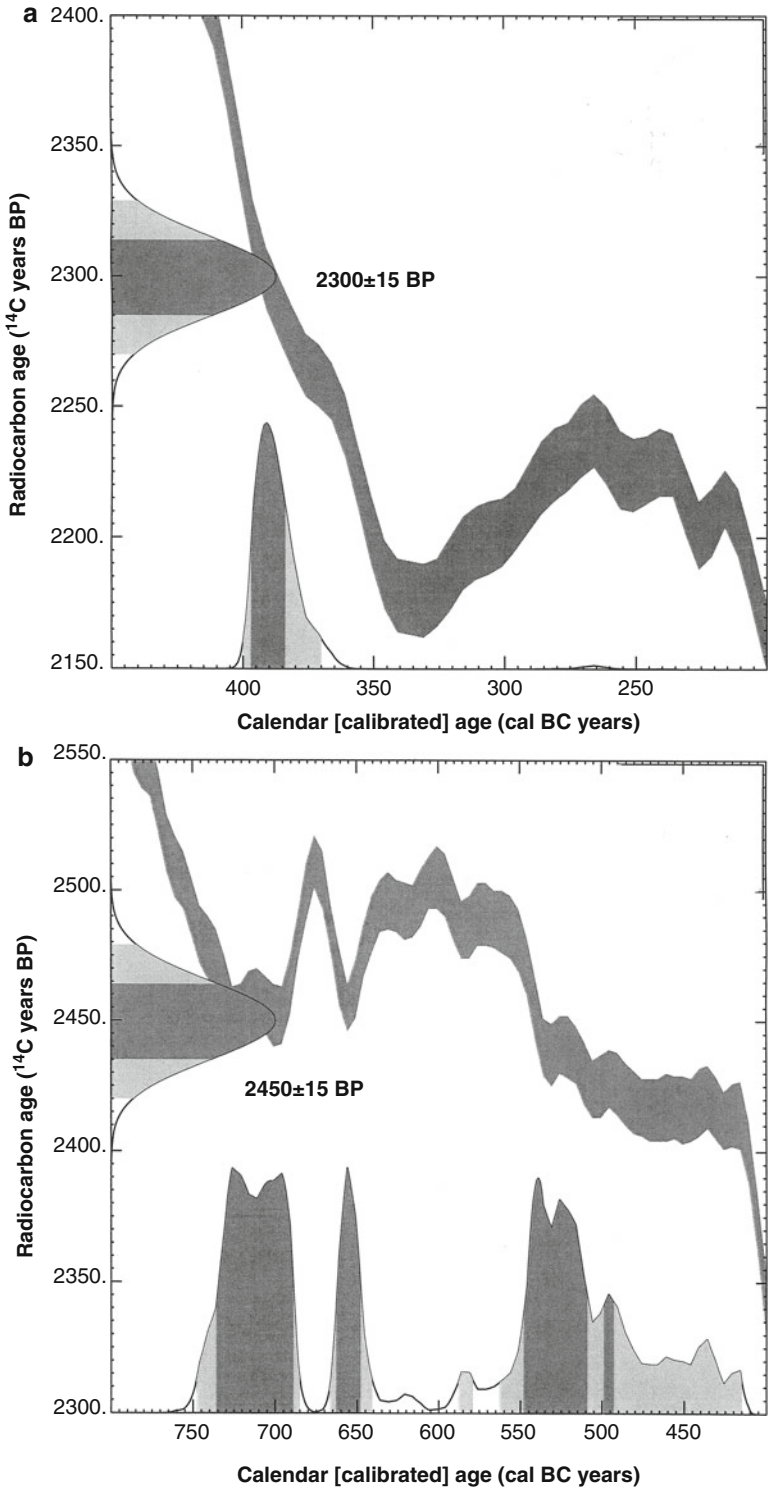

Radiocarbon Dating in Archaeology, Fig. 4 (**a**) Plot of calibrated ^{14}C values of 2300±15 BP employing Calib 7.0 calibration protocol (Stuiver and Reimer 1993) and IntCal13 data (Reimer et al. 2013). The dark zones in the areas under the curves representing the ^{14}C BP values and the calibrated span are 1σ ranges while the lighter portions are the 2σ ranges (Source: Taken from Taylor and Bar-Yosef 2014: Fig. 5.9). (**b**) Plot of calibrated ^{14}C values of 2400±15 BP employing Calib 7.0 calibration protocol (Stuiver and Reimer 1993) and IntCal13 data (Reimer et al. 2013). The dark zones in the areas under the curves representing the ^{14}C BP values and the calibrated span are 1σ ranges while the lighter portions are the 2σ ranges (Source: Taken from Taylor and Bar-Yosef 2014: Fig. 5.10)

years before the present" or "cal BC or cal AD" meaning "calibrated years BC" or "calibrated years AD." Some publications employ a terminology which substitutes the expressions "CE" (Common [or Current] Era) for AD and "BCE" (Before [the] Common [Current] Era) for BC. For more information on the typical use of these protocols, please refer to Taylor and Bar-Yosef 2014: 124–129.

Future Directions

The "radiocarbon revolution" (Renfrew 1973) which was initiated more than six decades ago by Willard Libby and his research collaborators actively continues, with ^{14}C often playing a central role as the archaeological chronological court of final appeal. Radiocarbon data have been and will undoubtedly continue to be called upon on many occasions to resolve uncertainties and controversies concerning chronological ordering for cultural materials, including, in some cases, historical period artifacts of problematical authenticity, as well as human skeletal remains of disputed age.

For archaeologists and geologists, the most immediate and obvious impact of the ^{14}C method on the conduct of archaeological research has been the availability of a fixed-rate temporal scale of worldwide applicability for the terminal phases of the Late Quaternary. In providing a common frame of temporal reference for this period, it can be argued convincingly that ^{14}C data made a *world prehistory* possible by contributing a time scale which transcended local, regional, and continental boundaries. As Grahame Clark (1970: 38) noted, ^{14}C dating "has contributed more than any other single factor to complete the world coverage of prehistoric archaeology, not to mention the way it has helped scholars to synchronize phenomena in different parts of the world." Without the time scale provided by ^{14}C data, prehistorians would still be, in the words of J. Desmond Clark, "foundering in a sea of imprecisions sometimes bred of inspired guesswork, but more often of imaginative speculation." (Clark 1979: 7)

For archaeologists, a less immediately recognized contribution of ^{14}C data has been the fact that ^{14}C-based age estimates provide a means of deriving chronological relationships totally independent of assumptions about cultural processes and completely unrelated to any type of manipulation of artifacts. When pressure to derive chronology primarily from the analyses of artifact data was reduced, inferences about the long-term evolution of human behavior based on variations in environmental, ecological, or technological factors could be aggressively pursued employing an independent chronological framework (Bronk Ramsey 2008).

The great success of the ^{14}C method also provided a major impetus for interdisciplinary research in archaeological studies. The ^{14}C dating method provided one of the major catalysts that moved archaeologists increasingly to direct their attention to analytical and statistical approaches in the manipulation and evaluation of data as well as to maintain long-term collaborative relationships with colleagues in other scientific disciplines. Those long-term collaborative relationships will continue to be expanded into more and more areas of research (Clark 1970)

It was therefore entirely understandable that Frederick Johnson, an American anthropologist and archaeologists, an early proponent of interdisciplinary studies in archaeology, became an early advocate of the critical utilization of ^{14}C method among his colleagues. The general theme of his concerns at the inception of the method is still relevant as we look forward to the continuing expanding horizons of the application of ^{14}C in archaeological studies: "[P]rogress in the development of . . . [radiocarbon dating] depends to a large degree upon the character of the collaboration [between archaeologists and other scientists]. The laboratory procedure involves theories in physics and chemistry which for the most part are outside the experience of almost everyone who has a sample to be dated. On the other hand, the results secured are of little consequence

unless they are directly or indirectly related to some stratigraphic sequence. The value of the laboratory results is enhanced by critical evaluation by other scientists. Most particularly, the reverse is true. This involves continual examination of all basic theory and hypotheses by everyone concerned. The future value and usefulness of the method depends in large measure upon the success of continued collaboration between physicists, archaeologists, geologists, botanists, and others" (Johnson et al. 1951: 62).

This injunction assumed an even greater significance with the introduction of accelerator mass spectrometry (AMS) technology for ^{14}C measurements. AMS methods permit analyses to be conducted on microgram amounts of organics and opens up the possibility of extending the ^{14}C dating range. For archaeologists and Quaternary geologists, the utilization of submilligram-size samples will require an even more rigorous attention to the evaluation of geological, geochemical, and archaeological contexts of samples. The need for interdisciplinary cooperation and collaboration will become even more critical as AMS technology assumes an ever increasing role in the ^{14}C measurements of archaeological and other terminal Late Quaternary paleoenvironmental and paleoecological materials (Pollard 2009).

Cross-References

- ▶ Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues
- ▶ Monte Verde, Archaeology of

References

Bronk Ramsey, C. 2008. Radiocarbon dating: Revolutions in understanding. *Archaeometry* 50: 249–275.

Clark, G. 1970. *Aspects of prehistory*. Berkeley: University of California Press.

Clark, J.D. 1979. Radiocarbon dating and African archaeology. In *Radiocarbon dating. Proceedings of the ninth international conference, Los Angeles and La Jolla 1976*, ed. R. Berger and H.E. Suess, 7–31. Berkeley: University of California Press.

Cook, G.T., E.M. Scott, and D.D. Harkness. 2010. Radiocarbon as a tracer in the global carbon cycle. In *Environmental radionuclides: Tracer and timers of terrestrial processes*, Radioactivity in the environment, ed. K. Froehlich, vol. 16. Amsterdam: Elsevier.

Currie, L.A. 2004. The remarkable metrological history of radiocarbon dating. *Journal of Research of the National Institute of Standards and Technology* 109: 185–217.

Johnson F, Rainey F, Collier D, Flint RF. 1951. Radiocarbon dating, a summary. In *Radiocarbon dating. Memoirs of the Society for American archaeology*, vol. 8, 59–63. Salt Lake City: Society for American Archaeology.

Pollard, A.M. 2009. Measuring the passage of time: Achievements and challenges in archaeological dating. In *The Oxford handbook of archaeology*, ed. B. Cunliffe, C. Gosden, and R.A. Joyce, 145–168. Oxford: Oxford University Press.

Reimer, P.J., et al. 2013. IntCal13 and Marine13 radiocarbon age calibration curves, 0–50,000 years cal BP. *Radiocarbon* 55: 1869–1187.

Renfrew, C. 1973. *Before civilization: The radiocarbon revolution and prehistoric Europe*. New York: Alfred A. Knopf.

Schuur, E.A.G., E.R.M. Druffel, and S.E. Trumbore. 2016. *Radiocarbon and climate change: Mechanisms, applications, and laboratory techniques*. New York: Springer.

Stuiver, M., and H.A. Polach. 1977. Discussion: Reporting of ^{14}C data. *Radiocarbon* 19: 355–363.

Stuiver, M., and P.J. Reimer. 1993. Extended ^{14}C database and revised CALIB radiocarbon calibration program. *Radiocarbon* 35: 215–230.

Stuiver, M., and H.E. Suess. 1966. On the relationship between radiocarbon dates and true sample ages. *Radiocarbon* 8: 534–540.

Suess, H.E. 1965. Secular variations of the cosmic-ray produced carbon 14 in the atmosphere and their interpretations. *Journal of Geophysical Research* 70: 5957–5951.

Suess, H.E. 1970. Bristlecone-pine calibration of radiocarbon time: 5200 BC to present. In *Radiocarbon variations and absolute chronology*, ed. I.U. Olsson, 303–312. Stockholm: Almqvist and Wiksell.

Taylor, R.E. 2001. Radiocarbon dating in archaeology. In *Handbook of archaeological sciences*, ed. R. Brothwell and A.M. Pollard, 23–34. London: Wiley.

Taylor, R.E. 2014. Passing of the last of the three who established ^{14}C dating: A historical footnote. *Radiocarbon* 56 (3): 913–921.

Taylor, R.E., and O. Bar-Yosef. 2014. *Radiocarbon dating: An archaeological perspective*. 2nd ed. Walnut Creek/London: Left Coast Press/Routledge.

Trumbore, S.E. 2000. Radiocarbon geochronology. In *Quaternary geochronology, methods and applications*, ed. J.E. Noller, J.M. Sowers, and W.R. Lettis, 41–60. Washington, DC: American Geophysical Union.

Usoskin, I.G., and B. Kromer. 2005. Reconstruction of the ^{14}C production rate from measured relative abundance. *Radiocarbon* 47: 31–37.

Rapa Nui

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Introduction

The megalithic culture of Rapa Nui was created by Eastern Polynesians on a single island located in the remote eastern Pacific Ocean and in the Southern Hemisphere at 27° 9'S latitude and 109° 26'W longitude (Fig. 1). The defining megalithic components are sculpture (stone statues; *moai*) and architecture (religious centers; *ahu moai*). A Neolithic (stone-based) society, ancient Rapa Nui was a chiefdom in which the highest-ranking male (*'ariki mau*) was believed to be descended from deified ancestors who were major gods.

Rapa Nui marks the east vertex of what archaeologists, anthropologists, linguists, and art historians agree is a discrete Pacific island cultural area called the Polynesian Triangle. New Zealand (Aotearoa) surmounts the west vertex of the Triangle and consists of two large islands comprising over 500,000 km^2, and the archipelago of the Hawaiian Islands marks the Triangle's apex. Geographically situated at a straight-line distance of 1924 km east of Pitcairn Island and 3676 km west of today's busy port city of Valparaíso, Chile, Rapa Nui was annexed by that South American nation on September 9, 1888.

Although its surface area is only 163.6 km^2, Rapa Nui is not the smallest of Pacific "high" volcanic islands, which vary from only 0.8 km^2 (Anuta) to 10,458 km^2 (Hawai'i Island) (Kirch 2000:48). In fact, Rapa Nui is more than double the size of all possible islands from which its original Polynesian settlers may have departed, although it does have a highly marginal natural environment. Rapa Nui's nearest neighbors – Henderson Island, an uplifted coral island, and Pitcairn Island, a small, steep volcanic island – were each exploited for desired resources by Eastern Polynesians but never permanently inhabited, and both were eventually abandoned (Weisler 1998).

Rapa Nui: Polynesian Origins

Polynesian migration and island settlement were vast undertakings accomplished in a relatively

Rapa Nui, Fig. 1 Ahu Tongariki, the largest megalithic site in Polynesia

conservative and patterned way. First, a small contingent of seasoned explorers scouted new islands. They did so by sailing against the prevailing winds within increments that grew increasingly more distant from their starting point. These trained and experienced Polynesian voyagers and navigators enacted zigzag searches while seeking signs of land. Once new land was discovered, the search party returned to its home island with the wind and reported their discovery to chiefly leadership. A fully equipped settlement party was assembled of at least 50 or more persons, including women and children or young adults. Traditional Polynesian food plants and some animals were carried aboard the vessel, which was guided by a navigator entrusted with sailing directions. It is thought that most Polynesian groups could maintain sailing directions relatively accurately as oral histories for about four generations (or about 100 years).

The Polynesian story is told through archaeological and linguistic evidence and confirmed by human, plant, and animal DNA analyses. According to the currently accepted chronology, the story began in a region known as Near Oceania during the Neolithic culture history of Taiwan by ~5000 to 4000 BP (2000–1300 BC). The earliest dated, iconic ceramic phase is 2200 BC. It then progressed to the Philippines and spread to Borneo, Sulawesi, and Eastern Indonesia. Austronesian-speaking agriculturalists eventually established an Oceanic homeland in the Admiralty and Mussau islands of the Bismarck Archipelago, perhaps as early as 1500 BC. The archaeological construct known today as the Lapita cultural complex (Lapita peoples) emerged as a blended entity perhaps between ~1410 and 1290 BC.

Eastern Pacific voyages of exploration and those of settlement were originally initiated from the Western Polynesia formative homeland of Tonga–Sāmoa (Finney 1994: 103, Fig. 22). A northern Polynesian voyaging route led eastward out of Sāmoa, and a roughly parallel southern route extended from the Tonga Islands. Analyses of wind patterns indicate that "sailing back and forth across tropical Polynesia was nowhere near as difficult as assumed in isolationist models" and that "two–way voyaging was crucial to the discovery and settlement of the islands" (Finney 1994:265).

The northern route out of Tonga–Sāmoa eventually reached the Marquesas Islands, while the southern route encountered the Cook Islands and extended to the Austral Islands. Finney (1994:264) reports ethnographic research suggesting that the Marquesas may have been settled "by separate migrations, one from Tonga and the other from Sāmoa." Tahiti and the Society Islands, along with the low, widely scattered Tuamotu islands and atolls lie at the heart of Central Eastern (tropical) Polynesia and formed a complex interaction hub. As Finney (1994:266) also notes, that region is a "conglomeration of contiguous and near-contiguous archipelagos" assuring that any Western Polynesian explorers sailing eastward "would have intercepted islands." The greatest challenge was long-distance open-water dispersal to the distant "points" of the Polynesian Triangle. Ethnohistory reports that New Zealand was reached by more than one voyage, and archaeology suggests that perhaps the Hawaiian Islands were as well. Simulation studies and proxy evidence support the thesis that discovery of remote, uninhabited Rapa Nui was from Mangareva (Gambier Islands) via Pitcairn Island or, less likely, from the Austral Islands via the island of Rapa. In either case, discovery may have been a fortuitous accident driven by anomalous oceanic weather conditions caused by El Niño or another such natural event.

Rapa Nui: Human Impact

Satellite imagery clarifies the tectonic situation, topography, and depths of the southeast Pacific Ocean floor underlying Rapa Nui, which is part of the "Easter-Salas y Gómez Seamount Chain," sometimes called the "Easter Island Fracture Zone." The seamounts are ~3000 m above the seafloor, and the chain, which is ~200 m wide, extends over 2900 km from Rapa Nui to the point where it joins the Nazca Ridge at ~27°S. A defining characteristic of Rapa Nui is geographical isolation.

Rapa Nui, Fig. 2 Overview showing part of La Perouse Bay (Hanga o'Honu) and three parasitic cones on Poike slope

Rapa Nui, Fig. 3 Interior of Rano Kau caldera

Rapa Nui is a volcanic "high" island that is geologically quite young (~750 kya). Terevaka is one of its three formative volcanoes and defines the island's maximum elevation above sea level (asl) at 525 m. This elevation may be compared with Mangareva (441 m asl) or Rapa in the Austral Islands (650 m asl). Terevaka means *patron de bote de pesca* or the owner or captain of a canoe (*vaka*). The other formative volcanoes are Pōike (Pú a ka Tiki; 352 m; Fig. 2) and Rano Kau (324 m; Fig. 3). Geological age has implications for soil quality and

Rapa Nui, Fig. 4 Inner region of Rano Raraku and its lake (rano)

erosion, stone conservation, and agricultural productivity.

Rano Raraku (Fig. 4) is the quarry within which precisely 91.3% of 1693 stone sculptural objects (including statues, heads, torsos, and fragments) recorded to date were carved. It is a semicircular erosional geomorphic feature with an elevated rim measuring ca. 800–1000 m across and rising ca.100 m asl in the west and north and ca.160 m asl in the south and east. Rano Raraku contains a rain-fed lake averaging 3 m deep with minor fluctuations, and almost 400 *moai* still remain within the confines of the Rano Raraku statue quarry.

The weathered source rock out of which the *moai* were carved is a cross-bedded lapilli halotuff (Fig. 5). Recent excavations by the Easter Island Statue Project (EISP; www.eisp.org) of two upright *moai* in Rano Raraku inner region demonstrated that the soils nearly burying the statues were deposited post-quarrying and as a direct result of movement caused by rainfall and human activity on the deforested and quarried stone surface (Sherwood et al. 2019; Fig. 6). Following deforestation and quarrying, the surface of

Rapa Nui, Fig. 5 Unfinished megalithic statue (moai) in Rano Raraku quarry

Rapa Nui, Fig. 6 Overview of excavations of Moai 156 and 157, Rano Raraku Inner Region

the lapilli material on the upper slopes weathered, broke down, and then moved downslope to cover many of the statues. The soils thus created are highly productive and create an agricultural area with rich potential. The statues were erected in the fifteenth century and prior to new soil formation and deposition.

The island's climate is subtropical to temperate, but ancient Central Polynesian voyagers probably would have found it cold. At present, the warmest months are January, February, and into March (23.4 °C; 74^0 F). The coolest, wettest months are July and August (17.5 °C). The average annual temperature is 22° C; and average rainfall is between 1250 and 1500 mm per year. Annual rainfall adequate for dry land agriculture is between 1700 mm and 620 mm per year or a mean of ~1100 mm.

The recent average annual Rapa Nui precipitation rate shows an increase of 566 mm and varies from 50 m asl in the coastal plains to more than ten times that (511 m asl) on Terevaka. Outside of Rano Raraku quarry, the porous volcanic soils of Rapa Nui, like those of much smaller Pitcairn Island or Rapa, do not hold rainwater efficiently. Runoff depletes soils, and water travels in thousands of naturally eroded channels to coastal outlet locations to emerge at low tide. These outlets are "dry in the summer months," and their "low seasonal stream flow would not have supported an irrigation system" (Stevenson and Haoa Cardinali 1998:7). Minor sources of brackish water exist all along the coastline, and some researchers have suggested that they were key determiners in siting major *ahu moai*. However, this is highly unlikely as many water channels or collection areas are nowhere near *ahu moai*.

An important point is that rainfall predictability is as important as the actual amount of precipitation, noting that the more variable the rainfall, the greater the risk of crop failure or reduced yields. The issue of predictability is addressed in Polynesian chiefdoms both practically and spiritually, with observed changes in rainfall levels or wind directions remembered and preserved in oral traditions by mariners and agriculturalists, while control over such events was sought through priestly ministrations.

Métraux (1940:11) noted that on the north coast, some ravines (*ava*) are "clearly not due to erosion" and were probably constructed to manage water. Major *ahu moai* sites such as the Tahai ceremonial center, Tepe'u, Vai Tara Kai Ua, Puna Mareŋo, Ovahe, and many others from Vinapū to Akahaŋa all have well-known minor springs or outflow water sources, and at Akahaŋa, Ura Uraŋa Te Mahina, and Vaihū, the seasonally available rainwater runoff could be substantial.

The most important recent finding is a probable water management system documented by Vogt and Kühlem (2017). Their extensive excavations provide archaeological evidence of stone-faced earthen installations in a seasonal watercourse known as *ko te ava a raŋa uka a toroke ha'u* that

terminates at the coastline six kilometers away at Opipiri near Ahu Akahaŋa. Their new data unite and explore the site's extensive pavements and water storage features. The excavators suggest that a grove of palms existed in this upland area quite late in time and their preliminary radiocarbon determination for the site is cal AD 1477–1647. This date range is contemporaneous with the most recent dates from Rano Raraku (Sherwood et al. 2019).

Island-wide drought ($P_m = 591$ mm) may have occurred at Rapa Nui AD 1570–1720 due, in part, to natural events known as La Niña and El Niño, which alter sea surface temperatures in the tropical Pacific. Finney (1994) suggested that Rapa Nui "cultural collapse" could be related to drought. However, he also noted that major drought, if it occurred, could also just be a trigger for other environmental problems. A drought lasting 5 years or more would have been devastating if not terminal to the Rapa Nui agricultural economy (Van Tilburg 1994).

The remnants of 17 sea ramps occur along the coast, and most of them have extensive pavements located behind *ahu moai* sites. Some ramps have post-construction features (including at least one burial) that are evidence of adaptive reuse. An elaborate sea ramp at the reconstructed Tahai ceremonial center was characterized during restoration as a "canoe ramp" (Fig. 7). This may be correct, but it is impossible today to bring a large canoe through the current rocky shoreline and up that ramp.

The deep, traditionally relatively cold (18 °C at 200 m) waters of Rapa Nui spatially restrict the relative growth rates of corals. Of six species of corals (*puŋa*; *punga*), two are endemic to Rapa Nui. Carved coral eyes were once inserted in prepared sockets of statues upright on *ahu moai*. To date, the coral eyes are known to have survived relatively intact from excavations at only two major *ahu moai* locales: Vinapū and Ahu Naunau III, 'Anakena.

Six named fishing zones extend out to sea from the shoreline and correlate with the types of fish found within them. The greatest diversity of species is found in nearshore waters. Randall and Cea (2011:2) report a total of 169 species of Rapa Nui fishes, of which 139 are shore fishes living in waters less than 200 m deep and 21.7% of the

Rapa Nui, Fig. 7 Tahai Ceremonial Center with view of paved sea ramp in foreground

total is endemic. Polynesian fishhooks are a well-studied category of artifacts throughout the Pacific, and Rapa Nui marine technology includes one-piece and two-piece hooks. Large one-piece stone hooks (*mangai*) were used in deep water to catch prestige fish, including especially tuna, and may have been worn as amulets. The stone hook is a local innovation with a known counterpart from Pitcairn Island. It is also similar to one-piece bone fishhooks from Mangareva.

The number of bird species lost to extinction after humans colonized the Pacific islands is staggering. The most comprehensive Rapa Nui avifauna data are from ʻAnakena, where 14 species of seabirds and 6 undescribed taxa are reported (Steadman et al. 1994). Artifacts included a needle made from the bone of a Murphy's petrel (*Pterodroma ultima*), today a threatened species worldwide.

Rapa Nui has the dubious distinction of possessing one of the least diverse assemblages of food plants of any high island in Polynesia. About 42 species of vascular plants are reported. Of these, ~30 to 32 species are native and 4 or 5 are indigenous. Among the latter are leafy plants such as *Chenopodium glaucum?*, *Ipomoea pes-caprae*, *Tetragonia expansa*, and *Solanum forsteri.* Indigenous famine foods include especially ferns such as *Vittaria elongata* (*kavakava atua*) and possibly even sedges (grasses). Fortunately, several important taxa survived overseas transport by voyaging Polynesians and subsequently thrived on Rapa Nui, including *Colocasia esculenta* (dryland taro; *taro*); *Dioscorea* sp. (yam; *uhi*); *Cordyline fruticosa* (ti); *Saccharum officinarum* (sugarcane; *toa*); *Musa sapientum* (banana; *maika*); and *Curcuma longa* (turmeric; *pua*).

At the time of human arrival Rapa Nui was forested with an unknown species of palm now designated as *Paschalococos disperta* Dransfield. There are about 100 genera and 15,000 species of palms in the world. Pacific palms attain heights of 15 m or more. *Paschalococos*, however, is thought to have reached ~20–25 m tall and perhaps as much as 2 m in diameter. Because of its width and irregular shape it is hard to imagine they were useful in moving and raising *moai*, but the small coconut fruits were edible and the fronds, which may reach 5 m long, were used as thatch in Rapa Nui house construction. Instead, there were big trees of hardwood like *Alphitonia zizyphoides* (*toi*) and *Elaeocarpus rarotongensis*, which attains 15–20 m tall and were probably important for construction and canoe building.

A palm deforestation event at Ma'uŋa Orito AD 1100–1200 was followed by extensive gardening. Deforestation in discrete portions of Pōike began ca. AD 1280 and extended to ca. AD 1500–1675 (Mieth and Bork 2010:422–423). Forest clearance and the resultant heavy erosion negatively impacted agriculture and buried the structures on the lower portions of the Pōike slope. Land use in the downslope areas of eastern Pōike was abandoned post-ca. AD 1490, and a second land use period occurred southwest of Pōike ca. AD 1500–1675.

At Western contact Rapa Nui was completely deforested not only of palm but of all other trees. This was a direct result of human intervention. That is, progressive deforestation through cutting and burning vegetation created open land for planting, a common practice in many areas of the world and known as "swidden agriculture." Among economically important trees and shrubs, two had the highest value: *Triumfetta semitriloba* (Tiliaceae; *hauhau*) and *Broussonetia papyrifera* (paper mulberry; *mahute*). As everywhere in Polynesia, these trees were basic to creating the pre-contact lifestyle. Paper mulberry was used to make a whitish-gray fabric used for capes and other clothing. *Hauhau* provided cordage, twine, ropes, rigging, sails, and in some cases also bark cloth. *Sophora toromiro* (*toromiro*) was an important hardwood used in construction and the carvers' art. Sandalwood (*Santalum*; *naunau*) was used in woodcarving; it apparently had sacred connotations or associations. Other useful trees included *Caesalpinia major* (Caesalpiniaceae; *ngaoho*) and *Thespesia populnea* (Malvaceae; rosewood; *mako'i*).

Historical Background

Linguists conservatively suggest that Rapa Nui may have been discovered by Polynesians as

early as A.D. 800 but probably by at least the mid-AD 900 s. By the mid-AD 1200s, the well-established human population was dispersed widely on the landscape. To date, 27,000 georeferenced sites, features, and objects have been recorded by multiple survey teams. The numbers of habitations within that number suggest that population levels certainly reached 10,000 persons and perhaps attained nearly double that number. Thatched houses of stone and wood proliferated among agricultural fields, outdoor cooking areas, and kitchen gardens and jointly owned lineage territories were marked by large-scale ceremonial centers (*ahu*). Small, portable, roughly carved stone anthropomorphic figures were made and used by individuals and families. Gradually, these became standardized, iconic stone figures in male human form (*moai*) that represented major gods. Over time, multiple lineage groups consolidated into two major sociopolitical confederations linked to legendary personages and ranked according to primogeniture. The Western, higher-ranked group was known as Tu'u; the Eastern, lower-ranked group was Hotu 'Iti.

The proliferation, morphological similarity, and distribution of *moai* on the island and within Rano Raraku are independent but related characteristics indicative of production task management and supervision, time investment, and craft specialization. The exclusivity of Rano Raraku tuff use in *moai* production establishes ritualization of the stone and, by extension, allows conceptualization of the quarry itself as sacred. The numbers and sizes of *moai*, including those remaining in the quarries, point unequivocally to statue carvers as a non-subsistence-producing elite group. Such groups in other societies achieve prestige and privilege but also can become an economic burden on society. Other individuals with lesser expertise (e.g., apprentice carvers) likely performed lower-level support tasks, possibly including basaltic stone tool production. The *moai* artisans (*taŋata maori aŋa moai ma'ea*) were members of an elite occupational group and cooperated with the paramount chief (*ʻariki mau*), those in his direct line of descent (*ariki paka*), and the highest-ranking priests (*ivi atua*) who officiated at the *ahu.* Ethnographic and ethnohistoric sources report that sub-leadership ranks were composed of chiefly advisors (*hōnui*).

Key Issues and Current Debates

Certain issues have dominated Rapa Nui scholarship for several generations, including the chronology of discovery and settlement, the trajectory of megalithic development, and population numbers and demographics. In general, a major scholarly interest is the interactive functional relationships of a hierarchical social system (chiefdom) supported by an agrarian economy within a marginal natural environment.

Debates about Rapa Nui origins were once tied to the question of how and when the sweet potato (*Ipomoea batatas*) was introduced to Eastern Polynesia. A staple food on Rapa Nui at Western contact, sweet potato evolved in South America – its parent plant is the wild *Ipomoea trifida* – and Quechuan speakers of the Andes name it *cumal*, *cumar*, or *cumara*. In the Rapa Nui language, it is *kumara*, a word that appeared by or before AD 800 based upon the lexical reconstruction of ∗*kūmara* to the Proto-Polynesian (PPN) level (Kirch and Green 2001). For most researchers, the question of sweet potato introduction is settled: "It is entirely plausible that at least one [Polynesian] voyaging canoe reached South America to establish contact and return with sweet potato tubers" (Kirch 2017:208–210).

The earliest directly dated sweet potato in Eastern Polynesia is a tuber fragment found in the Kohala Field System of Hawai'i Island. It produced a radiocarbon date of cal AD 1290–1430. Starch grains were found on a shell tool within a context possibly dating as early as the thirteenth century or to the late fourteenth century in the Anaho Valley, Nuku Hiva, Marquesas Islands. Fragments of carbonized sweet potato on Mangaia, Southern Cook Islands, provide a conventional radiocarbon date range of cal AD 1448–1616, thus supporting sweet potato transfer into central Polynesia no later than the end of the fourteenth century AD. EISP excavations in Rano Raraku, the megalithic *moai* quarry, returned a directly comparable radiocarbon determination

of cal AD 1492–1646 (95.4% probability) on a carbonized sweet potato fragment (Sherwood et al. 2019).

Compilations of over 468 radiocarbon dates and area-wide site and demographic analyses suggest permanent and widespread Polynesian settlement and agricultural practices on Rapa Nui by at least AD 1200, with megalithic construction of major *ahu* ceremonial sites adorned with upright *moai* beginning ca. AD 1100–1200. Excavations in Rano Raraku Inner Region establish that standardized "classic" *moai* 6–7 m tall were being actively carved by cal AD 1455–1605 and then raised and retained permanently in place before cal AD 1510–1645 (95% probability). Carving of megalithic *moai*, many of which were 10 m or more tall, ended permanently by Western contact in 1722.

International Perspectives

International perspectives capable of producing research insights into the Rapa Nui past include genetic tracing, and such studies have implications for the modern community through concerns centered on the repatriation of human remains. A substantial problem for osteological data analyses is that cremation, which took place at the large ceremonial mortuary sites, obliterated most of the earliest skeletal evidence. Later burial practices during which ceremonial structures were demolished and rebuilt as semi-pyramidal *ahu*, along with indiscriminate collecting until at least 1872, caused extensive admixing of human remains. However, there is consensus that Rapa Nui crania are related to other Eastern and Central Polynesian cranial series and that some close biological connections exist between crania from Easter Island and the Gambier Islands (Mangareva).

It is increasingly evident that rapid forest replacement by grasses and sedges took place on Rapa Nui during the late Holocene. There is scientific consensus that deforestation – wherever it is recorded in closed Pacific island ecosystems – is attributable to human clearance. Sustainability of island life in the past and throughout the Pacific today is being assessed in the context of climate change.

Lake core evidence is important in establishing a clearer understanding of hypothesized "climatic forcing" of past and present cultural changes. For pre-Western contact Polynesia, few would question the assertion that anthropogenic environmental transformations were intense and extensive, although the full potential effects of climatic anomalies on such events remain to be analyzed within the context of international concerns about human behavior and the environment. Deforestation was fundamental to establishing successful agriculture on Polynesian islands, and knowing more about such patterns offers insight into the proportionate impact of human and natural events on the global cultural trajectory (Van Tilburg 1994:162). There is a need to continue widespread data collection and develop new analysis strategies in order to obtain insight into climate-driven cultural changes.

Future Directions

Three fields of inquiry suggest new opportunities for Rapa Nui research: linguistics, iconography, and soil micromorphology. Polynesian outliers are islands and atolls lying outside of the geographical boundaries of the "Triangle" yet displaying well-documented Polynesian archaeological and linguistic affinities suggesting voyaging contacts between, for example, Micronesia and Polynesia. Wilson (2012) traces a linguistic chain of Eastern Polynesian settlement to the Northern Outliers based upon 51 lexical and 22 grammatical reconstructions shared within a Central Northern Outlier-Eastern Polynesian subgroup. The Northern Outliers are the atolls of Kapingamarangi and Nukuoro. Wilson's research modifies the "standard subgrouping" linguistic model (see above) but continues to assert that Rapa Nui branches out of Proto-Eastern Polynesian and is a conservative language with important retentions.

A recent and rapid model of initial Eastern Polynesian settlement (AD 1025–1120) by some researchers. However, they presume that the Society Islands are the central "homeland" locale from which other areas of Eastern Polynesia were

settled. In contrast, Wilson (2012) argues that "linguistic similarity, often used to trace phylogenetic relationships of populations in East Polynesia" supports a model of "relatively slow, incremental expansion" that demands reconsideration "especially in the case of Rapa Nui." The Marquesic–Tahitic linguistic divide presents

> a challenge for [the Wilmshurst et al. 2011] scenario and its claim of the Society Islands as the homeland from which all other [Eastern Polynesian] areas were rapidly settled. The language native to the Society Islands, Tahitian, reflects Tahitic innovations that are not only absent from Rapanui but also absent from Marquesan, Mangarevan, and sometimes Hawaiian. These Tahitic innovations are spread, however, throughout the languages of the Cooks, Australs, Tuamotus, and New Zealand, [thus] supporting a distinctive unified history for these languages. (Wilson 2012:352–353)

Wilson's (2012) research takes a fresh look at integrating Polynesian Outliers into the linguistic history of Eastern Polynesia. It encourages broader contextual consideration of Rapa Nui linguistic and aesthetic roots, some of which are embedded in the Gambier Islands but also the Cook Islands. This has implications for the discussion of Rapa Nui origins, not as direct voyaging contacts but, rather, as subtle influences only detectable through careful comparative analyses of fields such as iconography.

Secondly, it has been recently shown that the application of petroglyphs to the standing statues in Rano Raraku was a secondary activity associated with late developing iconographic and ideological trends that followed the rejection of the *moai* as symbol and the collapse and redirection of the principles that dictated its cultural value (Sherwood et al. 2019). There is a continuity and affinity in all Rapa Nui arts, but there are also distinct stylistic trends that signal philosophical growth and change. Further work is needed, but there is very reason to believe that greater understanding of the megalithic culture lies in discerning the encoded meanings in patterned iconographic expressions of multiple motifs within iconographic types (e.g., tattoo, rock art, and portable and megalithic objects).

Finally, traditional Polynesian cultivars with potentially high productivity levels, including banana, sweet potato, and paper mulberry were present in Rano Raraku inner region, and statue quarrying there significantly enriched the soils (Sherwood et al. 2019). Excavation demonstrates that Rano Raraku soil/sediment itself was a valuable resource and, perhaps as the authors above suggest, an exchanged commodity. Soils micromorphology offers empirical and abundant botanical evidence of cultivars buried in the south slope of Rano Raraku inner region, thus revealing a mixed-crop production system located for an extended time among the quarries and standing *moai.* There is still much to learn about the Rapa Nui ecosystem use and misuse, including land management and ceremonial activities. However, the richly endowed agricultural area of Rano Raraku, and specifically the soils contained within it, offers new and more nuanced insights into the interactive nature of the prehistoric Rapa Nui *moai* production system and its related economy, thus offering new directions of research emphasis. Perhaps, at long last, we have the potential to lay to rest permanently some of the longstanding "mysteries" of Rapa Nui. In response, new scientific challenges will surely emerge.

Cross-References

► Routledge, Katherine Scoresby
► Statues and Monumental Art in Archaeology

References

Finney, B. 1994. *Voyage of rediscovery: A cultural odyssey through Polynesia*. Berkeley: University of California Press.

Kirch, P.V. 2000. *On the road of the winds: An archaeological history of the Pacific Islands before European contact*. Berkeley: University of California Press.

Kirch, P.V. 2017. *On the road of the winds: An archaeological history of the Pacific Islands before European contact*. Berkeley: University of California Press.

Kirch, P.V., and R.C. Green. 2001. *Hawaiki, Ancestral Polynesia: An essay in historical anthropology.* Cambridge/New York: Cambridge University Press.

Mieth, A., and H.-R. Bork. 2010. Humans, climate or introduced rats – Which is to blame for the woodland destruction on prehistoric Rapa Nui (Easter Island)? *Journal of Archaeological Science* 37: 417–426.

Randall, J.E., and A. Cea. 2011. *Shore fishes of Easter Island*. Honolulu: University of Hawai'i Press.
Sherwood, S.C., J. Van Tilburg, C.R. Barrier, M. Horrocks, R.K. Dunn, and J.M. Ramírez-Aliaga. 2019. New excavations in Easter Island's statue quarry: Soil fertility, site formation and chronology. *Journal of Archaeological Science* 111: 104994.
Stevenson, C.M., and S. Haoa Cardinali. 1998. Prehistoric gardening systems and agricultural intensification in the La Pérouse Area of Easter Island. In Easter Island in Pacific Context, South Seas Symposium, Proceedings of the Fourth International Conference on Easter Island and East Polynesia, University of New Mexico, Albuquerque, 5–10 Aug 1997, edited by C.M. Stevenson, G. Lee, and F.J. Morin, 218–222. Easter Island Foundation Occasional Paper 4. Los Osos: Bearsville and Cloud Mountain Presses.
Van Tilburg, J. 1994. *Easter Island: Archaeology, ecology, and culture*. London: British Museum Press.
Vogt, B., and A. Kühlem. 2017. By the Quebrada of Ava Ranga Uka A Toroke Hau-about landscape transformation and the significance of water and trees. In *Rapa Nui: Negotiating cultural and environmental changes, past and present*, ed. Haoa Cardinali, S.D.W. Ingersoll, K.B. Ingersoll, and C.M. Stevenson. Abingdon: Routledge.
Weisler, M.I. 1998. Issues in the colonization and settlement of Polynesian Islands. In *Easter Island and east Polynesian prehistory*, ed. P. Vargas Casanova, 73–86. Santiago: Facultad de Arquitectura y Urbanismo, Instituto de Estudios Isla de Pascua, Universidad de Chile.
Wilson, W.H. 2012. Whence the east Polynesians? Further linguistic evidence for a northern outlier source. *Oceanic Linguistics* 51 (2): 289–359.

Raposo, Luìs

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Basic Biographical Information

Luìs Raposo (Fig. 1) was born in Lisbon, Portugal, in 1955. He was Director of the National Archaeology Museum, Portugal, between 1996 and 2012, where he became Head of the Research Department since 2013. In 2000, Luìs Raposo was appointed as a member of the Board for the Gulbenkian Archaeology Award. In 2005 he became an invited professor at the University of Lisbon. In 2009 he became Chair of the Board of the Portuguese National Committee of ICOM and a member of the Advisory Committee of the Portuguese National Committee of UNESCO. He became Chair of the Fiscal Committee of the Portuguese Association of Archaeology in 2012, being earlier Chair of the Directive Board (1998–2000), the Chair of the General Assembly (2000–2010), and Chair of the Fiscal Committee of the Professional Association of Archaeologists.

Major Accomplishments

Luìs Raposo is an expert in ancient prehistory (Paleolithic). His main geographic areas of activity are the Lower and Middle Paleolithic of the Tagus Valley and Lisbon region (Raposo 1996) and the Epipaleolithic of the Alentejo Littoral (Raposo et al. 1993, 1994). His main subjects of research are a critical review of the earliest human occupations in Portugal and Iberia; evolution of Acheulean in the Tagus Valley (Raposo 1996); definition of the late survival of Neanderthals in Portugal and Southern Iberia (Raposo et al. 1999, 2000, 2007); macrolithic postglacial industries in river valleys and littoral fossil beaches (Raposo et al. 1982, 1984); and technology and typology of lithic assemblages (Raposo et al. 1975; Raposo and Santonja 1995).

Luìs Raposo has been a collaborator in the installation of local and regional archaeology museums in Portugal and coauthor, scientific consultant, or executive commissioner of national and international exhibitions (Museus de Arqueologia-Tomar 2009). In his role as an invited professor and recognized expert, he has supervised several postgraduate research projects, including students who hold scholarships from the Calouste Gulbenkian Foundation, and participated in several academic juries, in different countries.

Luìs Raposo has been instrumental in protecting and promoting Portugal's archaeology and cultural heritage at a governmental level and internationally. He has been the representative of Portugal and/or of the Ministry for Culture on

Raposo, Luìs, Fig. 1 Luís Raposo at the National Museum of Portugal

various committees, responsible for research projects approved and/or financed by the Ministry of Culture and the Ministry of Science, also having helped to develop several agreements on bilateral international cooperation. He is a member of the Network Coordinating Committee for the project "The Palaeolithic Occupation of Europe," which was created by decision of the European Science Foundation's governing bodies, in December 1992. He is a member of the editorial boards of several journals in Portugal and abroad, namely, "Al-Madan" "Trabajos de Prehistoria," and "Museologia.pt" (Museology.pt), and a participant in numerous national and international scientific meetings.

Luìs Raposo is a coauthor of university textbooks and synthesis works in the fields of museology (Raposo et al. 2009), archaeology, and history (Raposo et al. 1975, 1982, 1984, 1993, 1994, 1996, 1999, 2000, 2007; Raposo and Santonja 1995). He has published around 230 titles between 1972 and 2012 as part of a vast specialized bibliography on prehistory, archaeology, and museology, published in national and foreign monographs and specialist journals.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Heritage Museums and the Public

References

Raposo, L., and M. Santonja. 1995. The earliest occupation of Europe: The Iberian Peninsula. In *The earliest occupation of Europe*, 7–25. Leiden: University of Leiden.

Raposo, L., et al. 1975. Analyse descriptive des galets aménagés – un essai. In *Comunicaciones presentadas en el II y III Colóquio Internacional de Prehistoria – Morella 1975, 1976*, 28–54. (Morella, 1980).

Raposo, L., et al. 1982. A Estação languedocense do Xerez de Baixo (Guadiana). *Setúbal Arqueológica* 3: 43–84.

Raposo, L., et al. 1984. O Languedocense: ensaio de caracterização morfotécnica e tipológica. *O Arqueólogo Português* 4 (2): 87–166.

Raposo, L., et al. 1993. Les haches miriennes du Portugal et les houes Tensiftiennes du Maroc: quel type de relations? *Mediterrâneo* 2: 123–142.

Raposo, L., et al. 1994. O sítio de Palheirões do Alegra e a "Questão do Mirense". In *Arqueología en el entorno del Bajo Guadiana*, ed. J.M. Campos, J.A. Pérez, and F. Gómez, 55–69. Huelva: Universidad.

Raposo, L., M.M. Salvador, and J.P. Pereira. 1996. L'Acheuléen dans la vallée du Tage, au Portugal, in *L'Acheuléen dans l'Ouest de l'Europe*. Publications du CERP 4, 41–50. Lille: CERP.

Raposo, L., L.G. Vega Toscano, and M. Santonja. 1999. Environments and settlement in the middle Palaeolithic of the Iberian Peninsula. In *The Middle Palaeolithic occupation of Europe*, 23–48. Leiden: University of Leiden.

Raposo, L., et al. 2000. The middle-upper Palaeolithic transition in Portugal. In *Neanderthals on the edge: 150th anniversary conference of the Forbes' Quarry discovery, Gibraltar*, ed. C. Stringer, R.N.E. Barton, and C. Finlayson, 95–109. Oxford: Oxbow Books.

Raposo, L., L.G. Vega Toscano, and M. Santonja. 2007. Paleolítico Medio y Neandertales en la fachada occidental ibérica. In *El universo Neandertal I*, ed. E. Badequano, 10–69. Madrid: Fundación Duques de Soria.

Raposo, L., L.G. Vega Toscano, and M. Santonja. 2009. Arqueologia e museus. In *Museologia.pt*, vol. 3, pp. 75–103. Lisboa: Instituto dos Museus e da Conservação.

Further Reading

Raposo, L. 1996. Quartzite bifaces and cleavers in the final Acheulian assemblage of Miharós, Vale do Forno (AlpiarÇa). In *Non-flint stone tools and the Palaeolithic occupation of the Iberian Peninsula*. BAR international series 649, ed. N. Moloney, L. Raposo, and M. Santonja. Oxford: Tempus Reperatum.

Raposo, L. 2005. PaleolÍtico dos arredores de Lisboa. In *Construindo a memória: as colecções do Museu Arqueológico do Carmo*, ed. J.M. Arnaud and C.V. Fernandes, 95–101. Lisboa: AAP; MAC.

Raposo, L., and J.L. Cardoso. 2000. *Mousterian industries of the Gruta da Figueira Brava*, 319–337. XXXVIII: Memórias da Academia das Ciências de Lisboa, Classe de Ciências.

Raposo, L., P.P. Cunha, A.A. Martins, S. Huot, and A. Murray. 2008a. Dating the Tejo River lower terraces in the Ródão area (Portugal) to assess the role of tectonics and uplift. *Geomorphology* 102: 43–54.

Raposo, L., P.P. Cunha, A.A. Martins, S. Huot, and A. Murray. 2008b. Antes dos agricultores: unidade e diversidade da ocupação humana no Médio Tejo durante a pré-história Antiga. In *Megalith builders in the International Tagus, Iberian Península*. BAR international series 1765, 17, ed. P. Bueno-Ramirez, R. Barroso-Bermejo, and R. de Balbín-Berhmann. Oxford: Archaeopress.

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Basic Biographical Information

Affectionately known as "Rip," George Robert Rapp, Jr. (1931–) began his career as an experimental geochemist, earning his B.A. in geology and mineralogy in 1952 from the University of Minnesota and a Ph.D. in geochemistry from Pennsylvania State University in 1960. His early research focused on the synthesis of minerals such as zoisite and idocrase (doctoral work) and mineralogical studies of materials from South Dakota while serving on the faculty at South Dakota School of Mines and Technology. In 1965, after a year on sabbatical at the University of Minnesota Twin Cities, Rapp joined the faculty there as an Associate Professor of Mineralogy. He remained at the University of Minnesota, on both the Twin Cities and Duluth campuses for the duration of his academic career. Rapp served as Dean of the College of Letters and Science, then of Science and Engineering, as well as Director of the Archaeometry Lab (UMN-Duluth) for many years before retiring as a Regent's Professor of Geoarchaeology in 2003. He retired to Tucson, Arizona, and continued his publishing there.

Major Accomplishments

Rapp's principal contribution to archaeology is his work in developing the field of geoarchaeology or "archaeological geology" (Rapp and Gifford 1982). He founded the Archaeological Geology Division of the Geological Society of America. At the University of Minnesota, Rapp cofounded the Center for Ancient Studies (early 1970s), which later became the Interdisciplinary Archaeological Studies program. This was perhaps the first interdisciplinary graduate program in geoarchaeology and archaeological science. During this time, he produced a number of influential papers defining the field of geoarchaeology and the role of archaeological geologists as practitioners (Rapp Jr. 1970, 1975; Rapp and Gifford 1985). Both the graduate and undergraduate programs that he directed produced numerous students who went on to distinguished careers in the field (Julie Stein, Zhichun Jing, John Gifford, and Christopher Hill). Additional evidence of his lasting influence on geoarchaeology include *The Directory of Graduate Programs in Archaeological Geology and Geoarchaeology* (now maintained by members of the Archaeological Geology Division of GSA) and the Division award (the Rip Rapp Award) so named for its first recipient.

Rapp's first assignment as an archaeological geologist was as associate director of the Minnesota Messenia Expedition and its excavation of

the Bronze Age site of Nichoria in southwestern Greece (McDonald and Rapp 1972; Rapp and Aschenbrenner 1978). His work on this project combined a childhood interest in classical archaeology with his research strengths as a geoscientist (Jing 2007). Rapp's research in the circum-Mediterranean later included sites and regions in Cyprus (Swiny et al. 2003), Turkey, Israel (Herzog et al. 1989), Egypt (Rothe et al. 2008), and Tunisia (Gifford et al. 1992). These resulted in some of the first geoarchaeological explorations of coastal landscapes and paleogeography. Most notable among these were his investigations of the coastal regions surrounding Troy (Kraft et al. 2003), the Peloponnese (Kraft et al. 1977), Ephesus, Pylos, and Thermopylae (Kraft et al. 1987).

As with much of Rapp's career, his studies of artifact copper stood at the forefront of new advances in the discipline of sourcing using trace elements (Rapp et al. 2000). His research on archaeological copper followed nearly every part of the globe where Rapp left his mark, including his long tenure in the Great Lakes region, his retirement in Arizona, and his geoarchaeological research in China. His latest efforts in developing the new field of archaeomineralogy (Rapp 2009) follow naturally from this work and his initial research interests.

Rapp's research in China began in the 1990s, working with K.C. Chang on the Shangqiu project (Jing et al. 1997) and continued with Z. Jing through his retirement as part of the Anyang and Huanbei projects. Employing both traditional coring and more modern geophysical survey and satellite remote sensing, Jing and Rapp discovered important Bronze Age cities under meters of silt (Jing et al. 1997; Jing 2007). His work in China and the Mediterranean illustrate Rapp's strengths in forging and maintaining successful interdisciplinary and international collaborations.

While the research outlined above is central to defining the principal foci of Rapp's career, it would be unfair to characterize his contributions to archaeology as limited to these themes. Rapp is perhaps the consummate driver of new ideas. His graduate students, and undergraduates who trained with him initially, have been involved in many related but diverse facets of geoarchaeology including archaeological sediments and phytolith research (Rapp and Mulholland 1992). His extensive publication record includes the development of textbooks in geoarchaeology (Rapp and Hill 2006) and mineral encyclopedias (Roberts et al. 1974).

Cross-References

- ▶ Chang, Kwang-chih
- ▶ Cyprus, Archaeology of
- ▶ Geoarchaeology
- ▶ Phytolith Studies in Archaeology

References

Gifford, J.A., G. Rapp, and V. Vitali. 1992. Paleogeography of Carthage (Tunisia): Coastal change during the first millennium B.C. *Journal of Archaeological Science* 19: 575–596.

Herzog, Z., G. Rapp, and O. Negbi. 1989. *Excavations at Tel Michal, Israel*. Minneapolis: University of Minnesota Press.

Jing, Z. 2007. Integration comes of age: A conversation with Rip Rapp. *Geoarchaeology: An International Journal* 22: 1–14.

Jing, Z., G. Rapp, and T. Gao. 1997. Geoarchaeological aids in the investigation of early Shang civilization on the floodplain of the lower Yellow River, China. *World Archaeology* 29: 36–50.

Kraft, J.C., S.E. Aschenbrenner, and G. Rapp. 1977. Application of Holocene stratigraphy to paleogeographic reconstructions of coastal Aegean archaeological sites. *Science* 195: 941–947.

Kraft, J.C., G. Rapp, G. Szemler, C. Tziavos, and E.W. Case. 1987. The pass at Thermopylae, Greece. *Journal of Field Archaeology* 14: 181–198.

Kraft, J.C., G.R. Rapp, I. Kayan, and J. Luce. 2003. Harbor areas of ancient Troy: Sedimentology and geomorphology complement Homer's Iliad. *Geology* 31: 163–166.

McDonald, W.A., and G. Rapp, eds. 1972. *The Minnesota Messenia expedition: Reconstructing a Bronze Age regional environment*. Minneapolis: University of Minnesota Press.

Rapp, G. 2009. *Archaeomineralogy*. 2nd ed. New York: Springer.

Rapp, G., and S. Aschenbrenner, eds. 1978. *Excavations at Nichoria in southwestern Greece, volume 1: Site, environs, techniques*. Minneapolis: University of Minnesota Press.

Rapp, G., and J.A. Gifford. 1982. Archaeological geology. *American Scientist* 70: 45–53.
Rapp, G., and J.A. Gifford, eds. 1985. *Archaeological geology*. New Haven: Yale University Press.
Rapp, G., and C. Hill. 2006. *Geoarchaeology: The earth-science approach to archaeological interpretation*. 2nd ed. New Haven: Yale University Press.
Rapp, G., Jr. 1970. Geology in aid of archaeology: Investigations in Greece. *Journal of Geological Education* 18: 59–65.
Rapp, G., Jr. 1975. The archaeological field staff: The geologist. *Journal of Field Archaeology* 2: 229–237.
Rapp, G., and S.C. Mulholland, eds. 1992. *Phytolith systematics: Emerging issues*. New York: Plenum Press.
Rapp, G., J. Allert, V. Vitali, Z. Jing, and E. Henrickson. 2000. *Determining geologic sources of artifact copper: Source characterization using trace element patterns*. Lanham: University Press of America.
Roberts, W.L., G. Rapp, and J. Weber. 1974. *Encyclopedia of minerals*. New York: Van Nostrand Reinhold.
Rothe, R., W. Miller, and G. Rapp. 2008. *Pharaonic inscriptions from the southern eastern desert of Egypt*. Winona Lake: Eisenbrauns.
Swiny, S., G. Rap, and E. Herscher, eds. 2003. *Excavations at Sotira Kaminoudhia southwest Cyprus*. Boston: American Schools of Oriental Research.

Rathje, William Laurens

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Basic Biographical Information

William Laurens Rathje (1945–2012) was born in South Bend, Indiana. After receiving his B.-A. degree in anthropology from the University of Arizona in 1967, he attended Harvard University on a National Science Foundation Graduate Fellowship, where in 1971 he was awarded the Ph.D., also in anthropology. His museum-based dissertation, *Lowland Classic Maya Socio-Political Organization: Degree and Form Through Time and Space*, was directed by Gordon R. Willey. Even before the dissertation had been completed, Rathje in 1970 returned to the University of Arizona as a faculty member, where he remained until retirement in 2000. After retirement, he spent several years at Stanford University teaching with Michael Shanks.

Major Accomplishments

Rathje's contributions to anthropological archaeology were significant in a wide range of research areas. His numerous papers on Mesoamerican archaeology published in 1970–1978 established Rathje as one of the preeminent Mayanists of his generation. These publications, which continue to garner citations, set the agenda for studies of social organization, the role of religion in economic systems, mortuary assemblages, and exchange systems.

Rathje is best known for his study of modern middens. In 1973 he established an entirely new field of applied archaeology that came to be called garbology. The Garbage Project, the first long-term study of modern material culture, analyzed refuse – sometimes very fresh, sometimes from landfill excavations – in Tucson and other cities in the United States as well as from Canada, Japan, and Mexico. Although many prehistorians disdained the Garbage Project, Rathje was successful in obtaining funding from corporations and governments for more than two decades because household garbage could furnish information available through no other means on topics such as the social parameters of diet, household discard patterns and the composition of refuse, food waste, hazardous materials, and effectiveness of recycling campaigns. Not only did these studies furnish substantive results, but they also contributed new unobtrusive methods for measuring human behavior. The project brought to light differences in front door (interviews) and back door (garbage) evidence on consumption patterns. For example, they found that consumption of tobacco and alcohol was significantly underestimated in interviews.

Although Garbage Project findings were often published in journals not read by archaeologists – ranging from *Waste Age* to *Journal of Nutrition Education* – Rathje and his collaborators took

pains to bring major findings and methods to the attention of our discipline in many edited volumes and journal papers. He also wrote with Cullen Murphy, *Rubbish! The Archaeology of Garbage* (1992), a popular book that helped to spread the garbage gospel far and wide. For three decades the Garbage Project received more media publicity than any other University of Arizona research project. To millions of Americans, he was the public face of archaeology, highly visible on television and radio, in newspapers and magazines, and as a keynote speaker at trade group conventions. He even testified in Washington before a Congressional committee.

In recognition of the immense public impact of the Garbage Project, Rathje in 1990 received the highly prestigious AAAS/Westinghouse Award for Public Understanding of Science and Technology. And on the basis of his contributions to applied anthropology, in 1992 he was the recipient of the American Anthropological Association's Solon T. Kimball Award.

Rathje's scientific interest in modern material culture and human behavior has had a broad theoretical impact in archaeology. Several interrelated themes run consistently through his research and teaching: the importance of artifacts in human life, the necessity of studying relationships among people and artifacts, and the relevance of archaeological method and theory to addressing societal problems. With J. Jefferson Reid and Michael B. Schiffer, he cofounded behavioral archaeology, which prioritized the study of people-artifact interactions in all times and all places, from both historical and scientific perspectives. Behavioral archaeology, under the impetus he furnished, continues to develop new ways to research the material world.

Rathje was a phenomenally popular undergraduate teacher renowned for lively storytelling, a charming sense of humor, making any aspect of archaeology exciting, and using pithy examples to highlight the many contributions that the discipline can make to an understanding of behavior in modern societies. Although he chaired few dissertation committees, he exerted a profound influence on countless generations of Arizona graduate students, many of whom worked on the Garbage Project or were his teaching assistants.

Rathje's range of interests was breathtaking, as indicated by the many dozens of articles he published in popular archaeology and science magazines, which always melded archaeological insights to issues in contemporary society. It helped that he was an uncommonly good writer, a crafter of sparkling prose; he was also an artist who worked in several media. A kind and generous man, Rathje was one of American archaeology's most creative, prolific, and influential scholars.

Cross-References

- ▶ Behavioral Archaeology
- ▶ Consumption, Archaeology of
- ▶ Material Culture and Education in Archaeology
- ▶ Modern Material Culture, Archaeology of

Further Reading

Rathje, W.L. 1970. Socio-political implications of Lowland Maya burials: methodology and tentative hypotheses. *World Archaeology* 1: 359–374.

Rathje, W.L. 1971. The origin and development of Lowland Classic Maya civilization. *American Antiquity* 36: 275–285.

Rathje, W.L. 1974. The Garbage Project: a new way of looking at the problems of archaeology. *Archaeology* 27 (4): 236–241.

Rathje, W.L. 1979. Modern material culture studies. *Advances in Archaeological Method and Theory* 2: 1–37. New York: Academic.

Rathje, W.L. 1979. Trace measures. In *Unobtrusive measures today: new directions for methodology of behavioral science*, ed. L. Sechrest, 75–91. San Francisco: Jossey-Bass.

Rathje, W.L., W.W. Hughes, D.C. Wilson, M.K. Tani, G.H. Archer, R.G. Hunt, and T.W. Jones. 1992. The archaeology of contemporary landfills. *American Antiquity* 57: 437–447.

Rathje, W.L., M. Shanks, and C. Witmore, eds. 2012. *Archaeology in the making: conversations through a discipline*. London: Routledge.

Reid, J.J., M.B. Schiffer, and W.L. Rathje. 1975. Behavioral archaeology: four strategies. *American Anthropologist* 77: 864–869.

Recent Advances in the Archaeology of the Southern Proto-Jê People

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State of Knowledge and Current Debates

Introduction

The archaeology of southern proto-Jê groups dates back to c. 2220 cal year BP and extends to the beginning of the nineteenth century. It is mainly characterized by its diagnostic small ceramics with thin walls, the construction of earthworks (including pit houses and elaborated mound and enclosure complexes) in the highlands, plus collective burials in caves, and rock art (e.g., Schmitz et al. 1988; Beber 2005; Noelli 2005; Araújo 2007; De Masi 2009; Iriarte et al. 2008; Riris and Corteletti 2015). Recent works by archaeologists, anthropologists, and historians are emphasizing the historical continuity between the Taquara/Itararé Tradition (term used to refer to this archaeological tradition, cf. Beber 2005) and the southern Jê historic groups. We also use the prefix "proto" to encompass all the ancestors of modern southern Jê people in this tradition, including the former speakers of the extinct southern Jê languages (cf. Jolkesky 2010). Beyond the general label of southern proto-Jê and its shared material culture, there is increasing recognition that this broadly defined tradition spreads over a vast and diverse ecological area, encompassing a remarkable range of local variability in social and ritual organization (Fig. 1).

Archaeological projects during the last two decades have begun to reveal some general chronological trends in the development of the southern proto-Jê people. As shown in Fig. 2, the available radiocarbon dates indicate that Taquara/Itararé sites began to spread in the second millennium before the present, becoming more common around 1500 cal year BP and peaking after around 1000 cal year BP. Around 1000 cal year BP, we also see the appearance of mound and enclosure complexes and oversized pit houses (Copé 2006; Corteletti 2012; Iriarte et al. 2008; Schmitz et al. 2013a); significantly, this appearance coincides with the expansion of *Araucaria angustifolia* (Paraná pine) forest, as evidenced by pollen records along the southern Brazilian highlands (Iriarte and Behling 2007; Gessert et al. 2011).

The Southern Proto-Jê Emergent Social Complexity

Recent advances in the archaeology of southern proto-Jê people are the result of reanalyses of old data combined with the intense production of new data for the region. This work is showing that the southern Brazilian highlands were a highly structured landscape revolving around funerary/ceremonial mound and causewayed enclosure complexes, usually located on hilltops or ridges commanding wide views. Although the southern proto-Jê groups were established in the highlands for 2000 years, it was only in the latter half of this period that they started building mound and enclosure complexes as a novel form of funerary architecture (de Souza et al. 2016a). Locally called *danceiros* (dance grounds) in Brazil, these monuments are characterized by circular, elliptical, rectangular, and keyhole-shaped earthworks whose rims are 30–80 cm tall, 3–6 m wide, and 20–180 m in diameter. They may exhibit or lack mounds and associated ringlets. Mounds are generally circular but can be rectangular platforms (De Masi 2009); isolated large flat top platforms have been documented around São José do Cerrito (Schmitz et al. 2013a), Lages, and Campo Belo do Sul localities (Corteletti et al. 2016) (Figs. 3 and 4).

One of the most interesting aspects of the research on southern proto-Jê mound and enclosure complexes is that they reveal a clear connection between the archaeological record and ethnography. In fact, the southern Brazilian

Recent Advances in the Archaeology of the Southern Proto-Jê People, Fig. 1 Southern proto-Jê territory on Paraná River basin. (By Jonas Gregório de Souza, 2016)

highlands is one of the few regions in the world where mortuary rituals associated with mound-building are recorded in the European accounts of the seventeenth to nineteenth centuries. The southern Jê groups were subsequently investigated by ethnographers during the twentieth and early twenty-first centuries (Becker 1976, 1999; Crépeau 1994; Veiga 2006, as examples of syntheses). These groups exhibit dual social organization characterized by exogamic, patrilineal moieties. In the case of the Kaingang, the moieties are complementary but also asymmetrical; the archaeological and ethnohistoric records suggest the presence of sizeable, regionally organized, hierarchical societies (e.g., Crépeau 1994; Fernandes 2000). Importantly, funerary and post-funerary rituals are reported to be their single most important ceremony, when the entire group gathered together showing their dual organization. These events included the burial of important chiefs, secondary burials, the inheritance of the chiefly office by the eldest son of the deceased chief, initiation rites, name-giving ceremonies, performance and re-creation of the cosmogony myth, and feasting (Silva 2001; Veiga 2006).

In some regions mound and enclosure complexes occur together in groups. Their distribution in the landscape indicates that they are located on the top of prominent hills that today exhibit wide viewsheds (Iriarte et al. 2013). However, this is not always the case; these funerary structures can also be found in lower positions in the landscape, such as in the Urubici region (Corteletti 2012). As for the function of each category size of earthwork, Saldanha (2008) interpreted the small mound and enclosure complexes as likely village

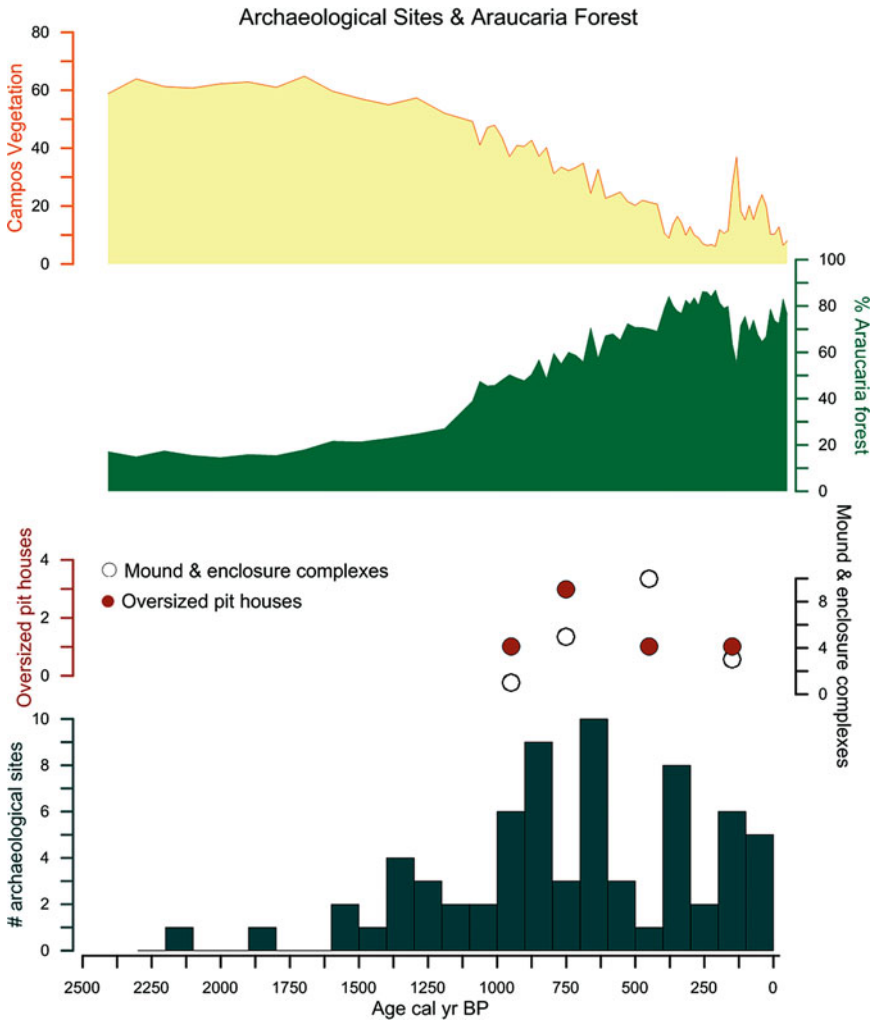

Recent Advances in the Archaeology of the Southern Proto-Jê People, Fig. 2 Relation between vegetation history and culture history. (Source: Iriarte et al. 2017)

cemeteries. De Souza and Copé (2011) interpret small paired mound and enclosure complexes as low-level integrative facilities built and visited by the inhabitants of nearby pit house villages. At these sites, the village inhabitants undertook the interment of secondary inhumations and participated in collective funerary rites, reinforcing community ties. By contrast, large mound and enclosure complexes are interpreted as high-level social interaction facilities, whose construction involved the mobilization of labor from different communities dispersed across the region. More recently, Iriarte et al. (2013), drawing on the complementary asymmetry of historic Kaingang moieties, have suggested that the ritual separation of space in southern proto-Jê small paired funerary structures, characterized by a larger mound and enclosure complex on the west side, may be representing this dual ranked opposition.

The excavation of such burial mounds and the analysis of the cremated human remains within them has also begun to reveal a diversity of funerary practices, including the cremation and burial of single or multiple individuals within pyres with the subsequent redeposition of cremated bone (Müller and Mendonça de Souza 2011; Ulguim

Recent Advances in the Archaeology of the Southern Proto-Jê People, Fig. 3 Excavation in progress at Abreu and Garcia mound and enclosure complexes, Campo Belo do Sul, Santa Catarina, and the wide landscape view. (Picture: Rafael Corteletti 2014)

Recent Advances in the Archaeology of the Southern Proto-Jê People, Fig. 4 Passo Fundo 1 flat top platform, Lages, Santa Catarina (Picture: Rafael Corteletti 2011)

2015). Remnants of funerary pyres containing burned bones have been found at the base of the mounds (De Masi 2009; De Souza and Copé 2011; Müller and Mendonça de Souza 2011). Redeposition of burned bone in "cremated deposits" is also common, both in small pits and on mound floors (Thompson and Ulguim 2016). Sometimes these practices are present within the same mound. In addition, patches of burnt earth with a few charcoal fragments have been identified at mounds, suggesting that these could be the pyre-bases and ash-beds of pyres where all the burned bone has been gleaned and redeposited at another mound (De Masi 2009; Iriarte et al. 2013). Finds of small ceramic cups are characteristically associated with the interments and possibly indicate food offerings. Despite the fragmented nature of the burned bones recovered in the excavations, aging evidence from the unfused distal tibial epiphysis indicates a probable subadult of 14–20 years old at the burial cut feature of RS-PE-29. At the SC-AG-108 site, evidence for dental eruption indicates an age of greater than 21 years (Ulguim 2015). The types of fractures on the bones suggest that bodies were cremated with soft tissues and that fire temperatures may have exceeded 650 °C (Müller and Mendonça de Souza 2011).

In summary, this monumental funerary architecture may be the best example of how new traditions may have been born out as a result of the multiethnic interactions that took place during the late Holocene. By synthesizing the dates and locations of all known mound and enclosure complexes in the highlands, De Souza et al. (2016a) have proposed that they emerged in a period when the Guarani groups started to advance up toward the highlands and that they only proliferated in areas where the local groups did not interact with the outsiders. De Souza et al. (2016a) argue that the construction of chiefly burial mounds represented a form of smart advertising to keep outsiders out; they were a key element in the regional integration of the southern proto-Jê groups, undertaken in order to resist the Guarani migrants. The mound and enclosure complexes from the first half of the second millennium AD, and the circumstances in which they arose, are very different from the ones reported during the seventeenth to twentieth centuries. However, there appear to be many subjacent structures associated with the asymmetrical dual organization of Jê societies and with the spatial segregation of ritual space and the alignment of burial mound and enclosures that endure during historic times (Iriarte et al. 2013).

Community patterns are also beginning to play an important role in understanding the nature of settlement patterns in the region. In the southern Brazilian highlands, pit house villages of the southern proto-Jê groups are beginning to be seen in a new light. Recently, detailed topographical mapping, tailored to reveal community patterns, has brought dividends in terms of the reinterpretation of these sites (see Iriarte et al. 2013 for details). The settlements themselves could also be defined by artificial low terraces on their downhill slopes (Fig. 5). Similarly, as new

Recent Advances in the Archaeology of the Southern Proto-Jê People, Fig. 5 The oversized pit House 1 at Baggio 1 site, Campo Belo do Sul, Santa Catarina. (Picture: Rafael Corteletti 2015)

large pit house villages are beginning to be mapped in their entirety, new spatial patterns are becoming apparent. For example, at the São José do Cerrito locality, site SC-CL-70/71 exhibits 107 pit houses in two groups of 39 and 68 subterranean structures. The larger group of houses is organized in discrete clusters and accompanied by a cluster of ten mounds. In particular, small clusters of houses have a linear, U-shape or semicircular layout and in one case surround a large mound (Schmitz et al. 2013b). In the Urubici region, Corteletti (2012) mapped cluster of sites approximately 5 km distant from each other along the Canoas river valley suggesting community patterns of the landscape use. These sets of sites include pit house villages, surface sites, mounds and enclosures complexes, rock-shelters with burials, and rock art sites suggesting each cluster may represent a different community (Fig. 6).

As well as these villages with a large number of pit houses and well-planned arrangements, the oversized pit houses are worthy of notice. These structures have diameters of up to 20 m and, in one case, over 25 m and depths that may reach 7 m (Copé 2006; Reis 2007; Schmitz et al. 2010, 2013a). Although they may be isolated, oversized pit houses may also form part of clusters where they are surrounded by smaller pits; they are often accompanied by large mounds (Schmitz et al. 1988; Copé 2006; De Souza et al. 2016b). It is not yet clear whether these structures represent habitations of extended families, high-status individuals, or communal facilities similar to men's

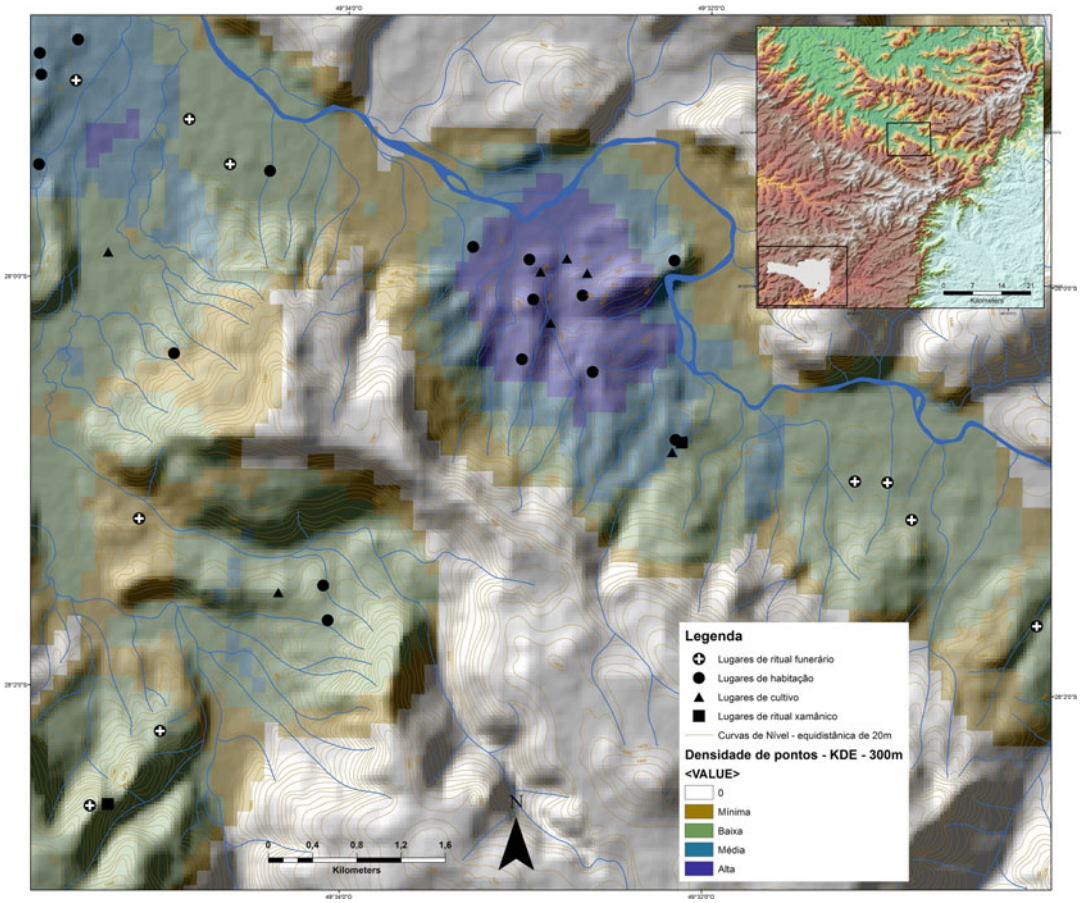

Recent Advances in the Archaeology of the Southern Proto-Jê People, Fig. 6 Kernel density map of one cluster of sites placed at upper Canoas valley, Urubici, Santa Catarina. (Source: Adapted from Corteletti 2012)

houses and *kivas*. Some appear to have been regularly kept clean, with high densities of ceramics deposited in adjacent midden refuse areas outside the house (Schmitz et al. 2002), whereas others revealed semicircles of hearths and associated activity areas around the center, suggestive of many nuclear families or different groups in a gathering place (Copé 2006). What is certain is that the large scale of these structures and the labor organization and effort necessary for their construction marks them apart from the other domestic sites. For example, De Souza et al. (2016b) conducted a program of comprehensive AMS radiocarbon dating and Bayesian modelling at the deeply stratified oversized pit House 1, at Baggio I site (cal. AD 1395–1650), in Campo Belo do Sul. The stratigraphy revealed a sequence of 12 well-preserved floors, including 5 completely burnt collapsed roofs, evidencing a major change in occupation dynamics (Fig. 7). The results of the radiocarbon dating allowed for an understanding of the occupation dynamics of an oversized pit house, demonstrating it was occupied for over two centuries with no evidence of major periods of abandonment. In addition, the House 1 sequence allowed transformations in ceramic style and lithic technology to be tied in to an absolute chronology, providing new evidence that the emergence of oversized domestic structures is a relatively recent phenomenon among the southern proto-Jê. As monumental pit houses started to be built, small pit houses continued to be inhabited, evidencing emerging disparities in domestic architecture after AD 1000.

In addition, the application of microfossil botanical techniques is changing our view of the diet of these groups and illuminating particular aspects of ritual behavior carried out in mound and enclosure complexes. For example, recent combined phytolith and starch grains residue analysis on ceramic fragments from the Bonin site in Urubici has documented for the first time the consumption of manioc (*Manihot esculenta* Crantz), beans (*Phaseolus* sp.), and possibly yams (cf. *Dioscorea* sp.), in addition to maize (*Zea mays* L.) and squash (*Cucurbita* sp.) (Corteletti et al. 2015). These results confirm that southern proto-Jê subsistence was based on a variety of plant foods and that the people were practicing food production from at least the thirteenth century. These data confirm the paleoecological records and allow us to suggest a new model of mobility, in which food production may have allowed populations to settle in the southern Brazilian highland plateau year-round (see Corteletti et al. 2015 for details).

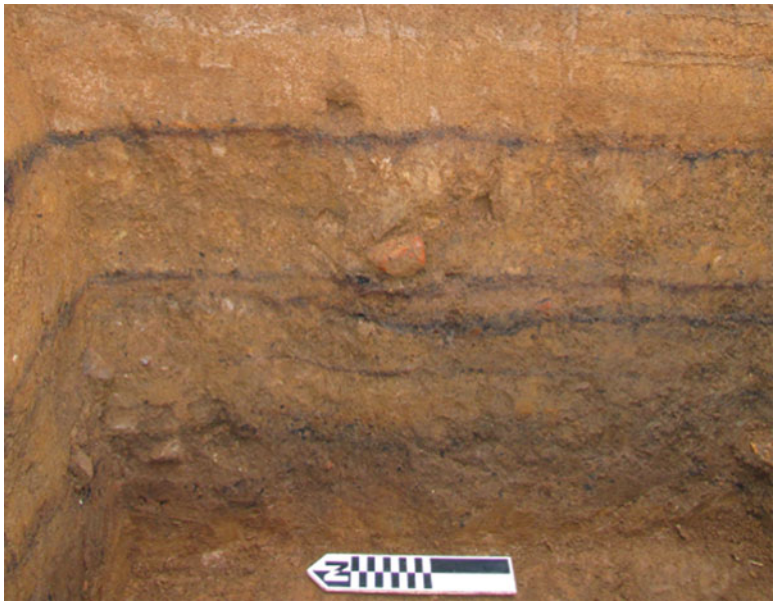

Recent Advances in the Archaeology of the Southern Proto-Jê People,
Fig. 7 Stratigraphical sequence of burnet floors at House 1 in Baggio 1 Site, Campo Belo do Sul, Santa Catarina. (Source: De Souza et al. 2016b)

The Southern Proto-Jê Built Landscape

Archaeologists and paleoecologists are investigating the different roles played by climate and humans in the changing landscapes of the late Holocene in the region, as evidenced by pollen and charcoal records (Bitencourt and Krauspenhar 2006; Iriarte and Behling 2007). The southern Brazilian highlands witnessed an increase in habitation sites around the turn of the first millennium AD, along with the arrival of mortuary/ceremonial architecture and oversize pit houses in the highlands and the development of patches of dark anthropogenic soils in the Atlantic rainforest escarpment. At the same time, Jê funerary patterns also began to appear along the coast (DeBlasis et al. 2014). Significantly, these cultural changes are broadly contemporaneous with the abrupt expansion of *Araucaria* forest, which according to some records (Behling et al. 2007) replaced high altitude grasslands within about 100 years. The rapidity and timing of this process raises the possibility of an anthropogenic cause (Bitencourt and Krauspenhar 2006; Iriarte and Behling 2007; Dos Reis et al. 2014). Previous paleoecological work has generally interpreted these abrupt changes as a response to increased precipitation (e.g., Behling et al. 2007). However, the human footprint in the expansion of the Paraná pine forest should be seriously considered. Paraná pine nuts were a major dietary staple of these pre-Columbian cultures; historically, regional chiefs had territorial control over Paraná pine forest patches, with collective feasts being held during the time of food abundance when the nuts were ripening. One can speculate that this abundant and reliable resource may underlie the increase in archaeological sites and may have been integral to the emergence of social complexity. It is therefore conceivable that the expansion of Paraná pine occurred not because of climate change but as a result of human activity promoting the expansion of this economically important food resource (Fig. 8).

However, it has not yet been possible properly to assess the relative influences of humans versus climate change in driving this *Araucaria* forest expansion, for the following reasons: (i) most vegetation reconstructions have insufficient chronological resolution; (ii) most cores have been retrieved from bogs/lakes far away from archaeological sites (Behling et al. 2007); and (iii) there are very few paleo-vegetation reconstructions. As a result, until now it has not been possible to determine the environmental characteristics of either the local or regional Jê settlements or their development, vis-a-vis the transformation and possible anthropization of the southern plateau environments. However,

Recent Advances in the Archaeology of the Southern Proto-Jê People, Fig. 8 *Araucaria* forest and the upper Canoas valley visibility from Urubici 20 pit house village, Urubici, Santa Catarina. (Picture: Rafael Corteletti 2010)

current archaeological and paleoecological research is being carried out to clarify all these patterns (Cárdenas et al. 2015; Corteletti et al. 2016). The potential manipulation of mixed *Araucaria* forest in the southern Brazilian highlands may not have been exclusively restricted to *Araucaria*; current studies are investigating the possible management of *goiabeira-serrana* (*Acca sellowiana*) (Santos et al. 2005), among other important economic plants and fruits, by integrating botany, genetics, and archaeology.

Final Considerations

In conclusion, the southern Brazilian highlands represent one of the most promising research areas in South America in which to investigate scenarios of social change concomitant with major transformations in the landscape. What is becoming increasingly clear is that the marked expansion of the resource-rich *Araucaria* forest at the turn of the second millennium AD was accompanied by novel social developments among the southern proto-Jê groups. The most evident of these is the rise of a new funerary tradition, represented by the mound and enclosure complexes, where a few cremated burials were likely commemorated with events of feasting. Parallel to that, we witness the emergence of aggregated well-planned villages, with evidence of a long duration of use and sometimes with notable disparities in pit house size. Some villages include centrally placed oversized pit houses, with diameters that may reach over 20 m, as well as mounded architecture. Management of the *Araucaria* forest, coupled with a more intense cultivation of domesticated plants, might have provided the basis for the mortuary feasting events at mound and enclosure complexes, as well as leading to increased population density and territoriality and the emergence of disparities in house size. These processes potentially relate to the foundations of political complexity among the southern proto-Jê groups and to the formation of the regionally organized, hierarchical societies documented in the southern Brazilian highlands during the historical period.

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Cremation in Archaeological Contexts
- ▶ Earthworks of the Amazon
- ▶ Geometric Earthworks of Western Amazonia
- ▶ Landscape Archaeology
- ▶ Sambaquis Shell Mounds, Archaeology of
- ▶ The Earthen Mounds (*Cerritos*) of Southern Brazil and Uruguay
- ▶ Tupi-Guarani Archaeology in Brazil

References

Araújo, A.G.M. 2007. A tradição cerâmica Itararé-Taquara: características, área de ocorrência e algumas hipóteses sobre a expansão dos grupos Jê no sudeste do Brasil. *Revista de Arqueologia SAB* 20: 9–38.

Beber, M.V. 2005. O sistema do asentamento dos grupos ceramistas do planalto sul-brasilero: o caso da Tradição Taquara/Itararé. *Documentos* 10: 5–125.

Becker, I.I. 1976. *O Indio Kaingang no Rio Grande do Sul*. São Leopoldo: Ed. UNISINOS.

Becker, I.I. 1999. *O Indio Kaingáng do Paraná: subsídios para uma etno-história*. São Leopoldo: Ed. UNISINOS.

Behling, H., V.D. Pillar, S.C. Müller, and G.E. Overbeck. 2007. Late-Holocene fire history in a forest-grassland mosaic in southern Brasil: Implications for conservation. *Applied Vegetation Science* 10: 81–90.

Bitencourt, A.L.V., and P.M. Krauspenhar. 2006. Possible prehistoric anthropogenic effect on *Araucaria angustifolia* (Bert.) O. Kuntze expansion during the Late Holocene. *Revista Brasileira de Paleontologia* 9: 109–116.

Cárdenas, M.L., R. Corteletti, M. Robinson, P.F. Ulguim, J.G. De Souza, J. Iriarte, F. Mayle, D.S.E. Farias, and P. De Blasis. 2015. Integrating archaeology and palaeoecology to understand Jê landscapes in southern Brazil. *Antiquity (Cambridge)* 89: 4.

Copé, S. M. 2006. Les Grands Constructeurs Précoloniaux du Sud Brésil: Etude de Paysages Archéologiques a Bom Jesus, Rio Grande do Sul, Brésil. Unpublished Ph.D. dissertation, Paris I Panthéon-Sorbonne University.

Corteletti, R. 2012. Projeto Arqueológico Alto Canoas – Paraca: Um Estudo da Presença Jê no Planalto Catarinense. Unpublished Ph.D. dissertation, University of São Paulo.

Corteletti, R., R. Dickau, P. De Blasis, and J. Iriarte. 2015. Revisiting the economy and mobility of southern proto-Jê (Taquara-Itararé) groups in the southern Brazilian highlands: Starch grain and phytoliths analyses from

R

the Bonin site, Urubici, Brazil. *Journal of Archaeological Science* 58: 46–61.

Corteletti, R., De Blasis, P., De Souza, J. G., Robinson, M., Fradley, M., Iriarte, J., Cárdenas, M.L., Mayle, F., and D.S. Farias 2016. News From the Field ou Como um Projeto Internacional começa a sair do papel. *Revista do Museu de Arqueologia e Etnologia USP* 27.

Crépeau, R. 1994. Mythe et rituel chez les indiens Kaingang du Bresil meridional. *Religiologiques* 10: 143–157.

De Blasis, P., D.S. Farias, and A. Kneip. 2014. Velhas tradições e gente nova no pedaço: perspectivas longevas de arquitetura funerária na paisagem do litoral sul catarinense. *Revista do Museu de Arqueologia e Etnologia USP* 24: 109–136.

De Masi, M.A. 2009. Centros cerimoniais do planalto meridional: uma análise intra-sítio. *Revista de Arqueologia SAB* 22: 99–113.

De Souza, J.G., and S. Copé. 2011. Novas perspectivas sobre a arquitetura ritual do planalto meridional brasileiro: pesquisas recentes em Pinhal da Serra, RS. *Revista de Arquelogia SAB* 23: 104–117.

De Souza, J.G., R. Corteletti, M. Robinson, and J. Iriarte. 2016a. The genesis of monuments: Resisting outsiders in the contested landscapes of southern Brazil. *Journal of Anthropological Archaeology* 41: 196–212.

De Souza, J.G., M. Robinson, R. Corteletti, M.L. Cárdenas, S. Wolf, J. Iriarte, F. Mayle, and P. De Blasis. 2016b. Understanding the chronology and occupation dynamics of oversized pit houses in the southern Brazilian highlands. *PLoS One* 11 (7): e0158127.

Dos Reis, M.S., A. Ladio, and N. Peroni. 2014. Landscapes with *Araucaria* in South America: Evidence for a cultural dimension. *Ecology and Society* 19 (2): 43.

Fernandes, R.C. 2000. Uma contribução da antropologia política para a análise do faccionalismo Kaingang. In *Uri e Wãxi: Estudos Interdisciplinares dos Kaingang*, ed. L.T. Motta et al., 85–143. Londrina: UEL.

Gessert, S., J. Iriarte, R.C. Ríos, and H. Behling. 2011. Late Holocene vegetation and environmental dynamics of the *Araucaria* forest region in Misiones Province, NE Argentina. *Review of Palaeobotany and Palynology* 166: 29–37.

Iriarte, J., and H. Behling. 2007. The expansion of *Araucaria* forest in the southern Brazilian highlands during the last 4000 years and its implications for the development of the Taquara/Itararé tradition. *Environmental Archaeology* 12: 115–127.

Iriarte, J., Corteletti, R., de Souza, G., and P. De Blasis 2017. Emergent complexity, changing landscapes and spheres of interaction in the Rio de la Plata Basin during the mid and late Holocene. *Journal of Archaeological Research*. (25): 251.

Iriarte, J., J.C. Gillam, and O. Marozzi. 2008. Monumental burials and memorial feasting: An example from the southern Brazilian highlands. *Antiquity* 82: 947–961.

Iriarte, J., S. Copé, M. Fradley, J.J. Lockhart, and J.C. Gillam. 2013. Sacred landscapes of the southern Brazilian highlands: Understanding southern proto-Jê mound and enclosure complexes. *Journal of Anthropological Archaeology* 32: 74–96.

Jolkesky, M. P. 2010. Reconstrução Fonológica e Lexical do Proto-Jê Meridional. Unpublished Ph.D. dissertation, University of Campinas.

Müller, L.M., and S. Mendonça de Souza. 2011. Cremações e sepultamentos: as estruturas anelares do planalto. In *Antes do Oeste Catarinense: Arqueologia dos Povos Indígenas*, ed. M. Carbonera and P.I. Schmitz, 269–305. Chapecó: Argos.

Noelli, F.S. 2005. Rethinking stereotypes and the history of research on Jê populations in South Brazil: An interdisciplinary point of view. In *Global archaeological theory. Contextual voices and contemporary thoughts*, ed. P. Funari, A. Zarankin, and E. Stovel, 167–190. New York: Springer.

Reis, M.J. 2007. *A problemática arqueológica das estruturas subterrâneas no Planalto Catarinense*. Erechim: Editora Habilis.

Riris, P., and R. Corteletti. 2015. A new record of pre-Columbian engravings in Urubici (SC), Brazil using polynomial texture mapping. *Internet Archaeology* 38.

Saldanha, J.D.M. 2008. Paisagens e sepultamentos nas terras altas do sul do Brasil. *Revista de Arqueologia SAB* 21: 85–95.

Santos, K., N. Steiner, J. Ducroquet, M. Guerra, and R. Nodari. 2005. Domesticação da goiabeira-serrana (*Acca sellowiana*) no sul do Brasil. *Agrociencia* 9: 29–33.

Schmitz, P.I., Í.I.B. Becker, F. La Salvia, D. Lazzarotto, and P.A.M. Ribeiro. 1988. Pesquisas sobre a tradição Taquara no nordeste do Rio Grande do Sul. *Documentos* 2: 5–74.

Schmitz, P.I., J.H. Rogge, A. Rosa, M.V. Beber, J. Mauhs, and F.V. Arnt. 2002. O Projeto Vacaria: Casas subterrâneas no planalto Rio-Grandense. *Pesquisas: Antropologia* 58: 11–105.

Schmitz, P.I., F.V. Arnt, M.V. Beber, A. Rosa, and D.S. Farias. 2010. Casas subterrâneas no planalto de Santa Catarina: São José do Cerrito. *Pesquisas: Antropologia* 68: 7–78.

Schmitz, P.I., J.H. Rogge, R.V. Novasco, N.M. Mergen, and S. Ferraso. 2013a. Boa Parada: um lugar de casas subterrâneas, aterros-plataforma e danceiro. *Pesquisas: Antropologia* 70: 133–195.

Schmitz, P.I., J.H. Rogge, R.V. Novasco, N.M. Mergen, and S. Ferraso. 2013b. Rincão dos Albinos: um grande sítio Jê meridional. *Pesquisas: Antropologia* 70: 65–131.

Silva, S.B. 2001. Etnoarqueologia dos grafismos Kaingang. Unpublished Ph.D. dissertation, University of São Paulo.

Thompson, T.J.U., and P.F. Ulguim. 2016. Burned human remains. In *Handbook of forensic anthropology and archaeology*, ed. S. Blau and D.H. Ubelaker, 2nd ed. Walnut Creek: Left Coast Press.

Ulguim, P.F. 2015. Analysing cremated human remains from the southern Brazilian highlands: Interpreting archaeological evidence of funerary practice at mound and enclosure complexes in the Pelotas River valley. In *The archaeology of cremation: Burned human remains inf funerary studies*, ed. T. Thompson, 173–212. Oxford: Oxbow Books.

Veiga, J. 2006. *Aspectos Fundamentais da Cultura Kaingang*. Campinas: Editora Curt Nimuendajú.

Recording in Archaeology

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Introduction and Definition

Archaeological field work is a scientific process that relies on recorded observations and measurement. It is accepted that the archaeological record is not an exhaustive rendering of the site, even though it may represent much of what is left of it. However, every anomaly recognized in the field must be given a location and a description, since without these no analyses or interpretations are possible. Comprehensive recording has become the guiding principle of archaeological survey and excavation, especially where a site is to be destroyed, since the record has to stand as a proxy for the site itself.

A multitude of factors, including the circumstances of deposition (intentional and unintentional in the past), site formation processes and postdepositional activity, terrain and types of remains, and the techniques available, determine what is or could be recorded. We can only record what we know how to detect, something that is in constant evolution, with new research alerting us to fruitful avenues of enquiry. A relatively recent example is the recording of significant chemical traces in floor areas, even though we cannot "see" them (see Carver 2011: 49–56 for an introduction to some of these techniques).

Key Issues, Current Debates, Future Directions, Examples

Recorders strive to strike a balance between measured and intuitive observation, as may be seen in the growing literature on archaeological practice, for example, the essays on practices from the seventeenth to the twentieth century in northwestern Europe (Wolfhechel Jensen 2012), or the discussion by Lucas (2012: 18–73) of philosophies of recording, including different stances on "total" or "selective" recording exemplified by Pitt Rivers and Petrie in later nineteenth- and early twentieth-century Britain and Egypt (Pitt Rivers 1887 cited in Lucas 2012: 45–51). General Pitt Rivers insisted that "every detail should [. . .] be recorded in the manner most conducive to facility of reference" (Pitt Rivers 1887 cited in Lucas 2012: 45), but he was by no means the only one or the first to adopt this stance. Modern archaeological historiography is writing a more varied and less linear account of field experience and precept, for example, the very detailed instructions in 1836–1837 for excavations of barrows in Mecklenburg (Germany) by Friedrich Lisch (Eberhardt in Wolfhechel Jensen 2012: 154–6). Similarly, the emergence of open area excavation has been claimed by many different traditions (Germany and Britain in the 1930s; Denmark in the 1930s; Soviet settlement archaeology in the 1920s–1940s influencing Leroi Gourhan's *grands décapages* of the 1960s).

Recent decades have seen growing criticism of the position that recording can be wholly objective. Reynolds and Barber (1984: 97) noted that "the emphasis on recording technique has been [. . .] an attempt to convert the whole site, lock, stock and barrel, into a physical record. In effect, this too often means that observation (an essentially active process) gives place to passive mechanical recording." For Hodder "The key point is that excavation method, data collection and data recording all depend on interpretation. Interpretation occurs at the trowel's edge" (1997: 693). Lucas's concept that the archaeological record is an *act of translation* (2012: 237–8) is helpful: translating the physical reality of what is

in the ground, transferring it into another medium, giving it meaning, and accepting that interpretation is part of the equation. If recording is translation, then the tension between subjectivity and objectivity becomes a positive force.

Recording in Four Acts

So, records must be made, but which records? Introductions to archaeology and textbooks on archaeological practice give primacy to written, drawn, and photographic records (physical or digital) and the definition and recording of sampled materials, and there is much agreement on procedures. A useful way of thinking about the archaeological record – rather than structure it into written, drawn, and photographic records – is to divide it into four *purposes*: recording *location* (position, geometry, distribution), recording the properties of *elements that are observed but not kept* (strata, stratigraphy), recording *elements that are kept* ("finds" including biota, samples), and *monitoring* (recording what has been recorded, how, and why). The summary that follows will be limited to reflections drawn from experience and from literature dealing with archaeological practice, especially on excavation (e.g., Roskams 2001; Carver 2009; Tassie and Owens 2010). Surface and subsurface surveys make use of some of these procedures (e.g., to record location), although they have their own strategies (e.g., for levels of coverage) and dedicated protocols and software not detailed further here.

Location

The principle of locating a point on the ground is to position it on a horizontal *grid* using an easting and northing (x and y coordinates) and to measure its height above a datum point, for example, sea level (z coordinate). The three-dimensional Cartesian coordinates (x, y, z) give a unique *map reference* relative to the rest of the known world. This can be measured with tapes and compass, with a square and level, with a Total Station Theodolite (TST), or with a Global Positioning System (GPS), depending on the resources available and the accuracy required (TST being the most desirable but fairly expensive) (Tassie and Owens 2010: Chapters 2 and 6). The speed and accuracy of electronic measurement can lead to a more mechanistic and paradoxically more interpretative way of recording site geometry, such as deciding where the outline of a layer lies and just plotting points along it rather than drawing detailed surface plans with planning frames (of course combinations of methods can be used or supplemented, e.g., by photography). Location records produce *maps* (showing sites and areas), *plans* (showing individual contexts, features, and structures), *plots* (showing the distribution of objects) and *sections* (vertical record of deposits). Maps, plans, and plots may be generated digitally on site using basic computer graphics programs.

Recording What Is Not Kept

Let us take a flint tool (an *artifact*) found in a layer (a *context* or stratigraphic unit). The artifact will be kept (see below), but it lies in soil (the context) that will be discarded or sampled, and has a physical, spatial, and stratigraphic relationship that can only be recorded on a unique occasion (when it is lifted) in written, drawn, and photographic form. Not surprisingly the burden of recording what cannot be kept lies heaviest on the recorder and has generated the most print on how to do it, such as Harris' principles of archaeological stratigraphy (whose application is explained in Roskams 2001: Chapters 9 and 11–13); how to record individual stratigraphic units (e.g., in the Museum of London Archaeology Service [MoLAS] (1994) manual and in countless textbooks); or how to capture graphic and photographic data in many ingenious ways (e.g., *Antiquity*'s online Project Gallery, http://php.york.ac.uk/org/antiquity/projgall.php, has published in 2011–2012 papers on real-time 3D field recording in southern Jordan, or photogrammetry for recording archaeological structures on the Upper Tigris).

The development of the definition of basic stratigraphic units (contexts) has been widespread and parallel; it is attributed, for example, to Britain in the 1970s, Sweden in the 1960s (Ambrosiani in Wolfhechel Jensen 2012: 312), or Poland in the 1940s. In excavation, the *context* is the deposit of material that we define as being different from another, in terms of composition, shape, and

stratigraphic position. A context does not have to be a layer of soil only, it can be the stones making up a wall (its mortar would be another context). Contexts are not givens (*data*), they are entities that we define (*capta* as they have been called), and therefore, we can also assign a context number to an *arbitrary layer* (or spit). Since contexts are defined, it follows that a cut into the soil (for a feature like a pit) can also be a context (it differs in shape and stratigraphic position from other contexts). *Single-context recording* (see Roskams 2001) focuses on these entities, without features and structures recorded in additional forms (see below).

As well as its location and shape, a context record includes a description of its material: something that has become standardized in the interests of analytical potential. Lucas (2012: 87) gives a typical example: "compact mid greyish brown sandy silt with occasional inclusions of fine charcoal (2%, <5 mm) and subangular gravel (1%, <10 mm) [etc.]" and laments the fact that the interpretation of this piece of soil is a laconic "pit fill." Indeed too much attention appears to be paid to the composition of strata and the geometry of the feature and too little to the human agency behind it (the "pitness" of a pit). It also seems that much of this descriptive detail has little analytical purpose, except perhaps analyses of the presence/absence of charcoal or of Munsell soil colors. This is not to say that we should stop recording context composition, but should look for more analytical outcomes, to match the discoveries of microstratigraphy and micromorphology (Carver 2011: Chapters 2) (Fig. 1).

The need for higher-level interpretations made on site, such as the recognition and study of a pit, a hearth, or a wall, has been met by the formal definition of groups of associated contexts, known in Britain and the USA as *features*. The nature of the feature (also confusingly called master context, locus, structure, group, set, complex, *Befundkomplex*, or *fait*) is well established and a helpful definition is given by Py (1997: 30): "if the context is the atom, the feature is the molecule." Examples of forms devised to record features are given in Carver (2009) and Pavel (2010), the latter a valuable collection and commentary of 60 different systems (all illustrated) used for recording on excavations in Europe, America, and the Near East. By the same token, sets of associated features may merit a site record at an even higher level of interpretation in the form of a *structure*, for example, a building formed by a regular pattern of postholes (Carver 2009: 138–46).

Recording What Is Kept

That artifacts and ecofacts are recorded and kept seems self-evident, but when we consider how

Recording in Archaeology, Fig. 1 Recorder at work, showing context record sheets (*right*), feature record sheet (under the tape), drawing (on the knee), and Munsell color chart (*center*) (M. Carver)

small and even "invisible" these can be, it becomes apparent that choices are being made and what is recovered is only a sample of the whole. At one extreme, on sites with huge amounts of pottery (e.g., at Lattes in southern France), it may be that we record the presence of body sherds of dolia with reference to a typological scheme, but do not keep them all. At the other end of the scale, minute fungal spores would only be found if we took samples of soils in which they survived. In general the trend has been to increase the amount that is recorded, because our perceptions of what is important have changed: excavators of the La Tène inhumations at Münsingen-Rain in Switzerland in the early 1900s kept only the skulls. By contrast the advent of routine sieving and flotation in the later twentieth century has vastly increased our knowledge of the environment and economy through the recovery of fish and small mammal bones or insect and vegetable matter. It follows that a consistent sampling strategy with an analytical purpose is needed. Indeed it would be futile and unmanageable to take 10-l bulk samples of every context just in case there was something there. We need to set out the degree of sampling, processing, analysis, and storage that is intended: for example, what percentage of what type of deposit is dry or wet sieved, put through flotation, or taken for specific purposes. Helpful tables of such purposes can be found in Carver (2009: Chapters 8 and 9) and in Tassie and Owens (2010: Chapter 4, Tables 4 and 9–14). It goes without saying that consistency is important, as it would be pointless to compare in analysis deposits that were similar (e.g., fills of storage pits) but which were treated differently (e.g., some excavated summarily, others treated with full recording and comprehensibly sampled). Obvious as this is, this need for consistency has implications for the recovery levels (see below) deployed on excavations.

Monitoring

As important as recording the stuff on site is recording the recording: what was done, not done, decided, discussed, and interpreted. In short, monitoring, which also includes the metadata (the documentation generated to keep track of what has been recorded, such as numerous indexes). So, in addition to the proformae used on site, a *site notebook* is an essential tool, to record the day-to-day running of the site, evolving ideas, and changes in strategy, in short all the things that are not accommodated in standard forms but which inform the outcome of the excavation. That outcome is dependent on the decisions taken about how to treat different parts of the site; indeed we dig and record at different levels of intensity, for example, removing the topsoil by machine, shoveling rubble, or carefully excavating a skeleton. Most recording proformae have boxes to record the levels at which individual contexts and features have been excavated and recorded, but this can be done more efficiently by referring to a structured scheme, such as *recovery levels*. There are obvious advantages to adopting a recovery level structure – it formalizes procedure and promotes consistency but also allows flexibility. However, that very flexibility has its dangers: having a recovery level scheme should not give license to implement arbitrary "gear changes" (e.g., "we decided to treat this deposit at level B rather than level D because we were pushed for time"). It is therefore important to stick to the recovery levels, once a project design has been agreed, so that like can be compared with like in analysis.

The records generated inform analysis and publication but they also exist for future generations to interrogate. Therefore, they need to be deposited in permanent archives and made easy to consult. Archives typically contain not only the "raw" data and the metadata in physical and electronic form but also the documentation pertaining to the conduct of the project and its analysis up to publication. How this is achieved will vary from country to country, as will the form of storage, whether as a physical archive or electronically; examples of pioneering digital systems can be found for Lattes in France (Py 1997) and in Britain an early example of an integrated archive was presented by Powlesland in 1998 (articles in *Internet Archaeology* 5). Good advice on archives in general, derived from the British experience, will be found in Brown (2007).

Prospect

To sum up, archaeological recorders are objective, subjective, consistent, selective, accountable, and creative all at once. There is no universal prescription, but there is a consensus that location, stratigraphy, composition, monitoring, and archiving underpin recording systems. Whether devised or adopted ready-made (you can, e.g., download the MoLAS manual, or the recording forms from a CD in Tassie and Owens 2010), this is only the beginning: systems should not be set in stone; they can be adapted to suit new analytical purposes. In this way the sophisticated investigations of the future will be integrated with the basics recorded now. Stratigraphic units will become more exciting: the tedious and analytically underexploited "loosely compacted 7.5YR 6/4 silty sand with occasional subangular gravel" will become the container of much more information: perhaps about tethered cattle which stood there chewing the cud (from chemical residues in a context stratigraphically later than another, which was a secondary deposit derived from a midden containing protein residues from fish processing). To contribute to documenting a (purely hypothetical) change from hunter-fisher-gatherers to an economy based on domesticates is not a bad aim for the hard-pressed recorder struggling in the wind and rain.

Cross-References

- ▶ British Pioneers and Fieldwork Traditions
- ▶ Excavation Methods in Archaeology
- ▶ France: Field Method Origins
- ▶ Hillfort Investigations in the Czech Republic
- ▶ Inner Ionian Sea Archipelago: Archaeological Survey
- ▶ Klithi Site: Excavating a Rockshelter in Northwest Greece
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Polish Pioneers and Traditions
- ▶ Scandinavia: Field Methods
- ▶ Surface Survey: Method and Strategies
- ▶ Switzerland: Upper Paleolithic Living Floor Investigations
- ▶ Tells in Archaeology

References

Brown, D.H. 2007. *Archaeological archives: A guide to best practice in creation, compilation, transfer and curation*. London: Institute of Field Archaeologists.

Carver, M.O.H. 2009. *Archaeological investigation*. Abingdon/New York: Routledge.

Carver, M.O.H. 2011. *Making archaeology happen: Design versus dogma*. Walnut Creek: Left Coast Press.

Hodder, I. 1997. 'Always momentary, fluid and flexible': Towards a reflexive excavation methodology. *Antiquity* 71: 691–700.

Lucas, G. 2012. *Understanding the archaeological record*. Cambridge: Cambridge University Press.

Museum of London Archaeology Service (MoLAS). 1994. *Archaeological site manual*. 3rd ed. London: MoLAS. Available at http://www.museumoflondonarchaeology.org.uk/NR/rdonlyres/056B4AFD-AB5F-45AF-9097-5A53FFDC1F94/0/MoLASManual94.pdf.

Pavel, C. 2010. *Describing and interpreting the past: European and American approaches to the written record of the excavation*. Bucharest: Bucharest University Editions.

Py, M., ed. 1997. *SYSLAT 3.1. Système d'information archéologique: Manuel de référence*, Lattara. Vol. 10. Lattes: Association pour la recherche archéologique en Languedoc oriental.

Reynolds, N., and J. Barber. 1984. Analytical excavation. *Antiquity* 58: 95–102.

Roskams, S. 2001. *Excavation*. Cambridge: Cambridge University Press.

Tassie, G.J., and L.S. Owens. 2010. *Standards of archaeological excavation: A fieldguide*, Egyptian cultural heritage organisation monograph. Vol. 1. London: Golden House Publications.

Wolfhechel Jensen, O., ed. 2012. *Histories of archaeological practices: Reflections on methods, strategies and social organisation in past fieldwork*, Stockholm studies. Vol. 20. Stockholm: National Historical Museum.

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Red Sea: Maritime Archaeology

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Introduction

The Red Sea extends over 1,900 km in length and is one of the youngest seas on the planet (Fig. 1). Despite its arid and inhospitable desert coastline,

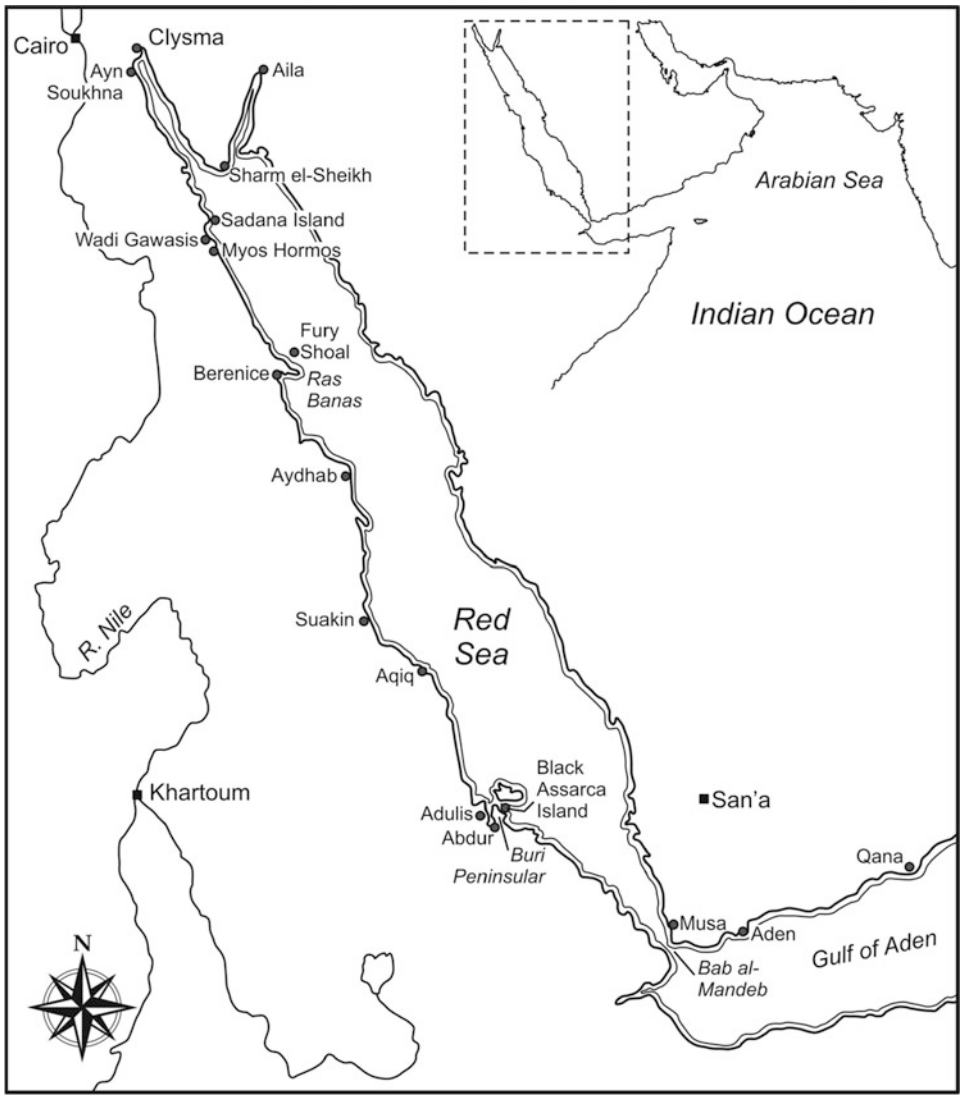

Red Sea: Maritime Archaeology, Fig. 1 Map of the Red Sea indicating the location of sites referred to in the text. (Produced by J. Whitewright)

it has been an important highway for maritime trade and shipping since antiquity. The Red Sea has a negligible tidal range (max. 90 cm) but is dominated by fierce and persistent NNW winds, particularly in the northern reaches (Whitewright 2007).

The earliest evidence of maritime activity in the region dates to the Middle Stone Age some 125,000 years ago, when early modern humans (*Homo sapiens*) first settled in the coast of the Buri Peninsula, modern Eritrea, fueling theories of Paleolithic maritime migrations out of Africa (Bailey and Flemming 2008).

In the Pharaonic era, tomb reliefs and texts reference maritime voyages that were conducted down the Red Sea to the mythical land of "Punt" (Kitchen 2009) to acquire frankincense and other exotic commodities. Finds dating to the Old, Middle, and New Kingdom excavated from storage galleries at the sites of Wadi Gawasis (Bard and Fattovich 2007: 135–163; Ward and Zazarro 2010) and Wadi el-Jarf (Tallet 2012) further to

the north extend knowledge of this trade and also reveal elements of ship's rigging and planking. A 280-m-long mole was also discovered at the site of Wadi el-Jarf, which together with the charred remains of Twelfth and Thirteenth Dynasty ship's timbers discovered at the site of Ayn Soukhna on the Gulf of Suez in the Sinai (El-Raziq et al. 2006; Tallet 2012) further enhances our understanding of the Red Sea harbor and ship construction of the period, essentially planks secured by double, unpegged, mortise-and-tenon fastenings with intermittent stitching.

Key Issues/Current Debates/Future Directions/Examples

Trade and Ports

From the Greco-Roman period, we have a wealth of evidence in the form of texts such as the mid-first-century CE *Periplus Maris Erythraei* (Casson 1989) that describe voyages within the Red Sea and beyond to the Indian Ocean. Key to the maritime expansion of Indo-Roman trade were ports. Ports facilitated an interface between land and sea and acted as a conduit for the transfer and storage of goods. It would be no exaggeration to suggest that the sister ports of Myos Hormos and Berenice were Rome's gateway to the East. Strabo (*Geography* 2.5.12; Jones 1917–1932) indicated that over 120 ships sailed annually from the port of Myos Hormos. Both ports have been identified and partially excavated and provide valuable insight into the nature of maritime trade (Casson 1989; Peacock and Blue 2006, 2011; Sidebotham and Wendrich 2007; Tomber 2008).

Excavations in the former lagoon at Quseir al-Qadim, ancient Myos Hormos, revealed part of a late first-century BCE to early third-century CE Roman waterfront consisting of an amphorae wharf or jetty sealed by a trampled earth surface (Peacock and Blue 2011: 35–42; Fig. 2), while at Berenice a series of large coral block seawalls or quays were identified around the edges of the settlement, dating to the first century CE with one example toward the east of the site, dating to the fifth century CE (Sidebotham and Wendrich 1996, 1999). Additional ports along the Red Sea coast critical to Indo-Roman trade include Clysma, Aila, Ptolemais Theron, Adulis, and Muza (Casson 1989; Peacock and Blue 2007: 135–140).

Ports also reveal evidence for the nature of the ships that sailed the Red Sea during the Roman

Red Sea: Maritime Archaeology, Fig. 2 Myos Hormos – view of the Roman harbor amphorae foundation of the jetty "hard" in the silted lagoon (Produced by the Quseir al-Qadim Southampton University project)

period, including wooden planks secured by mortise-and-tenon fastenings some with in situ pegs (treenails) (Sidebotham and Wendrich 1999: 316; Peacock and Blue 2011: 179–210). Rigging components, including brail rings and several fragments of sailcloth, have also been recovered, the general form of which is consistent with vessels operating in the Mediterranean Sea during this period, although some materials were sourced in India (Wild and Wild 2001; Whitewright 2007; Peacock and Blue 2011: 179–210). A graffito of a Mediterranean style ship was also found at Berenice reinforcing the idea that Mediterranean style ships plied the Red Sea during this period (Sidebotham and Wendrich 1996: 315–317).

Shipwrecks

Limited shipwreck finds of all periods have been discovered in the Red Sea which is believed to be primarily due to the warm deep waters and coral-line environment (Blue et al. 2012). A number of wrecks dating to the Roman era have been investigated that support the terrestrial port data and textual evidence relating to Indo-Roman trade and ship construction. The Roman ship, referred to as the Fury Shoals wreck, has no visible signs of hull remains but consists of a cargo of Dressel 2–4 type amphorae that date the wreck to the first century CE (Fig. 3; Blue et al. 2012). Likewise, the exposed and heavily concreted site at Abu Fendera, located to the south of Berenice, reveals the visible remains of at least five different amphorae types, three two-armed stock iron anchors, and other metal artifacts, including lead hull sheathing that protected the hull from marine borers. The wreck at Abu Fendera was clearly a merchant vessel, and the hull sheathing and iron anchors suggest that it was built in the Mediterranean tradition. The collective shipwreck assemblage indicates that it dates to no earlier than the end of the first century CE and not later than the mid-third century CE (Blue et al. 2012). From the late fourth and early seventh century CE, a wreck was partially excavated off the island of Black Assarca, Eritrea. No hull remains were recovered, but the amphorae cargo has strong parallels with those produced in Aqaba during this period (Tomber 2008: 92).

Red Sea: Maritime Archaeology, Fig. 3 View of the Roman shipwreck of Fury Shoals. (Produced by the Southampton University/British Museum Red Sea Shipwreck Project)

Medieval Seafaring

The Red Sea was equally important to medieval shipping as it was to Indo-Roman trade, transporting trade goods and importantly pilgrims on route to Mecca through ports such as Al-Quseir, Aydhab, Suakin, and Jeddah. Direct knowledge of ships of the Islamic era in the Red Sea is limited to sewn planks recovered in a secondary context from Quseir al-Qadim that date between the late twelfth and early fifteenth centuries CE (Fig. 4; Peacock and Blue 2011: 179–210). They are one of the few examples of the distinguishing feature of ancient Arab craft of the Indian Ocean and the Red Sea, generally agreed to be constructed with "the use of fiber, rather than nails, to sew the planks of hulls together" (Casson 1989: 141; Hourani 1995).

The primary Islamic era shipwreck to have been excavated is a large Ottoman period vessel from Sadana Island, Safaga. Dating to the second half of the eighteenth century, the ship is thought to have carried up to 900 ton of cargo. Over 3,500

Red Sea: Maritime Archaeology, Fig. 4 Sewn Medieval planks from Quseir al-Qadim. (Produced by the Quseir al-Qadim Southampton University project)

artifacts were recovered, about one third of which was Chinese porcelain. Despite the nature of the cargo, the excavators believe that the ship was a local vessel possibly Egyptian in origin. Little data on the hull construction has been published, although the vessel is secured with iron fittings rather than being sewn (Ward 2001). Recent discoveries off the Saudi Arabian coast at Umm Lajj by a joint Saudi-Italian team have discovered and commenced excavation of another eighteenth-century shipwreck (Zazarro and Loreto 2017).

Conclusion

This short entry has attempted to summarize what is known to date of the maritime archaeological record of the Red Sea. Unfortunately, the current archive does not constitute a reliable shipwreck database and has limited iconographic representations of boats, and the documentary evidence is restricted to comments from ancient travelers and sailor's guides (Casson 1989). As such, there is much more to be discovered about this critical sea that provided a link between the Indian Ocean and the Mediterranean and that supported maritime activities for thousands of years.

Cross-References

- ► Berenike, Archaeology of
- ► Indian Ocean: Maritime Archaeology
- ► Islamic and Maritime Archaeologies

References

Bailey, G.N., and N. Flemming. 2008. Archaeology of the continental shelf: marine resources, submerged landscapes and underwater archaeology. *Quaternary Science Reviews* 27 (23–24): 2153–2165.

Bard, K.A., and R. Fattovich, eds. 2007. *Harbor of the pharaohs to the land of punt: Archaeological investigations at Mersa/Wadi Gawasis Egypt 2001–2005*. Naples: Università Degli Studi di Napoli "L'Orientale".

Blue, L., J.D. Hill, and R. Thomas. 2012. New light on the nature of Indo-Roman trade: Roman period shipwrecks in the northern Red Sea. In *Navigated spaces, connected places. Proceedings of Red Sea Project V held at the University of Exeter September 2010*, BAR international series, ed. D.A. Agius, J. Cooper, A. Trakadas, and C. Zarraro, vol. 2346, 91–100. Oxford: Archaeopress.

Casson, L. 1989. *The periplus maris erythraei*. Princeton: Princeton University Press.

El-Raziq, M.A., G. Castel, and P. Tallet. 2006. Ayn Soukhna and la mer Rouge. *Egypte, Afrique and Orient* 41: 3–6.

Hourani, G.F. 1995. *Arab seafaring in the Indian Ocean*. Princeton: Princeton University.

Jones, H.L. (ed. and trans.) (1917–1932). *The geography of Strabo*, Loeb classical library series. Cambridge, MA/London, UK: Harvard University Press.

Kitchen, K. 2009. Ancient polities and interrelations along the Red Sea and its West & East hinterlands. In *Connected hinterlands: Proceedings of Red Sea Project IV held at the University of Southampton September 2008*, Society for Arabian studies monographs, BAR, ed. L. Blue, J. Cooper, R. Thomas, and J. Whitewright, vol. 2052, 3–8. Oxford: Archaeopress.

Peacock, D., and L. Blue, eds. 2006. *Myos Hormos – Quseir al-Qadim: Roman and Islamic ports on the Red Sea, volume 1: survey and excavations 1999–2003*. Oxford: Oxbow.

Peacock, D., and L. Blue, eds. 2007. *The ancient Red Sea port of Adulis, Eritrea*. Oxford: Oxbow.

Peacock, D., and L. Blue, eds. 2011. *Myos Hormos – Quseir al-Qadim: Roman and Islamic ports on the Red Sea, volume 2: the finds 1999–2003*, Southampton monograph series. Vol. 6. Oxford: Archaeopress.

Sidebotham, S.E., and W.Z. Wendrich, eds. 1996. *Berenike 1995. Report of the excavations at Berenike (Egyptian*

Red Sea coast) and the survey of the Egyptian Eastern Desert, African and Amerindian Studies (CNWS). Leiden: Research School of Asian.

Sidebotham, S.E., and W.Z. Wendrich, eds. 1999. *Berenike 1997. Report of the excavations at Berenike (Egyptian Red Sea coast) and the survey of the Egyptian Eastern Desert including excavations at Shenshef*, African and Amerindian Studies (CNWS). Leiden: Research School of Asian.

Sidebotham, S.E., and W.Z. Wendrich, eds. 2007. *Berenike 1999/2000 Report on the excavation*. Los Angeles: Costen Institute of Archaeology, University of California.

Tallet, P. 2012. Ayn Sukhna and Wadi el-Jarf: two newly discovered pharaonic harbours on the Suez Gulf. *British Museum Studies in Ancient Egypt and Sudan* 18: 147–168. http://honorfrostfoundation.org/wadi-el-jarf-archaeological-project-prof-pierre-tallet-2016/. Accessed 21 July 2018

Tomber, R. 2008. Indo-Roman trade: from pots to pepper. London: Duckworth Debates in Archaeology.

Ward, C., and C. Zazarro. 2010. Evidence for pharaonic seagoing ships at Mersa Wadi Gawasis Egypt. *International Journal of Nautical Archaeology* 39 (1): 27–43.

Ward, C. 2001. The Sadana Island shipwreck: a mid-eighteenth century AD merchantman off the Red Sea coast of Egypt. *World Archaeology* 32: 371–385.

Whitewright, J. 2007. How fast is fast? Technology, trade and speed under sail in the Roman Red Sea. In *Natural resources and cultural connections of the Red Sea. Proceedings of the Red Sea Project III*, Society for Arabian studies monographs 5, BAR international series, ed. J.P. Starkey and T. Wilkinson, vol. 1661, 77–78. Oxford: Archaeopress.

Wild, F.C., and J.P. Wild. 2001. Sails from the Roman Port of Berenice. *International Journal of Nautical Archaeology* 30: 211–220.

Zazarro, C. and R. Loreto. 2017. *Surveying an eighteenth-century merchantman of the Red Sea coast of Saudi Arabia' Proceedings for the Seminar for Arabian Studies* 47: 253–268.

Reflexive Approaches in Archaeology, Development of

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Introduction

Although many researchers in archaeology would agree that there has always been an element of reflexivity in archaeological interpretation, calls for an explicit and systematized reflexivity within archaeology are rather recent (e.g., Potter 1991; Shanks and Tilley 1992; Hodder 1997). These may be regarded as part of a trend, in which archaeology is viewed within an ethnographic perspective and the objects of study are archaeological practices (Edgeworth 2006). The calls for reflexive methods may also be seen as an attempt to bridge the gap between archaeological theory and practice, thereby bringing into focus archaeological field practices and interpretation processes. There have been a few explicit attempts to systematize reflexivity as well as many implicitly reflexive studies in archaeology in recent years. In the following section, case studies that attempted reflexive approaches during archaeological fieldwork are explored.

Definition

Like being reflected in a mirror, to be reflexive is to have something directed back on oneself. The concept of reflexive archaeology is thus an archaeology directed back on itself. This means that the interpretation process and the production of archaeological knowledge are reflected on while in progress, by the person creating this knowledge. However, the reflection does not have to be directed back to the same person, as a reflexive approach may also be more generally applied within the field of archaeology.

Reflexivity has been discussed in fields such as sociology, ethnography, anthropology, and philosophy since the mid-1900s, and the term has been assigned various meanings. Sometimes these meanings overlap and even contradict each other. The different versions of reflexivity that have been in use have been divided into categories, ranging from a mechanical and descriptive to a more radical and interactive view of reflexivity. They include versions of reflexivity in which the observer's self-consciousness and self-criticism are in focus and in which the aim is to correct biases that distort the access to the object of study. They also include versions in which the observer takes a detached position which enables him or her to see through "taken for granted" in a society

and in which what you see is depending on your point of departure. The latter view rejects that an observer can step back from culturally laden prejudice and focuses on different standpoints, for example, gender or culture. There are also versions that attempt to produce alternatives to habitual thinking, as well as versions that regard reflexivity as a part of all communication. Most of these views on reflexivity presuppose a dichotomy between subject and object and aim at maximizing objectivity even though some may question this same objectivity (Lynch 2000).

The many different interpretations of the idea of reflexivity illustrate how the subject-object dichotomy underlies much of our thinking in Western research traditions and the implicit position that if we can reveal the circumstances of a study, there is a possibility to reach a more accurate account of the studied object.

Reflexive approaches have been employed and understood in different ways in the archaeological discipline in recent years. The definition used appears to be context dependent, and some would even argue that the idea of reflexivity has not yet been defined satisfactorily in archaeology (Chadwick 2003). However, what the different approaches seem to share is an ethnographical effort to investigate how the archaeological discipline itself including the archaeologists and the structure of work, methods, and tools influence the resulting images of the past.

A number of projects have attempted to explicitly define the term, and in this regard, two case studies will be explored in this entry. The first case study is the well-known Çatalhöyük – project in Turkey – which centers around archaeological investigations of a Neolithic settlement (Hodder 1997, 1999, 2000). In this project reflexivity is defined as an examination of the effects of archaeological assumptions and actions on the various communities involved in an archaeological process, including participants in the project as well as other archaeologists and non-archaeological communities (Hodder 1997, 1999, 2000). The project aimed to promote reflexivity and multivocality in the process of creating archaeological interpretations as well as situating the research within a social context. The methodology is built on two main ideas: (1) that archaeology does not produce objective facts and (2) that no interpretation should have preeminence over another. The individual excavator is emphasized as playing an important role in forming the interpretations, and the goal is to record this subjective trait. The field methods are, therefore, aimed at documenting what may influence the archaeological interpretations (e.g., the preconceptions and assumptions of the excavating staff). The underlying objective is to create a non-dichotomous way of thinking, which will ultimately break down barriers both between disciplines and between interpretation categories used in archaeology, such as different materials and features. The context in which archaeological knowledge is created is thus illuminated. This does not only extend to the archaeological field but also to the society as a whole as a variety of stakeholders and interest groups are considered (Hodder 1997, 1999, 2000).

Another project that has attempted to define reflexive approaches is the Citytunnel project in Malmö, Sweden. It was a large-scale project within a developer-funded archaeology context, and the fieldwork took place during the early 2000s. The project aimed at "documenting the documentation process," which was stated in the research design (Lindhé et al. 2001). This was later broken down to a few practical components, partly inspired by the Çatalhöyük project.

In the Citytunnel project, reflexivity was defined broadly as a continuously ongoing process that includes thoughts about one's own thinking and one's own role in the production of knowledge, drawing on a sociological framework (Ehn and Klein 1994). By documenting the interpretation process, it was hoped that the different stages of the thought process and the various preconceptions of the individual excavators would be illuminated. The aim was to allow multiple voices to be heard, as well as to enable a critical evaluation of habitually used categories and interpretations. In the end, the objective was to gain new perspectives that would lead to new questions and new knowledge about the past (Berggren 2002).

Another project investigating the landscape at Leskernick on Bodmin Moor in Great Britain also

employed a reflexive approach. This project took as a starting point the statement that archaeological interpretation is an ongoing and open process in which there are always other possibilities and multiple interpretations. The project positions itself against what are called standard archaeological texts which protect themselves from criticism by filtering out the manner in which some interpretations are preferred to others, by excluding the process by which we arrive at certain understandings (Bender et al. 2007: 28).

Historical Background

The development of reflexive approaches in archaeology has to be seen in the context of how archaeology as a field has developed during the past few decades.

A few early attempts of ethnographic approaches to archaeological work appeared in the 1950s and 1960s (see Edgeworth 2006 for a detailed background). These may be seen as the first attempts to apply an explicitly reflexive approach in archaeology. Earlier, archaeologists had written diaries and kept notes in a way that sometimes reflected on their work. However, this was not done in a systematic and explicit way, and they are not included in this discussion.

The attempts of an ethnography of archaeology seem to have ceased during the 1970s and early 1980s, probably as a result of the emphasis on scientific objectivity in the processual archaeology that was developed under the name New Archaeology (Edgeworth 2006: 2). At that time there was a notion of scientific neutrality and objectivity of an existing record in the ground, waiting to be unearthed and discovered (Lucas 2001a). This meant that the social, economic, and scientific circumstances of the archaeological recovery were considered unimportant to the formation of this record. Reflections concerning this formation were thus not seen as useful.

During the late 1980s and 1990s, this notion of scientific objectivity was challenged from a post-processual viewpoint in which interpretation was regarded as an essentially subjective process. Archaeological practices, especially archaeological fieldwork, were starting to be reevaluated, and excavation was no longer seen as a mechanical uncovering and recording of preexisting truths but rather a social and subjective construction of interpretations (e.g., Tilley 1989; Gero 1996; Hodder 1997).

The question of excavation being an objective or subjective undertaking is connected to a separation between data and interpretation in archaeology that can be followed over time. This is not just a theoretical issue but connected to the separation of theory from practice in archaeological fieldwork and of thinking from excavating (which in turn is connected to the separation of subject from object). It has been shown that this separation has developed over a long period of time and has a social basis. From very early on (before the increasing professionalization of the discipline), the excavation process was seen as unskilled and requiring little formal training, which resulted in a gap between the excavator and the interpretation. In later years excavators were required to follow strict positivistic techniques, which were to insure a scientific quality. Contract archaeology was seen as providing scholars at universities with data to be interpreted, rather than producing interpretations in the trench. The moment of discovery was thus separated from the moment of study and data from analysis and interpretation. The excavator was thus regarded as a provider rather than a producer of data (Berggren and Hodder 2003). The hierarchical organization of developer-funded archaeology (Lucas 2001b: 12; Rudebeck 2004), the prioritization of economical over archaeological goals in the private sector (Watson 1991; Hester et al. 1997), the invisibility of the excavator in the record (McFayden 1997 quoted in Lucas 2001b; Cooper et al. 2000), the mechanics of excavation (Chadwick 2003), as well as the standardization of recording (Adams 2000) are a few of the reasons mentioned for this separation. Also, in a research context, unskilled, local workmen or inexperienced students may be used.

There are thus many factors that have acted through time that may explain the separation of theory and practice within archaeological fieldwork. One factor that seems to be overarching is hierarchy. The hierarchical organization of excavations, of the labor market, and of society as a whole are all connected and influence the situation of the excavator. The separation of interpretation from fieldwork thus has deep societal roots.

Key Issues/Current Debates

The key issues relating to the development of reflexive approaches in archaeology are to be found in the historical background described above. It was a reaction to some of the problems mentioned and to what may have been experienced as contradicting trends in contemporary archaeology. These trends include demands for a more formalized and predictable research from authorities (mainly in developer-funded archaeology) and at the same time demands for a democratic and multivocal archaeology, as well as an increasing digitalization of the archaeological record that demands predefined categories and at the same time, therefore, requires a deconstruction of concepts and categories (Berggren 2002; Rudebeck 2004).

There are several characteristics that can be identified in the development of reflexive approaches. First, there was a need to question and problematize concepts and categories that had become so well used and familiar that they seemed axiomatic. Discussions of concepts and categories have always formed a part of the archaeological discourse. However, this kind of problematization became a more explicit part of the problem orientation of developer-funded archaeology, especially in the development of research designs. Secondly, there was also a need to create syntheses of interpretations within archaeology and in collaboration with other disciplines as well as with other groups in society. Syntheses of interpretations have always been an important component in archaeological research. However, in a reflexive approach, a synthesis of different views and research areas was aimed at from an initial stage of the investigation, influencing decisions of how work was to be conducted, e.g., quick feedback from specialist analyses of materials such as lithics of archaeobotanical material could influence the continuation of the excavation of a certain area or a certain category of remains. Thirdly, there was an increased interest in an ethnography of archaeology and the need to reflect on the role of individual archaeologists in the process of interpretation and the creation of archaeological knowledge, as well as the role of archaeology in society. This concerned both archaeological fieldwork and engagement in public outreach (Berggren 2002).

Reflexive approaches in archaeology were also a way of implementing the post-processual school of thought in practice, which had previously been primarily theoretical. The Çatalhöyük project became well known as a post-processual excavation where the somewhat abstract ideas were turned into practice in the system of work. At Çatalhöyük the excavation and recording methods were designed to solve the recognized problems. These methods have been outlined and elaborated in several publications since the inception of the project (Hodder 1997, 1999, 2000). The methods were designed to promote reflexivity, contextuality, interactivity, and multivocality. Steps towards these four goals were to be taken through a series of strategies that were included in a daily work on site. The strategies, as presented by the project director, included interaction in the field between the excavators and the specialists that were present on site. Such interaction included negotiations about the priorities of what should be investigated in the field and laboratory. The employment of this method was a clear attempt to break down barriers between people in the organization of work. Another strategy employed to promote reflexivity was the process of improving the contextualization of finds. A process of immediate feedback from the laboratories to the excavators in the field was introduced, a so-called fast track, to enable quick

analyses and results to influence the decisions being made in the field. An integrated database enabled different participants to take part in the flow of information as it was being formed. All these strategies attempted to integrate people and processes that are often kept separate during archaeological research. Another way of promoting reflexivity was a digital diary that was created to function as a key to the database. In it the field staff were asked to write about the excavation, their assumptions, decisions, and interpretations about particular features or finds. In this way the information in the database was to be situated in a broader context. This was meant to enhance the flow of information while at the same time providing the excavators with additional opportunities to reflect on their work. For the same reasons, short video clips of the excavation were also filmed. Anthropologists were also included in the project to work with the team, studying the construction of knowledge, visualization processes, as well as the impact of the excavation on the local community. To allow other stakeholders and interest groups to have access to the information being generated as a result of the excavations, the database was made public on the Internet. The above approaches thus allowed information to be accessed via multiple pathways. In this regard, it can be argued that the usual restrictions inherent in linear narratives (i.e., that keep data and interpretation separated) can be avoided or at least mitigated. Access to a virtual reconstruction of the site also enabled alternative readings of the information generated. Lastly, as the excavation was conducted by different national teams with different methods this also served to create different views of the site (Hodder 2000: 5ff) (Fig. 1).

After a few years of excavation, a reaction to these methods from the field staff was published (Farid 2000). The reflexive methods that had been implemented, however, did not always produce the desired outcome. In fact, some had been experienced as counterproductive. The demands on the field staff were considered to be imbalanced and one sided in that they were not considered specialists in their own right and were to be told what they were excavating by the laboratory specialists

Reflexive Approaches in Archaeology, Development of, Fig. 1 Excavation of the South Area of Çatalhöyük during the season of 2011. (Photo: Åsa Berggren)

(Farid 2000: 20). This caused some tensions between excavators and laboratory staff that were described as fault lines by one of the anthropologists who studied the creation of knowledge on site (Hamilton 2000). In fact, the field team felt new barriers were created between field staff and laboratory staff by the implementation of the methodology (Farid 2000: 28f). Other parts of the methodology required adjustments such as sampling strategies and the feedback about prioritized units. Generally the field team felt they had to keep a fine balance between time spent on the reflexive methods and time spent on excavating and recording, as the former were experienced as time-consuming additions to normal work (Farid 2000: 22).

Another fault line of the project identified by the anthropologist was created by the database. Its structure was in some ways experienced as restricting interaction between participants and reinforcing of categories instead on breaking

down the barriers between them. In addition the film clips were also considered problematic due to the fact that they were directed and thereby concealing the interpretative processes they were supposed to visualize (Hamilton 2000; also Farid 2000).

These difficulties took place during the initial seasons of the project. Indeed, it took some time for the reflexive methodology to be integrated in the normal work procedure on site. However, after some years, certain aspects were integrated, while others were more or less dropped (e.g., in the publication of the first years of excavation, the diaries are used and cited as a source of information in a way that visualizes the various excavators in quite an unusual way – see Hodder 2007). A study of diary entries written when the project was well under way (1996–2008) shows that the use of the diaries has varied over the years. It is concluded that the diaries provide a wealth of additional information not recorded elsewhere. However, the content of the diaries has changed and discussions about interpretations declined over time. Instead, the diaries became used as weekly reports by more experienced excavators and as blogs by students working on site. In general, the diary was mainly used by participants on a low level of the hierarchy of the project, e.g., the students. In addition, the entries were not read by other participants on site to any great extent (Boddington 2012).

Generally, the reflexive methodology at Çatalhöyük has had varying results. The many projects involving the local community as well as other interest groups within the Çatalhöyük project show that the aim of being multivocal has attracted much attention (not discussed further in this text). The implementation of the methods in field practices has failed in some respects but succeeded in others and is subject to further evaluation (Berggren and Nilsson Forthcoming).

In part inspired by the Çatalhöyük project, a large-scale attempt to introduce a systematized reflexivity in a developer-funded archaeology context was the Citytunnel project in Malmo, Sweden. While this project is similar in size to the Çatalhöyük project, there are many differences primarily due to the fact that the Citytunnel project is developer funded.

This project sets out to "document the documentation" (Lindhé et al. 2001). The idea was to integrate some ethnographic elements to the investigation. The ideas were turned into a few practical components such as digital diaries and film clips. In addition, 4 h per week per person were budgeted for digital diary writing and so-called why-meetings. The goal was to make these procedures a natural part of the work process (Fig. 2).

Reflexive Approaches in Archaeology, Development of, Fig. 2 Documentation of the remains of a Neolithic dolmen during the Citytunnel project (2002). (Photo: Markus Andersson)

As was the case with the Çatalhöyük project, the implementation of the reflexive methods was somewhat problematic. An evaluation of the project has been carried out (Berggren 2009), and it suggests that several factors affected the implementation. Factors such as "vague instructions" and lack of follow-up sessions are seen to have created negative impacts. The practical, reflexive components were experienced as either unnecessary or too abstract and detached from the usual work procedures. This was connected to opinions that work was already carried out in a reflexive way or that more specific instructions and goals were needed. The label "reflexive" gave the majority of field staff an impression of the attempt at something detached from usual work. In some cases it was experienced as a separation of something that had previously been a part of normal work which was now taken away and put in a box of its own, and in other cases, it seems to have resulted in an expectation of an almost magic formula that would automatically bring new results. Underlying these problems are complex issues of work hierarchies, the structure of work in developer-funded archaeology and individual motivation, among other things (Berggren 2009).

Other interesting results of the evaluation include an uneven representation of contributors to the diary as well as what was voiced. In practice the diary was dominated by a few opinionated male excavators that were not in positions to make decisions but rather executed decisions made by others. This pattern is similar to the Çatalhöyük project where students without authority were the most frequent contributors to the diary. The discussions were dominated by extraordinary finds rather than larger contexts and connections. Above all, the discussions in the diary did not reflect the importance given to issues in the research design nor in later publications. Thus, the diary was not used to any large extent during the process of writing up the material. This way the diaries give access to interpretation processes that are not visible in the publications such as the site reports (Berggren 2009).

The above case studies reveal that there are interesting results to be gained but also that there are problems connected to the implementation of reflexive methods in the practice of fieldwork. Even though only two case studies are discussed here, it is interesting to note that the many of experiences are echoed in other projects, as the Leskernick project (Wilmore 2007). The problems highlight such issues as the hierarchy of the workplace and the social situations of the excavator. One lesson to take from these projects is the importance of integrating the work procedures that are thought to promote and document reflexivity into normal work so they become a part of the everyday routine.

Another issue connected to the separation of theory from practice is the separation of subject from object. It has been pointed out that the reflexive attempts so far have been rather one sided, prioritizing the subject. Not much attention has been paid to the objects and, in particular, the encounter between the two. The materiality of the objects is rarely taken into account (but see Cooper 2007) as the objects are treated as impassive and passive (Lucas 2001b; Chadwick 2003; Yarrow 2003). This may be described as yet another fault line that has to be dealt with by the methodology.

Future Directions

The future of reflexive approaches within archaeological practice may depend on how the fault lines described above are dealt with. As already noted the post-processual approach to archaeological practice has brought attention to the subjective trait in interpretation. However, it has been pointed out that this line of thought presupposes a distinction between subject and object and that how the subject is constructed through fieldwork is often overlooked in current approaches (Yarrow 2003; see also Hodder 2011: 155).

Further, it has been suggested that this fault line may be overcome by applying a theoretical perspective taken from actor-network theory to

investigations of how archaeological knowledge is created (Yarrow 2003). It entails an understanding of how archaeologists and investigated materials modify one another, in relation to each other, in the act of excavation. Instead of discussing an encounter between subject and object at the moment of discovery, one may say the distinction between a subject and an object is created at this moment. On the one hand, archaeologists create objectivity by embodying archaeological conventions, skills, and knowledge in the process of excavation. On the other hand, the objects create the subjectivity of archaeologists as they are excavated, as their material properties modify the thoughts and actions of the archaeologists. This way the things create the people excavating them as archaeologists (Yarrow 2003).

This line of thought may be used as a base to further explore the notions of materiality and embodiment. These concepts have often been used as means of understanding the past in "material culture studies," phenomenological studies, as well as what is called an "archaeology of the senses." However, these concepts are rarely used to study the present process of interpretation and creation of knowledge in archaeology. There is an unutilized potential in these concepts and areas of study. They could point to a future direction for the development of reflexive approaches in archaeology. The symmetrical relations between persons and things, as they may be described in actor-network theory, may be illustrated in entanglements (Hodder 2011). Again, this has been done describing the past, e.g., at Çatalhöyük (Hodder 2011), not including the archaeologists' material engagement and entanglement during excavation. These areas provide fertile ground for future studies.

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Hodder, Ian (Theory)
- ▶ Post-Processual Archaeology
- ▶ Reflexivity in Archaeology

References

Adams, M. 2000. The optician's trick: An approach to recording excavation using an Iconic Formation Process Recognition System. In *Interpreting stratigraphy. Site evaluation, recording procedures and stratigraphic analysis*, BAR International series 910, ed. S. Roskams, 91–101. Oxford: Archaeopress.

Bender, B., S. Hamilton, and C. Tilley. 2007. *Stone worlds. Narrative and reflexivity in landscape archaeology.* Walnut Creek: Left Coast Press.

Berggren, Å. 2002. Reflexivitet inom arkeologin. In *Reflexiv fältarkeologi? Återsken av ett seminarium*, ed. Å. Berggren and M. Burström, 17–26. Stockholm/Malmö: Malmö Kulturmiljö & Riksantikvarieämbetet.

Berggren, Å. 2009. Evaluation of a reflexive attempt: The Citytunnel project in retrospect. *Archaeological Review from Cambridge* 24 (1): 23–37.

Berggren, Å., and I. Hodder. 2003. Social practice, method and some problems of field archaeology. *American Antiquity* 68 (3): 421–434.

Berggren, Å., and B. Nilsson. Forthcoming. Evaluation of a reflexive methodology at Çatalhöyük.

Boddington, M. 2012. Archaeology and truth: Epistemology, metaphysics and ethics in archaeology. Unpublished PhD dissertation, University of Cambridge.

Chadwick, A. 2003. Post-processualism, professionalization and archaeological methodologies: Towards reflective and radical practice. *Archaeological Dialogues* 10 (1): 97–117.

Cooper, A. 2007. Interfering structures. In *Excavating Çatalhöyük. South, North and KOPAL Area reports from the 1995–99 seasons*, ed. I. Hodder, 142. Cambridge/Ankara: McDonald Institute for Archaeological Research/British Institute at Ankara.

Cooper, A. et al. 2000. House beautiful. Film presented at EAA meeting, Lisbon.

Edgeworth, M. 2006. Multiple origins, development, and potential of ethnographies of archaeology. In *Ethnographies of archaeological practice. Cultural encounters, material transformations*, ed. M. Edgeworth, 1–19. Lanham: Alta Mira Press.

Ehn, B., and B. Klein. 1994. *Från erfarenhet till text. Om kulturvetenskaplig reflexivitet*. Stockholm: Carlsson.

Farid, S. 2000. The excavation process at Çatalhöyük. In *Towards reflexive methods in archaeology: The example at Çatalhöyük*, ed. I. Hodder, 19–35. Cambridge/Ankara: McDonald Institute of Archaeological Research/British Institute at Ankara.

Gero, J. 1996. Archaeological practice and gendered encounters with field data. In *Gender and archaeology*, ed. R. Wright, 126–139. Philadelphia: University of Pennsylvania Press.

Hamilton, C. 2000. Faultlines: The construction of archaeological knowledge at Çatalhöyük. In *Towards*

reflexive methods in archaeology: The example at Çatalhöyük, ed. I. Hodder, 119–128. Cambridge/Ankara: McDonald Institute of Archaeological Research/British Instituteat Ankara.
Hester, T., H. Shafer, and K. Feder, eds. 1997. *Field methods in archaeology*. 7th ed. Mountain View: Mayfield.
Hodder, I. 1997. 'Always momentary, fluid and flexible': Towards a reflexive excavation methodology. *Antiquity* 71: 691–700.
Hodder, I. 1999. *The archaeological process*. Oxford: Blackwell.
Hodder, I. 2000. Developing a reflexive method in archaeology. In *Towards reflexive method in archaeology the example at Çatalhöyük*, ed. I. Hodder, 3–14. Cambridge/Ankara: McDonald Institute of Archaeological Research/British Institute at Ankara.
Hodder, I., ed. 2007. *Excavating Çatalhöyük. South, North and KOPAL Area reports from the 1995–99 seasons*. Cambridge/Ankara: McDonald Institute for Archaeological Research/British Institute at Ankara.
Hodder, I. 2011. Human-thing entanglement: Towards an integrated archaeological perspective. *Journal of the Royal Anthropological Institute* 17: 154–177.
Lindhé, E., P. Sarnäs, and M. Steineke. 2001. *Citytunneln och spåren i landskapet*. Malmö: Malmö Kulturmiljö.
Lucas, G. 2001a. Destruction and the rhetoric of excavation. *Norweigan Archaeological Review* 34 (1): 35–46.
Lucas, G. 2001b. *Critical approaches to field work. Contemporary and historical archaeological practice*. London/New York: Routledge.
Lynch, M. 2000. Against reflexivity as an academic virtue and source of privileged knowledge. *Theory, Culture & Society* 17 (3): 26–54.
Potter, P. 1991. Self-reflection in archaeology. In *Processual and postprocessual archaeologies: Multiple ways of knowing the past*, ed. R. Preucel, 225–234. Carbondale: Southern Illinois University at Carbondale.
Rudebeck, E. 2004. Trends and problems in Swedish contract archaeology. Some reflections. In *Current issues in Nordic archaeology*, ed. G. Gudmundsson, 55–58. Reykjavik: Society of Icelandic Archaeologists.
Shanks, M., and C. Tilley. 1992. *Re-constructing archaeology. Theory and practice*. London: Routledge.
Tilley, C. 1989. Excavation as theatre. *Antiquity* 63: 275–280.
Watson, P.J. 1991. A parochial primer: The new dissonance as seen from the midcontinental United States. In *Processual and postprocessual archaeologies: Multiple ways of knowing the past*, ed. R. Preucel, 265–274. Carbondale: Southern Illinois University at Carbondale.
Wilmore, M. 2007. The book and the trowel. Archaeological practice and authority at the Leskernick project. In *Stone worlds. Narrative and reflexivity in landscape archaeology*, ed. B. Bender et al., 244–276. Walnut Creek: Left Coast Press.
Yarrow, T. 2003. Artefactual persons: The relational capacities of persons and things in the practice of excavation. *Norwegian Archaeological Review* 36 (1): 65–73.

Reflexivity in Archaeology

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Introduction

Reflexivity is a relatively recent theoretical option in archaeology. It deals with a theoretical position that supposes that archaeological knowledge is determined by both the experience and the context of the investigator. This favors narratives in which archaeological facts are presented through stories that revolve around dialogue, a constant questioning, and diverse possibilities for interpretation. Basically, reflexivity supposes an analysis (a reflection) that the author makes of his own place in the story; it also suggests making explicit the conditions of possibility that determine the object under investigation and the forms for describing it as a scientific object. In this sense, reflexivity deals with a landscape of conditions of possibility that shape the archaeological statement. Viewed from another angle, one reflects upon the statements, which means generating a new enunciation that is equally susceptible to interpretation. This possibility of interpretation on multiple levels is what is known as the "hermeneutic spiral" (Gadamer 2004).

The inclusion of a reflexive agenda in archaeology is relatively recent, and as yet it does not form part of any program, unlike other studies (such as the origin of agriculture or the beginnings of domestication). Singularly, and moreover, reflexivity is repellent to archaeological research agendas based on the neo-evolutionary ideas of anthropology. Such is the case of programs that investigate the energy increment in societies, or the complicating of social differences, or the use of nature as an economic resource; in these cases, reflexivity is something to be avoided, a mere literary distraction. Reflecting on these questions, Joan Gero (1999) found that these processual tendencies unleash

narratives in which society is treated as a machine and people as mere accidents of chance.

Definition

Reflexivity in archaeology is a theoretical field that investigates the conditions of possibility in the archaeologically observed object, namely, the cultural past. The starting point of reflexive archaeology supposes that the research questions, as well as the analytical tools, are situational; a product of the particular historical conditions of the researchers who produce the archaeological discourse. This means that the concept of episteme of Michel Foucault (1999) is very useful to reflexive archaeology; this notion holds that each era shapes the conditions under which a scientific problem is posed, such that the evolution of knowledge becomes the evolution of the methodology of observing objects under investigation. This orientation prevents researchers from wondering about existing disciplinary frontiers or about any prohibitions to the shaping of research objects that question modern ontological divisions.

As a consequence, reflexive archaeology is not interested in knowing how well a certain archaeologist understands a cultural period. It is concerned with knowing why that particular archaeologist focuses on a certain period or cultural phenomenon. Interesting points have arisen from the reflexive archaeology agenda. For example, reflection has shown, in the broadest perspective, that the production of archaeological knowledge gives material support for thinking about social extinctions. Thus, museums are replete with evidence of "disappeared cultures," which the market uses to justify the appropriation of "waste" territories. Many archaeologists have shown how local communities question this rupture and mark it as a tool of domination (e.g., Gnecco and Hernández 2008).

Key Issues/Current Debates

Reflexivity has been both criticized and upheld, according to the different paradigms that have ruled the production of archaeological knowledge. Within these paradigms, two types can be discerned: those that are determined by the premise that there is a reality that can be captured systematically (scientific paradigm) and those that are influenced by the premise that knowledge of reality depends on the interpretive abilities of the individual (hermeneutic paradigm).

Within the scientific paradigm, reflexivity is unwelcome at the disciplinary table. In his book *Analytical Archaeology* (Clarke 1968), David Clarke argued that archaeology has its own analytical universe and that it should develop its own theoretical models, thus generating its own narratives. For Clarke, archaeological narratives should share nothing with historical narratives that are based on the idea of single, non-universal events.

In an early case recorded in South America, the president of Argentina, Bartolomé Mitre (1862–1868), in 1910 asked the archaeologist Adán Quiroga to suppress the poetic tone of his narrative of the cultural material of Northeast Argentina on the grounds that it would obscure the truth of the data being presented. Adán Quiroga responded that his new work would show the suppression of anything literary (Quiroga 2004 [1901]: 13). This point is not without merit, signaling the criticism of reflexivity as associated with specific academic traditions.

Any thought about the situation of the individual producing archaeological knowledge was simply erased by the rise of processual archaeology. In *Archaeology as Anthropology* (Binford 1962), Lewis Binford pronounced that archaeology was devoted to the study of culture, understanding this to be an extrasomatic adaptive mechanism. In Binford's proposed example, the emergence of a certain type of cultural material was evidence of readjustments within society related to the increase of energy. Archaeological explanations should be limited to presenting evidence of economic adjustments, themselves transforming the social and religious spheres of society. From this perspective, archaeological texts should outline systematic changes in culture. Since one is trying to merely recount energy fluctuations, there is no need to pay much attention to the form of the narrative, the metaphors used, or the strategic position of the author behind the data.

Allegations against processualism as a deliberate form of narrating the past came from various quarters and appealed to different interests. From the feminist perspective (Gero and Conkey 1991), for example, researchers began to make anatomies of processual scientific descriptions. It became clear that many narratives were centered on sexist positions (men discussing power, elite property, domination, and hierarchies), including terming "erratic" some interpretations that could have made more sense of the cultural material that was excavated, especially of objects that had belonged to women.

Another militant front against processualism and its narrative impositions came from local communities (Condori 1994). In various sites around the world, voices were raised, making it clear that sites and objects should not be treated as scientific evidence as they actually formed part of the living traditions of many local communities. From this critical area, narratives began to emerge in which archaeologists were in dialogue with the local communities and at the same time reflecting on those narratives (Londoño 2002). The idea that archaeology should only deal with the description of objects exploded under this intense scrutiny: it was fundamental to acknowledge the places where ideas were put forward as well as the local actors affected by the narratives.

Apart from feminist and local archaeologies, criticism of processualism and its lax understanding of archaeological narrative forms also came about with the introduction of theoretical ideas such as hermeneutics, structuralism, and post-structuralism (Tilley 1990). Perhaps the approach most open to reflexivity in archaeology was hermeneutics, as this is based on the idea that reality is meaningful and its interpretation is not determined by methodology as much as by the researcher's competence as an effective interpreter of particular facts. Thus, archaeological research is not a question of finding the correct method but the most adequate metaphors to move the researcher closer to the meanings of the cultural material deployed in the past.

Future Directions

A relation between narrative and reflexivity has been developed in phenomenological approaches in archaeology, assumed to be a contemporary reconstruction of forms of being-in-the-world in the past (Tilley et al. 2007). For phenomenology, it is fundamental to reflect on the place the observer occupies in the space of the investigation. This has obligated archaeological theory to fervently explore theories about the body and the landscape (Tilley 2008).

Phenomenology is not the only area in which reflexivity has risen to prominence. Moving beyond the use of ethnography to generate interpretive models, it has been suggested that ethnography has to bear in archaeological investigations (Edgeworth 2006), not only during fieldwork but also in the generation of meaning, the management of heritage resources, and the hiring of professionals, students, and laborers.

Indeed, a very prolific area that will need reflexivity for its development is the analysis of museums, both as objects and as narratives. More and more, archaeologists work intensely on formulating plans to spread their archaeological knowledge. This will require profound reflection about the manner in which exhibitions are configured, the way in which "noisy" discourses are edited, and the possibilities that other voices will be put forward. Paradoxically, archaeology has not been the place where these reflections have been attempted. Standing out from the crowd, as a forerunner, is the work of James Clifford (1997), especially his work on local museums.

Reflexivity will be important to analyze how archaeological knowledge is positioned as a hegemonic and vertical practice. In this regard, feminist archaeology will play a fundamental role. Narratives with locally situated actors will also be important in generating representations of the past that are not hegemonic, determined by the restrictions of nationalism. This will be, then, an exceptional field for reflexivity as a political and epistemic tool.

Cross-References

- ▶ Engendered Archaeologies
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Practice Theory in Archaeology
- ▶ Reflexive Approaches in Archaeology, Development of

References

Binford, L. 1962. Archaeology as anthropology. *American Antiquity* 28: 217–225.

Clarke, D.L. 1968. *Analytical archaeology*. London: Methuen.

Clifford, J. 1997. *Routes: travel and translation in the late twentieth century*. Cambridge: Harvard University Press.

Condori, C.M. 1994. History and prehistory in Bolivia: What about the Indians? In *Conflict in the archaeology of living traditions*, ed. R. Layton, 48–59. London: Routledge.

Edgeworth, M., ed. 2006. *Ethnographies of archaeological practice: Cultural encounters, material transformations*. Walnut Creek: Altamira.

Foucault, M. 1999. *Las palabras y las cosas. Una arqueología de las ciencias humanas*. Mexico: Siglo XXI.

Gadamer, H.-G. 2004. *Truth and method*. London: Continuum.

Gero, J. 1999. Sociopolítica y la ideología de la mujer-en-casa. In *Arqueología y teoría feminista*, ed. L. Colomer, P. González Marcén, S. Montón, and M. Picazo, 341–356. Barcelona: Crítica.

Gero, J., and M. Conkey, eds. 1991. *Engendering archaeology. Women and prehistory*. Oxford: Blackwell.

Gnecco, C., and C. Hernández. 2008. History and its discontents. Stones statues, Natives histories, and archaeologists. *Current Anthropology* 49: 439–466.

Londoño, W. 2002. La poética de los tiestos. El sentido de la cultura material prehispánica en una comunidad Nasa. *Revista de Arqueología del Área Intermedia* 4: 137–158.

Quiroga, A. 2004/1901. *La cruz en América*. Catamarca: Ediciones municipales.

Tilley, C. 1990. *Reading material culture: structuralism, hermeneutics and post-structuralism*. Oxford: Blackwell.

Tilley, C. 2008. *Body and image: explorations in landscape phenomenology*. Walnut Creek: Left Coast Press.

Tilley, C., B. Bender, and S. Hamilton. 2007. *Stone worlds: narrative and reflexivity in landscape archaeology*. Walnut Creek: Left Coast Press.

Refugees in the Near East and Eastern Mediterranean, Archaeology of

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Introduction

Until relatively recently, remarkably little attention has been paid to the potential for archaeological study of refugees in premodern times, despite related archaeological studies of migration, mobility, nomadism, and colonialism. While identifications of refugees recur throughout archaeological literature in the Near East as a social phenomenon, often through other terms (e.g., squatters, displaced), they are almost never the primary subject of inquiry. This is likely the result of a number of factors. First, to some extent, there exists a general perception that refugees are an exclusively modern phenomenon. Second, refugees are viewed to possess limited agency, and that they are primarily destitute and without means and that they are therefore archaeologically invisible (though this has not diminished a fascination with equally opaque subjects involving migration and mobility). Lastly, assumptions about the distance from which refugees migrate have meant that refugees only seem a reasonable suggestion for a context if their material culture is sufficiently distinct from that of the host culture. Refugees are, therefore, assumed to be a largely ephemeral phenomenon. Nevertheless, a combination of historical documentation and a variety of archaeological contexts, principally in the ancient Near East and eastern Mediterranean, reveal that an archaeology of refugees can be a highly productive avenue for ongoing research, particularly given its pervasiveness as a response to warfare and environmental change wherein entire communities are often forced to relocate. Furthermore, archaeological research of refugees holds

potential for giving voice to marginalized and largely muted historical groups whose experiences were not only significant in their own right but likewise contributed to many more frequently discussed historical and cultural phenomena.

Definition

To begin with, it is necessary to clarify the subject of inquiry for an archaeology of refugees. At the core of such investigations are any individuals or groups, who have been forced from their residences by any of a range of anthropogenic or natural causes (see United Nations 1951). However, such a definition involves preconceived notions of nation states and their borders. More simply and appropriately for archaeological contexts, then, refugees can be identified as "risk induced self-migrants" (Burke 2011). As a result of this, the archaeology that can address these circumstances is, by nature, concerned with understanding circumstances and conditions that informed the experiences of refugees from their places of departure (i.e., home), through potential waypoints along migration routes, and among their destinations. Of particular interest to this line of inquiry is the potential for identifying (1) characteristics of archaeological contexts that signal flight and abandonment of settlements, (2) the factors that may have induced flight, (3) migration routes and conditions, (4) landscapes of refuge, refugee settlement, and factors influencing their selection, and (5) material culture associated with refugees.

Key Issues/Current Debates/Future Directions/Examples

Refugees, as a social category, appear not infrequently among ancient Near Eastern sources, though their identification as such is often elided with, if not obscured by, translations of terms such as "aliens" or "fugitives," or their inclusion among other social groups among textual sources (Burke 2018). Texts from second millennium Mesopotamia and Anatolia, for example, make reference to the return of refugees, who are identified as "fugitives," among the provisions of treaties (see Beckman 1996). Another, particularly clear, case of this occurs in the study of the Hebrew Bible where refugees (Heb. *ger*) are referred to among lengthy discourses on the protection of alien communities, despite an absence of discussions for the contexts of the appearance of these communities or the potential for their identification by archaeological means. In still other cases, well-studied phenomena that may yield hallmarks of refugees have been easily overlooked, with emphasis placed on defining characteristics of migration and the identification of motives behind it (with exceedingly rare explicit identification of them as "refugees"). The vague circumstances behind various migrations invite consideration that these steady and long-term processes may have been the result of persistent stress, whether military, political, demographic, or environmental, and resulted in flight by different communities. The Phoenician expansions from the Eastern Mediterranean during the Iron Age (ca. 1000–800 B.C.), as well as that of the so-called "Sea Peoples" at the end of Late Bronze Age (ca. 1250–1150 B.C.), and Jewish diaspora communities at the end of the Iron Age (post 720 B.C.) are among the better-known case studies, inviting further consideration along these lines. The same may be asked of various historical migrations, including Viking expansion or the seemingly sudden arrivals of other foreign groups during different historical episodes. Likewise, extensive consideration could be given to the refugee-generating processes that were a side-effect of great empires in the Old World.

Several recent case studies from the ancient Near East and Eastern Mediterranean reveal the potential for studying various archaeological phenomena in relation to refugees in ancient contexts. Among the earliest were the inhabitants of agropastoral communities along the arid margins of the Fertile Crescent who, it is suggested, were displaced by the sudden and protracted onset of arid conditions around 4200 years BP that made rain-fed farming unsustainable (Weiss 2014). This contributed to the abandonment of these communities and, evidently, migration to neighboring

regions in which sudden population growth is attested (Weiss 2017), which has been associated with early Amorite groups (Burke 2017). Later in time, during the volatile circumstances at the end of the Late Bronze Age (ca. 1300–1100 B.C.) the displacement of Canaanite and other communities into the southern Levantine highlands, analogous to what occurred among other Eastern Mediterranean communities during this period (Barber 2010), has been identified as social, political, conflict, as well as climate-induced migration. Among the groups later claiming a shared identity in this migration were the Israelites, whose identification with the sudden appearance of small, unfortified hamlets and villages in the highlands of Israel around 1200 B.C. has been often characterized as analogous to refugee phenomena, though not previously explicated as such (Burke 2018), but instead associated these settlements with the sedentarization of pastoral nomads (Finkelstein 1988). An analogous, if largely inferred, set of circumstances have also been associated with flight from the threat posed by an expanding Assyrian Empire in the southern Levant during the Iron Age, principally after the fall of Israel in 720 B.C. (Finkelstein and Na'aman 2004), though not without its critics (Na'aman 2007, 2009). These circumstances, however, can be argued to have contributed to a range of social, linguistic, and artifactual traces in Jerusalem within the state of Judah, which appear to signal the arrival of refugees from its sister state, Israel, just to its north (Burke 2011, 2012). In addition to these are rapid, unplanned expansion of domestic quarters beyond Jerusalem's fortification walls; monumental building programs, such as the expansion of its water system, that were intended to provide for a surge in population; and inscriptions bearing evidence of a northern dialect of Hebrew (Rendsburg and Schniedewind 2010). The archaeological signature of refugees in the Near East is perhaps nowhere more evident than in the cave settlements of Jews during the first and second Jewish Revolts against Rome (Shivti'el 2017).

Studies of more recent historical refugee crises have also sought to employ archaeological methods (Hamilakis 2016). Among these studies, the paramount significance of forensics is clarified by reference to cultural narratives available through ethnographic and historical research. However, these studies rely more on ethnography and forensic anthropology, treating findspots like crime scenes (De León 2013), while employing photography to invoke cultural awareness of concerns surrounding issues like undocumented migration (De León 2015). These studies may, nevertheless, provide insights into the experience of refugees in the course of migration, which pertain to premodern archaeological contexts, though its value as such remains to be demonstrated through the correlation of ancient sites with modern ones; migrant stations have not been identified in antiquity, for example.

Despite its evident potential, a number of challenges limit opportunities for the archaeological study of refugees in premodern contexts. Foremost is the identification of the groups in question since the label refugee is a social and political one, and, if such a category was significant to such groups, it existed concurrently with identities held by these individuals prior to their flight. In the absence of written sources, in both modern and ancient contexts, it can be difficult if not impossible to be certain that a particular context is to be identified with refugees per se. In this regard, anthropological and NGO literature has been employed to articulate an approach to exploring refugee resettlement, the most concrete archaeological aspect of the refugee experience in antiquity. Of note is the impoverishment risks and reconstruction (IRR) model articulated by Michael Cernea, who employed anthropological approaches to the study of refugees over the past several decades, albeit in an effort to identify strategies for the successful resettlement of refugees (Cernea 2000). Building upon decades of anthropological research of the resettlement plights of refugees, it identifies universal risks experienced by refugees during resettlement (which, in its original context, was intended to permit addressing these through relief efforts). These risks include landlessness, joblessness, homelessness, marginalization, food insecurity, increased morbidity and mortality, loss of access to common property assets, and community

disarticulation. To this, of course, are added general security concerns that accompany refugees from the moment that their flight begins. All of these characteristics are commonly addressed even in recent ethnographic and archaeological studies of modern refugees, as discussed above.

The phenomena associated with refugees identified by the IRR model can be correlated with individual lines of archaeological evidence, that when taken together with other evidence, such as historical sources, the model has been employed to facilitate the identification of refugees in archaeological contexts (Burke 2011). Landlessness, for example, is identified through the abandonment of sites or landscapes, rapid site and settlement growth in neighboring territories, and in settlement pattern shifts, in particular accompanying abnormally rapid growth rates for settlement within a region or among particular groups of settlements. Joblessness, especially varying forms of nonagricultural subsistence, is likely to be reflected not in the absence of employment, which leaves no direct archaeological trace, but rather may be identified in the efforts made by polities to provide employment and for the essential needs of newly arrived refugees on relatively short notice. Military conscription and mass labor projects are, for example, among the principal and relatively conspicuous avenues for the potential employment of refugees, and one of the principal reasons that, for example, vassal treaties in the ancient Near East often stipulated the repatriation of refugees, often labeled fugitives in modern translations. Homelessness, while an admittedly modern terminology, might be reflected in the sudden growth of particular settlements, often extramurally at first, in whole quarters within settlements, or the identification of squatting within the remains of buildings. By contrast with modern housing projects, most households in antiquity were built and maintained by their inhabitants and therefore they are only distinct from other domestic structures insofar as the architectural traditions and domestic assemblages of the newcomers are themselves sufficiently distinct (i.e., foreign) in appearance. However, much of the evidence for premodern conditions suggests that most refugee migrations were relatively short-distance phenomena (i.e., to the nearest safe region, often relying upon extant social networks). Thus, the sudden increase in domestic buildings at a site, often resulting in a substantial increase in the size of a settlement, may account for efforts to mitigate the homelessness facing these newcomers. Likewise, the material culture is often unlikely to yield a starkly different assemblage.

Marginalization, though more difficult to identify archaeologically, may be embodied in the isolation of refugee communities to the periphery of settlements or within particular quarters within a settlement or, similarly, within settlements in remote locations including caves. Occasionally, marginalization may be more readily detected in written sources such as inscriptions, which are themselves often archaeological artifacts. Food insecurity, one of the more conspicuous refugee concerns, is likely to be reflected by the adoption of a wide range of subsistence strategies that expose the inconsistency and unpredictability of food sources for refugee communities, whether through the extensification – into new regions – or the intensification of agricultural production. The identification of these strategies requires, however, a high degree of resolution and chronological control from archaeological excavations, and many earlier excavations simply do not yield such data. Additionally, when skeletal evidence is available, there may be evidence of malnutrition, that may have resulted in increased morbidity and mortality, likely associated with various types of stresses upon refugee communities, such as food insecurity. The appearance of new cemeteries in areas previously unused at a period contemporaneous with the expansion of a settlement may corroborate the presence of refugees as well. As refugee studies indicate, given the varied economic level of refugee communities, it is impossible to predict the affluence of burials within such cemeteries, or that of refugee settlements as a whole, and for this reason, poverty is not necessarily a correlate to the identification of refugees. Furthermore, as with food insecurity, a certain quality of data collection is necessary to permit this type of assessment. Perhaps one of the more challenging of the risks to consider is the loss of

access to common property assets. However, assets such as commonly accessed resources such as ritual and cultic sites (e.g., temples and shrines) and burial grounds would likely need to be replaced for refugees, where changes in practice were not adopted almost immediately to satisfy such losses. If unresolved, access to required resources could lead to increased social conflict. Community or social disarticulation may be manifest not only in a breakdown in kinship bonds but also a loss of social capital, which can contribute to economic loss as well as social alienation. Albeit among the most challenging of the risks to identify archaeologically, indicators of kinship relationships and markers of social integration may permit a diachronic investigation of the social disarticulation of households and kin groups. Changing burial traditions, cultural adaptations, and other changes may signal not only this disarticulation as negative but, conversely, positive and productive interactions with host communities that result in the formation of new social groups through intermarriage, adoption, etc.

More general security concerns, which usually simply assumed in modern studies of refugee scenarios (and for this reason was not articulated among the IRR's resettlement concerns), also manifest themselves in the archaeological record of refugee communities. These are often reflected in dispersed settlement patterns and settlement within marginal or remote locations (e.g., landscapes of refuge). However, they may also be manifest in the creation of fortified complexes, as in the Cyclades at the end of the Late Bronze Age (Barber 2010). Hoarding, if not more appropriately identified as hiding practices, reveal another manifestation of security concerns. Food insecurity can therefore also be a part of this, wherein practices of burying caches of food in pits or small silos reveal a change in earlier strategies, as for example, during the early Iron Age in the southern Levant.

While the IRR model offers one approach to systematic consideration of archaeological contexts with reference to refugees, the body of anthropological literature concerned with the study of refugees is vast. Consequently, ample room exists for the exploration of other avenues for the identification of refugee-related phenomena. The aforementioned model does not, for example, explicitly address the concerns of internally displaced persons (IDPs) that have become a significant component of modern refugee studies. While at first glance such a concept may not appear to be relevant to pre-modern contexts, the frequent identification of postdestruction occupation with squatters by archaeologists may offer one of the most salient contexts for greater exploration of the issues surrounding IDPs that are relevant to archaeological investigations. Consequently, as sensitive as the subject is within modern studies, archaeologists may greatly benefit from the consideration of ethnographic and cultural studies of the plight of refugees since the early twentieth century.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Greek Colonialism, Archaeology of
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Nomads in the Near East

References

Barber, R.L.N. 2010. Cyclades. In *The Oxford handbook of the Bronze Age Aegean (ca. 3000–1000 BC)*, ed. E. H. Cline, 159–170. New York: Oxford University Press.

Beckman, G. 1996. *Hittite diplomatic texts*, Writings from the Ancient World Series, Society of Biblical Literature 10. Vol. vol 7. Atlanta: Scholars.

Burke, A.A. 2011. An anthropological model for the investigation of the archaeology of refugees in Iron Age Judah and its environs. In *Interpreting exile: Interdisciplinary studies of displacement and deportation in biblical and modern contexts*, Ancient Israel and Its Literature 10, ed. B.E. Kelle, F.R. Ames, and J. Wright, 41–56. Atlanta: Society of Biblical Literature.

Burke, A.A. 2012. Coping with the effects of war: Refugees in the Levant during the Bronze and Iron Ages. In *Disaster and relief management. Forschungen zum Alten Testament 81*, ed. A. Berlejung, 263–287. Tübingen: Mohr Siebeck.

Burke, A.A. 2017. Amorites, climate change and the negotiation of identity at the end of the third millennium

B.C. In *The late third millennium in the ancient near east: Chronology, C14, and climate change*, Oriental Institute Seminars 11, ed. F. Höflmayer, 261–308. Chicago: Oriental Institute.

Burke, A.A. 2018. The decline of Egyptian empire, forced migration, and social change in the southern Levant, ca. 1200–1050 B.C. In *The archaeology of forced migration: Conflict-induced movement and refugees in the Mediterranean at the end of the 13th c. BC*, AEGIS, ed. J. Driessen, 235–255. Louvain-la-Neuve: Archéologie du monde minoen.

Cernea, M.M. 2000. Risks, safeguards, and reconstruction: A model for population displacement and resettlement. In *Risks and reconstruction: Experiences of resettlers and refugees*, ed. M.M. Cernea and C. McDowell, 11–55. Washington, DC: World Bank.

De León, J.P. 2013. Undocumented migration, use wear, and the materiality of habitual suffering in the Sonoran Desert. *Journal of Material Culture* 18: 321–345. https://doi.org/10.1177/1359183513496489.

De León, J.P. 2015. *The land of open graves: Living and dying on the migrant trail*, California Series in Public Anthropology 36. Oakland: University of California Press.

Finkelstein, I. 1988. *The archaeology of the Israelite settlement*. Jerusalem: Israel Exploration Society.

Finkelstein, I., and N. Na'aman. 2004. The Judahite Shephelah in the late 8th and early 7th centuries BCE. *TA* 31: 60–79.

Hamilakis, Y. 2016. Archaeologies of forced and undocumented migration. *Journal of Contemporary Archaeology* 3: 121–294.

Na'aman, N. 2007. When and how did Jerusalem become a Great City? The rise of Jerusalem as Judah's Premier City in the eighth-seventh centuries B. *C.E. BASOR* 347: 21–56.

Na'aman, N. 2009. The growth and development of Judah and Jerusalem in the eighth century BCE: A rejoinder. *RB* 116: 321–335.

Rendsburg, G.A., and W.M. Schniedewind. 2010. The Siloam tunnel inscription: Historical and linguistic perspectives. *IEJ* 60: 188–203.

Shivti'el, Y. 2017. *Cliff shelters and hiding complexes in the Galilee during the early Roman period*, Novum Testamentum et Orbis Antiquus, Series Archaeologica 6. Göttingen: Vandenhoeck & Ruprecht.

United Nations. (1951). Article 1.A.2, Revised edn. United Nations, U.N. Convention relating to the status of refugees.

Weiss, H. 2014. The northern Levant during the intermediate bronze age: Altered trajectories. In *The Oxford handbook of the archaeology of the Levant (c. 8000–332 BCE)*, ed. M.L. Steiner and A.E. Killebrew, 367–387. Oxford: Oxford University Press.

Weiss, H. 2017. Seventeen kings who lived in tents. In *The late third millennium in the ancient near east: Chronology, C14, and climate change*, Oriental Institute Seminars 11, ed. F. Höflmayer, 131–162. Chicago: Oriental Institute.

Further Readings

Fiddian-Qasmiyeh, E., G. Loescher, K. Long, and N. Sigona, eds. 2014. *The Oxford handbook of refugee and forced migration studies*. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199652433.001.0001.

Harrell-Bond, B.E., and E. Voutira. 1992. Anthropology and the study of refugees. *Anthropology Today* 8: 6–10.

Kunz, E.F. 1973. The refugee in flight: Kinetic models and forms of displacement. *International Migration Review* 7: 125–146.

Kunz, E.F. 1981. Exile and resettlement: Refugee theory. *International Migration Review* 15: 42–51.

Regional/Site Museums

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Introduction

The term "site museum" was first used in the 1950s to describe a museum at a place of scientific or historical significance whose purpose was to interpret the site to visitors (Lewis 1959). Site museum at that time referred both to museums at historic and archaeological sites and to visitor interpretive centers at natural and historic monuments and within scenic parks. Shortly thereafter in the 1960s, the term "regional museum" began being used to identify local and specialized museums that interpreted objects and phenomena from a specific geographical location such as a district, landscape, or village. Like site museums, regional museums encompassed both natural and cultural history and were based in disciplines in addition to archaeology. Subsequently, outside the discipline of archaeology, "site museum" became an overlapping term for outdoor and open-air museums including historic houses, living history museums, folk museums, heritage villages, and historic parks (Shafernich 1993; Moolman 1996; Swanson 2009). And while the original use of "regional museum" suggested multiple sites or locales within a

defined area, the term was sometimes applied to individual site museums, community museums, and ecomuseums.

Expansion of these terms occurred in parallel with broadened definitions of heritage and culturally significant places within international policy (see Ahmad 2006; Cleere 2010). Unfortunately, such expansion has also led to confusion. "Site museum" has erroneously been applied to museums with buildings dislocated from their original sites and reconstructed in configurations that did not exist in the past. "Regional museum" is now used in several countries to designate district museums within a hierarchical museum system organized and overseen by a national-level ministry of culture or heritage trust. Both site museums and regional museums are associated with defined geographical locations and are tasked with interpreting aspects of the culture, history, and/or environment of those locations to visitors. Importantly, site and regional museums often attempt to communicate a sense of place (sensu Davis 2011) that enables visitors to understand the significance of a locale and to feel connected to the past. Archaeological site and regional museums fit within this broad definition but possess unique characteristics and face challenges based on the nature of archaeological sites, archaeological data, and perceived relationships with living communities.

Definition

Despite the large amount of work devoted to creating archaeological museums and promoting public outreach and heritage tourism through them (see, e.g., Stone and Planel 1999; Grabow et al. 2007; King 2011; Okamura and Matsuda 2011; Skeates 2017), there are few published definitions of archaeological site and regional museums. A notable exception is Silverman (2006: 4), who defines an archaeological site museum as a building at an archaeological site which displays materials excavated from that site and perhaps related sites together with explanatory texts that interpret the site and its archaeological culture for the public. Erturk (2006) and Swanson (2009) similarly identify an archaeological site museum as an archaeological site with associated interpretive elements such as text panels or an on-site museum and require that the site be preserved, protected, and periodically open to the public. Paardekooper (2012, 2014) includes some archaeological site museums in his review of archaeological open-air museums, but such open-air museums may not be located on the sites themselves and often do not exhibit archaeological artifacts. All of these definitions stress the integration of interpretation for the public with the archaeological site itself, but only Silverman's definition also requires exhibition of artifacts or other archaeological materials. Additionally, neither definition differentiates site museums from regional museums.

Expanding on this and in line with general definitions of museums, an archaeological site museum collects, preserves, researches, exhibits, and communicates evidence and interpretations of the human activities that occurred at that site to the public. By extension, an archaeological regional museum collects, preserves, researches, exhibits, and communicates evidence and interpretations of past human activities that occurred across a number of sites or landscapes to the public. In both cases, this communication should explain the site's or region's significance or relevance and frame the evidence and interpretations with respect to archaeological research methods and various historic, environmental, and other contexts. The goal of archaeological regional and site museums is to translate the archaeological record, or evidence of the past in a specific locale or region, for public understanding and consumption. Translation or interpretation requires more than simply displaying or documenting the material record; it requires encouraging visitors to ask questions of the material record and about its meaning (Chan 2011).

Key Issues/Current Debates/Future Directions/Examples

The issues and debates faced by archaeological site and regional museums, and by the

archaeologists working with them, involve balancing museological, archaeological, and heritage management theory and practice priorities (see, e.g., Watson 2007; Graham and Howard 2008; Okamura and Matsuda 2011), oftentimes in the face of contradictory market pressures and transnational policies. Challenges stem from the competing needs of the sites, their visitors, their researchers/caretakers, and the communities within which sites are located both geographically and genealogically. Additional challenges arise from differences among scholars, administrators, and policy-makers over the primary purposes of these museums and the best ways to achieve those purposes. Site museums are seen as a way to enable archaeologists to achieve their ethical responsibilities with respect to public engagement (Silverman 2006), but these museums become a double-edged sword when stakeholders disagree over how, and what, aspects of a site are to be preserved and interpreted, and for whom. Debates center on regional and site museums as stewards, as interpreters, as heritage, and as instruments in cultural policy, tourism, and development.

Archaeological site and regional museums collect, preserve, and exhibit materials and data from one or more archaeological sites and often have roles in the continued preservation and management of those sites. As simultaneous stewards and presenters of the archaeological record, these museums must balance preservation in place with excavation and reconstruction and the use of original items with restorations and reproductions. Attempts to achieve this balance lead to both specific debates over reconstructive techniques and broader controversies over preservation philosophies. A conservation ethos with respect to archaeological sites and artifacts can put museums at odds with tourism and development demands while also serving as a rallying ground for preservation legislation and activism at the local, national, and international levels. Numerous examples of both cases over the past decade are documented in the journals *Conservation and Management of Archaeological Sites* and *Archaeologies: Journal of the World Archaeological Congress*.

Conservation and preservation issues also play into the technologies chosen for interpretation and the relation of the museum to knowledge production. Contemporary regional and site museums, to the extent that they participate in now globalized professional museological discourse (Muller 2005; Skeates 2017), approach interpretation as explanation aimed at provoking or enabling visitors to create their own knowledge and make their own meaning about the site(s) and archaeology. This presents several challenges with respect both to the basis of interpretation and to how visitors are conceptualized and addressed. Because of the overwhelming amount and complexity of information yielded by archaeological sites, interpretive planning within regional and site museums is a highly selective process in which only a limited number of archaeological times, features, spaces, and stories are exhibited and communicated. Decisions about which stories to convey, and from what perspectives they should be told, require a clear understanding of visitor diversity, needs, and capabilities and control over the current state and future potential of archaeological and museological research.

Archaeological site and regional museums act as both interpreters and places of heritage, and because of the power relationships involved in knowledge production, these museums can be caught up in what has been referred to as the politics and poetics of representation (see Bell 2012). The information and interpretation presented by site and regional museums can be read in different ways and put to different purposes by visitors and critics. These museums portray and explain relationships between ideas and things and persons in ways that can promote collaborative generation of knowledge and support identity formation and expression within particular groups. Conversely, these same actions may provoke contestation and disputes among groups with competing claims on the museum. The role of regional and site museums in the production of identity and heritage is highly variable and involves related issues of authenticity, cultural commodification, and authority. Site and regional museums are also subject to public and scholarly

debates over agency and control in the realms of cultural policy, tourism, and development.

In many countries, archaeological site and regional museums are seen simultaneously as part of cultural tourism networks or destinations and as a way to implement government-based heritage management initiatives or cultural policies (Erturk 2006; Demoule 2012). They are seen as new industries in economically disadvantaged areas, as reasons for international development expertise and economic support, and as solutions to strained relations with ethnic minority or other excluded population sectors. These increased expectations and broader roles impact the kinds of interpretation, preservation and conservation practices, and physical configuration possible at regional and site museums. To meet the demands of tourism, regional and site museums must provide interpretation at different levels to accommodate the diverse expectations, interests, and capabilities of an expanded visitor base and may view visitors from a consumer or marketing perspective. These museums may also uncritically alter their missions and programming or adopt various globalizing standards to accommodate policy initiatives or to qualify for international support.

Interestingly, a number of digital applications originally developed to encourage or accommodate cultural tourism at archaeological museums, including site museums, are increasingly being used to promote heritage learning among domestic visitors and local communities. These applications range from social media that primarily serve a marketing function (De Man 2015) to interactive storytelling (Deliyiannis and Papaioannou 2014), serious gaming (Mortara et al. 2014), and collaborative research (Bonacchi et al. 2014) designed with learning in mind. Several of the applications use augmented reality and games on handheld mobile devices to assist visitors in interpreting an archaeological site as they move around it (see, e.g., Angelopoulou et al. 2011; Etxeberria et al. 2012). This new trend in digital heritage interpretation at archaeological sites and site museums suggests a renewed interest in promoting learning and a more democratic museum experience, but the impact of these applications on visitor experiences has yet to be fully assessed. Evaluation at the present time still lies in the realm of visitor satisfaction surveys and user testing, rather than learning outcomes. The issues and debates faced by archaeological site and regional museums are not restricted to particular regions of the earth, and how site museums address these challenges is shaping the future directions and configurations that they will take. What is currently variable across the world is the specific content, emphases, daily operations, and appearance of individual museums. Some regional and site museums address the nature of archaeological investigation or introduce multiple perspectives within their interpretations, while others do not. Some extend reconstruction beyond simple architecture to demonstrate various past behaviors through performances and reenactments. The variability among contemporary regional and site museums is due in part to the incredible diversity of human history, variation inherent in the archaeological record, and local and state level differences in archaeological and museological practice. With the adoption or imposition of international standards, some of this variation may disappear but challenges facing archaeological site and regional museums will not.

Cross-References

- ▶ Archaeological Record
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Museums
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage Museums and the Public
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ Museum Education and Archaeology
- ▶ Site Visitation and Interpretation: Management
- ▶ Uses of Heritage

References

Ahmad, Y. 2006. The scope and definitions of heritage: From tangible to intangible. *International Journal of Heritage Studies* 12: 292–300.

Angelopoulou, A., D. Economou, V. Bouki, A. Psarrou, L. Jin, C. Pritchard, and F. Kolyda. 2011. Mobile augmented reality for cultural heritage. In *International conference on mobile wireless middleware, operating systems, and applications*, 15–22. Berlin: Springer.

Bell, J.A. 2012. Museums as relational entities: The politics and poetics of heritage. *Reviews in Anthropology* 41: 70–92.

Bonacchi, C., A. Bevan, D. Pett, A. Keinan-Schoonbaert, R. Sparks, J. Wexler, and N. Wilkin. 2014. Crowdsourced archaeological research: The micro pasts project. *Archaeology International* 17 (4): 61–68.

Chan, A.A. 2011. Translating archaeology for the public: Empowering and engaging museum goers with the past. *International Journal of Heritage Studies* 17: 169–189.

Cleere, H. 2010. Management plans for archaeological sites: A world heritage template. *Conservation and Management of Archaeological Sites* 12 (1): 4–12.

Davis, P. 2011. *Ecomuseums: A sense of place*. 2nd ed. London: Continuum International Publishing Group.

De Man, A. 2015. Social media and archaeological museums: A Portuguese perspective. *International Journal of Cultural and Digital Tourism* 2 (1): 55–65.

Deliyiannis, I., and G. Papaioannou. 2014. Augmented reality for archaeological environments on mobile devices: A novel open framework. *Mediterranean Archaeology & Archaeometry* 14 (4): 1–10.

Demoule, J.-P. 2012. Rescue archaeology: A European view. *Annual Review of Anthropology* 41: 611–626.

Erturk, N. 2006. A management model for archaeological site museums in Turkey. *Museum Management and Curatorship* 21: 336–348.

Etxeberria, A.I., M. Asensio, N. Vicent, and J.M. Cuenca. 2012. Mobile devices: A tool for tourism and learning at archaeological sites. *International Journal of Web Based Communities* 8 (1): 57–72.

Grabow, S., D. Hull, and E. Waterton, eds. 2007. *Which past, whose future? Treatments of the past at the start of the 21st century: An international perspective*, BAR international series 1633. Oxford: Archaeopress.

Graham, B., and P. Howard, eds. 2008. *The Ashgate research companion to heritage and identity*. Burlington: Ashgate.

King, T.F., ed. 2011. *A companion to cultural resource management*, Blackwell companions to anthropology 17. Chichester: Wiley-Blackwell.

Lewis, R.H. 1959. Site museums and national parks. *Curator* II: 172–185.

Moolman, H.J. 1996. Site museums: Their origins, definition and categorisation. *Museum Management and Curatorship* 15: 387–400.

Mortara, M., C.E. Catalano, F. Bellotti, G. Fiucci, M. Houry-Panchetti, and P. Petridis. 2014. Learning cultural heritage by serious games. *Journal of Cultural Heritage* 15 (3): 318–325.

Muller, K., ed. 2005. A special issue on museums in the era of globalization. *Curator* 48: 5–110.

Okamura, K., and A. Matsuda, eds. 2011. *New perspectives in global public archaeology*. New York: Springer.

Paardekooper, R. 2012. *The value of an archaeological open-air museum is in its use: understanding archaeological open-air museums and their visitors*. Leiden: Sidestone Press.

Paardekooper, R. 2014. The history and development of archaeological open-air museums in Europe. In *Experiments past: histories of experimental archaeology*, R. Paardekooper and J. Reeves Flores, editors. Leiden: Sidestone Press.

Shafernich, S.M. 1993. On-site museums, open-air museums, museum villages and living history museums: Reconstruction and period rooms in the United States and the United Kingdom. *Museum Management and Curatorship* 12: 43–61.

Silverman, H., ed. 2006. *Archaeological site museums in Latin America*. Gainesville: University Press of Florida.

Skeates, R., ed. 2017. *Museums and archaeology*. London: Routledge.

Stone, P.G., and P.G. Planel, eds. 1999. *The constructed past: Experimental archaeology, education and the public*. London: Routledge.

Swanson, D.K. 2009. Site museums and monuments. In *Encyclopedia of library and information sciences*, 3rd ed. New York: Taylor and Francis.

Watson, S., ed. 2007. *Museums and their communities*, Leicester Readers in Museum Studies. London: Routledge.

Register of Professional Archaeologists (RPA)

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Basic Information

The Register of Professional Archaeologists (RPA) was formed in April, 1998, and succeeded the Society of Professional Archaeologists (SOPA), which had been formed in 1976. SOPA was self-defined as a professional society, and offered basic certifications in field and laboratory research, with additional certifications in areas

such as cultural resource management, teaching, museology, and underwater archaeology. Applicants agreed to adhere to a code of ethics that included a "Code of Ethics and Standards for Research Performance," which applied to individuals, and institutional standards that applied to the program within which the member conducted his or her research. SOPA also had defined standards for field schools (Jameson 2004: 38).

RPA was established as a result of the efforts of a joint task force composed of representatives from SOPA, the Society for American Archaeology (SAA), the Society for Historical Archaeology (SHA), and the Archaeological Institute of America (AIA). The SAA, SHA, and AIA became sponsors or RPA when it was formed, and were later joined in the same role by the American Anthropological Association. The governing Board of RPA consists of representatives of those four sponsors, while the officers, which include the RPA President, President-Elect, and Secretary-Treasurer, are elected by RPA registrants (Beaudry 2009: 17; www.rpanet.org).

RPA streamlined the registration process and dropped the specialty certifications that had been offered by SOPA. Two types of applications are offered. The Short Form application is offered for an applicant who:

- Holds an advanced degree with a specialization in archaeology
- Has designed and executed an archaeological study that has been reported in the form of a Master's thesis or Doctoral dissertation
- Accepts the responsibilities and standards described in the Code of Conduct, Standards of Research Performance, and Grievance Procedures of the Register of Professional Archaeologists (www.rpanet.org)

The Long Form application is required for those who have an advanced degree, but lack the specialization in archaeology and/or a thesis or dissertation that dealt with a substantive archaeological issue. Both Long and Short forms are reviewed and accepted or rejected by the RPA Registrar, who is elected by vote of the membership (www.rpanet.org).

The RPA "Code of Conduct" and the "Standards of Research Performance" replaced the SOPA "Code of Ethics and Standards for Research Performance." The Code of Conduct states:

> Archaeology is a profession, and the privilege of professional practice requires professional morality and professional responsibility, as well as professional competence, on the part of the practitioner (www.rpanet.org).

The Code of Conduct spells out what archaeologists shall and shall not do when dealing with the public, dealing with colleagues, employees, and students, and dealing with employers and clients. That code incorporates some elements of the SOPA institutional and field school standards, and provides clear ethical guidance to registrants (www.rpanet.org).

The Standards of Research Performance spell out standards that registrants must meet when engaging in any type of archaeological research. In broad terms, the standards require that the registrant "prepare adequately" for the research project, follow the prepared "scientific plan of approach" to the extent possible; ensure that adequate records are kept to ensure that provenience information is preserved in the laboratory; curate the project materials with an appropriate curatorial facility "unless otherwise required by law"; and disseminate the research results to "appropriate constituencies with reasonable dispatch" (www.rpanet.org).

The Code of Conduct and Standards of Research Performance (The Code) are enforced by RPA through a written grievance procedure by an elected Grievance Coordinator. Once a complaint is received, it is within the discretion of the Grievance Coordinator to dismiss the complaint or to appoint a Grievance Committee composed of two RPAs to work with the Grievance Coordinator to investigate it. The Grievance Committee prepares a report at the conclusion of its investigations that can recommend that the case be closed for lack of supporting evidence, that the person investigated be allowed to accept admonishment or censure with no further action, or that the case be referred to the Standards Board, the membership of which is elected by the RPA

registrants. The Standards Board then schedules a hearing to hear the case and takes testimony from all those who are involved. The Standards Board is required to render its opinion within no more than 30 days after the hearing. The Standards Board issues a "finding of fact" which includes a determination if any of the allegations are true and imposes disciplinary action if one or more allegations were supported. The actions taken may range from an admonishment to termination of registration (www.rpanet.org).

Major Impact

The major impact of RPA is that the number of registrants has increased from less than 1,000 members under SOPA to well over 2,000 at present. This increase is highly significant because it brings many more archaeologists under the provisions of the RPA Code. The RPA process is viewed by those in other disciplines as a certification process for professional archaeologists that is similar to other professional certifications. This has particular value to archaeologists involved in cultural resource management. RPA now certifies archaeological field schools that are conducted under the guidance of an RPA following a responsible research plan, and offers field school scholarships. RPA has recently begun certifying continuing education programs, which should be a significant benefit for its members. A founding principle of RPA was to "advance professionalism in archaeology," and that goal is certainly being met.

Cross-References

- ▶ American Anthropological Association (AAA) and Ethics
- ▶ Archaeological Institute of America (AIA)
- ▶ Ethics in Archaeology
- ▶ Field Schools, Archaeological
- ▶ Society for American Archaeology (SAA)
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

References

Beaudry, M.C. 2009. Ethical issues in historical archaeology. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gainster, 17–29. New York: Springer.

Jameson, J.H. 2004. Public archaeology in the United States. In *Public archaeology*, ed. N. Merriman, 21–58. London/New York: Routledge Taylor & Francis Group.

Register of Professional Archaeologists. n.d. Available at: http://www.rpanet.org

Reichel-Dolmatoff, Gerardo

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State of Knowledge and Current Discussions

Gerardo Reichel-Dolmatoff's work is important for South America's archaeology and anthropology; he together with his wife Alicia Dussán began to offer, with other scholars, the first disciplinary data that would mark the course of Colombian archaeology and anthropology. Reichel-Dolmatoff's work has been discussed by different scholars (Laurière 2010) who have pointed out the iconic phases of what could be considered the history of his academic production. It is necessary to mention something about this and given the fact that this anthropologist was the first to produce a series of data on the archaeology of Colombia, to some extent his history as a scholar coincides with certain aspects of the history of the anthropology in the country.

It is agreed that Reichel-Dolmattoff's arrival took place at the end of the 1930s when the liberal party ruled Colombia. They, unlike the conservative party, promulgated a certain integration policy of rural communities into the nation project. In this context, the emergence of social sciences in

the country was possible. This tendency strongly opposed the eugenics projects that were encouraged by certain fascist-driven currents in Colombia. It should be remembered that Colombia, like other the countries of the southern cone, tried at the beginning of the twentieth century to exterminate the indigenous population and promote the migration of Europeans from Western Europe, but certain liberal ideologues restrained the initiative and proposed an integration strategy that was based on the idea that, through education, assigned to the Catholic Church, the indigenous would become citizens of the republic; this initiative was known as the "reduction of savages" (Londoño 2003).

With the consolidation of the liberal republic, the State began to treat the issues of the nation's diversity with some scientific rigor, distancing itself from the models of extermination of the native population that had marked the processes of consolidation of the State in the southern cone in the last decades of the nineteenth century. This turn in national politics, in relation to indigenous communities, allowed the establishment of some ethnology institutes that were the predecessors of the three oldest anthropology departments of Colombia (Pineda1984).

The liberal republic of the 1940s (Silva 2006) called for a certain cultural recognition of the country; the premise was that there could be no nation unless the territory was known in some way. Likewise, the international conventions signed by Colombia to protect the indigenous population made it necessary to establish a national ethnic information system that prevented, as agreed, the indigenous people's extermination in exchange for their integration as citizens (Pineda 1984). It was in this way that Paul Rivet, fleeing from the Nazi's advance into France, was able to found the National Ethnological Institute in 1941. There is enough evidence to show that by 1941 Reichel-Dolmatoff was close to Rivet, up to the point that Reichel, without no institutional affiliation or role as an ethnographer, had the possibility of accompanying him in the National Ethnological Institute official explorations (Laurière 2010, 114). The Ethnological Institute foundation takes place in 1941, but Reichel-Dolmatoff had arrived in the country in 1939 and was recognized in the cultural scene of the capital as a painter, because, as a matter of fact, he had presented paintings in the newly founded art galleries of Bogotá. While there are different sources about the details of Reichel's arrival in the country, it is clear that his entry was favored by the series of laws that had made Colombia a possible destination for people with German passports and Caucasian appearance. Following a policy that could be labelled as a fascist, the Colombian government, on the eve of the Second World War, had banned Jews from Europe from entering the country (Galvis and Donadío 1986, 217). Given the Austrian origins that were recognized to Reichel, his arrival in 1939 to Colombia was easy.

In 1943, Gerardo Reichel-Dolmatoff marries the anthropologist Alicia Dussán, and thus the couple begins a project of exploration of the country. In the light of the present time, in Reichel-Dolmatoff's work, some inflections defined by his concerns could be discerned at particular moments of time. A first inflection would be his early studies on the archaeology of northern Colombia where, through archaeological surveys and colonial sources' consultation, he achieves two major disciplinary contributions. The first would be a documentation of archaeological sites in the coastal and mountainous areas, and the second the generation of some periodizations about the region that was based on elements of the archaeological record such as ceramic decorations (Reichel-Dolmatoff 1954). The other inflection is the contributions to a certain ethnography of an environmentalist nature, where he pointed out that the natives were ecologically friendly given their animistic cultures. These arguments are developed throughout the 1960s and 1970s. It is in the latter decade that Reichel begins to be recognized worldwide as an expert in Amazonian lowland societies regarding the use of hallucinogens. This fame, no doubt, was due to his membership in the Department of Anthropology at the University of California, Los Angeles; even Reichel managed to sign publications pointing to this

university as the institution to which he was affiliated (Reichel-Dolmatoff 1985a). Finally, in the 1980s and 1990s, there is another period, where it is possible to appreciate the appearance of synthesis of the country (Reichel-Dolmatoff 1997) and studies on the belief systems of Amazonian societies (Pineda 2003).

Something to be mentioned here is the fact that Reichel, while he was interested in the archaeological record of the North of Colombia, and while trying to offer regional syntheses of historical sequences through some archaeological features, helped to build the myth that some ethnographic tribes were the descendants of pre-Hispanic cultures whose remains began to be studied by archaeology. This is clearly seen in the idea of a continuity between the Tairona tribe, described by chroniclers as the one with the greatest resistance to the conquest, and the Kággaba or Kogui which, according to Reichel, was one of the best preserved tribes in northern Colombia (Reichel-Dolmatoff 1985b, 16).

This idea about the aforementioned Tairona-Kogui continuity was generated in the late nineteenth and early twentieth century, by American archaeologists, e.g., Marshall H. Saville, who had studied the Spanish chronicles with judgment. According to the information provided by Gregory Mason, a PhD student from Saville, he suggested excavating in Colombia to find Taironas remains (Mason 1938, ix). Saville knew about the Tairona collections, because at the beginning of the twentieth century some anthropologists who had been in Santa Marta had taken samples of pottery and gold to the United States (Giraldo 2010, 46). These first collections had been the result of some philanthropists' funding who had obtained their fortune from oil as George Gustav Heye, founder of the Museum of American Indian in 1916.

Today with the declassified archives of the First World War, it is known that Heye, through his foundations, financed archaeologists to conduct research in South America while acting as double agents of the emerging intelligence agencies of the United States. This was the case of Samuel K. Lothrop, who gathered, financed by Heye's resources, large collections in Central America and South America.

In the United States, at the beginning of the twentieth century, the idea of a probable continuity among the tribes described in the chronicles and current populations promised much for the development of pre-Hispanic society's archaeology. As it can be seen in the research that was taking place in the United States in the 1920s, these scholars knew the books written by chroniclers and priests about the North of Colombia very well. This was possible, undoubtedly, because of the archival investigations that were carried out in Spain, as well as the publication of works written in the sixteenth, seventeenth, and eighteenth centuries, which were published in Madrid and Paris in the nineteenth century and that circulated in America. In these works, repeatedly, it was pointed out that the conquerors had defeated the fierce Tairona, in the epic battles of the sixteenth century.

As early as 1953, Reichel-Dolmatoff, based on his ethnographic research, had determined that the Kággaba or Koguis, an ethnic group from the Sierra Nevada de Santa Marta, in northern Colombia, discriminated the Tairona in their genealogies, recognizing them as a different tribe (Reichel-Dolmatoff 1953, 29). Yet, Reichel did not maintain this position and used the name, as the conquerors had done, to refer to the tribes with whom they had fought in the conquest processes of the present North of Colombia. In the works where Reichel had the opportunity to present large-scale temporal and spatial visions of northern Colombia, he used the Tairona notion to refer to a nation that was neither a State nor a mere tribe, which inhabited the Sierra Nevada de Santa Marta until their submission in the sixteenth century. In the words of Reichel, the Muisca and the Tairona were the only two manifestations of social complexity of Colombia's archaeology; these two societies:

> Achieved a somewhat wider political cohesion. One can hardly speak here of 'incipient states', much less of 'kingdoms' or 'empires'; rather, they were strong villages federations in which a large numbers of settlements and peoples of the same ethnic stock were united under the control of a single individual. . . (Reichel-Dolmatoff 1965, 142)

As it can be seen, Reichel resumed the American tradition of thinking about the archaeological record of the North of Colombia, as evidence of the existence of the fierce tribes mentioned in the chronicles. By the eighteenth century, the historiographical imaginary pointed out that the conquests of the past two centuries had confronted the conquerors with the Tairona, which in some stories were compared with the antediluvian beings mentioned in the Genesis of modern bibles (Julian 1854). As reviewed by a variety of authors, America was already invented before being described (O'Gorman 2010).

According to this scenario, with the institutionalization of anthropology in Colombia in the 1940s, and with the emphasis that Reichel-Dolmatoff put on investigating the Kággaba tribes and Tairona archaeological sites, many of his students, who did research in the Sierra Nevada from Santa Marta in the 1970s and 1980s, openly pointed out that the Kággaba were the main descendants of the Tairona who, as a result of what was happening in the 1970s with the aperture toward environmentalism, were clear evidence of sustainable management and ancestral ecosystem. These ideas were legitimized by the project of investigating these tribes, to replicate their ecosystem management in the peasant societies that began to occupy the mountains of the Sierra and that were seen as predators (Serje 2008). Consequently, the Tairona-Kogui continuity was declared in the 1970s, appealing to the tradition instituted by Reichel-Dolmatoff, which in turn had been the result of retaking these presuppositions of American archaeologists such as Gregory Mason, who in turn had taken them back from Saville. However, since the chronicles indicated that the Tairona were warriors, and given the passivity of the Kággaba, Mason in the 1930s pointed out that, probably, the descendants of the Tairona were not the Kággaba but the "Goajiros" (Mason 1938, ix).

When reviewing Reichel's work, it has also to be added that other authors have offered images that auscultate his previous life before arriving in Colombia. According to this documentation (Oyuela-Caycedo 2012), he was an active supporter of the Hitler militias, and, just before his migration, he was a recognized murderer of the National Socialist paramilitary groups. This is not a minor detail, since, in fact, the peculiarities of Reichel's life are insipid when making a historiographical analysis of his work and its relationship with the development of anthropology and archaeology in Colombia. Some authors point out that when Reichel was questioned about his family background, he explained that he had been educated at a Benedict school in Munich and that he also received great influence from his family environment where works of art and history books proliferated (Lomnitz 2017). In this regard, some people have documented how Reichel-Dolmatoff was expelled from school, so his idyllic training history is a lie (Oyuela-Caycedo 2012). At the age of 14, Reichel was expelled from the Benedict College for promoting pro-Nazi organizations, so his time at school was brief. With a disintegrated nuclear family, since his father abandoned them, and with problems at school, Reichel's adolescence was spent in his eagerness to ascend in the fascist militias. Apparently when Reichel crosses his second decade of life, he has serious problems inside the party, so he leaves Germany and takes refuge in Paris at the beginning of the 1930s. It is in this context where he knows about the possibilities of migrating to Colombia, where he later on becomes part of the ethnological missions that would be in charge of the French ethnologist Paul Rivet.

If, as biographers point out, Reichel was born in 1912, by 1943, at the age of 31, he was already making his first publications in Colombia on archaeology of the center of the country. Something important in this decade has to do with the reports made by Reichel and Dussán about the activities of the Magdalena Ethnological Institute in 1947 (Reichel-Dolmatoff 1947). As it can be seen in these publications, the couple had been given the task of doing some research, and publications on behalf of the aforementioned institute, which complemented, in the North of Colombia, the ethnological works that were already being carried out in other parts of the country with the Ethnological Institute of Cauca (1947), the

Ethnology Service of Antioquia (1945), and the Institute of Ethnological Research of the Universidad del Atlántico (1947).

When observing the reports of these decades and the concerns they cover, the routine procedures appear as descriptions of archaeological materials or specific components such as generalities of indigenous economies. Certainly, in his activities at the Magdalena Ethnological Institute, Reichel sowed some disciplinary concerns such as the evaluation of the information available in the colonial documentation on the indigenous communities of northern Colombia, which led him to make some inventories of colonial documents that were useful for the understanding of the pre-Hispanic past. He was also worried about the archaeological sequences, so he proposed his first systematizations in the 1950s (Reichel-Dolmatoff 1954).

Reichel-Dolmatoff played a very important role by being one of the first to found institutes of anthropological studies in a region that, like Magdalena, was characterized by the presence of abundant indigenous communities and by the existence of huge vaguely studied archaeological sites. This is how a large number of archaeological materials emerged that served to define the ceramic typologies of northern Colombia. Something that should be mentioned is that these typologies are generally intuitive and confusing, while archaeological complexes in many cases were considered ethnic groups (Reichel-Dolmatoff, Colombia 1965), and also the type definitions were made without delineating the series of attributes that defined the types.

At the beginning of the 1950s, Reichel published a book where he summarized the information available in the General Archive of the Nation about the tribes of the old Spanish province of Santa Marta (Reichel-Dolmatoff 1951). In that book, it was possible to see how Reichel used the ethnohistoric information available to map the probable distribution of the tribes and the formation of provinces at the arrival of the conquerors. Likewise, he proposed a periodization of the archaeology of northern Colombia in which he would place some initial stages that could be equivalent to the Paleolithic, which would lead to phases of formation (American formative) that would eventually consolidate into developments of social complexity. With some variations, this periodization accompanied Reichel throughout his life and was ratified in his archaeology texts from Colombia (Reichel-Dolmatoff 1997).

In the 1950s Reichel had a prolific activity, especially in his records of sites close to the swamp system that make up the corridor between the mouth of the Magdalena River in Barranquilla and the city of Cartagena. Most of these sites were catalogued by Reichel as formative given the presence of shells and ceramics, associated with artifacts to process cassava. In general, these sites were characterized by little evidence of sedentary life, but with differentiating features such as the use of ceramics, which allowed us to think of semi-nomadism.

The formative was defined, consequently, as the period where the dependence on the collection of molluscs, added to the recollection of roots, allowed the basis for village life that was the distinctive feature of the regional development period. This idea is very important because Reichel always thought that there was a need for a mechanism to strengthen the villagers' ways of life that he considered, in any case, as post-formative. From Reichel's appreciation, what would be popularized was the idea that the formations of the littoral zone presented forms of adaptation of the formative that were earlier than the manifestations of the sierra characterized by their system of villages and roads, both marks of complexity development processes. As Lanhebaek properly pointed out, this apparent distribution of temporalities is not a feature of the pre-Hispanic past but the result of archaeologists' emphasis on studying "lost cities" without paying attention to coastal sites.

Undoubtedly, this is one of Reichel's most popular ideas, and, in turn, it is one of the best kept arguments of his disciplinary heritage. Yet, it has been shown that his thesis does not have empirical support since there is no systematic process of absolute dating that allows us to infer, in the case of northern Colombia, the population patterns of the sierra regions versus the

guidelines of population of the coastal regions, indicating that the former are more recent than the latter.

As some scholars of Reichel's work (Uribe 2017) have pointed out, before the question of his fascist past came up, panegyrics abounded about his work, especially signalling two things: first, the recognition of religious rituals of complex belief systems in the indigenous communities' use of certain hallucinogens. In a country as traditional as Colombia, talking about the fact that indigenous rituals had an anthropological sense was a challenge and a great contribution to the humanities. Second, the other contribution was having tried a global vision of the country's pre-Hispanic past, through his synthesis and descriptions of sites. No one knew Colombia better than Reichel-Dolmatoff and his wife Alicia Dussán, because they had the opportunity to visit indigenous communities that still did not face the rapid processes of change that occurred in the last quarter of the twentieth century.

Reichel-Dolmatoff's idea regarding the anthropological dimensions of the consumption of sacred plants probably came from his collaboration in the book edited by Johannes Wilbert on horticulture in indigenous communities in South America (Wilbert 1961). Wilbert was an active collaborator of the La Salle Foundation in Caracas, which through its famous "Anthropological" magazine spread important ethnographic and archaeological studies of the native communities of Venezuela. As it can be seen in the magazine's publications, Wilbert's entries disappear in 1964, when he is appointed director of the Latin American Centre at UCLA. In that book, Reichel would publish an article that would later on have great influence, entitled "The Agricultural Basis of the Sub-Andean Chiefdoms" (Reichel-Dolmatoff 1961). Basically, Reichel's thesis in this book was that corn constituted the device that had allowed the passage from the formative to the regional development. When you review the article, the descriptions of the processes are very general, and there are not really paleobotanic studies that support the claims; it is a purely speculative document that was not built with the intention of being a model to evaluate.

In that same decade, Reichel would arrange with Glyn Daniel, who was an archaeology professor at Cambridge University, an issue on Colombia, for the series he directed for the Thames and Hudson Publishing House, founded by the couple Walter and Eva Neurath, remembered for their anti-Nazi activism in the 1930s in Germany. In the first edition of this book (Reichel-Dolmatoff 1965), which was printed in Holland, two important things would happen that would mark Reichel's personal life and anthropology in Colombia. The first is identity laundering. On the flip of the book, it is written that Reichel "was born in Austria, was educated in Vienna, Munich, and at the University of Paris where his studies were interrupted by the war." In this way, Reichel constructs his name and creates his own past, as he was an active part of the fascist groups responsible for the war. The second would be the ratification of the idea that the level of chiefdoms was reached in Colombia, that is, societies with surplus production and centralized powers. This, according to the author, only occurred in northern Colombia in the Tairona chiefdoms and in the center of the country with the Muisca chiefdoms.

If a summary of Reichel's contribution to Colombian anthropology is made, it is clear his interest in systematizing time and space that no one dared to question until well ahead the 1990s. His contribution to the understanding of shamanism, arguing for a country like Colombia, that the use natives give to hallucinogens, could originate certain policy that would take the State, from the criminalization of consumption to its acceptance as an anthropological phenomenon. Undoubtedly, this agenda ceases in a certain way at the end of the 1960s when Reichel presents his resignation letter to the directors of the Universidad de los Andes, at the Department of Anthropology that he helped build, pointing out that the students did not want to benefit from a *pensum* where a matrix was not inserted to position anthropology as a tool to support the claims of social movements, especially indigenous people; this was something he was not willing to accept.

It should be noted that on the situation of indigenous communities, which was very tense in the 1950s because of the murder of indigenous

leaders in the southwestern part of the country claiming their land return, Reichel and his wife were quite cautious because in some way they did not want to hurt the susceptibilities of a state elite whose officials wished that the indigenous situation should not be denounced. Reichel and his wife made a decision, and they knew the integration of the indigenous people was inevitable, so it was necessary to access the possible benefits of a life-saving anthropology (Dussán 1977). This marked a huge gap in Colombian anthropology because many anthropologists took the opposite path and became activists in the indigenous movements and, in some cases, helped consolidate processes that included land return and the release of indigenous leaders who were imprisoned for activism.

At present, Reichel-Dolmatoff's work is received by the new generations of anthropologists in two senses. In the first sense, what is acknowledged are his attempts at visions of time and space on a large scale, which gave, in the end, heuristic elements for the understanding of the pre-Hispanic past. In the light of the criticism established by processualism, this inheritance is seen as a very representative sample of the paths of cultural-historical archaeology and its emphasis on migration as an explanatory mechanism of cultural change. There are even some archaeologists who take Reichel's periodifications to the letter and believe that there really was an evolutionary sequence in northern Colombia. In the second sense, ethnographers have been more critical than archaeologists and have made a revisionist analysis of Reichel's work (Serje 2008). In the results of this review, it is clear that Reichel represented the Kogui as environmentally sustainable societies governed by a sort of elite with ancient knowledge. As shown above, these ideas were quickly taken by Reichel's disciples who even tried to recreate in the Sierra Nevada de Santa Marta a pre-Hispanic utopia of environmentally sustainable societies, using the descriptions of the Kogui temples that Reichel made, as models of the new villages (Serje 2008).

The chronicles written in the colony told stories about the powerful antediluvian tribes, the reading of these chronicles by American archaeologists and their attempts to generate archaeology collections from South America and Reichel-Dolmatoff's use of these ideas when he founded the Ethnological Institute of the Magdalena, were elements that fostered the conditions of possibility of northern Colombia archaeology. Through this schizoid logic (Gnecco 1999), the indigenous of the past were presented as good, ecological artists, and the indigenous of the present were conceived as mere vestiges of pristine cultures that had to be registered before their disappearance.

At present, Reichel's inheritance is debated between two fields. On the one hand, there is a series of revisionists who, from the academic point of view, have shown the limits of Reichel's work, especially his assertion of the existence of social complexity. On the other hand, there is a series of anthropological debates about whether the idea of Tairona-Kággaba continuity should be assumed. In this regard, some voices indicate that this continuity is an imperative of the indigenous social movements of northern Colombia, who see in these postulates the principles of legitimacy for the territorial autonomy they claim. On the other hand, the deconstructionist heritage in anthropology has shown how these equations were built in conditions of possibility where otherness was possible to be narrated as long as it was ecologically friendly. Some scholars point out that these deconstructions were the response that critical anthropology made to the recognition of colonialism in ethnographic texts (Gnecco 2013, 13), which denounced colonialism only in the text and not in practice. Today the agenda, of course, is defined by the role that anthropology and archaeology must play in relation to the collectivities they describe. This debate is certainly relevant because indigenous groups increasingly question the fact that their ethnographic representation be a matter of experts.

In northern Colombia, the indigenous organizations, which include the Kággaba, have started their own self-representation agenda, so Reichel-Dolmatoff's work is also having its internal review. Undoubtedly in the present times, an

ethnographer, in the manner of Reichel, would be impossible because, even, access to the territory could not be given without the permits that must be managed with the indigenous authorities. Even the agenda has gone a little further, and some indigenous leaders are demanding that metropolitan museums return the objects that were taken by collectors at the beginning of the twentieth century. This is how today the Ethnographic Museum of Berlin is arranging the return of two Kággaba masks stolen by Konrad Theodore Preuss at the beginning of the twentieth century (personal communication Cabildo Gobernador Santos Sauna, 2017). This agenda of repatriation claims is happening together with a gradual increase in the control that the Kággaba have begun to have over archaeological sites such as the famous Pueblito Chairama village in the Tayrona National Natural Park in the city of Santa Marta, Colombia.

In this milieu of local communities' empowerment, in addition to the processes of touristification that are occurring on a global scale, Reichel-Dolmatoff's readings will be variable, but undoubtedly, these will be a mandatory reference for the historical knowledge of northern Colombia.

Cross-References

- ▶ Caribbean prehistoric archaeology
- ▶ Colombia, Historical archaeology of
- ▶ Langebaek, Carl

References

Dussán, Alicia. 1977. Problemas y necesidades de la investigación etnológica en Colombia. En *Estudios antropológicos*, de Gerardo Reichel-Dolmatoff y Alicia Dussán, 378–418. Bogotá: Instituto Colombiano de Cultura.

Galvis, Silvia, y Alberto Donadío. 1986. Colombia Nazi 1939–1945. Espionaje alemán. La cacería del FBI. Santos, López y los pactos secretos. Bogotá: Hombre Nuevo.

Giraldo, Santiago. 2010. *Lords of the snowy ranges: Politics, place, and landscape transformation in two Tairona towns in the Sierra Nevada de Santa Marta, Colombia*. Chicago: University of Chicago.

Gnecco, Cristóbal. 1999. Sobre el discurso arqueológico en Colombia. *Boletín de antropología*: 147–165.

Gnecco, Cristóbal. 2013. "Introducción." En *Transformaciones globales. La Antropología y el mundo moderno*, de Michel-Rolph Trouillot, 35–42. Popayán: Universidad del Cauca-Universidad de los Andes.

Julián, Antonio. 1854. *La perla de América, provincia de Santa Marta: reconocida, observada y expuesta en discursos históricos*. París: E. Thunot.

Laurière, Christine. 2010. Los vínculos científicos de Gerardo Reichel-Dolmatoff con los antropólogos americanistas franceses (Paul rivet, Claude Lévi-Strauss). *Antípoda* 11: 101–124.

Lomnitz, Claudio. 2017. Nueve tesis acerca de la relevancia del nazismo de Reichel para la antropología colombiana. *Antípoda* 27: 177–203.

Londoño, Wilhelm. 2003. La "reducción de salvajes" y el mantenimiento de la tradición. *Boletín de antropología* 34: 235–251.

Mason, Gregory. 1938. *The culture of the Taironas*. Los Angeles: University of Southern California.

O'Gorman, Edmundo. 2010. *La invención de América*. México: Fondo de Cultura Económica.

Oyuela-Caycedo, Augusto. 2012. Arqueología biográfica: las raíces Nazis de Erasmus.

Pineda Camacho, Roberto. 1984. La reivindicación del indio en el pensamiento social colombiano (1850–1950). De Jaime Arocha y Nina S. de Friedemann, 197–252. Bogotá: Etno.

Pineda Camacho, Roberto. 2003. El poder de los hombres que vuelan. Gerardo Reichel-Dolmatoff y su contribución a la teoría del chamanismo. Tabula Rasa 15–47.

Reichel-Dolmatoff, Gerardo. 1947. El Instituto Etnológico del Magdalena (Colombia) en 1947. *Boletín bibliográfico de Antropología Americana* 10 (1): 22–24.

Reichel-Dolmatoff, Gerardo. 1951. *Datos histórico-culturales sobre las tribus de la antigua Gobernación de Santa Marta*. Bogotá: Banco de la República.

Reichel-Dolmatoff, Gerardo. 1953. Contactos y cambios culturales en la Sierra Nevada de Santa Marta. Revista Colombiana de Antropología 1: 16–122.

Reichel-Dolmatoff, Gerardo. 1954. A preliminary study of space and time perspective in northern Colombia. *American Antiquity* 19 (4): 352–366.

Reichel-Dolmatoff, Gerardo. 1961. The agricultural basis of the sub-Andean chiefdoms of Colombia. In *The evolution of horticultural systems in native South America: Causes and Consequences*, ed. Johannes de Wilbert. Caracas: Sociedad de Ciencias Naturales de La Salle.

Reichel-Dolmatoff, Gerardo. 1965. *Colombia*. London: Thames and Hudson.

Reichel-Dolmatoff, Gerardo. 1985a. Aspectos chamanísticos y neurofisiológicos del arte indígena. In *Estudios en arte rupestre*, ed. Carlos de Aldunate, José Berenguer, and María Victoria Castro. Santiago de Chile: Museo chileno de arte precolombino.

Reichel-Dolmatoff, Gerardo. 1985b. *Los Kogi. Una tribu de la Sierra Nevada de Santa Marta, Colombia. Tomo I.* Procultura.
Reichel-Dolmatoff, Gerardo. 1997. *Arqueología de Colombia*. Bogotá: Presidencia de la República.
Serje, Margarita. 2008. La invención de la Sierra Nevada. *Antípoda* (Universidad de los Andes) 197–229.
Silva, Renán. 2006. *Sociedades campesinas, transición social y cambio cultural en Colombia: La encuesta folclórica nacional de 1942. Aproximaciones analíticas y empíricas.* Bogotá: Carreta.
Uribe, Carlos. 2017. De Gran Jaguar a padre simbólico: la biografía "oficial" de Gerardo Reichel-Dolmatoff. *Antípoda* (Universidad de los Andes) 36–60.
Wilbert, Johannes. 1961. *The evolution of horticultural Systems in Native South America: Causes and consequences*. Caracas: Sociedad de Ciencias Naturales de La Salle.

Religion in Islamic Archaeology

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Introduction

As an area of enquiry specifically concerned with one of the principal world faiths, Islamic archaeology has developed mostly within a secular tradition, and the attention paid to religion is fairly limited. The reasons for this are complex and have much to do with the development of archaeology as a secular field of enquiry in Europe and America. The majority of archaeologists working on Islamic material to date have been non-Muslims who perhaps felt ill-qualified to remark on the religious implications of their finds. In addition as with all world religions, there is a potential conflict between the revealed truth of the scriptures and the revelations of archaeology. While this has never become a major obstacle for Islamic archaeology, the scope for potential misunderstanding has meant that issues concerning the origins of the faith have generally been avoided. With these limitations in mind, archaeology has made some important contributions to the study of Islam both as a religious practice and as a diverse set of beliefs. One of the challenges of Islamic archaeology is to acknowledge the profound sense of unity within the faith while also demonstrating the diversity and variations from contemporary established beliefs.

Definition

The study of Islam as a religion may be firmly placed within the wider concept of the archaeology of religious belief as defined and characterized by Insoll (1999). The importance of this approach is that it does not seek to comment on the validity or otherwise of beliefs but rather investigates the material culture(s) of the religion as expressions of the faith. This approach differs from that of comparative religion where beliefs and practices in one religion are compared to and often equated with those of another faith. While the comparative view allows an overview of religious developments, its tendency to generalize and assumption of an interchangeability of belief both deny the agency of the individual and assume a superior position for the investigator.

As a field of enquiry, Islamic archaeology has been primarily concerned with the development and manifestations of Islamic society and culture. Particular attention has been paid to the first three centuries of Islamic civilization when the religion was largely coterminous with a single Islamic state or caliphate. The breakup of the Abbasid caliphate in the tenth century and the resulting political fragmentation created new power blocks based partly on different interpretations of Islam and partly on ethnic and cultural affiliations. The advent of the Crusades in the twelfth century and increasing political fragmentation has meant that much of the historical and archaeological interest in medieval Islam has focussed on conflict either as holy war (*jihad*) or power struggles amongst competing Muslim rulers. However, in the Indian Ocean and Central Asia, both archaeology and history point to societies where the Muslim faith linked traders across vast distances from Cairo to China. The European discovery and exploitation

of the New World coincided with profound changes in the Islamic world. There was a return to larger political entities such as the Ottoman, Safavid, and Mughal Empires, each with their own religious agenda. The archaeology of the recent past in the Islamic world (nineteenth and twentieth centuries) has focussed on an increasing European presence either through trade or colonial encounters as well as warfare.

Historical Background

> [I]n 1343 . . . a resident of Cairo unearthed what he claimed to be an old mosque. A "rowdy" named Shu'ayb could not miss this golden opportunity. He claimed that an apparition revealed to him that the site was an ancient grave of a Companion of the Prophet. . . .Excavations were begun by the commoners, including women, and indeed a "shrine" surfaced. That new discovery further increased the number of visitors, and industrious Shu'ayb organized "guided tours" for fees, in which wives of dignitaries also took part (al-Maqrizi, *Suluk li ma'arifat duwal al-muluk* II: 649–50; Shoshan 1993: 9).

Although Islamic archaeology is currently dominated by a secular European outlook, there are enough examples of Muslims carrying out excavations or studies of ancient material to suggest an archaeological tradition of some antiquity. The example of Shu'ayb (cited above) is interesting because it demonstrates an understanding of archaeological processes by the general public (e.g., buildings collapse, accumulation of material over time, excavation as a means of discovery, and the presentation of archaeology to the public). The other dimension to this discovery is the creation of a religious shrine which according to al-Maqrizi became the site of nightly celebrations until they were discontinued by the religious authorities. Although in this particular instance the orthodox religious establishment did not recognize the shrine, there are many instances where ancient sites were rediscovered and became shrines and centers of visitation. Such activities were particularly popular during the medieval period with prominent examples of rediscovery including the tomb of the Biblical Moses (Nabi Musa) in Palestine, the tomb of Jonah (Nabi Yunus) at Nineveh in Iraq, and Moulay Idris in Morocco. In each case some ancient remains were discovered and associated with some historical event or personage. Moulay Idris is a predominantly eighteenth-century shrine built around the mausoleum of Idris II (r.803–828) whose body was rediscovered in 1308. The shrine of Nabi Yunus is located on the site of ancient Nineveh and was built directly over the ruins of a Christian church. The shrine complex of Nabi Musa was built by the Mamluk Sultan Baybars in 1269 when the grave of Musa was rediscovered. In each case the shrine was built around an ancient relic or site which was both historically plausible and also tangible providing an authenticity which appeared to be lacking in Shu'ayb's discovery of 1343. All of this indicates that there was an empirical and rational understanding of the relationship between the present and the past which is akin to that of modern archaeology.

The Quran provides a basis for understanding the relationship of the past to the present with the story of the cave (Surah 18) in which a number of youths fall asleep in a cave and are awakened 309 years later. When they try to buy food, they are discovered because of their use of old silver coins which were no longer in circulation. The Quran (Surah 7) also explains how the polytheists of al-Hijr (Medain Salih) were punished for persisting in idol worship so that eventually they were killed and their city left in ruins. An appreciation of the processes of change over time is therefore a fundamental part of being Muslim.

One of the earliest and most important examples of archaeological work in relation to Islam was carried out when the Ka'ba in Mecca was rebuilt after its destruction by Ibn Zubayr in 683. Before the Ka'ba was rebuilt, a detailed investigation of the site revealed earlier foundations interpreted as Abraham's original construction. During the process meticulous notes were made including a detailed analysis of the Black Stone at the corner (Peeters 1994: 62–4).

Later on it is evident that there was an awareness of the value of studying ancient remains; thus, the prominent Egyptian scholar 'Abd al-Latif (1162–1231) had a deep respect for the

learning of the ancients and their monuments (Richter-Bernberg 2007). In a statement in his book on Egypt, he summarizes the reason for preserving ancient monuments as follows:

> Antiquities should endure as markers of a remote epoch and reminders of the ages since elapsed. They will serve as witness to the revealed scriptures for the venerable Koran mentions them and their people; thus by seeing them, narration becomes experience and tradition is verified. . . . They indicate something of the forebears' circumstances and conduct, the ampleness of their learning and the clairvoyance of their notions. ('Abd al-Latif, *Akhbar Misr*; Richter-Bernberg 2007: 365).

In addition to scholars directly interested in ancient remains, it is also worth noting that there was a sophisticated historical tradition in the Islamic world with writers such as al-Tabari providing detailed historical accounts of world history. However, perhaps the most sophisticated appreciation of history is found in the writings of the Ibn Khaldun who developed a philosophy of history based on his analysis of historical events in his native North Africa. This historical awareness provided a framework for understanding archaeological remains.

During the nineteenth century European interest in the antiquities of the Middle East and North Africa was often met with suspicion by local Muslims. Part of this mistrust was a feeling that objects of value might be discovered and exported without benefit to the natives of the region. However, there was also a feeling that Europeans would use antiquities to give their own contrasting interpretations of history. In some cases these misgivings were justified and Edward Said's book *Orientalism* documents how Europeans used archaeological investigations as a means of gaining information to help in their colonial endeavors (Said 1978). However, despite the disproportionate military and economic power of the Europeans, the authorities in Muslim countries were able to exercise some control on the activities of foreign (and indigenous) archaeologists. Thus, in 1884 Osman Hadi the director of the Archaeological Museum in Constantinople (Istanbul) enacted the first Ottoman antiquities law placing all excavations under the control of the Ministry of Education (Vernoit 1998). In general however from the nineteenth century onwards, archaeology in the Muslim world was dominated by Europeans (and Americans) who had both the resources and the training to carry out systematic investigations.

As Islamic archaeology developed during the late nineteenth and early twentieth century, the main interests were art and architectural history rather than investigation of Islam as a religion. Archaeologists working on Islamic sites were interested in the retrieval of objects of Islamic art for display in museums and in the recording of monumental architecture. There were however some areas where European archaeologists showed an interest in the religious aspect of Islamic material culture. For example, Conrad Preusser made a study of Islamic shrines and Christian churches in northern Iraq while attached to the German excavations at Babylon in the early twentieth century. In early twentieth-century Palestine, there was considerable interest in Muslim shrines partly because it was thought that they may relate to some Biblical sites and partly because archaeologists working in the Holy Land were predisposed to look at religious aspects of antiquity.

The other specifically religious aspect of Muslim culture that interested nineteenth- and early twentieth-century archaeologists and art historians was the question of iconoclasm or prohibition of figural images. Following excavation of Umayyad sites in Syria and present-day Jordan and Palestine, it became apparent that the religious ban on the portrayal of human figures was not universally applied. For example, semi-nude female figures were painted onto the walls of the bath house at Qusayr 'Amra in Jordan, while at Khirbat al-Mafjar there were stucco figurines of semi-naked women also in the bath house. However, in certain areas and times, the figural ban was implemented, most famously in the 690 s when Abd al-Malik (685–705) replaced figural coinage with purely epigraphic coins (Walmsley 2007: 59–64). For some archaeologists the implementation of the ban on figural images was aimed particularly at Christians and was seen as a sign of Muslim intolerance. For example, John Crowfoot commenting on the damaged mosaics of Jarash

wrote "...all representations of living creatures were ruthlessly destroyed. The sorry way in which the mutilations were repaired shows the wretched plight of the Christians" (Crowfoot 1938: 172–3).

Key Issues

The religious nature of Islamic society expressed through Islamic laws and customs has meant that all areas of Muslim life are potentially relevant to archaeology. However, a number of areas of investigation are of particular relevance to an understanding of the religion. These may be summarized as mosques; *hajj* routes; shrines, mausolea and burials; and *halal* diet.

Mosques

As the most visible symbol of the Muslim faith, mosques are an ideal subject for archaeological research particularly as they have been part of Islamic culture from the start (Figs. 1 and 2). When investigating ancient remains, the presence or absence of a mosque is often the best indicator of whether the former inhabitants had adopted Islam as a religion. It is even possible to get an indication of the possible number of Muslims in a settlement at a particular time. For example, the Byzantine and early Islamic settlement of Shivta in the Negev had three churches and a small mosque attached to one of the churches suggesting a Muslim minority in a Christian town (Magness 2003).

There are however some problems with using mosques as an indicator which may be summarized as (i) the identification of a building as a mosque, (ii) dating the period of construction and use, and (iii) problems associated with investigating mosques still in use.

The easiest way to identify a mosque is by the presence or absence of a *mihrab* which is a concave niche inserted into the wall of the prayer hall to indicate the direction of Mecca and consequently the direction of prayer (*qibla*). Even if a mihrab is not found, the orientation of a building to the *qibla* (direction of Mecca) will suggest that a building is a mosque. However, there are problems with both these indicators. The earliest mosques did not have a *mihrab* in the form of a concave niche.

The first concave *mihrab* was inserted into the Prophet's Mosque at Medina during some restorations carried out by the Umayyad caliph al-Walid I in 706. The date of the introduction of the *mihrab* niche is confirmed by excavations at

Religion in Islamic Archaeology, Fig. 1 Mosque of Sayyid Jamal al-Din at Anau, Turkmenistan (built 1446–1457), destroyed by an earthquake in 1948. Note the decorative dragons either side of the main arch

Religion in Islamic Archaeology, Fig. 2 Kutlug Timur Minaret at Kunya Urgench, Turkmenistan (built between 1321 and 1336). Large minarets such as these were not only a visual symbol of Islam but were also memorials to their founders

Wasit, Iraq, where two mosques were found built one on top of the other. The earliest mosque, dated to the seventh century, did not have a concave *mihrab*, while the later eighth-century mosque had a *mihrab* niche. Similarly the orientation of a building may be misleading because many early mosques were misaligned. In most cases however both the alignment and the presence of a *mihrab* will confirm a building's function as a mosque.

In terms of dating mosque construction and use, often it will be possible to get an idea of the date of a mosque from a foundation inscription. However, in many cases this will either be missing or the inscription may come from an earlier building. In addition the fact that mosques are not used for residential purposes means that an excavated mosque will rarely contain dateable material. Once a site has been designated for use as a mosque, it will tend to retain this function through time. In practice this means that many apparently new buildings are built on older foundations or may even incorporate portions of an earlier structure, which are thus not easily accessible to archaeologists.

Hajj Routes

The *hajj* pilgrimage to Mecca is one of the five obligations held by all Muslims. If a person has the necessary means and is physically able, the pilgrimage to Mecca once in a lifetime is obligatory. Given the rapid geographical spread of Islam from the seventh century onwards, this has meant that a network of pilgrimage routes from all over the world converges on Mecca (Petersen 1994). There have been a number of archaeological studies of these routes most notably the Darb Zubayda from Iraq, the Darb al-Hajj al-Shami from Syria, and the Darb al-Hajj al-Masri from North Africa.

Shrines, Mausolea, and Burials

Shrines, mausolea, and burials are three connected issues within the archaeological study of Islam. Firstly it is worth mentioning that all schools of Muslim thought agree that burials should be simple and that graves should not be marked with extravagant structures. However, in practice throughout the Muslim world, there have been elaborate grave markers and mausolea have been built around the graves of particularly prominent individuals (Fig. 3). Where the individual concerned is thought to have been particularly pious, valiant, or important, the mausolea have often become shrines venerated by Muslims (Fig. 4). There have been many archaeological studies focussing on these issues (Petersen 1996, 1999, 2001). Some draw attention to the fact that shrines provide a religious focus for women, illiterate people, and others who feel excluded from more formal religious practices at mosques.

Halal Diet

Muslims are governed by dietary laws dictating what food is permissible (*halal*) and what is forbidden (*haram*). The most well-known prohibition is against eating pigs, although many other categories of food are restricted. Environmental archaeology can investigate deposits to gain an

Religion in Islamic Archaeology, Fig. 3 Grave of holy man at Kunya Urgench, Turkmenistan, with rags tied to poles indicating the prayers of pilgrims, visitors, and relations. This form of religious practice with links to shamanism is discouraged by orthodox Islam but is widely practiced

Religion in Islamic Archaeology, Fig. 4 Pilgrims visiting the sixteenth-century tomb of Sultan Ali near Kunya Urgench, Turkmenistan

idea of whether a particular society was following Muslim dietary rules (for a discussion see Insoll 1999: 4–107). In southeast Asia the analysis of animal bones has been used to determine at what stages particular communities are converted to Islam (Lape 2005). However, it is known that in certain cases, people describing themselves as Muslim have ignored some of these rules; thus, evidence of wine consumption has been found at early Islamic sites, and it is known that some Sufi sects also drank wine as part of their activities.

International Perspectives

Within the archaeology of religion, international perspectives may be interpreted as the interaction with other faiths. Four examples will be used to indicate how archaeology can inform and in some cases inflame conflicts centering on religious sites.

The partition of India into India and Pakistan in 1948 polarized Muslim and Hindu sentiments, and both countries are still dealing with the consequences. In terms of archaeology and heritage, the most well-known incident was the destruction of the mosque (Babur Masjid) at Ayodhya in 1992 by supporters of the Hindu nationalist party (Nandini 1999). The demolition of the mosque led to rioting in which more than 2,000 people were killed, and the incident still incites violence. The mosque was built in 1528 by one of the generals of the Mughal Emperor Babur on a site which according to Hindus marks the place where the Hindi deity Lord Ram was born. In September 2010 following an archaeological investigation which revealed an earlier (Hindu?) building, custody of the site was divided between Muslims and Hindus.

The second example is the Dome of the Rock in Jerusalem which is believed to stand on the site of the Jewish temple which had been destroyed by

the Romans. The bitter conflict between Israel and Palestine has focussed on Jerusalem and in particular on the area of the Haram al-Sharif. For Muslims this is the third holiest shrine and the destination of Muhammad's miraculous night flight from Mecca (Necipoğlu 2008). The intensity of the conflict is such that there have been several attempts by Jewish extremists to destroy the building. The plans, a model and even actual fittings made for the new temple, which is planned once the Dome of the Rock has been destroyed, already exist.

At Bamiyan in Afghanistan the situation was reversed when the Taliban destroyed the two monumental Buddhas carved into the cliff. Prior to the destruction the Taliban publicized their intention finally blowing up the statues in 2001. The event was presented as an attack on figural images and idol worship which was intolerable to Muslims. However, archaeological research has indicated that Bamiyan was inhabited by a Muslim population for over 1,000 years without problems (Morgan 2012: 81–130).

Finally it is worth considering the mosque of Cordoba in Spain built by the Umayyad caliph Abd al-Rahman in 784 on the site of a church. The mosque was gradually enlarged over a period of 200 years and became one of the most celebrated mosques in the world (Khoury 1996). Cordoba and the mosque were reconquered by the Christians in 1236, and the mosque was gradually converted into a cathedral. In the sixteenth century major construction work within the former mosque saw the addition of a nave which while visually intrusive is thought by many to have preserved the building from the excesses of the Inquisition which may otherwise have called for the destruction of the entire building.

Future Directions

A number of difficulties arise when considering the relationship between Islam and archaeology. Three of the most pressing issues are pre-Islamic and Quranic archaeology, Muslim sects and divisions, and Islamic practice in archaeology.

Pre-Islamic and Quranic Archaeology

The general perception of Islamic archaeology is that it investigates the archaeology of Muslim societies from the 630 s to the present; however, to some extent it must also consider the pre-Islamic archaeology of Arabia. As a functioning religious center, the *haram* at Mecca is off limits to archaeology, yet we know a certain amount about the shrine from early Arabic authors (Nevo and Koren 1990) which gives a window on to the pre-Islamic archaeology of the site. Similarly there are some sites such as al-Khaf al-Raqim in Jordan (Walmsley 2007: 141–4) which have been identified as the site of the story of the cave as mentioned in the Quran (Surah 18). Both of these examples are fairly unproblematic; however, there is the potential for an archaeological investigation to encounter material which may challenge the orthodox religious view.

Muslim Sects and Divisions

Because Islam is a living religion and because extremists have drawn considerable attention to their faith, the archaeology of Islam is faced with considerable challenges. On the one hand as social scientists archaeologists must adopt a neutral detached approach to the field of study, yet it is inevitable that in some cases a particular view will be regarded as support for a particular position. Although Muslims see themselves as part of a single Islamic community (*ummah*), in practice there are many sects, ethnic and cultural affiliations, as well as political configurations which cause major divisions. The problem for the social scientist is that there is considerable pressure to regard any one of these forms as the normative Islam from which other forms deviate. This question is becoming increasingly important as communications improve and the ability of wealthier nations to encourage their interpretation of Islam increases. One of the main sectarian divisions is between *Shia* and *Sunni* Muslims, although there are also other groups which have political dimensions such as Sufis, Salafis (Wahabis), and Ibadis. In addition there are groups such as the Bahais and the Druze which originated within

Islam but are generally regarded as outside the recognized religion.

Islamic Practice in Archaeology

While the majority of nineteenth- and twentieth-century archaeologists investigating Islamic culture were from a secular Christian or Jewish background, the number of Muslim archaeologists working either in the field or as academics is increasing steadily. Should the religious faith of an archaeologist matter? And is it preferable to have Muslims investigating Islamic sites? In most cases the personal beliefs of the archaeologist will be irrelevant, although in some cases it has been argued that only Muslims are fit to excavate mosques and interpret Islamic culture. Such views are obviously extreme and would lead to a situation where the investigation of the archaeology of another religion or culture became effectively impossible. However, such views may be regarded as a reaction to the European-dominated Orientalist narrative which first characterized Islamic archaeology.

Cross-References

- ▶ Cyprus, Archaeology of
- ▶ Greater Syria: Islamic Archaeology
- ▶ Historical Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ India: Historical Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ North Africa: Historical Archaeology
- ▶ Ottoman Empire: Historical Archaeology
- ▶ Rural Life in Islamic Archaeology

References

Crowfoot, J. 1938. The Christian churches. In *Gerasa, city of the Decapolis*, ed. C.H. Kraeling, 171–262. New Haven: American Schools of Oriental Research.

Insoll, T. 1999. *The archaeology of Islam*. Oxford: Blackwell.

Khoury, N.N. 1996. The meaning of the Great Mosque of Cordoba. *Muqarnas* 13: 80–98.

Lape, P. 2005. Archaeological approaches to the study of Islam in Island Southeast Asia. *Antiquity* 79 (4): 829–836.

Magness, J. 2003. *The archaeology of the early Islamic period in southern Palestine*. Winona Lake: Eisenbrauns.

Morgan, L. 2012. *The Buddhas of Bamiyan*. Harvard: Harvard University Press.

Nandini, R. 1999. Ayodhya and the ethics of archaeology. In *Case studies in archaeology and world religions: The proceedings of the Cambridge conference*, BAR international series, ed. T. Insoll, 44–47. Oxford: Archaeopress.

Necipoğlu, G. 2008. The Dome of the Rock as a palimpsest: 'Abd al-Malik's grand narrative and the Sultan Süleman's glosses. *Muqarnas* 25: 17–105.

Nevo, Y.D., and J. Koren. 1990. The origins of the Muslim descriptions of the Jahili Meccan sanctuary. *Journal of Near Eastern Studies* 49: 23–44.

Peeters, F.E. 1994. *The Hajj: The Muslim pilgrimage to Mecca and the holy places*. Princeton: Princeton University Press.

Petersen, A.D. 1994. The archaeology of the Syrian and Iraqi Hajj routes. *World Archaeology* 26 (1): 47–56.

Petersen, A.D. 1996. A preliminary report on three Muslim shrines in Palestine. *Levant* 28: 97–113.

Petersen, A.D. 1999. The archaeology of Muslim pilgrimage and shrines in Palestine. In *Case studies in archaeology and world religions: The proceedings of the Cambridge conference*, BAR international series, ed. T. Insoll, 116–127. Oxford: Archaeopress.

Petersen, A.D. 2001. The tomb of Benjamin and other Old Testament figures. In *History of Egypt & Syria in the Fatimid, Ayyubid & Mamluk Eras III*, ed. U. Vermeulen and J. van Steenbergen, 361–384. Leuven: Peeters.

Richter-Bernberg, L. 2007. Past glory and present ignorance – 'Abd al-Latif al-Bagdadi on 'Ayyubid Egypt. In *Egypt and Syria in the Fatimid, Ayyubid and Mamluk Era V*, ed. U. Vermeulen and K. D'hulster, 349–368. Leuven: Peeters.

Said, E. 1978. *Orientalism*. New York: Vintage Books.

Shoshan, B. 1993. *Popular culture in medieval Cairo*. Cambridge: Cambridge University Press.

Vernoit, S. 1998. The rise of Islamic archaeology. *Muqarnas* 14: 1–10.

Walmsley, A. 2007. *Early Islamic Syria: An archaeological appraisal*. London: Duckworth Publishers.

Further Reading

Insoll, T., and R. Maclean, eds. 2011. *Oxford handbook of the archaeology of ritual and religion*. Oxford: Oxford University Press.

Milwright, M. 2010. *An introduction to Islamic archaeology*. Edinburgh: Edinburgh University Press.

Petersen, A.D. 1998. *Dictionary of Islamic architecture*. London/New York: Routledge.

Petersen, A.D. 2005. What is Islamic archaeology? *Antiquity* 79: 100–106.

Petersen, A.D. 2011. Islamic archaeology. In *Oxford handbook of the archaeology of ritual and religion*, ed. T. Insoll and R. Maclean, 967–982. Oxford: Oxford University Press.
Whitcomb, D., ed. 2005. *Changing identity with the spread of Islam*, Oriental institute seminars. Vol. 1. Chicago: University of Chicago Press.

Religion, Greek, Archaeology of

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Introduction

Archaeologies of Greek religion may be divided into three categories: the analysis of artwork, the publication of sites, and the categorization of ritual practices. Topically, boundaries between these are permeable; methodologically, all of them build on the integration of material, epigraphic, and textual evidence. This relationship to textual evidence both characterizes and problematizes Greek archaeology, which is often criticized for its theoretical naïveté, its distance from anthropological archaeologies, and its striking conservatism (Dyson 1993; Morris 1994; Whitley 2001: 11–59; Barrett 2015). These characteristics are the result of a long intellectual and political history. The identification of ancient Greece as the fountainhead of western civilization served the nationalism of Greece as it emerged from Ottoman rule: it helped secure the support of European nations, and the archaeological service was one of the first departments of the new government to be established (Hamilakis 2007). The "glory that was Greece" informed the cultural ambitions of the 17 nations who established archaeological schools in Athens; the tradition favored a focus on classical sites known from Greek historical texts and shaped a culture-historical approach to the interpretation of archaeological materials. The culture revealed was deemed a priori unique and so beyond comparison with other nations. The great ritual centers were among the sites apportioned to these foreign schools. Greek religion was already well established as a field of textual inquiry when these excavations commenced. The rich epigraphic record from these sites, which named figures familiar from myth and history, reinforced the unproblematized relationship with textual sources and delayed the emergence of a critical body of theory regarding the relationship between the textual and the archaeological record. Although calls for greater integration of textual and material evidence appear in many surveys of Greek religion, literary continues to outweigh material evidence in the key texts for the field (Hägg 1992; Osborne 1994; Morris 2000; Burkert 2011: 1–7). Archaeologists working on Greek cult, moreover, are rarely located in anthropology or religion departments, more frequently in art history, classics, or history – where publications focused on iconography, architectural history, or the relationship of finds to Greek and Latin texts speak most clearly to colleagues judging questions of promotion and tenure.

The archaeology of Greek cult is thus suspended between at least four academic disciplines – classics, art history, religion, and anthropology – and burdened with political and cultural expectations. Some of the most intriguing new work in the field, however, emerges precisely from the efforts to close the gap between these traditional divides. The mid-1970s saw the emergence of critical perspectives on the history of the discipline; these insights are combined with new technologies, increasingly accessible databases, and a more robust theoretical framework for the relationship between the textual and the archaeological record. These are reshaping the boundaries of artifact, site, and ritual studies within Greek archaeology, at the same time that the major locus for publications remains traditional classical rather than anthropological journals (Kindt 2011; Hamilakis 2011).

Definition

The archaeology of Greek religion may be defined as the investigation of material evidence for ritual

action carried out by individuals who identified themselves as Greeks. Ritual actions are defined here as symbolic, traditional communications designed to bridge the human and divine worlds: there is no ancient Greek category which corresponds precisely to our term "ritual," and while debates about the relationship between religious and secular ritual have appeared in classical studies, these lie beyond the framework of this essay (Bremmer 1994: 38–54; Bell 2007). The chronological and geographical boundaries of Greek religion shape its archaeology in both theoretical and practical ways. The chronological may be situated between Prehistoric and Bronze Age on the one hand and Christianity on the other; boundaries between these are permeable. Continuity from Bronze Age use is attested at sites such as the cave of Zeus on Mount Ida (Watrous 1996) and the sanctuary at Syme (Lebessi 2009); Mycenaean burials provided the focus for historical hero cult from the eighth century on (Antonaccio 1995); and Hellenistic architects in the sanctuary of the Great Gods of Samothrace constructed a false door in the style of the late Bronze Age mainland (McCredie 1974). The archaeological signatures of prehistory were thus part of the intellectual landscape of Greek ritual practice into the historic period and provide an ancient context for the reinterpretation and usurpation of the past (Voyatzis 1992; Naoum et al. 2004; Prent 2005). Christian responses to pagan traditions translated into desecration and destruction of classical material, their transformation into new sacred spaces and images, or their decontextualization and redistribution as spolia (Pollini 2007; Hahn et al. 2008). The most violent behavior, more articulate than simple destruction, carved crosses into ancient statuary, or smashed faces, breasts, and genitalia of ancient statues, while leaving the remainder intact as a statement of Christian triumph. More nuanced responses transformed the pagan symbols into Christian iconography, studies of which engage with textual as well as material evidence (Elsner 1995). The transformation of traditional temples into churches begins some 200 years after the Theodosian code of 391 dictated the closing of pagan sacred spaces; causes for the delay may be reflected in legislation, contemporary with the code, which recommended the preservation of the temples as symbolic and practical structures. Examples of these architectural conversions include the temple of Aphrodite in Aphrodisias in Caria, the Parthenon, the Hephaisteion, the Asclepeion, and the Erechtheion in Athens (Ward-Perkins 1999; Arce 2009). The reuse of architectural materials as spolia was a pagan as well as a Christian practice: recent publications explore the semantic range of such repurposing, from appropriation to nostalgia to triumphalism to exorcism (Brilliant and Kinney 2011).

Geographically, sites for Greek cult are found far beyond the Greek mainland or its islands. Greek settlements stretched from the Black Sea in the north to Egypt in the East and Italy in the west. The geographic range of study means that excavations relevant to Greek religion are shaped by the political realities of a number of Mediterranean countries. Braund describes the great personal risk undertaken by local people who aided him in his archaeological explorations in the 1970s around Colchis; Davis describes the fieldwork made possible, including the excavation of an archaic temple to Apollo, after Albania opened its doors to the outside world in the mid-1990s (Braund 1994; Davis 2012: 65–68). The opening of former Soviet Bloc countries redefined the study of Greek religion in the regions around the Black Sea, where some 90 colonies were attributed to one Greek city, Miletus, alone (Tsetskhladze 2006/2008; Muratov 2015). Theoretical frameworks for cult in these regions were initially shaped by studies of Greek colonization which began in the 1980s. These emphasize cult as a mechanism of cultural identity and mediation at ethnic, political, and territorial boundaries. Archaeological foci include the establishment of hero cults, the political uses of temple and monumental architecture, signals of cultural assimilation in funerary ritual, and the emergence of syncretistic celebrations. Sicily has been an especially rich locus for this work, as a place where Greeks interacted with indigenous cultural groups as well as the Phoenician settlers who could serve as both partners and competitors in their colonizing goals (Kleibrink et al. 2004; Marconi 2007;

Shepherd 2015). Intellectual models for Greek colonization have moved from models of Greeks-v-Barbarians and center-periphery toward post-colonial models of hybridity and mediation. Network models suggest that symbolic expressions of Greek identity are strongest at the greatest remove from territorial centers, reinforcing the importance of ritual at the edges of the Greek world (Malkin 2011); postcolonial and globalization theories offer light on identity construction in a profoundly connected Mediterranean world (Hodos 2010).

Historical Background

An archaeology of Greek religion may be argued to have its birth either in the early Renaissance or after the 1970s. The date depends on whether this archaeology is defined by the use of the site in antiquity or by a deliberate methodology and theoretical framework aimed at recovering the religion of the site. The former, which we may consider an incidental archaeology of cult, characterizes much of the earliest archaeology in Greece. The great sanctuaries of Greek history – known from ancient texts and confirmed by inscriptions – were objects of exploration as early as the fifteenth century, when the early Renaissance antiquarian Cyriacus of Ancona toured the Greek world, sketching monuments and recording inscriptions (Belozerskaya 2009). The historical functions of Greek sanctuaries as sites for competitive display also made them treasure houses of sculpture, architecture, finely worked votive objects, and the inscriptions which were the objects of particular interest for these first explorers.

The nineteenth-century excavations of these sites reflect a range of European intellectual trends – Romanticism, connoisseurship, nationalism, and *Altertumswissenschaft* – which came into being during the nearly four centuries that Greece was ruled by the Ottoman Turks (1460–1830). Romantics of the eighteenth and nineteenth centuries idealized the ancient Greek world and approached archaeological sites as the embodied past of a perfect heroism, now conquered and crumbling. Enthusiasm for the ruins, and the conviction that they offered access which texts could not, drew Romantic travelers, Goethe among them, to Ottoman Greece. J.J. Winckelmann, deemed the father of Greek archaeology (1717–1768), shared some of the conceptions of the early Romantics, if not their itineraries. He never went to Greece but proposed the first schematization of Greek art history based on his observations of objects in Rome. Winckelmann identified four historic and aesthetic stages of Greek art history, and the principle that changes in style was the key to chronology. His conjectural model received reinforcement from the museum collections which began to grow in earnest in the eighteenth century, when European nobles rushed to collect ancient Greek vases and sculpture. War between France and Britain in the eighteenth century further escalated the appetite for building private collections and public museums, as bitter military conflicts translated into cultural competition. Philhellenic sensibilities also spurred military and political support for the Greek war of liberation against the Ottomans and, subsequent to liberation, to the establishment of archaeological schools in Athens – the French in 1846, German in 1874, British 1876, and American in 1881. The major excavations run by these schools included the sanctuaries of Delos, Delphi, and Olympia. The excavations appear innocent of theory or agenda: the objectives were to excavate, preserve, categorize, and publish the finds. This apparent objectivity was underwritten, however, by the Hellenism which emerged in the Romantics, informed the tradition of the Grand Tour, fed the connoisseurship of the eighteenth century, and became an arena for the competitive nationalism of the nineteenth century (Dyson 1993; Morris 1994; Whitley 2001: 3–42).

The question of ritual practice per se was of minimal or no interest to these early explorers, despite the centrality of prophecy to Delphi, the cult of Apollo to Delos, and ritual competition to Olympia. "The glory that was Greece" did not include its paganism, which was either opposed to Christianity or reconciled with it through allegorizing explanations. Critical approaches to an archaeology of cult did not materialize in classical

archaeology until the 1970s, as part of the effort undertaken by some practitioners to redress the distance between classical and world archaeologies. This distance was not inevitable: the fields among which the archaeologies of Greek cult are now distributed – archaeology, classical studies, anthropology, and religion – were at their beginnings more closely tied to each other (Rowe 1965; Varto 2018). An education in classical and Biblical texts was the general rule for all earlier practitioners of archaeology, and the Romanticism and nationalism which shaped Greek archaeology shaped anthropology as well (Renfrew 1980; Morris 1994). Several historical junctures are identified as the moment at which classical and other archaeologies diverged. Morris points to the 1870s, when classical archaeology became a subdiscipline of classics and thus removed from the broader archaeological world (1994). Whitley notes the conflict between prehistoric and classical archaeology as a cause of the separation. This was exemplified in a paper delivered by V.G. Childe in 1943, in which he berated classical archaeology, and his teacher Beazley in particular, for its simultaneous enthusiasm for fine arts and indifference to the tools and households which were the real record of history. This initiated a separation of classical from world archaeology during the three decades when world archaeology most flourished, from 1945 to 1975. The separation grew even deeper in the 1960s, when classical archaeologist actively retreated from the new theoretical dimensions explored in other archaeologies. The paradigm for classical archaeology in this period is Beazley's attribution studies, which linked Renaissance humanism with Winckelmann's conjectural scheme and a scientific fastidiousness in matters of detail; the field drew its prestige from classics and its audience from those who read the ancient texts (Whitley 2001: 12–16).

If classical archaeology was absent from theoretical advances in world archaeology between 1870 and 1970, it was also engaged only peripherally in the theoretical advances in Greek religion. Myth, as preserved in literature, was fundamental to the study of Greek religion from the time of the Church fathers. These approaches changed in the early nineteenth century. Lobeck's massive, querulous volume, *Aglaophamus* (1829), demonstrates a determination to gather, critique, and chronologically order all the ancient sources for Greek myth and mystery cults; it may be deemed a philological analogue to the "science of antiquity" which defined German excavations at Olympia. In the last quarter of the nineteenth century, overseas colonies, reports from missionaries, and the emerging discipline of ethnography brought paradigms for comparative study, evolutionary models, and a focus on ritual to British and German scholars of Greek religion. The Cambridge Ritualists emerged in Britain, among whom Jane Harrison was the most archaeologically focused (Harrison 1890; Ackerman 1991). In Germany, Mannhardt (1875) compared European peasant customs with ancient traditions and postulated agricultural festivals of fertility and annual renewal; the Cambridge scholar Frazer extended the range of comparanda to include all ethnographically known cultures, as well as ancient Greece and Rome (Frazer 1890–1915). Dieterich, a follower of Mannhardt, founded the *Archiv fur Religionswissenschaft* in 1904 and thus the platform for an independent discipline of the history of religion (Burkert 2011: 1–7). Durkheim's sociology and the discovery of psychoanalysis both impacted studies in Greek religion as well. Gernet brought Durkheimian sociology to Greek religion and to the group known as the Paris school, led by Vernant and Detienne, who inaugurated a trend toward the application of structuralism and functionalism in studies of Greek myth and ritual in publications from the 1960s through to the new century. Detienne (2005) provides a conspectus of these discussions. Kerenyi applied concepts of archetypes developed from Jungian psychoanalysis to Greek myth (Kerényi and Jung 1941; Kerényi 1976; Schlesier and Sanchiño Martinez 2006); Caldwell employs Freudian analysis (1990); E.R. Dodds, in *The Greeks and the Irrational* (1951), invited investigation of those portions of Greek religion not represented in the shining marble edifices of Athens.

The archaeology of Greek cult remained as aloof from these developments as it did from

world archaeology. Changes of the last four decades, however, have begun to close both of these divides. Regional studies balance the traditional overemphasis on Athens; a shift away from attribution studies and toward mentalities has initiated fresh conversations on the insights into ritual provided by vase painting (Hedreen 2011; Bundrick 2014). Burial rituals are integrated with cultural constructions of space and memory, ethnic identity, and quantitative analyses (Arrington 2015; Kelley 2012; Shepherd 2005; Houby-Nielsen 1995). If these represent a lessening of the divide between Greek and world archaeologies, internal divisions within the field have also been lessened through the creation of several key resources. The online publication of the *Supplementum Epigraphicum Graecum* provides a searchable database for all Greek inscriptions; the *Epigraphic Bulletin for Greek Religion* offers an annual guide to new inscriptions relevant to Greek cult, published since 1991 in the journal *Kernos*. The *Lexicon Iconographicum Mythologiae Classicae* provides topical introduction to the iconographic traditions for Greek and Roman divinities and heroes (Boardman et al. 1981). The *Thesaurus cultus et rituum antiquorum*, published since 2004, offers up to date introductions to a range of Greek cult types; the *Chronique archeologique* offers an annual account of new archaeological discoveries relevant to Greek cult, published in the journal *Kernos* since 2001. There is as yet no established canon of theory and method for an archaeology of Greek cult, though Renfrew provided one in 1985 for Bronze Age studies (Renfrew 1985; Osborne 2004b). The changes of the last four decades have not resolved the distance between classical, prehistoric, and world archaeologies. The relationship between Greek religion and Greek archaeology continues to be uneven, and the footprints of the field's earliest days linger even in the newest approaches. Whitley, for example, has noted that the Romanticism that shaped the emergence of Greek archaeology appears in new survey and landscape studies and suggested that the same idealization may lie behind the relative absence of economic and environmental archaeology in classical archaeologies (2001: 47). An archaeology of Greek cult is still evolving: it is characterized most by its diversity and is apprehended through a range of examples rather than an established canon.

Key Issues

Issues both perennial and current within the archaeology of Greek cult demonstrate the range of advances made in the 1980s and beyond. An exploration of sacred space, and an overview of two ritual types, provides a framework for a number of the recent debates and new methodologies. A more complete list of ritual types and foci of investigation may be found in Motte et al. (1992, 1998).

Greek sacred space was defined by a range of factors, from natural sacrality to political need. Caves, grottos, and mountain peaks were among the natural spaces which were considered either inherently numinous or the location of prehistoric celebration. More recent studies demonstrate that these sites were neither necessarily prehistoric nor natural and served a range of ritual and intellectual functions. Dillon (1997a) surveys the textual evidence for the mentalities which inform these choices; the cave sanctuary in Sphakia, southwest Crete, demonstrates use into the Hellenistic and Roman periods (Francis et al. 2000); Hellenistic Rhodians constructed artificial grottoes which aligned with the city's grid plan and provided loci for the display of votives to unknown gods (Rice 1995). Sacred gardens offer analogous evidence for the man-made creation of naturally numinous spaces, rituals in which mediated between the human and the divine as the settings mediated between anthropogenic and natural landscapes (Barnett 2007). Approaches from cognitive psychology and neurosciences have now been brought to the investigation of cult in caves: Ustinova's (2009) study integrates these perspectives with archaeological, historical, and textual evidence.

The location of sanctuaries in the civic and natural landscapes received significant theoretical boost in 1984 with de Polignac's study linking sacred space to the emergence of Greek city-

states: temple and sanctuaries, he argued, were locations for city-states to contest territorial boundaries and achieve mediation with their neighbors. A flood of studies followed, including Schachter (1992), Alcock and Osborne (1994), and Cole (2004). The focus on sacred space has extended, in the first decade of this century, to studies of landscape: religious applications include the definition of sacred landscape, its memorial, metaphoric and ritual uses, and the balance of ritual and practical functions. Scheid and de Polignac provide an overview of the problems and potentialities of this discussion (2010); Gkiasta offers a review of how these methods and theories have been applied to Crete (2008); del Olmo applies the questions of landscape and religion to southwest Arcadia and Sicily (2005a, b, 2010); Olshausen and Sauer (2009) offer a collection of 28 papers from a 2005 colloquium. Both survey archaeology and regional approaches to Greek religion inform these approaches to sacred space which extend beyond the confines of a single sanctuary. Romano demonstrates the contribution of survey to the sanctuary of Zeus at Mount Lykaion (2005); del Olmo provides an exploration of the impact of regional approaches to Arcadian religion (2005b).

The date at which sanctuaries emerged in Greek history has been a matter of energetic debate. The first elements have been identified in the eighth and ninth centuries BC; investigations engage questions of the relationship between sacred space, political identity, and the definition of boundaries. Morgan's studies at Olympia offer a Peloponnesian case for this emergence; Simon provides an Ionian; Mazarakis Ainan has argued that temples replaced the homes of rulers as locations for cult around the first half of the eighth century (Sourvinou-Inwood 1993; Morgan 1993; Simon 1997; Mazarakis Ainan 1997). Østby provides an annotated, geographically arranged bibliography on research on Greek sanctuaries 1965–1993, including directions in architectural studies which define the functions of discrete areas within the temples (1993). Scott surveys the productive attempts over the last three decades to integrate temples not only within architectural typologies and ancient texts and inscriptions but within their landscapes, ritual types, and moveable finds (Scott 2015).

The boundary of sanctuary space was defined by both physical and behavioral means. Physical boundaries consisted of either a built wall or natural features: see Bergquist (1967) for a study of the definitions of the Greek *temenos* and Patera (2010a) for analysis of the terminology brought to sacred spaces. The "sacred laws" which regulated behavior in ritual areas constitute one of the most important bridges between written and archaeological evidence for sacred space. Lupu's (2005) publication offers an update to Sokolowski's canonical works of 1955, 1962, and 1969; Parker's (2004) essay considers the meaning of the term "sacred law"; Brulé (2009) offers a collection of essays exploring the dynamics of ritual regulations. Calendars varied from one city-state to another and reflect the festivals, sacrifices, priesthoods, and civic groups responsible for the performance of rituals which held the state together (Carbon 2015). Lambert (2002) offers the first full edition of the Athenian sacrificial calendar; Robertson (1999) uses the calendar to cast light on the Eleusinian mysteries.

The effective boundary of sacred space extended beyond the sanctuary walls, and two recent foci – processions and pilgrimage and the territories owned by the temple for economic gain – integrate archaeological and historical data in their investigation. Graf notes that studies of processions lapsed after the start of the century and proposes a distinction between centripetal and centrifugal (Graf 1996); Connor provides a survey of methodology (1987); Herda provides a detailed analysis of the new year's procession between Miletus and Didyma (Herda 2006). Travelling to internationally recognized oracles, festivals, and mystery sites extends the question into the broader Mediterranean; comparanda are drawn from Christian pilgrimage and have particular focus in late antiquity (Dillon 1997b; Elsner and Rutherford 2005; Kristensen and Friese 2017). The economic functions of the Greek temple include the owning and leasing of land, sale of priesthoods, the production of goods in the sacred area, and the cost of temple construction (Salmon 2001; Davies 2001; Dignas 2000, 2003). Festivals

and emporia demonstrate the integration of ritual activity and economically beneficial exchanges (Naerebout 2001; Demetriou 2011). The publication of conferences from 1990 to 2005 offers overviews of the state of the question (Linders and Alroth 1992; Nielsen 2009).

The altar is one of the most essential elements of Greek sacred space, and sacrifice has been the object of a range of publications in the first decades of the twenty-first century (Graf 2002; Knust and Várhelyi 2011; Naiden 2013). Greek cult practice knew both elevated altars and offering pits. The elevated types range from the mounds formed of the remains of previous offerings, consisting of ash, bone, or horn, to the architecturally elaborate monumental altars of the Hellenistic period. Altars made of ash and bone now appear to be more common than previously imagined: examples include the massive ash altars of Zeus at Olympia and at Mount Lykaion (Hägg 2000; Romano 2005). The archaeology of monumental Hellenistic altars on the order of the altar of Zeus at Pergamon has a continuing position in art historical and architectural study. Webb (1996) includes the altars in her study of Hellenistic architectural sculpture; Scholl (2009) explores arguments for the altar of Zeus as an imaginary palace. The ability to distinguish functional differences based on altar types is an ongoing debate: the traditional hypotheses of raised altars for Olympian gods, offering pits for chthonic gods and holocaustic sacrifice, have been challenged (Kearns 1992; Kron 1999; Ekroth 1999, 2002, 2001; Boehringer 2001; Stratiki 2002; Patera 2010b). The frequent representation of sacrificial scenes on vase paintings makes iconography a major resource for altar studies, which may be devoted to typology (Rupp 1991a, b) as well as to ritual practice (van Straten 1995). The divide between archaeological and textual studies of Greek religion is most thin in connection with sacrifice and feasting. These include anthropologically informed hypotheses for the origins and function of sacrifice (Burkert 1983), analyses of sacred violence (Girard 1972; Georgoudi et al. 2005), and the contributions of the Paris school, drawing on structural analysis of myth and history (Vernant and Detienne 1979; Faraone and Naiden 2012). The study of sacrifice is also one of the relatively few areas in which faunal analysis has come to play a role in the archaeology of Greek cult: overviews are provided in Reese (1997) and MacKinnon (2007); Bookidis et al. (1999) bring these technologies to the analysis of the cult of Demeter and Kore at Corinth. Essays collected in Georgoudi et al. (2005) provide a conspectus of current approaches to sacrifice in Greek religion, against which the archaeological studies may be measured; articles in Mehl and Brulé (2008) emphasize archaeological and iconographic approaches to sacrifice. Among the most theoretically bold approaches – and the most distant from the long history of an isolated classical archaeology – is the volume *Architecturer l'invisible*, in which altars are explored in Greek, Assyrian, Medieval, and ethnographic contexts (Cartry et al. 2009).

Sacred space was also defined by votive practice. Archaeological approaches have moved from collection and cataloguing of finds to considerations of function, regulations, and economic impact. Votives in the form of body parts are traditional inclusions in shrines of healing divinities and offer exceptional insight into the intent of the dedicator; studies of the production of votives on-site reshape the conception of the Greek sanctuary as experienced in antiquity. Key publications in the recent discussions include F. van Straten (1981, 1990), Bodel and Kajava (2009), and Prêtre and Huysecom-Haxhi (2009). Day has drawn attention to the interactive potential created by inscriptions on dedicated objects; Osborne positions Greek votive practices within the world archaeological perspective (Day 2010; Osborne 2004a). The "material turn" has brought to bear a range of new approaches to these objects as agents, which are both socially constructed and actively shape the contexts in which they function (Meskell 2005).

Among the many ritual types identified within Greek religion, hero cults and rites of passage demonstrate the confluence of methodologies and research agendas which have enlivened the archaeology of Greek religion over the past three

decades. In studies of hero cult, the uses of Homeric poetry exemplify the more nuanced relationship between text and archaeology which turns the classical reliance on texts from a liability into a critical asset. Current debates focus on political function of hero cult, its distinction from tomb and ancestral cult, the ancient reuse of Bronze Age remains, and the potential to identify a distinctive sacrificial practice (Popham et al. 1982; Morris 1988; Alcock 1991; Antonaccio 1994; Whitley 1994; Ekroth 2002). The ritual type identified by van Gennep over 100 years ago as Rites of Passage has long been applied to studies in Greek religion. While its heuristic value has been vigorously debated (Dodd and Faraone 2003), it continues to provide a framework of investigation for rituals at the sanctuary of Artemis at Brauron, athletic competitions for both genders at Olympia, analyses of weddings and funerals, and studies of data from Crete from the Bronze Age through the Hellenistic period (Kahil 1983; Koehl 1986; Sourvinou-Inwood 1988, 1990; Barringer 1991; Shapiro 1991; King 1993; MacGillivray et al. 2000; Scanlon 2002; Serwint 1993; Erickson 2009). These studies combine archaeological, iconographic, epigraphic, and historical evidence. Caveats regarding the historical tenability of van Gennep's paradigm must be balanced against the extent to which the model succeeds in bringing together a range of ritual types and examples and so furthers the movement toward comparative study whose absence once characterized the archaeology of Greek cult.

International Perspectives

Because of the role of non-Greek nations in Greek archaeology, a range of international voices has characterized the archaeology of Greek religion from the onset. Reactive or dissident schools have emerged in Cambridge, Paris, Hamburg, and Naples, each of which offers some contribution to a new archaeology of cult. Cambridge emerged as a center for theoretically rich studies, led by publications focusing on the emergence of the state and social complexity and the use of quantitative analysis (Snodgrass 1971, 1977; Renfrew 1972; Morris 1987; Morgan 1994). The Theoretical Archaeology Group, begun by the universities of Sheffield, Cambridge, and Southampton in 1979, provides an ongoing meeting ground for the debate of archaeological theories. Centers for structural studies emerged in Paris and Hamburg, which yielded two seminal publications: de Polignac (1984) for the landscape of Greek cult and Berard et al. (1984) for iconography. The journal *Hephaistos*, established in Hamburg in 1979, is as devoted to theoretical as it is to empirical studies; the journal *Annali di Archeologia e Storia Antica*, published in Naples, offers a range of classical archaeological studies positioned in a contemporary theoretical context (Whitley 2001: 54–56).

New Directions

Survey techniques, perspectives from neuroscience, and the exploration of network models are three areas in which new directions in Greek archaeology intersect with the study of cult. Field surveys have revealed previously unidentified shrines, are a natural format for the integration of ethnoarchaeological techniques, and are critical archaeological components in the growing interests in the intersection of religion, landscape, and geography (Lolos 2005). This "spatial turn" can be traced to the work of Lefebvre and Soja and offers the potential to bridge current research frameworks with ancient geographers such as Strabo (Knott 2005; Kong 2001; Blake 2004; Stump 2008; Tweed 2011). Cognitive and neuroscience perspectives have been brought to a range of topics in Greek religion, including sacred space, vase paintings, and mystery religions: the interest suggests a lessening of the divide from prehistoric archaeologies, where they have had a longer discussion (Martin 2006; McCauley and Lawson 2007; Whitley 2008; Ustinova 2009; Geertz 2010; Schauer 2012). Network models are impacting models of Greek religion, applied to interactions in the islands (Constantakopoulou 2007), the study of hero and

other cult in connecting scattered communities in the Archaic period (Malkin 2011), and the intersection of commercial and religious functions (Gabrielsen 2007; Stavrianopoulou 2006).

References

Ackerman, R. 1991. *The myth and ritual school: J.G. Frazer and the Cambridge ritualists*. New York/London: Routledge.

Alcock, S.E. 1991. Tomb cult and the post classical polis. *American Journal of Archaeology* 95 (3): 447–467.

Alcock, S.E., and R. Osborne, eds. 1994. *Placing the gods: Sanctuaries and sacred space in ancient Greece*. Oxford: Clarendon Press.

Antonaccio, C.M. 1994. Contesting the past: Hero cult, tomb cult, and epic in Early Greece. *American Journal of Archaeology* 98 (3): 389–410.

Antonaccio, C.M. 1995. *An archaeology of ancestors: Tomb cult and hero cult in Early Greece*. Lanham: Rowman & Littlefield.

Arce, J. 2009. Fana, templa, delubra destrui praecipimus: The end of the temples in roman Spain. In *The archaeology of late antique 'paganism*, ed. L. Lavan and M. Mulryan, 195–208. Leiden: Brill.

Arrington, N.T. 2015. *Ashes, images, and memories: The presence of the war dead in Fifth-Century Athens*. Oxford: Oxford University Press.

Barnett, R. 2007. Sacred groves: Sacrifice and the order of nature in ancient Greek landscapes. *Landscape Journal* 26 (2): 252–269.

Barrett, C. 2015. Material evidence. In *The Oxford handbook of ancient Greek religion*, ed. E. Eidinow and J. Kindt, 113–130. Oxford: Oxford University Press.

Barringer, J.M. 1991. Europa and the nereids: Wedding or funeral? *American Journal of Archaeology* 95 (4): 657–667.

Bell, C. 2007. Defining the need for a definition. In *The archaeology of ritual*, ed. E. Kyriakidis, 277–288. Los Angeles: University of California Press.

Belozerskaya, M. 2009. *To wake the dead: A renaissance merchant and the birth of archaeology*. New York: Norton & Company.

Berard, C., C. Bron, J.L. Durand, F. Frontisi-Ducroux, F. Lissarrague, A. Schnapp, and J.P. Vernant. 1984. (trans. 2004). *La cité des images: religion et société en Grèce antique (A city of images: iconography and society in ancient Greece)*. Trans. D. Lyons. Paris/Princeton: F. Nathan: Editions de la Tour/Princeton University Press.

Bergquist, B. 1967. *The archaic Greek temenos: A study of structure and function*. Lund: Gleerup.

Blake, E. 2004. Space, spatiality, and archaeology. In *A companion to social archaeology*, ed. L. Meskell and R.W. Preucel, 230–254. Malden: Blackwell.

Boardman, J., et al. 1981. *Lexicon Iconographicum Mythologiae Classicae*. Zürich: Artemis Verlag.

Bodel, L., and M. Kajava, eds. 2009. *Dediche Sacre nel mondo greco-romano. Diffusione, funzioni, tipologie/ religious dedications in the Greco-roman world. Distribution, typology, use*. Rome: Institutum Romanum Finlandiae.

Boehringer, D. 2001. *Heroenkulte in Griechenland von der geometrischen bis zur klassischen Zeit. Attika, Argolis, Messenien*. Berlin: Akademie Verlag.

Bookidis, N., J. Hansen, L. Snyder, and P. Goldberg. 1999. Dining in the sanctuary of Demeter and Kore at Corinth. *Hesperia* 68 (1): 1–54.

Braund, D. 1994. *Georgia in antiquity: A history of Colchis and Transcaucasian Iberia: 550 BC – AD 562*. Oxford: Clarendon Press.

Bremmer, J. 1994. *Greek religion*. Oxford: Oxford University Press.

Brilliant, R., and D. Kinney. 2011. *Reuse value: Spolia and appropriation in art and architecture from Constantine to Sherrie Levine*. Surrey: Ashgate Publishing Limited.

Brulé, P., ed. 2009. *La norme en matière religieuse en Grèce antique*. Liège: Centre International d'Étude de la Religion Grecque Antique.

Bundrick, S. 2014. Selling sacrifice on classical Athenian vases. *Hesperia* 83 (4): 653–708.

Burkert, W. 1983. *Homo necans: The Anthropology of ancient Greek sacrificial ritual and myth*. Trans. P. Bing. Berkeley: University of California Press.

Burkert, W. 2011. *Griechiesche religion der archaischen und klassischen Epoche*. 2nd ed. Stuttgart: Kohlhammer.

Caldwell, R. 1990. The psychoanalytic interpretation of Greek myth. In *Approaches to Greek myth*, ed. L. Edmunds, 342–392. Baltimore: Johns Hopkins University Press.

Carbon, J.-M. 2015. Ritual cycles: Calendars and festivals. In *The Oxford handbook of ancient Greek religion*, ed. E. Eidinow and J. Kindt, 537–550. Oxford: Oxford University Press.

Cardete del Olmo, M.C. 2005a. *Paisajes mentales y religiosos: la frontera suroeste arcadia en épocas arcaica y clásica*. Oxford: BAR International Series.

Cardete del Olmo, M.C. 2005b. Rural religion in ancient arcadia: A methodological approach. In *Ancient arcadia: Papers from the third international seminar on ancient arcadia, held at the Norwegian Institute in Athens, 7–10 May 2002*, ed. E. Østby, 51–65. Athens: Astroms editions.

Cardete del Olmo, M.C. 2010. *Paisaje, identidad y religión. imágenes de la Sicilia antiqua*. Barcelona: Bellaterra.

Cartry, M.J.-L. Durand, and R.K. Piettre, eds. 2009. *Architecturer l'invisible. Autels, ligatures, écritures*. Turnhout: Brepols.

Cole, S.G. 2004. *Landscapes, gender and ritual space: The ancient Greek experience*. Berkeley: University of California Press.

Connor, W.R. 1987. Tribes, festivals and processions. Civic ceremonies and political manipulations in archaic Greece. *Journal of Hellenic Studies* 107: 40–50.

Constantakopoulou, C. 2007. *The dance of the islands: Insularity, networks, the Athenian empire and the Aegean world*. Oxford: Oxford University Press.

Davies, J.K. 2001. Rebuilding a temple. The economic effects of piety. In *Economies beyond agriculture in the classical world*, ed. D.J. Mattingly and J. Salmon, 209–229. London/New York: Routledge.

Davis, J. 2012. Doing archaeology in the classical lands: The Greek world. In *Classical archaeology*, ed. S.-E. Alcock and R. Osborne, 2nd ed., 53–68. Malden/London: Wiley.

Day, J.W. 2010. *Archaic Greek epigram and dedication: Representation and reperformance*. Cambridge, UK: Cambridge University Press.

Demetriou, D. 2011. What is an emporium? A reassessment. *Historia* 60: 255–272.

de Polignac, F. 1984 (trans. 1995). *La Naissance de la cité greque: Cultes, espace et société VIIIe-VIIe siècles (Cults, territory and the origins of the Greek city-state)*. Trans. J. Lloyd. Paris/Chicago: Editions la Découverte/The University of Chicago Press.

Detienne, M. 2005 (trans. 2007). *Les Grecs et nous: Une anthropologie comparée de la Grèce ancienne (The Greeks and us: A comparative anthropology of ancient Greece).* Trans. J. Lloyd. Paris/Malden: Editions Perrin/Polity Press.

Detienne, M., and J.-P. Vernant, ed. 1979 (trans. 1989). *La cuisine du sacrifice en pays grec (The cuisine of sacrifice among the Greeks).* Trans. P. Wissing. Paris/Chicago: Editions Gallimard/University of Chicago Press.

Dignas, B. 2000. The leases of sacred property at Mylasa: An alimentary scheme for the gods. *Kernos* 13: 117–126.

Dignas, B. 2003. *Economy of the sacred in hellenistic and roman Asia minor*. Oxford: Oxford University Press.

Dillon, M. 1997a. The ecology of the Greek sanctuary. *Zeitschrift für Papyrologie und Epigraphik* 118: 113–127.

Dillon, M. 1997b. *Pilgrims and pilgrimage in ancient Greece*. London/New York: Routledge.

Dodd, D., and C. Faraone. 2003. *Initiation in ancient Greek rituals and narratives: New critical perspective*. London/New York: Routledge.

Dodds, E.R. 1951. *The Greeks and the irrational*. Berkeley: University of California Press.

Dyson, S.L. 1993. From new to new age archaeology: Archaeological theory and classical archaeology – A 1990s perspective. *American Journal of Archaeology* 97 (2): 195–206.

Ekroth, G. 1999. Pausanias and the sacrificial rituals of Greek hero-cults. In *Ancient Greek hero cult. Proceedings of the fifth international seminar on ancient cult, 21–23 April 1995*, ed. R. Hägg, 146–159. Stockholm: Skrifter utgivna av Svenska Institutet I Athen.

Ekroth, G. 2001. Altars on Greek vases: The identification of Bomos and Eschara. In *Ceramics in context. Proceedings of the Internordic colloquium on ancient pottery held at Stockholm 13–15 June 1997*, ed. C. Scheffer, 115–126. Stockholm: Almqvist and Wiksell International.

Ekroth, G. 2002. *The sacrificial rituals of Greek hero-cults in the archaic to early Hellenistic periods*. Liège: Centre International d'Étude de la Religion Grecque Antique.

Elsner, J. 1995. *Art and the roman viewer: The transformation of art from the pagan world to christianity.* Cambridge, UK: Cambridge University Press.

Elsner, J., and I. Rutherford, eds. 2005. *Pilgrimage in Graeco-Roman and early Christian antiquity. Seeing the gods*. Oxford: Oxford University Press.

Erickson, B. 2009. Roussa Ekklesia, part I: Religion and politics in East Crete. *American Journal of Archaeology* 113 (3): 353–404.

Faraone, C., and F.S. Naiden. 2012. *Greek and roman animal sacrifice: Ancient victims, modern observers*. Cambridge, UK: Cambridge University Press.

Francis, J., S. Price, J. Moody, and L. Nixon. 2000. Agiasmatsi: A Greek cave sanctuary in Sphakia, Southwest Crete. *Annual of the British School at Athens* 95: 427–471.

Frazer, J.G. 1890–1915. *The golden bough: A Study in magic and religion*. New York/London: MacMillan and Co.

Gabrielsen, V. 2007. Brotherhoods of faith and provident planning: The non-public associations of the Greek world. *Mediterranean Historical Review* 22 (2): 183–210.

Geertz, A.W. 2010. Brain, body and culture: A biocultural theory of religion. *Method and Theory in the Study of Religion* 22 (4): 304–321.

Georgoudi, S. 2005. 'L "occultation de la violence" dans le sacrifice grec. In *La cuisine et l'autel: Les sacrifices en questions dans les sociétes de la Méditerranée ancienne*, ed. S. Georgoudi, R.K. Piette, and F. Schmidt, 115–141. Turnhout: Brepols.

Georgoudi, S., R.K. Piettre, and F. Schmidt, eds. 2005. *La cuisine et l'autel: les sacrifices en questions dans les sociétés de la Méditerranée ancienne*. Turnhout: Brepols.

Girard, R. 1972. *La violence et le sacré*. Paris: B. Grasset.

Gkiasta, M. 2008. *The historiography of landscape research on Crete*. Leiden: Brill.

Graf, F. 1996. Pompai in Greece: Some considerations about space and ritual in the Greek polis. In *The role of religion in the early Greek polis: Proceedings of the third international seminar on ancient Greek cult, organized by the Swedish Institute at Athens, 16–18 October 1992*, ed. R. Hägg, 55–65. Stockholm: Skrifter utgivna av Svenska Institutet I Athen.

Graf, F. 2002. What is new about Greek sacrifice? In *Kykeon. Studies in honour of H.S. Versnel*, ed. H.F.J. Horstmanshoff, H.W. Singor, F.T. van Straten, and J.H.M. Strubbe, 113–126. Leiden: Brill.

Hägg, R. 1992. Cult practice and archaeology: Some examples from early Greece. *Studi italiani di filologia classica* 10: 79–95.

Hägg, R. 2000. Archäologie der Heiligtümer. In *Klassische Archäologie: Eine Einführung*, ed. A.H. Borbein, T. Hölscher, and P. Zanker, 280–290. Berlin: Reimer.

Hahn, J., S. Emmel, and U. Gotter, eds. 2008. *From temple to church: Destruction and renewal of local cultic topography in late antiquity*. Leiden: Brill.

Hamilakis, Y. 2007. *The nation and its ruins: Antiquity, archaeology and national imagination in Greece*. Oxford: Oxford University Press.

Hamilakis, Y. 2011. Archaeological ethnography: A multitemporal meeting ground for archaeology and anthropology. *Annual Review of Anthropology* 40: 399–414.

Harrison, J.E. 1890. *Mythology and monuments of ancient Athens*. London/New York: MacMillan.

Hedreen, G. 2011. Bild, mythos and ritual: Choral dance in Theseus's Cretan adventure on the François vase. *Hesperia* 80 (3): 491–510.

Herda, A. 2006. *Der Apollon-Delphinios-Kult in Milet und die Neujahrsprozession nach Didyma. Ein neuer Kommentar er sog. Molpoi-Satzung*. Mainz: Philipp von Zabern.

Hodos, T. 2010. Local and global perspectives in the study of social and cultural identities. In *Material culture and social identities in the ancient world*, ed. S. Hales and T. Hodos, 3–31. Cambridge, UK: Cambridge University Press.

Houby-Nielsen, S. 1995. "Burial language" in archaic and classical Kerameikos. *Proceedings of the Danish Institute at Athens* 1: 129–191.

Jung, C.G., and C. Kerényi. 1941 (trans. 1963). *Einführung in das Wesen der Mythologie (Essays on a science of mythology: The myth of the divine child and the mysteries of Eleusis)*. Trans. R.F.C. Hull. Zurich/Princeton: Pantheon Akademischen Verlagsanstalt/Princeton University Press.

Kahil, L. 1983. Mythological repertoire of Brauron. In *Ancient Greek art and iconography*, ed. W.G. Moon, 231–244. Madison: University of Wisconsin Press.

Kearns, E. 1992. Between gods and man: Status and function of heroes and their sanctuaries. In *Le Sanctuaire grec: huit exposés suivis de discussions*, ed. A. Schachter, 65–107. Geneva: Fondation Hardt.

Kelley, O. 2012. Beyond intermarriage: The role of the indigenous italic population at Pithekoussai. *Oxford Journal of Archaeology* 31 (3): 245–260.

Kerényi, C. 1976 (trans. 1976). *Dionysos: Urbild des unzerstörbaren Lebens (Dionysos: Archetypal image of indestructible life)*. Trans. R. Manheim. Munich/Princeton: Langen Müller/Princeton University Press.

Kindt, J. 2011. Ancient Greece. In *The Oxford handbook of the archaeology of ritual and religion*, ed. T. Insoll. Oxford: Oxford University Press.

King, H. 1993. Bound to bleed: Artemis and Greek women. In *Images of women in antiquity*, ed. A. Cameron and A. Kuhrt, 109–127. Detroit: Wayne State University Press.

Kleibrink, M., J. Kindberg Jacobsen, and S. Handberg. 2004. Water for Athena: Votive gifts at Lagaria (Timpone della Motta, Francavilla Marittima, Calabria). *World Archaeology* 36 (1): 43–67.

Knott, K. 2005. *The location of religion: A spatial analysis*. New York: Routledge.

Knust, J., and Z. Várhelyi, eds. 2011. *Ancient Mediterranean sacrifice*. New York: Oxford University Press.

Koehl, R.B. 1986. The chieftain cup and a Minoan 'rite of passage. *Journal of Hellenic Studies* 106: 99–110.

Kong, L. 2001. Mapping 'new' geographies of religion: Politics and poetics in modernity. *Progress in Human Geography* 25 (2): 211–233.

Kristensen, T.M., and W. Friese, eds. 2017. *Excavating pilgrimage: Archaeological approaches to sacred travel and movement in the ancient world*. London: Routledge.

Kron, U. 1999. Patriotic heroes. In *Ancient Greek Hero cult. Proceedings of the fifth international seminar on ancient cult, 21–23 April 1995*, ed. R. Hägg, 61–83. Stockholm: Skrifter utgivna av Svenska Institutet I Athen.

Lambert, S. 2002. The sacrificial calendar of Athens. *Annual of the British School at Athens* 97: 353–399.

Lebessi, A. 2009. The erotic goddess of the Syme sanctuary, Crete. *American Journal of Archaeology* 113 (4): 521–545.

Linders, T., and B. Alroth, eds. 1992. *Economics of cult in the ancient Greek world: Proceedings of the Uppsala symposium 1990*. Uppsala: Acta Universitatis Upsaliensis.

Lobeck, C.A. 1829. *Aglaophamus*. Berlin: Gebrüder Borntraeger.

Lolos, Y.A. 2005. The sanctuary of Titane and the City of Sikyon. *Annual of the British School at Athens* 100: 275–298.

Lupu, E. 2005. *Greek sacred law: A collection of new documents*. Leiden: Brill.

MacGillivray, J.A., J.M. Driessen, and L.H. Sackett. 2000. *The Palaikastro Kouros: A Minoan chryselephantine statuette and its Aegean context*. London: The British School at Athens.

MacKinnon, M. 2007. Osteological research in classical archaeology. *American Journal of Archaeology* 111 (3): 473–504.

Malkin, I. 2011. *A small Greek world: Networks in the Ancient Mediterranean*. Oxford: Oxford University Press.

Mannhardt, W. 1875/1877 (1904/1905). *Wald und Feldkulte*. Berlin: Gebrüder Borntraeger/W. Heuschkel.

Marconi, C. 2007. *Temple decoration and cultural identity in the archaic Greek world: The metopes of Selinus*. Cambridge, UK: Cambridge University Press.

Martin, L.H. 2006. Aspects of 'religious experience' among the Hellenistic mystery religions. *Religion and Theology* 12 (3–4): 349–369.

Mazarakis Ainan, A. 1997. *From Ruler's dwellings to temples: Architecture, religion and society in early iron age Greece (1100–700 B.C)*. Jonsered: Paul Astroms.

McCauley, R.N., and E.T. Lawson. 2007. Cognition, religious ritual, and archaeology. In *The archaeology of*

ritual, ed. E. Kyriakidis, 209–254. Los Angeles: University of California Press.

McCredie, J.R. 1974. A Samothracian enigma. *Hesperia* 43 (4): 454–459.

Mehl, V., and P. Brulé. 2008. *Le sacrifice antique: vestiges, procédures et stratégies*. Renes: Presses universitaires de Rennes.

Meskell, L. 2005. *Archaeologies of materiality.* Oxford: Blackwell.

Morgan, C. 1993. The origins of pan-Hellenism. In *Greek sanctuaries: New approaches*, ed. N. Marinatos and R. Hägg, 18–44. London/New York: Routledge.

Morgan, C. 1994. The evolution of a sacral 'landscape' – Isthmia, Perachora, and the early Corinthian state. In *Placing the gods: Sanctuaries and sacred space in ancient Greece*, ed. S.E. Alcock and R. Osborne, 105–142. Oxford: Clarendon Press.

Morgan, C. 1996. From palace to polis? Religious developments on the Greek mainland during the bronze age/iron age transition. In *Religion and power in the ancient Greek world: Proceedings of the Uppsala symposium 1993*, ed. P. Hellström and B. Alroth, 41–57. Uppsala: Almqvist & Wiksell International.

Morris, I. 1987. *Burial and ancient society: The rise of the Greek city-state*. Cambridge, UK: Cambridge University Press.

Morris, I. 1988. Tomb cult and the Greek renaissance. *Antiquity* 62: 750–761.

Morris, I. 1994. Introduction. In *Classical Greece: Ancient histories and modern archaeologies*, ed. I. Morris, 3–7. Cambridge, UK: Cambridge University Press.

Morris, I. 2000. *Archaeology as cultural history: Words and things in iron age Greece*. Malden: Blackwell.

Motte, A., V. Pirenne-Delforge, and P. Wathelet. 1992. *Mentor: Guide bibliographique de la religion grecque*. Liege: Centre international d'histoire des religions.

Motte, A., V. Pirenne-Delforge, and P. Wathelet. 1998. *Mentor 2, 1986–1990: Guide bibliographique de la religion grecque*. Liège: Université de Liège, Centre d'histoire des religions.

Muratov, M. 2015. The northern Black Sea: The case of the Bosporan kingdom. In *The Oxford handbook of ancient Greek religion*, ed. E. Eidinow and J. Kindt, 589–604. Oxford: Oxford University Press.

Naerebout, F.G. 2001. Emporikon ti pragma. Feest en economie in de antiek-Griekse wereld. *Leidschrift* 16 (2): 23–40.

Naiden, F.S. 2013. *Smoke signals for the gods: Ancient Greek sacrifice from the archaic through roman periods*. Oxford: Oxford University Press.

Naoum, D.-C., G. Muskett, and M. Georgiadis. 2004. *Cult and death: Proceedings of the third annual meeting of postgraduate researchers, the University of Liverpool, May 2002*. Oxford: Archaeopress.

Nielsen, I. 2009. *Zwischen Kult und Gesellschaft: Kosmopolitische Zentren des Antiken Mittelmeerraumes als Aktionsraum von Kultvereinen und Religionsgemeinschaften. Akten eines Symposiums des Archäologischen Instituts der Universität Hamburg, 12–14 Oktober 2005*. Augsburg: Camelion Verlag.

Olshausen, E., and V. Sauer, eds. 2009. *Die Landschaft und die Religion: Stuttgarter Kolloquium zur Historischen Geographie des Altertums 9, 2005*. Stuttgart: Franz Steiner Verlag.

Osborne, R. 1994. Archaeology, the Salaminioi, and the politics of sacred space in Archaic Attica. In *Placing the Gods: Sanctuaries and sacred space in ancient Greece*, ed. S. Alcock and R. Osborne, 143–160. Oxford: Clarendon Press.

Osborne, R. 2004a. Hoards, votives, offerings: The archaeology of the dedicated object. *World Archaeology* 36 (1): 1–10.

Osborne, R. 2004b. Greek archaeology: A survey of recent work. *American Journal of Archaeology* 108 (1): 87–102.

Østby, E. 1993. Twenty-five years of research on Greek sanctuaries: A bibliography. In *Greek sanctuaries: New approaches*, ed. N. Marinatos and R. Hägg, 192–227. London/New York: Routledge.

Parker, R. 2004. What are sacred laws? In *The law and the courts in ancient Greece*, ed. E.M. Harris and L. Rubinstein, 57–70. London: Duckworth.

Patera, I. 2010a. Espace et structures cultuels du sanctuaire grec: la construction du vocabulaire. *Revue de l'histoire des Religions* 22: 535–551.

Patera, I. 2010b. Theoi sumbomoi et autels multiples: Réflextions sur les structures sacrificielles partagées. *Kernos* 23: 223–238.

Pollini, J. 2007. Christian desecration and mutilation of the Parthenon. *Mitteilungen des deutschen archäologischen Instituts: Athenische Abteilung* 122: 207–224.

Popham, M., T. Touloupa, and L.H. Sacket. 1982. The hero of Lefkandi. *Antiquity* 56: 169–174.

Prent, M. 2005. *Cretan sanctuaries and cults. Continuity and change from late Minoan IIIC to the archaic period*. Leiden: Brill.

Prêtre, C., and S. Huysecom-Haxhi, eds. 2009. *Le donateur, l'offrande et la déesse: systèmes votifs dans les sanctuaires de déesses du monde grec: actes du 31 e colloque international organisé par l'UMR Halma-Ipel. (Université Charles-de-Gaulle/Lille 3, 13–15 décembre 2007)*. Liège: Centre international d'étude de la religion grecque antique.

Reese, D.S. 1997. Faunal remains from Greek sanctuaries: A survey. In *Greek sacrificial ritual, Olympian and chthonian: Proceedings of the sixth international seminar on ancient Greek cult, Göteborg university, 25–27 April 1997*, ed. R. Hägg and B. Alroth, 121–124. Stockholm: Aströms Förlag.

Renfrew, C. 1972. *The emergence of civilisation: The Cyclades and the Aegean in the third millennium BC*. London: Methuen.

Renfrew, C. 1980. The great tradition versus the great divide: Archaeology as anthropology? *American Journal of Archaeology* 84 (3): 287–298.

Renfrew, C. 1985. *The archaeology of cult: The sanctuary at Phylakopi*. London: The British School of Archaeology at Athens. Supplement 18.

Rice, E.E. 1995. Grottoes on the acropolis of Hellenistic Rhodes. *Annual of the British School at Athens* 90: 383–404.

Robertson, N. 1999. The sequence of days at the Thesmophoria and the Eleusinian mysteries. *Echos du Monde Classique* 43 (18): 1–33.

Romano, D. 2005. A new topographical and architectural survey of the sanctuary of Zeus at Mount Lykaion. In *Ancient arcadia: Papers from the third international seminar on ancient arcadia, held at the Norwegian Institute at Athens, 7–10 May 2002*, ed. E. Østby, 381–396. Athens: Norwegian Institute.

Rowe, J.H. 1965. The renaissance foundations of anthropology. *American Anthropologist* 67 (1): 1–20.

Rupp, D.W. 1991a. Blazing altars: The representation of altars in attic vase painting. In *L'espace sacrificiel dans les civilisations Méditerranées de l'antiquité*, ed. R. Étienne and M.-T. Le Dinahet, 57–63. Paris: De Boccard.

Rupp, D.W. 1991b. The altars of southern Greece: A typological analysis. In *L'espace sacrificiel dans les civilisations Méditerranées de l'antiquité*, ed. R. Étienne and M.-T. Le Dinahet, 303–306. Paris: De Boccard.

Salmon, J. 2001. Temples the measure of men: Public building in the Greek economy. In *Economies beyond agriculture in the classical world*, ed. D.J. Mattingly and J. Salmon, 195–208. London/New York: Routledge.

Scanlon, T.F. 2002. *Eros and Greek athletics*. Oxford: Oxford University Press.

Schachter, A. 1992. Policy, cult and the placing of Greek sanctuaries. In *Le sanctuaire grec*, ed. O. Reverdin and P. Grange, 1–57. Geneva: Vandoeuvres.

Schauer, P. 2012. Quantifying the importance of motifs on attic figure-painted pottery. In *Creating consilience: Integrating the sciences and the humanities*, ed. E. Slingerland and M. Collard, 194–204. Oxford: Oxford University Press.

Scheid, J., and F. de Polignac. 2010. Qu'est-ce qu'un 'paysage religieux' ? Représentations cultuelles de l'espace dans les sociétés anciennes. *Revue de l'histoire des religions* 227: 427–434.

Schlesier, R., and R. Sanchiño Martinez, eds. 2006. *Neuhumanismus und Anthropologie des Griechischen Mythos – Karl Kerényi im Europäischen Kontext des 20. Jahrhunderts*. Locarno: Rezzonico Editore.

Scholl, A. 2009. Ὀλυμπίου ἔνδοθεν αὐλή – Zur Deutung des Pergamonaltars als Palast. *Jahrbuch des Deutschen Archäologischen Instituts* 124: 251–278.

Scott, M. 2015. Temples and sanctuaries. In *The Oxford handbook of ancient Greek religion*, ed. E. Eidinow and J. Kindt, 227–240. Oxford: Oxford University Press.

Serwint, N. 1993. The female athletic costume at the Heraia and prenuptial initiation rites. *American Journal of Archaeology* 97 (3): 403–422.

Shapiro, A. 1991. The iconography of mourning in Athenian art. *American Journal of Archaeology* 95 (4): 629–656.

Shepherd, G. 2005. Dead men tell no tales: Ethnic diversity in Sicilian colonies and the evidence of the cemeteries. *Oxford Journal of Archaeology* 24 (2): 115–136.

Shepherd, G. 2015. Magna Graecia (South Italy and Sicily). In *The Oxford handbook of ancient Greek religion*, ed. E. Eidinow and J. Kindt, 567–588. Oxford: Oxford University Press.

Simon, C.G. 1997. The archaeology of cult in geometric Greece: Ionian temples, altars and dedications. In *New light on a dark age: Exploring the culture of geometric Greece*, ed. S.H. Langdon, 125–143. Columbia/London: University of Missouri Press.

Snodgrass, A. 1971. *The dark age of Greece: An archaeological survey of the eleventh to the eighth centuries BC*. Edinburgh: Edinburgh University Press.

Snodgrass, A. 1977. *Archaeology and the rise of the Greek state*. Cambridge, UK: Cambridge University Press.

Sokolowski, F. 1955. *Lois sacrées de l'Asie Mineure*. Paris: E. de Boccard.

Sokolowski, F. 1962. *Lois sacrées des cités grecques, Supplément*. Paris: E. de Boccard.

Sokolowski, F. 1969. *Lois sacrés des cités grecques*. Paris: E. de Boccard.

Sourvinou-Inwood, C. 1988. *Studies in girls' transitions. Aspects of the Arkteia and age representation in attic iconography.* Athens: Kardamitsa.

Sourvinou-Inwood, C. 1990. Ancient rites and modern constructs: On the Brauronian bears again. *Bulletin of the Institute of Classical Studies* 37: 1–14.

Sourvinou-Inwood, C. 1993. Early sanctuaries, the eighth century, and ritual space: Fragments of discourse. In *Greek sanctuaries: New approaches*, ed. N. Marinatos and R. Hagg, 1–17. London/New York: Routledge.

Stavrianopoulou, E. 2006. *Ritual and communication in the Graeco-roman world*. Liege: Centre international d'étude de la religion grecque antique.

Stratiki, K. 2002. Le culte des heros grecs chez Pausanias. *Bulletin de I'Assocation Guillaume Budel* 1: 70–93.

Stump, R.W. 2008. *The geography of religion: Faith, place, and space*. New York: Rowman & Littlefield.

Thesaurus Cultus et rituum antiquorum. 2004–2011. Los Angeles/Basel: J. Paul Getty Museum/Fondation pour le lexicon iconographicum mythologiae classicae.

Tsetskhladze, G.R. 2006/2008. *Greek colonisation: An account of Greek colonies and other settlements overseas*, vol 1 (2006), vol 2 (2008). Leiden: Brill.

Tweed, T.A. 2011. Space. *Material Religion* 7 (1): 116–123.

Ustinova, Y. 2009. *Caves and the ancient Greek mind. Descending underground in the search for ultimate truth*. Oxford: Oxford University Press.

van Straten, F. 1981. Gifts for the gods. In *Faith, hope and worship: Aspects of religious mentality in the ancient world*, ed. H.S. Versnel, 65–181. Leiden: Brill.

van Straten, F. 1990. Votives and votaries in Greek sanctuaries. In *Le sanctuaire grec*, ed. O. Reverdin and P. Grange, 247–290. Geneva: Vandoeuvres.

van Straten, F. 1995. *Hiera kala: Images of animal sacrifice in archaic and classical Greece*. Leiden: Brill.
Varto, E. 2018. *The classics and early anthropology*. Leiden: Brill.
Voyatzis, M. 1992. Votive riders seated side-saddle at early Greek sanctuary sites. *The Annual of the British School at Athens* 87: 259–279.
Ward-Perkins, B. 1999. Re-using the architectural legacy of the past, 'entre idéologie et pragmatisme'. In *The idea and the ideal of the town between late antiquity and early middle ages*, ed. G. Brogiolo and B. Ward-Perkins, 225–244. Leiden: Brill.
Watrous, L.V. 1996. *The cave sanctuary of Zeus at Psychro*. Liège: Université de Liège, Histoire de l'art et archéologie de la Grèce antique.
Webb, P. 1996. *Hellenistic architectural sculpture: Figural motifs in Western Anatolia and the Aegean islands*. Madison: University of Wisconsin Press.
Whitley, J. 1994. The monuments that stood before Marathon: Tomb cult and Hero cult in archaic Attica. *American Journal of Archaeology* 98 (2): 213–230.
Whitley, J. 2001. *The archaeology of ancient Greece*. Cambridge, UK: Cambridge University Press.
Whitley, D.S. 2008. Cognition, emotion, and belief: First steps in an archaeology of religion. In *Belief in the past: Theoretical approaches to the archaeology of religion*, ed. D.S. Whitley and K. Hays-Gilpin, 85–104. Walnut Creek: Left Coast Press.

Religion, Italo-Roman, Archaeology of

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Introduction

Roman scholars during the Late Republic and Empire credited Etruscan religion with much that was basic to Roman cult and ritual, most notably the "scriptures" of the *etrusca disciplina*, which they believed had been committed to writing in the earliest days of the cities of Etruria. Even though Etruscan culture, like its language, was perceived as radically different from that of the rest of Italy, as early as the Iron Age (and probably before), many sacred places, rituals, and material aspects of religion were shared with the Indo-European, Italic tribes; by the fourth century BCE, the neighboring Faliscans overtly shared sanctuaries (e.g., Lucus Feroniae) and utilized Etruscan art and script for religious depictions and votive dedications. The strong bonds to Etruscan cult were retained even after the Christianization of the empire: pagans exploited the Etruscan scriptures as a foil to Judaeo-Christian revelation, and in 410 CE, Etruscan haruspices offered to summon thunderbolts to defend the city of Rome from Alaric's army.

Religion in Italy was constantly evolving, in tandem with the growing complexity of societies, in response to catastrophes and through exposure to alien cultures. While sacred places and basic attitudes of worship, divination, and expiation were maintained over many centuries, such familiar (to us) features as temples and cult statues were optional or mutable in Italic and Etruscan practice. By the mid-third century BCE, Rome dominated Etruria, the Italic tribes, and Greek southern Italy; Sicily was soon to follow: almost immediately artistic and ritual aspects of many cults began the process of syncretism, interpreted by some scholars as a means of "Romanizing" or achieving favor within the new political system. During the last two centuries of the Republic and the first two of empire (second century BCE – second century CE), conquests abroad would escalate the process through the adoption of foreign cults. Worship of Cybele (Magna Mater/Great Mother) from Asia Minor and Aesculapius (imported from Kos in a time of plague) came in response to state initiatives and consultation of Greek oracles. The cults of Dionysos/Bacchus, Isis, Mithras, etc., begun as popular, sometimes underground, movements were at times suppressed but ultimately embraced by all levels of an increasingly diverse population. Rome developed new cults to commemorate abstract principles such as piety, honor, and hope, quite different from the cults and myths of the chthonic or Olympian gods. As early as the death of Julius Caesar, an imperial cult began to form, asserting the special status of members of the emperor's family and enhancing respect for the imperial regime. The acceptance of Christianity by Constantine in 303 CE was the next, and revolutionary, stage in the process.

Although references to primitive religion appear in the Classical authors and we know that scriptures existed and were consulted, the actual matter of Italo-Roman cults can today only be restored by reference to archaeological evidence. Scholarly interpretations may be skewed by the situation of Roman dominance of Italy and by the failure of Roman priestly colleges to preserve intact the writings of earlier groups. Numerous references to the *etrusca disciplina* and epigraphic finds such as the *Iguvine Tables* (from Gubbio, Italy) attest to such lost documents. The texts themselves may only be reconstituted from references left by Roman authors who wrote centuries after the various scriptures had been revealed or posted: so all such analyses must be appraised with caution. (Main authors: Livy; Cicero, *De divinatione*; Ovid, *Fasti* and *Metamorphoses*; Seneca, *Naturales Quaestiones*; John the Lydian, *De ostentis*; Martianus Capella, *De nuptiis Mercurii et Philologiae*; Censorinus, *De die natali*; Macrobius, *Saturnalia*.)

Historical Background

Pre- and Protohistoric Evidence

Ever since the Neolithic period, burials attest to funerary religious cult, in the placing of offerings with the prepared dead; the evidence culminates in the dramatic change (perhaps inspired by a cult or religious revival?) in the Final Bronze Age (c. 1200–1000 BCE) to highly formalized cremation ritual and the use of biconical urns, sometimes dressed or decorated with clothing or ornaments. In Latium, some cremations were buried in hut-shaped urns with miniature sets of vessels and even figurines placed inside: surely tokens of ancestor cult. Other Iron Age finds, especially certain metal hoards buried on the outskirts of hut villages, may represent boundary offerings, and images used to decorate vessels and metalwork include boats and birds, perhaps recalling the sun-barque or messengers of the gods. At Etruscan Tarquinia (Pian di Civita) burnt sacrifices and animal bones and antlers mark a sacred area of the ninth through sixth centuries BCE (below).

Key Issues/Current Debates

The Primacy of Writing

Written religious documents included the Etruscan received scriptures, the *etrusca disciplina*, believed to have been dictated by the prophet Tages, a supernatural being resembling a child with the features (teeth, gray hair) and wisdom of an old man (*puer senex*). He emerged from a plowed furrow made by Tarchon, founder of the city of Tarquinia, and proceeded to sing or recite the directives of the gods on divination and required ritual. At the end of his mission, he disappeared back into the earth. The verses included the doctrine of *saecula*, time cycles allotted to different humans and cultures, including Rome, the doctrines on boundaries and land (some preserved by the Roman surveyors' guild: the "Prophecy of Vegoia"), and the *libri Acherontici*, texts covering funerary ritual. Some terms incorporated in Etruscan and Italic cults are preserved in glosses by later authors, e.g., *aiser*, Etruscan for "gods," and *camillus* for a youth officiating in certain cults.

The *etrusca disciplina* was not the only recorded/received scripture in Italian culture: the Latin verse "Prophecies of Marcius" was attributed to an illustrious wandering prophet of legendary times and was circulating in Latin literature by the third century BCE (Livy 25.12.2–15). The Sibylline books, also of foreign origin (the sibyl who sold them to King Tarquinius was said to be from the oracle of Apollo at the Greek colony of Cumae), were kept secret at sacred locations in Rome and consulted in times of crisis, at the order of the Senate. Such texts suffered precarious fortunes, being transferred to different temples and archives in times of fire or war and occasionally having to be reconstructed from dispersed copies.

The Umbrians of Iguvium (Gubbio) displayed, on seven large bronze plaques, the "*Iguvine Tables*," inscribed in Umbrian language using either Etruscan or Latin script. Discovered in 1444, they were written during the third to first centuries BCE as transcriptions of much older documents directing animal sacrifices, observation of birds (augury), and purification rituals

linked to Jupiter Grabovius (and other gods). The faithful of Samnium recorded in the *Agnone Tablet* (now in the British Museum) the mystery cult of Kerres (Ceres/Demeter), using the Oscan language of the Bay of Naples.

Rome itself posted the *Laws of the Twelve Tables* and other laws believed to have been created by the pious, early seventh-century BCE king, Numa Pompilius: such laws as the *lex regia de mortuo inferendo*, still attributed to Numa in the era of Justinian (d. 565 CE) (*Digesta 11.8.2 Marcellus 28 dig.)*, instilled a connotation of cosmic, religious significance into some state regulations.

Divination

Religion throughout Italy seems to have embraced a wide array of divination techniques and rituals, many of them credited to Etruria by the Romans. Augury (the study of the flight of birds, clouds, lightning, and thunder), haruspicy (examining the organs, especially liver, of a sacrificial victim), and the study of *prodigia* (unnatural phenomena and creatures) may all be traced to the *etrusca disciplina*; sacrifice and bird augury appear in the *Iguvine Tables* and in the Latin tales of Romulus and the founding of Rome. The bronze "Piacenza Liver" model, inscribed with the names of Etruscan gods on compartments corresponding to the regions of the universe, is believed to have been a symbolic or educational tool for haruspices; some elements of the procedure and terms can be traced to much older, Mesopotamian haruspical models and texts.

The philosopher Seneca (d. CE 40) (*Naturales Quaestiones* 2.32.2) commented on Romans' perception of the Etruscan scriptures and rituals: "This is the difference between us and the Etruscans, with whom resides the utmost learning for interpreting lightning: We believe that lightning is caused by clouds colliding, whereas they believe that clouds collide in order to create lightning. Since they attribute everything to the divine, they are led to believe not that events have a meaning because they have happened, but that they happen in order to express a meaning."

The Umbrian *Iguvine Tables* also contain directives on divination, while under Rome, the College of 60 Haruspices (*Ordo LX Haruspicum*) operated under the Roman state, presumably following a long Etruscan tradition; it was based at Tarquinia. Eventually, official haruspices traveled with Roman armies and practiced in most regions of the Empire. From early times, oracular shrines were maintained, the most famous perhaps that of Fortuna Primigenia at Praeneste, which included caves and an elaborate, multitiered sanctuary inspired by the great Hellenistic Greek shrines but constructed in concrete and other Roman building materials: modern Palestrina conforms to the outline of its second century BCE plan.

Rituals

When divine messages warned of the need for expiation, the books were again consulted for the rituals by which to make amends to the gods (in Rome this included lustration, when the whole city participated in processions, sacrifices, and rededication). Other ceremonies, again attributed to Etruria, site of the peninsula's first cities, were the essential rites by which cities are founded (presumably the source of Romulus' plowing of a furrow with bull and cow to delineate the city's sacred boundaries). Such a furrow may have been identified in seventh-century levels at Etruscan Veii. Other rituals involved processions and displays such as the chants and leaping dances of the Arval Brethren and the carrying of gods' statues in processions. Many rituals surrounded liminal events such as birth, marriage, and death. The Roman state held regularly scheduled rituals of *vota* – vows made by consuls and priestly colleges with special reference to wars, battles, and catastrophes such as epidemics; generals might vow to build a temple with future spoils.

Little is preserved of such personal rites as prayers, but comments in the ancient authors show that such communications had to be accurately recited and must be repeated in entirety if the speaker stammered. Vows must be made and resolved publicly, with promised, meaningful offerings: inscriptions on vases, cult equipment, statues, and personal belongings offered in fulfillment of vows sometimes give the names of the grateful (in Etruria occasionally including freedmen or their families). In Latin custom, votives

often were marked *v.s.* for *votum solvit* ("she/he fulfilled the vow"). Again, in votive religion, writing assumed a significant position in the conduct of religious activities. On analogy to modern Christian customs of offering inscribed representations of objects desired and gained or body parts healed, these represent phenomena already granted to the worshipers by the gods. A significant change in society and belief around the end of the fourth century BCE seems to be illustrated by the rapidly spreading phenomenon of offering anatomical votive models (usually terracotta, but in the Archaic north of Italy, in metal). These take the form of rationalized internal and external organs, heads or complete statues, and figures of swaddled infants; large numbers of uterus models were found in such cults as those of Vei/Demeter, Uni/Hera, and Turan/Aphrodite at Gravisca, an extramural sanctuary of the Tarquinian port. After c. 300 BCE, there is evidence of freedmen participating publicly, as well as large numbers of women, and similar votive models and inscriptions occur in Latin and Campanian shrines also, where even in healing cults, almost any god might be the recipient/patron, including Minerva and Hercules.

Other ritual activities indispensible to Etruscan and Italic cults include sacrifice, usually of animals, often of inanimate foodstuffs. Possible human sacrifice is suggested in rare evidence such as a wounded warrior's skeleton buried anomalously in the sacred area of Tarquinia's Pian di Civita in the mid-eighth century BCE: he had been killed by an axe blow similar to that used for ritual slaughter of sheep or cattle. Rare scenes depicting Etruscan funerals with a costumed character, "Phersu," seem to show blood sacrifice (a wounded, captive performer) but are the only potential evidence of atavism of earlier human sacrifice. The Roman sacrifice of enemy couples (Gauls and Greeks) buried alive in the Forum Boarium (228, 216 BCE, Livy 22.57.6) was considered a response to state crises, rarely repeated and by Pliny's day prohibited (*Natural History* 28.12ff.). Traces of young animals cremated with the deceased at Etruscan funerals (Iron Age through Hellenistic period) may illustrate the practice of creating the *dii animales* which Roman authors attributed to Etruscan scriptures: for the recently dead to metamorphose into "spirit gods"(from Latin *anima*), a sacrifice of living blood was required. The bloody mythological scenes (battle, murder, monsters) often depicted on Etruscan urns and sarcophagi may be tangible reminders of these beliefs.

Many details are known, from art and literature, of Roman ceremonies: Roman men covered their heads, if not with the special priestly headgear, like the *apex* or *galerus*, then with a fold of the toga; many votive heads and statues depict this pose *capite velato* ("with veiled head"). Although they may be found in the same votive deposits (as at Ponte di Nona outside Rome), comparable (male) images lacking the veiled aspect are often considered to represent Etruscan rather than Italic practice. Rome maintained a plethora of religious colleges, cults, and offices, all perceived as in some way aiding the state as a whole. Such offices as the *pontifex maximus*, who determined dates of festivals and law courts, the *flamines* (priests assigned to specific state cults in Rome and the towns), and Vestal Virgins were strictly controlled with harsh penalties for impropriety; priests' wives, too, came under such restrictions. Aristocrats assumed the priestly offices, and many apparently served in multiple cults, to judge from the Etruscan *curriculum vitae* held (as a scroll) in the hand of the effigy of Lars Pulenas, on his sarcophagus (c. 270 BCE). *Netsvis* and *cepen* are read as Etruscan titles for priests, the former indicating a haruspex, to judge from the bilingual epitaph of Lars Cafates/Cafatius, found at Pesaro: he was *netsvis trutnut* and *frontac* – in Latin, *haruspex [et] fulguriator* ("priest of divination by liver and by lightning"). Rome had many religious colleges, staffed mainly by the upper classes, although some allowed freedmen full membership, and certain cults, such as that of Isis, welcomed slaves also.

The Roman year was filled with festivals (*feriae*) of particular cults and state ceremonies, including many celebrations of the agricultural year, the flocks, and historical events; they usually involved a sacrifice and distribution of the meat,

followed by games. For instance, the Megalesia included theatrical performances and games honoring Magna Mater, introduced from Asia Minor in the third century BCE (early April). Festivals include Vinalia (April 23 and August 19, wine), Robigalia (April 25, to prevent rust on grain), Consualia (August 21, storage of crops after harvest), Saturnalia (December 17, end of year), and Lupercalia (February 15, purification and fertility of flocks). Later many dates accrued for the anniversaries of temples or cults founded, historical events, imperial birthdays, etc.

Sacred Places and Structures

Places of worship did not require a formal structure and often focused on some special natural feature, with worship conducted in the open air; there is ample evidence across the Italian archipelago for the use of caves as cult places, from the Neolithic through the Iron Age and beyond. Most sacred sites show cult activity in later periods as well. Etruscan cult places included the seashore (Gravisca, Pyrgi, Punta della Vipera), swamps, springs, or lakes (Brolio, Falterona) and mountaintops (Lucus Feroniae, shrine of a Sabine earth goddess, shared with Faliscans). Confederated sanctuaries were often politicized, such as the *Fanum Voltumnae apud Volsinios* (the shrine of Voltumna/Vertumnus in the territory of Volsinii, i.e., Orvieto), where an extramural sanctuary has been identified, with subsequent structures (Christian church) as late as the medieval period. The Latin League celebrated annual festivals in April on the Alban Mount with the sacrifice of a white heifer and communal meal.

One of the most famous cults, both Etruscan and Italic, was that of Soranus (oracular, syncretized to Apollo Soranus) on Mount Soracte. A sanctuary of the goddess Mefitis at Ampsanctus in the Hirpine territory centered around a sulfurous spring. At Rossano di Vaglio in Lucania, the extra-urban cult of Mefitis included a paved courtyard with sacrificial altar; it also featured the worship of the Oscan war-god Mamers (c. 350 BCE to first century BCE or CE). Many modern scholars, following ancient authors in emphasizing the primitive aspects of Italic, supposedly tribal, culture, have undervalued the sanctuaries and monuments of such cultures as the Samnites. Their great rural sanctuary at Pietrabbondante included a temple and theater complex probably used for political and military gatherings which included bull sacrifice and offerings of weapons. Like the Republican-era rural shrine at San Giovanni in Galdo (a *sacellum*, a small shrine, within a rectangular precinct), such sacred places served to reinforce the boundaries of different territories. The Italic cults often favored Hercules or patron goddesses such as Juno of Gabii, whose Republican-era temple still stands. To the south, Lucania has also yielded evidence of crossroad sanctuaries and cults within the households of Italic aristocrats. Pompeian murals (Boscotrecase, House of Agrippa Postumus) illustrate such idyllic rustic shrines and country worship.

The phenomenon of "visiting gods," well known in Greek sanctuaries, was also frequent in Italic cults. At Iguvium, the great bronze plaques cite at least 29 deities, to be honored with rituals such as auspices and sacrifices conducted at the city gates. These were undertaken on behalf of the community in general or the college of the "Brotherhood of the Atiedii" (paralleled at Rome by the Arval Brethren worshipping Dea Dia, or the Salii, the "leaping priests" of Mars).

At Samnite Pietrabbondante, the outdoor shrine only acquired a temple building between the end of the third century and 90 BCE (the period between the Hannibalic War and the Social War). By that time, generals in the midst of military campaigns or battles might vow to build a temple if their patron god(dess) gave victory: in Rome, the temples of Mater Matuta and Fortuna Virilis in the Forum Boarium (now beneath the church of Sant'Omobono) were dedicated by the victorious Camillus (replacing a sanctuary of the regal period), and the small, jewel-like, Republican temples placed close together along the triumphal route (now Largo Argentina) seem to be similar victory monuments (one dedicated to *Fortuna Huiusce Diei*, "Good Fortune on This Day"). The triumph (a tradition also attributed to Etruria) was essentially a religious ceremony for a

victorious general and his army, a procession exhibiting spoils and captives, culminating in a sacrifice at the Capitoline Temple and slaughter of prisoners (as of Vercingetorix after Caesar's triumph in 50 BCE).

The earliest formal temple seems to be a small *sacellum*, a simple, rectangular shrine erected c. 600 BCE in the city of Veii; at port towns such as Gravisca and Pyrgi, Greek residents influenced the building of cult rooms and eventually an early peripteral temple at Pyrgi (Temple B, sixth century), although it was constructed with Etruscan-style terracotta roofing and ornamentation. Pyrgi had a motel-like building possibly for ritual banquets (erroneously associated with "sacred prostitution"), and Temple A, erected c. 460 BCE, was a large Tuscan-style temple with dramatic, narrative terracotta sculpture covering the ridge and other beams in an insert roof. The famous *Pyrgi Plaques*, gold inscriptions nailed to some structure and given ritual burial when the temples were deconsecrated, were inscribed c. 500 BCE to commemorate an event in the reign of "king" Thefarie Velianas of Caere – one is in the Punic/Phoenician language and script and the other two in Etruscan.

At Veii, the famous extramural temple crowned with terracotta statues of Apollo and other gods was built late in the sixth century BCE and included a precinct with a large ritual pool, altar, and other structures. (It was not dedicated to Aplu/Apollo, but probably to one or more goddesses.) Large quantities of votive offerings once displayed there were found buried on the site, including gifts of Aulus Vibenna and members of the once-royal Tolumnii family.

In Latin terminology, *templum* was originally simply a place for public activity, approved by Jupiter, inaugurated when *augurs* (divination priests) consulted the gods by taking auspices in various ways; this activity had to occur inside the ritual city boundary, the *pomerium*, within which burial and armed soldiers were banned. (Inscribed stone *cippi* found at Daunian Bantia (modern Banzi, Italy) may have marked an *auguraculum*, a space designated for taking auspices for this Roman colony.) Crucial for an Etruscan or Italic sanctuary were an altar and precinct wall; altars of different types reflect the character of the cult, such as the *mundus* altar, which had a drain into the earth, for chthonic and underworld gods. The so-called Tuscan temple, a rectangular building on high podium, with deep, colonnaded frontal porch, broad eaves, and ornately decorated, insert roof, was never rigidly canonical in proportion or plan, but can be seen in the remains of terracotta roofing systems and large plans at Etruscan and Latin sites such as Veii, Vulci, Tarquinia, Caere, Satricum, and Velletri. The tripartite cella became characteristic of the Capitolium, the main temple of the Roman state, duplicated in many municipalities as Rome grew; rooms were linked to Jupiter, Juno, and Minerva. By the Late Republican period and Empire, Roman temples were hybrids of "Tuscan" and (Hellenistic) Greek design.

Shrines could also be erected in necropoleis, such as the Cannicella Necropolis at Volsinii/Orvieto, where running water and a nude goddess statue were displayed, along with votives. In the center of the necropolis of Sovana, there was even a healing cult, where anatomical votive models (of the viscera) were dedicated. Several sanctuaries employed running water features, including the fifth-century fountain shrine at the Adriatic colony of Marzabotto. During the period of Roman colonization of Etruria, worship also continued within the ruins of some cult places, where masses of votives were left in nighttime rituals at Gravisca and at Veii Latin names appear on the offerings.

It was assumed (by ancient and modern authors) that when the monarchy ended, the king's priestly functions were delegated to citizens, resulting in a number of fragmented offices such as the so-called *rex sacrorum* ("king of sacred things"). In Rome, the Regia, supposedly the royal palace converted to the headquarters of the state cult (of Jupiter, Juno, and Mars), was situated in the heart of the Forum near the House of the Vestals and ultimately became the office of the *pontifex maximus*. (Which office was exploited by Julius Caesar among others; certainly politicians took advantage of the opportunities of public religious office, as would the emperors).

Domestic Cults

Little evidence has been detected for permanent structures of household cult in Etruria – although much information has been attributed to the ancestor cult practiced in funerary ritual: some tombs encompass cult rooms fitted with carved furniture as if the family expected to picnic with the deceased occupants of the tomb; statues of venerable personages, enthroned and with footstools, even scepters, in the Tombs of the Statues and of the Five Statues in the territory of Caere, while showing Near Eastern/Syrian inspiration in their design and carving, appear to be monumental versions of such earlier figures as the clay humanoids found in some Latin hut urns or the seated banqueter on the lid of a Volterran Iron Age cremation urn from Montescudaio. The deceased are presumably now ancestors; Etruscan tombs of the fourth century depict a family's earlier generation at banquet in the underworld, enjoying the attention of Hades and Persephone. Images of Vanth, the Etruscan death goddess, show her as beautiful and nubile, sometimes winged, or scantily clad, and other funerary images emphasize sexual aspects of death: ancestors are intrinsically bound with the ongoing fertility of their family.

Strong traditions of funerary ceremonies are found in all cultures of ancient Italy, including artistic or other references to the journey to the afterlife, completion of the course of life (symbolized by steering oars or ships), apotropaic scenes, offerings and consumption of a meal with the dead, funeral games, and the equation of sex and death. Roman funerals displayed effigies, even masks of deceased illustrious family members. The Roman festivals of Lemuria and Parentalia were held in May and February in honor of the spirits of dead members of the Roman household, the former hostile spirits, and the latter benign members of the immediate family.

Roman literature preserves commentary on Italic household and family cults including the Lares and Penates, guardian spirits for the Roman household; Lares may derive from the family land, while Penates protected the larder. The houses destroyed at Pompeii and Herculaneum in 79 CE contain several Lararia, cabinet-like shrines imitating a temple, with paintings and/or figurines depicting dancing Lares (youths with cornucopiae) and venerable bearded snakes, with the occasional offering bowl. The Roman practice of a free-born youth dedicating his golden *bulla* (a "bubble" amulet in essence like a native American medicine bag) in the shrine of the family Lares was preceded in the Iron Age by Picene, Etruscan, and Faliscan wearers of similar, hollow lockets.

Magic, although the dark side of belief, was a prominent feature of ancient Italy, as seen in curses and binding spells, often worked in necropoleis, as in a pair of inscribed lead, nude and bound figurines depicting an Etruscan man and woman, found in a tomb in Sovana. During the Roman Empire, binding spells were often recorded on lead tablets (*defixiones*) and deposited in secret in the circus or court with pleas to underworld gods to affect the outcome of competitions and trials.

Cross-References

► Central Italy: Etrusco-Italic Sanctuaries

Further Reading

Ancillotti, A. and R. Cerri. 1996. *The tables of Iguvium* (English translation, abridged version of *Le tavole di Gubbio e La Civiltà degli Umbri*). Perugia: Edizioni Jama.

Beard, M., J. North, and S. Price. 1998. *Religions of Rome*. 2 v. Cambridge: Cambridge University Press.

Bonfante, L.W. 1981. Roman triumphs and Etruscan kings: The Latin word *Triumphus*. In *Studies in honor of J.A. Kerns*. Ianua Linguarum, Vol. 44, ed. J.A. v. Kerns, R.C. Lugton, and M.G. Saltzer, 108–120. Den Haag/Paris: De Gruyter.

Briquel, D. 1997. *Chrétiens et haruspices. La religion étrusque, dernier rempart du paganisme romain*. Paris: École Normale Supérieure.

de Grummond, N.T., and E. Simon, eds. 2006. *The religion of the Etruscans. Proceedings of sixth Langford conference, Florida State University, 1999*. Austin: University of Texas Press.

Edlund, I.E.M. 1987. *The gods and the place: Location and function of sanctuaries in the countryside of Etruria and Magna Graecia (700–400 BCE)*. Skrifter

utgivna av. Svenska Institutet i Rom, Vol. 43. Stockholm: Paul Åström.
Gaultier, F., and D. Briquel, eds. 1997. *Les Étrusques, les plus religieux des hommes. État de la recherche sur la religion étrusque. Actes du colloque international, Galeries nationals du Grand Palais, 17-18-19 novembre 1992*. Paris: École du Louvre.
Haack, M.-L. 2006. *Prosopographie des haruspices romains*. Biblioteca di Studi Etruschi, Vol. 42. Pisa/Rome: Istituto Nazionale di Studi Etruschi ed. Italici, Istituti Editoriali e Poligrafici Internazionali.
Harvey, P., and C. Schultz, eds. 2006. *Religion in Republican Italy*. Yale Classical Studies, Vol. 33. Cambridge: Cambridge University Press.
Iles Johnston, S., ed. 2004. *Religions of the ancient world. A guide*. Cambridge, MA: Belknap Press of Harvard University.
MacBain, B. 1982. *Prodigy and expiation: A study on religion and politics in Republican Rome*. Collection Latomus, Vol. 177. Brussels: Latomus.
Orr, D.G. 1978. Roman domestic religion: The evidence of the household shrines. *Aufstieg und Niedergang der römischen Welt* 2 (16/2): 1557–1591.
Prosdocimi, A. 1989. Le religioni degli Italici. In *Italia: Omnium Terrarum Parens*, 477–545. Milan: Scheiwiller.
Scullard, H.H. 1981. *Festivals and ceremonies of the Roman Republic*. London: Thames & Hudson.
Stek, T. 2009. *Cult places and cultural change in Republican Italy*. Amsterdam: Amsterdam University Press.
Thesaurus Cultus et Rituum Antiquorum (ThesCRA). (2004-ongoing). Los Angeles: J. Paul Getty Museum, and Basel: LIMC.
Torelli, M. 1999. *Tota Italia. Essays in the cultural formation of Roman Italy*. Oxford: Clarendon Press.
Turfa, J.M. 2012. *Divining the Etruscan world: The brontoscopic calendar and Etruscan religion*. Cambridge: Cambridge University Press.
van der Meer, L.B. 1987. *The bronze Liver of Piacenza. Analysis of a polytheistic structure*. Amsterdam: J.C. Gieben.
van der Meer, L.B. 2007. Liber Linteus Zagrabensis. In *The linen book of Zagreb. A comment on the longest Etruscan text*. Leuven: Peeters.
van der Meer, L.B. 2011. Etrusco ritu. In *Case studies in Etruscan ritual behavior*. Leuven: Peeters.
van der Meer, L.B., ed. 2010. *Material aspects of Etruscan religion. Proceedings of the International Colloquium Leiden, May 29 and 30, 2008*. Peeters: Leuven.
Wilkins, J.B. 1994. The Iguvine tables: Problems in the interpretation of ritual text. In *Territory, time and state. The archaeological development of the Gubbio basin*, ed. C. Malone and S. Stoddart, 152–177. Cambridge: Cambridge University Press.
Wilkins, J.B., ed. 1996. *Approaches to the study of ritual: Italy and the ancient Mediterranean*. London: Accordia Research Centre Specialist Studies.

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Basic Biographical Information

Colin Renfrew (Lord Renfrew of Kaimsthorn) is best known in archaeological circles for his contributions to archaeological theory. He is rather less well known for his work toward protecting cultural heritage, which he has often performed away from professional and public view. He has served in various capacities on the Hampshire Archaeological Committee (1974–1981), the Royal Commission on Historical Monuments (England) (1984–1986), the Historic Buildings and Monuments Commission of England (1984–1986), the UK National Committee for UNESCO (1984–1986), and the British School at Athens (2004–2010). Since the 1990s, he has been an outspoken critic of the illicit antiquities trade and its promotion of archaeological looting (Renfrew 2000, 2003, 2006; Brodie et al. 2001; Brodie and Renfrew 2005).

Major Accomplishments

In 1991, Renfrew became the first director of the newly established McDonald Institute for Archaeological Research at the University of Cambridge, and in 1997, he established as a project of the McDonald Institute the Illicit Antiquities Research Centre (IARC). Staffed by Neil Brodie and Jenny Doole, with the association of Peter Watson, the mission of the IARC and its newsletter *Culture Without Context* was to research and raise awareness of the damage caused to cultural heritage by the antiquities trade and to promote appropriate public and professional policy responses. In recognition of its work, the IARC was awarded the European Archaeological

Heritage Prize (2004) and the Archaeological Institute of America's Outstanding Public Service Award (2006). In 2004, Renfrew retired as director of the McDonald Institute, and in 2007, the IARC was closed down.

While fully involved with the work of the IARC, Renfrew continued his committee work and was active in promoting ethical and legislative change aimed at regulating the antiquities trade. As a trustee of the British Museum (1991–2001), he was instrumental in drafting a new (1998) acquisitions policy, which stated that in future the museum would only acquire an antiquity when there was documentation to show that it had already been out of its country of origin by 1970, the date of the UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership on Cultural Property, or legally exported since that date (Renfrew 2000: 124–125). Also in 1998, he encouraged the Council of the British Academy to adopt a similar policy to guide scholarly engagement with traded antiquities (Renfrew 2000: 126–128), and likewise the UK's National Art Collections Fund after he was appointed to its executive committee in 2001. The "bright line" of 1970, initially taken up in 1970 by the Museum of the University of Pennsylvania, has since been adopted by other museums, including the J. Paul Getty Museum (2006) and, acting with Renfrew's advice, the Badisches Landesmuseum in Karlsruhe (Renfrew 2006: 251–255). It is largely through Renfrew's advocacy that the 1970 threshold has now become an international standard, recommended by the UK government in 2005 and by the Association of Art Museum Directors in 2008.

Renfrew was created a life peer in 1991 and since then he has been prepared to use his position in the House of Lords to question the UK government about policy (*inter alia*, the failure of the US-UK coalition to prevent the looting of the Iraq National Museum in 2003 (Renfrew 2003)) and to scrutinize some of the less than transparent out-of-court maneuverings of rich and powerful collectors, such as those involving Lord Northampton and the Sevso Treasure (Renfrew 2000: 46–51) and Martin Schøyen and the Aramaic incantation bowls (Balter 2007). He has not shrunk from exploiting his celebrity to raise issues in the press, using the occasion of his attendance in Paris for the 30th anniversary celebrations of the 1970 UNESCO Convention, for example, to question publicly the acquisition by the Louvre of some Nigerian Nok terracottas (Riding 2000). In 2009, for his work in opposing the illicit antiquities trade, he was awarded the SAFE Beacon Award.

In 2000, Renfrew was invited to be a member of the ministerial Advisory Panel on Illicit Trade (ITAP), convened by the UK government to advise on policy as regards the antiquities trade. Recommendations made in ITAP's report that the UK should accede to the 1970 UNESCO Convention and introduce specific criminal legislation were subsequently realized, with accession to the UNESCO Convention in 2001 and enactment of the Dealing in Cultural Objects (Offences) Act in 2003.

Cross-References

- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Vandalism and Looting (Ethics)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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References

Balter, M. 2007. University suppresses report on provenance of Iraqi antiquities. *Science* 318: 554–555.

Brodie, N., and C. Renfrew. 2005. Looting and the world's archaeological heritage: The inadequate response. *Annual Review of Anthropology* 34: 343–361.

Brodie, N., J. Doole, and C. Renfrew, eds. 2001. *Trade in illicit antiquities: The destruction of the world's archaeological heritage*. Cambridge: McDonald Institute.

Renfrew, C. 2000. *Loot, legitimacy and ownership*. London: Duckworth.

Renfrew, C. 2003. Reflections on the looting of the Iraqi National Museum in Baghdad. In *The Iraq War and its*

consequences, ed. I. Abrams and G. Wang, 319–336. New Jersey: World Scientific.
Renfrew, C. 2006. Museum acquisitions: Responsibilities for the illicit traffic in antiquities. In *Archaeology, cultural heritage, and the antiquities trade*, ed. N. Brodie, M.M. Kersel, C. Luke, and K.W. Tubb, 245–257. Gainesville: University Press of Florida.
Riding, A. 2000. Chirac exalts African art, legal and (maybe) illegal. *New York Times*, November 25.

Repatriation Acts: Before NAGPRA

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Introduction

As influential as it has been on archaeology, museums, and Indigenous people – well beyond US national borders – many people consider the enactment of the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 in the United States to be the beginning of the repatriation movement. But in the US, repatriations and reburials of human remains, as well as return of sacred objects, started substantially earlier. Even before repatriation and reburial became openly controversial, archaeologist Roderick Sprague and anthropologist Deward Walker, for example, had worked closely with Nez Perce people in the state of Idaho, quietly repatriating remains as early as the late 1960s. As the issues became heated over the next two decades, American Indian demands and attempts by the archaeological and museum communities to respond eventually led to NAGPRA. Before NAGPRA became law, however, Indians and archaeologists had numerous discussions and occasionally bitter arguments about respectful treatment of the dead. As the issue developed, there were efforts to compromise, several repatriations occurred, and many states enacted repatriation laws (Price 1991). The path to NAGPRA was complex and meandering.

Tribes had expressed concerns about the treatment of their ancestral remains for decades but had little power to stop excavations and collections of skeletal remains by the scientific community and museums (Thomas 2000: 52–63). Intense pressure for archaeologists to stop excavating human remains, however, accompanied the intensifying American Indian activism of the late 1960s, which was linked in part to the general social upheavals of the time in the United States. As they found their voice, one activist group, the American Indian Movement (AIM), specifically targeted archaeology in their agenda for change. In 1969, the Onondaga (Iroquois) fought for the return of *wampum* belts from the New York State Museum, and in 1971, AIM disrupted an excavation near Welch, Minnesota. That same year, activists occupied the Southwest Museum in Los Angeles, requested repatriation of human remains and sacred objects, and demanded that other objects be taken off display. In 1972, AIM members confiscated human remains from Colorado State University. In the aftermath of the Wounded Knee II takeover in 1973, the federal legal system distracted the AIM leadership from addressing issues such as Indian concerns about archaeology at the national level (Deloria 1973: 29–35), so not until the late 1970s and early 1980s did AIM again specifically demand ethical treatment of human remains and grave goods by archaeologists and museums. However, pressure continued to grow at the state level, and one of the key pre-NAGPRA events arose in the state of Iowa.

In 1971, archaeologists removed Indian remains from the edge of a pioneer-period 1860s cemetery in southwest Iowa that was being disturbed by highway construction, taking them to an archaeology laboratory to be studied; the numerous non-Indian remains were immediately reburied in a nearby cemetery. *Ihanktonwan* (Yankton Sioux) activist Maria Pearson demanded equal treatment of the dead from the governor of the state, leading to the dismissal of the seated state archaeologist and eventually to the passage in 1976 of the first state reburial law. The Iowa law became precedent-setting for other states, structuring a collaborative model for the ethical treatment of human remains. To assure

equal treatment under the state laws, all human remains deemed to be from 150 years ago or older (roughly the time of the first substantial presence of non-Indians in the region) became the responsibility of the Office of the State Archaeologist (OSA), with more recent remains handled by county and state law enforcement officials. The OSA was to arrange for an "autopsy" by a forensic physical anthropologist, essentially an assessment of key skeletal metrics and examination for gross skeletal pathologies. The remains then were to be returned to genetically or culturally affiliated tribes if identity could be established, but because numerous Indian nations had once lived in the state, affiliation often could not be confirmed. Such "unidentifiable" remains were then reburied in one of four secure, state-owned cemeteries, as close as possible to where the remains were found. All activities were done with the agreement and oversight of the Iowa Indian Advisory Committee and affiliated tribes. The key element in the success of the law proved to be the trust relationship built between the archaeological and Native American communities. The process proved so successful that the state was given an exemption from the processes of NAGPRA when it was enacted 14 years later. Other states copied many elements of the Iowa statute, and some core elements of NAGPRA stem from it.

The Iowa precedent provided impetus for repatriations in other places. Most involved small numbers of remains, but one large repatriation and reburial drew national attention, especially in the archaeological community. The 1978 excavation of nearly 500 individuals from the Crow Creek site in central South Dakota required collaboration between archaeologists, Native Americans, and a federal agency. Archaeologists and the US Army Corps of Engineers (COE) became involved when erosion and looting disturbed the remains. Because the individuals died in a fourteenth-century massacre and represented a large group of people dying at the same time, they represented an almost unique population for anthropological study. At the same time, because the remains were discovered on the Crow Creek Sioux (Lakota) Reservation, the local residents demanded that the archaeologists and the COE hear their concerns about how the remains should be treated and what should eventually happen to the skeletons. The Lakota would let the project proceed only when the archaeologists and the COE agreed that the remains would not leave the state and would be reburied after study (Alex and Zimmerman 1981). In 1981, the remains were reburied near where they were discovered. The project caused many members of the archaeological community to speak out against repatriation and reburial, but Crow Creek was one element among many that made archaeologists pay close attention to Indian demands.

At about the same time, AIM and the International Indian Treaty Council established American Indians Against Desecration (AIAD), directed by Jan Hammil, an urban Indian woman with Mescalero Apache heritage. Hammil pressured organizations such as the Society for American Archaeology (SAA) to listen to Indian demands for repatriation. In 1982, when the SAA Executive Committee determined that the organization should pass a resolution against reburial, Hammil and a small delegation of AIM members met with the committee to convince them not to adopt the resolution (Zimmerman 1989). As a result of events at that meeting, the SAA waited until the following year to do so and without consultation, much to the chagrin of AIAD. Although the SAA appeared to be against repatriation, many archaeologists sought to understand Indian concerns and some continued to work toward some compromises. Continuing demands by Indian people pushed several local, regional, and national organizations, eventually including the SAA, to sponsor meetings and conference sessions during which Indians and members of the archaeological community could present their views. The media, supported by some archaeologists and Indians, generally portrayed the issues as bipolar – Indians versus archaeologists and religion versus science – but there was actually a continuum of opinion about repatriation and reburial. In 1986, Hammil and a number of other Indian people joined Indigenous people from around the world at the first World Archaeological Congress (WAC) meeting in the UK, where they exchanged views

about repatriation in their regions. Archaeologists who attended the meeting were generally supportive of repatriation, and the WAC leadership urged Hammil to organize an international conference on the topic, which was held at the University of South Dakota in 1989 as a WAC Inter-Congress on Archaeological Ethics and the Treatment of the Dead. That conference resulted in the Vermillion Accord, which became the basis for similar statements in Canada and Australia, and was the first time Indigenous people and archaeologists were able to come to agreement on working toward real solutions about reburial internationally. As with the enactment of the Iowa law and the Crow Creek reburial, however, most disputes about repatriation – there were many – occurred at the local or regional level, but they certainly influenced the national scene. All were important to the people directly involved, but a few had a very direct impact on the development of NAGPRA.

For more than a decade, the people of the Omaha nation had sought the return of many sacred objects from Harvard University's Peabody Museum, but especially the return of *Umon'hon'ti*, their sacred pole. In 1888, tribal members were under extreme pressure to abandon their traditional beliefs and accept Christianity. To safeguard *Umon'hon'ti* and other sacred objects, including ceremonial war pipes and their sacred shell, the tribe had turned them over to ethnographer Alice Fletcher who transferred them to the Peabody. After an extraordinary effort to reclaim their objects, the Omaha received the sacred pole in 1989, and the Peabody has since returned other sacred objects (Ridington and Hastings 1997). Although other museums had repatriated sacred objects before the Peabody Museum did, the museum's stature was symbolically important for other museums, making them very aware that Indian concerns involved more than just human remains.

Two related repatriations of human remains were directly relevant to NAGPRA because of the involvement of the Native American Rights Fund (NARF) and the Pawnee nation. One of the NARF attorneys for both cases, and a man of Pawnee heritage, was Walter Echo-Hawk, who was one of the key authors of NAGPRA. In 1985, the Kansas State Historical Society sought to acquire and build a museum around the so-called Salina Burial Pit, a tourist attraction outside Salina, Kansas. Open since 1937, the privately owned business displayed the remains of 146 people. They had been buried in the twelfth to thirteenth centuries, and as most archaeologists agree, they were probably direct ancestors of the Pawnee people. When the Pawnee, who now live in the adjacent state of Oklahoma, heard about the plans, they objected and demanded that the facility be closed and their ancestors reburied. Many archaeologists in the region fought closure of the site, but to his credit, the state archaeologist, Tom Witty, agreed to listen and eventually agreed that the site should be closed. In 1989, Kansas enacted an unmarked burials law similar to the Iowa law. Then in 1990, the Pawnee finally shrouded each body with a blanket or shawl and, after prayers and a funeral feast, covered the entire pit with clean sand, topped by a concrete cap to protect the remains from future disturbance (Echo-Hawk and Echo-Hawk 1994).

In 1988, the Nebraska State Historical Society (NSHS) became embroiled in controversy when it refused to honor several requests from Lawrence Goodfox, Jr., on behalf of the Pawnee nation, to return human remains known to be directly ancestral to the Pawnee and grave goods associated with known individuals, long held by the NSHS. When the society director refused to respond to the Pawnee requests, a nationally visible controversy ensued. With NARF's help, the Pawnee joined forces with other regional tribes to ask the Nebraska legislature for help in the form of a state law. After rancorous debate, in 1989, the coalition saw passage of the Unmarked Human Burial Sites and Skeletal Remains Protection Act, which required Nebraska public museums to return all tribally identifiable skeletal remains and burial offerings to tribes that requested them for reburial.

What is important about these repatriations is they directly set the stage for NAGPRA. National publicity had an impact on the US Congress, and elements of the Nebraska law found their way directly into NAGPRA because Walter Echo-Hawk helped author both laws. While these local disputes and repatriations were underway, Indian people continued to press the US Congress to work toward a national solution. As much as

anything, the Smithsonian Institution, as a federal agency, became a symbolic target because of the large number of remains and objects the Smithsonian housed. After negotiations between Native American groups, the American Association of Museums, the SAA, and others, Congress was willing to pass the National Museum of the American Indian (NMAI) Act of 1989, which 15 years later saw the opening of the NMAI as part of the Smithsonian but also set up a process for repatriation of human remains and grave goods in the Smithsonian's possession. While there are differences, that process became the model for NAGPRA, which was signed into law the next year, but only after intense negotiations and compromises (McKeown 2013).

There are very likely differing assessments of the importance of certain individuals or events leading to a national repatriation law in the US, but NAGPRA stemmed from the many local acts of repatriation that happened from the 1960s until NAPGRA became law in 1990. Many people were involved in the process, from quiet, resolute tribal elders, holy people, and officials to outspoken activists. Many non-Indian archaeologists, museum professionals, and local, state, and federal government employees worked to resolve difficult issues. As many have said, even though repatriation is driven by national law, it is still mostly a local matter that depends on trust and good will.

Definition

In a general sense, repatriation means returning to your country of origin, but in the specific sense of archaeology, it has meant the return of human remains and any associated objects buried with the dead, as well as sacred objects or other items of cultural patrimony that were inappropriately, illegally, under duress, or otherwise taken without permission from a nation or people. Colonized Indigenous people were often the victims of the removal of such objects. In the process of decolonization during the last half-century or so, they have demanded return of these items. In North America, the situations in which human remains and objects of cultural patrimony were removed from rightful, usually Native American ownership ranged from outright theft to a hope that a stronger authority might better be able to protect objects for the future. Acts of repatriation have sometimes been done willingly or carried out after negotiation, but in many instances, the rightful owners have had to act by force or take legal action to have objects returned to them.

Key Issues/Current Debates/Future Directions/Examples

In the United States, a number of issues have surfaced relating to repatriation, some of them similar to repatriation in other places. Many people, especially with the return of human remains, realized that they had no ceremonies or rituals for the process of *re*burial because no one ever considered that such a ceremony would ever be needed. Thus, many adapted some form of contemporary practice, perhaps with minor variations to account for the age of the remains. As well, many Native American people have been subjected to proselytizing by missionaries and are now Christian. For example, when the Crow Creek Massacre victims were reburied in 1971, there were two traditional Lakota ceremonies, a private ceremony by the Arikara descendants and Catholic, Episcopal, and Baptist Christian rituals.

Another problem in the United States is that many skeletons and burial items have been recovered from what is now considered to be private property. Although some state laws protect all human remains, even on privately held lands, in most cases they do not. Federal law rarely applies to private lands unless the federal government is somehow involved. Private individuals often understand that tribes may want the remains of ancestors returned, but do not know to whom they should give them and often not even precisely where the remains came from, precluding all but a guess of genetic or cultural affiliation. Other private individuals have little concern for the dead and get involved in looting. At the Slack Farm site in the state of Kentucky, looters actually paid a private landowner for rights to "mine" a known precontact Native American cemetery for pottery and other burial objects. Paying no

attention at all to the skeletal material, they dug hole after hole and fragmented numerous skeletons. After protests by both Native Americans and archaeologists, Kentucky passed a burials protection law that encompassed remains found on private land. In spite of such laws, however, there is rarely enforcement and only relatively light sanctions.

Finally, a number of archaeologists and museum professionals still resist repatriation. Commonly heard explanations are that some tribes do not know how to properly care for returned sacred items or perhaps that a particular tribe did not care what happened to bodies after death so should not care if the remains are studied or stored in laboratories or museums. Under NAGPRA, many agencies claimed that remains could not be positively identified as to which tribe was affiliated or that multiple tribes might be, so they did not want to return remains fearing legal action if they were returned to the wrong tribe. Although some of these concerns may be legitimate, many have primarily used them as excuses not to repatriate remains and objects.

Generally, the public understands the concerns of American Indians about the return of ancestors and sacred objects, but many do not, especially when they see the remains or objects as their property or somehow important to collections at their local museum. As for professional archaeologists and museum staff members, NAGPRA has now been in place for more than 20 years, so as new professionals are educated they are taught about repatriation and its importance. Most have an understanding about why NAGPRA came into existence, and even though they might disagree with all or some elements of repatriation, they are now compelled by law to take repatriation into account as part of their regular dealings with Native Americans and other Indigenous peoples.

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ Deloria Jr., Vine
- ▶ Echo-Hawk, Roger C.
- ▶ Ethics and Human Remains
- ▶ Indigenous Peoples, Working With and for
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Repatriation: Overview
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ Vermillion Accord on Human Remains (1989) (Legislation)
- ▶ Zimmerman, Larry J.

References

Alex, R.A., and L.J. Zimmerman. 1981. How the Crow Creek archaeologists view the question of reburial. *Early Man* 3 (3): 25–26.

Deloria, V., Jr. 1973. *God is red*. New York: Delta Books.

Echo-Hawk, R.C., and W.R. Echo-Hawk. 1994. *Battlefields and burial grounds: The Indian struggle to protect ancestral graves in the United States*. Minneapolis: Lerner Publications.

McKeown, C.T. 2013. *In the smaller scope of conscience: The struggle for national repatriation legislation, 1986–1990*. Tucson: University of Arizona Press.

Price, H.M. 1991. *Disputing the dead: US law on Aboriginal remains and grave goods*. Columbia: University of Missouri Press.

Ridington, R., and D. Hastings. 1997. *Blessing for a long time: The sacred pole of the Omaha tribe*. Lincoln: University of Nebraska Press.

Thomas, D.H. 2000. *Skull wars: Kennewick Man archaeology, and the battle for Native American identity*. New York: Basic Books.

Zimmerman, L.J. 1989. Made radical by my own: An archaeologist learns to understand reburial. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 60–67. London: Unwin Hyman.

Further Reading

Fine-Dare, K.S. 2002. *Grave injustice: The American Indian repatriation movement and NAGPRA*. Lincoln: University of Nebraska Press.

Killion, T.W., ed. 2010. *Opening archaeology: Repatriation's impact on contemporary research & practice*. Santa Fe: School for Advanced Research.
Mishesuah, D.A., ed. 2000. *Repatriation reader: Who owns American Indian remains?* Lincoln: University of Nebraska Press.

Repatriation Acts: NAGPRA Repatriation in Tribal Practice

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More than 25 years have passed since the Native American Graves Protection and Repatriation Act (NAGPRA) became law in the United States. According to the National NAGPRA program, this law has resulted in the return of the remains of more than 50,000 individuals, 1.4 million funerary objects, and over 14,000 sacred objects/objects of cultural patrimony to Native American tribes (https://www.nps.gov/nagpra/FAQ/INDEX.HTM#How_many). It has also resulted in the publication of numerous books and articles investigating the myriad issues surrounding the law (Fine-Dare 2002; Killion 2008; Mihesuah 2000; Colwell 2017), including the conditions leading to its passage (Thomas 2000), its legislative background and history (Trope and Echo-Hawk 1992; Lovis et al. 2004), implementation (Anyon and Thornton 2003), and the responses of various stakeholders (Ayau and Tengan 2002; Preucel et al. 2003).

This entry seeks to give insight into the process of repatriation on the tribal side of the law. How does repatriation play out for tribes? How is NAGPRA implemented "behind the buckskin curtain" (Deloria 1995: 1), and What happens to repatriated Native American human remains, funerary objects, and sacred objects after the papers are signed and they leave museum shelves? In what follows, I give some behind-the-scenes insights into the repatriation process at one Native American tribe, the Pueblo of Jemez, where I served as NAGPRA program director from 2003–2005.

For tribes, the process of repatriation often begins with the receipt of an inventory or summary from a museum. This written notice serves to inform the tribe about human remains or objects eligible for repatriation that are currently housed in that museum. *Summaries* are estimates of the number of objects (either funerary, sacred, or those of cultural patrimony) in that museum's collections determined to be culturally affiliated with the tribe in question. *Inventories* are similar but are typically more detailed item-by-item descriptions of human remains and associated funerary objects. Sometimes the tribe is well aware of the locations of these collections prior to receiving a summary or inventory, as is the case with many high-profile sacred artifacts and those collected by well-known expeditions of the nineteenth and twentieth centuries. But in many other cases, tribes are unaware of the whereabouts of collections and sometimes even unaware that such collections exist at all. The practice of sharing and swapping of artifacts and human remains that frequently occurred among museums in the late nineteenth and early twentieth centuries served to break up and scatter collections across multiple institutions, and it is often only with the receipt of an official NAGPRA summary or inventory that tribal officials become aware of their current locations.

At the Pueblo of Jemez, the receipt of an inventory or summary from a museum triggers an established protocol for handling NAGPRA claims. Upon receipt of new summaries or inventories, the NAGPRA program coordinator enters a record of the collections into a computer database created specifically to keep track of NAGPRA claims, along with any accompanying relevant information about the objects or human remains they detail. The information from this database is summarized at regular intervals and presented for review to tribal officials. Over the past decade, this review has been performed either by the Governor of the Pueblo or by a committee of traditional religious leaders appointed by the Governor. This committee, known as the Cultural Resource Advisory Committee (CRAC), comprises 10–15 representatives from the tribe's religious societies who have special expertise in

issues of cultural patrimony. After reviewing the latest inventories and summaries, these tribal officials set the priorities and agenda for future repatriation claims. At Jemez, human remains have typically received the highest priority, followed closely by sacred objects.

Although non-Natives often assume that tribal policies call for claiming everything and everybody deemed eligible for repatriation, this is not necessarily the case. The Pueblos of Santa Clara and Zuni, for example, have declined to repatriate human remains because they have no ceremonies to mitigate the desecration that has occurred to their ancestors (Ferguson et al. 2000:258; Alvin Warren, personal communication 2012). At Jemez, tribal representatives carefully consider each summary and inventory they receive, discussing the pros and cons of repatriation in each case. Issues factoring into their decision include whether or not the items can be appropriately curated once in tribal possession, information that could be gained from returning items to active use, where returned items/human remains will be curated/reburied, whether or not reburial is possible, and future research desires and needs. Furthermore, the tribe does not always concur with the findings of museums. In some cases, museums' determinations of cultural affiliation do not accord with those of the tribe (i.e., the tribe does not consider itself to be culturally affiliated with the items/human remains in question). When this happens, the tribe typically declines to continue the repatriation process. In other cases, the museum may conclude that a tribe is not culturally affiliated, contrary to tribal beliefs. This often results in difficult negotiations and sometimes a hearing before the National NAGPRA review committee.

If an item or collection is judged to be a potential candidate for repatriation, representatives from Jemez usually desire to view the objects/materials (in person if possible) before submitting an official claim. At this stage, the NAGPRA program coordinator typically works with the museum staff to organize a preliminary visit to the museum. Funding for these visits may be covered by the host institution, but more commonly it is paid for out of tribal funds often raised through federal grants administered by the US Department of Interior. Once at the museum, the tribal representatives examine the collections and again discuss the suitability and desirability of repatriation with one another. These discussions are often frank and nuanced as the pros and cons of each repatriation are carefully weighed. On numerous occasions, I have witnessed tribal members peering over an open drawer in a museum storehouse, examining the artifacts within while simultaneously debating whether or not they should be brought home. At times, these discussions acknowledged the irony that those artifacts may not have survived to the present day if they had not been curated in a museum. In some of those cases, the decision was made to postpone repatriation until the day when the tribe possessed appropriate curatorial facilities to properly care for these items in the long term. Following the examination of collections, the tribal representatives commonly meet with museum staff members, who brief them on a proposed timetable for repatriation, any extenuating circumstances, and any likely problems or conflicts. In my experience, these meetings were typically cordial, with both sides working toward an amicable solution; however, in some cases, conflicts can arise, particularly if one side (or even just one person) enters into these negotiations harboring resentments or hostilities.

After the preliminary visitation and viewing of artifacts, the tribal officials who examined the materials eligible for repatriation typically report back to a larger contingent of elders and religious leaders to discuss the Pueblo's wishes and strategies. Based on that conversation, the Governor or CRAC decides whether or not to pursue a repatriation claim. When repatriation is desired, the NAGPRA program director works with the Governor to notify the museum staff of their intention. In theory, the tribe then submits an official request to repatriate, and the museum prepares an appropriate notice for publication in the Federal Register. In practice, however, some museums need additional time to prepare their collections for repatriation (often due to budgetary and staffing constraints), and they request that the tribe delay submission of an official claim to repatriate until

the museum is able to make ready the collection. In one case involving Jemez human remains, this delay lasted more than 6 years – enough time to raise suspicions on the tribal side that the museum was guilty of intentional foot-dragging. In the end, however, even that repatriation was successfully completed. Another issue that can cause delays at this stage is the past conservation practices used by the museum, as toxic chemicals such as arsenic, mercury, and pesticides were used to preserve organic artifacts in the past (Odegaard and Sadongei 2005). Prior to repatriation, objects must be tested for these contaminants, and if the tests are positive, a plan for appropriate disposition must be formulated.

Following submission of the tribe's official repatriation request, the museum publishes an appropriate notice in the Federal Register, after which the repatriation can officially take place (30 days after a Notice of Inventory completion for human remains and associated funerary objects is published; 90 days after publication of a Notice of Intent to Repatriate for sacred objects, unassociated funerary objects, or objects of cultural patrimony). While the museum is preparing the paperwork for publication, the tribal NAGPRA coordinator typically works on the logistics of the repatriation, including how the materials will be transported from the museum back to the reservation, where they will be stored (if necessary), and, in the case of human remains, where and when they will be reburied.

On the day of the return of the human remains and/or artifacts, a contingent from the tribe (often members of the CRAC and the Governor) visits the museum to officially take possession of the collections. This is often a somber occasion, with tribal members conducting the appropriate ceremonies prior to removal of the materials from the museum. The Governor then meets with museum staff members to sign the necessary legal paperwork, and the artifacts/human remains are loaded into a vehicle for transport. Depending on the size of the repatriation, this can either be a very short process involving a single car or a much more involved process involving multiple forms of ground and air transport. The 1999 repatriation of more than 2000 human remains from Pecos Pueblo held at Harvard's Peabody Museum of Archaeology and Ethnology required a tractor-trailer to transport the individuals more than 2,200 miles across the country.

At Jemez, once the objects or human remains return to the reservation, there is no single protocol that is followed. Some repatriated objects have been placed on display in the tribal museum (mainly ceramics). Others, particularly in the case of sacred objects and objects of cultural patrimony, are typically entrusted to traditional religious leaders for safekeeping and appropriate ceremonial use. The Jemez policy for human remains is always reburial. In theory the most desirable reburial location is the site from which the individuals were disinterred. However, because the excavations necessary for reburial could disturb additional graves if performed at the site itself, reburials often take place nearby but off-site. The locations chosen for these reburials are private, remote, and secret. A backhoe is employed to dig a deep pit in order to ensure that these individuals will not be disturbed again. Then tribal members, overseen by the *Fiscales* (appointed officials responsible for coordinating funerary activities), place the remains in the pit and perform a short ceremony. Finally the pit is refilled, and the reburial is complete. The ancestors have returned home.

References

Anyon, Roger, and Russell Thornton. 2003. Implementing repatriation in the United States: Issues raised and lessons learned. In *The dead and their possessions: Repatriation in principle, policy, and practice*, ed. C. Fforde, J. Hubert, and P. Turnbull, 190–198. London: Routledge.

Ayau, Edward Halealoho, and Ty Kawika Tengan. 2002. Ka Huaka'i O Na 'Oiwi: The journey home. In *The dead and their possessions: Repatriation in principle, policy and practice*, ed. C. Fforde, J. Hubert, and P. Turnbull, 191–189. London: Routledge.

Colwell, Chip. 2017. *Plundered skulls and stolen spirits: Inside the fight to reclaim native America's culture*. Chicago: University of Chicago Press.

Deloria, Vine. 1995. *Red earth, white lies: Native Americans and the myth of scientific fact*. New York: Scribner.

Ferguson, T.J., Roger Anyon, and Edmund J. Ladd. 2000. Repatriation at the pueblo of Zuni: Diverse solutions to

complex problems. In *Repatriation reader: Who owns American Indian remains?* ed. D. Mihesuah, 239–265. Lincoln: University of Nebraska Press.
Fine-Dare, Kathleen S. 2002. *Grave injustice: The American Indian repatriation movement and NAGPRA*. Lincoln: University of Nebraska Press.
Killion, Thomas W., ed. 2008. *Opening archaeology: Repatriation's impact on contemporary research and practice*. Santa Fe: SAR Press.
Lovis, William A., Keith W. Kintigh, Vincas P. Steponaitis, and Lynne G. Goldstein. 2004. Archaeological perspectives on the NAGPRA: Underlying principles, legislative history, and current issues. In *Legal perspectives on cultural resources*, ed. J.R. Richman and M.P. Forsyth, 165–184. Walnut Creek: Altamira Press.
Mihesuah, Devon A., ed. 2000. *Repatriation reader: Who owns American Indian remains?* Lincoln: University of Nebraska Press.
Odegaard, Nancy, and Alyce Sadongei. 2005. *Old poisons, new problems: A museum resource for managing contaminated cultural materials*. Walnut Creek: AltaMira Press.
Preucel, Robert W., Lucy F. Williams, Stacy O. Espenlaub, and Janet Monge. 2003. Out of heaviness, enlightenment: NAGPRA and the University of Pennsylvania Museum of archaeology and anthropology. *Expedition* 45 (3): 21–27.
Thomas, David Hurst. 2000. *Skull wars*. New York: Basic Books.
Trope, Jack F., and Walter R. Echo-Hawk. 1992. The native American graves protection and repatriation act: Background and legislative history. *Arizona State Law Journal* 24 (1): 35–77.

Repatriation Acts: The Politics of Repatriation in North America

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Introduction

In North America, the National Museum of the American Indian Act and the Native American Graves Protection and Repatriation Act are the two laws that regulate the repatriation of materials to American Indian tribes. Since much has been written about these laws, Native American Graves Protection and Repatriation Act (see the entry on NAGPRA in this encyclopedia) will not be discussed in detail here; the reader is referred to numerous websites devoted to discussing these laws and their histories. Since the National Museum of the American Indian Act was the first of the repatriation acts, it will be discussed first, but since the Native American Graves Protection and Repatriation Act has had perhaps the most widespread impact on museums and anthropologists, it will be discussed in more detail.

Definition

Repatriation, in its very basic sense, is the process of returning something to its home country. More often than not, the items returned are soldiers or their remains following a war of some sort. However, in the sense of Indigenous populations, repatriation generally is used to refer to the return of particular classes of objects held within museum or government collections to the cultures from which they were acquired.

Historical Background

On November 19, 1620, Pilgrim explorers in search of the inhabitants of their new land happened across "a place like a grave." They dug into it and found "the bones and skull of a man [and] . . . the bones and head of a little child" along with cultural material placed with the bodies. Not content to leave the material alone, they ". . . brought sundry of the prettiest things away with us, and covered the corpse up again" (Heath 1963: 27–28). Only 8 days after the Pilgrims had anchored off Cape Cod, American Indian graves had already been plundered for their contents.

In the United States, American Indian concerns regarding materials in the collections of museums and government agencies reached a crescendo during the political unrest of the 1960s and 1970s when pan-Indian groups such as the American Indian Movement staged protests about the

storage and display of American Indian skeletal materials. American Indians distrusted archaeology and archaeologists; the American Indian Movement's disruption of excavations at Welch, Minnesota, in 1971 exemplifies the physical actions taken to confront the issue, as were organized protests aimed at getting American Indian human remains and sensitive material out of public displays such as the occupation of the Southwest Museum in Los Angeles in 1971. Additionally, tribal groups began addressing the desire for the repatriation of human remains and artifacts with the fight for the return of the Onondaga wampum belts from the State Museum of New York in 1969.

The National Museum of the American Indian Act (NMAIA) and Its Amendment

The passage of the National Museum of the American Indian Act (PL 101–185) in 1989 established the National Museum of the American Indian and also required the Smithsonian Institution to inventory, document, and, if requested, repatriate culturally affiliated human remains and funerary objects to federally recognized native groups. Congress amended the NMAI Act in 1996 to make it more closely conform to the language of the Native American Graves Protection and Repatriation Act (NAGPRA) passed by Congress in 1990.

The Native American Graves Protection and Repatriation Act (NAGPRA)

Public Law 101–601, the Native American Graves Protection and Repatriation Act (NAGPRA), affirms the rights of lineal descendants, Indian tribes, and Native Hawaiian organizations to custody of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony held in federal museums or agencies or in museums that receive federal funds.

Signed into law by President George Bush in November 1990, NAGPRA places the responsibility for compliance upon federal agencies and museums that receive federal funds. It required all federal departments, agencies, or instrumentalities of the United States (except for the Smithsonian Institution) to complete summaries and inventories of Native American materials in their control (including those held by nongovernmental repositories) and to ensure compliance regarding inadvertent discoveries and intentional excavations of human remains conducted as part of activities on federal or tribal lands.

The system outlined by these two statutes generally provides a framework for resolving issues surrounding the disposition of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony excavated or discovered on federal or tribal lands or held in federal or museum collections. Categories of materials that are eligible for return under the laws include (1) human remains of an individual whose identity is known, (2) culturally affiliated human remains, (3) associated and unassociated funerary objects, (4) sacred objects, and (5) objects of cultural patrimony. In addition, tribes may request the return of objects transferred to or acquired by museums and federal agencies illegally or under circumstances that render the museums' or federal agency's claim to them invalid.

Culturally affiliated human remains are defined in the legislation as human remains that share a relationship with a present-day Indian tribe that can be demonstrated based on a preponderance of available evidence. Associated and unassociated funerary objects are items that, as part of the death rites of a culture, are believed to have been intentionally placed with an individual of known affiliation at the time of death or later. The only distinction between whether a funerary object is considered unassociated or associated is whether or not the museum or federal agency has the human remains with which it was originally interred. Sacred objects are specific ceremonial objects that are needed by traditional Native American religious leaders in order to continue practicing their traditional Native American religions by present-day adherents. Objects of cultural patrimony are more difficult to define and vary among tribes. In general, they are cultural objects that were originally owned by the entire tribe rather than a single individual and which have an ongoing historical, traditional, or cultural

importance to the native group. Because the objects were tribally owned rather than individually owned, they cannot have been alienated, appropriated, or conveyed by any individual at the time they were acquired. An example of an item of cultural patrimony for American citizens would be the original signed copy of the Bill of Rights or the Liberty Bell.

Repatriation of Native American human remains and certain cultural objects may be made by lineal descendants of named individuals, federally recognized Native American tribes, federally recognized Native Alaskan villages, and Native Hawaiian organizations named in the Acts.

The Acts also required the establishment of special committees to monitor and review the process of inventory, identification, and repatriation covered by each specific law. The Review Committee established by each law reviews findings relating to the origin or the return of human remains and cultural objects. The committees also assist in resolving disputes between groups or between a group and the museum or agency regarding the disposition of collections.

Key Issues/Current Debates

Within repatriation, there are some issues that have arisen due to problems within NAGPRA, among them the failure of NAGPRA to prevent the perceived continuing desecration of American Indian human remains through further scientific study, the failure of NAGPRA to protect human remains on private land, the repatriation of materials from extremely ancient cultures, the ambiguous definition of "sacred objects" and "objects of cultural patrimony," the failure of NAGPRA to address the needs of nonfederally recognized tribes, and the disposition of "culturally unidentifiable human remains."

While NAGPRA itself does not allow scientific study as part of the repatriation process, it does allow study of the materials if necessary for the more correct disposition of the materials to an appropriate tribal claimant. Some tribes are opposed to many forms of scientific testing on human remains and see this as an unnecessary continuation of scientific information gathering at the expense of the tribes.

Many American Indian groups cannot understand why the graves protection portion of NAGPRA was not applied to all lands within the United States, rather than just to federal or tribal lands. Since the entire continent was at one time Indian land, tribes have a difficult time understanding why federal protection of graves should be extended only to federal or tribal lands. In a review of the legislative history of NAGPRA, Trope and Echo-Hawk note that many states have burials protection laws which provide guidelines to protect human graves (1992: 52). While human remains may be protected under various state laws, federal intervention on private land can sometimes been seen as a violation of the "takings clause" of the 5th Amendment to the Constitution if the land owner is somehow denied access to or free use of property without adequate compensation. Since the majority of land in the United States is held in private ownership, this limits the law's protection to the majority of situations where human remains and objects are encountered.

There are certain objects within museum collections that do not easily fall within the definition of "sacred" items or "objects of cultural patrimony." A Kiowa war chief named Satanta had a war shield that was given to him for his protection in battle, and it worked through his participation in more than a hundred battles. The shield hung in the Kiowa medicine lodge, and Satanta proudly displayed it after every battle for the Kiowa people to see. Even though the shield did not have a specific role in the practice of the Kiowa Sun Dance, the last Sun Dance of the Kiowa was delayed until the shield could be brought from its home to its place of honor. Before Satanta was taken to Texas for imprisonment, he gave the shield to his son, Gray Goose, who kept it until he died. Supposedly Gray Goose bequeathed the shield to the superintendent of the Anadarko Agency of the Bureau of Indian Affairs. Eventually the shield made its way to the Phoebe Hearst Museum in Berkeley, California. The museum

had a valid right to ownership, as indicated by the original accessions records. The shield is not sacred under the definition of the NAGPRA, since it never had a formal role within the tribe's traditional religion except within the practice of religion by an individual tribal member (Satanta). Neither is the shield an object of cultural patrimony under the definition of the NAGPRA, since it was an individually owned property that could be legally disposed of (sold or given away) by the owner. However, the shield is both sacred and an object of cultural patrimony to the Kiowa tribe and the family. It is believed to possess powers that were given it by its maker, and it was a part of the tribal cultural inventory relating to the Indian Wars of the 1860s and 1870s, as well as an important object related to one of the last war chiefs of the Kiowa. The descendants of Satanta did not want the shield to go to the Kiowa tribe for fear of its theft. Additionally, the family recognized that the museum had a legal claim to ownership of the shield based on the donation documents. Eventually, a compromise was worked out. The museum sent the shield on permanent loan to the Fort Sill Museum in Fort Sill, Oklahoma, where the family members can more easily visit it. The original museum still technically maintains ownership of the shield but the family does not have to fly to California to see it. It still plays an important role in the Kiowa family's history, even if it does not reside within their home.

There are multitudes of issues regarding the repatriation of objects from ancient cultures, depending on whether one is dealing with human remains or with cultural objects. In relation to human remains, the situation regarding Kennewick Man/the Ancient One is illuminating, while the situation regarding cultural property is well illuminated by the situation regarding the Spiro materials of eastern Oklahoma.

The situation regarding the human remains known alternately as "the Ancient One" or "Kennewick Man" is exemplary for the problems associated with extremely old human skeletal material. Kennewick Man (see Downey 2000; Thomas 2000) was the name given to a nearly complete set of human remains discovered in the Columbia River in 1996. Shortly before the remains were to be repatriated to the tribes in the area of the discovery, eight anthropologists filed suit in court to block the repatriation. The fact that the skeleton was not related to *any* recent human groups, especially any American Indian groups, made it more difficult to justify repatriating it to any particular Indian group and easier to justify continued study. The fact that the people who temporally follow show some resemblance to the Kennewick material hints that they *may* have derived some of their morphological characteristics from the population of which the Kennewick individual was a member. While there were certainly conflicts between the scientific possibilities raised by the discovery of a nearly complete skeleton such as "the Ancient One," the principle issue tested throughout the conflict has been the legal question of whether NAGPRA should apply to materials of such antiquity. Ultimately, the court held that the material known as the Ancient One did not meet the definition of "Native American" under NAGPRA and was therefore not subject to repatriation. In 2014, scientists were able to obtain aDNA material from the skeleton that indicated a genetic relationship with two Colville individuals who had provided DNA samples (Rasmussen et al. 2015). Ultimately, in 2016, Congress passed a law allowing transfer of the remains to the State of Washington, who then repatriated the material to the Tribes. Kennewick Man was reburied on February 18, 2017.

The disposition of objects from the Spiro Mounds of eastern Oklahoma (Watkins 2004) is a good example of the issues that arise when two groups with seemingly equal claims to materials (but divergent ideas about the disposition of those objects) interact with a willing museum. The University of Oklahoma controls artifacts that were collected from the Spiro Mounds, one of the best-known mound complexes in the southeastern United States with "...extraordinarily rich litter burials of the elite and the shameless looting of the burial mounds during the Depression" (Bense 1994: 223). While these artifacts are indeed special in their size and workmanship, they also meet the definition of "funerary objects" under

NAGPRA eligible for repatriation to culturally affiliated tribes. The tribes most likely to be culturally affiliated with the Spiro materials are the Wichita and Affiliated Tribes of Indians and the Caddo Tribe of Oklahoma. Each tribe has a "valid" claim to the artifacts based on the shared cultural component of the most likely recognizable Indian tribal group which created the artifacts, but each have an opposite idea of how the materials should be used. The museum continues to maintain control of the artifacts and displays some of them.

Additionally, the repatriation legislation only indirectly addresses materials associated with groups that are not currently "recognized" by the federal government to have the special relationship of an "Indian tribe" or Native American under the law through its "cultural unidentifiable" clause. Many tribes feel that nonfederally recognized American Indian tribes are no less Indian than their federally recognized counterparts, but others are afraid that to allow standing under NAGPRA would allow such groups to bypass the normally tedious process of federal recognition. While all tribes agree that human remains of unrecognized American Indian groups are have been and always will be American Indian, many are concerned about extending rights to groups under NAGPRA. In a statement prepared for the March 1997 Review Committee meeting in Oklahoma, NAGPRA representatives from seven tribes from southwestern Oklahoma – the Apache Tribe of Oklahoma, the Caddo Tribe, the Comanche Tribe, the Delaware Tribe of Western Oklahoma, the Fort Sill Apache, the Kiowa, and the Wichita and Affiliated Tribes – felt that repatriation should occur only to federally recognized groups. While they felt that human remains, regardless of affiliation, should not be left in museums, they expressed a concern that to repatriate human remains to nonfederally recognized tribes could potentially assign rights and authority to groups that have come into existence without a legitimate claim of continuity. The working group felt that the human remains associated with such groups should instead be repatriated to the federally recognized tribes on whose aboriginal lands the remains were found, with the Review Committee making decisions in cases of multiple tribes claiming the same ancestral lands.

The most current issue regarding NAGPRA is the disposition of "culturally unidentifiable human remains," defined under the law as human remains for which no lineal descendants or cultural affiliations have been determined. Under recent regulations, museums have been required to identify human remains which do not easily fall within other aspects of the repatriation regulations. These sets of human remains can fall into this category because they are of an age that prevents the adequate attribution to a specific culture (cultural affiliation) or tribal group and can belong to a known tribal group which is not currently a "federally recognized tribe," or the information regarding the location of the site where the human remains originated makes adequate determination of geographic information unreliable or unknowable. While each of these aspects which contribute to the adequate determination of which tribal groups should be able to request repatriation under the law, tribal groups believe that such materials should be returned to tribal groups rather than languish within museum collections until such time as the museum determines who should get them. In 2015, NAGPRA regulations concerning "unclaimed" materials (43 C.F.R. 10.7) were promulgated which allows a federal agency to transfer materials that have not been claimed by a tribal group to an Indian tribe or Native Hawaiian organization that is not a potential claimant. As a result, the Choctaw and the Chickasaw Nations of Oklahoma have worked together to initiate claims for ancestors in collections in their aboriginal homelands; the Michigan Anishinaabek Cultural Protection and Repatriation Alliance (MACPRA) Committee was formed to repatriate unclaimed materials known to have come from within the State of Michigan borders (http://www.macpra.org/mission/).

International Perspectives

Repatriation under the NMAIA and NAGPRA has been major influence on international perspectives regarding the repatriation and return of items

within museum and government agency collections which derive from Indigenous cultural groups. While there is nothing within these specific laws that require repatriation to non-American Indian, Alaska Native, or Native Hawaiian organizations, the laws serve as models for the continuing recognition of rights of Indigenous populations to their cultural heritage. In terms of International Repatriation, Article 12 of the UNESCO Declaration on the Rights of Indigenous People (United Nations 2006) is perhaps the more relevant document to be used in support of the rights of Indigenous peoples to the use and control of their ceremonial objects and the right to the repatriation of their human remains.

Future Directions

The repatriation of human remains and other items of importance to American Indian tribes will continue to occur so long as archaeologists continue to excavate archaeological sites. As new items are encountered in construction projects or within controlled excavation, human remains and their associated funerary objects will pass into and through federal agencies and museum collections. American Indian tribes will continue to work with federal agencies and museums to regain those items that have special meaning to their tribal cultures.

Internationally, more and more groups will probably continue to press for the return of human remains and special classes of objects from museums to be returned to the cultures of their origin. The utilization of international accords developed by organizations such as the United Nations and international archaeological organizations such as the Society for American Archaeology and the World Archaeological Congress will also contribute to the return of such objects to Indigenous groups and organizations.

Cross-References

► Australia: Indigenous Cultural Property Return
► Indigenous Archaeological Organizations
► Repatriation Acts: Before NAGPRA
► Repatriation Acts: NAGPRA Repatriation in Tribal Practice

References

Bense, J.A. 1994. *Archaeology of the southeastern United States: Paleoindian to world war I*. New York: Academic Press.

Downey, R. 2000. *Riddle of the bones: Politics, science, race, and the story of Kennewick man*. New York: Copernicus Books.

Heath, D.B., ed. 1963. *Mourt's relation: A relation or journal of the English plantation settled at pilgrims at Plymouth in New England, by certain English adventurers both merchants and others*. New York: Corinth Books.

Rasmussen, Morten, Martin Sikora, Anders Albrechtsen, Thorfinn Sand Korneliussen, J. Víctor Moreno-Mayar, G. David Poznik, Christoph P.E. Zollikofer, Marcia S. Ponce de León, Morten E. Allentoft, Ida Moltke, Hákon Jónsson, Cristina Valdiosera, Ripan S. Malhi, Ludovic Orlando, Carlos D. Bustamante, Thomas W. Stafford Jr., David J. Meltzer, Rasmus Nielsen, and Eske Willerslev. 2015. The ancestry and affiliations of Kennewick man. *Nature* 523: 455–458.

Thomas, D.H. 2000. *Skull wars: Kennewick man, archaeology, and the battle for native American identity*. New York: Basic Books.

Trope, J.F., and W. Echo-Hawk. 1992. The native American graves protection and repatriation act: Background and legislative history. *Arizona State Law Journal* 24 (1): 35–77.

United Nations. 2006. UN declaration on the rights of indigenous peoples. Available at: http://www.ohchr.org/EN/Issues/IPeoples/Pages/Declaration.aspx.

Watkins, J. 2004. Representing and repatriating the past. In *North American archaeology*, ed. T. Pauketat and D. Loren, 337–358. Malden: Blackwell Press.

Further Readings

Fine-Dare, K.S. 2000. *Grave injustice: The American Indian repatriation movement and NAGPRA*. Lincoln: University of Nebraska Press.

Mihesuah, D. 2000. *Repatriation reader: Who owns American Indian remains?* Lincoln: University of Nebraska Press.

National Museum of the American Indian Repatriation office. n.d. Available at: http://nmai.si.edu/explore/collections/repatriation/.

National NAGPRA. n.d. Available at: http://www.nps.gov/nagpra/.

Smithsonian Institution Repatriation Office. n.d. Available at: http://anthropology.si.edu/repatriation/.

Watkins, J. 2005. *Sacred sites and repatriation (contemporary native American issues series)*. Philadelphia: Chelsea House Publishers.

Repatriation and Race in Indigenous Archaeology

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Introduction

The success of the racial Native American sovereignty movement during the second half of the twentieth century inspired a new narrative of hope among adherents to racial Indianhood (Wilkinson 2005). The passage of a law known as NAGPRA contributed greatly to this rekindling of optimism, helping to shore up the gradually sinking racial contract that had defined American identity since its founding as a nation.

After World War Two, the loosening of white privilege in American life and the challenges to racial whiteness as a socially acceptable form of bonding helped make possible civil rights initiatives for racial minorities. Moving slowly against white-pride racism, mainstream racial whites necessarily launched into an unacknowledged project to dismantle white identity systems. This meant that the currents of the American social project had begun to shift away from race as the central defining instrument of American identity.

Passed in 1990, the Native American Graves Protection and Repatriation Act (NAGPRA) served as a minor milestone in the historical evolution of racial practice in the United States. By that date, an emerging majority of Americans had become invested in a social narrative that rejected racial identity. These *faux whites* had little or no reason to engage in intraracial bonding – the true hallmark of racial identity. With no inducement to center their selfhood on race, these *white* people had become *faux white*. This process was invisible in an America that believed in race as a biological reality.

NAGPRA sought to strengthen the American racial contract. Swimming against the current of changing racial culture in American life, adherents to racial Indianhood relied on the structures of race in the American world as the basis for advocating passage of federal and state repatriation laws regulating the treatment of racially categorized *Native American* human remains and cemeteries. Race had come to America as a colonialist import, but now NAGPRA signified that racial Indianhood had become remythologized into an *indigenous* identity system.

As a matter of law, NAGPRA reflected an established American legal and political convention that subsumed diverse political entities under a race-based category termed *Indian tribes*. Rather than become integrated into the American union as states or continue as independent nations, *Indian tribes* joined the American political system as subaltern domestic dependencies with no formal constitutional role within either the federal system or state system. Laws, legislation, administrative directives, and court decisions pertaining to this group of racially defined quasi-sovereignties gradually fell under the racial rubric of *federal Indian law*. NAGPRA emerged from this colonialist legal tradition (Fig. 1).

Despite the fact that by 1990 anthropology held a shaky consensus that rejected race as a biological construction, NAGPRA helped to change the face of American anthropology, reshaping the academic relationship with racial Native America, particularly in archaeology (Killion 2007). Empowered by these developments and by the success of other pan-Indian initiatives, the intellectual and political leaders of Indian country entered the twenty-first century fully committed to the continued production of racial identity systems as an American cultural reality. Assisted by faux white supporters and encouraged by an academic preference to confine challenges to race to technical gray literature, racial Indians had no reason to question race. This ensured that racial Indians would deliberately link their social fortunes to the fate of race in America.

Definition

NAGPRA authorized racial Indian sovereign governments and Native Hawaiian organizations to claim culturally affiliated human remains,

Repatriation and Race in Indigenous Archaeology, Fig. 1 Billboard for a tourist attraction near Salina, Kansas. The State of Kansas and a coalition of tribes led by the Pawnee Nation closed this private business in 1990. (Photograph by Linda Echo-Hawk, March 1988)

funerary objects, sacred objects, and objects of cultural patrimony from US federal agencies and from museums receiving federal funding. It also covered new discoveries on US federal lands and within racially designated Native American sovereign homelands.

Federal funding became available in 1994 to help carry out NAGPRA, and in 1995 federal regulations implementing the law were issued by the National Park Service (NPS). Between 1994 and 2010, a total of 660 grants were awarded to racial Indian sovereignties (*Indian tribes*), Native Hawaiian organizations, and museums (National NAGPRA n.d.). These grants funded a variety of NAGPRA implementation projects, which typically involved hiring staff and consultants, purchasing equipment, and paying travel expenses.

Tribal delegations became a common sight at museums across the United States, and some major museums made NAGPRA implementation a part of the museum's public mission. At the Denver Art Museum, for example, the Native Arts Department hosted its 100th post-NAGPRA racial Indian delegation in June 2002 – a daylong NAGPRA training workshop with the Nooksack tribe. Almost half of those visits were funded by National Park Service NAGPRA grants to the Denver Art Museum, and most of the other tribal delegations were funded by NPS grants to racially classified sovereigns. These NPS-funded projects focused on assessing the applicability of the law to collections of human remains and several categories of cultural items.

Key Issues and Current Debates

Sparked primarily by moral concerns over museum collections of racially identified Native American human remains, NAGPRA took shape during the late 1980s as a response by the United States to a national social justice movement among adherents to racial Indianhood (Preucel 2011). During the 1970s and early 1980s, social momentum on this issue steadily grew. But racial Indian attitudes about human remains in museum collections received little systematic acknowledgement from either racial sovereign governments or from anthropologists. The 1980s saw a swift expansion of public discourse on the issue among racial Indians and in anthropological literature (Green and Mitchell 1990).

By the time NAGPRA became law in 1990, growing outrage regarding museum collections of racially identified Native American human remains had generated a powerful sense of unity among many self-identified Indians. As racial sovereignties began reburying human remains and repatriating cultural items from museum collections, NAGPRA-related storytelling entered

the central bonding narratives of racial Indianhood. *Repatriation* among Indians signified the successful assertion of race-based social power; NAGPRA affirmed that racial Indianhood could produce empowering results for racial Indians in America.

Anthropologists were less unified in their response to passage of NAGPRA. It is arguable that a majority of anthropologists – especially cultural anthropologists – quickly adjusted to the new authority of racial Indian sovereignties under NAGPRA, seeing themselves primarily as students of racial Indian cultures rather than as imperialistic white-pride oppressors. But through the decade that followed passage of the law, significant groups of anthropologists and Indians worked to concurrently craft a national narrative of science-versus-religion polarization.

Prominent segments of the anthropological community fretted about the potential negative consequences of the law for academic scholarship, worrying particularly about the potential impact on archaeological inquiry, museum collections, and biological science. They feared that antiscience Indian sovereigns would ally with sympathetic US federal bureaucrats to invasively cripple useful research.

When Indians worried about the law, they suspected that entrenched white racism would thwart an important Indian quest for social justice. Encountering opposition from anthropologists and sensing resentment from academia, racial Indians suspected that white racism would limit repatriation and undermine tribal authority.

Simmering resentments between these elements of the anthropological community and Indian country flared in the wake of the 1996 discovery of ancient human remains in the waters of the Columbia River in Washington. A group of anthropologists successfully sued to prevent *Kennewick Man* from being turned over to a coalition of local racial Indian sovereignties. Reporting on this case, the American media commodified NAGPRA as an exciting culture war battleground, ignoring the fact that a vast collaborative interfacing between racial Indians and archaeologists was well underway across America (Dongoske et al. 2000).

The Kennewick Man situation thrust a facade of extremist voices to the forefront of this cultural interface. Among Indians who distrusted academic anthropology, the Kennewick Man fiasco enflamed suspicions that the academic world was bent on crafting surreptitious plots to undermine an empowered Native America. Among NAGPRAphobic anthropologists, the Kennewick Man fiasco enflamed suspicions that Indian country was bent on replacing science with religion.

In *Skull Wars* (2000), archaeologist David Hurst Thomas sought to reframe the Kennewick Man battleground into a new anthropological cultural consensus. Pondering the history of relations between anthropologists and Indians, this influential book explained the anthropological rejection of race, yet it also adopted a deferential tone to the American racial status quo. In this narrative of Indians versus whites, Vine Deloria Jr. was poised as the leading spokesperson for Indians, while Thomas set up himself as the introspective voice of anthropology. *Skull Wars* argued that anthropologists should develop partnerships with Indians. It also suggested that academic scholars should retain professional analytical skepticism toward racial Indian ambitions related to implementation of NAGPRA.

In *Indigenous Archaeology* (2000), Joe Watkins framed the archaeological component of the NAGPRA culture war as a clear divide separating the practices of white archaeologists from the values of racial Indians. Acknowledging that the master narrative of racial Indianhood included many suspicions about archaeology, Watkins suggested that the future growth of a more fully empowered *indigenous archaeology* would be dependent upon the willingness of racial whites to cede meaningful control of archaeology to racial Indians.

Watkins (2000: 105–15) presented a case study of the Pawnee Nation's efforts to repatriate human remains, contrasting the cooperative tone that unfolded in Kansas with an acrimonious dispute that took place in Nebraska. Launched by the Native American Rights Fund in Colorado, the Pawnee repatriation project ultimately helped give rise to NAGPRA. Carefully orchestrating legislative initiatives, negotiations, and historical

research, the Pawnee project showed that the American public supported racial Indian repatriation.

Prior to the 1990s, little dialogue occurred between archaeologists and Pawnees despite the extensive investigations of Pawnee sites that began during the 1920s. As an outcome of the Pawnee repatriation program, new relationships developed that included Pawnees participating in archaeology and conducting research projects in partnership with archaeologists – the first visit by archaeologists with the leadership of the Pawnee Nation occurred in the post-NAGPRA era. Despite this more positive atmosphere, cooperative projects remained sporadic. Indeed, one Pawnee repatriation activist articulated the dominant Pawnee attitude toward archaeology at the end of the 1990s, characterizing the entire discipline as *oppressive and sacrilegious* (Riding In 2000: 106).

Seeking to promote a more collaborative interfacing of the interests of academic archaeology and racial Indians, Joe Watkins and his colleagues in 2001 founded the Closet Chickens. This group took shape as an informal association of self-identified Indian archaeologists and carefully vetted nonracial faux white supporters. Standing up for implementation of NAGPRA by racial Indian sovereignties, the social idealism of the Closet Chickens attached positive meanings to the empowerment of racial Indianhood, but this idealism also promoted racialism in an academy that was slowly abandoning the prerogatives of white racial identity.

The Kennewick Man case was decided in 2002 and upheld in 2004 by the 9th Circuit Court of Appeals. These court decisions gutted the consultation provisions of NAGPRA, dismissed oral traditions, undermined joint claims by multiple claimants, and denied the racial assignment under NAGPRA of Kennewick Man as *Native American*. Efforts soon followed to maneuver around the Kennewick Man court rulings on the racial definition of *Native American* by amending NAGPRA. These efforts failed. But an expansive mechanism for dealing with the NAGPRA class of *culturally unidentifiable* racially identified Native American human remains became finalized in the US federal regulations in 2010. This promoted the repatriation of unaffiliated racially designated Native American human remains to racial Indian tribal claimants and Native Hawaiian organizations.

Despite the confrontational tone set by the Kennewick Man case, NAGPRA eventually helped to establish a new consensus throughout the discipline of American archaeology. Archaeologists increasingly understood and accepted that the accommodation of racial sovereignties would make the profession more inclusive of racial Indian viewpoints. The term *multivocal archaeology* became adapted to characterize this new inclusiveness. But the emergence of multivocal archaeology did not necessarily mean that Indian views on oral literature would gain easy admittance to academic constructions of history.

The NAGPRA cultural affiliation standard encouraged the use of oral traditions, heartening racial Indians who often bonded through complaints that archaeology disrespected oral traditions. Few scholars chose to take up this challenge, however, and post-NAGPRA literature saw only a handful of peer-reviewed publications that integrated the study of oral traditions and the archaeological record (Echo-Hawk 2000; Whiteley 2002). Though such research would seem likely to appear in time, talk of a *separate but equal* paradigm also took shape. The culturally respectful pedagogy of multivocalism opened the door for the comparison of archaeological models of prehistory and Indian traditions about ancient history, but mainstream archaeology seemed content to treat these as separate racially segregated *ways of knowing*.

During the late twentieth century, Indian activists who sought to advance the Indian sovereignty movement by villainizing archaeology often felt suspicious of Indians who took up anthropology. These Indian activists found it easy to ignore the vast changes that reshaped the profession in the decades after passage of NAGPRA (Riding In 2000; Echo-Hawk 2010: 255–71). Racial Indians entering the discipline of archaeology understood that their social position could sometimes be precarious. Many found a sense of balance by policing archaeology via ethical precepts influenced by

NAGPRA. Some helped their communities develop new ways of addressing archaeological inquiry by implementing tribal historic preservation programs. Drawing on the new expertise of these racial Indian archaeologists, racial Indian sovereignties like the Navajo Nation began building their own archaeology programs.

Indian archaeologists embraced the pan-Indian narrative on NAGPRA as a law pertaining to race-based social justice. This meant they also had to preferentially bond through the doctrines of racial Indianhood. Rather than help Indian people wrestle with the anthropological consensus rejecting race, Indian anthropologists chose to maintain a code of professional silence about the nature of American racialism. This communal vow of silence became a new tenet of racial Indianhood. Indian intellectuals conjointly handed down to their heirs an unwavering commitment to race, unaffected by the changing definitions of race in the American world beyond Indian country.

Faux white supporters of social justice for racial Indians were less unified in maintaining silence about the true nature of race (see Thomas 2000; Echo-Hawk and Zimmerman 2006; Colwell-Chanthaphonh 2009; Preucel and Mrozowski 2010: 286–7). The faux white supporters of Indians did not practice race themselves. They did not engage in racial bonding with other members of their own assigned racial group. In fact, they had a professional suspicion of race as a discredited theory of human biological diversity. Unlike colleagues who acted purely as cheerleaders for Indian racialism, urging Indians to stay faithful to race while they themselves abandoned it, these authors seemed willing to experiment with a more nuanced semi-postracial position. They didn't believe in race and they said so, but they still had a heartfelt commitment to NAGPRA and the production of race-based social justice.

Repatriation empowered racial Indianhood, and race helped Indian tribes assert control over human remains and repatriate long-lost cultural items, so the doing of race could not be cleanly separated from the making of social justice. The two were intertwined. For this reason, faux whites could not support one and reject the other. But a vast weakening of white racial bonding and an undermining of white privilege had been unfolding slowly for decades, pushed along by the American civil rights movement. The white abandonment of race declared that the American racial contract was somewhere in the process of getting swept to the edges of American life. In a slowly dawning postracial America, would Indians always hold fast to the promises of racial identity?

As an articulation of over two centuries of entrenched American racialism, the passage of NAGPRA added considerable momentum to the racial Indian sovereignty movement. Renewing a sense of enthusiasm for American racialism among Indian practitioners of race, the NAGPRA narrative of success inspired Indians to work to buttress the wavering American racial consensus. Guided by an energetic investment in the tenets of race, Indians failed to understand the detachment from racial bonding that had emerged among racial whites.

The legal philosophers of racial Indianhood understood that the social project that led to NAGPRA had to do with exploiting race. The power of racial bonding had been applied to uphold the status of Indian tribes in the American political system as racially defined domestic dependent nations. Indian lawyers also believed that the strengthening of this status would lay the foundation for the production of a viable political independence movement. In fact, the repatriation of cultural items and human remains under NAGPRA did encourage many racial Indian sovereignties to recalibrate their social agendas and reinvigorate their cultural heritages.

The successes of NAGPRA meant much for many racial Indian sovereignties. But these successes did not rewrite the truths that really shaped the status of Indians in the American political system. In affirming the empowerment of race through NAGPRA and in attempting to keep faux white Americans bound to their abandoned racial compact, Indians necessarily reaffirmed the status of *Indian nations* in the United States as racially defined quasi-sovereignties. Indian lawyers had built an active sovereignty movement by

looking to the US constitution to protect Indian rights, but this same constitution mentioned racial Indians twice and racial whites not at all. By law, Indians would never have the freedom enjoyed by whites, who could freely abandon race, and were doing so in large numbers by the end of the twentieth century.

Rejecting the nonracial social option embraced among faux whites, Indians rejected freedom from the tyranny of race. Attaching their racial Indian governments to the colossal sinking façade of race through NAGPRA and other pan-Indian initiatives, Indian leaders opted for continued dependence on the US federal trust relationship. There would be no confrontation of a fundamentally unfair system in which all Americans could abandon race except racial Indians. There would be no challenge to an undemocratic system of sovereigns in which racially identified Indian sovereigns lacked official political representation and therefore had no formal voice in their own fate.

Holding fast to the fading fortunes of American racialism, Indians left untapped a huge aquifer of moral authority that could be potentially accessed by strategically confronting the imposition of racial Indianhood under the racialist traditions of US federal Indian law. The Indian sovereignty movement would remain a project devoted to race. Indians would accept dependence within the American racial system over the more uncertain quest for full sovereign independence. Continuing the project of cultivating race as a convenient source of social power, Indian leaders began to repackage racial Indianhood into a more international form of racial indigenism – even aspiring to harvest ideological assistance from the United Nations (Echo-Hawk 2010: 426–60).

Embracing race through repatriation and NAGPRA, adherents to racial Indianhood entered the twenty-first century as optimistic stewards of a race-based sovereignty movement. They won many victories by investing in the social authority of the American racial narrative. Even as this metanarrative steadily evaporated from the hearts of other Americans, Indians persevered, clasping vanishing dreams of sovereignty as they trekked onward to the unknown destinations of race.

Cross-References

- ▶ Atalay, Sonya
- ▶ Closet Chickens
- ▶ Community Archaeology
- ▶ Cultural Heritage Management and Native Americans
- ▶ Decolonization in Archaeological Theory
- ▶ Deloria Jr., Vine
- ▶ Echo-Hawk, Roger C.
- ▶ Ethics and Human Remains
- ▶ Ethnoarchaeology
- ▶ Ferguson, T. J.
- ▶ Human Remains in Museums
- ▶ Indigenous Archaeological Organizations
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues
- ▶ Multivocality and Archaeology
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Race in Archaeology
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Repatriation: Overview
- ▶ Watkins, Joe (Indigenous Archaeology)
- ▶ Yellowhorn, Eldon
- ▶ Zimmerman, Larry J.

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References

Colwell-Chanthaphonh, C. 2009. *Inheriting the past: The making of Arthur C. Parker and indigenous archaeology*. Tucson: University of Arizona Press.

Dongoske, K.E., M. Aldenderfer, and K. Doehner, eds. 2000. *Working together: Native Americans & archaeologists*. Washington, DC: Society for American Archaeology.

Echo-Hawk, R. 2000. Ancient history in the New World. *American Antiquity* 65: 267–290.

Echo-Hawk, W.R., Jr. 2010. *In the courts of the conqueror: The 10 worst Indian law cases ever decided*. Golden: Fulcrum Press.

Echo-Hawk, R., and L.J. Zimmerman. 2006. Beyond racism: Some opinions about racialism and American archaeology. *American Indian Quarterly* (Special Issue: Decolonizing Archaeology) 30: 461–85.

Green, R., and N.M. Mitchell. 1990. *American Indian sacred objects, skeletal remains, repatriation and reburial: A resource guide*. Washington, DC: The American Indian Program, National Museum of American History.

Killion, T.W., ed. 2007. *Opening archaeology: Repatriation's impact on contemporary research & practice*. Santa Fe: School for Advanced Research Press.

National NAGPRA. n.d. Available at: http://www.nps.gov/nagpra/. Accessed 21 July 2011.

Preucel, R.W. 2011. An archaeology of NAGPRA: Conversations with Suzan Shown Harjo. *Journal of Social Archaeology* 11: 130–143.

Preucel, R.W., and S.A. Mrozowski, eds. 2010. *Contemporary archaeology in theory: The new pragmatism*. 2nd ed. Chichester: Wiley-Blackwell.

Riding In, J.T. 2000. Repatriation: a Pawnee's perspective. In *Repatriation reader: Who owns American Indian remains?* ed. D.A. Mihesuah, 106–120. Lincoln: University of Nebraska Press.

Thomas, D.H. 2000. *Skull wars: Kennewick man, archaeology, and the battle for native American identity.* New York: Basic Books.

Watkins, J. 2000. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: AltaMira Press.

Whiteley, P.M. 2002. Archaeology and oral tradition: The scientific importance of dialogue. *American Antiquity* 67: 405–415.

Wilkinson, C. 2005. *Blood struggle: The rise of modern Indian nations*. New York: W.W. Norton.

Further Reading

Bray, T.L., ed. 2001. *The future of the past: Archaeologists, Native Americans, and repatriation*. New York: Garland Publishing.

Burke, H., C. Smith, D. Lippert, J. Watkins, and L.J. Zimmerman, eds. 2008. *Kennewick Man: Perspectives on the ancient one*. Walnut Creek: Left Coast Press.

Echo-Hawk, R. 2002. *Keepers of culture: Repatriating cultural items under the Native American Graves Protection and Repatriation Act*. Denver: Denver Art Museum.

Echo-Hawk, R. 2010. *The magic children: Racial identity at the end of the age of race*. Walnut Creek: Left Coast Press.

Fine-Dare, K.S. 2002. *Grave injustice: The American Indian repatriation movement and NAGPRA*. Lincoln: University of Nebraska Press.

Mason, R.J. 2006. *Inconstant companions: Archaeology and North American Indian oral traditions*. Tuscaloosa: University of Alabama Press.

Russell, S. 2010. *Sequoyah rising: Problems in post-colonial governance*. Durham: Carolina Academic Press.

Swidler, N., K.E. Dongoske, R. Anyon, and A.S. Downer, eds. 1997. *Native Americans and archaeologists: Stepping stones to common ground*. Walnut Creek: AltaMira Press.

Repatriation and Restitution of Cultural Property: Relevant Rules of International Law

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Introduction

The logical and legal link between appropriation and restitution of cultural properties is self-evident. If appropriation of the properties is illegal, there is an obligation to return them. Any State which is responsible of an internationally wrongful act is bound, first of all, to reestablish the situation that would have existed if the act had not occurred.

The question of restitution of cultural properties (A distinction is sometimes made today between "return," used in a general sense, and "restitution," used for stolen or illegally exported properties. The term "repatriation" is also used. But such questions of terminology do not seem important.) is the subject matter of a number of international treaties which have a world scope of application. Their main provisions can today be considered as belonging also to customary international law. The trend toward the restitution is growing, as the result of the application of principles having also a moral and cultural character.

Key Issues

Restitution After War

The experience of the pillages occurred during the Second World War influenced treaty provisions

relating to the protection of cultural heritage in time of war. Article 33 of the Convention on the Protection of Civilian Persons in Time of War (Geneva, 1949) prohibits in general pillage and reprisals against the property of protected persons. Article 4, para. 3, of the Convention for the Protection of Cultural Property in the Event of Armed Conflict (The Hague, 1954) (131 States are parties to it.) concluded within the framework of the United Nations Educational, Scientific and Cultural Organization (UNESCO), prohibits "any form of theft, pillage or misappropriation of, and any acts of vandalism directed against, cultural property," as well as the requisition of movable cultural property situated in the territory of another party. Article I of the First Protocol (The Hague, 1954) (109 States are parties to it.) to the Convention binds a State Party "to prevent the exportation, from a territory occupied by it during an armed conflict, of cultural property" (Art. I, para. 1) and "to return, at the close of hostilities, to the competent authorities of the territory previously occupied, cultural property which is in its territory, if such property has been exported in contravention of the principle laid down in the first paragraph." The provision adds that "such property shall never be retained as war reparations" (Art. I, para. 3). Under Art. 9, para. 1, of the Second Protocol (The Hague, 1999) (76 States are parties to it.) to the Convention, "(. . .) a Party in occupation of the whole or part of the territory of another Party shall prohibit and prevent in relation to the occupied territory: *a*. any illicit export, other removal or transfer of ownership of cultural property; *b*. any archaeological excavation, save where this is strictly required to safeguard, record or preserve cultural property; c. any alteration to, or change of use of, cultural property which is intended to conceal or destroy cultural, historical or scientific evidence."

Irrespective of the application of any treaty, the obligation to return cultural properties removed in time of war or during military occupation is confirmed by United Nations Security Council Resolution 1483 of 22 May 2003, dealing, inter alia, with measures to facilitate the return of cultural properties illegally removed from Iraq after 6 August 1990 (in fact, after the said date, Iraq underwent periods of war, periods of peace, and periods of military occupation). According to the resolution, "(. . .) all Member States shall take appropriate steps to facilitate the safe return to Iraqi institutions of Iraqi cultural property and other items of archaeological, historical, cultural, rare scientific, and religious importance illegally removed from the Iraq National Museum, the National Library, and other locations in Iraq since the adoption of resolution 661 (1990) of 6 August 1990, including by establishing a prohibition on trade in or transfer of such items and items with respect to which reasonable suspicion exists that they have been illegally removed, and calls upon the United Nations Educational, Scientific, and Cultural Organization, Interpol, and other international organizations, as appropriate, to assist in the implementation of this paragraph" (para. 7).

Such an obligation was restated by Security Council Resolution 2199 of 12 February 2015, which also applies to cultural properties removed from Syria since 15 March 2011. Here the Security Council also noted with concern "that ISIL [= Islamic State in Iraq and the Levant], ANF [= Al-Nusrah Front] and other individuals, groups, undertakings and entities associated with Al-Qaida, are generating income from engaging directly or indirectly in the looting and smuggling of cultural heritage items from archaeological sites, museums, libraries, archives, and other sites in Iraq and Syria, which is being used to support their recruitment efforts and strengthen their operational capability to organize and carry out terrorist attacks" (para. 16).

Recently, under Resolution 2347 (2017) of 24 March 2017, the Security Council stressed the existence of a vicious circle, explicitly stating that the destruction and looting of cultural properties, besides being a likely consequence of war, can also be in itself a cause of war, insofar as it "can fuel and exacerbate conflict and hamper post-conflict national reconciliation, thereby undermining the security, stability, governance, social, economic and cultural development of affected States" (preamble).

Restitution in Time of Peace

The issue of restitution of cultural properties is today also related to the problem of illegal trafficking in time of peace. In this regard, the first matter to be addressed is the apparently simple question of determining in what cases "illegal trafficking" really is "illegal." While such a qualification depends on a given national legislation, in cases of transboundary movements of cultural properties, at least two different domestic legal systems are involved, namely, that of the State of origin and that of the State of destination, to which may sometimes be added that of the State of transit. The relevant regimes may be different, depending on the legislation of the States involved.

Under a universally recognized principle of law, the theft, that is, the appropriation of properties without the consent of the owner, is a crime subject to criminal sanction and cannot create a valid title for the thief over the stolen objects. However, even in the case of theft, the domestic legislation of different countries may vary as to whether the rights of a third good faith purchaser should be protected and as to whether the statute of limitation (called also acquisitive prescription) could apply in favor of the possessor after the passing of a certain number of years from the crime. Here two maxims taken from Roman law – *beati possidentes* (possessors have priority) and *nemo plus iuris transferre potest quam ipse habet* (nobody can transfer more rights than those that he has) – play one against the other.

In the case of cultural objects fortuitously found and subsequently removed, national legislation may vary also as to who is their owner, either the private owner of the land or the finder or the State as the trustee of a public interest. Similar differences may exist in the case of objects found in excavations. If the objects are found on the seabed, the alternative as to the holder of title is between the finder and the State.

In the case of illegal movements, the picture becomes more complex because they may be the result not only of thefts but also of the violation of domestic legislation which prohibits or limits the export of cultural properties from the national territory. National legislation for this purpose has been adopted by a number of States, especially those that are rich in cultural heritage (One of the first instances in this regard is a decision taken in 1602 by the grand duke of Tuscany, subjecting to a license the export of "good paintings" and prohibiting altogether the export of the works of 19 selected masters, namely, "Michelangelo Buonarroti, Raffaello Sanzio, Andrea del Sarto, Mecherino, Rosso Fiorentino, Leonardo da Vinci, Franciabigio, Perino del Vaga, Jacopo da Pontormo, Tiziano, Francesco Salviati, Bronzino, Daniele da Volterra, Fra Bartolomeo, Sebastiano del Piombo, Filippino Lippi, Correggio, Parmigianino, Perugino."). Rules which prohibit or restrict or submit to an authorization the export of cultural properties can be violated irrespective of a theft and even by the owner himself (for instance, if he delivers the object to a buyer abroad or takes the object with him when transferring his residence abroad). However, the legislation of the State of destination may consider as legal the import of such properties, as if they were any other commercial good, and may refuse to apply a foreign legislation that prohibits or limits their export. Moreover, the definition of cultural property and the kinds of objects belonging to this category may vary depending on the national legislation involved.

It is evident that only a generally accepted regime adopted at the international level could overcome the problems posed by the differences in domestic legislation as regards international movements of cultural properties. To achieve this objective, two treaties of a universal scope of application have been concluded and are today in force, namely, the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Properties (Paris, 1970) (136 States are parties to it.), concluded within the framework of UNESCO, and the UNIDROIT (International Institute for the Unification of Private Law) Convention on Stolen or Illegally Exported Cultural Objects (Rome, 1995) (42 States are parties to it.).

Taking into account the importance of cultural properties, the 1970 Convention sets forth the

duty of every State to respect both its own cultural heritage and that of other countries:

> Considering that cultural property constitutes one of the basic elements of civilization and national culture, and that its true value can be appreciated only in relation to the fullest possible information regarding its origin, history and traditional setting,
>
> Considering that it is incumbent upon every State to protect the cultural heritage existing within its territory against the dangers of theft, clandestine excavation, and illicit export,
>
> Considering that, to avert these dangers, it is essential for every State to become increasingly alive to the moral obligations to respect its own cultural heritage and that of all nations (...). (preamble)

The basic assumption of the 1970 Convention is that illegal trafficking must be condemned and fought because it impoverishes the cultural heritage of the States of origin of the objects:

> The States Parties to this Convention recognize that the illicit import, export and transfer of ownership of cultural heritage is one of the main causes of the impoverishment of the cultural heritage of the countries of origin of such property and that international co-operation constitutes one of the most efficient means of protecting each country's cultural property against all the dangers resulting there from. (Art. 2, para. 1)

The properties to which the 1970 Convention applies are those that belong to the categories listed in detail in Art. 1 and that have a specific link with a certain State, as specified in Art. 4 ("The States Parties to this Convention recognize that for the purpose of the Convention property which belongs to the following categories forms part of the cultural heritage of each State: (a) cultural property created by the individual or collective genius of nationals of the State concerned, and cultural property of importance to the State concerned created within the territory of that State by foreign nationals or stateless persons resident within such territory; (b) cultural property found within the national territory; (c) cultural property acquired by archaeological, ethnological or natural science missions, with the consent of the competent authorities of the country of origin of such property; (d) cultural property which has been the subject of a freely agreed exchange; (e) cultural property received as a gift or purchased legally with the consent of the competent authorities of the country of origin of such property."). The parties recognize the "indefeasible right" of each of them "to classify and declare certain cultural property as inalienable which should therefore *ipso facto* not be exported" (Art. 13, *d*). They are bound to introduce a specific certificate in which the exporting State specifies that the export of the cultural property in question is authorized and to prohibit the export of such property unless accompanied by it. They undertake to prevent museums and similar institutions within their territories from acquiring cultural property originating in another State Party which has been illegally exported (Art. 7, *a*). They also undertake to prohibit the import of cultural property stolen from a museum or a religious or secular public monument or similar institution in another State Party (Art. 7, *b*, i) as well as, at the request of the State Party of origin, to recover and return any such cultural property, provided that the requesting State pays just compensation to an innocent purchaser or to a person who has valid title to such property (Art. 7, *b*, ii).

Although very important for fostering international cooperation in the fight against illicit trafficking, the 1970 Convention has some limits. It does not have a retroactive character, applying to properties involved in illicit movements after the entry into force of the Convention for both the State parties concerned. It covers only certain kinds of illicit movements. For instance, the interdiction to acquire cultural properties illicitly imported is limited to museums, and the obligation to return is limited to cultural properties stolen from museums or similar institutions, without extending to cases where private individuals have been the victims or where the objects have been illegally excavated.

While the 1970 Convention envisages diplomatic action at the interstate level to achieve the return of cultural properties, the UNIDROIT Convention aims at providing individual victims with the right to bring proceedings before domestic courts for the return of stolen or illegally exported cultural objects. Under the UNIDROIT Convention, the illicit trade in cultural objects causes an irreparable damage which

also affects the heritage of all peoples. It follows that the return of such objects to the States of origin serves the interest of all. In fact, the States parties declare themselves

> deeply concerned by the illicit trade in cultural objects and the irreparable damage frequently caused by it, both to these objects themselves and to the cultural heritage of national, tribal, indigenous or other communities, and also to the heritage of all peoples, and in particular by the pillage of archaeological sites and the resulting loss of irreplaceable archaeological, historical and scientific information,
>
> Determined to contribute effectively to the fight against illicit trade in cultural objects by taking the important step of establishing common, minimal legal rules for the restitution and return of cultural objects between Contracting States, with the objective of improving the preservation and protection of the cultural heritage in the interest of all. (preamble)

The UNIDROIT Convention clearly provides that "the possessor of a cultural object which has been stolen shall return it" (Art. 3, para. 1) and that a State Party may request the court or another competent authority of another State Party "to order the return of a cultural object illegally exported from the territory of the requesting State" (Art. 5, para. 1). Specific provisions, which are subject to certain exceptions, apply as regards the time limitation of claims for restitution or return. Another provision specifies the cases where the return of illegally exported objects must be ordered:

> The court or other competent authority of the State addressed shall order the return of an illegally exported cultural object if the requesting State establishes that the removal of the object from its territory significantly impairs one or more of the following interests:
>
> (a) the physical preservation of the object or of its context;
>
> (b) the integrity of a complex object;
>
> (c) the preservation of information of, for example, a scientific or historical character;
>
> (d) the traditional or ritual use of the object by a tribal or indigenous community,
>
> or establishes that the object is of significant cultural importance for the requesting State. (Art. 5, para. 3)

Under certain conditions, the good faith possessor of a stolen cultural object or of an illegally exported object is entitled to a fair and reasonable compensation (Art. 4, para. 1, and Art. 6, para. 1). Also the UNIDROIT Convention has no retroactive application.

In all cases where the 1970 Convention or the UNIDROIT Convention are not applicable, for *ratione materiae*, *ratione personae*, or *ratione temporis* reasons, use can be made of the consultative services of the Intergovernmental Committee for Promoting the Return of Cultural Property to Its Countries of Origin or Its Restitution in Case of Illicit Appropriation (ICPRCP), provided that the property has "a fundamental significance from the point of view of the spiritual values and cultural heritage of the people of a Member State or Associate Member of UNESCO" and "has been lost as a result of colonial or foreign occupation or as a result of illicit appropriation" (Art. 3, para. 2, of the Statutes of the Committee). As set forth in Art. 4, paras. 1 and 2, of its Statutes, the ICPRCP is entrusted with the responsibility for "seeking ways and means of facilitating bilateral negotiations for the restitution or return of cultural property to its countries of origin" and "promoting multilateral and bilateral co-operation with a view to the restitution and return of cultural property to its countries of origin." By Recommendation No. 4 of 23 September 2010, the ICPRCP adopted a procedure for mediation and conciliation within its framework.

Future Directions

An Evolutionary Trend

In the last years, an evolutionary trend has developed toward the restitution of removed cultural heritage to countries of origin (for some relevant instances, which cannot be recalled hereunder because of space constraints, see Sandholtz 2007; Nafziger and Scovazzi 2008; Nafziger and Nicgorski 2009; Scovazzi 2011: 341). The trend applies in time of both war and peace.

The evolutionary trend is based on a number of principles that are located in the space between morality and law and that can be instrumental in addressing the shortcomings of multilateral treaties in force regarding the restitution of cultural properties, in particular their non-retroactive character and the fact that they can create rights and obligations only for the State parties.

The principles in question include the principle of non-exploitation of the weakness of another subject for cultural gain, which applies to situations of persecution, war, colonial domination, and foreign occupation or to situations involving indigenous peoples. This principle has also inspired the legislation enacted by certain countries on property looted to victims of the Holocaust (e.g., the *Holocaust (Return of Cultural Objects) Act 2009* of the United Kingdom), on the basis of the 2000 Vilnius Declaration on Holocaust Era Looted Cultural Assets.

Also relevant is the principle of preservation of the integrity of cultural contexts, which is deeply rooted in the nature of cultural heritage, especially as regards properties having an emblematic character for the country of origin. To divide is to destroy (*diviser c'est détruire*), as the French scholar Antoine-Chrysostome Quatremère de Quincy wrote already in 1796 in his book (*Lettres sur le préjudice qu'occasionneroient aux Arts et à la Science, le déplacement des monumens de l'art de l'Italie, le démembrement de ses Ecoles, et la spoliation de ses Collections, Galeries, Musées,* etc.), against the looting by France of paintings, statues, and manuscripts found in the occupied Italian States. Cultural properties have a special status and cannot be treated as any other commercial good. There is very little merit in the attitude of those who, in the name of an alleged principle of "cultural internationalism," plead for an almost uncontrolled movement of cultural properties (see Merryman 1986: 847). It is not by chance that such movement goes always in the same direction, following the rules of the market, to the benefit of those who can invest huge amounts of money in purchasing foreign cultural properties and to the detriment of the cultural identity of the countries of origin.

These principles, which play in favor of the State of origin of cultural properties, could be balanced against other considerations, which may play in favor of the State of destination, such as the contribution given by the latter for the preservation of the properties in question and the time elapsed since the removal. The objective is to reach an equitable solution for each particular case in the light of all the relevant circumstances.

Settlements negotiated by the parties concerned can only strengthen the efforts to achieve equitable solutions. Interesting in this regard are the agreements on the return of cultural properties concluded in the last years by the Italian Ministry of Cultural Properties and Activities with a number of cultural institutions located in the United States, such as the Metropolitan Museum of Art of New York, the Princeton University Art Museum, the Paul Getty Museum of Los Angeles, and the Museum of Fine Arts of Boston. The agreements provide for the return of cultural properties that Italy claims were illegally excavated in the national territory and sold clandestinely outside the country. The museums accept to transfer to Italy the requested items while rejecting any accusation that they had knowledge of their alleged illegal provenance. The second, but not secondary, objective of the agreements is to promote cooperation between the parties by temporary loans to the museums of objects of equivalent value, joint activities of excavations, and exchange of information about restorations.

The present trend goes mainly in the direction of the restitution of cultural properties to the countries of origin. Moral and cultural principles that dictate the restitution are being progressively transformed into legal rules. The trend has probably not yet reached the final stage when a body of new customary rules on restitution of cultural properties is definitely created. But it can be considered as already being within the dynamics of the evolution of international law (see Borelli and Lenzerini 2012; Francioni and Gordely 2013).

Cross-References

- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Looting and Vandalism (Cultural Heritage Management)

▶ Parthenon (Elgin) Marbles: Case Study
▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Borelli, S., and F. Lenzerini, eds. 2012. *Cultural heritage, cultural rights, cultural diversity*. Leiden: Martinus Nijhoff Publishers.

Francioni, F., and J. Gordely. 2013. *Enforcing international cultural heritage law*. Oxford: Oxford University Press.

Merryman, J.H. 1986. Two ways of thinking about cultural property. *American Journal of International Law* 80 (4): 847.

Nafziger, J.A.R., and A.M. Nicgorski, eds. 2009. *Cultural heritage issues: The legacy of conquest, colonization, and commerce*. Leiden: Martinus Nijhoff.

Nafziger, J.A.R., and T. Scovazzi, eds. 2008. *Le patrimoine culturel de l'humanité – The cultural heritage of mankind*. Leiden: A.V.M. Struycken.

Sandholtz, W. 2007. *Prohibiting plunder: How norms change*. Oxford: Oxford University Press.

Scovazzi, T. 2011. Diviser c'est détruire: Ethical principles and legal rules in the field of return of cultural property. *Rivista di Diritto Internazionale* 94 (2): 341.

Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)

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Introduction

In the United States, the Native American Graves Protection and Repatriation Act of 1990 ("NAGPRA" hereafter) created mechanisms whereby individuals and federally recognized tribes could request the return of human remains, funerary objects, sacred objects, and items of cultural patrimony from museums and federal agencies. These processes have allowed tribal groups to obtain various classes of human remains and material artifacts from federal museums and federal agencies, as well as those institutions which receive federal funding.

Definition

The following definitions are found on the National NAGPRA Glossary (n.d.) at http://www.nps.gov/nagpra/TRAINING/GLOSSARY.HTM. "Human remains" are generally considered to be "(t)he physical remains of the body of a person of Native American ancestry. The term does not include remains or portions of remains that may reasonably be determined to have been freely given or naturally shed by the individual from whose body they were obtained, such as hair made into ropes or nets." "Funerary objects" are defined as "(o)bjects that, as a part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later." If "both the human remains and associated funerary objects are presently in the possession or control of a Federal agency or museum," the funerary objects are considered to be "associated funerary objects." Those funerary objects "for which the human remains with which they were placed intentionally are not in the possession or control of a museum or Federal agency" are considered to be "unassociated funerary objects."

In NAGPRA, "sacred objects" are defined as "(s)pecific ceremonial objects which are needed by traditional Native American religious leaders for the practice of traditional Native American religions by their present day adherents." Additionally, an "object of cultural patrimony" is defined as "(a)n object having ongoing historical, traditional, or cultural importance central to the Native American group or culture itself, rather than property owned by an individual Native American, and which, therefore, cannot be alienated, appropriated, or conveyed by any individual regardless of whether or not the individual is a member of the Indian tribe or Native Hawaiian organization and such object shall have been considered inalienable by such Native American group at the time the object was separated from such group."

Historical Background

In the United States, the passage of Public Law 101-601, the Native American Graves Protection and Repatriation Act (hereafter NAGPRA), in 1990 signaled a change in the level of interaction between archaeologists, biological anthropologists, museums and federal agencies, and American Indian tribal groups not seen previously. Prior to the law's passage, American Indian groups lobbied to regain materials that had been taken, collected, or placed into museums of federal agency control. Often such materials were collected by researchers or explorers into relatively unknown regions; other times, materials were obtained under questionable practices by explorers, researchers, or even military personnel.

The passage of NAGPRA was not without controversy, as particular archaeologists lamented about the destruction of archaeology as a possible outcome of the legislation. Clement Meighan was quoted as saying that repatriation agreements "... assume all Indian remains of whatever age are the property of contemporary claimants and that it doesn't matter how old things are" (1992: 39). Others, including the museum profession, feared that the passage of such repatriation legislation would result in the decimation of museum collections that contained ethnographic materials. Neither was NAGPRA the first repatriation legislation passed in the United States. The National Museum of the American Indian Act of 1989, which established the National Museum of the American Indian in Washington, DC, provided repatriation legislation aimed specifically at the collections within the various museums within the broader Smithsonian Institution.

NAGPRA required federal agencies and museums to inventory the materials within their collections (either physically within them or those objects on "loan" to other museums or agencies which they maintained "control") to determine those that met the guidelines and definitions for the classes of materials covered by the law. Once those materials which were covered by NAGPRA were identified, the museum, in consultation with the federally recognized Indian tribes who were most likely to be associated with those materials, was then required to develop a plan for returning or keeping the materials. Once these inventories were completed, the tribe most likely to be "culturally affiliated" with the objects was to be given the opportunity to enter into an agreement with the museum for the proper disposition of the objects. Such "disposition" could entail the return of the objects to the tribe, retention of the objects by the museum for the benefit of the tribe, or any other agreement mutually agreed upon by the groups involved.

If materials within the museum's collections could not be identified to a particular group or if more than one group claimed the objects, the regulations implementing NAGPRA provided a list of ten criteria or types of evidence that could be used in helping determine "cultural affiliation." The ten lines of evidence suggested by the regulations include kinship, folklore, oral tradition, and geographical, biological, archaeological, anthropological, linguistic, historical, or other relevant information or expert opinion. Decisions were to be made based on the preponderance of the evidence, not with scientific certainty.

Key Issues/Current Debates

Repatriation of the classes of materials covered by NAGPRA has been ongoing for years, and many Native American tribes and federal agencies and museums have reached workable agreements on the proper disposition of the materials. Most contentious, however, have been classes of artifacts which cannot be easily affiliated with a cultural group because of either the age of the material which makes attribution difficult if not impossible, those materials where the museum or federal agency does not have adequate records to determine general affiliation to either a specific location or time period, materials that are more likely to be affiliated with a tribe that does not have federal recognition (a special government-to-government relationship with the federal government), or other possible reasons for the shared uncertainty.

Museums and federal agencies are allowed to transfer the "culturally unidentifiable human remains" (as well as any other material associated

with them as funerary objects) to tribes from whose lands the materials were excavated, to tribes who once were recognized as the Aboriginal occupants of the land where the materials were removed, or to other tribes who can demonstrate a "reasonable" claim to the materials. In the absence of any tribes that meet these three criteria or if no federally recognized tribes claim the materials, the museum or federal agency can turn control of the objects over to a non-federally recognized tribe, or the museum or agency can actually reinter (rebury) the materials if it wishes.

Scientific and museum organizations have been concerned that this section of the regulations creates situations whereby the scientific value of these materials has been ignored. In written testimony before the US House of Representatives' Committee on Natural Resources Oversight Hearing on the Native American Graves Protection and Repatriation Act on October 7, 2009, Susan Bruning, the Chair of the Society for American Archaeology's Repatriation Committee, responded "stewards of the NAGPRA process [should] seek to carry out their responsibilities in a manner that is respectful of scholarly research and appropriate scientific inquiry as tools that assist in determining 'cultural affiliation' and in understanding aspects of the broader human past" (http://saa.org/Portals/0/SAA/repatriation/BRUNING_TESTIMONY.pdf).

In this regard, the interpretation of the regulations on "culturally unidentifiable human remains" has been thought to be slanted toward repatriation and reburial without the "balanced" approach archaeologists had sought for past repatriation actions. However, in 2015, NAGPRA regulations concerning "unclaimed" materials (43 C.F.R. 10.7) were promulgated which allows a federal agency to transfer materials that have not been claimed by a tribal group to an Indian tribe or Native Hawaiian organization that is not a potential claimant. As a result, the Choctaw and the Chickasaw Nations of Oklahoma have worked together to initiate claims for ancestors in collections in their Aboriginal homelands; the Michigan Anishinaabek Cultural Preservation and Repatriation Alliance (MACPRA) Committee was formed to repatriate unclaimed materials known to have come from within the State of Michigan borders (http://www.macpra.org/mission/).

International Perspectives

Other repatriation actions have occurred throughout the global environment. One such example among many is the volume documenting actions in Australia edited by Paul Turnbull and Michael Pickering (2010) which derives from a conference convened in September of 2005 to examine the status of various relationships with the ongoing process of repatriating Aboriginal Australian ancestral bodily remains. The volume situates the context of global repatriation issues in Canada and Great Britain and the ways that external events have influenced Australian actions. Additionally, there have been recent actions in Japan in relation to the development of the Ainu as a globally recognized Indigenous group and the repatriation of human remains. In 2016, 12 sets of Ainu human remains were returned by Hokkaido University and reburied at a local cemetery after 85 years in an institution, serving as the first repatriation from a Japanese university (Kato 2017: 185). Additional research is underway to regain Ainu human remains from museums in Russia, Australia, and the United States.

Future Directions

In the United States, NAGPRA will continue to play an important role in the relationships between Native American tribes and the federal government and museum environments. New discoveries of human remains as a result of ongoing or new federal construction projects are covered under NAGPRA, and future projects will continue to operate under this legislation's long reach.

Cross-References

- ► Australia: Repatriation Acts
- ► Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ► Repatriation Acts: Before NAGPRA

▶ Repatriation Acts: The Politics of Repatriation in North America
▶ Repatriation and Race in Indigenous Archaeology
▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law

References

Bruning, S. 2009. Written testimony before the US House of Representatives' Committee on natural resources oversight hearing on the Native American Graves Protection and Repatriation Act. Available at http://saa.org/Portals/0/SAA/repatriation/BRUNING_TESTIMONY.pdf. Accessed 3 Mar 2012.

Kato, H. 2017. The Ainu and Japanese archaeology: A change of perspective. *Japanese Journal of Archaeology* 4: 185–190.

Meighan, Clement W. 1992. Some scholars' views on reburial. *American Antiquity* 57(4): 704–710.

National NAGPRA. n.d.. Available at http://www.nps.gov/nagpra/TRAINING/GLOSSARY.HTM.

Turnbull, P., and M. Pickering. 2010. *The long way home: The meaning and values of repatriation*. Oxford: Berghahn Books.

Further Reading

Fforde, C., J. Hubert, and P. Turnbull, eds. 2002. *The dead and their possessions: Repatriation in principle, policy, and practice*, One world archaeology. Vol. 43. New York: Routledge.

Mihesuah, D.S. 2000. *Repatriation reader: Who owns American Indian remains?* Lincoln: University of Nebraska.

Watkins, J. 2005. *Sacred sites and repatriation*, Contemporary Native American issues series. Philadelphia: Chelsea House.

Repatriation: Overview

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Introduction

In the twenty-first century, most people view the repatriation of human remains and sacred objects as something that is appropriate as well as ethically and morally correct. Tribes and/or appropriate indigenous or religious groups or relatives ask museums or institutions for the return of one or more sacred objects or burials that are historically or culturally related to the group, and the museum or university gives it back. However, this perspective has not always been commonplace, and the process is more complicated than it appears at first.

Most people have little idea of the nature and process of repatriation or the potential associated problems and complications. This is not to say that repatriation is problematic and should not be done, but rather that all parties are obligated to follow a clear and explicit legal process. The biggest difference between repatriation in the twenty-first century and repatriation in the twentieth century is (1) the repatriation of human remains and associated objects is now law in the United States and a number of other countries around the world, and (2) the repatriation of human remains, associated objects, and sacred objects is now widely accepted as something that responsible and ethical institutions do. While most Americans associate repatriation and reburial with Native American remains, this is not always the case, even in the United States.

Definition

The dictionary definition of "repatriation" is not necessarily helpful: "send (someone) back to their own country, or send or bring back to one's own country." Wikipedia defines repatriation similarly:

> Repatriation (from Late Latin *repatriare*) is the process of returning a person back to one's place of origin or citizenship. This includes the process of returning refugees or soldiers to their place of origin following a war. The term may also refer to the process of converting a foreign currency into the currency of one's own country.

The repatriation and reburial of human remains, funerary objects, and sacred objects represent a special case of repatriation. Groups representing indigenous peoples and religious organizations around the world have requested that human remains and sacred objects originally

taken from their respective historical territories be repatriated from museums and other institutions. Sometimes institutions repatriate human remains and items because they agree that they should rightfully be in the possession of the group that is descended from those remains and objects, other times the return is done because the institution acknowledges that the original acquisition was unethical, and still other times the return is based on the requirements of specific laws.

One reason that repatriation – as applied to archaeology and biological anthropology –is not a simple process is because the motivation for these requests is about people in the present and their perception of the past in the present. Repatriation claims are often associated with politics, ethnic identity, and other issues in contemporary society that have, or claim to have, a historical link to the object or human remains. Such motivations in no way make the claim less valid or less appropriate, but the context of the request can be important to understanding the request. Archaeologists, biological anthropologists, and museum directors do not generally approach repatriation from this perspective; they try to contextualize the materials based on science and archaeological and historical knowledge. It is a discussion that has often led to misunderstandings and differences because the parties are focused on different matters. However, since repatriation laws have come into effect, it is a discussion that is happening in many places, and consequently museums are getting better at responding to requests, and indigenous groups are getting better at making their requests (see Colwell 2017 for changing perspectives on these issues). Repatriation is most active in the United States, primarily because repatriation laws have been in effect for the longest period of time. Further, in other parts of the world, laws are not only more recent; they are sometimes unclear applications of previous laws (cf. Sayer 2017).

Please note that although the term "archaeologist" is generally used throughout this entry, the reader should understand that this is a shorthand or simplified way of encompassing people who are archaeologists, biological anthropologists, human osteologists, museum studies scholars, and those in related fields who deal with human remains, grave goods, and sacred or religious objects.

Historical Background

During the 1960s, 1970s, and 1980s, some US institutions listened and responded to repatriation requests from tribes, subsequently returning human remains and sacred objects before there were specific laws in place. However, the passage of two federal laws in the United States – the National Museum of the American Indian Act (NMAIA; 20 United States Code (U.S.C.) 80q et seq.) and the Native American Graves Protection and Repatriation Act (NAGPRA; 25 U.S.C. 3001 et seq.) dramatically and permanently changed the nature and process of repatriation. The effect of this change in process and culture has had international and long-term implications.

Buikstra (2006), Lambert (2012), McKeown (2014), Mihesuah (2000), Trope and Echo-Hawk (1992), and Ubelaker and Grant (1989) provide detailed discussions of the history and some of the problems of repatriation in the United States. During the 1980s, the position held by many institutions, as well as by many national professional organizations, was that the ethics of today supersede those of the past, and museums should consider how to change accordingly. At the basic level, repatriation should be done to living descendants upon request and examination of the claim. As Ubelaker and Grant (1989) note, if a group requested remains where there were no living descendants, that group must demonstrate compelling religious or cultural values that outweigh scientific interests. This position also reflected the position of the Society for American Archaeology (SAA) at the time. However, the SAA increasingly assumed the role of representing the scientific community during the 1980s and their view broadened to some degree.

Since the 1980s, the SAA has been remarkably consistent in their position on repatriation (Lovis et al. 2004). The SAA argued for repatriation, but on a case-by-case basis. Indeed, the SAA

Executive Committee passed an initial resolution in 1983, followed by a revised version in 1986, and a reaffirmed position in 1999. The key points of the SAA position include (1) both native and scientific viewpoints have legitimacy; (2) scientific importance must be considered against the strength of affiliation; (3) implementation of repatriation should be done on a case-by-case basis because of the variability in circumstances and histories; and (4) communication and consultation with affected groups is of critical importance. Since 1986, the SAA (Lovis et al. 2004) has recognized the importance and legitimacy of repatriation and worked actively with Congress to create balanced legislation.

Some native tribes and organizations, archaeologists, and other activists argued that repatriation represented something that was morally and ethically important for the archaeological profession to do, even if archaeology lost access to the remains and artifacts. However, even though several states enacted legislation that in some manner dictated repatriation and/or consultation with native groups, there was no consistent national policy until the 1990s (cf. McKeown 2014).

During the late 1980s, a number of tribes in the United States argued that repatriation of human remains was a human rights issue – that these were human bodies that had to be treated with respect and respect was not possible if the remains were excavated and placed in a museum. Tribes did not see much difference between archaeologists and looters. One incident that angered many (including many archaeologists) happened in Iowa. A cemetery was excavated due to road construction. All of the historic white settlers were immediately moved to a new location and reburied, and the Native American remains were sent to a museum. The lack of consistency and parity and the continuing idea that Native American remains belong in a museum (in part suggesting that this may be because they have no clear descendants) represented the perfect example of what was wrong with archaeology and museums. Ironically, it is likely that in the Iowa case, if archaeologists and biological anthropologists had their way, they would have treated all remains the same but would have studied them all before reburying.

A number of issues and events changed archaeological and other perspectives on repatriation. First, there were several instances, like the aforementioned Iowa case, that led many archaeologists to become increasingly uncomfortable over the idea of study and curation. In the 1980s and early 1990s, the archaeologist who perhaps best personified this position was Larry Zimmerman. In one article, Zimmerman reflects on his experiences and the present and future of archaeology (2000). Zimmerman notes (2000: 294–295) that the reburial issue's trajectory has followed classic syncretism, or a coalescing or reconciliation of differing beliefs. Zimmerman (2000: 295) argues that "the problem has been that the belief system of Western science about the past, through archaeology, had imposed itself on belief systems of indigenous peoples about their pasts and those they consider their ancestors." Because archaeologists had little resistance from these indigenous people over a long period of time, they assumed that these people agreed or did not object. The past 25–30 years has demonstrated that archaeologists were wrong. Public discussion – as represented in various polls and forums – demonstrates that the general public supported the Native American position.

As Buikstra (2006: 395–396) points out, another influence on the relationships between archaeologists and indigenous peoples was the development and impact of postprocessual theories in archaeology in the 1980s and 1990s. This approach to archaeology moved away from being scientific and was humanistic and contextual in nature, with practitioners arguing for multivocality in interpreting the past (cf. Hodder 1985; Shanks and Tilley 1987). Such an approach was certainly more open and welcoming to resolving repatriation disputes, but not everyone agreed with the approach or the benefit for repatriation.

The first US federal law that directly addressed issues of repatriation was the National Museum of the American Indian Act (NMAIA; 20 United States Code (U.S.C.) 80q et seq.), which was signed into law on November 28, 1989. The NMAIA was written and passed primarily to

establish a new national museum dedicated to the history, music, and art of American Indian cultures. The collections of the private Heye Foundation in New York formed the basis of this new museum, to be part of the Smithsonian and built on the national mall in Washington, DC.

The new museum opened in 2004. As a part of the new law, Native Americans had lobbied for a Smithsonian repatriation requirement to be included. In particular, the law affects all collections of Native American, Native Alaskan, and Native Hawaiian human remains and funerary items held by the Smithsonian Institution (although the vast majority of relevant human remains and funerary objects are in the Smithsonian Museum of Natural History, the law affects all of the Smithsonian museums, including the new Museum of the American Indian, American History Museum, etc.). The NMAIA dictates that all designated items are to be inventoried and, where possible, the Smithsonian will determine tribal or descendant origins. When the law was passed, the Smithsonian was estimated to have 19,250 sets of Native American remains (Smithsonian Repatriation Office website). As of December 31, 2010, approximately 29% of this number have been offered for return, and about 20% of the total have actually been repatriated (estimated from Smithsonian Repatriation Office's website – http://anthropology.si.edu/repatriation/faq/index.htm). More remains and items have been offered for repatriation since 2010, but the website has not been recently updated so a more current estimate is not available.

Lambert (2012: 21) makes the point that the NMAIA marks a real "shift in archaeology law from the protection of archaeological resources to the legal acknowledgement of private ownership (or rights of stewardship) by a sector of the American population of a component of the archaeological record."

Legal representatives of appropriate tribes or descendants can request the return of remains and objects; except in special circumstances of direct descent, an individual cannot request return – a person must be approved to represent the tribe. The Smithsonian notifies tribes if they determine an affiliation, but tribes are also encouraged to submit a request for remains to be returned. If there is a disagreement between the Smithsonian and the requesting tribe, the Smithsonian Repatriation Review Committee can examine the case in detail and submit its recommendations to the head of the Smithsonian. The Review Committee is composed of archaeologists, biological anthropologists, tribal representatives, and tribal elders. The tribal representatives on the Committee have one more representative (and therefore one more vote) than the scientific representatives.

One of the most important results of the Smithsonian act is that systematic study of human remains and objects prior to return is a priority, and the law provides funding for a Repatriation Office. As noted by Killion and Molloy (2000), as well as by Ousley et al. (2005), an enormous amount of contextual knowledge and a systematic catalogue have been gained as a result of this law. Data recovered can be used in the future, and data recording has been done in a consistent manner. It is important to realize, however, that the NMAIA *only* affects collections held by the Smithsonian.

The Native American Protection and Repatriation Act was passed on November 16, 1990 (NAGPRA; 25 U.S.C. 3001 et seq.). NAGPRA is a far-reaching law that was crafted as a compromise between Congress, Native Americans, and the scientific community. Although NAGPRA does not apply to the Smithsonian, the Smithsonian has accepted and incorporated the regulations of NAGPRA, and the NMAIA was amended in 1996 to reflect this incorporation of NAGPRA regulations.

NAGPRA has several components:

1. It applies to federally recognized Native American tribes, as well as Native Hawaiian organizations and Alaska native corporations.
2. In addition to human remains, NAGPRA includes the repatriation of associated and unassociated funerary objects (objects clearly part of a burial as well as objects that were likely funerary objects but for which details are unknown), sacred objects (objects required for rituals and ceremonies), and objects of cultural patrimony (objects that are owned by the

group and cannot be owned or sold by an individual).

3. NAGPRA requires museums and federal agencies to identify and inventory human remains and associated funerary objects and also produce a summary of unassociated funerary objects, sacred objects, and items of cultural patrimony by November 16, 1995. These inventories and summaries were distributed to the federal government and appropriate tribes.
4. NAGPRA established tribal ownership of Native American human remains and cultural items recovered from federal and tribal lands after 1990, requiring procedures prior to excavating on such land whether the excavations were inadvertent or intentional.
5. Violation of NAGPRA includes prohibitions against trafficking, sanctions against museums for not meeting deadlines and procedures, and enforcement of the Act by the ability to go to court.

NAGPRA established a Review Committee similar in composition to the Smithsonian's Repatriation Review Committee, with the balance tilted toward Native Americans. NAGPRA also established a grant program for museums, Indian tribes, and Native Hawaiian organizations (although these funds have been very small relative to the need), and the law promulgated regulations to make the law work.

As Lambert (2012: 20) notes:

> These laws reveal significant changes in attitudes concerning the scientific value of archaeological human remains over the course of the 20th century, and illustrate the complexities that can arise when secular and religious ethics collide in the conduct of scientific research.

NAGPRA is important – its passage meant that the federal government was acknowledging that some things in museums were not obtained in a way consistent with modern American ethics, even though the original acquisition may have been legal. Fortunately, NAGPRA was also an impetus for beginning conversations between tribes and the scientific and museum communities. Some tribes and archaeologists had already been talking with each other, but NAGPRA mandated such discussions.

Key Issues and Current Debate

Archaeologists and museums operating in the United States today adhere to federal laws and policies concerning repatriation. While some opposed these laws initially, they now honor the law. More importantly, there has been a significant culture change among the public and among archaeologists and museum professionals, who accept that repatriation is appropriate federal policy. It is important not to minimize this culture change: repatriation is now considered the de facto result of most burial excavation in the United States.

Under NAGPRA and the NMAIA, repatriation does not have a timetable. Except for specific dates by which museums were required to report their holdings, there is no deadline for completion of the repatriation process. This was done deliberately since it was impossible to estimate how long the process would take, and no one wanted to put the burden of a timetable on tribes who were already overwhelmed by the numbers of potentially related remains and artifacts in museums.

A key issue in the passage of NAGPRA was the concept of "cultural affiliation." Cultural affiliation is the basis for decisions about which remains are open to repatriation claims. NAGRPA's definition is "a relationship of shared group identity which can be reasonably traced historically or prehistorically between a present day Indian tribe or Native Hawaiian organization and an identifiable earlier group" (25 USC 3001, Sec. 2[2]). If there is no clear evidence for such a relationship, NAGPRA specifies establishing cultural affiliation based on a "preponderance of the evidence based upon geographical, kinship, biological, archaeological, anthropological, linguistic, folkloric, oral traditional, historical, or other relevant information or expert opinion" (25 U.S.C. 3005, Sec. 7[4]). The preponderance of evidence is a low legal threshold of simply >50%, and all types of evidence are to be treated equally. The notion of cultural affiliation has been problematic in some cases and is the focus for a number of legal and ethical debates about the meaning and intent of the law.

Some think that the so-called Kennewick Man case legally settled the issue of cultural affiliation,

but this is not true (Thomas 2000). Kennewick Man (found in Washington state) was a legal battle over a very ancient skeleton. A group of scientists and a group of citizens (Friends of America's Past) were on one side, and five Native American tribes and bands from the Columbia River Basin were on the other side (technically the case was against the United States). Not only did the skeleton date to a very early time, some biological anthropologists argued that the skeleton had characteristics that were more Caucasoid than Native American in nature. The details of the case can be found in Thomas (2000) and elsewhere. Unfortunately, instead of deciding the case on the basis of cultural affiliation – a finding that might have helped clarify decisions made under NAGPRA – the US Court of Appeals for the Ninth Circuit argued that the federal government had failed to prove that the skeleton was Native American, and therefore it was not subject to NAGPRA. It was a decision that angered Native Americans and also angered many archaeologists because the decision was based on an idea about which Native Americans and archaeologists generally do *not* disagree – both sides would say that ancient remains found in the United States can generally be considered Native American.

Subsequent to the Kennewick decision, attempts were made to amend and/or adapt NAGPRA. Most important for the present discussion was the Department of the Interior's 2007 decision to address the issue of "culturally unidentifiable human remains" (CUHR). This category includes the largest majority of archaeological human remains in the United States. Included are those remains that museums and repositories have not been able to affiliate with a modern tribe or descendant. Following the lines of evidence in the definition of "cultural affiliation" (and outlined above), these are remains for which institutions have not been able to assign an affiliation. For the most part, these remains are those of greater antiquity, with fewer clear ties to the present. Members of the scientific and museum communities had worried about this group of remains from the earliest repatriation discussions because archaeologists and museums were concerned about the impact of repatriation law on the study of prehistory. Some Native American groups were also concerned about the rule from both practical and legal perspectives.

The final rule for culturally unidentifiable human remains (CUHR) was approved in May 2010. The original negotiations involved in crafting NAGPRA had carefully maintained a balance between various interests. The new rule ignores that balance and favors native issues over any scientific interests or concerns; it also does not necessarily give tribes much leeway in how they wish to respond to repatriation. It is likely that this rule could be the focus of future legal challenges.

One issue in the Final CUHR rule focuses on the term "disposition" or the outcome of a repatriation claim. NAGPRA does not mandate the nature or type of disposition for successful repatriation claims, intentionally avoiding the use of the term "reburial." The reason for this avoidance is that a tribe might or might not wish a particular or mandated outcome. While most tribes might wish reburial, if the repatriation decision is that the remains belong to the group, the specifics of the final disposition should be the group's prerogative. The CUHR Final Rule effectively calls for the reburial of all Native American human remains currently in museums and federal repositories, even if evidence for relationship of shared group identity is lacking.

Although many contentious issues remain, current debate in archaeology has moved from the question of whether or not repatriation is right or wrong, to more complicated issues. Colwell-Chanthaphonh and Ferguson (2006) present one aspect of this new direction. Instead of principles and rules of ethics, they promote the idea of virtue ethics. "Instead of beginning with questions of obligations and oughts, Virtue Ethics begins with questions of character, focusing on relationships and the subjectivities of social interaction" (Colwell-Chanthaphonh and Ferguson 2006: 118). They argue that we need to focus on agents and sustained actions, rather than single acts. Effectively, Colwell-Chanthaphonh and Ferguson (2006) argue for a more complex, layered discussion about archaeological practice. They note that archaeologists have a series of unique relationships with multiple interactions, and these interactions have consequences for ethical standpoints.

Sayer (2017) provides examples of the importance of inclusion and consultation. He outlines case studies in which people have protested archaeological excavations of human remains. His examples come from Europe and the United States and primarily focus on historic cemeteries. He notes:

> The past holds meaning for the people of the present, and where projects focus on disenfranchised social and political groups they will desire an involvement in that project, but more specifically in its interpretation. When this has been part of the archaeological project design, investigations have not been hampered by protest but instead have attracted much more positive media interest. . . . (Sayer 2017: Location 1216–1220)

International Perspectives

In their broad discussion of ethics of bioarchaeology, Larsen and Walker (2004: 114) outline three ethical principles for the study of human remains: (1) human remains should be treated with dignity and respect; (2) descendants should have authority to control the disposition of their relatives' remains; and (3) because of the importance of human remains for understanding our common past, human remains need to be preserved when possible so that they are available for scientific research. From the discussions above, it is clear that there may not be universal agreement on these principles.

Canada and Australia share with the United States a basic issue associated with repatriation: the majority of the contested collections derive from minority indigenous populations where treatment of the dead is an important part of broader indigenous rights issues. Most repatriation efforts focus on trying to redress historical wrongs associated with Western colonialism (see DeLeiuen's discussion and summary of the Australian situation in this volume).

Buikstra (2006: 408–409) notes that Canada has no federal legislation similar to NAGPRA, but relationships between First Nations and archaeologists are stronger. Why the difference between countries? First, the Canadian archaeological profession voiced their sympathy with First Nation concerns relatively early, with biological anthropologists practicing in situ analyses and reburials during the 1970s. Canadian bioarchaeologists were collaborating and consulting with First Nations over a decade before US archaeologists, and they did so without being mandated by legislation, producing impressive work with multivocal perspectives. Indeed, there are multiple examples of First Nations requesting osteological analyses and allowing destructive tests. The National Museum of Canada stopped accessioning human remains in the early 1970s. As Buikstra (2006: 412) notes, "Canadian museums, physical anthropologists, and archaeologists appear to favor mediation over litigation in addressing repatriation issues."

Lambert (2012: 25–26) notes that while the United States, Canada, and Australia have seen repatriation on a national scale coming from indigenous populations and issues relating to colonialism, some similar historical situations exist in Argentina, Norway, and South Africa. To date, repatriation efforts in these countries have been limited and generally involve the return of named, historically significant individuals.

In Israel (Nagar 2011: 8), opposition to the excavation of human remains is associated with sites dating to Classical Antiquity and comes from a group of religious Jews who believe that graves of Jewish dead should always remain undisturbed; their political power has been successful in gaining severe restraints on research. Nonetheless, the Israeli Antiquity Authority created and has maintained a human osteological database since 1994; all time periods are included (Nagar 2011).

In Great Britain, considerable dialogue has focused on repatriation and is in part the result of connections to developments in Canada, Australia, and the United States. However, Parker Pearson et al. (2011: 1) provide a recent summary of the issues and concerns. In 2008, "the British government announced that all human remains archaeologically excavated in England and Wales should be reburied after a two-year period of scientific analysis." Not surprisingly, this announcement caused great consternation on the part of museums and archaeologists. It appears that the policy will not be implemented as stated, but Parker Pearson et al. (2011: 3) point out that:

> The weaknesses and contradictions in the legal frameworks that govern archaeology are shocking in many respects, and cannot remain unresolved; archaeologists are pulled hither and thither by property law and planning law, while human remains exist in a peculiar (but ethically and morally appropriate) legal limbo in that they cannot technically be owned.

In sum, outside of Canada and Australia, laws regarding repatriation and reburial are scattered and sometimes under debate; they resemble the issues raised for the United States when there is a similar historical colonial situation. Sayer (2017) provides updated data on these international situations.

Future Directions

Larsen and Walker (2004) discuss the ethics of bioarchaeology and their view of the future. They argue that compromise is the key to reaching an ethical solution to skeletal studies of ancient ancestors. Compromise can be legislated, or it can come about through working together. However, Larsen and Walker (2004: 118) note that this balance achieved through compromise is now endangered with "a perceptible shift in the balance of power toward extremist native perspectives on repatriation." They close their discussion with the comment that "compromise is developed when there is trust between two parties who have invested time and effort in reaching solutions that may not be perfect, but nonetheless attempt to [address] competing interests of different groups" (Larsen and Walker 2004: 118).

An excellent example of a historic cemetery study that was inclusive from the beginning to the end of the project is the Tucson (Arizona) Alameda-Stone cemetery (Heilen 2012). The planned building of a new court complex in downtown Tucson required the discovery and removal of a large historic (1860–1880) multiethnic cemetery. Although project requirements were outlined by court order, the project was successful because of transparency of the work to the affected parties and the development of relationships between the parties. The project developed community-sensitive methods for identifying cultural affinities, as well as addressing a variety of community concerns and requirements. The cemetery included Native American, Hispanic, European, and other groups, representatives of whom were involved in the excavation, analysis, and reburial of the remains and artifacts.

The notion of trust is an important one and will continue to be so in the future. As noted above, Colwell-Chanthaphonh and Ferguson (2006) use the concept of virtue ethics to look to the future without specific reference to NAGPRA. They also discuss the concept of trust and the nature of trust in archaeological practice. They draw on Baier (1994) to outline and discuss "virtue ethics," citing Baier's contention that goodwill is an essential component of trust. Colwell-Chanthaphonh and Ferguson (2006: 122–124) outline the complex web of categories of trust relationships in archaeological practice, noting that there are relationships within categories but also relationships between them. Trust requires goodwill, but each group has to interpret acts of goodwill as benevolent (Colwell-Chanthaphonh and Ferguson (2006: 127). If we wish to develop trust between archaeologists and museums and indigenous groups, all parties must move to a focus on people and actions over time, rather than things and single interactions at one time. Although it takes time to develop and establish trust, the goal has an excellent reward.

In making an international case for resolution of repatriation issues, Sayer (2017: Location 1859–1879) outlines what he calls the Seven Principles of Public Life when dealing with human remains and repatriation issues: "Selflessness, Integrity, Objectivity, Accountability, Openness, Honesty, Leadership." Sayer goes on to note (2017: Location 1879):

> These principles require archaeologists to think beyond the profession, and beyond scholarship. They require independence from the scientific importance of a project while still requiring that individuals and projects are accountable to a scientific community. They ask for openness, accountability to all and objectivity in everything, and if appropriately applied at the beginning of a project they may help to reduce friction, heal hearts and safeguard scientific and public interests for the

future. They require leadership from archaeologists who in that role may become facilitators to access rather than providing boundaries to contact. Most importantly they can be equally applied to research projects and commercial activities and may assist both to fulfill their wider social and academic importance.

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies
- ▶ Indigenous Peoples, Working with and for
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation and Race in Indigenous Archaeology

References

Baier, A. 1994. *Moral prejudices*. Cambridge, MA: Harvard University Press.

Buikstra, J.E. 2006. Repatriation and bioarchaeology: Challenges and opportunities. In *Bioarchaeology: The contextual analysis of human remains*, ed. J.E. Buikstra and L.A. Beck, 389–415. London: Academic Press, Elsevier.

Colwell, C. 2017. *Plundered skulls and stolen spirits: Inside the fight to reclaim native America's culture*. Chicago: University of Chicago Press.

Colwell-Chanthaphonh, C., and T.J. Ferguson. 2006. Trust and archaeological practice: Towards a framework of virtue ethics. In *The ethics of archaeology: Philosophical perspectives on archaeological practice*, ed. C. Scarre and G. Scarre, 115–130. Cambridge, UK: Cambridge University Press.

Heilen, M.P., ed. 2012. *Uncovering identity in mortuary analysis: Community-sensitive methods for identifying group affiliation in historical cemeteries*. Walnut Creek: Left Coast Press and Tucson: SRI Press.

Hodder, I. 1985. Postprocessual archaeology. *Advances in Archaeological Method and Theory* 8: 1–26.

Killion, T.W., and P. Molloy. 2000. Repatriation's silver lining. In *Working together: Native Americans and archaeologists*, ed. K.E. Dongoske, M. Aldenderfer, and K. Doehner, 111–117. Washington, DC: Society for American Archaeology.

Lambert, P.M. 2012. Ethics and issues in the use of human skeletal remains in paleopathology. In *A companion to paleopathology*, ed. A.L. Grauer, 17–33. Malden: Wiley.

Larsen, C.S., and P.L. Walker. 2004. The ethics of bioarchaeology. In *From repatriation to genetic identity: Biological anthropology and ethics*, ed. T. Turner, 111–119. Albany: State University of New York Press.

Lovis, W.A., K.W. Kintigh, V.P. Steponaitis, and L.G. Goldstein. 2004. Archaeological perspectives on the NAGPRA: Underlying principles, legislative history, and current issues. In *Legal perspectives on cultural resources*, ed. J.R. Richman and M.P. Forsyth, 165–184. Walnut Creek: AltaMira Press.

McKeown, C.T. 2014. *In the smaller scope of conscience: The struggle for national repatriation legislation, 1986–1990*. Tucson: University of Arizona Press.

Nagar, Y. 2011. Human osteological database at the Israel Antiquities Authority. *Bioarchaeology of the Near East* 5: 2–18.

Ousley, S.D., W.T. Billeck, and R.E. Hollinger. 2005. Federal repatriation legislation and the role of physical anthropology in repatriation. *Yearbook of Physical Anthropology* 48: 2–32.

Parker Pearson, M., T. Schada-hall, and G. Moshenska. 2011. Resolving the human remains crisis in British archaeology. In *Papers from the Institute of Archaeology*. London: University College. https://doi.org/10.5334/pia.369.

Sayer, D. 2017. *Ethics and burial archaeology (debates in archaeology)*. Kindle ed. London: Bloomsbury Publishing.

Shanks, M., and C.Y. Tilley. 1987. *Social theory and archaeology*. Cambridge, UK: Cambridge University Press.

Smithsonian Repatriation Office. 2017. http://anthropology.si.edu/repatriation/index.htm.

Thomas, D.H. 2000. *Skull wars: Kennewick man, archaeology, and the battle for native American identity*. New York: Basic Books.

Trope, J.F., and W.R. Echo-Hawk. 1992. The native American graves protection and repatriation act: Background and legislative history. *Arizona State Law Journal* 24: 35–77.

Ubelaker, D.H., and L.G. Grant. 1989. Human skeletal remains: Preservation or reburial? *Yearbook of Physical Anthropology* 32: 249–287.

Zimmerman, L. 2000. A new and different archaeology? With a postscript on the impact of the Kennewick dispute. In *Repatriation reader: Who owns American Indian remains*, ed. D. Mihesuah, 294–306. Lincoln: University of Nebraska Press.

Further Readings

Colwell, C. 2017. *Plundered skulls and stolen spirits: Inside the fight to reclaim native America's culture*. Chicago: University of Chicago Press.

Dongoske, K.E., M. Adenderfer, and K. Doehner, eds. 2000. *Working together: Native Americans and archaeologists*. Washington, DC: Society for American Archaeology.

Fforde, C., J. Hubert, and P. Turnbull, eds. 2002. *The dead and their possessions: Repatriation in principle, policy and practice*, One World Archaeology Series, No. 43. New York: Routledge.

McKeown, C.T. 2014. *In the smaller scope of conscience: The struggle for national repatriation legislation, 1986–1990*. Tucson: University of Arizona Press.

Mihesuah, D., ed. 2000. *Repatriation reader: Who owns American Indian remains?* Lincoln: University of Nebraska Press.

National Nagpra Office. 2012. http://www.nps.gov/nagpra/ .

Sayer, D. 2017. *Ethics and burial archaeology (debates in archaeology)*. London: Bloomsbury Publishing. Kindle Edition.

Scarre, C., and G. Scarre, eds. 2006. *The ethics of archaeology: Philosophical perspectives on archaeological practice*. Cambridge, UK: Cambridge University Press.

Smithsonian Repatriation Office. 2017. http://anthropology.si.edu/repatriation/index.htm.

Thomas, D.H. 2000. *Skull wars: Kennewick man, archaeology, and the battle for native American identity.* New York: Basic Books.

Walker, P.L. 2002. Bioarchaeological ethics: A historical perspective on the value of human remains. In *Biological anthropology of the human skeleton*, ed. M.-A. Katzenberg and S.R. Saunders, 3–39. New York: Wiley.

Watkins, J.E. 2003. Beyond the margin: American Indians, first nations, and archaeology in North America. *American Antiquity* 68 (2): 273–285.

Research Laboratory for Archaeology and the History of Art (University of Oxford)

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Basic Information

The Research Laboratory for Archaeology and the History of Art (RLAHA) came into being as a result of a dinner in Christ Church in 1949, hosted by Lord Cherwell, involving Teddy Hall, Christopher Hawkes (Professor of European Archaeology), and Stanley Robinson, a keen collector of Greek coins who subsequently gave his collection to the Ashmolean Museum. Lord Cherwell was a physicist and the Director of the Clarendon Laboratory (as well as Chief Scientific Advisor to the wartime and postwar Churchill governments), and Teddy Hall was a D.Phil. student who had recently carried out an X-ray fluorescence examination of the Piltdown cranium and deduced that it had been artificially stained to give the appearance of age. Christopher Hawkes and Teddy retired to Teddy's flat for port and coffee after the dinner, and by morning, the idea of a scientific lab dedicated to archaeological research had been born. Lord Cherwell was instrumental in raising funds, and the whole venture was facilitated by the fact that Teddy declined to take a salary, using the money instead to appoint a Deputy Director. The Lab started in Keble Road in 1953, and the first Deputy Director, Stuart Young, was appointed in 1955. On his return to South Africa, he was replaced by Martin Aitken in 1957.

Major Impact

From the very beginning, the Lab was populated largely by physicists, who were dedicated to developing instruments and techniques for the benefit of archaeology. Teddy's D.Phil. thesis had involved him building the first X-ray fluorescence spectrometer specifically designed for the nondestructive analysis of museum objects. He quickly turned his attention not only to electron microprobes but also, in partnership with Martin, to the development and testing of proton magnetometers for geophysical survey, both on land and underwater. Martin continued his interest in magnetism to develop instruments, initially for dating using direction measurements (requiring in situ samples) and subsequently using intensity measurements. From the 1960s onwards, he also pioneered the use of luminescence measurements on heated pottery as a dating technique (TL), followed in the 1980s by OSL techniques. RLAHA still runs an OSL Laboratory, now jointly run with the School of Geography.

Robert Hedges joined the Lab in 1974, initially as an inorganic analyst, but, increasingly from 1977, with a developing interest in radiocarbon dating by accelerator mass spectrometry (AMS), which had also triggered Teddy's passion for designing and building scientific instruments. The heart of the accelerator is made from a 3-m diameter oil pipeline, which was delivered in 1981. The first dates were published in 1984, and the most publicly notable date, that on the Shroud of Turin, was published in 1988. A replacement accelerator was delivered in 2000, and the Radiocarbon Unit now produces more than 2000 dates a year, including providing a national facility for archaeological radiocarbon dating, jointly supported by NERC and AHRC.

The radiocarbon lab is solely focussed on providing dates for archaeological research, and consequently most of the samples measured are either bone (which makes up the majority) or charcoal. Bone, because of degradation, is one of the most difficult materials to date, requiring scrupulous chemical pretreatment to provide clean endogenous samples for dating. Because of this, the Lab has developed considerable expertise in preparing archaeological bone for analysis, including the recently developed protocols for ultrafiltration, which have resulted in considerable changes to the dates published for the Palaeolithic in Europe. Robert Hedges, once the accelerator was up and running routinely, became increasingly interested in the isotopic study of carbon and nitrogen in bone collagen and has published a number of papers on bone diagenesis as well as a large number of dietary studies using bone isotopes. He has supervised an impressive stream of graduate students in this and related areas.

Both Martin and Teddy retired in 1989, with Teddy being replaced by Prof. Michael Tite, previously at the British Museum, and with Robert Hedges moving in to Martin's position as Deputy Director of the Lab. His place as Director of the Radiocarbon Unit was taken by Christopher Bronk Ramsey, who, as well as running the Unit, has been responsible for writing the Oxcal software, initially for calibrating radiocarbon dates but more recently incorporating Bayesian modelling algorithms which have demonstrably revolutionized yet again the applications of radiocarbon dating to archaeology.

Under Mike Tite, the Lab developed a considerable expertise in the technology of glasses and glazed materials, particularly in Egypt and the Near East. This perhaps marked a change of emphasis from the work in the 1950s and 1960s, away from the development and building of new instruments, to the application of more established scientific techniques to substantial archaeological and technological problems, marking the maturation of the discipline of archaeological science. Mike retired in 2004.

The first volume of the journal *Archaeometry* (a word coined by Christopher Hawkes) was published in 1958, originally subtitled the "Bulletin of the Research Laboratory for Archaeology and the History of Art, Oxford University," but including international contributions from volume 3 onwards. This is still published for Oxford University by Wiley-Blackwell.

In 1962, Martin Aitken organized a day meeting in Oxford for archaeologists who had purchased proton magnetometers to compare notes on applications and review new developments, which became an annual meeting. The scope of these meetings broadened in 1969 to become the "Symposium on Archaeometry and Archaeological Prospection," held in Oxford until 1975. In 1976, with the meeting in Edinburgh, it became the "International Symposium on Archaeometry and Archaeological Prospection" and in 1980 (Paris) the "International Symposium on Archaeometry," which continues to this day as a biannual international conference.

Martin Aitken's contribution to science was recognized by the award of a Fellowship of the Royal Society (FRS) in 1983, and Teddy Hall was awarded an Honorary FBA in 1984. Robert Hedges was awarded the Royal Medal of the Royal Society in 2008.

Cross-References

- ► Aitken, Martin
- ► Hall, Edward T.
- ► Radiocarbon Dating in Archaeology
- ► X-Ray Fluorescence (XRF): Applications in Archaeology

Further Reading

Archaeometry. Available at: http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291475-4754.

Research Laboratory for Archaeology and the History of Art. n.d. Available at: http://www.arch.ox.ac.uk/rlaha.html

Revista de Arqueología Histórica Argentina Y Latinoamericana

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Historical archaeology research focused on Argentinean and Latin-American past has experienced an outstanding growth during the last 25 years. Such a development demanded for specialized publications. Despite abundant research carried out within this field in Argentina, peer-reviewed journals did not exist until 10 years ago.

In 2007, a publication with the main goal of gathering Latin-American research results and becoming a regional reference for the specialty was created. The *Revista de Arqueología Histórica Argentina y Latinoamericana*/Journal of Argentine and Latin-American Historical Archaeology (ISSN 1851–3190) was conceived as a peer-reviewed publication of semiannual periodicity. Later, this journal became open access and is currently available at www.arqhistorica.com.ar.

It is mainly dedicated to the publication of original contributions in the field of historical archaeology, as well as in related disciplines (history, historical anthropology, and ethnohistory, among others). The articles consider epistemic, theoretical, and methodological aspects and specific results of Latin-American case studies.

From the very beginning, the publication was also conceived to be a lasting media for the sharing of Latin-American social science beyond the academic community. It sought to raise consciousness regarding aspects such as the value of cultural heritage and the richness of diverse social identities (Fig. 1).

Main Impact

Currently, the journal provides a forum for scientific communication that also attends to high editorial standards. It is supported by a permanent academic committee, national and international reviewers, and the endorsement of numerous academic and research institutions.

As regards the editorial process, all manuscripts are submitted for evaluation, which includes a revision by the editorial committee and a report from two external reviewers of outstanding expertise. The journal is listed in the following databases: Latindex, Anthropological Literature, and REDIB (Red Iberoamerica de Innovación y Conocimiento Científico). Besides, back issues are hosted in JSTOR: www.jstor.org/journal/reviarquhisargla.

Revista de Arqueología Histórica Argentina Y Latinoamericana, Fig. 1 Cover of the first issue of *Revista de Arqueología Histórica Argentina y Latinoamericana*.

During its first decade of existence, the journal published more than 60 articles, as well as reports and book reviews from Argentina, Brazil, Colombia, Chile, Mexico, and Uruguay. Works presented at scientific meetings (*IV Congreso Argentino de Arqueometría*, in 2011; *VII Congreso de Arqueología de la Región Pampeana Argentina*, in 2014; and VI *Congreso Nacional de Arqueología Histórica*, in 2015) have been compiled as dossiers since 2012.

The editors hope that this endeavor will allow for greater interaction within the regional academic community and will help Latin-American scientists to share their accomplishments worldwide.

Cross-References

- ▶ Funari, Pedro Paulo A. (Historical Archaeology)
- ▶ Brazil: Historical Archaeology
- ▶ Hispanic South America: Historical Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Schávelzon, Daniel
- ▶ Vestígios, Revista Latino-Americana de Arqueologia Histórica

Ribeiro, Carlos

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Basic Biographical Information

Carlos Ribeiro (1813–1882) (Fig. 1) was a pioneer in Portuguese geology and archaeology, being considered as the "Father" of Portuguese prehistoric archaeology. He was born in Lisbon in 1813, among a family of humble condition that could only offer him primary instruction. However, the intense intellectual necessity that he shows, since his youth, takes him to a different destiny than working in a commercial business. It was Filipe Folque (1800–1874), a student of the Royal Academy of Fortification, that lends him several books and helped with secondary school.

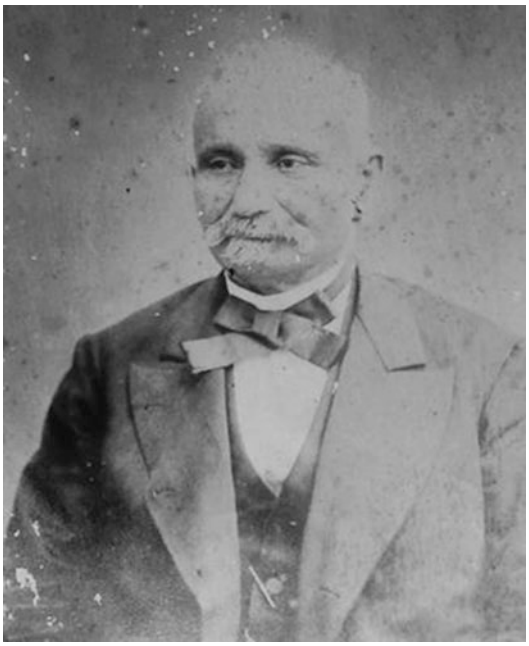

Ribeiro, Carlos, Fig. 1 Carlos Ribeiro

Carlos Ribeiro was then ready to get access to superior studies. The Portuguese civil war (1832–1834) leads him to a military career, being promoted to Second Lieutenant in 1840, to Captain in 1851, to Major in 1866, and to Colonel in 1875. But Ribeiro preferred a scientific career instead of a military life. Contact with another artillery officer, José Vitorino Damásio, allowed Ribeiro to acquire knowledge of metallurgy and mines. This provided him the experience to be the Director of the Section of Mines and Technical Department of the Ministry of Public Works, when this ministry was created in 1852. This position allowed Ribeiro to supervise and stimulate mining research in the country. In 1857, the Ministry of Public Works creates the Geological Commission of Portugal, Ribeiro being one of the Directors, together with F. A. Pereira da Costa (1809–1888). The research and professional activities of Ribeiro included the organization of the Geological Chart of Portugal, which he started in 1862.

He was a member of diverse scientific societies from Portugal and other countries, being awarded several times at national and international level.

Carlos Ribeiro was also elected for the Parliament in the legislatures of 1870–1874 and 1880–1881.

Besides his scientific career, he maintained the military status, being retired as General a short time before his death in 1882.

Major Accomplishments

Carlos Ribeiro, together with Nery Delgado (1835–1908), is among the founders of Portuguese Geology. Considering fieldwork as an essential element for geological studies, he inaugurates a tradition in this practice, until then almost nonexistent in Portuguese geological research. Carlos Ribeiro was the first Portuguese geologist to recognize, in a general way, the stratigraphic succession of the lands in the area of Continental Portugal. In 1850, he establishes relations with the British geologist Daniel Sharpe (1806–1856), who lived a few years in Portugal and had published some papers about the geology of the country (Ribeiro 1850). Ribeiro's research allows him to correct some remarks made by Sharpe, what granted him the first international recognition. He kept regular correspondence with the most eminent specialists of the time, especially after meeting them during his trip to several European countries in 1858 (Leitão 2001).

In 1863, he starts his prehistoric studies with the discovery of the Mesolithic shell mounds (kjökkenmöddinger) from Muge, when he was studying the Tertiary lands from the Tagus Valley.

The participation in several international conferences engaged him in the European archaeological movement, mainly in terms of debates around the so-called Portuguese Tertiary Man. This subject, among others, was discussed in 1880 in Lisbon, during the IX International Congress of Prehistoric Anthropology and Archaeology (Ribeiro 1880). Before this event, Carlos Ribeiro had carried out a series of archaeological surveys and archaeological excavations, gathering an excellent collection of prehistoric artifacts for *Comissão Geológica de Portugal* (Geological Commission of Portugal) (Ribeiro 1867, 1871, 1878).

Ribeiro, Carlos, Fig. 2 The bust of Carlos Ribeiro at Museu Geológico (Geological Museum)

In addition to organizing this Conference, Carlos Ribeiro discovered, studied, and published several prehistoric lithic objects that he found at Ota, which he called "sílexes da Ota" (flint from Ota). The pioneering aspects of his studies about prehistoric materials in Portugal gave him the title of "Father" of Portuguese Prehistoric Archaeology (Fig. 2).

In 1878, his geological map of Portugal, presented at the International Exhibition of Paris, was awarded with the silver medal. This map was later reviewed and updated by Nery Delgado and by the Swiss geologist Paul Choffat (1849–1919), which Ribeiro first met during the Exhibition (Choffat 1883).

In 1887, 5 years after his death, several researchers founded at Oporto a scientific association, regarding archaeology and natural sciences, carrying his name in an honorary way (*Sociedade Carlos Ribeiro).* This association started editing a journal that published articles by eminent scholars, such as Paul Choffat and the Portuguese archaeologists José Leite de Vasconcelos and Francisco Martins Sarmento, among other researchers.

Cross-References

▶ Europe: Early Upper Paleolithic
▶ Geoarchaeology
▶ Human Evolution: Theory and Progress

References

Choffat, P. 1883. Notice Nécrologique sur Carlos Ribeiro. *Bulletin de la Société Géologique de France*., , 3eme série 11: 321–329.

Leitão, V. 2001. *The travel of Carlos Ribeiro (1813–1882) to Europe, in 1858*, Comunicações dos Instituto Geológico e Mineiro, 88, 293–300. Lisboa.

Ribeiro, C. 1850. Estudos geologicos do Bussaco. *O Atheneu* 52: 410–413.

Ribeiro, C. 1867. Note sur le terrain quaternaire du Portugal. *Bulletin de la Société Géologique de France* 24: 692–717.

Ribeiro, C. 1871. *Memoria sobre a descripção de alguns silex e quartzites lascados encontrados nas camadas dos terrenos Terciario e Quaternario das bacias do Tejo e Sado*. Lisboa: Typografia da Academia Real das Sciencias de Lisboa.

Ribeiro, C. 1878. Des formations tertiaires du Portugal. In *Extrait du Compte-rendu sténographique du congrès international de géologie tenu à Paris*. Paris: Imprimerie Nationale.

Ribeiro, C. 1880. *L'homme tertiaire en Portugal. Extrait du Compte-rendu du congrès international d'anthropologie et d'archéologie préhistoriques en 1880*. Lisboa: Typografia da Academia Real das Sciencias de Lisboa.

Rice: Origins and Development

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Basic Species Information

The genus *Oryza* consists of 24 species, among which two domesticated species are recognized. On the one hand, there is Asian rice, *Oryza sativa;* today one of the most widely grown and productive of world crops, which had its origins in southern and eastern Asia. On the other hand, there is African rice, *Oryza glaberrima*, which is native to and mostly restricted to western Africa (see Fig. 1). Asian rice is conventionally divided into two subspecies, subsp. *japonica* and subsp. *indica*, although more recent genetics suggests that five distinct groups should be recognized within *O. sativa* (Garris et al. 2005): *indica, aus, tropical japonica, temperate japonica*, and *aromatic*. Rice is closely related to bamboos but distantly related to the major cereals maize, wheat, and sorghum (Vaughan 1994). *Oryza sativa* and *O. glaberrima* and their wild progenitors are diploids (2n = 24) with AA genomes. Asian rice is closely related to a wild complex of annual and perennial species, often recognized as *Oryza nivara* and *O. rufipogon*, while African rice is domesticated from the annual *O. barthii*, which in turn is close to perennial *O. longistaminata* (Agnoun et al. 2012).

Rice is cultivated in a wide range of ecological habitats, from dryland to wetland fields, to terraces cut in the slopes of hills and even in deep water up to 4 m. It can grow in altitudes from sea level to 3000 m and is cultivated as far north as 50° in China and as far south as 40° in Argentina (Vaughan 1994; Fuller et al. 2011). Under rainfed conditions, 800 mm of rainfall can be taken as a minimum with higher precipitation preferred. African rice is a traditional staple over major areas of western Africa, while Asian rice is the staple cereal of the most densely populated countries and regions. Many varieties exist, especially in Asian rice, to cater to different tastes. There are sticky and fragrant varieties and colors from white to red and black. The total world production of rice in tonnes is second to maize with China and India being the largest rice producers (FAOSTAT 2012). Asian *Oryza sativa* has been widely grown in western Africa for the past few hundred years, but it remains the case that native *O. glaberrima* tends to be more reliable on poor soils without the application of expensive fertilizers (Richards 1996; Agnoun et al. 2012).

Major Domestication Traits

Rice has been studied in great detail by botanists and geneticists unravelling a complicated history which is still subject to disagreement. Divergent views mainly focus on the origins of domesticated

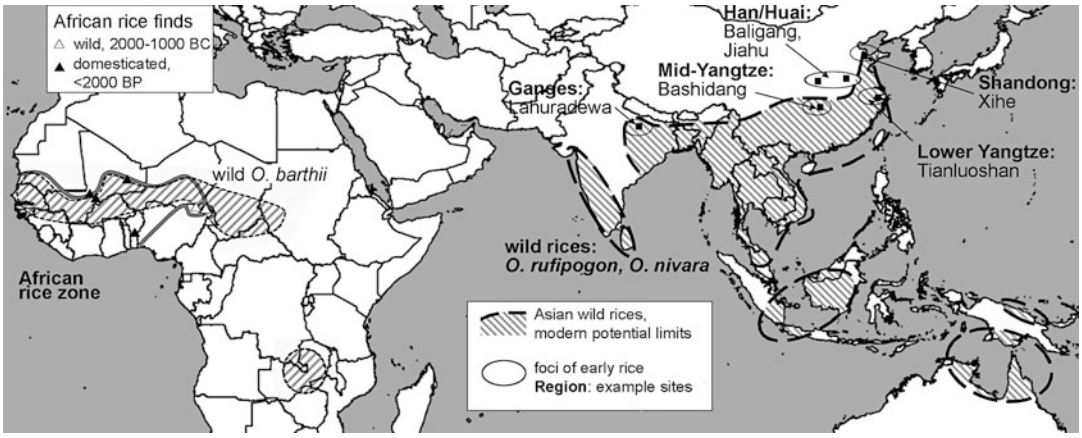

Rice: Origins and Development, Fig. 1 Map showing the distribution of wild progenitor rices in Asia and Africa, locations of sites with important evidence of African rice, and areas discussed in relation to early rice cultivation in Asia

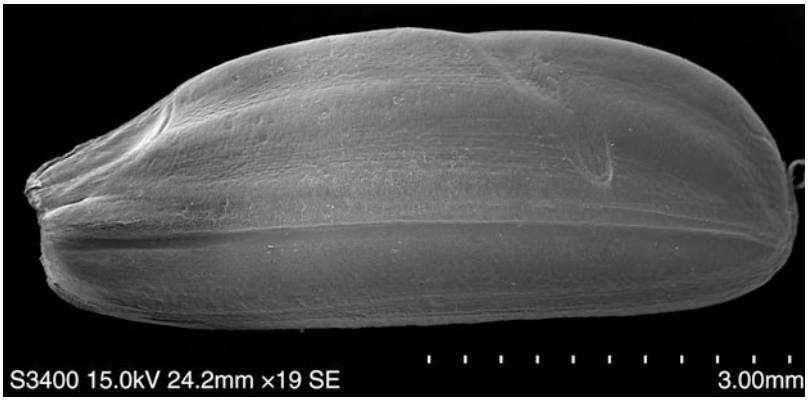

Rice: Origins and Development, Fig. 2 SEM image of caryopsis of modern rice showing the ridges and profile of small embryo

rice. The single-origins model points towards China as the center of origin, whereas the multiple-origins model indicates *O. sativa japonica* was first domesticated in China and *O. sativa indica* later in India (Fuller et al. 2010). The genetic evidence has established that the two subspecies have different mitochondrial genomes and therefore corroborates two distinct origins, with *indica* derived from an annual *O. nivara*-like ancestor and *japonica* from the perennial *O. rufipogon*. However, those who favor a single origin argue that *indica* was derived from *japonica* rice, with some local gene flow from wild populations (e.g., Molina et al. 2011). What is clear is that hybridization, which may represent intentional breeding, has played an important role in the history of rice as has regional diversification and adaptation (Fuller 2011).

Rice caryopses are one of the most easily recognizable archaeobotanical remains (Fig. 2). Grains are long and laterally compressed. These are characterized by an oblique tip with lengthwise ridges corresponding to the lemma and palea, which had contained the grain. Grain measurements are highly variable, especially in length, but domesticated forms usually have thicker and wider grains than their wild ancestors, making many domesticated types shorter and plumper in contrast to thin wild forms (Murray 2007; Fuller et al. 2010). Other important lines of archaeological evidence include husk patterns, spikelet bases, and phytoliths (Fig. 3). The husk (lemma and palea) has a distinctive and regular reticular pattern. This is often identifiable from husk impressions in ceramics in which rice was used as temper. Advances in archaeobotany have

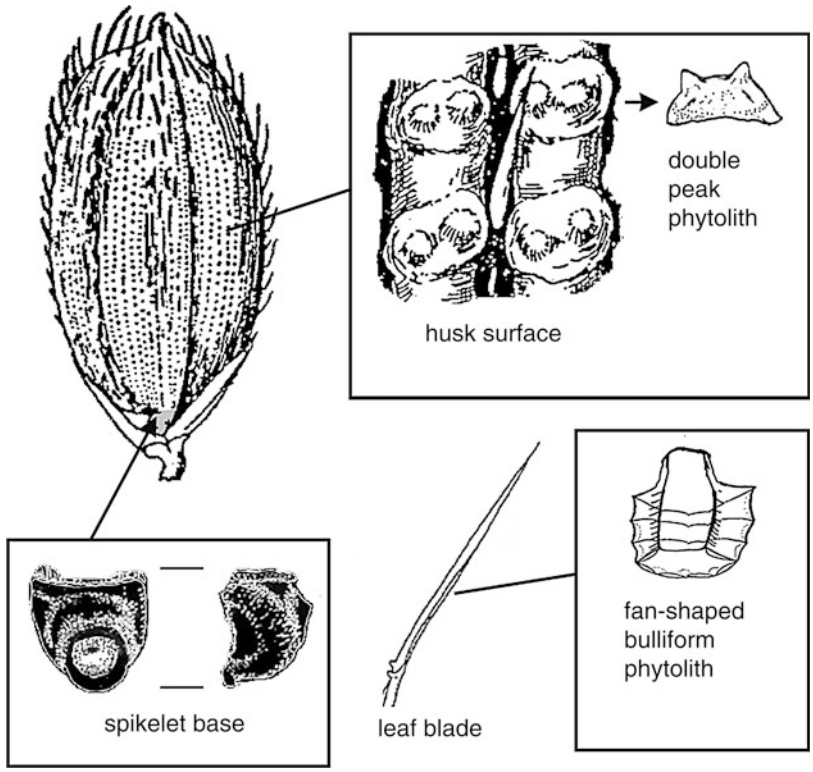

Rice: Origins and Development, Fig. 3 Illustrations of lines of archaeobotanical evidence for rice in addition to grains, including rice husk, spikelet bases, and two main phytolith morphotypes

also made it possible to distinguish wild from domesticated rice by examining the spikelet base rachilla scars (Fuller et al. 2009). Unlike wild rice, domesticated rice does not naturally disperse its seeds when ripe, making the spikelet base a key line of evidence in tracking the domestication process. Other important lines of archaeological evidence are bulliform phytoliths from rice leaves and double-peaked phytoliths from the husks. Both are certainly diagnostic of *Oryza* and show variation within and between species, but there remain debates about the utility of these phytoliths for tracking the domestication process or separating *indica* versus *japonica* (Fuller et al. 2008, 2010). In Africa, there has been less archaeobotanical research on rice (Murray 2007), with little application so far of spikelet base studies or phytoliths.

Domesticated rice exhibits qualities derived from both its wild species. *O. nivara* is an annual species preferring open habitats but also growing in swampy areas, is daylength insensitive, and self-fertilizing. *O. rufipogon* is a perennial species better adapted to wetlands, is often daylength sensitive, and cross-fertilizing. It is found across a wider geographic range than *O. nivara* including extending to northern Australia and southern China (Vaughan 1994) but previously extending in eastern China northwards towards the Shandong peninsula (Fig. 1; Fuller et al. 2010). *O. sativa* is annual and self-fertilizing like *O. nivara*, though some domesticated rice varieties also grow in deep water and are photosensitive like *O. rufipogon* (Sang and Ge 2007). As rice spread through Asia, hybridization with local wild populations is thought to have provided additional adaptive traits (Fuller 2011). Similar processes are likely in African rice (Richards 1996).

Timing and Tracking Domestication

African rice origins remain obscure. Final Stone Age sites, with ceramics, in the region west of Lake Chad in Nigeria have produced evidence for the gathering and use of wild *Oryza longistaminata* (e.g., Bigga and Kahlheber 2011) by the second millennium BCE, but with no clear

sequence leading to domestication. The earliest domesticated rice finds are grain assemblages from the Iron Age at Dia in the middle Niger River valley in Mali, dating after 800 BCE (Murray 2007). Finds from a few other sites in Mali and elsewhere indicate that African rice was associated with urban sites through first millennium CE and into the Islamic period.

In Asia, five regions are discussed in relation to possible centers of rice cultivation and domestication origins. It is plausible that several of these areas were involved in parallel processes of domestication. The best documented is in the Lower Yangtze where Tianluoshan is representative of a regional sequence of evolutionary change towards domesticated rice. A pre-domestication phase showing morphological change is evident in the sites of Kuahuqaio (6000–5400 BCE), Tianluoshan, and Hemudu (5000–4500 BCE), with agricultural field systems based on domesticated rice emerging by the terminal Majiabang culture (by c. 4000 BCE) at sites such as Caoxieshan and Chodun (Fuller et al. 2008, 2009, 2010). The middle Yangtze region provides some of the earliest evidence for rice use from phytoliths in postglacial cave sites (from c. 16,000 to 15,000 BCE), while cultivation was probably practiced by the time of Bashidang (7000–6000 BCE) with domestication by subsequent phases. Also important in debates is the site of Jiahu on the Huai river (7000–6000 BCE), which lacks clear evidence for rice domestication but has been linked to comparably aged evidence from Baligang some 150 km away on the Han river valley (Zhang and Hung 2013). At Baligang, significant proportions of domesticated spikelet bases occur, suggesting comparability to Tianluoshan or later sites in terms of domestication status. Rice finds from the Houli culture of Shandong are of similar age (Jin et al. 2013) but plausibly wild gathered. While the data from China is rapidly accumulating, they suggest that more than one region may have been involved in parallel development of early rice cultivation and domestication.

By contrast, in India, the search for domestication is focused on the Ganges valley. Combining archaeobotany and genetics suggests that *O. sativa* subsp. *indica* emerged through hybridization from a proto-*indica* that was managed in a morphologically wild state (Fuller et al. 2010; Fuller 2011) with introduced domesticated *japonica* rice, perhaps c. 2000 BCE. The earliest evidence of rice use in the middle Ganges at Lahuradewa has an AMS date of c. 6400 BCE but was plausibly wild gathered or under pre-domestication cultivation. Clear domesticated rice began to become widespread across northern India between 2000 and 1500 BCE. From the Ganges to the Yangtze region, Asian rice cultivation spread to become a major agricultural staple throughout much of monsoon Asia between 1000 and 0 BCE, and it also began to be adopted on a smaller scale as a crop in Mesopotamia (for a review, see Fuller et al. 2010). Asian rice reached eastern Africa during the Swahili period from c. CE 800 (Walshaw 2010), but may not have been added to western African agricultural diversity until the sixteenth century.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Jiahu: Agriculture and Domestication
- ▶ Phytolith Studies in Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

R

References

Agnoun, Y., S.S.H. Biaou, M. Sie, R.S. Vodouhe, and A. Ahanchédé. 2012. The African rice *Oryza glaberrima* Steud: Knowledge distribution and prospects. *International Journal of Biology* 4 (3): 158–180.

Bigga, G., and S. Kahlheber. 2011. From gathering to agricultural intensification: Archaeobotanical remains from Mege, Chad Basin, NE Nigeria. In *Windows on the African past. Current approaches to African archaeobotany*, ed. A.G. Fahmy, S. Kahlheber, and A.C. D'Andrea, 19–66. Frankfurt: Africa Magna.

FAOSTAT. 2012. http://faostat.fao.org. Accessed 20 July 2012.
Fuller, D.Q. 2011. Pathways to Asian civilizations: Tracing the origins and spread of rice and rice cultures. *Rice* 4: 78–92.
Fuller, D.Q., L. Qin, and E.L. Harvey. 2008. A critical assessment of early agriculture in East Asia, with emphasis on Lower Yangtze rice domestication. *Pradghara* 18: 17–52.
Fuller, D.Q., L. Qin, Y. Zheng, Z. Zhao, X. Chen, L.A. Hosoya, and G. Sun. 2009. The domestication process and domestication rate in rice: Spikelet bases from the lower Yangtze. *Science* 323: 1607–1610.
Fuller, D.Q., Y.-I. Sato, C. Castillo, L. Qin, A.R. Weisskopf, E.J. Kingwell-Banham, J. Song, S.-M. Ahn, and J. van Etten. 2010. Consilience of genetics and archaeobotany in the entangled history of rice. *Archaeological and Anthropological Sciences* 2 (2): 115–131.
Fuller, D.Q., J. van Etten, K. Manning, C. Castillo, E. Kingwell-Banham, A. Weisskopf, L. Qin, Y.-I. Sato, and R.J. Hijmans. 2011. The contribution of rice agriculture and livestock pastoralism to prehistoric methane levels: An archaeological assessment. *The Holocene* 21: 743–759.
Garris, A.J., T.H. Tai, J. Coburn, S. Kresovich, and S. McCouch. 2005. Genetic structure and diversity in *Oryza sativa* L. *Genetics* 169: 1631–1638.
Jin, G., W. Wu, K. Zhang, Z. Wang, and X. Wu. 2013. 8000-year old rice remains from the north edge of the Shandong Highlands, East China. *Journal of Archaeological Science* online. https://doi.org/10.1016/j.jas.2013.01.007.
Molina, J., M. Sikora, N. Garud, J.M. Flowers, S. Rubinstein, A. Reynolds, P. Huang, S. Jackson, B.-A. Schaal, C.D. Bustamante, A.R. Boyko, and M.-D. Purugganan. 2011. Molecular evidence for a single evolutionary origin of domesticated rice. *PNAS* 108 (20): 8351–8356.
Murray, S.S. 2007. Identifying African rice domestication in the Middle Niger Delta (Mali). In *Fields of change. Progress in African archaeobotany*, ed. R. Cappers, 53–63. Groningen: Barkhuis.
Richards, P. 1996. Agrarian creolization: The ethnobiology, history, culture and politics of West African rice. In *Redefining nature: Ecology, culture and domestication*, ed. R. Ellen and K. Fukui, 291–318. Oxford: Berg.
Sang, T., and S. Ge. 2007. The puzzle of rice domestication. *Journal of Integrative Plant Biology* 49: 760–768.
Vaughan, D.A. 1994. *Wild relatives of rice: Genetic resources handbook*. Los Baños: International Rice Research Institute.
Walshaw, S.C. 2010. Converting to rice: Urbanization, Islamization and crops on Pemba Island, Tanzania, AD 700–1500. *World Archaeology* 42: 137–154.
Zhang, C., and H.-C. Hung. 2013. Jiahu 1: Earliest farmers beyond the Yangtze River. *Antiquity* 87: 46–63.

Rivers: Environmental Archaeology

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Introduction

River environments have played a major role in our understanding of the human past. Humans and other hominids have a long record of using the resources associated with river environments. Whether it is short-term use of a specific resource or long-term settlements, riparian systems have provided valuable habitats. The relationship between humans and river environments has changed over time. Humans have always used the resources found in riverine environments, but over time, they have had an increasing impact on these ecosystems. The environmental archaeology of rivers provides a way to measure changes in riverine ecosystems over time by examining the influence they have had on humans and the effect people have had on these settings. This is done by applying techniques from the natural sciences, in particular the earth sciences and biology, to the interpretation of archaeological sites and their contexts. In addition to providing a natural science approach to interpreting the human past, an understanding of long-term patterns of human and riverine interactions provides a valuable means for developing future sustainable management practices that take into consideration the consequences of climate change and human activities to these important environments. The physical and biologic processes that prevail in river environments can greatly modify patterns of past human activity and therefore have the capacity to transform the archaeological record. The study of river landscapes in archaeology encompasses millions of years of time and every continent inhabited by prehistoric humans.

Definition

The term "environmental archaeology" encompasses the empirical study of the long-term relationship between humans and the physical (abiotic) and biological settings they inhabit. As might be expected, this biophysical contextual approach is rooted in the natural and historical sciences, especially the earth and biological sciences. Because of its emphasis on relationships and interactions, environmental archaeology is connected to ecology, and because it has as a focus human relationships with the environment, it is connected to human ecology. The objective of environmental archaeology is to evaluate the linkages between past ecosystems and people; it examines the relationship between the environment and humans over time. The study of humans and paleoenvironments includes dating methods; abiotic factors such as climate, landforms, sediments, and soils; and biotic components, including vegetation (paleobotany) and animals (paleozoology). Thus, environmental archaeology is commonly divided into three subfields: geoarchaeology, archaeobotany, and zooarchaeology. Some researches further separate the study of the abiotic components of the ecosystem into geoarchaeology and archaeometry. In this approach, geoarchaeology provides a means for examining physical settings, stratigraphic contexts, and site formational processes in contrast to archaeometry, which would include aspects of remote sensing, laboratory techniques for dating, and raw material analysis. Likewise, the study of the remains of plants and animals to interpret past environmental settings or to evaluate their use as resources used by humans may be defined as bioarchaeology. Various scales of time and space can be used in the ecosystem approach to the study of humans and river environments, providing an understanding of the short-term or long-term sequence of events within an archaeological site and its landscape context.

River environments are defined by the presence of flowing water. The flow of water may be perennial (year-round) or seasonal, and it may change in terms of rate of flow on a seasonal basis or over longer intervals of time. These two factors alone have important consequences for humans. For example, if year-round water is present, humans may stay in the vicinity of the river even if there is seasonal availability of particular plant and animal resources. On the other hand, the sporadic availability of water or dramatic changes in water discharge may lead humans to abandon a riparian setting if no resources are available.

There are abiotic and biotic components to a river ecosystem. Besides the flowing water, which is an aquatic habitat, there is the interface between the land and the flowing water known as the riparian (*ripa*, Latin = river bank) habitat. Flowing water is a significant force in the formation of landscapes associated with past and present human activity. It both contributes to the formation of settings or habitats used by people and can modify or transform the archaeological record. Landforms associated with flowing water are termed "alluvial," while sediments deposited by running water are termed "alluvium"; where the landforms are directly attributable to rivers and streams, the term "fluvial" is applied.

Even though particular local riverine environments can be quite variable, they commonly possess similar functional and structural features. This means, although rivers are found in many different settings, there are some basic patterns. Despite their variety, river environments show similar features. An idealized river system will include the channel, a floodplain, and terraces above the floodplain. The channel may be straight, meandering, or braided. Point bars can form in a meandering river which typically will consist of a single winding channel. Lateral movement of the river channel leads to erosion of river banks. Oxbow lakes form where a portion of the channel has been abandoned. Floodplains can include these oxbow lakes as well as levees which are raised areas along the bank of the river. Braided rivers will typically have many intersecting channels within a floodplain. The type of channel can directly affect the ways humans use a riverine environment. Settings

with meandering channels and oxbow lakes may be habitats of high biodiversity or be accessible for human use except during periods of flooding. In contrast, braided streams may be less stable habitats that are used by people on a more sporadic basis.

The rate of flowing water is associated with the amount of water available and the steepness of the terrain. Water flows faster in steep terrain compared to areas where the slope is lower. Larger-size sedimentary particles (including artifacts) are transported in high-energy river contexts, such as channels. Sediments associated with abandoned main channels which form lakes on floodplains are characterized by cross-stratified sands and muds. Especially important for environmental archaeology, channel fills commonly contain plants and mollusk remains and vertebrate bones. Finer-sized sediments are often associated with low-energy overbank deposition, such as on floodplains. Typically, the finest sediments, such as silt and clay, along with lenses of cross-bedded sands can be expected to form overbank floodplain deposits. Terraces, the remnants of former floodplains, can have the same features or they can provide information on previous conditions associated with the river system.

From an archaeological point of view, rivers are dynamic systems. While one part of a river may be dominated by erosion and consequently the destruction of sites, other parts of the river may be locations of burial and consequently the preservation of sites. Thus, one goal of the environmental archaeology of rivers is to account for the basic geomorphic processes that impact individual archaeological sites as well as their surrounding landscapes (e.g., Turnbaugh 1978).

An abrupt movement of a channel belt from one location to another across a floodplain, an *avulsion*, has important implications for the location and preservation of archaeological sites. Dramatic examples of avulsion events are lateral shifts undergone by the Yellow River in China, the Kosi River (a tributary to the Ganges), and the Po River in Italy (Mackey and Bridge 1995). During the late Holocene, over the last 4,000 years, the Yellow River has shifted laterally over 800 km. Over the last 250 years, starting in the 1700s, the Kosi River has shifted about 113 km. The Po River has also seen a series of shifts since about 1000 BCE of about 50 km, with the average avulsion interval of slightly less than 500 years. Some of the youngest avulsions were connected with human actions. Over the last 10,000 years, there have been over 91 avulsion events with the Rhine-Meuse delta with variation over time associated with cross-valley faulting and changes in water and sediment supply (e.g., Stouthamer and Berendsen 2001). These changes in the location of major river channels have serious implications for the location of archaeological sites and the interpretation of settlement patterns.

Biological remains that provide valuable information on environmental settings and resources available for use by people are preserved in river settings. Plant remains are present as macrofossils and also pollen and diatoms, and are also reflected by root casts in soils and sediments. Important invertebrates include arthropods (such as insects and crustaceans) and mollusks (gastropods and bivalves). Vertebrate remains include fish, amphibians, reptiles, and mammals. As with artifacts, these biotic remains can be in primary (in situ, *autochthonous*) or secondary (redeposited, *allochthonous*) context. Evaluating the degree of transportation is critical because it determines what habitat or mix of environments is represented by the fossils. The types of plants and animals change with the terrain and the levels of moisture. Different sub-environments within a river system will have different amounts and varieties of biotic materials; the abundance and diversity will change throughout the riverine system. Thus, there are aquatic resources associated with the channel, marsh and floodplain habitats, and upland habitats. Each can have its own characteristic plants and animals. Fossil remains that are autochthonous will be representative of the local area, while allochthonous assemblages reflect conditions over a much larger area. There are also general biotic patterns associated with riverine habitats from different climate zones. In fact, the same river can have different biotic elements as it passes through different regimes of topography, precipitation, and temperature. Thus, almost by definition, there are a wide variety of studies that are within the scope of the environmental archaeology of rivers.

Historical Background

Studies of archaeological occurrences in riverine settings date back to the beginning of the scientific investigation of the human past. Even before the 1800s, artifacts were found in ancient river sediments. The first recorded Paleolithic hand axes were found in river gravels in the 1690s close to the present location of the King's Cross railway station in London and in the late 1700s at Hoxne in Suffolk. Besides the discovery of Paleolithic artifacts in river gravels, floodplains were key settings for archaeological discoveries. In the late 1700s, Thomas Jefferson directed excavations of an archaeological mound on the floodplain of the South Fork of the Rivanna River, Virginia. Many mounds located in similar floodplain settings have been modified or destroyed over time by the changes in the course of a river or by plowing connected with farming.

During the 1800s, many advances in archaeology were the result of artifacts recovered from riverine settings. Sir Charles Lyell's *Principles of Geology* (published in the early 1830s) examined present-day processes as a way to understand the record of the biotic and abiotic past or as he described it, "the organic as well as inorganic kingdoms of nature." In *Principles*, Lyell restricted the term "alluvium" to sediments transported by rivers and remarked that bones of animals could get buried in alluvium. He cited the channel changes in the Po River of northern Italy since the time of the Iron Age, as well as the consequences of human constructed embankments along the river. Lyell's comparisons spanned the globe; besides the Po River, he compiled information on the action of running water and the erosion and transportation of materials by floods in the Peloponnese of southern Greece and along the Mississippi, Nile, and Ganges Rivers.

Starting in the 1840s, ancient river terraces became important localities that provided evidence for the presence of humans with extinct animals. In France, within river gravels along the Somme River Valley, Boucher de Perthes found stone artifacts and fossils of extinct animals. These observations were subsequently confirmed by the studies of Rigollot in alluvial deposits at St. Acheul, near Amiens. By the late 1850s, the Pleistocene alluvium in the Somme Valley had gained the attention of several prominent British geologists, including Lyell.

Another early example of the study of humans and river environments is found in *Man and Nature* written by George Perkins Marsh and first published in 1864. Marsh was concerned with the changes to the environment caused by human actions. He noted that human activity such as deforestation connected with agriculture led to increased flooding and increased sedimentation. He used accounts from the time of the Romans to document the ways people had modified river systems for irrigation, canals, aqueducts, and reservoirs. The use of land for agriculture was linked to rapid runoff and the increased danger of flooding. Marsh also considered the benefits (flood control, supplies of fresh water) and the costs (loss of farm land, sediment storage, possibility of devastating overflows) of barriers or dams across river channels.

Although many examples of discoveries connected with river environments could be recounted in the history of archaeology, the present-day approach to the environmental archaeology developed during the middle of the 1900s. This approach is exemplified by the contributions of Frederick Zeuner, who held the position of Professor of Environmental Archaeology at the University of London, Institute of Archaeology. In the 1930s, Zeuner used evidence from river deposits to examine the orbital forcing theory for climate change. Zeuner's *The Pleistocene Period* contains extensive descriptions of river terraces and their value for understanding past climates and environments. In this classic text, he evaluates both the geomorphic and paleontologic evidence from ancient river deposits to construct a chronology of the Pleistocene. During the 1950s, an ecological orientation to the study of the archaeological record started to become more prominent. For example, Karl Butzer initiated a long-term program encompassing environmental archaeology with his studies of human interactions with abiotic and biotic processes in the Nile Valley and C. Vance Haynes began his geoarchaeological studies of alluvial sequences in North America.

Key Issues/Current Debates

The key issues connected with the environmental archaeology of rivers center on two questions: to what degree does environmental change impact human activity and to what degree does human activity impact the environment? These issues involve examining the processes of environmental change and the types of environmental resources used by people in river environments. In many cases, the debate involves how the evidence from environmental archaeology should be interpreted. For instance, are the changes seen in a particular riverine setting the results of climate change, tectonic events, or human actions? Evidence from environmental archaeology has also played a critical role in evaluating the changing relationships between humans and the environment. In general, environmental archaeology provides support for the contention that hunter-gatherer (foraging and collecting) human groups have a lower overall impact on river ecosystems compared to agricultural/agrarian and urban populations. The environmental archaeology of rivers contributes to examining questions related to the changing patterns of land use and landscape evolution. For instance, what were the environmental consequences of agriculture in different parts of the world?

Late Paleolithic sites along the edge of the Nile River Valley north of Aswan provide an example of the application of environmental archaeology to study floodplain formation processes, environmental dynamics, and subsistence (Close 1989). Dating from about 21,000 to 12,000 years ago, the sites located at Wadi Kubbaniya were preserved because of the interplay between processes of overbank deposition and blowing sands. The sands often provided a surface on which human activities took place which was then buried by overbank Nile silts from seasonal floods. Besides stone artifacts, many biotic materials were preserved providing a unique view of the seasonal subsistence pattern connected with this river environment. The Nile would flood the dune surfaces around September, and harvesting of fish trapped in ponds between the dunes would happen right after the seasonal flood. Remains of migratory birds suggest possible human use of the river environment during the winter. This time of year would have also been the optimal season for the growth of vegetation along the margins of the floodplain, providing an explanation for the remains of wild cattle and hartebeest. Grinding stones at the sites were used to process tubers during the long interval before and after the onset of the flood. The overall picture is one where humans utilized the diverse resources of the Nile, taking advantage of the seasonal availability of a variety of plants and animals.

A late Holocene archaeological site situated near the border of the United States and Canada in northern Minnesota provides another example where a diverse array of natural science techniques were used to interpret site formation processes and hunter-gather use of riparian resources (Hill et al. 2011). The archaeological site is situated in the active floodplain of the Big Fork River. The stratigraphic sequence shows both lateral migration and aggradation connected with overbank flooding during the last 3,000 years. Human presence begins around 1300 BP and people continued to use the banks of the river as its channel shifted across the floodplain. The floodplain would have been available for human use except when seasonally inundated. By 900 BP, a natural levee was formed along the bank of the river which became a location for human activity. In terms of site formation processes, the artifacts within the site are in primary context, except perhaps for some rearrangement by the overbank flood events that buried the habitation surfaces. Also, artifacts found in point bar deposits appear to have been transported and redeposited and are therefore archaeologically in secondary context. This geomorphic setting was part of an ecosystem that provided fish and aquatic mammal resources. Over time, there was a change from a reliance on spearing sturgeon to taking bottom-feeding fish. Besides the fish, the riparian setting is also reflected by the remains of beaver, porcupine, muskrat, and river otter. The integration of geoarchaeological and zooarchaeological data provides a means to examine both the physical processes of site formation and the biotic resources used by humans along the Big Fork River.

Various natural processes connected with river systems play major roles in the formation of the archaeological record. Tectonics contribute to the evolution of fluvial systems and therefore impact the potential preservation and visibility of sites. The asymmetrical, terraced meander system along the Madison River in southwest Montana is an example (Alexander et al. 1994). This is an instance where there were no major changes in the overall style of channel during the last 10,000 years. It remained a meander belt, but one that was consistently moving towards the tectonically down-tilted area of the valley, leaving a series of abandoned meander belts spanning the Holocene in the up-tilted area. Thus, in this situation, faults caused the tilting of a floodplain across a valley which led to lateral channel migration. In terms of environmental archaeology, the abandoned channels contain a record of late Quaternary environmental change within the river valley.

Studies of the evolution of river systems have been used to determine whether climate change affected human choices about the use of the environment. For instance, a period of settlement abandonment along the Rena River in Norway has been linked to increased flood intensity which caused widespread erosion (Balbo et al. 2010). In some instances, the environmental record of river deposits contains evidence for both climate change and human impact to the surrounding landscape. In China, paleoecological studies of a relict oxbow lake contained evidence of cultivation starting around 5,400 years ago with intensification of agricultural activities about 700 years later (Li et al. 2006). Superimposed on this record of human impact is evidence of climate change that can be correlated with the Medieval Warm Period and the Little Ice Age. An example from Mesoamerica where human action appears to have altered a river system is the study of the Rio Verde Valley in Oaxaca (Joyce and Mueller 1992). From about 400 to 100 BCE, during the Late Formative, flooding and alluviation increased within the river system. This increase appears to have been caused by a change in the pattern of the river; initially, the river was meandering and it changed to a braided stream. In the upper part of the river valley, accelerated erosion and runoff were caused by land clearance connected with farming and settlement. The consequences of these human actions in the upper river valley included increased flooding and river sediment deposition. The flooding and alluviation transformed the meandering stream to a braided stream with high-energy channels, overbank floodplain sediments, and oxbow lakes. This change in the river led to an increase in the agricultural productivity of the lower river valley.

Site formation in alluvial settings is associated with process of erosion, deposition, and post-burial modification. Regardless of whether they are artifacts or ecofacts, objects transported by stream flow are commonly sorted by size, shape, and weight or density. They can be oriented by the current or abraded and broken during transport. They can be transported short or long distances. The longer the transport distance, the higher the amount of expected abrasion and breakage. Quick deposition and burial of biotic materials increase the likelihood of preservation. At site FCW in Bed II at Olduvai Gorge, in Tanzania, artifacts were found in two concentrations that suggested the arrangement was a product of redistribution by river flow. The artifacts appear to have been transported by a flowing river and redeposited on a clay surface and then buried. At the Olduvai site of HWKE-4, the presence of larger sedimentary particles such as sands, pebbles, and gravels indicated a high-energy river environment which would have removed small artifacts (Petraglia and Potts 1994).

Channel settings can be locations for the preservation of macrobotanical remains such as seeds, twigs, logs and leaves, as well as bivalves and vertebrate remains. While mollusks may be in primary context, botanical and vertebrate remains are often transported in channel settings. They may be disarticulated and fractured or abraded, sorted, or preferentially oriented. While providing information on the regional environment, the degree of transport could limit the amount of information provided about the immediate locality. In contrast, channels that become floodplain lakes will contain a mixture of local and

watershed plant pollen contributed through the water, along with the pollen transported through the air. Macrobotanical and animal remains recovered from the fill in abandoned channel lakes on terraces above active floodplains will likely provide more reliable information on local environmental conditions. Floodplains can contain both in situ and redeposited fossils. Materials exposed on the surface can become weathered and damaged and disarticulated by processes like trampling and carnivore activity. Frequent flooding in these settings can help preservation as overbank sediments bury artifacts and ecofacts.

International Perspectives

Studies of past river environments and humans extend beyond the description of a particular site or even a series of sites with a restricted river basin. Historically, there has been much interest in correlating terraces sequences in river valleys with glacial-interglacial climate transitions (Blum and Törnqvist 2000; Mishra et al. 2007; Bridgland and Westaway 2008) or smaller-scale climate events such as the Younger Dryas, the Altithermal, or the Little Ice Age. There is also a global-scale or international dimension to evaluating what natural and social processes are reflected in fluvial deposits containing archaeological materials. While attempts to correlate individual river systems with global-scale processes have long been a part of the study of past rivers and humans, it has become a prominent goal of ongoing research. This can be seen in studies that use paleoenvironmental information to evaluate the risk to present-day populations of floods or the vulnerability of societies to changes in land use or climate (e.g., Arnaud-Fassetta et al. 2010). One very practical application is estimating the long-term frequency of floods in a river system which would provide planners and policy makers with an understanding of long-term environmental patterns. For instance, the last 2,000 years of flood history for the Columbia River in Washington State was evaluated using the stratigraphic sequence at an archaeological site (Chatters and Hoover 1986). The site was on a landform at about the same elevation as the highest historic flood. The stratigraphic sequence consisted mostly of sand and silt along with charcoal, shells, and stone tools. It was determined that there was a high interval of flooding from between CE 1029–1390. Compared to the last 600 years when large floods occurred on average about once every 140 years, during the earlier interval, floods would have been at least three times as common. Thus, the last 600 years has been a period of relative climate stability compared to the interval ending around CE 1390. Examining these types of patterns from a specific riverine site and correlating them to sequences are especially relevant for evaluating broad-scale patterns associated with land use or global climate events.

Future Directions

The potential value of environmental studies of past river systems and their connection with humans has become very apparent. The information from these types of studies is especially relevant for making decisions that affect the sustainability and resilience of these important environments. Some future directions for research include studies linked to landscape evolution, land use, restoration of biodiversity, and landscape management (e.g., Brown 2002; Hudson et al. 2008). In summary, the value of applying natural science techniques and concepts to the archaeological record connected with river environments may ultimately rest on the ways it can contribute to our understanding of the relationships between humans and nature. It can provide decision-makers with a long-term perspective on human land use. Environmental archaeology can also provide a way of examining the ways human actions are a product of both environmental factors and other processes that influence human choices. Thus, a future direction for environmental archaeology may be the application of knowledge regarding the long-term connections between humans and natural systems to broader socially relevant issues of sustainability, resilience, and persistence.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Archaeobotany
- ▶ Butzer, Karl W.
- ▶ Disaster Response Planning: Flood
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Kostenki: Geography and Culture
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Zeuner, Frederick Everard

References

Alexander, J., J. Bridge, M. Leeder, R. Collier, and R. Gawthorpe. 1994. Holocene meander belt evolution in an active extensional basin, southwestern Montana. *Journal of Sedimentary Research* B64: 542–559.

Arnaud-Fassetta, G., N. Carcaud, C. Castanet, and P.G. Salvador. 2010. Fluviatile palaeoenvironments in archaeological context: Geographical position, methodological approach and global change-hydrological risk issues. *Quaternary International* 216: 93–117.

Balbo, A., P. Persson, and S. Roberts. 2010. Changes in settlement patterns on the River Rena, southeast Norway: A response to Holocene climate change? *The Holocene* 20: 917–929.

Blum, M., and T. Törnqvist. 2000. Fluvial responses to climate and sea-level change: A review and look forward. *Sedimentology* 47 (sup. 1): 2–48.

Bridgland, D., and R. Westaway. 2008. Climatically controlled river terrace staircases: A worldwide Quaternary phenomenon. *Geomorphology* 98: 285–315.

Brown, A. 2002. Learning from the past: Palaeohydrology and palaeoecology. *Freshwater Biology* 47: 817–829.

Chatters, J., and K. Hoover. 1986. Changing late Holocene flooding frequencies on the Columbia River, Washington. *Quaternary Research* 26: 309–320.

Close, A., ed. 1989. *The prehistory of Wadi Kubbaniya, volume 2: Stratigraphy, paleoeconomy, and environment*. Dallas: Southern Methodist University Press.

Hill, C., G. Rapp, and Z. Jing. 2011. Alluvial stratigraphy and geoarchaeology in the Big Fork River Valley, Minnesota: Human response to Late Holocene environmental change. In *Human interactions with the geosphere: The geoarchaeological perspective*, ed. L. Wilson, 109–124. London: Geological Society of London.

Hudson, P., K. Butzer, and T. Beach. 2008. Fluvial deposits and environmental history: Synthesis. *Geomorphology* 101: xvii–xvxx.

Joyce, A., and R. Mueller. 1992. The social impact of anthropogenic landscape modification in the Rio Verde drainage basin, Oaxaca, Mexico. *Geoarchaeology* 7 (6): 503–526.

Li, Y., K. Willis, L. Zhou, and H. Cui. 2006. The impact of ancient civilization on the northeastern Chinese landscape: Palaeocological evidence from the western Liaohe River basin, inner Mongolia. *The Holocene* 16: 1109–1121.

Mackey, S., and J. Bridge. 1995. Three dimensional model of alluvial stratigraphy: Theory and application. *Journal of Sedimentary Research* B65: 7–31.

Mishra, S., M. White, P. Beaumont, P. Antoine, D. Bridgland, N. Limondin-Lozout, J. Santisteban, D. Schreve, A. Shaw, F. Wenban-Smith, R. Westaway, and T. White. 2007. Fluvial deposits as an archive of early human activity. *Quaternary Science Reviews*: 2996–3016.

Petraglia, M., and R. Potts. 1994. Water flow and the formation of early Pleistocene artifact sites in Olduvai Gorge, Tanzania. *Journal of Anthropological Archaeology* 13: 228–254.

Stouthamer, E., and H. Berendsen. 2001. Avulsion frequency, avulsion duration and interavulsion period of Holocene channel belts in the Rhine-Meuse delta, the Netherlands. *Journal of Sedimentary Research* 71: 589–598.

Turnbaugh, W. 1978. Floods and archaeology. *American Antiquity* 43: 593–607.

Further Reading

Branch, N., M. Canti, P. Clark, and C. Tuney. 2005. *Environmental archaeology: Theoretical and practical approaches*. London: Hodder Arnold.

Brown, A. 1997. *Alluvial geoarchaeology: Floodplain archaeology and environmental change*. Cambridge: Cambridge University Press.

Butzer, K. 1982. *Archaeology as human ecology*. Cambridge: Cambridge University Press.

Dincauze, D. 2000. *Environmental archaeology: Principles and practice*. Cambridge: Cambridge University Press.

Ferring, C. 2001. Geoarchaeology in alluvial landscapes. In *Earth sciences and archaeology*, ed. P. Goldberg, V. Holliday, and C. Ferring, 77–106. New York: Kluwer Academic/Plenum.

Gladfelter, B. 2001. Archaeological sediments in humid alluvial environments. In *Sediments in archaeological context*, ed. J. Stein and W. Farrand, 93–125. Salt Lake City: The University of Utah Press.

Howard, A., M. Macklin, and D. Passmore, eds. 2003. *Alluvial archaeology in Europe*. Lisse: Balkema.
Huckleberry, G. 2001. Archaeological sediments in dryland alluvial environments. In *Sediments in archaeological context*, ed. J. Stein and W. Farrand, 67–92. Salt Lake City: The University of Utah Press.
O'Connor, T., and J. Evans. 2005. *Environmental archaeology: Principles and methods*. Sparkford: Sutton Publishing.
Shackley, M. 1981. *Environmental archaeology*. London: George Allen & Unwin.
Wilkinson, K., and C. Stevens. 2008. *Environmental archaeology: Approaches, techniques, and applications*. Stroud: Tempus.

Rock Abrading in South India

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Introduction

Rock art is classified into two different types based on the techniques involved in their production. They are pictographs and petroglyphs. Pictographs are drawings by the use of pigments, and petroglyphs are engraving, pecking, and abrading on the rock surface by the use of hard material like pebble hammer or metal tools. The focus of this entry is on few selected sites (Fig. 1) of rock abradings in South India, particularly semiarid environs of Raichur Doab and southern middle Tungabhadra basin (north Karnataka – northwest Andhra Pradesh), where rock abradings in the sites of Neolithic (3000–1200 BC) to Iron Age (1200–300 BC) outnumbering painted images became common. Rock bruising is a popular term known in South India for rock abrading; nomenclature is framed by Robert Bruce Foote (1916: 88) on the initial reporting of the art on granitic boulders along occupational materials of Neolithic culture:

> Rock- bruisings would be the best term by which to describe them. They were, I doubt not, produced by hammering the weathered surface of the rock with stones more or less sharp-pointed, a pastime not infrequently indulged in by the herd boys of the present time whom I have sometimes come upon so occupied. It is true they always ran away when I approached, but I examined their rude hammerings carefully and never found the streak of an iron tool on the freshly bruised surface. (Foote 1916:88)

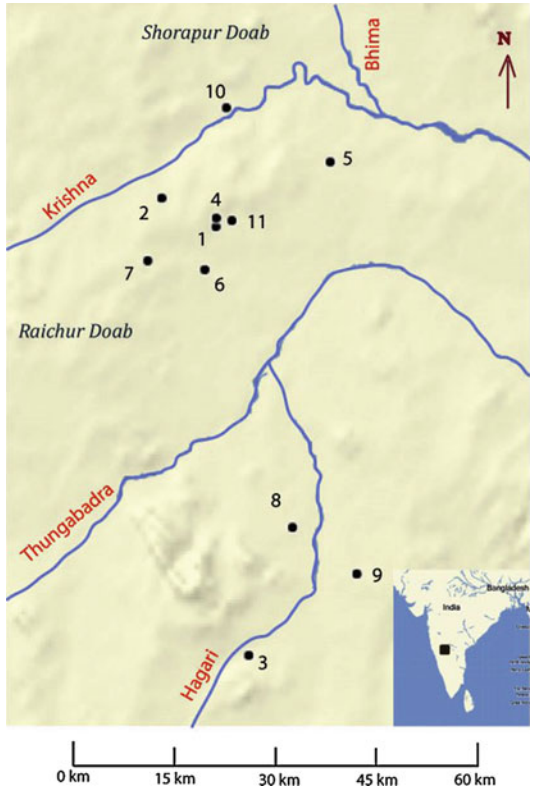

Rock Abrading in South India, Fig. 1 Sites mentioned in the discussion are semiarid regions of Raichur Doab, Shorapur Doab, and Southern Middle Thungabhadra basin (north Karnataka and northwest Andhra Pradesh). (1) Anandgal, (2) Bilamrayangaudda, (3) Brahmagiri, (4) Kotekal, (5) Maladkal, (6) Maski, (7) Piklihal, (8) Sanganakallu-Kupgal/ Hiregudda/ Birappa rock shelter, (9) Velpumudugu, (10) Vitragal-Devapura/Kupgal, (11) Watgal. (Map prepared by author)

Background

Mr. Hubert Knox was the earliest to bring the rock abrading of South India (from the site of Kupgal) to the scholarly notice (Foote 1916: 87), and Fawcett (1892) produced the first report on it in 1892. Foote (1916) during 1880s–1890s has explored dozens of Neolithic sites with rock

abradings in the Raichur Doab and Southern middle Tungabhadra region of Karnataka. Munn (1934, 1935) revisited and reported rock abradings from many of the sites of Foote that were left unnoticed, for example, the sites of Kotekal and Bilamrayanagudda. His contribution to rock art lays in the fact that he was the first to highlight the pictographs of the region. Allchin (1954, 1960) added to the data of Foote and Munn by recording abradings from the sites like Maski, Piklihal, Kupgal, and Bilamrayanagudda. This should be the beginning and one of the limited systematic recordings of the rock abrading undertaken in this region preceding D.H Gordon (1951), Gordon and Allchin (1955), Allchin and Allchin (1994–1995), Paddayya (1968), Irwin Neumayer (2011), Sundara (1994), Rami Reddy (1971), and Boivin (2004). Among all, Foote (1916), Allchin and Allchin (1994–1995), and Sundara (1994) are specific publications worked on multiple sites of rock abradings and attempted on comparative analysis of the representative images. Whereas, Boivin (2004), Fuller et al. (2007), Blinkhorn et al. (2012), and Korisettar (Korisettar and Prassanna 2014) are site-centered investigations on Sanganakallu-Kupgal complex; for the first time, they analyzed rock abradings in the background of local landscape, society, rituals, and economy. Referring to these publications takes the reader from a basic identification of the rock abradings and the associated archaeological data of many of the sites in South India. In addition, they indicate gradual developments in recording of rock abradings to contextualize on image style and form classification, chronological frameworks, rituals, and social associations emerging during the Neolithic and Iron Age.

Art Scenes and Panels

The subjects of the rock abrading during third to first millennium BC in these regions predominantly were humped cattle (*Bos indicus)*. Other images in lesser number are deer, anthropomorphs, tiger, buffalo, peacock, swan, and elephants. They appear in simple scenes arranged closely to each other or limited to single or double images on a boulder. They fall short of thematic narration unlike the pictographs of India or elsewhere shedding light on the cultural materials and activities of the past societies (Neumayer 2011: 34). Occasionally the panel consists of superimposed and congested images. They are in groups and singles often over the boulder facets overlooking habitational areas or in prominent positions of the hilltops (Allchin and Allchin 1994–1995: 316; Arjun 2018). The panels used on the rock boulders are both easily accessible and at steep slopes challenging artists to draw and investigator to record. For example, in certain locations, one can sit and draw images reaching to a shoulder or eye level of an individual, whereas certain locations are steep and hardly have a space to stand and reach high up to the panel (Arjun 2018). Such steep localities are though challenging to reach, but they contain one of the most appealing images in the sites. They might have resorted to overhanging ropes from the hilltops or vertical chain of humans carrying the artist to reach the panel. Art on such adventurous localities tests the physical fitness of young male (Boivin 2004: 45). However, this should not be resulting in arguing in lieu of "easy accessible locales were of female or age-old productions." There are easily accessible boulder panels bearing large images reaching beyond one's hand stretching extent and as lower as the foot levels. Therefore, gender or age would not have primarily contributed in the art productions at settlement sites as dynamically as the social and landscape factors might have played.

Few scenes take a special note, and the following are selected panels as representative of a larger art assemblage from various Neolithic- Iron Age sites of Raichur Doab and Northern Maidan. Heavy bodied styled humped cattle (*Bos indicus*) imaged on a flat facet granodiorite boulder at the site of Maladkal hilltop (Fig. 2). The cattle images are darkly abraded, thick outlined, bruised infillings, and they are depicted with upward projected 'U shaped' horns and heavy hump (Arjun 2018). Two images on a boulder, horse rider and cattle, are shown as the cattle is being hunted (Fig. 3), and the cattle is responding in a mannered style. These two images should be of different period, probably of late Neolithic and Iron Age.

Rock Abrading in South India, Fig. 2 Humped cattle (*Bos indicus*) depicted in a heavy bodied manner with thick outlines and abraded flillings from Maladkal. (Photo by author in 2016)

Rock Abrading in South India, Fig. 3 Images of horse rider and humped cattle in mannered style from Maladkal. Horse rider with spear or javelin like weapon is later production in date to such humped cattle. (Photo by author in 2016)

Rock Abrading in South India, Fig. 4 Upper two images are cattle in mannered or exaggerated style, and the third one is water buffalo distinguishable through its inward turning horns and forehead projection. The script in the right is Kannada datable to medieval period. Animal images and script abradings differ in color due to the aging, weathering, and patination. (Photo by author in 2016 from Kotekal)

Cattle has abnormally high hump with projected out "V"-shaped horns. The horse and rider are quite naturally depicted, rider holding a spear like weapon. In the site of Kotekal, three images are in a hierarchical dimensionsr (Fig. 4); two of them are cattle and the other is a buffalo, and at the other end of the boulder has a writings in medieval period kannada script (local dialect). This boulder illustrates a very uncommon penal, for the reason that it has depictions of both cattle and buffalo. Interestingly, the cattle are in a diagrammatic or elliptical style, and buffalo is more or less similar to them (the inward turning of the horns with prominently projected head helps in the identification of the buffalo). The cattle images of Velpumudugu are interesting for two reasons. On one panel, two *Bos indicus* cattle breeds are in heavy bodied style with abraded infillings facing each other (Fig. 5a). On the other panel, two cattle are *Bos gaurus* breeds (Fig. 5b) in naturalistic style (breed identification and photos by Dorian Q Fuller). A large panel of Watgal has a group of images superimposed with a combination of subjects like water buffalo, abstract symbols, script, geometric motifs, and anthropomorphs (Fig. 6). Two individuals are anatomically well depicted (Arjun 2018), one male ithyphallic and the other probably a female dancing with upraised arms and leg at Bilamrayanagudda (Fig. 7). At Hiregudda, chains of human images are abraded in a miniature size, running continuously on subsequent boulders, and are accompanied by the other images like elephant peacock, buffalo, and abstract symbols (see Robinson et al. 2008: Figure 5). At the same site, cattle images are arranged in a circular motion with their limbs connected to each other, and in the other stance, single face of the cattle is connected with the bodies of three cattle (see Robinson et al. 2008: Figure 4).

Rock Abradings in Archaeological Association

Fawcett (1892: 150) was the earliest to bring the rock abrading into the archaeological and geographical association, and attributed that the images were produced during the Neolithic times. This

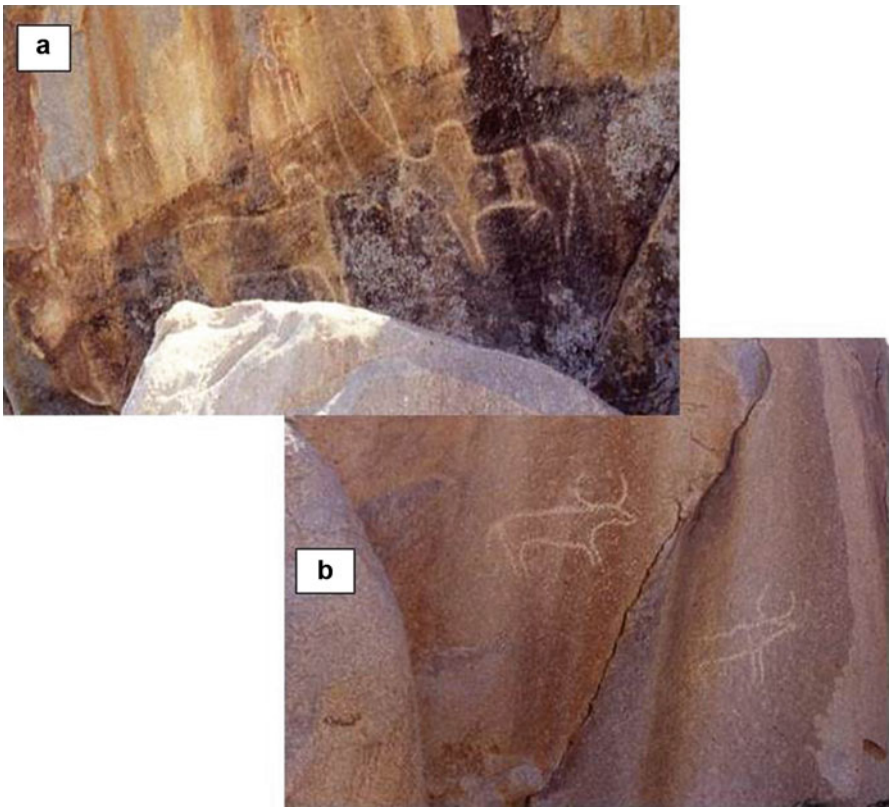

Rock Abrading in South India, Fig. 5 Cattle images of *Bos indicus* (5a) and *Bos gaurus* (5b) from the site of Velpumudugu. (Photo and breed identification by Dorian Q Fuller, taken in 1998)

Rock Abrading in South India, Fig. 6 Images of large sized water buffalo superimposing and accompanied by a set of anthropomorphs, abstract symbols, and early Brahmi script at Watgal. (Photo by author in 2016)

Rock Abrading in South India, Fig. 7 Human figures from Bilamrayanagudda. Male (ithyphallic) and female in dancing postures. (Photo by author in 2016)

assertion was made on the similarity of artifacts found in the Neolithic settlements frequently near the rock abrading localities. The images like elephant gave him a sense of paleoecology, where elephants are not presently a local inhabitant, and perhaps were the spots of earlier environs (Fawcett 1892: 151). However, his assertion on elephant images to be prehistoric depends on the association of animal with the humans; elephant with rider images becomes common in the pictographs of early history and later periods. He also further emphasized on the iconographical differences within the art assemblages and hypothesized on images becoming stylized over the time based on schematization of limbs of the individuals.

Later Allchin (1960) proposed temporal developments in the art forms and styles emphasizing on the evidences of Piklihal and comparatively with the images of Bilamrayanagudda, Maski, and Kupgal. The faunal remains and terracotta figurines of cattle retrieved from the excavations of Piklihal (Allchin 1960) considerably helped him to observe increasing evidences of them in the Neolithic levels, and they were predominant members in the rock art panels. Combination of cultural materials and art suggests at an increasing significance of humped cattle on the advent of agricultural and pastoral economies during the Neolithic and Iron Age (Allchin 1960: 131–133; Allchin and Allchin 1994–1995: 314–315). Neolithic hill settlements frequently exhibit rock abradings and not the medieval and later settlements in the region (Arjun 2018). Therefore, rock abradings and paintings in this region are Neolithic in times and continued down up to early history (Allchin and Allchin 1994–1995: 322). At the end of second millennium and throughout the first millennium BC, art style and subjects were introduced with horses and horse riders carrying metal weaponries in Piklihal (Allchin 1960) and horse riders without any objects in Brahmagiri (Arjun 2018a). This coincides with the beginning of domestication of horse and introduction of metals during the Iron Age in South India.

Allchin and Allchin (1994–1995: 319–320) argued on the forms of humped cattle images beginning from naturalistic to crude depictions during Early Neolithic to later times. Cattle images in naturalistic style are of slender and light bodied images. Crude styles have square or

rectangular body, legs, horns, head tail, and humps that are arbitrarily attached. The other styles among are mannered or exaggerated style, diagrammatic or elliptical style, and heavy bodied style. To a certain extent, iconography of the terracotta figurines of humped cattle retrieved from different excavated layers is indicated at such developments (Allchin 1960). Further, they also indicate the domestication of different cattle breeds (Allchin and Allchin 1994–95: 323). This must be regarded as sequential rather than chronological developments (Arjun 2018). Long and slender *Bos indicus* were wild in the region and were locally domesticated. Heavy body and short horned are a different breed, perhaps brought from somewhere else and are selectively bred. Such images coincide with the horse riders and metal weaponries during the early first millennium BC. Cattle idols in the temples from second half of the first millennium AD are chiseled with swept back curved horns comparable to common forms in a crude styled cattle abradings of Late Prehistoric Period. Such style of images probably represents transitional forms from mannered style and diagrammatic style during the first millennium BC.

Sundara (1994: 37–40) classified the rock abradings native to various geographical regions of Karnataka from his archaeological surveys conducted during 1970s. They are art styles of coastal Western Ghats (engravings only) and semiarid zones (abrading and engravings). In both of these regions, cattle abradings predominate, and the images fall chronologically into Neolithic-Chalcolithic, Iron Age, and Early History. Recent works of Arjun (2018; 2018a; 2018b) disputes with Sundara (1994), on images of protostructural motifs being modern production, and images like tiger and elephants are early historic, and the images of humped cattle, anthropomorphs, and herds of deer belonging to Neolithic-Chalcolithic and Iron Age.

A more recent works later to Sundara and prior to Arjun (2018b), the archaeological examinations at Sanganakallu- Kupgal complex penetrated into the understanding rock abradings in association with ashmounds, botanical and settlement evidences highlighting the ritual concerns (Boivin 2004; Fuller et al. 2007; Robinson et al. 2008; Korisettar and Prasanna 2014). They delineated from accounting on usual image description and turned theoretical over the association of image and sound features at the sites. Mahadevan (1941: 157) and Paddayya (1976) observed that the locations of the rock abradings are often associated with ringing rocks/lithophone in the hillocks of Vitrgal and Kupgal at Shorapur Doab, and this was the very first attempts made in linking rock art image with rock gongs. Their observations were relooked and further examined by Boivin (2004) and advanced with a nomenclature of "South Indian Neolithic soundscapes" based on the arguments that the images at Sanganakallu-Kupgal were made with musical annotations probably during the ritual performance.

Blinkhorn et al. (2012) from the ritual factors turned to contextualizing stone tool manufacturing activities with images production at Sanganakallu- Kupgal. Many of the image localities are found with axe-grinding grooves that were in use during the Late Neolithic and Megalithic. Late Neolithic activities proceed by a ritual of ashmound formation on hilltop and plains (Fuller et al. 2007), and occupation continued with increasing amount of lithic production that must have become a part of it (Blinkhorn et al. 2012: 190).

Robinson et al. (2008) made a fresh approach on the rock art of Birappa and Hiregudda (part of Sanganakallu-Kupgal), where art as well as cultural material activities began since Mesolithic (10000–3000 BC) and Neolithic (3000–1200 BC) and Iron Age (1200–300 BC). Birappa is a rock shelter with multiple layers of superimposed pictographs in which cattle do not appear but animals like deer, antelope, boar, lizards, and hand stencils appeared. A few meters away from Birappa is dyke capped hill of Hiregudda accounting to hundreds of rock abradings with the evidence of Neolithic occupation and stone tool workshops developed comparatively later by 2000 BC (Fuller et al. 2007). Here, indications of single images of cattle were an invention during the earlier phases of Neolithic, and multiple images of herds are taken as a matter of growing community networking and

economy, and the introduction of anthropomorphs was a reinvention during the latter phases of Neolithic. The gradual abandoning of Hiregudda hilltop and occupying its foothill plains, yet must not have avoided the artists to reinvent abradings in the landscapes but continued by adding of anthropomorphs in community dancing and sexual scenes outnumbering cattle or any animals during the Iron Age.

The contextual affiliation of rock art production and other activities in association becomes clearer with the recent studies by the present author at the sites of Bilamrayanagudda, Kotekal, Maladkal, Watgal, Anandgal, and Advibhavi-Rampura, all in Raichur Doab (Arjun 2018). In all these sites, rock-abrading locations are associated with either in combination of evidences such as artificial water pools, rock gongs, axe-grinding grooves, bedrock mortars, and modified terraces. With such combination of activities when geo-referenced to analyze settlement patterning within the site landscapes, the data suggested that abrading localities played a prominent role in holding the societal activities of different economic importance alongside the rituals. Rock-abrading localities with water pools not only indicate at ritual sanctification; rather, it could also be a matter of water becoming an important resource management beyond the ritual life of the people in the semiarid environs. Such developments are not abrupt emergence but could be a gradual process during the Neolithic and Iron Age specifically their focal area being slopes and mid-slopes of the hill sites (Arjun 2018: 265–290; Arjun 2018b).

Future Research Prospects

From the above publications on rock abradings of South India, three phases of research can be marked in Indian Archaeology: first, site findings and reporting; second statistical and attribute analysis of images in the site drawing inferences on their chronology, style, and themes; and, third, interpretation of rock art images in the background of cultural understanding of the sites, geo-referencing art localities with other archaeological remains. Despite of a large number of rock-abrading sites in South India, only few of them are prominently studied to understand the content of the art and scope of images and locations within the sites. Sites such as Sanganakallu-Kupgal, Bilamrayanagudda, Advibhavi-Rampura, Maladkal and Kotekal serve as best case studies that are documented digitally and geo-referenced on the satellite imageries followed by intensive landscape studies. Yet there remain comparative works to develop multiple theories on contextualizing art with socio-politics, economy, chronology, and taphonomic studies. We do not have much time to salvage and initiate detailed studies of the panels on the advent of granite mining in many of the sites in the Southern Deccan. In addition, the gneiss regions of north and central Karnataka have series of dolerite dyke swarms, which are potential to explore rock abradings in non-settlement contexts. The best example is the site of Advibhavi-Rampura in Raichur (Arjun 2018: 269–273). Neolithic people introduced the use of dyke rocks for making of tools, and this makes them to be connected with the dyke swarms. Archaeological explorations at number of dyke swarms could bring to light number of rock-abrading sites, and the absence of occupational evidences at such localities is not a surprise, as the Neolithic people preferred tors and inselberg landscapes than the valleys and plains. We may not expect a completely unique kinds of images adrabed, but their commitment to image production might be different from those at settlement sites.

Sonic production was involved in the making of abrading images, and certain localities of art within the site were not easily accessible unless the artist would have been an athletic male, which is one of the theoretical frameworks in vague (Boivin 2004). Two of these theories are to be tested in the other sites too, especially in the high elevated and low elevated sites like Maladkal and Piklihal. Rock abradings are found on the steep rocky cliffs elevated 60 m from the foothill plains in the case of Maladkal and 20 m at Piklihal. For a note, Piklihal images are not associated with the rock gongs, whereas Maladkal images or any other sites like Bilamrayanagudda

and Sanganakallu-Kupgal do. Such sites with combination of rock art and other archaeological categories associated with rock bruising localities scattered across different elevation of the hills helps on developing site-centred alternative theories, addressing not limited to ritual dynamics but also on the possibility of developing economy and politics surrounding the rock adrading localities.

Cognitive archaeology is yet to see its sunrise in Indian Archaeology (Korisettar 2014). We have much focused on the narration of images by their style and forms but not entering into the debate of what factors that might have triggered them to abrade images followed by the long-existing tradition of pictography across large number of sites particularly during Neolithic and Iron Age. Rock abradings did appear on the advent of Neolithic culture in Southern Deccan and have continued during the Iron Age. How the Neolithic invention must have appealed to the Iron Age populace and what could have made them to succeed Neolithic art is a matter of exclusive inquiry to be initiated. Selection of localities and panels for image production seems to be a factor of careful selection. Were the panel surface modified to any extent for getting a faceted projection should be one of the testable hypotheses. Much of the images are on the faceted nature of the boulders and are often overlooking at the settlement areas. Therefore, how these images appeal from the settlements on the foothill and vice versa are to be recorded with the use of 3D imageries, experimenting on reproduction/replication of images to assert on the amount of labor, skills, and technology required, and also recording on the preservation condition of the panels over the time requires a special attention. These are a few of the research prospects to locate the importance of the rock abradings of South India at a global level.

Cross-References

- ▶ Early Iron Age India
- ▶ East and Southern African Neolithic: Geography and Overview
- ▶ Rock Art, Forms of

References

Allchin, F. R. 1954. *The development of early cultures in the Raichur district of Hyderabad*. Unpublished PhD Dissertation. London University.

Allchin, F.R. 1960. *Piklihal excavations*. Hyderabad: Government of Andhra Pradesh.

Allchin, F. R., and B. Allchin. 1994–1995. Rock art of north Karnataka. *Bulletin of the Deccan College Post-Graduate and Research Institute* 54–55: 313–39.

Arjun, R. 2018. *Landscapes and settlement pattern of neolithic and iron age cultures in Raichur Doab.* PhD Thesis Submitted to Deccan College Post Graduate and Research Institute. Pune.

Arjun, R. 2018a. Archaeological investigations at the Brahmagiri rock shelter: Prospecting for its context in South India late prehistory and early history. *Archaeological Research in Asia* 15: 1–16, https://doi.org/10.1016/j.ara.2016.12.003.

Arjun, R. 2018b. Neolithic-Iron Age Rock Art in the Northern Maidan of Karnataka: Recent Surveys. In *Beyond Stones and More stones* ed. Ravi Korisettar, 2: 377–400, Bengaluru: The Mythic Society.

Blinkhorn, J., N. Bovin, P.C. Tacon, and M. Petraglia. 2012. Rock art research in India: Historical approaches and recent theoretical directions. In *Companion to rock art*, ed. Jo McDonald and Peter Veth, 179–196. Oxford: Blackwell.

Boivin, N. 2004. Rock art and rock music: Petroglyphs of the South Indian Neolithic. *Antiquity* 78 (299): 38–53.

Fawcett, F. 1892. Pre-historic rock pictures near Bellary, South India. *Imperial and Asiatic Quarterly Review* 3: 147–157.

Foote, R.B. 1916. *The Foote collection of Indian prehistoric and protohistoic antiquities: Notes on their ages and distributions*. Madras: Government Press.

Fuller, D.Q., N. Boivin, and R. Korisettar. 2007. Dating the neolithic of South India: New radiometric evidence for key social, economic and ritual transformations. *Antiquity* 81: 755–778.

Gordon, D.H., and F.R. Allchin. 1955. Rock paintings and engravings in Raichur, Hyderabad. *Man* 55: 97–99.

Gordon, D.H. 1951. The Rock Engravings of Kupgallu Hill, Bellary, Madras. *Man* LI, 117–119.

Korisettar, R. 2014. *Prehistoric landscape art of India and mobility range of hunter-gatherer and agro-pastoral communities: A working hypothesis. Dr. V.S. Wakankar Memorial Lecture*. Bhopal: Dr. V.S. Wakankar Archaeological Research Institute.

Korisettar, R., and P. Prasanna. 2014. Sanganakallu. In *History of India: Prehistoric roots*, ed. D.K. Chakrabarti and M. Lal, 824–842. New Delhi: Vivekananda International Foundation and Aryan Books International.

Mahadevan, C. 1941. Geology of the south and south-western parts of Surapur Taluk of Gulbarga District. *The Journal of Hyderabad Geological Survey*: 402–6.

Munn, L. 1934. Prehistoric and protohistoric finds. *The Journal of Hyderabad Geological Survey*: 121–135.

Munn, L. 1935. Prehistoric and protohistoric finds in Raichur District. *Man in India* XV: 225–250.
Neumayer, E. 2011. *Rock art of India, the prehistoric cave-art of India*. New Delhi: Oxford University Press.
Paddayya, K. 1968. *Pre and protohistoric investigations in Shorapur Doab*. PhD Thesis submitted to Pune University, Pune.
Paddayya, K. 1976. Cup-marks in the Shorapur Doab (South India). *Man* 2: 35–38.
Reddy, V.R. 1971. Rock paintings and bruisings of Andhra Pradesh. *The Eastern Anthropologist* XXIV (3): 289–294.
Robinson, D.W., R. Korisettar, and J. Koshy. 2008. Meta-narratives and the (re) invention of the neolithic: A case study in rock art from Birappa and Hiregudda Hill, South-Central India. *Journal of Social Archaeology* 8 (3): 355–379.
Sundara, A. 1994. *Karnataka Pragitihaasa Kalada Kale (prehistoric art in Karnataka)*, A Monograph. Bangalore: Karnataka Lalita Kala Academy.

Rock Art in Namibia

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Introduction

Rock art in Namibia is of special interest for research on a global scale because it is particularly rich hunter-gatherer art and it features paintings and engravings (or petroglyphs) in roughly equally shared landscapes that have experienced comparatively little anthropogenic changes since creation of the art. Above all, Namibia is the country where hunter-gatherers lived their traditional way of life in arid landscapes far into the twentieth century and therefore becoming the main reference for forager studies worldwide. However, differently from the Republic of South Africa, none of the extant hunter-gatherer groups in Namibia has recent links to or a cultural memory of the prehistoric art that is generally older than 1000 years. The oldest known African portable art originates from Namibia with the 30,000 years old painted slabs from the so-called Apollo 11 Cave, Southern Namibia (Fig. 2) (Wendt 1976; Vogelsang et al. 2010). While rock art is a country-wide phenomenon where suitable rock is available, western Namibia's region primarily stand out through the density and richness of the art: Dâureb (Brandberg), Erongo mountains, /Ui-//aes (Twyfelfontein) engraving site, declared UNESCO World Heritage Site in 2007, as well as Spitzkoppe Mountains (Fig. 1). To some extent, the concentration of research in these sites was caused by their location in places comparatively easy to reach from the larger cities and because their rather well-known names may have promised a certain prestige.

Definition

Namibia's four outstanding rock art areas constitute characteristic Later Stone Age (LSA) hunter-gatherer rock art environments. However, there is variability in the placement of the artwork in the landscape, in the basic quantitative data and there are variations and idiosyncrasies of two genres of hunter-gatherers rock art tradition (paintings and engravings). Notwithstanding such differences in the quantitative weight of human and animal motifs, abstract symbols or the production of scenes, similarities have been observed in the content of both, paintings and engravings (themes, techniques, stylistic expressions) indicating a broad geographical and temporal continuity of the hunter-gatherer tradition in this life-world.

The **Dâureb** (also Dâures) is a granitic inselberg constituting an extensive mountain oasis on the fringes of the Namib Desert. This circular mountain with a diameter of 30 km rises 2 km above the surrounding desert and savannah areas and harbors about 1000 rock art sites with approximately 50,000 rock paintings, most of which have been published (Pager 1989–2006; Lenssen-Erz 2001; Brandberg Daureb Database n.d.) and over 2700 rock engravings (Gwasira 2011). This density of rock art is owed to the advantageous living conditions for hunter-

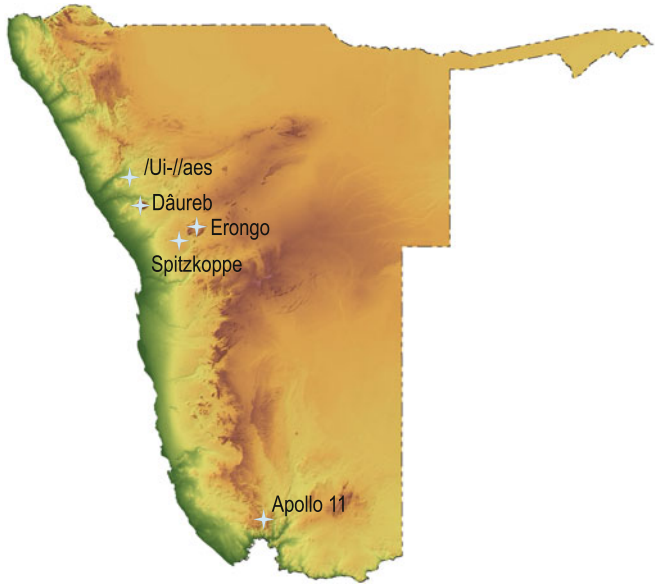

Rock Art in Namibia, Fig. 1 Map of Namibia showing rock art regions and sites mentioned in the text. (Graphic artwork by O. Vogels)

Rock Art in Namibia, Fig. 2 One of the several painted slabs from Apollo 11 cave in southern Namibia; with a date of more than 30,000 years Africa's oldest representational work of art showing a therianthropic figure with animal body and human hind legs (max. width 11.2 cm; photo Heinrich-Barth-Institut)

gatherers in this highland. Copious natural cisterns and dense vegetation can be encountered even months after the rainy season, yet no big game. This framework gave reason for the anatomically modern human to settle this area in varying intensity from the Middle Stone Age until the colonial times. The times of the Later Stone Age between 2000 and 4000 years ago are among the phases with most intense activities, and it is also this period when most of the rock art was created (Richter 1991; Breunig 2003).

There is an enormous span with sites containing only a single figure and others with more than 1000. Quite obviously, such a divergence must also go together with differences in use and function. In the number of figures per site the median is 18, accordingly half of the sites have 18 or less figures; but it also means that in this half of the sites

Rock Art in Namibia, Fig. 3 A rich panel from Snake Rock in Hungorob Gorge, Dâureb, showing the inseparable link of rock art with the landscape. (Photo M.T. Erz)

there is only 8% of the entire wealth of art. This indicates a very wide scattering of the art across the landscape (Fig. 3).

On the other hand, the six sites with more than 800 figures make less than 1% of the sites but they harbor almost 12% of the art. Extending these considerations by the inclusion of sites holding more than 200 figures it turns out that more than 40% of the art can be found in only 6% of the sites. These figures show clearly that besides the scattering of the art across the landscape, there is another principle of the art being highly concentrated in a few places. Since rock art is a phenomenon of ritual and religious significance, such concentrations also mean a concentration of powers, supernatural ones that is. These observations are corroborated by further functional analyses of the sites which include features of the natural surroundings as much as archaeological finds and rock art (Lenssen-Erz 2004). The patterns of use suggest a reaction of the people to climatic conditions: the many small sites which could have been used only by a small number of people may have provided shelter during short stays in dry periods. In these times, they had to restrict their group sizes due to scarcity of food and water while keeping up a high mobility since in a small region the limited resources would have been exhausted within short time. The constant preparedness of the people to produce rock art any time even during a short stay at small, inconspicuous places indicates, besides the everyday character of the art, that frequently there arose a necessity to become ritually active (cf. Kinahan 1991: 42). Such high activity is typical for times of crises – which in a region like the Dâureb are likely to be ecological in character (draught). The problems of an ecological crisis could easily become a social crisis as well (competition for resources) to which people reacted by implementing their social and spiritual management tools, the most visible and durable of which are rock paintings. Ethnographic observations among Kalahari hunters show that ritual activities such as healing are significantly intensified when resources are strained (Lee 1979) (Fig. 4).

The two somehow contradictory distribution patterns suggest two basic conclusions: On the one hand, the scattered rock art was a medium of everyday which one could get into contact with anytime "in small doses." Without a special setting and without much ado, the pictures were strewn into the landscape, thus releasing them from a special weight and including them into the everyday. Even in places which were occupied only shortly or where one only passed by, people left behind their pictures.

This pattern is contrasted by the concentration of art in a few "mega-sites," indicating that in some places, which were also suited for large

Rock Art in Namibia, Fig. 4 This extraordinary scene from Ga'aseb Gorge, Dâureb, shows three richly decorated men (shamans?) approaching a giraffe over which a rain shower seems to come down (height of central man 30 cm; photo M.T. Erz)

gatherings, art was celebrated for large crowds. Very likely, these were the occasions where together with the ritual of painting, the entire cultural knowledge with all its rules of conduct between all agents of the physical and metaphysical world was activated. Form and content of communication and behavior would have been strongly regulated through conventions and people would sharpen their awareness that the same kind of art could serve for everyday as well as for the extraordinary, depending on the context.

There may also be an ecological context for the large aggregation sites since they could have been meeting points on special occasions during the rainy season when even with the presence of many people (possibly more than 100) resources would not become scarce.

Rising above 2350 m from the surrounding Namib plains is another principal dome-shaped inselberg, the **Erongo Mountains**, about 100 km ESE of the Dâureb. It has a diameter of 65 km, making the largest and one of key prominent landmarks in central Namibia and one of the key prehistoric rock art areas in Namibia. Its inventory to date stands at more than 108 sites with over 5300 figures (Nankela 2017). However, a large number of rock art collections remain relatively unregistered. Erongo Mountains are located within a transitional zone between the Namib Desert and the savannah woodland; the area supports a rich diversity of flora and fauna. Unlike Dâureb, Spitzkoppe and /Ui-//aes, Erongo receives more than twice the 100 mm annual rainfall of its surrounding Namib Plains as a result of orographic precipitations and other moisture in form of fog. Such advantageous configurations translate to localized microclimates thereby affording favorable living environment for people and animals. Very likely, such resources must have sustained livelihood throughout the years. Consequently, hunting and gathering economic activities may have survived longer into more recent time without being entirely displaced by herder groups. This explains the persistence of archaeological signatures during the later stage of the LSA when some rock art was likely produced (Nankela 2017) (Fig. 5).

Compared to Dâureb and Spitzkoppe Mountains, some farms and areas in Erongo do not exhibit similar patterns of distribution and density which can be attributed to the site use and function. In Omandumba Farms, for instance, the latter indicates that the average number of figures per site stands at 30.4. Consequently, 72% of these sites have between 10 and 49 figures to attest their use. Such sites are widely scattered across the landscape and occupy various topographical locations with very little to no traces of human occupations because they occupy spaces that are not useful for habitation. Furthermore, such sites do

Rock Art in Namibia, Fig. 5 Typical scene with hunters from Omandumba Farm, Erongo. These men carry their hunting gear under their arms and additional bundles on their heads. (Photo A. Nankela)

not necessarily have direct access to reliable water sources. The sites might have functioned as casual hunting blinds, overnight stations for hunters or waymark sites since they are located along the natural travel routes. The characteristics of these sites exhibit the profile features of a typical "Waymark site" (Lenssen-Erz 2004: 145) defined for spatial analyses of Dâureb rock art. Numerically, these sites are dominated by anthropomorphic depictions. Common scenes include hunters bearing hunting equipment (bow, arrows with quiver bags), long sticks and carrying some unidentified objects on their shoulders (which according to local San men can be interpreted as hunted game/meat); very few depictions show social gatherings of people in small bands. Extending these are sites that have between 50 and 169 figures per site, which account for 15% in the repertoire. By character, this defines part of the profile of "Short-term living site," "Long-term living site," "Aggregation Camp," and "Casual ritual site," respectively (Lenssen-Erz 2004). They occupy spacious rock shelters and caves with complex paintings. These sites have strong evidences of human occupations with extensive surface scatter of LSA archaeological artifacts such as lithics, ostrich eggshells, hearths, charcoals, sediments, and beads. Such sites are primarily found at lower topographical locations with direct access to the resources (game and water), with smaller peripheral sites scattered about the same general area. Some of these sites also have good overview of the landscape – which probably meant that the whole territory was under constant surveillance. Such sites might therefore provide security from predators or perhaps rival groups. Very likely these sites functioned as dwelling spaces for long- or short-term stays living. Sites that fit the profile of "Sanctuary, 'hermitage'" account for 13% of the sites with between 1 and 9 figures per panel. These sites are very secluded, highly concentrated, and limited in distribution. They are often isolated on hilltops without neighboring sites and with no useful spaces for habitation – due to their morphology as evidenced by the absence of surface artefacts. Furthermore, they do not have direct access to natural infrastructures. The profile that Nankela (2017: 447–448) assigned to the sites includes "Casual ritual sites" and "Sanctuary, 'hermitage'". Unlike the public displays and greater visibility of artworks in other classes, figures at these sites are often small and placed at inaccessible locations such as ceilings, crevices, and fissures or on boulders where only extremely restricted movements are possible. The sites also depict unusual figures associated with their possible shamanistic functions where hunter-gatherers religious practices were likely carried out, including rain-making, healing, initiations ceremonies for boys and girls, and other shamanistic activities such as out-of-body travel and the spiritual control of game animals. Within this tradition, such shamanistic experiences were perceived, used, and

were expressed in the metaphors that were then transferred to rock art.

Unlike the pattern of usage in Dâureb, which is suggested of partly resulting from people reacting to climatic conditions (Lenssen-Erz 2001; Breunig 2003), the use of many small sites in Omandumba farms, Erongo, may not necessarily translate to such. It could instead be seen that landscape was rather exploited sustainably. Its advantageous configurations meant that Erongo was an affluent area with complex vegetation mosaic for migratory large game and people. Like today, resources (food and water) were probably readily available without people and animals having to compete for it even during dry seasons. Here, very likely people could stay longer and produce rock art only when necessary. This notion is further evidenced by the persistence of hunter-gatherers archaeological signatures about 50 AD. Moreover, Erongo's strategic position could also serve as a corridor between the dry and barren Namib and Savanna grassland during dry seasons for migratory hunter-gatherers bands and large game. This might explain the high density and distribution of archaeological sites towards the southwestern and northwestern sides of the mountain in which directions Spitzkoppe, Dâureb, and /Ui-//aes are oriented as opposed to other areas of the mountain which do not lead to comparable significant forager lands. The high density of such archaeological sites, although known, remains relatively unregistered (Nankela 2017). Erongo's seasonal rivers do not retain water throughout the year, but rainwater disappears beneath the sand of ephemeral rivers. Sometimes this water is readily accessible in shallow, hand-dug wells and complemented by other underground seepages. The existence of permanent springs and a lake may further support its inhabitants during dry seasons which might explain the majority of artworks being strewn across the landscape as opposed to being localized as observed in Dâureb, Spitzkoppe, and /Ui-//aes, whose mega-sites have direct access to scarce localized resources.

Another comparable iconic topographic feature in the central Namib landscape is the **Spitzkoppe** Mountain, rising over the featureless Namib Desert and about 40 km southwest of Erongo Mountains. The complex consists of the Klein Spitzkoppe (1640 m), the Gross Spitzkoppe (1728 m), which lies 15 km to the east, and the Pondok Mountains. Available archaeological record indicates that Spitzkoppe area was inhabited for more than 4000 years. This period coincides with the onset of increasingly arid conditions experienced in the Namib. Paleoclimatic evidence into central Namib and northwestern Namib shows series of rapid aridification events beginning at 3800 BP, which marked a progressive decrease in regional humidity across Southern Africa (Chase et al. 2010: 36–45). Spitzkoppe's archaeological heritage is therefore represented at 65 hunter-gatherers rock painting sites with more than 737 figures, most of which are concentrated around the edges of its granite outcrops (Kinahan 1990). The sites were strategically placed at low topographical configurations because of their direct access to open space and where water and shelter are in convenient proximity. Consequently, such sites may have served as aggregation areas for otherwise dispersed groups of hunter-gatherers occupying these outcrops. Ultimately such aggregation led to the archaeological signatures becoming localized in the area. But also here, in times of ecological crises and diminishing food resources, ritual activities must have intensified (Kinahan 1990) (Fig. 6).

Spitzkoppe rock art is mainly devoted to human and some animal figures. In general, the pattern of use and distribution exhibits similar phenomena as in Dâureb Mountain. Rock art sites are loosely clustered in a number of small groups, with a number of isolated individual sites. The clustered sites sometimes contain one single figure with little or no traces of human occupations to attest their use (Kinahan 1990). Sites with many paintings have complex depictions of artwork related to ritual practices. These clusters surround small water seepages or rock basins where rainwater accumulated (Kinahan 1990). The pattern further reflects both the availability of water resources, suitable shelters among the boulders, and an abundance of food resources (game and edible plants) particularly during and immediately after rain

Rock Art in Namibia, Fig. 6 Another file of men seen at Spitzkoppe Mountain; besides bows also other types of equipment are displayed here with expressive gestures. (Photo A. Nankela)

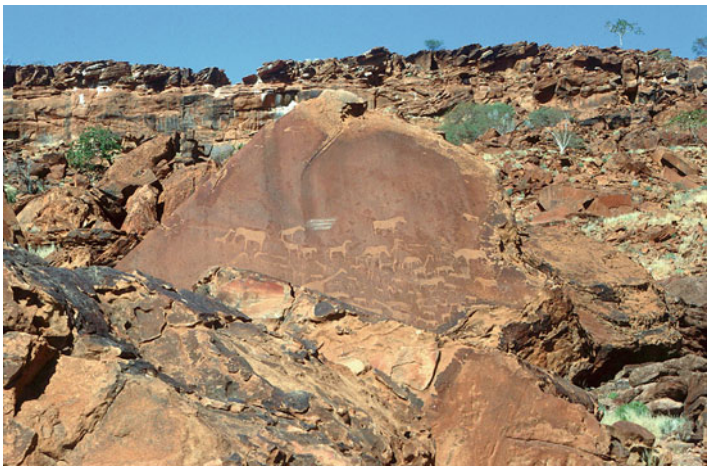

Rock Art in Namibia, Fig. 7 At /Ui–//aes engravings are scattered widely over a slope with a more or less reliable spring. (Photo M.T.Erz)

seasons. No doubt this pattern also reflects the social spacing of related but separate hunter-gatherer bands (Kinahan 1990). As aridity increased, it evidently led to the seasonal migration of large game and hunter-gatherers to affluent areas that offered favorable conditions such as Erongo in order to cope with diminishing and critical resources. Evidence from the archaeological test excavation in Bushman Paradise rock shelter for instance yielded a radiocarbon dated sequence spanning from the period from 4160 to 1240 years BP (Kinahan 1990). The archaeological deposits contained a well-stratified series of occupation events with hearths, stone artifact assemblages indicative of hunting and gathering strategy, as well as faunal remains such as tortoises, mongooses, birds, rodents, ostrich eggshells, and hunted animals such as springbok. The reduction of big game hunting went together with the production of rock art, possible adjustment of stone tool technologies, as well as the exploitation of plants to supplement diet (Kinahan 1990: 7–8). Such evidence according to Kinahan indicates an early transition from a hunter-gatherer to herding economy. However, evidence for herding is scant with only one depiction that has been addressed as a buffalo or wildebeest (gnu) while Kinahan identified it as cattle.

The fourth key rock art area in northwestern Namibia with the largest concentration of engravings in Southern Africa is Namibia's first World Heritage site, **/Ui-//aes** or **Twyfelfontein** (Fig. 7).

The site is located in a valley flanked by a spring and slopes of sandstones of Etjo, Gai-As and Kuiseb formations while rising above 550 m. Today, the area receives unreliable rainfall pattern with series of ranging temperatures. Its rock art repertoire contains (according to different authors) between 2404 and 5000 figures, most of them engravings and much lesser paintings, (Scherz 1975), with a dominance of animals in form of figures and animal spoors. Human representation is in form of hand and footprints only. The engravings are scattered over an area of several hectares in a sloping terrain with hundreds of sandstone boulders. The majority of engravings are found on open and highly visible rock surfaces (Fig. 8) while others appear to be hidden or intentionally placed at the entrances of natural tunnels in the rock face with restricted movement from one physical space to another (Kinahan and Kinahan 2006: 44–45). The significance of such is not found within the figures themselves but rather in their placement in the landscape, deemed important in ritual practices. Rock paintings on the other hand are concentrated and found exclusively in a few rock shelters that are partly secluded and in hidden locations such as rock crevices and fissures. Such places have been viewed to have "double significance" in that they were likely used by the shaman in solitary preparation for ritual practices and used as points of entry to the supernatural world by medicine man (Kinahan and Kinahan 2006).

Archaeological investigations carried out at numerous rock painting shelters in /Ui-//aes show intensive and repeated human occupations with radiocarbon dates between 3450 and 5850 BP and 370–180 years BP (Wendt 1972; Richter 1991). Such evidence suggests seasonal occupations over the last 5000 years by hunter-gatherer groups. As in most parts of the Namib, this period corresponds to arid conditions in the Namib Desert but the presence of the permanent spring /Ui-//aes, especially during dry periods, meant that water and shelter were found in a convenient location that served as aggregation locale for hunter-gatherer groups and game. The increase of ritual activity during such aggregation would have then culminated into accumulation of rock art within the site.

Key Issues and Current Debates

Contextualizing rock art tradition in the regional archaeological framework is one of the vital components in understanding this complex archaeological material. However, both genres of rock art proved to be difficult, consequently, they are often dated in associations with other archaeological artifacts. Such associations do not necessarily produce the actual age of the artworks, rather the period from which the tradition was likely abandoned. In these cases, it is possible that the artworks could either be older or younger than its

Rock Art in Namibia, Fig. 8 A famous motif at /Ui–//aes is the so-called Dancing Kudu, executed in a rare polishing technique and surrounded by typical geometric motifs that are sometimes associated with waterholes. (Photo M.T. Erz)

associated artifacts. A classic example is from Namibia, is Africa's oldest painting, Apollo 11 *art mobilier* from Southern Namibia, recovered from the Middle Stone Age assemblages. It is possible that the artwork could even be older as demonstrated by the new calibrated data between 31,100 and 32,900 calBP (Vogelsang et al. 2010). Rock engravings are even more difficult because they are mostly found in open-air sites and not in the usual archaeological contexts, which means that they cannot be dated in association with other artefact assemblages.

In order to establish the chronological contexts of rock art, a series of radiocarbon dates collected at several sites within the Dâureb indicate that prehistoric hunter-gatherers settled the mountainous massif between 5000 calBC and 1000 calAD (Breunig 2003: 273). The dating of the rock art itself is a more difficult task. J. Richter correlated radiocarbon dates from painted sites and unpainted sites in northern central Namibia and concluded that the rock art may have flourished in a rather short time period between 3500 and 2000 years BP (Richter 1991: 257). There is corroboration for this time period from archaeological excavations conducted by P. Breunig at several sites within the Dâureb. Most importantly, he excavated an in situ piece of painted rock fallen off the wall. Two radiocarbon dates from charcoal in the relevant archaeological layer yielded ages of 2760 ± 50 (KN-3544) and 2710 ± 60 BP (KN-4117), providing a *terminus ante quem* for the act of painting (Breunig 2003: 83) and supporting the chronology suggested by Richter. Of importance for the understanding of the western Namibian rock art is the fact that the archaeological results from Namibia pre-date the so-called Bantu Expansion (roughly dated to c. 400 AD) that brought pottery and small stock and later iron and cattle to the region.

In Erongo, reliable dates directly linking rock art to sites' occupations have been recorded at a number of important sites. Archaeological excavations at Cymot Shelter, Striped Giraffe shelter, and Davib-Ost Farm near Ameib Farm have produced the earliest LSA occupations in the entire Erongo Mountains from sediments that produced charcoal materials with radiocarbon dates 5740 ± 110 BP and 3790 ± 110 BC. These were supplemented by dates obtained from the Stripped Giraffe shelter between 4590 ± 100 BP and 3080 ± 100 BP, where rock paintings were also found but not recorded. The mid-section of the horizon B of the LSA site of Fackelträger in Omandumba West Farm excavated by Eric Wendt (Wendt 1972: 39; Richter 1991) has also yielded concentration of 360 g of hematite dating 3500–2000 BP as well as a pigment-stained pestle dating 2500 BP and 3000 Cal BP (Freundlich et al. 1980). Such dates were complemented by lithic artifacts directed towards activities such as hunting and tool production recovered from the LSA sequence between 2980 ± 120 BP with most recent dates of 2770 ± 120 BP (Wendt 1972: 39). Another prominent LSA site in Erongo is Leopard Cave, south of the Fackelträger shelter in Omandumba West Farm excavated by David Pleurdeau and other researchers. This excavation yielded significant artifacts, charcoal remains, pigments, grindstones, and pestles dating between 2000 and 3500 Cal BP (Pleurdeau et al. 2012) while test excavations at Rain Cloud Shelter in Omandumba West Farm had also produced vital dates of 2000–2500 Cal BP from charcoal materials, pigments, grindstones, and pestles directly linked to hunter-gatherers rock art production.

The small-scale archaeological excavation at Bushman Paradise in Spitzkoppe had produced radiocarbon-dated sequence spanning from the period from 4160 to 1240 BP (Kinahan 1990). These are said to be indicative of hunting and gathering economy and comparable to the chronological sequence established for Dâureb and Erongo. This site is linked to prehistoric occupation by depictions of figures that show several aspects associated with ritual activities of hunter gatherers.

In /Ui-//aes radiocarbon dates from three excavated sites of Affenfelsen, Zwei Schneider, and Hasenbild rock shelters show variations of Late Stone Age occupation between 3450 ± 40 years BP (KN-I 468) and 5850 ± 70 BP (Pta-2654) (Freundlich et al. 1980). These dates fit in very well in the regional chronology of the Late Stone Age Period occupation. However, since none of the rock paintings and engravings were directly

dated, it is possible that some of the artwork could be older and some might be very much younger.

Future Directions

For the future through the availability of sophisticated GIS tools, rock art research in Namibia has the potential to contribute significantly to the general understanding of spatial organization of rock art and landscape use by prehistoric foragers. This can be based on the dense record of art sites encompassing almost the full number of sites in the respective regions such as in parts of the Erongo or the Dâureb. Particularly for the latter, data for more than 39,000 single figures and more than 600 sites are in open access online (Brandberg-Daureb Database n.d.) besides their full publication in paper (Pager 1989–2006).

With the development and spread of Artificial Intelligence tools as well as crowd sourcing practices, rock art research will learn to harvest large bodies of picture repositories to annotate and tag them, thus making them accessible to new ways of analyses. On the side of the presently prevailing iconographic methods, rock art will thus be analyzed across the board with statistical methods that have little in common with statistical approaches from earlier times.

With the recent expansion of modern analytical techniques using a wide range of instruments such as X-ray fluorescence (XRF), nondestructive *insitu* pXRF analyses, scanning electron microscopy coupled with energy dispersive X-ray spectrometry (SEM-EDS), X-ray diffraction (XRD), particle induced X-ray emission (PIXE), Raman and FTIR spectroscopies (see, for example, Mauran et al. 2019), for elemental analysis and structural characterization of rock art pigments, researchers are able to establish the mineralogical composition used of production of rock paintings tradition. Such studies enable researchers to provide further information about the geographic origin and sources of pigment used, conservation history of rock paintings as well as possible practices employed by artists in producing rock paintings, i.e., mixing with extenders (e.g., ochre with kaolinite), the use of binders (e.g., plant resins, wax, or urine), and/or heat treatment to alter the color of pigments.

Finally, community involvement will make important advances. On the one hand, there is a growing interest in rural communities to claim and foster their links to the cultural heritage, partly in a quest for identity and partly as a sector of economic development. On the other hand, archaeologists begin to employ indigenous knowledge in research, thus acknowledging the depth of insight that knowledge transfer in two directions can provide if members of local communities become part of the research teams (Nankela 2017).

Cross-References

► Tracking in Caves: Indigenous Ichnology

References

Brandberg Daureb Database. n.d. http://datenportal.ianus-fdz.de/pages/collectionView.jsp?dipId=1672239. Accessed 4 July 2019.

Breunig, P. 2003. *Der Brandberg. Untersuchungen zur Besiedlungsgeschichte eines Hochgebirges in Namibia*. Köln: Heinrich-Barth-Institut.

Chase, B.M., M.E. Meadows, and A.S. Carr. 2010. Evidence for progressive Holocene aridification in southern Africa recorded in Namibian hyrax middens: Implications for African Monsoon dynamics and the "African Humid Period". *Quaternary Research* 74 (1): 36–45.

Freundlich, J.C., H. Schwabedissen, and W.E. Wendt. 1980. Köln radiocarbon measurements II. *Radiocarbon* 22 (1): 68–81.

Gwasira, G. 2011. A rare combination of engravings and paintings in the Dome Gorge, Daureb/Brandberg. In *A potential core element for World Heritage Status*, Culture and environment in Africa series, vol. 1. Köln: Cologne African Studies Centre.

Kinahan, J. 1990. Four thousand years at the Spitzkoppe: Change in settlement and land use on the edge of the Namib Desert. *Cimbebasia* 12: 1–4.

Kinahan, J. 1991. *Pastoral nomads of the Central Namib Desert. The people history forgot*. Windhoek: New Namibia Books.

Kinahan, J., and J.H.A. Kinahan. 2006. Twyfelfontein / Ui−//aes World Heritage Site volume 1: Nomination dossier & volume 2: Property management plan. National Committee for the Implementation of the

World Heritage Convention in Namibia. https://whc.unesco.org/uploads/nominations/1255.pdf. Accessed 4 July 2019.
Lee, R. 1979. *The !Kung San: Men, women and work in a foraging society.* Cambridge: Cambridge University Press.
Lenssen-Erz, T. 2001. *Gemeinschaft – Gleichheit – Mobilität, Felsbilder im Brandberg, Namibia und ihre Bedeutung*. Köln: Heinrich-Barth-Institut.
Lenssen-Erz, T. 2004. The landscape setting of rock-painting sites in the Brandberg (Namibia): Infrastructure, Gestaltung, use and meaning. In *The figured landscapes of rock-art. Looking at pictures in place*, ed. C. Chippindale and G. Nash. Cambridge: Cambridge University Press.
Mauran, G., M. Lebon, F. Détroit, B. Caron, A. Nankela, D. Pleurdeau et al. 2019. First in situ pXRF analyses of rock paintings in Erongo, Namibia: Results, current limits, and prospects. *Archaeological and Anthropological Sciences*: 1–23. https://doi.org/10.1007/s12520-019-00787-7. Accessed 4 July 2019.
Nankela, A.M. 2017. *Rock art and landscape: An empirical analysis in the content, context and distribution of the rock art sites in Omandumba East and West, Erongo Region Namibia*. Unpublished PhD dissertation, Universidade de Tras-Os-Montes e Alto Douro.
Pager, H. 1989–2006. *The rock paintings of the Upper Brandberg, part I–VI*. Köln: Heinrich-Barth-Institut.
Pleurdeau, D., E. Imalwa, F. Détroit, J. Lesur, A. Veldman, J.J. Bahain, and E. Marais. 2012. Of sheep and men: Earliest direct evidence of caprine domestication in Southern Africa at Leopard Cave (Erongo, Namibia). *PLoS One* 7 (7): e40340.
Richter, J. 1991. *Studien zur Urgeschichte Namibias*. Köln: Heinrich-Barth-Institut.
Scherz, E.R. 1975. *Felsbilder in Südwest-Afrika, Teil II: Die Gravierungen im Nordwesten Südwest-Afrikas*. Köln Wien: Böhlau.
Vogelsang, R., J. Richter, Z. Jacobs, B. Eichhorn, V. Linseele, and R.G. Roberts. 2010. New excavations of Middle Stone Age deposits at Apollo 11 rock shelter, Namibia: Stratigraphy, archaeology, chronology and past environments. *Journal of African Archaeology* 8 (2): 185–218.
Wendt, W.E. 1972. Preliminary report on an archaeological research program in South West Africa. *Cimbebasia B* 2: 1–61.
Wendt, W.E. 1976. 'Art mobilier' from the Apollo 11 cave, South West Africa: Africa's oldest dated works of art. *South African Archaeological Bulletin* 31: 5–11.

Further Readings

Coulson, D., and A. Campbell. 2001. *African rock art*. New York: Harry N. Abrams.
Deacon, J. 2002. Southern African rock art sites. International Council of Monuments and Sites (ICOMOS). https://www.icomos.org/fr/116-english-categories/resources/publications/227-southern-african-rock-art-sites. Accessed 4 July 2019.
Lenssen-Erz, T., and M.T. Erz. 2000. *Brandberg, der Bilderberg Namibias. Kunst und Geschichte einer Urlandschaft*. Stuttgart: Thorbecke.
Lewis-Williams, D., and T.A. Dowson. 1989. *Images of power: Understanding bushman rock art*. Johannesburg: Southern Book Publishers.
Marshall, L. 1976. *The Kung of Nyae Nyae*. Cambridge, MA: Harvard University Press.
Phillipson, D.W. 1993. *African archaeology.* 2nd ed. Cambridge: Cambridge University Press.
Pleurdeau, D. 2016. *Dynamique des peuplements en Namibie a l'holocène, mission archéologique en Namibie*, rapport d'activités de la champagne, Unpublished report, Paris, Museum National D'Histoire Naturelle.
Sandelowsky, B., and A. Viereck. 1969. Supplementary report on archaeological expedition of 1962 to Erongo Mountain of South West Africa. *Cimbebasia B* 1: 1–43.
Scherz, E.R. 1970–1986. *Felsbilder in Südwest Afrika, Teil I-III*. Köln/Wien: Böhlau.

Rock Art in Southern Africa, Regional Difference

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Introduction

Before the interpretative approach to San rock art in the 1970s (Lewis-Williams 2002: xiv), a significant interest of amateurs and rock art specialists was the regional differences seen across the southern African subcontinent. After a long hiatus, there has been a renewed interest in regionality (e.g., Hampson et al. 2002; Hampson 2015; Laue 2017). There are three distinct art traditions in southern Africa, the geometric art of the Khoekhoen pastoralists, finger painted art of Bantu-speaking farmers, and the fine line art tradition of the San (Bushman) hunter-gatherers. Considered here is this fine-line San hunter-gatherer tradition. Archaeological and ethnographic evidence points to the wide distribution of San hunter-gatherers and their ancestors throughout southern Africa. Their art is found

painted and engraved across the subcontinent with similarities and distinct differences seen.

It has long been recognized that the art was made by peoples with a similar world view, but regional differences are seen. Although there has been considerable recent work in the subcontinent looking at regional and locally specific traditions (e.g., Blundell 2004), little of this research has looked explicitly at regionality in terms of how to identify regions and what they may mean (see Laue 1999; Hampson et al. 2002 for exceptions).

Definition

Part of the problem with studies into difference has to do with definition. Style has long been used as a way to look at difference but is seldom defined. Many different aspects of the art are considered under the category "style," including the manner of depiction, subject matter, color, and technique. Despite a body of literature problematizing the word "style" (e.g., Boast 1997), the literature on rock art seldom addresses the issues around using this word. This entry takes regional difference to include all aspects of the art that inform on the final "look" of the images in a particular area. These include, but are not limited to technique (engraving vs. painting or finger painting vs. fine line painting), raw material on which the image is painted or engraved, motif or subject choice, differing proportions of image types (e.g., human versus animal), color choices, and subsequent use of the images through superpositioning, repainting, or touching and rubbing. Both the natural constraints of the environment and raw material availability and the cultural constraints of "ways of doing" play a role in how the images are perceived today and divided into different regions.

Historical Background

Some of the earliest work by archaeologists on southern African San rock art concentrated on the similarities and differences of rock art across the subcontinent. Miles Burkitt, a Cambridge prehistorian, spent 3 months travelling around southern Africa viewing archaeological sites. These travels resulted in a publication in 1928 which outlined three distinct rock art painting regions and one engraving region. As with much of the archaeological thought at the time, Burkitt hypothesized that the art was linked to that found in the north, particularly Spain, and had reached the subcontinent through diffusion and migration of people. Differences were thought to correspond to different Stone Tool Industries, the Smithfield, and the Wilton. Burkitt's focus on "typology" (stylistic classification of imagery) and "stratigraphy" (superposition sequences) influenced those that followed (Davis 1990: 280). At the time, elucidation of the meaning of the art was not thought possible, so the only way to study the art was to try and explain the temporal and spatial differences.

Taking the lead from Burkitt, Dorothea Bleek (1932) used her knowledge of the art to expand on the regions proposed by Burkitt. Like Burkitt, many of her described differences were based on motif, color, or subjective descriptions such as the "quantity and quality of the paintings of this Area surpass those in the first area" and that some of the animal depictions are "exquisite specimens of art" (Bleek 1932: 73). In 1941 (updated 1952), Clarence van Riet Lowe compiled an inventory of sites from South Africa and Namibia. He used the information given by magistrates, administrative officers, museums, universities, and schools to map all the known rock art localities. These localities were usually farm names or nature reserves given on the 1:50,000 survey maps. In many cases, there were many sites in each locality (Van Riet Lowe 1952: 2). He divided this area into five separate regions, which, for the first time, was clearly mapped out (Fig. 1). This map forms the basis for the regional maps and studies that followed. In 1970, Jalmer and Ione Rudner published *The Hunter and His Art* which gave an overview of southern African rock art and included an analysis of their eight painted regions and three engraved areas. Although they highlight more regions than van Riet Lowe, their descriptions of regions follow

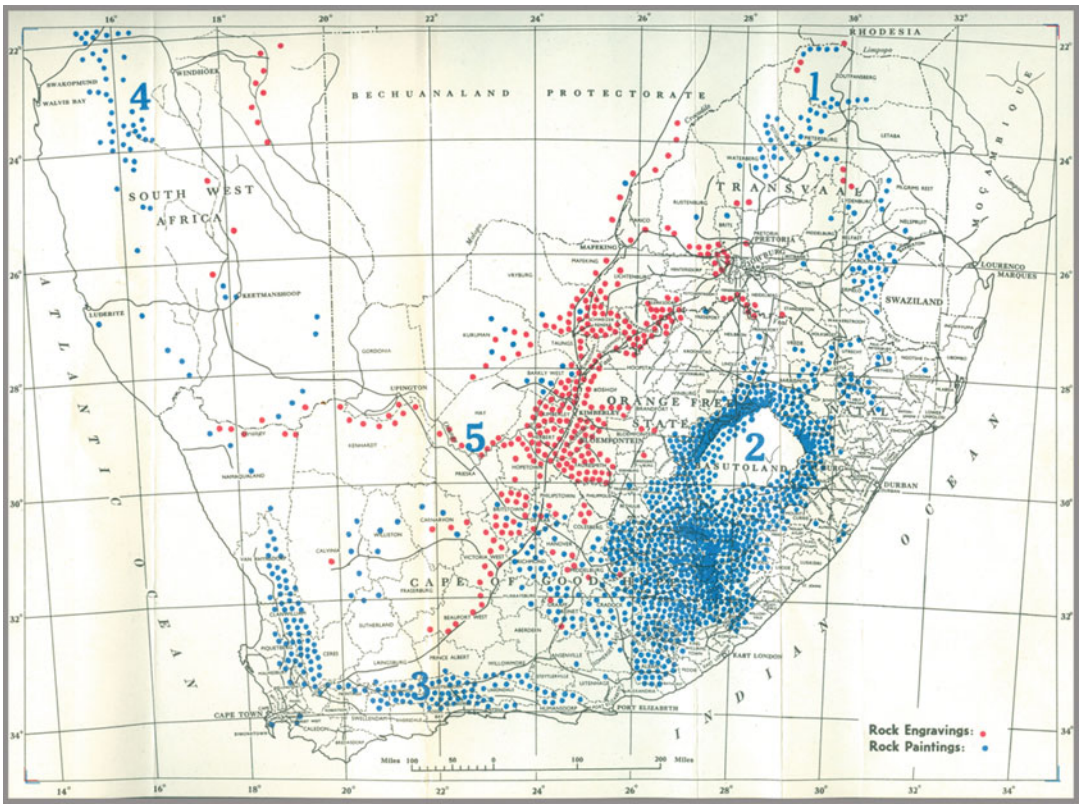

Rock Art in Southern Africa, Regional Difference, Fig. 1 Map of southern African rock art sites showing van Riet Lowe's five areas. (After van Riet Lowe 1952)

van Riet Lowe. The last person to look at regional difference comparatively across the whole southern African subcontinent was Alex Willcox (1984). While his book covers the whole of Africa, more than a third is devoted to the fine-line hunter-gatherer rock art of southern Africa and focuses on regional differences. The rock art regions proposed for southern Africa (Willcox 1984: 128) largely follow those of the authors previously mentioned with few new insights.

The common theme in all these early attempts to understand regional difference was the use of "style," without any attempt to define what was meant by the term. For the most part, what constituted regional difference was purely impressionistic, and often there was little correspondence between different author's descriptions of the same region. The author's ethnocentric bias and subjectivity are seen in the way the art was described with terms such as "vigorous and attractive" (Burkitt 1928: 131), "characterised by… a certain sense of humour" (Rudner and Rudner 1970: 1790) or being "on the whole more primitive" (Willcox 1984: 181). The principal problem with using "style" to define regions was recognized early on by Burkitt (1928: 132) "the observer . . . will find it far easier to recognize the different styles than to explain their differences," but this did not stop him or others from trying.

To these early researchers, the reason for the differences seen was obvious; different styles equalled different cultural groups. All the authors discussed, seemingly based on Burkitt's (1928) original assessment, claimed that there was an association between the Maloti-Drakensberg art (Fig. 1, area 2) and the Smithfield Stone Tool Industry, and an association between the art of the other areas and the Wilton Stone Tool Industry. In time, the association between the art and the stone

tool cultures became intrinsically bound to identity with the use of terms such as "Smithfield people" (Rudner and Rudner 1970: 180) or "Wilton man" (Willcox 1984: 142). This culture-history approach made the assumption that visual stylistic differences pointed to distinct cultural or ethnic groupings.

In the 1970s, some rock art researchers began to investigate the large body of San ethnography available, and it became clear that contrary to earlier opinions, the overall meaning of the art could be understood (Lewis-Williams 2002). At the heart of San thought lies the idea of a tiered cosmos in which the activities of shamans were all-important to the fundamentals of San life. So it was not surprising to find that the rock art dealt with "similar issues and within the same cosmological framework" (Lewis-Williams 2002: 95). The shamanistic worldview and its reliance on entering a trance state, principally through the central ritual of the trance dance, led researchers to investigate neuropsychological research on altered states of consciousness. Together, the rock art images, San beliefs and rituals and neuropsychology, were threads that were woven together to form a "complex explanatory apparatus" to explain the art (Lewis-Williams 2002: 96).

Over the years, various criticisms have been levelled against use of ethnography in southern African rock art research and the so-called "shamanic explanation." These include the way the ethnography has been used, problems in the collection of the ethnographic data and its reliability, and the problems with using more recent ethnographic information to explain images that could be thousands of years old, leading to shamanic explanations of the art being derided as essentialist and ahistorical. But despite criticisms, the cognitive approach has been extraordinarily successful and still dominates much of southern African rock art studies today. This has meant that the question of regional difference has been largely ignored. However, the old ideas founded on cultural-historical theories retained a tacit currency with the assumption that regional differences pointed to real differences identity.

Realizing the problematic nature of using "style" as a means to assess difference, the question to the few researchers who were interested in regionality became, how else can differences be investigated? In the 1990s, there were two attempts to use quantitative analysis to address this question (Hollmann 1993; Laue 1999). Both studies were constrained by the data collected by earlier researchers as well as the methodological problems of undertaking such a counting exercise. In the late 1960s and early 1970s, there had been a push to make the study of rock art more scientific which resulted in large body of quantitative data for the Maloti-Drakensberg and more limited data set from the Western Cape (Lewis-Williams 2002: 15–28). The quotidian categories used for scenes such as "hunting" and "fighting" spoke to the understanding of the art at the time; it was seen as a record of daily life and the shamanic elements of the art were not properly recorded (Lewis-Williams 2002: 20). The later quantitative studies therefore opted to only use the more basic data collected, such as animal types, male to female ratios and color used. Distinct differences were found between the areas studied and the earlier quantitative data from the Western Cape and Maloti-Drakensberg, but there was little attempt to investigate what these differences could mean (Hollmann 1993; Laue 1999). Quantitative analysis could point to differences in what was painted in various "regions" but could not explain what these differences meant in terms of the people who made the art.

A more recent attempt to explicitly look at regionality in southern African rock art recommend that, in order to avoid the tricky topic of style, motif should be the only factor investigated (Hampson 2015). Jamie Hampson (2015) suggests an approach to the investigation of regional difference by looking at the presence or absence of imagery. Three broad categories are suggested "1. Widely distributed rock art motifs; 2. Regional rock art motifs; and 3. Extremely rare or unique rock art motifs" (Hampson 2015: 90). Hampson uses this method to interrogate the imagery found in the Mpumalanga Province, South Africa, and compares the imagery to other areas in the

subcontinent. His analysis shows that while the art of Mpumalanga remains within a broad shamanic framework, there are differences in the motifs emphasized. He does not attempt to understand why we see these difference, instead concluding "[e]xactly what those regional emphases may signify is, at present, impossible to say" (Hampson 2015: 112). This approach still does not get down to solving the questions of how to define regions and what they may mean. There is also a problem of bias; how does one decide on which motifs to consider necessary in the analysis.

Which motifs are looked at will influence what a region will look like, the spread of so-called "regional motifs" are unlikely to all have the same boundaries. In the case of "widely distributed rock art motifs," it is difficult not to take into account their manner of depiction. Eland are the most common, identifiable, antelope painted in both the Maloti-Drakensberg (Fig. 2) and the southern Cape of South Africa (Fig. 3), but the way they are painted is very different. But even looking at manner of depiction has its problems, while only one image of a shaded polychrome

Rock Art in Southern Africa, Regional Difference, Fig. 2 Polychrome eland from the Maloti-Drakensberg, north Eastern Cape Province, South Africa. (Photo credit: Rock Art Research Institute)

Rock Art in Southern Africa, Regional Difference, Fig. 3 Bichrome eland from the Western Cape Province, South Africa. (Photo credit: Rock Art Research Institute)

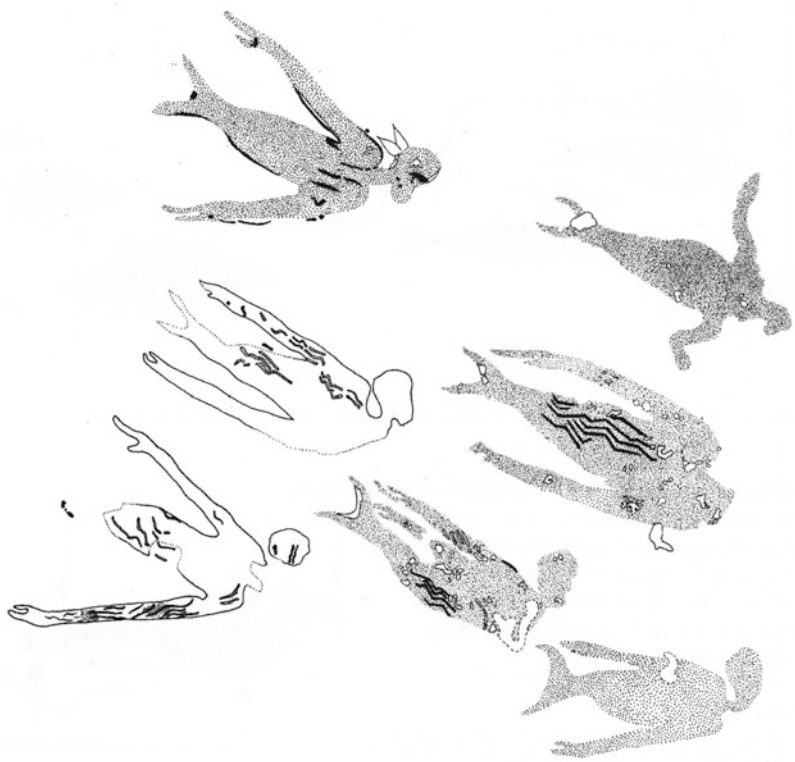

Rock Art in Southern Africa, Regional Difference, Fig. 4 Swift-tailed therianthropes from the southern Cape, South Africa. (After Hollmann 2005)

eland is known from the southern Cape, there are many monochrome and bichrome eland from the Maloti-Drakensberg which are similar to those of the southern Cape. In the case of more unusual images which have a limited distribution, the argument could be made for information exchange across that region. An example is the swift-tailed images found in a limited area, approximately 600 km by 40 km, of the southern Cape (Hollmann 2005). These unusual therianthropic figures (Fig. 4) have a human head and bird body. The similarities in the way the images are painted over this large area argue against independent origins in many locals but rather point to contact between painters across this subregion. More widely spread motifs point to the known similarity in hunter-gatherer belief systems across the subcontinent. If motif is the only factor considered, then the result is motif regions which ignore all other factors that contribute to the look of the art. Motif should aspect of the art that is investigated when looking at regional difference but should not be the only consideration.

Key Issues

There are many challenges to the study of regional difference in southern African hunter-gatherer rock art. Below are some key issues which need to be considered:

- The dating of southern African rock art sites is still in its infancy. To date, only a handful of images have been directly dated (Bonneau et al. 2017). The oldest date, obtained so far, for parietal art in southern Africa comes from Botswana with a date of 5723–4420 cal BP. Dates from western Lesotho are given as 2326–965 cal BP, while dates from the Maclear region, in the north-Eastern Cape, South Africa are given as 2998–2381 cal BP (Bonneau et al. 2017: 675). All these dates fall in the mid to late Holocene, but there are indications from the excavation record that hunter-gatherer rock art in southern Africa has a much greater time depth. The oldest dated painted stones were excavated from the Apollo 11 Shelter in

Namibia and date to at least 26,000 years ago (Lewis-Williams 1984). Although research indicates that at least some of symbolism seen in the art has a great time depth (Lewis-Williams 1984), one cannot expect that the way people made the art and the choice of motifs stayed static through time. A lack of dates means that there will be an inevitable flattening of the diachronic and synchronic elements used to investigate regional difference. However, this does not mean that regionality cannot be studied, but instead, we are likely to see broad regional trends rather than micro-regional differences.

- Motif is only one factor of many that needs to be considered when investigating difference. Quantitative analysis has shown that there are differences in the percentages of different motifs in different parts of the subcontinent. For example, female figures are more frequently painted in the Western Cape compared to the Drakensberg and southern Cape (Laue 2017: Fig. 16). The percentages of animals as compared to anthropomorphic figures in the paintings also differs between different rock art areas; in the Drakensberg, human figures only slightly out-number animal images, while in the southern and Western Cape, there are almost twice as many animal figures (Laue 2017: Fig. 25). Beyond motif, how the images are painted and how they "look" is another a critical component to consider. An example is the way that human figures are painted in different areas. In the Groot Winterhoek Mountains of the southern Cape, just over 50% of the humans are painted with hook heads compared to 18% in a study in the Drakensberg (Laue 2017: 160).
- The way the art was made, often termed "style," is a crucial factor in many of the differences noted between different areas (e.g., Figs. 1 and 2).
- Beyond simplistic ideas relating difference to ethnic or linguistic groups, there is seldom consideration given to what regional differences tell us about people of the past.
- There are still large areas of southern Africa where little or no survey work has been done. Where intensive work has been undertaken, the researchers often focus on specific aspects of the imagery or a particular motif rather than giving a more general characterization of the art needed for regional comparison.
- Geology and environmental differences are often ignored by those trying to understand difference. These natural constraints affect both what is painted (e.g., if eland do not commonly occur in a specific area, they are unlikely to be painted) and how it looks when painted. Differing geological substrates influence the placement of images as well as how the end product is perceived and how it weathers over time.

International Perspectives

Studies in regional difference in rock art, a primary focus of study in other parts of the world, encounter similar problems to those faced in southern Africa. There is little published on theoretical and methodological approaches to difference. Instead, "stylistic" differences are analyzed and often pinned to linguistic differences (e.g., Taçon 1993: 118).

With this reliance on the concept of style in much of world rock art studies, translation of these ways of looking at regional difference into a southern Africa situation is not easy. More recent studies appreciate that in order to understand regional differences and similarities, it is crucial to understand the "networks of relationships in which the rock art in embedded," but there is still a reliance on "style" as a means of classification (Brady and Bradley 2014: 376). In many cases, it is easier to justify the use of the term style, as often the cultural breaks are much more apparent. It is analogous to the differences seen between San rock art and farmer art in the Limpopo Province of South Africa. The former is a fine line art related to shamanism and beliefs about the spirit world, while the latter is a finger painted art, usually white, related to other practices such as initiation or protest (Smith and van Schalkwyk 2002). Although there are overlaps in motif, the manner of depiction is so

different that there is no confusing the two. Very little of the regional work in Australia and North America seeks to look at regional difference between areas of art which are similar in manner of depiction and have been shown to have been produced by people with very similar worldviews, as is seen in southern African San art (cf. Taçon 1993: 118).

Future Directions

This entry may seem to have painted a bleak picture of the state of research into regional difference in southern African rock art, but there is cause for optimism. Two main questions need to be answered when investigating regional difference. First, there are distinct differences between areas, but how can we record these differences without resorting to the tricky term "style"? Second, what do these differences mean?

One suggestion (Fiore 2007; Laue 2019) is that we take a more holistic approach to investigate difference. Using the idea of the *chaine opératoire* we can look at the art-making process from production to consumption. Each step along the way can be examined and thus, the differences due to natural constraints (e.g., geology, environment) can be separated from the cultural "choices" made by the painters. Further, each step or "choice" can be isolated, and similarities and differences compared. Take, for example, the two eland in Figs. 2 and 3; the difference is immediately apparent. We could say that the one is more naturalistic and the other more stylized or even worse one is more aesthetically pleasing than the other, but this does not give us a way to understand their difference. Using the method proposed above all of the following would be taken into account: differences in geology, color, technique (shading vs. no shading), details such as horns and finally how differential weathering has affected the images. Where possible, it is also important to consider the age of the paintings as older images may have lost many of their details over time. When moving beyond single images, motif "choices" could also be considered as could superpositioning. Together all these factors influence differences in the "look" of the images and differences between different regions.

Style, the presence/absence of motifs, or any other method of assessing difference does give clues to why regionality exists. Research into African farmer archaeology has challenged the view that cultures have discrete boundaries which indicate ethnic or linguistic units. Instead, the landscape can be viewed as a series of many overlapping communities of practice (Stahl 2009: 250). We are able to look at "ways of doing" without resorting to culture-history modes of thought using the concept of "communities of practice." "Communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger et al. 2002: 4). Although rock art in hunter-gatherer society fulfils a different function to pottery in farmer society, exploring the formation of communities of practice through the practice of learning and knowledge transfer can help shed light onto the differences and similarities we see in the rock art across space (Laue 2019). There are two benefits to using the concept of "communities of practice." The first is that it is the practice of making the object that is important rather than the "style" of the finished product, which gives us a way of investigating rock art which avoids the problematic use of "style." Secondly, this theoretical view lets us move away from the ideas that relate material culture to ethnicity or identity and instead look at difference as a function of different practices over varying distances in space.

Cross-References

► Rock Art in Southern Africa, Regional Difference
► Ukhahlamba-Drakensberg Park (South Africa), Rock Art at

References

Bleek, D.F. 1932. A survey of our present knowledge of rock paintings in South Africa. *South African Journal of Science* 29: 72–83.

Blundell, G. 2004. *Nqabayo's Nomansland: San rock art and the somatic past*. Uppsala: Uppsala University Press.
Boast, R. 1997. A small company of actors a critique of style. *Journal of Material Culture* 2: 173–198.
Bonneau, A., R.A. Staff, T. Higham, F. Brock, D.G. Pearce, and P.J. Mitchell. 2017. Successfully dating rock art in southern Africa using improved sampling methods and new characterization and pretreatment protocols. *Radiocarbon* 59 (3): 659–677.
Brady, L.M., and J.J. Bradley. 2014. Reconsidering regional rock art styles: Exploring cultural and relational understandings in northern Australia's Gulf country. *Journal of Social Archaeology* 14: 361–382.
Burkitt, M. 1928. *South Africa's past in stone and paint*. Cambridge: Cambridge University Press.
Davis, W. 1990. The study of rock art in Africa. In *A history of African archaeology*, ed. P. Robertshaw, 271–295. London: James Currey.
Fiore, D. 2007. The economic side of rock art. Concepts on the production of visual images. *Rock Art Research* 24: 149–160.
Hampson, J. 2015. *Rock art and regional identity: A comparative perspective*. Walnut Creek: Left Coast Press.
Hampson, J., Challis, W., Blundell, G. and De Rosner, C. 2002. The rock art of Bongani Mountain Lodge and its environs, Mpumalanga Province, South Africa: an introduction to problems of southern African rock-art regions. *The South African Archaeological Bulletin* 57: 15–30.
Hollmann, J.C. 1993. Preliminary report on the Koebee rock paintings, Western Cape Province, South Africa. *South African Archaeological Bulletin* 48: 16–25.
Hollmann, J.C. 2005. 'Swift-people': Therianthropes and bird symbolism in hunter-gatherer rock paintings, Western and Eastern Cape provinces, South Africa. *South African Archaeological Society, Goodwin Series* 9: 21–33.
Laue, G.B. 1999. *The rock art of the Uniondale District: The significance of regionality in Southern African rock art*. Unpublished BSc Honours Project, University of the Witwatersrand.
Laue, G.B. 2017. McAll's Cave: Characterising the rock art of the Groot Winterhoek Mountains, eastern Cape Province, South Africa. *South African Humanities* 30: 145–183.
Laue, G.B. 2019. *Exploring regionality in the rock art of the Groot Winterhoek Mountains, Eastern Cape Province, South Africa.* Unpublished PhD thesis, University of the Witwatersrand, Johannesburg.
Lewis-Williams, J.D. 1984. Ideological continuities in prehistoric southern Africa: The evidence of rock art. In *Past and present in hunter-gatherer studies*, ed. C. Schrire, 225–252. New York: Academic Press.
Lewis-Williams, J.D. 2002. *Cosmos in stone: Interpreting religion and society through rock art*. Walnut Creek: Altamira Press.
Rudner, J., and I. Rudner. 1970. *The hunter and his art*. Cape Town: Stuik.
Smith, B.W., and J.A. van Schalkwyk. 2002. The white camel of the Makgabeng. *The Journal of African History* 43: 235–254.
Stahl, A.B. 2009. The archaeology of African history. *The International Journal of African Historical Studies* 42 (2): 241–255.
Taçon, P.S.C. 1993. Regionalism in the Recent Rock Art of Western Arnhem Land. *Archaeology in Oceania* 28: 112–120.
Van Riet Lowe, C. 1952. The distribution of prehistoric rock engravings and paintings in South Africa. *Archaeological Series* VII: 1–59. Pretoria: Government Printer.
Wenger, E., R.A. McDermott, and W. Snyder. 2002. *Cultivating communities of practice: A guide to managing knowledge*. Boston: Harvard Business Press.
Willcox, A.R. 1984. *The rock art of Africa*. Johannesburg: Macmillan.

Rock Art of Siberia: Baikal and Transbaikal Regions

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Introduction

Siberia is an extensive geographical region, and it has a rich body of rock art. This entry is focused on two interrelated large rock art provinces: the Baikal and Transbaikal regions. It starts with an outline of timeline and geography, continues with the history of rock art scholarship, and then is followed by a review of rock art traditions and styles in chronological order with a discussion of relevant issues, debates, and future directions.

Definition

As in many parts of the world, in Siberia, the issue of the earliest rock art is problematic, and established traditions, groups, and styles were related to the periods of Neolithic, Bronze Age, Early Iron Age, and Middle Ages. The

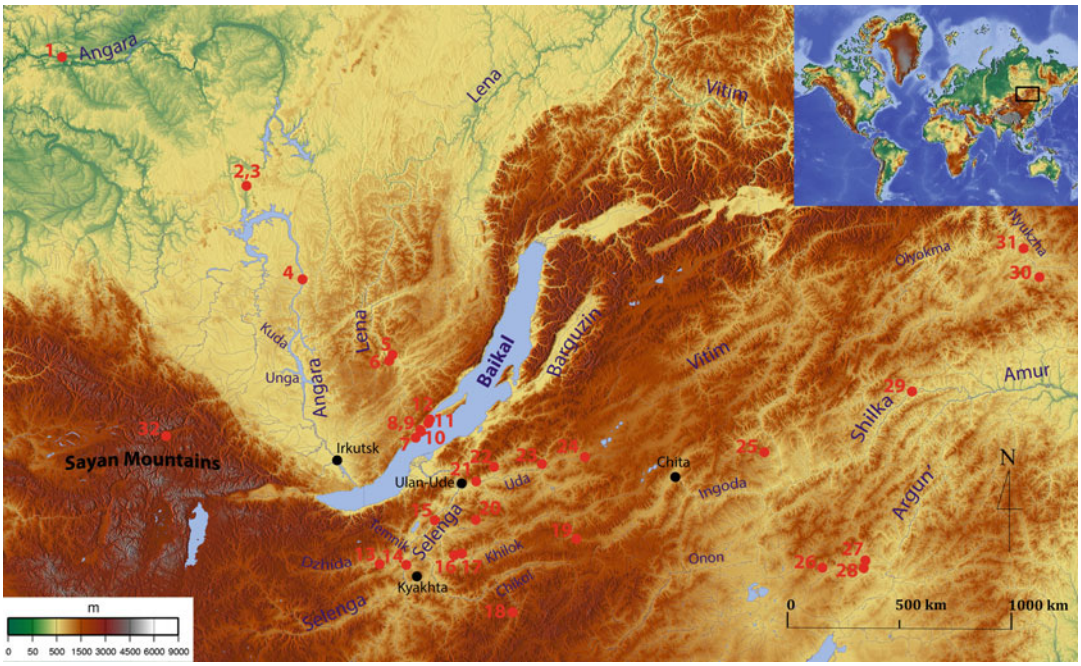

Rock Art of Siberia: Baikal and Transbaikal Regions, Fig. 1 Sites mentioned in the text. 1, Manzya; 2, Ushkaniy island; 3, Dolgiy Rapids; 4, Second Kamenny Island; 5, Shishkino; 6, Tal'ma; 7, Sagan-Zaba; 8, Sakhyurte; 9, Elgazur I; 10, Aya bay; 11, Nutgei; 12, Orso; 13, Sarbadui; 14, Baga-Zarya; 15, Mondogor-Khabsagai; 16, Khaisagar; 17, Maly Gutai; 18, Ust'-Menza I; 19, Shaman-Gora; 20, Gol-Tologoi; 21, Zal'tira; 22, Bain-Khara Angirskaya; 23, Khotogoi-Khabsagai; 24, Mukhorshibir (Onokhoiskaya); 25, Butikha; 26, Ust'-Tsoron; 27, Byrka; 28, Urulyungui I; 29, Srendeshaikino; 30, Srednyaya Nyukzha; 31, Nyukzha; 32, Mongol'dzhin (Mongolzhon)

populations of the Baikal and Transbaikal regions shared many cultural trends and actively engaged in the cultural processes of Central, Northeast, and East Asia. As it is conventionally accepted, the Neolithic Age in Siberia starts with the adoption of pottery, and the general periodization for the Baikal region can be outlined as the following:

Early Neolithic: 8000/7500–5500 BP
Late Neolithic: 5500–4500/3800 BP
Bronze Age: 4500/3800–2700 BP
Early Iron Age: seventh century BC to fourth century AD
Middle Ages: fifth to sixteenth centuries AD

There are different ways for the regional division of Siberia depending on the context. In this entry, regions are defined in order to better describe rock art provinces. The Baikal region is understood as an area to the west from Lake Baikal, which includes the western coast of Lake Baikal and southern sections of the Angara and Lena River basins. The Transbaikal region, or Transbaikalia, is understood as an area to the east from Lake Baikal and includes two Russian federal subjects, the Republic of Buryatia, conventionally referred to as Western Transbaikalia, and Zabaykalsky Krai, referred to as Eastern Transbaikalia. Some sites discussed in the entry are located in the adjacent federal subject of Amurskaya oblast, which is not traditionally considered as a part of Transbaikalia (Fig. 1).

Historical Background

The history of rock art research in Siberia started back in the eighteenth century, and the rock art

sites of Baikal and Transbaikal regions were among the first to be mentioned. These are the petroglyphs of the Angara River surveyed by Daniel Gottlieb Messerschmidt in the 1720s and by Johann Georg Gmelin a decade later. Gmelin also discovered and documented the Shishkino rock art site. In addition, some rock art sites at the Temnik and Dzhida Rivers, which are tributaries of the Selenga River, were mentioned by Friedrich Müller, the leader of the academic group of the Great Northern Expedition (1733–1743) (Okladnikov 1959, 1966; Okladnikov and Zaporozhskaya 1969).

In the nineteenth–early twentieth centuries, the aggregation of knowledge about East Siberian rock art accelerated. A number of rock art sites were discovered in the Angara River basin and surveyed by several explorers, namely, by geologist Yakovlev (1810), by a Polish convict and self-educated archaeologist Nikolai Witkowsky (1882), by Plaskovitsky (1888), by another convict Dmitri Klements (1889), and by archaeologist and archivist Mikhail P. Ovchinnikov (1916). The rock art sites on the coast of Lake Baikal were studied by N.N. Agapitov (1881), by Timofey I. Savenkov (1913), and by Berngard Petri (the 1910s–early 1920s). The latter was an influential archaeologist and anthropologist who, while working at the Irkutsk University, trained such well-known researchers as Alexey P. Okladnikov and Mikhail M. Gerasimov (Okladnikov 1966, 1974). Some brief reviews of the Baikal and Transbaikal rock art were published by Pavel P. Khoroshikh (Okladnikov and Zaporozhskaya 1969).

During this period, several rock art sites were examined and reported in Transbaikalia, such as Khotogoi-Khabsagai in the Uda River basin by Finnish ethnologist and philologist Matthias A. Castrén (1840) and by D.P. Davydov (1856), Mongol'ddzhin in the Eastern Sayan Mountains by Peter A. Kropotkin (1865), a rock art site at the mouth of the Temnik River by A.P. Mostits (1895), Khaisagar and Maly Gutay in the Khilok River basin by N.V. Kirillov (1897), and the rock art sites of Mukhorshibir, Gol-Tologoi, and Zal'tira by V.V. Popov (1925, 1927) (Okladnikov and Zaporozhskaya 1969, 1970, 13).

In the 1930s, the rock art sites of the Uda River basin were examined by G.P. Sergeev and E.R. Rygdylon. They suggested a relationship between rock art panels and burial grounds which were often found nearby, although Sergeev associated them with those belonging to the slab grave culture (the Late Bronze Age–the Early Iron Age) and Rygdylon – with those of the late nomadic culture (the Late Middle Ages). Information from Rygdylon's and Sergeev's field reports of 1934–1935 was later incorporated in Okladnikov's two-volume monograph.

A major advance in the rock art studies of Siberia was brought by Alexey Okladnikov. His explorations were so vast and intense that they included the whole of Siberia and Central Asia and all periods of human history. Concerning only the Baikal and Transbaikal regions, Okladnikov covered the following. In 1927, he reported a rock art site near the village Fofanovo. In 1929, Okladnikov rediscovered the Shishkino rock art site, which was studied again in 1941, 1947, and 1957 (Okladnikov 1959; Okladnikov and Zaporozhskaya 1959). In the 1940s, he explored the basin of the Lena River from the source to the mouth. The result was a fundamental work on the prehistory of Yakutia in which the rock art of the Upper and Middle Lena River basins was considered along with other archaeological data, although the rock art materials were completely published 20 years later (Okladnikov and Zaporozhskaya 1972; Okladnikov 1977). During 1947–1958, the systematic research of Transbaikal rock art was conducted by the Buryat-Mongol archaeological expedition, which was led by Okladnikov (Okladnikov and Zaporozhskaya 1969, 1970). He also recorded rock art sites of the Angara River during 1934–1937 and 1951–1959 (Okladnikov 1966). In 1968, 1971, and during 1973–1974, Okladnikov examined rock art sites at the Lake Baikal in the Sagan-Zaba and Aya bays (Okladnikov 1974) and, in 1976, discovered new rock art sites in the Barguzin valley (Okladnikov et al. 1980). The result of his rock

art research was more than 20 monographs containing an enormous number of tables with drawings. Okladnikov also wrote a popular science book on rock art, *The Deer with Golden Antlers*, which inspired many young archaeologists.

Okladnikov significantly advanced rock art research by bringing it into a prominent position within the broader field of archaeology and by providing the first reliable chronology of Siberian rock art, which was originally developed based on the materials of the Shishkino rock art site (Okladnikov and Zaporozhskaya 1959). He then applied this chronological framework to other rock art provinces (Okladnikov 1966; Okladnikov and Zaporozhskaya 1972). Okladnikov was the first Soviet archaeologist who used analogous depictions on artifacts from archaeological context to date rock images. Although some of his presumptions were not valid and some of his conclusions have been debated (Mel'nikova et al. 2011), in general, Okladnikov's chronological scheme is still relevant. Okladnikov also collected all available ethnographic data to uncover the meaning of prehistoric pictures, even though this was done within the framework of Marxist theory, predominant at the time in Soviet humanities.

Okladnikov was not the only one who explored rock art in East Siberia in the Soviet period. In the Transbaikal region, in the 1940s–1960s, the exploration of rock art and the search for interpretations were conducted by the head (1946–1978) of the Kyakhtinsk Local History Museum, Rodion F. Tugutov, and local researcher Galdan L. Lenkhoboev. They also participated in Okladnikov's Buryat-Mongol archaeological expedition and provided him with information on rock art sites (Okladnikov and Zaporozhskaya 1969).

In the 1970s–1980s in East Siberia, Okladnikov's exploration was continued by his disciples, and one of them was Alexander I. Mazin, who recorded many rock art sites in the Eastern Transbaikal region, Southern Yakutia, and Upper Amur basin. Mazin paid a lot of attention to the excavations under rock art panels aiming to relate the pictures with the datable cultural remains and to investigate the religious role of the sites. Although the relationship between the pictures on rocks and the culture deposits underneath is not obvious, Mazin's presumption about religious actions allowed him to correlate groups of similar pictures defined on a panel (stylistically or made by the paint of the same color) with stratified culture deposits (Mazin 1986, 1994).

The study of Transbaikal rock art was continued in the 1970s by Alexey V. Tivanenko. During 1977–1978, Tivanenko led the archaeological expedition of the Ethnological Museum of Peoples of Transbaikalia which focused on searching for and recording of rock art sites of the Republic of Buryatia. As many other rock art researchers of East Siberia of that time, Tivanenko also conducted excavations at rock art sites in order to provide age and to study religious activities. These materials later became the basis for more detailed study on the so-called sanctuaries of East Siberia (Tivanenko 1989, 1990).

In 1987, the revision of rock art sites of the Upper Lena River was started by Larisa V. Mel'nikova, Vadim S. Nikolaev, and N.I. Dem'janovich. As a result of the 20-year research, the Shishkino rock art site, as well as other sites of the Upper Lena basin, was redocumented using more accurate techniques. Dem'janovich studied the geomorphology of the Shishkino rock cliff, and her conclusions about the rock destruction process allowed her to clarify the chronological sequence for the rock art (Fig. 2). Unfortunately, only the data on the Shishkino site have been published to this day (Mel'nikova et al. 2011, 2012).

In the late 1980s–1990s, new rock art sites were discovered on the western coast of Lake Baikal and in the Khilok River basin, Transbaikalia. New sites from other areas of Transbaikalia were also reported. During the last few decades, several archaeological inventories of Buryatia were prepared, which provide brief information about site location, condition, and time of examination, and they also include some

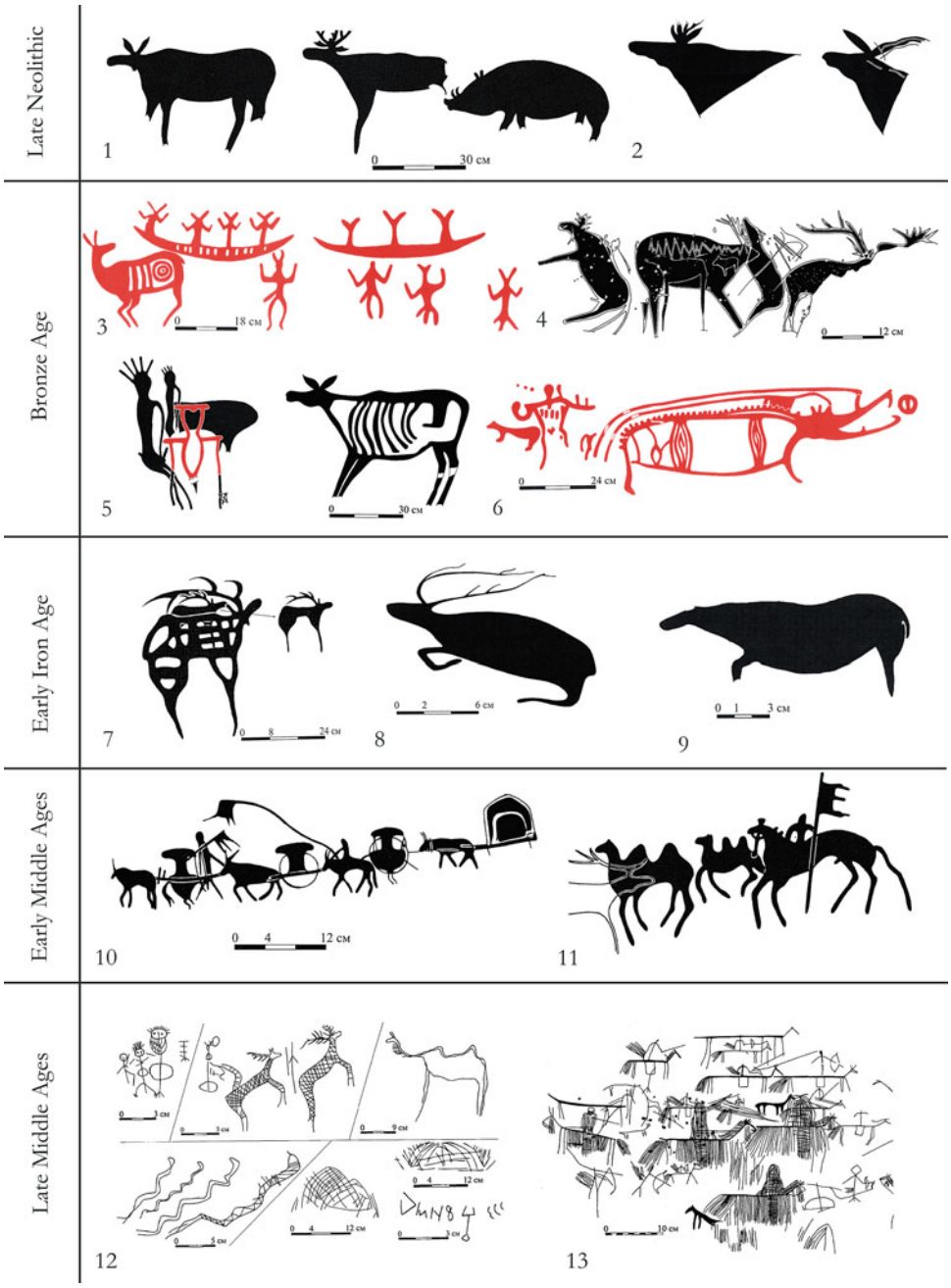

Rock Art of Siberia: Baikal and Transbaikal Regions, Fig. 2 Chronological model of the Upper Lena basin rock art after Mel'nikova et al. (2012). The table is arranged by I. Ponomareva. 1–11, Shishkino (after Mel'nikova et al. 2011); 12, Upper Lena; 13, Tal'ma (after Mel'nikova and Nikolaev 2006)

site reports which were not previously published (see Bazarov and Namsaraev 2011). These inventories did not include Zabaykalsky Krai, and the fullest information on rock art sites of the region can be found in the *Small Encyclopedia of Transbaikalia* (Geniatulin 2011).

R

Key Issues/Current Debates

The Earliest Rock Art

Until recently the oldest rock art of Siberia was believed to be the animalistic images discovered by Okladnikov at the Shishkino rock art site, which, as he assumed, belonged to the Paleolithic Age. These were two figures of wild horses and a large figure of an aurochs. His main argument was that these animals belong to the Pleistocene fauna, since their bones were unearthed from the Paleolithic sites of the region. In the Neolithic and Bronze Age, these animals could not have survived, because the climate and landscape changed, and this territory was covered by dense taiga. Other arguments referred to the stylistic appearance. Okladnikov emphasized that these figures differed from other groups related to either the Neolithic or Bronze Age or Iron Age (Okladnikov and Zaporozhskaya 1959). However, this dating was mainly criticized for its stylistic analogy of these archaic-looking images with Franco-Cantabrian cave art. The later research of the Shishkino rock art site proved that the rock surface itself on which the bull was depicted could not have appeared earlier than the Bronze Age. The surface with the horses could have been exposed as early as the Late Neolithic Age (Mel'nikova et al. 2012). Three more sites, Ushkaniy island and Dolgiy Rapids in the Angara River basin and Tal'ma in the Upper Lena River basin, yielded pictures which were related to the Paleolithic Age. These are three amorphous zoomorphic figures which were interpreted by Okladnikov as rhinoceroses. However, this interpretation raises doubts.

A number of sites in Eastern Transbaikalia and adjacent northwestern Amurskaya oblast have been related to the final Pleistocene–Early Holocene period (Figs. 3 and 4). These are Byrka, Nyukzha, Sredneshaikino, and Butikha (Mazin 1986). The Byrka site was discovered in 1983 and contained 20 panels with more than 80 painted designs, among which extinct fauna was present. It included a figure of a rhinoceros and numerous figures of steppe bison. According to dates available for the extinction of fauna, the earliest group of images at this site was then dated to 18,000–12,000 uncal BP. The Nyukzha site yielded even more solid evidence. The excavations undertaken at the site revealed that the cultural layer was covering a fallen panel with a painting of an animal. This layer yielded pieces of ochre, and some stone artifacts recovered from the layer had stains of red paint on them. One stone flake even featured an ochre fingertip. However, the site was dated only based on the typology of stone artifacts which were related to the Paleolithic Dyuktai culture of Northeast Asia dated to 35,000–10,500 BP. The sites Sredneshaikino and Butikha were related to the Early Holocene period based on stylistic similarity with the images at Byrka and Nyukzha, and the typological dating of artifacts recovered from the lower cultural layers excavated in the vicinities of the panels with the paintings. Another site, Shaman-Gora featuring stylistically similar figures of steppe bison, was discovered in the 1990s (Fig. 5). Although the authors insist upon its Late Neolithic–Bronze Age date, the arguments are not convincing since they refer to the finding of osseous remains of the steppe bison unearthed at the Ust'-Menza 1 site, which were not directly dated.

Thus, there is no rock art in the Baikal region which can be related to the Paleolithic Age. It appears that the earliest surviving rock art sites belong to the Neolithic. However, there are sites in Eastern Transbaikalia that can be quite old. The problem is that the arguments do not have a solid base. The interpretation of depicted animals as rhinoceroses and steppe bison may be doubtful. The relationship between the excavated cultural layers with rock art panels is not obvious, and the ochre uncovered from the layers was not analyzed to determine if it is the paint by which the figures on the panels were painted. Moreover, no radiocarbon dates were yielded for the excavated sites including the Nyukzha site. Therefore, these sites can be considered as possible candidates for being the earliest rock art sites in the region, along with several sites in the Altai Mountains (Molodin and Cheremisin 2007), but their age demands further investigation.

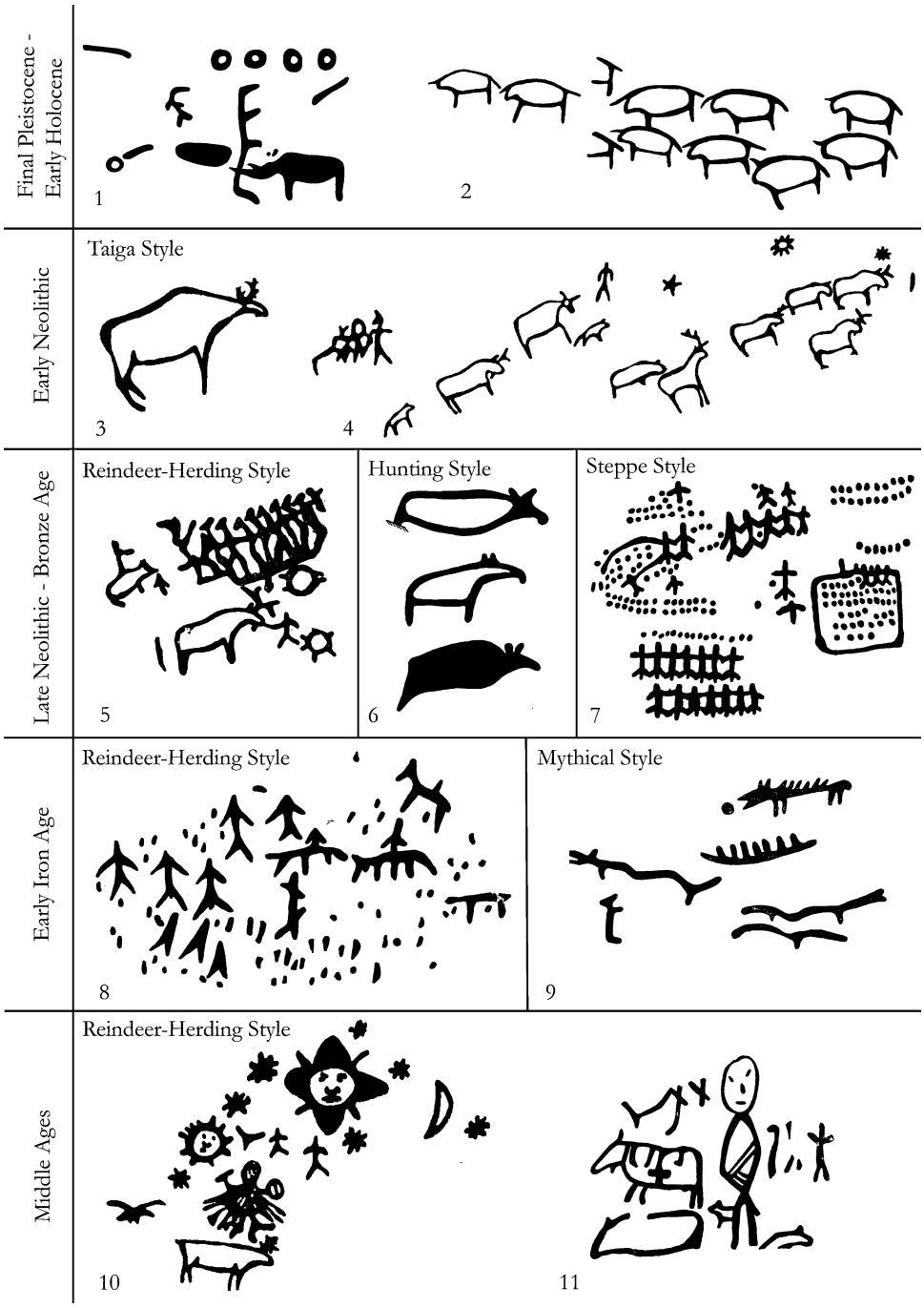

Rock Art of Siberia: Baikal and Transbaikal Regions, Fig. 3 Chronological model of Eastern Transbaikalia, Upper Amur, and Olyokma basins after Mazin (1986). The table is arranged by I. Ponomareva. 1, 2, Byrka; 6, Ust'-Tsoron; 7, Urulyungui I (after Mazin 1986); 3, 4, 10, Srednyaya Nyukzha; 5, Olyokma; 8, Tungurchakan; 9, Arbi; 10, Onen (after Okladnikov and Mazin 1976)

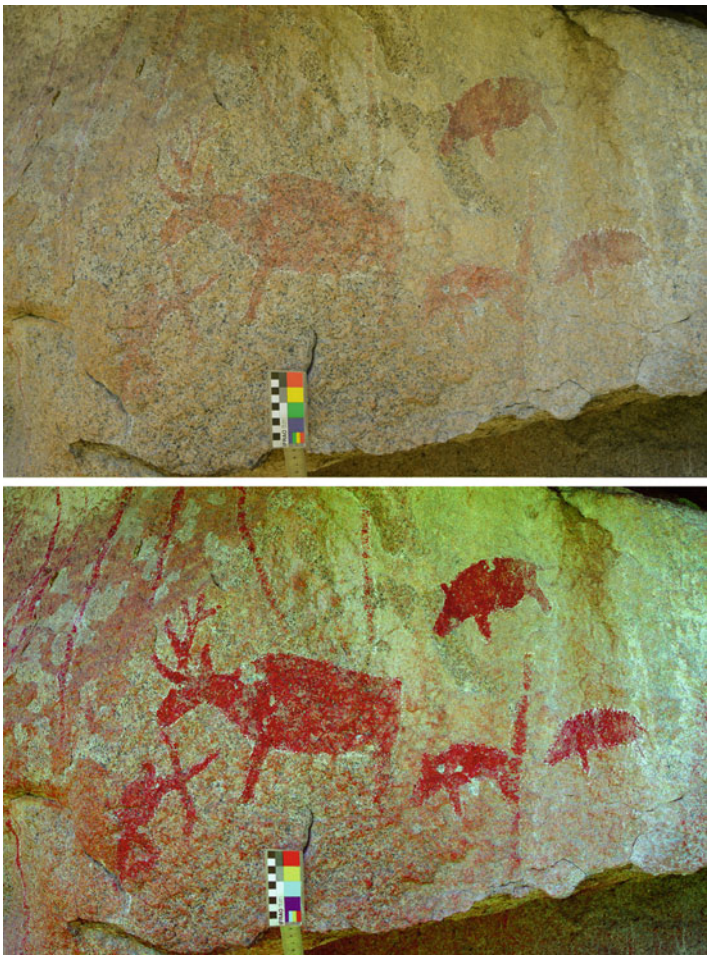

Rock Art of Siberia: Baikal and Transbaikal Regions, Fig. 4 Butikha site. (Original and DStretched photograph by I. Ponomareva)

The Rock Art Traditions of the Baikal Region in the Neolithic, Bronze, and Early Iron Ages

Neolithic rock art was first identified by Okladnikov, who characterized it as having a focus on a single motif – the elk. Elk images dominate the rock art sites of the taiga zone, which are mostly found on the banks of the Lena and Angara Rivers and their tributaries. The first group of elk depictions has a naturalistic manner of representation, features which are distinctive for the animal such as the beard, nose, eyes, and ears are shown, and the dynamics of movement expressed (Fig. 6). The second group featured a more simplistic manner of depiction where no details were shown, and the head has a paraboloid shape. The former was dated to the Early Neolithic and the latter to the Late Neolithic based on analogies in portable art.

The early naturalistic elk images were interpreted in terms of the fertility cult. The elk played an important role in the economy of the taiga peoples, and it was one of the most common characters in the mythology of indigenous peoples of Siberia (Okladnikov 1966). Okladnikov illustrated the point by rites and rituals of the Evenks, which were aimed at elk reproduction (Okladnikov and Zaporozhskaya 1959). The second group was assumed to indicate the development of hunting magic, because there were examples of archers next to simplistically depicted elk figures, elk figures with arrows in their bodies and depictions of rows of vertical

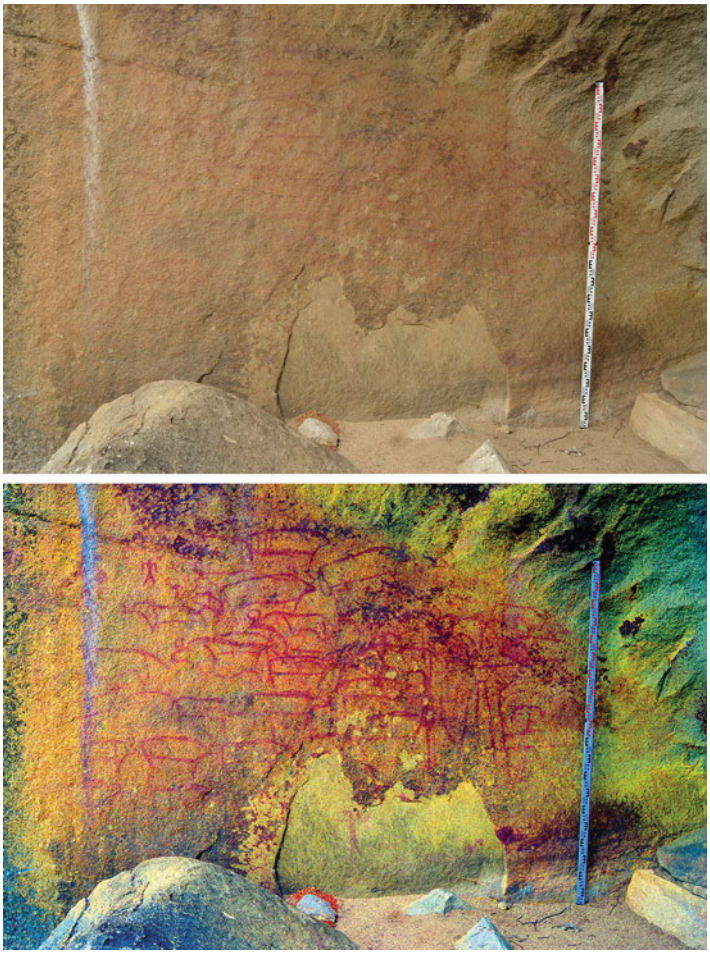

Rock Art of Siberia: Baikal and Transbaikal Regions, Fig. 5 Shaman-Gora (Ulan-Khada) site. (Original and DStretched photograph by I. Ponomareva)

lines which were interpreted as game drive structures (Okladnikov 1966).

The rock art of the Bronze Age, according to Okladnikov (1966), considerably differed from that of the Neolithic. In general, the images became smaller, the painted pictures prevailed, and the stylistic manner appeared to be more abstract in contrast to naturalistic Neolithic images. In terms of the content, the set of motifs is dominated by anthropomorphic figures which include dancing figures, sometimes shown as in a half-sitting pose, and many of them are phallic. Also, images of boats appeared in this period, which were quite abstract and depicted with anthropomorphic figures shown as vertical lines (Okladnikov 1966).

In the Angara River basin, two complexes were identified. The first included the images of faces/masks. They were correlated with the face/mask depictions of the Okunev culture present in the Minusinsk basin in the Early Bronze Age. The second included anthropomorphic figures with horns, upraised arms, and rhomboid legs which were dated to the Late Bronze Age (Okladnikov 1966). The latter was initially described based on the materials of the Shishkino rock art site where anthropomorphic figures with horns and upraised arms were found in boats in a composition with a figure of a deer which had its head turned back and vertical lines along with a spiral on the rump. Okladnikov considered it to be similar to the deer figures found on the deer stones in

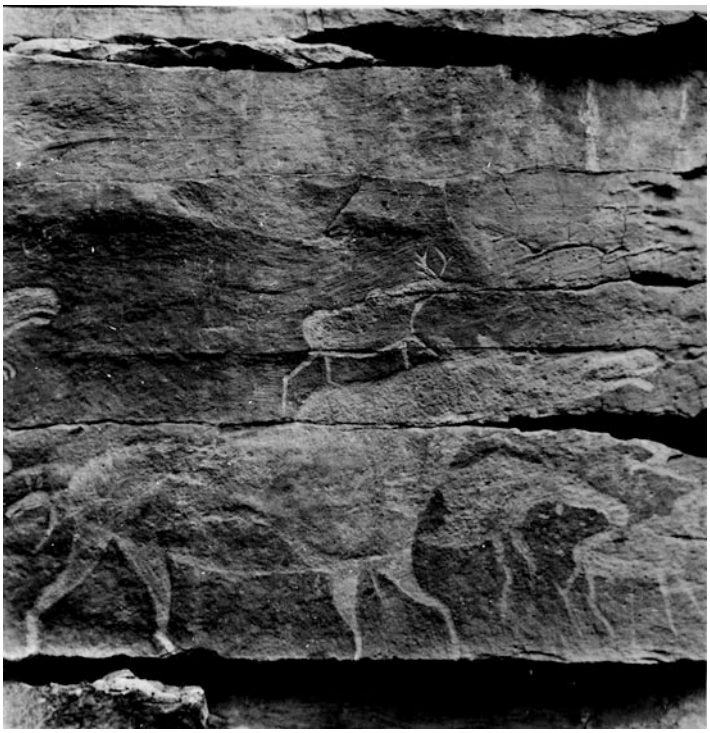

Rock Art of Siberia: Baikal and Transbaikal Regions, Fig. 6 Second Kamenny Island. (© St. Petersburg Branch of the Archive of the Russian Academy of Sciences (SPbB ARAS), Saint Petersburg branch, Fund # 1099, Inv. 1, File # 872)

Transbaikalia and metal artifacts of the Scythian type and therefore dated the complex to the Late Bronze Age–Early Iron Age (Okladnikov and Zaporozhskaya 1959).

Another area with striking Bronze Age rock art is the eastern coast of Lake Baikal where two sites, Sagan-Zaba and Aya bay, are present. The petroglyphs of Sagan-Zaba are located on a high white marble cliff which towers over the lake. A prevailing motif here is large anthropomorphic figure with broad shoulders, thin waists, and short legs. The figures give an impression that they are dancing, and some of them have horns and stripes on the torso. The site was dated to the Early Bronze Age based on the analogy with anthropomorphic figures depicted on the ceramic vessels of the Samus' culture present in West Siberia in the Early Bronze Age. Another argument was that, in the vicinity of the rock art site, the cultural remains of the Glazkovo culture of the Early Bronze Age were unearthed. The Aya bay site was related to the Late Bronze Age, since the anthropomorphic figures present there, although being similar to those at Sagan-Zaba, were smaller and more simplistic in their stylistic appearance and were shown in an X-ray manner.

The pictures of the Sagan-Zaba and the Aya bay rock art sites allowed Okladnikov to suggest cultural contacts across Eurasia, from Scandinavia to Lake Baikal, in the Bronze Age. These are "dancing" anthropomorphic figures, boats, and swans. The latter is a motif rarely found in Siberia but present in the rock art of Fennoscandia. This hypothesis was supported by the phenomenon of a wide distribution of the Glazkovo white nephrite rings and Seima-Turbino bronze artifacts. Considering the anthropomorphic imagery of the Baikal Bronze Age rock art, which featured many shamanistic traits such as headdresses, X-ray style, dancing manner, and depictions of rings which can be interpreted as drums, Okladnikov inferred the emergence of shamanism, which therefore was indigenous in Siberia (Okladnikov 1974).

The rock art of the Early Iron Age in the Baikal region is related to the deer stone style distributed throughout the Central Asia and South Siberia and associated with the early nomads (tenth to fifth centuries BC) (Savinov 1990, see also Jacobson-

Tepfer 2015). Depictions of deer resembling figures found on deer stones were identified by Okladnikov at the Sakhyurte rock art site on the western coast of Lake Baikal (Okladnikov 1974). In the Angara River basin, the Manzya site was related to this period based on three depictions of cauldron of Scythian type (Okladnikov 1966). Later a number of petroglyphs in deer stone style were discovered at the Shishkino site in the Upper Lena River basin (Fig. 2, *7–9*), the area where also bronze casting objects of Scythian animal style were found in the context of Korsakov's treasure. The petroglyphs were dated from seventh to second centuries BC (Mel'nikova et al. 2012). However, the rock art of the Late Bronze Age–Early Iron Age is more diverse and abundant in the adjacent, Transbaikal region.

The Rock Art Traditions of the Transbaikal Region in the Neolithic, Bronze, and Early Iron Ages

According to Okladnikov's model, only few images, elk figures at the Bain-Khara Angirskaya site, could have been dated to the Neolithic Age because of their naturalistic manner of depiction. They were defined as forest, or hunting, rock art group which was generally dated to the Bronze Age (Okladnikov and Zaporozhskaya 1970). Later Alexander Mazin, whose fieldwork mainly occurred in Eastern Transbaikalia, Upper Amur River basin, and Yakutia, the regions mostly covered by dense taiga forest, identified several rock art style appearances of which was related to the Neolithic Age (Fig. 3) (Mazin 1986).

The taiga rock art style included a naturalistic image of a deer and zoomorphic figures with paraboloid heads present at the Srednyaya Nyukzha and Byrka sites (Fig. 3, *3, 4*). Their age was established by excavations which yielded Early Neolithic artifacts. According to Mazin (1986), in the Late Neolithic Age, the taiga style split into two coexistent styles named hunting and reindeer herding. The former is localized in Transbaikalia and includes depictions of elk from the Ust'-Tsoron site dated to the Late Neolithic and anthropomorphic figures with horns which are related to the Early Bronze Age based on analogies on ceramic vessels of the Glazkovo culture. The latter, reindeer herding, is present in Amurskaya oblast and Yakutia and is characterized by anthropomorphic figures in association with reindeer where they appear to ride or lead them. This style also continues into the Bronze and Iron Ages.

Mazin identified another style, the steppe style, in the steppe zone and dated its emergence to the sixth–fifth millennia uncal BC based on excavations at the Urulyungui site (Fig. 3, *7*). However, this is the only evidence for such early age. The style is represented by the same set of motifs and their fashion as Okladnikov's Selenga group (see below) and is related to the Bronze Age.

The rock art of the Iron Age in the forest zone of Eastern Transbaikalia and the Amur region, according to Mazin (1986), is represented by two styles, the reindeer herding, which emerged in the Late Neolithic, and mythical, the chronological boundaries of which could not have been well defined. The latter was characterized as featuring mythical scenes with serpentlike creatures.

Although Mazin identified several Neolithic traditions, most of the Transbaikal rock art is related to the Bronze and Early Iron Ages, and the dominating type of rock art was identified as Selenga group (Fig. 7) after the core area, the Selenga River basin, where the sites are concentrated (Okladnikov and Zaporozhskaya 1970). To date, the sites exhibiting the motifs and elements characteristic for the Selenga group are found in the area which extends from the northwestern coast of Lake Baikal in the north to Ulan-Bator in the south and from the Dzida River basin in the west to the Onon and Vitim River basins in the east (Tivanenko 1990). The sites of the Selenga group are usually found in the steppes and forest steppes, on isolated rock outcrops, and sometimes in shelters and caves.

The Selenga sites often dominate a picturesque landscape. All Selenga rock art was made by red paint and included the following motifs: (1) so-called yards-enclosures of different shapes such as rectangular, square, oval, and circular, with other motifs depicted inside them such as rows or chaotic assemblages of dots and anthropomorphic and ornitomorphic figure,

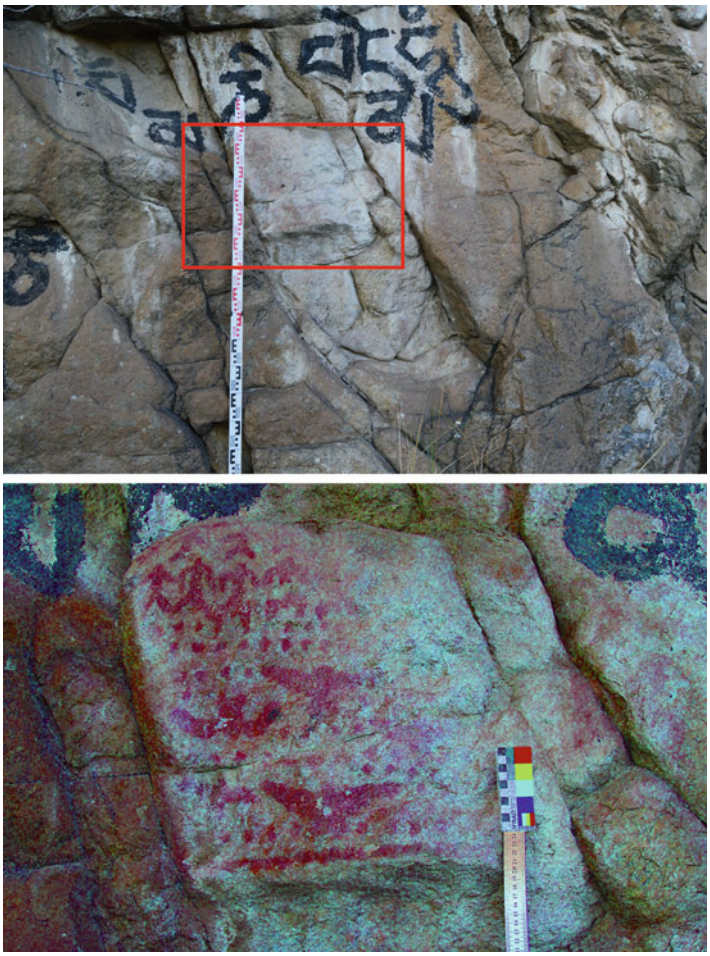

Rock Art of Siberia: Baikal and Transbaikal Regions, Fig. 7 Mondogor-Khabsagai site. Selenga group. (Original and DStretched photograph by I. Ponomareva)

(2) ornitomorphic figures with spread wings shown as if flying and seen from underneath, and (3) anthropomorphic simplistic figures, often shown in rows. This group was related to the slab grave culture of the Late Bronze Age–Early Iron Age based on few analogous images found on bronze knives typologically dated to this period.

In addition to the age determination, Okladnikov developed the interpretation heavily relying on the ethnography of the Central Asian and Caucasian peoples which allowed him to infer that the rock art sites of the Selenga group could have played an important role in the spring rites related to the fertility cult. When considering another common motif, the images of birds of prey, it was noted that eagles were assistants and companions of Siberian shamans. In the Siberian ethnography, the eagle also has a feature of culture hero and related to myths about ancestors and tribe patrons.

The rock art sites of the hunting group mentioned above did not yield the motifs characteristic for the Selenga group. Although the area of this tradition partly overlapped that of the Selenga group, the sites were found in forested areas of Transbaikalia. The motifs included anthropomorphic figures, many of which had hornlike headdresses and were part of scenes with the depictions of wild fauna such as deer, elk, bear, and boar. Okladnikov considered these images as being more dynamic and expressive in their style and considered them as being synchronous with the dominating Selenga group since some

Rock Art of Siberia: Baikal and Transbaikal Regions, Fig. 8 Baga-Zarya site. Kyakhta group. (Photograph by I. Ponomareva)

zoomorphic figures exhibited slight stylistic resemblance with deer stone style. Okladnikov considered the sites of the hunting group as having a different function and related to the hunting magic.

Another group that was identified by Okladnikov is Kyakhta group (Fig. 8). In contrast to the groups described above found on a huge territory, the Kyakhta group is present only in the southern part of Buryatia and considerably differs in its geo-ecological setting, technique, and imagery. The sites are represented by the concentrations of basalt boulders scattered on hills. Petroglyphs, namely, pecked, engraved, and scratched figures present on these boulders, are dominated by the depictions of ibex, deer, and wolves. Okladnikov related this group to the Late Bronze Age–Early Iron Age since the figures have the attributes of the deer stone style.

The diversity of the Bronze–Iron Ages rock art traditions and styles of Transbaikalia will be complete after another type of rock art, the deer stones, is considered. The deer stones are decorated stone stelae which are found throughout the steppes of Eurasia and related to various sepulchral and ritual complexes of the early nomads (1000–500 BC) (Savinov 1994). They were named deer stones by the earliest explorers of Central Asia because many of them are decorated with stylistically distinct figures of deer. However, the deer stones are very diverse in their form, subject matter depicted, and the compositions of images. More than 500 out of 700 known deer stones were found in Mongolia, where they are related to the khirigsuurs, large and complex ritual sites. In Transbaikalia only a dozen is known, and the region is considered as a periphery of the deer stone area. Here they were found reused in the grave construction of the slab grave culture.

The Rock Art of the First to Second Millennia AD

In the Baikal region, the rock art of this period is present at the sites of the Upper Lena River, on the western coast of Lake Baikal (the Sagan-Zaba and Aya bays, the Yelgazur I and Orso sites, and the Nutgei area), and in the basins of the Unga and Kuda Rivers, tributaries of the Angara River (Mel'nikova et al. 2012; Okladnikov and Zaporozhskaya 1959; Nikolaev and Mel'nikova 2008). The rock art was made by various techniques of engraving, incising, rubbing, and scratching.

According to Mel'nikova et al. (2012), there are three chronological groups. The first group was related to the early medieval Kurumchi archaeological culture and dated to second–eleventh centuries AD. The culture is identified with the Kurykan tribe which is considered among the ancestors of the Yakuts and Buryats. The rock art is very realistic in the sense that it depicts diverse scenes from everyday life, such as hunting, battles, nomadic migrations,

and movements of riders with standards, naturalistically and in detail. The animalistic imagery in addition to elk, deer, and horse also included camels. Several scenes were accompanied by Turkic runic inscriptions. The second group was dated to twelfth–fourteenth centuries AD and included images which can be described as more static and simplistic compared to the first group. The third group was related to sixteenth–nineteenth centuries AD and belongs to the indigenous Buryat peoples and Russian Cossacks. This rock art was incised or scratched and depicted detailed figures of riders-archers, Orthodox crosses and domes, and small ships which were accompanied by inscriptions and dates.

In Western Transbaikalia, the medieval rock art is concentrated in South Buryatia, where it is present at the sites of the Kyakhta group and the Sarbadui site. Some images were painted, although the majority of figures were incised and they depict scenes of nomadic life similar to those abundantly present in the steppes of the Angara and Upper Lena basins (Okladnikov and Zaporozhskaya 1969, 1970). Several images dated to the Middle Ages were found in other areas of Western Transbaikalia, such as the Uda and Khilok River basins (Tivanenko 1990). In Eastern Transbaikalia, no rock art belonging to the Middle Ages has been identified yet. Mazin dated several sites to the second millennium AD, but they are located in the adjacent Amur region (Fig. 3, *10, 11*).

International Perspectives

This entry considers only rock art present in the territory of the Russian Federation, but some of the traditions and styles discussed above are present more widely and found not only in Asia but also in European parts of the continent. In terms of international interest, research in many parts of Asia has been carried out by international teams of scholars, and one of the outcomes is that the research on archaeology and rock art of the region is present in many languages and universities all over the world.

Future Directions

Numerous topics need academic attention. First, the most important issue is the conservation and preservation of Siberian rock art. Many outstanding rock art sites have been badly damaged by vandalism, e.g., Byrka and Sokhatinny Kamen' in Transbaikalia and Shishkino and Vorob'yovo in the Baikal region. Even though there are examples of sites well preserved and managed due to endeavors of passionate researchers and amateurs (e.g., Oglahkty in Khakasia), no policy exists in Russia specifically devoted to look after rock art. Second, in terms of chronology, the existing models need reconsideration since most of them were created a half a century ago. No chronometric techniques have been applied, and scientific approaches would be also of high interest. Third, some of the interpretations offered in the recent decades are disputable, possibly because the rock art of the Baikal and Transbaikal regions has seen insufficient scholarly interest, and its rise could result in better understanding of all aspects of this rock art which is an open field for various methodological approaches applied elsewhere.

Cross-References

- ▶ East Asia: Rock Art
- ▶ Okladnikov, Alexey P.
- ▶ Rock Art of Siberia: Baikal and Transbaikal Regions

References

Bazarov, B.A., and D.V. Namsaraev. 2011. *Pamyatniki arkheologii (Svod ob"ektov kul'turnogo naslediya Respubliki Buryatiya, t.2)* [Archaeological sites (Inventory of the culture heritage sites, Vol. 2)]. Ulan-Ude: NovaPrint.

Geniatulin, R.F. 2011. In *Malaya entsiklopediya Zabaykal'ya. Arkheologiya* [Small encyclopedia of Transbaikalia. Archaeology], ed. R.F. Geniatulin. Novosibirsk: Nauka.

Jacobson-Tepfer, E. 2015. *The hunter, the stag and the mother of animals*. New York: Oxford University Press.

Mazin, A.I. 1986. *Tayozhnye pisanitsy Priamur'ya* [The Taiga rock art sites of the Amur region]. Novosibirsk: Nauka.

Mazin, A.I. 1994. *Drevnie svyatilishha Priamur'ya* [Ancient sanctuaries of the Amur region]. Novosibirsk: Nauka.

Mel'nikova, L.V., and V.S. Nikolaev. 2006. Periodizatsiya petroglifov Predbaikal'ya [Periodization of the petroglyphs of Predbaikal'ye]. *Journal of Ancient Technology Laboratory* 4: 259–283.

Mel'nikova, L.V., V.S. Nikolaev, and N.I. Dem'janovich. 2011. *Shishkinskiye petroglyphs. volume 1: The history and methods of research, problems of museofication and description of the petroglyphs*. Irkutsk: IZK SO RAN.

Mel'nikova, L.V., V.S. Nikolaev, and N.I. Dem'janovich. 2012. *Shishkinskiye petroglyphs. volume 2: Natural conditions for formation of flat surfaces, main plots and ages, semantics of ancient images and object in general*. Irkutsk: IZK SO RAN.

Molodin, V.I., and D.V. Cheremisin. 2007. Petroglyphs of the Ukok Plateau. *Archaeology, Ethnology & Anthropology* 32: 91–101.

Nikolaev, V.S., and L.V. Mel'nikova. 2008. *Petroglify Kudinskoy doliny* [Petroglyphs of the Kuda valley]. Irkutsk: Izd-vo IrGTU.

Okladnikov, A.P. 1959. *Shishkinskie pisanicy: Pamjatnik drevnej kul'tury Pribajkal'ja* [Shishkino rock art sites: The monument of the ancient culture of the Baikal region]. Irkutsk: Irkutskoe knizhnoe izd-vo.

Okladnikov, A.P. 1966. *Petroglify Angary* [Petroglyphs of the Angara River]. Moscow/Leningrad: Nauka.

Okladnikov, A.P. 1974. *Petroglyphs of Baikal – Reliquiae of the ancient culture of Siberian peoples*. Novosibirsk: Nauka.

Okladnikov, A.P. 1977. *Petroglify Verkhney Leny* [Petroglyphs of the Upper Lena]. Leningrad: Nauka.

Okladnikov, A.P., and A.I. Mazin. 1976. In *Pisanitsy reki Olyokmy i Verkhnego Priamur'ya* [Rock art sites of the Olyokma River and the Upper Amur region], ed. R.S. Vasil'evsky. Novosibirsk: Nauka.

Okladnikov, A.P., and V.D. Zaporozhskaya. 1959. *Lenskie pisanitsy: naskal'nye risunki u derevni Shishkino* [The Lena river rock art sites: Rock pictures near the village Shishkino]. Moscow/Leningrad: Izdatel'stvo Akademii nauk SSSR.

Okladnikov, A.P., and V.D. Zaporozhskaya. 1969. *Petroglify Zabaikal'ya. Chast' I* [Petroglyphs of the Transbaikal. Part I]. Vol. 1. Leningrad: "Nauka", Leningradskoye otdeleniye.

Okladnikov, A.P., and V.D. Zaporozhskaya. 1970. *Petroglify Zabaikal'ya. Chast' II* [Petroglyphs of the Transbaikal. Part II]. 2. Leningrad: "Nauka", Leningradskoye otdeleniye.

Okladnikov, A.P., and V.D. Zaporozhskaya. 1972. *Petroglify Sredney Leny* [Petroglyphs of the Middle Lena River]. Leningrad: Nauka, Leningradskoye otdeleniye.

Okladnikov, A.P., V.I. Molodin, and A.K. Konopatskiy. 1980. *Novye petroglify Pribaykal'ya i Zabaykal'ya* [New petroglyphs of the Baikal region and Transbaikalia]. Novosibirsk: Nauka.

Savinov, D.G. 1990. Naskal'nye izobrazheniya v stile olennykh kamney [Rock art depictions in the deer stone style]. In *Problemy izucheniya naskal'nykh izobrazheniy SSSR*, 174–181. Moscow: IA AN SSSR.

Savinov, D.G. 1994. *Olennye kamni v kul'ture kochevnikov Evrazii* [Deer stones in the culture of Eurasian nomads]. Saint-Petersburg: Saint-Petersburg State University.

Tivanenko, A.V. 1989. *Drevnie svyatilishha Vostochnoy Sibiri v epokhu kamnya i bronzy* [Ancient sanctuaries of East Siberia in the Stone and Bronze Ages]. Novosibirsk: Nauka.

Tivanenko, A.V. 1990. *Drevnee naskal'noe iskusstvo Buryatii* [Ancient rock art of Buryatia]. Novosibirsk: Nauka.

Rock Art of Siberia: Sakha/Yakutia Republic

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Introduction

Siberia is an extensive geographical region, and it has a rich body of rock art. This chapter is focused on one of the largest regions of Siberia and the Russian Federation, the Sakha/Yakutia Republic. It commences with an outline of the timeline and geography, continues with the history of rock art scholarship, and then is followed by a review of key issues and current debates. The rock art of Yakutia has not seen vigorous debates, but several topics have been in focus by rock art researchers, such as chronology, ancient ontologies, and the origins of shamanism. The strong tradition in Siberian scholarship to approach rock art sites as open-air sanctuaries is also reviewed. The chapter ends with a discussion of the international perspectives and future directions for the rock art of Yakutia.

Definition

Sakha/Yakutia Republic is a vast Russian region which occupies more than three million km^2 in North-Eastern Siberia. Its northern zone lies above the Arctic circle, the Tundra belt stretches below, and the southern section of Yakutia is covered by dense Taiga forest. One of the largest Siberian rivers, the Lena river, flowing into the Arctic Ocean, constitutes the major river drainage. To date, more than 100 rock art sites are known in Yakutia, and the majority are found in Southern and Central Yakutia, in the basins of the Lena river and its tributaries, the Aldan and Olyokma rivers. However, several sites are present in the North, in the basins of the Indigirka and Olenyok rivers (see Fig. 1).

It was suggested that Yakutia was occupied by early human populations in the Middle Paleolithic, although the exact dates of this event have been vigorously debated. The oldest known rock art was related to the Late Paleolithic Dyuktai culture dated to 35000–10500 BP, and the rest of the rock art was related to the following archaeological cultures (Mochanov and Fedoseeva 2013; Alekseyev and Dyakonov 2009):

Rock Art of Siberia: Sakha/Yakutia Republic, Fig. 1 Yakutia/Sakha Republic: Rock art sites and rivers mentioned in the text. 1 – Kirbei, 2 – Tangaralakh, 3 – Dzhampa, 4 – Suruktakh-Khaya-at-Markha, 5 – Churu, 6 – Sinsk, 7 – Petrovskoye, 8 – Toyon-Ary, 9 – Tokko, 10 – Basynai, 11 – Krestyakh, 12 – Tungurchakan, 13 – Nyukzha, 14 – Srednyaya Nyukzha, 15 – Kuskangra, 16 – Bes-Yurekh, 17 – Ilim-Orgo-Yurekh, 18 – Onneyu, 19 – Maya, 20 – Sygdar'ya, 21 – Tomtor, 22 – Malotarynskaya, 23 – Suturuokha, 24 – Shishkino

The Mesolithic Sumnagin culture – 10,500–6000 BP
The Early Neolithic Syalakh culture – 6900–5500 BP
The Middle Neolithic Bel'kachi culture – 6200–4200 BP
The Late Neolithic – Early Bronze Age Ymyjakhtakh culture – 5000–3000 BP
The Bronze Age Ust'-Mil' culture – 3400–2000 BP
Early Iron Age- 2700–1500 BP
Middle Ages – 1500–400 Centuries AD

Historical Background

The first information about rock art in Yakutia appeared in the late nineteenth century. These were the sites near the town of Olyokminsk (1888) and at the Maya River (1893); the latter was examined again by Yakov V. Stefanovich the following year. In 1897 Nikolai A. Vitashevsky (Mikołaj A. Witaszewski – Polish exile) published the first detailed report on Yakutian rock art. He visited, meticulously described, and accurately redrew pictures at two sites at the Olyokma River: Krestyakh and Basynai. The local Tungus people, who provided the information about the sites to Vitashevsky, also advised him about two more sites – at the Nyukzga River and at the Tungurchakan River, but Vitashevsky could not locate them. In 1898, another student of Yakutia, Ivan I. Mainov, reported seeing a rock art site at the Amga River (Onneyu) while studying the Tungus people. He also conveyed information about rock art at the Sinyaya River, a tributary of the Lena River, and mentioned being shown signs on a rock at the Bordakh River in the Indigirka River Basin (Kochmar 1994).

More Yakutian rock art sites were reported in the beginning of the twentieth century: in 1900 near the Elanskaya station at the Lena river by P.S. Alekseev; in 1912–1913 at the Nyuya River; in 1915 at the Olyokma river, near the mouth of the Oyulakh spring, by A.A. Gaiduk; and in 1915 at the Lena River by M.P. Ovchinnikov (Okladnikov and Zaporozhskaya 1972; Kochmar 1994). Although the rock art of Yakutia became known much later than the rock art of other Siberian regions, the data on Yakutian sites grew rapidly almost every year.

In 1923, the investigations of the rock art of the Lena, Olyokma and Maya rivers were led by Yefim D. Strelov, the first professional Yakutian archaeologist. In 1924, the importance of studying pictures and inscriptions on rocks was pointed out by Yakutian historian Grigory A. Popov (see Kochmar 1994). In 1921–1923, ethnographer Gavriil V. Ksenofontov undertook the archaeological exploration of the Middle basin of the Lena river to study the origins of the Yakuts. Ksenofontov recorded nine rock art sites on the left bank of the Middle Lena River and provided ten tables with drawings. In analyzing this rock art, he relied upon the ethnographic data of the Yakuts, Buryats, Tungus, and Uygurs (Ksenofontov 1927). In general, his work differed considerably from previous brief reports in that it was an academic paper with a grounded argument. In 1935, his materials were utilized in the studies of the development of the Yakutian language by philologist Platon A. Oyunsky. In 1926–1928, ethnographer Viktor N. Vasil'ev surveyed the Tungus of the Aldan-Maya basin and the Ayan-Okhotsk area and enriched the knowledge of previously reported sites. In 1931, geologist N.B. Kyakshto reported on a rock art site, the Shaman-stone (now known as the Srednyaya Nyukzha), located at the Nyukzha river and provided a drawing of the rock art. Some reports of rock art also appeared in a local newspaper, the "Avtonomnaya Yakutia." These included rock art sites: at the Markhachan, Olyokma and Tokko rivers in 1924; and the Amga and Markha rivers in 1929. Rock art sites of the Olyokma, Nyukzha and Maya rivers were also mentioned in E.R. Pekarsky's Dictionary of the Yakutian language (see Kochmar 1994; Okladnikov and Mazin 1976).

The next stage in the studies of Yakutian history started with the foundation of the Institute of Language and Culture of the Yakut Autonomous Soviet Republic in 1935. In 1939, the Institute sent local ethnographer A.A. Savin to explore

the basin of the Middle Lena River, from which in the early 1920s Ksenofontov reported nine rock art sites. Savin reported ten sites, but only three of them were those recorded by Ksenofontov (Okladnikov and Zaporozhskaya 1972).

In 1940, Alexey P. Okladnikov commenced the Lena historic-archaeological expedition, and for several years he explored the basin of the Lena River from the source to the mouth. The result was his seminal work on the prehistory of Yakutia in which the rock art of the Upper and Middle Lena River Basins was considered along with other archaeological data (Okladnikov 1955), although the entire body of work on rock art was completely published 20 years later (Okladnikov and Zaporozhskaya 1972; Okladnikov 1977).

Since the late 1950s, studies of Yakutian rock art have been continued by a new generation of archaeologists. In the 1950s–1960s, new rock art sites were discovered at the Amga, Maya, and Olyokma rivers. In 1958 and 1965, the outstanding sites of Krestyakh and Basynai at the Olyokma River were re-examined, and in 1955, the Tomtor rock art site, on the Indigirka river, was reported by G.A. Pytlyakov (see Kochmar 1994). The works of this period differed from brief reports published previously. All of them attempted to provide rock art with age, for instance, Svetlana A. Fedoseeva compared the sites discovered at the Amga river with those found elsewhere and suggested their Neolithic age. Geologist V. Frolov related the site which he discovered in the Upper section of the Olyokma river to the end of the Paleolithic Age because one of the depicted figures was an aurochs (see Kochmar 1994). Yakutian rock art was also a source for the studies of ancient Turkic inscriptions (Bernshtam 1951) and the art traditions of indigenous people of Siberia. In 1969–1978, Yakutian archaeologist Nikita D. Arkhipov re-examined many outstanding sites such as Krestyakh and Basynai, where he revealed new panels, and discovered two sites at the Olenyok river (see Kochmar 1994). Arkhipov purposefully searched and studied accumulations of artifacts, considered as offerings, at rock art sites which therefore were seen as sacred places. This became an important part of the subsequent studies of the Yakutian rock art.

In 1965–1976, Alexander I. Mazin carried out extensive surveys of rock art sites in the basins of the Olyokma, Aldan, and Amga river which resulted in two monographs (Okladnikov and Mazin 1976, 1979). His focus on studying and excavating the cultural deposits near the rock art panels allowed him to further elaborate on the chronological model developed earlier by Okladnikov (see the next section).

In 1977, a long-term period of rock art research commenced which is associated with the name of a prominent archaeologist Nikolai N. Kochmar. During the years 1970s–2000s, his expedition explored the basins of the Olyokma, Lena, Amga, Indigirka, Aldan, Chara, Buotuma, Tyaka, and Tokko rivers. The result was 115 recorded rock art sites and more than 5000 recorded rock art pictures. The collected data were analyzed and synthesized in Kochmar's monograph on the rock art of Yakutia, which is the most complete summary of all the information on Yakutian rock art to date (Kochmar 1994). However, the quality of the graphics was not an improvement on the Okladnikov's books published in previous decades; Kochmar's book included black-and-white drawings of rock art images and drawings of locations and general views at rock cliffs. Kochmar, similar to his predecessors, also focused on studying cultural deposits in the vicinity of the rock art sites and related them directly to the images.

Between 2000 and 2003, some rock art sites along the Lena and the Olenyok rivers were investigated by Polish-Yakut archaeological-ethnological team, particularly from the perspective of their relations to shamanism. This research resulted with fresh English publications (Rozwadowski and Knurenko 2002; Rozwadowski 2014, 2017a, b).

After Kochmar's decease in 2008, no big projects have been undertaken, although several rock art sites have been re-examined and a few have been discovered (e.g., Suruktakh-Khaya-at-Markha and Dzhampa).

Key Issues/Current Debates

Cultural History

Ksenofontov was the first to infer the age of the Yakutian rock art and their ethnic attribution. In surveying the rock art sites in the Middle Lena basin, he observed their stylistic unity and inferred that they belonged to a single ethnic group. Ksenofontov did not believe that the painted designs could have survived more than 1000 years. Moreover, the imagery included depictions of horses and cows. All this implied that the rock art could be attributed to the Yakuts. He pointed to the resemblance of the Lena anthropomorphic figures with those reported at the Maya and Olyokma rivers and Lake Baikal and suggested that they were made by a single ethnic group or closely related groups (Ksenofontov 1927).

The first detailed and grounded chronological model was established by Alexey Okladnikov. Based on the evidence from the cultural deposits unearthed at the Suruktakh-Khaya-at-Markha (Fig. 4) and Churu sites, he identified the Neolithic rock art which was named "monumental-realistic" style and included naturalistic depictions of elk. The next identified group was related to the Bronze Age, the period of Glazkovo culture of the Baikal region and Ymyjakhtakh culture of Yakutia, and included anthropomorphic figures and more simplistic depictions of elk. Another group of images was defined as "pictures-ideograms" and provisionally dated to the 1st millennium AD. It was suggested that these images may indicate the emergence of a writing system. The youngest group of rock art pictures included so-called ancient Yakutian and ancient Tungussic rock art. This included several shamanistic scenes and graffiti.

Okladnikov's model considered rock art only in the Lena basin. Mazin's seminal research allowed further development of the model which also included the rock art of the Olyokma and Aldan river basins (Okladnikov and Mazin 1976, 1979). Rock art groups identified by style and superimposition analysis were then correlated with archaeological cultures based on the analysis of unearthed cultural deposits at the rock art sites. Kochmar elaborated the model by including more data and evidence, although the methodology remained the same.

The earliest surviving rock art was hypothesized to be of the Upper Palaeolithic age (Fig. 2, 19–23). This contains figures of aurochs, horses, elk, and deer which are characterized by a naturalistic manner of depiction, present at the Tokko site in the Olyokma basin. Okladnikov and Mazin (1976) suggested they were painted at least 4000 BP. The main argument for this was that aurochs and wild horses are characteristic for the Pleistocene period. Moreover, these figures, the paint of which is very faint, occupy central positions on the panels and were superimposed by later images. Kochmar re-examined the Tokko site and concluded that the figure of aurochs was actually a depiction of Steppe bison, thus supporting the Palaeolithic attribution of this rock art (Fig. 3). However, the Palaeolithic attribution of some Yakutian rock art requires reassessment. The researchers pointed to the stylistic resemblance of the Tokko figures with those present at the Shishkino rock art site in the Upper Lena basin which Okladnikov related to the Palaeolithic age based on the same grounds (Okladnikov and Zaporozhskaya 1959). The later research of the Shishkino rock art site showed that the rock surface itself on which the aurochs was depicted could not have appeared earlier than the Bronze Age. The surface with the horses could have been exposed as early as the Late Neolithic Age (Mel'nikova et al. 2012).

The Early Neolithic rock art was identified based on the excavations of the Nyukza rock art site, located in the adjacent Amurskaya oblast, where cultural deposits were found over a panel featuring a zoomorphic figure with a paraboloid head (Fig. 2, 14). Stylistically similar figures are present at the Srednyaya Nyukzha and Tokko sites in the Olyokma basin (Fig. 2, 15, 16). The artifacts unearthed from the Nyukzha site were dated based on typological similarities with artifacts of the Syalakh archaeological culture (Okladnikov and Mazin 1976). However, later, this attribution was reconsidered, and the artifacts were claimed to belong to the Late Palaeolithic age; however, no

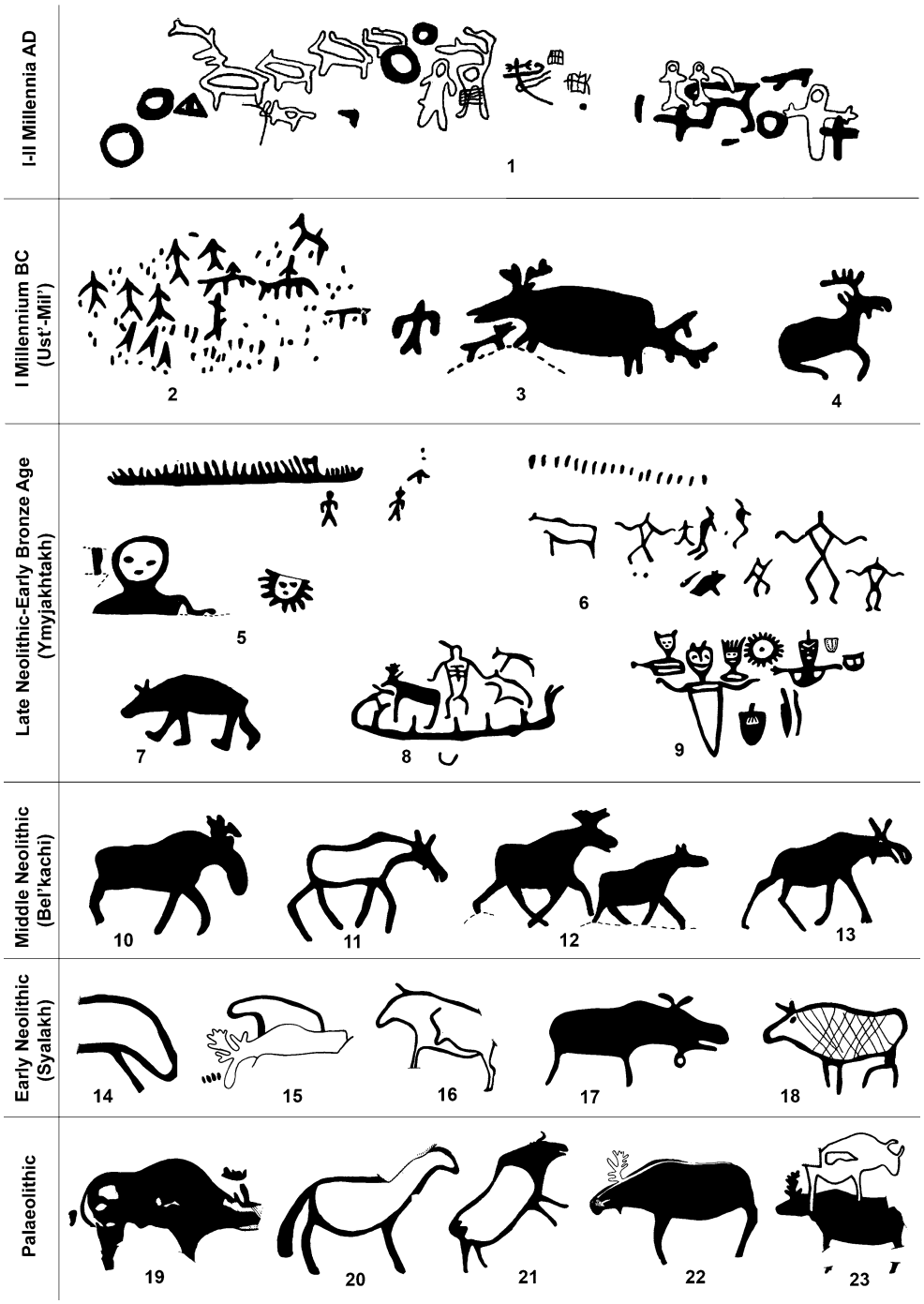

Rock Art of Siberia: Sakha/Yakutia Republic, Fig. 2 Chronological model of the rock art of the Aldan and Olyokma river basins after Okladnikov and Mazin (1976, 1979). The table arranged by I. Ponomareva. Olyokma basin: 2 – Tungurchakan, 6, 8 – Basynai, 7, 15, 16, 19-23 – Tokko, 10, 11 – Krestyakh, 14 – Nyukzha (after Okladnikov and Mazin 1976); Aldan basin: 1 – Ilim-Orgo-Yurekh, 4, 12 – Bes-Yurekh, 3, 5, 9, 13, 17 – Maya, 18 – Sygdar'ya (after Okladnikov and Mazin 1979)

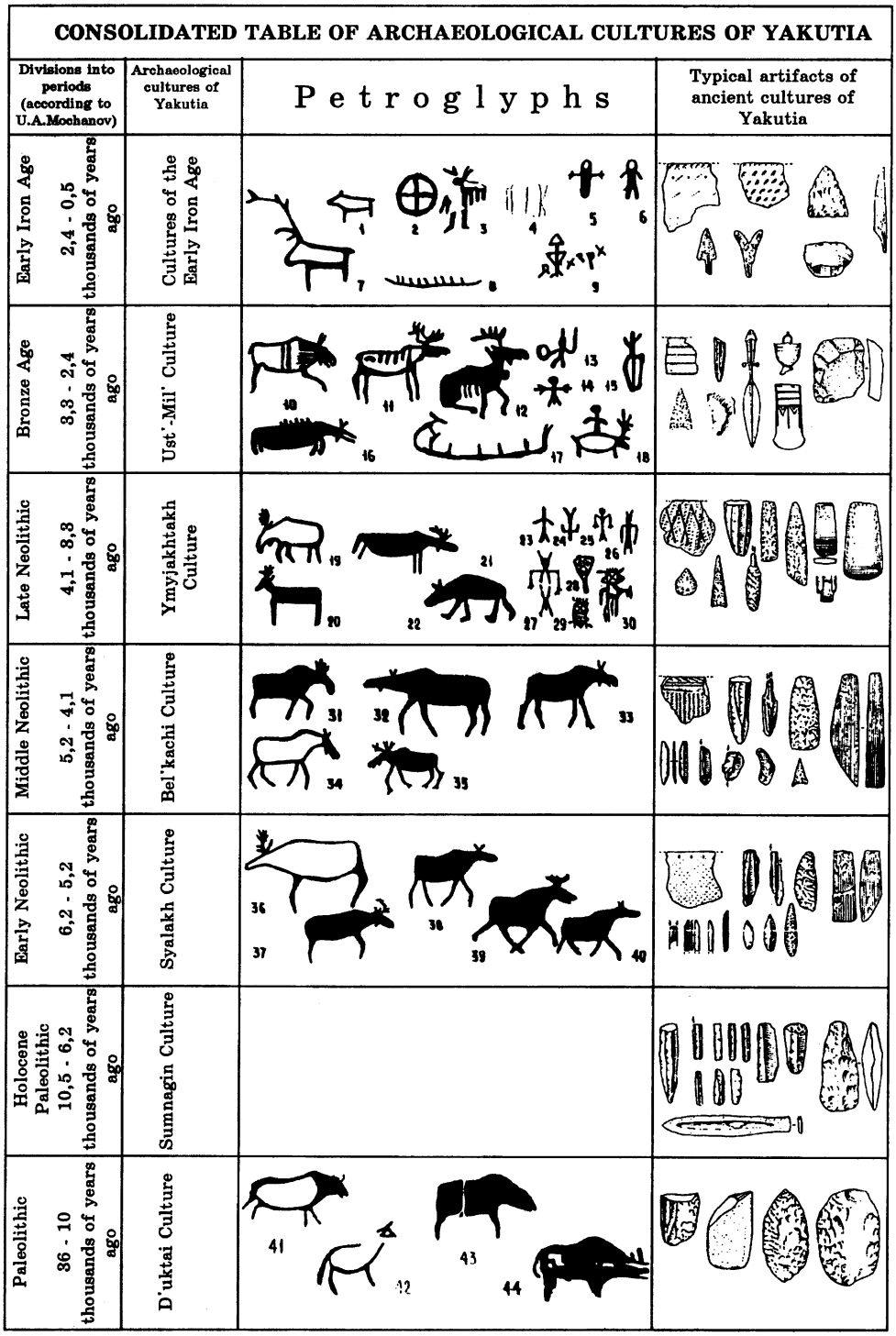

Divisions into periods (according to U.A.Mochanov)	Archaeological cultures of Yakutia	Petroglyphs	Typical artifacts of ancient cultures of Yakutia
Paleolithic 36 - 10 thousands of years ago	D'uktai Culture		
Holocene Paleolithic 10,5 - 6,2 thousands of years ago	Sumnagin Culture		
Early Neolithic 6,2 - 5,2 thousands of years ago	Syalakh Culture		
Middle Neolithic 5,2 - 4,1 thousands of years ago	Bel'kachi Culture		
Late Neolithic 4,1 - 3,3 thousands of years ago	Ymyjakhtakh Culture		
Bronze Age 3,3 - 2,4 thousands of years ago	Ust'-Mil' Culture		
Early Iron Age 2,4 - 0,5 thousands of years ago	Cultures of the Early Iron Age		

Rock Art of Siberia: Sakha/Yakutia Republic, Fig. 3 Chronological model of the rock art of Yakutia/Sakha Republic after Kochmar (1994)

R

radiocarbon dates have been obtained (Mazin 1986). In the Aldan basin, figures of elk at the sites of Maya and Sygdar'ya were dated to the Early Neolithic based on their larger size compared to other images and their central positions on the panels (Fig. 2, 17, 18) (Okladnikov and Mazin 1979).

There is some debate where the following group belongs to the Early or Middle Neolithic. It included figures of elk in a naturalistic manner of depiction. In some cases, these figures were accompanied by linear marks and rows of vertical lines which were interpreted as game driving structures. This group of images has analogies throughout the forest zone of Siberia at the rock art sites of the Upper Lena, Angara, and Tom rivers. These naturalistic elk figures were identified as Angara style and have been a focus of debates concerning their age and cultural attributions (see Kovtun 2001). Okladnikov and Mazin (1976) related this group to the Middle Neolithic Bel'kachi culture based on the excavations at the Krestyakh rock art site (Fig. 2, 10–13). Later Kochmar claimed the Early Neolithic age of this group of naturalistic elk figures by drawing on the same stylistic similarity with naturalistic elk depictions in the Baikal region where Okladnikov related them to the Early Neolithic (Fig. 3) (Okladnikov 1966). Another argument was concerning the Syalakh attribution of the stone artifacts unearthed at the Kuskangra rock art site (Kochmar 1994), although the stylistic unity of the Kunkangra elk depictions with this group is questionable.

While Okladnikov and Mazin (1976, 1979) related the group of naturalistically depicted elks to the Middle Neolithic Bel'kachi culture, Kochmar (1994) attributed quite different groups of images to this period (Fig. 3). These are the zoomorphic figures with paraboloid heads that are stylistically similar to those dated to the Early Neolithic based on the Nyukzha site evidence. This group also included other zoomorphic figures with wedge-like and rectangular heads. Kochmar also related anthropomorphic figures of the Suon-Tiit site to this period based on the inferred association with cultural deposits excavated there. He pointed out that the rock art of the Middle Neolithic differed from the previous periods in that new motifs appeared, such as depictions of serpents and specific anthropomorphic figures with three-fingered hands, round heads and in some cases with phalli. According to Kochmar (1994), this imagery is an expression of shamanistic beliefs which can be seen in the rock art of later periods elsewhere in Siberia.

The next period in the Yakutian history was occupied by the Ymyjakhtach archaeological culture, which is considered as Late Neolithic, but at the same time it is synchronous to the Early Bronze Age Glazkovo culture in the Baikal region, where distinct rock art imagery was related to the Glazkovo period based on anthropomorphic depictions present on several pottery vessels (Okladnikov 1974). Later such pottery was also found in Yakutia dating to the same period. There is other evidence that suggests intensification of cultural contacts across Siberia in the 3rd–2nd millennia BC. This phenomenon can be clearly seen in the rock art of Yakutia attributed to this period which finds its counterparts as far as the Yenisey river basin. These are anthropomorphic figures with triangular bodies and horns/horn headdresses which are shown in various poses, such as adoration and dancing, and compositions, e.g., hunting and reindeer-herding scenes (Fig. 2, 5–9). Many of the figures are ithyphallic. The imagery, as in other parts of Siberia, also included depictions of boats with simplified anthropomorphic figures shown as vertical lines. This rich rock art group also included so-called "solar symbols" depicted as four-spike wheels and face-masks, a motif rarely found in East Siberia (Okladnikov and Mazin 1976, 1979; Kochmar 1994). Another group, which was related to the Ymyjakhtakh culture, is not so widely present in Siberia and found only in Yakutia and adjacent Amurskaya oblast. It includes animal depictions the legs of which are depicted as boots (Fig. 2, 7) (Mazin 1986).

The following period is the time of the Bronze Age Ust'-Mil archaeological culture dated to 3300–2000 BP. In the Aldan basin, a group of rock art was related to the late 1st millennium BC–early 1st millennium AD which included more diverse themes and scenes such as hunting

with dogs (Fig. 2, 3), boats and nets, reindeer-herding and reindeer-riding (Okladnikov and Mazin 1979). In the Olyokma basin, two sites, Tungurcha and Tungurchakan, were related to the 1st Millennium BC. They featured scenes of anthropomorphic figures with serpentine creatures and reindeer-herding scenes (Fig. 2, 2) (Okladnikov and Mazin 1976). Some of the images of the Bes-Yurekh site were related to the Iron Age because one figure of deer (Fig. 2, 4) had a slight stylistic resemblance with deer-stone style distributed throughout the Central Asia and South Siberia and associated with the early nomads (tenth–fifth centuries BC). Kochmar related "solar symbols," x-ray anthropomorphic figures, some shaman's depictions, boats and overturned anthropomorphic figures to this period (Fig. 3) (Kochmar 1994).

More recent rock art includes the site Ilim-Orgo-Yurekh in the Aldan basin which was broadly attributed to the 1st–2nd Millennia AD and included mostly abstract designs, such as rings, triangles, rectangular figures, crosses, and various lines (Fig. 2, 1) (Okladnikov and Mazin 1979). Kochmar also pointed out that the rock art of the 1st and 2nd Millenia AD is not large in number. Although the imagery is represented by the scenes that are also characteristic for the rock art of the earlier periods, such as reindeer-herding, hunting scenes and shamanistic rituals, their style appears to be more simplistic and artless (Kochmar 1994).

Rock Art of Siberia: Sakha/Yakutia Republic, Fig. 4 The Suruktakh-Khaya-at-Markha rock art site. General view. (Photo N.S. Bagdaryyn)

Ontologies

The first explorers who provided the information about rock art were also curious about its meaning. For instance, Nikolai A. Vitashevsky, who published the first detailed report on Yakutian rock art in 1897, informed on the Tungus' beliefs that the pictures were made by the mountain spirit *Khaya Ichchite*. The Tungus also believed that the spirit was responsible for the appearance and disappearance of images from the rock panels. Similar beliefs existed in the Aldan-Maya river basins. The Tungus in this area, according to ethnographer Viktor N. Vasil'ev, also noticed that the rock art pictures sometimes had become faint and sometimes bright which was explained by the activity of the "*master of the mount*" (see Kochmar 1994; Rozwadowski 2017b, 15–20).

The first researcher who attempted to methodologically approach the interpretation of the Yakutian rock art by drawing in ethnography was Gavriil Ksenofontov. He emphasized the multicomponential nature of the rock art meaning. Some scenes were suggested having ideographic memorial function, while others featured obvious shamanistic connotations. The famous Toyon-Ary scene (Fig. 5) was interpreted as a symbolic representation of the confrontation between the Yakut and Tungus. The figure of the cow symbolizes the stock-breeding Yakuts and the figure next to it is "piebald deer," the symbol of hunting, and reindeer-herding Tungus (Ksenofontov 1927).

Alexey Okladnikov also heavily relied on the ethnographic data. Drawing on the chronological model created for the rock art of the Lena river, he could show how the ideology expressed in rock art developed from hunting magic in the Neolithic through the emergence of the shamanistic beliefs

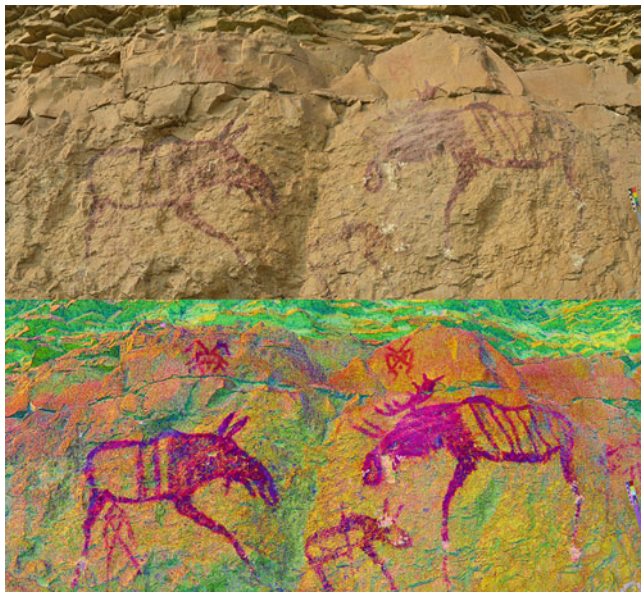

Rock Art of Siberia: Sakha/Yakutia Republic, Fig. 5 The famous scene of the Toyon-Ary rock art site in the Lena river basin. Original and DStretched. (Photo I. Ponomareva)

in the Bronze Age and eventually into the beginning of an ideogrammatic writing system. Siberian ethnography allowed the identification of several themes in the rock art of Yakutia. One of them was the Cosmic Hunt. A number of hunting scenes were related to this story present in the mythologies of many North Eurasian peoples, in which the Cosmic Elk stole a sun or a day and is pursued by a legendary hunter.

Shamanism

Shamanism is "supra-ethnic ritual and religious tradition" among the Siberian people (Rozwadowski 2014, 99), and it provides an interpretative context for some of the rock art of Yakutia (see Gogolev 2002; Rozwadowski 2014, 2017b). Okladnikov was the first to interpret several scenes in the rock art of the Middle Lena river as shamanistic (Okladnikov and Zaporozhskaya 1972). They included anthropomorphic figures with horn headdresses and dancing figures. The most famous and often-referred to rock art scene comes from the site at the Sinsk village (Fig. 7). In the center, there is an oval design with a cross inside, interpreted as a drum, and an anthropomorphic figure with horn headdress and vertical lines coming from the shoulders interpreted as shaman's attire.

It is obscure when shamanism emerged in Siberia. In Yakutia the only evidence is present in the rock art and its chronology is yet to be clarified. It is assumed that some form of shamanism could have appeared as early as the Neolithic Age (see Gogolev 2002). This view is based on Okladnikov's claim that the belief system has appeared as early as in the Late Neolithic-early Bronze Age, although Kochmar dated the appearance of this imagery to the Middle Neolithic (Kochmar 1994; Rozwadowski 2017b).

Open-Air Sanctuaries

An important theme related to the rock art sites was the Evenks' cult of Bugady which is the highest deity and lives inside the rocks which have prominent features, and rock art sites are among them. One of the symbols of Bugady was elk or deer, and Evenks by performing rituals and leaving offerings at the places where the deity resided aimed at the reproduction of game (Okladnikov and Mazin 1979). Therefore, rock art sites were a priori considered by researchers as open-air sanctuaries. The study of cultural deposits at the rock art sites was a strong focus established by Okladnikov. The study of the cultural deposits at the Suruktakh-Khaya-at-Markha (Fig. 4) not only gave clues on the age of the rock

art, but also provided evidence of the continuity of worshipping at this place. The offerings included various items of weaponry spanning from ancient stone arrowheads to modern bullets (Okladnikov and Zaporozhskaya 1972). Mazin reports finding accumulations of offerings at 37 sites out of 52 that he studied, while Kochmar drew on the data recovered from 56 such accumulations found at 19 rock art sites (Kochmar 1994; Mazin 1994).

The alternative interpretation of these accumulations as short-term camp sites was denied because these deposits were found at places which are not suitable for living, these were slopes, covered by rock sediments and in many instances located far from water sources. Mazin pointed out that modern people avoid visiting these sites so as not to disturb the spirits, and other types of archaeological sites, such as burial and settlements, are rarely found in the vicinities of rock art sites (Mazin 1994). However, the later phenomenon is rather the consequence of the difficulties in detecting archaeological sites in the forested landscape and therefore insufficient state of knowledge.

Mazin distinguished two types of offering places at rock art sites, namely, ground and enclosed. Ground offering places were just accumulations of offering left next to the rock art panels. This is the most commonly found type present from the end of the Pleistocene period to present day. Enclosed offering places feature stone constructions within which offerings were placed. These are found in the Steppe and Forest-Steppe zones of the adjacent Eastern Transbaikalia. Mazin concluded that rock art sites with offering places have been ancient sanctuaries.

Kochmar paid a lot of attention to documenting present-day sanctuaries found at rock art sites. He reported recording 24 such ethnographic sanctuaries at 17 rock art sites. These were idols-*shenkens,* anthropomorphous wooden sticks, which were placed toward rock art panels to mediate with Eneke-Bugady, the patroness of family and nature (Kochmar 1994; see also Rozwadowski 2014).

The Yakutian Runic Script

In 1895, in a speech at the session of Troitskosavsko-Kyakhtinsky division of Priamursky department of Imperial Russian Geographical Society, Dmitry Klements, ethnographer and archaeologist, informed about the presence of runic inscriptions in Yakutia, although he did not provide any details (Kochmar 1994). A half a century later, Okladnikov identified a group of rock art images as "pictures-ideograms" and inferred that they are evidence of a writing system (see Okladnikov and Zaporozhskaya

Rock Art of Siberia: Sakha/Yakutia Republic, Fig. 6 Yakutian runic inscription. The Petrovskoye site in the Lena river basin. (Photo I. Ponomareva)

Rock Art of Siberia: Sakha/Yakutia Republic, Fig. 7 Shamanistic scene at the Sinsk Village site. After Okladnikov and Zaporozhskaya (1972); see also Rozwadowski and Knurenko (2002) for more recent tracing

1972). Ivan I. Barashkov distinguished two groups: unidentifiable ideogramic signs and runic-like signs resembling Old Turkic script (Fig. 6). Some of the runic inscriptions of the second type were deciphered (Bernshtam 1951). To date, 21 runic inscriptions are known in Yakutia and the Upper Lena river basin including those located on the rock panels (Levin 2014).

International Perspectives

Although the rock art of Yakutia has not attracted much attention from foreign scholars, it may be of interest for international teams of researchers. From global perspective, the rock art of Yakutia finds its counterparts in other regions of the Sub-Arctic zone, for instance, in Scandinavia and the Canadian Shield, and methodological frameworks developed there can be applied to the Yakutian rock art. There are other research questions which can be approached from international perspective, as an example, rock art of Yakutia has been engaged in international research on shamanic themes in rock art (Devlet 2001; Rozwadowski 2014, 2017b).

Future Directions

As in many parts of the world, the most salient issue related to rock art is the problem of its conservation and preservation. Already one of the first explorers in Yakutia, A.A.Savin, who surveyed the Middle Lena basin in 1939, noted the poor condition of the rock art and described many cases where local people destroyed sites either to use the paint as a cure for diseases or to fight pagan beliefs. He pointed out that the limestone rocks constantly collapsed due to their fragile structure. Many outstanding rock art sites have been badly damaged by vandalism since then, and rock art sites of Yakutia are particularly exposed to erosion. Even though there are examples of sites in Siberia well preserved and managed due to endeavors of passionate researchers and amateurs (e.g., Oglahkty in Khakasia), no policy exists in Russia specifically devoted to look after rock art. The problem of managing rock art sites along with other archaeological sites is complicated by insufficient number of professional archaeologists in such large region as Yakutia. The second most important issue is the chronology of rock art (Rozwadowski 2017a). No

chronometric and scientific techniques have been applied, and the existing models need reconsideration based on the methods available today. As such, the rock art of Yakutia has a strong potential as an open field for various methodological approaches.

Cross-References

- ▶ East Asia: Rock Art
- ▶ Okladnikov, Alexey P.
- ▶ Rock Art of Siberia: Baikal and Transbaikal Regions

References

Alekseyev, A.N., and V.M. Dyakonov. 2009. Radiocarbon chronology of neolithic and bronze age cultures in Yakutia. *Archaeology, Ethnology & Anthropology* 37 (3): 26–40.

Bernshtam, A.N. 1951. Drevnetyurkskoe pis'mo na r. Lene [Ancient turkic writings on the Lena River]. *Epigrafika Vostoka* IV(6): 76–86.

Devlet, E. 2001. Rock art and the material culture of Siberian and Central Asian shamanism. In *The archaeology of shamanism*, ed. N. Price, 43–55. London: Routledge.

Gogolev, Anatolii I. 2002. Rock art of the Middle Lena River and Eastern Siberian shamanism. In *Spirits and stones. Shamanism and rock art in Central Asia and Siberia*, ed. A. Rozwadowski and Maria M. Kosko, 153–162. Poznan: Institut Wschodni UAM.

Kochmar, N.N. 1994. *Pisanitsy Yakutii [Rock art sites of Yakutia]*. Novosibirsk: IAET SB RAS.

Kovtun, I.V. 2001. *Izobrazitel'nye traditcii epokhi bronzy Central'noy i Severo-Zapadnoy Azii: problemy genezisa i khronologii ikonograficheskikh kompleksov severo-zapadnogo Sajano-Altaya [Art traditions of Central and Noth-West Asia in the Bronze Age: problems of genesis and chronology of iconographic complexes in the Noth-Western Sayan-Altai Mountains]*. Novosibirsk: Izd-vo IAET SB RAS.

Ksenofontov, G.V. 1927. Izobrazheniya na skalakh r. Leny v predelakh Yakutskogo okruga [Pictures on rocks of the Lena River in Yakutsky okrug]. *Buryatovedenie* (3-4): 64–70.

Levin, Gerasim Gerasimovich. 2014. Lensko-Pribaikal'skiye rinucheskiye nadpisi (The Lena-Baikal runic inscriptions). *Karadeniz (Black Sea)* 21: 13–23.

Mazin, A.I. 1986. *Tayozhnye pisanitsy Priamur'ya [The Taiga rock art sites of the Amur region]*. Novosibirsk: Nauka.

Mazin, A.I. 1994. *Drevnie svyatilishha Priamur'ya [Ancient sanctuaries of the Amur region]*. Novosibirsk: Nauka.

Mel'nikova, L.V., V.S. Nikolaev, and N.I. Dem'janovich. 2012. *Shishkinskiye petroglyphs. volume 2: Natural conditions for formation of flat surfaces, main plots and ages, semantics of ancient images and object in general*. Irkutsk: IZK SO RAN. (In Russian).

Mochanov, Yu. A., and S. A. Fedoseeva. 2013. *Essays on preliterate history of Yakutia. Stone age*. 2 vols. Vol. 2. Yakutsk: Center of Arctic Archaeology and Human Paleoecology.

Okladnikov, A.P. 1955. *Yakutiya do prisoedineniya k russkomu gosudarstvu [Yakutia before joining Russian State]*. Moscow-Leningrad: Izd-vo Akademii nauk SSSR.

Okladnikov, A.P. 1966. *Petroglify angary [Petroglyphs of the Angara River]*. Moscow/Leningrad: Nauka.

Okladnikov, A.P. 1974. *Petroglyphs of Baikal – reliquiae of the ancient culture of Siberian peoples*. Novosibirsk: Nauka. (In Russian).

Okladnikov, A.P. 1977. *Petroglify Verkhney Leny [Petroglyphs of the Upper Lena]*. Leningrad: Nauka.

Okladnikov, A.P., and A.I. Mazin. 1976. *Pisanitsy reki Olyokmy i Verkhnego Priamur'ya [Rock art sites of the Olyokma River and the Upper Amur region]*. Novosibirsk: Nauka.

Okladnikov, A.P., and A.I. Mazin. 1979. *Pisanitsy basseina reki Aldan [Rock art sites of the Aldan River Basin]*. Novosibirsk: Nauka.

Okladnikov, A.P., and V.D. Zaporozhskaya. 1959. *Lenskie pisanitsy: naskal'nye risunki u derevni Shishkino [The Lena river rock art sites: Rock pictures near the village Shishkino]*. Moscow/Leningrad: Izdatel'stvo Akademii nauk SSSR.

Okladnikov, A.P., and V.D. Zaporozhskaya. 1972. *Petroglify Sredney Leny [Petroglyphs of the Middle Lena River]*. Leningrad: Nauka, Leningradskoye otdeleniye.

Rozwadowski, A. 2014. In search of shamanic themes in Eastern Siberian Rock Art (Sakha/Yakutia Republic). *Shaman* 22 (1-2): 97–118.

Rozwadowski, A. 2017a. Rock art of Northern, Central, and Western Asia. In *The Oxford handbook of the archaeology and anthropology of rock art*, ed. Bruno David and Ian J. McNiven, 1–43. Oxford Handbooks Online. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190607357.013.3.

Rozwadowski, A. 2017b. *Rocks, cracks and drums: In search of ancient shamanism in Siberia and Central Asia*. Budapest: Molnar & Kelemen Oriental Publishers.

Rozwadowski, A., and P. Knurenko. 2002. Reconsidering the rock paintings at the Sinsk Village, Middle Lena River (Yakutia). In *Spirits and stones. Shamanism and rock art in Central Asia and Siberia*, ed. A. Rozwadowski and M.M. Kośko, 163–172. Poznań: Instytut Wschodni UAM.

Rock Art Recording Methods: From Traditional to Digital

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Introduction

In the twenty-first century, accurate, integral, and noninvasive documentation of rock art has become a priority among researchers and cultural heritage managers, given the fragility of this cultural heritage which is subject to continuous environmental and human threats.

Today the documentation of rock art should meet multiple aims. Along with its main role as a research tool, rock art recordings are essential in monitoring the processes of degradation affecting rock art assemblages in the short, medium, and long term.

Furthermore, these documents are also significant as vehicles for scientific and, more importantly, public dissemination of the art, necessary to raise public awareness of the value of this heritage as a long-term conservation strategy to guarantee the preservation of this heritage resource for current and future generations.

Definition

By rock art recording, we refer to any form of visual documentation of the works of art and their spatial location, by means of photographs (analogical or digital), illustrations (drawings and/or tracings, traditional, or digital), and 3D real or virtual models. These documents are produced to record the formal and technical characteristics of the rock art, including the individual motifs (its shape, color, texture, technique, and conservation state), the spatial relations with the other motifs and the rock surface (including superimpositions), and the location within the site and the natural (Fig. 1) and cultural context.

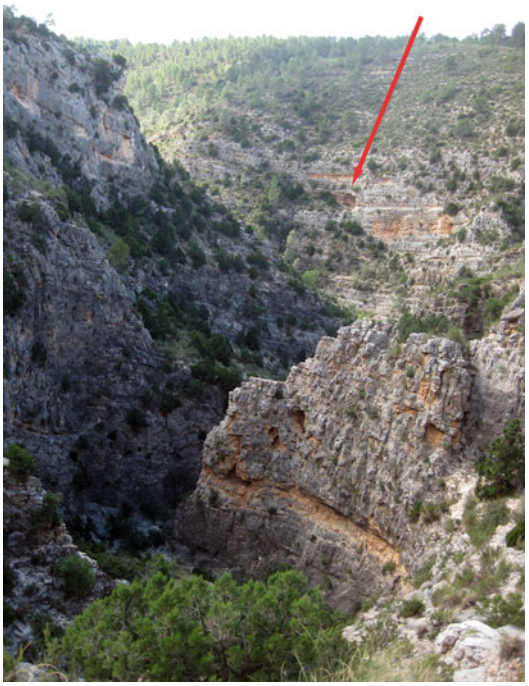

Rock Art Recording Methods: From Traditional to Digital, Fig. 1 Location of El Carche Levantine rock art site (Jalance, Spain). (Photo I. Domingo)

Rock art recordings are permanent scientific records capturing the state of the art at a specific point in time. Since rock art is a fragile heritage and unfortunately, it is progressively degrading, rock art recordings are of great heritage value. Thus, they have to be accurate, avoid ideal reconstructions (even though they may be of use later on to facilitate public interpretations), and include a reference to the scale of the motifs recorded.

Two-dimensional recordings (either photographs or illustrations) usually capture one of the hundreds of point of views from where the work of art can be seen, with a general preference for the frontal (orthogonal) view to each motif to reduce perspective distortion. Three-dimensional models (real or virtual) usually provide a more realistic volumetric reproduction of the art complexes, and thus a more realistic volumetric approach to the sites themselves at a specific point in time.

Historical Background

Current rock art recording methods are the legacy of over a 100 years of experimentation leading to a gradual refinement of methods to obtain as complete and accurate working documents as possible, while minimizing the direct impact on the art and the rock surface.

Since the advent of photography, this recording system has been considered the most objective rock art recording method, because of its capacity to reproduce reality with great fidelity. This capacity to provide a controlled picture of the art clearly responds to the principle of scientific rigor required by any archaeological work. Although photography is not exempt from metric inaccuracies caused by lighting conditions, perspective, and/or lens distortion, today both forms of metric distortion can be minimized with different software (e.g., rdf) and with the use of digital calibrated cameras (Domingo et al. 2013).

In the initial stages of rock art research, photography was in its infancy and its use in the underground was problematic because of little available light. In this context, hand drawings and tracings became the main tool for rock art recording and dissemination. Decades later, and despite the great advances in photography, tracings retain their value as a primary rock art recording method because of their capacity to facilitate motif identification, especially when motifs are faded or part of complex superpositions. Thus, tracings consolidated as a technical tool for rock art interpretation, whose main role is to facilitate the reading of the rock art motifs and to be used for scientific and public dissemination and research (Aujoulat 1987, 1993).

The times have long gone when hand drawings, water colors, and pastels produced by researchers, artists, and illustrators, such as Breuil, Porcar, Cabré, Benitez-Mellado, to name some, were used as evidence of the first findings at the early stages of the twentieth century (Aujoulat 1987; Moneva 1993; Tosello and Fritz 2007). But hand drawings have not been completely excluded from the documentation process, and still play an important role in its initial stages. An initial hand sketching of the panels including the location and numbering of all the remaining motifs provides a good first understanding on how the panel works. And this first approach is necessary to plan the systematic recording of the site.

Continuous advances in research and the interest in answering new questions from the study of rock art led to the need for more accurate formal and metric documents than those obtained from hand drawings. Progressive new developments resulted in a gradual improvement of the results. These new methods can be classified into two main categories: direct recording methods and indirect recording methods.

Direct tracing or *contact tracing* is probably the most widespread rock art recording technique worldwide, among the direct recording methods.

This method involves placing a transparent paper on the decorated surface, on which motifs are identified and traced using a permanent ink pen. Different colors can be used to identify different motifs or to code different types of information related to the motifs (e.g., shapes, techniques, etc.) and the rock surface (e.g., cracks, bumps, etc.). The relatively good adaptability of the cellophane or polythene to the irregularities of the rock surface improved the resulting reproductions both from the metric and the formal points of view. However, one of the most significant disadvantages of this method is the direct impact on the fragile rock surfaces and the motifs, which could accelerate the degradation processes. The location of the tracing paper between the recorder and the motifs obstructing the direct view of the art also hinders the recording process. One last disadvantage is the problematic transformation of the resulting real size tracings, usually of large dimensions, into manageable scales for research and publication, since large format scanners would be needed. In most countries, a permit from the regulatory authority is required for this practice.

Another widespread form of direct recording is the rubbing of engravings. It consists of laying a thin paper on top of the engraved surface and rubbing carbon paper on top to obtain a reproduction of the engraving. As in the previous methods, this technique impacts directly on the rock surface, so the use of other noninvasive methods is more recommended.

Indirect recording methods include, apart from analogical and digital photography, a variety of indirect ways of tracing:

- *Tracing produced using a frame*, with several options based on the use of a rigid or semirigid structure placed at a certain distance from the rock surface to avoid direct contact (Lorblanchet 1993a, b). The main weakness of this method is the struggle to adapt these structures to the irregular surfaces characteristic of most of the rock art sites, with consequent deformation of the final results.
- Tracing on analogue photographs, which involves tracing the motifs on transparent paper placed directly on the photograph. The use of orthogonal photographs, digital calibrated cameras, and specific software (as mentioned before) to correct metric distortion minimizes distortions generated by the camera and the transformation of 3D into 2D surfaces (Domingo et al. 2013). This also applies to the next two indirect recording methods.
- Tracing on slide, in which the projected motif is traced using tracing paper.
- Digital tracings, which are the digital version of the *tracing on photographs* method, are produced using digital image enhancement and processing software. Rock art paintings are generally "traced" from digital photographs using color selection tools to individualize the pigment from the rock surface (Domingo and López-Montalvo 2002). Rock engravings are mostly drawn with several drawing tools on top of the digital photographs taken using oblique light in dark conditions.

Key Issues/Current Debates

Certainly, the quantum leap in rock art recording methods came in the 1990s, with the widespread use of new digital technologies. Gradual technological improvements have broadened the range of rock art recording methods available. They have also provided the tools to facilitate a continuous review, correction, and update of the rock art recordings.

Several software (Adobe Photoshop, Gimp, Corel Photo Paint, and so forth) and specialized plugins (DStretch for ImageJ) for digital image enhancement and processing are used worldwide to facilitate rock art visualization (Clog et al. 2000; David et al. 2001; Brady and Gunn 2012) (Fig. 2). These photo processing software programs have also replaced traditional tracing methods. They provide the tools for digitally drawing rock engravings and to produce digital "tracings" of rock paintings using a range of color selection and drawing tools (magic wand tool and color range tools) (Vicent et al. 1996; Cacho and Gálvez 1999; Clog et al. 2000; Domingo and López-Montalvo 2002; Rüther 2007; Martínez-Bea 2009; Cassen and Robin 2010; Domingo et al. 2013; etc).

The traced motifs can easily be scaled, assembled into panels (Fig. 3), divided into stylistic phases or periods, or used individually for formal comparison with other motifs, and so forth.

The digital era has also provided sophisticated equipment and software to produce virtual 3D models of rock art sites (digital photogrammetry, laser scanner, and so forth) (Robson et al. 2001; Lerma et al. 2010; Ortiz et al. 2010, etc). These models provide a unique approach to the 3D quality of rock art, which is key to understand the art in context (location in the panels, use of the rock surface, and so forth) and to show the multiple perspectives from where the audience can visualize the art.

However, when the rock art panels are faded or the motifs are difficult to identify due to complex superpositions, photorealistic models are insufficient to identify them (Fig. 4). Thus, recent developments in rock art recording methods recommend the combination of photographs and tracings into the 3D models (Domingo et al. 2013), and the use of several layers within the files containing the 3D model, the photorealistic model, and the tracings to facilitate the reading of the art (Fig. 5).

Furthermore, the addition of old and new records into the 3D model will allow the creation of 4D models displaying changes in the site

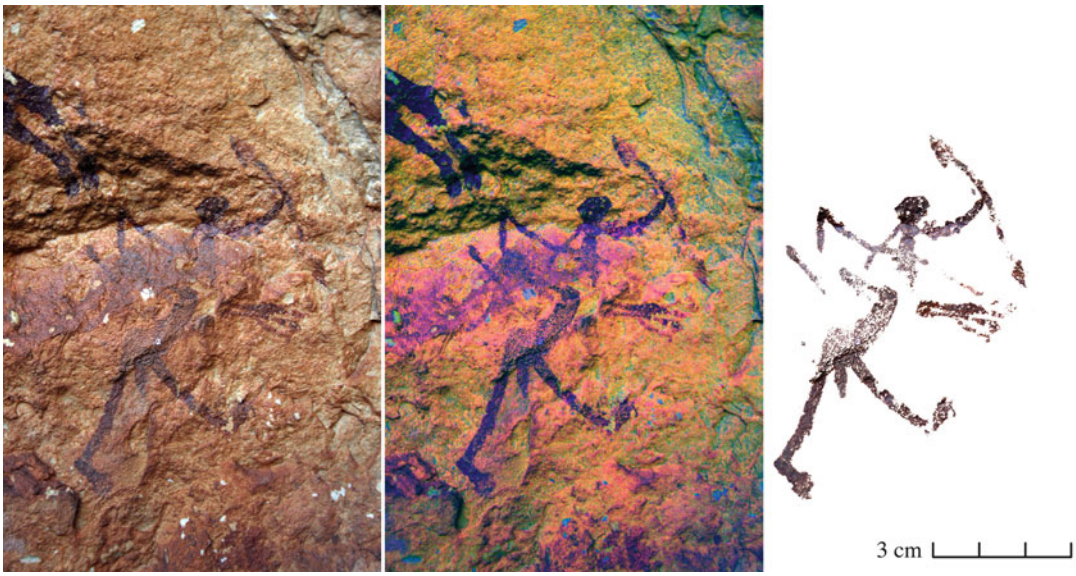

Rock Art Recording Methods: From Traditional to Digital, Fig. 2 Human figure with bow and arrows from El Carche site (Jalance, Spain). Digital enhancement using Dstretch facilitates the visualization of details. Scaled digital tracing produced with Photoshop color selection tools

through time. These models could be of great value in assessing future rates of degradation processes.

While 2D rock art recording methods are currently the most widely used, the value of 3D models for the study, long-term digital preservation, and dissemination of rock art is widely accepted. Nevertheless, the high costs of high-quality reproductions, the storage limitations, and the virtual dissemination of the models are still problematic and will have to be solved in the near future, if 3D and 4D methods are to become the standard methods of rock art recording.

Future Directions

More than a 100 years of rock art discoveries and research have generated a significant amount of visual records (photographs, illustrations, real and virtual models, and so forth) that unfortunately are so dispersed among institutions, publications, and private hands that, as rock art, they are in danger of disappearing. In the past, and still in the present, a significant number of these records have been in

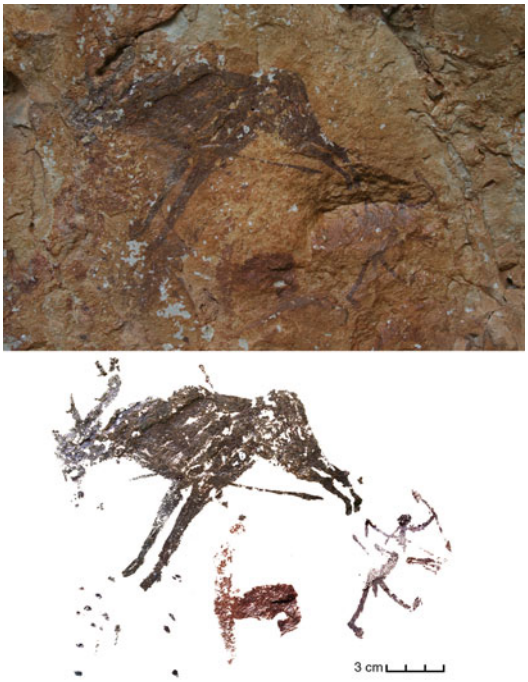

Rock Art Recording Methods: From Traditional to Digital, Fig. 3 Digital tracing showing the relationship of the human figure with the motifs located in the surroundings

Rock Art Recording Methods: From Traditional to Digital, Fig. 4 Snapshot of the photorealistic 3D model of El Carche site, with the location of the human figure. (Project HAR2011–25440, ICREA/UB/SERP. Produced by GIFLE)

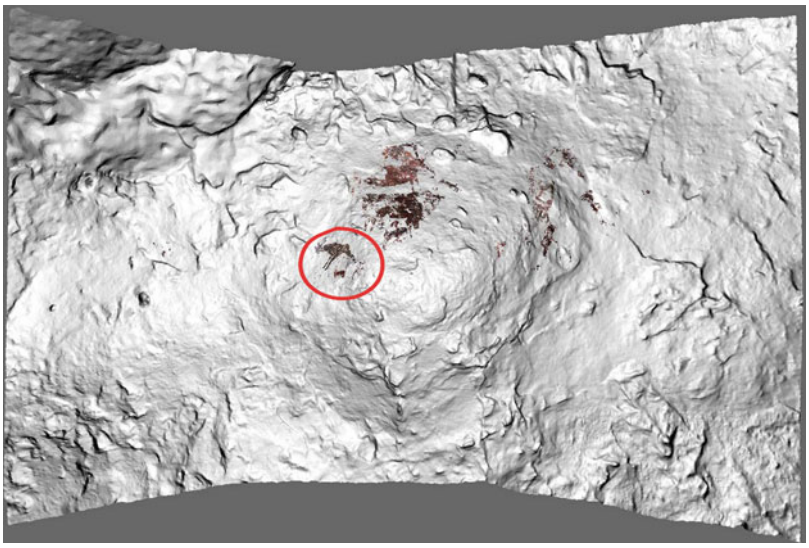

Rock Art Recording Methods: From Traditional to Digital, Fig. 5 Snapshot of the textured 3D model, with tracings of the painted motifs on top. (Project HAR2011–25440, ICREA/UB/SERP. Produced by GIFLE)

the hands of the people who produced them, and thus, they have disappeared together with their authors. But the heritage value of these records requires guaranteeing their long-term preservation, thus, the need to create official repositories (real or virtual) at stable institutions, to guarantee their conservation, and perpetuate their value.

As new technologies develop, new improvements in each step of the rock art recording process will be introduced. This will include reducing subjectivity and direct impact on the art, increasing the accuracy of the records, or reducing the size of the files to facilitate virtual storage and dissemination, to name a few. At the moment, 4D models are with no doubt the most immediate future for rock art recording methods, but certainly, the digital era still hides new unimaginable surprises that will benefit the discipline.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Portable Art Recording Methods
- ▶ Recording in Archaeology
- ▶ Rock Art Sites: Management and Conservation

References

Aujoulat, N. 1987. Le relevé des oeuvres pariétales paléolithiques. In *Enregistrement et traitement des dones*, Documents d'Archéologie Française, vol. 9. París: Éditions de la Maison des sciences de l'homme.

Aujoulat, N. 1993. Les relevés. L'évolution des techniques. In *L'art pariétal paléolithique. Techniques et méthodes d'étude*, 317–327. Paris: GRAPP (Groupe de Réflexion sur l'Art Pariétal Paléolithique), Ministère de l'Enseignement supérieur et de la Recherche, édition du Comité des Travaux Historiques et Scientifiques.

Brady, L.M., and R.G. Gunn. 2012. Digital enhancement of deteriorated and superimposed pigment art: Methods and case studies. In *A companion to rock art*, ed. J. McDonald and P. Veth, 627–643. Oxford: Wiley-Blackwell.

Cacho, R., and N. GÁlvez. 1999. New procedures for tracing Paleolithic rock paintings: Digital photography. In *Proceeding of the 26th CAA, held at Barcelona, Spain, in March 1998*, British Archaeological Reports International series, ed. J.A. Barceló, I. Briz, and A. Vila, vol. 757, 73–76. Oxford: Archaeopress.

Cassen, S., and G. Robin. 2010. Recording art on Neolithic Stelae and Pasaje tombs from digital photographs. *Journal of Archaeological Method and Theory* 17 (1): 1–14.

Clog, P., M. Diaz-Andreu, and B. Larkman. 2000. Digital image processing and the recording of rock art. *Journal of Archaeological Science* 27: 837–843.

David, B., J. Brayer, I.J. McNiven, and A. Watchman. 2001. Why digital enhancement of rock paintings works: Rescaling and saturating colours. *Antiquity* 75: 781–792.

Domingo, I., and E. López-Montalvo. 2002. Metodología en el proceso de obtención de calcos o reproducciones. In *La Cova dels Calvalls en el Barranc de la Valltorta,* Monografía del Instituto de Arte Rupestre, coords. R. Martínez and V. Villaverde, vol. 1, 75–81. Tírig: Museo de la Valltorta.

Domingo, I., V. Villaverde, E. López -Montalvo, J.L. Lerma, and M. Cabrelles. 2013. Latest developments in rock art recording: Towards an integral documentation of Levantine rock art sites combining 2D and 3D recording techniques. *Journal of Archaeological Science* 40: 1879–1889.

Lerma, J.L., S. Navarro, M. Cabrelles, and V. Villaverde. 2010. Terrestrial laser scanning and close range photogrammetry for 3D archaeological documentation: The Upper Palaeolithic Cave of Parpalló as a case study. *Journal of Archaeological Science* 37: 499–507.

Lorblanchet, M. 1993a. Finalité du relevé. In *L'art pariétal paléolithique. Techniques et méthodes d'étude*, 329–337. Paris: GRAPP (Groupe de Réflexion sur l'Art Pariétal Paléolithique), Ministère de l'Enseignement supérieur et de la Recherche, édition du Comité des Travaux Historiques et Scientifiques.

Lorblanchet, M. 1993b. La restitution. I – Les conventions graphiques. L'évolution des techniques. *L'art pariétal paléolithique. Techniques et méthodes d'étude*: 369–374. Paris: GRAPP (Groupe de Réflexion sur l'Art Pariétal Paléolithique), Ministère de l'Enseignement supérieur et de la Recherche, édition du Comité des Travaux Historiques et Scientifiques.

Martínez -Bea, M. 2009. *Las pinturas rupestres del abrigo de La Vacada (Castellote, Teruel)*, Monografías Arqueológicas, Prehistoria, 43. Zaragoza: Universidad de Zaragoza.

Moneva, M.D. 1993. Primeros sistemas de reproducción de arte rupestre en España. *Espacio, Tiempo y Forma, Serie I, Prehistoria y Arqueología* 6: 413–442.

Ortiz, J., M.L. Gil, S. Martínez, M.T. Rego, and G. Meijide. 2010. A simple methodology for recording petroglyphs using low-cost digital image correlation photogrammetry and consumer-grade digital cameras. *Journal of Archaeological Science* 37 (12): 3158–3169.

Robson, K.A., A. Chalmers, T. Saigol, C. Green, and F. D'Errico. 2001. An automated laser scan survey of the upper Palaeolithic rock shelter of Cap Blanc. *Journal of Archaeological Science* 28: 283–289.

Rüther, H. 2007. State of the art technologies in heritage documentation: The giraffe engravings of Oued Djerat, Algeria. In *African rock art: The future of Africa's past*, ed. J. Deacon, 59–70. Kenya: Trust for African Rock Art.

Tosello, G., and C. Fritz. 2007. The hidden meaning of forms: Methods of recording Paleolithic parietal art. *Journal of Archaeological Method and Theory* 14 (1): 48–80.

Vicent, J.M., I. Montero, A. Rodríguez, I. Martínez, and T. Chapa. 1996. Aplicación de la imagen multiespectral al estudio y conservación del arte rupestre post-paleolítico. *Trabajos de Prehistoria* 53 (2): 19–35.

Further Reading

Brady, L.M. 2007. A different look: Comparative rock-art recording from the Torres Strait using computer enhancement techniques. *Australian Aboriginal Studies* 1: 98–115.

López-Montalvo, E., and I. Domingo. 2005. Nuevas tecnologías y restitución bidimensional de los paneles levantinos: primeros resultados y valoración crítica del método. In *Actas del III Congreso de Neolítico de la Península Ibérica*, 719–728. Santander: Universidad de Santander.

López-Montalvo, E., and I. Domingo. 2009. Nuevas técnicas aplicadas a la documentación gráfica del arte Levantino: valoración crítica del método tras una década de experimentación. In *El arte rupestre del Arco Mediterráneo de la Península Ibérica. 10 años en la Lista del Patrimonio Mundial de la UNESCO. Actas del IV Congreso (Valencia 3-5 diciembre de 2008)*, 295–302. Valencia: Generalitat Valenciana.

Pinçon, G., and J.M. Geneste. 2010. *Art rupestre: la 3D un outil de médiation du réel invisible?* In situ: *revue des patrimoines*, 13. Available at: http://insitu.revues.org/6411. Accessed 28 Feb 2013.

Rock Art Sites: Management and Conservation

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Introduction

Concomitant with an increase in site accessibility, digital availability of information, and concern by traditional stakeholders is an increase in the need for explicit management plans, thorough condition assessments, and, whenever necessary, hands-on conservation and maintenance of rock art sites. Significance values concerning rock art sites tend to vary; whereas traditional stakeholders normally value the spiritual aspects of places with rock art, researchers typically look for material samples suitable for physical analysis and dating, and public visitors and tourists mostly look for any destination that they expect to be aesthetically pleasing. Interactions by traditionalists, academics, and the visiting public with the rock surface, albeit in different ways and to different degrees, are adversely affecting the longevity of the rock art. Being fixed to the surrounding terrain on relatively hard and durable material, art on rock constitutes places that tend to survive the ravages of time. But because painted or engraved marks on the rock are vulnerable to agents of natural and cultural destruction, site custodians, such as private landowners and land-managing agencies, often look for ways to slow the clock of decay, while a few others, such as visitors and traditional users of sites, view decay as part of the natural order. Whichever view prevails, it remains important to devise ways in which rock art sites are managed and conserved to best suit the needs of the most prominent stakeholders and/or surrounding communities. In the eyes of both landowners/managers and traditional users, rock art sites suffer negatively when they are arbitrarily "managed" through the unpredictable actions of outside visitors with no long-term or vested interests in those sites and effected communities.

Definition

The most frequently found examples of rock art include painted or drawn pictographs (i.e., where naturally colored clays are applied as ground-up powder mixed with water and a binding medium or applied directly with a lump of clay or charcoal) and engraved or pecked petroglyphs (i.e., where natural surfaces are engraved, incised, or pecked with a sharp implement, typically a hard rock). Hands-on graffiti removal from rock surfaces has shown that water is an essential material to produce lasting pictographs and petroglyphs. By adding water to pigment powder, colorants penetrate the pores and interstices in the rock surface, hence creating a tighter physical bond between pigment and rock than when applied dry. By adding water to the rock surface, dust particles created by engraving, incising, and pecking speed up the production of petroglyphs and allow for deeper and wider lines. Without the addition of water during pictograph and petroglyph production, the images would not survive long, especially in open air settings. Surface accretions, such as silica-rich skins, that cover many pictographs, create a protective layer. Knowing that pictographs and petroglyphs are part of the rock surface, rock art is better referred to as "art *in* the rock" instead of "art *on* the rock." Pictographs are most frequently found in dark zone caves (e.g., mostly in the form of dry-applied drawings in the Paleolithic-aged Franco-Cantabrian region or Archaic to Mississippian ones in the southeastern United States), comparatively shallow caves and rock shelters (e.g., mostly in the form of wet-applied paintings in Middle to Late Stone Age San sites in Africa, various Native American sites in the Americas, and Aboriginal sites in Australasia), or where boulders create rock overhangs. Petroglyphs are more frequently found in rock shelters (e.g., Africa, Australia, and the Caribbean), rock pavements (e.g., coastal Scandinavia), or against

boulders. Petroglyphs might be attached to the parent rock or can be on boulders inserted into the ground surface, such as along the prehistoric ball courts of the Taíno peoples in the Caribbean. Proper management of rock art sites includes recommending proactive guidelines concerning acceptable recording, sampling, visitor behavior and numbers, interpretive infrastructure, and conservation and maintenance. Hands-on maintenance and conservation are important components of rock art site management. Actions range from keeping the site free of litter and deleterious agents through regular monitoring through to removing graffiti. A thorough assessment of a site's physical condition helps to determine major conservation problems as well as potential threats to visitors' safety. Determining what section of the population a site should be opened to and/or catered for will usually be based on understanding a site's significance values. Knowledge of the management history and infrastructure of a place helps with decision regarding what has worked in the past and what is likely to fail in the future. Sustainability is also a key concept; management infrastructure and conservation measures should not only be minimalist and repeatable but also compatible with natural materials and prevailing significance values.

Key Issues/Current Debates/Future Directions/Examples

Rock art is found in almost every corner of the globe where people have lived. Antarctica was the only continent without rock art up until the first documented landing of humans in around 1821. Knowing that most rock art we see today is old (currently the oldest dates range between 40,000 and 70,000 years ago), they are essentially non-renewable resources; in the absence of their original makers, nothing can recreate rock art panels that have been severely damaged or destroyed. The non-renewability of rock art is one important aspect that makes preventative management so important, especially in the light of increasing visitation by uninformed people. It is important to realize that rock art that has survived two millennia can be destroyed in less than two minutes of frenzied vandalism. Ways to prevent interference with rock art panels are not clear-cut and have given rise to various debates, both between and within divergent interest groups.

The location and shape of rock art panels are important, bearing in mind that certain locales and rock surfaces are chosen over neighboring ones that appear at first glance to be equally suitable. Every effort should accordingly be made to conserve rock art sites in their original location. Often this becomes impossible, where infrastructure critical to the livelihoods of local communities is constructed: in these situations, the best alternative can be to carefully remove and relocate the panels to the interpretive setting of the closest viable museum. Sometimes, such as in the Côa River Valley area of northeastern Portugal, academic and public outcry can be sufficiently loud to stop dam construction activities so that significant rock art sites can be preserved in place.

There is a site in Puerto Rico, which must remain anonymous to prevent looting, where excavated petroglyph boulders have been reburied, because the condition assessment results indicate that the soil cover provided the best preservation matrix for the 1,000-year-old carved imagery. But the preservation afforded by the soil was not the only reason for this conservation decision: all stakeholders agreed that the spiritual and research significance of the boulders overrode the need for display to outside visitors.

Rock art sites often have ongoing importance to many direct descendants of the makers or by people historically associated with them, most vocally in portions of Australia and North America. Rock art sites are undoubtedly important to direct descendants and related traditional users in other part of the world, but these peoples' voices have yet to be heard in an equal degree. Traditional practitioners who visit rock art sites tend to do so without fanfare, so what these people do at sites is difficult to determine. Telltale signs of visitation within some rock shelters in the Americas are the application of traditional-looking pigment on top of recent flake scars. In

portions of western North America and Australia, the need for repainting or overpainting existing imagery has become topics of intense debate, including among traditionalists. Lasting solutions are hard to come by, one reason being that even within a single community, there can be a division between those who support painting and others who oppose it; rock art sites are part of a wider web of contested sociopolitical and economic relations.

In portions of subequatorial Africa, Bantu-speaking agriculturalists are using the rock painting sites of their hunting and gathering predecessors for ritual sacrifices to their ancestral spirits. These rituals, which include spattering sorghum beer onto old paintings and vigorous dancing, generate dust that settles on and adheres to the panels, which is deleterious to the ongoing visibility and integrity of the imagery. However, in terms of community concerns and support, it would be difficult, and indeed unethical, for authorities to suppress this long-standing practice. Does the conservation of this imagery have a greater value than the ongoing traditional uses of the imagery by local people? The Kondoa Irangi rock painting sites in Tanzania have great significance for locals selling their goods and services to tourists as well as for local ritual practitioners. As in other parts of the world, the management issues are not straightforward, since communities seldom represent a single interest group or speak with one voice.

The use of the very term "rock art" has been questioned by traditional stakeholders. Both Australian Aborigines and Native American Indians, for example, have requested that terms such as rock imagery, rock pictures, or rock writing be used instead. Their reason for this request is not so much that they deny the aesthetic quality of the paintings or engravings but rather that the place and its associated narrative and ongoing use by far override artistic significance. This is something that agencies responsible for the management of such sites should bear in mind; interpretation and presentation to the visiting public should emphasize, where justified and relevant, that locales with paintings and engravings are significant for reasons other than artistic merit or aesthetic appeal. Nonetheless, the word rock art is still recognized and used by most people.

When dealing with rock art sites, it may be helpful to realize that among most traditional cultures, the division between sacred and profane is not as rigid as it is among post-Industrial peoples. For example, Bantu-speaking women who collect plants from below drip lines in rock shelters insist that the leaves or fruits are food provided by ancestral spirits residing immediately below the surface. Some Blackfoot Plains Indians used to incise depictions of their everyday exploits, such as during raids or hunting expeditions, as if these were intertwined with their vision quest experiences. Knowing that the divide between practical and spiritual is blurred, it may be rushing to judgment labeling certain sites religious and others secular.

There is no blanket solution that covers all rock art-related management and conservation issues. Although rock types, weather systems, biota, and sociocultural formations share many properties, they combine in unique ways, reminiscent of fingerprints. Due to the unique characteristics of each site and panels within those sites, it is important to assess and manage these on their own terms.

One common reaction among land managers is to close rock art sites for public visitation. While this solution may work for constricted sites that are sensitive to slight changes in air quality or inadvertent physical abrasion of surfaces along narrow passages and low ceilings, particularly within dark zone caves, it is more difficult to close to the public spacious rock shelters that are highly visible and well known. When properly managed, with the necessary protective and interpretive infrastructure in place, rock art sites that show signs of custodial care and attract many visitors tend to suffer less from vandalism.

Successful infrastructural changes at rock art sites in countries such as Australia include removable boardwalks with low handrails and mounted interpretive panels that help visitors identify motifs. Sites opened to the public in this fashion help draw visitors away from nearby sites that are

physically more susceptible to visitor-induced damage. Visitor books, kept in boxes that are mounted on pedestals near the entrance to many sites in the United States, serve many functions, including recording the numbers, names, addresses, and comments of visitors as well as providing basic interpretations of the site and its rock art. However, when not properly maintained, the neglected appearance of rock art sites may increase the chances of vandalism. In drier areas, structures such as wooden boardwalks may increase chances of fire damage and sand accumulation at sites. To reduce incidences of unforeseen damage, it is preferable that site managers only make minimal infrastructural additions to a site.

Generally, sites farther from car parks tend to be vandalized less than those in close proximity to motorized vehicle access. Once graffiti appears at a site, it tends to beget more graffiti. For this and other reasons, such as increasingly used enamel-based spray paints bonding with the rock through time, it is important to remove graffiti as soon as possible (Fig. 1). Specialized and experienced individuals, who know the rock art of the area, should be hired to do graffiti removal, as often original images have accidentally been removed by well-meaning conservators that have no knowledge of rock art. It moreover helps to consult all interested parties prior to graffiti removal, bearing in mind that some names and dates may have historic and sentimental value to people from the local area. But knowing that even the best managed sites can be vandalized, well-paced motion-detection cameras can help monitor sites and catch vandals in action. Proper walking surfaces, barriers, and signage are essential to create a sufficiently wide protective space between visitors and the rock art surface. Without monitoring and properly designated viewing areas, graffiti is likely to be recurrent and costly to mitigate.

Rock Art Sites: Management and Conservation, Fig. 1 Example of spray paint graffiti removal at a pictograph site near Las Vegas. (**a**) Graffiti spray paint before removal. (**b**) Graffiti spray paint after removal

Correct conservation and management decisions depend a lot on good background information, such as old photographs, maps, and descriptions of rock art sites and the surrounding terrain. When rock art specialists consult such archival sources, it becomes possible to reconstruct a history of site condition, visitation, and land-use. Reconstruction of this kind often helps rock art specialists identify critical changes in visitation and/or land-use that resulted in damage to the rock support and imagery. But historic photographs can also reveal that no change has occurred in the recent past and that observed "damage" to sites has a very long gestation.

Practiced properly, rock art management and conservation is a holistic undertaking; knowledge of both the physical makeup of sites and human context is vital. Where past and present uses and significances of rock art sites can be confidently reconstructed through archaeological and ethnographic research, it is important to include this knowledge when making decisions about the best ways to interpret and present sites to the visiting public. When ethnohistoric background research shows that distant features, such as mountains, rivers, or abandoned towns, are conceptually related to rock art sites, it is important to take this into account and preserve the integrity of the views to these other landscape features whenever possible.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology and Anthropology
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Australian Rock Art
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cueva de las Manos, Río Pinturas Cave Art
- ▶ Culture in Archaeology
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Europe: Prehistoric Rock Art
- ▶ Heritage Museums and the Public
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Media and Archaeology
- ▶ North American Rock Art
- ▶ Pigment Analysis in Archaeology
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art, Forms of
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts
- ▶ South American Rock Art
- ▶ Stone: Preservation and Conservation
- ▶ United Kingdom: Cultural Heritage Management Education
- ▶ Vandalism and Looting (Ethics)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Bwasiri, E.J. 2011. The implications of the management of indigenous living heritage: The case study of the *Mongomi Wa Kolo* rock paintings world heritage site, Central Tanzania. *The South African Archaeological Bulletin* 66 (193): 60–66.

Corruchaga, J.A.L., and P.F. Monforte. 2006. The new museum of Altamira: Finding solutions to tourist pressure. In *Of the past, for the future: Integrating archaeology and conservation*, ed. N. Agnew and J. Bridgland, 177–183. Los Angeles: The Getty Conservation Institute.

Gale, E., and J. Jacobs. 1986. Identifying high-risk visitors at aboriginal art sites in Australia. *Rock Art Research* 3 (1): 3–19.

Loubser, J. 2001. Management planning for conservation. In *Handbook of rock art research*, ed. D.S. Whitley, 80–115. Walnut Creek: AltaMira Press.

Sullivan, S. 1993. Conservation policy delivery. In *Cultural heritage in Asia and the Pacific: Conservation and policy*, ed. M.G.H. MacLean, 15–26. Los Angeles: The J. Paul Getty Trust.

Thorn, A., and C. Dean. 1995. Condition surveys: An essential management strategy. In *Management of rock art imagery (occasional AURA publication 9)*, ed. G.K. Ward, and L.A. Ward, 116–123. Melbourne: Australian Rock Art Research Association.

Zilhão, J. 1998. The rock art of the Côa Valley, Portugal: Significance, conservation and management. *Conservation and Management of Archaeological Sites* 2: 193–206.

Rock Art, Forms of

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Introduction

The most general and commonly used term, "prehistoric art," refers to forms produced on diverse mediums by human who lived in distinct prehistoric periods, in particular region of the world (Lorblanchet 1999; White 2003; Vialou 2004, 2006).

Definition

It should be understood from the outset that these forms, commonly called pictures or images, are those that have had the capacity to be preserved. Thus, only the forms inscribed in lasting materials and organic mediums, which are resistant to multiple natural alterations and changes in the environment and climate, testify to the symbolic-artistic behavior of prehistoric peoples: their voice and songs have gone; their dances have disappeared in the fleeting animated moments.

Other examples of symbolic behavior have survived from prehistoric times, for example, unusual objects gathered and brought inside habitations. But it is above all the burials of men, women, and children that attest, for nearly 100,000 years, to a metaphysics of life and death, whose religions have been the distant heirs, about tens of thousands of years ago in some scattered crucible of ancient civilizations.

From various prehistoric cultures and from various eras dating back more than 100,000 years, graphic representations have reached us (lines incised and sometimes painted – more rarely preserved) on portable or manipulable and hence transportable mediums, decorated weapons, ornamental objects for the body, and sculptured objects. These *portable* forms, as they are often called, sometimes form considerable groups alongside rock or parietal forms; the best example is given by "Paleolithic art" in Europe during the last thirty millennia of the last ice age (Leroi-Gourhan and Delluc 1995; Anati 2003; González Sainz et al. 2003).

The words "wall" and "rock" describe immobile monumental forms, sometimes of monumental proportions. However, the majority of them fall within the gestural space of their authors; a good portion of them are also small, within the size of the palm, and some even smaller.

The adjective *parietal* commonly used in anatomy, is the most appropriate term for cave walls. The adjective *rupestre* in Romance languages, refers to media formed by rocks or boulders. It is thus less generic than the adjective *pariétal*. In the English language, *rock art* corresponds to *rupestre*, whereas *cave art* refers to art on the walls of caves: it is thus equivalent to the French qualifier *parietal*, specifically applied to Paleolithic cave art and in contrast to portable art. The use of the word *rupestre* has become dominant internationally for designating prehistoric representations on rocky mediums encompassing all of their geological and morphological diversity.

Key Issues/Current Debates/Future Directions/Examples

The Nature of Prehistoric Representations

The concept of *representation* here concerns the image or form in order to emphasize the psychological and semantic dimensions of the relationships established by each one with the outside world: the representation of things or beings is an invention or a personal (psyche/state of mind) and collective (social) construction engaging the meaning that is assigned to them through naming, seeing, or manipulating them; for example, the representation of a weapon can be formulated in various figures (or images), a dagger, a bow. The representation of violence can be expressed visually in a thousand ways (forms), combat, fight, tortured face. . .. The representation of sexuality engages in a similar way the individual and the group, with even more obviously an unconscious part, both underlying the representation expressed

on the wall and the representation in the depths of *moi*. In fact, most prehistoric rock iconography, of varied times and locations, culturally independent, shows treatment, figurative or partially codified, of sexuality: this denotes simultaneously the universal and the cultural side.

The systems of representations shaped by the brain, including the most basic (literally), that is, the language born in infancy, integrate multiple forms of abstraction, the preferred tools of social communication based on intellect. The graphic expression of abstractions is based on codes, socially created and recognized. Prehistoric rock iconography has undoubtedly codified expressions of abstraction, but it is impossible to decode those that may be considered in this way; as examples, it is probable to regard concentric circles or rows of dashes as counting systems: mathematic codifications, such as I + I = II, are made up of graphical representations which are frequent in many rock assemblages. Symbolic activity, totally intrinsic to humans, constantly produces mental images during sleep as well as during wakefulness. Recalling what F. Goya was saying, as an epigraph to his Caprices that reason asleep produces monsters, it appears that many rock art presentations (according to different cultures) fall under these symbolic productions, conscious and unconscious: half-animal-half-human beings, scary monsters, etc. That such myth claiming that the Tapir was the creator of the world comes under the same expressive power; such rock art representation of an antelope, snake, or mammoth could take the same role in telling the story, symbolically the most reliably true of such group.

The graphic expression of symbols which are thought about, spoken, and exchanged within a group for a limited time (over one or many generations) is not only linked to the real world (or considered as such, whenever it involves an animal or a human figure). Christians have the cross and the sign of the cross, the Magdalenians from Perigord 14,000–15,000 years ago had the tectiform sign (in the shape of a roof hut), while those, more or less contemporary, of the Cantabrian region symbolically used quadrilaterals with internal partitioning. Visual symbolization (graphic for rock art) passes easily through the geometric abstraction. For example, we could mention the most banal angular sign that can be seen, a V: it can symbolize an injury when it is placed on the side of an animal and an arrowhead when placed over a linear axis (Fig. 1) or even signify hope for an expected victory, drawn by the two raised fingers of a political figure.

Abstract rock art representations, most commonly designated by the semantically neutral term *sign*, abound in some rock art cultures, like on the walls of Paleolithic caves in western Europe or in the rockshelters of the central

Rock Art, Forms of, Fig. 1 Niaux cave (Ariège, France) buffalos, horses, and symbols Magdalenian. Cl. A and D. Vialou

Brazilian plateau, and are (more or less) absent in others, like in the rockshelters of Tassili n'Ajjer (Algerian Sahara) or in Arnhem Land (Australia).

Anthroposocial Origins of Prehistoric Representations

Whether figurative or abstract, rock (and portable) art representations are rooted in the individual and collective consciousness of prehistoric peoples who produced them, from early hunter-gatherers to later producers in various parts of the world. The domestication of animal species did not suppress the creativity of rock art!

The first known graphic representations, such as the incisions systematically made into portable mediums, which come from the occupation of habitats recently excavated in southern Africa, are dated more than a hundred thousand years ago (Henshilwood and d'Errico 2011). The oldest rock art representations of signs, combining figurative representations, animals and humans, and geometric or abstract, are dated between 30,000 and 40,000 years (Aurignacian art in Paleolithic Europe).

These most distant origins of representations made in and on durable media are part of the phylogeny of Sapiens (*lato sensu*) and its diaspora throughout the world, which is currently being debated (Otte 2010). The ability to produce these forms, graphically materialized, is not attested before Sapiens and/or contemporary human lineages, which are genetically close in various regions, such as the Neanderthals in the Middle East and Europe. It becomes apparent between, on the one hand, the production of graphic images and the evolution of human lineages and, on the other hand, the production of complex parietal settings, which bring into play figurative expressions and abstract expression of the evolution of Sapiens.

Diverse and multiple symbolic behaviors evidently existed prior to graphic manifestations. But the emergence of these in association with the development of the Sapiens lineage indicates that it pertains to it: there is indeed a *before* the forms and an *after* the prehistoric forms, which connects us (all Sapiens) to an evolutive modernity, specific to prehistoric Sapiens. The construction of these graphic forms, driven by the representation of the world, emerges from and in the brain (Vialou and Vilhena Vialou 2005). The most notable evolutionary trait of the Sapiens compared to earlier types of Homo is that of cerebral development. This trend is paleontologically visible with the progressive verticalization of the face of unearthed fossils. The frontal lobe, that is, the cortical area directly involved in the development of systems of representation, benefits from an increase (and more complex) that is crucial for the maturation of symbolic and technical relationships with others. The emergence of prehistoric art is in parallel to these new techniques of fabricating tools and weapons in bone and stone and of new modes of economic acquisition and exploitation of natural resources. Obviously, the systems of graphic representation were born simultaneously and correspondingly within the brain and the Sapiens societies, notably anatomically modern humans from prehistory, over the past 40,000 years.

The Universality of Prehistoric Representations

Prehistoric representations present universal characteristics, derived from their anthropogenic origin, expressed in graphic and artistic behaviors.

The techniques of graphic expression on walls are remarkably uniform. Three major categories can be differentiated, each one offering secondary variations: engravings, drawings, and paintings (Vialou 2003).

What is commonly called *engravings* covers all forms of incisions made with instruments, organic and mineral, harder than the media. One (or more) finger may be used as a natural (and spontaneous) instrument to leave its mark on a wall that is sufficiently soft, such as the mondmilchs in limestone caves. These digital prints, usually more or less long meandering maze lines (the "macaroni"), express a direct, almost fleshy relationship of the body with the material which develops since childhood with the footprints that are left or made involuntary or voluntary in the sand of a river or the beach. But one's touch on a wall, even if superficial, retains

its trace, in contrast to the one done in sand or mud. Bones or pieces of wood are also used for equally tracing quite large parietal marks removing a notable quantity of media material.

The use of hard stone tools (flint, quartz, quartzite, etc.) enabled people to carve, pound, or peck on rocky walls that are themselves resistant. A wide range of strokes are found ranging from ultrafine incisions (less than 1 mm) to deep grooves (several cm wide and deep). Often these deep grooves have been polished by intensive rubbing bringing into play other stone tools and granular abrasives (sand). The use of percussion tools, by hammering the medium, has given pecked linear grooves or more or less deeply pounded surfaces.

The removal of material *on* a medium also represents the achievement of surfaces in *relief on* a rock surface: either by making a peripheral withdrawal of the material to raise a surface in the center or by making localized withdrawals within the rocky surface that is worked to represent, for example, the anatomical volumes of an animal. Finally, according to the thickness of the material removed, the representation obtained appears in *bas-relief*, eventually in *semi-relief*, but almost never in *high relief* (as is found on historic monuments).

Whereas engraved (and pecked) representations cover the totality of prehistoric thematic fields, representations in relief (raised up and hollowed) are (almost) exclusively figurative, namely, animals and much less often humans. Representations in relief are rare and indeed absent from most rock art sites, regardless of their chronological position. By contrast, engraved representations are generally the most common and found in all rock art in the world. We can explain the dominance in the engraving technique by two factors of which it is difficult to evaluate the reciprocal influence: the choice of the technique as such, which is proven *a contrario* by the absence of engravings in the rocky regions. These choices may have been based on ideological, artistic, or simply technical motifs. The second factor is that of conservation compared with drawings or paintings. Engravings have a better and longer resistance against the multiple effects of weather and geochemical modifications of rocky surface that are affected by them.

What is commonly known as *paintings* covers all inputs of coloring materials on the different medium. The coloring materials of natural minerals, hematite, ocher, manganese, kaolin, etc., taken from the surroundings landscape (sometimes many kms away), have been used as they are found or are well prepared: thus, for example, small flat hematite pebbles (red iron oxides) were directly used as pencils to draw on walls (shorter or longer linear marks); the same types of mineral pigments were reduced into a powder and mixed with a liquid (most commonly water): the paint thus obtained, more or less liquid or as a paste, as desired, is then deposited on the media in the form of linear marks, that is to say, lines or colored tracks; on the one hand, we are dealing with drawings and, on the other, with flat color paintings (solid infill), with all the possible variations in between these two extremes of graphic-pictorial expression.

The *thematic categories* of prehistoric rock art characterize both its universality and its precedence on the global chronological scale compared to historic arts. Figurative representations, abstract representations, and undetermined representations constitute the three thematic categories of rock art, on the five continents, with variations of course, dominant or absent, according to different regions and eras.

The *indeterminate* representations, which occur in varied quantities in different iconographies, include numerous lines or spots, small or large, and shapeless and undistinguishable. Indeterminate representations seem to participate in both the thematic expression of the devices and their structure chart (like prepared backgrounds).

Abstract representations, geometric shapes that are more or less simple (signs) or complex (motifs), are, on the one hand, more numerous than figurative ones, and, on the other hand, much smaller than these (Figs. 2 and 3). Whether they result from the graphic abstraction process or from the graphic process of symbolic expression, they escape immediate identification. They distinguish prehistoric rock art from the historic arts. However, the emergence, only recently, of

Rock Art, Forms of, Fig. 2 Shelter Mano Aroe, Mato Grosso, Brasil. Group of symbols. Holocene Period. Cl. A and D. Vialou

Rock Art, Forms of, Fig. 3 Shelter Arqueiros, Mato Grosso, Brasil. Group of symbols, complex motifs, and two archers. Holocene Period. Cl. A and D. Vialou

abstraction within Western graphic (and fine) arts raises questions about what could be conceptual affinities in terms of expressive modality that deliberately put aside recognizable reality.

Figurative representations, more spectacular than the others, make people believe, within the imagery of our societies of Western culture, that prehistoric art is an art of animals. Indeed, animal representations are common and numerous: they include wild fauna – hunted or fished – but also domesticated species in rock iconography among Neolithic societies who have domesticated livestock, for example, cattle herds painted in shelters of Tassili n'Ajjer (Fig. 4). Human representations

Rock Art, Forms of, Fig. 4 Shelter 6 of Sefar, Tassili N'Ajjer, Algerian Sahara. Domesticated bovine herd. Holocene Period. Cl. A and D. Vialou

are frequent, sometimes outnumbering animal representations.

This category also includes, but in a very uneven and inconsistent fashion, representations of weapons, clothing, or more rarely with other material objects like gourds or even constructions like fences or huts. There is a near total absence of the plant world and landscapes. In addition, the stylistic treatment of human figures on rock (as well as on portable mediums) is different from animal representations to the extent that figurative, naturalist realism is almost never applied to them. In this, they differ radically from realistic human representations that occur, here and there, only with history.

Media and Parietal Setups

The chosen *media* guided, by their structures and dimensions, the conception and the construction of parietal setups. In some areas, hardened soil, such as the laterite soils of the tropics, offered sometimes immense surfaces: the representations, more often pecked than incised, unfold themselves in all directions, in contrast to that which occurs on vertical or tilted walls, naturally oriented (top-down and left-right). Sometimes these representations, figurative or not, are very large, because they were produced by moving.

The rocks themselves give the dimensions and the composition of parietal setups: there may be blocks of average size (from a few tens of cm to 1 m) offering one or more faces to engravers. There are the rocks exposed on the surface of streams: rock art in the Amazon is replete with engraved rocks, often with geometric motives such as spirals. There are also engraved rocks scattered, or alternatively, showing on the surface in their hundreds on plateaus, such as in South Africa (Magaliesberg), the sides of valleys, for example, Foz Côa (Portugal), valleys close to Santa Fe (New Mexico), and also in high Alpine valleys like that of Mont Bego. Similarly, rocky chaos on steep hillsides has been filled by thousands of representations, in the Dampier Archipelago (Australia), for example. Powerful rocks or bulging rocky outcrops over several meters were chosen to depict representations reaching impressive proportions.

Walls at the foot of cliffs, glacis on mountains, walls of rockshelters, or the porches of underground cavities were selectively chosen by prehistoric peoples to deploy their symbolic constructions according to the parietal setups responding to the rules of organization of the graphic space. The parietal space offered by rockshelters has morphological and topographical constants, whatever their secondary variations (small-large, high-low, wide-narrow, deep-dish), and these are crucial to the development of representations and their display. The space is oriented in three dimensions: a design space with high-low and left-right and, where required, the depth of

space constituted by the ceiling of the canopy, which can, accordingly, be laterally framed by one or two rocky walls, more or less perpendicular to those at the back of the shelter, normally chosen to accommodate the representations. These volumetric dimensions of the space available to those who came to perform representations or/and live there, temporarily or not, condition the parietal setups in shelters.

The *parietal setups* are normally done on the back wall of the shelter. The ceiling of the cave is more often ignored than not. The parietal setups on the wall of a cliff or a large rock, not sheltered, are oriented and structured like those at the back of the shelter. The graphic space most commonly attested is that of the manual field of the author, standing up: there are infinitely fewer representations placed below the knees and even less higher than the limit reached by outstretched arms.

The composition of parietal setups (regardless of their location) are based on three categories of spatial relations: the *juxtapositions* between two or more representations, on the same plan, for example, to simulate a line or a confrontation, or, on fragmented plans, as if the representations floated in space; more or less partial *superpositions* between two or more representations and according to the same variations of previous plans; and finally, the *interlocking* between two representations, which are even more rare. The symbols (and geometric motifs), being always (except in very rare exceptions) smaller than the animal figures, are more often interlocked than are the animals between them. Human representations, often reduced to small, simplified silhouettes, are regularly arranged in rows, in close juxtaposition; they are not frequently superimposed or interlocked with animals. The symbols have little effect on human representations by superposition and even less by interlocking: it is clear that there is like a disjunction between animals and humans in terms of their symbolic links, and this is true in the ensemble of prehistoric rock iconography.

Diversity of Prehistoric Representations

Prehistoric representations and their parietal setups offer an infinite number of special characteristics related to the diversity of cultures with which they identify.

Rock themes generate the dynamic of this inexhaustible diversity. The figurative themes play the most constant role in relation to the abstract theme, because they concern all rock art in the world, across various epochs.

The category of animal representations is obviously the first issue: indeed, in the rock setups in Africa, there exists a purely African fauna, for example, giraffes, tapirs in south America, echidna in Australia, or reindeer in Scandinavia. The animal species clearly characterize the environments in which they live and the climates which are linked to them. But their representations correspond to the choices made by the societies that produced them. The impact of economic behavior and social exploitation and the consumption of animals (hunting, fishing, scavenging, domestication, breeding) are real but uneven according to the societies and their rock iconography. Animal species, represented almost endlessly, in some contexts have been elevated to totems, to emblematic figures, we do not know, in any case representations entrusted with their own meaning. There are wonderful examples attesting to this: the eland in Bushman art in southern Africa (Fig. 5) and the barramundi in Arnhem Land (Fig. 6). Paleolithic representations show variations of animal representations allowing the identification of regional or local traits: we can take, for example, the representations of horses and bison, two species which are extensively represented by Magdalenian, of which the quantitative weights are different depending on the region, Cantabria, Pyrenees, and Dordogne. In other sites there are emphases on horses (in Ekain and Combarelles) or bison (in Altamira and Font-de-Gaume) (Leroi-Gourhan and Delluc 1995). In some cases fauna portrayed in rockshelters and rocks in the Sahara shows adaptation of societies to desertification with the progression of camelids, horses, and finally of Neolithic bovines.

Unlike animals, human representations could reflect a universal thematic unity, but their graphic treatment reveals their symbolic variability. These obviously discriminate the societies and cultures

Rock Art, Forms of, Fig. 5 Shelter Game Pass, Drakensberg, South Africa. Elands du Cap, *Sorciers* et archers *volants*. Holocene Period. Cl. A and D. Vialou

Rock Art, Forms of, Fig. 6 Ubir Shelter, Arnhem Land, Australia. Brramundas expressed in *X-rays*. Holocene Period. Cl. A and D. Vialou

that produced them, with clothes and jewelry (Fig. 7), weapons, and various objects. The most notable of the irreducible diversity of human representation comes from depictions of the naked body, whether it be distinctly gendered or not. It would be more precise to speak of *disfiguration* than figuration, as the symbolic value given to silhouettes and heads, face, and their profile is strong and often strays away from the real anatomy. Some ideologies, however, give clear figurative similarities without suggesting the least cultural kinship. This is clearly the case with bow hunters, more or less schematic, seen as spectacularly stepping over open space, legs fully extended, torsos bulging, and bow stretched forward, elegiac images of famous hunters (Figs. 5 and 8)!

The apparent convergence of basic geometric shapes explains the apparent uniformity of signs through a multitude of rock iconography: in fact, a point resembles a point, a double row of dashes is just like any other, concentric circles resemble concentric circles, etc. By contrast, the most complex symbols and motifs (repetitive or not), such

Rock Art, Forms of, Fig. 7 Tan Zoumaïtak Shelter, Tassili N'Ajjer, Algerian Sahara. Adorned and dressed characters. Holocene Period. Cl. A and D. Vialou

Rock Art, Forms of, Fig. 8 Shelter 23 de Sefar Tassili N'Ajjer, Sahara algérien. *Flying* bowmen. Holocene Period. Cl. A and D. Vialou

as reticulated rectangles or closed sinuous outlines internal fill-ups, are specific to their own region and period. Within the same rock region, culturally homogenous, the complex symbols and motifs belong to a single site or two or three neighboring sites: these topographic specificities offer the possibility to distinguish symbolic neighboring micro-territories sharing common traits and other individual ones relating to a single regional population. The spatial connections between symbols, between them and figurative representations, which frame the symbolic constructions of parietal setups, accentuate even more the cultural identities which they characterize in different ways.

At this level, we have reached the fundamental nature of prehistoric art and its major function, which is to reflect the most significant cultural

traits of societies, in an aesthetic and symbolic dimension extremely elaborated. Art and society have cross-fertilized in this way since modern humans were created in all their universality.

Cross-References

- ▶ Art, Paleolithic
- ▶ Australian Rock Art
- ▶ Cognitive Archaeology
- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ Form in the Archaeology of Art
- ▶ *Homo sapiens*
- ▶ Leroi-Gourhan, André
- ▶ Mobiliary Art, Paleolithic
- ▶ South American Rock Art

References

Anati, E., ed. 2003. *40 000 ans d'art contemporain: aux origines de l'Europe*. Capo di Ponte: Edizioni del Centro.

González Sainz, C., et al. 2003. *Arte paleolítico en la region cantábrica*. Santander: Universidad de Cantabria.

Henshilwood, C., and F. d'Errico, eds. 2011. *Homo symbolicus: The dawn of language, imagination and spirituality*. Amsterdam: Benjamins.

Leroi-Gourhan, A.B.., and G. Delluc. 1995. *Préhistoire de l'art occidental*. Paris: Citadelles et Mazenod.

Lorblanchet, M. 1999. *La naissance de l'art. Genèse de l'art préhistorique dans le monde*. Paris: Editions Errance.

Otte, M. 2010. *Cro-Magnon. Aux origines de notre humanité*. Paris: Éditions Perrin.

Vialou, D. 2003. L'art paléolithique. In *La préhistoire*, ed. M. Otte, D. Vialou, and P. Plumet, 211–289. Bruxelles: Éditions De Boeck.

Vialou, D., ed. 2004. *La préhistoire. Histoire et dictionnaire*. Paris: Robert Laffont.

Vialou, D., ed. 2006. *La préhistoire*. Paris: Gallimard.

Vialou, D., and A. Vilhena Vialou. 2005. Modernité cérébrale-modernité comportementale de Homo sapiens, Brno. *Anthropologie* XLIII (2): 241–247.

White, R.K. 2003. *L'art préhistorique dans le monde*. Paris: Editions de La Martinière.

Further Reading

Flood, I. 1995. *Archaeology of the dreamtime: The story of prehistoric Australia and the people*. Sydney: August & Robertson.

Geneste, J.M., ed. 2005. *Recherches pluridisciplinaires dans la grotte Chauvet*. Paris: Société Préhistorique Française.

Le Quellec, J.L. 2005. *Peintures et gravures d'avant les pharaons du Sahara au Nil*. Paris: Fayard.

Lewis-Williams, D., and S. Challis. 2011. *Deciphering ancient minds: The mystery of San Bushmen rock art*. London: Thames and Hudson.

Plagnes, V., C. Causse, M. Fontugne, H. Valladas, J.-M. Chazine, and L.-H. Fage. 2003. Cross dating (Th/U-^{14}C) of calcite covering prehistoric paintings in Borneo. *Quaternary Research* 60 (2): 172–179.

Rock Art, Semiotics and Meaning of

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Introduction

The problem of the meaning of past societies' material culture has been one of the main concerns of archaeology since its origins as a scientific discipline. Such interest in the meaning of things led archaeologists to make the first classifications, which were based primarily on utilitarian criteria. In this way, it was possible to differentiate between those objects with some functional meaning (an arrow, a pot, a plough, etc.) from those whose meaning was less obvious or could not be assigned a specific function, these were associated with the ambiguous sphere of the symbolic (a lithic statuette, a decorated rib, the ochre scattered on a buried body, etc.). Within this last group, rock art was – and still is – one of the cultural productions that has received most attention from researchers, precisely because of the difficulties involved in accessing its meanings. Even in ethnographic cases, where there was the possibility of working with aboriginal communities that continued to produce rock art beyond the middle of the twentieth century (Sanz et al. 2017), the problem of meaning continued to persist,

mainly, because the different representations were liable to different readings according to gender, age, or social position of the community member who officiated as an informant in that occasion.

The meaning of rock art, and the meaning of archaeological objects in general, was always slippery, or inaccessible. However, archaeology, throughout its history, sometimes with greater and sometimes with less intensity, sought to develop theoretical and methodological tools that facilitate some approximation to meanings. Many times these tools were borrowed from other disciplines. From the 1960s, archaeologists found in semiotics a theoretical framework that provided various methodological and analytical resources that enabled systematic approaches to problems not even considered by traditional archaeology. Rock art studies were, possibly, the ones that benefited most from the encounter between semiotics and archaeology, fostering the development of special interest areas: analysis of the structure of rock art designs, syntax of images and use of support, typology of representations and stylistic correlation, social aesthetics, cognitive studies of image-interpreter relationship, and analysis of interpretive habits in the context of the use of images, among other topics. In this opportunity, we will focus on the contributions of semiotics to the study of meanings in rock art, perhaps, the most controversial and interesting of the contributions.

Definition

The two main definitions of semiotics correspond to its founders: the Swiss linguist Ferdinand de Saussure (1857–1913) and the American philosopher Charles S. Peirce (1839–1914). The name that Saussure gives to this discipline is that of semiology and defines it as the science that studies the life of the signs within society. In addition, Peirce, uses the term semiotics and defines it as the formal doctrine of the signs that seeks to discern the necessary conditions of the object it studies. Although both conceive the sign as the object of primary study, its theoretical conception will be different and that difference will determine the ways in which its study is approached and the interpretations that are made (Preucel 2006).

For the Saussurean perspective, with linguistic bases, the sign is everything that tells us about something other than itself and is conceived as a purely mental entity independent of the material world, consisting of a signifier and a signified. The relationship between the two is a social convention established by the user community. Besides, Peircean semiotics, with philosophical logic bases, defines the sign as something that is in something else's place under some aspect or capacity and conceives it as an entity made up of three elements: object, representamen, and interpretant. In this triadic conception, the material world (the object) is part of the sign and can condition, to a greater or lesser degree, its mental representation (representamen). Such representation will later be associated with a meaning (interpretant) that can be a concept, a new sign, or an action. In this way, Peirce provides a pragmatic view of the sign, not considered by Saussure, in which he argues that the interpretation of a sign will generate certain practical consequences, which will complete its meaning. That is, the meaning of a sign will have different characteristics and effects depending on the relationship it establishes with each of its constituent elements, giving rise to different sign classifications.

For archaeology, the classification that proved most useful is the one that considers the sign-object relationship and allows differentiating between icon, index, and symbol. In the first, the relationship of significance is given by the similarity between the sign and its object of reference, be it real or imaginary. In the index, which defines a mode of significance that indicates the contextual existence of an entity, the relationship is established by contiguity, causality, or factoriality. Finally, in the symbol, the relationship between sign and object is a social convention. It is important to note that, what for Peirce is only one type of sign, the symbol, corresponds to the more general conception of Saussure's sign.

Knowing these elementary theoretical differences between the two main semiotic traditions will allow us to better understand the different semiotic approaches applied to rock art, which

are basically divided into (a) structuralist approaches that apply concepts and methodologies derived from structural linguistics, showing particular interest in the role of representations in social communication processes (e.g., Troncoso 2008) and (b) pragmatic approaches that put emphasis on aspects related to the agency of rock art and associated social practices that generate meaning (e.g., Ambrosino 2017).

On the other hand, rock art can be defined in broad terms as any visual art representation made on a rocky support through different engraving and/or painting techniques. Like any human production, rock art is the result of a creative process, an artifact, but with the particularity of being the graphic representation of something, where that something can have – or not – a real material existence. As a creative process, mediated by thought, rock art carries a communicative purpose (Troncoso 2007; Vogt 2014, among others). Such characteristics give rock art the necessary conditions to be considered a sign and, consequently, subject of study of semiotics.

Historical Background

In Robert Preucel's book, *Archaeological Semiotics* (2006), he emphasizes that the relationship between archaeology and semiotics is mostly expressed through the use of some of its methodological tools in research with diverse theoretical orientations and not in the explanation of specifically semiotic theoretical frameworks. Although in recent years a significant number of papers have been published that propose semiotics as the main theoretical-methodological resource for the analysis and interpretation of their data, Preucel (op cit) recognizes that it is in structuralism where we will find the farthest information of semiotics' contributions to archaeology.

The impact of structural linguistics of Saussurean roots in the social sciences gave rise to what became known as the "linguistic turn," which had its greatest expression in the 1960s. It is in this context that Claude Levi-Strauss, strongly influenced by linguist Roman Jakobson, lays the foundations of *Structural Anthropology*. Like that famous phrase from Antoine de Saint-Exupéry's *The Little Prince* (1943) "the essential is invisible to the eyes," *Structural Anthropology* focused on the deep structures of cultures (supposedly universal mental structures), which were those responsible for the way in which the material and social aspects of these cultures were presented to us. This key principle of structuralism has its origin in the dual structure of the sign: the signifier, what we perceive, and the signified, the associated concept. Therefore, the study of objects (signs) of extinct cultures put archaeologists in the face of the particular situation of having the signifiers but no longer their signified.

In this scenario, the linguistic model provided a solution to the problem. On the one hand, the generative rules of the language and its linear principles offered certain similarities with the manufacturing process of the artifacts (Preucel 2006). On the other, the Saussurean concepts of significance and value of the sign allowed us to recognize that the meaning of the sign depended not only on its intrinsic meaning but also on the relationship of similarity, difference, and opposition with other signs and, consequently, on the articulation – syntax – among them.

André Leroi-Gourhan (1968) and Anette Laming-Emperaire (1962) were the first to apply the theoretical concepts of structural linguistics and Saussurean semiology for the analysis of Paleolithic rock art. To do this, they used a system of binary oppositions that allowed them to identify the organizational principles of the rock art assemblages, which would reveal the significant underlying structure. As Moragón Martínez (2007, 17) says, "the Structuralist tradition offers a vision of culture as a text; governed by hidden laws and rules that must be decoded in order to understand the meaning of what is presented in the registry."

Basically, for Leroi-Gourhan, Paleolithic art was ordered according to the feminine-masculine opposition where, given certain formal analogies between the human anatomy and that of some animals, the feminine was represented by the figure of the bison and the masculine by that of the horse. Then, from the analysis of the distribution of these representations in the caves studied and

their relationship with other representations that alluded to different animals or abstract motifs, Leroi-Gourhan proposes that the sets would configure narrative scenes associated with the fertility issue. Yet, Laming-Emperaire, disagreed to some extent with such interpretations. For her, contrary to what Leroi-Gourhan proposed, the feminine was associated with the figure of the horse and the masculine with the bison, and the alternation of such images would have represented a society organized in halves.

The criticisms that followed these proposals greatly discouraged the application of semiotic frameworks to the study of rock art. The questions mainly pointed to their psychological interpretations, the lack of chronological control in relation to the production of representations, their scarce interest in broader theoretical approaches (Preucel 2006), and the use of a style concept that was not systematic and operational enough to be applied to rock art and that it did not account for its active role (Troncoso 2007). However, although less frequently but with new approaches within the Saussurean perspective, semiotics continued to be a theoretical-methodological option for rock art studies. In the decades after the 1960s, interest in the meaning of rock art dropped down to give rise to the question of how rock art signifies, deepening the syntactic and contextual aspects, the perceptual analyses of rock art productions, and their impact in the structuring of the communication systems of past societies (Sauvet 1988; Kechagia 1995, among others).

It is worth noticing that we have not included in the historical background, examples of studies of rock art that have been carried out applying Peircean semiotics. However, such a peculiarity would have its explanation in the late resurgence of Charles Peirce's work in the field of social sciences and humanities. As for archaeology, the consolidation of postprocessual currents in the 1980s and 1990s favored the consolidation of material culture studies, which provided a pragmatic view, understanding it as an active social practice constitutive of the social order. This new perspective fostered an approximation of archaeology to Peircean semiotics, which begins to be considered methodologically more systematized at the beginning of this century (Preucel and Bauer 2001). As we will see next, the application of Peircean concepts to rock art studies is relatively recent, and they have come to provide proposals that exceed the question of the representations' significance to explore the practical consequences of rock art production in the network of significant relationships that account for issues such as the construction of social landscapes, memory, identity, and power.

Key Issues/Current Discussions

At present, it can be seen that the debates about the semiotic study of rock art preserve the Saussurean/Peircean dichotomous perspective. The investigations of the first group maintain, in a broad sense, the theoretical conception that rock art is a visual communication system and, as a communication system, will share similar structures with the language system and the existence of a code that allows its recognition and interpretation.

Along these lines, Paul Bouissac is one of the researchers who has investigated the most in the development of a semiotic methodology to address the problems of significance in Paleolithic rock art. His proposals regarding the existence of a possible early writing system are based on rigorous and exhaustive statistical analyses that allow us to define, not by perceptual assumptions, whether the spatial, technical, and stylistic relations between the representations that make up the rock art assemblages respond – or not – to particular combinatorial rules. According to the author, confidence in the method is growing given that the continuous advances in the knowledge about the cognitive capabilities of Paleolithic humans are reversing the old ideas that denied these populations complete linguistic and symbolic competence. Therefore, as long as the archaeology of this period continues to reveal other types of graphic productions that are recognizable as symbolic, they can be compared with the rock art sets through statistical correlation tests that allow identifying the recurrence of particular combinatorial patterns, which would increase the

chances of recognizing textual properties in some of these rock art sets (Bouissac 2006, 2009).

From a similar perspective, Andrés Troncoso (2007) proposed style as a specific semiotics for rock art. He defines style as a broad standardized system that responds to the encyclopedic code that a society possesses at a given time and space. The production of rock art and the rules that stipulate how its elements can be combined are given by the code, so the analysis of the rock syntax is shown as a possible access path for the decoding of the system. The author maintains that style is the individual materialization of a supra-individual reality that gives the intelligibility framework. In the same way, such supra-individual reality will also affect the styles of other material productions, both visual and objectual, offering opportunities for comparing the syntax of the elements that compose them and thus have other ways of accessing the code of the same intelligibility horizon. The use of the space in the rock art panel and the criteria for selecting the site with rock art are also part of Troncoso's concept of style: first, because it defines the way in which the composition is ordered inside the panel from a specific syntax between the elements of the rock art assemblages, which allows to identify the basic principles of the code of the semiotic system, and second, because the spatial location of the site accounts for the domain of validity of the semiotic system and orders the social space (Troncoso 2007, 2008).

Finally, we could say that the studies of rock art that apply Peircean semiotics tools do not attempt to elucidate the meanings of the representations but to understand the practical consequences of rock art production in the rest of the a community spheres of action.

For example, Vogt (2014) proposes a more pragmatic view that takes the focus out of the rock art representation in itself to investigate more systematically the relationship between rock art and landscape. Based on the study of numerous sites with rock art from the south of the Scandinavian region, the author carries out a socio-semiotic analysis of the spatial distribution of rock art and its relation to available resources and roads. He maintains that rock art production was a means to impregnate a landscape that intended to make explicit certain messages about power and identity. While recognizing that the main role of rock art as a semiotic system is its ability to communicate, he postulates that it necessarily acts in relation to other semiotic systems with communicative logics other than linguistics. Rock art is a visual strategy that cognitively models space, influencing its perception and allowing greater political and ideological control than can be achieved through physical power.

Another interesting line of research is proposed by Cabak Rédei et al. (2018), who apply the concept of cartosemiotics for the analysis of a rock art set in Aspeberget, Sweden. The proposal considers the analysis of the representations following the Peircean classifications and paying particular attention to the way in which certain figures are combined with others giving rise to specific themes. For its part, the cartosemiotic perspective assumes that the rock art set can be understood as a kind of map – not in the current sense of the map – which provides a representation of the world where social practices, spatio-temporal conceptions, and a variety of signs that allude to the main referents of the material culture and subjects – or the social roles of such subjects – of that community or neighboring communities at a given moment in their history are interrelated. The semiotic reading of the coordinates of these maps will allow to differentiate the local and the foreign, as well as the peaceful or conflicting intersocial relations. The authors conclude that the analyzed panel represents what is important for the society that produced it and, as a map, schematizes a model of spatial relationships that would have been necessary to know in circumstances such as long-distance travel.

Another example to consider is the work of Ambrosino (2017), who from the tripartite semiotic model icon-index-symbol tries to understand the way in which rock art participates in the social construction of the landscape in a sector of the central Andes and, in turn, interpret its agency in the configuration of intersocietal relationships over a temporal segment of approximately 3,000

years. The author argues that rock art, in the period studied, acted as a semiotic means of reference to the past, constituting a mnemonic device that linked specific identities to specific places and at different scales. The originality of his proposal lies in a dynamic vision of rock art, oriented to its agency in social processes, that is, oriented to the understanding of its role as a connector of different planes of social significance: identity, memory, power, space, mythical time, etc.

International Perspectives

We still observe, on a global level, that the semiotic approaches to the study of rock art and their meanings remain within the limits of the two main spaces of semiotic thought, originally proposed by Saussure and Peirce. Although it is difficult to find studies that seek to assemble both methodologies, it is less difficult to identify certain common trends, such as the incorporation of the spatial analysis of rock art sites' locations and their relationship with the configuration of past landscapes.

However, depending on the theoretical-methodological perspective that is applied, the analysis of the space will grant different interpretative possibilities in relation to rock art and its meanings. Lindström et al. (2014) argue that, in the semiological/structuralist (Saussurean) approach, the landscape is conceived as a system of signs where its various elements are assumed as a coherent whole; in this way, each phenomenon, each trait, will be related to another according to certain codes. Thus, the rock art site, as a sign, is susceptible to being analyzed syntactically in relation to a spatiality greater than that of the site itself, revealing structural relationships with the other elements of the landscape and configuring for its inhabitants a communicative system in itself.

From the Peircean approaches, the landscape assumes a more dynamic role in its interrelation with rock art. These approaches, tacitly based on the Peircean concept of *synechism* – a tendency to consider the whole as a continuum – offer an appropriate theoretical model to understand the practical consequences of the sign interactions. For example, considering Hodder's concept of entanglement (2012) – which I assume as a true semiotic model for the analysis of the pragmatic dimension of object-subject dynamics – the significant relationship between rock art and landscape could arise from the following form: rock art modifies space, modified space influences the perception of subjects, such perceptions derive in specific behaviors and practices, these practices have material consequences on space, which is again modified and re-signified, and so *ad infinitum*.

In short, the general trend in rock art studies and meaning is to look for broad contextual perspectives that allow consideration and analysis of all other semiotic systems that influence, affect or condition the production, function, use, agency, form, and content of rock art.

Future Directions

In a relatively recent work, Kull and Velmezova (2014) collect the opinion of more than 30 semiologists regarding the new challenges that semiotics must face as a discipline. In their conclusions, the authors identify a series of disciplinary needs that should be addressed in the near future, of these, I would like to highlight the following: (a) redefine its goals, its language and methodology, while reconsidering its past to provide an appropriate auto-description, (b) rethink its relationships with other disciplines, (c) respond in an appropriate manner to the demands of the contemporary world, especially favoring the production of new knowledge and theoretical tools.

This synthetic semblance of semiotics' current problems is important to understand the future perspectives of semiotic studies on rock art and meaning. In relation to the first of the mentioned needs, its impact is direct. Until the main semiotic currents are terminologically and methodologically reconciled, the application of semiotics in the study of rock art will continue to be through particular methodological tools and not as a

concrete theoretical framework, with the consequent indeterminacy on the possibility of accessing the meanings: can we really access them or should we just settle for approximations to their possible ways of signifying? The second need raises a more affordable objective: interdisciplinarity. The success of semiotic studies on rock art and meaning lies entirely in interdisciplinary approaches. Which, automatically, leads to a partial response to the third need mentioned, since the interpretive requirements of rock art would lead to the development of specific semiotic methods for the understanding of temporarily distant material realities.

Until these contingencies are resolved, deepening the semiotic aspects of rock art as an object poses a promising future for these studies. Today, the indissoluble unity and co-dependence between mind and matter is evident, which allow us to affirm that the mind is embodied and extended to the material world: human beings know, do, and install themselves in the world in open systems that include embodied brains, social networks, or resources and key parts of the natural and cultural world and that are true social, political, economic, ideological, and cultural networks. Seen on this light, the link between the world and the subjects are the objects; both constitute the symmetric nodes of those networks in which the agency, understood as the ability to act onto another, lies in the relationships between them.

Peircean semiotics is closely related to the Theory of Material Engagement (Renfrew 2004) because the former understands that the sign is distinguished by the contours of its significant effect and semiosis as a relative and relational property, independent of language and behavior, and linked to particular experiential situations. Everything that exists (and rock art exists!) is likely to be read as a sign, all signs display an agency of diverse kinds and, consequently, agency and meaning are comparable (Giraudo and Martel 2015). From this perspective, an affirmative answer to the question asked above about whether or not we can access meanings is increasingly likely.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Cognitive Archaeology
- ▶ Landscape Archaeology
- ▶ Leroi-Gourhan, André
- ▶ Materiality in Archaeological Theory
- ▶ Pragmatism in Archaeological Theory
- ▶ Structural Archaeology
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Symmetrical Archaeology

References

Ambrosino, Gordon. 2017. *Rock art, ancestors and water: The semiotic construction of landscapes in the Central Andes*. Ph.D. Dissertation, Department of Anthropology, Universidad de Los Andes, Colombia. https://www.academia.edu/35713000/Rock_Art_Ancestors_and_Water_The_semiotic_construction_of_landscapes_in_the_central_Andes. Accessed 3 May 2019.

Bouissac, Paul. 2006. Probing prehistoric cultures: Data, dates and narratives. *Rock Art Research* 23: 89–96.

Bouissac, Paul. 2009. The prehistory of scripts. *Semioticon Virtual Symposia*. https://semioticon.com/virtuals/arch_behaviour/bouissac_1.pdf. Accessed 11 June 2019.

Cabak Rédei, Anna, Peter Skoglund, and Tomas Persson. 2018. Applying cartosemiotics to rock art: An example from Aspeberget, Sweden. *Social Semiotics*. https://doi.org/10.1080/10350330.2018.1488338.

Giraudo, Silvia E., and Álvaro R. Martel. 2015. Memory, identity, power: A semiotic approach to the social construction of meaning in rock art. *Chinese Semiotic Studies* 11 (4): 479–497.

Hodder, Ian. 2012. *Entangled. An archaeology of the relationships between human and things*. Oxford: Wiley-Blackwell.

Kechagia, Hermione. 1995. The row and the circle: Semiotic perspective of visual thinking. *Rock Art Research* 12 (2): 109–116.

Kull, Kalevi, and Ekaterina Velmezova. 2014. What is the main challenge for contemporary semiotics? *Sign Systems Studies* 42 (4): 530–548.

Laming-Emperaire, Anette. 1962. *La signification de l'art rupestre palèolithique*. Paris: A. & J. Picard & Co.

Leroi-Gourhan, André. 1968. *The art of prehistoric man in western Europe*. London: Thames and Hudson.

Lindström, Kati, Kalevi Kull, and Hannes Palang. 2014. Landscape semiotics: Contribution to culture theory. In *Estonian approaches to culture theory*, ed. V. Lang and K. Kull, 110–132. Tartu: University of Tartu Press.

Moragón Martínez, Lucía. 2007. Estructuralismo y post-estructuralismo en Arqueología. *ArqueoWeb* 9 (1): 1–52. https://webs.ucm.es/info/arqueoweb/pdf/9-1/moragon.pdf. Accessed 6 June 2019.
Preucel, Robert. 2006. *Archaeological semiotics*. Malden: Blackwell.
Preucel, Robert, and Alexander Bauer. 2001. Archaeological pragmatics. *Norwegian Archaeological Review* 34 (2): 85–96.
Renfrew, Colin. 2004. Towards a theory of material engagement. In *Rethinking materiality: The engagement of mind with the material world*, ed. E. De Marrais, C. Gosden, and C. Renfrew, 23–31. Cambridge: McDonald Institute.
Sanz Domingo, Inés, Sally K. May, and Claire Smith 2017. Etnoarqueología y arte rupestre en el siglo XXI: De la analogía directa a la redefinición del método arqueológico. *Kobie Serie Anejo* 16: 163–180.
Sauvet, Georges. 1988. La communication graphique paléolitique. *L'Anthropologie* 92 (1): 3–16.
Troncoso, Andrés. 2007. Arte rupestre en la cuenca del Río Aconcagua: Formas, sintaxis, estilo, espacio y poder. *TAPA* 39: 9–242.
Troncoso, Andrés. 2008. Spatial syntax of rock art. *Rock Art Research* 25 (1): 3–11.
Vogt, David. 2014. Silence of signs – Power of symbols: Rock art, landscape and social semiotics. In *Rock art and sacred places*, ed. D.L. Gillette et al., 25–47. New York: Springer Science+Business Media.

Further Reading

Gell, Alfred. 1998. *Art and agency: An anthropological theory*. Oxford: Oxford University Press.
Keane, Webb. 2003. Semiotics and the social analysis of material things. *Language & Communication* 23: 409–425.
Knappett, Carl. 2005. *Thinking through material culture*. Philadelphia: University of Pennsylvania Press.
Lele, Veerendra. 2006. Material habits, identity, semeiotic. *Journal of Social Archaeology* 6 (1): 48–70.
Llamazares, Ana María. 1991. A semiotic approach in rock-art analysis. In *The meaning of things*, ed. I. Hodder, 242–248. London: Unwin Hyman.
Magariños de Morentín, Juan. 2008. *Semiótica de los bordes*. Córdoba: Comunicarte.
Martel, Álvaro, and Silvia Giraudo. 2014. Semiótica de la imagen en Arqueología: El caso de los "escutiformes". *Revista Chilena de Antropología Visual* 24: 21–45.
Morales-Campos, Arturo. 2018. Análisis semiótico-cognoscitivo del arte rupestre de La Pasiega. *La Colmena* 100: 81–91.
Wyndham, Felice S. 2011. The semiotics of powerful places: Rock art and landscape relations in the Sierra Tarahumara, México. *Journal of Anthropological Research* 67 (3): 387–420.

Rohr, João Alfredo

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Basic Biographical Information

João Alfredo Rohr was born in 1908 at Arroio do Meio, Rio Grande do Sul, in southern Brazil, amidst a community of German Catholic immigrants. At the age of 12, at a time where there were no universities in the southern part of the country, he left to attend a seminary maintained by the Society of Jesus. It was in Pareci Novo, and later, São Leopoldo, that João Alfredo pursued his education for the next 20 years, until finally becoming an ordained priest of the Jesuit Order (Schmitz 2009).

Father Rohr's first assignment was to teach at the traditional school that the Jesuits had established in 1905 at the city of Florianopolis. Father Rohr taught chemistry, physics, and natural sciences at the Catarinense School for 22 years. As a Jesuit, he had a strong background in Humanities and Natural History (Schmitz 2009). The school had a small museum, which Father Rohr expanded into the Museum of the American Man and later into the Museum of the Sambaqui Man (shell mound builders). In 1956 the Anchieta School was founded in Porto Alegre, RS, and with it the Anchietan Research Institute, which gathered together many Jesuit researchers working in South Brazil. The institute disseminated the work done by its associates and preserved and promoted previous achievements.

Major Accomplishments

It was within the field of archaeology that Fr. Rohr became well known. His first achievement was to secure the Carlos Behrenheuser

Collection, comprised of more than 8,000 artifacts related to the *sambaqui* (shell mound) builders that abound in the south coast of Brazil and 80,000 artifacts and fragments of pottery related to the Guarani groups. After that, in 1958, Fr. Rohr started his surveying and excavating efforts to locate and identify archaeological sites in the region. This task extended for 24 years, until 1982. At the same time, Paulo Duarte, of the University of São Paulo, and José Loureiro Fernandes, of the Federal University of Parana, were gathering archaeologists from abroad in order to improve scientifically oriented archaeological research in Brazil. Fr. Rohr accompanied the French researcher Annette Laming-Emperaire in some excavations in Paranagua and Lagoa Santa and attended the first seminar held in Brazil by the American couple Clifford Evans and Betty J. Meggers, regarding the research of pottery archaeological sites (Schmitz 2009).

Fr. Rohr recorded more than 400 archaeological sites and excavated many of them. The archaeology that he practiced encompassed all elements present in the State of Santa Catarina's archaeological record. Although the answers to the questions present in those elements could not be addressed exclusively within the state's borders, Father Rohr's approach helped to expand enormously the knowledge about the diversity of the southern Brazilian archaeological record as a whole.

In 1972, along with Brazilian authorities, Fr. Rohr initiated a huge effort to protect the archaeological record from being destroyed, especially the big shell mounds, which were being explored for commercial purposes. Thanks to these efforts, many of those mounds, built through several millennia, are still standing along the southern shores, allowing archaeological investigation of an enduring coastal culture (Reis and Fossari 1984).

Father João Alfredo Rohr stands as a true pioneer of Brazilian archaeology. He lived in a time of transition and managed to educate himself and the public in order to establish archaeology as a field of research and secure the way for many other future researchers.

Cross-References

▶ Duarte, Paulo
▶ Sambaquis Shell Mounds, Archaeology of
▶ Smithsonian Institution

References

Reis, M.J., and T.D. Fossari. 1984. In memorian do Padre João Alfredo Rohr. *Anais do Museu de Antropologia da UFSC XVI* 17.

Schmitz, P.I. 2009. João Alfredo Rohr: Um jesuíta em tempos de transição. *Pesquisas, Anthropologia* 67: 9–22.

Further Reading

Gaspar, M.D., P. DeBlasis, S.K. Fish, and P. Fish. 2008. Sambaqui (Shell mound) societies of coastal Brazil. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 319–335. New York: Springer.

Roman Army, Archaeology of

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Introduction

The Roman army was perhaps one of the most influential and enduring human institutions of the ancient Mediterranean world: its history spans over a millennium, from its origins as a community muster to an imperial force deployed across Europe, Asia, and North Africa. The army was the sine qua non of Rome's empire, and it generated enormous cultural, social, religious, and economic interactions within this imperial configuration. Archaeology provides critical insights to how the Roman army operated both as a combat force and as a community. Archaeological research has the capacity to (1) supplement, clarify, and at times correct information provided by textual sources, (2) recover physical specimens of Roman arms and armor, (3) provide visual

representations of soldiers' clothing and equipment, (4) reveal the daily life of Roman soldiers in garrison, (5) excavate fortifications and camps, (6) identify the location of battles and sieges, and (7) recover new texts, such as inscriptions, papyri, ostraca, diplomas, and wooden tablets. Archaeological discoveries represent the only new source of information about the Roman army, supplementing a staid canon of classical texts and offering dynamic new perspectives on the subject.

Definition

The Roman army represented the organized military force of the Roman state in its various permutations, from an archaic city-state, to a Republican conquest state, to an imperial monarchy overseeing a stable pan-Mediterranean empire that endured into the fifth century CE. The Roman army experienced substantial developments over this period, transforming from a civic militia into a professional force. The army outlasted the Western Empire, as some military units in the West continued as corporate entities after the overthrow of the last emperor in 476 CE. In the East, the *Legio V Macedonica*, formed by Octavian in the 40s BCE, persisted, albeit in a much evolved formed, until the Arab conquests of the seventh century CE.

Historical Background

Little archaeological evidence about the Roman army comes from Rome itself during the earliest periods of Roman history. Rather, we must rely on Central Italian weaponry and equipment from tomb deposits, as well as visual representations of Italic warriors such as wall paintings, vase painting, and votive figurines. The evidence collectively suggests that Greek-style hoplite equipment was widespread across Italy, with heavily armored infantrymen fighting behind large round shields. Indeed, the earliest depiction of hoplite warfare anywhere in the Mediterranean comes from the so-called Chigi vase, made in Corinth in the seventh century BCE but unearthed in an Etruscan tomb, featuring two formations of hoplites advancing in close order. It is unclear that the use of hoplite weapons in Italy coincided with the adoption of such close-order phalanx tactics, although a fourth century BCE wall painting from Lucania also depicts two dense formations of soldiers with locked round shields facing off against one another.

One piece of epigraphic evidence points to the existence of private warfare in the Early Republic, coexisting along with the state musters of Central Italian communities. A sixth century BCE statue base from the site of Satricum in Latium reads "the companions (*suodales*) of Poplios Valesios set this up for Mars" and is commonly interpreted to represent a dedication by a band of armed retainers, perhaps loyal to the Publius Valerius Publicola who features prominently in the narrative tradition of the Early Republic (*Année épigraphique* 1982 161). Nonetheless, by the fourth century BCE, these war bands were largely subsumed by the growing power of community armies (Armstrong 2016).

The rise of Roman hegemonic power in the fourth century BCE may have prompted cultural changes across Italy that limit our ability to reconstruct subsequent Italian military equipment. With Roman hegemony, elite burial practices changed, with less emphasis placed on burial with weapons or martial iconography in tomb painting. Given that iron weapons degrade unless preserved in anaerobic conditions such as tombs, we have fewer examples of weapons from the Middle and Late Republic than we do from Archaic Italy.

The panoply that emerged by the Middle Republic was largely derived from the Celts and can be reconstructed from visual evidence, especially the Pydna monument of Aemilius Paullus at Delphi (c. 168 BCE) and the so-called Altar of Domitius Ahenobarbus (c. 100 BCE), portions of which are now in the Louvre (Stilp 2001 (Ahenobarbus); Taylor 2016 (Pydna battle scene). For defense, a Roman infantryman carried a large curved oval shield, the *scutum*, an Italic variation on the Celtic *thureos* ("door") shield. The *scutum* was featured on a bronze currency bar issued in the early third century BCE, on the

poorly preserved tomb painting today known as the Esquiline Historical Fragment (c. 325–250 BCE), and the Pydna and Ahenobarbus monuments. Only a single Republican-era *scutum* has survived, preserved in the dry conditions of the Fayum in Egypt. The Fayum *scutum* is not Roman, but probably a copy of a Roman-style shield used by Ptolemaic forces, who had widely adopted Roman equipment by the first century BCE (for military equipment throughout the Roman period, see Bishop and Coulston 2006).

The most common helmet type in Republican Italy was the Montefortino, characterized by a distinctive crest knob and a high conical dome, initially developed in the Celtic regions of Northern Italy. It was eventually widely used across Italy and beyond, although by the First Punic War, it had become closely associated with Rome (Burns 2003). Plumed Montefortino helmets decorated Roman naval rams from ships sunk in 241 BCE, although some of the Montefortino helmets recovered from the seafloor after that Roman victory were likely worn by Gallic or Italic mercenaries serving Carthage. Other helmet types persisted, including the Apulo-Corinthian and Phrygian-Attic types, attested in both the iconographic and material records.

Celtic mail armor (*lorica hamata* or *lorica gallica*), constructed from small, interlocking rings of iron or copper alloy, was by the second century BCE mandatory equipment for wealthy infantrymen. Mail armor protects the soldiers on the Pydna and Ahenobarbus monuments, and a few mail fragments were unearthed at Numantia. Polybius (6.23.14) reports that poorer men wore chest protectors a span wide, probably referring to a small round breastplate, an example of which was excavated at Numantia (Spain). A number of Italian bronze figurines from the Middle Republican period feature infantrymen without any body armor to supplement their helmet and shield. Some Etruscan and South Italian figurines still featured muscle cuirasses, which are also worn by some of the soldiers on the Pydna monument, perhaps an attempt to differentiate Italic allies (*socii*) from legionaries in mail.

A mix of Greek- and Celtic-style swords were used by Roman and Italian soldiers into the Second Punic War. A Greek-style stabbing sword (*xiphos*), similar to blades preserved in South Italian tombs, was used to decorate an early third century BCE stamped bronze currency bar. And a late fourth century BCE Celtic-style sword found in San Vittore del Lazio was proudly stamped "made in Rome" (*fecet Roma*). During the Second Punic War, Roman soldiers in Spain adopted a Celtiberian blade that became the famous *gladius hispaniensis*, or Spanish sword, which has been identified archaeologically by comparing blades found in likely Roman military contexts to Celtiberian swords preserved in tombs (Quesada-Sanz 1997). The *hispaniensis* had a c. 60–70 cm blade, sometimes slightly waisted, with a long point, suitable for both stabbing and slashing as described by Polybius (6.23.7). Prior to engaging with the sword, Roman soldiers threw javelins (*pila*), which consisted of iron shanks, attached to a wooden shaft. Nineteenth-century experiments with reconstructed weapons overseen by Napoleon III's Chief of Artillery suggested a maximum range of 30 meters.

Only a few battlefields from the Republican period have been identified archaeologically, in part because the Romans did not build monumental memorials, in contrast to Greek practice, e.g., the Theban shield monument at Leuctra. On the naval side, the recent discovery of naval rams, ballast, storage amphora, and helmets on the seafloor off of the Egadi Islands has starkly illuminated the last great naval confrontation of the First Punic War, fought in 241 BCE. The archaeological evidence has offered a sobering check on the literary sources, as the recovered rams suggest that Roman warships were much smaller than the massive *quinqueremes* that Polybius (1.29.9) reports in his account of the war (Tusa and Royal 2012). A team of Spanish archaeologists has recently identified a major Second Punic War battlefield in the upper Guadalquivir valley, most likely from the Battle of Baecula in 207 BCE (Bellón et al. 2016).

Sieges are more conducive to archaeological recovery than set-piece battles. While weapons and equipment might clatter to the ground in a

battle, these generally landed in the open, easily recoverable after the battle, where stripping the dead was an organized task undertaken by the victorious side. Sieges, however, involved entrenchments where artifacts might be accidentally buried, along with the construction of enduring structures such as earthworks, semipermanent camps, and ramps. From the Republican period, the most impressive set of excavated Roman camps were those used to besiege Numantia in Spain between 153 and 133 BCE. Excavations overseen by Adolf Schulten in the early twentieth century provide the most important archaeological record of the Republican army in action, suggesting that Roman camps hewed roughly to the theoretical model of a Roman camp described by Polybius (6.27–31), although the plan was flexibly adapted based on the terrain and the varying size of the unit housed within (Dobson 2008).

The Roman army evolved significantly between the Middle and Roman Republic, a process often incorrectly dubbed the "Marian reforms." The archaeological evidence for the Marian reforms is tenuous. The quality of Montefortino helmets declines somewhat in the late second century BCE, but this cannot be conclusively linked to Marius' drafting of impoverished *proletarii* into the army. The report by Plutarch (*Marius* 25) that Marius retooled the *pilum* with a wooden rivet to cause it to break off in enemy shields is patently disproved by subsequent *pila* with two metal rivets.

Intensive warfare defined the Late Republic, both in terms of expansion (Pompeius Magnus in the East, Julius Caesar in Gaul) and increasingly savage civil wars. Pockmarks on the walls of Pompeii, along with recovered catapult balls, testify to Sulla's siege of the town during the Social War (91–88 BCE). The excavations of Valencia in Spain illuminate a horrifying moment in the extended civil conflict, when Pompeius sacked the city in 73 BCE, having captured it from forces loyal to the warlord Sertorius. Excavators discovered the skeleton of an elderly man with his arms bound behind his back, sodomized to death with a *pilum*. A young man of military age was found with all of his limbs hacked off (Alapont 2009). The skeletal evidence seemingly confirms Polybius' earlier report (10.15.5) that mutilation of human corpses while sacking towns was standard practice as a terror tactic, although the circumstances of civil war might bring out special brutality. The civil wars that destroyed the Republic give us some of the first funerary monuments for Roman centurions, most notably that of Minucius Lorarius ("the flogger"), who died near Padua in 40 BCE. His full-body image represents perhaps the earliest visual representations of a centurion's iconic grapevine stick (*vitis*).

Military reforms effected by Augustus radically increased the archaeological visibility of the Roman army. Augustus transformed the citizen militia of the Republic into a truly professional force. Roman legions became standing units, permanent communities, as well as combat formations. The histories of individual legions can be traced archaeologically, even as they redeployed around the empire, through brick stamps marking the product of legionary kilns. The increasing mobility of many soldiers, combined with their growing sense of corporate identity, contributed to the explosion of the epigraphic habit near military bases. Tombstones frequently present images of soldiers, a treasure trove of information concerning military equipment, clothing, career patterns, and martial self-representation more broadly.

While Augustus initially carried out active conquests on the Rhine and Danube, expansion largely ceased late in his reign, and legionary camps soon developed into permanent bases. The site of Inchtuthil in Scotland, abandoned in the Flavian period and never built over, provides a particularly pristine view of a Roman legionary camp, including a hoard of nearly 10 tons of nails (Shirley 2000). The bogs at Vindolanda have preserved a sizable collection of wooden and leather goods, as well as textile fragments. Other camps, occupied for centuries, accumulated buildings, inscriptions, trash middens, and sundry deposits that offer rich insight into the daily life of the Roman army.

Conditions at some permanent bases proved conducive to preserving written texts. Records written on ostraca survive from the legionary camp at Bu Njem in Libya and the military district surrounding the mines of Mons Claudianus in

Egypt. At Vindolanda in Britain, wooden tablets written upon with ink illuminate the daily life of the Roman army: a birthday invitation, in Latin, from one army wife to another; a shopping list of comestibles for the camp Saturnalia festival, including Mediterranean fish sauce and Celtic beer; and a complaint to the cohort commander from a merchant claiming he has been beaten, presumably by soldiers. Other original records, including papyrus from Egypt and Dura-Europos, as well as tablets from Vindonissa, provide a sample of the vast quantities of official paperwork army units processed, such as daily strength reports, to casualty reports, pay stubs, furlough requests, letters of recommendation, and so on (Fink 1971).

The Augustan period also brought rapid changes in military equipment. A new type of body armor, dubbed *lorica segmentata* by modern archaeologists, consisting of a complex series of interlocking metal strips was in use by 9 CE. The Montefortino, along with the closely related Coolus helmet, gave way over the first century CE to the Imperial helmet, subdivided into Gallic and Italic varieties based on early findspots. The primary advantage of the new helmet was an enormous neck guard, not dissimilar that of a modern-day firefighter's helmet, which offered protection in sieges as well as for legionaries in a combat crouch. The legionary *scutum* underwent some modifications, mostly detectable in the visual record, becoming shorter and more rectangular. The so-called Mainz style gladius, along with the closely related Fulham type, was essentially a shorter and stouter version of the old *hispaniensis*. The Pompeii type, which emerged in the later first century CE (named after blades preserved in the Vesuvian eruption of 79 CE), featured a short blade with parallel edges and a short triangular point. In the second century CE, a type of ring-pommeled sword entered service, probably borrowed from the Sarmatians on the lower Danube.

Perhaps the most famous battle of the Imperial period, the defeat at the Teutoburger Wald, is known primarily because of the efforts of Tony Clunn, a British military officer who located the battlefield at Kalkriese in Germany through years of metal detecting. Subsequent professionally managed excavations have provided new insights into the massacre of Publius Quinctilius Varus and his legions in 9 CE, including the care with which the Germans prepared the ambush site through earthworks, while also providing a cache of early imperial equipment, including the earliest dated piece of *lorica segmentata* and the earliest known cavalry face mask (Rost and Wilbers-Rost 2010). A recently discovered Roman military camp in eastern Germany near Thuringia, dating to the second century CE, and a battle site from the third century CE suggest that large Roman armies continued to operate far east of the Rhine, probably conducting large-scale punitive raids.

As with the Republic, sieges during the Imperial period provide the most concentrated archaeological record of combat operations. The sites of sieges are more likely to attract professional archaeologists, often interested in excavating the ancient community more broadly, rather than just uncovering a particular moment of armed combat. Ongoing excavations at Jerusalem have revealed many artillery projectiles fired as Titus' forces breeched the city's defenses in 70 CE, as well as cooking vessels and lamps left behind by refugees hiding in the sewer system. Perhaps the most famous remains of Roman siege works come from Masada, where Romans built an enormous ramp to capture the mountain fortress in 73 CE, the physical remains of which are still visible. While the Romans had used various types of catapults and other siege engines since the Middle Republic, the Imperial period provides more complete archaeological coverage of the technology (springs, washers, bolts, etc.). Evidence of the lethality of Roman catapults can be found in the skeletons of men killed by the Romans near Maiden Castle in Britain, where one Briton was transfixed by a bolt which lodged in his spine and another had his face collapsed, likely by a similar projectile.

The most stunning visual representation of the Roman army in action is Trajan's column, which features a spiraling series of intricate reliefs illustrating Trajan's two campaigns in Dacia (101–2/105–6 CE). While many aspects of the illustrated scenes find confirmation in the archaeological record, the artists took some liberties, not

dissimilar to the inaccuracies that crop up in modern war films. The soldiers on Trajan's column, for example, mostly wear a style of Attic helmet which was occasionally used for parade purposes (featured in representations of the Praetorian Guard) but seldom turns up along the frontier. Taking Trajan as a model, Marcus Aurelius (or his son Commodus) erected a similar monument commemorating the Marcomannic Wars (166–180 CE). On these columns, provincial auxiliaries are separated from citizen legionaries through their mail armor and flat oval shields, compared to legionaries in *lorica segmentata* and curved rectangular shields. Some differences in equipment did separate auxiliaries from legionaries, although perhaps not as starkly as the columns would suggest, for example, a flat oval shield from Doncaster appears to have been an auxiliary model.

These representations provide a blunt portrayal of Roman violence. Trajan's column celebrates headhunting Roman auxiliaries and features severed heads on poles in front of Roman fortifications. This visual scene has a physical counterpoint, as excavators at Vindolanda discovered disembodied skull just outside of the fort's wall, where it probably was at one point on display. Marcus Aurelius' column shows even more savage violence: a woman stabbed to death by a legionary, a village razed, and mass executions of German prisoners. A mass grave of decapitated bodies unearthed not far from Maiden Castle in Britain may represent forensic evidence of such a massacre. Another Trajanic monument, the *Tropaeum* at Adamklissi, shows Roman soldiers killing Dacian warriors with panache and savagely attacking a Dacian family riding in a wagon.

Starting in the reign of Claudius (d. 54 CE), provincial auxiliaries were granted bronze diplomas upon discharge from service, documentation of Roman citizenship granted to both them and their families as a reward for service. These diplomas document perhaps the most salient mechanism of spreading Roman citizenship in the provinces and provide insight into the family arrangements of auxiliary soldiers, as well as information about auxiliary recruitment and deployment.

Meanwhile, Roman soldiers in the provinces not only became exposed to foreign religious beliefs, but the social networks of army itself served as a means of disseminating religious ideas across the empire (Collar 2013). Roman soldiers erected altars and dedicated votive inscriptions to a wide array of gods outside of the traditional pantheon, including the Celtic horse goddess Epona, the Syrian Jupiter Dolichenus, the Germanic Matronae Aufaniae (or Matres), and Mithras, a deity worshipped in underground rites.

The Late Roman Empire saw a series of military crises, often lethal combinations of external invasions and destabilizing civil wars. The starkest illustration of the so-called Third Century Crisis (c. 235–284 CE) is illustrated by Naqsh-e Rustam, where a massive rock carving depicts the Roman emperor Valerian groveling in surrender before the Sassanid Great King Shapur I, also a rare vision of a Roman war from an opponent's point of view. The accompanying trilingual inscription proclaims, "Caesar lied and did wrong towards Armenia."

On the frontline between Rome and the Sasanian Persian empire, the fortified town of Dura-Europos, excavated between 1922 and 1937 (and sadly recently badly damaged by the so-called Islamic State), provides evidence of the garrison life of Late Roman soldiers in the east, including a religious calendar (*Feriale Duranum*) and a ceremonial shield. The frescoes of the synagogue, depicting Old Testament battle scenes, nonetheless featured the equipment of contemporary Roman soldiers. Dura also provides a grisly snapshot of siege warfare between the Romans and Sasanians prior to the Persian capture of the city in 257 CE. The Romans were in the process of sinking a countermine against the Sasanian mine, when the Persians, detecting their efforts, managed to cut a vertical shaft and asphyxiate the Roman sappers with toxic smoke, while the mine's collapse froze a moment of combat in time (James 2011).

Roman military equipment also experienced major changes in the Late Empire. Wide oval shields, sometimes virtually circular, became common, which could be more easily interlocked into a shield wall, the sort of close-order tactics described

in the literary sources and represented visually on the Arch of Galerius in Thessalonica and a fresco at Dura. The so-called ridge helmets predominated, made from separate sections riveted together, with the eponymous ridge connecting the pieces of the skullcap. The transition toward riveted helmets may be related to the rise of centralized mass production facilities (*fabricae*). Mail cowls displace helmets in some Dura frescoes, pointing toward common usage in the Middle Ages. Meanwhile, the relatively short *gladius* gave way to the *spatha*, a long sword of northern origin. The four tetrarchs can be seen clutching their long swords in the statue group from Venice, a reminder that the length of these swords may have been as much about display as tactical efficacy. A number of significantly cut down *spatha* (perhaps the *semispatha* referenced by Vegetius) have been found, either recycled into short swords following damage or perhaps intentionally shortened to make them more suitable for close combat. In place of the old *pilum*, Roman soldiers threw smaller darts weighted with lead, referred to in literary sources as *plumbatae* or *martiobarbuli*.

The major cavalry development in the Late Empire was the cataphract, a type of heavily armored cavalryman who anticipated the Medieval knight, borrowed from Iranian and Steppe riders. Sarmatian cataphracts are depicted on Trajan's column wearing head-to-toe scale armor, with their horses, similarly, if implausibly equipped with scales down to their hooves. A more accurate cataphract (probably Persian) is illustrated by a graffito at Dura-Europos, where a scale coat is draped over the horse's body. It is easy to see why such fighters were also known as *clibanarii*, or "boiler boys." A partial example of scale horse armor was recovered at Dura.

Meanwhile, military dress shows an enduring influence from the north. A collection of images of Late Roman soldiers is preserved on military tombstones from Apamea in Syria (Balty and van Rengen 1993). Many of these soldiers wear a long-sleeved tunic, a style imported from the north. Meanwhile, trousers, a quintessentially barbarian garment, had been worn in some form by Roman soldiers since the early second century CE, when they turn up on Trajan's column as short leggings worn under the traditional tunic. A military tribune at Dura offers a sacrifice while wearing dark trousers and a long-sleeved tunic. The consular diptych of the fifth century CE *magister militum* Stilicho also displays the long-sleeved tunic with trousers combination. In the mid-twentieth century, archaeologists identified a series of graves in Gaul as the remains of Germanic warriors in imperial service. The locations of these graves do not correspond well with the known stationing of *Laeti* units, and it is not impossible that some graves contained Romans who had adopted Germanic burial customs, or at least preferred to be buried with weapons (Halsall 1992). Regardless, the material culture of the Late Roman army reflected enormous Germanic influences, less a descent into barbarism than the recapitulation of a long-standing dynamic, dating back to the influence of the Celtic panoply on the Middle Republican army, in which military developments in northern Europe drove the evolution of Rome's fighting forces.

Key Issues/Current Debates

1) Women and Gender: Material evidence can shed light on the role of women in Roman military operations, even though they are largely excluded from ancient historical narratives. When Fulvia, the wife of Mark Antony, rebelled against Octavian at Perusia in 39 BCE, she personally commanded the forces under siege. Some sling bullets were inscribed with crass slogans, including two that proclaim that they are aimed at Fulvia's vagina (*FULVIAE LANDICAM PETO*). Ironically such bullets could only be read if they failed to hit their target (Hallett 2015).

   Material evidence also helps to reconstruct the role of women in garrisons. Women left behind a variety of gendered artifacts such as combs, brooches, and beads, suggesting that military camps were not gender-segregated zones, but contained numerous women as well (Allison 2013). Some were certainly prostitutes. A Flavian era tariff inscription from Koptos (OGIS 671) charges 108 drachmas for

a prostitute to pass into the military zone while charging ordinary women only 20. From the same military zone, an ostrakon documents the lease of a prostitute named Procla to a desert *praesidium* (O. Krok. 252). But others were wives of officers (common soldiers were forbidden to marry). The birthday invitation at Vindolanda (TVII 291), mostly written by an *amanuensis*, includes a brief personal note written in the hand of the army wife Claudia Severa to her friend Sulpicia, capturing the emotion and loneliness of women living on a far-flung frontier: "I await you sister" (*sperabo te soror*).

2) Literacy and Enculturation: The Roman army overall enjoyed unusually high rates of literacy, evidenced in part by texts produced by soldiers, ranging from inscriptions dedicated to fallen comrades to papyrus letters written home. Indirect evidence for literacy comes from seal boxes, which secured letters written on wooden tablets. The tablets and their contents have rotted away, but they indicate a letter was sent, assuming literacy for both a writer and reader. Unusual concentrations of these seal boxes in Batavia has been correlated to service in the Roman army, as Batavia was a prominent auxiliary recruiting ground, suggesting the seal boxes represent letters written home from soldiers serving abroad (Derks and Roymans 2002).
3) Animal Bones and Military Diet: Analysis of zooarchaeological remains from military sites suggests that Roman soldiers ate substantially more beef than their civilian counterparts back in Italy, who favored pork (King 1999). The beef-heavy diet of Roman soldiers (who still ate more pork than natives in Britain and Germany) may have reflected the dietary influence of locally recruited auxiliaries, the pastoral ecology of the frontier regions, as well as the effect of military demand for cowhide (for tents, shoes, saddles, etc.) on local husbandry patterns.
4) Grand Strategy: Since the publication of Edward N. Luttwak's *The Grand Strategy of the Roman Empire* (1976), scholars have debated the extent to which Rome practiced centralized strategy in its military deployments and dispositions. The remains of Roman fortification systems collectively embody the massive resources of the empire and have been used to reconstruct the possibilities and limitations of Roman grand strategy. Hadrian's Wall in northern England inevitably looms large in such debates, a project personally initiated by the emperor during a visit to Britain in 122 CE (Breeze and Dobson 2000). The top-down plan of the Wall, with milecastles every 5000 feet and guard towers every 1⁄3 of a mile, was rigid, so that milecastle gates occasionally opened onto cliffs and watchtowers were raised on heights that already offered commanding views. During the Wall's use, watchtowers were abandoned or demolished, and milecastle gates bricked up, decisions presumably made based on the facts on the ground rather than dictates from Rome. The actual strategic goal of Hadrian's Wall is much debated, although certainly the structure could simultaneously prove an argument in stone as well as a substantial barrier to mobility along the frontier. It is important to note the diversity of Roman fortification systems; the forts, walls, and outposts of heavily militarized frontiers such as Britain, Germany, and the Upper Euphrates might follow a very different logic than those in provinces that lacked a serious external threat, such as North Africa and Judaea (Wheeler 2007).

International Perspectives

Given the far-flung deployments of Roman military units, the study of the Roman army is spread across numerous national scholarly traditions. Spanish archaeologists focus on Republican sites associated with the conquest of Iberia, while the archaeological traditions in Britain, the Netherlands, and Germany have tended to focus on imperial frontier garrisons and fortifications sometimes literally in their backyards. In the 1960s, Israeli excavations related to the Jewish War were closely tied to the new national project: Yigael Yadin, who excavated at Masada and the Cave of Letters, a refuge likely used by survivors of the Bar Kochba revolt in 135 CE,

had previously served as the chief of staff of the Israel Defense Force.

Future Directions

Only a fraction of battlefields (or naval seascapes) attested in the literary sources have been confirmed archaeologically (e.g., Baecula, the Egadi Islands, and Harzhorn above); most are instead known from topographical speculation based on close readings of literary sources. Battlefields can be identified archaeologically from javelin heads, sling bullets, and even the hobnails from legionary boots (*caligae*). Archaeological exploration of battle sites has the potential to improve our understanding of specific military events and help develop a more thorough portrait of the Roman army in action. Of course, the future direction of material aspects of the Roman army will be largely determined by both the serendipity of discovery and creative reevaluation of current artifacts.

References

Alapont-Martin, Llorenc, et al. 2009. La destruccion de Valentia por Pompeyo (75 a.C.). *Quaderns De Difusio Arqueologica* 6: 9–40.

Allison, Penelope. 2013. *People and spaces in Roman military bases*. Cambridge: Cambridge University Press.

Armstrong, Jeremy. 2016. *War and society in early Rome: From Warlords to Generals*. Cambridge: Cambridge University Press.

Balty, Jean, and Wilfried van Rengen. 1993. *Apamea in Syria: The Winter quarters of Legio II Parthica: Roman gravestones from the military cemetery*. Brussels: VUB Press.

Bellón, Juan, et al. 2016. An archaeological analysis of a battlefield of the Second Punic War: The camps of the Battle of Baecula. *Journal of Roman Archaeology* 29: 73–104.

Bishop, M.C., and J.C.N. Coulston. 2006. *Roman military equipment from the Second Punic War to the fall of the Western Empire*. 2nd ed. Oxford: Oxbow.

Breeze, David, and Brian Dobson. 2000. *Hadrian's wall*. 4th ed. New York: Penguin.

Burns, Michael. 2003. The homogenisation of Roman military equipment under the Roman Republic. *Digressus* 1: 60–85.

Collar, Anna. 2013. *Religious networks in the Roman empire*. Cambridge: Cambridge University Press.

Derks, Ton, and Nico Roymans. 2002. Seal-boxes and the spread of Latin literacy in the Rhine delta. In *Becoming Roman, writing Latin?: Literacy and epigraphy in the Roman west*, ed. A.E. Cooley, 87–134. Portsmouth: Journal of Roman Archaeology.

Dobson, Michael. 2008. *The army of the Roman Republic: The second century B.C., Polybius and the camps at Numantia, Spain*. Oxford: Oxbow.

Fink, Robert O. 1971. *Roman military records on papyrus*. Cleveland: Case Western Reserve.

Hallet, Judith P. 2015. Fulvia: The representation of an Elite Roman woman warrior. In *Women and war in antiquity*, ed. Jean Fabre-Serris and Allison Keith, 247–256. Baltimore: Johns Hopkins.

Halsall, G. 1992. The origins of the Reihengräberzivilisation: Forty years on. In *Fifth century Gaul: A crisis of identity?* ed. John Drinkwater and Hugh Elton, 197–207. Cambridge: Cambridge University Press.

James, Simon. 2011. Stratagems, combat, and 'Chemical Warfare' in the siege mines of Dura-Europos. *American Journal of Archaeology* 115 (1): 69–101.

King, Antony. 1999. Diet in the Roman world, a regional inter-site comparison of the mammal bones. *Journal of Roman Archaeology* 12: 168–202.

Quesada-Sanz, Fernando. 1997. Gladius Hispaniensis: An archaeological view from Iberia. *Journal of Roman Military Equipment Studies* 8: 250–270.

Rost, Achim, and Susanne Wilbers-Rost. 2010. Weapons at the battlefield of Kalkriese. *Gladius* 6: 117–136.

Shirley, Elizabeth. 2000. *The construction of the Roman legionary fortress at Inchtuthil*. Oxford: Archaeopress.

Stilp, Florian. 2001. *Mariage et Suovetaurilia: étude sur le soi-disant "Autel de Domitius Ahenobarbus"*. Rome: Giorgio Bretschneider.

Taylor, Michael. 2016. The battle scene on Aemilius Paullus's Pydna monument: A reevaluation. *Hesperia* 85: 560–576.

Tusa, S., and J. Royal. 2012. The landscape of the naval battle at the Egadi Islands (241 B.C.). *Journal of Roman Archaeology* 25: 7–48.

Wheeler, E. 2007. The Army and the Limes in the East. In A Companion to the Roman Army, ed. Paul Erdkamp. Malden: Wiley-Blackwell.

Roman Wall Painting

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For many people interested in the ancient world, one of the most attractive aspects of Roman art is the wealth of wall paintings in houses of Pompeii

and other towns as well as villas buried by Vesuvius. Since their discovery in the eighteenth century, these and later found paintings have formed highly esteemed objects, for which reason they play a major role in art history. The study of Roman wall painting uses to start from this material and bases its chronology, which covers an era beginning in the second century BCE and ending with Vesuvius' eruption in 79 CE, on an articulation established by the German scholar August Mau in the 1870s during his in-depth explorations of Pompeii's ongoing excavations (Mau 1882; cf. Eristov and Monier 2014). Mau divided the bulk of Pompeian material he knew – which has grown ever since on account of additional findings but at the same time often no longer available due to bad conservation and loss of much data – into four chronological phases, which he called "Styles."

As a rule, Roman painting entails the rendition of architectural elements and precious materials into wall-covering architectural façades, compositions of panels, and articulations into horizontal and vertical zones filled in with parts of these elements. While we should never expect a more or less realistic *trompe l'oeil* of a really existing (or even plausible) architectural façade, although a painted decoration may look like those of lavishly adorned Roman theatre and fountain buildings, the painters created an entirely fantastic and illusionary world which in few cases looked like a realistically architectural composition. Suchlike constructions of walls, columns, cornices, doors, windows, and arches could create the suggestion of separating the real space of the painted room from realms beyond it that is outside the space the paintings are adorned with. From the beginning, constructional elements were combined with or used next to motifs alien to architecture, e.g., repetitive patterns similar to wallpaper (e.g., Oplontis: Thomas 1995, Fig. 102), monochrome panel decorations, or consisted of fancy garden vistas and large landscapes which, like the façades, seemed to exist outside the real space. Many painted façades contain living creatures: in the first phases small animals and later on larger human figures moving around within the architectural structures. Moreover, all these wall coverings were to be embellished by the imitation and suggestion of artworks, costly objects, and other figural elements (cf. Mulliez 2014). Over the centuries, some of these effects could get more or less attention, or the figural elements could become unrecognizable, but they never completely vanished. The bulk of paintings we know does not show repetitions or copies of wall systems; each decoration is a unique case on its own, of course full of repeating motifs and syntax, as well as color schemes. Painters might have worked with pattern books or basic schemes; at the same time, they invented decorations depending on the space to be decorated, the light, the budget and material available, and the patron's wishes.

Dating Roman paintings with absolute terms is a difficult matter, since there is no linear development of techniques and forms as we know from more or less firmly dated classes of objects like Attic black- and red-figure vase painting. Even the extensive dossier of Pompeii and Herculaneum, ending in 79 CE, contains a great number of problematic cases, especially for the imperial period, partly because of the dramatically bad excavation methods due to which substantial data went lost. It is an ironical situation that the fragmentary paintings found in many excavations scattered over the Roman Empire often are much better dated thanks to documented stratigraphy and other chronological indications (e.g., Orba in Switzerland: Dubois 2016). Yet, secure dates are rare and may rely on graffiti and dipinti applied on the painted surfaces. A good example is a graffito in house XII in Glanum (Provence, Southern France) dated 32 BCE and thus an indication of the painting's production before that year (A. Roth Congès in Perrier 2007, 207–220; Barbet 2008, 23). In the Augustan-Tiberian settlement of Magdalensberg (Noricum, modern Austria), a painting is dated to the reign of Tiberius by a graffito (Thomas 1995, 188). A peculiar case forms the imprint of coins from the 1970s in the wet plaster of a room in the House of the Old Hunt in Pompeii (Allison and Sear 2002; see below). Historical dates like the eruption of Vesuvius in 79 CE, the sack of Zeugma in 252 or 253, and earthquakes in Ephesus around 262 provide termini ante quem. If unfinished decorations are found, they may be associated with such a natural

disaster (e.g., House of the Chaste Lovers in Pompeii) or a war making an end to the site (e.g., Dura-Europos in 256–257 CE).

While studying finds in Rome, Mau himself could observe a correspondence between Campania and the center of the empire: his "Pompeian" Style system proved to be applicable there as well. Ever since Mau's seminal book, scholars have used his four "Pompeian Styles" and refined their chronology, yet without radically changing them (e.g., Strocka 1996, 2007; Esposito 2014; Bragantini 2014). Therefore, for the period of ca. 200 BCE–100 CE, we still adopt these "Styles," and the predominance of material from Rome, Pompeii, Herculaneum, and adjacent sites during these three centuries should not prevent us from looking at fragmentary, yet informative patches of paintings from many other sites in the Roman world.

The development of decorative trends as proposed by Mau and followed by most scholars, albeit with modifications, should not lead to a slavish imitation of this model, that is, a development model from simple via complex toward degradation. Extremely simple and very complex mural decorations occur in the same complex contemporaneously and depend on the function and status of the rooms. An illustrative example is the House of Augustus on the Palatine Hill in Rome decorated in the early years of his career, ca. 42–36 BCE (La Rocca 2008; Tomei 2014; Sauron 2016; Pensabene 2017, 43–75): smooth whitewashed walls, with some linear articulation in the secondary room 4, which would – if found elsewhere – be seen as late products, occur next to iconic Second-Style paintings in the representative rooms looking onto the peristyle, and innovative adornments in cubiculum 15, while a small black room has a tiny ornamentation in the guise of Third-Style walls. Finally, a couple of badly lit rooms have white walls adorned with (1) slim architecture combined with open central sections with landscapes and (2) a yellow colonnade which get a certain volume thanks to attached garlands and theatrical masks exposed on the architraves.

Mau did not yet problematize the genesis of the four Pompeian Styles. In more recent times, several proposals have been made to explain them culturally. The only contemporary written testimony, Vitruvius' *De architectura* 7.5.1–2, dating to about 20 BCE, offers a fundamental clue, since it describes the formal criteria of paintings in Roman elite houses and distinguishes a couple of subsequent fashions corresponding with Mau's First and Second Styles: "Hence the ancients who first used polished stucco, began by imitating the variety and arrangement of marble inlay; then the varied distribution of festoons, ferns, coloured strips. Then they proceeded to imitate the contours of buildings, the outstanding projections of columns and gables; in open spaces, like exedrae, they designed scenery on a large scale in tragic, comic, or satirical style; in covered promenades, because of the length of the walls, they used for ornament the varieties of landscape gardening, finding subjects in the characteristics of particular places; for they paint harbours, headlands, shores, rivers, springs, straits, temples, groves, hills, cattle, shepherds" (Vitruvius *On architecture* (Loeb Classical Library) v. 2, p. 103 trans. Frank Granger; on this passage, see Tybout 1989, 55–107; Heinrich 2002, 20–21). For Vitruvius, floor and wall decorations constituted an expression of wealth and power of elite persons who formed their leadership and had established their prestige in the Middle and Late Republic by expanding Rome's power from the area around Rome beyond the Italian peninsula, especially in the eastern Mediterranean. As we know from other branches of art, the Roman conquerors imported Greek-style culture and art from "abroad" into their hometown and applied Greek-style decorations such as mosaics and mural decorations in their gradually expanding residences. Public and religious buildings, both old and new ones, received similar decorations. During the Late Republic, Rome experienced a booming business in building, which has to do with the increase of capital and richness and the need to erect temples and other prestigious monuments to commemorate the military victories.

Development of Decorative Systems

The First Style, also known as Incrustation or Masonry Style, consists of a rendering in shallow

stucco relief of a wall in layers of rectangular marble blocks of standing and oblong shape, subdivided into various horizontal ashlar layers. Cornices, columns, and pilasters enliven the ashlar systems and create the suggestion of colonnades and upper storeys with windows and adorned panels (Fig. 1). Figural elements are scarce but are not entirely absent. The finely made relief decorations were expensive and prestigious commodities, perfectly meeting the elite's demands, and it is striking that in Pompeii, relatively many of them have remained in use up to the end of the town's existence (Laidlaw 1985; Heinrich 2002, 10: 80 houses in Pompeii; cf. L. McAlpine in Lepinski and McFadden 2015, 167–186). The fashion has been associated with the mentioned second-century building boom in Rome (e.g., Elkins 2015, 47–51). The fake marble coatings hid tuff and limestone walls and gave them a rich but, thanks to the absence of further ornamentation, austere appearance. In the eastern Mediterranean, the ashlar blocks, often rendered in fancier colors which can barely be connected with real stone or marble types, are enriched by ornamental details like Lesbian cymatium and other cornice forms (Guldager Bilde 1993; e.g., Tel Anafa, Ephesos, and Pergamon: Rozenberg 2008, 298–309; B. Tober in Zimmermann and Ladstätter 2010, 31–33; Schwarz 2016; Bachmann and Radt 2017, 256–264; B. Tober in Mols and Moormann 2017, 215–219). A striking example is the Tel Anafa decoration from a Late Hellenistic Stuccoed Building, seen by various scholars as a villa, inhabited between 120 and 90 BCE in the environment of Damascus. The opulent and heavy-looking wall decoration contained, among the materials used, particles of thin gold leaves in the Corinthian capitals, which must have made these murals extremely expensive (Fig. 1; see B. Kidd in Lepinski and McFadden 2015, 77–95). A connection with royal palaces in Alexandria (no longer extant, but see Rozenberg 2008, 286–288) and Pergamon (cf. Schwarz 2016) has deservedly been postulated, while for the west we should also take into account the royal town of Syracuse on Sicily conquered in 211 BCE and considered a rich source of inspiration for Rome, as well as Carthage overrun and destroyed by the Romans in

Roman Wall Painting, Fig. 1 Tel Anafa, reconstruction of mural decoration from upper floor room of unknown function from the Late Hellenistic Stuccoed Building (LHSB), late second c. BCE. (Reconstruction courtesy of Benton Kidd, University of Missouri)

146 BCE; here masonry-imitating fragments have come to light (Lancel 1995, 320, Fig. 190). Similar stucco reliefs are known from sites in Sicily and the Italian peninsula, predecessors of the more or less completely preserved First-Style walls in the Vesuvian towns and elsewhere (e.g., Iatas; cf. La Torre and Torelli 2011). They demonstrate that the Pompeian First Style stood in a firmly established Hellenistic tradition. In eastern Spain (C. Guiral Pelegrín et al. in Mols and Moormann 2017, 477–481) and southern France (Barbet 2008, 39), examples stem from the earliest colonized part of Hispania and Gaul, respectively, where the First Style might have existed (especially in sites connected with Carthage) or have been brought by commercial routes from the center. All these western examples including Pompeii are less colorful and less heavy than the contemporary cases in the east.

The greatest innovation which stands at the origin of the Second Style (see Tybout 1989; Heinrich 2002; Perrier 2007), covering the

decades from 90 BCE (Rome) or the 80 BCE (Pompeii) to 20 BCE, is the absence of stucco relief apart from cornices between horizontal zones or at the top of the walls: it constitutes the first phase of "real" Roman wall painting. Second-Style paintings consist of a two-dimensional rendering of what characterizes the First Style, that is, a combination of large blocks or smooth frieze in the dado followed by a central and upper zone with orthostates rendered in various colors, and an upper zone containing three tiers of oblong or – less commonly – standing blocks as in room 45 of the Villa of Ariadne at Stabiae (Fig. 2; M. Grimaldi in Perrier 2007, 177–194), or a smooth plain surface. More simplified is the panel decoration in either two or three horizontal zones, subdivided by colored bands, pilasters, or columns (Heinrich 2002). The "flat" decorations form pure paintings which give the makers a greater liberty to vary with architectural and other elements next to the application of plain surfaces of various dimensions. The oldest example known would be the House of the Griffins on the Palatine in Rome; its rooms were backfilled in later ages and remained preserved for that reason (i.e., Tybout 1989, 373–375; Rozenberg 2008, 311, Figs 3. 280–281; Pensabene 2017, 3–14: maybe slightly later). The most conspicuous, but considerably less frequent, expressions are architectural fantasy façades which appear in the years 60–40 CE and do not adorn specifically big rooms, but those most favored architectonically and functionally by the owners and seen by them as a representative and suitable to receive guests and relatives (Heinrich 2002, 57–67). These "façades" – which have incorrectly determined the perception of the Second Style (cf. Heinrich 2002, 70, note 787) – contain fake openings leading toward an imaginary space beyond the painted (and real) wall. To create these double realms, doors or fences separate the spectators as occupants of the room from gardens, courtyards, or even cityscapes (Fig. 3: cubiculum M of Boscoreale; see on this villa Barbet and Verbanck-Piérard 2013). On the basis of the masonry imitations and the fancy façades, scholars tend to subdivide the Second Style into three or more stages corresponding with their "openness," although the chronological sequence is less rigid than has been presumed. We should not look for examples in real architecture nor try to reconstruct the painted mock architectures in some sort of 3D model, nor connect them with the building boom in the same era (contra Elkins 2015, 40, 42–44; see review by J. Lipps, *BABESCH* 92, 2016, 214–216, esp. 215), since these depictions are

Roman Wall Painting, Fig. 2 Castellammare di Stabia, Villa of Ariadne, Second-Style decoration. (Photo Domenico Esposito)

Roman Wall Painting, Fig. 3 Boscoreale, cubiculum, left wall, now New York, Metropolitan Museum of Art. (Public domain: https://commons.wikimedia.org/wiki/File:Cubiculum_(bedroom)_from_the_Villa_of_P._Fannius_Synistor_at_Boscoreale_MET_DP170950.jpg)

purely fantastic creations. Apart from the *megalographiae* and garden paintings (see below), figural elements tend to remain scarce.

It has been argued that the Second Style in Pompeii was a phenomenon brought top-down by Roman colonists who occupied the town after its definite Romanization in the 80 BCE. This would mean that the fashion originated in the center of power, Rome, and that old inhabitants of Pompeii would not be interested in the new forms. To assume a Rome-centrism in Pompeii only (discussion and evaluation in L. McAlpine in Lepinski and McFadden 2015, 170–171) is unlikely, since this fashion expanded contemporaneously toward other towns on the peninsula and beyond and should be seen as a change of taste occurring simultaneously in other art genres and in literature (Grüner 2004). Moreover, Second-Style paintings are known from numerous sites outside Italy, to begin with some 20 examples in France (Barbet 2008, 40–52; cf. Perrier 2007; La Torre and Torelli 2011). A fascinating example in the Near East is that of residential complexes built and decorated after 30 BCE under a vassal king of Augustus, Herod the Great, who had sojourned for several years in Rome and might have brought painters from the center to Iudaea. They include the Second and Third Palaces at Jericho, the fortress of Masada, and the Herodium (Rozenberg 2008, 333–375; S. Rozenberg in Mols and Moormann 2017, 229–235) and show decorative systems adopting elements from the First, Second, and Third Styles contemporaneously. However, the existence of further examples in the region itself, not tightly connected with Rome, as sources of inspiration rather than the Roman connection, cannot be ruled out.

A peculiarity of Pompeii and the villas in its surroundings – and much less its twin Herculaneum (Esposito 2014, 95–107) – is that there are rather conspicuous remains of First- and Second-Style paintings preserved in buildings functioning until the last days of their existence. Those in Rome are hidden under later layers and will not have been on view, whereas in other sites we possess finds from debris depositions only and do not know how long they were visible. Their presence in the Vesuvian area testifies to their careful preservation (and sometimes restoration, see Ehrhardt 2012) as heirlooms, not only in a literal sense of possession transferred from one to a subsequent generation of one family but also of subsequent owners who

apparently fostered the old murals as a prestigious commodity referring to the previous generations of citizens (see L. McAlpine in Lepinski and McFadden 2015, 167–186).

The classicizing fashion of the reigns of Augustus and Tiberius, ca. 20 BCE–40 CE, that is, Mau's Third Style, gets its full expression in the miniaturization of architectural elements, a reduction to linear motifs which articulate the walls into plain fields combined with vistas through imaginary windows or large figural scenes applied as if they were canvases hung on the wall (Fig. 4; Bastet and De Vos 1979; Ehrhardt 1987; Thomas 1995, 36–78, 172–211; Esposito 2014, 108–132). Third-Style decorations often have closed, that is, dark-colored, lower and central zones articulated by means of thin vertical architectural elements or bands, with an upper zone featuring stylized architectures and human figures against a contrasting, mostly bright plain background. The latter may reflect the vistas of the Second Style, in which the onlooker looks beyond the imaginative separation wall into a fantastic realm. Alix Barbet aptly called this tendency toward flatness a "réaction anti-illusioniste" to the illusionistic world of the Second Style (Barbet 2008, 53).

Good examples are various rooms in the so-called Villa Imperiale which lies on top of and in front of Pompeii's old city wall and under the Julio-Claudian Temple of Venus (Fig. 4). Still simpler, but equally rich thanks to the refined and detailed paint work is the villa found in the village of Boscotrecase, northwest of Pompeii, which is generally attributed to Marcus Agrippa's son Agrippa Postumus, dating between 12 BCE and 7 CE. The decorations were stripped in the early twentieth century and sold, so they are (mainly) in Naples and New York (see, e.g., Anderson 1987; von Blanckenhagen and Alexander 1990; Thomas 1995, 45–51). The tiny architectural elements in the black room 15 – reconstructed from partially cutout fragments in New York (Fig. 5) – possess no volume at all. Each wall has a flattish central niche or window frame adorned with a tiny landscape, whereas the surface is subdivided vertically by tholos-like metallic structures and candelabra supporting yellow Egyptianizing scenes. All these purely ornamental devices produce a bricolage of various origins, e.g., "Egypt" and the agrarian Roman rural realm surrounded by almost abstract forms (on bricolage or mix of elements from various cultural realms, see Versluys 2017,

Roman Wall Painting, Fig. 4 Pompeii, Villa Imperiale, room A, view toward the east wall. (Photo Domenico Esposito)

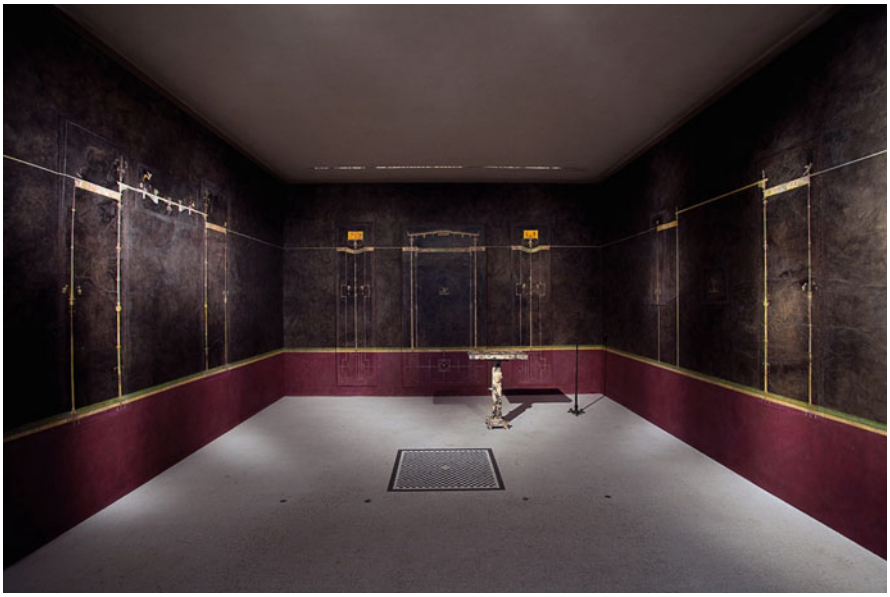

Roman Wall Painting, Fig. 5 Boscotrecase, Villa of Agrippa Postumus, "black room" (15), now New York, Metropolitan Museum of Art, inv. 20.192.1–11. (Public domain: https://www.metmuseum.org/toah/works-of-art/20.192.1-.8,.10,.11/), 10–1 BCE

221–229). The small tondi on top of the miniaturized candelabra of the north wall has convincingly been interpreted as portraits of Agrippa Postumus' mother Julia and her stepmother Livia, so that the application of these paintings might have been realized in 11 BCE, just after the death of Marcus Agrippa, Julia's husband, and Agrippa Postumus' father (Anderson 1987). Over the years, the Third Style tends to regain more substantial architectural forms, e.g., worked-out central niches and heavier architecture in the upper zones, whereas the complete system remains closed and lacks the corporality of the preceding Second-Style walls.

Popular elements are thin candelabra next to likewise thin and richly adorned columns as vertical dividing elements, which occur for the first time in the Villa della Farnesina in Rome, usually dated in the late 30s or 20s BCE, but probably a decade older in tandem with the House of Augustus, viz., 42–36 (La Rocca 2008; Pensabene 2017, 81). Both in Italy and beyond the quality of many decorations are very high, which tallies with their representative status. Candelabra frequently occur in the northern part of the Roman Empire (Thomas 1995, 27–36: early examples; for Gaul, see Barbet 2008, 61–63, Figs. 57 and 58). Several rooms in a mid-first-century house in Fréjus (Place Jules-Formigé: Barbet 2008, 73–76, Fig. 82) display a predominance of red panels in the main zone, all adorned with miniature candelabra and columns, but lacking figural motifs, with the exception of a garden decoration. There might be some chronological difference between the various rooms, but the owner (or successive owner) maintained this Third-Style look in later decades. From the same era is a house found in Soissons (Rue Paul-Deviolaine; Barbet 2008, 95–98, Fig. 120) in which there are five red and two black rooms, two of which (room II and room IV) definitely are of early fabrication. The red panels suggest pieces of fabric hung upon a blue panel and surrounded by minute ribbons and green garlands, whereas friezes with birds separate these panels from the dado. This fashion of fake tapestry would become a popular Fourth-Style element but might be an early experiment in this context.

The two-dimensional character of the Third Style, with less heavy architectural elements and almost complete absence of marble veneer, has

been connected with Augustus' wish to observe austere *mores maiorum* and to abstain from ostentatious luxury. While this may be true for the formal aspects, showing a certain soberness, many decorations look simpler but are extremely expensive thanks to the use of precious paint material and the application of refined ornamentations by skillful decorators. What is more, if one wants to connect this tendency with Augustus' own sobriety, one should be puzzled, since his own building projects, both public and private, are not simple at all. Yet, the remains in his own house on the Palatine (see above) date to his first years of adulthood, around 40 BCE, when he started struggling for power; they are at odds with this simplification but belong to a different approach to displaying power and prestige.

Alix Barbet connects the expansion of the Third Style in Gaul with Augustus' sojourn in Lyon in 16–13 BCE (Barbet 2008, 103–104), but a diffusion via less official channels seems more likely. Augustus was in Gaul to oppress local opposition and, certainly came not as a propagator of culture. Since motifs of the Augustan fashion also were in circulation in other zones of the growing empire (e.g., Cologne, see Thomas 1993, 85–87, pl. 1), this explanatory model cannot be substantiated.

A sort of transition to the Fourth Style, taking place in the age of Caligula and Claudius, is formed by the House of Marcus Lucretius Fronto in Pompeii, where purely ornamental motifs are combined with tentative vistas, and the House of the Tuscan Colonnade in Herculaneum, with its more articulated architectural forms in the upper zone of the oecus (Fig. 6; Esposito 2014, 128–130, pls. 92–93). These decorations constitute a hybrid transitional set of decorations with characteristics of both the Third and Fourth Styles, which – among other reasons – tend to be more critically approached than the First and Second Styles (cf. assessment in Esposito 2014, 133–147).

The Fourth Style is the most puzzling phase in first-century CE painting developments (see inter alia Thomas 1995, 79–169, 211–320; Mols 2007; V.M. Strocka in Zimmermann 2014, 29–40; Esposito 2009, 2014, 151–200). Despite the

Roman Wall Painting, Fig. 6 Herculaneum, House of the Tuscan Colonnade, oecus 5, south wall. (Photo Domenico Esposito)

great bulk of material known from many sites, it is difficult to establish a firm chronology on the basis of stylistic and/or formal developments. We cannot observe a clear-cut formal development, similar to the Second and Third Styles, on the basis of rendering architectural elements or other forms or on the degree of openness of the decorative systems. Murals attributed to this phase, which runs from the Claudian era up to the beginning of the second century CE (on the extension beyond 79 CE, the destruction date of Pompeii, see Mols 2007; S.T.A.M. Mols and E.M. Moormann in Zimmermann 2014, 105–111), display forms deduced from all previous stages, including substantial next to miniature architectural elements, more or less organized in open façade-like structures as well as closed panel schemes and zones filled with marble veneer (Fig. 8). They show what Renate Thomas has aptly called a "style pluralism" (Thomas 1995, 169). Representations of First-Style-like ashlar blocks occur in a much simpler form, i.e., as a plain, white field subdivided into blocks by simple red or black lines, next to fine *opus sectile* imitations.

Architectural schemes may cover entire walls or large parts thereof in compositions often called *scaenarum frontes*, after the stage façades of the Roman theatres; although as in the Second Style, there is no immediate relationship between the real and painted architecture. Structural elements form sections between panels and constitute an articulation of the wall into a set of large and small built arches and niches. Good examples of these, in German aptly called *Prunkfassaden*, have been preserved in Nero's Golden House, which might be the first instance of a popular fashion expanded both in Italy and beyond (Fig. 7; Meyboom and Moormann 2013, 90–91; Dubois 2016, I, 175–177). European examples include façades in Calais (France: Barbet 2008, 3) and Dover (Great Britain: Davey and Ling 1982, 111–114;

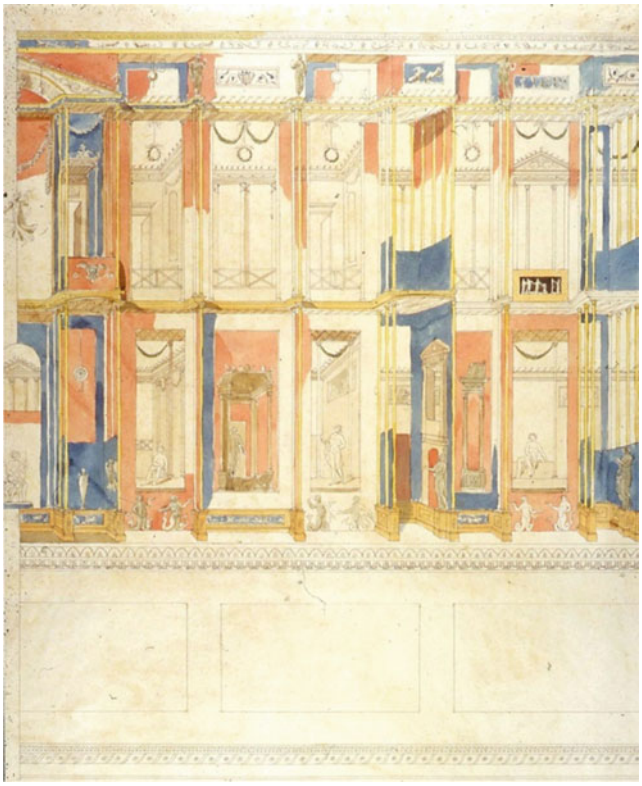

Roman Wall Painting, Fig. 7 Rome, Golden House of Nero, corridor 50, fantasy façade, now faded, here reproduced after a late eighteenth-century colored print. (From Meyboom and Moormann 2013, II, Fig. 50.5)

Philp 1989) dating to the middle of the second century CE.

Often, we observe a combination or mix of different forms, as if the painters used cuts from master models like ornamental façades and panel decorations (Peters 1982). A new element is the insertion of mock fabric draperies instead or on top of rectangular panels in the middle and upper zones, adorned with embroideries (Fig. 8). Behind and between the hung tapestries, architectural elements and ornaments fill the surface as if the painters felt a *horror vacui* and ventured to fill all spaces otherwise left empty. Textile borders also substitute for the frames around the panels or run on top of them. Due to this potpourri of forms, it is impossible to connect the Fourth Style with a determined primary location or context, let alone a specific creator, although Rome's imperial elite is the most likely candidate (V.M. Strocka in Zimmermann 2014, 32), while the rationale of this wild mix of forms is likewise difficult to define. It has been argued that the Fourth Style was an invention made at Nero's court in Rome, which theory reflects a traditional notion that new fashions in art were created in the highest circles of patrons such as courts or urban elites. Given the fact that wall decorations made according to this fashion are known from earlier monuments, especially in Pompeii, this assumption is unrealistic (Thomas 1995, 79; Meyboom and Moormann 2013, 23–24). At the same time, it would be a reaction on the Third Style's austerity (e.g., Thomas 1995, 106), but Third-Style-like systems frequently occur in the Fourth Style. Another point brought forward is that the Fourth Style shows a certain degree of neglecting pictorial qualities and is artistically less convincing than its predecessors; this opinion started with Mau (Mau 1882). A strong impetus to find this fashion below good taste originates from Paul Zanker's influential article on the imitation of villa culture of the late Republican period during the Neronian and Vespasianic era in Pompeii. He argued that the predecessors had good taste, whereas the followers were nothing but tasteless nouveaux riches (Zanker 1979; also, in later publications). Apart from the fact that, in a technical sense, Fourth-Style paintings are not worse (or better) than the previous ones, this negative estimation implies a scarcely enlightened assessment of the Neronian and Flavian period as a whole. These intimations seem strongly conceived by the negative image of the notoriously badly esteemed emperors Nero and Domitian rather than based on a meticulous analysis of their era's culture.

Some scholars have tried to distinguish between Neronian and Flavian painting, in which reasoning the connection of style forms is once more connected with the personalities of

Roman Wall Painting, Fig. 8 Pompeii, House of the Old Hunt, tablinum 11. (Photo Domenico Esposito)

these emperors (e.g., Thomas 1995, 136–166; Strocka 2010; cf. Esposito 2014, 151–152). The Flavian decoration would be more "baroque" and richer of lavish elements, although the mature Fourth Style, which is the late Neronian phase, as we can see in first instance in Nero's Golden House on the Oppian Hill, already displays a wide array of possibilities. Although many shapes encountered in this palace – ornamental façades (Fig. 7), panel decorations, *aediculae* and parts of them subdividing panel systems, repetitive patterns, embroideries – are found in buildings elsewhere in more or less the same time (see the analysis of Pompeian decorations in Thomas 1995, 134–136), the lack of firm chronological criteria for the latter group of monuments makes such an assumption rather shaky. In the Vesuvian area, the few dated complexes comprise the not yet completed decorations in various houses, e.g., the House of the Chaste Lovers in Pompeii. An extraordinary case is the aforementioned set of stamps of datable coins in the wet plaster of the atrium in the House of the Old Hunt in Pompeii (Allison and Sear 2002, 83, Figs. 263–271; cf. Thomas 1995, 151–152). A group of heavily adorned decorations in Herculaneum's public and sacral edifices of the *Augusteum* and the unfinished *Aedes Augustalium* in Herculaneum form a Flavian set (Moormann 2011, 119–137; Esposito 2014, 45; for houses ibidem, 158–163). Here architectural elements are plastically rendered, there are vistas through open windows, and the color scheme is abundant. A group of decorations attributed to a large workshop named after their principal project, the Vettii workshop, seems also to have been active in the last decade of Pompeii's existence (Esposito 2009, 49–132, esp. 57; cf. Moormann 2011, 149–162, on this workshop's paintings in the Temple of Isis). Nevertheless, even firmly dated walls do not yet help us very well to define different stylistic phases within the Fourth Style. Experts have to rely on stylistic and formal associations, which often are rather arbitrary and subjected to connoisseur-like estimations. Yet, the paintings attributed to this latter phase are similar to the preceding decorations albeit richer and, especially in respect to the architectural elements, more complicated. Wallpaper patterns and marbling are present to a larger extent than before.

Whereas Rome itself has little on offer beyond the complex of Nero's Golden House (see Meyboom and Moormann 2013), in Rome's harbor city Ostia, the painted material known was until recently limited to material from the second century CE onward (see below). Thanks to recent stratigraphic excavations and research on fragments found during the two previous centuries, one can now observe the same trends as in Rome and the Vesuvius area (Falzone 2007, 29–47; several contributions in Mols and Moormann 2017, 335–361). The quality of these murals seems to have been extremely high, as one can see in situ on the red paintings of the temple of Bona Dea dated to the early first century CE (Falzone 2007, 41–42; Moormann 2011, 67–68; S. Falzone in Mols and Moormann 2017, 337). The same is true for complexes elsewhere in the Roman world, where a common decorative language is recognizable.

From the Fourth Style onward, the application of mock marble veneer never vanishes from the painters' repertoires. The consumption of marble plaques at a large scale occurs for the first time known in Nero's Golden House in Rome, where wall painting has a secondary value in the principal rooms, because these could be clad with marble up to their entire heights or lower sections (Meyboom and Moormann 2013, 74–76, 84–87). Elsewhere, however, the use of real marble is much less lavish, so that painting remains an indispensable commodity for the furnishing of interior space; these veneer depictions were no mere cheap substitute. A couple of times one finds combinations of real and mock marbles in the same room, and in the second and third centuries, the rendering of costly opus sectile in painted form demonstrates the careful and far from easy and cheap-looking application of imitation marble patterns. The final impression seems to have become much more important than the materiality, which corresponds with one of the principles of Roman mural painting: imitation and *trompe l'oeil*. Initially, marbling as well as the use of real marble is limited, especially in the Vesuvian area up to 79 CE, to the dado, but

gradually it appears in the form of orthostates or pilasters occupying the main zone, the orthostates being equivalents of standing marble blocks or panels made of marble slabs, in all cases framed by strips of different marbles (for Ostia, see Danner 2017, 94–98).

Our knowledge of second- and third-century painting, both in Italy and outside, is disparate (most recent overviews: Ling 2014; Dubois 2016, I, 137–191). In the sense of decorative systems, there are no radically new trends or "Fifth-Style" decorations differing conspicuously from the Fourth Style. It has been observed that post Fourth-Style painting grows less elaborate and less expensive in the run of the imperial period (Ling 2014, 371–372). This would correspond with the increasing application of marble veneer as well as wall mosaics on the walls after the example of the imperial palaces in Rome, to begin with the Golden House (see above). Even if, indeed, many decorations show a lower artistic level than earlier murals, this suggestion is at the same time contradicted by fine and well-executed paintings. The second and third centuries show the same wide array of possibilities as the Fourth Style and might rather constitute a consequent development of the Fourth Style. The negative judgment might originate from the similar thoughts on that fashion (see above). The Roman Empire which partly enjoyed a flourishing and booming era was partly struck by political turmoil and economic inconsistency, for which reason the economic base of private culture greatly differed regionally and in time and affected artistry and craftsmanship. Architectural systems exist, especially during the second century, next to panel decorations and allover patterns or combinations. Panel decorations gradually become the dominating fashion. The schemes of juxtaposed panels can be enlivened by the intersection of vertical architectural mini-vistas, candelabra and foliate patterns, as well as the adaptation of contrasting color schemes. What is more, the frames may be adorned, and the panels themselves can contain small figural scenes or vignettes in the form of standing human and divine figures, sometimes explained by added texts in the form of *tituli picti* (see Dubois 2016, I, 336–343).

In Rome, decorative systems from the first half of the second century still display combinations of plastically rendered architecture and flattish panel systems. Although lost and only known from Carlo Buti's fine watercolors, mention should be made of murals from a Roman house found in the late eighteenth century not far from the modern Stazione Termini in Rome, in the Villa Negroni. Buti's images show semicircular decorations stemming from the upper parts or lunettes of vaulted rooms, with *aediculae* and subtly colored surfaces, embellished with large mythical scenes, which seem to date to the 130s (*Antiche Stanze* 1996, 29–35; Ling 2014, 375). They display a great preference for large yellow and red planes combined with smaller sections in other colors and with columns and architraves.

During a radical Hadrianic transformation (Falzone 2007, 52–54), Ostia was more or less rebuilt and got apartment buildings, the *caseggiati*. Decorations often show a colorful use of red and yellow surfaces (panels or interiors of *aediculae*) combined with architectural elements as vertical dividers, e.g., in the House of the Muses. Dadoes may contain the same color scheme panels or marbling (Falzone 2007, 51–95). Whereas the later second century shows both voluminous and stylized architecture, with a peculiar combination of red and yellow panels filled in with sketchy architecture, tiny scrolls, and thin frames such as those in the House of Painted Ceiling and the House of Jupiter and Ganymede (Falzone 2004, 61–74, 95–101, 2007, 107–124; Dubois 2016, I, 167–168), the third century marks the presence of linear, highly "abstract" structures. Thin festoons, floating figures, and diverse ornaments enliven the walls. A further simplification brings new schemes and color combination in the subsequent era, with predominantly white-grounded decorations (Ostia, *Caseggiati* of the Sun and of Themistocles, see Falzone 2004, 143–165, 174–176; cf. Dubois 2016, I, 158–167). As in the Third Style, architectural details make place for "geometrization" (Falzone 2004, 190) in linear systems, creating the aptly called "Linear Style" or, less ideally, "Catacomb Style" (after occurrences in Rome's underground cemeteries) in the late second

century (see Falzone 2004, 192–197; Dubois 2016, I, 144–146). The houses in Ostia mostly do not show more than one painting layer per room, which either means a unique phase lasting for many decades or a radical replacement of an older decoration that was completely removed, whereas between the rooms there can be considerable differences (Falzone 2004, 169–175). There reigns a certain hierarchy between the rooms, so that the more important ones display more color and architectural elements than secondary rooms. A few wall-covering scenes represent garden depictions and mythological figures like the marine Venus in a third-century house under the Church of Santi Giovanni e Paolo in Rome (Ling 2014, 414–419, esp. 414–415, plate 9.16).

There is no overview available of the material from the Roman provinces as a whole (see a summary in Ling 2014), but a couple of towns and villas for which extensive corpora are available should serve as representative cases. Architectural schemes could be as elaborated as the Ostian examples. In Britain, for instance, there are remains in situ in a Roman house in Dover dated to the Severan age (Philp 1989; Dubois 2016, I, 176–177, Fig. 12) and in a house in Leicester dated with less substantiation to the middle of the second century CE (Davey and Ling 1982, 111–114; 123–131; cf. R. Thomas, *Bonner Jahrbücher* 183, 1983: 905). They contain plastically rendered architectural elements framing panels and adorned with objects which seem exposed within the painted realm.

In Germany the ancient town of Cologne offers a wide array of subsequent painting phases which in general match developments in the center of the empire. Panel decorations with candelabra in the division bands often display a high quality (Thomas 1993, 44–50). A house decoration in the area of the Cathedral from the Flavian era comprises richly elaborated candelabra on black vertical panels framing red panels (Fig. 9; now Römisch-Germanisches Museum Köln; see Thomas 1993, 44–46, 177–194). The candelabra are peopled by mythical figures maybe inspired by Ovid's *Metamorphoses* (R. Thomas in Mols and Moormann 2017, 493–500) and enriched by vegetal bands and garlands. The Cologne scheme is found elsewhere in the northern provinces; see the Gallo-Roman temple of the Flavia era in nearby Elst (The Netherlands: Moormann 2011, 91–92) and a house in Verulamium (Great Britain: Davey and Ling 1982, 188–191), while we encounter similar candelabra in Carthage (Barbet 2013, 38–39, Figs. 36–37; 54–55, Figs. 57–58). They

Roman Wall Painting, Fig. 9 Cologne, wall with candelabra from House H/1 of Domviertel, now Cologne, Römisch-Germanisches Museum. (Courtesy Rheinisches Bildarchiv, Cologne)

differ from the Italian examples in that they adorn dark-colored strips framing monochrome panels, frequently without the addition of architectural elements.

In the second century, there are various examples of decorations with larger and smaller figures in various registers. Debris from the Roman villa of Maasbracht (The Netherlands, see Swinkels 2017, here Fig. 11) contained fragments of a grand decoration, in three registers, with gladiators, functionaries, or patrons acting in or near the villa itself, as well as mythical figures like Apollo and Venus, some of them adorned with *tituli picti*. On the basis of both archaeological and comparative material, they should date to the late second century CE. A similar set of magistrates is known from a watercolor documenting a lost decoration in the House of the Boar Hunt in Carthage, probably applied in the late second or early third century (Barbet 2013, 40–42, Figs. 41–42). In Rome, there are examples from a luxurious house annex bath suite from the mid-second century and slightly later CE found on Piazza del Cinquecento, showing bathing women and personnel (*Antiche Stanze* 1996, 122–130, 162–166). In the large villa of Piazza Armerina in Sicily, principally known for its figural mosaics, there are figures of this kind on wall paintings from the early fourth century (J. Valeva in Mols and Moormann 2017, 63–68), whereas Christian influence can be found in panels with praying humans from the Romano-British villa in Lullingstone dating to the middle of the fourth century (Davey and Ling 1982, 138–145).

The Metropolis of Ephesos on the western shore of Asia Minor has some remarkably well-preserved complexes of painting covering high and late antiquity. Researchers from the Austrian Archaeological Institute executed longstanding explorations in two house blocks situated on the north slope of Bülbüldağ, commonly known under their German name as Hanghaus 1 and 2. A corpus of the paintings was edited in 1977 by Volker Michael Strocka, which together with a volume dedicated to the houses' mosaics provided the first full documentation of murals in the eastern Roman Empire. Strocka articulated various phases over a very long period, viz., the early first century until an earthquake in 612/614 CE, and distinguished various fashions, e.g., a simplified white panel "style" in late Antiquity next to a richer set of polychrome decorations, embellished by the insertion of figural scenes and large and heavy ornamental elements like garlands carried by putti. Re-examination and reassessment of this material in the 1990s caused a chronological landslide: on the basis of coins and graffiti mentioning *assaria*, coins used until 268 CE, the life of the complexes resulted to have lasted until a major earthquake around 262 (Krinzinger 2002; on paintings ibidem N. Zimmermann, pp. 101–117; accepted by Strocka 2002; now Zimmermann and Ladstätter 2010, 45–49, 81, Figs. 54, 117–119; Zimmermann 2018). The new chronology has met with approval and got substantiation by new investigations and elaborations of the finds at large in the more recent volumes of *Forschungen in Ephesos* dedicated to the seven single houses within Hanghaus 2. In correspondence with four (re)construction phases, paintings from three up to eight layers thick, corresponding with various subsequent refurnishing campaigns, can be distinguished. Panel decorations form a constant theme. There are two series of red panels in the main zone from the Trajanic era separated by black bands. In one room they were adorned with vignettes featuring, among others, Socrates and the Muse Urania, while the upper zone contained mythical scenes circling around Achilles. The learned literary touch of this well-made decoration is evident. In later phases white decorations dominate, although colored ones are not entirely absent. The upper zones contain simply rendered architectures recalling those of Third-Style ensembles in Italy. The panels are enlivened by a wide array of vignettes: children as gladiators, putti, busts of the Seven Wise Men, Muses (Fig. 10), fish, and birds. The vertical bands contain garlands and candelabra, and the dadoes are often filled with elaborate marbling, sometimes in combination with real veneer. The Ephesos paintings show a mix of local trends and impulses from the west in the first half of the second century, especially from Rome and Ostia, where specific correspondences can be observed, which might have to do with personal contacts of elite Ephesians with the

Roman Wall Painting, Fig. 10 Ephesus, Hanghaus 2, Wohneinheit 3, room 12, panel decoration with Sappho, Apollo, and Kalliope as vignettes in the main zone and idealized heroes in the upper zone, second quarter of the third century. (Photo N. Zimmermann, © IKAnt ÖAW)

Roman Wall Painting, Fig. 11 Maasbracht, Roma villa, reconstruction of a wall decoration from around 200 CE, with mythical figures in the dado, gladiators in the main zone and daily life scenes in the upper section. Reconstruction Louis J.F. Swinkels. (Courtesy L.J.F. Swinkels)

Empire's capital, but do not develop afterward new ways of decoration and tend to stick to flattish panel ensembles (Zimmermann and Ladstätter 2010, 120–123; Zimmermann 2018).

Rescue excavations at Zeugma in eastern Turkey in the late 1990s brought to light various houses on a slope similar to the Ephesus Hanghäuser, decorated with mosaics and paintings. Due to the construction of the Bireçik Dam in the Euphrates destroying the site, these items were removed in 2000 and brought to the Archaeological Museum in Gaziantep. While the mosaics

mainly date to the late second century, most paintings decorated the houses in their last decades, just before the town's destruction in 252 or 253 CE by Sasanians (Aylward 2013, I, 9, 12, 29–31; on the paintings Barbet et al. 2005 and B. Bergmann in Aylward 2013, I, 168–177). There are similarities to the Ephesus material such as the use at large scale of marbling dadoes, mock opus sectile panels, and white panels filled with standing figures in the main zones. The upper zones are all lost. Some rooms have different strata of subsequent, but as yet barely datable phases. An extremely colorful ensemble adorned the representative room P11 of the House of Poseidon: on top of a protruding base, male figures, probably representing, servants, ca. 125 cm tall, are standing inside arched niches between which there are fake miniature doors. They remind us the Second-Style *megalographiae* and, more likely, reflect the attendants in the aforementioned bathhouse rooms at Piazza del Cinquecento in Rome, dated around 180–200 CE. A panel decoration of room P26 of the House of the Euphrates dated to ca. 220 has rectangular panels occupied by seven mythical women; two have their names written next to them (viz., Deidameia and Penelope). Strikingly, just as six unidentifiable women in room P23 of the Poseidon House, the figures are too big for the panels so that their heads cut the upper frames. Various buildings, mainly religious ones, in the Syrian town of Dura-Europos show a bricolage of various elements by which the results, e.g., the lavishly decorated Jewish synagogue and the Mithraeum, are incomparable with material from the mid-third century in the Near East (Moormann 2011, 189–201; Kaiser 2016). Figural scenes dominate.

Roman North Africa has been partially studied well. Thanks to Alix Barbet's monograph on some 20 sites in the area now covered by Tunisia, we glean some general tendencies which partly tie in with the developments in other parts of the empire (Barbet 2013). Few wall systems can be reconstructed on the basis of both material in situ and fragmentarily preserved so that we retain an extremely unsatisfactory image, not ameliorated by the likewise bad chronological anchoring of the greater part of the material. Mosaics often serve as comparative material and fixed points, but this dating method is not entirely conclusive, since floors could have a longer life than paintings and serve various generations, getting new paintings as companions in the run of time. The material assembled shows the same motifs and structural elements as in the center of the empire. Due to the fragmentary state of preservation, almost no complete buildings can be studied in detail. A house in the Theatre quarter of Thysdrus contained a set of a no longer existing, extremely colorful (and maybe precious because of the pigments) house with predominating panels in red, vermillion, green, and mixed marbling fields, sometimes adorned with vignettes. A plaque preserved in the El Jem Museum, probably from the same site, has a white background and contains a rectangular panel with a Diana or Amazon, placed on top of a sort of stretched veil similar to those in Pompeii. Barbet tentatively dates the decorations to the early and middle of the third century CE, but unfortunately, we have neither further clues nor parallels to substantiate this chronology (Barbet 2013, 205–218, Figs. 292–311). Yet the lack of depth and linearity of figure and surrounding motifs might plead in favor of this suggestion.

Context

The decoration fragments known from the Roman world belong to or stem from various sorts of buildings: mainly houses and villas, less frequently baths, tombs, temples, and public buildings. Whereas Vitruvius gives very brief rules about the décor suitable for various spaces (cf. Tybout 1989, 71–77), he "applies" these rules only to the houses of the Roman elite, belonging to men who had to receive guests and to display wealth and power. In a way, these remarks are out of order, since the elite in his day had to be subordinate to the emperor and no longer capable of taking vigorous decisions. For the Republican period, we see a display of wealth in Pompeian houses by means of paintings, but the sizes of the houses appear to be less important than one is tempted to assume (see Heinrich 2002 and L. McAlpine in Lepinski and McFadden 2015, 167–186).

The connection between function, form, and architecture does not allow for establishing substantial differences between building categories. Most buildings do not contain specific characteristics to discern systems or schemes peculiar for a determinate sort of buildings. Houses – much better known than other categories – are decorated in the same ways as temples or public buildings. That means that, apart for shrines of more or less closed religious communities like Isis and Mithras worshippers, temples were painted by the same painters and with the same templates as private contexts (cf. Esposito 2009 for workshops and Moormann 2011 for temples; examples at Dura-Europos, see Kaiser 2016). If archaeologists find painting fragments, they will rarely be able to establish the room's and building's specific parameters on the basis of this material only, unless evidenced by specific iconographic or textual elements.

Figural Systems and Iconography

As mentioned above, the First and Second Styles tend to remain devoid of living creatures occupying the spaces represented (Figs. 1, and 2). In Second-Style decorations, figural elements gradually become important embellishing items (Fig. 3). There are not yet framed figural scenes, while we know a small, but fascinating set of figural friezes of the Second Style similar to historical reliefs like those of the Ara Pacis Augustae in Rome (12–9 BCE), mostly dated to the middle of the first century BCE. On the basis of Vitruvius, these decorations are called *megalographiae*, in singular *megalographia*, referring either to "painting of large figures" or "large-size painting." The first interpretation entails figures moving or standing on a podium, which is the top of a plastically rendered protruding dado, against a set of imitation marble panels (overview: Bragantini 2014, 311–316). The figures are rendered as living persons and seem to represent acting persons or *tableaux vivants* (as if they, indeed, were actors on a stage). Unfortunately, their iconographies are elusive, so that the manifold interpretations of various complexes would leave the onlooker rather confused about their meaning. The most puzzling examples are a frieze in room 5, a banquet room, of the so-called Villa of the Mysteries, painted around 60 (D. Esposito in Perrier 2007, 450; Bergmann 2007) featuring as the protagonist a drunk Dionysus lying in the lap of Ariadne or Aphrodite, often interpreted as religious or mystical scenes, and a now-dispersed set of personages from the Villa of Publius Fannius Synistor in Boscoreale seen as either historical or mythical personae (Barbet and Verbanck-Piérard 2013). The lack of well-interpreted comparable instances enhances the difficulty of interpretation.

In painting beyond Italy, large-size figures are often also called *megalographiae* (e.g., figures in Roquelaure from the early first century CE (Thomas 1995, 23 Fig. 132; Barbet 2008, 89–92). Indeed, if we take into account "large figural paintings" as *megalographiae* (see Dubois 2016, I, 200–202), we encounter many more genres of wall-covering figural scenes from the late Second Style onward, to begin with Augustan garden vistas adorning interior spaces. Early examples are the magnificent subterraneous room from the Villa of Livia at Prima Porta, north of Rome, and fragments from the Villa della Farnesina (both exhibited in the Palazzo Massimo alle Terme in Rome). One wonders what they meant to be: gardens seen beyond the real space through imaginary windows or, as in the Villa of Livia, from within an artificial grotto whose rocky edge is represented on top of the garden representations. They clearly had to embellish the private sphere by creating a relaxed atmosphere (Thomas 1995, 71–72). While they cover walls in rooms during the late Second and the Third Styles (e.g., House of the Orchard in Pompeii), they also adorn open spaces of gardens and courtyards from the middle of the first century CE onward all over the empire, such as in Gaul (Barbet 2008, 295–304) and Asia Minor (e.g., Pergamon, House of Attalus). In a peristyle of house 4 of Hanghaus 2 in Ephesus, dating to the middle of the second century, a *locus amoenus* was created, with real and fake marble dadoes and gardens adorned with statues both painted and real (Zimmermann and Ladstätter 2010, 88–90, Fig. 138; 131–132, Fig. 243). Some painted gardens are occupied by large mythical figures, such

as the Orpheus in the House of Orpheus in Pompeii and the Aphrodite in the House of Venus in the Shell in Pompeii (M. Carucci in Mols and Moormann 2017, 295–300). Alternatives comprise landscapes filled with wild animals, seascapes, Egyptianizing watersides, and villa landscapes. Large mythical and genre scenes cover entire walls or complete zones in later centuries in houses in Ostia, Rome, Ephesus, as well as Libya, where compelling examples of gladiators and hunts are known from houses and bathes in Silin and Leptis Magna from the late second and early third centuries CE (B. Bianchi in Mols and Moormann 2017, 103–106) as well as from northern sites like Cologne and Maasbracht (Fig. 11; see Swinkels 2017, 108–112). Hunting scenes and domestic occupations depicted in the Roman provinces have been interpreted as examples of appropriation of Roman habits by local grandees, an example of which might be the representation from a house in Colchester, Britain, dating to the late first century CE (Davey and Ling 1982, 42, 99–101). In a few cases, these elite people could have practiced commerce, for instance, trading animals for the games in the Colosseum in Rome, or for amphitheaters elsewhere. Although it seems superfluous to apply depictions of what happens in the specific places, in this case of animal and gladiator games, some amphitheaters possess them. A lost example that was documented briefly after its discovery is the amphitheater of Pompeii, which had elaborate Flavian paintings on the parapet walls of its arena. A similar case is that of Uthina in Tunisia (Barbet 2013, 93–98, Figs. 111–117) where some scenes bear the names of the hunters. Barbet remarks that there are, as in many other cases, no sound dating criteria for Uthina; the second century CE seems most likely (Barbet 2013, 95).

From the late Second Style onward (e.g., House of Livia on the Palatine, maybe rather a sacral building (see Pensabene 2017, 81), and the Villa della Farnesina, both in Rome), large figural scenes occupy the central niche or panel of the flattish decorative ensembles (Fig. 4). At the beginning of the first century CE, these scenes include atmospheric landscapes populated by mythical figures. In the Villa Imperiale (Fig. 4), the three scenes illustrate episodes from Cretan mythology: Theseus appearing after killing the Minotaur, Theseus abandoning Ariadne on Naxos, and Icarus falling down after his escape from the Labyrinth. Sometimes the same protagonists appear twice within the same image, expressing two subsequent actions within one myth in what is called a *narratio continua* or continuous narration. On the Polyphemus scene from the Villa at Boscotrecase (von Blanckenhagen and Alexander 1990, 28–33, pls. 42, 44–45), Polyphemus sits on a rock while playing the syrinx to – unsuccessfully – attract Galateia who passes riding a sea creature. In the background, the same cyclops throws a large stone to a vanishing ship, obviously that of Odysseus. This story, mixing the old epic *Odyssey* and Theocritus' *Idyll* 7 (and the contemporary record in Ovid, *Metamorphoses* 13.750–768), shows the refined combination of literary genres. On one of the other walls in this room, the story of Perseus and Andromeda was likewise represented in continuous narration. Next to large panels, there are smaller figural scenes as adornments of the decorative schemes from the late Third Style onward. Their number can differ largely per room, but they form integrated parts thereof. It has been a question of debate whether sets of mostly three mythical scenes constituted iconographically thematic combinations or that stories were applied at random. Over the last years, scholars tend to recognize formal aspects uniting them rather than content: figures are represented in similar postures or the scenes play out in similar backgrounds like the seashore or a woodland (Hodske 2007; Lorenz 2008). Surprisingly, many mythical figures are shown in frontal nudity, which used to shock Romans in "everyday life" but pleased them in art; viewers could make their own associations as to the contents (S. Pearson in Lepinski and McFadden 2015, 149–166). A certain degree of erotization comes to the fore in these nudes as well as in explicit erotic couples who appear in diverse contexts and have been connected with erotic *tabellae* described by Ovid (*Tristia* 2.521–530; see Grüner 2004, 211–218). Popular are genre scenes, representing land- and seascapes, still lives, and daily life occupations, but we rarely encounter scenes intimately related with the

houses' patrons. There is a striking difference between Pompeii and Herculaneum: in Pompeii figural scenes are much more frequent than in the sister town, which can be explained by the fact that the Herculaneum complexes unearthed belong to the richest category of private dwellings, in which real artworks will have had a place of pride. This was also true in large palaces in Rome like Nero's Golden House and Domitian's Domus Flavia (Fig. 7).

Framed scenes tend to become less frequent in Roman wall painting from the late first century onward. A set of mythical figures from Villa Negroni in Rome (see above) include couples of mythical figures, like Adonis and Venus, Mars and Venus, and Bacchus and Ariadne, as well as still lives and landscapes (*Antiche Stanze* 1996, 29–35). In other parts of the Roman Empire, we see the same tendency. A Roman officer of the time of Emperor Commodus in Echzell (Germany) apparently ordered a fine set of mythical images framed by opus sectile imitations of Amazon shields. The scenes include Europa, Perseus, Theseus slaughtering the Minotaur, and Daedalus and Icarus (now in Saalburgmuseum, Bad Homburg; see M. Fuchs in Mols and Moormann 2017, 483–488). Unframed figural motives and scenes become integrated parts of the wall decorations, in the way of the former *megalographiae*, or occupy entire wall zones.

Painters and Workshops

As a rule, the material from antiquity we possess is the product of anonymous artisans. In late Antiquity the terms *pictor parietarius* and *pictor imaginarius* are used to indicate wall and figure painters. In written descriptions of artists, mainly those of Pliny the Elder's *Naturalis Historia* (book 35), many names of painters are transmitted, but none of them is known thanks to his or her own original work, mainly due to the fact that most of them were panel painters rather than mural decorators. In extremely few cases, we have the graffito of a person, or we can connect a name transmitted in literature with a still extant complex. An example of the latter category is Famulus who should have worked in Nero's Golden House between 64 and 68 and whose hand has tentatively connected with scarce remains in the pavilion on the Oppian (Pliny, *Naturalis Historia* 35.120; Meyboom and Moormann 2013, 61–62).

The organization of painters' workshops is not described in ancient sources apart from Vitruvius' mention of *pictorum officinae* (*De architectura* 6.4.2), so that it is a bone of contention whether they really existed or that the individual workmen executed tasks in a loosely organized form. In few cases specialists are capable of recognizing corresponding features like color palette, stylistic particularities, iconographical details, and repeating fill motifs, which betray a connection between the works in one complex (e.g., Nero's Golden House, see Meyboom and Moormann 2013, 54–68) or in one town (Pompeii between 62 and 79 CE, see Esposito 2009). In Herculaneum the painters active in the House of the Mosaic Atrium formed a unique group, also active in most other houses and displayed a wide array of painting modes and levels, from complicated to simple (Esposito 2014, 177–200). On the microlevel, individual painters working in one piece have been individualized a couple of times (cf. Esposito 2009). Outside Campania and Rome, studies of this kind necessarily remain few due to the usually fragmentary status of the decorations (but see on Ephesos Zimmermann and Ladstätter 2010).

Technique

Roman mural paintings were usually executed in the fresco technique, i.e., applied onto a wet preparatory layer or more layers (Vitruvius, *De architectura* 7.3.6–7). After the application of a couple of base layers, the wet top layer was applied just before the painter started his work. Therefore, one may observe the portions prepared to be filled in in one working session or day, called in Italian *giornata*, or corresponding with a division into horizontal scaffolding areas, *pontata*. The top layer was just worked before applying the paint by a *sinopia* or preparatory drawing and subdivided with scratched and hatched lines, all serving to guide the painter in his work. Pigments were chemically bound with the calcium in the layers of plaster and became very resistant. At

the same time, we observe tempera paintings, made on top of frescoes with binding agents which sometime deteriorate in the run of time and may destroy the underlying paintings.

The pigments used are of mineral or vegetal nature and can be of high resistance, thanks to which quality we still have so many paintings preserved. So, we have minerals red, yellow, and green ochres, black made of burnt bones or wood, the very expensive synthetic vermilion, and likewise expensive Egyptian blue or *caeruleum* (on technique see Barbet and Allag 1972; Davey and Ling 1982, 51–62, with attention for specific local features; Barbet 2008, 25–33; Dubois 2016, I, 59–124; F. Pique, E. MacDonald-Korth, and L. Rainer in Lepinski and McFadden 2015, 57–76).

References

Allison, Penelope M., and Frank Sear. 2002. *Casa della Caccia Antica (VII 4, 48)*, Häuser in Pompeji 11. Munich: Hirmer.

Anderson, Maxwell L. 1987. The portrait medallions of the imperial Villa at Boscotrecase. *American Journal of Archaeology* 91 (1): 127–135.

Aylward, William. 2013. *Excavations at Zeugma*. Los Altos: The Packard Humanities Institute.

Bachmann, Martin, and Wolfgang Radt. 2017. *Altertümer von Pergamon 15. Die Stadtgrabung 5. Bau Z. Architektur und Wanddekor*. Berlin/Boston: De Gruyter.

Barbet, Alix. 2008. *La peinture murale en Gaule romaine*. Paris: Picard.

Barbet, Alix. 2013. *Peintures romaines de Tunisie*. Paris: Picard.

Barbet, Alix, and Claudine Allag. 1972. Techniques de préparation des parois dans la peinture murale romaine. *Mélanges de l'Ecole Française de Rome. Antiquité* 84: 935–1069.

Barbet, Alix, and Annie Verbanck-Pierard, eds. 2013. *La villa romaine de Boscoreale et ses fresques*. Arles: Ed. Errance.

Barbet, Alix, et al. 2005. *Zeugma II. Les peintures murales romaines*, Varia Anatolica 17. Paris: De Boccard.

Bastet, Frédéric Louis, and Mariëtte De Vos. 1979. *Il terzo stile pompeiano. Proposta per una classificazione del terzo stile pompeiano*, Archeologische Studiën van het Nederlands Instituut te Rome 4. The Hague: Ministerie van Cultuur, Recreatie en Maatschappelijk Werk.

Bergmann, Bettina. 2007. Seeing women in the Villa of the mysteries. A modern excavation of the Dionysiac murals. In *Antiquity recovered. The legacy of Pompeii and Herculaneum*, ed. Victoria C. Gardner Coates and John L. Seydl, 231–270. Los Angeles: J. Paul Getty Museum.

Bragantini, Irene. 2014. Roman painting in the republic and early empire. In *The Cambridge history of painting in the classical world*, ed. Jerome J. Pollitt, 288–369. Cambridge, UK: Cambridge University Press.

Danner, Marcel. 2017. *Wohnkultur im spätantiken Ostia*, Kölner Schriften zur Archäologie 1. Wiesbaden: Reichert Verlag.

Davey, Norman, and Roger J. Ling. 1982. *Wall-painting in Roman Britain*, Britannia Monograph 3. London: Society for the Promotion of Roman Studies.

Dubois, Yves. 2016. *Urba II.1–3. Ornementation et discours architectural de la villa romaine d'Orbe-Boscéaz*, Cahiers d'Archéologie Romande, 163–165. Lausanne: Cahiers d'archéologie romande.

Ehrhardt, Wolfgang. 1987. *Stilgeschichtliche Untersuchungen an römischen Wandmalereien: von der späten Republik bis zur Zeit Neros*. Mainz am Rhein: Philipp von Zabern.

Ehrhardt, Wolfgang. 2012. *Dekorations- und Wohnkontext. Beseitigung, Restaurierung, Verschmelzung und Konservierung von Wandbemalungen in den kampanischen Antikenstätten*. Wiesbaden: Dr. Ludwig Reichert Verlag (Palilia 26).

Elkins, Nathan T. 2015. *Monuments in miniature. Architecture on Roman coinage*, Numismatic Studies 29. New York: American Numismatic Society.

Eristov, Hélène, and Florence Monier, eds. 2014. *L'héritage germanique dans l'approche du décor antique. Actes de la table ronde organisée à l'École normale supérieure le 23 novembre 2012*. Bordeaux: Ausonia.

Esposito, Domenico. 2009. *Le officine pittoriche di IV Stile a Pompei*, Studi della Soprintendenza Archeologica di Pompei 28. Rome: "L'Erma" di Bretschneider.

Esposito, Domenico. 2014. *La pittura di Ercolano*, Studi della Soprintendenza Archeologica di Pompei 33. Rome: "L'Erma" di Bretschneider.

Falzone, Stella. 2004. *Scavi di Ostia 14. Le pitture delle insulae (180–250 circa d.C.)*. Rome: Libreria dello Stato.

Falzone, Stella. 2007. *Ornata aedificia. Pitture parietali delle case ostiensi*. Rome: Libreria dello Stato.

Grüner, Andreas. 2004. *Venus ordinis: der Wandel von Malerei und Literatur im Zeitalter der römischen Bürgerkriege*, Studien zur Geschichte und Kultur des Altertums, 1. Reihe, Monographien 21. Paderborn: Schöningh.

Guldager Bilde, Pia. 1993. The international style: Aspects of Pompeian first style and its eastern equivalents. *Acta Hyperborea* 5: 151–177.

Heinrich, Ernst. 2002. *Der zweite Stil in pompejanischen Wohnhäusern*. Munich: Biering & Brinkmann.

Hodske, Jürgen. 2007. *Mythologische Bildthemen in den Häusern Pompejis: die Bedeutung der zentralen*

Mythenbilder für die Bewohner Pompejis, Stendaler Winckelmann-Forschungen 6. Ruhpolding: Franz Rützen.

Kaiser, Ted, ed. 2016. *Religion, society and culture at Dura-Europos*, Yale Classical Studies 38. Cambridge: Cambridge University Press.

Krinzinger, Friedrich, ed. 2002. *Das Hanghaus 2 von Ephesos. Studien zu Baugeschichte und Chronologie*. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.

La Rocca, Eugenio. 2008. Gli affreschi della casa di Augusto e della villa della Farnesina: una revisione cronologica. In *Le due patrie acquisite: studi di archeologia dedicati a Walter Trillmich*, Bullettino Comunale Supplement 18, ed. Eugenio La Rocca, Pilar Leon, and Claudio Parisi Presicce, 223–242. Rome: L'"Erma" di Bretschneider.

La Torre, Giocchino Francesco, and Mario Torelli. 2011. *Pittura ellenistica in Italia e in Sicilia. Linguaggi e tradizioni. Atti del convegno di studi (Messina, 24–25 settembre 2009)*, Archaeologica 163. Rome: Giorgio Bretschneider.

Laidlaw, Anne. 1985. *The first style in Pompeii: Painting and architecture*, Archaeologica 57. Rome: Giorgio Bretschneider.

Lancel, Serge. 1995. *Carthage*. Oxford/Cambridge: Blackwell (original French edition 1992, Paris: Fayard).

Lepinski, Sarah, and Susanna McFadden, eds. 2015. *Beyond iconography. Materials, ethods, and meaning in ancient surface decoration*, Selected Papers on Ancient Art and Architecture 1. Boston: Archaeological Institute of America.

Ling, Roger. 2014. Roman painting of the middle and late empire. In *The Cambridge history of painting in the classical world*, ed. Jerome J. Pollitt, 370–427. Cambridge, UK: Cambridge University Press.

Lorenz, Katharina. 2008. *Bilder machen Räume: Mythenbilder in pompeianischen Häusern*, Image and Context. Berlin/Boston: De Gruyter.

Mau, August. 1882. *Die Geschichte der decorativen Wandmalerei in Pompeji*. Berlin: G. Reimer.

Meyboom, Paul G.P., and Eric M. Moormann. 2013. *Le decorazioni dipinte e marmoree della Domus Aurea di Nerone a Roma I-II*, BABESCH Supplement 20. Leuven/Paris/Walpole: Peeters Publishers.

Mols, Stephan T.A.M. 2007. La fine del IV stile nel centro dell'Impero. In *Circulación de temas y sistemas decorativos en la pintura mural antigua*, ed. Carmen Guiral Pelegrín, 139–144. Zaragoza: Departamento de Política Territorial, Justicia e Interior.

Mols, Stephan T.A.M., and Eric M. Moormann, eds. 2017. *Context and meaning. Proceedings of the Twelfth International Conference of the Association Internationale pour la Peinture Murale Antique, Athens, September 16–20, 2013*, BABESCH Supplement 31. Leuven/Paris/Walpole: Peeters Publishers.

Moormann, Eric M. 2011. *Divine interiors. Mural paintings in Greek and Roman sanctuaries*, Amsterdam Archaeological Series 16. Amsterdam: Amsterdam University Press.

Mulliez, Maud. 2014. *Le luxe de l'imitation. Les trompe-l'oeil de la fin de la République romaine, mémoire des artisans de la couleur*, Collection du Centre Jean Bérard. Archéologie de l'artisanat antique 8. Naples: Centre Jean Bérard.

Pensabene, Patrizio. 2017. *Scavi del Palatino 2. Culti, architettura e decorazioni 2. La "casa dei Grifi", la casa di Ottaviano-Augusto e il tempio di Apollo*, Studi Miscellanei 39. Roma: L'"Erma" di Bretschneider.

Perrier, Bernard, ed. 2007. *Villas, maisons, sanctuaires et tombeaux tardo-républicains: découvertes et relectures récentes. Actes du colloque international de Saint-Romain-en-Gal en l'honneur d'Anna Gallina Zevi*. Rome: Quasar.

Peters, Willem J. TH. 1982. La composizione delle pitture parietali di IV stile a Roma e in Campania. In: *La regione sotterrata dal Vesuvio. Studi e prospettive*, 635–645. Naples: Università degli Studi di Napoli.

Philp, Brian. 1989. *The Roman house with bacchic murals at Dover*, Kent Monograph Series 5. Dover Castle: Kent Archaeological Rescue Unit.

Rozenberg, Silvia. 2008. *Hasmonean and Herodian Palace at Jericho IV. The Decoration of Herod's Third Palace at Jericho*. Jerusalem: Israel Exploration Society.

Sauron, Gilles. 2016. Choix de vie et choix de décor. Auguste et Livie au Palatin en 36 a.n.è. In *Vestigia. Miscellanea di studi storico-religiosi in onore di Filippo Coarelli nel suo 80° anniversario*, Potsdamer Altertümliche Beiträge 55, ed. Valentino Gasparini, 591–602. Stuttgart: Steiner Verlag.

Schwarz, Anja J. 2016. Die Stuckdekoration des so genannten Banketthauses. *Archäologischer Anzeiger* 141–146.

Strocka, Volker Michael. 1977. *Die Wandmalerei der Hanghäuser in Ephesos*, Forschungen in Ephesos. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.

Strocka, Volker Michael. 1996. Pompeiani Stili. In: *Enciclopedia dell'Arte Antica ed orientale. II Supplemento, 1971–1994* IV, 414–425. Rome: Istituto dell'Enciclopedia Italiana.

Strocka, Volker Michael. 2002. Die Fresken von Hanghaus 2 – ein Vierteljahrhundert später. *Jahreshefte des Österreichischen Archäologischen Instituts in Wien* 71: 285–298.

Strocka, Volker Michael. 2007. Painting and the 'four styles'. In *The world of Pompeii*, ed. John J. Dobbins and Pedar W. Foss, 302–322. London/New York: Routledge.

Strocka, Volker Michael. 2010. Der 'flavische' Stil in der römischen Kunst – Einbildung oder Realität. In *Tradition und Erneuerung. Mediale Strategien in der Zeit der Flavier*, Beiträge zur Altertumskunde 285, ed. Norbert Kramer and Christiane Reitz, 95–132. Berlin/New York: De Gruyter.

Swinkels, Louis J.F. 2017. The wall painting fragments. *Analecta Praehistorica Leidensia* 46: 83–127 (fascicle entirely dedicated to the Roman villa of Maasbracht, The Netherlands).

Thomas, Renate. 1993. *Römische Wandmalerei in Köln*. Mainz am Rhein: Philipp von Zabern.

Thomas, Renate. 1995. *Die Dekorationssysteme der römischen Wandmalerei von augusteischer bis in trajanische Zeit*. Mainz am Rhein: Philipp von Zabern.

Tomei, Maria Antonietta, ed. 2014. *Augusto sul Palatino: gli scavi di Gianfilippo Carettoni appunti inediti (1955–1984)*. Milan: Electa.

Tybout, Rolf A. 1989. *Aedificiorum figurae. Untersuchungen zu den Architekturdarstellungen des frühen Zweiten Stils*. Amsterdam: Gieben.

Versluys, Miguel-John. 2017. *Visual style and constructing identity in the Hellenistic world. Nemrud Dağ and Commagene under Antiochos I*. Cambridge, UK: Cambridge University Press.

Von Blanckenhagen, Peter Heinrich, and Christine Alexander. 1990. *The paintings from Boscotrecase*. 2nd ed. Mainz am Rhein: Philipp von Zabern.

Zanker, Paul. 1979. Die Villa als Vorbild des späten Pompejanischen Wohngeschmacks. *Jahrbuch des Deutschen Archäologischen Instituts* 94: 460–523.

Zimmermann, Norbert, ed. 2014. *Antike Malerei zwischen Lokalstil und Zeitstil, Akten des XI. Internationalen Kolloquiums der AIPMA 13.-17. September 2010 in Ephesos*. Vienna: Österreichische Akademie der Wissenschaften.

Zimmermann, Norbert. 2018. *Die Entwicklung der Wandmalerei in Kleinasien von der griechischen bis zur römischen Zeit am Beispiel von Ephesos*, In *Pictores per provincias II. Status quaestionis. Actes du 13e Colloque de l'Association Internationale pour la Peinture Murale Antique (AIPMA) Université de Lausanne, 12–16 septembre 2016*, Antiqua 55, ed. Yves Dubois and Urs Niffeler, 69-88. Basel: Archéologie Suisse.

Zimmermann, Norbert, and Sabine Ladstätter. 2010. *Wandmalerei in Ephesos von hellenistischer bis in byzantinische Zeit*. Vienna: Phoibos Verlag.

Romanization

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Introduction

This entry addresses the changing meanings of the term "Romanization" since the late nineteenth century. For much of the time between the initial introduction of this concept and the 1960s, the process of Romanization appears to have been viewed in an uncritical light by archaeologists and ancient historians. Romanization was often considered to operate as a relatively simple process through which indigenous societies across Italy and the Western Roman Empire became integrated into a civilized community. During the late nineteenth and early twentieth centuries, the ancient historians Theodor Mommsen (1817–1903) and Francis Haverfield (1860–1919) defined this concept. In many of the works that resulted from the tradition established by these two authors, Romanization was identified as a fairly simple process of social evolution, which derived its logic from the assumption that social change occurred in all societies from a primitive form to a civilized way of living and that this process occurred in a measured and progressive manner. During much of the twentieth century, the theory of Romanization was used to explain the gradual spread of urban life, villas, and "Roman" goods (*terra sigillata*, amphora, coins, etc.) across much of the Roman Empire during the period from the late first century BCE to the third century CE. It was considered that this blossoming of civilization was succeeded by a period of decline that eventually led to the fall of Rome in the West in the early fifth century.

A more critical assessment of Romanization arose as a result the decolonization movements of the 1950s to 1970s, as Western Empires were dismembered. At this time, critical accounts of classical Rome gradually developed which took issue with the ideas of civilization and progress on which the earlier theories of Romanization had been based. At first, these critical approaches focused upon the idea of indigenous resistance to Rome, but during the 1990s, a more focused critique of the concept of Romanization developed in Britain, representing a "postcolonial" turn in Roman imperial studies (Webster and Cooper 1996). Since this time, a number of archaeologists have argued that Romanization theory is too deeply associated with Western imperial discourse to remain a useful term (see Hingley 2005: 2). This argument suggests that,

during the early twentieth century, Romanists took on board contemporary ideas of social evolution and progress and read these concepts back into the evidence derived from the Roman past. As a result, classical texts and the material remains of Roman civilization were interpreted through the lens of a linear and progressive form of social evolution. A number of Romanists have argued as a consequence that the term "Romanization" should no longer be used, and this has, in turn, deeply influenced much of the subsequent scholarship on Roman imperial identities. Despite this, many archaeologists in Europe and the United States of America continue to use the theory of Romanization.

After a consideration of definitions, this entry explores a number of phases in the evolution of the theory of Romanization, although it is important to realize that these do not always represent successive stages in a simple process of the evolution of the theory. Firstly, it addresses the rise of the theory of Romanization in the context of the colonial world order of the late nineteenth and early twentieth centuries. Following this, it explores attempts to provide a rather more decentralized interpretation of Romanization during the 1960s to the 1990s. It then considers the postcolonial accounts that have aimed, since the mid-1990s, to dismiss the concept of Romanization. The section on current debates summarizes recent works that have aimed to provide more nuanced accounts of identities within the expanding Roman Empire. Finally, the current context for studying Roman identities is considered, and it is argued that today, no one explanatory framework dominates the subject.

Definition

The term "Romanization" was first introduced into the English language during the late nineteenth century. It drew upon the common use of the word "Romanized," which has much earlier origins in Europe (Hingley 2008: 436). There is only use of the noun ("Romanization") listed by the *Oxford English Dictionary* prior to the final 15 years of the nineteenth century, and the concept was introduced as a result of the scholarship of the German classicist, Theodor Mommsen, who in 1885 articulated the concept of "Romanisierung" in the fifth volume of his seminal work *Römische Geschichte* (Hingley 2008: 436). The term was adopted and popularized by the Oxford ancient historian Francis Haverfield in his influential work, "The Romanization of Roman Britain," first published as an article in 1906 and republished on several occasions as a small book.

There are many definitions of Romanization, and the meaning of the term has not remained static. The initial idea that a well-defined Roman urban civilization was gifted to the "barbarians" of the Western Empire was long ago replaced by accounts that explored the complexity of imperial relations. For Kathryn Lomas (1995: 109), Romanization means, "The transition [to] a characteristically Roman set of cultural attributes and assumptions, assuming that the speed and mode of transmission and the nature of their reception vary according to the nature of the recipient and the social and economic level at which the transmission operates at any given moment." This makes it evident that Romanization has often focused on the rich and well-connected peoples of the Roman Empire, stressing the material remains left behind by the villa owners, urban dwellers, and soldiers. However, the theory of "osmosis," or trickle-down Romanization, was introduced during the final quarter of the twentieth century to account for the agency of the less privileged people in indigenous communities, suggesting that the less wealthy and well connected adopted Roman ways wherever possible (see Hingley 2005: 43).

Some authors have continued to use the term "Romanization" in a constructive way until the present, while others have critiqued and rejected both the term and the approaches that the theory embodies. For Roman Roth (2007: 10), Romanization is valuable as an "umbrella term" because it is "the most neutral term which can be used in this context—paradoxically—just because its original implications are so widely rejected." For Andrew Erskine (2010: 62), Romanization continues to be used "out of convenience rather than because it is considered to be especially useful. Nevertheless, it is a term that has proved very useful at provoking

useful debate." Neville Morley (2010: 110) writes that "'Romanization' is an ambiguous term that can be understood either as a policy or as a process—as the result of a deliberate attempt by the Romans at civilising their conquests, or as the unintended result of the incorporation of a region into the political, social, and economic structure of the Empire, or as some combination of the two".

Historical Background

Romanization in the Colonial World

Theodor Mommsen drew upon classical texts and epigraphic evidence from the Roman provinces to transform earlier approaches that had developed a rather binary and relatively static ideal in which barbarians became Romans through the adoption of the Latin language. Before Mommsen, no clearly defined idea of a Roman cultural package existed, and the idea that Latin culture could be adopted in a gradual, flexible, and transformative fashion was not very fully conceptualized. A transformative idea of Roman imperial culture was one of Mommsen's gifts to studies of the Roman Empire.

Haverfield helped to build upon this rather more dynamic account of Roman social change (Freeman 1997: 39, 42). In 1906, Haverfield adopted the term "Romanization" for the title and content matter of his influential article, "The Romanization of Roman Britain"; this publication was expanded in 1912 into a small book that was republished on several occasions. The use of this new concept helped Haverfield to consider the available textual and archaeological evidence for Roman Britain and to challenge the earlier approaches that had explored the influence of Rome on this province (Hingley 2008: 436). Mommsen and Haverfield's idea of Romanization drew the archaeological discoveries that had been amassed over the previous centuries into a study previously dominated by linguistic and literary conceptions (Freeman 1997).

Several factors came into play during the twentieth century that encouraged the development of this idea of progressive Roman cultural change. First, a new comprehension of the material culture of pre-Roman, Roman, and post-Roman people was being created – including houses, settlements, pottery, and metalwork – as the result of the increasingly systematic excavation of sites and the study of ancient objects. Alongside this process, there was a growing appreciation of the considerable depth of time that people had occupied Europe prior to the Roman conquest (Hingley 2008: 437). The accumulation of information about the material culture of Roman Britain gradually came to suggest that many artifacts and building types represented an amalgamation between the better-known Roman culture of the Mediterranean and the objects that were now recognized as having been used by the later prehistoric people of Britain. Second, a growing internationalization of knowledge led to the idea that there was a significant indigenous input into much of the Roman culture that was known from the provinces of the Western Empire, including many of the towns and villas. Third, the growth of ideas of social evolution during the nineteenth century, together with the increasingly problematic international political situation at the start of the twentieth, called for explanations of cultural change which emphasized that the conquest and control of indigenous peoples had, in the case of the Roman Empire, resulted in the transmission of civilization (Hingley 2005: 34–6).

New approaches to the cultural assimilation and incorporation of indigenous people in the Roman Empire appealed to archaeologists, ancient historians, educationalists, and politicians because they communicated relevant ideas in the imperial present. It is important that these accounts also drew directly upon some of the available classical texts (particularly Tacitus' *Agricola*: 21). In Haverfield's account, Romanization resulted in a fairly unified empire, since among the towns and upper classes of the empire, Romanization was felt to be substantially complete. Indeed, even the less wealthy rural peasants appeared to have been influenced by the example of Rome (see Hingley 2005: 35).

Comparable approaches to Romanization across the Mediterranean emphasized the incorporation of people into the Roman Empire, the

creation of effective imperial unity, and the elaboration of cities and gracious rural living (Hingley 2001: 76; Roth 2007: 11–3). Although the details of national discourses in the various Western European countries varied (see the papers in Hingley 2001), the accounts produced by Mommsen and Haverfield had a deep influence on the development of Roman archaeology across Europe. The focus of attention on Roman urban life and the upper classes was (presumably) inevitable at this time, since it represented the emphasis of the available classical texts and also the particular cultural fixation that had typified the interest of Western Europeans since the Renaissance. By focusing generations of work on the urban dwellers, the villa owners, and the Roman military, this research tradition helped to provide the archaeological evidence that was taken to support the ideas that had promoted the research in the first place. The idea of the highly Romanized landscape across the Western Empire was a colonial image, created by Rome and reproduced by modern scholars (cf. Hingley 2005: 92).

Approaches to the Romanization of provincial societies certainly did not create one entirely standardized international approach to classical archaeology, but there was a strong element of unity to the archaeological works that were published across Europe prior to the 1970s. This was posited on the idea that social change was relatively one sided and was promoted specifically by Rome for the benefit of subservient peoples in Italy and the provinces (Erskine 2010: 58–9). Changes in the political climate, however, were about to result in a sustained challenge to this received wisdom (Hingley 2005: 37).

Decentering Romanization

The decolonization movements of the middle decades of the twentieth century caused a wider intellectual challenge to the theories and methods that were used to study the Roman Empire. From the 1960s and 1970s, new types of archaeological materials started to be collected as the result both of the regional archaeological field surveys that were undertaken across Italy and the excavation of sites in Britain and the Netherlands as the result of development. The new focus on some rather less Roman-looking rural populations began to result in a changing emphasis of research that eventually led to the attacks that came to be mounted on the theory of Romanization (Hingley 2005: 36).

New accounts were developed that argued that monumental towns and villas were just one of the responses to the incorporation of rural societies into the Roman Empire, and the rural background to this urban-based civilization came to be more fully acknowledged. As a result, some Romanists began to challenge the dominant perspective, reflecting growing dissatisfaction with the colonial ways of thinking that in the West had dominated most areas of academia prior to the 1960s. The publication of Marcel Benabou's volume on African resistance to Rome in 1976 proved particularly influential, despite a frosty reception from some Romanists. Steve Dyson's article on revolt patterns in the Western Empire (1975) also led to a new focus of attention that aimed to combat the colonial knowledge inherent in earlier approaches. Direct attacks on the term "Romanization," however, took over a decade longer to develop, while some of these early attempts to redefine provincial identities were "nativist," in that they emphasized resistance to Rome through the active maintenance of indigenous identity in the context of imperial incorporation (Hingley 2005: 40–1).

One work that drew upon this nativist tradition to create a transformational perspective was Millett's*The Romanization of Britain* (1990). The value of Millett's perspective is that it emphasized an idea of Romanization that was of value to a postimperial generation. In order to achieve this, Millett stressed the indigenous input into the process of social change and identity formation in the Roman province but without losing a focus on the central imperial power of Rome. Romanization was far less of a direct policy that was implemented by the imperial center and far more the result of the efforts and desires of members of the indigenous elites that became caught up in the expanding empire. This argument had a deep impact since it enabled the creation of a less centralized and the less deterministic accounts of the Romanization of societies in Italy and across

the empire (e.g., Keay and Terrenato 2001; Roth 2007: 18–9). The idea of indigenous agency also impacted upon influential accounts of the Roman Empire that have consciously avoided the use of the term "Romanization."

Dismissing Romanization

During the second half of the 1990s, a number of British archaeologists turned critical attention to the concept of Romanization. In response, some Romanists argued that Romanization represented a value-free description of the process of Roman social change. For many Anglo-American commentators over the past fifteen years, however, the term "Romanization" is too problematic to continue to be of any value. Since the mid-1990s, a series of works have aimed to replace the term and the intellectual baggage on which it is based (e.g., Webster and Cooper 1996; Mattingly 1997; Hingley 2005; Mattingly 2006). Many British and American archaeologists and ancient historians have rejected Romanization, and some archaeologists in the Netherlands, Spain, and elsewhere have followed suit. The focus of many of these critiques is upon the political contexts in which the idea of Romanization became popular. During the late nineteenth and early twentieth centuries, this concept was popular, specifically, because it projected contemporary (modernist) concepts of progress and social evolution; in turn, such knowledge of the past can now be seen to have provided historical justification for ideas that were used to justify contemporary imperialism (Hingley 2005: 43–5). As Neville Morley (2010: 111) has argued,

> The superiority of Roman civilization, it was assumed, was such that it would then spread through the provinces by osmosis; it was enough for the natives to be brought into contact with Romans, whether soldiers, officials, colonists or traders, to recognize their superior status and wish to imitate them. . . . The close connection between these assumptions and the discourses of modern imperialism, which similarly see the colonized natives as uncultured or culture-free primitives in need of civilizing, is obvious.

The idea of the development of barbarians, or primitives, on the periphery of the Roman Empire to a more evolved and settled, Roman, condition of life matched contemporary interests and concerns for Britain and other Western nations that had empires or held imperial aspirations. In particular, Romanization propounded the positive value of the imposition of imperial order, downplaying the rights of indigenous societies to self-determination. This research tradition drew a direct but usually unacknowledged comparison between the character of imperialism in the ancient and the modern worlds.

These three stages in the development and abandonment of Romanization have been presented above as if they operated according to a simple and progressive logic in all of the regional and national traditions of study across Western Europe, but the fact that many Romanists continue to use Romanization theory today indicates that the situation documented here is not actually so simple.

Key Issues/Current Debates

As a result of the critical postcolonial dismissal of the value of the term "Romanization," many British and American authors have argued that we require new ways to view the process of identity formation and cultural change across the Roman Empire. It is necessary to define ideas that fit our current desire to live in a "postcolonial" world. A number of new approaches to identity and social change have emerged.

For some time, the influential interpretation developed by Greg Woolf (1998) in his research upon Roman Gaul appeared likely to grow to dominate the field. Woolf rejected Romanization as an approach and outlined the idea of "becoming Roman," exploring how the Roman Empire was characterized by "a new, highly differentiated social formation incorporating a new cultural logic and a new configuration of power" (quoted in Hingley 2005: 47). Woolf's account had a deep influence on Roman imperial archaeology, but a number of authors over the past decade have argued that "becoming Roman" adopts some of the more problematic aspects of Romanization, particularly in that it remains focused on the elite of the Roman Empire (Hingley 2005: 48). It

continues to emphasize the ways of life of the powerful and well connected and assumes that most of those involved in the Roman Empire had broadly similar aims and objectives. Carol van Driel-Murray has argued that the application of recent approaches to the Batavi of the lower Rhine Valley in the Roman period have created "undefined, undifferentiated and apparently entirely male" elites, and her critique can be extended to other recent approaches to individual societies of the empire (quoted in Hingley 2005: 91).

As a result, a body of work has developed over the past decade that aims to comprehend the local and perhaps rather fragmented identities that existed across the empire. Jane Webster's study of creolization (2001) has had a considerable impact, and some other works have focused on the identity of groups such as soldiers, traders, and industrialists; these accounts explore the variable ways in which these people were incorporated into empire (see works addressed in Hingley 2005: 91–116). Another influential approach has explored the discrepant experiences of the individuals who found themselves incorporated into the empire, addressing the highly variable nature of individuals and communities that were assimilated (Mattingly 1997). David Mattingly (2006, 2011) has developed this argument in detail in his informative study of Roman Britain as an imperial possession.

International Perspectives

It is unusual in Britain today for scholars to develop accounts that draw directly on Romanization, and when published works do draw upon this concept, a lengthy justification for the use of the term is usually felt to be appropriate. At the Roman Archaeology Conferences (RAC) and Theoretical Roman Archaeology Conferences (TRAC) in Britain and overseas, the term is usually used only in papers that seek to critique the research of past scholars. Romanization appears to have been abandoned by many who seek to study the Roman Empire. Despite the effective banning of the concept in certain circles, other authors – particularly those that address the Roman societies of Italy, Gaul, Germany, Iberia, and Dacia – continue to draw upon the concept of Romanization (for a survey, see Hingley 2005: 18). For instance, useful recent studies of Roman pottery and society in central Italy (Roth 2007) and society in Roman Dacia (Oltean 2007) adopt Romanization as an explanatory concept. The concept has been critically assessed by Germany scholars (Schörner 2005) and continues to influence the research of Roman cultural historians (cf. Wallace-Hadrill 2008: 103–4, 454).

In addition, recent reviews that address aspects of Roman imperial policy sometimes still champion the use of the concept, even if only as a result of the convenience of the term (Erskine 2010: 62). Many recent works that adopt the term evidently conceive that different societies could become Romanized in highly variable manners, ways that project individual cultural responses to their incorporation within the Roman Empire. Such studies take on board many of the critical points outlined by the authors who have sought to undermine the use of Romanization. Numerous others accounts of Romanization, however, remain more traditional in character, perpetuating earlier approaches without any particularly detailed justification. It has even been observed in discussion that the focus on abandoning Romanization is a British fixation, resulting from the United Kingdom's particular imperial history. This is an idea that appears to ignore the impact of classical ideas in national and imperial discourses in other parts of the world and also the role of Roman models in the political actions of the West today.

Those who remain critical of the use of the term continue to emphasize the way that it focuses research on the elite and the more Romanized peoples of the empire and also the way that it creates a rather simplistic interpretation of identity and social change (see Mattingly 2011). The investigation of the nature of the ways that the term has been used in different national traditions has hardly begun perhaps because the interrogation of the term often appears to be felt to be boring or irrelevant to current research on the people of the Roman Empire. A counterargument is that the study of research traditions needs to form a vital element in archaeological research,

since the materials that archaeologists address and the research traditions that the subject is based upon have been passed down though time, although they are also transformed through constructive and critical thought (Hingley Forthcoming). Indeed, Romanization should represent a lively area of international debate, but the two sides of the argument are rarely communicated in public discussion.

Future Directions

Currently, the field of Roman imperial archaeology does not have a single concept that serves to unite the study of provincial societies. Whether this lack of consensus represents a problem or an opportunity for Roman archaeologists is open to debate.

At a number of times in the past, particular works have served to focus academics research into agreed sets of approaches, theories, and methods. Mommsen's work had a deep impact across Europe, and this influenced Haverfield, resulting in a tradition of research on Romanization that dominated in Europe for the best part of a century. Martin Millett (1990) and Greg Woolf (1998) have added to this picture by creating powerful new ideas about Roman identity and cultural change that have considerably influenced subsequent studies. These works are useful for particular places and times, but none of these accounts provide an adequate picture of the nature and character of the transformative system that constituted Roman imperialism. Greg Woolf's theory of "becoming Roman" has had a lasting influence but continues, in the terms addressed here, to provide too focused an emphasis on the adoption of a Roman culture by the elite of Italy and the provinces. As a result, a number of other approaches have been developed that aim to decenter such concepts by exploring the variable ways that indigenous peoples were incorporated into the empire at different times and in various contexts.

Another approach that is being explored in current research is that of "globalizing Roman culture" (cf. Hingley 2005). Some Romanists are drawn to the analogy between the imperial Roman and the contemporary worlds precisely because this approach provides a means to appreciate the highly varied local responses to Rome without dismissing the idea of a central dynamic to imperial civilization. Richard Hingley has emphasized that a focus on the globalization of Roman culture helps to emphasize the current context in which knowledge of classical Rome is developing (Hingley 2005: 117–20). Past critiques of Romanization focus on the development of new approaches that are less closely tied to Western imperial discourses, but we need to continue to focus on the ways that ideas about classical Rome continue to be used to articulate the political and military actions of the West today (Hingley Forthcoming).

There appears, however, to be no consensus about how we might best approach the issues of Roman imperialism and cultural change, and this means that this field of study is open to a variety of competing approaches. Some archaeologists remain passionately supportive of the term "Romanization," and it is always possible that there will be a revival of interest in the Romanization of Britain in the near future. The concept has, however, been entirely abandoned by others.

Cross-References

- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Haverfield, John Francis
- ▶ Western Roman Provinces, Archaeology of the

References

Dyson, S.L. 1975. Native revolt patterns in the western empire. *ANRW II* 3: 138–175.

Erskine, A. 2010. *Roman imperialism*. London: Duckworth.

Freeman, P. 1997. Mommsen to Haverfield: the origins of studies of Romanizationin late 19th-c. Britain. *Journal of Roman Archaeology* (supplementary series) 23: 27–50.

Hingley, R. (ed.). 2001. Images of Rome: Perceptions of ancient Rome in Europe and the Unites States of

America in the modern age. *Journal of Roman Archaeology* (supplementary series) 44.
Hingley, R., ed. 2005. *Globalizing Roman culture*. London: Routledge.
Hingley, R., ed. 2008. Not so romanized? Tradition, reinvention or discovery in the study of Roman Britain. *World Archaeology* 40: 427–443.
Hingley, R. (ed.). forthcoming. Post-colonial and global Rome: the genealogy of "Empire," in M. Pitts and M.J. Versluys (eds.) Globalisation and the Roman world: Perspectives and opportunities.
Keay, S., and N. Terrenato. 2001. Preface. In *Italy and the West: Comparative issues in Romanization*, ed. S. Keay and N. Terrenato, ix–xii. Oxford: Oxbow.
Lomas, K. 1995. Urban elites and cultural definition: Romanization in southern Italy. In *Urban society in Roman Italy*, ed. T.J. Cornell and K. Lomas, 107–120. London: UCL Press.
Mattingly, D.J. (ed.). 1997. Dialogues in Roman imperialism: power, discourse, and discrepant experiences in the Roman empire. *Journal of Roman Archaeology* (supplementary series) 23.
Mattingly, D.J., ed. 2006. *An imperial possession: Britain in the Roman empire*. London: Penguin.
Mattingly, D.J., ed. 2011. *Imperialism, power and identity: experiencing the Roman empire*. Princeton: Princeton University Press.
Millett, M. 1990. *The Romanization of Britain: An essay in archaeological interpretation*. Cambridge: Cambridge University Press.
Morley, N. 2010. *The Roman Empire: Roots of imperialism*. New York: Pluto.
Oltean, I.A. 2007. *Dacia: Landscape, colonisation, Romanisation*. London: Routledge.
Roth, R.E. 2007. *Styling Romanisation: Pottery and society in central Italy.* Cambridge: Cambridge University Press.
Schörner, G., ed. 2005. *Romanisierung-Romanisation: Theoretische Modelle und praktische Fallbeispiele*. British Archaeological Reports International series. Oxford: Archaeopress.
Wallace-Hadrill, A. 2008. *Rome's cultural revolution*. Cambridge: Cambridge University Press.
Webster, J. 2001. Creolizing the Roman provinces. *American Journal of Archaeology* 105: 209–225.
Webster, J., and N. Cooper, eds. 1996. *Roman imperialism: post-colonial perspectives*. Leicester Archaeological Monographs. Leicester: School of Archaeological Studies, University of Leicester.
Woolf, G. 1998. *Becoming Roman: The origins of provincial civilization in Gaul*. Cambridge: Cambridge University Press.

Further Reading

Terrenato, N. 2008. The cultural implications of the Roman conquest. In *Roman Europe: 1000 BC – AD 400*. Short Oxford History of Europe, ed. E. Bispham, 234–264. Oxford: Oxford University Press.

Ippolito Rosellini

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Basic Biographical Information

Niccola Francesco Ippolito Baldassarre Rosellini, better known as Ippolito Rosellini, was an Italian Egyptologist. He is considered the founder of Italian Egyptology. He was born in Pisa on the 13th of August 1800. His parents, Giovan Battista Rosellini and M. Angiola Biagetti, came from the city of Pescia in Tuscany.

Ippolito Rosellini started his studies at the University of Pisa when he was 17 years old. He mainly focused on Theology, Hebrew and Greek. He graduated in 1821, and he was then presented by Professor Bagnoli to the Grand Duke Ferdinand III as the best candidate for the Chair of Oriental Studies, shortly after being accepted to continue his studies in Bologna. Inspired and praised by Professor Giuseppe Mezzofanti, he published his first paper *La Fionda di Davide*.

After he completed his studies, he went back to Pisa in 1824, and he obtained the Chair of Oriental Literature and Hebrew. In the same year, he had the chance to read *Prècis du système hièroglyphique* by Jean-François Champollion, and he immediately became passionate about Egyptian studies. In August 1825 Ippolito Rosellini met Champollion in person; the scholar was in Italy to study Egyptian collections such as the one of Drovetti in Turin.

In 1826 Rosellini and Champollion met again; the Egyptologist went back to Italy to study the collection of Egyptian antiques of the British consul Henry Salt which was bought by the French government. The possibility of spending 4 months together in Livorno led to stronger mutual esteem and friendship; in fact Champollion considered Rosellini as his "loyal friend and disciple." Because of this special connection, Rosellini decided to follow Champollion on his travels and asked to leave the chair at the University of Pisa.

In the same year, the two scholars went to Rome, Naples, and Paris where they continued studying the collections of Salt and Drovetti for 7 months. In this period Rosellini met and married Zenobia, daughter of the Italian composer Luigi Cherubini.

While working together, Champollion and Rosellini started to plan to conduct an expedition to Egypt and Nubia. The French government was not keen on financing this enterprise, so Rosellini submitted the idea to the Grand Duke Leopoldo II. At the end he obtained the approval from both the Grand Duke and Charles X, King of France, together with the necessary funding in 1827. Rosellini was also nominated head of the expedition of the Tuscan group.

The expedition left Toulon on the 31st of July 1828, and it reached Alexandria on the 18th of August. Several areas from the Lower Egypt to Nubia were visited in order to study the main monuments and to copy the texts of numerous inscriptions. The travelers encountered difficulties, especially because of the extreme temperatures of the desert. The mission lasted over a year; Rosellini went back to Pisa in January 1830. As agreed, all the artifacts collected during the expedition were equally divided between France and the Grand Duchy of Tuscany; this is how the Egyptian collections of the Louvre Museum in Paris and the Egyptian Museum in Florence started.

A diary of the French-Tuscan expedition written by Ippolito Rosellini himself was published by Gabrieli in 1925.

In the summer of the year 1831, Rosellini went back to Paris to talk with Champollion about his intention to publish *Monumenti dell'Egitto e della Nubia* (See Rosellini 1832–1844), and the French scholar gave his consent. Unfortunately, Champollion died prematurely on the 5th of March 1832, and Rosellini had to carry on this project alone. Sadly it was also not possible for Rosellini to have the name of his friend on the publication due to the opposition of Champollion's brother who looked at the project with suspicion. Eight months later, Rosellini published the first volume of the *Monumenti Storici*, a publication rich of information that will count three parts for a total of nine volumes in 1841. A tenth volume will be added afterward by Niccolò Capurro in 1844.

During the years 1834–1835, Rosellini taught the first lessons of Egyptian and Coptic languages at the University of Pisa and through this became the founder of Italian Egyptology (See Rosellini 1937). He soon became well known, thanks to his teaching and his written work. His fame reached Richard Lepsius who went to Pisa to become his disciple and to perfect his studies in Egyptian antiquities in 1836. In that same year, Rosellini's health started to worsen after contracting a severe and incurable form of malaria fever during one of his trips to Egypt.

Ippolito Rosellini died on the 4th of June 1843 in Pisa when he was 42 years old. He was buried at the Camposanto Monumentale where other eminent scholars also rested in peace.

Major Accomplishments

Ippolito Rosellini's major accomplishments mainly originated from his extensive and profound dedication to Egyptology besides his interest for Hebrew language and Oriental studies in a broader sense. The collaboration with Jean-François Champollion was the most important stimulus for Rosellini, but during his studies, he had already proved to have the necessary qualities in order to become one of the most important pioneers of Egyptology in Italy.

Without doubt Rosellini's most remarkable achievement was the French-Tuscan expedition in Egypt, led side by side with Champollion in 1828–1829 (see Rosellini 1830). The expedition included people who drew the artifacts, botanists, architects, and workers. Their journey started in Alexandria and went through some of the most important destinations on the way to Nubia: Sais (San el-Hagar), Cairo, Menfi (Mit Rahina), Saqqara, Giza, Beni Hasan, Dendera, Tebe (Luxor), Esna, Edfu, Kôm Ombo, Philae, Abu Simbel, and Kalabsha. A large number of artifacts

were found, and it produced countless notes, drawings, and transcriptions. Unfortunately, numerous grave goods had to be torn apart in the intent of equally diving the findings between the two sponsors of the expedition. For example, the bas-relief of the pillar from the tomb of Seti I had to be divided in two parts (See Rosellini 1926); one part is now on display at the Egyptian Museum in Florence and the other is at the Louvre in Paris. Rosellini brought around 2000 artifacts back from the expedition in Egypt.

Once he came back from the expedition, Rosellini founded the first Chair of Egyptology in Italy, and on the same year, he started to work with his colleague and friend Champollion at *I monumenti dell'Egitto e della Nubia*. In 1830 he organized an exhibition at the *Accademia di Arti e Mestieri* of Santa Caterina in Firenze to show the Egyptian artifacts to the public. Rosellini continued his studies by publishing his project through over nine volumes; due to his poor health, he couldn't complete the revision of the tenth volume, the last. The tenth volume was published in 1844. From 1835 to 1843, he became director of the University library of Pisa and professor of Philology, Literature, and Eastern Archaeology.

After his death, his numerous books were donated to the library of the University of Pisa. In 1879, a few days after his death, his wife Zenobia Cherubini made the first donation following the instructions given by Rosellini himself. She donated other books in 1879, and their son, Giovan Battista Rosellini, made a last donation in 1879.

The donations include letters that show the richness of this scholar's intellectual networks, both in Italy and abroad (Fig. 1).

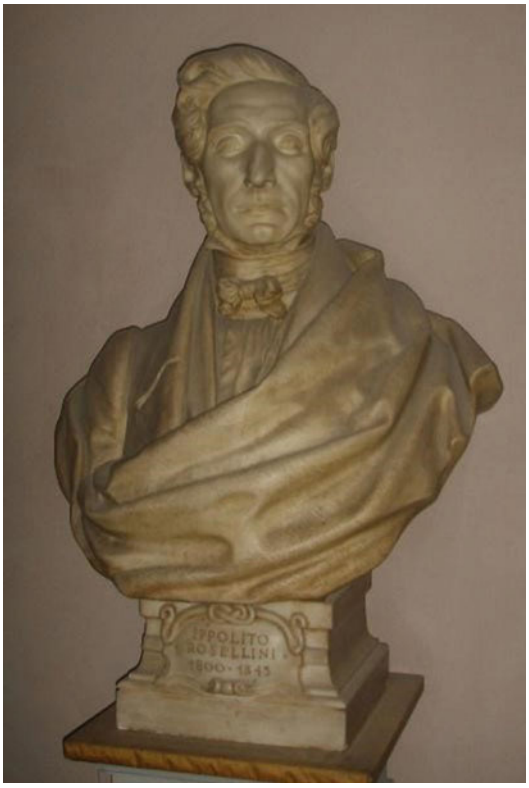

Ippolito Rosellini, Fig. 1 Bust of Rosellini. Archeological Museum of Florence

Cross-References

► Archaeology of Ancient Egypt
► Champollion, Jean-François

References

Rosellini, I. 1830. *Breve notizia degli oggetti di antichità egiziane riportate dalla Spedizione letteraria toscana in Egitto e nella Nubia, eseguita negli anni 1828–29 ed esposti al pubblico nell'Accademia delle arti e mestieri in S. Caterina*, ed. Stamperia Piatti, Firenze.

Rosellini, I. 1832–1844. *I Monumenti dell'Egitto e della Nubia, disegnati dalla spedizione scientifico-letteraria Toscana in Egitto: distribuiti in ordine di materie, interpretati ed illustrati*, ed. Niccolò Capurro e C., Pisa.

Rosellini, I. 1926. *Di un bassorilievo egiziano della imp. e r. Galleria di Firenze*, ed. Stamperia Piatti, Firenze.

Rosellini, I. 1937. *Elementa Linguae Aegyptiacae, vulgo Copticae*, ed. Typographia Collegii Urbani sumptibus Francisci Archini, Rome

Further Reading

Bardelli, G. 1843. Biografia del professore Ippolito Rosellini scritta dal suo discepolo e amico. Firenze, Dalla Tipografia Piatti.

Rosenfeld, Andrée

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Basic Biographical Information

Andrée Jeanne Rosenfeld, B.Sc., Ph.D., FAHA (1934–2008) (Fig. 1), was an influential rock art archaeologist and scientist, who worked in Europe and Australia.

She arrived in Australia in 1972 as a well-respected young researcher and joint author of a seminal reevaluation of European Palaeolithic cave art (Ucko and Rosenfeld 1967). Her Ph.D. (Institute of Archaeology, University of London, 1960) under Frederick Zeuner on cave deposits from sites in Devon drew strongly on her science background (B.Sc. Physics, Bristol, 1956) and her interest in caving. Andrée continued her research combining the scientific, environmental, and human aspects of material culture and by 1964 was curating the British Museum Palaeolithic collections, researching European Palaeolithic cave art and assisting her then partner, Peter Ucko, teaching material culture at University College London.

Rosenfeld, Andrée, Fig. 1 Photo of Andrée Rosenfeld in 2001 taken by Tricia Edwards

She joined the Department of Prehistory and Anthropology, Australian National University, in 1973 where she remained until her retirement as Reader in 1997. She then moved to Southern Queensland where she built a home surrounded by friends; travelled, often to visit her family; became an accomplished weaver; and continued to write on rock art. Andrée died of pancreatic cancer in 2008.

Born in Belgium in 1934 into a brilliant academic family – both parents were well-qualified physicists – she was surrounded by European scholarship and languages despite experiencing the exigencies of a childhood overshadowed by World War 2. Her father, Professor Léon Rosenfeld, worked with Niels Bohr and Werner Heisenberg on the development of the Copenhagen Interpretation of quantum mechanics. Andrée's early family life underpinned her academic career and her combination of rigor and humanity.

Major Accomplishments

Palaeolithic Cave Art (Ucko and Rosenfeld 1967) was a small book of great importance. The authors questioned many existing theories about the interpretation and recording of European Palaeolithic cave art and provided a refreshingly open approach to an area of research still mired in superstition, old-fashioned techniques, and the understandable awe of early researchers such as the Abbé Breuil. In the 1960s Andrée worked at Arcy-sur-Curé with the leading French cave art researcher, Professor Leroi-Gourhan, who was using new, scientifically meticulous recording techniques and producing innovative interpretations of the associations between the animals depicted and the exact placement of the art within the cave system.

These research experiences, combined with her own precise scientific training, encouraged Rosenfeld to tackle new and innovative research in Australia. She arrived at a time when little fieldwork had been carried out in the vast field of Australian rock art. She led a team of colleagues and students to excavate and investigate the rock art of the Early Man shelter near Laura in Queensland – a milestone in the establishment of rock art research in Australia (Rosenfeld et al. 1981).

Andrée addressed the practical as well as the theoretical. She understood that conservation was imperative to the preservation and study of Australian rock art (Rosenfeld 1985). She understood that Aboriginal rock art embodied systems of social being beyond comprehension of symbols and figures. She was keen to make Australian rock art research available to a worldwide audience (Bahn and Rosenfeld 1991). By the late 1990s, she had became deeply interested in how rock art could be used in the understanding of the social contexts, which she demonstrated through her Central Australian field research (Rosenfeld 1997, 2002; Rosenfeld and Smith 2002). Her last paper (Rosenfeld 2005) was a bold analysis of the rich and complex relationship between the art and the song of the Arrernte people in Central Australia in recognition of the deep spirituality, knowledge, and culture that underlies all rock art.

Andrée established teaching courses at the Australian National University in the archaeology of art and the study of material culture and, with firmness and understanding, encouraged students, both at honors and postgraduate level, into active research. She received wide recognition through her election as Fellow of the Australian Academy of the Humanities. At her retirement, her students and colleagues, including Howard Morphy, Mike Morwood, Jo McDonald, Paul Taçon, Bruno David, Iain Davidson, June Ross, Ursula Frederick, and Nick Hall, produced a volume of papers showing the breadth and depth of her influence on the rapidly increasing area of Australian rock art research (Frederick et al. 1999).

Andrée's underlying strength was a rigorous academic discipline combined with creative and artistic flair. She was very self-disciplined and employed meticulous techniques in the field through to prompt publication. Andrée Rosenfeld was a pioneer in the field of Australian rock art, who demonstrated how the controlled application of scientific techniques combined with understanding and respect for indigenous communities would allow all Australians to appreciate the phenomenal richness and importance of Australian rock art.

Cross-References

- ▶ Art, Paleolithic
- ▶ Australian Rock Art
- ▶ Europe: Paleolithic Art
- ▶ Leroi-Gourhan, André
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Smith, Mike
- ▶ Ucko, Peter (Indigenous Archaeology)
- ▶ Zeuner, Frederick Everard

References

Bahn, P. & A. Rosenfeld. (ed.) 1991. *Rock art and prehistory.* Monograph 10. Oxford: Oxbow.

Rosenfeld, A. 1985/1988. *Rock art conservation in Australia*. Canberra: Australian Heritage Commission.

Rosenfeld, A. 1997. Archaeological signatures of the social context of rock art production. In *Beyond art: Pleistocene image and symbol*, ed. M. Conkey, O. Soffer, D. Stratman, and N. Jablonski, 289–300. San Francisco: California Academy of Science.

Rosenfeld, A. 2002. Rock art as an indicator of changing social geographies in central Australia. In *Inscribed landscapes: Marking and making place*, ed. B. David and M. Wilson, 61–78. Honolulu: University of Hawaii Press.

Rosenfeld, A. 2005. Structural convergence in Arrernte art and song. In *Many exchanges: Archaeology, history, community and the work of Isabel McBryde*, ed. I. MacFarlane, M.-J. Mountain, and R. Paton, 171–184. Canberra: Aboriginal History Monograph 11.

Rosenfeld, A., and M.A. Smith. 2002. Rock-art and the history of Puritjarra rock shelter, Cleland Hills, Central Australia. *Proceedings Prehistoric Society* 68: 103–124.

Rosenfeld, A., D. Horton & J. Winter. 1981. *Early man in North Queensland.* Terra Australis 6. Canberra:

Department of Prehistory, Research School of Pacific and Asian Studies, Australian National University:
Ucko, P., and A. Rosenfeld. 1967. *Palaeolithic cave art*. London: Weidenfeld and Nicholson.

Further Reading

Frederick, U., M. Wilson & P. White. (ed.) 1999. Papers on rock-art for Andrée Rosenfeld. Archaeology in Oceania 34(3).

Rostain, Stéphen

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Basic Biographical Information

After his first contacts with New World archaeology in Teotihuacan, Mexico, and in the Maya site of Chaguite, Guatemala, Dr. Rostain focused his research on Amazonian lowlands and Caribbean islands. He was employed as an archaeologist in French Guiana from 1985 until he received his Ph. D. from the Pantheon-Sorbonne University in Paris in 1994. His dissertation was written on the archaeology of French Guiana.

Major Accomplishments

Stéphen Rostain is the first French archaeologist to dedicate his work to the Amazonian rain forest. He has developed innovative aerial archaeology along the Guiana coast, where he discovered thousands of pre-Columbian raised fields. From 1994 to 1996, he was the codirector of the archaeological project Tanki Flip in Aruba, which led to the publication of a large monograph. After the organization (with D. Schoepf) of the exhibition *Autoportraits du Nouveau Monde* in Geneva, Switzerland, he lived in Ecuador between 1996 and 2001, where he managed an archaeological project in the Upano Valley, particularly in the prestigious site of Sangay, famous for its numerous artificial earthen mounds. His main interests are historical ecology of the Amazon, pre-Columbian earthworks, indigenous agriculture, and ethnoarchaeology. One original characteristic of his projects is an interdisciplinary approach with an extensive team of specialists. He is presently Director of Research at the National Center for Scientific Research of France (CNRS) and between 2003 and 2011 has been in charge (the second one with D. McKey) of two interdisciplinary projects on the Guiana coast. Since 2012, he is conducting interdisciplinary project at the foothill of the Andes, in the Pastaza and Upano Valleys that were strongly impacted by ancient volcanic events. In 2008, he received the Paris Clio award for French projects in foreign countries. He was the director of the French Institute for Andean Studies (IFEA) in Ecuador between 2011 and 2013 and chairman of the third International Congress of Amazonian Archaeology in Quito, Ecuador, in 2013.

Cross-References

▶ Aerial Archaeology
▶ Agrarian Landscapes: Environmental Archaeological Studies
▶ Earthen Architecture in Archaeological Conservation and Preservation
▶ French Guiana: Archaeology and Minority Communities
▶ Landscape Domestication and Archaeology
▶ People as Agents of Environmental Change
▶ The Guianas: Pre-Columbian Heritage

Further Readings

Rostain, S. 1994. *L'occupation amérindienne ancienne du littoral de Guyane*. Paris: ORSTOM.
Rostain, S. 2008a. Agricultural earthworks on the French Guiana coast. In *Handbook of south American archaeology*, ed. H. Silverman and W.H. Isbell. New York: Springer.
Rostain, S. 2008b. The archaeology of the Guianas: An overview. In *Handbook of south American archaeology*, ed. H. Silverman and W.H. Isbell. New York: Springer.

Rostain, S. 2012. *Islands in the rainforest: Landscape management in pre-Columbian Amazonia*. Walnut Creek: Left Coast Press.
Silverman, H., and W.H. Isbell, eds. 2008. *H andbook of south American archaeology*. New York: Springer.
Versteeg, A.H., and S. Rostain. 1997. *The archaeology of Aruba: The Tanki Flip site*. Oranjestad: Archaeological Museum Aruba.

Routledge, Katherine Scoresby

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Basic Biographical Information

Katherine Scoresby Routledge (1866–1935) was born Katherine Maria Pease in Darlington, County Durham, England, the daughter of Gurney Pease (1839–1872) and Kate Wilson Pease (1840–1915). The second of five children and the eldest of two daughters, she grew up at Woodside, the Pease family home. Her paternal grandparents were Joseph Pease and Emma Gurney of Southend, Darlington. Joseph Pease, an industrialist, abolitionist, and pacifist, is known as the financial "father of English railways." All Pease and Gurney families were substantially wealthy and devout members of the Society of Friends (Quakers) for generations, and Joseph Pease was the first Quaker in English history to be elected as member of Parliament (Braithwaite 1857; The British Workman 1873; Pease 1992). Katherine's debut presentation to Queen Victoria took place in 1884.

In 1891 Katherine Pease was accepted at non-denominational Somerville Hall (now Somerville College), Oxford University. Gertrude Bell (1868–1926), a contemporary and Pease family friend, attended Lady Margaret Hall. Katherine was a serious student and strongly committed to women's rights. Her intellectual mentors included anthropologist R.R. Marett (1866–1943) and zoologist E.B. Poulton (1856–1943). She was acquainted with anthropologist Barbara Freire-Marreco (1879–1967). Katherine and only 11 other women (of her original class of 20) sat for exams in 1895, but none of them received anything above Honors 2nd Class. Nor were they granted degrees as a matter of policy. It was not until 1906 that Katherine and six other Somerville women claimed *ad eundem* degrees from Trinity College, Dublin (Fig. 1).

In 1906 Katherine married William Scoresby Routledge (1859–1939). Born in Melbourne, Australia, he was the son of William Routledge, a merchant, and Anne Sophia Twycross. Named after William Scoresby (1789–1857), an Arctic explorer, whaler, and natural scientist, William Scoresby Routledge's first cousin was John Milne (1850–1913), inventor of the seismograph. William Scoresby Routledge graduated from Christ Church, Oxford, and in 1882 he enrolled in University College London. In 1883 he

Routledge, Katherine Scoresby, Fig. 1 Katherine Maria Pease Routledge (left) and William Scoresby Routledge (right) ca. 1910. © Photograph Peter Bucknall. Easter Island Statue Project (EISP)/Van Tilburg Archives and Database

received the physiology prize and was elected to the Royal Geographical Society. In 1887 he received his M.A. degree from Oxford University, and in 1888–1889, he won the coveted Erichsen Prize for Practical Surgery. He departed Oxford without attaining his M.D. and travelled among the Micmac people in Canada. He departed there at an unknown date and journeyed to what was then British East Africa and is now Kenya, where he lived among the Kikuyu.

After their marriage at Darlington, the Routledges returned to Kenya, where they were entwined in a messy colonial scandal about which Katherine spoke out publicly. Referred to in the London Times as the Silberrad Affair, it involved sexual misconduct with minors in Nyeri, Kenya, by Mr. Hubert Silberrad, acting district commissioner. Katherine employed all of her political contacts to have the entire sordid affair brought before Parliament in open forum. It was noted that they were all "grateful to the lady for the action which she took" (Van Tilburg 2003: 67). In 1910 the Routledges published a co-authored, well-received scholarly work entitled *With a Prehistoric People: The Akikuyu of British East Africa* (Routledge and Routledge 1910). On March 28, 1914, the Routledges arrived at storied Easter Island (Rapa Nui) aboard their own yacht *Mana*, where Katherine spent 17 months conducting ethnographic fieldwork and, upon her return to England, produced her self-published, seminal work *The Mystery of Easter Island* (Routledge 1919). Other travels followed and then a major illness erupted. The Routledges parted under very trying circumstances. Katherine was diagnosed with "systemized delusional insanity" and was confined by her husband and family until her death at Ticehurst House, a mental institution in Sussex, in 1935.

Major Accomplishments

There is no question that the Mana Expedition to Easter Island, 1914–1915, co-led by William Scoresby Routledge and Katherine Routledge was the highlight of their marriage and the major achievement of their ambitious intellectual collaboration. They designed and built the yacht *Mana*, assembled a crew, and then sailed from Falmouth on March 25, 1913, bound for the Pacific and Easter Island. The expedition was fully funded by Katherine, who also assembled a scholarly advisory committee made up of experts in Western Pacific cultures and secured the necessary letters of introduction from the British Museum and other institutions. The voyage itself was a major accomplishment and a triumph over the direct threats of marauding warships during the opening stages of the Great War (World War I). In 1917 the Royal Cruising Club (founded in 1880) awarded the Challenge Cup "by special resolution of the Club to W. Scoresby Routledge for his cruise in the Pacific in 'Mana' and Exploration on Easter Island."

Once on Easter Island (now known as Rapa Nui), Katherine Routledge encountered an impoverished population of about 250 persons living in a repressive and exploitive colonial society. She was dismayed at the conditions people were living in and had at first little hope that she could answer the four basic research questions she and Scoresby had formed: Who were the original settlers of Easter Island? Where had they come from? What, exactly, did the hundreds of monolithic statues on the island mean? How are the statues linked to the present inhabitants? In fact, however, Katherine Routledge collected a massive quantity of unprecedented and irreplaceable ethnohistorical data including place names, family names, genealogies, and land ownership records. She conducted an archaeological survey of the 164 km^2 island that is still used today. Unfortunately, she and her team also conducted more than 30 excavations that are poorly documented. Nonetheless there is no doubt that her untiring devotion to interviewing Rapanui elders salvaged several generations of Rapanui prehistory (Routledge 1917; Van Tilburg 1996). Her observations of the environment, social behavior, the arts, land use, the economy, and customs remain a treasure trove of information to modern researchers. Housed today in the Royal Geographical Society (with the Institute of British Geographers), the British Museum, and the Pitt Rivers Museum, the Routledge papers and artifact collections are key to conserving the Rapa Nui past.

Cross-References

▶ Rapa Nui
▶ Statues and Monumental Art in Archaeology

References

Braithwaite, J.B. 1857. *Memoirs of Joseph John Gurney*. Philadelphic: J.B. Lippincott & Co.
Díaz-Andreu, M., and M.L. Stig Sørensen, eds. 1998. *Excavating women: A history of women in European archaeology*. London/New York: Routledge.
Pease, J.G., ed. 1992. *A wealth of happiness and many bittter trials: The Journals of Sir Alfred Edward Pease, a restless man*. York: William Sessions, Ltd. The Ebor Press.
Routledge, K.S. 1919. *The mystery of Easter Island: The story of an expedition*. London: Sifton, Praed & Co.
Routledge, K.S. 1917. The bird-cult of Easter Island. *Folk-Lore* 28 (4): 338–355.
Routledge, W.S., and K.S. Routledge. 1910. *With a prehistoric people: The Akikuyu of British East Africa*. London: Frank Cass & Co.
The British Workman. 1873. Tribute to the memory of the late Mr. Joseph Pease. January Special Number.
Van Tilburg, J. 1996. Katherine Scoresby Routledge and the Mana Expedition to Easter Island in 1914–15: Two exhibitions, in Easter Island and London. Pacific Arts nos. 11 & 12: 103–04.
Van Tilburg, J. 2003. *Among stone giants: The life of Katherine Routledge and her remarkable expedition to Easter Island*. New York: Scribner's.

Further Reading

Karttunen, F. 1994. *Between worlds: Interpreters, guides, and survivors*. New Brunswick: Rutgers University Press.

Royal Exhibition Building

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Introduction

The Royal Exhibition Building is a unique feature of the built heritage of Melbourne, Australia. Governor Sir George Bowen laid the foundation stone on the 19th of February 1879 (*The Australian Sketcher* 1879), and the building was opened to the general public on 29th of May 1880. The Great Hall, the current building, is a permanent structure and is built of brick, while the basement and base are constructed of bluestone. Removable annexes that were used during the 1880 and 1888 World Exhibitions were constructed using wood and metal. The building itself was purposely built for the 1880 World Exhibition and was funded by the Parliament of Victoria (Official Record 1882). At the time of construction, the Royal Exhibition Building was the tallest building in Melbourne.

Image: Meyers, H.G. The Exhibition Building illuminated at night in 1901 to celebrate the federation of Australia. Museum Victoria: http://museumvictoria.com.au/reb/history/the-building/

The Royal Exhibition Building is recognized for its heritage value at state, national, and international levels. It is one of the only buildings that were constructed for the great exhibitions of the nineteenth century that are still used for their

original purpose. The Royal Exhibition Building held both the 1880 and 1888 World Exhibitions and showcased the relatively new colonial city of Melbourne to the world. In 2004, it was the first building in Australia that was recognized on the World Heritage List (Smith and Thomas 2014).

Key Issues/Current Debates/Future Directions/Examples

The 1880 and 1888 exhibitions played a significant role in the growth of Australia. The historical impact of the Royal Exhibition Building and associated Carlton Gardens marks Australia's growth from a collection of colonies to a nation. At the 1880 and 1888 exhibitions, the Royal Exhibition Building was divided into the exhibiting colonies and nations, which included many of the wealthy industrializing states of the time such as Japan, India, Russia, Germany, Victoria, Britain, the USA, New South Wales, Queensland, Tasmania, and many more. At the time of the exhibitions, Australia was still far from becoming a nation, but the spread of technological and cultural ideas through the exhibitions contributed to the development of the newly formed colonies that would later form the nation of Australia. The role the building played in hosting both the 1880 and the 1888 exhibitions was significant within the context of nineteenth-century world exhibitions and is the basis for the World Heritage listing of the building.

The architectural style of Royal Exhibition Building incorporates elements of Roman, Byzantine, Lombardic, and Greek Classical designs. This reflects the major influences in architecture throughout modern European development. In addition, the Royal Exhibition Building introduced to Melbourne an obscure style of architecture, *Rundbogenstil*, an early-nineteenth-century style that was made popular in Germany. *Rundbogenstil* makes use of a round-arched style and was well regarded due to its "rigidity of composition, repetition of identical elements and emphasis on direct structural expression" (Willington 1996: 53). With the assistance of ongoing maintenance and repair, the dome construction and cathedral-like influences have maintained their majestic nature over time.

Some 15,000 people attended the opening ceremony of the 1880 Exhibition on October 2, 1880, while over 24,100 people attended the Exhibition that day (Official Record 1882). The 1880 Exhibition saw an impressive total of 1.3 million people through its doors and captured the imagination of the colony and showcased over 32,000 exhibits from over 29 countries (Royal Exhibition Building Museum Project Volunteers 1996). At the time, The Royal Exhibition Building had what was considered the best view in Melbourne; a panoramic view for 50 miles was reported from the dome with the observation that a visitor could see the growing city at their feet. In all, the Exhibition took up an area of 22 acres.

The 1888 Exhibition opened on the 1st of August 1888 and closed on 31st of January 1890; it was considerably greater in scale and scope than its 1880 predecessor. The Exhibition's buildings covered 35 acres (United States Commissioners, 1890), and the Exhibition attracted over two million visitors, surpassing attendance at the 1880 Exhibition.

The 1888 Exhibition saw two major changes to the Royal Exhibition Building itself. The most exciting change was the introduction of electricity; over 825 brush arc lamps were added to light the building in order to extend its hours of operation. The other major change was a temporary "safety lift" or elevator that gave access to the roof and to a viewing platform. These advancements combined to display the prosperity of the colony of Victoria and its industrial advances.

The social and national significance of the Royal Exhibition Building is an outcome of the various uses of the building. In 1901, the Royal Exhibition Building hosted the opening of the first Australian Parliament, watched by a crowd of over 12,000 people. When the Duke of Cornwall and York stated "I now declare the Parliament of

the Commonwealth of Australia open" (The Argus 1901), the Duchess pressed an electric button that signaled outside the building for the Union Jack to be raised in all the state schools of the colony. The same parliament infamously saw the introduction of the White Australia Policy in an attempt to remove black laborers from the Queensland sugar industry (The Brisbane Courier 1901). The Countess of Hopetoun, who was the Governor of Victoria's wife, was also the first to raise the Australian flag at the Royal Exhibition Building on September 3, 1901.

The Royal Exhibition Building has served as a venue of national significance under the direction of the Australian Defence Force. In 1922 the Australian War Museum first opened in the eastern annex the Royal Exhibition Building. During the two and a half years that this museum was opened, it was visited by over 800,000 patrons (Dunstan 1996). The museum was a site of national mourning and outlined the First World War and the role of the Australian armed forces in this war. The museum displayed many objects that helped the audience to understand the everyday life of soldiers during the war, including gas masks, uniforms, and maps. The museum and its collection were moved to Canberra in 1935 (Willis 2004). The Australian Defence Force later used the buildings during the Second World War. The Royal Australian Air Force occupied the Royal Exhibition Building and the Carlton Gardens in 1940. At its peak, in 1942, the building accommodated over 2000 personnel. Conditions were tough, especially in the winter months. It was later used for low-cost accommodation for soldiers and sailors on leave in Melbourne.

Although not part of Australia's initial colonial history, the national significance of the Royal Exhibition Building and Carlton Gardens augmented its national significance during the post World War II period, when it was used as an emergency accommodation center for newly arrived immigrants and refugees from 1947 to 1962 (Lock 1996). The purpose of the accommodation was short-term housing for immigrants while they found work and more permanent housing. For most, the bungalows at the Royal Exhibition Building that housed families, couples, and single immigrants were their first accommodation in Australia. On the whole, the migrant reception center provided immediate and mostly adequate accommodation for the many poor and hopeful immigrants of the postwar period in Melbourne.

The Royal Exhibition Building and the Carlton Gardens have been utilized for numerous entertainment events including the 1956 Olympics and housing Australia's first aquarium. In between the two great exhibitions of the nineteenth century, on the 24th of February 1885, the aquarium at the Royal Exhibition Building opened. The aquarium housed animals such as crocodiles, seals, and penguins, and later after the construction of the fernery, this collection also included monkeys and birds. The aquarium was demolished after a large fire destroyed most of the structure in 1953. Across time the Royal Exhibition Building and Carlton Gardens have held a number of sporting events. Some of the more notable include the world's first 6-day penny-farthing race in 1882 and a scandalous tug of war competition in 1892 that included a women's event that was noted as being very improper at the time. Also the 1956, Melbourne Olympics held a number of events at the Royal Exhibition Building including fencing, weightlifting, wrestling, boxing, and the pentathlon.

The Royal Exhibition Building has been further etched in the memory of the Australian nation for its philanthropic utility. In 1930, during the depths of the great depression, Sidney Myer held a Christmas Day dinner. He was known for his generosity and fed 11,500 people from 10 am onward; they were fed corned beef and ham and were catered for in waves of 2000. Although the initial invitation to the dinner was for only 10,000 guests, an uninvited extra 1500 guests arrived and were welcomed. None were turned away (The Advertiser 1930). The Royal Exhibition Building has also acted as a hospital during the Spanish influenza outbreak in February 1919, which killed

over 3500 Victorians. The building was able to hold over 500 patients, but winter made heating the hall a problem, and patient transport was a major concern. The depth of public use of the Royal Exhibition Building and the Carlton Gardens marks out specific events in Melbourne and Australia's past and allows us to understand its unique cultural significance.

In 2012 the Melbourne Museum, the current custodian of the building, was given a 20 million dollar grant from the Australian Federal Government to restore the viewing platform at the base of the dome, which will afford a superb view of Melbourne. Museum Victoria director Patrick Greene said he considered it to be the "largest object in the museum's collection" (The Age May 2012) and there was also a possibility of extending a tunnel from the Museum to the building. These works are expected to be completed in 2019.

Cross-References

► World Heritage List: Criteria, Inscription, and Representation

References

Dunstan, D. 1996. A Mecca for Australians. In *Victorian icon: The royal exhibition building*, ed. D. Dunstan. Kew: The Exhibition Trustees.

Lock, J. 1996. A very British establishment: The migrant reception centre. In *Victorian icon: The royal exhibition building*, ed. D. Dunstan. Kew: The Exhibition Trustees.

Melbourne International Exhibition 1880–1881. 1882. Official record 1880, Melbourne.

Meyers, H.G. 1901. The exhibition building illuminated at night in 1901 to celebrate the federation of Australia. Museum Victoria. Accessed on 30 Oct 2012 http://museumvictoria.com.au/reb/history/the-building/

Reports of the United States Commissioners to the Centennial International Exhibition at Melbourne 1888. 1890. Government Printing Office – Washington, United States of America.

Royal Exhibition Building Museum Project Volunteers. 1996. Royal exhibition building Melbourne.

Smith, C., and B. Thomas. 2014. *Visions of colonial grandeur: John Twycross at Melbourne's international exhibitions*. Melbourne: Museum Victoria.

The Advertiser 10th December 1930.

The Age May 16, 2012.

The Argus 10th May 1901.

The Australian Sketcher 15 March 1879.

The Brisbane Courier 4th March 1901.

Willington, A. 1996. A permanent and extensive exhibition building. In *Victorian icon: The royal exhibition building*, ed. D. Dunstan. Kew: The Exhibition Trustees.

Willis, E. 2004. *The royal exhibition building, Melbourne: A guide*. Melbourne: Museum Victoria.

Ruffer, Marc Armand

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SIR MARC ARMAND RUFFER

Basic Biographical Information

Born in Lyon on August 29, 1859, into an aristocratic family, Marc Armand Ruffer was the son of Baron Alphonse, a Swiss-born banker, and his German wife Caroline Prieger (Ventura 2017). Although his early education was in France and Germany, Marc Ruffer's professional studies were completed in England (Sandison 1967). He graduated from Brasenose College in Oxford (Arts) and from the University College of London (Medicine). He was also trained at the Pasteur Institute in Paris, under both Louis Pasteur and Ilya Mechnikov, and collaborated with the laboratory of Charles Bouchard at the Paris Faculty of Medicine (Cavaillon 2013). In 1891, the scientist was appointed first director of the British Institute of Preventive Medicine in London. Soon after, while working on diphtheria, he got infected and, as a consequence, suffered paralytic sequelae, which led to his resignation and his subsequent transfer to Egypt for convalescence (Sandison 1967). There, he settled in Ramleh (Alexandria), and, once recovered, became professor of bacteriology at the Cairo Medical School in 1896, as well as the president of the Sanitary, Maritime, and Quarantine Council in 1901.

While continuing his laboratory investigations, Marc Ruffer developed preventive medicine and undertook various public duties, including that of commissioner for the British Red Cross Society (British Medical Association 1917; Sandison 1967). For his services, he received a number of recognitions by the Ottoman Empire, Greece, Russia, and Italy, as well as a British knighthood in 1916 (Kelly's Directories 1916). He tragically died in the Aegean Sea on April 15, 1917, while returning from Thessaloniki, where he had traveled to improve sanitation of the provisional Greek government. His ship, the HMS Arcadian, was torpedoed by a German submarine, leading to as many as 277 casualties (Cavaillon 2013). Marc Armand Ruffer was survived by his wife Alice Greenfield, who he married in 1890. They had three daughters (Ventura 2017).

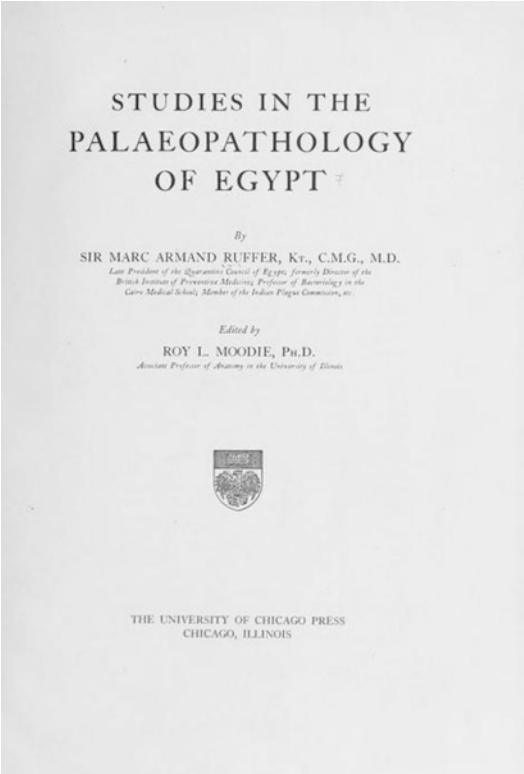
STUDIES IN THE
PALAEOPATHOLOGY
OF EGYPT

By

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Edited by

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Major Accomplishments

Beyond his accomplishments in the fields of immunology and hygiene (Swinton 1981; Cavaillon 2013), Marc Armand Ruffer is also recognized as one of the most prominent figures of modern paleopathology, in that he applied scientific methods to investigate archaeological human remains, identifying the wealth of medical information that could be extracted from them (Aufderheide and Rodríguez-Martín 1998). He began publishing his observations within this specialty as early as 1909 and continued until his death, with some of the articles being published posthumously. Although he was not the first to study mummified tissue histologically, Ruffer devised a successful method to rehydrate those hard, brittle, and friable specimens with a solution of alcohol and sodium bicarbonate, which led the way to the preparation of other similar fluids

(Sandison 1967; Aufderheide 2003). His most relevant finding was probably the diagnosis of schistosomiasis in ancient Egypt, extending back the history of this condition for millennia, of relevance for archaeoparasitology (Reinhard and Araújo 2008). Furthermore, he was able to find mummy evidence of anthracosis, pleural adhesions, kidney abscesses, and notably atherosclerosis, putting forward important views for understanding the natural history of this disease (Ruffer 1921). In addition, he hypothesized the presence of smallpox lesions on the skin of another Egyptian corpse, a theory that was recently challenged via genetic tests (Wertheim 2017). Among his other achievements was the diagnosis of tuberculosis in a subject showing Pott's disease, by demonstrating involvement of the psoas muscle in the infection process (Sandison 1967). Finally, he spotted baldness, blackheads, ulcers, and skin eruptions among the Royal mummies at the Cairo Museum through visual inspection (Ruffer 1921).

Beyond mummy science, Ruffer also contributed to bone paleopathology, with the description of several lesions including injuries, osteoarthritis, ossifying myositis, cancer, and tooth anomalies and disease such as wear, caries, abscesses, and periodontitis. He even reviewed the published literature concerning prehistoric trepanation and provided important observations on the diverse embalming methods (Ruffer 1921). On a different note, Ruffer contributed to the disciplines of medical history and iconodiagnostics, using literary and artistic sources to describe achondroplasia and other deformities such as talipes, Pott's disease, and rickets among the ancient Egyptians (Ruffer 1921). Accordingly, he reached the conclusion that consanguineous marriage among the New Kingdom and Ptolemaic rulers did not necessarily lead to ill-effects (Ruffer 1921). After his death, Lady Ruffer, who wished to accomplish the husband's desire to collect his archaeological contributions into a single book, encouraged publication of a monograph edited by anatomist Roy Moodie, the first comprehensive volume exclusively devoted to ancient disease (Ruffer 1921; Sandison 1967). In fact, it was Ruffer who popularized the term "paleopathology" in the scientific literature, providing its best definition in 1913 as "the science of the diseases which can be demonstrated in human and animal remains of ancient times" (Ruffer 1921: 139; Aufderheide and Rodríguez-Martín 1998). Despite this physician's tremendous contribution to the scientific analysis of mummies, however, the investigation of preserved human remains faltered after his demise, and paleopathologists returned to their interest in skeletal lesions until the mid-twentieth century (Aufderheide 2003; Aufderheide and Rodríguez-Martín 1998).

Cross-References

- ▶ Animal Paleopathology
- ▶ Aufderheide, Arthur Carl
- ▶ Mummy Studies

References

Aufderheide, A.C. 2003. *The scientific study of mummies*. Cambridge: Cambridge University Press.

Aufderheide, A.C., and C. Rodríguez-Martín. 1998. *The Cambridge encyclopedia of human paleopathology*. Cambridge: Cambridge University Press.

British Medical Association. 1917. Obituary. Sir Marc Armand Ruffer, C.M.G., M.A., M.D. Oxon., president of the Sanitary, Maritime, and Quarantine Council of Egypt. *The British Medical Journal* 1: 602.

Cavaillon, J.-M. 2013. Sir Marc Armand Ruffer and Giulio Bizzozero: The first reports on efferocytosis. *Journal of Leukocyte Biology* 93: 39–43.

Kelly's Directories. 1916. *Kelly's Handbook to the Titled, Landed, and Official Classes for 1916. 42nd annual edition*. London: Kelly's Directories Ltd.

Reinhard, K.J., and A. Araújo. 2008. Archaeoparasitology. In *Encyclopedia of archaeology*, ed. D.M. Pearsall, 494–501. New York: Academic Press.

Ruffer, M.A. 1921. *Studies in the palaeopathology of Egypt*. Chicago: The University of Chicago Press.

Sandison, A.T. 1967. Sir Marc Armand Ruffer (1859–1917) pioneer of paleopathology. *Medical History* 11 (2): 150–156.

Swinton, W.E. 1981. Sir Marc Armand Ruffer: One of the first palaeopathologists. *Canadian Medical Association Journal* 124: 1388–1392.

Ventura, L. 2017. In memory of Sir Marc Armand Ruffer (1859–1917) a century after his demise. *Paleopathology Newsletter* 180: 19–23.

Wertheim, J.O. 2017. Viral evolution: Mummy virus challenges presumed history of smallpox. *Current Biology* 27 (3): R119–R120.

Further Readings

Buikstra, J., and C. Roberts, eds. 2012. *The global history of paleopathology. Pioneers and prospects*. New York: Oxford University Press.

Cardin, M. 2014. *Mummies around the world. An encyclopedia of mummies in history, religion, and popular culture*. Santa Barbara: ABC-Clio.

Rural Life in Islamic Archaeology

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Introduction

The study of the rural world has become a significant area of growth in Islamic archaeology, and its potential as a source of data about past societies has been increasingly realized. As new approaches to the study of archaeological landscapes have become more common (Johnson 2006), features that would be missed in a more traditional focus on sites alone are now being documented by survey projects which investigate multiple strands of information in the extra-urban context. Archaeology visualizes and interprets human activity, often absent from historical accounts, which are primarily urban in their perspective and authorship. Where the countryside is cited in historical sources from the Islamic world, it is largely viewed as secondary or supportive to urban society. The material evidence, however, often points towards the important economic role which rural communities played. This is significant given that the economies of past Islamic societies were fundamentally agricultural in character and that the majority of the population is likely to have lived in rural areas. Material culture in this setting can include remains of agricultural and hydraulic infrastructure (such as field systems, canals, mills, terraces, and threshing floors) as well as settlements identified by the presence of standing architecture or by the visibility of surface artifacts or distinguishing features in soil or vegetation appearance.

In many rural regions of the Islamic world, less is understood about the traces of human activity from more recent historic periods than those of earlier times, an anomaly when contrasted with knowledge of historical landscapes in Europe, for example, where recent historic periods dominate survey data (Wilkinson 2003: 5). Prior to the mid-twentieth century, archaeological enquiry in much of the Middle East and North Africa focused on biblical or classical antiquity, while scholars of the Islamic past concentrated their attention on monumental architecture and fortified urban settings. Similarly, Islamic pottery studies tended to be centered on finewares, neglecting the establishment of excavated reference typologies and making it difficult to interpret material collected from rural sites, which is primarily composed of more utilitarian classes of ceramic object. Towards the end of the twentieth century, the focus shifted in many archaeological projects towards broader regional perspectives. Zones beyond major urban centers were examined in detail, and research questions began to address directly issues related to rural societies of the Islamic period. This has resulted in a combination of ethnographic and historical approaches and the incorporation of scientific methodologies, including remote sensing; geomorphological, archaeobotanical, and archaeozoological studies; and soil chemical analyses.

Definition

The rural Islamic world encompasses a diverse cross section of geographic, climate, and hydrological conditions, all characterized by agricultural activity as the principal means of subsistence. The inhabitants of this vast geographical area cannot be understood through the

Rural Life in Islamic Archaeology, Fig. 1 Open-air mosque, Qatar. (Image: Stephen McPhillips 2012)

perspective of singular ethnic, religious, or linguistic parameters. Similar circumspection is needed in developing models of how rural societies functioned, and the often cited dichotomy of the "desert and the sown" can sometimes be overplayed. Arid and semiarid environments are characteristic of many parts of the Islamic world, but rain-fed agriculture is also widely practised, and diverse landscapes zones (woodlands, marshes, high mountain, and upland plateaux and grassland) must be taken into consideration in a survey of rural life. Recent research has expanded knowledge of how agriculture was practised in arid zones that are no longer agriculturally productive. The reinterpretation of the role of so-called desert castles, or *qusur*, in the Syrian and Jordanian steppe is one such example of site hinterlands providing new interpretations of their function. Skillfully designed water procurement systems in fact permitted extensive agricultural activities, leading to long-term occupation, use, and reuse of many sites into the medieval or modern period (Genequand 2009).

Composed of diverse religious and ethnic elements, rural areas do exhibit characteristics that can be connected to the practice of Islam. This may include such features as cemeteries or individual burials which face the direction of the *qibla*, travel infrastructure linked to the *hajj*, or the remains of built or open-air mosques (Fig. 1). Further cultural commonalities can be detected in the material culture found in many rural contexts, such as the widespread use of lead and alkaline glazing on pottery vessels, or the morphological characteristics of the vessels themselves, such as the *ibriq*, or filter-necked spouted water jug, common in the Eastern Mediterranean after 1000 CE (Fig. 2). In the same region and further eastwards into Iraq and the Iranian plateau, the appearance of calcareous cream or buff fabrics in pottery assemblages in the eighth century has been noted in many archaeological assemblages, from substantially varied sites, and most likely produced in many different workshops. Their appearance has been interpreted as one indicator of a gradual shift in material culture from late antique Mediterranean traditions of red fine ceramic wares towards the fine cream vessels that were more prevalent in Iraq and are attested in particular at the major urban excavations of Raqqa and Samarra (Walmsley 2001).

Methodological Considerations

The discipline of Islamic archaeology has developed throughout the twentieth century in tandem with broader theoretical and methodological trends. Shared approaches with other disciplines (anthropology, biology, geography, geomorphology, and prehistory) have characterized some of the more recent large field survey projects. These

Rural Life in Islamic Archaeology, Fig. 2 Fired *ibriq*s at a potter's workshop, Lebanon. (Image: Stephen McPhillips 2012)

have given equal weight to remains from all periods of human presence in a given landscape, documenting long-term processes of landscape formation and change.

Even when settlements consist of standing architecture, taphonomic processes may obscure the archaeological evidence or blur chronological definitions. In western Syria, tell sites are readily apparent in the landscape, whereas low-lying dispersed settlements, which characterize occupation from the Hellenistic period onwards, are frequently located in open areas away from the earlier tell sites and have undergone intensive agricultural use (Philip et al. 2002: 19–20). In the Byzantine and early Islamic past agricultural lowlands in the Mediterranean also underwent periods of sedimentation and soil deflation (dependant on their location), linked to overly intensive farming practices and deforestation of upland zones (Vita-Finzi 1969; Casana 2008). Ethnographic analogies can be usefully applied when interpreting archaeological data across the Near East. Studies focusing on the rural Islamic environment can produce particularly fruitful results, when modern subsistence strategies are compared with archaeological data, partly because of their close temporal proximity. Pastoral, agropastoral, and sedentary agricultural modes of existence in the Middle Euphrates valley in the 1980s were analyzed in conjunction with archaeological and archaeobotanical data from extensive survey. A diachronic model was then proposed demonstrating how access to primary resources changed through time in direct relationship to settlement patterns and geopolitical factors. The significant investment in hydraulic and agricultural infrastructure that took place here from the seventh century is apparent in the revitalized Nahr Dawrin canal, built in the Neo-Assyrian period, but maintained and flourishing through the Umayyad and Abbasid periods, when the region alimented the large urban populations of the Tigris and Euphrates valleys (Berthier et al. 2001: 32–78, 165–168; Kennedy 2011) (Fig. 3).

New possibilities for interpreting survey and excavation data are being explored using remote sensing methodologies, which are now being applied systematically in archaeological projects. Archaeological evidence of occupation and settlement is often first identified through desk-based analyses, synthesizing many different sources of data, such as satellite imagery, maps, textual, or ethnographic sources. This can be verified by visits on the ground or walkover transects where access allows. The benefit of ground survey is that the collection of surface material may permit the detailed characterization of site function and suggest chronological attributes. More complex approaches to the assimilation of landscape data have been attempted using GIS where these

Rural Life in Islamic Archaeology, Fig. 3 Remains of the Nahr Dawrin canal, Syria. (Image: Stephen McPhillips 2009)

different data sources can be visualized simultaneously, providing an overview of rural land use. Criticism of this methodology when applied to Islamic periods includes its lack of sensitivity to the recognition of temporary, ephemeral, or seasonal habitation, and it is therefore unsurprising that evidence for these forms of occupation is underrepresented in the archaeological record.

Other challenges are encountered when using material culture to interpret rural settlement and occupation patterns. The tendency to assign ceramic wares to dynastic periodizations, based principally on urban sequences, can sometimes result in an oversimplified classification of rural pottery assemblages and consequently produce chronological models of regional settlement and land use which contain artificial breaks and lacunae. A recurrent problem is posed by the recognition of cooking pots and food preparation vessels, storage, and water transportation jars, typically made in local centers. They are challenging to distinguish from one district to another, although regional trends are often apparent. The problem is compounded for the early modern era, concerning which archaeological research, especially in the rural context, has only really begun in the last 20 years. Along with the development of reference ceramic typologies, a deeper analysis of vernacular architecture is potentially one route forward, with work currently being pursued in both of these directions. A further useful avenue involves collaborative research with historians who work with archival materials. Most areas that came under Ottoman control in the sixteenth century were documented in court records, tax registers, as well as *waqf* (endowment) records, and in many instances, these contain details of rural land holdings and resources. One caveat is that many of the chronicles, treatises, and encyclopedia of the pre-modern era are written exclusively from the perspective of a literate urban elite.

Historical Background

The earliest archaeological survey of Islamic-period remains was unsystematic, focusing on monumental architecture, and was often driven by the search for locations or civilizations associated with biblical or classical history. Scholars such as Smith and Robinson made extensive travels and recorded many observations about villages and landscapes in the Near East, recounting rural environments that are vastly different today (Smith and Robinson 1841).

Significant discoveries from Islamic periods were being made known to the western public in the early twentieth century, notably Musil's publication of the Umayyad bathhouse at Qusayr 'Amr in Jordan, while epigraphist van Berchem and the architectural historian Creswell systematically recorded Islamic monuments throughout the Middle East. The main focus of documentary work was on the fortifications and castles of the first Islamic frontiers or the crusades and counter-crusades of the twelfth and thirteenth centuries, while caravanserais linked to the hajj and postal networks saw detailed study in the Near East, Iran, and Central Asia.

Soviet archaeologists were active through much of the twentieth century in Central Asia, excavating at Islamic sites under the auspices of strongly centralized state institutions and within a Marxist theoretical framework. A notable feature of this work was the large "expeditions" and "complex expeditions," which analyzed many aspects of landscapes. For example, the South Turkmenistan Complex Expedition (YuTAKE) compiled extensive data about rural and desert environments, from the archaeological recording of architectural remains to ethnographic descriptions of twentieth-century populations and botanical, hydrological, and geological data. Tolstov's Khwarezmian Expedition also recorded multiple aspects of rural landscapes in the Amu Darya delta region of northwestern Uzbekistan. Rural Islamic society in this period was interpreted as essentially feudal, as in Tolstov's work at Kavat Kala, where a fortified citadel was interpreted as a center of power, and fortified dwellings in the surroundings as the estates of lesser landowners (for an overview, see Fedorov-Davydov 1983).

Large field surveys were also undertaken by expeditions in the Near East. Initially, the concern was the discovery of new archaeological sites in the light of historical sources, but this shifted towards a more holistic exploration of the hinterlands of urban centers. Islamic-period landscapes and sites were secondary foci for much of this work, but as early as the 1930s in the Balikh valley in the Syrian Jazirah, Mallowan combined historical sources and nineteenth-century traveller's accounts with survey results. He argued for periods of environmental prosperity and degradation, corresponding to tight control of rural resources under Abbasid rule, and of disengagement by the Ottomans (Mallowan 1946: 113). Adams' Diyala basin project in central Iraq, the "Lands behind Baghdad," dated the extensive canal networks and settlements he documented by association with ceramic surface finds and recorded all periods of human occupation discernible in this landscape. Referencing the stratigraphic ceramic sequence he established at the site of Tell Abu Sarifa, he extrapolated a peak in settlement numbers in the Sasanian period, tailing off in the ninth century. Adams' evidence corroborated textual sources for the intensive irrigation of the agricultural plain, supporting the establishment firstly of Veh-Ardashir, the new Sasanian capital, followed by the great Abbasid cities of Baghdad and Samarra. He argued that the diminution in size of the irrigated areas corresponded to the rise of the new Abbasid cities, reflecting a degradation that might be linked to over-exploitation of soils and overtaxation of its inhabitants and leading to a subsequent decline in their upkeep and in rural prosperity from the eleventh century (Adams 1965, 1970).

Field projects were now actively addressing Islamic periods as part of comprehensive landscape histories and new surveys undertaken from the 1980s in countries as diverse as the Morocco, Spain, the United Arab Emirates, Jordan, Syria, and Turkey looked directly at questions of settlements and land use in Islamic periods. The application of scientific survey and excavation methodologies, and the analysis of finds, has enabled Islamic archaeology to stand on its own merits, and subsequent work has revised a number of previously held assumptions. Until the mid-twentieth century, past Islamic societies were perceived by many western scholars in terms of social and economic decline. This is most strikingly apparent in the frequent interpretation of the geopolitical changes in the seventh century, the arrival of Islamic rule, as the collapse of a late antique order. Survey and excavation data was interpreted in these terms, and the extensive seventh century and later histories of late Roman and Byzantine village and agricultural life surviving in

the Levant and parts of North Africa went unrecognized or were ignored in the archaeological record. It was only as more careful attention was paid to archaeological evidence for Islamic periods, often involving the reinvestigation of previously excavated sites and the revision of ceramic typologies, that abundant evidence for social and economic continuity from late antiquity to at least the tenth century became apparent in many parts of the Mediterranean. Such revisions have accompanied a gradual shift in perception of the Islamic world from the 1970s, with Said's *Orientalism* raising awareness of the pitfalls of an unreflective western view of the Islamic world. The development of postcolonial archaeology has taken into consideration local and global discourses about the past in an attempt to avoid giving dominance to western academic perspective (Said 1978; Gosden 2012). The *Annales* approach to history also influenced archaeological studies of the rural world, concerned as it is with different timescales of change, notably the most gradual, unfolding over centuries (the *longue durée*). Resilience theory, offering a multidisciplinary perspective on human adaptation and reaction to ecological cycles of change, has recently been suggested as ideally suited to exploring the archaeology of the rural environment (Redman 2005; Walmsley 2007: 146–147).

Methodological advances in archaeology after the 1960s have permitted deeper analysis of arid or hyperarid areas of the Islamic world, where water procurement is critical. Site and regional survey in the basaltic Hawran uplands in southern Syria and northern Jordan demonstrate the value in reexamining landscapes once considered marginal, revealing successful management of seasonal and perennial water resources. A range of techniques were used for the storage and redistribution of ground- and rainwater, such as the sinking of wells along stream courses, the catchment and storage of rainwater, and the diversion of water into side channels and storage cisterns by means of check dams inserted across seasonal streams. The use of GIS to group data from many field projects reveals that the channels functioned over considerable distances, across a large area of the Hawran, and proved their sustained operation from the fourth millennium BCE to the early twentieth century CE. This hydraulic landscape seems most likely to have been maintained cooperatively at the local village level, rather than being more centrally organized (Braemer et al. 2009).

Geographical Range of Archaeological Work

Fieldwork investigating rural societies in Islamic periods has not been uniformly distributed, with Southeast Asia and West Africa only beginning to receive attention. The Iberian Peninsula has witnessed sustained growth in the study of Islamic archaeology after the reorganization of Spanish regions was completed in 1983. Studies of urban hinterlands and landscape surveys have since been undertaken in many areas (for an overview of key issues in Islamic archaeology in Spain and Portugal, see Boone 2009) (Fig. 4). Recent analyses of rural themes include the documentation of the development and modification of hydraulic networks under Islamic rule in Spain and the Balearic Islands (in particular see Kirchner 2009) and the recording of a large number of small fortified dwellings and agricultural estates located in rural areas (Bazzana et al. 1988). The study of material culture in the Vega plain, west of Granada, has more recently produced evidence of the complex processes of Islamic acculturation in the countryside (Carvajal 2013). In Portugal, work has demonstrated that while an expansion in rural settlement took place between the tenth and the twelfth centuries, an overall decline in the number of inhabitations may be linked to soil degradation (Boone and Worman 2007).

In North Africa, work during the twentieth century has focused on classical antiquity, but ethnographic studies of the rural world have also been well represented in Morocco and Algeria. Archaeological and historical studies of Islamic periods have begun to construct an overview of rural life across highly varied terrain, ascending from the coast to the high mountains and down into the fringes of the Sahara (for an overview, see De Meulemeester 2005). Elsewhere in North Africa, more limited attention has been given to the Islamic rural world. Surveys of the hinterlands of cities such as Carthage and Leptis Magna have

Rural Life in Islamic Archaeology, Fig. 4 Islamic-period terraced hillside, Ohanes, Almería, Spain. (Image: Ma. Teresa Bonet García & José María Martín Civantos)

demonstrated continuity of rural population well into the Islamic period (see Leone and Mattingly 2004 for a synthesis). In Egypt, the high density of settlement and land-use continuity in the limited cultivated space of the Nile valley and Delta has rendered survey difficult, while much information was lost when Islamic remains were cleared from pharaonic sites such as Medinet Habu without being studied. There has been less documentation of Islamic rural life in southeastern Europe, although recent surveys in Sicily, Crete, and Cyprus have brought forward knowledge of how rural communities related to imperial administration and regional economies. Work in Cyprus has looked beyond sites to seasonal settlements, hydraulic systems, monasteries, and agrarian remains of the Ottoman period in the Troodos mountains, interpreting the connections between settlement, agriculture, and landscape in relation to historical source materials (Given 2000).

The Levant and the Arabian Peninsula figure large in the archaeology of the Islamic rural sphere, and it is here that since the 1980s research projects have been designed with an explicit focus on understanding Islamic rural economy and society. Much progress has been made in constructing regional material culture chronologies, which enable the development of nuanced diachronic regional models of rural life in varied landscapes. Particular foci have been the Euphrates River basin in Turkey and Syria, prompted in part by large dam projects, and areas of western Jordan and Palestine where research resources have been concentrated for historic reasons. The excavations of Khirbat Faris, and the surveys of the Karak Plateau, and Hubras region of northern Jordan have enabled the investigators to characterize later medieval rural settlement, investigating how village economies functioned and changed through time (Miller 1991; McQuitty 2005; Walker et al. 2007). The Jordan valley and Palestinian coasts have seen the excavation and survey of many smaller sites, providing insight particularly into the sugarcane industry which flourished between the thirteenth and fifteenth centuries and revealing how rural populations were impacted by the Frankish occupation of the region. In the Arabian Peninsula, substantial development in the same period has driven much new archaeology in the Gulf countries, and questions of rural subsistence in semiarid zones, involving the analysis of irrigation systems, have been paramount in work undertaken on Islamic-period remains. In Yemen and Oman, life in coastal, upland, and desert regions requires a range of highly adaptive responses to varied climatic and hydrological

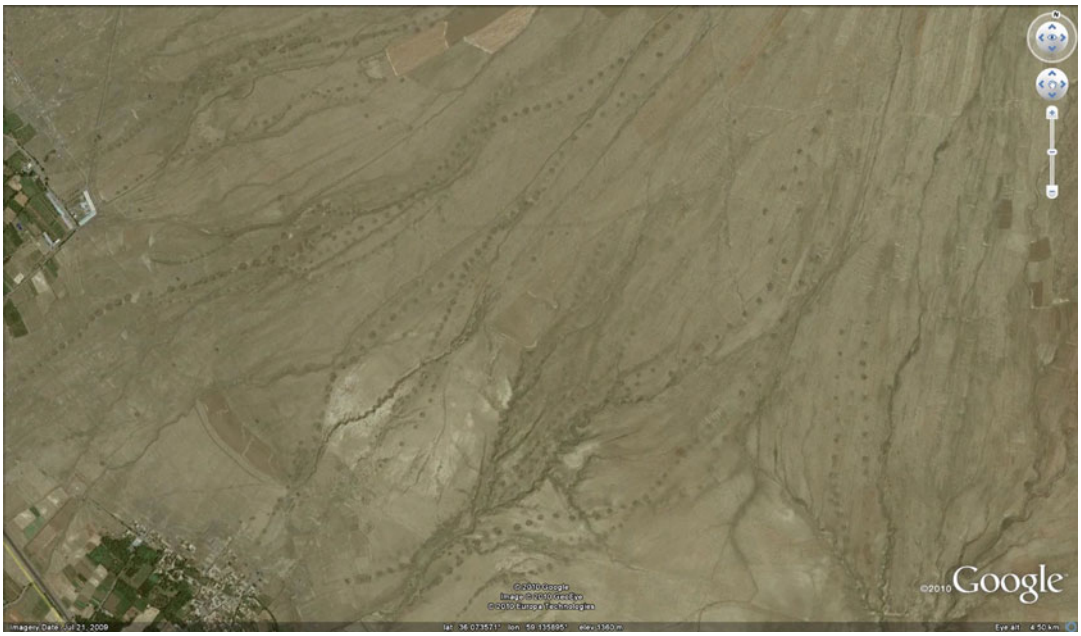

Rural Life in Islamic Archaeology, Fig. 5 *Qanat*s, Nishapur, Iran. (Image: © 2010 Google © 2010 GeoEye © 2010 Europa technologies)

conditions. Modern agricultural lifestyles continue to employ traditional techniques here, ranging from the use of terraced field systems at higher altitude to carefully managed oasis agriculture and irrigation networks in lowland and desert regions (Wilkinson 2003: 186–195).

In Iran and Central Asia, rural archaeological studies have been strongly divided between those areas practising rain-fed agriculture and those which rely upon the seasonal fluctuations of major river systems or artificial irrigation. Of the latter, the *qanat* systems of the Iranian plateau warrant particular mention (Fig. 5). Although in many cases it is difficult to attribute their establishment to the period after the coming of Islam, many of these systems were maintained throughout the medieval and early modern eras, into the present day. Historical case studies acknowledge the changeability of urban trends and the pressure this exerts on rural production (Bulliet 2009: 1–16). This relationship is also vividly portrayed in the archaeology of the oasis settlements of Central Asia, where intensive, highly structured cultivation of fertile river-fed lands enabled small rural micro-systems to evolve around major urban centers. The geography of Afghanistan presents an interesting challenge to rural models as the impassable mountains of the Hindu Kush brought forth altogether different approaches to agricultural production. Here, settlements nestled in the fertile valleys were as much dependent on the extreme continental seasonal variability as those in desert lands, giving rise to fluid and often mobile rural communities (Thomas 2008). Comprehensive studies such as that undertaken by Ball highlight the potential for analyses across this landscape of extremes, but recent political conditions mean that systematic ground survey is lacking, and more remote rural areas remain underrepresented and poorly understood (Ball 1982).

Key Issues/Current Debates

A range of issues of critical importance to the understanding of past societies has been raised by current archaeological research on the rural world of Islamic periods. The relationship between societies and the environment is

foremost, given the potential that study of the Islamic past has for incorporating historical and ethnographic data into archaeological studies. Evidence for environmental change in many areas of the Mediterranean has been detected from late antiquity well into the early Islamic period, with sedimentation of river valleys, soil degradation, and deforestation of upland areas part of a linked chain of processes influenced directly by agricultural and timber procurement practices. For later Islamic periods, isotope and pollen analyses have been used to construct models of colder more arid periods between 900 and 1150, and 1500 and 1650, both in the eastern Mediterranean and Central Asia, using a range of archaeological evidence. Such evidence feeds into broader discussion of social and cultural phenomena, linking rural life to geopolitical change and to ongoing global issues of climate change and sea and lake level fluctuation, as seen, for example, with the degradation of the Aral Sea in Central Asia (Sorrell et al. 2007).

The excavation of more rural sites, the establishment of solid regional material culture references, and the collection of more refined survey data in hitherto neglected regions now allow more subtle interpretations of settlement patterns and landscape use. Work at Khirbat Faris in Jordan has demonstrated that smaller rural sites could enjoy long-term stability based on agricultural activity, exhibiting evidence of integration with urban centers. Architectural units at Khirbat Faris were in use over many centuries, and the excavator suggests that seasonal or permanent occupation is likely to have continued after the sixteenth century, significant given the argument advanced by many scholars that settlement of rural areas of the Levant was then undergoing a major decline. Another current issue is the acculturation of rural populations. The careful analysis of material culture can reveal shifts in technical practices and stylistic choices through time, reflecting regional geopolitical developments. In Spain, this was manifest in changes in irrigation and ceramic technologies, while in the Levant the rural economy underwent a slow tilt away from being centered on a predominantly Mediterranean axis towards having stronger connections with Iraq. In northern Syria and Iraq, survey has corroborated textual evidence for investment in rural areas by the state, and the countryside saw the large-scale redevelopment of irrigation networks needed to support sizeable new urban foundations. Archaeobotanical (botanical, weed-flora, soil composition, pollen, and phytolith analyses) and zooarchaeological studies are at the core of a significant development in the study of Islamic rural life, the study of biological data. While Watson's thesis of an influx of new crops into the central Middle East alongside the arrival of Islam has not been corroborated by this research, many other indications of changes in agricultural regimes can be detected. An important botanical study in the Middle Euphrates valley suggests an importation of sophisticated new irrigation and agricultural regimes in the Umayyad period, continuing until the end of the fourteenth century. Characterized by both winter and summer planting seasons, a wide range of crops was grown in soils prone to degradation and salination (Watson 1983; Samuel 2001).

The rural Islamic world in the archaeological record is complex and changeable and should not be characterized in either positive or negative terms with regard to earlier or later societies. Nevertheless, as studies of archaeological and textual data progress, a picture of economic dynamism and close links to urban society both emerge as frequent themes. Centralized investment is apparent; irrigation development and land redistribution requiring massive investment in human resources and long-term upkeep were undertaken on the state level. Hydraulic technologies underwent major advances in the Islamic world, and in large parts of the former Ottoman Empire, in Iberia and Iran, agricultural products were processed using locally adapted water milling systems, often relying on limited seasonal water supplies (Fig. 6). Combined with the study of archival sources, studying the remains of rural technologies provides rich data about early modern economies. One new crop that has been significant in this regard is sugarcane, and significant evidence has emerged of the hydraulic organization, both in terms of water supply and milling operations, required behind its massive

Rural Life in Islamic Archaeology, Fig. 6 Al-Banjukiyya Watermill, Orontes river, Syria. (Image: Stephen McPhillips 2009)

cultivation in the microclimate of the Jordan valley (Kaptijn 2009). Hydraulic infrastructure and hydraulic energy use could be conceived and managed much more locally, calling to mind the example of the evidence from the Hawran. Artisanal production in the rural setting is one further related area of current archaeological enquiry. Ceramic, glass, and metalworking activities have all been documented at large scales in nonurban settings, indicating a perhaps surprising degree of integration between rural production and urban consumption. New evidence is emerging for expanded mining activities in areas as diverse as Portugal, Jordan, and Iran. As further methodological advances continue to be applied, it is hoped that geographic areas that are currently neglected by scholarship will be able to be examined, building a fuller picture of Islamic rural life. It is significant that the field is attracting new interest from scholars living in the countries concerned, often facing the enormous difficulty of preserving a disappearing rural archaeological heritage in the face of pressing modern economic realities. The destruction of remains is exacerbated when settlements and features are widely spread throughout the landscape, rather than in those areas where sites are highly concentrated. The collection of ethnographic data is now difficult in many parts of the world as traditional agricultural practices and rural traditions slowly disappear, but ways can be found to make this heritage relevant and beneficial to local populations. Initiatives in Wadi Dana in Jordan and at Ovakent in Turkey consider the economic needs of local communities by encouraging sustainable heritage tourism in projects conceived and run by specialists from the regions themselves, while the Turquoise Mountain Foundation seeks to foster traditional artisanal techniques in post-conflict rebuilding in Afghanistan (Coburn and Svensson 2010; Steen et al. 2010: 174–176; Bayizitlioglu 2012). Most landscapes of the Islamic past are living landscapes today, with active economic roles in their respective societies. For that reason, gaining access to the archaeological information they contain can be especially challenging, but the complex interplay between the past and the present is also a greatly rewarding field of enquiry.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Archival Research and Historical Archaeology
- ▶ Bioarchaeology: Definition

▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
▶ Environmental Reconstruction in Archaeological Science
▶ Ethnoarchaeology
▶ Greater Syria: Islamic Archaeology
▶ Heritage Landscapes
▶ Iran: Islamic Archaeology
▶ Iraq: Archaeological Heritage
▶ Islamic Archaeology
▶ Islamic Archaeology and Art History
▶ Postcolonial Archaeologies
▶ Religion in Islamic Archaeology
▶ Spain and North Africa: Islamic Archaeology
▶ Swahili Archaeology

References

Adams, R.M. 1965. *Land behind Baghdad*. Chicago: University of Chicago Press.

Adams, R.M. 1970. Tell Abu Sarifa. A Sassanian-Islamic ceramic sequence from south central Iraq. *Ars Orientalis* 8: 87–119.

Ball, W. 1982. *Archaeological gazetteer of Afghanistan.* Catalogue des sites archéologiques d'Afghanistan. Paris: Editions Recherche sur les Civilisations.

Bayizitlioglu, B. 2012. Comprehension of the rural: Ovakent (Adagide), Turkey. *The Historic Environment* 3 (2): 143–163.

Bazzana, A., P. Cressier, and P. Guichard. 1988. *Les châteaux ruraux d'al-Andalus. Histoire et archéologie des husûn du Sud-Est de l'Espagne*. Collection de la Casa de Velázquez 19. Madrid: Casa de Velázquez.

Berthier, S., L. Chaix, J. Studer, O. D'Hont, R. Gyselen, and D. Samuel. 2001. *Peuplement rural et aménagements hydroagricoles dans la moyenne vallée de l'Euphrate, fin VIIe-XIXe siècle*. Damascus: Institut français d'études arabes de Damas.

Boone, J.L. 2009. *Lost civilization. The contested Islamic past in Spain and Portugal*. Duckworth Debates in Archaeology. London: Gerald Duckworth.

Boone, J.L., and F.S. Worman. 2007. Rural settlement and soil loss from the late Roman through the medieval Islamic period in the Lower Alentejo of Portugal. *Journal of Field Archaeology* 32: 115–132.

Braemer, F., D. Genequand, C.D. Maridat, P.M. Blanc, J.M. Dentzer, D. Gazagne, and P. Wech. 2009. Long-term management of water in the Central Levant: The Hawran case (Syria). *World Archaeology* 41 (1): 36–57.

Bulliet, R.W. 2009. *Cotton, climate, and camels in early Islamic Iran: A moment in world history*. New York: Columbia University Press.

Carvajal, J.C. 2013. Islamicization or Islamicizations? Expansion of Islam and social practice in the Vega of Granada (south-east Spain). *World Archaeology* 1–15.

Casana, J. 2008. Mediterranean valleys revisited: Linking soil erosion, land use and climate variability in the Northern Levant. *Geomorphology* 101 (3): 429–442.

Coburn, N., and E. Svensson. 2010. Shaping Afghanistan: Traditional pottery and economic reconstruction. In *Images of Afghanistan: Exploring Afghan culture through art and literature*, ed. A. Loewen and J. McMichael, 228–234. Karachi: Oxford University Press.

De Meulemeester, J. 2005. Islamic archaeology in the Iberian Peninsula and Morocco. *Antiquity* 79 (306): 837–843.

Fedorov-Davydov, G.A. 1983. Archaeological research in Central Asia of the Muslim period. *World Archaeology* 14 (3): 393–405.

Genequand, D. 2009. Économie de production, affirmation du pouvoir et dolce vita: aspects de la politique de l'eau sous les Omeyyades au Bilad al-Sham. In *Stratégies d'acquisition de l'eau et société au Moyen-Orient depuis l'Antiquité*, ed. M. Mouton and M. Al-Dbiyat, 157–177. Beirut: Presses de l'Ifpo.

Given, M. 2000. Agriculture, settlement and landscape in Ottoman Cyprus. *Levant* 32: 209–230.

Gosden, C. 2012. Post-colonial archaeology. In *Archaeological theory today*, ed. I. Hodder, 251–266. Cambridge: Polity Press.

Johnson, M. 2006. *Ideas of landscape*. Oxford: Blackwell.

Kaptijn, E. 2009. *Life on the watershed. Reconstructing subsistence in a steppe region using archaeological survey: A diachronic perspective on habitation in the Jordan Valley*. Leiden: Sidestone Press.

Kennedy, H. 2011. The feeding of the five hundred thousand: Cities and agriculture in early Islamic Mesopotamia. *Iraq* 73: 177–199.

Kirchner, H. 2009. Original design, tribal management and modifications in medieval hydraulic systems in the Balearic Islands (Spain). *World Archaeology* 41 (1): 151–168.

Leone, A., and D. Mattingly. 2004. Vandal, Byzantine, and Arab rural landscapes in North Africa. In *Landscapes of change: Rural evolutions in late Antiquity and the early Middle Ages*, ed. N. Christie, 135–162. Ashgate: Hampshire.

Mallowan, M.E.L. 1946. Excavations in the Baliḫ Valley, 1938. *Iraq* 8: 111–159.

McQuitty, A. 2005. The rural landscape of Jordan in the seventh-nineteenth centuries AD: The Kerak Plateau. *Antiquity* 79: 327–339.

Miller, J.M. ed. 1991. *Archaeological survey of the Kerak Plateau: Conducted during 1978–1982 under the direction of J. Maxwell Miller and Jack M. Pinkerton*. American Schools of Oriental Research Archaeological reports 1. Atlanta: Scholars Press.

Philip, G., F. Jabour, A. Beck, M. Bshesh, J. Grove, A. Kirk, and A. Millard. 2002. Settlement and landscape development in the Homs region, Syria: Research questions, preliminary results 1999–2000 and future potential. *Levant* 34: 1–23.

Redman, C.L. 2005. Resilience theory in archaeology. *American Anthropologist* 107 (1): 70–77.
Said, E. 1978. *Orientalism*. London: Routledge & Kegan Paul.
Samuel, D. 2001. Archaeobotanical evidence and analysis. In *Peuplement rural et aménagements hydroagricoles dans la moyenne vallée de l'Euphrate, fin VIIe-XIXe siècle*, ed. S. Berthier, 347–481. Damascus: Institut français d'études arabes de Damas.
Smith, E., and E. Robinson. 1841. *Biblical researches in Palestine, Mount Sinai and Arabia Petraea: A journal of travels in the year 1838*. London: John Murray.
Sorrell, P., S. Popescu, M. Klotz, S.J.P. Suc, and H. Oberhänsli. 2007. Climate variability in the Aral Sea basin (Central Asia) during the late Holocene based on vegetation changes. *Quaternary Research* 67 (3): 357–370.
Steen, D., B. Porter, J. Jacobs, and B. Routledge. 2010. Exploring heritage discourses in central Jordan. In *Controlling the past, owning the future: The political uses of archaeology in the Middle East*, ed. R. Boytner, L. Swartz Dodd, and B.J. Parke, 159–177. Tucson: University of Arizona Press.
Thomas, D. 2008. The ebb and flow of empires – Afghanistan and neighbouring lands in the twelfth-thirteenth centuries. In *Proceedings of the 5th International Congress on the Archaeology of the Ancient Near East: Madrid, April 3–8, 2006. Colección Actas*, ed. J.-M. Córdoba, M. Molist, M.C. Pérez, I. Rubio, and S. Martínez, 285–300. Madrid: Ediciones Universidad Autónoma de Madrid: Centro Superior de Estudios sobre el Oriente Próximo y Egipto.
Vita-Finzi, C. 1969. *The Mediterranean valleys*. Cambridge: Cambridge University Press.
Walker, B.J., E. Kenney, L. Holzweg, L. Carroll, S. Boulogne, and B. Lucke. 2007. Village life in Mamluk and Ottoman Hubras and Saham: Northern Jordan project. Report on the 2006 season. *Annual of the Department of Antiquities of Jordan* 51: 429–470.
Walmsley, A. 2001. Turning east: The appearance of Islamic cream wares in Jordan - the end of antiquity. In *La Céramique Byzantine et Proto-Islamique en Syrie-Jordanie*, ed. E. Villeneuve and P.M. Watson, 305–313. Beirut: Institut français du Proche-Orient.
Walmsley, A. 2007. *Early Islamic Syria*. Duckworth Debates in Archaeology. London: Gerald Duckworth.
Watson, A.M. 1983. *Agricultural innovation in the early Islamic world*. Cambridge: Cambridge University Press.
Wilkinson, T.J. 2003. *Archaeological landscapes of the Near East*. Tucson: University of Arizona Press.

Further Reading

Milwright, M. 2010. The countryside. In *An introduction to Islamic archaeology*, 59–74. Edinburgh: Edinburgh University Press.

Ruralia: The Jean-Marie Pesez Conferences on Medieval Rural Archaeology

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Basic Information

Ruralia is an international association for study of the archaeology of medieval and postmedieval settlement and rural life. The archaeology of rural life is an important issue, precisely because in medieval and early modern times, the majority of the population lived in rural settlements. The *Ruralia* association thus promotes research on such diverse topics including the nature of settlements, environment and landscape, economic systems (e.g., handicraft agriculture, the distribution of food), houses and other farm buildings, hierarchies, and other social dimensions. The temporal range of these covers the early medieval ages up to postmedieval times.

The association is an international European society registered as an association in the Netherlands. The first president of the association was Jean-Marie Pesez (1929–1998), and further presidents were Alan Aberg and Johnny de Meulemeester. At present 19 countries are represented: Austria, Belgium, Croatia, the Czech Republic, Denmark, Finland, France, Germany, the Grand Duchy of Luxembourg, Great Britain, Hungary, Ireland, Italy, Norway, Poland, Portugal, Russia, Slovakia, Spain, Sweden, and the Netherlands. Further countries are welcome to join the association. The coordinating body of *Ruralia* is the Ruralia Committee, which is made up from national representatives of all participating countries, led by the president (Claudia Theune, University of Vienna), a vice-president (Mark Gardiner, University of Lincoln), and an executive committee.

Major Impact

The association hosts biennial conferences across Europe in one of the participating countries. These provide a forum, especially for younger researchers, for presentation of new research and more general discussion of the full range of topics of interest to the association. The conference languages are English, French, and German. The first conference was held in 1995 in Prague (Czech Republic) followed by conferences in Spa, Belgium, 1997; Maynooth, Republic of Ireland, 1999; Bederkesa, Germany, 2001; Lyons, France, 2003; Dobogókö, Hungary, 2005; Cardiff, Great Britain, 2007; Lorca, Spain, 2009; Götzis, Austria, 2011; Smolenice, Slovakia, 2013; Clervaux, Grand Duchy of Luxembourg, 2015; and Kilkenny, Ireland 2017. The next conference will be held in Stirling, Scotland (September 2019). The conference papers are published as edited and peer-reviewed proceedings, of which 11 volumes are now available and listed on the association's website (www.ruralia.cz), where further information can also be found.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Deutsche Gesellschaft für Archäologie des Mittelalters und der Neuzeit e.V. (DGAMN)
- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Historische Archäologie
- ▶ Österreichische Gesellschaft für Mittelalterarchäologie

References

Ruralia Association. n.d. Available at: http://ruralia2.ff.cuni.cz/ and on facebook: https://www.facebook.com/Ruralia-Conferences-on-Medieval-Rural-Archaeology

Russia: Management of Archaeological Heritage

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Introduction

General Principles of Protection of Cultural Heritage in the Russian Federation

For Russia, the preservation of archaeological heritage means, firstly, the preservation of the 50,000 archaeological sites that are officially registered as archaeological heritage, and secondly, the preservation of an immeasurably larger number of archaeological sites that have not yet been put on record or remain undiscovered and so have not been scientifically described. Protection of archaeological heritage in Russia is of particular significance, because the period of recorded history in this part of Eurasia began much later than in many other areas of the Old World, and archaeological materials are thus the sole or main source for the reconstruction of historical processes until the Middle Ages, and in many parts of the country, until modern times.

The public authorities for cultural heritage protection are the Ministry of Culture of Russia and its regional offices in the administrations of the Russian Federation (committees, management, departments). The regional administration (committees, centers, inspection) carries out state control, registration, protection, and use of historical and cultural monuments in the administrations of the Russian Federation. In accordance with the legislation that underlies the whole system of protection of historical and cultural heritage in Russia, only identified archaeological sites assessed to be valuable historical and cultural sites, ensembles, or systems can be listed for cultural heritage protection by public authorities.

Russia has no single inventory of historical and cultural lands, including the diverse archaeological heritage, which is consistent with other codes (e.g., land, water, forestry).

However, more recently, a new factor in the destruction of archaeological heritage has quickly come to the fore. A wave of poaching has swept Russia, throwing on the shelves of antique stores thousands of rare finds. Illegal production of antiquities has become a well-established profitable trade, which involves hundreds of people. Also the European Convention on the Protection of the Archaeological Heritage was ratified by the Russian Government in June 2011.

Definition

Each national tradition in the field of cultural heritage has its own special terms. The basic terms and their definitions commonly used in Russia are discussed below.

Archaeological heritage is a kind of cultural heritage that includes settlements, burial mounds, the remains of ancient settlements, camps, fortifications and military camps, facilities, irrigation, paths, graves and places of worship, megaliths, rock art, sites of historical cultural layer of fifteenth to nineteenth century, ancient battle fields, and remnants of the ancient life of prehistoric people.

Objects of the archaeological heritage are a special type of real estate containing identified cultural heritage sites and are the exclusive property of the state. The objects of the archaeological heritage and land (or part of a water body, within which the object is located) in the legal turnover are separated.

Historical Background

Historical and Cultural Heritage as a Matter of State Regulation

Archaeological sites of Russia were first mentioned more than 300 years ago in connection with the development of Siberia when the Russian government began the search for ways to Eastern Asia. Thanks to a decree of Peter the Great in 1721, antiquities became a matter of national importance, and the foundations for research and scientific collections were laid. In the first months after the 1917 October Revolution, there was a series of historical events in the area of public policy with regard to historic heritage. Preservation of heritage was completely subordinated to the Ministry of Culture, and funding was provided by the residual principle, not nearly enough to solve the simplest problems. By the mid-1990s, there were signs of growing crisis in all spheres of Russian society, and there were radical changes in the field of heritage protection in general such as the development of state programs to protect cultural and archaeological heritage, including developing a series of legislative acts, a system of government protection and use of historical and cultural heritage, and the establishment and development of educational programs. Today, state protection of historical and cultural sites (including archaeological heritage) encompasses the legal, institutional, financial, information, and other measures taken by the state to identify, record, study, develop historical and cultural expertise, establish boundaries and territories of historical and cultural objects, and control their conservation and use.

Modern Legal Situation and Problem

Management of archaeological heritage in the territory of Russia is regulated by the RF Presidential Decree "On Particularly Valuable Objects of Cultural Heritage of Russian Federation Peoples" (1992) and RF laws "On Culture" (1992) and "On Objects of Cultural Heritage (Historical and Cultural Sites) of Nations of the Russian Federation" (2002). These regulations should form a legal basis for management of movable and immovable historical and cultural values. The RF Law "On Museums and Museum Funds" (2002) regulates management, restoration, and conservation of movable values; the RF Law "On Territories of Traditional Nature Management of the Minority Peoples and Other Ethnic Communities of the North, Siberia and the Far East" provides the legal foundations for setting up territories of traditional nature management, as

well as environmental, historical, and cultural heritage.

Archaeological works of different complexity should be conducted in conformity with the "Regulations on Open Lists" authorizing archaeological excavations.

These regulations should form a legal basis for management of movable and immovable historical and cultural values. However, in the judgment of many experts, the laws are incomplete and in need of subordinate legislation and adjustment in accordance with international legislation.

In the last few years, transformation of socioeconomic and political conditions of development of regions of Russia, especially Siberia and the Far East, raised additional problems concerning the protection of archaeological heritage. Socioeconomic problems, weak legislation, and an increasing crime rate have led to the growth of "black archaeology." In addition, numerous archaeological sites suffer from unfavorable ecological conditions and natural factors in zones of continental climate (e.g., wind erosion, floods, and mudflows).

Key Issues/Current Debates

Protection of Historical and Cultural Heritage in the Conduct of Business

The main challenge for Russian heritage managers is to expand their understanding of the term "object of cultural and historical heritage" to facilitate fundraising for the maintenance and restoration of numerous archaeological sites and to help integrate heritage management into the economic cycle. In Russia, we can now mark:

- Privatization of monuments (historical places, archaeological sites), imposing burdens on private property owners
- Development of cultural and tourism and the creation of heritage-based tourism products and brands
- Sales of the "aura" of historical and cultural heritage, when the attractiveness of historic districts is used to increase the value of new property

Therefore, if we talk about successful regeneration of heritage sites, as a rule, these methods are used in combination.

Historical and Cultural Examination

The first academic expeditions (1724, 1733–1743, 1768–1772) aimed at investigation of natural resources of Siberia were commissioned to "gather information about different rarities and antiquities." Researchers and explorers, members of the first Russian academic expeditions (D.G. Messerschmidt, F.I. Stralenberg, G.F. Mueller, P.S. Pallas, and others), and political exiles ("Decembrists" and members of the "Narodnaya Volya") collected rather extensive stocks of historical and ethnographical evidence. In the nineteenth century, research priorities were established for the departments of the Russian Geographical Society and, since the 1870s, the Russian Archaeological Society.

The existing system had several significant shortcomings. In particular, huge archaeological researches in the USSR were not provided with the proper degree of resources or personnel. At the same time, full archaeological mapping remained a matter for the distant future, and protection of archaeological heritage was a task of unimaginable scale. The only possible way out of this situation could be the ongoing development of existing and establishment of new regional centers.

Today more than 200 organizations are doing research in the study and conservation of archaeological heritage in Russia. The main research organizations are the Institute of Archaeology RAS, the Institute of Archaeology and Ethnography of SB RAS, the Institute of History of Material Culture RAS, and the Institute of Cultural and Natural Heritage.

Privatization and the Stewardship of Cultural Heritage

The 2002 Regulations of the Government of the Russian Federation allowed the privatization of historical and cultural heritage with the obligations of stewardship placed on the owner. According to Article 50 of Federal Law N73, objects not subject to privatization include

monuments and ensembles that are included in the UNESCO World Heritage List; especially valuable objects of cultural heritage of the Russian Federation, which are included in the state list of the most valuable objects of cultural heritage of the Russian Federation (the list No 1487 "On the most valuable objects of cultural heritage of the Russian Federation"); historical and cultural reserves; and sites of archaeological heritage. Thus, the archaeological heritage is completely excluded from commercial traffic and is the exclusive property of the Russian state.

Archaeological Heritage of Russia

The earliest evidence of archaeological cultures in Russia dates to the Lower Paleolithic. The material can be divided into major archaeological provinces, where different objects characterize different local areas – archaeological micro-districts. The main areas of concentration of Paleolithic sites are the territory of the Russian Plain, the Caucasus, the Sayan-Altai district, Transbaikalia, and Yakutia. Notable objects include Kapova Cave in the Urals, a complex of sites in the area Kostenki, Sungir and Avdeevo in Russian Plain, and Malta and Buret in Siberia are examples of Paleolithic art. Denisova Cave in the Altai Mountains represents an opportunity to observe continual development of human culture for more than 300,000 years. Mesolithic and Neolithic times are represented by short-term sites and large necropolises of 200–300 burials, indicating the development of cultures of hunters and gatherers in post-glacial era. A number of archaeological cultures have been identified – the Dnieper-Donets, Lyalovskaya, Kama and Volgokamskaya, Kitoyskaya, Syyalahskaya, Voznesenovskaya, and so on. The era of metal is a crucial time-related change in cultural and economic types, with an almost universal shift to producing forms of economy – agriculture and cattle breeding and development of metallurgical provinces. The archaeological culture of the Bronze Age – Early Iron Age – is associated with earlier ethnic entities. Groups include the Scythian-Siberian culture, Prebaltic and Baltic cultures, Finno-Ugric culture, Ural-Siberian culture, Huns, hunter-fishers of the East Siberian taiga, early Eskimos, the Okhotsk cultural and historical area, and the Far Eastern culture. Different levels of development have left us with unique pieces of ancient cultures, such as burial mounds (the largest includes Turbino, Pelenger, Sintashta, Andron, Karasuk, Koban, Pazaryk, and Tashnyk), fortified settlements (Archaim, Chicha, Ivolginsk), monumental art, and cave paintings. The Middle Ages – the time of formation of ancient states – produced the Turkic, Uygyrsky, Kyrgyz and Hazar kaganates, Kievan Rus, Volga Bulgaria, and the Mongol Golden Horde. In Russia, many of the cities are known for showing the development of crafts, architecture, temple construction, and building authorities. World-famous ancient Russian cities include Novgorod, Staraya Ryazan, Chernigov, and Pskov; cities on the Volga river in Bulgaria include Bilyar and Suvar; Mongolian cities and settlements include Saray, Tsarevsky, and Hadji-Tarhan.

Large-Scale Archaeological Rescue Work

In Russia, rescue archaeology has been undertaken for more than 80 years. In 1927, archaeologists began to study the archaeological sites in the flood zone of DneproGES (hydroelectric power station on Dnepr River). In 1929, the first expedition of GAIMK – Volga-Don was organized. In 1934, it was accepted by the Executive Committee and SNK that construction funds should be allocated to the excavation of archaeological sites to be destroyed by development. This made it possible to organize archaeological work in the construction of several power plants, the Volga-Don canal, as well as in the construction of the Moscow Metro. After World War II, rescue of archaeological work continued with the establishment of power stations on the Volga, the Yenisei, and the Angara and the development of the agricultural systems in southern Russia.

Today the development of the gas and oil industry, power complexes, and highways in Siberia and the Far East is of geopolitical importance for Russia. Transcontinental oil and gas pipelines, development of power complexes (e.g., Katun and Boguchan hydroelectric power stations), modernization of throughways and building new infrastructure, as well as a private housing "boom," require adjustment of legislation and

government control over the discovery and protection of cultural heritage, an increase in the number and quality of specialists involved in the assessment of threats, and monitoring and salvage of the objects of historical and cultural heritage located within development sites.

Public Organizations of Protection of Archaeological Heritage in Russia

At the present time in Russia, a number of different public organizations have emerged in connection with the formation of civil society. They have a significant impact on decision making in public bodies, including the protection of cultural heritage. The Archaeology Fund was established in 2004 as a noncommercial organization but has been actually functioning for almost 20 years. The establishment of the Archaeology Fund was a logical next step for ordinary people to help serve science.

The growing activity and importance of nongovernmental organizations involved in the protection of cultural and historical heritage of Siberia and the Far East is worth noting. The most effective are such organizations as the interregional movement "Siberian People's Council," the association "Cultural Tourism in South Siberia," the Federation of "Internet-Education," the Association of Culture Managers, and the funds "The Cultural Heritage of Siberia," "Society of Historical Archeology," and "ArcheoWorld." The main attention is paid to holding forums, festivals, and conferences, the development of cultural and scientific tourism, providing information about excavation, the organization of tours, and work with mass media.

Protection of Objects of Archaeology

Information support for management of cultural heritage, including discovery and inventory of archaeological heritage in the regions of Russia as well as for the development of schemes, cadastres, registers, and databases enabling consideration of historical and cultural potential of the territory, forms the basis for resource management in programs and projects concerning territorial objects or national parks, reserves, and protected territories.

The step beyond information support is to create museums for objects of archaeological heritage and to organize a series of archaeological parks. Today there are still only a few examples of museums at archaeological sites and of archaeological parks. Examples of archaeological parks include "Archaim" in the Chelyabinsk region, "Tomsk Pisanytza" in the Kemerovo region, "Crossroads of the Worlds" in the Altay region, and "Batakovo" on the Irtysh River. There are other famous projects, such as the "Archaeological Park in Moscow – Mitinsky Park," which includes 30 archaeological sites, and the "Park of Dolmens" on the lower River Jane (Krasnodars region, Couscous). The publicly organized "Taman" Archaeological Center has realized two projects, "Protection of Archaeological Memorials" and "Saving Ghermonassa Necropolis."

International Perspectives

UNESCO Activity in Russia

At present, about 50,000 archaeological objects of federal importance are registered in the territory of Russia. UNESCO World Heritage Sites in Russia make up 2.6% of the total, and only 12 archaeological sites are on the list of objects.

In the territory of Siberia and the Far East, a number of large-scale UNESCO and ICOMOS network projects in protection of historical and cultural heritage are currently under way. The most known are "UNESCO Associated Schools" (Omsk), "Museum Compass of Siberia" (Barnaul), "Dances of Nations of Siberia," and "Information for All."

Several large state universities (e.g., Moscow, Novosibirsk, Altai) have founded UNESCO international chairs to study problems in cultural heritage, archaeological and ecological education, and problems of the minority peoples of the north.

International Archaeological Heritage Preservation Projects in Russia

Russia supports intensive international contacts in the field of archaeological heritage, especially through scientific projects. In addition,

international cooperation in the protection of the archaeological heritage of Russia is implemented through a series of joint research projects, institutions of the Academy of Sciences, state universities, and individual research teams with colleagues from France, the USA, Canada, Germany, South Korea, Japan, and other countries. The largest international projects in cultural and scientific tourism which include Russian territories are "The Great Tea Road" and "China–Mongolia–Russia: Dialogue of Civilizations."

Future Directions

Information Resources in the Management of Historical and Cultural Heritage

Work on an inventory of historical and cultural sites in the territory of Russia is still in its developmental stage. Available resources can be divided into the following structural and thematic categories:

Information storage and retrieval systems, such as the "Museums of Russia" server, which contains links to the Internet sites of Russian museums and mobile exhibitions. Other systems include the catalogue of socioeconomic and humanitarian Web resources of the Irkutsk Interregional Institute of Social Sciences, which encompasses online catalogues of scientific and educational Web resources, the "Siberian Zaimka" and "SIBIRICA" data retrieval systems, and the museum portal "History and Culture of Siberian's and Far East Peoples."

Thematic Catalogues of Sites and Collections of Central Russia, Ural, Siberia, and North and Central Asia

Not all museums have electronic catalogues of archaeological collections as yet. We can get on summary information on collections in major museums – the State Historic Museum, Hermitage, Kunstkamera, Pushkin's Museum, and so on – which comprise several million archaeological artifacts. But there are some other sources, such as the catalogue of "Stone Sculptures of Altai" representing more than 300 sculptures of the Ancient Turkic Period, a virtual museum (digital collection) called "History and Culture of Nations of Northern Asia" which has a database and virtual museum of ethnographic collections of Siberian nations being created, catalogues of Novosibirsk State University's virtual museum "Ancient Art of Siberia," and the Information Center "Trade of War of Siberian and Central Asian Peoples."

Joint catalogues of regional museums of Russian cities, such as the "Catalogue of Rare and Valuable Museum Artifacts from Regional Museums of the Omsk's Oblast," the "Tomsk Regional Museum of Local Lore" presenting unique collections, and the "Archaeological Heritage of Karelia."

There is also the Web portal "Archaeology of the Russian Federation," the main objective of which is the preservation and maintenance of emerging Internet information in archaeology, history, ethnography, and related historical disciplines.

Popularization of Archaeological Heritage

Academic scientific organizations of the Russian Academy of Science possess rich archaeological, ethnographical, and paleontological collections, parts of which are exhibited at permanent expositions of the "Historical and Architectural Open-Air Museum" and the "Museum of Archaeology and Ethnography of Siberian Peoples." The catalogues of a few virtual museums have been created on the basis of these collections. Materials of some archaeological and ethnographic expeditions have been exhibited throughout Europe, in Asia, and also in Australia.

Features of Modern Legislation for the Protection, Utilization, and Conservation of Cultural Heritage

Local communities take measures to protect historical and cultural heritage, but these measures are restricted to territories of traditional land use or places inhabited by ethnic groups and sacral and clan territories. In our opinion, it is advisable to develop a complex of measures related to legislation, organization, information, and recreation

at the level of government regulation, through local government and in scientific and cultural communities, so the most important tasks are:

1. Information support for management of cultural heritage, including discovery and inventory of archaeological heritage in all regions of Russia as well as for the development of schemes, cadastres, registers, databases enabling consideration of the historical and cultural potential of the territory as a basis for resource management in programmers and projects aimed at territorial objects and/or national parks, reserves, protected territories, and so on.
2. Monitoring of cultural landscapes on macro level and at the level of individual objects of historical and cultural value. Studies of ethnic differentiation, traditional land use, and economic development of cultural complexes (in the context of the Durban Declaration).
3. Development of property aspects of historical and cultural heritage management on the level of territorial and local administration. Strong regulation of town planning and other forms of economic activity is needed.
4. Maintenance of a common information network of educational institutions, libraries, museums, and archives as a key component for improving the access to information and knowledge.
5. Development of practical strategies, technologies, and new models for enhancing the historical and cultural potential of territories with consideration of geopolitical, economic, scientific, and cultural factors.

Cross-References

► Medieval Russia (Rus'), Archaeology of

Further Reading

Fund "Archaeological Heritage". Available at: http://www.council.gov.ru/inf_ps/chronicle/2005/12/item4012.html; http://www.archaeology-russia.org/

Gaimk – Institute of History of Material Culture of RAS. Available at: http://www.archeo.ru/eng/index.htm

Institute of Archaeology and Ethnography of Sbras. Available at: http://www.archaeology.nsc.ru/default.aspx

Institute of Archaeology RAS. Available at: http://archaeolog.ru/

Institute of Cultural and Natural Heritage. Available at: http://www.heritage-institute.ru/index.php?title=%D0%97%D0%B0%D0%B3%D0%BB%D0%B0%D0%B2%D0%BD%D0%B0%D1%8F_%D1%81%D1%82%D1%80%D0%B0%D0%BD%D0%B8%D1%86%D0%B0

Kocheshev, S.P., ed. 2011. *Culture: Management, economics, law*, vol. 1.

Lbova, L.V., and M.Ya. Sklyarevskyi. 2006. Management of history. In *State protection in sphere archeological heritage*, Cultural heritage, ed. V.I. Molodin, vol. 6. Novosibirsk: NSU.

Makarov, N.A. 2004. *Predatory excavations as a factor in the destruction of the archaeological heritage of Russia*. Moscow: Institute of Archaeology RAS.

Mazurov, U.L., ed. 2001. *Methodical recommendations for environmental monitoring of immovable cultural heritage*. Moscow: Institute of Heritage.

Medved, A.N. 2004. *Museification archeological sites in Russia (past and present)*. Moscow: Gnom & D.

Ministry of Culture of Russia. Available at: http://mkrf.ru/

Museum Portal "History and Culture of Siberian's and Far East Peoples". Available at: http://www.sati.archaeology.nsc.ru/museum/prj7/href.php?hr=all

Okladnikov, A.P., ed. 1968. *History of Siberia, volume 1: Ancient Siberia*. Leningrad: Nauka Press.

Public Organizations of Protection Archaeological Heritage in Russia. Available at: http://www.amatororg.ru/; http://www.archae.ru/projects/protection-archaeological/

Rybakov, B.A., ed. 1981–1996. *Archaeology from ancient times to the Middle Ages*. Moscow: Nauka.

Smirnov, A.S. 2004. Protection of archaeological heritage in the federal law "on objects of cultural heritage (monuments of history and culture) of the peoples of the Russian Federation". In *Proceedings of the round table of the federation council conservation of the archaeological heritage of Russia*. Moscow.

State Historical Museum (GIM). Available at: http://www.shm.ru/dep_archeolog.html

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Sabloff, Jeremy Arac

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Basic Biographical Information

Jeremy Arac Sabloff is a leading anthropological archaeologist, specializing in the comparative study of cities and urbanism with a focus on the ancient Maya. His work is characterized by an intellectual commitment to balancing science and humanism. Born in 1944, he grew up in Manhattan. He received his B.A. from the University of Pennsylvania in 1964 and his Ph.D. from Harvard University in 1969 under the direction of Gordon R. Willey. He has taught at Harvard University, the University of Utah, the University of New Mexico (where he was chair of the department), the University of Pittsburgh (where he also was chair), and the University of Pennsylvania where he was Christopher H. Browne Distinguished Professor of Anthropology. At Penn, he also served as the Williams Director of the University of Pennsylvania Museum from 1994 to 2004 and Interim Director from 2006 to 2007. He is currently the president of the Santa Fe Institute in Santa Fe, New Mexico (Fig. 1).

Sabloff has held or currently holds many influential positions in the profession. He has served as president of the Society for American Archaeology, chair of the anthropology section of the American Association for the Advancement of Science, chair of the Smithsonian Science Commission, and editor of *American Antiquity*. He is a member of the National Advisory Board of the National Museum of Natural History and the Board of Trustees of the SRI Foundation and chairs the visiting committee for the Peabody Museum at Harvard University. He is the recipient of numerous professional awards and honors. Among the most prestigious of these are his memberships or fellowships in the National Academy of Sciences, the American Philosophical Society, the American Academy of Arts and Sciences, the Society of Antiquaries of London, and the American Association for the Advancement of Science.

Major Accomplishments

Sabloff is a specialist in Maya archaeology and has made major contributions to the understanding of settlement and urbanism. As a graduate student, from 1965 to 1968, he joined Gordon Willey's project at Seibal, Guatemala. His main focus was the study of ceramics. From 1972 to 1973, he and William Rathje developed the Harvard-Arizona Cozumel Project in Quintana Roo. In the course

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Sabloff, Jeremy Arac, Fig. 1 Jeremy Arac Sabloff (InSight Foto Inc.)

of two field seasons, they studied approximately 30 sites in order to understand the role of long-distance trade in the development of Mesoamerican states. Although the project results did not support the port-of-trade model, the research provided an important new perspective on the Late Postclassic Period. From 1983 to 1988, he and Gair Tourtellot established a long-term project at the site of Sayil in Yucatan, Mexico. This project investigated for the first time the archaeology, environment, adaptation, organization, and history of an entire Maya city in the Puuc region of Yucatan.

Sabloff is equally well known for his contributions to the history of American archaeology. His overview of American archaeology, coauthored with Willey, was the first comprehensive history of the field. Significantly, they provided an intellectual genealogy for the rise of the new or processual archaeology by identifying four broad periods: Speculative (1492–1840), Classificatory-Descriptive (1840–1914), Classificatory-Historical (subdivided into Chronology (1914–1940) and Context and Function (1940–1960)), and the Explanatory (1960–present) (Willey and Sabloff 1974, 1980). Some of the important trends that they identified were the growing emphasis on evolutionary thinking, general systems theory, ecological models, and deductive reasoning in the context of making archaeology more scientific. They also argued that the new archaeology was not a revolution in the Kuhnian sense. Rather, it signaled a field in crisis yet to coalesce around a single theory. In their most recent edition (Willey and Sabloff 1993), they emphasize the importance of avoiding dogmatic thinking in method and theory and of acknowledging that the scientific and humanistic goals of the discipline are complementary rather than antithetical.

Sabloff has made numerous contributions to archaeological method and theory. He published with Willey an influential essay on the importance of history to processual explanation and argued that the Classic Lowland Maya collapse was due to an invasion of non-Maya peoples (Sabloff and Willey 1967). This essay was subsequently critiqued by Lewis Binford for not putting hypothesis testing first. In 1978, Sabloff joined the faculty of the University of New Mexico where Binford was teaching. At this time, he was focusing on the role of simulation in archaeology as a tool for understanding settlement change (Sabloff 1981). Team teaching with Binford led to an influential essay on paradigms and systematics that concluded with a plea for a "science of the archaeological record" (Binford and Sabloff 1982; Sabloff et al. 1987). Sabloff is committed to the comparative method to draw out insights about culture history and process. He coauthored a book on the rise of New and Old World civilizations with C. C. Lamberg-Karlovsky (Lamberg-Karlovsky and Sabloff 1979; also see Sabloff and Lamberg-Karlovsky 1975). A more recent

example is his book on ancient cities coedited with Joyce Marcus (Marcus and Sabloff 2008).

Finally, Sabloff is an outspoken advocate of the role of archaeology in the modern world and avid proponent of science communication. As the Williams Director of the Penn Museum, he eagerly embraced the challenges of educating the public about anthropology and archaeology. He published his book *Archaeology Matters* (Sabloff 2008) to demonstrate how archaeology contributes to the understanding and amelioration of present-day problems. Using his research on ancient Maya civilization as an example, he noted that the collapse of Classic Period Maya civilization provides important insights into such contemporary issues as overpopulation, shortsighted agricultural policies, and political competition. In 2010, he delivered the distinguished lecture at the American Anthropological Association's annual meeting, encouraging anthropologists to make their work accessible to their relevant publics and cultivate a new generation of scientist communicators (Sabloff 2011).

Cross-References

- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Mesoamerica: Complex Society Development
- ▶ Science Communication in Archaeology
- ▶ Willey, Gordon Randolph

References

Binford, L.R., and J.A. Sabloff. 1982. Paradigms, systematics, and archaeology. *Journal of Anthropological Research* 38 (2): 137–153.

Lamberg-Karlovsky, C.C., and J.A. Sabloff. 1979. *Ancient civilizations: The Near East and Mesoamerica*. 2nd ed., 1995. Menlo Park: Cummings.

Marcus, J., and J.A. Sabloff, eds. 2008. *The ancient city: New perspectives on urbanism in the Old and New World*. Santa Fe: School for Advanced Research Press.

Sabloff, J.A., ed. 1981. *Simulations in archaeology*. Albuquerque: University of New Mexico Press.

Sabloff, J.A. 2008. *Archaeology matters*. Walnut Creek: Left Coast Press.

Sabloff, J.A. 2011. Where have you gone, Margaret Mead? Anthropology and public intellectuals. *American Anthropologist* 113: 408–416.

Sabloff, J.A., and C.C. Lamberg-Karlovsky, eds. 1975. *Ancient civilization and trade*. Albuquerque: University of New Mexico Press.

Sabloff, J.A., and G.R. Willey. 1967. The collapse of Maya civilization in the Southern Lowlands: A consideration of history and process. *Southwestern Journal of Anthropology* 23 (4): 311–336.

Sabloff, J.A., L.R. Binford, and P.A. McAnany. 1987. Understanding the archaeological record. *Antiquity* 61: 203–209.

Willey, G.R., and J.A. Sabloff. 1974. *A history of American archaeology*. 2nd ed., 1980; 3rd ed., 1993. San Francisco: W.H. Freeman.

Willey, G.R., and J.A. Sabloff. 1980. *A history of American archaeology*. 2nd ed. San Francisco: W.H. Freeman and Co.

Willey, G.R., and J.A. Sabloff. 1993. *A history of American archaeology*. 3rd ed. New York: W.H. Freeman and Co.

Further Reading

Sabloff, J.A. 1989. *The cities of ancient Mexico: Reconstructing a lost world*. 2nd ed., 1994. London: Thames and Hudson.

Sabloff, J.A., and W.L. Rathje. 1975. *A study of changing Pre-Columbian commercial systems: The 1972–1973 seasons at Cozumel, Mexico*. Monographs of the Peabody Museum 3. Cambridge: Peabody Museum.

Sabloff, J.A., and W.L. Rathje. 1990. *The new archaeology and the ancient Maya*. New York: Scientific American Library (2nd ed., 1994 New York: W. H. Freeman and Co).

Sabloff, J.A., and G. Tourtellot. 1991. *The ancient Maya city of Sayil: The mapping of a Puuc region center (Pub. 60)*. New Orleans: Middle American Research Institute, Tulane University.

Sabloff, J.A., T.W. Beale, and A.M. Kurland Jr. 1973. Recent developments in archaeology. *Annals of the American Academy of Political and Social Science* 408: 103–118.

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Sacred Site Conservation and Preservation

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Introduction

Sacred sites are widely considered to be different from other forms of archaeological sites and cultural heritage in that they represent and are imbued with sacred or spiritual values by a

religion, the adherents of a specific faith, or a group of people in the past or the present. In that respect, sacred sites are among the world's most popular visitor attractions (Shackley 2001) while religious heritage in general is estimated to constitute "perhaps the largest single category of heritage property to be found in most countries around the world" (Stovel 2005: 2). Because of their tangible and intangible associations and meanings and their potential active use for religious or other purposes, sacred sites demand particular attention, and their conservation and preservation often requires special treatment and sensitivity.

Definition

The popularity of sacred sites within the wider heritage industry can threaten their physical integrity, impose changes or impact their contemporary use. At the same time, the contemporary principles of conservation and cultural resource management, that demand preservation for present and future generations, can often advocate interventions and operational strategies that may seemingly compromise the very essence of a sacred site: its sacred or living heritage value and its use by traditional custodians or the people who value it. Therefore, when dealing with this specific type of heritage, archaeologists and other heritage professionals have great responsibility in recognizing both the human dimension of the site in question and the immaterial values it holds.

Key Issues/Current Debates/Future Directions/Examples

There is a very broad range of places that can be termed sacred sites and the differences relating to the geographical location, the antiquity, the size, the cultural and social affiliation, and other special characteristics may be enormous. One common way to categorize these numerous sacred sites is by distinguishing those that are today actively used by a living religious tradition or a group of people for religious or spiritual purposes (e.g., active churches, mosques, temples, monasteries, sites constituting or associated with pilgrimage destinations) as opposed to those that were valued for their sacredness or other intangible values in the past but are not religiously active in the present (e.g., the megalithic monuments of prehistoric Europe or the temples and sanctuaries of Ancient Greece and the Roman Empire). The latter share more similarities to historical monuments or sites with primarily archaeological value. However, in countries such as Greece, it has been argued that the importance of monuments that have served in building and consolidating national consciousness and identity, such as the Parthenon temple on the Acropolis hill in Athens, is subject to a certain form of sacralization (Hamilakis and Yalouri 1999). Even sites associated with long gone cultures or civilizations that archaeologists may consider "dead" can become a contested space and may be appropriated by groups of people that claim to continue old religious traditions, as witnessed in the case of the pagan/neo-shaman worshippers (Blain and Wallis 2007). It is also important to consider, when thinking of the spectrum of examples that the term sacred sites can encompass, that for certain cultures a sacred site may be a landscape thus emphasizing the role of the natural environment in this process – with Aboriginal Australian notions with regard to living landscapes a case in point (Colley 2002). In addition, there are also places such as holocaust sites, war memorials, burial grounds, or political shrines that are vested with certain holiness and religious undertones (Shackley 2001: 155–174). These places, although secular in character, can also be viewed as sacred by specific groups of people.

What becomes evident from the aforementioned range of examples is that, whether belonging to the major world religions or to the individual sacred traditions of indigenous people and descendant communities, dealing with sacred sites also means dealing with the people who value them. Without doubt, sacred sites have always posed certain challenges and problems to archaeologists and heritage professionals that have strived to conserve and preserve them. Indeed, approaches to the conservation of sacred

sites, in order to balance both tangible and intangible values, need to carefully consider issues related to different definitions of sacredness, ownership, right to worship, public access, and the wider meanings and associations placed by stakeholders on a local, regional, national, and international level. Active sacred sites that are valued as cultural heritage present additional complexities because they carry with them the requirements of contemporary life and cooperation among heritage professionals and religious communities can become particularly complex if the worldviews and consequently the aspirations and expectations towards any given intervention are different. Such examples truly demonstrate the difficulties in bridging modern secular standards of conservation and heritage management with traditional ways of life and faith.

It has been claimed that heritage professionals often find religion too hard to tackle because the religious context is too sensitive "to treat with objectivity and fairness" (Stovel 2005: 2) or because they lack the proper approach to understand it and to adequately articulate and communicate their aims to the concerned stakeholders (McNally 2011). The challenge, from the part of the conservator or archaeologist, is finding a way to conserve and preserve sacred sites without attempting to fossilize the traditions they represent and the religious groups that actively use them. On the other hand, custodians of sacred sites usually regard themselves predominantly as "facilitators of worship" and may have very different views on how the elusive spiritual quality of a sacred place may be preserved without serious compromises (Shackley 2001: xv–xvi). As a result, traditional ways of dealing with sacred sites do not often conform to conventional standards of heritage management practice. Furthermore, the way archaeologists and their institutions are perceived can hinder mutual trust and collaboration. For example, archaeologists are often not viewed in a positive light by indigenous communities because they are seen to intrude through excavation on sensitive sacred space and to provide interpretations that are sometimes not valid to local sacred beliefs (Layton 1989; Carmichael et al. 1994). Tensions and conflicts can arise particularly when heritage professionals are acting as an authority that dominates decision-making and excludes alternative voices. The case of the Orthodox monastic community of Mount Athos, a World Heritage Site located in Northern Greece, illustrates the difficulties of achieving mutual understanding and essential cooperation among the national archaeological authorities and the monastic authorities – the area being a self-governed part of the Greek state ruled by century-old customary traditions and laws (Alexopoulos 2010). In order to empower the Athonite monasteries in decision-making about the conservation and preservation of their own area, a special agency has been established (KEDAK = Centre for the Preservation of Athonite Heritage) with an administrative council that consists of representatives of several disciplines (e.g., archaeologists, architects, engineers), practitioners, academics, state officials (politicians), and, most importantly, members of the monastic community.

A very common source of tension and conflict between religious communities and heritage professionals is the adherence of the latter to principles and standards of practice that advocate the preservation of original material fabric and minimal intervention. When these principles dictate that a site should not be used for religious purposes and to accommodate worshippers, for example, for fear of physical degradation, they may clash with the worldview of a group of people that see preservation of continuity and use as primary objectives. In some cases, such as the active Buddhist temples of Sri Lanka (Wijesuriya 2005), authorities responsible for heritage conservation have taken into consideration the requests of the religious communities by offering alternative options to intervention without preventing contemporary use and the accommodation of religious practices. In a very different context, the conservation of ecclesiastical buildings in the United Kingdom has pursued to keep these places primarily in use for worship but often balancing preservation costs by also accepting an alternative or subsidiary purpose (Derrick 2004).

Some religious communities struggle to face the changes of the modern globalized world and

are resistant to its extensively secularized societies and the rapid modernization that is fueled by the advances of the information technology. At the same time, reconciling the potential of sacred sites as a financial resource with the widely held view that such places are a priceless public good (Shackley 2001: 80) is not always feasible. Many pilgrimage destinations – such as the sacred sites of the Holy Land for Christians, Mecca and Medina for Muslims, and the Char Dham circuit for Hindus – account for a massive movement of people and are supported by a large industry that is responsible for catering for transport, accommodation, etc. Consequently, another potential obstacle in the smooth cooperation between experts and nonexperts is the impact of mass tourism and the issue of visitor access on the nonmaterial qualities of sacred sites. Particularly challenging is to achieve a balance in relation to the common fear towards the perceived deconsecration of sacred heritage places by touristification or museumification (Alexopoulos 2010). When a sacred site becomes a tourist attraction, not all of the visitors can be expected to be adherents of the faith in question, but nonetheless, custodians and managers have the responsibility to accommodate accessibility, contemporary use, and any conservation interventions with respect towards the people who value the religious or spiritual values. Concerns over the carrying capacity of sacred sites in combination with a tendency to keep religious communities and worshippers uncontaminated by secular tourists often dictate measures for controlling and restricting visitor numbers, dress and behavior, and levels of accessibility (Shackley 2001). The visitor management strategies designed to cope with these problems, when formulated by the religious communities themselves, may often establish rules that exclude large sections of the wider public and limit the right of access to culture. The monasteries of Mount Athos, for example, ban female visitors from accessing the area and operate with a strict visitor quota that favors adherents of the Orthodox Christian faith. However, this measure, respected and not interfered with by-the-state heritage agencies, is deemed as vital for the raison d'être of the community of monasteries (Alexopoulos 2010).

The preservation of sacred cultural heritage has often also been jeopardized by conflicts among coexisting faiths. In the case of Jerusalem, a holy city for the monotheistic religions of Judaism, Christianity, and Islam, the challenge of preserving the several major religious sites existing within its Old City in a manner that supports tolerance and respect to all faiths can be difficult, particularly considering the tensions generated by current politics (Guinn 2006). In several other cases, religious monuments have been targeted for destruction on sectarian and ethnic grounds or as a consequence of religious fundamentalism as witnessed in the case of the Babri Masjid mosque in Ayodhya, India, or during the war that followed the breakdown of Yugoslavia and the creation of separate nation-states (Layton and Thomas 2001). Such deliberate destruction demonstrates the importance that sacred sites can have, as well as their subsequent vulnerability, as symbols of national or ethnic identity and as markers of multiculturalism and religious diversity.

Individual approaches to the treatment of sacred sites benefit from a consideration of archaeological practice and heritage conservation in a more global context. The trend towards recognizing the importance of sacred values attached to cultural heritage and dealing with the implications for the conservation and preservation of sacred sites can be traced in the postwar period. The original impetus for addressing relevant issues was provided by debates over architectural conservation, the desirable limits to restoration interventions, and the much disputed concept of authenticity. However, among the most influential developments underpinning the so-called values-based heritage management has been the Burra Charter (Australia ICOMOS Charter for Places of Cultural Significance), a policy document drafted in 1979 and revised considerably in 1999. This charter – and particularly its complementary guidelines (Australian Heritage Commission 2002) – constituted an important effort to address the notions of sacredness, spirituality, and continued traditional use by taking into consideration the associations, meanings, and heritage values of the indigenous Australian Aboriginal people.

Overall, the practice of archaeological heritage management in North America and Australia has paved the way towards an international heritage discourse that emphasized the recognition of indigenous heritage and has advocated the participation and engagement of a wider public in the conservation process. Within this context, the conservation and management of sacred sites has gradually featured in several specialized research programs and workshops of international organizations such as UNESCO (United Nations Educational, Scientific and Cultural Organization) and ICOMOS (International Council on Monuments and Sites). In recent years, ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property) in particular has been actively promoting the conservation of living religious heritage by focusing on integrated approaches and community involvement. One of the most important developments, with potential future implications for sacred sites, is the special emphasis afforded to the notion of intangible heritage, as adopted by UNESCO's Convention for the Safeguarding of the Intangible Cultural Heritage (Ahmad 2006). Despite the criticism addressed towards the tendency to separate tangible and intangible heritage values, the convention itself has underlined the importance of various manifestations (e.g., oral traditions and expressions; performing arts; social practices, rituals, and festive events; knowledge and practices concerning nature and the universe; traditional craftsmanship) that resonate with many sacred sites.

To conclude, the conservation and preservation of sacred sites has never been an easy task for archaeologists and heritage professionals, especially when faced with the task to reconcile the standards and principles of contemporary practice (advocated by the experts) with the values and perceptions of religious communities and traditional custodians (the nonexperts). However, the tensions and conflicts often generated by different stakeholders over the preeminence of tangible or intangible heritage values can be overcome through tolerance, the development and fostering of mutual respect, the ability to formulate compromising solutions, and the recognition that conservation and sacredness can coexist. Archaeologists, in particular, can gain immensely from a better awareness of and a "more refined understanding of the workings and diversity of religious practices and beliefs" (McNally 2011: 172) (Fig. 1).

Sacred Site Conservation and Preservation, Fig. 1 A view of the Orthodox monastery of Iviron on Mount Athos, Greece – an important sacred site that constitutes a major pilgrimage destination, a World Heritage Site, and is host to a thriving self-governed monastic community with twenty ruling monasteries. (Photograph by Georgios Alexopoulos 23.08.2005)

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Intangible Cultural Heritage
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ Sacred Sites in Indigenous Archaeology
- ▶ Stakeholders and Community Participation
- ▶ Uses of Heritage

References

Ahmad, Y. 2006. The scope and definitions of heritage: From tangible to intangible. *International Journal of Heritage Studies* 12: 292–300.

Alexopoulos, G. 2010. Reconciling living religious heritage with value-based management: The case of Mount Athos, Greece. Unpublished Ph.D. dissertation, University College London.

Australian Heritage Commision. 2002. *Ask first: A guide to respecting indigenous heritage places and values*. Canberra: Australian Heritage Commission.

Blain, J., and R.J. Wallis. 2007. *Sacred sites, contested rites/rights: Contemporary pagan engagements with archaeological monuments*. Brighton: Sussex Academic Press.

Carmichael, D.L., J. Hubert, B. Reeves, and A. Shanche, eds. 1994. *Sacred sites, sacred places*. London/New York: Routledge.

Colley, S. 2002. *Uncovering Australia: Archaeology, indigenous people and the public*. Washington, DC: Smithsonian Institution Press.

Derrick, A. 2004. New work in historic places of worship: New guidance from English heritage. *Conservation* 46: 12–13.

Guinn, D.E. 2006. *Protecting Jerusalem's holy sites: A strategy for negotiating a sacred place*. Cambridge: Cambridge University Press.

Hamilakis, Y., and E. Yalouri. 1999. Sacralising the past: Cults of archaeology in modern Greece. *Archaeological Dialogues* 6: 115–135.

Layton, R., ed. 1989. *Conflict in the archaeology of living traditions*. London: Unwin Hyman.

Layton, R., and J. Thomas, eds. 2001. Introduction: The destruction and conservation of cultural property. In *The destruction and conservation of cultural property*, ed. R. Layton, P. G. Stone, and J. Thomas, 1–21. London/New York: Routledge.

McNally, M.D. 2011. Religious belief and practice. In *A companion to cultural resource management*, ed. T.F. King, 172–202. Chichester: Wiley-Blackwell.

Shackley, M. 2001. *Managing sacred sites: Service provision and visitor experience*. London/New York: Continuum.

Stovel, H. 2005. Introduction. In *Conservation of living religious heritage. Papers from the ICCROM 2003 Forum on living religious heritage: Conserving the sacred*, ed. H. Stovel, N. Stanley-Price, and R. Killick, 1–11. Rome: ICCROM.

Wijesuriya, G. 2005. The past is in the present: Perspectives in caring for Buddhist heritage sites in Sri Lanka. In *Conservation of living religious heritage. Papers from the ICCROM 2003 Forum on living religious heritage: Conserving the sacred*, ed. H. Stovel, N. Stanley-Price, and R. Killick, 30–43. Rome: ICCROM.

Sacred Sites in Indigenous Archaeology

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Brief Definition of the Topic

Australian indigenous sacred sites are both a place associated with customary practices and beliefs and a legal entity, identified and protected under Australian laws. It is a site in the landscape that is of specific cultural and social custom, a place of significance according to Aboriginal laws and traditions. Sacred sites are tied into the creation myths, song lines, personal histories, and events of the indigenous peoples. They connect individuals, both as traditional owners and custodians of the present with that of the Dreaming and map a totemic geography across the landscape, anchoring spiritual and kinship relationships to the land (see Elkin 1933; Berndt 1970; Strehlow 1971; Mountford 1976).

The Dreaming is a word to describe the creation time, its associated stories, and sacred sites, when the ancestor beings interacted with the land, created all living things, and formed natural features. Different Australian indigenous groups have their own word and understanding of this concept, like Tjukurrpa for the Arrernte of central Australia or the Pilbara Guruma word Yulurngulurngkamu. Indigenous Australian beliefs link the Dreaming, ancestor beings, sacred sites, and present-day actions into an integrated relational concept.

Sacred sites, although spiritually derived, have a physical manifestation, being natural features like rock outcrops, trees, water holes, or coral reefs or culturally marked places like stone arrangements and rock art. They can range in size and configuration from a single stone to a mountain range and embody both natural and culturally constructed markers. For indigenous Australians, the sacred is manifest in all aspects of nature and the landscape. Knowledge of sacred sites is learned through ritual attendance, initiation, and explanation of traditional law and lore. Singing the country and hearing and participating in the songs are ways of leaning about both the sacred sites and associated traditional knowledge. The act of singing and ritual renews and invigorates the spiritual essence of the land; it keeps the country alive (see Bradley 2010).

Protection of sacred sites is fundamental in ensuring the well-being of the country and people. Aspects of sacred sites may document historical happenings, inform on behavioral dictates and cultural values, and demonstrate personal links to ancestor, both Dreaming and genealogical. Places and knowledge may be restricted to gender, age, and initiation status. Locations and the mythological association of the place may be benevolent or contain great power which can destroy. Some places require the enactment of rituals and songs for the maintenance of species (see Daniel 1990). Other locations necessitate specific customary behavior to placate residing spirits or ensure illness does overcome the visitors.

The patterns of sacred sites weave a tapestry of resource access and control, land ownership, and traveling pathways. Areas and features are natural reference points throughout the landscape, many the physical manifestations of actions and marks created by the ancestor beings in the Dreaming. Some, like the Wandjina figures in the Kimberley rock art, are the shades of the Dreaming spirits (Crawford 1968; see also Lewis and Rose 1988). With these Wandjina figures, as with other sacred places, contain a dormant power that can be access through song and ritual performance.

The current social, educational, and traditional knowledge and land association of the indigenous people across Australia are variable, this often reflecting the timing, extent, and actions of white Australian occupation. Laws enacted for the protection and management of Australia's cultural heritage reflect this situation and what is important to the lawmakers. The *Northern Territory Aboriginal Sacred Sites Act* is undoubtedly the strongest in terms of protection and providing Aboriginal control in the process. Other states place more emphasis on archaeological rather than sacred sites, although, in cases, there are archaeological components to a sacred site. In the situation of the *Queensland Heritage Act 1992*, it specifically excludes places which would be regarded as sacred site but do not have material cultural evidence.

Cross-References

- ► Sacred Site Conservation and Preservation
- ► Sacred Traditions and "Art" in Hunter-Gatherer Contexts
- ► Silbury Hill: Environmental Archaeology

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References

Berndt, R.M. 1970. *The sacred site: The western Arnhem Land example*. Canberra: Australian Institute of Aboriginal Studies.

Bradley, J. 2010. *Singing saltwater country*. Sydney: Allen & Unwin.

Crawford, I. 1968. *The art of the Wandjina*. London: Oxford University Press.

Daniel, D. 1990. *Thalu sites of the West Pilbara*. Perth: Department of Aboriginal Sites, Western Australian Museum.

Elkin, A.P. 1933. Totemism in north-western Australia (the Kimberley Division). *Oceania* 3 (4): 435–481.
Lewis, D., and D. Rose. 1988. *The shape of the dreaming*. Canberra: Aboriginal Studies Press.
Mountford, C.P. 1976. *Nomads of the Australian desert*. Adelaide: Rigby.
Strehlow, T.G.H. 1971. *Song of Central Australia*. Sydney: Angus & Robertson.

Sacred Traditions and "Art" in Hunter-Gatherer Contexts

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Introduction

Prehistoric hunter-gatherers produced art and practiced sacred traditions, very often in tandem, leaving associated debris at archaeological sites across the world. This section of the encyclopedia provides a summary of aesthetics and sacred concepts in prehistoric hunter-gatherer contexts, as viewed from artifacts and archaeological sites. I define terms and provide a historical background, beginning with the origins of symbolism and language (Lieberman 1998) and progressing to the historical origins of hunter-gatherer art (Lewis-Williams 2002; Mithen 2006; Clottes 2008). I then provide a summary of key issues and current debates on prehistoric hunter-gatherer art studies, including method, theory, and interpretation, concluding with four international case studies. Finally, I identify several outstanding contributions to this field which provide further information for the interested reader.

Definition

Art is defined as the production of various modes of expression – music, paintings, sculpture, and literature – that influence human senses, emotions, and thought. Art is very often a reflection of sacred tradition, defined as the transcendence from the human realm to the spiritual one. All human cultures have a conception of what is sacred to their world, usually encompassing beliefs in their origins, morals, and reasons for existence (Bellah 2011). Some anthropologists have proposed that the capacity for religion and sacred belief is an evolved characteristic of the human mind, an adaptive strategy for survival (Mithen 1996; Lewis-Williams 2002).

Art is often used to express such beliefs, but should not be thought to exclusively reflect that spiritual realm (Whitley 2011). Just as humans in the current age, hunter-gatherers in prehistory used art to express a much wider variety of experiences beyond the sacred, including subsistence practices (hunting, gathering, fishing, etc.), various material aspects of their world (animals, people, plants, etc.), historical events (battles, hunting scenes, etc.), and social life (dancing, ritual, etc.). While anthropologists have established the complex nature of both music and literature in contemporary hunter-gatherer society (Patel 2007), no material remains – in the form of sound recordings or books – exist for these forms of art in archaeological contexts. Archaeologists attempt to understand prehistoric music by the study of the few musical instrument artifacts found at archaeological sites (Mithen 2006), while literature study is restricted to the interpretation of rock art panels to gain insight into myths and stories of prehistoric hunter-gatherers.

As such, without music and literature, archaeologists are left to study art of prehistoric hunter-gatherers through objects, paintings, and sculpture found at archaeological sites. Namely, archaeologists study two types of artifacts: (1) art material culture (manufactured objects, sculptures, or portable objects) and (2) rock art (also referred to as parietal art). Art material culture is found as various forms of sculpture, using a variety of mediums, including ceramics, rock modification, plants (e.g., twig figurines), and other physical objects (Fig. 1). For example, this small palm-sized river cobble found at Ghost Cave in Montana was transformed into a human face effigy; it is a good example of art material culture, or portable art. Rock art is identified at archaeological sites in the form of pictographs, or

painted images (Fig. 2), and petroglyphs, or pecked images (Fig. 3) on rockshelters, cliff faces, large boulders, and other similar lithic landscapes. Using these two types of art, archaeologists study hunter-gatherer aesthetics in the past. This image shows a human (anthropomorph) and associated animal pictographs painted in red ocher on a cliff face in central Montana, while this petroglyph shows etched human figures engaged in a gun fight on a rock wall in southern Alberta, Canada.

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 1 Human face effigy recovered at Ghost Cave, Montana, United States. (Courtesy Montana Fish, Wildlife, and Parks)

Archaeologists often study art to understand the second topic of this encyclopedia entry, sacred tradition. Art often is produced for, or is at least inspired by, human beliefs in the sacred (Lewis-Williams 2002). For archaeologists who study hunter-gatherers, art is the only means by which we can study ancient religion and spiritual beliefs. Hunter-gatherers, because of the mobile nature of their world, generally did not produce religious architecture, such as kivas used by the Anasazi (see "▶ Chaco Canyon, Archaeology of," this volume). Hunter-gatherers also did not leave behind literature and music, as discussed above, although they surely had myths, stories, and music about these important aspects of their lives (Mithen 2006).

Thus, for purposes of this entry, sacred tradition is reflected in archaeological sites only through art material culture and rock art. For example, Fig. 4 below of a Dinwoody figure in Wyoming is thought by archaeologists to reflect Shoshone Native American vision quest practices, an important aspect of their sacred traditions.

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 2 24JF695 Foothills-Abstract rock art showing a human and turtle painted in *red ochre*, Montana, United States. (Courtesy of Mavis and John Greer)

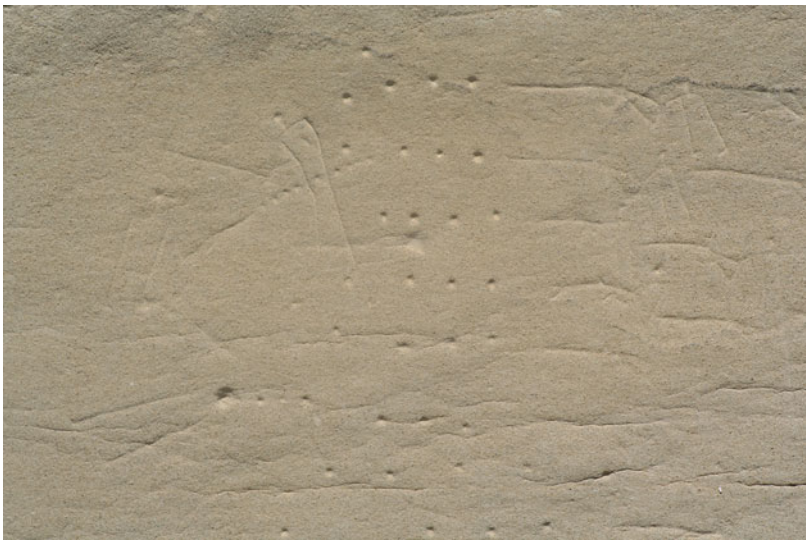

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 3 Battle scene pictograph, Writing-On-Stone Provincial Park, Alberta, Canada

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 4 Dinwoody rock art, Legend Rock, Wyoming, United States

Based on ethnographic studies of Shoshone Native Americans, Francis and Loendorf (2002: 110) explain that, "Engravings and paintings were created the morning after a vision was received in order to preserve it, as forgetting the details of the vision could result in death or illness." Hunter-gatherers, thus, often represented their sacred traditions in art, either as portable objects, non-portable sculptures, or rock art, that archaeologists can study to understand human prehistory.

Historical Background

Archaeological sites throughout the world are filled with an enormous wealth of information regarding sacred traditions and art used by hunter-gatherers in prehistory. For at least 100,000 years, people have produced art as a means of social interaction, to form alliances, to establish territories, to express themselves, to practice their religions, and to broadcast important

information (Bahn and Vertut 1997; Lewis-Williams 2002; Clottes 2008; Fagan 2010). While subsistence, economy, technology, and settlement systems are thought of as the key points of study for hunter-gatherer archaeology (see "▶ Hunter-Gatherers, Archaeology of" and "▶ Hunter-Gatherer Settlement and Mobility," this volume), the study of aesthetics and religious beliefs is also important. Due in part to the comparatively large size and organizational complexity of our brains, humans are alone in the animal kingdom in having evolved the capacity for complex thought (Mithen 1996). With this complex thought, humans evolved the origins of symbolism – the representation of one thing as another – which has also led us to a capacity for three additional uniquely human innovations: (1) language, (2) beliefs in the sacred, and (3) aesthetics (art). As Philip Lieberman (1998: xiii–xiv) states in his study of the evolution of human language, "horses run faster, gorillas are stronger, bacteria adapt faster to different environments. Speech, language, and thought differentiate humans from other species."

The prehistory of early art has long been controversial and, thus, is a fairly well-studied topic. Lewis-Williams (2002), among others (Whitley 2011), provides excellent overviews of the history of study of hunter-gatherer art. Among the early scholars instrumental in the study of prehistoric hunter-gatherer art include the Abbe Henri Breuil. Breuil's studies of early cave sites such as Altamira in Spain were critical in establishing the antiquity of art into the Upper Paleolithic period. Since then, numerous archaeologists have studied prehistoric hunter-gatherer art, including Andre Leroi-Gourhan and Champion (1982), Paul Bahn and Jean Vertut (1997), and Jean Clottes (2008) in Europe; David Lewis-Williams (2002) in South Africa; David Whitley (2011) and Keyser and Klassen (2001) in North America; and Ronald Berndt (Berndt et al. 1992) and Geoffrey Bardon (Bardon and Bardon 2004) in Australia.

One of the main foci of study of these hunter-gatherer art researchers is the origins of early art in their respective regions of study. Bahn and Vertut (1997) provide a summary of the origins of art that place the production of art material culture (art objects) back to more than 100,000 years ago in both Africa and Europe. Such art consists of ornamental jewelry, including incised bones and other human-modified natural objects (e.g., shells with bored holes) presumed to have been used in decoration/jewelry. In 2011, Henshilwood and colleagues reported in the journal *Science* on a 100,000-year-old red ochre-processing site – Blombos Cave – in South Africa which is the earliest evidence for the sophisticated and organized production of material used in modern human art production (likely used in the painting of objects, rock art, or bodies). Also in 2011 in *Science*, Henshilwood and his colleagues also recorded the earliest production of ornamentation – a string of perforated shell beads – at the same site, dating back to some 77,000 years ago. Finally, in 2002, these same archaeologists recovered a polished red ochre fragment with a motif of three parallel lines and patterned crosshatches that date to approximately 75,000 years ago (Clottes 2008).

Whether ornamental objects and incised rocks, such as those recovered at Blombos Cave, should be considered art is a key research question in dispute by archaeologists and art historians alike; without question, ornamental objects and incised or etched objects represent the earliest examples of human symbolic capacity associated with the origins of the uniquely human mind (Mithen 1996). Along with this, some also propose that this period – c. 100,000 years ago – likely marks the origins of human language, a similarly symbolic, uniquely human invention (Lieberman 1998).

Today, archaeological evidence for the earliest human art – that goes beyond ornamentation and incised tablets – is found at archaeological sites in Eurasia and Africa dating to approximately 30–40,000 uncalibrated years ago (Bahn and Vertut 1997). This marks the important event known as the Middle to Upper Paleolithic transition in which modern humans emerged in the Old World and migrated out of Africa into Europe, Asia, and Australia. With those major migrations, humans transported their art and sacred traditions, transforming them within

their new environments, wherever they decided to settle down and make their home.

In Africa, we commented above on the important work of Henshilwood and his colleagues at Blombos Cave, South Africa, pushing the origins of symbolic thought and art-like objects back to between 75 and 100,000 years ago. The earliest well-dated art objects (not ornamentation) in Africa are from Apollo 11 Cave in Namibia and include several animal figures painted on stone plaques that date to approximately 26,000 years ago (Lewis-Williams 1984: 230).

In Europe, art objects and parietal art date to approximately 30–35,000 years ago, with the earliest being a group of 17 ivory figurines from three caves in Germany; one of these from Hohlenstein-Stadel depicts a transformative figure of a human with a lion's head (Mithen 1996). The earliest painted parietal art in Europe is from Grotte Chauvet in France, at 32,000 years ago. Discovered in 1994, Grotte Chauvet remains the earliest well-dated European rock art site and is the oldest painted cave in the world (Clottes 2008). Its sophistication is unparalleled in Upper Paleolithic rock art; as such, it is assumed by most archaeologists and art historians that art was produced prior to this time but remains undiscovered at Old World archaeological sites.

While Europe has been the major focus of early rock art researchers, Bahn and Vertut (1997: 31–34) provide a summary of the earliest indisputable art in other regions of the world. In Asia, an archaeological site in Shanxi province, China, yielded a perforated stone ornamental disc dated to c. 28,000 years ago. Australia's earliest art sites include Koonalda Cave which contains human-produced striations in the cave walls that are dated to between 15 and 30,000 years ago. Finally, in the Americas, early rock art has been identified in Texas at the Gault Site, with incised bone objects dating to greater than 11,000 uncalibrated years ago. Overall, the earliest examples of art are of a similar age to the first presence of modern humans in those regions, implicating art as a uniquely human endeavor that was carried with humans as they migrated across the continents.

Key Issues/Current Debates

What Is Art?

In addition to studying the history and origins of hunter-gatherer art, the definition of art is another research issue for prehistorians. Some believe that ornamental objects such as those from Blombos Cave should be considered evidence of true art, while still others believe that the definition should be restricted to actual art material culture (portable art), sculpture, and/or paintings, as we have defined here. We leave that debate open for future archaeologists of hunter-gatherers to resolve (see Mithen 1996: 154–163).

Dating of Art

The dating of art is another major focus of archaeologists interested in the study of hunter-gatherer aesthetic and sacred traditions (Keyser and Klassen 2001; Whitley 2011). Dating art can often be quite difficult, but recent methodological advances in dating methods are allowing us to date art in innovative ways. Art of hunter-gatherers can be dated by four main methods: (1) association with dated archaeological sites or objects, (2) datable subject matter, (3) superimposition of designs, and (4) chronometric dates on the art itself. The first method – association with dated archaeological sites or objects – associates the age of an art object to a well-dated archaeological deposit from the site of the art itself or an associated one.

Second, the subject matter of the art might give its age away. In the Late Pleistocene, mammoths and mastodons and other now-extinct animals are pictured in art; we know that these animals went extinct at the end of the last ice age, so therefore we also know that any depiction of these animals predates the end of the ice age, c. 11,000 years ago. In the Americas, the depiction of the horse in Native American hunter-gatherer art means it must postdate 1,600 or so, the time after the introduction of the horse by the Spanish. Also, the representation of large, full-body shields in prehistoric Native American art of Montana and Wyoming implies that it dates before the introduction of the horse, since such full shields were deemed impractical for riding. Many other similar

subject matter interpretations are often used to date rock art.

Superimposition of designs – the third major dating method – is a very common means of dating art, one pioneered by the earliest art researchers. This method is mainly for rock art, with a series of art images painted or pecked atop one another, allowing the researcher to understand the sequence of image formation and, thus, attain a relative dating sequence.

Finally, innovations in chronometric dating are leading to a revolution in the absolute dating of art. Advances in radiocarbon dating by accelerator mass spectrometry (AMS) have allowed researchers to sample minute (less than a gram) portions of organic rock art objects and/or organic materials (e.g., charcoal) in rock art panels. It is by this means that the Grotte Chauvet rock art panels in France have been so well dated. Similarly, the lion figure from Hohlenstein-Stadel in Germany was also dated by AMS.

Another chronometric method of dating gaining some popularity is cation-ratio dating. This method measures leaching of potassium and calcium out of rock varnish in comparison to ratios to titanium in the rock (which does not leach). The Legend Rock site in western Wyoming has been subjected to cation-ratio dating to some success (Francis and Loendorf 2002); however, the method requires initial dating of the art by AMS or other methods to measure the rate of leaching within the rock in the microenvironment of the site. So, this method is untenable if one does not previously know the absolute dates of some art at the site (e.g., AMS). At this time, thus, cation-ratio dating is not considered to be as accurate as AMS or standard radiocarbon dating.

Art Interpretation and Sacred Tradition

Study of the interpretation, or meaning, of art has become a major field of study, with a suite of specialized terms used by scholars, defined well by Keyser and Klassen (2001) in their study of Plains Indian rock art of western North America. We summarize some of their key terms here to facilitate an explanation of rock art research and interpretation. Most of the world's hunter-gatherer art is either representational or nonrepresentational. Geometric designs – in the form of circles, lines, or other shapes – are examples of nonrepresentational art, or images of objects that do not occur in nature. Representational art takes the form of either anthropomorphic (humanlike) or zoomorphic (animallike) images but can depict any real object. Often, representational and nonrepresentational images are superimposed upon each other or used in tandem to form the overall composition. In this vein, art often can be depicted in naturalistic, or lifelike (realistic), form or can be abstract (nonrealistic/nonrepresentational) art that lacks obvious interpretation.

For example, Fig. 3 of a petroglyph in Alberta, Canada, is considered to be a naturalistic, representational image of humans (stick figure anthropomorphs) in combat using guns; bullets are represented in animated form by the lines of dots. Somewhat in contrast, the other image from Wyoming (Fig. 4) shows an anthropomorphic zoomorph, a combination often interpreted to represent spiritual transformation of the individual. For hunter-gatherers, this art very often shows an elongated anthropomorph becoming an animal (zoomorph) and/or attached to an animal with a line (here, a turtle), representative of a spiritual transformation. The integrated nature of both compositions contributes to the overall interpretation. Rather than being solitary images or even juxtaposed (a series of isolated, individual, unrelated images on an art object or panel), these particular works of art are coherent compositions with individual attributes that combine to form a larger meaning. In the former image, the meaning is explicit and biographic in its depiction of a battle scene, while the latter image has implicit meaning due to its largely spiritual content; we may never know this latter image's true meaning, other than to say it represents an individual's transformation from human to sacred. We understand the basic principle of the transformation, but not the precise meaning of its experience to the hunter-gatherer artist.

While these terms help us to uniformly describe hunter-gatherer art, whether it be portable material culture, sculpture, or rock art, interpreting rock art is extremely complicated

and subjective to the researchers' theoretical, cultural, and historical background. Ethnographic analogy is a key method of rock art interpretation. In this method, study of contemporary hunter-gatherers provides concepts useful in the interpretation of art produced by hunter-gatherers in prehistory. David Lewis-Williams' (2002) various books and articles on South Africa rock art have been instrumental in the understanding of the spiritual nature of much of the world's hunter-gatherer art. His methods of study have been adopted by many researchers in other areas of the world as well, namely, that much art reflects sacred traditions of hunter-gatherers, especially the concept of self-transformation that often accompanies the human quest for spiritual guidance, as shown above.

Ethnographic analogy contributes to understanding of various possible means of interpreting rock art (Whitley 2011), whether it be art produced for hunting magic (sympathetic magic) to facilitate success in the hunt, to reflect spiritual transformation through a religious experience (transformational magic), or whether the art is simply representational in an art-for-art's sake sense. The major impact of rock art research was to establish the role of symbolic imagery in art, usually through abstract symbols in combination with representational, naturalistic images of animals and/or humans. Through research of hunter-gatherer art, most archaeologists realize that there is probably more than meets the eye in art interpretation. While the image may appear to be representational and mainly naturalistic, its depiction could have hidden, implicit meaning unfathomable to the archaeologist studying the art.

In his study of trance-induced hallucinations among contemporary hunter-gatherers, Lewis-Williams (1984, 2002) identifies several art images that represent events of hunter-gatherer sacred transformation, at least among the San of South Africa. Hunter-gatherer depiction of such spiritual events often shows death (e.g., hunting scenes or bleeding life-forms), mystical flight (e.g., birds or other images of flight), drowning (to reflect the weightlessness of the spiritual experience), or sexual arousal (e.g., erect phallic representation). He argues that these images in combination with more obvious signs of transformation (combination human-animal forms) connected with lines to other animals and abstract forms likely reflect spiritual activity of the individuals. As we have discussed in this section, such images are present in even the oldest examples of hunter-gatherer art, meaning that the representation of this transformative experience (e.g., from human to animal to spirit) is among the most fundamental of human experiences that dates back to our earliest ancestors 30–40,000 years ago. It is this connection between art and sacred tradition that defines our symbolic ability as humans, which defines us as such and which is visible in the archaeological record of hunter-gatherer cultures throughout the world.

International Perspectives

This final section briefly summarizes four aesthetic systems which show the diversity of hunter-gatherer art and sacred traditions found at world archaeological sites, including Northwest Coast Native American art, Upper Paleolithic Europe portable and parietal art, South African San parietal art, and aboriginal art of the western and northern territories of Australia.

Northwest Coast North American Art

In the annals of world prehistory, many hunter-gatherer cultures exhibit characteristics of generalized foragers, including egalitarianism, high mobility, and risk minimization through expansive kinship networks. Hunter-gatherers of the Northwest Coast of North America lived in semisedentary villages of hunter-gatherer-fishers, exhibiting a complex ranked form of social organization, using storage to offset long-term resource stress. Northwest Coast art reflects the hierarchical and organizational complexity of their society (Holm 1965). Northwest Coast art includes a wide variety of mediums, styles, and produced objects. Black, red, and blue/green are the primary, secondary, and tertiary colors, with formlines and ovoids used to represent zoomorphic and anthropomorphic images, often splitting and reshaping the art forms to fit within the space of the produced object

(e.g., a wood box). Among the most commonly produced art mediums are blankets, masks, boxes/chests, bowls, rattles, jewelry, and totem poles (MacDonald 1983; Wright 2011).

Totem poles were (and still are) handcrafted by wood-working specialists, carving household crests, representations of characters in stories, and/or household histories into a tree to be placed in front of houses and ceremonial structures. Production of Northwest Coast art dates back at least 3,000 years, with objects of the tradition recovered at sites like Ozette, Hoko River, and Tse Whit Zen in coastal Washington State (Kirk and Daugherty 2007). At the site of Ozette on the northernmost Washington Coast, archaeologists and local Makah unburied a 300–500-year-old village, including thousands of well-preserved art objects in the Northwest Coast style (Kirk and Daugherty 2007: 106).

Portable art objects and sculptures dominate the aesthetic traditions of Northwest Coast, but rock art was produced as well, including the famous image of Tsagaglalal, or She Who Watches, from the Dalles in Washington State (Fig. 5). The complexity of art produced by Northwest Coast Native Americans reflects the organizational complexity of their society, with hierarchical social organization and craft specialization, rare among hunter-gatherers in prehistory.

Upper Paleolithic Europe Portable and Parietal Art

The Upper Paleolithic period of Europe persisted from c. 40,000 to 10,000 uncalibrated years ago. As introduced above, Upper Paleolithic hunter-gatherers of Europe produced some of the most sophisticated examples of portable and parietal art in prehistory (Leroi-Gourhan and Champion 1982; Conkey 1984). The earliest dated examples – Grotte Chauvet, France (parietal art) and Hohlenstein-Stadel Germany (portable art) – are among the most artistically advanced as well. As described by Jean Clottes in his wonderful book *Cave Art* (2008), Grotte Chauvet contains hundreds of painted and pecked images, including mammoth, bison, lion, rhinoceros, horse, bear, and humans. One painting called the "Sorcerer" depicts a human with a bison head in a transformative composition. Other important parietal art sites in Europe include Lascaux, Altamira, Niaux, Cosquer, Peche Merle, Trois-Freres, and Le Tuc d'Audoubert, all of which are in France or Spain, the heart of this tradition. Portable art is characterized by the famous Venus figurines found throughout sites in Germany, Italy, Spain, and France. Numerous other art objects and sculptures have been recovered and identified at archaeological sites in Europe that date to the Upper Paleolithic period, making it one of the oldest and best

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 5 She Who Watches, the Dalles, Oregon, United States

studied prehistoric hunter-gatherer art traditions in the world (Mithen 1996; Bahn and Vertut 1997).

South African San Parietal Art

As reviewed briefly above, David Lewis-Williams pioneered the study of South African San art, especially their parietal art. As shown by the finds at Blombos Cave, art in South Africa is among the earliest in the world. The early innovation of art facilitated a rich prehistory of traditions. The parietal art is particularly wonderful, depicting pictographic and petrographic images of elongated anthromorphs and zoomorphs participating in a wide range of activities, including the sacred trance dance tradition (Fig. 6), hunting practices, and other transformative religious experiences. The eland is the most commonly depicted animal in this tradition, as shown here. Transformative anthropomorphs and zoomorphs in combination with abstract geometric designs and connecting lines denote the spiritual connectedness and compositional nature of many of the murals. Lewis-Williams (1984) argues for the great (Paleolithic) antiquity of this tradition, linking it to early portable art objects that date back 15,000 years. However, he states that the best preserved and most well-dated objects that can securely date the San art tradition are 2,200 years old from Klasies River Mouth (Lewis-Williams 1984: 235).

Australian Aboriginal Art, Western and Northern Territories, Australia

The parietal and portable art of the aborigines of the western and northern territories of Australia is truly unique among world hunter-gatherer traditions (Bardon and Bardon 2004). The art is produced to reflect aboriginal views of the sacred world (Caruana 1993). Visions of the dreamtime are often depicted in aboriginal art, usually accompanied by oral narratives that describe the stories and myths and travels of mythical individuals on their dreamtime journeys through the environment and the sacred world. The mediums for Australian aboriginal art include rock walls and similar lithic landscapes but also include bark paintings and other portable objects. The earliest examples of aboriginal art occur in northwestern Australia. There, Bradshaw figures – small, pictographic, animated anthropomorphic images – are present on lithic landscapes and date to a minimum of 3,000 years ago (Caruana 1993: 157) to as old as the Late Pleistocene (>10,000 years ago). More recently, within the last few hundred years, this region has witnessed the proliferation of wandjina images, an aboriginal term used to describe pictographic anthropomorphic figures that are associated with the sky and water.

These traditions continue into the ethnographic present, with the art and dreamtime tradition

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 6 South African San dancers. (Courtesy of Jack Fisher)

remaining important to Australian aborigines. As with South Africa and the Northwest Coast of North America, the continuation of production of these art traditions into the modern era allowed for a better understanding of the prehistoric art's meaning and aesthetic purpose associated with the sacred beliefs of its producers. The art and sacred traditions of hunter-gatherers are often inseparable, since aesthetic values commonly reflect spiritual and cosmological beliefs of hunter-gatherer individuals in prehistory. Several important volumes are available to better understand these topics.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Australian Rock Art
- ▶ Chaco Canyon, Archaeology of
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Europe: Paleolithic Art
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ North American Rock Art
- ▶ South Africa: Heritage Management
- ▶ Style: Its Role in the Archaeology of Art

References

Bahn, P.G., and J. Vertut. 1997. *Journey through the Ice Age*. 2nd ed. Berkeley: University of California Press.

Bardon, G., and J. Bardon. 2004. *Papunya: A place made after the story*. Melbourne: Miegunyah Press.

Bellah, R.N. 2011. *Religion in human evolution: From the Paleolithic to the Axial Age*. Cambridge: The Belknap Press of Harvard University Press.

Caruana, W. 1993. *Aboriginal art*. New York: Thames and Hudson.

Clottes, J. 2008. *Cave art*. New York: Phaidon Press.

Conkey, M.W. 1984. To find ourselves: Art and social geography of prehistoric hunter gatherers. In *Past and present in hunter-gatherer studies*, ed. C. Schrire, 253–276. New York: Academic.

Fagan, B. 2010. *Cro-Magnon: How the Ice Age gave birth to the first modern humans*. New York: Bloomsbury Press.

Francis, J.E., and L.L. Loendorf. 2002. *Ancient visions: Petroglyphs and pictographs of the Wind River and Bighorn County, Wyoming and Montana*. Salt Lake City: University of Utah Press.

Holm, B. 1965. *Northwest Coast Indian art: An analysis of form*. Vancouver: Douglas and McIntyre.

Keyser, J.D., and M.A. Klassen. 2001. *Plains Indian rock art*. Seattle: University of Washington Press.

Kirk, R., and R.D. Daugherty. 2007. *Archaeology in Washington*. Seattle: University of Washington Press.

Leroi-Gourhan, A., and S. Champion. 1982. *The dawn of European art: An introduction to paleolithic cave painting*. London: Cambridge University Press.

Lewis-Williams, D. 1984. Ideological continuities in prehistoric Southern Africa: The evidence of rock art. In *Past and present in hunter-gatherer studies*, ed. C. Schrire, 225–252. New York: Academic.

Lewis-Williams, D. 2002. *The mind in the cave: Consciousness and the origins of art*. New York: Thames and Hudson.

Lieberman, P. 1998. *Eve spoke: Human language and human evolution*. New York: W.W. Norton and Company.

MacDonald, G. 1983. *Haida monumental art*. Vancouver: University of British Columbia Press.

Mithen, S. 1996. *The prehistory of the mind*. New York: Thames and Hudson.

Mithen, S. 2006. *The singing Neanderthals*. Cambridge: Harvard University Press.

Patel, A.D. 2007. *Music, language, and the brain*. London: Oxford University Press.

Whitley, D.S. 2011. *Introduction to rock art research*. Walnut Creek: Left Coast Press.

Wright, R.K. 2011. *Totem poles: Heraldic columns of the Northwest Coast*. Seattle: University of Washington Burke Museum Digital Collections. Available at: http://content.lib.washington.edu/aipnw/wright.html

SAFE/Saving Antiquities for Everyone

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Basic Information

Saving Antiquities for Everyone (SAFE) is a nonprofit organization devoted to combatting the illicit antiquities trade, by raising awareness among both academics and the public. By utilizing an active online presence and social media, SAFE facilitates connections between officials, the public, and on-the-ground heritage

preservation efforts. SAFE's primary goal is to raise mainstream awareness and educate the public on current events, legislation, and heritage management projects that influence the global antiquities market.

SAFE operates entirely on a community-led volunteer basis – relying on international co-creative efforts to rally against the destruction of cultural heritage and advocate for the protection of human history around the world. This unique citizen-led approach allows SAFE to respond to issues that are not always addressed in mainstream media. In this way, SAFE serves as a forum where anyone can have a voice to speak out against the illicit antiquities trade and contribute to heritage preservation efforts.

Funded in 2003 in response to the looting of the Iraq Museum, SAFE members have been at the forefront of legislative overhaul in response to wide-scale looting and heritage destruction in Iraq and across the Middle East. Since then, SAFE has expanded to include anti-looting curriculums and online campaigns with country-specific objectives and is launching on-the-ground heritage management campaigns. Through these efforts, SAFE strives to publicize these issues and projects. Fundamentally, SAFE wants to share the message that our archaeological heritage is a nonrenewable resource, worthy of protection and safeguarding for future generations.

Major Impact

Though SAFE is led by archaeologists, all of our content is created by volunteers who generously donate their time to this cause. Many of SAFE's campaigns have been designed during student internships and through volunteer-led initiatives. This volunteer force is the heart of every SAFE project, embodying SAFE's objective to empower the public and enable community-based engagement in combatting the illicit antiquities trade. In response to the devastating effects of the 2015 earthquake in Nepal, SAFE created the #HonorNepal campaign. This campaign called on followers to contribute their personal photographs of Nepal's heritage landscape into an online photo database, archiving community photographs of now lost cultural heritage.

The SAE website [savingantiquities.org] hosts a variety of news resources and articles geared toward safeguarding cultural heritage and combatting the illicit antiquities trade, by connecting the public with easily relatable materials. The *A Global Concern* section represents SAFE's increasingly international outreach. Each page of this section addresses a different country and its unique heritage preservation issues. Soon, SAFE will release the *Toolkits* project, an easily distributed anti-looting curriculum, designed to aid museum educators in discussing ethical collecting and the illicit antiquities trade. SAFE has launched numerous international advocacy campaigns to raise awareness of looting and heritage destruction, such as *Say Yes to Egypt*, *Save Old Kashgar*, and *The Donny George Candlelight Vigil for Global Heritage*, among others. Coinciding with these campaigns, SAFE has written blog posts, distributed posters and buttons, and participated in conferences.

SAFE has also participated in and sponsored many on-the-ground anti-looting initiatives. In early years, *SAFE Tours* offered participants privately guided tours through major art museums, sharing information on the history of ethical collecting and objects of contested origin. These tours challenged participants to reimagine objects without their cultural context, thereby tasking them with recognizing the importance of documentation and object history. SAFE has consulted on numerous anti-looting projects by providing interviews, offering heritage management expertise, and assisting with dissertation research. In 2016, SAFE created anti-trafficking posters for distribution in Belize airports, to alert travelers to the impact and consequences of purchasing looted antiquities. Currently, SAFE is working to partner with on-the-ground campaigns that foster anti-looting education and promote sustainable heritage management across at-risk sites.

Cross-References

- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ Vandalism and Looting (Ethics)

Further Reading

Brodie, Neil, and Colin Renfrew. 2005. Looting and the world's archaeological heritage: An inadequate response. *Annual Review of Anthropology* 34: 343–361.

Brodie, N., J. Doole, and C. Renfrew, eds. 2001. *Trade in illicit antiquities: The destruction of the world's archaeological heritage*, Series: McDonald Institute monographs. Cambridge: McDonald Institute for Archaeological Research.

Ho, Cindy. 2006. Saving antiquities for everyone: SAFE. *IKA* 32–33.

Sagalassos, Archaeology of

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Introduction and Definition

The Pisidian city of Sagalassos is located 109 km north of Antalya (Southwest Turkey) near the town of Ağlasun (Burdur Province). The ruins are situated on the southern slopes of the Ağlasun Dağları in the Western Taurus range at an altitude of 1,490–1,600 m. Although discovered in 1706 by P. Lucas, it was not until 1824 that F. V. J. Arundell identified these ruins as Sagalassos. A detailed study of Sagalassos' ruins and inscriptions was carried out in 1884–1885 by a team led by Count K. Lanckoroński. Neglected and forgotten during the following century, Sagalassos was included in the British "Pisidia Project" by S. Mitchell, who surveyed and mapped it in 1986–1988. Following a small-scale excavation in 1989 supervised by the Burdur Museum, M. Waelkens (KU Leuven, Belgium) obtained full excavation rights in 1990 (Waelkens 1993: 37–41; id. 2006). Since then, the site and its 1,200 km^2 territory (Vanhaverbeke and Waelkens 2003) have become the object of one of the largest multidisciplinary archaeological projects in the Mediterranean (Waelkens 2008). In 2014, after M. Waelkens' retirement, J. Poblome (KU Leuven, Belgium) took over as project director.

Key Issues/Current Debate

Middle Paleolithic to Bronze Age (120,000–1,200 BCE)

Recent intensive surveys in the territory of Sagalassos have indicated that from the Middle (120,000–45,000 BCE) to the Late Paleolithic/Epipaleolithic (to 10,000 BCE), hunter-gatherers were active in the eastern part of the later territory of Sagalassos. They were attracted by the available resources: good grazing for game and chert outcroppings, which they exploited to produce high-quality tools (Vandam et al. 2017b). From the Neolithic onwards, this district apparently no longer saw any human activity until the Late Chalcolithic (3,500–3,000 BCE). However, at the latest from the Late Neolithic (6,500–6,100 BCE), permanent (farming) settlements emerged in the western part of the territory, more specifically in the Plain of Burdur. Initial settlement may have been limited to two major mounds, Hacilar and Kuruçay. Their inhabitants probably practiced small-scale mixed farming (plant cultivation and animal husbandry). During the subsequent Chalcolithic (6,100–3,000 BCE) and Early Bronze Age (3,000–2,000 BCE), periods during which larger mounds coexisted with farmsteads or

hamlets alternated with centuries during which human activity in the valley appears to have been scarce. This may be caused by problems of either recognition or visibility, or social change or environmental shifts (De Cupere et al. 2015a; Vandam 2015; Vandam and Kaptijn 2015; Vandam et al. 2017a, b).

The absence of diagnostic remains makes it difficult to explain why around the start of the second millennium BCE, here as elsewhere in Anatolia, Early Bronze Age mounds were abandoned. They were gradually replaced by a landscape of principalities. At Sagalassos, it has so far proven impossible to associate local Late Bronze Age pottery found at the surface in the western part of the classical city with stratigraphic contexts. Consequently, the suggestion that Salawassa, a Luwian mountain fortress mentioned in Hittite sources around the middle of the fourteenth century BCE, might be a predecessor of Sagalassos (Waelkens 2000) cannot be substantiated. Equally unclear is through which mechanisms the Indo-European Luwian language gradually spread across Western Anatolia from the later third millennium BCE on (Poblome 2012). In any case, the region of Sagalassos seems to have been part of one of the Late Bronze Age Luwian kingdoms (Waelkens 2000).

Early Iron Age and Archaic Period (1,200–500 BCE)

After the collapse of both the Hittite empire and the Luwian kingdoms in the twelfth century BCE, the Pisidians settled the Western Taurus range. They consisted of a number of tribes; each tribe had a distinct dialect, predominantly originating from Luwian. During the Early Iron Age, from c. 1,000 to 800 BCE, there is evidence of increased human activity in the territory of Sagalassos; in fact, palynological and geomorphological research indicates a significant human presence. Around 860 BCE, major deforestation caused considerable slope erosion and corresponding valley sedimentation, lasting for two or three centuries, especially in the western valley systems (Waelkens et al. 2002; Dusar et al. 2012). Here, from the ninth century BCE on, some mountain sites emerged. Around 800 BCE, human presence also reappeared in the eastern part of the territory (Vandam et al. 2017a, b).

The subsequent Archaic period (c. 750–500 BCE) saw the development of central places/principalities with monumental burials, both in the lake district and in the Çeltikçi valley region, in the western and eastern part of Sagalassos' territory, respectively. Protected by smaller, fortified mountain sites, these sites were located in large agricultural plains and situated by natural arteries, connecting them with the southern Mediterranean coast. While these central places would have relied on smaller farming villages or hamlets, palynological evidence of potential human activity in the central part of the territory, with the Ağlasun Valley and Sagalassos, has so far yielded virtually no evidence of Archaic occupation (Poblome 2012; Poblome et al. 2013a).

Classical and Hellenistic Periods (500–25 BCE)

Except for some sites in the eastern part of the territory, most Archaic sites continued to be occupied during the subsequent Classical and Hellenistic periods (Poblome et al. 2013; Vandam et al. 2017a), during which all of Anatolia was incorporated into the Achaemenid empire. Yet gradually, a shift can be observed from fortified hilltop sites to occupation of the lower slopes or even the valley floors. The fortified hilltop settlements had a proto-urban character, yet none would develop into a city. These sites, which now also appeared in the central part of Sagalassos' territory, were all absorbed by Sagalassos between the Early Hellenistic and the early Imperial period.

Systematic occupation of the Ağlasun Valley started in late Achaemenid times, probably from the later fifth century BCE, when two new settlements co-originated, surrounded by smaller farms on the lower slopes (Poblome 2014; De Cupere et al. 2015a; Daems and Poblome 2016: 101). These two sites, Sagalassos and Düzen Tepe, were only 1.8 km apart: Sagalassos on the upper slopes of the Ağlasun Dağları and Düzen Tepe on a plateau located further down the valley (Poblome 2014). Düzen Tepe was excavated by M. Waelkens in 2006–2011 (Vanhaverbeke et al. 2010). Both were self-sustaining communities, dependent on arable farming and animal

husbandry but also developing craft activities (Daems and Poblome 2016). Düzen Tepe, inhabited until the late second century BCE, was a large, densely settled and well-fortified site covering c. 13 ha (Poblome and Waelkens 2011; Poblome et al. 2013a). Its core occupation dates to the fourth and third centuries BCE. A public bakery and a public building, as well as impressive fortification walls – unless these predate the Classical settlement – reflect a well-organized society. The site and its material culture remained virtually unchanged until its late second century BCE abandonment, possibly caused by water shortage (Waelkens and Poblome 2011: 33–56).

At Sagalassos, human activity becomes visible from the late fifth/fourth centuries BCE onwards. The first settlers were likely attracted by the local abundance of water (Steegen et al. 2000; Martens 2006; id. 2008; Waelkens 2016: 323). Although the layout and extent of Classical Sagalassos are not yet clear, initially Sagalassos was thought to have been smaller than Düzen Tepe (Poblome et al. 2013a), despite the fact that it seemed to have already controlled the greater part of the Ağlasun Valley (Poblome 2014). One recent suggestion is that during the fourth and third centuries BCE, the settlement was still a largely independent village that would only have evolved into an urban settlement from c. 200 BC onwards, possibly after extension of its territory (Daems and Poblome 2016). By 188 BCE, this territory reached as far as the southwestern part of the Burdur Plain in the west (Livy XXXVIII. 15; Polybius, Historiae XXI.36.3–4; Waelkens 2004: 444) and the Kestros River (Aksu) in the east. It eventually covered an area of 1,200 km^2.

Eighteen centuries of continuous occupation make it difficult to determine the character of Classical and Early Hellenistic Sagalassos, as its remains are buried up to 4 m below the current surface and covered by later structures. Moreover, if the local building technique was similar to that in contemporaneous Düzen Tepe – rubble plinths supporting mudbrick walls – they may have been largely destroyed by later, more monumental architecture. Nevertheless, residual material dating to this period is found at various locations in the northern part of the city. Structural remains were encountered both below the southern part of the Upper Agora (Talloen and Poblome 2016a: 114–115; id. 2016b: 124–125) and possibly even below the Urban Mansion to the east of it (Uytterhoeven et al. 2013: 376). Late Classical to at the latest Early Hellenistic clay quarrying probably took place in both the northeastern part of the Upper Agora (Daems and Poblome 2016: 97–98; Talloen and Poblome 2016a: 115–116) and in the Eastern Suburbia. As evidenced by the construction of terracing walls, contemporaneous farming was also practiced there along its northern edge (De Cupere et al. 2015b: 174). Just south of the Upper Agora, below the Roman Odeon, a small potters' quarter was active from the end of the third century into the first half of the second century BCE. It reflected a more specialized production process than had been the case in Late Classical – Early Hellenistic times (Poblome et al. 2013b). Overall, an extensive area, ranging from the southwestern part of the Imperial city up to the eastern outskirts in the later Eastern Suburbia, was already being exploited for some purpose (Daems and Poblome 2017: 60–61).

However, a recent suggestion that at the time of its conquest by Alexander the Great in BCE 333, Sagalassos was still a village (Daems and Poblome 2016: 96–98; Talloen and Poblome 2016a: 116, 147) rather than the "not a small city" mentioned by Arrian (Anabasis Alexandri I.28), seems to be contradicted by other evidence. Firstly, traces of pre-Hellenistic activities are already spread over a large part of the Roman imperial city. Secondly, during the intensive urban surveys, Classical to Early Hellenistic pottery was well represented as surface material across an extensive area, mainly in the southwestern parts of the site (Martens et al. 2008; Martens et al. 2012b; Daems and Poblome 2017: 50). This (unexcavated) area appears to contain the earliest domestic structures, including several probable Hellenistic peristyle houses (Uytterhoeven et al. 2010: 294–295). The nucleus of the earliest settlement may be located there.

Arrian wrote nearly five centuries after the event, yet his topographical description of the conical hill in front of the city (the "Alexander Hill"), on the top of which Alexander defeated the

Sagalassians, is so accurate that it must rely on an eyewitness account. It is also hard to believe that Alexander would have given up the siege of Termessos – then the second most important Pisidian town – and moved northwards to capture Sagalassos instead, if that had been a mere village. A fragmentary inscription dated to the late fourth – first half of the third century BCE, i.e., shortly after Alexander's conquest – contains a new law issued following internal strife. Written in impeccable Greek, the new lingua franca, it refers to a local system of government at Sagalassos that cannot be associated with a settlement of the village type. The text identifies Sagalassos as a "polis" with "politai" and elected, rotating magistrates ("archontes," "dikastai"). It also refers to an even older legal system (Waelkens 2018: 3–4; Eich et al. 2018: 21–28 no. 1). Interestingly, the twenty-plus individuals mentioned in the text all still have exclusively Pisidian names (Eich et al. 2018: 28).

From the Early Hellenistic period on, Sagalassos must have rapidly become Hellenized. Five centuries after its capture by Alexander, Arrian described its population as "Pisidians who were thought to be the most warlike of this warlike people" (Arrian, Anabasis Alexandri I. 28). At the time when the Roman consul Cn. Manlius Vulso entered their territory (189 BCE), Livy referred to the Sagalassians as "by far the best warriors in this region" (Livy XXXVIII. 15.7). According to Greek sources, from the early fifth century BCE on, many Pisidians served as mercenaries for the Persian Great Kings or their adversaries. This may have brought them into direct contact with the Greek colonies in Asia Minor, from which the Pisidians adopted Hellenizing influences (Waelkens et al. 2011). As the Sagalassians must have earned their reputation as excellent warlike soldiers before 189 BCE, they may well have been Pisidian mercenaries in the Achaemenid and later Seleucid and Ptolemaic armies. This may be corroborated by the omnipresence of weaponry depicted on cremation urns or bone containers – totally absent at Düzen Tepe – from the later third to second centuries BCE and on public monuments as late as the reign of Claudius (Waelkens 2018: 3). This also fits with the claim on the city's coinage, starting from the reign of Caligula, that it was of Spartan origin, as documented by the cult of the "heros Lakedaimon" (Waelkens 2018: 3 note 33).

In Early Hellenistic times (Waelkens 2004), Sagalassos became part of the realm of the Seleucids (Waelkens 2004). Because the city had refused to welcome Cn. Manlius Vulso after the Seleucids' defeat at Rome's hands in 189–188 BCE, the Romans imposed an enormous penalty (Livy XXXVIII. 15; Polybius, Historiae XXI.36.3–4). The apparent good relations with the Seleucids (Waelkens 2004: 440–444; id. 2018: 4) may also explain why around 300 BCE posthumous Alexander tetradrachms were minted at Sagalassos (Van Heesch and Stroobants 2015). This, it has been suggested, may have represented a measure of active urbanization by the Seleucids in order to facilitate market exchange and ensure the flowback – as taxation – of their silver stocks to the royal treasury (Aperghis 2004: 29–34). However, it is more likely to have been a temporary issue of "proxy Seleucid" coinage in order to pay for short-term military campaigns in the region (Le Rider and de Callatay 2006: 267). The choice of Sagalassos was perhaps inspired by the fact that it was already in full urban development, just like the other main places in Pisidia and Pamphylia, where contemporaneously similar coins were minted for similar purposes (Van Heesch and Stroobants 2015). The recent suggestion by Daems and Poblome (2016) that the Seleucids actually intervened in the urban development of Sagalassos therefore seems unlikely.

Around 200 BCE the center of Sagalassos seems to have shifted northwards, when a new political center, better suited to Hellenized urban settlement, was created around the Upper Agora (Fig. 1). The clay extraction pit in this area was infilled and an agora of beaten earth laid out, seemingly covering an area of roughly 1,000 m^2 (Talloen and Poblome 2016a: 116–118). By the end of the third century, the city had started producing pottery that drew its inspiration from the Cypriot-Levantine area rather than from shapes from the major western production centers (van der Enden et al. 2015: 90–94). This pottery was

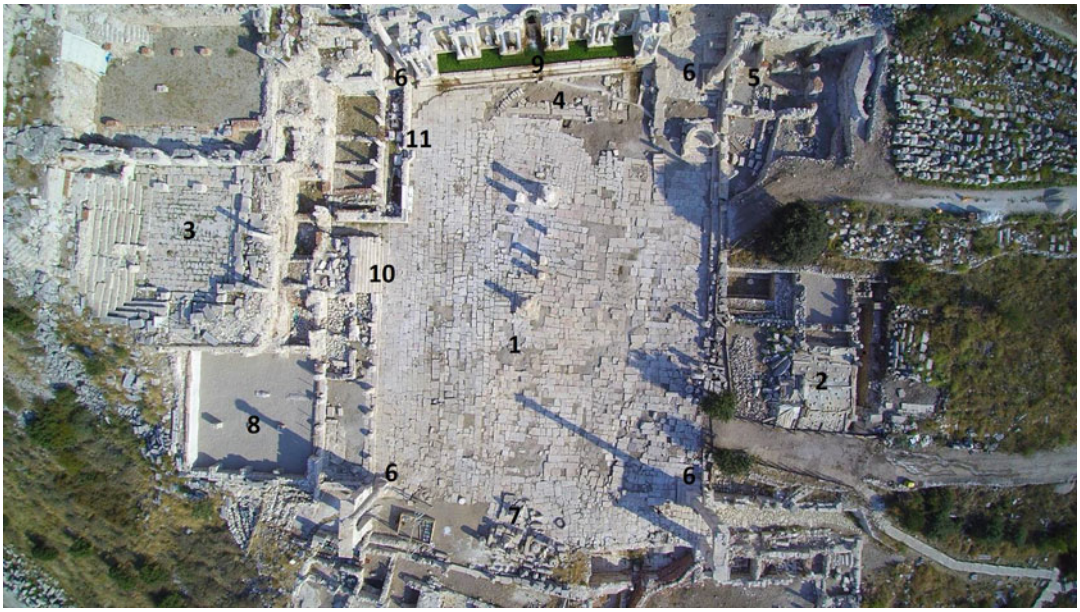

Sagalassos, Archaeology of, Fig. 1 Aerial view of the Upper Agora: in the center, the Upper Agora (no. 1). Surrounding it: the Middle Hellenistic building (no. 2), the early Imperial bouleuterion (no. 3); dated to reign of Augustus: the Doric fountain (no. 4), the NE building (no. 5), the honorific columns (no. 6) and the Tychaion (7); in the southwest corner of the square the mid-first century CE prytaneion (no. 8); along the northern edge, the mid-Antonine nymphaeum (no. 9); on the west side, the sixth-century CE monumental staircase to the bouleuterion complex (10); and the sixth-century water basin to the north of it (no. 11). (© Sagalassos Archaeological Research Project)

exported all over the territory of the city, seemingly reflecting Sagalassos' growing political influence over the region (Poblome et al. 2013a: 534). In the Hellenistic period, settlements in the territory became more numerous. Many were relocated from the upper slopes and hilltops to the lower slopes and the fertile valley floor (Vanhaverbeke and Waelkens 2003: 230, 242; De Cupere et al. 2015a: 8).

Between 188 BCE and its incorporation in the "provincia Asia" of the Roman Republic in 133/129 BCE, Pisidia was part of the Attalid kingdom (Waelkens 2004; id. 2018: 5). A large stone structure overlooking the slopes to the southeast of the Upper Agora, currently being excavated, may date to the earlier period of Attalid rule (Fig. 1, no. 2). The suggestion that it represents a market building of the Pergamene type (Talloen and Poblome 2016a: 118–119) cannot yet be confirmed (Waelkens 2018: 5). In fact, the structure – incorporated into a much larger early Imperial complex and rebuilt several times in late Antiquity – seems to be much smaller than previously assumed. Although it may have functioned as a market building, it could also have been a smaller administrative structure, as known from other Pisidian cities (Waelkens 2004: 466).

Towards the late second or early first century BCE, under Roman Republican rule (129–39 BCE), a monumental terrace building (Fig. 2, no. 3) – previously erroneously dated to the Early Hellenistic period (Waelkens 2004: 464–46) – monumentalized the access to the agora from the northeast (Talloen and Poblome 2016a: 119–120). The extant remains of the pre-Imperial city wall are Hellenistic, built around 100 BCE, yet in 189 BCE Livy described Sagalassos as a "well-fortified town in a land where such strongholds were few" (Livy, Historiae XXXVIII.15.7), suggesting there may have been an earlier wall (Waelkens 2018: 4).

Despite extortion by Roman tax collectors ("publicani"), regional wars and piracy on the Mediterranean, by the second century BCE,

Sagalassos, Archaeology of, Fig. 2 The mid-Antonine nymphaeum built c. CE 160–180 along the north side of the Upper Agora (no. 2) and replacing an Augustan predecessor (no. 1). Restored and returned to a functional state in 2010, the monument currently displays copies of original (both corner "tabernacles") and recycled statues of Olympian gods placed in it during the sixth century. Adjoining the fountain to the right, the terrace wall of a terrace building erected c. BCE 100 and pierced by a vaulted opening giving access to a postern running below the city's northern fortification (no. 3); on a higher terrace, the Late Hellenistic Doric temple (no. 4) and the restored Augustan NW Heroon (no. 5). On either side of the nymphaeum, the two northern honorific columns (no. 6). (© Sagalassos Archaeological Research Project)

Sagalassos' built-up area had begun to expand eastward, beyond the fortifications (Martens 2009: 192; Uytterhoeven et al. 2013: 376), and during the Late Hellenistic period also towards the south (Jacobs and Waelkens 2013: 223–224). This was perhaps not only the result of demographic growth, but also the consequence of a "synoikismos" with the by now largely abandoned settlement of Düzen Tepe (Waelkens 2018: 5). In any case, the settlement pattern in the Ağlasun Valley suggests a process of demographic nucleation at Sagalassos during the Late Hellenistic and Early Roman Imperial periods (Poblome 2015: 120–121). Probably during the second or early first century BCE, the city once again issued a limited number of anonymous silver and bronze coins (Van Heesch and Stroobants 2015).

Mark Antony had created a small client kingdom ruled by the Galatian king Amyntas (39–25 BCE), who expanded it over wide parts of Anatolia. However, not all citizens of Sagalassos accepted his rule; one stronghold on the eastern edge of the city's territory even resisted the king until his death. A decree by the "demos" of Sagalassos concerning a Termessian citizen, who had negotiated at this time of serious internal strife, shows that by then Sagalassos possessed a city council or "boulè," which must have convened in a building predating the early Imperial bouleuterion. The highest magistrates were now the eponymous "probouloi," who presided the council (Waelkens 2018: 5; Eich et al. 2018: 28–31 no. 2).

During the short reign of Amyntas, a fountain house of the Greek type (a U-shaped Doric stoa:

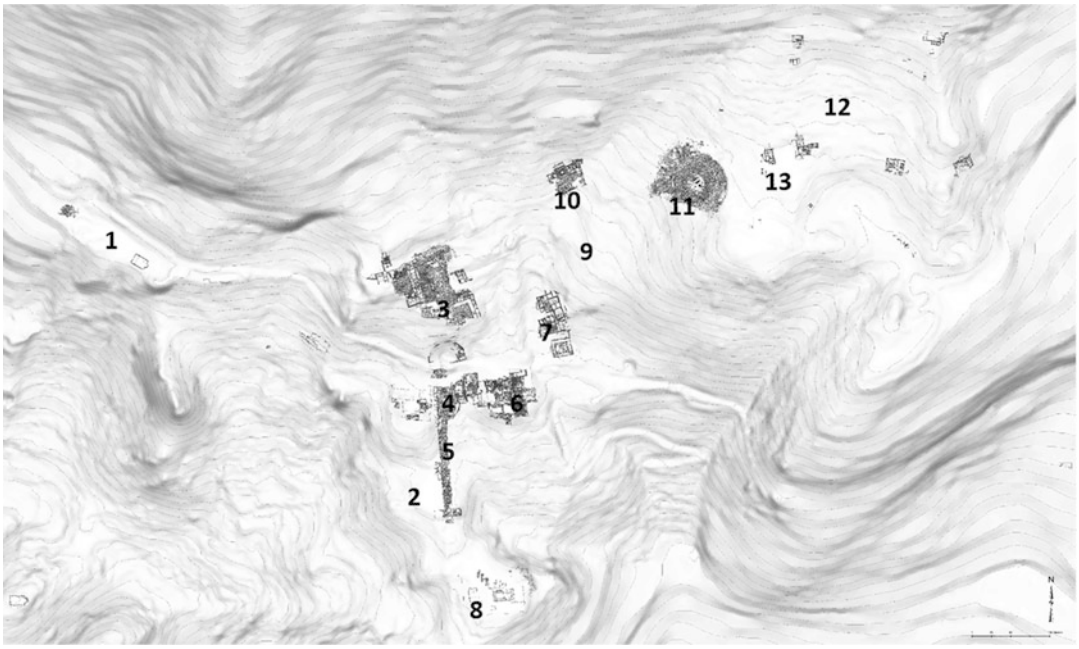

Sagalassos, Archaeology of, Fig. 3 General site plan. On the west side, the Julio-Claudian stadium (no. 1) and the southwest domestic quarter, perhaps the location of Classical/Hellenistic Sagalassos (no. 2); in the center, the Upper Agora with the macellum (no. 3), the Lower Agora (no. 4), the Colonnaded Street (no. 5), the Imperial Baths (no. 6), the Urban Mansion (no. 7), and the shrine of the Pisidian emperor cult (no. 8). On the east side, the eastern domestic quarter (no. 9) with the Late Hellenistic fountain house fronting the Neon Library (no. 10) and the theater (no. 11). In the Easter Suburbia (no. 12), the "schola" (no. 13). (© Sagalassos Archaeological Research Project)

Waelkens 2016: 323–324) was built in the by now rapidly expanding eastern domestic quarter of the city (Martens et al. 2008: 136–138; Poblome et al. 2015: 203–205). It captured the water of a local aquifer (Fig. 3, no. 10). A Corinthian temenos in the lower city and a Doric "distyle in antis" temple (Fig. 2, no. 4) – probably dedicated to Zeus – may date to the same period, since the latter's construction on a hill dominating the Upper Agora from the west predated that of the early Imperial bouleuterion (Waelkens 2002: 316–317; id. 2018: 6). The reign of Amyntas also saw a fresh start and even a peak of the local anonymous bronze coin production, possibly related to an increased military presence of the king's troops in the region (Waelkens 2002: 316–317). From now on Sagalassos would issue bronze coins intermittently throughout the Imperial period until the reign of Claudius II (CE 268–270) (Waelkens 2018: 5).

The High Roman Imperial Period (25 BCE – 300 CE)

In 25 BCE the Roman emperor Augustus (BCE 27 – CE 14) incorporated the kingdom of Galatia, including Pisidia, into the Roman Empire. During his reign Sagalassos underwent a complete metamorphosis (Waelkens 2002, 2018; Waelkens and Poblome 2011: 57–98). Augustus' foundation of seven new colonies and settlement of veterans in four existing cities – all located within a 100 km radius around Sagalassos – expanded the potential market for Sagalassos' produce and craft products by up to 60,000 colonists, predominantly from southern Gaul and central Italy (Willet and Poblome 2015: 3, 14). Combined with the city's growing territorial impact and demographic changes, this may have stimulated elite investment (Willet and Poblome 2015: 14) in a new type of tableware (Willet and Poblome 2015: 1–2). Consequently, as early as under Augustus, Sagalassians, aware that the Italian colonists

preferred fine, red-slipped tableware, turned their existing local pottery tradition into an industrial-scale production of "eastern sigillata," the "Sagalassos red slip ware" (Poblome 1999: 314). This new tableware was in all likelihood primarily aimed at external markets, mostly Pisidia and western Anatolia but also reaching central and eastern Mediterranean markets, as far afield as Ostia and Carthage, at least during the first three centuries CE (Poblome 1999; Poblome 2008: 207; Willet and Poblome 2015). The potters of Sagalassos began to expand their activities into a new quarter in the Eastern Suburbia, where the increased output correlated with an increase in production units (thus far 135 kiln locations have been identified: Murphy and Poblome 2017: 62–63; Janssen et al. 2017: 594). The genuine type of sigillata produced here initially combined new elements with regional design traditions, resulting in a specific and recognizable set of shapes (van der Enden et al. 2015: 93). An exponential growth in production took place in Flavian times, peaking in the Antonine period (Willet and Poblome 2015: 9–10). From the second half of the first century CE onwards, Sagalassos' potters switched to more generic Italian-inspired types (Poblome et al. 2007: 228).

In 6 BCE the Via Sebaste was built, connecting the major Augustan colonies with the Pamphylian ports. The city of Sagalassos maintained a stretch of over 42 miles of this important road (Eich et al. 2018: 31–39 no. 3). It offered the city direct access to the Mediterranean, and Sagalassos' elite seized this economic opportunity and invested in agriculture on a massive scale. They burned down large stretches of forest and transformed them into pasture and fields for growing cash crops such as grain and olives. A climatic optimum, starting with Augustus' reign and lasting for several centuries, enabled olive cultivation (previously confined to 900 m) up to an altitude of c. 1,400 m. Heavy-metal trace elements found in consumed animal bone indicate that the city's subsistence requirements for its estimated population of 2,500–3,000 inhabitants (Willet and Poblome 2015: 5; Janssen et al. 2017: 598) could be largely met by the production capacity of its immediate vicinity, although the local environment was heavily polluted by craft activities (Degryse et al. 2004; Vanhaverbeke et al. 2011; Fuller et al. 2012; Poblome 2015: 111–113; De Cupere et al. 2015a: 8–12). During most of the Imperial period, the output of the large territory of Sagalassos may in fact have vastly exceeded the subsistence needs of the rural population, which is estimated to have been anywhere between 6,000 and 25,000 (Willet and Poblome 2015, 6; Janssen et al. 2017, 598). Owners could thus devote surplus production not used for paying taxes in kind (annona) to trade. This explains the numerous mausoleums and expensive sarcophagi found throughout the countryside from the early Imperial period onwards, in which the landed gentry were buried near their estates (Waelkens et al. 2000a: 63, 67; Kaptijn et al. 2013: 78; Waelkens 2018: 6).

In the course of the first century CE, the city almost quadrupled in size (Fig. 3), eventually covering an area of c. 41 ha (Willet and Poblome 2015: 2). From the first century CE on, rich peristyle houses – even with private bath sections – were built in the eastern domestic quarter (Uytterhoeven 2013: 146; Uytterhoeven et al. 2013: 376–378, 392). This urban development necessitated the construction of elaborate urban water supply systems. From the reign of Augustus onwards, two aqueducts, one from the west and one from the east, respectively, provided the new lower city in the south and the expanding eastern domestic quarter with water. The largely rock-cut eastern aqueduct henceforth also fed the partially adapted Late Hellenistic fountain house, from where water was diverted to a new fountain of the Doric order along the north side of the Upper Agora (Owens 1995; Waelkens 2016: 324–328). Although the latter's existence had been assumed, the remains of its lower courses were only identified in 2017 (Fig. 1, no. 4).

During the first quarter of the first century CE, the city center was entirely monumentalized. Towards the end of the late first century BCE, the Middle Hellenistic Upper Agora had been extended to the west and doubled in size (Talloen and Poblome 2016a: 120–121), to form a roughly trapezoidal square covering 2,380 m^2 (Fig. 3, no. 1; Fig. 1). The square was

only paved just before the construction of the southwest honorific arch dedicated to Caligula (37–41 CE). Porticoes flanking the square to the west and the east were part of the same building project (Talloen and Poblome 2016a: 129–135). A portico fronting a row of shops and bordering the agora to the south was equally erected in the first century CE (Jacobs and Waelkens 2017: 177). Under Augustus, the trapezoidal agora obtained a more regular appearance through the construction of a rectangular Doric fountain along its northern edge (Fig. 1, no. 4; Fig. 2, no. 1) and the erection of the NE Building aligned with it in the northeast corner (Talloen and Poblome 2016a: 128). The latter structure, located south of the northeast access to the agora and facing the Middle Hellenistic terrace building, created a right angle, hiding the earlier oblique access (Fig. 1, no. 5). An arched gateway formed the transition between the eastern and the western extremities of the building's north wall, respectively, maintaining the orientation of the old access road and aligned with the new fountain. In mid- to late Augustan times, four nearly 14 m tall honorific columns carrying bronze statues, forming a rectangle, created even more visual regularity (Fig. 1, no. 6; Fig. 2, no. 6; Fig. 4). The two western columns were dedicated by the "people's assembly" (demos), which probably assembled on the square, to two brothers who were the ancestors of the first Sagalassian family to acquire Roman citizenship in the next generation (Waelkens 2018: 7, 9; Eich et al. 2018: 151–152 nos. 66–67). They may have been instrumental in the new layout of the agora. Most likely, one of them was also involved in the construction of a public building replaced by the current macellum southeast of the agora (Eich et al. 2018: 84). The two eastern columns were not adorned by a statue until much later (Waelkens 2015a: 100–102; id. 2018: 7; Talloen and Poblome 2016a: 123–12, 135). Around the same time, a canopy-roofed monument dedicated to the Tyche of the city (Fig. 1, no. 7) was erected in the middle of the square's south side (Talloen and Poblome 2016a: 129, 133–134).

During Augustus' reign, the urban elite was still honored with elaborate honorific monuments,

Sagalassos, Archaeology of, Fig. 4 View from the east of the southeast access to the Upper Agora with in the foreground the southeast honorific arch, dedicated to Claudius in CE 43–46, and adjoining southeast honorific column. In the background, the arch erected by Kallikles for Caligula and rededicated to Claudius in CE 41–42. Next to it the southwest honorific column carrying a statue of Kallikles' paternal uncle. (© Sagalassos Archaeological Research Project)

such as the NW Heroon (Fig. 2, no. 5), one of many on a terrace overlooking the Upper Agora from the north. This monument apparently honored a young aristocrat, who, based on the decoration, may have introduced the Dionysus cult or initiated a Dionysiac festival in the city (Waelkens et al. 2000c; Waelkens 2015a: 99–100).

During the first quarter of the first century CE, a (new) bouleuterion of Hellenistic type – Doric outside and Corinthian inside – decorated with a weaponry frieze, arose on the slope between the Doric temple and the expanded Upper Agora. Accessed from an open courtyard to the north of it (Talloen and Poblome 2016b: 121–127;

Waelkens et al. 2000b: 246–268), it had a U-shaped seating arrangement for c. 220 council members (Fig. 1, no. 3). Around the same time, the Middle Hellenistic "market building" along the agora's southeast corner was incorporated into a larger structure with a central columnar courtyard (perhaps a gymnasion), of which excavation is still ongoing (Fig. 1, no. 2).

In the lower city, a second agora (Lower Agora) with a more commercial character, covering an area of 1,550m^2, was also built during the early Imperial period (Waelkens 2015a: 104; id. 2018: 7). Its orientation was different from that of the Upper Agora (Fig. 5, no. 1); it was aligned with the rectangular street pattern of the new southern urban quarters (Martens 2009: 194). The Augustan period also saw the erection of a small Ionic "distyle in antis" temple dedicated to Apollo Klarios, overlooking the Lower Agora from the west (Fig. 5, no. 3). Through Apollo, the Sagalassians may have worshipped the living emperor Augustus, who had adopted Apollo as his patron (Waelkens 2015a: 110–114; id. 2018: 8). The construction of an odeon (Fig. 6, no. 7), only finished two centuries later and eventually displacing the old council hall, completed the Augustan building programs in this area (Waelkens 2015a: 105–106), most likely all financed by the city proper.

During the reign of Tiberius (CE 14–37), one of Anatolia's oldest and widest colonnaded streets (9.6–10 m wide; 290 m long) was completed and embellished with a monumental gate at either end (Jacobs and Waelkens 2013: 222–235). Purely pedestrian (Fig. 5, no. 2), it connected the city's Lower Agora with the South Gate (Fig. 3, no. 5). Most other streets were also paved during the Julio-Claudian period, covering a very dense

Sagalassos, Archaeology of, Fig. 5 Aerial view from the south of the middle city with the Augustan Lower Agora (no. 1) extended south by a 290-m-long and 9.8-m-wide colonnaded street of Tiberian date (no. 2). Also Augustan are the shrine of Apollo Klarios (and since Vespasian the "urban" imperial cult) (no. 3). Along the north side of the agora the Trajanic/Hadrianic single-storey nymphaeum, renovated under the Severi (no. 4); on the plaza above and behind it, the two-storey late Hadrianic nymphaeum (no. 5). To the east of the agora, the Imperial Baths overlying the Old Baths (no. 6). (© Sagalassos Archaeological Research Project)

Sagalassos, Archaeology of, Fig. 6 Aerial view of the Imperial Baths overlying the remains of the Julio-Claudian Old Baths (no. 1). On the west side, the female bathing circuit (no. 2); in the center, the "marble room" (no. 3) and to the north of it the Theodosian new men's frigidarium (no. 4); on the east side, the partially excavated palaestra (no. 5) and the original cross-shaped old men's frigidarium, converted to a public hall around CE 400 (no. 6). To the northwest of the bath complex, the Odeon (no. 7). (© Sagalassos Archaeological Research Project)

water supply network that also accommodated the houses of the rich (Martens 2006: 182; id. 2009: 193–196). In 2007, the oldest known Roman bath complex in Anatolia was discovered below the second-century CE "Imperial Baths" (Fig. 6, no. 1). Known as the "Old Baths," this building, which measured 1120 m^2 and was already in use by CE 10–30, seems to follow Campanian prototypes (Waelkens and Poblome 2011: 59–60; Waelkens 2015a: 105–106; id. 2016: 328). The most likely explanation for this is the central Italian origin of many veterans in the region.

Augustus' tax reforms based on a population count system directed much of the revenue straight into the imperial treasury. Consequently, the local elite used its resources to embellish the city, often while carrying out urban magistracies. In return, the city honored them by raising dozens of honorific statues (Talloen and Poblome 2016a: 137, 147), which eventually filled both city squares or lined the Colonnaded Street. Following Augustus' death, elite building programs were focused on purely honorific monuments (mainly arches and gates) dedicated to

the emperors and their families. These served both as an instrument for local self-advertisement and as a means of acquiring Roman citizenship and eventually knighthood. Kallikles, a grandson of the aristocrat honored on the northwest honorific column on the Upper Agora, dedicated an arch to the emperor Caligula (CE 37–41) in the square's southwest corner (Fig. 4). In CE 42/43, after the emperor's death and ensuing "damnatio memoriae," he rededicated it to Claudius, topping it with statues of this emperor and his deceased brother Germanicus (Waelkens 2015a: 101–102; Eich et al. 2018: 51–55 no. 8). A few years later, in CE 43–46, the city's demos dedicated a twin arch to Claudius in the southeast corner of the square (Fig. 4), but once more it was Kallikles who erected a statue of Claudius on top of the monument (Eich et al. 2018: 55–57 no. 9a-b). The building inscription of another arch dedicated to Germanicus and Claudius near the NW Heroon shows that by then, Kallikles' family had been granted Roman citizenship (Eich et al. 2018: 57–58 no. 10). They are the first Sagalassians known to have become "cives romani" (as Tiberii Claudii: Waelkens 2018: 9; Eich et al. 2018: 59). As "civis romanus" Kallikles also dedicated an unspecified monument along the main east-west axis of the city to Claudius and Nero, the gods of the fatherland and the demos (Eich et al. 2018: 156–158 no. 71). Shortly after the middle of the first century CE, his father and uncle, as Roman citizens, financed the construction of a public building, probably a prytaneion (Fig. 1, no. 8), in the southwest corner of the Upper Agora. This building, housing the office of the magistrates responsible for the daily maintenance of the city and serving as the city's banquet hall, was excavated between 2012 and 2017 (Talloen and Poblome 2016b: 127–129).

It was probably during the reign of Vespasian (CE 69–96) that T. Claudius Piso, a son of Kallikles' uncle, forged an association between the emperor cult and the games linked to the cult of Apollo Klarios, the Klareia, which he had founded under Nero and which were held in the recently built stadium (Waelkens 2015a: 115; Fig. 3, no. 1). Piso went on to become the city's first Roman knight or "eques" (Waelkens 2015b: 116).

Under Vespasian, another high-ranking family obtained Roman citizenship (as Titi Flavii), following the introduction by one of its members of a municipal cult for the Flavian imperial house, albeit in connection with that of Apollo Klarios and housed in his shrine (Waelkens 2015a: 115–116). The area around the Lower Agora was further monumentalized in late Flavian – Trajanic times. First, the square itself was given Ionic porticoes along its long sides (Waelkens 2002: 347). Shortly after that, the Augustan Apollo temple – which in the meantime had become associated with the municipal emperor cult – was transformed into an Ionic peripteros by the addition of an outer colonnade. The latter's smooth style contrasts sharply with the exuberant local architecture of the Antonine period, but perfectly correlates locally with the transition from the first to the second century CE. The governor Proklos (Proculus) mentioned in the building inscription of this renovation must therefore have been the governor of Lycia and Pamphylia in CE 101–102 (Waelkens 2015b: 188. id. 2018: 9–10) and not one of the homonymous governors of the same province under Antoninus Pius, as recently suggested (Eck 2013; Eich et al. 2018: 71–75 no. 20). An unpublished inscription, reused in the prytaneion, confirms him as governor of that province during that year. In the Eastern Suburbia, around the end of the century, a mid-first-century structure with uncertain function (Fig. 3, no. 13) was transformed into a (semi-)public structure (probably a "schola"), which from the second into the second half of the third century accommodated the communal dining of an association (De Cupere et al. 2015b; Claeys and Poblome 2017).

The reign of Trajan (CE 98–117) initiated a century-long building boom that peaked under Hadrian, Antoninus Pius, and Marcus Aurelius. At some point after the second half of the first century CE, the NE Building on the Upper Agora was considerably enlarged and re-oriented, henceforth facing west towards the Upper Agora, where most likely it had a columnar front (Fig. 1, no. 5).

Its function however remains unclear. Local aristocrats still financed the construction of monuments dedicated to emperors, but now these structures usually also fulfilled a utilitarian function for the urban community. These included no less than five monumental fountains (Waelkens 2016: 328–333) – three of which were nymphaea with columnar screens, the two others fountains were of the so-called tabernacle type (Fig. 5, nos 5–6; Fig. 2) – and a macellum or food market (Fig. 3, no. 3; Fig. 7). This coincided with a second wave of aqueduct building at Sagalassos, as a result of which three new aqueducts supplied the fountains as well as the Imperial Baths (Waelkens 2016: 328–331). The urban elite were particularly keen to fund nymphaea of the tabernacle type, as the alternation of niches in their back walls with projecting columnar "tabernacles" or aediculae provided them with opportunities to erect statues of their founders and family members side by side with those of emperors and Olympians. In CE 116–117, members of the local Tiberii Claudii dedicated an apsidal fountain lined with freestanding columns to the city and to the emperor Trajan near the entrance of the stadium (Waelkens 2016: 328–329 Fig. 6; Eich et al. 2018: 63–65 no. 15). During the same reign, the construction of a monumental fountain bordering the Lower Agora to the north further monumentalized this square (Fig. 5, no. 4). The two-storied fountain, composed of a straight rear wall with two superposed rows of nine niches each, was lined by a two-storied columnar screen of isolated columns, fronted by a drawing basin (Waelkens 2016: 329–330 Fig. 7). However, before it was completed, most of the fountain's upper story was dismantled and the remaining part transformed into the retaining wall of a new plaza at a higher level behind it. The purpose of this drastic intervention was to increase the visibility of a new fountain, built at the back of this plaza, from the Lower Agora (Mägele et al. 2007; Waelkens

Sagalassos, Archaeology of, Fig. 7 View from the north of the central courtyard and tholos-shaped water basin of the macellum, financed by the city. A priest of the emperor cult to Commodus dedicated the surrounding porticoes, during the last decade of his reign. (© Sagalassos Archaeological Research Project)

2016: 330; Waelkens et al. 2017: 448). T. Claudius Piso, the above-mentioned first Roman knight of the city, dedicated this two-storied nymphaeum of aedicular type with projecting side wings to Hadrian (Fig. 5, No. 5). It was completed by his heirs in CE 129–132 (Mägele et al. 2007; Waelkens et al. 2017; Waelkens 2018: 12–13; Eich et al. 2018: 67–68 no. 17; 123–124 no. 49). The dismantled Trajanic nymphaeum on the Lower Agora was hidden behind another fountain – only one storey high and preceded by a columnar screen – of which the easternmost (ninth) niche was removed in approximately CE 120–125. This intervention was necessitated by the construction of the new Imperial Baths to the east of the Lower Agora, as the result of which the square's northeast entrance had to move westward, cutting the eastern extremity of the fountain (Waelkens 2016: 330 Figs. 9–10).

All this frantic building activity resulted from the fact that in CE 117–118, Hadrian transferred northern Pisidia to the province of Lycia and Pamphylia, uniting it with the rest of Pisidia, and accepted Sagalassos as the "neokoros," the officially recognized center of the imperial cult practiced by all Pisidians. He also granted it the honorific title of "first city of Pisidia, friend and ally of the Romans" (Eich et al. 2018, 68–70 no. 19). The city carried this title proudly, including on third-century CE coinage, until the fourth (or early fifth) century (Waelkens 2015a: 126–127, 2015b: 199–202; id. 2018: 10; Eich et al. 2018: 47–49 no. 7). As Pisidia's neokoros, Sagalassos hosted festivals and games, attracting visitors and delegations from all over Pisidia every year. This brought the city additional income and necessitated the construction of buildings, the size of which far surpassed local needs. They included a temple of the Corinthian peripteral type, accommodating the Pisidian emperor cult, which became the largest sanctuary of Pisidia. It was built on a promontory in the southeast part of the city (Fig. 3, no. 8). Although construction started under Hadrian, it was only completed under his successor and therefore dedicated to Antoninus Pius and his entire household (Waelkens 2015a: 120–121; Eich et al. 2018: 68–70 no 19). Henceforth, the Colonnaded Street may have been a procession street linking the two sanctuaries of the emperor cult. Its increased importance possibly prompted the replacement of at least part of the early Imperial Ionic columns with more elaborate Corinthian ones. In late Hadrianic times, the vista along the street was further improved by the construction of the late Hadrianic nymphaeum above the Lower Agora (Fig. 5, no. 5), located in the axis of the street (Jacobs and Waelkens 2013: 232–235; Waelkens 2018: 12).

Another new structure to accommodate visitors to the festivals was the Imperial Baths (Fig. 3, no. 6). Covering c. 5,542 m^2, these were built on top of the infilled Old Baths, which were incorporated into the largely artificial terrace upon which the new bath complex arose (Fig. 6). The monumental entrance of the structure as well as a large open-air palaestra was only discovered in 2012 and partially exposed in 2013–2014. Construction may have lasted until the late Severan period (Martens et al. 2012a; Waelkens 2013, 2015a: 122–123; id. 2015b: 193–195). In 2007–2008, the excavations in the southern apodyterium of the huge men's frigidarium exposed – in a later, secondary setup – the marble remains of six nearly 5 m tall acrolithic statues representing Hadrian (Fig. 8) and his successors Antoninus Pius and Marcus Aurelius and their spouses. It has been suggested that they originally stood in the Antoninus Pius Temple (Mägele 2013: 57–59). However, the inner dimensions of the cella (9.2 × 6.83 m) are less than half of those of other imperial temples with (even less numerous) statues of similar size and could hardly accommodate the three imperial couples. A sunken surface in the cella floor was erroneously associated with a base for these statues (Mägele 2017). Therefore, it is cautiously suggested here that the colossal statues may have been set up in pairs in the large niches of the "marble room" of the new bath complex (Fig. 6, no. 3). This may have been the "aleipterion," a key space where prior to the event, athletes participating in the Klareia/imperial games received the oil to cover their bodies and where the victors were given their prizes (Waelkens 2015b: 196; id. 2018: 11).

A third new structure, a theater replacing a smaller predecessor and eventually seating 7,000

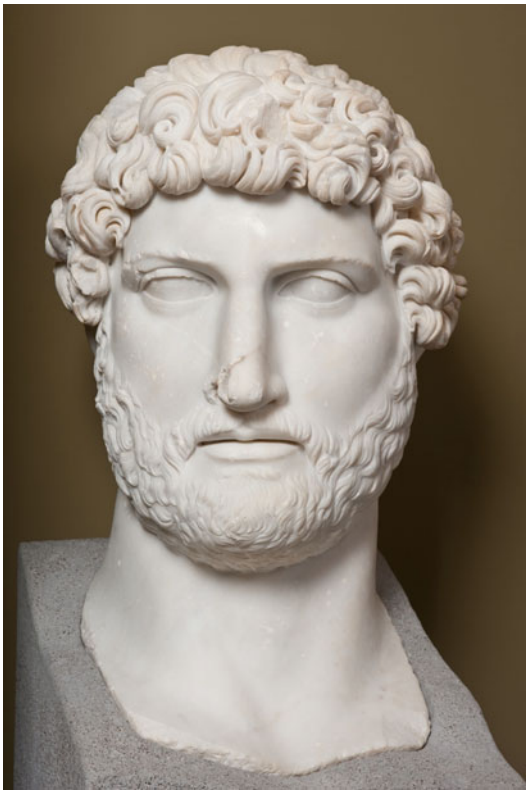

Sagalassos, Archaeology of, Fig. 8 Colossal portrait head, belonging to an acrolithic statue of the emperor Hadrian, sculpted c. CE 120–125 and at that time perhaps displayed in the "marble room" of the Imperial Baths. (© Sagalassos Archaeological Research Project)

(Fig. 3, no. 11), was completed during the later second century (Waelkens 2015a: 121–122).

Around the middle of the second century CE, T. Flavius Severianus Neon apparently became the greatest benefactor in the city's history. Between CE 120 and 125, he built a structure that may have functioned both as a public library and as a dynastic monument (Waelkens 2015c; id. 2018: 12; Eich et al. 2018: 124–127; Fig. 3, no. 10). Neon was a grandson of the man who had introduced the municipal emperor cult at Sagalassos and of a prominent female member of the local Tiberii Claudii. Together with his wife, he may also have financed the construction of the mid-Antonine nymphaeum on the Upper Agora (Fig. 3, no. 9; Fig. 2). This elaborately decorated and single-storied fountain of aedicular type with projecting side wings dates to the reign of Marcus Aurelius. It replaced the Augustan Doric stoa-like fountain (Fig. 3, no. 4; Fig. 2, no. 1) along the north side of the square (Waelkens 2015c: 235–236; id. 2016: 331–332; id. 2018: 13). Whereas the late Hadrianic nymphaeum referred to the emperor and Apollo Klarios (represented by a colossal statue), who were worshipped together in the nearby Apollo sanctuary, the mid-Antonine nymphaeum was dedicated to Dionysos. Two c. 2.5 m tall sculpture groups of Dionysos and a satyr stood in the side wings (Jacobs and Waelkens 2017: 186).

During the last decade of the reign of Commodus (CE 182–192), in commemoration of an imperial victory, a high priest of the emperor cult financed the four porticoes of a food market or macellum on a terrace below and southeast of the Upper Agora (Fig. 3, no. 3; Fig. 7). The central courtyard was paved and a tholos-shaped fountain built in the middle of it by the city (Richard and Waelkens 2012; Waelkens 2018: 13–14; Eich et al. 2018: 81–85 no. 25; 193 no. 105).

The Severan dynasty saw the completion of more than a century of continuous building activity (e.g. Odeon, Imperial Baths). Around CE 200, the Neon Library was renovated (Waelkens 2015c: 238–242) and perhaps incorporated into a new public building adjoining it to the east, of which the function remains unclear (Poblome et al. 2015). Both structures bordered a new plaza above and behind the Late Hellenistic fountain house (Waelkens 2018: 14). All of this may have been part of large-scale renovation of the infrastructure in this area, from the late second to third centuries CE (Martens 2009: 194). Around the same period or shortly after, the Hadrianic single-storied nymphaeum on the Lower Agora saw its entire undecorated upper structure replaced by an elaborately decorated entablature. This carried small Victories, probably referring to the Parthian victories of the Severi, who had recruited soldiers from Pisidia for these campaigns (Waelkens 2016: 333; id. 2018: 14). Along the Colonnaded Street, a high priest of the emperor cult dedicated a large building to Alexander Severus and Julia Mamaea (Eich et al. 2018: 89–90 no. 29). The city's second neocorate (Eich et al. 2018: 91–92 no. 31) was perhaps granted on this occasion.

Although urban survey data do not suggest considerable impact from the third-century CE crisis (Poblome 2006; Poblome et al. 2012: 170), from the 220 s onwards the involvement of the civic elite in financing public amenities gradually declined. However, by the early third century, the urban fabric was already saturated with the full array of urban amenities that were continuously maintained or renovated (Jacobs 2015: 166). Nevertheless, this stagnation in building activity was perhaps also the result of insecurities in the income of the upper crust (shrinking markets, civic instability, invasions) and a shift in focus from imperial to civic causes (Jacobs 2013: 668). This may explain why the higher echelons of Sagalassian society now invested mainly in new games that celebrated their names and association with the Klareia and the imperial cult (Eich et al. 2018: nos 44, 93, 109, 112, 120), as this allowed them to display both civic euergetism and loyalty to the emperor (Stroobants 2014: 541). Many of the agonistic inscriptions and statues of victors were now concentrated on the plaza in front of the late Hadrianic nymphaeum, built by the man who had forged the link between the Klareia and the emperor cult. In the course of the third century, the plaza saw the addition of a balustrade incorporating new bases with agonistic inscriptions on its south side, and around the turn of the century, a portico-shaped structure was added on the west side. Eventually, the plaza also housed statues of emperors (Eich et al. 2018: 147–149 no. 65). The third-century boom in agonistic festivals in Pisidia and Pamphylia also reflected the privileges granted to the region, because it supplied grain and probably arms to the Roman troops for their Persian wars. The sudden popularity of Hephaistos, the divine blacksmith, on coins from Sagalassos and the wider region may illustrate the latter (Talloen et al. 2015).

The Late Roman Imperial Period (c. 300–450 CE)

In c. CE 297 Diocletian divided the empire into new provinces grouped in "dioceses." In the process, he created a "provincia Pisidia," part of the "diocese Asiana." However, while this new provincia included Sagalassos, Diocletian selected Phrygian Antioch-near-Pisidia as its capital (Belke and Mersich 1990: 185). Nevertheless, Sagalassos continued to carry its title of "first city of Pisidia" and was recompensed – probably by Constantius II – with the title of "metropolis" (Waelkens 2018: 14; Eich et al. 2018: 47–49 no. 7; 92–94 nos 33–3). However, it was clear that the city had become to a certain degree less of a regional pole of attraction (Waelkens 2002: 356–358; Poblome et al. 2012: 170; Poblome 2015: 128).

In the third and fourth centuries CE, while cereal and olive cultivation was abandoned in parts of the territory in favor of more reliable livestock herding, the immediate vicinity of the city focused on growing walnut and grapes. Oil and wine were stored in a new type of amphora that from the middle of the fourth century was probably produced on the same estates as the content. Pottery production in the Eastern Suburbia declined (Willet and Poblome 2015: 9; Poblome 2015: 115; Janssen et al. 2017: 594), but it was neither interrupted nor as much reduced as that of many other former ceramic centers (Poblome et al. 2008; Kaptijn et al. 2013: 75, 88–90; Poblome 2015: 109, 114–115, 121–122). Nevertheless, Sagalassos red slip ware never filled the gap left by those centers (Poblome 2006: 207); from the mid-fourth century CE on, some outlying parts of the territory even shifted to other providers for their common and tableware (Kaptijn et al. 2013: 75, 79–92; Poblome 2015: 123–124). During the second half of the fourth century, however, a new line of tableware arose in Sagalassos' potters' quarter, conforming to the "koine" of Late Roman D (Poblome and Firat 2011). A century later, yet more ceramic activity started in this quarter (Murphy and Poblome 2016) and, for half a century, also east of the Neon Library (Poblome et al. 2015: 222–230; Uleners and Poblome 2014), the latter possibly reflecting a general decentralization of craft activities. Until the mid-sixth century CE it saw the production of figurines and mold-made wares (oil lamps, "oinophoroi") with some supra-regional distribution (Murphy and Poblome 2012; id. 2016; Poblome 2015: 115–116).

During the fourth century CE, Sagalassos became the third highest-ranking bishopric of the provincia Pisidia, after the Phrygian bishoprics of Antioch and Philomelion; the first documented bishop attended the Council of Constantinople in CE 381 (Belke and Mersich 1990: 368–369). During this century, the city may have seen some unrest between religious factions. The Neon Library was renovated for a second time, but it was burned down and demolished by a Christian mob some time before the turn of the century (Waelkens 2015c: 242–245; id. 2018: 14–15; Jacobs and Waelkens 2017: 177–178). This destruction also put an end to the public character of the monumental structure adjoining it to the east (Poblome et al. 2015: 215). Perhaps during the interval between the death of the orthodox emperor Valens in 378 CE and the reign of the orthodox emperor Theodosius I (CE 379–395), an Arian faction of the city transformed the Tychaion on the Upper Agora into a monument honoring the western, predominantly Arian, Valentinian dynasty. A generation later, it was rededicated to Eudoxia, wife of the emperor Arcadius (Waelkens and Jacobs 2014: 96–104; Waelkens 2015b: 204–205; id. 2018: 14–15; Jacobs and Waelkens 2017: 178–179; Eich et al. 2018: 97–101 no. 37 a–d). During the second half of the fourth century, the seats of the odeon, which was by now probably used as a more comfortable meeting place for the councilors than the early Imperial bouleuterion, were raised to a higher level, on top of a podium. This intervention protected the spectators during animal hunts and gladiatorial games, for which the building was now also a venue (Waelkens and Jacobs 2014: 117; Stroobants and Poblome 2015: 82). In the course of the fourth century, public inscriptions honoring the local elite gradually became fewer and eventually disappeared (Waelkens et al. 2006: 221–222, 226).

Overall, the fourth to sixth centuries CE represented another period of growth for the territory of Sagalassos. The number and size of villages increased (Vanhaverbeke and Waelkens 2003: 241–283; Vanhaverbeke et al. 2011) as a result of agricultural intensification and a more specialized craft and farming landscape (Poblome 2014), possibly reflecting rural demographic growth (Poblome 2015: 122–125; id. 2015b; Vandam et al. 2017b). During the fifth and first half of the sixth century, more people than ever inhabited the Ağlasun Valley (Poblome 2015: 122). During the fourth and first half of the fifth centuries, Sagalassos also saw its highest degree of specialization in livestock farming, with a marked increase in cattle, an indicator of a general intensification of land use (Fuller et al. 2010; Poblome 2015: 109, 114). As before, pigs were herded in the polluted environment of Sagalassos throughout Late Roman times. However, a drop in heavy metal content in contemporaneous cattle bones implies that beef no longer came from the valleys surrounding Sagalassos – as had been the case before, and once more from the mid-fifth century onward – but from different, less polluted areas in the territory (Degryse et al. 2004). This possibly reflects a higher integration of the rural economy into the urban economy (Vanhaverbeke et al. 2011; Stroobants and Poblome 2015), as well as intraregional economic specialization throughout the territory (Poblome 2015: 111). Although a similar pattern can be observed for ovicaprines, there seems to have existed a greater resilience in shifting their grazing locations (Fuller et al. 2012; Poblome 2015: 113).

The late fourth and fifth centuries CE were prosperous times for the city and left an impact on the urban appearance, as both public and private construction resumed. Theodosius I (CE 379–395) cemented the triumph of Christianity by an Empire-wide prohibition on pagan rituals and the forced closure of temples. Around 400, a new city wall was built, incorporating the by now abandoned Doric temple and adjacent NW Heroon as towers on either side of a new gate. However, as it followed the trajectory of the Early Hellenistic fortifications, it protected only a third of Sagalassos. Despite the use of spolia, many originating from the bouleuterion and Doric temple and some blatantly pagan, its walls were carefully built, especially near gates. This suggests there was no hasty construction caused by a specific threat, but rather the walls reflect a new civic pride (Waelkens and Jacobs 2014: 94–96; Jacobs and Waelkens 2017:

179–181). The Hellenistic fountain house, although partially providing the mid-Antonine nymphaeum with water, was not included in the fortification circuit. Nevertheless, new water-collecting systems and a small but richly decorated fountain were installed inside the new NW Gate (Martens 2008: 253; Jacobs and Richard 2012: 22–23).

During the reign of the Theodosii (CE 379–450), the Imperial Baths underwent elaborate renovation, which changed the function of many rooms. Some walls were clad with new marble and some floors covered with opus sectile, both predominantly made from spoliated material. The "marble room" (Fig. 6, no. 3) became the men's hot water bathing room (caldarium), whereas the colossal acrolithic imperial statues were moved to the southern undressing rooms of the former huge men's frigidarium (cold-water space), now sealed off from the bathing circuit (Waelkens 2013; id. 2018: 15). A mosaic inscription, laid during floor repair work in the early sixth century CE, tells us that this room was now a multifunctional public hall (demosion), also used for communal dining (Fig. 6, no. 6). It is likely that the space rapidly became used for organizing public meals on the occasion of Christian feasts and as part of Christian charity. Shortly after the frigidarium's conversion, its eastern aisle – transformed into a kitchen before the end of the fifth century CE – also accommodated a small wooden theatre, replacing the infilled "natatio." Perhaps the city council assembled here, once the Odeon had become a venue for organizing blood sports. A new men's frigidarium with a new natatio (Fig. 6, no. 4) was created in a former entrance hall (Martens et al. 2012a: 159–164; Waelkens and Jacobs 2014: 111–121).

In the late fourth/early fifth century CE, two older peristyle villas northeast of the Imperial Baths became the nucleus of an enormous urban palace, known as the Urban Mansion (Fig. 3,

Sagalassos, Archaeology of, Fig. 9 Aerial view of the Urban Mansion, built c. CE 400. On the left (north), the public part of the complex (no. 1); on the right (south), the private part (no. 2), between the bath complex (no. 3) and the large peristyle courtyard (no. 4). (© Sagalassos Archaeological Research Project)

no. 7; Fig. 9). Containing a public and a private wing, it was composed of more than ninety spaces on nine different levels. It may have been the residence of a member of a newly emerging super-elite, composed of "principals," "honorati," and bishops. Surpassing the "curiales" (council members) in power and wealth (Waelkens and Jacobs 2014: 121–123), they used their houses rather than public buildings to demonstrate their position in society. Their palatial features were enhanced by luxurious decorative elements such as mosaic floors, wall paintings, and statuary (Uytterhoeven 2014: 425–432; Uytterhoeven et al. 2013; id. 2014: 222–227). Carefully chosen decorative programs highlighted the educational background of the house owner (Uytterhoeven 2009). Whereas city councilors and municipal magistrates still carried all (by now very burdensome) financial responsibilities of their office, members of this new top class earned exemption from taxation by serving in the Imperial administration of the province(s), where they acquired large landholdings beyond their cities of origin.

By now, Christianity had become the predominant religion in Sagalassos (Waelkens et al. 2006; Waelkens and Poblome 2011: 131–152), but the classical culture remained deeply embedded in society, well into the sixth century. In fact, despite the establishment of a bishop by the end of the fourth century, the material culture shows little sign that Christianity at that time had a drastic influence on the city. Temples were abandoned rather than destroyed and their subsequent repurposing ensured their survival until the end of Antiquity (Jacobs and Waelkens 2017: 189). Apart from the destruction of the Neon Library, there is no evidence that clashes between religious factions lead to the fires ravaging in the later fourth century the prytaneion and the upper part of the market building/gymnasium.

Whereas the lower level of the market building was abandoned and infilled and its upper floor rebuilt from scratch for an unknown purpose, early in the fifth century the prytaneion was rebuilt as a three-aisled space and at within a short period lavishly renovated twice after new fires. Sigma-shaped marble tables illustrate its continued use for public banquets (Waelkens 2018: 16). During the same century, the west portico of the Upper Agora fronting a row of shops was also rebuilt (Lavan 2012: 292–295; Stroobants and Poblome 2015: 91). The workshop of a blacksmith and the possible office of a tax collector or a civil servant in charge of checking the value of the currency rapidly encroached within the portico itself (Lavan 2012: 295; Stroobants and Poblome 2015: 91). After being destroyed by the Neon Library fire, the public building adjoining it to the east was subdivided into smaller units. They included a late fourth-century dwelling, and a contemporaneous or slightly later textile and coroplast workshop, active during the second half of the fifth century and the early years of the next century (Poblome et al. 2015: 215–230). These arrangements seem to reflect a gradual change in the urban fabric, with eventually intramural burials, use of former domestic or public areas by craft activities, abandoned plots, and widespread waste dumping. The macellum also underwent overall renovation during the fifth century but operated as a food market until the second half of the sixth century, although one space was already used for waste disposal (Richard and Waelkens 2012: 83–104).

The Early Byzantine Period (c. 450–600 CE)

By the mid-fifth century, dilapidated monuments of the pagan past were being transformed into the city's first Christian basilicas. This is what happened to the abandoned shrine of Apollo Klarios – its cella and peristasis re-erected inside out – and around the same time or shortly later, perhaps also to the Hellenistic bouleuterion (Jacobs 2013: 317; Jacobs and Waelkens 2017: 180–183; Waelkens 2018: 160). Some reused reliefs of Athena and Ares from the bouleuterion in the atrium of the bouleuterion church document a Christian reinterpretation of pagan imagery (Jacobs and Waelkens 2017: 181–182). The church was erected in the former courtyard of the complex, while the original council hall henceforth functioned as an open atrium. These transformations were not symbols of the victory of the new religion; rather they reflect a continuing concern with maintaining the city's aesthetic appearance, as the highly visible structures had become eyesores in the cityscape

(Jacobs and Waelkens 2017: 183). Based on small-scale test soundings, it has recently been suggested that this church was only built around the middle or even in the third quarter of the sixth century (Talloen and Poblome 2016a 142–149; id. 2016b: 121–127). However, the current remains clearly belong to a renovation phase of the church, when a new mosaic in the basilica's aisles and an opus sectile floor in the "bema" replaced an earlier floor covering, possibly that of the original early Imperial courtyard. A second layer of frescoes also covered earlier wall paintings. Small columns for constructing a baldachin over the altar were still neatly arranged against the north wall of the church. Consequently, the test soundings may illustrate interventions postdating the earthquake around 500 CE, the more as half a century later, no more new building programs were developed in the town center (Jacobs 2015: 172). The construction of a monumental staircase linking the Upper Agora directly to the church (Fig. 1, no. 10) during the second quarter of the sixth century (Lavan 2012: 292–295; Jacobs and Waelkens 2017: 188–189) may also belong to a renovation phase of the complex. The church was dedicated to St Michael, who had a large following (the "Michaelitai") at Sagalassos during the sixth century (Jacobs and Waelkens 2017: 182; Talloen and Poblome 2016a: 140). Between the middle of the fifth and the middle of the sixth centuries, at least eight churches (of the tripartite basilica type) were built in the city and its periphery (Waelkens et al. 2006: 220, 224–226, 241–242; Vanhaverbeke et al. 2009: 182; Talloen et al. 2017). Recently, two more were identified, one in the Eastern Suburbia and one in the periphery, dating to the second half of the sixth and the early seventh centuries.

Christian symbols only appear on locally produced pottery around the middle of the fifth century (Talloen and Poblome 2005: 70–77; Jacobs and Waelkens 2017: 183–184), initially still overlapping with Dionysian motifs that remained popular for another century. However, rather than being indicative of the continued vitality of the cult of Dionysos (Talloen and Poblome 2005: 62–63, 68–70; Talloen 2011: 582–584), these images were entirely decorative and narrative, as symbols of hospitality and conviviality, and as such part of elite iconography (Jacobs and Waelkens 2017: 183–184). Sagalassos' potters also produced both anthropomorphic and zoomorphic figurines until the first half of the sixth century, which remained in use into the next century. Although originating from indigenous rider gods (Talloen and Poblome 2015: 73–77; Talloen 2011: 593), they had also been reinterpreted to serve Christian purposes (Jacobs and Waelkens 2017: 184–186, 191).

During the first and second quarter of the sixth century, many structures throughout the city were almost entirely rebuilt on a monumental scale, affecting the urban infrastructure as well as both public and private monuments. The date and nature of these renovations suggest repairs after some catastrophic event, most likely an earthquake, now known to have prompted extensive work on the baths shortly after CE 500. The scale and monumentality suggest that the citizens of Sagalassos were still wealthy enough and willing to restore the city to its former glory (Jacobs and Waelkens 2013: 236; Jacobs and Sterling 2017: 199). On the Upper Agora, most statues – probably toppled by the catastrophe – and their bases were removed (Talloen and Poblome 2016a: 140). Only those honoring the couple which had built the mid-Antonine nymphaeum and those of their relatives were reassembled inside and on the roof of this fountain, of which the eastern half and central niche were rebuilt (Jacobs and Richard 2012: 39). The fountain was thus transformed into a dynastic monument for the original builders' family (Jacobs and Waelkens 2017: 186–188). In all likelihood, the nymphaeum was explicitly Christianized by means of a Christian inscription and decorative elements with crosses. Except for the two large Dionysos-satyr groups in the lateral aediculae, mythological or pagan statues collected elsewhere in the city replaced the original sculpture display. By now, all statues appear to have been considered purely decorative (Jacobs 2015: 190–191; Jacobs and Waelkens 2017: 187).

Although the early first-century CE pavement of the Upper Agora was retained throughout Late Antiquity, the north-west corner of the pavement

seems to have been re-laid in the sixth century (Talloen and Poblome 2016a: 141). A series of holes cut through the pavement of the agora to fix wooden market stalls, as well as a number of "topos" inscriptions, allocating specific spaces to certain salesmen, indicate that the square was now used for commercial activities (Lavan 2012: 328–331; Talloen and Poblome 2016a: 141–142).

During the second quarter of the sixth century, a monumental staircase built over the west portico linked the square directly to the open atrium of the basilica in the bouleuterion complex (Fig. 3, no. 10), after an earlier access route from the south, just behind the prytaneion, had been blocked (Lavan 2012: 289–353; Jacobs and Waelkens 2017: 188–189). During the late fifth or early sixth century, the northern part of the building behind and above the mid-Antonine nymphaeum was subdivided into smaller units with separate entrances and an arcaded front (Jacobs 2013: 634–635; id. 2000b: 279–297). During the first half of the sixth century, a similar subdivision into smaller spaces also occurred in the Northeast Building and in the market building/gymnasium to the south of it, which is still being excavated. In the early sixth century, the north portico of the macellum was rebuilt once more (Richard and Waelkens 2012: 89–99; Eich et al. 2018: 84–85).

During the first half of the sixth century, the Lower Agora was enlarged and the staircase leading up from the Grand Colonnaded Street re-laid several meters to the south (Jacobs and Waelkens 2013: 241–243; Jacobs 2015: 167–171). The porticoes, now serving more as a food court, were re-erected using a diverse collection of recycled material and subsequently subdivided into several small units. The predominantly smaller businesses of the western portico sold snacks as well as wine, while the north side of the east portico housed a five-roomed thermopolium, serving hot food and beverages (Putzeys et al. 2005: 235–236, 2009: 184–194; Waelkens et al. 2007: 508–510; Jacobs 2015: 166–167). By the sixth century, both city squares had thus been converted into open-air markets and may have been more crowded than ever before (Lavan 2012; Jacobs 2013: 635–636). Whereas the partially rebuilt mid-Antonine nymphaeum on the Upper Agora had only kept the original statues of its side wings, most of the statuary display of the late Hadrianic nymphaeum was still found amidst the remains of the collapsed building. This could suggest that it had fallen victim to the same earthquake but was never repaired.

During the same period, the Colonnaded Street itself also saw a substantial phase of repair, including the partial replacement of its pavement and the renovation of the porticoes, now predominantly composed of pillars supporting arcades (Jacobs and Waelkens 2013: 237–240). New decorative monuments adorned the street. One apparently honored Julian the Apostate (CE 361–364), unless the inscribed statue had been re-used and plastered over (Jacobs and Waelkens 2013: 245; Eich et al. 2018: 95–96 no. 35). Immediately south of the agora, at least eight small pagan statues, originating from fourth-century CE domestic contexts, were placed on top of consoles inserted in the new pillars. The mythological statuary in all likelihood had lost its pagan connotations and was interpreted as an adornment (Jacobs and Waelkens 2013: 236–250; Jacobs 2015: 167–171; Jacobs and Sterling 2017). Other streets were narrowed and stripped of their pavements to restore both the water network below them and the street system. Some had their level raised with accumulated debris (Martens 2009: 197).

A crack running the entire height of the south wall of the frigidarium/public hall in the Imperial Baths was repaired and the vaulted substructures supporting the space were infilled. The floor was leveled and covered with a new mosaic. A sounding underneath the floor confirmed an early sixth century CE date for this intervention. The cracked wall veneer was removed, but eventually only replaced by a simple white plaster coating. The western bath section used by women was abandoned (Fig. 6, no. 2), while the original caldarium for men became a service room, considerably reducing the actual bathing section (Jacobs 2015: 166–168). This perhaps also explains the dismantling of a public latrine in the substructures below the abandoned bathing section. Radiocarbon dating shows that some time between c. 420 and 600 cal. CE, the

latrine was converted and used as a container for dung, which, mixed with large amounts of urban waste, produced a fertilizer (Baeten et al. 2012). Although many of these repairs were carried out with building materials from derelict or abandoned structures, they testify to a great sense of monumentality, illustrating that the municipal spirit of old was still very much alive (Jacobs 2015: 166).

Some work elsewhere in the city may also have been earthquake-related. During the late fifth–early sixth centuries CE, the private bath complex of the Urban Mansion was partially dismantled and considerably reduced in size. Several spaces of the mansion were subdivided and changed function (Uytterhoeven 2011: 299; Uytterhoeven et al. 2013: 376). Other changes lack evidence for violent destruction. Around 500 or in the early decades of the sixth century, the dwelling east of the Neon Library burned down. Both the textile and the coroplast workshops were abruptly but consciously abandoned, leaving all material in place. In the course of the same century, however, the whole area was reorganized with the creation of a professional bakery, active into the second half of the century but possibly given up before the end of it (Uleners and Poblome 2014: 91–92; Poblome et al. 2015: 232–238).

There are indications that in the early sixth century the available water supply was reduced through either damage to the aqueducts (Martens 2008: 255–256) or the disappearance of springs because of tectonic activity. The collection of rain or natural runoff water resulting from the melting of snow became important, as shown by the appearance of cisterns throughout the city. However, other evidence suggests that any water shortages were neither dramatic nor life-threatening (Martens 2006: 183; id. 2008: 257–259). On the Upper Agora, the interconnected workshops in the former west portico were transformed into a portico again, fronted by an open water basin (Fig. 1, no. 11) fed by rainwater (Jacobs and Richard 2012: 12–13). The still functioning Late Hellenistic nymphaeum was remodeled into a "castellum divisorium," with its central courtyard and basins leveled with debris to support water pipes (Jacobs and Richard 2012: 56–57). This suggests a change in water usage and possibly a significant retargeting of water resources. The installation of small street fountains during the sixth century confirms that water was brought closer to potential users (Jacobs and Richard 2012: 26; Jacobs 2015: 66–69).

All these renovation activities ended abruptly around the middle of the sixth century, when the program of repair was interrupted in the course of its execution or given less priority, as was the case with the street renovation. Yet the water network continued to function and initially there was still a clear concern for public sanitation (Martens 2009: 197). This sudden change may have been caused by a combination of factors, among which the intermittently recurring bubonic plague (CE 541–542), thought to have killed a third of the urban and rural population of Anatolia. The resulting demographic losses may have led to diminished agricultural yields and famine (Waelkens and Sagalassos Team 2000: 270–271). While urban survey data initially show virtually no impact of the plague in Sagalassos (Poblome et al. 2012: 171), they do suggest much reduced occupational activity during the later sixth and seventh centuries CE (Martens 2008: 249; Waelkens et al. 2006: 230–231; Martens et al. 2008: 139; Willet and Poblome 2015: 3). In 2015, the skeleton of one plague victim was identified at Sagalassos (Van de Vijver 2018: 228, Fig. 14). Recent Bayesian coalescence-based simulations of mtDNA data sets suggest that the sixth/seventh-century CE catastrophic events (earthquake and plague) possibly caused a gradual and temporary decrease, but certainly not a sudden depletion of the population (Ottoni et al. 2016: 2–3). Yet the number of sampled skeletons was very small (24 individuals from the second up to the sixth century CE, one mid-Byzantine skeleton) for a comparison with modern mtDNA sequences from Ağlasun (Waelkens 2018: 19). Other factors with a negative impact may have been climatic change, a decline in long-distance trade, external military threats, and brigandage (Vanhaverbeke et al. 2004; id. 2007: 635–640; Waelkens et al. 2006: 247–248; Jacobs and Waelkens 2017: 176). In CE 535/536, Justinian had to take measures against

Pisidian brigands rebelling against taxation (Justinian, Novellae Constitutiones XXIV, 1). Whatever the cause(s), it is certain that Sagalassos was drastically weakened within a short period of time (Jacobs and Waelkens 2013: 252).

Nevertheless, the city remained the main urban settlement in the region during the second half of the sixth century, even if by now the interpretation of "urban way of life" was very different from that during the high empire (Poblome 2014: 630). Sagalassos gradually lost its urban appearance and eventually gave up all municipal services such as organized waste collection. This coincided with increasing impoverishment and stress on urban subsistence, as farming activities now also happened inside the city proper (Waelkens et al. 2006; Waelkens and Poblome 2011: 153–58). The reuse of spolia became widespread.

The progressive abandonment of the craft and commercial units alongside both agorae indicates that the population quite suddenly had other preoccupations (Jacobs and Waelkens 2013: 252). Shortly after the mid-sixth century, the southern part of the west portico on the Upper Agora was abandoned and dismantled. Only a bakery installed in the southernmost space as well as a bronze workshop in the street next to it probably functioned until the early seventh century (Talloen and Poblome 2016a: 145–146; Jacobs 2015: 173–174). By the mid-sixth century the mosaic floor of the prytaneion had been destroyed and covered with soil. The structure was probably divided into an area for cooking and one for dining, albeit now in a religious context (the "Michaelitai"). On the Lower Agora, only the northernmost taverns in both porticoes functioned until the early seventh century (Lavan 2012: 297; Putzeys et al. 2009: 165; Jacobs 2015: 173–174). The renovation of the Colonnaded Street was never completed. Whereas some shops were already deserted in the later sixth century, others probably remained active until the early seventh century (Jacobs 2015: 172, 174; Jacobs and Waelkens 2013: 251–252).

As indicated above, in the late sixth and early seventh centuries, waste disposal was no longer municipally organized. The basins of some fountains, the corridors and stage area of the former Odeon, abandoned shops along the Lower Agora and the Colonnaded Street all became primary or secondary dumping places for consumption and butchery refuse, and even for pottery waste. Parts of the macellum remained in use until the early seventh century CE, including for craft activities (antler and bone working: Richard 2014: 272). Yet from the mid-sixth century the northern part of the courtyard was used as a dumping ground (Richard and Waelkens 2012: 95–100). Water distribution and sewage systems were no longer well maintained either. The fact that waste was left to rot in full view, producing putrid smells in the very center of the city, suggests a drastic change in mentality from the civic pride displayed only a few decades earlier. The decline in municipal authority eventually affected the network of streets, many of which were ultimately encroached by private structures (Martens 2009: 197–198; Jacobs 2013: 598–612; id. 2015: 171–172; Jacobs and Waelkens 2013: 251–252).

The public hall of the Imperial Baths, no longer used for public banquets, eventually accommodated two large lime kilns and several small furnaces, used to burn most marble parts and smelt all bronze parts of the colossal imperial statues displayed in the same space (Waelkens 2013: 70–71; Jacobs 2015: 172–173). Other parts of the complex were still being used for communal dining around the middle of the seventh century (Waelkens and Jacobs 2014: 117–118). At the latest by the second half of the sixth century, the Urban Mansion had also lost its previously luxurious character. Spaces in both the private and formal areas were now used as storage rooms. Squatters installed themselves in the public part, while in the later sixth century a "xenodocheion" or inn apparently occupied most of the private part of the complex. The mansion's wall cladding and statuary fed a large lime kiln installed in the atrium (Waelkens et al. 2007: 503–508; Uytterhoeven et al. 2013: 376; Jacobs 2015: 174). In the course of the century, the kilns of the coroplast workshops in the Eastern Suburbia equally became lime kilns (Murphy and Poblome 2016: 188–189).

From the middle of the sixth century onwards, Sagalassos red slip ware was no longer made in

the workshops in the city's potters' quarter, but relocated, possibly to somewhere in the countryside. This tableware continued in existence until at least the end of the next century (Poblome et al. 2012: 147, 2017: 304; Poblome 2014: 634). Common wares were also made in the countryside, as before (Poblome 2014: 632). Both types of pottery show that despite a gradual decline in social complexity, Sagalassos still formed part of a wider cultural sphere in Southwest Asia Minor and western Cyprus (Vionis et al. 2009a; Poblome 2014: 635). From the middle of the century, field walls delineating plots of land suggest a return of agricultural and pastoral activities in the Eastern Suburbia. This was perhaps the result of less favorable conditions on the valley floors because of a wetter climate (Poblome 2014: 630; Poblome et al. 2017: 304). By the later sixth century, there is evidence for food cultivation in the immediate surroundings of the city (Vanhaverbeke et al. 2004: 269). Some farming activities (threshing) even seem to have taken place within the urban context, where now there were abundant wild cultivars (Waelkens et al. 2007: 506–507). By now, like many contemporaneous cities, Sagalassos had become more rural, which probably resulted in a sharp decline in public investments (Jacobs 2013: 652–655). However, even in these decades, at least part of the population was not deprived of decent subsistence patterns. Centralized cattle butchering and organized meat distribution continued until the early seventh century. Fish from regional lakes and rivers, the Mediterranean, and even Egypt was imported throughout the sixth and into the seventh century (Arndt et al. 2003; Van Neer et al. 2004), as was the case with vessel glass and wine amphorae from the Levant and elsewhere (Poblome et al. 2005: 227–228; Jacobs 2015: 172). However, the general quality of life had certainly declined considerably (Jacobs 2015: 190–191).

In the countryside, the trend to establish sites in easily defendable locations, starting in the second half of the fifth century CE, accelerated in the second half of the next century (Vanhaverbeke and Waelkens 2003: 250–251, 297–298; Vanhaverbeke et al. 2004: 247–279: 259, 2007: 623). At least until the end of the sixth century and in some cases beyond, the villages in the territory remained occupied and active, with possibly even some degree of rural population growth in the early Byzantine period (Poblome et al. 2017: 304). In CE 535/536, Justinian referred to Pisidia as a region with "large and populous villages," without mentioning any other type of settlement or settlement hierarchy. Rather than just reflecting a self-regulating process of societal change (Poblome 2014: 631), this seems to confirm the image of former cities and towns gradually losing their urban character and no longer being regarded as "cities."

The Byzantine Dark Ages (Seventh to Ninth Centuries CE) and the Middle Byzantine Period (Tenth to Early Thirteenth Centuries)

Eagle owl pellets deposited on the floor of the former public hall of the Imperial Baths, after sections of its vaults had crashed down in an earthquake, provided radiocarbon dates between cal. CE 540 and 620 (with 95% probability) and a peak around CE 590 (De Cupere et al. 2009). A recent re-evaluation of coins found underneath certain destruction layers confirms that the most recent coins were invariably datable to the reign of Phocas (CE 602–610) or his predecessor Maurice (CE 583–602). These include gold coins, which were not usually lost easily and if lost, would have been searched for. This suggests that the earthquake, which virtually wiped out Sagalassos as an urban settlement, took place in or shortly after the early seventh century (Jacobs 2015: 175; Jacobs and Waelkens 2017: 176). Though the destruction was massive, it left virtually no trace in the recent mtDNA analysis (Ottoni et al. 2016), perhaps because some survivors went on living in the valley below. Although most public buildings were left in ruins, the local community continued to execute projects requiring a communal effort, besides developing private initiatives at household level.

The intensive urban surveys identified significant quantities of seventh-century surface material, mainly in the western parts of ancient Sagalassos, continuing into the upper reaches of the Ağlasun Valley (Poblome 2014: 631). The excavations also recognized continuity in

postearthquake occupation at multiple locations around the Upper Agora and in the Urban Mansion until the mid-seventh century (Uytterhoeven et al. 2013: 383; id. 2014: 222; Jacobs 2015: 176, 188; Jacobs and Waelkens 2017: 189–190). There was even an attempt to salvage the Bouleuterion-basilica through the construction of walls on top of earthquake debris to support the collapsing apse (Poblome et al. 2017: 305). Consequently, at least in the seventh century, the early medieval community living among the ruins may have been more sizeable and better organized than previously assumed, even though its material culture was poor compared to that of the early Byzantine phase of the town (Jacobs 2015: 164, 189).

In the course of the seventh century, occupation was concentrated on the promontory near the dismantled shrine of the Pisidian emperor cult, which was eventually fortified separately. Shortly after the earthquake, building elements such as column drums and capitals were rolled against the edges of the Colonnaded Street, showing continuity of some traffic to and from the old city center from the new nucleus (Jacobs and Waelkens 2013: 253). A water channel ensured a continuous freshwater supply from the area around the Upper Agora (Richard and Waelkens 2012: 100–101) to this settlement (Martens 2008: 253; Jacobs 2015: 181). However, probably around the middle of the seventh century or somewhat later, an impressive barrier wall with two towers, perhaps associated with the Arab invasions, permanently blocked the traffic flow to and from the earlier city center, initiating a definite break with all earlier habitation (Jacobs 2015: 177–185).

Sagalassos appears to have lived on as a "kastron," a defensive and administrative outpost within a "thema," on the fortified promontory. Since the mid-seventh century, when these new military districts were created, it had belonged to the Anatolic Theme (Belke and Mersich 1990: 49, 84). It is perhaps mentioned in CE 905 by Constantine Porphyrogenetus (De thematibus XIV, 37) as a kastron of the Cibyrrhaeotic theme (Poblome et al. 2017: 306), to which Sagalassos had been moved during the first half of the eighth century. However, the reliability of this source is questionable (Jacobs 2015: 186). The fortified settlement was continuously inhabited until at least the later eleventh century (Martens 2009: 191; Vionis et al. 2009a, b; Jacobs 2015: 183–185), perhaps even later (Poblome et al. 2017: 308–310). Its abandonment may have been the result of the Seljuk control of the region (Belke and Mersich 1990: 104). Sigillographic evidence possibly documents its growing economic and military importance during the second half of the eleventh century, in the face of this Turkish threat (Poblome et al. 2017: 308–309).

The kastron also housed the see of a bishop, who may even have been involved in the construction of the fortifications (Jacobs 2015: 186). In any case, Sagalassos remained a regional nuclear community of which the bishop participated in various synods until the eleventh/twelfth century. During the ninth century, it had even become the second highest bishopric of the ecclesiastical province of Pisidia (Belke and Mersich 1990: 368–369; Poblome et al. 2017: 306, 309). During the ninth to eleventh centuries, a sixth-century basilica on the Alexander Hill was elaborately renovated (Poblome et al. 2017: 308).

Yet the kastron was not the only spot of the former city still inhabited during the Byzantine Dark Ages and the mid-Byzantine period. During the eighth to twelfth/thirteenth centuries, evidence for building activities and/or occupation is also present at the former temple of Apollo Klarios, converted to a Christian basilica in the fifth century (Martens 2009: 191; Jacobs 2015: 188). During the ninth to eleventh centuries, a smaller chapel was built inside this church (Poblome et al. 2017: 306–308). The use of a cemetery surrounding it could be radiocarbon dated to the eleventh to the thirteenth centuries (Ottoni et al. 2011).

Although from the seventh century on Sagalassos' economy was probably based on dry crop farming and livestock raising, the morphology of its pottery testifies to a continued degree of connectivity (Poblome 2014: 631–632). From the mid-seventh century on, colder and drier conditions, resulting in an increase of dry, open steppe and maquis vegetation, eventually reinforced a shift towards pastoralism (Vanhaverbeke et al.

2009: 183–187; Bakker et al. 2011, 2012; id. 2013: 70–73). Pastoral activities were recently identified on the slopes of the mountains above Sagalassos (Talloen et al. 2017: 391). Yet there is evidence of ongoing cultivation in many valleys within the former territory of Sagalassos until the eleventh/twelfth century (Vanhaverbeke et al. 2009: 183–184; Jacobs 2015: 189; De Cupere et al. 2015a: 9; Talloen et al. 2017: 390; Poblome et al. 2017: 311). In the countryside, life probably continued to be centered on villages, hamlets, and farms, functioning in a landscape in which most former cities were abandoned, reduced in size to kastra or had become mere villages. Evidence from Imperial legislation and casual references in hagiographies show that between the eighth and eleventh centuries, the village had become the fundamental center of the state's fiscal interests and of rural society. Many villages were located in remote valleys or on hill/mountain slopes. Some were new, others were occupied locations of fortified sites dating to the Archaic and Classical/Hellenistic periods (Poblome et al. 2017: 311). It was here, rather than near the city, that manufacture (e.g., of pottery) took place, perhaps to supply the villages (Vanhaverbeke et al. 2009: 177–181; Poblome 2014: 632; Vandam et al. 2017b: 230). A truly pastoral economy with extensive grazing can only be detected from the eleventh and twelfth centuries onwards (Vanhaverbeke et al. 2009: 183–184; Jacobs 2015: 190).

More research is required to establish to what degree the later part of the eleventh century represents a genuine break for the kastron at Sagalassos. All sites with tenth- to eleventh-century material also contained finds from the thirteenth century (Poblome et al. 2017: 310). Sagalassos' last bishop was referred to as bishop of "Agalassu," a name living on in that of Ağlasun. Recent finds suggest some kind of continued community organization at and around Ağlasun, where new settlement activity developed, into the early thirteenth century. This could reflect a partial relocation of the population in the immediate vicinity, after the seventh-century earthquake, and provide an explanation for the genetic pool remaining largely unchanged (Ottoni et al. 2016; Poblome et al. 2017: 310–311; Talloen et al. 2017: 388–389).

During the mid-Byzantine period, a fortress was built on the Alexander Hill (Vanhaverbeke et al. 2009: 182), possibly by the Comneni after they reconquered the region from the Seljuks in the later twelfth century. It was probably the Seljuks who destroyed it in CE 1204, when they took hold of Saparda (Isparta, on the other side of the Ağlasun Dağları), the last Byzantine stronghold in the area (Belke and Mersich 1990: 123, 155). This meant the end of Sagalassos as an organized community (Poblome et al. 2017: 310). However, the cemetery around the former Apollo Klarios shrine and associated with another, as yet unidentified habitation nucleus, remained in use until the middle to late thirteenth century. MtDNA analysis suggests a drastic fall in population in the region, corresponding to the abandonment of the city (Ottoni et al. 2016: 5–8). In the meantime, Ağlasun had become the new regional center. The Seljuk han, built there during the reign of Giyaseddin Kaykhosrau II (CE 1237–1246), the hamam of which is preserved until this day, may have constituted the core (marketplace) of several outlying small-scale permanent or temporary settlements (Vanhaverbeke et al. 2005; Vanhaverbeke et al. 2009: 182). This indicates both continued occupation of the area and a shift in central place (Poblome et al. 2017: 310).

References

Arndt, A., W. Van Neer, B. Hellemens, J. Robben, F. Volckaert, and M. Waelkens. 2003. Roman trade relationships at Sagalassos (Turkey) elucidated by ancient DNA of fish remains. *Journal of Archaeological Science* 30: 1095–1105.

Baeten, J., E. Marinova, V. De Laet, P. Degryse, D. Devos, and M. Waelkens. 2012. Faecal biomarker and archaeobotanical analyses of sediments from a public latrine shed new light on ruralisation in Sagalassos, Turkey. *Journal of Archaeological Science* 39 (4): 1143–1159.

Bakker, J., E. Paulissen, D. Kaniewski, V. de Laet, G. Verstraeten, and M. Waelkens. 2011. Man, vegetation and climate during the Holocene in the territory of Sagalassos, Western Taurus Mountains, SW Turkey. *Vegetation History and Archaeobotany* 2: 249–266.

Bakker, J., D. Kaniewski, G. Verstraeten, V. De Laet, and M. Waelkens. 2012. Numerically derived evidence for late Holocene climate change and its impact on human presence in the southwest Taurus Mountains, Turkey. *The Holocene* 22: 425–438.

Bakker, J., E. Paulissen, D. Kaniewski, J. Poblome, V. De Laet, G. Verstraeten, and M. Waelkens. 2013. Climate, people, fire and vegetation: New insights into vegetation dynamics in the Eastern Mediterranean since the first century AD. *Climate of the Past* 9: 57–87.

Claeys, J., and J. Poblome. 2017. The 2011 to 2016 excavation campaigns at site PQ 2, Sagalassos. Dissecting a suburban club house (schola). *Anatolica* 43: 1–36.

Daems, D., and J. Poblome. 2016. Adaptive cycles in communities and landscapes: The case of Sagalassos and Düzen Tepe during the classical/Hellenistic period. *Archaeological Review from Cambridge* 31 (2): 91–107.

Daems, D., and J. Poblome. 2017. The pottery of late Achaemenid Sagalassos: An overview. *Herom* 6: 49–62.

De Cupere, B., S. Thys, W. Van Neer, A. Ervynck, M. Corremans, and M. Waelkens. 2009. Eagle owl (*Bubo bubo*) pellets from roman Sagalassos (SW Turkey): Distinguishing the prey remains from nest and roost sites. *International Journal of Osteoarchaeology* 19: 1–22.

De Cupere, B., D. Frémondeau, E. Kaptijn, E. Marinova, J. Poblome, R. Vandam, and W. Van Neer. 2015a. Subsistence economy and land use strategies in the Burdur province (SW Anatolia) from prehistory to the Byzantine period. *Quaternary International* 30: 1–14.

De Cupere, B., J. Poblome, S. Hamilton-Dyer, and S. Van Haelst. 2015b. Communal dining in the eastern Suburbium of ancient Sagalassos. *Herom* 4: 173–197.

Degryse, P., Ph. Muchez, B. De Cupere, W. Van Neer, and M. Waelkens. 2004. Statistical treatment of trace element data and ancient animal bone: Evaluation of Roman Byzantine environmental pollution. *Analytical Letters* 37: 2819–2834.

Dusar, B., G. Verstraeten, K. D'Haen, J. Bakker, E. Kaptijn, and M. Waelkens. 2012. Sensitivity of the eastern Mediterranean geomorphic system towards environmental change during the late Holocene: A chronological perspective. *Journal of Quaternary Science* 27: 371–382.

Eck, W. 2013. Die Dedikation des Apollo Klarios unter Proculus, legatus Augusti pro praetore Lyciae et Pamphyliae unter Antoninus Pius. In *Exempli gratia. Sagalassos, M. Waelkens and Interdisciplinary Archaeology*, ed. J. Poblome, 43–49. Leuven: Peeters Publishers.

Eich, A., P. Eich, W. Eck, and mit Beiträgen von M. Waelkens, ed. 2018. *Die Inschriften von Sagalassos. Teil I*, Inschriften Griechischer Städte aus Kleinasien 70. Bonn: Dr. Rudolf Habelt GmbH.

Fuller, T.B., B. De Cupere, E. Marinova, W. Van Neer, M. Waelkens, and M.P. Richards. 2012. Isotopic reconstruction of human diet and animal husbandry practices during the classical-Hellenistic, imperial and Byzantine periods at Sagalassos, Turkey. *American Journal of Physical Anthropology* 149: 157–171.

Jacobs, I. 2013. *Aesthetic Maintenance of Civic Space. The 'Classical City' from the 4th to the 7th c. AD*, Orientalia Lovaniensa Analecta 193. Leuven-Paris/Walpole: Peeters Publishers.

Jacobs, I. 2015. Early Byzantium to the middle ages at Sagalassos. In *The Long Seventh Century. Continuity and Discontinuity in an Age of Transition*, ed. A. Gnasso, E.E. Intagliata, T.J. MacMaster, and B.N. Morris, 163–198. Oxford: Peter Lang.

Jacobs, I., and J. Richard. 2012. "We surpass the beautiful waters of other cities by the abundance of ours": Reconciling function and decoration in late antique fountains. *Journal of Late Antiquity* 5 (1): 3–71.

Jacobs, I., and L. Sterling. 2017. Re-using the gods: A 6th-c.statuary display at Sagalassos and a re-evaluation of pagan mythological statuary in Early Byzantine civic space. *Journal of Roman Archaeology* 30: 196–225.

Jacobs, I., and M. Waelkens. 2013. Five centuries of glory. The North-South Colonnaded street of Sagalassos in the first and the sixth century A.D. *Istanbuler Mitteilungen* 63: 219–266.

Jacobs, I., and M. Waelkens. 2017. "Christians do not differ from other people". The down-to-earth religious stance of late antique Sagalassos (Pisidia). In *Die Christianisierung Kleinasiens in der Spätantike*, Asia Minor Studien 87, ed. W. Amelung, 175–198. Bonn: Dr. Rudolf Habelt GmbH.

Janssen, E., J. Poblome, J. Claeys, V. Kint, P. Degryse, E. Marinova, and B. Muys. 2017. Fuel for debating ancient economies. Calculating wood consumption at urban scale in Roman Imperial times. *Journal of Archaeological Science: Reports* 11: 592–599.

Kaptijn, E., J. Poblome, H. Vanhaverbeke, J. Bakker, and M. Waelkens. 2013. Societal changes in the Hellenistic, Roman and early Byzantine periods. Results from the Sagalassos territorial archaeological survey 2008 (Southwest Turkey). *Anatolian Studies* 63: 75–95.

Lavan, L. 2012. The agorai of Sagalassos in late antiquity. An interpretive study. In *Field Methods and Post-excavation Techniques in Late Antique Archaeology*, Late Antique Archaeology 9, ed. L. Lavan and M. Mulryan, 289–353. Leiden: Brill.

Mägele, S. 2013. A colossal portrait of Hadrian and the imperial group from the Roman Baths at Sagalassos. In *Hadrian: Art, Politics and Economy*, ed. T. Oppert, 50–61. London: The British Museum.

Mägele, S. 2017. Das Nachleben von Kaiserbildnissen in der Spätantike. Die kolossalen Statuen aus Sagalassos. In *Urbanitas – Urbane Qualitäten. Die antike Stadt als kulturelle Selbstverwirklichung*, Kolloquium 19.-21. Dezember 2012 in München, ed. A.W. Busch, J. Griesbach, and J. Lipps, 433–457. Mainz: Verlag des Römisch-Germanischen Zentralmuseums.

Mägele, S., J. Richard, and M. Waelkens. 2007. A late Hadrianic nymphaeum at Sagalassos (Pisidia, Turkey). *Istanbuler Mitteilungen* 57: 469–504.

Martens, F. 2006. The diachronic research of urban water management at Sagalassos, Southwest-Turkey. In *Cura Aquarum in Ephesus. Proceedings of the Twelfth International Congress on the History of Water Management and Hydraulic Engineering in the Mediterranean Area, Ephesus/Selçuk, Turkey, October 2–10, 2004*, Babesch Supplements 12, ed. G. Wiplinger, 179–185. Leuven: Peeters Publishers.

Martens, F. 2008. Water abundance and shortage at Sagalassos (SW Turkey). In *Cura Aquarum in Jordanien. Proceedings of the 13th International Conference on the History of Water Management and Hydraulic Engineering in the Mediterranean Region, Petra/Amman, 31 March – 9 April 2007*, ed. C. Ohlig, 247–262. Siegburg: Books on demand.

Martens, F. 2009. Urban traffic in the hills of the eastern Mediterranean: The development, maintenance, and usage of the street system at Sagalassos in South-Western Turkey. In *La rue dans l' antiquité – Définition, aménagement et devenir de l' Orient méditerranéen à la Gaule (Colloque de Poitiers, 7–9 septembre 2008)*, ed. N. Ballet, N. Dieudonné, and C. Salou, 191–200. Rennes: Presses universitaires de Rennes.

Martens, F., H. Vanhaverbeke, and M. Waelkens. 2008. Town and suburbium at Sagalassos. An interaction investigated through survey. In *Thinking about Space. The Potential of Surface Survey and Contextual Analysis in the Definition of Space in Roman Times*, Studies in Eastern Mediterranean Archaeology 8, ed. H. Vanhaverbeke, J. Poblome, F. Vermeulen, M. Waelkens, and R. Brulet, 127–149. Turnhout: Brepols Publishers.

Martens, F., J. Richard, and M. Waelkens. 2012a. The Roman Baths at Sagalassos (SW Turkey). A preliminary study of the research potential for a reconstruction of its water management system. In *SPA. Sanitas per Aquam. Tagungsband des Internationalen Frontinus-Symposiums zur Technik- und Kulturgeschichte der antiken Thermen/Proceedings of the International Frontinus-Symposium on the Technical and Cultural History of Ancient Baths. Aachen 18.-22. März 2009/March 18–22, 2009*, Babesch Supplement 21, ed. R. Kreiner and W. Letzner, 159–175. Leuven-Paris-Walpole: Peeters Publishers.

Martens, F., B. Mušič, J. Poblome, and M. Waelkens. 2012b. The integrated urban survey at Sagalassos. In *Urban Landscape Survey in Italy and the Mediterranean*, ed. F. Vermeulen, G.-J. Burgers, S. Keay, and C. Corsi, 84–93. Oxford: Oxbow Books.

Murphy, E.A., and J. Poblome. 2012. Technical and social considerations of tools from Roman-period ceramic workshops at Sagalassos (Southwest Turkey): Not just tools of the trade? *Journal of Mediterranean Archaeology* 25 (2): 197–217.

Murphy, E.A., and J. Poblome. 2016. A late antique ceramic workshop complex: Evidence for workshop organization at Sagalassos (Southwest Turkey). *Anatolian Studies* 66: 185–199.

Murphy, E.A., and J. Poblome. 2017. From formal to technical styles: Production challenges and economic implications of changing tableware styles in Roman to late antique Sagalassos. *American Journal of Archaeology* 121 (1): 61–84.

Ottoni, C., F. Ricaut, N. Vanderheyden, N. Brucato, M. Waelkens, and F. Decorte. 2011. Mitochondrial analysis of a Byzantine population reveals the differential impact of multiple historical events in South Anatolia. *European Journal of Human Genetics* 19: 571–576.

Ottoni, C., R. Rasteiro, R. Willet, J. Claeys, P. Talloen, K. Van de Vijver, L. Chikhi, J. Poblome, and R. Decorte. 2016. Comparing maternal genetic variation across two millennia reveals the demographic history of an ancient human population in Southwest Turkey. *Royal Society Open Science* 3: 1–9.

Owens, E. 1995. The aqueducts of Sagalassos. In *Sagalassos III. Report on the Fourth Excavation Campaign of 1993*, ed. M. Waelkens and J. Poblome, 91–113. Leuven: Leuven University Press.

Poblome, J. 1999. Sagalassos Red Slip Ware. *Typology and Chronology*, Studies in eastern Mediterranean archaeology 2. Turnhout: Brepols Publishers.

Poblome, J. 2006. Mixed feelings on Greece and Asia Minor in the third century AD. In *Old Pottery in a New Century. Innovating Perspectives on Roman Pottery Studies*, ed. D. Malfitana, J. Poblome, and J. Lund, 189–212. Catania: Bretschneider.

Poblome, J. 2008. Sherds and coins from a place under the sun. Further thoughts from Sagalassos. *Facta. A Journal of Roman Material Cultural Studies* 2: 193–217.

Poblome, J. 2012. Word versus dirt. History and archaeology applied to proto-historical Sagalassos. In *The Ancient Near East, a life. Festschrift K. Van Lerberghe*, Orientalia Lovaniensia Analecta 220, ed. T. Boiy, J. Bretschneider, A. Goddeeris, H. Hameeuw, G. Jans, and J. Tavernier, 457–470. Leuven: Peeters.

Poblome, J. 2014. Shifting societal complexity in Byzantine Asia Minor and Dark Age pottery. In *LRCW 4, Late Roman Coarse Wares, Cooking Wares and Amphorae in the Mediterranean. Archaeology and Archaeometry. The Mediterranean: A Market without Frontiers*, BAR International Series 2616, 1, ed. N. Poulou-Papadimitriou, E. Nodarou, and V. Kilikoglu, 623–642. Oxford: BAR Publishing.

Poblome, J. 2015. The economy of the Roman world as a complex adaptive system. Testing the case in second to fifth century CE Sagalassos. In *Structure and Performance in the Roman Economy. Models, Methods and Case Studies*, Collection Latomus 350, ed. P. Erdkamp and K. Verboven, 85–129. Brussels: Éditions Latomus.

Poblome, J., and N. Firat. 2011. Late Roman D. A matter of open(ing) and closed horizons. In *LRFW 1. Late Roman*

Fine Wares: Solving Problems of Typology and Chronology, Roman and Late Antique Mediterranean Pottery 1, ed. M.A. Cau, P. Reynolds, and M. Bonifay, 49–55. Oxford: Archaeopress Archaeology.

Poblome, J., and M. Waelkens. 2011. Sagalassos before Sagalassos. The pre- and proto-history. From 10.000 to 546 BC. In *Sagalassos. City of Dreams*, ed. M. Waelkens and J. Poblome, 23–32. Gent: Openbaar Kunstbezit in Vlaanderen.

Poblome, J., Ph. Bes, and P. Degryse. 2005. The decline and fall of Sagalassos. A ceramic perspective. *Rei Cretariae Romanae Fautorum Acta* 39: 225–230.

Poblome, J., Ph. Bes, and V. Lauwers. 2007. Winning hearts, minds and stomachs ? Artefactual or artificial evidence for Romanization. In *Neue Zeiten – Neue Sitten. Zu Rezeption und Integration römischen und italischen Kulturgutes in Kleinasien*, ed. M. Meyer, 221–230. Wien: Phoibos Vlg.

Poblome, J., M. Corremans, P. Bes, K. Romanus, and P. Degryse. 2008. It is never too late: The late Roman initiation of amphora production in the territory of Sagalasssos. In *Euergetes – Festschrift Haluk Abbasoğlu*, ed. I. Delemen, S. Çokay-Kepçe, A. Özdibay, and O. Turak, 1001–1012. Istanbul: AKMED.

Poblome, J., R. Willet, N. Firat, F. Martens, and Ph. Bes. 2012. Tinkering with urban survey data: How many Sagalassos-es do we have? In *Archaeological Survey and the City*, ed. P. Johnson and M. Millett, 146–174. Oxford: Oxbow Books.

Poblome, J., D. Braekmans, N. Fırat, B. Neyt, E. Kaptijn, H. Vanhaverbeke, F. Martens, K. Vyncke, R. Willet, M. Waelkens, and P. Degryse. 2013a. How did Sagalassos come to be? A ceramological survey. In *Studies in Honour of K, Levent Zoroğlu*, ed. M. Tekocak, vol. 2013, 527–540. Ege Yayınları: Istanbul.

Poblome, J., D. Braekmans, B. Mušič, M. van der Enden, B. Neyt, B. De Graeve, and P. Degryse. 2013b. A pottery kiln underneath the Odeon of ancient Sagalassos. The excavation results, the table wares and their archaeometrical analysis. In *Networks in the Hellenistic World*, BAR international series 2539, ed. N. Fenn and C. Römer-Strehl, 75–185. Oxford: BAR Publishing.

Poblome, J., H. Uleners, I. Uytterhoeven, E. Marinova, and B. De Cupere. 2015. The 2012 to 2014 excavation campaigns at site LE, Sagalassos. The structural remains and general phasing. *Anatolica* 41: 203–240.

Poblome, J., P. Talloen, and E. Kaptijn. 2017. Sagalassos. In *The Archaeology of Byzantine Anatolia. From the End of Late Antiquity until the Coming of the Turks*, ed. P. Niewöhner, 302–311. Oxford: Oxford University Press.

Putzeys, T., J. Poblome, and Ph. Bes. 2005. Functional analysis of early Byzantine contexts at Sagalassos. *Rei Cretariae Romanae Fautorum Acta* 39: 231–236.

Putzeys, T., M. Waelkens, J. Poblome, W. Van Neer, B. De Cupere, T. Van Thuyne, B. Kellens, and P. Bes. 2009. Shops and retail in Late Antiquity. A contextual approach to the material evidence from Sagalassos. In *Thinking about Space. The Potential of Surface Survey and Contextual Archaeology in the Definition of Space in Roman Times*, Studies in Eastern Mediterranean Archaeology 8, ed. H. Vanhaverbeke, J. Poblome, F. Vermeulen, M. Waelkens, and R. Brulet, 161–217. Turnhout: Brepols Publishers.

Richard, J., and M. Waelkens. 2012. Le macellum de Sagalassos: un marché "romain" dans les montagnes du Taurus? Compte-rendu préliminaire des fouilles archéologiques menées depuis 2005. In *Tout vendre, tout acheter. Structures et équipements des marches antiques. Actes du colloque d' Athènes 16–19 juin 2009*, Scripta Antiqua 42, ed. V. Chankowski and P. Karvonis, 83–104. Bordeaux/Athènes: Ausonius éditions.

Steegen, A., K. Cauwenberghs, G. Govers, M. Waelkens, E.J. Owens, and P. Desmet. 2000. The water supply to Sagalassos. In *Sagalassos V. Report on the Survey and Excavation Campaigns of 1996 and 1997*, ed. M. Waelkens and L. Loots, 635–649. Leuven: Leuven University Press.

Stroobants, F. 2014. The production of civic coins in third-century Pisidia and Pamphylia: Mapping regional trends and urban deviations. In *First International Congress of the Anatolian Monetary History and Numismatics. 25–28 February 2013 Antalya, Proceedings*, ed. K. Dörtlük, O. Tekin, and R. Boyraz Seyhan, 541–558. Antalya: AKMED.

Stroobants, F., and J. Poblome. 2015. Buying and selling in late Roman Pisidia: A hypothetical framework of coin use in Sagalassos and its countryside. *Revue belge de numismatique et sigillographie* 161: 73–104.

Talloen, P. 2011. From pagan to Christian: Religious iconography in material culture from Sagalassos. In *The Archaeology of Late Antique 'Paganism'*, Late antique archaeology 7, ed. L. Lavan and M. Mulryan, 575–607. Leiden: Brill.

Talloen, P., and J. Poblome. 2005. What were they thinking of? Relief decorated pottery from Sagalassos. A cognitive approach. *Mélanges de l'Ecole Française de Rome. Antiquité* 117: 55–81.

Talloen, P., and J. Poblome. 2015. The 2012 to 2014 excavation campaigns at site LE, Sagalassos. The structural remains and general phasing. *Anatolica* 41: 203–240.

Talloen, P., and J. Poblome. 2016a. The 2014 and 2015 control excavations on and around the Upper Agora of Sagalassos. *Anatolica* 42: 111–150.

Talloen, P., and J. Poblome. 2016b. The 2015 control excavations in the Bouleuterion-Basilica of Sagalassos. *Anmed 14: News of Archaeology from Anatolia's Mediterranean Areas*. 119–128.

Talloen, P., F. Stroobants, and P. Degryse. 2015. Hephaistos in Pisidia. *Revue belge de numismatique et de sigillographie* 161: 325–342.

Talloen, P., R. Vandam, M. Broisch, and J. Poblome. 2017. A Byzantine church discovered in the village of

Aglashun (Burdur): Some more light on Dark Age Pisidia. *Adalya* 20: 375–404.

Uleners, H., and J. Poblome. 2014. A new and unexpected potters' workshop at Sagalassos. *Anmed* 12: 87–93.

Uytterhoeven, I. 2009. Know your classics! Manifestations of 'classical culture' in late antique domestic contexts. In *Faces of Hellenism. Studies in the History of the Eastern Mediterranean (4th century B.C. – 5th century A.D.)*, Studia Hellenistica 48, ed. P. Van Nuffelen, 321–342. Leuven: Peeters Publishers.

Uytterhoeven, I. 2011. Bathing in a "western style". Private bath complexes in Roman and late antique Asia minor. *Istanbuler Mitteilungen* 61: 287–346.

Uytterhoeven, I. 2013. Running water. Aqueducts as suppliers of private water facilities in (Late) Roman Asia Minor. In *Historische Wasserleitungen. Gestern – Heute – Morgen. Tagungsband des Internationalen Frontinus-Symposiums Wien, 19-23 Oktober 2011*, ÖAI Sonderschriften 49, Babesch Supplements 24, ed. G. Wiplinger, 139–160. Leuven/Paris/Walpole: Peeters Publishers.

Uytterhoeven, I. 2014. Passages full of surprises. Circulation patterns within the late antique urban élite houses of Asia Minor. In *Die Architektur des Weges. Gestaltete Bewegung im gebauten Raum. Internationales Kolloquium in Berlin am 08.-11. Februar 2012 veranstaltet vom Architekturreferat des DAI*, Diskussionen zur Archäologischen Bauforschung 11, ed. D. Kurapkat, P.I. Schneider, and U. Wulf-Rheidt, 425–435. Regensburg: Schnell & Steiner GmbH.

Uytterhoeven, I., F. Martens, B. Mušič, and M. Waelkens. 2010. Urban housing in the Pisidian town of Sagalassos (Burdur, Turkey). In *Städtisches Wohnen im östlichen Mittelmeerraum 4. Jh. v. Chr. – 1 Jh. n. Chr., Akten des Internationalen Kolloquiums vom 24.–27. Oktober 2007 an der Österreichischen Akademie der Wissenschaften*, Archäologische Forschungen 18, ed. S. Ladstätter and V. Scheibelreiter, 291–309. Vienna: VÖAW.

Uytterhoeven, I., H. Kökten, M. Corremans, J. Poblome, and M. Waelkens. 2013. Late antique private luxury. The mosaic floors of the 'Urban Mansion' of Sagalassos (Ağlasun, Burdur – Turkey). *Jahreshefte des Österreichischen Archäologischen Instituts* 82: 373–407.

Uytterhoeven, I., H. Kökten, V. Muros, and M. Waelkens. 2014. Bits and Pieces. Wall Paintings in the Late Antique Urban Mansion of Sagalassos (Ağlasun, Burdur – Turkey). In *Antike Malerei zwischen Lokalstil und Zeitstil. Akten des XI. Internationalen Kolloquiums der AIPMA (Association Internationale pour la peinture murale antique). 13–17 September Ephesos*, Archäologische Forschungen 23. Ôsterreichische Akademie der Wissenschaften. Philosophisch-historische Klasse Denkschriften 468, ed. N. Zimmermann, 221–231. Wien: VÖAW.

Van de Vijver, K. 2018. *Fiziksel antropoloji çalışmaları, 39 Kazı sonuçları toplantısı 22–26 Mayış 2017 Bursa*, 227–228. Ankara: T.C. Kültür ve Turizm Bakanlığı.

van der Enden, M., J. Poblome, and Ph. Bes. 2015. From Hellenistic to Roman Imperial in Pisidian tableware: The genesis of Sagalassos Red Slip Ware. In *Late Hellenistic to Mediaeval Fine Wares of the Aegean Coast of Anatolia. Their Production, Imitation and Use*, Travaux de l'Institut des Cultures Méditerranéennes et Orientales de l' Académie Polonaise des Sciences, Tome I, ed. H. Meyza and with collaboration of K. Domżalski, 81–93. Warsaw: Éditions Neriton.

Van Heesch, J., and F. Stroobants. 2015. The silver coinage of Sagalassos in Pisidia. In *Studies in Ancient Coinage in Honour of Andrew Burnett*, ed. R. Bland and R. Calomino, 13–30. London: Spink.

Van Neer, W., O. Lernau, R. Friedman, G. Mumford, J. Poblome, and M. Waelkens. 2004. Fish remains from archeological sites as indicators of former trade connections in the Eastern Mediterranean. *Paléorient* 30 (1): 101–147.

Vandam, R. 2015. The Burdur Plain survey (SW Turkey): In search of the Middle Chalcolithic (5500–4200 BC). In *The Archaeology of Anatolia. Recent Discoveries (2011–2014)*, ed. S.R. Steadman and G. McMahon, vol. I, 278–297. Cambridge: Cambridge Scholars Publishing.

Vandam, R., and E. Kaptijn. 2015. Living in the Burdur plain. A diachronic reconstruction of human subsistence (6500-200 BC). In *Pisidian Papers. Essays in Honour of Haci Ali Ekinci*, ed. H. Metin, B. Ayça Polat Becks, R. Becks, and M. Fırat, 165–175. Istanbul: Ege Yayınları.

Vandam, R., P.T. Willett, and J. Poblome. 2017a. Living on the margins: First results from the Dereköy archaeological survey of the Sagalassos project in the Western Taurus Mountains. In *The Archaeology of Anatolia, Recent Discoveries (2015–2016),* ed. Sh.R. Steadman and G. McMahon, vol. II, 321–346. Cambridge: Cambridge Scholars Publishing.

Vandam, R., P.T. Willett, and J. Poblome. 2017b. Up in the hills: The 2016 Sagalassos archaeological survey results. *Anmed* 15: 224–232.

Vanhaverbeke, H., and M. Waelkens. 2003. *The Chora of Sagalassos. The Evolution of the Settlement Patterns from Prehistoric until Recent Times*, Studies in Eastern Mediterranean Archaeology 5. Turnhout: Brepols Publishers.

Vanhaverbeke, H., F. Martens, M. Waelkens, and J. Poblome. 2004. Late antiquity in the territory of Sagalassos. In *Recent Research on the Late Antique Countryside*, Late Antique Archaeology 2, ed. W. Bowden, L. Lavan, and C. Machado, 247–279. Leiden: Brill.

Vanhaverbeke, H., Ö. Başağaç, and K. Paul. 2005. A Selçuk hamam at Ağlasun (Burdur Province). *Turcica* 37: 309–336.

Vanhaverbeke, H., F. Martens, and M. Waelkens. 2007. Another view on late antiquity: Sagalassos (SW Anatolia), its suburbium and its countryside in late antiquity. In *The Transition to Late Antiquity on the Danube and Beyond*, ed. A. Poulter, 611–648. Oxford: OUP/British Academy.

Vanhaverbeke, H., A.K. Vionis, J. Poblome, and M. Waelkens. 2009. What happened after the 7th century AD? A different perspective on post-Roman rural Anatolia. In *Archaeology of the Countryside in Medieval Anatolia*, PIHANS 113, ed. T. Vorderstrasse and J. Roodenberg, 177–190. Leiden: NINO.

Vanhaverbeke, H., M. Waelkens, K. Vyncke, V. De Laet, S. Aydal, B. Mušič, B. De Cupere, J. Poblome, D. Braekmans, P. Degryse, E. Marinova, G. Verstraeten, W. Van Neer, B. Šlapšak, I. Medarič, H.A. Ekinci, and M.O. Erbay. 2010. "Pisidian" culture? The classical-Hellenistic site at Düzen Tepe near Sagalassus (Southwest Turkey). *Anatolian Studies* 60: 105–128.

Vanhaverbeke, H., P. Degryse, B. De Cupere, W. Van Neer, M. Waelkens, and P. Muchez. 2011. Urban–rural integration at ancient Sagalassos (SW Turkey). Archaeological, archaeozoological and geochemical evidence. *Archaeofauna* 20: 73–83.

Vionis, A.K., J. Poblome, and M. Waelkens. 2009a. The hidden material culture of the Dark Ages. Early medieval ceramics at Sagalassos (Turkey): New evidence (ca. AD 650–800). *Anatolian Studies* 60: 147–165.

Vionis, A.K., J. Poblome, and M. Waelkens. 2009b. Ceramic continuity and daily life in medieval Sagalassos. In *Archaeology of the Countryside in Medieval Anatolia*, PIHANS 113, ed. T. Vorderstrasse and J. Roodenberg, 191–213. Leiden: NINO.

Waelkens, M. 1993. Sagalassos. History and archaeology. In *Sagalassos I (1986–1991). First General Report on the Survey (1986–1989) and the Excavations (1990–1991)*, ed. M. Waelkens, 37–85. Leuven: Leuven University Press.

Waelkens, M. and the Sagalassos Team 1997, The 1994 and 1995 excavation seasons at Sagalassos. In *Sagalassos IV. Report on the Survey and Excavation Campaigns of 1994 and 1995*, ed. M. Waelkens and J. Poblome, 103–216. Leuven: Leuven University Press.

Waelkens, M. 2000. Sagalassos and Pisidia in the Late Bronze Age. In *Sagalassos V. Report on the Survey and Excavation Campaigns of 1996 and 1997*, ed. M. Waelkens and L. Loots, 473–485. Leuven: Leuven University Press.

Waelkens, M. 2002. Romanization in the East. A case study: Sagalassos and Pisidia (SW Turkey). *Istanbuler Mitteilungen* 52: 311–368.

Waelkens, M. 2004. Ein Blick von der Ferne. Seleukiden und Attaliden in Pisidien. *Istanbuler Mitteilungen* 54: 435–471.

Waelkens, M. 2006. Sagalassos. In *Stadtgrabungen und Stadtforschung im westlichen Kleinasien. Geplantes und erreichtes*, Byzas 3, ed. W. Radt, 325–357. Istanbul: Ege Yayinlari.

Waelkens, M. 2008. Geo- and bio-archaeology at Sagalassos and in its territory. In *Sagalassos VI. Geo- and Bio-Archaeology in the Territory of Sagalassos*, ed. P. Degryse and M. Waelkens, 1–16. Leuven: Leuven University Press.

Waelkens, M. 2013. The fate of the colossal statues of Hadrian and other members of the imperial family from the 'Imperial Baths' at Sagalassos during late antiquity. In *Hadrian: Art, Politics and Economy*, ed. T. Oppert, 62–72. London: The British Museum.

Waelkens, M. 2015a. The emperor cult at Sagalassos (Anatolia) from Augustus to Hadrian. In *Auguste, son époque et l' Augusteum de Narona*, ed. P. Gros, E. Marin, and M. Zink, 93–128. Paris: Académie des inscriptions et belles-lettres.

Waelkens, M. 2015b. Hadrian and the 'neokoria' of Sagalassos. In *Pisidian Papers. Essays in Honour of H. A. Ekinci*, ed. H. Metin, B.A. Polat-Becks, R. Becks, and M. Firat, 179–214. Istanbul: Ege Yayınları.

Waelkens, M. 2015c. The library of T. Flavius Severianus Neon at Sagalassos. In *Pisidian papers. Essays in Honour of H. A. Ekinci*, ed. H. Metin, B.A. Polat-Becks, R. Becks, and M. Firat, 215–259. Istanbul: Ege Yayınları.

Waelkens, M. 2016. Sagalassos. City of water. In *De aquaeductu atque aqua urbium Lyciae Pamphyliae Pisidiae. The Legacy of Sextus Julius Frontinus. Tagungsband des Internationalen Frontinus-Symposiums. Antalya, 31. Oktober – 9. November 2014*, Babesch, Supplements 27, ed. G. Wiplinger, 323–336. Leuven/Paris/Bristol: Peeters.

Waelkens, M. 2018. Geschichtlicher Überblick. In *mit Beiträgen von M. Waelkens. 2018. Die Inschriften von Sagalassos. Teil I*, Inschriften Griechischer Städte aus Kleinasien 70, ed. A. Eich, P. Eich, and W. Eck, 1–19. Bonn: Dr. Rudolf Habelt GmbH.

Waelkens, M., and I. Jacobs. 2014. Sagalassos in the Theodosian age. In *Production and Prosperity in the Theodosian Period*, Interdisciplinary Studies in Ancient Culture and Religion 14, ed. I. Jacobs, 91–126. Leuven/Walpole: Peeters.

Waelkens, M., and J. Poblome. 2011. *Sagalassos. City of Dreams*. Gent: Openbaar Kunstbezit in Vlaanderen.

Waelkens, M., and the Sagalassos Team. 2000. Eine interdisziplinäre Methodologie zur historischen Geographie einer kleianasiatischen Metropole. In *Byzanz als Raum. Zu Methoden und Inhalten der historischen Geographie des östlichen Mittelmeerraumes*, Veröffentlichungen der Kommission für die Tabula Imperii Byzantini 7, ed. K. Belke, F. Hild, J. Koder, and P. Soustal, 261–288. Wien: VÖAW.

Waelkens, M., et al. 2000a. The 1996 and 1997 surveys in the territory of Sagalassos. In *Sagalassos V. Report on the Survey and Excavation Campaigns of 1996 and 1997*, ed. M. Waelkens and L. Loots, 17–216. Leuven: Leuven University Press.

Waelkens, M., et al. 2000b. The 1996 and 1997 excavation seasons at Sagalassos. In *Sagalassos V. Report on the Survey and Excavation Campaigns of 1996 and 1997*, ed. M. Waelkens and L. Loots, 217–398. Leuven: Leuven University Press.

Waelkens, M., L. Vandeput, C. Berns, B. Arıkan, J. Poblome, and E. Torun. 2000c. The Northwest Heroon at Sagalassos. In *Sagalassos V. Report on the Survey and Excavation Campaigns of 1996 and 1997*, ed. M. Waelkens and L. Loots, 553–594. Leuven: Leuven University Press.

Waelkens, M., E. Paulissen, and E. Smets. 2002. Late Holocene local vegetation dynamics in the marsh of Gravgaz (Southwest Turkey). *Journal of Paleolimnology* 27: 429–451.

Waelkens, M., H. Vanhaverbeke, F. Martens, P. Talloen, J. Poblome, N. Kellens, T. Putzeys, P. Degryse, T. van Thuyne, and W. van Neer. 2006. The late antique to early Byzantine city in Southwest Anatolia. Sagalassos and its territory: A case study. In *Die Stadt in der Spätantike – Niedergang oder Wandel? Akten des Internationalen Kolloquiums in München am 30. und 31. Mai 2003*, Historia Einzelschriften 190, ed. J.-U. Krause and C. Witschel, 199–255. Stuttgart: Franz Steiner.

Waelkens, M., T. Putzeys, I. Uytterhoeven, Th. Van Thuyne, W. Van Neer, J. Poblome, and N. Kellens. 2007. Two late antique residential complexes at Sagalassos. In *Housing in Late Antiquity*, Late Antique Archaeology 3.2, ed. L. Lavan, L. Özgenel, and A. Sarantis, 495–513. Leiden: Brill.

Waelkens, M., J. Poblome, and K. Vyncke. 2011. Indigenous versus Greek identity in Hellenistic Pisidia. Myth or reality?. In Hellenes and Non-Hellenes/beyond identity in the Hellenistic East, in H. Di Giuseppe & M. Della Riva, *Meetings Between Cultures in the Ancient Mediterranean. XVII International Congress of Classical Archaeology. Rome: 22–26 September 2008. Bollettino di Archeologia Online*, *Edizione speziale.1, Anno Due*, J. Gates-Foster (ed.), 19–54. Available at http://151.12.58.75/archeologia/index.php?option=com_content&view=article&id=2&temid=2. Accessed 19 Dec 2011.

Waelkens, M., G. Üner, and J. Richard. 2017. The finishing touch. The architectural decoration of the Late Hadrianic Nymphaeum at Sagalassos – The stoneworking process. In *Werkspuren. Materialverarbeitung und handwerkliches Wissen im antiken Bauwesen. Internationales Kolloquium in Berlin vom 13.–16. Mai 2015 veranstaltet vom Architekturreferat des DAI*, Diskussionen zur archäologischen Bauforschung 12, ed. D. Kurapkat and U. Wulf-Rheidt, 446–466. Regensburg: Schnell & Steiner GmbH.

Willet, R., and J. Poblome. 2015. The scale of Sagalassos red slip ware production – Reconstructions of local need and production output of roman imperial tableware. *Adalya* 18 (2): 1–25.

Further Reading

Aperghis, M. 2004. *The Seleukid Royal Economy. The Finances and Financial Administration of the Seleukid Empire*. Cambridge: Cambridge University Press.

Belke, K., and N. Mersich. 1990. *Phrygien und Pisidien*, Tabula Imperii Byzantini 7. Wien: VÖAW.

Le Rider, G., and F. de Callatay. 2006. Les Séleucides et les Ptolémées. In *L' heritage monétaire et financier d'Alexandre le Grand*. Paris: Éditions du Rocher.

Richard, J. 2014. Macellum/Μάκελλον, 'Roman' food markets in Asia Minor and the Levant. *Journal of Roman Archaeology* 27: 255–274.

Sahara, Makoto

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Basic Biographical Information

Makoto Sahara (1932–2002) (Fig. 1) is a Japanese archaeologist. He was born in Osaka, Japan, in 1932. He picked up a piece of pottery in the park when he was a kindergarten child and decided to become an archaeologist. He participated in an anthropology class for junior high school students organized by the Japanese Anthropological Society and was impressed by Sugao Yamanouchi who founded Jomon studies in 1947. He started visiting Yamanouchi at the University of Tokyo to take private lessons and became absorbed in study of the decoration of Jomon pottery. After graduating from the Department of German at the Osaka University of Foreign Studies, Sahara obtained a doctoral degree in archaeology from Kyoto University. After this, he joined the Nara National Research

Sahara, Makoto, Fig. 1 Makoto Sahara. (Photo courtesy of Shin'ichiro Fujio)

Institute for Cultural Properties in Nara and took part in excavations of the Heijo Palace site in 1964. He became the Head of the Center in 1992 at the age of 60 and an Assistant Director of the National Museum of Japanese History in 1993. He was Director of this museum from 1997 until he retired in 2001. He died in 2002.

Major Accomplishments

Although the Yayoi period was the focus of Makoto Sahara's study, the range of his interests was wide and included the origin and lifestyle of Japanese people. The title of his graduate thesis was "The application of the question of handedness to archaeology." Among his unique works is a comparative analysis of prehistoric pictures on the bronze bells from the Yayoi period with children's pictures, undertaken from the viewpoint of art history and psychology. The archaeology of the Wei-zhi was his last work. He used to comment that he leaned the method of fine observation from Sugao Yamanouchi and how to construct theory from Yukio Kobayashi.

Makoto Sahara strongly insisted that archaeology should not be for a limited number of specialists but for the public. He advocated an accessible and interesting archaeology. He tried to use simple, plain words instead of academic jargon in his writing and suggested that other archaeologists to do the same. In order to make archaeological data and interpretations available to the public, he worked hard to establish and/or empower museums and to protect and preserve archaeological sites, such as the Yayoi settlement site of Yoshinogari, Saga prefecture. When he retired in 2001, Sahara donated about 7,000 of his own books to the library of Chatan town in Okinawa prefecture.

Makoto Sahara's research into the origin of warfare had implications in terms of contemporary warfare. His analysis of stone arrowheads from the Yayoi period concluded that arrowheads as weapons developed during the Yayoi period as evidence of weapons for killing people did not exist in the preceding period. Based on this data – and with potential lessons for modern warfares in mind – Sahara insisted that we should be able to stop warfare because human beings lived without it until recently (in terms of an archaeological time frame).

After Makoto Sahara's death, a collection of his works was assembled by Hiroshi Kanaseki and Hideji Harunari and published in six volumes in 2005 as *The works of Makoto Sahara*.

Cross-References

► Kanaseki, Hiroshi
► Yamanouchi, Sugao

Further Reading

Kanaseki, H. 2005. Kaisetsu [Expository chapter]. In *Sahara Makoto no shigoto: Kokogaku eno an'nai [The works of Makoto Sahara, volume 1: An introduction to archaeology]*, ed. H. Kanaseki and H. Harunari, 303–311. Tokyo: Iwanami Shoten (in Japanese).

Sahara, M. 1987. *Nihon-jin no tanjo. [The birth of the Japanese people.]*. Tokyo: Shogakkan (in Japanese).

Sahara, M. 1996. *Shoku no kokogaku. [Archaeology of eating.]*. Tokyo: Tokyo University Press (in Japanese).

Sahara, M. 1997. *Genshi kaiga. [Primitive pictures.]*. Tokyo: Kodansha (in Japanese).

Sahara, M. 2005a. Kokogaku wo yasashiku shiyo [Let's make archaeology easy]. In *Sahara Makoto no shigoto: Kokogaku to gendai [The works of Makoto Sahara, volume 6: archaeology and the present]*, ed. H. Kanaseki and H. Harunari, 248–274. Tokyo: Iwanami Shoten (in Japanese).

Sahara, M. 2005b. Kokogaku wo tanoshiku shiyo [Let's make archaeology interesting]. In *Sahara Makoto no shigoto: Kokogaku to gendai [The works of Makoto Sahara, volume 6: archaeology and the present]*, ed. H. Kanaseki and H. Harunari, 275–301. Tokyo: Iwanami Shoten (in Japanese).

Saito, Tadashi

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Basic Biographical Information

Saito Tadashi is a Japanese archaeologist and an Emeritus Professor of Taisho University. He was

born in Hokkaido in 1908 and has lived to be over 100 years old. When he was one year old, his parents moved to Sendai in the northeast part of Japan. In 1921, Saito Tadashi entered junior high school (in the old system of education, almost equal to the high school in the present educational system), and during his junior high school days, he loved to walk around watching the local customs and manners and sometimes collecting artifacts on the Daigi-gakoi shell midden of Jomon period. In 1926, he entered Second High School (in the old system of education, equal to the half stage of an undergraduate degree in the present educational system) in Sendai. There, he organized a studying club for students who were interested in field surveys, with Nobuo Ito, who would later become the first professor of archaeology in Tohoku University. As a member of the club, he took part in the excavations of Daigi-gakoi shell middens by Sugao Yamanouchi in 1927, and in 1929 he learned from Dr. Yamanouchi about how the cord-mark decoration had been made on Jomon pottery. Saito Tadashi's first paper was published in 1927 as a report on that shell midden. He subsequently wrote papers on folklore for the journal edited by the great folklorist, Kunio Yanagita.

Following Yanagita's advice, Professor Saito chose to study at the Department of Japanese History of The University of Tokyo in 1929. He also attended various lectures in different faculties such as anthropology, prehistory, and architectural history. During this period, he helped to edit the archaeological journal issued by The Imperial Museum, *KokogakuZasshi* (*The Journal of the Archaeological Society of Nippon*), which led him to have broad knowledge and a large network of contacts. In 1932, he wrote his bachelor dissertation on Japanese ancient mortuary practices. He then went to Kyoto University to learn archaeology from Kosaku Hamada, who made him a junior assistant (1932–1935). From 1933 to 1940, he undertook many excavations and surveys in and around Korean Peninsula. He served as a curator of the museum in Gyeongseong in the second half of his overseas mission. This experience would come to fruition in 1955 in his doctoral thesis on the Silla culture.

After returning to Japan, Professor Saito worked in the Ministry of Education and Culture for more than a quarter century (1940–1966), travelling throughout the Japanese Archipelago to conduct cultural heritage management by inspecting archaeological sites. This included his contribution as a governmental officer to facilitating the excavation of Toro in 1948 in which an interdisciplinary team systematically investigated a prehistoric paddy field for the first time, and through which establishment of the Japanese Archaeological Association was promoted. In 1955, Professor Saito received a doctorate from The University of Tokyo, and he started to give lectures there in 1962. He then became a professor of the Faculty of Letters at the university, 1 year before he left the Ministry of Education and Culture. In 1969, he left the university on reaching retirement age and was invited as a lecturer to Taisho University. In the next year, he became a professor, and in 1983 he became an Emeritus Professor of the university.

Major Accomplishments

Professor Saito wrote a large number of books, ranging from the history of archaeology, through Buddhism archaeology and archaeological methodology, to paleology. In his work he placed importance on the following: (a) making full lists of archaeological sites; (b) making a reference list of archaeological books, papers, and other writings; and (c) making comprehensive collections of the information, drawings, and photos of archaeological objects. He has never shirked such basic works and regarded them as essential to the discipline. One of his conspicuous accomplishments is thorough and comprehensive research on the history of archaeology. He once said that he had a sense of mission in studying the history of archaeology because he had graduated from a Department of Japanese History (1997b).

Professor Saito had made every effort to preserve archaeological sites during the decades of his career when he was with the Ministry of Education and Culture. His outstanding contribution to cultural heritage management was to protect significant national heritage sites from military,

political, and economic pressure even during and immediately after World War II. It included the development of a Navy military base planned on the location of a shell midden, the construction of a railroad besides a castle for military use, and manganese mining by the local conglomerate planned below a tumulus. These episodes demonstrate his strong sense of responsibility for archaeological materials.

Professor Saito published a textbook on archaeology, *Koko-gaku no Kekyu-ho* (*Methods in Archaeology*), in 1950. A considerable amount of data had been collected since the first textbook of archaeology in Japan was written by Kosaku Hamada in 1922, but a systematic introductory book of archaeology had not been produced for decades. Saito's textbook followed the style of his master of archaeology, Hamada, and looked like a revised edition of Hamada's book, *Tsuron Koko-gaku*, together with upgraded appendix such as a full glossary, comprehensive references, and extracts of relating laws. Saito's practical experience in the Korean Peninsula and his broad purview on ancient remains obtained as an officer of the Ministry of Education and Culture possibly enabled him to produce this significant book for beginners in archaeology, not later than five years after the defeat of the WWII.

In practical archaeology, Professor Saito takes a comparative approach to study of the ancient East Asian cultures based on his broad knowledge and experience of archaeology there, accumulated since the 1930s. The products of his work include several books on ancient Korean culture, including his doctoral thesis. His interest in burials and temples was combined with knowledge of historiography and paleology, making him a prominent figure in historical archaeology. Above all, his achievements in the archaeology of Buddhism are unparalleled.

Cross-References

- ▶ Hamada, Kosaku
- ▶ Periodization in Japanese Prehistoric Archaeology
- ▶ Yamanouchi, Sugao

References

Hamada, K. 1922. *Tsuron Koko-gaku*. [*An introduction to archaeology*]. Tokyo: Taikaikaku (in Japanese).

Saito, T. 1950. *Koko-gaku no Kekyu-ho*. [*Methods in archaeology*]. Tokyo: Yoshikawa-kobun-kan (in Japanese).

Saito, T. 1997a. Koko-iseki nanaju-nen no tabi: ge. [A seventy-year journey through archaeological sites: Part 2]. *Nihon-rekishi* [*Japanese History*] 594: 33–48 (in Japanese).

Further Reading

Saito, T. 1976. *Kodai-shi to Koko-gaku*. [*Ancient history and archaeology*]. Tokyo: Yoshikawa-kobun-kan (in Japanese).

Saito, T. 1988. Koko-gaku to watashi. [Archaeology and myself]. In *Koko-gaku Ronko, Jo-kan*. [*A collection of papers on archaeology*. vol. 1], ed. Publication Committee for the Memorial Essays for Celebration of Longevity of Professor Tadashi Saito, 1–52. Tokyo: Yoshikawa-kobun-kan (in Japanese).

Saito, T. 1996–98. *Saito Tadashi Chosaku Senshu*. [*A selection of Tadashi Saito's works*]. vols. 1–6. Tokyo: Yuzan-kaku (in Japanese).

Saito, T. 1997b. Koko-iseki nanaju-nen no tabi: jo. [A seventy-year journey through archaeological sites: Part 1]. *Nihon-rekishi* [*Japanese History*] 593: 17–31 (in Japanese).

Saito, T. & H. Sakadume. 1998. Taidan: Saito koko-gaku wo megutte. [An interview: Archaeology and Professor Saito]. In *Saito Tadashi Chosaku Senshu*. [*A selection of Tadashi Saito's works*, *volume 6*], ed. T. Saito, 233–260. Tokyo: Yuzan-kaku (in Japanese).

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Basic Biographical Information

Noel B. Salazar is a Belgian-Spanish anthropologist who received his Ph.D. in Anthropology from the University of Pennsylvania (USA). He is currently Research Professor at the Faculty of Social Sciences of the University of Leuven (Belgium), where he founded the research cluster Cultural Mobilities Research (CuMoRe). He teaches in the anthropology program and the interdisciplinary heritage management module. In addition, he

is Visiting Professor at the Faculty of Foreign Languages and Literatures of the University of Bergamo (Italy).

Major Accomplishments

While at the University of Pennsylvania, Dr. Salazar experienced firsthand the benefits of transdisciplinary research. His involvement within the Department of Anthropology's "Public Interest Anthropology" taught him the necessity of bridging the divide between academia and the wider public. Together with archaeologist Benjamin W. Porter, now Director of the Phoebe A. Hearst Museum of Anthropology and Associate Professor of Near Eastern Archaeology at the University of California at Berkeley, he applied the public interest perspective to heritage tourism. For this work, he was awarded with a Student Achievement Award from the National Association for the Practice of Anthropology. Understanding the changing meaning and value of cultural heritage, both material and intangible, is still high on his research agenda. It forms part of Salazar's broader work within the field of critical heritage studies.

Dr. Salazar's research interests include anthropologies of mobility and travel, the local-to-global nexus, discourses and imaginaries of Otherness, heritage interpretation, cultural brokering, and cosmopolitanism. He has conducted fieldwork at world heritage sites in Indonesia and Tanzania. His anthropological work synthesizes ethnographic findings with conceptual frameworks developed within anthropology, sociology, geography, cultural studies, tourism studies, philosophy, and psychology. Dr. Salazar is particularly interested in disentangling the connections between tourism, heritage, and human mobility.

Dr. Salazar has won numerous grants for his innovative research projects, including from the National Science Foundation, the European Commission, and the Research Foundation Flanders. He was involved as expert collaborator in the first UNWTO study on tourism and intangible cultural heritage and the World Heritage Tourism Research Network international survey on the heritage of the Great War, 1914–1918.

Internationally, Dr. Salazar serves as Secretary-General of the International Union of Anthropological and Ethnological Sciences and Chair of the IUAES Commission on the Anthropology of Tourism. He is Past President of the European Association of Social Anthropologists. In addition, Dr. Salazar is on UNESCO's and UNWTO's official roster of consultants and an expert member of the ICOMOS International Cultural Tourism Committee (with fieldwork missions to Samarkand and the Seychelles) and the UNESCO-UNITWIN Network "Culture, Tourism and Development" (with fieldwork missions to Barcelona, Buenos Aires, Salta, Libreville, and Haifa). In Belgium, he is a member of the National Consultation Panel of the European Commission's Joint Programming Initiative on Cultural Heritage and steering group member of the University of Leuven's interdisciplinary Cultural Heritage Task Force.

Dr. Salazar is the author of several books and numerous peer-reviewed articles and book chapters on the anthropology of heritage tourism (see References). He is the editor of the *Worlds in Motion* (Berghahn) and *Anthropology of Tourism* (Lexington) book series. Dr. Salazar sits on the editorial boards of, among others, *American Anthropologist*, *Annals of Tourism Research*, *Journal of Sustainable Tourism*, *Pasos – Revista de Turismo y Patrimonio Cultural*, and *AIBR – Revista de Antropología Iberoamericana*.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Indonesia's World Heritage
- ▶ Intangible Cultural Heritage
- ▶ Journal of Heritage Tourism
- ▶ Sustainability and Cultural Heritage
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ Tanzania's History and Heritage

References

Porter, B.W., and N.B. Salazar, eds. 2005. Heritage tourism, conflict, and the public interest. Theme issue. *International Journal of Heritage Studies* 11 (5)

Salazar, N.B. 2010a. *Envisioning Eden: Mobilizing imaginaries in tourism and beyond*. Oxford: Berghahn.

Salazar, N.B. 2010b. The glocalisation of heritage through tourism: Balancing standardisation and differentiation. In *Heritage and globalisation*, ed. S. Labadi and C. Long. London: Routledge.
Salazar, N.B. 2012. Shifting values and meanings of heritage: From cultural appropriation to tourism interpretation and back. In *Global tourism: Cultural heritage and economic encounters*, ed. S.M. Lyon and C.E. Wells. Lanham: Altamira.
Salazar, N.B. 2013. Imagineering otherness: Anthropological legacies in contemporary tourism. *Anthropological Quarterly* 86 (3): 669–696.
Salazar, N.B. 2016. One list, a world of difference? The dynamics of global heritage at two neighbouring properties. In *World heritage on the ground: Ethnographic perspectives*, ed. C. Brumann and D. Berliner. Oxford: Berghahn.
Salazar, N.B., and N.H.H. Graburn, eds. 2014. *Tourism imaginaries through an anthropological lens*. Oxford: Berghahn.
Salazar, N.B., and Y. Zhu. 2015. Heritage and tourism. In *Global heritage: A reader*, ed. L. Meskell. New York: Wiley Blackwell.

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Basic Biographical Information

Dr. Saleh graduated from the Faculty of Engineering of Cairo University and received his Ph.D. from the University of Paris, France. His main interest is the application of the new technologies in the different fields of cultural and natural Heritage. He is currently professor of computer engineering at Cairo University. From 1995 to 1997, Dr. Saleh occupied the position of cultural councilor at the embassy of Egypt in Paris, and from 1997 to 1999, he was Egypt's ambassador to UNESCO.

Major Accomplishments

Dr. Saleh is also the president of Herimed (Association for the Documentation, Preservation and Valorization of Euro-Mediterranean Cultural Heritage). He is a member of the Supreme Council of Culture and of the Board of the Director of the Supreme Council of Antiquities, as well as a member of "Institut d'Egypte."

Dr. Saleh founded the Center for Documentation of Cultural and Natural Heritage (CULTNAT) in 2000 as a national center for documentation of different aspects of cultural and natural heritage of Egypt. CULTNAT is part of Bibliotheca Alexandrina and is supported by the Ministry of Communications and Information Technology. Dr. Saleh currently holds the position of CULTNAT's founder and emeritus director.

In the field of cultural heritage, CULTNAT has documented different aspects of tangible and intangible heritage. One of the major projects in tangible heritage has been building the Archaeological Map of Egypt for which the center has won the Stockholm Chalange Award in 2004. CULTNAT has a series of publications in every field of heritage such as atlases for every region in Egypt with all archaeological sites included, works of the Egyptian musicians, contribution of Arab Civilization in sciences through old manuscripts, the presidential palaces, etc.

A major study was carried by the center and headed by Dr. Saleh entitled "A strategic approach to Egypt's Cultural Heritage." This study was done upon request from UNESCO. The study shows the different steps to be followed in order to properly manage Egypt's cultural heritage.

Dr. Saleh also managed to establish a masters degree in cultural heritage management (CHM) in association with the French University in Cairo.

Dr. Saleh has won several international awards. In Qatar, in 2010, he received the "Information Systems Expert First Award" from the Arab Towns Organization. In 2010, he won the award of ARCHAEOLOGICAL 2.0 from the "Il Congreso Internacional de Arqueologia et Informatica Grafica, Patremonio e Innovacion" held in Seville, Spain, for his work on "Virtual Representation of Egyptian Cultural Heritage."

Besides these awards, he won the World Summit Awards for different heritage contributions three times. The first was in Geneva in 2003, the second was in Tunisia in 2005, and the third was in Abu Dhabi in 2010.

Cross-References

- ▶ Heritage Areas
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage List: Criteria, Inscription, and Representation

Further Reading

Butler, B. 2007. *Return to Alexandria. An ethnography of cultural heritage, revivalism and museum memory.* Walnut Creek: Left Coast Press.

Hawass, Z. 2000. Site management at Giza Plateau: Master plan for the conservation of the site. *International Journal of Cultural Property* 9: 1–22.

Haikal, F. 2003. Egypt's past regenerated by its own people. In *Consuming ancient Egypt*, ed. S. MacDonald and M. Rice, 123–138. London: UCL Press.

Ikram, S. 2011. Collecting and repatriating Egypt's past toward a new nationalism. In *Contested cultural heritage. Religion, nationalism, erasure and exclusion in a global world*, ed. H. Silverman, 141–154. New York: Springer.

Sambaqui Research in Brazil: A Review and Recent Trends (Coastal Archaeology from Southern Shores of Brazil)

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Introduction

Sambaquis (from native Tupi language, literally meaning *shell mounds* or *concheros*) are archaeological mounded sites distributed all over the Brazilian coast, concentrating mostly at ecologically patchy areas involving brackish waters, mangrove, and forests such as lagoon, bay, and estuarine inlets, including coastal islands. These sites achieve impressive dimensions especially toward the southern shores, where they may reach up to 70 m height and 500 m width (Prous 1992; Gaspar 2000). They usually display heterogeneous stratigraphic sequences, intercalating expressive shell layers to darker strata richer in organic materials, including abundant funerary structures in specific portions of the mound. In fact, several burials are reported in most sambaqui descriptions, disposed in specially prepared places, frequently accompanied of artifacts, food offerings, and hearths (Gaspar 1998, 2000; Gaspar et al. 2008, 2013; Klökler 2014) (Fig. 1).

Even though constantly present in Brazilian archaeological literature since the nineteenth century, the meaning of the sambaquis as archaeological structures is still poorly known, and modeling coastal occupations all along the extensive Brazilian coast is just at the beginning. Systematic studies have started only on the 1950s, focusing more intensively at the southern Atlantic shores, from Rio de Janeiro to Santa Catarina. Regional approaches are rare, prevailing typological descriptions or site-specific reports. Only recently systematic and articulated studies about the relations connecting sambaqui regional settlements and dynamic coastal environments have taken place, though recognition and analysis of this theme appeared in former studies.

Traditionally seen as remains of successive camping locations of very mobile mollusk gathering and fishing bands, sambaquis have occasionally been described as places of residence or mortuary structures. The great diversity of sambaqui sites, nevertheless, suggests a certain amount of functional variability still to be adequately explored. Only recently sambaquis have been recognized as intentionally built structures, full of symbolic signification to their builders.

Despite arguments favoring coastal/hinterland connections, Gaspar (1994) suggested that, at least in Brazilian central southern coast, these sites are remains of societies endowed with proper cultural identity, quite distinctive from other hinterland cultures and traditions. Moreover, such an identity seems to be common to most of the extensive Atlantic Brazilian coast.

Sambaqui Research in Brazil: A Review and Recent Trends (Coastal Archaeology from Southern Shores of Brazil), Fig. 1 Sambaqui Garopaba do Sul, Santa Catarina

Two multidisciplinary research projects aiming at the regional scope of sambaqui occupation and, at the same time, the formation processes involved in mound building have changed the sambaqui research scenario since the 1990s (Gaspar et al. 2008, 2013). Studies on Quaternary natural landscape evolution and human occupation patterns were integrated by means of environmental and archaeological approaches, teaming up researchers and specialists from a number of institutions. One of these projects took place in the southern shores of Santa Catarina, at the lagoon/strand plain area between Laguna and Jaguaruna, and the other at the Lakes Region from Rio de Janeiro, extending northward from Guanabara Bay to Cabo Frio (DeBlasis et al. 1998; Fish et al. 2000; Gaspar et al. 2013; Fig. 2). In both projects, a regional approach using systematic dating and careful stratigraphic profiling, together with horizontal expositions in a few sites, allowed for both the analysis of the regional settlements and the careful study of site formation processes in some key contexts.

Two mounds stand out as prominent foci of research. Jabuticabeira II, a large shell mound located in the southern Santa Catarina shores, has been excavated between 1996 and 2006. Several Brazilian and foreign researchers and students have been working on it, and the studies at this mound have had an important role regarding the expansion in the investigation of sambaqui formation processes, bringing in unprecedented new approaches and insights, taking new interdisciplinary research avenues still open today (Klökler 2014; Villagrán 2010). The other mound is Sernambetiba, at the northeastern part of Guanabara Bay, Rio de Janeiro. This site was excavated in the 1980s (Heredia et al. 1982), leaving behind open areas that have, recently, been carefully reexamined with fresh eyes (Bianchini 2015). Thus, most examples used in this text will come from these areas and sites. The other areas will be but quickly appreciated, since they have been less investigated but with very interesting recent contributions.

Sambaqui Research in Brazil: A Review and Recent Trends (Coastal Archaeology from Southern Shores of Brazil), Fig. 2 Sambaquis distribution along the Brazilian coast

Early Research: Evolutionary Perspectives

Scientific interest in sambaquis has been present since the beginning of archaeology in Brazil, and these shell mounds constitute a research theme that has remained active since the nineteenth century. They have been reported from early sixteenth century, having furnished ever since tons of shell for lime production. In fact, most of the first coastal colonial settlements have made extensive use of it for paving and construction, and massive mound destruction has ended not before the 1980s. Economic interest aside, early researchers were puzzled by their large dimensions, as well as the conspicuous presence of human burials, sometimes accompanied by superb sculptures in stone and bone. In fact, these faunal-rich shell mounds, highly visible on the coastal plains along the Brazilian shores, sometimes deliver hundreds of burials per site, appearing frequently as they were mined.

Despite these undisputable archaeological features, the question whether these mounds were natural or human-made phenomena has dominated the debate up to Leonardos (1938), who established sound criteria for distinguishing *sambaquis* (human-made mounds) from the natural shell beds, also conspicuous throughout Brazilian coast. On the next decades, research on these mounds has multiplied and diversified; in the 1960s and 1970s, they have been extensively excavated and dated, and the first technological and stratigraphic studies appeared, as well as the first modern bioanthropological analyses. Following the strict historical-cultural approach then in vogue, sites have been organized into phases, and some different coastal traditions have been created (Prous 1992; Gaspar et al. 2013).

Research has focused mostly on identification, quantification, and sizing of the specimens directly responsible for the volume of the mounds; particularly as regards their most visible components, shells of *Anomalocardia brasiliana*, *Ostrea* sp., and *Lucina pectinata* are thought of as food remains and taken as the staple diet of the sambaqui mound builders. In Santa Catarina and Rio de Janeiro, compositional phasing clearly revealed a shift from earlier shell mounds to later dark earthen deposits rich in fish remains and reduced amounts of shell, where the downsizing of shells was taken as evidence for the exhaustion of local resources. These darken layers are frequently deposited over the shell mound in stratigraphic sequence and occasionally also displaying ceramics.

This approach stands at the basis of the long-standing interpretive perspective of these people as shellfish collectors that, lately, have become mostly fishers (Prous 1992). Following this evolutionary perspective, economic (and social) changes derive from environmental transformations due to climatic and sea level oscillations, affecting the availability and distribution of resources, thus leading to high mobility of small bands of shellfish collectors across coastal areas. Mobility, in this way, has been used as explanation for the mounds' complex stratigraphic sequences, interpreted as successive camping episodes. Thus, large amounts of accumulated food debris has led to interpret these sites as habitational, despite the also large amounts of burials, that have led earlier researchers such as Wiener (1876) and Duarte (1968) to think about them as funerary monuments.

Human remains recovered at the excavations (with interest almost exclusively in the crania) were taken to physical anthropologists that, in Brazil, were very much influenced by deterministic racial theories from nineteenth- and early-twentieth-century French and German authors (Seyferth 1995). Until the first half of the twentieth century, the goal of most archaeological excavations was to produce skeletons used to establish the human physical types considered representative of the past. Human bones, particularly skulls from *sambaquis*, were analyzed apart from their original archaeological context. The *sambaquis* were considered merely as *jazidas* (or mines, a term used widely at the time) from which the bones – the sole focus of anthropological interest – were extracted.

The impressive small sculptures in bone and stone recovered at the sambaquis are relatively rare (only about 300 pieces have been reported), not bigger than circa 40 cm long. They have been acknowledged since the nineteenth century, when some authors (e.g., Lacerda 1885) have considered them too sophisticated to be created by such a "primitive culture," being probably crafted by later civilizations. Prous (1992) calls attention to their elegant and beautiful design, noting that most of these sculptures have come from mound dismantling; the very few excavated pieces are securely associated to funerary contexts. Some exhibit geometric designs, but sea creatures, such as ray, shark, whale, dolphin, and anchovy, are among the most commonly represented in the effigies, an evidence of the deep connection that sambaqui societies have with the aquatic world (DeBlasis et al. 1998). Flying species (albatross, owl, kingfisher, bat) and terrestrial species (armadillo, turtle, alligator, penguin), among others, are also depicted. Very few of them have anthropomorphic figurines, eventually evoking a human/animal entity. Prous (1992: 102) refers to these sculptures as depicting "an animated world, creatures that swim, run and fly, can be taken by surprise having sex" (Fig. 3). Some sea creatures are so realistically depicted that their anatomic details allow for species identification. Terrestrial animals and fowl are usually less realistic (with some exceptions), sometimes just evoking bird or mammal morphology.

Most of these sculptures have a cavity in the ventral face, suggesting a relationship toward fertility and reproduction, and Prous (1992) points out that several pieces have sexual organs represented or have phallic extremities. One sculpture depicts fishes copulating; others show birds about to do it; another one depicts a bird with four younglings in the nest. The geographical distribution of these sculptures is exclusive of the southern shores, between São Paulo and Uruguay. This has led Prous (1992: 223) to

Sambaqui Research in Brazil: A Review and Recent Trends (Coastal Archaeology from Southern Shores of Brazil), Fig. 3 Rock sculptures of sambaquis

consider the existence of an ideological unity along that area, evinced by thematic recurrence and rigid stylistic rules, suggesting some degree of endogamy. In contrast, the remaining lithic industry was described as simple, "primitive," because of being cobble-based, with a large number of used but not technologically modified pieces, and little finishing, except for a variety of polished ax blades (e.g., Bryan 1993).

The Brazilian archaeological scene by the 1960s to the 1980s was marked by the nationwide North American-influenced PRONAPA project, with strong historical-cultural theoretical orientation, mostly concerning regional approaches to the study of ceramic and preceramic hinterland occupations. In contrast, French archaeological missions, and their local followers, conducted rock art studies and extensive excavations on punctual sites (Barreto 2000). Occasional sambaquis have been excavated in French structuralist-based style (*décapage*), while others have been tested in a prospective way, in order to provide for chronological sequences and detect sociocultural changes by means of analyzing economic (diet) variability in the faunal record.

Figuti (1993) has expanded this approach by introducing sampling methods (thus allowing for quantitative analysis) and investigating the relationship between the preserved bone or shell parts and the edible amount of food therein represented. His analysis made it clear that fishing has always been the staple economic activity of the sambaqui mound builders and that the idea of evolution from shellfish collecting toward fishing (mainstream up to that point) was fallacious. On the other hand, against a trend to consider mounds as entities isolated in space and time, studies point out the need for systemic and regionally integrated site studies and the fact that shell has been used as construction material for volume accretion at the mound building process. De Masi (1999), using for the first time isotopic analysis in sambaqui studies, has demonstrated that shellfish has no significant contribution in mound builders diet. Finally, studies on fluvial *sambaquis* in the coastal hinterland of the Ribeira valley have shown intensive settling of patchy coastal inland areas by mound builders, a very long-lived occupation (11.5–1.2 kyBP approx.), evoking the presence of coastal mound building societies even before the Holocene sea transgression, dating from the fringe of the Pleistocene (Figuti et al. 2014).

New Perspectives

Around the 1990s begins to appear studies on mound builders lifestyle, technology, diet, health, and behavioral habits (Scheel-Ybert et al. 2009). Bioanthropologists team up with archaeologists and focus on meticulous exhumation of the burials, with attention to depositional and post-depositional patterns and careful recording of the contextual setting, including artifactual and faunal materials. This has led to a much better

understanding of the depositional sequences and mound building processes. The former historical-cultural premises were heavily criticized, the archaeological research on sambaquis has taken a new impulse, and, in this sense, the *Sambaquis & Landscape* project has been paradigmatic, as follows.

The objectives of the studies at the sambaquis from the southern shores of Santa Catarina were twofold. First, understand and describe mound building sequences in terms of site formation processes. As regards this approach, Brazilian researchers have coined the expression "strategic archaeology," referring to the use of previous interventions on the mounds (usually for mining purposes) to access its internal parts and understand the formation processes taking place in their totality, without much additional site intervening (Gaspar et al. 2013). This approach has been successfully applied to Jabuticabeira II (in southern Santa Catarina) and Sernambetiba (Guanabara Bay) shell mounds, among others. Second, explore the perception that these mounds configure dense settlement systems at a regional scope, by using extensive dating vis-à-vis the study of the dynamic coastal physiognomic changes along the Holocene.

The sambaqui Jabuticabeira II was chosen due to the presence of large cavities that have remained from mining, allowing for extensive profiling throughout the mound, complemented by some additional trenching and horizontal exposures. The conspicuous presence of burials associated to specific dark layers related to paleosurfaces of the mound has revealed the funerary architecture of the mound building sequences, reinforced by the absence of domestic activity areas (Fish et al. 2000). Even after 2000 BP, when the depositional regime changes abruptly from thick shell packages to a dark earthen sediment, rich in fish remains and charcoal, the funerary nature of mound accretion remains as the driving vector for mound building (Fish et al. 2000; Villagrán et al. 2010).

On the other side, regional mapping, profiling, and testing have confirmed the existence of a circum-lagunar settlement system, with several large and small contemporaneous mounds, evincing a coeval face-to-face community system sharing, without perceptible discontinuity, the lagoon resources after many a millennia (approx. 6–1.5 kyBP). This approach reinforces the perception (already indicated by the large number of burials in most mounds) that sambaqui societies were sedentary and demographically expressive, thus deviating significantly from previous "small bands of shellfish collectors evolving to fishermen" models (DeBlasis et al. 1998, 2007). The continuous use of the same places for burial purposes, in some cases for more than 2000 years, depicts a strong sense of territorial attachment, a belonging deeply related to the ancestors and strongly tied into their ecologically patchy coastal habitat (Fish et al. 2013).

End of the Opposition Game and a Lot of Questions

It is important to note that these achievements have only been possible with the abandonment of former "theoretical straightjacket" evolutionary schemes, thus allowing for new insights without adhering to established mainstream ideas born in the 1800s that have dominated the scientific scene for most of the twentieth century. Site formation and systemic approaches freed the researchers from "dual thinking," that is, a theoretical structure based on excluding oppositions that prevailed since the beginnings of sambaqui research in Brazil.

First debates focused on whether the mounds were "natural" or "artificial" or its occupants had brachycephalic or dolichocephalic heads, later on, habitational locations or cemeteries, "clean" or "dirty" (i.e., made mostly of shells or earthen sediments), Macaé or Itaipu phase, shellfish collectors or fishermen, bands or macro-bands, simple or complex hunter-gatherers, and this or that. Even if some of these questions might be significant, tagging labels to the sites do not really help on understanding structural aspects of the sambaqui mound builders life and social organization nor help to explain why and how they have built such huge and everlasting mounds, invested so much effort to preserve the bodies of the

deceased and in elaborate funerary rituals to mourn them. Neither help explain how they have created such a successful culture, which has endured, without great deal of change, for so many millennia. This "duality game," so important for the academic research until recently, seems to have got exhausted, because it does not propitiate pertinent insights toward social life, opening space for more contemporaneous and interdisciplinary interests.

For instance, recent studies developed at the sambaquis Jabuticabeira II (SC) and Sernambetiba (RJ) reveal that these mounds have been built upon natural shell beds. Some other shell mounds have incorporated natural sandy layers into their overall volume (DeBlasis et al. 2007). These examples show that the classical opposition "natural × cultural" does not apply, preventing the analysis of the ever-present articulation between the physical environment and the cultural choices of the mound builders.

To move beyond dual thinking and explore the mounds from the perspective of formation processes implied into the mounding sequences have promoted the production of archaeographies in different scales, from burial composition to regional structural recurrences, thus allowing the surpassing of a research agenda defined by pre-existing, tightly framed themes such as "are they collectors or foragers?" This move has brought to the scene new questions, linked to the mound building sequences and processes therein involved. It also promoted the development of new methodologies, freeing the researchers from normative (typological and classificatory) thinking, and stimulating reflection and questioning derived from the characteristics of the archaeological record itself, with an open theoretical mind.

Besides fine-grained sedimentology and zooarchaeology, a wide range of new approaches (analyses of macro- and micro-botanical vestiges, dental calculus, charcoal, the composition of tiny stratigraphic features and post molds into funerary mounding sequences, among others) got together to provide a wide perspective on the sambaqui mound builders' lifeways. On a regional scale, beyond a settlement system approach, comparative explorations on site formation, sediment composition, burial disposition and funerary ritual, mound architecture, health and diet, and so on. These new approaches do not exclude most of the oppositions that based previous research but, building upon them, bring in a whole new perspective, at once anthropological and historical, and strongly related to the evolution of the Quaternary environments on the coast, thus bringing together natural and cultural elements into coastal landscape history.

Emphasis on Recurrence

Fish et al. (2000), in an effort to understand a mound as a whole, have profiled about 340 m of stratigraphic sections throughout the sambaqui Jabuticabeira II. This pioneering approach has detected an amazing recurrence of stratigraphic structuring across the mound, analogue layers, lenses, and burial structures involving postholes, hearths, funerary accompaniments and offerings, and also burial-specific mounding up sequences.

Burials usually concentrate in specific surfaces, perceived as dark layers into the stratigraphic sequences and described as funerary areas. These areas define paleosurfaces of the mound, from where postholes, associated with funerary structures around and over the burials, first appear, plunging vertically through the layers below. The small heaps above the burials are composed by a sequence of lenses with predominance of crushed *Mytilus* shells and fishbone intercalated with tiny dark lenses of sand with plenty of charcoal, ash, burnt fishbone, and plant remains, frequently associated to earths and clusters of fire-cracked rock and artifact fragments (Klökler 2014; Villagrán et al. 2010).

Funerary areas are dispersed all over the mound, frequently overlapping and superposing themselves with clean shell packs in between. These sequences are found all over the mounds and are easily recognizable for the contrasting "clear and dark" visual effect into the profiles (Fig. 4). In the upper "dark earth" package of the mound, when shells almost disappear from the archaeological record, this rationale for mound construction remains the same, even if

Sambaqui Research in Brazil: A Review and Recent Trends (Coastal Archaeology from Southern Shores of Brazil), Fig. 4 Sambaquis profiles highlighting the "clear and dark" contrast

composition changes and fish remains are responsible for most of the materials used in the mounding up process (Klökler 2014).

Sambaqui stratigraphy shows recurrence of such sequences of burial areas with evidence for burial delimiting and fencing, and other paraphernalia, with very much ritualized deposition of bodies and offerings and food remains of feasting. There is also evidence for burning over the burial (apparently after funerary ceremonies are completed) and revisiting (with some interfering and new offerings) for a while after burial ceremonies have taken place. At a certain point, a specific funerary area is closed and covered by fresh layers of clean shell, and the sequence starts all over again, apparently without a significant lapse of abandonment. The recurrence of these sequences toward the centuries has, ultimately, lend the mounds the impressive volume and monumentality that can be seen today.

The realization that the mound accretion is a consequence of the millenary recurrence of specific behavior toward the dead has thrown the study of the burials in to a completely new perspective. The focus shifted from exposing burials and their accompaniments to the understanding of the funerary area as a whole, including its preparation, the ritual deposition of the deceased, the procedures related to mourning and feasting them (and closing the burial place), and the periodic returning to the site (Gaspar et al. 2014). It is important to note that all these behaviors toward the dead are deeply ritualized, and in Santa Catarina they have been kept, with no significant changes, along four millennia at least (DeBlasis et al. 2007; Fish et al. 2013). Findings at the sambaqui Amourins, Rio de Janeiro, for instance, bring unquestionable evidence for the presence of food offerings for the dead. Near the burials were found closed *Lucina* shells with small sections of articulated fish, or a small bone, or even smaller closed shells inside, like a delicate and valuable container, or package, for the food offered to the dead (Gaspar et al. 2013).

Daniela Klökler's zooarchaeological and site formation studies (2014) have brought some detail into these rituals involving death and food. Analyzing samples from different parts of Jabuticabeira II, she has identified distinct behaviors related with faunal materials, appearing sometimes as a whole fish skeleton or mammal parts and sometimes as dispersed and/or burnt assemblages of fishbone, in different layers. This detailed analysis has brought light into the carefully organized funerary rites, involving selection of species in offerings and using massive amounts of fish for feasting. By or above the burials, whole fish skeletons or whole bird or mammal parts have been found, well preserved and without cutting or burning marks, taken as evidence for offerings deposited together with the deceased.

In contrast, most of the mounding up over the burials is composed of common and abundant lagoon fish species like the croaker (*Micropogonias furnieri*) and catfish (*Genidens barbus* and *Genidens genidens*), and the predominance of small individuals suggests net fishing. Larger prey, occasionally present as offering, is rare in the feasting remains deposited over the burial. The absence of large fires suggests that feasting takes place nearby, and the remains are brought to the funerary space and deposited over the burial. This interpretation is reinforced by the low degree of shell fragmentation into the mound, suggesting little circulation into the funerary area (Villagrán et al. 2010). After feasting and covering the burial, large fires were lit above and nearby, but its composition does not seem to be related to food preparing and feasting. These ritual

fires on the top of the mound would propitiate the closing of the burial and would be visible from far, announcing the end of a mourning cycle.

The economic basis of the sambaqui society subsistence, that earlier has given support to the evolutionary line "shellfish collectors to fishermen foragers," has also known new contributions. Initially, demonstrating that fishing has always been the staple economic activity and that shellfish collecting, although impressive in mound stratigraphy, has never been a staple resource. Moreover, recent studies on dental calculus, anthracology, and micro-vestiges into sediments have pointed out the importance of plant foods on mound builders' diet (Scheel-Ybert et al. 2009). These studies demonstrate that the nutritional spectrum of the sambaqui people go well beyond the faunal profile seen by naked eye on mound stratigraphy.

Recent studies with lithic industries from Jabuticabeira II and other southern mounds reveal a very interesting technological profile, far from the "primitive" picture drawn before. Although production sequences are relatively short, there are a variety of flaked scrapers and piercers and a great deal of sophistication in choosing and polishing the supporting pebbles for axes and zooliths, with very precise carving tools produced by splitting slabs of basalt. Moreover, a number of different types and sizes of grinding stones and pestles reinforce the notion of the importance of vegetable food in everyday diet.

Another interesting insight comes out from Klokler's (2014) analysis of carbon and nitrogen isotopes of 14 individuals from Jabuticabeira II. It shows that mound builders' diet was based on fish from high trophic levels and sea and land mammals, thus in sharp contrast with the zooarchaeological record on mounding stratigraphy. This contrast supports the idea that intensive fish consumption relates to feasting, while everyday meals would have stronger sea (whale, shark, and ray bones are frequently found associated to burials) and terrestrial game components and taken place mostly outside the mound. Croakers and catfishes, easy to catch in large quantities into the lagoon, would be prone to provide for the commensality inherent to funerary ritual, suggesting it to be an integrative social event, promoting solidarity and reciprocity and creating or reinforcing allegiances among communities.

This study reinforces former interpretations, on the northern coast of Rio de Janeiro (Gaspar et al. 2013) and on the southern shores of Santa Catarina (DeBlasis et al. 2007), based on site distribution and chronological concomitance, pointing out that mound builders communities show a high level of regional integration and collaborative behavior. Additionally, evidence for violent death seems uncommon among mound builders (Lessa and Medeiros 2001).

The commensality detected among sambaqui societies is recurrent among South American native groups ethnographically described, a cultural trace that seems to pervade many cultures and displaying a long history. Besides, the use of shells for mound building must not be underestimated. The microenvironmental conditions created by massive amounts of shell have propitiated the preservation of the burials, quite often in very good conditions. It is unlikely that it has not been intentional; it seems that the sambaqui people valued the body and made a great effort to preserve it even after death.

The study of the burials went well beyond the analysis of the skeletons themselves, expanding to the processes involved in disposing the bodies. The archaeological remains of the disposing of only one body, considering the complete ritual performance and features involved, occupy more than 2 m^3. In its recurrence throughout the sambaqui, it is paramount to understanding the organization of space and site accretion processes, in other words, its architecture (Bianchini 2015). Gaspar et al. (2013) point out that sambaqui culture is very careful with the bodies, investing time and effort to keep the memory of the deceased, and, as regards mound building, they occupy a central place (Fish et al. 2000). From this perspective, the evidence from the excavations at the sambaquis Sernambetiba and Amourins, Rio de Janeiro (Heredia et al. 1982), has been reassessed. The examination of the field notes has allowed detecting artifact clustering in some levels,

always associated to funerary heaping, as if these structures acted like attraction elements to artifacts and fire pits.

Another focus of research is the understanding of different depositional processes. Zooarchaeological studies developed on different sambaquis from Santa Catarina have been able to define different activities and occupation patterns along the stratigraphic sequence, some performed in situ and some others made of materials redeposited from elsewhere. By means of micromorphological analysis of sediments from Jab II, Villagrán et al. (2010) make clear distinction between primary deposits, such as body deposition and the *mise-en-place* of funerary accompaniments and fires, and secondary deposits, mostly related to the mounding up processes from feasting remains and others brought in from outside areas. This perception led to the need of exploring activity areas outside the mound, revealing peripheral small structures undoubtedly related to the events taking place in mound building.

Anthracological studies by Scheel-Ybert et al. (2003) indicate that wood used for cooking and funerary fires was obtained in the surroundings, mostly dead wood and *butiá* (palm) seeds, while the wood used for constructing fences and funerary structures has come from further away, probably from nearby mountain forests.

Villagrán (2014), examining several mounds at the southern shores of Santa Catarina, compares their stratigraphic sequences, concluding that the complex formation sequences of the sambaquis can be reduced at least one main action: the recurrent redeposition of midden material possibly carried in from domestic spaces. Recognizing that sambaquis are artifacts of long-term production, she concludes that the thick and apparently complex stratigraphy seems to be made after the recurrent deposition of similar contents and depositional behaviors.

Bianchini (2015) explores the depositional architecture of the Sernambetiba mound, taking advance of the scars left by excavations from the 1970s and 1980s, plus some additional trenching. This relatively late shell mound (2.3–1.5 kyBP) has an internal structuring and geometry of the stratigraphy, such as mounding structures, flat shell surfaces, dark and ashy lenses, posthole distributions, the burials themselves, and the geological substrate. Characteristic features are the "visiting structures," that is, encircling deposits that affect laterally the surrounding layers. The lateral contact of these features is usually abrupt, and composition does not differ from other layers; nevertheless, the organization of the shell materials is chaotic and is mostly associated to burials aside or above. They have been interpreted as successive interventions into the burial scene, deconstructions and reconstructions, apparently due to the manipulation of older burials when bringing new ones to the mound.

Klökler (2014), Gaspar et al. (2013), and Villagrán et al. (2010) have already pointed out the existence of these features, but Bianchini (2015) carefully describes, at Sernambetiba, a secondary burial in a small basket intervening in former burials. At that same site, careful examination of the burials, and the places where they have been deposited, has revealed intense activity in the funerary areas. Secondary burials exhibit cutting and burning marks, evidence for manipulation, reinforced by chronological inversions of dated burials in stratigraphy.

The careful analysis of the depositional architecture also comes in supporting the perception that the funerary areas have been intensely remodeled and older bones into later sediments are to be occasionally expected. Chronological inversions occur not only in the funerary areas but also in the covering heaping sequences above them. As suggested by Bianchini (2015), funerary mound building is deeply related to the alive, reflecting active roles in the social context. It changes with time, vanishes from memory, and needs to be continuously refurnished, reconfigured, and reenacted. As regards the sambaquis case, the detailed analysis of depositional architecture reveals that the building process includes "demolition," redepositing, and refurbishing, and not just accretion. Moreover, studies by Klökler (2014) have suggested that the funerary mounds are organized social facilities, with areas for circulating, open spaces and areas where circulation is restricted.

In her detailed study at Sernambetiba, Bianchini (2015) reports well-preserved tiny and fragile mussel deposits alternating with ashy lenses into the burial heaps, an evidence for a reserved place, not subject to circulation, walking and/or trampling. These fires and deposits are probably related to ritual activities, as suggested by their immediate relation to the body deposited below the heap; thus it sounds pretty reasonable that the whole burial structure are not an area for free circulation, at least while memory of the deceased person remains alive. The heaping up structure itself imposes a limit, as well as eventual fences and other wooden tomb structures.

At the same time, burial heaps relate laterally to flat surfaces of packed shell, sometimes extending up to 10 m, constituting large platforms that, eventually, can be detected along the profiles. Their flat and extensive geometry and the way they relate to the burial mounds indicate that they were paved areas right below and around the burials, probably for circulation, as no burials have been found into them. It is likely that at these open surfaces, and circulation areas, possibly are where ritual performances have taken place.

The recurrence of stratigraphic sequences and related features in different mounds, detected by means of different research strategies and different researchers, reinforces that sambaquis are, essentially, ritual activity locations. Ritual activities are traditional and defined by formality, invariance, and performance, among other characteristic behaviors, and are an aspect of social life less susceptible to changes and adjustments; after van Gennep (1960 [1909]), rites are exceptional situations but always relate, somehow, to everyday life. Formal reenacting performances are their principal characteristics, while routine activities allow for behavior that is more flexible, especially in terms of space and time. At the sambaquis, the large amount of burials and the abundant evidence as regards mound architecture speak aloud toward its nature as the *locus* of funerary ritual, a space related to the dead and full of symbolic connotations.

Regional Facies and Social Change

The study of social change has taken new directions after the 1990s, particularly due to the intense cross-interdisciplinary referencing of contemporaneous research, involving up-to-date analytic methodologies and techniques (e.g., isotopic analysis) and regional approaches. Long-term research projects propitiate rigorous chronological control and access for a variety of different and complementary approaches teaming different specialists (anthracology, zooarchaeology, geoarchaeology, geophysics, DNA, etc.), thus producing more robust hypotheses and interpretations.

In Santa Catarina, one indicator of change is the shift from shells to fishbone as principal building material (Fish et al. 2000; Villagrán et al. 2010). This change, very neat in the stratigraphy, might relate to changes in symbolic aspects of the funerary program but might as well reflect environmental changes taking place in the lagoon around 2000 years ago. The appearance of pottery associated to inland Je-speaking groups, some 600 years after, is also a sign of change and intercultural contacts; nevertheless, bioarchaeological studies by Okumura and Eggers (2014) point out the continuity of biological affinities and the growth of violent death among coastal populations. The isotopic analysis by Colonese et al. (2014) also reinforces the continuity of subsistence practices, while Hubbe et al. (2009) suggest changes in the postmarital residence practices. Moreover, isotopic analyses by Bastos et al. (2011) reinforce the perception of a considerable amount of endogamy and regional pooling among these mound building groups dispersed along the coast. Even if they do have contacts and exchange, people seems very much attached to their local networks. In this sense, Hubbe et al. (2009), using epigenetic traces of the skeletons, have suggested the existence of microevolutionary contexts, and Okumura and Eggers (2014) point out the evidence for biological affinity between older shell mounds and later dark earthen/fishbone-borne structures, whether with ceramics or not, implying a great deal of regional cultural continuity.

Indeed, there is a peculiar rock art tradition in this area, with typical geometric engravings and clusters of polishing basins on coastal diabase dykes at prominent coastal rocky shores. Although geometric compositions predominate, evoking, sometimes, fantastic entities, sketchy human figurines also appear. These representations share a common esthetic grammar, and their distribution along the coast/island system of the central shores of Santa Catarina reinforces the idea that this art style is related to the peculiar cultural scene that emerged into this area during the recent Holocene (2500–800 BP approx.).

Regional Diversity and Structural Consistence

Since the anthropogenic nature of the sambaquis became clear, archaeologists have focused on mapping evolutionary change through the variability of the archaeological record, taking into consideration stratigraphic, faunal, and artifactual changes to discuss adaptation, diet, economic changes, and intensification, among other issues (Gaspar et al. 2008).

The mounding nature and longevity of the sites have propitiated intra-site comparisons, even if, in most cases, only a tiny portion of the whole site has been examined. From this kind of analysis, it has emerged evolutionary interpretations of the economic and social changes of the sambaqui culture, such as the transition from a shellfish collecting way of life toward fishing intensification. Changes in the relative amount of faunal materials were taken as direct evidence for dietary preferences, regardless their structuring toward the distribution of features like fires, burials, and the mounding up processes involved therein. The presence of potsherds into the upper layers of the mounds reinforced this evolutionary perspective, referencing the arrival of foreign ceramist Je- and Tupi-speaking societies occupying the top of the mounds and the adoption of agriculture.

One of the authors of the entry thinks that it is unlikely that these late-coming agriculturalists might have simply given away their former cultural habits as they arrived at the coast and that these sherds rather reflect cultural contacts and exchange. At least in some areas, like the central coast of Santa Catarina and the Lakes Region in Rio de Janeiro, these intercultural relations with Je groups seem to have given rise to new cultural expressions (Barbosa-Guimarães 2007). "Pure" Je sites, as well as Tupinamba settlements, are located at the more interior sections of the lagoon area, where their funerary traditions, strongly different from the sambaqui culture, have been kept. In Rio, as well as in Santa Catarina, the contacts with Je societies seem to have been slow and fluid, and the sambaqui people seem to have preserved most of their habits for about six or seven centuries after the first contacts.

Around the Guanabara Bay, Sernambetiba seems to be at the end of the shell mound building era, right before, or even contemporaneous, to the Tupi-speaking groups' arrival to the coast. In this sense, the peculiar body treatment given to the dead at this site might be related to this dramatic moment of conquest and cultural disruption. However, even being a late site, Sernambetiba is pretty large, revealing that, at the fringe of its disappearance, the sambaqui culture in this area was still strong and attached to its old traditions.

In the northern coast of Santa Catarina, the presence of Je-style potsherds in the upper layers of the Forte Marechal Luz shell mound without further noticeable cultural changes has led Bryan (1993) to suppose the presence of Je women among the sambaqui people, thus evoking cultural and biological exchange. Throughout the Brazilian coast, sambaqui mound builders have shared similar cultural rules toward the dead and very similar architectural and ritualistic principles as regards mound building processes. The demographic expansion and economic intensification of the sambaqui societies seem to have been even more intense toward the southern shores, where at least for 6000 years, sambaqui people have been continuously building the enduring monumental mounds we can still see today.

In the northern shores of Brazil, a different and less studied scenario brings new tonalities to this discussion. Shell mounds over there are slightly older (around 6 kyBP), and ceramics appear throughout the mounding sequence, a distinctive

small, sand, and shell-tempered ware almost without decoration. Reexamining these materials at one of the excavated sites of the area, Lopes (2016) confirms the widespread distribution of these sherds into the stratigraphy of the mound. Nevertheless, he observes that potsherds are too small (less than 5 cm) and are difficult to refit and seem to have entered the mound as secondary deposition. And, very important, he has detected several burials, with mounding up processes upon them, associated fires and other evidence that make these northern mounds structurally similar to the southern ones, sharing with them the same building rationale, thus also sharing the same cultural and ideological background.

Despite the fascination exerted upon archaeologists by social evolutionary thinking, it is not an easy task to explain changes detected in the material expression of the sambaqui way of life. Linear readings of the archaeological record have shown their fragility, and its interpretation demands a more comprehensive contextual approach, tuned on both regional variability and long timeframe scales. Faunal variability must be understood as regards the Holocene coastal dynamics at a regional scale and demands the adoption of a zooarchaeological methodological framework allowing for adequate nutritional input, as well as seasonal fluctuations. Sometimes an apparently abrupt disruption in the stratigraphic record, as has been detected at Jabuticabeira II (Fish et al. 2000; Villagrán et al. 2010), when looked at more attentively, reveals a great deal of continuity in faunal proportions, layer-sequence structuring, and the presence of distinctive features such as burials, postholes, and hearths.

The funerary nature of the mounds throughout the long period of the sambaqui occupation is taken here as a central expression of the sambaqui society cosmogony, and, in this sense, integral to its cultural essence, the millenary continuity of this culture strongly comes out. Funerary ritual, episodic in nature, acts as passage rite (van Gennep 1960 [1909]) mobilizing, integrating, and reordering all the members of society (particularly as regards the so-called "simple" ones) and, usually, assumes rather peculiar and exclusive aspects. It is deeply related to cosmogony and, although not intrinsically connected to environmental transformations, sometimes reflects them in some way. This perspective seems to be the most adequate to approach the study of the sambaquis, given the large amount of burials found at these sites and the fact that they seem to be the reason behind mound building.

Gaspar et al. (2008) suggests that, for sambaqui society, the dead has fundamental importance and their locale occupies a special and distinctive positioning into the landscape, where funerary ritual takes place and its essence is to preserve, transform, and control the body. The vital importance of the body as cosmological principle is, by no means, exclusive of the sambaqui society but a cultural characteristic widely acknowledged among South American native societies. After Viveiros de Castro (2002: 388), the emphasis in the social construction of the body is a differential of the Amerindian cosmologies.

Let us have a look at the body treatment reported in the Lakes Region, Rio de Janeiro. Estanek (2016) relates, at Sernambetiba, tight wrapping and defleshing in 17 burials, while other have been manipulated and redeposited (secondary burials), a process involving intentional bone selection and fragmentation, reburying in small baskets (or something similar) and parts preserved in connection, such as hands and feet. Furthermore, sections of the vertebral column and members (both inferior and superior) have been disconnected and regrouped with other parts and the crania intentionally broken and deposited together with the rest, thus giving to the burial a more compact outcome. Estanek stresses the intention of modifying the original design of the body, and, even at the primary burials, the hyperflexion of the members is extreme, in order to make them acquire rather unusual positioning. In addition, although never cremated, almost all skeletons are slightly burned or show evidence of intense heating, probably due to proximity to fires lit during the mourning period or even after that. A bit further to the north, at Corondó (4.2–3 kyBP), bone manipulation has also been reported. Machado (1995) retrieved collars of human teeth over the skull of children, and, at Saquarema (3.3–2.5 kyBP), long bones display cut marks and the sectioning of the epiphyses, probably after defleshing.

Manipulation of human skeletons has been noticed in sambaquis all along the Brazilian coast, particularly as regards secondary burials, although body manipulation seems to be particularly intense at the Lakes area. For instance, Okumura and Eggers (2014: 109) have analyzed 89 individuals from Jabuticabeira II, and only 1 small star-shaped cut marks have been found. Although anatomical rearrangements are the most common intervening, there are also tight-flexed primary inhumation, indicative pre-burial body manipulation, and/or active defleshing, repositioning of long bones and the incorporation of some (older) bones into new burials.

Other interesting feature of the funerary treatment at the sambaquis is the use of reddish ocher over the burials. Although a widespread practice along the coast, it seems to have been especially intense in the Lakes Region, at the sambaquis Beirada, Moa, Pontinha (Kneip and Machado 1992: 32), and Manitoba (Machado 2001), where a large amount of colorant has been applied over some funerary structures. Cremation has also been reported at the older layers of the sambaqui of Pontinha (among other sites) around 2.3 kyBP, while, at the upper layers (1.8 kyBP), the burials are primary. Barbosa-Guimarães (2007) suggests that cremation is related to contacts with Je-speaking peoples arriving to the coast, a phenomenon also recurrent in the southern shores, with analogous explanation (DeBlasis et al. 2014). Indeed, it is clear that the arrival of these hinterland Je groups to the coast is somewhat related to the collapse of the long-lived sambaqui tradition all along the central and Southern Brazilian coast, while, at the northern shores, these cultural sequences are still poorly known.

Thus, as Lilia Machado (1995) has pointed out, after examining 445 individuals from Corondó and 75 from Malhada, despite some variability in the individual treatment of the body, it is perceptible that the whole funerary program is rather traditional, displaying an amazing continuity through time and place. We feel comfortable to expand this perception to the entire Brazilian coastal area, adding that ceremonial performance involves a mounding up rationale, intense use of fire, and conspicuous accretion of food remains resulting from feasting.

Innumerable factors might be influencing individual variability as regards funerary peculiarities. Personal abilities and powers, marriage and social inception, life and death circumstances, parental affiliation, even regional fashioning of a certain time – conjuncture events important enough to be remembered, or evoked, in funerary rites. As already pointed out, it is in body treatment that social difference emerges in Amerindian societies (Viveiros de Castro 2002: 387–388), and that is probably why there are so many tiny differences among sambaqui funerary structures. For that reason, as well, understanding what lies subjacent to all this variability, the structural rules that are essential to the sambaqui social organization and perception of the world are the principal defiance ahead for archaeologists today.

There is an apparent paradox in the perception of a cultural pattern that has remained stable for about 6000 years, without significant change, while settlement longevity and demographic markers point out toward a considerable intensification in economic productivity. Mound building, on faunal (and other) materials, of a ritual space for manipulating and preserving the dead and the presence of ocher, adornments, and offerings, all with deep symbolic meaning, seem to indicate a society where the cult of the ancestors is among the most important structuring elements, a cultural trace that integrates all sambaqui communities of a region. And, as the use of zooliths suggest, also connects a sequence of social aggregates along the linear coastal shores, thus generating macro-regional spheres of interaction that, despite local differences, bring out an amazing structural homogeneity all along the Atlantic shores.

References

Barreto, C. B. 2000. A construção de um passado pré-colonial: uma breve história da arqueologia no Brasil. *Revista USP*. São Paulo, n° 44, p. 32–51.

Barbosa-Guimarães, M. 2007. *A ocupação pré-colonial da região dos lagos, RJ: sistema de assentamento e relações inter societais entre grupos sambaquianos e grupos ceramistas Tupinambá e da tradição Una*. PhD thesis, University of São Paulo. 382p.

Bastos, Murilo Q.R., Sheila M.F. Mendonça de Souza, Roberto V. Santos, Bárbara A.F. Lima, Ricardo V. Santos, and Claudia Rodrigues-Carvalho. 2011.

Human mobility on the Brazilian coast: An analysis of strontium isotopes in archaeological human remains from Forte Marechal Luz Sambaqui. *Anais da Academia Brasileira de Ciências* 83 (2): 731–743.

Bianchini, Gina Faraco. 2015. *Por entre corpos e conchas: prática social e arquitetura de um sambaqui*. PhD thesis, University of Rio de Janeiro.

Bryan, Alan. 1993. *The Sambaqui at Forte Marechal Luz, State of Santa Catarina, Brazil*. Oregon: Brazilian Studies.

Colonese, Andre Carlo, Matthew Collins, Alexandre Lucquin, Michael Eustace, Y. Hancock, Raquel de Almeida Rocha Ponzoni, Alice Mora, Colin Smith, Paulo DeBlasis, Levy Figuti, Veronica Wesolowski, Claudia Regina Plens, Sabine Eggers, Deisi Scunderlick Eloy de Farias, Andy Gledhill, and Oliver Edward Craig. 2014. Long-term resilience of Late Holocene coastal subsistence system in southeastern South America. *PLoS One* 9 (4): 1–31. e93854. https://doi.org/10.1371/journal.pone.0093854.

De Masi, Marco Aurélio Nadal. 1999. *Prehistoric hunter-gatherers mobility in the southern Brazilian coast. Santa Catarina Island*. PhD thesis, Departamento de Antropologia, Stanford University, San Francisco.

DeBlasis, Paulo, Suzanne Fish, Maria Dulce Gaspar, and Paul Fish. 1998. Some references for the discussion of complexity among the sambaqui moundbuilders from the southern shores of Brasil. *Revista de Arqueologia Americana* 15: 75–105. Mexico, Instituto Panamericano de Geografia e Historia.

DeBlasis, Paulo, Andreas Kneip, Rita Scheel-Ybert, Paulo C.F. Giannini, and MaDu Gaspar. 2007. Sambaquis e Paisagem: dinâmica natural e arqueologia regional no litoral do sul do Brasil. *Revista de Arqueología Suramericana* 3 (1): 28–61.

DeBlasis, P., Farias, D., Kneip, A. (2014). Velhas tradições e gente nova no pedaço: perspectivas longevas de arquitetura funerária na paisagem do litoral sul catarinense. *Revista do Museu de Arqueologia e Etnologia* (24): 109–136.

Duarte, Paulo. 1968. *O sambaqui visto através de alguns sambaquis*. São Paulo: Instituto de Pré-História.

Estanek, Angélica. 2016. *Preparativos funerários no Sernambetiba – sambaqui vida e morte*. PhD thesis, University of Rio de Janeiro.

Figuti, Levy. 1993. O homem pré-histórico, o molusco e o sambaqui: considerações sobre a subsistência dos povos sambaquianos. *Revista do Museu de Arqueologia e Etnologia* 3: 67–80.

Figuti, Levy, Claudia Plens, and Paulo DeBlasis. 2014. Small sambaquis and big chronologies: Shellmound building and hunter-gatherers in Neotropical highlands. *Radiocarbon* 55 (2–3): 1215–1221.

Fish, Suzanne, Paulo DeBlasis, Maria Dulce Gaspar, and Paul Fish. 2000. Eventos incrementais naconstrução de sambaquis, litoral sul do Estado de Santa Catarina. *Revista do Museu de Arqueologia e Etnologia* 10: 69–87.

Fish, Paul, Suzanne Fish, Paulo DeBlasis, and Maria Dulce Gaspar. 2013. Monumental shell mounds as persistent places in southern coastal Brazil. In *The archaeology and historical ecology of small scale economies*, ed. Victor D. Thompson and James C. Waggoner, 120–140. Florida, USA: University Press of Florida.

Gaspar, Maria Dulce. 1994. Espaço, rito e identidade pré-histórica. *Anais da Revista de Arqueologia* 8 (2): 221–237.

Gaspar, Maria Dulce. 1998. Considerations of the sambaquis of the Brazilian coast. *Antiquity* 72: 592–615.

Gaspar, Maria Dulce. 2000. *Sambaqui: Arqueologia do Litoral Brasileiro*. Rio de Janeiro: Editora Jorge Zahar.

Gaspar, MaDu, Paulo DeBlasis, Suzanne Fish, and Paul Fish. 2008. Sambaqui (shell mound) societies of coastal Brazil. In *Handbook of South American archaeology*, ed. Helaine Silverman and William H. Isbell, 319–335. New York, USA: Springer.

Gaspar, Maria Dulce, Daniela Klökler, Rita Scheel-Ybert, and Gina Faraco Bianchini. 2013. Sambaqui de Amourins: mesmo sítio, perspectivas diferentes. Arqueologia de um sambaqui 30 anos depois. *Revista del Museo de Antropologia* 6: 7–20.

Gaspar, Maria Dulce, Daniela Klökler, and Paulo DeBlasis. 2014. Were *sambaqui* people buried in the trash? Archaeology, physical anthropology, and the evolution of the interpretation of Brazilian shell mounds. In *The cultural dynamics of shell-matrix sites*, ed. Mirjana Roksandic, Sheila Mendonça de Souza, Sabine Eggers, Meghan Burchell, and Daniela Klökler, 91–100. Albuquerque: University of New Mexico Press.

Heredia, Osvaldo, Maria da Conceição de Moraes Coutinho Beltrão, Maria Dulce Gaspar de Oliveira, and Marcelo Gatti. 1982. Pesquisas arqueológicas no sambaqui do Amorins. *Arquivos do Museu de História Natural* 7: 175–188.

Hubbe, M., W.A. Neves, E. Castro de Oliveira, and A. Strauss. 2009. Postmarital residence practice in southern Brazilian coastal groups: Continuity and change. *Latin American Antiquity* 20: 267–278.

Klökler, Daniela. 2014. A ritually constructed shell mound. Feasting at the Jabuticabeira II site. In *The cultural dynamics of shell-matrix sites*, ed. Mirjana Roksandic, Sheila Mendonça de Souza, Sabine Eggers, Meghan Burchell, and Daniela Klökler, 152–162. Albuquerque: University of New Mexico Press.

Kneip, Lina Maria, and Lilia Cheiuche Machado. 1992. Cremação e outras práticas funerárias em sítios de pescadores-coletores pré-históricos do litoral de Saquarema, RJ. In *Reunião Científica da Sociedade de Arqueologia Brasileira, Anais*, Vol. 6(2), 457–465.

Lacerda, João Batista. 1885. O homem dos Sambaquis, contribuição para a Antropologia brasileira. *Arquivos do Museu Nacional* 6: 175–204.

Leonardos, Othon. 1938. *Concheiros naturais e sambaquis*, Avulsos. Vol. 37. Rio de Janeiro: Serviço de Fomento da Produção Mineral.

Lessa, A., Medeiros, J. C. 2001. Reflexões preliminares sobre a questão violência em populações construtoras de sambaquis: análise dos sítios Cabeçuda (SC) e Arapuan. (RJ). *Revista do Museu de Arqueologia e Etnologia* 11: 77–93.
Lopes, P. R. do C. 2016. *Caracterização do modo de vida dos sambaqueiros que ocuparam o litoral paraense: Quatipuru, Pará, Brasil*. PhD Thesis. Universidade Federal do Rio de Janeiro.
Machado, Lilia Cheuiche. 1995. Tendências à continuidade e mudança em ritos funerários. In Maria da Conceição de Moraes Coutinho Beltrão (Org.). *Arqueologia do Estado do Rio de Janeiro*, 111–118. Rio de Janeiro: Arquivo Público do Estado do Rio de Janeiro.
Machado, L.C. 2001. Os sepultamentos, contextos arqueológicos e dados bioesqueletais. *Documentos de Trabalho* 5: 71–79.
Okumura, Mercedes, and Sabine Eggers. 2014. Cultural formation processes of the bioarchaeological record of a Brazilian shellmound. In Mirjana Roksandic, Sheila Mendonça de Souza, Sabine Eggers, Meghan Burchell, and Daniela Klökler (Org.). *The cultural dynamics of shell-matrix sites*, 1st ed, 103–112. New Mexico: New Mexico Press.
Prous, Andre. 1992. *Arqueologia Brasileira*. Brasilia: UnB.
Scheel-Ybert, Rita, Sabine Eggers, Verônica Wesolowski, Cecília C. Petronilho, Célia Boyadjian, Paulo DeBlasis, Márcia Barbosa-Guimarães, and Maria Dulce Gaspar. 2003. Novas perspectivas na reconstituição do modo de vida dos sambaquieiros: uma abordagem multidisciplinar. *Revista de Arqueologia* 16: 109–137.
Scheel-Ybert, Rita, Sabine Eggers, Verônica Wesolowski, Cecília Petronilho, Célia Helena Boyadjian, Maria Dulce Gaspar, Marcia Barbosa-Guimarães, Cristina Maria Tenório, and Paulo DeBlasis. 2009. Subsistence and life way of coastal Brazilian moundbuilders. In Raquel Piqué i Huerta, Aylen Capparelli, and Alexandre Chevalier (coords.). *La alimentación em la América pré colombiana y colonial: una aproximación interdisciplinaria*, Treballs d'Etnoarqueologia 7, 37–53.
Seyferth, Giralda. 1995. A Invenção da Raça e o Poder Discriminatório dos Estereótipos. *Anuário Antropológico* 93: 175–204.
Van Gennep, Arnold. 1960 [1909]. *The rites of passage*. Chicago: University of Chicago Press.
Villagrán, Ximena. 2014. A redefinition of waste: Deconstructing shell and fish mound formation among coastal groups of southern Brazil. *Journal of Anthropological Archaeology* 36 (2014): 211–227.
Villagrán, X. 2010. *Geoarqueologia de um Sambaqui Monumental – estratigrafias que falam*. São Paulo: Annablume; Fapesp, 2010. 213p.
Villagrán, Ximena, Daniela Klökler, Paula Nishida, Maria Dulce Gaspar, and Paulo DeBlasis. 2010. Lecturas estratigraficas: Arquitectura funerária y depositación de resíduos em El sambaqui Jabuticabeira II. *Latin American Antiquity* 21 (2): 195–216.
Viveiros de Castro, Eduardo B. 2002. *A Inconstância da Alma Selvagem e Outros Ensaios de Antropologia*. São Paulo: Cosac & Naify. 552 pp.
Wiener, Carlos. 1876. Estudos sobre os sambaquis do sul do Brasil. *Arquivos do Museu Nacional* 1: 1–20.

Sambaquis Shell Mounds, Archaeology of

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Introduction

The Brazilian coast was settled by groups of fisher-gatherers who built mounds known as sambaquis. These mounds (Fig. 1) are the main archaeological evidence of these groups, known as sambaquieiros or shell mound people. Sambaqui is a word of Tupi etymology, the language spoken by farmers and ceramic-making groups that occupied the Brazilian territory when Europeans arrived. Tamba means shell, and ki means mound, which are the most important visual features of these sites.

The oldest dates indicate that some areas of the coast were already occupied around 7000 years ago and the territory was intensively populated by mound-building groups between 4 and 3000 years BP. These fisher-gatherers dominated the Brazilian coast until 2000 BP, when ceramic-making groups originating from central South America and Amazonia began to occupy coastal areas and destabilized the sambaquieiros' way of life.

Definition

Sambaquis are typically characterized by rounded, elevated structures in southern Brazil; some sites reached 65 m in height, although the sites are usually not higher than 5 m in other areas.

Sambaquis Shell Mounds, Archaeology of, Fig. 1 Santa Marta Sambaqui, Santa Catarina, Brazil

The archaeological deposits that compose these sites primarily include mollusk shells and bones of fish, birds, and mammals. A variety of stone and bone artifacts, postholes, and hearths have also been identified, often resulting in an intricate stratigraphic record. The most noticeable remains in the composition of these sites are the shells from *Anomalocardia brasiliana*, *Lucina pectinata*, and several mussel species. Burials of men, women, and children of different ages have been recovered from the most sambaquis, and the skeletons are usually articulated. These sites are a distinct space that becomes conspicuous on the landscape because of their sheer volume and the topographic nature of the coastal plain. They served as the final destination of the deceased, particular places, in which concentration of shells neutralized soil acidity and created conditions conducive to the preservation of human bone.

The prehistoric occupation of the Brazilian coast caught the attention of researchers long ago, and scientific interest in this type of archaeological site has been significant since the second half of the nineteenth century. Initially, the issue that dominated the studies concerned natural versus anthropic origins of the sites. The "naturalist" school argued that sambaquis were the result of receding sea levels and the resulting effects of wind upon shells on the beach. The presence of human remains was commonly attributed to shipwrecks. In contrast, scientists that believed in an anthropogenic origin asserted that the sites were the results of human action and proposed multiple explanations for the accumulations of faunal remains.

The advancement of research at several sites and findings of indisputable evidence of human activities made the naturalistic movement lose its followers. However, the origins of sambaquis were discussed until the 1940s by some researchers who argued that the sites were created by a combination of natural and anthropic elements. This perspective became known as the "mixed" theory.

Since the nineteenth century, the proponents of anthropogenic origins of sambaquis are divided among two distinct views that continue to influence current research. On one hand, sambaquis are considered to be the results of casual accumulation of food refuse because of the large quantity of faunal remains found at the sites. The other perspective argues that the sites are mortuary monuments because of the presence of burials (Wiener 1876). These distinct perspectives

emphasize different functions of the settlements: the first model suggests that sambaquis were habitation sites, while the second supposes that they were cemeteries.

Although the focus of early debate was the origins of sambaqui formation, some important contributions were made at the end of the nineteenth century, including observations about formation processes, landscape, composition, chronology, subsistence, and the physical characteristics of the populations. Some of these topics remain current and more fully developed, while others have been dismissed. One of the main issues that dominated the social sciences in Brazil between the end of the Empire and the First World War (1889–1914) was the diversity of the human species and the notion of race, later rejected as a scientific category. Skeletons, especially skulls, were favored by researchers, often to the detriment of other materials, and they were used extensively in the first works of Brazilian anthropology, dating from 1860. These studies were influenced of French and German authors and were strongly affected by deterministic, racial theories (Seyferth 1985). These investigations resulted in extremely descriptive research, focused on characterizing human "types."

Although eventually dismissed, the naturalistic theory resulted in an important contribution to the understanding of sambaquis. Some researchers explored the idea that rather than being the result of natural forces, sambaquis mark natural processes, and they can be good indicators of sea-level variation. For example, Krone (1908) believed that older sambaquis, composed predominantly by oysters, were farther away from the modern coast, while more recent sites would be located close to the sea and composed of *A. brasiliana* shells. These studies were significantly developed from the 1970s onward with research focused on comprehending coastal evolution.

Some geomorphologists, considering that the basis of sambaquieiros' diet came from the sea, believed that the groups lived closed to the coastline. For these researchers, a site's spatial proximity to the sea was used to make inferences about coastal dynamics (Martin and Suguio 1976). Despite being considered questionable evidence for some (Scheel-Ybert et al. 2009a), spatial distribution research yielded important results. Recent coastal evolution analyses resulted in indispensable paleoenvironmental reconstructions, allowing the characterization of locales chosen by sambaquieiros to erect their settlements, as well as an understanding of the criteria that guided site selection.

Until the 1950s, sambaqui studies were focused on individual sites, hindering the broader understanding of coastal occupation. In this same decade, the first systematic works were completed, and radiocarbon dates were recovered. French and North American archaeologists, including Annette and Joseph Emperaire, Alan Bryan, and Wesley Hurt, went to Brazil to study two eminent topics of the country's archaeology: monumental sambaquis and the hunter-gatherers of Lagoa Santa, Minas Gerais. At the same time, Brazilian intellectuals, led by Castro Faria, Paulo Duarte, and Loureiro Fernandes, initiated an intense movement aimed at the protection of the sambaquis, which had been continuously destructed for large-scale lime production since the sixteenth century.

Slowly, the number of studied sites increased, along with the breadth of the research questions being addressed. The noteworthy accumulation of knowledge that occurred from 1965 helped to renew the discipline. Two large projects had great repercussions in the way archaeology was carried out in Brazil, leaving strong impressions upon the predominant theoretical and methodological perspectives among Brazilian archaeologists: the National Program for Archaeological Research (PRONAPA) was initiated in 1965 and coordinated by Clifford Evans and Betty Meggers, while the French-Brazilian Mission was created in 1973 and coordinated by Annette Laming-Emperaire.

The major concern of Brazilian archaeology until the end of the 1980s had been the investigation on cultural change through time. The discipline was marked by the creation of various phases and traditions used to define economic transformations deemed important. This system prevailed for more than two decades; the site-

based approach and the interpretative scheme became practically synonymous with archaeology in the country. Conversely, some isolated studies started to investigate the spatial organization of sambaquis' internal features. The distribution of hearths, house outlines, and burials were studied using teachings from French archaeology to understand their complex arrangement (Kneip 1976). One notable exception is Prous (1974), who detected great similarities in the representations of animals in bone and lithic sculptures and suggested the possibility of some form of ideological unity shared by sambaquieiros from the southern and southeastern coasts.

Scholars who considered sambaquis as deposits of food refuse were particularly interested in investigating faunal remains. At first, this line of research focused exclusively on the identification of animal remains, resulting in long species lists. Later, the lists were supplemented by quantification of the identified elements, and researchers tried to infer the dominant economic activities. Finally, bones and shells were counted, and correlations were made between the remains and the quantity of food they represented. This was a significant advancement, as the visual prominence of the shells was overcome. Shell valves tend to preserve well in the archaeological matrix and are obviously notable because of their color and volume. These characteristics give the impression that collection of shellfish was the primary activity that sustained the population. The goal of investigators was to characterize the diet, treating the sites individually without advancing in the delineation of social relationships of an economy based on aquatic resources.

Systematic studies of food remains were linked to PRONAPA's perspective, and this context helped to elaborate a reference model that persisted until the beginning of the 1990s. The model asserted that the sites' different layers were the remains of successive settlement episodes by bands of nomadic gatherers and mollusks were the basis of the diet. Environmental alterations related to sea-level changes and/or mollusk bed overexploitation were believed to have led the sambaquieiros builders to change their economic basis, transforming them into fishers. The location of the sites in relation to the coast was frequently cited as evidence in support of this hypothesis.

The 1990s brought renewed interest in sambaquis, and the representation of these groups changed. They were no longer perceived as bands of nomadic mollusk gatherers searching for food. Researchers began to discuss social organization, site formation processes, and the elaborate funerary ritual, and the grandeur of the sites was now seen as the outcome of more complex social interactions. The paradigm was forever changed, usurping the preconceived notions that had lingered since the nineteenth century, equating the sambaquieiros to "primitive" people.

Key Issues/Current Debates/Future Directions

Recently, archaeologists have pursued the idea that sambaquis themselves are artifacts, constructed according to social rules making it possible to study not only their content but also their form, function, and settlement implications. As a consequence of their visibility in the coastal plain environments, sambaquis are considered landscape markers, further transforming approaches to this type of site.

In the first decade of the twenty-first century, different scales of observation were articulated to build interpretations about the lifeways of sambaquieiros. On one extreme, a broad perspective investigates satellite images to study site distribution and function and settlement patterns. On the opposite end, some scholars use a focused approach, employing microscopes to examine evidence like dental calculus, joint conditions, and wood fragments, providing information about some of the more particular habits of coastal groups.

Research focusing on groups of sites attempts to understand the relationships among the units and their characteristics. Since sambaquis have different dimensions, the hierarchical relationships among settlements are discussed, and since many neighboring sites were simultaneously occupied, scholars also explore their

complementary roles. It has been argued that isolated sites did not have sociological significance and that a set of sambaquis is the minimum unit of occupation. It has also been established that sambaquis occur in all regions of the Brazilian coast and are concentrated in areas where the coast is interrupted by rivers, estuaries, and lagoons. Some scholars argue that, despite regional and temporal specificities, sambaqui builders had a "collective individuality," in the sense proposed by Marcel Mauss (1979). Comparison with other types of sites located in Brazil indicates that the custom of building mounds in the coastal plain through accumulation of faunal materials and interring the dead in these spaces is a custom exclusive to the sambaqui population.

Systematic studies interested in landscape use and the spatial distribution of sambaquis use an approach that involves detailed knowledge of coastal evolution, site dimensions, site function, and formation processes. Research at Santa Marta paleolagoon, in Santa Catarina state, confirmed an ample territorial overlapping, as in other areas, clearly indicating patterns of community interaction surrounding the lagoon. Lagoons were the epicenter of these groups' social and economic universe. The spatial configuration of sites, along with the analysis of several radiocarbon dates, demonstrates that some sambaquis were active for more than eight centuries. Analysis of the visibility of large sites, almost always central within each site cluster, indicates the existence of sedentary communities that grew in the surroundings of the lagoon (DeBlasis et al. 2007). Demographic parameters suggest impressive concentration of people in some areas of the Brazilian coast (Fish et al. 2000).

A fundamental interpretive change occurred regarding sambaquis' formation processes: faunal remains cease to be seen solely as indicators of diet but also as building materials. These changes refer specifically to the shells, since isotopic studies indicate mollusks did not make a significant contribution to the diet of sambaquieiros (De Masi 1999; Klokler 2008). In fact, new zooarchaeological methods and analyses demonstrate that fishing was always an important subsistence activity of these coastal groups (Figuti 1993). Moreover, paleobotanical studies and analyses of plant remains recovered from dental calculus and lithic artifacts show a more diverse diet than previously thought. The diet included a great variety of wild plants, and probably some cultivated species as well, which possibly included some

Sambaquis Shell Mounds, Archaeology of, Fig. 2 Jabuticabeira II Sambaqui, Santa Catarina, Brazil

cariogenic species. An incipient form of tending and harvesting (horticulture) of tubers and fruit trees is suggested in many sites located in the southeastern region and at least in some sites of the Brazilian south (Scheel-Ybert et al. 2009b).

Concerning the funerary realm, sambaquieiros' use of mollusk valves to build their cemeteries assured the preservation of human skeletons. This preservation, associated with the visibility of the dead, who controlled the sambaquieiros' territory from the top of the sites, resulted in a particular funerary program. Everything within a sambaqui seems to have followed the logic of increasing the height of the monument while at the same time guaranteeing better visibility for the dead.

Studies of several meters of profiles from the site Jabuticabeira II, in Santa Catarina (Fig. 2), indicate that its volume, 320,000 cubic meters, is primarily a consequence of activities related to funerary ritual. The ritual involved the deposition of the body in the top of the mound, inclusion of large quantities of offerings, and long-term maintenance of hearths, resulting in thick deposits of ash.

Hyperflexed bodies were deposited close to each other, delineating funerary areas within the large site. Shallow graves were delimited by posts, occasionally made with hardwood (Bianchini et al. 2007). After the deposition of many burials, the areas were closed with the deposition of successive lenses composed predominantly by shells or fish bones, charcoal, and sand, resulting in an intricate stratigraphic sequence (Fish et al. 2000; Klokler 2008).

Studies of archaeofacies propose that the materials were processed in spaces outside the site and had different treatments before being deposited within the sambaqui. In this way, the body and its associated offerings comprise a primary deposit, and the materials covering the funerary areas were secondary or tertiary deposits. The materials that cover the funerary areas may have been accumulated in small sambaquis located nearby, whose archaeological layers rarely surpass 40 cm in thickness (Villagran et al. 2010).

The repetition of funerary ceremonies throughout more than eight centuries created a monumental element in the landscape that, due to its size and configuration, perpetuates a message that its builders wanted to transmit (Fish et al. 2000). The successive events, directly related to the process of site growth, inform visitors to the coast that the area is the sambaquieiros' domain where they interred their dead. In this way, sambaquis are the result of intense social processes that resulted in a highly domesticated landscape, marked by sentimental and emotional references.

Cross-References

- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Mesoamerica: Subsistence Strategies by Region

References

Bianchini, G.F., R. Scheel-Ybert, and M.D. Gaspar. 2007. Estaca de Lauraceae em contexto funerário (sítio Jabuticabeira-II, Santa Catarina, Brasil). *Revista do Museu de Arqueologia e Etnologia* 17: 223–227.

De Masi, M. 1999. *Prehistoric hunter-gatherer mobility on the southern Brazilian coast: Santa Catarina Island*. Unpublished PhD dissertation, Stanford University.

Deblasis, P., A. Kneip, R. Scheel-Ybert, P.C. Giannini, and M.D. Gaspar. 2007. Sambaquis e Paisagem: dinâmica natural e arqueologia regional no litoral do sul do Brasil. *Arqueologia Suramericana* 3: 28–61.

Figuti, L. 1993. O homem pré-histórico, o molusco e o sambaqui: considerações sobre a subsistência dos povos sambaquianos. *Revista do Museu de Arqueologia e Etnologia* 3: 67–80.

Fish, S.K., P. Deblasis, M.D. Gaspar, and P.R. Fish. 2000. Eventos incrementais na construção de sambaquis, litoral sul do estado de Santa Catarina. *Revista do Museu de Arqueologia e Etnologia* 10: 69–87.

Klokler, D. 2008. *Food for body and soul: Mortuary ritual in shell mounds (Laguna-Brazil)*. Unpublished PhD dissertation, University of Arizona.

Kneip, L.M. 1976. Sambaqui do Forte - identificação espacial das atividades humanas e sua implicações (Cabo Frio, RJ, Brasil). *Coleção Museu Paulista, Série Arqueologia* 2: 81–142.

Krone, R. 1908. Exploração do Rio Ribeira de Iguape. Informações etnográficas do Vale do Ribeira do Iguape. *Boletim da Comissão Geographica e Geológica do Estado de São Paulo* 24: 23–34.

Martin, L., and K. Suguio. 1976. Les variations du niveau de la mer au Quaternaire récent dans le Sud de l'Etat de São Paulo (Brésil). Utilizations des "Sambaquis" (kjokkenmoddings) dans la detérmination des anciennes lignes de Rivages Holocènes, in

Congrés International des Américanistes, 42, Paris. *Actes* 9: 73–85.
Mauss, M. 1979. *Seasonal variations of the Eskimo: A study in social morphology*. London: Routledge & Kegan Paul.
Prous, A. 1974. Les sculptures préhistoriques du sud brésilien. *Bulletin de la Société Préhistorique Français* 71: 210–217.
Scheel-Ybert, R., M.C. Afonso, M. Barbosa-GuimarÃes, M.D. Gaspar, and J.-P. Ybert. 2009a. Considerações sobre o papel dos sambaquis como indicadores do nível do mar, in XI Congresso da Associação Brasileira de Estudos do Quaternário – ABEQUA, 2009. *Quaternary and Environmental Geosciences* 1: 3–9.
Scheel-Ybert, R., S. Eggers, V. Wesolowsk, C. Petronilho, C. Boyadjian, M.D. Gaspar, M.C. Tenório, and P. Deblasis. 2009b. Subsistence and lifeway of coastal Brazilian moundbuilders. *Treballs d etnoarqueologia* 7: 37–53.
Seyferth, G. 1985. A antropologia e a teoria do branqueamento da raça no Brasil: a tese de João Batista de Lacerda. *Revista do Museu Paulista Nova Série* XXX: 81–98.
Villagran, X., D. Klokler, P. Nishida, M.D. Gaspar, and P. Deblasis. 2010. Lecturas estratigráficas: Arquitectura funerária y depositación de resíduos en el sambaquí Jabuticabeira II. *Latin American Antiquity* 21: 195–216.
Wiener, C. 1876. Estudos sobre os sambaquis do sul do Brasil. *Arquivos do Museu Nacional* 1: 1–20.

Sanders, William T.

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Basic Bibliographic Information

William Timothy Sanders (April 19, 1926–July 2, 2008), a dedicated anthropological archaeologist, charismatic scholar of New World archaeology, innovative investigator, highly influential theoretician, popular and dynamic teacher, and prolific author, enjoyed an international reputation and changed the course of Mesoamerican archaeology in the 1960s. Born and raised in Patchogue, Long Island, New York, he served in the US Navy during World War II as a PBY air crewman on Mediterranean Axis submarine patrol based in North Africa. Accepted as a student at Harvard College under the GI Bill (Servicemen's Readjustment Act of 1944), he was awarded an AB magna cum laude in anthropology, elected to Phi Beta Kappa, and received his AM (1953) and doctorate (1957) from Harvard University. Archaeologist Louis Dupree was a friend and fellow student. Sanders' 700-page dissertation, *Tierra y agua (soil and water)*, formed a basis for subsequent fieldwork in lowland and highland Mexico, Guatemala, Honduras, and Peru. In 1960 he initiated the pathbreaking Teotihuacan Valley Project, an archaeological settlement pattern assessment covering 610 km^2 (Sanders 1965; Sanders et al. [12 volumes] 1970–2007; Kolb 2019) leading to the larger Basin of Mexico Project analyzing an area of 7500 km^2 occupied by a growing Mexico City. The result was a monumental book – now a classic – and detailed maps documenting the evolution of civilizations and empires (Sanders et al. 1979). The highland Maya Classic period city of Kaminaljuyú (encroached upon by modern Guatemala City) and surrounding Valley of Guatemala, ca.700 km^2, was the focus of a 5-year (1968–1971) endeavor by Sanders and Joseph Michels to survey and conduct excavations (Sanders and Michels 1977). By invitation of the Honduran government, Sanders and David Webster focused next on the 460 km^2 Copán Valley in western Honduras (1981–1985) to reconstruct the social, political, and economic institutions of the city of Copán at its ca. CE 700–800 peak (Sanders 1986–1990).

Bill Sanders ("Vincent van Sanders"). (Photo courtesy of William G. Mather III, 1963)

Charles C. Kolb has retired.

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Major Accomplishments

Sanders was among the first archaeologists to attempt to make the discipline of archaeology a true science through the development of theories and the formation of testable hypotheses about culture (Marcus 2011). His approach, cultural ecology, provided fundamental environmental and archaeological data to assess the evolution of ancient societies. He shifted the scale of analysis from individual sites to the macroregion to document population growth and dispersal and identify processes leading to urbanization and civilization. The fieldwork utilized aerial photographs as a guide to site location and full-coverage survey, a technique used widely today, along with student crews for on-foot site verification. Sanders created an extensive corpus of empirical data, including the location of thousands of archaeological sites (many since destroyed by modern urban growth) and the environmental settings in which they arose.

He was the author, coauthor, or editor of 25 books, major reports or monographs, numerous book chapters, and professional papers published in English and Spanish. A great synthesizer, he coauthored with Barbara Price *Mesoamerica: The Evolution of a Civilization* (1968) and, with Joseph Marino, the textbook *New World Prehistory: Archaeology of the American Indian* (1970). Sanders was a frequent commentator at professional meetings and instrumental, with Frederick Matson and Louis Dupree, in establishing the separate Penn State Department of Anthropology in 1965. He created and narrated the 1961 instructional film, *Land and Water: An Ecological Study of the Teotihuacan Valley*, recently updated by Kirk French (Kolb 2018). With David Webster he co-hosted "Out of the Past," an eight-part public television (PBS) series, comparing and contrasting Mesoamerican civilizations' and ancient Old World cultures, and created instructional videos and a companion college textbook, *Out of the Past: An Introduction to Archaeology* (Webster et al.1993).

Sanders trained nearly three dozen doctoral and Masters students and chaired numerous dissertation and thesis committees, https://anth.la.psu.edu/graduate/graduate-alumni. Among the Mesoamericanists were Joe Marino†, Dick Diehl, Charlie Kolb, Bob Santley†, Deb Nichols, Susan Evans, William G. Mather III, Jim Sheehy, Prudence and Don Rice, Rebecca Story, Dolph Widmer, Ken Brown, Steve Whittington, and Carson Murdy. His Eastern US archaeology doctoral students included Barry Kent, Ira Smith, Tim Senulis, Bill Womsley, Sam Casselberry, Sue Ann Curtis, Gary Webster, and Randy Turner. Non-Penn State students who became influential Mesoamerican archaeologists and Sanders' longtime colleagues were Jeff Parsons, Tom Charlton†, and Barbara Price†.

Joyce Marcus (2011:17–18) has cogently characterized his personal qualities:

> Sanders possessed enormous confidence and tenacity; great dedication to long-term goals; an ability to complete arduous tasks; tremendous loyalty to family, informants, students, collaborators, and colleagues; and an exceptional ability to debate with others, yet collaborate and learn from them He had the wisdom to see merit in divergent views and frameworks, and did not regard those who disagreed with him as rivals or enemies. Competition merely encouraged him to collect more field data. He also could draw on the ethnohistoric and ethnographic record, which he knew even better than his list of publications reveal.

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Archaeological Fieldwork
- ▶ Charlton, Thomas H.
- ▶ Cultural Ecology in Archaeology
- ▶ Dating Techniques in Archaeological Science
- ▶ Dupree, Louis B.
- ▶ Interpretation in Archaeological Theory
- ▶ Kolb, Charles C.
- ▶ Matson, Frederick R.
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mesoamerica: Complex Society Development
- ▶ Mesoamerica in the Classical Period
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Mesoamerica: Subsistence Strategies by Region

▶ Surface Survey: Method and Strategies
▶ Teotihuacan: Geography and Culture

References

Sanders, W.T. 1957. *Tierra y agua (soil and water): A study of the ecological factors in the development of Meso-American civilization*, 2 vols. Unpublished Ph.D. dissertation. Cambridge: Harvard University.

Sanders, W.T. 1965. *The cultural ecology of the Teotihuacán valley: A preliminary report of the results of the Teotihuacán Valley project*. University Park: Pennsylvania State University, Department of Sociology and Anthropology.

Sanders, W.T., and B.J. Price. 1968. *Mesoamerica: The evolution of a civilization*. New York: Random House.

Sanders, W.T., and J. Marino. 1970. *New world prehistory: Archaeology of the American Indian*. Englewood Cliffs: Prentice-Hall.

Sanders, W.T. et al. eds. 1970–2007. *Teotihuacan valley project.* Vols. 1–12. Occasional papers in anthropology 10(1–2), 13, 15, 19, 20, 21, 24, 25, 26, 27, 30 [12 volumes]. University Park: Pennsylvania State University, Department of Anthropology [digitized and online]. https://journals.psu.edu/opa/issue/archive.

Sanders, W.T., and J.W. Michels, eds. 1977. *Teotihuacan and Kaminaljuyú: A study in prehistoric culture contact*. University Park: Pennsylvania State University Press.

Sanders, W.T., J.R. Parsons, and R.S. Santley. 1979. *The Basin of Mexico: ecological processes in the evolution of a civilization [book and 12 folded maps in case]*. New York: Academic Press.

Sanders, W.T., ed. 1986–1990. *Excavaciones en el área urbana de Copán*. Vol. 3. Tegucigalpa: Instituto Hondureño de Antropología e Historia.

Webster, D.L., S.T. Evans, and W.T. Sanders. 1993. *Out of the past: An introduction to archaeology.* Mountain View: Mayfield Publishing.

Further Reading

Baker, P.T., and W.T. Sanders. 1972. Demographic studies in anthropology. *Annual Review of Anthropology* 1: 151–178.

Kolb, C.C. 2018. Maurice, Fred, Louie, Paul, Bill and friends: the beginnings of anthropology at Penn State. K.D. French (coord.). In *Teotihuacan Valley Symposium & Land and Water Revisited Project*, San Juan Teotihuacan, 2–3 July 2018. PowerPoint.

Kolb, C.C. 2019. In the beginning: TVP and TMP – reflections on the classic Teotihuacan period survey in the Teotihuacan valley, 1962–1964. In *Symposium: The legacies of the Basin of Mexico: the ecological processes in the evolution of a civilization*. Society for American Archaeology, Albuquerque, 11 Apr 2019. PowerPoint.

Marcus, J. 2011. *William Timothy Sanders, 1926–2008*, Biographical memoir, 27. Washington, DC: National Academy of Sciences. http://www.nasonline.org/publications/biographical-memoirs/memoir-pdfs/sanders-william-t.pdf.

Webster, D.L., and S.T. Evans. 2008. "Even jades are shattered . . ." William Timothy Sanders, 1926–2008. *Ancient Mesoamerica* 19 (2): 157–163.

Sankalia, Hasmukh Dhirajlal

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Basic Biographical Information

Hasmukh Dhirajlal Sankalia (Figs. 1 and 2) was born in Bombay on 10 December 1908 into an upper-middle-class Gujarati family for solicitors. He was born underweight and retained a frail constitution all through his life. Sankalia was dead in 28 January 1989. In 1959, Uma Vasudev, a journalist writing in the *Illustrated Weekly of India*, described Sankalia "as fragile as the potsherds he mends." Sankalia passed his matriculation examination in 1925, securing the highest marks in Sanskrit for which he won the Chimanlal Ranglal Prize of Shri Surti Dasha Porwad Hitechhu Sabha. His father and uncle wanted him to follow the family profession of law, but he joined St. Xavier's College to pursue the study of Sanskrit and History. Sankalia studied Sanskrit for his B.A. and History for his M.A. Sankalia passed his M.A. examination in 1933 with a first class and won the Pandit Bhagwanlal Indraji Prize of Bombay University. The thesis was published in 1934 as a book. Simultaneously with his M.A. degree, Sankalia also passed his LL.B. examination to satisfy the wishes of his father and uncle.

In 1934, Sankalia joined London University to do his Ph.D. in ancient Indian History. It was the influence of his teachers in England that eventually turned Sankalia's interest in Archaeology. He wrote his Ph.D. thesis on the Archaeology of Gujarat. This was the study of historical period

Sankalia, Hasmukh Dhirajlal, Fig. 1 Young Sankalia

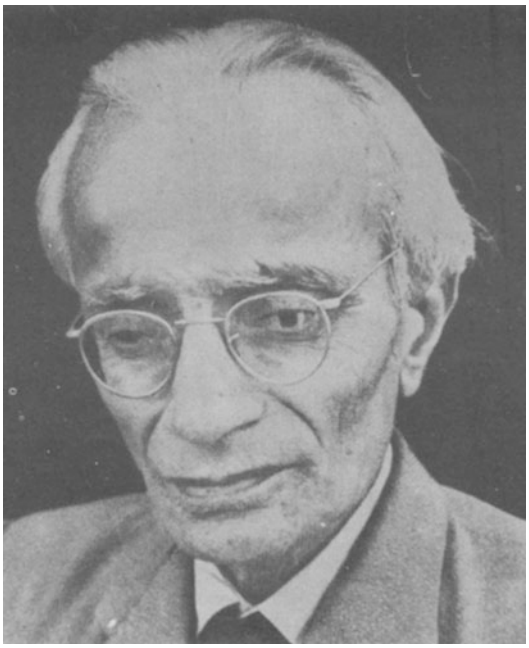

Sankalia, Hasmukh Dhirajlal, Fig. 2 Old Sankalia

comprising art, architecture, epigraphy, and numismatics and was based on both field work and library sources. Sankalia got his Ph.D. degree in 1936. The thesis was published as a book in 1941 with financial assistance from London University (Sankalia 1941).

Sankalia was a life member of the Asiatic Society of Bombay; Bhandarkar Oriental Research Institute, Pune; Linguistic Society of India, Pune; and Indian Archaeological Society, New Delhi. He was the founder Chairman of the Indian Archaeological Society and continued in this position until he voluntarily resigned it in 1980 much against the wishes of the society's members. He was a member of the Permanent Council of the International Union of Prehistoric and Protohistoric Sciences from 1961 and Honorary Member of the Instituto Italiano di Prehistoria e Protohistoria, Italy, from 1962. He was a member of the following Advisory Boards of Archaeology: Government of India (1955–1975), Government of Maharashtra (1955–1974), Government of Gujarat (1964–1980), Government of Madhya Pradesh (1966–1974), and Government of Uttar Pradesh (1969–1978).

Sankalia was selected as a professor of Pro-Indian and Ancient Indian History in 1939 at the Deccan College Post-Graduate and Research Institute, Pune. This was Sankalia's first and last job.

Major Accomplishments

For his academic achievements Sankalia received numerous honors from professional organizations, the central and state governments, and the public at large in the form of fellowships, memberships of academic organizations, prizes, medals, nominations to prestigious bodies, invitations to deliver lectures and preside over conferences and seminars, felicitations by public bodies, etc. Sankalia received the Explorer's Medal from the Explorers Club, New York, in 1984. He was among the first batch of scholars to be awarded the Jawaharlal Nehru Memorial Fellowship in 1968. The President of India in 1974 conferred on him

the title of *Padma Bhushan* in recognition of his enormous contribution to archaeological studies.

The citizens of Maheshwar in Madhya Pradesh presented him a manapatra (citation) in 1954 in appreciation of his excavations at Maheshwar. The Municipality of Ahmednagar in Maharashtra presented him a manapatra and a shawl in 1973 "for bringing light in the history of Ahmednagar district form the dim past by excavation and exploration at and around Nevasa." Less than 2 weeks before his death, the Aitihasik Vastu Sangrahalaya of Ahmednagar presented him the Late Principal Naralkar Learning Prize at a function held at Deccan College.

Sankalia's first enterprise in prehistoric research was the expedition that he led to Gujarat at the instance of Rao Bahadur K.N. Dikshit, the then Director General of Archaeological Survey of India, in 1941–1942 to explore Stone Age remains, following the clues provided by the work of Robert Bruce Foote more than six decades earlier. In this expedition he included a geologist, a paleontologist, and a surveyor-draftsman. Sankalia located several new Paleolithic and Mesolithic sites in the Sabarmati valley in Mehsana district. One of the important Mesolithic sites was Langhnaj where Sankalia carried out several seasons of excavation jointly with his anthropologist colleague, Irawati Karve. Langhnaj was the first Mesolithic site to be excavated in India as also the first Stone Age site to yield physical remains of man. With this work Sankalia opened up a new and dynamic phase of research in prehistory. Sankalia published the results of his work both as a monograph entitled *Investigations into the Prehistoric Archaeology of Gujarat, Being the Official Report of the First Gujarat Prehistoric Expedition 1941–42* (1946) and in article in several journals (Sankalia 1942, 1955, 1956; Sankalia and Karve 1945, 1949).

The significance of Sankalia's work at Nevasa and particularly the discovery of a distinct Middle Paleolithic phase were recognized by the prestigious American journal *Science* when it invited him to contribute a paper on the Middle Paleolithic of India and Pakistan (Sankalia 1964).

The Government of India nominated him as a member of the archaeological delegation to the USSR in 1963–1964, cultural delegation to Yugoslavia in 1966, delegation to the International Congress of Orientalists at Ann Arbor, Michigan, USA, in 1967, and again at Paris in 1973.

Sankalia was elected Honorary Fellow or Member of the Ethnographic and Folk Culture Society, Lucknow (1974); Indo-Pacific Prehistoric Association, Canberra, Australia (1976); the Heras Institute of Indian History and Culture, Bombay (1977); and the British Academy, London (1986). He was nominated as a member of the Editorial Board of the prestigious British journal *World Archaeology* from its inception in 1969 and continued in this position until 1987. He was the Honorary Tagore Professor of Indian History and Culture at the M.S. University of Baroda from 1960 to 1965.

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Environmental Archaeology and Conservation
- ▶ Historical Archaeology
- ▶ Spatial Analysis in Field Archaeology
- ▶ Urban Archaeology

Further Reading

Sankalia, H.D. 1941. *The archaeology of Gujarat (including Kathiawar)*. Bombay: Natwarlal and Company.

Sankalia, H.D. 1942. In search of early man along the Sabarmati. *Journal of Gujarat Research Society* 4: 75–80.

Sankalia, H.D. 1955. Navadatoli dancers. *Antiquity* 29: 28–37.

Sankalia, H.D. 1956. The microlithic industry of Langhnaj, Gujarat. *Journal of Gujarat Research Society* 18: 275–284.

Sankalia, H.D. 1963. *Prehistory and protohistory in India and Pakistan*. Bombay: University of Bombay.

Sankalia, H.D. 1964. *Stone Age tools: Their techniques, names and probable functions*. Poona: Deccan College.

Sankalia, H.D. 1965. *Excavations at Langhnaj: 1944–63, Part 1: Archaeology*. Poona: Deccan College.

Sankalia, H.D. 1969. Kot- Diji and Hissar. *Antiquity* 43: 142–144.

Sankalia, H.D. 1971a. New evidence for early man in Kashmir. *Current Anthropology* 2 (4): 558–562.
Sankalia, H.D. 1971b. Prehistoric colonization in India. *World Archaeology* 5 (1): 86–91.
Sankalia, H.D. 1987. Stone Age man in and around Pune (Poona) or the habitation of early man in Sat- Chit-Ananda. *Bulletin of the Deccan College Research Institute* 46: 115–135.
Sankalia, H.D., and I. Karve. 1945. *Preliminary report on the third Gujarat prehistoric expedition and human remains discovered so far*. Poona: Deccan College.
Sankalia, H.D., and I. Karve. 1949. Early primitive microlithic culture and people of Gujarat. *American Anthropologist* 51: 28–34.
Sankalia, H.D., S.B. Deo, and Z.D. Ansari. 1971. *Chalcolithic Navdatoli*. Poona and Baroda: Deccan College and M. S. University.

Sanogo, Kléna

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Basic Biographical Information

Kléna Sanogo (Figs. 1 and 2) is the Director of the Institut des Sciences Humaines, in Bamako, Mali. He is one of the country's leading figures, who has worked throughout his career for the protection and safeguarding of Mali's cultural heritage.

Sanogo, Kléna, Fig. 1 Kléna Sanogo

Born in 1948 in Doumanaba (Sikasso), Kléna Sanogo undertook his graduate studies at Voronezh, where he obtained a Masters in History from Voronezh State University (former USSR). He then worked at the Institut des Sciences Humaines as a Research Fellow from 1973 to 1974. This allowed him to participate in a number of archaeological excavations in Dogo (Bougouni) and to participate in archaeological research at Doupwill and Galia (Mopti) in Mali. Kléna Sanogo became the first Malian professional archaeologist. He was Director of the National Museum of Mali from 1974 to 1978. In 1980, he obtained the title of Doctor of Archaeology from Voronezh State University. In his role as Director of the Institut des Sciences Humaines since 1987, Kléna Sanogo has been instrumental in the implementation of numerous national programs of archaeological research.

Kléna Sanogo is an active member of several national, sub-regional and international professional associations and organisations; among these are the International Council of Museums (ICOM), the International Council on Monuments and Sites (ICOMOS), the West African Association of Archaeology (AOAA) of which he was President from 1996 to 1998, the PanAfrican Association of Prehistory and Related Studies (PANAF), and the Society of Africanist Archaeologists (SAFA).

Major Accomplishments

Kléna Sanogo has worked extensively towards the revitalization of archaeological research in Mali and the promotion of Malian archaeological heritage. He took an active part in the development of legislation and regulations on cultural heritage. In his role as Director of the National Museum of Mali in the 1970s, Kléna Sanogo was one of the key figures to set up a national Heritage Day in Mali. He also took an active part in the development of a new museum policy that led to the construction and inauguration of the National Museum of Mali in 1982. Kléna Sanogo also contributed to a large extent to the design and organization of exhibitions of national and

Sanogo, Kléna, Fig. 2 Kléna Sanogo at an excavation site

international scope, most notably the exhibitions on the Tellem and on the Vallées du Niger (1993). From 1985 to 1987, Kléna Sanogo led the archaeological components of the first the environmental impact studies in Mali in the reservoir area of the Manantali Dam and the gold mining area of Syama (Kadiolo).

The establishment in the 1980s of an inventory of archaeological sites in the region of the lakes and the inland delta of the Niger river gave a new impetus to archaeological research in Mali. Kléna Sanogo was one of the major players in the development and implementation of this project, which established the Institut des Sciences Humaines as the center of archaeological research at a national level. Moreover, this project allowed the training of a new generation of archaeologists. The results of this ambitious project were published in 1991 under the supervision of Michel Raimbault and Kléna Sanogo in Recherches archéologiques au Mali: prospections et inventaire, fouilles et études analytiques en Zone lacustre (Raimbault and Sanogo 1991).

Further of work conducted under his supervision includes archaeological research in Nioro du Sahel (1990–1995) and the pursuit of archaeological excavations at stone circle sites in Banamba, Nioro du Sahel, and Koulikoro (from 2003).

Since the early 1990s Mali has witnessed a revival in collaborations with overseas institutions and the implementation of new research projects, including the Togué project (an inventory of archaeological sites in the Inner Niger Delta) (1989–1992), the international archaeological excavations at Dia (1998–2002), the findings of which led to the publication "Recherches archéologiques à Dia dans le Delta intérieur du Niger" (Bedaux et al. 2005) and the program "Peuplement Humain et Paléoenvironnement en Afrique de l'Ouest" (Ounjougou) (1998–2010). This period is also marked by the organization of numerous African and international archaeological meetings in Mali. These include the meeting of the West African Association of Archaeology (AOAA) in Bamako in 1978 and at Djenne in 1999 and the 11th Congress of the PanAfrican Association of Prehistory and Related Studies (PANAF) in Bamako in 2001, which led to the publication of the proceedings under the direction of Klena Sanogo and Térába Togola (2004).

Cross-References

- ▶ International Council of Museums (ICOM)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)

▶ International Council on Monuments and Sites (ICOMOS) (Museums)
▶ Togola, Téréba

References

Bedaux, R., J. Polet, K. Sanogo, and A. Schmidt. 2005. *Recherches archéologiques à Dia dans le Delta intérieur du Niger, Mali: bilan des saisons de fouilles 1998–2003*, Mededelingen van het Rijksmuseum voor Volkenkunde series, Research School CNWS. Leiden: Leiden University.

Raimbault, M., and K. Sanogo. 1991. *Recherches archéologiques au Mali: prospections et inventaire, fouilles et études analytiques en Zone lacustre*, Karthala Editions. Paris: ACCT.

Sanogo, K., and T. Togola. 2004. *11ème Congrès de l'Association panafricaine de Préhistoire et disciplines assimilées, Bamako, 7–12 février 2001*. Bamako: Institut des Sciences humaines.

Further Reading

Connah, G. 2001. *African civilizations: An archaeological perspective*. Cambridge: Cambridge University Press.

Sanogo, K. 1974. Réflexion sur la situation de la Recherche Archéologique en République du Mali. *Etudes Maliennes*, No. 9.

Sanogo, K. 1999. The looting of cultural material in Mali. Culture without context. *The Newsletter of Illicit Antiquities Centre* 4.

Sanogo, K. 2004. La problématique des modes d'inhumation dans la Boucle du Niger (Mali): du Lieutenant Desplagnes à nos jours. In *Du Nord au Sud du Sahara. Cinquante ans d'archéologie française en Afrique de l'Ouest et au Maghreb: Bilan et perspectives*, ed. A. Bazzana and H. Bocoum, 189–194. Paris: Sépia.

Sanogo, K. 2010. *Quelques aspects de la lutte du Mali contre le pillage du patrimoine culturel in Halte au pillage*: 09-414. Sous la direction de Grégory Compagnon. Paris: Edition Errance.

Sanogo, K., and M. Dembélé. 1990. Recherches ethnoarchéologiques dans la zone lacustre. In *Boucle du Niger*, Approches Multidisciplinaires 2, ed. K. Junzo, 261–309. Tokyo: ILCAA.

Sanogo, K., and M. Dembélé. 1994. La céramique à travers les âges dans le delta intérieur du Niger in K. Junzo. In *Boucle du Niger*, Approches Multidisciplinaires 4, 45–70. Tokyo: ILCAA.

Sanogo, K., and E. Huysecom. 2008. Innovations et dynamiques créatives dans la préhistoire africaine. In *Petit précis de remise à niveau sur l'histoire africaine à l'usage du président Sarkozy*, ed. A.B.. Konaré, 59–69. Paris: Editions La Découverte.

Sanogo, K., and G. Liesegang. 1977. Céramique, tombeaux et autres traces de l'âge du fer à Dogo. *Etudes Maliennes* 21: 48–57.

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Basic Biographical Information

Mario Sanoja Obediente, for his career in teaching and research, is one of the most influential archaeologists in Venezuela. He was born in Caracas on September 12, 1934, and graduated in 1957 in the first class of the Central University of Venezuela-Caracas's School of Sociology and Anthropology.

Immediately following graduation, Mario Sanoja received a scholarship to study in France at the Ethnological Research Center of the Museum of Man and the Institute of Hautes Etudes de l'Amerique Latine under the mentorship of André Leroi Gourhan. In 1961 he met Betty Meggers and Clifford Evans who invited him to take a seminar on quantitative archaeology at the University of Barranquilla-Colombia where he met James Ford, Reichel-Dolmatoff, Carlos Angulo, Luis Lumbreras, Carlos Navarrete, and Olga Linares, among others, with whom he began a rewarding scientific relationship in the following years.

In 1963, Mario Sanoja established the Department of Sociology and Anthropology of University of Los Andes-Mérida. Together with fellow archaeologist and life partner Iraida Vargas Arenas, he carried out archaeological investigations from a regional perspective in Mérida's Range, Lake Maracaibo Basin, and the Quíbor Valley. This work marked the beginning of a period of change in Venezuelan archaeology because, in those days, research concentrated only on chronological sequences and lines of cultural diffusion established through the analysis of lithic and ceramic traditions.

In 1967, Mario Sanoja became a professor at Central University of Venezuela-Caracas, initiating a path that led him to investigate the ways of life and ancient geohistorical regions associated with the settlement of Venezuelan territories, producing, in co-authorship with Iraida Vargas, a

Sanoja, Mario, Fig. 1 Mario Sanoja Obediente

series of archaeological papers, scientific articles, and presentations in national and international congresses and seminars. These make it clear the historical processes developed by the native peoples, their relations with other societies, and native cultures to the North of South America and insular Caribbean (Fig. 1).

Major Accomplishments

The 1970s and 1980s was a period of meetings and exchanges that materialized Latin American Social Archaeology; Sanoja Obediente would be among its founders. Following the symposium on "Native American Formations" held in 1970 at the Congress of Americanists in Lima, Mario Sanoja and Iraida Vargas published in 1974 *Venezuelan Ancient Formations and Modes of Production. Notes for the study of integration processes of Venezuelan society (12,000 BC–1900ª. AD.).* This book sought, from the archaeological evidence of these years, to interpret the history of Venezuela from a Marxist perspective. Moreover, it encouraged no epistemological rupture between the study of ancient and modern societies and constitutes a transverse axis in Mario Sanoja's work that was also displayed in his book *The Yucca and Maize Men. An Essay on the Origin and Development of Agrarian Systems in the New World* (Sanoja 1982).

In his publications, Mario Sanoja postulated the concepts of space-domestic-group, space-territorial-group, and geohistorical region for the inference of archaeological contexts (Sanoja 1997). These were useful conceptualizations to characterize archaeological contexts in connection with social relations and production and reproduction conditions of the material and immaterial basis of any given social economic formation. He contended that the application of the concept of geohistorical region in archaeological inference would allow us understand the qualities of the uses of a determined geographic region by territorial groups, which were themselves constituted by domestic groups (Sanoja 1997).

Mario Sanoja not only elaborated important theoretical proposals but, together with Iraida Vargas, applied the ethical-evaluative postulates of social archaeology, turning it into a socially useful science in the sense of directing archaeological practice toward a search for solutions to our communities' problems. From this perspective, they published several proposals, among them, the book *History, Identity and Power* (Vargas and Sanoja 1993), in which they discussed the origin of the Venezuelan nation, the cultural heritage, and the historical-cultural patrimony; the problems of teaching history in Venezuela; and the role of museums as educational tools, all articulated with the question of identity as a strategic element for the consolidation and defense of national sovereignty.

In 1990, Mario Sanoja organized the Second World Archaeological Congress (WAC-2) in the city of Barquisimeto-Venezuela. He was appointed as Academic Vice-President for this Congress. From 1995, he published a number of books that made groundbreaking contributions to archaeology in Venezuela: *Canoe People. Political Economy of the former Appropriation Society of north-eastern Venezuela* (Sanoja and Vargas 1995), *Water and power: Caracas and the formation of the Caracas colonial state: 1567–1700* (Sanoja and Vargas 2002), *Guayana's Ages. Archaeology of a Chimera. Santo Tomé and the Catalan Capuchin Missions 1595–1817* (Sanoja and Vargas 2005), and *The Dawn of Venezuelan Society* (Sanoja 2013). In the first book, Sanoja and Vargas discuss, for the first time, the role of women in the Appropriating Social Formation period and the ways of life of collectors who settled in about 8000 BC in the Caribbean littoral zone and Venezuela Atlantic coast. In the second

and third books, they combine archaeological field data and the *Indias* texts, to explore the Venezuelan colonial way of life as a particular form of capitalist social formation that was implanted in Venezuelan territories as part of the European conquest of these territories in the fifteenth century. In the last book, within the geohistorical context, the native colonization of Venezuelan territory in the Caribbean and South American context is discussed in order to highlight the temporal and territorial continuity of that process (Sanoja 2013).

His work marked the way of doing archaeology in this country and today influences by its theoretical postulates in the research that is carried in present.

Cross-References

▶ The Decolonization of Venezuelan Archaeology
▶ Latin American Social Archaeology
▶ Vargas, Iraida

References

Sanoja, M. 1982. *Los hombres de la yuca y el maíz*. Caracas: Monte. Ávila Editores.

Sanoja, M. 1997. *Regiones geohistóricas y Modo de vida. Fundamentos para la historia alternativa.* Boletín de Antropología Americana, N° 31. México: Instituto Panamericano de Geografía e Historia.

Sanoja, M. 2013. *El alba de la sociedad venezolana*. Caracas: Centro Nacional de Historia.

Sanoja, M., and I. Vargas. 1974. *Antiguas formaciones y modos de producción venezolanos*. Caracas: Monte Ávila Editores.

Sanoja, M., and I. Vargas. 2002. El agua y el poder: Caracas y la Formación del Estado colonial Caraqueño:1567–1700. Caracas: Banco Central de Venezuela.

Sanoja, M., and I. Vargas. 2005. La edades de Guayana. Arqueología de una quimera. Santo Tomé y las misiones capuchinas catalanas. 1595–1817. Caracas: Monte Ávila Editores Latinamericana.

Sanoja, M., and I. Vargas. 1995. *Gente de la canoa. Economía política de la antigua sociedad apropiadora del noreste de Venezuela.* Caracas: Fondo editorial tropikos.

Vargas, I., and M. Sanoja. 1993. *Historia Identidad y Poder*. Caracas: Fondo Editorial Tropykos.

Santa María, Geography and Culture of

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Santa María is the name of an Argentine city located in the valley that holds the same name. It is also used to refer an ancient indigenous pottery style as well as the archaeological culture defined by the researcher Alberto González (1950). Santa María funerary urns for the burial of children constitute the best known objects from pre-Columbian times in northwest Argentina displayed widely in many museums around the world.

The city of Santa María owes its name to the fact that it has been developed near the site of the ephemeral seat of the Jesuit mission "Santa María de los Ángeles de Yocavil" founded in 1618. "Yocavil" was the name of an indigenous tribe from the South of the valley. This extends from Punta de Balasto, in the south, to Cafayate, in the north, place of confluence of the rivers Santa María and Calchaquí. Both Santa María and Calchaquí valleys, along with the Quebrada de las Conchas-Valle de Lerma, form the group called "Valles Calchaquíes" extending throughout the provinces of Catamarca, Tucuman, and Salta. However, the sphere of interaction in which Late Intermediate societies produced and consumed Santa María ceramics was much wider, including at least the adjacent valleys of Cajón, Tafí, Quebrada del Toro, and the piedmont of Tucumán (Sali river basin).

Santa María is a broad valley running in south-north direction (Figs. 1 and 2), about 12 km wide by more than 100 long, with an average altitude of 1900 m. It is delimited, by the mountain range Sierra del Aconquija and Cumbres Calchaquíes in the east and by Sierra del Cajón (also called Quilmes) in the west. The climate is arid with annual average temperatures reaching 16 °C and the

Santa María, Geography and Culture of, Fig. 1 Overview of Santa María valley from sector VI El Carmen 1 site (Tucumán province). In the background, the mountain ranges of Sierra del Aconquija (right) and Cumbres Calchaquíes (left, corresponding to the north)

rainfall minor than 200 mm. Rains are concentrated between October and April.

Vegetation is xerophilous; carob and *chañar* stand out as the unique native trees highly regarded due to the benefits their seeds and pods provided for food preparation. Among the native animals, the main species are camelids as guanaco (*Lama guanicoe*), vicuña (*Vicugna vicugna*), and llama (*Lama glama*); cervids as *huemul* (*Hippocamelus antisensis*); flightless birds such as partridge and brokerages as the rhea (*Pterocnemia pennata*); rodents like *chinchillas* and *viscachas* (*Lagidium viscacia*); *quirquinchos* (*Chaetophractus vellerosus*); hares; foxes; and pumas.

Vast majority of Santa María river collectors are dry during nearly all year. The most important are those that run along the western slope of the Sierra del Aconquija, yielding some fertile oasis on the eastern side of the Santa María river as Ampajango, Jujuil, and Entre Rios in a desert general context that contrasts with the western band river, where the distribution of the little available water is more uniform, leading the growth forests of carob, a resource heavily exploited by ancient farmer populations.

Late Indigenous Populations

Countless names for different populations who took part in the political events occurred in the Calchaquí valleys during the Spanish conquest were included in the historical chronicles of sixteenth and seventeenth centuries. Some of them are *tafíes*, *acalianes*, *pacciocas*, *ingamanas*, *pulares*, *pichaos*, and *quilmes*. The meaning and extent of each one of these names is a matter of debate until the present due to Spaniards lacked of precise conceptual tools to account for a different cultural reality. Modern historical studies evaluated the scope of the various denominations, understanding some of them -calchquíes, diaguitas- as terms refferring also to more inclusive groups of people culturally related. This way, they began to be used to name hole populations

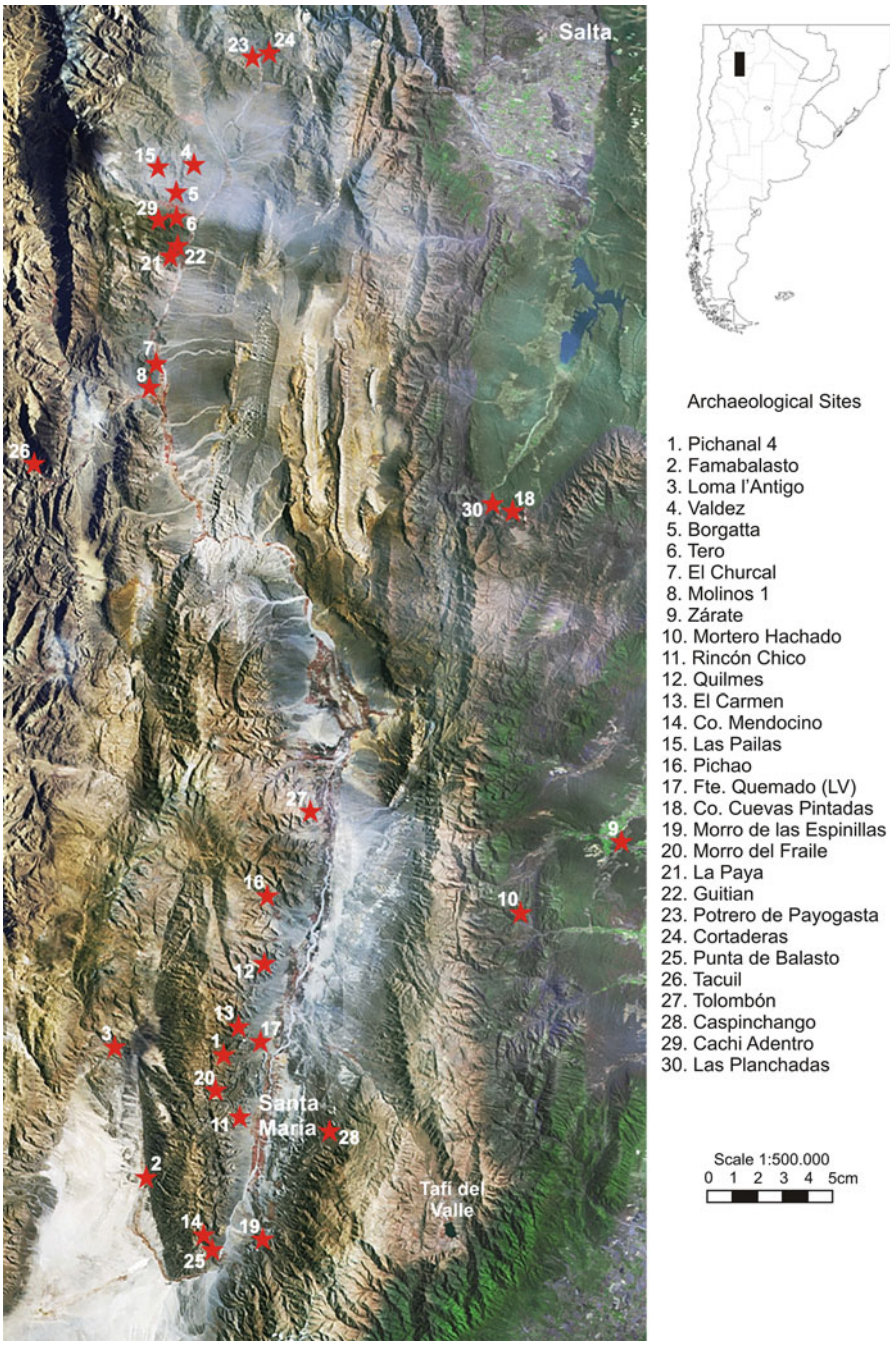

Santa María, Geography and Culture of, Fig. 2 Map showing the location of the sites mentioned in the text

along big areas. According to the new chronological criteria introduced in the regional archaeology by the mid-twentieth century, González suggested the replacement of the general term "diaguita" by the designation of cultures Santa María and Belén (González y Pérez 1972). Both correspond to the geographical distribution of the characteristic ceramic styles: Santa María at the north includes

Calchaquí valley, Quebrada del Toro, Quebrada de las Conchas, Valle de Lerma, Tafi valley, Santa María valley, Cajón valley, and Tucuman hillfoot (Fig. 2) and Belén, in the South, comprehending Hualfín, Abaucán, and Andalgalá valleys.

The archaeological remains of Belén and Santa María cultures are indicative of Late Intermediate Period (1000–1450 AD) -also known as Regional Development Period (Núñez Regueiro 1974) - in the Argentine northwest. In Santa María valley, the settlements were placed on the slopes and peaks of the hills (Fig. 3) naturally protected against potential sieges, while defense walls and other military structures such as parapets (Fig. 4) and watchtowers were also added. Constructions ranging in numbers that could exceed 200 or 300 compounds were built along the slopes, the foothills, and adjacent areas, while the agricultural infrastructure was located at the bottom of the valley. In the high altitudes of Sierra del Cajón, small installations for handling herds of *llamas* were constructed, and there is at least one known case, Pichanal 4 (Cantarelli et al. 2014) of a pastoralist aggregation site possibly held to perform ceremonies linked to the cattle reproduction cycle. Finally we should also mention defensive positions consisting of a few enclosures and stone walls of large dimensions located at strategic places.

Santa María large settlements were built mainly in stone and have been defined as *clusters* (Madrazo and Otonello 1966) or *populated centers* (Nastri et al. 2012). Many authors point out that these large dimensions are indicators of an increasing population (Nunez Regueiro 1974; Tarragó 1995; etc.). The truth is, as discussed below, that very little is known about the previous developments in the area. When it comes to the Late Intermediate Period, a number of variations on Santa María settlement and pottery are appreciated throughout the vast territory.

Regional Variation

Archaeological sites at the west of Sierras de Aconquija-Cumbres Calchaquíes are better known because of the use of stone in architecture

Santa María, Geography and Culture of, Fig. 3 View of enclosures on the slopes of Cerro Pintado de las Mojarras site (Catamarca province)

Santa María, Geography and Culture of, Fig. 4 Circular enclosure at Las Cañas site (Tucumán province)

with walls of about a meter from the surface providing the possibility of making an assembly drawing for at least some of the residential units that count in a number of cases, with more than 100 structures. In the eastern sector, instead, research has been scarce owing to the abundant vegetation which constitutes an obstacle for visibility. The few sites known in this area belong to cemeteries or lowlands settlements with no fortifications identified.

Santa María populated centers in the semiarid valleys of the west may extend about 60 ha and harbor about 300 structures in rock taking into account buildings, retaining walls, defensive walls, and roads. Structures are displayed on the top of an immediately adjacent mountain to the flat lands in which many other buildings can be seen. In those cases where the topographic conditions of the area allowed, settings were also built over the mountain slope. This implied the Calchaquí villages being separated from the agriculture and collecting areas. Hunting was also practiced in high altitudes where camelid herding also took place, evidenced by posts of temporary use, also made of stone.

Differences on settlement arrangement between the eastern and western bands of Santa María river occurred owing to variations on the provisioning source of raw materials employed for building construction as well as the terrain differences contributed to shape the layout of settlements. These differential patternings led to archaeologists as Tarragó to establish two types of populated centers: *Rincón Chico pattern* corresponds to the western side of the river. In this, buildings extend from the top of the mountain, where metamorphic schists abound, along the slopes and the alluvial fans to reach river floodplain. Stones were disposed vertically as the founding of structures and then stacked horizontally to conform double-lined walls which could be filled with sediments. The thickness of the walls varies between 70 cm and 1.20 m. On the other hand, *Loma Rica pattern* takes place on the eastern side of the river. There, sedimentary conditions resulted in mountains with flat summits, selected by ancient inhabitants for installation. Here slopes lack of the suitable conditions necessary for building, so structures are found at the top of the mountain and at the bottom. Masonry is

constituted by stones with sphere shape. The sites corresponding to Loma Rica pattern are located near to tributaries of the main rivers but not on the valley floor (Tarragó 1995).

Stone buildings were displayed along the landscape isolated or associated with others in variable numbers. The rectangular compounds over the rugged slopes shared the shorter walls, showing a lineal disposal. Assemblies with rectangular shared courtyards are frequent in flat lands on the foothills in Rincon Chico pattern sites while occurring on the hilltops in Loma Rica pattern sites. In Rincon Chico, these courtyards are rectangular with broad dimensions (about 10 × 15 m). Between one and five circular or quadrangular rooms were associated with a courtyard through the presence of openings. Whereas rooms could have been covered completely by roofs, courtyards were surrounded by a gallery held on posts.

Along Cajón valley, the spatial location corresponding to both models inverts: on the eastern side of Cajón river, sites as Famabalasto (Cigliano 1958) correspond to Rincón Chico pattern, whereas on the western side, sites as Loma L'antigo (Bugliani 2012) match with Loma Rica pattern. The nature of the mountainous formations as well as the raw material available for the construction of buildings in these areas has determined the spatial inversion of settlement configurations in comparison with Santa María Valley.

In Calchaquí valley, there is a clear contrast between the localization of settlements during the first phase of Late Intermediate Period, from the subsequent phase: initially, villages were settled at the interior of the tributary streams of the main river, and later population concentrated in bigger settlements along the Calchaquí river (De Marrais 2001: 312; Baldini 2010: 54). These settlements were installed on the low terraces on the limits of crop areas (e.g., Valdez) whereas other compounds (e.g., Borgatta) were established over the alluvial fans next to the rivers and reaching the foothills of the neighboring mountains (De Marrais 2001: 318). The settlements could host more than 200 residential units, with open spaces and a big number of mounds corresponding to mortuary functions and refusal concentrations areas (De Marrais 2001; Baldini 2010).

Sites as Tero, El Churcal, and Molinos I in the Calchaquí valley display a particular constructing technique which consists on digging the surface that will be used as the building's floor and covering with stones the sides of the big pit. The attachment between the compounds generates the effect of double-lined walls (Baldini 2010: 58).

In Tapia-Trancas basin, on the eastern side of Calchaquí peaks and Aconquija Mountain range, archaeological visibility is reduced, and, unlike the semiarid valleys of the west, few researches were made. Nonetheless nearly 20 sites corresponding to this period have been recorded (most of them now sunken under the waters of El Cadillal dam). Most of the sites display ceramic fragments dispersed over the ground, burials, rectangular depressions on the ground with the presence of rocks over the surface, and remnants of cultivated fields (Esparrica 2003). In Zárate, a cemetery was excavated composed by 13 cists with walls made of stone in false dome constituting collective burials, two adults primary burials, and more than 50 Santa María urns which belonged to the phases tricolor, bicolor, and ordinary with maize traces stamped, used for children burial (Esparrica 2003). The housing compounds are located over the hill on the other side to the Acequiones river.

Mortero Hachado is the biggest Santa María site known in Tucumán foothills extending along 40 ha. Burials of adults, primary and secondary, along with the presence of bowls and urns have been recorded.

Most of the abundant cemeteries from the Late Intermediate were excavated massively by researchers, looters, and smugglers during the first decades of the development of Argentine archaeology. In recent times, the cemetery of Rincón Chico 21 has been excavated, and 15 subterranean cists with slab roofs and the same amount of urns for the burial of children, two direct burials, and a charnel house were registered.

Santa María pottery is widely spread along the landscape: from the proximity of the actual city of Salta on the north, to the valley of Belén in the

south, Antofagasta de la Sierra on the west, and Tucumán foothill on the east (Fig. 2). Caviglia defined four areas that correspond to sub-traditions: *Yocavil*, corresponding to the Santa María valley and its adjacent area, Cajón valley on the west and Tafí on the east; *Calchaquí*, corresponding to the homonymous valley; *Valle Arriba*, where the two last mentioned areas merge; and Santa Barbara or *Pampa Grande*, the eastern sector already mentioned.

Interactions among the populations from different valleys have been a matter of interest in recent times. Researchers as Tarragó argue that Tafí valley provided apt lands for cultivation of microtermic species as potatoes and camelid herding exploited directly by communities in the Yocavil valley. Manasse rejects this hypothesis on the grounds that it consists on an aprioristic peripheral role to the Tafí valley (Manasse 2014). The settlements of Late Intermediate in Tafí were isolated rectangular structures in groups till five located along the lowlands. The walls were made of mud with the occasional appearance of stones. Frequently habitations are associated to mounds of variables sizes. These compounds may have been articulated to other structures, generally quadrangular that were employed as enclosures for camelid herding. This kind of structures has been also documented in the mountain range neighboring the valley.

Late Stone Architecture in Santa María Valley

Residential enclosures constitute the most frequent type of structures in late settlements of Calchaquí valleys. They spread out as single or composed units, sharing walls with other enclosures alike or large courtyards denominated "canchones." These compounds lie along the alluvial fans and foothills, while the simple isolated units appear associated in pairs or lineally arranged perpendicular to the gradient of hilltops and slopes.

Courtyards vary from 5 × 10 to 15 × 40 m and may not be completely enclosed. They hold an entrance or two that communicate with the exterior. Several activities such as food processing and manufacturing of pottery and metals took place inside these structures (Tarragó 1995: 227). Connected to this rectangular enclosure are the rest of the rooms. The attached small circular buildings (Fig. 4) with narrow (50 cm) and low (1 m) entrances held storage functions. Other rooms operated as cooking and housing places. In the high altitude herding posts, the assembly of structures (generally corresponding to the circular type) were minimal, probably having the same room the twofold function of housing and cooking.

All openings were narrow (no more of 60 cm length) and surrounded by a wood frame that made the orifice even smaller. The walls were erected using slabs in the side posts displayed vertically as jambs. The lintels were made of big straight slabs. Ramps were used in several cases as a way of access to the compounds. The top of the walls operated as platforms for circulation along the slopes covered by constructions, and content walls were also used to flatten the ground.

Small irregular rooms associated with the compounds could have been used as little storage settings; some of them lacked an entrance.

Housing grounds were formed with the simple use of the surface, although there are cases of floors on live rock over the mountain slopes.

Roofs haven't been preserved in any of the sites known. They were made of branches filled with mud and wicker or could lean over cross-pieces of carob tree. Wooden posts were registered in Quilmes during the late nineteenth century. It is possible that the small circular rooms had conic roofs, suggested by the founding of central settings for hole posts in buildings in Rincon Chico 18 (Tarragó 1995: 227) and El Carmen 1 sites. Rectangular rooms could have counted with shed roofs.

Over the mountain ridges, big slabs of 2 m tall by 1 of width are displayed along the roads of access with a manifest defensive propose (Tarragó 1987: 188). In areas where the preservation is poor, and given the large dimension they can hold, these parapets can mislead the interpretation toward the founding typical slabs of these period walls. The parapets are well articulated with the

walls obstructing the ascent of potential enemies. These walls can be relatively short, as well as those which constitute the limits on the peak sectors. They can also be very high (with 6 m of height) with steps disposed at different levels of the slope (in some cases twisting and articulated with the watchtowers, as in Cerro Mendocino); or they can also be medium height, as in the case of the large walls that avoided the entrance to the populated centers located on the debris cones formed by piled rocks.

Watchtowers were small and circular buildings articulated with the defensive walls along the mountain slopes. They had an entrance opening, and some of them counted with steps formed by protruding slabs. In Cerro Mendocino – the greatest fortress of Santa María valley – pebbles that could have been taken there as projectiles used in the defense of the settlement were found inside these structures (Carrara et al. 1960: 31).

As far as the productive infrastructure is concerned, enclosed yards designated to camelid herding stand out in their different varieties: circular, rectangular, or irregular. They stand out on the high mountain posts, contrasting the small circular structures that worked as shepherd shelters. In the case of the populated centers, these farmyards can be easily confused with the characteristic large courtyards described above. Studies on phosphorous of the sediments inside one medium size enclosure in Morro del Fraile allowed determining its function as a farmyard for camelids in past times (Nastri et al. 2012).

Agriculture was practiced by means of cropping platforms made of lines of stone over the soft gradient slopes, irrigated by channels that extracted and distributed water from the rivers. Attached to these terraces, storage enclosures were located, while the accumulations of rocks as a product of the cleaning of terrain rest in the adjacent parcel. Quilmes dam is the best documented structure in the area for water storage. A ridge that formed semicircular arch was used and continued with a low stone wall to enclose the gap held with the mountain. A narrow small door constituted the opening by which the water flowed through a big orifice made on a rock block. Las Pailas is one of the largest sites documented for agricultural production, embodied by an intricate and well-preserved network of surface and underground irrigation channels (Paez et al. 2012). As well as Quilmes dam system, it is up to be determined whether this structures correspond to the Late Intermediate or to the subsequent Incaic period.

In the settlements of the west band of Santa María river, people harbored a number of orifices for grinding activities, denominated mortars, over plenty of big rock blocks (till 3 m high) that lay dispersed on the floodplain. They were also carved in live rock at the foothills probably for public access.

One of the megalithic rocks which contain mortars and petroglyphs is associated with ritual activities that took place in sector I of the site of Pichao (Fig. 5). This rock is located over the perimeter of a circular mound delimited by short walls of stones with a smaller elevated circle inside, with the same building technique applied. It constitutes a two-level platform in which interior a burial of a 5 year old boy in a Santa María urn from the variety "Valle Arriba" was found, together with beads from a ceramic necklace, malachite, azurite, and bones. There were also isolated animal bones and carbonized seeds and fruits (Tartusi and Nuñez Regueiro 2001: 91–93). The shape of this structure coincides with the descriptions of the indigenous temples given by the chronicler Lozano in middle eighteenth century (Tartusi and Nuñez Regueiro 2001: 97).

There are differences in the construction material used in this structure: white quartz stones were used in the north section, while gray colored ones were used in the rest of the areas. The resource of different color rocks interspersed was employed in diverse settlements of the western band of Santa María valley. The most remarkable example is that of Rincon Chico, where the bonding between the rock disposition and astronomic phenomena has been demonstrated. A plaza at the bottom of the *Puma ravine* embraces a sequence in which rocks of white quartz appear arranged lineally on the upper eastern wall contrasting with the leaden gray slabs of the remnant structure. Half way up the hill, there is a semicircular room built on dark slabs which exhibits two blocks of quartz inserted

Santa María, Geography and Culture of, Fig. 5 Ceremonial mound at Pichao site (Tucumán province)

on each side of the external wall. Finally on the upper sector of the hill, a third structure forming a terrace displays gray slabs, blocks of white quartz, and granitic pink blocks. Right over of the straight line projected from these aligned structures, the sun rises during the summer solstice (Reynoso 2003).

Ultimately, it is important to note the mortuary structures constituted by underground chambers. They can present tiled floors and roofs on false domes made of slabs that stand out off the external sides of the walls. The plan shape of these cists varies from circular, ovoid, or rectangular. In the instances where the cists lack from domed roofs, there are plain slabs as covers instead (Johansson 1996).

Debates Regarding Social Organization During the Late Intermediate Period

Social inequality was a subject of concern since the development of the first investigations about Calchaquí settlements. Lafone Quevedo felt overwhelmed of by what he thought it look like the kingdom of the "Republican equality" when wandering among the remnant buildings of the Quilmes site. Adan Quiroga suggested the existence of specific structures that functioned as a residence for the authorities of La Ventanita site in Fuerte Quemado. Once historical sources from the time of the conquest began to be studied profoundly on first decades of twentieth century, authors began to make projections backward of the scenery provided by the documents in which political fragmentation, internal wars, and an overall background of simple or rudimentary life conditions stand out.

The first approach to social organization based exclusively on archaeological evidence was introduced by Madrazzo and Otonello in 1966, on the basis of the comparison between a vast number of sites registered. The authors came to the conclusion that no solid grounds based on archaeological register could account of specialization or social stratification in the past. At very least there could have been a "rudiment of function specialization" visible by the way of chief housing structures or specific settlements for the performance of religious ceremonies (Madrazo and Otonello 1966: 11).

During 1970s, some researchers began to consider Late Intermediate societies of northwestern Argentina as chiefdoms with a "sociopolitical organization" complexer than that developed by the native populations during the precedent periods in the region (Nuñez Regueiro 1974: 182–183). The idea of the existence of a system or a rank society was discarded; however, the proposal of specialization on the making of goods as textiles and metals gained acceptance. Cigliano and Raffino argued that in Tastil, social differences existed in the form of family lineages (Cigliano and Raffino 1977: 19).

From the second half of 1980, the first results shown by the researches of Yocavil Archaeological Project in Rincon Chico thrown light on the existence of architectural differences at the interior of sector 1, which were interpreted as the material correlate of social differentiation among the residents of the different neighborhoods (Tarragó 1987). The hypothesis that differences on altitudinal location at the interior of the settlements locations had meaning in terms of social status then gained sustainability.

An interest fact to remark is a legal litigation in sixteenth century in which blood nobility is manifest among Calchaquí people, as well as differential economic rights for the chief and his family (Palermo and Boxaidos 1991).

Berberián and Raffino employed the category of chiefdom consistent with the theoretical propositions of Elman Service. According to these approach, there is a power structure in which the chief is on the top, followed by the other social ranks. Years later, analysis carried out on archeometallurgical material recovered from Rincón Chico 15 lead Tarragó and González to put forward the existence of productive specialization sponsored by the dominant elites so as to replicate and increment their power. To achieve this goal, the elites would have manipulated the production, distribution, and use of goods to reproduce the hegemonic ideology (Tarragó and González 1996: 88).

Contrasting to the ideas presented, Nielsen strives for the abandon of the term chiefdom applied to these societies owing to three main difficulties this concept generates: (1) the incapability to account the great variability among the sedentary stateless societies that exhibit inequality and heterogeneity only in incipient grades; (2) its qualifying nature, rather than explanatory, based on stereotypes of ethnographic foundations; and (3) the tendency to employ ethnographic cases to explain problematic facts when archaeology fails to provide an accurate answer (Nielsen 1995: 23).

Aligned with the objective of recovering the variability and originality of the indigenous organizational forms as well as stepping aside the classification of forms of life into an evolutionary scale, the theoretical framework elaborated by Ben Nelson for the study of complexity in North America is taken into account for the Calchaquí case. Nelson argues that instead of determining *how much* complex these societies were, the focus should be set on *how* this complexity was developed (Nastri 1997–1998: 266). In this direction, knowledge about settlement for the western band of Santa María valley was used for the grouping of sites with complementary functionality on bands running transversally to the main river. These groupings could include two population centers, one of bigger dimensions than the other (Nastri 1997–1998; Coll Moritan and Nastri 2015). The question about the kind of exchange networks (defined by Renfrew in the decade of 1970) that took place among the centers belonging to the same settlement pattern (reciprocity and redistribution) and among the social groups represented by distinct settlement patterns along the valley (chain interaction, direct exchange or through emissaries) is to be answered. Countless changes occurred concerning to economic and politic integration during the long time span corresponding to Late Intermediate, Imperial, and Hispanic-indigenous periods (Nastri 1997–1998).

Acuto recovered the interest in the *how much* of the complexity, but divorcing from the perspectives which considered Calchaquí societies positioned at an elevate place into the evolutionary scale, and pointing out the absence of the necessary archaeological evidence to validate these assumptions. He argued that the general circumstances during this period were characterized by a "communal integration," "a symbolic and

material homogeneity," and a "social control and vigilance upon the development of inequality" (Acuto 2007: 75). Nonetheless the author does not provide definitions about these concepts nor supply the material correlate examples to be contrasted by the archaeological evidence. Without any detailed analysis of the materials and their temporal and spatial distribution, absence of evidence is equated by the author to evidence of absence. Finally, Acuto pointed out that Santa María as well as middle and south Catamarca constituted exceptions to the previous propositions of "communal integration"; thus manifesting the alternative position of "fragmentation."

Coll Moritan and Nastri (2015) adopt a relativistic position in which they consider complexity as constituent to all societies. Each of them is original and deserves to be studied in detail through the focus on positive features. This means an interest on actual material findings instead of considering apparent absences of elements included in general classificatory lists. The study of settlement patterns and hierarchies and residential segregation are two ways to approach past social and economic organization. The authors documented the association of populated centers in uneven pairs separated by minor distances than 5 km (Fig. 2). They also recognized the complementary economic functions of the site of Morro del Fraile, located inland mountain range, and the settlements next to the agricultural lands on the bottom of the main valley or in little transversal valleys. This way they pointed out how ancient populations could access the vital subsistence resources. Secondly, the researchers examined the differential distribution of types of walls among diverse sectors of the settlements (Coll Moritan and Nastri 2015: 75), highlighting the existence of sectors where some specific constructing techniques were employed in contrast with the rest of the habitations of the settlement. Apart from the selection of color (preserved in Rincón Chico and also registered in other neighboring populated centers), walls of aligned slabs are disposed presenting a soft uniform surface. This effect can be reach by a previous preparation of the slabs. Experimental studies as well as systematic measurements are required to evaluate the differential distribution of this stylistic architectonic device that may cast light on residential segregation, as what was the case of Rincón Chico.

To summarize, complexity among Late Intermediate societies as well as regional differences constitutes subjects of current investigation. Recent studies on the representation of human figure add another line of evidence to the discussion about Calchaquí social organization and their archaeological indicators.

Santa María Iconography

The existing knowledge of the material depictions displayed by the Late Intermediate societies comes from the study of museum collections constituted as a result of the massive excavation of burials during the last decades of nineteenth and the beginning of twentieth century. Santa María ceramic urns (Fig. 6) and discs, axes (Fig. 7), and bronze bells were the most outstanding items of this early collections. However, the most detailed analysis of mortuary contexts were carried out as a consequence of Muniz Barreto expeditions during 1920s, where a broad spectrum of the material culture from Late Intermediate Period in Santa María valley was recovered. Contextual analysis began in 1950 from the studies of González (1950) and Cigliano (1958) and continues to the present (e.g. Matera 2008). The Santa María urns for the burial of children are complemented by other numerous archaeological findings: the bowls and the big funerary urns for children up to 12 years old, a rich variety of ceramic types (cooking pots and beakers of varying sizes) with or without decoration in different colors or with surfaces crossed by irregular incised lines; ceramic human figurines; mortars, pestles, and stone axes; monoliths representing human figures made of wood or stone; and bronze axes, knives, mittens, bells, shields, anklets, chisels, and tweezers. Where there are good preservation conditions, little basketry bowls and knitted textiles were also found.

The burial urns to which the name of Santa María was first applied are constituted by a body

Santa María, Geography and Culture of, Fig. 6 Santa María funerary Urn (inventory number 87155, Welt Museum Wien, Schreiter collection)

and a neck, with lateral handles on the body segment (Fig. 6). The surfaces are smoothed and present a white covering on which motifs, mainly in black and sometimes also in red, were displayed. As it has been noticed by many researches, there was an intentional rejection to empty spaces inside pictorial fields.

Images displayed on the urns surface are arranged by a twofold disposition demarcated with strips on the sides that conform the limit between the front and the back of the piece. The urn itself constitutes an anthropomorphic metaphor visible on the inflection point between the neck and the body. A contrast as the existing between the human head and thorax is thus accomplished and intensified by the depictions that highlight other human features.

The anthropomorphic being indicated by modeling and painting is known as the "figure of the long eyebrows" (Nastri 2014: 95). Its face is arranged along the neck of the urn and the thorax displayed along the body. There are no clear indications of lower limbs. This basic scheme has an occurrence frequency superior to 90%. Only in 1% of the cases other motifs are displayed on the neck of the urn (as animals by front or profile), and in 5% of the cases, geometrical motifs are

Santa María, Geography and Culture of, Fig. 7 Bronze axe (inventory number 86552, Welt Museum Wien, Odt collection

depicted, similar to those contained in textiles. This last mentioned feature can be indicative of a way of representing the "long eyebrow figure" as a mummy covered its head with clothes (Velandia Jagua 2005: 117–118).

Cephalic masks and ornaments are depicted over the urns on the early phases, and faces with aggressive expressions are characteristic of phases III and IV (Fig. 6). These traits allowed the researchers to associate the "long eyebrow figure" with important political functions, such as those exercised by shamans and warriors (Nastri 2014: 96). The other motifs displayed - snake, rhea, humans, in this order of frequency - are subordinated to the central figure. They are depicted by pairs in the neck or the body of the urn with the exception of toads in phase 0 vessels, where they may appear as the only one figurative motif in the body of the urn. The snakes depicted over the neck of the urns sometimes may represent a cephalic ornament (Nastri 2014: 96), and rheas are displayed as if they were facial paintings of the figure of the long eyebrow. In line with this, a great number of abstract geometric designs in the neck can be interpreted as representation of tattoos.

Imperfect symmetry is a procedure utilized on design patterning. It is constituted by the layout of the motifs in two opposing planes that structure the overall arrangement of the design. The former artisans included deliberately *slight differences* – on shape, type, or quantity of motives – in mirror symmetry between the front and the back as well as in the relationship between the right and left side of each cheek, or body sides that pass unnoticed at first sight. Complementing this mode of representation, the natural asymmetry of human body over a horizontal axis is altered through creation of "artificial" symmetries. As the bottom of the urn is constituted by a bowl, habitually, urns were covered by bowls at the top. A black curved triangle under the arms of the figure of long eyebrows is depicted (Fig. 6) as a procedure that generates a relation of mirror symmetry with the motif disposed over the eyebrows of the personage.

Santa María art pursuits a fusion of identity and difference. Through the use of symmetry, it becomes clear there was an intended purpose to show different objects as if they were similar, and, at the same time, to show things that are similar as if they were different. This elaborated symbolic system is likely to be also constituent of the ceramic group denominated San José. This ceramic group took part in funerary contexts and was present in everyday life during the first moments of Late Intermediate Period (Marchegiani 2008). The study of this style in detail has not been undertaken until recent times (Palamarczuk et al. 2015).

Rock art remained as a regular practice during the Late Intermediate in Calchaquí valleys, represented by paintings or stone engravings with a reduction in the variety of motifs depicted in comparison with earlier times. Caravans of *llamas* stand out (Fig. 8) as well as human depictions wearing clothing or shields. Cerro Cuevas Pintadas in Guachipas (Salta province) constitutes an exceptional case with more than 30 caves and rock shelters with polychrome depictions (Podestá et al. 2005). There, as in Calchaquí valley, the Puna, and north of Chile sites, researchers have documented a symbiosis among the representations of men with shields and axes, as if their referents were exchangeable. The concept of "axe-men" came up owing to these depictions (Montt and Pimentel in Podestá et al. 2013: 86) that exceed the Santa María context to become a mark of the period over a broad area. Santa María ceramic style acquires a remarkable significance on the subject due to the fact that urns collections contain great numbers of human figures for comparison. Several connections can be made among the depictions over ceramics, rock art, and textiles (as differential representations or transpositions of motives). These representations are connected to power relationships given during Late Intermediate and related with groups consolidation processes over territory. Transformations and resignifications of these representations were employed by the Incas to establish their domain over the region (López Campeny and Martel 2014: 47). The two different varieties in the axe-men depictions would correspond to different social functions. "Shielded men" figures would have symbolized political or ritual authorities;

Santa María, Geography and Culture of, Fig. 8 Rock carvings at El Carrizal 5 site (Tucumán province)

while the "T"-shaped human figures would have been linked to the military sphere. Finally, the overlapping motifs corresponding to different temporalities exhibiting an exaggerated size would constitute expressions of resignificance practices destined to the creation and reproduction of the social memory (López Campeny and Martel 2014: 48).

Origins of Late Intermediate Way of Life

The lack of evidences corresponding to the previous centuries before the Late Intermediate led researchers such as Tartusi and Núñez Regueiro to suggest a geographical displacement of the development centers from a period to another. Thus, the formative centers (250 BC–600 BC) of Campo del Pucará would continue throughout the Middle Period -also known as Regional Integration Period - (600–900 AD) along Ambato valley, and finally Santa María valley would acquire prominence during Late Intermediate (Tartusi and Nuñez Regueiro 1987). Fieldworks carried out along the last few decades have begun to provide the necessary elements to complete the local sequences backward and onward on time. Middle to Late Intermediate Period transitional settlements have been identified on different sectors of the valley (Scattolin 2010), and also Middle Period sites without continuity in Late Intermediate Period have been discovered. Bañado Viejo, located in Tucumán province, is a fine example of the latter, where a Middle period component was isolated and named *Colalao phase* by Scattolin (2010). Little is known about architecture and settlement patterning during this time owing to the limited extension of excavated surfaces. And in settlements with components from Middle and Late Intermediate Periods –as Morro de las Espinillas and Morro del Fraile – it results very hard to distinguish accurately the period in which architecture structures were built. At least, it can be pointed out that middle populations located their villages over high topographies, anticipating the Late Intermediate settlement way of life. In Morro del Fraile, the pottery recovered correspond to both Middle and Late Intermediate Periods. In the rock shelter as well as in enclosures located over the slopes,

occupations for both periods were dated (Nastri et al. 2012). It is possible that the transition to Late Intermediate began with occupations on high terrains that continued inhabited over the next period, thus becoming into a characteristic feature of Late Intermediate times.

The Inca Domain

The Incas incorporated the current Argentine Northwest Territory to the Tawantisuyu during the middle fifteenth century, as recorded by Spanish chroniclers and confirmed by radiocarbon dates. Calchaquí valleys were divided into two different provinces of the Collasuyu: *Chicoana* and *Quire Quire* (Tarragó 1984; Lorandi 2000; Williams 2004). The Inca domain in South Andes was based on the setting up of fortresses along the boundaries; the organization of state enclaves along the main road and secondary routes; the intensification of agropastoral, mining, and crafts activities; and the building of a network of sanctuaries at the peak of mountains as a way of appropriation of the religious local traditions previous to the Inca conquest (Williams 2004: 210).

When it comes to the establishment of government centers, the Incas built imperial compounds where no local settlements of Late Intermediate societies were previously erected. When populated settlements existed, Incas occupied limited sectors inside them. Lorandi considers that Inca domain on northwestern societies took place throughout *mitimaes* communities (foreign populations introduced in the area by the conquerors) that produced for the Inca. This implies that many of the local communities included along the conquested area might have never paid tribute to the Tawantisuyu (Lorandi 2000: 292). Williams points out that differences among the varieties of Inca settlements can be interpreted as expressions of different kinds of Inca domination: direct or interceded by the local elites. Thus the Inca marks over the landscape are in correspondence with the varying modes in which the state power associated with local populations (Williams 2004).

In Santa María valley, La Ventanita, located on Fuerte Quemado, constitutes an accurate example of a setting where local population included a specific sector for Inca administration. Williams (2004) considers that the site functioned as an imperial post. La Paya, in middle sector of Calchaquí valley, proportionates a similar case, though reduced to a unique compound constructed with clear Inca architectural technique: the red house (Williams 2004: 221; De Marrais 2001: 333). Not far from these sites, Guitian is a good example of a mix site (Inca-local) where the Inca sectors present wider dimensions, with a *kallanka* (big state house) clearly defined (Williams 2004: 221).

Among the entirely Inca sites, Potrero de Payogasta and Cortaderas stand out on the north of Calchaquí valley; Fuerte Tacuil in a lateral valley connected to Calchaquí and Punta de Balasto on the south end of Santa María valley are also remnants of exclusive Inca settlements (De Marrais 2001: 334–335; Williams 2004).

The objects that indicate the Inca presence in the region are the *duck-dishes* and the *aryballos* vessel type. These items presented a display of Incaic designs, but studies in the clays evidenced they were produced with techniques that corresponded with local traditions (Páez and Sardi 2014). Other northwestern ceramic styles that accompany Inca styles are Famabalasto black on red and polychrome Yocavil from Santiago del Estero, or the black on red urns where Belén and Santa María features were mixed (Marchegiani et al. 2009).

Hispanic Indigenous Contact

From the first entrance of Spaniards to Calchaquí region in 1535, conflicts between the newcomers and the inhabitants of the area took place. In 1557, the colonial authorities of Chile extended the occupation of the territory, capturing and then releasing the prominent leader that would give the name to the region: Juan Calchaquí, chief of Tolombón (Lorandi 2000). This authority led the destruction of the city of *Córdoba de Calchaquí* in 1562. Despite de indigenous resistance,

conquerors persisted with determination to take over the territories, subjecting the local populations to their personal requirements.

Between 1630 and 1643, the first generalized indigenous rebellion took place and was mitigated by a forced relocation of a great part of the communities away from their homeland. Thus, between 1643 and 1658, Jesuitical residences were re-established until the last outburst in 1659, commanded by the Andalusian impostor Pedro Bohorquez, who impersonated as the Inca king was accepted as leader by Calchaquí groups. The Spaniard governor Mercado and Villacorta needed to organise three military campaigns to subjugate the indigenous tribes permanently. The utmost resistance was carried out by the *Quilmes*, *Acalines*, and *Anghinhaos* and mitigated by the massive banishment of these populations to Buenos Aires, where they subsisted in a reduction for some time (Palermo and Boxaidos 1991). This way, Colonial period in the Calchaquí valleys did not begin until 1666 (Tarragó 1984).

Several testimonies related to settlement occupations and cemeteries from Hispanic-indigenous period account of a time span comparable in duration, to that of Inca domain. From this period, cemeteries as Caspinchango and Pichao in Santa María valley and Cachi Adentro in Calchaquí valley were registered (Tarragó 1984; Johansson 1996; Matera 2008). In Caspinchango cemetery, a Hispanic-indigenous context was isolated for the first time. The name of this location also refers to a group of ceramics with specific motifs and a characteristic form (cooking pots with foot) that perform as a diagnostic chronological indicator. According to the recent re-examination carried out by Matera, seven different kinds of burials existed, always located near cultivated fields and constituted by (1) grave goods with no association to particular individuals, (2) urns for the burial of children, (3) direct individual burials with no protection, (4) burials of individuals protected by stones that officiate as roofs, (5) pits with adjoining chambers, (6) cists or cylinder chambers with roofs on false domes and walls made of stone, and (7) urns inside rock structures (Matera 2008: 239–240).

In Amancay cemetery, located in Pichao, the burial patterning is constrained to two varieties: cists and ground burials. Inside the cists – which plan can be circular or rectangular – the presence of till 14 individuals of both sexes was registered inside a single structure (mainly adults but also young persons) together with pieces of objects made of iron, copper (bracelets), textiles, and glass beads along with ceramic recipients. Within a single structure, primary and secondary burials coexisted. The singular case of a direct burial was comprised by a single adult with grave goods alike the cist described above (Johansson 1996: 114–118).

In Cachi Adentro burials are individual, conformed by pits with lateral chambers, something exceptional along southern Andes (Tarragó 1984: 152).The graves for children, of smaller dimensions, are located between adult graves, containing under no circumstances burials in funerary urns. Among burial goods there were ceramic cooking pots with food remains and covered with bowls with their concave side up, attached to the mouths of the cooking pots with mud. Piles of bowls were displayed containing the ones on the top rests of food, bone arrowheads, or bundles of sticks. Occasionally these grave goods were complemented by spearheads, arrow shafts, objects of iron and copper, glass necklaces, arrows, and ochre (Tarragó 1984: 153). Other objects of European origin found inside some of the graves in Cachi Adentro are cow horns, chicken eggs, a belt buckle, and textiles (Tarragó 1984: 154).

In rock art depictions, the equestrian figure marks a clear chronological indicator. A rider on his horse leads a group of *llamas* – probably portrayed during pre-Columbian times and repainted during Hispanic-indigenous times – on Las Planchadas rock shelter, located in Guachipas, Salta province (Podestá et al. 2005: 45).

Archaeological Heritage and the Current Re-emergence of Indigenous Identities

Calchaquí wars shaped an empty remaining space caused by the banishment of local societies that soon began to repopulate the area under the *encomienda* system. This way some native people were sent back to work on plantations as well as indigenous that escaped from Tucumán returned

to their former territories. The valleys also received indigenous peoples proceeding from some other South Andean localities, as in the case of populations from Atacama (Lorandi 2000: 322–333; Rodríguez 2008).

Nowadays, a revival identity process began to emerge after a sustained rejection of indigenous traditions, embodied by resistance mobilizations that took place during 1960s and 1970s. Neoliberal policies along the 1990s caused the weakening of Argentine government power propelling empowerment processes then fostered by national administrations between the 2000s and the first half of 2010s.

"La Ventanita" site of Fuerte Quemado can be taken as an enlightening example of the gestation of the identity processes in Santa María valley. On the top of the hill, a door or a window frame made of stones stands out on the landscape attracting many visitors especially for the celebration of *Inti Raymi*, the *quechua* ritual carried out on the winter solstice. The construction of this landmark is attributed to the ancestors. Archaeological fieldwork allows sustaining that it was built over the founding of an ancient structure in early twentieth century that might have worked in pre-Columbian times as a solar clock. La Ventanita has become over the last decades into a symbol widely spread along Santa María urban architecture. Also public monuments inspired by the well-known Santa María funerary urns were erected, and each day more building projects are constructed according to indigenous methods. Combined techniques and designs belonging to indigenous, colonial, and peasant traditions are displayed along the landscape of the region, mainly in the localities of Amaicha del Valle and Colalao del Valle (Tucumán), Santa María (Catamarca province).

Transformations of the urban landscape inspired by the indigenous traditions take place parallel to the claims for the restitution of ancestral lands.

References

Acuto, F. 2007. Fragmentación vs. integración comunal: Repensando el Período Tardío del Noroeste Argentino. *Estudios Atacameños* 34: 71–95.

Baldini, L. 2010. El espacio cotidiano. Las casas prehispánicas tardías en el Valle Calchaquí, Salta. In *El Hábitat Prehispánico*, ed. M. Albeck, M. Scattolin, and M. Korstanje, 53–114. Jujuy: Ediunju.

Bugliani, M. 2012. Loma L'antigo: consideraciones sobre la arquitectura de un poblado tardío en el valle del Cajón (Catamarca, Argentina). *Comechingonia* 16: 71–84.

Cantarelli, V., D. Rampa, and M. Grattone. 2014. Dos sitios de altura en la Sierra del Cajón. El estado actual de las investigaciones en la Localidad Arqueológica de Pichanal, provincia de Catamarca. *La Zaranda de Ideas* 10 (1): 9–28.

Carrara, M., A. Lorandi, S. Renard, and M. Tarragó. 1960. Punta de Balasto. In *Investigaciones arqueológicas en el valle de Santa María*, ed. E. Cigliano, 13–41. Rosario: Universidad Nacional del Litoral.

Cigliano, E. 1958. Arqueologia de la zona de Famabalasto. Departamento de Santa Maria (Provincia de Catamarca). *Revista del Museo de La Plata (Nueva Serie)* 5 (24 antropologia): 29–122.

Cigliano, E., and R. Raffino. 1977. Un modelo de poblamiento en el N.O. argentino. Período de los desarrollos regionales. In *Obra del centenario del Museo de La Plata*, 1–25. La Plata: Universidad Nacional de La Plata.

Coll Moritan, V., and J. Nastri. 2015. Organización social y asentamientos intermedio tardíos en el valle de Santa María: Problemas y vías de análisis. *Arqueología* 21 (Dossier): 67–87.

De Marrais, E. 2001. La arqueología del Norte del Valle Calchaquí. In *Historia Argentina Prehispánica*, ed. E. Berberián and A. Nielsen, 289–346. Córdoba: Brujas.

Esparrica, H. 2003. Estado actual de las investigaciones arqueológicas en el área de la comuna de San Pedro de Colalao, Tucumán Argentina. *Anales N.E.* 6: 241–271.

González, A. R. 1950. Contextos culturales y cronología relativa en el área central del Noroeste argentino. *Ciencia Nueva* 1:11–37.

González, A., and J. Pérez. 1972. *Argentina indígena. Vísperas de la conquista*. Buenos Aires: Paidós.

Johansson, N. 1996. *Burials and society*. Gothenburg: Goteborg University.

López Campeny, S., and A. Martel. 2014. La vestimenta del poder. Comparando los registros textil y rupestre en el noroeste de Argentina (siglos XIII a XV). *Relaciones de la Sociedad Argentina de Antropología* XXXIX (1, enero-junio): 21–55.

Lorandi, A. 2000. Las rebeliones indígenas. In *Nueva Historia Argentina, vol. 2 "La sociedad colonial"*. Buenos Aires: Sudamericana.

Madrazo, G., and M. Otonello. 1966. *Tipos de instalación prehispánica en la región de la Puna y su Borde*, Monografías 1. Olavarría: Museo Etnográfico Municipal Dámaso Arce.

Manasse, B. 2014. Hacia el oriente de la región valliserrana: historia diaguita de Tafí del Valle, Tucumán. *Arqueología* 20 Dossier: 217–239.

Marchegiani, M. 2008. Estilo y cronología. Los cambios en la cerámica funeraria de Rincón Chico entre los siglos X y XVII DC. In *Estudios arqueológicos en Yocavil*, ed. M. Tarrago and L. González, 127–176.

Buenos Aires: Asociación de Amigos del Museo Etnográfico.

Marchegiani, M., V. Palamarczuk, and A. Reynoso. 2009. Las urnas negro sobre rojo tardías de Yocavil (Noroeste Argentino). Reflexiones en torno al estilo. *Boletín del Museo Chileno de Arte Precolombino* 14 (1): 69–98.

Matera, S. 2008. Ochenta años después: una revisión de las prácticas mortuorias en el valle de Caspinchango, Catamarca. In *Estudios arqueológicos en Yocavil*, ed. M. Tarragó and L. González, 225–276. Buenos Aires: Asociación de Amigos del Museo Etnográfico.

Nastri, J. 1997–1998. Patrones de asentamiento prehispánicos tardíos en el sudoeste del valle de Santa María (noroeste argentino) *Relaciones de la Sociedad Argentina de Antropología* 22–23:247–270.

Nastri, J. 2014. Territorios de significación. La variación estilística calchaquí y sus implicancias sociales. In *Las Tierras Altas del Área Centro Sur Andina entre el 1000 y el 1600 D.C. TANOA II*, ed. M. Albeck, M. Ruiz, and B. Cremonte, 89–120. Jujuy: Ediunju.

Nastri, J., V. Coll Moritan, and C. Belotti López de Medina. 2012. El Intermedio Tardío en la Sierra del Cajón (provincia de Catamarca). Avance de las investigaciones en Morro del Fraile. *Estudios sociales del NOA/nueva serie* 12: 81–110.

Nielsen, A. 1995. El pensamiento tipológico como obstáculo para la arqueología de los procesos de evolución en sociedades sin estado. *Comechingonia* 8: 21–46.

Núñez Regueiro, V. 1974. Conceptos instrumentales y marco teórico en relación al análisis del desarrollo cultural del Noroeste argentino. *Revista del Instituto de antropología* 5: 169–191.

Páez, M., and M. Sardi. 2014. Changes in pottery production under Inca rule in a frontier site in the Tafí Valley, Argentina: A mineralogical analysis. *Ñawpa Pacha* 34 (1): 61–78.

Páez, M., M. Giovannetti, and R. Raffino. 2012. Las Pailas. Nuevos aportes para la comprensión de la agricultura prehispánica en el valle Calchaquí Norte. *Revista Española de Antropología Americana* 42 (2): 339–357.

Palamarczuk, V., A. Álvarez Larrain, and M. Grimoldi. 2015. Repensando una época. Aproximación semiótica a los estilos alfareros de inicios del período tardío en Yocavil por medio del caso "Lorohuasi". *Boletín del Museo Chileno de Arte Precolombino* 20 (2): 23–55.

Palermo, M., and R. Boixadós. 1991. Transformaciones en una comunidad desnaturalizada: los Quilmes, del valle Calchaquí a Buenos Aires. *Anuario IEHS* 6: 13–42.

Podestá, M., D. Rolandi, and M. Proaño. 2005. *El Arte Rupestre de Argentina Indígena. Noroeste*. Buenos Aires: Academia Nacional de la Historia.

Podestá, M., D. Rolandi, M. Santoni, A. Re, P. Falchi, A. Torres, and G. Romero. 2013. Poder y prestigio en los andes Centro-Sur. Una visión a través de las pinturas de escutiformes en Guachipas (Noroeste argentino). *Boletín del Museo Chileno de Arte Precolombino* 18 (2): 63–88.

Reynoso, A. 2003. Arqueoastronomía en Rincón Chico (Catamarca, Argentina): monumentos del tiempo, monumentos de encuentro en el valle de Yocavil. *Anales* 6: 127–162.

Rodríguez, L. 2008. *Después de las desnaturalizaciones*. Buenos Aires: Antropofagia.

Scatttolin, M. 2010. La organización del habitat precalchaqui (500 a.C.-1000 d.C.). In *El hábitat prehispánico*, ed. M. Albeck, M. Scattolin, and M. Korstanje. Jujuy: Ediunju.

Tarragó, M. 1984. El contacto hispano-indígena: la Provincia de Chicoana. *Runa* 14: 145–185, Buenos Aires.

Tarragó, M. 1987. Sociedad y sistema de asentamiento en Yocavil. *Cuadernos del Instituto Nacional de Antropología* 12: 179–196.

Tarragó, M. 1995. Desarrollo regional en Yocavil. Una estrategia de investigación. *Hombre y Desierto* 9: 225–245.

Tarragó, M., and L. González. 1996. Producción especializada y diferenciación social en el sur del valle de Yocavil. *Anales de Arqueología y Etnología* 50 (51): 85–108.

Tartusi¸ M. and V. Nuñez Regueiro 1987. Aproximación al estudio del área pedemontana de Sudamérica. *Cuadernos Instituto Nacional de Antropología, 12*, 126–160.

Tartusi, M., and V. Nuñez Regueiro. 2001. Excavación de la unidad 6 del sector I del sitio STucTav 5 (El Pichao). In *Investigations at Pichao. Introduction to studies in the Santa Maria Valley, Northwestern Argentina*, BAR international series, ed. L. Bengtsson, P. Cornell, N. Johansson, and S. Sjódin, vol. 978, 85–100. BAR Publishing, Oxford.

Velandia Jagua, C. 2005. *Iconografía funeraria en la cultura arqueológica de Santa María, Argentina*. Olavarría: Incuapa.

Williams, V. 2004. Poder estatal y cultura material en el Kollasuyu. *Boletín de Arqueología PUCP* 8: 209–245.

Further Reading

Cornell, P., and P. Stenborg, eds. 2003. *Local, regional, global: prehistoria, protohistoria e historia en los Valles Calchaquíes*. Gothenburg: Universidad de Göteborg.

Greco, C. 2014. La cronología del valle de Yocavil. Escalas, datos y resultados. *Arqueología* 20 Dossier: 11–37.

Ledesma, R. 2015. Las estructuras funerarias prehispánicas en Cafayate (Salta). Estudio de territorialidad por medio de marcadores gráficos. *Mundo de Antes* 9: 169–192.

López, M., ed. 2015. *Arqueología y paleontología de la provincia de Catamarca*. Buenos Aires: Fundación Azara.

Nastri, J. 2014. Investigadores, habitantes y restos arqueológicos. In *Multivocalidad y activaciones patrimoniales en arqueología. Una perspectiva desde Sudamérica*, ed. M.C. Rivolta, M. Montenegro, L. Menezes Ferreira, and J. Nastri, 257–285. Buenos Aires: Fundación Azara.

Nastri, J., and L. Stern Gelman. 2011. Lo mismo, lo otro, lo análogo. Cosmologías indígenas y construcción histórica a partir del registro iconográfico. *Boletín del Museo Chileno de Arte Precolombino* 16 (2): 27–48.

Raffino, R. 1988. *Poblaciones Indígenas en Argentina*. Buenos Aires: TEA.

Tarragó, M. 2000. Chacras y pucara. Desarrollos sociales tardíos. In *Nueva Historia Argentina*, vol. 1, 257–300. Buenos Aires: Sudamericana.

Tarragó, M., and L. González, eds. 2008. *Estudios arqueológicos en Yocavil*. Buenos Aires: Asociación de Amigos del Museo Etnográfico.

Williams, V. 2010. El uso del espacio a nivel estatal en el sur del Tawantinsuyu. In *El Hábitat Prehispánico*, ed. M. Albeck, M. Scattolin, and M. Korstanje, 77–114. Jujuy: Ediunju.

Santoro, Calogero M.

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Basic Biographical Information

Calogero Santoro (Fig. 1) was born in 1953 in Antofagasta in Northern Chile, and when he was a teenager, he moved with his family to live in Calama, both cities located in the Atacama Desert. The experience of growing up in this uniquely hyper-arid landscape was a key to the passion he developed in later life, for researching the societies that had inhabited this harsh environment in the past.

In Calama, Calogero attended public elementary and high school and became familiar with the traditions of the indigenous Atacameño people. In this diverse cultural atmosphere, he remembers listening to public talks given by the pioneer archaeologists Father Gustavo Le Paige and Lautaro Núñez late in the 1960s, which fired his interest in the science of archaeological discovery.

In 1972, he entered the archaeology undergraduate program at Universidad del Norte in Antofagasta. Two years later, he was invited to participate in the Field Restauration Archaeological Project at Orongo ceremonial center, in Easter Island, directed by William Mulloy. This led him to discover the importance of rigorous long-term field studies and collaborative teamwork in archaeology. Four years later, in 1976 and while only 23 years old, Calogero became a faculty member of the Universidad del Norte, converted later in Universidad de Tarapacá.

Calogero obtained his bachelor's degree in 1980, which included preparing a dissertation on the formative period burial site of Azapa-71. Motivated to improve his archaeological knowledge, he applied successfully for a Fulbright Fellowship, for a master's Program at Cornell University in the United States. He moved there in 1985 with his two young daughters. Tom Lynch guided his master's thesis, focused on the archaic high Andean occupations of northernmost Chile.

Between 1987 and 1991, and with the support of FONDECYT (the main program of the Chilean Science Foundation), Santoro collaborated with specialists in paleoecology and paleobotany and with Marvin Allison, who was undertaking paleopathological studies on how social patterns played a role in health conditions of pre-Columbian societies. Subsequently, he undertook his doctoral studies at the University of Pittsburgh, funded by the Heinz Foundation under the supervision of Marc Berman. His thesis, focused on characterizing and explaining how local societies from a coastal valley of Northern Chile interacted with larger central Andes polities, like Tiwanaku and Inka states, has been recently published as a book (Santoro 2016).

Today, Calogero Santoro is a full professor at the Instituto de Alta Investigación, which is for senior academics from the Universidad de Tarapacá. In 2010 Calogero created the Laboratory of Archaeology and Paleoenvironment at this institute, where several graduate and postgraduate students, as well as senior researchers from both disciplines, undertake a range of research on the past cultures and environments of the Atacama Desert.

From 1989 to 2013, Calogero was the editor of Chungara Revista de Antropología Chilena, which is an internationally highly regarded peer-

Santoro, Calogero M., Fig. 1 Calogero M. Santoro at the National Museum of Australia, Canberra, 2007. (Photo courtesy of George Serras)

reviewed journal for American archaeology and anthropology. From 2002 to 2011, Professor Santoro was the scientific director of the Research Center for Desert People in Arica, Chile, which he helped to form.

Major Accomplishments

The bachelor thesis of Calogero, with the advice of Lautaro Núñez, led to a longer-term study of a pre-Columbian funerary site with more than 400 burials, which was supported by a National Geographic fund granted to Marvin Allison. The results were summarized in three journal papers and several presentations at national and international conferences (Santoro 1981). Simultaneously, Santoro initiated a project on the "Highland Archaeology of Northernmost Chile" which focused on the adaptations of prehistoric hunter-gatherers in the high Andes and their rock art (Santoro and Dauelsberg 1985). In the course of this pioneer fieldwork, several archaeological sites were discovered in the high Andes dating to the Early, Middle, and Late Archaic (Fig. 2). Prior to this field research, it was thought that early prehistoric populations may not have inhabited these high-altitude environments. The critical and in-depth analysis of these localities was the basis for his master's thesis, which was subsequently transformed into one of his most frequently quoted papers on the Archaic period in the high Andes (Santoro and Núñez 1987). In this interdisciplinary paper, which used paleoenvironmental and ecological data, ethnographic information, and archaeological evidence, Calogero established an interpretative model that is still used for reconstructing the mobility of the Andean hunter-gatherers of the dry puna (Osorio et al. 2017).

The cutting-edge interdisciplinary and methodological approaches used in this study have been characteristic of all his work, from his field research on the earliest peopling of the Atacama Desert (Santoro and Latorre 2009), to his studies of longer-term cultural processes among hunter-gatherer societies, to his research on the development of later prehistoric farming societies through to his work on the Inka period (Santoro et al. 2017; Santoro and Uribe 2018). In his scientific studies, Santoro has explored all the ecological zones of northernmost Chile, and this has involved a wide range of methodological and theoretical approaches and working with different archaeological data sets including lithic, pottery, botanical, faunal and human remains, ethnohistorical data, textiles, and rock art. This last topic has been undertaken in collaboration with his partner Daniela Valenzuela.

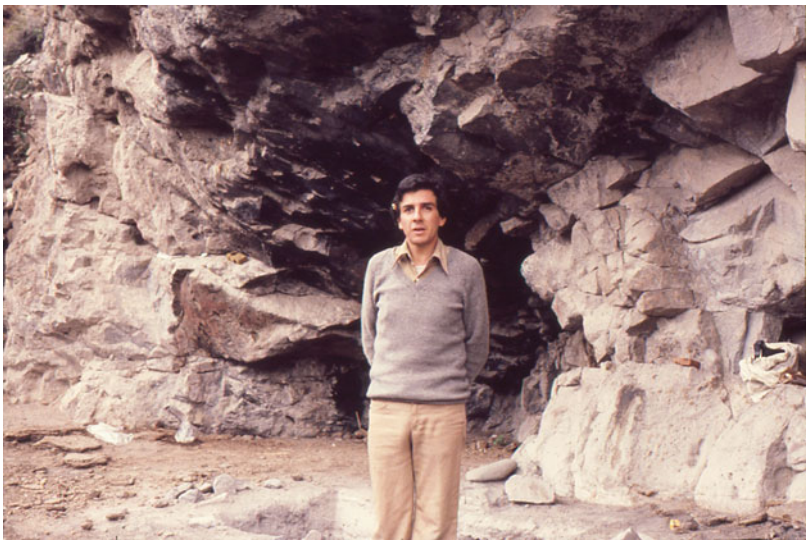

Santoro, Calogero M., Fig. 2 Calogero in the rock shelter Puxuma, one of the archaic sites founded during his highland project, at the end of the 1970s

Calogero has been supported by grants from the National Geographic, FONDECYT, the Wenner Green Foundation, PAGES (Past Global Chances), Fundación Andes, CONICYT (Chilean National Science Foundation), FONDART (National Art Foundation), and Mecesup (Education Ministry of Chile). He has also received fellowships from the Fulbright and Heinz Foundations, the National Museum of Natural History in Washington, DC, the American Museum of Natural History in New York, Dumbarton Oaks, the Endeavor Award from Australia, and the Chaire des Amériques of L'universite Rennes 2 in France.

His scientific productivity has been linked with a strong commitment to share and update archaeological knowledge through working with new generations of young professionals as well as senior colleagues from different parts of the world in the Americas, Europe, and Australia. His aspiration has been to use archaeological science as a context for flourishing international collaboration and friendship as well as for developments in archaeological research and understanding. This aim has taken him to participate in fieldworks in different regions of Chile including lately Patagonia, as well as Central Australia, South Africa, and Namib Deserts. He has advised graduate students and taught at universities of Argentina, Bolivia, Peru, Australia, the United States, and France.

In his fieldwork and academic activities, Calogero has strived to involve the indigenous communities of Northern Chile in the reconstruction of the past. He has offered talks and courses on the prehistory of the Andes and Atacama Desert to the general public, to archaeological tour guides, to school and university students, as well as to local indigenous communities (Fig. 3). He has always been willing to contribute to local and national newspapers and radio shows, in order to build a bridge between the latest scientific research and broader society. He has collaborated with television programs on the Discovery Channel, the National Geographic, BBC, La Tierra en que Vivimos, Al Sur del Mundo, and Catalyst of Australia, among others. These have been instrumental in highlighting Northern Chile as an area where interdisciplinary scientific teams have reconstructed long-term developments through prehistory in this unique region of South America. This includes evidence of the world's earliest

Santoro, Calogero M., Fig. 3 Calogero giving a public talk in the archaeological site Pukara Copaquilla, in 2003

human artificial mummification in the context of the Chinchorro culture of northern coastal Chile (Santoro et al. 2012; Standen et al. 2014).

Cross-References

► Inca State and Empire Formation

References

Osorio, Daniela, James Steele, Marcela Sepúlveda, Eugenia M. Gayo, Jose Capriles, Katherine Herrera, Paula C. Ugalde, Ricardo De Pol-Holz, Claudio Latorre, and Calogero M. Santoro. 2017. The dry Puna as an ecological megapatch and the peopling of South America: Technology, mobility, and the development of a late Pleistocene/early Holocene Andean hunter-gatherer tradition in northern Chile. *Quaternary International* 461: 41–53.

Santoro, Calogero Mauricio. 1981. Formativo temprano en el extremo norte de Chile. *Chungara Revista de Antropologia Chilena* 8: 33–62.

Santoro, Calogero Mauricio. 2016. *Late prehistoric regional interaction and social change in a Coastal Valley of Northern Chile*, BAR International Series 2823. Oxford: BAR Publishing.

Santoro, Calogero Mauricio and Percy Dauelsberg. 1985. Identificación de indicadores tempo-culturales en el arte rupestre del extremo norte de Chile. In *Estudios en arte rupestre. Primeras jornadas de arte y arqueología*, ed C. Aldunate, J. Berneguer and V. Castro, 69–86. Santiago: Museo Chileno de Arte Precolombino.

Santoro, Calogero Mauricio, and Claudio Latorre. 2009. Propuesta metodológica interdisciplinaria para poblamientos humanos Pleistoceno tardío/Holoceno temprano, precordillera de Arica, Desierto de Atacama Norte. *Andes, Boletín del Centro de Estudios Precolombinos de la Universidad de Varsovia* 7: 13–35.

Santoro, Calogero Mauricio, and Lautaro Núñez. 1987. Hunters of the dry puna and salt puna in the northern Chile. *Andean Past* 1: 57–110.

Santoro, Calogero Mauricio, and Mauricio Uribe. 2018. Inca imperial colonization and ethnicity of Northern Chile. In *The Oxford handbook of the Inca*, ed. Sonia Alconini and Alan Covey. Oxford: Oxford University Press.

Santoro, Calogero Mauricio, Marcelo Rivadeneira, Claudio Latorre, Francisco Rothhammer and Vivien Standen. 2012. Rise and decline of Chinchorro sacred landscape along the hyperarid coast of the Atacama Desert. Chungara Revista de Antropologia Chilena 44(4):637–653

Santoro, Calogero Mauricio, José Capriles, Eugenia M. Gayo, María Eugenia de Porras, Antonio Maldonado, Vivien G. Standen, Claudio Latorre, Victoria Castro, Dante Angelo, Virginia McRostie, Mauricio Uribe, Daniela Valenzuela, Paula C. Ugalde, and Pablo A. Marquett. 2017. Continuities and discontinuities in the socio environmental systems of the Atacama Desert during the last 13,000 years. *Journal of Anthropological Archaeology* 46: 28–39.

Standen, Vivien G., Bernardo T. Arriaza, and Calogero M. Santoro. 2014. Chinchorro mortuary practices on infants: Northern Chile (Archaic period BP 7000–3600). In *Tracing childhood: Bioarchaeological investigations of early lives in antiquity*, ed. Jennifer L. Thompson, Marta P. Alfonso-Durruty, and John J. Crandall, 58–74. Gainsville: University Press of Florida.

Further Readings

Alan, Williams, Calogero M. Santoro, Michael A. Smith, and Claudio Latorre. 2008. The impact of ENSO in the Atacama Desert and Australian arid zone: Exploratory time-series analysis of archaeological records. *Chungara Revista de Antropología Chilena* 40 special number: 245–259.

Arriaza, Bernardo T., Vivien G. Standen, Vicky Cassman, and Calogero M. Santoro. 2008. Chinchorro culture: Pioneers of the coast of the Atacama Desert. In *Handbook of South American archaeology*, ed. H. Silverman and W.H. Isbell, 45–58. New York: Springer.

Dorsey Vinton, S., Linda Perry, Karl J. Reinhard, Calogero M. Santoro, and Isabel Teixeira-Santos. 2009. Impact of empire expansion on household diet: The Inka in northern Chile's Atacama Desert. *PLoS One* 4 (11): e8069.

Gayo, Eugenia M., Claudio Latorre, Teresa E. Jordan, Peter L. Nester, Sergio A. Estay, Karla F. Ojeda, and Calogero M. Santoro. 2012. Late Quaternary hydrological and ecological change in the hyperarid core of the northern Atacama Desert (21°). *Earth Science Reviews* 113: 120–140.

Grosjean, Martin, Calogero M. Santoro, Lonnie G. Thompson, Lautaro Núñez, and Vivien G. Standen. 2007. Mid-Holocene climate and cultural change in the south-central Andes. In *Climate change and cultural dynamics a global perspective on mid-Holocene transitions*, ed. D. Anderson, K. Maasch, and D. Sandweiss, 51–115. San Diego: Academic.

Latorre, C., C.M. Santoro, Paula C. Ugalde, Eugenia M. Gayo, Daniela Osorio, Carolina Salas-Egaña, Ricardo De Pol-Holz, Delphine Joly, and Jason Rech. 2013. Late Pleistocene human occupation of the hyperarid core in the Atacama Desert, northern Chile. *Quaternary Science Reviews* 77 (1): 19–30.

Marquet, P.A., Calogero M. Santoro, Claudio Latorre, Vivien G. Standen, Sebastián R. Abades, Mauricio M. Rivadeneira, Bernardo Arriaza, and Michael E. Hochberg. 2012. Emergence of social complexity among coastal hunter-gatherers in the Atacama Desert of northern Chile. *PNAS* 109 (37): 14754–14760.

Mauricio, Rivadeneira, Calogero M. Santoro, and Pablo A. Marquet. 2010. Reconstructing the history of human impacts on coastal biodiversity in Chile: Constraints and opportunities. *Aquatic Conservation: Marine and Freshwater Ecosystems* 20: 74–82.

Núñez, Lautaro, and Calogero M. Santoro. 2011. El tránsito Arcaico-Formativo en la circumpuna y valles occidentales del Centro Sur Andino: hacia los cambios "neolíticos". *Chungara Revista de Antropología Chilena* 43: 487–531.

Osorio, Daniela, José M. Capriles, Paula C. Ugalde, Katherine A. Herrera, Marcela Sepúlveda, Eugenia M. Gayo, Claudio Latorre, Donald Jackson, Ricardo De Pol-Holz, and Calogero M. Santoro. 2017. Hunter-gatherer mobility strategies in the high Andes of Northern Chile during the Late Pleistocene-early Holocene transition (ca. 11,500–9500 CAL B.P.). *Journal of Field Archaeology* 43 (3): 228–240.

Rothhammer, Francisco, Mauricio Moraga, and Calogero M. Santoro. 2010. Origen de los Changos. Análisis de ADNmt antiguo sugiere descendencia de pescadores de la Cultura Chinchorro (7.900 ? 4.000 A.P.). *Revista Médica de Chile* 138: 251–256.

Santoro, Calogero M., Veronica Williams, Daniela Valenzuela, Álvaro Romero, and Vivien G. Standen. 2010a. An archaeological perspective on the Inka provincial administration from the south central Andes. In *Distant provinces in the Inka empire: Toward a deeper understanding of Inka imperialism*, ed. M.A. Malpass and S. Alconini, 44–74. Iowa City: University of Iowa Press.

Santoro, Calogero M., Tom D. Dillehay, Jorge Hidalgo, Daniela Valenzuela, Álvaro L. Romero G., Francisco Rothhammer, and Vivien G. Standen. 2010b. Revisita al Tercer Caso de verticalidad de Murra en la costa de los Andes Centrales y Centro Sur. *Chungara Revista de Antropología Chilena* 42: 321–336.

Santoro, Calogero M., Daniela Osorio, Paula C. Ugalde, Marcela Sepúlveda, Isabel Cartajena, Vivien G. Standen, Eugenia M. Gayo, Antonio Maldonado, Mauricio Rivadeneira, Claudio Latorre, Bernardo T. Arriaza, Francisco Rothhammer, Patricio de Souza, Carlos Carrasco, and Lautaro Núñez. 2016. Cazadores, recolectores y pescadores arcaicos del Desierto de Atacama. Entre el Pacífico y los Andes, Norte de Chile (ca. 10.000–3.700 años a.p.). In *Prehistoria de Chile*, ed. M. Uribe and F. Falabella, 117–180. Santiago: Ed. Andrés Bello.

Standen, Vivien G., Bernardo T. Arriaza, Calogero M. Santoro, Álvaro Romero, and Francisco Rothhammer. 2010. Perimortem trauma in the Atacama Desert and social violence during the late formative period (2500–1700 years BP). *International Journal of Osteoarchaeology* 20 (6): 693–707.

Valenzuela, Daniela, Calogero M. Santoro, and Luis Briones. 2011. Arte Rupestre, tráfico caravanero e interacción social: Cuatro modalidades en el ámbito exorreico de los Valles Occidentales, norte de Chile (períodos Intermedio Tardío y Tardío, ca. 1000–1535 d.C.). In *Ruta: Arqueología, historia y etnografía del tráfico surandino*, ed. L. Núñez and A. Nielsen, 199–245. Buenos Aires: Encuentro Grupo Editor.

Sarianidi, Victor I.

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Basic Biographical Information

Victor Ivanovich Sarianidi is a famous Soviet and Russian archaeologist. He was born in September 1929 in Tashkent. In 1952, he graduated from the department of history of the Tashkent State University. For more than 50 years, Victor Sarianidi worked at the Institute of Archaeology in the Academy of Sciences.

The archaeological activities of V.I. Sarianidi started from participation in the excavation of the observatory of Ulugbek in Samarkand (Uzbekistan) in 1948, which was his first field expedition. Since then his life has been devoted to studying Central Asia.

In 1949, still being the student, V.I. Sarianidi started to work in Turkmenistan. As a graduate student, he was already taking part in archaeological expeditions in Uzbekistan and Turkmenistan. Later, he participated in the excavation of such monuments that are known nowadays as Togolok, Takhirbay, and Yaz Dep (1955–1956). In 1959, he joined the Institute of Archaeology in the Academy of Sciences of the USSR in Moscow.

From 1969 to 1979, V.I. Sarianidi participated as a leader (together with I.T. Kruglikova) in archaeological excavations in Northern Afghanistan. There he discovered monuments of the Bronze Age for the first time.

In 1975, V.I. Sarianidi defended his doctoral thesis on the topic of "Afghanistan in Bronze and Iron Ages" and was granted the full degree of Doctor of Historical Sciences.

From 1980 to the present, he has conducted very fruitful archaeological works in Turkmenistan on settlements and burial grounds of Togolok, Gonur-depe, and other objects.

Major Accomplishments

Thanks to V.I. Sarianidi's excavations (1969–1979) on the early urban settlements and burial grounds (archaeological group of Dashli monuments), the new center of agricultural civilization was revealed in Bactria.

He discovered the remains of a Bronze Age culture in the Karakum Desert in 1976. The culture came to be known as the Bactria-Margiana Archaeological Complex.

From 1978, under his supervisor, he organized the archaeological expedition excavating the royal necropolis Tillya Tepe of the early Kushan period. More than 20,000 golden objects were found in this necropolis. He also discovered six undisturbed tombs at Tillya Tepe, dating to the first century BCE. The deceased were richly equipped with the so-called Bactrian Gold.

By 1990 in the ancient delta of the Murghab River, he opened no less than 200 separate settlements of an Epoch of Bronze and the Early Iron Age – so-called the country Margush. Since 1974, V.I. Sarianidi has continued to carry out excavation of the capital city of this country Gonur-depe.

Sarianidi has also been excavating Margiana (Turkmenistan) since 1972. There he found a previously unknown civilization of the late Bronze Age. During the many years, his expedition's works have been concentrated on the urban necropolis Gonur. For 10 years from 1996, V.I. Sarianidi excavated the Gonur's Big Necropolis, where almost 3,000 burials and thousands of valuable artifacts were discovered.

Victor Sarianidi is a Doctor of Historical Sciences at the Institute of Archaeology in Moscow and an honorary member of the Greek Anthropological Society. He is the author of more than 20 books and 200 articles published both in Russia and abroad.

Cross-References

► Burial Archaeology and the Soviet Era
► Early Regional Centers: Evolution and Organization
► Fortifications, Archaeology of

S

▶ Masson, Vadim M.
▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts

Further Reading

Sarianidi, V.I. 1977. *Drevnie zemledel'tsy Afganistana. Materialy Sovetsko-Afganskoy Ekspeditsii 1969–1974 [Ancient farmers of Afghanistan]*. Moscow: Nauka.
Sarianidi, V.I. 1985. *Golden hoard of Bactria: From the excavation of the Tillya-tepe Necropolis in northern Afghanistan*. New York: Harry N. Abrams.
Sarianidi, V.I. 1986. *Die Kunst des alten Afghanistan: Architektur, Keramik, Siegel: Kunstwerke aus Stein und Metall*. Leipzig: E.A. Seemann Verlag.
Sarianidi, V.I. 1989. *Khram i Nekropol Tillia-tepe (Tillia-tepe's Temple and Necropolis)*. Moskva: Nauka.
Sarianidi, V.I. 1990. *Drevnosti strany Margush [Antiquities of Margush country]*. Ashkhabad: Ylym.
Sarianidi, V.I. 2005. *Gonur-depe. Gorod tsarey I bogov [Gonur-depe. Town of kings and gods]*. Ashkhabad: Miras.
Sarianidi, V.I. 2010. *Zadolgo do Zaratushtry. Arkheologicheskie dokozatel'stva protozoroastrizma v Baktrii i Margiane [Long before Zarathustra. Archaeological evidences of protozoroastrianism in Bactria and Margiana]*. Moscow: Stary Sad.

Sasanian Empire, Archaeology of the

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Introduction

The Sasanian Empire was the last polity headed by an Iranian dynasty to rule from the geographic entity known as Iran before the advent of Islam, from 224 CE to 651 CE. At its height under Khosrow II in the early seventh century CE, its territorial extent encompassed many of the countries of the Middle East, Central Asia, and the Eastern Mediterranean. Over these 400 years, the political, ethnic, and religious composition of the empire changed continuously, and partly as a consequence of its location, the Sasanian Empire was involved in successive military confrontations with the Roman Empire on its western border, as well as with seminomadic peoples in various locations, including the Caucasus, Central Asia, and the Arabian Peninsula. Notwithstanding this sporadic but ever-present pattern of conflict, this period also witnessed the acceleration of a trend of interregional economic connectivity, especially between Chinese polities to the east and the Roman and then Byzantine Empire to the west. While this complex economic network often tends to be described in simplified terms as trade across a single "Silk Road," it underscores, in fact, a legacy of economic connectivity that intensified during this period.

Compared to its peer western and eastern polities, archaeology has played a relatively minor role in the interpretation of the Sasanian world. Literary sources in Greek, Latin, Middle Persian, Arabic, Syriac, and Armenian continue to inform a chiefly philological (and less often, historical) perspective. A significant portion of prior archaeological research focused on the analysis of monumental architecture, epigraphy, rock reliefs, and elite art objects. While noticeable advances in each of these areas have formed a more nuanced understanding of Sasanian royal culture and history, archaeological excavation has not enjoyed the same level of influence in reconstructing the daily lives of the majority of the empire's inhabitants. In addition, excavations of Sasanian sites in the early twentieth century did not employ contemporary scientific methods (cf. Huff 1987), which has hindered to some extent the reanalysis of material remains of Sasanian date. The sheer size of the empire, stretching across the boundaries of many separate modern countries, has also done much to complicate detailed investigation. Prominent in this regard is the continued limited accessibility of "core" territories to nonlocal archaeologists.

Despite these challenges, archaeological research has provided an unparalleled glimpse into many aspects of Sasanian imperial and domestic life that have often escaped notice in the literary record. These include the physical conditions of cities, agricultural intensification, variability in religious practice and ideology, and

details of the governing imperial bureaucracy. Ongoing and new archaeological research in the "periphery," such as in Central Asia, Arabia, and the Caucasus, has shed light on the social and ecological complexities of life on the frontier. The main contribution of more than a century of archaeological research has been recognition of the material heterogeneity of the empire. This extends to a wide variety of objects such as ceramic vessels, seals, coins, and textiles. Indeed, as many historical assessments of the Sasanian world emphasize a high degree of centralized political authority that was undoubtedly present, archaeological research may be said to have revealed a dynamic dialogue between local and external influences.

Definition

The political history of the Sasanian Empire begins with Ardashir I (224–241 CE), a vassal of the Parthian king Artabanus IV (216–224 CE), who rose in rebellion in the region of Fars in southwestern Iran. Ardashir marched against the Parthian monarch and defeated his army in the Hormozgan plain, an event that symbolized the toppling of the Parthian dynasty that had stood for close to four centuries (see Daryaee 2009 for a detailed social and political history). The victory was at once commemorated on a large rock relief at near Firuzabad, in which he and his son Shapur are shown unhorsing their Parthian opponents. In another investiture scene at Naqsh-i Rostam, famous for its monumental Achaemenian tombs, Ardashir is shown mounted and trampling on Artabanus. In the same relief, he receives the symbol of legitimate royal power, the *kydaris*, from Ahura Mazda, the supreme deity of Zoroastrianism, who himself is trampling Angra Mainyu.

The tradition of commemorating major political events on large rock reliefs and transmitting royal ideologies through them is a defining aspect of imperial practice for the first 100 years of the empire's existence. After Ardashir, the monarchs Shapur I (241–271 CE), Bahram I (271–274 CE), Bahram II (274–292 CE), Narseh (293–301), and possibly Ardashir II (379–383 CE) all commissioned rock reliefs whose meaning, content, and composition have been widely discussed. The construction of cities also became an enduring tradition, beginning with Ardashir's creation of a circular city named Ardashir Xwarrah (or "the glory of Ardashir") in Fars. Newly founded cities acted as spaces where Sasanian elites could create distinct imperial, urban traditions while engaging with perceptions of their own past (Canepa 2010).

In addition to rock reliefs, the early empire is marked by a large number of native Middle Persian inscriptions, especially by Shapur I, the son of Ardashir I, most notable for his success in a series of conflicts with the Roman Empire. In his third campaign, the Roman Emperor Valerian was captured, and this event was enshrined in rock reliefs at Naqsh-i Rostam and Bishapur, in Fars. Shapur I recorded these events in an inscription at Naqsh-i Rostam known as the "ŠKZ," or the Shapur inscription on the Ka'ba-ye Zardosht, a monument whose initial function is still debated. The inscription in question has been a key focus of scholarship for assembling a view of social and elite relations seen through the eyes of the imperial court. In particular, the hereditary, patrilineal nature of the monarchical system is stressed, though with significant acknowledgement of the elites of the empire. The dynamic relationship between regional elites and the monarch had significant long-term repercussions for the stability of the Sasanian polity as there were frequent struggles and negotiations between these two groups over political decision-making – to the extent that some monarchs were deposed by elite collusion and some elite social and political power was curbed by monarchical action. Other important epigraphic sources for this period include the Zoroastrian *mowbed* Kirdir's inscription at Naqsh-i Rostam and Narseh's (293–301 CE) inscription at Paikuli.

After the reign of Shapur II (309–379 CE), noticeable changes in imperial ideology are visible, especially through royal titles on coins. Yazdegerd I (399–420 CE) began to employ the title *ramshahr*, or "peace in dominion," perhaps to emphasize the end of recurrent military engagements with the Roman Empire. It is during the

reign of Peroz (459–484 CE) that new large-scale constructions appear in the archaeological landscape. It is argued that the construction of massive defense systems in the northwest and northeast might have begun in this period due to conflicts with seminomadic peoples. Under Kavad (488–531 CE), adjustments to the imperial bureaucracy continued, as are visible in offices with new seals, changes in coinage, and military positions. For instance, the internal division of the Sasanian Empire initially seems to have been organized around provinces encircling a provincial capital, perhaps from the reign of Kavad, the empire seems to have been quadripartitioned with an elaborate political apparatus established to oversee the fiscal and political governance of these areas (Gyselen 2001).

By the mid-sixth century, military conflict with the Byzantine Empire flared, although defenses against different groups passing through the Caucasus, were sometimes maintained with economic assistance from the Byzantine state. Under Khosrow I (531–579 CE) and especially Khosrow II (590–628 CE), the empire reached its territorial zenith through a series of initially successful, but ultimately ineffective, military campaigns that led the Sasanians to dominate the Eastern Mediterranean and Egypt for over a decade in the early seventh century CE. Architectural evidence such as that supplied by the palace at Taq-i Kisra near Ctesiphon and the rock relief grotto in Taq-i Bostan marks this political ascendancy. The empire began its collapse under Yazdegerd III (632–651), who fled in the face of encroaching, victorious Arab armies until he was eventually murdered in Merv. Although the empire ended as an autonomous political entity, the imprint of its ideologically imbued material trappings reverberated for centuries in the region, above all in its agricultural technologies, architecture, art, coinage, and everyday goods.

Key Issues/Current Debates

Agricultural Intensification

Most of the available archaeological evidence collected over the past 100 years points to a substantive trend of agricultural intensification during the Sasanian period. In some areas it represents the apogee of premodern intensive land use. Physical evidence for the maximization of agricultural output is provided by irrigation canals, dams, and weirs. Differentiating early Sasanian (third to fourth century CE) from late Sasanian (fourth to seventh century CE) irrigation canals remains, however, a problem exacerbated by the frequent reuse of these structures well into the Islamic period. Nevertheless, massive canals, such as the Nahrawan canal that diverted water from the Tigris River, attest to the impact of Sasanian imperial initiatives on the landscape. Initial and influential research in the Diyala region locating its dense, crisscrossing canals has shown that during the late Sasanian period, almost all of the cultivable land on the Lower Diyala was exploited. Improved imaging technologies and resolution have permitted identification of the density of these irrigation networks. CORONA satellite imagery has revealed a complex network of feeder canals and rectangular fortified sites in the Mughan Steppe in Azarbaijan (Alizadeh and Ur 2007). Elsewhere in Mesopotamia, shuttle radar topography has further elucidated the complications that beset Sasanian-period engineers who had to enlarge existing canals and build new ones in a landscape that had been irrigated since the third millennium BCE (Hritz and Wilkinson 2006).

A sophisticated series of drop-mill towers positioned at regular intervals at the edge of a rocky piedmont in the Deh Luran plain in south-west Iran illustrates the technological changes that accompanied new production initiatives (Neely 2011). Nearby, a dam bridge across the Karun river in Shushtar (Khuzestan), attributed to the early Sasanian period, was constructed to feed two major canal systems. Careful management of hydrological resources is evident at urban sites such as Gondeshapur and in military settings, where soldiers manning the Gorgan Wall maximized their ability to draw water from the Gorgan river in order to build canals for irrigation or to support construction projects. Settlement surveys in core political territories of the empire (discussed below) illustrate a marked quantitative

increase of settlements during periods of Sasanian intervention, especially in the late Sasanian period. Pollen cores have provided direct evidence for vegetative transformation in the landscape with significant increases in the cultivation of *Vitis* (grape), *Olea* (olive), *Juglans* (walnut), and other economic species (Djamali et al. 2009). Archaeobotanical reports from Merv from late Sasanian levels also indicate the cultivation of cotton (*Gossypium* sp.), a key for trade in textiles. A late Sasanian burial repository found in Shahr-i Qumis reflects these changes in burial practices, as the bones of an individual were interred with an entire pomegranate, almonds, and patterned cotton textiles.

The degree to which this intensification of production was overseen by the Sasanian state or initiated by local communities has yet to be resolved. There are some indications that the Sasanian state directly oversaw and stimulated the intensification process. For instance, a clay bulla from Veh-Ardashir yields an inscription stating it to be "the king's canal of Valashabad. . .of Veh Ardashir," and another bulla of the late Sasanian period mentions a "chief of the cultivators." These objects hint at the involvement of state authorities in the construction of new irrigation structures and in wide-scale agricultural production.

Economic Intensification

To a large extent, the trend of agricultural intensification was part of a larger process of interregional economic intensification. The archaeological data for Sasanian economic intensification can be divided into two categories: coinage and durable media. The main proxy for identifying trade during this period is the geographic distribution of Sasanian objects, especially coins, far outside the limits of their constituent territories. Researchers in China have documented almost 2,000 (on some counts) Sasanian silver coins at sites throughout China, with western China (Dunhuang, Chang'an) prominent. The contexts in which these coins are found include coin hoards, burials, and even decoration on furniture (Li 2004). The distribution, the eastern origin of the mints, and the appearance of these coins beginning with Shapur II onward (c. 300–650 CE) point to the eastward economic networks that developed in the early Sasanian period and which became more established with time. The distribution of glass goods is also correlated with coinage both spatially and temporally – glass objects of Sasanian manufacture found at Chinese sites appear in fourth century contexts and are found in greater concentration thereafter. An indication of imperial concern for the glass trade is validated by chemical composition studies of glass from Veh-Ardashir in Mesopotamia which illustrate differing sand types utilized after the fourth century CE to increase the quality of the glass.

It is important to note that the Sasanians were probably not directly engaged in this easterly trade in most instances. Excavations at archaeological sites in Central Asia, aided by the discovery of documents known as the "ancient letters," have shown the importance of the Sogdians, an Iranian-speaking people of western Central Asia, as traders and trade intermediaries within these economic networks (de la Vassiere 2005). At Merv, a sixth- to seventh-century CE structure was found containing Bactrian, Sogdian, and Middle Persian ostraca, a testament to the heterogeneous multilingual and multiethnic trading world of Central Asia of which the Sogdians and Sasanians were a part. Nevertheless, there were also direct contacts with Persian merchants, especially in later periods. A bilingual Chinese–Middle Persian inscription in Chang'an, China commemorating the burial of a Sasanian elite represents the outcome of already long-standing contact.

Overland routes were complemented by sea trade that originated in the Persian Gulf. Both ceramic and numismatic evidence attest to increased trade with South Asia, perhaps in direct competition with Roman trade emanating from the Red Sea. Ceramic vessels such as "torpedo jars" found in Pattanam in southern India, along with Roman and Sasanian coins, reveal a brisk exchange that began in the late fourth century and continued until the seventh (Tomber 2007). The analysis of bitumen-coated vessels from nearby Sri Lanka has been able to identify the source of

the bitumen; vessels dating from the third to ninth century appear to have originated near Susa in south-west Iran. The circumscribed nature of this resource pool indicates probable imperial involvement or craft communities in long-distance trade ventures.

Toward the west, Sasanian coins have been found in Roman and Byzantine contexts, even in more "remote" areas such as the Southern Levant. A coin hoard found in Humayma in Jordan contains potentially Byzantine counterfeit and Sasanian coin types. Based on the mark of the official Susa mint, the excavators concluded that the individual(s) carrying these coins and jewelry probably originated outside the limits of the Byzantine Empire (and perhaps within the Sasanian Empire). Other evidence in the Southern Levant points both to the paucity of objects of Sasanian manufacture in the Byzantine world and also the late date at which they begin to appear. In general, trade with the Roman and Byzantine empires has been less visible and less discussed. Apart from literary references to specific trade points such as Nisibis after its incorporation into the empire by Shapur II in 364 CE, Roman coins found as far east as Merv, and Byzantine coins found distributed throughout China, undoubtedly show that the Sasanian world acted as an economic intermediary and that frequent nonimperial economic transactions between these two polities were not an irregular phenomenon.

Border Defense

A complex system of border defense, especially in the northern boundaries of the empire, was initiated in the latter part of the Sasanian period. The longest extension of these structures stretches in an arc from the west to the east of the Caspian Sea. Construction of these massive walls seems to have been due to pressure from both sedentary and seminomadic people to the north, as well as the economic and ideological ambitions of the Sasanian imperial elite in these areas. The Derbent Wall is a massive fortification complex that is 50 km in length and stretches from the western littoral of the Caspian Sea westward through the central mountain range ("Dag Bary") of Dagestan, Russia. In some places the fortress walls in the city of Derbent reach 18 m in height. Middle Persian inscriptions on the walls of the fortress have formed the main criterion for dating its construction, which range from the fifth to the seventh century CE. An earlier mud-brick wall immediately to the south in Northern Azarbaijan known as Ghilghilchay ("clay wall") has been recently identified, perhaps dating to the sixth century, and itself stretches 60 km in length from the Caspian to the Caucasian interior.

To the east of the Caspian Sea, archaeological research has confirmed the presence of a formidable wall which was thought to date to the Parthian period, if not before (reflected in its Persian name, Sadd-i Iskandar, or "Alexander's Barrier"). A nearly 200-km-long wall, around 2 m in width, stretches from the Caspian Sea to the foothills of the Elburz in the east (Rekavandi et al. 2008). Recent studies of the Gorgan Wall have revealed a microcosm of Sasanian military life on the frontier as a series of forts, almost 40 in number, span the entirety of the wall, alongside barracks that may have housed as many as 20,000 soldiers. Numerous brick kilns point to the way in which Sasanian soldiers used available resources, especially local hydrology, in site maintenance on the frontiers. Radiocarbon and OSL dating indicate construction took place between the fifth and sixth centuries CE, which corresponds, in part, to literary sources that link its construction to the Emperor Peroz's (459–84 CE) conflicts with the Hephthalites. Other fortified structures such as the fortress at Turang Tepe and a fortified farmstead at Geotchick Tepe argue for the importance of the protection of this frontier zone.

Non-frontier fortresses imply that the Sasanian state was highly involved in maintaining control in the interior as well as along its borders. Ardashir and Shapur constructed numerous fortifications, in order to secure strategic positions in political centers both before and after full independence from their Parthian overlords. Other sites with notable fortifications include the port city of Siraf, where a large Sasanian-era barracks was identified in the early 1970s. The capital city Ctesiphon was also well fortified with massive walls 10 m wide. Despite literary references to a wall built in the southwest corner of the empire

meant to deter Arab tribes, no traces of such a constrution have yet been observed on the ground.

Urbanization

An explosion of urban and village construction occurred during the Sasanian period. The factors that led to this quantitative increase are still debated, but both ideological and environmental hypotheses are suggested. Settlement data from archaeological surveys have revealed how densely settled the empire was; it has been calculated that 75% of the Lower Diyala in Mesopotamia was occupied by urban sites larger than 10 ha (Adams 1981). Yet this phenomenon seems to have been regionalized, as surveys in other areas, such as near Susa, show a contraction of the total area occupied by settlements in the Early Sasanian Period (Wenke 1975–6), while the Bushehr region near the Persian Gulf shows a marked density of Sasanian-period settlements.

Royal patronage of urban construction is visible in the names of many of the cities themselves. Veh-Andiyok-Shapur, later Gondeshapur, is named after Shapur I's successful capture of the Roman city of Antioch, and excavations have revealed that its foundations are not preceded by prior settlement. Numerous new large cities dotted the landscape, above all in the region of Fars and to some extent in southern Mesopotamia. Cities such as Ctesiphon were expanded by the Sasanians, and in the case of Veh-Ardashir, new settlements were constructed adjacent to cities established in the preceding Seleucid and Parthian periods. Seals and bullae also reflect administrative changes that came with new urban priorities, such as specific offices for cities and territories like the *amargar* ("accountant"), who seemed to oversee financial transactions in them.

Less intensively studied have been the ramifications of life within and outside urban spaces in this period (Simpson 2008). Excavations in the 1960s and 1970s in Ctesiphon yielded a complex system of alleys, domestic structures, and activity areas. Ovens and querns are present in some rooms, and one excavated quarter of Ctesiphon yielded evidence of concentrated artistic production. Many alleyways were covered by a combination of clay and bitumen, making drainage of seasonal rainfall difficult. Using comparative evidence from Merv, it has been argued that this may have caused significant urban pollution in the form of runoff. In Merv, no door hinges were found (unlike in Ctesiphon), implying that the denizens of Merv during the Sasanian period covered their doorways with soft material. The material conditions of these cities should be contrasted with royal centers such as Bishapur, Firuzabad, and Istakhr, where evidence for domestic, nonelite life is less pronounced. Even in Fars, a considerable degree of heterogeneity is encountered in elite residential structures, such as can be seen in the mid-fourth-century-CE manor house at Hajiabad, where elaborate idiosyncratic stucco decorations point to negotiations of the ruling elite with individual expression (Azarnoush 1994).

The Impact of the Sasanian State on the "Periphery"

Identifying the material impact of the Sasanian state on areas beyond its nominal core, namely, Fars and Khuzestan, continues to be an area of debate for archaeologists and historians. In northern Mesopotamia, despite the presence of a large number of ceramic vessels (themselves diverse in style and decoration) from a range of archaeological sites, architectural evidence for an imperial presence is still lacking. In southern Iraq, excavations at Hira in the early 1930s revealed the center of the important sixth- and seventh-century CE client kingdom of the Lakhmids, who were formally incorporated into the empire by Khosrow II. Yet the excavators were unable to locate any diagnostically Sasanian objects or stratigraphic levels and tentatively associated the earliest Sasanian intervention to the latter half of the empire's history (sixth to seventh century). This is compounded by the continued lack of a formal ceramic typology from the "core" Sasanian territories and regional affinities in ceramic styles. The debate concerning the timing and intensity of the Sasanian presence in Arabia (Eastern Saudi Arabia, Bahrain, and the UAE) continues, with scholars arguing that despite Sasanian epigraphic claims to early control over this area, archaeological evidence is lacking.

In the north, aside from the impressive fortifications of Derbent with unequivocal attachment to the Sasanian state, evidence for changes in daily life is more difficult to detect. A decade of excavation at the site of Dvin, Armenia, has yielded a large number of Sasanian artifacts, many of them dating to the *Marzpanate* period of Shapur II. One church that can be dated by excavations to the late fourth/early fifth century indicates that the local Christian identity was never wholly supplanted despite frequent Sasanian attempts to persuade the population of Armenia of this date to "return to" some form of Zoroastrian practice.

The eastern frontier of the Sasanian Empire has yielded evidence for the presence of imperial officials and their active involvement in daily life in these territories. The decipherment of Bactrian and the discovery of a trove of "Bactrian letters" have provided insight into the administration of an area where excavations have not been able to provide extensive archaeological data. An unambiguous reference to a Sasanian official in these letters dates to the late fourth century, where a nonofficial refers to a "satrap," or governor of Bactria, which is in agreement with a bulla bearing the title of a "satrap" of Balkh in Bactrian and Middle Persian. Another letter refers to a "fortress commander," emphasizing the commercial and military interventions brought about by Sasanian involvement. A recently discovered monumental rock carving at Rag-i Bibi in Afghanistan, Sasanian in style but with local Kushan themes and fauna (such as the royal hunt of a rhinoceros), demonstrates the diverse potentials for imperial and local interaction.

Religious Pluralities and Identities

Throughout the history of the Sasanian Empire, diversity between and within religions was markedly pronounced. Zoroastrianism was not alone, however, Christianity, Manichaeism, Mazdakism, Mandaeanism, Buddhism, and Judaism all had adherents at different times and places within areas of Sasanian political control. A host of other undocumented local traditions, beliefs, and practices probably existed alongside these traditions as well. Archaeological evidence for the development, presence, and variability in religious practice is seen in architecture, epigraphic remains, and domestic objects. The remains of fire temples, places of worship for Zoroastrian adherents, are found throughout the entirety of the Sasanian world. Architectural changes seem correlated to larger political changes, such as the *chahar taq*, or four-arch construction, which only appears during the Sasanian period. At Kuh-i Kwaja in Seistan, Sasanian builders added a *chahar taq* to the temple not long after their political ascendancy.

In addition to large Zoroastrian religious centers such as that at Takht-i Suleiman in Azarbaijan and a more modest temple at Turang Tepe near the Gorgan Wall, recently discovered fire temples contribute additional knowledge of Sasanian Zoroastrian practices. At Mele Hairam in southwest Turkmenistan, a fire temple with Sasanian occupation levels contains a fire altar whose enclosing room displays the floor plan of a *chahar taq* (Kaim 2004). The site of Bandiyan in Khorasan also possesses a fire altar housed inside a cross-shaped room (Rahbar 2008). Elaborate stucco reliefs depicting elite individuals are accompanied by inscriptions in Middle Persian. The extent to which the site of Bandiyan is a religious complex rather than a manor with religious edifices attached is still debated. The site, according to the excavators, was not sponsored by the ruling imperial authorities but instead looked to local architectural styles. The debate reflects a more generalized discussion concerning the precise function of reticular rooms in particular temples and whether fire altars can be connected to Zoroastrian rituals known from literary texts.

Royal patronage of many of these structures is nevertheless clear. Shapur I records his dedication to the maintenance of official fires in his ŠKZ inscription. Fire altars and their attendees are also prominently depicted on the obverse of Sasanian coins. Bullae record imperial offices such as the *mowbed mowbedan* ("priest of priests"), who seem to be standard functionaries in the provinces. Officials called *driyošan jadaggov ud dadvar*, or "judges and protectors of the poor," have titles

directly derived from the *Avesta*, the key religious text of the Zoroastrian community. These artifacts illustrate the entanglement of administration, ideology, and ethnoreligious rule throughout the Sasanian period.

Epigraphic information also shows that early Sasanian officials already had knowledge of some of the beliefs and practices of non-Zoroastrian adherents. The third-century inscription of Kirdir, the "court priest," beneath the ŠKZ, describes how he suppressed "Jews, Buddhists, Hindus, Nazarenes, Christians, Mandaeans, and Manichaeans." It is an explicit indication of the presence, or the perception of a presence, of these groups within the empire. An inscription written in Roman Dura Europos by a scribe of the invading Sasanian army records how he recognized in one of the synagogue paintings the "god of god of the Jews." Numerous personal seals of individuals with either traditionally Jewish names written in Hebrew, or with scenes from the Hebrew Bible, have been found at sites in Mesopotamia. Aramaic "incantation bowls" also found at a number of sites in Mesopotamia, decorated on the interior and lined with text written in Aramaic, Mandaic, Syriac, and Middle Persian, request physical outcomes in the secular world using a wide array of religious language (Morony 2007).

The existence of a Christian community in the Sasanian world increasingly became an ethnopolitical issue, to the extent that conflict with the Roman and Byzantine empires later involved the role of religion after the conversion of the Emperor Constantine I. Nestorian churches have been found both within Sasanian territory and within its sphere of influence, such as in Northern Iraq (Khirbet Deir Situn) and in the capital, Ctesiphon. Some seals display Christian names or portray Christian themes. In Merv a coin displays an image of the Emperor Yazdegerd I flanked by a cross and crescent with flying ribbons (Herrmann and Kurbansakhatov 1995). This underscores the fluid nature of royal involvement with religious communities and their self-representation. This became especially important as native Persians began to convert to Christianity – a Psalter written in Middle Persian found in the Turpan oasis in China is indicative not only of the routes through which religious communication flourished but also of a burgeoning need to communicate religious texts in local languages.

Future Directions

Archaeological research has enriched the perception of the Sasanian world and complicated attempts to portray it as a homogeneous whole. Many archaeologists have sensed a missed opportunity in terms of careful, scientific excavation that incorporates the full panoply of modern archaeological methods. The addition of environmental archaeological analysis, such as zooarchaeology and paleoethnobotany, in recent excavations has revealed important patterns in production and consumption during these periods of economic intensification. This coincides with a need for more excavation of domestic structures and residential sites, of which very little is known outside of scant remarks in literary sources. A strong theoretical framework for these inquiries could help generate hypotheses or provide the lenses through which more could be explored concerning gender, agency, and identity, especially the ways in which individuals or communities in this period negotiated the impact of Sasanian imperial interventions.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Dura-Europos, Archaeology of
- ▶ Economy, Roman
- ▶ Empire in the Ancient Near East, Archaeology of
- ▶ Excavation Methods in Archaeology
- ▶ Households in the Ancient Near East, Archaeology of
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Surface Survey: Method and Strategies

References

Adams, R. McC. 1981. *Heartland of cities*. Chicago: University of Chicago Press.

Alizadeh, K., and J.A. Ur. 2007. Formation and destruction of pastoral irrigation landscapes on the Mughan Steppe, north-western Iran. *Antiquity* 81: 148–160.

Azarnoush, M. 1994. *The Sasanian manor houseat Hajiabad, Iran*. Florence: Le Lettere.

Canepa, M.P. 2010. Technologies of memory in early Sasanian Iran: Achaemenid sites and Sasanian identity. *American Journal of Archaeology* 114: 563–596.

Daryaee, T. 2009. *Sasanian Persia: The rise and fall of anempire*. London: I.B. Tauris.

de la Vassiere, E. 2005. *Sogdian traders: A history*. Leiden: Brill.

Djamali, M., J.-M. Beaulieu, V. Andrieu-Ponel, M. Berberian, N.F. Miller, E. Gandouin, H. Lahijani, M. Shah-Hosseini, P. Ponel, M. Salimian, and F. Guiter. 2009. A late Holocene pollen record from Lake Almalou in NW Iran: Evidence for changing land-use in relation to some historical events during the last 3700 years. *Journal of Archaeological Science* 36: 1364–1375.

Gyselen, R. 2001. La designation territoriale des Quatre Spahbed de l'empire Sassanide, d'apres les sources primaires sigillographiques. *Studia Iranica* 30: 137–141.

Herrmann, G., and K. Kurbansakhatov. 1995. The International Merv Project, preliminary report on the third season (1994). *Iran* 33: 31–60.

Hritz, C., and T.J. Wilkinson. 2006. Using shuttle radar topography to map ancient water channels in Mesopotamia. *Antiquity* 80: 415–424.

Huff, D. 1987. Archaeology iv. Sasanian. *Encyclopaedia Iranica* 2: 302–308.

Kaim, B. 2004. Ancient fire temples in the light of the discovery at Mele Hairam. *Iranica Antiqua* 39: 323–337.

Li, S. 2004. Distribution of Sasanian silver coins and their functions in China. *Acta Archaeologica Sinica*: 35–54.

Morony, M.G. 2007. Religion and the Aramaic incantation bowls. *Religion Compass* 4: 414–429.

Neely, J.A. 2011. Sasanian period drop-tower gristmills on the Deh Luran Plain, southwestern Iran. *Journal of Field Archaeology* 36: 232–254.

Rahbar, M. 2008. The discovery of a Sasanian period fire temple at Bandiyan, Dargaz. In *Current research in Sasanianarchaeology, art and history*, ed. D. Kennet and P. Luft, 15–40. Oxford: Archaeopress.

Rekavandi, H.O., E.W. Sauer, T. Wilkinson, G.A. Abbasi, S. Priestman, E.S. Tamak, R. Ainslie, M. Mahmoudi, N. Galiatsatos, K. Roustai, J.J. van Rensburg, M. Ershadi, E. MacDonald, M. Fattahi, C. Oatley, B. Shabani, J. Ratcliffe, and L.S. Usher-Wilson. 2008. Sasanian walls, hinterland fortresses and abandoned ancient irrigated landscapes: The 2007 season on the Great Wall of Gorgan and the Wall of Tammishe. *Iran* 46: 151–178.

Simpson, St.J. 2008. Suburb or slum? Excavations at Merv (Turkmenistan) and observations on stratigraphy, refuse, and material culture in a Sasanian City. In *Current research in Sasanianarchaeology, art, and history*, ed. D. Kennet and P. Luft, 65–77. Oxford: Archaeopress.

Tomber, R. 2007. Rome and Mesopotamia – Importers into India in the first millennium AD. *Antiquity* 81: 972–988.

Wenke, R.J. 1975–6. Imperial investments and agricultural developments in Parthian Sasanian Khuzestan: 150 B.C. to A.D. 640. *Mesopotamia* 10/11: 31–221.

Sauer, Carl

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Basic Biographical Information

Considered one of the most important geographers of the twentieth century, Carl Ortwin Sauer (1889–1975) was born on December 24 in Warrenton, Missouri (USA), a rural surrounding which he would recognize as an important influence in his interest in earth history (Parsons 2009).

Sauer was the grandson of German immigrants from Wurtemburg, and from the ages of 9–11, he lived in Southern Germany (Gade 2011). Back in his hometown, he later obtained his undergraduate degree at the Central Wesleyan College in Warrenton, where his father was a professor of French and Music (Parsons 2009; Gade 2011). After 1 year as a graduate student in geology at Northwestern University, Sauer was attracted to the geography program at the University of Chicago, where he obtained his PhD degree in 1915. It was also at this time of his life that he married Lorena Schowengerdt, a fellow student from Central Wesleyan College. The two would go on to share a relationship which would last until their passing away in the city of Berkeley in 1975, in which Lorena would pass away a month before Carl's death on the 18th of July (Parsons 2009).

Major Accomplishments

It was at the University of California's campus at Berkeley that Sauer conducted much of his work, from the year he began lecturing there in 1923 and past his retirement in 1957. Afterward, he continued to teach at Berkeley as Professor Emeritus and wrote four more books, one of these published posthumously (Parsons 2009). He is of fundamental importance in the establishment of what became known as the Berkeley School, a branch of geography known for its cultural and historical approach regarding environmental history.

Sauer's themes of inquiry, such as human dispersals, the domestication of plants and animals, and the origins of agriculture, were frequently of common interest to archaeology. Sauer's opinions regarding the relationships established between people and their environments would place him in an important debate with Herbert Joseph Spinden, a prominent archaeologist who in the second decade of the twentieth century published pioneering works on the origin of agriculture in the Americas.

Sauer criticized Spinden on what he would call a "potamic" theory for the origins of agriculture in the New World. Sauer did not believe that agriculture would have first been developed in an arid region with the necessary need for irrigation, and he believed that data such as that presented by Russian botanist Nicolai Vavilov on plant domestication centers around the world demonstrated that domestication would have first taken place in mountainous valleys, where conditions would favor the manipulation and experimenting of a variety of plants. Sauer also believed that Vavilov's work in plant biogeography, which pointed to various centers (also called hearths) of domestication in the New World, reinforced the idea of multiple and independent areas of agricultural origins in the Americas, and proposed the existence of a geographical pattern which indicated two great regions of plant domestication for the continent, roughly divided around Central America. To the north, seed agriculture (such as that of maize) would have been of major importance, while to the south root agriculture (such as that of manihot) would have been the major form of cultivation (Sauer 1952, 1963 [1936]).

Sauer's criticism regarding Spinden's hypothesis on agricultural origins in the Americas can be seen as more than a disagreement of various points, demonstrating in fact a fundamental difference between two distinct forms of understanding such phenomenon. If for Spinden agriculture originated in an environment which would have produced a *healthy but hungry population*, for necessity would be the *mother of invention* (Spinden 1920 [1915]), Sauer stressed out the importance of an idea of abundance in order to understand the same phenomenon, arguing that the development of domesticated plants through the process of the selecting of individuals with desirable characteristics would only have been possible in societies where, with no shortage of dietary resources, leisure time would have been available for the reflecting, experimenting, and discussing which is necessary in every process of invention, including that of plants. His unique thoughts on plant and animal domestication can be appreciated in his book *Agricultural Origins and Dispersals*, published in 1952 and which attempted to present a synthesis of Sauer's hypothesis and opinions on the subject.

Sauer's interest in the history of the dispersal of human and of cultivated plants in the past was shared by some of his students, as can be seen in the works of George F. Carter on human settlement of the Americas and of Carl Johannessen on the dispersal of maize (Gade 2011). His interpretation and that of his students regarding agricultural origins and human and plant dispersals did not always hold up in the face of new archaeological and genetic evidence, but his importance in integrating various lines of evidence in order to elaborate such interpretations cannot be underestimated.

Sauer's work has received uncommon attention since his death (Gade 2009). Out of hundreds of articles and chapters in which he is cited, about 70% of these were published after his passing (Denevan 2009) many times by non-geographers, including archaeologists. By defending the importance of tropical world regions and root crop agriculture in the

development of the origins of agriculture, Sauer's work was and still is influential for archaeologists working in tropical areas, for it demonstrates a sophisticated train of thought for which to think questions regarding settlement and subsistence of past populations in these contexts. Sauer's work has been an important point of reference for studies regarding agricultural origins and practices in precolonial Amazon, as can be seen in the work of Donald Lathrap and William Denevan.

In the course of his long and productive life, Carl Sauer advised over 30 doctoral dissertations students and published over 100 works, some of which can be seen in important compilations (see further readings).

Cross-References

- ▶ Maize: Origins and Development
- ▶ Manioc: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology

References

Denevan, W.M. 2009. Bibliographies of commentaries on the life and work of Carl Sauer. In *Carl Sauer on culture and landscapes: Readings and commentaries*, ed. W.-M. Denevan and K. Mathewson, 53–86. Baton Rouge: Louisiana State University Press.

Gade, D.W. 2009. Thoughts on bibliographic citations to and by Carl Sauer. In *Carl Sauer on culture and landscapes: Readings and commentaries*, ed. W.M. Denevan and K. Mathewson, 29–52. Baton Rouge: Louisiana State University Press.

Gade, D.W. 2011. Carl Sauer e a Força da Curiosidade nas Pesquisas Geográficas. In *Sobre Carl Sauer*, Org. R.L. Corrêa and Z. Rosendahl, 21–34. Rio de Janeiro: EdUERJ.

Parsons, J.J. 2009. Carl Ortwin Sauer, 1889–1975. In *Carl Sauer on culture and landscapes: Readings and commentaries*, ed. W.M. Denevan and K. Mathewson, 3–8. Baton Rouge: Louisiana State University Press.

Sauer, C.O. 1952. *Agricultural origins and dispersals*. New York: American Geographical Society.

Sauer, C. O. 1963 [1936]. American agricultural origins: A consideration of nature and culture. In: *Land and life: A selection from the writings of Carl Ortwin Sauer,* ed. J. Leighly, 121–144. Berkeley: University of California Press.

Spinden, H.S. 1920 [1915]. The origin and distribution of agriculture in America. In *Sourcebook in anthropology,* ed. A.L. Kroeber and T.T. Waterman, 245–251. Berkeley: University of California Press.

Further Readings

Callahan, B., ed. 1981. *Selected essays 1963–1975: Carl O. Sauer*. Berkeley: Turtle Island Foundation for the Netzahaulcoyotl Historical Society.

Denevan, W.M., and K. Mathewson, eds. 2009. *Carl Sauer on culture and landscapes: Readings and commentaries*. Baton Rouge: Louisiana State University Press.

Leighly, J., ed. 1963. *Land and life: A selection from the writings of Carl Ortwin Sauer*. Berkeley: University of California Press.

Scandinavia and the Baltic Sea Region: Medieval Archaeology

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Introduction

Scandinavia and the Baltic experienced significant change during the medieval period, including its perception by other European peoples. At the beginning of the period, it was a region largely unknown to the literate societies in the west. By the end of the medieval era, it was a known entity that had been largely integrated into the west European system both culturally and economically. This change occurred during three major periods of trade, cultural exchange, and armed conflict: the so-called Viking Age, which was centered in Scandinavia but also impacted upon other areas of the Baltic, the Northern Crusades, and the formation of the Hanseatic League.

Definition

The Middle Ages is a particularly problematic term for Scandinavia and the Baltic as both its

beginning and end are traditionally dated to events that occurred beyond this region. If the medieval period is considered to have started when the Western Roman Empire collapsed during the fifth century, then choosing a starting date for the Middle Ages in Scandinavia and the Baltic is highly problematic. Although items from the Empire reached northern Europe and occasionally men from Scandinavia and the Baltic served Rome as mercenaries, the region was never part of the Empire so there is no convenient starting date for the Middle Ages. However, the fifth-century migration period, during which groups described in classical sources as *gens* moved south, is often used. Many of these groups, including the Goths, Jutes, Angles, and Burgundians, traced their roots to Scandinavia (Hedeager 1992). The problem is compounded in the southern Baltic where the material culture of the Slavic people is trans-regional, making it difficult to break the early medieval era into periods (Urbańczyk 2008). Attempts at periodization are complicated further by the convention in Scandinavian scholarship for the Middle Ages to start at the end of the Viking Age, at around 1000 CE, when the kingdoms of Denmark, Norway, and Sweden (began to be) unified, Christianity made serious in-roads, and Scandinavia began to have its own, non-runic, written history. The end of the Middle Ages is equally problematic, as conventionally it ends with the start of the Renaissance, a cultural movement which arguably did not directly influence all areas of Scandinavia and the Baltic. For the sake of convenience, the Middle Ages will be taken as ending in c. 1500. Between these two end points, the medieval period up to c.1000 in Scandinavia and Poland and as late as 1200 elsewhere in the Baltic is divided into various sub pre- and proto-historic periods which are often named after developments further west. These terms often vary according to the country and include the Merovinger/Merovingian Period, Vendel Period, Iron Age, Germanic Iron Age, Late Roman Iron Age, Middle Iron Age, and Viking Age. As noted above, the chronologies of these sub-periods are not always well defined, but there is general agreement for the start of the Viking Age. Its traditional historical start is the Norse raid on Lindisfarne, England, in 793, although there is also a possible raid in Dorset, England, recorded in 787. Art historians concur, with the early Viking Age having a native animal ornament style (style E) that appeared from the late eighth century, at roughly the same time as the first raids. Individual sites, particularly those of the earlier period, are often difficult to date precisely unless dendrochronology is available, although the importation of such items as glass beakers, pottery, and especially coins do help in establishing a terminus post quem.

For this entry, Scandinavia comprises the three current day nations of Denmark, Norway, and Sweden. The Baltic Sea ends at the Kattegat (the waterway between Jutland and Sweden) and, in addition to Denmark and Sweden, has shores on the current day nations of Finland, Russia, Estonia, Latvia, Lithuania, Poland, and Germany. Discussion of Russia is generally excluded from this entry and can be found elsewhere in this volume. In terms of cultural groups, "Norse" is used for those speaking Old Norse and excludes the Sámi living across northern Norway and Sweden, as well as northern Finland and the Kola Peninsula in Russia. Outside of Scandinavia, cultural and/or genetic groups are often difficult to locate, and there is uncertainty over the reliability of the tribal names provided by outsiders such as the "Bavarian Geographer" and Tacitus. Finno-Ugric speaking peoples occupied the south of Finland. Baltic Russia came to be controlled by the Rus, a mixed group of Slavs and Norse. Elsewhere along the Baltic rim, there appears to have been populations of Slavs, Finno-Ugrians, and Balts, and the populations moved and mixed over time.

Historical Background

Written sources provide, at best, tantalizing glimpses into those peoples occupying Scandinavia and the Baltic during the early medieval period. Prior to the Viking Age (c. 780–1000) our knowledge is based almost entirely on material evidence, supplemented by the reports of foreigners, later legendary material including the poem *Beowulf* and post-1100 sagas, and the few

Scandinavia and the Baltic Sea Region: Medieval Archaeology, Fig. 1 Scandinavia and the Baltic in the medieval period up to 1000 CE. (Map drawn by Aurore McLeod)

characteristically short runic (the alphabet used in Scandinavia) inscriptions (Fig. 1). There were no written sources produced by those living elsewhere around the Baltic Sea, nor by the Sámi living in the north of Scandinavia and Finland. Although the Viking Age is characterized as a time in which speakers of Old Norse ventured from Scandinavia in large numbers and had an impact on many other parts of Europe, the majority of our written information about them comes from non-Scandinavian sources. For those living elsewhere around the Baltic rim, there is hardly any written information available at all, perhaps in part as those living there were not involved in activities away from home that attracted comment. It has been noted that the first consistent and relatively comprehensive account of the peoples living in Scandinavia and around the Baltic did not occur until the 1070s with the work of Adam of Bremen (Blomkvist 2004), which was partly based on information obtained during a stay at the court of the Danish king Svend Estridson.

Before this, the most detailed accounts were the travel narratives of the Norwegian Ohthere and Wulfstan, possibly an Anglo-Saxon, recorded in southern England in the late ninth century. They report on sailing journeys that stretched from the White Sea (Russia), around the coast of Norway and into the southern Baltic via Hedeby to Truso (Poland). These presumably first-hand accounts provide information on sailing routes, trading places, and the location of different peoples. Recent multidisciplinary publications have done much to enhance our understanding of these voyages, including the archaeology of the regions in c. 900 (Bately and Englert 2007; Englert and Trakadas 2009). The travel reports make plain the ease of water travel within the Baltic and around the coast of Scandinavia during the Viking Age and the subsequent interactions between different peoples.

This dearth of written material for the first half of the medieval period makes archaeology essential to the study of virtually all aspects of the region, which has resulted in a great deal of inter- and multidisciplinary work. Fortunately, the number of sites available has been steadily increasing in recent decades. Important sites of the pre- and Viking Age period include furnished burials, both inhumations and cremation, such as those at Jelling, Hedeby/Haithabu (Denmark), Gamla Uppsala, Vendel, Valsgärde (Sweden), Oseberg, Gokstad, Borre, Tune (Norway), Truso (Poland), Ėgliškiai (Lithuania), and Grobiņa (Latvia); trading sites and central places, often including a cult site, such as Lundeborg/Gudme, Hedeby, Ribe, Aarhus (Denmark), Helgö, Birka, Uppåkra (Sweden), Kaupang (Norway), Grobiņa (Latvia), Reric, Usedom (Germany), Truso, Wolin, Gdańsk (Poland), and Palanga and Žardė (Lithuania); the chieftains farms at Borg in Lofoten (Norway); and fortifications at Trelleborg, Fyrkat (Denmark), and Daugmale (Latvia). Materials recovered from these sites includes weapons, jewelry, coins, and ceramics, both of local manufacture and imports, and buildings, defenses, particularly the 30-km-long earthwork Danevirke across the Jutland that was built in three phases between 737 and 968, sleds, wagons, and items associated with craft production. The site of Borg in Lofoten is an important reminder of how well connected Scandinavia and the Baltic were to other parts of Europe during this pre-/protohistoric period. Although Borg is the most northerly known Norse settlement in Scandinavia and the furthest north that subsistence farming was possible, the finds included a number of prestige objects from the sixth to tenth centuries from southern Scandinavia, England, the Celtic world, and western and eastern Europe (Näsman and Roesdahl 2003). As one would expect, underwater archaeology makes a significant contribution to our understanding, and a number of harbors, jetties, and defensive structures have been uncovered throughout Scandinavia and the Baltic. Of particular note is the Viking Ship Museum in Roskilde, Denmark, which includes local discoveries of Viking Age warships, cargo ships, and a fishing vessel; reconstructed medieval ships from throughout the Baltic Sea; and recently recovered vessels being preserved at the Archaeological Workshop.

The contact between those living in Scandinavia and those living across the Baltic Sea reported by the travel account of Wulfstan is attested in the archaeological record. Material evidence for Norse involvement in the southern Baltic stretches back to at least 650 and the establishment of a Norse population in Grobiņa (Valk 2009). During the Viking Age, Norse involvement elsewhere along the Baltic rim increased dramatically, although in many instances those often referred to as "Rus" or "Varangians" in written sources were simply passing through to reach the eastern trade routes to the Black and Caspian Seas. The routes connected Scandinavia, especially Gotland and Birka in Sweden, with Constantinople and Arabia, often via Staraya Ladoga in Russia. The most tangible evidence of these trade routes is the large numbers of silver dirhams (Arabic coins) found around the Baltic, both in hoards and as single finds, with a concentration of coins on Gotland and mainland Sweden. One anomaly is Lithuania, which has little evidence of Norse trade during the Viking Age (Valk 2009). Some finds, in particular burials with close affinities to some found in Scandinavia, suggest that there were resident communities of Norse in

many of the trading centers in the south of the Baltic, such as Truso and Grobiņa (Jagodziński 2009), while Norse mercenaries may have been living in Poland in the late tenth century (Urbańczyk 2008). The island of Åland and possibly the west coasts of Finland and Estonia had a large number of permanent immigrants from Sweden from at least the Viking Age, and these areas were culturally Norse to varying degrees (Markus 2004; Edgren 2009). Meanwhile, there is written and archaeological evidence, in the form of burials, for a resident Slavic population in Hedeby, and it has been noted that there was a "Widespread maritime Baltic Sea culture linked by the water and similar subsistence strategies and lifestyles" (Markus 2004). There are written accounts of intermarriage between royal families in Scandinavia and elsewhere around the Baltic, and such relations are likely to have occurred at other levels of society. Relations between the different communities settled in trade centers appear to have been cordial, but there are instances of Norse attacks on Baltic trade centers. The troubled times on both sides of the Baltic are attested by many initially unfortified trading centers either being fortified or abandoned for fortified ones during the ninth and tenth centuries, such as Wolin, Usedom, and Hedeby (Jöns 2009). Similarly, Viking Age and post-Viking Age settlements in Estonia were inland, probably due to the dangers presented by the Norse sailing along the coast (Valk 2009).

The period immediately following the Viking Age was in many respects a continuation from the earlier period: Norse fleets dominated the Baltic, allowing them to control trade and attack trade centers. The most dramatic example of the latter is probably the attack by the Norwegian King Magnus the Good against Wolin in 1043 which indirectly, in conjunction with the degradation of the local environment, led to the demise of what had probably been the largest trade center in the Baltic Sea (Broich 2001). But in other respects, it was a period characterized by religious change and state formation, although both of these also had their roots in the Viking Age, especially in Norse Scandinavia. Following centuries of influence, evidenced by some Christian objects being found in burials, and some unsuccessful missionary attempts, Christianity had a significant impact from the late tenth century, beginning in the western Baltic and spreading east. The Danish king Harald Bluetooth converted in c. 965 and convinced or forced his people to follow, as he proudly proclaims on his runestone at Jelling, and the Polish king Mieszko I was baptized in c. 966, although pagan practices among the populace continued for some time. Norway converted in the early eleventh century, while Sweden had a Christian king at the same time, but Christianity and Paganism probably coexisted for at least another century. Poland was the only area along the south Baltic to convert to Christianity without a foreign invasion. The archaeological evidence for conversion and Christianization is most readily seen in changing burial customs and the building of churches. The conversion of Scandinavia also had an impact on the non-Christian parts of the Baltic as Norse kings began to focus their attention on the Baltic instead of the west. For example, the Danish king Svend Estridson involved himself in the Lutici (Polabian Slavs in Baltic Germany) civil war in 1057, and Swedes conquered much of Finland during the twelfth and thirteenth century. Yet at the same time, some Slavic people appear to have migrated to Denmark, as suggested by the appearance of Slavic pottery from the eleventh century and some Slavic place-names (Naum 2012).

The conversion of those living in Scandinavia and the Baltic (predominantly) by the Latin Church has been termed "Europeanization" and involved the imposition of the Catholic World system in the region (Blomkvist 2004). Material evidence for the various pre-Christian religious beliefs is best attested through burials and pendants, including Thor's hammers for the Norse, but temples/cult sites and statues of gods are also known, including at Jaromarsburg on the Baltic island of Rügen (Germany) and on the west bank of Lake Tissø (Denmark) and a possible open-air sacrificial site at Frösö (Sweden). Following largely unsuccessful missionary efforts to covert Balts and Slavs, crusades were launched by the Teutonic Order from Germany during the thirteenth century against various pagan peoples

around the Baltic including the Slavs of Prussia and the Lithuanians, with the latter crusade being particularly drawn out and bloody and ultimately unsuccessful. The crusaders also came into conflict with Christian Poland. Earlier, Danes, Germans, and Poles had been involved in the Wendish Crusade against the Plobian Slavs in 1147, and Germans and Danes participated in the Livonian (modern-day Latvia and Estonia) Crusade which began in 1198. The crusades were often accompanied by a colonization effort, particularly in Prussia where the Teutonic Order created around 100 cities and 1,400 villages, resulting in a great amount of material culture (Ekdahl 2005). These foreign invasions effectively made indigenous state formation like that experienced in Scandinavia and Poland (intermittently) all but impossible, although Lithuania managed to survive intact and actually expanded during the crusade (Blomkvist 2004). Important archaeological sites include crusader castles at Karksi, Viljandi (Estonia), Grudziądz and Malbork/Marienburg (Poland), and Pöide church (Estonia). A new development has been an investigation of the ecological impact of these castles and how the crusaders and those who followed transformed the surrounding landscapes.

A major development as part of the Europeanization process was the establishment of the Hanseatic League, a trade network centered on Lübeck (Baltic Germany), by German merchants collaborating with the missionary effort (Blomkvist 2004). The league was involved in armed conflict with trade rivals. This led to the domination of the Baltic trade by German merchants from the thirteenth century to the end of the medieval period and also saw German migrants settling in cities along the east Baltic coast. Material evidence for the Hanseatic League consists of surviving gabled architecture in member cities such as Lübeck, Riga (Latvia), and Reval (present-day Tallinn in Estonia) and shipwrecks of Cogs, a distinctive type of ship only found in areas controlled by the League or under its influence (Smith 2010).

From the period around 1000, an increase in trade led to the formation of new trade centers (Fig. 2), while some earlier Scandinavian centers, including Hedeby, Birka, Uppåkra, and Kaupang, were abandoned and were effectively replaced by the new nearby towns of Schleswig, Sigtuna, Lund, and possibly Tønsberg, respectively. Other important new towns, or those that grew from humbler settlements, post-1000 not mentioned above include Oslo, Bergen, Trondheim (Norway), Stockholm, Visby (Sweden), Copenhagen (Denmark), Kiel, Stralow/Stralsund, Rostock (Germany), Memel/Klaipēda (Lithuania), Turku (Finland), Ventspils (Latvia), Königsberg/Kaliningrad, and Beryozovskoye/Primorsk (Russia). As all of these cities still exist, the opportunity for extensive excavation is necessarily limited.

Key Issues/Current Debates

Ethnicity and the associated territorial identification is a particular problem, and classic methods of identifying territory in terms of material culture are often difficult to apply. Of course, this method itself is a continuing source of debate among archaeologists (Jones 1997). In the southern Baltic, the material culture of the Slavic people in the early medieval period was transregional, making it difficult to break the early medieval era into periods, and it has been suggested that many archaeologists use the term "tribal" uncritically (Urbańczyk 2008). In Scandinavia, there are often significant regional differences in such things as the use of runestones and other aspects of material culture, and in some regions both cremation and inhumation burials were occurring at the same time, suggesting different regional identities if not ethnicities (Svanberg 2003a; Sindbæk 2008). Yet at the same time, there appears to have been a pan-Scandinavian use of material culture among the Norse elite and an acknowledgement of supra-regional identities (Svanberg 2003b; Sindbæk 2008).

A key barrier to our understanding of Scandinavia and the Baltic during the medieval period is that many of the excavations are in the form of rescue archaeology, and there are large areas with little economic development that remain largely unexcavated. Other finds that may occur

Scandinavia and the Baltic Sea Region: Medieval Archaeology, Fig. 2 Scandinavia and the Baltic: new foundations after c. 1000 CE. (Map drawn by Aurore McLeod)

are those made by metal detectorists, although the legal requirements differ between the countries. Metal-detecting is effectively banned in Sweden, legally difficult in Denmark and Norway, and a license is required in Poland and Germany. Elsewhere in the Baltic, metal-detecting is easier, leading to enthusiasts from elsewhere visiting those regions. Along with other issues involving metal-detecting, such as a loss of context and find location, this raises the issue of items not being reported and ending up on the black market. As a maritime region, the lack of excavations is compounded by the difficulties involved in locating new underwater sites. A powerful reminder of the gaps in our knowledge is the failure thus far to locate with certainty the trading center of Vineta/Wineta that is thought to have been on the Baltic coast in either Germany or Poland. The descriptions of the port in medieval written sources suggest that it may have been the largest urban center in the Baltic, if not Europe, in c. 1000.

Future Directions

The issue of personal and group identity has been mentioned above, but throughout the medieval period in Scandinavia and the Baltic, it must also be considered in light of the material and written evidence for migration, both between and within Scandinavia and the Baltic, and from further afield, especially of German merchants and Crusaders. How these peoples interacted and what new identities may have been created is a fruitful area for future research. So too are the interactions between the Sámi and their neighbors in Scandinavia, Finland, and Russia. The use of migration theory, which suggests such things as motivations for migration, information networks, and duration, is also likely to lead to new avenues of research.

A field that is likely to revolutionize our understanding of migrant populations at different times is that of genetics. Previously, there have been difficulties in obtaining uncontaminated samples from ancient skeletons, leading to samples from modern-day populations being used and scholars projecting back. However, it now appears that usable genetic samples from ancient skeletons can be obtained (Töpf et al. 2006). Such samples could be used in conjunction with stable strontium and oxygen isotope analysis from ancient teeth (which allows the location/s of a person during childhood to be determined) and the associated material finds, to provide a more detailed understanding of migrant populations and the creation of group and individual identity. The initial challenge will be to obtain a quantifiable sample of ancient skeletons from new excavations.

Significant improvements in our understanding of the eastern Baltic have occurred since the fragmentation of the Soviet Union, which has allowed scholars in the former Soviet states to investigate their past without political "supervision." The political changes have also facilitated the exchange of research and ideas with colleagues from other countries. This is likely to continue as cultural and linguistic barriers are broken down (Ekdahl 2005). An example of these new possibilities is the Institute of Baltic Sea Region History and Archaeology which has existed since 2003 and is based at Klaipēda University in Lithuania. Collaborators include scholars and institutions from Lithuania, Poland, Germany, Sweden, Russia, Latvia, and Denmark.

Cross-References

- ▶ Burial Mound Dissection in Sweden
- ▶ Cremation in Archaeological Contexts
- ▶ Dating Methods in Historical Archaeology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Early Regional Centers: Evolution and Organization
- ▶ Ethnic Identity and Archaeology
- ▶ Europe Incastellated: Medieval Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Hanse Archaeology
- ▶ Islamic and Crusader Archaeologies
- ▶ Medieval Archaeology
- ▶ Medieval Russia (Rus'), Archaeology of
- ▶ Medieval Urbanism
- ▶ Metal Detecting in Archaeology
- ▶ Scandinavia: Field Methods
- ▶ Scandinavia/Northern Europe: Historical Archaeology
- ▶ Ship Archaeology

References

Bately, J., and A. Englert, (eds.) 2007. *Ohthere's voyages: A late 9th century account of voyages along the coasts of Norway and Denmark and its cultural context*. Maritime culture of the north 1. Roskilde: Viking Ship Museum.

Blomkvist, N. 2004. *The discovery of the Baltic: The reception of a Catholic world-system in the European North (AD. 1075–1225)*. Leiden: Brill.

Broich, J. 2001. The wasting of Wolin: Environmental factors in the downfall of a medieval Baltic town. Beyond local, natural ecosystems. *Environment and History* 7 (2): 187–199.

Edgren. 2009. The Viking Age in Finland. In *The Viking world*, ed. S. Brink and N. Price, 470–484. London/New York: Routledge.

Ekdahl, S. 2005. Crusades and colonization in the Baltic. In *Palgrave advances in the crusades*, ed. H. Nicholson, 172–202. Basingstoke: Palgrave Macmillan.

Englert, A., and A. Trakadas, (eds.) 2009. *Wulfstan's voyage: The Baltic Sea region in the early Viking Age as seen from shipboard*. Maritime culture of the north 2. Roskilde: Viking Ship Museum.

Hedeager, L. 1992. Kingdoms, ethnicity and material culture: Denmark in a European perspective. In *The age of Sutton Hoo: The seventh century in North-Western Europe*, ed. M. Carver, 279–300. Woodbridge: Boydell Press.

Jagodziński, M. 2009. The settlement of Truso. In *Wulfstan's voyage: The Baltic Sea region in the early Viking Age as seen from shipboard*. Maritime culture of the north 2, ed. A. Englert and A. Trakadas, 182–197. Roskilde: Viking Ship Museum.

Jones, S. 1997. *The archaeology of ethnicity: Constructing identities in the past and present*. London: Routledge.

Jöns, H. 2009. Ports and emporia of the southern coast: From Hedeby to Usedom and Wolin. In *Wulfstan's voyage: The Baltic Sea region in the early Viking Age as seen from shipboard*. Maritime culture of the north 2, ed. A. Englert and A. Trakadas, 160–181. Roskilde: Viking Ship Museum.

Markus, F. 2004. *Living on another shore: Early Scandinavian settlement on the north-western Estonian coast* (OPIA 36). Uppsala: Department of Archaeology and Ancient History, Uppsala University.

Näsman, U., and E. Roesdahl. 2003. Scandinavian and European perspectives – Borg l:1. In *Borg in Lofoten: A chieftain's farm in North Norway*, ed. G. Munch, O. Johansen, and E. Roesdahl, 283–299. Trondheim: Tapir Academic Press.

Naum, M. 2012. Ambiguous pots: Everyday practice, migration and materiality. The case of medieval Baltic ware on the island of Bornholm (Denmark). *Journal of Social Archaeology* 12 (1): 92–119.

Sindbæk, S. 2008. The lands of *Denemearce*: Cultural differences and social networks of the Viking Age in South Scandinavia. *Viking and Medieval Scandinavia* 4: 169–208.

Smith, J. 2010. Hanseatic cogs and Baltic trade: Interrelations between trade technology and ecology. *Anthropology Department Theses and Dissertations* (Paper 4). Available at http://digitalcommons.unl.edu/anthrotheses/4. Accessed 21 June 2012.

Svanberg, F. 2003a. *Decolonizing the Viking Age 1*. Acta Archaeologica Lundensia series in 8° 43. Stockholm: Almqvist & Wiksell International.

Svanberg, F. 2003b. *Death rituals in South Scandinavia AD 800–1000*. Decolonizing the Viking Age 2. Acta Archaeologica Lundensia series in 4° 24. Stockholm: Almqvist & Wiksell International.

Töpf, A., M. Gilbert, J. Dumbacher, and A. Hoelzel. 2006. Tracing the phylogeography of human populations in Britain based on 4th–11th century mtDNA genotypes. *Molecular Biology and Evolution* 23 (1): 152–161.

Urbańczyk, P. 2008. Slavic and Christian identities during the transition to Polish statehood. In *Franks, Northmen, and Slavs: Identities and state formation in early medieval Europe*. Cursor mundi 5, ed. I. Garipzanov, P. Geary, and P. Urbańczyk, 205–222. Turnhout: Brepols.

Valk. 2009. The Vikings and the eastern Baltic. In *The Viking world*, ed. S. Brink and N. Price, 485–495. London/New York: Routledge.

Further Reading

Anthony, D. 1997. Prehistoric migration as social process. In *Migrations and invasions in archaeological explanation*. BAR international series 664, ed. J. Chapman and H. Hamerow, 21–32. Oxford: Archaeopress.

Brown, A., and A. Pluskowski. 2011. Detecting the environmental impact of the Baltic crusades on a late-medieval (13th–15th century) frontier landscape: Palynological analysis from Malbork Castle and hinterland, northern Poland. *Journal of Archaeological Science* 38 (8): 1957–1966.

Ecology of Crusading. n.d. Available at http://www.ecologyofcrusading.com/index.html. Accessed 29 June 2012.

Hedeager, L. 2009. Scandinavia before the Viking Age. In *The Viking world*, ed. S. Brink and N. Price, 11–22. London/New York: Routledge.

Institute of Baltic Sea Region History and Archaeology. n.d. Available at http://briai.ku.lt/naujienos. Accessed 30 June 2012.

Iregren, E. 1989. Under Frösö kyrka – ben från en vikingatida offerlund? In *Arkeologi och religion. Rapport från arkeologidagarna 16–18 januari 1989*. Institute of Archaeology, report series 34, ed. L. Larson and B. Wyszomirska, 119–133. Lund: Arkeologisk institutt, Universitetet i Bergen.

Jorgensen, L. 2009. Manor, cult and market at Lake Tissø. In *The Viking world*, ed. S. Brink and N. Price, 77–82. London/New York: Routledge.

McLeod, S. 2008. Know thine enemy: Scandinavian identity in the Viking Age. In *Vikings and their enemies: Proceedings of a symposium held in Melbourne 24 November, 2007*, ed. K. Burge, 3–16. Melbourne: Viking Research Network.

Müller-Wille, M. 1993. Hedeby. In *Medieval Scandinavia: An encyclopedia*. Encyclopedias of the Middle Ages, ed. P. Pulsiano, 273–275. New York: Garland.

Słupecki, L. 1994. *Slavonic pagan sanctuaries*. Warsaw: Institute of Archaeology.

Wilson, D. 2009. The development of Viking art. In *The Viking world*, ed. S. Brink and N. Price, 323–338. London/New York: Routledge.

Scandinavia/Northern Europe: Historical Archaeology

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Introduction

The regional term Scandinavia/Northern Europe can be defined in different ways but is used here to

refer to the present-day Nordic countries which include the Scandinavian states of Denmark, Norway, and Sweden, along with Iceland and Finland. The Faroe Islands and Greenland are autonomous parts of the Danish realm, whereas the Åland Islands in the Baltic Sea comprise an autonomous province of Finland.

The beginning of the historical period in the Nordic world is conventionally set around the turn of the second millennium CE. However, the number of Scandinavian written documents is rather limited especially before the fourteenth century, and many regions – as well as many aspects of culture and society – are poorly known from documentary sources well into the late medieval and even postmedieval period. The famous medieval sagas of Iceland represent an early development of historical narrative in the Nordic world.

The transition to the historical period in the Nordic world was associated with Christianization and the formation of the Scandinavian kingdoms of Denmark, Norway, and Sweden. Southern parts of Scandinavia became urbanized and integrated into wider European economic, social, and cultural networks by the fourteenth century, whereas traditional ways of life and thought persisted in more peripheral regions. While Denmark was the dominant Scandinavian power especially in the medieval period, Sweden established itself as a great power in the seventeenth century. Sweden acquired new provinces in addition to its old province of Finland and came to dominate the Baltic Sea region after its successful intervention in the Thirty Years' War (1618–1648), but the Swedish empire collapsed at the beginning of the eighteenth century.

Archaeological research into the historical period Nordic world began in the nineteenth century, and large-scale (rescue) excavations have been conducted since the mid-twentieth century, especially in association with urban redevelopment in historic towns. While the initial interest in churches, palaces, and other high-status or special sites continues, the scope of research has broadened to include all kinds of sites from medieval hamlets to modern ruins, and research topics and approaches have similarly diversified. Traditional descriptive and cultural-historical approaches are still in evidence, but theoretical perspectives have been combined with empirical research increasingly since the 1990s.

Definition

Historical archaeology can be defined in several slightly different ways. In the most general sense, historical archaeology refers to the archaeological study of the historical period which began around CE 1000 in Scandinavia and slightly later in Finland. Historical archaeology can also be understood in methodological terms as a form of archaeology which employs literary and documentary sources (e.g., written narratives, tax records, probate inventories, maps) together with archaeological data. Thus conceived, Nordic historical archaeology includes also the study of Iron Age societies with the help of later documentary sources. The term historical archaeology may also be associated, due to US influence, with the global archaeology of the post-Columbian world, though such usage is not common in the Nordic countries.

Rather than a unified field of study, historical archaeology in the Nordic countries is divided into several chronological and thematic subfields. As elsewhere in Europe, the study of the medieval period has dominated historical archaeology, whereas postmedieval archaeology is a somewhat less established field, albeit of growing interest. On the other hand, the conventional chronological boundaries between the Iron Age and Middle Ages and the medieval and early modern period are also being increasingly ignored in current research.

Thematic specialisms are plentiful in Nordic historical archaeology and include, for example, urban, rural, and maritime archaeology as well as church, industrial, and conflict archaeology. General texts on historical archaeology in the Nordic countries are not available, which in part probably reflects the compartmentalized or dispersed character of the field. Thematic surveys of narrower topics, such as urban archaeology, have been published, but those also vary in scope and geographical and chronological coverage. Although studies in Nordic historical archaeology have

tended to have a regional focus and/or concentrate on particular (types of) sites or classes of material culture, broader perspectives and theoretically informed approaches have been increasingly emerging over the last two or so decades.

While medieval sites are considered protected heritage in the Nordic countries, the heritage status of postmedieval sites is more problematic and subject to discussion and debate. Teaching is given and research conducted in historical archaeology at archaeology departments around the Nordic countries. Additionally, Lund University in Sweden has a chair in medieval archaeology and Aarhus University in Denmark a section for medieval and Renaissance archaeology. There is, at present, little unity in Nordic historical archaeology with regard to research topics or the methodologies and theoretical frameworks employed.

Key Issues and Current Debates

Three broad themes are considered below which illuminate various aspects of historical archaeology in the Nordic countries. A brief survey is necessarily selective and a number of other topics could also be considered central to Nordic historical archaeology. For example, Christianization and the archaeology of churches and other ecclesiastical sites have been of much interest and caused debate for over a century. Maritime archaeology with its many dimensions, from the excavation of shipwrecks to the study of coastal landscapes, could similarly be identified as a key issue, although it is referred to only in passing below.

Urban Archaeology

Urban archaeology is one of the main fields of historical archaeology in the Nordic countries. The interest in urban sites reflects, first, the significance of towns in large-scale transformations of Nordic societies from the early medieval to the industrial period, that is, the Europeanization and modernization of the Nordic world. Second, urban sites have been subject to extensive fieldwork due to urban redevelopment since mid-twentieth century, which has produced rich and large assemblages of archaeological data. Important excavations have been conducted in, for example, Lund in Sweden, Trondheim in Norway, and Turku (Åbo) in Finland.

There were a few urban-like central places in Scandinavia during the Viking Age, but urbanization really began with state formation early in the second millennium CE. There were some 175 towns in the Nordic world in the Middle Ages, concentrated mainly in Denmark and southern Sweden. There were important towns also in Norway, a few in the Swedish province of Finland, and none in Iceland. All medieval towns were located in southern parts of Scandinavia, that is, south of the Trondheim-Gävle-Ulvila (Ulfsby) line (see further, e.g., Andrén 1989).

Archaeological interest has traditionally focused on earlier phases of towns, and the research has sought, for example, to reconstruct changes in urban space in relation to broader economic, political, and other historical developments. In addition to conventional cultural-historical approaches, theoretically aware interpretive approaches to built environments have been adopted since the 1990s especially in Sweden but also in other Nordic countries (e.g., see various papers in Ersgård et al. 1992; Andersson et al. 1997; Immonen et al. 2007). Such studies have often focused on social and power relations and how they were expressed in urban or other built environments. For example, the research on the extensively excavated Archbishop's Palace in Trondheim, Norway, has provided insights into the relationship between monumental architecture and power from the late medieval period to the Reformation. The research has explored how changes in the organization and structure of the palace, and craft production within it, were dynamically linked to historical processes and how the architecture of the palace mediated broader social and cultural transformations in the turbulent times of the medieval-early modern transition (Saunders 2002).

Hanseatic trade and German influence on Scandinavia have attracted much interest in Nordic medieval archaeology. German merchants controlled trade in the Baltic Sea and arguably had a major impact on the development of Nordic

urban culture (see, e.g., Gaimster 2005). The intensification of trade and German influence is in evidence not only in towns but also in more peripheral regions beyond the urban zone, as manifested in, for example, increased coin finds and emergence of market places in the northernmost coastal region of the Baltic Sea.

Early modern towns are also being archaeologically studied, especially in Sweden and Finland. The seventeenth century was a time of urban development in the kingdom of Sweden. A number of new towns were founded by the Crown in previously nonurban regions, and old towns were reorganized in grid plan, following Renaissance ideals of urban planning. Research has been done, for example, in Göteborg in southwestern Sweden and the small town of Tornio (Torneå) in northern Finland. Archaeological study of postmedieval towns is very limited in Denmark and Norway, but some research has recently been conducted on eighteenth-century deposits in Copenhagen harbor (Høst-Madsen 2005). Some research has also been undertaken in the capital of Iceland, Reykjavik, founded in the late eighteenth century.

Colonization and Colonialism

Although the historical core areas of the Nordic world are located in the southern and western parts of Scandinavia, the north and its resources attracted increasing interest since the early medieval period. Farming settlement spread toward the north from the early second millennium onward. The medieval expansion of farming settlement into northern parts of Sweden and Finland is poorly known archaeologically, although some important sites have been studied. For example, the site of Kainuunkylä-Hietaniemi just south of the Arctic Circle on the Swedish-Finnish border has produced evidence of an early phase of the southern colonization of the north. There was also a market place and non-Christian burials at the site (Wallerström 1995).

Although the northern periphery lacked actual towns, there were market places across the northern fringe of Europe. Archaeological research has been conducted at, for example, Gásir in Eyjafjörður (Iceland), Vågan in Lofoten (Norway), and Haminasaari in Kemi (Finland). Recent research on the so-called multiroom houses in northernmost Arctic Norway has also produced interesting results on economic intensification and intercultural contacts in northernmost Europe during the medieval period (Olsen et al. 2011).

In addition to fish and fur, northern mineral resources were also of interest to the Scandinavian states. The great mine of Kopparberg in Falun, south-central Sweden, is a particularly famous medieval and early modern mining complex, and today a UNESCO World Heritage site, but mines and forges were also established in the northern fringes of the Swedish realm, and the sites of Silbojokk and Kvikkjokk in Swedish Lapland have also been archaeologically studied. Archaeological research has also been undertaken on later mining communities elsewhere in Sweden (e.g., Svensson et al. 2009).

Archaeology of the Modern World

The transitional period between the medieval and early modern period, from the fifteenth to seventeenth century, is today an accepted part of Nordic historical archaeology as something of a chronological extension to medieval archaeology. Fieldwork at urban and other multi-period sites, for example, has produced archaeological material also from later historical periods which has so far been little studied, although there are important exceptions (e.g., Rosén 2004; Lucas 2009). Archaeological research focusing specifically on the postmedieval processes of modernization and modernity is relatively scanty but attracting increasing interest (e.g., Lihammer and Nordin 2010).

Although the modern world has until recently received limited attention within Nordic historical archaeology, younger industrial and military sites in particular have been documented and excavated for some time. In Finland, for instance, the national heritage agency has documented WWI fortifications around the Finnish capital, Helsinki, and fieldwork has occasionally been conducted also at WWII sites. Although the fieldwork at modern sites has often been motivated by cultural heritage management, academic research is now

also engaging with twentieth-century military sites. For example, some research has recently been done on the landscapes, materiality, and archaeology of WWII German sites in Finland and Norway (e.g., Seitsonen and Herva 2011). Likewise, the study of modern ruins from an archaeological perspective has recently begun in Norway and Iceland.

Future Directions

Future challenges in Nordic urban archaeology will include, for example, understanding how changes in urban environments were linked to broader transformations in ways of life and thought in early modern towns. The local character and diversity of urban life also remain to be properly appreciated; urban experience in southern urban centers was presumably quite different from small peripheral towns (cf. Herva 2010).

While aspects of trade have been central to Nordic urban and historical archaeology, consumption studies have also emerged since the 1990s. The consumption models initially adopted from Anglo-American historical archaeology may not be directly applicable to the early modern Nordic world, and especially its more peripheral regions. The importance of the local cultural background and context of consumption is being increasingly appreciated today, as indicated, for instance, by recent research on artifact biographies in the seventeenth-eighteenth-century town of Tornio (Herva and Nurmi 2009) or the ceramic revolution in nineteenth-century Iceland (Lucas 2010).

Equally, although Sámi archaeology is an established field of study in Norway, Sweden, and Finland, researchers have yet to truly engage with the Sámi past in terms of colonialism, and within the framework of the archaeology of colonialism, which has emerged as a key topic in current world historical archaeology. Specifically, the expansion of farming settlement and the exploitation of northern resources resulted in increased contacts with the indigenous Sámi who inhabited northern parts of Fennoscandia and became subject to Scandinavian colonialism. The southern colonization and colonialism of northern Fennoscandia came to have a long-standing impact on the Sámi which is still felt today in many ways, including a continuing debate on land ownership in traditional Sámi homelands and the repatriation of Sámi cultural heritage (e.g., Mulk 2009). Much more research on the archaeology of these processes is needed, however.

Sweden and Denmark engaged also in global colonial pursuits, albeit in small scale. Denmark came to dominate Iceland and Greenland and established colonies also in Africa and the Caribbean, whereas the most well-known (albeit short-lived) Swedish colony was established in Delaware. Limited archaeological research has been done on Scandinavian overseas colonies, but they have recently become of increased interest among Nordic archaeologists (e.g., Immonen 2012; Nordin 2012).

Finally, the archaeology of the contemporary and recent past is a new branch of study in Nordic historical archaeology, but a Swedish language introduction to the field has recently been published (Burström 2007). Although still a contested field, the increasing archaeological study of the later historical times suggests a degree of liberation from the so-called tyranny of historical sources which has always overshadowed historical archaeology in the Nordic countries and beyond. Theoretical advances in archaeology and material culture studies have provided historical archaeology with new perspectives and approaches for addressing issues which are pertinent to the emergence and development of the modern world in the last half-millennium. In all these areas, the historical archaeology of the Nordic countries can offer "a view from the periphery" on modernization and its archaeological study.

Cross-References

► Colonial Encounters, Archaeology of
► Contemporary Past, Archaeology of the
► Hanse Archaeology

▶ Scandinavia and the Baltic Sea Region: Medieval Archaeology
▶ Sweden: Cultural Heritage Management

References

Andersson, H., L. Ersgård, and P. Carelli, eds. 1997. *Visions of the past: Trends and traditions in Swedish medieval archaeology*. Lund: University of Lund.

Andrén, A. 1989. State and towns in the middle ages: The Scandinavian experience. *Theory and Society* 18: 585–609.

Burström, M. 2007. *Samtidsarkeologi: introduktion till ettforskningsfält*. Lund: Studentlitteratur.

Ersgård, l., M. Holmström, and K. Lamm, eds. 1992. *Rescue and research: Reflections of society in Sweden700–1700*. Stockholm: Riksantikvarieambetet.

Gaimster, D. 2005. A parallel history: The archaeology of Hanseatic urban culture in the Baltic c. 1200–1600. *World Archaeology* 37: 408–423.

Herva, V.-P. 2010. Buildings as persons: Relationality and the life of buildings in a northern periphery of early modern Sweden. *Antiquity* 84: 440–452.

Herva, V.-P., and R. Nurmi. 2009. Beyond consumption: Functionality, artifact biography and early modernity in a European periphery. *International Journal of Historical Archaeology* 13: 158–182.

Høst-Madsen, L. 2005. Eighteenth-century Copenhagen viewed from a refuse dump. *Post-Medieval Archaeology* 39: 311–322.

Immonen, V. 2012. Farming and brass kettles as forms of colonial encounter: New Sweden from an archaeological perspective. *Scandinavian Studies* 83: 365–386.

Immonen, V., M. Lempiäinen, and U. Rosendahl, eds. 2007. *Hortus novus: Fresh approachesto medieval archaeology inFinland*. Turku: The Society for Medieval Archaeology in Finland.

Lihammer, A., and J. Nordin, eds. 2010. *Modernitetens materialitet: arkeologiska perspektivpå det moderna samhälletsframväxt*. Stockholm: Statens historiska museum.

Lucas, G. 2009. The tensions of modernity: Skálholt during the 17th and 18th centuries. *Journal of the NorthAtlantic* 2: 75–88.

Lucas, G. 2010. The ceramic revolution in Iceland 1850-1950. In *Table settings: The material culture and social context of dining, AD 1700–1900*, ed. J. Symonds, 125–132. Oxford: Oxbow Books.

Mulk, I.-M. 2009. Conflicts over the repatriation of Sami cultural heritage in Sweden. *Acta Borealia* 26: 194–215.

Nordin, J. 2012. Embodied colonialism: The cultural meaning of silver in a Swedish colonial context in the 17th century. *Post-Medieval Archaeology* 46: 143–165.

Olsen, B., P. Urbanzcyk, and C. Amundsen, eds. 2011. *Hybrid spaces: Medieval Finnmarkand the archaeology of multi-room houses*. Oslo: Novus.

Rosén, C. 2004. *Stadsbor och bönder: materiellkultur och social statusi Halland från medeltidtill 1700-tal*. Stockholm: Riksantikvarieämbetet.

Saunders, T. 2002. Power relations and social space: A study of the late medieval Archbishop's palace in Trondheim. *European Journal of Archaeology* 5: 89–111.

Seitsonen, O., and V.-P. Herva. 2011. Forgotten in the wilderness: WWII German PoW camps in Finnish Lapland. In *Archaeologies of internment*, ed. A. Myers and G. Moshenska, 171–190. New York: Springer.

Svensson, e., S. Bodin, H. Hulling, and S. Pettersson. 2009. The crofter and the iron works: The material culture of structural crisis, identity and making a living on the edge. *International Journal of Historical Archaeology* 13: 183–205.

Wallerström, T. 1995. *Norrbotten, Sverige och medeltiden: problem kring makt ochbosättning i en europeiskperiferi*. Lund: Almqvist & Wiksell International.

Scandinavia: Field Methods

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Introduction

Scandinavian archaeology has been influenced by three important factors: its embrace by the state, its terrain, and its methodological innovations. The position of Scandinavian archaeology within the state administration descends from the frequent, long, and bloody conflicts between Denmark-Norway and Sweden-Finland. The number of monuments that could be claimed was instrumental in the diplomatic game of the day: the most venerable history gave a higher ranking at peace negotiations. In short, Scandinavian archaeology is the offspring of an "antiquarian arms race." The Danish legal tradition goes back as far as medieval times: all "treasure" found is the property of the King, while in the Swedish tradition, which has been a reference for both the Norwegian and Finnish legislation, sites and monuments belong to the state. Sites and monuments are to be protected or, if this not being possible, recorded professionally, thus making it a public responsibility to maintain a body of archaeologists. The overwhelming majority of excavations

Scandinavia: Field Methods, Fig. 1 A large-scale excavation of the medieval village of Örja, just outside Landskrona, Sweden (Photo by Thomas Hansson, Swedish National Heritage Board)

are performed within this legal administration, resulting in large-scale archaeological projects, today aided by digital recording (Fig. 1).

Key Issues/Current Debates/Future Directions/Examples

Archaeological deposits in Scandinavia vary from Paleolithic deposits and large Mesolithic dwelling sites of the Ertebølle culture, to the heaped clay Bronze Age burial mounds of Jutland ("the mound people," Glob 1974), to large-scale settlements, votive deposits in bogs, ship burials, shipwrecks, and large-scale central places of the Iron Age to early trading and manufacturing centers of the Viking Age. In upland areas, settlements and burial mounds remain visible above ground level. In lowland areas, they have been located by intensive surveys (Welinder 2009).

Scandinavian innovations include the development of typology, large-scale survey, and different approaches to excavation. Typology became something of a Scandinavian speciality, starting with C.J. Thomsen's (1788–1865) presentation of the "three-age system," i.e., the division of prehistory into the Stone, Bronze, and Iron Ages, which was developed indirectly from the taxonomy developed by C. Linnaeus and his disciples. The system was gradually refined during the course of the nineteenth century by, among others, J.J Worsaæ (1821–1885), S. Müller (1846–1934), and B.E. Hildebrand (1806–1884). Particularly influential was the concept of chronological evolution to explain the changing forms of artifacts by O. Montelius (1843–1921) (Fig. 2).

Since all archaeological remains were (and are) regarded as the cultural property of the state, large-scale surveys pursued the goal of total record. This has empowered geographical methods of historical analysis, such as Bjørn Myhre's early medieval kingdoms in Norway, drawn by Thiessen polygons from hierarchies of burials, ship-sheds, and hill forts (1987), and Åke Hyenstrand's use of Sweden's Ancient Monuments Register for tracing regions and socio-economical systems (Hyenstrand 1984).

In excavation, Scandinavian archaeologists have been influenced by both the German approach, which divides a deposit into horizontal and vertical slices ("schnitt"), and the British, which gives primacy to the stratification. However, it was the pioneering work of Gudmund Hatt and C.J. Becker in the 1930s and 1940s that led to the development of large-scale open area excavations. These were applied in particular to prehistoric and medieval settlements where survival may be little more than postholes and ribbons of small stones left by turf and timber buildings. These techniques were taken up in Britain and spread widely in Europe. On site pioneering methodologies by Scandinavian

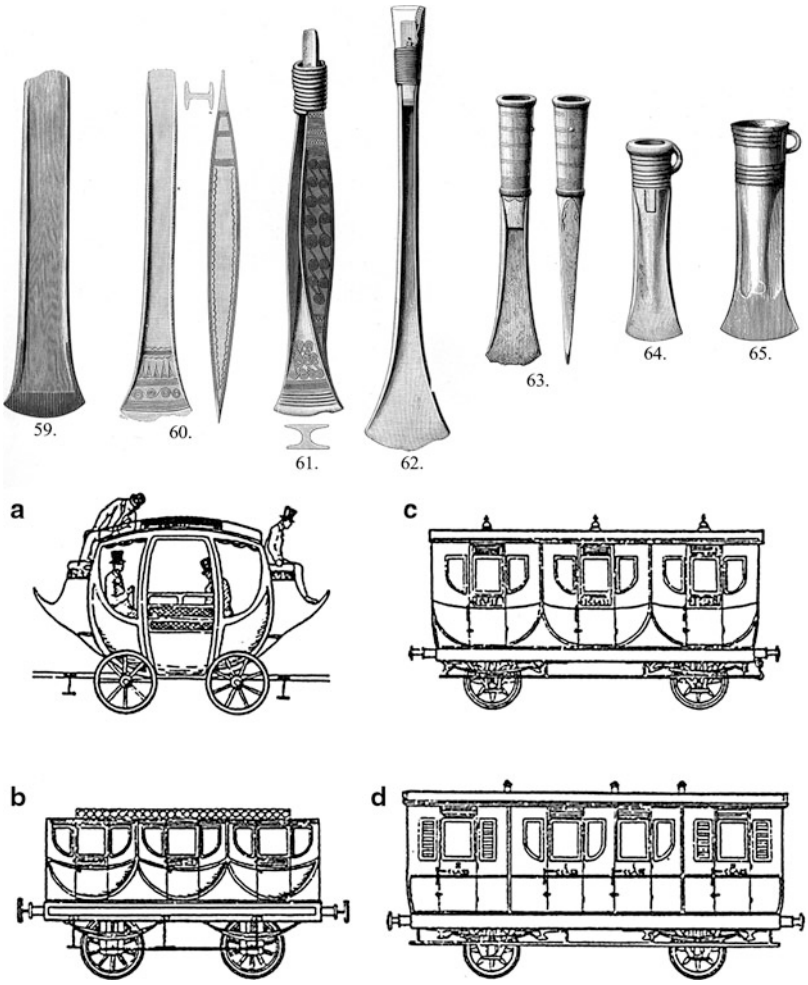

Scandinavia: Field Methods, Fig. 2 Oscar Montelius (1843–1921) used the evolution of carriages, from horse drawn to railway, to illustrate how artifacts develop through time. The method allows an artifact type, and assemblages of artifacts, to be assigned to a particular period

archaeologists include the excavation of huge preserved timber ships and their contents from mounds at Gokstad and Oseberg (see Gansum 2004), the recovery and analysis of bog bodies (Asingh and Lynnerup 2007), and the lifting of an entire *burial chamber* at Medelpad, Sweden, in 1952. Modern pioneers have been contributing in particular to the development of methods of electronic *remote mapping*.

Cross-References

- ▶ Burial Mound Dissection in Sweden
- ▶ Nondestructive Subsurface Mapping in Field Archaeology

References

Asingh, P., and N. Lynnerup, eds. 2007. *Grauballe Man. An Iron Age bog body revisited*. Højbjerg: Jutland Archaeological Society & Moesgaard Museum.

Gansum, T. 2004. *Hauger som konstruksjoner – arkeologiske forventninger gjennom 200 år*, GOTARC Series B, Gothenburg Archaeological Theses. Gothenburg: Gothenburg University.

Glob, P.V. 1974. *The mound people. Danish Bronze-Age man preserved*. London: Faber & Faber Ltd.

Hyenstrand, Å. 1984. *Fasta fornlämningar och arkeologiska regioner*. Stockholm: Riksantikvarieämbetet. (in Swedish).

Myhre, B. 1987. Chieftain's graves and chiefdom territories in South Norway in the migration period. *Studien zur Sachsenforschung* 6: 169–187.

Welinder, S. 2009. *Sveriges Historia. 13000 f.Kr. – 600 e. Kr.* Stockholm: Norstedts.

Scanning Electron Microscopy (SEM): Applications in Archaeology

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Introduction

Scanning electron microscopy (SEM; this acronym is used for both the instrument itself and the technique) has been broadly used in archaeology for over four decades. The SEM is capable of two basic functions: imaging and providing compositional information. Consequently, it has been utilized for nearly every archaeological application in which one wishes to examine magnified images of a specimen and/or determine its composition on a microscopic scale, everything from determining the raw-material sources of stone tools to examining the five-millennia-old skin of Ötzi the Iceman.

All SEMs permit one to acquire highly magnified images of a specimen. The range of magnifications possible is much greater with SEM than with visible-light microscopy (VLM). Depending on the instrument, the magnification can be adjusted as low as 5X (equivalent to a hand lens) and as high as 200,000X (roughly 100 times better than a powerful VLM) or more. SEM also offers a much greater depth of field than VLM (roughly 300 times better), meaning that more of the specimen will appear in focus.

Most contemporary SEMs are also outfitted to measure the elemental composition of the specimen based on the X-rays emitted under electron bombardment. A closely related technique, which developed alongside SEM, is electron microprobe analysis (EMPA; this acronym is also used for the instrument). Figure 1 illustrates the major systems of SEM and EMPA.

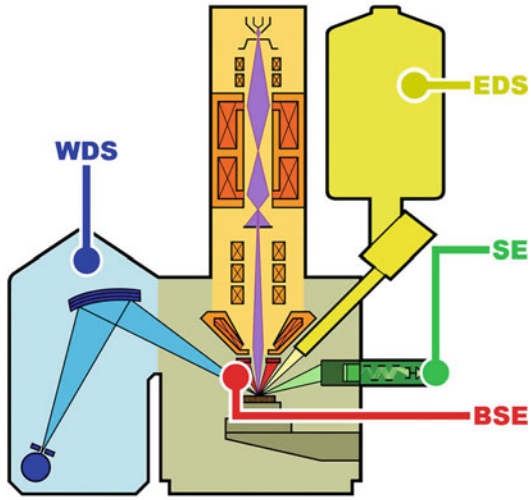

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 1 Simplified schematic of a typical SEM and EMPA. The beam (purple) is generated in the electron column (orange) and focused onto a specimen (brown) in the chamber (tan). The secondary-electron (SE) detector is green, and the backscattered-electron (BSE) detector is red. X-rays from a specimen are measured by an energy-dispersive spectrometer (EDS; yellow) and, in the EMPA, wavelength-dispersive spectrometers (WDSs; blue). (Image by Ellery Frahm)

Definition

At the top of the SEM is an "electron gun," which produces a beam of electrons and accelerates them toward a specimen. The electron beam is focused onto a specimen by a series of apertures and electromagnetic lenses. The beam rasters across the specimen to produce an image, much like a CRT-based television set. This process ordinarily occurs under a high vacuum to avoid beam scattering by air molecules and other effects.

When the electrons strike a specimen, a wide variety of information-bearing signals is produced. Some of these signals are useful for imaging. Others may be used for compositional or microstructural analysis, provided the appropriate detectors are present.

One imaging signal is the emission of secondary electrons (SEs). SEs have low energies, so only those emitted within nanometers of the specimen surface can escape. Therefore, SEs are sensitive to the specimen's topography and are useful for imaging surface details. Many people have seen examples of these images: microscopists frequently use SE images of spiders, table salt crystals, or pollen as examples of SEM images.

Backscattered electrons (BSEs) offer another way to image a specimen. BSEs are beam

electrons that have "ricocheted" out of the specimen. They have much higher energies than SEs and are less affected by topography. Instead, BSEs are strongly affected by the atomic number of the elements in a specimen. The dependence on atomic number is used to produce images that show compositional contrast (although there is also a topographic component to BSE images for non-flat specimens). BSE images have bright areas where the mean atomic number is higher and dark areas where it is lower (Fig. 2).

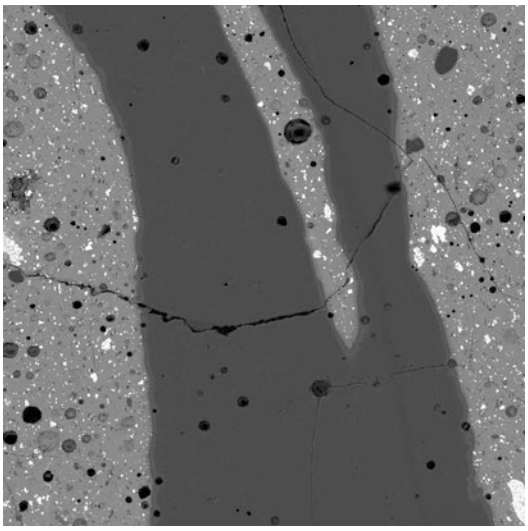

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 2 A BSE image shows the interfaces between two distinct glasses used to manufacture an East Java mosaic bead. The glass that contains lead oxide as an opacifier appears lighter in this image. The field of view is 2 mm across. (Image by Ellery Frahm)

Contrast in BSE images, though, reveals only relative differences in composition. The elements present cannot be identified without measuring their X-ray emissions. Characteristic X-rays have wavelengths and energies unique to the elements from which they are emitted, and they are measured using X-ray spectrometers to determine a specimen's elemental composition.

Modern SEMs are commonly outfitted with energy-dispersive spectrometers (EDS) to measure such X-rays (Fig. 3). EDS is also sometimes abbreviated as EDX, EDXA, or the trade name EDAX. In SEM-EDS, one searches for and measures the intensity of characteristic X-rays at energies which correspond to elements within a specimen. EDS spectra, though, suffer from overlapping X-ray peaks for some elements, and the system is usually not sensitive enough to measure the tiny signals produced by trace elements.

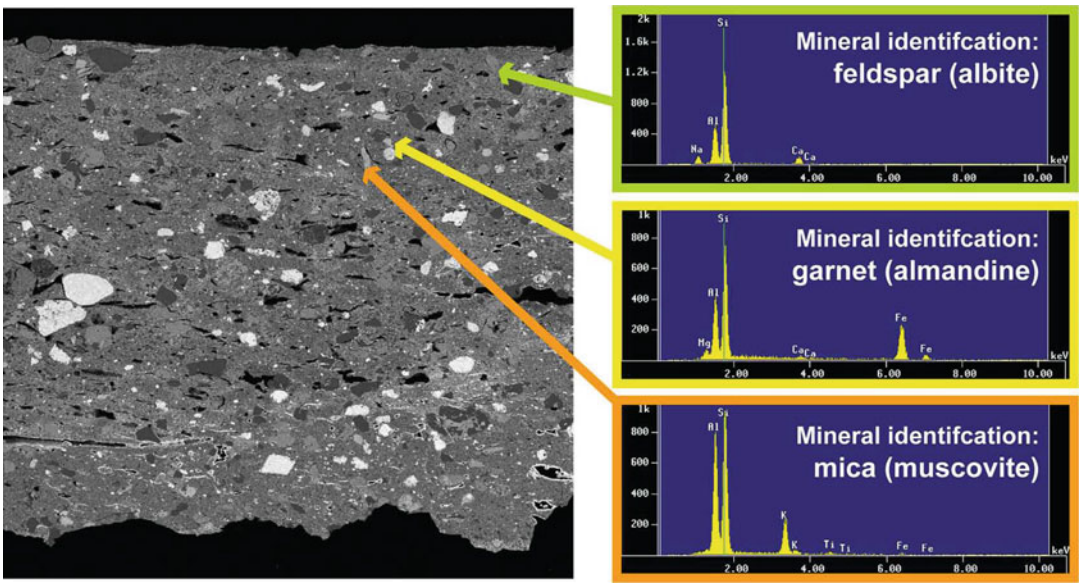

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 3 A BSE image of a ceramic sherd (Khabur ware from Tell Mozan, Syria) and the EDS spectra of three mineral inclusions. The field of view is 8 mm across. (Image by Ellery Frahm)

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Characteristic X-rays are measured differently in electron microprobe analysis (EMPA). An electron microprobe is outfitted with several wavelength-dispersive spectrometers (WDS). EMPA-WDS differentiates X-rays by wavelength, rather than energy, for more precise measurements. Like an SEM, a microprobe has also EDS, and it can acquire highly magnified images of a specimen.

SEM-EDS and EMPA-WDS are both spot techniques, meaning the electron beam is focused on a spot and elemental composition is measured for only a small volume, just a few cubic micrometers, not the full specimen. This permits one to obtain highly localized data and to analyze specimens so small that they cannot be studied using other techniques. It also permits one to measure the elemental variation across a specimen surface. Thus, SEM-EDS and EMPA-WDS are well suited to study mixtures, that is, specimens with mixed components (e.g., ceramics, glasses, rocks, slags). Element distributions can be mapped using SEM-EDS or EMPA-WDS, yielding an image constructed from a grid of X-ray measurements (Figs. 4, 5, and 6).

Nonconductive specimens (i.e., nonmetals) must be coated with an ultrathin layer (about 100 Å) of a conductive material, normally gold or carbon, to prevent an electric charge from building up on the specimen surface. This coat can be later removed from many specimens.

Historical Background

The earliest commercial SEM model, the Stereoscan, was developed at Cambridge University and sold by Cambridge Scientific Instrument Company. The first batch in 1965 consisted of five instruments. Within 3 years, 100 SEMs were sold each year. It was at this time that paleoecologist Jonathan Pilcher (1968) published one of the first papers to apply the technique to archaeology. In particular, he used SEM to observe and identify pollen as a means of ecological reconstruction. The next year, archaeologist Don Brothwell (1969) at the British Museum discussed the advantages of SEM for examining such archaeological materials as ancient bone and teeth, fibers, botanical remains, and lithics.

By 1985, about 13,000 SEMs had been sold worldwide, and the technique was frequently used to observe the archaeological materials discussed by Brothwell. A year later, the "Scanning Electron Microscopy in Archaeology" conference was held at the University of London, and the proceedings were published in a book edited by Sandra Olsen (1988). Due to advancements in SEM over the last two and a half decades, particularly regarding hardware and performance as well as data processing, these 1986-era papers are showing their age and nearing obsolescence.

Key Issues

Recent Developments

The instruments discussed at the 1986 London conference date to the 1970s and early 1980s, and SEMs have advanced considerably since the publication of Olsen (1988). For example, most of the backscattered-electron (BSE) detectors in that volume are now obsolete. In a modern SEM, there is a newer type of dedicated BSE detector that offers images superior to those one will see in older publications. Secondary-electron (SE) imaging has improved due to the development and popularity of a new type of electron gun. This new electron gun, known as a field-emission gun (FEG), enables higher-resolution imaging due to an even smaller beam diameter. As a result, the resolution in a modern research-grade SEM is about 2 nm, an order of magnitude better than two decades ago.

Digital imaging is another major advancement. In earlier decades, photographs were taken of high-resolution CRT screens. Now images are captured, stored, and processed digitally.

Another recent development is imaging at reduced vacuums (i.e., closer to atmospheric pressures), called environmental SEM (ESEM; also sometimes called variable-pressure SEM). Additional air within the specimen chamber reduces the electrical charging of nonconductive specimens so that coating with carbon or gold is often unneeded.

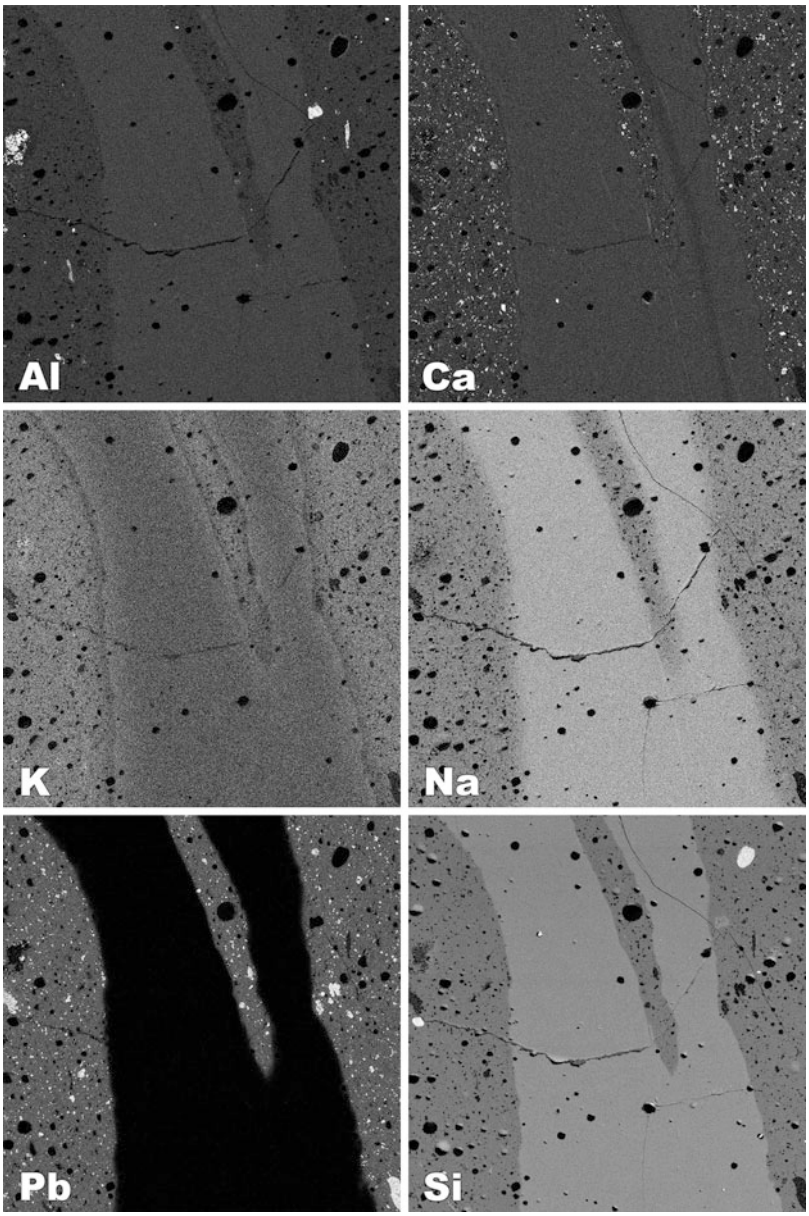

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 4 Element maps of the same area as Fig. 2. These maps show how the two glasses differ in the concentrations and spatial distributions of six elements. The lighter areas have a higher concentration of the element than the darker areas. It is clear that one of these glasses contains lead oxide as an opacifier, whereas the other glass does not. (Images by Ellery Frahm)

The last few years have seen the introduction by several manufacturers of so-called "tabletop" SEMs. These instruments currently are not what microscopists would consider "research grade," but their lower purchase and maintenance costs as well as their smaller sizes and relative portability are quite attractive for archaeological applications. As a trade-off, their capabilities are limited (e.g., magnification) and highly variable from model to model. Only a few tabletop SEMs have EDS systems.

In addition, SEM-EDS is often used today in conjunction with other analytical techniques not readily available to archaeologists in 1986. SEM-EDS (and EMPA-WDS) data, for example, are often used to calibrate LA-ICP-MS measurements.

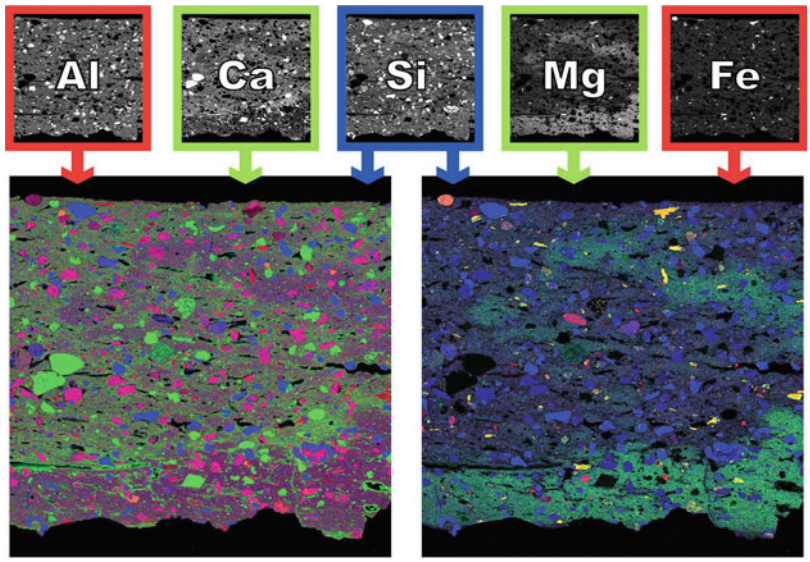

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 5 An example of how element maps can be combined into red-green-blue (RGB) maps to highlight compositional differences in a specimen. The sherd and area shown are the same as Fig. 3. When overlaid, these maps show the abundance, variety, and distributions of different minerals as well as elemental variations within the clay itself. (Image by Ellery Frahm)

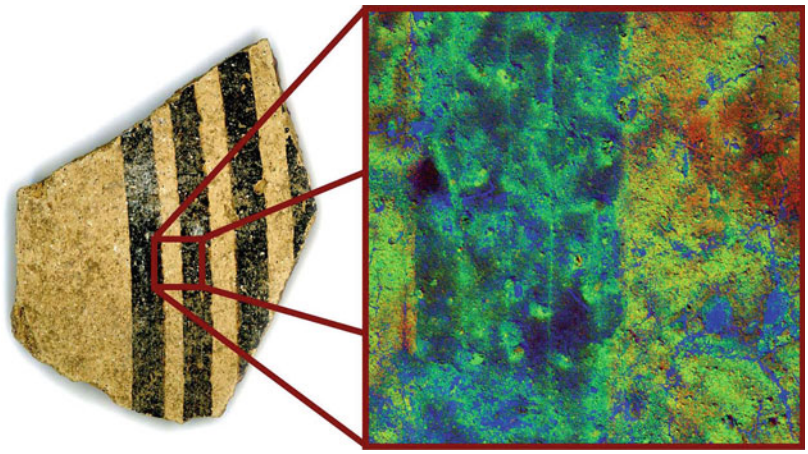

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 6 An RGB element map shows the compositional differences between the slip and paint on this sherd (the same ware as Figs. 3 and 5). The map also reveals a series of incised lines not apparent to the naked eye. (Images by Ellery Frahm)

Current Applications

SEM-EDS is one of the most versatile analytical techniques in archaeology, applicable to the study of a wide range of inorganic and organic artifacts and archaeological materials. Only a very few of these applications can be considered here.

SEM imaging and analysis is experiencing a renaissance in all fields of archaeological obsidian studies. Geochronologists often use SEM-EDS and EMPA-WDS to analyze volcanic glass shards and chemically match them to a specific volcanic eruption. This dating procedure, called tephrachronology, is quite similar to obsidian sourcing, so it is not surprising that SEM-EDS can also be useful for analyzing obsidian. After brief experiments with mixed results during the 1980s, archaeologists have recently returned to SEM-EDS as an obsidian sourcing technique. Due to advancements over the last two decades, the results have been promising, especially in the Western Mediterranean (Le Bourdonnec et al. 2006). SEM has been suggested as a way to improve obsidian hydration dating by eliminating the problematic reliance on VLM (Kayani and McDonnell 2008). It has also been utilized for use-wear analyses of Mexican obsidian scrapers (Mandujano et al. 2002).

Artificial glasses, which are typically mixtures, are also well studied by SEM-EDS. For example, Heck and Hoffmann (2000) used this technique to analyze the glass matrix and identify the colorants and opacifiers of Merovingian beads. Bronk and Freestone (2001) took advantage of this spot-analytical technique to analyze submillimeter-sized fragments sampled from glass artifacts with only minimal damage. Weathering and corrosion of Sassanian glass artifacts from Iraq have also been investigated using SEM-EDS (Gulmini et al. 2009).

As mixtures, ceramics are well suited to characterization using SEM-EDS. For instance, SEM-EDS allows tempering materials, such as sands, to be characterized (Fig. 7). Ownby and her colleagues analyzed schist temper in Hohokam ceramic wares and distinguished between schist that naturally occurs in sand and clay versus crushed schist deliberately added as a temper (Ownby et al. 2004). Thin pottery glazes can be studied, and their components, such as opacifiers and colorants, can be identified (Charalambous et al. 2010). Wolf (2002) used SEM-EDS to investigate the production technology of medieval Swiss bricks through examination of their microstructure and mineralogy.

Metallurgy is also well studied by SEM. For example, Giumlia-Mair and her colleagues investigated the Bronze Age metallurgical traditions of the al-Midamman culture in Yemen and contrasted them with Near Eastern traditions (Giumlia-Mair et al. 2000). Experimental alloys, designed to mimic ancient metals, have been examined (Constantinides et al. 2001). Slags can also be characterized by SEM-EDS and the metallurgical processes that produced them identified (Fig. 8), and the analysis of metal ores can complete the picture.

Rocks, minerals, and their products, such as lithics and pigments, can also be studied using SEM. Bustillo and her colleagues used BSE imaging and EDS analysis to classify cherts used in Neolithic Iberia (Bustillo et al. 2009). The

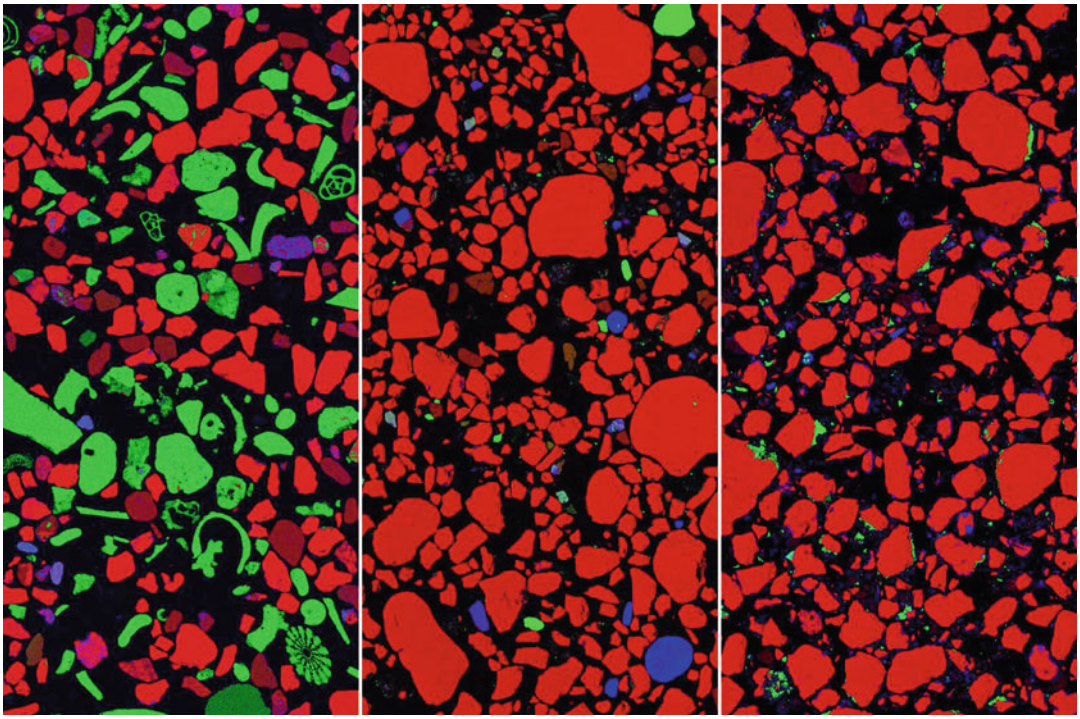

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 7 RGB element maps of sand from Bahrain, Giza, and Petra. Silicon is red, calcium is green, and iron is blue. Examination in the SEM or EMPA reveals differences in the sediment composition, sorting, and roundness. (Image by Ellery Frahm)

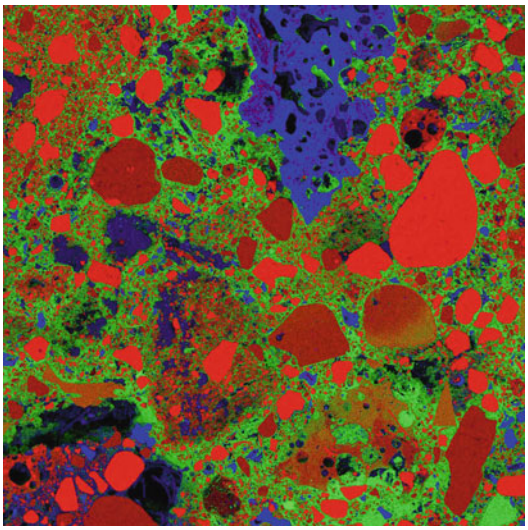

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 8 Excavation of a historic site near downtown Minneapolis turned up slag specimens, which came as a surprise because maps indicate the area was a residential neighborhood during the nineteenth century. Analyses revealed that it was slag from a puddling furnace. Puddling removes excess carbon, silicon, and other impurities from pig iron to make wrought iron. This causes loss of iron to the slag, so the glassy matrix of the slag is iron rich. Iron is green, carbon is blue, and silicon is red. The field of view is 500 μm across. (Image by Ellery Frahm)

imaging capabilities of SEM have been used to study use-wear traces and also investigate lithic reduction techniques. For example, traces of a copper-based point used for pressure flaking have been found on chert blades in the Indus Valley (Méry et al. 2007). Layers of mineral-based pigments and plasters can also be studied with an electron beam that can be focused to microscopic sizes (Damiani et al. 2003).

A wide variety of biological materials, too many to list, can also be studied using SEM. Identifying pollen was one of the earliest archaeological uses (Pilcher 1968). This continues to be a popular application, especially when combined with charcoals and other microbotanical evidence to reconstruct the vegetation history and thus paleoclimate of a region. Teeth and bone are frequently examined by SEM to study diagenesis, pathologies, and other phenomena. Coppa and his colleagues identified in vivo drilling of human teeth using flint tools in Neolithic Pakistan (Coppa et al. 2006). SEM examination of eggshell fragments can permit species identification, and using this technique, Beachan and Durand (2007) found evidence of turkey husbandry over eight centuries ago in the American Southwest.

Future Directions

The future of SEM in archaeology will most likely involve (1) the availability of new detector systems to investigate new problems and (2) advances in "tabletop" SEMs. Regarding the first issue, a system already available on certain SEMs detects the beam electrons that diffract out of a specimen due to its crystalline structure. This phenomenon is known as electron backscatter diffraction (EBSD), and it is just now starting to be applied to archaeological specimens (Peruzzo et al. 2011). Its clearest advantage for archaeologists is being able to distinguish in situ minerals with the same elemental composition but different structures and origins, for example, calcite from limestone or aragonite from shell, both $CaCO_3$ and indistinguishable using EDS in isolation. It is possible that in the future new detectors will be developed that combine the speed of EDS with the precision of WDS.

Regarding the second issue, future "tabletop" SEMs will have fewer limitations than current models and will become even more portable. SEM-EDS and EMPA-WDS were developed during the 1970s, in part, as a way to nondestructively analyze lunar rocks, and new instruments will likely take advantage of research to miniaturize SEMs for future Mars rovers. Just as it seems more practical for NASA to send an SEM to Mars than to bring specimens back to Earth, it will eventually be more practical for archaeologists to bring portable SEMs into the field rather than export artifacts to a laboratory halfway around the world.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Imaging Techniques in Bone Analysis
- ▶ Pigment Analysis in Archaeology

▶ Provenance Studies in Archaeology
▶ Soil Pollen Analyses in Environmental Archaeology
▶ Stone Tool Usewear and Residue Analysis
▶ Technological Studies in Archaeological Science
▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Beachan, E.B., and S.R. Durand. 2007. Eggshell and the archaeological record: New insights into turkey husbandry in the American Southwest. *Journal of Archaeological Science* 34: 1610–1621.

Bronk, H., and I.C. Freestone. 2001. A quasi non-destructive microsampling technique for the analysis of intact glass objects by SEM/EDXA. *Archaeometry* 43: 517–527.

Brothwell, D. 1969. The study of archaeological materials by means of the scanning electron microscope: An important new field. In *Science in archaeology: A comprehensive survey of progress and research*, ed. D. Brotherwell and E. Higgs, 2nd ed., 564–566. London: Thames and Hudson.

Bustillo, M.A., N. Castañeda, M. Capote, S. Consuegra, C. Criado, P. Díaz-Del-Río, T. Orozco, J.L. Pérez-Jiménez, and X. Terradas. 2009. Is the macroscopic classification of flint useful? A petroarchaeological analysis and characterization of flint raw materials from the Iberian Neolithic mine of Casa Montero. *Archaeometry* 51: 175–196.

Charalambous, A.C., A.J. Sakalis, N.A. Kantiranis, L.C. Papadopoulou, N.C. Tsirliganis, and J.A. Stratis. 2010. Cypriot Byzantine glazed pottery: A study of the Paphos workshops. *Archaeometry* 52: 628–643.

Constantinides, I., M. Gritsch, A. Adriaens, H. Hutter, and F. Adams. 2001. Microstructural characterisation of five simulated archaeological copper alloys using light microscopy, scanning electron microscopy, energy dispersive X-ray microanalysis and secondary ion mass spectrometry. *Analytica Chimica Acta* 440: 189–198.

Coppa, A., L. Bondioli, A. Cucina, D.W. Frayer, C. Jarrige, J.-F. Jarrige, G. Quivron, M. Rossi, M. Vidale, and R. Macchiarelli. 2006. Early Neolithic tradition of dentistry. *Nature* 440: 755–756.

Damiani, D., E. Gliozzo, I.M. Turbanti, and J.E. Spangenberg. 2003. Pigments and plasters discovered in the House of Diana (Cosa, Grosseto, Italy): An integrated study between art history, archaeology and scientific analyses. *Archaeometry* 45: 341–354.

Giumlia-Mair, A., E. Keall, S. Stock, and A. Shugar. 2000. Copper-based implements of a newly identified culture in Yemen. *Journal of Cultural Heritage* 1: 37–43.

Gulmini, M., M. Pace, G. Ivaldi, M.N. Ponzi, and P. Mirti. 2009. Morphological and chemical characterization of weathering products on buried Sasanian glass from central Iraq. *Journal of Non-Crystalline Solids* 355: 1613–1621.

Heck, M., and P. Hoffmann. 2000. Coloured opaque glass beads of the Merovingians. *Archaeometry* 42: 341–357.

Kayani, P.I., and G. McDonnell. 2008. The potential of the scanning electron microscope for non-destructive characterisation and hydration-rim dating research. *Archaeological Sciences* 1995: 5–10.

Le Bourdonnec, F.-X., G. Poupeau, and C. Lugliè. 2006. SEM-EDS analysis of western Mediterranean obsidians: A new tool for Neolithic provenance studies. *Comptes Rendus Geoscience* 338: 1150–1157.

Mandujano, C., S. Elizalde, G. Cassiano, and D. Soto. 2002. Provenance and use wears of Pre-Hispanic obsidian scrapers from Metztitlan, Hidalgo, Mexico. *Journal of Radioanalytical and Nuclear Chemistry* 252: 81–88.

Méry, S., P. Anderson, M. Inizan, and M. Lechevallier. 2007. A pottery workshop with flint tools on blades knapped with copper at Nausharo (Indus civilisation, ca. 2500 BC). *Journal of Archaeological Science* 34: 1098–1116.

Olsen, S.L. 1988. *Scanning electron microscopy in archaeology*. Oxford: British Archaeological Reports.

Ownby, M.F., C.L. Ownby, and E.J. Miksa. 2004. Use of scanning electron microscopy to characterize schist as a temper in Hohokam pottery. *Journal of Archaeological Science* 31: 31–38.

Peruzzo, L., F. Fenzi, and P.A. Vigato. 2011. Electron backscatter diffraction (EBSD): A new technique for the identification of pigments and raw materials in historic glasses and ceramics. *Archaeometry* 53: 178–193.

Pilcher, J.R. 1968. Some applications of scanning electron microscopy to the study of modern and fossil pollen. *Ulster Journal of Archaeology*, 3rd series, 31: 87–91.

Wolf, S. 2002. Estimation of the production parameters of very large medieval bricks from St. Urban, Switzerland. *Archaeometry* 44: 37–65.

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Basic Biographical Information

Born in Buenos Aires, Argentina, in 1950, Daniel Schávelzon earned a degree in architecture in the

Faculty of Architecture and Urbanism of the Buenos Aires University (1975). He earned a Master (1981) and Doctorate in Architecture (1984) at the National Autonomous University of Mexico (UNAM). Back in Argentina since 1984, currently, he is higher investigator at the National Council for Scientific and Technological Research (CONICET) and professor at Museo Social Argentino University and at the Faculty of Architecture, Design and Urbanism of Buenos Aires University, where he is the head of the Center of Urban Archaeology. Schávelzon is the director of the Area of Urban Archaeology of the Buenos Aires City Government; emeritus historical adviser of the National Commission of Historical Museums, Monuments and Places; and member of the Academy of History of Buenos Aires and of the ICOMOS Argentine Committee.

He teaches graduate courses and conducts seminars in Argentina and other Latin American universities and frequently serves as mentor, as well as undergraduate and graduate advisor. He has presented more than 180 papers in scientific meetings and gave nearly 170 lectures.

Schávelzon is the author of about 40 books, 200 scientific and divulgation articles, tens of pamphlets and exhibition guides, as well as innumerable mass media articles. His scientific production and his contribution to the preservation of the cultural heritage have received distinctions, scholarships, and prizes both in Argentina and abroad.

Major Accomplishments

The initial years of Daniel Schávelzon's career were dedicated to the study of Mesoamerican pre-Hispanic architecture, mainly in Mexico on subjects of conservation and restoration (Schávelzon 1992). After his return to Argentina, after the military dictatorship ruling the country between 1976 and 1983 was overthrown, Schávelzon's research focused on a new and until then practically unexplored area: Urban Archaeology (Zarankin y Salerno 1997). In 1986, he founded the current Center of Urban Archaeology in the Faculty of Architecture, Design and Urbanism of Buenos Aires University, leading an interdisciplinary group of specialists that has carried out archaeological investigations not only in Buenos Aires city and its vicinity but also in other Argentine cities, with the subsequent study of the archaeological collections (Centro de Arqueología Urbana n.d.). Among others, the Ezcurra House, the Coni Printing House, the Convent of Santa Catalina, Tres de Febrero Park, the Government House and the Town Hall, and several tunnels and underground constructions in Buenos Aires city should be mentioned (Schávelzon 2000a, 2005, among others). Other relevant investigations include the areas of the early foundation of the cities of Mendoza and Puerto Deseado.

Schávelzon has been a precursor in the conservation and analysis of artifacts (ceramics, clay pipes, glasses, metals, etc.) from post-Hispanic archaeological contexts (sixteenth to twentieth century). His publications represent important contributions, and his catalogs are remarkable references (Schávelzon 1991, 2000b, 2001, 2003, among others).

Schávelzon has stimulated the collaboration with research centers of several Argentine provinces and has promoted the formation of local research teams, inspiring the growth and diversification of Historical Archaeology in Argentina and its relations with other Latin American countries (Funari 1997; Gómez Romero 2005; Politis 2003). His assiduous activities in favor of scientific divulgation in newspapers, radio, television, and more recently Internet contribute to increase both general knowledge and public interest about Urban and Historical Archaeology (Schávelzon 2008, n.d.).

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Clay Pipes in Historical Archaeology

▶ Hispanic South America: Historical Archaeology
▶ Historical Archaeology
▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
▶ Modern World: Historical Archaeology
▶ Public Involvement in the Preservation and Conservation of Archaeology
▶ Urban Archaeology

References

Centro de Arqueología Urbana. n.d. Available at: http://www.iaa.fadu.uba.ar/cau/

Funari, P.P. 1997. Archaeology, history, and historical archaeology in South America. *International Journal of Historical Archaeology* 1: 189–206.

Gomez Romero, F. 2005. Introduction: A brief overview of the evolution of historical archaeology in Argentina. *International Journal of Historical Archaeology* 9: 135–141.

Politis, G. 2003. The theoretical landscape and the methodological development of archaeology in Latin America. *American Antiquity* 68: 245–272.

Schávelzon, D. 1991. *Arqueología histórica de Buenos Aires. Volumen I: la cultura material porteña de los siglos XVIII y XIX*. Buenos Aires: Corregidor.

Schávelzon, D. 1992. La conservación del patrimonio cultural en América Latina. Restauración de edificios prehispánicos en Mesoamérica: 1750–1980. *Studies in Conservation* 37 (4): 285–286.

Schávelzon, D. 2000a. *The historical archaeology of Buenos Aires: A city at the end of the world*. New York: Kluwer/Plenum Press.

Schávelzon, D. 2000b. *Historias del comer y del beber: arqueología de la vajilla de mesa en Buenos Aires*. Buenos Aires: Aguilar.

Schávelzon, D. 2001. *Catálogo de cerámicas históricas de Buenos Aires (siglos XVI–XX) con notas sobre la región del Río de la Plata. CD-rom*. Buenos Aires: Fundación para la Investigación del Arte Argentina, Telefónica de Argentina y FADU-UBA.

Schávelzon, D. 2003. *Buenos Aires negra. Arqueología histórica de una ciudad silenciada*. Buenos Aires: Emecé.

Schávelzon, D. 2005. *Túneles de Buenos Aires, historias, mitos y verdades del subsuelo porteño*. Buenos Aires: Sudamericana.

Schávelzon, D. 2008. *Mejor Olvidar: La conservación del patrimonio cultural argentino*. Buenos Aires: Deloscuatrovientos.

Schávelzon, D. n.d. Available at: http://www.danielschavelzon.com.ar/

Zarankin, A., and M. Salerno. 1997. El sur por el sur. Una revisión sobre la historia y el desarrollo de la arqueología histórica en América meridional. *Vestígios* 1: 17–47.

Schiffer, Michael Brian (Modern World)

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Basic Biographical Information

I was born in Winnipeg, Manitoba, Canada, on October 4, 1947, to Louie and Frances-Fera Schiffer. In 1953 we moved to Los Angeles, where I grew up. My parents enjoyed a happy marriage for 63 years and provided a loving home. Neither parent had finished high school, but both were avid readers and instilled in me a love of learning and the expectation that I would attend UCLA.

At UCLA I took classes from Sally and Lewis Binford, James Hill, and James Sackett. During the summer of 1968, prior to my senior year, I attended Paul Martin's summer program at Vernon, Arizona, whose staff included Fred Plog, Mark Leone, and Ezra Zubrow. These undergraduate experiences familiarized me with processual archaeology, which I expected to practice in graduate school. On December 22, 1968, I married Annette Leve, who remains my lover and best friend. Annette and I have two sons, Adam Joseph and Jeremy Alan, of whom we are very proud.

Turning down generous fellowships at Michigan and UCLA, I attended graduate school at the University of Arizona. During graduate studies, I became disenchanted with the processual approach to inference and, especially, its inept handling of the formation processes of the archaeological record. Also while a graduate student, I collaborated with J. Jefferson Reid and William Rathje to create the research program known as behavioral archaeology, which privileges the study of relationships between human behavior and material culture in all times and all places. These emphases resulted in a Ph.D. dissertation (1973) that became, after much revision, *Behavioral Archaeology* (Schiffer 1976).

In my first job, with the Arkansas Archaeological Survey, I learned about Cultural Resource Management (CRM) from Charles McGimsey and Hester Davis. This experience eventuated in a monograph (Schiffer and House 1975) and book (Schiffer and Gumerman 1977). Some say that these works had a salutary effect on CRM projects in the United States by demonstrating the necessity of conducting cutting-edge research in a management context.

In 1975 I returned to the University of Arizona as assistant professor. Among my first projects was an overview, with Randall McGuire, of the prehistory of southwestern Arizona (Hohokam and Patayan 1982) and a study of reuse processes in modern Tucson; I also became interested in experimental archaeology and ethnoarchaeology and continued work on formation processes.

Major Accomplishments

One of my proudest accomplishments was editing, beginning in 1978, 23 annual volumes of archaeological method and theory stretching over three series and three publishers: *Advances in Archaeological Method and Theory*, *Archaeological Method and Theory*, and *Journal of Archaeological Method and Theory*.

I was promoted to associate professor in 1979 and 3 years later to professor. In 1983 James Skibo and I built the Laboratory of Traditional Technology, dedicated to experimental studies and equipped with tools for making pottery. Our experiments led to more than a dozen publications (e.g., Schiffer and Skibo 1987) and decisively turned my research interests toward technological change. The publication of *Formation Processes of the Archaeological Record* (Schiffer 1987) closed that chapter of my career.

During the mid-1980s a hobby – collecting portable radios – turned into a study of that artifact's history, which furnished insights into social, economic, and technological change (Schiffer 1991). Next was an early history of the electric automobile (Schiffer et al. 1994). The radio and automobile studies addressed, respectively, then-current issues in American society: the hollowing out of manufacturing and a possible electric car revival.

During the 1980s, postprocessual archaeology stridently attacked processual and behavioral archaeologies. Beyond criticizing the antiscience, intellectual relativism of early postprocessual statements, I encouraged students to engage from a behavioral standpoint the postprocessual research topics such as ritual and religion, symbolism, and social power. My own response was to fashion an artifact-based theory of communication (Schiffer and Miller 1999) and with William Walker an artifact-acquisition perspective on social power.

Curious about the earliest electrical technologies, I first tackled the eighteenth century (*Draw the Lightning Down*: *Benjamin Franklin and Electrical Technology in the Age of Enlightenment*, *2003*) then the nineteenth (*Power Struggles*: *Scientific Authority and the Creation of Practical Electricity Before Edison*, *2008*). Both books, which exemplify my best scholarship, challenged from a behavioral standpoint many interpretations crafted by historians. Although the subjects of these books may seem distant from the concerns of prehistoric and even most historical archaeologists, the projects were an opportunity to conduct a kind of ethnoarchaeology that employs historical evidence. Given the copious documentary and published materials available on both the technologies and their behavioral contexts, I fashioned widely applicable generalizations about technological change, which I aimed at archaeologists in a half dozen articles and a book (2011). Drawing on my studies of technology and more traditional topics, I also wrote a "Reader's Digest" version of behavioral archaeology (Schiffer 2010).

In 2004 my colleagues elected me the fourth Fred A. Riecker Distinguished Professor of Anthropology.

Cross-References

- ▶ Behavioral Archaeology
- ▶ Ethnoarchaeology
- ▶ Experimental Maritime Archaeology
- ▶ Journal of Archaeological Method and Theory
- ▶ Modern Material Culture, Archaeology of

▶ Processualism in Archaeological Theory
▶ Rathje, William Laurens
▶ Site Formation Processes

References

Schiffer, M.B. 1976. *Behavioral archeology*. New York: Academic.
Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico Press.
Schiffer, M.B. 1991. *The portable radio in American life*. Tucson: University of Arizona Press.
Schiffer, M.B. 2010. *Behavioral archaeology: Principles and practice*. London: Equinox.
Schiffer, M.B. 2011. *Studying technological change: A behavioral approach*. Salt Lake City: University of Utah Press.
Schiffer, M.B., and G.J. Gumerman, eds. 1977. *Conservation archaeology: A guide for cultural resource management studies*. New York: Academic.
Schiffer, M.B., and J.H. House. 1975. *The Cache River Archeological Project: An experiment in contract archeology*. Research series 8. Fayettville: Arkansas Archaeological Survey.
Schiffer, M.B., and A.R. Miller. 1999. *The material life of human beings: Artifacts, behavior, and communication*. London: Routledge.
Schiffer, M.B., and J.M. Skibo. 1987. Theory and experiment in the study of technological change. *Current Anthropology* 28: 595–622.
Schiffer, M.B., T.C. Butts, and K.K. Grimm. 1994. *Taking charge: The electric automobile in America*. Reprinted 2002 with a new Preface. Washington, DC: Smithsonian Institution Press.

Further Reading

McGuire, R.H., and M.B. Schiffer, eds. 1982. *Hohokam and Patayan: Prehistory of southwestern Arizona*. New York: Academic.

Schiffer, Michael Brian (Theory)

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Basic Biographical Information

Michael Brian Schiffer (Fig. 1) was born on a small farm in Winnipeg, Manitoba, Canada, on October 4, 1947. He moved with his family in the early 1950s to California growing up in the Crenshaw district of south-central Los Angeles. As an undergraduate, he attended the University of California at Los Angeles. Initially he majored in chemistry but changed to anthropology in his sophomore year. He graduated with a B.A. in Anthropology in 1969. As an undergraduate, he was steeped in New Archaeology; his professors included James N. Hill, James Sackett, Lewis R. Binford, and Sally R. Binford. In the summer of 1968, he joined the Chicago Field Museum of Natural History's Southwest Expedition to east-central Arizona directed by Paul Sidney Martin and assisted by Fred Plog, Mark Leone, and Ezra Zubrow.

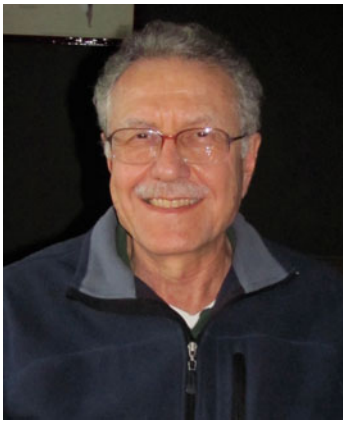

Schiffer, Michael Brian (Theory), Fig. 1 Michael Brian Schiffer in 2012. (Photo by Annette Schiffer)

Schiffer entered the doctoral program in Anthropology at the University of Arizona in 1969 and conducted his dissertation work at the Joint Site in the Mogollon Rim country. He received an M.A. in 1972 and Ph.D. in 1973. His doctoral dissertation, entitled *Cultural Formation Processes of the Archaeological Record: Applications at the Joint Site, East-Central Arizona*, laid the foundation for his subsequent scholarship as a behavioral archaeologist. Upon graduation, he took a job with the Arkansas Archaeological Survey for 2 years. In 1975, he returned to the University of Arizona as an Assistant Professor of Anthropology. He was promoted to Associate Professor in 1979 and Full Professor

in 1982. Upon William A. Longacre's retirement in 2004, he was elected Fred A. Riecker Distinguished Professor of Anthropology.

In 1983, Schiffer and his graduate student, James M. Skibo, established the Laboratory of Traditional Technology at the University of Arizona. This facility is dedicated to studying experimentally the effects of technical choices on the performance characteristics of artifacts, especially ceramic artifacts. Some of their most important collaborations include their article "Theory and Experiment in the Study of Technological Change" (Schiffer and Skibo 1987).

Major Accomplishments

Michael Schiffer is one the founders of Behavioral Archaeology, a social science research program that defines human behavior as interaction between people and objects (artifacts, architecture, and other people). In the beginning of his career (Schiffer 1976, 1987), Schiffer focused on developing behavioral method and theory to describe and explain archaeological patterning. This included creation of behavioral chain analysis and a synthetic model of inference (Schiffer 1975). As one of the cofounders of the subdiscipline of behavioral archaeology, along with William Rathje and J. Jefferson Reid, Schiffer has consistently developed method and theory that places material objects at the center of behavioral studies of human activity (Reid et al. 1975).

Building on the basic definition of human behavior, Schiffer developed a synthetic model of inference (Schiffer 1976) that takes into account the behavioral and natural processes that create the archaeological record. The synthetic model of inference drew together various sources of actualistic knowledge, including ethnography, ethnoarchaeology, history, and experiments, to create generalizations that could be used in inferences about unknown relationships between past peoples and objects. Such a model necessarily assumes continuities between past and present relationships: (1) the sequential nature of behaviors forming objects' histories, (2) the causal contribution objects make to behaviors that propel the forward motion of activities in life histories, and (3) four kinds of measurement that make possible the empirical study of object performances and life histories (Schiffer 1987).

To call attention to the generalizations concerning artifact disposal activities and subsequent archaeological patterning, Schiffer (1976) coined the terms n- and c-transforms, which denote the effects that natural and human (or cultural) processes have on the formation of archaeological deposits. Correlates, another kind of behavioral generalization, pair dimensions of measurable artifact variability (frequency, formal properties of materials, locations in three-dimensional space, and associations in space between objects) to the organization of behaviors (people-object interactions).

As his career has progressed, he has extended behavioral method and theory across a range of disciplines and has extensively explored human-object interactions in the history of technology, modeling of behavioral processes involved in the invention, development, manufacture, and adoption of technologies (Schiffer 2010, 2011). Several models and constructs have been critical to this endeavor, including the analysis of performance characteristics and performance matrices, which were developed in collaboration with James M. Skibo (e.g., Schiffer and Skibo 1987; Skibo and Schiffer 2008). Performance characteristics, such as heating effectiveness in cooking pots, are capabilities or competences that objects bring to interactions that allow them to take place (cooking) and facilitate the forward motion (feasting) of behavioral events. The rise and spread of new technologies often involves competitions among performance characteristics in different stages (e.g., manufacture, use) in the life histories of artifacts comprising technologies. Use of performance matrices enabled Schiffer to explore the electric automobile in the late nineteenth and early twentieth centuries as well as the history of electric lighthouses (Schiffer et al. 1994; Schiffer 2008). More recently, he completed two studies of the history of electrical science and technology spanning the eighteenth and nineteenth centuries (Schiffer 2008; Schiffer et al. 2003).

Finally, the placement of artifacts at the center of behavioral study has allowed Schiffer to

ground seemingly immaterial topics in material-behavioral perspectives. One of the most interesting such treatments has been Schiffer and Miller's (1999) artifact-focused approach to human communication. Inspired by the process of information transmission implicit in the synthetic model of archaeological inference, Schiffer and Miller retasked this model for the behavioral study of communication. Their approach differs from more traditional ones by highlighting the important roles artifacts play in the process and by reversing the analytical emphasis from senders of information to receivers.

Cross-References

- ▶ Archaeological Record
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Behavioral Archaeology
- ▶ Binford, Lewis R. (Theory)
- ▶ Ceramics: Scientific Analysis
- ▶ Leone, Mark P.
- ▶ Material Culture and Education in Archaeology
- ▶ Modern Material Culture, Archaeology of
- ▶ Processualism in Archaeological Theory
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Site Formation Processes

References

Reid, J.J., M.B. Schiffer, and W.L. Rathje. 1975. Behavioral archaeology: Four strategies. *American Anthropologist* 77 (4): 864–869.

Schiffer, M.B. 1975. Behavioral chain analysis: Activities, organization, and the use of space. In *Chapters in the prehistory of eastern Arizona* IV. Fieldiana. Anthropology 65, 103–119. Chicago: Field Museum of Natural History.

Schiffer, M.B. 1976. *Behavioral archeology*. New York: Academic.

Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico Press.

Schiffer, M.B. 2008. *Power struggles: Scientific authority and the creation of practical electricity before Edison*. Cambridge: MIT Press.

Schiffer, M.B. 2010. *Behavioral archaeology: Principles and practice*. London: Equinox.

Schiffer, M.B. 2011. *Studying technological change: A behavioral approach*. Salt Lake City: University of Utah Press.

Schiffer, M.B., and A.R. Miller. 1999. *The material life of human beings: Artifacts, behavior, and communication*. London: Routledge.

Schiffer, M.B., and J.M. Skibo. 1987. Theory and experiment in the study of technological change. *Current Anthropology* 28: 595–622.

Schiffer, M.B., T.C. Butts, and K.K. Grimm. 1994. *Taking charge: The electric automobile in America*. Washington, DC: Smithsonian Institution Press.

Schiffer, M.B., K.L. Hollenback, and C.L. Bell. 2003. *Draw the lightning down: Benjamin Franklin and electrical technology in the age of enlightenment*. Berkeley: University of California Press.

Skibo, J.M., and M.B. Schiffer. 2008. *People and things: A behavioral approach to material culture*. New York: Springer.

Further Reading

Schiffer, M.B. 1972. Archaeological context and systemic context. *American Antiquity* 37: 156–165.

Schiffer, M.B. 1983. Toward the identification of formation processes. *American Antiquity* 48: 675–706.

Schiffer, M.B. 1985. Is there a "Pompeii premise" in archaeology? *Journal of Anthropological Research* 41: 18–41.

Schiffer, M.B. 1988. The structure of archaeological theory. *American Antiquity* 53: 461–485.

Schiffer, M.B. 1995. A personal history of behavioral archaeology. In *Behavioral archaeology: First principles*, ed. M.B. Schiffer, 1–24. Salt Lake City: University of Utah Press.

Schiffer, M.B. 1996. Some relationships between behavioral and evolutionary archaeologies. *American Antiquity* 61: 643–662.

Schiffer, M.B. 1999. Behavioral archaeology: Some clarifications. *American Antiquity* 64: 166–168.

Schiffer, M.B. 2004. Studying technological change: A behavioral perspective. *World Archaeology* 36: 579–585.

Skibo, J.M., W.H. Walker, and A.E. Nielsen, eds. 1995. *Expanding archaeology*. Salt Lake City: University of Utah Press.

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Basic Biographical Information

International entrepreneur and self-taught archaeologist Heinrich Schliemann (1822–1890), whose excavations are widely credited with discovering the Greek Bronze Age, was born in Neubukow (Mecklenburg, Germany). The son of a clergyman

who lost his rural parish for immorality (1831) (Traill 1995), Schliemann attended the Neustrelitz *Realschule* (1833–1836) before becoming a grocer's apprentice (1836–1841) and studying bookkeeping. Shipwrecked off Holland while en route to Venezuela (late 1841), he found work in the import–export business in Amsterdam and began to learn foreign languages. Employment with B.H. Schröder & Co. in 1844 inspired him to learn Russian. In early 1846, he moved to St. Petersburg as agent for several firms, soon founding his own company to sell commodities such as indigo, cotton, coffee, and sugar. In 1850, his brother's death took him to California, where he made large sums buying gold dust. Back in St. Petersburg in 1852, he married Ekaterina Petrovna Lyshin, a lawyer's daughter by whom he had a son and two daughters. His wealth grew during the Crimean War (1853–1856) as he imported commodities like sulfur, saltpeter, and lead. From 1856, Schliemann turned to banking and the study of the ancient world. He toured Europe, Egypt, the Levant, and Athens (1858–1859) and traded in tea (1862–1864) before exchanging commerce for round-the-world travel. In 1866, Schliemann attended a variety of scholarly lectures in Paris, returned briefly to Russia, and settled in Paris by year's end to enjoy literary-intellectual pursuits funded by investment income. In 1867–1868, he traveled to North America and Cuba, Italy, Greece, and the Troad. In 1869, he published his first archaeological book, inspired by fieldwork in Greece and Turkey, received a Ph.D. from the University of Rostock, obtained US citizenship and a divorce, and married the 17-year-old Athenian Sophia Engastromenos, who bore him a son and a daughter. Concern for Sophia's well-being caused his permanent move to Greece in 1871. Schliemann died in Naples, Italy, on 26 December 1890 of complications from ear surgery.

Major Accomplishments

At Troy, Mycenae, Orchomenos, and Tiryns, Schliemann discovered remains of a prehistoric civilization, which he dubbed "Mycenaean" after Homeric epic (Calder and Cobet 1990). During campaigns at Troy between 1870 and 1890, he evolved from novice excavator to experienced scholar. At Mycenae (1876), Schliemann and his wife excavated several tholos tombs, including the "Treasury of Atreus," and Grave Circle A's famous shaft graves. At Orchomenos (1880, 1881), Schliemann cleared the ruined "Treasury of Minyas," noting the distinctive pottery now called Gray Minyan Ware. Excavations at Tiryns (1876, 1884, 1885) uncovered Cyclopean walls and a palace complex featuring frescoes and a bathroom.

Despite the famous treasures of Troy and Mycenae, Schliemann preferred artifacts that led to substantive scientific results; his awareness of stratigraphic method and materials analysis antedates his collaboration with Wilhelm Dörpfeld. His choice of photographs to illustrate the Troy finds was innovative though unsuccessful, his multilingual excavation publications exemplary. With prehistoric archaeology in its infancy, identification and dating errors were inevitable, but his expertise grew through experience and consultation (Kennell 2010).

Relations with officialdom were often strained. His removal of artifacts led to a lawsuit by the Turkish state (1874–1875), and he resisted supervision by the Greek Archaeological Service at Mycenae. His funding of the demolition of the Frankish Tower on the Athenian Acropolis also sparked controversy. After the Turkish lawsuit was settled, Schliemann traveled around Europe seeking comparative material in museums and investigated other sites in Greece (Levadia, Marathon, Ithaka, Kythera) and Italy (Albano, Motya). On the strength of his work at Troy and Mycenae (Fig. 1), Oxford University awarded Schliemann an honorary doctorate in 1883. In Crete, he vainly tried to obtain land at Knossos and a permit to excavate (1884–1889). He toured Egypt twice, visiting Flinders Petrie. Schliemann collaborated with other scholars and organized international conferences at Troy (1889, 1890) (Fig. 2). He left three monuments in Athens: his house, the Iliou Melathron; the German

Schliemann, Heinrich, Fig. 1 Schliemann in 1883. (Courtesy of the American School of Classical Studies at Athens, Gennadius Library Archives, Heinrich Schliemann Papers)

Archaeological Institute building; and his own mausoleum in the First Cemetery. Over decades, he archived tens of thousands of letters from hundreds of correspondents that significantly complement his publications and diaries (Kennell 2007; *Heinrich Schliemann* papers n.d.).

Schliemann's publications excited scholarly interest and impressed the general public, not least because of his personal voice as entrepreneur, writer, and excavator. Academics and amateurs disparaged his reliance on Homer and Pausanias, along with his chronology and interpretations (Zavadil 2009). Even today, his greatest fame comes from his discoveries at Troy and Mycenae, regardless of the nature and circumstances of his results. With his forceful personality and scientific bent, this ex-businessman redefined archaeology, formerly the purview of academic admirers of Classical aesthetics, as the comprehensive study of the material remains of past civilizations (Herrmann 1992). He combined literary zeal with practical skill to organize, finance, run, and publicize large-scale excavations that initiated the rediscovery of the Aegean Bronze Age. In an age when imperialism was often expressed by nationally funded archaeology, Schliemann's projects were as exceptional in being self-funded, broadly promoted, and internationally disseminated as in their tangible finds (Runnels 2007).

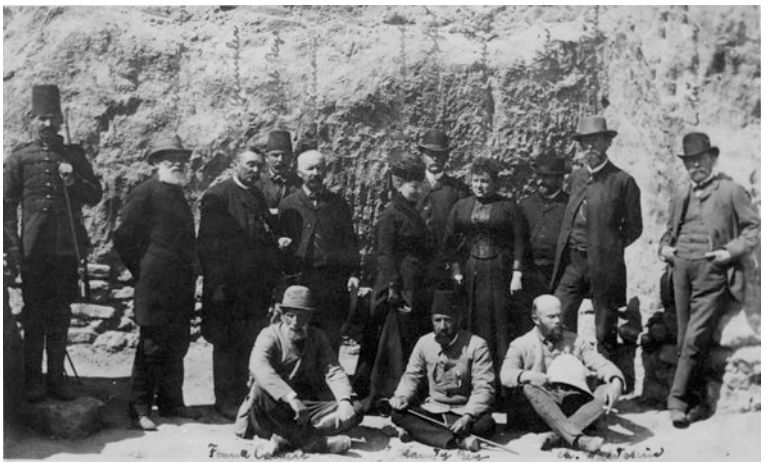

Schliemann, Heinrich, Fig. 2 Schliemann and the 1890 Troy Conference participants. (Courtesy of the American School of Classical Studies at Athens, Gennadius Library Archives, Heinrich Schliemann Papers)

Cross-References

▶ Baths and Bathing, Greek
▶ Oral Tradition: Ancient Greece

References

Calder, W.M., III, and J. Cobet, eds. 1990. *Heinrich Schliemann nach hundert Jahren*. Frankfurt: Vittorio Klostermann.
Heinrich Schliemann Papers. n.d.. Available at http://www.ascsa.edu.gr/index.php/archives/heinrich-schliemann-finding-aid/. Accessed 28 May 2013.
Herrmann, J., ed. 1992. *Heinrich Schliemann: Grundlagen und Ergebnisse moderner Archäologie 100 Jahre nach Schliemanns Tod*. Berlin: Akademie Verlag.
Kennell, S.A.H. 2007. Schliemann and his papers. *Hesperia* 76: 785–817.
Kennell, S.A.H. 2010. . . . Dass es keinen so gelehrten und tüchtigen Mann gibt als Sie: The Heinrich Schliemann – Wilhelm Dörpfeld correspondence, 1879–1890. *MDAI(A)* 125: 257–308.
Runnels, C. 2007. *The archaeology of Heinrich Schliemann: An annotated bibliographic handlist*. Boston: Archaeological Institute of America.
Traill, D.A. 1995. *Schliemann of Troy: Treasure and deceit*. London: John Murray.
Zavadil, M. 2009. *Ein trojanischer Federkrieg*. Vienna: Österreichischen Akademie der Wissenschaften.

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Basic Biographical Information

Peter Schmidt's impacts on archaeology and African history are theoretical, substantive, and pragmatic. Since the 1970s, his initiatives in Africa have fostered research, institution building, and heritage advocacy. Trained as an archaeologist and historian, Schmidt's approach to archaeology is inclusive, methodologically sophisticated, grounded in structural and symbolic theory, and politically aware (Schmidt 1978, 1983a, b, 1997, 2010; Schmidt and Patterson 1995). His scholarship makes informed representations of Africa and Africans. He highlights the long-term pasts of eastern Africa by integrating material, ethnographic, oral historical, documentary, and environmental sources (Schmidt 1978, 1983a, 1997; for conspectus, see Schmidt 2006).

Born in 1942, Schmidt grew up in northern California and graduated from Stanford University in 1965. He completed his masters degree in African History at UCLA and studied at Makerere University in Uganda with Merrick Posnansky. In 1974, he earned a Ph.D. at Northwestern University, at the time a leading institution of African Studies. Since 1971, Schmidt has been a professor of Anthropology in the United States, including at Brown University (1971–1988) and, his current position, at the University of Florida. His dissertation interpreted Haya kingdoms and the long-term history – technological and otherwise – of northwestern Tanzania using a structural approach to the historical sources of the region. Schmidt's historical archaeology integrated and valorized oral historiographies (Schmidt 1978, 1997, 2006). Thereafter, he worked for a time as the state archaeologist of Idaho, in between his African research and teaching at Brown University. Throughout this period, he continued to practice ethnoarchaeology and experimental ethnoarchaeology as well as to investigate the complex symbol systems of African iron technology. Schmidt's scholarship challenged preconceived notions about African technological inferiority and suggested an independent origin for iron technology on the continent (Schmidt 1997). For popular audiences, *The Tree of Iron*, an award-winning film, recounts the principal findings.

Schmidt's prominence in African Studies and anthropological archaeology expanded during the middle 1980s, when he founded and led the Archaeology Unit at the University of Dar es Salaam in Tanzania (1985–1987). Subsequently, Schmidt spearheaded efforts to establish a human rights center in Uganda and his research on iron technology expanded to Gabon and Cameroon. In 1988, Schmidt joined the University of Florida, serving as director of the Center of African Studies until 1995. As early as 1998, Schmidt began to develop a new stream of research in Eritrea. While in Eritrea, Schmidt served as Dean of the College

of Arts and Social Sciences at the University Asmara and as Chief Curator of Archaeology at the National Museum of Eritrea. Based on detailed archaeological survey and excavations in the vicinity of Asmara, he and his team concluded that the Aksumite Empire developed out of the indigenous Ona culture in the first millennium BCE, rather than arising exclusively or primarily from South Arabian influences (Schmidt et al. 2007).

Major Accomplishments

Throughout his career, Schmidt has worked effectively to overcome the conventional separation of history and "prehistory" to examine historical representations and social memory in Africa (Schmidt 2006). More recently, his interests turned to the play of tropes in archaeological interpretations, the anthropology of time and time concepts, community approaches to heritage in Africa, and the postcolonial integration of archaeology and African history into university pedagogy as an act of political liberation. Schmidt's research, teaching, and publications continue to shape and promote informed historical representations of Africa, Africans, and their pasts.

Cross-References

- ▶ Critical Theory in Archaeology
- ▶ Ethnoarchaeology
- ▶ Historical Archaeology
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Oral Sources and Oral History

References

Schmidt, P.R. 1978. *Historical archaeology: A structural approach in an African culture*. Westport: Greenwood Press.

Schmidt, P.R. 1983a. An alternative to a strictly materialist perspective: A review of historical archaeology, ethnoarchaeology, and symbolic approaches in African archaeology. *American Antiquity* 48: 62–81.

Schmidt, P.R. 1983b. Cultural meaning and history in African myth. *International Journal of Oral History* 4: 165–183.

Schmidt, P.R. 1997. *Iron technology in East Africa: Symbolism, science, and archaeology*. Bloomington: Indiana University Press.

Schmidt, P.R. 2006. *Historical archaeology in Africa: Representation, social memory, and oral traditions*. Lanham: AltaMira Press.

Schmidt, P.R. 2010. The play of tropes in archaeology: Ethnoarchaeology as metonymy. *Ethnoarchaeology* 2: 131–151.

Schmidt, P.R., and T.C. Patterson, eds. 1995. *Making alternative histories: The practice of archaeology and history in non-western settings*. Santa Fe: SAR Press.

Schmidt, P.R., M.C. Curtis, and Z. Teka, eds. 2007. *The archaeology of ancient Eritrea*. Trenton: Red Sea Press.

Further Reading

Schmidt, P., ed. 2009. *Postcolonial archaeologies in Africa*. Santa Fe: SAR Press.

Schmidt, P.R., and R.J. McIntosh, eds. 1996. *Plundering Africa's past*. Bloomington: Indiana University Press.

Schmitz, Pedro Ignacio

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Basic Biographical Information

Pedro Ignacio Schmitz (Fig. 1), priest of the Society of Jesus, is one of the oldest, most renowned, and most awarded Brazilian archaeologists still at work. He was born on the 30th of August 1929, in the city of Bom Princípio, state of Rio Grande do Sul, Brazil, descending from a family of small farmers of European origin and Catholic formation (Magalhães 2011). He thought about becoming a historian at the beginning of his career, but under the guidance of the anthropologist, botanist, and geographer Balduíno Rambo (1906–1961), also a Jesuit, Schmitz chose the Archaeology as his main field of work (Teixeira et al. 2002; Teixeira 2006; Schmitz 2007; Martins and Rogge 2012).

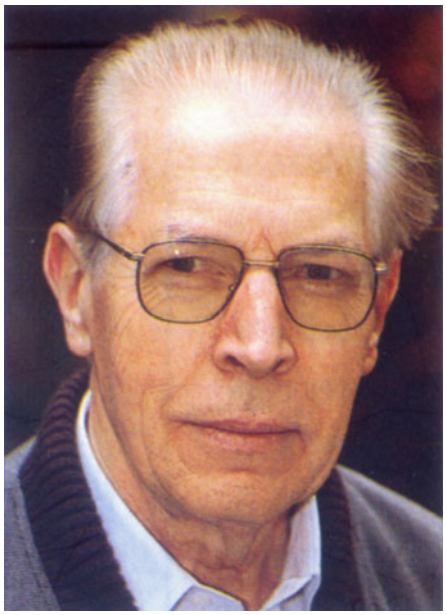

Schmitz, Pedro Ignacio, Fig. 1 Pedro Ignacio Schmitz, picture displayed in his *Curriculum Vitae*. (Available at http://to.plugin.com.br/jag-part-inschmitz.htm (Accessed 16 September 2012))

He holds degrees of Philosophy (1952–1954, from Faculdade de Filosofia Cristo Rei), History and Geography (1955–1958, from Universidade Federal do Rio Grande do Sul – UFRGS), and Theology (1959–1963, from Pontifícia Faculdade de Filosofia e Teologia de Cristo Rei). He concluded his doctorate degree in History and Geography in 1976 from Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS) with the thesis entitled *Sítios de pesca lacustre em Rio Grande, RS, Brasil* ("Archaeological Sites of Lake Fishing in Rio Grande, Rio Grande do Sul, Brazil"), recently republished (Schmitz 2011), study that earned him the title of full professor at that same university (vide Curriculum Vitae at http://lattes.cnpq.br/1125239815915680).

He received training in archaeology in Brazil and several other countries in the Americas and Europe and participated in courses taught by José Loureiro Fernandes (1903–1977) and Annette Laming-Emperaire (1917–1977), among other renowned archaeologists. Betty J. Meggers (1921–2012) and Clifford Evans (1912–1985) invited him to participate in the "Programa Nacional de Pesquisas Arqueológicas" (PRONAPA –acronym in Portuguese for "National Program for Archaeological Research"), developed in Brazil between 1965 and 1970, but he declined the offer. Nevertheless, he adopted the culture-historical proposal of the project, accepted sponsorship from the couple of American archaeologists from 1965 on, and continued developing archaeological research in several Brazilian states: Bahia, Goiás, Mato Grosso do Sul, Pernambuco, Rio Grande do Sul, Santa Catarina, and Tocantins. He also developed archaeological research in Uruguay and published studies on prehistoric Argentina (Schmitz 2006b; Schmitz 2007; Eremites de Oliveira 2008; Martins and Rogge 2012). His scientific production is very significant quantitatively and qualitatively. Beginning in the 1950s, it comprises hundreds of works, mostly published in Portuguese by the Instituto Anchietano de Pesquisas (IAP), one of the major Brazilian institutions of archaeological research, created in 1956 and currently connected to the Universidade do Vale do Rio dos Sinos (UNISINOS), in São Leopoldo, Rio Grande do Sul, for which Schmitz has long been its greatest name. Among many other studies concluded throughout his academic life, it is worth noting his studies on Guarani language in Paraguay, in 1958, as well as his internship in Archaeology at Universidad Nacional de La Plata, Argentina, between 1970 and 1971. He is thus a pioneer archaeologist of holistic formation, within and beyond the four fields of the boasian lineage, with an intellectual production marked mainly by experiences in the subfield of Prehistoric Archaeology in Brazil. He identifies himself as an archaeologist "of historical and multilinear evolutionist trend" linked to American Cultural Anthropology (Teixeira et al. 2002; Schmitz 2007: 3) (Fig. 2).

He was a professor of anthropology at UFRGS from 1958 to 1985, since the days of the former University of Porto Alegre, institution for which he worked part-time and where he retired. He was also a director of IAP from 1966 to 2009, where he continues with his research, coordinates the

Schmitz, Pedro Ignacio, Fig. 2 Pedro Ignacio Schmitz, the first on the left with glasses, during the 3 ° Simpósio de Arqueologia da Área do Prata ("3rd Symposium of Archaeology of the Areaof Prata"), held at the Instituto Anchietano de Pesquisas, in São Leopoldo, Rio Grande do Sul, in 1969. (Martins and Rogge 2012: 258)

Schmitz, Pedro Ignacio, Fig. 3 Areas where Pedro Ignacio Schmitz coordinated programs of archaeological research in Brazil. (Martins and Rogge 2012: 265)

area of Archaeology since 1962, and is the editor of the *Pesquisas* journal, established in 1957 (Schmitz 2006a) (Fig. 3).

He was one of the founders of UNISINOS in 1969, with which he collaborated since 1963, when he began teaching at the former Faculdade

S

de Filosofia, Ciências e Letras, that originated the university. Since then, he has taught the disciplines of Anthropology and Archaeology in undergraduate courses, and since 1987, he has composed of the Post Graduation Program in History (M.A. and Ph.D.).

Since 1969, he is a researcher of the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq – acronym in Portuguese for "National Council for Scientific and Technological Development"). Nowadays, he is as representative before government agencies such as CNPq, Instituto do Patrimônio Histórico e Artístico Nacional (IPHAN – acronym in Portuguese for "Institute of National Historical and Artistic Heritage") and the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES – acronym in Portuguese for "Coordination for the Improvement of Higher Education").

Major Accomplishments

The major contribution of Pedro Ignacio Schmitz to archaeology is linked to research conducted in various regions of Brazil, besides the institutionalization, development, and popularization of the archaeological science; the instruction of several generations of archaeologists, sociocultural anthropologists, and ethnohistorians; and the preservation and appreciation of the national archaeological heritage.

Schmitz was one of the founders of the Sociedade de Arqueologia Brasileira (SAB – acronym in Portuguese for "Society of Brazilian Archaeology"), established in 1980, an entity that he not only came to preside during several periods (1980–1981; 1981–1983; 1989–1991) but also took part in its board of directors in other moments. He also occupied important spaces in public agencies charged of the promotion, support, and authorization of archaeological research in Brazil. Many archaeologists worked under his direct influence in the beginning of their careers: Adriana Schmidt Dias, Altair Sales Barbosa, Ana Luiza Vietti Bitencourt, André Luiz Jacobus, Arno Alvarez Kern, Fabíola Andréia Silva, Irmhild Wüst, José Luis dos Santos Peixoto, Marco Aurélio Nadal De Masi, Maribel Girelli, Pedro Augusto Mentz Ribeiro (1936–2006), Rodrigo Lavina, Sílvia Moeleck Copé, and others who, like me, had a passage at the IAP at the beginning of their professional careers (Eremites de Oliveira 2008). Some other colleagues, as André Osorio Rosa, Ítala Irene Basile Becker, Ivone Verardi, Jairo Henrique Rogge, and Marcus Vinicius Beber, either worked or still work under his coordination in the institution. All these people received certain influence from the epistemological model of PRONAPA. Schmitz has also been keeping himself up to date, by following the new contributions registered in World Archaeology, which can be noticed in his most recent works.

Cross-References

- ▶ Brazil: Cultural Heritage Management Education
- ▶ Brazil: Historical Archaeology
- ▶ Laming-Emperaire, Annette
- ▶ Meggers, Betty Jane

References

Eremites De Oliveira, J. 2008. *Arqueologia Pantaneira: história e historiografia (1875–2000)*. Dourados: Editora UFGD. Available at: http://www.dominiopublico.gov.br/download/texto/gd000005.pdf. Accessed 16 Sept 2012.

Magalhães, T. 2011. Entrevista com Pedro Ignacio Schmitz. *IHU On Line* 11 (385): 1–4. Available at: http://www.ihuonline.unisinos.br/index.php?option=com_content&view=article&id=4293&secao=385. Accessed 16 Sept 2012.

Martins, M.C.B., and J.H. Rogge. 2012. Por cerrados, matos e pantanais. As experiências de um pioneiro da arqueologia brasileira. Entrevista com Pedro Ignacio Schmitz. *História UNISINOS* 16 (2): 256–268. Available at: http://www.unisinos.br/revistas/index.php/historia/article/view/htu.2012.162.08. Aaccessed 16 Sept 2012.

Schmitz, P.I. 2006a. *Fazendo Arqueologia Brasil afora*. São Leopoldo: IAP/UNISINOS. Available at: http://www.anchietano.unisinos.br/index1.htm. Accessed 16 Sept 2012.

Schmitz, P.I. 2006b. *Instituto Anchietano de Pesquisas – Histórico*. São Leopoldo: IAP/UNISINOS. Available at: http://www.anchietano.unisinos.br/index1.htm. Accessed 16 Sept 2012.

Schmitz, P.I. 2007. Depoimentos de arqueólogos pioneiros: Pedro Ignacio Schmitz. *História e-História* 12: 1–8. Available at: http://www.historiaehistoria.com.br/materia.cfm?tb=arqueologia&id=12. Accessed 16 Sept 2012.

Teixeira, S.A. 2006. A Antropologia no Rio Grande do Sul. In *Memória da Antropologia no Sul do Brasil*, S.S. dos Santos (org.), 124–204. Florianópolis: Editora da UFSC/ABA.

Teixeira, S.A., R.G. Oliven, M.E. Maciel, and S. Baptista Da Silva. 2002. Entrevista com Pedro Ignacio Schmitz. *Horizontes Antropológicos* 8 (18): 279–208. Available at: http://www.scielo.br/pdf/ha/v8n18/19066.pdf. Accessed 16 Sept 2012.

Further Reading

Carbonera, M., and P.I. Schmitz. (org.) 2011. *Antes do Oeste catarinense: arqueologia dos povos indígenas*. Chapecó: Argos.

Cigliano, E.M., P.I. Schmitz, and M.A. Caggiano. 1971. Sítios cerámicos prehispánicos en la costa septentrional de la Província de Buenos Aires y de Salto Grande, Entre Ríos: esquema tentativo de su desarrollo. *Anales de la Sociedad Científica Argentina* 192: 129–191.

Schmitz, P.I. 1984. *Caçadores e coletores da pré-história do Brasil*. São Leopoldo: IAP/UNISINOS.

Schmitz, P.I. 1987. Prehistoric hunters and gatherers of Brazil. *Journal of World Prehistory* 1 (1): 53–126.

Schmitz, P.I. 1988. As tradições ceramistas do planalto sul-brasileiro. In *Arqueologia do Rio Grande do Sul*, P.I. Schmitz (org.), 75–130. São Leopoldo: IAP/UNISINOS.

Schmitz, P.I. 1990. O povoamento pleistocênico do Brasil. *Revista de Arqueologia Americana* 1: 33–68.

Schmitz, P.I. 2003. Arqueologia no Brasil. *Habitus* 1 (2): 261–273.

Schmitz, P.I. 2011/1976. *Sítios de Pesca Lacustre em Rio Grande, RS, Brasil*. Erechim: Habilis.

Schmitz, P.I., and A.S. Barbosa. 1984. *Horticultores pré-históricos do estado de Goiás*. São Leopoldo: IAP/UNISINOS.

Schmitz, P.I., C.N. Ceruti, A.R. González, and A. Rizzo. 1972. Investigaciones arqueológicas en la Zona de Goya (Corrientes), Argentina. *Dédalo, São Paulo* 8 (15): 11–121.

Schmitz, P.I., I. Wüst, S.M. Copé, and U.M.E. Thies. 1982. Arqueologia do Centro-Sul de Goiás. Uma fronteira de horticultores indígenas no centro do Brasil. *Pesquisas (Antropologia)* 33: 1–281.

Schmitz, P.I., M.B. Ribeiro, A.S. Barbosa, M. de O. Barbosa, and A.F. Miranda. 1986. *Caiapônia – Arqueologia nos cerrados do Brasil Central*. São Leopoldo: IAP/UNISINOS.

Schmitz, P.I., L. Artusi, A.L. Jacobus, M. Gazzaneo, J.H. Rogge, H.E. Martin, and G. Baumhardt. 1990. *Uma Aldeia Tupiguarani. Projeto Candelária*. Documentos 4. São Leopoldo: IAP/UNISINOS.

Schmitz, P.I., I.I.B. Becker, and G. Naue. 1991. *Pré-história do Rio Grande do Sul*. Documentos 5. São Leopoldo, IAP/UNISINOS.

Schmitz, P.I., I. Verardi, M.A. De Masi, J.H. Rogge, and A.L. Jacobus. 1993. O Sítio da Praia das Laranjeiras II. Uma Aldeia da Tradição Itararé. *Pesquisas (Antropologia)* 49: 1–192.

Schmitz, P.I., A.S. Barbosa, A.F. Miranda, M.B. Ribeiro, and M. de O. Barbosa. 1996. Arqueologia nos Cerrados do Brasil Central: Sudoeste da Bahia e Leste de Goiás – O Projeto Serra Geral. *Pesquisas (Antropologia)* 52: 1–198.

Schmitz, P.I., M. De O. Barbosa, and M.B. Ribeiro. 1997a. *As Pinturas do Projeto Serra Geral*. São Leopoldo: IAP/UNISINOS.

Schmitz, P.I., F.A. Silva, and M.V. Beber. 1997b. *Serranópolis II – As pinturas e gravuras dos abrigos*. Publicações Avulsas 11. São Leopoldo: IAP/UNISINOS.

Schmitz, P.I., A.O. Rosa, M.V. Beber, and J.H. Rogge. 1998. Aterros indígenas no Pantanal do Mato Grosso do Sul. *Pesquisas (Antropologia)* 54: 1–271.

Schmitz, P.I., A.O. Rosa, J.M. Izidro, F. Haubert, M.L.B. Krever, A.L.V. Bitencourt, J.H. Rogge, and M.V. Beber. 1999. Içara: um jazigo mortuário no litoral de Santa Catarina. *Pesquisas (Antropologia)* 55: 1–164.

Schmitz, P.I., J.H. Rogge, A.O. Rosa, M.V. Beber, J. Mahus, and F.V. Arnt. 2002. O Projeto Vacaria: casas subterrâneas no Planalto Rio-grandense. *Pesquisas (Antropologia)* 58: 11–105.

Schmitz, P.I., A.O. Rosa, and A.L. Bitencourt. 2004. Arqueologia nos cerrados do Brasil central – Serranópolis. *Pesquisas (Antropologia), São Leopoldo* 60: 1–286.

Scholarly Publishing of Archaeology

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The publication of scholarly research in archaeology is as old as the profession itself and inextricably linked; archaeological knowledge needs to be shared between scholars to be of value in increasing our knowledge of the past. Over the past two centuries, a stable system of transmitting scholarly information between colleagues through publication was developed, only to be upended in recent years by radical changes in digital technology.

History of Scholarly Publishing of Archaeology

The prehistory of scholarly publishing in archaeology parallels the development of human knowledge about the past. Ancient writers from Herodotus to Sima Qian to Pausanias described both the peoples on the fringes of their known world and their material cultures. Medieval travelers from Ibn Battuta to Marco Polo did the same. With the coming of the western Enlightenment, investigation of the lifeways and material culture of previous eras increased, as did the publications relevant to them. Possibly the most important of these was the 20-volume *Description d'Égypte* commissioned by the French emperor Napoleon after his invasion of Egypt, which, with Champollion's translation of the Rosetta Stone, first introduced literate Europeans to ancient civilizations beyond the classical world.

Prehistory and ancient histories became the pastime of many educated Europeans, leading to the development of antiquarian societies whose proceedings and journals recorded and interpreted local finds. The Society of Antiquaries of London began publishing as early as 1718 and launched its first journal, *Archaeologia*, in 1770. The American Antiquarian Society launched its *Transactions* in 1820 (Willey and Sabloff 1974, p. 38).

European natural historians expanded their travels to encompass the globe, and reports of their travels, usually in book form, both advanced scholarship and created an interest in the past societies among the lay public. The writings of scholars such as Alexander von Humboldt on South America and John Lloyd Stephens and Frederick Catherwood on Central America left longing impressions on both scholars and others.

As the field of archaeology professionalized and created academic societies late in the nineteenth century, each launched publication series and scholarly journals to share knowledge with colleagues. Publication of the *Palestine Exploration Fund Quarterly Statement* began in 1869. *American Journal of Archaeology* and *Excavation Memoirs of the Egypt Exploration Fund* were both initiated in 1885, *Antiquity* in 1927, and *American Antiquity* in 1935. Government agencies responsible for archaeology also published results of their work, such as the Bureau of American Ethnology's *Annual Reports*, which appeared beginning 1879–1880 and included research reports from Frank Hamilton Cushing, John Wesley Powell, and Cyrus Thomas.

For most of the twentieth century, scholarly publication in archaeology exhibited a stable pattern. Academic journals carried new research supported with mounds of data. Books of two sorts appeared regularly: popular books, often with titles like *Mysteries of the Past* or *The Glories of Ancient Egypt*, and scholarly books that delved into larger-scale issues and cultural histories in greater depth and length. Excavation and survey reports appeared generally through the publications arms of archaeological research institutes, museums, government agencies, and professional societies like the American School of Classical Archaeology in Athens or the American Schools of Oriental Research. As archaeology became ever more popular a topic with the expansion of higher education in the 1960s, textbooks on the two most popular classes – introduction to archaeology and world prehistory – began appearing, many of the pioneering ones written by Brian Fagan. Conference sessions were converted into edited volumes or journal thematic issues on topics of interest, including a long-standing One World Archaeology series from quadrennial meetings of the World Archaeological Congress (WAC), published sequentially by Routledge, UCL Press, Left Coast, and now Springer. A key series of authoritative cultural histories emerged from Cambridge University Press, which still regularly produces new ones and new editions of their classic ones.

The New Archaeology of the 1960s–1980s found its communication podium in Academic Press, which was looking for ways to expand beyond their base in physical sciences by adding "scientific" social sciences (S. Holwitz pers. comm). Led by editors Bill Woodcock and Stan Holwitz, Academic published 132 archaeology titles over these decades and publicized the ideas of a generation of American scholars, including Lewis Binford, Kent Flannery, and Patty Jo Watson, among many others (O'Brien et al. 2005,

p. 186). The European backlash of post-processual archaeology in the 1980s, led by scholars such as Ian Hodder, Michael Shanks, and Chris Tilley, led the ascent of their British publishing houses, Blackwell, Routledge, and Cambridge, into greater prominence in archaeological publishing. Development of electronic publications changed delivery system but not the products for a period of time. The same books, articles, and reports were available but were read online. Keeping this system intact was the academic tenure and promotion reward system, which still favored peer review article and university press books for academic advancement.

The development of cultural resource management (CRM) created yet another stream of academic writing, CRM reports that were delivered to commercial or governmental sponsors. Data driven and limited in scope to meet the requirements of economic development regulations, these reports were often hastily constructed and rarely peer reviewed. These reports were housed in governmental offices, with access to them severely limited, and thus were given the moniker "gray literature." As the need for training materials for the growing legion of CRM workers and firms emerged, a series of manuals edited by Don Fowler, many of them written by Thomas F. King, were issued from AltaMira Press.

Scholarly Publishing in the Twenty-First Century

With the arrival of the twenty-first century, the publishing landscape changed radically. Academic publishing has become a mature industry, with its customer base static or shrinking. For companies to increase their market share, acquiring competitors became a more efficient strategy than organic growth. Thus, some of the better-known commercial presses publishing archaeology were swallowed up by larger competitors: Academic Press by Elsevier, Plenum by Springer, Berg by Bloomsbury, and Left Coast by Routledge. The same is true with journals: Plenum's group of archaeology journals are now with Springer and Maney's collection now part of Taylor & Francis (T&F). The result is a small number of gigantic commercial presses controlling a significant percentage of the published works in archaeology. Despite this consolidation, a few small independent archaeology presses still remain in North America and Europe – Casemate Academic (formerly Oxbow), British Archaeological Reports, and Berghahn. A significant number of university presses, such as Cambridge, Colorado, Florida, Arizona, and Texas, still publish a significant number of archaeological titles.

Simultaneously, ever more scholarly material began appearing in electronic form, some posted by archaeologists on websites of their universities or government agencies, more coming from the traditional books and journals controlled by commercial presses, academic organizations, and university presses. While the complex physical nature of archaeological data – photos, line drawings, maps, data tables, and lists of registered finds – at first provided a challenge for online publication, these have become ever easier with improvements in digital technology.

Aggregation and Disaggregation of Content

Large publishing conglomerates used the aggregation of publications and their electronic availability on a single platform to capture ever-larger market share of their key customers, academic libraries. Called the "Big Deal," libraries were offered access to large aggregations of journals, discounting each to increase the value of purchasing the aggregation over individual journal subscriptions. Libraries responded by creating consortia so that the cost of groups of subscriptions would be shared by multiple academic and government institutions. As more and more archaeological organizations partnered with commercial or university press publishers (WAC with Springer, Society for American Archaeology with Cambridge, European Archaeological Association with T&F), they too became part of these journal aggregations. Books were soon added to these collections, so that a library could buy the archaeological "content" of a large publisher for a fixed fee no matter what the original format is. To compete, smaller publishers, research organizations, and university presses used third parties

like JSTOR, Project Muse, or EBSCO to aggregate their content. Soon the escalating prices of these aggregations met resistance – the University of California Berkeley refusing to carry the journals of the Nature group in 2010 (Howard 2010) and the national consortium of German libraries temporarily canceling their subscriptions to all Elsevier journals in 2016 (Schiermeier and Rodriguez Mega 2016).

Content disaggregation affected publication of archaeology as well. The individual publication – book or journal – became less central than the amount of overall content, leading large publishers disassembled their book projects into individual chapters and their journals into individual articles as the unit of access and sale. This led to a strategy of increasing the output of large reference works that contained hundreds of articles that could be obtained individually or as part of a database: encyclopedias, handbooks, dictionaries, and companions. The ten-volume Springer World Encyclopedia of Archaeology, of which this entry is a part of the second edition, is one good example. Even more aggressive was the Oxford University Press, which has published several hundred Oxford Bibliographies on archaeology-related topics and 36 Oxford Handbooks in Archaeology between 2010 and 2017, each handbook containing hundreds of articles on almost every topic in the field. The handbooks became part of the Oxford Handbooks Online, which boasted 750 books and 27,000 articles in 2017, a tempting product for the budget-stressed librarian looking to maximize content. Each of these projects is sold on a subscription basis to libraries.

The Open-Access Movement

The migration to online publishing and the exorbitant price increases associated with publisher consolidation led to a countermovement by scholars to make publications open access, available online for all readers worldwide. The open-access mantra, buoyed by the large technology companies who host open platforms and urge that "information should be free," still rings strong in many parts of the academy. Sustainability is difficult since publication involves costs for editorial work, electronic hosting, publicity of findings, and personnel to manage the journal. A good example of this was the first major English language open-access journal, *Internet Archaeology*, launched in 1996 through grant funds. When the grants ran out, a subscription model for institutions was instituted. Since 2014, the journal has replaced subscriptions with Author Processing Charges (APC), asking authors to subsidize publication costs from their institutions, grant funds, or other sources.

Numerous other open-access journals have been launched since then. In 2017 the Directory of Open Access Journals listed 104 in the discipline of archaeology out of the 10,000 in their database. Many use APCs to pay their costs, like *Science & Technology of Archaeological Research* (*STAR*), sponsored by the Society for Archaeological Sciences and published by Taylor & Francis since 2015.

Open access has led to unintended consequences. First, commercial presses embraced the APC model, allowing scholars who could afford it to convert their articles to "gold open access," thereby adding another revenue stream for their journals in addition to library subscriptions. Second, following the lead of *Public Library of Science (PLoS)* founded in 2001, many large publishers have created omnibus journals, accepting articles from any discipline and, like *PLoS*, publishing huge numbers of articles each year. While this greatly expanded the opportunities for publication journal income depends on the number of articles accepted, so the incentive to say no to inferior articles disappears. Many of these journals suffer from middling quality. A more suspect group of open-access journals do not provide rigorous peer review but will post almost any article on their journal's website for a fee. Labeled "predatory" journals, they are often enticing to scholars facing the publish-or-perish rules of academia (Allen 2018). An American librarian, Jeffrey Beall, created a blacklist of these journals to help scholars and librarians sift through the chaff, now replaced by a similar list from Cabell's, a journal indexing service (Anderson 2017).

Further adding to these complexities is the requirement of government and funding

organizations that the results of research using public or grant funds be available to "the public" in an open repository, called "green open access" and usually hosted by universities or professional organizations. Unfortunately most subscription-based journals will not accept articles for publication that are openly available on the web. Authors have been caught in the middle of these competing claims, either limited by time embargoes before depositing their work in a repository or managing multiple drafts of the same work – one in published form and another in repository form.

Yet another complexity has been with the academic reward system itself, as universities increasingly assess scholars through the Journal Impact Factor, which weighs the importance of the journal in which scholars (and, in the United Kingdom, their departments and colleges) are publishing, though not the value of the articles themselves. This metric favors journals controlled by larger publishers, older in age, larger in subscriber base, and more scientific than humanistic in mission, thus tilting the evaluation of a scholar's work in certain directions.

Among the positive effects of digitization has been the ready availability of older research now out of copyright, which has been digitized and made open access through sources such as Google Books, Project Gutenberg, the HathiTrust, or government agencies. Thus, researchers looking to find works by Aurel Stein, Flinders Petrie, or the Bureau of American Ethnology reports mentioned above can obtain them at several clicks of the computer rather than after a long search through university shelves or used book stores.

Publishing Archaeology Books

Publication of archaeological monographs and site reports has also been transformed by technological and economic changes. While costs of publication have steadily declined by the digitization of the production and printing functions, the shrinking library market has created financial stresses on publishers of archaeological reports and studies. Recent studies indicate that American university presses generate only about 4000 monographs a year, only a fraction of them in archaeology (Esposito and Barch 2017), and the average title costs $40,000 to produce while generating only half that amount in revenue (Maron et al. 2016). Subsidies have become the norm for some of the monographic publishers that remain. Authors are increasingly being asked to produce camera-ready texts and forego royalties as prices for these limited-market volumes spike. Like journals, these books are now being included in content aggregations or are sold by the article. Some monograph publishers, like UC Berkeley's Archaeological Research Facility Series, are being published in electronic version only.

As with most other trends in archaeology, the advent of indigenous archaeology has led to a growth of publications either by indigenous scholars or in partnerships between professional archaeologists and indigenous communities. The Nicholas/Andrews collection *At a Crossroads* (1997) and Joe Watkins' *Indigenous Archaeology* (2001) were the early steps in this area. A WAC-sponsored Left Coast Press series (now Routledge) on *Archaeology and Indigenous Peoples* has been published since 2005. Many indigenous people have built their own publications programs, such as Australian Aboriginal Press in Canberra.

Professional archaeologists have always contributed to the popular literature on the past. Flinders Petrie, like most of his Victorian contemporaries, penned poetry. Magazines from *Illustrated London News* to *Time* to *Smithsonian* regularly feature articles by archaeologists or about interesting archaeological projects. Archaeologists launched their own popular magazines such as *Current World Archaeology*, *Archaeology*, *Kemet*, and *Biblical Archaeology Review*. Popular books by archaeologists and a greater number by professional writers and pseudoarchaeologists have had a regular presence in generalist book stores. Heavily illustrated books about Egyptian pyramids, Greek temples, and Mexican figurines line coffee tables around the world, many of the best from English publisher Thames & Hudson. Possibly the best known popular archaeology book, *Gods, Graves, and Scholars* by CW Ceram, published in 1949, is still in print and has sold five million copies (Holtorf 2005, p. 56). Well-known archaeologists like Colin Renfrew, Brian Fagan, Paul Bahn, and Neil Silberman

are in constant demand for new popular titles. The profession, often disdaining this popularization of scholarship in the past, has recently realized the value of the archaeological story being told by archaeologists. Both the Society for American Archaeology and Society for Historical Archaeology present annual awards for the best popular book on the subject. Guidebooks and articles about how to write popular archaeology have increased (Fagan 2010; Connah 2010; Allen 2002; Van Dyke and Bernbeck 2015).

New Models for Archaeological Publishing

The needs of archaeologists to disseminate their findings to their colleagues, funders, stakeholders, and the public will not disappear, but the methods by which this will take place is likely to continue to broaden beyond the traditional scholarly channels. Each of these audiences requires a separate method of dissemination, which will make the ability of archaeologists to communicate in different formats and at different levels of complexity a crucial professional skill. The archaeological researcher will be expected to speak with equal fluency to groups of school children, adults walking through a museum, their expert colleagues, and the history buff scrolling through Netflix offerings. The need for archaeologists to partner with professional writers and videographers, with university public relations offices, and with archaeological educators will only increase as these competing demands do.

There are already some new communication modes on the horizon that will likely come to dominate scholarly publication.

Digitization and government regulation have led to the growth of digital archaeological archives, where the full corpus of research notes, illustrations, maps, plans, and measurements from a project can be housed for future researchers to use. Tested in the United States first in the 1980s as the National Archaeological Database as a way of allowing researchers to access the archaeological gray literature, it has been replaced by a large handful of repositories for archaeological data such as The Digital Archaeological Record (USA), Open Context (USA), Archaeological Data Service (UK), and Mappa (Italy). As new field projects become harder to approve and fund, and as analytic methods improve, these repositories may become the chief source for research data.

The gradual shrinking of avenues of income from traditional publication led large scholarly media companies to expand their array of publishing services in an attempt to capture and monetize the entire research process rather than just the final published product. Preprint server, a forum to post early drafts of research for review in a non-deterministic setting, was developed in hard science fields by several nonprofit organizations over the past two decades. Recently, the best known of these services was purchased by publishing giant Elsevier. Archival repositories, commonly required by governments and funders, are also being developed or purchased by these multinational media conglomerates. The University of Florida, for example, contracted their institutional repository requirements out to Elsevier in 2016. Scholars are encouraged to house their entire scholarly output from research notes to course syllabi in "the cloud," often controlled by large corporations. This expansion of large publishers into all phases of the research and publication process raises the specter of vertically integrated monopolies, as Amazon has developed in the trade book world. These vertical monopolies may come to dominate scholarly publishing in all fields if not prevented by the concerted efforts of communities of scholars.

The visual nature of archaeological data has made it a natural fit for digital technology. Site websites, blogs, news services, online documentaries, virtual tours of famous sites, 3D imaging, 3D printing, and archaeogaming have all become part of the twenty-first century publication panoply. Virtual tours can be taken of sites ranging from Rome to Petra to Merv. Digital archaeological games date at least as far back as Steve Davis and Vin Steponaitis's *Excavating Occaneechi* in 1998 and were boosted by the development of civilization-building games like SimCity and virtual reality worlds created in Second Life. With the high interest in gaming in younger generations and the visual nature of archaeological work,

these trends should only expand in the future. Most of these media are fluid, allowing for constant updates and changes as the knowledge base changes and increases. Scholars will likely be constantly updating their work. They will also likely be responding to regular critiques of it as these media tend to invite interaction from readers.

But the pace of change in digital media is ever accelerating and impacting the entire archaeological process. Thus the future of scholarly publishing will likely take many more turns over the next few decades and is impossible to predict.

References

Allen, M. 2002. Reaching the hidden audience: Ten rules for the archaeological writer. In *Public benefits of archaeology*, ed. B. Little, 244–251. Gainesville: University Press of Florida.

Allen, M. 2018. Beware the predatory journal: it's not just fieldwork that is dangerous. *SAA Archaeological Record* 18:6–9 (May)

Anderson, R. (2017). Cabell's new predatory journal blacklist: A review. *The Scholarly Kitchen*. July 25. https://scholarlykitchen.sspnet.org/2017/07/25/cabells-new-predatory-journal-blacklist-review/. Accessed 21 Nov 2017.

Connah, G. 2010. *Writing about archaeology*. Cambridge, UK: Cambridge University Press.

Esposito, J J, and K Barch (2017). Monograph output by American University Presses, 2009–2013, Mellon Foundation report. https://3spxpi1radr22mzge33bla91-wpengine.netdna-ssl.com/wp-content/uploads/2017/02/Monograph-Output-of-University-Presses.pdf. Accessed 21 Nov 2017.

Fagan, B. 2010. *Writing archaeology: Telling stories about the past*. 2nd ed. Walnut Creek: Left Coast.

Holtorf, C. 2005. *From Stonehenge to Las Vegas: archaeology as popular culture*. Walnut Creek: AltaMira.

Howard, J. 2010. U of California tries just saying no to rising journal costs. *Chronicle of higher education*, June 8. http://www.chronicle.com/article/U-of-California-Tries-Just/65823

Maron, N.L., et al. 2016. *The costs of publishing monographs: Toward a transparent methodology*. New York: Ithaka S+R Publications. http://www.sr.ithaka.org/publications/the-costs-of-publishing-monographs/. Accessed 21 Nov 2017.

O'Brien, M.J., R.L. Lyman, and M.B. Schiffer. 2005. *Archaeology as a process: Processualism and is progeny*. Salt Lake City: University of Utah Press.

Schiermeier, Q., and E. Rodriguez Mega. 2016. Scientists in Germany, Peru and Taiwan to lose access to Elsevier journals. *Nature* 541: 13. December 23. https://www.nature.com/news/scientists-in-germany-peru-and-taiwan-to-lose-access-to-elsevier-journals-1.21223.

Van Dyke, R.M., and R. Bernbeck, eds. 2015. *Subjects and narratives in archaeology*. Boulder: University Press of Colorado.

Willey, G.R., and J.A. Sabloff. 1974. *A history of American archaeology*. San Francisco: WH Freeman.

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Basic Biographical Information

Born in 1941, Robert L. Schuyler is Associate Professor in the Department of Anthropology (University of Pennsylvania) and Associate Curator-in-Charge of the Historical Archaeology Section (University of Pennsylvania Museum of Archaeology and Anthropology). He received his B.A. in Anthropology from the University of Arizona and his M.A. and Ph.D. in Anthropology from the University of California-Santa Barbara (Fig. 1).

Schuyler has directed several fieldwork projects, including investigations of Potomac River Native American sites from the Contact period (seventeenth to eighteenth centuries); the Sandy Ground, Staten Island, nineteenth- to twentieth-century African-American oystering community; the boarding houses of female factory workers in the town of Lowell, Massachusetts, which was one of the first large cities in America to undergo industrialization in the early nineteenth century; and the short-lived silver mining town of Silver Reef, Utah (c. 1877–1887) (Schuyler 1980, 1991).

His current fieldwork research is the South Jersey Project, which is developing the story of Vineland, New Jersey, from the 1860s to the present, in partnership with the Vineland Historical and Antiquarian Society. His innovative approach in this project is historical ethnography

Schuyler, Robert L., Fig. 1 Robert L. Schuyler. (Photo credit: University of Pennsylvania Museum of Archaeology and Anthropology, photographer Lauren Hansen-Flaschen)

(Schuyler 1988), which combines archaeology, archival documents, oral histories, and the study of living communities; it is a framework for historical archaeology that he describes as "the only archaeology in which the subject matter is still forming." The South Jersey Project is part of a new research domain, the archaeology of the twentieth century, and Schuyler's particular interests are in understanding the processes underlying how an agricultural center of the mid- to late 1800s came to have the largest municipal boundaries in present-day New Jersey.

Major Accomplishments

Schuyler is a founding member of the Australasian Society for Historical Archaeology, the Society for Commercial Archaeology, the Society for Post-Medieval Archaeology, and the Society for Industrial Archaeology, among others. He also is a member of the Society for Historical Archaeology (President, 1982), the Council for Northeast Historical Archaeology (President, 1980–1981), the American Anthropological Association, the Society for American Archaeology, and numerous other national, regional, state, and local organizations.

After arriving at the University of Pennsylvania, he developed a Ph.D. program in historical archaeology based on historical ethnography (see above).

In 2009, he received the J.C. Harrington Medal in Historical Archaeology from the Society for Historical Archaeology for his scholarly (Schuyler 1978, 1999, 2003), educational, and professional activities in the discipline.

Cross-References

- ▶ Archaeology as Anthropology
- ▶ Archaeology: Definition
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Australasian Historical Archaeology
- ▶ Dating Methods in Historical Archaeology
- ▶ Historical Archaeology
- ▶ History and Archaeology: Relationship Over Time (US Perspective)
- ▶ Industrial Archaeology
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Modern World: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ North America During the European Contact Period
- ▶ Postcolonial Archaeologies
- ▶ Post-Medieval Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

References

Schuyler, R.L., ed. 1978. *Historical archaeology, a guide to substantive and theoretical contributions*. Amityville: Baywood.

Schuyler, R.L., ed. 1980. *Archaeological perspectives on ethnicity in America: Afro-American and Asian American culture history*. Amityville: Baywood.

Schuyler, R.L. 1988. Archaeological remains, documents, and anthropology: A call for a new culture history. *Historical Archaeology* 22: 36–42.

Schuyler, R.L. 1991. Historical archaeology in the American West: The view from Philadelphia. *Historical Archaeology* 25: 7–17.
Schuyler, R.L. 1999. The centrality of post medieval studies to general historical archaeology. In *Old and new worlds*, ed. G. Egan and R.L. Michael, 10–16. London: Oxbow Books.
Schuyler, R.L. 2003. The second largest city in the English speaking world: John L. Cotter and the historical archaeology of Philadelphia 1960–1999. In *Philadelphia and the development of Americanist archaeology: 156–164*, ed. D.D. Fowler and D. Wilcox. Tuscaloosa: University of Alabama Press.

Science Communication in Archaeology

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State of Knowledge and Current Debates

Archaeology has a long history of generating fascination outside of academia. The interpretation of sites, cultural artifacts, and past human behavior using archaeological methods provides a rich source of material for communicating the human stories behind scientific data. Most archaeologists will be involved in public or media communication at some point in their career. When done effectively, science communication in archaeology benefits both society and the discipline. In practice, effective science communication can be time-consuming and challenging. It requires a different set of skills to those used by researchers when communicating within academia, and archaeologists are not typically trained in public engagement techniques. Although science communication and public engagement are increasingly seen as a vital part of an archaeologist's role, it can still be difficult for archaeologists to balance the time and resources to communicate their work outside of academic circles against the competing demands of their roles.

The definition of science communication used in this article is "the exchange of knowledge between scientific experts and public audiences." Contemporary ideas of "science communication" overlap with those of "public engagement," although some authors distinguish between the two. "Public engagement" is generally meant to reflect a mutual exchange of ideas between members of the public and scientists during their interactions. This contrasts with more traditional ideas of science communication as a one-way dissemination of scientific knowledge that is produced by specialists to a less-informed audience. The broader use of "science communication" in this article incorporates "public engagement" as defined above. It also includes dialogue, engagement, participation, and an understanding of the complex and diverse ways in which information is received and understood (Hilgard and Li 2017). Although science communication can also encompass academic peer-to-peer communication, this article focuses on the importance, implications, and opportunities of communicating archaeology to nonspecialists.

Science communication is a skill that incorporates many components: objectives, messages, audience, and communication medium – be it print, television, radio, public exhibition, lectures, or digital platforms. The goals of science communication are varied and so too are the range of communication approaches. There are many different audiences for archaeological information, each with their own needs, perspectives, and biases (Harding 2007). The role and participation of the audience in any communication activity impact how information is received, understood, and used. In the last few decades, the expansion and uptake of digital technologies have created new communication opportunities but also challenged traditional knowledge hierarchies in both how knowledge is created and disseminated.

Why Participate in Science Communication?

What and how archaeologists communicate impact wider political and public support for research funding and the protection and management of cultural heritage. Effective communication of archaeological knowledge is made more important in the current climate of increasingly

competitive research budgets, the proliferation of misinformation from pseudoscience and fake news, and growing scientific skepticism and distrust of experts. Outside of academia, perception of archaeology's value largely rests on effective communication between archaeologists, the public, and policymakers. Much of archaeology is funded through public money, and archaeologists have a responsibility to consider the value of their work for society. It is now common within grant proposal applications for funding bodies to request that researchers explicitly state the broader societal impacts of their research or to describe intended public communication activities. Science communication encourages archaeologists to think about their work in a new light. How is it relevant to everyday life? What use does it have? How does it connect to current events? Do the results justify the costs? In what ways are the results or method extraordinary? As science communicators, archaeologists are expected to think about how their research is situated socially, economically, and politically.

As science, technology, and the Internet pervade more and more of our everyday existence, many segments of society have shown a greater interest in science and how it connects to their lives. Growing public appetite for scientific knowledge encourages investment in science communication centers and postgraduate science communication courses. Archaeologists can contribute to wider efforts to raise scientific literacy by communicating engaging scientific insights about the past. In so doing, they can help create better-informed publics on a wide range of controversial current issues such as climate change, environmental degradation, evolution, cultural and genetic diversity, technological disruptions, the destruction of monuments, and nationalism. Archaeology is uniquely positioned to engage different publics in science because it is an inherently interdisciplinary field that combines expertise and methods from the social, earth, and physical sciences to tell past human stories through objects and material culture. By sharing what archaeologists do, revealing the marvels of past societies, the everyday life of ancient people, and explaining why it matters today, archaeologists have an important role to play in supporting scientific literacy within society.

Whose job is it to tell scientifically informed archaeological stories? To what extent is it the responsibility of the journalist or the archaeologist to communicate scientific knowledge? The roles and relationship of researcher and journalist are undergoing considerable change, and participation in science communication activities is increasingly viewed as a core part of an archaeologist's job. To do it well, science communication is time-intensive and requires a different skill set to that used in research, teaching, and project management. Regardless of their personal level of enthusiasm for science communication, archaeologists must weigh the amount of time to dedicate to communication activities against the competing demands of their roles. In general, archaeologists are not formally rewarded for communication activities, and they have to justify to their colleagues and institutions the time spent away from research. Science communication activities are often considered less important and less prestigious than "mainstream" research work. This attitude is beginning to change in the face of increasing demands on universities and research institutions to deliver public engagement and as some of the larger funding bodies incentivize and fund science communication projects and training. The personal benefits of being involved in science communication activities are also becoming more widely acknowledged and understood. Participating in science communication can provide skills and career development, enhance the impact of and awareness about research, lead to new research perspectives, raise both personal and institutional profiles, create networking and collaboration opportunities, be a source of additional funding, and aid student recruitment.

Although archaeologists often have the ingredients – knowledge and enthusiasm – for successful communication, scientific training does not often prepare archaeologists with the professional skills to harness them. The standard tools of academic communication (lengthy introductions, technical terms, and methodological detail) learned during training must be set aside to avoid constructing boundaries with, and boring,

audiences (Harding 2007). In public engagement activities, academic writing styles are replaced by an inverted structure. Inverted communication structures prioritize concise explanations of the results, the bigger picture, and the "so what" of the story while employing anecdotes and analogies to convey more complicated ideas without resorting to jargon. As science communicators, archaeologists must learn to balance the need to avoid technical jargon and unnecessary detail against concerns of misrepresentation and oversimplification. They also need to be able to perform different roles in the communication exercise, either as a presenter, consultant, discussion participant, or listener, as is required to fit the project's goals and the role taken by the audience.

Models of Science Communication in Archaeology

Successful communication requires information not only to be disseminated but also to be received and understood by the intended recipients. This entails a clear understanding of the communication goals and the target audience. There are many different publics, with different needs, wants, socioeconomic backgrounds, perspectives, and levels of knowledge and interest about the past. In addition to personal and institutional recognition, some of the many goals for communicating archaeological work outside of academia might include correcting misinformation, building trust in the scientific process, raising awareness of an issue, improving public perceptions of their field, getting people involved civically or politically, or promoting evidence-based policy outcomes. There are a number of possible science communication strategies with different approaches producing different types of engagement (Moussouri 2014).

Science communication has a long history. In the seventeenth to nineteenth centuries, scientists began to consider it their responsibility to communicate knowledge to the public. During this time, the tradition of public lectures and the foundation of various scientific institutions, such as the Royal Institution of Great Britain (1799); the Royal Society of London (1663); the British Association for the Advancement of Science (1831), now the British Science Association; and the American Association for the Advancement of Science (1848), helped to popularize science to an increasingly literate public. Over the last few hundred years, science communication has been through a number of theoretical transformations. In recent decades, it has been strongly influenced by critical theory, postcolonial theory, post-processualism, feminism and the concepts of inclusion, empowerment, engagement, and stewardship. Contemporary ideas of science communication no longer consider value, authority, and the control of narrative to be the priority of "specialists" (Stocklmayer 2013).

Holtorf (2007b) outlined three models of science communication in archaeology – the educational, promotional, and the democratic – that address differing communication objectives. The education model is based on a unidirectional and hierarchical flow of information from knowledge-generating experts to a less-informed audience. This fits with more traditional ideas of science communication in which academic knowledge is privileged above other forms of knowledge and the audiences are treated as passive receivers. Science communication using the educational model assumes a gap, or deficit, in the audience's knowledge that the scientist hopes to correct. As a more elitist and hierarchical mode of communication, it also risks miscommunication from a lack of understanding about the needs and wants of the audience.

In Holtorf's promotional model, science communication is a public relations activity, and archaeology is treated as a brand or business. Promotional models of science communication aim to foster a positive public image of archaeological science to potential "customers" in order to return benefits such as funding and support for archaeological "products" (e.g. monuments, museums, research projects, or heritage legislation). This form of communication is often seen in lobbying or mass media to persuade various publics that archaeology is important and worthwhile (Holtorf 2007a). Mortimer Wheeler, a popular archaeological figure from the early twentieth century, was adept at using this communication rational in the mass media to obtain financial

support for his excavations (Clack and Brittain 2007). Common disadvantages of the promotional communication model are the risks of sensationalizing archaeology, "dumbing-down" content, or oversimplifying the past to an extent that results in misrepresentation.

Under the democratic model, communication is two-way, equal, and participatory. The perspectives of nonspecialists form part of the knowledge creation and dissemination process. Engagement, dialogue, and participation are as important as the education of the audience (Holtorf 2007b). A similar science communication model focuses on the role of the audience as "consultants" in which information flows from the nonspecialist audience back to the practitioners of the scientific discipline. The principles of democratic communication differ quite radically from scholarly styles of communication. Democratic communication treats scientific methods as only one possible way of interpreting the past. It challenges archaeologists to rethink what they do, why they do it, and for whom they are doing it. A challenge for this model of communication is how archaeologists should address all-too-common pseudoscience and sensationalist claims, such as "lost" cities, sunken continents, extraterrestrial explanations for ancient monuments, or evolution denials that contradict widely held academic consensus (i.e. "facts"). If scientific perspectives do not take precedence over other ways of knowing, how do archaeologists contest unreliable or misinterpreted claims, especially those used to support racist, nationalistic, or other negative and divisive sociopolitical statements? While it is possible to challenge misuse of science while maintaining true to the ideal of democratic communication, few archaeologists are well trained to do so.

Strategies for communicating archaeological knowledge can also draw insights from cross-cultural communication. Archaeologists are used to communicating in their own technical language. Most are aware of the pitfalls of using discipline-specific jargon, but it is also important to consider how more common words, widely used in archaeology, can carry implied judgments and values or very different meanings, particularly to people outside academia (Stocklmayer 2013). Word choice can strongly impact the public's perception of the message being delivered, especially among marginalized, indigenous, or descendent communities (Watkins 2006). Word's such as "abandoned," "discovered," "complex," and "Old World" have been used to support dominant, elitist, and colonial narratives that reflect very real and persistent biases in the lives of some groups. Archaeologists must be sensitive to how their discipline has been used in the politics of race, identity, power, and inequality in both the, past and present. The use of language can also be a significant barrier with policymakers. The archaeological language of samples, material analyses, and sediment horizons do not translate into the governmental and legalistic language of policymakers and politicians. Careful word choice and awareness of different value judgment applied to terms are important for communicating a message the way it was intended.

A number of leading archaeologists have discussed the power of narrative storytelling for making archaeological knowledge more accessible and interesting (Hodder 1989; Tilley 1989; Joyce 2008; Dahlstrom 2014; van Dyke and Bernbeck 2015). Narrative structures work by creating an unsolved question, problem, or conflict faced by a cast of characters and then describe the actions they take to resolve it. Narrative structure is considered a key component of effective communication as it is engaging and persuasive. It has been shown to have better recall and ease of comprehension for audiences than many other communication techniques. Storytelling often relies heavily on the use of metaphor and analogy, and these are a useful tool for translating scientific concepts through comparison to everyday ideas. Examples of scientific metaphor and analogy such as greenhouse effect, black hole, butterfly effect, evolutionary trees, and selfish genes are now widespread in popular vocabulary. An inherent risk in narrative storytelling is the ethical issues it can raise in terms of implied value judgments, use of persuasion, and a potential loss of accuracy (Dahlstrom 2014). Despite the widespread use of narrative in others forms of communication, it is

largely avoided in academia for these reasons, although there are undoubtedly situations in science communication where the strengths of narrative outweigh the risks. A bigger barrier in its successful use is that scientists receive little, if any, formal training on how to construct effective narratives.

The models discussed above are just some of the approaches to science communication available to archaeologists. Each have their own set of strengths and weaknesses, but together they provide a complementary set of tools for addressing the varied communication needs in archaeology.

Opportunities and Channels for Science Communication in Archaeology

Communication is a rapidly evolving field. The widespread uptake of online digital technologies has changed the role of "traditional" mass media journalism (TV, radio, newspapers) and how archaeologists engage with different publics. Ongoing technological developments are continuing to create new means and opportunities to communicate and engage. Although the reach of the Internet is unrivaled, the Internet cannot meet all needs of science communicators. Mass media remains an important intermediary between researchers and different publics. Museums and science centers provide in-person and multilayered experiences. Community partnerships and outreach offer deeply engaging, personal, and collaborative modes of communication. These assorted communication channels are increasingly integrated with each other, and science communicators rarely use a single communication channel in isolation. Mass media, the Internet, museums, and community projects all play a role in developing new approaches to science communication. Each channel serves different, often complementary purposes, audiences, content, and styles of communication.

Online communication channels include blogs, discussion sites, videos, social media apps, and mixed-media websites. Unlike print or television, online media permits communication to be layered and self-exploratory. One of the strengths of online communication channels is the ability to create multimedia stories that can combine video, animations, slideshows, written narrative, photography, and digital storytelling techniques. Deeper levels of a website can contain research details without cluttering the engaging and interactive content on the upper pages of navigation. The Archaeological Institute of America and *Archaeology Magazine*'s Interactive Dig website is a layered online experience that allows audiences to explore the processes of excavation along multiple pathways and in a range of different excavation contexts. Another example of rich format storytelling is the multimedia feature story, "The Thousand-Year Graveyard," produced by *Science* reporter Ann Gibbons. The story provided a behind-the-scenes look at an ancient Italian burial ground and used multimedia to highlight the site's significance, explain the archaeological methods used, and describe the lives of the people buried there.

Web 2.0 (user-generated content and social media platforms such as Facebook, Twitter, YouTube, and Instagram) is founded in the principles of interactivity, dialogue, and commentary. It has disrupted traditional communication hierarchies and democratized communication by encouraging users to develop their own curiosity about a subject and engage with it directly, either through comments, seeking out further online content, or uploading content of their own. The separation of archaeologists and the public in the generation and consumption of information has blurred. The consumers and producers of culture are now one and the same. Many archaeologists already leverage Web 2.0 channels to share their work, to promote or discuss interesting research, and to contribute to debates in the discipline. The self-editing philosophy of social media gives science communicators flexibility in their writing style, presentation, and use of multimedia to enrich their stories and posts. The strengths of Web 2.0 platforms are that they provide users (both science communicators and science consumers) with instant content updates, links to other resources, and access to people all over the world. Nonscientists have direct access to the latest scientific results, and scientists get feedback from practitioners regarding their ideas and their work. Archaeological information is accessible

24/7, and conversations between archaeologists and members of the public can happen in real time.

Online social networks also provide a variety of instant channels to share and cross promote research using other social media sites. The viral structure of social media gives communicators direct access to unexpected audiences. To leverage the full reach of Web 2.0 communication, science communicators seek out and connect with online opinion leaders and influencers. Social media "influencers" have established networks of hundreds of thousands, if not millions, of individuals online. The vast extent of their networks means these online influencers can attract quality discussion participants from diverse backgrounds to the science communicator's work simply by commenting on, sharing, or re-posting the story. Social media can therefore provide informal connections to people in other fields not readily accessible to archaeologists in the "real" world. In this way, an archaeologist may find novel insights or inspiration from a statistician, chemist, architect, linguist, or ecologist who is engaging with their work in the online environment.

Despite the unrivaled reach of the Internet, as a communication channel it can struggle to reach certain demographic groups, particularly the elderly, rural, and some lower-social economic groups. The sheer amount of available information can also make it difficult for audiences to recognize quality content. Another problem with online communication is that it is very difficult to control how content is picked up and subsequently interpreted and shared by other users. Social media in particular requires intensive and regular attention in order to maintain a successful online profile. It is also important to recognize that the existence of online scientific content does not necessarily equate to increased knowledge of that topic or to the use of such online resources in the absence of targeted outreach efforts.

Despite the general trend in online communication for concise, sometimes superficial, levels of information, other digital developments are opening up unprecedented access to scientific detail online. A good illustration of this in archaeology is advances in 3D scanning and geospatial technology. It is now possible to upload high-quality 3D reconstructions of artifacts, fossils, and even whole archaeological sites. The resolution of many of these scans allows people to explore archaeological materials in microscopic detail in a way never before possible outside of a lab. As 3D technology becomes more affordable, increasing proportions of people are able to afford 3D printers to print out models of 3D artifact scans in their own home. In 2017, English Heritage partnered with Google to use Google Street View and high-definition camera technology to create 360° walk-around images of heritage sites and artifacts for people to explore online. Many of these artifacts and sites have restricted physical access, and this technology makes them available to the public for the first time. The English Heritage-Google partnership is indicative of a trend in which archaeologists can expect to increasingly work alongside technology organizations in their communication activities in order to take advantage of digital skills, expertise, and technologies. The future of the digital communication of science will continue to reveal previously unrealized opportunities for communication and engagement using advances in the "Internet of things," virtual and augmented reality, real-time data, the semantic web, artificial intelligence, and big data. These new technologies hold great potential for the geographical, visual, and content-rich data of archaeology.

Over the last few decades, increasing public engagement in science and digital innovations has changed the way that science is both conducted and communicated. Online citizen science initiatives – projects that crowdsource participation from nonspecialist volunteers – have flourished. Archaeology was in many ways an early adopter of citizen science. Archaeological field schools, volunteer archaeology, site-stewardship programs, and community archaeology projects are all founded on public participation. However, online mass participation initiatives are only just beginning in archaeology. Online citizen science projects tend to be aimed at analyzing "big data." In archaeology, these huge datasets often result from the application of technologies, such as LiDAR (and other satellite imagery), geographic

information systems, and ancient DNA. "Big data" is increasingly common in archaeology as multivariate phenomena are used to understand complex processes such as human-environmental interactions, paleo-demography, and cultural complexity (Smith 2014). Archaeology can leverage citizen science in four main ways – mobile photography and scanning technologies (often in the field), site discovery and monitoring using satellite imagery databases, crowdsourcing of data input, and crowdfunding (Smith 2014). Citizen science is a powerful science communication tool because it encourages participation, dialogue, and understanding of science outside of academia by involving people in the research and data analysis process. It is also a practical solution for processing "big data" sets that might challenge the capacity of small research teams. However, these projects also bring new concerns for researchers: How should citizen scientists be acknowledged for their work? Do citizen scientists really learn anything substantive about the science in which they are involved?

A recent and well-known citizen science example in archaeology is the GlobalXplorer platform launched by Dr. Sarah Parcak at the University of Alabama in 2016. The GlobalXplorer project enlists people to identify and preserve global cultural heritage using high-resolution satellite imagery. Citizen scientists participate by searching for unrecorded archaeological sites and document destruction and looting at existing sites. Termed "space archaeology" in the mass media, Parcak's research programme has had an enduring component of public engagement and earned her the 2015 TED Prize. Other examples of archaeological citizen science projects, past and present, include the US site of Montpelier in Virginia; the medieval churches project in the UK; the Valley of the Khans project in Mongolia; and CITiZAN (Coastal and Intertidal Zone Archaeological Network) that monitors the threat to coastal and estuarine UK archaeological sites.

Public archaeology is another channel for direct and democratic communication between archaeologists and nonspecialists. Public archaeology, sometimes referred to as community archaeology, is a diverse field centered on public participation, service, and outreach in archaeological work through engagement and dialogue. It is specifically designed for, and substantially involves, local communities in research. This form of community-led participation and dialogue is most often found in historic, battlefield, postcolonial, indigenous, and urban archaeology projects that have clearly identifiable stakeholder communities. Rather than simply aiming to educate members of different publics about archaeology that is being conducted in proximity to them, public archaeology sets out to incorporate the values, ideas, and participation of public stakeholders into the project (Simpson and Williams 2008). The practice of public archaeology is redefining how archaeologists value and use community knowledge. Through active participation in archaeological projects, local and stakeholder communities can help shape research questions and contribute their own knowledge to the research exercise (Sabloff 2016). In community-led archaeology initiatives, trained archaeologists may take a consultant and advising role, while community groups take a more active role in directing the project. The Çatalhöyük Project in Turkey is an often-cited example of a successful community archaeology project, in which the interpretation of the site and site artifacts was discussed extensively with the local community (Bartu 2000; Bartu-Candan 2005).

One key aspect of public archaeology is engaging with contemporary issues in the communities within which archaeologists work. Archaeology can have political implications, whether implicit or explicit, which may touch on local, indigenous, or ancestral sensitivities. In these instances, communication through community partnership may be essential for the researcher to gain both understanding of the impact of their work on local people and the support and goodwill necessary to facilitate access to sites and materials. "Action archaeology" is part of public archaeology and reflects a growing recognition that archaeologists have responsibilities to the local and descendent communities with whom they work. Action archaeologists work for present-day communities, not just in proximity to them (Sabloff 2016).

Collaborative research between archaeologists and local communities is not new, but the importance and popularity of this combined research and communication approach have grown in recent years. Genuine dialogue and partnership between archaeologists and different publics can raise new research questions, enhance interpretations, generate local initiatives to protect and preserve sites from looting, or bring about social change through enriching group identities, reducing community divisions, or addressing historical biases (Little and Shackel 2007; Simpson and Williams 2008; Byrne 2012). Archaeologists hoping to use public or action archaeology to communicate and leverage these benefits must recognize that this approach requires a commitment to genuine partnership. Stakeholder groups should be involved throughout the project, from the design through to publication (Little and Shackel 2007). However, present-day research environments characterized by project-driven timeframes, rigid organizational structures, and cultures of accountability can be a serious challenge to engaged and democratic forms of science communication (Moussouri 2014). For an informative introduction to the different aspects of public archaeology, see the Public Archaeology entry in this volume and references therein.

Museums and exhibitions have a long-established reputation as centers for archaeological education and debate. They also play a social and democratizing role in society (Barker 2010). For centuries, museums have hosted public debates on scientific and archaeological discoveries and connected people to science through the objects housed in their collections. In the last few decades, museums have shifted their objectives from "teaching" their visitors, to understanding how visitors learn, make sense of the information, and form meaning. While objects remain a key part of museum exhibitions, the trend toward interactive, multimedia, and immersive museum displays demonstrates how museums intersect traditional and more democratic modes of engagement. Museum exhibits and experiences can use visual, textural, and multimedia communication to encourage visitors to actively explore and discover objects as a source of knowledge.

Long before the widespread uptake of the Internet, museums were developing as forums for informal, self-directed, and flexible communication and learning experiences. Exhibition spaces are increasingly designed to support interactivity and dialogue between visitors and museum staff and to challenge traditional knowledge hierarchies (Barker 2010). The Darwin Centre at the Natural History Museum London breaks down the physical barrier between its visitors and the curators, researchers, and objects. By giving visitor's access to the behind-the-scenes science and collections, the Darwin Centre supports learning and discovery through discussion, observation, and "hands-on" participation. One challenge for museum-based science communication is how to attract visitors who have neither the predisposition to visit museums nor a pre-existing interest in the subject. One approach to combat this is to leverage the strengths and allure of the arts and humanities by integrating painting, photography, poetry, and music into exhibitions on scientific topics. New formats for bringing scientific topics to new audiences include science cafes, science festivals, and even science comedy. Many of these new science communication formats have their roots in, and are often hosted at, museums and science centers.

For the second half of the last century, television was undoubtedly the most influential medium for cultivating public perceptions of archaeology to mass audiences (Holtorf 2007a). Although online digital platforms are increasingly encroaching on the supremacy of television as a communication channel, it remains a powerful tool for audiovisual storytelling. Archaeologists are often concerned at the potential trivialization of complex topics or the perpetuation of archaeological stereotypes in television programming. On the other hand, thoughtful archaeological programming increases public interest in the discipline and has helped to counteract sensational representations of archaeology (Holtorf 2007a). Television shows such as the United Kingdom's *Time Team* or *Britain AD* or the History Channel's *Digging for the Truth* can bridge the gulf between popular

culture and informative entertainment, while also conveying information about the process of archaeology (Clack and Brittain 2007). *Time Team*, which broadcast its final and 20th season in 2013, was the longest running archaeological series in the history of television and serves as a good indicator of archaeology's long-running popular appeal. Archaeological programming was present from the early days of television. In the 1950s, Mortimer Wheeler and Glyn Daniel were named British Television Personalities of the Year for their roles in the archaeological shows *Animal, Vegetable, Mineral* and *Buried Treasure*, programs which also guest-featured other well-known archaeologists including V. Gordon Childe.

Confusion about how to communicate, the amount of time to dedicate to it, and who the target audience is means archaeologists continue to rely on professional journalists to communicate the impact of their research through television, radio and print. Archaeologists concerned with journalistic appreciations of accuracy, detail, and uncertainty may fear media misrepresentation, but journalists can, and often do, produce balanced and informative archaeological stories with mass appeal despite using completely different rules of communication (Scherzler 2007). In the 1990s, an archaeological study of urban rubbish (Rathje and Murphy 1992) became a hot and thoughtfully reported media story because the authors and journalists were able to connect seemingly pointless trash to social, political, and environmental issues of the time. Over the last few decades, changes in both academic and journalistic professions have resulted in both sectors re-prioritizing their relationship to one another (Clack and Brittain 2007). Mass media journalism has begun to redefine and reassert its role in the online space after a difficult transition from "analogue" media. Archaeologists will continue to gain skills and confidence in using the Internet to communicate their research, but they will also need to develop their journalistic narrative and popular writing skills to maximize the reach of their research in the digital age.

Conclusion

Science communication is a vital bridge between researchers and different publics. Science communication in archaeology has the potential to positively impact political, ethical, and civic thinking and bring a range of benefits for the discipline. The ability of archaeology to create fascination, enthusiasm, and value about our collective past is an important contribution to building a rich and vibrant society. Archaeological methods and knowledge also result in scientific insights on long-term human trends. These trends can be relevant to contemporary issues faced by the world today. If archaeologists want these potential insights to inform and influence social, political, and economic decision-makers, then these insights need to be effectively communicated to government officials, policymakers, urban planners, business leaders, and a range of different publics. Although archaeologists are less frequently questioning if science communication is something they should do, they are still working out how best to do it. How, exactly, should we connect knowledge about how past humans lived in cities, coped with environmental changes, waged war, managed changing resources, established trade networks, or coped with new technologies, to parallel issues in the present?

To improve public perception and understanding of archaeology, archaeologists need to communicate engaging human stories. This requires embedding communication activities into core activities and evaluating the outcomes of different communication efforts. Archaeologists have a wealth of communication channels and approaches to achieve the varied goals of science communication in archaeology. Continuing developments in communication technology and theory will offer new opportunities to reach even wider audiences.

Successful science communicators know what they hope to achieve, with whom they want to communicate, and where they want to communicate it. They know that different audiences have vastly different cultural references, prior knowledge, and experiences. The shift

toward increasingly democratic and digital science communication should encourage archaeologists to reassess the different values placed on the past, how they share information, and the quality of their relationships with different publics. As scientists, archaeologists are as much knowledge communicators as knowledge creators. As communicators, archaeologists facilitate awareness of the existence, meanings, and worth of archaeological knowledge to support the publics' choice to engage with archaeology. The next challenge for science communication in archaeology is how to guarantee equal access to such knowledge for everyone with an interest in our collective human past and how this knowledge can effectively inform present-day issues in society. By working toward these goals, science communication in archaeology contributes to open, fair, free, and informed society.

Cross-References

- ▶ Activism and Archaeology
- ▶ Adult Education in Archaeology
- ▶ Applied Archaeology (Including Activist Archaeology)
- ▶ Clubs and Societies Promoting Archaeology (National and Local)
- ▶ Community Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Outreach
- ▶ Educational Tools and Techniques in Archaeology: Overview
- ▶ Engaged Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ Heritage: Public Perceptions
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Internet Use for Archaeological Education
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ Material Culture and Education in Archaeology
- ▶ Media and Archaeology
- ▶ Museum Education and Archaeology
- ▶ Narrative and Storytelling for Archaeological Education
- ▶ Popular Culture and Archaeology
- ▶ Preserving Heritage: The Role of the Media
- ▶ "Public" and Archaeology
- ▶ Public Archaeology and Education: Present Relevance to the Past
- ▶ Public Archaeology, The Move Towards
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Television and Archaeology: Views from the UK and Beyond
- ▶ Volunteers in Archaeology

References

Barker, A.W. 2010. Exhibiting archaeology: Archaeology and museums. *Annual Review of Anthropology* 39: 293–308.

Bartu, A. 2000. Where is Çatalhöyük? Multiple sites in the construction of an archaeological site. In *Towards reflexive method in archaeology: The example at Çatalhöyük*, ed. I. Hodder, 101–109. Cambridge, UK: McDonald Institute for Archaeological Research, University of Cambridge; Distributed by Oxbow Books.

Bartu-Candan, A. 2005. Entanglements/encounters/engagements with prehistory: Çatalhöyük and its publics. In *Çatalhöyük perspectives: Reports from the 1995–99 seasons*, McDonald Institute Monographs/Çatalhöyük Research Project Vol.6/BIIA Monograph 40, ed. I. Hodder, 27–38. Cambridge, UK: McDonald Institute for Archaeological Research/British Institute at Ankara.

Byrne, S. 2012. Community archaeology as knowledge management: Reflections from Uneapa Island, Papua New Guinea. *Public Archaeology* 11 (1): 26–52. https://doi.org/10.1179/175355312X13311392295513.

Clack, T., and M. Brittain. 2007. *Archaeology and the media*. Walnut Creek: Left Coast Press.

Dahlstrom, M.F. 2014. Using narratives and storytelling to communicate science with nonexpert audiences. *Proceedings of the National Academy of Sciences* 111 (Supplement 4): 13614–13620.

Harding, A. 2007. Communication in archaeology. *European Journal of Archaeology* 10 (2–3): 119–133. https://doi.org/10.1177/1461957108095980.

Hilgard, J., and N. Li. 2017. A recap: The science of communicating science. In *The Oxford handbook of the science of science communication*, ed. K. Hall Jamieson, D.M. Kahan, and D.A. Scheufele. New York: Oxford University Press. http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780190497620.001.0001/oxfordhb-9780190497620-e-8.

Hodder, I. 1989. Writing archaeology: Site reports in context. *Antiquity* 63 (239): 268–274. https://doi.org/10.1017/S0003598X00075980.

Holtorf, C. 2007a. *Archaeology is a brand! The meaning of archaeology in contemporary popular culture*. Oxford/Walnut Creek: Archaeopress/AltaMira Press.

Holtorf, C. 2007b. Can you hear me at the back? Archaeology, communication and society. *European Journal of Archaeology* 10 (2–3): 149–165. https://doi.org/10.1177/1461957108095982.

Joyce, R. 2008. *Languages of archaeology: Dialogue, narrative, and writing*. Chichester: Wiley. https://doi.org/10.1002/9780470693520.

Little, B.J., and P.A. Shackel. 2007. *Archaeology as a tool of civic engagement*. Lanham: AltaMira Press.

Moussouri, T. 2014. From telling to consulting: A perspective on museums and modes of public engagement. In *Public participation in archaeology*, ed. S. Thomas and J. Lea, 11–22. Woodbridge: Boydell & Brewer. https://doi.org/10.7722/j.ctt5vj829.

Rathje, W.L., and C. Murphy. 1992. *Rubbish!: The archaeology of garbage*. 1st ed. New York: HarperCollins Publishers.

Sabloff, J.A. 2016. *Archaeology matters: Action archaeology in the modern world*. Milton: Taylor and Francis.

Scherzler, D. 2007. Journalists and archaeologists: Notes on dealing constructively with the mass media. *European Journal of Archaeology* 10 (2–3): 185–206. https://doi.org/10.1177/1461957108095984.

Simpson, F., and H. Williams. 2008. Evaluating community archaeology in the UK. *Public Archaeology* 7 (2): 69–90. https://doi.org/10.1179/175355308X329955.

Smith, M.L. 2014. Citizen science in archaeology. *American Antiquity* 79 (4): 749–762. https://doi.org/10.7183/0002-7316.79.4.749.

Stocklmayer, S. 2013. Engagement with science: Models of science communication. In *Communication and engagement with science and technology: Issues and dilemmas: A reader in science communication*, ed. J.K. Gilbert and S. Stocklmayer. New York: Routledge.

Tilley, C. 1989. Excavation as theatre. *Antiquity* 63 (239): 275–280. https://doi.org/10.1017/S0003598X00075992.

van Dyke, R.M., and R. Bernbeck. 2015. *Subjects and narratives in archaeology*. Boulder: University Press of Colorado.

Watkins, J.E. 2006. Communicating archaeology: Words to the wise. *Journal of Social Archaeology* 6 (1): 100–118. https://doi.org/10.1177/1469605306060569.

Further Reading

Bonacchi, C., ed. 2012. *Archaeology and digital communication: Towards strategies of public engagement*. Archetype Publications.

B. Fischoff, and D.A. Scheufele, eds. 2014. The science of science communication II. *Proceedings of the National Academies of Sciences* 111(4).

Hall Jamieson, K., D.M. Kahan, and D.A. Scheufele, eds. 2017. *The Oxford handbook of the science of science communication*. New York: Oxford University Press.

Websites

CITiZAn (Coastal and Intertidal Zone Archaeological Network). n.d. Citizen science initiative that monitors the threat to a coastal and estuarine U.K. archaeological sites.

Collective Memory. n.d. This UK-based resource is a database of evaluations from a diverse range of science communication initiatives. It has been deliberately designed to encourage sharing of good practice amongst practitioners from across the science communication community.

GlobalXplorer. n.d. Citizen science initiative using satellite imagery to identify and monitor archaeological sites.

Interactive digs. n.d. Website by the Archaeological Institute of America and *Archaeology Magazine's* provides layered online experience that allows audiences to explore the processes of excavation along multiple pathways in a range of different excavation contexts.

Medieval churches project. n.d. Citizen science project from the UK.

The Thousand-Year Graveyard. n.d. Multimedia story on archaeology by a foremost archaeology journalist.

Related Journals

International School for Advanced Studies. 2002. *Journal of Science Communication: JCOM.* Journal.

Maney Publishing, Institute of Archaeology at University College. n.d.. *Public Archaeology*. Journal. London.

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Screening Methods in Archaeology

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Introduction

Screening methods are a relevant component of excavation methodology and are nowadays

included in most fieldwork experiences. Archaeological excavations are destructive actions; consequently it is of utmost importance to devise procedures that help to recover the higher amount of ecofacts and artifacts. The recovery of all possible finds is fundamental to avoid bias in the consequent analysis of the site.

Screening methods have been part of the archaeological discourse for the last 60 years and focus on the analysis of the removed sediments in order to recover smaller artifacts, usually missed during excavation. The methodology varies and can be divided into dry screening (or sieving) and wet screening, implemented by water.

Definition

Screening methods consist of analyzing the soil removed doing excavation through screen meshes of different sizes. This technique allows to recover artifacts and ecofacts, which are usually overlooked during the removal of the sediments due to their negligible size. Screening the soil directly impacts the amount of material that can be recovered and helps avoiding bias during sample collection (Balme and Paterson 2014: 262–268; Hester et al. 2016: 93–97; Renfrew and Bahn 2016: 177).

The screening is conducted through a mesh fixed on a rectangular screen box characterized by an open top. The screen box can be made of wood or metal and can be manufactured in different sizes depending on the amount of sediments to be processed (Fig. 1).

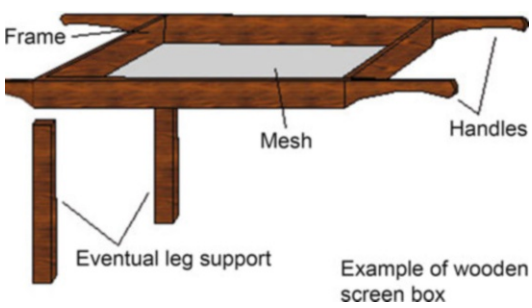

Screening Methods in Archaeology, Fig. 1 Screening box. (Image: M. Lorenzon)

The screening is often set up in the proximity of the digging area in order to facilitate the movement of soil from the actual excavation with buckets or wheelbarrows. Once brought to the screening area, the sediment is poured on top of the screen box, which is then shaken, manually or mechanically, to separate fine and coarse fractions as this latter usually includes the overlooked artifacts and ecofacts. The fine fraction of the sediments passes through the mesh, thus leaving the coarse fraction resting on top of it.

Hence, the choice of mesh size is particularly important and depends on the local geology of the site. For instance, a too fine mesh would not allow small pebbles to pass through and can be problematic in fluvial contexts, where sediments are mainly made of gravel.

Traditionally, four mesh sizes are used in the fields, 1/2 in., ¼ in., 1/8 in., and 1/16 in. (or 12.7 mm, 6.35 mm, 3.1–1.5 mm), but they are not exclusive and other sizes can be employed. In order to understand which mesh is required at any given site, a pilot sampling is often carried out, in which the sediments are initially screened through a fine mesh to determine the size required for that specific deposit (Connor 2007: 37–38; Reitz and Shackley 2012: 84).

Screening methods can be divided into two diverse techniques: dry and wet screening.

Dry screening is the sieving of sediments through a mesh and requires the soil to pass dry through the mesh. The mesh frame is suspended and can be positioned on legs or handheld. Sediments pass through the screens by shaking the mesh mechanically with a motor or simply manually when the mesh is operated by one or two people (Maschner and Chippindale 2005: 142–144).

On the other hand, wet screening consists of using water to help the sediments through the mesh. The running water is poured on top of the screen to help the soil positioned on top of the screen box to pass through it. Once the fine fraction passes through, artifacts and ecofacts left on the screen are retrieved and dried before being archived. While this method is efficient, it can also be problematic for sites located in an arid environment or sites that do not have easily access to water sources to

implement wet screening (Balme and Paterson 2014: 265, 293). Additionally, even though they share similar goals as identifying overlooked ecofacts, wet screening should not be confused with flotation, which follows a different methodology based on the density of the archaeobotanical remains (Renfrew and Bahn 2016: 244–250).

Both screening methods, dry and wet screening, can also be employed with a greater degree of accuracy in the laboratory environment during the post-excavation study period. Often soil samples from specific contexts (context samples) are packed and analyzed at a later date to answer specific research questions (see entry on "▶ Excavation Methods in Archaeology").

The choice between dry and wet screening is directly contingent to the type of sediment. For instance, wet silty-clayish soil can be particularly difficult to dry screen and often required water in order to break down clay bumps, separate the sediments from the artifacts, and move it through the screen (Balme and Paterson 2014: 262–264; Maschner and Chippindale 2005: 143). Some systems of screening involve the use of multiple screen boxes positioned on top of each other with different mesh sizes to increase the finesse of the analysis (Hester et al 2016: 93–97).

Finally, once the residue (i.e., artifacts and ecofacts) has been collected by dry or wet screening, it is sorted by separating bones, pottery fragments, shells, archaeobotanical remains, charcoals, and eventual other finds to proceed with specialist analysis (Balme and Paterson 2014: 262–264).

Key Issues/Current Debates/Future Directions/Examples

The choice of appropriate screening techniques is of essential importance in order not to negatively affect the recovery of finds (Hageman and Goldstein 2009; Reitz and Shackley 2012: 83; Shaffer 1992; Shaffer and Sanchez 1994). This major issue relies on three cardinal points: (1) there is not a "one and only" screening method that can be applied to every site; (2) screening technique should be consistent within the same excavation; and (3) the methodology selected should offer to all finds the same likelihood to be recovered (Balme and Paterson 2014: 262–264; Reitz and Shackley 2012: 83–84; Watson 1972).

Thus, the analysis of the site matrix is essential to determine which screening techniques should be implemented at each site to recover all the cultural and environmental finds (Hageman and Goldstein 2009; Reitz and Shackley 2012: 85). Ingbar's investigation (1985) tests the efficiency of diverse screening methods and indicates dry screening as more effective than wet screening while dealing with sandy deposits since it allows for a more efficient recovery of finds. On the other hand, numerous studies indicate that clayish soils often require water to uncover finds, and recovery percentages are negatively affected by dry sieving (Burke et al. 2009: 170; Pearsall 2000: 18–22; Reitz and Shackley 2012: 86).

In the best-case scenario, different techniques should be tested and implemented based on the type of sediments (e.g., prevalence of clayish, loamy, or sandy soil) as soil types clearly influence the choice of recovery method. Furthermore, they have a direct impact on the density of finds uncovered and their successive interpretation.

Likewise, the selection of mesh size deeply affects the recovery of artifacts as the choice of the wrong mesh may alter quantitatively the amount of microfauna recovered (Orton 2000: 164–165). Sapir-Hen et al. (2017) illustrate this key issue through a well-designed case study at Dor, presenting the impact on the archaeologists' interpretation when the percentage of macrofauna vs microfauna highly varies based on distinct mesh sizes and techniques. In this case the fluctuation in finds' density results may be attributed equally to different techniques, diverse mesh size, or altered patterns of human behavior present at the site. Therefore, this ambiguity should be discussed in the publication and acknowledged as a relevant factor affecting the archaeologist interpretation (Sapir-Hen et al. 2017).

Additionally, while the main aim of selecting the right screening method or mesh size is to drastically reduce the prejudice on collecting artifacts and ecofacts, there are still biases to be considered in the subsequent analysis and interpretation established by the sampling strategy

carried out during excavation (Pearsall 2000: 112–116; Reitz and Shackley 2012: 88–91; Shaffer 1992). If not all the excavated deposits undergo screening, soil sampling – and the rationale behind it – becomes essential to understand contexts, occupational levels, and findings. Sampling rationale involves multiple factors such as prior knowledge of the area, representativeness, and accessibility (Hester et al. 2016: 25–39; Pearsall 2000: 69–71). These factors have a direct effect on the method's reliability and accuracy and need also to be acknowledged when interpreting the finds.

Consequently, the methodology used and the eventual sampling rationale should be clearly stated in the final report to recognize and consider possible prejudices on the interpretation of the excavation materials.

Another noteworthy issue connected to screening methods deals with the treatment of fragile materials as these can be negatively affected by recovery techniques. For instance, careless screening can easily damage fragile ecofacts and artifacts as shells and bones can be broken when forcefully hit by stones during sieving or painted artifacts (e.g., plaster, pottery) can be damaged by water during wet screening. Thus, screening should be carefully implemented with sediments that presents an abundance of these types of cultural and environmental finds (Balme and Paterson 2014: 326; Hester et al. 2016: 93; Reitz and Shackley 2012: 85).

A secondary problem in outlining screening methods is to clarify the difference between wet screening (or water screening) and floatation as the two methods fulfill different purposes (Maschner and Chippindale 2005: 779–781; Pearsall 2000: 15–29). Flotation is not usually performed on the integral excavation, but only on selected samples to help recovering archaeobotanical finds (seeds, plant remains, pieces of wood charcoal) (Renfrew and Bahn 2016: 244–250; Pearsall 2000: 15–29). It consists of immerging a soil sample contained in a mesh, or catch sieve, inside a body of water, which is then shaken to separate light-density materials. Various typologies of floating devices are currently used in archaeology (Wagner 1988; Pearsall 2000: 15–20).

Finally, screening is a time-consuming technique, and excavation expediency often requires to work out a balance between methodological accuracy and efficiency (Burke et al. 2009: 167; Reitz and Shackley 2012: 89). For instance, large-scale excavations need to consider that all the excavated contexts should receive the same level of screening, and this latter task often requires multiple people assigned to it. Alternatively, a sample strategy can be implemented, but it requires to be well designed in advance and stating clearly the screening rationale and its impact on post-excavation analysis and publication of the results (Hageman and Goldstein 2009; Ingbar 1985; Sapir-Hen et al. 2017; Quitmyer 2004).

Cross-References

- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Recording in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology

References

Balme, J., and A. Paterson. 2014. *Archaeology in practice: A student guide to archaeological analyses*. Malden: Wiley Blackwell.

Burke, H., C. Smith, and L.J. Zimmerman. 2009. *The archaeologist's field handbook*. Lanham: Altamira Press.

Connor, M.A. 2007. *Forensic methods: Excavation for the archaeologist and investigator*. Lanham: Altamira Press.

Hageman, J.B., and D.J. Goldstein. 2009. An integrated assessment of archaeobotanical recovery methods in the Neotropical rainforest of northern Belize: Flotation and dry screening. *Journal of Archaeological Science* 36 (12): 2841–2852.

Hester, T.R., H.J. Shafer, and K.L. Feder. 2016. *Field methods in archaeology*. Abingdon: Routledge.

Ingbar, E. 1985. A comparison of small scale recovery techniques. In *Archaeology of Hidden cave, Nevada*, Anthropological papers 62, ed. D.H. Thomas, 74–80. New York: American Museum of Natural History.

Maschner, H., and C. Chippindale. 2005. *Handbook of archaeological methods*. Lanham/Oxford: AltaMira Press.

Orton, C. 2000. *Sampling in archaeology*. Cambridge, UK: Cambridge University Press.
Pearsall, D.M. 2000. *Paleoethnobotany: A handbook of procedures*. New York: Academic.
Quitmyer, I. R. 2004. What kind of data are in the back dirt? An experiment on the influence of screen size on optimal data recovery. *Archaeofauna 13*: 109–129.
Reitz, E.J., and M. Shackley. 2012. Research designs and field methods. In *Environmental archaeology. Manuals in Archaeological Method, Theory and Technique*, Reitz E.J. and M. Shackley (eds.), 69–102. Boston, MA: Springer.
Renfrew, C., and P.G. Bahn. 2016. *Archaeology: Theories, methods, and practice*. London: Thames and Hudson.
Sapir-Hen, L., I. Sharon, A. Gilboa, and T. Dayan. 2017. Wet sieving a complex: Implications for retrieval protocols and studies of animal economy in historical periods. *Journal of Archaeological Science* 82: 72–79.
Shaffer, B.S. 1992. Quarter-inch screening: Understanding biases in recovery of vertebrate faunal remains. *American Antiquity* 57 (1): 129–136. https://doi.org/10.2307/2694839.
Shaffer, B.S., and J.L.J. Sanchez. 1994. Comparison of 1/8″- and 1/4″-mesh recovery of controlled samples of small-to-medium-sized mammals. *American Antiquity* 59: 525–530.
Wagner, G. 1988. Comparability among recovery techniques. In *Current Paleoethnobotany: Analytical methods and cultural interpretations of archaeological plant remains* ed. C.A. Hastorf and V.S. Popper, 17–35. Chicago: University of Chicago Press.
Watson, P.J. 1972. Fragmentation analysis of animal bone samples from archaeological sites. *Archaeometry* 14: 221–228.

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia

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Introduction

Patagonia is the southernmost tip of South America and in general terms is constituted by two sharply contrasting territories. The first corresponds with the eastern slopes of the Andes Cordillera and is characterized by plains and plateaus, a semidesert climate and steppe and shrub vegetation, extending to the Atlantic coast. This part was occupied by land hunter-gatherers from the late Pleistocene to the early twentieth century. The second belt characterized by a vast archipelago occupies the western slope of the Andes from the Chacao Channel (46° south latitude) to Cape Horn (56° south latitude). In this region, ethnographic and historical information describes three ethnic groups, which include from north to south: Chonos, between Chiloé Island and Tres Montes peninsula; Alacalufes or Kawésqar, from the Gulf of Penas to Brecknock channel; and Yamana or Yagan, who lived from Brecknock to Cape Horn (Fig. 1). The three groups shared livelihoods based on hunting, gathering, and fishing of marine species and the use of navigation technologies basically canoes built with sewn planks (Chonos) or bark (Alacalufes and Yamana) (Bird 1946; Cooper 1946; Gusinde 1986[1937], 1991 [1974]; Emperaire 2002 [1963]; Lothrop 2002 [1928]). From a linguistic point of view, these ethnic groups shared a common trunk that diverged about five millennia ago (Viegas Barros 2005). Archaeological data establishes that the oldest sites of marine hunters for the southern cone of South America are concentrated in the south and reach 6,500 years BP. This period overlaps with the pick of the worldwide mid-Holocene marine transgression and with a general temperature and moisture increase associated with a major outbreak of forest cover. The origin of these adaptations is still under discussion, as well as the colonization of this vast coastal region.

Following, the main geographical features of the archipelagic region, the implications of different geological processes in sea-level changes and coastal evolution, and the main features of early Patagonian marine hunters are considered. Then, after outlining the history of archaeological research in these topics, we will present a brief summary of key issues under discussion for this subject, considering the origins of these adaptations and cultural evolution of marine hunter settlement in the southern cone of South America.

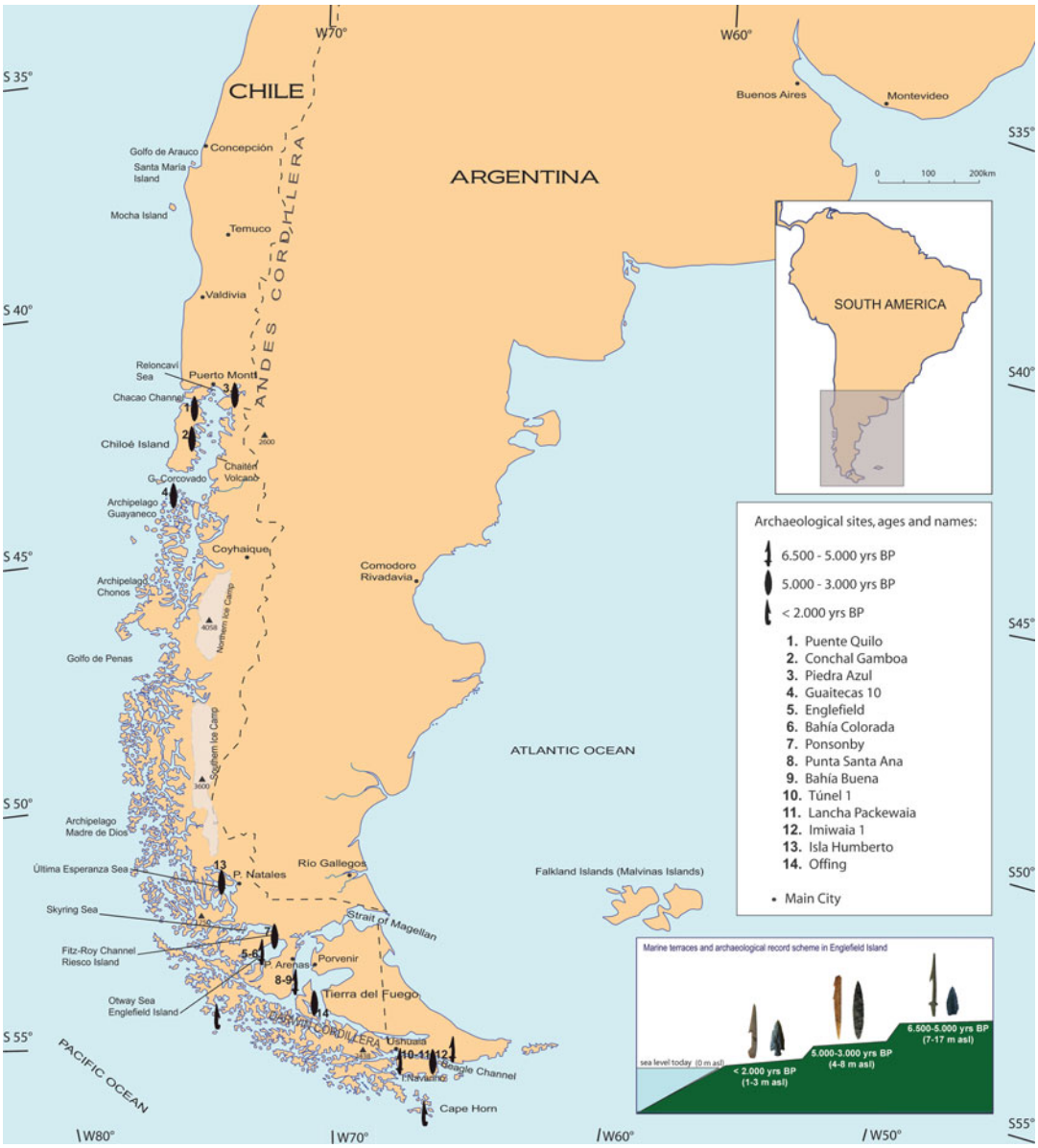

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 1 Localization map with main marine hunter archaeological sites from Patagonia

Definition

Environmental Characteristics of the Southernmost South American Pacific Coast

An intricate archipelago develops south of Chacao Channel (46°South Latitude) up to Cape Horn (56° South Latitude); it describes an arc approximately 1,800 km long, with an average width of 120 km from the Pacific coast to the foothills of the Andes Cordillera. The Patagonian archipelago has an estimated length of over 19,000 km of coastline (Bird 1988). The main factor that shaped the topography of this region corresponds to the erosive action of Quaternary glaciations that carved an intricate system of valleys, later flooded during the Holocene rise of

global sea level. The central zone between the Gulf of Corcovado (43°50′ South Latitude) and Última Esperanza Sea (51°50′ South Latitude) presents two continental ice fields and major mountain ranges that significantly limit pathways between the Pacific and Atlantic basins. In addition, the circulation is severely restricted due to steep coastlines and the presence of many front glaciers that divide the continental shore.

Dominated by a humid climate, with rainfall averaging 5,000 mm per year in the western band, this region is dominated by dense forest and peat bogs. The marine fauna is rich and varied. The most abundant marine mammals are pinnipeds (*Arctocephalus australis*, fur seal, and *Otaria flavescens*, sea lion), and whales and dolphins are also frequently recorded. Terrestrial fauna is much more limited and includes two species of deer (*Hippocamelus Bisulcus* and *Pudu puda*) and a camelid (*Lama guanicoe*), although the latter is recorded only in the extreme northeast and southeast of the area. Edible vegetables are rare and had a minor role in the human diet.

Coastline Evolution

Since the late Pleistocene period, much of the extensive coastline and mountains were covered by great ice masses, and during the Late Glacial Maximum (LGM), the sea level was about 120 m below the current level. In this period, the Pacific coast was located further to the west of its current position, and large basins and fjords were occupied by ice or proglacial lakes. Hereafter, with glacier retreat and gradual rise in sea level starts a process of maritization, a quick shoreline modification which along the Holocene will shape the archipelago as we know it today. For example, toward 8,000 years BP, Tierra del Fuego Island is separated by the opening of the Strait of Magellan and the same applies to Navarino Island with the formation of the Beagle Channel, in the far south. This process of sea-level rise reaches its peak some 6,000 years ago, and sea reached current levels around 500 years ago. As for the specific case of the central part of the Strait of Magellan, between continental Patagonia and Tierra del Fuego, the marine transgression reached an elevation of about 3.5 masl near 6,000 years BP. Because of isostatic rebound, marine terraces have decreasing elevations from west to east between 10 and 3 masl, as the western areas covered by ice during the last glacial advance have increased isostatic rise, compared to the eastern portion that was ice-free during this period (Porter et al. 1984; McCulloch et al. 2005).

Changes in sea level combined with tectonic and isostatic processes acted differentially in coastal evolution of Patagonian archipelago shorelines. From the Gulf of Penas northward starts tectonic plate contact which stretches for thousands of miles along the Pacific coast of South America, between the Nazca and South American plates. This conjunction gives origin to an important tectonic activity associated with plate subduction, resulting in an intense process of sinking and/or uprising, periodically triggering large-scale seismic activity that often is associated with the generation of tsunamis. There are few measurements for central and northern Patagonian archipelago coastal evolution. However, it has been established that during the mega-earthquake of Valdivia (1960, 9.5 MW), a band between the Chacao Channel zone and Gulf of Penas would have sunk up to 2.4 m while some islands located west of the area rose to 5.7 masl (Plafker and Savage 1970). South of the Gulf of Penas, tectonic activity is less intense and is controlled by other factors. For example, in the east-central part of the Strait of Magellan, Holocene marine terraces of different ages are observed, while in the western portion, these terraces are absent. This is due to tectonic activity associated with a fault system that would have caused vertical movements of the crust in this specific area (McCulloch et al. 2005; Cisternas and Vera 2008).

Early Marine Hunters from Patagonia, Archaeological Assemblages

The available information is concentrated in the southern and northern ends of the archipelago, because archaeological research has focused in these areas. At the moment, the vast central archipelagic zone record is limited to late Holocene sites.

In the southern zone, we find the oldest records of marine hunter-gatherers with navigation media,

at sites located within the Otway Sea-Strait of Magellan and Beagle Channel-Navarino Island localities. The archaeological sites have been dated between 6,500 and 5,000 years BP and are located at altitudes between 7 and 17 m, usually associated with ancient Middle Holocene marine land forms. The most important traits of material culture are present on bone tools as detachable harpoon points with one or two barbs and cruciform base, multi-denticulate harpoons, chisels on pinniped ulnas, cruciform base stemmed wedges on whalebone, and ornament artifacts as pendants on drilled or grooved pinniped incisors. Lithic artifacts are characterized by subtriangular projectile points, knives, other instruments with elongated edges, and fishing-line weights with grooves and/or side notches. We highlight the use of a volcanic rock, a green obsidian whose source is unknown at present and that is recorded in the vast majority of archaeological sites in the southern region. The faunal assemblages are dominated by fur seals, birds, and fish, and shell middens are described as characteristic features. The presence of sites on islands confirms the existence of well-developed navigation technologies. This assemblage has been defined as a cultural tradition called *Englefield* (Fig. 2).

In the same area, between 5,000 and 3,000 years BP, cultural evidence showing technological changes is recorded in archaeological sites including the presence of large lithic lanceolate projectile points, in concordance with less frequent bone harpoon points and the virtual abandonment of green obsidian use (Fig. 3). The quantifications of exploited fauna indicate an increase in guanaco hunting. The sites are located between 4 and 8 masl, associated with sea-level regression and coastline retraction during this period.

The northern end of the archipelago earliest archaeological records are somewhat less antique, spanning from 5,500 to 4,000 years BP, and include sites emplaced between Reloncaví Sea and Gulf of Corcovado (Guayaneco Archipelago). Artifact assemblages are characterized by lanceolate projectile points carved bifacially and fishing-line weights with side notches, among other tools (Fig. 4). Exploited fauna consisted mainly of sea lions, fish, and seabirds, with important shell midden accumulations. The location of sites varies between 0 and 10 m, elevation differences related to local variations in sinking and/or uplifting tectonic processes in this area. Interaction between groups in this area is attested by the presence of obsidian artifacts from a rock source located at Chaitén Volcano.

Historical Background

Research in the pacific southern coast began with ethnological work in the far south, associated with the description of the last Yamana (Gusinde 1986[1937]; Lothrop 2002 [1928]; Martial et al. 2007 [1888]) and Alacaluf ethnic groups (Gusinde 1991 [1974]; Emperaire 2002 [1963]). Nevertheless, the first archaeological excavations go back to the 1870s in Isabel Island, in the central part of the Strait of Magellan (Borrero et al. n.d.). Later, ethnological work led to initial questioning of the antiquity of marine hunter population, and estimates based on observations of shell deposit accumulation rates, elevation of sites above sea level, and isostatic lifting rates calculated for that epoch were made in the decades of 1920 and 1930 (Bird 1946; Lothrop 2002 [1928]). They reached pioneer dates with a maximum around 2,500–5,000 years BP. In this period, Junius Bird carried out test pit excavations in different areas of the archipelago, developing an initial cultural outline and periodification for the southernmost area, but details were never published.

Systematic archaeological excavations would begin in the southern end between the 1950s and 1960s, conducted by the French ethnologist and prehistorian Joseph Emperaire within the Otway Sea. His excavations at Englefield, located on an ancient marine terrace on the homonymous island, led to the first characterization of an early marine hunter group in Patagonia. Another relevant site excavated by Emperaire, called Ponsonby, is located along the Fitz-Roy Channel. The locus offered the first description of an assemblage dominated by lanceolate projectile points and

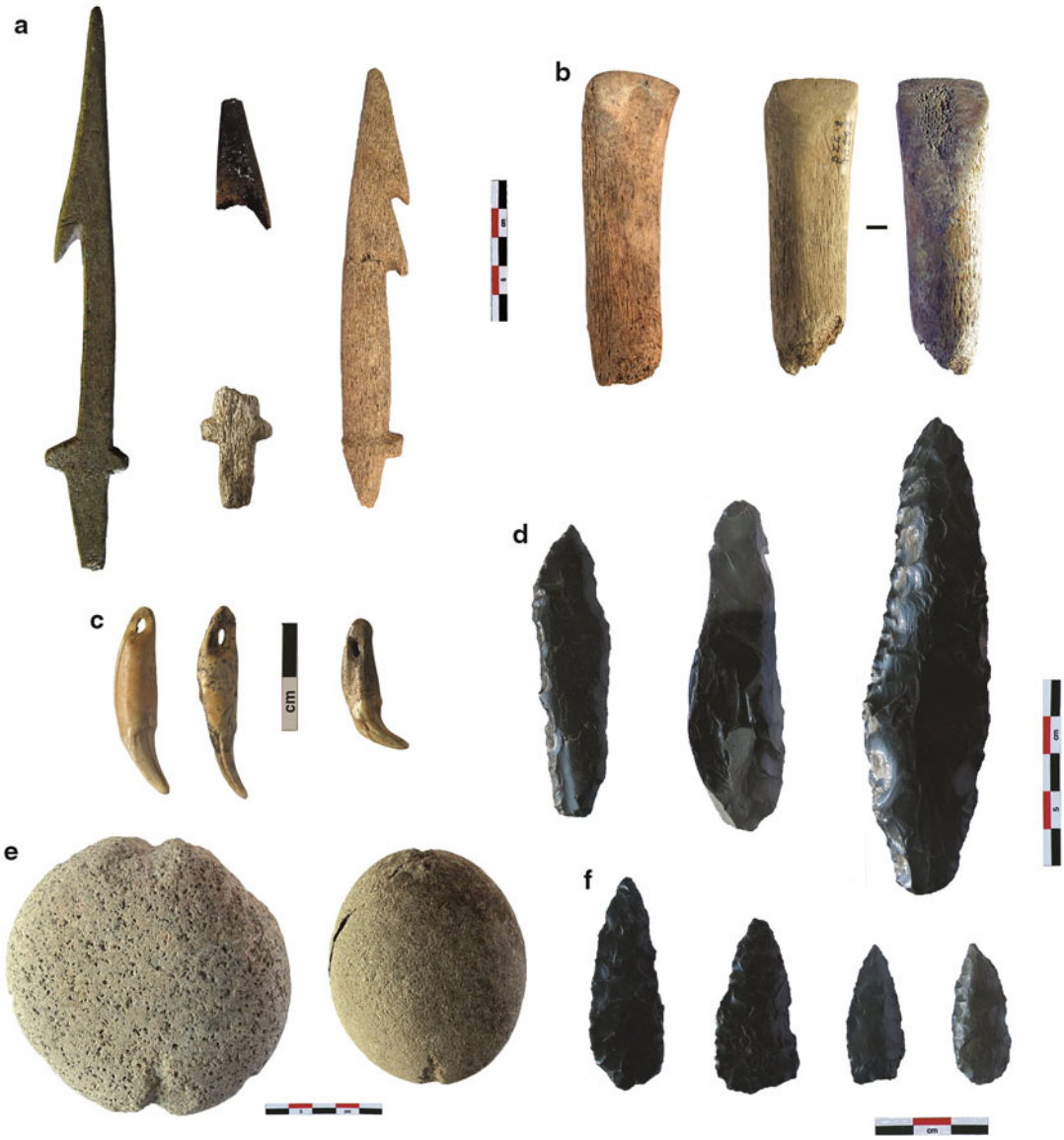

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 2 Lithic and bone artifact assemblage from early marine hunters, Englefield Tradition: (**a**) harpoon points with one and two barbs and cruciform base, (**b**) chisels made on pinniped ulnas, (**c**) pendants on pinniped perforated teeth, (**d**) green obsidian bifacial-knife instruments, (**e**) fishing-line weights and (**f**) subtriangular projectile points (green obsidian)

other bone and lithic artifacts that markedly differed from those recorded in Englefield. The site survey was interrupted by the tragic death of Emperaire who died buried by sediments during his excavation work.

During the first half of the 1970s, the work of Chilean archaeologist Omar Ortiz-Troncoso allowed discovering two new sites on the Strait of Magellan shoreline, with a similar assemblage to those described in Englefield Island. Excavations at sites Punta Santa Ana and Bahia Buena confirmed the technological and economic relationship, integrating them as a cultural tradition with a 1,500-year phase. The dates obtained in the

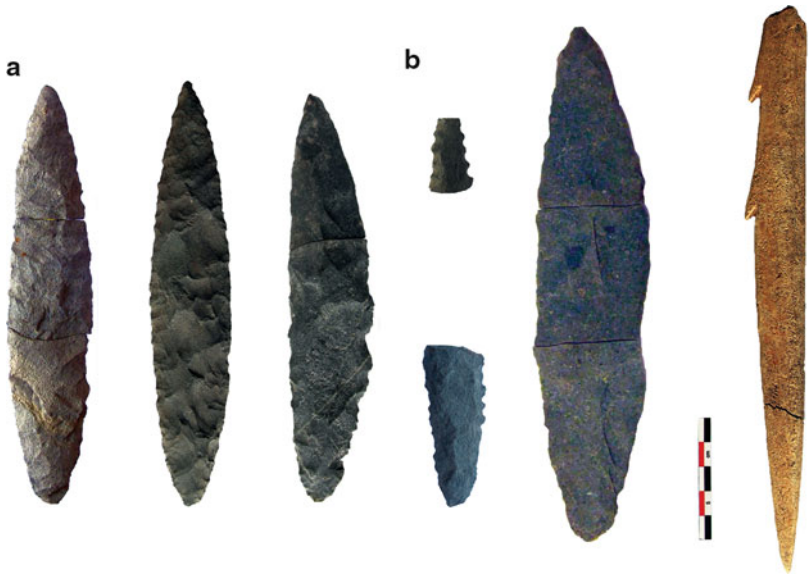

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 3 (**a**) Large lanceolate lithic projectile points and (**b**) harpoon point from sites in Southernmost Patagonia dated between 5,000 and 3,000 years BP

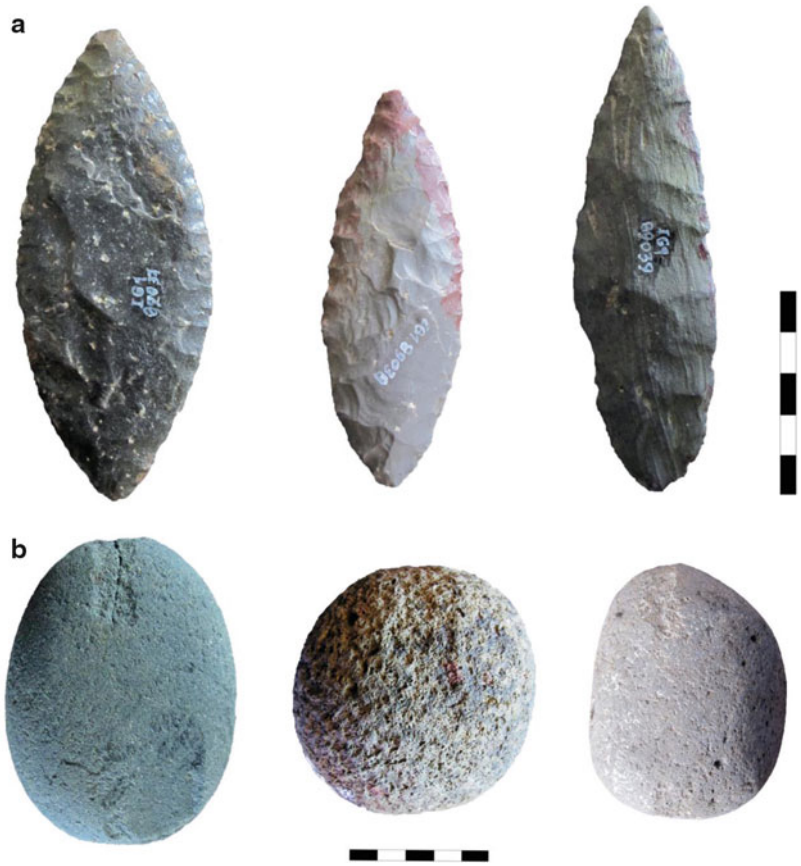

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 4 Lithic artifact instruments from early marine hunters of northern Patagonian archipelago, spanning between 5,500 and 4,000 years BP: (**a**) lanceolate lithic projectile points and (**b**) fishing-line weights

Strait of Magellan were located in a range between 6,400 and 5,200 years BP.

At the southernmost end of the archipelago, specifically on the north shore of Beagle Channel, archaeological research started in the mid-1970s led by Argentinean archaeologists Luis Abel Orquera and Ernesto Piana. Their research developed and characterized an archaeological sequence for the settlement of marine hunters in this zone. Excavations at Tunel 1, Imiwaia, and Lancha Packewaia sites, located on the southern coast of Tierra del Fuego Island, allowed recording a peopling sequence spanning the last 7,000 years BP. The earliest evidences, with dates around 7,850 years BP in the layer S of Imiwaia and 6,800 years in the first component of Tunel, were interpreted as brief occupations generated by terrestrial hunters and with no ties to later assemblages of marine adaptation groups. Following the stratigraphic sequence, further above in the second component of the Tunel I site and Imiwaia are dated between 6,400 and 4,300 years BP, the sites render another assemblage. The material cultural verifies an association with the bone and lithic industry described in Englefield, highlighting the same detachable harpoon points with cruciform base, multi-denticulate harpoons, chisels on pinniped ulna, and cetacean bone wedges. Outstanding decoration is invested on bone tools, and various ornament artifacts, including pendants on pinniped incisors, are recorded. A peculiarity of Beagle Channel assemblages is related to morphological variations in harpoon points with cruciform base. The stone tools are similar, stressing the rare but regular record of green obsidian artifacts that attest interaction between early human groups settled in the Beagle Channel and the Strait of Magellan-Otway Sea. In relation to Lancha Packewaia site, there are two stratigraphic assemblages, an old component dated near 4,200 years BP and another recent group of artifacts dated after 1,600 years BP. The former component is noted because of its striking similarities with Ponsonby site, dominated by big lanceolate lithic projectile points and fauna records that attest an important role of guanacos in the diet (Orquera and Piana 1999, 2009; Orquera et al. 2012).

During the 1980s, the French Archaeological Missions in southern Patagonian archipelagos are restarted by Dominique Legoupil. The excavation of Bahia Colorada site, located on a high terrace in the eastern coast of Englefield Island, allowed her to characterize in great detail this assemblage, defined thereon as Englefield cultural tradition. Another landmark was the reassessment of the Ponsonby site, describing an occupational sequence of seven millennia. The earlier component has a chronology in the order of 7,000 years BP, but few materials, of little diagnostic value, were found in association with faunal remains of guanaco. This archaeological level was interpreted as the result of ephemeral terrestrial hunter campsite activities at a time prior to the opening of the Fitz-Roy Channel and Riesco Island. Further up, the main component of Ponsonby site is associated with a rich lithic industry characterized by large lanceolate projectile points and the predominance of guanaco consumption, with dates between 5,000 and 3,000 years BP. This assemblage shows remarkable similarities with the Lancha Packewaia site oldest component and corresponds to a second cultural tradition for southern Patagonian marine hunters.

Research in the northern archipelago started later, noting at the beginning of the 1970s the publication of Chilean archaeologists Cristian Diaz and Marcelo Garretón informing about the systematic excavation of Conchal Gamboa site, a big shell midden located on the eastern coast of Chiloé Island. This work is the first description of marine hunter-gatherers context. From the collection, we can note the lithic lanceolate projectile points and some decorative elements made on bones and shells (Diaz and Garretón 1972–73). This site was not radiocarbon dated and remained an isolated reference to early canoe groups in the area until the late1980s, when researcher Charles Porter discovered and characterized the site Guaitecas 10, located immediately south of the Gulf of Corcovado and dated around 5,000 years BP. Porter's work was pioneer in highlighting the impact of tectonic subsidence phenomena and its relevance in differential preservation of archaeological

evidence in the northern Patagonian area (Porter 1993). After the 1990s, new evidence of early settlement of hunter-gatherers resulted from the excavations conducted by archaeologists Carlos Ocampo, Pilar Rivas, and Eugenio Aspillaga at Puente Quilo site, north of Chiloé Island (Ocampo and Rivas 2004), and Nelson Gaete rescue excavation in Piedra Azul site, recovered on the shore of Reloncaví Sea (Gaete et al. 2004). These sites correspond to shell middens with stratigraphic sequences of occupation ranging from 5,500 years BP until at least the first millennium AD. In general, the assemblages are associated with early industry markers: big lanceolate lithic projectile points carved bifacially, fishing-line weights, and some contexts also include multi-denticulate bone harpoons.

Key Issues and Current Debates

Origin of Maritime Adaptations for the Southern Pacific Coast of South America

One of the main questions of the prehistory of the Patagonian archipelago is the origin of marine adaptations. The explanation of the peopling process is held by two main hypotheses. The first supports a local origin from pedestrian hunter groups that would have developed specialized technologies for the exploitation of marine resources (harpoons, fishing techniques) and a transport media – canoe – which would have allowed colonizing this region. Two likely areas for the development of this process have been indicated: the northern archipelago, which includes the Reloncaví Sea and Chiloé Island (Ocampo and Rivas 2004), associated with a lanceolate projectile point tradition and the southern archipelago, near the Strait of Magellan and/or Beagle Channel, linked to the development of the Englefield cultural tradition (Legoupil and Fontugne 1997; Orquera 2005; Orquera and Piana 2009).

The second hypothesis bases its explication on migration of hunter-gatherer groups equipped with water transport, canoeists which would have arrived in the archipelagic region from the north, along a Pacific coastal route.

Among arguments pro or against the hypothesis of the origins of these prehistoric human adaptations, we must note that older ages for sites in the southern end suggest a local source. But in return, the early records show a high degree of technological specialization (harpoons, deep-sea fishing, navigation aids). A reasonable expectative that could support local origin as explanation of this maritime adaptations would be to find older evidences and cultural traits of evolving local development describing different stages of experimentation and adaptation to marine environments. Nevertheless, this evidence has not been recorded for the area. Furthermore, the second hypothesis of migration of populations from the Pacific coast is not supported by existing data, as the northern coast sites from Chacao Channel upward possess ages considerably lower than early sites from the southern end.

A core issue to verify any of the alternatives for the origins of maritime settlement in Patagonia lies on the scarcity of coastal sites that predate the Holocene marine transgression. This fact could be explained because the shorelines would have been submerged and/or eroded during this period of marine transgression. The only sites currently registered that correspond are Ponsonby – initial occupation – in Fitz-Roy Channel and Tunnel I first component and Imiwaia I ancient occupation in southern Tierra del Fuego. Nevertheless, these assemblages have been interpreted as a result of the occupation of terrestrial hunters (Legoupil 2003; Orquera et al. 2012).

Cultural Trajectories in Maritime Settlement

As for the cultural evolution of coastal settlement, we can state that in the northern archipelago, in Chiloé Island and Reloncaví Sea, researchers describe continuity in technological traditions and subsistence during the hunter-gatherer occupation periods, noting that during the last millennium, pottery is recorded in association to the arrival of horticultural populations of Huilliche-Mapuche ancestry.

South of Gulf of Corcovado prehistoric groups keep a hunter-gatherer lifestyle unto historic times. However, there are different interpretations

as to whether or not there was cultural continuity along the sequence, particularly in the case of the southern end. For Piana and Orquera (2007), the archaeological sequence shows a remarkable continuity, homogeneity, and stability over time, considering the subsistence elements, lithic and bone tools, and lifestyle in general. Other researchers argue that there would be a major change from the appearance of assemblages related with big lanceolate projectile points, remarking these sites as constituting a different cultural tradition, possibly related to assemblages described in the northern part of the archipelago (Morello et al. 2002; Ocampo and Rivas 2004; Schidlowsky 2004). Evidence supporting the identification of different traditions is based on both the appearance of new stone-tool designs, involving operational chains and methods of fabrication, as well as the abandonment of green obsidian lithic raw material use, particularly in the Strait of Magellan-Otway Sea area, where the source would be located. Among the hypotheses that would account for the emergence of a new cultural tradition, the possibility of migration of marine hunter groups from the northern area is raised. While a common hunter-gatherer marine lifestyle is a constant for 6,500 years, it is clear that there are changes in technology and wildlife resource exploitation. Current discussions are focused on the processes which could explain the changes perceived in the archaeological record through time. The argument that supports the notion of continuity tends to interpret these changes in technology and use of raw materials as innovation or diffusion involving no fundamental cultural change (Orquera et al. 2011). The counter arguments indicate that changes in technology and in the use and knowledge of certain raw materials involve cultural aspects that must be transmitted from generation to generation and characterize a distinct cultural tradition, therefore involving an essential cultural shift (Figs. 2, 3, 4, and 5).

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 5 Late marine hunter artifacts dating from the last 2,000 years BP: (**a**) characteristic bone harpoon points that last up to ethnographic times and (**b**) lithic pedunculated projectile points (green obsidian and cherty rocks)

International Perspectives

The study of the peopling of the Patagonian archipelago has a vast importance in the research on processes of colonization and effective occupation of the marginal end frontiers of the Americas. This region forms a distinctly marine environment, both because of its predominant wildlife resources and its geographical setting, which makes it necessary the use of navigation media to travel around this intricate system of fjords, channels, and islands. The origins of maritime adaptation in Patagonia face us to a global problem related to the challenge of identifying archaeological evidence previous to the coastal marine transgressive phenomena (Massone et al. 2013). Researches in other areas of the Americas have determined coastal occupation records of at least 10,000 years BP. Some of these sites are located in the coastal desert of southern Perú and northern Chile. Furthermore, the presence of hunter-gatherer populations in late Pleistocene continental areas adjacent to the archipelago makes it plausible to propose a much older appearance of marine adaptations in Patagonia than those reported to date. The search for information that would give support to this idea confronts us with a crucial methodological and theoretical duel, that of designing search strategies that allow exploring conditions that might have preserved this type of evidence.

Future Directions

The current state of knowledge about the prehistory of Patagonian archipelago is restricted to areas located inland, along the continental coast and/or located on islands nearby narrow channels that were covered by glaciers during the LGM. It is a paradox that until now no research efforts have been done to incorporate the extreme western pacific coastline. Free of ice since the late Pleistocene, this area currently concentrates the greatest number and diversity of fauna of the region, something that could not pass unnoticed by hunter-gatherer populations. These characteristics determine the importance of incorporating the area in future research efforts.

In addition to expanding research areas, the incorporation of survey designs based on geomorphological studies to help guide the search for areas that could preserve ancient coastlines from times preceding the Holocene marine transgression should be achieved. In this sense, it is relevant to explore areas where tectonic phenomena and isostatic uplift of the land crust could contribute to the preservation of this type of evidence. This line of work can substantially contribute new evidence to the debate about the antiquity of coastal settlement and mechanisms – being migration or local development and adaptation – that have operated in the colonization of the American border.

Cross-References

- ▶ Bird, Junius
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Monte Verde, Archaeology of
- ▶ Peopling of the Americas

References

Bird, J. 1946. The archeology of Patagonia. In *Handbook of South American Indians, volume 1: The marginal tribes*. Bureau of American Ethnology Bulletin 143, ed. J.H. Stewart. Washington, DC: Smithsonian Institution.

Bird, J. 1988. *Travels and archaeology in south Chile*. Iowa: University of Iowa Press.

Borrero et al. n.d. La historia, etnografía y arqueologíade Isla Isabel, estrecho de Magallanes, Chile. Enviado a Magallania.

Cisternas, A., and E. Vera. 2008. Sismos históricos y recientes en Magallanes. *Magallania* 36: 43–51.

Cooper, J.M. 1946. The Chono. In *Handbook of South American Indians, volume 1: The marginal tribes*. Bureau of American Ethnology Bulletin 143, ed. J.H. Stewart, 47–54. Washington, DC: Smithsonian Institution.

Diaz, C. D., and M. C. Garetton. 1972–73. El poblamiento prehispánico del área insular septentrional chilena. *Actas del VI Congreso de arqueologia chilena* (oct. 1971) 559–584.

Emperaire, J. 2002 [1963]. *Los nómades del mar*. Santiago: LOM Ediciones.

Gaete, N., X. Navarro, F. Constantinescu, R. Mera, D. Selles, M. E. Solari, M. L. Vargas, D. Oliva, and L. Duran. 2004. Una mirada al modo de vida canoero

del mar interior desde Piedra Azul. *Chungara, Revista de Antropología Chilena Volumen Especial*: 333–346.
Gusinde, M. 1986 [1937]. *Los Indios de Tierra del Fuego, T. 2: Los Yámana*. Buenos Aires: Centro Argentino de Etnología Americana.
Gusinde, M. 1991 [1974]. *Los Indios des Tierra del Fuego, T. 3: Los Halakwulup*. Buenos Aires: Centro Argentino de Etnología Americana.
Legoupil, D. 2003. Cazadores-recolectores de Ponsonby (Patagonia austral) y su paleoambiente desde VI al III milenio A.C. / Les chasseurs-cueilleurs de Ponsonby (Patagonie australe) et leur environnement du VIème auIIIème mill. av. J.-C. *Magallania* 31 (Documentos).
Legoupil, D., and R. Fontugne. 1997. El poblamiento marítimo en los archipiélagos de Patagonia: Núcleos antiguos y dispersión reciente. *Anales del Instituto de la Patagonia, Serie Ciencias Humanas* 25: 75–87.
Lothrop, S. K. 2002 [1928]. *The Indians of Tierra del Fuego*. Ushuaia: Zacher & Urruty Publications.
Martial, L.F., P. Hyades, and J. Deniker. 2007. *Etnografía de los Indios Yaghan de la Misión Científica del Cabo de Hornos 1882–1883*. Punta Arenas: Ediciones Universidad de Magallanes e Instituto Francés de Estudios Andinos.
Massone, M., F. Morello, L. Borrero, D. Legoupil, F. Mena, A. Prieto, C. Ocampo, P. Rivas, M. San Román, F. Martin, C. Méndez, O. Reyes, and D. Munita. 2013. La Patagonia Chilena. In *Prehistoria: Culturas de Chile*, ed. F. Falabella. Editorial Andrés Bello: Santiago.
McCulloch, R., M.J. Bentley, R.M. Tipping, and C. Clapperton. 2005. Evidence for late-glacial ice dammed lakes in the central Strait of Magellan and Bahía Inútil, southernmost South America. *Geografiska Annaler* 87A: 335–362.
Morello, F., M. San Román, and A. Prieto. 2002. Puntas de Proyectil Lanceoladas en Patagonia Meridional y Tierra del Fuego. Anales del Instituto de la Patagonia, *Serie Cs. Humanas* 30: 155–166.
Ocampo, C., and P. Rivas. 2004. Poblamiento Temprano de los extremos geograficos de los Canales Patagonicos: Chiloe e Isla Navarino. *Chungara, Revista de Antropología Chilena*, Volumen Especial: 317–331.
Orquera, L. 2005. Mid-Holocene littoral adaptation at the southern end of South America. *Quaternary International* 132: 107–115.
Orquera, L.A., and E. Piana. 1999. *Arqueología de la Región del Canal Beagle (Tierra del Fuego, República Argentina).* Buenos Aires: Sociedad Argentina de AntropologÍa.
Orquera, L.A., and E. Piana. 2009. Sea nomads of the Beagle Channel in southernmost South America: Over six thousand years of coastal adaptation and stability. *Journal of Island & Coastal Archaeology* 4: 61–81.
Piana, E., and L. Orquera. 2007. Diferencias regionales y temporales en el litoral sudoccidental de Sudamérica. In *Arqueología de Fuego-Patagonia. Levantando piedras, desenterrando huesos… y develando arcanos*, ed. F. Morello, M. Martinic, A. Prieto, and G. Bahamonde, 311–326. Punta Arenas: Ediciones CEQUA.
Plafker, G., and J. Savage. 1970. Mechanism of the Chilean earthquakes of May 21 and 22, 1960. *Geological Society of America Bulletin* 81: 1001–1030.
Porter, C. 1993. GUA-010, un sitio costero erosionado en una zona sísmica activa. *Boletín del Museo Regional de la Araucanía* 4 (1): 81–88.
Porter, S., M. Stuiver, and C. Heusser. 1984. Holocene sea-level changes along the Strait of Magellan and Beagle Channel, southern South America. *Quaternary Research* 22: 59–67.
Schidlowsky, V. 2004. Primeros cazadores marítimos y terrestres de Patagonia austral y Tierra del Fuego: TecnologÍa lÍtica e identidad cultural. *Chungará* 36 (supl.esp): 89–94.
Viegas Barros, J.P. 2005. *Voces en el viento. Raíces lingüísticas de la Patagonia*. Buenos Aires: Mondragón.

Further Reading

Orquera, L.A., D. Legoupil, and E.L. Piana. 2011. Littoral adaptation at the southern end of South America. *Quaternary International* 239: 61–69.
Orquera, L., E. Piana, D. Fiore, and A.F. Zangrando. 2012. *Diez mil años de fuegos. Arqueología y Etnografía del Fin del Mundo*. Buenos Aires: Editorial Dunken.

Second Modernity and the Second Phase of European Colonialism

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Introduction

The impact of European Colonialism upon world cultures has been, and continues to be, undeniably profound. More and more in contemporary archaeology (and heritage studies) this impact is being recognized in the way we formulate our perception of the past. Whether our gaze be cast upon pre-colonial societies or colonial and post-colonial heritages, it is all unavoidably (it can be argued) viewed through the lens of the European colonial influence.

Definition

The term *Second Modernity* is a theory first developed by philosopher Enrique Dussel in relation to

the historic period between the seventeenth and the second half of the twentieth century. It refers to the idea that people who live under colonial rule are subject not only to Western economic and political forces but are also influenced in the way they see and think of themselves (and others) based upon a change in mindset brought about by Western influence and control. The *Second Phase of European Colonialism* is the period of world history when global mercantile activities led to the development of European colonies, most notably by Britain, Holland, France, and later Germany, and largely focused on Africa and India from the seventeenth century until colonial states began to acquire independence in the second half of the twentieth century. This is sometimes referred to as *New Imperialism* and follows the earlier period of European Colonialism (or *First Modernity*) that saw Spanish and Portuguese exploitation in the Americas. The two are inseparably linked in the way that the global historical activity that occurred during the Second Phase of European Colonialism resulted in the development of subaltern non-colonialist social theory such as Second Modernity.

Historical Background

Developed out of postcolonial studies and specifically Latin American Social Theory, the idea of Second Modernity was a response to Marx's lack of analyses of class struggle in Latin America and his apparent skepticism in the development of the bourgeoisie in non-European societies. The bourgeoisie were central to Marx's theory of social change, or "Universal History," as it was the bourgeoisie who represented the first revolutionary class in history and who (through maintaining the ability to control and revolutionize the means of material production) were able for the first time to actively influence and change social relations. This, however, he did not apply to feudal societies. It was the development of international markets through the tool of colonialism that Marx saw as the necessary stage through which a previously feudal society must pass before the creation of the revolutionary bourgeoisie. His assessment was, however, from a purely European perspective and the lack of investigation into the development of capitalism outside that of the European model (i.e., where colonial control implanted European structures into non-European geographies). As Castro-Gómez (2008: 262) observes, "Latin America was, it seemed to Marx, a grouping of semi-feudal societies governed by large landowners that wielded their despotic power without any organized structure." Colonialism is then, for Marx, a tool of capitalism and responsible for the overthrow of feudal societies in the march toward revolution. Colonialism in effect "delivers" capitalism and, by association, the revolutionary bourgeoisie. He did not see, as others have subsequently done, that colonialism is more than an economic or political phenomenon. And it was the study of this more expansive and socially pervasive impact of colonialism that lead to the growth of late twentieth-century subaltern social theories from former European colonies of which Second Modernity and the writing of Enrique Dussel was one.

Dussel argues that European modernity was founded on materiality that had been specifically created after Spain's sixteenth-century territorial expansion (Castro-Gómez 2008: 272). He goes on to argue for the historical existence of two modernities. This first began in the sixteenth century when the Christian Renaissance spread globally via Spain's colonial domination of the Americas, and the second was the colonial expansion into Africa and Asia by Britain, Holland, France, and later Germany.

Enrique Dussel was born in 1934 in La Paz, Mendoza, Argentina, and is best known as one of the founders of the movement known as the Philosophy of Liberation. His writing aims to dismantle the nature of European thinking by critiquing the Eurocentrism of modern philosophy and characterizes the dominant model of philosophy as one of European conquest over the rest of the world (in this way mirroring Said's ideas of "Europe" and the "Other" (Said 1978) and Wallersteins' (1980) world-system with its "Core" and "Periphery." In doing this Dussel (1995: 148–49) aimed to liberate non-European

social discourse from the "Eurocentric myth of modernity":

> Modernity is not a phenomenon that can be predicated on a Europe considered as if it were an independent system, but only about Europe if it is conceived as a centre. This simple hypothesis completely transforms the concept of modernity, its origin, development, and contemporary crisis, and consequently it also transforms the content of late and post-modernity. In addition, I would like to introduce another idea that qualifies the former: Europe's centrality within the world-system is not the result of an internal superiority accumulated during the European Middle Ages about and against other cultures. It is instead a basic effect of the discovery, conquest, colonization, and integration (submission) of Ameri-india. This simple fact gave Europe the comparative and determinant advantage over the Ottoman-Islamic world, India and China. Modernity is the result of these events, not their cause. Therefore, it is the administration of that centrality within the world-system that would allow Europe to become something like "the reflexive consciousness" (the modern philosophy) of world history. . .Even capitalism is the result and not the cause of this conjunction between European expansion around the world and the centralization of the world-system.

As a result, any study of world heritages should recognize non-European cultures for the role they have in the reflective dominance of European cultural narratives.

Another important figure in the development of the idea of Second Modernity and its intrinsic tie to colonialism is Walter Mignolo. Mignolo developed a critique of Wallerstein's world-systems theory based upon Dussel's ideas of the (non-bourgeois) Hispanic world, arguing that "World-systems analyses is indeed a critique of Eurocentrism, but a Eurocentric critique of Eurocentrism" (Mignolo 2000: 314).

World-systems analyses are based upon a neo-Marxist model of economic history formulated primarily by Wallerstein in the 1970s and 1980s (Wallerstein 1980, 2005). It attempts to explain economic globalization, or supranational economic activity, through the concept of inequitable interrelation between national economic units. The model's primary supposition is that the economies of "the developing world" are in every way effected by (and should therefore be analyzed in terms of their relation to) the economies of the wider world, a world which is dominated by the USA, Japan, and Europe. Like Marx, Wallerstein argues that the modern capitalist world-system originated in Europe in the sixteenth century via the economic transformation from feudal organization to capitalist (Wallerstein 1980: 2005):

> . . .our original primary purpose was to show that most production within the capitalist world-economy that placed items for consumption on the market was the result of a long chain that did in fact cross frontiers, and that this had been so throughout the entire history of the capitalist world-economy from the long sixteenth-century to today (Wallerstein 2005).

Mignolo bases his criticism of Wallerstein's world-system on the opinion that the theory is simply another example of Western ideas being presented to non-European peoples as *the* model for critical analyses. In his explanation Mignolo quotes Darcy Ribeiro:

> In the same way that Europe carried a variety of techniques and inventions to the people included in its network of domination. . .*it also introduced to them its equipment of concepts*, *preconcepts*, *and idiosyncrasy that referred at the same time to Europe itself and to the colonial people*. The colonial people, deprived of their riches and of the fruit of their labor under colonial regimes, suffered, furthermore, the degradation of assuming as their proper image that was no more than the reflection of the European vision of the world. . .. (Ribeiro 1968: 63 in Mignolo 2000: 13).

In looking at cultural identity and modernity in Latin America, the Peruvian sociologist Aníbal Quijano also put forward the argument during the 1990s that colonial power cannot be reduced to economic, political, and military domination of the world by Europe, but that it also supports and spreads globally European models of the formation of knowledge in modernity (Castro-Gomez 2008: 280). This is what Gómez calls the "coloniality of power" and sees the action of colonization as attempting to replace Indigenous forms of knowledge with those more appropriate to the underlying aims of the controlling Western regime.

This relationship between capitalism, colonialism, and the control of the formation of knowledge can, arguably, be seen in the histories of the expansion of mercantilism across national

frontiers throughout the world in the later European historic period (closely linked to Britain's industrial revolution and France's bourgeois revolution). The period categorized the Second Phase of European Colonialism.

Portugal (in alliance with Spain) was the world's major colonial power during the first phase of European Colonialism in the sixteenth century. This was to begin to diminish in the seventeenth century, a fall which was precipitated by the defeat of the Spanish Armada in 1588. By 1600, the formerly dominant Portuguese maritime establishment was in no state to counter the dual mercantile threat of the new royally chartered English East India Company and, in 1602, the Vereenigde Oost-Indische Comagnie (Dutch East India Company). The East India Company (EIC) was first established in 1600 as a joint-stock association of English merchants under the title of "The Governor and Company of Merchants of London Trading into the East Indies," the "Indies" being defined as the lands lying between the Cape of Good Hope and the Straits of Magellan. The aim in trading in the Indian Ocean for both the English and the Dutch was not Africa or India primarily, but Indonesia or the Spice Islands beyond. During its first 10 years the EIC sent 17 ships to Asia, in contrast to the VOC's 134. The result being that the Dutch were able to establish trade settlements at Java and Moluccas, Batavia (to be capital of their eastern empire) in 1607, Malacca in 1641, Mauritius in 1644, Table Bay in 1652, and Ceylon (taken from the Portuguese) in 1658. By the end of the century their "factories" and forts were dotted all over the East – in the Persian Gulf, on the coast of India, and the Malayan archipelago. The EIC was largely confined to Surat (1612), Madras (1639), Calcutta (1650), and Bombay (1665). This inequality of settlement numbers is also indicative of the different approaches to overseas trade at this time by the English and Dutch. In contrast to the VOC the EIC remained independent of direct state ownership (being answerable instead to company shareholders) and promoted its activities upon the basis of free enterprise.

By 1784 there was sufficient support in the British parliament for Prime Minister Pitt to introduce the *India Act*. The intention of which was to "...take care to prevent the Government from being ambitious and bent of conquest. Propensities of that nature had already involved India in great expenses, and cost much bloodshed. These, therefore, ought most studiously to be avoided. Commerce was our object, and with a view to its extension, a pacific system should prevail, and a system of defence and conciliation" (Pitt's speech in the House of Commons 6 July 1784 in Aspinall & Smith 1969: 826). The bill effectively gave the control of Company occupied lands to the British government by subordinating the Directors to a new government department, the Board of Control:

> It shall not be lawful for the Governors or Presidents and Councillors of Fort Saint George and Bombay...to...issue any order for commencing hostilities or...to negotiate...any Treaty...with any Indian Prince or State (except in cases of sudden emergency or imminent danger, when it shall appear dangerous to postpone such hostilities or Treaty) unless in pursuance of express orders from...Governor-General and Council...or from the...Court of Directors.... (clause XXXV of the 1784 *India Act* in Aspinall & Smith 1969: 830).

Following the Bill, trade to the East Indies was controlled by the newly organized United Company of Merchants of England and the sovereignty of India became Britain's responsibility. Thus, it was to begin that under the newly organized United Company of Merchants of England trading to the East Indies, the sovereignty of India became Britain's responsibility. By concentrating their main center in Java the Dutch had seceded any Indian interest to the English, and the French (who had not entered the competition until 1700s) lacked the support they needed to compete with the already established English.

Prior to the nineteenth century, Germany's maritime activity had concentrated upon internal European trade under the Hanseatic League. Preoccupation with the politics of unification also separated it from the kind of long-distance overseas trade enjoyed by other European rivals. During the nineteenth century, Germany's foreign policy was controlled by Chancellor Otto von Bismarck. Like the involvement of the other principal players in what was to become the *Scramble*

for Africa, movement into the African continent was instigated in equal parts by the desire to increase the nation's economic production in light of burgeoning industry and, by association, the need to maintain economic growth. It was also an attempt to balance internal European political and economic stability. By this note, Africa was for both Great Britain and Germany a tool by which to maintain a European equilibrium. This equilibrium was such a consuming matter that Bismarck himself later told a German explorer, "Here is Russia and here is France. . .with Germany in the middle. That is my map of Africa" (translated in Packenham 1991: 203).

By 1888 the British government was under pressure from antislavery campaigners and a conference in Brussels was convened under the guise of establishing civilizing legislation designed to end the scourge of the slave trade, but in reality was an opportunistic gathering together of the various European powers with a stake in the control of Africa. For the British government it was also used to reestablish naval supremacy in the Indian Ocean where the rights to stop and search vessels had not previously been fully realized between all nations, thus allowing for greater control of the movement of trade commodities and domination of the regional capitalist system.

The results of the conference were highly influential. For the first time, humanitarian concerns were addressed within an international political arena, with the measures agreed upon by the signatories affectively legitimizing colonial conquest through the agreed strategy of combating slavery by the establishment of colonial administration in the interior of Africa and the restructuring of African society. At the conference it was suggested by the Belgian delegation that the most effective way to establish such an administration was through the development of colonial infrastructure. This was to include the establishment of fortified posts in the interior to act as centers of refuge for emancipated slaves, as well as garrisons for troops able to pursue slave caravans. Roads and railways were to be constructed from the coast into the interior and steamboats were to be placed on navigable rivers and lakes. Although neither Britain nor Germany fully committed to these proposals, their discussion at the Brussels Conference was nonetheless later useful. When either government wished to propose large-scale infrastructure development in Africa it could now legitimately invoke the Brussels Conference and antislavery civilizing rhetoric.

This European drive to control overseas land and populations did not rest solely with Britain and Germany (though it was the antagonism of these two nations which was to drive other nations to develop their overseas "dominions" up to the twentieth century). Britain eventually controlled most of the subcontinent of India, Australia, New Zealand, Canada, and large areas throughout Africa (e.g., Sudan, Botswana, Kenya, Egypt, Gambia, Ghana, Nigeria, Zambia, Malawi, Sierra Leone, Zimbabwe, Swaziland, Tanzania, and Uganda). In Africa, France also controlled large areas throughout the continent (most notably Ivory Coast, French Sudan (now Mali), Guinea, Mauritania, Niger, Senegal, northeast Nigeria, Gambia, Chad, Republic of Congo, Gabon, Cameroon, Eritrea, Madagascar, Djibouti, Comoros, and Reunion). Germany controlled (among others) Burundi, Rwanda, Tanzania, and Namibia. With Italy dominating; Eritrea, parts of Somaliland and Libya.

Economic justification for national policies of colonialism and expansionism led in turn to global sociohistorical change through the development of class formation, political struggle, and cultural perceptions. The ultimate outcome of the Brussels Conference was therefore the partitioning of Africa into colonial blocks controlled by Europe and the full realization of the Second Phase of European Colonialism.

Key Issues/Current Debates

Central to this strand of social theory and postcolonial studies is the question of subjectivity. Accordingly there is a long tradition of Latin American intellectuals addressing this question. Among them were Dussel, Rodolfo Kusch (whose philosophy of Indigenous thinking as equal to European thought was published in

1970 but not translated into English until 2010), earlier still the "cannibal" movement in early twentieth-century Brazil, and the "Forja" movement in Argentina in the 1930s. During the 1990s, subjectivity and the ways in which people describe themselves to others also became a significant area of interest within archaeology and cultural studies (see, e.g., Hall 1996; Gosden 1999). The primary questions being related to identity, i.e., the process and manner in which individuals, groups, communities, cultures, and institutions define themselves. However, the debate as to the nature of the establishment of identity can be approached in two ways. First, one can argue for fixed categories based upon definable "foundational" differences. Or secondly, one can view one's perception of identity as a more fluid phenomenon based upon reaction/reflexivity and dialogue (both inner and outer) (Meskell and Preucel 2004: 122). This first taxonomical approach can be useful when it becomes necessary to quantify groups of individuals, but can stray into dangerous labels/pigeonholes and meta-identities. The second, more poststructural view approaches the formation of identity as involving the negotiation of "race," class, religion, sexuality, ethnicity, and gender, as well as the environmental and cultural context in which individuals find themselves. Constructivists would even go so far as to argue that identities do not exist but are in reality discursive constructs which are formulated through one's personal dialogue with one's sociocultural, physical, and political environment.

It is the nature of this dialogue and one's autonomy within it that has developed into a philosophical debate as to the role of the self in the formation of identity. In the past the two main protagonists within this debate are Foucault (1972) and Giddens (1991). Both agree that:

> . . .self-identity is negotiated through linked processes of self-exploration and the development of intimacy with the other (Giddens 1991: 97).

However, the debate rests upon the level of autonomy available to the individual within the multiple and competing discourses within the postcolonial/colonialist world. Foucault (1972) argues that the individual is subservient to the dominant social discourse, which is based upon the power of shared knowledge. Alternatively, Giddens' (1991) views the individual within society as less the passive participant and more the creative transformer:

> The self is not a passive entity, determined by external influences; in forging their self-identities, no matter how local their specific contexts of action, individuals contribute to and directly promote social influences that are global in their consequences and implications (Giddens 1991: 2).

Giddens' *structuration theory* (1991) gives the individual an understanding of the social context in which they exist and allows for reaction against it. This not only allows for one to develop multiple situationist identities but also allows for the idea that individuals have an indelible political and social autonomy. This is a concept central to the postcolonial debate on the role of participants in colonial activity. Furthermore, the search for identity, be it individual or society, requires a meta-narrative in order to formulate a dialogue between life experience (meta-narrative) and perception (the self). This meta-narrative takes the form of *culture* while *cultural identity* is the extent to which one is representative of a given culture behaviorally, communicatively, psychologically, and sociologically.

All of these theoretical strands exist within the history of the development of postcolonial identities or, more specifically, the international politicization of identities in the twentieth century. As Hall (1990: 225-26) demonstrates in an essay addressing the African diaspora, wrestling control of contextualizing metanarratives is central to the struggle for equality:

> Not only, in Said's 'Orientalist' sense, were we constructed as different and other within the categories of knowledge of the West by those regimes. They had the power to make us see and experience *ourselves* as 'other'. Every regime of representation is a regime of power formed, as Foucault reminds us, by the fatal couplet, 'power/knowledge' (Hall 1990: 225–26).

International Perspectives

As can be seen from this short explanation of Second Modernity and the Second Phase of

European Colonialism, although the social theory and events described above were born within distinct geographical regions of the world (i.e., Africa and Latin America), they possess the common linkage of having been the result of European action based on a capitalist development and world view. The commonality of the two is in the need to recognize the role of the colonized and its impact on the perceptions of Europe and its activity and the manner in which we have subsequently addressed non-European cultures from a dominantly European foundation.

This is a phenomenon that is reflected in the development of archaeology as a practice and it is important to recognize the nature of the "constructedness" within archaeology. The practice and debate of archaeology worldwide has not taken place in a vacuum immune to the influences of those ideas outlined thus far. Likewise, these ideas have not developed without the influence of archaeological and historical knowledge. Archaeology began as a Western colonial science, with a role in the conquest of territories and peoples (represented by antiquarian styled exploration and collection). It has become, through the application of deconstructive philosophies, a potential tool for the study, definition, and voice of subaltern or less well-represented groups within Western-dominated historical narratives, with specific strands of "new" archaeologies (such as historical archaeology – see discussion below) specifically attempting to construct non-European cultural narratives developed outside the world of historical and cultural colonialism.

Future Directions

Our current understanding of colonial processes is largely based upon the development of Western anthropologists. More recent studies have begun to question traditional colonial ethnographies and their close link to colonial powers (e.g., Comaroff and Comaroff 1992; Barker et al. 1994; Mignolo 1995; Benjamin 2002; Gasco 2005). What these studies have in common is their rejection of binary oppositions in colonial discourse. By rejecting the traditional historical view of the "colonizer" and the "colonized," new ideas of sociocultural hybridity have developed in response to the recognition of new societies created through the colonial process. The problematization of these traditional discourses has developed into what we now term postcolonial theory:

> Colonialism broadly conceived, or 'coloniality', when seen as a process including territorial expansion and imperialism, labour regulation processes, and epistemological and discursive 'reorganization', is not therefore only current because of territories which are still formally colonial, but because the relations of difference that mark the 'colonial' period are still very much in operation throughout the world, particularly in the West and wherever 'the West' and its epistemology asserts itself, i.e.: globally (Benjamin 2002: 15).

The second definition of postcolonial theory as an ideological application has been separated by Goldberg and Quayson (2002: xii-xvi) into three interrelated sets of ideas of particular relevance to the question of Second Modernity and the spread of Western capitalism via colonial activities.

Postcolonial study possesses a "theoretical expansiveness" by the way in which it aims to adopt the voice of "otherness" included within all experiences. With this approach the author would promote the role of archaeology and specifically historical archaeology as a means of addressing and examining accepted definitions of social and cultural activity within the colonial context (see Rhodes 2010). It may therefore be that archaeology of the traditionally historic period is able to attempt to strip our understanding of the past of its historical prescription through analyses of subaltern material evidence. Or at least offer new ways of viewing the historic colonial past as long as the unavoidable embedded bias of cultural perspective is recognized and deconstructed along with received historic narratives.

So what of the application of these definitions to the development of non-Western archaeologies? First is the rejection of meta-narratives. Although archaeology is well suited to address the actual material processes of European colonial activity over a large geographical scale, the aim should not be to lay claim to a totalizing knowledge of this process. The author would echo the

so-called *Frankfurt School* and the development of *critical theory* (see, e.g., Hodder 1986, 1992 and Shanks and Tilley 1987), with its recognition of the historically conditioned nature of studies of the past, and accept that all archaeological research stands within a specific context and is generated form a specific world view but, nonetheless, aims to highlight shared characteristics within (perceived) events and activities in the past. As Foucault argues, the aim is to demonstrate the nature of discourse within a given context:

> Instead of following the thread of an original calendar, in relation to which one would establish the chronology of successive or simultaneous events, that of short or lasting processes, that of momentary or permanent phenomena, one tries to show how it is possible for there to be succession, and at what different levels distinct successions are to be found (Foucault 1972: 169).

Furthermore, archaeology exists within the postcolonial paradox, by openly beginning from the ideological position of defining one people at the rejection of others. It is hoped that active investigation of the remains of the past in a more ethically transparent way than has been previously attempted can offer a newer and broader insight into the past. The intention is that by applying archaeological techniques to an area that has previously seen little investigation outside traditionally historical interpretation newer perspectives can be created.

Can this be achieved? What is required is the application of a unifying approach which allows for the development or sharing of postcolonial strands of archaeological study over more globally inclusive geographies. This is to say that the issues raised by the experience/history/activity/narrative of colonialism exist in many places and over a wide temporal sphere (the examples above being Latin America and Africa). Dialogue between historically peripheral groups (that is to say groups not focused upon by European-led investigations) would seem the next step in developing truly non-capitalist global heritages. But this is not to say that all "new" or "subaltern" heritages should be essentially reactionary or counter colonial. Rather, scope should be given to define the internally heterogeneous character of cultures based on the ever re-negotiated identities.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Supermodernity and Archaeology

References

Aspinall, A., and E. Smith, eds. 1969. *English historical documents*. Vol. 11, 1783–1832. Oxford: Oxford University Press.

Barker, F., P. Hulme, and M. Iversen, eds. 1994. *Colonial discourse/postcolonial theory*. Manchester: Manchester University Press.

Benjamin, J. 2002. *East Africa and the world: The relationship of knowledge and power in the construction of history, race and identity*. Unpublished PhD dissertation, Binghamton University, SUNY.

Castro-Gómez, S. 2008. (Post)Coloniality for dummies: Latin American perspectives on modernity, coloniality, and the geopolitics of knowledge. In *Coloniality at large: Latin America and the postcolonial debate*, ed. M. Moraña, E.D. Dussel, and C.A. Jáuregui, 259–285. Durham: Duke University Press.

Comaroff, J., and J. Comaroff. 1992. *Ethnography and the historical imagination*. Boulder: Westview Press.

Dussel, E. 1995. *The invention of the Americas. Eclipse of "the other" and the myth of modernity*. New York: Continuum Publishing.

Foucault, M. 1972. *The archaeology of knowledge*. London: Tavistock.

Gasco, J.L. 2005. Spanish colonialism and processes of social change in Mesoamerica. In *The archaeology of colonial encounters, comparative perspectives*, ed. G.J. Stein, 69–108. Santa Fe: School of American Research Press.

Giddens, A. 1991. *Modernity and self-identity. Self and society in the Late Modern Age*. Cambridge: Polity Press.

Goldberg, D., and S. Quayson, eds. 2002. *Relocating postcolonialism*. Oxford: Blackwell.

Gosden, C. 1999. *Anthropology and archaeology: A changing relationship*. London: Routledge.

Hall, M. 1996. *Archaeology Africa*. London: James Curry.

Hall, S. 1990. Cultural identity and diaspora. In *Identity, community, culture, difference*, ed. J. Rutherford, 222–237. London: Lawrence & Wishart.

Hodder, I. 1986. *Reading the past: Current approaches to interpretation in archaeology*. Cambridge: Cambridge University Press.

Hodder, I. 1992. *Theory and practice in archaeology*. London: Routledge.
Meskell, L., and R.W. Preucel. 2004. Politics. In *A companion to social archaeology*, ed. L. Meskell and R.W. Preucel, 315–334. Oxford: University Press.
Mignolo, W. 2000. *Local histories/global designs. Colonality, subaltern knowledge and border thinking*. New Jersey: Princeton University Press.
Mignolo, W.D. 1995. *The darker side of the renaissance: Literacy, territoriality, and colonization*. Michigan: University of Michigan Press.
Packenham, T. 1991. *The scramble for Africa 1876–1912*. London: Random House.
Pitt's speech in the House of Commons 6 July 1784. 1969. In *English historical documents*, ed. A. Aspinall and E. Smith, vol. 11, 1783–1832. Oxford: Oxford University Press.
Rhodes, D. 2010. *Historical archaeologies of nineteenth-century colonial Tanzania*, British Archaeological Report series 2075. Oxford: Archaeopress.
Said, E.W. 1978. *Orientalism*. New York: Pantheon Books.
Shanks, M., and C. Tilley. 1987. *Social theory and archaeology*. Cambridge: Polity Press.
Wallerstein, E. 1980. *The modern world-system II. Mercatalism and the consolidation of the European world-economy, 1600–1750*. New York: Academic Press.
Wallerstein, E. 2005. Protection networks and commodity chains in the capitalist world-economy. Paper presented at the Global networks: Interdisciplinary perspectives on commodity chains conference, Yale University, May 13–14. Available at www.binghamton.edu/fbc/iw-cc2005.htm. Accessed 12 April 2007.

Further Reading

Jackson, R.L. 1999. *The negotiation of cultural identity: perceptions of European Americans and African Americans*. London: Praeger Publishers.
Kusch, R. 1970. (trans. 2010). *Indigenous and popular thinking in América*. Trans. M. Lugones and J.M. Price. Durham: Duke University Press.

Second Temple Judaism Archaeology

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Introduction

The term "Second Temple Judaism" refers quite literally to the period of Jewish history when the second Jewish temple stood in Jerusalem, c. 515 BCE to 70 CE. The first temple, traditionally attributed to the Israelite King Solomon in the tenth century BCE, had been destroyed by the Neo-Babylonian Empire during its conquest of the region, c. 586 BCE. When the Achaemenid Persian Empire defeated the Babylonians, it acquired the southern part of the Levant associated with modern Israel, Palestine, and adjacent areas. The Persians allowed Jews to rebuild their temple, c. 515 BCE, and it stood until c. 70 CE, when the Romans destroyed it while suppressing a Jewish uprising, the First Revolt. Jews in the Second Temple period experienced rule by the Persians, Alexander the Great, the Ptolemies, the Seleucids, an independent Jewish dynasty known as the Hasmoneans, and the Romans, who administered Palestine through both appointed Roman officials as well as the Herodian dynasty of client kings. The era was formative for the development of Judaism, as various biblical works were composed and revised, a scriptural canon was nearly finalized, diverse Jewish sects flourished, Jewish territory expanded, and Jewish society was thoroughly integrated into the larger cultural matrix of the Mediterranean world. Although this period also saw the increasing dispersal of Jews beyond their traditional homeland to areas ranging from the Italian peninsula to North Africa to Asia Minor to Mesopotamia, this entry will focus primarily on the area known variously as Israel or Palestine, where evidence is more abundant. In general, more archaeological data is available for the later centuries of this period than for the earlier ones, particularly in regard to religious practices. Historians are fortunate to have not only the archaeological record but also numerous literary sources written from various perspectives.

Historical Background

Biblical sources credit the Persian King Cyrus II for allowing Jews exiled to Mesopotamia by the Babylonians to return to Jerusalem and the surrounding area of Judah beginning c. 538 BCE. Scholars have often cited the famous cuneiform inscription on the Cyrus Cylinder, found in

Babylon in the nineteenth century, as supporting evidence for a Persian policy of returning subject peoples to their native lands. The deportees returning from Babylonia, which were likely a small group, joined with Jews who had remained behind in rebuilding Jewish society and its primary city, Jerusalem. Yehud was the Aramaic name of the Persian province in which they lived, which was a subunit of a much larger Persian satrapy. The exact boundaries of Yehud are disputed, but it is obvious that it was fairly small and limited to the areas surrounding Jerusalem. Its initial population was correspondingly small. Although scholars once proposed that in the late sixth and early fifth centuries, Jerusalem, the major population center, had as many as 5,000–7,000 inhabitants, more recent estimates have been as low as 1,250 or even 400 (Meyers and Chancey 2012). What is clear from both surveys and excavations is that the Persian era inaugurated a period of population growth that would continue for centuries. Biblical sources suggest that construction of the Second Temple began c. 515 BCE, although virtually no archaeological evidence of the structure from this period survived due to the extensive renovations carried out later by the Hasmonean and Herodian kings.

Persian-period finds of various categories (architecture, local pottery, imported pottery import from Greece and the Eastern Mediterranean, inscriptions) from the southern Levant are abundant and have been the subject of considerable scholarly interest since the 1980s, largely due to the publication of an impressive archaeological synthesis by Ephraim Stern. Coins had already entered the region in the early sixth century but became more common under Persian rule. The province minted its own coins, marked by the Aramaic inscription YHD ("Yehud") and decorated with various images including the Athenian owl, the Greek deity Arethusa, griffins, and the Persian kings. Jars and jar handles from multiple sites bearing stamps reading "Yehud" in Aramaic and Paleo-Hebrew scripts were probably components of a tax-in-kind system. Many "Yehud" seals and seal impressions have also been discovered, sometimes accompanied by personal names and administrative titles. Efforts have been made to associate some of the names on the Yehud seals and coins with Jewish figures; it is possible, for example, that the figure "Yehohanan the priest" mentioned in inscriptions was a Jewish priest. The use of Aramaic characters on coins and seals reflects the importance of the language as the Persian lingua franca. Aramaic grew in importance as a written and spoken language throughout the Second Temple period, eventually displacing Hebrew as the primary Jewish language, and the Aramaic script became standard even for most Hebrew texts. That the inhabitants of Yehud held distinctive religious views is demonstrated by the general lack of figurines and cultic objects, which are common finds in surrounding areas (Stern 1982; Betlyon 2005).

The most important evidence from the Jewish Diaspora in this time period comes from the Egyptian island of Elephantine, located in the Nile River near Aswan. Papyri associated with the site preserve letters and legal documents from a garrison of Jewish and Aramean mercenaries stationed there. The military colony had a temple devoted to the Jewish deity YHWH, demonstrating that the later Jewish belief that animal sacrifices could only be carried out in Jerusalem had not yet fully developed. One papyrus preserves instruction regarding unleavened bread that is generally interpreted as a reference to the Jewish Passover festival (Porton 1996; Betlyon 2005).

Alexander the Great famously conquered the eastern Mediterranean coast in 332 BCE. The years between his conquest and that of the Romans in 63 BCE are known as the Hellenistic Period. After Alexander's death (323 BCE), Palestine lay at the meeting point of two of his successor kingdoms, the Ptolemies, based in Egypt, and the Seleucids, situated in Syria and parts of Asia Minor. The Ptolemies initially possessed Palestine until the Seleucids gained possession c. 200 BCE. Jews threw off Seleucid rule in the Maccabean Revolt, which began in 168 BCE, and from the leadership of that rebellion emerged a Jewish royal dynasty, the Hasmoneans.

Under the Ptolemies and the Seleucids, Hellenistic (Greek) influence in Palestine increased steadily, becoming a dominant component of Jewish and other local cultures in the region for the

next thousand years. The minting of coins with Semitic inscriptions in Jerusalem initially continued in the Ptolemaic period but then ceased. Aramaic inscriptions YHD and YRSLM ("Jerusalem") appeared on jar handles, but such pottery was soon be joined by amphora handles with Greek stamps imported from the eastern Mediterranean (Arav 1989; Berlin 1997; Tal 2005). Papyrological records associated with Zenon, a third-century BCE agent of the Ptolemaic finance minister, shed light on government holdings and agricultural practices in Palestine, and numerous other papyri attest to the varying fates of Jews in Egypt, some possessing land and wealth, others working as artisans, peasants, and land tenants. Greek inscriptions in Ptolemaic Egypt attest to the existence of buildings there known as *proseuchai*, Jewish prayerhouses (Tcherikover et al. 1957–1964).

Under the Hasmonean dynasty, Jewish territory expanded considerably. With their Seleucid foes weakened, the Hasmoneans pushed in all directions, stretching Jewish territory far beyond the environs of Jerusalem to include Samaria (roughly equivalent to the modern West Bank), Galilee, portions of the Negev, and parts of modern Jordan. Archaeological findings sometimes corroborate literary reports of Hasmonean conquests. Evidence of destruction probably associated with Hasmonean campaigns has been found at sites including Gezer, Tel Istabah near Beth-Shean, Ashdod, Shikmona, and Maresha. In Samaria, a Persian-period temple on Mount Gerizim overlooking Shechem was completely destroyed. By the early first century BCE, Hasmonean forces had taken Galilee, which subsequently became a predominantly Jewish region. Surveys and excavations there have revealed the abandonment of older sites, the establishment of new ones, and dramatic changes in the ceramic repertoire that are best explained by population shifts (Berlin 1997; Tal 2005; Meyers and Chancey 2012).

The general parameters of Hasmonean territory can be traced by finds of their coinage. They minted numerous bronze issues of varying weights and sizes, typically employing Attic denominations, as had the Seleucids, rather than using Phoenician standards. Hasmonean coins differed from most other regional coinage in their less prominent use of Greek. Many coins had Hebrew inscriptions written in Paleo-Hebrew script, symbolically connecting the dynasty with earlier Jewish history, though some had Aramaic legends and those of later kings also used Greek. The symbols on Hasmonean coins also differed from those of surrounding minting authorities in their avoidance of anthropomorphic and zoomorphic imagery. They instead displayed symbols often drawn from the standard Mediterranean repertoire, such as cornucopiae, a lily, and an anchor. Only coins from the last Hasmonean ruler, Mattathias Antigonus, had what might be described as uniquely Jewish symbols: some depicted a menorah, while others portrayed an image often interpreted as cultic furniture from the temple, the Showbread Table. The names and titles on Hasmonean coins also show how Jewish and broader Hellenistic culture interplayed. Early coins bore rulers' Semitic names; only later issues were inscribed with their Greek names. The title of "king" did not appear until the first century BCE, but the title of "high priest" appeared throughout the Hasmonean era, and claims to be the "head of the council of the Jews" marked the currency of some rulers (Meshorer 2001).

Jerusalem grew considerably in the Hasmonean era, stretching beyond the area adjacent to the temple westward onto modern Mount Zion. The Hasmoneans enclosed the city's new territory with a major defensive wall equipped with additional towers. They also undertook occasional renovation of the temple complex, and some attribute particular ashlars in its eastern retaining wall to them because their crude bosses are similar to other Hasmonean masonry. Elites in the city constructed lavish tombs that closely resembled monumental tombs elsewhere in the Hellenistic world, advertising their political stature and wealth. Two of the better-known examples include the tomb of Benei Hezir, which stood just outside the eastern walls of Jerusalem, and the tomb of Jason, located west of the walls. The first is known for its red-painted Hebrew inscription associating it with "priests of the sons of Hezir," a family mentioned in the biblical books

1 Chronicles 24:15 and Nehemiah 10:21. Its interior chambers had the types of burial slots that would be typical of Jewish tombs for centuries, loculi (niches cut perpendicular into the wall) and arcosolia (shelves cut parallel to the wall). Doric motifs and a pyramid decorated its exterior. A pyramid and Doric motifs also marked Jason's Tomb, located west of the city. The walls of its porch bore an Aramaic and a Greek inscription as well as charcoal drawings of a ship, a palm branch (an early example of a symbol that comes to typify Jewish art), and five menorahs that are among the earliest images of the temple candelabrum. In addition, a drawing of a stage shows that not all Jews avoided figural representations of living things, suggesting that modern notions of strict ancient Jewish aniconism are an oversimplification (Berlin 1997; Levine 2002; Fine 2005; Hachlili 2005).

The Roman general Pompey's expeditions into the region started the Roman period, which lasted from 63 BCE until the mid-fourth century CE. The Romans quickly grew tired of infighting between the last members of the Hasmonean dynasty and appointed a new ruler from an entirely different family, Herod (variously called the Great or the First). Herod was a descendent of Idumeans who had converted to Judaism after the Hasmonean conquest.

Herod was deeply influenced by the massive construction he witnessed on his visits to Rome and became one of the most influential sponsors of Roman-style architecture in the Levant. In his own kingdom, he built a variety of monumental buildings, sports facilities, fortresses, and palaces that blended Roman, Hellenistic, and local styles. Roman construction and decorative techniques in his construction projects included *opus reticulatum*, the facing of walls with diamond-shaped blocks; *opus sectile*, the inlaying of multi-shaped and multicolored stone tiles on floors; mosaics with Roman-style floral and geometric designs; and frescoes with colored panels, stripes, dots, and patterns that resembled those in Pompeii (albeit without the images of humans, animals, or mythological characters found there). Limited Greek-style bathing facilities had entered Palestine in the Hellenistic era, but Herod's palaces had Roman baths with multiple chambers devoted to different temperatures and the use of hypocaust technology for warming (Netzer 2008).

Herod's embrace of Roman culture is visible in the layout of the new city he built on the Mediterranean coast outside of Jewish territory. Named Caesarea Maritima after the emperor, the city's streets were organized on a grid, like other typical Roman cities. Its buildings included a long oval-shaped structure that was either a stadium for foot races or a hippodrome for horse and chariot competitions and a 3,500–5,000 seat theater, built in a half-circle shape with a back wall behind the stage, as per Roman conventions. The new harbor reflected the most advanced technology of his day, with long breakwaters consisting of concrete blocks made of hydraulic cement. The centerpiece of the city was a temple dedicated to the emperor standing on a massive platform that made it easily visible from sea; it was one of the earliest temples of the imperial cult anywhere in the Roman Empire. It was one of three such temples Herod built; the others were at Banias, known in antiquity as Paneas and briefly in the first century CE as Caesarea Philippi, and at Sebaste, a new Roman-style city built at the site of the ancient city Samaria (Netzer 2008).

Herod also strengthened the fortifications of Jerusalem. The lower courses of the so-called Citadel of David now visible at Jerusalem's Jaffa Gate are remnants of a Herodian tower, as are walls visible in the adjoining courtyard. By far, the best known of Herod's projects in Jerusalem, however, is his extensive renovation of the temple and the platform on which it stood, known in Jewish tradition as the Temple Mount and in the Islamic world as the Haram al-Sharif. Herod's engineers expanded the platform northward, westward, and southward; eastern expansion was impossible because of the steep Kidron Valley. Clear evidence of the southern extension can be seen in the eastern retaining wall, where a vertical "seam" separates Herodian ashlars from earlier ones. The size of the modern Temple Mount is largely due to Herod's construction; it measures roughly 315 m on the north, 280 m on the south, 485 m on the west, and 470 m on the east. The retaining walls, of which the most famous is the

Western Wall, were themselves massive. Built from local limestone, most of their blocks weighed at least several tons, and some, such as the 14-m long and 4-m high example in a tunnel running along the Western Wall, weighed much more. A special station stood up top of the wall at the southwestern corner for the blowing of the traditional Jewish shofar, as indicated from the discovery of a corner block with the Hebrew inscription "the place of trumpeting. . .." Huge staircases led up to two gates (their outlines still visible) on the southern side of the temple complex, and evidence of four gates has been found on the western side. Porticoes lined the four sides of the courtyard atop the Temple Mount, their existence reflected in the many column fragments found in modern excavations; this extensive use of columns reflected both Hellenistic and Roman influence. Two copies of a Greek inscription have been found that marked the limits on the Mount beyond which non-Jews could not go upon punishment of death. As for the temple building itself, the presence of Islamic shrines (the Dome of the Rock and the Al-Aqsa Mosque) makes archaeological effort to recover it impossible. If, as is typically thought, silver coins from the Second Revolt against Rome (132–135 CE) with stylized representations of a temple preserve memories of its appearance, its facade had four columns and a cornice. Taken as a whole, the temple complex was the largest in the Roman Empire and one of the largest anywhere in the ancient Mediterranean and Near Eastern worlds (Bahat 1999; Levine 2002; Netzer 2008).

After Herod's death in 4 BCE, his territory was parceled out to his sons. Members of the Herodian dynasty would alternate with Roman prefects and procurators in governing his former territory, the complex administrative arrangements not stabilizing until after the First Revolt against Rome (66–73 CE). Herod's successors lacked his resources, though they still attempted their own building projects. His son Antipas, for example, who governed Galilee and Perea (east of the Jordan River) from 4 BCE to 39 CE, rebuilt the older city of Sepphoris (in Hebrew, *Zippori*) and established the new city of Tiberias (named after the emperor), both in Galilee. Modern habitation has limited the archaeological exploration of Tiberias, but excavations have recovered ample evidence of Jewish habitation at Sepphoris in the form of stone vessels and ritual baths (see discussion below). In the second century CE, Sepphoris would become a major center of Jewish thought as teachers known as rabbis settled there and began to compile traditions that ultimately were included in the rabbinic literature that became authoritative for Judaism. The site is noteworthy for the presence of Roman-style architecture (especially a theater) and art (most notably mosaics, including some with mythological imagery), although these appear to postdate the First Revolt, often by considerable margins (Meyers and Chancey 2012).

Like the Hasmoneans, the Herodian client kings minted bronze coins. Those of some, like Antipas and Archelaus, refrained from depicting living things, but those of others bore busts and images of either themselves, the Roman emperor, or members of the royal or imperial family. Coins of Philip had images of a temple usually interpreted as that dedicated to Caesar at Banias, while those of Agrippa II went so far as to depict classical deities; both rulers oversaw the northernmost parts of Herod's territory, where Jews were a minority. Most Herodian coinage had Greek inscriptions, although a few issues of Agrippa II had Latin (Meshorer 2001).

Jewish tensions with Rome ultimately led to the First Revolt (66–73 CE). The writings of the Jewish historian Josephus, who served first as a field commander of Jewish forces in Galilee and then as a translator for the Romans, are our primary literary source for understanding events (especially *Bellum Judaicum*; Williamson 1970). After initial successes, Jewish forces suffered a series of devastating defeats. In the north, the aftermath of siege warfare in 67 CE is clearly visible at the Galilean site of Yodfat (in Greek, Jotapata) and at Gamla, in the southwestern Golan Heights. Archaeological finds at the hilltop village of Yodfat include fortification walls, arrowheads, ballista stones, a rolling stone, other pieces of weaponry, portions of a siege ramp, and skeletal remains. Finds at Gamla are similar: some 2,000 ballista stones, 1,600 arrowheads, and 100 catapult bolts, as well as large stones dropped and

rolled by the defenders down the steep ravines surrounding the site. Fortification walls are still clearly visible, including a major breach near the village synagogue. The town struck its own bronze coins during the revolt, each bearing the defiant Hebrew inscription "For the redemption of H[oly] Jerusalem" (Meshorer 2001; Berlin and Overman 2002).

Jerusalem was the site of the fiercest combat. Jewish forces there issued both silver and bronze coins with the Paleo-Hebrew inscription "Jerusalem the Holy," but they were not be able to defend the city against the Romans' overwhelming strength. Roman forces succeeded in entering the city and destroying the Second Temple in 70 CE. Excavations carried out since the Israelis gained possession of the Old City in 1967 have found ample evidence of widespread destruction in the elite residences of the Herodian Quarter west of the Temple Mount. In the so-called Burnt House, everyday domestic items lay scattered on the floor, a spear leaned against a wall, and the bones of a woman's forearm and hand remained stuck in the debris. South and west of the Temple Mount, extensive rubble lay on Roman-period streets, consisting of ashlars, pieces of columns, and other architectural fragments thrown down by the Romans as they dismantled the buildings of the sacred precinct above (Berlin and Overman 2002; Levine 2002).

In 73 or 74 CE, Roman units moved east into the Judean wilderness near the Dead Sea to complete their victory by mopping up the last of the Jewish resistance. The chief battle there occurred at the old Herodian fortress of Masada, built atop a massif. Josephus famously records that after a lengthy siege, Masada's Jewish defenders committed suicide rather than allow the Romans to claim a victory, though some modern scholars question the veracity of this account. The outlines of the Romans' siege wall surrounding the site can still be seen today, along with a 4,500-m long siege ramp and the rectangular boundaries of their military camps. A remarkable amount of military equipment has been found, including pieces of scale armor, helmets, spearheads, arrowheads, fragments of swords, and ballista balls (Berlin and Overman 2002).

The Romans advertised their victory over the Jewish rebels by striking coins proclaiming "Iudaea Capta." The Arch of Titus in Rome portrays legionnaires triumphantly carrying plunder from Jerusalem, including the menorah from the temple (Berlin and Overman 2002). The Second Revolt against the Romans under the leadership of Bar Kokhba in 132–135 CE would also prove unsuccessful and end Jewish attempts to reclaim Jerusalem and rebuild the temple.

Key Issues and Current Debates

Among the chief discoveries in recent decades is the ample evidence of ancient Jewish interest in ritual purity. One reflection of this interest was the construction of small pools generally interpreted as ritual baths (in Hebrew, *miqva'ot*) because of their general similarity to the descriptions of such baths in rabbinic sources. Ritual baths were stepped, plastered pools cut into bedrock. Their sizes varied, but they were generally deep enough to allow full immersion of the body and were sometimes accompanied by a small storage pool to the side. Although the practice of ritually cleansing oneself through immersion is attested in the Hebrew Bible, the appearance of pools built specifically for this purpose was a new phenomenon of the Hasmonean period. By the first century CE, *miqva'ot* were numerous throughout Judea, and examples have also been unearthed in Galilee and in the Golan at Gamla. Ritual baths are found in Herodian palaces, where they served as the cold pool (in Latin, *frigidarium*) of Roman-style bathing facilities; on major roadways near Jerusalem, perhaps for the use of pilgrims; at various points in the vicinity of the temple; near synagogues (such as that at Gamla); near cemeteries (possibly to help remove impurity contracted by contact with or proximity to corpses); in association with wine and oil presses to facilitate production of pure juice and oil; and in both rural and urban domestic contexts (Berlin 2005; McCane 2010).

A related phenomenon was the use of limestone vessels, which rabbinic texts describe as impermeable to ritual impurity. These vessels were found in a variety of forms, including jar

stoppers, mugs, kraters, bowls, and large storage jars. Most were clearly intended to hold and thus keep pure liquids. Their manufacture and use quickly extended beyond Jerusalem to other parts of Palestine, and whole vessels or fragments have been found at dozens of sites in Judea and Galilee, in both cities and villages and in the residences of both elites and commoners. Stone vessels are generally absent from sites in Samaria or in surrounding areas that were primarily inhabited by non-Jews (Berlin 2005). Yet to be answered in regard to both limestone vessels and miqva'ot is whether differences in practices between Jews associated with various sects (Pharisees, Sadducees, Essenes) or no sect can be identified archaeologically.

Another new phenomenon of the late Second Temple period was the use of small sarcophagi known as ossuaries for secondary burial. For reasons not yet clear (typical explanations appeal to views of the afterlife, hopes for the expiation of sins, or increasing emphasis on individual identity), some Jews began gathering up the bones of the deceased after the flesh had decayed (roughly a year's time) and placing them in ossuaries. Although the practice of secondary burial within Judaism is attested earlier, the creation of special receptacles for the purpose is apparently unprecedented. Most ossuaries were made of limestone, but ceramic examples are also known. Ossuaries have been discovered at sites in Judea, Samaria, and Galilee. The rate of their geographical diffusion is unclear, as is the date for the end of the practice; once thought to be the end of first century, it now clearly extends into second. Aside from coins, ossuaries are the single most common source of Jewish inscriptions from this time period. Typical content of these inscriptions includes the name, place of residence or origin, and names of family members of the interred. Most are in Aramaic or Hebrew, though roughly a third are in Greek and a few in Latin (Hachlili 2005).

Scholarly understanding of the early history of the synagogue has also made significant advances. Synagogues were categorically different from the Jerusalem temple. For most Jews, the temple was the only place where animals could be sacrificed. In contrast, many towns and villages had synagogues, in which where the local Jewish community gathered for worship, study, and public meetings. The earliest evidence of synagogues comes from Ptolemaic-period Greek inscriptions from Egypt referring to *proseuchai* (houses of prayer) and from a first-century BCE structure often interpreted as a synagogue on the Greek island of Delos. Several likely examples from the late Second Temple period have been found at sites in Israel, including Gamla, Masada, Herodium, Kiryat Sefer, Modi'in, and most recently, Magdala. In addition, the first-century CE Greek inscription from Jerusalem known as the Theodotus Inscription provides important information about a synagogue there. It identified the primary activities associated with the synagogue as teaching about the Law (the Jewish Torah) and the commandments and providing hospitality to strangers, and it mentions three generations of *archisynagogoi* (rulers of the synagogue) (Cotton et al. 2010: 53–6). Jewish and Christian texts make clear that numerous other synagogues existed by the first century CE, but at present, they are difficult to identify in the archaeological record. A wave of construction beginning in the late third century CE resulted in the creation of over a hundred synagogues in Israel (Levine 2000; Meyers and Chancey 2012).

Like later synagogues, those from the pre-70 CE period are square or rectangular, with benches around their interior walls and columns that sometimes made aisles. Unlike later synagogues, they generally lack inscriptions, extensive decorations such as mosaic floors or external friezes, special shrines to hold the Torah scroll, or the raised platform known as a bema. An excellent example is the Gamla synagogue, which was destroyed in the First Revolt. Built of local basalt, it measured 13.4 by 9.3 m. Columns lined all four interior walls, their capitals in the Doric style, and those in the corner cut in the shape of hearts. Benches provided seating for perhaps 150 people (Levine 2000; Meyers and Chancey 2012).

Aside from Jerusalem, no single site has proven as important for understanding Second Temple Judaism as Qumran, a set of ruins found

in the desert less than a mile west of the Dead Sea. The complex there included a tower, a pottery workshop, common dining area, cisterns, and large pools that are usually interpreted as communal ritual baths. A cemetery with roughly 1,200 graves lay nearby. The community was destroyed in the First Revolt, probably in 68 CE. Hidden in caves adjacent to the site were the over 900 manuscripts now known as the Dead Sea Scrolls, which were discovered in the late 1940s and the 1950s. The scrolls were mostly of parchment, though some were made of papyrus. They included a remarkable range of Hebrew, Aramaic, and Greek texts, with fragments of every book of the Hebrew Bible except Esther, apocryphal and pseudepigraphical books, rewritten scripture, commentaries on biblical books, apocalyptic works, astrological texts, legal texts, and liturgical texts. Some scrolls contained sectarian writings describing beliefs and practices similar to those of the Essenes, a group known from other literary sources. On the basis of the proximity of the caves to Qumran and the presence at both sites of an unusual ceramic form, a large lidded storage jar, most scholars have concluded that the group living at Qumran in antiquity was an Essene community. Other scholars, however, dispute the identification of the sectarian writings as Essene and question the wisdom of interpreting the settlement site primarily through the lens of the scrolls. Alternative theories regard the ruins as originally an agricultural villa, a fortress, a center for pottery production, or a trade station (Schiffman and Vanderkam 2000; Meyers and Chancey 2012).

The end of the Second Temple period marked a major transition in the historical development of Judaism. The religion continued its transformation from a tradition centered on a sacrificial cult to one focused on the teachings and practices prescribed in sacred texts such as the Hebrew Bible and rabbinic writings, which were composed in the centuries following the temple's destruction. Although memories of the temple and hopes for its restoration have played key roles in subsequent Jewish theology and liturgy, by the end of the Roman era the synagogue had emerged as the religion's dominant communal institution.

Cross-References

- ▶ Baths and Bathing, Roman
- ▶ Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of
- ▶ Sepphoris, Archaeology of
- ▶ Urban Planning, Roman

References

Arav, R. 1989. *Hellenistic Palestine: Settlement patterns and city planning, 337–31BCE*. Oxford: B.A.R.

Bahat, D. 1999. The Herodian temple. In *The Cambridge history of Judaism. volume 3: The early Roman period*, ed. W. Horbury, W.D. Davies, and J. Sturdy, 38–58. Cambridge: Cambridge University Press.

Berlin, A.M. 1997. Between large forces: Palestine in the Hellenistic period. *Biblical Archaeologist* 60: 2–51.

Berlin, A.M. 2005. Jewish life before the revolt: The archaeological evidence. *Journal for the Study of Judaism* 36: 417–470.

Berlin, A.M., and J.A. Overman, eds. 2002. *The first Jewish revolt: Archaeology, history, and ideology*. London: Routledge.

Betlyon, J.W. 2005. A people transformed: Palestine in the Persian period. *Near Eastern Archaeology* 68: 4–58.

Cotton, H.M., L. Di Segni, W. Eck, B. Isaac, A. Kushnir-Stein, H. Misgav, J.J. Price, I. Roll, and A. Yardeni, eds. 2010. *Corpus Inscriptionum Judaeae/Palaestinae, volume 1: Jerusalem. Part 1*. Berlin/New York: De Gruyter.

Fine, S. 2005. *Art and Judaism in the Greco-Roman world: Toward a new Jewish archaeology*. Cambridge: Cambridge University Press.

Hachlili, R. 2005. *Jewish funerary customs, practices and rites in the Second Temple period*. Leiden/Boston: Brill.

Levine, L.I. 2000. *The ancient synagogue: The first thousand years*. New Haven: Yale University Press.

Levine, L.I. 2002. *Jerusalem: Portrait of the city in the Second Temple period (538 BCE – 70CE)*. Philadelphia (PA): Jewish Publication Society.

McCane, B. 2010. Miqva'ot. In *The Eerdmans dictionary of early Judaism*, ed. J.J. Collins and D.C. Harlow, 954–956. Grand Rapids (MI): Wm. B. Eerdmans.

Meshorer, Y. 2001. *A treasury of Jewish coins*. Jerusalem/Nyack: Yad Ben-Zvi Press/: Amphora Books.

Meyers, E.M., and M.A. Chancey. 2012. *Alexander to Constantine: Archaeology of the land of the Bible*. New Haven: Yale University Press.

Netzer, E. 2008. *The architecture of Herod the Great builder*. Grand Rapids: Baker.
Porton, B. 1996. *The Elephantine Papyri in English: Three millennia of cross-cultural continuity and change*. Leiden: Brill.
Schiffman, L.H., and J.C. Vanderkam. 2000. *Encyclopedia of the Dead Sea Scrolls*. Oxford: Oxford University Press.
Stern, E. 1982. Material culture of the land of the Bible in the Persian period, 538–332 BC. In *Warminster: Aris & Phillips*. Jerusalem: Israel Exploration Society.
Tal, O. 2005. *The archaeology of Hellenistic Palestine between tradition andrenewal*. Jerusalem: The Bialik Institute, (in Hebrew).
Tcherikover, V., A. Fuks, and M. Stern. 1957–1964. *Corpus Papyrum Judaicarum*. Cambridge, MA: Harvard University Press.
Williamson, G.A. 1970. *Josephus: The Jewish war*. rev ed. London: Penguin.

Further Reading

Stern, E. 2001. *Archaeology of the land of the Bible, volume 2: The Assyrian, Babylonian, and Persian periods (732–332B.C.E.)*. New Haven: Yale University Press.
Stern, E., A. Lewinson-Gilboa, and J. Aviram, eds. 1993. *The new encyclopedia of archaeological excavations in the Holy Land*. Vol. 1–4. New York/Jerusalem: Simon & Schuster/Israel Exploration Society and Carta.
Stern, E., H. Geva, A. Paris, and J. Aviram. 2008. *The new encyclopedia of archaeological excavations in the Holy Land*. Vol. 5. Jerusalem: Israel Exploration Society and Washington (DC): Biblical Archaeology Society.

Secondary Products and the "Secondary Products Revolution"

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Introduction

The term "secondary products" was coined by Andrew Sherratt in 1981 to refer to three resources that can be provided by livestock prior to slaughter: milk, wool, and labor. He saw these as components in a post-Neolithic "Secondary Products Revolution" (SPR) that fundamentally changed the economic bases of pre- and protohistoric societies in the Near East during the fourth millennium BCE, before spreading to Europe by diffusion: systematic production of milk and wool rendered specialized large-scale pastoralism (geared toward exchange) feasible; cattle-drawn plows permitted both intensification of agriculture and expansion of cultivation to previously marginal soils; and wheeled vehicles pulled by livestock allowed transportation of both arable and pastoral products in bulk.

Sherratt was in fact building on arguments by previous researchers that milking and wool use were not part of the original "Neolithic package," but rather later developments (e.g., Bökönyi 1974). However, by bringing these two strands together with animal traction; by setting out a detailed model of their economic implications; and by providing testable hypotheses regarding the timing and geography of this putative revolution, Sherratt set an agenda within economic prehistory that remains relevant more than 30 years on. There is some dispute as to whether this model requires the use of secondary products to be a unified post-Neolithic complex of *innovations*, or whether the SPR should rather be seen in looser terms as a revolution in the *scale* of their exploitation (see, e.g., Greenfield 2010). While research over the last three decades has steadily undermined the former, stricter view, there remains considerable empirical support for the broad thrust of Sherratt's argument.

In the decades since the phrase was first coined, the concept of secondary products has caught on more widely and has been expanded to include other preslaughter resources such as blood, hair, and dung. Beyond the geographic and temporal limits of the SPR model itself, Sherratt's ideas have focused the attention of zooarchaeologists and other researchers on the refinement of techniques for characterizing the nature of animal husbandry. The terminology inherited from Sherratt is perhaps unfortunate here: the "secondary" in his SPR referred to the hypothesized *chronological* precedence of exploitation for "primary products" (i.e., meat, fat, hide, and bone) over that for milk, wool, and traction, rather than to the

relative importance of pre-slaughter and post-slaughter products. Taken out of this context, however, one must be careful to avoid the erroneous implication that pre-slaughter products are necessarily secondary to meat as a motivation for raising livestock.

Definition

"Secondary products" refers to all resources that can be extracted from domestic animals during their life as opposed to after death, including milk, blood, dung, fiber, and labor/traction. The term has sometimes been extended to certain processed plant products such as olive oil and wine, but is used here only for resources derived from animals.

The "Secondary Products Revolution" is a specific model of economic change set out by Andrew Sherratt with regard to European and Near Eastern pre/protohistory. It holds that a complex of exploitation of several secondary animal products (namely, milk, wool, and traction) spread across the region in the Chalcolithic and Bronze Age, allowing both intensification and extensification of agriculture, promoting development of specialized pastoralism, and ultimately playing an important role in the development of complex societies.

Key Issues/Current Debates/Future Directions/Examples

Milk and Dairying

Of the three secondary products that were central to Sherratt's original argument, milk (and by extension the wide range of foodstuffs derived from it) has probably received the most attention in the literature. Of the four main Eurasian Neolithic domesticates, three – cattle, sheep, and goats – can practicably be milked, with horses later added to this number.

Far from being a purely post-Neolithic development, lipid residue analysis (see below) has now provided fairly conclusive evidence that milking was practiced to some extent from the beginning of the Neolithic in the Near East and southeast Europe (Evershed et al. 2008). It should be stressed, however, that more than a single innovation was required for it to become a major component of husbandry strategies. For one thing, full adult lactose tolerance remains the exception rather than the rule for human populations globally, and its contemporary prevalence in – for example – northwest Europe is believed to have been driven by selection pressure resulting *from* the availability of ruminant milk. In most Neolithic contexts, the contribution of milk to adult diet would thus have been dependent on the development of fermented milk products – cheese, yoghurt, etc. – in which the lactose is broken down.

Meanwhile, Neolithic livestock would not have produced much more milk than was required by their infants, leaving little for human consumption. In recent dairy herds, most young are slaughtered very early to avoid competition, and this pattern is sometimes sought as a signature of dairying in zooarchaeological mortality profiles (see below). The ability of cows to let down milk without the presence of their own offspring appears to have been a recent development, however (McCormick 1992), and in prehistoric herds, milking probably required calves to be kept alive (the situation for sheep and goats is less clear). Calves might nonetheless have been weaned early to increase the milk available for humans: isotopic evidence from French Neolithic cattle indicates fairly early weaning, at around 6–9 months (Balasse and Tresset 2002).

Fiber

While the milk production potential of early domesticates is debatable, the situation for wool is starker: wild sheep simply do not have woolly fleeces, and it must have taken many generations for domestic populations to develop them. The fine fibers that form the undercoat of wild sheep eventually came to make up the bulk of the fleece, replacing the much coarser outer hair, but despite being the subject of considerable research, the timing of this process remains poorly understood. Although surely a gradual development, the key point from a technological point of view was

probably the emergence of wool that could be spun in the same way as flax. The present data seem to uphold Sherratt's view that this was a fourth millennium phenomenon in the Near East (see review in Greenfield 2010), although an earlier date cannot be ruled out. The subsequent spread of woolly sheep across Europe and Asia remains poorly resolved, but appears to have been fairly rapid.

As with milking, specialized production of wool has certain implications for herd structures. Both male and female individuals are likely to be kept alive into adulthood, and the former may also be castrated to improve the quality of their fleeces while facilitating management.

Of course, wool is not the only animal fiber: sheep hair may have been employed for various purposes before it became fine enough to spin, while the use of goat and horse hair in more recent periods is well attested. Nor are sheep the only woolly domesticate: llama wool has a long history of use in the Andean region, as does alpaca fiber (Mengoni Goñalons and Yacobaccio 2006).

Labor

In the present context, labor refers to the use of domesticates as draught- or pack-animals and for riding. Within the geotemporal range of the SPR model, the implicated species are cattle, horse, donkey, and camels (both Bactrian camel and dromedary); elsewhere, other bovines, South American camelids, reindeer, and the Indian elephant can be added to the list.

The development of the cattle-drawn plow is at the heart of the original SPR model, in which it is held to represent a fundamental shift in the relationship between plant and animal husbandry (Sherratt 1981, 1983). Yoking cattle to ards (and later to moldboard plows) allowed for effective cultivation of heavier soils, greatly increasing both the fertile land available for arable crops and the productivity of land already under cultivation.

As with exploitation of caprine fibers, the use of cattle for traction might be expected to increase the value of adult animals – particularly castrated males (oxen) – and hence to promote delayed slaughter. This depends on the scale of stockkeeping and its relationship with arable farming, however, and in many circumstances, it may be more economic to use cows for traction than to support dedicated plow oxen that neither breed nor provide milk (see Isaakidou 2006: 108). A recent survey of draught cattle use through time noted substantial global variation both in the age/sex of animals used and in the degree of training involved (Johannsen 2011).

If cattle can pull plows then they can also pull carts, and figurine evidence suggests that the first wheeled vehicles were cattle-drawn. Within the SPR model, the development of carts allowed for bulk transport of agricultural and pastoral products and was thus important to the development of extensive production and provisioning systems (Sherratt 1981). The domestication of equids and camelids and their use as pack-animals is seen in the same light, although it seems likely that cattle had been used as *ad hoc* beasts of burden during the Neolithic (Greenfield 2010: 39).

Other Secondary Products

The use of blood from living animals is well-attested in the ethnographic record, particularly among cattle pastoralists. As with milk, blood represents one way of extracting sustenance from herds without reducing their numbers, although it requires considerable skill to carry out without endangering the animal. Unlike systematic milking, however, blood use need not have any impact on herd management.

Perhaps the most overlooked secondary product is dung, despite its often substantial role in agriculture. This may be because its use as fertilizer does not require any real technological innovations or specialized husbandry practices and is thus likely to have begun with the first animal husbandry. Manuring may have played an important role in the Early Neolithic of central and southeast Europe, for example, where intensive garden agriculture was probably integrated closely with small-scale herding (Bogaard 2005). Insofar as the shift toward extensive pastoralism implied by the SPR represented a spatial separation of caprine herding from agriculture, it may in fact have reduced the role of manure. That said, the degree of effort involved in dung collection

and the range of uses to which it is put may vary widely: apart from fertilizer, dung may be used as fuel or building material (Moreno-García and Pimenta 2011).

Finally, domestic animals may provide less tangible resources related to their social and symbolic importance and role in exchange, e.g., as bridewealth (Russell 1998). While it would be a stretch to refer to wealth and prestige as secondary products, they may certainly be important motivations for keeping livestock and must be borne in mind when assessing husbandry practices, alongside both primary and secondary products.

Lines of Evidence for Secondary Products Exploitation

Sherratt's original argument relied heavily on artifactual, iconographic, and early textual evidence for secondary products exploitation. In Mesopotamia, Uruk-period (fourth millennium) pictographs and cylinder seals present some of the earliest representations of milking, plowing, and wheeled vehicles; in central and southeast Europe, figurines and clay models play the same role from the Chalcolithic or Bronze Age. Such representations can only ever provide a *terminus ante quem* for the origin of the activities represented, however (Chapman 1982).

Artifactual evidence is also problematic, due largely to issues of preservation. Early plows and vehicles were largely made of organic materials and are thus rarely preserved, although ard marks may provide direct evidence for the use of the former. Occasional finds in waterlogged deposits from across Europe may post-date the earliest use of the technology in any given area by centuries. For textiles, this problem is compounded by the fact that wool survives in very different conditions to plant fibers such as flax, while the associated inorganic material culture (spindle whorls and loom weights) does not unequivocally reveal which fibers were used. Nonetheless, it is notable that while flaxen fabrics are known from the Neolithic in both Europe and the Near East, woolen textile fragments start to appear in Chalcolithic and later contexts.

Neither does milking necessarily have a distinctive material culture. Perforated ceramic vessels from Linearbandkeramik (central European Early Neolithic) contexts have sometimes been linked to cheese production (Bogucki 1984), but this is by no means certain. Recent advances in stable isotope analysis of lipid residues on ceramics have allowed ruminant milk fat to be distinguished from ruminant or porcine body fat, by comparing $\delta^{13}C$ between 16- and 18-carbon chains (Evershed et al. 2008). While this technique reveals widespread use of milk from the early Neolithic in the Near East and Europe, estimating the frequency of milk consumption or its contribution to diet remains problematic.

By contrast to artifactual and iconographic data, animal bone assemblages are near-ubiquitous features of prehistoric sites, and may provide indirect evidence for the use of secondary products. Evidence for traction has been sought through systematic observation of pathologies and activity markers on animal bones (e.g., Bartosiewicz et al. 1997; Isaakidou 2006), but by far the most common approach involves quantitative analysis of age-at-death and sex ratio data (e.g., Greenfield 1988, 2005; Vigne and Helmer 2007). Systematic attempts to analyze herd management from age data began in earnest with Payne's (1973) publication of idealized mortality profiles for caprine herds managed for meat, milk, and wool, respectively (Fig. 1). Similar reasoning can be applied to cattle and their use for traction.

There are various obstacles to interpretation of mortality profiles, however. Firstly, prehistoric herds will rarely have been managed purely for a single resource, and the three models should therefore be seen as extreme cases; indeed, Payne also set out a "mixed meat and milk" profile. More nuanced models have since been proposed for "tender meat" and for nonintensive milk production more suited to primitive breeds and/or small-scale production systems ("type B milk" – Vigne and Helmer 2007). The next problem is one of equifinality: once one moves away from Payne's extreme cases, different production strategies cannot necessarily be distinguished from age data alone. Sex ratios may help to tease out different herd management strategies, although it is usually impossible to link age and sex data

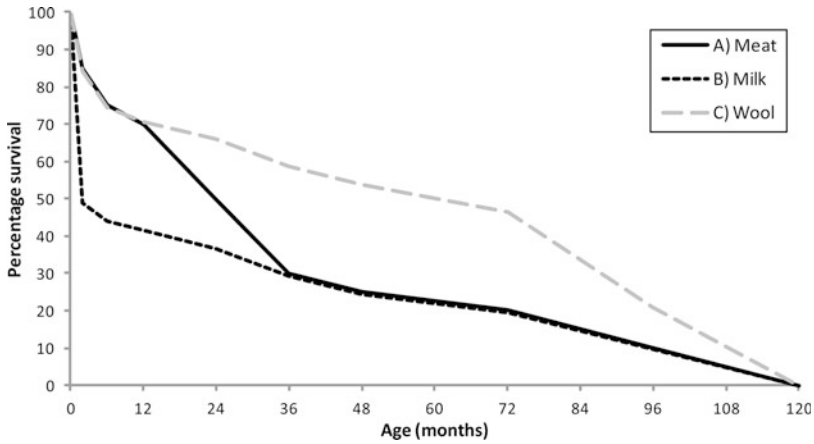

Secondary Products and the "Secondary Products Revolution", Fig. 1 Idealized survival curves for sheep herds managed for meat, milk or wool, according to Payne (1973)

directly since different skeletal elements are used in each case. Widespread castration would be a strong indicator of systematic traction or wool use, in cattle and sheep respectively, but is itself difficult to demonstrate unless large numbers of intact limb bones are present.

As a result of these problems, it is not unknown for the same data to be interpreted in contradictory ways (e.g., Greenfield 2005 vs. Vigne and Helmer 2007). Moreover, particular herd structures can only ever indicate *potential* for exploitation of milk, wool, etc. (Halstead 1998). Additional factors such as herd security concerns or social incentives to maintain herds may intervene between theoretical optimal herd structures and reality. The scale of herding is important, with management of smaller herds likely to be more conservative and therefore to appear more generalist, but of course it is notoriously difficult to assess scale from bone remains. The upshot is that while highly specialized herd management might constitute convincing evidence for the type of large-scale specialized pastoralism inherent in the SPR model, the absence of such patterns does not necessarily indicate either small-scale herding or an absence of secondary products exploitation.

Matching observed mortality profiles to theoretical models is thus extremely problematic, but tracking changes over time may nonetheless help to reveal shifts in emphasis (Greenfield 2010). Post-Neolithic shifts broadly in line with the predictions of the SPR are indeed seen in the Balkans (Greenfield 2005; Isaakidou 2006), Anatolia (Arbuckle et al. 2009), and elsewhere, but their interpretation remains contentious (see Vigne and Helmer 2007; Brochier 2012).

One final line of evidence that is likely to become increasingly important in the near future is ancient DNA. On the one hand, ancient DNA studies are rapidly improving our understanding of the spread of adult lactose tolerance among human populations; on the other, genetics has the potential to trace the development and spread of traits such as woolly fleeces in sheep.

The "Secondary Products Revolution" 30 Years On

In the three decades since its inception, the SPR has been subject to critique on both empirical and conceptual grounds, and the fact that it is still a subject of debate today speaks to the contribution it made to economic prehistory. Three aspects of the model may be reevaluated in the light of recent research: (1) the idea that milking, plowing, etc., were post-Neolithic *innovations*; (2) the existence of a coherent "package" of husbandry practices that diffused from the Near East into Europe and elsewhere; and (3) the core argument for a revolution in scale and specialization of animal husbandry during the fourth millennium.

The first of these is arguably a red herring (Greenfield 2010: 46–47). While Sherratt's 1981 paper did seem to imply that the SPR involved a complex of innovations, his 1983 reprise of the model clarified that elements of this complex probably had Neolithic roots, and that the

"revolution" was one of scale. This has not prevented the construction of strawmen, however: it is hard to reconcile Sherratt's statement that "milking was probably practised in Europe by Neolithic populations" (Sherratt 1983: 95) with the view that Neolithic people were "without any abilities other than killing animals for their meat, exactly as did hunters-gatherers" – attributed to him 24 years later in an unusually passionate critique by Vigne and Helmer (2007: 35).

Regardless of Sherratt's original intentions, it is now clear that at least some features of the SPR can be traced well back into the Neolithic of Europe and the Near East. Most notably, the lipid residue evidence makes clear that milking was practiced *to some extent* from fairly early in the Neolithic (Evershed et al. 2008). Likewise, few would deny that sheep and goat fibers may have been exploited before they became fine enough to spin, or that cattle were sometimes used to pull or carry loads before the development of the ard or the wheel. On the other hand, 30 years of new empirical data has done little to overturn the idea that the plow and the wheel *were* fourth millennium developments, or that spinnable sheep's wool developed at a broadly similar time.

The second point – the idea of the SPR as a coherent package of practices that spread together – is also highly problematic. It is increasingly clear that each component had a discrete origin and subsequent take-up and spread (Greenfield 2010).

At its core, however, the SPR model was about the development of large-scale specialized pastoralism on the one hand; systematic use of cattle (and later equid) traction to transform agriculture on the other; and the implications that both had for the development of economic systems. "Large-scale" is of course an ambiguous term, but there remains considerable empirical support for the idea that major changes to this effect took place around the fourth millennium BCE in the Near East, and had taken hold in parts of Europe by at least the third millennium. The most contentious aspect of these changes is the role of milking, with debate continuing to rage over (a) whether or not the available zooarchaeological data indicate a widespread post-Neolithic shift in herd management, and (b) to what extent earlier signatures of dairying can be identified in Neolithic mortality profiles (e.g., Greenfield 2005, 2010; Vigne and Helmer 2007).

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Asses/Donkeys: Domestication
- ▶ Camels: Domestication
- ▶ Cattle: Domestication and Development
- ▶ Goat: Domestication
- ▶ Horses: Domestication
- ▶ Organic Residue Analysis in Archaeology
- ▶ Sheep: Domestication
- ▶ Social Zooarchaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

References

Arbuckle, B.S., A. Öztan, and S. Gülçur. 2009. The evolution of sheep and goat husbandry in central Anatolia. *Anthropozoologica* 44: 129–157.

Balasse, M., and A. Tresset. 2002. Early weaning of Neolithic domestic cattle (Bercy, France) revealed by intra-tooth variation in nitrogen isotope ratios. *Journal of Archaeological Science* 29: 853–859.

Bartosiewicz, L., W. van Neer, and A. Lentacker. 1997. *Draught cattle: Their osteological identification and history*. Tervuren: Musée Royal de l'Afrique Centrale.

Bogaard, A. 2005. 'Garden agriculture' and the nature of early farming. *World Archaeology* 37: 177–196.

Bogucki, P.I. 1984. Ceramic sieves of the linear pottery culture and their economic implications. *Oxford Journal of Archaeology* 3: 15–30.

Bökönyi, S. 1974. *History of domestic mammals in central and eastern Europe*. Budapest: Akadémiai.

Brochier, J.É. 2012. The use and abuse of culling profiles in recent zooarchaeological studies: Some methodological comments on "frequency correction" and its consequences. *Journal of Archaeological Science* 40: 1416–1420.

Chapman, J. 1982. The secondary products revolution and the limitations of the Neolithic. *University of London Institute of Archaeology Bulletin* 19: 107–122.

Evershed, R.P., S. Payne, A.G. Sherratt, M.S. Copley, J. Coolidge, D. Urem-Kotsu, K. Kotsakis,

M. Ozdogan, A.E. Ozdogan, O. Nieuwenhuyse, P.M.-M.G. Akkermans, D. Bailey, R.-R. Andeescu, S. Campbell, S. Farid, I. Hodder, N. Yalman, M. Ozbasaran, E. Bicakci, Y. Garfinkel, T. Levy, and M.M. Burton. 2008. Earliest date for milk use in the Near East and southeastern Europe linked to cattle herding. *Nature* 455: 528–531.

Greenfield, H.J. 1988. The origins of milk and wool production in the Old World: A zooarchaeological perspective from the central Balkans. *Current Anthropology* 29: 573–593.

Greenfield, H.J. 2005. A reconsideration of the secondary products revolution in south-eastern Europe: On the origins and use of domestic animals for milk, wool and traction in the central Balkans. In *The zooarchaeology of fats, oils, milk and dairying*, ed. J. Mulville and A.K. Outram, 14–31. Oxford: Oxbow.

Greenfield, H.J. 2010. The secondary products revolution: The past, the present and the future. *World Archaeology* 42: 29–54.

Halstead, P. 1998. Mortality models and milking: Problems of uniformitarianism, optimality and equifinality reconsidered. *Anthropozoologica* 27: 3–20.

Isaakidou, V. 2006. Ploughing with cows: Knossos and the secondary products revolution. In *Animals in the Neolithic of Britain and Europe*, ed. D. Serjeantson and D. Field, 95–112. Oxford: Oxbow.

Johannsen, N. 2011. Past and present strategies for draught exploitation of cattle. In *Ethnozooarchaeology: The past and present of human-animal relationships*, ed. U. Albarella and A. Trentacoste, 13–19. Oxford: Oxbow.

McCormick, F. 1992. Early faunal evidence for dairying. *Oxford Journal of Archaeology* 11: 201–210.

Mengoni Goñalons, G.L., and H.D. Yacobaccio. 2006. The domestication of South American camelids: A view from the south-central Andes. In *Documenting domestication: New genetic and archaeological paradigms*, ed. M.A. Zeder, D.G. Bradley, E. Emshwiller, and B.-D. Smith, 228–244. Berkeley: University of California Press.

Moreno-García, M., and C.M. Pimenta. 2011. Animal dung: Rich ethnographic records, poor archaeozoological evidence. In *Ethnozooarchaeology: The past and present of human-animal relationships*, ed. U. Albarella and A. Trentacoste, 20–28. Oxford: Oxbow.

Payne, S. 1973. Kill-off patterns in sheep and goats: The mandibles from Asvan Kale. *Anatolian Studies* 23: 281–303.

Russell, N. 1998. Cattle as wealth in Neolithic Europe: Where's the beef? In *The Archaeology of value: Essays on prestige and the processes of valuation*, ed. D.W. Bailey, 42–54. Oxford: Archaeopress.

Sherratt, A. 1981. Plough and pastoralism: Aspects of the secondary products revolution. In *Patterns of the past: Studies in honour of David Clarke*, ed. I. Hodder, G. Isaac, and N. Hammond, 261–306. Cambridge: Cambridge University Press.

Sherratt, A. 1983. The secondary exploitation of animals in the Old World. *World Archaeology* 15: 90–104.

Vigne, J.-D., and D. Helmer. 2007. Was milk a "secondary product" in the Old World neolithisation process? Its role in the domestication of cattle, sheep and goats. *Anthropozoologica* 42: 9–40.

Further Reading

Mulville, J., and A.K. Outram. 2005. *The zooarchaeology of fats, oils, milk and dairying*. Oxford: Oxbow.

Russell, N. 2004. Milk, wool, and traction: Secondary animal products. In *Ancient Europe 8000 B.C.-A.D. 1000: Encyclopedia of the barbarian world*, ed. P.I. Bogucki and P.J. Crabtree, 325–333. Farmington Hills: Scribner.

Secwepemc Cultural Education Society and Simon Fraser University (SCES-SFU) Indigenous Archaeology Program

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Basic Information

The Secwepemc (or Shuswap) are an Interior Salish people of south-central British Columbia, Canada, today comprised of 17 bands. In 1989, the Secwepemc Cultural Education Society (SCES) and Simon Fraser University (SFU) entered into a partnership to develop a unique post-secondary education program for First Nations Students on the Kamloops Indian Reserve in Kamloops, British Columbia. These efforts were led by then-Skeetchestn Band chief Ronald Ignace, Marianne Boelscher Ignace (anthropologist, SFU), and Hari Sharma (sociologist, SFU). The goal was to offer university courses on the reserve in order to enhance the quality of life for the Secwepemc peoples and their indigenous neighbors; to preserve and promote their history, language, and culture; and to provide training in research and

developmental opportunities to assist them in controlling more fully their own affairs (Ignace et al. 1996). Ironically, the program started in several rooms within the former residential school run by the Catholic Church, whose mission was to "remove the Indian from the child."

The program sought to provide First Nations individuals, from near and far, with an entry into post-secondary education, but also welcomed non-indigenous students. The location on the reserve was intentional as it provided a comfortable setting distinct from that of regular universities, which many individuals found intimidating. A significant percentage of students were the first in their family to ever attend a university course or complete a university degree. The SCES-SFU program was known informally as Coyote U; the campus logo featured *Sk'elep*, the coyote, a trickster figure to Secwepemc people known for both good deeds and causing trouble.

Soon after it began, the program quickly expanded into a small campus, consisting of six portable classrooms, adjacent to the residential school. The small permanent teaching and administrative staff was complemented by sessional instructors from other academic institutions in the region. The curriculum was designed to help Secwepemc communities meet their needs, especially those related to cultural heritage. Anthropology, First Nations, linguistics, ethnobotany, archaeology, and museology were all emphasized, with courses also offered in sociology, writing, mathematics, history, and geography. Over 100 lower- and upper-level university courses were offered each year, as well as several graduate courses. Special courses and workshops were occasionally offered on treaty negotiations, film making, theater, wildlife management, and health and safety. In 1993, the SCES-SFU program received the "Award for Excellence" from the Canadian Association for University Continuing Education. The volume *Coyote U: Stories and Teachings from the Secwepemc Education Institute* (Murphy et al. 1999) is a collection of writing by students in the program.

The Archaeology program was developed in 1991 by George Nicholas (archaeologist, SFU), who directed it until 2005. The annual Archaeology Field School component combined a commitment to socially relevant, community-based archaeology with a scientific research program focused on the identification and excavation of pre-5000-year-old sites and the land-use system they represent (Nicholas 1997; Nicholas et al. 2016). These initiatives contributed to capacity building in field and research skills, as well as cultural resource management services to the communities. The Archaeology Field School (Fig. 1) provided students with a

Secwepemc Cultural Education Society and Simon Fraser University (SCES-SFU) Indigenous Archaeology Program, Fig. 1 Students in the SCES-SFU Indigenous Archaeology program received classroom instruction and field training in all aspects of archaeology – from theory and practice to community engagement. (Photo: George Nicholas)

thorough grounding in archaeological survey, site recording, testing and excavation skills, and basic laboratory analysis. The Field School worked closely with the Kamloops Indian Band to mitigate the impact of a large housing development and golf course on and around a location where Nicholas and students had previously conducted extensive field studies and conducted work on behalf of the Secwepemc Cultural Education Society and the Secwepemc Museum. These and other projects assisted the Secwepemc people in balancing current land-use plans with heritage preservation and introduced students to the very real demands of mitigative archaeology and to the rewards and frustrations that are part of cultural resource management.

Provincial certification in archaeological training was incorporated into the field school program or offered separately. The Resource Inventory Standards Committee (RISC) program prepares students with technical training in practical field methods to assist archaeologists in cultural resource management projects. This program has been delivered to numerous First Nations communities throughout British Columbia since 1997. For some, RISC training has been an introduction to the discipline of archaeology that has inspired them to pursue a post-secondary education, and for others, it has provided seasonal work. This work has provided networking with the archaeological community and other potential employers (Nicholas and Markey 2002).

The Secwepemc-SFU campus closed in 2010 due to financial cutbacks, increased competition for students, and a shift in priorities by the partnering organizations.

Major Impact

For 20 years, the SCES-SFU Indigenous Archaeology Program provided archaeological courses and field training to hundreds of First Nations students, more than any other institution in Canada. It created opportunities for their involvement in stewardship, heritage management, heritage policy making, developing on-reserve permit systems, cultural sensitivity in heritage research, land-use planning, cultural liaison with industry, and even mentoring for high school students. Through its archaeology, ethnobotany, and language immersion courses, the SCES-SFU campus offered many opportunities for First Nations students to visit, or revisit, parts of their traditional territories and to work with elders who as teachers and cultural advisors introduced them to knowledge lost to the language and cultural restrictions imposed through the residential school system and earlier Federal Indian policies.

For its part, archaeology assisted community members in identifying more fully with their culture by supplementing and expanding oral histories and by giving them the tools to identify, recover, and interpret ancestral sites and the material culture contained therein. SCES-SFU students have subsequently pursued their interests in heritage in a variety of contexts, including:

- As band council or committee members charged with making decisions on land-use planning (including archaeological overview assessments) for their communities
- As archaeological permit holders, project managers, business managers, project directors, or crew members for cultural resource management companies working on local, national, and international projects
- As managers, researchers, and field workers within First Nations cultural and/or natural resource departments, involved in archaeological and environmental assessments that incorporate both western science and traditional knowledge
- As museum archivists and tour guides
- As graduate students having the opportunity to teach at universities as sessional instructors
- As educators and instructors who have incorporated archaeology, ethnobotany, and language into the curriculum into elementary, high school, and university-level courses

The SCES-SFU program represented a manifestation of Indigenous Archaeology in which First Nations' concerns with heritage were addressed by providing First Nations members with the tools of archaeology that they could employ themselves as CRM practitioners, educators, or decision-makers. The approach melded community values and

recognition of sensitive and sacred places with scientific collection and preservation of archaeological materials and has proved pivotal in educating future generations of both First Nations and the general public about First Nations histories, cultural identity, political perspectives, and social dynamics. It has also served to enlighten the industry (private and corporate) and government with respect to developing better relations and protocols with First Nations (Markey 2010). The program has left a lasting legacy in Secwepemc territory, as well as contributed to the increased breadth of archaeological practice elsewhere.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canada: Cultural Heritage Management Education
- ▶ Community Archaeology
- ▶ Field Schools, Archaeological
- ▶ Heritage and Higher Education
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Knowledge and Traditional Knowledge

References

Ignace, R., M.B. Ignace, M. Layton, H. Sharma, and J.C. Yerbury. 1996. Partners in success: The Simon Fraser University and Secwepemc First Nations Studies Program. *Canadian Journal of University Continuing Education* 22: 27–45.

Markey, N.M. 2010. The 'other' accidental archaeologist. In *Being and becoming indigenous archaeologists*, ed. G.P. Nicholas, 199–209. Walnut Creek: Left Coast Press.

Murphy, P.J., G.P. Nicholas, and M.B. Ignace, eds. 1999. *Coyote U: Stories and lessons from the Secwepemc Education Institute*. Penticton: Theytus Press.

Nicholas, G.P. 1997. Education and empowerment: Archaeology with, for, and by the Shuswap nation. In *At a crossroads: Archaeology and first peoples in Canada*, ed. G.P. Nicholas and T.D. Andrews, 85–104. Burnaby: Archaeology Press, Simon Fraser University.

Nicholas, G.P., and N. Markey. 2002. Notes from the Kamloops underground: Some thoughts on 'the future management of archaeological resources'. *The Midden* 34: 7–13.

Nicholas, G.P., N.J. Bonneau, and L. Westfall. 2016. Archaeological approaches to long-term Secwepemc plant use in the Interior Plateau, British Columbia. In *Secwepemc people and plants: Research papers in Shuswap ethnobotany*, Contributions in Ethnobiology, ed. M. Ignace, N. Turner, and S. Peacock, 67–125. Tacoma, WA: Society for Ethnobiology.

Further Readings

Ignace, M., and R. Ignace. 2017. Secwepemc People, Yiri7 re Stsq'ey'-kucw Land, and Laws. Montreal and Kingston: McGill/Queens University Press.

Ignace, M., S. Peacock, N.J. Turner. 2016. Secwepemc people and plants: Research papers in Shuswap ethnobotany (Contributions in Ethnobiology series). *Contributions in Ethnobiology, Society for Ethnobiology.* pp. 1–484. Tacoma, WA.

Nicholas, G.P. 2006. Decolonizing the archaeological landscape: The practice and politics of archaeology in British Columbia. *American Indian Quarterly* 30: 350–380.

Nicholas, G.P., and N. Markey. 2015. Traditional knowledge, archaeological evidence, and other ways of knowing. In *Material evidence: Learning from archaeological practice*, ed. R. Chapman and A. Wylie, 287–306. New York: Routledge.

Nicholas, G.P., G. Baptiste, C. Coles, D. Dillman, J. Gilbert, and N. Markey. 1999. 'Telling a fresh story': Archaeology and native people. In *Coyote U: Stories and teachings from the Secwepemc Education Institute*, ed. P.J. Murphy, G.P. Nicholas, and M.B. Ignace, 97–105. Penticton: Theytus Press.

Seeds: Conservation and Preservation

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Introduction

Not all seeds that are preserved and recovered from archaeological contexts reflect uses by past peoples. Some of the seeds may be of modern origin: they may have been blown in, dropped from local plants (i.e., "seed rain"), or transported by burrowing animals or plant roots. Seed rain

also operated in the past and could be a source during site occupation and after site abandonment. At mesic sites where, as discussed below, carbonization is normally deemed necessary for preservation, uncharred seeds are often considered modern intrusions. However, the burning of an abandoned occupation site may result in the deposition of considerable quantities of carbonized seeds incidentally introduced by seed rain. Carbonized seeds can also be a result of indirect sources such as burning dung for fuel (Miller and Smart 1984). At water-logged sites, seeds may be introduced via beach drift (Matthews and Gosden 1997). Understanding depositional history is thus critical to interpreting seeds that have been preserved and recovered from archaeological sites.

Definition

Seeds are plant reproductive structures. In flowering plants, they develop within ovaries, and the ovaries and seeds then develop into fruits. The term "seed" as applied in many archaeological contexts refers to true seeds as well as kernels, achenes, pits, pips, and other kinds of dry fruits. It was the recovery of ancient seeds among other floral remains by nineteenth century researchers like John Harshberger, Oswald Heer, and Carl Kunth which propelled interest in the uses of plants by past societies. By the mid-twentieth century, it became widely recognized that seeds derived from archaeological deposits provide the kind of data needed to answer questions about diet, origins of food production, diffusion of cultigens, biodiversity, land use strategies, medicinal and ritual practices, and technological use of plants.

Key Issues/Current Debates/Future Directions/Examples

There are a number of means by which seeds may survive physical and chemical decomposition to become a part of the archaeological record. These include carbonization, desiccation, quick-freezing, and water-logging. In general, these processes inhibit the growth of decomposers like bacteria or saprophytic fungi, slow the rate of enzyme action, and lower the speed at which chemical reactions occur (Sobilik 2003: 21–28). Desiccation, quick-freezing, and water-logging are remarkable for the types of tissue preserved, if not for the shear abundance of material. The water-logged deposits of the ancient lake dwellers who built wooden houses along the shores of Switzerland's lakes have yielded cultivated grains, fleshy fruits, field weeds, legumes, and nuts, among many other kinds of plant remains, whereas the dry coastal valleys of southern Peru are equally rich in yielding desiccated seeds. Unfortunately, preservation by these means is relatively rare.

Most seeds are derived from open-air archaeological sites in mesic habitats where supplies of moisture are moderate. There the botanical remains are often subjected to oscillations between wet and dry regimes that increase their susceptibility to chemical decomposition. Repeated cycles of wetting and drying bring the seeds into contact with fresh supplies of inorganic and organic acids and bases (Bryant 1989). These substances dissolve or weaken cellulose (a component of most plant cells) to such a degree as to accelerate mechanical reduction. Also, a host of small organisms that facilitate decomposition inhabit mesic environments. Dead plant materials serve as food for earthworms, millipedes, ants, and mites, among other soil organisms (Bryant 1989). Fungi and bacteria, nature's most effective decomposers, also abound. Under these conditions, dead organic matter tends to decay rather rapidly. There are exceptions. First, seeds that were deeply and quickly buried may preserve. Deep layers of silt or clay can result in relatively anaerobic conditions that inhibit saprophytic organisms. The deeper the material is buried, the better the potential for preservation (Sobilik 2003). Such situations can arise in the case of a mudslide or in the event of the quick burial beneath meters of mound fill.

The second and a major exception are those seeds that have undergone the physical and chemical changes associated with carbonization. During the carbonization process, chemical constituents

are converted to elemental carbon, which is extremely durable and offers no nutrients on which saprophytic organisms can feed (Sobilik 2003). Beck (1989) developed and conducted experiments to evaluate basic rates of decomposition for carbonized and non-carbonized remains. She found that rates of decomposition will be greatest at those sites where the sediments are warmer, wetter, have higher organic carbon content, are more alkaline, and have more concentrated soil nutrients (e.g., phosphorus, calcium, nitrogen). However, if a seed is composed of more resistant materials – it has been carbonized – such a state will outweigh environmental factors. In many cases, seeds that have fortuitously carbonized can withstand the rigors of mesic environments.

While carbonization is a mechanism by which seeds can preserve, it is a very biasing mechanism (Wright 2003). Carbonized seed assemblages tend to reflect only a small portion of the population of plants used by past peoples. Miksicek (1987) illustrated this point when he observed traditional saguaro fruit harvesting and processing by members of the Tohono O'odham, and a year later returned to sample the processing loci. Ultimately, he found that "The flotation samples yielded evidence for approximately 0.2% of a morning's work, of which only 0.02% was carbonized" (Miksicek 1987: 221–222). Carbonization, hence the likelihood of seed preservation in mesic contexts, is influenced by proximity to a heat source which, in turn, is influenced by how seeds were used and/or discarded. For example, seeds consumed as a part of eating a fleshy fruit would have less of a chance to be introduced to a heat source and carbonize, than the accidental burning of maize kernels while roasting an ear or the partially digested grains contained within animal dung that was burned as fuel.

The culturally dependent phenomenon of proximity represents only a portion of the preservation equation. The ability of plant materials to carbonize is dependent on phenomena such as thermal intensity, length of exposure, the presence of oxygen, and moisture and chemical contents. A number of researchers have experimented with the carbonization process (for examples, see Wilson 1984; Wright 2003; Margaritis and Jones 2006; Braadbaart et al. 2007; Markel and Rosch 2007). Wilson (1984) and Wright (2003) observed that a particular seed accidentally subjected to a high temperature for a very short time may differ in distortions or degree of degradation than one exposed to a lower temperature for a longer time. Markel and Rosch (2007) and Wright (2003, 2008) noticed differences in the survival of oily versus starchy seeds: oily seeds may have less of a chance of fully carbonizing at lower temperatures than their starchy counterparts. Carbonization can impact the shape and dimensions. For example, Wilson (1984) and Wright (2003) found that there is less size change in drier seeds than in moisture specimens. The potential impact on size has ramification when researchers rely on lengths, widths, and diameters of seeds to determine if a plant remain reflects a wild or a domesticated species (see Braadbaart and Wright 2007).

Carbonization and postdepositional processes can reduce seeds and fruits to simpler structures, as seed coats, embryos, and endosperm are disarticulated (Pearsall 2000). Mechanical damage due to a host of natural activities such as freezing and thawing, gravity, rodent gnawing, and so on can thoroughly destroy seeds or render them unidentifiable. Seed coats, which are often an important to identification, can be lost, blackened during carbonization, highly eroded when desiccated, and distorted or lost in the event of water-logging (Pearsall 2000). Even the methods used to recover the seeds can impact whether or not the seed will be preserved in an identifiable state as a part of the archaeological record as the wetting of remains during flotation can cause increased splitting and damage seeds that will impact recovery rates (Wright 2005).

Seeds recovered from archaeological sites as well as the associated documentation (e.g., analytical forms, reports, images, and so on) need to be conserved for future reference. Unfortunately, little has been written in the archaeological literature about this topic. Conservation of archaeological remains recovered from marine contexts is perhaps the most researched and published in the archaeological literature. One of the more crucial tasks is the removal of salts from any seeds or other plant materials excavated from salt-water deposits. The

Conservation Research Laboratory at Texas A&M University provides details about how to conserve all kinds of archaeological remains recovered from such contexts (see http://nautarch.tamu.edu/CRL/conservationmanual/File1.htm).

Governments, museums, and other professional organizations provide guidelines for conserving organic materials. For example, the U.S. Department of the Interior, National Park Service provides free, online leaflets, referred to as "Conserve O Grams," that treat preservation issues of all kinds of remains including organic materials like seeds. Phenomena to avoid when storing seeds include excessive heat, direct sunlight, radical changes in temperature and humidity, atmospheric pollutants, and pests as all of these can be deleterious. Collections should be regularly inspected to detect and record deterioration of the seeds themselves or of associated labels, containers, and/or archival documents. Also appropriate are procedures used by herbaria. Courses like that offered by the Brooklyn Botanic Garden in conjunction with the Royal Botanic Gardens, Kew, where international and institutional standards of curating plant materials at herbaria and ideas about promoting collections of plant materials to scientific and lay communities are discussed, can be useful sources of information in the curation and conservation of archaeologically recovered seeds.

Cross-References

- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ International Council of Museums (ICOM)
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Paleoethnobotany
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes

References

Beck, W. 1989. The taphonomy of plants. In *Plants in Australian archaeology*, ed. W. Beck, A. Clarke, and L. Head, 31–53. St. Lucia: Anthropology Museum, University of Queensland.

Braadbaart, F., and P.J. Wright. 2007. Changes in mass and dimensions of sunflower (*Helianthus annuus* L.) achenes and seeds due to carbonization. *Economic Botany* 61: 137–153.

Braadbaart, F., P.J. Wright, J. Van Der Horst, and J.J. Boon. 2007. A laboratory simulation of the carbonization of sunflower achenes and seeds. *Journal of Analytical and Applied Pyrolysis* 78: 316–327.

Bryant, V.M., Jr. 1989. Botanical remains in archaeological sites. In *Interdisciplinary workshop on the physical-chemical-biological processes affecting archaeological sites*. Environmental Impact Research Program Contract Report E11-89-1, ed. C.C. Mathewson (complier), 85–115. Washington, DC: U.S. Army Corps of Engineers.

Margaritis, E., and M. Jones. 2006. Beyond cereals: Crop processing and *Vitis vinifera* L. ethnography, experiment and charred grape remains from Hellenistic Greece. *Journal of Archaeological Science* 33: 784–805.

Markel, T., and M. Rosch. 2007. Experiments on the effects of carbonization on some cultivated plant seeds. *Vegetation History and Archaeobotany* 17: 257–263.

Matthews, P.J., and C. Gosden. 1997. Plant remains from waterlogged sites in the Arawe Islands, West New Britain Province, Papua New Guinea: Implications for the historic of plant use and domestication. *Economic Botany* 51: 121–133.

Miksicek, C.H. 1987. Formation processes of the archaeobotanical record. In *Advances in archaeological method and theory*, ed. M.B. Schiffer, vol. 10, 211–247. New York: Academic.

Miller, N.F., and T.L. Smart. 1984. Intentional burning of dung as fuel: A mechanism for the incorporation of charred seeds into the archaeological record. *Journal of Ethnobiology* 4: 15–28.

Pearsall, D.M. 2000. *Paleoethnobotany: A handbook of procedures*. New York: Academic.

Sobilik, K.D. 2003. *Archaeologist's toolkit 5: Archaeobiology*. New York: Academic.

Wilson, D.G. 1984. The carbonization of weed seeds and their representation in macrofossil assemblages. In *Plants and ancient man: Studies in palaeoethnobotany*, ed. W. van Zeist and W.A. Casparie, 201–206. Rotterdam: Balkema.

Wright, P.J. 2003. Preservation or destruction of plant remains by carbonization? *Journal of Archaeological Science* 30: 577–583.

Wright, P.J. 2005. Flotation samples and some paleoethnobotanical implications. *Journal of Archaeological Science* 32: 19–26.

Wright, P.J. 2008. Understanding the carbonization and preservation of sunflower and sumpweed remains. *Midcontinental Journal of Archaeology* 33: 137–153.

Further Reading

Beck, W. 2006. Plant remains. In *Archaeology in practice*, ed. J. Balme and A. Paterson, 296–315. Malden: Blackwell Publishing.

Fritz, G.J. 2005. Paleoethnobotanical methods and applications. In *Handbook of archaeological methods*, ed. H.D.G. Machner and C. Chippindale, vol. 1, 771–832. New York: AltaMira Press.

Van Der Veen, M. 2007. Formation processes of desiccated and carbonized plant remains – The identification of routine practice. *Journal of Archaeological Science* 34: 968–990.

Wright, P.J. in press. Formation processes of the macrobotanical record. In ed. J.M. Marston, J. d'Alpoim Guedes, and C. Warinner, 23–40. Boulder: University of Colorado Press.

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of

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State of Knowledge and Current Debates

At the time of Alexander's conquest, Iran and Mesopotamia, which were regions of ancient civilization possessing a multi-millenary history of contacts, exchanges, and conflicts, had been part of the Achaemenid Empire for two centuries. With the conquest of Babylon by Cyrus the Great in 539 BCE, Mesopotamia lost its political independence, becoming part of a multinational empire that had its center in Iran, homeland of the ruling dynasty. Nevertheless, thanks to its key geographical position and to its rich agricultural resources the region still played a very important role within the empire. The city of Babylon enjoyed a privileged status and was one of the royal residences of the Achaemenid kings, together with Pasargadae-Persepolis, Susa, and Ecbatana.

In choosing Babylon as the capital city of his empire, Alexander shifted the axis of the political power from Iran to Mesopotamia. A few years later, in 311 BCE, Alexander's general Seleucus – satrap of Babylonia from 320 to 315 BCE – moved from Babylon with the aim of conquering what was going to be the largest of the Diadochi kingdoms, first annexing Media and Susiana. The centrality of the area was confirmed by the Arsacids, the Iranian dynasty that succeeded the Seleucids in the rule of the Asian Alexander's heritage. They set up their capital in Ctesiphon, which was opposite the Greek metropolis of Seleucia on the Tigris. Ctesiphon also retained its role as capital under the Sasanians, who displaced the Arsacids in the early third century CE.

From the Achaemenid time on, the political destinies of Mesopotamia and Iran were closely linked: for over a millennium, they were part of complex state structures, characterized by the coexistence and – with different nuances depending on different periods – by the transmission and assimilation of artistic and cultural features of various origins. It was the conquest of the Persian Empire by Alexander the Great that especially opened the Near Eastern and Central Asian territories to Greek culture and led to an extraordinary process of encounter and exchange with the local cultures. The available archaeological data enable one to recognize the significance of this process and to observe some of its results, but unfortunately it does not enable one to follow step by step every single phase of it. Because of their political and cultural centrality, Iran and Mesopotamia must have played a key role in the intercultural dialogue between the Greek culture, the Iranian element, and local traditions; in spite of this, the archaeological documentation coming from these areas is far from being complete.

The Seleucid Period

The archaeological documentation from the Seleucid period is particularly scanty. In the case of Mesopotamia, the lack of data is at least partly due to the difficult political situation suffered by Iraq in the last decades, which has resulted in a necessary reduction if not an almost complete lull in the field activities. This situation has been partly counterbalanced by recent developments in historical research that has offered a more articulated picture of the administrative, social, and economic reality of the Seleucid Empire through its growing attention to the local sources.

In spite of the systematic investigation conducted during the last century on the site of Seleucia on the Tigris, the Seleucid court art and architecture still remain unknown. In fact, 20 archaeological campaigns carried out during the last century by the University of Michigan and the Centro Ricerche Archeologiche e Scavi di Torino per il Medio Oriente e l'Asia only affected a very small portion of the entire surface of the city, which encompasses a surface of about 550 ha on the right bank of the Tigris, approximately 30 km south of Baghdad. Moreover, the Seleucid levels were reached only in some of the investigated areas. Seleucia was founded in the last years of the fourth century BCE by Seleucus I; its location – close to the mouth of the Royal Canal and the outlet of the Diyala Valley – was highly strategic for the communications between the western territories and the far eastern lands of the empire via the Iranian plateau. The city master plan probably falls under the foundation period (Fig. 1). The urban layout was organized in accordance with basically Greek planning principles: the main public buildings are concentrated in the northern part of the city, where wide open areas divide the regular grid of rectangular blocks. These are the largest in the Hellenistic world, with an extension of 144.70 × 72.35 meters, and they are bound by streets intersecting at right angles. A larger east-west street running along the southern limit of the urban perimeter and a ship canal cutting it in two halves are the main street axes. On the northern limits stood the theatre, a major institution in a Greek city. The massive remains of its mud-brick substructures, enclosed later in a Sasanian watchtower, form the artificial mound of Tell 'Umar that dominates the archaeological area of the city. Immediately south of the theatre, the agora is an open area with a long, rectangular shape. On the east wing of the square stands a stoa; the west wing is occupied by the public archives, hosted in a building destroyed by fire in the last quarter of the second century BCE and never rebuilt.

The Greek character of Seleucia on the Tigris is hardly surprising. The city was a royal Macedonian foundation, and it was conceived as the eastern capital of the Seleucid Empire. What is remarkable is the ability for Macedonians to adapt Greek features to a different geographic and cultural context, as shown by the huge size of the city, by the presence of a ship canal as a main street axis or by the use of mud-brick for the civic theatre. Moreover, some data point to the coexistence of different architectural traditions: in the agora, a stoa, an edifice with a strictly codified Greek plan, is opposite a building that hosted archives and whose plan offers analogies

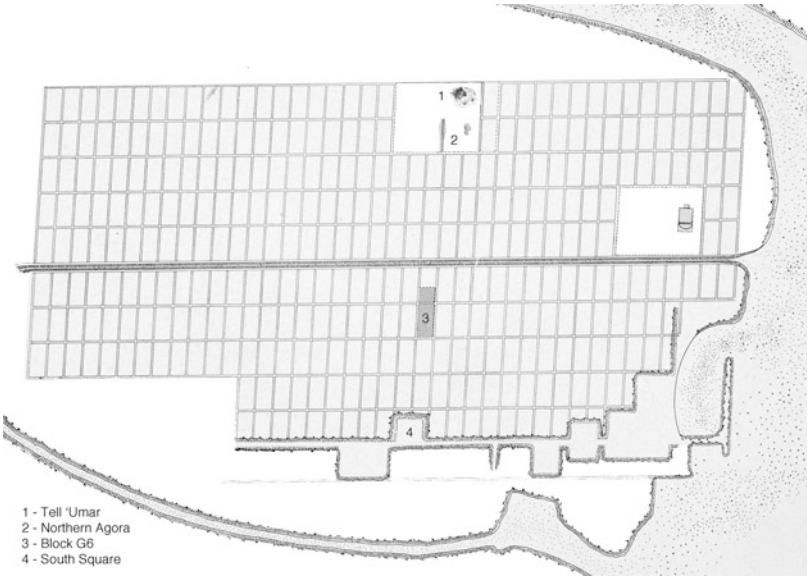

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 1 Seleucia on the Tigris. Schematic plan of the city (Archive Centro Scavi Torino)

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with Mesopotamian temple precincts (Messina 2007: 60–63). Also the seal impressions found inside the archival building testify to the complex cultural life of Seleucia. Over 11,000 figured seals offer an overview of the different features of artistic production that existed in the Seleucid period. Hellenistic style and iconography predominate: particularly noteworthy are the large set of representations of Greek gods and the portraits of the Seleucid kings, some of which are true masterpieces of the Hellenistic glyptic (Fig. 2). Besides Greek subjects one can still find a little but significant number of pre-Hellenistic patterns, both of Mesopotamian and Greco-Persian origin: priests with conical cap, composite beings, hunting scenes, pig-tailed figures (Invernizzi 2004).

The coexistence – in different proportions – of Greek and local elements appears to be a common feature of the main cities of Seleucid Mesopotamia. With the foundation of Seleucia on the Tigris, Babylon lost its dominant position in terms of internal and international politics. However, it was still an important regional center, as testified by written sources and archaeological remains. The first phases of the theatre, which is located in the northeastern sector of the city known as Homera, may have dated to the last years of the fourth century BCE. The mud-brick cavea leans on an artificial mound formed by debris coming from other areas of the city. The presence of a theatre fits well within the framework of the city, whose Greek community was organized as a polis. On the other hand, textual documents and archaeological data both attest continuities in the use of pre-Hellenistic buildings, from the royal palaces to the temples. Several texts record Seleucid royal activities – restoration works and offerings – in Esagila, the sanctuary of Marduk. Similarly, the enclosure walls of the ziggurat Etemenanki show traces of Seleucid works. The active role of the Seleucid kings in the religious life of the main Mesopotamian centers – which is clearly testified by the well-known cylinder of Antiochus I from Borsippa, the last known royal inscription written in cuneiform, celebrating the restoration of the Ezida temple – coheres completely with the political attitude of the new rulers. These were respectful to the different cultures of their composite empire inasmuch as they were particularly concerned with the accomplishment of the duties connected to Babylonian kingship.

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 2 Seleucia on the Tigris. Clay sealing with portrait of the Seleucid king Demetrius II. (Photo archive Centro Scavi Torino)

The continuity of traditional religious practices is even more evident in the case of Uruk, the most ancient center of Southern Mesopotamia. Texts of Seleucid period mention the "High Akitu of Anu" and the "Akitu of Ishtar," attesting that at Uruk, the celebration of the New Year festival continued to be performed during the Seleucid times. The main temple complexes of the city – the Bit Resh and the Irigal – were constructed and renovated according to the traditions of Babylonian religious architecture, both in terms of plan and decoration. Both sanctuaries were built on a Babylonian court plan; the temple proper was set in a walled precinct that included several courtyards lined by rooms, chapels, and passages. The outer walls of the temples and, in the case of the Bit Resh, more extensively investigated, the sides of the main courts of the whole precinct were decorated with projections and niches in the traditional Mesopotamian style. Archaeological and textual evidence show that in Seleucid times, the Bit Resh was the

most important religious complex in Uruk. The sacred precinct and the associated ziggurat were dedicated to the sky god Anu, who replaced Inanna-Ishtar as the preeminent deity of the city, and to his wife Antum. The Irigal became the main temple dedicated to the worship of Ishtar and Nana, thus superseding the ancient E-anna temple, which still remained in use until late Seleucid to early Parthian period. In charge of the works in the Bit Resh was the governor of Uruk, a member of the Anu-uballit family who received the Greek name of Nikarchos from the king Antiochus II. Subsequent works were undertaken by another member of the family, Anu-uballit Kephalon, governor of the city under Antiochus III (Downey 1988: 15–35). The fact that the local ruling elite was closely connected to the royal dynasty is testified by the royal practice of conferring Greek names on its members; moreover, such important works as the ones carried on in the Bit Resh sanctuary had to enjoy direct or indirect royal patronage. Even Uruk, in spite of its strongly conservative character, shows important traces of Greek cultural presence, testified by the exceptional discovery of the two tumuli of Frehat en-Nufegi. Both tumuli, located north of the city, had a burial chamber with corbelled vault. The western tumulus hosted the burned remains of four adults, buried in four urns; the eastern one was the burial place of a single adult, originally lying on a kline. In this case, both the funerary practices and the grave goods – which include golden wreaths and iron strigils – are completely foreign to the Mesopotamian milieu and point to the Greco-Macedonian world (Pedde 1991).

If we look at the material culture, the relation between Greek and Mesopotamian tradition seems to go beyond the simple coexistence of features of different origins. In the case of the pottery production, the extremely rich documentation shows that already in the Seleucid period Mesopotamian craftsmen freely employed the local technique of the alkaline glazing to produce vessels highly inspired by western prototypes such as the so-called fish plates, extremely popular in the Mesopotamian area during the Seleucid period and attested until fully Parthian times (Valtz 1993: 170–172). Unfortunately, the thousands of terracotta figurines found in Central and Southern Mesopotamia do not provide precise indications on the first phases of the encounter between Greek and Mesopotamian traditions: examples certainly dating to the Seleucid period are too rare to be informative about the tendencies of the coroplastic production of that époque. Some representations of gods on the seal impressions from Seleucia on the Tigris stand out in that respect, for their western iconography is enriched with Mesopotamian features that allow one to offer a twofold Greco-Mesopotamian interpretation: Athena-Nanaia-Artemis with a helmet, crescent, and torch and Apollo-Nabu with an arrow stylus in the hand and a crescent and tablet in the field (Invernizzi 2004).

Archaeological data coming from Northern Mesopotamia are very scanty and seem to suggest a contraction of the settlements in the area. At Nimrud, traces of a third- or second-century village were found in the area of the Ezida temple. At Nineveh, surface pottery finds that can be closely compared with the materials from Nimrud possibly indicate a Hellenistic occupation of the area east of the citadel. Besides, some epigraphic evidence point to a potential Seleucid origin as regards the organization of the city as a polis (Reade 1998).

French excavations carried out since 1986 at Dura Europos, a Macedonian foundation on the northwestern corner of Mesopotamia, shed new light on the early history of the site. The city, with its Hippodamian plan and its powerful fortifications, is now dated to the latest phases of Seleucid rule, around the middle of the second century BCE. In early Seleucid times, the site was only the place of a stronghold established on a citadel in order to control the route connecting the two capital cities of the empire, Antiochia on the Orontes and Seleucia on the Tigris (Leriche 2010). Beyond the southern limits of Mesopotamia, the island of Failaka, near the head of the Gulf, was the seat of a small Hellenistic settlement dating from the end of the fourth to the second century BCE. Both the material finds from the excavations – namely, the pottery and the terracotta figurines – and the epigraphic

evidence point to the coexistence and mutual exchanges of Greek and non-Greek elements (Salles 1993).

The archaeological data from Mesopotamia allow one to recognize some of the cultural dynamics generated by the encounter of Greek culture and local traditions; by contrast, the information coming from Iran is too fragmentary to enable the creation of a general interpretive framework. The historical sources attest the interest of the Seleucid rulers in Iran. As already mentioned, in 311 BCE, Seleucus I started to build his empire by annexing Media and Susiana. Moreover, Seleucid rule in Iran was consolidated by new foundations, by the refounding of old cities and by the establishment of garrison sites. Unfortunately, the pattern of the Seleucid settlements in Iran has largely been lost, and many of the foundations quoted by the written sources have not yet been identified on the ground. The archaeological remains of the Seleucid period are not homogeneously distributed on the Iranian plateau; on the contrary, they are mainly concentrated in the western regions, namely, Media and Susiana, which were areas of great economical and strategic importance for the ruling dynasty. In the heart of Media, close to Nahavand, the Greek city of Laodicea was founded. A stele found on the site bears a double Greek inscription – dated to the reign of Antiochus III – that identifies the city as a Greek polis and testifies to the spread of the Seleucid dynastic cult in Iran. At Bisutun, on the route connecting Mesopotamia to the Upper Satrapies, there was a Greek sanctuary dedicated to Heracles. To the sanctuary belonged the well-known high relief depicting the reclining hero, with an inscription dated to 148 BCE. Further north, in Media Atropatene, a Seleucid garrison was established on the site known as the Karafto Caves (Kuhrt and Sherwin-White 1993: 72–81).

The city of Susa was refounded as a Greek polis under the name of Seleucia on the Eulaios. Not much data concerning its Seleucid phases are available. The site was an object of systematic exploration by French archaeologists from the end of the nineteenth century on, but the documentation concerning the recent phases suffered neglect from the lack of interest of the first archaeological missions. A recent reexamination of the data collected in almost a century of excavations has led to the conclusion that the city was not densely populated in the early Seleucid period. The Greek presence became more manifest starting from the second half of the third century BCE. In the meantime the city underwent a strong commercial development that reached its peak in the period between the end of Seleucid times and the first century CE (Martinez-Sève 2002a). From the excavations of Susa come many terracotta figurines – generically dated to the Seleucid-Parthian period – whose iconography and style testify to the contemporary presence of Greek and Near-Eastern influences. The presence of types from the coroplastic repertoire of Susa – namely, naked female figures and riders – in other sites of Susiana and Elymais testifies to the cultural influence exercised by the city between the Seleucid and the Parthian periods (Martinez-Sève 2002b). A fragment of a bronze statue possibly depicting a Seleucid king found in the sanctuary of Shami, in Elymais, suggests that the sacred area was already in use in the Seleucid period.

In Fars, homeland of the Achaemenid dynasty, the Achaemenid heritage has been evident for a long time, and the reuse of previous buildings was a common practice: at Pasargadae, the archaeological data point to continuity between the Achaemenid and the Seleucid phases. The interest of the new ruling dynasty in the area is evident in the foundation, probably by Antiochus I, of the city of Antiochia Persis, whose localization on the ground is still debated. Fragments of marble statues of Hellenistic taste – some of which are considered to be imports from the Eastern Mediterranean – were found in different sites of the region (Callieri 2007). On the whole, the number and variety of the archaeological remains support scholars' quite recent reassessment of the end of the Seleucid rule in Fars. On the basis of the coins minted by the first local rulers, the *frataraka*, the end of the Macedonian control of the region has been shifted from the beginning of the third to the beginning of the second century BCE.

The Parthian Period

141 BCE marks the beginning of Parthian rule in Mesopotamia. This was when the city of Seleucia on the Tigris was taken by Mithridates I, founder of the Arsacid Empire. The attempts of the Seleucid king Demetrius II and his successor Antiochus VII to regain possession of Mesopotamia were in vain and ended with the defeat and death of Antiochus VII in 129 BCE. During the reign of Mithridates II (123–88 BCE.), who expanded the empire, Parthian rule stretched from Central Asia to the Euphrates.

The starting point for the conquests of Mithridates I was Parthia, a region of outer Iran that had been under Arsacid control since the second half of the third century BCE. In Parthia, at the feet of Kopet Dagh mountains, Mithridates I founded Old Nisa/Mithradatkert: not an ordinary seat of the Arsacids, but the center of their dynastic cult. The site is of a primary importance: from Nisa comes the only available evidence of Arsacid court art and architecture, as the royal residences of the Parthian rulers have been so far unknown; the Parthian levels of Ctesiphon have not yet been located on the ground, and the excavations at Shahr-i Qumis near Damghan, which has been identified with Hecatompylos, the former capital of the Parthian Empire, did not bring to light any evidence related to palatial architecture. The ceremonial buildings unearthed in Old Nisa by Soviet, Russian, and Italian excavations (Pilipko 2001; Invernizzi and Lippolis 2008) conform to the Iranian architectural traditions of Central Asia in their recurring use of centric layouts organized around a central space surrounded by perimetral rooms and/or corridors. Moreover, two of the buildings of the central complex – namely, the Red Building and the Tower-Building – are characterized by the presence of facade porticoes (Fig. 3). The most recent excavations have demonstrated that the main ceremonial buildings of Nisa – not only the Square House, but also the central complex – were flanked by large built areas used for stocking and storing food. As highlighted by the excavator, the association of religious/ceremonial buildings with administrative/economic structures conforms to an ancient eastern tradition (Lippolis 2013: 114). The architectural decoration features patterns of Greek origin that have been freely adapted to the different exigencies of mud-brick architecture; this is the case, for instance, with the terracotta-assembled capitals. The influence of Hellenistic culture is definitely stronger in the works of art. If the marble statuettes and some of the metal figurines are purely Hellenistic works (Invernizzi 2000, 2009), the monumental clay statues – unfortunately badly fragmentary – possess western features that find expression in a technique which is meant for great fortune in Central Asia, as demonstrated by Kushan and Greco-Buddhist clay sculptures (Fig. 4). The 48 ivory rhytons found in the Square House are the extraordinary result of a synthesis of Greek subjects, Iranian elements, and local tastes and traditions (Fig. 5). The drinking horn, a type of vessel widespread in Iran and Central Asia, is enriched with a decorative apparatus dominated by clearly western themes and iconographies such as, among the others, the twelve Olympian gods, the twelve labors of Heracles, and the members of the Dionysian cortege that decorate its upper frieze (Pappalardo 2010). All of the Nisean finds contribute to underlining both the philhellenism of the first Arsacid kings and the ability of local artists to re-elaborate cultural influences of different origins. In fact, the synthesis of Greek, Iranian, and local traditions is a common trait of much of the archaeological evidence from the Parthian period.

Greek culture still maintained a considerable influence at Seleucia on the Tigris. Under the new rulers, the city kept flourishing through its commercial activities and retained a high degree of political and administrative autonomy. This status, however, changed after a revolt of the Seleucian inhabitants in the first century CE. The Arsacid kings were aware of the strategic importance of the site: opposite Seleucia, on the left bank of the Tigris, they founded Ctesiphon, capital of the empire from the first century CE, whose Parthian phases have not yet been identified on the ground. In the area of Seleucia-Ctesiphon – named by the Arabic sources al-Madā´in, "the

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 3 Old Nisa. Schematic plan of the central complex. (archive Centro Scavi Torino)

cities" – urban settlements flourished up to the Islamic period.

The development of Seleucia on the Tigris in Parthian times respects the outline of the Seleucid layout. Important public buildings, such as the theatre, are maintained. By contrast, in the agora dwelling houses and workshops are built on the remains of the archival building and the stoa. At the southern limit of the city, a large commercial square not foreseen in the original plan is opened, facing the above-quoted main east-west street. The excavation of a dwelling block in the southern half of the city illuminates the emergence, between the first and the second century CE, of a new architectural feature that characterizes civil and religious Mesopotamian architecture of the first century CE: the iwan, a large rectangular room open on one short side (Hopkins 1972). According to the excavators, at Seleucia the evolution in the domestic architecture is contemporaneous to the introduction of stucco in the architectural decoration of the block. The

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 4 Old Nisa. Fragmentary clay head of Mithridates I. (Photo archive Centro Scavi Torino)

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 5 Old Nisa. Ivory rithon n. 43. (Photo archive Centro Scavi Torino)

coroplastic repertoire from Seleucia gives us a reflection of what probably was the richness of the artistic production of the city. Over 11,000 terracotta figurines brought to light by excavations are the product of a sustained process of interaction and synthesis between Greek and Mesopotamian culture. New western iconographies, styles, and techniques of manufacturing stimulated the renewal of practices that had persisted for millennia. Ancient Mesopotamian subjects, such as rigidly standing nude women, nursing women, musicians, riders, animals, and scale models, coexisted with western subjects, such as Greek deities, women in Greek dresses, reclining figures, children, grotesques, and theatrical masks (Fig. 6). At Seleucia, Greek and Near-Eastern iconographies did not form distinct clusters and were not free from reciprocal influences. Quite the opposite, their reciprocal contacts resulted in a

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 6 Seleucia on the Tigris. Terracotta figurine showing a draped woman. (Photo archive Centro Scavi Torino)

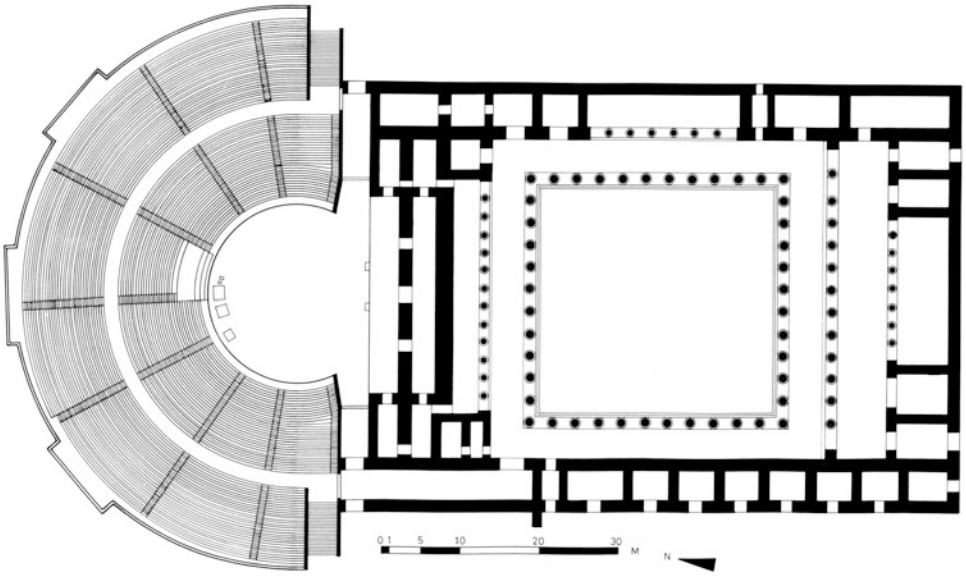

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 7 Babylon. Plan of the theatre (Graphic elaboration Claudio Fossati)

profound transformation of both traditions and led to the creation of a new and original iconographic and formal language. From Seleucia on the Tigris, such a language spread throughout the lands of Babylonia, as testified by the presence of types originated in Seleucia within the coroplastic repertoires of Babylon, Nippur, Uruk, and minor sites of Central and Southern Mesopotamia (Menegazzi 2014: 59–63).

Continuity with the Seleucid phases and the strength of local traditions, together with the intensity of intercultural dialogue and the creation of new artistic solutions, are features that Parthian Seleucia shares with the other regional centers. The persistence of ancient local customs is demonstrated by the burial practices. Even though extramural cemeteries are attested, intramural burials appear to have been the norm, both in inhabited dwelling houses and in abandoned areas of the city. Various types of inhumation included simple ditch graves, jar burials, backed brick graves, and vaulted tombs with loculi. Glazed ceramic "slipper coffins" were a particularly distinctive type that was popular in Central and Southern Mesopotamia during the first to second century CE.

The urban layout of Babylon shows elements of continuity with the previous phases. The theatre remained in use until the second century CE; it was accompanied by an adjacent peristyled building variously interpreted as a gymnasium or an agora (Fig. 7). In the Merkes, an area whose occupation goes back without interruption to the neo-Babylonian times, the Parthian houses follow the same plans already in use in the Seleucid period; they are characterized by a peristyled courtyard. On the contrary, during the Parthian period, the big sanctuaries were progressively abandoned. At Babylon, there is no archaeological evidence showing continuity in the use of the Esagila, even though some texts indicate that the sanctuary was still in use in the early Parthian period. A cuneiform tablet from Uruk dating to 108 BCE demonstrates that the Bit Resh and the Irigal were in use at that time. However, both sanctuaries were destroyed by fire during the first century CE, and dwelling areas were situated on their remains. At Uruk the temple of Gareus, located on a mound to the southeast of the Bit Resh and Irigal sanctuaries, provides a sample of the religious architecture of Parthian period. Its interior follows a plan of Babylonian type, with a

forecella and a cella of equal breadth. By contrast, the decoration of its outer walls freely employs architectural details of clear western influence, such as fluted engaged columns with Ionic bases and Ionizing capitals. The temple was made of baked brick; stucco was employed in its architectural decorations, for molding the flutes of the columns and for the finishing details of the decorated bricks.

The original synthesis of different cultural influxes shown by the temple of Gareus is a common feature of many architectural remains from Northern Mesopotamia. During the Parthian period, this area experienced great development, as testified by the growth of urban settlements. Parthian-era Assur covered more or less the same extent of the ancient city, and this old Assyrian capital has provided substantial architectural evidence for continuity and expansion. The persistence of old religious practices is testified by the rebuilding of the Bit Akitu on its old plan. On the contrary, the so-called peripteros is a combination of very different features: the nucleus, which consists of a broad forecella and cella of Babylonian origin, is preceded by an *iwan* on the façade and a peristyle that surrounds the back and the sides of the building. Likewise, a multiple *iwan* temple is built on the ruins of the old Assur temple. This peculiar feature also recurs in residential architecture, as shown by the palace of Assur: a large *iwan* opens to each side of its central courtyard. The stuccoed decoration of the courtyard's façades was organized in three registers of slender engaged columns that framed niches.

Many of the features evidenced for Assur recur in the architecture of Hatra, the main center of the Jazira. Located on a frontier zone between the Parthian and Roman empires, the city was governed by Arab rulers while being under the Parthian political sphere of influence. The archaeological data elucidate its extraordinary development in the late Parthian period, between the second and the first half of the third century CE. The heart of the city was the sanctuary dedicated to the sun god Shamash, and this sacred precinct enclosed many temples. Whereas the temple of Maran – rising on a high podium and surrounded by a double peristyle – recalls Romanized Syrian temples, the *iwan* is the dominant feature of almost all the temples built on the western part of the *temenos*. Particularly outstanding is the "Great Iwans" complex, a series of juxtaposed *iwans* with a number of subsidiary rooms. Its façade, 115 meters long, is dominated by arched openings, framed by richly sculpted archivolts and separated by high engaged columns (Fig. 8). On the contrary, some of the small shrines built outside the sacred precinct, in the dwelling areas, show plans analogous to earlier Mesopotamian religious architecture.

Besides architecture, the city of Hatra has left us a large body of evidence for figurative arts. These include reliefs and statues depicting gods and members of the city elite involved in ritual acts or in devotional attitude. These sculptures are characterized by the strict frontality of the poses, the descriptive taste in the careful rendering of decorative details and the paratactic organization of the figured scenes. In his essay *Dura and the Problem of Parthian Art*, which was focused on the figurative documents from Dura Europos and was published in 1935, Michael Rostovtzeff identified these features as main principles of Parthian art. Thanks to the availability of further artistic evidence from the Parthian world, today we can say that the abovementioned principles, rather than the art of Parthian times as a whole, define an artistic tendency that developed in the late Parthian period; has been attested in different areas, namely, Northern Mesopotamia and Elymais; and spread even beyond the geographical and chronological limits of the Parthian Empire. In fact, Palmyra – whose figurative production share common traits with the Durean and Hatrean art – falls within the Roman cultural and politic sphere of influence, and many of the mural paintings from Dura Europos are dated after the Roman conquest of the city. Moreover, some artefacts from Northern Mesopotamia seem to suggest the contemporary presence of different artistic tendencies, even in the same area: this is the case of the statuette of Heracles Epitrapezios from Nineveh, which dates to the second century CE and was strongly inspired by western models (Invernizzi 1989). As regards Central Mesopotamia, the terracotta figurines found in the most

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 8 Hatra. The Great Iwan complex from southeast, detail. (Photo Antonio Invernizzi)

recent levels of Seleucia on the Tigris similarly testify to the coexistence, in the coroplastic repertoire of late Parthian times, of different stylistic tendencies, as the same iconographic types were produced both in a very simplified and in a more naturalistic style (Menegazzi 2014: 33–34). In the light of that complexity, a recent essay has pointed out the necessity of a diachronic re-reading of the figurative materials of the Parthian period in order to trace a history of Parthian art (Invernizzi 2011).

Similar complexity also characterizes the Iranian archaeological remains. The culture of Iran in the Parthian period is marked by strong regional features and significant gaps in the archaeological documentation. It is nonetheless possible to recognize some of the cultural traits already highlighted within the Mesopotamian context.

The strength and variety of local traditions are verified by the different burial practices attested in the various areas of Iran: jar burials in the north, rock tombs in Media, cairn burials in Fars and in the southeast, and vaulted tombs at Susa. In regard to the architectural remains, the temples built on the sacred terraces of Bard-e Neshandeh and Masjid-i Sulaiman, in Elymais, are indebted to Iranian and Near-Eastern building traditions. Particularly, the temple of Bard-e Neshandeh – with its portico on the façade and the central, four-columned room surrounded by shallow, rectangular spaces – perfectly fits with the Iranian and Central Asian architectural traditions already mentioned for Old Nisa. Features of Iranian origin – the portico and the circumambulatory corridor isolating the inner spaces of the building – also recur in the Great Temple of Masjid-i Sulaiman, which otherwise shows a connection with Mesopotamian religious architecture through its possession of a forecella and cella unit behind a court (Ghirshman 1976). The identity of the deities worshipped at Masjid-i Sulaiman and Bard-e Neshandeh still remains uncertain. Nevertheless, the numerous fragments of stone sculptures (statues and reliefs) dated to the first/second century CE and depicting rulers and officials testify to the importance played by the two sanctuaries, at least in the first century of our era (Martinez-Sève 2004: 197–198).

From the village of Kal-e Chendar, in the valley of Shami, come the famous over-life-size

bronze statue of a nobleman in Parthian dress, fortuitously found in 1936. The site was briefly explored by Aurel Stein: a few days of excavation allowed him to recognize Shami as a sanctuary of Hellenistic and Parthian Elymais, whose importance is testified by the quality of the sculptures found on the spot. A joint Iranian-Italian archaeological expedition has recently resumed excavations there, bringing to light remains of structures built on monumental terraces adjacent to the one explored by Stein. In the whole area surrounding the terraces, tombs of various types have been recognized (Baqherian et al. 2016).

The materials of Parthian-era Susa testify to continuity with the Seleucid phases: epigraphic evidence – still written in Greek – attests the persistence of Greek traditions and institutions. The western influence is evident also in the figurative arts: besides the above-quoted terracotta figurines, which are generically dated to the Seleucid-Parthian period, some fragments of stone sculptures that include a well-known female head with a Greek inscription on the crenelated crown are worth mentioning. In the sculptural production from Susa, iconographies inspired by Hellenistic art coexisted with purely Iranian types, such as men in Parthian dress that closely recall – in spite of the difference in size and material – the abovementioned statue of the Parthian prince from Shami.

Hellenistic culture left a clear mark on the plan of Ecbatana, a former Median and Achaemenid capital: recent excavations have demonstrated that the regular grid of the city dates to the Parthian period. Likewise, the palace of Khurheh in the central Iranian plateau, with its slender columns with Ionic capitals, has been interpreted in the past as a Seleucid temple, but it was founded in Parthian times.

The stuccoed decoration – already seen in Mesopotamian architectural decoration – is a distinctive feature of the palace of Qal´eh-i Yazdigird, most likely the seat of a local ruler. This palace dates to the late Parthian era and is located on the westernmost slope of the Iranian plateau, not far from the Zagros gates that connect Iran and Mesopotamia. The extremely rich decorative patterns include not only abstract motifs and architectural elements but also figural motifs both of Greco-Roman and Eastern origin (Keall et al. 1980). The excavator of the palace also hypothesizes the presence of *iwan* chambers.

From Elymais comes an important series of rock reliefs that date from the first to the early third century CE, which is otherwise the time when the area was ruled by local dynasts

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 9 Hung-e Azhdar (Khuzestan). Rock relief (Photo courtesy Centro Scavi Torino and Iranian Center for Archaeological Research)

(Fig. 9). These reliefs, often carved on boulders, usually depict reclining figures, scenes of devotion, investiture, or homage to the prince; hunting scenes and riding figures are less common (Kavami 1987: 88–130). The reliefs from Elymais are the product of a local, provincial art. Nonetheless, they share meaningful stylistic features with the above-quoted artistic production of Syria and Northern Mesopotamia in the late Parthian period; they are characterized by frontality, paratactic distribution of the figures taking part in a scene, and descriptive taste in the rendering of the details. These common traits were already highlighted in the late 1960s by Daniel Schlumberger, who explained their birth in different regions of the Parthian Empire by hypothesizing that they might have been reflections of the lost court art of Ctesiphon (Schlumberger 1970: 152–160).

Cross-References

- ▶ Antioch, Apamea, and the Tetrapolis, Archaeology of
- ▶ Dura-Europos, Archaeology of
- ▶ Empire in the Ancient Near East, Archaeology of
- ▶ Palmyra, Archaeology of
- ▶ Sasanian Empire, Archaeology of the

References

Baqherian, Yalireza, Ilaria Bucci, Alessandra Cellerino, Enrico Foietta, Jafar Mehr Kian, Vito Messina, and Mana Rouhani Rankouhi. 2016. Preliminary report on the first season of excavation of the Iranian-Italian joint expedition in Khuzestan at Kal-e Chendar, Shami (6th campaign, 2013). *Parthica* 18: 31–52.

Callieri, Pierfrancesco. 2007. *L'archéologie du Fārs à l'époque hellénistique*. Paris: Éditions de Boccard.

Downey, Susan B. 1988. *Mesopotamian religious architecture: Alexander through the Parthians*. Princeton: Princeton University Press.

Ghirshman, Roman. 1976. *Terrasses sacrées de Bard-è Néchandeh et Masjid-i Solaiman*, Mémoires de la Délégation archéologique en Iran 45, Mission de Susiane. Leiden: Brill.

Hopkins, Clark. 1972. *Topography and architecture of Seleucia on the Tigris*. Ann Arbor: The University of Michigan.

Invernizzi, Antonio. 1989. L'Heracles Epitrapezios de Ninive. *Archaeologia Iranica et Orientalis* 2: 623–633.

Invernizzi, Antonio. 2000. *Sculture in metallo da Nisa. Cultura Greca e Cultura Iranica in Partia*, Acta Iranica 35. Lovanii: Peeters.

Invernizzi, Antonio, ed. 2004. *Seleucia al Tigri. Le impronte di sigillo dagli Archivi*, Mnème 3. Alessandria: Edizioni dell'Orso.

Invernizzi, Antonio. 2009. *Nisa Partica. Le sculture ellenistiche*, Monografie di Mesopotamia 11. Firenze: Le Lettere.

Invernizzi, Antonio. 2011. Parthian Art – Arsacid Art. *Topoi* 17: 189–207.

Invernizzi, Antonio, and Carlo Lippolis, eds. 2008. *Nisa Partica. Ricerche nel complesso monumentale arsacide 1990–2006*, Monografie di Mesopotamia 9. Firenze: Le Lettere.

Kavami, Trudy S. 1987. *Monumental art of the Parthian period in Iran*, Acta Iranica 26. Leiden: Brill.

Keall, Edward J., Margaret A. Leveque, and Nancy Willson. 1980. Qal´eh-I Yazdigird: Its architectural decorations. *Iran* 18: 1–41.

Kuhrt, Amélie, and Susan Sherwin-White. 1993. *From Samarkhand to Sardis. A new approach to the Seleucid Empire*. Berkeley/Los Angeles: University of California Press.

Leriche, Pierre. 2010. Europos-Doura séleucide. *Electrum* 18: 23–40.

Lippolis, Carlo. 2013. Old Nisa. Excavations in the South-Western area. Second preliminary report. *Parthica* 15: 89–115.

Martinez-Sève, Laurianne. 2002a. La ville de Suse à l'époque hellénistique. *Revue archéologique* 33: 31–53.

Martinez-Sève, Laurianne. 2002b. *Les figurines de Suse. De l'époque néo-élamite à l'époque sassanide*. Paris: Éditions de la Réunion des musées nationaux.

Martinez-Sève, Laurianne. 2004. Les figurines de Masjid-i Soleiman et les relations entre Suse et l'Élymaïde. *Parthica* 6: 179–201.

Menegazzi, Roberta. 2014. *Seleucia al Tigri. Le terrecotte figurate dagli scavi italiani e americani*, Monografie di Mesopotamia 16. Firenze: Le Lettere.

Messina, Vito. 2007. *Seleucia al Tigri. L'edificio degli Archivi. Lo scavo e le fasi architettoniche*, Monografie di Mesopotamia 8. Firenze: Le Lettere.

Pappalardo, Eleonora. 2010. *Nisa Partica. I rhyta ellenistici*, Monografie di Mesopotamia 12. Firenze: Le Lettere.

Pedde, Friedhelm. 1991. Frehat en-Nufegi. Zwei seleukidenzeitliche Tumuli bei Uruk. *Baghdader Mitteilungen* 22: 521–535.

Pilipko, Viktor N. 2001. *Staraja Nisa. Osnovnye itogi arheologičeskogo izučenija v sovetskij period*. Moskva: Nauka.

Reade, Julian E. 1998. Greco-Parthian Nineveh. *Iraq* 60: 65–83.
Salles, Jean-François. 1993. Hellénisme et traditions orientales à Failaka. In *Arabia antiqua. Hellenistic centres around Arabia*, ed. Antonio Invernizzi and Jean-François Salles, 223–255. Roma: Istituto Italiano per il Medio ed Estremo Oriente.
Schlumberger, Daniel. 1970. *L'Orient Hellénisé. L'art grec et ses héritiers dans l'Asie non méditerranéenne*. Paris: Editions Albin Michel.
Valtz, Elisabetta. 1993. Pottery and exchanges: Imports and local production at Seleucia-Tigris. In *Arabia antiqua. Hellenistic centres around Arabia*, ed. Antonio Invernizzi and Jean-François Salles, 167–182. Roma: Istituto Italiano per il Medio ed Estremo Oriente.

Further Reading

Amiet, Pierre. 2001. La sculpture susienne à l'époque de l'empire parthe. *Iranica Antiqua* 36: 239–291.
Boucharlat, Remi, and Ernie Haerinck. 2011. *Tombes d'époque parthe (Chantiers de la ville des artisans)*, Mémoires de la Délégation archéologique en Iran 35, Mission de Susiane. Leiden-Boston: Brill.
Downey, Susan B. 1977. The stone and plaster sculpture. In *The excavations at Dura Europos, conducted by Yale University and the French academy of inscriptions and letters, final report III*, Monumenta Archaeologica 5. Los Angeles: Cotsen Institute of Archaeology.
Keall, Edward J. 1982. Qal´eh-I Yazdigird: An overview of the monumental architecture. *Iran* 20: 51–72.
Klengel Brandt, Evelyn, and Nadja Cholidis. 2006. *Die Terrakotten von Babylon im vorderasiatischen Museum in Berlin. Teil 1. Die anthropomorphen Figuren*, WVDOG, 115. Saarwellingen: Saarländische Druckerei & Verlag.
Kose, Arno. 1998. *Uruk. Architektur IV. Von der Seleukiden- bis zur Sasanidenzeit*, AUWE 17. Mainz am Rhein: Verlag Philipp von Zabern.
Mathiesen, Hans E. 1982. *Ikaros – The Hellenistic settlement. volume 1. The terracotta figurines*. Copenaghen: Jutland Archaeological Society Publications.
Mathiesen, Hans E. 1992. *Sculpture in the Parthian Empire. A study in chronology*. Aarhus: Aarhus University Press.
Messina, Vito. 2010. *Seleucia al Tigri. Il monumento di Tell 'Umar*, Monografie di Mesopotamia 10. Firenze: Le Lettere.
Safar, Fuad, and Muhammad A. Mustafa. 1974. *Hatra. The city of the sun god*. Baghdad: Wizāraï al-I'lām, Mudīriyyaï al-A_tār al-Āmmat.
Yarshater, Ehsan, ed. 2000–1983. *The Cambridge history of Iran. volume 3, Part 1–2. The Seleucid, Parthian and Sasanian periods*. Cambridge: Cambridge University Press.
Wetzel, Friedrich, Erich Schmidt, and Alfred Mallwitz. 1957. *Das Babylon der Spätzeit*, Wissenschaftliche Veröffentlichungen der Deutschen Orient-Gesellschaft 62. Berlin: Mann.

Semiotics in Archaeological Theory

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Introduction

Archaeological interest in semiotics, or the study of signs, has a long history due to the centrality of interpreting "meaning" in the archaeological record. It has had particular currency with respect to questions of symbolism and style, two areas traditionally associated with the Saussurean language-based model of the sign that underlies structuralism. Its emphasis on linguistic codes and meanings also found favor among archaeologists interested in terminological classification schemes and computer applications, especially the use of artificial intelligence modeling. The limited interest in structuralism or even symbolism within Processual archaeology, on one hand, and the turn toward poststructuralist approaches within Post-processualism, on the other, however, reduced the overall impact of Saussure's structural semiotics in archaeology. In spite of this, semiotics has recently been undergoing something of a renaissance as archaeologists have turned to alternative semiotic models, in particular that of the American philosopher Charles Sanders Peirce, best known as being the founder of pragmatism. This entry presents an overview of the two main types of semiotics, that of Saussure and Peirce, and reviews their archaeological applications and key contributions and then closes with a discussion of the current and future prospects for semiotic approaches within archaeology.

Definition

Semiotics is the study of signs and the ways in which they convey meaning. The term comes from the Greek word *semeion* ("sign") and has

been the focus of philosophical debate since Plato. At the heart of such debates is the question of how well signs – and most often linguistic signs, or words – represent reality or truth in the world, and what the precise relationship is between the sign or *that which represents* and idea or thing *being represented* by the sign.

The two most influential approaches to semiotics were both developed around the turn of the twentieth century: those of French linguist Ferdinand de Saussure (1857–1913) and American philosopher Charles Sanders Peirce (1839–1914). Saussure's has had a lasting effect on anthropology and, to a lesser extent, archaeology, since its adoption as the foundation of structural analysis by Claude Lévi-Strauss. Peirce's approach, largely ignored for the half-century following his death, has more recently found favor in both anthropology and archaeology.

Saussure termed his approach *semiology* and though he acknowledged that nonlinguistic signs such as rites and customs act as signs, he focused mainly on linguistic signs as he felt those were the most complex types of signs. Understanding a language system could thus provide insight into all other dimensions of a culture. In Saussure's model, the sign is the fundamental unit of analysis and consists of two interrelated components, the "signifier" (*signifiant*), or the form of the sign itself, and the "signified" (*signifié*), or the concept being represented by the signifier (Fig. 1).

For example, the word "tree" is the signifier for the concept of that thing with branches and leaves known as a tree. Two key points about Saussure's model follows from this: (1) the concept being signified is not the instantiated thing in the world, but rather the mental concept or idea of that thing and (2) the relationship of the signifier to the signified is arbitrary and based on a social/linguistic group's convention. There is no necessary relationship between the word "tree" and the concept it represents, as other languages have other words for the same concept, such as "arbre" in French and "ağaç" in Turkish. A complete language system depends on the interrelationship among its various words/signifiers, and the aim of linguistic analysis is to understand the structure and rules at the core of that system.

Peirce's *semeiotic* model differs from Saussure's approach in several ways. First, rather than accord special status to language, Peirce conceived of all things in the world, even thoughts and humans themselves as signs. To Peirce, words are only one particular (and quite limited) kind of sign. Second, and perhaps most important, Peirce's understood signs to be triadic, rather than dyadic in nature. Rather than consisting of a signifier that stands for a signified idea, Peirce understood the sign as "something which stands to somebody for something in some respect or capacity" (Hartshorne et al. 1938–51: 2.228). In other words, Peirce understood a sign to represent its "object," or thing out there in the world, for some interpreter of that sign. The resulting interpretation in the mind of the interpreter is itself a new sign, termed the "interpretant," which stands in triadic relation with both the sign being interpreted and the object that sign was meant to represent (Fig. 2).

In this way, Peirce both acknowledged that there is a physical world "out there" which

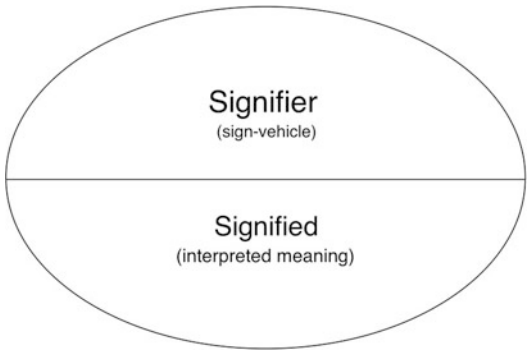

Semiotics in Archaeological Theory, Fig. 1 Saussure's model of the sign

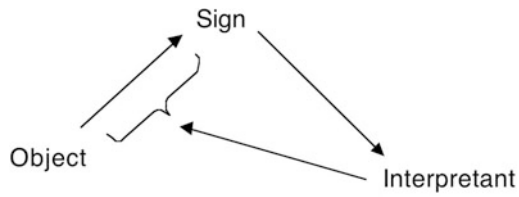

Semiotics in Archaeological Theory, Fig. 2 Peirce's model of the sign (after Parmentier 1994: 10)

impinges upon and constrains interpretation, while at the same time recognizing that any interpretation of the world is not direct but mediated through signs generated through the act of interpretation, interpretation itself being a sign. The implication of this is the third important difference with Saussure's model: that rather than being a closed "system," semiosis may be understood as continually unfolding in two directions, both by endlessly generating new signs in further acts of response and interpretation and by referring back to previous signs in the semiotic chain.

Historical Background

Saussure and Structuralism

Saussure's focus on codes and structures as being key to linguistic analysis was taken up in anthropology by Claude Lévi-Strauss (1963 [1958]) and formed the basis of his structuralist approach. He suggested that anthropology uses Saussure's framework to determine the binary logic of categories that constitute all aspects of social life. Through the analysis of the constitutive elements of various aspects of a society – its kinship terms, its myths, and its cuisine – Lévi-Strauss felt that the researcher could uncover the codes and "deep structures" underlying thought and behavior in a given culture.

While Lévi-Strauss had enormous influence in anthropology (though few will today claim that his results are either replicable or even reliable), structuralism's influence in archaeology was limited. While sharing some of the positivist goals of Processual archaeology, structuralism's emphasis on symbolism and meaning did not easily fit within the largely ecological framework of Processualism. Nonetheless, we can identify several ways in which Saussure's approach influenced archaeological thinking in the 1960s and 1970s.

The most direct archaeological engagement with Saussure's linguistic model and structuralism was that of American historical archaeologist James Deetz in his book *Invitation to Archaeology* (Deetz 1967). In that book, he advocates studying the elements of culture as signs and, taking up Saussure's approach explicitly, argues (1967: 87), "there may be structural units in artifacts which correspond to phonemes and morphemes in language… reflecting an essential identity between language and objects in an structural sense." He then coined the terms "factemes" and "formemes" as material correlates to Saussure's "phonemes" and "morphemes" as a way of categorizing specific artifact types in order to identify the grammatical rules underlying the relationships among them. Deetz's approach was taken up by several of his students, most notably in work by Mary Beaudry (1988) and Ann Yentsch (1991).

Structuralism and its focus on grammatical categories have also been influential in analyses of artifact style and meaning. Dorothy Washburn's (1977) symmetry analysis of polychrome pottery design, for example, builds on the idea that information is encoded within particular design elements like a linguistic code or grammar and that particular design structures displayed on painted pottery is therefore reflective of social interaction among pottery-making groups. Similarly, Hodder (1982a) drew on symmetry analysis and structuralist ideas about grammar in his study of Nuba material culture. At the same time, though, Hodder (1982b, 1986) raised important questions about the limitations of a structuralist approach and (along with his students) began a move away from it toward the discourse and text model of poststructuralist theorists such as Derrida, Ricoeur, and Foucault.

A final important application of Saussurean semiotics within archaeology is built upon the problem of grammar and terminological meaning to focus on how archaeologists themselves name and categorize artifacts and how differences in those terminologies can affect what kinds of archaeological knowledge are produced. This was the problem taken up by French prehistorian Jean-Claude Gardin (1980), whose work drew upon both Saussure's semiotics and elements of Peirce, mediated through the work of Umberto Eco (1976). Of particular concern to Gardin was the issue of how the language of archaeology could be standardized both for the sake of translation among scholars working in different languages and traditions, and for computational and

artificial intelligence (AI) applications (Gardin 1987; Gardin and Peebles 1992).

In spite of these applications, a good deal of skepticism remained about the applicability to archaeology of Saussure's linguistic model (e.g., Hymes 1970) and structuralism in general (Wylie 1982). Part of the reason may be due to the poor fit between Processual archaeology and a semiotic approach that was largely concerned with interpreting symbols. More than that, however, is the fact that, as Hodder (1989: 73) argued, material objects depart from the Saussurean linguistic model because their meanings are often nonarbitrary, they are polysemous and ambiguous, and they have durability that spoken words do not.

Current Debates

Recent Engagements with Peirce

In spite of the important critiques of earlier (mainly Saussure-based) semiotic applications in archaeology, semiotics has recently witnessed a resurgence of interest, mainly due to the (re-) discovery of the semiotic writings of Charles Sanders Peirce (Preucel 2006). Peirce's anti-foundational approach (which inspired the philosophy known as pragmatism), coupled with his view that the meanings of signs are not fixed as in a code, but are continually remediated in the process of communication and semiosis, parallels critiques raised by Post-Processualism. At the same time, the growing popularity of Peirce among linguistic anthropologists concerned with problems of discourse and contextual meaning (e.g., Silverstein 1976; Parmentier 1994), as well as a new project dedicated to editing and publishing his entire corpus (The Peirce Edition Project, based at Indiana University), has made his work newly accessible to archaeologists.

Most critically, Peirce's semiotics addresses the very problems with material culture meaning identified by Hodder (1989). In his most oft-cited contribution, Peirce argued that most relationships between signs and the objects they represent are not "arbitrary" in the Saussurean sense, but necessary, and he typologized such relations as either "iconic," "indexical," or "symbolic." This distinction (and trichotomy) was the subject of the earliest archaeological references to Peirce (e.g., Conkey 1982 [via Jakobson, Sebeok, and Eco]; Chase 1991; Byers 1994; Deacon 1997), as most archaeological interpretation is grounded in iconic and indexical meanings (e.g., the distribution of artifacts, how things mediate social relations, how style and function are related to materiality). His semiotic model also offered a way to account for the seeming ambiguity or polysemy in a sign's meaning, since he argued that any given sign may variably function as an icon, index, or symbol, depending on the particular interpretation generated (what Peirce called the "interpretant") in the mind of the interpreter of that sign.

The first substantial engagement with Peirce in archaeology was by Preucel and Bauer (2001), in which they argued that Peirce offered a way to deal with the problem of ambiguity in material culture meaning and provided a framework for not simply dealing with, but building a rigorous archaeology upon, seemingly incommensurable approaches to archaeological interpretation. Preucel followed this with a book-length treatise on the subject (Preucel 2006), and several of his students took up the challenge of applying Peirce to various questions in archaeology (Bauer 2002, 2013; Capone and Preucel 2002; Coben 2006; Cipolla 2008; Liebmann 2008). Since then, Peirce's ideas have been increasingly invoked, highlighting the broad potential of the approach in helping to answer questions of archaeological interest. While several have focused on epistemological issues (e.g., Knappett 2002; Lele 2006; Watts 2008), Peirce's model has also been applied to understanding material culture style and technology (Capone and Preucel 2002; Joyce 2007; Agbe-Davies 2010); architecture (Ferguson and Preucel 2005; Coben 2006), bodies (Crossland 2000), and religion (Aldenderfer 2011).

Peirce's ideas are particularly relevant to current discussions about materiality and the agency of material culture. As described above, Peirce argued that all signs (including material objects) actively mediate interpretation in the ongoing process of semiosis, effectively generating new signs (interpretants) as interpretive responses. This view intersects recent ideas about material agency, where objects are seen to play an active role and

even demand certain actions through their very existence. But while those approaches seek to break down the barrier between structure and agency (Dobres and Robb 2000), and human and nonhuman agents (Knappett and Malafouris 2008), Peirce's model at its core avoids the Kantian dualism underpinning Saussure's model of the sign that these theories seek to transcend. Rather than focusing on how objects do or do not represent "reality," by adding the third dimension to the sign relation, Peirce instead focused on the act of interpretation itself, to consider the ways in which such interpretations about reality were made. This "pragmatic" approach was not meant to suggest that a real world didn't exist, but that it was not directly accessible in the interpretive act. Instead, what something "means" depends on what kinds of interpretations are being privileged in each moment of semiosis. Peirce's model thus offers a way to think through material culture's active and meditative role in social life, but from the perspective of an active interpreter rather than in the object itself.

International Perspectives

Outside of Anglo-American archaeology and anthropology, almost all engagements with semiotics draw upon Saussure's ideas, particularly since his work and ideas were widely disseminated (and critiqued) through the work of a number of important twentieth-century linguists and philosophers, including Louis Hjelmslev, Valentin Voloshinov, Mikhail Bakhtin, Roman Jakobson, and Umberto Eco. Voloshinov and Bakhtin raised important critiques of Saussure's emphasis on language structure at the expense of its experiential, dialogic qualities, criticisms that parallel Peirce's ideas about mediation, though it is unlikely that they ever read Peirce. Jakobson, a founder of the influential Prague School of Linguistics early in his career, both built on and departed from Saussure's model in his analysis of sound systems. After his move to the United States later in his career, he incorporated Peirce's ideas into his thinking, in turn influencing his student at Harvard, Michael Silverstein. Otherwise and until recently, most scholars outside the United States who have engaged with Peirce's ideas have done so through Umberto Eco's (1976) work, which builds on both Saussurean and Peircean approaches.

Gardin's (1980, 1987) work on the relation of language to archaeological terminology and meaning is perhaps the most internationally well-known application of semiotics in archaeology. Gardin's focus on the problem of translation in archaeology has been a particularly important question of how to transcend academic language barriers, which he attempted to address through the use of computer applications and AI modeling. In short, Gardin argued that if some universal code for categorizing and describing artifacts were developed, scholars from different countries could share and compare data much more easily and without confusion in meaning. While some attempts have been made to employ Gardin's ideas, the issue of translation and artifact meaning remains a difficult problem in archaeology.

Future Directions

While semiotic perspectives that directly build on Saussure's writings have largely fallen out of favor in archaeology, his impact can still be felt in the numerous post-Saussurean approaches popular in contemporary social theory (particularly those of Bakhtin, Ricoeur, Foucault, and Bourdieu). Approaches that build on this work often still wrestle with the dualistic sign at the core of Saussure's system, seeking ways to transcend the objectivism assumed by its oppositional structure of meaning relations. Theories of agency and practice increasingly invoked in archaeology seek to highlight the recursive nature of structure and agency and thus see signs such as material objects as actively reinforcing, shaping, and challenging social life.

One potential impact of a Peircean semiotic approach is in laying the foundation for a pragmatic archaeology, one that is committed to understanding the various ways that individuals and cultures mediate their social lives through signs (Preucel 2006; Preucel and Mrozowski 2010). Such an approach is important for the epistemology and ethics of archaeology in the

twenty-first century. In the aftermath of the Processual/Post-Processual debates of the 1990s, the diversity of interpretive approaches has expanded to the point that some fear an irreconcilable disciplinary divide. At the same time, indigenous and other perspectives are challenging many of archaeology's core assumptions and methods and demanding an archaeology that addresses a broader range of concerns. As a non-foundational approach, pragmatism offers a way to recognize and productively build upon multiple voices, perspectives, and ways of knowing the world in the interpretive process, and suggests that such disunity adds strength to our inquiries about the world. Moreover, as Preucel and Mrozowski (2010: 33–34) argue, a pragmatic archaeology is one that continually challenges current understandings and is open to new dialogues leading to "meaningful social action."

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Beaudry, Mary C.
- ▶ Deetz, James (Theory)
- ▶ Gardin, Jean-Claude
- ▶ Hodder, Ian (Theory)
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Materiality in Archaeological Theory
- ▶ Post-Processual Archaeology
- ▶ Practice Theory in Archaeology
- ▶ Pragmatism in Archaeological Theory
- ▶ Preucel, Robert W.
- ▶ Processualism in Archaeological Theory
- ▶ Structural Archaeology

References

Agbe-Davies, A.S. 2010. Social aspects of the tobacco pipe trade in early colonial Virginia. In *Social archaeologies of trade and exchange*, ed. A.A. Bauer and A.S. Agbe-Davies, 69–98. Walnut Creek: Left Coast Press.

Aldenderfer, M. 2011. Envisioning a pragmatic approach to the study of religion. In *Beyond belief: The archaeology of religion and ritual*, ed. Y. Rowan, 23–36. Arlington: American Anthropological Association.

Bauer, A.A. 2002. Is what you see all you get? Recognizing meaning in archaeology. *Journal of Social Archaeology* 2: 37–52.

Bauer, A.A. 2013. Multivocality and "Wikiality": The epistemology and ethics of a pragmatic archaeology. In *Appropriating the past: Philosophical perspectives on the practice of archaeology*, ed. G. Scarre and R. Coningham, 176–194. Cambridge: Cambridge University Press.

Beaudry, M.C. 1988. Words for things: Linguistic analysis of probate inventories. In *Documentary archaeology in the New World*, ed. M.C. Beaudry, 43–50. Cambridge: Cambridge University Press.

Byers, A.M. 1994. Symboling the Middle-Upper Paleolithic transition: A theoretical and methodological critique. *Current Anthropology* 35: 369–399.

Capone, P., and R.W. Preucel. 2002. Ceramic semiotics: Women, pottery, and social meanings at Kotyiti Pueblo. In *Archaeologies of the Pueblo revolt: Identity, meaning and renewal in the Pueblo world*, ed. R.W. Preucel, 99–113. Albuquerque: University of New Mexico Press.

Chase, P.G. 1991. Symbols and palaeolithic artifacts: Style, standardization, and the imposition of arbitrary form. *Journal of Anthropological Archaeology* 10: 193–214.

Cipolla, C.N. 2008. Signs of identity, signs of memory. *Archaeological Dialogues* 15: 196–215.

Coben, L.S. 2006. Other Cuzcos: Replicated theaters of Inka power. In *Archaeology of performance: Theaters of power, community, and politics*, ed. T. Inomata and L.S. Coben, 223–260. Walnut Creek: Alta Mira.

Conkey, M.W. 1982. Boundedness in art and society. In *Symbolic and structural archaeology*, ed. I. Hodder, 115–128. Cambridge: Cambridge University Press.

Crossland, Zoe. 2000. Buried lives: Forensic archaeology and the disappeared in Argentina. *Archaeological Dialogues* 7: 146–159.

Deacon, T.W. 1997. *The symbolic species: The co-evolution of language and the brain*. New York: W.W. Norton and Co.

Deetz, J. 1967. *Invitation to archaeology*. New York: Anchor Books.

Dobres, M.-A., and J. Robb, eds. 2000. *Agency in archaeology*. London: Routledge.

Eco, U. 1976. *A theory of semiotics*. Bloomington: Indiana University Press.

Ferguson, T.J., and R.W. Preucel. 2005. Signs of the ancestors: An archaeology of the mesa villages of the Pueblo revolt. In *Structure and meaning in human settlement*, ed. J. Rykwert and T. Atkin, 185–207. Philadelphia: University Museum.

Gardin, J.-C. 1980. *Archaeological constructs*. Cambridge: Cambridge University Press.

Gardin, J.-C. 1987. *Systèmes experts et sciences humaines: le cas de l'archéologie*. Paris: Eyrolles.

Gardin, J.-C., and C.S. Peebles, eds. 1992. *Representations in archaeology*. Bloomington: Indiana University Press.

Hartshorne, C., P. Weiss, and A.W. Burks. 1931–1958. *Collected papers of Charles Sanders Peirce*. Cambridge, MA: Harvard University Press.

Hodder, I. 1982a. *Symbols in action: Ethnoarchaeological studies of material culture*. Cambridge: Cambridge University Press.

Hodder, I., ed. 1982b. *Symbolic and structural archaeology*. Cambridge: Cambridge University Press.
Hodder, I. 1986. *Reading the past: Current approaches to interpretation in archaeology*. Cambridge: Cambridge University Press.
Hodder, I. 1989. Post-modernism, post-structuralism and post-processual archaeology. In *The meanings of things*, ed. I. Hodder, 64–78. London: Unwin Hyman.
Hymes, D. 1970. Linguistic models in archaeology. In *Archéologie et Calculateurs: Problèmes Sémiologique et Mathématiques*, 91–120. Paris: CNRS.
Joyce, R.A. 2007. Figurines, meaning, and meaning-making in Early Mesoamerica. In *Material beginnings: A global prehistory of figurative representation*, ed. A.C. Renfrew and I. Morley, 107–116. Cambridge: McDonald Institute for Archaeological Research.
Knappett, C. 2002. Photographs, skeuomorphs and marionettes: Some thoughts on mind, agency and object. *Journal of Material Culture* 7: 97–117.
Knappett, C., and L. Malafouris, eds. 2008. *Material agency: Towards a non-anthropocentric approach*. New York: Springer.
Lele, V. 2006. Material habits, identity, semeiotic. *Journal of Social Archaeology* 6: 48–70.
Lévi-Strauss, C. 1963/1958. *Structural anthropology*. Trans. C. Jacobson and B.G. Schoepf. Garden City: Doubleday.
Liebmann, M. 2008. The innovative materiality of revitalization movements: Lessons from the Pueblo revolt of 1680. *American Anthropologist* 110: 360–372.
Parmentier, R.J. 1994. *Signs in society: Studies in semiotic anthropology*. Bloomington: Indiana University Press.
Preucel, R.W. 2006. *Archaeological semiotics*. Oxford: Blackwell.
Preucel, R.W., and A.A. Bauer. 2001. Archaeological pragmatics. *Norwegian Archaeological Review* 34: 85–96.
Preucel, R.W., and S.A. Mrozowski. 2010. The new pragmatism. In *Contemporary archaeology in theory: The new pragmatism*, ed. R.W. Preucel and S.A. Mrozowski, 1–49. Oxford: Wiley-Blackwell.
Silverstein, M. 1976. Shifters, linguistic categories, and cultural description. In *Meaning in anthropology*, ed. K. Basso and H. Selby, 11–55. Albuquerque: University of New Mexico Press.
Washburn, D.K. 1977. *A symmetry analysis of Upper Gila Area ceramic design*, Papers of the Peabody Museum 68. Cambridge, MA: Peabody Museum.
Watts, C.M. 2008. On mediation and material agency in the Peircean Semeiotic. In *Material agency: Towards a non-anthropocentric approach*, ed. C. Knappett and L. Malafouris, 187–207. New York: Springer.
Wylie, A. 1982. Epistemological issues raised by a structuralist archaeology. In *Symbolic and structural archaeology*, ed. I. Hodder, 39–46. Cambridge: Cambridge University Press.
Yentsch, A. 1991. The symbolic divisions of pottery: Sex-related attributes of English and Anglo-American household pots. In *The archaeology of inequality*, ed. R.H. McGuire and R. Paynter, 192–230. Oxford: Blackwell.

Sensory Archaeology

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Introduction: Senses as Material and Discursive Construction

We are embodied beings and thus we come into contact with the materialities of the world through our bodies and our senses. The senses represent the most fundamental domain of our engagement with the world, the means by which all values and practices are performed. Even our memories are created and activated through our sensorial relationship with the material world. Without our senses we would lose our ability to affect and be affected by the world and by other bodies, because the senses set in motion assemblages of bodies through lights, sounds, colors, textures, moods, temperatures, odors, emotions, tastes, and narratives, and without the senses the affective flows that move these set, which Deleuze (1984) calls the assemblage, would cease to exist (Pellini 2018).

In the same time, we need to consider that the perceptual reality, that is, what a body perceives, is not something external to the body, a fixed and preexisting reality, but it is something that emerges from our material and discursive engagement in each different situation of daily life. The reality of what is perceptible is not in the promulgation of perception but in its actualization. As Hammarstrom (2015, p. 176) would say, "a measure does not measure something non-existent in existence but actualizes one of the possibilities of the perceptible."

The sensorial perception is a process involving human and nonhuman, matter and discourse, subjects and objects in a relationship of mutual constitution. We cannot say that the senses only pertain to humans and that only humans could feel and perceive. Existence is not an individual affair (Barad 2007, p. ix). Sensing, is not an individual nor exclusively human affair, but it is a

process enacted by a material-discursive practices, where to make sense through the senses is to consider the distribution of the senses among all the elements of a relationship. Hayward (2017) proposes to think that sensations are relational processes distributed among the entities present in a relation, that is, sensations are formed by the convergence force of perceiving, feeling, affecting, and being affected. The author named this process of *ciliated sensuousness.* The senses cannot be reduced to a mechanical or biological phenomenon or even to a social construction. The senses are neither subject nor object, but a relational ontology that brings meanings, memories, bodies, materialities, and discourses together during a relationship. Likewise, the human and nonhuman, subject and object, sense and making sense are not independent entities separated by clear cut boundaries but entangled phenomena whose ongoing intra-actions produce an endless series of local and contingent configurations of reality (Mcnay 2016).

As a material and discursive practice, the senses cannot be thought without the affects, the memories, the corporal practices, the education, discourses, and narratives. Different relationships imply different reconfigurations of this set. As Labanyi (2010) shows us, the materiality of experience is ever changing, since the human sensorium is always updating itself and what is experienced as experience is always variable.

Definition: An Archaeology with Senses

Despite our senses' importance in our lives, archaeology has generally given little attention to them. This is, first, because the senses are recognized only as physiological tools and not as material-discursive practices subject to cultural influences. Secondly, even among those who recognize the importance of culture in the senses, many believe that they are too ephemeral to be analyzed scientifically. However, this is not the case, for, since sensory experience is material, it requires materiality in order to be activated and thus to work with the materialities is to work with the senses. Thirdly, archaeology remains a scientific discipline that privileges vision as an instrument of analysis. Much of archaeology takes the form of a testimony of appropriation where testimony implies more than looking. It means establishing a psychological relationship where the observer is superior to the object of observation. The directionality of observation is from us to them. Fourthly, archaeology, born within the Western colonial and modernist project, communes and perpetuates a distant form of relating to the materialities of the world. As a result, we end up excluding other possibilities and ways of apprehending the world other than those based on the Western Aristotelian model. Worse, by focusing only on vision as the only legitimate way of relating to the world, we are assuming that those we want to analyze share the same sensory model as ours, and we are thus categorically discounting the possibility that the other's world may be different. *This practice limits our understanding of the past.* Take, for example, the case of the Desana of Colombia, who differentiate their baskets according to the odor of the straw they are made of. According to Reichel-Dolmatoff (1985), among the Desana, besides their utilitarian character, baskets have a symbolic value that is directly associated with the odor and texture of the raw materials used for their preparation, since the odors and textures of the different fibers used in these objects' creation make direct reference to Desana mythology. In a traditional, vision-centered archaeological approach, the classification of Desana baskets is likely to be based on visual indices such as shape, decoration and style. Such a system would have no meaning among the Desana, simply because they, unlike us, do not order their world through visual forms but based on odorous manifestations. In this way, what is the point of ordering all Desana baskets according to sizes, shapes, colors, and designs if what matters to them is the raw material's smell?

In this context, the proposal of Archaeology of Senses is not to demonize vision, much less to elevate the position of minor senses into dominant ones, but to investigate the way in which meanings are invested and conceived through the senses. Archaeology of Senses seeks to

understand how people produce their subjectivity, their collective identity, their experiences, their daily routines, and how they built their own history through the sensory and affective experience of matter, animate and inanimate beings, humans, and plants (Hamilakis 2012).

Current Debates: Archaeology and the Senses

In general, the Archaeology of the Senses usually focuses only on the five Aristotelian senses, and the vision is the most explored sense both in practice and archaeological interpretation. The visual aspects have been explored, for example, in the significance of colors and visibility profiles. For Whitley et al. (1999), the sensorial qualities of raw materials must be considered together with their technological characteristics. In one of their examples, the authors discuss how the quartz glow was an important tangible aspect in the choice of raw material for some societies. Jones and MacGregor (2002) have suggested that the use of rocks of different lithologies and coloring in the construction of the passageways of Mesolithic Irish tombs created a colored structure that interfered in the direction and conduction of the natural light inside the monuments; the authors conclude that the interrelationship between light, color, and specific lithologies could suggest performances associated with cosmological significance.

Pursell (2013), on the Shiloh Mounds, has shown how the use of sediments of different shades, mainly white and red, in certain areas of the mounds during the construction process acts to modify what he calls the theatrical experience of space. According to the author, many southeastern Native Americans characteristically split their ideological and their social realities into the dichotomous categories of red and white, which may be thought of as symbols of a suite of related concepts including clan and animal symbolism, tied to various personal or social attributes.

Working with the polished axe exchange system in the Neolithic period in Ireland, Cooney (2002) concluded that the polishing of axes had a function of highlighting the color of the axes, since rocks of different stains indicated specific production sites. In this sense, the coloring of the axes functioned as an index of social identity.

From the analysis of artifacts discovered at the medieval site of Sutton Hoo in England, Williams (2011) has worked with the idea of mnemonic art agency. An interesting aspect of the artifacts identified during the excavations is that most objects are decorated with eyes or take the form of eyes. The author believes that this is a clear reference to the Norse myths, especially Odin and the idea of clairvoyance.

Working with rupestrian sites in Ontario, Canada, and art sites in New Zealand, Allen et al. (2013) suggest that the tremulous reflection of water under certain walls is an effect that may have attracted prehistoric groups to use these rocks to express their iconography. Although the authors acknowledge that further investigation is needed, they suggest that there appears to be a correlation in both Ontario and New Zealand between the shimmering and the presence of paintings in nearby waterways.

Villegas and Martinón-Torres (2012), working with the votive objects of the Muisca, demonstrated how the choice of offerings was directly linked to the sensory aspects of artifact fabrication. While the majority of pre-Columbian groups generally emphasize objects made of metal, the brilliance of artifacts, color, and other sensory aspects, the Muisca value the constitution of objects – their essence, not their appearance. While we Westerners, before displaying an object in a museum, clean it, polish it, and make it shine, among the Muisca the objects are left dirty and unpolished. What is most important to the Muisca is what the object contains, that is, the alloys and the wax coming from the manufacturing process, and not necessarily what it looks like.

In relation to hearing, a number of archaeologists have explored the idea of soundscapes. In an attempt to explore new meanings for the landscape, Scarre and Lawson (2006) worked with the recreation of the ceremonial sounds of the Bronze Age. Similarly, Loose (2008) explored the sounds of screams and bells in ancient rituals.

According to King and Santiago (2011), in ancient Mexico the sensorial involvements in the form of oratory, music, and performance were the main components of the festivals sponsored by the state and the elite. Working with the Rio Viejo sites in the city of Oxaca, the authors argue that sound production created a sound landscape that was shared by all members of the community.

Boivin et al. (2007) have also explored the idea of soundscape. In studying the Sanganakallu-Kupgal region, they identified a series of sonic-capable lithologies that functioned as a kind of gong echoing throughout the region. The "gong" rocks generally support each other, being free of the ground and able to reverberate. Hitting in different places with different rocks produces a wide variety of tones. The authors suggest the idea that the valley, where the studied sites are located, formed a kind of auditorium that amplified the sound in specific points of the landscape.

The Litho-acoustic Project of the University of Cambridge is another good example of how sounds and hearing can work in archaeology. By conducting experimental studies, it has been hypothesized that hunters and gatherers could have used tools and even the process of carving stone to produce sound (Cross et al. 2002).

Odor has been one of the least studied sensory aspects in archaeology. In *L'intelligence d'un Sens: Odeurs Miraculeuses et Odorat dans l'Occident du haut Moyen Âge* (2009), Roch explores the use and meanings of odors in medieval Christianity, suggesting that odors played a central role in the relationship between the mundane and the spiritual worlds. According to the author, finding an odor was evidence of the material presence of something. The odors in medieval Christianity carried a social meaning that determined the concepts of divinity, holiness, God, the individual, etc.

According to Brazinsky and Fryxell (2013), Christian relics of the medieval period share several material characteristics that may have contributed to their unique scents. Bottles and ampoules were produced near various holy sites to serve as portable vessels for sanctification. Many of these relics were used not only to contain the sacred liquids but also as personal ornaments. In addition, ointment containers were used to produce a specific sweet smell in the tombs of saints which created a direct association between odors and holiness due to the use of incense and candles.

With regards to taste, there is an understanding that the study of it, far from being a peripheral aspect of our understanding of culture, can indeed provide a new way of studying social life. Sutton (2011) proposes a gustative analysis where taste is placed in a context in which it refers to the lives of the people, mainly with regard to the formation of identities.

In relation to touch, we must first remember that it cannot be reduced to just the touch of the hands, for touch is a complex sensation that involves the whole body. According to Tringham (1991), when we think about the tactile experience of the past in terms of movement and contact, we have to think of materials that may have made contact with the body, including tool surfaces and surfaces that act as intermediaries between the skin and the outside world or material, such as clothing, handbags, sheaths, and handles. The other important aspect in dealing with touch, according to the author, comprises the kinetics of contact, which includes pressure, variable force, direction, velocity, and friction between two inanimate materials and between the inanimate material and the human actor.

Cummings (2002), also working with touch, discussed how some European stone circles and megaliths were constructed on the basis of tactile aspects. In Bargrennan in southwestern Scotland, for example, a stone chamber has different lithologies on the walls of its inner part to guide the movement of people, given the restriction of light inside the monument.

The South American Way

Although South American archaeology remains closed and mostly culture-historical, works that attempt to discuss the senses from the bias of material culture have grown exponentially. One of the pioneers of this field, at a moment when there was no mention of an archaeology of the senses, was Tania Andrade Lima. She worked

with the odors of the city of Rio de Janeiro in the nineteenth century in the identification of laxative substances and clysters (Lima 1996). For the author, the abundant presence of these materials in domestic dumps suggested a scenario where the body and the senses were being disciplined.

Melisa Salerno is another scholar who has dedicated herself to the work of sensory archaeology for a long time. Recently, the author, with Andrés Zarankin and myself, edited two books on the subject. The first, published in 2015, is called *Coming to Senses: Topics in Sensory Archaeology*. The book is the result of papers presented at the Symposium on Sensory Archaeology, which we coordinated at the 2013 World Archaeological Congress in Jordan. The second book, *Undisciplined Senses*, is the result of the discussions on archaeology and the senses during the Theoretical Archaeology Congress of South America (TAAS) that took place in Chile in 2014. Apart from the two books, the author has a long tradition in the themes involving the senses and the body in general. The author discussed the contexts of repressive regimes in Argentina and those associated with the occupation of Antarctica (Salerno 2011, 2015). In the latest, in analyzing the shoes identified during the archaeological excavations in the South Shetland Islands, she identified two different types of footwear: one long boot type and the other short. The long shoes had leather soles and showed a better quality of materials and finishing, which indicates that they were more expensive. By contrast, the short footwear had wooden soles covered with leather and a lower quality finish, resulting in footwear of lower cost and more connected to the working classes. According to the author, by hindering the movement of the ankle, boot-like footwear results in wider steps with the legs well stretched. For Salerno, such a way of walking is associated with the supposed elegance and pride of those in power. In the case of the short shoes, the author shows that the leather covering of the wooden sole is a clear indication of the lower quality of these shoes, since they tried to imitate the shoes with leather soles. In these low-cost shoes, the wooden sole prevented the correct flexibility of the feet, and this resulted in an awkward, unsafe, and unsightly type of walk.

Jimena Cruz, also working on the Antarctic seal hunter groups during the eighteenth and nineteenth centuries in her 2014 master's dissertation in the graduate program in Anthropology at the Federal University of Minas Gerais, discussed how foods can be thought of as elements of identification of different social behaviors. She shows us that there was a great difference between the food made on the boats during the voyages and the meals provided at the ground hunting camps. In the boat, the food consisted mainly of canned goods acquired in the ports through which the ship passed. Once on land in the hunting camps, the food was mostly made with local items. At the same time, the author shows us that the differences were not only related to the type of food but also to social behavior, since while there was a certain hierarchy on the ship, with the highest posts receiving better quality food, in the ground camps there was greater equality among the people.

Marschoff (2007) also focuses his research on food, but with a different bias. His work discusses both food and cooking as mnemonic elements in order to show how individual collective subjectivities come into play in social practices. He discusses how memory is tied to both taste and cooking, since anyone who teaches a recipe has to invade the memories of others. At the same time, the author shows us how taste is used as an element of remembrance.

Kolar (2013) studied the monuments of the ceremonial center of Chavin de Huantar in Peru in order to establish, through the experimentation of musical instruments recreated from archaeological and ethnographic contexts, a relation between space and the transmission of acoustic properties, as in the case of *pututus* trumpets made of shell. The first results point to a strong acoustic correlation between the central square of Chavin de Huantar and a monolith located inside the temple of the ceremonial center.

The work of Andrés Troncoso is another good example of the application of sensory archaeology in South America. Working with rock art from

northern Chile, he compares the paintings of hunter-gatherers with the petroglyphs of agricultural communities. According to Troncoso and Armstrong (2017), the production and consumption of rock art is historically contingent and thus the differences between these two types of art are not only a difference of technique but a difference linked to the ways of conceiving and experiencing art in the body. According to the author, paintings associated with hunter-gatherer groups are usually found in living areas, which means that the experience of art is daily and communal. At the same time, he points out that the use of pigments derived from various local minerals shows a deep knowledge of the landscape. This creates a bond between the painting and the landscape that integrates the art with its surroundings. Pigments in Troncoso's work can be seen as agents in their own right. They can be thought of as acting as the animation of rocks and supports. Art in this sense acts as an animated medium through the use of pigments. Troncoso considers the act of painting under the rock a bodily act, which involves not only sight but also and above all touch.

Alexandre Herrera (2007), working with *pututus* and *kepas* (aerophones made of shell), has discussed the creation of sound landscapes in the Andean highlands and their importance in the constitution of a sense of place. Usually associated with public festivals and rituals, the aerophones, with their loud sound sometimes reminiscent of thunder, created an ambience that generated intense mnemonic processes.

Andrés Zarankin is another author with a long tradition in working with the body and the senses. His work on the structures of visual control of regimes of repression in Argentina with his *Walls that Domesticate* (2002) discusses the use of the panopticon by the dictatorship as a form of control of so-called subversives.

In this South American scenario, an important initiative for the development of sensory studies within archaeology was the creation of the Laboratory of Sensory Archaeology at the Federal University of Minas Gerais in Brazil. Created in 2013, the LAS already has seven researchers and a number of undergraduate and graduate students in archaeology. Among the topics are rock art, with the discussion of the sensorial aspects associated with the apprehension and production of their iconography; sensory aspects associated with the implantation of prehistoric and historical sites within the landscape; analysis of the sensory properties of objects; social discrimination; religion; artifacts and musical landscapes; memory; and color.

The Future: An Archaeology of Senses and Affects?

By working with the senses, we approach the possibility of breaking with the political and ideological continuum that has colonized us and forced us to perpetuate specific sense-racial hierarchies, discourses of power and worldviews (Ouzman 2005). For Hamilakis (2012), perhaps the main potential of Sensory Archaeology is its ability to reshape the field of Archaeology, freeing the discipline and archaeologists themselves from their modernist and ocular-centric currents by adopting a multisensory and mnemonic practice. We need to un-discipline our senses, rethink our scientific practice and our role as producers of truths. It is no longer enough to recognize that the hegemonic scientific discourse colonizes, violates, and shapes our lives. It is not enough to understand that we cannot treat other people's worldviews as something smaller and exotic, a deviation from Western and scientific ontologies. It is not enough to recognize that we need to think of a different archaeology, an archaeology that is in essence relational and post-human. We need to stop talking and start changing. But how to act if most of the time we do not provide an account of how we reproduce hegemonic discourses?

In this way, our first step would be to decolonize the senses, because this is the only way we can break up with the modernist hegemonic structures that determine the senses as purely human, formal, and apolitical elements. According to Mignolo (2013), only the decolonization of normative sensorial models can allow us to awaken from the situations of shock and anesthesia to which we are submitted in our everyday lives. For Mignolo, to decolonize our senses is a

movement toward a democratic future that goes beyond the concept of democracy in the West. We must recover our critical capacities and understand that our senses are educated within an aesthetics that violates, segregates, and discriminates. We need to understand that our perception has been naturalized and that the sensing and making senses is not a human capacity. We do not question why we only trust vision as a source of truth. We do not question why we do not touch objects or people. We do not question why we like certain scents and dislike others. Everything appears very natural. The problem is that it also seems natural for us to think that if the body smells good, then it is naturally clean.

We need to free our senses because this ultimately means decolonizing the modernist, postmodernist, and multiculturalist logics governing archaeology today. Decolonized aesthetics is a tool to confront a world crowded with the situations of shock, anesthesia, merchandising, and information that invade our lives and confine our creative and imaginative potential. In this way, to think of an archaeology with senses is not only to use the senses as a tool of analysis for past and present societies or to see how societies conceive their world, identity, histories, and memories through the sensorial experience of matter, but to consider the sensorial, affective, and emotional relations that we have with the world around us. We need to change not just as scientists – we need to change as human beings.

References

Allen, W., G. O'Regan, P. Fletcher, and R. Noganosh. 2013. Dibéwagendamowin/Kãrohirohi: Reflections on sacred images on the rocks. In *Making senses of the past: Toward a sensory archaeology*, Center for archaeological investigations occasional paper no. 40, ed. J. Day, 32–48. Carbondale: Southern Illinois University.

Barad, K. 2007. *Meeting the universe halfway. Quantum physics and the entanglement of matter and meaning*. Durham: Duke University Press.

Boivin, N., A. Brumm, H. Lewis, D. Robinson, and R. Korisettar. 2007. Sensual, material, and technological understanding: Exploring prehistoric soundscapes in South India. *Journal of the Royal Anthropological Institute* 13: 267–294.

Brazinsky, P., and A. Fryxell. 2013. The smell of relics: Authenticating saintly bones and the role of scent in the sensory experience of medieval Christian veneration. *Papers from the Institute of Archaeology* 23 (1): 1–15.

Cooney, G. 2002. So many shades of rock: Colour symbolism and Irish stone Axeheads. In *Colouring the past. The significance of colour in archaeological research*, ed. A. Jones and G. Macgregor, 93–108. Oxford: Berg.

Cross, I., E. Zubrow, and F. Cowan. 2002. Musical behaviours and the archaeological record: A preliminary study. In *Experimental archaeology: British archaeological reports international series 1035*, ed. J. Mathieu, 25–34. Oxford: Archaeopress.

Cummings, V. 2002. Experiencing texture and transformation in the British Neolithic. *Oxford Journal of Archaeology* 21 (3): 249–261.

Deleuze, G. 1984. *A thousand plateaus: Capitalism and schizophrenia*. Minneapolis: University of Minnesota Press.

Hamilakis, Y. 2012. Afterword: Eleven theses on the archaeology of the senses. In *Making senses of the past: Toward a sensory archaeology*, Center for archaeological investigations, occasional paper no. 40, ed. J. DAY, 409–419. Illinois: Southern Illinois University Press.

Hammarstrom, M. 2015. On the concepts of trans-action and intra-action. In *Action, belief and inquiry – Pragmatist perspectives on science, society and religion*, Nordic studies in pragmatism 3, ed. Ulf Zackariasson, 174–186. Helsinki: Nordic Pragmatism Network.

Hayward, E. 2017. *Ciliated senses.* https://drum.lib.umd.edu/bitstream/handle/1903/11833/Ciliated%20Sense.htm?sequence=1

Herrera, A. 2007. Social landscapes and community identity. The social organization of space in the North–Central Andes of Peru. In *Defining social complexity. Approaches to power and interaction in the archaeological record*, ed. S. Kohring and S. Wynne Jones, 161–185. Oxford: Oxbow.

Jones, A., and G. Macgregor. 2002. *Colouring the past. The significance of colour in archaeological research*. Oxford: Berg.

King, S., and G. Santiago. 2011. Soundscapes of the everyday in ancient Oaxaca, Mexico. *Archaeologies* 7 (2): 387–422.

Kolar, M. 2013. *Archaeological Psychoacoustics at Chavín de Huántar*. Perú. PhD thesis. Stanford, Stanford Interdisciplinary Fellow.

Labanyi, J. 2010. Doing things: Emotion, affect and materiality. *Journal of Spanish Cultural Studies* 11 (34): 223–233.

Lima, T. 1996. Humores e Odores: Ordem Corporal e Ordem Social no Rio de Janeiro, século XIX. *História Ciência e Saúde* 2 (3): 44–94.

Loose, R. 2008. Tse'Biinaholts'a Yalti (curved rock that speaks). *Time and Mind* 1 (1): 31–50.

Marschoff, M. 2007. La alimentación española del XVI al XIX: una perspectiva desde los sentidos. In *II Jornadas de Interdisciplina "Fuentes e interdisciplina"*, 67–75. Editorial DunKen: Imhicihu–Conicet.

Mcnay, L. 2016. Agency. In *The oxford handbook of feminist theory*, ed. L. Disch and M. Hawkesworth, 39–60. Oxford: Oxford University Press.
Mignolo, W. 2013. Geopolitics of sensing and knowing on (de)coloniality, border thinking, and epistemic disobedience. *Confero* 1(1): 129–150. http://eipcp.net/transversal/0112/mignolo/en/print
Ouzman, S. 2005. Prose has its cons. Seeing beyond material culture as text. Paper presented to the *congress seeing the past: Building knowledge of the past and present through acts of seeing*. Stanford Archaeology Centre, Stanford University, 5–6 Feb 2005.
Pellini, J. 2018. *Senses, affects and archaeology. Changing the minds, the Heatrh and the pants*. London: Cambridge Scholars.
Pursell, C. 2013. Colored monuments and sensory theater among the Mississippians. In *Making senses of the past: Toward a sensory archaeology*, Center for archaeological investigations occasional paper no. 40, ed. J. Day, 69–89. Carbondale: Southern Illinois University.
Reichel-Dolmatoff, G. 1985. *Basketry as metaphor: Arts and crafts of the Desana Indians of the Northwest Amazon*. Los Angeles: Museum of Cultural History, University of California.
Salerno, M. 2011. *Persona y cuerpo–vestido en la modernidad: Un enfoque arqueológico*. PhD thesis in archaeology. Facultad de Filosofía y Letras, Universidad de Buenos Aires. Manuscript on file.
Salerno, M. 2015. Sealers Were not Born but Made. Sensory-motor Habits, Subjectivities and 19th-century Voyages to the South Shetland Islands. In *Coming to Senses. Topics in Sensorial Archaeology*, ed. J. Pellini, M. Salerno and A. Zarankin. Cambridge: Cambridge Schoolars Publisher
Scarre, C., and G. Lawson. 2006. *Archaeoacoustics*. Cambridge: MacDonald Institute for Archaeological Research.
Sutton, D. 2011. Memory as a sense: A Gustemological approach. *Food, Culture and Society* 14 (4): 468–475.
Tringham, R. 1991. Households with faces: The challenge of gender in prehistoric architectural remains. In *Engendering archaeology: Women and prehistory*, ed. J. Gero and M. Conkey, 93–131. Oxford: Basil Blackwell.
Troncoso, A., and F. Armstrong. 2017. Ontología, Historia y la Experiencia del Arte Rupestre en el Centro–norte de Chile. In *Sentidos Indisciplinados. Arqueología, sensorialidad y Narrativas alternativas*, ed. J. Pellini, A. Zarankin, and M. Salerno, 3015–3345. Madri: JAS.
Villegas, M., and M. Martinón-Torres. 2012. Composition, color and context in Muisca votive metalwork (Colombia AD 600–1800). *Antiquity* 86: 772–791.
Whitley, D., R. Dorn, J. Simon, R. Rechtman, and T. Whitley. 1999. Sally's rockshelter and the archaeology of the Vision Quest. *Cambridge Archaeological Journal*, 9: 221–247.
Williams, H. 2011. The sense of being seen: Ocular effects at Sutton Hoo. *Journal of Social Archaeology* 11 (1): 99–121.

Sepphoris, Archaeology of

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Introduction

Sepphoris was a major ancient city located in lower Galilee, in what is today Israel. Most prominent in the Roman era, the city was located about 6 km from Nazareth. Sepphoris became an important commercial and political center in the first century CE, and likely due to this affluent economic status, its residents did not actively take part in the Jewish rebellion that took place from 66 to 70 CE. Ultimately, Sepphoris fell into decline during the Islamic era. In the twentieth century, largely due to its proximity to Nazareth, the childhood home of Jesus, the site attracted the attention of biblical scholars and archaeologists, and many excavations have taken place over the last several decades. Although never actually mentioned in the Bible, scholars have long sought to uncover any possible links that may exist between this ancient city and Jesus. In addition, ancient historians have maintained an interest in Sepphoris because of its prominent status in the Roman world.

Definition

Known in Hebrew as *Tzippori* (from the word "bird"), Sepphoris was a major Roman city located in lower Galilee that thrived from approximately the first century BCE through the seventh century CE. The name *Tzippori* is a reference to the city's prominent location perched upon the top of a hill (286 m above sea level) in the Beit Netofa Valley (Batey 2001). The city's location was also strategic due to the fact that it sat at the intersection of two major roads. Little is known of the city's early history prior to its rise to prominence in the first century BCE, although it is likely that the city existed much earlier. Archaeological

evidence has been found dating as far back as the Iron Age. This evidence, mainly in the form of pottery fragments, is sparse. Scattered pottery sherds as well as vase fragments and a rhyton date from the Persian era (Chancey 2001). However, no firm architectural evidence has survived from this time period. Therefore, the city was likely functional, yet still small, during the Persian era. During the Hasmonean era, around 104 BCE, the historian Josephus notes that the city was attacked by an invading Cyprian king, Ptolemy Lathyrus (*Ant*. 13.338). This, in fact, is the first historical reference to Sepphoris by Josephus, and from this point on, the city is mentioned frequently in his histories. This suggests that Sepphoris was probably an established city by the first century BCE. However, it is only with Rome's ascension to power that Sepphoris rose to its greatest heights.

Several years after the Roman takeover of Palestine at the hands of Pompey, around 55 BCE, Sepphoris was elevated to the status of council seat (for the Sanhedrin) after a visit by the proconsul in Syria, Gabinius (*Ant*. 14.91). By this time, the city was probably largely Jewish and would remain so for the duration of its existence. There is no evidence to suggest a strong Roman presence within the government and everyday affairs of Sepphoris (Chancey 2001). Herod the Great retained the city during his reign (beginning in 37 BCE) until his death in 4 BCE. Upon his death, Jewish nationalists in Sepphoris revolted against the Romans, resulting in a legion being sent in to subdue the city (*Ant*. 17.271). Much of the city was destroyed as a result of the riots. Out of the ashes came a renewal effort instigated by Herod's son, Antipas. Hence, Sepphoris became a fortified, cosmopolitan Herodian city, and Antipas made it his capital until Tiberias replaced it some 20 years later. The city was rebuilt in a typical Roman grid fashion, with a main east–west street (*decumanus*) intersecting with a main north–south one (*cardo*).

During this period of growth and fortification, Josephus refers to Sepphoris as the "ornament of Galilee" (*Ant*. 18.27). It has been suggested that this phrase was only used when referencing strongly fortified and secure cities (Miller 1984). In the latter twentieth century, many facets of the ancient Roman city were uncovered, including a paved road system, a first-century villa, an aqueduct, cisterns, two marketplaces, a cemetery, and a theater. Population estimates for first-century Sepphoris range anywhere from about 10,000 to 25,000. Surveys conducted in the early twenty-first century suggest that several small "satellite" settlements may have sprung up near Sepphoris during the Roman and Byzantine eras, which indicate that the city's robust economy spurred the creation of small support villages nearby (Dark 2008).

During the Jewish revolt of 66–70 CE, most residents of Sepphoris, although mostly Jews themselves, chose a pacifist stance and did not fight against the Romans (*War* 2.574). Archaeologically, the most significant finds from this period are probably the pro-pacifist Roman coins, which date from the year 68 CE. The coins, minted in Sepphoris, were meant to honor the emperors Nero and Vespasian. Most noteworthy, however, was the inclusion of the Greek inscription "City of Peace" (Reed 2000). Also relevant is the fact that none of these coins exhibit a portrait of the emperor, suggesting a willingness to adhere to Jewish tradition, which forbids human images on coins.

Following the revolt, and despite Rome's victory, Sepphoris became a vital center of Jewish learning, as rabbinic texts indicate. The most famous Jewish tradition linked to Sepphoris was the belief that the Mishnah was recorded in the city by Judah Ha-Nasi early in the third century CE. Archaeological remains from the late Roman and early Byzantine periods are plentiful and point to a time of renewed building. This is especially the case in the late first and early second centuries. Revamped water systems, additional roads, an agora, and a Roman bathhouse have all been found, and the city became known in the Roman world as Diocaesarea. Some estimates have placed the size of Sepphoris in the late Roman era at about 35 ha (approximately 86.5 acres).

Yet the population of the city remained mostly Jewish, although Hellenistic and Roman influences may have become more prevalent at this

time, as coins now bearing busts of the emperors indicate (Chancey 2001). In addition, Greek inscriptions have been found at Sepphoris dating from the late Roman and early Byzantine periods, further suggesting the presence of pagan inhabitants. Noteworthy archaeological finds from the Roman period include the discovery of a third-century basilica-like building (70 × 95 m) and a private residence (48 × 23 m) containing exquisite mosaics. The former structure, however, remains somewhat of a mystery regarding its function. The two most popular theories are that it was either part of a marketplace or it was an actual basilica. The latter structure has become known as the house of Dionysus, since many of the mosaics pertain to the life and cult of this Greek god of wine and fertility. Most noteworthy, the house of Dionysus contains a mosaic housing what has become known as the "Mona Lisa of the Galilee." This mosaic, found on the floor of the residence, contains the face of a beautiful, unknown woman. The discovery of the "Mona Lisa" has been called one of the "Ten Most Significant Finds" of the twentieth century by Biblical Archaeology Magazine, although some experts downplay the importance of this assertion (Fig. 1).

Sepphoris itself continued to thrive into the Byzantine era, despite earthquakes and periodic revolts. Remains of a fifth- to seventh-century synagogue have been found, containing a floor mosaic complete with a picture of the Zodiac. By this time, it was not unusual to find traces of Hellenistic influence in Jewish buildings, even synagogues. In addition, the remains of two churches have been uncovered on either side of the *cardo*. Christianity likely gained a foothold in Sepphoris by the fifth century (Miller 1984). In recent years, a second-century pagan temple has been found, suggesting that Jews, Christians, and pagans eventually inhabited the city together until the Muslim era. The most noteworthy structure found dating from the Byzantine era may be the Nile Festival building, located east of the *cardo*. The mosaic found inside the building, known as the Nile Mosaic, is one of the most famous features of the archaeological site (Fig. 2).

After the seventh century, Sepphoris declined as a city, due to many factors, including natural disasters and wars (Ward 2001). The city became known after its Arabian conquest as *Saffuriyya*. During the Crusader era, when Christians briefly inhabited the city, a watchtower was erected on the hill, which is still visible today. Ultimately, the city was under Muslim rule until the modern era. Worth noting is the fact that although in a state of decline, Sepphoris may be the only site in Galilee that was occupied from the Hasmonean era to 1948 (J. Strange *pers. comm.*, February 2012) (Fig. 3).

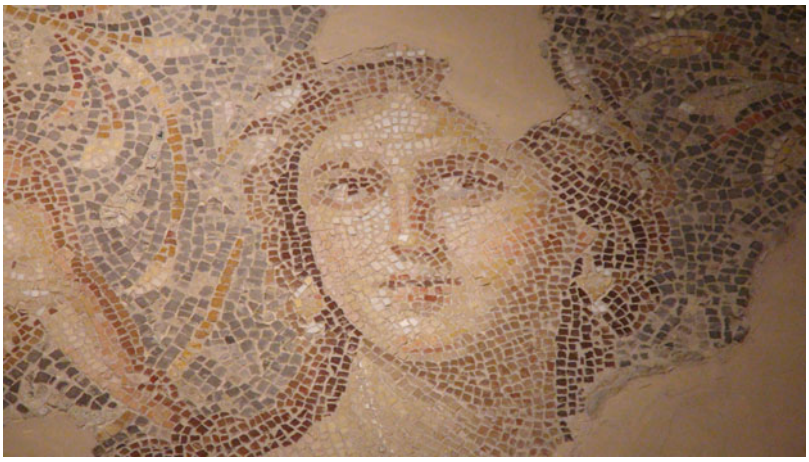

Sepphoris, Archaeology of, Fig. 1 Mona Lisa of the Galilee at Sepphoris

Sepphoris, Archaeology of, Fig. 2 Synagogue floor (with zodiac) at Sepphoris

Sepphoris, Archaeology of, Fig. 3 Looking across the archaeological site of Sepphoris

Key Issues/Current Debates

The earliest major archaeological excavation of Sepphoris was undertaken in 1931 by Leroy Waterman from the University of Michigan, who was looking for a link between the city and Jesus. Virtually no additional excavations were undertaken until 1983, when James Strange (University of Southern Florida) renewed the efforts. In 1985, a joint team from Duke University and the Hebrew University of Jerusalem under the direction of Eric Meyers and Ehud Netzer, respectively, began excavating the site. Since the 1980s, work at Sepphoris has continued. In the twenty-first century, a team from the Institute for Archaeology at the Hebrew University of Jerusalem under Zeev Weiss continues to dig and provide field reports from the site. Other universities also still excavate at

Sepphoris. Some tombs from rabbis have recently been found, mostly northwest of the center of the site (J. Strange *pers. comm*., February 2012).

Although never mentioned in either the Old or New Testaments, Sepphoris remains a relevant site for biblical scholars, historians, and archaeologists. Due to its proximity to the city of Nazareth, where Jesus lived for a time (6 km), Sepphoris has been studied with an eye toward the Bible. Most noteworthy, biblical scholars have debated the cultural and religious composition of the city. In particular, the conflict centered upon whether Sepphoris contained a Jewish, pagan, or mixed population in the early Roman era. Initially, claims were made that Sepphoris was a largely Hellenistic city that attracted the attention of Greek philosophers (Downing 1987). Others argued that the city was almost entirely Jewish. However, it is possible that Greco-Roman culture was not in itself incompatible with Jewish life and practice (Reed 2000). In other words, some aspects of pagan culture (i.e., artwork, decorations) could coexist side by side within a population that still adhered to the Jewish faith. Jews would have considered them to be ornamental only and not a threat to the faith itself. Yet the debate concerning the religious nature of Sepphoris continued throughout the late twentieth century (Fig. 2).

At the dawn of the twenty-first century, the controversy seemed to peak over the issue of whether stepped pools (discovered on the western summit) were bathing pools or Jewish ritual baths (Heb. *mikva'ot*). A general scholarly consensus affirmed that they were indeed ritual baths (Meyers 2000; Chancey 2001). Additional archaeological evidence found at Sepphoris, including a lack of pig bones and the discovery of limestone vessels, has resulted in a predominating view that the city was primarily Jewish during the Roman era. James Strange believes that Sepphoris was almost 100% Jewish, at least until the second century CE (J. Strange *pers. comm*., February 2012).

One other archaeological feature is still being debated by scholars. A 4,500 seat theater was uncovered on the northern slope of the acropolis, and a controversy has emerged over the date of its construction. It has been suggested that those attempting to link Sepphoris to the historical Jesus are biased toward an early first century date. However, other scholars refute this claim, dating the theater instead to the late first or the early second century (Charlesworth 2003). Such debates have served to keep Sepphoris at the forefront of archaeological dialogue today, and the city continues to remain a relevant site for historians and biblical scholars.

References

Batey, R.A. 2001. Sepphoris and the Jesus movement. *New Testament Studies* 46: 402–409.

Chancey, M. 2001. The cultural milieu of ancient Sepphoris. *New Testament Studies* 47: 127–145.

Charlesworth, J.H. 2003. Jesus research and Near Eastern archaeology: Reflections on recent developments. In *Neotestamentica et Philonica. Studiesin honor of Peder Borgen*, ed. D.E. Aune, T. Seland, and J.H. Ulrichsen, 37–72. Leiden: Brill.

Dark, K.R. 2008. Roman-period and Byzantine landscapes between Sepphoris and Nazareth. *Palestine Exploration Quarterly* 140: 87–102.

Downing, G. 1987. The social contexts of Jesus the Teacher: Construction or reconstruction. *New Testament Studies* 33: 439–451.

Meyers, E.M. 2000. The pools of Sepphoris: Ritual baths or bathtubs? Yes they are. *Biblical Archaeology Review* 60: 46–49.

Miller, S.S. 1984. *Studies in the history and traditions of Sepphoris*. Leiden: Brill.

Reed, J.L. 2000. *Archaeology and the Galilean Jesus*. Harrisburg: Trinity Press International.

Ward, S. 2001. Muhammad Said: 'You are only a Jew from the Jews of Sepphoris': Allegations of the Jewish ancestry of some Umayyads. *Journal of Near Eastern Studies* 60: 31–42.

Sequence and Date in Field Archaeology

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Introduction

For the field researcher, a primary task is assigning a date and a sequence (order of

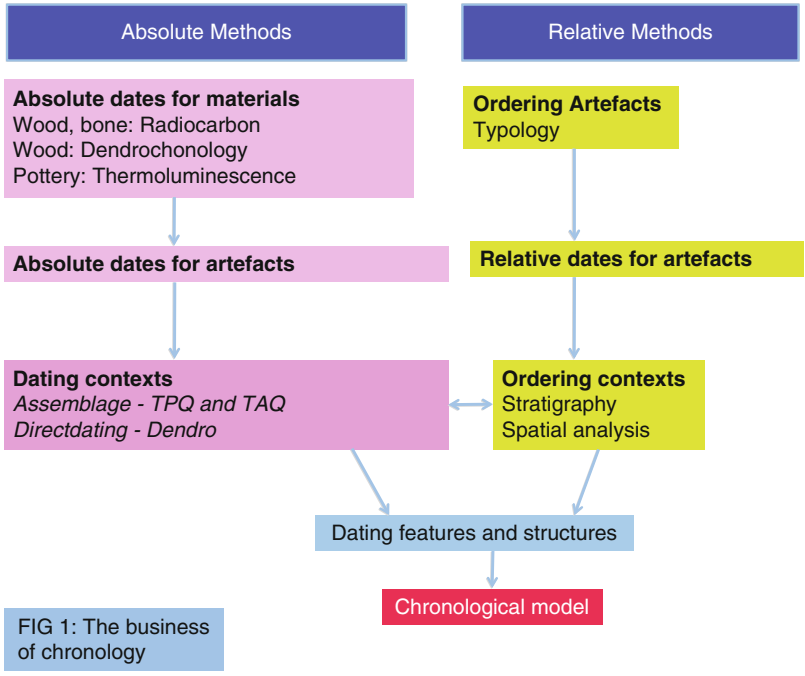

Sequence and Date in Field Archaeology, Fig. 1 The business of chronology (Carver 2009: 267)

occurrence) to the features and structures they record. Occasionally an archaeological site has already been recorded in history, for example, the celebrated urban excavation at Five Points, New York City, exposed a plan of buildings and streets that had appeared on a map in 1855. Even sites mentioned in documentary references seldom offer a date as precise as this, and dated events which might *seem* to refer to an excavated site have to be used with great caution.

In general, very few objects, activities, or structures discovered by fieldwork can be given a precise calendar date, and archaeologists are obliged to build a *chronological model*, which balances all the available information (Fig. 1).

Key Issues

Dating Objects

As applied to objects, the methods at our disposal are *typology*, which offers a *relative dating* for artifacts (e.g., pottery) and structures (e.g., architecture). Typology uses the likely order of manufacture, based on form and style, combined with the dates given elsewhere. For example, pottery, one of the most useful of artifacts since it occurs widely and endures well in the ground, has an enormous range of types. Some periods of manufacture are known from kiln sites, but most are deduced from which types occur together; in this way archaeologists have built up extensive typologies that help to date every kind of site built by pottery users.

Artifacts may also be given an *absolute dating*, by scientifically measuring the *age of materials* they are made from. Well-known examples here include *radiocarbon dating*, which measures the age since the death of a living plant (i.e., wood) or creature (e.g., bone); *dendrochronology*, which measure the age of timber since it was felled, from the numbers and spacing of annual growth rings; *archaeomagnetism*, which measures the age of a hearth since it was heated; and *optically stimulated luminescence* (OSL) which measures the time that has elapsed since a layer of sand was last exposed to sunlight (Hedges 2001). These dates, which have an error range from 1 year (dendro) to 25% or more, indicate when an organism died or a mineral was buried.

Dating Contexts

Absolute and relative dates for artifacts, or groups of artifacts, can be used to date the archaeological layers they are found in – but the relationship is not a simple one. A layer is always deposited later than the latest object found in it, for example, a floor with a coin of 400 CE beneath it must have been laid in 400 CE or later (since the coin must have existed before the floor was laid). This relationship is called a terminus post quem (TPQ). A wall which has a date written on it (say 1929) must have been constructed before 1929. This relationship is called a terminus ante quem (TAQ). However, these equations are by no means always valid or helpful. A coin may be not just earlier, but centuries earlier, than the floor that covers it. A coin within a floor may be *intrusive* and so later than the floor. A coin found on top of a floor may be later than the floor, if dropped on it soon after manufacture and never moved, or much earlier than the floor if carried around for decades in someone's pocket. Similarly a coin or a potsherd found in a foundation trench is usually earlier than the wall in the same trench, but it may also be much earlier since it has been displaced – is residual – from an earlier phase or site. Since we rarely know the circumstances in which a coin was discarded, it is risky to use coins to date structures. They are at least very rarely contemporary. In spite of this, equating the date of a building with the date of the coins found in it remains a widespread practice.

Structures, features, and contexts may also be dated directly – by typology and by scientific dating. Typology may be applied to the shape of hearths or kilns, or the ground plans of houses, comparing them to others found elsewhere and so presuming that they can be assigned to the same culture and date. Absolute dating can sometimes be applied, for example, *dendrochronology* will date the timbers of a timber-framed house (Kuniholm 2001). However, it is frequently found that such a house, in the form it survives, is composed of structural timbers of different dates. Even the earliest of these may have been recycled from another usage – for example, in a ship. *Radiocarbon* dating is applied to carboniferous materials, such as charcoal or bone, but here the association with the deposit is of crucial importance (Taylor 2001). The charcoal in a hearth may represent the date of last burning but only if it derives from twigs or animals. Otherwise the wood may have already have been cut down long before it was burnt (the 'old wood' effect). Similarly the bones in a grave should date the digging of the grave very well, but animal bone

Sequence and Date in Field Archaeology, Fig. 2 A vertical section through consecutive layers at the early monastic site at Portmahomack, Scotland (M. Carver)

may have been disturbed and redeposited and so give a date before, perhaps long before the deposition of the layer in which it was found.

An important method applied by excavators to contexts, features, and structures is stratigraphic ordering. This does not date them but provides a *relative order* for each deposit in the overall sequence. The traditional method of presenting the order of occurrence is the section, which shows the deposition of layers from the side, and is recorded by drawing (Fig. 2), and these may still be valuable even if they only report the sequence in a specific slice through the strata. A more comprehensive method of stratigraphic ordering that applies to the whole site is the stratification diagram – which models the sequence in two dimensions, the earliest contexts at the bottom and the latest at the top (Fig. 3). These have

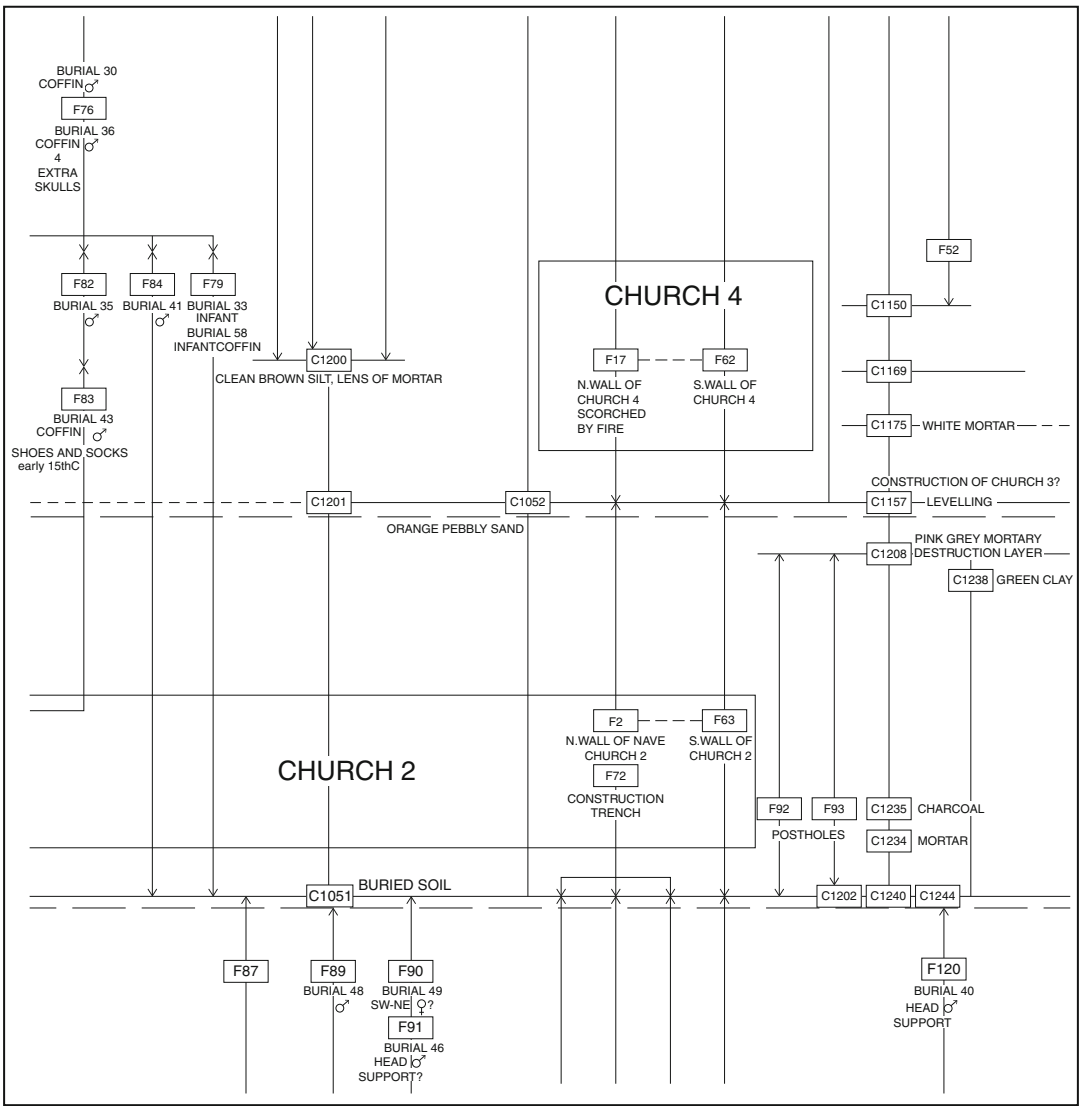

Sequence and Date in Field Archaeology, Fig. 3 Extract from a stratification diagram, showing the sequence of contexts and features at an urban excavation in the Stafford Town, England (Carver 1980: Fig. 51). The features are shown as vertical arrows, locating them in time. Contexts not belonging to features are shown as horizontal lines. This diagram was devised to show the sequence in a deep but poorly stratified deposit

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developed from pioneer examples in the 1970s (e.g., Harris 1989) to more comprehensive models which include features and structures and represent uncertainties in the sequence (Carver 2009: 296). These uncertainties form an important aspect of the modelling process and show where other interpretations are possible.

The stratigraphic ordering of graves containing bone or hearths containing charcoal can be dated with much greater precision by using radiocarbon dating combined with *Bayesian analysis*. The radiocarbon dates give a range of error, but this range is reduced by knowing the order in which deposition occurred. The Bayesian analysis produces shorter ranges of probability for each date (posterior density estimates, Fig. 4). This is giving archaeological sequences of high precision dating back to 20,000 years ago (Buck 2001).

Relative Ordering by Space

The business of establishing a sequence makes also use of *spatial analyses*. For example, a settlement that is spatially coherent (like the grid of a *planned* town) suggests that all the streets and houses were laid out at the same time. Features that are *aligned* are also thought to reflect contemporary use. For example, inhumation graves in a cemetery may have different orientations, but those that are most closely aligned are said to be close to each other in date. Similarly, graves that mimic the orientation of a building are later in date than the building. On the scale of a landscape, alignments are important indicators of sequence. Roads and field boundaries seen from above may indicate a sequence where they "respect" one other. For example, the field boundaries may join up to a preexisting road, or the road may cut straight across the line of the fields, showing it was imposed on a preexisting agricultural landscape.

Modelling

At the scale of a landscape, archaeologists use such spatial mapping as an indication of sequence. It is often possible to apply typology, for example, to infer the likely culture and date of cropmark forms encountered in *aerial investigation*. Similarly, forms recorded in *subsurface survey* are sometimes recognized by virtue of their shape alone: a straight

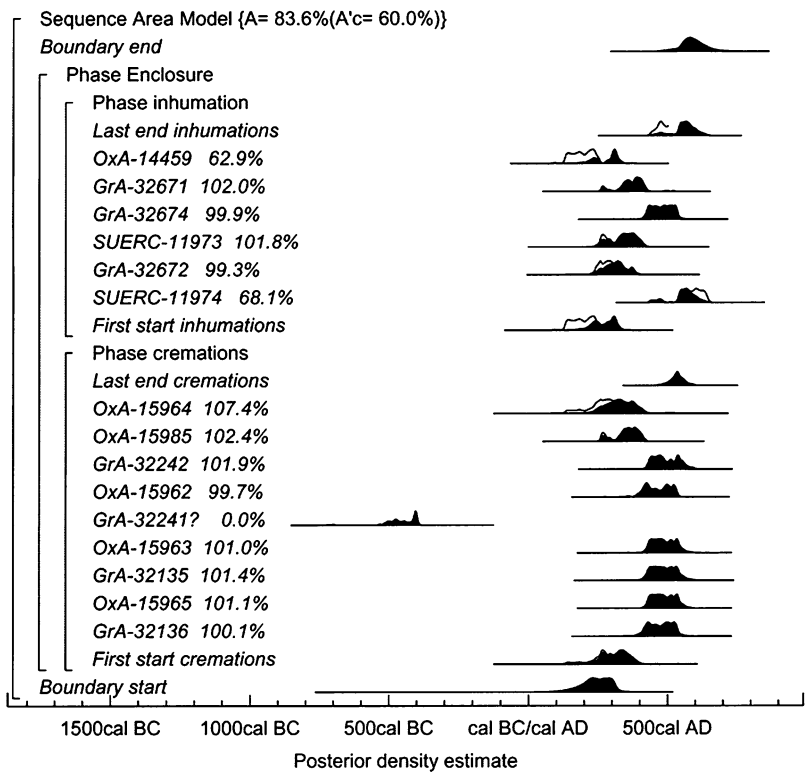

Sequence and Date in Field Archaeology, Fig. 4 A sequence of graves from the Anglo-Saxon cemetery at Wasperton, England, placed in their best order by Bayesian analysis. The outline shows the error range of the calibrated date; the solid black profile is the more precise "posterior density estimates" derived from Bayesian modelling (Carver et al. 2009: Fig. 4.1)

road or a circular ditch or a settlement grid. When using *surface survey* to find sites, archaeologists rely on typologies to provide a broad date for the pottery or stone implements or metal artifacts they are mapping. The distribution of this material provides the location of sites belonging to a particular culture and period.

On excavated sites, stratigraphic ordering provides the surest indication of relative sequence. The alignment of features and structures often give an inference of where these might be contemporary. The broad dates of objects and structures (and the very occasional documentary reference) allow a sequence to be anchored more closely in time. In well-stratified sites, such as towns, the stratigraphic sequence is treated as primary. Poorly stratified sites (the majority) rely more on relative and scientific dating of objects and samples. The method is to examine and record the detailed possible relationships of objects and strata in every case and then to use typology, stratification, spatial analysis, and absolute dating to build up a robust chronological model.

Cross-References

- ▶ Aerial Archaeology
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Methods in Historical Archaeology
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ Recording in Archaeology
- ▶ Spatial Analysis in Field Archaeology
- ▶ Surface Survey: Method and Strategies
- ▶ Urban Archaeology at Five Points

References

Buck, C.E. 2001. Applications of the Bayesian statistical paradigm. In *Handbook of archaeological sciences*, ed. D.R. Brothwell and A.M. Pollard, 695–702. Chichester: Wiley.

Carver, M. 1980. *Medieval Worcester*. Worcester: Worcester Archaeological Society.

Carver, M. 2009. *Archaeological investigation*. London: Taylor & Francis.

Carver, M., C. Hills, and J. Scheschkewitz. 2009. *Wasperton. A Roman, British and Anglo-Saxon community in central England*. Woodbridge: Boydell Press.

Harris, E.C. 1989. *Principles of archaeological stratigraphy*. London: Academic.

Hedges, R.E.M. 2001. Overview – dating in archaeology: Past, present and future. In *Handbook of archaeological sciences*, ed. D.R. Brothwell and A.M. Pollard, 3–8. New York: Wiley.

Kuniholm, P.I. 2001. Dendrochronology and other applications of tree-ring studies in archaeology. In *Handbook of archaeological sciences*, ed. D.R. Brothwell and A.M. Pollard, 35–46. New York: Wiley.

Taylor, R.E. 2001. Radiocarbon dating. In *Handbook of archaeological sciences*, ed. D.R. Brothwell and A.-M. Pollard, 23–34. New York: Wiley.

Serra da Capivara National Park

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Introduction

The Serra da Capivara National Park, which covers 320,000 acres, is located in Northeast Brazil, in Piauí state. The park has a geological border where a large row of vertical walls separates two distinct formations: the plateaus that form a mountain range, and the sedimentary basin of Piauí-Maranhão (Fig. 1).

Its current climate is semi-arid. There is a brief rainy season when large amounts of precipitation produce lush vegetation, and the power of water flowing across the area causes the land to degrade. The rain period is then followed by a dry season, and the local vegetation loses its foilage. However, the climate in the region has not always been as such. Until 9000 years ago or so, when the onset of Holocene climate triggered the current desertification process the region was covered by tropical rainforest.

Definition

The Serra da Capivara National Park houses a dense and diverse collection of prehistoric

Serra da Capivara National Park, Fig. 1 Chapadas, valleys, dendrites, and *cuesta* abysses of the National Park

paintings and petroglyphs produced over the millennia. There are rock art sites are located in different ecosystems within the park, in valleys, and canyons. The rock art is more numerous inside the caves where rockshelters are at different heights from the bottom of the valley to the top of the *chapada*. Opposite to the *cuesta* is a chain of limestone outcrop caves. There appear to be no traces of paintings or engravings inside them other than an occasional isolated motif at their entrances.

Key Issues/Current Debates

Since the 1970s, more than a thousand sites with prehistoric paintings and engravings have been identified in the National Park. The continuous research and conservation work in the Park has allowed for new discoveries of archaeological sites to periodically increase the volume of the graphic collection. Due to the cultural value of its archaeological sites, UNESCO's World Heritage Committee included the Serra da Capivara National Park in the World Heritage List in 1991.

The paintings in the archaeological sites of the National Park are diverse, both thematically and technically, as well as in the way the figures are arranged on the rocky surface. The paintings feature mostly recognizable figures and compositions. In many places it is possible to recognize pictures created at different times, by different human groups.

During an initial organization of the National Park's rock art collection, a preliminary general classification was proposed, based on morphological criteria and on the establishment of a thematic typology guided by techniques and scenography (Guidon 1991). One of the proposed types, designated as *Tradição Nordeste* (Northeast tradition), is dominant in the region's conservation unit and its surroundings. It is composed by figures that are recognizable thanks to the presence of essential

traits for identification, that graphically represent actions or events.

Assorted anthropomorphic, zoomorphic, and phytomorphic figures can also be recognized – and some figures are arranged to represent scenes. The most frequent themes are hunting, dancing, sex, violence, fighting, and scenes depicting rites around a tree (Figs. 2 and 3). The figures address the themes through identifiable postures and gestures. The graphical representation of the action suggests rhythms. Differentiation among grouped figures is made based on the graphic themes and modes of representation used in each situation. The presence of repeated actions performed by human figures in which the represented theme is not recognizable in an emblematic marker that allows characterizing the narrative. Sometimes, the figures display emblematic features similar to conventional signs that reveal encoded information as image attributes (Fig. 4).

The paintings and engravings provide information on the techniques developed and used for its production. The choice of location and the rock characteristics are primary aspects. As seen in a diversity of surviving paintings, there are sites in the National Park that were painted on across millennia by different human groups.

The features of the engraved or painted lines inform us about the types of instruments used to obtain specific graphic effects. These techniques included a range of means, ranging from the body parts– hands and fingers – to instruments made of reeds, cotton, thorns, and stamps made with clay and rubber plant. The paintings also inform us about the composition of paints prepared with pigments and dyes mixed with other elements, thus providing different degrees of robustness. The differences in thickness of the paints enabled the acquisition of distinct textures. Volume effects were also obtained through successive superimposition of paints of different consistencies applied on flat and uniform surface. A broad spectrum of dark hues that created a series of visual effects was obtained by exposing the paints to high temperatures. Physicochemical analyses also revealed the use of saps, blood, and other products of organic origin. High rates of calcium, associated with the presence of painted human bones in graves suggest that the paints' composition also included ground bones. The identification of composition patterns in rock art, allows for the reconstruction of the graphical profiles of the cultural groups to which the authors of these pieces belonged. Such profiles are formed by

Serra da Capivara National Park, Fig. 2 Toca da Extrema – ritual scene around a tree

Serra da Capivara National Park, Fig. 3 Toca Subida da Serrinha I – hunting scene

Serra da Capivara National Park, Fig. 4 Toca do Baixão das Mulheres I – emblematic back to back figure

different and precise graphic attributes, detectable by the way the paintings are done and through the reconstitution of the operative chain of the art production technique. There are numerous components to the graphic profiles, but they appear standardized according to aspects prioritized in each piece of the work. The accuracy of the records outlines these aspects as it singles out differences allowing for the identification of meaningful patterns.

There are indicators of the symbolic theme choices of these human groups. These compositions are recognizable, while the identification of the action theme may not. They are standardized representations of gestures and postures that do not allow for a functional association to an action. Through their frequent repetition, they become emblematic by theme and not necessarily by technique. In the National Park, there is a figure repeated at several sites, composed of two human figures positioned back-to-back. This is present in all stylistic variations through time, suggesting a symbolic value in a cultural horizon (Pessis 2003).

The state of conservation of the paintings depends mainly on the homogeneity of the painted shelter rock and the exposure of the paintings to the

impact of natural agents determined by their positioning on the wall. The National Park covers a geographical area composed mainly by sandstone and conglomerate resulted from the rising of the seabed. The presence of water in the region created a residual surface, which is an amalgam of heterogeneous rock and sediment. Thus, the cortex on the site wall detaches itself more easily, which also suffers the impact of daily atmospheric temperature range.

The paintings of *Tradição Nordeste* (Northeast tradition) are scattered throughout all Northeastern Brazil. Chronologies obtained in archaeological excavations as well as the density of the figures indicate that paintings of this tradition have its origin in the area now known as Serra da Capivara National Park. Between the region of Seridó Potiguar (RN) and the Serra da Capivara (PI), there are sets of paintings with features similar to those of Serra da Capivara. A case of dispersion stands out in the region of Seridó Potiguar (RN) where there are a multiple archaeological sites with paintings of belonging to *Tradição Nordeste* (Martin 2008). Such paintings have specific themes and scenography that suggest a different graphic development compared to the Serra da Capivara National Park. They appear to have some overlapping features that suggest a close cultural relationship.

Future Directions

Dating prehistoric rock art is still a complex and vague task. With the exception of some sites kept in isolation, the dating of paintings is relative. The action of natural agents on the painted or engraved walls, over the millennia, affects the results of physicochemical analyses on samples altered by sedimentary deposition. In the National Park's sites, the effects of the detachment of rock cortex with paintings are noticeable. Dropped painted fragments are deposited on the sediment, and are retrieved in the course of archaeological excavation. Dating the sediment in which these fragments were collected indicates the moment the detachment happened, thus providing an (minimum) estimate of the dating of the paints.

Natural and anthropogenic agents destroy numerous rock art sites each year. To declerate this process, the sites within the National Park are being systematically monitored using laser scanning which is the most accurate technical resource available. Only the intensive photogrammetric recording of rock art sites will allow us to save this heritage from eventual total loss.

Cross-References

- ▶ Brazil: Cultural Heritage Management Education
- ▶ Brazil: Historical Archaeology
- ▶ Rock Art Recording Methods: From Traditional to Digital

References

Guidon, N. 1991. *Peintures préhistoriques du Brésil. L'art rupestre du Piauí*. Paris: ERC.

Martin, G. 2008. *Pré-história do nordeste do Brasil*. 5th ed. Recife: Edufpe.

Pessis, A.-M. 2003. *Imagens da Pré-história. Parque Nacional Serra da Capivara; Images de la préhistoire; Images from prehistory*. São Paulo: Fumdham/Petrobras.

Further Reading

Etchevarne, C. 2007. *Escrito na pedra: cor, forma e nos grafismos rupestres da Bahia [Written on stone: color, form and movement in the rock graphics of Bahia]*. Rio de Janeiro: Organização Odebrecht.

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Service Learning and Public Archaeology

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Introduction

Public archaeology has experienced exponential growth since the term was coined in 1972 in the context of legislation designed to conserve the

archaeological record in the public interest. Public archaeology in the twenty-first century is an increasingly diversified pursuit in which professional archaeologists, employed in a variety of settings including both heritage management agencies and academic institutions, collaborate in a multitude of ways with a diverse array of community partners. Professional archaeologists in academic settings are uniquely positioned to extend the scope of public archaeology through community service learning where students in course-based, credit-bearing experiences actively engage with the public in real-world settings on projects of local interest emanating from the community itself. By integrating learning, service, and research, students develop deeper understanding of course content as they link theory with practice, become sensitive to both community needs and assets, and express greater interest in civic engagement. As a high-impact instructional practice, community service learning has the potential to provide students engaged in archaeological practice with a transformative educational experience that forges relationships with both faculty members and the surrounding community.

Definition

Service learning is a form of experiential learning where students gain knowledge through active participation in an organized service activity coordinated with the community that affords students the opportunity to critically reflect on their service experience (Bringle and Hatcher 1999). Service learning is a pedagogical initiative undertaken by institutions of higher learning to better integrate liberal arts colleges as well as public and private research universities into their surrounding communities through faculty and student collaborations with community members. As the needs of the community shape the nature of the service project, service learning necessitates engagement between faculty and the community prior to the commencement of any work. Faculty, students, and community partners collaborate within a research framework in which the community benefits from the resources offered by the college and the students profit by developing a greater sense of social responsibility. Most colleges and universities now include service learning as part of their curriculum. Service learning is one way to reintroduce students to the idea that they are part of a social world beyond their immediate campus environment. Service learning is thus distinguished by its pedagogical underpinnings, and academic archaeologists have incorporated this powerful teaching method into the archaeological curriculum since the early 1990s (Baugher 2007).

Examples

Archaeological applications of service learning have engaged with a wide range of community partners including museums, historical societies, historic preservation groups, elementary schools, churches, and cemetery associations and have had as their focus Mississippian-era Native American mounds (Homsey et al. 2012), seventeenth-century forts (Nassaney 2004), eighteenth-century Spanish missions (Mendoza 2009), and nineteenth-century African-American sites (Levine et al. 2005; Levine and Delle 2009). Service-learning experiences have been successfully integrated into all levels of the archaeological curriculum from introductory courses (Levine and Delle 2009) to graduate-level seminars (Chilton and Hart 2009). Summer field schools are also common sites for integrating service-learning pedagogy into archaeological practice (Nassaney 2009). Service learning can define an entire college course, or it can be a component of a regular academic course. Christopher Matthews' (2011) course, "Archaeology in Montclair," is an example of a class completely dedicated to affording students the opportunity to participate in documentary and field-based research to assist the Montclair Historical Society's mission to promote the preservation and study of local history. Service learning is a flexible pedagogy and, as McLaughlin (2009: 66) aptly points out, is "not a one-size-fits-all teaching strategy." However it is deployed, service learning is a powerful pedagogy

that can result in unanticipated outcomes long after the service activity is over. Take, for example, Mehta's (2016) archaeological field school at Carson Mounds. As the field site is located in a region marked by extreme poverty, Mehta designed a service-learning activity with his adopted community that would support efforts to offer educational programming to underserved youth. Underprivileged high school students from the Griot Youth Program joined the Carson Mound field school in a collaborative field day experience, and college students assisted their partners with academic programming. One field school student was so moved by the service experience that he organized a benefit concert to raise funds for the Griot Youth Program long after the field school had ended.

The Thaddeus Stevens and Lydia Hamilton Smith public archaeology project can serve as an example of how service-learning pedagogy can be incorporated into a college-level "Introduction to Archaeology" course. The public archaeology program through which this service-learning project developed began when the Historic Preservation Trust of Lancaster County requested that James Delle and I undertake an excavation at the former homes of Thaddeus Stevens (1792–1868), one of Pennsylvania's most famous radical politicians, and Lydia Hamilton Smith (1813–1884), his African-American housekeeper and companion. Thaddeus Stevens was an influential congressman who was a leader of the Radical Republicans who advocated for universal public education, opposed the death penalty, and agitated for the abolition of slavery and equal rights to emancipated blacks. He was a primary author of both the 13th and 14th Amendments to the US Constitution. Lydia Hamilton Smith served as housekeeper for the bachelor Stevens and became a pioneering businesswoman by owning and renting various properties. The houses were in imminent danger of complete destruction to make way for a new convention center-hotel complex in Lancaster, Pennsylvania. The historic preservation laws in the state did not explicitly require that archaeology be done at that site as no demolition or construction funds came from the federal government. Archaeological excavations unearthed evidence of many episodes of Lancaster's history including evidence that a cistern at the Stevens and Smith site had been modified to be a hiding place to harbor fugitive slaves escaping north during the antebellum period (Levine and Delle 2009).

The Stevens and Smith project was undertaken with an explicit commitment to making the project accessible to the community (see Levine and Delle 2009 for examples of our community outreach efforts). Once the excavation was over, we received many requests from various school groups to provide presentations on Stevens and Smith, archaeology, and the Underground Railroad. We responded by partnering with the local inner-city school district to have the undergraduate students enrolled in "Introduction to Archaeology" at Franklin and Marshall College to provide presentations designed to expose elementary and middle school children to archaeology in general, to the rich archaeological heritage that lies beneath their city streets, and to the historical significance of Thaddeus Stevens and Lydia Hamilton Smith. For their service-learning project, college students brought a traveling kit of artifacts from the excavation, large-scale photos of the excavation, and an archaeological toolbox of equipment used on a typical dig. Schoolchildren learned about the practice of archaeology, principles of stratigraphy, interpreting historic artifact assemblages, nineteenth-century urban life in Lancaster, and the role Stevens and Smith played in the Underground Railroad. After several iterations of this class, nearly 40 college students had engaged an estimated 1500 schoolchildren with the Stevens and Smith archaeology project and issues of race, slavery, and emancipation. Reflection journals kept by my students report that the experience resulted in understanding course content on a more profound level because they taught it and fostered increased interest in civic engagement. Their interactions with the schoolchildren promoted personal growth and served as a catalyst to reflect on their own position and role in society. As archaeology is not a part of most curricula prior to college, the presentation filled an

educational void in the community, and schoolchildren expressed considerable enthusiasm for learning about archaeology, handling artifacts, and hearing about their city's heritage.

Future Directions

Archaeological applications of service learning can productively extend the current contours of public archaeology, and an increasing number of faculties have embraced service learning. Although it is far from being a permanent fixture in archaeological pedagogy, some practitioners have developed community service-learning projects that have grown and developed over the course of more than a decade. The Fort St. Joseph Archaeological Project is one example of service-learning pedagogy that is anchored in a robust and long-term partnership (Berliner and Nassaney 2015). Advocates of service learning acknowledge that there are challenges that come with retooling our pedagogical approaches but contend that the benefits of service learning far exceed any difficulties (Baugher 2009; Nassaney 2009, 2012). Implementing a service-learning project can be time-consuming and does create additional responsibilities for faculty. Untenured faculty may be concerned that the extra effort required to create service-learning opportunities for their students will not be rewarded. Nevertheless, many colleges and universities are providing the infrastructure to facilitate service-learning partnerships. As archaeological practice in the twenty-first century continues to reach out and acknowledge multiple stakeholders in diverse communities, the prospects for service learning are promising.

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community and Archaeology
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Public Archaeology, The Move Towards

References

Baugher, S. 2007. Service-learning: Partnering with the public as a component of college archaeology courses. In *Past meets present: Archaeologists partnering with museum curators, teachers, and community groups*, ed. J. Jameson and S. Baugher, 187–202. New York: Springer.

Baugher, S. 2009. Benefits and barriers to archaeological service learning: Examples from New York. In *Archaeology and community service learning*, ed. M.S. Nassaney and M.A. Levine, 36–58. Gainesville: University of Florida Press.

Berliner, K.M., and M.S. Nassaney. 2015. The role of the public in public archaeology: Ten years of outreach and collaboration at Fort St. Joseph. *Journal of Community Archaeology & Heritage* 2 (1): 3–21.

Bringle, R.G., and J.A. Hatcher. 1999. Implementing service learning in higher education. *Journal of Higher Education* 67 (2): 221–239.

Chilton, E.S., and S.M. Hart. 2009. Archaeology and community service learning in the "Pioneer valley". In *Archaeology and community service learning*, ed. M.-S. Nassaney and M.A. Levine, 168–182. Gainesville: University of Florida Press.

Homsey, L., A.L. Ortmann, and K.W. Wesler. 2012. Integrating community service learning into the Murray State University archaeology program. *Journal of Kentucky Archaeology* 1 (2): 39–51.

Levine, M.A., and J.A. Delle. 2009. Archaeology and community service learning at the Thaddeus Stevens and Lydia Hamilton Smith site, Lancaster, Pennsylvania. In *Archaeology and community service learning*, ed. M.S. Nassaney and M.A. Levine, 83–109. Gainesville: University of Florida Press.

Levine, M.A., K.M. Britt, and J.A. Delle. 2005. Heritage tourism and community outreach: Public archaeology at the Thaddeus Stevens and Lydia Hamilton Smith site in Lancaster, Pennsylvania, USA. *International Journal of Heritage Studies* 11 (5): 399–414.

Matthews, C.N. 2011. Archaeology in Montclair: Service learning and fieldwork at the Montclair historical society site. *Bulletin of the Archaeological Society of New Jersey* 66: 1–10.

McLaughlin, S. 2009. Developing an archaeology service-learning course. In *Archaeology and community service learning*, ed. M.S. Nassaney and M.A. Levine, 59–79. Gainesville: University of Florida Press.

Mehta, J.H. 2016. Fieldwork and community service learning in New Orleans and the Mississippi River Delta. *The SAA Archaeological Record* 16 (3): 17–21.

Mendoza, R. 2009. Archaeology and community service learning at an early California mission, 1995–2008. In *Archaeology and community service learning*, ed. M.-S. Nassaney and M.A. Levine, 122–150. Gainesville: University of Florida Press.

Nassaney, M.S. 2004. Implementing community service learning through archaeological practice. *Michigan Journal of Community Service Learning* 19 (3): 89–99.

Nassaney, M.S. 2009. The reform of archaeological pedagogy and practice through community service learning. In *Archaeology and community service learning*, ed. M.-S. Nassaney and M.A. Levine, 3–35. Gainesville: University of Florida Press.

Nassaney, M.S. 2012. Enhancing public archaeology through community service learning. In *The Oxford handbook of public archaeology*, ed. R. Skeates, C. McDavid, and J. Carman, 414–440. Oxford: Oxford University Press.

Sesame: Origins and Development

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Basic Species Information

Sesamum indicum L. (syn. *S. orientale* L.) Pediliaceae. The name sesame is derived from the Late Babylonian *shawash-shammu*, "oil seed" or plant oil, via Phoenician to Greek *sesamon* to Latin *sesamum* (www.etymonline.com). Sometimes sesame is known as gingelly from the Hindi *gingli*, which is from Arabic *jaljala*, the meaning referring to the sound of the seeds rattling within the capsules (http://www.oed.com). Sesame has one of the highest oil contents of any seed, approximately 50% oil and 25% protein. The meal left after pressing for oil can be used as a high-protein animal feed. The oil can survive for long periods before going rancid due to the presence of antioxidants, sesamol and sesamolin (Oplinger et al. 1990). There are many recorded medicinal uses (Bedigian 2004).

Sesame is an oilseed crop that is self-pollinating and annual but occasionally perennial (Bedigian 2004). The four-segmented seed capsule is grooved, is rectangular in section, and ranges from 2 to 8 cm long/0.5 to 2 cm wide. Once ripe the seed capsules split open to release the seed – "open sesame." The ovate flattened seeds range from 3 to 4 mm long/2 mm wide/1 mm deep and are thinner at the hilum end. The testa is slightly raised and reticulate (Fig. 1), and this is especially marked in wild sesame (*Sesamum* spp.). The seeds are usually white/yellow but can be brown or black. Sesame can be grown from seed in warm climates. Although drought resistant, it cannot tolerate frosts, waterlogging, or salinity (Oplinger et al. 1990; van Wyk 2005). Sesame takes between 70 and 120 frost-free days to mature, and there is morphological variation between plants (Bedigian 2004). While tolerant

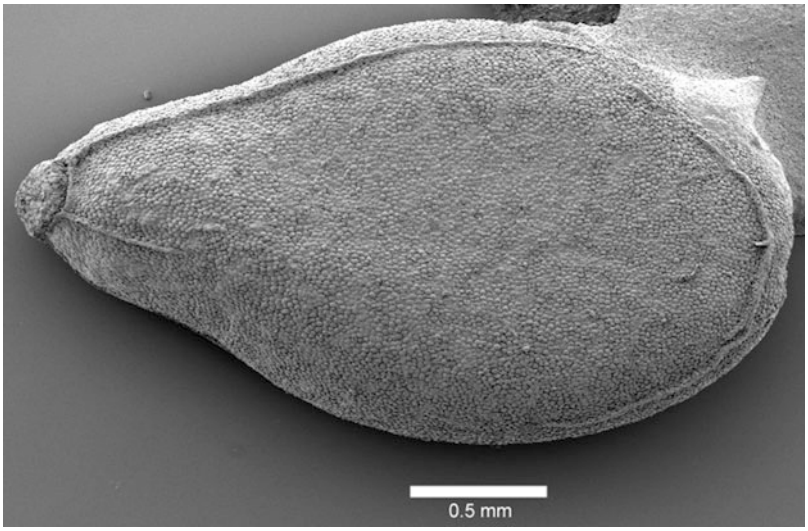

Sesame: Origins and Development, Fig. 1 Scanning electron micrograph of typical domesticated *Sesamum indicum* seed

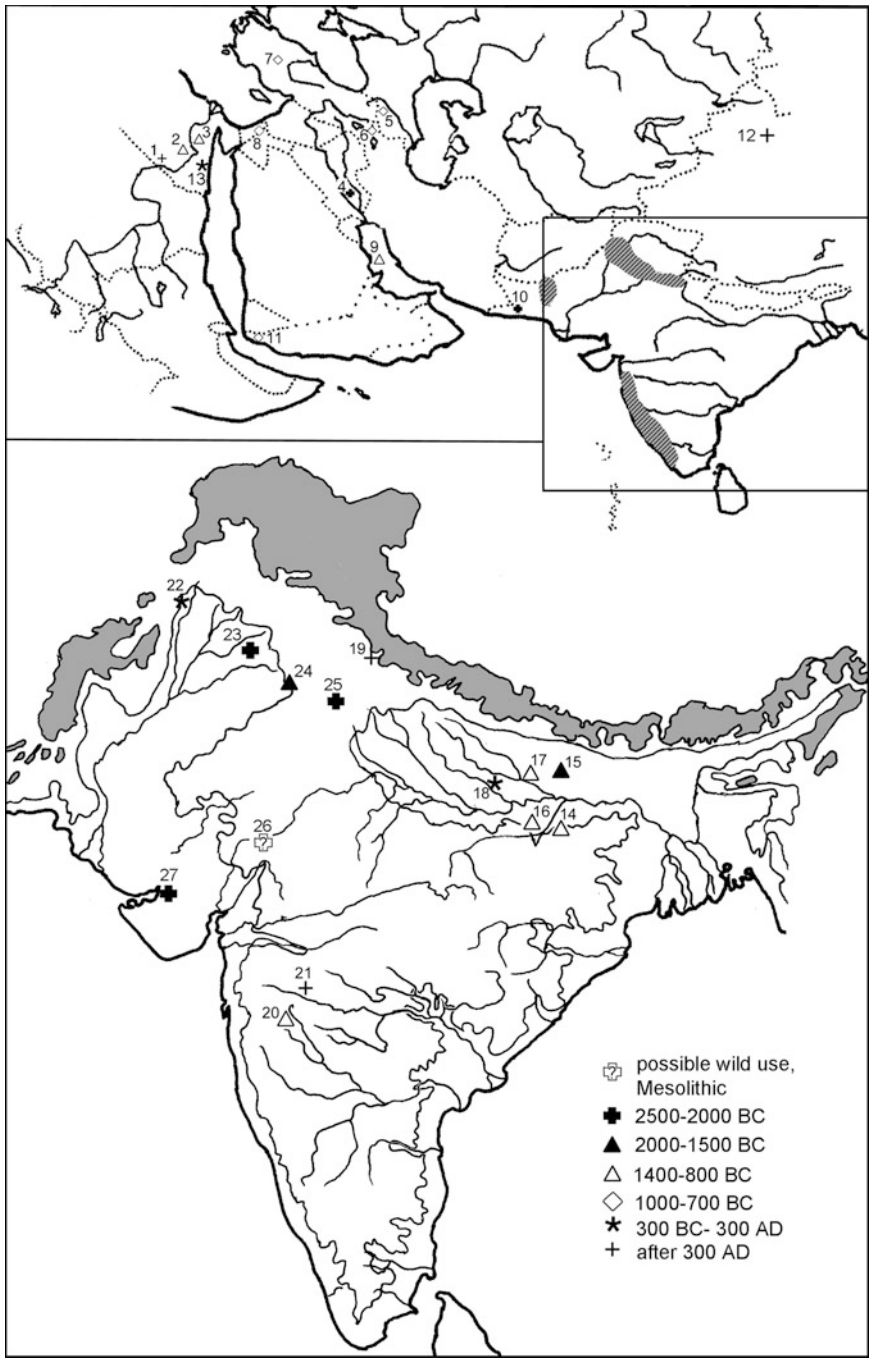

Sesame: Origins and Development, Fig. 2 Map showing the approximate modern wild range of *Sesamum indicum* subsp. *malabaricum* and the distribution of archaeological reports, with an enlarged focus on the India subcontinent. (Map updated, modified from Fuller 2003). Sites numbered *1*. Qasr Ibrim, *2*. Luxor (Tutankhamun's tomb and Deir el-Medina), *3*. Amarna, *4*. Abu Salabikh, *5*. Karmir Blur, *6*. Bastam, *7*. Gordion, *8*. Deir Alla, *9*. Bahrain, *10*. Miri Qalat, *11*. Sabir, *12*. Thousand Buddha Grotto (Xinjiang), *13*. Myos Hormos, *14*. Malhar, *15*. Imlidh-Kurd, *16*. Sunuwar, *17*. Narhan, *18*. Hulaskhera, *19*. Ufalda, *20*. Inamgaon, *21*. Paithan, *22*. Hund, *23*. Harappa, *24*. Sanghol, *25*. Farmana, *26*. Bagor, *27*. Kanmer

of many growing conditions, sesame prefers well-drained fertile soils and neutral pH. Its large branching root system can improve poor soil structure. A non-shattering mutation was not found until 1943, so traditionally sesame is grown in small hand-harvested plots. Instead domestication focused on reduction of germination inhibition which is linked to a thinning of the seed, a reduced seed coat architecture, and an increased tendency for seeds to be black (Fuller and Allaby 2010).

There has been debate over the correct taxonomy for cultivated sesame (see Bedigian 2004). Wild sesame taxa are widespread with many wild species in sub-Saharan Africa and fewer in India. Studies of wild populations of *Sesamum* sp. support an origin from the South Asian *Sesamum orientale* L. *var. malabaricum* Nar. (syn. *S. mulayamum Nair*) (Fuller 2003; Bedigian 2004). This is likely to have taken place in the Indus Valley, including the Indian Punjab and parts of Pakistan, although the wild progenitor also occurs down the west coast of the Indian peninsula (Fig. 2).

Timing and Tracking Domestication

Archaeobotanical evidence has been slow to accumulate due to preservational biases against oilseeds like sesame in favor of charred preservation of more robust-seeded species like cereals. Early archaeological evidence for sesame stems from Harappan sites in the greater Indus Valley from the Mature Harappan civilization (2600–2000 BCE), including Harappa in Pakistan; Miri Qalat in the Markan region of Pakistan; Farmana in Haryana, India; and Kanmer in Saurashtra, Gujarat, India (Tengberg 1999; Weber et al. 2011; Pokharia et al. 2011). This is in keeping with a domestication in the Indus region sometime prior to 2500 BCE, although this might also have occurred to the east in Saurashtra, Haryana, or somewhere in between. There is a suggestion that starch grain evidence collected from a tool by A. Kashyap from Bagor, a preceramic Mesolithic site (4000–5000 BCE), has evidence for exploitation of possible *Sesamum* (cf. Shinde 2008); if verified this would suggest wild exploitation, although this site may not be within the wild distribution and towards the top of the Indian peninsula. Historical linguistic data suggest sesame was known to early Dravidian speakers, prior to knowledge of many other crops (Fuller 2007), which fits with a Saurashtran origin.

There is limited evidence for the early spread of sesame. First it was taken westward to Mesopotamia by 2300–2200 BCE (Fuller 2003; Bedigian 2004). There are numerous reports from the second millennium BCE across India (Fuller 2003). After 1400 BCE sesame is known from Bahrain and ancient Egypt, famously among seed finds in Tutankhamun's tomb (de Vartavan and Asensi Amoros 1997). In the Late Bronze Age (c. 1300 BCE), sesame is apparently mentioned in early Greek Linear B texts, although archaeobotanical finds from this period and region are so far lacking (Kroll 2000). Recently finds from Southern Thailand indicate the presence of sesame in the last few centuries BCE (C. Castillo, personal communication). There are also Roman era finds from the port of Myos Hormos (Quseir al-Qadim) on the Egyptian Red Sea coast (van der Veen 2011). Elsewhere in Yemen and Anatolia, sesame appears in the early first millennium CE (Fig. 2).

In China, although sesame is known from written sources going back about 2,000 years to the Han dynasty, archaeobotanical finds have been elusive. The only positively identified sesame comes from a 700-year-old Buddhist monastic cave in Xinjiang province, as well as reports from similarly aged or slightly older graves (Qiu et al. 2012). A few earlier claims for sesame in central China are mostly misidentifications (Qiu et al. 2012).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants

▶ Domestication: Definition and Overview
▶ Genetics of Early Plant Domestication: DNA and aDNA
▶ Plant Domestication and Cultivation in Archaeology
▶ Plant Processing Technologies in Archaeology

References

Bedigian, D. 2004. History and lore of sesame in Southwest Asia. *Economic Botany* 58 (3): 329–353.

de Vartavan, C., and V. Asensi Amoros. 1997. *Codex of ancient Egyptian plant remains: Codex des restes végétaux de l'Egypte ancienne*. London: Triade Exploration.

Fuller, D.Q. 2003. Further evidence on the prehistory of sesame. *Asian Agri-History* 7 (2): 127–137.

Fuller, D.Q. 2007. Non-human genetics, agricultural origins and historical linguistics in South Asia. In *The evolution and history of human populations in South Asia*, ed. M. Petraglia and B. Alchin, 393–443. Dordrecht: Springer.

Fuller, D.Q., and R. Allaby. 2010. Seed dispersal and crop domestication: Shattering, germination and seasonality in evolution under cultivation. *Annual Plant Reviews* 38: 238–295.

Kroll, H. 2000. Agriculture and arboriculture in mainland Greece at the beginning of the first millennium B.C. In *Revue Pallas T.52; paysage et alimentation dans le monde grec antique*, ed. H. Guiraud, 61–68. Toulouse: Press Universitaires Du MiRail.

Oplinger, E.S., D.H. Putnam, A.R. Kaminski, C.V. Hanson, E.A. Oelke, E.E. Schulte, and J.D. Doll. 1990. *Alternative field crops manual: Sesame*. West Lafayette: Center for New Crops & Plant Products at Purdue University. www.hort.purdue.edu

Pokharia, A.N., J.S. Kharakwal, R.S. Rawat, T. Osada, C.M. Nautiyak, and A. Srivastava. 2011. Archaeobotany and archaeology at Kanmer, a Harappan site in Kachchh, Gujarat: Evidence for adaptation in response to climatic variability. *Current Science* 100 (12): 1833–1846.

Qiu, Z., Y. Zhang, D. Bedigian, X. Li, C. Wang, and H. Jiang. 2012. Sesame utilization in China: New archaeobotanical evidence from Xinjiang. *Economic Botany* 66: 255–263.

Shinde, V. 2008. Cultural development from Mesolithic to Chalcolithic in the Mewar region of Rajasthan, India. *Pragdhara* 18: 201–213.

Tengberg, M. 1999. Crop husbandry at Miri Qalat, Makran, SW Pakistan (4000–2000 BC). *Vegetation History and Archaeobotany* 8: 3–12.

van der Veen, M. 2011. *Consumption, trade and innovation. Exploring botanical remains from the Roman and Islamic ports ar Quseir al-Qadim, Egypt*. Frankfurt: Africa Magna Verlag.

van Wyk, B.-E. 2005. *Food plants of the world: An illustrated guide*. Portland: Timberland Press Inc.

Weber, S.A., A. Kashyap, and L. Mounce. 2011. Archaeobotany at Farmana: New insights into Harappan plant use strategies. In *Excavations at Farmana*, ed. V. Shinde, T. Osada, and M. Kumar, 808–823. Kyoto: RIHN, Nakanish Printing.

Further Reading

Zohary, D., M. Hopf, and E. Weiss. 2012. *Domestication of plants in the Old World*. Oxford: Oxford University Press.

Sex Assessment

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Introduction

The estimation of the sex of a deceased person from an analysis of skeletal remains is one of the first procedures undertaken by anthropologists and osteologists as the sex of a person affects other analyses such as estimation of ancestry and age at death (e.g., Rowbotham 2016). In forensic cases, the estimation of sex is pivotal in contributing to the identification of unknown bodies as determining whether the individual is male or female halves the number of possible matches.

Definition

The sex of an individual is a biologically determined variable and differs from the gender of a person which is a social construct (e.g., Agarwal and Wesp 2017).

Key Issues

Age of the Individual

There has been considerable research undertaken on estimating the sex of an individual from the

examination of juvenile skeletal remains (e.g., Bilfeld et al. 2013; Cunningham 2014). However, estimating the sex of individuals who have not reached puberty is limited because in most cases the degree of sexual dimorphism in the juvenile skeleton is not distinct enough to allow accurate methods for evaluation of the sex, particularly for forensic cases.

Nonmetric Methods

In cases of adult skeletal remains, the estimation of sex can be undertaken using a visual examination of nonmetric traits, that is, the morphology (shape) of sexually dimorphic parts of the skeleton (Phenice 1969). Many studies have demonstrated that the pelvis is the most reliable area of the body to evaluate sex (cf. Spradley and Jantz 2011). The overall shape of the pelvis (broader in females than males as a result of the need for childbirth), the angle of the sciatic notch, the subpubic angle, the subpubic concavity, the shape of the ischiopubic ramus, the presence or absence of the ventral arc, and the shape of the sacrum are all examined to evaluate the sex.

After the pelvis, the skull is the most sexually dimorphic structure in the body. On the skull, the morphology of the nuchal crest, mastoid process, supraorbital ridge/glabella (Graw et al. 1999), mental eminence, flexure of the ramus, and size of the palate and teeth (Jones Haun 2000) are assessed. In general, within different populations, male skulls illustrate features that are more robust and muscular than those of females.

Metric Methods

In addition, metric criteria in the form of indices (comparison of measurements) and/or discriminant functions (uni- or multivariate statistics) can be used in sex evaluation (e.g., Robinson and Bidmos 2009). A number of skeletal measurements can be taken that are indicative of the sex of an individual. The most commonly used include the ischiopubic index (e.g., Krogman and Iscan 1986), the discriminant function cranial sexing method of Giles and Elliot (1963) and Giles (1970), and the diameters of the articular ends and/or the midshaft circumference of long bones (Krogman and Iscan 1986). Research has been undertaken to attempt to evaluate the sex from measurements from various parts of the body including vertebrae (Snodgrass 2004), ribs (Wiredu et al. 1999), femur (Stojanowski and Seidemann 1999), tibia (Iscan and Miller-Shaivitz 1984), patella (Kemkes-Grottenthaler 2005), clavicle (McCormick et al. 1991), humerus (Rogers 1999), radius (Berrizbeitia 1989), ulna (Purkait 2001), feet (Introna et al. 1997), and metacarpals (Burrows et al. 2003). The decision about which method to use is influenced by the condition and preservation of the skeletal remains and the age of the individual.

Context and Disease

The circumstances of a burial are also important to assess when evaluating the sex of an individual. For example, recognition of fetal bones in the abdominal area will indicate the individual was female. Further, some diseases which affect the skeleton are sex-specific (Ortner 2003).

Molecular Methods

Finally, the ability to extract DNA from skeletal remains of varying ages and preservations has meant that DNA analysis has also been used to determine the sex of both juvenile (e.g., Townsend 2001) and adult (e.g., Gibbon et al. 2009; Thomas et al. 2016) skeletal remains. "Genetic sex identification is done through the isolation and amplification of a gene or genes in the sex chromosomes (X and Y). The most commonly used sex determining genes are the sex determining region Y (SRY locus), zinc finger protein (ZF) and the amelogenin (AMEL) genes" (Bidmos et al. 2010: 4). While extraction techniques become increasingly less invasive, molecular approaches to the determination of sex are nonetheless destructive and expensive. In addition, the success of DNA analysis is influenced by the relative preservation of the remains and the ability to recover DNA.

Categories and Population-Specific Approaches

Skeletal dimorphism occurs as a result of the differences in hormone levels between men and women. As a result of individual variation (i.e.,

Sex Assessment, Table 1 Categories used in the determination of sex

Category	Comment
F	Definitely female
F?	Possibly female
A	Ambiguous (shows neither male nor female characteristics)
M?	Possibly male
M	Definitely male
?	Unable to comment on the sex due to poor condition or preservation of the skeletal remains

gracile males and robust females exist), it is not always possible to provide a definitive answer. Consequently, forensic anthropologists and osteologists use a range of categories to describe the sex of the individual (Table 1). In addition, population-specific variation (e.g., in size) is known to influence the evaluation of sex from the skeleton (Manthey et al. 2017; Ubelaker and DeGaglia 2017). For this reason, population-specific reference collections are essential for developing standards to assess sexual dimorphism within populations (e.g., Smith 1997; Robinson and Bidmos 2011; Klales and Cole 2017; Mahakkanukrauh et al. 2017).

Accuracy

If the entire skeleton is present and well preserved and both morphological and metric methods can be employed, the sex of an individual can be estimated with nearly 100% accuracy. If only the pelvis is examined, accuracy is said to be 95% and decreases as less skeletal elements are employed (Krogman and Iscan 1986; Duric et al. 2005).

Future Directions

As technology advances and debate continues about the impact on preservation of studying and handling collections of archaeological human skeletal remains, there has been a shift to the virtual analyses of skeletal remains. Virtual evaluation of sex has been demonstrated to be as accurate as examining the physical bone (e.g., Decker et al. 2011).

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Taphonomy: Definition

References

Agarwal, S.C., and J.K. Wesp, eds. 2017. *Exploring sex and gender in bioarchaeology.* Albuquerque: University of New Mexico.

Berrizbeitia, E.L. 1989. Sex determination with the head of the radius. *Journal of Forensic Sciences* 34 (5): 1206–1213.

Bidmos, M.A., V.E. Gibbon, and G. Strkalj. 2010. Recent advances in sex identification of human skeletal remains in South Africa. *South African Journal of Science* 106 (11–12): 1. https://doi.org/10.4102/sajs.v106i11/12.238.

Bilfeld, M.F., F. Dedouit, N. Sans, H. Rousseau, D. Rougé, and N. Telmon. 2013. Ontogeny of size and shape sexual dimorphism in the ilium: A multi-slice computed tomography study by geometric morphometry. *Journal of Forensic Sciences* 58 (2): 303–310.

Burrows, A.M., V.P. Zanella, and T.M. Brown. 2003. Testing the validity of metacarpal use in sex assessment of human skeletal remains. *Journal of Forensic Sciences* 48 (1): 17–20.

Cunningham, C.A. 2014. Anthropology: Skeleton; estimating juvenile age. In *Encyclopedia of forensic science*, 1–11. London: Wiley.

Decker, S.J., S.L. Savy-Jow, J.M. Ford, and D.R. Hilbelink. 2011. Virtual determination of sex: Metric and nonmetric traits of the adult pelvis from 3D computed tomography models. *Journal of Forensic Sciences* 56 (5): 1107–1114.

Duric, M., Z. Rakocevic, and D. Donic. 2005. The reliability of sex determination of skeletons from forensic context in the Balkans. *Forensic Science International* 147: 159–164.

Gibbon, V.E., M. Paximadis, G. Štrkalj, P. Ruff, and C.B. Penny. 2009. Novel methods of molecular sex identification from skeletal tissue using the amelogenin

gene. *Forensic Science International Genetics* 3: 74–79.

Giles, E. 1970. Discriminant function sexing of the human skeleton. In *Personal identification in mass disasters*, ed. T.D. Stewart, 99–109. Washington, DC: Smithsonian Institute.

Giles, E., and O. Elliot. 1963. Sex determination by discriminant function analysis of crania. *American Journal of Physical Anthropology* 21: 53–68.

Graw, M., A. Czarnetzki, and H.T. Haffner. 1999. The form of the supraorbital margin as a criterion in identification of sex from the skull: Investigations based on modern human skulls. *American Journal of Physical Anthropology* 108: 91–96.

Introna, F., Jr., G. Di Vella, C.P. Campobasso, and M. Dragone. 1997. Sex determination by discriminant analysis of *calcanei* measurements. *Journal of Forensic Sciences* 42 (4): 725–728.

Iscan, M.Y., and P. Miller-Shaivitz. 1984. Discriminant function sexing of the tibia. *Journal of Forensic Sciences* 29 (4): 1087–1093.

Jones Haun, S. 2000. Brief communication: A study of the predictive accuracy of mandibular ramus flexure as a singular morphologic indicator of sex in an archaeological sample. *American Journal of Physical Anthropology* 111: 429–432.

Kemkes-Grottenthaler, A. 2005. Sex determination by discriminant analysis: An evaluation of the reliability of patella measurements. *Forensic Science International* 147: 129–133.

Klales, A.R., and S.J. Cole. 2017. Improving nonmetric sex classification for Hispanic individuals. *Journal of Forensic Sciences* 62: 975–980.

Krogman, W.M., and M.Y. Iscan. 1986. *The human skeleton in forensic medicine*. 2nd ed. Springfield: C.C. Thomas.

Mahakkanukrauh, P., S. Ruengdit, S.M. Tun, T. Case, and A. Sinthubua. 2017. Osteometric sex estimation from the os coxa in a Thai population. *Forensic Science International* 271: e1–127.e7.

Manthey, L., R.L. Jantz, M. Bohnert, and K. Jellinghaus. 2017. Secular change of sexually dimorphic cranial variables in Euro-Americans and Germans. *International Journal of Legal Medicine* 131 (4): 1113–1118.

McCormick, W.F., J.H. Stewart, and H. Greene. 1991. Sexing of human clavicles using length and circumference measurements. *The American Journal of Forensic Medicine and Pathology* 12: 175–181.

Ortner, D.J. 2003. *Identification of pathological conditions in human skeletal remains*. 2nd ed. London: Academic Press.

Phenice, T.W. 1969. A newly developed method of sexing the os pubis. *American Journal of Physical Anthropology* 30 (2): 297–301.

Purkait, R. 2001. Measurements of ulna – a new method for determination of sex. *Journal of Forensic Sciences* 46 (4): 924–927.

Robinson, M.S., and M.A. Bidmos. 2009. The skull and humerus in the determination of sex: Reliability of discriminant function equations. *Forensic Science International* 186 (1–3): 86.e1–86.e5.

Robinson, M.S., and M.A. Bidmos. 2011. An assessment of the accuracy of discriminant function equations of sex determination of the femur and tibia from a South African population. *Forensic Science International* 206 (1–3): 212.e1–212.e5.

Rogers, T.L. 1999. A visual method of determining the sex of skeletal remains using the distal humerus. *Journal of Forensic Sciences* 44 (1): 57–60.

Rowbotham, S. 2016. Anthropological estimation of sex. In *Handbook of forensic anthropology and archaeology*, ed. S. Blau and D.H. Ubelaker, 2nd ed., 261–272. London: Routledge.

Smith, S.L. 1997. Attribution of foot bones to sex and population groups. *Journal of Forensic Sciences* 42 (2): 186–195.

Snodgrass, J.J. 2004. Sex differences and aging of the vertebral column. *Journal of Forensic Sciences* 49 (3): 458–463.

Spradley, M.K., and R.L. Jantz. 2011. Sex estimation in forensic anthropology: Skull versus postcranial elements. *Journal of Forensic Sciences* 56: 289–296.

Stojanowski, C.M., and R.M. Seidemann. 1999. A re-evaluation of the sex prediction accuracy of the minimum supero-inferior femoral neck diameter for modern individuals. *Journal of Forensic Sciences* 44 (6): 1215–1218.

Thomas, R.M., C.L. Parks, and A.H. Richard. 2016. Accuracy rates of sex estimation by forensic anthropologists through comparison with DNA typing results in forensic casework. *Journal of Forensic Sciences* 61: 1307–1310.

Townsend, S.M. 2001. Sex determination of juvenile skeletal remains using ancient DNA: An evaluation of current molecular sex identification methods. MS dissertation, University of Auckland.

Ubelaker, D.H., and C.M. DeGaglia. 2017. Population variation in skeletal sexual dimorphism. *Forensic Science International* 278: 407.e1–407.e7.

Wiredu, E.K., R. Kumoji, R. Seshadri, and R.B. Biritwum. 1999. Osteometric analysis of sexual dimorphism in the sternal end of the rib in a West African population. *Journal of Forensic Sciences* 44 (5): 921–925.

Further Reading

Bass, W.M. 1995. *Human osteology: A laboratory and field manual of the human skeleton*, Special publication. Vol. 2. 4th ed. Columbia: Missouri Archaeological Society.

Blau, S., and A.J. Hill. In press. Paediatric anthropology and odontology. In *Handbook of pediatric forensic pathology*, ed. R.W. Byard and K.A. Collins. New York: Springer.

Byers, S.N. 2005. *Introduction to forensic anthropology*. 2nd ed. Boston: Pearson.

Garvin, H.M. 2012. Adult sex determination: Methods and application. In *A companion to forensic anthropology*, ed. D. Dirkmaat, 239–247. Southern Gate: Wiley-Blackwell.

Hoppa, R.D., and C.M. FitzGerald. 2005. From head to toe: Integrating studies from bones and teeth in biological anthropology. In *Human growth in the past: Studies from bones and teeth*, ed. R.D. Hoppa and C.M. FitzGerald, 1–32. Cambridge: Cambridge University Press.

Klales, A.R., S.D. Ousley, and J.M. Volner. 2012. A revised method of sexing the human innominate using Phenice's nonmetric traits and statistical methods. *American Journal of Physical Anthropology* 149 (1): 104–114.

Rogers, T., and S. Saunders. 1994. Accuracy of sex determination using morphological traits of the human pelvis. *Journal of Forensic Sciences* 39: 1047–1056.

Wescott, D.J. 2000. Sex variation in the second cervical vertebra. *Journal of Forensic Sciences* 45 (2): 462–466.

Williams, B.A., and T. Rogers. 2006. Evaluating the accuracy and precision of cranial morphological traits for sex determination. *Journal of Forensic Sciences* 51: 721–735.

Shackel, Paul

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Basic Biographical Information

Paul Shackel received his Ph.D. from the State University of New York at Buffalo in 1987. After completing his dissertation, Shackel worked for a short time for the Historic Annapolis Foundation coordinating various archaeological projects in the historic district of Annapolis. In 1989 he entered the National Park Service and worked for over seven years at Harpers Ferry National Historical Park. He has served as principal investigator for several projects with the National Park Service in the National Capital Region. Shackel became an Assistant Professor at the University of Maryland in the Department of Anthropology in 1997. In 1999 he became an Associate Professor, and in 2002 he was promoted to Full Professor. He also served as chair of the department.

Major Accomplishments

Dr. Shackel's dissertation research in Annapolis, Maryland, examined archaeological materials, probate inventories, and the development of etiquette books to show the development of a modern discipline. This new behavior helped to create separate and segmented places as well as the development of the individual. Much of this new behavior can be found in the development of Renaissance ideals that helped to standardize behavior necessary for industrial capitalism.

His work at Harpers Ferry National Park focused on the Harpers Ferry Armory, which developed as one of two US installations for the manufacturing of arms for the US military. The armory initially developed with craft manufacturing, whereby the gunsmith made the entire gun, lock, stock, and barrel. However, in the 1820s, the War Department placed John Hall in Harpers Ferry where he perfected the process of interchangeable parts in gun manufacturing. With the implementation of wage labor in the 1840s, the landscape became more formal as new surveillance techniques were implemented. Workers appear to have damaged an increasing number of products and machinery. Families tended gardens, raised pigs, and purchased material culture that was fashionable when they had control over their means of production.

In 2002 Dr. Shackel embarked on a cooperative project with several other institutions to document the founding the settlement of New Philadelphia, a town established by a freed African American in 1836. Frank McWorter and his family sold town lots to whites and blacks and used the proceeds to purchase family members out of slavery. Based on census and deed records, it appears that both White families and Black families lived next to each other. The archaeology shows that material culture differences between households of different ethnic backgrounds is indistinguishable. The archaeological record is more of a reflection of class rather than ethnic background.

Beginning in 2009, Shackel began exploring issues of race in the anthracite region of northeastern Pennsylvania. In the 1880s and 1890s, people of Slavic and Italian backgrounds migrated to this region, and they were treated poorly by their employers and their established

neighbors whose families migrated here several generations earlier. The new immigrant spoke a different language, dressed differently, and had different customs. Lattimer Mines is the site of one of the most deadly labor massacres in US history, although the event has disappeared from the national public memory. Archaeology located the place of the massacre, and work is currently being undertaken at domestic sites in this coal town. The archaeology team notices parallels between the treatments of the historic immigrant with the new Latino immigrants that now make up a significant proportion of the contemporary community's population.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Local Communities and Archaeology: A Caribbean Perspective

Further Reading

Fennell, C. 2009. Combating attempts of elision: African American accomplishments at New Philadelphia, Illinois. In *Intangible heritage embodied*, ed. D.F. Ruggles and H. Silverman, 147–168. New York: Springer.

Leone, M.P., P.B. Potter Jr., and P.A. Shackel. 1987. Toward a critical archaeology. *Current Anthropology* 28: 283–301.

Little, B.J., ed. 2002. *Public benefits of archaeology*. Gainesville: University Press of Florida.

Little, B.J., and P.A. Shackel, eds. 2007. *Archaeology as a tool of civic engagement*. Lanham: AltaMira.

Shackel, P. 1993. *Personal discipline and material culture: An archaeology of Annapolis, Maryland, 1695–1870*. Knoxville: University of Tennessee Press.

Shackel, P. 1996. *Culture change and the new technology: An archaeology of the early American industrial era*. New York: Plenum Publishing Corp.

Shackel, P. 2000. *Archaeology and created memory: Public history in a national park*. New York: Kluwer Academic/Plenum Publishing.

Shackel, P. 2001. Public memory and the search for power in American historical archaeology. *American Anthropologist* 102: 655–670.

Shackel, P. 2003. *Memory in Black and White: Race, commemoration, and the post–bellum landscape*. Walnut Creek: AltaMira Press.

Shackel, P. 2011. *New Philadelphia: An archaeology of race in the heartland*. Berkeley: University of California Press.

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Basic Biographical Information

Govardhan Rai Sharma was born on 13 August 1919 in a rural family of Ghazipur district in Eastern Uttar Pradesh. After his primary education in the village school, he shifted to Allahabad where he had all his subsequent school and university education. G.R. Sharma was a brilliant student throughout and passed his M.A. in History in 1942, securing a first division and standing first in order of merit. It was customary in those days for the above-average students of Allahabad University to go in for the civil services. Nationalist to the core and taking active part in the Quit India Movement, G.R. Sharma shunned the very idea of serving under an alien government. Instead he chooses the teaching profession, joining the Allahabad University as a Lecturer in history in 1944.

G.R. Sharma was appointed as a Professor in 1958 in Allahabad University, remaining there till his retirement in 1981, as a Head of the Department. He was appointed Advisor, Archaeology and Museum, of the Uttar Pradesh Government. Sharma was a Co-director of the Indo-Soviet Commission for cooperation with UNESCO. Sharma was an active member of the Central Advisory Board of Archaeology for well over 20 years. Sharma was also a member of the Indian Council of Historical Research and the National Commission for the History of Sciences. Sharma died on November 11, 1986 (Fig. 1).

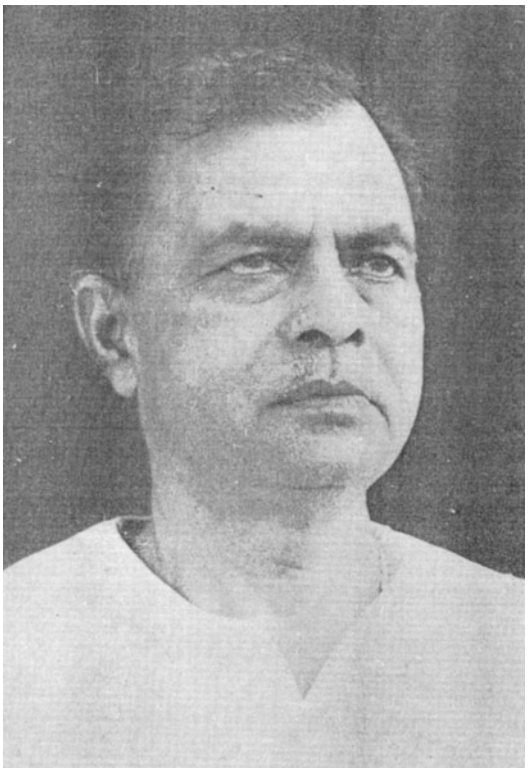

Sharma, Govardhan Rai, Fig. 1 Prof. G. R. Sharma, a pioneer prehistorian of India

Major Accomplishments

G.R. Sharma remained in the archaeological research for over three decades. His entry in the field in the year 1949 was itself an event of far-reaching significance for Indian Archaeology. When in that year Allahabad University, under his direction, began archaeological excavations at the famous site of Kausambi, a new era in archaeological research had been ushered in. This continued until 1966. Sharma's major task in the fifties was introducing archaeology as a subject in the university's teaching and research program. This task is by no means easy even today, and one can imagine how difficult it must have been 30 years back. Sharma had to face an unsympathetic Head of the Department, a hostile Vice-Chancellor, and a totally insensitive state government, a situation almost tailor-made to break the nerves of any ordinary persons. Overcoming various odds coming in his way, he forged ahead to build, nurture, and develop a strong Department of Ancient History, Culture and Archaeology in Allahabad University. In recognition of work done by Sharma and his colleagues, the Allahabad University Department of Ancient History, Culture and Archaeology was brought under the UGC Special Assistance Program which besides creating an adequate infrastructure of archaeological field research also helps many of his younger colleagues to improve their careered prospects.

With the help of A. Ghosh, the then Director-General of the Archaeological Survey of India, G.R. Sharma went on to make discovery after discovery at Kausambi, which was against the wish of K.M. Munshi, the then Chancellor of Allahabad University. His initial digging at the spot near the Asokan Pillar brought to light a textbook sequence of the early historical period. This was followed by the spectacular discovery of Ghositarama monastery dating back to first-second century CE.

The Lower, Middle, and Upper Paleolithic remains of the Belan valley with a rich haul of remarkable faunal finds, the Mesolithic burials of Sarai Nahar Rai and Mahadaha, and the Neolithic settlements of Kaldihwa are some of his significant achievements in this area. It was indeed G.R. Sharma's brilliant insight that led him to achieve a major breakthrough in the identification of Mesolithic settlements in this area.

It is largely to the credit of G.R. Sharma and his colleagues that southern Uttar Pradesh is now firmly on the Stone Age map of the subcontinent. The last 15 years of his career was devoted almost exclusively to researches in the Stone Age Archaeology of the region. The archaeological discoveries made by the Allahabad University under his leadership have added very significantly to our knowledge of India's past. And the archaeological findings are deposited in the Allahabad University museum.

In recognition of his work, Professor Sharma was invited by the British Academy to deliver lectures at the Universities of Cambridge, Oxford, and Southampton and Institute of Archaeology

London. Professor Sharma singly and jointly authored several books and articles incorporating the results of his fieldwork. Notable among them are *Excavations in Kausambi* (Sharma 1960), *Reh Inscriptions of Menander and the Indo-Greek Invasion* (Allahabad, 1980), and *Excavation at Mahadaha* (Sharma et al. 1980). He also coauthored with his colleagues in the *University Beginning of Agriculture and Prehistory of History*, and with Desmond Clark as the coauthor, he published *Palaeo-environment and Prehistory of the Middle Son Valley*. Professor Sharma also wrote books in Hindi. From his last publication entitled *Bharatiya Sanskrit – Puratattvika Adhara* (Delhi, 1984) which can serve as a model of writing on Archaeology in Hindi.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Complex Hunter-Gatherers
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Jericho Archaeological Site
- ▶ Rice: Origins and Development

References

Sharma, G.M. 1958. Excavation at Kausambi. In *Annual bibliography of Indian archaeology*, vol. 16, 1949–1953. Leiden: Kern Institute.

Sharma, G.M. 1960. *The excavation at Kausambi: The defences and the Syenaciti of the Purusamedha*, University publication. Vol. 1. Allahabad: Institute of Archaeology.

Sharma, G.M. 1965. Excavations at Lekhahia, Mirzapur, Indian prehistory: 1964. In *Proceedings of the seminar of Indian prehistory and protohistory*. Pune: Deccan College.

Sharma, G.M. 1973. Mesolithic lake culture in the Ganga valley. *Proceedings of the Prehistoric Society* 39: 129–146.

Sharma, G.M. 1975. Seasonal migrations and the Mesolithic lake cultures of the Ganga valley. In *K.C. Chattopadhyaya memorial volume*, 1–20. Allahabad: Department of the Ancient History, Culture and Archaeology, University of Allahabad.

Sharma, G.M. 1978. Megalithic cultures of the Vindhyas. In *Recent advances in the Indo-Pacific prehistory*, ed. V.N. Mishra and P. Belwood. New Delhi: Oxford and IBH Publishing Co.

Sharma, G.M., and J.D. Clark, eds. 1982. *Palaeoenvironment and prehistory in the Middle Son valley*. Allahabad: Abinash Prakashan.

Sharma, G.M., V.D. Mishra, and J.N. Pal. 1980. *Excavations at Mahadaha: A Mesolithic settlement in the Ganga valley*. Allahabad: Department of Ancient History, Culture and Archaeology, University of Allahabad.

Sheep: Domestication

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Basic Species Information

Sheep, *Ovis aries*, (Mammalia, Artiodactyla, Bovidae, Caprinae) are a highly versatile and adaptable species. From their domestication in the Fertile Crescent, approximately 11,000 years ago, sheep now span the diverse terrains of each inhabited continent where they are exploited for a variety of uses including the production of food (milk, fat, meat) and clothing (skin, wool) (Dwyer 2008). Selection based on environmental tolerance, behavioral, and commercial traits has led to the development of more than 1,400 breeds. These designations are traditionally based upon morphology (e.g., coat color, fleece, and carcass conformation, Fig. 1). Sheep weigh between 25 kg and 160 kg depending on breed, and display significant sexual dimorphism, with males often ~40–50% larger than females (Dwyer 2008). The key adaptations since domestication have included the selection for thicker wool coats that do not molt (hair sheep are an exception), and an increase in the number of polled breeds. Members of both sexes can either be horned or polled (Fig. 1). Sheep are reproductively mature at 4–8 months of age, gestation occurs over 5 months, and individuals can be expected to live for 10 or more years (Dwyer 2008).

Due to their similar sizes and shared geographic range, it is difficult to use bone

Sheep: Domestication, Fig. 1 Naturally occurring phenotypic variation within a single breed of *Ovis aries*, the Icelandic sheep. This breed demonstrates a range of color morphs from black spotted (**a**) to full black (**b**) and full white (**c**) as well as the full complement of ornamentation, horned (**a**, **c**), polled (**b**), and the unusual four horned sheep (**d**). (Image credit F. Imsland)

morphology to distinguish between ancient sheep and goats. The zooarchaeological record suggests sheep were domesticated in the northern Levant (a large area of the Middle East including modern Israel, Lebanon, Syria, and Turkey, Fig. 2) during the Pre-Pottery Neolithic (PPN), and subsequently transported south in the mid to late PPNB, toward the end of the ninth millennium BP (Haber and Davan 2004). Neolithic farmers are also thought to be responsible for the transport of sheep north to Europe by approximately 7000 BCE, while demographic profiling of the fossil record has dated the expansion of sheep south into Africa and east into Asia to 6000 BCE and 3000 BCE, respectively (Dwyer 2008; Gifford-Gonzalez and Hanotte 2011). There is ongoing debate with regard to which wild sheep species were domesticated to form *Ovis aries*, how many times this process occurred, and to what extent subsequent introgression of wild animals has augmented modern domestic sheep.

The current natural geographic range of wild sheep relative to the Fertile Crescent is illustrated in Fig. 2. Wild sheep are divided into three classes: pachyceriforms (*O. dalli*, *O. canadensis*, both $2n = 54$, Northern America; *O. nivicola*, $2n = 52$, Northern Russia), argaliforms (*O. ammon*, $2n = 56$, central Asian highlands), and moufloniforms (*O. vignei*, $2n = 58$, Aralo-Caspin basin; *O. orientalis*, $2n = 54$, Iran, Armenia, Turkey; *O. musimon*, $2n = 54$, Europe). Based on overlapping cytogenic and geographic data, *O. orientalis* has been suggested to be the progenitor of domestic sheep (*O aries*, $2n = 54$). Unraveling the genetic contribution of other *Ovis sp.* to *O. aries* has been complicated, however, by known

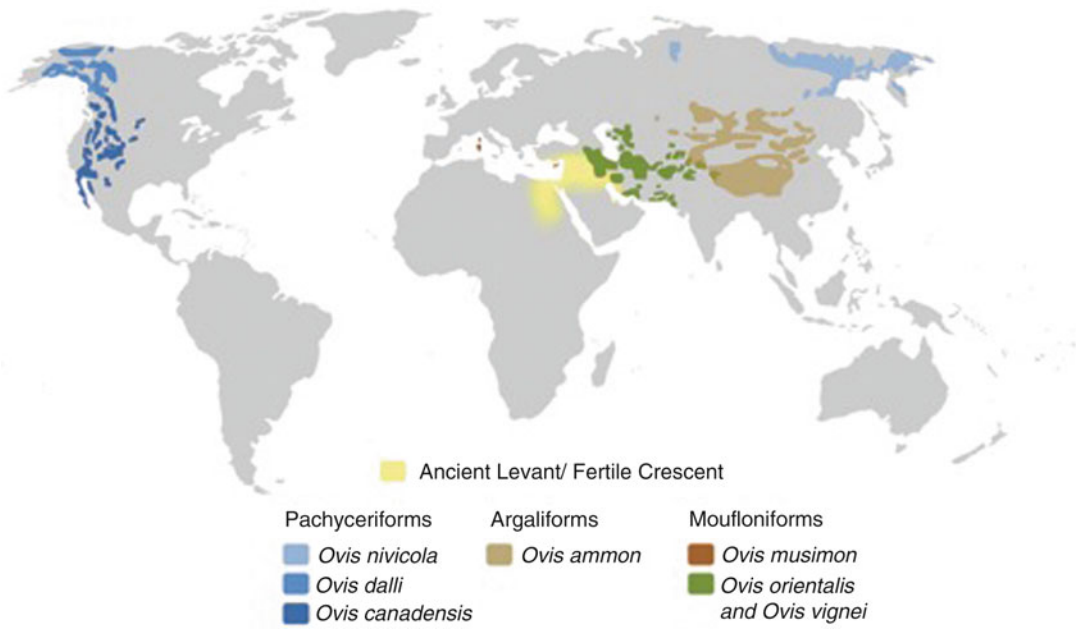

Sheep: Domestication, Fig. 2 Natural global distributions of the seven wild *Ovis species* relative to the center of domestication, the Ancient Levant or Fertile Crescent. *Ovis orientalis* is the proposed progenitor of domestic sheep, *Ovis aries*, although *Ovis species* are known to interbreed where their geographic ranges overlap. Distributions are adapted from the IUCN Red List of Threatened Species. (Image credit D. Meadows)

fertile cross-species hybridizations which can result in odd numbered karyotypes (Bunch et al. 2006). *O. musimon* is considered a feral derivative of early domestic sheep.

More recently, genetic evidence following maternally (mitochondrial) or paternally (Y-chromosomal) inherited data has been used in attempts to elucidate the process of domestication. In domestic animals with controlled matings, a small number of males are often responsible for a disproportionate number of offspring. Genetic data focused on the Y-chromosome suggests two patrilines in domestic sheep, one with a possible European origin and the other a less restricted distribution (Meadows and Kijas 2009). The female mediated picture from mitogenome data has revealed five distinct matrilineages (A-E) that diverged before domestication (Meadows et al. 2011).

Each of these five signatures is present in modern domestic sheep sourced from the Near East, but the frequency with which they occur together decreases with distance away from the center of domestication (Meadows et al. 2011). To date, only *O. musimon* has been shown to share a matriline (B) with domestic sheep in keeping with its classification as a feral domesticate (Meadows et al. 2011). Global analyses of modern domestic sheep have shown matrilineages A, B, and C to be the most common. Studies of ancient DNA taken from sites spanning Bronze Age China demonstrate that A was originally predominant and that B may have been introduced through later trade with the West (Cai et al. 2011). A similar study using diverse breeds of modern domestic sheep calculated that matrilineages A and B expanded at the same time into Europe from the Near East via the Caucasus (~9000 BCE), and that matriline C was introduced ~3,000 years later (Tapio et al. 2006).

Autosomal data paired with archaeological finds have been used to suggest two distinct entry points for thin and fat tailed sheep into Africa. Thin tailed sheep are thought to have arrived first, entering overland from the Levant and spreading west (tomb paintings,

3100–2613 BCE). Fat tailed sheep appeared later in recorded history and dispersed south past the horn of Africa to the continental cape (first depicted 1991–633 BCE) (Gifford-Gonzalez and Hanotte 2011). Autosomal data (endogenous retroviruses) has also revealed that the global colonization of sheep breeds occurred in waves. Improved breeds were shown to replace their primitive counterparts in a pattern of migration which followed that of initial domestication, i.e., from the Fertile Crescent into Europe and Africa, followed by a later phase east across Asia (Chessa et al. 2009). No signature of extant wild introgression has been recorded.

The ability of sheep, *Ovis aries*, to adapt to a range of climatic and dietary extremes, combined with their specialized production traits and ease of transportation, has made this ruminant one of the most valuable domestic animals to man. As access to the past and current ranges of wild sheep increases, archaeological and genetic studies will continue to combine in an effort to elucidate the complex history of sheep domestication.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Goat: Domestication

References

Bunch, T.D., C. Wu, Y.P. Zhang, and S. Wang. 2006. Phylogenetic analysis of snow sheep (*Ovis nivicola*) and closely related taxa. *Journal of Heredity* 97: 21–30.

Cai, D., Z. Tang, H. Yu, L. Han, X. Ren, X. Zhao, H. Zhu, and H. Zhou. 2011. Early history of Chinese domestic sheep indicated by ancient DNA analysis of Bronze Age individuals. *Journal of Archaeological Science* 38: 896–902.

Chessa, B., F. Pereira, F. Arnaud, A. Amorim, F. Goyache, I. Mainland, R.R. Kao, J.M. Pemberton, D. Beraldi, M.J. Stear, A. Alberti, M. Pittau, L. Iannuzzi, M.H. Banabazi, R.R. Kazwala, Y.P. Zhang, J.J. Arranz, B.A. Ali, Z. Wang, M. Uzun, M.M. Dione, I. Olsaker, L.E. Holm, U. Saarma, S. Ahmad, N. Marzanov, E. Eythorsdottir, M.J. Holland, P. Ajmone-Marsan, M.W. Bruford, J. Kantanen, T.E. Spencer, and M. Palmarini. 2009. Revealing the history of sheep domestication using retrovirus integrations. *Science* 324: 532–536.

Dwyer, C.M. 2008. Environment and the sheep. In *The welfare of sheep*, ed. C.M. Dwyer, 41–79. Dordrecht: Springer.

Gifford-Gonzalez, D., and O. Hanotte. 2011. Domesticating animals in Africa: Implications of genetic and archaeological findings. *Journal of World Prehistory* 24: 1–23.

Haber, A., and T. Davan. 2004. Analyzing the process of domestication: Hagoshrim as a case study. *Journal of Archaeological Science* 31: 1587–1601.

Meadows, J.R., and J.W. Kijas. 2009. Re-sequencing regions of the ovine Y chromosome in domestic and wild sheep reveals novel paternal haplotypes. *Animal Genetics* 40: 119–123.

Meadows, J.R., S. Hiendleder, and J.W. Kijas. 2011. Haplogroup relationships between domestic and wild sheep resolved using a mitogenome panel. *Heredity* 106: 700–706.

Tapio, M., N. Marzanov, M. Ozerov, M. Cinkulov, G. Gonzarenko, T. Kiselyova, M. Murawski, H. Viinalass, and J. Kantanen. 2006. Sheep mitochondrial DNA variation in European, Caucasian, and Central Asian areas. *Molecular Biology and Evolution* 23: 1776–1783.

Shell Middens and Coastal Archaeology in Southern South America

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State of Knowledge and Current Debates

Introduction

Shell middens appear in many coastal environments of southern South America. They are normally called "concheros" or "conchales," in Argentine and Chilean coasts, and "sambaquis," in southeastern part of Brazil. These cultural accumulations are shell-bearing middens which can vary in size from a few centimeters to approximately 30 m high and where shell is the major constituent of the sediment matrix. Proportions of

sediments, shell, and cultural inclusions and features vary. Different kinds of activities are represented in those archaeological contexts. Features of dwellings, distributions of artifacts, and animal remains indicate domestic activities. Other shell-bearing middens have been represented as campsites or processing stations. These deposits also served as mortuary contexts all around the coasts of southern South America. They were even used as formal places for mortuary activities, accumulating a large number of human remains in some regions. Visibly, the huge diversity in properties, function, and processes of formation do not appear at a same area. However, research from different coastal settings of southern South America and from different academic traditions agrees that shell-bearing middens, independently of the scale of their formation, are noteworthy features in the landscape which persuade humans to the reuse them.

This essay focuses on concepts and methodological approaches from the Southern Cone. It is a geographic region composed of the southernmost areas of South America, south of and around the Tropic of Capricorn (Fig. 1). Shell mound formations appear in different aquatic environments of that area, but this paper is going to refer to those located in coastal marine environments. Those deposits are present with variable frequency along the littoral regions of southern South America, but not continuously in all settings. It is also remarkable that shell mound formation occurred in some specific coastal locations during the Pleistocene-Holocene transition. Nevertheless, these deposits are significantly more abundant after sea level was established about 7000 to 6000 years ago.

In the Southern Cone, shell midden formations are associated to forager societies with aquatic-orientated subsistence but with diverse

Shell Middens and Coastal Archaeology in Southern South America, Fig. 1 Southern Cone and geographic references mentioned in the text

S

foraging, mobility, and social patterns. In the southeastern coast of Brazil, the sambaquis are mainly identified as mortuary monuments within regional settlement systems of complex fisher-gatherers and hunters. Further south in the Atlantic façade, shell middens indicate the use of coastal environments and its resources by terrestrial hunter-gatherers through alleged movements between the Patagonian coast and the hinterland. Shell midden formations in the southwest coast of South America represent the settlement pattern of marine hunter-gatherers. In sum, shell midden research in the Southern Cone allows one to explore the human-sea relationship at different spatial and temporal scales while concerning diverse subjects in human behavior. Next, this essay provides an overview of the applied concepts and methodological approaches on the matter.

Shell Mounds as Monumental Constructions

Sambaquis is a term that derives from the Tupi language referring to the shell mounds distributed along the coasts of Brazil (Gaspar et al. 2008). These cultural deposits have been more intensively studied between the states of Espirito Santo and Rio Grande do Sul, approximately between 18° and 32° south. Although sambaquis can occur in a substantial variety of environmental settings, including marine ridges, outcrops, dunes, and inland locations faced to large bays, they are mainly located in highly productive bay and lagoon ecotones, which support mangrove ecosystems (Wagner et al. 2011). The sambaquis significantly vary in size and morphology. In fact, this term can refer to small deposits of shell layers, archaeologically dense sequences of shell and sand layers, to huge shell mounds of 50 m high with horizontally and vertically complex stratigraphy (Gaspar et al. 2008, Fig. 2). Proportions and properties of cultural inclusions and features are also highly variable; particularly distinctive are the clusters of human burials. While the smaller shell mounds with less complex stratigraphy may represent campsites, most others with monumental sizes and complex stratigraphy clearly served mortuary functions (Gaspar et al. 2008).

Shell Middens and Coastal Archaeology in Southern South America, Fig. 2 Sambaqui: the person on the top evidences the monumental size of these shell mounds

While chronological information from sambaquis denotes continuity from the early to the late Holocene, most of the radiocarbon data is concentrated between 4000 and 2000 BP (Lima 1999; Gaspar et al. 2008; Wagner et al. 2011).

Between the states of Santa Catalina and Rio de Janeiro, the archaeological record is consistent with marine- and lagoon-orientated foraging activities. Artifactual assemblages are characterized by adzes and polished axes, fishing net weights, hammerstones, lithic vessels, etc. Fishing net weights commonly present polished, performed, or flaked grooves. Fishing activities are also represented by bone technology as hooks, harpoon points, and needles for producing and maintenance of nets. The presence of adzes and polished axes in the archaeological record is interpreted as indirect evidence of boat production. The most distinctive polished stone technology is, however, the realistic zoomorphic sculptures of fish, birds, and mammals; though they are rare items in the archaeological record, they occur in a wide area containing sambaquis. The zooarchaeological record shows a pattern of exploitation of both marine and terrestrial environments. Ichthyoarchaeological studies conducted at the sambaqui Espinheiros II indicate that croakers (*Micropogonias furnieri*) and perches (*Bairdiella* sp.) were the most represented fish resources inside the Babitonga bay. In more open coastal locations near to this bay, the fish bone assemblages are represented by beltfish (*Trichiurus lepturus*) and barred grunt (*Conodon nobilis*). Shellfish gathering was conducted mostly in bays and mangroves; this activity was focused on bivalves (e.g., *Ostrea* sp., *Anomalocardia brasiliana*, *Modiolus brasiliensis*). The consumption of plants was also inferred from human teeth studies (Wagner et al. 2011: 53), though teeth show almost no caries suggesting a low carbohydrate intake (Gaspar et al. 2008: 323).

Further south, at the state of Rio Grande do Sul (between the 32° and 29° south), sambaquis become smaller and are located at the plateaus on the top of marine ridges between coastal lakes and the Atlantic coast. Since the climate is more temperate in this area, mangrove ecosystems are less abundant. Radiocarbon data indicate that occupations occurred later, between circa 3500 and 1100 BP. The artifact assemblages include polished axes, polishers, fishing net and lines weights, lithic vessels, hammerstones, and flakes. Zooliths were also recovered in shell middens of this area. Bone tools are rare, but a diverse technology made on this material was identified for the region: needles and projectiles points from mammal bone, hooks and pendants from fish bone, and spatulas from cetacean bone. Clam (*Mesodesma mactroides* and *Donax hanleyanus*) represents the main shellfish resource and constitutes the primary shell component in the site formations.

During the 1980s, under the influence of cultural ecology theory, the repetitive deposits of shells that characterized the sambaquis were interpreted as long sequences of successive occupations of foragers. Archaeological studies at those times were focused on understanding the human subsistence in relation to the environmental conditions, with a strong emphasis on zooarchaeological research. The stratigraphic imbrication between shell deposits and black units with dense assemblages of fish bones observed in some sambaquis promoted arguments of dietary changes in human societies due to environmental changes and overexploitation of shellfish. These changes were related to a fish intensification process as an overall loss in shellfish productivity. However, ichthyoarchaeological studies conducted at the early 1990s demonstrated that fishing was always a predominant foraging activity among those human societies, which led to the conception of the sambaquis as constructive deposits and not as simple accumulations of waste from subsistence activities (Figuti and Klokler 1996; Villagran et al. 2010). These concepts and studies developed in the last 15 years led archaeologists to consider the sambaquis as monumental constructions, showing that these very visible mounds in coastal flat settings were preferred for burials.

Excavations at Jabuticabeira II provided critical information about the monumental sambaquis and mortuary contexts in the state of Santa Catarina, where bulkier shell mounds are located. The stratigraphic sequence of this site is

composed by an imbricated thick shell layers and fine dark levels integrated with organic matter and fish bone remains. Burials are mainly concentrated in these dark layers associated with artifacts and hearth structures. This evidence led to the interpretation of these sectors of the stratigraphy as mortuary units, and the shell deposits were understood as part of a constructive pattern for covering the human bodies (Klokler 2012). The shell layers are primarily composed by clam valves, especially of the species *Anomalocardia brasiliana*. Clam valves would have been intentionally chosen because of their physical properties which allow less fragmentation, create large volumes, and provide a good drainage. At the same time, the light tone of the shells favors the visibility of the mounds (Klokler 2012).

Shell procurement for construction purposes is also another interesting point in the debate. Villagran and coauthors (2010) analyzed two possible arguments about the provenance and transport of the shells. One possible hypothesis is that the procurement of shells was only associated with construction activities, either that the collection was conducted by the exploitation of valves deposited on inactive coastal landforms (marine ridges, paleo-beaches, etc.) or by the exploitation of living mollusc beds. Another possibility is that the accumulation of shell deposits was the product of shellfish consumption, where waste was reworked later for constructive purposes. In relation to the first argument, radiocarbon data from shell and charcoal samples from the same levels show that used shellfish were contemporary to the occupations at the site and not earlier. On the other hand, stable isotope studies on human remains demonstrated the molluscs were not important staples for those populations. Thus, the more likely explanation is that the gathering activities on shellfish were mainly promoted for construction reasons (Villagran et al. 2010). These authors also suggest that this hypothesis can also be used for explaining the formation of the dark layers: the accumulations of fishbone and other zooarchaeological remains could have been reworked and transported to the shell mounds for construction purposes from residential sites. In fact, the difficulty to locate residential sites related to sambaquis would partially be explained by the practice of these recycling activities (Villagran et al. 2010).

There is a general agreement among archaeologists that the mortuary practices that resulted in shell mound buildings should have played a decisive role in social dynamics (Gaspar et al. 2008). In fact, it has been argued that several significant properties of the coastal archaeological record of southern Brazil provide evidence of social complexity (Lima 1999; see also Lima and Lopez Mazz 2000): (a) a human subsistence based on abundant and stable marine resources, which allow low mobility pattern in lagoons and estuaries; (b) an increase in human demography; (c) the construction of shell mounds required an important labor investment and cooperation; (d) artistic expression of sophisticated forms (zooliths); and (e) evidence of long-range ideological exchange by the presence of artifacts of high symbolic value (zooliths) from thousands of kilometers away.

Shell Midden Formations and Human Mobility Patterns in Arid Coasts

Arid coasts are those areas where deserts and steppes meet marine environments. Shell midden formations are directly related to the human use of the interface between those different ecosystems. The southern South America area offers interesting perspectives on the subject (Martínez and Mitchell 2017): the Patagonian and Fuegian coasts connect steppe regions with the Atlantic Ocean (Fig. 3), and the hyperarid Atacama Desert borders with the highly productive Pacific Rim.

Research and excavations conducted on shell middens along these coasts have shown diverse settlement patterns, zooarchaeological assemblages, and material culture allowing archaeologists to identify a highly variable relationship in human-sea-desert interfaces.

The archaeological locality of Taltal in the Atacama Desert in northern Chile presents the most extensive regional sequence in coastal settlements of southern South America, exposing shell midden formations from the Pleistocene-Holocene transition. Mobility and subsistence strategies assessed from this coastal

Shell Middens and Coastal Archaeology in Southern South America, Fig. 3 Steppe and sea: shell mounds in the Lobos Island near to the Deseado River mouth. (Photo: Miguel Ángel Zubimendi)

record display significant variation throughout the Holocene.

Five shell middens associated to rock-shelters are recorded in this region at the mouth of the Cascabeles Ravine. These sites are dated between 11,400 and 10,000 cal. BP and associated to the Huentelauquén cultural complex (Salazar et al. 2015). The functionality of these contexts is still not clear, but shell midden formations were indicated as the main waste accumulation areas related to occupation of the rock-shelters as non-permanent stationary dwellings. It is possible the sites at the Cascabeles Ravine were part of a wide settlement system where household spaces are currently submerged (Salazar et al. 2015). Similar considerations for the Huentelauquén cultural complex were supported from an archaeological context of Los Vilos in the north coast of Chile (Ballester et al. 2012).

Important changes in settlement patterns from the Early-Middle Holocene transition and along the Middle Holocene were inferred from archaeological studies on the Morro Colorado site, which was interpreted as a residential area (Andrade and Salazar 2011; Salazar et al. 2015). This 35-cm-thick shell midden presents several burned layers throughout the stratigraphic sequence, indicating different moments of reoccupation. Importantly, there was recognition of a pit house formation during Middle Holocene occupations, where previous shell midden strata were excavated and removed for preparing housing place (Andrade and Salazar 2011).

After 7500 cal. BP, shell midden formations become more visible in the coastal landscape, with deposits that reach 1–2 m thick. In this context, it was inferred that the settlement pattern is dominated by residential camps and semipermanent occupations (Castelleti 2007; Salazar et al. 2015). However, shell middens of the Middle Holocene do not always present similar dimensions and artifact compositions, indicating diversity in permanence of occupations and activities at the sites. An increase in complexity of settlement and mobility patterns is observed after 5500 cal. BP, which is related to a reduced mobility. Sites appear as more elaborate structures, where mortuary contexts are below households and waste areas (shell middens) are spatially segregated from them. After 4500 cal. BP, a new drastic change in mobility patterns was recorded in the Taltal region: site formations indicate

Shell Middens and Coastal Archaeology in Southern South America, Fig. 4 Mid-Holocene shell middens in the arid coasts of the San Matías Gulf. (Photo: Florencia Borella)

reduced camp sizes and a decrease in the duration of occupations.

Shell middens can be considered geoarchaeological features, by which human involvement contributes to the shape of the landscape, providing a particular physiognomy to coastal settings (Castro et al. 2001; Favier Dubois and Borella 2007). These mounds are not, however, ubiquitous along the coasts. In Northern Patagonia, recent archaeological research (Favier Dubois and Borella 2011) has shown high densities of shell mounds in the north littoral section of San Matías Gulf, while those middens are very scarce on its western coast. The low frequency of shell middens, and the archaeological evidence in general, on the Western coast indicates a marginal use in terms of occupational intensity (Borrero 2004). Mounds at this area have predominantly little thickness, indicating low reoccupation rates of the sites and/or a lesser importance of shellfish for human subsistence in comparison with other coastal areas of Patagonia (Favier Dubois and Borella 2007). The presence/absence of shell middens could also be related to topographic variations (Favier-Dubois and Kokot 2011) or water procurement (Fig. 4). This last factor is critical and, for example, is related to the lack of native human occupations in the coasts of Northern Patagonia since the eighteenth century (Favier Dubois and Borella 2011).

Spatial analysis of shell middens conducted between the San Jorge Gulf and the Deseado River mouth (Fig. 5), at the southern coast of Patagonia, has shown a discontinuous distribution of shell middens (Castro et al. 2003; Zubimendi et al. 2004). This spatial analysis, considering different sizes and types of sites, indicates significant variation in the density of the archaeological record, indicating different mobility strategies in the use of coastal environments during the Late Holocene. In the San Jorge Gulf, shell middens likely represent a more generic use of the coastal landscapes and resources. Southward, on the coastline near the mouth of the Deseado River, the archaeological record shows a more specific use of the littoral environment with more

Shell Middens and Coastal Archaeology in Southern South America, Fig. 5 Shell mound eroded by the wind in the Lobos Island (north coast of Santa Cruz). (Photo: Miguel Ángel Zubimendi)

redundancy in site occupations and more structured use of space. Mortuary contexts (chenques) and residential sites are spatially segregated at the Punta Medanosa archaeological locality (Castro et al. 2001). This settlement pattern would indicate restricted home ranges to coastal settings (Castro et al. 2001; Zubimendi et al. 2004).

Coastal landscapes with high and low shell midden ubiquity alternate along the Atlantic façade of Patagonia and Tierra del Fuego, opening a wide range of hypotheses about coastal use and mobility patterns of hunter-gatherer populations. In the southern Patagonian coast, near to Vírgenes Cape and Cañadon Gap, the low intensity of shell midden formations is related to discontinuity in the use of coastal environments, indicated by a complete lack of reuse and long temporal gaps in the archaeological record (Borrero and Barberena 2006). Stable isotope studies of human remains show that the use of these coastal settings was linked to high mobility, which ranged to inland areas. A different situation is observed immediately across the Strait of Magellan, in the context of the island of Tierra del Fuego, where archaeological localities like Los Chorrillos and Punta María with large formations of shell mounds were identified as "occupational nodes" in a regional archaeological perspective (Borrazzo et al. 2008).

Shell Middens and the Transformation of Coastlines

The analyses of shell midden distributions in coastal landscapes are useful for considering sea level fluctuations and have provided key information for archaeological research in southern South America. Coastal sea level changes from the late glacial period up to the Mid-Late Holocene are intertwined with hunter-gatherer settlements and their relationships with marine and coastal environments (Fig. 6). Questions concerning archaeological surveys (Reyes et al. 2016a), human subsistence patterns (Favier-Dubois and Kokot 2011; Zangrando et al. 2016), and coastal cultural landscapes (San Román 2014; San Román et al. 2016) are involved in this matter.

Holocene sea levels and paleogeographical reconstructions were used in order to conduct

Shell Middens and Coastal Archaeology in Southern South America, Fig. 6 Huge shell mound (the Posa archaeological site) in the Guaitecas Archipelago, in the northern part of the Western Patagonian Archipelago. It is more than 7 m high and presents occupations between 3400 and 1300 cal. BP (Reyes et al. 2016a). (Photo: Omar Reyes)

broad archaeological surveys for exploring poorly known localities in the Chonos Archipelago in the north of the Western Patagonian Channels (Reyes et al. 2016a). In the Strait of Magellan area and the Otway and Skyring Sounds, surveys have revealed strong correlations between the chronologies of archaeological sites and their locations on marine landforms (San Román 2014; San Román et al. 2016; Fig. 7). The spatial distribution of shell middens was therefore organized by three blocks corresponding to different sea level and time periods. These blocks were also correlated with dissimilar cultural materials leading to the recognition of three distinct cultural traditions (San Román et al. 2016). Two main assumptions appear to be important in this matter: first, a direct relationship between the chronology at the base of the archaeological sites and their location on marine landforms, and second, the marine hunter-gatherer settlements occurred immediately along the coastlines in all settings and progressively with the marine regression during the Holocene. Regarding the first premise, it is important to consider that the ages for the formations of the marine landforms can provide maximum ages for the archaeological record located above them, but not minimum ages. This fact is clearly illustrated, among other examples, by the long archaeological sequence at the Túnel I site (Fig. 8), situated in the Beagle Channel, which clearly shows that the shell midden formation took place at the same location from the Middle to the Late Holocene (Orquera and Piana 1999). The lack of direct association between the age of an archaeological site and the age of the marine landform where it is located was widely recognized by archaeologists

Shell Middens and Coastal Archaeology in Southern South America, Fig. 7 Excavation of shell midden in the Offing Island, western sector of the Strait of Magellan. (Photo: Manuel San Román; San Román et al. 2016)

Shell Middens and Coastal Archaeology in Southern South America, Fig. 8 Archaeological sequence of the Túnel I site (Beagle Channel): several episodes of shell deposition superimposed one on the other in the same place over 6000 years. (Photo: Luis A. Orquera)

in southern South America (Orquera 1984–85; Favier Dubois and Borella 2007; Reyes et al. 2017) Concerning the second assumption, the relation between occupation patterns in coastal settings by marine hunter-gatherers and the coastline evolution does not seem to be apparent in other areas of the Western Patagonian Channels. In the Beagle Channel, there was no correlation between the locations of sites above sea level and their chronology (Barceló et al. 2002). This regional difference between two adjacent archaeological landscapes creates interesting questions concerning how geological and environmental factors can affect the visibility of shell mounds

Shell Middens and Coastal Archaeology in Southern South America, Fig. 9 Shell midden section of the Imiwaia I: shell mounds around a central pit with occupations comprising chronologies from 6400 to 1500 BP. (Photo: Ernesto L. Piana)

and how in turn it influences the cultural interpretations about marine hunter-gatherers.

Fishing, gathering, and hunting activities determine the locations of settlements and the formation and spatial distribution of shell middens in an archaeological scale. Since changes in coastal configuration along the Holocene lead to variations in the distributions of exploitable resources, paleogeographical reconstructions enable a better understanding of the archaeological materials contained in shell middens. An interdisciplinary approach performed at Bajo de la Quinta (San Matías Gulf, Northern Patagonia) allowed the reconstruction of coastal landscape evolution and natural scenarios that could affect human decision-making on the use of the coast and its resources over time (Favier-Dubois and Kokot 2011). The spatial distribution of the archaeological evidence in simulated paleogeographic scenarios suggests that there were changes in fishing practices correlated to changes in coastal configuration through time (Favier-Dubois and Kokot 2011; Favier Dubois and Scartascini 2012). By comparing data from paleogeography and archaeoichthyology, Zangrando et al. (2016) have also been able to evaluate how changes in Holocene coastal geomorphology near the Imiwaia I site (Beagle Channel) influenced hunter-gatherer subsistence (Fig. 9). These results show that the abundance and taxonomic diversity recorded in ichthyofaunal assemblages at Imiwaia I coincide with the environmental expectations arising from paleogeographic reconstructions of the Cambaceres Bay during the Middle and Late Holocene.

Shell Middens as Niche Construction

Shell middens are very conspicuous accumulated forms in the coastal landscapes of the Beagle Channel. In the Cambaceres area, along a coastline of approximately 13 km and surrounding emplacements, Bjerck et al. (2016) have reported

more than 1200 structures. Archaeological surveys have also shown that more than 90% of the shell middens are located within 300 m of the coastline (Barceló et al. 2002). Although different shell midden types were recorded in that region (Orquera and Piana 1989–1990), the ring-shaped mounds are the most frequent feature, with a tendency to be clustered in large sites (Piana and Orquera 2010; Bjerck et al. 2016).

Excavations conducted in the Beagle Channel over 40 years indicate that the formation of shell middens resulted from repeated occupations at the same place. These reoccupations are indicated both by short-term but continuous accumulation rates of shells and by the reuse of the same places after long-term hiatus. This constant pattern in the archaeological landscape of the Beagle Channel leads archaeologists to assign a special role to shell midden formation, determining later use of space for human settlements (Piana and Orquera 2010). No evidence of seasonal-based bias in site formations was recorded (Estévez and Vila 2006). Ethnographic sources indicate that huts were located in these depressed sectors, and when people move to other place, those housing structures were neither turned down nor damaged. The abandoned hut could be later used by new occupants (Piana and Orquera 2010). Actualistic research, by the building of huts with similar shape, size, and constructive patterns to those observed in the ethnographical sources, shows that branched structures can last during several years (Piana and Orquera 2010). Ethnographic information also suggests that residential movements occurred frequently in a short time span, and lack of variation in the dimensions of the shell mound pits along the archaeological sequence does not allow us to assume significant variations in human mobility patterns in the last 6000 years (Orquera and Piana 1999). Central pits in shell mounds normally have diameters between 3 and 4 m (Barceló et al. 2002).

Initial settlement can occur as a consequence of multiple factors, such as a need for shelter, proximity to shell beds, access to water supply, etc. But once the first shell disposal happens, a repeated deposition of shells in the same location takes place, motivated by social and practical reasons. This pattern implies adding new volume of shell material to the mounds, increasing the depth of the pit leading to constraints in drainage because of rain and snowmelt. When a shell mound reaches an impractical size, a new adjacent hut may be raised, having part of the previous mound act as basal protection from wind and rain. Thus, new accumulations of shell mounds could have taken place around the new structure, progressively producing an agglomeration of ring-shaped mounds (Piana and Orquera 2010; Fig. 10).

The reuse of shell middens is also related to other visibility factors. Shell accumulations produce a high concentration of $CaCO_3$ in soils, modifying the environmental conditions for ground vegetation. Actually, vegetative covers of shell middens are colonized by particular species of grasses with distinctive green tones, which can be identified from long distances (Piana and Orquera 2010). This particularity was noted by Charles Darwin when he travelled areas bordering the Beagle Channel. In his travel diary he wrote (Darwin 1839: 234): "The inhabitants, living chiefly upon shell-fish, are obliged constantly to change their place of residence; but they return at intervals to the same spots, as is evident from the pile of old shells, which must often amount to some tons in weight. These heaps can be distinguished at long distance by the bright green colour of certain plants which invariably grow on them."

A Final Reflection: Shell Mounds, Visibility, and Potential Biases

The above discussion indicates that shell middens and shell mounds are cumulative structures, the product over years to centuries of multiple episodes of shell and cultural material deposition superimposed in the same location. Multiple occupations at the same spot are promoted by the visibility of these deposits, which could have resulted from conscious or unconscious factors. Therefore, shell middens archaeologically result in complex structures with a variable sequence of use and significance. This attribute leads to

Shell Middens and Coastal Archaeology in Southern South America, Fig. 10 Panoramic view of an agglomeration of shell mounds at the Cambaceres Bay (Beagle Channel). (Photo: Atilio Francisco Zangrando)

consider the shell middens as very high resolution deposits to the point of being able to define a certain number of occupations along an archaeological sequence (Estévez and Vila 2006). However, a paradox appears on this matter since it is quite possible that multiple occupations at the same spot produce a partial removal of successive deposits and a mixing of the different episodes of deposition (Bailey 2007, 2009). This assumption makes it difficult to divide the shell mound structures into their individual constituent episodes, but it is possible to identify patterns in overall site structure and trajectories through time, which can be interpreted in the light of additional information on variable patterns of site use and dwelling (Bailey and Galanidou 2009). Not ignoring the time-averaged nature of shell mounds, elaborate excavation techniques (Orquera and Piana 1992) and geoarchaeological studies (Villagran et al. 2010) have shown compelling results for understanding the formation processes of the mounds and their implications on social and subsistence practices of humans.

Shell middens are visible deposits of the past; they naturally attract archaeologists as locations with prehistoric coastal occupations and because of their good preservational context in comparison to other types of archaeological records. Shell middens are normally assumed as major archaeological indicators of human marine-orientated economies, and the occurrence and distribution of these deposits are evoked as an increase in the intensity of exploitation of marine resources. However, these assumptions can produce some biases in our understanding of those societies. Considering that shell mound formation represents a complex process where geological, ecological, and cultural factors interact (Reyes et al. 2017), one important precondition for the occurrence and visibility of shell middens is the local availability of shellfish and the persistence of the mollusc supply concurrent with changes in sea level and shoreline ecology (Bailey 2009). Thus, the lack of availability of shellfish restricts both the visibility and the good preservational context in the coastal archaeological record. In conclusion, it is not possible to

assume that the absence of shell middens is not in itself evidence for absence of littoral settlements along shorelines or the development of human marine-orientated economies (Bailey 2009). This simple observation, though rarely considered, has important implications for coastal archaeological research, especially to those concerning the first adaptations of native peoples to marine environments where shell gathering is not necessarily assumed as the primary human practice.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Early Peopling of the Atacama Desert
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Landscape Archaeology
- ▶ Maritime Landscapes
- ▶ Sambaquis Shell Mounds, Archaeology of
- ▶ Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia

References

Andrade, P., and D. Salazar. 2011. Revisitando Morro Colorado: comparaciones y propuestas preliminares en torno a un conchal arcaico en las costas de Taltal. *Taltalia* 4: 63–83.

Bailey, G. 2007. Time perspectives, palimpsests and the archaeology of time. *Journal of Anthropological Archaeology* 26: 198–223.

Bailey, G. 2009. Shell mounds, palimpsests and the dynamics of archaeological site visibility. In *Humans, evolution and environment*, British archaeological reports international series S2026, ed. E. Crubezy, E. Cunha, and B. Ludes, 1–9. Oxford: Archaeopress.

Bailey, G., and N. Galanidou. 2009. Caves, palimpsests and dwelling spaces: Examples from the upper Palaeolithic of south-east Europe. *World Archaeology* 41: 215–241.

Ballester, B., D. Jackson, M. Carré, A. Maldonado, C. Méndez, and R. Seguel. 2012. An early Holocene task camp (~8.5 kcal BP) on the coast of the semi-arid north of Chile. *Antiquity* 86: 88–98.

Barceló, J.A., E.L. Piana, and D.R. Martinioni. 2002. Archaeological spatial modelling: A case study from Beagle Channel (Argentina). In *Archaeological informatics: Pushing the envelope, computer applications and quantitative methods in archaeology*, British archaeological reports British series 1061, ed. G. Burenhult and J. Arvidsson, 351–360. Oxford: Archaeopress.

Bjerck, H.B., A.F. Zangrando, H.B. Breivik, E. Piana, and J. Negre. 2016. *Marine ventures: The Cambaceres surveys, Tierra del Fuego, Argentina*. Trondheim: NTNU Vitenskapsmuseet arkeologisk rapport.

Borrazzo, K., F.M. Martín, R. Barberena, and L.A. Borrero. 2008. Geografía cultural y circulación humana en el norte de Tierra del Fuego. In *Arqueología del extremo sur del continente americano. Resultados de nuevos proyectos*, ed. L.-A. Borrero and N. Franco, 227–249. Buenos Aires: Dunken.

Borrero, L. 2004. The Archaeozoology of Andean "Dead ends" in Patagonia: Living near the continental ice cap. In *Colonisation, migration, and marginal areas. A Zooarchaeological approach*, ed. M. Mondini, S. Muñoz, and S. Wickler, 55–61. Oxford: Oxbow Books.

Borrero, L., and R. Barberena. 2006. Hunter-gatherer home ranges and marine resources. *Current Anthropology* 47: 855–867.

Castelleti, J. 2007. Patrón de Asentamiento y uso de recursos a través de la Secuencia ocupacional prehispana en la costa de Taltal. Unpublished PhD dissertation, Universidad Católica del Norte – Universidad de Tarapacá.

Castro, A., J.E. Moreno, M. Andolfo, and M.A. Zubimendi. 2001. Distribución espacial de sitios en la localidad de Punta Medanosa, Santa Cruz (Argentina). *Relaciones de la Sociedad Argentina de Antropología* 26: 303–321.

Castro, A., J.E. Moreno, M. Andolfo, R. Gimenez, C. Peña, L. Mazzitelli, and P. Ambrústolo. 2003. Análisis distribucionales en la costa de Santa Cruz (Patagonia Argentina): Alcances y resultados. *Magallania* 31: 69–94.

Darwin, C.H. 1839. Journal and remarks. In *Narrative of the surveying voyages of his Majesty's ships adventure and beagle between the years 1826 and 1836, describing their examination of the southern shores of South America, and the Beagle's circumnavigation of the globe*, vol. 3. London: Henry Colburn, Great Marlborough Street.

Estévez, J., and A. Vila. 2006. Variability in the lithic and faunal record through 10 re-occupations of a XIX century Yamana Hut. *Journal of Anthropological Archaeology* 25: 408–423.

Favier Dubois, C., and F. Borella. 2007. Consideraciones acerca de los procesos de formación de concheros en la costa norte del Golfo San Matías (Río Negro,

S

Argentina). *Cazadores Recolectores del Cono Sur, Revista de Arqueología* 7: 152–165.

Favier Dubois, C., and F. Borella. 2011. Contrastes en la costa del golfo: una aproximación al studio del uso humano del litoral rionegrino en el pasado. In *Arqueología de Pescadores y Marisqueadores en Norpatagonia. Descifrando un registro de más de 6000 años*, ed. F. Borella and M. Cardillo, 13–42. Buenos Aires: Editorial Dunken.

Favier Dubois, C.M., and F.L. Scartascini. 2012. Intensive fishery scenarios on the North Patagonian coast (Río Negro, Argentina) during the Mid-Holocene. *Quaternary International* 256: 62–70.

Favier-Dubois, C.M., and R. Kokot. 2011. Changing scenarios in Bajo de la Quinta (San Matías Gulf, Northern Patagonia, Argentina): Impact of geomorphologic processes in subsistence and human use of coastal habitats. *Quaternary International* 245: 103–110.

Figuti, L., and D. Klokler. 1996. Resultados preliminaries dos vestígios zooarqueológicos do sambaqui Espinheiros II (Joinville, SC). *Revista do Museu de Arqueologia e Etnologia* 6: 169–187.

Gaspar, M.D., P. Deblasis, S.K. Fish, and P.R. Fish. 2008. Sambaqui (Shell Mound) societies of coastal Brazil. In *Handbook of south American archaeology*, ed. H. Silverman and W.H. Isbell, 319–335. New York: Springer.

Klokler, D. 2012. Consumo ritual, consumo no ritual: festins funerários e sambaquis. *Habitus, Goiânia* 10: 83–104.

Lima, T.A. 1999–2000. Em busca dos frutos do mar: os pescadores/coletores do litoral centro-sul brasileiro. *Revista Universidade de São Paulo* 44: 270–327.

Lima, T.A., and J. López Mazz. 1999–2000. La emergencia de complejidad entre los cazadores recolectores de la costa atlántica meridional sudaméricana. *Revista de Arqueología Americana* 17–19: 129–175.

Martínez, G., and P. Mitchell. 2017. Introducing Coastal Deserts. *The Journal of Island and Coastal Archaeology* 12: 1–7.

Orquera, L.A. 1984–85. Tradiciones culturales y evolución en Patagonia. *Relaciones de la Sociedad Argentina de Antropología* XVI: 249–273.

Orquera, L.A., and E.L. Piana. 1989–1990. La formación de los montículos arqueológicos de la región del canal Beagle. *Runa* XIX: 59–82.

Orquera, L.A., and E.L. Piana. 1992. Un paso hacia la resolución del palimpsesto. In *Análisis espacial en la Arqueología Patagónica*, ed. L. Borrero and J.L. Lanata, 21–52. Buenos Aires: Ayllu.

Orquera, L.A., and E.L. Piana. 1999. *Arqueología de la región del canal Beagle*, Tierra del Fuego, República Argentina. Buenos Aires: Sociedad Argentina de Antropología.

Piana, E.L., and L.A. Orquera. 2010. Shell midden formation at the Beagle Channel (Tierra del Fuego, Argentine). In *Monumental questions: Prehistoric megaliths, mounds and enclosures*, British archaeological reports international series 2122, ed. D. Calado, M. Baldia, and M. Boulanger, 263–273. Oxford: Archaeopress.

Reyes, O., M. San Roman, and F. Morello. 2016a. Searching for maritime hunter-gatherer archaeological record in the shifting shorelines of the South Pacific Coast (Chonos and Guaitecas archipelago, Chile). In *Marine ventures. Archaeological perspectives on Human-Sea relations*, ed. H.B. Bjerck, H. Breivik, S. Fretheim, E.L. Piana, B. Skar, A. Tivoli, and A.F. Zangrando, 141–155. Sheffield: Equinox.

Reyes, O., M. San Roman, and F. Morello. 2016b. Searching for maritime hunter-gatherer archaeological record in the shifting shorelines of the South Pacific Coast (Chonos and Guaitecas archipelago, Chile). In *Marine ventures. Archaeological perspectives on Human-Sea relations*, ed. H.B. Bjerck, H. Breivik, S. Fretheim, E.L. Piana, B. Skar, A. Tivoli, and A.F. Zangrando, 141–155. Sheffield: Equinox.

Reyes, O., C. Méndez, M. San Román, and J.P. Francois. 2017. Earthquakes and coastal archaeology: Assessing shoreline shifts on the southernmost Pacific coast (Chonos archipelago 43°50′-46°50′S, Chile, South America). *Quaternary International*. (in press).

Salazar, D., V. Figueroa, P. Andrade, H. Salinas, L. Olguín, X. Power, S. Rebolledo, S. Parra, H. Orellana, and J. Urrea. 2015. Cronología y organización económica de las poblaciones arcaicas de la costa de Taltal. *Estudios Atacameños* 50: 7–46.

San Román, M. 2014. Sea-level changes and coastal peopling in southernmost pacific South America: Marine hunters from Patagonia. In *Encyclopedia of global archaeology*, ed. C. Smith, 6515–6525. New York: Springer Science Business Media.

San Román, M., O. Reyes, J. Torres, and F. Morello. 2016. Archaeology of maritime hunter-gatherers from southernmost Patagonia, South America: Discussing timing, changes and cultural traditions during the Holocene. In *Marine ventures. Archaeological perspectives on Human-Sea relations*, ed. H.-B. Bjerck, H. Breivik, S. Fretheim, E.L. Piana, B. Skar, A. Tivoli, and A.F. Zangrando, 157–174. Sheffield: Equinox.

Villagran, X.S., D. Klokler, P. Nishida, M.D. Gaspar, and P. Deblasis. 2010. Lecturas estratigráfias: Arquitectura funeraria y depositación de residuos en el sambaquí Jabuticabeira II. *Latin American Antiquity* 21: 195–216.

Wagner, G., K. Hilbert, D. Bandeira, M.C. Tenório, and M.M. Okumura. 2011. Sambaquis (shell mounds) of the Brazilian coast. *Quaternary International* 239: 51–60.

Zangrando, A.F., J.F. Ponce, M.P. Martinoli, A. Montes, E. Piana, and F. Vanella. 2016. Paleogeographic changes drove prehistoric fishing practices in the Cambaceres Bay (Tierra del Fuego, Argentina) during the middle and late Holocene. *Environmental Archaeology: The Journal of Human Paleoecology* 21: 1–11. https://doi.org/10.1080/14614103.2015.1130888.

Zubimendi, M.A., A. Castro, and J.E. Moreno. 2004. Una aproximación hacia la definición de modelos de uso de la costa norte de Santa Cruz. *Magallania* 32: 209–220.

Shell Middens in North America

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Introduction

Sites classified as shell middens have been identified by archaeologists on every inhabited continent and in every coastal area throughout the world since the mid-nineteenth century (Claassen 1998). Considering the high calcium content of shellfish remains, shell middens often contain amazingly preserved organic materials such as bone and textiles. They often have incredibly complex stratigraphic sequences as well, which helps to understand their usage over time. Given their high visibility and the fact that they are often threatened by erosion and development, shell midden sites are currently being destroyed at increasing rates.

Since shellfish beds (and essentially shell middens) are reliant upon stabilized sea levels, most shell midden sites date between 10,000 and 300 years ago. However, the frequency of shell midden sites throughout the world varies widely and is often connected to the presence of hunter-gatherer groups within a given region (Allen 2017) here. For example, the presence of shell middens in Europe often wanes during the Mesolithic/Neolithic transition (Milner 2002), while Native American groups were still reliant upon shellfish resources up until and even during the Contact Period on both the East Coast (i.e., seventeenth and eighteenth centuries) and the West Coast (i.e., eighteenth and nineteenth centuries). Notable exceptions include historic sites left from various local shell button industries (e.g., in Muscatine, IA; Leavenworth, IN; and St. Mary's, WV) (see, for example, Claassen 1994).

Definition

The term "shell midden" is a well-established site type in North America used to describe archaeological sites that contain large and dense deposits of freshwater and/or marine shellfish that were transported and/or somehow used by site inhabitants. Shell midden archaeology focuses on the use and significance of these sites through time and how they shed light on past human behavior and lifeways. "Shell mound," "kitchen midden," and "shell heap" have been used by archaeologists through time when discussing dense shell-bearing sites. Shell mound is still a commonly used phrase in the international archaeology community. Shell midden is the most commonly used term, while shell mound is a regionally preferred term throughout North and South America and tends to signify shell-bearing sites with great depth and a certain moundedness (Thompson et al. 2016). To be clear, while the same site type, "shell midden," is used across the globe, these sites are quite regionally diverse and did not necessarily serve the same function across cultures.

Historical Background

The genesis of American shell midden archaeology is largely dependent on early archaeological work across the Atlantic. The first large-scale investigation into dense shell sites of human origin was conducted in Denmark in the 1840s. Here the Royal Academy of Copenhagen established a three-man committee, which included Dr. Forchhammer (a geologist), Dr. Steenstrup (a zoologist), and Dr. Worsaae (an archaeologist), to investigate the dense shell sites on the Danish coast. Through their work, they accomplished two main things (Steenstrup et al. 2002 [1851]). First, they coined the site type "*kjoekkenmoedding,*" which translates to mean kitchen midden (later called shell heaps or shell middens in English). Secondly, they proved through excavations that these sites were created by humans and were not natural formations, as many previously believed.

It was not for a full decade after these early reports were published in Danish that Adolphe

Morlot translated their work into English (Morlot 1861). According to his reading of Forschhammer, Steenstrup, and Worsaae's reports, Danish *kjoekkenmoeddinger* had the following fifteen defining traits: (1) they were Stone-Age/hunter-gatherer sites, (2) they contained food refuse; (3) they showed evidence for long-term deposition, (4) they varied in 3-dimensional size and shape, (5) they were very close or within 2-miles of the shore, (6) they showed no evidence for stratification, (7) they had a predominately shell matrix, (8) they were part of or near a habitation, (9) they contained dense charcoal and ash deposits, (10) they had no floral remains, (11) they contained many shellfish species, (12) they contained many bird and mammal species, (13) they showed evidence that wild and/or domesticated dogs were eaten, (14) they showed evidence for seasonality, and (15) they did not contain human remains or burials (Morlot 1861). While some of these characteristics were likely assumptions based on the nascent nature of archaeology at the time (i.e., kjoekkenmoeddinger contained no floral remains), and while many of these characteristics are similar to shell midden sites throughout the world, some of these characteristics are not true of regional shell midden sites. In short, early-nineteenth-century research in Denmark established that *kjoekkenmoeddinger* (shell middens) were Stone Age sites that were the accumulation of shellfish food remains, an assumption that would not be contested until the late twentieth century.

Shell midden archaeology in America and beyond was highly influenced by these early Danish researchers, although regional shell midden sites are unique in terms of specific characteristics, form, and function. The next generation of late-nineteenth-century archaeologists inspired by the early Danish work included Dall (Aleutian Islands), Matthew (Canada), Morse (Japan), Putnam (Eastern United States), Rau (Eastern United States), Schumacher (Northwest Coast, United States), and Wyman (Northeastern and Southeastern United States) to name just a few. These researchers wanted to understand the complexities of these sites in a regional context and went into the field to identify and better understand local shell middens. Wyman was one of the first to conduct an in-depth investigation of shell middens in America (Wyman 1868). A trained doctor and the first curator at Harvard's Peabody Museum of Archaeology and Ethnology, Wyman traveled throughout coastal Maine and Massachusetts in the 1860s, accompanied by former students Frederick Ward Putnam and Edward S. Morse, to identify shell middens and to collect specimens for the Peabody's growing collection. Wyman was well versed in the earlier Danish work as well as Morlot's translations and was clear that these sites "yield nothing which indicates as high an antiquity as those of the old world" (Wyman 1868: 571).

One early debate that took hold in shell midden archaeology during the late nineteenth century related to the fact that many shell middens in the United States, for example, contained human remains. This information led early researchers to claim that widespread cannibalism existed among these groups. Researchers argued that if shell middens were places for food refuse disposal, then the presence of human remains signified the consumption of human flesh as well. In many instances, this spawned from and fed into assumptions at the time regarding Native people as "savage." In hindsight, many of these human remains were likely intentional human burials (both primary and secondary). Shell middens also provided evidence to some researchers that Native peoples in American had "uncivilized" taste leading up to European contact. For example, upon researching shell middens in Maine and Massachusetts (USA), Jeffries Wyman explained "Although the kinds of meat used were in the main palatable, the natives certainly did not hesitate to make use of some which did not commend themselves to the taste of civilized people" (Wyman 1868: 575). Not only did Native groups engage in cannibalism throughout the continent, but also their eating habits were uncivilized. The language in many early publications (and even today) describes shell midden sites as dirty, disorganized locales where people came, quite literally, to *throw* their trash. This is an assumption that becomes increasingly problematic when shell

midden sites contain intentional human burials, dog burials, and other potentially sacred spaces.

Key Issues/Current Debates

Shell midden formation processes: Shell midden sites are perhaps some of the most stratigraphically complex sites excavated by archaeologists (Stein 1992). One of the most thorough case studies on this point is the British Camp, which was a shell midden site that was occupied for at least two millennia on what is now San Juan Island, Washington. Here Stein and her crew excavated hundreds of facies (layers), which were identified depending on varying percentages of carbonate and artifactual data (Stein 1992). The British Camp showed that weathering and ground water movement, rather than simply cultural activity, can affect many layers at archaeological sites.

While it is clear that shell midden sites are stratigraphically complex sites, the term "shell midden" implies a certain similarity of form and function, as already discussed (Roksandic et al. 2014). Taking a rather theoretical approach, Bailey (2007) has referred to shell middens as "cumulative palimpsests" where "the successive episodes of deposition, or layers of activity, remain superimposed one upon the other without loss of evidence, but are so re-worked and mixed together that it is difficult or impossible to separate them out into their original constituents" (Bailey 2007: 204). In response to this, Moore (2015) has looked closely at the Green River sites in the southeastern United States and to break down the multitude of activities that occurred at these sites over generations into isolated events (i.e., burying a loved one, eating a meal, etc.). In essence, Moore takes a dwelling versus a building perspective. In the former, people dwell "in an ever-evolving lifeworld," while in the latter, people must first build a world before they can move in it (Moore 2015: 65–66). This perspective relates to site formation practices, although it is decidedly more agent-based.

Shell midden function: Historically, shell middens have been interpreted as places for food refuse disposal. Debates around the usefulness of the vague and all-encompassing site type "shell midden" began in the late 1980s with Widmer (1989), who urged that archaeologists should classify these sites in a way that did not *assume* site functionality (i.e., food refuse disposal). Widmer (1989) suggested differentiating between shell middens sites, shell middens, shell-bearing midden sites, and shell-bearing habitation sites, although few archaeologists classify their sites according to these criteria. Also, more neutral and all-encompassing terms like "shell-bearing site" or "shell matrix site" have been suggested, although the term "shell midden" has been hard to remove from the general archaeological lexicon (Claassen 1998).

In Claassen's (1991) chapter on "Normative Thinking and Shell-Bearing Sites," she strengthens Widmer's (1989) conclusion that we should refer to archaeological sites bearing shell as shell-bearing sites because "to use a more specific label would require the investigator to assess formation processes" (Claassen 1991: 252). Claassen (1991: 283) is quite clear that "Far too often in shell 'midden' research, basic correlations between human behavior and shell or site formation are assumed when they should be hypothesized." As a result, archaeologists may have "a false sense of knowledge upon which successive interpretations are built" (Claassen 1991: 284).

More recently Marquardt (2010: 551) reviewed the many proposed functions of shell mounds in the southeastern United States (also referred to as shell middens, shell heaps, shell rings, and shell works), which include "feasting, monumentality, burial ceremonialism, and identity signaling." Marquardt questions the boundaries between all of the terminology surrounding dense shell sites, asking "But when do shell mounds qualify as monuments? As ceremonial sites? As temple mounds? As indicative of feasting behavior? What makes a shell mound a 'shell work' or a 'shell ring'? I argue that much depends on the initial assumptions of the analyst and on her or his calculus of verification" (Marquardt 2010: 554). This piece brings up important issues with archaeological terminology as correlated with site form and function, which

are not yet resolved (Claassen 2010). Marquardt's work correlates with the author's dissertation research in Massachusetts, where several professional archaeologists admitted that although hundreds of shell midden sites were listed in the state's site files, "real" shell middens did not exist in the area (see Kirakosian 2014). There are clearly regional struggles with the application of this terminology, especially when archaeologists so steadily recognize it globally.

Shell middens and local chronologies: Before the advent of radiocarbon dating, shell middens were vital in establishing regional master chronologies and stone tool and pottery typologies, given their stratigraphic complexities and high artifact content. Research into these areas took hold in the culture-historic period in archaeology although this research has continued until the present day (see, for example, Rick et al. 2014; Pluckhahn and Thompson (2017)). Indeed, shell middens aided Worsaae when he created his first basic chronology and were also hugely important to the establishment of early chronologies and stone tool typologies of southern California and Massachusetts (Gallegos 1987; Kirakosian 2014).

Sampling shell midden sites: Shells from shell middens were not routinely collected at all from shell midden sites until well within the twentieth century (Claassen 1998). In many regions, only shells made into tools were collected from shell midden excavations until well into the twentieth century. Collecting shellfish from shell midden sites became much more common place after field methods became more rigorous and strategic. Since shell middens contain such large quantities of shell, researchers have often struggled with how to sample these sites and collect representative samples without collecting tons of shell per site. Sampling shell midden sites becomes increasingly complicated because oftentimes shell middens are so large, that site boundaries are not full established. Field strategies to adequately sample shell midden sites have ranged from trenching, augering, coring, and collecting flotation samples, although approaches vary regionally as well (Claassen 1998; Stein 1992; Waselkov 1987).

Quantifying shell middens: In the United States, quantifying shellfish remains by weight has been a common practice since its genesis by E.W. Gifford and the California School of Midden Analysis during World War I (Mason et al. 1998). Many have used weight to infer the amount of shell meat brought to a site, although this approach fails to account for the effects of taphonomy. Another chronic problem with using shell weights occurs when a small number of samples are used to make generalizations about a site, with the assumption that shell middens are homogeneous. Weights also mask the fact that some species have very heavy shells and little meat and vice versa. MNI is also more reliable in terms of estimating species abundances and it is faster than weighing; calculating weight requires one to separate all of the fragments into groups by species, which can be very difficult with heavily fragmented shell, while calculating MNI only requires separating out the non-repetitive elements by species and counting those. Finally, MNI is a better method for statistical analysis because it is a "discrete, interval-scale level measurement" (Mason et al. 1998: 309). With this in mind, weights are not as useful when looking at questions of population dynamics and overexploitation (Mason et al. 1998). Weight is the most reliable, according to Glassow (2000: 413), for highly fragmented shell assemblages, while using MNI would be more appropriate with largely fragmented shells or if the shell quantities are not high per excavation unit. Such choices would also certainly depend on the species involved, the preservation, the screen-size used, and/or the number of flotation samples taken at the site. Weight can be less reliable than MNI because it is affected by so many other variables, such as site preservation, screen size, shell weight and age by taxa, shell fragmentation. However, one could argue that many of these variables also affect MNI. In many cases, using MNI is more reliable, while using weight can lead to false interpretations (Mason et al. 1998). Calculating both weight and MNI may be the best approach, although both can be affected by methodological choices like screen-size.

Dietary reconstructions: Shell middens provide interesting information about ancient diet. Shell midden data often reflect ancient population's reliance on shellfish. However, the reverse can also be true. For example, stable isotope analyses on the human remains buried at the Turner Farm site in Maine showed that "the site's Susquehanna tradition occupants, surrounded by the riches of the sea, apparently made little use of them, consuming less marine protein than any other coastal population known to us" (Bourque 2007: 2). It is also important to point out that because shell preserves quite well and shell middens are quite large, this may lead to certain biases in terms of archaeological interpretations on the importance of shellfish resources to ancient peoples. With this in mind, it is also true that shellfish are also collected for purposes other than direct human consumption, such as bait (Claassen 1998).

Interestingly, early research here focused on Optimal Foraging Theory, which may have biased archaeological understandings reconstructions of shellfish consumption. Assumptions about efficiency and effort are called into question when ethnographic accounts are taken into consideration (i.e., Meehan 1982). In some early studies, in order to estimate rough population size that could have been sustained by a particular midden, the number of calories was calculated based on the number of shells present and the time in which the midden was formed. These estimates relied on many assumptions, of course, and are not generally standard practice today.

The dietary implications of isotope analysis are intriguing, although due to concerns over the treatment of Native American human remains, few studies of this kind have occurred in the United States over the past few decades. Some early carbon and nitrogen isotope research that relied in part on shell midden data from Nantucket, MA, led Little and Schoeninger (1995: 364) to conclude that the Late Woodland period diet of indigenous Nantucketers was reliant on marine foods much more so than "the dominance of mammal bone in the archaeological shell middens indicates." Interestingly, these isotope data show a heavier reliance on fish, although few fish bones show up in local shell middens. In short, Little and Schoeninger (1995: 351) believe that the Late Woodland Nantucket diet was "40–65 percent oceanic animals, with the rest consisting of substantial amounts of animals from salt marsh and eelgrass meadows or of maize, and minor amounts of C3 plants and their consumers." As their data were inconclusive in terms of the importance of maize within the diet, the authors called for more research to decipher the difference between maize and salt marsh and seagrass meadow resources, which have a similar signature.

Trade and craft specialization: Shell middens sites also show evidence for larger trade networks and regional craft specialization. A reconnaissance survey by Mitchell and Foster (2000) on outlying prehistoric Hohokam shell middens in Sonora, Mexico, offered evidence that the Hohokam and other local groups were going into modern-day Mexico for over a millennium to gather raw shell for ornament production. The Hohokam are known for their shell craftsmanship, which moved extensively throughout the southwest regional trade. These shell middens also show evidence that some shellfish species were collected for food as well, based on the breakage patterns of many species.

In New York, the mid-seventeenth-century Fort Massapeag is believed to be a locale of wampum manufacture during the height of the Fur Trade (Cantwell and Wall 2003). A shell midden found just outside the fort's palisade walls contained shells in all stages of wampum manufacture as well as tools associated with wampum production. Researchers have estimated that this site was "a place where the Passapequas, probably those living in the nearby village, gathered to make the money that joined their economy with those of Europeans and Iroquoian peoples in the interior" (Cantwell and Wall 2003: 138). This site shows yet another complex and unique story behind an American shell midden site.

Shell middens as socially significant spaces: As already suggested, shell midden sites offer many clues about past lifeways beyond dietary choices and environmental variability. One shell midden in particular that has been the subject of

discussions surrounding gender and social status differentiation in the past is the Indian Knoll Site. Located on the Green River in Kentucky, this shell midden site contained hundreds of burials dating to the Archaic period and contained tens of thousands of artifacts, including copper and marine shell artifacts. The inclusion of these artifacts among burials, including male, female, and children's burials, shows that such prestigious objects were not solely possessed by any one age group or gender (Jefferies 1996). Analyses of human remains from this site also show relatively little difference between the health of the larger population, implying that those interred in the Indian Knoll site lived in a largely egalitarian society with some social differentiation based on a complex array of individual factors (Jefferies 1996).

While shell midden sites like Indian Knoll have illuminated the ancient past, they can also shed light on the more recent history of archaeological science and the paradigmatic shifts and times of the archaeologists working on such sites. For example, starting in the 1980s, archaeologists began to reconsider the conclusions of earlier researchers on sites like Indian Knoll. When initially excavated in the 1930s as part of the WPA program, William Webb (and later Howard Winters) connected certain artifact types to activities that both men assumed were decidedly male or female in nature (i.e., food-processing as female activities while trade and hunting were solely male spheres). In particular, Winters found the inclusion of atlatl weights in women's graves particularly difficult to explain. In their seminal paper, *Archaeology and the Study of Gender*, Conkey and Spector (1984: 11) explain that comparing the archaeological evidence at such sites to the archaeological interpretations can show "how preconceived notions about gender arrangements can confuse, in fact contort, archaeological interpretations."

In the Northwest Coast, Moss (1993) has shown how shellfish, gender, and status were inextricably linked in complex ways. Using archaeological, ethnographic, and ethnohistoric data, she examines the ways in which shellfish had dietary, economic, social, and symbolic importance among the Tlingit. Here women consumed shellfish in larger quantities than men, although women's consumption of shellfish was highly regulated at certain times (i.e., during menstruation). This may be complicated, however, by the fact that shellfish were seen in historic times, as "less desirable" foods, making consumption somewhat taboo to openly discuss and therefore underreported. This is important to take into consideration as well, when comparing ethnographic and ethnohistoric data to archaeological data in the region, which shows an increase in the presence of shell midden sites after 5500 B.P. (Moss 1993). In short, scant "ethnographic data on shellfish may be partly responsible for some archaeologists regarding shellfish as inconsequential resources" (Moss 1993: 631).

Symbolic significance of shell: Regions with many shell midden sites with unique contents and configurations, like the Green River in Kentucky, have led researchers over the past few decades to closely consider the symbolic significance of shell in various regions throughout the United States. For example, Claassen hypothesizes that the Green River shell middens might have been restricted to the Archaic period (AKA Shell Mound Archaic) because of human agency – namely women's choices. According to her theory, women did not just collect shellfish for economic purposes, but because "of its prestige value, because it provides social enjoyment, because it fits with child rearing, or because it allows one to realize spiritual goals" (Bruhns and Stothert 1999: 72). The Shell Mound Archaic, according to Claassen, was connected to the economic and religious significance of shellfish and its association with fertility. As a result, the collecting and mounding of shell on this level ceased with the introduction of plant domesticates. In this vein, "Claassen postulates that the old religious metaphors were mooted by new ideas associated with the cycle of planting, growing, and harvesting, and that the gourd replaced the shell as the most provocative fertility symbol" (Bruhns and Stothert 1999: 73). Shell middens in this region were still important as residential and ritual locales, although many were capped by soil versus shells, which were subsequently discarded elsewhere.

Working in the Northeastern United States, Kerber (2002) also contends "shellfish could have been collected for both consumption of the meat and ideology of the shell" (Kerber 2002: 24). In this and other regions throughout American, he is also "curious of the myriad reasons why burials were put within deposits also containing shellfish remains, and, conversely, why shells individually and/or collectively were placed in burials" (Kerber 2002: 27). Until rather recently however, shellfish remains were almost always directly and unquestionably linked to dietary practices.

International Perspectives

Varied promising research on shell middens has occurred outside of the United States. While it is impossible to highlight even a small fraction of the important work that has been done to further shell midden research throughout the world, the work of a few key researchers and organizations is highlighted. For example, Meehan (1982) completed one of the first ethnoarchaeological projects, in which she documented shellfishing practices among the aboriginal Anbarra women in Australia. Her work was highly influential and has shed light on the diverse lived experiences surrounding shellfishing that might have been otherwise overlooked by archaeologists.

The work of British archaeologist Geoff Bailey is also quite noteworthy, as his work spans shell midden research throughout Europe, Australia, the Near East, and Africa. One of his more recent projects has involved stable isotope research on human bones dating from the Mesolithic and Neolithic to better understand dietary shifts between these two time periods. His work on the Weipa shell mounds in New Zealand has been quite interdisciplinary and far-reaching and has included surveying and excavating shell mounds, tracing the changing shoreline of the region, dating shell mounds, looking at palaeoenvironmental and palaeoclimatic data, as well as recording the oral histories of the Napranum community, who are the traditional Owners of this region. Also, as the Principal Investigator of the Dynamic Landscapes, Coastal Environments & Human Dispersals (DISPERSE) project, Bailey has also collaborated on ground-breaking shell midden explorations on the Farasan Islands in the Red Sea, which involved underwater archaeology and remote-sensing to map palaeoshorelines (Hausmann et al. 2015). Since so little is known about these shell middens, fieldwork here has been highly exploratory since 2006. Bailey also organized a fruitful conference at the University of York in 2005, which resulted in another important book on the topic of shell middens in Europe (Milner et al. 2007). Another fruitful meeting, organized by Bailey and Karen Hardy, focused on "Shell Energy" and was held in Dakar, Senegal, in 2008 and resulted in an edited volume of the same name (Bailey et al. 2013). In 2011, Bailey was also part of a team that tested a new method of amino acid racemization (AAR), which has far-reaching implications for shell midden research throughout the world (Demarchi et al. 2011). In short, Bailey's work touches upon many diverse specialties that have far-reaching implications for shell midden researcher across the world.

The Archaeomalacological Working Group (AMWG) of the International Council for Archaeozoology (ICAZ) is an important group that focuses in part on shell midden research. Looking back at the topics of their meetings since 2005 also gives a sense of shifting research trends over the past decade:

- 2005: The Status of Archaeomalacology in the twenty-first Century (Gainesville, Florida)
- 2006: Shells of Mollusca: Environmental Adaptations, Ideological Expressions (Mexico City, Mexico)
- 2008: Not only food (Santander, Spain)
- 2010: Archaeomalacology: Shells in the Archaeological Record (Paris, France)
- 2012: Advancing Method, Enhancing Understanding: Technique and Narrative in Archaeomalacology (Cairns, Australia)
- 2014: Global Patterns in the Exploitation of Animal-Based Raw Materials: Technological and Socio-Cultural Issues (San Rafael, Argentina)
- 2016: Methods in our Madness: Approaches to Archaeomalacology (Kirkwall, Orkney Island)

Future Directions

Shell midden archaeology has seen many developments over the past century. The future of this specialty will likely involve collaborations with researchers outside of archaeology around increasingly complex, yet relevant research questions. For example, there is much work yet to be done on shell middens and paleoenvironmental reconstructions and how these can inform climate change science. Shell midden analysis can also help biologists understand species diversity and habitat loss through time. Research into shell beyond diet also has great potential, including the spiritual significance of shell within shell midden sites throughout the world. Ethnographic research into shell collecting and shell midden formation processes, similar to Meehan's early work, could help with many unanswered questions surrounding these topics. In short, archaeologists studying shell middens must form interdisciplinary teams to better understand these complex sites and their varied significance in the past as well as in the twenty-first century.

Cross-References

► Molluscs (Invertebrates): Analyses in Environmental Archaeology

References

Allen, Michael J., ed. 2017. *Molluscs in archaeology: Methods, approaches and applications*, Studying scientific archaeology. Vol. 3. Oxford: Oxbow Books.

Bailey, Geoffrey 2007 Time Perspectives, palimpsests and the archaeology of time. Journal of Anthropological Archaeology 26:198–223.

Bailey, Geoff N., Karen Hardy, and Abdoulaye Camara, eds. 2013. *Shell energy: Mollusc shells as coastal resources*. Oxford: Oxbow Books.

Bourque, Bruce J. 2007. *Diversity and complexity in prehistoric maritime societies: A gulf of maine perspective*. New York: Plenum Press.

Bruhns, Karen Olsen and Karen E. Stothert 1999 Women in Ancient America. Norman: University of Oklahoma Press.

Cantwell, Anne-Marie E., and Diana diZerega Wall. 2003. *Unearthing Gotham: The archaeology of New York city*. New Haven: Yale University Press.

Claassen, Cheryl. 1991. Normative thinking and shell-bearing sites. In *Archaeological method and theory*, ed. Michael Schiffer, vol. III, 249–298. Tucson: University of Arizona Press.

Claassen, Cheryl. 1994. Washboards, pigtoes, and muckets: Historic musseling ubdustries in the Mississippi watershed. *Historic Archaeology* 28 (2): 1–145.

Claassen, Cheryl. 1998. *Shells*. Cambridge: Cambridge University Press.

Claassen, Cheryl. 2010. *Feasting with shellfish in the Southern Ohio Valley: Archaic sacred sites and rituals*. Knoxville: The University of Tennessee Press.

Conkey, Margaret W., and Janet D. Spector. 1984. Archaeology and the study of gender. *Advances in Archaeological Method and Theory* 7: 1–38.

Demarchi, Beatrice, Matthew G.M. Williams, Nicky Milner, Nicola Russell, Geoffrey N. Bailey, and Kirsty Penkman. 2011. Amino acid racemization dating of marine shells: A mound of possibilities. *Quaternary International* 239 (1-2): 114–124.

Gallegos, Dennis. 1987. *San Dieguito-La Jolla: Chronology and controversy*. Research paper no. 1. San Diego: San Diego County Archaeological Society.

Glassow, Michael A. 2000. Weighing vs. counting shellfish remains: A comment on mason, Peterson, and tiffany. *American Antiquity* 65: 407–414.

Hausmann, Niklas, Matthew Gregory Meredith-Williams, and Geoff N. Bailey. 2015. Results of recent excavations on the Farasan Islands and studies of large-scale prehistoric shellfish gathering in the Red Sea. In *Muge 150th: The 150th anniversary of the discovery of mesolithic shellmiddens – volume 2*, ed. Nuno Bicho, Cleia Detry, T. Douglas Price, and Eugénia Cunha, 301–314. Cambridge: Cambridge Scholars Publishing.

Jefferies, Richard W. 1996. Hunters and gatherers after the ice age. In *Kentucky archaeology*, ed. R. Barry Lewis, 39–77. Lexington: The University Press of Kentucky.

Kerber, Jordan E. 2002. Interpreting Diverse Marine Shell Deposits of the Woodland Period in Southern New England: Interrelationships Among Subsistence, Symbolism, and Ceremonialism. Bulletin of the Massachusetts Archaeological Society 63 (1,2): 24–34.

Kirakosian, Katharine Vickers. 2014. Curious Monuments of the Simplest Kind: Shell Midden Archaeology in Massachusetts, 1868-2008. Ph.D. dissertation, Department of Anthropology, University of Massachusetts Amherst.

Little, Elizabeth A., and Margaret J. Shoeninger. 1995. The late woodland diet on Nantucket Island and the problem of maize in Coastal New England. *American Antiquity* 60 (2): 351–368.

Marquardt, William H. 2010 Shell Mounds in the Southeast: Middens, Monuments, Temple Mounds, Rings, or Works? American Antiquity 75 (3):551–570.

Mason, R.D., M.L. Peterson, and J.A. Tiffany. 1998. Weighing vs. counting: Measurement reliability and the California School of midden analysis. *American Antiquity* 63: 303–324.

Meehan, Betty. 1982. *Shell bed to shell midden*. Canberra: Australian National University.

Milner, Nicky. 2002. Oysters, cockles and kitchenmiddens: Changing consumption practices at the Mesolithic/Neolithic transition. In *Consuming patterns and patterns of consumption*, ed. P.T. Miracle and N. Milner, *89–96*. Cambridge: McDonald Institite.

Milner, Nicky, Oliver E. Craig, and Geoff N. Bailey. 2007. *Shell middens in Atlantic Europe*. Oxford: Oxbow Books.

Mitchell, Douglas R., and Michael S. Foster. 2000. Hohokam shell middens along the sea of Cortez, Puerto Peñasco, Sonora, Mexico. *Journal of Field Archaeology* 27 (1): 27–41.

Moore, Christopher R. (2015) Hunter-Gatherer Histories: The Role of Events in the Construction of the Chiggerville Shell Midden. In The Archaeology of Events: Cultural Change and Continuity n the Pre-Columbian Southeast, ed. Zachary I. Gilmore and Jason M. O'Donoghue, 62–76. Tuscaloosa: University of Alabama Press.

Morlot, Adolphe. 1861. *General views on archaeology.* Trans. Philip Harry, Esq. Smithsonian Institution Annual Report for 1860:284–343.

Moss, Madonna L. 1993. Shellfish, gender, and status on the northwest coast: Reconciling archaeological, ethnographic, and ethnohistorical records of the Tlingit. *American Anthropologist* 95 (3): 631–652.

Pluckhahn, Thomas J., and Victor D. Thompson. 2017. Woodland-period mound building as historical tradition: Dating the mounds and monuments at crystal river (8CI1). *Journal of Archaeological Science Reports* 15: 73–94.

Rick, Torben C., Leslie A. Reeder-Myers, C. Jane Cox, Stephanie T. Sperling, Alex Jansen, and Anson H. Hones. 2014. Shell middens, cultural chronologies, and coastal settlement on the rhode river sub-estuary of Chesepeake Bay, Maryland, USA. *Geoarchaeology* 29 (5): 371–388.

Roksandic, Mirjana, Sheila Mendonça de Souza, Sabine Eggers, Meghan Burchell, and Daniela Klokler, eds. 2014. *The cultural dynamics of shell-matrix sites*. Albuquerque: University of New Mexico Press.

Stein, Julie, ed. 1992. *Deciphering a shell midden*. San Diego: Academic Press.

Steenstrup, J. J. S., G. Forchhammer, and J. J. A. Worsaae 2002 [1851] The Discovery of Kitchen Middens from the Stone Age. In The Neolithisation of Denmark: 150 years of debate, edited by Anders Fischer and Kristian Kristiansen, pp. 37–44. J.R. Collis Publications, Sheffield.

Thompson, Victor D., William Marquardt, Alexander Cherkinsky, Amanda Roberts Thompson, Karen Walker, and Lee Newsom. 2016. From shell midden to shell mound: The geoarchaeology of mound key an anthropogenic island in Southwest Florida, USA. *PLOS One* 11 (4): e0154611.

Waselkov, Gregory. 1987. Shellfish gathering and shell midden archaeology. In *Advances in archaeological method and theory*, ed. Michael Schiffer, vol. XI, 93–210. San Diego: Academic Press.

Widmer, Randolph. 1989. Archaeological research strategies in the investigation of shell-bearing sites, a Florida perspective. Paper delivered at the annual meeting of the society for American archaeology, Atlanta.

Wyman, Jeffries. 1868. An account of some kjoekkenmoeddings, or shell-heaps, in Maine and Massachusetts. *American Naturalist* I (2): 561–584.

Shell Middens of the Arabian Sea

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Introduction

In 1848, the Danish Academy of Sciences and Letters promoted the formation of a commission whose scope was to study a phenomenon well-known along the northern coasts of Denmark. The main purpose of the commission, originally called Lejra Commission, was to verify whether the presence of oyster heaps along the coast of Jutland was due to natural causes or to some kind of human activity, as the presence of archaeological implements on the surface of Krabbesholm would suggest (Andersen 2000). The discovery of an impressive shell midden at Meilgård, in the Jutland Peninsula, where the commission, composed by J.J.A. Worsaae, J.J.S. Steenstrup, and J.G. Forchhammer, collected knapped stone tools and animal bones, showed for the first time that the shell mounds were undoubtedly prehistoric sites and not simply natural formations due to the ocean's waves and that the heaps of shells were just accumulations of food refuses (Kristiansen 2002).

The excavations carried out a few years later by J.J.A. Worsaae demonstrated for the first time that the impressive shell mound of Meilgård was a prehistoric site and not a sequence of naturally deposited over-imposed layers of marine shells and sterile horizons. Moreover, the site was undoubtedly to be attributed to a period preceding the Neolithic on the basis of the lithic finds and

wild animal bones. This type of sites was called *Køkkenmødding* (shell midden) a term later systematically employed in the archaeological literature (Szabó 2017). Following this discovery, the first excavation of one of the most important shell middens of Denmark, Ertebølle, was carried around the end of the 1800s (Fischer and Kristiansen 2002). At present we know that the shell middens of Denmark are to be attributed to different periods of prehistory and that their presence is probably due to the variable saline content of the ocean and consequently to the possibility of exploiting different marine resources.

Definition

As mentioned above, shell middens greatly contributed to the study of the early development of archaeology in Denmark and other Scandinavian countries in particular (Gräslund 1987). They are well-known from many countries around the world, among which are those along the coasts of the Arabian Sea. Though they have simply been defined as "refuse deposits in which molluscan shell is one of the major constituent materials" (Szabó 2017: 772), they consist of important archaeological archives, rich of different types of organic material, whose study can provide us with much information regarding the diet followed by their inhabitants, seasonality of occupation, characteristics of the landscape around the sites and its logistic use, as well as changes that affected the local environment due to either natural events or human interference. The study of shell middens tells us the way coastlines changed through time, how and when people moved or migrated, and the periods when marine, mangrove, and riverine ecosystems were exploited (Codding et al. 2014) by mobile or more sedentary fisher-gatherers. Moreover, shell middens can be radiocarbon dated because of the presence of a great variety of food refuses, mainly marine or mangrove or freshwater mollusks, as well as charcoal and other organogenic remains, among which are fish, turtle, and mammal bones.

Shell middens are often distributed in areas of so-called ecological tension, that is, areas very favorable to the exploitation of different environments, where all the resources necessary to the subsistence of their inhabitants were available. Though many shell sites are composed mostly of food refuses, nevertheless some show that other activities were practiced, among which is the production of ornaments and other specific items, among which are lime and bite for fishing or for preservation and later consumption (Szabó 2017: 779–780). They have been classified into four categories, according to their main characteristics: composition, function, exclusive recurrence of shellfish, and presence or not of habitations, burial grounds, and other types of consistent or ephemeral structures, among which are hearths and fireplaces (Claasen 1991: 252) that might help improve our knowledge regarding activities practiced at the sites and their eventual ethnoarchaeological interpretation (Hardy et al. 2016).

Historical Background

The shell middens described and discussed in this paper were discovered or excavated along the western and northern coasts of the Arabian Sea and the Gulf of Oman (Fig. 1). A few more were excavated in the Gulf of Aden by the Russian archaeological expedition in Yemen (Amirkhanov 2006: 534–583). The impressive urban development that took place in this part of the Arabian Peninsula during the last 50 years led to an intensification of both rescue and research archaeological excavations and surveys that were promoted mainly by the governments of the United Arab Emirates (UAE) and the Sultanate of Oman. In contrast archaeological research was not very productive along the northern coast of the Arabian Sea. This was due to political problems, among which are instability and insecurity, absence of interest by local authorities, universities' inactivity, and logistic difficulties. In effect, except for the geoarchaeological surveys carried out by Professor A.R. Khan of the Department of Geography, Karachi University in the late 1970s (Khan 1979), the French Archaeological Expedition in Makrani Balochistan (Sanlaville et al. 1991), and the Italian Archaeological Expedition

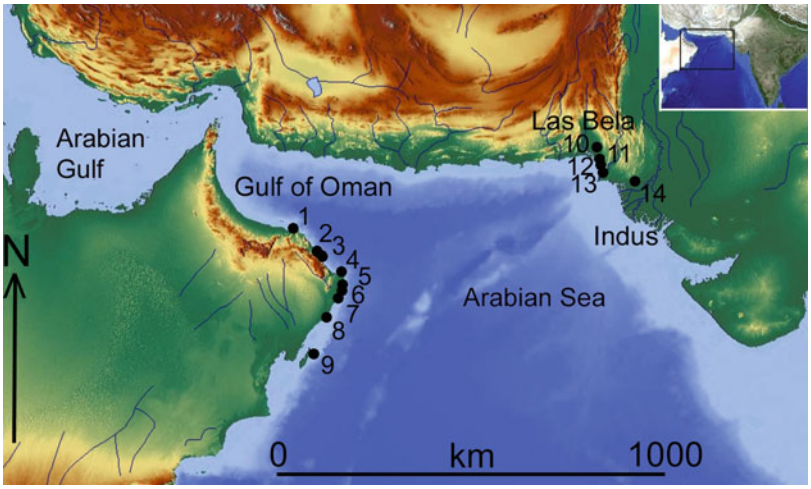

Shell Middens of the Arabian Sea,
Fig. 1 Distribution map of some of the most important sites mentioned in the text. Ra's al-Hamrā (1), Khor Milkh (2), Ash Shab (3), Ra's al-Hadd (4), Ra's al-Khabbah (5), Ra's Ruways (6), Suwayh (7), Ra's Jibsh (8), Masirah (9), Lake Siranda (10), Daun Bay (11), Ras Gadani (12), Sonari and Pir Shah Jurio (13), and the Makli Hills (14). (Drawing by P. Biagi)

in Lower Sindh and Las Bela (Balochistan) and the Indus delta (Sindh) between 2007 and 2014, very little attention has ever been paid to the prehistoric archaeology of this very important coastal region (Biagi et al. 2016).

According to the chronicles of the classical authors, both the Arabian Sea coastlines discussed in this entry were settled by groups of fish-eaters (*ichthyophagoi*) at least during Hellenistic times and the first centuries AD. The two countries have similar landscapes and share comparable environmental conditions. Broadly speaking, these semiarid regions are rich in sandy or gravelly deposits whose bare, treeless surfaces in many cases have favored the discovery of prehistoric sites or isolated items. Moreover, both coastlines are affected by seasonal monsoon episodes, though with different intensity and precipitation rates (Snead 1969; Gupta 2004). In both regions, shell middens have been found close to the shore of ancient lagoons that began to dry up around the end of the Bronze Age and progressively disappear following the climate worsening that took place in that period, which led to the present arid conditions and contributed to the collapse of the Indus Civilization (Berger et al. 2013).

In the Sultanate of Oman, many shell aceramic middens have been discovered at the top of flat, rubified limestone terraces protruding toward the sea, often located close to the mouth of wadi courses. The available data show that around the beginning of the Holocene, the general climate of the region was more humid than that of the present. In this period many mangroves flourished along the shores of shallow lagoons, where watercourses flew into the Arabian Sea (Berger et al. 2005). This fact is confirmed also by the composition of the faunal and charcoal remains identified from the shell middens of both regions. Moreover, the recovery of fish hooks made from marine shell, double-pointed bone gorges, and net sinkers obtained from beach and wadi pebbles shows that in many cases (e.g., in the Sultanate of Oman), the subsistence economy of their inhabitants was based not only on the collection of marine and mangrove shells but mainly on fishing, the exploitation of mangal resources, and in some cases hunting and also the breeding of domestic animals (Woodman 2013).

One of the main problems to be faced in the study of Arabian Sea shell middens regards their chronology. It is well-known that the marine and mangrove shells yield different $\delta^{13}C$ (positive in the case of marine specimens and negative in the case of mangrove samples), and they both are problematic to calibrate according to the different areas from which the samples have been collected. These problems have already been discussed in many papers written by several authors who reached controversial results (see, for instance, Biagi 1994; Uerpmann and Uerpmann 2003; Biagi et al. 2012; Zazzo et al. 2012). In the case of the shell middens of Las Bela and Lower Sindh,

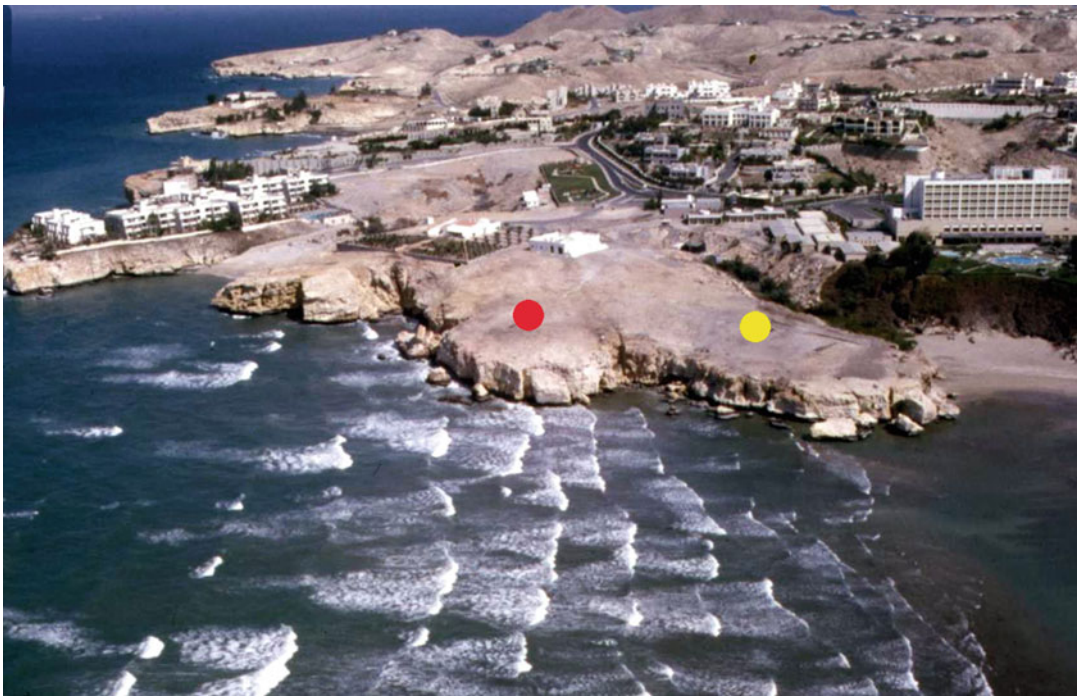

Shell Middens of the Arabian Sea, Fig. 2 The Cape of Ra's al-Hamrā with the location of sites RH-5 (yellow dot) and RH-10 (red dot) excavated by the Italian Archaeological Mission. (Helicopter photograph by R. Salm 1986)

their calibration has been obtained according to the data provided by a core drilled in the ocean, ca 300 km north of port Okha, with a regional mean of 229 ± 27 ^{14}C years. The calibrated dates have been compared with those obtained from charcoal retrieved from Chalcolithic (Amri culture) and Bronze Age sites (Indus Civilization) of the same region, with good results. However, the calibration of the Omani shell middens is still controversial because of the variety of locations, material and laboratories employed especially during the last 30 years, and the absence of a systematic program of dating.

Current Debates

The Western Coast of the Arabian Sea

The first shell middens of the Oman Peninsula were discovered in the 1970s on the cape of Ra's al-Hamrā (Red Cape) at Muscat (Durante and Tosi 1977) by R. Jäckli of Petroleum Development Oman (PDO). The headland protrudes toward the sea at the southern end of the Batinah coast (Fig. 2). It faces a unique, very productive marine ecosystem that still nowadays is intensively exploited in some seasons because of its richness (Biagi and Nisbet 1993). Most of the Ra's al-Hamrā shell middens lie at the top of this flat, rubified limestone terrace that elongates east of the mouth of Wadi Aday. Here the rich freshwater supply of the wadi course favored the formation of the Qur'm mangrove swamp, at present a national park (Uerpmann and Uerpmann 2003). In contrast, the oldest shell midden so far known discovered in the same area, RH-6, is located on a lower terrace, very close to the right bank of the same wadi (Fig. 3), just a few meters above the maximum high reached by the tide (Biagi 1999). Most of the Ra's al-Hamrā shell middens were destroyed before the end of the 1970s due to increasing building expansion. During those years, only a few Ra's al-Hamrā sites were partly excavated or test-trenched (RH-3, RH-4, RH-5, RH-6, RH-7, and RH-10), and just one was partly preserved for future research (RH-6).

Shell Middens of the Arabian Sea, Fig. 3 The mouth of Wadi Aday and the mangrove swamp of Qur'm with the location of site RH-6 (yellow dot). (Helicopter photograph by R. Salm 1986)

The radiocarbon dates obtained during many years of excavations carried out at Ra's al-Hamrā constitute the backbone of the chronology of the Holocene peopling of the northern coast of the Sultanate (Biagi 1994). During the mid-Holocene period, shell middens started to be settled and sometimes used also for other purposes, as graveyards, for example. The radiocarbon chronology of the Ra's al-Hamrā shell middens was developed almost exclusively from samples of marine and mangrove shells, as well as terrestrial and mangrove charcoals collected from the almost uninterrupted sequences of two neighboring shell middens: RH-6 and RH-5. All samples were processed at East Berlin (former DDR) radiocarbon laboratory headed by H. Quitta (Bln-). The results showed that the two sites were repeatedly (seasonally?) inhabited throughout a period of ca 1000 years each, roughly from the middle of the seventh to the second half of the fifth millennium BP, with a gap of a few centuries between the sequences of the two sites (RH-6, from 6530 ± 60 BP, Bln-3637/II to 5750 ± 60 BP, Bln-3636/I; RH-5, from 5395 ± 85 BP, Hv-10925 to 4730 ± 60 BP, Bln-3135). A few more dates were obtained also from sites RH-3, RH-4, and RH-10 (Biagi 1994).

The importance of fish in the diet of the RH-5 inhabitants has been interpreted thanks to the study of the bone remains, where fish represents ca 80% of the total assemblage (Fig. 4). According to their results, Uerpmann and Uerpmann (2003: 180) concluded that fishing of small species, among which are sardines, was one of the main strategies followed by the inhabitants of RH-5, though their marine subsistence economy relied mainly on larger fishes. This observation is suggested also by the presence of different types of shell fish hooks, bone gorges, and net sinkers made from stones (Uerpmann and Uerpmann 1996: 134).

At least four Omani shell middens yielded evidence of local shell fish hooks manufacture. At RH-6, fish hooks made from *Pinctada*

Shell Middens of the Arabian Sea, Fig. 4 Location of the site GAS-1 at Wadi Shab, near the white house along the terrace facing the Arabian Sea in the background. (Photograph by P. Biagi 1992)

radiata marine shells started to be produced locally during the first two centuries of the sixth millennium BP, according to a series of radiocarbon dates obtained from the archaeological layers where the shell hook workshop was uncovered (5980 ± 60 BP, Bln-3641/I and 5830 ± 80 BP, Bln-3640/I; Biagi 1999: 41). However, the radiocarbon evidence from other sites, namely, GAS-1 at Ash Shab (Fig. 5), Khor Milkh near Tiwi, and Ra's al-Khabbah (Cavulli and Scaruffi 2011), shows that shell hooks continued to be manufactured in a similar way throughout the entire fifth millennium BP. Net sinkers of oval or spherical cross section made from wadi or beach pebbles are characterized by pecked or sawn notches or one or two engraved lines. They have been found in large numbers from many middens of the Oman coast, together with other ground stone tools among which are different types of hammerstones, crushing stones, and anvils. The net sinkers vary in size, shape, type, weight, and technology of manufacture. Their variability might reflect different fishing techniques practiced at the sites according to the variability of marine environment and most probably also chronology.

Some of the Omani shell middens are multistratified (see RH-6 and RH-5 at Muscat, for instance). Their sequences consist of overimposed and intercalated layers and lenses of marine and mangrove shells (*Terebralia palustris*), fish, green turtle (*Chelonia mydas*), wild and domestic mammal bones, ash, charcoal, and wind-blown sand (Biagi and Nisbet 1999: 46). Many sites yielded evidence of different types of structures. The commonest consists of semicircular or circular dwelling features delimited by postholes or small C-shaped narrow canals, postholes, (rubbish) pits, hearths, and fireplaces (Biagi and Nisbet 2006).

Primary and secondary graves were also excavated from some of the middens. The most important prehistoric cemetery so far discovered is that of RH-5 (Fig. 5). It was excavated in the 1980s during six long seasons. The graveyard

Shell Middens of the Arabian Sea, Fig. 5 Tombs from the prehistoric graveyard excavated at RH-5 by S. Salvatori of the Italian Archaeological Mission. (Photograph by P. Biagi 1984)

extends over a surface of ca 160 sqm within a well-defined area of the settlement site. The cemetery was not in use throughout the entire life of the site (for its absolute chronology, see Biagi and Nisbet 2006: 226). It yielded the remains of 215 individuals, buried in three main different ways, most of whom passed away at 20–25 years of age. They were uncovered from 121 grave pits. Most bodies were found crouched on their left side within simple oval pits, with their hands placed in front or just under the face (Salvatori 2007; Zazzo et al. 2012). Secondary burials have also been recovered, as well as sparse bones of partly burnt skeletal remains sometimes in anatomical connection, scattered within a wide circular structure delimited by a line of stones. Arrowheads made of shark fishes were also recovered from this latter area. The grave goods consisted of simple, personal ornaments made from oceanic shells, among which are fish-like pendants, necklaces, and bracelets, as well as earrings, and a few beads, made from green steatite, and a few real pearls.

A long survey was carried out between 1983 and 1988 along the coast of Oman from Muscat, in the north, to Ra's Sharbitat, at the Dhofar border. It showed for the first time that shell middens are present also in other parts of the coastline, though their characteristics vary region by region as well as their chronology.

The first sites were discovered along the coasts of the bay of Bandar Khayran, a few kilometers east of Muscat, where 12 shell middens composed almost exclusively of heaps of marine bivalves (*Anadara uropigimelana*) were found and radiocarbon dated to different periods of the sixth millennium BP. Moving southward, the coastal strip between Dibab and Qalhāt revealed the presence of more shell middens. The shell midden of Dibab is located on a limestone terrace facing the ocean at the mouth of Wadi al-Araybiyin. This site was radiocarbon dated to the sixth millennium BP by a sample of marine shells. Similar dates were obtained from the important site of GAS-1 located on a high terrace facing the ocean at the mouth of Wadi Shab. The coastal strip that elongates between Sur and Ra's al-Hadd also yielded evidence of many sites, the highest number of which was discovered around the gulf of Khawr al-Jaramah. The remains of an important, though still undated village made of stone structures, were discovered close to Shiya (SHI-4east). Interestingly enough, the shell midden of Sur is located inside the walls of a Portuguese fort (Biagi 1988) (Fig. 6). Moving south of the cape of Ra's al-Hadd, other shell middens were discovered at Ra's al-Khabbah, Ra's Ruways, Ra's al-Sharik, Ra's Jibsh, Ra's Halat, Ra's Shirab, Ra's Hadid, and Suwayh, where the site SHW-11 was radiocarbon dated to the end of the eighth millennium

Shell Middens of the Arabian Sea, Fig. 6 The shell midden of Sur located inside the walls of the Portuguese fort. (Helicopter photograph by R. Salm 1986)

BP (Lézine et al. 2002; Berger et al. 2013). The surveys made between 1983 and 1988 showed the great archaeological potential the Omani coastal zone. They also showed that the Oman coast is rich in good-quality, knappable chert and jasper outcrops that were both exploited by prehistoric communities during different ages at least from the Neolithic to the Bronze Age.

Moreover, recent surveys promoted by the French Archaeological Mission in Oman, along the coasts of the Island of Masirah, led to the discovery of many prehistoric sites among which are shell middens, the most important of which are the Neolithic settlement of Ra's Dah, the oldest so far discovered in Oman, and the Early Bronze Age sites of Jebel Sfaiq and Marsis-A. According to the French colleagues, further investigations of these sites might shed light "...on the arrival of the famous 'black boats of Magan', loaded with products from far away 4500 years ago, as well as that of other, earlier boats, made of reeds or even logs. Eight thousand years ago, Neolithic populations would have easily crossed the 20 km that separated the island from the continent. This history of the first Neolithic peoples seeking new territories has yet to be written" (Charpentier et al. 2013: 12).

The Northern Coast of the Arabian Sea

The surveys, carried out by the Italian Archaeological Mission along the northern coast of the Arabian Sea in Las Bela province of southeastern Balochistan (Pakistan) between 2000 and 2014, led to the discovery of three main areas with evidence of palaeo-mangroves. They are located either close to the present coastline or a few kilometers inland, in the territory that extends between Miāni Hor (Sonmiāni Lagoon), in the north, and the Hab River mouth, in the south. Thanks to a systematic program of radiocarbon dating, 84 assays were obtained from specimens of *Terebralia palustris* and *Telescopium telescopium* mangrove gastropods and 22 more from seashells (*Purpura panama*, *Meretrix* sp.,

Ostreidae, *Lunella coronata*, *Turbo bruneus*, Mactridae). The radiocarbon dating program, still underway, provides us with a first detailed data set aimed to the reconstruction of the early exploitation of mangal resources that took place in the region between the mid-Holocene Atlantic period and the present (Biagi et al. 2016). According to the available data, mangrove swamps started to be exploited most probably during second half of the ninth millennium BP. This fact is suggested by one radiocarbon result obtained from a fragment of a bivalve seashell with a negative $\delta^{13}C$ of −4.44 that shows its mangrove provenance. The specimen was retrieved from the surface of a Mesolithic site discovered in the Kadeji River gorge (KDJ-1, GrA-63862, 8275 ± 45 BP), ca 40 kms north of Karachi, in Lower Sindh (Biagi 2018).

As reported above, the archaeological research still underway has been coupled with a program of systematic radiocarbon dating of mangrove (*T. palustris* and *T. telescopium*) and seashells. Its scope is to define the chronology and intensity of exploitation of the local mangal forests by prehistoric communities and to interpret the changes that took place in the coastal region that extends between Las Bela and the Indus delta throughout a period comprised between the beginning of the Holocene and the present. Moreover, it aims to study not only the typological characteristics of the material culture remains (knapped, ground stone tools, and ceramic potsherds, whenever they are present) but mainly to interpret the radiocarbon results obtained from one single adult specimen of mangrove gastropod (mainly *T. palustris* but also *T. telescopium*) weighing from ca 5 to 10 grams. The samples have dated at Groningen University isotope research laboratory (CIO): GrA- in the case of AMS dates from one individual and more specimens of the same species in the case of ordinary dates (GrN-) processed before 2004, when AMS facilities were not available.

Two main areas of the Las Bela province of southeastern Balochistan have been taken into consideration: (1) Lake Siranda, it consists of a saline depression, ca 15 km long and 3.5 km wide. Its southwestern side is situated ca 5 km from the northern shore of the Sonmiāni Lagoon (Miāni Hor) and ca 15 km from the present Arabian Sea coastline (Fig. 7). In January and August, the depression is sometimes filled by seasonal monsoon rains and, more rarely, by small freshwater streams flowing from the north (Biagi 2013). (2) The coast between Cape Gadani and the Hab River mouth that marks the boundary between Balochistan and Sindh, with its low, long sandy shores (see, e.g., the Bay of Daun) and a few headlands of solid, massive rocks (see, for instance, Ras Gadani, Ras Phuari, and Sonari north of Cape Monze at the boundary with Sindh) (Biagi et al. 2013).

Lake Siranda Palaeo-Lagoon

A detailed radiocarbon sequence showing the intensive, though most probably seasonal, exploitation of palaeo-mangroves is at present available from the so-called Lake Siranda depression located ca 20 km south of the small city of Uthal in the Las Bela plain. The early morphological history of the basin is still poorly known and even less understood (Snead 1969). It has been suggested that it was formerly part of the Sonmiāni Bay (Miāni Hor) and that it functioned as a tidal lagoon at least until the beginning of the dramatic events that led to the decline and fractionation of the Bronze Age Indus Civilization that took place around the end of the third and the beginning of the second millennium cal BC (Biagi et al. 2016). The radiocarbon dates so far obtained from the shell middens discovered along its shores show that the first exploitation of the local mangroves took place during the last two centuries of the eighth millennium BP and continued almost uninterruptedly throughout the entire seventh and sixth millennia BP. The oldest group of radiocarbon dates spans from the last two centuries of the eighth to the middle of the seventh millennium BP. They have been obtained from mangrove shell samples retrieved from shell middens discovered mainly along the southeastern shore of the basin. Quite a rapid shift of sites toward its southern edge took place between the end of the sixth and the end of the fifth millennia BP. The radiocarbon results show the progressive desiccation of the ancient lagoon, which would

Shell Middens of the Arabian Sea, Fig. 7 A view of the southeastern shore and the depression of Lake Siranda taken from the shell midden of SRN-63. (Photograph by P. Biagi 2013)

have lost its connections with the Arabian Sea most probably around the end of the fifth millennium BP (see above). This fact is demonstrated by the most recent radiocarbon date obtained from a shell midden discovered inside the southernmost edge of the basin (SRN-57, GrA-57533, 4315 ± 35 BP). This assay can be compared with other radiocarbon dates from mangrove shells obtained from the multilayered Chalcolithic-Bronze Age mound of Balakot (Shaffer 1986) located at the northern edge of the fertile Kurkhera Plain, north of the Winder River course.

The Coast Between Ras Gadani and the Hab River Mouth (Cape Monze/Ras Muari)

The coastline south of the Bay of Sonmiāni is a long sandy strip interrupted only by the rocky headlands of Ras Gadani and Ras Phuari. The first is rich in dark red chert outcrops that were exploited by prehistoric communities at least since the beginning of the Mesolithic. Ras Gadani belongs to the Bela Ophiolite, a sequence of basaltic pillow lavas, inter-flow sedimentary rocks (chert, argillite, and limestone) mostly of Upper Cretaceous age emerging as the western part of Mor Range, and the Parh limestone formation (Upper Cretaceous), a unit of the Pab Range. Farther south, the shell middens discovered along the small, well-sheltered Bay of Daun (Biagi et al. 2013) are distributed partly close to the sand beach that delimits the southern shore of the bay, ca 4–10 m above the maximum level reached by the tide, partly at the top of the neighboring Pleistocene marine terrace 16–20 m high that extends south of a small headland. Their distance from the present coastline varies from 60 to 700 m. Most sites consist of heaps or scatters of small fragments of *T. palustris*, *T. telescopium* mangrove gastropods among which anvils and knapped stone artifacts have been collected (see site Daun-1, for instance), as well as marine bivalves and other species, though a few larger shell middens are also present (Fig. 8). According

Shell Middens of the Arabian Sea, Fig. 8 The shell midden of Daun-4 from the south. (Photograph by P. Biagi 2000)

to the radiocarbon chronology, they are to be subdivided into two main groups: the first to be attributed to the Neolithic and the second to the Bronze Age.

South of the Hab River mouth, in Sindh, at the top of a saddle ca 30 m high, near the fishers village of Sonari, some 7 km northeast of Cape Monze (Ras Muari), Chalcolithic-Bronze Age fishers built rectangular stone structures whose floors are covered with valves of *Meretrix* marine shells, other marine bivalves (mainly *Anadara rhombea*), and fragments of mangrove gastropods (Fig. 9) collected from a tidal forest most probably growing along the southern bank of the river mouth. Sonari is the only Chalcolithic/Bronze Age fishers and mollusk gatherers village so far discovered all along the northern coast of the Arabian Sea. The material culture remains found at Sonari are represented by notched net sinkers made from beach pebbles, anvils, pestles, one quern, and other ground stone implements, a few ceramic potsherds, and knapped stone tools made mainly from good-quality red chert collected from the neighboring Ras Gadani outcrops (Biagi et al. 2020).

These data summarize the information at present available for Las Bela coastline. It would be very important to complete the archaeological project; continue the surveys all along the southwestern palaeoshore of Lake Siranda, in order to explore also the (mobile) sand dunes that separate the sabkha depression from Miāni Hor; and investigate also the northern coast of the Sonmiāni Bay. The latter has been the subject of a one-day survey carried out in January 2012 along its eastern edge. It led to the important discovery of a thin, though continuous horizon of *Zootecus* cf. *chion* land snails located at the bottom of a sand dune deposit, whose radiocarbon dating yielded an unexpected fifth millennium BP assay, with a negative $\delta^{13}C$ (-1.14), a result that needs to be better explained (MHOR, GrA-62258, 5700 $\pm$ 40 BP).

Other problems to be solved regard the absence of fishbones from all the shell middens so far

Shell Middens of the Arabian Sea, Fig. 9 The Bronze Age Fishers' site of Sonari at the Hab River mouth (Sindh). (Photograph by R. Nisbet 2013)

discovered around Lake Siranda and the Bay of Daun. In a few cases, fish otoliths have been collected as well as net sinkers (only five from four different sites from Siranda and two from Daun) and very few crab claws belonging to *Scylla serrata*, a typical tropical mangrove species, though no fish hooks or gorges have ever been recovered. It would be important to radiocarbon date the otoliths retrieved from the surface of five sites that belong to only two marine fish species (*Plicofollis tenuispinis* and *Protonibea diacanthus*) and compare the results with those obtained from the mangrove shells dated from the same site by Groningen University isotope research laboratory, following identical procedures.

Another problem still to be solved regards the location of the lithic raw material sources exploited for the manufacture of the knapped and ground stones artifacts collected from the surfaces of the Siranda shell middens. We know that the poor, though very good, dark red chert outcrops of Ras Gadani were exploited for the production of a great variety of knapped stone tools among which are characteristic geometric microliths (lunates and trapezoidal implements) as well as straight microdrills. We also know that the Ras Gadani knappable resources cover a maximum distribution radius of ca 100 kms north and east of the outcrop. Some of the questions still to be answered are: Where are the outcrops exploited to manufacture the other lithic implements retrieved from the Siranda Lake middens found? What do they represent? Relatively long or short distance movements? The general impression is that they might come from one or more of the so far unknown limestone deposits to be searched in Balochistan (Las Bela mountains of the Kirthar range?) or Jhalawan, as reported by A.W. Hughes (1878), undoubtedly not from Sindh, whose knappable lithic resources are well-known since a few years thanks to the discoveries made by the Italian Archaeological Mission in Lower Sindh (Ongar and Jhimpir). What do we know of other sites eventually located farther inland from the

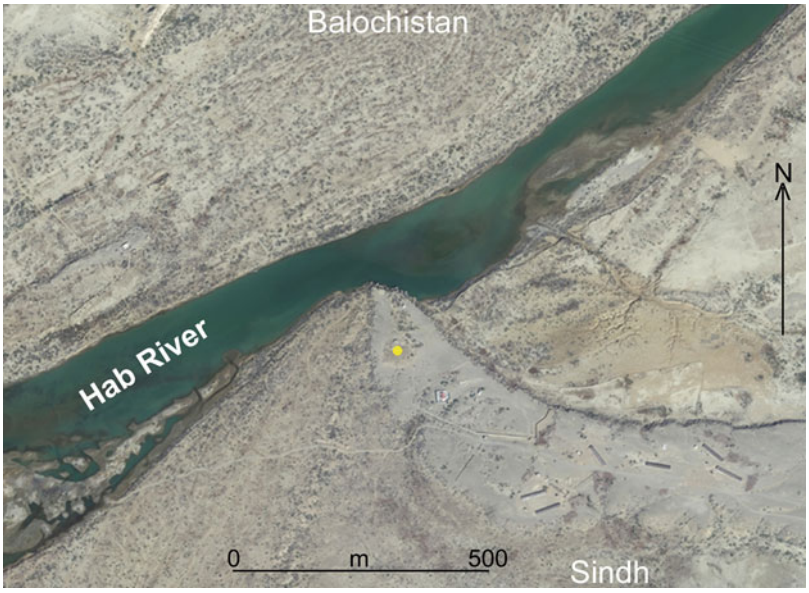

Shell Middens of the Arabian Sea,
Fig. 10 Location of the Indus Civilization site of Pir Shah Jurio (yellow dot), at the edge of a terrace located along the left (southern) bank of the Hab River, where a mangrove swamp flourished during the Bronze Age. (Drawing by P. Biagi)

Lake Siranda shores attributable to a time period comprised between the Neolithic and the Bronze Age? And where did the seasonal mollusk gatherers of Lake Siranda come from? Where are their more permanent sites located?

Recently, it has been pointed out that our knowledge of the prehistory of Balochistan is far too poor, especially as regards the problem of the origin of the Neolithic, and that the absence of radiocarbon dates from interior territories makes its study very problematic (Shaffer 1986). What are the relationships between the sites located along the Arabian Sea coast and the famous though far too poorly radiocarbon dated aceramic site of Mehrgarh in northeastern Balochistan, along the course of the Bolan River? We know that Mehrgarh inhabitants exploited marine resources mainly to make shell ornaments, most probably during the eighth–sixth millennia BP. Did the two regions entertain some kind of relationships during this period, as the presence of marine ornaments made from small (*Conus* and *Cipraea*) and large oceanic shells (e.g., *Turbinella pyrum*) would suggest?

One more problem to be solved regards the chronology of the disappearance of mangal environments from Lake Siranda. The available data show that this event took place when the Bronze Age Indus Civilization began to decline, roughly around the very beginning of the second millennium cal BC. It would be important to better correlate the chronological results available from the mangrove shell sites discovered around Lake Siranda; Miāni Hor; the Chalcolithic/Bronze Age mound of Balakot; the small Indus city of Pir Shah Jurio (Fig. 10), along the lower course of the Hab; and the fishers site of Sonari, close to Cape Monze in southwestern Sindh, to improve our knowledge of the presence and exploitation of mangal resources in the area also during the Bronze Age and contribute to the interpretation of the environmental/climatic changes that might have contributed to the decline and collapse of the urban, Bronze Age Indus Civilization (Biagi et al. 2016: 12).

The presence of prehistoric shell middens and *T. telescopium* mangrove shell scatters has been recorded also along the Arabian Sea coast of neighboring Sindh, from Karachi, in the west, to Thatta and the Makli Hills, in the east. The radiocarbon chronology of the sites spans from the middle of the eighth millennium BP to the third millennium BP. Shell heaps of mangrove and marine food refuses have been systematically recorded also from the top of all the limestone terraces and sandstone hillocks rising from the alluvial plain of the Indus, at an altitude of

15–40 m above the present sea level. These discoveries contribute to the reconstruction of the progressive advance of the Indus River delta, at least from the Neolithic to the Bronze Age, and to the study of the ancient mangrove swamps that flourished in the delta region at least until the Chalcolithic Amri culture period. Most of the shell middens and sparse scatters of marine or mangrove shells discovered along the (ancient) coast of Lower Sindh are located ca 30 km from the present seashore and in one case more than 80 km from the mouth of the most important Indus channel (Biagi et al. 2016: 17).

Current Debates and Future Perspectives

The archaeology of the two coasts of the Arabian Sea discussed in this paper started to develop around the end on the 1970s near Muscat, in the Sultanate of Oman, more precisely in the mangrove swamp of Qur'm and its surroundings. Since then many things have changed. A region that was considered remote and marginal from any archaeological points of view, reported almost exclusively as the coasts of the fish eaters (*ichthyophagoi*) in the classical literature (Schoff 1974), is nowadays greatly developed within the general picture of the archaeology of the entire Indian Ocean (see, for instance, Cleuziou 2004).

The research promoted since 2000 along the coast of Las Bela in Balochistan yielded evidence of mid-Holocene shell middens also in this remote area (Biagi et al. 2016). Their absolute chronology and environmental location are similar to those known from the coast of the Sultanate of Oman, though one can notice great differences between the sites of the two areas. They regard, for example, the presence/absence of habitation and other type of structures among which are graveyards and tombs, thickness/thinness of the stratigraphic sequences, and presence/absence of faunal (especially fish) and material culture remains among which are ceramic potsherds (Berger et al. 2013; Biagi et al. 2016). Regarding the knapped stone assemblages, there are no technological and typological similarities between the finds from the two coastlines that are to be regarded as resulting from two absolutely different traditions. This fact indicates that the two areas were not in contact at least during the Neolithic and the Chalcolithic. They started to develop only around the beginning of the Bronze Age Indus Civilization when transoceanic navigation and trade began. Nevertheless, the presence of marine shells at the top of a few limestone terraces rising from the alluvial plain of the Indus in Lower Sindh, radiocarbon dated to the beginning of the seventh millennium BP (Biagi 2013: Table 1), and the discoveries recently made at Masirah Island in Oman suggest that coastal navigation took place already in this period (Charpentier et al. 2013), though transoceanic contacts started only around the beginning of the Bronze Age. Evident indicators of Neolithic navigation, in the form of both material culture remains and bitumen fragments, have been retrieved from the Neolithic site of As-Sabiyah in Kuwait along the northwestern coast of the Arabo/Persian Gulf (Carter 2006).

The absolute chronology of the Arabian Sea shell middens has greatly improved during the last decades thanks to systematic programs of radiocarbon dating. Those regarding the sites of Balochistan and Sindh are especially important because all dates have been obtained from the same laboratory, and the shell samples (mainly from *T. palustris*) have been processed to develop a precise chronology of the shell middens of the region in relation to the presence of mangrove environments. This approach greatly contrasts with that developed in Oman, where different laboratories and materials have been utilized from time to time mainly during the last two decades, to contribute to the solution of specific or local problems or to try to define the reservoir age to employ to calibrate mangrove or marine shell dates, though with contrasting results. It is well-known that shells are problematic to calibrate and that the mangrove and marine shells show quite different $\delta^{13}C$ percentages. Nevertheless, the results so far obtained show that the first shell middens started to be settled during the last centuries of the eighth millennium BP both in Las Bela, where the Lake Siranda site SRN-43 was

dated to 7200 ± 35 BP (GrA-54290: Biagi 2013), and the Sultanate of Oman (see SWY-11 at Suwayh, Pa-1716: 7275 ± 60 BP: Lézine et al. 2002: 222). These data reinforce the impression that important changes started to take place along the coasts of this part of Arabian Sea during the last centuries of the eighth millennium BP when the first shell middens make their appearance.

Many problems are still to be solved regarding the shell middens of the Arabian Sea coasts. It is well-known that shell middens are a world phenomenon of which little is known and even less studied and understood, with just few exceptions. The two cases presented in this paper perfectly fit into the above general pattern. The contrasting evidence at present available from the two regions is exemplary in this respect. It also shows the different approaches followed by archaeologists in the two areas and the similarities achieved, for example, in the study of the way the two coastlines developed since the beginning of the Neolithic. Regarding the coast of Las Bela, more surveys are necessary to continue the research west of Lake Siranda. We know that shells were found and radiocarbon dated along the coast of Makran, at Pasni, for instance (Sanlaville et al. 1991), though we do not have any data regarding the presence of real shell middens in the area. Another problem to be solved is that of the Sonmiāni Bay where an important mangrove swamp is flourishing still nowadays. When did it start to develop and where? How did it move through time? Are there shell middens along the northern coast of the bay? Unfortunately, this important area has never been investigated by archaeologists. Regarding the Sultanate of Oman, though the research has greatly improved during the last two decades, mainly thanks to the work of the French Archaeological Mission, a systematic program of radiocarbon dating of the shell middens is absolutely necessary as is the detailed publication of many sites excavated since the beginning of the 1980s.

Cross-References

► Radiocarbon Dating in Archaeology

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References

Amirkhanov, H.A. 2006. *Stone age of South Arabia*. Moscow: Nauka. (in Russian).

Andersen, S.H. 2000. 'Køkkenmøddinger' (Shell Middens) in Denmark: A survey. *Proceedings of the Prehistoric Society* 66: 361–384. https://doi.org/10.1017/S0079497X00001857.

Berger, J.F., S. Cleuziou, G. Davtian, M. Cattani, F. Cavulli, V. Charpentier, M. Cremaschi, J. Giraud, P. Marquis, C. Martin, S. Méry, J.-C. Plaziat, and J.-F. Saliège. 2005. Évolution paléographique du Ja'alan (Oman) à l'Holocène moyen: impact sur l'évolution des paléomilieux littoraux et les stratégies d'adaptation des communautés humaines. *Paléorient* 31 (1): 46–63. https://doi.org/10.2307/41496718.

Berger, J.F., V. Charpentier, R. Crassard, C. Martin, G. Davtian, and J.A. López-Sáez. 2013. The dynamics of mangrove ecosystems, changes in sea level and the strategies of Neolithic settlements along the coast of Oman (6000–3000 cal. BC). *Journal of Archaeological Science* 40: 3087–3104. https://doi.org/10.1016/j.jas.2013.03.004.

Biagi, P. 1988. Surveys along the Oman coast: Preliminary report on the 1985–1988 campaigns. *East and West* 38: 271–291.

Biagi, P. 1994. A radiocarbon chronology for the aceramic shell-middens of coastal Oman. *Arabian Archaeology and Epigraphy* 5: 17–31. https://doi.org/10.1111/j.1600-0471.1994.tb00053.x.

Biagi, P. 1999. Excavations at the shell-midden of RH6 1986–1988 (Muscat, Sultanate of Oman). *Al-Rāfidān* 20: 57–84.

Biagi, P. 2013. The shell middens of Las Bela coast and the Indus delta (Arabian Sea, Pakistan). *Arabian Archaeology and Epigraphy* 24: 9–14. https://doi.org/10.1111/aae.12013.

Biagi, P. 2018. The Mesolithic settlement of Sindh (Pakistan): New evidence from the Khadeji River course. *Praehistoria* 11–12: 59–74.

Biagi, P., and R. Nisbet. 1993. Environmental history and plant exploitation at the aceramic sites of RH5 and RH6 near the Mangrove Swamp of Qurm (Muscat – Oman). *Bulletin de la Societe Botanique de France* 139 (2–4): 571–578. https://doi.org/10.1080/01811789.1992.10827129.

Biagi, P., and R. Nisbet. 1999. The shell-midden sites of RH5 and RH6 (Muscat, Sultanate of Oman) in their environmental setting. *Archeologia Polona* 37: 31–48.

Biagi, P., and R. Nisbet. 2006. The prehistoric fisher-gatherers of the western coast of the Arabian Sea: A case of seasonal sedentarization? *World Archaeology* 38 (2): 220–238. https://doi.org/10.1080/00438240600708188.

Biagi, P., T. Fantuzzi, and C. Franco. 2012. The shell-middens of the Bay of Daun Bay: Environmental changes and human impact along the Coast of Las Bela (Balochistan, Pakistan) between the 8th and the 5th millennium BP. *Eurasian Prehistory* 9 (1): 29–49.

Biagi, P., R. Nisbet, and A. Girod. 2013. The archaeological sites of Gadani and Phuari headlands (Las Bela, Balochistan, Pakistan). *Journal of Indian Ocean Archaeology* 9: 75–86.

Biagi, P., R. Nisbet, and T. Fantuzzi. 2016. Mangroves: Environmental changes and human impact along the northern coast of the Arabian Sea (Pakistan) from the beginning of the Holocene to the present. *Archaeologische Mitteilungen aus Iran und Turan* 48: 1–32.

Biagi, P., R. Nisbet, M. Spataro, and E. Starnini. 2020, in press. Sonari: A bronze age fisher-gatherers settlement at the Hab River mouth (Sindh, Pakistan), in its environmental settling. *The Antiquaries Journal* 100.

Carter, R. 2006. Boat remains and maritime trade in the Persian Gulf during the sixth and fifth millennia BC. *Antiquity* 80: 52–63.

Cavulli, F., and S. Scaruffi. 2011. Fishing kit implements from KHB-1: Net sinkers and lures. *Proceedings of the Seminar for Arabian Studies* 41: 27–34.

Charpentier, V., J.-F. Berger, R. Crassard, F. Borgi, G. Davtian, S. Méry, and C.S. Phillips. 2013. Conquering new territories: When the first black boats sailed to Masirah Island. *Proceedings of the Seminar for Arabian Studies* 43: 1–14.

Claasen, C. 1991. Normative thinking and shell bearing sites. In *Archaeological method and theory*, ed. M.B. Schiffer, vol. 3, 249–298. Tucson: University of Arizona Press.

Codding, B.F., A.R. Whitaker, and D.W. Bird. 2014. Global patterns in the exploitation of shellfish. *Journal of Island and Coastal Archaeology* 9: 145–149. https://doi.org/10.1080/15564894.2014.881939.

Durante, S., and M. Tosi. 1977. The Aceramic Shell Middens of Ra's al-Hamra: A preliminary note. *The Journal of Oman Studies* 3 (2): 137–162.

Fischer, A., and K. Kristiansen, eds. 2002. *The Neolithisation of Denmark 150 years of debate*. Sheffield: J.R. Collins.

Gräslund, B. 1987. *The Birth of Prehistoric Chronology. Dating methods and dating systems in nineteenth-century Scandinavian archaeology*, New studies in archaeology. Cambridge: Cambridge University Press.

Gupta, S. 2004. Monsoon environments and the Indian Ocean interaction sphere in antiquity: 3000 BC – AD 300. In *Monsoon and civilization*, ed. Y. Yasuda and V. Shinde, 133–160. New Delhi: Roli Books.

Hardy, K., A. Camara, R. Piqué, E. Dioh, M. Guèye, H.D. Diadhiou, M. Faye, and M. Carré. 2016. Shellfishing and shell midden construction in the Saloum Delta, Senegal. *Journal of Anthropological Archaeology* 41: 19–32. https://doi.org/10.1016/j.jaa.2015.11.001.

Hughes, A.W. 1878. *The country of Balochistan*. London: Williams Clowes and Sons.

Khan, A.R. 1979. Ancient settlements in Karachi region. In *Studies in geomorphology and prehistory of sind*, ed. A. Khuhro. Grassroots 3(2): 1–24 (special issue). Pakistan Studies Centre, Jamshoro.

Kristiansen, K. 2002. The birth of ecological archaeology in Denmark: History and research environments 1850–2000. In *The Neolithisation of Denmark 150 years of debate*, ed. A. Fischer and K. Kristiansen, 11–31. Sheffield: J.R. Collis Publications.

Lézine, A.-M., J.-F. Saliège, R. Mathieu, T.-L. Tagliatela, S. Méry, V. Charpentier, and S. Cleuziou. 2002. Mangroves of Oman during the Late Holocene: Climatic implications and impact on human settlements. *Vegetation History and Archaeobotany* 11: 221–232. https://doi.org/10.1007/s003340200025.

Salvatori, S. 2007. The prehistoric graveyard of Ra's al Hamrā 5, Muscat, Sultanate of Oman. *The Journal of Oman Studies* 14: 5–202.

Sanlaville, P., R. Besenval, J. Evin, and A. Prieur. 1991. Évolution de la région littorale du Makran Pakistanais à l'Holocène. *Paléorient* 17 (1): 3–18.

Schoff, W.H., ed. 1974. The periplus of the Erytræan sea. *Travel and trade in the Indian Ocean by a merchant of the first century*. New Delhi: Oriental Books Reprint Corporation.

Shaffer, J. 1986. The archaeology of Baluchistan: A review. *Newsletter of Baluchistan Studies* 3: 63–111.

Snead, R.E. 1969. *Physical geography reconnaissance: West Pakistan coastal zone*, University of New Mexico Publications in Geography 1. Albuquerque: Department of Geography, University of New Mexico.

Szabó, K. 2017. Shell middens. In *Encyclopedia of geoarchaeology*, ed. A.S. Gilbert, 772–786. Dordrecht: Springer Science+Business Media. https://doi.org/10.1007/978-1-4020-4409-0.

Uerpmann, H.-P., and M. Uerpmann. 1996. Ubaid pottery in the eastern Gulf – New evidence from Umm al-Qawain (U.A.E.). *Arabian Archaeology and Epigraphy* 7: 125–139. https://doi.org/10.1111/j.1600-0471.1996.tb00096.x.

Uerpmann, H.-P., and M. Uerpmann. 2003. Stone age sites and their natural environment. *The capital area of northern Oman. Part III*. Beihefte zum Tübinger Atlas der Vorderen Orients, Reihe A (Naturwissenschaften) Nr. 31/3. Ludwig Reichert, Wiesbaden.

Woodman, P. 2013. Shell energy: An overview. In *Shell energy Mollusc shells as coastal resources*, ed. G.B. Bailey, K. Hardy, and A. Camara, 299–307. Oxford/Oakville: Oxbow Books.

Zazzo, A., O. Munoz, J.-F. Saliège, and C. Moreau. 2012. Variability in the marine radiocarbon reservoir effect in Muscat (Sultanate of Oman) during the 4th millennium BC: Reflection of taphonomy or environment? *Journal of Archaeological Science* 39: 2559–2567. https://doi.org/10.1016/j.jas.2012.01.043.

Further Readings

Andersen, S.H., and E. Johansen. 1986. Ertebølle revisited. *Journal of Danish Archaeology* 5: 31–61.

Bailey, G., and N. Milner. 2002–2003. Coastal Hunter-gatherers and social evolution: Marginal or central? *Before Farming* 4(1): 1–15. http://eprints.whiterose.ac.uk/926/

Bailey, G., and J. Parkington, eds. 1988. *The archaeology of prehistoric coastlines*, New directions in archaeology. Cambridge: Cambridge University Press.

Bailey, G.N., K. Hardy, and A. Camara, eds. 2013. *Shell energy. Mollusc shells as coastal resources*. Oxbow/Oakville: Oxbow Books.

Bar-Yosef Mayer, D., ed. 2005. *Archaeomalacology. Molluscs in former environments and human behavior. Proceedings of the 9th ICAA conference, Durham 2002*. Oxford: Oxbow Books.

Biagi, P. 2011. Changing the prehistory of Sindh and Las Bela coast: Twenty-five years of Italian contribution. *World Archaeology* 43 (4): 523–537. https://doi.org/10.1080/00438243.2011.624695.

Cleuziou, S. 2004. Pourquoi si tard? Nous avons pris un autre chemin. L'Arabie des chasseurs cueilleurs de l'Holocène au début de l'Age du Bronze. In *Au Marges des grand foyers du Néolithique: Périphéries débitrices ou créatrices?* ed. J. Guilaine, 123–148. Paris: Errance.

Dales, G.F., and C.P. Lipo. 1992. *Explorations on the Makran Coast, Pakistan. A search for paradise*. Contributions of the Archaeological Research Facility, University of California at Berkeley, 50.

Finlay, N., S. McCartan, N. Miller, and C. Wickham-Jones, eds. 2009. *From Bann Flakes to Bushmills papers in honour of Professor Peter Woodman*. Oxford: Oxbow Books.

Frenez, D., and M. Cattani, eds. 2019. *Dreamers. 40 years of Italian archaeological research in Oman*. Rome: BraDypUs.net.

Girod, A., ed. 2015. *Appunti di Archeomalacologia*, Futuro Anteriore. Vol. 3. Firenze: All'Insegna del Giglio.

Haq, B.U., and J.D. Milliman, eds. 1984. *Marine geology and oceanography of the Arabian Sea and coastal Pakistan*. New York: Van Nostrand Reinhold Company.

Hasan, M.U. 2002. *Baluchistan a retrospect*. Karachi: Royal Book Company.

Heizer, R.F. 1956. Archaeology of the Uyak Site Kodiak Island, Alaska, Anthropological records, vol. 17 (1). Berekeley/Los Angeles: University of California Press.

Mellars, P., ed. 1987. *Excavations on Oronsay. Prehistoric human ecology on a small island*. Edinburgh: Edinburgh University Press.

Milner, N., O.E. Craig, and G.N. Bailey, eds. 2007. *Shell Middens in Atlantic Europe*. Oxford: Oxbow Books.

Minchin, C.F. 1907. *Las Bela. Text and appendices*. Karachi: Ahmad Brothers Printers.

Potts, D.T. 1990. *The Arabian Gulf in antiquity*. Vol. 2. Oxford: Clarendon Press.

Ray, H.P. 2003. *The archaeology of seafaring in ancient South Asia*. Cambridge: Cambridge University Press.

Rice, M. 1994. *The archaeology of the Arabian Gulf c. 5000-323 BC*. London/New York: Routledge.

Rick, T.C., and J.M. Erlandson, eds. 2008. *Human impact on ancient marine ecosystems. A global perspective*. Berkeley/Los Angeles/London: University of California Press.

Schenck, W.E. 1926. The Emeryville Shellmound final report. *University of California Publications in American Archaeology and Ethnology* 23 (3): 147–282.

Snead, R.E. 1966. *Physical geography reconnaissance: Las Bela coastal plain, West Pakistan*, Louisiana State University studies. Coastal studies series. Vol. 13. Baton Rouge: Louisiana State University Press.

Stein, Sir A. 1943. On Alexander's route into Gedrosia: An archaeological tour in Las Bela. *The Geographical Journal* CII (5–6): 193–227.

Stein, J.K., ed. 1992. *Deciphering a shell midden*. London: Academic.

Uerpmann, M. 1992. Structuring the late stone age of southeastern Arabia. *Arabian Archaeology and Epigraphy* 3: 65–109. https://doi.org/10.1111/j.1600-0471.1992.tb00032.x.

Worsaae, J.J.A. 1849. *The Premieval antiquities of Denmark*. London: John Henry Parker.

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Basic Biographical Information

Andrew Sherratt was a prehistorian whose regional focus was Europe and Eurasia but whose wide-ranging command of archaeological data and interest in large-scale (even intercontinental) questions and syntheses made him an Old World prehistorian rare in contemporary archaeology. He earned a B.A. in Archaeology and Anthropology at the University of Cambridge in 1968. He continued his graduate studies there and completed a Ph.D. in 1976 on the Bronze Age in the Balkan region, under the guidance of David L. Clarke, whose students at that time included Robert Chapman, Norman Hammond, Ian Hodder, and Stephen Shennan.

Beginning in 1973, Sherratt took up residence at the Ashmolean Museum, Oxford, where he

served as Assistant Keeper of Antiquities. His service at Oxford far exceeded what that title suggests, as he was a central figure in the university's archaeological community, such as when he helped establish its joint archaeology and anthropology program in 1993. In 1996, he was named a recipient of the McNeill Erasmus Prize for his contributions to European prehistory. Sherratt was finally made a Reader in Archaeology at Oxford in 1997 and Professor in 2002. In 2005, he moved to the University of Sheffield to assume a new Chair in Old World Prehistory, a move that seemed to promise new opportunities until he died suddenly from a heart attack in the spring of 2006.

Major Accomplishments

The breadth of Sherratt's work resulted in his making significant contributions on a wide range of subjects in archaeology, including European prehistory, plant and animal exploitation, ancient trade and exchange, history of drugs and alcohol, climate and environmental change, and archaeological theory. He is perhaps most widely cited for his wide-ranging analysis of the "secondary products revolution," referring to formative use of animals for their renewable products such as milk, wool, and traction and its impact on human society (Sherratt 1981). The data-rich yet sweeping perspective he took in that analysis was characteristic of his work, so much so that he was often compared to his intellectual forbear, V. Gordon Childe, whose contributions Sherratt both sought to defend and reassess through his own collection of essays on European prehistory (Sherratt 1997).

Inspired by both Childe and Clarke, Sherratt spent much of his energy focusing on the "big" questions of European prehistory – from the beginnings of agriculture and the spread of farming into Europe to first use of iron and coinage in the Mediterranean – but his perspective on these questions combined his predecessors' ideas into an approach that was unmistakably his own. As exemplified by his work on "secondary products," Sherratt was drawn to the study of technological and economic innovations and their impact on society as a whole and would use both his deep grasp of archaeological data and cross-cultural analogy to make his case. Like Childe, he explored how such innovations spread from neighboring regions through communication and trade networks, thus seeking a reengagement with diffusion as an important explanatory idea long after it had fallen out of intellectual favor. Through all his work, Sherratt remained dedicated to the idea that the "Grand Narrative" was important for archaeology and that archaeology was uniquely situated to facilitate such long-term and large-scale syntheses (Sherratt 1995).

Sherratt's interest in long-term and large-scale processes led him to explore the potential of a range of models and tools for archaeological analysis. He had a great interest in the potential of world systems analysis for archaeology, critically thinking through the concept and focusing on dimensions neglected in other archaeological engagements, such as the "margin" between "cores" and "peripheries" and the role of consumption as an instigator of contact and social change (Sherratt and Sherratt 1991; Sherratt 1994). More recently, he turned to geographic information systems and the growing availability of high-resolution satellite imagery for mapping and modeling settlement patterns and interregional route systems (Sherratt 2005), and he began an innovative project at Sheffield called "ArchAtlas" to explore their potential (see www.archatlas.dept.shef.ac.uk).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Childe, Vere Gordon (Theory)
- ▶ Hodder, Ian (Theory)
- ▶ Secondary Products and the "Secondary Products Revolution"
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ World-Systems Analysis

References

Sherratt, A. 1981. Plough and pastoralism: Aspects of the secondary products revolution. In *Pattern of the past: Studies in honour of David Clarke*, ed. N. Hammond, I. Hodder, and G. Isaac, 261–305. Cambridge: Cambridge University Press.

Sherratt, A. 1993. What would a Bronze Age world system look like? *Journal of European Archaeology* 1 (2): 1–57.

Sherratt, A. 1994. Core, periphery and margin: Perspectives on the Bronze Age. In *Development and decline in the Mediterranean Bronze Age*, Sheffield archaeological monographs, ed. C. Mathers and S. Stoddart, vol. 8, 335–345. Sheffield: Sheffield Academic Press.

Sherratt, A. 1995. Reviving the grand narrative. *Journal of European Archaeology* 3: 1–32.

Sherratt, A. 1997. *Economy and society in prehistoric Europe*. Edinburgh: Edinburgh University Press.

Sherratt, A. 2005. TransTaurus: Early connections between central and southeast Anatolia. *Anatolian Archaeology* 11: 24–26.

Sherratt, A., and S. Sherratt. 1991. From luxuries to commodities: The nature of Bronze Age trading systems. In *Bronze Age trade in the Mediterranean*, SIMA, ed. N.-H. Gale, vol. 90, 351–384. Göteborg: Paul Åströms Förlag.

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Basic Biographical Information

Peter Lewis Shinnie (18 January 1915–9 July 2007) was one of the founders of African archaeology (Fig. 1). He developed a particular focus upon Sudan and is best known for the 11 seasons he spent excavating at Meroe, the capital of the Meroitic Kingdom. Shinnie was also a pioneer in archaeological, ethno-historical, and linguistic research in West Africa and particularly in Uganda and Ghana.

Shinnie was born in Wimbledon near London, where he attended Westminster School. According to Shinnie, he was distantly related to John Garstang, another Sudan scholar, whose sister married Robert Gurney, a relative of Shinnie's mother (Grzymski 2007). When he was 12 years old, Shinnie became captivated by H. G. Well's chapter on Egypt in *The Outline of History*. Inspired, Shinnie saved up the two guineas required to purchase Gardiner's recently published *Egyptian Grammar* and began to teach himself the hieroglyphic script. At the age of 14, Shinnie joined the Egypt Exploration Society. In 1933, when he was 15 years old, Shinnie was introduced to the eminent Egyptologist F. Ll. Griffith who advised him not to study Egyptology because the career prospects were bleak (Bradley and Robertson 2007). Shinnie ignored this advice.

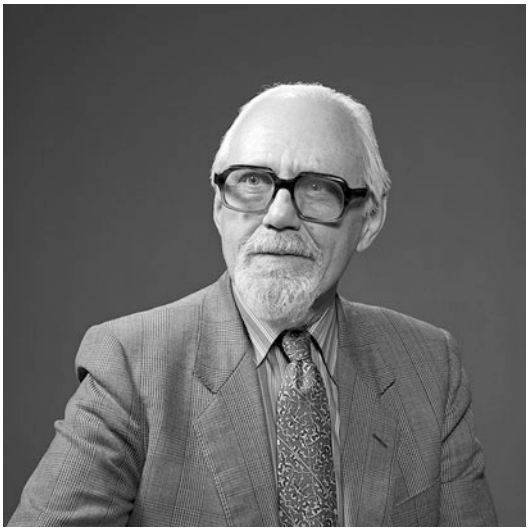

Shinnie, Peter L., Fig. 1 Peter Lewis Shinnie portrait photograph of the faculty and staff at the University of Calgary, September 1971 (University of Calgary Archives 84.005_10.04)

Shinnie's first training excavation was in 1934 at Maiden Castle, Dorset, with Mortimer Wheeler (Fig. 2). During four seasons at Maiden Castle, Shinnie learned Wheeler's box method of excavation, to which he remained dedicated for the duration of his archaeological career (Shinnie 1990). He later read Egyptology at Christ Church, Oxford (1934–1938), studying under B. G. Gunn (Bierbrier 2012), and achieving a third-class degree. While at Oxford, Shinnie participated in numerous undergraduate activities: he became an

Shinnie, Peter L., Fig. 2 Peter Lewis Shinnie with Mortimer Wheeler at Maiden Castle, Dorset, England (*ca.* 1934–1938) (University of Calgary Archives 2013.029_1.06)

active member (and later president) of the University Archaeology Society, joined the University Communist club, learned to fly in the University Air Squadron, and attended lectures on Comparative Ethnography at the Pitt Rivers Museum (Shinnie 1990). After graduating from Oxford, Shinnie had to choose between a position on H. W. Fairman's excavations at Amara West in Sudan and one as a full-time organizer for the Communist Party at three pounds per week. Shinnie chose the latter (Bradley and Robertson 2007).

After less than a year as a Communist Party organizer, Shinnie returned to archaeology with an appointment at the Ashmolean Museum as a temporary assistant. When war broke out in 1939, he was called up to the Royal Air Force to fly bombers. Shinnie was a useful resource for the war effort since he already had done his first solo flight in June 1936 (Grzymski 2007). In September 1940, before leaving England, he married Margaret Cloake. Most of Shinnie's active service took place in North Africa, Italy, and Greece. He also served in intelligence, working on aerial photography interpretations and selecting sites not to bomb due to their archaeological significance (Shinnie 1990; Clark 2007).

After the war, he returned to the Ashmolean Museum as an Assistant Keeper (1945–1946) and excavated at the Bronze Age site of Tell Atchana in Turkey with Sir Leonard Woolley. Shinnie began to learn Arabic at this time due to the site's proximity to the Syrian border (Bierbrier 2012). By the time of his death, he was proficient in Arabic, Greek, French, and Italian, as well as numerous ancient languages, such as Ancient Egyptian, Coptic, Meroitic, and Old Nubian (Grzymski 2007). Fascinated by Nubian linguistics, Shinnie also edited a grammar and lexicon of the Nubian language.

Shinnie's first permanent post in archaeology was as Assistant Commissioner for Archaeology in Anglo-Egyptian Sudan (1946–1948). He later succeeded his boss, A. J. Arkell, as Commissioner for Archaeology (1948–1955) (Bierbrier 2012). At Amara West, he had his first experience as an excavation director, followed by research at Soba, Tanqasi, and Ghazali. While on leave, Shinnie conducted research abroad, including a survey in Euboea, Greece (1951, 1952), and an excavation at Kouklia, Cyprus (1953) (Grzymski 2007). He carried out a vigorous publication practice alongside his research and continued the occasional paper series inaugurated by Arkell. Among his accomplishments as Commissioner for Archaeology, Shinnie acquired Flinders Petrie's library for the museum and hired Negm el-Din Mohammed Sherif, who later became Commissioner for Antiquities.

With Sudan's independence in the mid-1950s, Shinnie's post was "Sudanised" (1955). Upon the loss of the Commissioner for Archaeology post, Shinnie returned briefly to the Ashmolean

Museum (1955–1956) before becoming the Director of Antiquities, Uganda (1956–1958). He then moved on to become Professor of Archaeology at the University of Ghana, Legon (1958–1966), with a brief sabbatical break as a Visiting Professor at the University of Birmingham in England (Grzymski 2007). While in Ghana, Shinnie created the first archaeology department in sub-Saharan Africa. He also founded the University of Ghana's Institute for African Studies in 1959 and acted as its first director until 1961. Shinnie organized archaeological expeditions in Sudan that included Ghanaian students, working mainly on the medieval period on the Nubian stretch of the Nile before it was flooded by the Aswan High Dam (Professor Peter Shinnie: A Leading Africanist who promoted archaeology in the sub-Sahara 2007). Among these UNESCO expeditions, his research at Debeira West is particularly well known. The eminent historian Abu Boahen joined him on this excavation while still a young scholar.

Shinnie returned to Sudan and took up a professorship at the University of Khartoum (1966–1970). During this period, Shinnie conducted the research he is best known for: his excavations at Meroe (1965–1984, intermittent), which began while he was still based at the University of Ghana. These excavations were distinct from contemporary ones because Shinnie explored the urban layout, houses, and industrial installations in addition to temples and other monumental structures. He improved his Arabic and spoke it nearly fluently.

By the late 1960s, Shinnie decided that he needed a post that would provide him with a generous retirement. After a single term at the State University of New York at Buffalo, Shinnie moved to the University of Calgary in Canada as Head of the Archaeology Department and his final professorship (1970–1980) (Calgary Archives) (Fig. 3). In the mid-1980s, Shinnie decided to terminate his excavations in Sudan due to his objections to the political climate (Calgary Archives). While at Calgary, he continued his research in Ghana, namely, at the sites of Asante-maso and Daboya. Together with his second wife, Ama Owusua Nantwi Shinnie, he also investigated the origins of the Ashanti by combining research on archaeology, history, and oral history. He sustained active research and student mentorship even after his retirement in 1980.

Shinnie, Peter L., Fig. 3 Peter Lewis Shinnie portrait photograph of the faculty and staff at the University of Calgary, March 1983 (University of Calgary Archives 84.005_41.32_1)

Following his retirement, Shinnie's long career in archaeology gained substantial recognition. In 1983, the University of Calgary warded him an honorary doctorate in appreciation of his contributions to archaeology and to the University. At the Nubiological Congress, held in Geneva in 1990, Shinnie was unanimously elected the Honorary Patron of the International Society for Nubian Studies and presented with an issue of the Society for the Study of Egyptian Antiquities Journal published in his honor. In 1992, his Africanist colleagues presented him with a Festschrift, *An African Commitment*. A final honor was conferred upon him in 2006 when he was awarded the Order of the Two Niles by the government of Sudan.

Throughout his career, Shinnie was deeply invested in an archaeology of inclusivity. He founded the journal *Kush* (1953), an important journal for specialists working in Sudan. Shinnie then founded and edited *Nyame Akuma,* which later became the newsletter for the Society of Africanist Archaeologists. Shinnie insisted that

Nyame Akuma should be sent free to Africa so that his African colleagues could keep abreast of international research. Equally, Shinnie supported the research of African archaeologists while he was based at the University of Calgary (Professor Peter Shinnie: A Leading Africanist who promoted archaeology in the sub-Sahara 2007). Shinnie also ensured that the pamphlets that he produced on Sudanese archaeology and history be available in both English and Arabic. Through these endeavors, Shinnie aimed to knit together scholars from around the globe in a manner that would foreshadow open access publishing.

Shinnie's long career spanned many different phases of archaeological research since he worked for the duration of his long life. Every one of his site reports was published; a rare accomplishment in archaeology. He was aided in these endeavors by his first wife, Margaret Shinnie, and by his students and colleagues, such as N. Chittick (el-Ghazali), R. Bradley, and J. R. Anderson (Meroe). At the time of his death, he was in the process of editing a Nubian dictionary that he had researched with one of his students (A. Osman). In addition to his passion for archaeology, Shinnie spent his leisure time enjoying literature, jazz and classical music, food and wine, travelling, and good conversation (Bradley and Robertson 2007). Shinnie died in Calgary on 9 July 2007 at the age of 92.

Major Accomplishments

Shinnie amassed a large number of research, educational, and outreach accomplishments over the course of his long career in archaeology.

With respect to research, Shinnie served important roles in African antiquities services; he was the Assistant Commissioner and then Commissioner of Archaeology in Anglo-Egyptian Sudan and later served as the Director of Antiquities in Uganda. Shinnie's 11 seasons of excavation at Meroe, Sudan is perhaps the best known of his many excavations. In Sudan, he also pioneered scholarship on the Nubian language and promoted the study of its medieval archaeology. In Ghana, Shinnie combined archaeology and a study of oral traditions to develop a picture of the Asante state from the ninth century onward.

It is especially notable that Shinnie promoted the roles of Sudanese and Ghanaian archaeologists through the foundation of formal educational programs in their home countries. In doing so, Shinnie founded the first archaeology department in sub-Saharan Africa. In the 1960s, Shinnie created a diploma in archaeology at the University of Khartoum and trained three of the pioneers in the Sudan Antiquities Service at Royal City of Meroe. As part of this degree program, Shinnie recruited Dr. Steven Green to the Department of History at the University of Khartoum to teach honor degree students in ancient history (1968–1970). Shinnie sustained his commitment to these students even after relocating to Canada. From the first cohort of University of Khartoum archaeology students, two subsequently attended the University of Calgary to complete MA degrees in archaeology.

In recognition of Shinnie's foundational research and commitment to the archaeology of Sudan, he was awarded Sudan's Order of the Two Niles in 2006.

Cross-References

- ▶ British Pioneers and Fieldwork Traditions
- ▶ North and Saharan Africa: Geography and Chronology

References

Bierbrier, M.L. (2012). Peter L. Shinnie. In *Who was who in Egyptology*, ed. M.L. Brierbrier, 4th ed., 507–508. London: Egypt Exploration Society.

Bradley, R, Robertson, JH (2007). Peter Lewis Shinnie (1915–2007) Antike Sudan: Mitteilungen der Sudanarchäologischen Gesellschaft zu Berlin e. V.:18. pp. 211–213.

Clark, P. (2007). Peter Shinnie: One of the leading pioneers of African archaeology. In The Guardian. https://www.theguardian.com/news/2007/oct/30/guardianobituaries.obituaries.

Grzymski, N. (2007). Sudan and Nubia 11. pp. 129–130.

Professor Peter Shinnie: A Leading Africanist who promoted archaeology in the sub-Sahara. (2007). *The Times* (11 October 2007). https://www.thetimes.co.uk/article/professor-peter-shinnie-2fplvvk36qs

Shinnie, P.L. 1990. A personal memoir. In *A history of African archaeology*, ed. P. Robertshaw, 221–235. London: James Currey Ltd.

Further Reading

David, N. (2008). Newsletter of society for the study of Egyptian antiquities. pp. 1–2 (portr.)
Der Antike Sudan 18. (2007). pp. 211–213.
Egyptian Archaeology 31. (2007). pp. 211–213.
Sterner, J.A., and N. David, eds. 1992. *An African commitment*. Calgary: Papers in Honour of Peter Lewis Shinnie University of Calgary Press.
The Records of Old Westminsters III. (1963). pp. 347.

Ship Archaeology

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Introduction and Definition

Ship Archaeology is that subset of Maritime Archaeology that deals with water transport: floats, rafts, boats, and ships. By the analysis and interpretation of excavated remains, archaeologists trace the origins of such vessels, their function, how they were built, propelled, steered, and navigated, the harbors they used, and the origins and destinations of the cargo and the people that they carried. Those who specialize in this subject have to be multidisciplinary: In addition to archaeology and/or history, a sound understanding is needed of seafaring, navigation, naval architecture, woodworking techniques, ancient climates, and former sea levels.

Historical Background

During past millennia, lakes have altered their bounds, and rivers changed their courses; sea levels have varied, thereby altering coastlines, and latterly there have been large-scale drainage projects. Nowadays, therefore, ancient vessels may be found not only in seas, rivers, and lakes, but also on what is now land. Some vessels were ritually deposited – for example, one of the oldest plank-built vessels in the world, Pharaoh Cheops' ship of c. 2,600, BCE, was found entombed in the Egyptian western desert. Furthermore, five medieval ships excavated at Skuldelev in Roskilde Fjord, Denmark, that were subsequently published in standard-setting volumes by Ole Crumlin-Pedersen, had been reused to block sea inlets against invaders. Nevertheless, the majority of excavated, seagoing vessels are found to have been wrecked inshore or in deeper water, or abandoned on what was then the foreshore. River and lake boats (for example, simple logboats) are usually excavated from the environment in which they had been used.

In the intertidal zone, excavation tactics have had to be developed to cope with the conditions encountered underfoot and with the varying stages of the tide. Reliable excavation underwater has been possible only since the post-WW2 development of diving gear and of specialized surveying and excavation techniques.

Related Disciplines

Early accounts and representations of water transport have the potential to increase understanding of excavated remains, but that enhancement may not amount to much. It is often difficult, and sometimes impossible, to understand details depicted in early drawings and carvings. Moreover, chroniclers' accounts are usually general in nature, and, even where boats are mentioned, the technological information derived may be minute. On the other hand, technical instructions compiled by ship builders are of exceptional importance, the earliest known being published in sixteenth century CE Venice. Useful accounts have also come down to us from travelers and explorers who were familiar with boats. In recent times, traditional boats have been described in detail as a result of ethnographic fieldwork. Such accounts have proved useful in the interpretation of enigmatic features found on excavated vessels.

The theoretical reconstruction of former environments is essential to a full understanding of

each maritime site. Early sea levels and the former run of coastlines and rivers must be ascertained so that a picture is obtained of the environment in which the vessel was wrecked or abandoned. Furthermore, "back-casts" of ancient tidal flows, currents, and weather patterns (especially predominant winds) provide a guide to the sailing conditions prevailing in former times.

Key Issues/Current Debates

Archaeological Research

The focus of ship archaeological projects is initially on the site itself, supplemented by related information drawn mainly from the fieldwork experience of the excavator. Subsequently, research shifts to the laboratory where samples from the excavation are identified and dated, and the constituents of substances such as fastenings, tar, and paint are determined. After the remains have been recorded on site, they are lifted, either as a coherent whole or timber by timber, and stored in water within a specialized laboratory where, before active conservation, each component is recorded by measured drawing, photograph, and written description. The timbers are conserved by spraying with, or immersion in, polyethylene glycol; alternatively, or in addition, freeze-drying may be used. Other methods under development include the use of sucrose, and impregnation with a resin which is then cured. Whichever method is chosen, the process (including the final drying phase) may take years, even for a medium-sized vessel.

While the timbers are being conserved, an "as-found" measured drawing of the vessel is compiled using the results of the recording process. This drawing depicts the remains as they were when excavated, but with displaced timbers reinstated, distorted timbers realigned, incomplete and fragmented timbers made whole, and the resulting structure rotated until it is orientated as was the original vessel when in use. A small-scale model (Fig. 1) may then be built from this "as-found" drawing and used to investigate whether it is possible to reconstruct – in a theoretical way – the complete hull of this vessel: Insufficient surviving evidence may make this impossible. A valid reconstruction of the original form and structure of the hull is likely to result when:

- (Most of) both ends of a boat have survived, or one end survives and it can be deduced that the boat had been "double-ended"
- Articulated runs of planking survive, up to an undoubted sheerline and/or sufficient framing survives to define the outline of the hull

During such reconstruction, wishful thinking must be avoided: Only those features that are supported by rigorous argument should be added to the "as-found" scale drawing. It is valid, for example, to incorporate hull structure and fittings that it is believed are undoubtedly essential and

Ship Archaeology, Fig. 1 "As-found" 1:10 scale model of the Barland's Farm boat, based on measured drawings of all timbers excavated. (Courtesy and copyright of the Newport Museum)

have been documented in a near-contemporary wreck of the same building tradition. When evidence for sail (such as a mast-step) survives on an excavated vessel, contemporary iconographic evidence – if such exists – may assist in the difficult task of determining details of mast, sail, and rigging. At intervals in this process, findings and intentions should be presented to a "jury" of specialists in this type of research. If the final hypothetical reconstruction drawings (Fig. 2) are validated by such a group, they may be used to estimate performance figures. A scale model may also be built which will probably be more informative to the nonspecialist.

When conservation of the excavated vessel is finished, and timbers can be handled, the remains are reassembled in the area in which they will be displayed. This "rebuilding" of the vessel may result in fresh ideas about the hypothetical reconstruction that if validated can be incorporated in another revision of the drawings and model.

Subsequently, if funding can be acquired and working spaces identified, it may become feasible to use these drawings and the model to build a full-scale reconstruction that, after launch and fitting-out, should undergo rigorous sea trials. This process is known as "Experimental Archaeology" and the vessel built and tested is considered to be a "floating hypothesis." The reconstruction and the building of a floating hypothesis of a *trireme* (Fig. 3) – an eastern Mediterranean warship of seventh to fourth centuries BCE – is a (possibly unique) example of such an experimental project that was based almost entirely on documentary and illustrative evidence rather than on excavated remains (Shaw 1993; Morrison et al. 2000).

The most difficult processes in such experiments have proved to be:

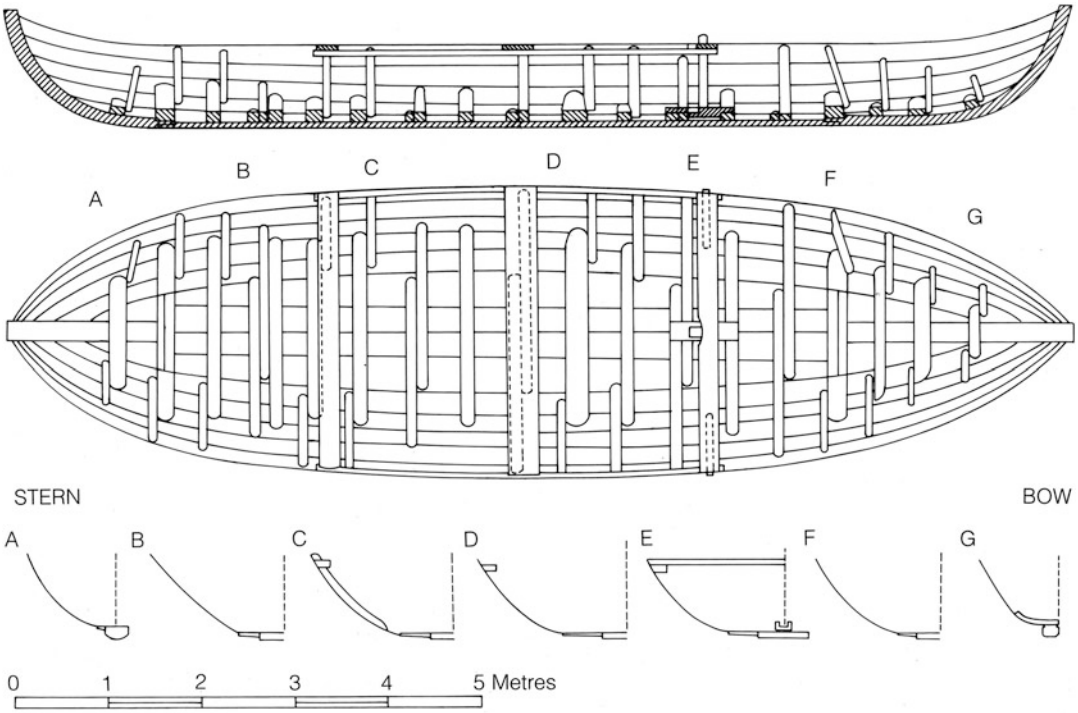

Ship Archaeology, Fig. 2 Reconstruction scale drawing of the hull of the Barland's Farm boat. Elements reconstructed may be identified by comparing this drawing with the "as-found" model in Fig. 1. (Courtesy and copyright of the Glamorgan-Gwent Archaeological Trust)

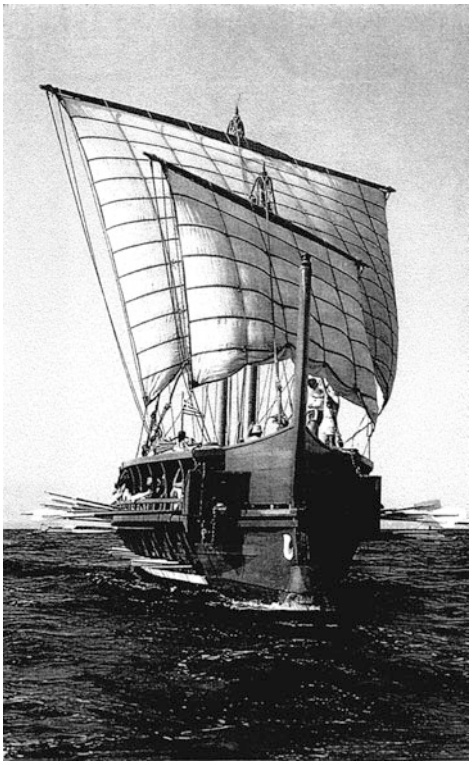

Ship Archaeology, Fig. 3 The "floating hypothesis" *Olympias*: a full-scale reconstruction of a fourth century BCE Greek *trireme*, under sail in the Aegean. (Courtesy and copyright of the Trireme Trust)

- The formulation of the academic aims of the project
- The rigorous production of a reconstruction drawing or model
- After each phase, the submission to external criticism of (a) conclusions drawn and (b) the project's intentions for the next phase

Unless these procedures are satisfactorily undertaken, any hypothetical reconstruction will be invalid, and any vessel built will not be authentic (Bennett 2009: 16–23)

Key Issues

Terminology

In the preface to his classic work *Water Transport*, James Hornell (1946: vii; 1970: xv), observed: there are "many devices upon which men, living in varying stages of culture, launch themselves afloat upon river, lake and sea." Since, in earlier times, every raft or boat was individually built, each one was different in some respect from all others. We therefore need a method of grouping together boats that are generally similar so that patterns may be identified and fundamental shifts in technology recognized.

The primary classification of water transport is into the three classes: floats, rafts, and boats/ships. A *float*'s buoyancy is applied directly to the human body which is part-immersed, whereas the buoyancy of rafts and boats is applied indirectly. How that indirect buoyancy is derived differentiates rafts from boats/ships: Rafts are "flow-through"; therefore, a *raft*'s buoyancy is derived from each floating element of its structure; a *boat*'s buoyancy, on the other hand, is derived from the displacement of water by her continuous, watertight hull. In this context, a *ship* is considered to be a large boat.

It is convenient to subdivide these classes into subclasses identified by the principal material used in their construction:

- Four types of float: log; bundle; hide; and pot – plus, in recent years, oil drums
- Four types of raft: log; bundle; hide-float; and pot-float
- Six types of boat: log; bundle; hide; bark; basket; and plank

Building Sequences

In the mid-twentieth century CE, two sequences, "shell-built" and "skeleton-built," were identified as the principal ways in which plank boats were built (Hasslöf 1963). This distinction can also be seen in bark boats and hide boats. In the "shell-built" sequence (Fig. 4), planking is fashioned and then fastened together to form a watertight hull; framing is then fastened inside that planking. The builder visualizes such a boat as a watertight shell reinforced by framing. This sequence is now known as "plank-first."

In the "skeleton-built" sequence (Fig. 5), framing is fashioned to give the hull shape required; planking is then fastened to that framework. The builder visualizes such a boat as a framework or

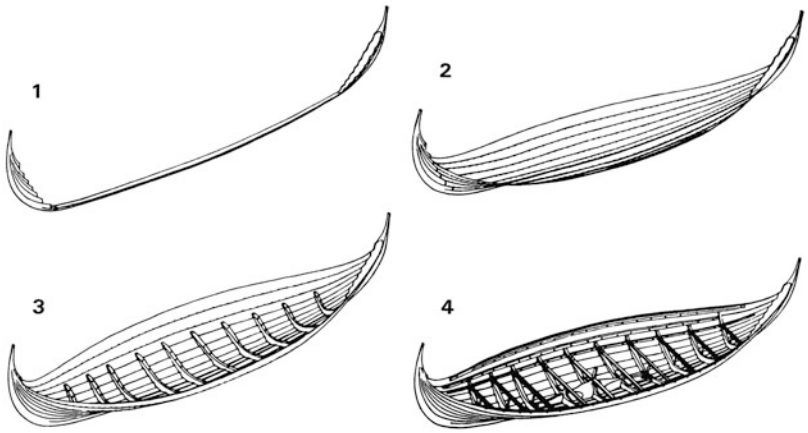

Ship Archaeology, Fig. 4 Four stages in the plank-first sequence of building a medieval Scandinavian boat. (Copyright of Seán McGrail, after Ole Crumlin-Pedersen 1983: Fig. 5)

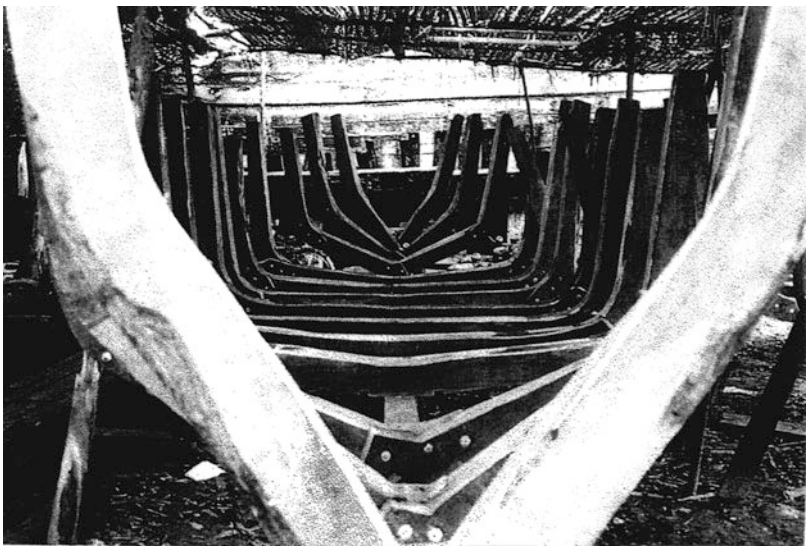

Ship Archaeology, Fig. 5 The frame-first sequence: the framing of a *vattai* fishing boat fashioned to shape and set up in Atirampattinam, Tamil Nadu, before planking was added (Copyright of Seán McGrail)

skeleton made watertight by adding planking. This sequence is now known as "frame-first": It may be further divided into:

- Those built sequentially: first, lower framing, to which planking is fastened; then, upper framing that is then planked. This sequence of building may be described as "framing-first": Such boats are mostly early in date.
- Those that were not planked-up until virtually the entire framework/skeleton had been erected. This sequence is the true "frame-first": Such vessels are mostly from post-medieval times when great ships were built in this way.

Building Traditions

Builders and users today recognize the concept of a "tradition" of building for the range of vessels with which they are familiar. For excavated vessels, it would be desirable to use the original type-names but, even when names have survived, it can prove difficult to link one to specific excavated vessels. In northern Europe, this link has proved possible in one case: The characteristic features of the medieval merchant ship "cog" were deduced from late medieval texts and from depictions on town seals. Using this key, a number of wrecks have been identified as cogs. A principal feature of the cog, and of several other traditions, is the way the planking is fastened together (Fig. 6).

The distinctive boat-and-ship type used by Scandinavians (and subsequently others) from the early centuries CE to the fourteenth century (and later) CE is not precisely named in early texts but in recent times has been known as "Viking." Since this way of building originated before the Viking Age, and continued in use long afterward, it is now described as "Nordic." Excavations, research and publications by Ole Crumlin-Pedersen, during the past 50 years, have greatly added to our knowledge of this boatbuilding style (Crumlin-Pedersen and Olsen 2002).

For other periods and places, it has been found useful to group excavated vessels with similar features into "traditions." A "tradition" may be defined as: "the perceived style of boat-and-ship building generally used in a certain region within a given time range." This concept has increased understanding of the way building techniques have changed over time, and has facilitated the recognition that some traditions have induced changes in the building methods of other regions. Such traditions are artificial groupings constructed by archaeologists after the analysis of each excavated vessel over a wide range of characteristics – mostly structural features such as fastening methods (Fig. 6), but also hull shape, propulsive means, and steering arrangements. It is not necessary that the vessels in each tradition should have all characteristics in

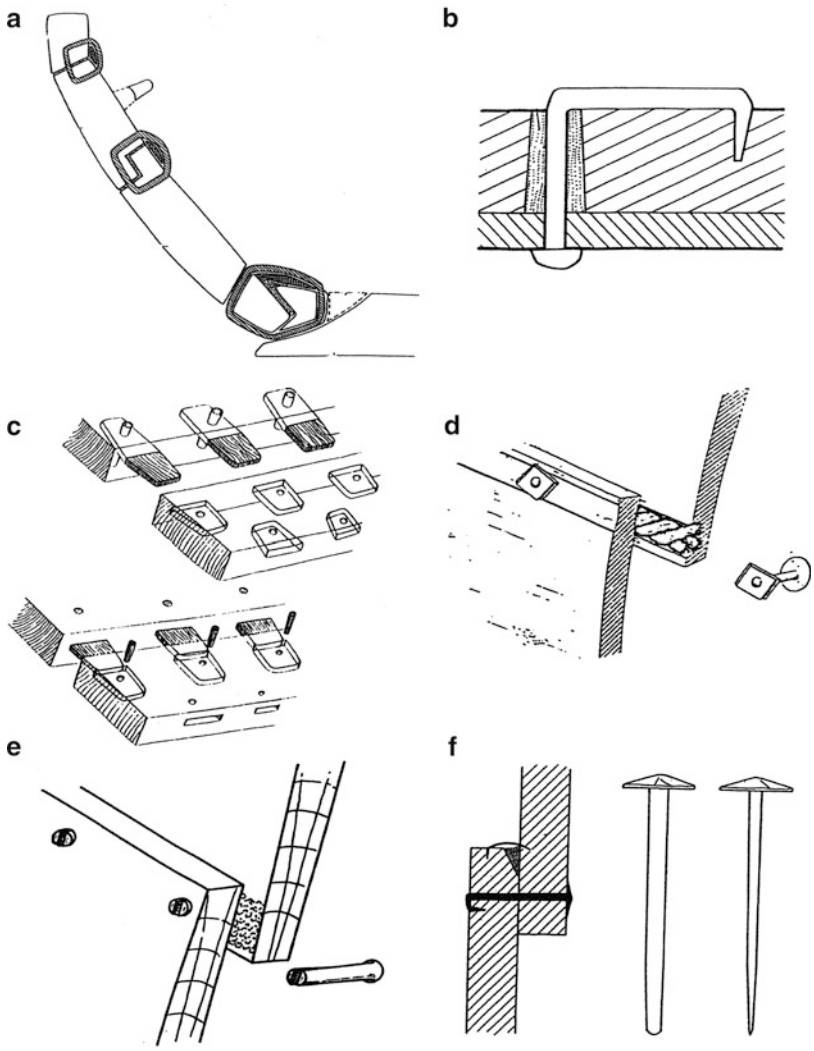

Ship Archaeology, Fig. 6 Plank fastenings. (**a**) Planking lashed together, as in the early, sewn plank boats of southern Britain. (**b**) Planking fastened to the frames of an early centuries CE, Romano-Celtic boat. (**c**) Locked mortise-and-tenon plank fastenings used in early, eastern Mediterranean vessels. (**d**) Early medieval, Nordic fastenings in overlapping (clinker) planking, with hair caulking and nails clenched over a metal rove. (**e**) A Slav variant of (**d**) with moss caulking and treenail fastenings. (**f**) Hooked nail, plank fastenings in the medieval Bremen cog, with moss caulking held in place by metal clamps. (Copyright of Seán McGrail)

common. In a *polythetic* group, each boat shares a large number of characteristics with every other boat in that tradition, but no one characteristic has to be possessed by all boats. In this respect, polythetic groups reflect an understanding of the real world (Doran and Hodson 1975: 160), and should be used whenever possible.

Sewn plank boats, excavated or ethnographic, are known throughout the world (McGrail 1996). The group of prehistoric sewn plank boats is generally undifferentiated, although two broad types have been identified in those excavated in northwest Europe:

- Boats with planks *lashed together* by single stitches through large holes (Fig. 6a)
- Later boats with planks fastened by *continuous sewing* through smaller holes

Other traditions, such as "Romano-Celtic" (Fig. 6b) and "Nordic" (Fig. 6d), which were initially identified by intuitive, ad hoc methods, were subsequently placed on a sound basis using evidence from excavated boats.

Design and Building

It is generally considered that the earliest rafts and boats were built by eye, using "rules of thumb." It seems likely that rafts continued to be constructed in this way into recent times. Boats were probably similarly built (in the plank-first sequence) until the early centuries CE, when there is the earliest evidence for frame-first boats built on a designed framework (see below). In time, and in certain places (for example, Europe and China), the size of these designed boats was increased so that they became ships.

Building Frame-First Vessels

Three, seagoing boats of the first to fourth centuries CE have been excavated: from the River Thames at Blackfriars, London; in St Peter Port harbor, Guernsey; and in a former tributary of the River Severn, at Barland's Farm in southeast Wales (Rule and Monaghan 1993; Marsden 1994; Nayling and McGrail 2004; Oleson 2008: 625–627). From them, distinctive structural features of this Romano-Celtic tradition have been identified, the most characteristic being:

- Absence of plank-to-plank fastenings (Fig. 6b), and no plank scarfs but butt joints at frame stations
- Use of the framing-first building sequence (the earliest known)

These features are clearly different from those used to build prehistoric logboats and sewn plank boats, the only other known types of early European wooden boat. The builders of these Romano-Celtic boats appear to have used a unit of measurement (55–56 cm – possibly two human feet) to space the framing. There may also have been a 1:2:3 ratio between maximum breadth, length of plank-keel, and length overall. Moreover, it seems possible that, before planking, longitudinal battens on a master frame were used to give hull shape. In these, characteristics may be seen the beginnings of a formal design method. Early framing-first builders probably handed on their skills by word-of-mouth as "rules of thumb," since not until the late medieval period do we get written accounts and illustrations of such procedures (McGrail 2001/2004: 160–165; Oleson 2008: 613–625).

It may be that this northwest European frame-first building sequence originated in the building of hide boats. No early hide boat has been excavated, but there is documentary and iconographic evidence for their use in the British and Irish archipelago from the mid-first millennium BCE suggesting that, in earlier times, they had a significant role in northwest European seafaring. From postmedieval accounts, we learn that such boats were built – as they still are today – by covering a wicker framework with hides: first the framework; then the "skin": This is the frame-first sequence.

A similar sequence of construction, but differing in detail from that in the Romano-Celtic ships, was used from the fifth/sixth to the ninth century CE to build several Mediterranean planked vessels excavated from Levant coastal waters. It has been suggested that this framing-first building sequence may have come to mind when replacement planking was fitted to the framing of a plank-first vessel (Kahonov 2011: 161–181).

After the fourth century CE in northwest Europe, and the ninth century CE in the Mediterranean, there is, at present, no sign of the frame-

first sequence until eleventh century when it was used in Asia Minor and in southern Europe; from there, the technique appears to have spread along the coast of Atlantic Europe as far as the Baltic. In the fifteenth century CE, this sequence was used to build the European sailing ships that sailed "all the seas of the world" (McGrail 2001/2004: 245–257). During this period, there also seems to have been a shift to building frame-first in China (Xi and Xin 1991; McGrail forthcoming). Some of the medieval ships recently excavated in Chinese waters may well have been built "bulkhead-first" – a variant of frame-first. Like the medieval European ocean-going ships, the hull shape of these late-fourteenth century CE Chinese ships appears to have been determined by their framework (of bulkheads).

In both China and Atlantic Europe, this significant shift from plank-first to framing-first (possibly around the same time) was followed by ocean-going voyages: into the India Ocean by the seven Chinese fleets commanded by Admiral Zheng Ho, and into the Atlantic Ocean by Portuguese and Spanish ships.

Building in the Mediterranean

Although logboats have been excavated in the Mediterranean region (for example, in Italy), plank boats, subsequently ships, dominate the archaeological record (Oleson 2008: 606–637). The earliest known are from late-fourth millennium BCE Egypt: In addition to sewn fastenings, wooden tenons were used within the plank thickness to link planking together. Sewn plank boats were still being used in the Adriatic until the twelfth century CE. From the fourteenth century BCE, however, the locked mortise-and-tenon joint (Fig. 6c) appears to have become the principal eastern Mediterranean fastening. It continued in use through Greek and Roman times and on into the Byzantine period until it was superseded by framing-first vessels (without plank-to-plank fastenings).

As Roman commercial interests expanded, the use of mortise-and-tenon plank fastening spread over much of the then-known world. Several northwest European vessels of the early centuries CE were built with such fastenings, including a third/fourth century CE boat excavated from Lough Lene in County Westmeath, some 50 miles northwest of Dublin (O'Heailidhe 1992). This fastening has also been found in southeast Asia: on an undated wreck at Johore Lama in Malaya, and during recent excavations in northern Vietnam of a first century BCE plank-extended logboat and a second century CE boat planking reused in a coffin (Bellwood et al. 2007).

Boat Operations

Steering and Propulsion

Rivers may be obstacles to land travel (hence the development of fords and ferries) but they can also be used as "highways" across land to the sea. Drifting downstream would have been unreliable until a means of steering had been devised – paddles (examples of which have been excavated from European Mesolithic sites), poles, and oars could have been used to steer as well as to propel. Rudders differ from other means of steering in that they are fastened to the hull of the boat and are rotated by the helmsman around their own, near-vertical axis. There are two types: side rudders fastened to the boat's hull on one (sometimes both) quarter(s); and median rudders fastened at the stern. When the helmsman rotates a rudder so that its aerofoil section blade lies at an angle to the water flow, a horizontal force is generated in the water at the stern; this force causes the boat to turn until the rudder is returned to its neutral position.

The problem of returning upstream against the current was solved in early Mesopotamia by rowing and by towing, the latter from an oared tug or by a team of men walking along the river bank. In Egypt, on the Nile below Aswan where there was generally a northerly wind, sail was used to overcome the northward-flowing current, and propel boats southward. Depictions of the use of sail, dated 3,000–4,000 BCE, have been excavated in Egypt, but earlier evidence has recently been excavated from a site in Kuwait (Carter 2006): a vessel with a bipod mast on a ceramic disc dated sixth to fifth millennium BCE (Fig. 7).

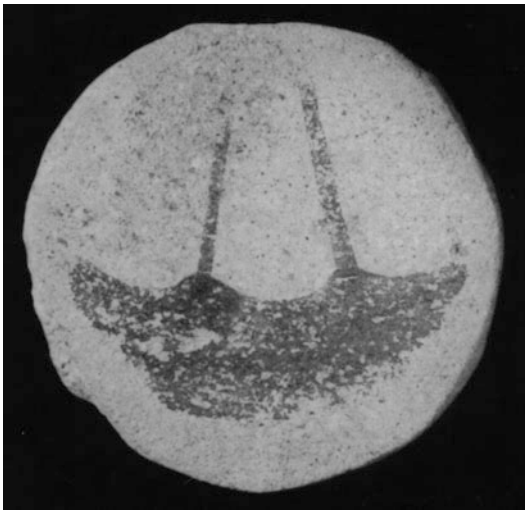

Ship Archaeology, Fig. 7 A painted ceramic disc from Kuwait, dated to the Ubaid 3 period (sixth to fifth MBC), depicting a vessel with a bipod mast. (Copyright of Carter 2006: Fig. 4)

It seems likely that these earliest sails – in both in Mesopotamia and Egypt – could only be used to propel a boat down- or across-wind. How, and when, sailing vessels first made ground against the wind is difficult to determine, but there are indications that it may have been in the second millennium BCE. Interpretation of Egyptian representations of sailing vessels dated to the middle of that millennium suggests that such vessels could have been sailed when the wind was from a point forward of the beam. At around this same time, the methods used to find and settle Oceanic islands appear to have changed significantly. As these pioneering seafarers spread eastward from the western rim of the Pacific, island groups were found to be much more widely spaced. Passages could therefore no longer be undertaken by visual, pilotage methods, and ways of navigating when out-of-sight of land had to be devised (see below – "Early Seafaring"). It may be that at this time, in Egypt as well as in Oceania, a sailing rig was evolved, and procedures established, that resulted in vessels making ground against the wind.

From the dates now given for the earliest depictions of sail in India and China, and in the Eastern Mediterranean, Western Europe, and Scandinavia, it might seem that sail use spread outward from the Egypt–Mesopotamia region through the Mediterranean to Atlantic Europe in the northwest, and through India and SE Asia to China in the east. This may or may not be true, but it is undoubtedly not true that Egypt–Mesopotamia was the sole origin of sail. Early European explorers of the Americas found a range of sail types and rigs on rafts and boats, on both east and west coasts, from the Arctic to Brazil and Peru. Such rigs and sail shapes have no parallels in Europe or elsewhere, and must have had an American origin.

Associated with sail in several European depictions of South American craft was the *guares*, an immersed steering foil or "variable leeboard." These long, wooden boards, of aerofoil cross-section and with a handle at the upper end (Fig. 8), were lowered through gaps between the logs of seagoing rafts. By varying their position and depth of immersion, course could be altered, sailing balance attained, and leeway reduced. Such usage was first noted by Europeans in the eighteenth century CE. Excavated *guares* have been dated to *c*. 300 BCE (McGrail 2001/2004: 401–412).

Sailing Seasons

Periods of storms and of obscured skies were avoided and times of favorable winds used: thus seasonal sailing evolved. In European Atlantic waters, for example, vessels were generally not used on sea passages between mid-October and mid-March; similarly, Arabian vessels avoided approaching the west coast of the Indian subcontinent between mid-June and mid-September. In Roman times, ships sailing for India left Red Sea ports in July so that the southwest monsoon wind would take them across the Arabian Sea in August and September. In late November, the northeast monsoon was similarly used for their return passage. Columbus, heir to much seafaring knowledge, timed his pioneering, fifteenth century CE Atlantic voyage so that he would have a generally following, easterly wind for his outbound passage, and, in more northerly latitudes, a fair, westerly wind for his return to European waters (McGrail 1992).

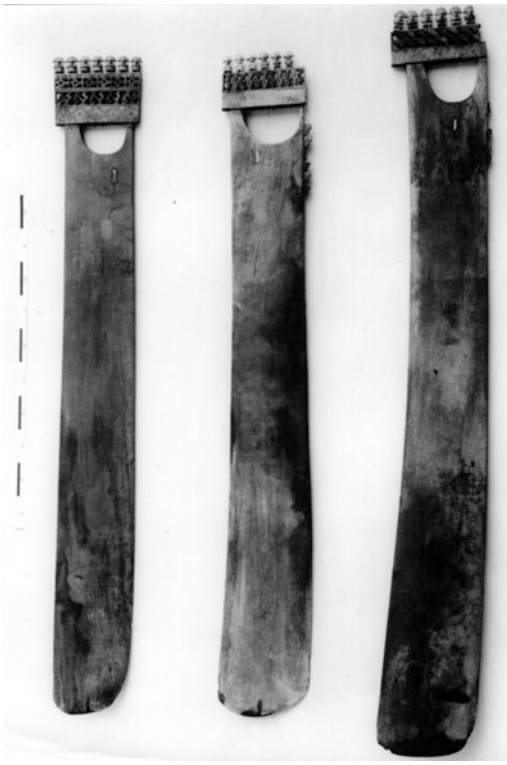

Ship Archaeology, Fig. 8 Variable leeboards ("guares") excavated from graves of c. 300 BCE, at Ica, Peru. (Courtesy and copyright of the Museum für Völkerkunde, Berlin)

Landing Places and Harbors

In tidal waters, early water transport was used from intertidal beaches where, on each flood (rising) tide, vessels floated. Where beaches and river banks were soft, withies and poles or hurdles and stakes were laid to form a hard. In tideless seas, such as the Mediterranean, on the other hand, vessels were left afloat, at anchor, with their stern moored by line to the shore. Such informal sites are still used in many parts of the world (McGrail 1987/1998: 267–274)

The earliest known harbor walls were built in the eastern Mediterranean during the eighth to ninth centuries BCE to protect landing places exposed to onshore winds and seas. As time progressed, additional features – jetties, lighthouses, silt-dispersal facilities – were incorporated until, by late Roman times, important harbors had many of the facilities seen in nineteenth century Europe. During the tenth to eleventh century CE, as towns in northwestern Europe grew, and economic life became more complex, seagoing ships became bigger. Rather than remaining at anchor, such vessels could more readily be loaded and discharged in deep-water berths, alongside wharfs. These requirements, the state regulation of trade, and the introduction of warehouse marketing methods, all combined to cause a surge in the building of formal harbors at focal points in international networks.

Early Seafaring

There is no direct evidence for any type of water transport before 9,000 BCE, but other archaeological and geophysical evidence demonstrates that Man crossed seas very much earlier (Anderson et al. 2010). Two questions arise about such early voyages:

- What type of water transport was used?
- How did these early mariners navigate?

Water Transport

Since these voyages were undertaken millennia before the date of any excavated example of water transport, it is necessary to work indirectly toward an answer to that first question. Using data from recent examples of all known types of water transport, the technical stage (hence approximate date) appropriate to the building of each one of those types (each with a simple and a complex version) can be estimated. This method suggests, for example, that the settlement of Australia from southeast Asia in Palaeolithic times could have been undertaken in paddled rafts of bamboo logs (Anderson et al. 2010: 95–107).

Navigation

It seems likely that such early overseas migrations were undertaken over a lengthy period from island to island, with succeeding generations undertaking successive legs. On each passage, in that age of lower sea levels, land would always have been in sight, ahead or astern, or both. Thus, *pilotage techniques*, using the human eye, would have

been used to keep track of a vessel's position as she progressed from one island to the next.

From the second millennium BCE, widely spaced groups of Oceanic islands were settled by mariners who must have been out-of-sight of land during much of the passage. It is conjectured that these island groups were first sought on reconnaissance voyages from southeast Asia and from the islands of western Melanesia. Such voyages would have lasted several days during which *deep-sea*, *navigational techniques without instruments* would have been necessary. After these explorers had returned home and thereby "fixed" the position of the newly located islands, settlement voyages in more capacious boats would have been undertaken (McGrail 2001/2004: 339–345).

In the late-twentieth century, Micronesian seaman demonstrated how boats could be navigated without instruments, using methods handed on by their ancestors that are generally similar to those now known to have been used by Arabs and other late medieval seamen. Courses were steered relative to the sea swell or to the wind, or, at night, by reference to specific stars – in the northern hemisphere, especially the Pole Star and its circumpolar constellations. These courses would then be cross-checked during daylight by noting the relative bearing of the sun at sunrise, noon (its highest point), and sunset. The boat's speed was probably assessed by comparison with past performance in the light of the existing wind and sea states, such "speeds" being expressed as "faster" or "slower than usual."

Land may be detected long before it becomes visible, by the sight of cloud sitting over it, by the flight line of birds, and by soundings that reveal decreasing depths of water. The outline shapes of coastlines, especially those with high peaks or distinctive cliffs, would have been memorized for future use. On subsequent passages, navigators would have to identify their actual landfall relative to this known silhouette and thus be able to turn along the coast toward their intended destination. The accuracy of this "navigation without instruments" has been demonstrated during sea trials in which Micronesian navigators, monitored by Australian and American observers, used such methods on Oceanic passages out-of-sight of land.

Future Directions

In conjunction with documentary, iconographic, and ethnographic evidence, excavations have thrown light on the building and the use of the early plank boats and ships of Egypt, the eastern and central Mediterranean, and the European Atlantic seaboard. Furthermore, in Chinese and southeast Asian waters, several important seagoing medieval ships have been excavated and published. In other regions of the world, however, Boat and Ship Archaeology is, at best, still in its infancy. Moreover, direct evidence worldwide for water transport is strongly biased, there is no evidence of early floats and negligible examples of rafts. Furthermore, evidence for boats is almost entirely limited to those built of planks or of logs.

Water transport is its own advertisement: Through the ages, boatbuilders everywhere have been influenced by nearby building traditions, or by the traditions of overseas trading partners. To understand fully the ancient water transport of any one region, a sound knowledge of the ancient vessels of other lands is needed: The early maritime aspects of India, China, and similar regions should be investigated.

By its published research during the late-twentieth to early twenty-first century CE, ship archaeology has attained a recognized place within the archaeological discipline. To consolidate that position, it is now necessary not only to improve fieldwork techniques, but also to make the study of water transport worldwide, and to trace early examples of every type of float, raft, and boat.

Cross-References

► Islamic and Maritime Archaeologies
► Maritime Iconography
► Mexico: Underwater Archaeology
► Waterlogged Finds: Conservation

References

Anderson, A.J., H. Barrett, and K.V. Boyle, eds. 2010. *Global origins of seafaring*. Cambridge: MacDonald Institute for Archaeological Research.

Bellwood, P., J. Cameron, N. Van Viet, and B. Van Liem. 2007. Ancient boats, boat timbers and locked mortise and tenon joints from Bronze-Iron Age northern Vietnam. *International Journal of Nautical Archaeology* 36: 2–20.

Bennett, J., ed. 2009. *Sailing into the past*. Barnsley: Seaforth.

Carter, R. 2006. Boat remains and maritime trade in the Persian Gulf. *Antiquity* 80: 52–63.

Crumlin-Pedersen, O. 1983. *From Viking ships to Hanseatic cogs*. Greenwich: National Maritime Museum.

Crumlin-Pedersen, O., and O. Olsen, eds. 2002. *Skuldelev ships 1*. Roskilde: Viking Ship Museum.

Doran, J.E., and F.R. Hodson. 1975. *Mathematics and computers in archaeology*. Edinburgh: Edinburgh University Press.

Hasslöf, O. 1963. Wrecks, archives and living tradition. *Mariner's Mirror* 49: 162–177.

Hornell, J. 1946 (reissued 1970). *Water transport*. Newton Abbot: David & Charles.

Kahonov, Y. 2011. Ship reconstruction, documentation and in situ recording. In *Oxford handbook of maritime archaeology*, ed. A. Catambis, B. Ford, and D. Hamilton, 161–181. Oxford: Oxford University Press.

Marsden, P. 1994. *Ships of the Port of London*. Vol. 1. London: English Heritage.

McGrail, S. 1987 (reissued 1998). *Ancient boats in north west Europe*. Harlow: Longman.

McGrail, S. 1992. Columbus' trans-Atlantic voyages in 1492–93. *Medieval History* 23: 76–91.

McGrail, S. 1996. Study of boats with stitched planking. In *Tradition & archaeology*, ed. H.P. Ray and J.-F. Salles, 225–238. New Delhi: Manohar.

McGrail, S. 2001. *Boats of the world*. Oxford: Oxford University Press.

McGrail, S. 2004. *Boats of the world*. 2nd ed. Oxford: Oxford University Press.

McGrail, S. forthcoming. Nautical ethnography as an aid to understanding the maritime past. In *Of ships and men: Proceedings of a conference held in Beijing in November 2009*, ed. E. Rieth.

Morrison, J.S., J.F. Coates, and N.B. Rankov. 2000. *Athenian Trireme*. 2nd ed. Cambridge: Cambridge University Press.

Nayling, N., and S. McGrail, eds. 2004. *Barland's Farm Romano-Celtic boat*. Council for British Archaeology Research Report 138. York: Council for British Archaeology.

O'Heailidhe, P. 1992. Monk's Boat: A Roman period relic from Lough Lene, Co. Westmeath. *International Journal of Nautical Archaeology* 21: 185–190.

Oleson, J.P., ed. 2008. *Oxford handbook of engineering and technology in the classical world*. Oxford: Oxford University Press.

Rule, M., and J. Monaghan. 1993. *Gallo-Roman trading vessel from Guernsey*. Guernsey Museum Monograph 5. St Peter Port: Guernsey Museum.

Shaw, T., ed. 1993. *Trireme project*. Oxbow Monograph 31. Oxford: Oxbow.

Xi, L., and Y. Xin. 1991. Preliminary research on the historical period, and restoration design, of the ancient ship unearthed in Penglai. In *Proceedings of the International Sailing Ship History Conference*, ed. S. Zhang, 225–236. Shanghai: Society of Naval Architecture & Marine Engineering.

Shipyard Archaeology

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Introduction

A growing body of international peer-reviewed research on shipyards published since the 1990s is testimony to the rapid expansion of the discipline beyond the traditional focus on shipwrecks and vernacular watercraft. Analytical frameworks such as maritime cultural landscapes and maritimity, regional and global approaches, ship graveyards, shoreline, and port studies are conducive to the inclusion of shipbuilding and repair facilities (Pastron and Delgado 1991; Pitt and Goodburn 2003). The bulk of the yards that scholars have investigated are located in proximity to active ports in urban areas. The multiple footprints of these sites in the archaeological record, both on land and underwater, are commonly wharves, slipways, docks, sawpits, sandpits for kiln work, warehouses, and specific tools and machinery associated with the shipbuilding process. Researchers have addressed a colorful cross section of themes related to shipyard archaeology including critiques of archaeological methodology, recycling ship parts, innovation and technology, gender, ethnicity, labor, and land use. Management of shipyard sites are associated primarily with concerns about rapid urban development along inland waterways and ports, coupled with lack of training of cultural resource

managers to either identify or document these sites (Stammers 1999; Ford 2006; Richards 2008; Harris 2010; Moser 2011).

Definition

A shipyard, generally situated close to the water and building resources, is an industrial site closely linked with labor history and current socioeconomic events. It represents the crucial connecting piece between the product – the ship – manufacturers or shipbuilders, society, and environment in which the ship is designed to operate. There exists a wide variation in the size of the shipyard, services the shipyards offered, and how the yard conducted primary shipbuilding functions through time. Some were located inland on rivers at small towns and others served larger cities and ports.

Moser (2011) proposes a useful typology dividing shipyards into five broad categories or tiers: (1) large state-owned and operated yards like the naval British dockyards of the eighteenth and early nineteenth centuries, (2) well-organized private yards with a large labor force like the Dutch East India Company operatives in Amsterdam, (3) private yards with a substantive labor pool that could build multiple vessels at the same time, (4) smaller private shipyards with single slipways that could only build or repair one vessel at a time such as Wicomico shipyard in Maryland, and (5) shipyards with little permanent infrastructure only constructing or repairing a few vessels and often in dire financial straits.

Key Issues and Current Debates

The limitation of a typology is that most yards, in any time period, went through spiraling stages of economic development and decline influenced by a variety of factors, most prominently war and labor issues. Shipyards in category 3 and 4 often had multiple site identities and served a variety of roles for the local community functions beyond shipbuilding. The multifunctional nature of a "shipyard" further complicates interpretation of the archaeological record. Shipyards were both small and big businesses that survived or thrived, went out of commission, partnered reluctantly or enthusiastically with other enterprises, or dabbled in other economic endeavors in addition to shipbuilding to stay solvent. In the North American colonies, for example, the shipyard labor pool was comprised of a potpourri of immigrants, apprentice and itinerate shipwrights often trained in the large European yards, hired plantation slaves, shipyard-owned slaves trained in shipbuilding skills, and free black and white laborers. Shipyards were supported financially, and often precariously, by family still living in Europe, wealthy local colonial and marriage networks, and lucrative skilled partnerships with other shipwrights. One of the key issues in attempts to add meaning to shipyard research is how to discern the signatures of socioeconomic changes in shipyard status through time. Another dilemma is how to tweak out the essence of contributions of women, family networks, and labor pool to the success and failure of shipyard enterprises from the archaeological record. Lacking that dynamic socioeconomic context, shipyard archaeology studies are at best only a descriptive site report or database entry.

Between 2003 and 2004 scholars conducted extensive excavations at the *treasure* shipyard or *boachuanchang* in Nanjing. The yard was utilized actively in a period of China's maritime history during the early fifteenth century when thousands of government-commissioned ships ventured from the mouth of the Yangzi River southwards along the Chinese coast to Southeast Asia and the Indian Ocean. Archaeologists recorded multiple pylons believed to provide stable frameworks for ships under construction. Excavators unearthed an assemblage of around 2,000 artifacts. Among the collection were two rudder posts, both over 10 m long. These artifacts complement the 11.6-m rudder post discovered at the same shipyard in 1957, currently stored in the National Museum of China in Beijing. Iron artifacts included shipbuilding tools like knives, chisels, punches, rings, hoops, picks, and nails. Of interest in the archaeological record for shipbuilding processes were iron staples or *bading*. These straight pieces of iron, with the two ends bent at 90° in the same direction,

were used to fasten wooden joints. The site also yielded ceramic items including a variety of earthenware and porcelain (Nan Jing Shi Bo Wu Guan 1991).

Shipbuilding yards have been identified in Greece, Italy, and Israel (Baika 2003; Blackman 2003; Raban and Linder 1978: 243). Many ships were simply built on the shores of the beaches, like the Black Sea coastline, with easy access to launching. In Turkey thirteenth-century shipyard buildings survived at Alanya on the Mediterranean Coast. Buildings provided an important study in architecture and further knowledge about the types of warships used by the Anatolian Seljuk. The shipyard is situated within a medieval town, cut into the rock on a hill and surrounded by high walls. The enterprise comprises sheds for building and protecting vessels, metal-working areas, and administrative spaces. Productively utilized, the shipyard not only was a place to build and store ships not in use but also provided facilities for repairs, with the additional capability of producing sails and rigging for the navy (Daggullu 2009: 13–20).

Northern European shipyard scholarship is devoted primarily to military shipyards beginning in the 1970s with work by Courtney (1974–1975) at the Royal Woolwich dockyard. This formative study interpreted land use through time while explaining specific uses of facilities for dockyard operations. While industrial facilities comprise a dominant portion of the work, other ancillary features investigated included the surgeon quarters, the clock house, and roadways. Underwater investigations in the 1990s around the Beaulieu River in England, the London and Amsterdam waterfront centered on slipways, which were the most diagnostic underwater component of a shipyard site. Archaeological interpretation encompassed bathymetric and topographic surveys, followed by documentation of the stylistic features of the slipways (Adams 1994; Gawronski 2003).

In North Wales and North West England, Stammers (1999: 253–264) explored a variety of historical shipbuilder records including census records, court records, trade directories, advertisements, artwork, and ordnance maps showing shipyards. The study identified variation in size of shipyards in urban England and the problem of space in working areas. Stammers reinforces the value of shipyards to the archaeological record as important resources that can show evidence of the construction process of shipbuilding, the materials deployed, information about a workforce, and how it transmitted ideas into tangible form. In Ireland, research of maritime landscapes included phase one archaeological surveys and historical documentation of shipyards such as the industry surrounding Portaferry, a leading port for Strangford Lough during the late eighteenth and nineteenth centuries. The town grew around a sixteenth-century tower house, later expanding into a large industrial operation with three yards that could accommodate the construction of an impressive array of ships for the transatlantic trade (McErlean et al. 2002: 220).

To date, most landscape analysis in the southeastern USA has been devoted to plantation sites rather than industrial sites. In a sense, plantations with slaves trained as craftsmen, including boat and shipbuilders, represent a form of rural and private sector industrialization. Studies of coastal and riverine shipyards including Hobcaw shipyard and Mars Bluff shipyard in South Carolina, McKnight yard in North Carolina, and Willink shipyard in Georgia offer pertinent information about the diverse archaeological signatures of southern shipyards in different time periods and geographic locations (Figs. 1 and 2). The case studies reveal that choice of site, location, and layout plan of the work facility are key elements in understanding the operation of the shipyard. Historical records of these three shipyards like naval recommendations, advertisements for land, sale receipts, probate records, and comments of customers all provide keener insights into social perceptions about suitable shipyard locations, the trade-offs of choices, growth, and fiscal stability of shipyard endeavors.

In 1984 investigations at Hutchinson Island in Savannah Harbor included observations of

Shipyard Archaeology, Fig. 1 Artistic impression of Hobcaw shipyard. (Courtesy of Hernandez family)

Shipyard Archaeology, Fig. 2 Caulking tool from Mars Bluff Shipyard. (Courtesy of East Carolina University)

features such as Willink's marine railway, a shipyard in operation from 1873 to 1898; shoreline spoil edge; and extensive brick scatter. Archaeologists recovered over 2,000 artifacts related to shipbuilding and machinery repair. The material culture record was supplemented by a plat showing wharf lot titles, a floating dry dock, and two useful plans dating respectively to 1879 and 1891 showing landscape features like a fence, engine house, power plant, railway, and city saw mill, and docking area (Babits and Barnes 1984: 48–52). The site was increasingly critical to regional shipping and tracing the sales of this property through time reflected a shift in the use of the harbor and shipyard from small, locally owned companies to a large corporate structure with greater fiscal stability and ability to monopolize the shipping industry.

During the latter half of the eighteenth century, Hobcaw Creek outside Charleston became the colony's largest shipbuilding center despite the presence of smaller yards scattered around the colony. An advertisement in the *South Carolina Gazette* on November 30, 1769 by these new partners lists the services of Hobcaw yard and John Rose's other yard, Rose's Wharf in Charleston, including shipbuilding, heaving down, repairing, graving, and mast building. Apart from their service as a shipbuilding depot, the yard also represented a sales depot that supplied the products required for shipbuilding and repair like live oak, cypress, and spars for topmasts, yards, and booms. Despite the existence of several yards on Hobcaw Creek, the success of the yard was attributed to attractiveness of this specific location for naval shipbuilding, sufficient space to heave down three large vessels simultaneously, good depth of water, a freshwater spring close to the shore, and enough distance away from the distractions of the city of Charleston to the laborers. From formative status as a plantation smallholding to small private yard run by two

shipwrights, it evolved into the largest state yard leased by the South Carolina Navy during the Revolutionary War. Ultimately, the successful shipyard reverted back to a smallholding in the aftermath of the war, and the shipwright, John Rose, left for Jamaica where he used his shipyard earnings to purchase over 9,000 acres and 221 slaves (Harris 2010: 17–35).

Clients of shipyards also reveal why one shipyard succeeded economically over another – reputable craftsmen, timely completions of tasks, and use of high-quality lumber. Loss of labor, including slave labor, resulted in losing the edge with competing shipyards. Sufficient resources to purchase and train shipyard slaves was more beneficial to business than renting slaves from planters. Consensus between business partners in shipyard businesses about investments and business practices was also a critical part of the equation, as demonstrated in the case of Hobcaw where squabbles about managing shipyard finances ultimately led to a suicide, or murder, of one of the shipyard partners.

By the mid- to late 1800s through years of the Civil War and postbellum period, concerns about the wartime vulnerability of shipyards on the coast and the convenience of shipping hardware materials and machinery by rail became critical planning factors in shipyard location. Southern shipyards served as manufacturing facilities and needed convenient access to transportation networks, building materials, and labor. Other considerations for fiscal success in the investigation of Mars Bluff Confederate War shipyard was proximity of clientele for shipbuilding and repair contracts and a wealthy community to raise funds and invest in the shipyard operation when warfare drained government subsidy of wartime manufacturing.

Shipyard studies primarily consider the role of European men. Less evident are the significant background roles played by women and slaves from the surrounding community in supporting the success of this southern manufacturing industry. Similar to plantations a skilled workforce comprised of slave artisans were an important ingredient for success. Women also played a role in the financing and support behind shipyards, whether through marriage and connections to the local community. Others participated in fundraising and attracting men to the shipyards with social events (Harris 2010: 34–35).

In 12wAustralia, ship graveyards or discard areas are frequently also the locale of repairing, modifying, and building ships from recycled parts. In Tasmania ship repairers used the waterway as a demolition yard for vessels beyond repair with floatation problems. Major shipbuilding locations along the Derwent River were situated close to ship dumping grounds (Richards 2008: 88–89). Other places in the world also have correlates between dismantling of ship timbers and shipyards, for example, Egypt, and waterfronts like Dublin in Ireland, Bergen in Norway, and numerous English port cities (Richards 2008: 26). The recycled parts are, in essence, potential chronological records and signatures of socioeconomic trends linked to the life of the shipyard in proximity. A 1,800 shipbreaking yard in San Francisco, California, represents the deliberate salvage of unused hulks along the waterfront subsequent to the Gold Rush (Pastron and Delgado 1991).

Future Directions

Possible directions for future research include delving deeper into the historical fabric, ethnographic record, and social narrative from actively working shipyards around the world to develop new frameworks and research questions of a more global character. Neglected geographic areas of scholarship, beyond Europe and North America, suited to shipyard research might be explored to assess potential for contributions to shipyard archaeology and history, for example, sites of traditional dhow shipbuilding at East African Swahili ports (Figs. 3 and 4), along the coast of the Persian Gulf at centers like Qesh, Khamir, Kong, Busher, Ganaveh, Chabahar, and Jask (Fig. 5) (Agius 2008: 142–147; De Leeuwe 2005: 107–113), and in India at Surat, Gujarat, and Alang.

Archaeologists might consider looking beyond seventeenth- to nineteenth-century shipyards to

Shipyard Archaeology, Fig. 3 Boatbuilding in Tanzania (Courtesy of Lynn Harris)

Shipyard Archaeology, Fig. 4 Maintenance on a Tanzanian dhow at low tide (Courtesy of Lynn Harris)

investigate the potential of derelict twentieth century, World War I and II shipyards drawing on a wealth of literature. Historical publications present vibrant and colorful compilations of personal anecdotes and historical information from letters and legal documents. Photographs depicting shipyard facilities, workers, and working scenes add to the appeal of historical investigation and could serve as an essential supplement to material culture studies of shipyards.

Another key direction is exploring appropriate archaeological methodology to interpret

Shipyard Archaeology, Fig. 5 Shipyard in Iran (Courtesy of Sorna Khakzad)

shipyard sites and make meaningful contributions to the historical record and management inventory. Ford (2006) and Moser (2011) attempted to create models and typologies using landscape features combined with the historic record to create layers in geographic information systems to predict, locate, and identify shipyard sites in Maryland, USA. While this study contributed to the archaeological and historical database in the state, an acknowledged limitation was that the footprint of substantive archaeological remains was very ephemeral due to shoreline filling, erosion, and development. Artifacts were not specific to shipbuilding and it was impossible to incontrovertibly conclude the presence of a shipyard. These two studies are landmark works towards the archaeological inventory and interpretation of shipyard sites in the new millennium that might be duplicated in other areas of the world.

Beyond basic inventory and exploring reasoning in selecting shipyard location, a productive example of a shipyard study is Goodburn's (1999) investigation of postmedieval London waterfront where researchers correlated tool marks on wood recovered from shipyards to tools and practices of shipwrights through time. Other diagnostic features of prominence at shipyards are remnants of wharves and docks. There is growing body of unpublished theses and dissertation scholarship since the 1980s on these structures in other contexts, like plantations and waterfront settlements that include critical assessments of typologies, recording methodologies, and theoretical frameworks that might be fruitfully applied to shipyard research. Most recently, a new and less static direction of study by Blackman (2011) that might be duplicated as an analytical framework is the query into the sociology of landings in the Baltic Sea Region that reaches across time and space, considering shifts in social relations and site functions.

Cross-References

- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Heritage Landscapes
- ▶ Heritage: History and Context
- ▶ Ship Archaeology
- ▶ Shipyard Archaeology

References

Adams, J. 1994. *Bucklers hard: The Beaulieu project, report no. 1*. Southampton: University of Southampton.

Agius, D. 2008. *Classic ships of Islam from Mesopotamia to the Indian Ocean*. Leiden: Martinus Nijhoff Publishers.

Babits, L., and J. Barnes. 1984. *Archaeological investigation of the marine railway site, Hutchinson Island, Savannah, Georgia*. Savannah: Report Prepared for the US Army Corps of Engineers.

Baika, K. 2003. Operating on shipsheds and slipways: Evidence of underwater configuration of slipways from Neosoikos of "Trypiti". In *Boats, ships and shipyards: Proceedings of the Ninth International Symposium on Boat and Ship Archaeology*, ed. C. Beltrame, 103–108. Oxford: Oxbow.

Blackman, D. 2003. Progress in the study of ancient ship sheds: A review. In *Boats, ships and shipyards: Proceedings of the Ninth International Symposium on Boat and Ship Archaeology*, ed. C. Beltrame, 132–143. Oxford: Oxbow Press.

Courtney, T.W. 1974. *Excavations at the Royal Dockyard*. London: Victor Gollancz.

Daggullu, I.B. 2009. A thirteenth-century shipyard Alanya (Alaiyye) on the Mediterranean coast of Turkey. *The International Journal of Nautical Archaeology* 38 (1): 13–20.

De Leeuwe, R. 2005. Constructing sailing ships on the Swahili shore. *Azania: Archaeological Research in Africa* 40 (1): 107–113.

Ford, B. 2006. Down by the water's edge: Modeling shipyard locations in Maryland, USA. *International Journal of Nautical Archaeology* 36 (1): 125–137.

Gawronski, J. 2003. Slipways of the VOC shipyard in Amsterdam: A maritime site where tradition and innovation meet. In *Mer et Monde: Questions d'Archaeologie Maritime*, ed. C. Roy, J. Belisle, M.-A. Bernier, and B. Loewen, 10–22. Quebec: Association des Archeologues du Quebec.

Goodburn, D. 1999. Echoes of axes, adzes and pitsaws. In *Old and new worlds*, ed. G. Egan and R. Michael, 171–179. Oxford: Oxbow Press.

Harris, L. 2010. South Carolina shipyards: Labour, logistics, lumber and ladies. *Journal of Maritime Archaeology* 5 (1): 17–35.

McErlean, T., R. McConkey, and W. Forsythe. 2002. *Strangford lough: An archaeological survey of the maritime cultural landscape*. Belfast: Blackstaff Press.

Moser, J.D. 2011. Shipyard archaeology. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 834–855. Oxford: Oxford University Press.

Nan Jing Shi Bo Wu Guan. 1991. *Ming dynasty Baochuanchang shipyard in Nanjing*. Cambridge: Cambridge University Press.

Pastron, A., and J. Delgado. 1991. Archaeological investigations of a mid-19th century ship-breaking yard, San Francisco, California. *Historical Archaeology* 25 (3): 61–77.

Pitt, K., and D. Goodburn. 2003. 18th-and 19th -century shipyards at the south east entrance to the West India docks, London. *International Journal of Nautical Archaeology* 32 (2): 191–209.

Raban, A., and E. Linder. 1978. Dor: A Hellenistic shipyard. *International Journal of Nautical Archaeology* 7 (3): 238–243.

Richards, N. 2008. *Ships graveyards: Abandoned watercraft and archaeological site formation process*. Gainesville: University of Florida Press.

Stammers, M. 1999. Slipways and steamchests: The archaeology of 18th and 19th-century wooden merchant shipyards in the United Kingdom. *International Journal of Nautical Archaeology* 28 (3): 253–264.

Shizitan

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Introduction and Definition

The **Shizitan site** is an open-air archaeological site located along the Qingshui River, a perennial tributary of the Yellow River, Jixian County, Shanxi Province, North China. It includes several dozen identified localities, of which S1 (Linfen Administrative Bureau of Culture 1989), S5 (Shizitan Archaeological Team 2016), S9 (Song 2012), S12 (Zhao 2008), S14 (Shizitan Archaeological Team 2013), and S29 (School of History and Culture, Shanxi University & Shanxi Provincial Institute of Archaeology 2017) have been excavated (Fig. 1). The site was first excavated in 1980 and was interpreted as a "Mesolithic" site (Linfen Administrative Bureau of Culture 1989). Subsequent field work was conducted from 2000 to 2010 and showed that the site mainly contains Late Upper Paleolithic (LUP) deposits (Fig. 2). The excavations have yielded important new information on the chronology and environmental background for the evolution of Paleolithic lithic and bone tool

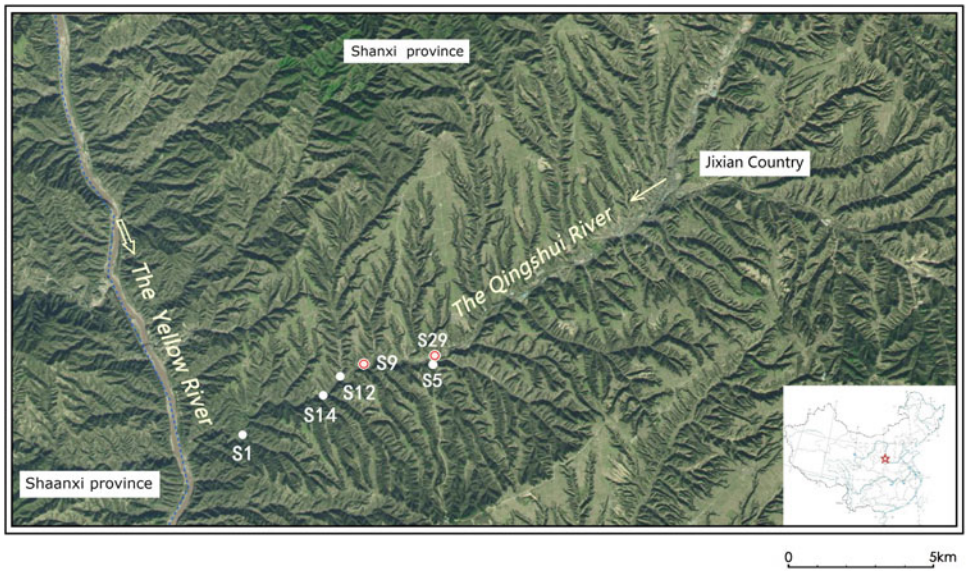

Shizitan, Fig. 1 The geographical position of S29, S9, and other excavated Paleolithic localities along the Qingshui River, Jixian County, Shanxi Province

Shizitan, Fig. 2 The stratigraphic section and cultural layers at Shizitan 29

technology, exploitation of plant foods, diffusion of modern human in East Asia, and adaptations to Ice Age conditions.

Systematic radiocarbon dates show the Shizitan localities date between c. 28,500 and 18,000 years, and c. 14,000–13,000 years before present (BP). The earlier deposits are mainly represented by S29, which features deposits up to 15 m in depth reflecting changing environmental conditions, as seen through water and wind deposition, as well as the activities of animals and humans (School of History and Culture, Shanxi University & Shanxi Provincial Institute of Archaeology 2017; Song et al. 2017). Later deposits are represented by S9, with 5 m-thick deposits that include the cold period of the Younger Dryas (Song 2012; Liu et al. 2011).

Key Issues and Current Debates

The Site of S29

S29 (36°2′54″N, 110°35′22″E, 723 m above sea level) is located about 500 m east of Shizihe Village of Jixian County. It was excavated from March 2009 to October 2010 due to highway construction. The 1200 m^2 excavation area features a 15 m deep depositional sequence with 8 cultural layers (Level 8 is the lowers) with sterile geological layers between most of them. The excavation procedure used 1 × 1 m squares divided into quadrants and vertical spits of 10 cm to maintain spatial control. Locations of lithics and other cultural materials were recorded during excavation, and smaller artifacts were also recovered through dry and wet screening. More than 80,000 artifacts were recovered, including lithic artifacts (microblades and microcores), animal bones from at least seven kinds of big and middle-sized herbivores, grinding slabs and handstones, ochre pigments, and ornaments made of shells and ostrich eggshell (Fig. 3) (Song and Shi 2013; Song 2013). A total of 285 excavated hearths were found in Layers 1 through 7.

Analyses at the site of S29 include systematic series radiocarbon dating, pollen and non-pollen palynomorph studies, zooarchaeology, and soil micromorphology (Song et al. 2017). These allow a detailed understanding of the chronology, formation processes, and changing environment of the site. Layer 8 (ca. 28 Ka cal BP) dates before the Last Glacial Maximum (LGM) and shows a warmer and damper climate. Layer 7 (ca. 26–24 Ka cal BP) reflects colder conditions setting in at the beginning of LGM. Full cool and dry conditions of the LGM continue during Layers 6–3 (ca. 24–19.5 Ka cal BP), and Layer 2 (ca. 19–18 Ka cal BP) marks the end of LGM conditions. Thick geological deposits during the occupational gap above Layer 2 show warming conditions, and human occupation begins in Layer 1 ca. 13 Ka cal BP. The LGM sequence at the S29 and the northerly location of Shizitan during LGM makes the site central to debates on how humans adapted to local conditions during the LGM: the site shows that some human groups were able to live this at this latitude rather than needing to migrate to warmer conditions in the south.

The site of S29 revealed some of the important adaptations made by hunter-gatherers to LGM conditions. First is the use of fire. Clear outlines of hearths first appear in Layer 7. A total of 285 such hearths were excavated, with 278 (98%) coming from LGM layers. Firewood could be identified as coming from pine and several other coniferous tree types based on identifications to the genus level on tracheal cells of wood in NPP samples. There is also indirect evidence at S29 for the humans making clothing. Detailed studies on the eyed bone needles from the site show that they were used for sewing at the onset of the LGM (Song et al. 2016). Although further studies are needed, the NPP samples also show potential evidence for the processing of flax fibers and the use of wool and bird feathers. Nine species of wild flax grow in central and northern China and could have been used long before domestication (Song et al. 2017).

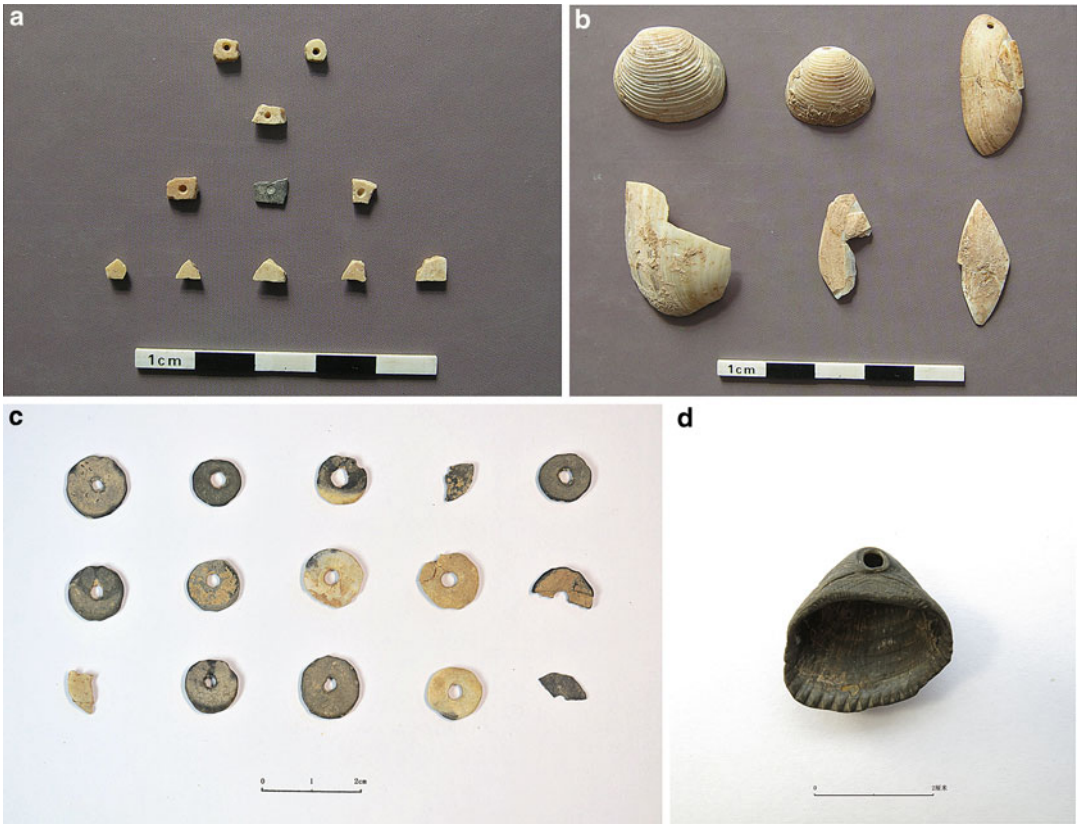

Shizitan, Fig. 3 The perforated ornaments from S9 and S29. (**a**) Ostrich eggshell ornaments (S9: L4); (**b**) shell ornaments (S9: L4); (**c**) ostrich eggshell ornaments (S29: L7); (**d**) shell ornaments (S29: L7)

The cultural layers at S29 also supply diachronic evidence for a key change in Upper Paleolithic lithic technology, with the earliest well-dated appearance of microblade production. Layer 8 features a "core and flake" industry (recently also referred to as "flake and shatter"), but a dramatic change occurs at the top of Layer 7 with the appearance of microblades and microcores along with such new types of stone tools as end-scrapers and burins (Fig. 4). A techno-functional study of lithic production and raw materials (local black flint and pebbles from the Yellow River) supports ideas that these new technologies may be derived from hunter-gatherer groups who lived further north, so microblade technology was introduced into the North China Loess Plateau rather than being invented there (Song et al. 2019).

Grinding slabs and handstones at Shizitan localities and other Upper Paleolithic sites are a unique feature of this time period in China. Macroscopic use wear and starch residue analysis on the surfaces of grinding stones made of sandstone and other chipped tools made of flint or quartzite uncovered in Layers 8, 7, 4, and 2 at S29 show that plant food was processed on site. Poaceae phytoliths, which are also an indicator of anthropogenic changes in soils, are present as well. Wild Poaceae was important in the human diet of the Upper Paleolithic, and microremains of these plants (pollen, phytoliths, starch, stems, epidermis) were observed in all the cultural layers. Looking at the whole of the data, even though certain details are missing, during the LGM, the Shizitan hunter-gatherer groups likely exploited a broad spectrum of food resources. Various cereal

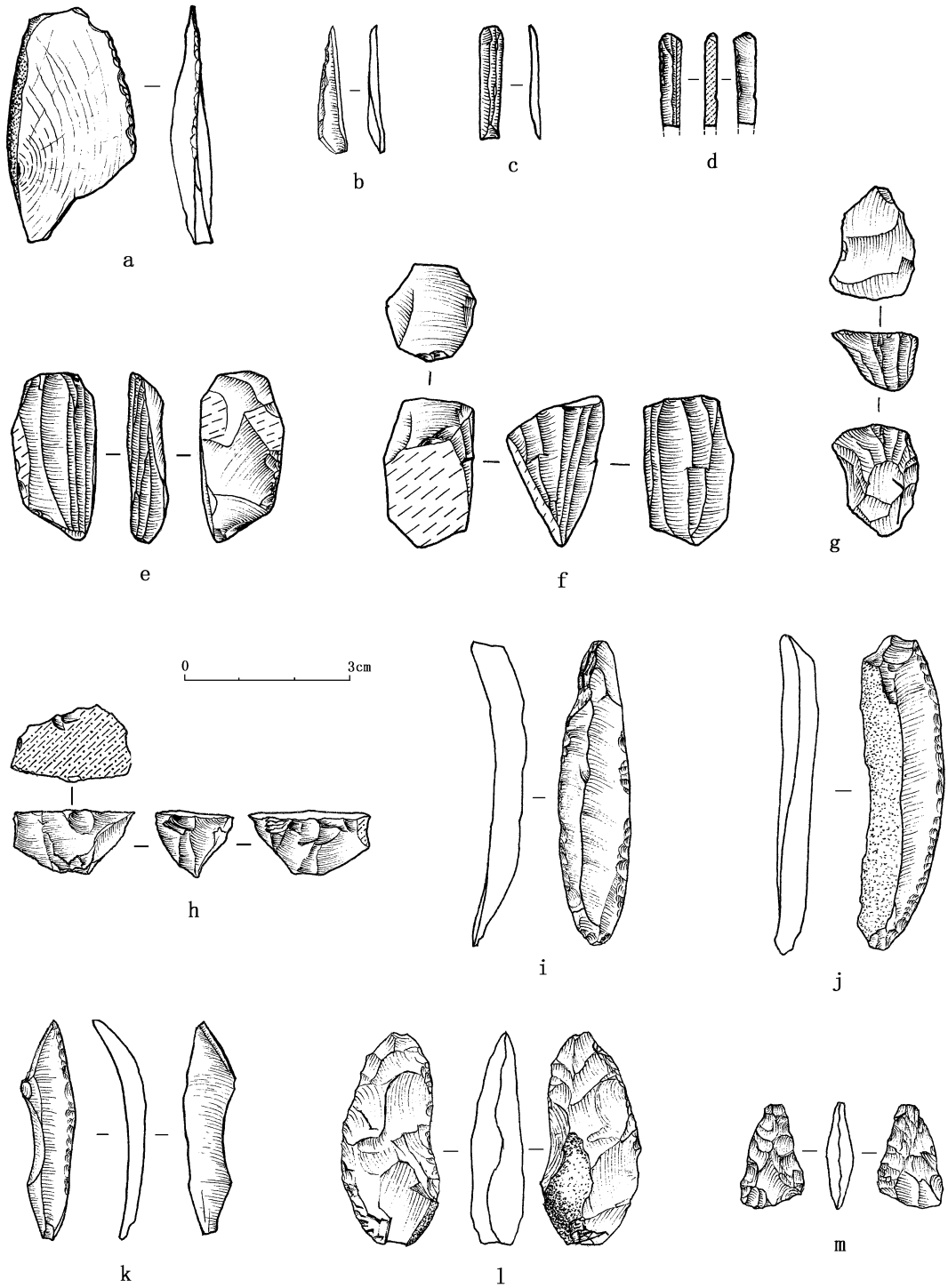

Shizitan, Fig. 4 The stone artifacts at S29. (**a**) Scraper (L8); (**b**–**d**) microblades (L7); (**e**–**f**) semi-conical microcores (L7); (**g**–**h**) boat-shaped microcores (L1; L6–7); (**i**–**j**) retouched blade (L7); (**k**) blade-blanked burin (L7); (**l**–**m**) bifacial points (L3; L1)

plants, as well, were harvested and processed as early as the LGM. This may be indications of the initial step that eventually leads to millet production in North China but is also some 18,000–14,000 years before the earliest evidence for domesticated millet in this region (Liu et al. 2018).

The Site of S9

Shizitan Locality S9 (36°2′11″N, 110°32′40″E, 688 m above sea level) provides evidence for the transition from the Late Upper Paleolithic to early Neolithic periods. It is located about 150 m north of Gaolouhe Village of Jixian County. The site was identified in 2000 and excavated over three seasons in 2001, 2002, and 2005. The excavated area reached 25 m^2 with deposits 455 cm in depth primarily feature aeolian loess sediments. These can be divided into five cultural layers, for which 9 AMS ^{14}C dates are available. A total of 2,359 screened artifacts and an additional 5,000 sieved pieces, primarily lithic artifacts and animal bones, along with occasional grinding stones (Fig. 5), pigments, and ornaments, were recovered from all layers except Layer 2. Fire use is indicated by a hearth in Layer 3 but was in general use, as seen through most animal bones being broken and burnt. The most informative finds are grinding stones, pigments, and ornaments made of shells and ostrich eggshell (Fig. 3) (Song et al. 2011; Song 2013; Song and Shi 2013) found only in Layer 4.

Shizitan, Fig. 5 The grinding stones excavated from S9

Ongoing research shows that the lowest layer, Layer 5 (ca.13.8–13 Ka cal BP), features a warmer and damper period immediately followed by Layer 4, which dates ca.12.8–11.4 Ka cal BP, during the Younger Dryas (YD) period (a period of sudden climatic worsening and return to glacial conditions in the northern hemisphere dating 12.8–11.5 Ka cal BP). This is one of the few sites in North China for which we have YD data. The end of the YD marks the beginning of the Holocene and warmer conditions, during which there was a short break in the occupation of S9 seen through the sterile deposit between Layer 4 and Layer 3 (ca. 9.5–8.4 Ka cal BP). During the time period of Layer 3, a profound change in human behavior occurs with the appearance of millet-cultivating Neolithic villages in lowland North China, but these farming populations have not yet spread into the Loess Plateau, where we still see hunter-gatherers who will soon need to adapt to encroaching farming populations.

Shizitan grinding stones provide evidence for the early use of these objects in food processing in North China. The grinding stones that date to the YD generate important insights into the origin of millet exploitation and the transition from the Late Paleolithic to early Neolithic period. The residue and use-wear analyses of the S9 grinding stones shows that they had multiple functions including wild plant processing, grinding pigments, and shaping materials that were used in ornaments (so possible for making the ornaments). An increase through time is seen in the proportion of the grass subfamily Panicoideae identified in the starch grain samples, indicating an intensification in the use of wild serials occurring at S9 through time. People here may also have become more semi-sedentary, as evidenced by the grinding stones and cereal exploitation, perhaps. The site of S9 can be seen as representing an early-stage cereal exploitation, with a new, intensive gathering of wild cereals before the intentional initiation of millet cultivation in North China (Liu et al. 2011; Song et al. 2013).

Future Directions

Based on more than 10 years' field work, Shizitan site owns her potential to be well known by international archaeologists by broadening the international co-operations and multidisciplinary approaches. More detailed researches on the diachronic changes of Paleolithic technology and the selective use of high-quality raw materials are ongoing. New lines of research are also focusing on the structural and functional changes of hearths. The relative results will shed light on the cultural diversity of modern human and the cultural exchanges among human populations in larger geographic areas beyond the Middle Yellow River.

Cross-References

- ▶ Archaeological Soil Micromorphology
- ▶ Chinese Archaeology in the Twenty-First Century
- ▶ Early State Formation in China
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Millets: Origins and Development
- ▶ Phytoliths in Archaeology: Chemical Aspects
- ▶ Radiocarbon Dating in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology

References

Linfen Administrative Bureau of Culture. 1989. Mesolithic remains at Shizitan site in Jixian County, Shanxi Province. *Acta Archaeologica Sinica* 3: 57–62. [in Chinese].

Liu, L., W. Ge, S. Bestel, D. Jones, J.M. Shi, Y.H. Song, and X.C. Chen. 2011. Plant exploitation of the last foragers at Shizitan in the middle Yellow River Valley China: Evidence from grinding stones. *Journal of Archaeological Science* 38 (12): 3524–3532.

Liu, L., M.J. Levin, M.F. Bonomo, J.J. Wang, J.M. Shi, X.C. Chen, J.Y. Han, and Y.H. Song. 2018. Harvesting and processing wild cereals in the upper Palaeolithic Yellow River Valley, China. *Antiquity* 92 (363): 603–619.

School of History and Culture, Shanxi University & Shanxi Provincial Institute of Archaeology. 2017. The excavation of locality S29 of the Shizitan site, Jixian County, Shanxi. *Archaeology* 2: 35–51. [in Chinese].

Shizitan Archaeological Team. 2013. The excavation of the locality S14 of Shizitan Paleolithic site in Jixian County, Shanxi. *Archaeology* 2: 3–13. [in Chinese].

Shizitan Archaeological Team. 2016. The Excavation of the Locality S5 of Shizitan Palaeolithic Site in Jixian County, Shanxi. *Archaeology* 4: 3–15. in Chinese.

SONG, Y.H. 2012. Late Palaeolithic site at locality S9 of Shizitan complex in Jixian County, Shanxi Province. *Chinese Archaeology* 12: 61–69.

Song, Y.H. 2013. On the stringing and tying fashions of perforated ornaments found at Shizitan site. *Cultural Relics of Central China* 1: 17–22. in Chinese.

Song, Y.H., and J.M. Shi. 2013. Researches on the ornaments unearthed from the Shizitan site of the Paleolithic age in Jixian County. Shanxi. *Archaeology* 8: 46–57. [in Chinese].

Song, Y.H., J.M. Shi, and C. Shen. 2011. Study on technological process of the Shell ornaments discovered from Shizitan Palaeolithic site. *Acta Anthropological Sinica* 30 (2): 115–123. [in Chinese].

Song, Y.H., J.M. Shi, and L. Liu. 2013. The origins of millet agriculture in North China from the evidences on the grinding stones at locality S9 of Shizitan Paleolithic site in Shanxi Province. *Agricultural History of China* 3: 3–8. [in Chinese].

Song, Y.H., X.R. Li, X.H. Wu, E. Kvavadze, P. Goldberg, and O. Bar-Yosef. 2016. Bone needle fragment in LGM from the Shizitan site (China): Archaeological evidence and experimental study. *Quaternary International* 400: 140–148.

Song, Y.H., J.D. Cohen, J.M. Shi, X.H. Wu, E. Kvavadze, P. Goldberg, S.Q. Zhang, Y. Zhang, and O. Bar-Yosef. 2017. Environmental reconstruction and dating of Shizitan 29, Shanxi Province: An early microblade site in North China. *Journal of Archaeological Science* 79: 19–35.

Song, Y.H., S. Grimaldi, F. Santaniello, J.D. Cohen, J.M. Shi, and O. Bar-Yosef. 2019. Re-thinking the evolution of microblade technology in East Asia: Techno-functional understanding of the lithic assemblage from Shizitan29 (Shanxi, China). *PLoS One* 14 (2): e0212643. https://doi.org/10.1371/journal.pone.0212643.

Zhao, J.F. 2008. Locality 12 in Shizitan site. In *A Collection of Studies on Archaeology (VII), Festschrift in Commemoration of Professor Lü Zun'e's 80th Birthday and 55 Years of Archaeological Teaching and Research*, 223–231. Beijing: Science Press. [in Chinese].

Further Readings

Bar-Yosef, O., and Y.P. Wang. 2012. Paleaolithic Archaeology in China. *Annual Review of Anthropology* 41: 319–335.

Qu, T.L., O. Bar-Yosef, Y.P. Wang, and X.H. Wu. 2013. The Chinese upper Paleolithic: Geography, chronology, and techno-typology. *Journal of Archaeological Research* 21: 1–73.

Siberia: Paleolithic

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Introduction

Siberia is a territory of 13.1 mil km^2 encompassing the northern part of Asia east of the Ural Mountains to the Pacific coast (the Far East). This vast area has major significance for documenting the evolutionary processes of initial human settlement in the frame of past climates and climate change in the boreal and (circum-) polar regions of the Northern Hemisphere. Particularly, the central continental areas in the transitional subarctic zone between the northern Siberian lowlands south of the Arctic Ocean and the southern Siberian mountain systems characterized by a strongly continental climate regime have been subjected to multidisciplinary Quaternary (paleoecological and geoarchaeological) investigations during the last decades. Siberia is also the principal territory for transcontinental studies and correlations of geological climate proxy records across Eurasia following the East-West and South-North geographic transects (Fig. 1). Among them, loess (fine aeolian dust) represents, together with the Lake Baikal limnological archives, the most significant source of globally indicative paleoclimate and paleoenvironmental data with bearing for reconstruction of the past climate history in the north-central Asia (Chlachula 2003a).

The broader Siberia with the adjacent parts of the Urals and the Russian Far East (the Primorye, Magadan and Chukotka regions) has the key

Siberia: Paleolithic, Fig. 1 A: Geographic map of Siberia with the principal regions of Paleolithic research. *1*. Trans-Urals and West Siberia; *2*. Southwestern Siberia (the Altai region, the upper Ob River Basin); *3*. South-Central Siberia (the Sayan Mountains, the upper Yenisei Basin); *4*. East Central Siberia (the Baikal region, the Angara and upper Lena Basins); *5*. North-East Siberia (the Lena, Yana, Indigirka and Kolyma Basins), the Russian Far East

relevance for elucidation of timing and conditions of environmental adaptation of the prehistoric and early historic people to the high latitudes of Eurasia, as well as the initial colonization of the Pleistocene Beringia, including the NW of the American continent. The particular geographic location and the variety in topographic configuration of regional landscape reliefs together with changing Quaternary environments governed by the past global climate change played the key role in this long and complex process over the last 2.4 Ma. The spatial and contextual distribution of the documented archaeological sites reflects a climatic instability and a timely discontinuous inhabitability of particular geographical areas of Siberia. The cyclic nature of glacial and interglacial stages led to periodic geomorphic transformations and generation of specific ecosystems adjusted to particular topographic settings and responding to acting atmospheric variations. Diversity of the present reliefs and environments, reflecting the past climate change, played the key role in the process of the initial peopling of the immense territory. Paleoenvironmental databases (palynological, paleontological) as well as early cultural records provide unique evidence of strongly fluctuating Pleistocene glacial and interglacial climates, corroborating the continental geological as well as Marine Oxygen Isotope (MIS) chronostratigraphic archives. Because of the large spatial extent and a limited accessibility, particularly the north(eastern) regions of Siberia and the Russian Far East belong to the least explored ones in terms of elucidating the World prehistory.

Definition

The regional geographic diversity with vegetation zonality of Siberia encompassing the southern parkland steppes and semi-deserts, vast boreal taiga forests, and the northern Arctic tundra illustrates the diversity of the present as well as past environments, with the most extreme seasonal temperature deviations in the World ranging from +45 °C to −80 °C. The main physiographical units include the continental basins of the Western Siberian Lowland, the Lena and Kolyma Basin; the southern depressions (the Kuznetsk, Minusinsk, Irkutsk and Trans-Baikal Basins); the Central Siberian Plateau; and the mountain ranges in the South (Altai, Sayan, Baikal, and Yablonovyy Range) and in the North-East Siberia (Stavonoy, Verkhoyanskyy, Suntar-Hajata, Cherskego, Kolymskyy Range). The major Siberian rivers (Ob, Yenisei, Lena, Kolyma) drain the territory into the Arctic Ocean. The Cenozoic neotectonic activity together with the periodic Pleistocene glaciations and interglacial geomorphic processes modeled the configuration of the former relief. During the cold Pleistocene stages, the vast extra-glacial regions of West Siberia south of the NW Arctic ice-sheet were transformed into a large periglacial superzone which became a major sedimentation area of aeolian (silty) deposits cyclically derived by winds from the continental ice-front ablation surfaces. Main paleoenvironmental records, spanning over several hundred thousand years, have been preserved in deeply stratified sections within the major basins (Ob, Yenisei, Angara, and Lena River) that were exposed after progressive erosion triggered by constructions of large dams. Equally important sources of the Quaternary (geological and biotic) paleoclimate proxy data originate from open-coalmines and other modern industrial landscape disturbances.

Because of the complex, multifactorial nature of a long-term climatic and ecology evolution, Siberian geoarchaeology-oriented studies have become increasingly interdisciplinary, integrating Quaternary geology and paleogeography, paleopedology, paleontology, paleobotany, Paleolithic archaeology, and other fields (Chlachula et al. 1999, 2014; Prokopenko et al. 2001; Derevianko et al. 2005; Chlachula and Catto 2010; Ineshin and Teten'kin 2017). Reconstructions of past environments in the specific regions and the time periods have been used to assess the effects of orbital variations on seasonal and latitudinal distribution of solar radiation and atmospheric circulation patterns and the consequential changes in regional temperatures, precipitation, and moisture balance. Some long-term models provide means of predicting future climatic evolution in the context of the global climate history and help in the assessment of the modern human

factor in environmental change. Because of the pronounced climatic continentality of the territory, even minor variations in atmospheric humidity and temperature led to major transformations in local ecosystems, particularly in the open southern Siberian continental sedimentary basins and the upland depressions.

Geoarchaeology of the Siberian Paleolithic and Mesolithic, framed into the broader scope of Quaternary science, chronologically entails the Pleistocene time span with the documented cultural records dating from the Early till Final Pleistocene depending on the particular geographic area (Chlachula 2017). The evidence of the occupation includes technologically diverse stone and bone industries, butchered fossil fauna remains, paleoanthropological remains, fireplaces, and other early human behavioral elements stored in geo-contexts.

Historical Background

Until the 1980s, Siberia was generally believed to have been colonized by the Late Pleistocene people. Human occupation was traditionally associated with the Late Paleolithic cultures (Tseitlin 1979). Systematic geoarchaeology investigations during the last 20 years across the entire Siberia (with the key research loci in the Tran-Ural region of West Siberia, the Altai region, the Upper Yenisei, Angara and Lena Basins, as well as at the easternmost margins of the Russian Far East in Primoriye and on the Sakhalin Island) revealed several hundred of Paleolithic and Mesolithic sites (e.g., Astakhov 1986; Derevianko 1990; Drozdov et al. 1990; Larichev et al. 1990; Medvedev et al. 1990; Mochanov 1992; Derevianko and Markin 1992; Konstantinov 1994; Markin 1996; Chlachula et al. 1999, 2003; Mochanov and Fedoseeva 2001, 2002; Zenin 2002; Vasilevskyy 2008; Derevianko and Shunkov 2009). Particularly the discoveries of numerous Paleolithic locations, some of potentially great antiquity (>0.5 Ma), in large-scale surface exposures (river erosions and industrial mining) followed by systematic archaeological investigations within the major river basins of south and central Siberia between the Irtysh River in the west and the Lena River/Lake Baikal in the east (Fig. 1), have provided overwhelming evidence of a much greater antiquity of human presence in the broader Siberia and capability of early people to adjust to changing Pleistocene environments. Cultural remains are located in diverse geomorphic settings (i.e., lowland plains, mountain valleys, upland plateaus) and geological contexts (aeolian, fluvial, lacustrine, palustrine, alluvial, glacial, and karstic), with the highest concentrations in the Pleistocene periglacial parkland steppe and the boreal tundra-forest foothill zone. Particularly the geographically extensive and deeply stratified loess-paleosol sections in the southern Siberian parkland zone have revealed a long and complex cultural sequence of human occupation. The variety of cultural finds provides witness to several principal stages of inhabitation of the Pleistocene Siberia, possibly encompassing the time interval close to 1 Ma. The earliest (Early/Middle Pleistocene stages) are represented by "pebble tool" industries, followed by the Middle Paleolithic complexes, including the (Neanderthal) traditions with the Levallois prepared-core stone-flaking technology, and the regionally diverse Late/Final Paleolithic blade complexes eventually replaced by the microlithic Mesolithic cultural facies that developed in response to major natural transformations during the final Pleistocene.

A further northern geographic expansion of humans into the Arctic regions reflects a progressive cultural adaptation to extreme climatic conditions of (sub)polar Pleistocene environments (Mochanov and Fedoseeva 2002). Presence of the Paleolithic sites in North Siberia (Pitulko et al. 2004) provides eloquent evidence that people reached the Arctic coast already before the Last Glacial (>24,000 years ago/24 ka BP). All these discoveries logically lead to revision of the traditional perceptions on a late peopling of northern Asia as well as the "late chronology" models of the initial human migrations across the exposed land-bridge of Beringia to the North American continent (Chlachula 2003b). Geoarchaeology studies, particularly in the poorly explored and marginal geographic regions of northern and

eastern Siberia (Slobodin 1999; Vasilevskyy 2008), are of utmost importance for reconstruction of past climate change as well as the early human history in north Eurasia.

Key Issues/Current Debates

Siberia has principal bearing for elucidating the prehistory of peopling of northern Eurasia, with the key issues of the traditional debate – the antiquity, the chronology of migration processes, and the environmental contexts of the Pleistocene dispersal of early humans within this vast territory. A specific study issue is the cultural adaptation in the extreme environments of the Russian (sub-) Arctic regions. Interactions of past climate change and the regional relief modeling triggered by the neotectonic activity and reflected by natural transformations of local ecosystems attest to the complexity of the Quaternary landscape development, ultimately affecting timing, intensity, and adaptations of the early human occupation of north-central Asia. Contextual geology, paleoecology, and paleontology records from investigated archaeological sites and stratified geological sections provide evidence of pronounced (paleo) environmental and biotic shifts triggered by the global climate evolution as well as the associated glacial and interglacial geomorphic processes. Quaternary climatic cycles regulated spatial and temporal movements of prehistoric people into the high latitudes of Eurasia. Integrated ecology multiproxy databases thus document trajectories of the complex and long occupation history of this extensive, but still rather marginally known part of the World.

Southwest Siberia

Natural Context, Paleogeography, and Climate History

The territory of West and SW Siberia, encompassing the West Siberian Lowland, the Altai region, and the Kuznetsk Basin, is characterized by a mosaic physiography with high mountain massifs in the south and east (max. 4,506 m asl), and open lowlands in the north and west (Fig. 1). Hydrologically, the area belongs to the Ob River drainage system with the Katun', Biya, Irtysh, and Tom' River being the main tributaries. The lower relief zone (>1,200 m asl.) includes >50% of the area and constitutes relics of old denudation surfaces covered by more recent (Pleistocene) deposits derived during glaciations. The territory shows a complex Quaternary history for the last 2.5 Ma governed by climate changes leading to the present pronounced continentality of the inner Eurasia in association with a regional Cenozoic orogenic activity initiated by the Miocene uplift of the Trans-Baikal region and reaching the Sayan-Altai area during the late Pliocene (3 Ma ago). Dynamics of these processes continued until the early Middle Pleistocene leading to construction of a system of mountain ranges separated by deep depressions filled by lakes. The beginning of the Pleistocene period brought a major modification of former landscapes as a result of dramatic climatic changes with progressive continental cooling and aridity. Periodic glaciations caused a regional topographic restructuring with intensive erosion in the glaciated zone and accumulation of (pro)glacial, alluvial, proluvial, lacustrine, and aeolian deposits in the intramontane depressions. The geological records display a wide range of environments and climates. Particularly the deeply stratified loess-paleosol sections deliver most detailed information on high-resolution and globally indicative Late Quaternary atmospheric variations in Siberia.

The climate evolution in the southern mountain regions is witnessed by interglacial alluvial deposits separated by glacial moraine (till) formations with the most extensive dating to the final Middle Pleistocene (MIS 6) glacial stage. The alpine glaciers periodically formed coalescent ice fields supporting large glacial lakes in the central and southern mountain basins of Gorno Altai followed by cataclysmic drainages shaping the paleolandscape topography in the form of prominent glacio-fluvial terraces (Fig. 2). The two Late Pleistocene glacial stages (MIS 4 and 2) are separated by the mid-Last Glacial (MIS 3) warming (59–24 ka BP) associated with accumulation of gravelly alluvial sediment facies from the

Siberia: Paleolithic, Fig. 2 A system of terraces at the confluence of the Katun' and Chuya River (Gorno Altai) resulting from cataclysmic drainages of ice-dammed glacial lakes. The mountain areas of Siberia provide witness of major past geomorphic processes having impact on visibility and preservation of the Pleistocene occupation sites

former ice ablation. The broken mountain relief differentiated the regional climatic pattern during the Last Glacial (24–12 ka BP), with microclimate conditions in protected locations along the northern Altai foothills and in the central Katun' River basin, allowing potential survival of interstadial flora and biota until the Holocene. The Pleistocene climate variations in the lowland extraglacial areas of SW Siberia and the continental depressions north of the Altai-West Sayan Mountains are evidenced by a massive deposition of aeolian (silty and sandy) deposits during glacial periods and surface stabilization with soil formation during warm (interglacial/interstadial) stages. The extensive loess-paleosol formations on the Altai Plains provide the most detailed multiproxy records of the climatic cycles for the last c. 300,000 years. The MAT during the Last Interglacial climatic optimum (MIS 5e, 125 ka BP) in SW Siberia was by 1–3 °C higher than at present, with a c. 100 mm increase in annual precipitation. Environmental conditions were broadly similar to the present ones during the following interstadials that were the most suitable time intervals for human colonization and inhabitation.

Pleistocene Environments and Early Human Occupation

Studies of the Paleolithic and Mesolithic occupation have a long tradition in Siberia with the key foci in the Altai region. The transient geographic areas along the margin of SW Siberia are believed to be the main gateway and passages for early human migrations from the southern regions of Central Asia into Siberia (Fig. 1). Reconstruction of the past climate dynamics that shaped the configuration of the regional topography and local ecosystems is essential for understanding timing and adaptations of the initial peopling of northern Asia. The spatial distribution of the Pleistocene sites on the territory of SW Siberia shows a location of most sites within the 75–150 km wide zone of the 300–1,000 m altitude between the southern mountain ranges and the northern plains and

lowlands (Baryshnikov and Maloletko 1999). This (paleo)geographic occupation pattern, reflecting specific environmental adaptation strategies to local settings, applies for both open-air localities buried in alluvial, colluvial, or aeolian deposits, as well as cave sites concentrated in the NW Altai (the Anui valley). Formation of the karstic systems is linked to a progressive downcutting by fluvial erosion through the Devonian-Carboniferous limestone bedrock during the late Middle Pleistocene.

Timing of the Pleistocene human migrations in Siberia was principally governed by climatic change and the associated environmental development. Intensified orogenic uplifts, triggering large-scale erosions in river valleys, reshaped natural occupation habitats. Relatively stable conditions seem to have persisted in the central and northern Altai due to increased regional precipitation and a tempering atmospheric effect of the mountain ranges. Limestone caves provided shelters for a more permanent human inhabitation of the Altai area, particularly in the northern foothills and the central intramontane depressions (Derevianko and Markin 1992; Markin 1996), characterized by warm microclimate conditions. The initial peopling of the Altai-West Sayan region likely occurred in some of the early Middle Pleistocene interglacials in the process of the northern expansion of warm biotic communities. Mixed coniferous and broadleaf forests established in the mountain areas with elevations 1,500–2,000 m asl. Parklands covered most of the adjacent plains of southwest Siberia with continental depressions filled by lakes and drained by meandering rivers. Rudimentary core and flake ("pebble tool") stone industries scattered on high river terraces and along former lakeshore margins of the present arid basins (Kuznetsk and Zaisan Basin) attest to several stages of early human inhabitation and a relative environmental stability (Chlachula 2010). There is limited evidence on persistence of the Early Paleolithic occupation during glacial stages, although some intermittent semi-continuity in the southernmost areas is assumed in view to finds of weathered lithic artifacts from the old periglacial alluvia in association with cold-adapted megafauna. Mastering the technique of fire making was clearly the main precondition for early human survival in cold tundra-steppe and tundra-forest habitats of southern Siberia.

The Last Interglacial warming (starting at 130 ka BP) is associated with a recolonization of southern Siberia by coniferous taiga forests and the appearance of the Mousterian Neanderthal tradition. Changes in the relief configuration influenced a regional climate regime and opened new niches of habitats for the Middle Paleolithic population concentrated in the karstic area of the NW Altai foothills (Ust'-Kanskaya, Strashnaya, Denisova, Okladnikova, Kaminnaya Caves) as well as at open-air sites in the central valleys (Kara-Bom, Ust'-Karakol, Tyumechin I and II) (Derevianko and Markin 1992; Chlachula et al. 1999; Derevianko et al. 2005). The Middle Paleolithic horizons, encompassing a timespan of up to 140,000 years (180–40 ka BP), represent a marked cultural phenomenon in the Altai (Figs. 3 and 4). Isolated teeth (2) from the Denisova Cave dated to MIS 5 and identified as *Homo neaderthalensis* support the model of biological evolution of premodern humans in Siberia (Derevianko and Shunkov 2009). Major cooling during the early Last Glacial (MIS 4) led to establishment of full glacial conditions in the central and southern Altai, and a zonal geographic replacement of boreal forest by periglacial tundra forest in the northern Altai and by arid tundra-steppe in the adjacent lowlands (the Ob River basin and the Kuznetsk Basin). Accentuated moderate climate fluctuations between cold stadials are evidenced by embryonic regosolic soils in the loess formations on the North Altai Plains and sparse cultural records in protected locations in the Altai foothills.

Human occupation of the central and southern Altai during the early Last Glacial (74–60 ka BP) was impeded by harsh, ice-marginal environments and expansion of glaciers in the upper reaches of the Katun'-Chuya valleys subsequently filled by proglacial lakes. Progressive warming during the early mid-Last Glacial interstadial interval (MIS 3, 59–35 ka BP) caused a dramatic wasting of the ice fields accompanied by cataclysmic releases of ice-dammed lakes and large-scale

Siberia: Paleolithic, Fig. 3 Stratigraphy of the multi-layer Denisova Cave Site (the Anui River valley, NW Altai) enclosing a series of c. 15 occupation horizons dating since the late Middle Pleistocene until Holocene

mass-flow and slope erosional processes (Fig. 2). The former valley glaciers receded to the highest elevations as corrie glaciers. The periodic outbursts of the glacial basins had a dramatic impact on the local ecosystems, but also obliterating most of the earlier cultural records. Enormous erosional processes associated with these major events significantly reduced the site visibility potential in the formerly flooded areas, with traces of former inhabitation locations preserved only at high topographic elevations above the glacial lake basin waterlines (Fig. 5). Mixed forests dominated by birch, pine, spruce, and fir invaded the former periglacial and ice-marginal landscape. The presence of broadleaf arboreal taxa (oak, lime, chestnut, maple) indicates a climate warmer than at the present time.

Increased humidity and cooling during the later stage of the mid-Last Glacial interstadial interval (35–24 ka BP) initiated mass gravity slope processes and cryogenic deformations followed by warmer oscillations with formation of podzolic gleysols (Fig. 6). Appearance of the transitional early Late Paleolithic cultural facies reflects human adaptation to mosaic interstadial habitats, including subalpine taiga, dark coniferous forests, mixed parklands, and steppes with mixed nonanalogue biotic communities. The identical geographical distribution of the Middle-Late Paleolithic sites and the time-transgressive lithic technologies suggests a regional cultural (and biological?) continuity in the Altai area during the Late Pleistocene (Derevianko 2010). A phalanx fragment from Denisova Cave dated to 40,000 years ago and interpreted on basis of DNA as an extinct human species (Dalton 2010) reinforces this scenario. Reestablishment of cold tundra-steppe habitats correlates with dispersal of the developed Late Paleolithic with blade-flaking techniques in stone tool production and associated with a periglacial "mammoth" megafauna that possibly survived in protected and climatically milder locations in the northern Altai throughout the LGM (20–18 ka BP). Emergence of the microlithic stone tool assemblages with wedge-shape cores is linked with a new cultural adjustment during the final stage of the Paleolithic development responding to natural transformations of the former periglacial ecosystems toward the end of Pleistocene.

South-Central Siberia

Natural Context, Paleogeography, and Climate History

The south-central Siberia, bordered by the western Mongolia from the South and the Central Siberian Plateau in the North, is topographically and biotically a varied territory structured by high ranges of the Sayan Mountains passing into foothills transected by river valleys draining water discharge from the southern mountain massive (Fig. 1). The regional (paleo)relief is built by the south Siberian continental basin with intermountain depressions modeled by fluvial erosion of the Yenisei River and its tributaries. An extensive loess cover with a series of buried

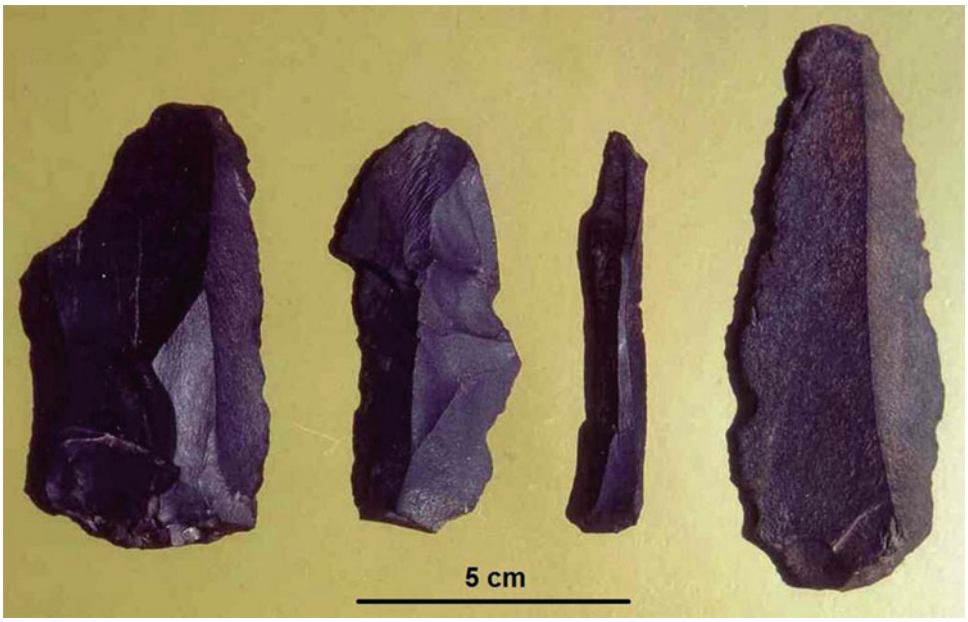

Siberia: Paleolithic, Fig. 4 Denisova Cave, the Anui River valley. A transitional Middle-Late Paleolithic industry including the Levallois as well as the blade stone flaking techniques

Siberia: Paleolithic, Fig. 5 Krasnaya Gorka Site (Gorno Altai). A view from the Paleolithic locality positioned on a promontory of an alluvial fan (1,780 m asl) over the Chuya River valley with stone artifacts made on high-quality raw materials (jasper, chert) exposed by erosion on the present top surface

Siberia: Paleolithic, Fig. 6 Stratigraphy of the Ust' Karakol Site (the Anui Halley, NW Altai) with several Late Paleolithic occupation horizons ^{14}C-dated to 28,700–31,400 year BP. Complex post-depositional processes are evidenced by slope-wash and cryogenic periglacial disturbances of the geological context due to climatic fluctuations in the Altai Mountains during the mid- and late Last Glacial stage

paleosols in the parkland-steppe zone of the Northern Minusinsk Basin, being a continuation of the southern Siberian loess belt, has provided the most complete, high-resolution Late Quaternary paleoclimate record in the north-central Eurasia (Chlachula 2003a). The interglacial periods are evidenced by stages of landscape stabilization and soil formation disrupted by intervals of loess deposition and cryogenic surface deformation during cold (glacial/stadial) stages. Coupled with the pollen evidence, the continuous loess-paleosol sequences encompassing a time interval of the last c. 300,000 years (MIS 8-1) document periglacial steppe-tundra established during cold stadials, replaced by mixed boreal forests and a mosaic parkland steppe during warm interstadials and interglacials. The associated Pleistocene natural transformations are reflected in the large diversity of fossil faunal species, including nonanalogue communities, to modern biota. The variety of the Quaternary faunal communities recorded in the Minusinsk and Kuzbas Basins documents particular evolutionary stages with zonal vegetation shifts triggered by pat climate change. The presence of cold-adapted species in the fossiliferous sedimentary beds indicates a very high biological potential of the Pleistocene periglacial steppe. A major drop of annual temperatures marks the time around the Last Glacial Maximum (20,000–18,000 years BP) that was less dramatic than during the preceding early Last Glacial stage (74,000–59,000 year BP). A progressive warming with several climatic oscillations expressed by an initial pedogenesis characterizes the Final Pleistocene climate development, leading to establishment of the Holocene (MIS 1) interglacial conditions. The present continental climate (with MAT −0.4 °C), with cold and dry winters with little snow cover and warm to hot summers, is strengthened by the geographical location of the territory near the geographical center of Asia.

Pleistocene Environments and Early Human Occupation

The upper Yenisei basin in the southern part of the Krasnoyarsk Region is together with the Altai

region and the Angara basin in the Irkutsk Region the key area of the Quaternary climate and Pleistocene geoarchaeology studies. Systematic investigations in the Northern and Southern Minusinsk Depressions, initiated after progressive erosion of unconsolidated aeolian (loess) deposits, revealed a rich series of Early, Middle, and Late Paleolithic stone industries associated with abundant fossil faunas (Drozdov et al. 1990; Chlachula et al. 1999). The main focus of the current studies is on reconstruction of the Pleistocene ecology and chronology of the human occupation in the frame of peopling of Siberia. The loess-paleosol formations, being the principal geological context of the early human cultural remains, also have a fundamental bearing for the high-resolution mapping of the past climate and the environmental history of north-central Asia. The archaeological and paleontological records incorporated in fluvial and subaerial sedimentary formations have provided new insights on timing, processes, and conditions of the initial peopling of this territory, as well as on the ecosystem biodiversity of the Pleistocene occupation habitats.

The earliest archaeological (Early Paleolithic) finds represented by simply flaked, but diagnostic stone artifacts originate, together with the taxonomically rich paleontological remains, from alluvial gravels of the 60–70-m Yenisei River terrace beneath 20–40-m thick loess deposits. The abundant "pebble tool" assemblages bear witness to human occupation of the area prior to the Last Interglacial (>130 ka BP). The formal variability of these lithic industries, displaying a differential degree of patination and aeolian abrasion, points to several stages of peopling with the earliest documented from the Tobol Interglacial (the Berezhekovo Site). The cultural implements also suggest, in conjunction with the cold-adapted megafauna, an early human adjustment to local periglacial environments. The archaeological records from the Minusinsk Basin, together with analogous finds from the Kuzbas and the Angara Basins (Medvedev et al. 1990), indicate a repeated occupation of the broader southern Siberia during the Middle Pleistocene (740–130 ka BP).

Evidence on the more recent Middle Paleolithic inhabitation of south-central Siberia is principally from the foothill areas of the Altai and Sayan Mountains and the local tributary river valleys (Konstantinov 1994; Derevianko 2010). Favorable climatic conditions promoted expansion of the Mousterian (Levallois) tradition during the Last Interglacial (MIS 5) that persisted until the early Last Glacial stage (MIS 4). In the Minusinsk Basins, the Middle Paleolithic is principally found in the Last Interglacial (130–74 ka BP) paleosols (Fig. 7). An exceptional Middle Paleolithic occupation site Ust'-Izhul' produced concentrated fossil skeletal remains incorporated in situ on top of the Last Interglacial (MIS 5e) chernozem IRSL dated to 125 ± 5 ka and overlying the 65 m Middle Pleistocene Yenisei terrace (Chlachula et al. 2003). The well-preserved fauna included an early form of mammoth (*Mammuthus primigenius* Blum.), wooly rhinoceros *(Coelodonta antiquitatis)*, bison *(Bison priscus)*, horse *(Equus mosbachensis)*, elk *(Cervus elaphus)*, as well as small mammals (Fig. 8). The most abundant species – mammoth – was represented by at least 12 individuals, parts of which were recorded in anatomical position. The associated and mostly expedient stone artifacts (200 pcs) were used for processing the slaughtered animals. Human activity is also manifested by flaked/cut ivory and bones of mammoth, rhinoceros, bison, and elk and by three fireplaces with a fir-wood charcoal ($^{14}C > 40$ ka BP). The paleogeographic site configuration with the discrete concentration of the skeletal remains points to game hunting by people in the nearby area over a terrace cliff and transported in dissected pieces to the habitation place. In respect to the high age and the contextual completeness, the Ust'-Izhul' locality is unique in Siberia. The megafaunal assemblages bear witness to the rich biological potential of the Yenisei area for early human inhabitation. There is no consensus if the Middle Paleolithic tradition in southern Siberia can be associated with the European and Near Eastern cultural milieu, although some "classical" Mousterian influences in the Altai cave sites are evident (Derevianko and Markin 1992). Analogous cultural finds are exposed on the present surface in low-sedimentation-rate areas of Khakhasia, Tuva, Gorno Altai, and East

Siberia: Paleolithic, Fig. 7 Late Quaternary loess sections at Kurtak exposed along the Krasnoyarsk Lake (the Northern Minusinsk Basin, south-central Siberia) with the Last Interglacial pedocomplex encompassing a time interval of 130–74 ka BP (Section Kurtak 29). The buried parkland-steppe paleosols (MIS 5e, 5c, 5a) correlate with stages of the Middle Paleolithic occupation of the area

Siberia: Paleolithic, Fig. 8 The Middle Paleolithic occupation site Ust'-Izhul' (the Kurtak Archaeological Region) dated to 125,000 year BP. Remains of megafauna (mainly of early *Mammuthus primigenius*) with stone artifacts and fireplaces attest to early human hunting and adaptation strategies in the upper Yenisei River Basin

Kazakhstan (Astakhov 1986; Chlachula 2010). The Middle Paleolithic stone-flaking technology, especially the Levallois technique, is still reminiscent in the Late Paleolithic traditions, suggesting a certain continuity of the cultural and possibly biological human evolution in Siberia during the Pleistocene.

The Late Paleolithic occupation in the southern Central Siberia is documented at both open-air and cave sites. Warming during the mid-Last Glacial interstadial stage (MIS 3) accelerated the cultural development characterized by blade-flaking techniques. The upper Yenisei basin is one of the major loci of the Late Paleolithic sites in Siberia (the Krasnoyarsk – Kanskaya forest-steppe, the Northern and Southern Minusinsk Basin, and the Western Sayan foothills) (Astakhov 1986; Drozdov et al. 1990; Larichev et al. 1990; Vasiliev 1992). The earliest occupations are buried in the Karginsk (MIS 3) pedocomplex (31–29 ka BP), in the early Sartan loess and the intercalated, weakly developed interstadial forest-tundra soils (dated to 25–22 ka BP). Intervals of significant climatic deterioration and onset of full Last Glacial (MIS 2) conditions are manifested by the absence of archaeological records except for biotic refugia in the northern foothills of the Western Sayans. During the LGM (20,000–18,000 year BP), the Yenisei area, as most of southern Siberia was vacated due to very cold and hyper-arid conditions with the biologically productive mid-Last Glacial parkland steppe replaced by barren steppe-tundra. More recent Final Paleolithic finds from the lowland and foothill areas provide evidence of recolonization of the upper Yenisei region during warm climatic oscillations at the end of the Pleistocene. A reindeer, red deer, argali sheep hunting, composite bone tools (spears/harpoons), and a microblade stone flaking illustrate major shifts in adaptation strategies in response to changing environments during the warm interstadial (16–13 ka BP), preceding the last cold climatic interval of the Final Pleistocene (Younger Dryas, 12.9 ka BP). The present archaeological records provide evidence that this territory was inhabited repeatedly at several stages during the Pleistocene, including some intervals of glacial stages with productive periglacial natural conditions. Human occupation may have persisted throughout the Last Glacial in protected southern locations despite severe climates over most of the northern plains.

East Siberia

Natural Context, Paleogeography, and Climate History

East Siberia, including the Pribaikal area (the upper Angara Basin), the Trans-Baikal area (the Selenga Basin), and the Lena Basin, is a vast territory of contact of the tectonic structures of the Siberian Platform and the adjoining mountain massifs (Fig. 1). The major orogenic activity initiated during the Pliocene/Pleistocene (the Baikal Tectonic Phase spanning for the last 3.5 Ma) led to formation of the present regional topographic configuration built by a series of tectonic depressions. The Baikal rift zone extends for about 2,500 km from Lake Khubsugul in Mongolia to the upper Aldan River in SE Yakutia. Most of the relief is shaped by smooth mountain ranges (800–1,300 m asl.) separated by river valleys and shallow basins occupied by mixed (spruce, larch, and birch) taiga forests. Cold and extreme continental climatic conditions prevail in East Siberia (MAT −4 °C). Most of the territory is covered by mountain tundra with larch *(Larix sibirica)*, Siberian pine *(Pinus sibirica)*, and dwarf birch *(Betula nana)* and underlain by seasonally active perennial permafrost.

The paleogeographical and paleoenvironmental evolution in East Siberia during the Quaternary was influenced by a dynamic interaction of global climatic change and the regional neotectonic modeling. The orogenic movement around the Pliocene/Pleistocene boundary (2.5 Ma ago) triggered uplifting of the Pribaikal and West Trans-Baikal regions, reactivated during the early Middle Pleistocene (after 750 ka BP) with accumulation of thick deltaic, fluvio-lacustrine, and slope deposits filling major river valleys and intermountain basins. The Cenozoic tectonics in conjunction with the mountain glaciations continuously shaped the topography of Eastern Siberia structured by a system of

mountain ranges (North Baikalskyy, Verkhoyanskyy, Cherskego, Kolymskyy) separated by the major (Angara, Lena, Viluy, Aldan, Indigirka, Yana, Kolyma) river basins and their tributaries. The subrifting regimes of the Mongolian-Siberian mountain zone gave rise to a diversity of geomorphic settings throughout the Pleistocene. Past glaciations in the East Siberian mountains, with the major one of the late Middle Pleistocene (MIS 8), played a significant role in the regional landscape development and environmental shifts in the extra-glacial depressions. Contrary to the Pribaikal Highlands, experiencing the most extensive glaciation during the Last Glacial Maximum (20–18 ka BP) with piedmont glaciers advancing far down into the foothills (Rezanov and Kalmikov 1999), only isolated ice-caps and corrie glaciers formed in the Eastern Sayan Mountains (above 2,700 m) and on the NE Siberian mountain ranges (Verkhoyanskyy, Cherskogo, Kolymskyy) despite very low temperature, but due to a high aridity and lack of winter precipitations.

The Pleistocene climatic variations in the extra-glacial areas are witnessed by a wide range of paleosols indicating mosaic vegetation and a high relief zonation. Increased accumulation rates of aeolian sediments with periglacial deformations point to a gradual cooling during the Late Quaternary. A major drop of temperature following the Last Interglacial climatic optimum (MIS 5e; 125 ka BP) around 115 ka BP (MIS 5d) suggests a major glaciation in the eastern Siberia corroborated by records from Lake Baikal as well loess-paleosol sequences (Prokopenko et al. 2001; Chlachula 2003a). The mid-Last Glacial (MIS 3) optimum (31 ka BP) was thermally approaching the Last Interglacial (MIS 5e) climate conditions. Fossil pollen, fauna, and early cultural records from stratified geological contexts including cryolithic permafrost formations of North Siberia (Fig. 9) provide evidence of structure and pronounced regional paleoecology changes in human occupation habitats. A greater variety of the early Quaternary faunal communities became reduced as a result of the long-term climatic cooling, leading to the relative taxonomic species uniformity in the Late Pleistocene.

Siberia: Paleolithic, Fig. 9 Anthropogenically worked quartz flakes from the Diring site from the 200 m Lena River terrace representing the earliest (Early Paleolithic) cultural inventories found in NE Siberia

Pleistocene Environments and Early Human Occupation

Present cultural evidence attests to several stages of human inhabitation of Eastern Siberia during the Pleistocene, with the oldest represented by the Early and Middle Pleistocene records, implying very early hominid migrations into the middle and high latitudes of Asia. Systematic investigations at the occupation sites in the upper Angara, Lena, Vitim, Aldan, Viluy, and Selenga River basins, along the Baikal Range and the Eastern Sayan foothills, contextually associated with diverse paleo-geomorphic zones and geological (alluvial, colluvial, aeolian, karstic) settings, deliver detailed multiproxy information on the Pleistocene climate evolution and the associated paleoenvironmental trends (Medvedev et al. 1990; Mochanov 1992; Konstantinov 1994; Lbova 1996; Mochanov and Fedoseeva 2002; Ineshin and Teten'kin 2017). Archaeological sites may be partly obliterated or poorly preserved around the Lake Baikal due to the neotectonic activity, triggering intensive erosional processes. The cultural finds, chronologically defined by the stratigraphic geological positions and technological attributes of stone flaking, include: (1) the Early Paleolithic from the Early(?)/Middle Pleistocene alluvial deposits (>130 ka BP); (2) the Middle Paleolithic buried in the Last Interglacial (MIS 5) pedocomplex and the early Last Glacial (MIS 4) gleysol horizons; (3) the early Late Paleolithic (42–30 ka BP) from the mid-Last Glacial (MIS 3) humic soils; (4) the "classical" Late

Paleolithic from the late mid- and early Last Glacial (MIS 2) gleyed soil horizons (30–17 ka BP); (5) the final Paleolithic (17–12 ka); and (6) Mesolithic (12–8 ka BP) from diverse geo-contexts.

The earliest Pleistocene sites are associated with old alluvial formations in the Lena and Angara River basins. The Diring Uriah Site sealed in coarse sandy deposits of the 200-m-high terrace of the Lena River is presently one of the earliest sites found in Siberia (Fig. 10). Despite its indefinite chronological assignment ranging from 2.5 Ma to 350 ka (Mochanov 1992), this site eloquently demonstrates a very early peopling of northern parts of Asia in the principal river valleys during some of the Early but surely the Middle Pleistocene interglacials that also promoted northern expansion of mixed taiga and open parklands. The Middle Pleistocene cultural records from the upper Lena and Angara areas, represented by stone artifacts made of quartz and quartzite cobbles with the typical archaic tool forms (choppers, bifaces, scrapers on flakes, polyhedral cores), display strongly wind-abraded surfaces. The age of these cultural assemblages from the Angara region exposed along the Bratsk Lake (the Igetei locality), referred to as of the Acheulian-Mousterian tradition, is estimated to be c. 200 ka BP, corresponding to the Shirta Interglacial/MIS 7 (244–170 ka BP) (Medvedev et al. 1990). A Middle Paleolithic occupation at the Mungkharyma Site (64*N) located on the 70 m terrace of the middle Viluy River produced a well-made stone industry of the Levallois tradition, including bifaces, bifacial knives, and side-scrapers, found with Pleistocene fauna (mammoth, wooly rhinoceros) (Fig. 11). A luminescence date 150 ± 38 ka BP (RTL-958) from the overlying sandy-silt layer suggests a (late) Middle Pleistocene age (Mochanov and Fedoseeva 2001). Climatic cooling, leading to expansion of mosaic steppe and pine-larch parklands, is linked with the onset of the Samarovo (270–244 ka BP) glacial period. A drop of annual temperature and increase in aridity during the Tazov Glacial (170–130 ka BP) hastened the degradation of interglacial forests and extension of open periglacial landscapes. The marked final Middle Pleistocene environmental deterioration is indicated by a cold-adapted tundra-steppe fauna from alluvial deposits including progressive

Siberia: Paleolithic, Fig. 10 The Middle Paleolithic Mungkharyma Site (64*N) on the 70 m Viluy River terrace, east-central Yakutia (Excavations by Y.A. Mochanov 2009)

taxa (mammoth, wooly rhinoceros, bison, horse, kulan, giant deer, argali), as well as species specific to the Trans-Baikal area (the Kiakhta antelope, the Baikal yak, dzeren, camel). Human survival in SE Siberia during the Samarovo (MIS 8) and the Tazov (MIS 6) glacial stages with MAT by up to −10 °C lower than at the present time presumes knowledge of fire making.

Siberia: Paleolithic, Fig. 11 The Middle Paleolithic quartzite tools from central Yakutia (the Kyzyl Syr Culture) (Courtesy S.A. Fedoseeva)

The Middle Pleistocene sites from the central and southern Lena basin and its tributaries (Viluy, Aldan) (Fig. 12) have the principal implications to the initial prehistoric colonization of NE Asia as well as North America.

During the Last Interglacial (MIS 5), mixed taiga forests were widely distributed in the mountain areas, indicating a temperate continental climate with summer air temperatures up to 5 °C higher than at present. Fossil chernozems at the Middle Paleolithic sites Mal'ta and Igetei (MIS 5e and 5c, resp.) illustrate open parkland-steppe settings of the upper Angara basin. Marked cooling, increased aridity, and intensified aeolian activity contributed to accumulations of extensive sandy deposits derived from drying up of river beds in the Irkutsk Depression and the Lena Basin during the early Last Glacial (MIS 4). Cold intervals with increased humidity correlate with cryoturbation processes, solifluction horizons, and pollen records of invading periglacial grasslands and open pine-birch tundra. Despite very harsh conditions, a Middle Paleolithic (Mousterian?) occupation may have locally survived in the Angara area.

Siberia: Paleolithic, Fig. 12 Partly humanly articulated Pleistocene fauna skeletal remains (mammoth, bison, horse) from the Yana River basin, NW Yakutia, providing evidence of the biotically rich mid-Last Glacial North Siberian ecosystems exploited by the Palaeolithic people (J. Chlachula, unpublished data)

The mid-Last Glacial interval (MIS 3), with an early cold and arid loess sedimentation phase (59–40 ka BP) followed by a warm and humid pedogenic phase (40–24 ka BP), brought a major change in the distribution of vegetation zones in East Siberia, with a northern expansion of mixed taiga forests and pine-birch dominated parklands. Broad-leaved arboreal taxa (oak, beech, elm, hazel) distributed in river valleys of the Baikal region attest to mosaic habitats with climate conditions possibly warmer than today. Cultural finds from the principal occupation sites (Ust'-Kova in the Angara basin, Mezin in the Kana valley, Kamenka in the Selenga basin, and the Aldan River complex) dated to 30–24 ka BP display a poor preservation due to cryogenesis and solifluction processes persisting until the onset of late Last Glacial (Sartan) stage (MIS 2). Remains of fauna exploited by people (horse, antelope, wooly rhinoceros, mammoth, bison, sheep-argali, and camel) and rodent taxa are indicative of an open steppe and parkland habitat. At the Kamenka Site, specific site complexes of game-processing, wood-working, stone and bone tool production, mineral paint manufacturing, and other behavioral cultural (ritual) activities were documented (Lbova 1996). The fossil fauna variety from different (mountain) ecotones shows a wide (>100 km) mobility range of the local Paleolithic hunters. A northern expansion of the Late Paleolithic occupation ambit into the extreme parts of the East Siberian Arctic is recorded at the Yana RHS site located 100-km south of the Laptev Sea coast (70° 43′ N, 123° 25′ E). The cultural evidence (stone and bone industry) and fossil fauna sealed in cryogenic silt blocs on the 18-m Yana River terrace and dated to 45–26 ka BP indicate environmental stability and a high biotic productivity of the mid-Last Glacial (MIS 3) interstadial floodplain meadow of the Yana River delta (Pitulko et al. 2004, 2017). This site provides evidence of humans migrating along the ice-free northern coast of Siberia/the exposed continental Arctic shelf. Favorable environmental conditions with boreal forest-parkland biotopes across the continental Siberia during the mid-Last Glacial are supported by isolated paleoanthropological remains indicating an early Upper Palaeolithic occupancy. A male femoral bone eroded from ancient alluvial deposits of the Irtysh River (the Ust'-Ishim Site) points to presence of modern humans in the West Siberian Lowland at least 45,000 yr ago, Its genome sequence points to co-ancestry with the North Asian Neanderthal population (Fu et al., 2014).

During the late Last Glacial stage (MIS 2) – the Sartan Glaciation (24–12 ka BP) – tundra-steppe covered most of the territory occupied by the Late/Final Paleolithic people represented by the famous sites Mal'ta and Buret' in the upper Angara basin (Tseitlin 1979). Climate deterioration with sparse Arctic vegetation and a progressive loess accumulation around the LGM caused presumably a major decline in the population density over East Siberia despite some adaptation indices to extreme periglacial environments (the Krasnyy Yar Site in the upper Angara with animal bones and fossil coal used as fuel) (Medvedev et al. 1990). A periglacial fauna (horse, wooly rhinoceros, mammoth, bison, giant deer, elk, saiga) implies cold periglacial tundra-steppe in the Angara, Lena, and the Trans-Baikal basins. Climate amelioration after the LGM (18 ka BP) is best evidenced by rodents from the Baikal-Angara-Lena Paleolithic sites (Buret', Krasnyy Yar, Igetei, Mal'ta, Bolshoi Jakor) that indicate a gradual transition from tundra-steppe and meadow-steppe to forest-steppe landscapes corresponding to shifts from a cool and dry climate to milder and humid conditions. This warming trend fostered dispersal of the Final Paleolithic complexes during the late Last Glacial (18–12 ka BP) associated with the Diyuktai Culture with microblade stone and bone technologies. The Final Pleistocene recolonization of East Siberia reached the marginal subpolar regions of the NE Arctic (e.g., the Berelekh Site in northern Yakutia at 70° N, dated to 13–11 ka BP or the Zhokov Island Site at 76°N dated to 9 ka BP (Pitulko 2013) (Fig. 13). The broad geographical distribution of the new technologies to the most distant parts of Siberia and the Russian Far East Islands (Slobodin 1999; Ponktratova 2007; Vasilevskyy 2008; Ineshin and Teten'kin 2017) reflects a successful prehistoric adaptation to the Final Pleistocene environments (Fig. 14).

Siberia: Paleolithic, Fig. 13 A view from the Final Pleistocene Kheta Site onto the Kheta valley, the Kolyma Basin, NE Siberia. River valleys served as the main migration corridors during the Pleistocene colonization of the northern territories of Siberia and the Russian Far East (all photos Figs. 2–13 by the author).

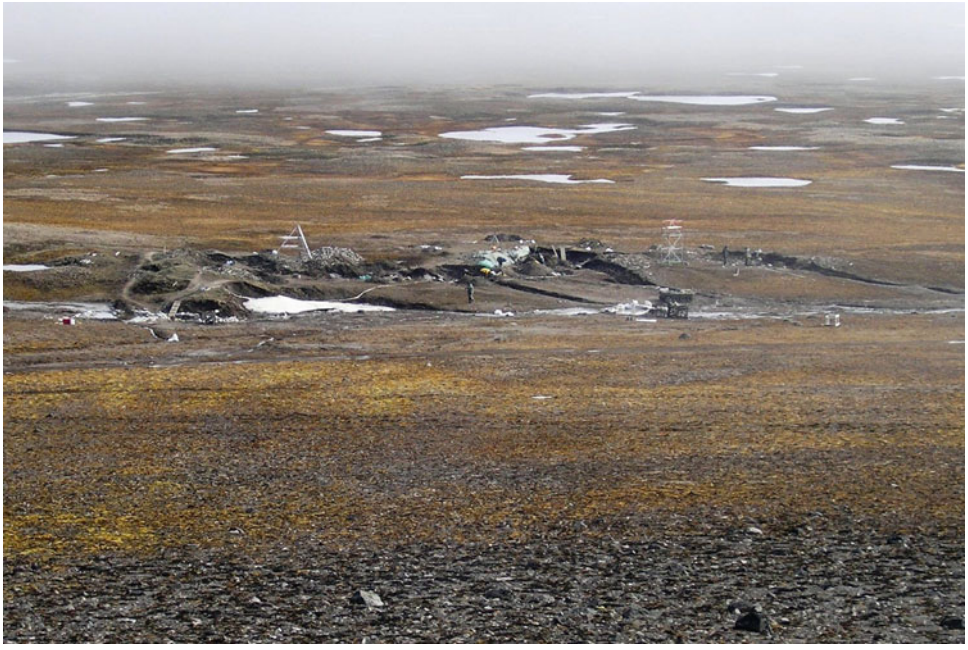

Siberia: Paleolithic, Fig. 14 The Mesolithic (early Holocene) Zhokhov Site (76° N), the New Siberian Islands, retaining "Paleolithic" adaptations and bone-processing technologies (2003 excavation). The northernmost located early occupation site in Siberia (Photo courtesy of E. Pavlova)

This process culminated in a spatial spreading and presumably a major population increase by the end of the Pleistocene, represented by the early Mesolithic (11–9 ka BP) hunters and gatherers reaching the extreme parts of the Arctic Siberia. In sum, the geological and biotic climate proxy records document a complex Quaternary evolutionary environmental development in East Siberia as seen in the gradual cultural adaptation of people and the geographic expansion of occupied areas.

International Perspectives

The geological and paleoecological evidences across western, south-central, and eastern Siberia, including the Ob, Irtysh, Kuznetsk, Yenisei, Angara and upper Lena basins and the adjacent regions of the Trans-Urals, Altai, Western and Eastern Sayans Mountains, Baikal Range and the NE Siberian mountains, disclose cyclic climatic changes during the Quaternary leading to establishment of the present environments. A global trend toward a strongly continental climate, with increased aridity and high seasonal temperature fluctuations, is traced since the late Pliocene. The progressing development during the Quaternary Period (the last 2.5 Ma) is evidenced by the zonal geographic shifts in the vegetation distribution, with the expansion of boreal (taiga) forests northward during the interglacial periods and warm interstadials stages, succeeded by the subarctic periglacial forest-steppe and tundra-steppe during the glacial periods with the tree cover confined to refugia in the southernmost areas of Siberia (the Altai and Sayan Mnt. foothills). Complex paleoenvironmental evolution archives are stored in the high-resolution loess-paleosol sequences, pollen records, and fossil fauna remains from deeply stratified alluvial and loessic formations. The loess-paleosol sections on the Altai Plains and the upper reaches of the Yenisei basin have provided most complete information on the past climatic variations, the landscape development, and the associated changes in the Pleistocene biotic communities on the territory of Siberia. The high-resolution stratigraphic records coupled with pollen and paleontology data indicate marked Pleistocene ecosystem transformations, with arctic tundra and forest-tundra during cold stadial intervals replaced by boreal forest and parkland – steppe during the warm interstadial intervals.

The Early and Middle Pleistocene climates brought major transformations of natural habitats, facilitating the northward dispersal of the Paleolithic people from the southern areas of Central Asia and Mongolia, and their environmental adaptation to the Siberian regional settings. The earliest unequivocally documented Middle Pleistocene (Early Paleolithic) occupation followed the main continental basins and the major river valleys. The human dispersal further east and north is assumed to have principally occurred during warm interglacials in the processes of the northern expansion of mixed parkland forests and the associated fauna communities, whereas only local movements of early human groups are envisaged during cold stages. The Tobol (MIS 9) Interglacial (390–270 ka BP), when the MAT was by c. 3–4 °C higher than at present, is likely to have been (one of) the most favorable time periods for initial migration to northern Asia reaching as far north as 60 °N latitude. The Early and Middle Paleolithic finds bear witness of repeated inhabitation of the Irtysh, Ob, upper Yenisei, Angara, Viluy, Vitim, Aldan, and the upper Lena River basins prior to the Last Interglacial. During the late Middle Pleistocene, glaciers in the Western and Eastern Sayan ranges expanded into the foothills to about 300–400 m altitude preceded by a downslope retreat of dark coniferous taiga forests. In the Minusinsk Depressions, the Kuznetsk Basin, and the northern Altai valleys protected from arctic tundra in the north, propitious (although periglacial) conditions with high biomass concentrations of steppe-parklands may have persisted during the glacial stages. This is evidenced by the abundant fossil remains from the Yenisei and Angara alluvia (60–80 m terraces) found with cultural records, as well as a colluvial reworking of the older (late Middle Pleistocene) loess cover, indicative of a fluctuating moderately cold climate regime, not excluding a continuation of the early human inhabitation of these areas.

Within the Last Interglacial (MIS 5; 130–74 ka BP), most of Siberia was covered by coniferous or mixed forests including broad-leaved taxa (lime, elm, oak), with forest-steppe distributed at lower elevations and in river valleys. At that time, the Middle Paleolithic (Neanderthal or early *Homo sapiens*) people entered the territory from Central Asia and/or the East European Plains. Expansion of the occupation habitat into the mountain areas, following the Last interglacial climatic optimum, likely occurred in the later (MIS 5c and 5a) interstadials. During the early Last Glacial (Zyriansk) stage (MIS 4; 74–59 ka BP), cold periglacial tundra/tundra-steppe and continuous permafrost expanded across most of Siberia. The approaching glacial maximum disrupted human settlements, although this may have persisted in some protected southern locations. Following the interval of intensive loess deposition at the end of the glacial, renewed warm climate pulses during the mid-glacial (Karginsk) interval (MIS 3; 59–24 ka) preconditioned formation of zonal soils associated with the transitional Middle/early Late Paleolithic stone industries, suggesting a certain regional cultural (and possibly biological) continuity in the Late Pleistocene Siberia. Moderately cold and stable environments during the second half of the interstadial interval (30–24 ka BP) promoted a major enlargement of occupation habitats marking a climax of the Paleolithic peopling in Siberia associated with the emergence of the "classical" Late Paleolithic cultures. Productive interstadial ecosystems with mixed parkland forests and taiga were gradually transformed into periglacial tundra of the approaching Last Glacial (Sartan) stage (MIS 2; 24–12 ka BP). A reduced population density is assumed around the LGM (20–18 ka BP) hindered by extremely cold climate conditions. Some occupation continuity persisting until the end of the Pleistocene may have applied just for biotic refugia in the protected southernmost locations along the Altay-Sayan foothills. Overall, the spatial and temporal distribution of the early cultural records documents environmental instability over large parts of Siberia during the Quaternary Period (the last 2.5 Ma). Specific geographical and contextual locations of early sites indicate that natural conditions during the earlier periods were generally more favorable for peopling than during the later periods. On the other hand, increased continentality and gradual shifts towards cold and arid conditions accelerated adaptation of the Middle and Upper Paleolithic populations to harsh periglacial climates promoting a progressive development of sophisticated survival strategies and fostering colonization of the extreme Siberian North.

Timing and evolutionary processes related to the initial colonization of northern Asia are still insufficiently mapped, although ongoing archaeological investigations supply continuously new evidence about particularities and general trajectories of this evolutionary process. The traditional views, assuming a very late (Late Pleistocene) inhabitation of Siberia and Beringia, have been definitely challenged. The archaeological discoveries disprove the long-held assumption of a late penetration (by Late Paleolithic people) into the middle and high latitudes of northern Asia. Instead, glacial-interglacial and stadial-interstadial climate cycles regulated a geographic movement of early people northward, predetermining the inhabitability of particular geographical areas. During glacial maxima, most of Siberia seems to have been vacated, especially during the earlier periods, because of the expansion of continental glaciers in the north and inhospitable environments in the southern extra-glacial regions. Gradual adaptation to cold natural habitats accelerated during the Late Pleistocene in connection with the advanced cultural and biological adjustment, enabling people to establish permanently in the vast and geographically diverse Siberian territory.

Future Directions

The studies on the Paleolithic of Siberia have made a major progress during the last 20 years changing radically the once valid paradigm on the Late Pleistocene colonization of north-central Asia. Despite this, most of the presently mapped sites tend to concentrate in the southern geographical regions and reflect a limited accessibility of

the northeastern subarctic and Arctic areas which are, however, of major potential for future investigations also with respect to mapping the initial peopling of the American continent. The evolutionary processes in the natural environments and specific behavioral Paleolithic adaptation patterns and material-technological conditions as well as documentation of the sequenced climatic events stored in geological records are the principal objectives of the current multidisciplinary Quaternary investigations. Equally important are the contextual past climate and paleoecology studies encompassing the last 2.5 Ma, because of increased awareness of the value of regionally reconstructed geological and natural proxy histories for understanding the past and present-day ecosystems and the early human (Pleistocene-Holocene) cultural adjustment strategies to the diverse Siberian environments. The integrated Quaternary geology and geoarchaeology studies are of principal importance for the future field surveys particularly in the marginally investigated areas of Siberia and the Russian Far East aimed at completing the culture-historical mosaic of the early human inhabitation of these geographically very extensive and scientifically fascinating territories.

Cross-References

- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ *Homo neanderthalensis*
- ▶ Lithic Technology, Paleolithic
- ▶ Urals: Paleolithic
- ▶ West and Central Asia: Early Homo Fossil Records

References

Astakhov, S.N. 1986. *The Paleolithic of Tuva*. Novosibirsk: Nauka (in Russian).

Baryshnikov, G.Ya, and A.M. Maloletko. 1999. Physiographic distribution regularities of Palaeolithic sites in the Altai area. *Anthropozoikum* 23: 199–202.

Chlachula, J. 2003a. The Siberian loess record and its significance for reconstruction of the Pleistocene climate change in north-central Asia. In *Dust indicators and records of terrestrial and marine paleoenvironments (DIRTMAP)*, ed. E. Derbyshire. *Quaternary Science Reviews* 22 (18–19): 1879–1906.

Chlachula, J. 2003b. Controverse sur l'age des premiers Américains. *La Recherche (Paris)* 370: 42–46.

Chlachula, J. 2010. Pleistocene climate change, natural environments and Paleolithic peopling of East Kazakhstan. *Quaternary International* 220: 64–87.

Chlachula, J. 2017. Chronology and Environments of the Pleistocene Peopling in North Asia. *Archaeological Research in Asia* 12: 33–53.

Chlachula, J., and N. Catto, eds. 2010. Eurasian perspectives of environmental archaeology. *Quaternary International* 220: 64–87.

Chlachula, J., J. Czerniawska, K. Pestereva, and D. Pesterev. 2014. Geological and environmental contexts of Pleistocene occupation of the central Yana River basin, northern Yakutia. *Eurasia in Cenozoic* 3: 166–175.

Chlachula, J., R.A. Kemp, and J. Tyráček, eds. 1999. *Quaternary of Siberia, Anthropozoic*. Vol. 23 (special volume). Prague: Czech Geological Survey.

Chlachula, J., N.I. Drozdov, and N.D. Ovodov. 2003. Last interglacial peopling of Siberia: The middle Paleolithic site Ust'-Izhul', the upper Yenisei area. *Boreas* 32: 506–520.

Dalton, R. 2010. Fossil finger points to new human species. DNA analysis reveals lost relative from 40.000 years ago. *Nature* 464: 472–473.

Derevianko, A.P. 1990. *Paleolithic of North Asia and the problem of ancient migrations*. Novosibirsk: SB AS SSSR.

Derevianko, A.P. 2010. Three scenarios of the middle to upper Paleolithic transition: Scenario 1: The middle to upper Paleolithic transition in northern Asia. *Archaeology, Ethnology and Anthropology of Eurasia* 38 (3): 2–32.

Derevianko, A.P., and S.V. Markin. 1992. *The Mousterian of the Gorno Altai*. Novosibirsk: Nauka (in Russian).

Derevianko, A.P., A.V. Postnov, E.P. Rybin, Y.V. Kuzmin, and S.G. Keates. 2005. The Pleistocene peopling of Siberia: A review of environmental and behavioral aspects. *Indo-Pacific Prehistory Association Bulletin* 25 (3): 57–68.

Derevianko, A.P., and M.V. Shunkov. 2009. Development of early human culture in northern Asia. *Paleontological Journal* 43 (8): 881–889.

Drozdov, N.I., Laukhin, S.A., Chekha V.P., Kol'tsova B. G., Bokarev A.A., and A.A. Vikulov. 1990. *The Kurtak archaeological region*. Excursion guide of International Symposium Chronostratigraphy of Palaeolithic of North, Central and Eastern Asia, and America, 1990. Krasnoyarsk: SB RAS (in Russian).

Fu, Q., Li, H., Moorjani, P., Jay, F., Slepchenko, S.M., Bondarev, A.A., Johnson. P.L.F., Aximu-Petri, A., Prüfer, K., de Filippo, C., Meyer, M., Zwyns, N., Salazar-García1, D.C., Kuzmin, Y.V., Keates, S.G.,

S

Kosintsev, P.A., Razhev, D.I., Richards, M.P., Peristov, N.V., Lachmann, M., Douka, K., Higham, T.F.G., Slatin. M., Hublin, J.J., Reich, D., Kelso, J., Viola, T. B., and Pääbo, S. 2014. Geonome sequence of a 45,000-year-old human from western Siberia. Nature 514: 445–450.

Ineshin, E.M., and A.V. Teten'kin. 2017. *Humans and the environment in Northern Baikal Siberia during the Late Pleistocene*. (trans: Hommel, P.N. and Reynolds, N.). Newcastle: Oxford Academic Press.

Konstantinov, M.V. 1994. *L'age de Pierre de la Région est de l'Asie de Baikal*. Ulan-Ude: SB RAS.

Larichev, V., U. Khol'ushkin, and I. Laricheva. 1990. The upper Paleolithic of northern Asia: Achievements, problems, and perspectives, II: Central and eastern Siberia. *Journal of World Prehistory* 4 (3): 347–385.

Lbova, L. 1996. The Paleolithic site Kamenka. In *New Paleolithic sites of the Zabaikalye*, ed. M. Konstantinov, 24–47. Chita: Nauka.

Markin, S.V. 1996. *The Paleolithic of the north-west of the Altai-Sayan mountain region*. Novosibirsk: SB RAS (in Russian).

Medvedev, G.I., N.A. Savel'ev, and V.V. Svinin. 1990. *Stratigraphy, paleogeography and archaeology of southern Central Siberia*. Irkutsk: SB AN SSSR (in Russian).

Mochanov, Y.A. 1992. *The early Paleolithic at Diring and the question of extra-tropical origin of man*. Novosibirsk: SB RAS.

Mochanov, Yu.A. and Fedoseeva, S.A. 2001. Neosphere and Archaeology, Nauka i Tekhnika v Yakutii 1: 28–33 (in Russian).

Mochanov, Y.A., and S.A. Fedoseeva. 2002. *Archaeology of the Paleolithic of North-East Asia, ex-tropical homeland of humankind and early human occupation stages of America*. Yakutsk: Polyrnyj Krug (in Russian).

Pitulko, V.V. 2013. *The Zhokhov Island site and ancient habitation in the Arctic*, 202. Vancouver/Canada: Archaeology Press/Simon Frazer University.

Pitulko, V.V., P.A. Nikolsky, E.Y. Girya, A.E. Basilyan, V.E. Tumskoy, S.A. Koulakov, S.N. Astakhov, E.-Y. Pavlova, and M.A. Anisimov. 2004. The Yana RHS site: Humans in the Arctic before the last glacial maximum. *Science* 303: 52–56.

Pitulko, V.V., E.Y. Pavlova, and P.A. Nikolskiy. 2017. Revising the archaeological record of the upper Pleistocene Arctic Siberia: Human dispersal and adaptations in MIS 3 and 2. *Quaternary Science Reviews* 165: 127–148.

Ponktratova, I.Yu. 2007. Ushki 5 site (Kamchatka): Recent investigations, problems and perspectives (the Palaeolithic period). *Kolymskyy Gumanitarnyy Almanach* 2007 (2): 13–20 (in Russian).

Prokopenko, A., N. Catto, and J. Chlachula, eds. 2001. Lake Baikal and surrounding regions. *Quaternary International* 80/81: 131–167.

Rezanov, I.N., and N.P. Kalmikov. 1999. Paleogeography of the Pribaikal and Transbaikal quaternary. *Quarternary Geology, Palaeogeography and Palaeoanthroplogy, Anthropozoikum* 23: 43–48.

Slobodin, S.B. 1999. *Archaeology of Kolyma and continental Priokhotye in late Pleistocene and early Holocene*. Magadan: NEISRI FEB RAS (in Russian).

Tseitlin, S.M. 1979. *Geology of Paleolithic of northern Asia*. Moscow: Nauka.

Vasiliev, S.A. 1992. The late Paleolithic of the Yenisey: A new outline. *Journal of World Prehistory* 6: 337–383.

Vasilevskyy, A.A. 2008. *Stone age of the Sakhalin Island*. Yuzhno-Sakhalinsk: Yuzhno Sakhalinsk Press.

Zenin, V.N. 2002. Principal stages of peopling of the west-Siberian plain by Paleolithic man. *Archaeology, Ethnography and Anthropology of Eurasia* 12: 22–44.

Further Readings

Derevianko, A.P., ed. 1998. *The Paleolithic of Siberia: New discoveries and interpretations*. Urbana: University of Illinois Press.

Sicily and Magna Graecia, Archaeology of

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Introduction and Definition

The Latin term "Magna Graecia" (in Greek, "Megalē Hellas") means "Greater Greece." In the term's first attested usages, by Pindar and Euripides in the fifth century BCE, it applied to all of the territory inhabited by Greeks around the Mediterranean (Cordano 2005). While it has been suggested that "Megalē Hellas" was used as early as the fifth or fourth century to mean only the parts of modern Italy that were colonized by Greeks – the coasts of Sicily, Campania, Calabria, Basilicata, and Puglia – the texts which might have done so, by Antiochus of Syracuse and Pythagoras of Croton, are not preserved today.

The earliest recorded use of the phrase to mean southern Italy and Sicily is thus Polybius (*Histories* 2.39) in the second century BCE, followed by Strabo (*Geography* 6.1.2) and, for the Latin version, Pliny the Elder (*HN* 3.95). Modern scholars tend to be even more restrictive in their usage, employing Magna Graecia to mean

only peninsular Italy where it was settled by Greeks, in contrast to Sicily, which is often considered as a case by itself.

Much of the landscape of Magna Graecia and Sicily is composed of rolling hills and low mountains up to 2,000 m in height. The environment is well suited to a pastoral agricultural economy of sheep and goat herding, supplemented by other animals on a limited basis. Coastal plains were farmed for grain – wheat, barley, and spelt – while hilly areas typically featured olives, grapes, and other plants adapted to the terrain. The climate is generally dry and temperate, with an average annual rainfall of about 40–60 cm.

Key Issues/Current Debates

Bronze Age

The archaeology of the Bronze Age (c. 2200–900 BCE) in southern Italy is largely marked by the transition through successive cultural phases from pre- and proto-Apennine through the Apennine and sub-Apennine periods. The distinctions between these cultural phases do not correspond well to the usual chronological divisions of the Eneolithic (or "Copper Age") and the Early, Middle, and Late Bronze Ages. Dates for the later periods are largely given by the presence of Aegean imports. In the pre-Apennine phase, from roughly 2200 onwards, settlements were placed on low hills to allow control of surrounding agricultural zones. Burials were inhumations in single pit graves organized into cemeteries, and grave goods of a few bronze objects occasionally supplemented by one or two vases. The earliest contacts with Mycenaeans date to the latter part of the proto-Apennine phase, which started in the early second millennium and continued down to c. 1500. Typical imports consisted of Late Helladic I and II pottery. In this phase, the coasts of the Adriatic and Ionian Seas (though not the Tyrrhenian Sea) were the locus of many settlements. Funerary practices comprised a wide variety of types, from caves to tumuli, though in every case, burials remained single inhumations grouped together. The Apennine culture ultimately gave way around 1200–1100 to the proto-Villanovan culture, with the introduction of cremation burials. From 900 onwards, Italic-speaking populations south of the Tiber River developed separately from the Etruscan-speaking groups of central and northern Italy, reintroducing inhumation burials.

In Sicily, the Early Bronze Age (c. 2500–1500 BCE) was characterized by multiple burials in chamber tombs. The primary EBA cultural group was identified with the site of Castelluccio, where pottery had black designs on a red background. As in south Italy, Mycenaean artifacts began to appear between 1500 and 1250 BCE, during the Sicilian Middle Bronze Age. At Thapsos, a town on the southeastern coast with notably large storage areas (possibly indicating thriving commercial activity), Mycenaean pottery was particularly well represented. Locally produced pottery is marked by incised decoration and carinated shapes, most strikingly on large pedestaled bowls with zoomorphic features.

Two major typologies have been identified for the Late Bronze Age (c. 1250–1050 BCE) and the so-called Final Bronze Age (c. 1050–900 BCE): Ausonian, in the north, and Pantalica, in the southeast. Affinities with the Apennine culture have led to the suggestion that the Ausonians, known from tombs and huts on Lipari and the Milazzo peninsula, might have migrated from the mainland (as mentioned by Greek authors). Evidence for the later Sikel language from Iron Age inscriptions indicates an Italic ancestry which could have come to the island at this time. Ausonian culture was characterized by inhumation and cremation burials in large jars. Pantalica represented continuity from the Thapsos culture, with baggy vase shapes and pedestaled bowls, usually with incised geometric decoration. Burial was made in thousands of chamber tombs cut into limestone cliffs (Fig. 1). There is little evidence for settlements in the Late and Final Bronze Ages.

Iron Age

Increased contact with the Greek world began again in the eighth century, with the earliest identifiable artifacts arriving in the form of Middle Geometric cups from Euboia. The earliest Greek

Sicily and Magna Graecia, Archaeology of, Fig. 1 Late Bronze Age rock-cut chamber tombs in the cliffs of Pantalica, Sicily

settlement in the region was made at Pithekoussai, on the island of Ischia just north of the Bay of Naples, in the second quarter of the eighth century. This town, known mainly from the excavation of a cemetery, seems to have been an *emporion*, or a trading post lacking in agriculture. It seems likely that the foundation of the town at this location was meant to facilitate trade with Etruscans who controlled metal production in central Italy and Sardinia. There is strong evidence of Phoenician and indigenous presence at Pithekoussai, the latter particularly in female burials, which might imply intermarriage with local groups from the mainland. The earliest example of writing in the Greek alphabet is known from Italy rather than Greece itself: an inscription, perhaps reading "euoin," was incised on a vessel found in a tomb of the Osteria dell'Osa necropolis near Gabii, in Lazio, and was dated to perhaps as early as 800–770 (Watkins 1995: 37–39). Likewise, the earliest known reference to Homeric myth was found in a dipinto on a Euboian cup (c. 750) found at Pithekoussai. The text, in dactylic hexameters, refers both to the legendary cup of Nestor and to Aphrodite.

The first true colony (*apoikia*, or "foreign home," in Greek) was founded at Kyme, a mainland promontory facing Ischia, around 750. More colonies followed around the coast of southern Italy and eastern and southern Sicily, with new foundations occurring into the sixth century in Sicily and into the fifth century on the mainland. Greek colonies shared cultural ties with their mother city (*metropolis*) and felt some allegiance to their homeland, but an *apoikia* was politically and economically independent. While colonization of Sicily was mostly carried out by only two *metropoleis*, Chalcis and Corinth, expeditions to south Italy originated from a wider swath of the mainland, including Achaea, Sparta, and even (in one late example, Thurii) Athens. Ancient narratives often described colonizing expeditions that were carried out as a result of an oracular instruction from Apollo at Delphi; these were commonly represented as ignorant of the territory that was their destination. In reality, these expeditions demonstrated significant prior Greek experience with the Italian landscape. Colonies often seem to have displaced indigenous settlements, as at Syracuse and Naxos, and were purposely situated to take advantage of flat arable land, good harborage, and river valleys leading into the hinterland. Such advance planning can be identified at Catane, Syracuse, and Gela in Sicily and Poseidonia, Sybaris, and Taras in Magna Graecia. A system of land division existed in each colony

to apportion plots of land to colonists in both their urban and rural areas. Aerial study combined with excavation has brought to light the grid of roadways that were created to divide the countryside of Metapontion; crossroads were marked by groups of tombs. It is not clear to what extent attempts at equitable land division at the time of foundation – as identified, for example, at Megara Hyblaia – reflect political equality among colonists, although some efforts have been made by scholars to suggest it.

Ancient authors (Thucydides, Diodorus Siculus, Dionysius of Halicarnassus, Strabo, and others) identified a number of indigenous groups in Sicily and south Italy at the time of Greek colonization. The Daunians and Iapygians inhabited Puglia, and the Lucanians and Oenotrians were in Basilicata, the Ausonians and Opicians in Campania, and the Sikels in Calabria. In Sicily the Sikels (or the Ausonians or the Morgetians) in eastern Sicily were found, the Sikans in the west, and the Elymians in the northwest. The ancient writers, who were uniformly Greek or Roman, sometimes lacking firsthand experience in the region, and often writing several centuries after contact, did not explain what ethnic or cultural distinctions existed between any of the groups, except to mention divergent lineages extending back to foundational heroes. It is therefore unclear to what extent Greek identifications reflected natives' views of the boundaries between and among themselves.

In striking contrast to the written record, archaeology has not shown significant differences between indigenous groups in Sicily, for example, either before or after contact with Greek or Phoenician settlers. Two types of pottery – one matte-painted, called Siculo-Geometric, or after the type site of Licodia Euboea, and another incised, named for the site of S. Angelo Muxaro, near Acragas – were produced by the indigenous cultures of Iron Age Sicily. Siculo-Geometric seems to predominate in the supposedly Sikel east, but it is also found in the west, while the opposite is true for S. Angelo Muxaro ware. Rather than revealing a strict dichotomy, then, between eastern Sikel and western Sikan cultures, respectively, the archaeological record shows that individual sites should be placed instead at various points along a continuum defined by these pottery types and other attributes. Indigenous settlements were composed of cellular nuclear-family housing, as at Sabucina or Vassallaggi, or longhouse-type dwellings up to 25 m long for extended families, as at Morgantina.

Bronze hoards are one of the most impressive indicators of Iron Age indigenous culture; the most spectacular deposit was the Mendolito hoard of the eighth or seventh century, found near modern Adrano, consisting of over 1,000 pieces (especially spearheads, plaques, belt-like girdles, and other objects) weighing 900 kg. Brief inscriptions dating into the fifth century have been found in Sikel, employing a Greek alphabet.

Greek Colonization

Equality seems to have been the rule in the distribution of land to colonists, with urban plans tending towards orthogonality – even at Megara Hyblaea, where the plan is not orthogonal but the streets were laid out in straight lines, the house lots were designed to be approximately equal in area (Tréziny 1999). Pottery from Corinth and Euboea continued to dominate in Sicily into the sixth century.

Phoenician Colonization

Phoenician colonial expeditions were also sent to Sicily, though not to south Italy. These began around the eighth century, in the northwest of the island, closest to Carthage. Major settlements were founded at Panormus and Solunto and on the island of Mozia in the seventh and sixth centuries. Phoenician towns do not seem to have had strong agricultural components and on the whole were probably less independent than Greek colonies from their mother city. These towns enabled trade between Carthage and Italy and, to a lesser extent, the northwestern Mediterranean instead. Phoenician-style spaces have been found in these settlements, such as a *tophet* (where first-born sons were ritually sacrificed) on Mozia and several cemeteries with rich burials dating from the seventh through the third centuries at Panormus. Solunto's Roman-period settlement shows a

highly Hellenized character, including peristyle-courtyard houses and a theater.

Archaic and Classical Period

The fifth century in both Sicily and Magna Graecia was marked by conflict. In both areas, wars were waged between Greek cities and between Greeks and indigenous groups. The city of Poseidonia was conquered by the Lucani (Strabo *Geography* 6.1.3) at some point in this period, after which the town was renamed Paestum and the two groups lived together, apparently as equals. In Sicily, Greek tyrants fought against each other, against a Sikel league, and against Carthaginians, leading to the destruction or forced evacuation of several major centers. A Carthaginian invasion destroyed many Greek cities between 409 and 405, including Selinous, Acragas, Himera, Gela, and Camarina. Syracuse barely escaped destruction. The appearance of fortification walls across the island, as at Selinous, Gela, Tyndaris, and the Euryalos fort outside Syracuse, is testimony to the violent nature of this period.

Sicilian and south Italian builders began building monumental stone architecture almost as soon as they appeared in mainland Greece. There are Doric temples at Syracuse, Selinus, Poseidonia, and Taras dating to between 600 and 550 (Fig. 2). These early buildings are long and narrow, with small intercolumniations, similar to contemporary mainland temples such as the Temple of Hera at Olympia. Later buildings assumed shorter and wider proportions in their plans (Fig. 3). Colonies often placed extra-mural temples (especially ones dedicated to Hera) on the edges of their territory as a means of sending a message regarding their claim to the land to natives and other Greeks alike (de Polignac 1995). At the same time, however, religious life in Sicily was marked by syncretism of indigenous and Greek beliefs and practices. At Palike, the site of a volcanic spring and an indigenous shrine to chthonic deities, Greek-style buildings including a *hestiatorion* (dining hall) and stoas were built (Maniscalco and McConnell 2003). Greek myth incorporated the worship of female fertility deities around Lake Pergusa by identifying them with Demeter and Persephone; this pair received shrines at sites across the island. A crater rim found at the archaic settlement of Morgantina was inscribed with an inscription in Greek reading "Kuparas emi," "I am (or I belong to) Kupara" (Antonaccio 1997) (Fig. 4). The name Kupara is connected with a Sikel water deity located near Syracuse, perhaps indicating that this Greek vessel had been dedicated as a gift to an indigenous god by a Greek speaker. At the same time, "kupara" can mean "hollow" in Greek, reflecting the crater's large open shape. Such word play was common in the Greek symposium, and thus the inscription can be seen as evidence for linguistic crossing in a mixed cultural environment.

Sicily and Magna Graecia, Archaeology of, Fig. 2 The early Doric Temple of Hera I at Poseidonia (c. 550 BCE)

Sicily and Magna Graecia, Archaeology of, Fig. 3 The Temple of Hera II at Poseidonia (c. 460 BCE)

Sicily and Magna Graecia, Archaeology of, Fig. 4 A Lakonian krater rim from the Archaic settlement at Morgantina (Aidone Museum inv. 90-61) with an inscription in Greek reading "Kuparas emi" ("I am Kupara" or "I belong to Kupara")

By the mid-sixth century, large stone buildings at Selinous and Poseidonia included stone sculpture in the metopes. Both Sicilian and South Italian colonies maintained strong ties to Greece, most clearly in the construction of numerous treasury buildings at the panhellenic sanctuaries of Olympia and Delphi (where they also competed in the games). Sicilian tyrants were especially successful in Panhellenic competitions. Victories were celebrated by sculptures including the Delphi Charioteer (c. 478–474), given by Polyzalos of Gela, and the Motya Charioteer (c. 470). Cities also competed for prestige the construction of massive temples, especially following the Greek victory at Himera over the Carthaginians in 480. Temple G at Selinous and the Temple of Zeus at Acragas vied for recognition as the largest Doric temple in the Greek world. Greek colonies also seem to have featured *heroöns*, or shrines where a colony's founder was worshiped as a hero, in its marketplace, though such a structure is only well identified at Poseidonia.

The lack of marble in the region led to the use of local limestone and sandstone for building material. Sicilian builders made up for the lack of high-quality stone by using brightly colored terracotta revetments and figural sculptures as decoration, such as the relief plaque from the Temple of Athena at Syracuse depicting a gorgon running on bended knee (Fig. 5), and even on structures built in Greece, such as the Treasury of Gela at Olympia. Imported marble was used for smaller works, such as the so-called Ludovisi Throne, which is made of marble from the Aegean island of Thasos. This work, with its remarkable reliefs depicting the birth of Aphrodite flanked by smaller scenes showing a clothed and a nude female worshipper, respectively, was actually one half of the frame for an altar. It was found in Rome, where it had been taken in antiquity. The sculpture's original location has now been determined as the sanctuary of Aphrodite at Lokris (modern Locri Epizefiri). Imported marble was also used for the exposed skin of some sculptural subjects, such as for the heads, hands, and feet of the metope figures of Temple E at Selinous. Free-standing acrolithic sculptures using imported

Sicily and Magna Graecia, Archaeology of, Fig. 5 Terracotta plaque of a gorgon from the Temple of Athena at Syracuse (Syracuse Archaeological Museum "Paolo Orsi," inv. 34540, 34543, 34895, c. 570 BCE)

stone were much more common in Sicily than elsewhere in the Greek world. The most important examples are the archaic Demeter and Persephone from Morgantina and the spectacular over-life-size cult statue, probably of Hera or Demeter, that is claimed to be from the same site (in the Aidone Museum since 2011 but formerly in the J. Paul Getty Museum collection, where it was erroneously identified as depicting Aphrodite) (Fig. 6). South Italian and Sicilian sculptors also created a few free-standing sculptures in marble of youths (*kouroi*) and boys from Akragas and Rhegion which show links to contemporary mainland Greek types like the Kritios Boy from Athens.

The best preserved example of Greek major painting – indeed, practically the only one from the Classical period – was found at Poseidonia, in a grave now known as the Tomb of the Diver (c. 480–470). The interior of the grave's sarcophagus was decorated on its side walls with scenes of a symposium, while the inside of the lid showed a young man diving from a platform into a pool of water, which has been interpreted as possibly being a metaphor for the transition from life to death (Fig. 7).

Sicily and Magna Graecia, Archaeology of, Fig. 6 Over-life-size Greek cult statue of a female deity in limestone and marble (c. 425–400 BCE), today called the "Morgantina goddess"

People in south Italy and Sicily continued to be consumers of imported Greek pottery, primarily Corinthian and East Greek wares (especially Ionian cups – though many of these were also manufactured in the colonies) in the sixth century and Athenian in the fifth. Greek pottery is found in Greek, mixed, and non-Greek settlements and in domestic, religious, and funerary contexts. In the fourth century, with the decline of Athenian exports of painted pottery due to the crisis following the Peloponnesian War, south Italian and Sicilian production grew significantly. In southern Italy, regional groups have been distinguished (especially by A.D. Trendall and A. Cambitoglou) for Apulia, Lucania, Campania, and Poseidonia. The red-figure painted decorations featured mythological stories and especially scenes from theater productions – testimony to the popularity of drama in the western Mediterranean.

Sicily and Magna Graecia, Archaeology of, Fig. 7 Interior of the lid of the sarcophagus from the burial known as the Tomb of the Diver, Poseidonia (National Archaeological Museum, Paestum, inv. 23103, c. 480–470 BCE)

The existence and importance of democratic institutions is evident in many cities throughout both regions at various points in time. Both Poseidonia and Metapontion built large circular assembly structures (*ekklesiasteria*) of a type that may be related in some way to the shape of the Comitium at Rome. At Morgantina, large flights of stone steps that mitigated the sloping terrain of the city's agora were arranged in a trapezoidal form starting at the end of the fifth century so that they could also be used as seating for the citizen assembly to hear speakers.

Interpreting Cross-Cultural Relations, 800–400 BCE

In the nineteenth and early twentieth centuries, scholarship was defined by the prevailing colonialist attitudes of the time. Greek colonists were seen not only as members of one of the two ancestral societies of western civilization (the other being Rome) but as the initial transmitters of their cultural traditions to the Romans. Greeks appeared urbane, cosmopolitan, and sophisticated compared to the natives they met in Sicily and south Italy. At the same time, scholars approached the process of ancient colonization as analogous to modern colonialism, particularly as carried out by the British empire, where colonies existed for the purpose of controlling and exploiting far-off resources on behalf of the colonizing nation (Dunbabin 1948). For the purposes of historical explanation, then, Greeks were the primary, if not the sole actors, and either indigenes passively received Greek culture or they abandoned their own traditions in order to become as similar to Greeks as possible. The latter process was identified as "Hellenization," a local variant of what anthropologists elsewhere in the world referred to as acculturation. It is true that indigenous populations adopted Greek practices and material culture, and at least in Sicily from the fourth century on, it is no longer possible to distinguish between Greek and indigenous cultures in the archaeological record (Antonaccio 2001). Siculo-Geometric and S. Angelo Muxaro pottery were no longer made, for example, and the shapes and fabrics that survived were Greek.

Recognition of this broad phenomenon has often obscured other important facts, however: first, natives did not abandon their own culture wholesale, but selected aspects of Greek culture that they found useful within their own societies; second, in southern Italy, the process was never fully completed, particularly because Magna Graecia was ultimately conquered by the Romans, who were themselves an Italic group like those who were neighbors to the Greeks; and third, Greeks were also open to adopting some native ideas and traditions, even in Sicily – for example, the greater emphasis on worship of Demeter and Kore in the island's center because of the importance of similar deities for Sikels. Athenian potters made vases in indigenous forms, such as the pair of *nestorides* (an ornate Daunian shape) in the Getty Museum collection (since the findspot of these vases is unknown, it is not clear whether

Sicily and Magna Graecia, Archaeology of, Fig. 8 Athenian red-figure vase in a Daunian shape, the *nestoris* (Attributed to the circle of the painter Polygnotos, c. 450–440 BCE; J. Paul Getty Museum inv. 81.AE.183.2)

they were intended for indigenous or Greek buyers) (Fig. 8). So acculturation was not inevitable, nor was it a one-way street. Beginning in the 1980s, Classical archaeologists began to adopt new theoretical perspectives from other branches of archaeology, especially world-systems theory (Cunliffe 1988). More recently, others have focused on the altered meaning imported objects could be given in new cultural environments, with the process of meaning change given the name "consumption" (Dietler 1999). In these ways, the ability of indigenous populations to make active choices about how to shape and interpret the world around them has been acknowledged and integrated into scholarly discourse about ancient colonization.

The Hellenistic Period

Southern Italy came under Roman control as a result of victory in the Pyrrhic War in 272. Links to Rome grew quickly from the time of the construction of the Via Appia to Capua in 312 and the road's extension to the heel of Italy and the port of Brundusium in 264. Little evidence has appeared to differentiate south Italian culture in this period from what came before it, however, apart from the wide distribution of mass-produced moldmade terracotta figurines at Taranto (Graepler 1997). These sculptures, known as the Tanagra type, generally depicted women in various activities, especially moving rapidly, dancing, or twirling – perhaps to be interpreted as religious or dramatic action. They were exported across the Mediterranean.

Both regions suffered greatly during the First and Second Punic Wars, with several major cities being sacked and their populations sold into slavery. The main exception was Syracuse, which remained independent and prosperous until the death of the tyrant Hieron II (270–215). The kingdom of Syracuse's wealth is shown by evidence from Morgantina, which underwent great development under Hieron's rule. Several public buildings including stoas, granaries, and a fountain house can be dated to this period. A private house at Morgantina revealed the earliest known tessellated mosaics, dating to the mid-third century, and, perhaps most significant, a bath complex built at the same time was found to incorporate the world's earliest known self-supporting domed roof, constructed of interlocking tubes (Lucore 2009). Although these examples are so far known only from Sicily's interior, it appears likely that the innovations of tessellated mosaics and domes were made at Syracuse. Extant monuments known from Syracuse itself in this period include the theater and the 200-m-long Altar of Zeus Eleutherios. Some of the most distinctive cultural products of the Hellenistic period were the pottery produced at Centuripae. This ware, developed in the third century, employed a wide range of bright colors to produce realistic scenes comparable to Hellenistic wall painting, and it was further adorned with ornate molded pieces.

One important trend that is clearly visible in the Hellenistic period was related to the domestic sphere: the size and development of housing. Hellenistic houses tended to be considerably larger than their Classical predecessors, and they included new features, such as second stories and particularly courtyards with a peristyle colonnade, as seen at Megara Hyblaia, Solunto, and

Monte Iato. The latter site featured a house with an area of 800 m^2.

The Roman Period

The result of the shift in control to an external power was the advent of peace, if not necessarily prosperity, for both Greeks and non-Greeks by the second century. Sicily became the first Roman province in 241 BCE, and Roman military forces completely conquered Sicily by 211. The island was seen by Rome as a significant source of grain. As a result, slave-run *latifundia* became a dominant part of the economy (though slave revolts occurred twice between 135 and 100). The cultural and economic wealth of pre-Roman Sicily was famously looted in the first century BCE by the governor Verres (Cicero *Verrine Or.*). Overall, the island seems to have been in serious decline during the empire perhaps initially because most cities supported Sextus Pompey against Augustus during the civil war. The town of Centuripae, however, thrived following Augustus' victory; it alone had been a supporter of the emperor. The town was given control of much of the Catania plain, which led to a building boom in the town, including a large public building (perhaps a *porticus*), baths, and a large suburban nymphaeum (Wilson 1990). There were few other Sicilian centers in this period; Halaesa is the best known, though it, too, had seen its greatest flourishing under the Republic rather than the empire.

The most important archaeological sites for this period in south Italy are undoubtedly the ones destroyed by the eruption of Mount Vesuvius in August of 79 CE, especially Pompeii and Herculaneum. The Via Appia's route was altered under the emperor Trajan in the second decade of the second century CE. The new road split from the old one at the town of Beneventum in order to take a shorter route across the Apennine mountains to the southern ports that linked Rome to the eastern empire. The construction was commemorated by a triumphal arch at Beneventum, decorated with relief sculptures showing the good deeds and welfare projects undertaken by Trajan on behalf of Italians. Saepinum, not far from Beneventum, is a well-preserved Roman town in the mountains of Molise, complete with remains of a basilica, a small theater, and walls built under Tiberius in the masonry style known as *opus reticulatum*.

Late Antiquity

Sicily is best known in late antiquity for several large villas, especially the Villa Casale at Piazza Armerina, where the largest extant collection of mosaic floor decoration has been found. The luxurious nature of the Villa Casale's architecture and decoration led to the initial hypothesis that it belonged to a member of the imperial family, perhaps even one of the Diocletianic tetrarchs. The discovery of similar complexes at Patti and elsewhere shows it instead to be simply the grandest example of a *latifundium* headquarters, owned by a well-connected Roman family. Similar complexes existed in southern Italy (just as they did in Spain and elsewhere); the best known of these is at San Giovanni di Ruoti, where three villa houses were built on the same site between the first and sixth centuries CE. Christianity was well established by the time of Constantine, and catacombs dating as early as the third century are known from Palermo and Naples.

Cross-References

- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Classical (Greek) Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Getty Foundation
- ▶ Greek Colonialism, Archaeology of
- ▶ Italy, Sicily, Malta, and the Lipari Islands: Prehistory
- ▶ Religion, Greek, Archaeology of
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Romanization
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ Urban Planning in the Greek World

References

Antonaccio, C.M. 1997. Kupara, a Sikel nymph? *Zeitschrift für Papyrologie und Epigraphik* 126: 177–185.

Antonaccio, C.M. 2001. Ethnicity and colonization. In *Ancient perceptions of Greek ethnicity*, ed. I. Malkin, 113–157. Washington, DC: Center for Hellenic Studies.

Cordano, F. 2005. Megale Hellas, Magna Graecia, Italía: Dinamiche di Nomi. In *Magna Graecia: Archeologia di un Sapere*, ed. S. Settis and M.C. Parra, 33–40. Milan: Mondadori Electa.

Cunliffe, B. 1988. *Greeks, Romans and Barbarians: Spheres of interaction*. London: Batsford Press.

de Polignac, F. 1995. *Cults, territory, and the origins of the Greek city-state*. Chicago: University of Chicago Press.

Dietler, M. 1999. Consumption, cultural frontiers, and identity: Anthropological approaches to Greek colonial encounters. In *Confini e Frontiera nella Grecità d'Occidente. Atti del 36°Convegno di Studi sulla Magna Grecia*, 475–501. Taranto: Convegno di Studi Sulla Magna Grecia.

Dunbabin, T.J. 1948. *The western Greeks: The history of Sicily and South Italy from the foundation of the Greek colonies to 480 B.C*. Oxford: Clarendon Press.

Graepler, D. 1997. *Tonfiguren im Grab: Fundkontexte hellenistischer Terrakotten aus der Nekropole von Tarent*. Munich: Biering & Brinkmann.

Lucore, S. K. 2009. Archimedes, the north baths at Morgantina and early developments in vaulted construction. In *The nature and function of water, baths, bathing and hygiene from antiquity through the renaissance*. Technology and Change in History 11, ed. C. Kosso and A. Scott, 43–59. Leiden: Brill.

Maniscalco, L., and B. McConnell. 2003. The sanctuary of the divine Palikoi (Rochicella di Mineo, Sicily): Fieldwork from 1995 to 2001. *American Journal of Archaeology* 107: 145–180.

Tréziny, H. 1999. Lots et îlots à Mégara Hyblaea. Questions de métrologie. In *La colonisation grecque en Méditerranée occidentale. Actes de la recontre scientifique, Rome-Naples, 15–18 Novembre 1995.* Collection de l'Ecole française de Rome 251, 141–183.

Watkins, C. 1995. Greece in Italy outside Rome. *Harvard Studies in Classical Philology* 97: 35–50.

Wilson, R.J.A. 1990. *Sicily under the Roman empire: A Roman province, 36 BC – AD 365*. Warminster: Aris and Phillips.

Further Reading

Albanese-Procelli, R.M. 2003. *Siculi, Sicani, Elimi. Forme di identità, modi di contatto e processi di trasformazione*. Milan: Longanesi.

Gabba, E. & G. Vallet. (ed.) 1980. *La Sicilia antica*, 2 vols. Arnaldo Lombardi Editore.

Greco, E. 2004.*Archeologia della Magna Grecia*. Manuali Laterza 29. 6th ed. Rome-Bari: Editori Laterza.

Holloway, R.R. 1991. *The archaeology of Sicily*. London: Routledge.

La Torre, G.F. 2011.*Sicilia e la Magna Grecia: Archeologia della Colonizzazione Greca d'Occidente*. Manuali Laterza 314. Rome-Bari: Editori Laterza.

Leighton, R. 1999. *Sicily before history: An archaeological survey from the Paleolithic to the Iron Age*. Ithaca: Cornell University Press.

Pugliese Carratelli, G. 1985–1991. *Magna Grecia*. 4 vols. Milan: Electa.

Pugliese Carratelli, G., ed. 1996. *The Greek world: Art and civilization in Magna Graecia and Sicily*. New York: Rizzoli. = Pugliese Carratelli, G. (ed.) 1996. *The western Greeks: Classical civilization in the western Mediterranean*. London: Thames and Hudson.

Smith, C.J., and J. Serrati, eds. 2000. *Sicily from Aeneas to Augustus*. Edinburgh: Edinburgh University Press.

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Basic Biographical Information

Born in Diaramana (Cercle of Bla) in 1952, Samuel Sidibé (Fig. 1) is the Managing Director of the National Museum of Mali. After his secondary studies in Mali, Dr. Sidibé received a postgraduate scholarship, which took him first to Clermont-Ferrand (France), where he obtained a Masters in Art History and Archaeology in 1975, then to the University of Paris I Panthéon Sorbonne for his doctoral studies between 1976 and 1980. He defended a thesis on the theme of funerary archaeology *Archéologie funéraire de l'ouest africain: sépultures et rites*.

On his return to Mali, Samuel Sidibé worked at the Institut des Sciences Humaines (ISH) as a researcher from 1981 to 1987. In this capacity, he actively participated in field missions and was involved in a project to create an inventory of archaeological sites in the lake region and

Sidibé, Samuel, Fig. 1 Samuel Sidibé, at his office in the National Museum of Mali

the Inner Niger Delta. The launch of this project coincided with his arrival at the ISH. During the same period, Dr. Sidibé was responsible for courses in Art History at the National Institute of Arts (INA) in Bamako, Mali. In 1987, he was appointed Director of the National Museum.

Dr. Sidibé is an active a member of several professional associations and organisations at the national, sub-regional, and international level, including the International Council of Museums (ICOM), the International Council on Monuments and Sites (ICOMOS), and the West African Association of Archaeology (WAAA). From 1993 to 2003, he was a member of the AFRICOM (International Council of African Museums), working group, the program of the ICOM (International Council of Museums) for Africa and He was a founding member of AFRICOM as an association and Dr. Sidibé was a member of the scientific committee for archaeological research at the Dia site in the Inner Niger Delta (1998–2002) and of the committee for the rehabilitation of earthen architecture. He has been a member of the screening committee and the acquisition committee at the Musée du quai Branly in Paris, a member of the Advisory Board of the World Festival of Negro Arts (2007–2009), and a member of the Commission of French archaeological excavations abroad (from 2008).

Major Accomplishments

As the head of the National Museum of Mali, Dr. Sidibé brought about profound changes in the management and operation of this institution. The National Museum, a showcase of Malian culture, is now open to the world and has become a place for encounters between, and dialogue about, cultures.

Dr. Sidibé made a considerable contribution towards enhancing the museum's collections by implementing some major research projects and initiating collections on material and immaterial culture. These projects generated research and collections on musical heritage (1991–1996), traditional pottery (1992–1994), material culture of the Dogon people (1996–1997), and ornaments (2008–2010). Taken together, these collections make a substantial contribution to the preservation of culture in Mali. Since 2005, Dr. Sidibé has opened the National Museum to modern art, making it one of the few African museums to have a collection in this domain.

In addition to developing major new collections, Dr. Sidibé's contributions to the National Museum have included expanding and renovating its premises aimed to support the museum's increasing role in promoting of Mali's cultural heritage. This included the opening of new exhibition space as well as a multipurpose hall, the construction of a storehouse for archaeological objects, the redevelopment of the Koulouba caves in the prehistory garden, and the development of the Point G cave as a place to visit. New initiatives in respect to the museum's cultural activities included a revitalization in visitor programs for school groups, aimed at educating young people about the discovery, study, and understanding of Malian cultural heritage. Another public outreach program "Musical Thursdays," was initiated to make the museum more accessible to the public. Every Thursday afternoon from October to May the stars of Malian music perform at the National Museum.

The National Museum of Mali remains true to its original purpose, namely, the dissemination and promotion of Malian cultural heritage. At the same time, it presents many international

exhibitions, one of which includes the exhibition Vallées du Niger (1991–1997). Dr. Sidibé was the Deputy Commissioner and Coordinator of the African itinerary for the exhibition which travelled through Mali, Burkina Faso, Nigeria, Mauritania, Guinea, and Niger. Since 2009 the National Museum has hosted the African Photography Biennial and Dr. Sidibé has been the General Delegate of the "Rencontres de Bamako".

Cross-References

- ▶ Heritage Museums and the Public
- ▶ International Council of Museums (ICOM)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)

Further Reading

Devisse, J., and S. Sidibé. 1993. Madinka et Mandéphones. In *Vallées du Niger*, Catalogue d'exposition, 143–150. Paris: RMN.

Kiethega, J.B., S. Sidibé, and R.M.A. Bedaux. 1993. Les pratiques funéraires. In *Vallée du Niger*, Catalogue d'exposition, 425–440. Paris: RMN.

Sidibé, S. 1986. *Evolution de l'environnement et archéologie*, Le Grand Atlas de l'Archéologie. Paris: Encyclopaedia Universalis.

Sidibé, S. 1990. Reconnaissances archéologiques aux environs de Diré. In *Recherches archéologiques au Mali*, ed. M. Raimbault and K. Sanogo, 190–202. Karthala: ACCT.

Sidibé, S. 1993. The fight against the plundering of Malian cultural heritage and illicit exportation. In *Plundering Africa's past*, ed. P.R. Schmidt and R.J. McIntosh. London: James Currey and Bloomington and Indianapolis: Indiana University Press. The Carter Lectures, Centre for African Studies. University Florida.

Sidibé, S., ed. 1997. *Sons et rythmes du Mali: instruments et genres musicaux traditionnels du Mali*, Catalogue d'exposition. Bamako: National Museum of Mali.

Sidibé, S. 1999. *Un itinéraire exemplaire: Vallées du Niger*, Les Cahiers de l'Ecole Nationale du Patrimoine 5. Paris: Ecole Nationale du Patrimoine.

Sidibé, S., and M. Raimbault. 1990. Les sondages dans la butte de Kawinza I (KWZ 1) campagne de 1994: les recherches sur le terrain. In *Recherches archéologiques au Mali*, ed. M. Raimbault and K. Sanogo, 273–280. Karthala: ACCT.

Siega Verde Rock Art Sites

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Introduction

The discovery of Altamira Cave in 1878 opened the door to an understanding and appreciation of Paleolithic art and perhaps toward other kinds of prehistoric graphic representations. It marked the beginning of an appreciation of the intellectual capacity of prehistoric people which, until then, was neither known nor accepted. This is because prehistoric art is not only an aesthetic manifestation but much more; it is evidence of the cognitive and communicative ability of ancient humans.

Following that first discovery, which was not acknowledged for many years, the model of Paleolithic art became linked to cave environments as its sole location and created a concept of location and behavior that would endure until the present time. This has caused an inertia that has been difficult to overcome because it has become so rigid.

Leading scholars of Paleolithic art, including Breuil, Laming, and Leroi-Gourhan, interpreted the manifestations with constructive theories that referred to graphic behavior inside caves and religious categories derived from its location and consequent mystery.

By chance, in 1981 a team from the University of Oporto discovered an engraving of a horse in a clearly Paleolithic style, but in the open air, on the banks of a reservoir on the River Douro, by the dam at the border near Aldeadávila. The evidence was limited, an isolated image in an unsuspected location, but it suggested the existence of Paleolithic representations outside caves or the protection of any rock-shelter.

Although this was initially not adequately assessed or accepted, it signified a revolution in

Paleolithic art, as it implied a new groundbreaking interpretation of the way of understanding that communication system. The graphic manifestations of the Ice Age did not need caves to hide from the general view of people, but were there to be seen and understood by everyone who visited those places. It was the start of a change which began slowly but later picked up speed with the addition of the sites of Domingo García, Piedras Blancas, and Fornols Haut, respectively, in the Province of Segovia, in Andalusia, and in the French Pyrenees (Balbín 2009).

In 1989, Manuel Santonja, then director of the Museum of Salamanca, located the first engraving in the open air at the site of Siega Verde. This figure of a horse was the start of the exploration of the site and the subsequent discovery of 443 figures, through the documentation carried out by the Prehistory Department at the University of Alcalá de Henares (de Balbín and Alcolea 1992) (Figs. 1 and 2).

Siega Verde was not the first open-air site with Paleolithic representations, but it was the first large ensemble of panels to be studied methodically. The research was interrupted between 1995 and 2005 due to the incomprehension of the administration in the Autonomous Community of Castilla y León. However, despite this interruption, work continued, and in 2006 the first complete study of a site of this size and characteristics was produced. Additionally, all the previous research continued, at a site that was justly assessed for the first time from the perspectives of its significance and chronology. Other sites were discovered, like Côa, Zézere, Ocreza, Sabor, Tras-os-Montes, and Foz do Medal in Portugal and Molino Manzanez in Extremadura and Piedras Blancas in Andalusia. It became possible to characterize open-air Paleolithic art first in the area of the Portuguese-Spanish border and then in other places. This is the area with the best schist outcrops in the Iberian Peninsula and where most archaeological surveying has taken place, following the first discovery at Mazouco.

Since the discovery of the site of Côa, close collaboration was established with its researchers, and the study at Siega Verde took into account the reality of the neighboring Portuguese site. Côa was designated World Heritage in 1998 and Siega Verde was listed in 2010 as an extension of the first designation. Once again both sites, 60 km apart in a straight line, were linked in a joint action, in which the Portuguese site and administration moved more quickly.

Siega Verde Rock Art Sites, Fig. 1 Map of Spain with Siega Verde indicated

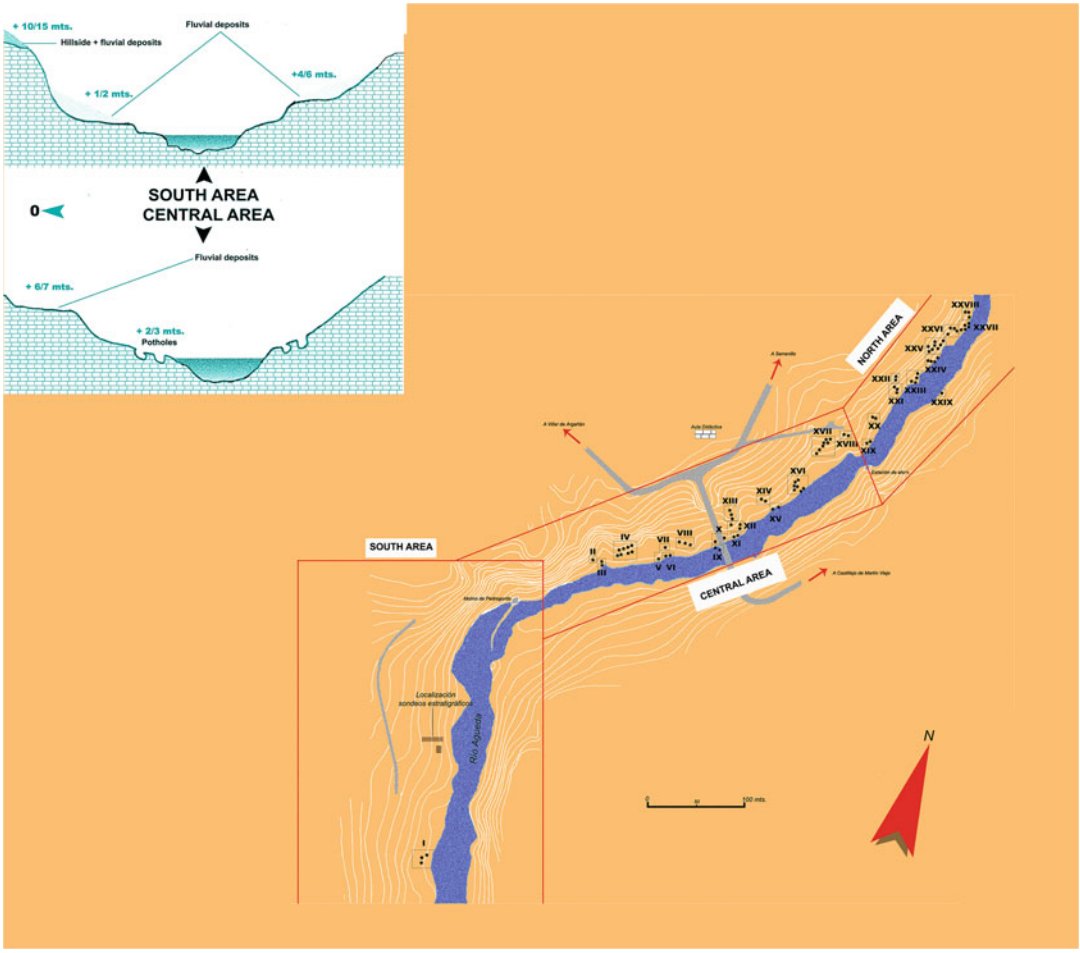

Siega Verde Rock Art Sites, Fig. 2 Map of Siega Verde, decorated ensembles and fluvial sections

The Site of Siega Verde

The open-air Paleolithic site of Siega Verde is located in the middle-upper valley of the River Agueda as it flows through the municipalities of Villar del Ciervo and Villar de Argañán. Its geographic coordinates are 40° 41′35″ N/02° 58′ 28″ W on the 1:50,000 sheet of the national topographic map (Sheet No. 500, Villar del Ciervo) (Fig. 3).

It is in the tertiary depression of Ciudad Rodrigo, basically a dissymmetric tectonic graben, with its faulted southern edge at the foot of Peña de Francia, whereas the northern edge is gentler and gradually connects with the peneplain of Salamanca. It is a large depression, about 40 km wide, filled with detrital sediment whose upper layer is Pliocene and in which the Quaternary fluvial network, principally the River Agueda, has cut down. The site's location in the northern part of this geomorphic unit connects it with the Arribes del Duero. These are near the border with Portugal, where the River Douro and some tributaries, like the Tormes, Huebra, and Agueda, cut down into the base rock, which reaches a thickness of 300–400 m, forming steep escarpments.

This is a strategic position, as it is on the route to the peneplain and the southwestern depression in the basin, whereas toward the north, only the river network can be followed as it gradually cuts

Siega Verde Rock Art Sites, Fig. 3 South view from the brdige of Siega Verde

down as far as the confluence of the Douro and the Agueda. This position did not go unnoticed by the Paleolithic inhabitants of the region nor by the herds of animals they hunted.

The archaeological surveying covered a large area on the banks of the River Agueda as it crossed the municipalities of Villar de Argañán, Villar de la Yegua, Castillejo de Martín Viejo, Saelices el Chico, San Felices de los Gallegos, and Puerto Seguro. In the end, the site was delimited to an area about a kilometer long, centered on the road bridge connecting Castillejo de Martín Viejo with Villar del Ciervo, in which originally 17 zones with engravings were established, all on the left bank of the river. The rest of the surveyed area did not provide the same results although some schematic engravings were found on a rock outcrop upstream of the Puerto Seguro bridge.

Later research studied the rock art comprehensively in the years 1991, 1992, 1993, 1994, 1996, and 2005, with the result of 15 interim papers and a definitive monograph (Alcolea and Balbín 2006).

The site of Siega Verde is on the banks of the river, with the engravings on outcrops on the banks. These are formed by ferruginous schist that creates quite regular surfaces, often stained red due to exudations from the substrate.

The incision of the river into the Paleozoic schist beds has produced a series of rock terraces which are fluvial erosion planes (Fig. 2). Three terrace formations have been documented at the site. The first (level + 10 to 15 m) is the oldest and is covered by slope deposits. The second (level + 2 to 3 m) is covered by fluvial flood deposits, while the third and most recent is at the level + 0.5 m. The +2 to 3 m level is represented by large river potholes with remains of recent floods. The engraved figures are often found in these areas and are altered at their base by the erosion. The structure in the valley bottom is very rigid, and together with the river regime, this produces rapid disturbance of the sediments in the riverbed, which does not allow the preservation of any type of archaeological deposit contemporary with the artistic representations.

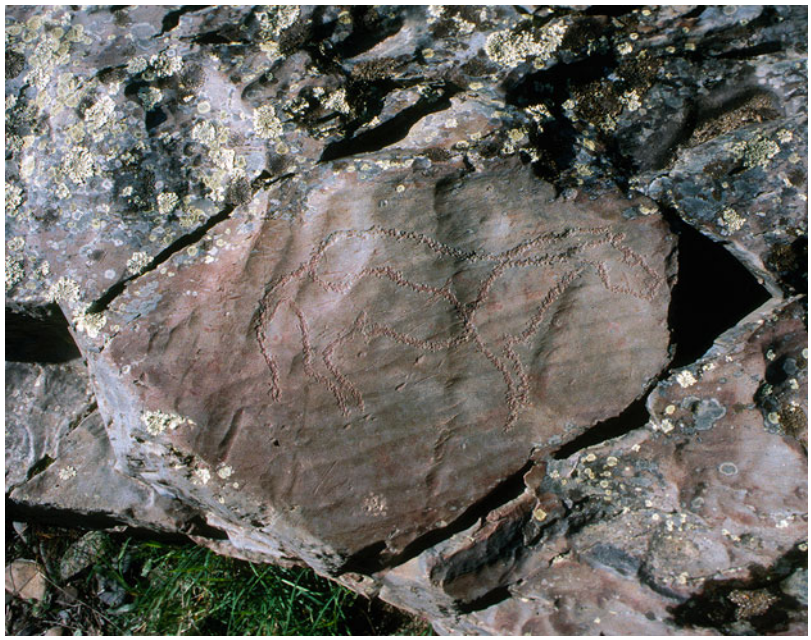

Siega Verde Rock Art Sites, Fig. 4 Panle 3 discovery horse

The southern sector at Siega Verde, with only five decorated surfaces, is about 300 m long, between the first horse to be discovered (Fig. 4) and the medieval Pedrogordo Mill. The small number of surfaces in this sector may be connected with the construction of the mill, as old engravings have been documented on the stones in the building.

The central sector, with the largest concentration of decorated panels, occupies the next 400 m of the western river bank, from Pedrogordo Mill to the water-level station of the Douro Hydrographic Confederation, 200 m upriver. This is the easiest place to wade across the river, where also in the early twentieth century a road and a bridge were built. A pillar of the bridge is supported on rocks with Paleolithic engravings, which have been partially covered and fissures have opened up in the rock surface. The decorated surfaces generally face toward the east and are mainly large outcrops parallel to the river and the large potholes, most of which have been eroded.

The northern sector is in the 200 m separating the River Agueda water-level station and the last panel that has been documented and includes Panels 54–91. As in the other two sectors, the representations are on the left bank of the river, except for Panel 91, on the right bank. The topography is different from the other sectors because the river flows between narrow sides. In this sector the outcrops are large masses of schist with larger upper surfaces and vertical faces toward the east. The Quaternary artists used both types of surfaces. In the case of the former, they used their flat orientation and shape, with numerous concavities and lines of projections caused by erosion. These projections were formed when the riverbed was at their level, at a time before the Paleolithic engravings were produced.

The ensemble of decorated surfaces and its characterization as produced by Upper Paleolithic hunters are overwhelming evidences within the study of the Upper Paleolithic occupation of the Castilian Plateau. Advances in research in the last two decades have approached a panorama of occupation and graphic development that is much more complex than traditionally accepted. We can now affirm that the interior of the Iberian Peninsula was permanently occupied during the second part of the last Ice Age and that this occupation was original and did not depend on other, better-known parts of Iberia, such as the northern or Mediterranean coasts.

Techniques Used

Pecking

The rock art at Siega Verde is currently seen to be engraved. However, the monograph on the site stressed that it was impossible to reach a definitive conclusion about this aspect (Alcolea and Balbín 2006: 187–188). Apart from the difficulties for the conservation of Paleolithic pigments, many of the outcrops were reddish in color and these were used for the engravings. This coloring must have held a special interest for the artists.

In 2007, the pigments were analyzed at the IPH of the Spanish Ministry of Culture. The results confirmed the presence of iron and manganese oxides in Panels 46, 48, and 49. The samples also contained phosphates, apatite, and silicates originating in clay. Neither the manganese nor the other components are natural to the site. Painting existed at Siega Verde and must have been extensive in its use to accompany and highlight the engravings. The incised engravings may have served to frame the painted surfaces.

In the current state of our knowledge, the site contains 443 Paleolithic depictions, of which 244 are animal representations, 165 more or less are complex abstract motifs, and 34 are indeterminate forms with no evident figurative intention as well as 3 anthropomorphs. Of these, 72.23% were produced by pecking the rock, 26.18% by incision, and 1.58% by combination of both techniques (Fig. 5).

Equids and bovines were pecked in all the sectors and ensembles, as well as most of the complex signs. Incision appears to have been reserved for certain motifs, such as caprids, the cervids in the central sector, and some types of sign also found mostly in the central sector.

Pecking is therefore the technique that predominates in the Siega Verde ensemble. It is a fully Paleolithic technical procedure, often ignored or even said to be unknown during the last Ice Age (Alcolea and Balbín 2006: 193–196). This controversy has rapidly lost its relevance because of the discovery of the open-air sites in the Douro Valley and also because it has been demonstrated that this technique was frequently used from the beginnings of Paleolithic rock art in France. Studies by such researchers as the Dellucs (1991) have repeatedly shown this.

Pecking may be direct or indirect. In the former case, the rock was impacted by a hammerstone held directly in the artist's hand. In the latter, a stone is held against the rock and struck by a second heavier stone.

The presence of direct pecking at Siega Verde is quite a novelty, as it is generally agreed that the indirect technique was used in the Paleolithic. However, it is likely that some discontinuous pecking, forming shallow and rounded lines, may have been produced with that technique. Discontinuous lines with separate impacts were usually produced by direct pecking, whereas the continuous outlines may have used both techniques.

Most of the figures at Siega Verde were drawn with continuous pecked lines, like those produced by indirect percussion. Other techniques, like abrasion, were organized around this indirect pecking. The ideal technical process would begin with a linear sketch, which was emphasized by direct percussion and the definitive production of the lines by indirect percussion. This *chaîne opératoire* was completed in a single figure at the site by later abrading the outline (Fig. 6).

The art is therefore fundamentally linear, at least as it appears today. Two possibilities existed to complete the figures: using certain shapes of the rock surface to achieve a sense of volume and conventional modes, which aimed to highlight particular parts of the anatomy.

The first approach was seldom used and is almost exclusively circumscribed to the northern sector of the site. The second, also unusual, is a more advanced and compete procedure. The conventionalisms of the figures are essentially linear, although some of them suggest a more elaborate treatment. In this case, the pecked lines possess fainter outer edges. They are lines achieved by subtle and light percussion, which formed lines of variable depth and width and are able to differentiate certain anatomical parts.

Here, despite the generalized tendency toward pure lines, more complex treatments were introduced. As occurs in the figures painted with dotted lines in the north of Spain, a technique that

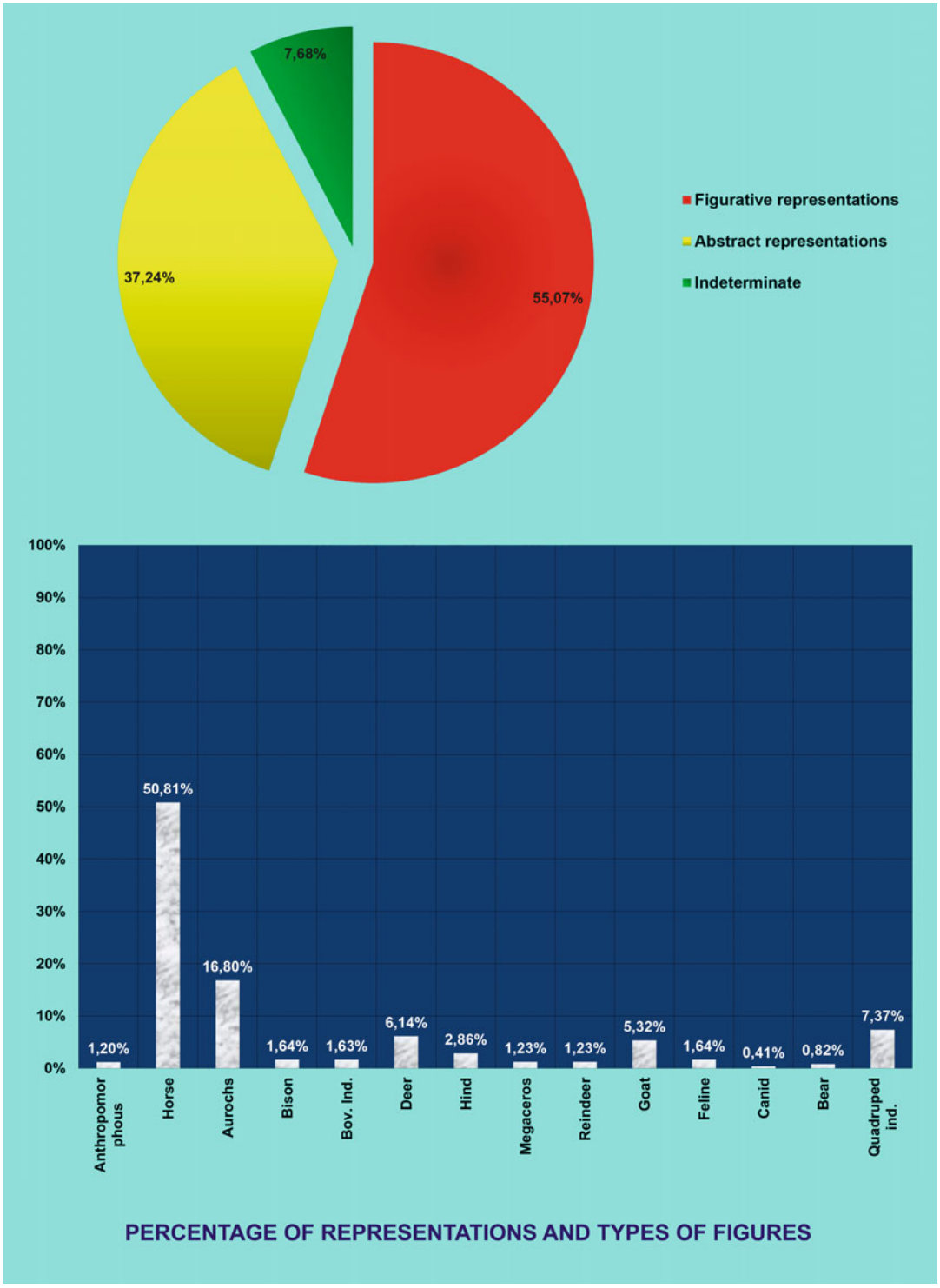

Siega Verde Rock Art Sites, Fig. 5 Percentage of representations and types of figures

Siega Verde Rock Art Sites, Fig. 6 Pnale 4 abraded bull

evidently converges with pecking, the width of the outline may have a pictorial value.

From this perspective, the absence at Siega Verde of graphic procedures that are found at some nearby sites, such as the frequent abrasion of pecked lines at Côa, may be explained as a stylistic option. The formalization of the deep outline would annul all the possibilities of expression that appear incipiently at the site. It shares with its Portuguese neighbors a basic concept as regards the production of the figures, and yet it seems more complex from the point of view of the expressive treatment. This complexity becomes clearer if we observe the selection of themes produced with pecking, mainly representations of horses, bovines, and complex signs.

On the River Agueda, pecking may be a substitute for the paintings in the decorated caves. This does not mean that we rule out the original existence of paintings at the site, as they may have accompanied both pecked and incised figures. All this suggests two basic characteristics of the pecking technique at Siega Verde: its value as an incipient expressive resource and its profound conventionalism. Any attempt to explain pecking as an obligatory adjustment to the conditions of the rock surfaces, or to nuance its value as a form of expression in comparison with other techniques employed in European Paleolithic art, cannot be maintained if the data from Siega Verde are analyzed (Fig. 7).

Incision

Our classification, based on the one used by R. de Balbín and A. Moure in their study of Tito Bustillo Cave in Asturias (Balbín and Moure 1982), considers single simple lines, repeated simple lines, striations, and scraping, both of outlines and modeling. The techniques are also compatible.

The percentage of incised engravings in the total number of figures at Siega Verde is 26.18%. These engravings are distributed unequally both spatially and thematically. Only 15.61% of the figurative representations at the site were drawn with direct incision. The percentage increases to 41.61% in the case of abstract depictions and decreases again to 19.19% in the indeterminate motifs.

Single simple lines predominate absolutely, as they are seen in 78.28% of the cases. Repeated simple lines are also present with a percentage of 17.82%, whereas other more complex forms appear very occasionally (striations, 1.66%; scraping, 2.32%). Therefore the incised art is very simple technically, and the more complex

Siega Verde Rock Art Sites, Fig. 7 Panel 89 horses in galope

Siega Verde Rock Art Sites, Fig. 8 Panel 51 grooved deer head

modalities play only an auxiliary role. They appear mainly in animal representations and particularly in large cervids, where repeated lines, scraping, and even striations are used to emphasize some anatomical parts (Fig. 8).

Incision is used in very similar percentages in the different themes. Only a few themes are exclusively pecked (carnivores, rhinoceros, and some complex groups). No group reaches over 10% among the animals, where equids, cervids, and indeterminate quadrupeds predominate, whereas the other animals rarely reach over 5%. Among the abstract representations, a group formed by lines and series of lines stands out with 31.89%, while two other relatively important groups are toothed signs and "darts."

Some subject matters prefer incision. These themes are cervids: stags and hinds, whereas the

reindeer at the site are exclusively pecked, and ibex. Claviforms and dots are never produced with incision, whereas circles and ovals are only incised in a third of their representations. As these signs are the most numerous among the complex abstract representations, the participation of incision in their creation is insignificant.

Again it must be stressed that the use of technical resources at Siega Verde was based on nonmaterial criteria, in connection with the values that each theme held for the Paleolithic artists. This concept underscores the profound conventionalism of the techniques at the site, as remarked above in relation with pecked engravings.

The techniques at Siega Verde are quite coherent with the patterns of Paleolithic art in caves. The differences are only nuances, and in many cases the great geological differences between the two environments are solved by peculiar systems to make use of the relief, as occurs in the northern sector at the site, where the morphology of the horizontal surfaces was systematically used to create figures.

The fully open-air nature of the site and its adaptation to a particular geological reality do not imply a conceptual change from the decorated caves. The apparent dissimilarity is only in the forms and does not involve the use of other technical procedures. Pecking was a well-known technique among European Paleolithic artists, and only the different visual appearance in soft and hard rocks suggests divergences between Siega Verde and more classic sites. The techniques and composition at Siega Verde are Paleolithic in their overall conception and very different from other pre- and protohistoric engravings in all Europe.

Subject Matter

Figurative Representations

The range of subject matter at Siega Verde is relatively limited. It is restricted to several of the typical species in European rock art: equids, large bovines (aurochs (*Bos taurus)* and bison (*Bison bison*)), cervids (red deer (*Cervus elaphus*), reindeer (*Rangifer tarandus*), and giant deer (*Megaloceros giganteus*)) (Fig. 9), and caprids, where the distinction in wild goats between *Capra ibex* and *Capra pyrenaica* is virtually impossible. These four genera contain most of the animal iconographic information, although

Siega Verde Rock Art Sites, Fig. 9 Panel 67 reindeer and horse

Siega Verde Rock Art Sites, Fig. 10 Panel 69 wooly rhinoceros

some more unusual species are found, such as woolly rhinoceros (*Coelodonta antiquitatis*) (Fig. 10), fox (*Vulpes vulpes*), bear, and large felines, but always in much smaller percentages. The high percentages of the equids and cervids are noteworthy. The importance of the latter in the center of the Iberian Peninsula is well known. The numerical differences between the animal themes at Siega Verde and European Paleolithic art in general (more equids than bovines and similar numbers of bovines and cervids) equate Siega Verde with the Paleolithic art in the Iberian Plateau and most European art at that time, despite the different locations.

However, the site does possess some peculiarities in the subject matter. These include representations of extinct species (woolly rhinoceros, bison, and felines) or species that had moved away (reindeer), which is unusual on the plateau. The presence of three human representations is equally noteworthy although these are found at sites on the plateau, such as Los Casares, La Hoz, and La Griega (Balbín and Alcolea 1992: 420; Alcolea and Balbín 2003: Figs. 5 and 7; Corchón, *coord.* 1997: Fig. 194–1 and 2), and even in the open air at Côa, at Ribeira de Piscos to be precise (Baptista 2001: Figs. 4 and 5).

This monotonous range of animals displays significant spatial variations at the site. The central and southern sectors differ from the north as they possess two particular iconographic models. The first is in the central sector, where the trio equids-aurochs-stags creates a monotonous panorama in which only caprids appear sporadically and, to a much lesser extent, unusual animals such as the giant deer, felines, a bear, and a fox. The second model, in the north, is richer and includes reindeer, bison, woolly rhinoceros, bears, and felines. The model is gradually imposed as we move further north in the site.

Siega Verde thus corresponds quite closely to the paleoclimate conditions in the Iberian Plateau during the upper Würm: a large and varied landscape with vast cold steppes and more sheltered areas. Another publication (Alcolea and Balbín 2006: 247) stresses that the plateau was not the environmental desert that it has traditionally been thought to be. In addition to the highlands appropriate for steppe forms of life, microclimates must have produced ecosystems in sheltered areas for more general species. These sheltered environments would be found in the valleys of the plateau's fluvial network, which would also have acted as the routes for contacts and movements across inland Iberia.

The chronological significance of some of the species represented should be analyzed from the perspective of the cultural conditions, in which direct economic or ecological imperatives have little influence. From this point of view, certain animal themes, such as horses and large bovines, appear to persist, whereas other lesser and

complementary themes vary in their frequency spatially and temporally.

In the absence of paleontological data, any study will necessarily be limited. However, one animal is often represented at the site: red deer. Data from other sites on the plateau are similar. Red deer are important and numerous in the caves of Los Casares, La Griega, El Reno, and the more southern Cueva del Niño. This persistence in time, and its coexistence at times with almost arctic fauna, implies that this species was able to live in extreme conditions and that the choice of the subject matter did not correspond directly to the climate conditions but to the cultural preferences of the group.

The appearance of reindeer in Paleolithic iconography has been explained in different ways, but usually appears to be indicative of very cold conditions. Depictions of this animal are not very common and are said to belong to two cold episodes in particular, the Dryas I a or inter-Laugerie-Lascaux (18,000 BP) and the Dryas II (Moure et al. 1987: 91), which does not necessarily mean that reindeer were absent at other times.

The representations of reindeer appear most in the northern sector of the site, together with bison and woolly rhinoceros. There may be a conceptual or even chronological separation between the sectors. This is the case at the cave of La Hoz (Balbín et al. 1995: 44), where finely incised small reindeer and bison are superimposed on previous figures. In El Reno Cave, also in Guadalajara (Alcolea et al. 1997a: 255), an archaic group of paintings and engravings are in a Gravettian style, over which a more recent phase of engravings and paintings, including reindeer, is superimposed. These similarities illustrate the coherence between the cave art on the plateau and its expression in the open air.

The fauna of extreme conditions represented at sites on the Iberian Plateau is documented in late periods with Paleolithic art, because of a harsher climate but always because of the composition criteria. The appearance of the two large bovines represented in Quaternary art was explained by A. Leroi-Gourhan (1971: 462) through two arguments: one geoenvironmental and the other chronological. The increase in the numbers of bison would depend on the latitude and the chronology, as their presence increased in time. This does not explain very well the fact that both bovines depend generally on the same cold ecosystem, although aurochs display a greater capability to adapt.

On the plateau, aurochs are the only bovines documented in archaic phases and are mostly represented in La Griega Cave (Corchón, coord. 1997: Table 1) and in the open air at Foz-Côa (Baptista 1999: Table 4), whereas bison appear at sites with a later stylistic attribution. However, the composition of the subject matter at Siega Verde corresponds to the ecological reality of the Iberian Plateau throughout the last Ice Age and not to the artistic representation of a particular biotope. The depictions coincide closely with the usual situation on the plateau, with a large number of horses and abundant red deer, and differences would mainly be the consequence of chronological changes.

Within their own original appearance, the animal themes on the plateau clearly share some of the stylistic traits seen in the whole Franco-Cantabrian region. The stylistic analogies with the east and south of the Iberian Peninsula gradually disappear over time, and it is proposed that the plateau looked toward the north rather than the south and east.

Nonfigurative Representations

If the analysis of the subject matter shows that Siega Verde can be included within European Paleolithic art in general and is closely related to cave art in the Iberian Plateau, the study of the abstract representations leads to a different interpretation. It is well established that the appearance of complex abstract motifs is linked to spatial, chronological, and cultural criteria. The consideration of Paleolithic complex signs as ethnic markers (Leroi-Gourhan 1981) has been confirmed by several modern studies of the distribution of these signs. From this point of view, Siega Verde complies with the rule, as its abstract representations form an original system of their own.

Signs are quite scarce. Simple abstract forms predominate, especially incised lines which are mostly lesser artistic evidence. They may be

mere freestanding lines, or elements such as zigzags, comets, and other more elaborate forms, like the two crosshatches in the central sector. From this perspective, two types possess a greater significance due to their frequency and their preferences: circular and oval shapes and claviforms.

The former vary from ovals to open forms that tend toward an oblong shape. A total of 13 have been documented; they were mostly produced by pecking and their distribution is quite homogeneous. Pure circular forms are not found, as most of them are closed ovals, of which ten have been recorded. In general they only consist of the outline without any type of internal fill. Only on one occasion, in Panel 46, an oval shape has an internal vertical line that divides it into two, creating a shield-like figure. These are therefore very simple forms, which display spatial patterns and a general association with bovines.

The claviform signs are always pecked and consist of a vertical line with a lateral protuberance. In two cases this is in the upper third of the line, in six it is in the central part, and in four it is in the lower third. These signs resemble the Pyrenean and Cantabrian model in the late series, included in advanced early Style IV and the transition to the recent Style IV (González Sainz 1993: 45). This chronology seems too late for the representations at Siega Verde, whereas very old examples are known in Paleolithic cave art (Pike et al. 2012). A very early chronology is not incompatible with their persistence in time, even to the late limits that Leroi-Gourhan proposed, and surely not all the claviforms can be included in the same group. The cultural coherence in the classic Pyrenean-Cantabrian region allows this chronological coincidence, but the same cannot be affirmed for other regions (González Sainz 1993: 50). Morphologically they correspond to the late Pyrenean-Cantabrian model and not to the peculiar claviforms of the lower Magdalenian in northern Spain, but a series of thematic, stylistic, and compositional details suggest an older age. As in the case of the circular and oval shapes, the claviforms are associated with a certain animal, in this case the horses, in contrast with the model proposed by A. Leroi-Gourhan (1971).

The abstract inventory at Siega Verde can be defined as an ensemble of depictions in which most motifs are linear (claviforms, stripes) or are reduced to very simple shapes like ovals and circles. These abstract motifs form an original system of their own. There are no ogival or triangular forms as in the Central System mountain range nor any of the incised depictions such as tectiforms, scutiforms, scaleriforms, comets, straight or zigzagging lines, dots, and cupmarks as documented at Côa (Baptista 1999: 30, Table 4).

An autonomous catalogue of abstract forms was constructed on the banks of the River Agueda. Its difference from the group in the Central System mountain range may be due to geographic criteria, whereas the differences with Foz Côa may be because the two ensembles are of different chronologies (Alcolea and Balbín 2003: 250).

Style

Constant variation is seen between the large size of the pecked animals and the incised figures, which are always smaller and fit within the manual field of the artists. Thus the site displays a graphic selection equivalent to a hierarchic perspective, even though incision is suitable for drawing large figures, as can be observed in some stags in the central sector. The reason why bovines and horses are usually pecked must be connected with the difference between pecking and incision. Pecking is more visible whereas incision is more discreet, unless it is used as the basis for painting later.

At Siega Verde, the representations tend to be reduced to their outlines, with special emphasis on the area of their heads. There is a general lack of concern for the limbs, and the legs are omitted or represented with few details. Most animals are quite elongated, especially in the case of the large pecked figures. The level of details and artistic conventions is low and varies depending on the sector of the site. Most details are represented in the head (ears, eyes, and mouth) and are normally linear.

The spatial variation in the style is expressed by subtle changes. In the central sector the horses are represented with archaic internal dividing lines in the belly and have stepped or double manes that meet in an angle at the forehead and semicircular eyes next to the forehead. The aurochs are engraved with slender horns in correct or semi-twisted perspective and internal lines in their snout and eyes like those of the horses, while the cervids display internal lines in their neck and jaw. In the northern sector, the figures are smaller and better balanced, with more advanced internal lines, such as the "M"-shaped interior lines of the horses, while archaic features such as the stepped manes and eyes next to the forehead disappear almost absolutely.

Some animals seem to display more sophisticated conventions, although these are always associated with incision and smaller figures. This is the case of the ibex, where beards and tear ducts are represented. This may be the consequence of a different system, in which the details would be used to underscore the specific significance of the subject matter, as well as the greater capacity of incision to create minute details in the figures.

Most of the figures are represented in absolute profile, which derives from a tendency toward linear engravings, the lack of interest in the limbs, and the schematic nature of many of the horns, which do not correspond to the style of the rest of the body. The archaic nature of the disinterest in the limbs as well as such graphic procedures as the relatively poorly drawn "M"-shaped interior lines, the archaic details in the eyes and other parts, and the elongated form of many bodies seem to announce middle Magdalenian art without achieving it.

The articulation of the perspective with different parts of the body often results in figures drawn with at least two perspectives, even in a formula which combines absolute profile, horns in correct perspective, and limbs in twisted perspective, as in the large stag in the northern sector. The figures that combine absolute profile with straight biangular perspective are the most significant. Most of these are formed by animals with slender legs in a frontal view, but there are also bodies with horns in frontal view, like the "V"-shaped ears of several hinds and some horses. The frontal perspective of horns is the most frequent trait of both bovines and cervids in the central sector, while it is less abundant in the north, where figures in better accordance with visual reality were achieved.

Inanimate figures dominate in the ensemble, in line with the general simplicity of the figures. The omission of the limbs and the reduction of many figures to the area of the head explain this infrequency of animation, in addition to the fact that animated figures are very unusual in Paleolithic art.

In the few figures displaying animation, this is segmentary and limited to movements of a fore or hind leg, although a correct but partial depiction of movement is sometimes attempted, as in the case of the giant deer in Panel 13. Other examples are the bears at the site, which are represented with their paws in front of them and in a semi-erect position. In general, movement is always partial and inorganic, without truly achieving coordinated animation.

The least animated animals are the most numerous: the horses and bovines. Cervids are slightly animated and caprids more so. The felines and bears are most often shown in movement. It seems as if the large animals, the most numerous and dominant in the panels, were associated with static postures, whereas the less numerous compensated for their scarcity with animation.

As in other cases, the animation of figures appears to reflect certain stylistic evolution. The number of examples of animation appears to increase in the northern sector, normally in association with scenes.

A few figures with an archaic appearance are distributed across the site. These are some horses, bovines, and occasional examples of deer and ibex which must correspond to the non-evolved type at Foz Côa and other sites. They seem to be related to figures in caves in the Iberian Plateau, such as La Griega, Los Casares (in its oldest phase). and El Reno (also in its archaic phase), and are the only ones that link solidly with the iconography in the east and south of the Iberian Peninsula.

The other representations relate in a different way. Their correspondence with open-air sites like Domingo García, Mazouco, and Zézere is clear. However, even greater similarity is seen with caves in the Central and Iberian System mountain ranges. This is most apparent in the repetition of the treatment of equids and bovines, the dividing lines in horses' manes, and the modeling of the faces and chests of cervids. Additionally, another aspect affects some figures in the north of the site and has chronological implications: the presence of exotic animals in late phases.

Exotic animals and figures of anthropomorphs are of great importance in the stylistic and thematic analysis at Siega Verde. Woolly rhinoceros and felines also find their place in the Iberian Plateau. The case of the rhinoceros, which are unique in the Iberian Peninsula, apart from the example at Los Casares (Alcolea and Balbín 2003b: Fig. 16), repeats the situation of the reindeer and bison. At the same time as these animals appear in the north sector, more advanced graphic solutions are applied, as occurs in the caves in central Iberia. The indication of the coat on the pachyderms in Guadalajara and Salamanca is proof of this.

The felines at Siega Verde are quite schematic, partly because of the percussion method, but their presence on the plateau is well known, at Los Casares (Balbín and Alcolea 1992) and with greater doubts at La Griega (Corchón 1997: Table 1). They seem to be a motif characterizing the art of the plateau, especially as they are rare in northern Spain and limited almost exclusively to Tito Bustillo (Balbín et al. 2003: Fig. 58).

Bears are unusual in Iberian Paleolithic iconography. The figures at Siega Verde are similar to those at Tito Bustillo, and, together with the absence of these animals at sites in the south and east, this is another example of a relationship between Siega Verde and the north of the Iberian Peninsula.

Anthropomorphs are known on the plateau, where they form a large group throughout the Paleolithic (Alcolea and Balbín 2003: 227–228) and also in the north, whereas they are not found in the south or east. In addition to the well-known examples at Los Casares, figures have been documented at La Hoz (Alcolea and Balbín 2003: Figs. 5 to 8) and at La Griega, where two figures of this type have been recorded (Corchón 1997: Table 1). The figures at Ribeira de Piscos (Baptista 2001: Figs. 4 and 5) are of particular interest, as two incised anthropomorphs are very similar to the figures at Siega Verde. Their relationship is again mostly with northern Iberia.

It is clear that, within its originality, the subject matter at Siega Verde can be included within the model in the Castilian Plateau. The stylistic connections with the Mediterranean, if they were ever very significant, decrease with time, and only some archaic figures suggest a plausible relationship. The connections with northern Spain are more numerous and largely provide the foundations for the stylistic chronology.

Chronology

A debate about the Paleolithic age of the ensembles in the Douro Valley first arose in connection with the Côa sites. This debate, caused by a complex web of economic, political, and "scientific" interests, reached its peak with the reports issued by R. Bednarik (1995) and A. Watchman (1995). These reports mixed the results of attempts at direct and relative dating with contextual and stylistic arguments.

The results these studies reached, mainly by Bednarik (1995), suggested a Holocene age for the engravings at Côa. This was based on direct dates determined by micro-erosion, situated by Bednarik between 8500 and 6500 BP, and the minimum age of the engravings at Penascosa, calculated by the analysis of patinas to be 2703 BC and by TL/OSL to be about 4500 BP. These results were combined in Bednarik's study (1995) with a further three types of argument: the inexistence of cold species in the Portuguese ensembles, the absence of an archaeological context, and, finally, some stylistic traits of the figures that, in his opinion, were not characteristic of Paleolithic depictions. The same author produced a new study in 2009, but this time in reference to Siega Verde. Using similar arguments, he

proposed a sub-modern age for the engravings on the banks of the River Agueda (Bednarik 2009).

The opposite view was given by J. Zilhao (1995), who explained in detail all the methodological and interpretative errors committed by Bednarik. The Portuguese scholar criticized the use of experimental and unreliable dating methods and the profound ignorance of the archaeological context in inland Iberia. It may be added that the absence of extinct fauna is not a criterion to demonstrate the non-Pleistocene age of a rock art site. If it was, most of the cave sites accepted as Paleolithic would have to be rejected. The valid argument is completely the opposite; the presence of extinct fauna is a clear criterion to attribute a Paleolithic age to an artistic representation. In fact, Siega Verde contains several examples of extinct Quaternary fauna, which destroys the Australian author's first argument.

In second place, and following Bednarik's critique, it is not true that inland Iberian lacks Upper Paleolithic archaeological deposits. As J. Zilhao stated (1995: 114), late glacial occupations are known in the center of the plateau, as at La Dehesa (Fabián 1986), possibly corresponding to the late Magdalenian. Sites with pre-Solutrean and Solutrean occupations are also known, such as Peña Capón rock-shelter in Guadalajara (Alcolea et al. 1997a, b; Yravedra et al. 2016). Other sites in the north of the Douro Valley can be named, like Mucientes in Valladolid (Martín et al. 1986) and the caves of La Cantera and El Espertín in León (Neira et al. 2006). The latter sites seem to belong to an undefined period in the late Upper Paleolithic. The Magdalenian chronology and sequence at Estebanvela rock-shelter in Segovia (Cacho et al. 2012) can be added to the site already known at Verdelpino (Moure and López 1979) and the terraces in the surroundings of Madrid (Alcaraz et al. 2012). In recent years, a team from the University of Zaragoza has documented several Upper Paleolithic sites in the Ebro Valley, including Gato 2, Vergara/Alejandre, Bolichera, and Peña del Diablo, in the Jalón river valley, directly connecting with the plateau. This connection with the north and east of the Iberian Peninsula partly fills a gap in the area and once again demonstrates the existence of a Magdalenian occupation in the interior of the peninsula (Utrilla et al. 2006).

The main contradiction to Bednarik's argument is found in the Côa Valley itself, because the most important Upper Paleolithic remains in inland Iberia have been documented there. The centers that have been published to date are Quinta da Granja, Quinta da Barca, Quinta da Barca Sul, Salto do Boi, and Olga Grande (Aubry 2009). Salto do Boi possesses two archaeological areas, Cardina II and Cardina I. The first site seems to possess objects in a secondary position, probably from Cardina II, and levels 1–3 at Cardina I are attributable to the upper or final Magdalenian with a chronology of between 12,000 and 10,000 BP. Levels 4c–5 at Cardina CARDINA I belong to the final Gravettian and 4b to a pre-Solutrean level. These latter levels are dated to between 22,000 and 21,500 BP, a time that is well documented in the littoral region between the Tagus and the Mondego. Solutrean remains are also known, at the site of Olga Grande, and the levels superimposed archaeologically on the Gravettian engravings at Penascosa (Aubry 2009).

Excavations after 1999 at Fariseu, on the banks of the Côa, located occupation levels that covered a wall decorated with engravings that would have been produced before 18,400, by OSL/TTL dating, and until 11,000 BP. The style of these engravings corresponds to most of those in the archaic phase at Côa, and this find guaranteed the archaeological age of the whole open-air graphic ensemble (Aubry 2009), in opposition to the claims of some authors. Previously, in 1992 and 1995 (Balbín 1995; Balbín and Alcolea 1992), this chronological period had been proposed for the first engravings in the Douro Valley, based on stylistic procedures.

The open-air art on the Douro includes a first phase in Foz Côa, dated by stylistic elements and the archaeological context to A. Leroi-Gourhan's Style II. This characterization, already published elsewhere (Balbín and Alcolea 1992: 40), connects most of the Portuguese engravings with the oldest cave sites in the plateau: La Griega and El Reno.

A second phase of open-air engravings may be included in Leroi-Gourhan's Style III and early Style IV, in the Magdalenian. It is represented by the central sector at Siega Verde, Domingo García, and a few figures at Côa. Its cave version is abundant on the Iberian Plateau, with the same thematic and stylistic conditions: many of the figures at Los Casares and La Hoz, El Niño, El Turismo, and the late phase at El Reno Cave. The end of the sequence is found in the northern sector at Siega Verde, with the generalization of the most classic early Style IV traits ("M"-shaped internal lines, reduction in size of the figures, and animation), as well as frequent cold fauna (reindeer, woolly rhinoceros, bison). This phase is also found in the final figures at Los Casares and La Hoz.

This chronological assessment of the site of Siega Verde has been studied in several papers and most specifically in the monograph on the site (Alcolea and Balbín 2006: 305–328). The main arguments were the existence of Pleistocene fauna among the representations, the presence of sub-modern constructions covering decorated panels, and, above all, the superimposition of Paleolithic engravings over other prehistoric engravings of a different kind and style.

These engravings, whose chronology in the late Pleistocene and early Holocene has been argued elsewhere (Bueno et al. 2009), have been detected in other parts of the plateau, both in caves and in the open air, with the advantage that they have been documented archaeologically in the recent levels at Fariseu, dated in the tenth millennium cal BC, which in itself is an argument for a definitive relative chronology.

In order to define the position of Siega Verde in the chronological framework of the Upper Paleolithic, owing to the impossibility of using criteria of absolute and archaeological dating (Alcolea and Balbín 2006: 312), we have used indirect stylistic methods, to be precise the most convincing method, which is the one devised by A. Leroi-Gourhan (1971), despite the anti-stylistic reaction that has taken place in the last decade.

We have reflected on this issue elsewhere and proposed a positive and updated use of the methods of stylistic dating (Alcolea and Balbín 2007). This paper points out that absolute dates have partially ratified Leroi-Gourhan's system and that the problems of radiocarbon dating applied to rock art (few figures are dated, sampling errors, and significant proportion of incoherent dates) do not allow this to be a criterion that can replace stylistic and archaeological methods as a way to define the evolution of Paleolithic art.

The characteristics of most of the figures at Siega Verde indicate a middle phase that is neither very archaic nor very advanced within Paleolithic art. The general canon, characterized by certain dysfunction between the head and the body, which is often elongated, scarce details, lack of interest in the limbs, the rare animation, and the solution of perspective, with a predominance of absolute profile and infrequent uniangular perspective, fits within the scope of Leroi-Gourhan's Style III (1971: 252).

However, these characteristics are accompanied by others of a more advanced appearance: insistence on dividing lines in the belly, chest, face, and head and a gentler dorsal line, which is practically straight in most of the equids and cervids at the site. These traits imply that many of the figures must belong to later phases within Style III, when the depiction of internal dividing lines becomes widespread (Barandiaran 1972: 347), and which is also one of the periods best supported by direct dates.

The most significant sites in the plateau that can be associated with most of the figures at Siega Verde are the caves of Los Casares, La Hoz, and El Reno. The most reasonable chronology for Los Casares includes two phases, corresponding to late Style III and an initial early Style IV (Balbín and Alcolea 1992: 429). The cave of La Hoz seems to belong to a very similar decorative pattern, with one phase between the late Style III and the early Style IV and another one fully in early Style IV (Balbín et al. 1995: 44; Balbín and Alcolea 2002: 145–146). The generic similarity of Siega Verde with the late Style III figures in the caves is clear, whereas some figures in the northern sector on the River Agueda, such as the woolly rhinoceros and some horses with "M"-shaped dividing line, correspond well with the later phases at Los Casares, located in Chamber C and, above all, in Chamber A. Similarly, the diversification in the range of animals, the use of

natural rock forms to construct figures, and the general reduction in the size of the figures seen in the later phase at La Hoz repeat graphic behavior that is well represented in the north of Siega Verde.

The similarities with El Reno Cave are also significant. Like the others, this cave was decorated in two phases (Alcolea et al. 1997a: 255–256). In the first, painted and engraved objects with an archaic appearance can be dated between Styles II and III (Balbín and Alcolea 2002: 147), whereas the second, attributed to between Styles III and IV, repeats the traits seen at Siega Verde: horse's heads with a mane with a double angular line, archaic dividing lines in the chest and face of cervids, little attention to the limbs, etc. These examples, which can be completed with the similarities between the cervids and caprids in El Niño Cave and Siega Verde, suggest stylistic synchrony between the caves and the Agueda valley, which can be assigned to a time between Leroi-Gourhan's Styles III and IV.

This chronological proposal is ratified by considering analogies with northern Spain and especially with the caves in the Ramales de la Victoria group and La Pasiega Cave. The cervids at Siega Verde often display dividing lines in their chest and face that are very similar, although more simple, to the striated modeling of animals in Cantabria. As the figures in the north are initially attributed to the start of early Style IV, the examples at Siega Verde may be assigned to a slightly older phase, which underscores their correspondence to the transition between Leroi-Gourhan's Styles III and early IV.

The figures belonging to the oldest phase, principally two aurochs and some horses, found in isolation in several panels at the site, resemble figures in the ensembles at Côa, in La Griega Cave, and in the early phases in the caves in the Central System mountains, all thought to belong to pre-Magdalenian times, within Leroi-Gourhan's Styles II and III (Alcolea and Balbín 2006: 317). This date is supported by data from Fariseu in Côa (Aubry 2009), where a minimum age in the Solutrean or Gravettian has been demonstrated for engravings. This indicates that the intensive superimpositions in Côa correspond to a graphic resource rather than to a long chronology and suggests that most of the Quaternary cycle on the Portuguese river is dated in the Gravettian (Baptista and García 2002: 203–204). These figures may belong to an old phase which additionally signifies a connection between Siega Verde and Côa.

The site functioned during a relatively long period of time, which would correspond to the late Solutrean and first phases of the Magdalenian in northern Spain. In stylistic terms, the decoration was continuous, starting with forms that are characteristic of Styles II and III and then gradually advancing to the transition to the early Style IV and then fully in that style. The hypothesis might be proposed that most of the depictions were produced in a period of time between 18,000 and 15,000 BP. A smaller number of representations were produced before that time, while the upper limit would reach 14,000 BP, a time that corresponds to the middle Magdalenian in northern Spain (González Sainz 1989: 169, Fig. 59). Finally, some figures in the Paleolithic-Epipalaeolithic transition would be superimposed on these and form part of the so-called Style V in the Douro Valley.

Conclusion

Siega Verde is one of the most important rock art sites in the Iberian Peninsula and therefore in the whole of western Paleolithic art.

The study of the representations at Siega Verde has shown that the phenomenon of open-air rock art in inland Iberia is framed perfectly within known Paleolithic graphic activity in the area. The differences it displays with other sites, such as those in Côa, can be explained by its more recent chronology, which matches sites in the center of the Iberian Plateau, with which it displays undeniable connections. These circumstances signify that Siega Verde and thus the other open-air sites in Iberia do not belong to any exotic cycle different from that of the Paleolithic cave sites in Western Europe. Paleolithic rock art in the open air is situated in a different setting from that of the decorated caves, and this setting must have been commonplace in Upper Paleolithic graphic systems.

The mere existence of the sites in the Douro Valley, and their great similarity with the cave sites, implies that caves were just another setting for Paleolithic art and not the only one nor the fundamental one. Darkness and the mystery of the caves was not a determining factor in the graphic message.

Caves only provided the human groups with an ideal architecture in which to represent their discourse, an essentially linear architecture organized according to a unifying thread, which was formed precisely by the passages and chambers of the caves. The Rivers Agueda and Côa, with their river banks, provided a similar vehicle of communication for the inhabitants of the Douro Valley. They had no caves, but they possessed similar cultural and ideological concepts to those of other inhabitants of Europe in the last Ice Age.

The open-air sites in Iberia and the study of several classic cave ensembles underscore the urgent need to reappraise the meaning of European Paleolithic rock art. The principles that have been used uncritically are no longer valid and are unable to explain this rich and varied graphic world. More open and versatile explanations must be sought, to avoid resorting invariably to religion and hidden places as the only reasons for the development of Paleolithic art.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Côa Valley Rock Art Sites
- ▶ Europe: Prehistoric Rock Art
- ▶ Style: Its Role in the Archaeology of Art

References

Alcaraz, M., M. López-Recio, M. Roca, F. Tapias, I. Rus, J. Baena, J. Morín, A. Pérez-González, and M. Santonja. 2012. Nuevos datos sobre el yacimiento paleolítico de las Delicias: un taller solutrense en el valle del Manzanares (Madrid, España). *Espacio, Tiempo y Forma Serie I, Nueva época Prehistoria y Arqueología, t.* 5: 427–446.

Alcolea, J.J., and R. de Balbín. 2003. El Arte Rupestre Paleolítico del interior peninsular. Elementos para el estudio de su variabilidad regional. In *Primer Symposium Internacional de Arte Prehistórico de Ribadesella*, ed. R. de Balbín and P. Bueno, 223–253. *Ribadesella*.

Alcolea, J.J., and R. de Balbín. 2006. Arte Paleolítico al aire libre. El yacimiento rupestre de Siega Verde, Salamanca. *Arqueología de Castilla y León n° 16. Junta de Castilla y León 2006*, 390 p., 203 figs.,126 láms.

Alcolea, J.J., and R. de Balbín. 2007. C14 et style. *La chronologie de l'art pariétal à l'heure actuelle. L'Anthropologie.* 111: 435–466.

Alcolea, J.J., R. de Balbín, M.A. García Valero, and P.J. Jiménez. 1997a. Nuevos descubrimientos de arte rupestre paleolítico en el centro de la Península Ibérica: La cueva del Reno (Valdesotos, Guadalajara). In *Bueno Ramírez: II Congreso de Arqueología Peninsular. Tomo I. Paleolítico y Epipaleolítico*, ed. R. de Balbín and P. Behrmann, 239–257. Zamora: Fundación Rei Afonso Henriques.

Alcolea, J.J., R. de Balbín, M.A. García Valero, P.J. Jiménez A. Aldecoa, A. Casado, and B. Andrés. 1997b. Avance al estudio del poblamiento paleolítico del Alto valle del Sorbe (Muriel, Guadalajara). *II Congreso de Arqueología Peninsular. Tomo I. Paleolítico y Epipaleolítico*, 201–218. Zamora: Fundación Rei Afonso Henriques.

Aubry, Th., ed. 2009. 200 séculos da história do Vale do Côa: incursões na vida quotidiana dos caçadores-artistas do Paleolítico. Trabalhos de Arqueologia Ministerio da Cultura, IGESPAR, 507 pp.

Baptista, A.M. 1999. O ciclo quaternário do Vale do Cõa. Com algumas considerações do metodo sobre estílos, valoração estética e crono-estratigrafia figurativa. *Arkeos.* Tomar 6(2m): 197–277.

Baptista, A.M. 2001. The quaternary rock art of the Côa Valley (Portugal). In *Les prémiers hommes modernes de la Péninsule Ibérique. Actes du Colloque de la Commision VIII de la U.I.S.P.P.*, 237–252.

Baptista, A.M., and M. García. 2002. L'Art Paléolithique dans la vallée du Côa (Portugal). La symbolique dans l'organisation d'un sanctuaire de plein air. En *L'art. Paléolithique à l'air libre. Le paysage modifié par l'image*, ed. D. Sacchi, 187–205. Tautavel-Campôme, 7–9 octobre 1999.

Barandiaran, I. 1972. Algunas convenciones de representación en las figuras animales del Arte Paleolítico. *Santander Symposium. Santander-Asturias, Santander-Madrid*, 345–381.

Bednarik, R.G. 1995. The Côa petroglyphs: An obituary to the stylistic dating of Paleolithic rock-art. *Antiquity* 69: 877–882.

Bednarik, R.G. 2009. Fluvial erosion of inscriptions and petroglyphs at Siega Verde, Spain. *Journal of Archaeological Science* 36: 2365–2373.

Bueno, P., R. de Balbín, and J.J. Alcolea. 2009. Estilo V en el ámbito del Duero: Cazadores finiglaciares en Siega Verde (Salamanca). In *Arte Prehistórico al aire libre en el Sur de Europa*, ed. R. de Balbín, 259–286. Actas. PAHIS. Junta de Castilla y León.

Cacho, C., J.A. Martos, J. Jordá-Pardo, J. Yravedra, C. Sesé, L. Zapata, B. Avezuela, J. Valdivia, M. Ruiz, L. Marquer, I. Martín-Lerma, and J.M. Tejero. 2012.

Human landscapes of the late glacial period in the interior of the Iberian Peninsula: La Peña de Estebanvela (Segovia, Spain). *Quaternary International* 272–273 (2012): 42–54.
Corchón, M.S. Coord. 1997. La cueva de La Griega de Pedraza (Segovia). *Arqueología en Castilla y León, 3. Junta de Castilla y León.*
de Balbín, R. 1995. Lárt paléolithique à l'air libre de la vallée du Douro. Archéologia, no 313, Junio, 34–41.
de Balbín, R. 2009. El Arte Rupestre Paleolítico al aire libre en la Península Ibérica. Actas. PAHIS. Junta de Castilla y León, 19–56.
de Balbín, R., and J.J. Alcolea. 1992. La grotte de Los Casares et l'Art Paléolithique de la Meseta espagnole. *L'Anthropologie* T.96 (2–3): 397–452.
de Balbín, R., and J.J. Alcolea. 2002. L'art rupestre paléolithique de l'intérieur péninsulaire ibérique: une revision chronoculturelle d'ensemble. In *Actes du Colloque L'art Paléolithique à l'air libre: le Paysage modifié par l'image, 07–09/10/1999. Coor. D. Sacchi*, 139–157.
de Balbín, R., and J.A. Moure. 1982. El panel principal de la cueva de Tito Bustillo (Ribadesella, Asturias). *Ars Praehistorica,* t. I, 47–97.
de Balbín, R., J.J. Alcolea, F. Moreno, and L.A. Cruz. 1995. Investigaciones arqueológicas en la cueva de La Hoz (Sta. María del Espino, Guadalajara). Una visión de conjunto actualizada. In *"Arqueología en Guadalajara". Patrimonio Histórico-Arqueología Castilla-La Mancha*, ed. R. de Balbín, J. Valiente and M. Mussat Coord, 37–53.
de Balbín, R., J.J. Alcolea, and M.A. González Pereda. 2003. El macizo de Ardines, Ribadesella, España. Un lugar mayor del arte paleolítico europeo. In *El Arte Prehistórico desde los inicios del siglo XXI. Ribadesella 2003*, ed. R. de Balbín y P. Bueno, 91–152.
Delluc, B. 1991. L'art pariétal archaïque en Aquitaine. *XXVII supplément à Gallia Préhistoire. Editións du Centre National de la Recherche Scientifique. París*. 393. 235 figs.
Fabián García, J.F. 1986. La industria lítica del yacimiento de la Dehesa en El Tejado de Béjar (Salamanca). Una Industria de tipología magdaleniense en la Meseta. Numantia no 2, 101–143.
González Sainz, C. 1989. *El Magdaleniense Superior-Final de la región cantábrica*. Tantín-Universidad de Cantabria. Santander.
González Sainz, C. 1993. En torno a los paralelos entre el Arte Mobiliar y el Rupestre. *Veleia, T. 10.* Vitoria, 39–56.
Leroi-Gourhan, A. 1971. *Prehistoire de l'Art Occidental. 2ème édition augmentée*. París: Mazenod.
Leroi-Gourhan, A. 1981. Les signes pariétaux comme marqueurs ethniques. *Altamira Symposium. Madrid-Asturias-Santander 1979*, 164–168. Madrid: Ministerio de Cultura.
Martín, E., A. Rojo, and M.A. Moreno. 1986. Hábitat postmusteriense en Mucientes (Valladolid). *Numantia, II*, 87–100.
Moure, A., and P. López. 1979. Los niveles preneolíticos del abrigo del Verdelpino (Cuenca). *XV Congreso Nacional de Arqueología*, 11–124.
Moure, J.A., C. González Sainz., and M.R. González Morales. 1987. La cueva de La Haza (Ramales,Cantabria) y sus pinturas rupestres. *Veleia,* 4. Vitoria, 67–92.
Neira, A., N. Fuertes, C. Fernández, and F. Bernaldo de Quirós. 2006. Paleolítico Superior y Epipaleolítico de la provincia de León. En *El Paleolítico Superior en la Meseta Norte Española. Studia Archaeologica. no 54*, ed. G. Delibes y F. Diez, 113–148.
Pike, A.W.G., D.L. Hoffmann, M. García-Diez, P.B. Pettitt, J. Alcolea, R. de Balbín, C. González-Sainz, C. de las Heras, J.A. Lasheras, R. Montes, and J. Zilhão. 2012. U-series dating of Paleolithic art in 11 caves in Spain. *Science* 336 (6087): 1409–1413.
Utrilla, P., F. Blasco, and J.M. Rodanés 2006. Entre el Ebro y la Meseta: el Magdaleniense de la cuenca del Jalón y la placa de Villalba. In *El Paleolítico Superior en la Meseta Norte Española. Studia Archaeologica. no 54*, ed. G. Delibes y F. Diez, 173–213.
Watchman, A. 1995. Dating the Foz Côa engravings, Portugal. In *News 95-International Rock Art Congress*, ed. D. Seglie, 98. *Turin*.
Yravedra, J., M.A. Julien, M. Alcaraz-Castaño, V. Estaca-Gomez, J. Alcolea-Gonzalez, R. de Balbín-Behrmann, C. Lecuyer, C.H. Marcel, and A. Burke. 2016. Not so deserted . . . paleoecology and human subsistence in Central Iberia (Guadalajara, Spain) around the last glacial maximum. *Quaternary Science Reviews* 140: 21–38.
Zilhão, J. 1995. The age of the Côa valley (Portugal) rock-art: Validation of archaeological dating to the palaeolithic and refutation on "scientific" dating to historic or proto-historic times. *Antiquity* 69: 883–901.
Zilhão, J., T. Aubry, A.F. de Carvalho, G. Zambujo, and F. Almeida. 1995. O sítio arqueológico paleolítico do salto do boi (Cardina, Santa Comba, Vila Nova de Foz Côa). In Dossier Côa, ed. V.O. Jorge, 471–498.

Sierra de San Francisco: Great Mural Rock Paintings

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Introduction

In the Baja California peninsula, Mexico, exists one of the most extraordinary repertoires of rock art in the country. This long and narrow strip of land sits between the calm, tepid waters of the California Gulf and the impetuous Pacific Ocean. In this peninsula rises an impressive series

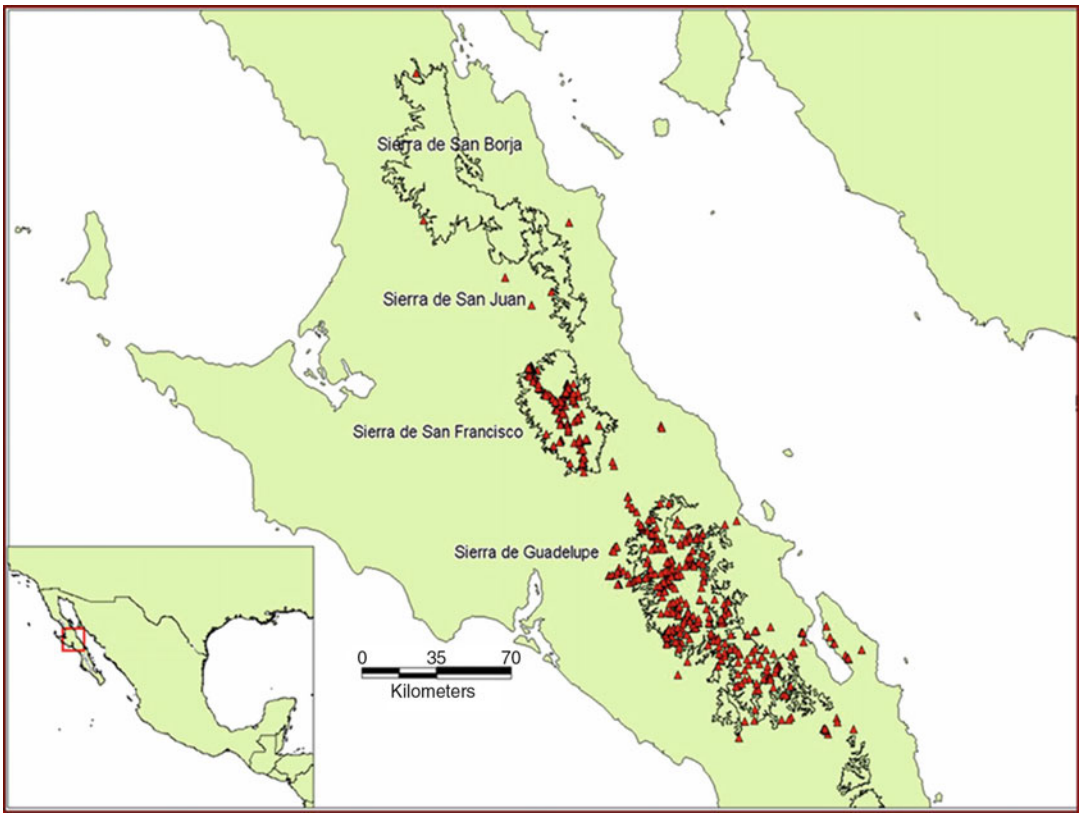

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 1 The central mountain ranges in Baja California peninsula: this is the distribution area of the Great Mural style

of mountain ranges that, along with the oceans that embrace it, provides interesting contrasts between the ocean, the desert, and the mountain. This landscape scenario provided optimal conditions for hunter-gatherer-fishing societies, who first inhabited the peninsula in the early Holocene, until the arrival of explorers and Jesuit missionaries at the end of the seventeenth century (Gutiérrez & Hyland 2002).

One of the most salient features of this region's prehistory is that its protagonists produced massive quantities of rock art since very ancient times. They found in the practice of painting and engraving an extremely important medium of ritualistic expression and in the resulting rock art an extraordinary instrument of communication. In this way, the symbolism expressed in the imagery can be considered an essential element in the process of construction and consolidation of the social identities of these peoples through the millennia.

The central mountain ranges of the peninsula represent the densest concentration of rock art (Fig. 1). In these mountains, the imagery is persistently integrated with the landscape, symbolically inscribed, and it gives it a cultural meaning that shows us with clarity the fluid movement of the peoples who created it, witnesses and protagonists of the comings and goings (Conkey 1984: 264–267; Gutiérrez and Hyland 2002: 30).

Key Issues/Current Debates/Future Directions/Examples

The Rock Art Tradition of Great Murals

The Great Mural style (Gran Mural) is one of the most prominent of the region. This term was coined by Harry Crosby (1997) in the seventies taking into account their large size. The Sierra de San Francisco is the one that concentrates the

most spectaculars Great Mural sites. The paintings are located in hundreds of rockshelters in the intermountain canyons. The style is essentially realistic and is dominated by human figures and animals painted in red, black, white, and yellow. In 1992, these rock paintings were inscribed in the UNESCO World Heritage List.

On the rock panels of the Sierra de San Francisco, the anthropomorphs are static or unmoving, while the posture of some animals suggests certain movement. The female figures can be identified by the breasts that are positioned under the arm as well as by the demonstration of pregnancy (Fig. 2). The animal that appears most frequently is the deer, followed by the Bighorn Sheep, but there also exists a broad range of land and marine animals depicted (Fig. 3).

Chronology and Cultural Affiliation

One of the key questions surrounding the archaeological investigation of the Great Murals concerns their antiquity. The first references to the murals can be found in the records of the Jesuit missionaries of the eighteenth century (Barco 1973). The impression given by some of these records was that the paintings were "old," while the indigenous people denied knowledge of their origins, attributing them to the work of an ancient and lost race of giants from the North.

Before 2000, there were only six radiocarbon dates for three panels of the Great Murals (Fullola et al. 1994; Gutiérrez and Hyland 2002: 337). There has been a more recent focus on increasing the chronological information about this pictorial tradition. From the radiocarbon dates that have been obtained so far, one stands out. The panel of Cueva San Borjitas has a date as far back as 7500 B.P. (which signifies Before Present) (Watchman et al. 2002). The investigations surrounding chronology have produced interesting debates but also valuable information about the production process of the paintings and the meaning behind their creation.

Another essential aspect has been to verify the origin of the pigments and explore the possibility of identifying the minerals. The analyses indicate that the paint is composed of local mineral pigments: red and yellow from iron oxides, black from manganese oxide, and white from gypsum. Large deposits of gypsum and of red iron oxide, intense in color, quality, and varying shades, can be found in the Azufre Canyon, in the Volcanes Tres Vírgenes (Three Virgins Volcanoes) (Fig. 4). Archaeological evidence tells us that this source was used to obtain the pigments. It should be noted that this paint recipe was formulated not only for creating the rock art imagery but also for the development of body painting (Gutiérrez and Hyland 2002; Gutiérrez 2009).

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 2 Cueva del Batequi, Sierra de San Francisco. The female image is identifiable on the basis of her breasts and probable pregnancy

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 3 It is common to find maritime animals in some Great Mural sites. To the *left*, the sea lion-whale of site San Gregorio II and to the *right*, hare and stingrays in site Cuesta de San Pablo

It is interesting to note that as the Great Mural panels are located further away from this source, decreases the intensity of the color in the rock paintings and many of them were only outlines. This may correspond with the difficulty that faced the most distant groups to travel to the volcano and collect the precious pigment and could explain the changes in the chromatic component of the southern substyles. A hypothetical explanation is that the volcano could have been perceived as the dwelling of mythical beings, bearers of unusual properties like the pigments and obsidian; in these terms, the pigment could have been considered rare, and the distant groups would have had limited access to them and thus had to use them in moderation.

Context and Function

In general the panels of the Great Murals present a complex diversity of style, theme, and archaeological context, showing us of the plurality of its origin and function. The presences of human figures or wounded animals have led many researchers to suggest that the painters reproduced scenes or hunting and/or combat, while others describe the shamanistic orientation of the imagery.

Another perspective has been to contextualize the paintings based on the religious concepts and ritualistic practices of the peninsula (Gutiérrez and Hyland 2002). The veneration of the ancestors and of the dead shaped the nucleus of the indigenous worldview around which developed a set of ritual practices; among these practices stand out the communication with such entities through its embodiment, and the spirit possession under a state of trance. The layers of human hair, the wooden effigies, the tables and ceremonial sticks, and the rock art, were elements of the ritual paraphernalia and served as substitute images of mythological heroes and remote ancestors.

The importance and intensity that had image production for the representation of the dead and ancestors, is the key to understanding the meaning and role that played some emblematic panels of Great Mural, those that are characterized by their huge dimensions and by the predominance of

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 4 Extensive pigment deposits found at Cañón del Azufre in Tres Vírgenes Volcanoes. To the *left*, the end of this canyon and Sierra de San Francisco on the back and to the *right*, pigment deposits

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 5 Cuesta Palmarito, Sierra de San Francisco. This Great Mural panel is characterized by the human figures with a wide range of headresses and chromatic patterning

human figures, which showing a broad range of headdresses and colored patterns (Fig. 5). Detailed analysis shows that certain figures were repainted, possibly throughout centuries. What motivated this "reactivation" of the images? It is possible that the personages painted in these sites could represent founding ancestors of lineages and/or mythical beings; in this sense, the groups of images concentrated the collective memory of these groups, and, through the ritual of repainting, the people worshipped them, reaffirming at the same time their individual and group identities.

The functions of the rock paintings and the sites that contain them could have been numerous. By analyzing each of the categories of identified panels, we would be in a position to deepen the study around origin, function, and rhythms of the creation of the imagery, the places that contain them, and the resulting symbolic space. Meanwhile, what we can confirm from a general perspective is that the role that the Great Murals played as a codifying system of visual communication was very successful, because their consistency, expands propagation and the permanency of certain emblematic images tells us of the great ability that its makers had in the construction and consolidation of this landscape and the capacity of the society to decode their meaning, on more than one level, throughout the history of the region, and over vast territories of local and regional identities, pervaded with memory and feeling.

Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Australian Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Kakadu National Park: Rock Art
- ▶ Maritime Contact Rock Art
- ▶ "Motif" in the Archaeology of Art
- ▶ North American Rock Art
- ▶ Pigment Analysis in Archaeology
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts
- ▶ Serra Da Capivara National Park
- ▶ South American Rock Art

References

Barco, M.D. 1973. *Historia natural y crónica de la antigua California*. México: Universidad Nacional Autónoma de México.

Conkey, M.W. 1984. To find ourselves: Art and social geography of prehistoric hunter-gatherers. In *Past and present in hunter-gatherer studies*, ed. C. Schrire, 253–276. New York: Academic Press.

Fullola, J.M., V. Castillo, M.A. Petit, and A. Rubio. 1994. The first rock art datings in Lower California (Mexico). *International Newsletter on Rock Art* 9: 1–4.

Gutiérrez, M.L. 2009. Las Vírgenes volcanoes: Social agents in the process of landscape enculturation in Central Baja California, México. Paper presented at the 75th Annual Meeting of the Society for American Archaeology. Saint Louis, Missouri, 14–18 April 2009.

Gutiérrez, M.L., and J.R. Hyland. 2002. *Arqueología de la Sierra de San Francisco: Dos décadas de investigación del fenómeno Gran Mural*, Colección Científica 433. México: INAH.

Watchman, A.L., M.L. Gutiérrez, and M.I. Hernández. 2002. Giant murals of Baja California: New regional archaeological perspectives. *Antiquity* 76 (294): 947–948.

Further Reading

Crosby, H.W. 1997. *The cave paintings of Baja California: discovering the great murals of an unknown people*. San Diego: Copley Books.

Silbury Hill: Environmental Archaeology

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Introduction

Silbury Hill in Wiltshire, UK (NGR SU 100 685), is the largest prehistoric mound in Western Europe. Its lies at approximately 158 m OD close to the source of the river Kennet, on the western side of the valley bottom within a natural amphitheater formed by the surrounding chalk hills. It is one of the complexes of early prehistoric monuments that comprise the UNESCO Avebury and Stonehenge World Heritage Site with Avebury Henge lying 1 km further up the valley to

Silbury Hill: Environmental Archaeology, Fig. 1 Silbury Hill is in the top left of the picture. The village of Avebury (lying partly within the Avebury Henge) is seen in the foreground (©English Heritage)

the north (Fig. 1), the West Kennet palisade enclosures 1 km to the east, and the West Kennet chambered long barrow occupying the first chalk ridge to the south east. Silbury Hill is a designated scheduled monument (National Heritage List for England 1008445; Scheduled Monument 21707; formerly County Number WI 2SAM 220743) and also a site of special scientific interest (SSSI) on account of the rare chalk grassland vegetation that grows on its slopes. The site is under the guardianship of the Secretary of State for the Department of Culture, Media and Sport and is managed by English Heritage on the UK government's behalf (Whittle 1997; Field and Leary 2014).

Today, Silbury Hill takes the form of a flat-topped cone 150 m in diameter and just under 31 m high when measured from the original land surface (37 m when the depth of the large external ditch surrounding the mound is taken into account). The mound itself is the result of multiple phases of activity and sits on a truncated old land surface (see below). At the center is a low gravel mound (maximum height 0.8 m, diameter 10 m) over which is a mixture of topsoil and turves, enlarging the central mound to just over 1 m in height with an estimated diameter of 22 m. A series of wooden stakes (recorded as stake holes) around the edge of this lower organic

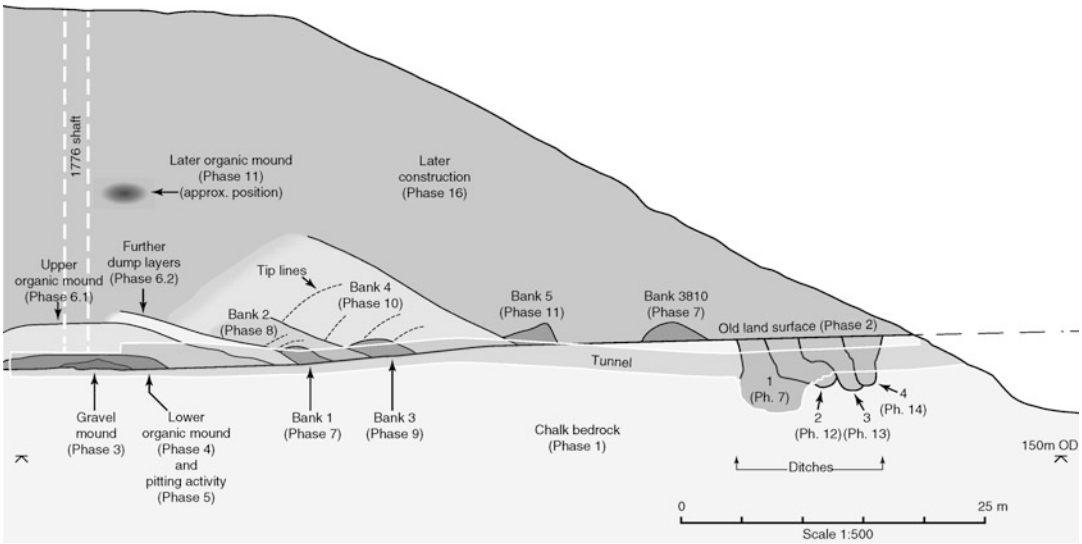

Silbury Hill: Environmental Archaeology, Fig. 2 Section through Silbury Hill showing the different phases of construction (Eddie Lyons ©English Heritage)

mound may have held the structure in place but could equally have been freestanding. Also believed to belong to this phase of activity are one or more smaller additional deposits (mini-mounds) constructed around the central mound, again comprising turf and topsoil. Following on from this phase, pits were dug into the surface of the organic central mound, rapidly backfilled with turf and topsoil then built up, resulting in a central mound of some 35 m in diameter. This upper organic mound was additionally sealed by a series of further dumped layers made up principally of chalk and silty clay, around which at least five chalk and clay banks were constructed, gradually increasing the mound's size. Many of these banks may be associated with the cutting and recutting of a large ditch dug some 50 m out from the center of the hill. However, the first phase of the ditch is associated with a separate bank thrown up toward the center of the hill (i.e., on the internal side), suggesting that the mound may have, at one time, sat inside an enclosure with an internal bank. The later phases of the hill are less well understood because of the nature of the archaeological interventions (see below) but the deliberate backfilling of the ditch, followed by a series of recuts each slightly further out from the center of the mound, possibly continued until the final form of the ditch surrounding the hill was achieved. Similarly, while the piling of quarried chalk was used to expand the monument above and around the central mound and the surrounding deposits, at some stage a different procedure was adopted which entailed the construction of revetment walls of chalk rubble, behind which fine chalk dumps were built up. It is this technique which is evident from excavations on the summit of the hill (Leary 2014; Fig. 2).

The whole construction process is likely to have lasted somewhere between 55 and 155 years. The lower organic central mound and additional mound(s) are estimated to have been completed between 2460 and 2395 cal BCE with final completion estimated at between 2335 and 2270 cal BCE (Marshall et al. 2014). The building of the hill thus falls within the same time period as major constructions at Stonehenge and Avebury.

Definition

The importance of Silbury Hill to environmental archaeology lies in the wealth of biological remains preserved within the organic mounds

and representing the early phases of the monument's construction. As the macroscopic plant remains, mollusks, and insects are derived from the turf and topsoil incorporated into the organic mounds (and from materials laid down or surviving within the old land surface beneath the hill), they give a unique insight into the nature of the late Neolithic environment within an area of major monuments. The remains are preserved due to the anoxic nature of the deposits within the center of the hill. These preservation conditions result from a combination of reduction and limited gaseous exchange between the deposits in the center of the mound and the outside air caused by the sheer volume of the hill coupled with the results of the extra compression caused by "the enormous weight of the mound" (Evans 1972: 267; Canti et al. 2004; and the entry on "▶ Environmental Archaeological Evidence: Preservation" in this encyclopedia).

In addition to the delicate biological remains, two other areas of interest from Silbury are the nature of the old land surface and the use of antler as tools. Antler picks are one of the main cultural materials recovered from late Neolithic deposits at the site which generally produced very little cultural material, animal bone, or charred plant remains. This paucity of finds suggests that the site may have been deliberately kept clean (Campbell 2014; Leary and Field 2014).

Historical Background

There have been four major archaeological interventions into the center of Silbury Hill (Fig. 3). The first comprised the digging of a vertical shaft from the summit down to the center of the hill, carried out by Colonel Drax and the Duke of Northumberland in 1776. The aim of this endeavor was to recover the burial believed to lie under the center, but all that was recovered from the base of the shaft was single sliver of oak (Whittle 1997: 9–10; Leary and Field 2010). The second excavations took place in 1849 funded by the Archaeological Institute. A horizontal tunnel was dug into the center of the hill from the southwest side of the mound with further tunnel extensions excavated in the center. While this excavation also failed to find a central burial, it was the first to record the extraordinary preservation of biological remains deep within the hill. The Very Reverend J. Merewether, in his account of the 1849 excavations, notes both the freshness of the moss found on turves piled up in the center of the hill and also the presence of mollusks, beetles, and other plant remains (Merewether 1851).

The huge potential of the environmental material only began to be realized following the next major intervention between 1968 and 1970 which was sponsored by the British Broadcasting Corporation (B.B.C.) and directed by Prof. R Atkinson. The tunneling works partly incorporated the footprint of the 1849 tunnels but extended further and included the excavation of two lateral tunnels to the east and west. Among the principal aims of this excavation was to gain an understanding of the composition and date of the monument and "to document its environmental setting" in the light of Merewether's findings (Whittle 1997: 11). To this end, a suite of pioneering environmental analyses was carried out on materials recovered from the tunnels including studies on soils, pollen, macroscopic plant remains (including mosses), insects, mollusks, and vertebrate remains (see Cornwall et al.; Dimbleby et al., respectively, in Whittle 1997). While these analyses are a major source of information concerning the site, they suffer from a lack of information about where exactly the material came from, and it is not always possible to ascertain whether the assemblages were recovered from the old land surface or from one of the organic mounds, additional mounds, etc. Thus, while the results give a good overall picture, indicating the presence of open herb-rich grazed grassland in the immediate vicinity of the hill in the later Neolithic (Whittle 1997: 140), details concerning the nature of the old land surface and the different deposits making up the mound are lacking (Canti et al. 2004; Campbell 2014).

The fourth major and most recent archaeological investigation at the site occurred during 2007–2008. The research took place as part of a

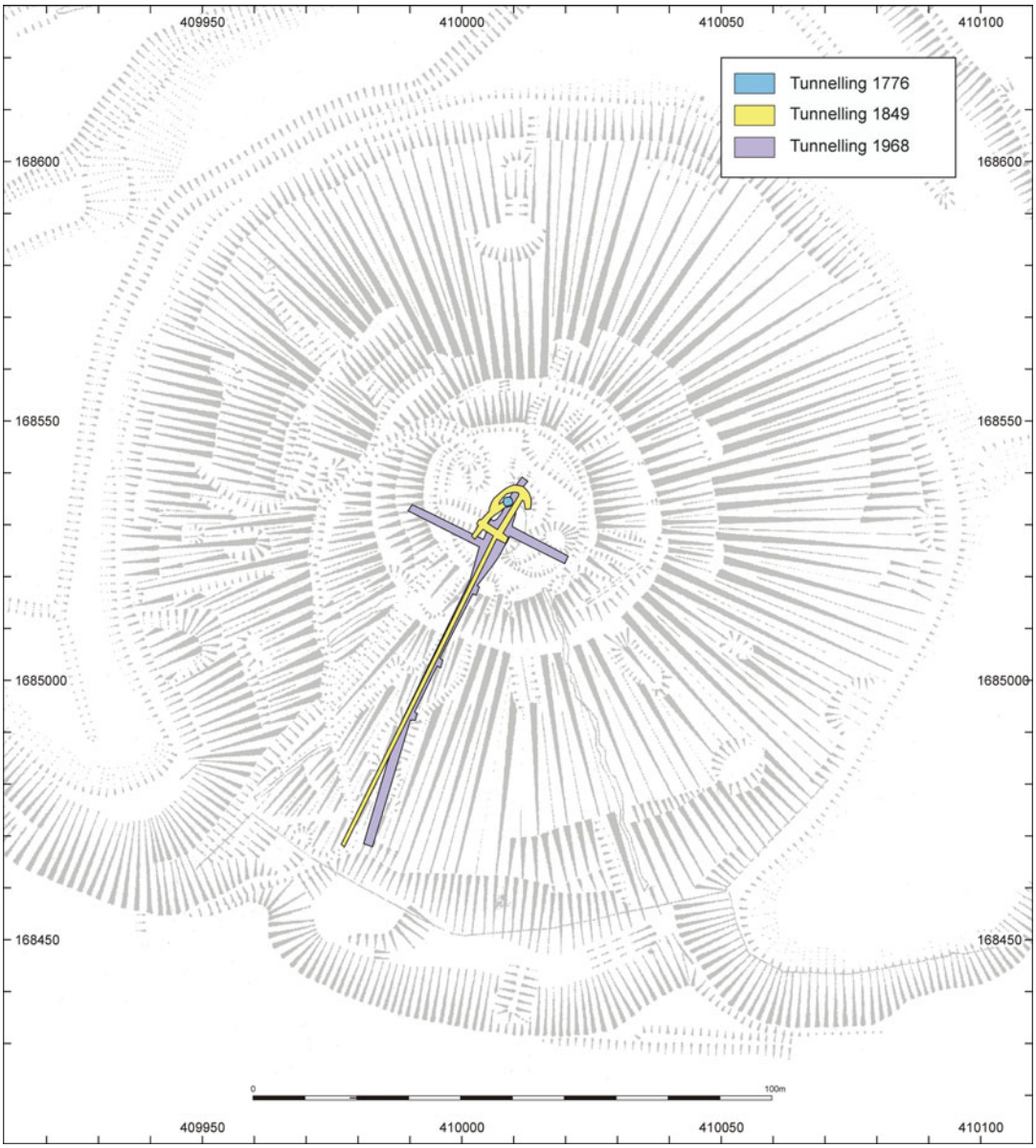

Silbury Hill: Environmental Archaeology, Fig. 3 Plan of Silbury Hill showing the 1776, 1849, and 1968–1970 interventions. The 2007–2008 remedial works reused the 1968–1970 tunnels from Leary et al. in press. (Eddie Lyons ©English Heritage)

major conservation project by English Heritage involving remedial works to the hill. These works were carried out in response to the discovery of voids resulting from incomplete backfilling associated with the 1776 shaft, the 1849 tunnel, and the 1968–1970 tunnels. It was clear that the voids would continue to migrate up through the hill to eventually be expressed on the surface, disrupting irreplaceable archaeology: a problem first brought to light by the sudden appearance of a hole on the summit of Silbury Hill on the 29 May 2000, caused by the collapse of the deposits in the 1776 shaft. Thus, the decision was made to re-excavate the 1968–1970 tunnels and to directly

backfill all the voids in order to conserve the monument and prevent further damage to its archaeology. This work was accompanied by detailed archaeological recording, including extensive sampling of in situ and disturbed deposits encountered in the sides of the tunnels in order to recover artifacts and biological remains and for geoarchaeological analysis. The results of this work are detailed in Leary et al. (2014). Some of the key findings from the environmental archaeology are discussed below.

Key Issues

The Nature of the Old Land Surface

Silbury Hill is situated on a 1–2-m deep layer of clay-with-flints drift overlying solid chalk, so the preconstruction surface of the chalk spur would have had a clay-with-flints soil profile over much of its area. Inside the hill, the old land surface was characterized by a relatively stone-free dense gray silty clay loam or silt loam layer formed at the junction between the chalk overburden and the underlying clay-with-flints. The layer was as little as 3 cm thick in some places (Fig. 4) but tended to gradually thicken downhill (toward the center of the mound) and was as much as 10-cm thick at some points. It mostly had a smooth interface with the chalk above it but also sometimes showed irregular upper surfaces (Fig. 4b).

The gray clay layer often had a sharp boundary to the underlying clay-with-flints, usually including a marked gravelly band. Variants on this basic morphology were found in the main exposures to the south and in the lateral tunnels. Toward the center of the hill, the gray layer was less pronounced and showed more gradual changes with depth. Comparisons with local soils on clay-with-flints showed clearly that, even allowing for redox-based color changes, a simple compression (as would occur if the hill was built straight onto the topsoil) could not generate the thin examples of the dense gray layer (Canti et al. in press).

The gray layer and underlying clay-with-flints were characterized using particle size analysis. This showed a strong relationship between the two materials. Although there was a wide variation among the samples, the gray layer could, essentially, be derived from the clay-with-flints if most of the stones larger than 2 mm were removed and the clay content was reduced by 10%.

Processes to effect this sorting were considered (including trampling and erosion), and some experimentation was carried out to try and simulate it. In the end, earthworm casting was thought to be the only feasible possibility. Earthworm action is capable of deep sorting (see, e.g., Canti 2003, Fig. 7), and the Silbury soil represents a fairly intense example. Although the process is commonly associated with more calcareous soils than those found on clay-with-flints, the unusual

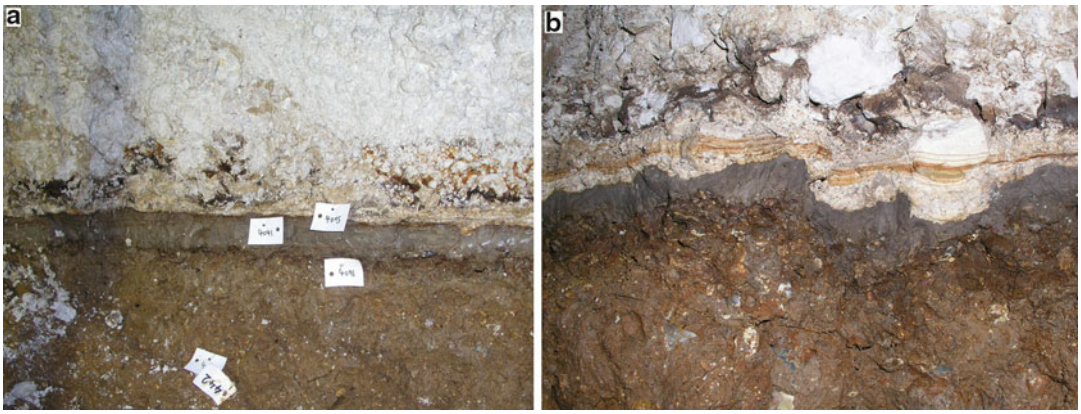

Silbury Hill: Environmental Archaeology, Fig. 4 (**a**) Typical example of the thin gray layer overlying clay-with-flints that forms the old land surface beneath the hill. (**b**) Irregular upper surfaces of the layer overlying clay-with-flints. (Matt Canti ©English Heritage)

lowland position of the Silbury deposit and possible calcareous inputs from upslope would likely overcome any inhibition due to acidity.

The Silbury builders would, therefore, have found a well-developed worm-sorted topsoil on the chalk spur and deturfed it. They cut well above the stone layer in many cases, producing the old land surface examples with a deeper gray clay layer. Toward the south, perhaps stimulated by increasing distance from the turf stack, they tended to go deeper and arrived at just 2 or 3 cm above the stone layer, producing the profiles seen in Fig. 4. The grayness of the gray layer would arise from leaching of the iron compounds chemically reduced (and thus rendered soluble) by decay of the organic matter still left in the earthworm casts.

The Biological Remains from the Organic Mounds and the Nature of the Later Neolithic Environment of Silbury Hill

Turves that can be cut as soil blocks and used in construction only form under open vegetation types such as grassland, moorland, and heaths. This is because, in order for the turf to hold together, there has to be dense vegetation cover and a mat of roots such that the topsoil remains attached to the surface vegetation (Hall 2003; Campbell 2014). It is therefore not unexpected that the majority of the biological remains recovered from the organic mounds within Silbury Hill attest to open grassland habitats. However, there is considerable variation between different turf samples and different contexts. This partly results from the nature of the matrix making up the different mounds.

The central lower organic mound is principally composed of turves and topsoil formed on neutral to acidic clay-with-flints material, resulting in pollen being relatively well preserved. In contrast, the upper organic mound contains typically rendzina turves and calcium-rich topsoil, leading to excellent preservation of mollusks but the destruction of pollen evidence. Overall, macroscopic plant remains and insects are preserved well in both mounds (see "▶ Environmental Archaeological Evidence: Preservation"). There is also a wide range of preservation states between different specimens, because some material was living or fresh when incorporated (e.g., moss growing on the surface, seeds forming part of the soil seed bank, and whole beetles (Fig. 5)), whereas other material was either dead or decayed when incorporated (e.g., dead grass, fragmented beetle remains, worn mollusk shells, and partly decayed seeds). These complex taphonomic factors impose limitations on interpretation but also present opportunities. Thus, the month in which a given turf was cut cannot be determined from the presence of the wings of the queen ant *Myrmica sabuleti* since these wings are bitten off following mating flights and would be plentiful around any ant nests, surviving in the soil for some time (Robinson 1997: 41, 43; Robinson in Campbell 2014). On the other hand, the presence of worn mollusk shells of species typical of woodland along with poorly preserved seeds of

Silbury Hill: Environmental Archaeology, Fig. 5 Mangold flea beetle (*Chaetocnema concinna*) found squashed on the surface of one of the turves, scale bar 2.5 mm. (Gill Campbell ©English Heritage)

woodland plants such as *Mercurialis perennis* (dog's mercury) and *Rosa*/*Rubus* type (rose or bramble) thorns among well-preserved remains of mollusks indicating dry open grassland and well-preserved remains of *Ranunculus* cf. *bulbosus* (bulbous buttercup) within an individual turf can be used to reconstruct the history of the turf; it may have been cut from grassland developed following woodland clearance undertaken probably less than a century earlier (Campbell 2014).

Bearing these factors in mind, the results from samples of individual turves from the central organic mounds within Silbury Hill indicate that turves were cut from grassland developed on at least two contrasting soil types, with different land-use histories and subject to varying degrees of wetness, disturbance, and grazing pressure. The moss remains in particular allow aspect (whether the turf was cut from a north- or south-facing slope) to be postulated (Williams 1976; Hall and Campbell 2014), while the presence of *Lasius flavus* gp. ants which build ant hills in old grassland may suggest the harvesting of turves from mature grassland (Robinson in Campbell 2014).

The results from the only mini-mound to be sampled gave somewhat different results than those of the central organic mound. Although a grassland element is present, indicators of woodland environments including propagules of *Taxus baccata* (yew), *Prunus spinosa* (sloe), and *Ajuga reptans* (bugle) along with some woodland beetles and well-preserved specimens of shade-loving mollusks such as *Clausilia bidentata* (common door snail) were recorded. Some cereal remains were also recovered, which given the evidence for animal dung obtained from the insect remains could be derived from the droppings of livestock fed on cereal chaff. At the same time, the few water beetles identified from this deposit (*Colymbetes fuscus*, *Helophorus* cf. *brevipalpis*, and *Hydrobius fuscipes*) which was otherwise largely devoid of wetland species suggest the presence of temporary pools or puddles. Overall, these results give an impression that the material used to construct this mound may have been gleaned from the woodland edge, where cattle or other livestock sheltered, churning up the ground to create muddy pools (Campbell 2014).

The contrasting environments represented in the materials used up to make the different organic mounds could all have been found within the immediate vicinity of the site, though this does not mean that elements could not have been brought from within the wider area of the Marlborough Downs. Indeed, the fact that different habitats were incorporated into different areas of the hill might be taken as evidence that the inclusion of different parts of the landscape into the monument held significance for those building the monument, as has been suggested for the inclusion of sarsens in the upper organic mound and for the monument as a whole (Leary and Field 2014; Leary and Field 2010: 119–122).

However, probably more important from an environmental perspective is the clear evidence for the existence of a herb-rich chalk pasture in the environs of Silbury in second half of the third millennium BCE. This is indicated by the presence of plants such as *Sanguisorba minor* ssp. *minor* (salad burnet) and *Linum catharticum* (fairy flax, and *Scabiosa columbaria* (small scabious), all of which were recorded both as plant macrofossils and during the first surveys of the vegetation growing on the monument in the mid-nineteenth century (Buckman 1864–1866; Williams in Whttle 1997; Campbell 2014). In addition, the numbers and percentage of remains of scarabaeoid dung beetles and meadowland weevils that feed mainly on grassland leguminous plants indicate grazing by domestic animals with stocking levels similar to those found in the area today (Campbell 2014; Robinson 1997). This implies careful management of the environment by late Neolithic people with grazing rights controlled or negotiated within or between groups (Campbell 2014).

International Perspectives

The biological remains from Silbury Hill give very little evidence of human occupation, in contrast to sites such as early Neolithic La Draga (see this encyclopedia "► La Draga: Environmental

Archaeology"). Rather, the site provides a snapshot of a late Neolithic landscape with clear evidence for the managed grazing of livestock and the presence of herb-rich chalk grassland. The fact that some of the turves from the organic mounds contain evidence of past woodland strongly suggests that if grazing ceased or was reduced, much of the area would eventually revert to woodland. Indeed, where indicators of woodland were recorded, the taxa found are more typical of secondary rather than primary woodland. These results fit in with the regional picture. Some clearance of primary woodland is attested from the beginning of the fourth millennium cal BCE followed by increased human presence and further clearance. The end of the fourth/beginning of the third millennium cal BCE appears to have been marked by woodland regeneration with the advent of Silbury coming at the same time as evidence for renewed clearance (Whittle 1997: 140; Campbell 2014). The presence of a generally wooded environment in the earlier Neolithic in the Avebury region contrasts with that for other areas of the southern chalk which seem to have been more open with larger areas, of grassland. Furthermore, it is suggested that, in these areas, post-glacial woodland may never have become fully developed and it is no longer valid always to assume that, prior to human influence, a given site would have been wooded (Allen and Gardiner 2009).

Analyses of biological remains present within turves (sods) used in the construction of mounds and other structures have been carried out at a number of other sites and provide valuable information on land-use history and the nature of the environment (Hall 2003; Karg 2008). Recent work on macroscopic plant remains in close conjunction with the geoarchaeological analysis of individual turves used in the construction of the Skelhøjthe mound, near Ribe, Denmark, has provided evidence of the management of heathland vegetation for grazing at around 1350 cal. B.C. The turves from beneath the iron pan layer represent the first meter of the mound makeup and contained well-preserved plant and insect remains preserved as a result of anoxic conditions. *Calluna vulgaris* (heather) remains, including roots, stalks flowers, and seeds, formed the principal component of the surface vegetation on the turves along with other species indicative of dry grazed heathland. Within the turves charred remains of heather and other plants such as *Rumex acetosella* (sheep's sorrel), *Pimpinella saxifraga* (burnt saxifrage), and *Carex pilulifera* (pill sedge) showed that the heathland had been previously burnt with the age of the heather and the nature of the surface vegetation, suggesting that this probably occurred between 3 and 10 years prior to the turves being harvested. The regular burning of heath increases fertility, prevents scrub encroachment, and ensures that heather flourishes at the expense of other species. Young plants and shoots of heather are also more nutritious than older growth. The results from the Skelhøj mound show that this traditional method of managing heath for grazing was already practiced in the fourteenth century cal B.C. (Karg 2008).

Future Directions

Green "Grass" Remains

The reported evidence of "short grass with square ends" from within Silbury Hill (Whittle 1997: 140) along with descriptions of the vegetation retaining its green color (see, e.g., Whittle 1997: 16) is one of the unusual features of the remains from this site. Pieces of green plant material were also recovered during the 2007/2008 excavations at Silbury, and the majority of these remains appeared at low magnification to resemble fragments of grass leaves or stems with some showing squared ends. However, when investigated further using transmission electron microscopy (TEM), this material was found to lack cellular structure consisting only of two thin outer membranes containing portions of chloroplast thylakoid membranes within an amorphous matrix (Collinson et al. 2011; Fig. 6).

In order to determine what this material might be and to understand how its unusual preservation might have arisen, it was compared to a number of different modern plant derivatives including fresh, rotted, animal digested, and humanly processed

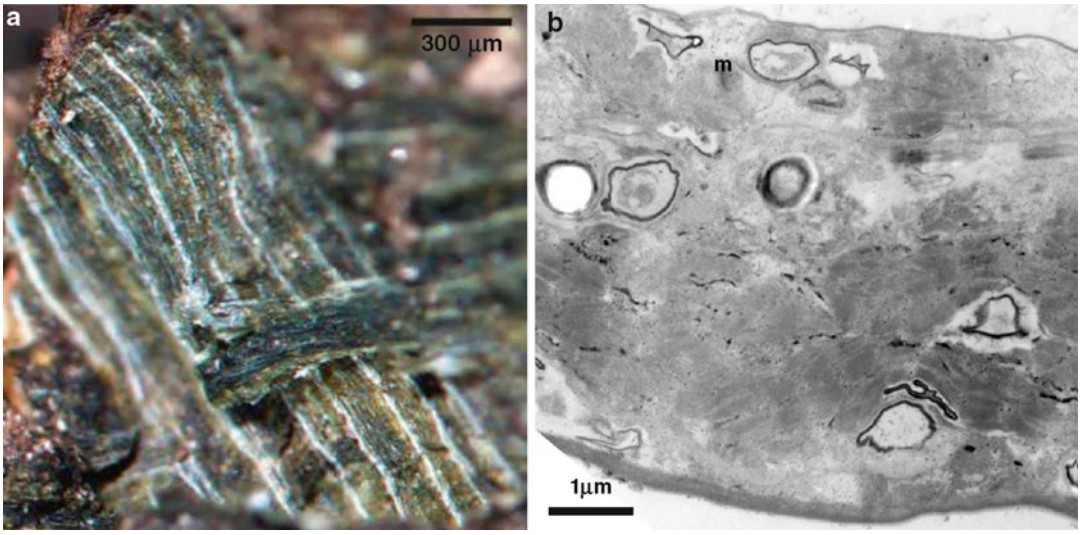

Silbury Hill: Environmental Archaeology, Fig. 6 (**a**) Silbury green plant material as it appears in situ as thin strands with blue green to bottle green color, scale bar 300 µm (Margaret Collinson and Eddie Lyons, ©English Heritage) (**b**) Green plant material in TEM section, scale bar 1 µm. (Margaret Collinson, Tony Brain and Eddie Lyons, ©English Heritage)

material using TEM. Of the plant materials examined, partially fermented (couched) woad (*Isatis tinctoria*) most closely resembled the green plant material from Silbury Hill as all the others retained cellular structure. While it is not proposed that woad is present at Silbury, the results suggest that the green plant material consists of partially fermented higher plant tissue (further determination is not possible given the lack of diagnostic features). This fermentation may have occurred naturally during construction, but it is also possible that the green plant material was the waste product from some unknown process involving fermentation, with the by-product being placed or discarded into the mound. Further work is required involving the examination of experimentally fermented plant material from known species, as well as material cut, trampled, and then treated in a variety of different ways (Collinson et al. 2011, Collinson et al. in Campbell 2014).

Antler

The 2007/2008 excavations at Silbury Hill produced a small fragmented antler assemblage probably resulting from the use of antler picks as tools, though only five antler fragments showed wear that could not be attributed to deer behavior. In addition, a chalk block bearing strike marks from an antler pick was recovered during excavations on the summit. There are also a number of other finds of antler from the previous interventions, with these finds often referred to as deer horn in the early reports (Worley 2014).

It is postulated that an antler pick can only be used as a tool for a single day during which time it can be used to dig out around 3 m^3 of chalk. Given that the volume of chalk making up Silbury Hill is estimated as somewhere between 236,000 m^3 and 23,900 m^3, this would mean that over 78,000 picks would have been needed over the period of construction (see above), so something like 500 antler picks would be needed each year. While these figures only provide estimates, they do serve to illustrate that the collection of shed antler would have been an important spring activity for people at this time and that in all likelihood this commodity would have been traded or exchanged as a valuable resource. Antler could also have been harvested from deer killed for meat (Worley 2014).

The small number of fragments retrieved from the various excavations into Silbury Hill, even taking into account the tiny proportion of the mound that has been excavated, suggests that the majority of tools or broken tools were not discarded on site. This could relate to the need to keep the site "clean" (see above) but might also mean that even broken fragments were reused or recycled into other items. This pattern of disposal might further indicate that those antler fragments that were found within the hill represent deliberately placed deposits. Similar practices have been noted at other ceremonial sites. The central zones of such sites (e.g., Avebury, Durrington Walls) tend to be free from antler tools, whereas caches of antler picks have been recovered from their ditches where they are interpreted as offerings marking the completion of works (Worley 2014).

The question of how and from where the antler picks used to build Silbury Hill were procured has become the subject of new research, funded by a grant from the British Academy. This project aims to discover whether strontium isotope analysis can be used on the antler from Silbury Hill to determine its provenance. If successful, the method could be applied to other sites and other antler artifacts.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
- ▶ La Draga: Environmental Archaeology
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Allen, M.J., and J. Gardiner. 2009. If you go down to the woods today; a re-evaluation of the chalkland post-glacial woodland; implications for prehistoric communities. In *Land and people; papers in memory of John G. Evans*, Prehistoric Society research paper 2, ed. M.J. Allen, N. Sharples, and T.P. O'Connor, 49–66. Oxford: Oxbow.

Buckman, J. 1864–1866. Notes on the flora of Silbury Hill. *Wiltshire Archaeological and Natural History Magazine* 9: 159–162.

Campbell, G. 2014. Silbury Hill: Understanding the environment. In *Silbury Hill. The largest prehistoric mound in Europe*, ed. J. Leary, D. Field, and G. Campbell. Swindon: English Heritage.

Canti, M.G. 2003. Earthworm activity and archaeological stratigraphy: A review of products and processes. *Journal of Archaeological Science* 30: 135–148.

Canti, M.G., G. Campbell, D. Robinson, and M. Robinson. 2004. *Site formation, preservation and remedial measures at Silbury Hill,* (Report 61/2004). Portsmouth: English Heritage/Centre for Archaeology.

Canti, M., M. Collinson, G. Campbell, A. Brain, R. Smith, M. Lillie, and I. Douterelo-Soler. Understanding preservation and formation processes. In *Silbury Hill. The largest prehistoric mound in Europe*, ed. J. Leary, D. Field, and G. Campbell. Swindon: English Heritage.

Collinson, M.E., A. Brain, and G. Campbell. 2011. *Green plant material recovered from the early phases of Silbury Hill (2007/08 excavations): An explanation for the unusual preservation?* Research department reports 61/2011. Swindon: English Heritage.

Evans, J.G. 1972. *Land snails in archaeology.* London: Seminar Press.

Field, D., and J. Leary. 2014. Preparations: The setting, previous research, recent research and surveys. In *Silbury Hill. The largest prehistoric mound in Europe*, ed. J. Leary, D. Field, and G. Campbell. Swindon: English Heritage.

Hall, A. 2003. *Recognition and characterisation of turves in archaeological occupation deposits by means of macrofossil plant remains*, Centre for Archaeology Report 16/2003. Portsmouth: English Heritage.

Hall, A., and G. Campbell. 2014. Mosses. In *Silbury Hill. The largest prehistoric mound in Europe*, ed. J. Leary, D. Field, and G. Campbell. Swindon: English Heritage.

Karg, S. 2008. Direct evidence of heathland management in the early Bronze Age (14th century B.C.) from the grave-mound Skelhøj in western Demark. *Vegetation History and Archaeobotany* 17: 41–49.

Leary, J. 2014. The evolution of a Neolithic mound: The prehistoric sequence. In *Silbury Hill. The largest prehistoric mound in Europe*, ed. J. Leary, D. Field, and G. Campbell. Swindon: English Heritage.

Leary, J., and D. Field. 2010. *The story of Silbury Hill*. Swindon: English Heritage.

Leary, J., and D. Field. 2014. Ways of understanding prehistoric Silbury Hill. In *Silbury Hill. The largest*

prehistoric mound in Europe, ed. J. Leary, D. Field, and G. Campbell. Swindon: English Heritage.
Leary, J., D. Field, and G. Campbell, eds. 2014. *Silbury Hill. The largest prehistoric mound in Europe*. Swindon: English Heritage.
Marshall, P.D., A. Bayliss, J. Leary, G. Campbell, F. Worley, C. Bronk Ramsey, and G. Cook. 2014. The Silbury chronology. In *Silbury Hill. The largest prehistoric mound in Europe*, ed. J. Leary, D. Field, and G. Campbell. Swindon: English Heritage.
Merewether, J. 1851. *Diary of a dean: Being an account of the examination of Silbury Hill and of various barrows and other earthworks on the downs of north Wilts, opened and investigated in the months of July and August 1849*. London: George Bell.
Robinson, M. 1997. The insects from Silbury Hill. In *Sacred mound, holy rings. Silbury Hill and the West Kennet palisade enclosures: A later Neolithic complex in North Wiltshire*, Oxbow book monograph 74, ed. A. Whittle, 36–47. Oxford: Oxbow.
Whittle, A. 1997. *Sacred mound, holy rings. Silbury Hill and the West Kennet palisade enclosures: A later Neolithic complex in North Wiltshire*, Oxbow book monograph 74. Oxford: Oxbow.
Williams, D. 1976. A Neolithic moss flora from Silbury Hill, Wiltshire. *Journal of Archaeological Science* 3: 267–270.
Worley, F. 2014. The antler. In *Silbury Hill. The largest prehistoric mound in Europe*, ed. J. Leary, D. Field, and G. Campbell. Swindon: English Heritage.

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Basic Biographical Information

Helaine Silverman received her B.A. at Queens College of the City University of New York, M.A. at Columbia University, and Ph.D. at the University of Texas at Austin. She holds the position of full professor in the Department of Anthropology at the University of Illinois in Urbana-Champaign where she is also the director of the university's Collaborative for Cultural Heritage Management and Policy (CHAMP). Prior to becoming involved in cultural heritage research, Dr. Silverman conducted many years of archaeological fieldwork on the south coast of Peru.

Major Accomplishments

Dr. Silverman's Nasca research in the 1980s and 1990s rewrote understanding of this ancient society, which previously had been known almost exclusively on the basis of its exquisite polychrome pottery and the countless tombs from which this material had been looted over the course of almost a century. She overturned the dogma that early Nasca had been organized as a state and that Cahuachi, the greatest early Nasca site, had been a city. Her fieldwork at Cahuachi and in several valleys of the Río Grande de Nazca drainage proved the lack of political centralization in early Nasca society and that Cahuachi had functioned, basically, as an "empty ceremonial center" animated by pilgrimage but without significant residential population. She also was the first scholar to contextualize the "mysterious" Nazca Lines (geoglyphs) within the society that produced them, identifying scores of geoglyph sites of various types on the hillsides of the valleys where the Nasca population lived and demonstrating the relationship between habitation sites and geoglyphs.

In addition to her own publications, Dr. Silverman has been a prolific editor of influential volumes on Andean archaeology: *Andean Archaeology* (Blackwell, 2004) and with William H. Isbell, *Andean Archaeology I: Variations in Sociopolitical Organization* (Plenum/Kluwer, 2002); *Andean Archaeology II: Art, Landscape, and Society* (Plenum/Kluwer, 2002); and *Andean Archaeology III: North and South* (Springer, 2006). She and Isbell also coedited the massive *Handbook of South American Archaeology* (Springer, 2008), a state-of-the-art compendium and the first to tackle the continent since Julian H. Steward's *Handbook of South American Indians* in the late 1940s.

It was constant media attention to her Nasca investigations that led Dr. Silverman into the cultural heritage field. She became intrigued with public interest in the past and how the past was deployed by the tourism industry and constructed by the Peruvian nation-state. As part of this new work, she also conducted ethnoarchaeological work on modern Peruvian cemeteries and in museums.

Dr. Silverman's current research is a critical analysis of the cooperative and conflictual production of archaeological monuments as cultural heritage sites for visual, performative, economic, and political consumption as undertaken by national governments, regional authorities, local administrations, community stakeholders, and the global tourism industry. In this regard, she has been conducting a long-term study of the historic district of Cuzco, former capital of the Inca Empire and today one of Peru's foremost tourist attractions. She also has worked in Thailand where has been studying the impact of cultural tourism in Phimai, a small town in whose center towers a great ancient Khmer temple that is currently on the Tentative List and intended for inscription on UNESCO's World Heritage List.

Dr. Silverman is a member of Forum-UNESCO, an expert member of ICOMOS' International Scientific Committee on Archaeological Heritage Management (ICAHM), and an affiliate member of ICOMOS's International Scientific Committee on Cultural Tourism (ICTC). She serves on the editorial boards of *International Journal of Heritage Studies, Heritage & Society, American Anthropologist* and *World Art*. She is a former editor of *Latin American Antiquity* (2008–2010). She was the book series editor for "Critical Perspectives in Identity, Memory and the Built Environment" (Routledge) and currently edits the "Heritage, Tourism, and Community" book series (Left Coast Press) and coedits ICAHM's book series, "Multidisciplinary Perspectives in Archaeological Heritage Management" (Springer).

Cross-References

- ▶ Collaborative for Cultural Heritage Management and Policy (CHAMP)
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage Theory
- ▶ Heritage Tourism and the Marketplace
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ Sustainability and Cultural Heritage
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Silverman, H. 1990. Beyond the Pampa. The geoglyphs in the valleys of Nazca. *National Geographic Research* 6: 435–356.

Silverman, H. 1993. *Cahuachi in the ancient Nasca world*. Iowa City: University of Iowa Press.

Silverman, H. 2002a. Touring ancient times: The present and presented past in contemporary Peru. *American Anthropologist* 104: 881–902.

Silverman, H. 2002b. *Ancient Nasca settlement and society*. Iowa City: University of Iowa Press.

Silverman, H. 2002c. Groovin' to ancient Peru: A critical analysis of Disney's "The Emperor's New Groove". *Journal of Social Archaeology* 2: 298–322.

Silverman, H. 2005. Embodied heritage, identity politics and tourism. *Anthropology and Humanism* 30: 141–155.

Silverman, H. 2006. The historic district of Cusco as an open-air site museum. In *Archaeological site museums in Latin America*, ed. H. Silverman, 159–183. Gainesville: University Press of Florida.

Silverman, H. 2007. Contemporary museum practice in Cusco, Peru. In *Archaeology and capitalism. From ethics to politics*, ed. P. Duke and Y. Hamilakis, 195–212. Walnut Creek: Left Coast Press.

Silverman, H. 2008. Mayor Daniel Estrada and the Plaza de Armas of Cuzco, Peru. *Heritage Management* 1: 181–218.

Silverman, H. 2011. Border wars: The ongoing temple dispute between Thailand and Cambodia and UNESCO's world heritage list. *International Journal of Heritage Studies* 17: 1–21.

Silverman, H. 2012. The space of heroism in the historic center of Cuzco. In *On location: Heritage cities and sites*, ed. D. Fairchild Ruggles, 89–113. New York: Springer.

Further Reading

Di Giovine, M.A. 2009. *The heritage-scape: UNESCO, world heritage, and tourism*. Lanham: Lexington Books.

Leask, A., and A. Fyall. 2006. *Managing world heritage sites*. Amsterdam: BH/Elsevier.

Mathers, C., T. Darvill, and B.J. Little, eds. 2005. *Heritage of value, archaeology of renown. Reshaping archaeological assessment and significance*. Gainesville: University Press of Florida.

McKercher, B., and H. Du Cros, eds. 2002. *Cultural tourism: The partnership between tourism and cultural heritage management*. Binghamton: The Haworth Press, Inc.
Silverman, H., and W.H. Isbell, eds. 2008. *Handbook of South American archaeology*. New York: Springer.
Silverman, H., and D.B. Small. eds. 2002. *The space and place of death*. Archaeological Papers of the American Anthropological Association 11. Arlington: American Anthropological Association.
Timothy, D.J., and S.W. Boyd. 2003. *Heritage tourism*. Harlow: Prentice-Hall.

Singapore: Cultural Heritage Management

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Introduction

Singapore is a small, densely populated country. Five million people live on the main island, which covers about 650 km^2. Competition for land is intense. These considerations are often cited to explain the fact that Singapore is one of the few countries in the world where archaeological resources are not protected by law. There is no official archaeological department; archaeological research in this country has been mainly funded by donations from private sources, with some government grants for specific projects. Research has been conducted by university academics from the National University of Singapore and Nanyang Technological University, students, and unpaid volunteers.

Several official bodies have duties concerned with specific aspects of heritage conservation; these include the National Heritage Board, the Urban Redevelopment Authority, and the Preservation of Monuments Board. The National Heritage Board, and the National Museum which forms part of it, has contributed funds and some administrative assistance to archaeological research projects. Other funds have come from NGOs (the Lee Foundation and the Southeast Asian Ceramic Society) and corporations (Royal Dutch Shell, American Express).

In 2010, the Institute of Southeast Asian Studies established an Archaeology Unit under its Nalanda-Sriwijaya Centre. The Unit conducts research in Singapore and elsewhere in Southeast Asia. The National Parks Board has allocated funds for the construction of an outdoor display on an archaeological site in Fort Canning Park. This is one of Singapore's most important precolonial sites and provides visitors with an opportunity to see a display of artifacts and a preserved example of stratigraphy. The Singapore Heritage Society is a registered nongovernmental organization, and often speaks out on issues of heritage management. The Society publishes books on the subject, and comments on topics of concern to the local media.

Definition

In this entry, the term "cultural resources" is understood to mean all artifacts and man-made structures of the period before 1950, and all sites where concentrations of such artifacts can be found, whether in disturbed or undisturbed contexts. "Management" will be used to refer to efforts by official bodies to preserve or modify these artifacts and sites.

Key Issues

The Singapore government has exhibited a laissez-faire attitude toward its archaeological heritage. Excavations since 1984 have demonstrated that sites exist with artifacts dating from the early fourteenth century, with some objects (Chinese coins) brought to the island at that time actually dating back to the Tang Dynasty (618–906). These sites consist of a fourteenth-century elite residential/craft zone on a hill now known as Fort Canning, and a settlement of artisans and traders on the left bank of the Singapore River which was occupied from the early

fourteenth to the early sixteenth centuries. The government has sponsored archaeological research at these sites, one of which has been preserved and presented to the public as a semi-permanent display. However, the government has not adopted proposed legislation which would have required contractors to stop work in case of the discovery of potential archaeological sites within the boundaries of the fourteenth-century urban area. There is no requirement that any impact assessments be conducted in advance of construction projects.

Conservation of individual buildings began in the 1970s when the Urban Redevelopment Authority (URA) and Preservation of Monuments Board (PMB) were formed. Controversies arose in the 1980s regarding the URA's focus on preserving individual building facades while neglecting districts and street life. The URA's policies have evolved as a result.

History of Archaeology in Singapore

Archaeological research in Singapore dates from January 1984, when the Singapore National Museum organized a test excavation at Fort Canning, a park where the museum staff suspected artifacts representing precolonial occupation might be discovered. The project succeeded in uncovering evidence of fourteenth-century occupation. In 1987, the Department of History of the National University of Singapore hired a lecturer to teach courses on archaeology and ancient history; the Parks and Recreation Department, the body which was then in charge of developing the park in which the archaeological site was discovered in 1984, hired the lecturer as a part-time archaeological consultant.

An excavation in 1987 was conducted as part of a sequence of archaeological workshops sponsored by the Association of Southeast Asian Nations (ASEAN). A total of 12 excavation projects has been carried out in Fort Canning Park, built on Fort Canning Hill (Miksic 1985, 2006). The name is derived from a British fort built on the top of the 45-m-high hill in 1859, then largely demolished in 1928 to build a reservoir. Other military structures were built on the hill's lower slopes at the same time.

The Fort Canning office of the Parks and Recreation Department (since 1990 the National Parks Board, NParks for short) has been very supportive of archaeological research. Although there is no requirement to do so, the management of Fort Canning Park often contacts an archaeologist when they discover remains during their normal maintenance activities, and when sizeable earth-moving is contemplated. For example, when handicapped access facilities are installed, they notify the archaeologist so that the location affected can be studied.

Public Archaeology on Fort Canning

In the 1990s, a number of projects were carried out to exploit the historical and cultural resources of the park. These include the redevelopment of a semi-historical, semireligious Muslim shrine called the Keramat Iskandar Shah; the construction of two Walks of History (one with signboards related to the fourteenth century and the other commemorating important sites of the British colonial period which began in 1819); and the development of a permanent display at a part of the archaeological excavation which revealed fourteenth-century artifacts in their original contexts.

The first project to be completed was the redevelopment of the Keramat, in 1990. In 1822, the jungle on the hill's surface was cut down and a number of brick ruins were found on the hill. According to a contemporary description (Crawfurd 1967 [1828]), these ruins were made of good quality brick, and were sufficiently numerous that they covered the greater part of the slope. Among the ruins were scattered Chinese and local pottery and Chinese coins dating from the Tang and Song Dynasties. A tradition rapidly arose, on what grounds it is not known, that the site was the final resting place of Iskandar Shah, the founder of the kingdom of Malacca and one of the first Malay rulers to accept Islam. According to Chinese sources, he died around CE 1413. A series of new structures were built on the site by devotees upon its discovery. By the 1980s, nothing of the original structure remained.

NParks formulated plans to build a new structure on the site, to call attention to the historical

Singapore: Cultural Heritage Management, Fig. 1 Keramat Iskandar Shah

character of the park. The few details noted in Crawfurd's description given just after the site's rediscovery in 1822, together with motifs used for early wood-carving, were combined to create the structure seen there now. A carved stone plaque records what is known of the history of the site and Iskandar Shah. It is one of the main stops on the fourteenth-century Walk of History. These walks are simple in concept: paths, in most cases preexisting, with appropriate plaques set up in suitable locations giving information about the historical significance of the site (Fig. 1).

The next major development was the erection of a roof with similar design to that over the Keramat to protect a partially completed excavation where dense evidence of fourteenth-century activities has been recovered. Dr. John Chen Seow Phun, Minister of State for Ministry of National Development and Ministry of Communications and Information Technology, officially opened the facility on 20 April 2001. Visitors can view an actual excavation which presents a soil profile with an early twentieth-century brick foundation in the top layer, beneath which is a layer of sterile red laterite soil, which changes at a sharply defined boundary to a dark brown loam containing a dense concentration of fourteenth-century artifacts. Around the pit, which measures 100 m^2, is a walkway with captions providing information on the general history of fourteenth-century Singapore, and explanations of general archaeological methods. Within an adjoining gallery are cases containing samples of artifacts excavated from the site, together with posters identifying the artifacts discovered and the methods used to recover and interpret them (Fig. 2).

NParks also conducts archaeology-themed events. These involve families who are given a chance to carry out mock excavations in sand boxes, using genuine artifacts found in the hill, and visiting the archaeological site near the Keramat.

Also in the early twenty-first century, reconstructed versions of colonial-period features were erected at the south end of the park. These include a flagstaff, lighthouse, and time ball. These are principal features of the nineteenth-century Walk of History. Further enhancements include installation of a sequence of carved cement reliefs depicting imaginary scenes from Singapore's history along the staircase at the south slope of the hill.

Eleven structures from the British colonial period still stand on Fort Canning. These include six military structures: the main fort gate and a sally port, built in 1859, and the Underground Command Centre and three other military buildings dating from 1928. The other remaining features from the colonial period are part of Singapore's first cemetery, which was in use from 1822 to 1860; they include two gothic

Singapore: Cultural Heritage Management, Fig. 2 Archaeological display, Fort Canning Park

Singapore: Cultural Heritage Management, Fig. 3 Gateway to Fort Canning Cemetery, 1848

gateways built in 1846 (Fig. 3), a monument to the son of a prominent British resident of the colony who died in 1848, and two cupolas built as places for cemetery visitors to rest. These cemetery features have been well preserved, whereas the tombstones which once crowded the graveyard were removed in the 1960s and set into the brick wall surrounding the cemetery.

In 1992, the role of Fort Canning in World War II was commemorated by a short-term exhibition held in the Underground Command Centre, a very large command bunker. Public response to the short-term exhibition was so strong that it was decided to make plans for a permanent exhibition in the bunker. NParks leased the bunker to a private firm for development: a bidder who won the right to develop another major British military structure on the hill into a country club. The structure had been the headquarters of the British high command in World War II, where Lieutenant General A.E. Percival, the General Officer Commanding Malaya, had his office.

The redeveloped bunker opened on 15 February 1997 (the 55th anniversary of the fall of Singapore to Japanese forces). The presentation utilizes techniques such as elaborate

technology for simulating a bombing attack, narration broadcast over a local FM transmitter to which visitors listen through headsets, and animated wax figures of soldiers. The installation of these displays required the remodeling of the structure including the drilling of new doorways through walls and excavation of floors to facilitate the flow of visitors and installation of simulators. Displays were fabricated using surplus military equipment purchased in Britain, of types which were not used in Singapore. Mock-ups of some rooms were given functions used in other rooms; for example, the Fortress Plotting Room became the Gun Operations Room, while the real Gun Ops Room is used for the bombing simulation. Most of the original fabric and atmosphere have thus been lost (Fig. 4).

Other Archaeological Sites in Singapore

In 1993, a reconnaissance of a site designated for Singapore's new Parliament House Complex yielded evidence that an archaeological record of precolonial activity was preserved there. In 1995, an archaeological team was given 2 months at the beginning of the rainy season when no construction could take place to attempt to recover more data on early Singapore. This was later extended by another month.

The site occupied a location on the north bank of the Singapore River in a position which seemed likely to have been occupied by residents of the ancient Temasik mentioned in Chinese, Javanese, and Vietnamese sources in addition to Malay texts. Excavations there demonstrated that the site contained undisturbed fourteenth century remains.

Since 1995, ten other sites in Singapore have been excavated, some in order to recover more evidence of the fourteenth century, others to explore the material culture of nineteenth and early twentieth-century Singapore. Artifacts from these research projects are now on display in the National Museum, the Asian Civilisations Museum, St. Andrew's Cathedral, and the National University of Singapore Museum. Most of the artifacts were stored in the Fort Canning Centre, a building on Fort Canning belonging to the National Parks Board, until 2008, when they were moved to the campus of the National University of Singapore, where cataloging and analysis are conducted by students and volunteers.

Other Singaporean Institutions Involved with CRM

In 2010, the Institute of Southeast Asian Studies announced the foundation of an Archaeology Unit under the Nalanda-Sriwijaya Centre. This unit

Singapore: Cultural Heritage Management, Fig. 4 Interior of Underground Command Centre before restoration

was officially launched in August 2011. The Unit has no jurisdiction over archaeological resources; it will still have to seek permission to conduct research from the landowner. The Archaeology Unit works closely with the archaeological laboratory which was set up at the National University of Singapore in 2009. The university has not courses on archaeology, but a course on CRM in Southeast Asia has been taught annually since 1999. Several academic exercises and master's theses have been written for the Department of Southeast Asian Studies, which was founded in 1991 as a program, and became a department in 2011.

The National Museum of Singapore has passed through a number of phases since Singapore became an independent nation in 1965, after having formed part of Malaysia for 3 years, and a British colony since 1819. The museum's building was erected in 1887, and for the next 75 years, it amassed a collection of specimens of flora, fauna, and ethnographia, with a few archaeological remains, from the Malay Peninsula and neighboring areas. The new nation was content to leave the museum mainly as it was inherited until 1984, whereupon the museum's potential as a nation-building tool was acknowledged, and major renovations were instituted (Kwa in press).

In 1994, the works of art and the artifacts from other parts of Southeast Asia were removed from the National Museum's collection and divided among a new Singapore Art Museum and an Asian Civilisations Museum. In 2006, a new wing was added to the old National Museum, and an archaeological gallery was installed. This gallery has a permanent exhibition of artifacts from systematic excavations in Singapore, and an audiovisual presentation in a theater which lasts about 12 min. This presentation is unusually designed, because instead of providing one standard narrative, it compares the interpretation of precolonial sources on the basis of different sources (Malay, Chinese, Javanese, and Portuguese).

In 1995, a Chinese Heritage Centre was founded; it is housed at the Nanyang Technological University. It focuses on the recent history of the overseas Chinese and has no archaeological interest. In 2000, preparatory to the development of a Malay Heritage Centre in a nineteenth-century palace, the Istana Kampung Gelam, archaeological excavations were conducted in the Center's courtyard. Excellent results were obtained in the form of different types of artifacts representing life in the palace in the nineteenth and early twentieth centuries, a period for which very little written documentation exists. A small sample of these was exhibited in the Centre until 2010, when they were removed as part of a major renovation of the Centre. It is not known whether they will be reinstalled in future. They are now stored in the archaeological laboratory of the National University of Singapore (Fig. 5).

Singapore: Cultural Heritage Management, Fig. 5 Istana Kampung Gelam excavation

An Indian Heritage Centre is the next such institution to be constructed. Plans have been made for a 3-week excavation at the site selected for the Centre in March 2012. If artifacts are found, they will be exhibited in the Centre together with artifacts of Indian origin found in fourteenth-century contexts elsewhere in Singapore.

Archaeology is gradually becoming recognized as a part of the Singapore story. One of the ways in which this field may make a deeper impression is connected with an online 3-D multi-player role-playing game entitled World of Temasek (www.worldoftemasek.com). This game was developed by the Media Development Authority of Singapore, the National Heritage Board, and an IT company, Magma Studios, and launched by the Minister for Information, Communications and the Arts, Lui Tuck Yew, on 3 March 2011. The game allows players to put themselves in the position of a character such as a spice trader, a pirate, or a sailor in Temasek (the fourteenth-century name of the island). Illustrations in the game are taken from archaeological data, and levels of information and interpretation available in the game provide illustrations of artifacts, links to historical sources, and other materials.

The Urban Redevelopment Authority and the Preservation of Monuments Board are other governmental institutions with jurisdiction over cultural resources. These resources are defined in terms of buildings, either individually or in streets or districts. Their involvement in archaeology has been minimal, but these two bodies have developed an increasingly sophisticated strategy aimed at preserving examples of colonial period architecture and districts. The Singapore Heritage Society, an NGO, has often lent its support to archaeological projects and preservationist causes.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage Areas
- ▶ Heritage: History and Context
- ▶ Historical Archaeology
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Marketing Heritage
- ▶ Urban Archaeology in Twenty-First Century Perspective
- ▶ Uses of Heritage

References

Crawfurd, J. 1967 [1828]. *Journal of an embassy from the governor-general of India to the courts of Siam and Cochin China; exhibiting a view of the actual state of those kingdoms*. Kuala Lumpur: Oxford University Press.

Miksic, J. 1985. *Archaeological research on the "Forbidden Hill" of Singapore: Excavations at Fort Canning, 1984*. Singapore: National Museum.

Miksic, J. 2006. Intrasite analysis of 14th-century Singapore. In *Uncovering southeast Asia's past: Selected papers from the 10th international conference of the European Association of Southeast Asian Archaeologists*, ed. E. Bacus, I.C. Glover, and V.C. Piggott, 335–346. Singapore: NUS Press.

Further Reading

De Konincke, R. 1992. *Singapour: un atlas de la revolution du territoire/Singapore: An atlas of the revolution of territory*. Montpelier: RECLUS.

De Konincke, R. 2006. *Singapour: la cité-état ambitieuse*. Paris: Éditions Belin.

Kwa, C.G. in press. Transforming an old colonial museum. In *Rethinking cultural resource management in southeast Asia*, ed. J. Miksic, G.Y. Goh, and S. O'Connor. London: Anthem.

Kwok, K.-W., C.G. Kwa, L. Kong, and B. Yeoh, eds. 1999. *Our place in time. Exploring heritage and memory in Singapore*. Singapore: Singapore Heritage Society.

Lee, E. 1990. *Historic buildings of Singapore*. Singapore: Preservation of Monuments Board.

Lim, W.S.W. 2004. *Architecture, art, identity in Singapore. Is there life after tabula rasa?* Singapore: Asian Urban Lab.

Miksic, J. 1999. The Fort Canning project and cultural resource management in Singapore. *Buletin Cagar Budaya* 1: 11–14.

Miksic, J., and C.-A.M.G. Low. 2004. *Early Singapore 1300s–1819: Evidence in maps, text and artefacts*. Singapore: Singapore History Museum.

Miksic, J., G.Y. Goh, and S. O'Connor. in press. *Rethinking cultural resource management in southeast Asia*. London: Anthem Press.

Murfett, M.H., J.N. Miksic, B.P. Farrell, and M.S. Chiang. 2010. *Between two oceans. A military history of Singapore from 1275 to 1971*. Singapore: Marshall Cavendish.

Siddhique, S., and N.P. Shotam. 1982. *Singapore's little India: Past, present, and future*. Singapore: Institute of Southeast Asian Studies.

Singapore Urban Redevelopment Authority. 1995. *Chinatown historic district*. Singapore: Urban Redevelopment Authority.

Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture

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Introduction

The canton of Valais contains one of the most important Swiss Neolithic sites: Petit-Chasseur in Sion. While this site is already internationally renowned for its megalithic necropolis dating from the Late Neolithic to the Early Bronze Age as well as for its beautiful anthropomorphic stelae, it also has occupation levels dating to the Middle Neolithic and burial sites of the Second Iron Age. The site of Petit-Chasseur was discovered in 1961, following the work of civil engineers in the heart of the city of Sion. It was extensively excavated by O. J. Bocksberger from 1961 to 1969 and by A. Gallay from 1971 to 1973. New interventions were carried out in 1987–1988 by S. Favre and M. Mottet, in 1992 by M. Besse, and in 2003 by M. Mottet.

Definition

Levels of Habitat in the Middle Neolithic

The Middle Neolithic occupations at Petit-Chasseur are subdivided into three phases (Besse and Piguet 2011). An early occupation phase dating to 4,500 BCE, and attributed to the Middle Neolithic I, was very poorly preserved, and no housing plan can be reproduced. A middle phase, situated between 4,000 and 3,800 BCE, attributed to the Middle Neolithic II – Cortaillod of the Petit-Chasseur type – reveals the best-preserved habitat. At this level, a hamlet composed of at least three housing buildings and a construction interpreted as a space dedicated to penning livestock have been identified (Fig. 1). Finally the third phase, dating from 3,800 to 3,600 BCE, is associated with the Middle Neolithic II – Cortaillod of the Saint-Léonard type. This level presents at least two domestic units, but these are poorly preserved, preventing identification of the housing plans.

The homogeneity and the distribution of the remains found are in line with similar ways of life and similar choices of consumer products (Besse and Piguet 2011). Production activities were oriented toward goat breeding and cultivation of cereals (barley and wheat). Subsistence activities and crafts were controlled at the scale of the house. Diverse and varied influences are highlighted by the study of ceramics. The lithic industry was dominated by quartz used for domestic blade production. During the regional Middle Neolithic in general, the knapping of quartz took place off-site, near the sources (Besse and Piguet 2011).

Excavations in the Middle Neolithic II habitation levels also revealed seven funerary structures (Besse and Piguet 2011). These are cysts of *Chamblandes* type, burial vaults formed of four slabs in a pit and, in general, a capstone. The chamber is covered with materials from the pit. Each cyst contains one or more individuals, usually buried in left lateral or supine position, with limbs bent. In domestic context, burials of this *Chamblandes* type contain mainly for juveniles (Desideri and Besse 2009).

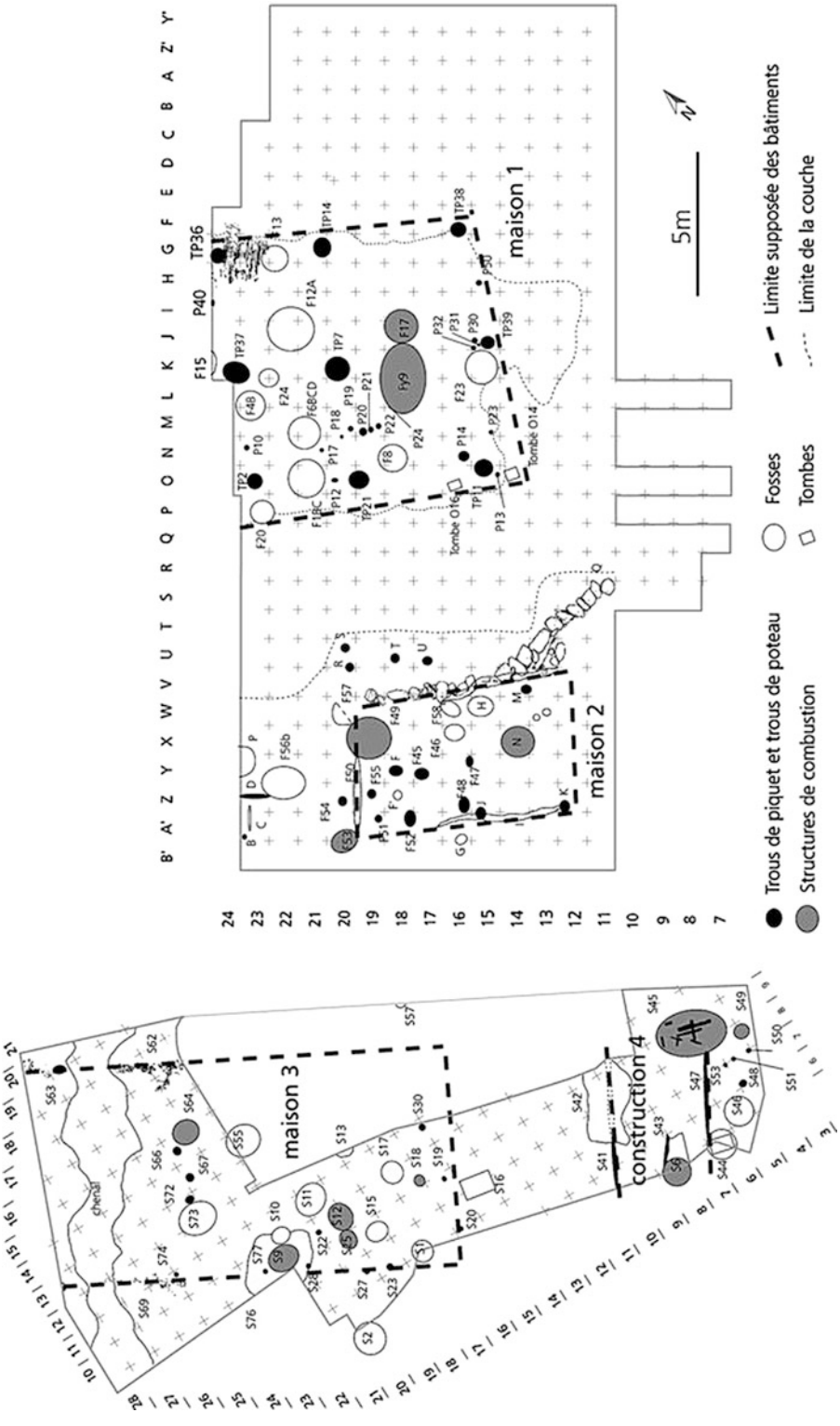

Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 1 The structures of the stratigraphic series of Middle Neolithic II, Cortaillod type Petit-Chasseur and the supposed boundaries of the buildings (Besse and Piguet 2011: 64)

The Megalithic Necropolis of Petit-Chasseur

The famous megalithic necropolis of Petit-Chasseur reveals an occupation that lasted for nearly fifteenth centuries. The magnificent collection of anthropomorphic stelae and funerary objects could be correlated to different chronological phases, thus enabling a seriation of several construction stages and use of the 12 monuments – MI to MXIII – of the megalithic area, from the Late Neolithic to the Early Bronze Age (Fig. 2).

Funerary Occupation During the Late Neolithic

The necropolis includes two monuments dating from the Late Neolithic, collective graves MVI and MXII. These are dolmens with a triangular base and antennas.

Dolmen MXII is the oldest megalithic area monument from Petit-Chasseur (Favre and Mottet 2011). It shows an occupation that lasted between five and seven centuries from 3,100 to 2,400 BCE and is the only tomb containing human remains in place for this period. The first phase of burials was completely reworked, and the remains piled northwest of the burial site. The second phase begins with the burial of an individual – in the middle position in the grave – in a slightly lateral right position. Next, those buried were spread in successive layers composed of three lines of two bodies, generally laid in supine or lateral position with limbs bent. Before a new occupation, a regular reorganization took place by leveling the ground and removing the bones disturbing the leveling. The skulls were moved and stored against a slab of the monument. The burial chamber contains at least 115 individuals.

Dolmen MVI, meanwhile, reflects a more diverse history spanning about eight centuries, from the Late Neolithic to the Bell Beaker or from 3,000 to 2,200 BCE (Bocksberger 1976). This monument was erected after dolmen MXII.

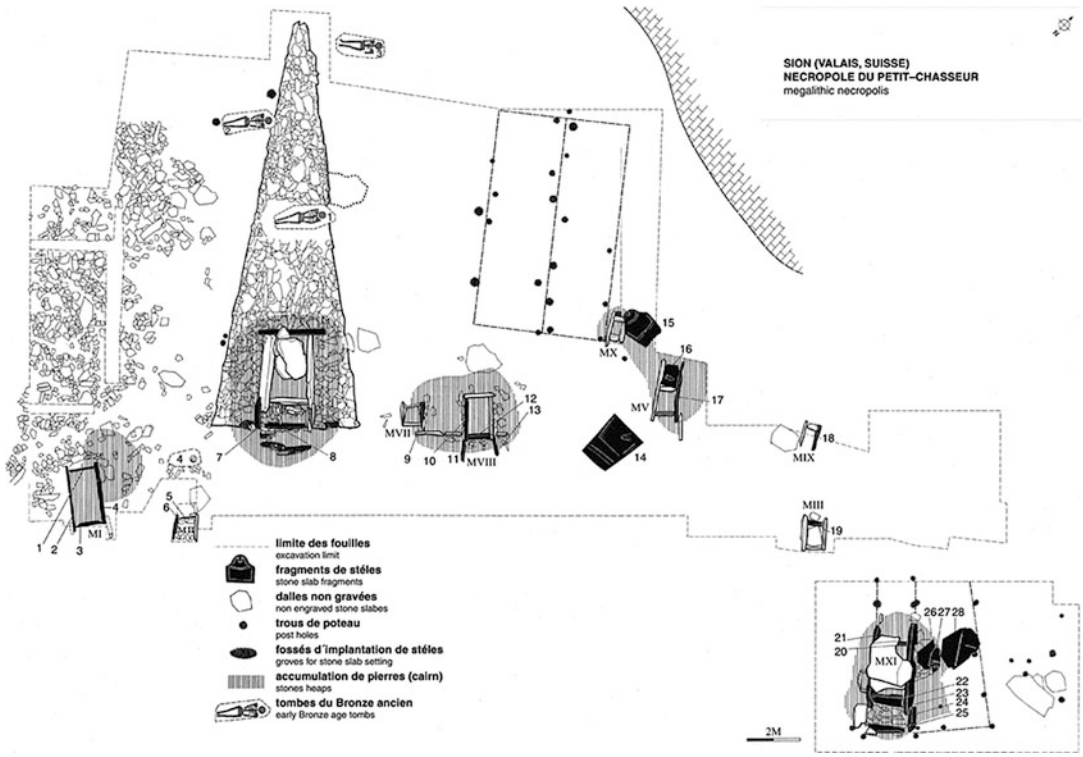

Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 2 Map of the megalithic necropolis of Petit-Chasseur (dolmen MXII and cyst MXIII located 100 m from the other monuments not shown) (Favre et al. 1986, plate 1)

Three separate moments can be distinguished. The first occupation is Late Neolithic and corresponds to the initial phase of construction use, although information regarding the original position of those buried in the monuments is difficult to precisely determine. This difficulty is linked to the second occupation phase, because the Bell Beakers emptied the burial chamber. However, it was possible to inventory 33 individuals from the first occupation (Gallay 1986).

Funerary Occupation During the Bell Beaker Period

Within the megalithic necropolis of Petit-Chasseur, the Bell Beakers display both mixed and new behaviors, mixed because they both reused earlier monuments and built their own monuments (dolmens and cysts) and new because although the construction of cysts is known in the Bell Beaker cultural area, the construction of collective monuments remains an original behavior (Besse and Desideri 2005).

The Bell Beaker occupation begins with the construction of three dolmens at the side entry (Gallay 1986). Dolmen MI contains no bones, but the remains of five individuals were found outside of the building with Bell Beaker artifacts. Dolmen MV contains the remains of nine individuals. Dolmen MXI contains at least 15 individuals. A reconstruction of the position of those buried inside the monuments was not possible.

Later, the Bell Beakers removed the remains of the first occupation phase (Late Neolithic) from dolmen MVI and laid them outside the monument (Bocksberger 1978). While the skulls were given special treatment – they were found carefully aligned along the wall of the dolmen – the rest of the bones and associated material were thrown in a jumble. It is likely that the evacuation was carried out in a single event, since no refitting between bones inside the room and those outside could be done. The Bell Beakers thus had a new place to put their own graves. The contents of the inside of the monument were completely disturbed, which does not seem to be related to a single moment, but rather to ongoing and repeated Bell Beaker visits to the grave. There are 14 individuals (Gallay 1986).

Finally, the Bell Beakers built new small graves around ancient monuments, that is, cysts MII, MIII, MVII, MVIII, MIX, MX, and MXIII (Gallay 1986). Some of these did not contain bones, but others contained from one to seven individuals.

Anthropomorphic Stelae

Thirty-one anthropomorphic stelae were recovered in the megalithic necropolis of Petit-Chasseur. Two types of stelae – A and B – were identified, respectively, attributed to the Late Neolithic and Bell Beaker. The stelae were all found in secondary position, being reused in the construction of monuments or simply lying flat next to the graves (Corboud and Curdy 2009).

The stelae of type A present sketchy anthropomorphic elements (limited to the drawing of arms, forearms bent at right angles, and opposing hands) and horizontal bands suggesting belts, double spiral pendants, daggers, and axes (Fig. 3).

The stelae of type B are lavishly decorated with weapons in their sheaths, clothes represented by geometric designs (tunics, loincloths, belts, bags, etc.). The appearance of the bow with a strap worn

Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 3 Stela 24 of type A in reuse in the construction of dolmen MXI: height 193 cm, width 94 cm, 10–11 cm thick (Favre et al. 1986, plate 20)

Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 4 Stela 25 of type B in reuse in the construction of dolmen MXI: height 157 cm, width 86 cm, 10–11 cm thick (Favre et al. 1986, plate 21)

over the shoulder with one or more arrows can also be seen. Type B stelae can be separated into masculine and feminine stelae, the latter characterized by the absence of weapons (Fig. 4).

These stelae have been interpreted as representations of important people in the community rather than deities. Their discovery in secondary position, notably reused as raw material in the construction of funerary monuments, suggests a change in status and above all a loss in symbolic value associated with either social death (during one's lifetime or at death) or the natural death of the important person it represented (Gallay 2009).

Funerary Occupation During the Early Bronze Age

The latter occupation phase of the megalithic area of the Petit-Chasseur is attributed to the Early Bronze Age (Gallay 1986), during which we see the appearance of individual tombs. Earlier graves were pillaged and emptied, the human bones regrouped and incinerated. A female individual is buried in dolmen MXI, some juveniles were placed either inside old emptied tombs (MV) or outside in the adventitious cysts (MVI and MXI). Finally, several burial tombs were also recovered in which the bodies were placed to lie on slabs (Bocksberger 1978).

Burials of the Second Iron Age

The site of Petit-Chasseur also contains seven individual burials dating to the La Tène period (Curdy et al. 2009). The entire funerary during the Iron Age is not yet known, and the tombs discovered demonstrate a relatively wide dispersal. The orientation of the graves is constant (NE/SW), and the dead are in supine position, with the head facing NE. The bodies appear to have been placed in wooden containers (dugouts [*monoxyles*] or planks). Funerary objects are abundant and include ceramics, swords, shield knobs, fibulae, and other ornaments.

Key Issues/Current Debates/Future Directions/Examples

The cultural sequence of Petit-Chasseur is one of the most comprehensive in the alpine area. The exceptional quality of the recovered archaeological remains and the system of field documentation make this site a key reference in understanding the history of Neolithic populations, not only in the Alps but also at a European scale.

The year 2011 marked the 50th anniversary of the discovery of Petit-Chasseur. It is clear that this group has been and still is the source of dozens of university theses (masters and doctorates) and a number of significant monographs, the results of successful collaboration between the three institutions responsible for its promotion (the Cantonal Service of Archaeology in Valais, the cantonal museums of Valais, and the Laboratory of Prehistoric Archaeology and Anthropology – formerly the Department of Anthropology and Ecology – at the University of Geneva).

Cross-References

- ▶ Megalithic Art: A Visual Repertoire for the Dead
- ▶ Tombs, Greek (Iron Age)

References

Besse, M., and J. Desideri. 2005. Bell Beaker diversity: settlements, burials and ceramics [La diversidad Campaniforme: Hábitats, sepulturas y cerámicas]. In *Bell Beakers in the Iberian Peninsula and their European context,* ed. M.A. Rojo Guerra, R. Garrido Pena, and I. Garcia Martinez de Lagran, 61–106. *[El Campaniforme en la Peninsula Ibérica y su contexto europeo]* (Arte y arqueologá 21). Valladolid: Universidad.

Besse, M., and M. Piguet, ed. 2011. *Le site préhistorique du Petit-Chasseur (Sion, Valais) 10. Un hameau du Néolithique moyen* (Cahiers d'archéologie romande 124; Archaeologia Vallesiana 6). Lausanne: Cahiers d'archéologie romande.

Bocksberger, O.-J. 1976. *Le dolmen M VI: texte, catalogue et planches* (publ. by A. Gallay) (Le site préhistorique du Petit-Chasseur, Sion VS; 1/2; Cahiers d'archéologie romande 6/7; Document du Département d'anthropologie et d'écologie de l'Université de Genève 1/2). Lausanne: Bibliothèque historique vaudoise.

Bocksberger, O.-J. 1978. *Horizon supérieur: secteur occidental et tombes Bronze ancien: texte, catalogue et planches* (publ. by A. Gallay) (Le site préhistorique du Petit-Chasseur, Sion VS 3/4; Cahiers d'archéologie romande 13/14; Document du Département d'anthropologie et d'écologie de l'Université de Genève 4/5). Lausanne: Bibliothèque historique vaudoise.

Corboud, P., and P. Curdy, eds. 2009. *Stèles préhistoriques: la nécropole néolithique du Petit-Chasseur à Sion [Prähistorische Stelen: die neolithische Nekropole Petit-Chasseur in Sitten]. Catalogue d'exposition*. Sion: Musées cantonaux du Valais.

Curdy, P., F. Mariéthoz, L. Pernet, and A. Rast-Eicher. 2009. *Rituels funéraires chez les Sédunes, les nécropoles du Second âge du Fer en Valais central (IVe-Ier siècle av. J.-C.)*, Cahiers d'archéologie romande 112; Archaeologia Vallesiana 3. Lausanne: Cahiers d'archéologie romande.

Desideri, J., and M. Besse. 2009. Les rituels funéraires néolithiques de la Haute Vallée du Rhône (Valais, Suisse). In *La mort en montagne* (Anthropologie des populations alpines), eds. G. Boëtsch, M. Signoli, and S. Tzortzis, 23–38. Gap: Editions des Hautes-Alpes.

Favre, S., and M. Mottet. 2011. *Le site préhistorique du Petit-Chasseur (Sion, Valais) 9. Dolmens M XII et M XIII, approche des différents niveaux préhistoriques* (Cahiers d'archéologie romande 123; Archaeologia Vallesiana 5). Lausanne: Cahiers d'archéologie romande.

Favre, S., A. Gallay, K. Farjon, and B. de Peyer. 1986. *Stèles et monuments du Petit-Chasseur: un site néolithique du Valais (Suisse)*. Genève: Département d'anthropologie de l'Université.

Gallay, A., ed. 1986. *Le Valais avant l'histoire: 14 000 av. J.-C. – 47 après J.-C.* Exhibit catalog (23 May–28 September 1986; Sion). Sion: Musées cantonaux du Valais.

Gallay, A. 2009. Chefs de guerre et matrones: stèles et statues-menhirs. *L'Archéologue: revue d'archéologie et d'histoire* 104: 12–13.

Further Reading

Gallay, A., ed. 2008. *Des Alpes au Léman: images de la préhistoire*. Gollion: Infolio.

Gallay, A., ed. 2011. *Autour du Petit-Chasseur, L'archéologie aux sources du Rhône, 1941–2011*. Paris: Errance.

Houot, A., and A. Gallay. 2017. *Le soleil des morts*. Gollion: Infolio.

Mariéthoz F., ed. 2009. *Les saisons du Petit-Chasseur* (Sedunum nostrum 14). Sion: Association Sedunum Nostrum.

Site and Artifact Preservation: Natural and Cultural Formation Processes

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Introduction

One of the best-known archaeological sites in the world is Pompeii, a Roman town buried by the eruption of Mount Vesuvius in CE 79. The disaster stopped daily life in its tracks, felling residents who were unable to escape and covering everything with a thick layer of ash. Millions of modern tourists visit Pompeii each year, now able to walk its streets, inspect its art (and graffiti), and peer into shops and homes. The casual observer might therefore imagine that *most* places of past human activity remain as they were in use, perhaps simply buried under a thick layer of dirt or volcanic ash. In this view, an archaeological site – much like the abandoned home described by Philip Larkin in his poem "Home Is So Sad" – "stays as it was left/Shaped to the comfort of the last to go."

Of course, nothing stays exactly as it was left. All archaeological sites suffer the effects of time,

climate, and organisms (including people). Organic materials at Pompeii that were not burnt subsequently decayed. Remains of the unfortunate residents trapped in the town decayed and could only be reconstructed by pouring plaster into the voids in the ash left by their bodies. Some of those who escaped later attempted to salvage what they could find and remove it from the site. After the rediscovery of the site, the material record at Pompeii was heavily affected by both looting and archaeological investigation.

Looting, decay, disturbance, and other natural and cultural processes affect the archaeological record (Schiffer 1987 for the best overview). These processes do not render it meaningless, but they must be recognized so that we can consider their impact on our sample of sites and artifacts, spatial patterning, and other matters so crucial for interpretation (see also ▶ Bam: Archaeological and Social Investigations After the Earthquake).

Key Issues/Current Debates/Future Directions/Examples

Natural Processes of Decay (and Preservation in Different Environments)

Some materials survive the vagaries of time better than others (Sease 1994 for an overview). *Highly perishable organic materials* include skin and soft tissue as well as wood and other plant remains. In most cases, these are very vulnerable to decay and hence do not survive in the archaeological record except under unusual conditions. As a result, at most sites we are unlikely to find baskets, textiles, wooden artifacts, leather, and any remains of people or animals other than bones or teeth.

The exceptions generally occur in arid, frozen, or waterlogged environments, such as deserts, glaciers, and peat bogs, which prevent decomposition and are favorable for preservation. Famous examples of organic preservation come from desert sites such as White Dog Cave (a Basketmaker site in northern Arizona), with conditions that naturally mummified burials, and Cahuachi (a Nazca site in coastal Peru), with cotton and wool textiles; the frozen body of the "Iceman" in the Italian Alps; the waterlogged site of Ozette in Washington state, United States, with wooden houses and artifacts; and peat bogs, including sites from northwestern Europe with Iron Age "bog bodies." Burial by volcanic ash may also seal the environment and prevent decomposition, such as in some contexts at the Cerén site in El Salvador. Decomposition may also be retarded by associated materials; copper, salt, or oil around organic items has been observed to preserve the organic remains.

Organic materials may also be preserved through burning. Charcoal (carbonized wood) and other carbonized plant remains are crucial sources of information about diet and other plant uses. Whole loaves of bread have been recovered from Pompeii because they were completely carbonized and therefore could not decay. Carbonized organic material preserves well in a variety of environments, but it is physically fragile. *Less perishable organic materials* include bone, ivory, and teeth, all of which have both a calcium-rich mineral component and an organic component. (We may also include shell here because it is made of calcium carbonate, although shell has no organic component and does not decay.) All of these materials preserve best in soils with neutral or slightly alkaline pH, as acidic environments break down the calcium-rich mineral component. For example, almost no bone was preserved at the Sloan site, a cemetery in the southeastern United States dating to around 10,000 years ago on acidic terrain. As a result, burial locations could only be inferred through calcium concentrations (into which the bone had disintegrated) and artifact clusters. Bones are also damaged and altered during processing and consumption of the carcass. Damage from human butchery provides important cultural information, but it may also result from carnivore and scavenger activity (Binford 1987).

Nonorganic materials include ceramic, glass, metal, and stone artifacts. Porosity is one factor affecting the survival of these materials, because greater porosity increases vulnerability to wet-dry cycles, freeze-thaw cycles, and accumulation of salts in the burial environment – all of which will lead to periodic expansion and stresses within the

body of the piece. For ceramics, firing temperature and temper type can significantly affect porosity and other attributes related to survival. Fiber-tempered pottery, which is the earliest pottery used in North America, is especially vulnerable to freeze-thaw action because of its high porosity. Calcareous temper, such as shell or limestone, will dissolve in acidic environments, leaving voids in the fabric. Such environments also cause acid leaching, or leaching of iron, lightening the color of the ceramic (Rye 1981).

The survival of glass and metal depends considerably upon its composition as well as the burial environment. Acidic soils are favorable for glass, but alkaline soils will cause leaching of the glass matrix. Pure gold resists corrosion from moisture and oxygen, but other metals (including those added to gold as part of the alloy) do not. Iron corrodes easily, producing reddish rust. Copper corrosion leads to a variety of colors, including green, and the chlorides in saline soils dramatically speed copper corrosion.

Stone generally survives well, but as with other material types, the structure and porosity is important. Mica, with its many thin sheets, is especially fragile physically. Limestone will erode or dissolve in acidic environments, as do other calcareous materials; this soft and porous rock may also suffer from erosion from wind, water, and crystallization of salts. Some combination of these factors probably caused the damage visible on the famous limestone monumental sculpture in Egypt, the Great Sphinx of Giza. Salts are of special concern in arid regions, because if not removed, they may continue to damage artifacts, even during curation (Fig. 1).

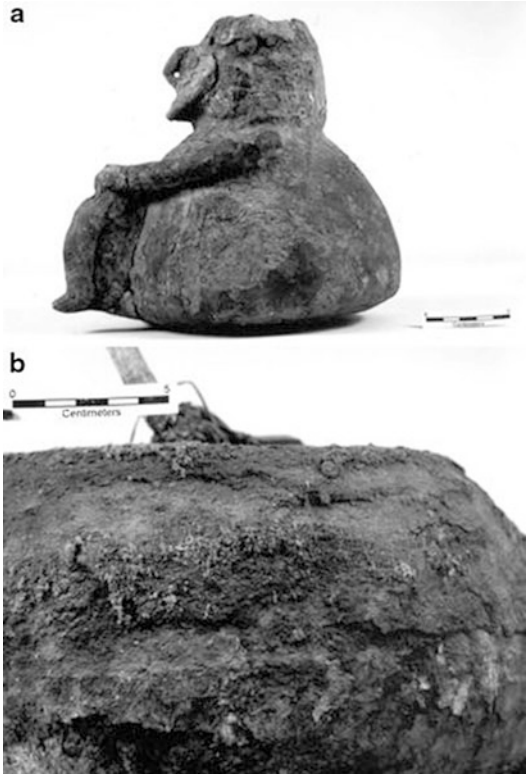

Site and Artifact Preservation: Natural and Cultural Formation Processes, Fig. 1 Damage from accumulated salts in (**a**) a prehistoric Hohokam effigy vessel from Arizona and (**b**) a modern flowerpot from Arizona. The modern flowerpot displays active growth of salt crystals (Photos taken by the author)

Natural Processes That Move and Damage Artifacts

Natural processes and their effects on archaeological sites are often addressed by the field of geoarchaeology (e.g., Goldberg and Macphail 2006). Natural processes can move artifacts and disturb features, sometimes so much so that the archaeological site is no longer a "primary" site (where the cultural deposition originally occurred) but a "secondary" site (where materials were redeposited). The effects of gravity seem obvious, for example – materials on slopes often move downhill – but materials deposited on level ground may also move around, up, and down. All of the processes that deposit, remove, and churn soils and sediments also affect soil within that matrix. Such processes include deposition and erosion from wind and water as well as the movement of particles by animals (faunalturbation; Fig. 2), plants (floralturbation; Fig. 3), freeze-thaw action (cryoturbation), and the shrinking and swelling of clay (argilliturbation).

Changes in climate also change the natural processes operating in a given place, altering conditions of preservation and threatening some archaeological sites that were not previously at risk. This is particularly evident in regions with melting glaciers or permafrost as well as in coastal

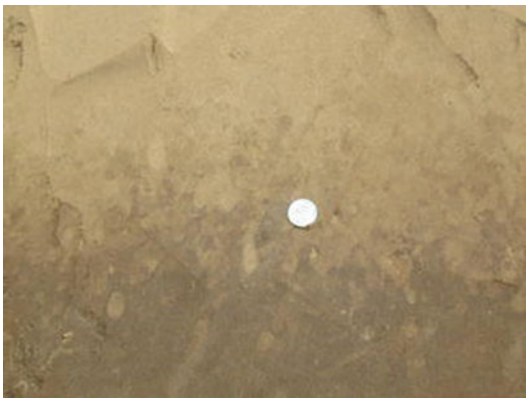

Site and Artifact Preservation: Natural and Cultural Formation Processes, Fig. 2 Mottling indicating movement of soil through animal burrows (Photo courtesy of E. Arthur Bettis, Department of Geoscience, University of Iowa)

Site and Artifact Preservation: Natural and Cultural Formation Processes, Fig. 3 Root disturbance (Photo courtesy of E. Arthur Bettis, Department of Geoscience, University of Iowa)

areas subject to flooding given higher sea levels. Warmer temperatures in the twenty-first century have thawed previously frozen Scythian tombs in Siberia, exposed Thule sites on Greenland's coast to greater erosion from storm surges, and flooded present and past areas of human occupation in Oceania. In the USA, the National Park Service is partnering with Native American communities and university researchers to study, predict, and mitigate the effects of climate change on cultural resources in the national parks.

Cultural Processes of Site Destruction: Scavenging, Looting, and Site Reuse

People frequently interact with material left by past activities, changing the nature of the evidence archaeologists will find. They may remove or alter traces of human behavior, soon after or long after the fact. This happens in a wide variety of ways at all stages of archaeological site formation, often motivated by a desire for the objects previously deposited or for the space these deposits occupy.

The process of reclaiming discarded or abandoned artifacts happens all the time in all societies, although it plays out differently in rich industrialized nations than in poorer ones. In the United States, the regular discard of usable, edible materials directly into the trash has spawned an entire movement known as "freeganism," in which adherents feed, dress, and entertain themselves from garbage deposits to protest against rampant consumerism and reduce environmental impact. In contrast, rural villagers such as Maya groups in Guatemala and the Kalinga of northern Luzon, Philippines, extensively reuse and recycle items before sending unusable scraps to a midden.

But these middens too may subsequently be modified: many are close to paths and activity areas, and may be dispersed by human and animal foot traffic at least along the margins. Children also collect things from middens for their play, and animals wander in to eat vegetable matter left over from food processing (Fig. 4). If trash deposits start to interfere with village needs (e.g., if they become too large or too smelly, or if they sit on land now desired for another purpose), they will be moved.

Abandoned residential sites may have more to offer in terms of reuse. Building materials are routinely scavenged from old dwellings for the new ones, either in the same community or a nearby one. If a dwelling or community was abandoned quickly or destroyed catastrophically, residents might have been forced to leave many items there, materials worth scavenging later. Some discarded items prove to be useful later for new reasons; for example, Hopi potters in the US Southwest are among those known to collect both sherds and pots to serve as models for designs and to grind up as temper.

Site and Artifact Preservation: Natural and Cultural Formation Processes, Fig. 4 Disturbance of a modern village midden by domestic animals in northern Luzon, Philippines (Photo taken by the author)

Some collectors are looking for wealth, things of beauty, or souvenirs, and this type of collection – like other processes of cultural disturbance – happened thousands of years ago just as it does today. The tombs of Egyptian pharaohs were targeted by robbers long before excavators such as *Belzoni* arrived in the early nineteenth century. Early visitors to archaeological sites often brought a shovel for souvenirs, a pattern common to many places including the eighteenth-century Spanish *presidio* in Tucson, Arizona, and nineteenth-century ghost towns in the western USA. Once materials have spent a certain amount of time in the archaeological record, many modern societies now have laws regulating their collection, although these laws are not always adequately policed. The illicit trade in antiquities continues, linking looters who dig up the items for sale to the museums who buy them (Watson and Todeschini 2007).

Archaeological sites are frequently reoccupied, reused, or affected by redevelopment and renewal. The buildings so hauntingly documented in Marchand and Meffre's *The Ruins of Detroit* will not simply dissolve in place to form Detroit's archaeological record; this is a living city, and the structures will eventually be rehabilitated, replaced, or removed. Boston's Central Artery/Tunnel Project or the "Big Dig" of the late twentieth century, while rerouting Interstate 93, displaced existing structures in use and also encountered abundant archaeological deposits. In the mid-twentieth century, Tucson, Arizona, demolished portions of the city from the nineteenth century, including the Spanish Convento and San Agustín chapel as well as its Chinatown, to make way for a convention center. Needs and values concerning the past change over time, and communities sometimes regret such land-use decisions. In awareness of the potential losses, the *Cultural Heritage Management* profession works to record significant sites before they are altered or destroyed and to mitigate the loss of information.

Conclusions

All archaeological sites have been altered in some way since their creation. The question is, how can we identify the types of disturbance and take account of them in interpretation? An understanding of decay processes, and of what we are unlikely to find in certain environments, is crucial for evaluating our sample of the material record. Geoarchaeology can be very helpful for assessing formation of natural and cultural strata, as can the study of artifact damage, fragmentation, and its *spatial analysis*. *Ethnoarchaeological* observations of historical and ongoing site formation processes provide invaluable clues about the range of

possibilities we should consider. These alterations do not diminish the value of the archaeological record but add to its richness and complexity.

Cross-References

- ▶ Bam: Archaeological and Social Investigations After the Earthquake
- ▶ Burial Mound Dissection in Sweden
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Spatial Analysis in Field Archaeology

References

Binford, L. 1987. *Bones: Ancient men and modern myths*. New York: Academic.

Goldberg, P., and R.I. Macphail. 2006. *Practical and theoretical geoarchaeology*. Malden: Wiley.

Rye, O.S. 1981. *Pottery technology: Principles and reconstruction*, Manuals on archeology 4. Washington, DC: Taraxacum.

Schiffer, M. 1987. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico Press.

Sease, C. 1994. *A conservation manual for the field archaeologist*, Archaeological research tools 4. Los Angeles: Cotsen Institute of Archaeology, University of California.

Watson, P., and C. Todeschini. 2007. *The Medici conspiracy*. New York: Public Affairs.

Site Formation Processes

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Introduction

As core concepts in contemporary archaeology, site formation processes (SFP) are indispensable in building strong inferences about the cultural past (Schiffer 1987). SFP are implicated at every level of archaeological inquiry, from designing research to interpreting variation in artifact form, assemblage composition, feature content, space modification, and landscape evolution. Without question, understanding the origins and significance of variability is fundamental to determining the suitability of certain kinds of archaeological phenomena for particular research questions.

A *formation process* is any event or situation involving the interactions of humans, surfaces, matter, and the environment that affects the characteristics of the archaeological record (such as its spatial extent, depth, surface expression, or content diversity). Such events create anomalies in natural ecosystems (often referred to as "traces") that register these interactions and subsequent modifications to them. In fact, as a contemporary phenomenon, the archaeological record can be considered the *current* expression of the cumulative effects of formation processes (Sullivan 2008a).

Theoretically, the study of the archaeological record is enabled by a consideration of formation processes because archaeologists are interested in understanding which factors have contributed to archaeological variability. These and other concerns are covered by *formation theory*, an integrated corpus of concepts that focuses on understanding how the archaeological record expresses the properties that it does (Shott 2006). As well, formation theory inspires the development of relevant methods for identifying and incorporating an understanding of SFPs and their effects in inferring the histories of archaeological phenomena.

Definition

Typically, SFP are distinguished on the basis of the agents involved in producing traces. Anthropogenic formation processes (AFP, also called "cultural" formation processes) register modifications to surfaces and matter caused by human activity. In contrast, environmental formation processes (EFP, also called "natural" formation processes) modify anthropogenic surfaces and

arrangements of matter by the actions of earth dynamics, vegetation growth patterns, and animal behavior (Schiffer 1987).

Anthropogenic Formation Processes

AFP and their archaeological consequences can be discussed conveniently in terms of several classes. First, significant ethnoarchaeological and experimental research has concentrated on documenting the traces that arise on *specific types of artifacts* and how variation in their use-histories (from acquisition to discard) affects their form. The transformation (or flow) model of these processes has focused specifically on investigating how an object's attributes and performance characteristics are manipulated by humans, including variation introduced by discontinuities that arise among stages of artifact production, use, re-fashioning, and ultimately abandonment (Schiffer 2010). Archaeologically, provenance studies using strontium isotope ratios, for instance, have shown that the distances between the sources of ceramic materials (e.g., rock temper) and the locations of ceramic manufacture vary tremendously for different wares (Carter et al. 2011). With respect to organic artifacts, such as domesticated crops, isotopic studies have determined that the areas where such plants were grown differ dramatically and changed through time, from the contexts where they were processed and stored (Benson et al. 2009).

Second, equally consequential AFP studies have been conducted by ethnoarchaeologists and archaeologists on the formation histories of assemblages, that is, how variation arises and is registered by the accumulation, and ultimately the abandonment, of *different kinds of artifacts* on surfaces. Often referred to as "activity area" research, the investigation of these AFP is intended to provide a framework to infer the behavioral or organizational factors that are responsible for differences in the quantities, concentrations, and diversity of "floor-contact" artifacts (Enloe 2008). In addition, exploration of assemblage formation histories has promoted the development of "accumulations" research, which is designed to enable archaeologists to develop inferences about the amount of time it took for certain quantities of artifacts to build up in specific contexts (Varien and Mills 1997).

Third, the anthropogenic modification of space is a formation process that has a deep and broad history of investigation by architects, ethnographers, ethnoarchaeologists, and archaeologists (e.g., Nabokov and Easton 1989). In both ancient and modern contexts, studies of these AFP invariably entail consideration of the traces of construction activities – terrain modification, material acquisition, labor mobilization, and relative chronology – that are registered by surface anomalies (e.g., Burks and Cook 2011), stratigraphic relationships among surfaces (e.g., bonding and abutting relationships among walls), interfaces created by the installation of architectural features (e.g., postholes), and alterations to preexisting architectural forms (Harris 1979). In fact, the extent of earlier occupation, the degree of subsequent rebuilding, and even the sizes and shapes of razed structures can be inferred by mapping the traces of buried foundation trenches, the locations of displaced mud-brick fragments, or the remnants of bedrock modifications (Fig. 1).

Fourth, an increasing number of AFP studies, conducted by archaeologists and geoarchaeologists, has focused on determining the authenticity or integrity of "sites" and their contents. For example, in the case of Pompeii, despite the sudden eruption of Vesuvius and rapid burial of the city in CE 79, the integrity of the "snapshot" was greatly altered by post-eruptive anthropogenic activities, such as removal of valuable goods by the fleeing populace, later excavation and retrieval of objects by the Romans, and, much later, by the construction of a large drain in the seventeenth century (Allison 2004). Conversely, the presence of 17 wells completely filled with "typical" demolition debris, adjacent to and dating closely to the same period as the demolition of monumental structures, confirmed the authenticity of "Persian destruction" events that transpired in the Athenian Agora (c. 480/479 BCE [Shear 1993]).

Fifth, as archaeology itself has become institutionally mandated in regional planning studies, many archaeologists have turned their attention to landscape scales of analysis and,

Site Formation Processes, Fig. 1 Bedrock cuttings in the cliff face for multiple-story structures opposite the Chateau de Commarque (twelfth to eighteenth century CE; Photo by Jonida Martini)

Site Formation Processes, Fig. 2 The sixth-century CE basilica of San Nicola in Carcere, Rome. (Photo by Jonida Martini). The basilica was constructed over the foundations and incorporated the superstructure of three temples: the Temple of Spes (c. 250 BCE), the temple of Juno (second century BCE), and the Temple of Janus (CE 17)

understandably, to understanding the formation histories of regional archaeological records. Such studies have become particularly attractive as archaeologists have become more deeply involved in climate change studies (Kirch 2005). In addition, many of the millennia-old terrain modifications created by small- to mid-scale societies, such as now long-abandoned reservoirs and rock alignments, not only have resulted in permanent changes to drainages and ecosystems but provide, as well, sources of paleoenvironmental samples that register temporally sensitive rates of change in anthropogenic environments (e.g., McIntosh et al. 2000).

Finally, archaeologists worldwide have been documenting the historic and continuing extent of anthropogenic modifications to archaeological phenomena. For instance, it is not uncommon in prehistoric contexts for abandoned artifacts, such as sherds, to be reclaimed from their discard contexts and recycled as architectural elements; in these cases, the original design and performance characteristics of these ceramics have been "overprinted" and adapted for new purposes (Peña 2011). Similarly, in more recent contexts, ancient materials have been repurposed and given new meanings, as when Roman columns were incorporated in a medieval church (Fig. 2) and a

Site Formation Processes, Fig. 3 Prehistoric (CE 700–1200) metate (grinding stone) installed as a grave marker in the twentieth-century public cemetery at Grand Canyon National Park, Arizona

prehistoric metate was installed as a grave marker in a modern cemetery (Fig. 3).

Still, tragically, the vast majority of anthropogenic modifications to archaeological phenomena materialize as modern traces that significantly affect ancient ones. Some of these formation processes are intentional, but the effects are well understood and, hence, can be factored into archaeological interpretation, as in the case of "plow zone" assemblages (Hawkins 1998). Others, such as the effects of camping, hunting, and woodcutting on surface archaeological phenomena (Fig. 4), although inadvertent, are more difficult to incorporate in archaeological interpretation because their effects are just beginning to be studied systematically (Uphus et al. 2006). Of course, modern activities targeted specifically to relieve the archaeological record of "valuable" objects for the antiquities market are globally proscribed but represent, nonetheless, a major AFP that continues to affect the content and contextual integrity of archaeological records worldwide (Lazrus and Barker 2012).

Environmental Formation Processes

For each of the three broad classes of EFP – earth dynamics, vegetation growth patterns, and animal behavior – humans are uninvolved in the production of traces that affect the characteristics of the archaeological record (Schiffer 1987). These SFP add, alter, or obliterate traces involving matter, surfaces, and their relations that have accumulated in the archaeological record as a consequence of any of the aforementioned AFP. Often glossed by the term "turbations" (or disturbances), the study of these formation processes by geologists, geomorphologists, soil scientists, and archaeologists has accelerated significantly during the last two decades (e.g., Goldberg et al. 2001).

One category of earth EFP includes short-term, largely unpredictable events, such as earthquakes (Bottari et al. 2009), volcanic eruptions (Sheets 2006), and tsunamis (Cook and Abbott 2012), that can quickly and dramatically alter prevailing arrangements of matter, including architecture, as well as introduce matter to existing surfaces. Equally important, the fallout from these processes, over which humans have no control, can disrupt social systems, leading to widespread regional depopulation and profound ecosystem transformation (McIntosh et al. 2000). Although potentially devastating for local populations, these events often produce so-called "Pompeii" assemblages, which provide a "snapshot" of activities at the moment they were discontinued. In these cases, although preservation is often enhanced because of rapid burial, it is unclear how far back in time such arrangements of artifacts and contents of features can be projected; hence, Pompeii assemblages are often considered

Site Formation Processes, Fig. 4 Modern, illegal woodcutting has altered the surface archaeology of prehistoric fire-cracked-rock piles (*lower left-center* to *upper right-center*), Kaibab National Forest, Arizona

to be "end-biased," short-term, though comparatively rich, samples of ancient human activity (however, as noted above, even in the case of Pompeii itself, post-destruction AFP can greatly alter the integrity of the "snapshot" of ancient activity).

A second category of earth EFP includes long-term and highly predictable modifications to abandoned objects and surfaces that arise as consequences of erosion or sedimentation. The major archaeological consequence of slope wash and stream action is artifact displacement, which can result in either "false" concentrations of artifacts or dispersal and redeposition of artifacts from their original discard contexts (Dibble 2008). Alleged "hearths" at the famous Paleolithic site of Zhoukoudian in China, for instance, once thought to be the earliest evidence of hominin-controlled fire, have now been determined to be accumulations of fluvial sediments (Goldberg and Macphail 2006). Similarly, in arid environments, deflation (removal of fine-grained sediments by wind) can cause commingling (settling) of objects originally deposited on asynchronous surfaces, thereby increasing artifact density and assemblage diversity (Schiffer 1987). Also, experiments have shown that both fluvial and aeolian processes can affect artifact form by "rounding" or "dulling" artifact edges and surfaces (Skibo 2012). Other studies have demonstrated that chemical changes can occur on abandoned objects when, for example, their ground-contact surfaces become locations for the development of "desert varnish" (Goldberg and Macphail 2006).

Originally developed by paleobiologists to understand the mechanisms by which animals come to be represented in the fossil record, the effects of taphonomic processes are being explored by archaeologists to understand how burial and fossilization may skew the content of archaeological samples (Gifford 1978). For instance, certain kinds of remains, such as soft plants or animal hides, generally do not preserve well, if at all, unless they are carbonized, desiccated, mineralized, or waterlogged (Miksicek 1987). In some depositional situations, therefore, archaeologists now proceed cautiously knowing that the absence of fragile material classes can be considered evidence of absence (i.e., indicative of human selection) only after carefully assessing taphonomic factors (Ward and Larcombe 2003).

The second major class of EFP pertains to traces produced by the dynamics of vegetation growth patterns (e.g., establishment, expansion, and contraction of plant communities). Abandoned archaeological sites, particularly those

with architectural remains, provide highly productive microenvironments (composed of soft sediments that preferentially retain moisture) that encourage the development of abnormally dense vegetation, which has a number of consequences for the archaeological record. First, thick vegetation (such as impenetrable thickets in desert areas or jungles) may obscure the very remains that archaeologists are interested in locating either by pedestrian survey or by satellite remote sensing (Sullivan et al. 2012). Second, the presence of archaeological sites is often revealed by concentrations of "anomalous" species (e.g., deciduous trees in a conifer forest) that otherwise should not be present. Third, because of climate change, which can adversely influence ecosystem health (e.g., promote bark-beetle infestations), archaeological sites in conifer forests are highly susceptible to damage from wildfires, which can introduce charcoal to buried horizons, topple trees, and their rooting systems in abandoned structures (Fig. 5); encourage erosion of exposed (vegetation-free) surfaces; and accelerate artifact displacement by destabilizing the surfaces upon which the material reposes. Finally, a common problem worldwide is that of the "tree-throw" (or tree-fall), which has two expressions that can confound archaeological interpretation (Goldberg and Macphail 2006). The first type, rather benign, occurs when large trees are upended and their root balls become exposed to the elements (Fig. 6) Within a short period, rocks embraced by the root system become dislodged from the root ball and accumulate as small mounds that mimic anthropogenic rock piles (however, because humans select rocks, size-class analysis should distinguish anthropogenic mounds (Fig. 7) from tree-throw mounds).

The second type, which is significantly more problematic, occurs when trees established in

Site Formation Processes, Fig. 6 Exposed and eroding root ball of a windblown tree, Kaibab National Forest, Arizona. Note the wide variety of rock sizes in contrast to those of the fire-cracked-rock pile (Fig. 7 below)

Site Formation Processes, Fig. 5 Late nineteenth-century log cabin, probably affiliated with Navajo households, that has been affected by bark-beetle-infested pinyon trees, which have collapsed and become incorporated in the structure (Grand Canyon National Park, Arizona)

Site Formation Processes, Fig. 7 Large fire-cracked-rock pile that has been affected by tree growth. Note that the rock sizes are relatively uniform in comparison to those exposed in the root ball and mound of the windblown tree (Fig. 6 above), Kaibab National Forest, Arizona

Site Formation Processes, Fig. 8 Destruction caused by a windblown tree whose roots have penetrated a prehistoric structure

Site Formation Processes, Fig. 9 Ceramic and lithic artifacts brought to the surface of an archaeological site by a burrowing vertebrate

archaeological phenomena are uprooted, thereby bringing artifacts and other material from deeper levels to the surface (Fig. 8), creating pathways for the introduction of modern material to ancient surfaces, and exposing buried surfaces and perishable materials (which may increase the likelihood of their hastened destruction by exposure to natural forces such as freeze-thaw cycles or wet-dry cycles; Goldberg and Macphail 2006).

The last category of EFP, animal behavior, pertains to traces that are introduced to the archaeological record by virtue of the activities of burrowing (e.g., gophers, badgers) and non-burrowing vertebrates (e.g., deer, cattle, sheep, and carnivores). Burrowing animals tend to displace artifacts on surfaces, move ancient objects from subsurface to surface contexts (Fig. 9), introduce modern material to ancient surfaces (and vice versa), and create anomalous features in ancient deposits (tunnels or cavities of anomalously soft sediments referred to as "krotovina").

Large-sized non-burrowing animals, principally because of their numbers and "herding" characteristics, have the potential to affect surface-assemblage characteristics (artifact number and density) by trampling objects into ever-smaller pieces (Gifford 1978). Carnivores, such as coyotes, as well as most domesticated dogs and pigs, can consume significant amounts of zooarchaeological material. However, anatomical-element density and growth studies suggest that analyses of fragment frequencies can serve to identify such carnivore-ravaged assemblages (Fig. 10; Lyman 1994).

Historical Background

In many respects, consideration of SFP is as old as the discipline of archaeology itself (Lucas 2012). In both the Old and New Worlds, for example, explanations of the origins of some extraordinary archaeological phenomena (e.g., pyramids, crystal skulls, or "exotic" artifacts) entailed pre-scientific arguments of how the activities of extraterrestrial agents, trans-oceanic adventurers, or marginalized refugees from various population dispersion events were responsible for the formation of a fantastic, if not alien, archaeological record (Fagan 2005).

The centrality of SFP was elevated and became foregrounded in archaeological practice with the publication of Michael B. Schiffer's theoretical article entitled "Archaeological Context and Systemic Context" in 1972. This and subsequent publications (see Schiffer 2010) framed a discourse focused on understanding the properties, origins, and sources of variability of the archaeological record itself that created a vast literature, which continues to proliferate (Shott 2006). Nonetheless, the importance of SFP in archaeological research became forever institutionalized as a consequence of the attention they received in

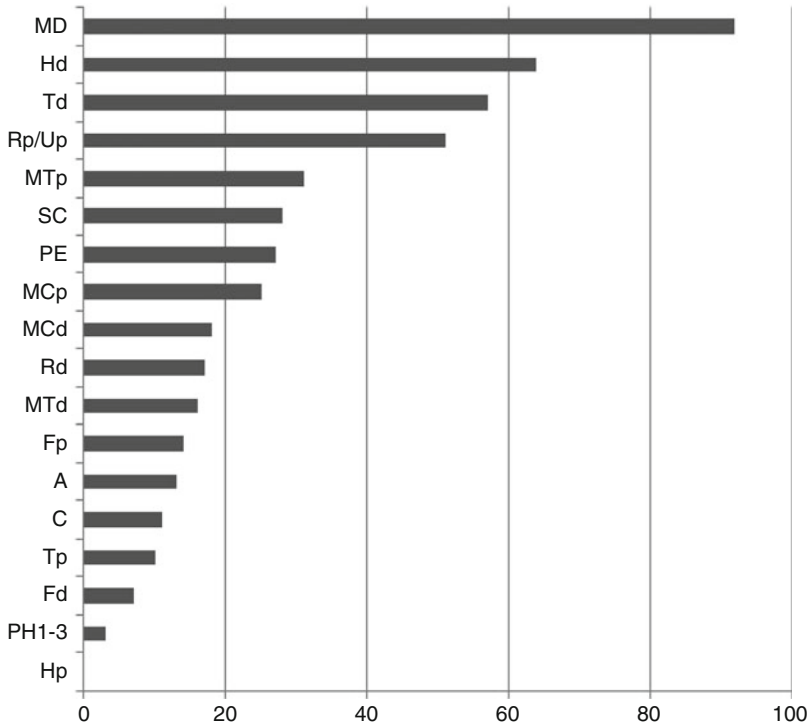

Site Formation Processes, Fig. 10 Percentages of modern goat anatomical elements (MNI 64) that survived after being ravaged by domesticated dogs in a Hottentot village. (Data from Brain 1980). MD mandible, Hd distal humerus, Td distal tibia, Rp/Up proximal radius or proximal ulna, MTp proximal metatarsal, SC scapula, PE pelvis, MCp proximal metacarpal, MCd distal metacarpal, Rd distal radius, MTd distal metatarsal, Fp proximal femur, A Astragalus, C calcaneus, Tp proximal tibia, Fd distal femur, PH1–3 first through third phalanges, Hp proximal humerus

the context of three hotly contested controversies – the "Binford-Bordes" (1966–1970), "Pompeii Premise" (1981–1985), and "Grasshopper-Chavez Pass" (1984–1989) debates. These disputes pivoted around fundamental differences of opinion regarding SFP – do they produce an archaeological record that is a fossil imprint of human activity, a distortion of human behavior, or something else (Sullivan 2008a)?

With the benefit of several decades of research inspired by these and other controversies, archaeologists nowadays are far more inclined to approach variability by thinking in terms of determining the formation histories of archaeological phenomena rather than in terms of being constrained by the archaeological record's interpretive limitations that are inherently attributable to distortions, disturbances, fragmentary remains, or poor preservation (Bailey 2007). In fact, largely as a consequence of the introduction and wide adoption of geoscientific methods during the last 20 years, archaeologists now see what once were considered obstacles to interpretation as research opportunities to explain why artifacts have the properties they do (Weiner 2010) or to ascertain what accounts for differences in the sedimentary composition of occupation levels (Holliday 2004). Similarly, archaeologists have developed their own "internal" concepts and methods to hypothesize, for example, why some ancient settlements, when fully excavated, disclose many intact vessels whereas others have none at all (e.g., "abandonment-mode" analysis [Deal 2008]), and why some highly fragmented artifact assemblages can be reassembled rather thoroughly whereas others cannot (e.g., "refitting analysis" [Chapman and Gaydarska 2007]).

Key Issues/Current Debates

Now that the significance of SFP is firmly established in archaeological practice, it is clear that whatever knowledge and principles have been secured so far are barely sufficient to cover the vast majority of archaeological cases – familiar and unfamiliar – that are implicated by the investigation of increasingly sophisticated

archaeological questions. Hence, archaeologists worldwide are exploring two major lines of inquiry that focus directly on expanding the study of formation processes with respect to the following questions: How is knowledge of SFP acquired, and how is that knowledge best applied?

The first line of inquiry for acquiring knowledge of SFPs is broadly *anthropological* and has two interrelated strands. One strand engages the ethnographic record and seeks to establish, for instance, statistical regularities among subsistence economies, environmental variation, and technology that serve as the basis for models whose implications can be independently tested with archaeological cases (Enloe 2008). The second strand is ethnoarchaeological research, which creates new data and empirical generalizations regarding material relationships among architecture, social organization, craft specialization, settlement systems, and ideology (David and Kramer 2001). Together, these strands, once fully developed, would constitute a middle range theory in archaeology that enables archaeologists to refer interpretations of archaeological phenomena and their formation histories to a highly confirmed body of cross-cultural principles.

The second line of inquiry is *archaeological* and has two principal strands, as well. The first strand is experimental, often referred to as actualistic research, where a "known" situation is created in the field using artifacts or other objects, animal carcasses or bones, and experimental plots of plants, and modifications to the material and their locations are monitored over time, generally several months or years (e.g., Banning et al. 2011). The objective is to gain an appreciation for rates of decomposition, displacement, or changes in soil properties that can be used to interpret the effects of EFP on similar kinds of archaeological phenomena (e.g., Rösch et al. 2002). The second strand consists of investigations of archaeological phenomena that are intended to understand the effects of SFP that materialize over long periods of time (centuries or millennia) and, hence, cannot be studied experimentally. Examples of this line of inquiry include studies of artifact displacement involving measures of artifact orientation (Dibble 2008) and of the composition of "fill" deposits to ascertain whether "termination rituals," for example, were responsible for material that accumulated above the floors of abandoned ceremonial structures (Van Keuren and Roos 2013).

The issues raised by these two lines of inquiry involve considerations of hypothesis testing. For instance, application of SFP knowledge derived from the "anthropological" approach to archaeological phenomena largely entails analogical reasoning, which, depending on the relevance of the cases (and hence the strength of the analogy), can lead to Type I errors (falsely concluding that the same or similar cause of the variability documented in the "anthropological" case is responsible for the variability seen in the archaeological case). Essentially, this type of error prematurely closes consideration of alternative hypotheses for the origins of the archaeological phenomena being investigated, thereby narrowing our views of what the cultural past may have been like (which is a form of presentism or projection of current knowledge of the present into the past). In contrast, application of SFP knowledge developed by the "archaeological" approach relies far less on analogical arguments because it is based on either replicable (highly confirmed) experimental results or well-established geoscientific principles. In these cases, the likelihood of Type I errors is reduced, the biases related to presentism are largely eliminated, and the potential for discovering ethnographically unprecedented cultural pasts is amplified (Sullivan 2007).

A second issue in the study of formation processes involves the units of analysis by which AFP and EFP and their effects can be unambiguously identified. As sketched above, because early (1970s and 1980s) formation process studies sought to understand how the form and location of artifacts changed through time, it is not surprising that they focused on examining factors that contributed to coarse-grained differences in assemblage composition (inventories of complete vs. fragmentary ceramic vessels), provenience categories (fill vs. floor), or refuse categories (primary vs. secondary refuse). By the mid-1980s, it had become clear that the usefulness of these studies was constrained by the incorporation

of interpretation-laden units of analysis, that is, the terms of the categories themselves, such as debitage types (e.g., primary flake or biface-thinning flake), room types (e.g., habitation or storage), site types (e.g., limited-activity or habitation), or settlement-system types (e.g., logistical or residential) biased conclusions regarding the origins and subsequent histories of the archaeological phenomena being studied (Sullivan 2008a). With this realization, archaeologists began developing interpretation-neutral units of analysis and more relevant methods, such as micromorphology, size-class analysis, assemblage refitting, and contextual analysis, to understand objectively how variability arises as a consequence of the tandem operation of different AFP and EFP (Matthews et al. 1997).

Another related issue is the extent to which information regarding the performance characteristics of artifacts, largely derived from experimental and replication studies, can be applied to archaeological phenomena (Schiffer 2010). Studies of total assemblages have now revealed that, in many cases, the most common artifacts – on occupation surfaces, in features, and incorporated in architecture – are fragments whose performance characteristics at the time they came to be deposited in those contexts or repose on those surface are largely extraneous to those that were designed-in at the time of artifact manufacture (Peña 2011). The scope of such widespread "de-correlation" between designed-in performance characteristics of intact artifacts at the time-of-manufacture and their post-manufacture use-contexts is beginning to be appreciated by archaeologists worldwide as a significant AFP affecting assemblage variability and archaeological interpretation (Chapman and Gaydarska 2007).

An emerging issue is renewed interest in the temporal scales at which SFP operate. Advances in the precision of independent dating techniques have alerted archaeologists to the disjunction between when events may have transpired (dated events, which are technique-specific) and how long it took for the phenomena (e.g., ancient matter, surfaces, features) associated with those dated events to materialize (target events), which are of archaeological interest. These considerations fall broadly under "time perspectivism" (Bailey 2007) and oblige archaeologists to reset their thinking regarding palimpsests, abandonment mode, and the significance of equifinality in archaeological interpretation. With respect to palimpsests, which refer to aggregate accumulations of objects, at least four types have been delineated depending on whether the same depositional contexts and surfaces are involved: true, cumulative, spatial, and temporal. Clearly, one "site" may be constituted of any number of these types, depending on its formation history, before it is ultimately abandoned, which raises profound issues for the methods by which archaeologists can infer artifact, surface, and feature contemporaneity (Sullivan 2008b).

An equally important and, surprisingly, unresolved matter raised by these concerns is whether abandonment mode invariably trumps occupation mode (which would mean that the archaeological record indeed is a massive "true and cumulative" palimpsest). That is, do the palimpsests and arrangements of matter on surfaces and in strata at the time of abandonment so thoroughly obliterate or obscure previous AFP traces that reliable inferences about pre-abandonment behaviors are utterly unattainable? Current research suggests that palimpsests actually may work in favor of archaeological interpretation because they serve as different kinds of clocks that measure the formation of the archaeological record in different ways. For example, cumulative palimpsests, such as "middens" (variably dense concentrations of ceramic fragments, lithic artifacts, and other materials), register elapsed "time-averaged" formation histories of entire settlements (and their aggregate discard patterns), whereas spatial palimpsests register "end-biased" formation histories of individual surfaces. Although far from fully confirmed and widely applied, these theoretical SFP concepts are valuable because they provide an interpretive framework for appreciating, and ultimately controlling for, the equifinal origins of the archaeological record (Sullivan 2007).

International Perspectives

With the theoretical maturation of the discipline since the 1970s, variability is no longer seen as something that is "monumentalized," that is, forever limiting the development of archaeological inferences because of the inherent distortions, biases, or incompleteness of the archaeological record itself. To the contrary, consideration of SFP is a global practice in modern archaeology involving the study of a wide variety of phenomena ranging from surface scatters of lithic artifacts in Western Australia (Fanning et al. 2009), flood-control sewer systems in ancient Rome (Aldrete 2007), buried villages in Ohio (Burks and Cook 2011), and the pollen record of historic period land-use patterns in pre-planned industrialized towns in Massachusetts (Kelso 1993). Moreover, SFP studies have evolved from largely theoretical exercises, which were not uncommonly dismissed as "cautionary tales" with little explanatory value or methodological potential, to rigorously tested and widely applied investigations that focus on specific problems involving human behavior and their archaeological consequences, such as determining the extent of prehistoric ecosystem management by fire in North America (Roos et al. 2010), distinguishing differences in the origins and uses of small-scale thermal features in Africa (Mallol et al. 2007), and resolving the geochemical signatures of household waste management practices in the Philippines (Beck 2007).

Also, SFP are being used to test and revise historical accounts, thereby resetting the long-standing tradition that texts are privileged, indisputable sources of information about the cultural past. For example, in Greek archaeology, fine-fabric and decorated ceramic vessels have been referred to as *oinochoe* [literally, wine-pouring jugs] because texts and images indicated that they were intended to be used exclusively at wine-drinking parties. However, because both *oinochoe* and identically shaped but undecorated coarse-fabric "jugs" numerically dominate ceramics recovered from "period of use" layers at the bottom of ancient Greek wells, it is reasonable to conclude that both types were used to fetch water (Fig. 11). Similarly, a reanalysis of the construction phases and brick stamps in the Pantheon in Rome suggests that the bulk of its design and reconstruction was completed during the reign of Trajan (CE 98–117) and not that of Hadrian (CE 117–138), despite numerous ancient historical references in support of the latter interpretation (Hetland 2007).

Future Directions

After some initial indifference, incorporation of SFP in archaeological research is now standard practice worldwide. In fact, most archaeologists would agree that studying the origins, history, and interpretive significance of the archaeological record has the potential to reveal aspects of bygone behavior, social organization, subsistence economies, and land-use strategies that have not been observed or recorded by cultural anthropologists, ethnohistorians, or ancient historians. At the least, such inquiries encourage the development of hypotheses about evolutionary processes and anthropogenic landscape transformations that take generations to materialize and, hence, can be studied only with an archaeological record whose examination is informed by an understanding of how it formed and came to express the properties that it does (Lucas 2012). Hence, the role of SFP in future archaeological investigations is not only secure but will expand as archaeologists endeavor to reduce disciplinary ignorance regarding how information about the past is transmitted to and disclosed in the present (Sullivan 2007).

In fact, we predict that future SFP research will concentrate minimally on four problem areas. First, progress in understanding the AFP of common but poorly understood archaeological phenomena, such as artifact scatters, will occur with the adoption of interpretation-neutral units of analysis because experience has demonstrated that normative categories, such as limited-activity site or special-use site, obscure rather than reveal the origins of these deposits. Second, advances in the application of geoscience (Goldberg et al. 2001) will provide a basis for archaeologists to reassess interpretations of common archaeological phenomena whose formation was thought to

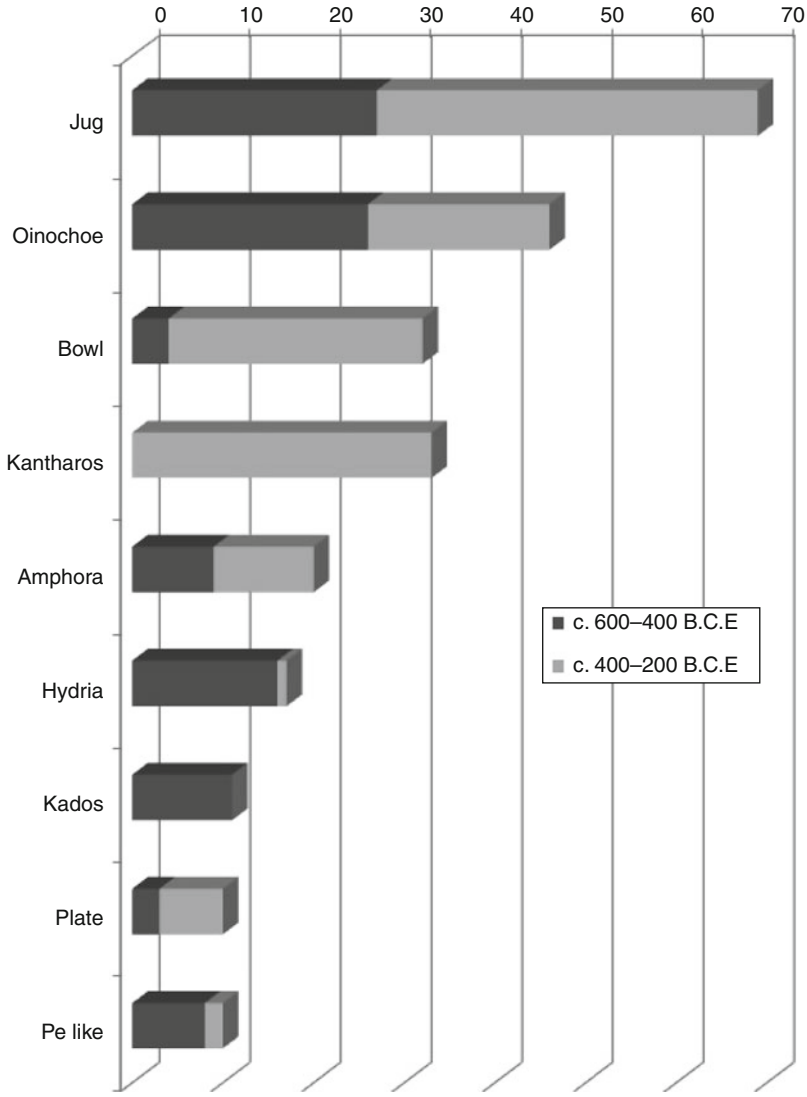

Site Formation Processes, Fig. 11 Counts of published vessels by type found in "period of use" layers from the bottom of Athenian wells (c. 600–200 BCE). Identically shaped coarse-tempered jugs and fine-tempered *oinochoe* ["wine-pouring" jugs], both equipped with a single handle and a spout, dominate such assemblages

be well understood, such as features (whose origins may be attributable more to EFP rather than AFP) and "fill" sequences of abandoned structures (whose origins may be attributable more to AFP than to EFP). Third, developments in appreciating the effects of long-ignored EFP that are widespread but not well understood at all, such as the deterioration and depositional consequences of multi-material structures and the extent of artifact commingling that arises because of pervasive inter-context (subsurface-surface-subsurface) artifact circulation, will emerge as interdisciplinary collaboration accelerates and becomes institutionalized (Killick 2008). Fourth, one persistent problem is understanding the extent to which, and the circumstances under which, variation in abandonment-mode overprints pre-abandonment (occupation) mode dynamics (i.e., determining the prevalence of "true" palimpsests). In contrast to the three preceding problem areas, solutions to this one may require inspiration from tightly controlled experimental studies in ethnoarchaeology and geoscience.

Professor Lord Colin Renfrew (1976: 2) boldly claimed that "every problem in archaeology starts as a problem in geoarchaeology."

S

Updating the scope of his proclamation with the benefit of more than three decades of sustained research on the topic, no archaeologist would be uncomfortable with the friendly amendment that *site formation processes* could be profitably substituted for "geoarchaeology." Looking forward, the study of SFP is poised to accelerate the identification of problematic and unwarranted assumptions about the meaning of archaeological variability that, in turn, will empower archaeologists worldwide to challenge orthodoxy, to unconstrain their interpretations, and to become consequential in revealing the nature and diversity of the cultural past.

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Ethnoarchaeology
- ▶ Middle-Range Theory in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes

References

Aldrete, G.S. 2007. *Floods of the Tiber in ancient Rome, ancient society and history*. Baltimore: Johns Hopkins University Press.

Allison, P.M. 2004. *Pompeian households: An analysis of the material culture*. Los Angeles: Cotsen Institute of Archaeology, University of California.

Bailey, G. 2007. Time perspectives, palimpsests, and the archaeology of time. *Journal of Anthropological Archaeology* 26: 198–223.

Banning, E.B., A.L. Hawkins, and S.T. Stewart. 2011. Sweep widths and the detection of artifacts in archaeological survey. *Journal of Archaeological Science* 38: 3447–3458.

Beck, M.E. 2007. Midden formation and intrasite chemical patterning in Kalinga, Philippines. *Geoarchaeology* 22: 453–475.

Benson, L.V., J.R. Stein, and H.E. Taylor. 2009. Possible sources of archaeological maize found in Chaco Canyon and Aztec Ruin, New Mexico. *Journal of Archaeological Science* 36: 387–407.

Bottari, C., S.C. Stiros, and A. Teramo. 2009. Archaeological evidence for destructive earthquakes in Sicily between 400 B.C. and A.D. 600. *Geoarchaeology* 24: 147–175.

Brain, C.K. 1980. *The hunters or the hunted? An introduction to African cave taphonomy*. Chicago: University of Chicago Press.

Burks, J., and R.A. Cook. 2011. Beyond Squier and Davis: Rediscovering Ohio's earthworks using geophysical remote sensing. *American Antiquity* 76: 667–690.

Carter, S.W., B. Weigand, G. Mahood, O. Dudas, J.L. Wooden, A.P. Sullivan III, and S. Bowring. 2011. Strontium isotopic evidence for prehistoric transport of gray-ware ceramic materials in the eastern Grand Canyon region, USA. *Geoarchaeology* 26: 189–218.

Chapman, J., and B. Gaydarska. 2007. *Parts and wholes: Fragmentation in prehistoric context*. Oxford: Oxford Books.

Cook, T., and L. Abbott. 2012. Santorini: Dangerous volcano, postcard-perfect jewel of the Aegean. *Earth* 57: 42–49.

David, N., and C. Kramer. 2001. *Ethnoarchaeology in action*. Cambridge: Cambridge University Press.

Deal, M. 2008. Abandonment patterning at archaeological settlements. In *Archaeological concepts for the study of the cultural past*, ed. A.P. Sullivan III, 141–158. Salt Lake City: University of Utah Press.

Dibble, H.L. 2008. Non-anthropogenic approaches to understanding lithic artifact and assemblage variability. In *Archaeological concepts for the study of the cultural past*, ed. A.P. Sullivan III, 85–107. Salt Lake City: University of Utah Press.

Enloe, J.G. 2008. Theory, method, and the archaeological study of occupation surfaces and activities. In *Archaeological concepts for the study of the cultural past*, ed. A.P. Sullivan III, 125–140. Salt Lake City: University of Utah Press.

Fagan, B.M. 2005. *A brief history of archaeology: Classical times to the twenty-first century*. Upper Saddle River: Pearson/Prentice Hall.

Fanning, P.C., S.J. Holdaway, E.J. Rhodes, and T.G. Bryant. 2009. The surface archaeological record in arid Australia: Geomorphic controls on preservation, exposure, and visibility. *Geoarchaeology* 24: 121–146.

Gifford, D.P. 1978. Ethnoarchaeological observations of natural processes affecting cultural materials. In *Explorations in ethnoarchaeology*, ed. R.A. Gould, 77–101. Albuquerque: University of New Mexico Press.

Goldberg, P., and R.I. Macphail. 2006. *Practical and theoretical geoarchaeology*. Malden: Blackwell.

Goldberg, P., V.T. Holliday, and C.R. Ferring, eds. 2001. *Earth sciences and archaeology*. New York: Plenum.

Harris, E.C. 1979. *Principles of archaeological stratigraphy*. New York: Academic Press.

Hawkins, R.A. 1998. Coming full-circle: Plowzone assemblages and the interpretation of Fort Ancient settlement structure. In *Surface archaeology*, ed. A.P. Sullivan, 91–109. Albuquerque: University of New Mexico Press.

Hetland, L.M. 2007. Dating the Pantheon. *Journal of Roman Archaeology* 20: 95–112.

Holliday, V.T. 2004. *Soils in archaeological research*. Oxford: Oxford University Press.

Kelso, G.K. 1993. Pollen-record formation processes, interdisciplinary archaeology, and land use by mill workers and managers: The Boott Mills Corporation, Lowell, Massachusetts, 1836–1942. *Historical Archaeology* 27: 70–94.

Killick, D. 2008. Archaeological science in America and Britain. In *Archaeological concepts for the study of the cultural past*, ed. A.P. Sullivan III, 40–64. Salt Lake City: University of Utah Press.

Kirch, P.V. 2005. Archaeology and global change: The Holocene record. *Annual Review of Environment and Resources* 30: 409–440.

Lazrus, P.K., and A. Barker, eds. 2012. *All the king's horses: Essays on the impact of looting and the illicit antiquities trade on our knowledge of the past*. Washington, DC: The Society for American Archaeology.

Lucas, G. 2012. *Understanding the archaeological record*. Cambridge: Cambridge University Press.

Lyman, R.L. 1994. *Vertebrate taphonomy*. Cambridge: Cambridge University Press.

Mallol, C., F.W. Marlowe, B.M. Wood, and C.C. Porter. 2007. Earth, wind, and fire: Ethnoarchaeological signals of Hadza fires. *Journal of Archaeological Science* 34: 2035–2052.

Matthews, W., C.A.I. French, T. Lawrence, D.F. Cutler, and M.K. Jones. 1997. Microstratigraphic traces of site formation processes and human activities. *World Archaeology* 29: 281–308.

McIntosh, R.J., J.A. Tainter, and S.K. McIntosh, eds. 2000. *The way the wind blows: Climate, history, and human action*. New York: Columbia University Press.

Miksicek, C.H. 1987. Formation processes of the archaeobotanical record. In *Advances in archaeological method and theory*, ed. M.B. Schiffer, vol. 10, 211–247. San Diego: Academic.

Nabokov, P., and R. Easton. 1989. *Native American architecture*. Oxford: Oxford University Press.

Peña, J.T. 2011. *Roman pottery in the archaeological record*. New York: Cambridge University Press.

Renfrew, C. 1976. Archaeology and the earth sciences. In *Geoarchaeology: Earth science and the past*, ed. D.-A. Davidson and M.L. Shackley, 1–5. London: Duckworth.

Roos, C.I., A.P. Sullivan III, and C. McNamee. 2010. Paleoecological evidence for systematic Indigenous burning in the Upland Southwest. In *The archaeology of anthropogenic environments*, ed. R.M. Dean, 142–171. Carbondale: Southern Illinois University.

Rösch, M., O. Ehrmann, L. Herrmann, E. Schulz, A. Bogenrieder, J.P. Goldammer, M. Hall, H. Page, and W. Schier. 2002. An experimental approach to Neolithic shifting cultivation. *Vegetation History and Archaeobotany* 11: 143–154.

Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico Press.

Schiffer, M.B. 2010. *Behavioral archaeology: Principles and practice*. London: Equinox.

Shear, T.L., Jr. 1993. The Persian destruction of Athens: Evidence from Agora deposits. *Hesperia* 62: 383–482.

Sheets, P.D. 2006. *The Ceren site: An ancient village buried by volcanic ash in Central America*. Belmont: Thomson Higher Education.

Shott, M., ed. 2006. *Formation theory in archaeology: Readings from American antiquity and Latin American antiquity*. Washington, DC: The Society for American Archaeology.

Skibo, J.M. 2012. *Understanding pottery function*. New York: Springer.

Sullivan, A.P., III. 2007. Archaeological anthropology and strategies of knowledge formation in American archaeology. In *Archaeological anthropology: Perspectives on method and theory*, ed. J.M. Skibo, M.W. Graves, and M. Stark, 40–56. Tucson: University of Arizona Press.

Sullivan, A.P., III. 2008a. An archaeological view of the archaeological record. In *Archaeological concepts for the study of the cultural past*, ed. A.P. Sullivan III, 7–23. Salt Lake City: University of Utah Press.

Sullivan, A.P., III. 2008b. Time perspectivism and the interpretive potential of palimpsests: Theoretical and methodological considerations of assemblage formation history and contemporaneity. In *Time perspectivism revisited*, ed. S. Holdaway and L. Wandsnider, 31–45. Salt Lake City: University of Utah Press.

Sullivan, A.P., III, K.S. Magee, P.B. Mink II, and K.M. Forste. 2012. Remote sensing of heritage resources for research and management. *Park Science* 28: 93–98.

Uphus, P.M., A.P. Sullivan III, and P.B. Mink. 2006. Identifying at-risk heritage resources with GIS: Modeling the impact of recreational activities on the archaeological record. *International Journal of Risk Assessment and Management* 6: 330–343.

Van Keuren, S., and C.I. Roos. 2013. Geoarchaeological evidence for ritual closure of a kiva at Fourmile Ruin, Arizona. *Journal of Archaeological Science* 40: 615–625.

Varien, M.D., and B.J. Mills. 1997. Accumulations research: Problems and prospects for estimating site occupation span. *Journal of Archaeological Method and Theory* 2: 141–191.

Ward, I., and P. Larcombe. 2003. A process-oriented approach to archaeological site formation: Application to semi-arid Northern Australia. *Journal of Archaeological Science* 30: 1223–1236.

Weiner, M. 2010. *Microarchaeology: Beyond the visible archaeological record*. New York: Cambridge University Press.

Site Stewardship Programs

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Introduction

Archaeological site stewardship programs are organizations of volunteers who assist with the protection, preservation, and interpretation of archaeological sites. The structure of site stewardship programs varies based on the type of archaeological resources protected, landownership, and the position of stewardship activities within volunteer programs (Kelly 2007). These programs operate on both public and private landholdings. In most programs, volunteers help to monitor archaeological sites by documenting any changes to the condition of particular sites at regular intervals. Volunteers in some programs also assist in collection management, laboratory work, site interpretation, and even the excavation of some sites (Davis 1990).

Through careful monitoring, stabilization, and public education, site stewardship programs can be a highly effective means of preventing both natural and human-caused damage to archaeological sites. Archaeological sites are affected by both environmental and human degradation. Environmental elements including erosion, wind, water, and sunlight can damage archaeological features and artifacts. Vandalism, looting, and unintentional damage inflicted on archaeological sites by humans can also destroy archaeological sites. Many programs report that site damage has decreased dramatically as a result of program initiatives (Kelly 2007).

Definition

Site stewardship programs represent a new movement towards public stewardship of archaeological resources (McManamon 1991; Thorne 1996: 2). State and federal protection strategies for archaeological resources originally limited public interaction with sensitive archaeological materials. In the mid- to late 1980s, however, federal and state governments adopted policies that relied on public education and active involvement in archaeological site protection. Most significantly, amendments to the Archaeological Resources Protection Act (ARPA) required federal land managers to ". . .establish a program to increase public awareness of the significance of the archaeological resources located on public lands and Indian lands and the need to protect such resources (1988 amendment to ARPA, Sec. 10c)." These new changes in attitude and legislation encouraged partnerships between federal and state agencies that resulted in the creation of the site stewardship programs in almost every region of the United States.

Most site stewardship programs function under a modest budget because nearly all labor is donated on a volunteer basis. Federal and state agencies support and manage some programs, while other programs operate as nonprofit organizations. Funds are typically used to hire a full- or part-time site stewardship coordinator and to pay for supplies related to monitoring or site stabilization activities. Funding sources for archaeological site stewardship programs vary depending on the resources protected and land ownership. Typical sources of monetary support include federal and state agencies, partnerships with local historical and archaeological societies and museums, and external grants.

The most important and sometimes only employee of site stewardship programs is the stewardship coordinator. The coordinator organizes volunteer labor, directs volunteer training and education, leads advertising and recruitment, and is each volunteer's main contact within the program. The coordinator's relationship with volunteers is the backbone of many programs. Regardless of the size of a stewardship program, consistent communication between coordinators and stewards is crucial to the efficient operation of the program and to the motivation of volunteers.

Attracting and maintaining good volunteers is essential to a successful volunteer stewardship program. Site stewardship programs must

carefully recruit volunteers who will not divulge sensitive site information. Site stewardship programs often require extensive training for their site stewards to ensure that volunteers will not intentionally or inadvertently cause harm to archaeological sites or artifacts. In most cases, training includes both a classroom and fieldwork component. Through training, programs emphasize the necessity to keep site locations secret. Often programs do not allow site stewards to bring visitors on their monitoring trips and require that volunteers sign confidentiality agreements. These measures help to ensure that only trained persons will visit archaeological sites.

Successful site stewardship programs recognize the reasons why people volunteer and address these motivations in volunteer activities. In many programs, stewards are invited to attend program meetings and presentations as well as regional conferences. Stewards can also participate in other fieldwork activities under professional supervision, such as special recording projects (e.g., documenting rock art panels), site damage assessments, land surveys, and site stabilization.

Regular communication between site stewardship coordinators and volunteers greatly enhances the volunteer experience as well as the efficiency of the program. Interaction with professional archaeologists and other people trained in cultural resource management is one of the most important things that volunteers seek and respond to in site stewardship programs. Coordinators should keep volunteers abreast of the progress towards program goals.

Volunteer recognition is a critical component of the recruitment and maintenance of site stewardship volunteers. Monitoring volunteers hours allows programs to recognize the contributions of individuals and to demonstrate that the program values the time that volunteers invest. Studies indicate that volunteer retention is higher in programs that monitor volunteer activities and reward volunteer service (Schwartz 1977; Field and Johnson 1993: 1629). In addition, many programs provide additional benefits to volunteers to demonstrate appreciation. For example, the Arizona Site Stewardship Program pays conference fees for volunteers to attend the Arizona Historic Preservation Conference. In programs such as the Nevada Site Stewardship program, volunteers have workman's compensation insurance as agency volunteers.

Many archaeological resources in the United States are related to the prehistoric and historic occupation of Native American tribes. The support and involvement of Native American groups in site stewardship initiatives is essential in areas where the majority of the archaeological sites are Native American. Site stewardship programs can help emphasize the connection between the protection and preservation of Native American archaeological resources and respect for native traditions. In addition, stewardship programs can facilitate interactions among Native American communities and archaeologists. For example, the Alutiiq Museum Site Stewardship Program in Alaska and the California Site Stewardship Program involve Native American communities as advisors, administrators, and stewards. These programs have also tailored program goals to fit those of local tribal governments. Finally, some tribal governments, such as the White Mountain Apache Tribe, have established site stewardship programs through their Tribal Historic Preservation Offices (Welch et al. 2009). These programs are directly run through the tribe for protection of archaeological resources within community boundaries.

Examples

The structure and operation of site stewardship programs depends on the landownership of archaeological sites and the resources that they serve to protect. Archaeological site stewardship programs can be a valuable component of protection plans for archaeological resources on both public and private lands. Programs that operate on public lands provide important assistance to land managers, who are often constrained by limited budgets and staff support. Site stewardship programs on private lands involve landowners in the protection of archaeological resources on private property.

Stewardship Programs on Federal and State Lands

Stewardship programs on public lands either are administered directly by agency land managers or function through nonprofit organizations that have allied with government land managers. Some of the largest site stewardship programs are part of volunteer programs established by major land management agencies. Volunteer programs that are associated with a federal agency and that involve a site stewardship component include the Forest Service's "Passport in Time" (PIT) program, the National Park Service's "Volunteers in Parks" (VIP) program, and the Tennessee Valley Authority's "A Thousand Eyes" program. Some federal agencies have also established independent site stewardship programs, such as the BLM's "Adventures in the Past" and the Forest Service's "Partners in Preservation" programs. State-sponsored site stewardship programs include the Georgia Underwater Archaeology Program, which involves both professional archaeologists and avocational scuba divers in the protection of Georgia's submerged archaeological resources (Burns and Crass 2006). Site stewardship programs can also operate through partnerships among several federal and state agencies. The New Mexico Site Watch program is one notable example of a collaboration among state and federal agencies. This program was established by the New Mexico State Historic Preservation Office in partnership with the National Park Service, the Bureau of Land Management, and the Forest Service to monitor archaeological resources in various locations in New Mexico. Finally, many site stewardship programs that monitor archaeological sites on public lands are nonprofit organizations that collaborate with federal and state agencies. Examples include the San Juan Mountains Site Stewardship Program in Colorado and the stewardship program run through the New York State Submerged Heritage Preserves.

Site stewardship programs serve as "watchdogs" for archaeological sites. These programs can provide support to federal and state land managers in several critical ways. They can assist land managers by establishing long-term protection strategies for sites. With consistent monitoring, the effects of environmental and human degradation on archaeological sites can be controlled. Site stewardship programs that are external to public agencies can also serve as advocates for the protection of archaeological resources on state and federal lands. Land managers, who are often charged with a myriad of tasks, may not be aware of dangers posed to archaeological sites on particular parcels of land. Volunteers in these programs can provide local knowledge of these threats and can serve as liaisons between land managers and the community. Site stewardship programs can help emphasize the importance of archaeological resource protection while providing support for these safeguards. Many programs have noted that the intentional damage of sites, either through vandalism or looting, significantly decreased after the implementation of their programs (Kelly 2007). The knowledge that site stewards regularly patrol an area is often enough to deter would-be vandals and looters.

As liaisons, site stewardship programs facilitate interaction and collaboration among government agencies, resource managers, archaeologists, and the public. Agency employees may be viewed as outsiders, while site stewards can offer a local perspective on resource management within communities. Site stewardship programs also provide a conduit through which local law enforcement and archaeologists can reach out to the public about the protection of archaeological resources in a positive manner. In general, people do not respond to negative messages that emphasize sanctions against looting and vandalism (Hoffman 1991; Simon 1994).

The Arizona Site Stewardship Program is an example of a program that uses positive public messages to address site destruction. In particular, the program educates the public on the importance of preserving archaeological sites and artifacts in Arizona. The program also highlights the variety of archaeological sites and museums that offer tours and provide additional information about the historic and ancient past of Arizona. Through these initiatives, the Arizona Site Stewardship Program educates the public on the importance of preserving archaeological resources and provides them with a

safe and fun way to learn more about local archaeology. Information and access to sites not only provides the public with a positive way to experience archaeology but deters would-be vandals and looters (Hoffman 1991).

Stewardship on Private Lands

Although the majority of site stewardship programs operate on public lands and waterways, some programs protect archaeological sites on private lands. These programs are generally run through the State Historic Preservation Office or through partnerships with other state and local agencies. Some programs use volunteer site stewards to monitor archaeological sites on private lands through agreements with the landowners. In other programs, landowners themselves agree to become stewards of archaeological sites on their land. Stewardship programs on private lands involve the cooperation of landowners who act as stewards of cultural materials on their own property. In most cases, private landowners sign an agreement with the local State Historic Preservation Office (SHPO) to protect archaeological materials.

Site stewardship programs on private lands play an important role in safeguarding sites and involving the public in cultural resource protection (Henderson 1989), because only a tiny fraction of the USA is under government protection. They demonstrate that archaeological sites can be effectively monitored through a relatively small monetary investment and that site conservation does not always require land purchases. These programs will be increasingly important in the coming years as more land is developed and sites are put at greater risk. For instance, the Archaeological Conservancy, which protects archaeological sites on private lands, now includes parcels from across the country.

Studies have shown that site stewardship programs that actively involve landowners in the protection of archaeological resources on their lands are much more successful than those that do not. These programs rely on incentives from local and state governments to join the stewardship program. Sanctions and restrictions against landowners, nicknamed "big stick" methods of site protection, are often met with hostility and prove ineffective in the long run (Simon 1994).

Underwater Archaeological Site Stewardship Programs

Site stewardship programs devoted to the monitoring and protection of underwater archaeological resources play a vital role in comprehensive site protection (Elliott et al. 2000). Many underwater site stewardship programs were developed in response to the Abandoned Shipwreck Act of 1987 and its advisory guidelines. These guidelines encourage the development of shipwreck preserves and the cooperation of both government agencies and the public in the management and protection of shipwreck sites. Recreational and heritage tourism stimulated by shipwreck preserves provide much needed attention to underwater stewardship programs. In the case of the Rhode Island Marine Archaeology Program (RIMAP), the discovery of the HMS Endeavor was the catalyst for public concern over the protection of underwater archaeological sites in the region. For the stewardship program associated with the New York State Submerged Heritage Preserves, the discovery of the land tortoise initiated the development of a shipwreck preserve system. The Texas Historical Commission established its Marine Stewards Group as a result of diver public interest generated by the State's recovery of French explorer Robert Cavelier Sieur de La Salle's ship La Belle from the waters of Matagorda Bay.

Summary

Archaeological site stewardship programs have become an integral part of archaeological site protection in the United States. These programs use public education and the active involvement of nonprofessional archaeologists to prevent or reduce environmental and human impacts on sensitive cultural resources. The structure of site stewardship programs varies considerably and includes archaeological protection on both public private lands, of both terrestrial and underwater archaeological resources. Stewardship programs originate from new attitudes about site protection that recognize the importance of public education and involvement in safeguarding archaeological resources.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Cultural Heritage and the Public
- ▶ Maritime Historic Site Management for the Public
- ▶ Public Archaeology, The Move Towards
- ▶ Stewardship, Concept of
- ▶ Volunteers in Archaeology

References

Burns, J., and D.C. Crass. 2006. Building a state underwater archaeology program from scratch. *SAA Archaeological Record* 6 (1): 20–24.

Davis, H. 1990. *Volunteers in archaeology*, Technical brief. Vol. 9. Washington, DC: U.S. Department of the Interior, National Park Service Archaeology Program.

Elliott, R.F., R. Rogers, and D. Crass. 2000. *Stemming the tide: A survey of submerged cultural resources programs in the United States, with a view toward Georgia*. Ellerslie and Atlanta: Southern Research Historic Preservation Consultants, Inc. and Georgia Department of Natural Resources.

Field, D., and I. Johnson. 1993. Satisfaction and change: A survey of volunteers in hospice organization. *Social Science and Medicine* 36: 1625–1634.

Henderson, G. 1989. *The Kentucky archeological registry: Landowner participation in site preservation*, Technical Brief. Vol. 6. Washington, DC: U. S. Department of the Interior, National Park Service Archeology Program.

Hoffman, T.L. 1991. Stewards of the past: Preserving Arizona's archeological resources through positive public involvement. In *Protecting the past*, ed. G.S. Smith and J.E. Ehrenhard, 253–259. Boca Raton: CRC Press.

Kelly, S.E. 2007. *Developing and implementing archeological site stewardship programs*, Technical brief. Vol. 22. Washington, DC: U. S. Department of the Interior, National Park Service Archeology Program.

McManamon, F.P. 1991. The federal government's recent response to archaeological looting. In *Protecting the past*, ed. G.S. Smith and J.E. Ehrenhard, 261–269. Boca Raton: CRC Press.

Schwartz, S.H. 1977. Normative influences on altruism. In *Advances in experimental social psychology, volume 10*, ed. L. Berkowitz, 221–279. New York: Academic.

Simon, B.G. 1994. The carrot, not the stick: Strategies for protecting archaeological sites on private property. In *Cultural resource management archeological research, preservation planning, and public education in the northeastern United States*, ed. J. Kerber, 191–208. Westport: Bergin and Garvey.

Thorne, R. 1996. *Developing an archeological site conservation database*, Technical brief. Vol. 17. Washington, DC: U. S. Department of the Interior, National Park Service Archeology Program.

Welch, J., M. Altaha, K. Hoerig, and R. Riley. 2009. Best cultural heritage stewardship practices by and for the White Mountain Apache tribe. *Conservation and Management of Archaeological Sites* 11 (2): 148–160.

Further Reading

Bureau of Land Management. 2012. *Cultural heritage stewardship*. Washington, DC: Bureau of Land Management, U.S. Department of the Interior. Available at: http://www.blm.gov/wo/st/en/res/Volunteer/stewardship.html. Accessed May 2012.

Forest Service. 2012. *Passport in time: A volunteer program of the USDA Forest Service*. Washington, DC: Forest Service, U.S. Department of Agriculture. Available at: http://www.passportintime.com/. Accessed May 2012.

National Park Service. 2012a. *Strategies for protecting archeological sites on private lands (Bibliography)*. Washington, DC: National Park Service, Cultural Resources, Heritage Preservation Services. Available at: http://www.nps.gov/hps/pad/strategies/stratbib.html. Accessed May 2012.

National Park Service. 2012b. *Volunteers-in-parks*. Washington, DC: National Park Service, U.S. Department of the Interior. Available at: http://www.nps.gov/whmi/forteachers/upload/vip_brochure.pdf. Accessed May 2012.

Site Visitation and Interpretation: Management

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Introduction

Typical archaeological and historical sites contain a multitude of resources about which they seek to preserve and inform the public. Archaeological resources, cultural landscapes, monuments, tombs, ethnographic resources, historic and

prehistoric structures, and museum collections are some of the major categories that must be juggled and integrated into visitation and cultural resources management plans. Archaeological materials are nonrenewable and irreplaceable; these considerations should guide the management of archaeological sites.

Definition

Within the context of site visitation, *interpretation* of heritage serves to communicate information about the origin and purpose of natural or cultural resources. Interpretation provides the means by which to better appreciate and understand archaeological sites through experience and interaction. Interpretation is not simply presentation for that implies a planned arrangement of information providing a one-way form of communication from scholars, heritage professionals, and the like (Silberman 2006). Rather, interpretation goes beyond to consider the totality of activities, research, and general creativity generated by an interaction with a cultural site. The first goal of interpretation at archaeological sites should be the preservation of archaeological materials at the site, and no interpretive activities that endanger archaeological materials should be permitted. Interpretation at archaeological sites must make visitors aware of site vulnerabilities and should build a constituency for the sustainable management of the site.

Key Issues/Current Debates/Future Directions/Examples

Interpretation

The presentation of archaeological, historical, and present-day heritage sites is incomplete without interpretation. Interpretation, as the term is used here, is provided for a public audience; it is a form of outreach that informs and, ideally, provokes contained interest and conversation. It is a means by which to better appreciate and understand the experience of visiting an archaeological site. Properly done, it is a guide to extracting meaning from the site, which provides the information needed to navigate the site in ways chosen by the visitor. Most importantly, it is a fundamental element in establishing and maintaining site sustainability.

The presentation of interpretation of historical context to a public also serves to highlight what is deemed significant and, through this act, can give strength to communities and provide a sense of place and belonging. Who creates such interpretation, however, raises question of ownership of heritage, social inclusion and exclusion, and the very politics of identity making. Interpretation gives voice to certain views of the past, and, in feasible and deft ways, these voices should be identified by reference to the scholarship and oral or written histories that have been used in preparing interpretive materials.

Site managers, archaeologists, and others seek to address three major questions in any interpretive plan: (1) How, when, why, and by whom was the site and surrounding landscape used in ancient times? (2) Why was the site a center of activity (in whatever manner that is defined)? (3) Why was the site important then, and why is the site important now? In order to disseminate such information, a master narrative is often created which serves as the basis for interpretation of all specific points of interest within the site. These narratives are then used as adaptable texts from which exhibits, brochures, training modules, and other interpretive devices are generated. However, all interpretive plans should accept that visitors have their own individual points of view and therefore should encourage dialogue.

Effective interpretive frameworks link specific tangible artifacts, buildings, and places with ideas, events, and concepts. Importantly, this interpretation should relate to wider social, cultural, historical, and natural contexts and settings (ICOMOS Ename 2007).

Role of Tourists

Clifford (1997) defines tourism as a contact zone, a place where identities are made and transculturation occurs. Archaeological and historical sites, therefore, become not only media through which cultures and events are presented but also

where the experience of being a tourist changes one's sense of self. As a result, there are a multitude of protagonists who affect, shape, and delineate the tourist's experience. These actors include scholars and scientists, national governments and agencies, local governments, local indigenous groups, nongovernmental organizations (NGOs), property owners, and the visitors themselves. Tourists can be agents of destruction or support to an archaeological site; the interpretive program should be designed to encourage the latter role.

The Stakeholders

The creation of an interpretive plan should be a community activity so as to include the multitude of their voices and, simultaneously, be informed by archaeological data. As Byrne (1991) and Smith (2000) have noted, the operation of conservation in the heritage management industry has often promoted and maintained dominant colonial positions. The very linearity of how sites discuss past events gives precedence to Western scientific explanation. As a result, the management of sites and the creation of interpretive plans create tension between national and local government agencies, indigenous groups, and property owners (Meskell 2001).

The ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Site (previously called the Ename Charter) is cognizant of these difficulties. This ICOMOS Charter was finalized in 2007 to highlight that role of interpretation and preservation. The Charter lays out the importance of taking into account the cultural contributions of all communities associated with a site, including minority groups as well as the interests of associated communities, property owners, governmental authorities, site managers, scholars, tourism operators, private investors, employees, and volunteers, and including them in the development of interpretive programs. The recent Statement of Menorca (2012), formulated by the International Council on Archaeological Heritage Management, expresses concern that archaeological sites, especially in developing countries, are increasingly seen as economic engines as opposed to being repositories of scientific and historic information or as places that enhance appreciation and understanding of human creativity and accomplishments. To correct this imbalance, it calls for the formulation of standards for the management and protection of archaeological sites, which should include the use of interpretation as a component of effective management. These standards should accommodate non-Western perceptions and thoughts about the meanings of material culture.

Recent scholarship by indigenous scholars and activists (e.g., Condori Mamami 1989; Cojti Ren 2006) demonstrates the, at times, systematic delinking of present indigenous groups to their past. As cultural heritage sites often remain important to current indigenous groups, traditionally associated groups to a site, therefore, should increasingly be permitted to pursue customary religious, subsistence, and other cultural practices at a site. Such continuing access to and use of traditional resources are often essential to the survival of family, community, or regional cultural systems, including patterns of belief, economic, and religious life. Due to the importance of such activities, however, site managers should not direct visitor attention to the performance of religious observances in particular unless these traditionally affiliated with the site lands or resources so desired.

Tourism Versus Protection

The difficulty faced by site managers is to balance tourism against the future protection of the site. Starting as early as the 1970s, researchers began looking at the impact of visitors on national parks and other protected areas (Flood 1982; Jacobs and Gale 1994; Forrest 1995). This research was amplified by investigations into artifact displacement as a result of agricultural practices or natural erosion (Cameron et al. 1990; Schofield 1991). It was not until recently, however, that some researchers turned their attention not just to the unintentional impact of specific categories of visitors on structural longevity but also to more active disturbances, movement, or outright removal of stone or other loose artifacts from sites by tourists. In their study, Migley et al. (1998) discovered that disturbance levels of artifacts did not decline evenly with an increasing

distance from the central visitor area; as a result, the impact of tourism goes beyond the most traveled paths.

Comer (2011) argues that the most common and often the greatest threat to site preservation is from development associated with providing amenities to tourists. Such developments often change regional hydrology. At Petra, for example, construction of hotels, restaurants, parking lots, roads, and other impervious surfaces produces flooding that damages ancient structures by exposing them to chemical-laden floodwater, which washes away subsurface archaeological deposits. Other sorts of hydrological change produced by tourism can also be catastrophic. At Angkor, water pumped from the ground for use by tourists at hotels and restaurants is threatening soil stability and thus the foundations of the ancient monuments. Other threats arise from social discord promoted by competition among groups for economic gain associated with tourism. Such discord can ultimately promote political instability if multinational corporations eliminate economic opportunities for local populations. Discord and political instability greatly reduce the capacity to effectively manage archaeological sites.

Signage, Walkways, and the Site Experience

Balancing the protection and long-term management of a site with daily tourists requires, among other things, well-delineated signage and walkways. It is important for walkways to be cleanly cut and maintained but also organized in such a way as to move visitors in and out of major throughways without producing erosion or encouraging tourists to sit on or rest against ancient structures. For this reason, benches or other seating, if possible in a shaded location, should be provided. Paths should never take tourists to remote, unobserved locations at archaeological sites where looting, vandalism (often in the form of graffiti, attempts to obtain rubbings, or even removal of architectural details), vending of looted antiquities, or use of ancient structures as ad hoc toilet facilities will eventually occur. The signage at any site should provide concise, well-worded text and associated images that provide a basic understanding of the meaning and significance of the monuments; limited text is fundamental to maintaining the movement of visitors while at the same time providing the educative material necessary for a pleasant and well-rounded visit.

In all, a comprehensive signage program includes way finding signs to help visitors identify the proper course, interpretive signs (wayside exhibits), orientation signs, trailhead information, consistent safety and warning information, and a Plan Your Visit sign at the entrance.

The site experience, however, begins before a visitor even arrives at the site in question. General information about the history of the site and how to visit it are often disseminated through a multitude of media, such as the Internet, or key hotels that educate individuals about coming to see the specific cultural heritage. This orientation includes maps, what to expect during the course of a visit, information about the services available to visitors, and a site bulletin highlighting points of interest of the specific tours or trails available. The Internet and individual site websites have become fundamental in this task; importantly, such websites manage visitor expectations by providing an introduction to interpretive themes, points of interest inside the park, and rules of behavior.

Site Management

The essence of site management is structuring visitor flow into a site so as not to exceed its carrying capacity. Carrying capacity can be concisely defined as the type and level of visitor use that can be accommodated while sustaining desired resource and social conditions. Visitation exceeds carrying capacity when it damages cultural or natural resources, renders the quality of the visitor experience less than that desired by either the visitor or management, or degrades the quality of life for the inhabitants of local communities.

Interpretation at an archaeological site is a tool of site management. Preservation of archaeological materials is paramount; other interpretive objectives, including generating income and providing an experience that

produce shared memories which are important to the development of group identities, must be served in ways that do not damage archaeological materials. For that reason, most interpretive programs and activities should take place outside of the archaeological site, preferably in local communities that can then realize economic benefit from hosting such activities. The experience of visiting the site is as a rule best interpreted elsewhere.

The site experience should be unique to place, or at least exemplary of a type of place. Therefore, it is necessary to eliminate sensory experience incompatible with the experience of that location. This includes viewshed, sounds, smells, and light pollution. It also includes eliminating the press of crowds in locations that were in ancient times places of contemplation or at places that are conducive to contemplation today.

Commercial Uses

Outside of the typical tourist visit and the economic benefits they can bring, archaeological and historical sites also become centers of political, social, or artistic interest that bring potentially high-impact activities to the site. These could include photography, filming programs, aircraft overflights, and recreational vehicles.

Film and photography of a site are important aspects of promoting protection, information, and general public enjoyment of cultural heritage resources. Managers of these resources may actively assist in filming and photography activities that serve this purpose and would not adversely affect the site. Entertainment interest in cultural heritage sites, however, usually exceeds these parameters. In such cases, a permit should be required for any filming or photography that (1) involves the use of a model, set, or prop; (2) requires entry into a closed area; (3) requires access to the site after normal working hours; (4) requires heavy equipment and its transport around a site. Securing a large performance bond is essential; despite stated intentions, no matter how sincere, it is common that archaeological and historical sites require substantial cleaning and even repair following filming. Film company budgets are often more depleted than anticipated by the film company after work on location.

Aviation is a necessary and acceptable management tool, but its uses go beyond site management and administrative purposes to include military, commercial, and general aviation. Noise and vibrations from touristic overflights can adversely affect a site's resources and values and interfere with visitor enjoyment. As such, these should be mitigated as much as possible.

Similarly, off-road vehicle use should be carefully planned and regulated due to their high impact on a landscape. Roads and areas may be designated for such vehicles only in locales in where studies indicate that there will be no adverse impacts on an area's natural, cultural, scenic, and esthetic values, and in consideration of other visitor uses. Such use should be carefully monitored and regulated. The use of off-highway vehicles by site managers should be limited to what is necessary to manage the public use of designated off-road vehicle routes and areas; to conduct emergency operations; and to accomplish essential maintenance, construction, and resource protection activities that cannot be accomplished reasonably by other means.

Cross-References

- ► Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ► Interpretation (Including Historic Reenactments): Current Approaches
- ► Stakeholders and Community Participation
- ► Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

References

Byrne, D. 1991. Western hegemony in archaeological heritage management. *History and Anthropology* 4: 269–276.

Cameron, D., P. White, R. Lampert, and S. Florek. 1990. Blowing in the wind: Site destruction and site creation

at Hawker lagoon, South Australia. *Australian Archaeology* 30: 58–69.
Clifford, J. 1997. *Route: Travel and translation in the late twentieth century.* Cambridge, MA: Harvard University Press.
Cojti Ren, A. 2006. Maya archaeology and the political and cultural identity of contemporary Maya in Guatemala. *Archaeologies* 2: 8–19.
Comer, D. 2011. *Tourism at Petra: Driver to development or destruction?* New York: Springer Press.
Condori Mamami, C. 1989. History and prehistory in Bolivia: What about the Indians? In *Conflict in the archaeology of living traditions*, ed. R. Layton, 45–59. London: Unwin Hyman.
Flood, J. 1982. *What future for Australia's arid lands?* Broken Hill: Australian Conservation Foundation National Lands Conference.
Forrest, P. 1995. Implications of the relationship between tourism and heritage conservation. In *Cultural conservation: Towards a national approach*. Special Australian Publication series 9, ed. S. Sullivan. Canberra: Australian Government Publication Service.
ICOMOS Ename. 2007. Charter for the interpretation and presentation of cultural heritage sites, proposed final draft 10 April 2007. Available at: http://enamecharter.org/downloads/ICOMOS_Interpretation_Charter_EN_10-04-07.pdf (accessed 1 September 2012).
Jacobs, J.M., and F. Gale. 1994. *Tourism and the protection of Aboriginal sites*. Special Australian Heritage Publication series 10. Canberra: Australian Government Publication Service.
Menorca Statement. 2012. Menorca Statement on the development and use of best practices in the management of archaeological world heritage sites. Proposed by the international committee on archaeological heritage management, 20 July 2012. Available at: http://www.icomos.org/icahm/documents/MenorcaStatement.pdf (accessed 1 September 2012).
Meskell, L. 2001. The practice and politics of archaeology in Egypt. In *Ethics and anthropology: Facing future issues in human biology, globalism and cultural property*, ed. A.-M. Cantwell, E. Friedlander, and M. Tram, 146–169. New York: Academic Science.
Migley, E., D. Spennemann, and H. Johnston. 1998. The impact of visitors on aboriginal sites in Mungo National Park. *Archaeology in Oceania* 33: 221–231.
Schofield, A.J. 1991. *Interpreting artifact scatters: Contribution to ploughzone archaeology.* Oxford: Oxbow Monograph.
Silberman, N. 2006. The ICOMOS-Ename charter initiative: Rethinking the role of heritage interpretation in the 21st century. *The George Wright Forum* 23: 28–33.
Smith, L. 2000. A history of aboriginal heritage legislation in South-Eastern Australia. *Australian Archaeology* 50: 109–118.

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea

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Introduction

From the 1920s until the 1990s, the Siuren I rockshelter was the only Crimean Paleolithic site with an archaeological sequence that was thought to represent almost the entire Crimean Upper Paleolithic industrial and chronological succession, additionally with an Early Upper Paleolithic component at its base. Siuren I was and is still considered to be a key site for the Crimean Upper Paleolithic. Some archaeologists have also interpreted many of the site's lithic assemblages as Aurignacian, making Siuren I a significant site among the few true Aurignacian sites in Eastern Europe. New excavations at Siuren I in the 1990s yielded both new data regarding the site's archaeological context and absolute dates.

The site (44° 58′ N; 34° 08′ E) is situated near the high road from Bakhchisarai to Yalta, 0.5 km from Tankovoe village (formerly Biuk-Siuren) and 13 km south of the town of Bakhchisarai, in southwestern Crimea. It is one of two rockshelters (Siuren II is a Final Paleolithic site) located on the right bank of the Belbek River at its narrowest point ("Belbek Gate") where it cuts through the cliffs of the second range of the Crimean Mountains. Siuren I is a large south-facing rockshelter, 43 m wide, 15 m deep, and 9–10 m thick with an elevation of 15–17 m above the present-day level of the Belbek River.

Key Issues/Current Debates/Future Directions/Examples

History of Investigations at Siuren I and Its Archaeological Interpretations

The archaeological site at the Siuren I rockshelter was discovered and first excavated in 1879–1880 by the pioneer of Crimean prehistoric archaeology, K.S. Merejkowski (St. Petersburg). The excavations were carried out in the central part of the rockshelter near its back wall over an area of about 60 sq. m (Fig. 1). At the time, two Paleolithic layers were identified, although due to poor publications, Siuren I was considered as a doubtful site for more than 40 years (Bonch-Osmolowski 1934).

It was only after the 1926–1929 excavations by the then famous Soviet Paleolithic archaeologist Gleb A. Bonch-Osmolowski that the site was finally recognized as a key site for Crimean Upper Paleolithic. Up to 120 sq. m were excavated and three cultural layers identified within the deposits. These layers were separated by huge limestone blocks, resulting from different rockfall events from the shelter roof (Fig. 2). Although Bonch-Osmolowski distinguished several artificial horizons and even some hearth/ashy lenses within each layer during the excavations, he later combined the finds from each layer into three assemblages on the basis of the rather homogeneous industrial characteristics of the artifacts and his belief that deposition occurred rapidly. The three cultural layers defined by Bonch-Osmolowski (1934) represented, in his view, three stages of Aurignacian development: (1) lower layer (over 85 sq. m excavated) – "Lower Aurignacian" with some Mousterian-type artifacts, core-like end scrapers and numerous microliths with fine retouch; (2) middle layer (over 95 sq. m excavated) – "Middle Aurignacian" with carinated end scrapers and busked burins; and (3) upper layer (over 120 sq. m excavated) – "Upper Aurignacian" with Gravette points and numerous backed bladelets. Accordingly, he placed the Siuren I Upper Paleolithic into European context, finding similar complexes in Europe.

Such Aurignacian interpretations of the Siuren I assemblages were not, however, supported in Soviet archaeology. Instead, it was proposed that the rockshelter's layers showed the entire developmental sequence of the Crimean Upper

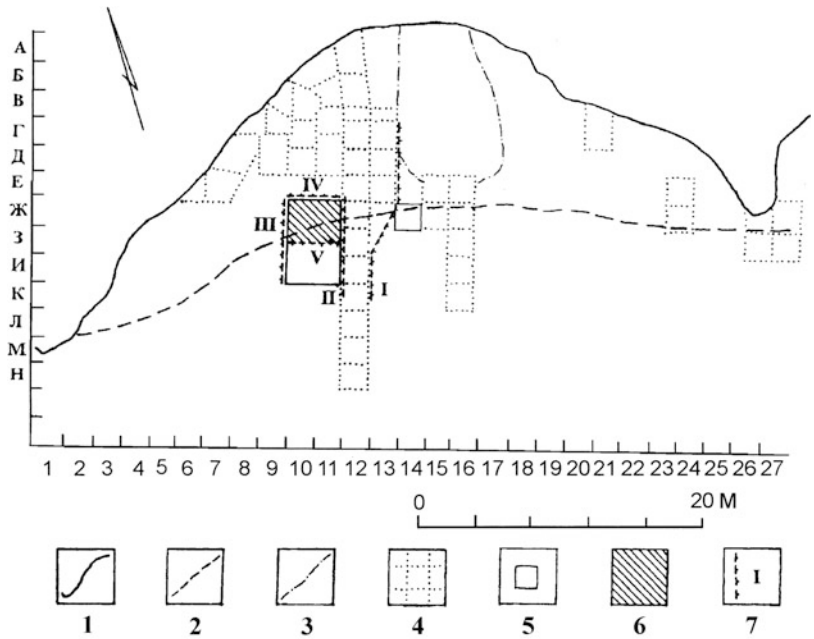

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 1 Siuren I. Map of the excavations. (Modified after Vekilova 1957: Fig. 2 on p. 237). *1*: the rockshelter's back wall; *2*: drip line; *3*: Merejkowski's excavation area (1879–1880); *4*: Bonch-Osmolowski's excavation areas (1926–1929); *5*: Tarasov's excavation area (1981–1982); *6*: new excavation areas (1995–1997); *7*: main stratigraphic profiles

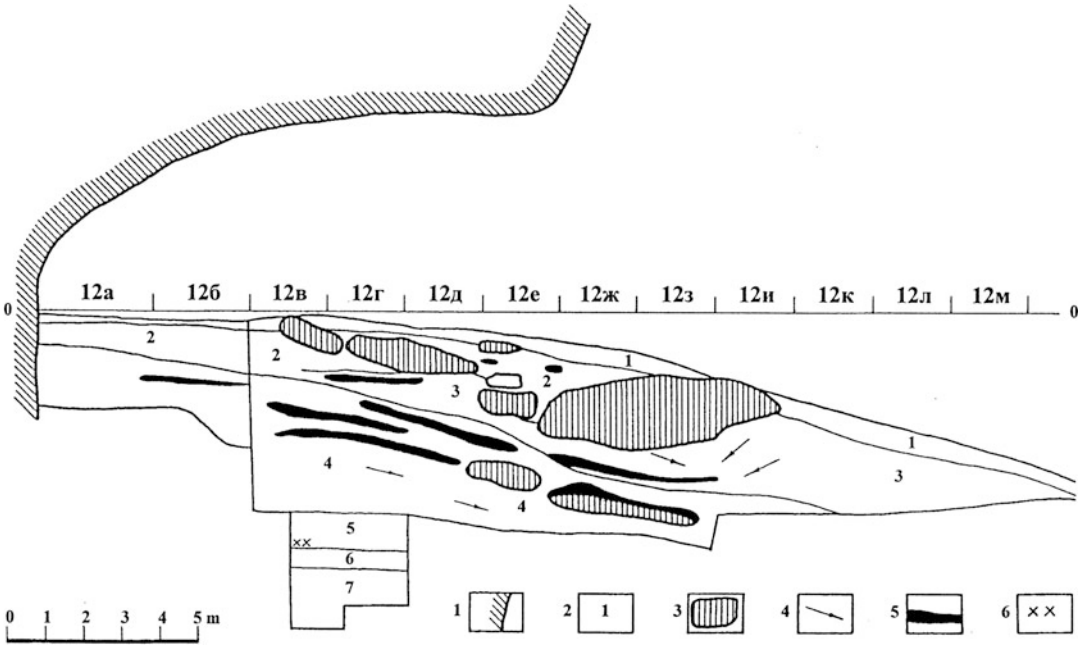

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 2 Siuren I. Stratigraphic profile of Bonch-Osmolowski's 1926–1927 longitudinal trench (*squares* 12 A-M), eastern side. (After Vekilova 1957: Fig. 4 on p. 240). *1*: the rockshelter's back wall; *2*: numbers of lithological strata (*2*: upper cultural layer, *3*: middle cultural layer, *4*: lower cultural layer); *3*: huge limestone blocks and slabs representing different rock fall phases from the roof of the rockshelter; *4*: direction of huge limestone blocks and slabs falls; *5*: hearth/ashy lenses; *6*: mammoth bone finds in archaeologically sterile lithological layer 5 (lower part)

Paleolithic with such "epochal dates": "*Aurignacian*" for the lower layer, "*time of Solutrean and possibly the beginning of Magdalenian*" for the middle layer, and "*time of Late Magdalenian and Early Azilian*" for the upper layer (Vekilova 1957). Siuren I and Crimea as a whole were also placed within the "*Mediterranean-African*" Upper Paleolithic zone although the Siuren I assemblages also have analogies in the southern Caucasus (Georgia) to the east. Vekilova's "chronological" interpretations for the Siuren archaeological context, demonstrating the whole Crimean Upper Paleolithic sequence, were widely accepted in Soviet archaeology. The Aurignacian attribution of the assemblages from the rockshelter's lower and middle layers was also lost, which is why they were later assigned to the unclear "*Aurignacoid route of Upper Paleolithic development in Eastern Europe*" and dated to the Last Glacial Maximum (c. 20–18,000 BP) (Anikovich 1992). On the other hand, Bonch-Osmolowski's Aurignacian definitions for the lower and middle layer assemblages were supported and developed by European archaeologists (since Peyrony 1948). Thus, there were two opposed interpretations of the lower and middle layer assemblages until the collapse of the USSR in the 1990s: mostly non-Aurignacian and simply an Early Upper Paleolithic attribution in Soviet archaeology and definite Aurignacian attribution in European archaeology.

To resolve the non-Aurignacian/Aurignacian question for Siuren I, new excavations were undertaken at the site in 1994–1997 by a joint Ukrainian-Belgian team headed by V.P. Chabai and M. Otte. These took place in an area of 12 sq. m in the western part of the rockshelter (Fig. 1). Correlation between new stratigraphic units and Bonch-Osmolowski's layers could be made: the lower layer corresponds to Unit G,

middle layer to Unit F, and upper layer to Units A–E. Additionally, a new unit (H) was discovered below Unit G.

Based on results from modern excavations, reanalysis of the 1920s assemblages, and evaluation of the information available for the original 1879–1880 excavation, the archaeological sequence of the site now includes seven different periods of human occupation from c. 31–30 to c. 12–11 ky BP (all dates discussed here are uncalibrated) within c. 6 m of deposits (Fig. 3). This stratigraphic sequence is represented by alternating limestone *éboulis* layers and sandy, silty-clay/clayey layers, where the rock layers account for more of the sequence than sedimentary layers (Demidenko et al. 1998, 2012; Demidenko 2000; Demidenko and Otte 2000–2001).

Assemblages from the 1920s lower layer/1990s Unit G (with stratigraphically distinct sublevels Gd, Gc1-Gc2, Gb1-Gb2, Ga) and lowermost Unit H represent two alternative occupations periods at the rockshelter no later than the Arcy Interstadial (c. 31–30,000 BP). The first is attributed to the Middle Paleolithic (MP) Crimean Micoquian Tradition (Kiik-Koba type industry) produced by Neanderthals (Fig. 4), and the second to the European Proto-Aurignacian with Dufour bladelets produced by modern *Homo sapiens* (Fig. 5).

The 1920s middle layer/1990s Unit F (with stratigraphically distinct sublevels Fc, Fb1-Fb2, Fa3, Fa1-Fa2) contains assemblages attributed to the Late/Evolved Aurignacian with Roc de Combe bladelets during either the Arcy Interstadial (c. 31–30,000 BP) or the Maisières Interstadial (c. 29,000–28,000 BP) (Fig. 6a: 1–26).

In the 1920s upper layer and Units A–E, it is possible to identify four human occupation phases:

- Late/Evolved Aurignacian (c. 27,000 BP?): Unit E and part of the lowermost finds in the upper layer (Fig. 6b: 1–2)
- Late Gravettian (c. 24/23,000–20,000 BP?): Unit D and some finds in the 3rd "excavation horizon" of the upper layer (Fig. 7)
- Epi-Gravettian (c. 19–18,000 to 15,000 BP?): Unit A (not in situ), a few redeposited tools in humic deposits and most finds in the 1st and 2nd "excavation horizons" of the upper layer (Fig. 8a: 1–11)
- Final Paleolithic "Crimean Azilian" (Shan-Koba industry) (Allerød Interstadial – c. 12, 11,000 BP): western and eastern discrete "find spots"(c. 8 sq. m each) in the 1st and 2nd "excavation horizons" of the upper layer (Fig. 8b: 1–10)

The proposed chronology for each occupation phase is based on three AMS dates on ungulate bones from Units H, G, and F (Unit H: 28,200 ± 440 BP (OxA-8249); level Ga, the uppermost level of Unit G: 28,450 ± 600 BP (OxA-5154); sublevel Fb2: 29,950 ± 700 BP (OxA-5155)), faunal data indicating a rather temperate climate during sediment deposition of Units H, G, and F (López Bayón 1998; Pettitt 1998) and industrial comparisons of the Siuren assemblages with techno-typologically similar and well-dated industries in Crimea and Europe. It should be also emphasized here that five other ungulate bone samples from Unit F (level Fb1-Fb2), Unit G (one sample from level Gb1-Gb2 and two samples from level Gc1-Gc2), and Unit H (one sample) were not dated by the Oxford radiocarbon laboratory because of collagen problems (Demidenko et al. 2012). At the same time, three dating attempts on charcoal samples by the Louvain-la-Neuve (Belgium) and Oxford laboratories were either too young to be Upper Paleolithic or had collagen problems, which is why subsequent dating attempts concentrated on ungulate bone.

Interpretations of the chronology of the Siuren I industries have the following implications for the lower (Units H–G) and middle (Unit F) deposits. The co-occurrence of Micoquian and Proto-Aurignacian artifacts in Units H and G testifies to the geochronological coexistence of MP Neandertals and EUP *Homo sapiens* in Crimea c. 30,000 BP. A chronological gap between the Micoquian and Proto-Aurignacian assemblages (Units H and G) and the Late/Evolved Aurignacian (Unit F) is either nearly absent or quite short, making it possible for modern *Homo*

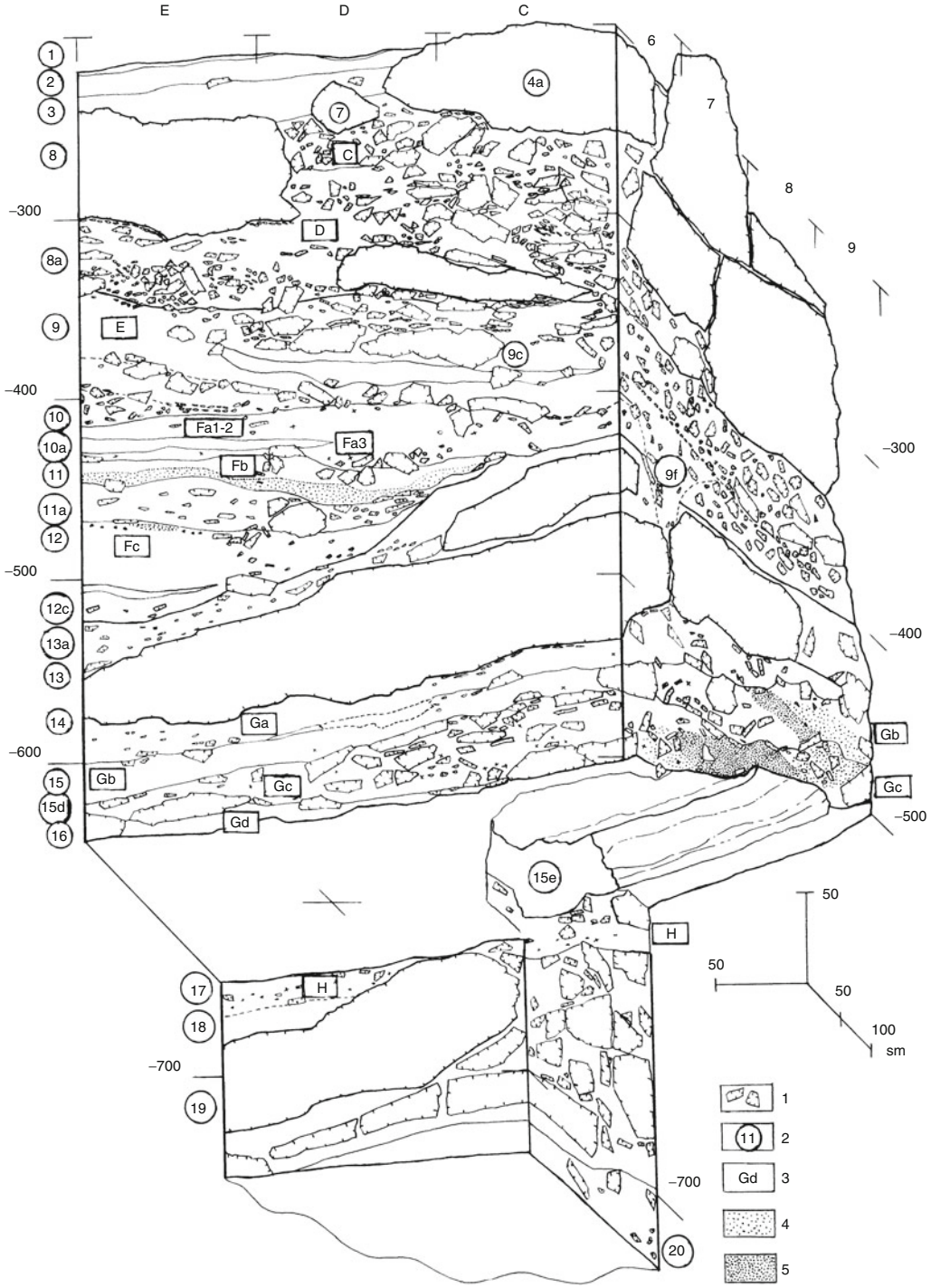

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 3 Siuren I. Combined profiles # III and IV of the 1990s excavations. *1*: limestone slabs and *éboulis*; *2*: lithological strata defined in the 1990s; *3*: archaeological units and levels defined in the 1990s; *4*: charcoal pieces; *5*: hearth/ashy lenses

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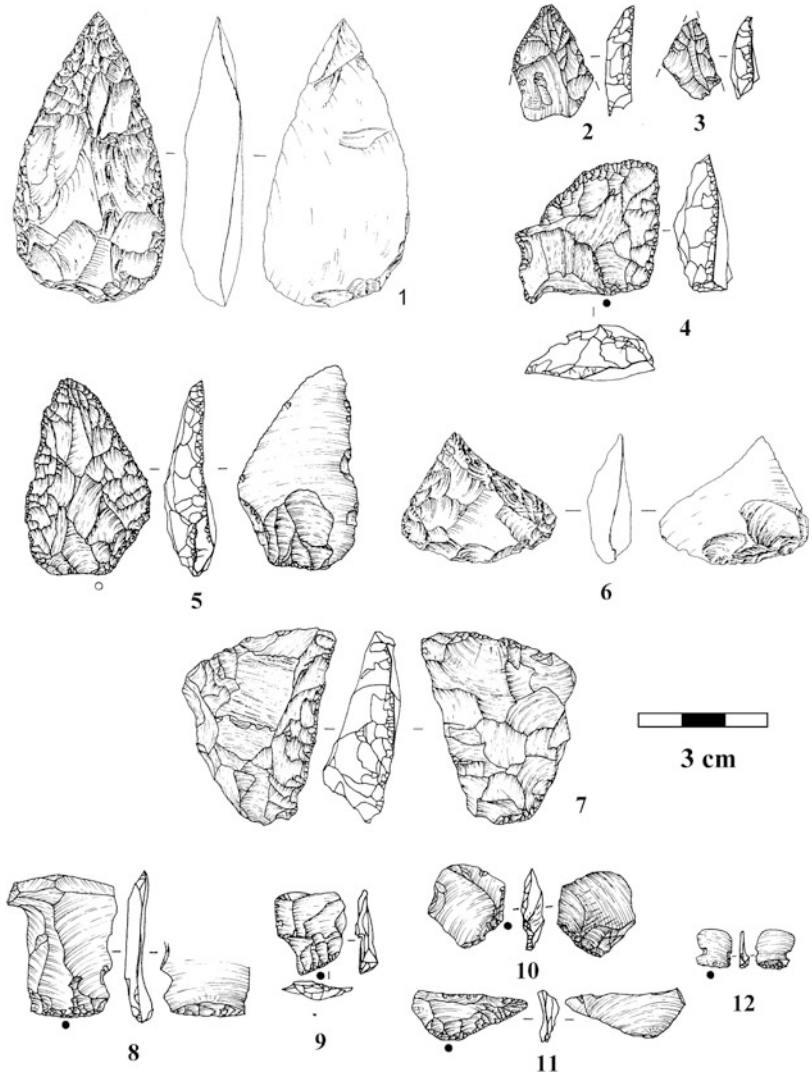

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 4 Siuren I. Units H and G (1990s), Middle Paleolithic Crimean Micoquian Tradition (Kiik-Koba type industry) flint artifacts *1–7*: unifacial and bifacial convergent tools; *8–12*: retouch and rejuvenation flakes and chips from unifacial and bifacial tools secondary treatment processes

sapiens with a Late/Evolved Aurignacian industry to quickly replace the previous inhabitants of Siuren I. As a result, this site not only occupies an important place within the MP-UP transitional period in Crimea but also serves to support both very late survival of Micoquian Neanderthals and the very late appearance of modern *Homo sapiens* and the Proto-Aurignacian here (Chabai 2000, 2003, 2004; Demidenko 2008). However, such a late Proto-Aurignacian Arcy Interstadial geochronology with AMS dates around 28,000 BP was not accepted by most European colleagues. In Western Europe, the Proto-Aurignacian is usually older, radiocarbon dated from c. 37–36,000 to 34–33,000 BP. The proposed Siuren I Proto-Aurignacian chronology could be too young, although the period of c. 30–28,000 BP is still within the broader Aurignacian time span. Therefore, it cannot be excluded that European Proto-Aurignacian *Homo sapiens* indeed penetrated into the south of Eastern Europe after occupation of southern and middle territories in Western and Central Europe. The Siuren I Proto-Aurignacian geochronological issue has also led to major debates on the Siuren I Late/Evolved Aurignacian and its significance for European Late/Evolved Aurignacian research. The Unit F assemblage not only perfectly fits the Western European Late/Evolved Aurignacian definition by having the

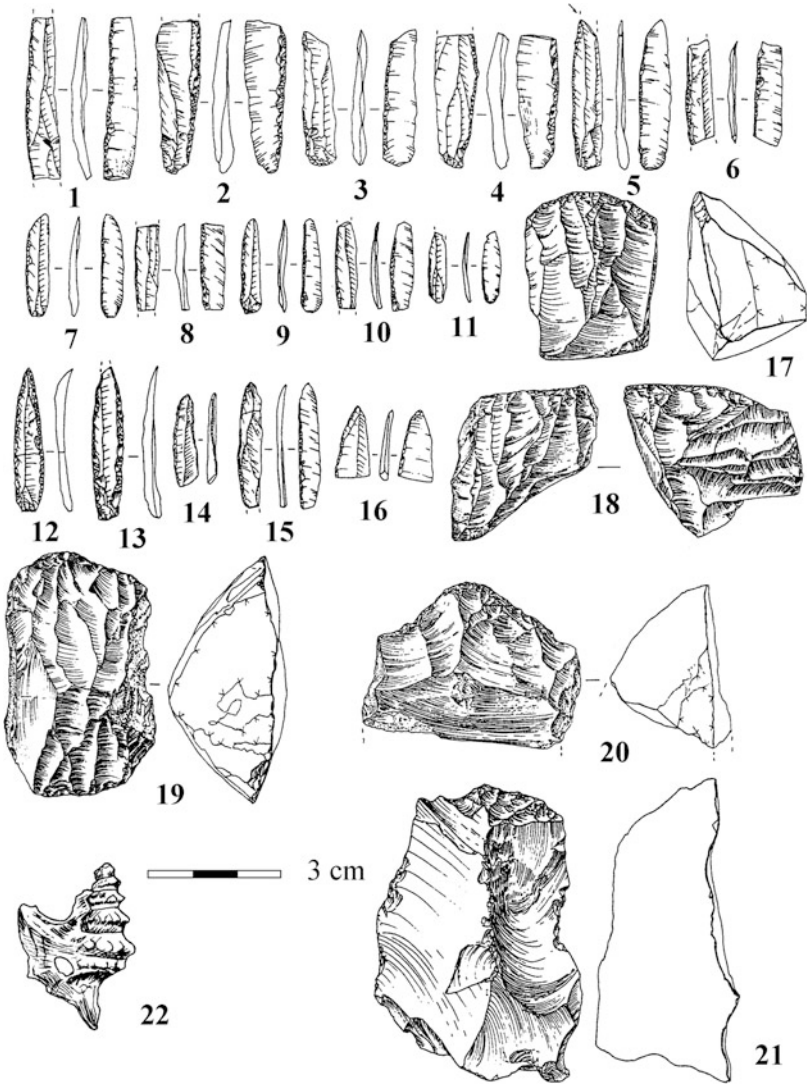

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 5 Siuren I. Units H and G (1990s), Proto-Aurignacian flint artifacts and a shell bead *1–11*: alternatively retouched Dufour bladelets and microblades of Dufour subtype; *12–16*: dorsally and alternatively retouched Font-Yves and Krems points; *17–19*: bladelet "carinated" cores; *20–21*: thick-shouldered end scrapers; *22*: *Apporhais pes pelicani* shell bead

"whole carinated piece package" (bladelet "carinated" cores and both carinated end scrapers and burins) and a single AMS date around 29,000 BP but also has the largest series of Dufour and pseudo-Dufour microblades of Roc de Combe subtype (68 specimens) in all of Europe.

Despite advances with the AMS dates obtained after the 1990s excavations, further dates were needed to provide additional support, leading to the very recent dating program for Siuren I.

Siuren I Dating Results in 2009–2011

From 2009 to 2011, a team of researchers (Yu.E. Demidenko, M. Otte, and P. Noiret (University of Liège) and Ph. Nigst and S. Talamo (Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany)) joined to systematically date ungulate bones from Units H, G, and F (Demidenko et al. 2012; Demidenko in press). In total, 25 samples were sent to the Oxford, Groningen, and Beta Analytic laboratories. The attempts were carried out on two groups of bone samples. One was composed of samples from eight bone tools: two Micoquian bone retouchers from Unit G, two Proto-Aurignacian points and an awl from Unit G, and two Late/Evolved Aurignacian tool production by-products and a point from Unit F. Dates obtained on these eight samples would ideally provide not only dates for human occupations on human-modified bone but also dates for

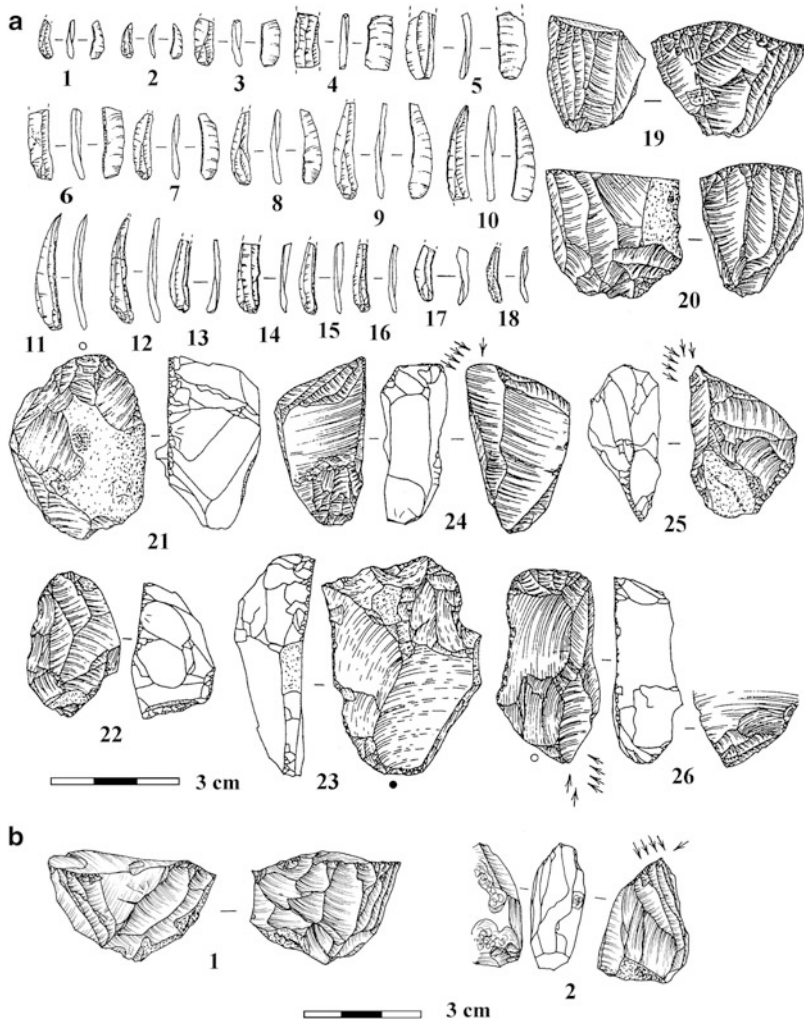

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 6 Siuren I. Units F and E (1990s), Late/Evolved Aurignacian flint artifacts (**a**) *1–26*: Unit F artifacts. *1–9*: ventrally retouched Dufour microblades of Roc de Combe subtype; *10*: alternatively retouched Dufour microblade of Roc de Combe subtype; *11–18*: dorsally retouched pseudo-Dufour microblades of Roc de Combe subtype; *19–20*: bladelet "carinated" cores; *21–22*: carinated end scrapers; *23*: thick-shouldered end scraper; *24–25*: bladelet narrow flaked single-platform cores/"carinated burins"; *26*: simple end scraper/carinated (busked) burin. (**b**): *1–2*: Unit E artifacts. *1* bladelet "carinated" core; *2* bladelet narrow flaked single-platform core/"carinated burin"

both Micoquian and Proto-Aurignacian occupations at the rockshelter. The second group was composed of unmodified ungulate bones: four samples from Unit H, nine samples from Unit G, and four samples from Unit F; their dating was intended to verify the other dates. The dating results, however, did not entirely meet expectations.

Unit F can be considered as successfully dated. All three samples of bone tools were dated by Oxford and ranged between 28.2 and 26.6 ky BP. Of the four ungulate bone samples, three dates were obtained by the three laboratories (30.9–29.4 ky BP) and only one sample had collagen problems. The latter set of dates is somewhat older than the former; although considering dates only for level Fb1–Fb2, the time span is narrower: 30.9–27.8 ky BP. On the other hand, only two dates for the Aurignacian time range were obtained, from Beta Analytic, out of the 18 samples for Units H and G: c. 30.5 ky BP for Unit H and c. 28.0 ky BP for level Gb1–Gb2. Moreover, no samples from the five Micoquian and Proto-Aurignacian Unit G bone tools had sufficient collagen. Four dates for Unit H and level Gb1–Gb2 were too young: 22–13 ky BP. The other six samples had also collagen problems and were not dated.

There is thus a significant difference in dating results obtained from the 1990s and 2009–2011 bone samples between Unit F and Units H–G.

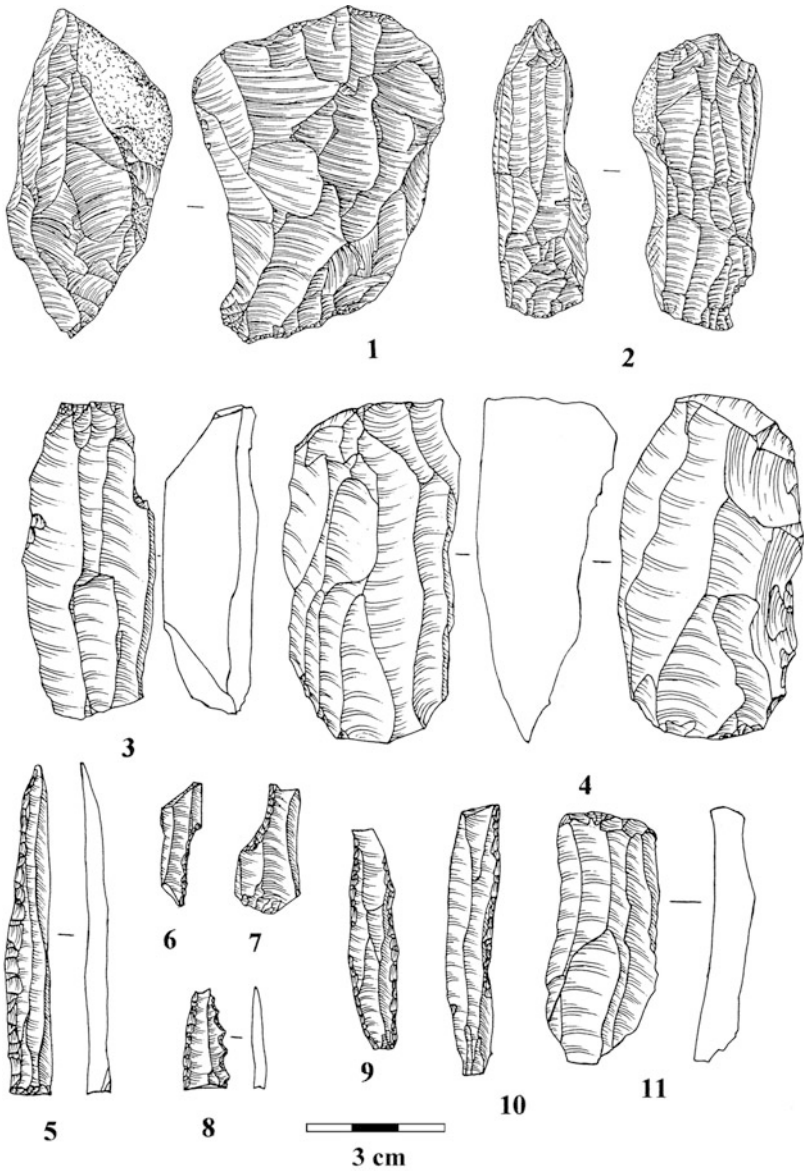

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 7 Siuren I. Late Gravettian flint artifacts. *1–2*: Unit D (1990); *3–11*: 3rd "excavation horizon" of upper layer (1920s) *1–4*: elongated blade/bladelet double-platform bidirectional cores; *5*: Gravette point with truncated base; *6–7*: shouldered/*pieces à cran* on bladelet and blade; *8*: backed bladelet microsaw; *9–10*: backed bladelets with elongated metric proportions and bidirectional scar pattern; *11*: simple flat end scraper

Below are data on samples with collagen problems, including those providing dates considered too young. Unit F has only 2 of 9 samples with collagen problems (22.2%), Unit G 16 of 18 samples (88.9%), and Unit H 4 of 6 samples (66.7%). Combined, samples with collagen problems from Units G and H are 20 of 24 (83.3%).

Such a high percentage suggests that something affected inner content of ungulate bone in Units G and H, causing most of them to have chemical content problems resulting in little or no collagen preservation. This may also explain the dates considered too young (22–13 ky BP). Moreover, with a few Aurignacian-like dates between 30.5 and 28.0 ky BP for Units H and G, statistically identical to the stratigraphically higher dates from Unit F (c. 30.9–29.4 ky BP for ungulate bones and 28.2–26.6 ky BP for bone tools), it is also possible to argue that the four Aurignacian-like dates (30.5–28.0 ky BP) do not

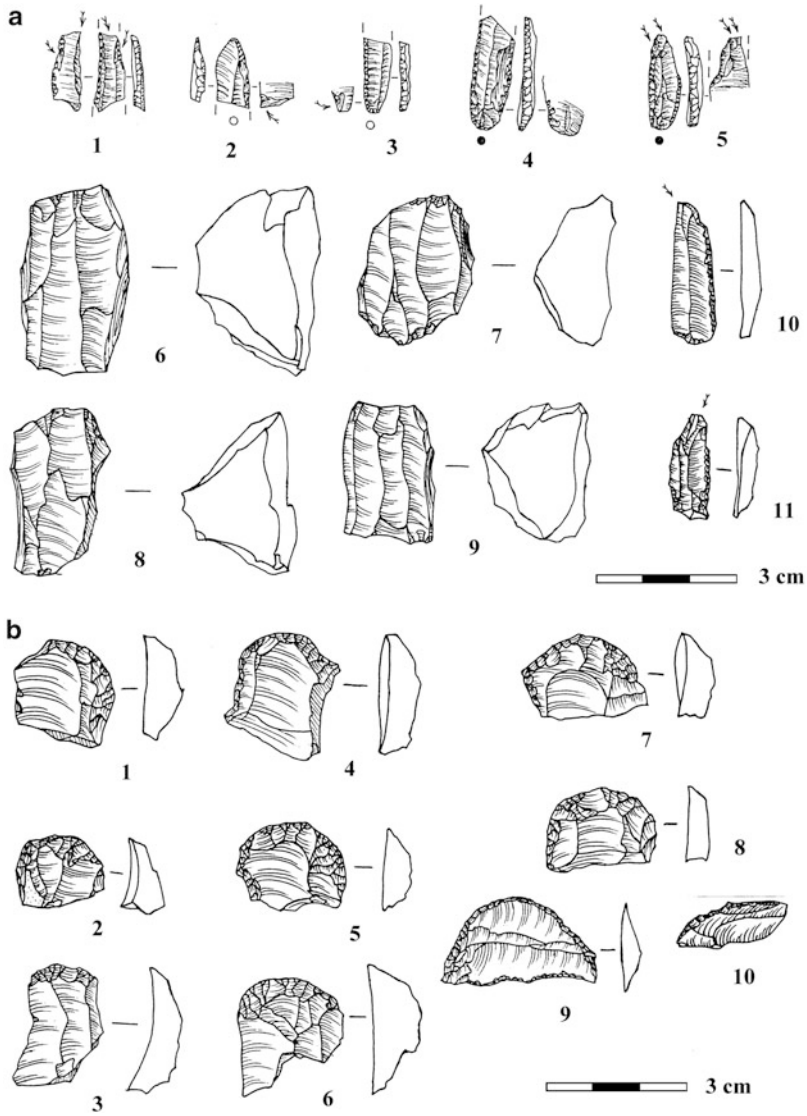

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 8 Siuren I. Epi-Gravettian and Final Paleolithic flint artifacts (**a**) *1–11*: Epi-Gravettian artifacts (1920s and 1990s excavations). *1–5*: non-in situ finds of Holocene humus sediments (1990s); *6–11*: 2nd "excavation horizon" of upper layer (1920s). *1–5*, *10–11*: backed bladelets with projectile damage; *6–9*: bladelet double-platform bidirectional cores. (**b**) *1–10*: The eastern Final Paleolithic "find spot" of 1st and 2nd "excavation horizons" of upper layer (1920s). *1–8*: simple flat shortened end scrapers; *9–10*: segments

represent a true age, being too young although not as recent as the four non-Aurignacian-like dates (22–13 ky BP).

Coming back to the uncalibrated AMS dates known in Europe for the Proto-Aurignacian with Dufour bladelets and Late/Evolved Aurignacian with Roc de Combe bladelets – c. 37–36 to 34–33,000 BP and c. 32–28,000 BP, respectively – recall that the two sets of Aurignacian units at Siuren I correspond well to these European Aurignacian industries. It is thus certain that Siuren I Unit F and its best archaeologically representative level (Fb1–Fb2) are attributable to the Late/Evolved Aurignacian with Roc de Combe bladelets, with six AMS dates around 30.9–27.8 ky BP, and corresponds well to the analogous European industry. On the other hand, the four existing "not too young" AMS dates for Units H and G (30.5–28.0 ky BP) do not at all fit into the known European Proto-Aurignacian chronology. Therefore, the suggestion of chemical content issues for the Units H and G ungulate bones appears more likely.

In sum, aside from the already proposed very late chronological position of Siuren I Proto-Aurignacian in Units H and G (c. 31–30,000 BP)

within the European Proto-Aurignacian as a whole (c. 37–36 to 34–33,000 BP), an alternative hypothesis is now proposed that the existing Siuren I AMS dates for Units H and G are too young for their real uncalibrated C14 age. As a result, the Siuren I Proto-Aurignacian could join the European Proto-Aurignacian not only on the basis of artifact similarities but also probably their chronology. Moreover, if this is valid, then the Micoquian in Siuren I Units H–G is also not too late, meaning that Siuren I can no longer serve as a strong argument for late survival of Micoquian Neanderthals in Crimea.

Cross-References

- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Crimean Upper Paleolithic
- ▶ Lithic Technology, Paleolithic

References

Anikovich, M.V. 1992. Early Upper Paleolithic industries of Eastern Europe. *Journal of World Prehistory* 6: 205–245.

Bonch-Osmolowski, G.A. 1934. The results of the investigations in the Crimean Paleolithic. *The Proceedings of the Second International Congress of the Association for the Quaternary Investigations in Europe* 5: 114–83 (in Russian).

Chabai, V.P. 2000. On the specific features of the Middle to Upper Paleolithic transition in Crimea. *Stratum Plus* 1: 54–83 (in Russian).

Chabai, V.P. 2003. The chronological and industrial variability of the Middle to Upper Paleolithic transition in eastern Europe. *Trabalhos de Arqueologia* 33: 71–86.

Chabai, V.P. 2004. *The Middle Paleolithic of Crimea: Stratigraphy, chronology, typological variability & eastern European context*. Simferopol: Shlyakh (in Russian).

Demidenko, Y.E. 2000. "Crimean Enigma" – Middle Paleolithic artifacts within Early Aurignacian of Krems-Dufour complexes at Siuren I: Alternative hypothesis for solution of the problem. *Stratum Plus* 1: 97–124 (in Russian).

Demidenko, Y.E. 2008. The Early and Mid Upper Palaeolithic of the North Black sea region: An overview. *Quartaer* 55: 91–106.

Demidenko, Y.E., and M. Otte. 2000–2001. Siuren I (Crimea) in the context of a European Aurignacian. *European Prehistory* 16–17: 133–146.

Demidenko, Y.E., V.P. Chabai, M. Otte, A.I. Yevtushenko, and S.V. Tatartsev. 1998. Siuren-I, an Aurignacian site in the Crimea (the investigations of the 1994–1996 field seasons). In *Anatolian prehistory. At the crossroads of two worlds, volume 1*. ERAUL 85, ed. M. Otte, 367–413. Liege: Université de Liège.

Demidenko, Y.E., M. Otte, and P. Noiret, eds. 2012. *Siuren I rock-shelter. From Late Middle Paleolithic and Early Upper Paleolithic till Epi-Paleolithic in Crimea*. ERAUL 129. Liege: Université de Liège.

Demidenko, Y.E., P. Nigst, S. Talamo, et al. in press. AMS C14 dating of bone samples for the Micoquian and Proto-Aurignacian, and Late/Evolved Aurignacian interfaces at Siuren I, Crimea (Ukraine). *Journal of Archeological Science*.

López Bayón, I. 1998. La faune de Siuren I (Crimee), analyse preliminaire. In *Anatolian prehistory. At the crossroads of two worlds, volume 1*. ERAUL 85, ed. M. Otte, 415–425. Liege: Université de Liège.

Pettitt, P. 1998. Middle Palaeolithic and Early Upper Palaeolithic: The radiocarbon chronology. In *Anatolian prehistory. At the crossroads of two worlds, volume 1*. ERAUL 85, ed. M. Otte, 329–338. Liège: Université de Liège.

Peyrony, D. 1948. Le Périgordien, l'Aurignacian et le Solutréen en Eurasie, d'après les dernières fouilles. *Bulletin de la Société Préhistorique Francaise (Paris)* 45: 305–328.

Vekilova, E.A. 1957. Siuren I site and its place among Paleolithic sites of the Crimea and neighboring territories. *Materials and Investigations of the Archaeology of the USSR (Moscow)* 59: 235–323 (in Russian).

Liang Siyong

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Basic Biographical Information

Liang Siyong 梁思永 was born on November 13, 1904, in Portuguese-occupied Macao as the second eldest son of political reformer and journalist Liang Qichao (1873–1929). Since his father was forced into exile after the premature end of the Hundred Days' Reform of 1898, Liang Siyong grew up in the Japanese harbor city of Yokohama where he received his primary education. After the downfall of the Qing Dynasty, he, together with is family, returned to China in 1913 where, from 1915 to 1923, he enrolled in classes at Qinghua University, preparing him for studies abroad in the United States (Wu 2002). There he

studied Archaeology and Anthropology with Alfred V. Kidder at Harvard University (Browman and Williams 2013). After graduating in 1930, he returned to China where he became a faculty member of the Institute of Archaeology at Academia Sinica's Department for History and Philology. From 1931 to 1937, he participated in and led numerous archaeological excavations in Northern China and at the site of the Shang capital of Anyang. In 1950, Liang Siyong was appointed deputy director of the Institute of Archaeology of the Chinese Academy of Sciences, serving for 4 years until April 2, 1954, when after a persisting illness he died of a heart attack. He was interred at Babaoshan Revolutionary Cemetery in Beijing.

Major Accomplishments

Liang Siyong is considered one of China's first thoroughly trained professional archaeologists and, together with Li Ji, father of Chinese archaeology, introducing the discipline to the country (Liu and Jones 2008). One of the first excavations Liang Siyong conducted in 1931 was at Angangxi in the city of Qiqihar, Heilongjiang province, where he unearthed Neolithic tombs and a number of wells from the Liangzhu culture, dating back more than 5000 years. Likewise, Liang Siyong's excavations of Longshan culture remains at Chengziya in Shandong province in 1934 represent a major breakthrough in the field, even more so due to his meticulous reports on the site, which were published as *Chengziya Site Excavation Reports* (城子崖遺址發掘報告) in the same year, one of the earliest scientific excavation reports ever to be published in China. Until 1937, the year of the outbreak of the Second Sino-Japanese War, Liang Siyong worked on the archaeological site of Anyang in Henan Province, where he unearthed tombs and burial structures in the ancient capital of the Shang dynasty. When in 1937 the majority of archaeological excavations ceded throughout the country, Liang Siyong retreated from the front lines of war to Changsha, Guilin, Kunming, and Lizhuang. After the founding of the People's Republic of China in 1949 and his being appointed deputy director of the Institute of Archaeology of the Chinese Academy of Sciences in the following year, Liang Siyong successively led further excavations in Anyang and at the sites of the Longshan and Yangshao civilizations, eventually sequencing the unearthed finds and establishing the first thorough chronology of China's earliest cultures.

His writing and areas of professional interest comprise – among others – publications on *Neolithic Pottery from the Prehistoric site at Xiyincun, Shanxi Province* (山西西阴村史前遗址的新石器时代的陶器), *Neolithic Pottery and Tools from Rehe* (热河查不干庙等处所采集之新石器时代石器与陶片), *Some Questions concerning Far Eastern Archaeology* (远东考古学上的若干问题), and *Longshan Culture – One of China's Prehistoric Civilizations* (龙山文化 – 中国文明的史前期之一).

References

Browman, David L., and Stephen Williams. 2013. *Anthropology at Harvard. A biographical history 1790–1940*, Peabody Museum Monographs 11, 354–355. Cambridge: Peabody Museum Press.

Liu, Xinyi, and Martin Jones. 2008. When archaeology begins: The cultural and political context of Chinese archaeological thought. *Bulletin of the History of Archaeology* 18 (1): 25–27.

Wu, Liming吳荔明. 2002. *Liang Qichao he ta de ernümen* 梁啓超和他的兒女們. Beijing: Beijing daxue chubanshe.

Skeletal Biology: Definition

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Brief Definition of the Topic

Human skeletal biology emphasizes the dynamic nature and complexity of the human skeleton. Research in human skeletal biology frequently focuses on human remains recovered from archaeological contexts. Topics of research generally relate to health, the relationships among ancestral populations as revealed in biological distance studies, and functional morphology through

related evaluations of behavior and use of the skeleton. Interpretations within the field recognize the mechanisms of growth and development, bone remodeling, sexual dimorphism, adult age changes, and population variation. More specifically, research foci can include skeletal evidence for disease, chemical analyses relating to diet, the growth and maintenance of bones and teeth, demographic reconstruction, trauma, cultural effects, biomechanical adaptation, and postmortem alterations. The term human skeletal biology is frequently used synonymously with the terms human osteology and bioarchaeology.

Cross-References

- ▶ Ancestry Assessment
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Bone: Chemical Analysis
- ▶ Dental Anthropology

Further Reading

Larsen, C.S., and P.S. Bridges. 1997. Skeletal biology. In *History of physical anthropology: an encyclopedia*, ed. F. Spencer, 937–943. New York: Garland Publishing.

Ubelaker, D.H. 2000. Methodological considerations in the forensic applications of human skeletal biology. In Biological anthropology of the human skeleton, ed. M.A. Katzenberg, and S.R. Saunders, 41–67. New York: Wiley-Liss.

Smith, Claire

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Basic Biographical Information

Claire Edwina Smith was born on July 15, 1957, in Sydney, Australia, as the second of three daughters, to James Alexander Smith and Annette (nee Jones) Smith. She spent her youth in Booragul, near Newcastle, NSW, with her working class parents, of Scottish and Irish background, inculcating her with empathy for the disadvantaged, tolerance toward others, valuing action rather than class or wealth, and respect for learning and progressive causes. Her interest in archaeology was inspired by a 1st year course in economic prehistory at the University of Newcastle in 1983 while enrolled in a degree in economics. It challenged her stereotypes about past and present Australian Aboriginal populations. She transferred to an Arts degree at the University of New England in Armidale, NSW, with a focus on Australian Aboriginal art, mentored by Mike Morwood and Jane Balme. She completed her Bachelor of Arts degree there in 1990, with First Class Honors and the University Medal with the thesis *Designed Dreaming: Assessing The Relationship Between Style, Social Structure And Environment In Aboriginal Australia*.

Her doctoral work, also with the University of New England at Armidale, focused on style in Aboriginal rock art, in theory and practice. It was based on extensive fieldwork with and for Aboriginal people of the Barunga region, Northern Territory, Australia, and mentored by Jane Balme, Betty Meehan, and Mike Morwood. It culminated in her 1996 PhD dissertation *Situating style: an ethnoarchaeological study of social and material context in an Australian Aboriginal artistic system.* Following an Australian Research Council Postdoctoral Fellowship, she was appointed to the faculty of the Department of Archaeology at Flinders University as Lecturer (1998), Senior Lecturer (2001), Associate Professor (2005), Professor (2010), and Head of Department (2012–2015). In 2016, she was appointed as Dean (Research) for the College of Humanities, Arts and Social Sciences. She has been the recipient of a Fulbright Postdoctoral Fellowship, hosted by the American University and the Smithsonian Institution National Museum for Natural History, Washington, D.C., in 2000–2001. She has held academic visiting appointments at Columbia University, Lock Haven University, Pitzer College, and the University of Denver in the USA, the University of Cape Town in South Africa, Kyushu University in Japan, and

Smith, Claire, Fig. 1 Claire Smith at Barunga, Northern Territory, 2012. With Danielle Bulumbara, Ester Bulumbara, and Nell Brown. Christine Camfoo and Wendy Willika in the background

the University of Newcastle, NSW, Australia. She is married to anthropologist Gary (Jacko) Jackson who has been an important collaborator in many of her research projects; they have one son (Jimmy) and reside in Blackwood, in South Australia (Fig. 1).

Major Accomplishments

Dr. Smith's scholarship is focused on the art, archaeology, heritage, present conditions, and deleterious outside interventions among postcolonial populations in general, and specifically the Aboriginal Barunga community of the Northern Territory, Australia. For details, consult Dr. Smith's full "Professional Curriculam Vitae" in the references. In addition, she has carried out fieldwork with Indigenous groups in India and Indonesia. Also among her research interests are rock art and the teaching of archaeology and cultural heritage (see for example Smith 2000), and how that teaching affects students, and also the future of Aboriginal populations and public understandings of the sophistication of Aboriginal cultures (e.g., she was the instigator of the following report: *A Past for all Australians: Archaeology and Australia's National History Curriculum,* submitted to the Australian government as input to the national history curriculum).

Very few people have been as intimately engaged with, and for, the people at the focus of their research as Dr. Smith. She has carried out fieldwork in the Aboriginal community of Barunga in the Northern Territory for more than 20 years now (e.g., Smith 2004) and with the Ngadjuri people in South Australia for more than a decade. Dr. Smith's goal is first and foremost to benefit Aboriginal communities and Indigenous communities in general. This is manifest in Dr. Smith's research and scholarship, in her teaching, and in her prodigious service and outreach.

She has been most visible internationally in her many roles in the World Archaeological Congress, particularly her 11 years as the President of the World Archaeological Congress (2003–2014), where she is the Immediate Past President. In her capacity for WAC, she worked to transform interpersonal relations in world archaeology. She has worked actively to democratize world archaeology by breaking down the "old-boy" English-speaking network that

controlled the field and increasing opportunities for Indigenous peoples and for archaeologists and archaeological students from low-income countries to share their knowledge with their peers and to obtain new knowledge in world conferences and through publications, including the *Encyclopedia of Global Archaeology*. She was the organizer and co-organizer of two WAC congresses, WAC-5 in Washington, D.C., in 2003 and WAC-7, at the Dead Sea, Jordan, in 2012. The latter conference provided substantial support for 440 participants from disadvantaged groups and low-income countries. In addition, she instigated many of WAC's new ventures including *the Global Libraries Program* (in support of disadvantaged institutions), *Archaeologists without Borders* (an international faculty exchange), *Archaeologies* (its international journal), and its web presence, and she reinvigorated its publication programs (with five new book series), its topical inter-congresses, and its championing of ethical practices within the archaeology and related disciplines.

Both in her academic and administrative functions, she is frequently voicing concerns in the public arena about policies deleterious to the archaeological record and its cultural custodians, particularly in postcolonial contexts. In Australia, and internationally, she frequently speaks out, and publishes academically and in popular media, about how governments and governmental and non-governmental organizations can interact with Indigenous populations in a culturally sensitive, fair, and just manner and how deleterious many public policies are toward Indigenous Communities. Most recently she is often asked to advise, consult, and help academic institutions, foundations, research museums, and Indigenous governmental bodies with that dimension of their work. Her research has been supported by grants from the Australian Research Council, the Australian Academy of the Humanities, the Fulbright Commission, Wenner-Gren Foundation, Australia Youth Foundation, Australian Institute of Aboriginal and Torres Strait Islander Studies, and Ian Potter Foundation, among others, and has generated considerable corporate support for the causes she champions.

Among her numerous publications, Dr. Smith has completed 12 books and more than 50 refereed articles and chapters (in English, and in Catalan, German, Japanese, and Spanish), as well as innumerable reports, conference papers, blog pieces, films, interviews, news releases, and more than 20 key note addresses at international professional venues (Argentina, Australia, Brazil, Canada, England, Japan, New Zealand, Nigeria, Portugal, Russia, and the USA). A number of these publications have been written with her close colleague, Dr. Heather Burke (Burke and Smith 2004, 2007; Burke et al. 2008, 2017; Domingo et al. 2007; Smith and Burke 2007). One of her most successful and far-reaching publication ventures has been her editorship of the *Encyclopedia of Global Archaeology* (11 volumes, 8,013 pages, 2,619 figures, 106 tables, 1,390 authors, and 1,625 entries). Its first edition, published in 2014, has received more than a quarter of a million downloads so far (Smith 2014).

But it is not just in her publications that Dr. Smith has helped to transform her profession. She has been a tireless worker behind the scenes, creating alliances, jumpstarting new cooperative research ventures, and helping along and mentoring young professionals, students, and people from disadvantaged populations. She has been one of the prime movers in the field of Indigenous archaeologies, in safeguarding Indigenous intellectual properties and cultural knowledges, and in the decolonization and empowerment of Indigenous heritage (See, for example, Smith and Wobst 2005). She is a passionate fighter for community-controlled research that increases opportunities; improves community control over community resources, knowledges, and patrimony; and leads to more sensitive and constructive treatment of community members by outsiders, be they academic, corporate, or governmental. She has worked ceaselessly to train students in these directions, to facilitate international and interdepartmental collaboration toward these ends, and to support young professionals from previously underrepresented populations, as in her support for the Closet Chickens (a mutual support group of Indigenous scholars and their friends). She also was a prime mover behind the

Smith, Claire,
Fig. 2 Claire Smith in Amman, Jordan, 2012, with student volunteers for WAC-7

Smith, Claire,
Fig. 3 Claire Smith, Gary Jackson, and extended family, 2017. Blackwood, South Australia

massive international cooperative research project *Intellectual Property Issues in Cultural Heritage* (funded by the Canadian Social Sciences and Humanities Research Council's Major Collaborative Research Initiatives program, 2008–2017), and she has organized a number of international conferences to further this agenda, including the Fulbright Symposium "Indigenous Cultures in an Interconnected World" (1997, Darwin, Northern Territory) (Smith and Ward 2000), "Cultural Heritage and Indigenous Cultural and Intellectual Property" (2006, Burra, South Australia), and "Cultural Heritage, Social Justice and Ethical Globalisation" (2007, Adelaide, South Australia).

Her many honors include the Jawoyn Aboriginal kin name, Lamjerroc, being given to her son Jimmy in 1990, and a number of prestigious teaching awards including the Carrick Award for Teaching (team category, held jointly with Dr. Heather Burke) and the Prince of Wales

Award, and she is a member of Flinders University's College of Distinguished Educators. She has been appointed to the Australian Research Council's College of Experts, elected to Fellowship in the Society of Antiquaries (London), and frequently invited to lend her insights and reflections as discussant to international symposia in anthropology, archaeology, Indigenous studies, heritage studies, and other fields. There are few if any people of her generation who have had a greater catalyzing influence on archaeology and related disciplines, to help them break out of narrow disciplinary molds and to direct them to projects that honor not only the past but also do justice and improve the conditions of the descendant populations who are the rightful custodians of that past today (Figs. 2 and 3).

Cross-References

- ▶ Australian Rock Art
- ▶ Burke, Heather
- ▶ Closet Chickens
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Ethics in Archaeology
- ▶ Intellectual Property Issues in Cultural Heritage (IPinCH) Project
- ▶ World Archaeological Congress (WAC)

References

Burke, H., and C. Smith. 2004. *The archaeologist's field handbook*. Sydney: Allen & Unwin.

Burke, H., and C. Smith, eds. 2007. *Archaeology to delight and instruct. Active learning in the university classroom*. Walnut Creek: Left Coast Press.

Burke, H., C. Smith, D. Lippert, J. Watkins, and L. Zimmerman, eds. 2008. *Kennewick: Perspectives on the ancient one*. Walnut Creek: Left Coast Press.

Burke, H., C. Smith, and L. Zimmerman. 2009. *The archaeologist's field handbook. North American edition*. Walnut Creek: AltaMira Press.

Burke, H.D., M.J. Morrison, and C.E. Smith. 2017. *The Archaeologist's field handbook*. 2nd ed. Sydney: Allen and Unwin.

Domingo, H. Burke, and C. Smith. 2007. *Manual de campo para arqueologos*. Barcelona: Ariel Editorial.

Professional curriculum vitae: www.flinders.edu.au/people/claire.smith

Smith, C. 2000. *Teaching archaeology in cyberspace. A pilot study at Flinders University, South Australia*. Adelaide: Southern Archaeology.

Smith, C. 2004. Country, kin and culture. In *Survival of an Australian Aboriginal community*. Adelaide: Wakefield Press.

Smith, C.E., ed. 2014. *Encyclopedia of global archaeology*. 1st ed. New York/Dordrecht/Heidelberg/London: Springer.

Smith, C., and H. Burke. 2007. *Digging it up down under: A practical guide to doing archaeology in Australia*. New York: Springer.

Smith, C., and G.K. Ward, eds. 2000. *Indigenous cultures in an interconnected world*. Sydney: Allen and Unwin.

Smith, C., and H.M. Wobst, eds. 2005. *Indigenous archaeologies: Decolonising theory and practice*. London: Routledge.

Smith, Laurajane

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Basic Biographical Information

Laurajane Smith earned her B.A. and Ph.D. from the University of Sydney. She has held positions at Charles Sturt University (1990–1995), the University of New South Wales (1995–2000), and the University of York (2000–2009). At the University of York, she directed the M.A. program in heritage studies. She moved to Australian National University in 2010 and was an ARC Future Fellow there from 2010 to 2014. In 2014, she became Director of the then newly established Centre of Heritage and Museum Studies and coordinator of the Masters in Museum and Heritage Studies. In 2016, she became Head of the School of Archaeology and Anthropology.

Major Accomplishments

Professor Smith specializes in heritage studies. She is renowned for the concept of the

"Authorized Heritage Discourse" (AHD), which she featured in her 2006 book, *Uses of Heritage*. The AHD is the "dominant Western discourse about heritage. . . that works to naturalize a range of assumptions about the nature and meaning of heritage" (Smith 2006: 4). The AHD focuses on "things" and is dominated by "concepts of monumentality and aesthetics" (p. 4). Professor Smith is the editor of the *International Journal of Heritage Studies*, coeditor of Routledge's *Key Issues in Cultural Heritage* series, and the founder of the Association of Critical Heritage Studies, whose inaugural meeting was held in 2012. She was elected as a Fellow of the Academy of the Social Sciences in Australia in 2016 and was awarded a *Doctor Honoris Causa* from the University of Antwerp in 2018.

Cross-References

- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Heritage Theory
- ▶ Intangible Cultural Heritage
- ▶ International Journal of Heritage Studies
- ▶ Uses of Heritage
- ▶ World Heritage and Human Rights

References

Smith, L. 2006. *Uses of heritage*. London: Routledge.

Further Readings

Akagawa, N., and L. Smith, eds. 2018. *Safeguarding intangible heritage: Practices and politics*. London: Routledge.

Gibson, L., and P. Pedlebury, eds. 2009. *Valuing historic environments*. Aldershot: Ashgate.

Graham, B., and P. Howard, eds. 2008. *Heritage and identity*. Aldershot: Ashgate.

Labadi, S., and C. Long, eds. 2010. *Heritage and globalisation*. Abingdon: Routledge.

Langfield, M., W. Logan, and M.N. Craith, eds. 2010. *Cultural diversity, heritage and human rights*. London: Routledge.

Smith, L. 2004. *Archaeological theory and the politics of cultural heritage*. London: Routledge.

Smith, L. 2006. Cultural heritage: Critical concepts in media and cultural studies. London: Routledge.

Smith, L., and N. Akagawa, eds. 2009. *Intangible heritage*. London: Routledge.

Smith, L., and E. Waterton. 2009. *Heritage, communities and archaeology*. London: Duckworth Publishing.

Smith, L., P. Shackel, and G. Campbell, eds. 2011a. *Heritage, labour and the working class*. London: Routledge.

Smith, L., G. Cubitt, K. Fouseki, and R. Wilson, eds. 2011b. *Representing enslavement and abolition in museums: Ambiguous engagements*. New York: Routledge.

Smith, L., E. Waterton, and S. Watson, eds. 2012. *The cultural moment of tourism*. London: Routledge.

Smith, L., M. Wetherell, and G. Campbell, eds. 2018. *Emotion, affective practices, and the past in the present*. London: Routledge.

Smith, Mike

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Basic Biographical Information

To my generation, Mike Smith seems one of the godfathers of prehistoric archaeology in Australia. Following in the footsteps of the Australian archaeology greats, like Rhys Jones, John Mulvaney, and Norman Tindale, Mike, a polymath by inclination, has been at the forefront of Australian archaeology debate since the 1980s. In over 30 years of research, Mike has been involved in research exploring the early colonization of Australia; the timing and composition of arid zone prehistoric occupation; the extinction of, and human interactions with, megafauna; the antiquity and mechanics of prehistoric seed grinding; and the late Holocene "intensification" debate. He has been instrumental in the application of new techniques to Australian archaeology, including geochemical provenancing of ochres, the use of thermo- and optically stimulated luminescence dating, and the routine inclusion of paleoclimatological and paleoecological analysis into excavations. Internationally, Mike is well

known within the South American and South African archaeological communities and is regularly invited to participate in conferences and research on both continents.

Mike grew up in Adelaide and much of his early career showed an ongoing interest in South Australia. His early fieldwork experience was pivotal and included Roonka, on the lower Murray, where he joined the museum's excavations in 1971 while still a school boy. Later he worked at Koonalda Cave with Sandor Gallus in 1973 and at Wyrie Swamp with Roger Luebbers, in 1974 prior to starting university. Both his B.A. (hons) and M.A. theses were undertaken at The Australian National University (ANU) and focused on sites in South Australia. His honors research involved a detailed faunal analysis of excavated materials from Devon Downs rockshelter, a 5000-year-old site located in the Lower Murray River. This site has a long history of investigation, originally excavated by Norman Tindale in 1930, who obtained some of first radiocarbon dates in Australia from this site in 1965, and most recently excavated by Mike himself in 1977 when he reopened part of the old trenches as part of his honors research. Mike's MA involved the systematic survey and investigation of Plumbago historic reserve (near Manna Hill) and was one of the first formal applications of probabilistic sampling techniques to an archaeological field survey.

At the beginning of 1980s, Mike took a job as the field archaeologist with the Northern Territory Museum, with a brief "to survey, record and excavate archaeological sites across the Northern Territory." Initially based in Darwin, Mike soon transferred to an office in Alice Springs and began a 30-year relationship with the prehistory of Central Australia. By the late 1980s, Mike had already surveyed and excavated a plethora of sites across region (Tjungkupu 1 and 2, Wanmara, Illarari kulpi malu tjukurr, Rrewurlpmurlpme Kweke, Kweyunpe 6, Urwemwerne, ORH16, Urre, Intirtekwerle, and Therreyererte), and importantly he had discovered one of the most significant sites in Australia – Puritjarra, a massive rockshelter in the Cleland Hills (Fig. 1). With the data from these sites, Mike completed a Ph.D. thesis (University of New England, 1988) and produced a number of seminal publications (see below), on the timing and pattern of prehistoric occupation of Central Australia. His ideas were critical in the formation of models on the colonization and abandonment of inland Australia during the Last Glacial Maximum. These studies were also the first to characterize the antiquity of seed-grinding processes in the desert and the first to explicitly explore the archaeology of a desert totemic center. Although his work highlighted the extent of economic intensification in the desert during the last millennium, Mike never formally

Smith, Mike, Fig. 1 (1986 Puritjarra) – Mike at excavations of Puritjarra Rockshelter 1986

entered the social intensification debates of the 1980s and 1990s preferring to decouple social and economic changes and empirically track these separately in his analyses.

Puritjarra was a key focus of Mike's research for several decades – with over 10 publications on the site in the last 20 years, each exploring a key theme in desert research. He has recently (Smith 2010) published the complete body of works on the site. It still remains one of the most comprehensive studies of an archaeological site in Australia.

Mike had met Rhys Jones, another key figure in Australian archaeology, on the Wyrie Swamp dig in 1974 and later sought out Rhys as an advisor and mentor on his Ph.D. panel. This developed into a strong partnership when Mike became a research fellow at ANU in 1989 and with Rhys and Bert (RG) Roberts undertook a number of nationally significant excavations at rockshelters in Arnhem Land, Northern Territory. These excavations, at Malakunanja II and Nauwalabila I, provided some of the earliest dates for the colonization of the continent (55 ± 5 ka). And even today, these sites still remain the earliest evidence of human occupation in Australia. This work in Arnhem Land – and that at Puritjarra – was the earliest deployment of luminescence dating at Australian archaeological sites.

Since 1996, Mike has worked for the National Museum of Australia (Canberra), as a Senior Curator and Research Fellow. While his main interests remained focused on Central Australia, the Museum provided a platform for broadening the scope of research to include other parts of the arid zone: looking at Genyornis nesting sites on the west coast with Gifford Miller (Fig. 2), mapping millstone quarries in the Strzelecki Desert, and using pack camels to explore the eastern margins of the Simpson Desert (Fig. 3). Key outcomes of his time at the Museum include his research (with June Ross) on the archaeology of the Glen Thirsty site, and the direct dating of Panaramitee style rock engravings in Central Australia (showing them to be much younger than previously believed); excavations at Lake Gregory (with Peter Veth and Jim Bowler) demonstrating early evidence of Aboriginal occupation; and the application of time-series analysis to explore human-environment interactions across dry lands in both Australia and South America.

Smith, Mike, Fig. 2 (2007 Kallakoopah) – Mike excavating a fragment of megafauna on the Kallakoopah River 2007

Most recently, Mike has brought the growing body of evidence from the arid zone together in a major synthetic book from Cambridge University, which has recently been published (Smith 2013).

Major Accomplishments

- Royal Society of South Australia's Verco Medal for outstanding contributions to the archaeology of Australia's deserts (2010)
- Contributing author to the Royal Zoological Society of New South Wales' Whitley Medal for "Boom and Bust" (2009)
- Australian Public Service Australia Day Achievement Medallion (2009) for outstanding performance relating to special projects or core duties
- Fellow of Society of Antiquaries (2007)
- Fellow of the Australian Academy of the Humanities (2006)
- Rhys Jones Medal for Outstanding Contribution to Australian Archaeology (2006).
- Member, National Committee for Quaternary Research, Australian Academy of Science (2010–)

Smith, Mike, Fig. 3 (2010 Simpson) – Over the years Mike (*right*) has become a keen cameleer. Inadvertently, this has given him far greater access into the interior of many of the deserts of Australia

- Commonwealth Government nominee, Strehlow Research Centre Board, Museums and Art Galleries of the Northern Territory (2010–2013); The Australian National University (2010–present)
- Board of Directors and Research Advisory Panel, Australian Desert Expeditions (2008–present)
- Steering Group, International Geological Correlation Program 413 (Understanding future desert changes from past dynamics), UNESCO (1996–2003)
- Technical and Scientific Advisory Committee, Willandra World Heritage Area, Department of Environment, Commonwealth Government of Australia (2000–2006)
- Advisory Board, Centre for Research into Language Change, The Australian National University (2002–2006).

Cross-References

- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Australian Rock Art
- ▶ Dating Techniques in Archaeological Science
- ▶ Geoarchaeology
- ▶ Hunter-Gatherers, Archaeology of

References

Smith, M.A. 2010. *Puritjarra rock shelter: final report on excavations 1986–1990*, Technical Report 1. Canberra: National Museum of Australia Press.

Smith, M. 2013. *The archaeology of Australia's deserts*. Cambridge University Press.

Further Reading

Roberts, R.G., R. Jones, and M.A. Smith. 1990. Thermoluminescence dating of a 50,000 year old human occupation site in northern Australia. *Nature* 345: 153–156.

Smith, M.A. 1986. The antiquity of seed-grinding in arid Australia. *Archaeology in Oceania* 21: 29–39.

Smith, M.A. 1987. Pleistocene occupation in arid Central Australia. *Nature* 328: 710–711.

Smith, M.A. 1989. The case for a resident human population in Central Australian Ranges during full glacial aridity. *Archaeology in Oceania* 24: 93–105.

Smith, M.A. 2006. Characterizing late Pleistocene and Holocene stone artefact assemblages from Puritjarra rock shelter: A long sequence from the Australian desert. *Records of the Australian Museum* 58: 371–410.

Smith, M.A., and S. Ross. 2008. What happened at 1500-1000 BP in Central Australia? Timing, impact and archaeological signatures. *The Holocene* 18 (3): 379–388.

Smith, M.A., A. Watchman, and J. Ross. 2009. Direct dating indicates a mid-Holocene age for archaic desert rock engravings in arid Central Australia. *Geoarchaeology* 24: 191–203.

Smithsonian Institution

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Introduction

The Smithsonian Institution (See Fig. 1.) is a broad-based cultural institute situated in Washington, D.C., USA, and offers free entry to all visitors. It was founded by a bequest from James Smithson (1765–1829), a British scientist who left his estate to the USA to establish "at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge." Smithson's bequest amounted to more than 100,000 gold sovereigns (Smithsonian Institution Website 2012). Since its establishment as a trust by President James K. Polk on August 10, 1846, the Smithsonian Institution has become the world's largest combined museum and research complex, with 19 museums, the National Zoo, and 9 research facilities. The institutions of the Smithsonian house over 137 million objects and have over 7.4 million digitized objects (Smithsonian Institution Website 2012).

Definition

The Smithsonian Institution considers its mission as being instrumental in the increase and diffusion of knowledge. It also promotes its vision as: Shaping the future by preserving our heritage, discovering new knowledge, and sharing our resources with the world. The values of the Smithsonian are Discovery, Creativity, Excellence, Diversity,

Smithsonian Institution, Fig. 1 Image: Smithsonian Institution Website, 2012 Institution Building also known as The Castle (Smithsonian Institution Website, 2012)

Integrity, and Service (Smithsonian Institute Website 2012).

As a national body, the Smithsonian Institute covers a large range of cultural interests which is reflected in the large amount of museums and research centers that operates under its umbrella.

The museums and research centers that are incorporated as part of the Smithsonian Institution are listed below (Smithsonian Institution Website 2012).

Museums

- National Museum of African American History and Culture
- National Museum of African Art
- National Air and Space Museum
- Smithsonian American Art Museum
- National Museum of American History
- National Museum of the American Indian
- National Museum of the American Indian George Gustav Heye Center
- Anacostia Community Museum
- Arts and Industries Building
- Freer Gallery of Art
- Hirshhorn Museum and Sculpture Garden
- National Zoological Park
- National Portrait Gallery
- National Museum of Natural History
- National Portrait Gallery
- National Postal Museum
- The Renwick Gallery of the Smithsonian American Art Museum
- Arthur M. Sackler Gallery
- Smithsonian Institution Building (The Castle)

Research Centers

- Archives of American Art
- Conservation Biology Institute
- Environmental Research Centre
- Marine Station at Fort Pierce
- Museum Conservation Institute
- Smithsonian Astrophysical Observatory
- Smithsonian Institutional Archives
- Smithsonian Institutional Libraries
- Tropical Research Institute

Issues

While all the Smithsonian centers are funded in part from the original Smithson endowment, most of the financial support for the Smithsonian comes from the US Federal Government. In 2011 the Smithsonian budget request for the financial year 2012 requested over $850 million dollars (The Smithsonian Institution Fiscal Year 2012). To offset this cost, some funding bodies have questioned the free entry to the Smithsonian Institutions. However, free access by the general public was a condition of the Smithson bequest and is unlikely to change. These museums generate indirect income through the tourists they attract.

Modern museums function in a number of ways that manage to both preserve and absorb material culture while also disseminating culture and knowledge. This complex communication is managed through a number of different functions including acting as keeping places, functioning as research centers, and providing publicly accessible interpretation of collections in the form of exhibitions.

As a national institution, the Smithsonian has had a number of high-profile controversial exhibitions. The political views put forward in some exhibitions have caused some issues for the institution. These controversial exhibitions have since been used to help explore the role of museums in society and were later the subject of a study by the museum (Gavaghan 1995).

Enola Gay Controversy

A major controversy arose around the Smithsonian's National Museum of American History's exhibition of the Enola Gay, the plane that dropped the first atomic bomb that was used on humans at Hiroshima, Japan, during the Second World War was at the center of much debate. The planned exhibit caused controversy over the interpretation of the events and the historical significance of the Enola Gay (Gavaghan 1995). The proposed exhibition was accused of being anti-American propaganda (Sowell 1995). Subsequently, the exhibition was altered to show only

the plane and some film footage with minimal interpretation.

Life and Land Arctic Exhibition

The exhibition of photographer Subhankar Banerjee's work at the Smithsonian National Museum of Natural History was moved to a less prominent space at the institution under what is perceived as political pressure regarding climate change and oil drilling in Alaska. The artist was also asked to make several revisions to a book that was based on the exhibit, which included any reference to the Smithsonian. The author was told that the work was "just too political" (Bailey 2003).

Publications

The Smithsonian contributes and disseminates knowledge not only through its museums and institutions but also through a number of publications.

The Smithsonian is a monthly magazine, begun in 1974 that is aimed to cover a broad selection of topics including the arts, environment, sciences, history, and popular culture. The *Smithsonian* is the official journal of the institute that is based around communicating issues related to the Smithsonian collections and exhibitions.

The magazine *Air and Space Smithsonian* has been produced by the museum of the same name since 1986 and covers topics related to the advancement of technology related to aviation and space exploration.

The Smithsonian has its own *Online Encyclopaedia* that is divided into several sections including Art and Design, Science and Technology, History and Culture, and Kids Favourites.

References

Bailey, H. 2003. Pictures of controversy. Newsweek. 5 May 2003:16.

Gavaghan, H. 1995. Smithsonian to study museums' role after dropping A-bomb exhibition. *Nature* 375.

Smithsonian Institute Website. 2012. Accessed 30 Oct 2012. http://www.si.edu/About

Sowell, T. 1995. The right to infiltrate. Forbes 155.6. 13 Mar 1995: 74.

The Smithsonian Institute Fiscal Year. 2012; Budget Justification to Congress Feb 2011. Accessed 30 Oct 2012. www.si.edu/content/pdf/about/fy2012-budgetrequest.pdf

Further Reading

Smithsonian. http://www.si.edu/

Snow, Clyde C.

Luis Fondebrider
The Argentine Forensic Anthropology Team (Equipo Argentino de Antropología Forense, EAAF), Buenos Aires, Argentina

Basic Biographical Information

Clyde Collins Snow was born in Fort Worth, Texas, on January 7, 1928. He grew up in Ralls, Texas, where his father was a country doctor. From his early years, he followed his father, who introduced him into the world of science, disease, life, and death.

After graduating from junior college at the New Mexico Military Institute in Roswell, New Mexico, he received his Bachelor's Degree in Biology at Eastern New Mexico University, a Master's Degree in Zoology from Texas Tech University, and his Doctoral Degree in Anthropology from the University of Arizona.

In 1960, he joined the staff of the Federal Aviation Administration's Civil Aeromedical Institute (CAMI) where, over the next two decades, he conducted research in factors influencing survivability in aircraft accidents. In this role, he participated in the investigation of major air disasters, specializing in the identification of the victims. He also served as a pro bono consultant to medical examiners, coroners, and law enforcement agencies throughout the United States in cases involving the identification of skeletal remains. In this latter conjunction, he published the first scientific paper containing the term "Forensic Anthropology" (Snow and Luke 1970).

Major Accomplishments

Among his varied research projects was a long-term study of the Tarahumara Indians of northern Mexico who are among the world's most famous endurance runners. Its objective was to determine the factors contributing to their remarkable physical conditioning. It entailed a number of long trips to their remote villages in the *Barranca del Cobre* (Copper Canyon) over whose rugged terrain they run races of 24–48 h. He and his colleagues studied the physique and diet of the runners and telemetrically monitored their cardiac performance on treadmills and during actual races (Balke and Snow 1965; Snyder et al. 1969; Paredes et al. 1970). He also performed research on factors contributing to survivability such as age, sex, and seat location in major aircraft accidents (Snow et al. 1970) as well as anthropometric surveys of aviation-using populations (Snow 1965; Snow et al. 1975). The last commercial aircraft accident he helped investigate was the crash of an American Airlines DC-8 in Chicago on May 25, 1979 where he supervised the identification of the 273 victims. He also served for 2 years in the late 1970s on the panel of experts called to review all the evidence concerning the assassination of President John F. Kennedy for the US House of Representatives' "Special Committee on Assassinations" (Snow et al. 1979).

In late 1979, he retired from federal service and launched a second career as a full-time forensic anthropology consultant. As such, he was consulted on all skeletal cases from Oklahoma. He was also contracted by the Cook County Medical Examiner to examine all skeletal cases from Cook County which includes Chicago and its suburbs. One of his early Chicago cases was that of the notorious John Wayne Gacy who killed 33 young men and boys, burying 29 of them under his house. Along with the work in Oklahoma and Chicago, he was frequently called on cases in other states, including the "Green River" serial killings in Washington (Haglund et al. 1987) and that of Polly Klass, a 12-year-old girl kidnapped from her home in Petaluma, California, in 1993 and whose case attracted nationwide attention. He also used his skills in the analysis of remains found in historical contexts such as the bones of soldiers killed at the Battle of the Little Big Horn (Snow and Fitzpatrick 1989).

In 1984, his career took another turn when he was called to Argentina to help in the investigation of the thousands of Argentine men, women, and children who had been murdered during the military's self-proclaimed "Dirty War." These victims, the *desaparecidos* ("disappeared ones"), had been kidnapped, held in secret detention centers under torture and interrogation, and, finally, extrajudicially executed with their bodies being buried in clandestine graves scattered throughout the country. Between 1984 and 1990, he spent over 2 years in Argentina helping in these investigations, periodically returning to the USA to carry out his regular case work. During this time, he also recruited a small group of Argentine anthropology and medical students whom he trained up to carry out these investigations. In 1985, that group, the *Equipo Argentino de Antropologia Forenses* (*EAAF*) and Snow were called upon as expert witnesses to present some of their early findings in the trial of the nine members of the military dictatorship which resulted in the sentencing of three of them to life and another three to lesser terms. The trial was a forensic landmark since it was the first in which the testimony of scientific experts was used in a human rights case.

Later that year, he was called to Brazil where he headed the Simon Wiesenthal team, which along with other experts from Brazil, the USA, Germany, and Israel identified the skeleton of Josef Mengele, the infamous Nazi SS physician responsible for the deaths of thousands of Jews (Snow 1986).

In 1988, Snow and the *EAAF* were asked to come to Chile, which had its own *desaparecidos*. There they recruited and trained a team of Chilean anthropology students to help recover and identify the bones of the disappeared in their own country. Later, the Argentines, Chileans, and Snow journeyed to Guatemala and Peru where they formed similar forensic anthropology teams. By the early 1990s, the successes of these teams in their own countries had attracted international attention, and they were being asked by the United Nations and

international human rights organizations to help in the investigation of war crimes, crimes against humanity, and human rights violations in other countries.

He has presented his findings as an expert witness in courts and international tribunals at The Hague, Ethiopia, El Salvador, Peru, Mexico, and other countries. In 2006, he went to Baghdad where he testified as a prosecution witness in trial of Saddam Hussein for his genocidal "Anfal" campaign against the Kurds. His testimony was based on investigations of several mass graves that he and the Argentine, Chilean, and Guatemalan teams had excavated in 1991–1992.

Dr. Snow's statistical analyses of the patterns of disappearances have contributed significantly not only to the location and recovery of the desaparecidos but also on the overall modus operandi of repressive regimes (Snow and Bihurriet 1992; Snow et al. 2008).

Through his work in many countries from Argentina to Zimbabwe, Dr. Snow has helped develop forensic anthropology as a key discipline in the investigation of human rights violations. His work has also inspired many young forensic scientists in these countries, particularly Argentina, Chile, Peru, Columbia, and Guatemala. The endeavors of these teams have brought solace and healing to the families of the disappeared in over 30 countries by repatriating their missing loved ones and bringing justice to their oppressors.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Forensic Anthropology: Investigating Human Rights Violations
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition

References

Balke, B., and C. Snow. 1965. Anthropological and philosophical observations on Tarahumara endurance runners. *American Journal of Physical Anthropology* 23 (3): 293–301.

Haglund, W.D., D.T. Reay, and C.C. Snow. 1987. Identification of serial homicide victims in the "Green River Murder" investigation. *Journal of Forensic Sciences* 32 (6): 166–175.

Paredes, A., L.J. West, and C.C. Snow. 1970. Biosocial adaptation and correlates of acculturation in the Tarahumara ecosystem. *International Journal of Social Psychiatry* 16 (3): 163–174.

Snow, C.C. 1965. An anthropometric survey of air traffic control. In *NTIS AM*, ed. Federal Aviation Administration, 65–26. Washington, DC: Office of Aviation Medicine.

Snow, C.C. 1986. Identification of Joseph Mengele: Anthropological aspects. *Proceedings of the American Academy of Forensic Sciences*.

Snow, C.C., and M.J. Bihurriet. 1992. An epidemiology of homicide: Ningun nombre burials in the province of Buenos Aires from 1970 to 1984. In *Human rights and statistics: Getting the record straight*, ed. T.B. Jabine and R.P. Claude, 328–363. Philadelphia: University of Pennsylvania Press.

Snow, C.C., and J. Fitzpatrick. 1989. Human osteological remains from the Battle of the Little Bighorn. In *Archaeological perspectives on the Battle of Little Bighorn*, ed. D. Scott and R. Fox, 243–282. Norman: University of Oklahoma Press.

Snow, C.C., and J.L. Luke. 1970. The Oklahoma city child disappearances of 1967: Forensic anthropology in the identification of skeletal remains. *Journal of Forensic Sciences* 15 (2): 125–153.

Snow, C.C., J.J. Carroll, and M.A. Allgood. 1970. Survival in emergency escape from passenger aircraft. In *NTIS AM*, ed. Federal Aviation Administration, 70–16. Washington, DC: Office of Aviation Medicine.

Snow, C.C., H.M. Reynolds, and M.A. Allgood. 1975. Anthropometry of airline. In *NTIS AM*, ed. Federal Aviation Administration, 75–72. Washington, DC: Office of Aviation Medicine.

Snow, C.C., E.R. Kerley, and I. Rosen. 1979. *Forensic anthropological issues in the investigation of the assassination of President John F. Kennedy. USGPO*. Washington, DC: House of Representatives Select Committee on Assassinations.

Snow, C.C., F.A. Peccedcelii, J.S. Susanavar, A.G. Robinson, and J.M.N. Ochoa. 2008. Hidden in plain sight: X.X. burials and the desaparecidos in the department of Guatemala. 1997–1986. In *Statistical methods and human rights*, ed. J. Asher, D. Banks, and F.J. Scheuren, 89–116. New York: Springer.

Snyder, R.G., A.A. Dahlberg, C.C. Snow, and T. Dahlberg. 1969. Trait analysis of the dentition of the Tarahumara Indians and Mestizos of the Sierra Madre Occidental, Mexico. *American Journal of Physical Anthropology* 31 (1): 65–76.

Soares, Joaquina

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Basic Biographical Information

Joaquina Soares (Fig. 1) was born in 1953. She obtained her Ph.D. in Prehistory from the Universidade Nova de Lisboa in 2011. The title of her doctoral thesis was *Social Transformations in the Third Millennium BC in Southern Portugal: The Settlement of Porto das Carretas*. She was an archaeologist in Gabinete da Área de Sines, from 1972 to 1988, and between 1988 and 2000, she worked in the Natural Park of Sudoeste Alentejano e Costa Vicentina. She has been director of the Museum of Archaeology and Ethnography of the District of Setúbal since 1974. Besides, she has been co-director of the archaeological review, *Setúbal Arqueológica*, since 1974 and editor of the cultural review, *Musa. Museus, Arqueologia e Outros Patrimónios*, since 2004.

Joaquina Soares lectures in prehistory and protohistory at the Universidade Nova de Lisboa and is an associate member of the Archaeological Center (UNIARQ) of the University of Lisbon.

Throughout her carrier, she has produced more than 100 publications.

Soares, Joaquina, Fig. 1 Joaquina Soares. Southwest Portuguese Coast, August 2012

Joaquina Soares and her husband, Carlos Tavares da Silva, were the first professionals working full time in field and theoretical archaeology in Portugal, starting with the project of the regional development of Gabinete da Área de Sines from 1972 to 1988 (Tavares Da Silva and Soares 1981).

Major Accomplishments

Joaquina Soares has directed and co-directed more than 100 archaeological excavations based on research projects and rescue programs over the last four decades. From 1997 to 2002, she worked on the largest rescue archaeological project of Southern Portugal, in Alqueva (dam of the Guadiana River). Along with Carlos Tavares da Silva and José Manuel Mascarenhas, she also conducted an archaeological and cultural heritage survey for the evaluation of the environmental impact of the dam construction in the phase preceding construction in 1984 and 1985.

Since 1975, Joaquina Soares had been dedicated to establishing a new concept of museology oriented to research and regional development in the Museum of Archaeology and Ethnography of the District of Setúbal, Portugal. Since 2003, she has promoted the first Portuguese regional network of museums, the Fórum Intermuseus do Distrito de Setúbal. Joaquina Soares combines research with social interactions and educational and information purposes. She has convened a number of conferences, workshops, and several international symposia, including the following: "Prehistory of wetlands. Landscapes of salt" held in 2011 and "Production and commerce of salted fish and fishsauces from the Atlantic Coast of the Iberian Peninsula, during Protohistory and the Roman Age" in 2004.

She has been the director of several research projects including the archaeological rescue project "Medida A" of the Alqueva dam, the urban archaeology research "Preexistencias of Setúbal," and the archaeological excavations on the pre- and protohistorical settlement of Chibanes in the region of Arrábida that is in the process of the

classification as a World Cultural Heritage by UNESCO.

Joaquina Soares has played a significant part in the development of Portuguese urban archaeology, mainly in the cities of Setúbal and Sines. With Carlos Tavares da Silva, she organized the first national congress on this matter: *I Encontro Nacional de Arqueologia Urbana* (1985). Her main research contributions in archaeology are in the areas of (I) cultural evolution of the Chalcolithic from Portuguese Estremadura, with Carlos Tavares da Silva; (II) identification of the first Chalcolithic fortifications from the III millennium cal BCE in Southern Portugal, with Carlos Tavares da Silva; (III) the Neolithization process in the Southwest Portuguese Coast (Soares 1996, 1997); (IV) the emergence of complexity in the III millennium cal BC on the Southwest of Iberia (Soares 2003, 2008a; Soares, and Tavares da Silva 1998, 2010a, b); (V) prehistoric salt exploitation in the Portuguese Coast (Soares 2008a); (VI) settlement strategy of the Middle Bronze Age of SW Iberia (Cultura do Bronze do Sudoeste); and (VII) urban archaeology in Setúbal (Soares 2008b).

Cross-References

- ▶ European Mesolithic: Geography and Culture
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Heritage Museums and the Public
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Material Culture and Education in Archaeology
- ▶ Social Archaeology
- ▶ Tavares da Silva, Carlos
- ▶ Urban Archaeology
- ▶ Urban Heritage
- ▶ Western Roman Provinces, Archaeology of the

References

Soares, J. 1996. Padrões de povoamento e subsistência no Mesolítico da Costa Sudoeste portuguesa. *Zephyrus* 49: 109–124.

Soares, J. 1997. A transição para as formações sociais neolíticas na Costa Sudoeste portuguesa. In *O Neolítico Atlântico e as Orixes do Megalitismo (Actas do Colóquio Internacional)*, ed. A. Rodríguez Casal. Santiago de Compostela: Consello da Cultura Galega, Universidad de Santiago de Compostela e Unión Internacional das Ciências Prehistóricas e Protohistóricas.

Soares, J. 2003. *Os hipogeus pré-históricos da Quinta do Anjo (Palmela) e as economias do simbólico*. Setúbal: Museu de Arqueologia e Etnografia do Distrito de Setúbal.

Soares, J. 2008a. Economias anfíbias na costa sudoeste ibérica. IV-III milénios BC. O caso da Ponta da Passadeira (estuário do Tejo). In *IV Congreso del Neolítico Peninsular*. T. II. Alicante: Museo Arqueológico de Alicante/Diputación Provincial de Alicante.

Soares, J. (coord.) 2008b. *Embarcações tradicionais do Sado. Contexto físico-cultural do estuário do Sado*. Setúbal: MAEDS e APSS.

Soares, J. and C. Tavares Da Silva. 2010a. Anta Grande do Zambujeiro – arquitectura e poder. Intervenção arqueológica do MAEDS, 1985–87. *Musa. Museus,* Arqueologia e Outros Patrimónios.

Soares, J., and C. Tavares Da Silva. 2010b. Campaniforme do Porto das Carretas (Médio Guadiana). A procura de novos quadros de referência. In *Transformação e mudança no Centro e Sul de Portugal: o 4° e o 3° milénios a.n.e*: 225–26, ed, V.S. Goncalves and A.-C. Sousa. Cascais: Câmara Municipal de Cascais e Uniarq.

Soares, J., and C. Tavares Da Silva. 1998. From the collapse of the Chalcolithic mode of production to the development of the Bronze Age societies in the southwest of Iberian Peninsula. In *Existe uma Idade do Bronze Atlântico?* (Trabalhos de Arqueologia 10), ed. S.O. Jorge, 231–245. Lisboa: IPA.

Tavares Da Silva, C., and J. Soares. 1981. *Pré-história da Área de Sines*. Lisboa: Gabinete da Área de Sines.

Further Reading

Soares, J. 1985. Museum of Archaeology and Ethnography of Setúbal. From research to cultural dissemination. *Museum* 2 (85): 143–149.

Soares, J., and C. Tavares Da Silva. 2004. Alterações ambientais e povoamento na transição Mesolítico-Neolítico na Costa Sudoeste. In *Evolução geohistórica do litoral português e fenómenos correlatives*, 397–423. Lisboa: Universidade Aberta.

Tavares Da Silva, C., and J. Soares. 1985. Monte da Tumba (Torrão). Eine befestigte Siedlung der Kupferzeit im Baixo Alentejo. *Madrider Mitteilungen* 26: 1–21.

Tavares Da Silva, C., and J. Soares. 1986. *Arqueologia da Arrábida*. Lisboa: Serviço Nacional de Parques, Reservas e Conservação da Natureza.

Tavares Da Silva, C., and J. Soares. 1993. *Ilha do Pessegueiro. Porto Romano da Costa Alentejana*. Lisboa: Instituto de Conservação da Natureza.

Tavares Da Silva, C., and J. Soares. 2006. *Territórios da pré-história em Portugal. Setúbal e Alentejo Litoral*. Tomar: Centro de Pré-história do Instituto Politécnico de Tomar.

Tavares Da Silva, C., and J. Soares. 2009. Práticas funerárias no Bronze pleno do Litoral Alentejano: o Monumento II do Pessegueiro. *Estudos Arqueológicos de Oeiras* 17: 389–420.
Tavares Da Silva, C., J. Soares, and L.N.C. Wrench. 2011. Les premières mosaïques romaines découvertes à Caetobriga (Setúbal, Portugal). In *11th International Colloquium on Ancient Mosaics*, 16th–20th Oct 2009, ed. M. Şahin, Bursa Turkey, 295–308. Istanbul: Basım Yayın ve Hizmet A.Ş.

Social Archaeology

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Introduction

Societies and social relations have always garnered attention in archaeology. What has changed over the years are the ways in which practitioners define, prioritize, and integrate *the social* into their work. With the emergence of new forms of archaeology (e.g., processual, feminist, public), the significance of the discipline's social dimensions mutates and grows, the term "social archaeology" broadens in scope, and archaeologists' relations to non-archaeologists creep towards the forefront of our professional concerns. All of these trends stem from the complexities of working on the past in the present. The myriad of research projects and publications over the past decade, including the founding of the *Journal of Social Archaeology* in 2001, point to the growing importance and diversity of social archaeologies. In this entry, I offer a working definition for social archaeology, particularly as it pertains to the archaeologies of Native North America; however, I only do so with the acknowledgement that definitions are contextual and in a constant state of flux. In addition to this broad definition, I also provide some historical background and an example of social archaeology from a recent multi-sited research project in northeastern and midwestern North America.

Definition

The introductory editorial statement from the inaugural issue of the *Journal of Social Archaeology*, now a decade old, provides a fitting start for any definition of social archaeology in the twenty-first century. The editor succinctly noted the dual nature of social archaeology, stating, "Our challenge is to understand past societies in terms of their social contexts and lived experience while, at the same time, to remain cognizant of how the knowledge of the past that we produce is used in the present" (2001: 9). Like all archaeologies, social archaeologies maintain a general concern with those that came before. Their specific foci on past social relations, identities, and discourses – as seen in the material residues left behind by past peoples – often lead them in new theoretical directions and sometimes differentiate them from other forms of archaeology. It is, however, the second component of the editors' statement – the cognizance of archaeology's social impact in today's world – that truly defines social archaeology. Given this entry's placement in the *Political and Social* section of the encyclopedia, I focus solely on this important facet, which continues to both challenge and strengthen contemporary archaeology as a whole. In this sense, I see social archaeology as any form of archaeology that takes its potential impacts on the present and future just as seriously as it takes its interpretations of the past. Archaeologies so described range greatly in form. Issues of representation of the past for non-archaeologists, integration of descendent communities into archaeological research, and simply striving to improve the modern world with archaeological knowledge all encompass the spirit of social archaeology. While their specific research objectives vary, most forms of social archaeology concern issues of cultural heritage and the relationships between archaeologists and the many "stakeholding" publics that surround them.

Historical Background and Key Issues

I limit my discussion of historical background to four interrelated forms of archaeology: public,

Indigenous, postcolonial, and applied/pragmatic. I see each of these trends as the key contributors to contemporary social archaeology in North America.

Public Archaeologies

As defined by Charles McGimsey in (1972), public archaeology was originally conceived of as *archaeology by the state*. Since the 1970s, however, the scope of public archaeology has broadened to encompass any process of professional archaeologists – academic or state-funded – managing archaeological sites for the general "public" (Merriman 2004). This transition extended public archaeology to include public-interest archaeology in addition to publicly funded archaeology. Recent developments in the field deal with the public's direct involvement in the archaeological process. Shadla-Hall (1999: 147) defines this more recent version of public archaeology as "any area of archaeological activity that interacted or had the potential to interact with the public." Merriman (2004: 5) sees this new form of public archaeology as primarily concerned with ethics and identity: "Public archaeology is inevitably about conflict over meaning. . .This broader definition of public archaeology opens up a space in which to discuss not just archaeological products (such as educational programmes, museum displays and site tours) but the processes by which meaning is created from archaeological materials in the public realm." Two models emerged within this concentration in archaeology: the *deficit model* and the *multiple perspectives model* (Merriman 2004). The deficit approach seeks to inform (and perhaps convince) the general public of the relevance of archaeological research. The multiple perspectives approach suggests that Western academic knowledge is only one of many types of knowledge and seeks to incorporate the general public's views on the past. Within this spirit of public archaeology, practitioners question the relevance of their research for the communities it impacts (Mapunda and Lane 2004). Such considerations lead to new methods of incorporating non-archaeologists in various aspects of the archaeological process. This includes directly integrating community needs and interests into the research (e.g., Potter 1994; Cipolla 2013), a key component of other forms of social archaeology, including the many Indigenous archaeologies discussed next.

Indigenous Archaeologies

North American Indigenous archaeologies stem from the Indigenous rights movements of the 1960s (see Atalay 2006). Activists like Vine Deloria Jr. critiqued the discipline of anthropology for what he saw as its exploitation of Indigenous peoples. Indigenous communities critiqued archaeologists mainly for the ways in which they treated Indigenous burial grounds and human remains. This discontent eventually took the form of protests at archaeological sites and other types of social activism, which led (and sometimes forced) archaeologists to begin listening more closely to the concerns of Indigenous communities. In some instances, these early consultations and collaborations were legally mandated by federal and state laws passed in the 1980s and 1990s to help protect Indigenous rights to cultural heritage. In other cases, researchers such as Janet Spector and Larry Zimmerman readily embraced American archaeology's changing relationship to Indigenous communities, embarking in new forms of collaborative archaeology (McGuire 2004). Of course, these new approaches also drew influence from postprocessual archaeologies, which emphasized the fluidity of meaning and the importance of multivocality in understanding the past. Finally, Indigenous people began earning degrees in archaeology, further diversifying the discipline and pushing archaeological research in novel directions.

Although defining North American Indigenous archaeology is a difficult task (see Watkins 2000; Atalay 2006), many practitioners embrace the definition offered by George Nicholas and Thomas Andrews (1997: 3) as archaeology conducted with for and by Indigenous peoples. Among the many different forms of Indigenous archaeology are tribal archaeology, covenantal/reciprocal archaeology, and collaborative archaeology (Preucel and Cipolla 2008). One of the key variables in these different forms is the presence and role that outsides (non-Indigenous) play in the

research (cf. Bendremer and Thomas 2008; Silliman and Sebastian Dring 2008). Some argue for the importance of multiple cultural perspectives in such research while others see Indigenous archaeology as archaeology conducted only by Indigenous people for Indigenous people. It is best to consider the distinctions between the different types of Indigenous archaeology as differences of degree rather than kind since all share common interests in decolonizing methodologies (Smith 1999). Of note, it is the more diverse research strategies in Indigenous archaeology – those that incorporate multiple stakeholders (descendants, non-descendant community members, archaeologists) – that I see as firmly situated within the realm of social archaeology. I provide an example of such research below with my discussion of the Brothertown Archaeology Project.

Postcolonial Archaeologies

Postcolonialism refers to a broad series of critiques of the Western cannon by scholars such as Edward Said (1978), Gayarti Spivak (1988), and Homi Bhabha (2004). In its varied forms, postcolonialism defies definition in many ways. Yet, as Matthew Liebmann (2008: 2) explains, at the most basic level, "postcolonial approaches challenge traditional colonialist epistemologies, questioning the knowledge about and the representation of colonized 'Others' that has been produced in colonial and imperial contexts." These critiques and challenges focus largely on the ways in which colonial populations represent colonized peoples and their histories (Liebmann and Rizvi 2008). Although much of the literature focuses specifically on modes of representation in parts of Asia and Africa, North American archaeologists have begun to draw influence from postcolonial studies. For example, postcolonial theory shares common themes with many iterations of public and Indigenous archaeology discussed above. From the perspective of social archaeology, engagements with postcolonial theory offer archaeologists new means of detecting the Western biases embedded in their practices, creating new spaces in which to redress the injustices of colonialism and the appropriation of Indigenous histories by nonnative archaeologists.

Applied and Pragmatic Archaeologies

Jeremy Sabloff's (2008) recent volume, *Archaeology Matters*: *Action Archaeology in the Modern World*, provides many fitting examples of how archaeological research can be used to solve social problems in the contemporary world. Sabloff draws upon a diverse set of archaeological studies in order to demonstrate how archaeological data speak to contemporary issues of sustainability, warfare, urbanization, and more. Efforts that strive to use archaeological research to serve contemporary social needs are part of a broader trend in archaeology that Robert Preucel and Stephen Mrozowski (2010) label "the new pragmatism." Pragmatism is a broad philosophical framework that concerns itself with the effects that knowledge production has in the world. At the heart of their essay, Preucel and Mrozowski thus ask about the differences that archaeology can and should strive to make in today's world. Those archaeologists working in the spirit of applied and pragmatic research thus recognize that their work does not take place in a vacuum devoid of political and social implications. Simultaneously, they seek out new ways of using their work to solve problems in the present.

Case Study: Social Archaeology at Brothertown

The Brothertown Archaeology Project, a collaborative endeavor between the *Brothertown Indian Nation* and the author of this entry (Cipolla 2013), provides a fitting example of the ways in which archaeological research is becoming more social, incorporating the interests, sensitivities, and needs of more than just archaeologists. The project was designed to investigate Brothertown history and the legacies of colonialism in Native North America via the lens of collaborative historical archaeology. Since 2006, students, volunteers, and archaeologists, both tribal and nontribal, have worked together on an archaeological survey of the two Brothertown settlements, including an intensive survey of Brothertown cemeteries. For the purposes of this entry, I focus mainly on the implications of this work for the Brothertown Indians and other stakeholding publics. I begin with a brief summary of Brothertown history

before moving on to discuss the dynamics of social archaeology at Brothertown.

The Brothertown Indian community formed in the late eighteenth century when Christian factions of several Algonquian tribes from Rhode Island, Connecticut, and coastal New York moved west together in hopes of escaping the politics and corrupting influences of colonial culture on the East Coast. The community settled in central New York State for a time but relocated once again to current-day Wisconsin in the 1830s, where it remains centered today. Also important for this entry is the fact that the *Brothertown Indian Nation* was recently denied federal recognition after spending more than three decades preparing their petition. As I discuss below, archaeology has the potential to speak to social issues and needs such as this.

The research project embodies social archaeology in the sense that it resulted only from the interaction of multiple stakeholders. The collaborative process informed everything from research design and data collection to analysis and interpretation. For example, the project's focus on grave markers emerged through continued dialogue and interaction with tribal members. In fact, it was several tribal elders who first suggested that the research focus on their historic cemeteries. We continued discussing this possibility over e-mail in the months that followed, and I eventually visited a tribal council meeting to discuss the idea with the entire council. The *Brothertown Indian Nation* officially approved the cemetery research after we talked through our respective questions, concerns, and expectations.

In addition to shaping the research design, the collaborative process also informed my interpretations. My understandings of the contemporary Brothertown community influenced me to work towards a deeper understanding of colonial culture and Native American identity politics of the eighteenth, nineteenth, and early twentieth centuries. Like that of all communities making their places in the modern world, Brothertown culture is comprised of things, practices, and ideas that did not originate solely from within the Brothertown community. As the name "Brothertown Indian Nation" implies, however, the Brothertown Indians still make distinctions between insiders and outsiders. Within the shared cultural milieu of the modern world, the Brothertown Indian Nation has its own political organization and communal gatherings. Brothertown Indians recognize and celebrate their unique communal history and their ties to sacred sites. And members continue to work towards maintaining and preserving the community and its future, clearly demonstrated by their 30-year quest for federal acknowledgement. Along with my interactions with members of the Brothertown community and the tribal council, these general observations emphasized the need to move beyond the dichotomous tropes often evoked in archaeologies of culture contact and colonialism. The Brothertown community – past and present – is much more complex than the differences between Native American and European, colonist and colonized, or accommodation and resistance.

Recursively, the research also had practical effects within the Brothertown Indian Nation itself. The cemetery project collected information from a large portion of Brothertown grave markers, including their text inscriptions, imagery, and locations. This is particularly useful for those stones whose text inscriptions and imagery are beginning to fade away. This information is now preserved in electronic and hardcopy catalogues of the stones. A complete catalogue of the stones is available online for all members of the tribe, including those that no longer live in the vicinity of the historic cemeteries. Furthermore, a ground penetrating radar survey of the largest communal cemetery in Brothertown, Wisconsin, revealed the locations of several unmarked Brothertown graves. At least one member of the community is currently using this information to protect these once-lost graves, and the community may decide to formally remark these graves in the future.

Nonnative landowners and residents of both Brothertown settlements were also exposed to new perspectives on the places and spaces in which they currently live via the archaeological

fieldwork. The archaeology emphasized the Native presence in the landscapes of both Brothertown settlements. By interacting with archaeologists and members of the Brothertown Indian Nation in the context of the archaeology project, local landowners and residents were endowed with new senses of their everyday surroundings. More broadly, these experiences also help to challenge widely accepted stereotypes of "Indian-ness" and myths of the vanishing Indian. By confronting contradictions of these tropes, such as stories of the Brothertown Indians building the first Methodist Church in Wisconsin territory or constructing the very roadways that the residents drive on every day, the current inhabitants of Brothertown renegotiated their understandings of Native communities, past and present.

The case of the Brothertown Indian Nation's petition for federal acknowledgment provides one final example with which to consider the future of social archaeology. In December of 2009, Kathleen Brown-Pérez, chair of the *Brothertown Indian Nation Federal Acknowledgment Committee*, contacted me regarding the comment period following the publication of the *Office of Indian Affairs*' negative proposed findings against the Brothertown Indians' petition for federal acknowledgement. During this period, all interested and informed parties were invited to comment on the proposed findings, either supporting or refuting the claims.

As I reviewed the proposed findings, I was surprised to learn that my work had been misconstrued and misappropriated by the authors of the report. For example, the report (United States Department of Interior – Indian Affairs 2009: 12) states that, "Scholarly archaeological excavations, even of sites in Wisconsin, do not provide evidence that any historical observer made a contemporaneous identification of an existing Indian entity (Cipolla 2007)." While the bibliography of the report lists the source of this statement as "Cipolla 2007, Brothertown Indian Nation Archaeology Project," its origin remains unclear since the project had just begun in 2006 and no findings had been published by 2007. This experience served as a harsh reminder of archaeologists' responsibilities to the publics that they impact, intentionally or not. My responsibilities on site went hand in hand with my duty to point these fallacies out to the federal government.

Beyond the poor scholarship that went into the report, however, lies a much deeper issue concerning the relationship between archaeological data and the federal acknowledgment process. In direct contrast to the above quotation, the Brothertown cemeteries that we studied do indeed provide evidence of outsiders identifying an "existing Indian entity" in Brothertown. The spatial distribution of Brothertown and non-Brothertown graves in the cemeteries illustrates this point precisely. In the largest cemetery in Brothertown, Wisconsin, nearly all Brothertown grave markers sit in the southern half of the cemetery, which is known locally as the "Indian half." In other words, the Brothertown Indians consistently chose to bury their loved ones in close proximity to other Brothertown Indians, while Euro-Americans consistently chose to bury their loved ones in close proximity to other Euro-Americans. The importance of this pattern should not be understated. Brothertown Indians and Euro-Americans alike recognized the disparities between their two groups. Other cemeteries surveyed as part of the project provide similar examples of these historically recognized social and cultural distinctions. The fact that local Euro-American residents continue to refer to the southern half of the cemetery as the "Indian half" also suggests that it was known as such since the 1850s, when Euro-Americans and Brothertown Indians began sharing the landscape of Brothertown, Wisconsin.

Although these facts do not change the Brothertown Indian Nation's current political standing, they do highlight an under-explored social use of archaeological data (Mrozowski et al. 2009). One of the criteria that petitioning tribes must demonstrate in order to become federally recognized is that a large portion of its members lived together as an identified Indian community, distinct from other groups (Office of Federal Acknowledgement 2011).

Archaeological histories sometimes speak directly to these issues, particularly in cases where the communities in question did not speak and write in the English language as the Brothertown Indians did. In these cases, archaeological remains may represent core pieces of evidence, but archaeologists have yet to fully apply their work in such instances. This is just one direction in which archaeologists can further decolonize archaeology and partially redress the injustices of colonialism in the general spirit of social archaeology.

Future Directions

This brief discussion of North American social archaeology points to three interrelated directions for the future. First, archaeologists will continue to work towards incorporating multiple perspectives on the pasts that they study. This will take place as public and Indigenous archaeologies continue to flourish. Second, the discipline will continue to diversify as it attracts and hopefully welcomes more individuals from underrepresented groups into the field. In the spirit of postcolonialism, this diversity will lead to further scrutiny and correction of the discipline's imperialist roots and colonial biases (i.e., decolonization). Third, the expectation for archaeologists to produce socially relevant (applied and pragmatic) work will increase. Each of these trends suggests that archaeology is in an interesting state of metamorphosis from a discipline solely focused on discovering, classifying, and synthesizing a past for a small and homogenous group of professionals to one that articulates with the diverse social world of which it is a part.

Cross-References

- ▶ Critical Theory in Archaeology
- ▶ Cultural Heritage Objects and their Contexts
- ▶ Journal of Social Archaeology
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives

References

Atalay, S. 2006. Indigenous archaeology as decolonizing practice. *The American Indian Quarterly* 30 (3&4): 280–310.

Bendremer, J., and E.L. Thomas. 2008. The tribe and the trowel: An Indigenous archaeology and the Mohegan archaeological field school. In *Collaborating at the trowel's edge: Teaching and learning in Indigenous archaeology*, ed. S.W. Silliman, 50–66. Tucson: University of Arizona Press.

Bhabha, H. 2004. *The location of culture*. New York: Routledge Press.

Cipolla, C.N. 2013. *Becoming Brothertown: Native American ethnogenesis and endurance in the modern world*. Tucson: University of Arizona Press.

Liebmann, M. 2008. The intersection of archaeology and postcolonial studies. In *Archaeology and the postcolonial critique*, ed. M. Liebmann and U.Z. Rizvi, 1–20. Lanham: AltaMira Press.

Liebmann, M., and U.Z. Rizvi, eds. 2008. *Archaeology and the postcolonial critique*. Lanham: AltaMira Press.

Mapunda, B., and P. Lane. 2004. Archaeology for whose interest—archaeologists or the locals? In *Public archaeology*, ed. N. Merriman, 211–223. New York: Routledge Press.

McGimsey, C.R. 1972. *Public archaeology*. New York: McGraw Hill.

McGuire, R.H. 2004. Contested pasts: Archaeology and Native Americans. In *A companion to social archaeology*, ed. L. Meskell and R.W. Preucel, 374–395. Malden: Blackwell.

Merriman, N. 2004. Introduction: Diversity and dissonance in public archaeology. In *Public archaeology*, ed. N. Merriman, 1–18. New York: Routledge Press.

Mrozowski, S.A., H. Herbster, D. Brown, and K.L. Priddy. 2009. Magunkaquog materiality, federal recognition, and the search for a deeper history. *International Journal of Historical Archaeology* 13 (4): 430–463.

Nicholas, G.P., and T.D. Andrews. 1997. Indigenous archaeology in the postmodern world. In *At a crossroads: Archaeology and the first peoples in Canada*, ed. G.P. Nicholas and T.D. Andrews, 1–18. Burnaby: Simon Fraser University.

Office of Federal Acknowledgement. 2011. Office of Federal Acknowledgement guidelines and precedent manual. Available at: http://www.bia.gov/WhoWeAre/AS-IA/OFA/OFAGuidelines/index.htm. Accessed Feb 2011.

Potter, P.B. 1994. *Public archaeology in Annapolis: A critical approach to history in Maryland's ancient city*. Washington (DC): Smithsonian Institution Press.

Preucel, R.W., and C.N. Cipolla. 2008. Indigenous and postcolonial archaeologies. In *Archaeology and the postcolonial critique*, ed. M. Liebmann and U.Z. Rizvi, 129–140. Lanham: AltaMira Press.

Preucel, R.W., and S.A. Mrozowski. 2010. The new pragmatism. In *Contemporary archaeology in theory: The*

new pragmatism, ed. R.W. Preucel and S.A. Mrozowski, 2nd ed., 1–50. Malden: Wiley-Blackwell.
Sabloff, J.A. 2008. *Archaeology matters: Action archaeology in the modern world*. Walnut Creek: Left Coast Press.
Said, E. 1978. *Orientalism*. New York: Vintage.
Shadla-Hall, T. 1999. Editorial: Public archaeology. *European Journal of Archaeology* 2 (2): 147–158.
Silliman, S.W., and K. Sebastian-Dring. 2008. Working on pasts for futures: Eastern Pequot field school archaeology in Connecticut. In *Collaborating at the trowel's edge: Teaching and learning in Indigenous archaeology*, ed. S.-W. Silliman, 1–21. Tucson: University of Arizona Press.
Smith, L.T. 1999. *Decolonizing methodologies: Research and Indigenous people*. London: Zed Books.
Spivak, G.C. 1988. Can the subaltern speak? In *Marxism and the interpretation of culture*, ed. C. Nelson and L. Grossberg, 271–313. London: Macmillon Press.
United States Department of Interior-Indian Affairs. 2009. Proposed findings against acknowledgement of the Brothertown Indian nation, 17 Aug 2009. Available at: http://www.bia.gov/WhoWeAre/AS-IA/OFA/RecentCases/index.htm. Accessed Aug 2010.
Watkins, J. 2000. *Indigenous archaeology: American Indian values and scientific practice*. Lanham: Altamira Press.

Social Identity in Historical Archaeology

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Introduction

Since the late nineteenth century, archaeologists have attempted to interpret widely recurring patterns of material artifacts in terms of a sense of distinctive identity. Linking such patterns explicitly to notions of social identity has become almost commonplace in contemporary historical archaeology in the last few decades, rendering it "the most pervasive theoretical term of the last few years" (McGuire and Wurst 2002: 85).

Definition

Psychologist Erik Erikson (1959) is generally credited with introducing the concept of identity to describe a person's psychological development over their lifetime: personal identity, despite periodic crises, is self-sameness, or self-stability, over time. Conceptions of the self, or the set of meanings that are tied to the self as an individual (personal identity), only arise in social interaction within the larger context of society; therefore, individuals are generally thought also to have social identities (Hogg 2006). Such a perspective connects identity with many other measures of social position around which social relations are organized, such as age, gender, occupation, religion, wealth, or education and the relative benefits and costs of each.

Historical and other forms of archaeology tend to approach the concept by assuming there is at least some potential to infer aspects of past social identities through material culture. There are two senses of the construction of social identity that are relevant here: the construction of it in the past, by people living their day-to-day lives in particular social and historical circumstances, and the reconstruction of it in the present by archaeologists relying on material proxies for this behavior (artifacts). A notion of personal identity (and, by extension, group identity) is not a property but a process; like the present, it always "is" and is never completed. Both are politically determined and are always in the process of being created; they cannot be reified as a category or a possession, even though archaeologists are forced to study them through the possessions of past people and the static patterns of material artifacts.

Historical Background

The study of social identity as a stand-alone goal of archaeology in the late twentieth and early twenty-first centuries has been spurred by four developments in archaeological theory and practice: studies of style as social strategy; the search for, and conceptualization of, agency in past human behavior; Marxist-derived critical archaeology that called for illumination of the origin of contemporary social circumstances; and its contemporary (although less overtly ideologically

positioned) derivative – the social justice movement in archaeology.

Deriving from structuralism, analyses of style in the 1970s and 1980s gave an explanatory lift to the concept of social identity by linking it to social, rather than merely physical, strategy. In a now well-worn formula, material artifacts were viewed as part of a strategic process and therefore used by different groups in different ways. Style functioned at the borders of groups to define difference to outsiders and within groups to signal similarity to insiders. In this sense, patterning was argued to have both a group and a personal identity dimension while still operating within the confines of what was socially and culturally possible.

While style brought a personal dimension to studies of social identity, agency perspectives, deriving as they did from sociology, deliberately sought to understand the conscious, creative, and collective practices of generic individuals within the limits imposed upon them by historical process and established social structures (Dornan 2002). Cultural theorists such as Pierre Bourdieu, for example, illuminated the constructed nature of taste to show how social reputation (and regulation) depends on struggles for prestige and position that employ material culture as markers. In the historical archaeological literature, agency is often presented as the local-level contrast to the global processes of capitalism, colonialism, or globalization. The central issues are the extent to which class, status, and other social axes constrain human behavior and to what extent people can operate outside these with material consequences, as well as the extent to which the construction of the individual (and notions of personhood and the self that tie deceptively easily to acceptance of Erikson's concept of identity) and class are in themselves ideological (Patterson 2005).

A strong Marxist strand in historical archaeology in the 1980s and 1990s focused discussion around issues of how social differences are given particular sets of meanings in the construction and discourse of social identity. Rather than treating identity as a categorical entity, we should use it as the lens though which to view society in a larger sense, since it is within this larger structure that important social processes (such as domination and resistance, power, class and inequality, or poverty and community building) are embedded. Notions of agency, society, and the individual should be problematized rather than reified and the many ways in which human action is embedded in social relationships exposed (Barrett 2000: 62).

The fourth and last strand is the trend within contemporary archaeological practice to contextually justify itself, often through the application of various "action" labels. The current literature abounds with adjectives reflecting both sides of the practice experience: the approach of the archaeologist (applied, engaged, ethically engaged, activist, advocate) and the involvement of some form of community (collaborative, participatory, embedded, public). This trend, and the strong social justice agenda it supports, has widened the search for social identity to encompass the material patterns of contemporary community politics often expressed through processes of cultural heritage management and to a lesser extent of the practice of archaeology as a middle-class activity (Matthews 2005).

Key Issues and Current Debates

The construction of social identity in the past was both a symbolic process and a slippery one; the reconstruction of it by archaeologists in the present is similarly complicated. Exploring notions of social identity highlights four key tensions within contemporary archaeology: the degree to which material patterning in groups of artifacts is a passive reflection or an active construction of past identity; the degree to which such patterning is produced consciously or unconsciously by the participants; whether or not it is ever possible to understand the individual as a social unit in archaeology, particularly for ordinary people; and the nature of the relationship between human choice and wider social structures.

Social identity operates at both the level of the individual and the collective. For every person, there will be facets of their individual identity that are important to their material choices, as well as

facets of their family and household identity. For the same individual, there may be a geographic community in which they live that influences their notion of identity (whether suburb, neighborhood, town, or village), various social communities of which they are a part (whether church, union, or social club), a work community (which can sometimes blend both the geographic and the social through the use of planned communities or company towns), and a range of other potential social categories that may well be beyond their individual control. While a person may be able to choose which church they belong to, for example, they cannot similarly choose whether or not to be female or black.

Trying to understand the slippery, contextual, and fluid nature of identity at any of these scales is the challenge of historical archaeology. Many historical archaeologists have used the notions of choice and autonomy that underlie the agency-social identity nexus as a means to reconstruct the lives of particular individuals as a way of personalizing the past. This has often been linked to the narrative turn in archaeology, so that connecting a person's identity to various facets of the material record from a site which they inhabited becomes a tale told of past lives. In historical archaeology, of course, there may be insufficient historical records from which to construct a profile of a particular person or household, and households as recovered archaeologically may or may not represent families, depending on the type and rate of occupancy for a particular building. At this personal level, studies have tended to focus on individual actors, despite the fact that agency as a theoretical paradigm disavows study of the individual per se (see Barrett 2000). Many Marxist studies would go further to argue that social identity should not be concerned with focusing on the individual, even with the best historical records, because our notion of the individual is itself an ideological concept. In this light seeing objects as the conscious creations of individuals or as part of the micro-histories of individual households is in fact dangerous (see, e.g., Johnson 1999: 128; McGuire and Wurst 2002).

At a community scale, archaeologists have focused on how identity is expressed through kinship networks, different modes of land distribution between generations, religion, notions of public and private space, or processes of community building and collective memory. A community can be as simplistic as a collective of individual households that may or may not be geographically bounded, a political construct, or a group of people linked by shared experience, daily interaction, and common class relations.

The ways in which material artifacts function as signifiers of identity in any of these contexts are equally as diverse. Many researchers have noted a distinction between genres of materiality, particularly the rapidly changing identity markers associated with the body (chiefly clothing, hairstyles, and language) and more stable markers, such as architecture, that endure and are able to convey a sense of permanence over the long term (see, e.g., Goodwin 1999; Mann and DiPaolo Loren 2001; Miller 1994; Parott 2005). Rapidly shifting markers are able to signal subtle shifts in political and social statements and in some contexts may have been more symbolically important than domestic goods contained within the private domain of the home (Steen 1999). The ideological value of more stable markers lies in their ability to retain patina (McCracken 1990), which verifies claims to status because it materializes longevity (Goodwin 1999: 144).

In between lie the many other material domains of domestic life. Historical archaeology, by necessity, most commonly approaches questions of social identity through the analysis of particular fields of material culture, such as the form and decoration of tablewares (e.g., Wall 1994); the political, gender, or class associations of clay pipes (e.g., Beaudry and Mrozowski 2001); meals and dining patterns (e.g., Shackel 1993); alcohol use (e.g., Reckner and Brighton 1999); choices in headstones and cemetery furniture (e.g., Mytum 2006); or the use of items of personal adornment (White 2005). The possession and use of such items were in many ways as important as their cost in terms of what they signified. Several studies of the identity constructs that accompanied the rise of gentility in the middle of the nineteenth century across the Western world (see, e.g., Young 2003) have noted how

closely the expression of social identity could be bound to the possession of behavioral knowledge (rules of behavior), as much as the economic ability to acquire specific material forms.

Future Directions

Social identity as a concept under which to cast various aspects of people's material choices is clearly very alluring to archaeologists. Linked to the strength of the concept of style in archaeology as a means to explain certain aspects of social dynamics and to various bases underlying contemporary archaeological practice that demands a more socially accountable archaeology, social identity has become a popular box in which to place many different aspects of past human behavior. At best it can become a means to highlight the tensions between individual subjectivity and the structuring constraints of broader social and historical circumstances; at worst it can become diffused beyond the point of serving as a useful analytical category. The challenge lies in understanding both correspondence and variation in material traces as more than just similarity or difference between groups and asking more difficult questions, such as how variation might be the result of, and create, social unity (Chenoweth 2011: 336–337), as well as its opposite, or how material similarity might mask social difference along other axes of identity. McGuire and Wurst (2002) remind us that shared identity is not necessarily the basis for shared action, any more than common goals derived from shared essential identities. The search for social identity hinges on seeing artifacts as parts of a process, not simply as finished end products, and on contextualizing patterning within a wider set of influences.

References

Barrett, J. 2000. A thesis on agency. In *Agency in archaeology*, ed. M. Dobres and J. Robb, 61–68. London: Routledge.

Beaudry, M., and S. Mrozowski. 2001. Cultural space and worker identity in the company city: Nineteenth century Lowell Massachusetts. In *The archaeology of urban landscapes: Explorations in slumland*, ed. A. Mayne and T. Murray, 118–131. Cambridge: Cambridge University Press.

Chenoweth, J. 2011. Social identity, material culture, and the archaeology of religion. *Journal of Social Archaeology* 9 (3): 319–340.

Dornan, J. 2002. Agency and archaeology: Past, present and future directions. *Journal of Archaeological Method and Theory* 9 (4): 303–329.

Erikson, E. 1959. Identity and the life cycle. Selected papers. *Psychological Issues* 1 (1). Monograph 1: 101–164.

Goodwin, L. 1999. *An archaeology of manners: The polite world of the merchant elite in colonial Massachusetts*. New York: Springer.

Hogg, M. 2006. Social identity theory. In *Contemporary social psychological theories*, ed. P. Burke, 111–136. Stanford: Stanford University Press.

Johnson, M. 1999. Commentary: Mute passive objects. *International Journal of Historical Archaeology* 3 (2): 123–129.

Mann, R., and D. DiPaolo Loren. 2001. Keeping up appearances: Dress, architecture, furniture and status at French Azilum. *International Journal of Historical Archaeology* 5 (4): 281–230.

Matthews, C. 2005. Public dialectics: Marxist reflection in archaeology. *Historical Archaeology* 39 (4): 26–44.

McCracken, G. 1990. *Culture and consumption: new approaches to the symbolic character of consumer goods and activities. Bloomington*. Indiana: Indiana University Press.

McGuire, R., and L. Wurst. 2002. Struggling with the past. *International Journal of Historical Archaeology* 6 (2): 85–94.

Miller, D. 1994. *Modernity: An ethnographic approach: Dualism and mass consumption*. Oxford: Berg.

Mytum, H. 2006. Popular attitudes to memory, the body, and social identity: The rise of external commemoration in Britain, Ireland, and New England. *Post-medieval Archaeology* 40 (1): 96–110.

Parott, F.R. 2005. "It's not forever". The material culture of hope. *Journal of Material Culture* 10 (3): 245–262.

Patterson, T.C. 2005. The turn to agency: Neoliberalism, individuality, and subjectivity in late-twentieth century Anglophone archaeology. *Rethinking Marxism* 17 (3): 373–384.

Reckner, P., and S. Brighton. 1999. "Free from all vicious habits": Archaeological perspectives on class conflict and the rhetoric of temperance. *Historical Archaeology* 33: 63–86.

Shackel, P. 1993. *Personal discipline and material culture: an archaeology of Annapolis, Maryland 1695–1870*. Knoxville: University of Tennessee Press.

Steen, C. 1999. Pottery, intercolonial trade, and revolution: Domestic earthenwares and the development of an American social identity. *Historical Archaeology* 33 (3): 62–72.

Wall, D. 1994. *The archaeology of gender: Separating the spheres in urban America*. New York: Plenum Press.

White, C. 2005. *American artifacts of personal adornment, 1680–1820: A guide to identification and interpretation*. Walnut Creek: Altamira Press.
Young, L. 2003. *Middle-class culture in the nineteenth century: America, Australia and Britain*. Basingstoke: Palgrave Macmillan.

Social Memory in Archaeological Theory

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Introduction

Social memory has been studied by historians, sociologists, psychologists, and anthropologists from many different angles. It has been described as a transdisciplinary concept with no single definition. While this varied interest has generated much insight, it has also made it important for researchers to be clear as to how they are approaching the concept. Archaeologists, not surprisingly, have been most interested in the relationship between social memory and the material world of ancient and historic societies.

Definition

Archaeological studies of social memory have centered on how monuments, buildings, objects, burials, and other material traces of human activity and practice create, reflect, or shape a group's social memory. Archaeologists have also been interested in how contemporary groups incorporate these material traces into their understanding of their history and identity.

Historical Background

Any discussion of social memory in anthropology must begin with Maurice Halbwachs (1877–1945), the French sociologist who wrote foundational works on memory in a social context. Originally published in France as *Les cadres sociaux de la mémoire* (*The Social Frameworks of Memory*, first published 1925) and *La topographie légendaire des évangiles en terre saint* (*The Legendary Topography of the Gospels in the Holy Land*, first published 1941), his ideas are best known to English-speaking scholars through the translations of Lewis Coser published as *On Collective Memory* (Halbwachs 1992). A third work, unfinished at the time of Halbwachs' death, *La mémoire collective*, was published posthumously in 1950. The original French edition was translated into English as *The Collective Memory*, but a more recent revised and corrected French edition has appeared and should be consulted (Halbwachs 1997).

Halbwachs argued for an essentially social approach to memory in contrast to existing approaches which saw memory as a function of the individual mind. He noted that people's memories are shaped by the social context in which they live and the social groups of which they are a part. What an individual remembers depends only in part on his or her lived experiences. For Halbwachs, more important were the events, relationships, places, and things that the collective group wished to remember. Central to his approach is the recognition that memory provides groups with a sense of identity, a sense of belonging, and a sense of history. *The Legendary Topography*, in particular, highlights a connection between place and memory, both in the way that places become memory cues and in the way that places become meaningful through their association with memory. One of Halbwachs' insights is that collective memory is not only social but can transcend the lived experience of any individual. In a striking illustration of this, he discusses how his first experience of London was shaped by his familiarity with Dickens and other authors as well as by conversations with friends. Halbwachs made it clear that memories are made, not just stored and retrieved, an insight since affirmed by social psychological research. He argued that the process of memory making was something that happened through or as part of social interactions. Consequently, people who interacted together

regularly were most likely to be involved in this process of memory making. Missing from Halbwachs' work is much of any discussion of conflict or how competing or contradictory collective memories might be resolved. In light of this, more recent work has preferred the term social memory, emphasizing its political as well as social aspects.

Paul Connerton has offered one way of understanding social memory in different types of societies that has been influential in archaeology because he dealt specifically with societies with and without writing (Connerton 1989). He also represents the move towards acknowledging the interplay between individual and social as a counterpoint to Halbwachs' emphasis on collectivities (reflecting Halbwachs' debt to Emile Durkheim). Connerton wants to find ways to recognize and study social memory independent of and in addition to what he calls inscription. The most familiar form of inscription is writing and the production of texts designed to transmit information. Connerton suggests that other ways of remembering exist. He focuses on commemorative ceremonies and bodily practices as forms of remembering that all societies make use of. Central to his argument is the efficacy of ritual in preserving and passing on memories that groups want to remember. This is a performative approach and a practice-based one – it is through performances of ritualized actions that people create a context for the passing on of traditions, beliefs, and what Connerton calls social habits. Bodily practices thus loom large in Connerton's model. These practices help produce what he calls habitual memory. In contrast to inscription, incorporation represents the bodily practices through which habitual memory is developed. Ultimately, Connerton's argument is evolutionary in that he sees a change over time from societies that rely on incorporating practices to those that rely on inscribing ones. This element of his model allies him with the notion that some societies have a sense of history and others do not. Nevertheless, his efforts to move beyond a reliance on texts have been fruitful for archaeologists, especially prehistorians or those interested in social memory created by social groups who, even in literate societies, did not typically inscribe their histories. Michael Rowlands provides one archaeological application of Connerton's ideas by looking at the role of monuments and burials in European prehistoric societies (Rowlands 1993). He argues against the usefulness of separating literate and nonliterate societies along an axis with inscription at one end and incorporation at the other. He also argues that certain kinds of material culture can result from acts of inscription. This latter point has been one that other archaeologists have emphasized, finding the distinction between inscription and incorporation too limiting. Landscapes, the ways they are shaped by people's actions, can be seen as a form of inscription and incorporation.

Another debate that archaeologists must address centers on the relationship between history and memory. Perhaps not surprisingly, many historians want to differentiate the two. Memory is individual, history is collective; memory is unreliable and mutable, history is as accurate as possible and subject to change through new information but not through new or different perceptions; memory is what nonliterate or non-Western societies have, while the literate Western societies have history – these are all aspects of the debate. Older theoretical perspectives in anthropology such as structuralism accepted this division between those with and without history as exemplary of hot and cold societies. The French historian Pierre Nora's massive project on *les lieux de mémoire* has been influential on archaeologists who have not always perceived the degree to which his concept draws on such structuralist framing. The rendering of *lieux de mémoire* as "sites of memory" in an early translation of his writing (a translation rejected by Nora in the later, more authoritative publication from Columbia University Press) was too tempting for archaeologists to ignore, and the term began to appear in discussions of social memory. However, for Nora, it is only modern societies, because they possess an historical consciousness, that create *lieux de mémoire*, foci of remembering that may be places but may also be songs, books, and other cultural products. Older societies, even "peasants," examples of groups without an historical consciousness, have no history and therefore do not create

lieux de mémoire. Instead, they create *milieux de mémoire* which allow the repetition of certain ideas and relationships through ritual but do not constitute history (Nora 1996).

Key Issues/Current Debates

More recent anthropological work on the subject has rejected the distinction between societies with and without a sense of history even as this work has endeavored to explore the different ways that remembering occurs. An example is the edited volume, *Making Alternative Histories*, which includes contributions from Latin American, African, and North American scholars assessing the interplay between anthropology, archaeology, and the politics of identity and heritage as part of their efforts to overcome the kinds of dichotomous thinking that reserves history to the West (Schmidt and Patterson 1995). In this endeavor, archaeologists have been joined by historians interested in the variability of social memory and its consequences for social interaction, political control, and cultural change. In the process, anthropologists have both undercut the idea that history can only take one form (that of specific events tied to particular dates) and that there is ever a pure or perfect historical narrative. Peter Schmidt, for example, examines the relationship between history, oral tradition, and memory in *Historical Archaeology in Africa*. In the process, he destabilizes the notion of prehistory or societies without history (Schmidt 2006). In *Houses in a Landscape*, Julia Hendon argues that alternative histories develop through the repeated actions of daily life and ritual at home that provide a counterpoint to the political histories produced by Maya rulers commemorated through monuments with hieroglyphic texts (Hendon 2010). These communities of memory provide localized histories tied to domestic places. Burying the dead at home and engaging in life-cycle rituals tied to the passage of time are two kinds of practices that took place in these domestic settings. These practices are ones that most archaeologists would recognize as ritual and likely to be productive of social memory. Hendon extends the ways that memory is produced, however, by arguing that domestic activities, which are ritualized in their own way, provide additional ways of making connections tied to particular places that endure over time.

Archaeologies of the Pueblo Revolt (Preucel 2002) and *History Is in the Land* (Ferguson and Colwell-Chanthaphonh 2006) explore the persistence of alternative perspectives on historical events by examining Native American (Hopi, Zuñi, Apache, etc.) expressions through oral tradition, art, and material culture of their views on their experiences with colonizers, Euro-American settlers, government officials, as well as with one another, ancestors, and other Native American groups. Archaeologists thus have solid support for applying social memory as a kind of history – or a history-making practice – to all societies. What is at issue is not whether or not a society has history or an historical consciousness but rather how that consciousness is expressed; how it relates to identity, politics, social relations, and even economy; and to what extent social memory is contested within society.

Recognizing memory as a social process has three important implications: First, as Adrian Forty and Susanne Küchler have argued, memory is as much about what is forgotten as it is about what is remembered (Forty and Küchler 1999). This is not a deficit but rather part of how societies use memory. Second, as *Houses in a Landscape* makes clear, it is more productive to focus on practices of remembering and forgetting rather than on social memory as a reified entity. Third (as already suggested by the first point), remembering and forgetting are inherently social and political. Social memory intersects with other aspects of society that archaeologists have long been interested in studying, especially politics, identity, and social relations.

Archaeologists working on literate societies, whether ancient Rome or the ancient Maya, have found that moving beyond the documentary record to a broader perspective on how social memory develops and what role it plays allows them to contextualize the statements of elites and leaders in the larger social setting. For those archaeologists working without documentary records, recognition of the ways that social memory can be inscribed in the material record has

provided insight into the kind of history that leaders, elites, or others in society wished to make their authority visible and permanent. Thus, in *Archaeologies of Memory*, editors Ruth Van Dyke and Susan Alcock divide the chapters between those studying societies with text and those studying societies without (Van Dyke and Alcock 2003). Despite the obvious differences between the two groupings, what is striking is the degree to which the contributors converge on a set of things to study and agree on the role of social memory. Alcock's earlier work on social memory in the classical world, *Archaeologies of the Greek Past*, makes a strong argument for the value of studying social memory from material evidence as well as from textual sources (Alcock 2002). Her three case studies demonstrate how landscapes and monuments become enmeshed in the construction of group identities.

Landscape, burials, and monuments constitute three of the commonly invoked material traces around which social memory coheres. Thus both the edited volumes, *Social Memory, Identity, and Death* (Howard 2003), and *Archaeologies of Remembrance* (Chesson 2001), take the practice of burying the dead or other kinds of rituals related to the dead as emblematic of how groups use social memory to create identities that continue over time, connecting the living and the dead. The recognition that it is the living who decide how to bury the dead is central to the case studies in these volumes. Rather than seeing burials as some fixed and essential reflection of status or individual identity, the contributors consider how mortuary rituals allow the living to reinforce or emphasize those aspects of identity important to their own identity and relationships.

Landscapes have been studied as complex palimpsests, using Barbara Bender's term, of deliberate and habitual actions that shape the land itself and people's understanding of their relationship to the world around them (Bender 1998). The degree to which places, monuments, and buildings – in other words features of the natural and build landscape – persevere beyond the individual human lifespan means that they provide solid, substantial anchors for remembering, a point first made by Halbwachs in his discussion of religious landmarks in Jerusalem and other Holy Land locations. It is this ability to seem permanent that led Rosemary Joyce and Julia Hendon to argue that Connerton's concept of inscription was too limited if confined only to documents or texts (Joyce and Hendon 2000). They used placemaking in the lower Ulua Valley of Honduras to exemplify how long-term relationships and meanings can be inscribed on a landscape. Unlike Rowlands, though, Joyce and Hendon also argue that incorporation and inscription can merge in the meanings ascribed to landscapes. Patricia Rubertone makes a similar point in *Archaeologies of Placemaking*, bringing the process of inscription into the present through her focus on the tension between public commemoration or acknowledgment of a Native American presence in North America and how those commemorated view these monuments (Rubertone 2008). Here, as with *Archaeologies of the Pueblo Revolt*, *History Is in the Land*, and Martha Norkunas's *Monuments and Memory* (Norkunas 2002), about preservation efforts in Lowell, Massachusetts, the political aspects of social memory become part of present-day attitudes and play into decisions about how to represent that past in public or official contexts.

Inherent in many of the treatments of social memory making discussed so far has been a focus on ritual. Connerton made this explicit in his discussion, arguing that rituals are well suited to remembering because they are less subject to change. Archaeologists have both embraced the importance of ritual and questioned it. Richard Bradley has pointed to its importance and has used evidence of ritual action to understand the construction of social memory in European societies that lacked writing (Bradley 2002). Nevertheless, as Hendon as noted, too strong a reliance on rituals runs the risk of neglecting the history-making potential of daily life at home or away. A more productive approach is that taken by Hendon and the contributors to *Memory Work: Archaeologies of Material Practices* (Mills and Walker 2008). Without rejecting the importance of ritual, *Memory Work* and *Houses in a Landscape* focus on *practices* through which people created or deposited or modified places and things. Some of these practices fit a standard anthropological definition of ritual but not all.

The focus in both books is on the depositional practices that leave behind traces of actions designed to inscribe on the landscape aspects of identity, significant action, and in the process memories. By shifting the focus to practices, archaeologists have a way to continue to acknowledge the importance of ritual while also recognizing the potential significance of all actions and practices in remembering and forgetting. Social memory does not develop only through specific kinds of actions. The decision to foreground or privilege certain kinds of action or practices is in fact a political one, on the part of either people in the past or researchers in the present.

International Perspectives

The study of social memory has become common throughout the discipline of archaeology. Specialists working on prehistoric, ancient, and historic societies in many different geographic regions have incorporated the concept into their research. As the references and suggestions for further reading at the end of this entry suggest, Mesoamerica, the Andean region, Africa, Mesopotamia, Europe, and North America have been particular sites of social memory research, but the concept is even more widespread than this list suggests. Issues of heritage and identity are not limited to the Americas, and historical archaeologists in particular have addressed the controversies and values surrounding the construction of social memory in many postcolonial contexts. Although this review has emphasized the English-language literature, scholarship on social memory is not restricted to Anglophone archaeologists or to those publishing in English. Latin American and European archaeologists have contributed to the discussion of *la memoria social or la mémoire social* as well.

Future Directions

At this point social memory is well integrated into the conceptual framework of many contemporary archaeologists. Studies of social memory-related practices will continue to appear. Like such other important social facts as gender, power, hierarchy, and heterarchy, social memory should also become incorporated into more general or broader studies as part of what one needs to address if one wishes to understand how past societies made sense of the world in which they lived. Debates about whether or not a group has social memory are no longer enlightening. Likewise, debates over the veracity of texts, oral traditions, or the material practices through which social memory is produced and reproduced are of less interest. What needs to be addressed are the how and why of remembering and forgetting in specific social and historical contexts.

Cross-References

► Museums and Memory Experiences
► Practice Theory in Archaeology

References

Alcock, S.E. 2002. *Archaeologies of the Greek past: Landscape, monuments, and memory*. Cambridge: Cambridge University Press.
Bender, B. 1998. *Stonehenge: Making space*. New York: Berg.
Bradley, R. 2002. *The past in prehistoric societies*. London: Routledge.
Chesson, M.S., ed. 2001. *Social memory, identity, and death: Anthropological perspectives on mortuary rituals*. Archaeological Papers 10. Arlington: American Anthropological Association.
Connerton, P. 1989. *How societies remember*. Cambridge: Cambridge University Press.
Ferguson, T.J., and C. Colwell-Chanthaphonh. 2006. *History is in the land: Multivocal tribal traditions in Arizona's San Pedro Valley*. Tucson: University of Arizona Press.
Forty, A., and S. Küchler, eds. 1999. *The art of forgetting*. Oxford: Berg.
Halbwachs, M. 1992. *On collective memory*. Trans. L. Coser. Chicago: University of Chicago Press.
Halbwachs, M. 1997. *La mémoire collective*. Edit. G. Namer. Paris: Albin Michel.
Hendon, J.A. 2010. *Houses in a landscape: Memory and everyday life in Mesoamerica*. Durham: Duke University Press.
Howard, W., ed. 2003. *Archaeologies of remembrance: Death and memory in past societies*. New York: Kluwer Academic/Plenum.
Joyce, R.A., and J.A. Hendon. 2000. Heterarchy, history, and material reality. In *The archaeology of*

communities, ed. M.-A. Canuto and J. Yaeger, 143–159. London: Routledge.
Mills, B.J., and W.H. Walker, eds. 2008. *Memory work: Archaeologies of material practices*. Santa Fe: School for Advanced Research Press.
Nora, P. 1996. General introduction: Between memory and history. In *Realms of memory: Rethinking the French past. Volume I: Conflicts and divisions*, ed. P. Nora and L. D. Kritzman, 1–20. Trans. A. Goldhammer. New York: Columbia University Press.
Norkunas, M. 2002. *Monuments and memory: History and representation in Lowell, Massachusetts*. Washington, DC: Smithsonian Institution Press.
Preucel, R.W., ed. 2002. *Archaeologies of the Pueblo Revolt: Identity, meaning, and renewal in the Pueblo world*. Albuquerque: University of New Mexico Press.
Rowlands, M. 1993. The role of memory in the transmission of culture. *World Archaeology* 25: 141–151.
Rubertone, P.E., ed. 2008. *Archaeologies of placemaking: Monuments, memory, and engagement in Native North America*. Walnut Creek: Left Coast Press.
Schmidt, P.R. 2006. *Historical archaeology in Africa: Representation, social memory, and oral traditions*. Lanham: AltaMira.
Schmidt, P.R., and T.C. Patterson, eds. 1995. *Making alternative histories: The practice of archaeology and history in non-Western settings*. Santa Fe: School of American Research.
Van Dyke, R., and S.E. Alcock, eds. 2003. *Archaeologies of memory.* Malden: Blackwell.

Further Reading

Burke, P. 1989. History as social memory. In *Memory: History, culture and the mind*, ed. T. Butler, 97–113. Oxford: Basil Blackwell.
Casella, E.C. 2012. "That's just a family thing, you know": Memory, community kinship, and social belonging in the Hagg Cottages of Cheshire, north-west England. *International Journal of Historical Archaeology* 16: 284–299.
Chiu, S. 2005. Meanings of a Lapita face: Materialized social memory in ancient house societies. *Taiwan Journal of Anthropology* 3: 1–47.
Crumley, C.L. 2002. Exploring venues of social memory. In *Social memory and history: Anthropological perspectives*, ed. J.J. Climo and M.G. Cattell, 39–52. Walnut Creek: Altamira.
Crane, S., ed. 2000. *Museums and memory.* Stanford: Stanford University Press.
Fentress, J., and C. Wickham. 1992. *Social memory.* Oxford: Blackwell.
Jones, S., and L. Russell. 2012. Archaeology, memory, and oral tradition: An introduction. *International Journal of Historical Archaeology* 16: 267–283.
Hall, M. 2001. Social archaeology and the theatres of memory. *Journal of Social Archaeology* 1: 50–61.
Hastorf, C.A. 2003. Community with the ancestors: Ceremonies and social memory in the Middle Formative at Chiripa, Bolivia. *Journal of Anthropological Archaeology* 22: 305–332.
Hodder, I., and C. Cressford. 2004. Daily practice and social memory at Çatalhöyük. *American Antiquity* 69: 17–40.
Holtorf, C. 1997. Megaliths, monumentality and memory. *Archaeological Review from Cambridge* 14 (2): 45–66.
Küchler, S., and W. Melion, eds. 1991. *Images of memory: On remembering and representation*. Washington, DC: Smithsonian Institution Press.
O'Sullivan, D. 2011. Normanising the North: The evidence of Anglo-Saxon and Anglo-Scandinavian sculpture. *Medieval Archaeology* 55: 163–191.
Olick, J.K., and J. Robbins. 1998. Social memory studies: From "collective memory" to the historical sociology of mnemonic practices. *Annual Review of Sociology* 24: 105–140.
Pennebaker, J.W., and B.L. Banasik. 1997. On the creation and maintenance of collective memories: History as social psychology. In *Collective memory of political events: Social psychological perspectives*, ed. J.-W. Pennebaker, D. Paez, and B. Rimé, 3–19. Mahwah: Lawrence Erlbaum Associates.
Rüsen, J., ed. 2002. *Western historical thinking: An intercultural debate*. New York: Berghahn Books.
Schwartz, G.M., H.H. Curvers, S.S. Dunham, and J.A. Weber. 2012. From urban origins to imperial integration in western Syria: Umm el-Marra 2006, 2008. *American Journal of Archaeology* 116: 157–193.
Torres-Rouff, C., W.J. Pestle, and B.M. Daverman. 2012. Commemorating bodies and lives at Kish's "A Cemetery": (Re)presenting social memory. *Journal of Social Archaeology* 12: 193–219.
Wallis, N.J. 2008. Networks of history and memory: Creating a nexus of social identities in Woodland period mounds on the lower St. John's River, Florida. *Journal of Social Archaeology* 8: 236–271.

Social Movements and Archaeology

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Introduction

With the aim of presenting a contemporary and yet generalized definition of archaeology in relation to social movements, it is necessary to situate both as two fields with origins that are dissimilar,

but not necessarily opposing, and increasing in mutual collaboration. The first field, archaeology, is found to be historically bound to the production of academic knowledge around the discipline of the past, usually in agreement with the political interests of the Administrators of the colonies and the modern Nation States. The second, social movements, is linked to emerging collective action and is about eminently practical orientations aimed at broadening the areas of participation in decisions of collective interest. And as such, it primarily contains and promotes, over all, a political meaning.

Archaeology has produced collaborative works with social movements that even gave origin to specific lines of work within the discipline; this is the case, for example, with Feminist Archaeology (e.g., Colomer et al. 1999) and Gender Archaeology (e.g., Gero and Conkey 1991; Gilchrist 1999) which were originally characterized by their questioning of the male-centered standards involved in the production of knowledge within the discipline and the cultural and politically construed character of essentialist categories employed by the discipline to approach the explanation and interpretation of the subject and data of the past. Such work renewed discussions of the subjective position of archaeologists in academic production and their political and social stakes within the social movements in their own societies.

But it was the postcolonial theorists who focused the attention of the discussions on the predicament and political role of the intellectuals starting from the subjective position of the researcher; they based the problem of discursive displacement that the new academics and professionals coming from the old colonies were beginning to produce at the interior of the Humanities and Social Sciences. As Castro Gómez and Mendietta (1998) aptly explain it, the postcolonial theories produce knowledge in a kind of "discursive translocation" starting from a crisis that is produced at the core of these theories. However, the postcolonial intellectuals' realization of their own hegemonic position, in academia and outside of it, necessitated the review of the paper that anticolonial and Third World narratives assigned historically to "critical intellect," a situation that also demanded the redefinition of the relation between theory and practice (Castro Gómez and Mendietta 1998). It is in this way that postcolonial theories, also in archaeology, were characterized by the appearance of these tensions of identity belonging to an era in which local knowledge interacted with global projects in a dynamic and changeable way, blurring the cultural frontiers.

Bound to political outlines of a postcolonial nature, the so-called Indigenous Archaeology, currently considered a subdiscipline within archaeology, was also developing during the last decades of the twentieth century as part of the agenda of work of various archaeologists especially in countries such as Australia, the United States, and Canada, and in response to the demands put forth by the movements of communities and nations of Indigenous peoples. George Nicholas (2008: 1660) has referred to Indigenous Archaeology "as a form of archaeology where the Indigenous people are involved in the care and excavation of the cultural and corporal remains of their ancestors." However, this definition does not specify a line of work, not exclusively of Indigenous subjects, and that in a broader plan it hopes to be a project of decolonization of the practice of archaeology the world over. That is to say, it deals with a redesign that occurs at the interior of the discipline of the ethical and political role assumed by archaeologists and the form in which they plan their research in relation to the communities with whom they interact (e.g., Ucko 1989; Watkins 1999, 2001, 2003; Endere and Curtoni 2003, 2006, 2007; Smith and Wobst 2005; Atalay 2006a, b, 2007a, b; Smith and Jackson 2006; Smith and Burke 2007; Burke et al. 2008; Bruchac et al. 2010; Jofré et al. 2010a; Nicholas 2010).

The Colombian archaeologist Cristóbal Gnecco (2008) referred to Indigenous or Native Archaeologies as "archaeologies of local meaning" or "reactionary political practices" to the dominant cultural rationale. These new archaeological practices, closer to emerging social movements, promote and contribute to the construction of plural areas and are also, as Alejandro Haber (2008) sustains, displacements that the discipline

carries out to rise up in its colonial relation with the local communities. Pedro Funari (2001, 2004) has for his part adhered to the denomination of "Public Archaeology" to refer to these new pluralisms that occur in the field of scientific archaeological practice. He understood them as horizontal expressions and not hierarchical in difference, in terms of political economy like interpretation, that which implicates archaeologies with publics, protagonists, and broader purposes. These collective, public, and plural archaeologies can be conceived "as a coproduction in which the involved sectors collaborate, learn and produce history together, although not without productive conflict" (Gnecco 2008: 101).

Key Issues and Current Debates

International View: Archaeology and Social Movements in South America

To speak of archaeology and social movements, we should refer ourselves to the type of relation initiated between this discipline and the conflicts, interests, and orientations that these social movements pose and or manifest. An always complex and delicate field is that of the processes of patrimonialization in which archaeology is generally implicated as the controlling agent of the State. However, as suggested earlier when I referred to the Indigenous Archaeology, there currently exists a number, fortunately ever-growing, of collaborative works between archaeologists and sectors of society historically passed over in its rights, such as the Indigenous peoples or communities of decedent Indigenous population that acknowledge other types of meanings and values in the remains of the past. In these cases, the archaeological patrimonialization of the remains of the living memory of a people can become the imposition of foreign values on these communities and the exposure can become the expropriation by means of legal mechanisms of intervention operated by state agents, multilateral organizations, private companies, etc. They offer an interesting debate with respect to distinctive archaeologists of the South closely reflecting the implications of the processes of patrimonialization in different ex colonial countries of the world (*Diálogos del Sur* 2007). As for example, Zimmerman contends:

> Academic archaeology should learn to live in the real world and acknowledge that not everybody considers the past public heritage. Many people that are not archaeologists consider archaeological heritage as their own, not as belonging to archaeology; they want to protect it and interpret it themselves or, they strongly wish for it to be left alone (*Diálogos del Sur* 2007: 14).

Patrimonialization is an "act of memory" in which the forces of political conflicts are implicated, whose finality is the production of a significant heritage for the State, and through which determined social actors try to conserve particular memories of their past. For this motivation, the processes of patrimonialization are accompanied by emerging processes that can be called contra-patrimonialization. These last processes would be something like the contra-hegemonic powers produced in and for the hegemonic conflicts for the definition and establishment of the heritage of a people or nation. From my own experience as an Indigenous archaeologist working in the Republic of Argentina, I offer a case for analysis as a current debate, in which I try to demonstrate how we can think of possible relations between archaeology and the emerging social movements from the perspective of patrimonialization. The case I refer to is, of course, subject to the local peculiarities, but it serves as an example of a situation largely generalized in South American countries today.

The Political Role of Archaeological Heritage in the Demand of the Social Movements of Citizens Assemblies in Argentina

The change of the capitalist accumulation model in Latin America during the last decades of the twentieth century witnessed the expansion and intensification of a project tending toward the control, extraction, and exportation of natural goods (Svampa and Antonelli 2009). This emerged in the 1990s at the height of the era of the politics of privatization, when the majority of South American countries started a profound reform of their regulatory frameworks to benefit the establishment of transnational companies in

this region of the world (Svampa and Antonelli 2009). These constitutional and legislative reforms that institutionalized the self-exclusion of the State as a productive agent were stimulated and supported by international organizations (World Bank, Inter-American Development Bank, among others). In this way, Argentina, as in other places in South America, awarded full exclusivity to the private sector to exploit the (inaptly named by capitalist jargon) "natural resources" (Buiteaar 2001; Power 2002; Schiaffini 2004; Clark and North 2006; Ortíz 2007; Bebbington 2007; Solanas 2007; Svampa and Antonelli 2009). In these conditions, the Nation State put into action, under the proposed expansion of a national development model, the suppression of the local economy, consistent in the exploitation of the so-called non-renewable "natural resources" by transnational actors and local partners (Ortíz 2007; Solanas 2007; Svampa and Antonelli 2009).

Only in the province of San Juan (located in the mountainous zone of central eastern Argentina) were more than 20 mega-mining projects put into place (Giovannini et al. 2009) which can be found in different phases of work; among these, the two most important projects belong to the transnational company *Barrick Gold Corporation*. This company possesses the Mina Veladero project, active since 2005, a deposit of gold and silver located more than 4000 m above sea level in the Andean mountain range in the Departments of Iglesia and Pascua-Lama; the first binational mega-mining project which is also located in the high Iglesian mountain range on the Argentinian side. Another important mega-mining project for the extraction of silver and copper, known as Gualcamayo, is located in the vicinity of the river of the same name in Jáchal. These grand-scale exploitation projects are located near the natural glacier springs and the former mountain pathway used intensely at one time by the communities for cross-mountain activity like shepherding, trafficking of products, and communication that served as local modes of social, cultural, political, and economic integration with varying levels of autonomy throughout local history. The archaeological remains of these distinct territorial occupations that were happening throughout history in this geographical space allow us to today account for the existence of multiple "places of memory" (Nora 1984), or significant spaces of the collective memory, coexisting by way of palimpsest in which they impose long-standing historic meanings (Jofré et al. 2010b).

These transnational extractive economic projects transform the state geographies of inclusion and exclusion. The city biases, and other identities subordinated to the construction of territorial sovereignties, begin to be reconfigured giving way to processes of confirmed supranational integration (that involves as many processes of inclusion as those of exclusion) for the Binational Argentine-Chilean Pact.

The symbolic conflicts that give transnational or supranational context call on forces of homogenization as well as heterogenization, and they attend to the processes of re-territorialization of the productive processes of flexible capitalism implicating, at the same time, de-territorialization of the social and cultural memory in which local identities have been constituted historically (Jofré 2013). On this point, scientific narratives like those of archaeology play a fundamental role in the installation of these true regimens in which the politics of knowledge oriented to the details of the appropriation-expropriation of territories is imposed (Jofré et al. 2010b).

Over a certain period, archaeological heritage came to be integrated within the heritage of the people threatened by an eminently extractive economic model with high environmental and socio-cultural impact, above all, without social license. The increasing installation of mining undertakings in the rural areas with greater archaeological sensitivity in provinces, like San Juan, Catamarca, Tucumán, Salta, Chubut, and Neuquén, generates conflicts that, in some cases, have had greater visibility for their capacity to permeate in social tactics, achieving diffusion in the public media sphere. The case of "Proyecto Navidad" in the Department of Gastre of the Province of Chubut (Claps 2010; Gómez Otero et al. 2010) is a paradigmatic example since, from being located in an Indigenous Community, it had to oppose the

distinct logics of territorialization of the social and cultural memory of communities with more than a millennium in the region.

In response to this situation of territorial pillaging instigated by their own State, a heterogeneous sector of the population began to organize social movements of protest throughout the lower part of the country, a new form of assembly. The Citizens Assemblies are new self-convened forms of social organization of citizens that began to crystallize in Argentina from the year 2001. It deals with a process of collective reproduction about the current forms of emancipation; its immediate antecedent is represented by the "picketing groups" who, like the Citizens Assemblies, brought to the public table new forms of social protagonism at one time dismissed from the traditional political process (Colectivo Situationes 2002). Currently, the self-summoned Citizens' Assemblies of neighbors have diverse location and demands throughout the length and breadth of our country, among these stand out the Assemblies that struggle against the undertaking of agricultural businesses, paper mills, and megaminers. In short, these social movements have been adapted through new forms of discussion, coordination, and collective thought by all who have decided to organize themselves outside of the classical political forums. Something very interesting about these new social organizations is that they crystallize new ways of constructing social links and they are above all active in the demands for work, food, and rights. It could be said that their struggle is for justice and social change, and in this sense, the Citizens Assemblies are a place of practical research because knowledge and new forms of sociability are being created there (Colectivo Situaciones 2002).

Among the claims carried out by the new organizations of the Citizens Assemblies in Argentina, archaeological heritage was notably missing in the initial concerns of these social movements, but with the flow of these in the last few years, they began to incorporate the concern for the remains of the living memory of the people more and more in their demands for the defense of the water and the land. This currently affects the momentum of the emergence of contra-patrimonialization processes to repel scientific discourse and de-historicizing "places of memory" considered "sacred" to Indigenous peoples. This type of learning began to be more evident within the Citizens Assemblies of places such as Catamarca, San Juan, Tucumán, Neuquén, and Chubut, where these social movements began to interact and work well with the claims of Indigenous peoples that were being newly threatened and stripped of their ancestral territories.

Claims for the return of the bodies of our ancestors, taken to museums by university or state commissioned archaeologists, to the land, today reignites the struggle for the land in a broader sense of the term, as a way of reaffirming our identities in a place belonging to history. Clearly, this discourse promotes a political sense of territory, potentially performative of the social relations of domination that made the establishment of highly questioned transnational projects in the region possible, and the exacerbated concentration of lands in the hands of agricultural industry landowners in Argentina.

In the same struggle for land, only a few months ago, in the province of San Juan, the Indigenous Community of Warpe of the Cuyum territory, in collaboration with the cosignatory of archaeologists and social organizations, presented a petition to the National University of San Juan soliciting the application of the recently regulated National Law 25.517 that protects and regulates the right of the Indigenous peoples to demand mass return of human bodies considered to be antecedents and ancestors. Today these bodies are in the hands of a museum dependent on this university, with motives of research and public exhibition in display cabinets and refrigerated coolers. This document states a demand for the return of the bodies to the land, avoiding the possibility that the State, by means of science, would implement the return of these human bodies as a hidden way of exchanging "bodies for land." From the original world view that territory comprises of an encompassing vision of the land and the beings that inhabit it: "We are land, the land is everything, the land is our life." Under this kind of statement, our Indigenous leaders question not only the universities but also the President of the Nation, Cristina Fernández de Kirchner, as previously done on May 20, 2010 (with motive of

the Bicentenary of the Argentinian Nation). During that opportunity, the leaders that mobilized a mass protest of 20,000 people asked the President for concrete solutions for the evictions suffered by the Indigenous Communities throughout the length and breadth of the country: in short an historic reparation to meet the demands of the people dispossessed by the Nation State.

This petitionary case carried out by the warpes communities in San Juan, like other similar cases that are happening in our country, highlights the political symbolism that the bodies of ancestors acquired in the field of these social conflicts that face different ontologies of the relations between communities and their lands, at the same time that it also redefines the place that archaeology holds in these movements (Jofré 2010).

Conflicts like those on which I have commented here raise meanings that are incompatible, and sometimes juxtaposed, from the traditional, the modern, the local, and the global, resulting in disastrous consequences due to the imposition of new forms of extreme, disproportionate, and limitless exploitation of the environment and the irreversible destruction of the local ways of life. As retaliation of this situation of extreme injustice, "Water is worth more than gold," in the case of the Republic of Argentina, represents the current determination of the communities and people that is similar to other sectors of South America, where they are rising up against the supposedly generous promises of the extractive models of global capitalism, imposed with the compliance of the serving government.

Future Directions

Possibilities of the Collaboration Between Archaeology and Social Movements: The Right to One's Own History

Today, the common point of intersection between archaeology and social movements is a work of innovative coproduction originating in the context of decolonization projects of the archaeological discipline. In countries in South America, for example, these new collaborative works markedly began in the 1990s as a response to the profound change in global world order connected to the processes of expansion of flexible capitalism. These processes began to take shape in the 1970s, and recently, in the 1990s they acquired a social visibility, crystallized in new conditions of planetary coexistence known now as: transnationalism, globalization, situations directly related to a new type of neoliberal governability (Gordon 1991). This last condition was characterized by the "rolling back of the State" or privatization of responsibilities through the outsourcing of key social services, and with the consequent concession of regional autonomies as part of an adjustment to new dependency models.

The deep undercurrent of these new scenarios of conflict in South America is the "dispute for land." These countries with colonial history today are threatened by tyrannical and violent endocolonialisms supported by their own Nation State acting in service of the private transnational capitals mobilized by the economic monopoly of the global market. Disciplines like archaeology see themselves inevitably questioned by emerging social movements that burst, in a truly visible way, onto the public order in the twenty-first century demanding changes in the political-economic agendas of the Nation Sates.

In this way, in current South American contexts, and emerging from a long-standing historical conflict, the disputes for land comprises of claims for the acknowledgement of ethnic difference for the returning of lands, the reestablishment of the subjects' and Indigenous peoples' rights over their cultural and natural heritage, and the defense against the indiscriminate advancement of exploitations with high ecological and social impact carried out on the part of foreign capitals with license from the States. These conflicts generate heated discussions of interest regarding the political, social, cultural, and economic importance of archaeological heritage in these scenarios, and over all, present new reflections around the possibilities of resistance and change that the communities possess in the conflicts facing the States and the new actors in the global market. All this is exacerbated in the Bicentenary of the South American Nation States, where they celebrate their colonial "independence." Now is the time to return to focus on the unavoidable topic of national heritage and calls

for the urgent revision of different agreements. This happens in the face of local trajectories marked by the violent silencing of cultural differences, absorbed by the homogenized projects of the modern republics. This is a critical moment and as such it is decisive to rethink the conservationist traditionalisms and strengthen the active social values that archaeological heritage has acquired in the long histories of pillaging and expropriation (Jofré 2010).

The collaboration between a discipline with a colonial history such as archaeology and the social movements of today must be submitted to necessary questions and revised in a global political scenario; in this course, it is strategically unviable to continue defending the autonomy of the communities in terms of the cultural relativism of conservationist intervention. The right to difference in these relativist terms has promoted the perception of a substantive, stable, and permanent cultural heritage. So in this form, culture and its heritage had to be perceived as the result of a historic process, the product of an accumulated historic experience captured like something stable through the concept of culture (Segato 2011).

Contrary to cultural relativism, the accompaniment of the social movements, and this is the challenge for a discipline like archaeology that is accustomed to intervening from a place of power and privilege, anticipates the acceptance of historical pluralism, the right to "*one's own history*." Each people plot their history passing, the inconsistency of their own cultural discourse, overcoming their contradictions, and above all choosing their alternatives, interacting within the heterogeneous index of the nation. Following Rita Segato (2011), this means accepting at least two principles: (a) that the collective subjects of this plurality of histories are the people, and they possess the deliberative autonomy to produce their own historic process; (b) that this collective subject, this living people, is not a stable cultural heritage with fixed and unchanging contents throughout time and space, rather it is the self-perception on the part of its members of a shared history that comes from a past and is directed toward a future.

It remains to be said that this accompaniment and collaborative experience between archaeology and social movements to achieve a successful association founded in common objects toward the decolonization is more and more compelled to find ways to reinforce and defend the autonomies of the people, therein lies the political and social predicament of the discipline in these times.

Cross-References

- ▶ Decolonization in Archaeological Theory
- ▶ Indigenous Archaeologies
- ▶ Latin American Social Archaeology
- ▶ Public Archaeology, The Move Towards

References

Atalay, S. 2006a. Introduction: Decolonizing archaeology. *American Indian Quarterly* 30(3): 269–79. (Special Issue: Decolonizing archaeology – efforts to transform a discipline).

Atalay, S. 2006b. Indigenous archaeology as decolonizing practice. *American Indian Quarterly* 30 (3): 280–310.

Atalay, S. 2007a. Global application of Indigenous archaeology: Community based participatory research in Turkey. *Archaeologies* 3 (3): 249–270.

Atalay, S. 2007b. Multivocality and Indigenous archaeologies. In *Evaluating multiple narratives: Beyond nationalist, colonialist, and imperialist archaeologies*, ed. J. Habu, C. Fawcett, and J. Matsunaga, 29–34. New York: Springer Press.

Bebbington, A. 2007. *Minería, movimientos sociales y respuestas campesinas. Una ecología política de transformaciones territoriales*. Lima: Instituto de Estudios Peruanos – Centro Peruano de Estudios Sociales.

Bruchac, M., S.M. Hart, and H.M. Wobst, eds. 2010. *Indigenous archaeologies: A reader on decolonization*. Walnut Creek: Left Coast Press.

Buitelaar, R. (comp.) 2001. Aglomeraciones mineras y desarrollo local en América Latina. Ottawa: Cepal – Centro Internacional de Investigaciones para el Desarrollo de Canadá.

Burke, H., C. Smith, D. Lippert, J. Watkins, and L. Zimmerman, eds. 2008. *Kennewick Man: Perspectives on the ancient one*. Walnut Creek: Left Coast Press.

Castro Gómez, S., and E. Mendietta. 1998. *Teorías sin disciplina (latinoamericanismo, poscolonialidad y globalización en debate)*. México: Miguel Ángel Porrúa.

Claps, L. 2010. Información, participación y mineras transnacionales en la meseta: una oportunidad perdida. In I.C. Jofré (comp.) *El regreso de los muertos y las*

promesas del oro: Patrimonio arqueológico en conflict (Colección Contextos Humanos, Serie Intercultura-Memoria y Patrimonio): 197–205. Córdoba: Facultad de Humanidades de la Universidad Nacional de Catamarca, Grupo Editorial Encuentro, Editorial Brujas.

Clark, T., and L. North. 2006. Mining and oil in Latin America: Lessons from the past, issues for the future. In *Community rights and corporate responsibility. Canadian mining and oil companies in Latin America, between the lines*, ed. L. North, T. Clark, and V. Patroni, 1–16. Toronto: Canada Council for the Arts, International Development Research Center.

Colectivo Situaciones. Colectivo De Investigación Militante. 2002. Asambleas, cacerolas y piquetes. Sobre las nuevas formas de protagonismo social. Available at: http://caosmosis.acracia.net/?cat=150.

Colomer, L., P. Gonzalez Marcen, S. Monton, and M. Picazo. (comp.) 1999. Arqueología y teoría feminista. Estudios sobre teoría femenista y estudios de la cultura material en arqueología. Barcelona: Icaria, Antrazyt.

Diálogos Desde El Sur. 2007. Foro virtual: arqueología y descolonización. *Arqueología Suramericana/ Arqueologia Sul-Americana* 3 (1): 3–19.

Endere, M.L., and R.P. Curtoni. 2003. Patrimonio, arqueología y participación: acerca de la noción de paisaje arqueológico. In *Análisis, interpretación y gestión en la arqueología de Sudamérica*, ed. R.-P. Curtoni and M.L. Endere, 277–296. Olavarría: Universidad Nacional del Centro de la Provincia de Buenos Aires.

Endere, M.L., and R.P. Curtoni. 2006. Entre lonkos y "ólogos". La participación de la comunidad indígena Rankülches de Argentina en la investigación arqueológica. *Arqueología Suramericana/Arqueologia Sul-americana* 2 (1): 72–92.

Endere, M.L., and R.P. Curtoni. 2007. Acerca de la interacción entre la comunidad indígena Rankülche y los arqueólogos en el área centro-este de La Pampa. *Quinto Sol* 11: 197–205.

Funari, P. 2001. Public archaeology from a Latin America perspective. *Public Archaeology* 1: 239–243.

Funari, P. 2004. Public archaeology in Brazil. In *Public Archaeology*, ed. N. Merriman, 202–210. London: Routledge.

Gero, J.M. 1991. In *Engendering archaeology. Women and prehistory*, ed. M.W. Conkey. Oxford: Basil Blackwell.

Gilchrist, R. 1999. *Gender and archaeology. Contesting the past*. London: Routledge.

Giovannini, M., M. Orellana, D. Rocchietti, and A. Vega. 2009. La construcción de San Juan como capital nacional de la minería: el concierto de voces entre el Estado y los medios de comunicación. In *Minería transnacional, narrativas del desarrollo y resistencias socials,* ed. M. Svampa and M. Antonelli (comp.), 255–275. Buenos Aires: Editorial Biblos.

Gnecco, C. 2008. Manifiesto moralista por una arqueología reaccionaria. In *Non satiata II. Acercamientos sociales en la arqueología latinoamericana* (Colección Contextos Humanos, Serie Intercultura-Memoria y Patrimonio), ed. F. Acuto and A. Zarankin (comp.), 93–101. Córdoba: Encuentro Grupo Editor, Facultad de Humanidades, Univeridad de los Andes.

Gómez Otero, J., E. Moreno, and Editores Del Volumen. 2010. Réplicas y contestaciones a las críticas de los trabajos arqueológicos realizados en el Proyecto Navidad. In *El regreso de los muertos y las promesas del oro: patrimonio arqueológico en conflicto* (Colección Contextos Humanos, Serie Intercultura-Memoria y Patrimonio), ed. I.C. Jofré (comp.), 243–252. Córdoba: Facultad de Humanidades de la Universidad Nacional de Catamarca, Grupo Editorial Encuentro, Editorial Brujas.

Gordon, C. 1991. Governmental rationality. In *The Faucault effect. Studies in governmentality*, ed. G. Burchell et al., 1–51. Chicago: The University of Chicago Press.

Haber, A.F. 2008. A dónde están los 99 tíficos? Notas de campo de arqueología subjuntiva. In *Sed non satiata II. Acercamientos sociales en la arqueología latinoamericana* (Colección Contextos Humanos, Serie Intercultura-Memoria y Patrimonio), ed. F. Acuto and A. Zarankin (comp.), 103–120. Córdoba: Encuentro Grupo Editor, Facultad de Humanidades, Univeridad de los Andes.

Jofré, I.C. 2010. Presentación del regreso de los muertos y las promesas del oro. In *El regreso de los muertos y las promesas del oro: patrimonio arqueológico en conflict* (Colección Contextos Humanos, Serie Intercultura-Memoria y Patrimonio), ed. I.C. Jofré (comp.), 17–27. Córdoba: Facultad de Humanidades de la Universidad Nacional de Catamarca, Grupo Editorial Encuentro, Editorial Brujas.

Jofré, I.C. 2013. Los pájaros nocturnos de la historia: Una arqueología indígena de las sociedades capayanas del Norte de San Juan (Rep. Argentina). Ph.D. dissertation, Universidad Nacional de Catamarca. San Fernando del valle de Catamarca, República Argentina.

Jofré, I.C., M.B. Guirado López, S. Araya Lisette, L. Bonfatti, and P.D. Aroca Negron. 2010a. Arqueologías nativas como una elaboración colectiva y la militancia en la investigación. In *Actas del XVII Congreso Nacional de Arqueología ArgentinaVolume IV*, ed. R. Bárcena and H. Chiavazza, 1465–1469. Mendoza: Facultad de Filosofia y Letras UNCuyo, INCHIUSA-CONICET.

Jofré, I.C., M.S. Galimberti & S. Biasatti. 2010b. Contra-informe de los estudios y evaluaciones de impactos arqueológicos de proyectos megamineros ubicados en el Departamento Iglesia, Provincia de San Juan, República Argentina. In *El regreso de los muertos y las promesas del oro: patrimonio arqueológico en conflicto* (Colección Contextos Humanos, Serie Intercultura-Memoria y Patrimonio), ed. I.C. Jofré (comp.), 207–41. Córdoba: Facultad de Humanidades de la Universidad Nacional de Catamarca, Grupo Editorial Encuentro, Editorial Brujas.

Machado Aráoz, H. 2009. Auge minero y dominación neocolonial en América Latina. Ecología política de

las transformaciones socioterritoriales neoliberales. In "*Latinoamérica Interrogada", Memorias XXVII CONGRESO ALAS*. Buenos Aires: Fac. de Ciencias Sociales, UBA.

Machado Aróoz, H. 2010. El auge de la minería transnacional en América Latina. De la ecología política del neoliberalismo a la anatomía política del colonialismo. In *Luchas por el territorio. Minería, Amazonía y ecologismo popular* Colección Contextos Humanos, Serie Intercultura-Memoria y Patrimonio (Grupo de Trabajo de Ecología Política de Clacso), ed. H. Alimonda (comp.). Buenos Aires: CLACSO.

Nicholas, G. 2008. Native peoples and archaeology (indigenous archaeology). In *The encyclopedia of archaeology, volume 3*, ed. D. Pearsall, 1660–1669. Oxford: Elsevier.

Nicholas, G., ed. 2010. *Being and becoming indigenous archaeologists*. Walnut Creek: Left Coast Press.

Nora, P. 1984. Entre mémoire et histoire. In *Les lieux de mèmoire I. La république*, XV–XLII. Paris: Gallimard.

Ortíz, R. 2007. *Las empresas transnacionales en la minería argentina: seguridad jurídica para las empresas; inseguridad ambiental e incumplimiento de los derechos para las comunidades locales*. Buenos Aires: Observatorio de las Empresas Transnacionales, FOCO.

Power, T.M. 2002. *Excavando hacia el desarrollo? Una visión histórica de la minería y el desarrollo*. Oxfam: Dpto. de Economía de la Universidad de Montana.

Schiaffini, H. 2004. *La inserción de la inversión minera en las tendencias socioeconómicas de la Argentina (Revista Theomai 10)*. Buenos Aires: Universidad Nacional de Quilmes.

Segato, R. L. 2011. Género y colonialidad: en busca de claves de lectura y de un vocabulario estratégico descolonial. In *Feminismos y post-colonialidad. Descolonizando el feminismo desde y en América Latina*, ed. K. Bidaseca and V. Vazquez Laba (comp.), 17–46. Buenos Aires: Ediciones Godot, Colección Crítica.

Smith, C., and H. Burke, eds. 2007. *Digging it up down under: A practical guide to doing archaeology in Australia*. New York: Springer.

Smith, C., and G. Jackson. 2006. Decolonizing indigenous archaeology: Developments from down under. *American Indian Quarterly* 30 (3&4): 311–349.

Smith, C., and H.M. Wobst, eds. 2005. *indigenous archaeologies. Decolonizing theory and practice*. London/New York: Routledge.

Solanas, F. 2007. El despojo de los metales argentinos. *Revista Realidad Económica* 227.

Svampa, M. & M. Antonelli. 2009. Hacia una discusión sobre la megaminería a cielo abierto. In *Minería transnacional, narrativas del desarrollo y resistencias socials,* ed. M. Svampa and M. Antonelli (comp.), 15–27. Buenos Aires: Editorial Biblos.

Ucko, P. 1989. Foreword. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 9–17. London: Unwin Hyman.

Watkins, J. 1999. Conflicting codes: Professional, ethical, and legal obligations in archaeology. *Science and Engineering Ethics* 5 (3): 337–345.

Watkins, J. 2001. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: Altamira Press.

Watkins, J. 2003. Beyond the margin: Americans Indians, First Nations and archaeology in the North America. *American Antiquity* 68 (2): 273–285.

Further Reading

Lins Ribeiro, G. 2003. La condición de transnacionalidad. In *Postimperialismo. Cultura y política en el mundo contemporáneo, Parte II*, 61–90. Barcelona: Editorial Gedisa.

Social Networks for Archaeological Research

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Introduction

Archaeologists reconstruct the activities and interactions of individuals using the accumulated material culture of the past, yet detecting these interactions can be difficult using traditional archaeological analytical tools. The development of a methodological framework emerging from graph theory, coupled with the growth of computational power and a growing multidisciplinary theoretical framework aimed at interpreting these analyses, have eased the difficulties of uncovering, analyzing, and interpreting networks in the past. From examining physical locations of sites and how they interact together (Peregrine 1991) to examining trade routes and migration pathways (Hofman et al. 2018), and the exchange of

ideas across time and space (Mills et al. 2013), network approaches have infiltrated archaeology and grown exponentially in published studies (Brughmans 2013; Mills 2017).

Definition

At its most basic, network analysis examines how entities connect to other entities. These entities, commonly called nodes, can represent any number of objects: cells in a body, people, species, households, and even cities have all been the subjects of network analysis. Archaeologists often examine artifacts, individuals, or archaeological sites as the nodes (the points of connection) in networks; nodes can have additional information attached to them that can be incorporated into the analysis and comparative scales of analysis can be used as well (Borck et al. 2015). For instance, if the nodes are archaeological sites, they can include information on size, estimated population, surrounding ecosystems, environmental context, artifacts, and/or public versus private architecture.

The connections among nodes are called edges, ties, or relationships and are a fundamental component for allowing measurements and analysis of the network as a whole. Common *social* network connections include relatedness, consumption practices, marriage, exchange/trade, and raiding. In an example of a trade network, Crabtree (2015) graphed exchange networks of goods between simulated households, creating the social networks explored in Fig. 1. While many connections will directly link two individuals, edges can be created from many different data types and do not necessarily have to incorporate direct interactions between two individuals. Alternatively, network analysis can allow researchers to explore ideational concepts like memory (Fig. 2) by exploring the relationship among curated material objects and their direction of manufacturing origin. Directionality within the relationships is often difficult to observe archaeologically (i.e., A → B, but not B → A) but is usually possible with many text-based and sourcing-based data. Other information can include the strength of the tie, for example, measuring how many times the connection occurs or the proportion of similarity within a multi-categorical assemblage.

The quantification of these links among nodes is what makes social network analysis so valuable to archaeological studies since it allows statistical analyses of how all of the parts interact with – and impact – each other. Put into a temporal sequence, this enables archaeologists to create robust predictions based on the underlying structure (or topology) of the networks, enabling researchers to advance interpretations of the past.

Archaeologists have long conducted visual analysis of networks. For instance, researchers interested in movement through architectural space have used the network-based space syntax approach, while anthropologically trained archaeologists are familiar with kinship diagrams (Fig. 3). In kinship diagrams, the nodes are individuals and the edges represent relatedness, and extra information can be coded into both the nodes and edges. For example, if the kinship network we are diagramming is a band of related foragers, we could look at the quantity of a resource each of them gathered in one foraging bout and then examine how much of these resources each of the individuals shared. We could then analyze the kinship diagram for who in the family was the most central for the redistribution of resources: who gathered the most, who gave the most, and who received the most?

Historical Background

While social network analysis has its theoretical roots in the early interests of foundational social scientists (e.g., Emile Durkheim's work examining relationships), the formal quantitative methodology was not really developed until the 1930s with the work of researchers like Jacob Moreno, William Lloyd Warner, Allison Davis, Burleigh Gardner, and Mary Gardner (Freeman 2004). Yet these early studies, while focusing on visual analyses of systematic relational data, did not develop computational tools to analyze the visual networks. In the 1940s, the step toward

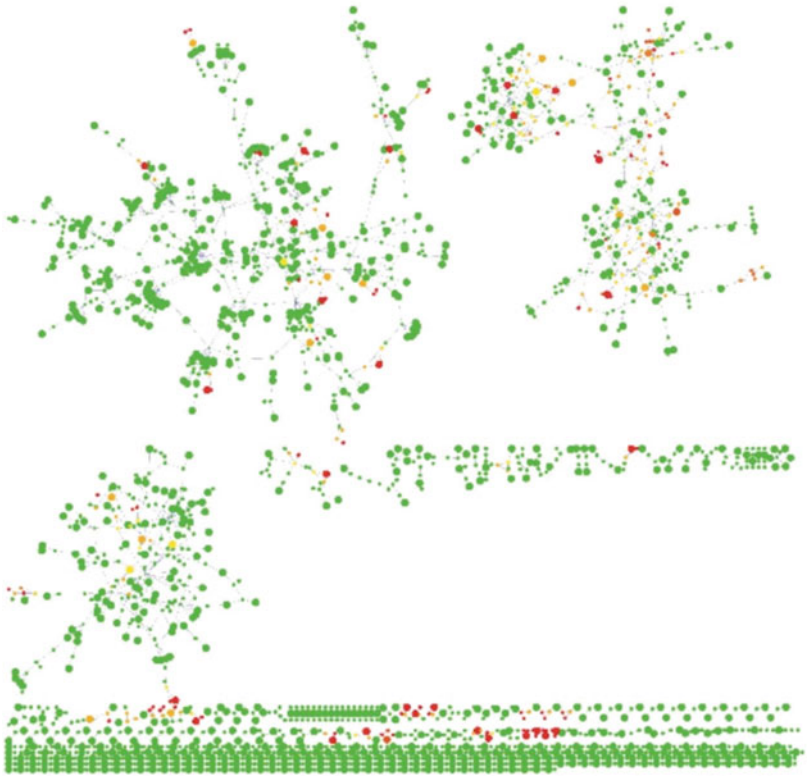

Social Networks for Archaeological Research, Fig. 1 Social network representing exchanges of maize between year 760 and 780 in an agent-based model simulation of household exchange among Ancestral Pueblo people. In this network, it is clear that there are multiple groups that exchange within their groups but do not exchange to other groups, thus the large connected components toward the center and the multiple unconnected networks at the base of the graph. Colors correspond to generosity (red = more donations, yellow = only receiving). This network has 254 connected components, 918 nodes, and an average number of neighbors (exchange partners) of 1.612. (Adapted from Crabtree 2015, Fig. 14)

quantification was taken by Eliot Chapple, Conrad Arensberg, and Willard Quine when they created an algebraic model that calculated relative relationships among individuals not directly observed to be interacting (Freeman 2004).

From these beginnings, social network analysis burgeoned as a way to quantitatively analyze and computationally model social interactions. One of the most famous examples of these is Milgram's letter mailing experiment that gave rise to the popular concept of "Six Degrees of Separation." His studies dramatically revealed the small world nature of human society as well as how restrictive racial categories can be in limiting someone's access to people in other parts of society. These interests eventually merged with research on graph theory that had begun in the 1700s with Leonhard Euler's resolution of the Königsberg bridge problem from mathematics, also engendering the field of topology. Later, graph theoretical methods increased the exploratory and explanatory power of networks. By the 1980s and 1990s social scientists in fields outside of sociology also began incorporating network methods into their research more frequently.

Within archaeology, the 1970s were the birth of some of the first formal social network analyses, with works by Irwin, Irwin-Williams, Terrell, and White (Brughmans 2013). In the 1990s, social network analyses were pursued via the influx of personal computing with researchers analyzing the geographical distribution of

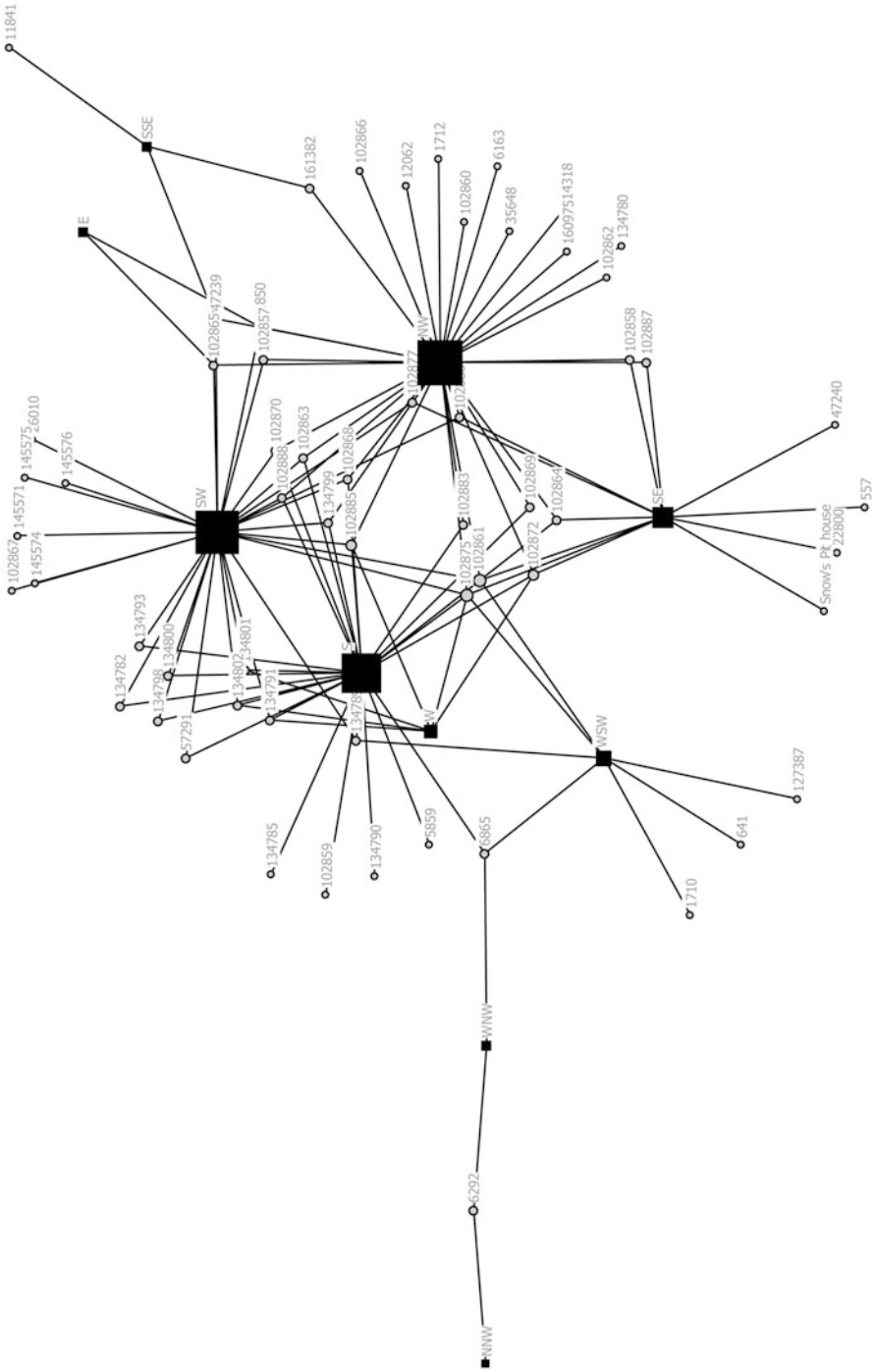

Social Networks for Archaeological Research, Fig. 2 Two-mode network of connections between archaeological sites in the Gallina region of the American Southwest and the directions from which curated ceramics were manufactured. Circles are archaeological settlements and squares are the direction of production of the foreign ceramics found at these settlements. (Modified from Borck 2018, Fig. 4.2)

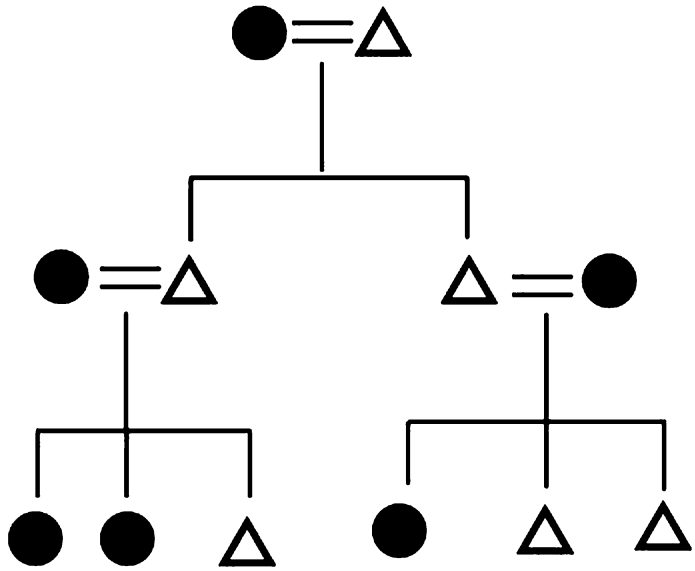

Social Networks for Archaeological Research, Fig. 3 A kinship diagram showing culturally constructed relatedness. Triangles represent males, circles represent females. Here two types of ties are present: the equals sign represents marriage, while the solid line represents descent/sibling relationships

architecture within certain settlements, such as Cahokia, using formal centrality measures to argue for their primacy as central places in larger networks (Peregrine 1991). These measures, however, did not take into account all of the possible connections among nodes, only the most proximal. With increases in computing power the growth of archaeological network studies truly began (Brughmans 2013). Modern network analyses can be multi-scalar, an approach especially attractive for archaeologists who aim to understand individuals within communities, and communities within their greater landscape and cultural contexts. These methods, then, help link *data* to standing bodies of *theory* helping to formalize long-standing verbal models of human interaction in the past. Today, network methods are being integrated in diverse archaeological problems, both as the central hub of research (Mills et al. 2013; Giomi and Peeples 2019) and as baseline approaches that bolster hypotheses (Peeples and Haas 2013; Crabtree et al. 2017a). The rapid growth in the adaptation of network analysis in archaeology bespeaks both its utility in understanding the past and an increasingly computationally savvy profession. These approaches have already illuminated key debates and prove to provide greater insight as our methods improve, as more datasets are incorporated, and as more researchers pose more questions.

Key Issues/Current Debates

In archaeology, many of our central questions are inherently relational: e.g., how did power differentials between individuals influence societal-level decision-making (Bentley et al. 2005; Crabtree et al. 2017a)? Were people able to survive environmental disasters because of long-distance partnerships, and if so, who were they trading with (Borck et al. 2015; Fitzhugh et al. 2016)? How did people in pre-writing societies maintain connections across large spatial scales and times (Coward and Gamble 2008)? Many of these fundamental questions are difficult to resolve with traditional statistical and GIS based analyses of the cultural detritus we find in excavation and survey. Formal network models, however, can take aspects of the objects we find, categorize them, discover similarities, and use those similarities to explain cultural phenomena.

A key facet of network-based approaches and their popularity in archaeology is the ability to telescope between the macro- and micro-scales. Researchers can study not only the structure of the

overall network but also analyze the connections of individual nodes within the network. This is especially attractive for archaeology, where often we want to understand both regional patterns and localized phenomena. For example, in one of the most expansive social network initiatives in archaeology, Mills et al. (2013) have used similarities in the decoration of pottery to infer social networks. By categorizing well-dated and distinctly painted ceramics, they find clusters of similarity in ceramic assemblages across a large portion of the US Southwest and detect where and when networks become more globally interconnected or regionally isolated. These relational analyses highlight the social processes that underlie transitions in the American Southwest and bolster the idea that the small world phenomenon is not a product of modernity (Fig. 4).

Critiques

The two biggest critiques in archaeology's use of social network analysis are: ascribing sociality to objects, and minimal interpretation of results, often driven by application of the methodology without a clear understanding of how that methodology works.

Pots Are People v 2.0

Inferring social connections from artifact similarity and/or from the movement of objects is often a necessity for constructing networks due to the difficulty of observing the physical relationships or movements of people in the past. However, within archaeology, the critique of assigning agency to objects is deep and social network analysis has, to some extent, revived these debates. Does design similarity between two artifacts that

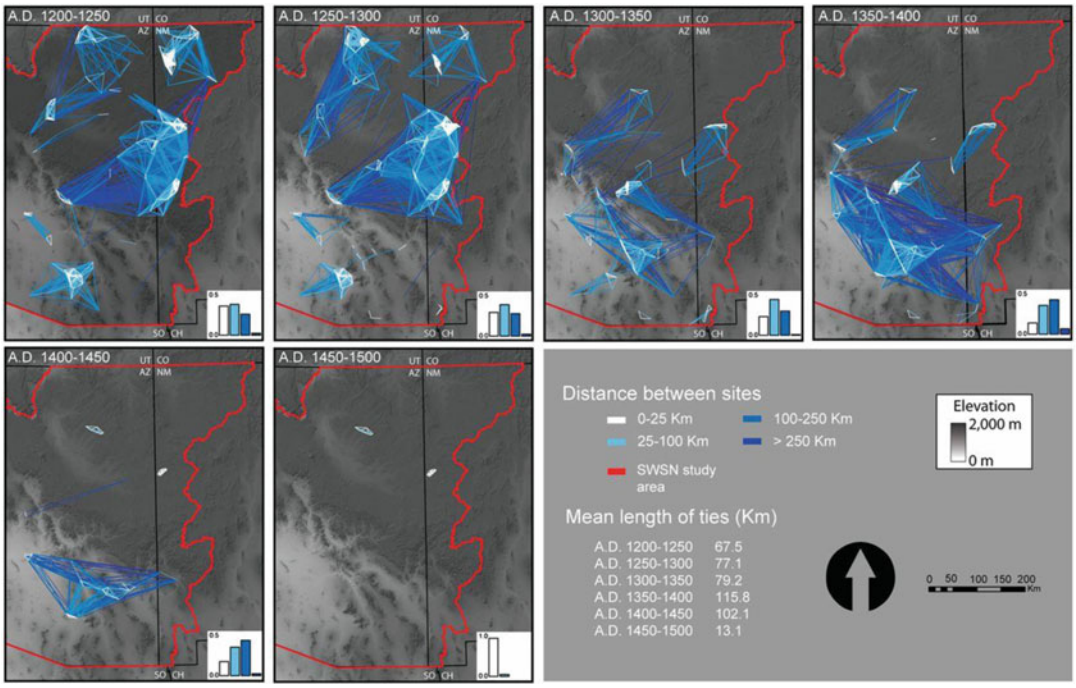

Social Networks for Archaeological Research, Fig. 4 Regional scale networks of ceramic similarity through time in the greater Arizona/New Mexico portion of the US Southwest. These maps summarize the strongest patterns of potential connectivity across the study area by displaying ties among all settlements with ≥75% of possible decorated ceramic assemblage similarity, color coded by the linear distance between settlements. Bar plots associated with each map show the relative proportions of connections of varying distance. The proportion of strong similarities among distant sites increases dramatically between the A.D. 1300–1350 and 1350–1400 intervals, in particular for areas south of the Mogollon Rim in central Arizona. This temporal plot shows that the spatial scale of connectivity among settlements dramatically increased over time. (From Mills et al. 2013, Fig. 2)

are hundreds of kilometers apart reveal a social network? Does this suggest trade routes? Or does this similarity reflect the serendipitous invention of similar styles miles apart? Or can it mean that someone in the past walked a long distance and accidentally dropped an object? Critics argue that equifinality and simultaneity mean that the construction of historic or archaeological networks based on things such as similarity of artifact design or similar proportions of decorated ceramic types is problematic at best or useless at worst. However, there are many ways that researchers have addressed these critiques. Below we briefly explore two of the most prominent methods.

First, researchers have compiled large datasets that enable a more nuanced and robust approach to studying the connections between artifact types and archaeological sites (e.g., Mills et al. 2013). Second, researchers have created agent-based models that incorporate networks, and then use those networks to compare against the archaeological record (Crabtree 2015).

Big Data – a current buzzword in both science and the media – has influenced archaeology, although the quantity of data archaeologists compile is relatively small-scale in comparison to that of other disciplines. Still, new comparative projects have compiled large quantities of data into compatible formats. As the amount of data increases, concerns stemming from sample size (e.g., whether networks simply indicate spurious patterns) often vanish. Additionally, large datasets can lessen concerns of anthropomorphizing data points, since researchers detect patterns in the aggregate instead of "chance" encounters. In other words, instead of suggesting that one pot moved from one area to another, finding similarities of design and structure in the aggregate bolsters interpretations of regions being connected through similar methodologies.

Pattern recognition in robust data assemblages often links archaeological network research with Complex Adaptive Systems (CAS) science. A complex adaptive system can be defined as being made up of multiple individuals who act and interact together, often in unpredictable ways that lead to changes in the overall structure that would not be predicted by individual behaviors. It is because of this definition that a CAS scientist often uses network analysis as one approach; the interactions between individuals lend shape to the network as a whole. A second approach used by CAS scientists is agent-based modeling, a method of creating simulations in silico that can examine how individuals interact together across space and through time. The combination of agent-based models and networks has proven fruitful for examining complex archaeological processes. For example, agent-based modeling approaches have shown that the generative processes for networks create distributions similar to those that we can detect in the archaeological record, helping to bolster confidence and understanding of network approaches (e.g., Graham and Weingart 2015). While critiques of agent-based models can undermine interpretations (e.g., oversimplification), the increasing refinement of, literacy of, and application of agent-based models ease these critiques, and as more researchers embrace these computational techniques, models will refine and understanding of them will increase.

Blackboxing and Data Interpretation

Another issue in network analysis in archaeology is the potential for misguided or missing data interpretation. While network analysis programs like Gephi, for example, compute multiple statistics based on principles in graph theory, interpretation of those statistics can be lacking. For example, scholars frequently report centrality scores for networks, barely moving past reporting these as being "important" nodes (Brughmans 2013). Moving beyond simply reporting statistics to interpretation can be achieved by focusing on the properties of the nodes (and the network) that lead to these statistics. For example, if the network was rearranged, what effects would that have for the flow of goods or information? Asking simple questions of the topology (what does it mean to be "central"?) can help practitioners move beyond just reporting statistics to uncovering powerful interpretations. Finally, as researchers use models as ways to directly test hypotheses, many of these critiques may well be alleviated, as direct hypothesis testing can lend a greater narrative power and help guide interpretations of results from "off the shelf" network packages.

Other fields have examined the implications of network topology of nodes leading to large gains in system understanding. In sociology, for example, network analyses have shown that weak ties can be just as important to the functioning of networks as strong, central, and highly connected nodes (Granovetter 1973). Comparing empirical and simulated networks generated from the same number of nodes and edges can lead to a more nuanced interpretation of network structure and help provide confidence intervals around the archaeological networks, lending to greater statistical significance of interpretations. In the energy sector, these simulations help predict power blackouts, while in ecology, examining importance of weak ties can have implications for extinction events (Crabtree et al. 2017b). These same approaches can be instrumental in archaeology, helping illuminate the processes that make certain sites important in a region-wide economic network (Peeples and Haas 2013).

International Perspectives

Several large projects have successfully used network analysis to explore social connections of societies across space and through time. The *Southwest Social Networks Project* catalogued similarities in ceramics and architecture to illuminate regional interaction networks that were affected by large-scale exogenous and endogenous events, such as migration, climate patterns, and warfare. This project compiled some of the largest archaeological databases to date, allowing for precise characterization of the various networks that bisected the greater US Southwest.

The large-scale ERC-synergy *Nexus1492* project, a collaborative project among Leiden University, the VU Amsterdam, and Konstanz University, examines Indigenous, African, and European interactions in the Caribbean using one of the deepest temporal databases that include pre-Colonial and Early Colonial sites. Because of the extremely violent nature of the colonial encounters in the region, both physically and culturally, descendant communities have often been disconnected from their pre-Colonial histories. *Nexus1492* is using archaeological data – such as ceramic style distributions and sourcing diverse material types – to rebuild this relational history as much as possible (Fig. 5). These archaeological histories are then being used in comparison to European histories to explore how the Indigenous world was represented, both accurately and inaccurately, within these texts.

The Kuril Biocomplexity Project, which involved Russian, American, and Japanese researchers, examined the 5000-year trajectory of human-environment interactions in the Kuril islands. Network analysis within this project illuminated deep-time risk mitigation networks for hunter-gatherer populations experiencing stochastic environmental events which led to vulnerabilities (Fitzhugh et al. 2016).

Finally, the French-based project *TransMonDyn* (Sanders 2017) studied 12 global transitions from the expansion of anatomically modern humans from Africa to the development of the modern rail system in France (Fig. 6), bringing together researchers in archaeology, computer science, geography, and history. While networks were not the central focus of this project, they provided a methodological approach to many of the studies to examine how the actions of people in the past led to expansions of populations, ideas, and industry, researchers are able to illuminate key drivers for societal change.

Each of these projects highlights the strength of network-based approaches. First, while network analysis is quite useful and revelatory on smaller datasets, these projects *analyze large amounts of data* allowing for greater synthetic understanding of the past. Generally, archaeological data is curated at the site-level, making comparison among sites and regions difficult. In the *Kuril Biocomplexity Project,* these datasets incorporating both cultural and ecological data enabled a more holistic understanding of the archaeology of the Kuril Islands. Compiling data from many sites together *enables cross-cultural comparison*, a key goal in many anthropological studies. The American Southwest, for example, is home to multiple different cultural traditions that are exemplified in both stylistic and technological ceramic attributes. The *Southwest Social*

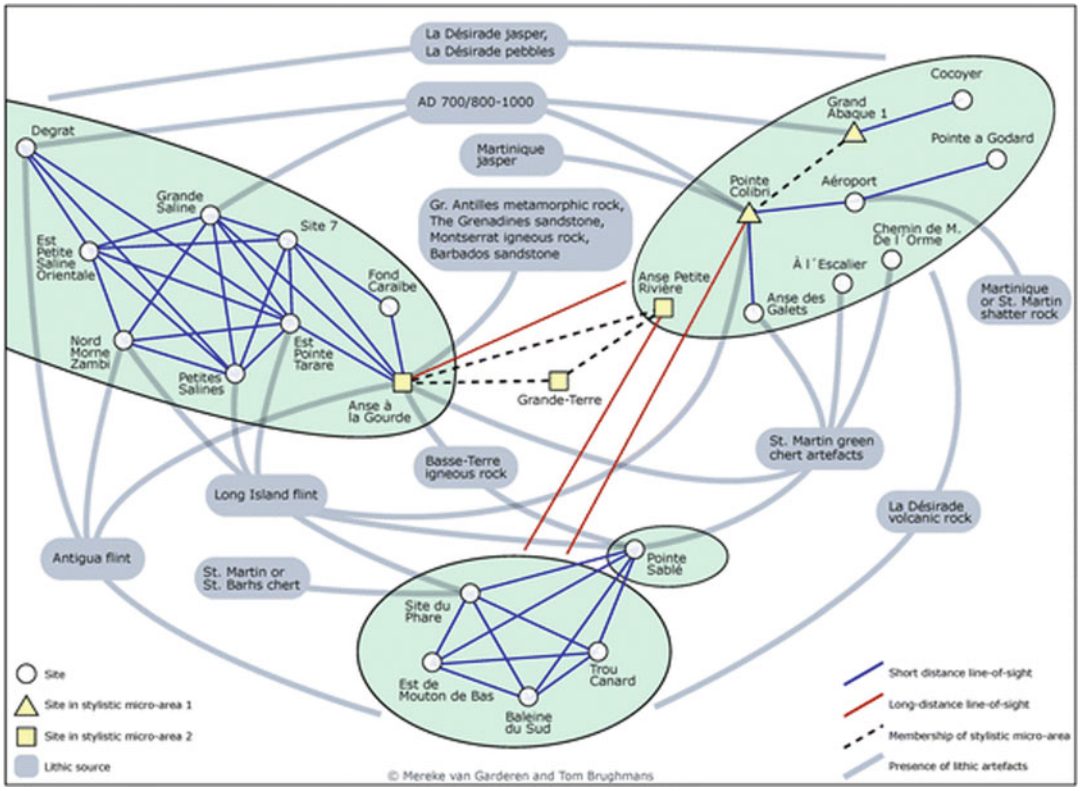

Social Networks for Archaeological Research, Fig. 5 Sites from the Caribbean are represented as white nodes and grouped per landmass (green circles). Square sites belong to stylistic micro-area 1; triangular sites belong to stylistic micro-area 2. Grey nodes represent lithic sources and contemporary dates. Blue lines represent short-distance lines-of-sight; red lines represent key long-distance line-of-sight; grey lines represent presence of lithic artifacts at sites; black dashed lines represent sites' membership of stylistic micro-areas. (From Brughmans et al. 2017, Fig. 11)

Networks Project enables a comparison of these cultural traditions by compiling the large databases on pottery styles and tracking diffusion of designs and ideas across the southwest. These projects also *integrate quantitative and qualitative data.* For example, artifact sourcing information can be combined with textual documents and artistic media like the pottery designs discussed above. *TransMonDyn* effectively used both qualitative and quantitative data in their twelve cases, demonstrating the utility of using these to better describe the past. Finally, network-based approaches *incorporate multiple perspectives* allowing for a more holistic understanding of the past. *Nexus1492,* by incorporating African, European, and Indigenous voices into the study of Caribbean social networks, along with researchers from archaeology, geochemistry, genetics, heritage studies, anthropology, and computer science, explored the multiple ways that people interacted *in* the past as well as how contemporary communities connect *with* the past. This also demonstrates how social network analysis within archaeology can help balance the colonial-dominated historical record by increasing the amount of data from nondominant populations.

Other Network Approaches

While this entry has focused on social network analysis, there are many other approaches to using network science within archaeology. For example, trophic network analysis, or food webs, are showing a promising way to highlight

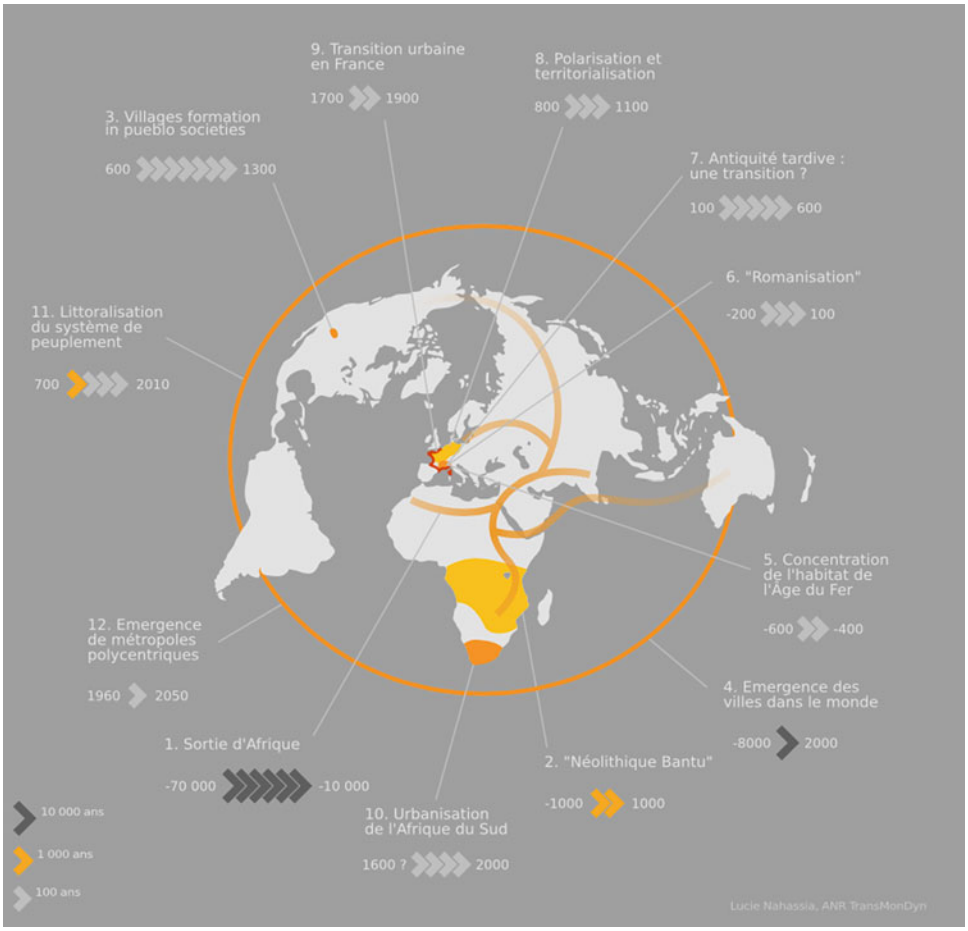

Social Networks for Archaeological Research, Fig. 6 Case studies from the TransMonDyn project. Network methods provided analytical techniques for several of their case studies

human/environment interaction in the past, and have already helped to shed light on the versatility and vulnerability of humans (Crabtree et al. 2017b). These studies have compiled large ecosystems of data and may provide a way to compare human/environment interaction worldwide, by analyzing the network structure as a whole as well as the properties of individual nodes (species or groups of taxa). Another network-like study is the study of least costs paths, which measure potential pathways across landscapes. Researchers have used these least cost paths to explore migration events in the past by looking at these migratory paths as edges, and intersections of these edges as nodes. Network analysis of cost-based travel corridors can be used to suggest which sites were important and why (Hofman et al. 2018).

Future Directions

We see several key points of direction for network analysis in archaeology. First, with the open data movement and digitally accessible data on repositories like tDAR, more datasets will be analyzed with social network approaches. Second, the development of methods to examine what natural variance of a network is will become more common place, allowing archaeologists to understand variability (as a proxy for statistical significance) in their own networks. Finally, more archaeologists

will adopt these methods into their own research, incorporating network methods into the digital archaeologist's toolkit in a similar manner that geographic information systems approaches were incorporated in the 1990s and 2000s.

One major roadblock in doing network analysis is the availability of data. Yet with increasing calls for data accessibility, including as a requirement for many granting agencies (e.g., NSF), these hurdles are being passed. With the availability of these types of data, more large-scale comparative projects can be completed. This will enable the growth of social network approaches to understand, for example, the connectedness of past populations across large geographic areas. We see the increasing availability of data as a positive development for networked approaches which will only enhance our understanding of the past.

However, even as more data becomes available, a challenge remains in the fragmentary archaeological record. We are left wondering if the data we have sampled corresponds to a real network, or if the amount of data we have gathered only forms a part of the actual network. Since networks are noisy and can be created with missing data, understanding variability to allow for a proxy for p-values will be instrumental in assessing how "real" our archaeological networks are. One approach, the exponential random graph model (or ERGM) may be useful for examining variability around observed archaeological networks.

Yet even descriptive statistics of networks (without examining variability around nodes) are impactful for understanding the past, and as archaeologists incorporate more and more digital tools into their research agendas, and as network analysis packages become more user friendly and ubiquitous, these tools are likely to become often-incorporated into archaeological analysis.

As computational power increases, and the use of large datasets that have unequal structure or resolution become easier and more common, network studies will undoubtedly shed further light on the archaeological past. These approaches may well herald new interdisciplinary collaborations and allow archaeologists to use these models of past social networks to understand our present and future.

References

Bentley, R. Alexander, Mark W. Lake, and Stephen J. Shennan. 2005. Specialisation and wealth inequality in a model of a clustered economic network. *Journal of Archaeological Science* 32 (9): 1346–1356.

Borck, Lewis. 2018. Sophisticated rebels: Meaning maps and settlement structure as evidence for a social movement in the Gallina Region of the North American Southwest. In *Life beyond the boundaries: Constructing identity in edge regions of the North American Southwest*, ed. Karen G. Harry and Sarah Herr, 88–121. Boulder: University Press of Colorado.

Borck, Lewis, Barbara J. Mills, Matthew A. Peeples, and Jeffery J. Clark. 2015. Are social networks survival networks? An example from the late pre-Hispanic US Southwest. *Journal of Archaeological Method and Theory* 22 (1): 33–57.

Brughmans, Tom. 2013. Thinking through networks: A review of formal network methods in archaeology. *Journal of Archaeological Method and Theory* 20 (4): 623–662.

Brughmans, Tom, Maaike S. de Waal, Corinne L. Hofman, and Ulrik Brandes. 2017. Exploring transformations in Caribbean Indigenous social networks through visibility studies: The case of late pre-Colonial landscapes in East-Guadeloupe (French West Indies). *Journal of Archaeological Method and Theory* 25 (2): 475–519. https://link.springer.com/article/10.1007/s10816-017-9344-0

Coward, Fiona, and Clive Gamble. 2008. Big brains, small worlds: Material culture and the evolution of the mind. *Philosophical Transactions of the Royal Society B: Biological Sciences* 363 (1499): 1969–1979.

Crabtree, Stefani A. 2015. Inferring Ancestral Pueblo social networks from simulation in the central Mesa Verde. *Journal of Archaeological Method and Theory* 22 (1): 144–181.

Crabtree, Stefani A., R. Kyle Bocinsky, Paul L. Hooper, Susan C. Ryan, and Timothy A. Kohler. 2017a. How to make a polity (in the Central Mesa Verde region). *American Antiquity* 82 (01): 71–95.

Crabtree, Stefani A., Lydia J.S. Vaughn, and Nathan T. Crabtree. 2017b. Reconstructing Ancestral Pueblo food webs in the Southwestern United States. *Journal of Archaeological Science* 81 (May): 116–127.

Fitzhugh, Ben, Erik Gjesfjeld, William Brown, Mark J. Hudson, and Jennie D. Shaw. 2016. Resilience and the population history of the Kuril Islands, Northwest Pacific: A study in complex human ecodynamics. *Quaternary International: The Journal of the International Union for Quaternary Research* 419 (October): 165–193.

Freeman, Linton C. 2004. *The development of social network analysis: A study in the sociology of science*. CreateSpace Independent Publishing. Empirical Press, Vancouver BC.

Graham, Shawn, and Scott Weingart. 2015. The equifinality of archaeological networks: An agent-based exploratory lab approach. *Journal of Archaeological Method and Theory* 22 (1): 248–274.

Granovetter, Mark S. 1973. The strength of weak ties. *American Journal of Sociology* 78 (6): 1360–1380.

Hofman, Corinne L., Lewis Borck, Emma Slayton, and Menno L.P. Hoogland. 2018. Archaic Age voyaging, networks, and resource mobility around the Caribbean Sea. In *Dearchaizing the Archaic: Middle to Late Holocene settlers of the insular Caribbean*, ed. Corinne L. Hofman and Andrzej T. Antczak. Tuscaloosa: University of Alabama Press.

Mills, Barbara J. 2017. Social network analysis in archaeology. *Annual Review of Anthropology* 46: 379–397.

Mills, Barbara J., Jeffery J. Clark, Matthew A. Peeples, W.R. Haas Jr., John M. Roberts Jr., J. Brett Hill, Deborah L. Huntley, et al. 2013. Transformation of social networks in the late pre-Hispanic US Southwest. *Proceedings of the National Academy of Sciences of the United States of America* 110 (15): 5785–5790.

Peeples, Matthew A., and W. Randall Haas Jr. 2013. Brokerage and social capital in the prehispanic U.S. Southwest. *American Anthropologist* 115 (2): 232–246.

Peregrine, Peter. 1991. A graph-theoretic approach to the evolution of Cahokia. *American Antiquity* 56 (01): 66–75.

Sanders, Lena. 2017. *Peupler la terre: de la préhistoire à l'ère des métropoles*. Paris: Presses Universitaires François-Rabelais.

Further Reading

Borck, Lewis, and Barbara J. Mills. 2017. Approaching an archaeology of choice. In *Foreign objects: Rethinking Indigenous consumption in American archaeology*, ed. Craig N. Cipolla. Tucson: The University of Arizona Press.

Cockburn, Denton, Stefani A. Crabtree, Timothy A. Kohler, and R. Kyle Bocinsky. 2013. Simulating social and economic specialization in small-scale agricultural societies. *Journal of Artificial Societies and Social Simulation* 16 (5).

Collar, Anna, Fiona Coward, Tom Brughmans, and Barbara J. Mills. 2015. Networks in archaeology: Phenomena, abstraction, representation. *Journal of Archaeological Method and Theory* 22 (1): 1–32.

Cotilla-Sanchez, Eduardo, Paul D.H. Hines, Clayton Barrows, and Seth Blumsack. 2012. Comparing the topological and electrical structure of the North American electric power infrastructure. *IEEE Systems Journal* 6 (4): 616–626.

Dungan, Katherine, Devin White, Sylviane Dederix, Barbara Mills, and Kristin Safi. 2018. A total viewshed approach to local visibility in the Chaco World. *Antiquity* 92 (364): 905–921.

Dunne, Jennifer A., Richard J. Williams, and Neo D. Martinez. 2002. Network structure and biodiversity loss in food webs: Robustness increases with connectance. *Ecology Letters* 5 (4): 558–567. Blackwell Science Ltd.

Dunne, Jennifer A., Herbert Maschner, Matthew W. Betts, Nancy Huntly, Roly Russell, Richard J. Williams, and Spencer A. Wood. 2016. The roles and impacts of human hunter-gatherers in North Pacific marine food webs. *Scientific Reports* 6 (February): 21179.

Giomi, Evan, and Matthew A. Peeples. 2019. Network analysis of intrasite material networks and ritual practice at Pueblo Bonito. *Journal of Anthropological Archaeology* 53: 22–31.

Gravel-Miguel, Claudine. 2017. *The impacts of geography and climate change on Magdalenian social networks*. Ph.D., Arizona State University.

Mills, Barbara J., Jeffery J. Clark, and Matthew A. Peeples. 2016. Migration, skill, and the transformation of social networks in the pre-Hispanic Southwest: Social network transformation in pre-Hispanic Southwest. *Economic Anthropology* 3 (2): 203–215.

Mills, Barbara J., Matthew A. Peeples, Leslie Aragon, Benjamin Bellorado, Jeffery Clark, Evan Giomi, and Thomas C. Windes. 2018. Evaluating Chaco migration scenarios using dynamic social network analysis. *Antiquity* 92 (364): 922–939.

Peeples, Matthew A. 2018. *Connected communities: Networks, identity, and social change in the Ancient Cibola World*. Tucson: University of Arizona Press.

Shields, Rob. 2012. Cultural topology: The seven bridges of Königsburg, 1736. *Theory, Culture & Society* 29 (4–5): 43–57.

Tilley, Christopher. 1997. *A phenomenology of landscape: Places, paths and monuments*. London: Bloomsbury Academic.

White, Andrew. 2013. An abstract model showing that the spatial structure of social networks affects the outcomes of cultural transmission processes. *Journal of Artificial Societies and Social Simulation* 16 (3): 9.

Social Zooarchaeology

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Introduction

Zooarchaeology, the study of animal bones from archaeological sites, began with a straightforward concern with diet, later expanded to

include subsistence strategies. The post-processual turn in archaeology eventually filtered into zooarchaeology, bringing a concern with social and symbolic aspects of human-animal relations. This approach seeks to understand the full range of these relations in past societies. Although it has roots in earlier work, it has largely come into existence in the last 25 years, initially as very much a minority approach. Early concerns included feasting and meat sharing, as well as animal symbolism exhibited by structured deposition of taxa or body parts. At least some recognition of social and symbolic factors now inflects nearly all zooarchaeological work.

Definition

Social zooarchaeology is the manifestation of social archaeology within zooarchaeology, the study of animal bones from archaeological sites in order to learn about human behavior. Social zooarchaeology explores aspects of human-animal relations beyond the dietary and human-human relations negotiated through animals, including the value of animals as wealth and symbols, sacrifice and other ritual and religious roles of animals, taboo, and the overvaluation of meat and its use in transactions of status and relationships through meat sharing and feasting.

Key Issues/Current Debates/Future Directions/Examples

Given the rich variety of roles that animals and their products have played in human society, many topics fall within the purview of social zooarchaeology, although some have received more attention than others. Animals serve as key symbols in all societies, intriguingly similar to humans yet different from them. The most obvious evidence of prehistoric animal symbolism is their portrayal in art, from the Early Upper Paleolithic on. There has been a century of debate over the interpretation of hunter-gatherer rock art: is it hunting magic, information transfer about game animals, art for art's sake, or does it depict ritual, myth, trance visions, or animal deities? Zooarchaeology can contribute where there are associated animal bone assemblages and invariably shows that the frequency of species in the art does not match the frequency of those hunted (e.g., Altuna 1996), thus ruling out straightforward explanations of art as hunting magic or teaching aid. Not uncommonly, a florescence of hunting art and elaborate hunting equipment occurs at times when actual hunting contributes less than previously to the diet, suggesting a performative aspect of hunting related to (gender) identity rather than subsistence.

Zooarchaeology can also contribute to classic debates about taboos, where proscriptions on killing or eating certain animals mark social distinctions (gender, age, religion, ethnicity, reproductive status, etc.). While it is always difficult to argue from absence, ethnoarchaeological work has shown that traces of taboo animals do occur in the archaeological record, but they are restricted spatially and limited in body part selection (Politis and Saunders 2002). Thus careful attention to rare taxa may reveal the contours of animal taboos and indicate whether the taboo is total or applies only to a segment of the population. Hesse and Wapnish (1998) provide a sterling example of social zooarchaeology in their interdisciplinary treatment of the Israelite pig taboo. Drawing on textual analysis, anthropological ethnicity theory, and zooarchaeological evidence, they show that Israelite ethnic identity was originally based on ties to place, but these were disrupted by the exile in Babylon. Afterward, the pig taboo and other food proscriptions help to construct a more portable ethnic/religious identity.

Many ritual practices incorporate animals or animal parts. Burial rites are the best studied, with careful attention to placement, body part selection, and butchering and cooking traces helping to distinguish among funerary sacrifices, the remains of mortuary feasts and food provisions for the afterlife (e.g., Méniel 1992). Outside of funerary contexts, sacrifice has received little attention except where historical records attest it, but ethnography suggests it would have been common in most societies with

domestic animals. Zooarchaeology has the potential to resolve the question of whether all meat from livestock in classical Greece derived from temple sacrifices and hence the extent to which sacrificial demand shaped herding practices. Only very recently has classical archaeology started to explore this potential, with promising results (Ekroth and Wallensten 2013). An exemplary study (Isaakidou et al. 2002) of animal bone deposits and associated deposits of other items in the Mycenaean Palace of Nestor at Pylos not only establishes that burnt offerings already occurred in this period (a point of controversy based on textual evidence) but also reveals a previously unknown practice in which palace accountants recorded or archived vouchers of sacrifices/feasts (bones, weapons, and drinking cups) prior to the proper disposal of the bones in discrete pits.

Hunting is crucial to the survival of foragers, but a social perspective would argue that hunters might seek prestige as well as protein and calories. In addition to the evidence from rock art and artifacts discussed above, ethnoarchaeological and zooarchaeological studies of various times and places suggest that hunters often target large game even when smaller animals would provide more meat (e.g., Hildebrandt and McGuire 2002).

Domestication is a particularly intense human-animal relationship. A longstanding debate concerns how and why domestication occurred (intentionally or through the gradual development of mutualism) and indeed what it is (morphological changes in the body or appropriation as property). Thanks to advances in genetics and the work generated by the famous Russian fox farm experiments, we have a better understanding of the mechanics of domestication, with selection for tolerance for humans the key factor that sets in motion genetic, endocrine, and developmental changes in animals' bodies and behavior (Zeder 2012). This explains how a similar result can be obtained from the rather different paths various species take to domestication, as is increasingly apparent. Recently, social zooarchaeologists have shifted the focus from the exploitative to the caring aspect of human relations with domestic animals (e.g., Oma 2010).

Human-animal relations are not limited to hunting and herding, however. Pet keeping is widespread and both wild and domestic animals can be pets. Studies of the surprisingly common prehistoric human translocation of animals to islands reveal a complex array of relations. While some cases appear to be a matter of bringing domestic animals when settling islands and others are probably stocking islands with game, animals such as wild cats and foxes do not fit comfortably into either category and may have been brought so they would be available for ceremonial requirements. Cyprus has been particularly well studied in this regard (although the earliest phases of human occupation are still being clarified) and exhibits instances of all three of these categories as well as probable commensal hitchhikers such as mice and shrews (Vigne et al. 2011).

Domestic animals provide meat and sometimes also secondary products such as milk and wool, but they are also property and therefore can serve as wealth. At the least, animal property can be exchanged or gifted like inanimate items but with the additional feature that they can reproduce and thus increase the flock. Ethnographically, livestock are very often important stores of wealth and used to create and maintain human relationships through a wide variety of transactions. These include inheritance to perpetuate wealth, contributions to feasts, fines to resolve disputes, and most importantly bridewealth to transact marriages and affiliate the children to the father's lineage. Bridewealth requirements affect the demography of herds and need to be modeled along with productive strategies that maximize meat and milk or minimize risk when interpreting mortality profiles (the age and sex kill-off pattern produced by culling decisions). Animal wealth and particularly bridewealth are powerful inducements to adopt herding and to invest labor in raising as many animals as possible. This expansionary tendency may help explain the spread of agriculture through the Old World following the domestication of herd animals. Animal wealth is also particularly susceptible to raiding and may be associated with an increase in warfare. Most of the zooarchaeological work that explicitly

addresses wealth has been done in Southern Africa, where livestock arrived in the Iron Age and ethnography attests to the practice of bridewealth. Drawing on mortality profiles and other evidence such as dung accumulations, current evidence suggests that cattle became more important as wealth through time and that this process may have been regionally variable.

The recent ontological turn in anthropology, in which scholars acknowledge the existence and validity of different understandings of how the world works, has inspired some zooarchaeologists to approach ancient animals differently. Some seek evidence that past cultures treated (some) animals as persons (Hill 2013). Usually these are wild animals; as well as transforming animals into property, domestication also tends to remove their souls. A related application of ontological theory draws on Descola's (2013) classification of ontologies (totemism, animism, analogism, naturalism) based on perceived continuities between human and animal bodies and souls, seeking to identify these ontologies in ancient societies through their treatment of animal remains and representations of animals.

Meat is an excellent food, a compact source of protein, fat, and vitamins. However, people seem universally to value meat beyond its nutritional contribution. The act of incorporating other creatures into our bodies is fraught with guilt and symbolism: meat makes special meals. In particular, meat is often the focus of sharing, especially when derived from wild game. Hunters are usually obligated to share large prey, at least, beyond their immediate family, according to rules that vary among societies. There has been considerable debate concerning whether meat sharing is a kind of delayed reciprocity, a risk-reducing strategy, a way to gain prestige (and mates), meant to benefit relatives beyond the nuclear family (differentially directed at kin), or a means of building and maintaining social relationships. Evidence suggests that all these functions may occur in different places, sometimes in combination. Archaeologically it is possible to detect the circulation of meat through careful contextual analysis, especially at sites that were occupied for relatively short lengths of time, so with higher resolution. Depending on the rules, sharing may produce skewed body part distributions. Refitting or conjoining studies that match articulating bones or right and left sides from the same animal can also reveal sharing. In some circumstances zooarchaeologists can determine not only whether sharing occurred but also whether it was symmetrical or uneven, which helps to sort out the models outlined above (Enloe 2003).

Feasting is another kind of sharing, with the meat distributed after cooking instead of before. The social dynamics are somewhat different, however, with a generous host gaining prestige from a well-executed feast, while hunters are usually enjoined to modesty about their kills. Feasting has received considerable attention in archaeology in the last 25 years, largely thanks to the work of Dietler and Hayden (2001) that assigns it an important place in transforming human societies and creating inequality. The performative aspect of feasts makes them relatively easy to detect archaeologically. Large or fancy serving vessels may mark a feast, for example. Meat (along with alcohol) is often the centerpiece of feasts, so large concentrations of animal bones, often less processed and cooked in larger pieces or unusual ways, can signal feasting remains. Both because the large amount of waste is more problematic and because it may carry ritual power (feasts often forming part of ceremonies), the bones may also receive different or more formal disposal treatment. Recently, some have argued that there has been too much focus on feasting and too great a dichotomy drawn between feasts and ordinary meals. Rather, all meals carry symbolism and varying degrees of ritualization, and there is usually a range of scale and formality (Hamilakis 2008).

While social zooarchaeology tends to be associated with interpretive approaches typical of post-processual archaeology, in fact it is not limited to a single theoretical school. Adherents of human behavioral ecology are increasingly including social factors in their models, often characterized as costly signaling (performance of behaviors that demonstrate the superior fitness of the signaler by

showing they can afford to put themselves at risk). Zooarchaeologists are recognizing that the social values of animals and meat are key to understanding past behaviors. For the most part, social zooarchaeology does not require new methods: mortality profiles, body part representation, and traces of butchering and cooking contain much social information. Most social questions do require a contextual approach, however, and frequently integration with other lines of evidence. The real key is to build models that take social values into account along with economic values.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Archaeology and Art
- ▶ Archaeology of Animal Burials
- ▶ Domestication: Definition and Overview
- ▶ Hunting and Hunting Landscapes
- ▶ Ontologies
- ▶ Post-Processual Archaeology
- ▶ Rock Art, Semiotics and Meaning of
- ▶ Social Memory in Archaeological Theory
- ▶ Zooarchaeology

References

Altuna, J. 1996. *L'Art des Cavernes en Pays-Basque: Les Grottes d'Ekain et Altxerri*. Paris: Seuil.

Descola, P. 2013. *Beyond nature and culture*. Trans. L. Janet. Chicago: University of Chicago Press.

Dietler, M., and B.D. Hayden, eds. 2001. *Feasts: Archaeological and ethnographic perspectives on food, politics, and power*. Washington, DC: Smithsonian Institution Press.

Ekroth, G., and J. Wallensten, eds. 2013. *Bones, behaviour and belief: The Zooarchaeological evidence as a source for ritual practice in ancient Greece and beyond*. Stockholm: Svenska Institutet i Athen.

Enloe, J.G. 2003. Food sharing past and present: Archaeological evidence for economic and social interactions. *Before Farming* 2 (1): 29–46.

Hamilakis, Y. 2008. Time, performance, and the production of a mnemonic record: From feasting to an archaeology of eating and drinking. In *Dais: The Aegean feast*, ed. L.A. Hitchcock, R. Laffineur, and J. Crowley, 3–20. Liège: Université de Liège.

Hesse, B.C., and P. Wapnish. 1998. Pig use and abuse in the ancient Levant: Ethnoreligious boundary-building with swine. In *Ancestors for the pigs: Pigs in prehistory*, MASCA research papers in science and archaeology, ed. S.M. Nelson, 123–135. Philadelphia: University of Pennsylvania, University Museum.

Hildebrandt, W.R., and K.R. McGuire. 2002. The ascendance of hunting during the California Middle Archaic: An evolutionary perspective. *American Antiquity* 67 (2): 231–256.

Hill, E. 2013. Archaeology and animal persons: Toward a prehistory of human-animal relations. *Environment and Society: Advances in Research* 4 (1): 117–136.

Isaakidou, V., P.L.J. Halstead, J.L. Davis, and S.R. Stocker. 2002. Burnt animal sacrifice at the Mycenaean 'Palace of Nestor', Pylos. *Antiquity* 76 (291): 86–92.

Méniel, P. 1992. *Les Sacrifices d'Animaux chez les Gaulois*. Paris: Éditions Errance.

Oma, K.A. 2010. Between trust and domination: Social contracts between humans and animals. *World Archaeology* 42 (2): 175–187.

Politis, G.G., and N.J. Saunders. 2002. Archaeological correlates of ideological activity: Food taboos and spirit-animals in an Amazonian hunter-gatherer society. In *Consuming passions and patterns of consumption*, ed. P.T. Miracle and N. Milner, 113–130. Cambridge, UK: McDonald Institute for Archaeological Research.

Vigne, J.-D., I. Carrère, F. Briois, and J. Guilaine. 2011. The early process of mammal domestication in the Near East: New evidence from the Pre-Neolithic and Pre-Pottery Neolithic in Cyprus. *Current Anthropology* 52 (S4): S255–S271.

Zeder, M.A. 2012. The Broad Spectrum Revolution at 40: Resource diversity, intensification, and an alternative to optimal foraging explanations. *Journal of Anthropological Archaeology* 31 (3): 241–264.

Further Reading

deFrance, S.D. 2009. Zooarchaeology in complex societies: Political economy, status, and ideology. *Journal of Archaeological Research* 17 (2): 105–168.

Orton, D.C. 2010. Both subject and object: Herding, inalienability and sentient property in prehistory. *World Archaeology* 42 (2): 188–200.

Russell, N. 2012. *Social zooarchaeology: Humans and animals in prehistory*. New York: Cambridge University Press.

Ryan, K., and P.J. Crabtree, eds. 1995. *The symbolic role of animals in archaeology*, MASCA research papers in science and archaeology 12. Philadelphia: University of Pennsylvania, University Museum.

Sykes, N.J. 2014. *Beastly questions: Animal answers to archaeological issues*. New York: Bloomsbury Academic.

Society for American Archaeology (SAA)

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Introduction

The Society for American Archaeology (SAA), founded in 1934, is "an international organization dedicated to the research, interpretation, and protection of the archaeological heritage of the Americas." It has more than 7000 members, including professionals from academic, cultural heritage, and museum fields, students, and avocational archaeologists. The society hosts a large annual meeting and publishes three scholarly journals, as well as a members' magazine. Policy is set by officers and a board of directors elected by the members of the society, and a professional staff is employed at its office in Washington, DC. In a number of ways, the SAA plays a vital role in the establishment and practice of CHM in the Americas (In the USA, CHM is usually referred to as CRM (cultural resource management)).

Guidelines for Ethical Practice

Protection of archaeological sites from looting and destruction has been a concern of the SAA since its beginning. The first president, Arthur C. Parker, stated that one of the new organization's goals was "...the conservation of sources. The fact that anyone with a spade has had the right to excavate ancient sites and hawk relics as a commercial venture has had baneful results" (Parker 1935: 3). In 1961, "Four Principles for Archaeology" were adopted by the SAA membership. These set forth several broad guidelines for methods, ethics, and training and stated that "collecting practices which destroy data" were to be avoided and that "state and federal statutes regarding preservation of antiquities and permits for excavation must be scrupulously observed" (Champe et al. 1961: 137).

The SAA's current eight "Principles of Archaeological Ethics" http://www.saa.org/AbouttheSociety/PrinciplesofArchaeologicalEthics/tabid/203/Default.aspx were adopted in 1996; they place CHM concerns at the heart of archaeological ethics. Principle 1 – stewardship – gives archaeologists an active responsibility to work for long-term protection of the archaeological record and for using that record for the benefit of all people. The second principle – accountability – requires a commitment to consult and attempt to establish working relationships with descendants and other groups affected by archaeological work. Principle 4 urges archaeologists to engage in public outreach and education with the aim of improving the preservation, protection, and interpretation of the archaeological record. Implications for stewardship and public benefits are also described for the other principles, which have to do with commercialization, intellectual property, reporting, records, and training. Also see Lynott and Wylie (2000) for further discussion. In 2015, the SAA adopted a *Statement on Sexual Harassment and Violence* in the context of archaeological education and work environments and published an accompanying *Guide*.

CHM Outreach and Educational Activities

Currently, the SAA has a number of programs, committees, and task forces that further its goals in CHM. The Education and Outreach Program produces and distributes materials that help archaeologists and educators bring information about archaeology and cultural heritage to students at all levels and to the general public. The "Archaeology for the Public" website http://www.saa.org/publicftp/PUBLIC/home/home.html serves as a clearinghouse for a large variety of educational resources. The SAA Public Education Committee provides leadership and advice to the board in this area, and committee members assist SAA staff on specific projects.

Separate committees are in charge of annual awards for excellence in public education and for outstanding efforts to enhance public understanding of archaeology. There is also a committee charged with encouraging improved coverage of

archaeology in the print and visual media; this committee oversees a Press Office at the annual meeting.

The SAA Government Affairs Program employs a full-time manager, who works with the SAA Board and both the Government Affairs and International Government Affairs Committees, to represent the archaeological community on governmental issues that have the potential to affect archaeological conservation and/or the practice of archaeology. Monthly bulletins regarding current governmental issues are circulated to members, and collaborations are pursued with colleagues and organizations in the broader historic preservation – CHM community. The SAA is one of the founding members of the advocacy group *Coalition for American Heritage*.

The SAA Committee on Native American Relations works to increase understanding by archaeologists about issues of concern to Native Americans and to promote better relationships between both groups. A Repatriation Committee deals with topics related to the repatriation of archaeological materials to descendant groups under US federal, state, and international laws. The SAA maintains an endowment to fund scholarships in archaeology or heritage management for Native American students, and the Native American Scholarships Committee is tasked with overseeing this program and selecting the scholarship recipients.

An active Online Seminar Series offers professional development opportunities for students and professionals. Members are also offered free online lectures given by prominent archaeologists. Many of the topics in both series are relevant to CHM practice.

Publications, Conferences, and Sponsorships

The SAA Annual Meeting regularly draws more than 3000 registrants, and the society sponsors the biennial La Conferencia Intercontinental de la SAA at a location in Latin America. The society publishes three peer-reviewed journals (*American Antiquity*, *Latin American Antiquity*, and *Advances in Archaeological Practice*), and the SAA Press publishes book length manuscripts. Its members' magazine – *The SAA Archaeological Record* – regularly publishes articles on topics broadly related to CHM. Articles in *Advances in Archaeological Practice* and books published by the *SAA Press* often deal with topics of special relevance to CHM.

The programs of both the Annual Meeting and of La Conferencia typically include forums and symposia that relate to the method, theory, and practice of CHM as well as governmental policies affecting cultural heritage. The conferences provide a venue for committee meetings, and at the Annual Meeting, US federal and state agencies often schedule staff meetings for their CRM specialists. The Annual Meeting features an award for Excellence in Cultural Resource Management, with the recipient designated by a committee assigned that task.

In the mid-1990s, the Society of Professional Archaeologists was transformed into the Register of Professional Archaeologists (RPA), under the sponsorship of SAA, the Society for Historical Archaeology, the Archaeological Institute of America, and the American Anthropological Association. The RPA recognizes professionals who have met basic educational and experience requirements and who agree to abide by the RPA Code of Ethics and Standards of Research Performance. Registrants also agree to take part in a formal grievance process if a credible complaint about their professional performance is filed with RPA. The SAA encourages its professional members to register, and a large percentage has done so. Although many RPAs are employed in academic settings, the majority work as consultants or managers in the CHM segment of the field.

References

Champe, John L., Douglas S. Byers, Clifford Evans, A.K. Guthe, Henry W. Hamilton, Edward B. Jelks, Clement W. Meighan, Sigfus Olafson, George I. Quimby, Watson Smith, and Fred Wendorf. 1961. Four statements for archaeology (report of the committee on ethics and standards). *American Antiquity* 27 (2): 137–138.

Lynott, Mark J., and Alison Wylie. 2000. *Ethics in American Archaeology*. 2nd revised ed. Washington, DC: Society for American Archaeology.

Parker, Arthur C. 1935. Editorial. *American Antiquity* 1 (1): 2–3.

Society for American Archaeology (SAA): Committee on Ethics

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Committee History

In 1991, in response to growing concerns about the state of the Society for American Archaeology's body of ethics, the SAA's Executive Board created a task force on ethics in archaeology, naming Mark Lynott and Alison Wylie as its cochairs. In November 1993, with funding from the National Science Foundation and the National Park Service, Lynott and Wylie convened a 3-day workshop in Reno, Nevada, attended by diverse members of the Society and nonmember individuals to discuss the then-current state of ethics in archaeology. The workshop participants crafted six draft principles of archaeological ethics. Since these were considered "draft" principles, they were presented to the SAA membership in various methods and comments solicited: in position papers at the April 1994 meeting of the SAA in Anaheim, California, as a Special Report of the SAA (with comments from non-workshop attendees) in 1995 (Lynott and Wylie 1995), in numerous presentations at regional archaeological or anthropological conferences, in the SAA *Bulletin*, in two discussion sessions held by Lynott at the 1996 meeting in Milwaukee, and in an *American Antiquity* article by Lynott (1997). After the adoption of the Principles of Archaeological Ethics by the SAA's Board of Directors in April 1996, a second, revised version of the SAA Special Report (Lynott and Wylie 2000) was produced to increase the educational utility of the process and to encourage discussion of ethical issues in the practice of archaeology. Since the initial formulations, three more principles have been added, bringing the total of principles to nine, providing a strong basis for continuing development of a stronger archaeological ethics program.

The Committee on Ethics became a standing committee of the Society in 1997, charged by the SAA's Board of Directors with promoting discussion and education about ethical issues in archaeology and proposing revisions, as necessary, of the Principles of Archaeological Ethics. The committee is not charged with enforcement powers or responsibilities and therefore does not enforce, oversee, or examine claims of ethical misconduct.

Major Impact

Education Programs

The Committee on Ethics maintains an active web presence as a means of fulfilling its educational mission. Its website offers resources for students on codes of ethics promulgated by other archaeological and anthropological organizations, as well as information regarding ethics as a general field of philosophy. In addition to these general resources, the Committee offers another program aimed at including student involvement with the concepts inherent in the ethical practice of archaeology.

One of the primary programs of the Committee on Ethics' educational outreach has been the Ethics Bowl, modeled on a similar program developed by the Association for Practical and Professional Ethics in 1995. The Society's first Ethics Bowl was held at the 2004 annual meeting in Montreal, Canada, and it has been included in the Society's annual meeting since then. Ethics Bowl organizers compile hypothetical cases that describe archaeological dilemmas that are used to initiate discussion about archaeological ethics and situations. Teams of college students use a debate-style competition to explore the ethics of archaeological practice. The competition is based on the abilities of the student teams to effectively communicate their arguments, to tie the ethical dilemmas to the legal and social frameworks which influence the discipline, and to analyze the impact of those issues on the discipline as well as non-archaeological stakeholders. The Committee also encourages the use of the Ethics

Bowl cases in classes relating to ethics in archaeology and anthropology.

The Principles of Archaeological Ethics has become a foundation upon which archaeological ethics has rested. But, while they have been viewed as a semipermanent document, their original authors viewed them as living documents subject to change as need arose. Therefore, the Society is open to revisiting and revising the Principles of Archaeological Ethics as the need arises. For example, the idea of "open access" brings with it the question of which data should be available and to what extent and how the availability of such data might contribute to looting and handling conflicting legal restrictions on posting and access. In such issues, the Committee does not represent only the interests of its US constituents but rather the interests of global constituencies, thereby making the revision of the SAA principles very important and more complex than simply applying US standards based on US stakeholders. Thus, the Committee on Ethics will continue to maintain an active role as a provider of resources and educational material relating to ethical practice in contemporary global archaeology.

Cross-References

- ▶ Ethics in Archaeology
- ▶ Ethics of the Archaeological Record
- ▶ Society for American Archaeology (SAA)

References

Lynott, M.J. 1997. Ethical principles and archaeological practice: Development of an ethics policy. *American Antiquity* 62: 589–599.

Lynott, M.J., and A. Wylie, eds. 1995. *Ethics in American archaeology: Challenges for the 1990s*. Washington, DC: Society for American Archaeology.

Lynott, M.J., and A. Wylie, eds. 2000. *Ethics in American archaeology*. 2nd ed. Washington, DC: Society for American Archaeology.

Further Reading

Ethics Bowl website. n.d. Available at: http://www.saa.org/AbouttheSociety/AnnualMeeting/EthicsBowl/tabid/193/Default.aspx

Society for Archaeological Sciences (SAS)

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Basic Information

The Society for Archaeological Sciences (SAS) is a professional society for those involved and interested in physical and natural science applications in archaeology and paleoanthropology. The purposes of the Society include establishing a forum from which current issues and advancements in archaeological science and archaeometry may be presented and discussed; promoting awareness and providing information for archaeologists, anthropologists, and other professionals about the potential and the problems involved in the application of techniques from the physical and natural sciences to archaeological scientific research; and maintaining an active program for the promotion and implementation of interdisciplinary research in archaeology.

During the International Symposium on Archaeometry and Archaeological Prospection in 1977 at the University of Pennsylvania in Philadelphia, five members of the acting executive board met to lay the groundwork for the formal organization and development of the SAS. The first issue of the *Newsletter* of the Society for Archaeological Sciences was produced in the summer of 1977. The founding SAS Acting Executive Board consisted of Rainer Berger, Karl Butzer, James B. Griffin, P. Edgar Hare, Richard L. Hay, Vance Haynes, Robert Maddin, George Rapp, Jr., Max Saltzman, and R.E. Taylor.

The articles of incorporation for the Society for Archaeological Sciences were filed in 1979.

SAS had about 100 charter members. Membership cost $5 US per year. The first meeting was held on April 25, 1979, at the Society for American Archaeology (SAA) meeting in Vancouver. Annual business meetings of the SAS now alternate between being held at the

SAA and at the biennial International Symposium on Archaeometry (ISA). Membership for the past decade has hovered around 300, with over 40% from outside the USA. The basic membership rate is currently $25; the increase over the last 40 years is consistent with the quadrupling of the US Consumer Price Index.

The presidents of the Society have been (in chronological order): Karl Butzer, R.E. Taylor, Jonathan Ericson, John Weymouth, George Rapp, Jr., Rainer Berger, Joseph Michels, Joseph Lambert, Jeffrey Dean, Garman Harbottle, Doug Price, Suzanne DeAtley, James Burton, Erv Garrison, Pat Martin, Rob Sternberg, Chris Prior, Arleyn Simon, Greg Hodgins, Aaron Shugar, Thilo Rehren, Sandra L. López Varela, Patrick Degryse, Rob Tykot, Marc Walton, and currently Rachel Popelka-Filcoff. The current president-elect (to become president in 2019) is Marcos Martinón-Torres. Thus, five of the past seven presidents have been from outside of the USA.

The office of the General Secretary was established in 1981, with R.E. Taylor assuming the post. All business affairs, including the maintenance of the membership files, membership renewals, elections of officers, and archiving of legal records, are organized by the General Secretary. R.E. Taylor held this position for more than 20 years until it was taken over by Rob Sternberg in the summer of 2002. Kyle Freund became the third General Secretary of SAS in 2017. The Society can be contacted through the General Secretary or other officers, listed on the SAS web page.

Major Impact

The official organ of the SAS has been its *Newsletter*, becoming the *Bulletin* with volume 12. The current annual volume number is 40. These publications have generally been issued on a quarterly basis. Some other milestones: the first stapled issue was volume 7. Bitnet email addresses first appeared in volume 10, with more than half of the officers and editorial staff showing email addresses by volume 12. Those who have served as editors of the *Newsletter/Bulletin* are (in chronological order): R. E. Taylor; Suzanne De Atley, George Rapp, Jr., Pat Martin, Rob Sternberg, Chris Nagle, Rob Tykot, Christian Wells, James Vanderveen, Vanessa Muros, and currently Thomas Fenn.

Members of SAS are also eligible for discount subscription rates to several significant journals of archaeological science.

Plenum Press and then Kluwer Publishers, now Springer, in cooperation with the SAS, published five volumes in the book series *Advances in Archaeological And Museum Science*: Mulholland and Rapp (1992), Taylor and Aitken (1997), Shackley (1998), Williamson and Nickens (2000), and Ambrose and Katzenberg (2001). The editorial board for this series has included Martin J. Aitken, Edward V. Sayre, R.E. Taylor, and Robert H. Tykot.

The SAS has sponsored archaeological science sessions at the SAA meeting since 1982. The R.E. Taylor Poster Award competition was established in 1998 to reward outstanding student posters presented at the SAA and ISA meetings. The SAS Student Research International Travel Award was started in 2012.

James Burton initiated the Internet activities of SAS, starting with the electronic bulletin board ArchSci in 1991. This morphed into the listserv SAS-Net and the ftp site SAS-Depot later in 1991. The SAS web site went up in 1997, and can now be found at the domain name www.socarchsci.org; it has been designed and managed by Destiny Crider. The listserv and web site are still active. In addition, an SAS blog was started in early 2009 by Rob Sternberg, Rachel Popelka-Filcoff and Destiny Crider, and a wiki containing announcements related to archaeological science was also brought online in 2009 by Rob Sternberg. Marc Walton initiated a Twitter feed (SocArchSci @Archaeo_Science) in 2014. These social media are not currently active, but you can now find SAS on Facebook!

The logo for SAS (Fig. 1) will often be used to identify its activities, such as the sponsorship of

Society for Archaeological Sciences (SAS), Fig. 1 Logo for the Society for Archaeological Sciences

the upcoming Encyclopedia of Archaeological Sciences to be published by John Wiley & Sons.

Cross-References

► Archaeometry: Definition

References

Ambrose, S.H., and M.A. Katzenberg, eds. 2001. *Biogeochemical approaches to paleodietary analysis*, Advances in archaeological and museum science series. Vol. 5. New York: Kluwer/Plenum Publishers.

Mulholland, S.C., and G. Rapp Jr., eds. 1992. *Phytolith systematics*, Advances in archaeological and museum science series. Vol. 1. New York: Plenum Publishers.

Shackley, M.S., ed. 1998. *Archaeological obsidian studies*, Advances in archaeological and museum science series. Vol. 3. New York: Plenum Publishers.

Taylor, R.E., and M.J. Aitken, eds. 1997. *Chronometric dating in archaeology*, Advances in archaeological and museum science series. Vol. 2. New York: Plenum Publishers.

Williamson, R.A., and P.R. Nickens, eds. 2000. *Science and technology in historic preservation*, Advances in archaeological and museum science series. Vol. 4. New York: Kluwer/Plenum Publishers.

Further Reading

The Society for Archaeological Sciences. n.d. Available at: http://www.socarchsci.org. Accessed 9 Aug 2017.

Society for Historical Archaeology (SHA) (Cultural Heritage Management)

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Basic Information and Major Impact

Historical archaeology is the archaeology of the modern world. The field is global in scope and deals with all groups of people, not simply those of European descent, although most historical archaeologists focus on the period after the fifteenth century.

The Society for Historical Archaeology (SHA) is an educational not-for-profit organization established to promote scholarly research and the dissemination of knowledge concerning historical archaeology and to exchange information in this field. It holds an annual conference to discuss problems of mutual interest relating to the study of historical archaeology and to have members and invited guests present topical papers, discuss new or shifting paradigms, and present results of recent research activities. The Society is very active in keeping informed of legislation, policy, rules, and regulations which effect cultural resources in the United States and worldwide. SHA has a long-standing relationship with the Advisory Council on Underwater Archaeology, which shares the society's annual conference in January.

SHA has its beginnings at a conference held in 1967 at Southern Methodist University in Dallas, Texas. The society almost immediately began publishing the journal *Historical Archaeology* which is currently a quarterly publication published by Springer. A newsletter followed in 1969 also published quarterly. Special publications have grown as have topical and specialty on-demand publications. The Society maintains a website – http://www.sha.org/ – which contains a variety of

information including names of officers, committee chairs, annual conference information, lists of publications, a member's area, a research resource area, a link to the Advisory Council on Underwater Archaeology's website, and other relevant information on historical archaeology.

SHA is governed by elected officers and a board of directors. The governing body is composed of a president, president-elect, secretary, treasurer, two publication editors, six directors, and the chair of the Advisory Council on Underwater Archaeology. The officers serve for a 3-year term. The SHA employs an executive director responsible for business office functions. The Society is funded by membership dues and other sources including donations, grants, and publication sales.

Today the Society for Historical Archaeology is the largest organization in the world dedicated to the archaeological study of the modern world and the third largest anthropological organization in the United States. Parallel organizations exist in Great Britain, the Society for Post-Medieval Archaeology, continental Europe, and Australasia, the Australasian Society for Historical Archaeology.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Critical Historical Archaeology
- ▶ Ethics in Archaeology
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ International Journal of Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Society for American Archaeology (SAA)
- ▶ Society for Industrial Archeology (SIA)
- ▶ South and Southeast Asia: Historical Archaeology
- ▶ Southern Africa: Historical Archaeology
- ▶ Urban Archaeology in Twenty-First Century Perspective

References

Society for Historical Archaeology. n.d. Available at: http://www.sha.org/

Society for Historical Archaeology (SHA) (Historical Archaeology)

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Basic Information

The Society for Historical Archaeology (SHA) is a scholarly organization devoted to the investigation, interpretations, preservation, and management of archaeological sites associated whether directly or indirectly with a literate tradition. SHA's primary period of interest starts with the spread of European peoples into other parts of the world during the fifteenth century and continues to the present day, though its subject matter is not limited to European cultures.

SHA traces its origins to a Central States Meeting of the American Anthropological Association held at St. Louis in 1965. Several archaeologists investigating historic period sites met there informally and concluded that a new society should be established to promote historic sites archaeology as a distinct discipline. Edward B. Jelks hosted the founding meeting at Southern Methodist University, in Dallas, Texas, during the 1st week of January 1967. About 100 persons attended the "International Conference on Historic Archaeology," which had 17 formal presentations on the program.

A special committee, chaired by Jelks, met there to lay the groundwork for what would become SHA. In conjunction with the formal proceedings, several business meetings convened to discuss the committee's recommendations. Critical actions included votes for organization of the new society and the election of officers. Also set

in motion were the processes of writing a constitution and bylaws, publishing a new annual journal, and planning for the first actual SHA meeting at Williamsburg, Virginia, in 1968. John L. Cotter, then of the US National Park Service, was elected to serve as SHA's first president. Society membership that 1st year was slightly over 200, mostly American, but including 13 in Canada and 1 each in England, Mexico, Chile, and Australia.

For much of its history, SHA was governed by a board consisting of a president, president-elect, immediate past president, secretary-treasurer, editor, newsletter editor, six directors, and the chair of the Advisory Council on Underwater Archaeology (ACUA), an independently chartered organization whose mission is to advocate, promote, and provide advice on responsible stewardship of underwater cultural heritage. A 2006 amendment to the SHA Constitution and Bylaws increased the presidential term from 1 to 2 years, eliminated the board seat of immediate past president, and divided the position of secretary-treasurer. A more recently approved change replaced the appointed positions of editor and newsletter editor with an elected editor for research (either the journal editor or co-publications editor) and an elected editor for communications (either the newsletter editor or website editor), respectively.

To date, there have been 46 presidents of the SHA; 32 of those individuals are still living. The incumbent president at this writing, Mark Warner (University of Idaho), with be succeeded by the current president-elect, Barbara J. Heath (University of Tennessee), at the annual meeting in January of 2020.

Major Impact

Today, with over 1700 members, SHA has become the largest scholarly organization dedicated to understanding the modern world through excavation and study of material remains. It is also the third largest anthropological society in the United States. Although based in the United States, with most of its members living and working there, the society is now truly international in its constituency. Its geographical scope correspondingly has broadened from a focus on the New World to a global perspective.

SHA has a large contingent of underwater archaeologists and, through terms of a memorandum of agreement, maintains formal cooperative ties with the ACUA. This close relationship is reflected in the fact that, since 1987, SHA's annual meeting has been officially called the Conference on Historical and Underwater Archaeology. The long-standing alliance between the two organizations also figured in accreditation of both SHA and ACUA as nongovernmental organizations (NGOs) for consultation and collaboration in the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage.

In addition to its quarterly journal, *Historical Archaeology*, SHA publishes a quarterly newsletter, occasional special publications, topical readers compiled from journal articles, technical briefs, and underwater proceedings. The society also holds agreements with several academic presses (e.g., the University Press of Florida, the University of Nebraska Press, and Springer Publishing) for the joint publications of books relating to the discipline. Other important activities include informing government policy makers and educating the general public about historical archaeology and cultural resource management. Much of its public outreach is accomplished through the official SHA website, http://www.sha.org/, which includes more detailed information about the society and discipline.

Cross-References

- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Historical Archaeology

References

De Cunzo, L.A., and J.H. Jameson Jr., eds. 2005. *Unlocking the past: Celebrating historical archaeology in North America*. Gainesville: University Press of Florida.

Hall, M., and S.W. Silliman, eds. 2006. *Historical archaeology*. Carlton: Blackwell.
Little, B.J. 2007. *Historical archaeology: Why the past matters*. Walnut Creek: Left Coast Press.
Majewski, T., and D. Gaimster, eds. 2009. *International handbook of historical archaeology*. New York: Springer.
Orser, C.E. 2004. *Historical archaeology*. 2nd ed. Upper Saddle River: Prentice-Hall.

Society for Historical Archaeology (SHA) (Modern World Archaeology)

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Basic Information

The Society for Historical Archaeology (SHA) promotes the study of the archaeology of the modern world (CE 1400 to present). It was founded in 1967 and has grown to become the largest international society of its kind, with a business office in the city of Rockville, Maryland. The majority of the SHA's members work in North America and focus on the archaeology of the post-Columbian New World; however, the society's geographical scope extends to the study of colonial encounters between indigenous peoples and Europeans in other continents, especially Africa and Asia. Over the years, the society has collaborated with the Society for Post-Medieval Archaeology in the UK and the Australasian Society for Historical Archaeology. It has also embraced underwater archaeology, in addition to terrestrial archaeology, and co-hosts a joint conference in January each year with the Advisory Council on Underwater Archaeology.

The development of the SHA mirrored the growth of professional archaeology in twentieth-century America and was closely tied to advances in legislation to protect historic sites and to the rise of cultural resource management in the late 1960s and 1970s. The origins and history of the SHA have been succinctly described by Richard Veit (http://www.sha.org/about/history.cfm). Veit identifies a number of key academic meetings which contributed to the establishment of the SHA. These included the 1958 meeting of the American Anthropological Association in Washington, DC, where a symposium was organized on the "Role of Archaeology in Historical Research" (Cotter 1993), and an "International Conference on Historical Archaeology" held at the Southern Methodist University of Dallas, Texas, in January 1967 (Schuyler 2001: 1177). The first meeting of the SHA took place in the heartland of colonial historic archaeology in the United States, in Williamsburg, Virginia, in 1968.

Major Impact

For the past 52 years, the SHA has published the quarterly peer-reviewed journal *Historical Archaeology* which publishes articles on research methods, theories, and findings from global historical archaeological. The society also publishes a *Technical Briefs in Historical Archaeology* series as well as specialist monographs. The SHA has played an important role in popularizing modern world historical archaeology and has actively worked to share the results of archaeological investigations with a wide range of educational and public interest groups, with almost one million people participating in some form of historical archaeology outreach in 2018. It has also worked tirelessly to lobby for the preservation of historic resources, including both tangible and intangible heritage assets, in political circles.

All members of the SHA and those who participate in SHA activities are asked to adhere to a 7-point ethical policy which serves to protect archaeological resources from needless destruction and highlights obligations to the archaeological record, colleagues, employers, and wider public audiences. Participants in the organization's annual meeting are also expected to adhere

to SHA's Sexual Harassment and Discrimination Policy. The SHA has also sought to raise professional standards and reward individual excellence by presenting a number of awards at annual meetings. The most prestigious of these awards is the J.C. Harrington Award, for lifetime achievement and scholarship, which was first awarded to Charles H. Fairbanks, in 1983.

Cross-References

► Australasian Society for Historical Archaeology (ASHA)

References

Cotter, J.L. 1993. Historical archaeology before 1967. *Historical Archaeology* 27 (1): 4–9.

Schuyler, R.L. 2001. Society for historical archaeology. In *Encyclopedia of archaeology: history and discoveries: 1179–1178*, ed. T. Murray. Santa Barbara: ABC-Clio.

Further Reading

Veit, R. n.d. History of the SHA. http://www.sha.org/about/history.cfm. Accessed 6 Oct 2019.

Society for Industrial Archeology (SIA)

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Basic Information

Probably the most important group focused on industrial heritage in North America is the Society for Industrial Archeology (SIA). Founded in 1971, this membership organization was created "to encourage the study, interpretation, and preservation of historically significant industrial sites, structures, artifacts, and technology." Inspired by the example of a similar group in the UK, the Association for Industrial Archaeology, and purposefully separate from the contemporary Society for Historical Archaeology, the founders included archaeologists, museum curators, government preservation officials, architects, engineers, planners and historians, academics, and avocational enthusiasts alike. While there has always been a small core of international members, the base remains within North America. The use of the term "archaeology" is based on the principal attention given to the physical evidence of industrialization, but not limited to the use of the traditional archaeological techniques. This terminology has been both a blessing and a curse; while it widens the scope and appeal of the enterprise beyond a focus on buildings and/or history, it also confuses some who respond to the term "archaeology" in its most narrow connotations referring to excavation and/or antiquity. Increasingly in North America, the term "industrial heritage" is used to refer to this area of interest and activism, consistent with practice in much of the remainder of the world, and recognizes the combination of attention to both the research enterprise and the preservation/management dimension of the field.

Major Impact

Throughout its history, the SIA has combined a scholarly approach to the study and understanding of industrial heritage with an enthusiast, preservationist ethic. As an organization that includes significant membership from both professional and avocational ranks, this dual focus is a major defining characteristic. SIA publishes a peer-reviewed journal, *IA*, along with a quarterly *SIA Newsletter*, and a website rich with information. SIA holds two meetings annually in shifting locations to feature a mix of scholarly presentations and highly popular tours of both historic industrial facilities and active production and infrastructure sites. SIA runs occasional international study tours, as well, to showcase exemplars of preservation practice and remarkable site survivals in other countries. In addition, SIA includes several affiliated local and regional SIA chapters that serve as a focus for regional activities and

preservation advocacy. The chapters hold seminars, conduct tours, publish newsletters and websites, and participate in campaigns to recognize the value of industrial heritage resources in their communities.

SIA is a community of like-minded individuals and groups that share an interest in the industrial heritage in its many forms. Increasingly the members communicate via electronic social media, though many traditionalists cling to the more familiar venues of print and direct personal interaction. Publications are shifting to online sources at the same time that ink is laid on paper. To learn more about the SIA, visit http://www.sia-web.org.

Cross-References

- ▶ Arqueologia Industrial
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Industrial Archaeology
- ▶ Industrial Heritage Association of Ireland (IHAI)
- ▶ Ironbridge Gorge Museum Trust (IGMT)
- ▶ Ironbridge Institute

Further Reading

Society for Industrial Archeology. n.d.. Available at: http://www.sia-web.org.

Society for Medieval Archaeology

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Brief Definition of the Topic

The Society for Medieval Archaeology exists to further the study of the period from the fifth to the sixteenth century CE. It does so by publishing *Medieval Archaeology* (a journal of international standing dealing primarily with archaeological evidence), a monograph series, and by other means of communication such as its newsletter and website, holding regular meetings and arranging conferences.

Medieval archaeology did not exist as a discipline in its own right at the time of the establishment of the Society in 1957, at the initiative of J. G. Hurst and D. M. Wilson. From the outset, this energetic Society has played an active and critical role in establishing and shaping medieval archaeology in Britain and Ireland (a special focus) and beyond. This is reflected in the contents of *Medieval Archaeology*. From the beginning, the journal has been central to the work of the Society and in many senses can be taken as a barometer of the development of the academic discipline and the challenges and opportunities existing in working within an inherently interdisciplinary and fragmented domain, where medieval archaeology has arguably lacked the confidence to establish its "own discipline's ability to write distinctive narratives" (Gilchrist and Reynolds 2009: 5–6). That the subject has expanded and matured across Europe is, for example, reflected in the birth of French, German, and Italian equivalents that in varying degrees have modeled themselves on the Society and its publications: *Archéologie medieval*, *Zeitschrift für Archäologie* des *Mittelalters*, and *Archeologia Medievale*. The iterative relationship between the development of the subject and of the Society is discussed directly and indirectly in two Society-edited volumes, *25 Years of Medieval Archaeology* (Hinton 1983) and *Reflections: 50 Years of Medieval Archaeology, 1957–2007* (Gilchrist and Reynolds 2009); see also Gerrard (2007).

As part of its 50-year celebrations in 2007, the Society made volumes 1–50 of *Medieval Archaeology* available free online to everyone, and the newsletters are also accessible on its website. In 2015 *Medieval Archaeology* was acquired from Maney Publishing by the Routledge Taylor and Francis publishing group, and in 2016 the journal moved to two issues per year. All volumes from 1 to 62 are now available via Taylor and Francis online. Subscribing individual and institutional members receive the journal *Medieval*

Archaeology (in hard copy and electronically), and individual members also receive hard copies of the all-color newsletter.

Since 1966, the Society has produced over 37 monographs dealing with particular aspects of the archaeology of Britain and Ireland between CE 400 and 1600, ranging from excavation reports to thematic overviews. Many of these appeared in recent years under the editorship of Christopher Gerrard.

A new development is the inclusion of a postgraduate student on council to represent the interests of students in general and to help promote activities particularly beneficial to them, notably student conferences reflecting the full breadth of interests in the Middle Ages and careers advice days.

The Society's presidents reflect the interdisciplinary outlook of the Society: R. L. S. Bruce-Mitford (1957–1959), W. A. Pantin (1960–1962), J. N. L. Myres (1963–1965), Eleanora Carus-Wilson (1966–1968), C. A. Ralegh Radford (1969–1971), A. J. Taylor (1972–1974), D. B. Harden (1975–1977), C. E. Blunt (1978–1980), J. G. Hurst (1981–1983), H. R. Loyn (1984–1986), A. C. Thomas (1987–1989), Helen Clarke (1990–1992), M. W. Thompson (1993–1995), M. Biddle (1996–1998), C. Dyer (1999–2001), R. A. Hall (2002–2004), Roberta L. Gilchrist (2005–2007), Leslie Webster (2008–2010), Mark Gardiner (2011–2013), Helena Hamerow (2013–2016), and Carenza Lewis (2017–2019).

Further information on the Society for Medieval Archaeology can be found at https://www.medievalarchaeology.co.uk/.

Cross-References

► Medieval Archaeology

References

Gerrard, C. 2007. Retrospect and prospect. *Society for Medieval Archaeology*. Available at: http://www.medievalarchaeology.org/. Accessed 13 Feb 2018.

Gilchrist, R., and A. Reynolds, eds. 2009. *Reflections: 50 years of medieval archaeology, 1957–2007*. Leeds: Maney Publishing.

Hinton, D.A., ed. 1983. *25 years of medieval archaeology*. Sheffield: Department of Prehistory and Archaeology.

Further Reading

Gerrard, C. 2009. The Society for Medieval Archaeology: The early years (1956–62). In *Reflections: 50 years of medieval archaeology, 1957–2007*, ed. R. Gilchrist and A. Reynolds, 23–45. Leeds: Maney Publishing.

Society for Medieval Archaeology. n.d. Available at: http://www.medievalarchaeology.org/. Accessed 13 Feb 2018.

Wilson, D.M. 2009. The foundation and early years of the Society for Medieval Archaeology. In *Reflections: 50 years of medieval archaeology, 1957–2007*, ed. R. Gilchrist and A. Reynolds, 11–21. Leeds: Maney Publishing.

Society of the Ship

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Introduction and Definition

The social order of ships occurs in both closed cultural systems that operate within the confines of the vessel at sea and open systems that interact simultaneously with the shore-based community that produces and supports them. The same can be said for shipwrecks as physical units of contemporaneity at the time of loss (so-called time capsules) versus the ways they are embedded in the context of ongoing natural and cultural processes that affect the postdepositional character of the archaeological record.

For our purposes, shipboard societies can be defined as floating communities that operate out of sight of land over variable distances and time. The ship itself can be small, like an ancient Polynesian voyaging canoe – a concept archaeologist Patrick V. Kirch called "the society of the canoe" in the 1980 PBS video production, *The Navigators* (Low 1980) – or it may be an ocean-going warship manned by hundreds of officers and sailors, such as the great eighteenth-century English line-of-battle ships described by historian N.A.M. Rodger in *The Wooden World* (1986).

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Size is not necessarily important, but the circumstances under which the vessel and its crew operated are. Modern maritime behavior can provide useful comparisons with the archaeological record at shipwreck sites and serves as a source of testable hypotheses. The goal, however, is to find out "what happened" in the past to account for shipwreck remains that may belong to any culture, including non-Western ones, and to be prepared to recognize situations in the past that may have no modern counterpart.

Key Issues/Current Debates/Future Directions/Examples

One could hypothesize generally, for example, that the need for making decisions and acting on them quickly aboard ships at sea, especially under stress, requires a hierarchical social order and degrees of absolute authority not always found on land in the same society. Many historic examples exist of authoritarian conditions on ships, and these are sometimes encoded as regulations – in the case of naval vessels – or as contracts, in the case of merchant ships. Rodger's (1986: 210) account, however, notes a multitude of ways: "The peculiar nature of seafaring gave to ships at sea a natural cohesion unknown ashore, and perhaps permitted the Navy a legal code which. . .was remarkably lenient by the standards of its day." Rodger's account reveals the complexities of authority aboard eighteenth-century Royal Navy ships and in shore-based institutions like the Admiralty. He cautions against hypotheses that could oversimplify the nature of the social order at sea.

The archaeological record is not always specific enough to provide a detailed characterization of social life aboard ships at sea, but some important connections are at least possible and can be explored. Although isolated at sea, sometimes for long periods, shipboard societies are not hermetically sealed off from land-based institutions. Archaeology can often posit robust connections between land and sea in such cases. There are contemporary practices in maritime behavior that have become institutionalized and can serve as models for comparison when analyzing shipwrecks, especially in maritime commerce. For example, *flags of convenience, preference trading*, and *barratry* are established practices with the potential to produce recognizable archaeological signatures at shipwreck sites that characterize the conduct of maritime commerce in the context of Western, mercantile capitalism:

- *Flags of convenience* involve registering ships in nations which themselves do not have significant merchant fleets of their own, mainly as a way of evading safety rules, manning requirements, or other regulations by major maritime nations that can be costly, especially for shipowners operating on narrow profit margins.
- The *preference trade* is a protected form of commerce in which a nation requires that only ships that are registered in that country can operate legally between that nation's ports.
- *Barratry* is a term that covers various ways shipowners and/or captains intentionally wreck a ship for personal or corporate gain. Many of these wreckings are "insurance jobs," but this can also be good way to get rid of a ship that has become uneconomical or unprofitable to operate, especially when the cargo is more valuable than the ship.

All of these practices have evolved into social institutions in Western maritime commerce that can be hypothesized to produce recognizable patterns in the archaeology of shipwrecks. Flags of convenience and the preference trade, for example, both encourage shipowners to push their vessels one more voyage beyond their intended use lives – something that maritime archaeologist Larry Murphy (1983) refers to as the "one-more-voyage" hypothesis. This kind of behavior can produce shipwrecks that show extreme efforts at repairs to keep the ship in service. For example, large amounts of hardened mastic cement were found in the bilges of the nineteenth-century wooden cargo vessel labeled archaeologically as the "Barrel Wreck" at Loggerhead Reef in the Dry Tortugas, FL (Gould and Conlin 1999). This was a common expedient for ship operators of that

period to plug leaks and fill in rotting timbers to keep an otherwise worn-out ship in service. The location of shipwrecks in areas of high risk such as reefs and shoals or in locations dangerously exposed to bad weather and strong currents – termed "ship traps" – can also be a clue to this kind of behavior.

In more modern ships, the resale of supertankers and their continued use at sea under flags of convenience past their roughly 5-year designed use life reveals this same kind of risky behavior – often without regard for the safety of the crew or the environmental consequences of oil spills (Mostert 1974). It may be hard to distinguish to what degree flags of convenience or the preference trade accounts for these archaeological patterns, since they can both produce these effects, but such institutions are as much a part of the wrecking process as the proximate conditions of the vessel's loss.

The physical patterning that results from barratry can be harder to detect, since there may be efforts by the shipowners to conceal their activities. Forensic-like investigation of shipwrecks, however, can identify such behavior as the most parsimonious explanation for such patterning, as happened in the case of the iron barque *North Carolina*, wrecked in Bermuda on New Year's Day, 1880 (Gould 2005). Barratry and these other institutionalized behaviors are all products of mercantile capitalist commence in Western or Western-related cultures. But what about non-Western societies?

As the classic (1922) study by anthropologist Bronislaw Malinowski in the Trobriand Islands of the southwest Pacific showed, maritime commerce may operate in non-market-based economies involving movement and exchange of prestige goods between lifelong trading partners on different islands (termed *kula*). This kind of behavior cannot be explained with reference to Western models of market-based exchange, even though there is evidence that *kula* exchanges and voyaging included large amounts of goods in trade, as opposed to prestige (Gould 2011: 164–170). The canoes used by such voyagers are unlikely to produce identifiable wrecks, but this example and others like it make it clear that archaeologists cannot rely exclusively on Western models of maritime commerce for their hypotheses about ancient trade.

As maritime archaeologists explore shipwrecks of non-Western origin, they must be prepared to account for situations in the past that may have no modern counterparts, even in extant non-Western cultures. For example, how did our species make its way initially from Southeast Asia to Australia/New Guinea at least 40,000 years ago? Land-based evidence shows that this was the earliest known case of oceanic voyaging in human history, but no direct evidence in the form of boat or raft remains has been found archaeologically. Historic and modern watercraft produced by Australian Aborigines were lightly constructed and were poor candidates as models for this kind of voyaging. Similar issues concern the social groups that attempted such early voyaging. They were a colonizing population as well as the vessel's crew, so their size and composition need to be considered along with the implications for provisioning such voyages. We do not yet have the answers to these questions, and in such cases the present cannot serve as a direct guide to the past. It may be the differences rather than similarities to the contemporary society of the ship that will direct archaeologists to what really happened in the past.

Cross-References

- ▶ Ethnoarchaeology
- ▶ Historical Archaeology
- ▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies
- ▶ Indigenous Peoples, Working with and for
- ▶ Pacific Ocean: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ United States: Cultural Heritage Management

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References

Gould, R.A. 2005. The wreck of the barque, "North Carolina," Bermuda, 1880: An underwater crime scene? *American Antiquity* 70: 28–56.

Gould, R.A. 2011. *Archaeology and the social history of ships*. 2nd ed. Cambridge: Cambridge University Press.

Gould, R.A., and D. Conlin. 1999. Archaeology of the barrel wreck, Loggerhead Reef, Dry Tortugas National Park. *International Journal of Nautical Archaeology* 28: 207–228.
Low, S., dir. 1980. *The navigators: Pathfinders of the Pacific*. USA: PBS.
Malinowski, B. 1922. *Argonauts of the western Pacific*. London: Routledge.
Mostert, N. 1974. *Supership*. New York: Knopf.
Murphy, L. 1983. Shipwrecks as a data base for human behavioral studies. In *Shipwreck anthropology*, ed. R.A. Gould, 65–89. Albuquerque: University of New Mexico Press.
Rodger, N.A.M. 1986. *The wooden world*. Glasgow: Collins.

Society of Vertebrate Paleontology of China (SVPC)

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Basic Information

The Society of Vertebrate Paleontology of China (SVPC) is an international organization dedicated to the promotion of research and the protection of the paleontological and paleoanthropological remains of China. The society is affiliated with the Institute of Vertebrate Paleontology and Paleoanthropology of the Chinese Academy of Sciences. In October 27 of 1984, more than 150 paleontologists and paleoanthropologists, representing more than 70 institutions, gathered in Laiyang of Shandong Province, where the famous duck-billed dinosaur *Tsintaosaurus spinorhinus* was discovered, and held the inaugural conference of the SVPC. On that meeting, paleomammalogist Min-chen Chow was elected the president and paleoichthyologist Meemann Chang the deputy president. The secretariat office information is as followed:

Address

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The official website: http://www.ivpp.cas.cn/jgsz/gkxh/gjzdwxh/
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Major Impact

Vertebrate paleontological investigations and studies had been carried out for many years around China before the establishing of the SVPC, and the researchers are well represented throughout the country. There was an increasing need for an organization by vertebrate paleontologists and paleoanthropologists in China for many years. The founding of the SVPC has played this role well, and it has been dramatically promoting the study of vertebrate paleontology, paleoanthropology, and paleolithic archaeology in China and continually impacting these fields in the international academic field.

Since 1984, which was the year of naissance of SVPC, 15 annual meetings have been held in different cities in China. Currently, the SVPC comprises more than 300 members. The official language of the SVPC is Chinese and English. The biyearly meeting is held every 2 years, with participants mainly from China and some Asian countries but is now attracting more and more participants from the United States and Europe.

The date and location of these 15 annual meetings are as follows:

The first annual meeting: 1984 October 17–24, the city of Laiyang, Shandong Province.
The second annual meeting: 1987 February 22–27, the city of Suzhou, Jiangsu Province.
The third annual meeting: 1989 October 19–24, the city of Beijing.
The fourth annual meeting: 1992 August16–22, the city of Dalian, Liaoning Province.
The fifth annual meeting: 1994 November 24–December 1, the city of Chengdu and Zigong, Sichuan Province.
The sixth annual meeting: 1997 June 1–4, the city of Beijing.
The seventh annual meeting: 1999 April 25–30, the city of Yuxi, Yunnan Province.
The 8th annual meeting: 2001 November 2–6, the city of Shenzhen, Guangdong Province.

The 9th annual meeting: 2004 November 19–22, the city of Nanning, Guangxi Province.
The 10th annual meeting: 2006 November 20–22, the city of Sanming, Fujian Province.
The 11th annual meeting: 2008 September 20–23, the city of Taiyuan, Shanxi Province.
The 12th annual meeting: 2010 September 13–15, the city of Pingyi, Shandong Province.
The 13th annual meeting: 2012 August 25–27, the city of Erenhot, Inner Mongolia Autonomous Region.
The 14th annual meeting: 2014 April 19–21, the city of Qianxi, Guizhou Province.
The 15th annual meeting: 2016 August 21–25, the city of Daqing, Heilongjiang Province.

Cross-References

► Animal Paleopathology
► Zooarchaeology

Further Reading

L.W. 1985. Society of Vertebrate Paleontology of China inaugurated. *Vertebrata PalAsiatica* 23: 87–88.

Soil Pollen Analyses in Environmental Archaeology

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Brief Definition of the Topic

Pollen liberated by flowers and spores from non-flowering plants contributes to the atmospheric pollen rain. After settling on the land surface, most is destroyed through oxidation and/or microbial and microfaunal activity. In fortuitous circumstances, pollen may be preserved in certain types of soil and can be extracted to provide data on past vegetation and environment. Pollen analysis is usually associated with lacustrine sediments and peat mires where the upward accumulation of sediments may provide a record of the changing vegetation and habitats at a local and more regional scale. Soil pollen analysis differs in that pollen and spores settling on suitable land where microbial decay is inhibited may be preserved through progressive incorporation into the developing soil profile. Such conditions occur where soils are of an acid character with no faunal (earthworm), mixing such as found on heathland, podzolic soils. In these circumstances, there is a general downward movement of pollen aided primarily by water flow, largely rain. Pollen and spores, however, do not move downward as individual grains but are locked in humic colloids. The downward movement is, therefore, slow and the breakdown and release from colloids depends on various pedological conditions. This results in a crude stratification of pollen within the soil profile with the oldest, irrespective of size, at the base of the profile. A soil pollen profile is, however, not truly stratified and while the youngest pollen is largely at the top and oldest lower down, at any particular level, there may be pollen of various ages (Dimbleby 1985). Longer residence in soils, the effects of bacterial action, and physical and chemical decay reduce the number of pollen grains present, resulting in differential preservation in favor of the most robust types. In Britain, this is often Lactucoideae (dandelion types) and fern spores. In acidic soils, with no faunal mixing, the highest absolute pollen numbers are in the upper levels, decreasing with depth. Thus, calculation of absolute pollen frequencies is an important tool in interpreting soil pollen data/assemblages coupled with knowledge of the differential preservation/resilience of various pollen types (Havinga 1964, 1985) in different soil and sediment types. Long-term study into taphonomic processes has been carried out to aid interpretation of palaeo-pollen spectra (Jewell and Dimbleby 1966; Dimbleby in Evans and Limbrey 1974; Havinga 1985). Interpretation of such stratified soil pollen thus requires a different approach to that of peat and lacustrine sediments.

The only principal contradiction to this is in soils where there is a buildup of a surface humus horizon as in a podzolic heathland soil (Ah) and woodland mor humus. Here, there may be a

stratigraphical accretion of pollen upward as humus continues to accumulate. High biological activity and breakdown of plant cellulose is carried out by microorganisms and fungal activity. With the former, ingested pollen is excreted to form *copromor* and the latter, *mycomor* (Stockmarr 1975). Changes in woodland structure through human activity may result in a change of the type of mor humus and rate of accumulation (Iversen 1964; Aaby 1983). In such mor humus, pollen may be remarkably abundant.

Historical Background

Soil pollen studies have been widely used to correlate vegetation history with soil profiles and development (e.g., Iversen 1964; Vuorela 1982). Professor G.W. Dimbleby pioneered and carried out numerous soil pollen analyses throughout Britain especially relating to archaeological contexts (Dimbleby 1955, 1957, 1985). When applied to soils buried (palaeosols) and preserved under archaeological sites, burial mounds, banks and by colluvium or other sedimentation, the technique has proved exceptionally useful in providing records of the vegetation prior to burial and information which may be directly relevant to the site occupation. The decrease of pollen down the profile can also be used to identify the old land surfaces where they are not visible in the overall profile and also to identify turves which (often inverted) were used to make up a funerary mound.

Dimbleby (1962) demonstrated that depletion of brown earth soils developed under deciduous woodland on sandy substrates initially had no pollen preservation. With increasing human activity (woodland clearance and agriculture), they became progressively more acid, resulting in heathland podzolic soil and consequent pollen preservation. Such pollen profiles frequently show an initial phase of scrub woodland (often hazel) with occasional traces of the preexisting woodland which was replaced by heathland vegetation on true podzolic soils. While such (podzolic) acid soils are favored for soil pollen analysis, in some circumstances, useful data can be obtained from calcareous soils developed on limestone lithology. This has proven valuable in establishing the vegetation and environment of the substantial areas of the chalklands of southern England through the analysis of prehistoric, subbarrow soils in this region (Dimbleby and Evans 1974). In such soils, due to faunal (largely earthworm) mixing, pollen may be distributed evenly throughout the soil. Absolute pollen numbers are generally small, and the potential for differential preservation and overrepresentation of taxa which have a robust pollen wall (exine) is substantially greater.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany
- ▶ Dimbleby, Geoffrey W.
- ▶ Environmental Archaeological Evidence: Preservation

References

Aaby, B. 1983. Forest development, soil genesis and human activity illustrated by pollen and hypha analysis of two neighbouring podzols in Draved Forest, Denmark. *Danmarks geologiske Undersøgelse IIR* 114: 1–14.

Dimbleby, G.W. 1955. Pollen analysis as an aid to the dating of prehistoric monuments. *Proceedings of the Prehistoric Society* 20: 231–236.

Dimbleby, G.W. 1957. Pollen analysis of terrestrial soils. *New Phytologist* 56: 12–28.

Dimbleby, G.W. 1962. *The development of British heathlands and their soils*. Oxford Forestry Memoirs, Vol. 23. London: Oxford University Press.

Dimbleby, G.W. 1985. *The palynology of archaeological sites*. London: Academic Press.

Dimbleby, G.W., and J.G. Evans. 1974. Pollen analysis and land snail analysis of calcareous soils. *Journal of Archaeological Science* 1: 117–133.

Evans, J.G., and S. Limbrey. 1974. The experimental earthwork on Morden Bog, Wareham, Dorset, England: 1963–1972. *Proceedings of the Prehistoric Society* 40: 170–202.

Havinga, A.J. 1964. Investigation into the decay of pollen and spores in various soil types. *Pollen et Spores* 6: 621–635.

Havinga, A.J. 1985. A 20 year experimental investigation into the corrosion susceptibility of pollen and spores in various soil types. *Pollen et Spores* 26: 541–558.
Iversen, J. 1964. Retrogressive vegetational succession in the post-glacial. *Journal of Ecology* 52: 59–70.
Jewell, P.A., and G.W. Dimbleby. 1966. The experimental earthwork on Overton Down Wiltshire, England: the first four years. *Proceedings of the Prehistoric Society* 32: 313–342.
Stockmarr, J.M. 1975. Retrogressive forest development as reflected in a mor pollen diagram from Mantingerbos, Drenthe, the Netherlands. *Palaeohistoria* 17: 37–51.
Vuorela, I. 1982. Pollen stratigraphy and chemical analyses of a mineral soil profile at a Corded Ware dwelling site in southern Finland compared with those of local organic sediments. *PACT. Journal of the European Study Group on Physical, Chemical and Mathematical Techniques Applied to Archaeology* 7: 175–193.

Further Reading

Havinga, A.J. 1974. Problems in the interpretation of pollen diagrams of mineral soils. *Geologie en Mijnbouw* 53: 449–453.

Somaliland: Cultural Heritage Management

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Introduction

The Somali peninsula has a rich heritage relevant to the world. Many ancient world civilizations have left their mark on this area, a connection facilitated by the region's strategic location, connecting Arabia, Africa, and Asia through the Red Sea Coast, the Indian Ocean and hinterland routes to North Africa, and the Swahili Coast. Ancient long-distance trade is confirmed by archaeological finds from Ras Hafun that demonstrate a Greco-Roman trade affiliation (Chittick 1975; Smith and Wright 1988). Furthermore, historical sources in Greek, *The Periplus of the Erythraean Sea* (translation Schoff 1995), and Chinese (Freeman-Grenville 1962) also verify long-distance trade, and Somali's own seafaring traditions in different prehistoric periods (Hourani 1995) attest to contacts with India, China, North Africa, Arabia, Persia, and Eastern Africa, with which Somalis share Swahili culture (Chittick 1969). Arabic (Gibb 1962) and Portuguese sources provide accounts of medieval coastal towns such as Muqdisho, Merka, Baraawe, Berbera, and Saylac. The commercial and cultural contact network in the hinterland is reflected both in archaeological remains (Smith and Wright 1988) and other sources such as oral tradition and historical records. Recent unpublished archaeological discoveries show links with ancient Egypt, Roman, and Greek world, South Arabia, India, and Ming and Yuan dynasty China. It is therefore clear that the region is a cultural crossroads.

Key Issues/Current Debates/Future Directions/Examples

In the last two decades, a man-made disaster has led to the destruction of an entire people's heritage. Somali cultural heritage property has become one of the irreplaceable victims of the longest recorded civil war in the world (Brandt and Mohamed 1996; see also Jama 1996; Abungu 2001). The commencement of the civil war triggered looting of the museums. The Garesa National Museum in Mogadishu and the Hargeisa Regional Museum have both long been emptied. Warlords commission systematic illicit digging of sites. Also the intangible heritage has recently been threatened by strict interpretations of Islam which prohibit the traditional performance arts, dances, songs, and dresses. Somali tangible and intangible heritage continues to suffer the ongoing civil war.

The failed state of Somalia is officially under the UN-backed Transitional Federal Government, but the country has in fact since 1991 been divided into at least three parts; the northwestern region is reclaiming independence in a quest for re-recognition of Somaliland (a country that existed for a week in 1960 when it gained independence from Britain and joined Italian Somalia voluntarily). Somaliland is now a de facto state

and enjoys peace and security. Puntland is semi-autonomous but is devastated by piracy, and South-Central Somalia is mostly controlled by Islamist groups.

In addition to the war, however, other factors have also contributed to the neglect of Somali tangible heritage both by Somalis and the international community (Mire 2007). One major issue is the approaches to cultural heritage before the war. Prior to the war, Somali tangible heritage was not managed properly. The Italian colonial administration set up the first sub-Saharan ethnographic museum in Somalia, but after the Italians left, this museum was allowed to deteriorate. The reason seems to be that Somalis did not understand the need for an ethnographic museum when most of the population was living still with the objects that the museum displayed. One of the former directors of this museum suggested that content was "backward" objects from the countryside, things that his grandparents were still using (Mire 2007). This is confirmed by Italian exhibition publications of the time, such as Caroselli (1934) and the exhibition catalogue *Museo della Garesa*. More recently, UNESCO tried to develop this museum by providing museum development experts (e.g., Posnansky 1979; Crespo-Toral 1988), but UNESCO's approach was not endorsed, and its recommendations were neglected by the Somali government. UNESCO failed to understand that the Garesa Museum was not a self-representation of the Somali people. It displayed objects from the nomadic lifestyle as the only identity of the Somali, and this approach was not popular in a time of struggle against colonial mentality and rule. Also the Somali dictatorship failed to ratify the 1972 UNESCO World Heritage Convention, and it did not draft any national heritage laws or policy. Heritage legislation was far from sufficient and in fact almost useless (see Jönsson 1983 for examples; Brandt and Mohamed 1996; Mire 2007). Also archaeological research material was taken out of the country with no reports (Jönsson 1983). Only a few people (Curle 1937; Chittick 1969; Brandt 1986, 1988, 1992) had attempted systematic archaeological survey before the current civil war. A few Somalis (External institutions that made effort to train local archaeologists were too few (see bibliography for references to the Swedish Aid Agency, the SAREC project 1982–1990 by Jönsson 1983; Broberg 1986, 1990, Broberg and Säfvestad 1988).) were involved with archaeological work (e.g., Jama 1996), but it seems all eventually ended up leaving the discipline altogether. All of this contributed to the lack of engagement of Somalis with the significance of their tangible heritage.

There was no infrastructure put in place for dealing with the notion of a museum and its local potential. Furthermore, archaeological research remained almost totally alien as very few locals were involved in it before the war. Hence, one of the reasons for the failure to preserve Somali tangible heritage over the few last decades is also due to the fact that Somalis do not associate archaeology with their heritage and identity. When studying Somalis' views on cultural heritage management and the significance of archaeological remains, it was noted Somalis have their own perceptions of heritage and methods of preservation. Somali have a knowledge-centered approach to heritage and its preservation (Mire 2007, 2008a, 2011). Understanding of this indigenous local approach to heritage and its preservation is paramount to any future and current involvement. Intangible and tangible heritage has been preserved through oral traditions and oral transmission of knowledge. Since there was no writing until 1973, Somalis have developed profound skills in transmission of knowledge and traditions through oral means. Somalis have strong intangible knowledge flowing from their experience in the landscapes in which they live. All aspects of life – cultural, social, and ritual – are maintained and developed through oral history, poetry, traditional performance art, and crafts production. Somalis regardless of where they reside (countryside, city, and diaspora) seem to keep their knowledge and skills acquired through experience as their heritage. To understand why Somalis do not preserve objects and monuments, it is important to understand their lifestyle. As nomads are always on the move, people carry very little, and instead it is vital to have the knowledge and skills to produce things when needed, to know the landscape and where to find raw

materials, and so on. Hence, preservation of objects is not important if one knows how to make these objects. This knowledge helped Somalis when they become refugees and fled their comfortable houses in the city and found themselves in the nomadic landscape. They were able to build portable organic huts and find water as well as use their ethnobotanical knowledge to treat illnesses. This holistic approach to heritage preservation as knowledge is key to Somali nomadic culture.

In post-conflict Somaliland (Mire 2008a, b), cultural heritage is key for development. The Knowledge-Centered Approach is used here to engage communities in heritage management (Mire 2011). Although archaeology is alien to them, through this Knowledge-Centered Approach, Somali communities have a role to play in the preservation of both their tangible and intangible heritage. However, the main obstacles in Somaliland are institutional capacity building and policy and strategy development. Since Somaliland is not a recognized state, it cannot sign or ratify the 1972 World Heritage Convention. Hence, heritage in Somaliland is suffering this lack of status. However, on a national level, cultural heritage is being put into the national agenda by the creation of the Department of Tourism and Archaeology which has a number of programs for implementation and development of heritage management strategies and for sustainable development. This involves, among other things, cultural resource management for sites, monuments, and development of museums.

The Local Education and Safeguarding Program (LESP) aims to assist communities and government staff to acquire basic knowledge of the significance, protection, and preservation of cultural heritage. The Department of Tourism and Archaeology has recruited local people in various areas, particularly to safeguard the most prominent archaeological sites. The program provides capacity building for the staff and communities based in different areas of Somaliland. The Knowledge-Centered Approach is critical here, because it assists in the acknowledgement that the locals possess knowledge about their heritage and can provide insights to its preservation. This empowers locals and after having established mutual interest in a particular site, the government appoints a local person as a custodian of the site. These local ideas are recorded and incorporated into the actual work taking place at the sites.

There is also the National Inventory List (NIL) program in which both tangible and intangible elements and history of the sites are recorded. Recent archaeological interest in Somaliland has produced important sites including the rock art sites of Laas Geel (Gutherz et al. 2003), Dhambalin, Haadh, and Jilib Rihin (Mire 2008b). However, except for conventional surveys of sites, the Knowledge-Centered Approach has facilitated the investigation of what the locals see as significant heritage. Many times there are sites and features in the landscape that the archaeologist does not recognize as something important, such as mountains, springs, or even trees. Such seemingly insignificant landscape features are often more significant to the locals than archaeological sites. When carrying out archaeological survey of selected areas of Somaliland provinces, local people are often involved in the initial creation of data about the sites.

The Department of Tourism and Archaeology runs public education and heritage awareness media programs. Since the Somali culture is basically oral culture, media such as radios, television, and recently the Internet play an important role in the awareness raising. Through TV programs, the department explained the problem of illicit diggings of archaeological sites and the archaeological excavation process to demonstrate the damage being done to archaeological context and how this impacts the results and history writing of the Somali past. Particular attention was given to the possible benefits of archaeological sites for local populations and measures that stakeholders (governments, communities, business people, etc.) need to take to safeguard cultural property. Photographs are used to show the Somali people the destruction inflicted on their heritage by fellow Somalis. Also, international media have recently been given a role to spread the information about Somali heritage and the work taking place in Somaliland. Awareness films featuring the

department's work have been televised by Somaliland National News as well as international news agencies such as National Geographic TV, CNN, and BBC.

The Department of Archaeology and Tourism invests in training of its staff in tourism management. Although infrastructure is poor in Somaliland, the department managed to profile sites near the main cities to become tourist sites. In particular, rock art sites provide a ready resource for income generation through tourist activities. Somaliland receives cultural and environmental tourism, although in small groups. Also the department has students in universities in the Horn of Africa who will be joining the department after completion of their studies. The Department of Tourism and Archaeology's strategy for protecting sites prone to looting is by engaging the elders of the villages in awareness programs. Such awareness programs have prompted the elders to take up their own search of stolen objects. One example of such local initiative is some stolen decorated stelae near the town of Burco that were returned by the locals on their way to Boosaaso to ship the material to the Gulf and sold on the black market.

However, since there are no museums currently in Somaliland, most objects are recorded and documented by the department, and local people are registered as the official custodians of the objects until there is an official museum. The lack of museums contributes to the disappearance of artifacts. Potential collection- and artifact-repatriation projects as well as archaeological-rescue projects are extremely challenged by this lack of storage and research space. The Hargeisa Museum building is awaiting development, although it has been utilized as a hospital since the war. Also in Sanaag region, there are a couple of cultural educational centers. The Department of Tourism and Archaeology has hired some of the local women artists and craftswomen for these educational centers. This enables the local people to engage with their heritage and transfer skills and knowledge to the younger generations. Also the women produce material culture which they can sell to generate their own income. Recently, Horn Heritage Organization, a nongovernmental organization, has been set up to promote awareness and preservation of Somali heritage.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Cultural Heritage Outreach
- ▶ Experiencing Cultural Heritage
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions
- ▶ Intangible Cultural Heritage
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Tangible Heritage in Archaeology

References

Abungu, A. 2001. Examples from Kenya and Somalia. In *Trade in illicit antiquities: The destruction of the world's archaeological heritage*, ed. N. Brodie, J. Doole, and C. Renfrew, 37–46. Cambridge: McDonald Institute Monographs.

Brandt, S.A. 1986. The Upper Pleistocene and Early Holocene prehistory of the Horn of Africa. *African Archaeological Review* 4: 41–82.

Brandt, S.A. 1988. Early Holocene mortuary practices and hunter-gatherer adaptations in southern Somalia. *World Archaeology* 20: 40–56.

Brandt, S.A. 1992. The importance of Somalia for understanding African and world prehistory. In *Proceedings of the first international congress of Somali studies*, ed. C. Greshekter and H. Adam. Atlanta: Scholars Press.

Brandt, S.A., and O.Y. Mohamed. 1996. Starting from scratch: The past, present, and future management of Somalia's cultural heritage. In *Plundering Africa's past*, ed. P.R. Schmidt and R.J. McIntosh, 250–259. Bloomington: Indiana University Press.

Broberg, A. 1986. Medeltidsarkeologin har nått Somalia. *Popular Arkeologi* 4.

Broberg, A. 1990. Några problem aktualiserade av ett svensk/somaliskt forskningssamarbete. In *META. Tredje världen* 4: 32–45. Lund.

Broberg, A., and U. SÄfvestad. 1988. Från Tobanka Buundo till Gezira. *Populär Arkeologi* 4.
Caroselli, F.S. 1934. *Il Museo Della Somalia*. Rocca. S. Casciano: Stabilimento Tipografio L. Cappelli.
Chittick, H.N. 1969. An archaeological reconnaissance of the southern Somali Coast. *Azania* 4: 115–130.
Chittick, H.N. 1975. An archaeological reconnaissance in the Horn: The British–Somali expedition. *Azania* 11: 117–133.
Crespo-Toral, H. 1988. *Museum development and monuments conservation*. Serial No. FMWCC/CH/88/102. Paris: UNESCO.
Curle, A.T. 1937. The ruined towns of Somaliland. *Antiquity* 11: 315–327.
Freeman-Grenville, G.S.P. 1962. *The East African coast: Select documents from the first to the earlier nineteenth century*. Oxford: Clarendon.
Gibb, H.A. 1962. *The travels of Ibn Battuta AD 1325–54*. Vol. 2. London: Hakluyt Society.
Gutherz, X., J.-P. Cros, and J. Lesur. 2003. The discovery of new rock paintings in the Horn of Africa: The rockshelters of Las Geel, Republic of Somaliland. *Journal of African Archaeology* 1 (2): 227–236.
Hourani, G. F. 1995. *Arab seafaring*. Princeton: Princeton University Press (expanded and revisited edition by J. C. Carswell, with additional notes from H. Frost, M. Horton, D. King, G. King, P. Morgan, G. Scanlon, and H. Wright).
Jama, A. D. 1996. *The origins and development of Mogadishu AD 1000 to 1850,* Studies in African Archaeology. Vol. 12. M.Phil. dissertation. Department of Archaeology. Uppsala: Uppsala University.
Jönsson, S. 1983. *Archaeological research cooperation between Somalia and Sweden*. Stockholm: Civiltryck.
Mire, S. 2007. Preserving knowledge, not objects: A Somali perspective for heritage management and archaeological research. *African Archaeological Review* 24 (3–4): 49–71.
Mire, S. 2008a. The discovery of Dhambalin rock art site, Somaliland. *African Archaeological Review* 25 (3–4): 153–168.
Mire, S. 2008b. The republic of Somaliland: Stability, international recognition and economic development. *The Middle East in Europe* 16: 12–13.
Mire, S. 2011. The knowledge-centred approach to the Somali cultural emergency and heritage development assistance in Somaliland. In F. Sulas ed. Africa's fragile heritages. Special Issue *African Archaeological Review* 29: 71–91.
Posnansky, M. 1979. *Museum and antiquities development*. Serial No. FRM/CC/CH/79/129. Paris: UNESCO.
Smith, M.C., and H.W. Wright. 1988. The ceramics of from Ras Hafun in Somalia. Notes on a classical site. *Azania* 23: 115–141.

Further Reading

Brandt, S.A., and R. Fattovich. 1990. Late quaternary archaeological research in the Horn of Africa. In *A history of African archaeology*, ed. P. Robertshaw, 95–108. London: James Currey.
Horn Heritage Organization. n.d. Available at: www.hornheritage.org
Museo Della Garesa. 1934. *Catalogo del Museo Delle Garesa*. Mogadiscio.
Schoff, W.H. 1912. *The Periplus of the Erythraean Sea: Travel and trade in the Indian Ocean by a merchant of the first century*. New York: Greenmans.
Somali Heritage and Archaeology. n.d. Available at: www.somaliheritage.org

South Africa: Heritage Management

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Introduction

South Africa is the southernmost country in Africa. It covers 1,219,090 sq. km, with 2798 km of coastline (Central Intelligence Agency (CIA) 2010). South Africa possesses a dominantly semiarid climate, with a subtropical climate along its east coast (Central Intelligence Agency (CIA) 2010). South Africa has a population of 49 million, with four predominant ethnic groups: black African (79%), white (9.6%), coloreds (8.9%), and Indian/Asian (2.5%) (Central Intelligence Agency (CIA) 2010). South Africa has twelve official languages, with IsiZulu being the most widely spoken, followed by IsiXhosa and Afrikaans (Central Intelligence Agency (CIA) 2010).

South Africa was first "discovered" by Dutch traders in 1652 and was used as a stopover point for trade routes between the Netherlands and the Far East; it was during this time that Cape Town was founded (Central Intelligence Agency (CIA) 2010). The English took control of the Cape of Good Hope in 1806, causing many of the Dutch settlers (Boers) to move further north (Central Intelligence Agency (CIA) 2010). Discovery of gold and diamonds in 1867 and 1886 caused a greater influx of people and the increased

degradation of the native peoples (Central Intelligence Agency (CIA) 2010). The Boers resisted the further-reaching control of the English but were defeated in the Boer Wars in 1899–1902 (Central Intelligence Agency (CIA) 2010). The Boers, now the Afrikaners, and the English established a rule together in 1910 as the Union of South Africa (Central Intelligence Agency (CIA) 2010). In 1948, the National Party instituted apartheid, and soon thereafter, South Africa was declared a Republic (Central Intelligence Agency (CIA) 2010). The African National Congress (ANC) opposed apartheid. After global pressure and years of turmoil in the country, the in-power regime negotiated a peaceful transition to majority rule (Central Intelligence Agency (CIA) 2010). The first multiracial elections were held in 1994, officially ending the apartheid and beginning the ANC's rule (Central Intelligence Agency (CIA) 2010).

In the years since, South Africa has been struggling with issues created or exacerbated by apartheid, including housing and education inequalities, poverty and health-care issues, as well as ANC infighting (Central Intelligence Agency (CIA) 2010).

Key Issues

Heritage Management Infrastructure

Heritage Laws

South Africa has one law that governs all heritage management in the country: the National Heritage Resources Act (NHRA) of 1999. This document serves multiple purposes including establishing a system for the management of heritage resources; encouraging good governing of these resources and empowering society to take a role in this governing for future generations; laying out principles and norms for the management of all heritage resources; creating a system for identifying, assessing, and managing heritage resources; establishing the South African Heritage Resources Agency (SAHRA); controlling the export of heritage resources and the illegal import of culturally significant items; allowing provinces to play a role in managing heritage resources of certain types; and creating laws and allowances for local authorities to protect heritage resources (Republic of South Africa (RSA) 1999).

This law takes special care in defining heritage resources, using an entire section to list all possible forms of a heritage resource (Republic of South Africa (RSA) 1999: Section 3). Most simply, heritage resources refer to any place or object of cultural significance (Republic of South Africa (RSA) 1999: Section 2.xvi). This law also mentions multiple times that any type of heritage resource should not be tampered with in any way without prior approval from SAHRA (Republic of South Africa (RSA) 1999: Sections 28–37). This document identifies the responsibility of heritage management as belonging not only to the government but also to the common person, for the sake of future generation (Republic of South Africa (RSA) 1999: Section 5.1.b). Though it does not state this explicitly, this law also acknowledges the existence of and the need to involve all stakeholders; it declares that heritage should be managed so that it acknowledges the right of affected communities to be consulted and to participate in the management of pertinent heritage resources (Republic of South Africa (RSA) 1999: Section 5.4) and that all relevant cultural values and indigenous knowledge should be taken into account as well (Republic of South Africa (RSA) 1999: Section 5.7.a). NHRA also acknowledges the role that tourism plays in heritage management. This law states that heritage resources contribute to tourism and should be developed and presented for this purpose (as well as for the purposes of research and education) (Republic of South Africa (RSA) 1999: Section 5.5); it also states that the identification, assessment, and management of heritage resources should contribute to economic development (Republic of South Africa (RSA) 1999: Section 5.7.d).

Though this law encompasses many ideas that are crucial to good heritage management, it appears to fall short on some accounts. The document as a whole seems more concerned with the bureaucracy behind the heritage management, rather than the methods and needs of heritage management; it spends a great deal of time

describing what permissions are needed from owners and organizations, rather than explaining the government's stance on methods, techniques, and authenticity. It also does not provide enough guidelines for the extent to which all stakeholders should be involved.

Heritage Institutions: Public

The main heritage management institute in South Africa is the South African Heritage Resources Agency (SAHRA). This agency was established by the National Heritage Resources Act (NHRA) in 1999 and is the government agency that is charged with the protection and administration of South Africa's heritage (Association of Southern African Professional Archaeologists (ASAPA) 2010). This agency is based out of Cape Town and has a regional office in each province (Association of Southern African Professional Archaeologists (ASAPA) 2010). SAHRA is run by an interdisciplinary council appointed by the arts and culture minister for South Africa and the chief executive officer; this position is currently held by Lynette Sibongile Van Damme (Association of Southern African Professional Archaeologists (ASAPA) 2010).

As the governmental agency for heritage management, SAHRA has a variety of duties, which are laid out on the home page of their website: "to coordinate and monitor the identification of our national heritage; to set a norm and standards and maintain the management of heritage resources nationally; to encourage and facilitate the development of provincial structures; to control export and import of nationally significant heritage resources; to develop policy initiatives on the promotion and management of our heritage; to nurture an holistic celebration of our history; to set national policy for heritage resources management, i.e. formal protection, general protection and management; and to develop an integrated and interactive system for the management of the national heritage resources" (South African Heritage Resources Agency (SAHRA) 2010a: home page). SAHRA provides protection and management guidelines to all types of heritage resources in South Africa, including archaeological sites, paleontological sites, meteorites, wrecks, burial grounds, and graves (South African Heritage Resources Agency (SAHRA) 2010b). They also supervise the creation of registers that are used to identify heritage resources and the creation of heritage areas (South African Heritage Resources Agency (SAHRA) 2010b).

Other governmental agencies include smaller regional ones, like Amafa aKwaZulu-Natali, which handles heritage resource management in KwaZulu Natal (Association of Southern African Professional Archaeologists (ASAPA) 2010).

Heritage Institutions: Private

The private or nongovernmental organizations (NGOs) in South Africa cover a wide variety of concerns and goals, from the integration of Black heritage and business strategy to the management of heritage resources that are not considered as such by the government to providing free consulting for heritage management groups and NGOs.

One such NGO is the Cape Town Heritage Trust, a private-sector, nonprofit organization. This organization was established by Cape Town's city council to take care of historic buildings and streets in Cape Town (Cape Town Heritage Trust (CTHT) 2010). Their website describes their mission as the conservation of the architectural, cultural, and natural heritage of Cape Town and its environs for the benefit of the inhabitants of the city and of the nation at large (Cape Town Heritage Trust (CTHT) 2010). This NGO works with the city council and the owners of buildings to improve and preserve historic buildings and other pieces of cultural heritage (Cape Town Heritage Trust (CTHT) 2010).

Other heritage NGOs include Nzumbululo Heritage Solutions (www.hessa.co.za), the Africa Heritage Society (www.africaheritage.com), and a number of province- or town-specific organizations that deal with natural heritage.

Examples

Part 1: Heritage Sites

South Africa's first entry onto the World Heritage List was in 1999, with the listing of Robben Island, iSimangaliso Wetlands Park, and the

Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai, and Environs (UNESCO World Heritage Center 1999a, b, c). Since then, another five sites have been added to the World Heritage List, along with twelve sites on the Tentative List. At the present, none of these sites are marked by UNESCO as being "at risk."

Sites on the World Heritage List

Of the eight sites South Africa has on the World Heritage List, four are cultural sites, one is a mixed cultural/natural site, and the remaining three are natural sites. My focus is on the cultural sites. The sites are described in the order in which they were inscribed on the World Heritage List.

Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai, and Environs This site was listed in 1999. It encompasses a variety of sites in Gauteng, Limpopo, and the Northwest Province. These sites contain evidence of early hominids, including the Taung Skull site, where the skull of an *Australopithecus africanus* was found, as well as the Makapan Valley site, where there are archaeological traces of human evolution, such as specimens of early hominids, such as Paranthropus, dating to between 4.5 million and 2.5 million years ago, and traces of human occupation, specifically the domestication of fire dating back to between 1.8 million and 1 million years ago (UNESCO World Heritage Center 1999a).

These sites meet two of the World Heritage criteria for possessing Outstanding Universal Value. The first met criterion is Criterion (iii): the archaeological evidence found here is an exceptional testimony to an extinct species while shedding light on our origins (UNESCO World Heritage Center 1999a). The second criterion met is Criterion (vi): these sites provide a vast reservoir of scientific data that will aid in the study of ancient humans (UNESCO World Heritage Center 1999a).

Robben Island This site was listed in 1999. Robben Island is a small island off the coast near Cape Town that has been in use since the seventeenth century as a hospital for socially unacceptable groups such as the mentally and terminally ill, a prison for both criminal and political prisoners, and a military base during World War II (UNESCO World Heritage Center 1999c). The prison on Robben Island held a variety of notable figures, including Nelson Mandela, who was incarcerated there for 20 years (Robben Island Museum 2009). The prison was closed in 1996, and the island has been developed as a museum and nature conservation area since then (Robben Island Museum 2009).

Robben Island fulfills two of the criteria for possessing Outstanding Universal Value. Criterion (iii) is met by the testimony it provides for the history of South Africa (UNESCO World Heritage Center 1999c). It also fulfills Criterion (vi) because it symbolizes the triumph of freedom, democracy, and the human spirit (UNESCO World Heritage Center 1999c, 2010).

uKhahlamba/Drakensberg Park This is a mixed cultural/natural site that was listed in 2000. This park stretches across KwaZulu Natal and the Eastern Cape Province and is known for its impressive geography and geology, as well as the concentration of native and endangered species, both flora and fauna, that this area is home to (UNESCO World Heritage Center 2003b). This park also contains many caves and rock shelters that hold the largest group of rock paintings found south of the Sahara. These paintings reflect the life of the now extinct San people (UNESCO World Heritage Center 2003b). The paintings show many aspects of San life, including hunting, dancing, food gathering, fighting, and ritual scenes (UNESCO World Heritage Center 2003b).

The uKhahlamba/Drakensburg Park meets four of the criterion for possessing Outstanding Universal Value. It meets Criterion (i) for the rock paintings – they are representative of a masterpiece of human creativity – and it meets Criterion (iii) because these rock paintings were recognized as a unique or exceptional testimony to a vanished culture (UNESCO World Heritage Center 2003b, 2010). The other two criteria met are Criteria (vii) and (x) for natural World Heritage Sites (UNESCO World Heritage Center 2003b).

Mapungubwe Cultural Landscape This is a cultural site that was listed in 2003. This landscape in the Northern Province at the confluence of the Shashe and Limpopo rivers was once home to the largest kingdom in the sub-Saharan continent, reaching the height of its power between CE 900 and CE 1300, before it was abandoned in the fourteenth century because of a rapid change in climate (UNESCO World Heritage Center 2003a). This landscape contains the nearly untouched remains of the palace sites and the surrounding settlement and two earlier capital sites (UNESCO World Heritage Center 2003a).

This landscape meets four of the criteria for possessing Outstanding Universal Value. Mapungubwe fulfills Criterion (ii) because the site provides evidence for the exchange of values that created cultural and social changes in Southern Africa during the height of their power; in the same vein, it also fulfills Criterion (iv) because the period of Mapungubwe's height of power and the effect of the cultural and social changes were part of a significant stage in the subcontinent's history (UNESCO World Heritage Center 2003a, 2010). The archaeological evidence found in this area provides a surprisingly complete testimony of Mapungubwe's rise and fall, fulfilling Criterion (iii) (UNESCO World Heritage Center 2003a, 2010). Finally, this landscape fulfills Criterion (v) by showing the impact of climate change and Mapungubwe as a culture that was vulnerable to irreversible change (UNESCO World Heritage Center 2003a, 2010).

Richtersveld Cultural and Botanical Landscape This is a cultural site that was listed in 2007. This landscape in the Northern Cape Province is home to the seminomadic, pastoral Nama peoples. Their pattern of life has persisted for over two millennia and includes the building of portable rush-mat houses, the only area in which this is still done, and seasonal migrations to grazing grounds (UNESCO World Heritage Center 2007). This way of life reflects old traditions that were once widespread, but no longer are (UNESCO World Heritage Center 2007).

This cultural landscape meets two of the criteria for possessing Outstanding Universal Value. The Nama peoples' way of life demonstrates a way of life that, when it was still a widespread way of life, played a major role in the history of South Africa; by this explanation, Richtersveld fulfills Criterion (iv) (UNESCO World Heritage Center 2007, 2010). Additionally, Richtersveld fulfills Criterion (v) because this area is one of the few remaining places were transhumance pastoralism, or the seasonal movement of people with livestock, is still practiced; this is an example of a traditional human land use that is now vulnerable (UNESCO World Heritage Center 2007, 2010). das könnte 2007 sein.

Part 2: Sites on the Tentative List

South Africa currently has 12 sites on the Tentative List, many of which were added to the Tentative List in 2004 or 2009. Eight of these are proposed as cultural sites; four are proposed as natural sites (UNESCO World Heritage Center 2009a). The cultural sites are, again, listed in the order they were proposed.

- *Pleistocene Occupation Sites of Klasies River, Border Cave, Wonderwerk Cave, and Comparable Sites Relating to the Emergence of Modern Humans*

  This cultural heritage site was proposed in 1998 and fulfills Criteria (ii), (iii), (iv), (v), and (vi) (UNESCO World Heritage Center 1998).
- *Kimberley Mines and Associated Early Industry*

  This cultural heritage site was proposed in 2004 and fulfills Criteria (i), (ii), (iv), and (vi) (UNESCO World Heritage Center 2004a).
- *Pilgrim's Rest Reduction Works Industrial Heritage Site*

  This cultural heritage site was proposed in 2004 and fulfills Criteria (i), (ii), (iv), and (vi) (UNESCO World Heritage Center 2004b).
- *The !Xam Khomani Heartland*

  This cultural heritage site was proposed in 2004 and fulfills Criteria (iii), (iv), (v), and (vi) (UNESCO World Heritage Center 2004c).
- *Liberation Heritage Route*

  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iii), and (vi) (UNESCO World Heritage Center 2009b).

- *The Cape Arc of Meridian*
  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iv), and (vi) (UNESCO World Heritage Center 2009c).
- *The Cape Winelands Cultural Landscape*
  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iii), and (iv) (UNESCO World Heritage Center 2009d).
- *The Namaqualand Copper Mining Landscape*
  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iii), and (iv) (UNESCO World Heritage Center 2009e).

Discussion of Sites on the World Heritage List and Tentative List

The sites inscribed on the World Heritage List for South Africa are perhaps indicative of what the South African government sees as important in the country's history. The cultural sites on the list favor themes such as the birth of the human race, precolonial civilizations, and the celebration of South African independence. None of these sites acknowledges the role colonialism and Europe played in developing the country. Whether or not these influences were considered unwanted or useful, all parts of a country's history should be considered equally when heritage is created. The omission of the colonial history is also an omission of those who live in the country who are descendants of the Dutch and English colonizers.

However, as the Tentative List suggests, heritage management in South Africa is beginning to acknowledge their colonial period. The Cape Winelands Cultural Landscape, suggested in 2009, acknowledges the role that colonialism, England, and the Netherlands played in the development of the wine industry there, as well as in the vernacular architecture (UNESCO World Heritage Center 2009d). In addition to this, there are three other sites that have been added onto the Tentative List since 2004. Kimberley Mines and Associated Early Industry, Pilgrim's Rest Reduction Works Industrial Heritage Site, and the Namaqualand Copper Mining Landscape are industrial heritage sites and acknowledge the role that England and the Netherlands played in starting off the industrial revolution of South Africa (UNESCO World Heritage Center 2004a, b, 2009e).

The order in which sites were added to the World Heritage List is also interesting. The first three sites, the Fossil Hominid Sites, Robben Island, and iSimangaliso Wetlands Park, were all added in the same year. These sites reflect, perhaps, a desire to be recognized by the world as a capable country; these sites establish the importance of South Africa to the rest of the world as the "Cradle of Humanity," as a free, self-governed country and as being wealthy enough to pay attention to issues that are a luxury, such as environmental conservation (UNESCO World Heritage Center 1999a, b, c).

Current Debates

Heritage Management Problems

Overall Problems

The predominant issues in heritage management for South Africa are laid out neatly in Colette Scheermeyer's (2005) article "A Changing and Challenging Landscape: Heritage Resources Management in South Africa." The first issue is one of balancing differing views of the same event. People in South Africa have bad memories of the apartheid, but good memories of their neighborhoods, social interactions, and lives during this period of time. It is the responsibility of those who practice heritage management to take both views and represent them fairly, without interference from their personal views or judgments (Scheermeyer 2005). So, despite the desire to portray the apartheid as entirely bad, one has to acknowledge that the injustices of the apartheid did not penetrate every aspect of life.

The second issue is the balance between the tangible and intangible. One must ensure that the intangible cultural aspects of a site are maintained along with the tangible, but on the flipside, the integrity of the site cannot be sacrificed while promoting the intangible heritage (Scheermeyer 2005). This problem manifests itself in the desire of communities to continue using culturally significant sites for ritual purposes.

The third predominant issue focuses on stakeholders. This problem is one that faces every heritage resource around the world. A holistic and fair approach to managing these cannot be achieved unless all stakeholders are identified consulted and involved (Scheermeyer 2005).

Site-Specific Problems

There are few sites with glaring difficulties in the heritage management. The most pressing problem is facing Wonderwerk Cave, one of the sites on the Tentative List. This cave, and the rock paintings within, is currently being threatened by erosion and the possibility of the cave collapsing (UNESCO World Heritage Center 1998).

Future Directions

Heritage management in South Africa is, by no means, an easy task. The presentation of heritage is plagued by negative heritage, conflicting views, and unwanted stakeholders. Despite these problems and inner turmoil, the South African government has made a strong, honest attempt at the competent management of their heritage. Their heritage management law tries to fairly address many of the issues that arise in heritage management, such as stakeholder claims and heritage preservation, though it does this at the expense of in-depth instruction on conservation. The South African government agency for heritage management is set up in an effort to include as many relevant disciplines as possible in heritage management.

However, some would argue that the effort and funding that is being put into heritage management and the World Heritage Sites and nominations is misplaced, given the staggering poverty rate of the country (around 50%) and the prevalence of HIV/AIDS and other infectious diseases (Central Intelligence Agency (CIA) 2010).

Cross-References

- ▶ African Stone Age
- ▶ African World Heritage Fund (AWHF)
- ▶ Heritage and Archaeology
- ▶ Heritage Conservation Training

References

Association Of Southern African Professional Archaeologists (ASAPA). 2010. Heritage management – heritage agencies. Available at: www.asapa.org.za/index.php/heritage/heritage_agencies/. Accessed 5 Dec 2010.

Cape Town Heritage Trust (CTHT). 2010. CTHT – about us. Available at: www.heritage.org.za/home/?page_id=4. Accessed 5 Dec 2010.

Central Intelligence Agency (CIA). 2010. *The world factbook: Africa: South Africa*. Available at: www.cia.gov/library/publications/the-world-factbook/geos/sf.html. Accessed 2 Dec 2010.

Republic of South Africa (RSA). 1999. *National heritage resources act. Government Gazette 406(19973)*. Notice 506. Cape Town: Republic of South Africa.

Robben Island Museum. 2009. History of Robben Island. Available at: www.robben-island.org.za. Accessed 26 Nov 2009.

Scheermeyer, C. 2005. A changing and challenging landscape: Heritage resources management in South Africa. *The South African Archaeological Bulletin* 60: 121–123.

South African Heritage Resources Agency (SAHRA). 2010a. SAHRA home page. Available at: www.sahra.org.za/default.asp. Accessed 5 Dec 2010.

South African Heritage Resources Agency (SAHRA). 2010b. SAHRA introduction. Available at: www.sahra.org.za/intro.htm. Accessed 5 Dec 2010.

UNESCO World Heritage Center. 1998. World heritage tentative list – Pleistocene occupation sites of Klasies River, Border Cave, Wonderwerk Cave and comparable sites relating to the emergence of modern humans. Available at: whc.unesco.org/en/tentativelists/1074/. Accessed 3 Dec 2010.

UNESCO World Heritage Center. 1999a. World heritage list – The fossil hominid sites of Sterkfontein, Swartkrans, Kromdraai and Environs. Available at: whc.unesco.org/en/list/915. Accessed 26 Nov 2010.

UNESCO World Heritage Center. 1999b. World heritage list – iSimangaliso Wetland Park. Available at: whc.unesco.org/en/list/914. Accessed 26 Nov 2010.

UNESCO World Heritage Center. 1999c. World heritage list – Robben Island. Available at: whc.unesco.org/en/list/916. Accessed 26 Nov 2010.

UNESCO World Heritage Center. 2004a. World heritage tentative list – Kimberley Mines and associated early industry. Available at: whc.unesco.org/en/tentativelists/1909/. Accessed 3 Dec 2010.

UNESCO World Heritage Center. 2004b. World heritage tentative list – Pilgrim's rest reduction works industrial heritage site. Available at: whc.unesco.org/en/tentativelists/1075/. Accessed 3 Dec 2010.

UNESCO World Heritage Center. 2004c. World heritage tentative list – The !Xam Khomani Heartland. Available

at: whc.unesco.org/en/tentativelists/1910/. Accessed 3 Dec 2010.
UNESCO World Heritage Center. 2007. World heritage list – Richtersveld cultural and botanical landscape. Available at: whc.unesco.org/en/list/1265. Accessed 26 Nov 2010.
UNESCO World Heritage Center. 2009a. World heritage tentative list. Available at: whc.unesco.org/en/tentativelists/state=za. Accessed 1 Dec 2010.
UNESCO World Heritage Center. 2009b. World heritage tentative list – liberation heritage route. Available at: whc.unesco.org/en/tentativelists/5459/. Accessed 3 Dec 2010.
UNESCO World Heritage Center. 2009c. World heritage tentative list – The Cape Arc of Meridian. Available at: whc.unesco.org/en/tentativelists/5461/. Accessed 3 Dec 2010.
UNESCO World Heritage Center. 2009d. World heritage tentative list – The Cape Winelands cultural landscape. Available at: whc.unesco.org/en/tentativelists/5455/. Accessed 3 Dec 2010.
UNESCO World Heritage Center. 2009e. World heritage tentative list – the Namaqualand copper mining landscape. Available at: whc.unesco.org/en/tentativelists/5460/. Accessed 3 Dec 2010.
UNESCO World Heritage Center. 2010. World heritage criterion for selection. Available at: whc.unesco.org/en/criteria/. Accessed 3 Dec 2010.

Further Reading

UNESCO World Heritage Center. 2003a. World heritage list – Mapungubwe cultural landscape. Available at: whc.unesco.org/en/list/1099. Accessed 26 November 2010.
UNESCO World Heritage Center. 2003b. World heritage list – uKhahlamba/Drakensberg Park. Available at: whc.unesco.org/en/list/985. Accessed 26 Nov 2010.

South Africa: Maritime Archaeology

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Introduction

South Africa has roughly a 3,000-km-long coastline scattered with an estimated 3,000 historically recorded shipwrecks dating from the sixteenth century right up to modern times. According to the South African Heritage Resources Agency database, the resource represents 38 different nationalities. Shipwrecks concentrated in "hot spots" like harbors or rough stretches of coastline mostly because the southern tip of Africa was the gateway to the east for the European colonial powers before the construction of the Suez Canal. This heritage is dominated by Portuguese, Dutch, and British shipwrecks. The Portuguese opened up the sea route from Europe to the east, the Dutch colonized the Cape in the seventeenth century, and the British prevailed over the Dutch in the early nineteenth century. Academic interest in historical shipwrecks is a twentieth-century phenomena as in the previous centuries the economic value of salvage was the foremost motive for investigating the remains of old ships.

Definition

Maritime archaeology, as a subdiscipline, has had a checkered existence in South Africa. Maritime archaeology arguably started in the late 1980s with the appointment of a maritime archaeologist at the University of Cape Town. There was however an awareness of the importance of the underwater cultural heritage from quite early on with sporadic archaeological interventions. As with most countries with a coastline and shipwrecks, the inevitable scourge of treasure hunting reared its head, and a large part of the history of maritime archaeology in South Africa has to do with how this dilemma was handled by heritage bodies in the country. This, of course, implies the development of legislative efforts to control the resource. Although important in understanding the development of maritime archaeology in South Africa, it is not the focus of this review, as it will be discussed elsewhere in this publication (see the entry "▶ South Africa: Maritime Legal Management" in this encyclopedia). This entry will rather look at the development of the subdiscipline at museums and universities, in particular at Iziko Museums, as well as describe some of the archaeological interventions mentioned above. The development of maritime archaeology will also be discussed in the context of a change in

the political climate prevalent in South Africa at various times.

Historical Background

The South African Museum as the oldest museum in sub-Saharan Africa did not play a major role in the early years of shipwreck exploration in South Africa. In 1956, however, the director of the SA Museum, Dr. A.W. Crompton, offered the museum's assistance to the legendary physical "culturalist," strong man, and treasure hunter Tromp van Diggelen in his bid to recover "treasure" from shipwrecks in Table Bay (SACHM D1/4). The museum was willing to help with the identification of the items recovered as well as provide display area. An article in the Cape Argus in July 1956 estimated a fortune of 30 million pounds to be found on shipwrecks in Table Bay. Fortunately, not much came from this endeavor.

The situation changed in the 1960s when the South African Cultural History Museum (SACHM) was formed in 1964 by the splitting of the "European" collections from the Natural History and Ethnography collections of the South African Museum. This overtly political move from the Nationalist government of the day would, in the formation of the New South Africa in the 1990s, have an important impact in the direction taken by maritime archaeology in the museum world as will be discussed later in this entry. As an institution with its focus on European and therefore colonial history, the SACHM's interest in shipwrecks became apparent early on. This could be ascribed to the increased access to the underwater world due to the availability of scuba gear and with the founding of underwater clubs. As an example, the Atlantic Underwater Club (formed in 1953 in Cape Town) became more interested in shipwrecks with the publication by the Johannesburg Public Library's chief librarian, R.F. Kennedy (1955), titled *Shipwrecks On and Off the Coasts of Southern Africa*. It is interesting to note that not much note was taken of the work done by George Bass in the 1960s possibly because shipwrecks were still equated as sources of treasure and interesting artifacts.

This is typified by the SACHM obtaining a Customs and Excise license for the salvage of shipwrecks in 1965. The director of the newly formed SACHM, Dr. G.A. Wacha, mentions that his predecessors in the South African Museum tried several times in the past to obtain a salvage license (SACHM D1/4). This unfortunate association with salvage created an image of the brave divers "rescuing" valuable artifacts from the clutches of the ocean. Still the museum was trying to gain more control of the shipwreck scene, especially with lucrative salvage attempts like that of the British East Indiaman Fame (1822) taking place at the time by members of the Atlantic Underwater Club in Table Bay. A large amount of gold and silver coins, silver spoons and forks, gold jewelry, watchcases, nails, and a broken ship's bell were salvaged from the Fame (Turner 1988). The divers did donate about 299 items to the fledgling museum, starting the SACHM's shipwreck collection.

In 1966, Dr. W. Schneewind, replacing G.A. Wacha as director of the SACHM, contacted the Western Province Underwater Union and the Atlantic Underwater Club in an attempt to salvage artifacts from the wreck of Dutch East India Company 1697 wreck of *Het huis te Crayenstein* under the museum's salvage license. The divers did remove several items from the wreck but gave the museum a trifle of what was actually taken out. In a letter to the chairman of the Atlantic Underwater Club, Dr. Schneewind asked for more "showy" (sic) objects to arouse the interest of the board of trustees and the government (SACHM D1/4).

Schneewind was aware of the lack of standards and in particular the lack of protection. He wrote to the secretary of Cultural Affairs in 1968 suggesting strict legislation modeled on the Swiss Civil Code and Danish Legislation (SACHM D1/4). He also realized that public support was lacking. In a letter to Miss M. Shaw, secretary of the South African Museums Association, he suggested the creation of a specific expedition to draw the attention of the public and the government. Not much came of this however.

The South African Museums Association (SAMA) did, however, enter the debate. In 1971 at their Western Cape branch meeting, SAMA voiced concern about the plundering of shipwrecks (SACHM D1/4). Several important recommendations were made:

Wrecks older than 100 years to become the property of the State.
Wrecks should be protected like other archaeological sites.
Permits should be made available through the National Monuments Council.

Some control measures were also suggested:

A special directive should be issued to the police to help control the pillaging of wrecks.
A social conscience should be cultivated with the public.
Funds to be made available to purchase equipment and employ personnel to investigate and recover material from wrecks in a systematic manner with the voluntary assistance of weekend divers.
Not to purchase wreck material from dealers.

Dr. Schneewind appointed as chair to the Western Cape branch of SAMA was to approach the Department of Customs and Excise with these suggestions. These suggestions were later on referred to the Department of Cultural Affairs.

A reply from the Committee of Enquiry into the Protection of Cultural Treasures, appointed by the Minister of National Education, came in 1972 enquiring as to the desirability of controlling the export of cultural treasures. In the case of shipwrecks, Dr. Schneewind suggested again the implementation of legislation similar to the Danish model that included some of the suggestions of the SAMA committee, like the protection of shipwrecks older than 100 years. The governments' efforts apparently stopped here for the time being. In a March 1977 (SACHM D1/4) letter, Professor E. Axelson, a prominent expert on Portuguese history in South Africa, wanted to know what happened to the above suggestions to the government as he was at that moment inundated with calls from the press concerning the looting of the wreck of the *Sacramento*. In his reply, Dr. Schneewind again stressed his awareness of the need for protective legislation for shipwrecks.

In 1977, the Natal Museum's archaeology department (focusing mainly on the South African Iron Age) became interested in early shipwrecks because survivor's accounts contained the earliest descriptions of the southeastern seaboard and its inhabitants. Consequently, they started a project attempting to identify and locate some of the early sixteenth-century Portuguese shipwreck sites. They located and tentatively identified two of these very scattered wreck sites that of the *Sao Joao* (1552) and the *Sao Bento* (1554), but unfortunately did not take the research much further than this (Auret and Maggs 1982; Maggs 1984).

Another development in the 1970s was the discovery of a shipwreck during the excavations for the foundations of the new Civic Centre in the Cape Town foreshore in 1970. The Cape Town foreshore was created by large land reclamation projects in the 1930s, and in the process, many shipwrecks were covered unknowingly. Fortunately, for posterity, a city of Cape Town engineer, R.A. Lightley, an avid ship model builder, immediately recognized the timbers being uncovered. He managed to obtain permission to study the remains and eventually tentatively identified it as the remains of the Dutch East India Company ship *Nieuw Rhoon* scuttled in 1776 (Lightley 1976). This project produced the first proper site plan of a shipwreck in Southern Africa as well as a heretofore unmatched technical study of ship construction in the subcontinent.

Mention should probably be made here of the efforts by Graham Bell-Cross (curator of a museum in Mossel Bay) in locating several early Portuguese shipwrecks often working with divers and homeowners finding remains of survivor's camps in development of their beach homes (Bell-Cross 1988) along the Eastern Cape seaboard. Although Bell-Cross approached the study systematically often with the help of leading historians and sometimes archaeologists,

the result did not go further than purely descriptive work of artifacts found and statements as to the identification of the various possible shipwreck sites.

Meanwhile, the exploitation of shipwrecks continued unabated with recoveries from the Dutch East India Company ship *Meresteyn* (1702) on the Cape West Coast (Marsden 1976) and more troubling the recovery of bronze and iron guns from the seventeenth-century Portuguese wrecks of the *Santissimo Sacramento* and *Nossa Senhore Da Atalaia do Pinheiro* with most of these guns from the famous Bocarro foundry in Macao being sold for scrap. Some of the better examples did, however, find their way to the Port Elizabeth Museum and was probably the reason for the appointment of a curator responsible for shipwreck material in 1980. The other consequence was the amendment of the Heritage Legislation of the day in the form of the National Monuments Act of 1969, which was amended in 1979 by giving the relevant minister the power to declare any wreck older than 80 years as a national monument (Gribble 2002).

Key Issues

In the 1980s, legislation was improved, the first in 1981 proclaiming wreck sites older than 100 years (Abrahams 1987). The National Monuments Council now issued permits only for wrecks that were scattered and without identifiable structure or stratification. Conditions were that accurate recording techniques of an archaeological standard should be applied and that 50% of the artifacts had to be lodged at a collaborating museum.

This attempt of regulating shipwreck exploitation was by no means the solution of the problem as it was difficult to enforce these regulations with almost no funding and a desperate lack of personnel. The treasure-hunting community reacted in naming themselves "salvers" and not treasure hunters.

Archaeologists started to voice their concerns about the exploitation of shipwrecks along the South African coastline possibly because of the changing legislation that brought the low standards and inability of museums to cope with the influx of permit applications to the fore. At the SACHM, the shipwreck collection came under archaeological control with the appointment of a historical archaeologist in 1981 (Abrahams 1987). The shipwreck collection, however, was more of an onerous duty than a promising field of research as the museum had to respond to requests from divers for letters of cooperation. These letters most often took the form of one-liners promising cooperation with no conditions attached other than that the stipulations of the National Monuments Act need to be followed. The result was a very imbalanced collection as the museum seldom received or asked for the 50% of recovered artifacts. In fact, of 144 permits issued since 1982, the museum had letters of cooperation for 42 shipwrecks with only 3,000 artifacts dating from the sixteenth to the nineteenth centuries (Boshoff 2006). No specialized conservation unit existed, and the museum was often reliant on the treasure hunters conserving the artifacts received.

The SACHM was however attempting to get the investigation of shipwrecks on a more professional footing as proved by the organizing of a "Symposium on Maritime Archaeology" with a combination of archaeologists, treasure hunters, historians, and heritage specialists as speakers in July 1984 (SACHM D1/4). This was in response to projects like the exploitation of the treasure wreck of the British East India Company wreck of the *Joanna* (1682) that produced numerous artifacts especially silver coins that was sold into the public on the open market and even in diving magazines (Turner 1988). In hindsight, it is almost as if there was a naiveté from museums and heritage bodies in attempting to control treasure hunting by trusting that the treasure hunters would do the "right" thing. The excuse often aired was the lack of funding and qualified personnel at institutions like museums and universities.

The formation of the South African Historical Wreck Society in the 1980s was meant to bridge the gap between the academic world and the euphemistically named salvers. They tried to initiate several projects unsuccessfully and

unfortunately seemed only to legitimize the activities of treasure hunters. They did however help promote the general shipwreck artifact amnesty declared by the National Monuments Council in 1986 (Abrahams 1987). The amnesty was an attempt from the NMC to start with a clean slate. The idea was that divers would declare any objects illegally removed from shipwrecks and would be exempt from prosecution. At the end of the amnesty, any items not declared would make the possessor liable for prosecution. The most useful outcome from the amnesty was the files with data on the collections in private hands that could now be used for comparison with what museums have in their possession. This resource was however never utilized until later when the author analyzed the collections (Table 1) of the SACHM in relation to the records in the amnesty (Boshoff 2006)

In 1983, the University of Cape Town initiated a project on the British East India Company ship *Arniston* (1815). Among the students was I.H. Gericke, a well-known treasure hunter. Under the supervision of Prof. A.B.. Smith Gericke and another student, J. Jobling started the first attempt at a scientific investigation of a shipwreck in South Africa (Jobling 1982). Unfortunately, the project was marred by the fact that it did have a profit motive even though it does seem that Gericke was keen to get archaeologists and treasure hunters working together. This collaboration would eventually lead into Gericke sponsoring the post for a maritime archaeologist in the form of the Dutch archaeologist, Bruno Werz, appointed in 1988 in a dual position at the University of Cape Town and the SACHM.

South Africa: Maritime Archaeology, Table 1 Comparison of total artifacts in museums collection with artifacts reported in amnesty

Shipwreck name	Amnesty artifacts	Museum artifacts
Athens 1865	206	3
De Visch 1740	215	0
Fame 1822	165	299
Het Huis te Crayenstein 1697	18	16
Maori 1909	334	5
Meresteyn 1702	287	30
Trafalgar 1839	194	40

The 1980s would end with the formation of the South African Maritime Museum as a satellite of the South African Cultural History Museum and the appointment of Bruno Werz as alluded to above. At the same time, the curator of the new Maritime Museum, Tom Graham, started an honors degree at the University of Cape Town. He was following up a previous 1984 workshop on the practice of seal hunting in the nineteenth and twentieth centuries on the subantarctic island Marion (annexed by the South African government in 1947), by doing an in-depth study of historical documentation and visiting the island to record the sites reported archaeologically (Graham 1989). Under very trying circumstances, Graham managed to do two small excavations and record some of the sites. Although he did not manage to return to the island and continue the project, mainly because of his increased responsibilities at the South African Maritime Museum, he did plant the seed for a future project developing another possible direction for maritime archaeology in South Africa. The focus, however, would remain on shipwrecks steered by Bruno Werz. As the first person appointed as a maritime archaeologist, Werz had a huge task in front of him. Whether the strategies he followed to establish maritime archaeology on a firmer footing was successful is a tale of the 1990s and still a matter of debate.

Werz shared a position at the SACHM and University of Cape Town. He was also consulting for the National Monuments Council. This arrangement however was problematic from the start. The institutions were constantly vying for the loyalty of the maritime archaeologist. This was because the ground rules for this shared arrangement were never properly established. It is pointless to speculate who was at fault and what part internal politics played. Maybe if an infrastructure of some kind had been established before the appointment of a maritime archaeologist, matters would have been different.

Werz however attempted to start with project-oriented research with the investigation of the Dutch East Indiaman, *Oosterland*, wrecked in

Table Bay in 1697 as part of his maritime archaeology Project Table Bay (Werz 1999). This wreck was discovered by three local divers who reported it to Werz. An agreement was drawn up between Werz and the treasure hunters regulating the conduct of the project (SACHM D1/4). One important condition was that the archaeologist would have an opportunity to study the artifacts before the division between the museum and the treasure hunters. Although under archaeological control to a measure and not overtly acknowledged, it was, however, still a treasure-hunting project. It seems as if the lessons learned from the Arniston in the 1980s were not properly heeded as in the mid-1990s the project spiraled into disagreement and effectively stopped.

Another important project started in 1991 was Operation Sea Eagle under the archaeological direction of Werz, but more importantly incorporating other bodies like the South African Navy providing the logistical support (Werz 1993). This project was to record all the shipwrecks around Robben Island and was quite successful in the end but ironic as the island was still a political prison at the time. Unfortunately, the divergent nature of Werz's appointment at the university and the museum and the various disagreements with museum management as to the parameters of his position resulted in the museum not renewing his contract. The museum however decided to continue with the post by appointing the author first on a contract basis and then later in 1992 on a permanent basis.

Werz continued his association with the University of Cape Town and during this period produced a number of honors students and two master's students. This continued up to 1999 when his association with the University of Cape Town came to an end. He did however also start a project on the wreck of the *Bato* (1806) in Simon's Bay in 1996 and started the South African Institute of Maritime Archaeology (SAIMA) in 1999. After a short stint as a consultant for Arqueonautas SA in Mozambique in 2000, Werz started to focus on the activities of SAIMA but had to change tack when the main benefactor unexpectedly died. In 2012 Werz established the African Institute for Marine and Underwater Research (AIMURE) with himself as CEO ostensibly to stimulate and support African marine, maritime, and underwater research. In 2015 Werz started looking for the wreck of the *Haarlem* (1647). This wreck is widely recognized as facilitating the genesis of the city of Cape Town (Werz et al. 2017).

Meanwhile at the SACHM, stricter controls were put in place for permit holders from 1992 onward. Instead of giving a one-line letter of cooperation, the museum now required a proposal with a clear research rationale. The screening of projects for substantive content saw a sharp decline in applications. With this strategy, the museum started moving away from cooperation with commercially motivated projects counter to the existing legislation and charted a new direction for the future. The museum also started a small conservation laboratory prompted by receiving a collection from the British East India Company ship *Colebrooke* (1778). A large part of this collection consisted of wine bottles with the content still intact and in dire need of stabilization.

In 1993, the National Monuments Council contracted Lynn Harris from the University of South Carolina to compile an electronic database of the shipwrecks around the South African coastline, combining several of the existing paper-based databases in existence at the time. Another major task Harris undertook was the introduction of the Nautical Archaeology Society (NAS) courses to South Africa (Boshoff 1998). With the assistance of the author, courses were run in most of the major coastal cities in South Africa and even one in Namibia. One of the outcomes of the NAS program was the investigation into the British East India Company ship *Brunswick* (1805) lead by the author. Most of the participants in this project were volunteers, and it was the first noncommercial underwater investigation into a shipwreck in South Africa.

Although Harris' position at the National Monuments Council was a contract position and she left after a year, the post was retained and T. Durden was appointed on a contract. In 1994, Boshoff, Durden, and Werz together with a group of businessmen formed the Save Our Shipwrecks

Trust to promote the running of the NAS courses as well as starting a shipwreck route along the Cape coastline. The trust was mostly successful with the continuation of the NAS courses but dissolved upon the death of one of the founding members (David Meaker) and with Durden leaving for greener pastures. When Durden left, J. Gribble was appointed on a permanent basis at the NMC. This would put the management of shipwrecks on a firmer footing and continue the partnership between the National Monuments Council and the South African Maritime Museum. In 1997, Boshoff and Gribble visited Australia to investigate the state of maritime archaeology in that country. They also investigated some of the premier maritime museums in Australia but, more than that, presented papers at the Australian Institute of Maritime Archaeology's annual conference. One of the outcomes of this visit was the invitation by the Queensland Museum to Boshoff and Gribble to join the 1999 field season on the wreck of the HMS *Pandora* on the Great Barrier Reef. This gave them the opportunity to gauge their skill levels on a first-class large-scale underwater project.

The year 1997 also saw the resumption of the Marion Island project when Boshoff was invited by the National Monuments Council to be the archaeologist. The focus was to complete the inventory of sites started by Graham in 1989. This was largely successful with the archaeological documentation of 13 sites as well as making recommendations for the future management of the sites (Boshoff et al. 1997). A second visit to Marion in 1999 saw the documentation of further three sites as well as the excavation of a small boat washed up on one of the beaches (Boshoff and Van Schalkwyk 1999). Due to changes in the heritage industry, this project would lie dormant till 2011 when the Antarctic Legacy Project invited the author to do a review of the state of heritage objects on the island. This led eventually to a National Research Foundation project into the wrecking of the Norwegian sealer *Solglimt* (1908) and the study of the survivor camp (Boshoff et al. 2015). The survivor camp study led to a master's degree by T. van Niekerk, the first nonwhite, female maritime archaeologist in sub-Saharan Africa (Van Niekerk 2016).

International Perspectives

In 1985, H.J. Deacon, head of the department of archaeology at the University of Stellenbosch, visited Australia on a fact-finding mission concerning maritime archaeology. He was especially interested in the Australian legislation and the agreement made with the Dutch government about Dutch East India Company ships on their coastline. Deacon started to get some of his students interested in maritime archaeology although this was difficult as the facilities at the University of Stellenbosch were not as conducive to marine sciences as at the University of Cape Town that had a Research Diving Unit training students in the scientific mysteries of the underwater world. The author, however, is a product of that program even though it was short-lived and inadequate.

The 1980s in South Africa was, however, politically quite a turbulent time as the struggle against the apartheid government went into overdrive. This was the worst possible timing as maritime archaeology was starting to get serious attention from universities in this period. In the archaeological world, the academic boycott was instigated against South Africa at the World Archaeological Congress (WAC) in 1986. This was in part brought on by a motion tabled at the 1983 meeting of the Southern African Association of Archaeologists that asked for the condemnation of apartheid and other forms of discrimination by the association. The motion was never put to a vote, and delegates from Mozambique and Zimbabwe resigned in protest (Shepherd 2002). In a sense, this was the end of innocence for archaeology in South Africa as the WAC of 1986 demonstrated that politics could not be separated from the practice of archaeology. This would have a serious influence on the development of maritime archaeology in South Africa.

This naiveté would however take some time to break down and would take a new government in 1994 with the first democratic elections in South Africa before change started to filter

through and archaeologists adapted to a new direction in archaeology. This "innocence" was still evident in 1988 at another shipwreck symposium organized by the National Monuments Council, the South African Cultural History Museum, and the South African Historical Wreck Society (SACHM D1/4). Speakers were a mix of treasure hunters and archaeologists. Unfortunately, it seemed as if the divers still regarded archaeology as a technique of approaching shipwrecks rather than a way of interpreting the past (Smith 1988). Archaeologists tried to explain the rudiments of archaeology (Deacon 1988), but it still did not seem as if the treasure hunters took this to heart as no projects by the treasure hunters following on from the conference attempted to address the issues raised there. This conference was further evidence of the complete disregard of the political situation in the country at the time by archaeologists and treasure hunters. One could expect this of the latter as their main motivation was profit, but it seems in hindsight that the archaeological community involved with shipwrecks at the time could have at least attempted to address the future in this context as the writing was on the wall with the many riots taking place in South Africa. Maybe it was an indication of the standing of maritime archaeology in South Africa at the time as a fledgling subdiscipline eating away at the conscience of the mainly precolonial archaeology community with the overt focus on saving a cultural resource from the economic threat of treasure hunting.

In 1999, an important event occurred for South African archaeology as the World Archaeological Congress was held that year at the University of Cape Town. For maritime archaeology, it was the first World Archaeological Congress with a session devoted to maritime archaeology. Although small and only taking place in 1 day, it would lay the foundation for the larger and more complex sessions on maritime archaeology at the following World Archaeological Congress in Washington, DC, in 2003. Eventually under the leadership of Iziko Museums, the example of WAC would be a primer for the first maritime archaeology session at the Association of Southern African Professional Archaeologists conference in 2016.

Future Directions

From the first democratic elections in 1994, changes were on the horizon for the heritage industry. Frantic national meetings started in 1995 and many projects were put on hold. In the museum world, this would culminate in the formation of several large national institutions by amalgamating existing ones. In Cape Town, this resulted in the birth of Iziko Museums in 2000. This was a joining of the South African Museum, the South African National Gallery, the William Fehr Collection, and the South African Cultural History Museum. Of this group of museums, the South African Cultural History Museum completely lost its identity and was totally assimilated into the group. The young South African Maritime Museum became the Iziko Maritime Centre moving to much smaller premises after a losing battle with the property owner, the Victoria and Alfred Waterfront. For the next 3 years, the growing pains of the new institution caused a hiatus in new projects. For maritime archaeology at the museum, this will end with new strategic directions and new opportunities.

One of the main foci for the new Iziko Museums was to redress the imbalances of the past. The way this was approached in terms of maritime archaeology was to start an investigation to find the wreck of the Dutch East India Company slave ship *Meermin* (1766) (Boshoff 2003, 2018). Another feature of this project was that it was one of the first maritime archaeology projects funded by the National Lotteries. The other major project funded by the Lotteries was the National Survey of Underwater Heritage around the coastline initiated by the successor of the National Monuments Council, the South African Heritage Resources Agency (SAHRA).

In 2005, John Gribble left SAHRA and was ably succeeded by Jonathan Sharfman. Another important development at SAHRA was the creation of a second permanent post. Sharfman negotiated successfully funding from the Dutch

government and with their representative, the Centre for Heritage Activities, started a skills development project to promote underwater cultural heritage. This project uses the Nautical Archaeology Society courses as the basis for running annual field schools.

The *Meermin* project eventually evolved into a partnership with the George Washington University, the US National Park Service's Submerged Resources Center, and SAHRA as the African Slave Wrecks Project (the name later changed to the Slave Wrecks Project) funded at the start by the Ford Foundation (Lubkemann et al. 2008). Besides looking at slave shipwrecks, the project also investigated ways in which archaeology could be sustainable in the developing world mainly by considering the implementation of the SAVE (scientific, academic, volunteer, and educational) tourism concept developed by the George Washington University. The *Meermin* project also produced the first traveling exhibition on maritime archaeology in South Africa as well as a documentary, *Slave Ship Mutiny*, produced by Off the Fence Productions and screened on PBS network in the USA. Currently the Slave Wrecks Project is moving into a new phase with the addition of new partners in the form of the National Association of Black Scuba Divers and the new Smithsonian's National Museum of African American History and Culture by investigating what is believed to be the Portuguese slaver *Sao Jose* (1794) (NCD 1794). This project has led to an exhibition in the new Smithsonian's National Museum of African American History and Culture in Washington, DC, that opened on September 24, 2015, and has had to date (2018) more than four million visitors. In 2015 the *Sao Jose* project successfully bid for a grant from the US Ambassador's Fund for Cultural Preservation to upgrade the conservation laboratory at Iziko and to do the first environmental study of a historic shipwreck on the African continent.

As the new century progresses, there is much hope for maritime archaeology in South Africa. The resumption in 2011 of old projects like the investigation into seal hunting sites on Marion Island, the investigation into the slave ship *Sao Jose*, the development of a world-class conservation facility, and the training of new young nonwhite and female archaeologists undertaken by Iziko and SAHRA help to steer maritime archaeology in South Africa into new and exciting directions that will hopefully establish a unique niche in the world of archaeology.

Cross-References

► South Africa: Maritime Legal Management

References

Abrahams, G. 1987. The development of historical archaeology at the Cape, South Africa. *Bulletin of the South African Cultural History Museum* 5: 20–32.

Auret, C., and T. Maggs. 1982. The great ship Sao Bento: Remains from a mid-sixteenth century wreck on the Pondoland coast. *Annals of the Natal Museum* 25 (1): 1–39.

Bell-Cross, G. 1988. Portuguese shipwrecks and identification of their sites. In *Dias and his successors*, ed. E. Axelson, 47–80. Cape Town: Saayman & Weber.

Boshoff, J.J. 1998. NAS courses in South Africa. *Bulletin of the Australian Institute for Maritime Archaeology* 22: 133–136.

Boshoff, J. 2003. Uncovering the slave ship Meermin: A project to reclaim the hidden heritage of slavery in South Africa. Paper presented at the Fifth World Archaeological Congress, Washington, DC. June 2003.

Boshoff, J. 2006. Did the experiment work? Paper presented at the South African Department of Arts and Culture workshop on the UNESCO Convention, Cape Town, 15 Mar 2006.

Boshoff, J 2018. The search for the slave ship *Meermin*. Developing a methodology for finding inter tidal shipwrecks. Unpublished Masters Thesis. University of South Africa.

Boshoff, J., and J. Van Schalkwyk. 1999. The archaeology of sealing on Marion Island. Report prepared Department of Environmental Affairs: Antarctic & the Islands, Cape Town.

Boshoff, J., D. Hart, and J. Loock. 1997. Survey of historical sealing sites on Marion Island. Report prepared Department of Environmental Affairs: Antarctic & the Islands, Cape Town.

Boshoff, J., T. Van Niekerk, and H. Wares. 2015. Preliminary investigations on the wreck of the SS *Solglimt*,

Marion Island. *Bulletin of the Australasian Institute for Maritime Archaeology* 39: 53–59.
Deacon, H.J. 1988. Practice and policy in maritime archaeology. *The South African Archaeological Bulletin* 43 (148): 123–124.
Graham, T.A. 1989. Cultural resource management of the Prince Edward Islands. Unpublished Honours dissertation, University of Cape Town.
Gribble, J. 2002. Past, present and future of maritime archaeology in South Africa. In *International handbook of underwater archaeology*, ed. C.V. Ruppe and J.F. Barstad, 553–570. New York: Kluwer.
Jobling, J. 1982. The Arniston-1815. Report prepared for the National Monuments Council, Cape Town.
Kennedy, R.F. 1955. *Shipwrecks on and off the coasts of southern Africa*. Johannesburg: Johannesburg Public Library.
Lightley, R.A. 1976. An eighteenth century Dutch East Indiaman, found at Cape Town, 1971. *The International Journal of Nautical Archaeology* 5 (4): 305–316.
Lubkemann, S., J. Boshoff, and J. Gribble. 2008. Southern African slave wrecks pilot project. Funding proposal submitted to Ford Foundation.
Maggs, T. 1984. The great galleon Sao Jao: Remains from a sixteenth century wreck on the Natal South Coast. *Annals of the Natal Museum* 26 (1): 173–186.
Marsden, P. 1976. The Meresteyn, wrecked in 1702, near Cape Town, South Africa. *The International Journal of Nautical Archaeology* 5 (3): 201–219.
NCD 2/18 pp 299 ½,¼, 23 December 1794. Original document. Cape Town: Archives.
SACHM D1/4. Archive file of the South African Cultural History Museum.
Shepherd, N. 2002. The politics of archaeology in Africa. *Annual Review of Anthropology* 31: 189–209.
Smith, A.B.. 1988. When is marine salvage archaeology? *The South African Archaeological Bulletin* 43 (148): 122–123.
Turner, M. 1988. *Shipwrecks and salvage in South Africa*. Cape Town: Struik.
Van Niekerk, T. 2016. An Archaeological Study of the *Solglimt* shipwreck survivor camp on sub-Antarctic Marion Island. Unpublished Masters Thesis. University of South Africa.
Werz, B.E.J.S. 1993. Shipwrecks of Robben Island, South Africa. An exercise in cultural resource management in the underwater environment. *International Journal of Nautical Archaeology and Underwater Exploration* 22 (3): 245–256.
Werz, B.E.J.S. 1999. *Diving up the human past (British archaeological reports 749)*. Oxford: Archaeopress.
Werz, B.E.J.S., W.H.B. Steenkamp, and M.R. Prowse. 2017. Searching for a symbolic shipwreck in Table Bay: Haarlem (1647). *South African Journal of Science* 113: 9–10.

South Africa: Maritime Legal Management

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Introduction and Definition

The management of maritime and underwater cultural heritage in South Africa has come a long way since legal protection was first given to historical shipwrecks in the late 1970s. Legislators and managers have learned to deal with thorny issues related to the ownership, relevance to changing heritage management priorities, public perceptions and expectations of maritime and underwater cultural heritage, and the significance (real and relative) of this heritage asset's constituent parts.

Shipwrecks have been the objects of particular official and popular attention and exploration since vessels were first wrecked on the South African coast. As early as the late seventeenth century, for example, the Dutch authorities at the Cape were involved in efforts to recover silver and other cargo from the wrecks of the English East Indiaman Joanna and the Portuguese vessel Nossa Senhora dos Milagros, both lost near Cape Agulhas. Much of this early interest was focused on contemporary shipwrecks and was salvage in the traditional sense of the concept. These historical salvage undertakings set a precedent for the next two centuries and had the effect of birthing and nurturing a popular perception among South Africans of shipwrecks, in general, as exploitable commercial resources. This perception drew no distinction between recent, contemporary wrecks and older sites with historical and archaeological value or significance, and the idea that historical wrecks had a wider meaning and value as precious archaeological windows into

our common past did not appear on the national radar until well into the 1970s.

Historical Background

A Rich Heritage Resource

South Africa owes its rich underwater heritage to its geographical position on the sea route around Africa from Europe to the East. More than 2,200 recorded shipwrecks, representing 36 different nationalities are recorded in South African waters. In addition to shipwrecks, South Africa's maritime heritage includes thousands of pre-colonial shell middens, numerous coastal cave sites, and, along the south coast, an assemblage of stone fish traps. A small collection of contact period rock art depictions of sailing vessels, which are believed to have been painted by the indigenous San and Khoi peoples, link European travelers and traders with South Africa's indigenous populations, while shipwreck survivor camps and maritime infrastructure like lighthouses, harbors, and boatyards attest to the extensive and varied European maritime activities in the region.

Treasure and Tribulation

The VOC salvage operations of the seventeenth and eighteenth centuries were superseded in the nineteenth century by treasure hunting and the development of a common view of wrecks as a source of curiosities and saleable "treasure." If anything good can be said about both this early salvage work and treasure hunting, it is that the recovery of artifacts was limited and that the majority of wrecks around the South African coast remained out of reach of the available diving technology, undiscovered and undisturbed. This changed with the birth of the aqualung in the 1960s and widespread plundering ensued as divers were quick to harness the new technology to find and exploit the commercial potential of many wrecks. In a 20-year period prior to the mid-1980s, a number of wrecks with rich cargoes of specie, Eastern exports like porcelain, or non-ferrous metals were found and salvaged. Collectively, these discoveries and the resulting recovery of often spectacular artifacts, coupled with the tales of treacherous diving conditions and not a few great white sharks, captured and fed the public imagination, reinforcing the perception that shipwrecks were no less than a source of treasure, to be recovered by those daring and intrepid enough to go out and help themselves. The significance of the wrecks plundered during these years, in as much as it was considered at all, was measured almost exclusively against their commercial potential. The absence of an argument for the heritage value of these sites simply entrenched South African public perceptions of the meaning and value of wrecks further.

The legal position of wrecks for much of this period was a further contributing factor in molding and entrenching the public and official view of shipwrecks. By 1969, coastal and maritime-related pre-colonial archaeological sites were protected by the National Monuments Act, by the inherent ethics of modern archaeological practices, and by virtue of them having little commercial value, but legislative protection for wrecks as a heritage asset was still some way in the future. Although a variety of domestic legislation did apply to historical wrecks, it can be argued that it was aimed primarily at dealing with contemporary or modern wrecks and was only incidentally applicable to historical wrecks (Van Meurs 1980). Nowhere was it "stated or suggested that any significance should be attached to wrecks known to be of historical and/or archaeological interest, or that such wrecks should be specifically protected" (Van Meurs 1980: 3).

For archaeologists, the immediate impacts of this period of rapid exploration and the discovery of many wrecks were negative. There was no professional archaeological diving capacity in South Africa and archaeologists had no access to these sites or material, except where they were above the water or when material had been recovered by divers. Although some divers did involve archaeologists and museum scientists in their projects (Jobling 1982; Maggs 1984), this was the exception rather than the rule and in most instances was aimed primarily at obtaining advice on artifact identity, and hence value, rather than because there was a real interest on the part of the divers in the archaeology of the sites in question.

Acceptable archaeological standards of excavation and recovery were generally not employed, detailed site recording was seldom carried out, site records were not generally made, and the publication of results seldom occurred (and then usually only selectively).

It would be disingenuous to completely disregard research carried out by salvage divers. Many did undertake historical investigations into their sites of interest, but this research was usually limited and generally fell into two broad categories, neither of which addressed the archaeological interest or significance of the sites concerned: initial research centered on identifying the location of a particular wreck, which usually fell short of examining the contemporary historical context in which the events occurred or the wider impacts of the wreck itself or the individuals involved on South African history, and research which revolved around the recovered artifacts. This was also limited and generally stopped short of examining relationships between artifacts or drawing inferences about the people or life aboard the ship and was purely descriptive.

In the final analysis, these activities were like any commercial operation, driven by profit. This meant that only certain shipwrecks and object types were targeted by divers. Wrecks that did not fall into the "treasure ship" category – slave ships, local coasting traders, or whaling vessels, for example – were unlikely to be profitable and were largely ignored. The same was true for artifacts forming the archaeological assemblages on "treasure ships." Only those of potential commercial value were of interest. The rest were ignored or discarded on site or, where recovered, offered to museums. The net result of much of the interest in South Africa's historical shipwrecks between the 1960s and late 1980s was the unquantifiable loss of archaeological and historical material and information as sites fell victim to often indiscriminate commercial salvage. In addition, the significance of this national maritime heritage was being shaped and determined by the small group of individuals who were seeking to profit from it, and this reinforced the already-skewed picture of South Africa's maritime history and heritage and its real significance to the nation and the world.

Legal Protection: National Monuments Act

As the scale of the hugely cosmopolitan underwater archaeological record in South African waters gradually became clear to archaeologists and historians during the 1970s, an appreciation of its true significance and heritage value began to coalesce. This was particularly the case among those working at coastal museums who were the first to see what was being recovered as divers approached them for artifact identification and valuation (Bell-Cross 1980; Gribble 1998). Archaeologists were slower to act on the potential of shipwrecks. The traditional preeminence in South African archaeology of pre-colonial studies meant that with few exceptions (e.g., Jobling 1982; Maggs 1984; Smith 1986), little archaeological interest was shown in colonial period (post-CE1652) archaeology and what lay beneath the waves until the mid-1980s. The national statutory heritage body, the National Monuments Council (NMC) was also slow to engage with underwater heritage and, in the absence of a stated national policy of cultural heritage protection, appeared unwilling to confront the Pandora's Box of legal, ethical, and heritage-related issues the escalating discovery and commercial exploitation of shipwrecks had opened.

Broad national heritage legislation had been introduced in 1969 in the form of the National Monuments Act (28 of 1969). The Act contained the seeds of a national policy of cultural heritage conservation, but it was not until a decade later, in 1979, that a national cultural heritage policy that was "morally and legally justifiable" (Van Meurs 1980: 6) was crystallized, defined, and made plain in an amendment to the Act. This amendment stated that: "The object of the [National Monuments] Council shall be to preserve and protect the historical and cultural heritage, to encourage and to promote the preservation and protection of that heritage and to coordinate all activities in connection with monuments in order that monuments will be retained as tokens of the past and may serve as an inspiration for the future" (Section 2A, National Monuments Act No. 28 of 1969). This amendment (Act 35 of 1979) also included the introduction of protection for historical shipwrecks. Section 10 gave the relevant

minister the power to declare as a national monument any wreck over 80 years of age which was considered to be of aesthetic, historical, or scientific value or interest (Deacon 1993).

Although the process for declaring wrecks proved to be flawed and difficult to implement, the 1979 inclusion of historical wrecks within the National Monuments Act was a critical moment in underwater heritage management in South Africa. For the first time wrecks could be legally protected. More importantly, however, this was the moment when the legal position and heritage view of historical wrecks shifted and they gained a new status and significance as heritage assets. Ironically, it was political pressure from a group of commercial salvors to protect their rights on two historical wrecks – the Santissimo Sacramento and the Dodington, both found near Port Elizabeth in the late 1970s – that was the catalyst for the introduction of this first legislative amendment, and the drafting of what was the first heritage position paper on historical shipwrecks, by the historian at the Port Elizabeth Museum (Nash 1977). This was also the moment when shipwrecks became a contested resource in South Africa. Until then, archaeological interest in wrecks had been minimal and the salvage and diving communities felt that they had both legal and moral primacy on the wrecks around the South African coast. They felt that the amendment constituted an intrusion of heritage interests into their previously exclusive domain.

Despite the inclusion of protection of shipwrecks in national legislation, there were still no diving archaeologists in South Africa, and the salvage community were quick to point out that archaeologists had no experience or understanding of the often challenging physical realities of working on underwater sites on the South African coast. They also accused archaeologists of being out of touch with reality, with rarefied and unrealistic views of what wrecks represented born of too much time spent in their academic ivory towers. In many instances this view still prevails within the South African salvage community. It has also been argued that modern South Africa has historically always tended to look inland and that, as a result, the national psyche has never fully engaged with South Africa's maritime history and underwater heritage. This influenced the nature of activities directed at the shipwreck record and may be responsible for the attitudes displayed by many South Africans towards historical shipwrecks (Brown 1987). These public sentiments and attitudes have, to some extent, guided the actions of the National Monuments Council and the policy frameworks developed for the management of South Africa's historic shipwrecks.

The NMC Grapples with Significance

Establishing and promoting the archaeological and historical significance of South Africa's underwater heritage was a major challenge for the heritage sector during the period between the 1960s and the late 1990s, and it is clear from documents of the period that the NMC was grappling with its own view of wrecks and their significance. For example, shortly after 1979, while acknowledging that the cultural value of wrecks increases with their age, the NMC also expressed the view that the wrecks around the coast were generally not part of South Africa's cultural heritage but that of the flag state concerned, such as Portugal, the United Kingdom, or the Netherlands (Rudner 1986). Furthermore, the NMC argued, the majority of these wrecks were wooden ships smashed to pieces during violent storms and that they therefore consisted only of scatters of artifacts spread over large areas of seabed. Therefore, went the argument "only the objects themselves are of value and should be salvaged before they are completely destroyed by chemical action, sand abrasion, . . . or by treasure hunters who constitute the greatest danger to them" (Rudner 1986: 2). In the NMC's view, therefore, the significance of these sites was tied firstly to "the objects themselves, [and] secondly, with the distribution on the seabed" (Rudner 1986: 2). Encouragingly the NMC did, at this stage, identify treasure hunting as a key threat to shipwreck sites.

From the contradictory nature of the elements of the NMC's de facto policy towards wrecks, it seems clear that the Council was battling to get to grips with this new and unfamiliar heritage asset. It was struggling to reconcile heritage

conservation objectives with pragmatic day-to-day management considerations, all within a foggy legal landscape, and was having its first experience of the sort of unhappy salvage versus conservation balancing act that has and still does characterize national shipwreck management policies in many parts of the world. Not surprisingly, the NMC's position on the value of the underwater cultural heritage was opposed by archaeologists and historians who viewed wrecks as sensitive archaeological sites and an important national cultural asset. As far as they were concerned, the investigation of maritime archaeological sites had to proceed on the same terms that applied to terrestrial archaeology (Deacon 1985) and argued that no disturbance of these sites should be permitted by the NMC until adequate national maritime archaeological expertise was in place (Rudner 1986).

During the late 1970s and early 1980s, the repeated use in official documents of terms like "salvage" and "scientific salvage" in relation to activities on, or aimed at wrecks, including archaeological work, is a clear indication that wrecks were not yet being considered to be archaeological sites by the authorities. At the same time, it is evident that after 1979 a clearer view of the nature and importance of South Africa's archaeological record, including wrecks, was developing within the NMC and the South African heritage sector. For example, it became clear from the Parliamentary debate on the 1979 amendment to the National Monuments Act that the legislation proposed did not deal comprehensively with the issues relating to wrecks. As a result, an interdepartmental Government Committee was appointed by the Cabinet to "investigate the preservation and protection of shipwrecks and their contents with a view to possible new legislation . . ." (Department of Transport 1983: 1). The Committee had the best interests of shipwrecks at heart and certainly did a good deal to ensure their protection. However, it was composed exclusively of government bureaucrats with non-archaeological views of what contributed to the significance of underwater cultural heritage sites. It is revealing that in one instance the Committee stated: "It is unacceptable . . . that a wreck which is still lying on the seabed or even on rocks or on the shore . . . be declared a national monument. The wreck cannot be attended to in such a condition, neither (sic) can it be cleaned, repaired or safeguarded and above all, it cannot be of value to the general public" (Department of Transport 1983: 21). This view of what constituted a national monument is clearly based on the traditional definitions of such monuments, drawn from the built environment.

Site significance also did not drive the NMC's attempts to protect underwater heritage in the 1970s and 1980s. Exerting control over activities aimed at wrecks drove protection, rather than the heritage significance of the sites themselves (Brown 1987). This changed in a NMC policy decision in the early 1990s in terms of which the date 1850 "should be taken as the date to divide the ships of higher historical and cultural interest from the later, less significant iron ones" (Brown 1987: 1). Although this division has its obvious flaws, it can be read as a genuine attempt to engage with the archaeological asset and make a clear statement of value about the remains of earlier, wooden sailing vessels. Following this decision, the NMC only issued permits for activities on pre-1850 wrecks in exceptional circumstances.

Archaeology Begins to Make a Mark

For much of the period discussed above, archaeological interest and involvement in underwater heritage-related work was reactive, driven by the need to have archaeological oversight and guidance on what were, in essence, licensed salvage projects. Only during the late 1990s did a change occur, partly the result of a fledgling maritime archaeological capacity but also because of tighter legislation and the NMC's engagement with, and commitment to, managing historical wrecks as part of the nation's cultural heritage. South Africa's first maritime archaeological appointment was a teaching and research post created at the University of Cape Town in the late 1980s. At about the same time, the former South African Cultural History Museum (now part of the IZIKO Museums of Cape Town) also employed its first maritime archaeologist. The

NMC followed in 1993 when it began the compilation of an inventory of historical shipwrecks in South African waters (Gribble 1996). A temporary post of maritime archaeologist was created to develop this database and 3 years later the Council confirmed its commitment to underwater heritage by making the post permanent.

This small core of professional maritime archaeologists was the catalyst for a number of research and conservation initiatives, like "Operation Sea Eagle," a major interdepartmental underwater survey of the waters within one nautical mile of Robben Island undertaken in 1990/1991. This early foray into the holistic management of shipwreck sites took place under the joint auspices of the government departments then responsible for the management of the island and aimed to provide an assessment of its underwater cultural resources at a time when its post-apartheid future was being considered (Werz and Deacon 1992; Werz 1993). Other early areas of research pursued by South Africa's maritime archaeologists include the archaeology of sealing and whaling, which begun with a project to document seal-hunting sites on South Africa's sub-Antarctic Prince Edward Islands (J. Boshoff, personal communication; Boshoff et al. 1997). Work continues on this project and it is also anticipated that it will in future be expanded to include a survey of coastal whaling sites within South Africa.

Key Issues/Current Debates

In 2000 the National Monuments Act was replaced by the National Heritage Resources Act (Act 25 of 1999), which established the South African Heritage Resources Agency (SAHRA). SAHRA's maritime archaeologists have worked hard to change and expand public perceptions of maritime archaeology and to develop a new national understanding of the significance of underwater heritage. The new legislation has facilitated this new focus by providing the same clear level of protection to maritime sites as had been given to terrestrial archaeological sites since the 1980s. One area of the new legislation which has and continues to be an issue for underwater heritage is the provision which allows the controlled sale and export of archaeological artifacts. Included in the Act to control the movement and export of collections of archaeological material in private hands, this provision has been seized on by treasure hunters to question SAHRA's de facto post-2000 ban on historical shipwreck salvage.

Although the Act does not state unequivocally that the commercial exploitation of historical shipwrecks is banned, the inclusion of wrecks under the definition of "archaeological" in the legislation and the fact that ownership of all archaeological material is vested in the State effectively remove shipwrecks and their contents from the realm of commercial salvage. After 2000, SAHRA began closing the door on the commercial salvage of historical wrecks and in 2003–2004 SAHRA introduced a Shipwreck Policy aligned with the UNESCO Convention on the Protection of Underwater Cultural Heritage and the Annex attached thereto. The Shipwreck Policy essentially outlawed commercial salvage and the issuing of salvage permits for any wreck older than 60 years by requiring the application of the rules of the Annex to any future shipwreck investigations. By 2005, however, SAHRA was forced to repeal its Shipwreck Policy after legal advisors adjudged it to be in conflict with the National Heritage Resources Act of 1999 and its associated regulations and suggested a return to the permitting system introduced in the 1980s. As a compromise a transition period was agreed, during which SAHRA undertook to consider salvage-based applications. A revised National Shipwreck Policy has been prepared by SAHRA and the national Department of Arts and Culture (DAC) but remains unimplemented as DAC considers the budgetary and others costs of implementation. The new Act has put the onus on the archaeologists at the SAHRA and other institutions to promote maritime archaeology and underwater cultural heritage, its significance, and the reasons for protecting of maritime sites. It is now up to archaeologists to develop and encourage a public

view of scientific investigation and excavation of this national, publically owned asset as a better alternative to salvage for the personal gain of a few individuals. To do this, maritime archaeologists in South Africa must wean the diving community and the wider public off the traditional, salvage-driven perceptions of historical shipwrecks and persuade them that the real attraction, value, and importance of these sites and objects lie in their archaeological and scientific potential and the human stories they can tell. While legislation can offer wrecks legal protection, real protection – the type that will stop treasure hunting and looting – can ultimately only come from a changed public view. The focus for SAHRA in recent years, therefore, has been on changing attitudes and expanding the public understanding of underwater heritage though education and participation. Its maritime archaeologists have thus been working to create an inclusive culture around maritime and underwater cultural heritage, and this has been marked, inter alia, by projects and work that reflect the heritage value and significance of South Africa's underwater heritage – in contrast to the historical situation where value and significance was defined and driven by a small group whose primary interest in underwater heritage and motivation for being involved was commercial. Projects aimed at the less well-publicized aspects of South Africa's underwater archaeology have been set up and brought into the public eye through the media. These projects include two National Lottery-funded initiatives – the National Survey of Underwater Heritage and the Meermin Project – and a capacity-building program funded by the Dutch government.

International Perspectives and Future Directions

Heritage legislation, the National Survey of Underwater Heritage, and the Dutch-funded Maritime Archaeology Development Programme appear to be bearing fruit with noticeable changes in attitudes towards underwater cultural heritage. Although progress has been slow, divers and others who use these sites are more aware of the legislation and the reasons for it and have taken a greater interest in protection of underwater sites. Local communities living near wreck or maritime heritage sites have begun to take ownership of these sites and are reporting transgressions against the heritage more often. The Department of Arts and Culture is also considering the ratification of the 2001 UNESCO Convention, and there is increasing political interest in underwater cultural heritage.

From a heritage management perspective, archaeologists and heritage professionals are adjusting to their new roles. New initiatives for policing must be developed, including community policing, volunteer programs, and interdepartmental and interagency cooperation. Archaeological foci must change from the simple description of sites and artifacts to social and theoretical studies, and new ways must be found to fund maritime archaeological work, develop and increase capacity, and protect sites. To be successful, South Africa must begin to look beyond its own shores: its underwater heritage assets represent a multicultural and multinational shared heritage, and for effective future management, it is going to be essential therefore to look more widely at cooperative projects, international partnerships, and global initiatives.

Cross-References

- ▶ Ship Archaeology
- ▶ South Africa: Heritage Management
- ▶ South Africa: Maritime Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime

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References

Bell-Cross, G. 1980. Research policy on shipwrecks. *South African Museums Association Bulletin* 14 (1 and 2): 39–44.

Boshoff, J. J., D. G. Hart, and J. Loock. 1997. *Survey of historical sites on Marion Island*. Report prepared for the National Monuments Council and South African Cultural History Museum, Cape Town.

Brown, A.G.K. 1987. Maritime archaeology in South Africa, dead on arrival? *Bulletin of the Australian Institute for Maritime Archaeology* 11 (1): 1.

Deacon, H.J. 1985. *Report on maritime archaeology in Australia and South Africa*. Report prepared for the National Monuments Council, Cape Town.

Deacon, J. 1993. Protection of historical shipwrecks through the National Monuments Act. In *Proceedings of the Third National Maritime Conference, Durban 1992*. Stellenbosch: University of Stellenbosch.

Department of Transport. 1983. Unpublished report on the Inter-Departmental Committee of Inquiry re Shipwrecks.

Gribble, J. 1996. National databases on monuments and sites. In *Monuments and Sites of South Africa*, 33–42. Colombo: ICOMOS 11th General Assembly.

Gribble, J. 1998. Keeping our heads above water – The development of shipwreck management strategies in South Africa. *AIMA Bulletin* 22: 119–124.

Jobling, J. 1982. *The Arniston – 1815*. Survey and excavation report prepared for the National Monuments Council, Cape Town.

Maggs, T. 1984. The Great Galleon São João: Remains form a mid-sixteenth century wreck on the Natal South Coast. *Annals of the Natal Museum* 26 (1): 173–186.

Nash, M. 1977. *Proposals regarding maritime archaeology in South Africa*. Report prepared for the Port Elizabeth Museum, Port Elizabeth.

Rudner, J. 1986. The science committee. Internal memorandum for the National Monuments Council, Cape Town.

Van Meurs, L.H. 1980. *National legislation on marine archaeology*. Cape Town: Legal opinion prepared for the National Monuments Council.

Werz, B.E.J.S. 1993. Shipwrecks of Robben Island, South Africa: An exercise in cultural resource management in the underwater environment. *The International Journal of Nautical Archaeology* 22: 245–256.

Werz, B. E. J. S., and J. Deacon. 1992. *Operation Sea Eagle: Final report on a survey of the shipwrecks around Robben Island*. Report prepared for the National Monuments Council, Cape Town.

Further Reading

Avery, G. 1975. Discussion on the age and use of tidal fish-traps (visvywers). *South African Archaeological Bulletin* 30: 105–113.

Bell-Cross, G. 1988. Portuguese shipwrecks and identification of their sites. In *Dias and his successors*, ed. E. Axelson, C.R. Boxer, G. Bell-Cross, and C.G.C. Martin, 47–80. Cape Town: Saayman and Weber.

Burman, J. 1974. *The Saldanha Bay story*. Cape Town: Human and Rousseau.

Burman, J. 1976. *The Bay of Storms: The story of the development of Table Bay 1503–1860*. Cape Town: Human and Rousseau.

Deacon, H.J., and J. Deacon. 1999. *Human beginnings in South Africa*. Cape Town: David Philip Publishers.

Gribble, J. 2005. The ocean baskets: Pre-colonial fish traps on the Cape South Coast. *Digging Stick* 22 (1): 1–4.

Hall, S.L. 1978. *Test excavations at the Atalaia camp site*. Grahamstown: Albany Museum.

Henshilwood, C.S., and C.W. Marean. 2003. The origin of modern human behaviour. *Current Anthropology* 44 (5): 627–651.

Hine, P.J., J. Sealy, D. Halkett, and T. Hart. 2009. Antiquity of stone-walled tidal fish traps on the Cape coast, South Africa. *The South African Archaeological Bulletin* 65 (1): 35–44.

Johnson, T., H. Rabinowitz, and P. Sieff. 1959. *Rock-paintings of the south-west Cape*. Cape Town: Nasionale Boekhandel.

Kemp, L.V. 2006. *Ancient stone wall fish traps on the south coast of South Africa: Documentation, current use, ecological effects and management implications*. Unpublished M.Sc dissertation, University of Cape Town.

Klein, R.G. 1999. *The human career*. Chicago: University of Chicago Press.

Leggatt, H., and R. Rust. 2004. An unusual rock painting of a ship found in the Attakwaskloof. *Digging Stick* 21 (2): 5–8.

Marean, C.W., M. Bar-Matthews, J. Bernatchez, E. Fisher, P. Goldberg, A.I.R. Herries, Z. Jacobs, A. Jerardino, P. Karkanas, T. Minichillo, P.J. Nilssen, E. Thompson, I. Watts, and H.M. Williams. 2007. Early human use of marine resources and pigment in South Africa during the Middle Pleistocene. *Nature* 449: 905–908.

Mavrodinov, N. 1999. *An assessment of the maritime archaeological potential of the eastern coastline of Table Bay, between the old Salt River mouth and Blouberg*. Unpublished M.A. dissertation, University of Cape Town.

Poggenpoel, C.A. 1996. *The exploitation of fish during the Holocene in the south-western Cape, South Africa*. Unpublished M.A. dissertation, University of Cape Town.

Singer, R., and J.J. Wymer. 1982. *The Middle Stone Age at Klasies River Mouth in South Africa*. Chicago: University of Chicago Press.

Smith, A. 1986. Excavations at Plettenberg Bay, South Africa of the campsite of the survivors of the wreck of the São Goncalo, 1630. *International Journal of Nautical Archaeology* 15 (1): 53–63.

Van Tonder, E. 2006. Shipwrecks, survivors and tragedy: The potential for shipwreck survivor camp research in South Africa. *Digging Stick* 23 (3): 9–12.

Van Tonder, E., and K.L. Harris. 2006. Searching for the São João survivor camp (1552): Predictive models as a possible solution. *South African Journal of Cultural History* 20 (1): 29–56.

South America: Lithic Industries

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Introduction

The lithic industries of South America constitute a privileged archaeological record for the reconstruction of the modalities for human settlement of this region, relatively recent on a global scale, and the techno-cultural identities of the human groups who occupied it.

Often focused on bifacial projectile points, studies have nonetheless demonstrated an impressive range of variability in knapping concepts and technological solutions employed by the first inhabitants of this vast and varying landscape. Our knowledge of such techniques is not yet as refined as in other parts of the world. It is, however, already possible to identify the broad developmental lines of these lithic industries and to distinguish techno-cultural groups relatively well defined in time and space.

Definition

The lithic assemblages form the principal evidence of the very first human activities on the continent, probably starting in oxygen isotope stage 3, less than 50,000 years ago. Use of stone persisted until contact with the first European colonists at the beginning of the sixteenth century and often even after. The major originality of South American prehistory is the expansion of human settlement of this subcontinent, linked in part to two elements: (1) the relative isolation of this area, flanked by two vast oceans and accessible by land via a narrow isthmus and (2) the recent date, on a global scale, of the first human presence. The approach to the history and evolution of techniques on the continent is thus limited to a much more restrained timescale than elsewhere. These techniques underwent a unique sequence of development, which appears to have been linked as much to local dynamics as to external contributions.

From a strictly technological viewpoint, the main characteristics of the South American lithic industries are common to all prehistoric lithic production systems. The broad families of knapping techniques are found in all of the industries in South America: shaping, which can be bifacial or unifacial; reduction processes, represented by concepts considered little developed but also sometimes by laminar, lamellar, and Levallois concepts. Similarly, most of the known knapping techniques are represented here: direct stone percussion, bipolar percussion on anvil, direct organic percussion, and pressure flaking. It is thus with the same methodological kit used elsewhere that these lithic industries are examined and in particular by technological, techno-functional, and use-wear approaches.

However, the South American lithic production systems are not devoid of originality, because while lithic knapping concepts are finite, methods of exploitation of stone and especially knapping objectives, that is, the intended tools, can be represented by a number of aspects. In the specific context of South American prehistory, new technological solutions were invented. These particularities are discussed below.

Historical Background

Apart from rare ethnographic comments by chroniclers and the first European voyagers, the earliest references to the South American lithic material date to the mid-nineteenth century. As for most of the continents at that time, what really matters is not the lithic artifact as evidence of a specific technological activity but rather as the marker of a human presence in the distant past. This is the case, for example, for the pioneering research of the Danish intellectual P. Lund, who sporadically mentioned the lithic material recovered during his excavations around 1840 in the

Lagoa Santa region (Brazil) to support his discoveries of human remains found in stratigraphic layers assumed to be very old (Fig. 1).

It is also in this context of debate on the antiquity of human occupation of the Americas that F. Ameghino would use, at the beginning of the twentieth century, complementary to the bones discovered, the lithic material recovered on the pampas to propose his hypothesis of an Argentine origin for our species. This theory was vigorously discussed, notably by A. Hrdlicka, but the positive effect of this debate led to more detailed analyses of the lithic material. As a direct result, one of the first rigorous and in-depth studies was carried out by W. Holmes, on artifacts collected by A. Hrdlicka during surveys along the northern coast of Argentina. These were principally cobble industries, transformed by pecking, percussion, or knapped using the bipolar on anvil method. This material, coming mainly from surface collection, is of undetermined age. The 1912 publication presents many innovative elements: in addition to an initial typology and many illustrations of excellent quality, we find comments on the criteria for raw material selection by the knappers and on the modes of production for stone tools, with some experiments on knapping techniques (Hrdlicka 1912).

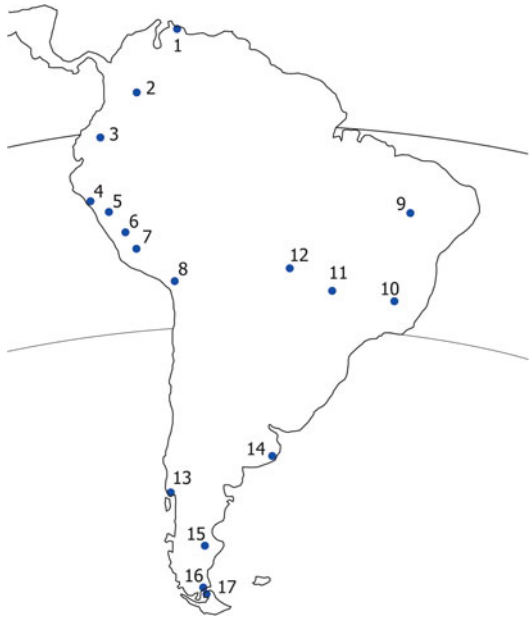

South America: Lithic Industries, Fig. 1 Distribution map of the archaeological sites mentioned in the text. 1: Taima-Taima, Venezuela; 2: El Abra, Columbia; 3: El Inga, Ecuador; 4: Paiján; 5: Guitarrero cave; 6: Telarmachay; 7: Pikimachay; 8: Asana, Peru; 9: Pedra Furada and Sítio do Meio; 10: Lagoa Santa region; 11: Serranópolis; 12: Santa Elina, Brazil; 13: Monte Verde, Chile; 14: Cerro La China; 15: Los Toldos, Argentina; 16: Fell's cave; 17: Cabo San Vicente, Chile

It is only in the 1930s that the lithic material was studied in its own right, as evidence of prehistoric human identities and activities. One of the key figures in research at this time is J. Bird, who excavated main sites in Patagonia (Bird 1988). Based principally on bifacial projectile points that he discovered, Bird established a typology structured in successive chronological phases. In 1950, with the invention of radiocarbon dating, Bird's studies took on a new dimension: the dates obtained for the earliest phase that he defined were older than 10,000 years at Fell's Cave, dates much older than anticipated. Considering the settlement theories and data obtained from North America, these dates would imply a very rapid movement of the initial occupants to the south. Following these discoveries, the lithic industries found in South America would have a tendency to be systematically studied through the filter of what is known in the north. In the South American material, one would thus look for markers typical of the Clovis culture, assumed to be the oldest in the Americas. The Clovis point, a bifacial foliate armature with a fluted base, is the emblematic element of the first assumed industries in North America. It is not found in South America, but the discovery of bifacial projectile points with small thinned tang (called "fishtail" points) by J. Bird in the early layers at Fell's Cave suggested a southern adaptation of the North American point. This hypothesis was all the more followed when it was seen that fishtail points were not confined to Patagonia but were also common further to the north, in the Pampas (Fig. 2) and also on the Pacific coast in Peru and Ecuador, for example, at the site of El Inga.

This view of the Clovis culture as the sole origin of all human (and thus technological) manifestation in the prehistory of the Americas would dominate throughout the second half of the

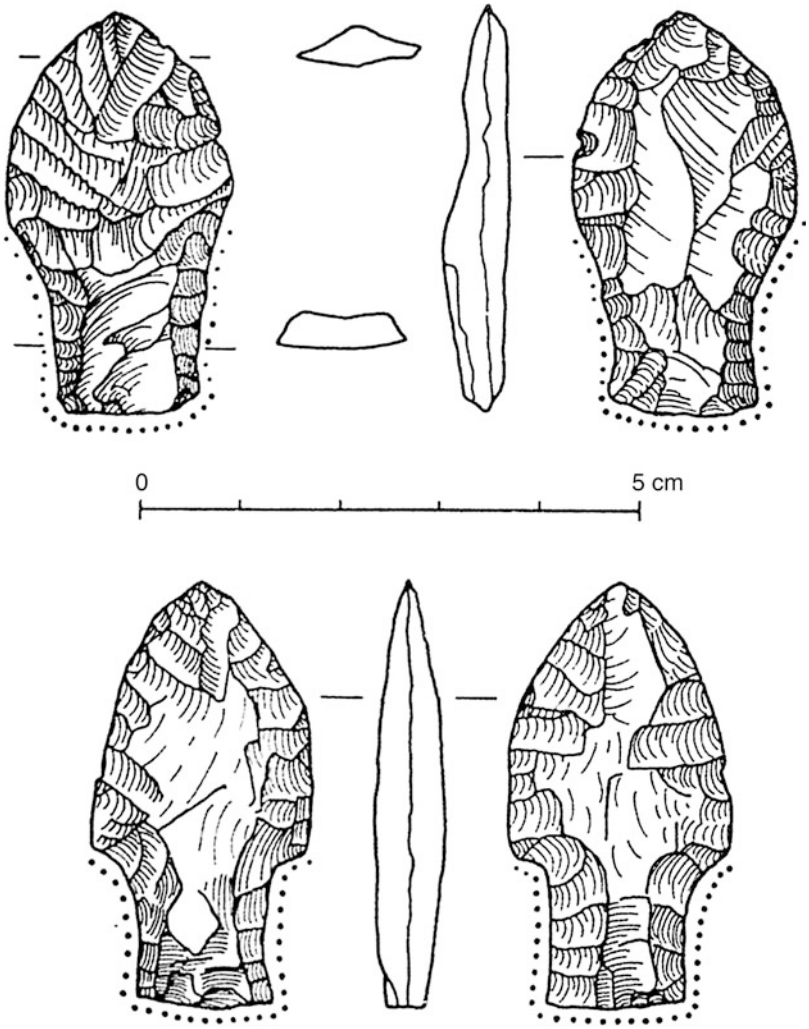

South America: Lithic Industries, Fig. 2 Two fishtail points from Cerro La China, Argentina. (From Zárate & Flegenheimer, 1991: 288, detail) (Courtesy of Nora Flegenheimer)

twentieth century and even today still have its supporters. However, in the 1960s and 1970s, a few dissenting voices made themselves heard. Based on the position maintained by A. Krieger, according to which the first American lithic industries lacked bifacial projectile points, A. Bryan argued that South American industries with projectile points at the Pleistocene-Holocene transition and during the Early Holocene resulted from evolution from a local Pleistocene substrate (Bryan 1999). He thus argued against the idea that all South American lithic technology was due to migration from the north.

Such "liberation" of South American prehistory from its influence from the north would open the field to consider the variability within the lithic industries, both spatially and diachronically. From then on, true technological groups would be described, not only on the basis of bifacial projectile points, thus revealing the considerable variety of industries within South America. So, in the 1960s–1970s, the Abriensian would be defined by G. Correal and T. Van der Hammen, later termed the Edge-Trimmed Tool Tradition by W. Hurt, in central Colombia, the Paijanian by *P. ossa* in northern Peru, the Andean Biface Horizon by E. Lanning in the Andes mountains, the Itaparica Tradition by V. Calderón and then P. Schmitz in central and northeast Brazil, the "Cerca Grande" complex by W. Hurt and

O. Blasi at Lagoa Santa, the Umbu and Humaitá Traditions by E. Miller in southern Brazil, the Toldensian and the Casapedrensian by O. Menghin, and then A. Cardich in Argentinean Patagonia, to cite only a few (Dillehay 2000; Lavalleé 2000).

As on the other continents, the approach to the lithic industries in South America would undergo significant changes during the 1970s. Very generally, two broad trends developed. The first, influenced by the Anglo-Saxon school, is characterized by a new perspective with respect to the material and the questions that can be addressed by it. Cultural questions and definitions of technological groups take second place in particular to processes, spatial organization, social evolution, and modes of adaptation to different environments. Lithic raw material analyses, their nature, provenance, and mode of circulation, develop considerably, especially in Argentina. The second trend is the result of a methodological approach rather than a change in perspective. Questions of a cultural order remain at the heart of research problems, behavioral approaches not being as excluded as in the first trend. This approach is based on the observation according to which the typological approaches to the material thus far are not sufficient for a complete understanding of the lithic material. The definitions of cultural groups by a simple list of types are seen as scarcely operational. A new, more technological, approach to lithic production was thus developed. Research is no longer focused only on the tools made but also examines the technological processes and the knowledge and know-how applied by the knappers. This approach, coming out of French research on lithic technology, is particularly heuristic for the interpretation of the differences observed between collections. Technological studies thus enable reevaluation of the validity of the previously defined cultural units and rationalization of the increasingly marked trend during the 1970s to create a new group, a new "tradition" or "culture" at each new site discovered. We note, among the studies done in this perspective, those of C. Chauchat and J. Pelegrin on the Paijanian industries (Chauchat et al. 2004), H. Nami on the Levallois debitage in southern Patagonia and Tierra del Fuego (Nami 1992), and more recently, the analyses of N. Pigeot, also on Patagonian material (Pigeot 2003).

With the rise of local research centers, the discovery and analysis of lithic assemblages have considerably multiplied in South America over the last two decades. Approaches remain most often more typological than technological, but knowledge has improved in the broad regions previously unknown, and the chronological framework for the analyses has expanded to include the periods as recent as the end of the Pleistocene and the Early Holocene. New methods to analyze the industries has also seen significant development, such as the techno-functional analyses in Brazil, which enables the finished products (tools) to be once again included in the discussion of technological processes and intentions (Fig. 1).

Key Issues

What Do the Points Tell Us (or Not)

Throughout the Americas, projectile points are the most commonly exploited artifacts in the lithic assemblages to address the questions of human settlement, spread, and circulation during prehistory. The contours of such points enable definition of types, for which one attempts to perceive development through time and to interpret the meaning of their distribution across space. To the north, this typological approach has been proven and the chronological and geographic limits of the different categories of bifacial foliate points (Clovis, Folsom, Plano, etc.) can be clearly followed. In South America, attempts at typology on a continental scale are not lacking, but apart from a few zones, this approach has not been particularly fruitful. This may be due first to the near complete absence of points in vast regions, such as central and northeast Brazil. In addition, the defined types often have a limited spatial distribution and are represented by fairly low frequencies.

Fishtail points are, however, an exception. These short bifacial points, with convex edges and a tang often thinned by what is interpreted as a small flute, have been found in Argentina,

Chile, Peru, and Ecuador, in contexts dating to the Pleistocene-Holocene transition (Fig. 2). This flute has led to many publications regarding the possibility of the relationship between the fishtail point and the Clovis point. Dominant in the first half of the twentieth century, this interpretation of the fishtail point as a development of its homologue to the north is today far from being unanimous. The only argument of the "flute" is quite weak since technological studies have demonstrated that, in most cases, these small removals thinning the tang were made during the shaping phase of the piece and not at the end of the production phase. They are thus not truly flutes or grooves. Therefore, several authors attribute a possible South American origin to this type of point (Politis 1991), and some even argue that there is not a single fishtail point type but several, each with its own regional origin and that their similarity is due to morphological convergence (Borrero 1983 cited in Nami 2010). Many other types of projectile points have been defined in South America, such as the "El Jobo" lanceolate point in Venezuela, the long-tanged point of Paiján type on the northern coast of Peru, and the Ayampitín point, one of many Andean point types. These artifacts were made by bifacial shaping with soft percussion, sometimes completed by a phase of pressure flaking. But fishtail points, probably the most studied type and for which the spatial distribution is the largest, are particularly representative of the limited potential of projectile points for approaching questions going beyond a regional scale. The principal danger of all morphological interpretations is the convergence of forms. To prove the existence of a historical link between two types of artifacts, one may ask, "Is the simple criterion of form really valid?" These variations between projectile points indicate limited technological differences, since the technical knowledge and skills needed are overall the same regardless of the kind of point produced and, excluding a few specific cases, the functional intentions appear to be similar. This variability may be linked to technological procedures related to different hafting modes. However, these differences may rather evidence, at least in part, stylistic variability, in other words, relatively versatile traits of technological productions that are difficult to follow for prehistoric periods. These traits are not necessarily markers of significant differences between the human groups studied.

The development of technological approaches to lithic assemblages has shown that, in order to estimate the degree of difference between several assemblages, it is necessary to study them at the scale of shaping concepts and not be limited to simply the forms resulting from application of such concepts. The profusion of publications on projectile points has had a tendency to overshadow the rest of the lithic industry, which forms the overwhelming majority of material recovered, and represent a potential often little exploited to study the development of techniques on the continent and the definition of cultural groups.

Industries of the First South Americans

Often mentioned to question their age or to discuss their human origin, South American industries dating to the Pleistocene are more rarely examined from a technological view. The earliest lithic productions discovered would date to oxygen isotope stage 3. At Pedra Furada (Brazil), a production based solely on quartz and quartzite cobbles has been found in layers dating between 50,000 and 15,000 BP (Parenti 2001). These cobbles were shaped into different classes of massive tools by uni- or bifacial removals and were knapped in the aim of obtaining flakes. Such reduction was organized into short series of removals, generally unidirectional. Bipolar on anvil reduction has also been identified. Most of the flakes obtained are cortical and sometimes retouched. At Santa Elina (Brazil), the toolkit from stratigraphic assemblage III, dating to around 25,000 BP, was obtained from limestone plaquettes and flakes (Vilhena Vialou 2005). The latter were produced via simple reduction. The supports were sometimes retouched, generally by abrupt retouch, in order to create concave or denticulated edges. In layer MV-I at Monte Verde (Chile), dated to around 33,000 BP, a few pieces of knapped basalt were found, including a core showing the production of small flakes in unidirectional series.

These early lithic industries are thus always very simple. The tools are essentially made of natural untransformed volumes (cobbles or plaquettes) on which only the edges were retouched. Tools are also sometimes made on flakes. These come from reduction processes in which the cores were subject to short series of removals without prior preparation. Shaping is absent in these industries.

Sites dating to the end of the Pleistocene, between 15,000 and 12,000 BP, attest in particular the appearance of bifacial shaping. This appears to be associated from the start with the production of projectile points, as at Taima-Taima (Venezuela) and layer MV-II at Monte Verde (Dillehay 1997). In these two cases, lanceolate bifacial points were found. These are elongated, untanged, shaped by soft percussion, and traditionally associated with the El Jobo type. The production of tools on natural supports (cobbles or plaquettes) and on flakes obtained by short series is still present, either in association with shaping activities, as at Taima-Taima and Monte Verde, or exclusively, as at Sítio do Meio (Brazil) and Pikimachay (Peru). Monte Verde is further set apart by the discovery of ground stones, including two small grooved cobbles.

Flaking Systems and Main Technocomplexes

The objective here is not to list, site by site, the lithic material produced. This section being thematic, a purely chronological organization is not presented but rather an overview based on the principal technological systems encountered throughout South American prehistory. This is, of course, a very general and fragmented summary, the reflection of current knowledge on this topic.

Ubiquitous "Simple" Reduction Process

Flake production from "simple" reduction processes are found throughout the continent, in all time periods and in significant proportions during South American prehistory. Such omnipresence has, in a way, slowed detailed studies of the lithic industries. Indeed, what can be said, from a typological viewpoint, of an industry where no standardization of products can be clearly seen? A technological approach to these industries, and in particular to the cores, enables the observation that reduction is structured in relatively short series, often unidirectional, in which the sequence of removals is based on naturally present criteria of convexity, without advance preparation of the block of raw material. It is possible to differentiate groups of methods by the mode of core management: number of flakes produced by series, organization of removals within a single series, number of series per block, and organization of these series on a single block (Fig. 3). Knapping techniques also offer a second degree of differentiation of the industries: all of this reduction is carried out by direct stone percussion, but some cores were exploited by launched percussion, without support, and others by bipolar on anvil percussion. Bipolar on anvil percussion is effectively common through the continent, particularly when knapping small volumes.

Description of intentions, or the classes of intended tools, forms another criterion of variability for this type of production. This is without doubt the most significant criterion to isolate techno-cultural groups. For such industries without standardization of blanks, the typological approach, which aims to identify artifact classes based on form, is not suitable. Determination of flaking objectives must be done by a techno-functional analysis that combines tool production schemas, the volumetric structures of the tools, the functional potentials of their active parts, and modes of grasping or hafting. Such analyses, still rare, have enabled identification, for example, in central Brazil during the Early Holocene, of the systematic intent to create short tools with a concave or denticulated edge opposite a back on flakes produced by "simple" reduction (Mello 2005).

Regions Noted for the Development of Bifacial Shaping

The utilization of bifacial shaping is observed from the end of the Pleistocene in several regions of South America, in particular for the production of projectile points. In addition to these armatures, the use of bifacial shapes also enables the creation of a broad range of tools, varying as much as tools

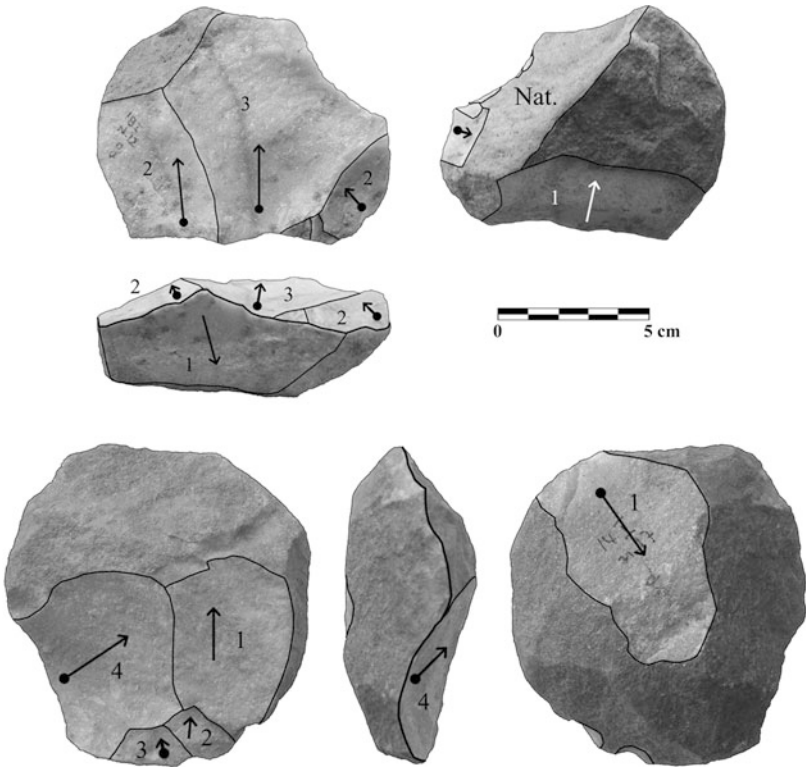

South America: Lithic Industries, Fig. 3 Two cores from Serranópolis, Brazil. Reduction is structured in short unidirectional series, without advance preparation of the block of raw material. (Photos by A. Lourdeau)

on flakes. One of the areas notable for the development of bifacial shaping to produce a wide range of tools is the Central Andean zone. In several sites dating from the end of the Pleistocene to the Late Holocene, including Guitarrero, Telarmachay, and Asana in Peru, bifacial shaping constitutes a privileged mode of blank production (Lynch 1980; Lavalleé 1985). The different types of projectile points generally represent more than half of such production, but a varied toolkit is also sought. Bifacial artifacts that are not point have had a tendency to be considered, sometimes with reason, as point preforms abandoned during the production process. However, many of these are clearly finished tools, with edges prepared by fine retouch (Fig. 4). They are supports probably destined for different functions and are comparable in this sense to the "bifaces" (or "handaxes") known in the Old World in earlier periods. The Andean bifacial pieces are always associated, in the archaeological assemblages, with many unifacially retouched flake tools.

In southern Brazil, bifacial retouch is also a technological solution especially used to obtain tool blanks in archaeological assemblages of the Umbu and Humaitá traditions, dating from the Early Holocene to more recent periods (Hoeltz 2005).

"Complex" Reduction Methods Still Less Tangible

The existence of exclusively blade production has long been known in Patagonia, in particular in the Casapedrense layer at Los Toldos, in Argentina (Middle Holocene) (Cardich & Flegenheimer 1978). Yet the technological traits of this reduction process and its geographic extension and development through time are still difficult to determine, due to lack of technological studies of the collections. Some indices of this type of production are also mentioned for more northern zones, in northwest Argentina and southern Brazil (Hoguin 2012). Based on the available data, this is clearly a reduction system in which the entire core

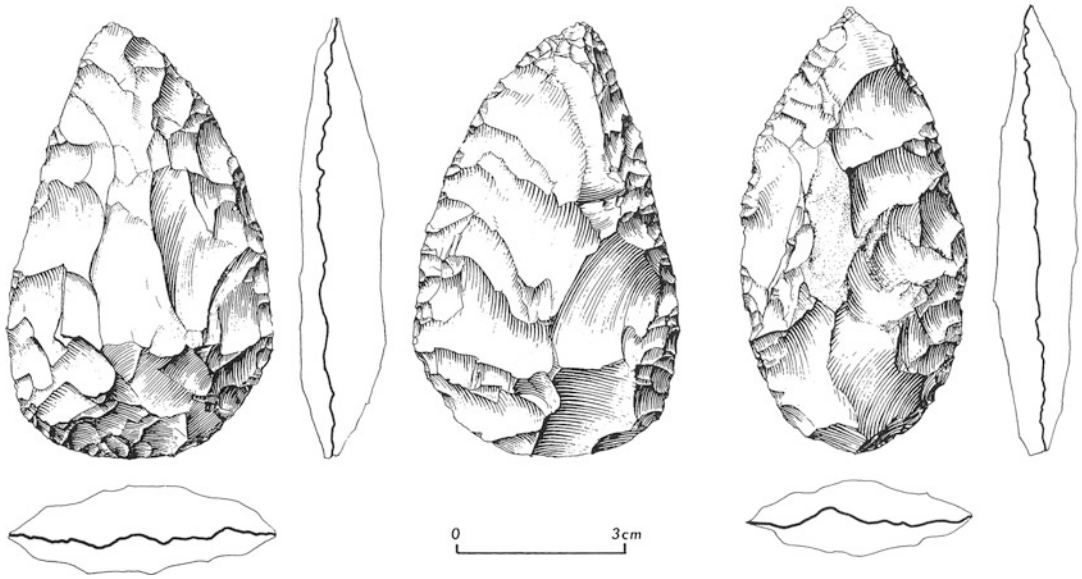

South America: Lithic Industries, Fig. 4 Two bifacial artifacts form Telarmachay, Peru. (Drawings by C. Chauveau, from Lavalleé 1985: 170–171, detail) (Courtesy of Danièle Lavallée)

is structured to produce only blade, the angle and front being maintained during the production of these blanks. The block is at least partially prepared (presence of crests), and the technique used is hard or soft percussion. No pressure flaking has as yet been described in South America. "Blades" and "bladelets" are mentioned in several other regions, but, given the lack of detailed description of the cores, it cannot be excluded that such elongated blanks could have been obtained during non-elongated flake production.

Predetermined flake production from cores for which the volumetric structure is identical in all respects to the Levallois system in the Old World has been identified by H. Nami in Patagonia (Nami 1992). Levallois reduction, until then known in quite different geographic and chronological contexts, is present in Patagonia with the same variability as elsewhere: preferential and recurrent flake methods have been described by F. Morello at Cabo San Vicente, Tierra del Fuego (Morello 2005) (Fig. 5). For now, this reduction system is limited to the extreme southern tip of the continent, in contexts dating to the Late Holocene. Based on the traits of some of the published flakes, it could, however, extend across a broader area and go back to earlier periods.

Unifacial Shaping: An Original Technological Solution?

Unifacial shaping constitutes a fairly common mode of blank production in South America between the end of the Pleistocene and the mid-Holocene. This is a relatively original solution with respect to the history of lithic flaking techniques, situated between shaping and reduction. The procedure consists of shaping large flakes only on their dorsal face, while the ventral face is never directly modified. The volumes obtained in this way are generally elongated, with an overall plano-convex section. Such pieces differ from flake tools with unifacial retouch by the fact that the removals after knapping clearly alter the initial volume of the blank and are not intended only to create or modify the active parts of the tool. Unifacial shaping is observed essentially in central and northeast Brazil in the Itaparica technocomplex (Lourdeau 2010). Detailed analysis of the Serranópolis collections have enabled determination that the tools obtained, often termed limaces, systematically have a symmetrical transformative part at one end, with a rounded, pointed, or transversal rectilinear delineation (Fig. 6). The analysis has demonstrated that these blanks were probably destined for several different functions

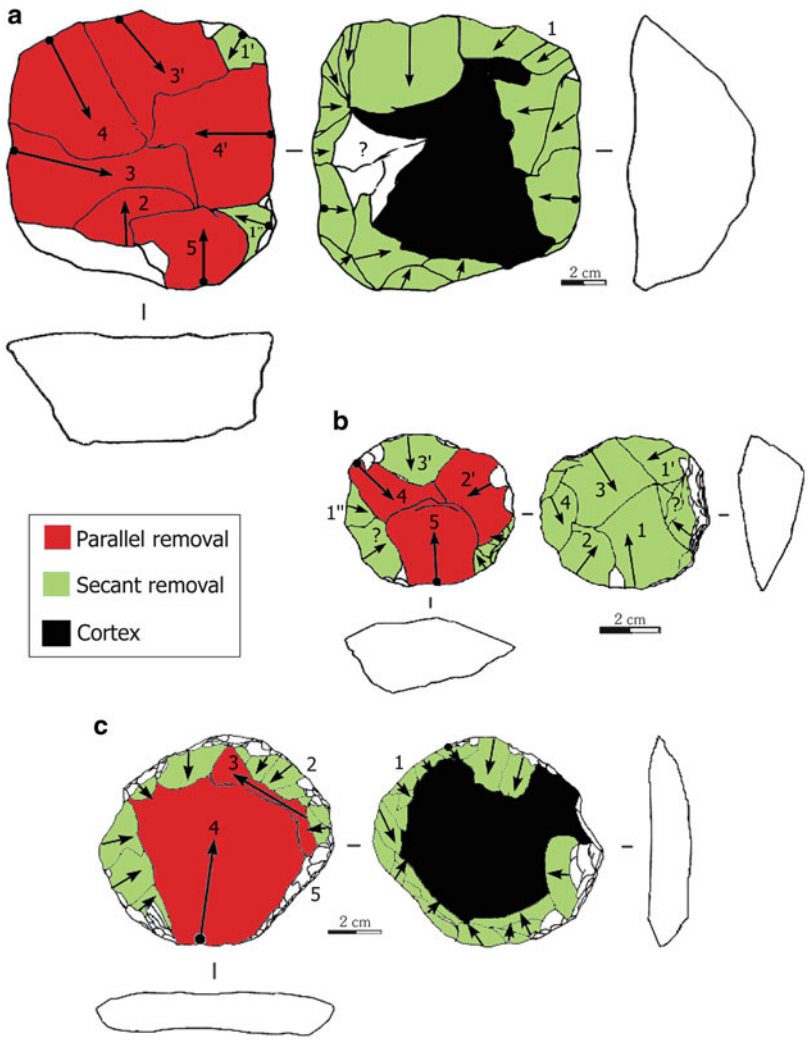

South America: Lithic Industries,
Fig. 5 Levallois cores from Cabo San Vicente, Chile. (**a**) and (**b**) Recurrent flake method; (**c**) Preferential flake method. (From Morello 2005: 40–41, modified) (Courtesy of Flavia Morello)

and a single piece could have several independent functional parts on the ends and/or the lateral edges. These are thus, like some bifacial pieces, supports for varied tools. Similar pieces exist further to the west, in Peru, Ecuador and Colombia, and to the south in Argentina, also dating to the Early and Middle Holocene.

This rapid overview of the main technological solutions that can be encountered in the South American lithic industries enables one to appreciate the significant variability in lithic production. One finds most of the concepts, methods, and reduction techniques known in other regions, but their position in time and space remains difficult to determine. To this can also be added certain uniquely South American practices, such as unifacial shaping, a practice that has not as yet been observed elsewhere.

International Perspectives

Despite a certain idea of isolation associated with South American prehistory, full understanding of the South American lithic industries requires an overall vision of these productions. Only such a broad perspective enables us to attempt to interpret the variability in the lithic industries,

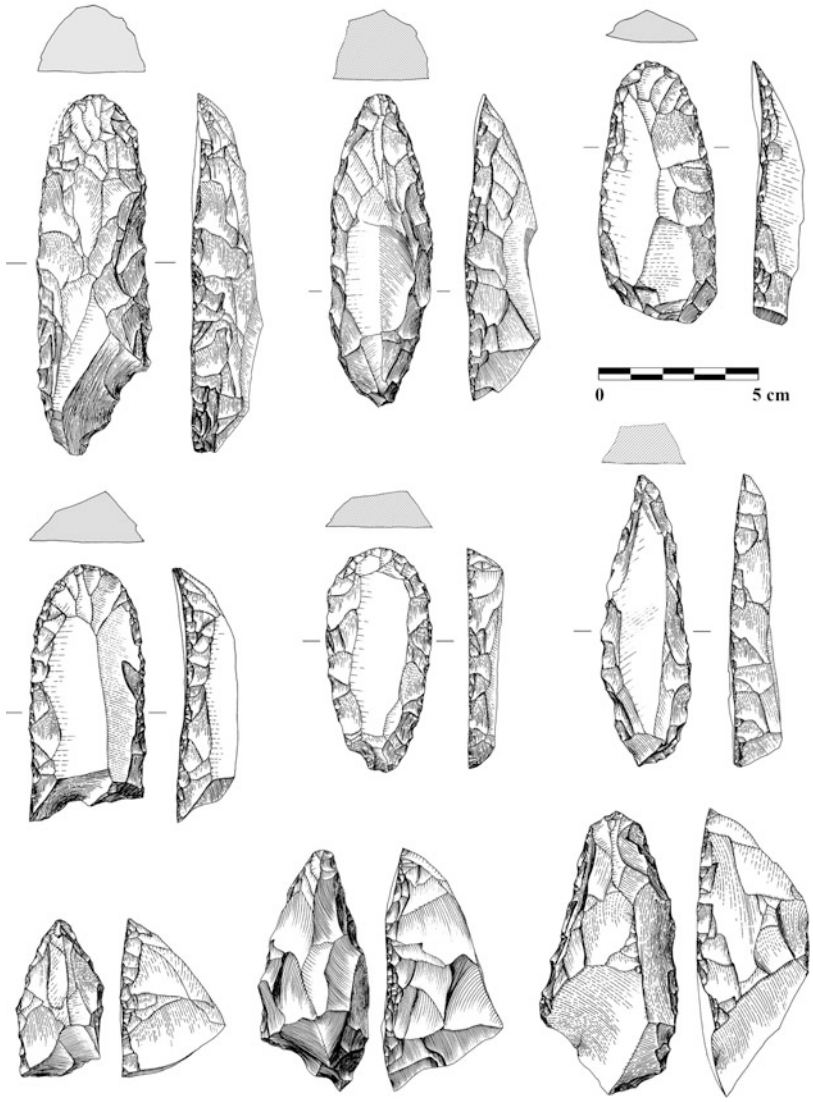

South America: Lithic Industries, Fig. 6 Unifacially shaped artifacts from Serranópolis, Brazil. (Drawings by A. Lourdeau)

determine their local or external origin, and thus explain the dynamics of human settlement of South America.

One can consider the signification of the very first lithic industries here. They are still fairly poorly understood but are based only on natural volumes or blanks produced by simple reduction. These productions are fairly out of sync with the development of contemporaneous industries on other continents (with the exception perhaps of East Asia). Is this local development or should we look elsewhere for the origin of such production systems? One or the other of these alternatives involves in its turn many questions.

As for bifacial shaping, this technique appears abruptly in the form of projectile points without intermediary stages. Based on data for the development of bifacial shaping observable in other regions, its presence in South America could thus be interpreted as an external contribution, already at a certain stage of development.

Unifacial shaping, in contrast, appears to have had its own unique development in South America. A few examples of limaces have been mentioned in North America, but as yet nothing described is comparable to the productions in the Itaparica technocomplex. In Southeast Asia, the Hoabinhian is also known for its unifaces made on

cobbles. However, important differences exist between these and the South American industries with respect to concepts of volumes and tools.

The example of the lithic industries of South America, and the singular context of its prehistory, may in addition enable understanding of certain important phenomena for the global explanation of technology (Boëda 2005). How better to illustrate technological convergence, that is, the independent development of two similar flaking systems, than by the example of Levallois reduction in Patagonia? The lack of geographic and chronological continuity with the Levallois of the Old Word is so obvious that it excludes any hypothesis of diffusion. South American blade production, while still lacking detailed technological description, would appear to be another example of convergence.

Future Directions

The next few decades should be decisive for the study and explanation of the South American lithic industries. The creation of new research centers, as well as a return to detailed studies of the material (relatively neglected for awhile in favor of more general considerations) but with more rigorous methods, foreshadow a clear increase in technological analyses of the modes of blank production and the tools which are the objective of such reduction. These new studies, coupled with new dating programs (particularly by OSL), should enable refinement of the regional sequences and offer the possibility of reconstructing a general framework for the development of lithic industries on a continental scale. New approaches, particularly use-wear analysis, will widen the field of knowledge of this material.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Bird, Junius
- ▶ Handaxes and Biface Technology
- ▶ Hrdlička, Aleš
- ▶ Lithic Technology, Paleolithic
- ▶ Monte Verde, Archaeology of
- ▶ Mousterian Industry Tradition
- ▶ Paleoindians
- ▶ Pedra Furada, Archaeology of
- ▶ Peopling of the Americas
- ▶ Technological Studies in Archaeological Science

References

Bird, J.B. 1988. *Travels and archaeology in South Chile*. Iowa City: University of Iowa Press.

Boëda, E. 2005. Paléo-technologie ou anthropologie des Techniques? *Arobase* 1: 46–64.

Bryan, A.L. 1999. El poblamiento originario. In *Historia general de América Latina, volume 1: las sociedades originarias*, ed. J.V. Murra and T.R. Rabiela, 41–68. Madrid: Trotta-Ediciones UNESCO.

Cardich, A., and N. Flegenheimer. 1978. Descripción y tipología de las industrias líticas mas antiguas de Los Toldos. *Relaciones de la Sociedad Argentina de Antropología* 12: 225–242.

Chauchat, C., J. Pelegrin, C.G. Mora, R.B. Urteaga, and R.E. Aalva. 2004. *Projectile point technology and economy: a case study from Paiján, North Coastal Peru*. College Station: Texas A & M University Press.

Dillehay, T.D. 1997. *Monte Verde: A Late Pleistocene settlement in Chile. volume 2, the archaeological context and interpretation*. Caldwell: Smithsonian Institution Press.

Dillehay, T.D. 2000. *The settlement of the Americas: A new prehistory*. New York: Basic Books.

Hoeltz, S.E. 2005. *Indústrias líticas do sul do Brasil. As tradições Umbu e Humaitá*. Unpublished Tese de Doutorado, Porto Alegre, Pontificia Universidade do Rio Grande do Sul.

Hoguin, R. 2012. Le débitage laminaire durant l'Holocène moyen dans la Puna orientale d'Atacama: Le cas de Susques (Province de Jujuy, Argentine). In *Peuplement et modalités d'occupation de l'Amérique du sud: l'apport de la technologie lithique/ Povoamento e modalidades de ocupação humana na América do Sul: a contribuição da tecnologia lítica*, ed. E. Boëda, M. Farías, and A. Lourdeau. Archéo-éditions: France.

Hrdlicka, A., ed. 1912. *Early man in South America.* Bulletin of the Bureau of American Ethnology 52. Washington: Smithsonian Institution.

Lavalleé, D., ed. 1985. *Telarmachay. Chasseurs et pasteurs préhistoriques des Andes*. Synthèse 20. Paris: Editions Recherche sur les Civilisations.

Lavalleé, D., ed. 2000. *The first South Americans: the peopling of a continent from the earliest evidence to high culture*. Salt Lake City: University of Utah Press.

Lourdeau, A. 2010. *Le tecnocomplexe Itaparica: définition techno-fonctionnelle des industries à pièces façonnées unifacialement à une face plane dans le centre et le nord-est du Brésil pendant la transition Pléistocène-*

S

Holocène et l'Holocène ancien. Unpublished Thèse de Doctorat, Université Paris Ouest Nanterre La Défense.
Lynch, T.F. 1980. *Guitarrero Cave: Early man in the Andes*. New York: Academic.
Mello, P.J.C. 2005. *Análise de sistemas de produção e da variabilidade tecnofuncional de instrumentos retocados. As indústrias líticas de sítios a céu aberto do vale do rio Manso (Mato Grosso, Brasil)*. Unpublished Tese de Doutorado, Pontifícia Universidade do Rio Grande do Sul.
Morello, F. 2005. Tecnología y métodos para el desbaste de lascas en el norte de Tierra del Fuego: los núcleos del sítio Cabo San Vicente. *Magallania* 33: 29–56.
Nami, H.G. 1992. Noticia sobre la existencia de tecnica «Levallois» en Peninsula Mitre, extremo sudoriental de Tierra del Fuego. *Anales del Instituto de Patagonia* 21: 73–80.
Nami, H.G. 2010. Experiments to understand North and South American Late Pleistocene lithic reduction sequence: an actualistic and comparative study. In *Experiments and interpretation of traditional technologies sssays in honor of Errett Callahan*, ed. H.G. Nami, 205–253. Buenos Aires: Ediciones de Arqueología Contemporánea.
Parenti, F. 2001. *Le gisement quaternaire de Pedra Furada (Piauí, Brésil). Stratigraphie, chronologie, évolution culturelle*. Paris: Editions Recherche sur les Civilisations.
Pigeot, N. 2003. L'économie de la taille de la pierre. In *Les chasseurs-cueilleurs de Ponsonby (Patagonie australe) et leur environnement du VIe au IIIe millénaire av. JC*. Documentos Magallania 31, ed. D. Legoupil, 117–164. Punta Arenas: Universidad de Magallanes.
Politis, G. 1991. Fishtail projectile points in the Southern Cone of South America: An overview. In *Clovis: Origins and adaptations*, ed. R. Bonnichsen and K.L. Turnmire, 287–301. Corvallis: Center for the Study of the First Americans – Texas A&M University.
Vilhena Vialou, A. 2005. *Pré-história do Mato Grosso. volume 1: Santa Elina*. São Paulo: Universidade de São Paulo.

Further Reading

Ardila Calderón, G., and G. Politis. 1989. Nuevos datos para un viejo problema. Invesitgación y discusiones entorno del poblamiento de América del Sur. *Boletín del Museo de Oro* 23: 3–45.
Boëda, E., M. Farías, and A. Lourdeau, eds. 2012. *Peuplement et modalités d'occupation de l'Amérique du sud: l'apport de la technologie lithique/Povoamento e modalidades de ocupação humana na América do Sul: a contribuição da tecnologia lítica*. France: Archéo-éditions.
Dillehay, T.D., G. Ardila Calderón, G. Politis, and M.C.M.C. Beltrão. 1992. Earliest hunters and gatherers of South America. *Journal of World Prehistory* 6: 145–204.
Guidon, N., and B. Arnaud. 1991. The chronology of the new world: Two faces of one reality. *World Archaeology* 23: 167–178.
Hoeltz, S.E. 2012. Les industries lithiques dans le bassin du Prata, ouest du Santa Catarina (Brésil): ancienneté, stratégie technologique et variabilité. In *Peuplement et modalités d'occupation de l'Amérique du sud: l'apport de la technologie lithique/Povoamento e modalidades de ocupação humana na América do Sul: a contribuição da tecnologia lítica*, ed. E. Boëda, M. Farías, and A. Lourdeau. Archéo-éditions: France.
Inizan, M.-L., M. Reduron, H. Roche, and J. Tixier. 1999. *Technology and terminology of knapped stone*. Préhistoire de la pierre taillée 5. Nanterre: Cercle de recherche et d'études préhistoriques.
Nami, H.G. 1997. Mas datos sobre la existencia de nucleos preparados y lascas predeterminadas en la Patagonia austral. *Anales del Instituto de Patagonia* 25: 223–227.
Prous, A. 1992. *Arqueologia Brasileira*. Brasília: Editora Universidade de Brasília.
Schidlowsky, V., and N. Pigeot. 1997. L'équipement en pierre taillée. In *Bahia Colorada (île d'Englefield), les premiers chasseurs de mammiferes marines de Patagonie Australe*, ed. D. Legoupil, 73–142. Paris: Editions Recherche sur les Civilisations.
Zárate, M., and N. Flegenheimer. 1991. Geoarchaeology of the Cerro La China locality (Buenos Aires, Argentina): Site 2 and Site 3. *Geoarchaeology: An International Journal* 6: 264–273.

South American Archaeology: Postcolonial Perspectives

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Introduction

Problematic Entrance as Entrance to the Problematic

A South American postcolonial perspective on any problem involves, first and foremost, a consideration of whether or not South America is a place from which it is possible to have such a perspective. If such perspectives are indeed postcolonial, this suggests two possibilities: (1) that they were later to a colonial experience or (2) that they were inspired by a

body of theory and assumptions designated as postcolonial. Those options are external because they could mean that the colonial experience is a thing of the past – thus post – or that postcolonial theory is something that you can embrace or reject as any other theory. However, that the colonial experience, on the one hand, was not surpassed by political independence and, on the other hand, is constitutive of subjectivity becomes immanent to the perspective and not external to it. Whether we call it postcolonial or otherwise, the colonial experience is immanent to the place of these theories. The postcolonial world, in this case, is more a pre-theoretical condition than a theoretical framework, i.e., more a condition of thinking, of knowledge, than a knowledge about a delimited field of content. Moreover, once introduced into theory, that postcolonial pre-theoretical condition is, at the same time, metatheory, i.e., it is theoretical knowledge about theory and its conditions. Finally, as knowledge about the conditions of knowledge, it leads through to the possibility of overcoming the conditions of coloniality, something which has been designated as a decolonial option.

If, even more, these South American postcolonial perspectives are given in the disciplinary framework of archaeology, two other issues must be weighed: (1) the object-history of archaeology established as prehistory, i.e., a historical narrative of a time without history, i.e., as an anomalous history, and (2) the importance of disciplining and institutionalization in the demarcation of the boundaries of the object-history, demarcation which is, at the same time, of the subjectivity of history.

Finally, if we try to make history of these perspectives – as this entry suggests – we could either consider history as a narrative of what happened objectively and externally or recognize from the beginning that history itself – its idea, its method, and its scope – is an integral and active part of colonialism and the conditions of possibility of postcolonial (and even decolonial) archaeologies in South America.

Key Issues and Current Debates

Colonial Designations and the Place of Theory

I shall begin with the first of the assumptions referred to in the preceding paragraph: that South America is a place from which a perspective on archaeology can emerge. This, again, leads to the colonial question, at least in two senses. It is clear that South America (or Latin America, or Ibero America, or Hispanic America, or any of the usual geographical categories) is the result of the history of colonial designations. America was not a geographical name or its real referent until 1507 when Martin Waldseemüller baptized it with the name of Amérigo Vespucci (what the Spaniards called then *the Indies*). At this point, it might be thought that this discussion is about a mere question of naming, and to some extent it is. It also happens that the act of naming has implications with respect to what is understood as the external reference to the name. For instance, America began to be *one* thing from that moment, i.e., a thing that was able to be designated by a single name. And, in addition, that thing that became America could, by the mere fact of the designation by European cartographers, be stated by its name from Europe (Mignolo 2007).

The designation of America, therefore, like any colonial designation, involved the appearance as one thing or category of what the name lawfully represented, as well as the appearance of a lawful enunciator of that thing. Whatever America is, then, becomes what is enunciated and written as such from the place of the colonial power, and this place becomes the place from where the colony is enunciated and written. Modern colonial bureaucracy is based on writing procedures, a technical device that needs, among other things, names for things in the world and people giving the names. Thus, the existence of both a proper name and a proper enunciator of the world out there targeted for appropriation is a material condition of modern colonialism. The colonial designation, being a mere question of names, is also a condition of the possibility of the realization of the desire of colonial expropriation. The things to expropriate – i.e., the colonized world – are lawfully enunciated by the colonizer and, as it follows, illicitly by the

colonized, who is possessor of a false knowledge and an imperfect language even to enunciate the world and the one's own body; such is the historical material condition of colonialism, or its dark face, *coloniality* (Schiwy and Maldonado-Torres 2006). This *differential constitution* of being and knowledge is one of the central tenets of postcolonial thought. That America has been, much later, a name appropriated by the United States for its self-designation has led to other designations arising to qualify the other America: South America, America of the South, and Latin America.

The existence of South America as a place of enunciation of a theoretical perspective on archaeology is closely linked to the self-awareness of South American archaeologists of their differential designation, i.e., of its constitution in the *difference* from colonial powers. But in the archaeological field, this self-consciousness has not been based in any postcolonial perspective but in the so-called Latin American Social Archaeology (LSA) of the 1960s and 1970s (Politis and Pérez Gollán 2004). This current, specifically inspired by historical materialism, has been perhaps the first to occur, more or less unified, with both a theoretical inspiration and a political sense (hence, it is *social*, beyond what each one understood as such in political terms) and a place from which to establish a new perspective (thus *Latin American*). This movement will not be outlined in any more detail here as other entries in this volume deal with its development.

Although the LSA continues to be a theoretical reference in Latin America (and also in Spain – Castillo et al. 2008 – as well as other countries), towards the mid-1990s the momentum of LSA was already reasonably diluted due to the growing hegemony of processual archaeology of North American origin and the anti-Marxism of the academic contexts in some countries of South America (particularly in the Southern Cone as a long-lasting effect of the military dictatorships of overt anti-Communist orientation and counterinsurgency action).

Also, the notion of a common South American belonging was not present anymore as an inspiration for theoretical reflection. In the mid-1990s South American archaeology was so dispersed that archaeologists from different South American countries read each other in European and/or North American publications. Moreover, it then seemed to be installed a disciplinary common sense of the banality of a local or regional perspective. In reaction to this there came the series of Meetings of Archaeological Theory in South America later known as TAAS (Funari et al. 1999). The meetings of Vitoria in 1998, Olavarria in 2000, Bogotá in 2002, Catamarca in 2007, and Caracas in 2010 were milestones in the emergence of exchange, research, mutual knowledge, and discussion, at a South American scale (Gnecco and Haber 2005). It was consolidated with the appearance of publications with continental scope, which were published on the continent by South American archaeologists, starting with the bilingual journal *Arqueología Suramericana/Arqueologia Sul-Americana*, to which *Revista de Arqueología Histórica Argentina y Latinoamericana* and *Vestígios Revista Latino-Americana de Arqueologia Histórica* were added. Thus, the beginning of the twenty-first century sees the recovery of the notion that South America can be a place from which an archaeological perspective can be enunciated. Indeed, the TAAS meetings and the South American publications have provided the forum for discussions about whether or not South America is a singular place from which knowledge about archaeology can be generated.

Peripheral and Critical Theory

In 1984, Trigger published an influential essay that proposed ways in which relations among nations gave rise to the archaeologies in each country. Colonial, national, and imperial archaeologies were influenced by the manner in which each country was globally related (Trigger 1984). The value of the cartography of Trigger was challenged explicitly (Olsen 1991) and implicitly (Funari 1989) from perspectives that characterized the geopolitics of archaeological knowledge in terms of the theories of dependency and the world-system, introducing the concept of *peripheral archaeologies*.

Pedro Funari (1989) characterized peripheral archaeology (particularly Brazilian) according to academic and social criteria. From an academic point of view, a peripheral archaeology is bilingual – and sometimes polyglot – while a central archaeology is monolingual. Multiple linguistic competence of the periphery also implies knowledge of theoretical bodies of various origins, regardless of the nationality of the authors at issue. A central archaeology, on the other hand, has a much more insular and self-sufficient behavior (Funari 1989). This vision of the conditions of the peripheral archaeology in comparison to central archaeology contrasts sharply with common visions, according to which the central archaeologies are role models to peripheral archaeologies. There is, then, a dislocation between the scope of peripheral knowledge and the way in which that knowledge is valued by agents (peripheral and central). The postcolonial sense of this can be better understood through Funari's criticism from a sociopolitical perspective:

> Hodder can write about the 'contemporary West' (Hodder 1986: 167) only because there is a non-West, maintaining economically the so-called 'alternative' perspectives, (western) indigenous, (western) feminist, and (western) working-class archaeology. It is symptomatic that even though the concept of *West* is accepted somewhat unconsciously by *western* archaeologies, it imples (sic) the existence of Third World (or non-Western) archaeology. (Funari 1989: 65)

The dependence between central and peripheral archaeologies was framed within neocolonial relationships – both academic and economic – which featured as coloniality. Within coloniality certain knowledge and certain enunciators are underestimated in relation to a "more perfect" knowledge emanating from the central academies. Like Latin American postcolonialism that would spread a couple of decades later, Funari (1989) both established criticism of the geopolitics of knowledge as a boost to the emancipator action (decolonial, as it would be called later) and located the place of liberation to the outskirts of the West: "There are therefore two radical tasks for peripheral archaeologists. First, to oppose inner and outer oppression and second, to promote a *new past*, in order to liberate people in the *present*. In this context, peripheral archaeology can provide central archaeology with a very pertinent critique, by stating the limitations of western archaeology or, at least, its one-sidedness" (1989: 65).

A Meeting of Times

Towards the end of the 1990s, Cristóbal Gnecco's text "*Historical Multivocality. Towards a Postcolonial Cartography of Archaeology*" was published; it would become the primary reference in the introduction of the discipline to the postcolonial debate. Perhaps the most significant contribution of this work to the postcolonial debate resides in the sharpness with which Gnecco exposes the colonial sense, or better the *endocolonialism* of the scientific program of the archaeological discipline. He writes: "Archaeology is part of the cognitive apparatus of the West and one of the refined expressions of its temporary thought" and "Western time is a tool of political domination and the time that builds the archaeology is Western time, not the time of the others" as well as "These questions are no longer limited to reflections carried to the interior of the disciplinary practice, as happened during the years of formation and consolidation of the scientific archaeology, they involve the same status of the discipline in the context of other knowledges and within the framework of the social contexts of their production; they are related, in short, with what I will call political economy of archaeology. In this sense, the most important question we have to ask ourselves about the role of archaeology in a contemporary context, twice postmodern and unsubordinated" (Gnecco 1999: 17–18). Clearly, for Gnecco it is not just that archaeology should recognize the inheritances of colonialist past to get rid of them. Nor does he say that archaeology, only through recognizing in its history its colonialist origin, is able to deviate from those formerly unacknowledged negative features.

Gnecco's program is critical enough to expose the mechanisms through which archaeology is a part of the arsenal of Western knowledge to subordinate other knowledges. In this sense, the key concept that is introduced is the one of *endocolonialism* or *internal colonialism*. Despite the

many multicultural readings that it has suffered, Gnecco's program is not a multicultural program of recognition and respect for differences; on the contrary, what he calls a "multivocal meeting" is a field of political struggle in which archaeology can enter only honestly by renouncing its hegemonism and opening itself to self-transformation. It is not possible for archaeology (or the Western disciplining of time, in general) to recognize in a *locus* vis-à-vis other times, without abandoning, in the first place, the universalism which constitutes the behavior characteristic of Western time, and secondly the alocronism with which it subordinates other times. Gnecco's text meant, at the end of the 1990s, a programmatic statement much more than an already transited path. Signs of that can be read in his provocations to the openness, transformation, and relativism as well as in the optimism with which post-processualism was then characterized as "unsubordinated" knowing of Western hegemonic practices. Such attitudes are common in other texts of the 1990s commented on this entry.

Ruptures and Metaphysics

History-object is marked by the colonial experience, i.e., South American history occurs before and after the colonial experience; there is a precolonial history of autonomy and a colonial history of subjugation. The postcolonial perspective comes to state that the colonial experience did not perish nor was it diluted with independence. The colonial experience has constituted colonial history as *history* and precolonial history as *prehistory*, or as a period without history. Archaeology has come both to liberate the precolonial history of the colonial gaze that constitutes it as without history and to extend the colonial sense of history over non-colonial times.

The subject of history is also marked by the colonial experience, i.e., that both the history of what happened since the colonial experience as the history of what happened before the colony, i.e., postcolonial and precolonial histories (the latter on which archaeology claims exclusivity), are focused, studied, and narrated from post-colonial perspectives. The observations offered by archaeology about precolonial history are, inevitably, still a postcolonial gaze. This is because the subjectivities of both the historian and the precolonial archaeologist are constituted by the same colonial experience.

The *constituent* character of the colonial experience in relation to archaeology is indicated in its disciplinary demarcation. Additionally, it is also interesting to explore its *constitutive* character, that is, the way in which coloniality implicitly constitutes or shapes the facts of experience, and then the scientific understandings of history. To the first constituent relationship, called *direct*, a constitutive *recursive* relationship is added, "once the matrices that define and frame scientific disciplines are established, and are put into motion, the knowledge of objects is already mediated by this division of labor, although its origins are unnoticed, thus facilitating its reproduction with all the appearance of naturalness" (Haber 1999). Haber explored how coloniality acts upon archaeology, through the analysis of the theoretical-methodological model for the interpretation of the colonial archaeology of northwestern Argentina (called "Caspinchango model" following the fact that it was based on the classical interpretation of a so-called type-site, Haber 1999). The classic report on the Caspinchango site, written by one of the founders of the archaeological discipline, Salvador Debenedetti, thus became a canonical text for archaeology about the long war period between Calchaqui and Castile, designated as the Hispanic-indigenous period by archaeology. It enhanced indexes of subjection (Christian rosary glass beads) and decomposition (the decay of ceramic manufacturing). Classical excavations at Caspinchango, however, offered some notable stratigraphic sequences that could undermine the interpretation of an irreversible trend towards the West, something that was predicted and meticulously observed by Félix Outes (Haber 1999). Despite signs to the contrary of this critique, however, the Caspinchango model won monolithically in the archaeological discipline. The question is not simply about the facts but also about those deep, extrascientific, and immanent conditions for the creation of the facts of experience. If the interpretation of the history-object follows an interpretative canon beyond the facts,

it is because the conditions by which those facts are facts do not correspond exclusively to the materiality of things nor to the objectivity of the record but to a cultural assumption, an epistemic understanding of historical time as founded on a momentous event, a rupture or gap that, beyond facts, is, as a consequence, metaphysical.

Indigenous historical archaeology is therefore an impossible endeavor, a no-time that should be moved, either towards a prehistorical past or to a nonindigenous ethnic group (Criollo, Mestizo, Christian, etc.). Preterization of the indigenous (past and present) is necessary for the consolidation of a cultural collective that needs to expurgate its indigenous para-Christian, or non-Christian, and doubtfully Western content. The *metaphysical rupture* in which the colonial understanding of history is based becomes thus encoded within the disciplinary frames of archaeology, i.e., its demarcation of object and method. In this way, being an archaeologist, that is to say, exercising knowledge within the boundaries defined by the disciplinary framework, is exercising a knowledge founded in metaphysical rupture, in a cultural form that colonial difference adopts in history as written from the canon of the national state. But, if archaeology carries even inadvertently, in its most basic internal structure, coloniality, there is no other way for archaeology than to reproduce and expand those colonial conditions of knowledge.

Future Directions

An Uncertain Way Out

The postcolonial debate has some specific areas unique to South America. Long before postcolonial theory was spreading in global academy, various aspects of South American thought interrogated similar issues. The nineteenth-century essayists, and also many and diverse currents of thought in the early decades of the twentieth century – including the reconstruction of the Andean Marxism by Mariátegui, the "cannibalist" current in Brazil, Forja Group in Argentina, to name a few – were of great influence in South America. Dependency theory and development were theoretical elaborations that received strong impetus in the middle of the last century. The theology of liberation, magical realism literature, and social muralism are some currents that transformed critical positions from other areas and many times on a Latin American scale. These and many other thoughts, together with the experience of hundreds of social movements and indigenous and peasant movements, contribute to the fact that the reception of the postcolonial debate has not adopted the known form of the simple translation of texts from the English-speaking academy.

Many of the postcolonial thinkers were grouped into what is known as the Modernity/Coloniality Program, although this label leaves out hundreds of relevant intellectuals, among them the ones that were gathered by the Aymara Oral History Workshop. So, postcolonial South American theory, rather than aligning itself with any global intellectual current, is a particular space of thought and theoretical practice that dialogues with various intellectual currents (including postcolonial theory, structural history, and queer studies). Such a space is characterized by a theoretical interchange with social movements, indigenous peoples, and peasant organizations in an active anti-colonial struggle. It is within this experience that the postcolonial prospects in South American archaeology must be understood, as participating in these conversations rather than the simple application of a theoretical approach to the field. At the same time, based on the historical continental experience, South American perspectives within archaeology, as well as the rest of the fields, maintain a commitment beyond the deconstructive critical moment, in what has been called "the decolonial turn."

The involvement with indigenous movements has been one of the most visible experiences in the decolonial sense. Unlike the multiculturalists' positions, decolonial positions have attempted to move beyond the aim of respect for the rights to diversity and historic reparation, towards recognizing indigenous thought as real theoretical perspectives capable of establishing symmetry and even move the Western, disciplinary, and intellectual constructions, and not simply as objects of knowledge or a subject of law. What in other cases

has been defined in the context of the restitution of material culture to indigenous descendants is reconfigured in South America as an encounter between archaeologies aware of their positions in the postcolonial field (Gnecco and Hernández 2008). What in science is understood as a traditional culture from traditional, ethnoscientific, or *ethic* perspectives is configured as theories of relationality that cannot be known without an epistemic-political shift that involves an openness to move the broader cultural and disciplinary certainties (Haber 2009).

The involvement with social movements (peasants, anti-mega-mining, indigenous peoples) leading the anti-colonial struggle in rural areas where archaeology is usually practiced has led us to consider epistemic priorities and other values other than the traditional basic (truth-oriented) and applied (market- and development-oriented) science, such as life – or even a good life. In all of these developments, archaeology not only expands on innovative fields guided by the goal of helping each other but also enters into a theoretical and epistemic conversation which transforms it (Curtoni and Chaparro 2011; Jofre 2010).

Finally, it is necessary to mention the efforts that, even at an initial stage, apply to the formation of networks of research and debate that link academics and movements of various South American countries with other countries of the geopolitical South, seeking to configure locales of thought and practice that are not mediated by the central academy. A case in this regard is the establishment of the South-South Network on Cultural Heritage and Globalization and the formation of South America/South Africa networks.

This entry cannot be a history of postcolonial archaeology in South America without addressing the history of the colonial constitution of history, archaeology, and South America as colonial categories. But that a history of history (or better an archaeology of archaeology) is not a mere intellectual movement locked in the campuses from where it observes what is happening "out there." If any South American perspective on things really exists, it has to be one according to which the drama of the collective history passes through each molecule of thought. This is a case as demanding for the archaeological discipline as promising for those who think it is simply unbearable to abandon the anti-colonial yearnings. Decoloniality and indiscipline could be the key words of the history that is yet to be written.

Cross-References

- ▶ Funari, Pedro Paulo A. (Historical Archaeology)
- ▶ Latin American Social Archaeology
- ▶ Postcolonial Archaeologies

References

Castillo, S., P. Fournier, and M.J. Blackman. 2008. Periodicidad y propiedad: problemas identificatorios en la Arqueología Social Iberoamericana. In *Sed non satiata II. Acercamientos sociales a la arqueología latinoamericana*, ed. F.A. Acuto and A. Zarankin, 81–92. Córdoba/Catamarca: Encuentro/Humanidades.

Curtoni, R., and G. Chaparro. 2011. Políticas de reparación. Reclamación y reentierro de restos indígenas: El caso de Gregorio Yancamil. *Corpus. Archivos virtuales de la alteridad americana* I.

Funari, P.P.A. 1989. Brazilian archaeology and world archaeology. Some remarks. *World Archaeological Bulletin* 3.

Funari, P.P.A., E.G. Neves, and I. Podgorny. 1999. Introduçao – A primeira Reuniao Internacional de Teoría Arqueológica na América do Sul: Questoes e debates. *Revista Do Museu de Arqueología e Etnología*, Sao Paulo, Suplemento 3: 1–12.

Gnecco, C. 1999. *Multivocalidad histórica. Hacia una cartografía postcolonial de la arqueología*. Bogotá: Uniande.

Gnecco, C., and A. Haber. 2005. Editorial. *Arqueología Suramericana* 1 (1): 3–4.

Gnecco, C., and C. Hernandez. 2008. History and its discontents stone statues, native histories, and archaeologists. *Current Anthropology* 49 (3): 439.

Haber, A.F. 1999. Caspinchango, la ruptura metafísica y la cuestión colonial en la arqueología sudamericana: el caso del noroeste argentino. *Revista do Museu da Arqueología e Etnología* Suplemento 3: 129–142.

Haber, A.F. 2009. Animism, relatedness, life: Post-Western perspectives. *Cambridge Archaeological Journal* 19 (3): 418–430.

Jofré, I.C., ed. 2010. *El regreso de los muertos y las promesas del oro: Patrimonio Arqueológico en Conflicto*. Córdoba/Catamarca: Encuentro/Humanidades.

Mignolo, W. 2007. *La idea de América Latina. La herida colonial y la opción decolonial*. Barcelona: Gedisa.

Olsen, B. 1991. Metropolises and satellites in archaeology: On power and asymmetry in global archaeological discourse. In *Processual and postprocessual archaeologies. Multiple ways of knowing the past*, ed. R.-W. Preucel, 211–224. Carbondale: Centre for Archaeological Investigations.

Politis, G., and J. Pérez Gollán. 2004. Latin American archaeology: Between colonialism and globalization. In *A companion to social archaeology*, ed. L. Meskell and R. Preucel, 353–373. Oxford: Wiley.

Schiwy, F., and N. Maldonado-Torres. 2006. *(Des) colonialidad Del Ser y Del Saber: (Vídeos Indígenas y Los Límites Coloniales de la Izquierda) en Bolivia*. Buenos Aires: Ediciones del Signo.

Trigger, B. 1984. Alternative archaeologies: Nationalist, colonialist, imperialist. *Man* 19 (3): 355–370.

South American Geography and Chronology

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State of Knowledge and Current Debates

In the international archaeological literature, South American archaeology has been mainly interpreted by imposing Northern Hemisphere concepts and labels. Some years ago (Scheinsohn 2003), I have argued in favor of considering South American diversity and its particularities which runs counter to the application of concepts elaborated elsewhere. While decolonizing literature expands in English-speaking countries, most known English books on South America archaeology are still written (e.g., Moore 2014) or edited by non-South American archaeologists (e.g., Peregrine and Ember 2001). Even when different contributors are included, those from South American countries are in frank minority (e.g., Peregrine and Ember 2001, only 2 out of 19 contributors are South American). Thus, South American archaeology in English language publications is still portrayed in terms of extra-American archaeology without considering vast quantities of literature written in Spanish. The reasons are multiple: the overall Northern Hemisphere dominance in science (and hence in archaeology), the preference for an author that speaks from a known point of view, the underplaying of South American archaeologists, etc. This last reason is quite problematic given the early archaeological developments in different South American countries (i.e., Tello and his disciples in the first half of the 1900s in Peru Ameghino and Moreno and their disciples at the end of nineteenth century in Argentina, etc.) and its strong research traditions.

But something has begun to change. Some authors have acknowledged that Old World labels mask South American diversity (e.g., Dillehay 1999, 2008, among others). South American archaeologists have begun to publish more in English, thereby widening their impact. Also, one of the two editors of Latin American Antiquity (the SAA's journal for the region) has been Latin American from the start of the journal, in 1990. Part of this progress has been the result of deliberate efforts by northern hemisphere institutions to train Latin American archaeologists, especially the University of Pittsburgh which, since the late 1980s, has provided Heinz fellowships to grad students from throughout Latin America with most of the graduates have returned home. Also, although with local impact, it is remarkable for the existence of a series of internally financed, permanent projects. The main example came from Peru coast, north of Lima, with projects run and staffed by national archaeologists as in Sipán (since 1987), Huaca de la Luna (since 1990), and Caral (since 1994), some of them accompanied by informative site museums and spectacular exhibits. The development of cultural resource management projects in many countries of the region has also facilitated archaeologist to engage in regular jobs. Finally, South American archaeologists have begun to establish their own networks (e.g., Reunión de Teoría Arqueológica de América del Sur, TAAS; Encuentro Latinoamericano de ArqueoZoología, ELAZ; the Neotropical Zooarchaeology Working Group, NZWG of the International Council for Archaeozoology, ICAZ; etc.), overcoming the old

barriers set between South American archeologists and cutting down the dependence on Anglo-Saxon authors. These barriers are also related with one of the South America particularities: currently is divided in 12 independent countries (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Surinam, Uruguay, and Venezuela) and French Guyana (overseas department of France, see Fig. 1). The majority of those countries are Spanish speaking with the exception of Brazil (Portuguese), Guyana (English), Surinam (Dutch), and French Guyana (French). This picture creates specific linguistic obstacles with the latter countries but also issues related with different national scientific research policies and circulation of information among the former that affected also archaeology. As Politis has signaled (2002), these divergences in their historical and sociopolitical contexts led to distinct regional and national archaeologies.

In any case, South America's distinctiveness has begun to be recognized. Among those features are the following: (1) it was the last continent colonized by humans (leaving Antarctica aside);

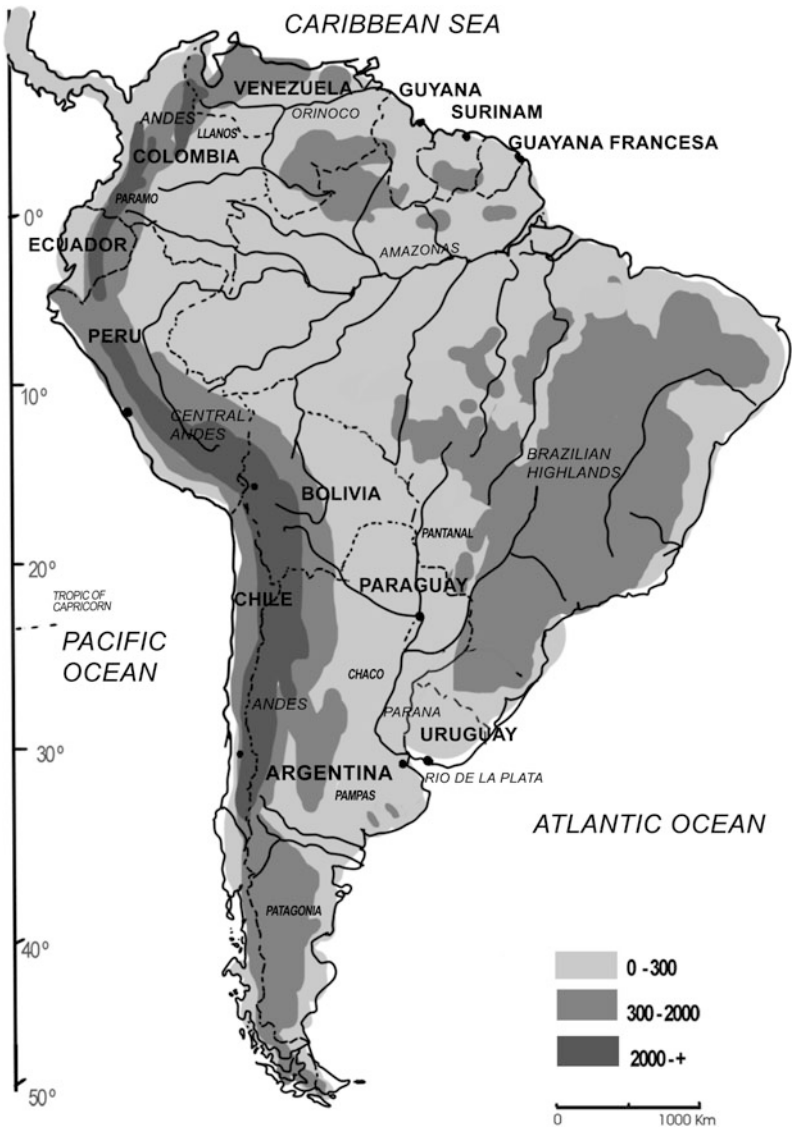

South American Geography and Chronology, Fig. 1 Map of South America. Shadowed areas represent different heights measured in meters above sea level

(2) it has the greatest latitudinal span among all the continents; (3) the North-to-South-oriented Cordillera de los Andes has far-reaching geographical and ecological effects, including a high altitudinal variation; (4) there were multiple animal and plant domestication locales; (5) as recent research allow to conclude, it has also a different model of population growth than other continents (Goldberg et al. 2016); and (6) it is also home to the developments of states and empires. In that last case, the problem is that the Andean phenomenon was so overwhelming that most of the South America readings were biased to it, to the detriment of focus on the diversity of cultural processes elsewhere in South America.

Since this entry is meant as an introduction to South American Archaeology for the international reader, most of the subjects are dealt with very briefly when there are specific entries on the same in this volume (see Cross References below). I will therefore only expand on certain issues that are less known or noteworthy and seek to deal mostly with archaeological literature available in Spanish. As an additional warning, I should add that, since I am an Argentinean archaeologist, most of the examples I will present are biased toward that country.

Geography

Four are the main characteristics of South America geography:

1. Continental shape: South America (Fig. 1) lies mainly in the Southern Hemisphere, stretching from 12° N to 55°S going from tropics to subpolar regions (Morello 1984). It has the approximate shape of an inverted isosceles triangle, with the narrow end pointing south. This narrowing begins south of the Equator and is more pronounced from the Tropic of Capricorn (23°S) onto the tip of the continent: in the middle latitudes of the continent, the longitudinal width is 15° and in the southern end just over 5°. This elongated shape implies an increasing marine influence to the South, moderating summer and winter extreme temperatures. This results in environments that are less harsh than expected by latitude alone and explains the lack of subpolar conditions, tundra, and permafrost in ice-free zones (Morello 1984).
2. The North-to-South-oriented Cordillera de los Andes (see darker area in Fig. 1) creates a Pacific coastline characterized by high relief, a narrow marine shelf bordering a deep trench, and short drainage basins with sharp vertical motions, as opposed to the Atlantic coastline, characterized by low relief, broad marine shelf, and extensive drainage basins and alluvial fans (Kellogg and Mohriak 2001 cit. in Barretto 2005). The Eastern part of the continent has outcrops of hard Precambrian rocks with a shallow cover of sedimentary rocks (Kellogg and Mohriak 2001 cit. in Barretto 2005, see intermediate darker area en Fig. 1). Most of South America's fluvial drainage flows out to the Caribbean or the Atlantic and away from the Andes, providing a world-class example of continent-scale drainage control by plate tectonics (Kellogg and Mohriak 2001 in Barreto 2005: 888). The high Andean mountain chain controls the circulation of humidity-bearing Pacific winds, creating patches of high ecological diversity (Morello 1984).
3. Three large river basins: Orinoco, Amazonas, and Paraná-Río de la Plata (Clapperton 1993, see Fig. 1).
4. A large arid and semiarid surface, the South American Arid Diagonal, going from the Equator to 54° S (Morello 1984).

Vegetation

Phytogeographically, we can define three main zones (Clapperton 1993):

1. East of Andes with tropical (Caatinga, Cerrado, transition forests and rainforests), subtropical (palm trees, parkland, and savanna, Pantanal in SW Brazil, see Fig. 1), and temperate vegetation (Pampas and Chaco grasslands and thorn forest, Patagonian steppe with dry resistant grasses and shrubs, see Fig. 1);
2. West of Andes (from North to South) with tropical rain forest, tropical desert (South Ecuador to Northern Chile), evergreen broadleaf forest (Central Chilean Valley), Valdivian

rain forest, deciduous forest, and Magellanic moorland in Southern Chile and Argentina.
3. Mountain vegetation with Páramo, Puna, Andean, and a subandean forest belt in the Southern Andes and Planalto (Brazilian Highlands with tropical and subtropical forest and grasslands see Fig. 1).

Paleoclimate

Given its high latitudinal position, South American Pleistocene continental glaciations occurred only in the Southern Andes (Clapperton 1993) and were milder and more restricted than in the Northern Hemisphere. Last Maximum Glacial (LGM) was reached at ca. 21,000 BP and the late glacial interval (LG) in the tropical Andes spans from the end of the LGM to 11,500 calendar years BP (Seltzer 2007). During LG there are several documented advances of glaciers, but their regional coherency has still to be determined. By the Early Holocene, glaciers had retreated to their modern limits in tropical Andes (Seltzer 2007). A thermally optimum climate is implied at most sites for the Middle Holocene centered around 8500–5500 BP, warmer and drier than at present (Clapperton 1993). As in the Northern Hemisphere, three Neoglacial advances have been modeled, but new research suggests additional events. Readvances were dated between 4700 and 4200 BP, 2700 and 2000 BP, and the last, corresponding to the Little Ice Age, between 1340 and ca. 1850 AD (see Clapperton 1993; Rabassa 2011). Some authors recognized the effects of the global warming event known as the Medieval Warm Epoch in South America and dated it between 1080 and 1250 AD (Villalba 1994; Fletcher and Moreno 2012; Bird et al. 2011). Also, after 5800 BP, with the return to Neoglacial conditions, El Niño Southern Oscillation (ENSO) was onset around 3200–2800 BP (Sandweiss et al. 2001).

Chronology

Peopling (c. 15,000–10,000 cal BP)

An intense debate exists regarding when and how South America was peopled. To date, linguistic, morphological, archaeological, and genetic evidence points to a pre-Clovis entry from Asia through the Bering land bridge, which connected Eastern Asia to North America during the last glaciation (Llamas et al. 2016). The Clovis first model, which posited Clovis people as the first settlers, has been questioned by the existence of pre-Clovis sites in South America as well as in North America (e.g., Paisley 5 Mile Point Caves, Schaefer and Hebior, Buttermilk Creek, Page-Ladson, etc.). But South American early sites are very different from what would be expected under the Paleo-Indian label (Scheinsohn 2003). Monte Verde II in Chile, the first fully accepted pre-Clovis site (sites still under scrutiny will be left aside for this review), has been dated at 14, 220 cal BP (or earlier see Dillehay et al. 2015) and presents a large number of artifacts, habitation structures, hearths, faunal remains, and plants (Dillehay et al. 2008) which clearly played an important role. In reference to this last resource, in the North of South America, some researchers support the idea that, during the Pleistocene, people created their own patches of resources in order to increase their effectiveness (Gnecco 2000; Politis 2002; Piperno and Stothert 2003). In any case, the importance of plants is recognized by the fact that ca. 10,000 BP intensive plant exploitation has begun in Central Andes and possibly in the eastern tropical lowlands (Dillehay 2008). Also, unlike North America, there are few South American sites with clear evidences of extinct megafauna exploitation (Dillehay 1999), and all those sites contain modern animal species which played a more important role. As Dillehay (1999) pointed out, as long as North American labels are applied, many South American Terminal Pleistocene sites present a diet more in line with an Archaic Period. In terms of the scant human skeletal evidence, they continue to point toward a relatively recent Asian origin (e.g., Schurr 2004; Pucciarelli et al. 2003). Genetic data suggest that early populations remained isolated for many generations in Beringia (in what it is called the Beringian Standstill model) or even in America, forming the basal Native American genetic lineages derived from Asian ancestors, which is in concordance with

paleoenvironmental evidence (Llamas et al. 2016). In any case, by 15,000 years ago (although this first entry could be extended to 25,000 years ago or more), humans began to settle North America and soon they entered to South America. Between 14,000 and 12,000 years ago, at the end of the last glacial advance, South American human populations were probably small and sparsely distributed (Dillehay 2008). They were mobile with large foraging territories (Dillehay 2008). These first foragers are well documented at Central Andes, Southern Patagonia, Pampas, Colombia, Perú, Chile, and eastern Brazil (Lavallée 2000; Dillehay 2000, 2008; Politis et al. 2016). But if first settlers migrated along the Pacific coast, some of the best evidence is probably underwater, along the former coastline, flooded by rising sea levels from the melting ice sheets. That effect would have been greatest in some regions of eastern South America, where the costal land is relatively flat and low lying, leading to drowning by postglacial eustatic sea level rise and thus hampering the discovery of sites of this age.

Maritime resources certainly played an important role at coastal Peru and Northern Chile during Late Pleistocene and Early Holocene transition since people at the Pacific coast were prepared to exploit the sea from the beginning (Dillehay 2008; Sandweiss and Richardson 2008). Another significant fact is that the most ancient rock art of South America, located in NW Argentina, North of Chile, Peru, and Brazil dates back to Late Pleistocene/Early Holocene transition (Tratebas et al. 2012).

Early Holocene (10,000–8,000 cal BP)

The onset of the Holocene saw a wide diversity of hunter-gatherer adaptations in South America. After 10,000 BP the archaeological signal becomes intense making it difficult to talk on a continental scale given the record richness (Scheinsohn 2003). Early sites have a wide variety of projectile points, which include such as El Jobo, Paiján, triangular, willow, and fishtail points (Gnecco 1990). Lanceolate El Jobo points show a limited distribution (Northern South America), but it should be added the lanceolate points recorded at Monte Verde, the Argentinean Northwest, and Northern Chile. In this case, although similar, convergence could be argued based on the generality of its design (Borrero 2001). *Cola de pescado* or fishtail (from the shape of the stem) points were widespread in Southern South America, between 11,600 and 10,200 BP, from Southern Patagonia to the Pampas and Central Chile. Since many present fluting, some have linked them with Clovis points, regardless of the differences in their morphology (Politis 1991) and reduction sequences suggesting separate origins (Nami 1996). Others researchers interpreted the dispersion of fishtail points as the result of functional effectiveness and a shared technology among different highly mobile populations, in which circulation of information played an important role (Aschero 2000). Projectile point typology apart, in Central and Southern Andes, Patagonia, Tierra del Fuego, and the Pampas, hunters relayed mostly in guanaco as a prey. The guanaco (*Lama guanicoe*) is one of the biggest herbivores in South America and was commonly available in various environments (Mengoni Goñalons 1999; Borrero 2001; Muñoz and Mondini 2008). Thus, in Pampas and Patagonia, after megafauna extinction, faunal diversity decreased, with an increase of guanaco exploitation.

Amazonian foragers are recorded in this moment (Roosvelt et al. 1996), in open contradiction with the traditional assertion that it was colonized later by groups dependent upon horticulture (see a critique of this position in Politis 2002). In the immediate lowlands and in the Central Andes, cultigens began to be recorded. Squashes are among the most ancient cultivates (around 10, 000 BP) at Las Vegas (Ecuador), San Isidro (Colombia), and Zaña Valley (Peru see Piperno 2011) followed by peanuts (*Arachis hypogaea*) and beans (*P. vulgaris*, *P. lunatus*). By 8800–7600 BP in the Zaña Valley (Peru), a significant number of dietary calories and nutrients came from crop plants (Piperno 2011). Early cultigens are also recorded in hunter-gatherer contexts (as in Huachichocana, in Northwestern Argentinean, Fernández Distel 1974).

Middle Holocene (8000–4000/3000 BP)

The increasing temperatures of Mid-Holocene had different effects in diverse areas. For instance,

in the Chilean Atacama Desert, a *silencio arqueológico* (archaeological silence) has been proposed (see Nuñez et al. 2002) for the period, meaning that between 8000 and 5500 BP, when aridity increased, a lack of human occupation is recorded. Some authors (e.g., Aschero 2000; Nuñez et al. 1999) maintain that this should not be attributed to the abandonment of the region but instead represent a retreat of human populations to strategic spots where resources were concentrated. Seasonal programming, transhumance with complementary use of resources in high and low areas, information flow through wide ranges, and symbolic systems followed (Aschero 2000; Nuñez et al. 2002). Eventually animal domestication started in the Andes between 6,000 and 4,000 years ago (Mengoni Goñalons 2008) with llamas and alpacas originating from guanaco and vicuña, respectively (Wheeler et al. 2006; Stahl 2008). Evidence suggests more than one simultaneous instances of domestication (in addition to the Peruvian central highlands).

At this time maritime coastal adaptations were also consolidating, and some of them would set the foundations for the later emergence of sedentarism (see below). Three main areas show these adaptations:

(a) Peru, Ecuador, and Northern Chile where marine hunter-gatherers were exploiting deep sea resources, at first with simple hooks made of shell and then with composite hooks, nets, and harpoons. The rich marine environment made fishes and mollusks available to humans living along the Pacific coast, which allowed the construction of villages and ceremonial centers during the climatic change that took place between 8000 and 5000 BP (Leon 2015). Literature suggests that these resources allowed the development of complexity in the Andean coast (Moseley 1975), as seen in the Complejo Chinchorro (Northern Chile, Arriaza 2003, see below) and Las Vegas and Nanchoc (Peru, Dillehay 2000).
(b) The Brazilian Atlantic Coast: *sambaquí* (shell mounds that proliferated from 6500 BP to 1000 BP) sites are conspicuous, and they could rise up to 30 m. These mounds were built by complex hunter-gatherers. Many were interpreted as burial structures, but others were semi- or permanently residential (De Blasis et al. 1998).
(c) Southern South America: According to Orquera and Piana (1999), specialized gatherers and fishers existed from 6000 BP at many sites of the Magellan and Fuegian channels (southern tip of Patagonia, etc.). Their main staples were pinnipeds. A main feature characteristic of this kind of adaptation was the abundance of bone tools (Scheinsohn 2010).

Also, occasional maritime faunal exploitation in the Middle Holocene has been argued for hunter-gatherers at the Southern Atlantic Pampean coast from the exceptional site of La Olla (Bayón and Politis 2014). Sporadically exposed in the intertidal zone of the present beach, it has been dated between 7,400 and 6,480 years BP. The site served as a place for the processing and consumption of pinnipeds and was accompanied by wood tools, which are exceptional in the region, as well as bone tools, stone tools, and bone and plant remains (Bayon and Politis 2014).

Apart of marine exploitation, terrestrial hunters, especially those living in the Andes and Patagonia, continued to focus on camelids, particularly, guanaco (*Lama guanicoe*). Coevolutionary relationships developed between humans and camelids, first as wild prey (see L'Heureux 2002) and eventually as domesticated (llama) in the Andean region (see below). Also, a great variety of new artifact designs emerged as plant-processing tools and bola stones, which were found in many grassland sites (Scheinsohn 2003).

Finally the emergence of complex mortuary behavior is recorded in the whole continent, in contrast with the scarcity of human burials in Late Pleistocene times. Climax was reached with artificial mummification in Complejo Chinchorro (Northern Chile), starting around 7000 BP. Individuals of all ages and genders were defleshed, butchered, eviscerated, dried, and then reconstructed, stuffed with animal and plant fibers, and body parts were modeled with clay forming a complex funerary bundle (Arriaza 2003) that were accompanied by abundant offerings such as

textiles, mats, and feather bundles. These funerary bundles are also recorded in Northern Argentina (e.g., Incacueva see Aguerre et al. 1973 and Huachichocana see Fernández Distel 1974) albeit without artificial mummification.

Late Holocene (4000/3000 BP to Present)

As from the Middle Holocene onward, humans in South America had acquired varying degrees of sedentarism, had developed complex hunter-gatherer societies, and had given way to a new lifestyle based on food production which, in some cases, leads to the development of chiefdoms and states (Scheinsohn 2003). South America was not solely a hunter-gatherer continent any longer: there were exchanges with different kinds of neighbors as well as oscillations between foraging and production, symbiosis, and dependence (Scheinsohn 2003).

In South America, as in other parts of the world, post-Pleistocene environmental changes were influential for the development of food production. For instance, the confluence of humans and animals at certain favorable points or ecorefugia (an idea probably related with Gordon Childe's model, see Childe 1928) during the arid interval, which caused the *silencio arqueológico* in certains spots of the Puna (Andean highlands), in others could lead to a logistic strategy, which in turn stimulated animal domestication, as was registered in Puripica 1 and other Northern Chile sites (Nuñez et al. 1999). However, environmental factors will not lead all human populations into food production necessarily.

In hunter-gatherer territories, increased density of sites and intensification of resources exploitation characterize this period (Scheinsohn 2003). In Patagonia, people were irregularly distributed (some sites are constantly reoccupied, e.g., Cerro de los Indios I, Figuerero Torres 2000) not only along rivers and lakes but also in lowlands, exploiting the highlands and forests. Few places remained empty. Also wide exchange networks are verified. For instance, obsidian sourcing of artifacts from hunter-gatherer contexts in Patagonia shows sourcing from 200 and exceptionally up to 800 km away (e.g., Stern et al. 2000). Also, in one burial site from Rawson (Patagonian Atlantic coast), dating back to the Spanish arrival in this area, a bronze ax similar to those produced in Northwestern Argentina was found, about 2000 km away of its origin (Gómez Otero and Dahinten 1997–1998). Networks and denser sites were evidencing social and cultural complexity (Dillehay 2000). One manifestation of this complexity was the presence of earthworks in Amazonia, Venezuela Llanos, Upper Magdalena River, Sierras de Tairona, and southern Cerritos (SE Brazil and E Uruguay) which allowed to postulate chiefdom emergence in some of these places (Politis 2002).

Food Production

Pearsall (2008) argues that plant domestication is a result of prolonged forager-plant interactions. There are three thresholds of domestication and agriculture in the Andes. At first, in the Early Holocene, there were frequent and dispersed plant domestications. Then, early domesticates spread, through social interactions among forager/horticulturalists. Cultivation in that context was small scale. Finally increasingly productive crops fueled population growth, which led to the spread of societies into dependence on agriculture and farming (Pearsall 2008). As mentioned above, cultigens were developed since Early Holocene/Middle Holocene, but by 4500 BP, they were widespread. Anyway, it is impossible to indicate in South America a single center or core area of agriculture. The origins of crops are spread from the northern parts to the southern parts of the continent, west and east of the Andes (Piperno 2011).

Probably camelid pastoralism developed to deal with the environmental unpredictability that characterized Andean highlands (Puna) starting from specialized hunting of wild camelids (see above) followed by a period of herding management 5,000–3,500 years ago and the introduction of domestic camelids as early as 4,500 years ago (Lavallée et al. 1986; Yacobaccio 2007; Marshall and Capriles 2015). Pastoralism was complemented with other strategies such as fishing, cultivating, and hunting. Wild camelids were always present, so hunting and production practices complemented each other (Yacobaccio et al. 1994). Llama domestication contributed meat and transport, while

alpacas provided fine wool. Anyway it is important to take into account that it is quite difficult for zooarchaeologists to sort wild from domestic camelids given the size overlap (Stahl 2008).

In addition to these two camelids, the domesticated animals of South America include only one large bird (Muscovy duck, *Cairina moschata*, although it is unclear if it was domesticated in Mexico or South America) and a medium-sized rodent, the guinea pig (*Cavia porcellus*, Stahl 2008).

Central Andes Complexity

In South America, food production (agriculture, camelid domestication) and marine resources allowed the development of sedentism and hence of more complex entities. In Andes, three moments of fusion of many regional cultures (called the pan-Andean Horizons) alternated with moments of dispersion (Leon 2015, among others).

Some 3,500 years ago, Chavín de Huantar site, in the Central Highlands of Perú, was established as the center of the first pan-Andean Horizon, influencing sites more than 500 km away from it (Leon 2015). Around the beginning of the CE, Chavín's dominance dwindles and a series of regional cultures, both on the coast and highlands, developed. These cultures (Vicus, Mochica, Nasca, Recuay) achieved great expertise in pottery, textiles, and metallurgy (Leon 2015). A new horizon the Middle Horizon, or Huari/Wari, developed between CE 600 and 1000 which has interacted with Tiahuanaco/Tiawanaku in Bolivia (so it is called Tiawanaku-Wari Horizon, 400–1000 AD). They developed a complex road system and constructed cities with administrative centers, public buildings, fortifications, temples, etc. Llama caravans allowed a huge goods exchange in the Andes. This period was followed by another fission time with Chimú ruling the Northern Coast of Peru and Huanca ruling in Central Peru (Leon 2015).

The third pan-Andean Horizon was generated by the expansion of the Inca State (1470–1536 AD). The origins of the Inca date back to at least the fourteenth century CE. The Incas and a few of their neighbors focused on surplus production, constructing new irrigation canals and agricultural terraces to cultivate maize and other crops. Inca society eventually grew to be larger and more hierarchical than its neighbors, and its leaders began to establish ties to groups across the Cuzco region, relationships turning the city of Cuzco into a ceremonial center (Leon 2015). Spreading out from Cuzco, their empire extended along the Cordillera de los Andes from present-day Colombia to Middle Chile and Argentina. They conquered peoples by force but also establishing alliances. In any case, Incas profited economically and consolidated as Andean heritage, what John Murra's model has called the "vertical control of different ecological floors" (Murra 1972). The model demonstrates that the Andean ideal of self-sufficiency limited commercial exchanges, which were replaced by obtaining the different resources that each natural environment allowed to exploit. It was an internal exchange within the community, governed by the practices of reciprocity among their members and of redistribution between the chief or curaca and their subjects. Although the model has undergone variations, it is considered a reference for understanding Andean populations. Also, for the reconstruction of Andean history, it is important to mention the work of many Peruvian etnohistorians as Rostworowski (1988) or Millones (1987).

European Conquest

The study of arrival of Europeans in the Americas has been covered archaeologically by the development of historical archaeology (Paterson 2015). Churches, convents, and monasteries have probably been excavated more than any other type of site (Van Buren 2015). Other aspects researched have been early urbanism, frontier expansion, the organization of extractive industries, dietary change, the reconfiguration of rural landscapes, and the local implementation of Spanish colonial policy. More recently the organization of silver mining, the reconfiguration of rural landscapes, the impact of Western goods on indigenous practices, and the interaction with haciendas or large agricultural estates and catholic missions were studied (Van Buren 2015).

Crosby (2003) described the exchange of diseases, ideas, food crops, and populations between the New World and the Old World, following the

voyage to the Americas by Christopher Columbus in 1492, as "The Columbian Exchange." The Old World gained new supplies of metals, new staple crops (such as potatoes, sweet potatoes, maize), and other vegetables (as tomatoes, chili peppers, cacao, peanuts, pineapples, tobacco, etc.). The exchange also produced losses. European contact enabled the transmission of diseases (as smallpox, measles, typhus, and cholera) to previously isolated American communities, which caused devastation. On their return home, European brought syphilis. The effects of the Columbian Exchange were not limited to the parts of the world directly participating in the exchange (Europe and the Americas). It also had large impacts on Africa and Asia. For instance, the cultivation of crops in the Americas, along with the devastation of native populations from disease, resulted in a demand for labor that was met with African population's slavery, during the sixteenth to nineteenth centuries (Nunn and Quian 2010).

European expansion, especially from sixteenth century on, affected South America differently, depending on resources available and the socioeconomic complexity achieved in the different regions. For instance, as a new way to interpret Spanish conquest in the Central Andes, Lamana (2008), based on the study of written documents, considered that during the period between 1530 and 1550, Spanish domination did not manage to exert an effective control on the peoples conquered. Social actors measured their respective forces not only in the military field but in the symbolic one, which produced a mutual exchange of knowledge and learning while exploiting the advantages and weaknesses of the other. He considered that Inca agency was as important as the Spanish agency concluding that it was not a situation of complete asymmetry but of competing regimes of visibility and feasibility (Lamana 2008). For the specific case of Northwestern Argentina, Quiroga (2010) explored how colonial power was felt by the aboriginal population in Catamarca, Argentina, departing from written documents but also from archaeological evidence. Although the establishment of a colonial order exerted physical violence, the conflict over the power of representation was not minor, given that colonial rule had to construct, justify, and reproduce asymmetries. Struggles to generate and reproduce a colonial society put into play practices, actors, representations, and categories built also from the material culture. From this standpoint Quiroga (2010) reconstructed the role of the highlands since they were important in Andean economy because key resources were located there, but for the Spanish rulers, highland exploitation could acquire the meaning of questioning the local colonial power. The native people's ascent to the hills and the refusal to "go down" to the valleys to comply with the services demanded by the *encomenderos* at the beginning of the agricultural cycle was interpreted as an unequivocal form of resistance to the dominion (Quiroga 2010). She studied archaeologically the material consequences of this behavior.

As this occurred in the Central Andes, in hunter-gatherers territories, before direct domination occurred, European presence was felt as a scarcity of traditional prey (as in the southern tip of South America owing to European whaling and pinniped overexploitation, see Orquera and Piana 1999) and the appearance of new prey (European cattle). For instance, Spanish settlers in the Pampas did not thrive at the beginning of their colonization (sixteenth century), given their hostile relationship with local communities, and they returned home, abandoning their cattle to become *cimarrón* (wild). By the end of that century, wild cattle became so widespread that native populations, and later new Spanish settlers, adopted them as their main staple, hunting them intensively in what were called *vaquerías* (Scheinsohn 2003). Between the eighteenth and nineteenth centuries, when this wild cattle population began to dwindle, native populations took their prey from the estancias (ranches) by means of *malones* (Indian raids). They traded in what is now Chile, to acquire new products. The archaeological signal of this trade circuit was found by Goñi (1986–1987) in Malleo River Valley (Neuquén Province, Northern Patagonia, Argentina). Among the European cattle, which were quickly incorporated by native populations, the horse was critical. What North American

anthropologists called "horse complex" also appeared in South America, owing to the introduction of European habits related to the horse, coupled with the development of horse-related new inventions (Scheinsohn 2003). Because horses require special care (e.g., constant access to grasslands and water), according to Goñi, human population home ranges increased, in what Binford has called extensification (Binford 2001), meaning an intense use of wide home ranges out from more permanent settlements. Thus, while home ranges were widening, a certain degree of sedentarism was developing (Goñi 2000).

After independence from Spain, at the beginning of the nineteenth century, when South American national states conformed, the picture did not change very much for the South American Indians. In the second half of the nineteenth century, the now consolidated States extended their control over their national territories and sought to define international borders. In many cases this meant taking control of indigenous territories. Forceful methods were deployed and an escalation of violence ensued. As an extreme case, Argentine national government launched the *Conquista del Desierto* in a 1879 military campaign that set out to dispose Indian territory in Patagonia and turn the "desert" into "productive" lands by the hard work of the "civilized" white colonists. This plan led to what can now be termed a genocide (Delrío et al. 2010) of the indigenous communities in Patagonia and was carried out in three stages (Pérez 2016): (1) the discursive "manufacture" of the internal "other" that portrayed Indians as a "savage" and materialized in Indian deportations and/or distributions as rural or domestic workers in any part of the country where needed, in slave-like conditions; (2) a stage that could be now considered as state terrorism, materialized in concentration camps for Indians (as in Valcheta, Rio Negro), constant persecutions, and land dispossession; and (3) a final stage of silencing and invisibilization of the Indians (for the invisibilization concept see also Lazzari 2003, among others). The process of invisibility was so strong that even the notion of *mestizaje*, so central to other national discourses in South America such as in Peru and Brazil (Ramos 1998; De la Cadena 2000), was absent in Argentina (Quijada 2004). Along this process, the Argentinean state oscillated between to fix the Indians to a certain territory, in order to control them (as in farm colonies) and deterritorialization. The lands taken to the Indians were given to few powerful landowners and large commercial enterprises. Indians that survived the genocide were converted into proletarians or persecuted as well as invisibilized.

Contemporary Past

Scholars have researched also a variety of sites dating to the nineteenth and twentieth century which allowed to approach the most recent past from an archaeological point of view (e.g., Buchli and Gavin 2001). Among the most productive fields it should be mentioned:

1. Subacuatic archaeology, which emerged as a specialty in the mid-1990s, somewhat later than in other parts of the world, mainly in Brazil, Argentina, Chile, Colombia, and Uruguay (Elkin 2011), but with a high level of productivity and quality. As present, there remain vast areas of South America lacking underwater research and/or with an underdeveloped field of conservation of waterlogged materials (Elkin 2011).
2. Urban and industrial capitalism archaeology: as urban archaeology is widely developed, industrial archaeology has less examples, such as Therrien's (2007 cit. in Van Buren 2015) research on a nineteenth-century Colombian ceramic factory that was established shortly after the national independence and Vilches (2011 cit. in Van Buren 2015) study of the nitrate mining town of Chacabuco (Chile) which was abandoned in 1938 only to be reoccupied as an internment camp during Pinochet's dictatorship.
3. Battlefield archaeology as well as the study of military fortifications (related with Indian conflicts in Pampa and Patagonia, see above Goñi and Madrid 1996, and/or colonial and national forces conflicts, see Albuquerque 1995 and Ramos et al. 2011 both cit. in Landa 2013) is

another field which, recently, has been strongly developed.

4. Forensic archaeology and anthropology: although initiated in Argentina, related with its special circumstances, forensic anthropology and archaeology soon were developed in other parts of South America and Latin America. The fall of the Argentine military dictatorship (1976–1983) and the advent of a democratic government opened the way to investigate what had happened to the victims of enforced disappearance during the military regime. The Argentinean dictatorship has implemented a system to persecute their political opponents and make them "disappear." This included kidnappings, setting up clandestine detention centers, torture, and finally murder. Many bodies of those murdered were buried without identification as "NN" (no name, equivalent to unknown or the American John/Jane Doe) either in individual or in mass graves all over the country (Fondebrider and Scheinsohn 2015). When the democratic government started the investigation of these crimes, the lack of personnel trained in recovering skeletal remains at the forensic departments caused a major catastrophe: remains were only partially recovered, the bones suffered postmortem damage, and relevant associated objects such as bullets were not retrieved or even discarded. The Abuelas de Plaza de Mayo (Grandmothers of the Plaza de Mayo), an organization made up of relatives of victims who disappeared during the dictatorship, started asking for help to solve the issue. They contacted the Association for the Advancement of Science (AAAS) in 1984 which sent a delegation of forensic scientists to Argentina to attempt the recovery of their grandchildren kidnapped and to implement an exhumation method which prevented the destruction of evidence (Fondebrider and Scheinsohn 2015). This later mission was the duty of the American forensic anthropologist Dr. Clyde C. Snow, member of the delegation. While in Argentina, Dr. Snow asked for help with a first exhumation to professional associations, but possibly afraid of the uncertain political context, they were rather reluctant. So Dr. Snow resorted to undergraduate anthropology students from the National University of Buenos Aires and the National University of La Plata. The first exhumation using archaeological techniques was carried out in an individual grave located at the Boulogne cemetery, province of Buenos Aires, in June 1984. The group of students who participated in this first exhumation became the core of what would be the Equipo Argentino de Antropología Forense (EAAF – Argentinean Forensic Anthropology Team). Since 1986, the original team of medicine, archaeology, and anthropology students has grown and currently comprises 60 persons, specialist of many different disciplines. The Argentine experience was taken to Chile, Guatemala, Peru, and Uruguay where groups of young archaeologist and anthropologists had decided to create independent organizations. Colombia, Venezuela, and México already had anthropologists working for the state (Fondebrider and Scheinsohn 2015). In 2003, these regional developments converged with the creation of the Asociación de Antropología Forense de América Latina – ALAF (Latin American Forensic Anthropology Association) which, since 2004, has organized an annual international congress in a Latin American country and implemented a certification program. Also forensic archaeology related with the excavation and reconstruction of local clandestine detention centers during the military dictatorship as in Pozo de Vargas (Tucumán Province, Argentina) Club Atlético (Buenos Aires City, Argentina) and Mansión Seré (outskirts of Buenos Aires city, Argentina). Some of these facilities, usually abandoned after being under police or military control, apart from been judicialized began to serve as sites for memory and reflection. A survey conducted by Salerno et al. (2012) identified more than 20 archaeological interventions in former clandestine prisons in Argentina. Archaeological interventions in former clandestine detention centers were also recorded in Chile and Uruguay.

5. Applied archaeology or studies where the past helps in the understanding and planning of the present. In South America, zooarchaeology is a well-developed line of archaeological research. But Ramos Roca's (2014) work in the Caribbean region of Colombia is an example of the study of the cultural manifestations related to the consumption of wild animals and how this can have an impact on their conservation. Consumption of certain "amphibian" species, understood as those species that move between land and water and not as a taxonomical category, are the same that are recorded in archaeological sites revealing 3,000 years of use. Based on the study of written sources, zooarchaeological analyses and ethnological work with the indigenous communities, recovering information about traditional foods associated with the use of wild animals (patterns of consumption, preparation techniques, etc.), Ramos Roca (2014) established that any proposal for sustainable use and its conservation must seek to respond, in a harmonious way, both the need to recover viable populations of wild species and the deep-rooted tradition of consumption of those animals during Holy Week. For instance, defining hunting quotas, which additionally could include a minimum allowable size for the capture and sale of individuals, would be more effective than ban the species' hunting.

Final Words

Important theoretical works and astounding research projects are being implemented. Diversity is a key word to understand South American archaeology. This far from complete summary has unfairly left out many regions and fields of research. But while much was done, much remains to be done. For instance, it is necessary that South American archaeologist begins to speak the same "language" among them and overcome the barriers that the existence of different countries had established among us. Those barriers, although bluntly real in the present, made no sense studying in the past.

Funding is needed for research, but also it is necessary that research results were available and consulted by policy-making institutions. It is necessary that these institutions understand the importance of archaeology for defining policies for heritage management but also for historical and contemporary issues, especially those related with Native South Americans. And related with this last but not the least issue, Indigenous rights should be mentioned. As said above, the dispossession of Indigenous communities implied the land but also their cultural heritage. As the Endere's (2014) recent review stated, at the beginning of the twentieth century, several South American countries have passed archaeological heritage laws in order to set up the public domain over archaeological sites. In the second half of that same century, international legislation favored the process of indigenous rights recognition, since most South American countries subscribed to them. Endere (2014) posited that the onset of democratic governments in the region in the 1980s shaped a new political setting for indigenous people's claims. Hence, over the past decade, indigenous people's rights are increasingly being incorporated into legal systems. Most of South American constitutions (Argentina, Bolivia, Brazil, Colombia, Ecuador, Paraguay, Peru, and Venezuela) made a wide recognition of indigenous rights. However, indigenous cultural heritage continues to be ruled by specific archaeological heritage laws that do not include the participation of these peoples in their management. However focused on land claims and their well-being, indigenous peoples have recently increased their claims on heritage issues, particularly in restitution of human remains held by museums. The first two restitutions carried out in Argentina – the Tehuelche Chief Inakayal in 1994 and the Rankulche Chief Mariano Rosas in 2001 – were ordered by special laws, since their remains were legally considered public domain of the nation-state (although after that Argentina passed a general law that recognizes the right of communities to claim the repatriation of human remains held in museums, Endere 2014). Also Uruguay

obtained the repatriation of the Charrúa Chief Vaimaca Pirú from the Musée de l'Homme of Paris, France, and in Chile, demands concerning indigenous human remains have also been raised by Atacameño, Mapuche, and Easter Island peoples. In parallel, Argentina have been voluntarily restituted human remains to indigenous communities of other countries: the Ethnographic Museum Juan B Ambrosetti of the University of Buenos Aires returned a preserved Maori tattooed head to Te Papa Museum in 2004, and the La Plata Museum handed in the remains of two individuals to the Aché community of Paraguay in 2010 (Endere 2014). Also South American countries repatriated archaeological artifacts to other South American countries as was the unprecedented case, given the quantity of materials implied, returned to Perú, Bolivia, Ecuador, and México by the Argentinean Instituto Nacional de Antropología y Pensamiento Latinoamericano (INAPL). In this context, as Endere (2014) pointed out, the update of most cultural heritage laws and policies, the construction of dialogue, and the development of a collaborative archaeology with indigenous communities are the major challenges.

In terms of heritage protection, although some South American countries have developed tools for it, corruption and capitalism are still sources of conflict. Sometimes, the state is the first in infringe heritage laws, doing earthworks without previous archaeological impact studies. In Buenos Aires city, one of the biggest cities of the world, ancient buildings are tore down every day due to real estate speculation infringing the regulations. For constructors, paying fines is cheaper than complying with the law. And there is no hint of interest of the local and national government to endorse the compliance with the law. Heritage is used and abused by tourism companies everywhere (e.g., Macchu Pichu). Archaeologists, architects, and museologists are not considered necessary for these developments. The inevitable result will be the damage and eventually the disappearance of that heritage. The most flagrant example, in a continental scale, is the destruction provoked by Dakar Rally.

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Andes: Origins and Development of Agriculture
- ▶ Andes: Prehistoric Period
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Argentina: Maritime Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Capsicums/Chiles: Origins and Development
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Clovis and Folsom, Indigenous Occupation Prior to
- ▶ Confinement and Detention in Political and Social Archaeology
- ▶ Contemporary Past, Archaeology of the
- ▶ Cueva de las Manos, Río Pinturas Cave Art
- ▶ Early Complex Society in South America, The Development of
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Guinea Pig: Domestication
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Inca State and Empire Formation
- ▶ Jewish People in Mexico and South America, Archaeology of
- ▶ Latin American Social Archaeology
- ▶ Machu Picchu: Geography and Culture
- ▶ Maize: Origins and Development
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- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Nasca and Pampa Jumana Lines and Geoglyphs
- ▶ Paleoindians
- ▶ Peopling of the Americas
- ▶ Sambaquis Shell Mounds, Archaeology of
- ▶ Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia
- ▶ Shell Middens and Coastal Archaeology in Southern South America
- ▶ South America: Lithic Industries

▶ South American Archaeology: Postcolonial Perspectives
▶ South American Rock Art
▶ Tupi-Guarani Archaeology in Brazil

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References

Aguerre, A., A. Fernández Distel, and C. Aschero. 1973. Hallazgo de un sitio acerámico en la Quebrada de Inca Cueva (Provincia de Jujuy). *Relaciones de la Sociedad Argentina de Antropología* 7: 197–235.

Arriaza, B. 2003. *Cultura Chinchorro: Las Momias más Antiguas del Mundo*. Santiago: Editorial Universitaria.

Aschero, C. 2000. El poblamiento del territorio. In *Los Pueblos Originarios y la Conquista, Nueva Historia Argentina*, ed. M. Tarragó, vol. I, 17–60. Buenos Aires: Sudamericana.

Barreto, A. 2005. South America, coastal ecology. In *Encyclopedia of coastal science*, ed. M. Schwartz, 888. New York: Springer.

Bayon, C., and G. Politis. 2014. The inter-tidal zone site of La Olla: Early–middle Holocene human adaptation on the Pampean coast of Argentina. In *Prehistoric archaeology on the continental shelf*, ed. A. Evans, J. Flatman, and N. Flemming, 115–130. New York: Springer.

Binford, L.R. 2001. *Constructing frames of reference. An analytical method for archaeological theory building using ethnographic and environmental data sets*. Berkley: University of California Press.

Bird, B., M. Abbott, M. Vuille, D. Rodbell, N. Stansell, and M. Rosenmeier. 2011. A 2,300-year-long annually resolved record of the South American summer monsoon from the Peruvian Andes. *Proceedings of the National Academy of Science* 108: 8583–8588.

Borrero, L.A. 2001. *El Poblamiento de la Patagonia. Toldos, Milodones y Volcanes*. Buenos Aires: Emecé.

Buchli, V., and L. Gavin. 2001. *Archaeologies of the contemporary past*. London: Routledge.

Childe, V. Gordon. 1928. *The most ancient near east : The oriental prelude to European prehistory*. London: Kegan Paul.

Clapperton, C.M. 1993. *The quaternary geology and geomorphology of South America*. Amsterdam: Elsevier.

Crosby, A.W. 2003. *The Columbian exchange: Biological and cultural consequences of 1492*. Westport: Praeger Publishers.

De Blasis, P., S. Fish, M. Gaspar, and P. Fish. 1998. Some references for the discussion of complexity among the Sambaqui mound-builders from the southern shores of Brazil. *Revista de Arqueología Americana* 15: 75–106.

De La Cadena, M. 2000. *Indigenous mestizos: The politics of race and culture in Peru*. Durham: Duke University Press.

Delrío, W., D. Lenton, M. Musante, M. Nagy, A. Papazián, and P. Pérez. 2010. Discussing indigenous genocide in Argentina: Past, present, and consequences of Argentinean state policies toward native peoples. *Genocide Studies and Prevention* 5: 138–159.

Dillehay, T.D. 1999. The Late Pleistocene cultures of South America. *Evolutionary Anthropology* 7: 206–216.

Dillehay, T.D. 2000. *The settlement of the Americas*. New York: Basic Books.

Dillehay, T.D. 2008. Profiles in Pleistocene history. In *The handbook of South American archaeology*, ed. H. Silverman and W. Isbell. New York: Springer.

Dillehay, T.D., C. Ramírez, M. Pino, M.B. Collins, J. Rossen, and J.D. Pino-Navarro. 2008. Monte Verde: Seaweed, food, medicine, and the peopling of South America. *Science* 320 (5877): 784–786.

Dillehay, T.D., C. Ocampo, J. Saavedra, A.O. Sawakuchi, R.M. Vega, M. Pino, M. Collins, L. Scott Cummings, I. Arregui, X. Villagran, G. Hartmann, M. Mella, A. González, and G. Dix. 2015. New archaeological evidence for an early human presence at Monte Verde, Chile. *PLoS One* 10 (11): e0141923.

Elkin, D. 2011. Shipwreck archaeology in South America. In *Oxford handbook of maritime archaeology*, ed. B. Ford, A. Catsambis, and D. Hamilton, 685–707. New York: Oxford University Press.

Endere, M.L. 2014. Archaeological heritage legislation and indigenous rights in Latin America: Trends and challenges. *International Journal of Cultural Property* 21: 319–330.

Fernández Distel, A. 1974. Excavaciones arqueológicas en la cueva de Huachichocana, Departamento de Tumbaya, Provincia De Jujuy, Argentina. *Relaciones de la Sociedad Argentina de Antropología* 8: 101–127.

Figuerero Torres, M.J. 2000. Tendencias en el uso del espacio en Cerro de los Indios 1. *Arqueología* 10: 203–214.

Fletcher, M., and P. Moreno. 2012. Vegetation, climate and fire regime changes in the Andean region of southern Chile (38°S) covaried with centennial-scale climate anomalies in the tropical Pacific over the last 1500 years. *Quaternary Science Reviews* 46: 46–56.

Fondebrider, L., and V. Scheinsohn. 2015. Forensic archaeology. The Argentinian way. In *Forensic archaeology: A global perspective*, ed. M. Groen, N. Marquez-Grant, and R. Janaway, 369–377. London: Wiley-Blackwell.

Gnecco, C. 1990. El paradigma Paleoindio en Suramérica. *Revista de Antropología y Arqueología* 6: 35–78.

Gnecco, C. 2000. *Ocupación Temprana de Bosques Tropicales de Montaña*. Popayán: Universidad del Cauca.

Goldberg, A., A.M. Mychajliw, and E.A. Hadly. 2016. Post-invasion demography of prehistoric humans in South America. *Nature* 532: 232–235.

Gómez Otero, J., and S. Dahinten. 1997–1998. Costumbres funerarias y esqueletos humanos: variabilidad y poblamiento en la costa nordeste de la Provincia de Chubut (Patagonia Argentina). *Relaciones de la Sociedad Argentina de Antropología* 22–23: 101–124.

Goñi, R. 1986–1987. Arqueología de sitios tardíos en el Valle del río Malleo, Provincia del Neuquén. *Relaciones de la Sociedad Argentina de Antropología* 17(1): 37–66.

Goñi, R. 2000. Arqueología de momentos históricos fuera de los centros de conquista y colonización: un análisis de caso en el sur de la Patagonia. In *Desde el País de los Gigantes. Perspectivas Arqueológicas en Patagonia*, ed. J.B. Belardi, F. Carballo Marina, and S. Espinosa, 283–296. Río Gallegos: Universidad Nacional de la Patagonia Austral.

Goñi, R., and P. Madrid. 1996. Arqueología sin hornear: sitios arqueológicos históricos y el fuerte Blanca Grande. *Intersecciones en Antropología* 2: 39–50.

L'Heureux, G. 2002. *Estudio arqueológico del proceso coevolutivo entre las poblaciones humanas y las poblaciones de guanacos en Magallania (Patagonia Meridional y Norte de Tierra del Fuego)*. Presented at XIV Congreso Nacional de Arqueología Argentina, Rosario.

Lamana, G. 2008. *Domination without dominance. Inca-Spanish encounters in early colonial Peru*. Durham: Duke University Press.

Landa, C. 2013. Arqueología de campos de batalla: solo un comienzo. *Arqueología* 19 (2): 265–286.

Lavallée, D. 2000. *The first South Americans*. Salt Lake City: University of Utah Press.

Lavallée, D., M. Julien, J.C. Wheeler, and C. Karlin. 1986. *Telarmachay chasseurs et pasteurs préhistoriques des Andes I. Editions Recherches sur les Civilisations*. Paris: ADPF.

Lazzari, A. 2003. Aboriginal recognition, freedom, and phantoms: The vanishing of the Ranquel and the return of the Rankülche in La Pampa. *Journal of Latin American Anthropology* 8 (3): 59–83.

Leon, E. 2015. Andes: Prehistoric period. In *Encyclopedia of global archaeology*, ed. C. Smith, 230–234. Cham: Springer.

Llamas, B., L. Fehren-Schmitz, G. Valverde, J. Soubrier, S. Mallick, N. Rohland, S. Nordenfelt, C. Valdiosera, S.M. Richards, L. Rohrlach, M.I. Romero, I.F. Espinoza, E. Cagigao, L.W. Jiménez, K. Makowski, I. Reyna, J.M. Lory, J.A. Torrez, M.-A. Rivera, R.L. Burger, M.C. Ceruti, J. Reinhard, R.S. Wells, G. Politis, C.M. Santoro, V.G. Standen, C. Smith, D. Reich, S. Ho, A. Cooper, and W. Haak. 2016. Ancient mitochondrial DNA provides high-resolution time scale of the peopling of the Americas. *Science Advances* 2 (4): e1501385.

Marshall, F., and J. Capriles. 2015. Animal domestication and pastoralism: Socio-environmental contexts. In *Encyclopedia of global archaeology*, ed. C. Smith, 249–258. Cham: Springer.

Mengoni Goñalons, G.L.M. 1999. *Cazadores de guanacos de la estepa patagónica*. Buenos Aires: Sociedad Argentina de Antropología.

Mengoni Goñalons, G.L. 2008. Camelids in ancient Andean societies: A review of the zooarchaeological evidence. *Quaternary International* 185: 59–68.

Millones, L. 1987. *Historia y poder en los Andes centrales (desde los orígenes al siglo XVII)*. Madrid: Alianza.

Moore, J.D. 2014. *A prehistory of South America: Ancient cultural diversity on the least known continent*. Boulder: University Press of Colorado.

Morello, J. 1984. *Perfil Ecológico de Sudamérica. Características Estructurales de Sudamérica y su Relación con Espacios Semejantes del Planeta*. Barcelona: ICI–Ediciones Cultura Hispánica.

Moseley, M. 1975. *The maritime foundations of Andean civilization*. Menlo Park: Cummings.

Muñoz, A.S., and M. Mondini. 2008. Long term human/animal interactions and their implications for hunter-gatherer archaeology in South America. In *Time and change: Archaeological and anthropological perspectives on the long term*, ed. D. Papagianni, R. Layton, and H. Maschner, 55–71. Oxford: Oxbow Books.

Murra, J. 1972. *El "control vertical" de un máximo de pisos ecológicos en la economía de las sociedades andinas*. Huánuco: Universidad Hermilio Valdiz.

Nami, H.G. 1996. Investigaciones actualísticas para discutir aspectos técnicos de los cazadores-recolectores del tardiglacial: el problema Clovis-cueva Fell. *Anales del Instituto de la Patagonia* 25: 151–186.

Nuñez, L., M. Grosjean, and I. Cartajena. 1999. Un ecorefugio oportunístico en la Puna de Atacama durante eventos áridos del Holoceno Medio. *Estudios Atacameños* 17: 125–174.

Nuñez, L., M. Grosjean, and I. Cartajena. 2002. Human occupations and climate change in the Puna de Atacama, Chile. *Science* 298: 821–824.

Nunn, N., and N. Quian. 2010. The Columbian exchange: A history of disease, food, and ideas. *Journal of Economic Perspectives* 24 (2): 163–188.

Orquera, L.A., and E.L. Piana. 1999. *Arqueología de la Región del Canal Beagle (Tierra del Fuego, República Argentina)*. Buenos Aires: Sociedad Argentina de Antropología.

Paterson, A. 2015. Colonial encounters, archaeology of. In *Encyclopedia of global archaeology*, ed. C. Smith, 1556–1562. Cham: Springer.

Pearsall, D.M. 2008. Plant domestication and the shift to agriculture in the Andes. In *The handbook of South American archaeology*, ed. H. Silverman and W. Isbell, 105–120. New York: Springer.

Peregrine, P., and M. Ember. 2001. *Encyclopedia of prehistory. volume 7: South America*. New York: Kluwer/Plenum Publishers.

Pérez, P. 2016. *Archivos del Silencio. Estado, Indígenas y Violencia en Patagonia Central 1878–1941*. Buenos Aires: Prometeo Libros.

Piperno, D. 2011. The origins of plant cultivation and domestication in the new world tropics: Patterns, process, and new developments. *Current Anthropology* 52 (S4): S453–S470.

Piperno, D., and K. Stothert. 2003. Phytolith evidence for early Holocene Cucurbita domestication in southwest Ecuador. *Science* 299: 1054–1057.

Politis, G. 1991. Fishtail projectile points in the southern cone of South America: An overview. In *Clovis. Origins and adaptations*, ed. R. Bonnichsen and K.L. Turnmire, 287–301. Corvallis: Center for the Study of First Americans, Oregon State University.

Politis, G. 2002. South America: In the garden of forking paths. In *Archaeology. The widening debate*, ed. B. Cunliffe, W. Davies, and C. Renfrew, 193–244. Oxford: Oxford University Press.

Politis, G., M. Gutiérrez, D. Rafuse, and A. Blasi. 2016. The arrival of *Homo sapiens* into the Southern Cone at 14,000 years ago. *PLoS One* 11 (9): e0162870.

Pucciarelli, H., M. Sardi, J. Jiménez López, and C. Serrano Sánchez. 2003. Early peopling and evolutionary diversification of South America. *Quaternary International* 109–110: 123–132.

Quijada, M. 2004. De mitos nacionales, definiciones cívicas y clasificaciones grupales. Los indígenas en la construcción nacional argentina, siglos XIX al XXI. In *Calidoscopio Latinoamericano. Imágenes históricas para un debate vigente*, ed. W. Ansaldi, 425–450. Buenos Aires: Ariel.

Quiroga, L. 2010. En sus huaycos y quebradas: formas materiales de la resistencia en las tierras de Malfín. *Memoria Americana* 18 (2): 185–209.

Rabassa, J., A. Coronato, and O. Martínez. 2011. Late Cenozoic glaciations in Patagonia and Tierra del Fuego: An up-dated review. *Biological Journal of the Linnean Society* 103 (2): 316–335.

Ramos, A. 1998. *Indigenism: Ethnic politics in Brazil*. Madison: University of Wisconsin Press.

Ramos Roca, E. 2014. Etnoozoología y Zooarqueología Aplicada a la Conservación de Especies de Fauna en el Caribe Colombiano: Primeros Pasos en un Largo Camino. *Cuadernos del Instituto Nacional de Antropología y Pensamiento Latinoamericano* 20: 27–45.

Roosevelt, A., M. Lima Costa, C. Lopes Machado, M. Michab, N. Mercier, H. Valladas, J. Feathers, W. Barnett, D.A. Imazio, M. Silveira, A. Henderson, J. Silva, B. Chernoff, D. Reese, J. Holman, N. Toth, and K. Schick. 1996. Paleoindian cave dwellers in the Amazon: The peopling of the Americas. *Science* 272: 373–384.

Rostworowski de Diez Canseco, M. 1988. *Historia del Tahuantinsuyu*. Lima: IEP.

Salerno, M., A. Zarankin, and M. Perosino. 2012. *Arqueologías de la clandestinidad. Una revisión de los trabajos efectuados en los Centros de Detención Clandestinos de la última dictadura militar en Argentina*. Revista Universitaria de Historia Militar 2. Cádiz: Centro de Estudios de Historia Militar, on line.

Sandweiss, D., and J. Richardson. 2008. Central Andean environments. In *The handbook of South American archaeology*, ed. H. Silverman and W. Isbell, 93–104. New York: Springer.

Sandweiss, D., K. Maasch, R. Burger, J. Richardson, H. Rollins, and A. Clement. 2001. Variations in Holocene El Niño frequencies: Climate records and cultural consequences in ancient Peru. *Geology* 29 (7): 603–606.

Scheinsohn, V. 2003. Hunter-gatherer archaeology in South America. *Annual Review of Anthropology* 32: 339–361.

Scheinsohn, V. 2010. *Hearths and bones. Bone raw material exploitation in Tierra del Fuego*. BAR International Series 2094. Oxford: Archaeopress.

Schurr, T. 2004. Molecular genetic diversity in Siberians and Native Americans suggests an early colonization of the New World. In *Entering America: Northeast Asia and Beringia before the last glacial maximum*, ed. D. Madsen, 187–238. Salt Lake City: University of Utah Press.

Seltzer, G.O. 2007. Late Quaternary glaciation in the tropical Andes. In *The physical geography of South America*, ed. T.T. Veblen, K.R. Young, and A.R. Orme, 60–75. Oxford: Oxford University Press.

Stahl, P. 2008. Animal domestication in South America. In *The handbook of South American archaeology*, ed. H. Silverman and W. Isbell, 121–130. New York: Springer.

Stern, C., J. Gómez Otero, and J. Belardi. 2000. Características químicas, fuentes potenciales y distribución de diferentes tipos de obsidiana en el Norte de la Provincia del Chubut, Patagonia Argentina. *Anales del Instituto de la Patagonia* 28: 275–290.

Tratebas, A., A. Prous, and M. Podestá. 2012. Symposium Pleistocene art of the Americas. In *L'art Pleistocene dans le monde*, ed. J. Clottes. Actes du Congres IFRAO, IFRAO, Tarascon-su-ariege, CD ROM.

Van Buren, M. 2015. Hispanic South America: Historical archaeology. In *Encyclopedia of global archaeology*, ed. C. Smith, 3375–3380. Cham: Springer.

Villalba, R. 1994. Tree-ring and glacial evidence from the Medieval Warm Epoch and the Little Ice Age in Southern South America. *Climatic Change* 26: 193–197.

Wheeler, J., L. Chikhi, and M. Bruford. 2006. Genetic analysis of the origins of domestic South America camelids. In *Documenting domestication: New genetic and archaeological paradigms*, ed. M. Zeder, D. Bradley, E. Emshwiller, and B.D. Smith, 329–341. Berkeley: University of California Press.

Yacobaccio, H.D. 2007. Andean camelid herding in the South Andes: Ethnoarchaeological models for archaeozoological research. *Anthropozoologica* 42 (2): 143–154.

Yacobaccio, H.D., D. Elkin, and D. Olivera. 1994. ¿El fin de las sociedades Cazadoras? El proceso de domesticación animal en los Andes Centro-Sur. In *Arqueología de cazadores-recolectores: limites, casos y aperturas*, ed. J.-L. Lanata and L. Borrero, 23–32. Buenos Aires: PREP.

South American Rock Art

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Introduction

South American and the Caribbean islands rock art has been produced in practically all known archaeological periods and up to our times. This entry deals with the following:

- The different kind of rock art of this subcontinent: rock engravings, rock paintings, and geoglyphs
- The distribution of rock art throughout South America, found in a great variety of geographic and cultural zones in nearly all regions from North to South and East to West including the Andean highlands and the lowlands of the Atlantic coast
- The history of research from the first reports on rock art till scientific studies as part of current archaeological and anthropological research
- References to the principal regional rock art surveys
- A summary of rock art chronology, from the first manifestations up to those produced in recent times
- Some aspects of rock art interpretation of the art
- References to rock art documentation and analysis, conservation, public and private administration of sites, as well as education campaigns in which local communities are concerned (Fig. 1).

Definition

The subject of this study is rock art in South America, including the Caribbean islands: rock engravings (petroglyphs), rock paintings (sometimes called pictographs), and geoglyphs.

South American Rock Art, Fig. 1 Rock painting from Cerro de las Cuevas Pintadas. Guachipas. Argentina. (Photo: INAPL Archive)

These categories of rock art are distinguished by their mode of production. Petroglyphs or engravings are motifs executed on a rock surface. Could be pecked, incised or abraded. Rock paintings are motifs painted or sprayed with a liquid mixture on the rock surface. Other rock art representations could be executed by a sort of crayon such as charcoal. There are some motifs which present the combination of both techniques: engraving and painting. Geoglyphs are large motifs produced on the ground, usually in desert regions, by arranging clasts (positive geoglyph, stone arrangement) or by removing patinated clasts to expose unpatinated ground (negative geoglyph). Mobile art is another important artistic manifestation which may be related to rock art; it consists of engravings or paintings executed on small objects, such as natural stones (Fig. 2). Grinding basins and cupules are, in many cases, associated to rock art.

South American and Caribbean rock art has been produced on rock walls of caves and rockshelters, as well as boulders and other rock surfaces of open-air sites, in practically all known archaeological periods, and up to our times. Deep caves with rock art in dark areas that need artificial lighting occur only in the Caribbean region. Rock art is found in all countries and in a great variety of geographic and cultural zones (with the exception of certain regions, generally lowlands) which lack

South American Rock Art, Fig. 2 Petroglyphs at Iaguy Guasu (Cerro Guazú/Jasuka Venda, Dept. of Amambay), Paraguay. Museo de Altamira

suitable rock surfaces such as the coastal region *Litoral* of Argentina.

Historical Background

South American rock art was noted in colonial times (from CE sixteenth to nineteenth century) by missionaries and numerous travelers (Greer 2001: 678). In the early Republican period (CE nineteenth century), travelers, explorers, and ethnographers contributed a wealth of information though in many cases with faulty recording and little care to detail.

Scientific interest in South American rock art began towards the end of the CE nineteenth century. In Argentina, F. Ameghino, J. B. Ambrosetti, and A. Quiroga published their findings between 1870 and 1890; in Uruguay, J. H. Figueira presented reports in the 1890s; and in Colombia, after first recordings by L. M. Girón (1892) and V. Restrepo (1895), systematic rock art research was started by M. Triana in 1922 though he – like many others – considered rock art motifs as a sort of hieroglyphs. In Bolivia, E. Nördenskiöld recorded a few rock art sites partially in 1904–1905 and 1913–1914.

Koch-Grünberg's pioneering work "Südamerikanische Felszeichnungen" (Berlin 1907, published in Portuguese 2010) is one of the first which may be considered scientific. He provided a synthesis and critical review of the state of knowledge of the art and a summary of sites he had registered during his ethnographic studies on the Brazil-Columbian border (1903–1905).

There is a notable increase in scientific work on South American rock art from the mid-1900s to present. Studies became more detailed and attempted to place the art into archaeological, ethnographic, and interpretive contexts.

In the late 1980s Colonial and Republican rock art began being studied in a combination of rock art recordings with ethnohistoric studies. For example, in Colombia, F. Urbina R. 2004; in Peru, R. Hostnig (2004); in Brazil, C. M. Guimarães (1992) (with regard to rock drawings by fugitive Negro slaves); in Bolivia, R. Querejazu Lewis (1992) and F. Taboada (1992); in northern Chile, F. Gallardo et al. (1990, 1999); and in Argentina, A. Fernández Distel (1992).

Key Issues/Current Debates

Main Geographical Areas

Regarding the cultural configuration based on traditions linked to archaeological cultures, historic information, and ethno-linguistic distributions, the following areas may be established:

- *Caribbean islands*: west India or the Antilles, in which two areas are defined as Greater Antilles (Puerto Rico, Dominican Republic, Cuba, Haiti, and Jamaica) and Lesser Antilles.

- *Lowland South America* as defined by Greer (2001: 665): the northern Amazonas-Guianas region of southern Venezuela, southeastern Colombia, southern Brazil, Guyana, Suriname, and French Guiana, as well as lowland regions of Ecuador, Peru, and Bolivia.
- *Central Brazil and northeast Brazil* as defined by Prous (1994: 89-124).
- *Southeastern coastal Brazil* as defined by Prous (1992: 511-513) comprises of areas attributed to the "Meridional Tradition" and "Coastal Tradition" (Prous 1994: 81–85).
- *The Basin of La Plata River* includes its principal tributaries and adjacent areas in Uruguay, Paraguay, south Brazil, and Northeast Argentina, with five subareas – (1) northern, (2) Atlantic, (3) lap of the Meridional Plateau, (4) southern, and (5) Chaco-Litoral (Consens 1995).
- *Andean South America*: divided in northern, central, and southern Andes, comprising the Pacific coast and highlands of Colombia, Ecuador, Peru, Bolivia, Chile, and northwestern Argentina, excluding southern Chile and Argentina.
- *West-central and central Sierras* in Argentina.
- *Pampa-Patagonia*: southern Argentina and Chile, extends to the top end of the continent and includes Patagonian Andes.

Regional Synthesis

Regional overviews have been presented from broad-areal, regional, country, and local perspectives (Greer 2001: 681). C. N. Dubelaar's Ph.D. thesis (1986) provided a synthesis of engravings on the South American continent and the Caribbean islands, detailing history of research, techniques of production, site characteristics, approaches to dating and interpretation, geographical distribution and classification according to "pilot motifs," and a comparison between petroglyphs of the Antilles and those of northeast South America. In later studies, Dubelaar presented inventories of rock art in the Guianas and adjacent areas, the Lesser Antilles, the Virgin Islands and Trinidad, as well as Puerto Rico.

Notable synthesis were provided for all areas and countries: *Caribbean area*: M. Hayward et al. (2009); *Venezuela*: R. de Valencia and J. Sujo Volsky (1987), J. Greer (1994, 1995, 2001), and F. Scaramelli and K. Tarble (2008, 2010); *Colombia*: G. Muñoz C. (1999) and A. Botiva C. (2000); *Ecuador*: G. González O. (2008); *Brazil*: N. Guidon (1991) on Piaui rock art, A. M. Pessis (2003) on Serra da Capivara rock art, A. Prous (1992, 1994), J. Marcos, A. Prous, and L. Ribeiro on rock engravings of southern Brazil and rock art of Central, Amazonian, and northeast Brazil (2007), G. Martin (1996) on northeast Brazil, and E. Pereira (2003, 2010) on the Central Amazonian *Peru*: J. Guffroy (1999, 2007) and R. Hostnig (2003); *Bolivia*: M. Strecker (1987); *Paraguay*: J. Lasheras et al. (2011); *Chile*: G. Mostny and H. Niemeyer (1983), Berenguer (1999, 2004), Núñez A. (1976) on rock art of Atacama, L. Briones (2008) on geoglyphs of northern Chile, and Troncoso (2008) on Aconcagua river, central Chile; *Argentina*: A. R. González (1977), J. Schobinger and C. J. Gradin (1985), Aschero (1999) on northwest Puna rock art, M. M. Podestá et al. (2005a) on northwestern rock art, M. M. Podestá et al. (2005b) on Patagonia rock art, and A. Recalde and E. Berberián (2005) on central Argentina rock art; *Uruguay*: M. Consens (1995), L. Cabrera Pérez (2008), and A. M. Florines (2004). A general view of *South American* rock art is presented by J. Schobinger (1997) and J. Schobinger and M. Strecker (2001). The Thematic Study edited by ICOMOS (2006) presents overviews on rock art in several regions of South America.

Chronology

In some of the South American countries – particularly in those with a long tradition of archaeological research – chronological sequences have been established on rock art which make it possible to assign the beginning of its production to the earliest occupations of hunter-gatherers which in the Northeast and Patagonian region of Argentina go back more than 10,000 years before present. In northern Chile and central-south Peru, somewhat later dates have been proposed for early rock art. Some regions in Brazil (Amazonia, Mato Grosso, Minas Gerais, Piauí, Peruaçu valley) have produced early dates for rock art (12,000–9,000 BP)

(Prous 2012). Guidon (2007) has proposed an extremely ancient rock art tradition for northeast Brazil (Serra da Capivara, Piauí) of some 48,000 years ago, while in the Amazonian region of Columbia (Serranía de Chiribiquete), rock paintings are believed to have started some 19,500 years ago; however, the considerable antiquity of these representations in Brazil is not accepted by a large part of the archaeologists and at present does not agree with the standard vision of early peopling of South America.

In the case of southern Peru, Toquepala y Sumbay caves have been related to human occupations dated between 11,198 and 10,413 AP and c. 7,300 AP and c. 6,300 AP, respectively (Muelle 1969 and Neira 1968) (Fig. 3). Some recent research by Guffroy (2007) and Hostnig (in preparation) have shed light on a natural style of archaic paintings with large representations of camelid figures accompanied by small stylized human figures. Most of these sites are located at an altitude of more than 4,000 m above sea level.

In most cases defining a sequence and antiquity of rock art styles is based on stylistic changes between motifs belonging to different superimposed layers and the correlation of the production and use of rock art figures with dated layers excavated at the foot of the rock art panels or in their immediate vicinity obtaining an indirect (estimated) chronology for the art. Frequently stylistic considerations play an important role, based on stylistic or iconographic similarities between rock art and other artistic productions.

On the other hand, there are very few "direct" or absolute dates for rock art which either provide a date for the rock art itself, for the rock surface underlying the art, or accretions overlying it. Dating should always be consistent with other archaeological data to be considered reliable. The first AMS dates (radiocarbon dating using accelerator mass spectrometry) of rock paintings have been reported for Argentina: – La Candelaria, Catamarca (Hedges et al. 1998) and Abrigo de los Emplumados or Media Agua 1, Jujuy (Hernández Llosas et al. 1999) – and Brazil: (Toca do Serrote da Bastiana, Piauí).

Rock art representations are present in all moments of human occupation of the South American mainland (preceramic hunter-gatherers, later phases of domestication, and early farmers/ceramists). Among the most ancient figures are non-iconic (abstract) designs, while in other sites figurative scenes occur including the representation of hunting wild animals, above all camelids (such as in southern Peru, northern Chile, Bolivia, northwestern Argentina, and Patagonia). In more recent periods, domesticated camelids are represented in pastoral scenes or in caravans that transported goods.

South American Rock Art, Fig. 3 Paintings featuring wild camelids at Sumbay, Dept. of Arequipa, Peru. (Photo: SIARB Archive)

South American Rock Art, Fig. 4 Colonial rock paintings at Carabaya, Dept. of Puno, Peru. (Photo by Nicolas Merma)

After the European conquest and initial colonization (CE fifteenth to sixteenth centuries), the indigenous communities continued its production up to the late Colonial and in some cases even to Republican times. Colonial and historical rock art is characterized by the representation of horseriders and other anthropomorphic figures with European garments, Christian crosses, horses, etc. An exceptional site in the highlands of Bolivia features numerous scenes of folkloric dances. Battle scenes have been found in sites around Titicaca Lake, possibly related to the indigenous uprisings of the late eighteenth century (Fig. 4). Among recent petroglyph motifs are the representations of cattle marks which date from the mid-twentieth century (Podestá et al. 2005a). In north Colombia similar engravings in territory of the Wayuu Indians are interpreted as totemic emblems (Delgado 2010).

In some cases, rock art sites in the Andean highlands continue to be the focus of religious rites, as recent indigenous offerings and ceremonies demonstrate.

Interpretation

Interpretation of rock art sites should be the result of long-term interdisciplinary research taking into account many factors concerning the cultural framework of the art, its distribution and natural setting, associations with the regional settlement pattern in the specific time periods, as well as indications regarding the ritual, social, and economic uses of the sites.

In South America, the theory of shamanism and its relation to rock art has been scarcely brought up, with the exception of some researchers such as J. Schobinger (2010). More widely accepted is the idea that rock art served as a communication system in which petroglyphs, rock paintings, and geoglyphs are interpreted as markings along traditional routes of travelers and llama caravans passing through wide regions of the Andes. Numerous researchers have favored this theory, for example, L. Núñez A. (1976) with regard to the Atacama Desert and C. A. Aschero with regard to the Argentinian puna and northern Chile. The same interpretation has been applied to historical rock art of mid-twentieth century related to cattle herders that crossed the Argentinian-Chilean border (Podestá et al. 2005a). Petroglyphs in another region and ecozone, along Río Negro river in the tropical lowlands of Brazil and Colombia, are now interpreted as territorial markers and symbols-related mythical migration routes.

Interpretation of some rock art sites in northern Chile is based on ancient indigenous myths and ceremonies related to the agricultural cycle and the growth of llama herds.

South American Rock Art, Fig. 5 Rock paintings at Toca do Boqueirao da Pedra Furada, Serra da Capivara, Piauí, Brazil. (Photo by Alice Tratebas)

With regard to the interpretation of Colonial and Republican rock art, as mentioned before, studies in Bolivia, Peru, Chile, and Brazil relate rock art to ethnohistoric documents.

Recording and Analysis

Sometimes it is hard to integrate rock art into archaeological contexts, especially if no dating can be provided for a site. This is one of the reasons why rock art was not taken seriously by archaeologists of some South American countries for a long time, leaving the investigation and recording of these sites to researchers outside the archaeological mainstream. However, in the last four decades, rock art has played an ever increasing role in archaeological research, national inventories of the cultural heritage, and planning of selected sites to be protected in public facilities such as archaeological parks and whose importance is recognized or acknowledged by including them in lists of National Heritage or even World Heritage sites.

Rock art research depends on a data basis with detailed and carefully elaborated recording of sites and their paintings, engravings, or geoglyphs. Colombia, Bolivia, Brazil, Argentina, Uruguay, and Chile have improved their rock art data basis, but in some countries of South America (e.g., Paraguay), no comprehensive and professional archaeological and rock art programs have existed until very recently (Lasheras et al. 2011) (Fig. 5). Many countries have been carried out rock art sites inventories. Caribbean rock art consists of much more than 1,000 sites across the region, with the greatest concentrations in the Greater Antilles (Haviser and Strecker 2006) (Fig. 6). Over 650 sites have been reported for Venezuela (Scaramelli and Tarble 2006) (Fig. 7). In the department of Cundinamarca (Colombia) alone, some 2,000 sites have been registered, while 5,000 sites are known for the whole country (Muñoz 2006: 97, in ICOMOS 2006). Some 1,500 sites were listed for Argentina in 1988 (Renard de Coquet 1988); however, meanwhile this number might be tripled (Podestá, in ICOMOS 2006). In Ecuador, Peru, and Paraguay, some 3,000 rock art sites have been estimated (Strecker, in ICOMOS 2006), but we now believe that the number of rock art sites is in fact considerably higher. No counts of rock art sites are available at present for Chile and Uruguay (Florines *pers. comm.*).

In some South American countries, invasive recording methods (such as chalking out or making rubbings of rock engravings) were frequently used till the decades 1960–1970, and the negative effects for the conservation of rock art can still be seen in some sites. However, noninvasive recording methods (including digital photography) are

South American Rock Art, Fig. 6 Petroglyphs at Caicara, Orinoco river, Venezuela. (Photo by Franz Scaramelli)

South American Rock Art, Fig. 7 Petroglyphs in Cueva de Panchito, Dominican Republic. (Photo by Adolfo López)

being used more widely, following such models as the IFRAO and SIARB codes of ethics.

Recent analysis of South American rock art have provided insight into engraving techniques and possible lithic tools used for their production (Álvarez et al. 2001). X-Ray Diffraction (XRD), Energy-Dispersive X-Ray Spectroscopy (EDX), Total Reflection X-Ray Fluorescence (TXRF), Fourier Transform Infrared Spectroscopy (FT-IR), and Gas Chromatography/Mass Spectrometry (GC-MS) have been employed to analyze the paint on rock walls and pigments from different occupational levels of archaeological excavations in different sites in Argentina, Uruguay, Bolivia, Chile, and Brazil. For example, analysis of pigments of rock paintings at sites in Argentina has been carried out in Cueva de las Manos and Cerro de los Indios in Patagonia (Aschero 1983-1985; Wainwright et al. 2002), northern Patagonia (Wainwright et al. 2002;

Boschin et al. 2011); in Puna de Atacama region (Podestá and Aschero 2012; Yacobaccio et al. 2012) and in Quebrada de Humahuaca, both in northwestern Argentina; Brazil, in Piauí (Duarte Cavalcante 2009) Bolivia, Paja Colorada (Wainwright and Raudsepp 2008); and Chile, sites of Salado river region reveal ingredients of paint mixtures and production processes (Sepúlveda et al. 2009; Sepúlveda and Laval 2010). Few results have been reported from Uruguay.

Conservation and Management Issues

Rock art sites, which in some cases have been preserved over thousands of years, are extremely vulnerable like all open-air sites. Their conservation depends on natural deterioration factors, such as moisture, physical weathering, biological weathering, pictogram deterioration, climate, as well as destruction of rock art by human visitors which is in many cases the overall destructive factor.

For example, the Nasca geoglyphs (Peru) have been damaged by car traffic crossing the ancient lines and lack of a global management plan. Several important rock art sites in Bolivia have been destroyed by the construction of roads, and many rock art sites from Chile and Uruguay have been deteriorated by mining industry. Deforestation exposes rock art sites to the negative effects of the natural elements (Venezuela).

On the other hand, there is a recent tendency to include more and more sites in tourist routes without their previous adequate planning and administration. The tourist boom has facilitated access to sites which formerly were protected due to their isolation and inaccessibility. Some rock art sites in the Caribbean have been seriously affected by tourism developments, such as Borbón cave and Cueva de las Maravilla in the Dominican Republic, while the archaeological park at Trois-Rivières in Guadeloupe is a noteworthy exception of an area planned by archaeologists and managed for tourist visits without putting the rock art at risk. In Venezuela a few rock art sites have been implemented with visitor centers and guides available for the public (Pintado in the Amazon state; Piedra Pintado, Vigirima, Carabobo state). In Argentina, the National Institute of Anthropology (INAPL) initiated a program with the aim of preserving some rock art sites of exceptional value. The institute acts as consulting agency; the program aims at an effective collaboration with the provinces and specifically the local communities which have to play their role in managing the sites (Podestá, in ICOMOS 2006).

In theory, rock art sites are protected by state legislation as part of the nation's cultural heritage. However, reality is very different because of the lack of enforcement of existing laws. In consequence, if rock art sites are destroyed, actions are seldom taken.

An indicator of the awareness of rock art sites as cultural heritage in South America is the fact that several sites have been inscribed in the list of World Heritage by UNESCO: Cueva de las Manos (Argentina), Fuerte de Samaipata (Bolivia), geoglyphs of Nasca and Pampas de Jumana (Peru), and Serra da Capivara (Piauí, Brazil), while others have been included in the Tentative List to be considered in the future – Chamangá (Uruguay) and sites of Patagonia (Chile), geoglyph of Chirgua, petroglyphs and megaliths of Vigirima, and petroglyphs of Caicara (Venezuela), between others (Fig. 8). In these cases, rock art serves as a tourist attraction which results in the development of local communities and the economic growth of the respective region. The National Park of Serra da Capivara (Brazil), one of the densest concentrations of archaeological and rock art sites in the continent (more than 1,000 recorded sites), is considered one of the best developed archaeological parks in the Americas; it possesses 128 sites which may be visited and 400 km of pathways (Guidon 2007). At the same time, conservation measures taken may serve as a model for other rock art sites in South America. After inclusion (1999) of Cueva de las Manos (Argentina) in the World Heritage list, visitation increased four times, and today the site possesses adequate infrastructure for tourism (Onetto 2006).

Raised wooden boardwalks provide efficient measures for visitor control at the sites and, at the same time, allow visitors a convenient view of the rock art; they have been implemented at a

South American Rock Art, Fig. 8 Geoglyphs Los Pintados, Pampa del Tamarugal, Tarapacá, North Chile. (Photo by Matthias Strecker)

number of sites such as Cueva de las Manos, Cerro Pintado (Patagonia, Argentina), Calacala and Fuerte de Samaipata (Bolivia) (Strecker and Podesta 2006), and Serra da Capivara (Brazil) (Guidon 2007).

Throughout the world, local communities possess long histories of interaction with their cultural and natural environments, and their involvement is essential in the planning stage and the management of rock art sites. In many of the South American rock art sites which have been incorporated in tourist circuits – such as the abovementioned parks – local communities participated in the planning and development of tourism. Local guides may provide to visitors an authentic message concerning the importance of the site for the cultural identity of their people (e.g., Falchi and Torres 2010).

Education

Education campaigns should play an important role in the management of rock art sites, and some models exist in Venezuela (ANAR, website), Colombia (Martínez and Botiva 2002), Brazil (Fundação do Homen Americano, São Raimundo Nonato, Museu Paraense Emilio Goeldi, Belem, Fundacão Universidade Federal de Mato Grosso do Sul, Corumba), Bolivia (Strecker 2001), Peru (Strecker 2005), Chile (Museo Chileno de Arte Precolombino, website), and Argentina (Oliva and Panizza 2010; Vega and Bestard 2010).

Unfortunately, with a few exceptions, such as INAPL in Argentina, and some institutions in Chile and Uruguay, South American state institutions responsible for the protection and maintenance of archaeological sites are poorly funded and normally lack professionals in the field of administration of cultural resources. On the other hand, private organizations, such as Fundação do Homen Americano and Museu Paraense Emilio Goeldi, Belem in Brazil, SIARB in Bolivia, and Museo Chileno de Arte Precolombino, are involved in investigation, recording, and protection of sites.

While professional conservation measures at rock art sites are still rare in South America (with the exception of Serra da Capivara, Piaui, in northeastern Brazil, as mentioned), conservation and administration of rock art sites play an increasing role at rock art meetings and in academic publications (Strecker and Taboada 1995).

International Perspectives

The growing interest in South American rock art is reflected in international academic meetings held in the last decades in several countries, such as eight international rock art symposia, the 2009

and 2012 IFRAO congresses in São Raimundo Nonato, Piauí, Brazil and La Paz, Bolivia, respectively. During the last decade archaeological national congresses held in a number of countries (Colombia, Brazil, Peru, Chile, Argentina, Uruguay) included sessions dedicated to rock art studies.

On the other hand, organizations have been formed in various South American countries which promote rock art research and conservation: APAR (Peru), ABAR (Brazil), SIARB and AEARC (Bolivia), CIAR-SAA (Argentina), and CIARU (Uruguay). They all belong to the International Federation of Rock Art Organizations (IFRAO).

The inclusion of some rock art sites in the list of World Heritage (UNESCO) and others in the Tentative List, as mentioned above, places South American rock art in a worldwide perspective of sites with outstanding characteristics.

The significant advances in rock art research in this continent are also revealed in regional articles published in four volumes of the series "Rock Art Studies – News of the World" (Bahn and Fossati 1996, 2003; Bahn et al. 2008, 2012).

Future Directions

There is a great need for documentation of unrecorded rock art sites and the creation of a data basis of sites. The application of new scientific analytical methods (e.g., Reindel and Wagner 2009) and of image enhancement techniques, such as d-Stretch, will improve considerably the results of research.

Rock art studies play a major role in South American archaeological research, but in some countries have not yet been incorporated in university programs, Argentina and Chile being notable exceptions. As the awareness of the importance of rock art grows, more academic programs to record, study, and protect this cultural heritage are needed.

State and regional institutions responsible for the administration of archaeological and rock art sites have to be strengthened and must rely more on work carried out by specialists. Education campaigns should be realized in close collaboration with universities, schools, and local communities.

Considerable efforts must be made in preservation, visitor management, and interpretation of rock art sites in the future. Conservation projects are practically inexistent, with the exception of Brazil, and, to a lesser extent, Argentina, Bolivia, and Chile. There is a great need for the training of specialists in this field.

Cross-References

► Archaeology of Art: Theoretical Frameworks
► Rock Art Sites: Management and Conservation
► Rock Art, Forms of

References

Álvarez, M., D. Fiore, E. Favret, and R. Castillo Guerra. 2001. The use of lithic artefacts for making rock art engravings: Observation and analysis of use-wear traces in experimental tools through optical microscopy and SEM. *Journal of Archaeological Science* 28: 457–464.

Aschero, C. 1983–1985. Pinturas rupestres en asentamientos cazadores recolectores: Dos casos de análisis aplicando difracción de Rayos-X. *Cuadernos del INA* 10: 291–306.

Bahn, P., and A. Fossati, eds. 1996. *Rock art studies*, News of the world 1; Oxbow monograph. Vol. 72. Oxford: Oxbow.

Berenguer, J. 1999. El evanescente lenguaje del arte rupestre en los Andes Atacameños. In *Arte Rupestre en los Andes de Capricornio*, 9–56. Santiago: Museo Chileno de Arte Precolombino.

Berenguer, J. 2004. *Caravanas, interacción y cambio en el desierto de Atacama*. Santiago: Sirawi Ediciones.

Boschin, M.T., M. Mayer, and G. Massaferro. 2011. Une lectura pluridisciplinaire des analyses chimiques et minéralogiques de peintures rupestres de la Patagonie argentine. *L'Anthropologie* 115: 360–383.

Briones, L. 2008. *Geoglifos del norte de Chile. Región de Arica y Parinacota*. Santiago: Consejo de Monumentos Nacionales.

Cabrera Pérez, L. 2008. Petroglifos en el Uruguay. *Revista TEFROS* 6 (2): 1–11.

De Valencia, R., and J. Sujo Volsky. 1987. *El diseño en los petroglifos venezolanos*. Caracas: Fundación Pampero.

Delgado, C.A., and R. MercadoEpieyú. La blasonería y el arte rupestre Wayuu. *Rupestreweb*. Available at: http://www.rupestreweb.info/wayuu.html.

Duarte Cavalcante, L.C. 2009. Arqueoqímica aplicada ao estudo de pigmentos. Depósitos de alteração e paleossedimentos do Piauí *Clio Arqueológica* 24 (1): 119–146. Recife: Universidade Federal de Pernambuco.

Dubelaar, C.N. 1986. *South American and Caribbean petroglyphs*. Dordrecht: Foris Publications.

Falchi, M.P., and M. Torres. 2010. Recursos didácticos para la valoración y conservación de sitios arqueológicos con arte rupestre. *Fumdhamentos* 9 (4): 1101–1109.

Fernández Distel, A. 1992. Investigación sobre arte rupestre hispano-indígena del N.O. de la República Argentina. In *Contribuciones al Estudio del Arte Rupestre Sudamericano*, vol. 3, 172–198. La Paz: Sociedad de Investigación del Arte Rupestre de Bolivia.

Gallardo, F., V. Castro, and P. Miranda. 1990. Jinetes sagrados en el desierto de Atacama: Un estudio de arte rupestre andino. *Boletín del Museo Chileno de Arte Precolombino* 4: 27–56.

Gallardo, F., C. Sinclaire, and C. Silva. 1999. Arte rupestre, emplazamiento y paisaje en la cordillera del desierto de Atacama. In *Arte Rupestre en los Andes de Capricornio*, 57–96. Santiago: Museo Chileno de Arte Precolombino.

Girón, L.M. 1892. *Las piedras grabadas de Chinuata y Anacutá*. Bogotá: Silvestre.

Greer, J. 1994. The painted rock art of southern Venezuela: Context and chronology. *American Indian Rock Art* 20: 45–58.

Greer, J. 1995. Rock art chronology in the Orinoco Basin of southwestern Venezuela. Ph.D. dissertation, Department of Anthropology, University of Missouri-Columbia. Ann Arbor: University Microfilms, UMI Dissertation Services.

Greer, J. 2001. Lowland South America. In *Handbook of rock art research*, ed. D. Whitley, 665–706. Walnut Creek: Altamira Press.

Guffroy, J. 1999. *El arte rupestre del Antiguo Perú*, Travaux de l'Institut français d'etudes andines. Vol. 112. Lima: Institut français d'études andines.

Guidon, N. 1991. *Peintures préhistoriques du Brésil*. Paris: Editions Recherche sur les Civilisations.

Guimarães, C.M. 1992. *Esclavitud, rebeldía y arte*, Contribuciones al estudio del arte rupestre sudamericano. Vol. 3. La Paz: Sociedad de Investigación del Arte Rupestre de Bolivia.

Haviser, J.B., and M. Strecker. 2006. Zone 2. Caribbean area and north-Coastal South America. In *ICOMOS. Thematic study – rock art of Latin America & the Caribbean*, 43–83. Paris: ICOMOS.

Hayward, M.H., L.-G. Atkinson, and M.A. Cinquino, eds. 2009. *Rock art of the Caribbean*. Tuscaloosa: The University of Alabama Press.

Hernández Llosas, M.I., A. Watchman, and J. Southon. 1999. Pigment analysis and absolute dating of rock paintings from Jujuy, Argentina. In *Dating and the earliest known rock art*, ed. M. Strecker and P. Bahn, 67–74. Oxford: Oxbow Books.

Hostnig, R. 2003. *Arte rupestre del Perú. Inventario nacional*. Lima: CONCYTEC.

Hostnig, R. 2004. Arte rupestre postcolombino de la Provincia Espinar, Cusco, Perú. *Boletín de la Sociedad de Investigación del Arte Rupestre de Bolivia* 18: 40–64.

ICOMOS. 2006. *Rock art of Latin America & The Caribbean. Thematic study.* World Heritage Convention, ICOMOS: Paris.

Koch-Grünberg, T. 2010. In *Pétroglifos Sul-americanos*, ed. E. Pereira. Belém/São Paulo: Museu Paraense Emílio Goeldi, Instituto Socioambiental.

Lasheras, J., P. Fatás, and F. Allen. 2011. Arte rupestre en Paraguay: Sitios con grabados de estilo de pisadas asociados a industria lítica sobre lascas planoconvexas. *Boletín de la Sociedad de Investigación del Arte Rupestre de Bolivia* 25: 93–100.

Martin, G. 1996. *Pré-história do nordeste do Brasil*. Recife: Ed. Universitario da Universidade Federal de Pernambuco.

Martínez Celis, D., and A. BotivaContreras. 2002. *Manual de arte rupestre de Cundinamarca*. Bogotá: Instituto Columbiano de Antropología e Historia.

Mostny, G., and H. Niemeyer. 1983. *Arte rupestre Chileno*. Santiago: Departamento de Extensión Cultural, Ministerio de Educación.

Muñoz, G. 2006. Zone 2. Colombia. In *Thematic study – Rock art of Latin America & the Caribbean*, 96–107. Paris: ICOMOS.

Oliva, F., and M.C. Panizza. 2010. Educación y capacitación como vías de protección del arte rupestre de Sierra de la Ventana, Prov. Buenos Aires (Argentina). In *VIII Simposio Internacional de Arte Rupestre, Resúmenes. CD*, 95–99. San Miguel de Tucumán: Instituto de Arqueología y Museo, Universidad Nacional de Tucumán.

Onetto, M. 2006. Experiencias de la gestión de un sitio del Patrimonio Mundial en Argentina: Mitos y realidades. Cueva de las Manos, Rio Pinturas. In *Tramas en la Piedra. Producción y usos del arte rupestre*, ed. D. Fiore and M.M. Podesta, 263–278. WAC. SAA & AINA.

Pereira, E. 2010. Historia de la investigación sobre el arte rupestre en la Amazonia brasileña. *Fumdhamentos* 9 (2): 331–345.

Podestá, M.M., and C.A. Aschero. 2012. Evidencias tempranas del arte rupestre de los cazadores-recolectores de la Puna (NO de la Argentina). In *L'art pléistocène dans le monde. Actes du Congrès IFRAO, Tarascon-sur-Ariège, sept. 2010, 136–137, CD*, ed. J. Clottes, 773–791. Tarascon-sur-Ariège: Société Préhistorique Ariége-Pyrenées.

Podestá, M.M., D.S. Rolandi and M.P. Sánchez 2005a. *El arte rupestre de Argentina indígena. Noroeste*. Buenos Aires: Union Académique Internationale, Corpus Antiquitatum Americanensium, Argentina V, Academia Nacional de la Historia.

Podestá, M.M., R. Paunero and D.S. Rolandi. 2005b. *El arte rupestre de Argentina indígena. Patagonia*. Buenos Aires: Union Académique Internationale, Corpus Antiquitatum Americanensium Argentina VI, Academia Nacional de Historia.

Prous, A. 1992. *Arqueologia Brasileira*. Brasilia: Editora Universidade de Brasília.

Prous, A. 1994. L'art rupestre du Brésil. *Bulletin de la Société Préhistorique del' Ariège* XLIX: 77–144.

Prous, A. 2012. Le plus ancien art rupestre du Brésil central état de la question. In *L'art pléistocène dans le monde. Actes du Congrès IFRAO, Tarascon-sur-Ariège, sept. 2010: 130–131, CD*, ed. J. Clottes, 719–733. Tarascon-sur-Ariège: Société Préhistorique Ariége-Pyrenées.

Querejazu Lewis, R., ed. 1992. *Arte rupestre colonial de Bolivia y Países Vecinos*, Contribuciones al Estudio del Arte Rupestre Sudamericano. Vol. 3. La Paz: Sociedad de Investigación del Arte Rupestre de Bolivia.

Restrepo, V. 1895. *Los Chibchas antes de la Conquista*. Bogotá: Imprenta de la Luz.

Scaramelli, F., and K. Tarble. 2006. Thematic study of Venezuelan rock art. In *Thematic study – rock art of Latin America & the Caribbean*, 84–95. Paris: ICOMOS.

Scaramelli, F., and K. Tarble. 2008. Arte sobre las rocas del Orinoco Medio: Contexto, mito y representación. In *World heritage papers*, vol. 24, 226–240. Paris: UNESCO.

Scaramelli, F., and K. Tarble. 2010. Nuevos datos sobre la ocupación prehispánica tardía del Orinoco Medio. In *Arqueología Amazônica*, ed. E. Pereira and V. Guapindaia, 137–165. Belém: Museu Paraense Emílio Goeldi.

Schobinger, J. 1997. *Arte prehistórico de América*. Mexico: Jaca Book, Centro Nacional para la Cultura y las Artes.

Schobinger, J. 2010. La interpretación shamánica del arte rupestre: comentario bibliográfico y balance somero de dos décadas de estudios y discusiones. *Anales de Arqueología y Etnología* 63–64: 21–42. Mendoza: Instituto de Arqueología y Etnología, Universidad Nacional de Cuyo.

Schobinger, J., and M. Strecker. 2001. Andean South America. In *Handbook of rock art research*, ed. D. Whitley, 707–759. Walnut Creek: Altamira Press.

Sepúlveda, M., and E. Laval. 2010. Aplicación y aplicabilidad de métodos físico-químicos para el estudio de pinturas rupestres. Ejemplo de estudio en la localidad del Río Salado (norte de Chile), in *XVII Congreso Nacional de Arqueología Chilena, Valdivia 2006. Actas*, 825–834. Santiago: Sociedad Chilena de Arqueología.

Sepúlveda, M., L. Briones, and J. Chacama, eds. 2009. *Crónicas sobre la piedra. Arte rupestre de las Américas*. Arica: Universidad de Tarapacá.

Strecker, M. 1987. *Arte rupestre de Bolivia*, Contribuciones al Estudio del Arte Rupestre Sudamericano. Vol. 1. La Paz: Sociedad de Investigación del Arte Rupestre de Bolivia.

Strecker, M. 2001. ¿Vandalismo vs. Conciencia? Las campañas educativas de la SIARB. *Rupestre* 4: 22–29.

Strecker, M. 2005. New children's brochure on rock art of Peru. *La Pintura* 31 (3: 7). Lemon Grove: ARARA.

Strecker, M., and F. Taboada, eds. 1995. *Administración y conservación de sitios de arte rupestre*, Contribuciones al Estudio del Arte Rupestre Sudamericano. Vol. 4. La Paz: Sociedad de Investigación del Arte Rupestre de Bolivia.

Taboada, F. 1992. El arte rupestre indígena de Chirapaca, Depto. de La Paz, Bolivia. *Contribuciones al Estudio del Arte Rupestre Sudamericano* 3: 111–167. La Paz: Sociedad de Investigación del Arte Rupestre de Bolivia.

Vega, T., and P. Bestard. 2010. Arte rupestre y comunidad II. In *VIII Simposio Internacional de Arte Rupestre, Resúmenes. CD*, 100–102. San Miguel de Tucumán: Instituto de Arqueología y Museo, Universidad Nacional de Tucumán.

Wainwright, I., and M. Raudsepp. 2008. Identificación de Pigmentos de Pinturas Rupestres de Paja Colorada, Prov. Vallegrande, Depto. de Santa Cruz. *Boletín de la Sociedad de Investigación del Arte Rupestre de Bolivia* 22: 41–45.

Wainwright, I.N.M., K. Helwig, D. Rolandi, C. Gradin, M.M. Podesta, M. Onetto, and C.A. Aschero. 2002. Rock paintings conservation and pigment analysis at Cueva de las Manos and Cerro de los Indios, Santa Cruz (Patagonia), Argentina. In *13th Triennial meeting Rio de Janeiro. ICOM committee for conservation. Preprints volume II*, 582–589. London: James & James.

Yacobaccio, H., P. Sola, M.S. Alonso, M. Rosenbusch, C. Vasquez, and M.P. Cata. 2012. Pinturas rupestres del Pleistoceno/Holoceno en la Puna de Atacama (Jujuy, Argentina). In *L'art pléistocène dans le monde. Actes du Congrès IFRAO, Tarascon-sur-Ariège, sept. 2010: 134–135, CD*, ed. J. Clottes, 751–777. Tarascon-sur-Ariége: Société Préhistorique Ariége-Pyrenées.

Further Reading

Archivo Nacional de Arte rupestre (ANAR). n.d.. Available at: www.anar.org.ve.

Associação Brasileira da Arte Rupestre (ABAR). n.d.. Available at: http://www.ab-arterupestre.org.br.

Bahn, P., and A. Fossati, eds. 2003. *Rock art studies*, News of the world. Vol. 2. Oxford: Oxbow.

Bahn, P., N. Franklin, and M. Strecker, eds. 2008. *Rock art studies*, News of the world. Vol. 3. Oxford: Oxbow.

Bahn, P., N. Franklin, and M. Strecker, eds. 2012. *Rock art studies*, News of the world. Vol. 4. Oxford: Oxbow.

Berenguer, J., and F. Gallardo, eds. 1999. *Arte rupestre en los Andes de Capricornio*. Santiago de Chile: Museo Chileno de Arte Precolombino.

Consens, M. 1995. Rock art sites of southeastern South America. In *Rock art studies in the Americas. Papers from the Darwin Rock Art Congress*, Oxbow monographs, ed. J. Steinbring, vol. 45, 151–163. Oxford: Oxbow.

Cuba Rock Art. n.d.. Available at: http://www.scmn.net/cubartparietal/es/Index.htm.

Florines, A.M. 2004. Relevamiento arqueológico de la localidad rupestre del Arroyo Chamanga, Flores. In *La Arqueología uruguaya ante los desafíos del nuevo siglo*, ed. L. Beovide, I. Barreto, and C. Curbelo.

Montevideo: X Congreso Uruguayo de Arqueología. CDROM publication.
Fiore, D. and M.M. Podestá, ed. 2006. *Tramas en la piedra. Producción y usos del arte rupestre*. Buenos Aires: Asociación Amigos del Instituto Nacional de Antropología, World Archaeological Congress, Sociedad Argentina de Antropología.
GIPRI Colombia. n.d.. Available at: http://www.gipri.org/.
Gonzalez, A.R. 1977. *Arte precolombino de la Argentina*. Buenos Aires: Filmediciones Valero.
Guffroy, J. 2007. L'art rupestre de l'ancien Pérou. *Future Sciences*. Available at: http://www.futura-sciences.com/comprendre/d/dossier673-1.php.
Guidon, N. 2007. Parque Nacional Serra da Capivara. Modelo de preservação do patrimônio arqueológico ameaçado. Patrimônio arqueológico: o desafio da preservação. *Revista do Patrimônio Histórico e Artístico Nacional* 33: 75–94.
INAPL Argentina. n.d.. Available at: http://www.cultura.gov.ar/inapl/.
Lambers, K. 2006. *The geoglyphs of Palpa, Peru. Documentation, analysis and interpretation*. Aichwald: Deutsches Archäologisches Institut, Linden Soft Verlag.
Lasheras, J.A., P. Fatás, and F. Allen. 2011b. Arte rupestre en Paraguay: Sitios con grabados de estilo de pisadas asociados a industria lítica sobre lascas planoconvexas. *Boletín de la Sociedad de Investigación del Arte Rupestre de Bolivia* 25: 93–99.
Marcos, J., A. Prous, and L. Ribeiro. 2006. *Brasil rupestre. Arte préhistórica brasileira*. Curitiba: Zencrane Livros.
Nuñez Atencio, L. 1976. Geoglifos y tráfico de caravanas en el desierto chileno. In *Homenaje al Dr. Gustavo Le Paige*, 147–201. San Pedro de Atacama: Universidad del Norte.
Onetto, M. 1996. Experiencias de la gestión de un sitio del Patrimonio Mundial en Argentina: Mitos y realidades. Cueva de las Manos, Río Pinturas. In *Tramas en la piedra. Producción y usos del arte rupestre*, ed. D. Fiore and M.M. Podestá, 252–263. Buenos Aires: World Archaeological Congress, Sociedad Argentina de Antropología & Asociación Amigos del Instituto Nacional de Antropología.
Pereira, E. 2003. *Arte rupestre na Amazônia. Pará.* São Paulo: Museo Paraense Emilio Goeldi.
Peru, Nasca Geoglyphs. n.d.. Available at: http://www.photogrammetry.ethz.ch/research/peru/index.html.
Pessis, A.-M. 2003. *Imagens da pré-história. Parque Nacional Serra da Capivara*. São Paulo: FUMDHAM.
Podestá, M.M., and M. de Hoyos. 2000. *Arte en las rocas. Arte rupestre, menhires y piedras de colores en Argentina*. Buenos Aires: SAA & AINA.
Recalde, M.A., and E. Berberián. 2005. *El arte rupestre de Argentina indígena. Centro*. Buenos Aires: Unión Académique Internationale. Corpus Antiquitatum Americanensium, Argentina VII, Academia Nacional de la Historia.
Reindel, M., and G.A. Wagner, eds. 2009. *New technologies for archaeology. Multidisciplinary investigations in Palpa and Nasca, Peru*. Berlin: Springer.
Renard de Coquet, S. 1988. *Sitios arqueológicos con arte rupestre de la República Argentina. Registro/Documentación*. Buenos Aires: FECIC.
Rupestreweb. n.d.. Available at: www.rupestreweb.info.
Schobinger, J., and C.J. Gradin. 1985. *Arte rupestre de la Argentina. Cazadores de la Patagonia y agricultores andinos*. Madrid: Editorial Encuentro.
SIARB. n.d.. Available at: www.siarb-bolivia.org.
Sociedad De Investigación Del Arte Rupestre De Bolivia (SIARB). 1987–2013. In *Boletín 1–27*, ed. M. Strecker. La Paz: Sociedad de Investigación del Arte Rupestre de Bolivia.
Strecker, M. and M.M. Podestá. 2006. Rock art preservation in Bolivia and Argentina. *Coalition, SCIC Thematic Network on Cultural Heritage, Electronic Newsletter* 11. Available at: http://www.rtphc.csic.es/boletin.htm.
Taboada, F., and M. Strecker, eds. 2002. *Documentación y registro del arte rupestre*, Contribuciones al Estudio del Arte Rupestre Sudamericano. Vol. 6. La Paz: Sociedad de Investigación del Arte Rupestre de Bolivia.
Whitley, D.S., ed. 2001. *Handbook of rock art research*. Walnut Creek: Altamira Press.

South and Southeast Asia: Historical Archaeology

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Introduction

This essay reviews the historical archaeology of South and Southeast Asia from the inside looking out and from the outside looking in. Most historical archaeological research has conventionally taken place in the New World, where a significant divide exists between pre-Columbian and post-Columbian eras. Pan-Eurasian developments swept across South and Southeast Asia for millennia before Columbus set sail for the East Indies, so no clear break is evident between an earlier period of cultural and physical isolation and a later period of contact, disease, and colonization. To reconcile this dissonance between conventionally defined historical archaeology and the Asian sequences, this essay concentrates on two periods of intensive interregional economic interaction in South and Southeast Asia with both

archaeological and documentary records. The first period begins at the end of "prehistory" and includes the emergence of indigenous writing systems (c. 500 BCE–500 CE). The second and externally defined period is associated with the earliest European penetration in the region, starting in the late fifteenth century CE, which elsewhere is called the premodern era.

The use of both internally and externally defined time periods in this entry honors indigenous frameworks of historical archaeology, offers comparative archaeological data on European contact and colonization, and overlooks major developments in each region associated with post-Gupta and Early Medieval South Asia (Hawkes 2014a) and "Classical" Southeast Asia (e.g., Istiawan 2012: 43). By the time that European states launched their expansionist projects, many of South Asia's Medieval empires had risen and collapsed, and its northern regions were under Muslim control. By the time the first Europeans reached Southeast Asia, nearly all of its Classical agrarian kingdoms (e.g., Angkor, Pagan, Dai Viet, Majapahit, and Sukhothai) had ceded power and influence to maritime-based successor states to their south.

South Asian archaeology's first "historical" period, the "Early Historic period", lasted from the third century BCE to the fourth century CE. This period includes part of the Mauryan Empire and ends with the collapse of the Guptas; archaeologists working in southern India call it the Sangam period. Archaeologists working at large coastal cities (e.g., Sisupalgarh, Arikamedu, Pattinam, Kaundinyapura) and large Buddhist sites elsewhere (e.g., Amaravati, Sanchi, and Sarnath) from this period recover substantial evidence of interregional trade, institutionalized religion, and the region's second wave of urbanism, with localized variations (e.g., Casile 2014; Hawkes 2014b; Shaw 2013; see reviews in Fogelin 2006; Smith 2006, 2016b). Hindu and Early Buddhist texts and epics in written, oral, and material form wended their way eastward from South Asia into what is now East and Southeast Asia. Abundant interdisciplinary research has been published on the Early Historic period, by archaeologists, historians, and art historians. From this amalgam has emerged a regional understanding of the Early Historic period as an urban landscape in which the region's cities were political and economic centers and in which states, empires, and religious institutions emerged earlier in the north (see review in Morrison 1997).

The late Medieval period in South Asian archaeology is associated with the European Renaissance and period of exploration. With few exceptions like the impressive program of archaeological research at the central Indian site of Vijayanagara (work by Sinopoli, Morrison, and others), most work has been undertaken through state archaeological projects and published in the gray literature. Little synthetic or theoretical archaeological research has been published on South Asia's late Medieval period (but see Chakrabarti 2003). Until recently, historians (not archaeologists) dominated the discourse on this critical period in South Asia.

Many Southeast Asian archaeologists describe the period from the third century BCE to the fourth or fifth century CE as prehistoric ("the Iron Age") despite substantial evidence for Chinese documentary records about the region near its inception and indigenous documents by Southeast Asians by its closure. This essay employs the "Early Historic period" designation for both South and Southeast Asia for this earliest "historic" period, although Southeast Asia's archaeological record for this period was almost undocumented until the last 20 years. Like South Asia, Southeast Asia was never isolated from contact with foreigners from all directions. Yet developments from c. 1450 CE onward, which scholars call Southeast Asia's Age of Commerce or the Early Modern period, prompted social and economic transformations across the region that merit attention. This period falls within the standard time frame for historical archaeologists working in the West and yields comparative insights on processes of colonization, emergence of social stratification/class, and culture change.

Space constraints also limit the geographic coverage included in the terms "South" and "Southeast Asia." Most South Asian archaeological examples derive from either India or Bangladesh; South Asia's reach far exceeds this

area and contains myriad, complex political and economic trajectories that sources in the "Further Readings" explore in some detail. Most Southeast Asian examples come from the Indonesian archipelago or from the Mekong basin (i.e., Thailand, Laos, Cambodia), from regions where particular European nation-states engaged in commerce and, later, political control. Just as South Asia varied markedly from one region to the next, so Southeast Asia's mainland and insular regions experienced different historical trajectories based, in part, on their access to outside contacts in South or East Asia. Agrarian states emerged across most of mainland Southeast's river valleys and deltas in the early to mid-first millennium CE; the few early states that arose across insular Southeast Asia, in contrast, took several centuries longer to emerge. With few exceptions, island Southeast Asia at European contact consisted of a socially fragmented landscape of small maritime-oriented polities of variable size (Bacus 1999) that were based on a series of unstable, personalized alliances and which competed with each other for access to trade goods (e.g., Junker 2004).

Key Methodological Issues and Substantive Themes

Similar methodological and substantive issues apply to South and Southeast Asia during this Early Historic period. A burgeoning Southeast Asian archaeological literature on the period skews this essay toward Southeast Asian examples for understanding dynamics during both periods. Methodological issues affect archaeological research on both the Early Historic periods of South and Southeast Asia and the fifteenth- to nineteenth-century research and parallel those found across the broad "historical archaeology." Foremost among these is an uncritical use of documentary data to frame archaeological research in both regions. Some of South Asia's important documentary sources (e.g., the *Mahabharata*, the *Ramayana*, and the *Puranas*) were crafted during this period and influence interpretations. So do Indological studies, which emerged out of a colonial intellectual tradition that subordinated archaeological patterns to documentary accounts (Trautmann and Sinopoli 2002: 496). More archaeological challenges involve chronological sequences (e.g., Smith 2016a: 688–689), and definition (Ali 2014).

Southeast Asia's Early Historic period has also been interpreted through contemporary Chinese dynastic annals and analogies with South Asia. One reason is that most research on the Early Historic period has been undertaken by epigraphers and historians, the earliest of whom began their careers as Indologists and Sinologists. Another is that most Southeast Asian archaeologists have concentrated their efforts either on prehistoric research (particularly on the Paleolithic, Bronze, and Iron Ages) or on preservation efforts devoted to the ninth- to fourteenth-century monuments that resonate with nationalist claims and also attract cultural tourism. Recent archaeological work has produced archaeological data which challenges extant accounts on which historians have long relied.

South and Southeast Asia remained linguistically, culturally, and geographically discrete from the late first millennium BE through the mid-first millennium CE. Yet beginning in the Early Historic period, people, goods, and ideas moved across land and water in both directions. Whether inhabitants of either region immigrated to the other remains a subject of some debate; so does the precise timing of these developments. Yet several substantive themes characterize archaeological research on the Early Historic period of both South and Southeast Asia:

- Studies of urbanization (the "second wave" for South Asia after the Indus Valley Civilization and the first for Southeast Asia)
- Continuity from first-millennium A.D. cultural transformations in religion and ritual vis-à-vis emergent statecraft traditions (the study of early religious architecture and iconography and the role of trade in Buddhist propagation)
- The emergence of a pan-South/Southeast Asian interactional network that relied on maritime circulation of people and commodities through the Bay of Bengal in what is commonly described as the Maritime Silk Road

- Landscape archaeology (ritual landscapes/sacred geography and pilgrimage, agrarian landscapes and water management)

Substantive themes in the historical archaeology of the Medieval period of South Asia (ninth century A.D. to sixteenth century A.D.) and historic and classical periods of Southeast Asia include:

- The nature of imperialism (ideology, militarism, production, and distribution)
- The nature of urbanism (political economy of craft production and social organization of cities)
- The agrarian basis of states

Readers are referred to Monica Smith's (2016b) recent review, a comprehensive review of South Asian archaeology during the historical and Medieval periods.

Substantive themes in Southeast Asian archaeology of the fifteenth to eighteenth centuries, however, involve the impact of European contact on settlement, political organization, and social structure. Individual European nation-states sought control of Southeast Asia both for access to the region's own resources (particularly precious metals and spices from the Spice Islands) and for access to China through the South China Sea. The earliest contact involved the 15th/16th establishment of trade networks as Europeans competed with each other for access. During the next two to three centuries, much of Southeast Asia was taken under European control, by the Portuguese, the Spanish, and the Dutch and, in the nineteenth century, by the French, British, and Americans.

Southeast Asia's trade relationships to the East and West had begun many centuries earlier and intensified in the fourteenth to fifteenth centuries as Islamization swept through island Southeast Asia. A burst of field-based archaeological excavations on the period from c. 2500 to 1000 BP since the mid-1990s has produced more nuanced understandings of economics, settlement, and ideology during the transition to history (from c. 500 BC to AD 500) and the following period in which Southeast Asians embraced writing systems, urbanism, and statecraft (e.g., Agustijanto 2012; Bulbeck et al. 2016; Kim et al. 2010; Miksic 2000; Stark 2006). Such work yields material evidence for cultural transmission within the region, which moved along historical trade routes that have roots into the second or first millennia BC (Bellina 2014; Favereau and Bellina 2016; Hung et al. 2013).

Archaeologically recovered beads from sites throughout the maritime region have provided the most robust evidence for the timing and scale of this network (Calo et al. 2015; Carter 2015), although archaeobotanical studies are also yielding intriguing patterns (Castillo et al. 2016). Increased commerce between the region and points west accompanied this religious shift; archaeological work documents economic and settlement changes that preceded European involvement (Christie 1996; Lape 2000). Figure 1 illustrates a variety of Southeast cities that were established or expanded across the region (some in conjunction with the rise of Muslim polities), from Batavia, Manila, and Singapore to mainland capitals that functioned as inland ports like Bangkok and Phnom Penh (Miksic 2006). Only a few such centers have received archaeological attention, like Singapore and Pattani in southern Thailand.

Little archaeological research has focused on local resistance to imperialist advances, but maritime research on the Mongol invation of northern Vietnam (Kimura et al. 2014) offers an excellent case study.

Fourteenth- to fifteenth-century shifts in Ming imperial economic policy also effected changes in Southeast Asia. Archaeological research in the Philippines suggests that agricultural and political intensification occurred during this period. So did the frequency of maritime raiding and inter-valley warfare in export-oriented islands. Manufacturing industries, like stoneware production, also emerged during this time to meet regional needs (Grave et al. 2000, 2017; Gutman 2002) and rarely circulated beyond Southeast Asia's borders. Evidence of regional industrial-level production of trade goods, like high-fired ceramics, has been reported from archaeological research on myriad shipwrecks in the region (Fig. 2). Research on

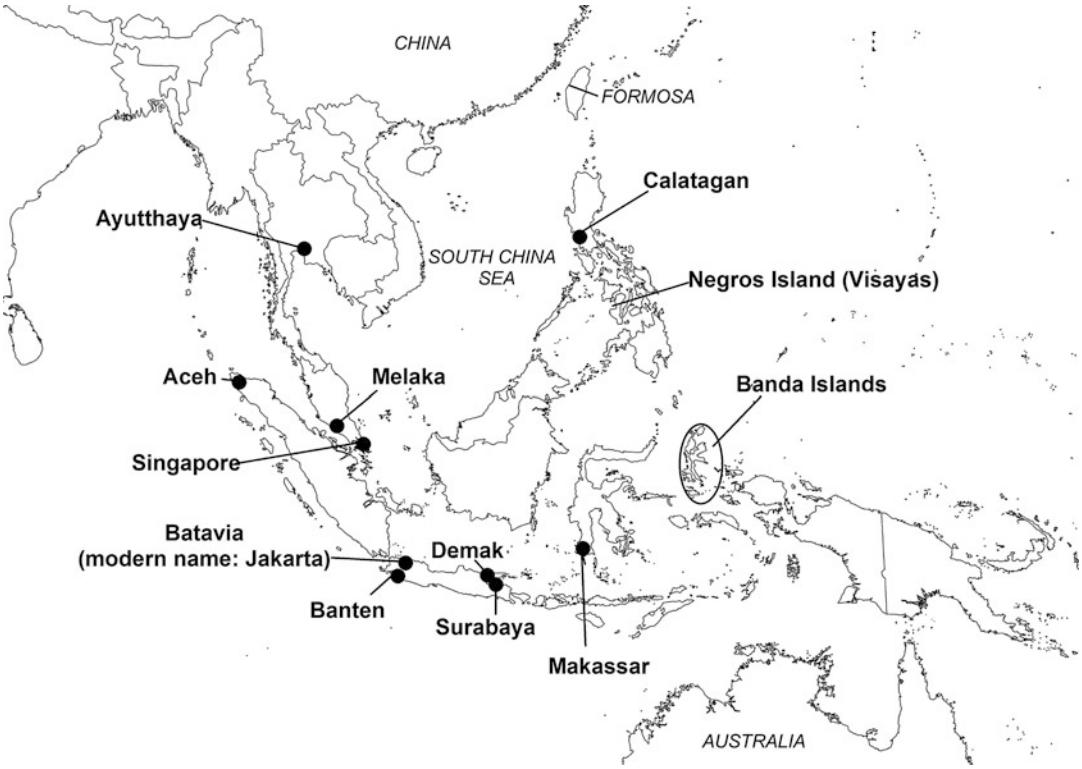

South and Southeast Asia: Historical Archaeology, Fig. 1 Location of sixteenth- to seventeenth-century Southeast Asian cities involved in world commerce (drafted by Alex Morrison)

recovered materials yields insights on valuable but perishable trade goods like resin (Lambert et al. 2017), and geoarchaeological research has enabled the study of maritime sites now covered by alluvium (Guy 2017; Kimura et al. 2014).

Southeast Asian archaeologists have not only documented shifts that preceded or coincided with European contact (e.g., Kim 2013; Stark 2006). Work has now been done on the impact of European colonization: in settlement, in economic structure, and in sociopolitical organization. European colonization entailed significant settlement reorganization to meet European demands for local products and Chinese goods and changed through time in response as European colonial policies shifted. Initial resistance to European contact was intense across much of the region outside of Sinicized northern Vietnam and effected settlement changes. In eastern Indonesia's Spice Islands, the Dutch resorted to wholesale slaughter of local populations to gain control of spice-growing islands like Banda (Lape 2000). Some Filipino populations fled into the Luzon highlands to escape Spanish relocation policies of *reduccion* in the Philippines (Acabado 2016). Local identity, encoded in Philippine burials, included political and spiritual leaders (Barreto-Tesoro 2008). Work in northern Thailand illustrates migrations to upland areas in response to lowland Ayutthaya state demand for labor to support new export-oriented production systems (Grave 1995: 258).

European colonization also brought the establishment of the new Manila Galleon network that moved goods between Asia and the New World. This network linked the Spanish Philippines to Spanish Mexico through annual or biannual trips from the sixteenth to nineteenth centuries. Chinese and Southeast Asian goods sailed eastward across the Pacific to reach Acapulco, on the west coast of Mexico. These goods were exchanged for silver bullion and minted coin that returned to the

South and Southeast Asia: Historical Archaeology, Fig. 2 Location of recovered fourteenth- to sixteenth-century shipwrecks in Southeast Asia. (From Flecker 2007, with permission from John Wiley and Sons)

Philippines. More than 100 Manila Galleon expeditions set sail during this period.

European colonization in the seventeenth to nineteenth centuries not only drew Southeast Asia into the western hemisphere; it also knit Chinese commerce more closely with the west. Diasporic ethnic communities and urban ethnogenesis borne of unions between overseas Chinese and European colonials and local women were one by-product of such commerce that archaeologists have not yet studied. Melaka (Malaysia) and Dutch Batavia (Indonesia), for example, housed *Peranakan* (Chinese/Malaysian), *Mardijker* (freed slaves of Malaysian and

Indian descent), and "Topas" or "black Portuguese" (descendants of Portuguese and Flores or Solor people) communities.

Archaeological research has begun to illustrate the differential impact of European contact and colonization across the very broad and heterogeneous region of Southeast Asia. Coastal and lowland areas were most receptive to initial contact and most susceptible to subsequent colonization. That European colonization also affected sociopolitical organization in some areas seems evident from research on sixteenth-century mortuary ceramics from Calatagan, Philippines (Barretto-Tesoro 2013).

The relative paucity of archaeological work on fourteenth- to eighteenth-century Southeast Asia may explain the near-absence of key debates. Perhaps the only salient and persistent issue concerns the ethics of "historical archaeology" that retrieves shipwrecked materials through maritime commercial salvage operations. These materials provide the region's basic chronological sequence. Given the unreliability of the radiocarbon curve for this period, and the dearth of alternative dating techniques, most archaeologists date their sites through their association with locally manufactured stonewares and Chinese tradewares. Geochemical analysis of maritime trade ceramics also helps archaeologists reconstruct changing regional and international trade networks through time.

South and Southeast Asian archaeology continue to play marginal roles in studies of the fifteenth through nineteenth centuries, where additional archaeological research could contribute to the expansion and refinement of micro- and macro-histories. Ethnohistorians working through multiple European and Southeast Asian literatures have been extraordinarily interested in economic and political history, two topics on which archaeological research often yields unique insights. Scholars of the Iberian expansion currently lack archaeological knowledge of the easternmost reach of the Iberian empire: while the Spanish colonized the Philippines, the Portuguese spent time in Melaka and in East Timor.

In a global perspective, South and Southeast Asia played instrumental roles in the emergence and operation of Asia's history that coincided with the expansion of a world system that linked New with Old Worlds along both land and ocean routes. Systematic, well-designed archaeological research in South and Southeast Asia might inform on how shifts in key source zones and peripheries reflected and affected other parts of the system. These regions offer rich archaeological data for studying other topics that fall under the purview of historical archaeology, like urbanism and ethnogenesis. Almost no one has yet studied Southeast Asia's Catholic missions, which were established by the seventeenth century in the Philippines, East Timor, Vietnam, and Cambodia. Such research would provide comparative data with studies already done in the New World (and particularly in North America) on Spanish and French missions.

Future Directions

Most areas of Southeast Asia still suffer from a paucity of archaeological attention to both the earliest historic period (c. 500 BCE–500 CE) and the premodern period that began in the late fifteenth century CE. Yet archaeological scholars of European imperialism would find ample data in both South and Southeast Asia: Europeans colonized every Southeast Asian country except Thailand, and British, French, Portuguese, and Danish all established a colonial presence in South Asia. So, too, would archaeologists in the emerging study of preindustrial and early modern "capitalism." Nor has adequate archaeological attention been paid to the political economy of plantations and especially to the rise of nineteenth-century industrial plantations: rubber in Indochina, Malaysia, and Sri Lanka; sugar in the Philippines, Indonesia, and India; tea in India, Sri Lanka, and Malaysia; spices in Indonesia; indigo and cotton in India; and coffee in Indonesia, Vietnam, and Sri Lanka.

High-quality, long-term research commitment to South and Southeast Asia's fifteenth- to nineteenth-century archaeological record would help redress the current imbalance in which historians have interpreted this period. Focused local

studies on the period would complement our knowledge based on documentary data and yield insights on topics that interest historical archaeologists worldwide and that center on long-term responses of social transformation and resistance. The need is increasingly urgent, as many parts of South and Southeast Asia transition out of their status as developing countries and obliterate much of the historical archaeological record.

Cross-References

- ▶ Archaeology: The World at 1800–1850
- ▶ Ethnic Identity and Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Historical Archaeology
- ▶ Indian Ocean: Maritime Archaeology

References

Acabado, S.A. 2016. The archaeology of pericolonialism: Responses of the "unconquered" to Spanish conquest and colonialism in Ifugao, Philippines. *International Journal of Historical Archaeology* 21 (1): 1–26.

Agustijanto, I. 2012. The pre-Srivijaya period on the eastern coast of Sumatra: Preliminary research at the Air Sugihan site. In *Connecting empires and states; selected papers from the 13th international conference of the European Association of Southeast Asian Archaeologists*, ed. M.L. Tjoa-Bonatz, A. Reinecke, and D. Bonatz, 32–41. Singapore: NUS Press.

Ali, D. 2014. The idea of the medieval in the writing of south Asian history: Contexts, methods and politics. *Social History* 39 (3): 382–407.

Bacus, E. 1999. Prestige and potency: Political economies of protohistoric Visayan polities. In *Complex polities in the ancient tropical world*, Archeological Papers of the American Anthropological Association 91, ed. E.A. Bacus and L.J. Lucero, 67–87. Washington, DC: American Anthropological Association.

Barreto-Tesoro, G. 2008. *Identity and reciprocity in 15th century Philippines*, BAR International Series, 1813. Oxford: John & Erica Hedges Ltd.

Bellina, B. 2014. Maritime silk road's ornament industries: Socio-political practices and cultural transfers in the South China Sea. *Cambridge Archaeological Journal* 24 (3): 345–377.

Bulbeck, D., F.A. Aziz, S. O'Connor, A. Calo, J.N. Fenner, B. Marwick, J. Feathers, R. Wood, and D. Prastiningtyas. 2016. Mortuary caves and the dammar trade in the Towuti-Routa region, Sulawesi, in an island Southeast Asian context. *Asian Perspectives* 55 (2): 148–183.

Calo, A., B. Prasetyo, P. Bellwood, J.W. Lankton, B. Gratuze, T.O. Pryce, A. Reinecke, V. Leusch, H. Schenk, R. Wood, R.A. Bawono, I.D.K. Gede, N.L.K.C. Yuliatia, J. Fenner, C. Reepmeyer, C. Castillo, and A.K. Carter. 2015. Sembiran and Pacung on the north coast of Bali: A strategic crossroads for early trans-Asiatic exchange. *Antiquity* 89: 378–396.

Carter, A.K. 2015. Beads, exchange networks and emerging complexity: A case study from Cambodia and Thailand (500 BCE – CE 500). *Cambridge Archaeological Journal* 25 (4): 733–757.

Casile, A. 2014. Changing religious landscapes in Gupta times: Archaeological evidence from the area of Baḍoh Paṭhāri in Central India. *South Asian Studies* 30 (2): 245–268.

Castillo, C.C., B. Bellina, and D.Q. Fuller. 2016. Rice, beans and trade crops on the early maritime silk route in Southeast Asia. *Antiquity* 90 (353): 1255–1269.

Chakrabarti, D.P., ed. 2003. *The archaeology of European expansion in India: Gujarat, c. sixteenth to eighteenth centuries*. New Delhi: Aryan Books International.

Christie, J. 1996. Money and its uses in the Javanese states of the ninth to fifteenth centuries A. D. *Journal of the Economic and Social History of the Orient* 39: 243–286.

Favereau, A., and B. Bellina. 2016. Thai-Malay Peninsula and South China Sea networks (500 BC–AD 200), based on a reappraisal of "Sa Huynh-Kalanay"--related ceramics. *Quaternary International* 416: 219–227.

Fogelin, L. 2006. *Archaeology of early Buddhism*. Lanham: Altamira Press.

Grave, P. 1995. Beyond the mandala: Buddhist landscapes and upland-lowland interaction in North-West Thailand AD 1200–1650. *World Archaeology* 272: 243–265.

Grave, P., M. Barbetti, M. Hotchkis, and R. Bird. 2000. The stoneware kilns of Sisatchanalai and Early Modern Thailand. *Journal of Field Archaeology* 27 (2): 169–182.

Grave, P., M. Stark, D. Ea, L. Kealhofer, B.S. Tan, and T. Tin. 2017. Differentiating Khmer stoneware production: An NAA pilot study from Siem Reap Province, Cambodia. *Archaeometry* 59 (1): 13–24.

Gutman, P. 2002. The Martaban trade: An examination of the literature from the seventh century until the eighteenth century. *Asian Perspectives* 40: 108–118.

Guy, J. 2017. The Phanom Surin shipwreck, a Pahlavi inscription, and their significance of the history of early Lower Central Thailand. *Journal of the Siam Society* 105: 179–196.

Hawkes, J.D. 2014a. Chronological sequences and the problem of early medieval settlement in India. *Puratattva* 44: 208–228.

Hawkes, J.D. 2014b. One size does not fit all: Landscapes of religious change in Vindhya Pradesh. *South Asian Studies* 30 (1): 1–15.

Hung, H.-S., K.D. Nguyen, P. Bellwood, and M. Carson. 2013. Coastal connectivity: Long-term trading networks across the South China Sea. *The Journal of Island and Coastal Archaeology* 8 (3): 384–404.

Junker, L. 2004. Political economy in the historic period chiefdoms and states of Southeast Asia. In *Archaeological perspectives on political economies*, ed. G.M. Feinman and L.M. Nicholas, 223–251. Salt Lake City: University of Utah Press.

Kim, N.C. 2013. Lasting monuments and durable institutions: Labor, urbanism, and statehood in northern Vietnam and beyond. *Journal of Archaeological Research* 21: 217–267.

Kimura, J., M. Staniforth, L.T. Lien, and R. Sasaki. 2014. Naval battlefield archaeology of the lost Kublai Khan fleets. *The International Journal of Nautical Archaeology* 43 (1): 76–86.

Lambert, J. B., A. J. Levy, L. C. Niziolek, G. M. Feinman, P. J. Gayford, J. A. Santiago-Blay and Y. Wu. 2017. The resinous cargo of the Java Sea Wreck. *Archaeometry* published online February 2017. https://doi.org/10.1111/arcm.12279.

Lape, P. 2000. Contact and colonialism in the Banda Islands, Maluku, Indonesia. *Bulletin of the Indo-Pacific Prehistory Association* 20: 48–55.

Miksic, J. 2000. Heterogenetic cities in premodern Southeast Asia. *World Archaeology* 32: 106–120.

Morrison, K.D. 1997. Commerce and culture in South Asia: Perspectives from archaeology and history. *Annual Review of Anthropology* 26: 87–108.

Shaw, J. 2013. Archaeologies of Buddhist propagation in ancient India: 'Ritual' and 'practical' models of religious change. *World Archaeology* 45 (1): 83–108.

Smith, M.L. 2006. The archaeology of South Asian cities. *Journal of Archaeological Research* 14: 97–142.

Smith, M.L. 2016a. Archaeology at Sisupalgarh: The chronology of an early historic urban centre in eastern India. In *South Asian archaeology and art 2012*, ed. V. Lefèvre, A. Didier, and B. Mutin, vol. 2, 683–695. Turnhout: BREPOLS.

Smith, M.L. 2016b. Historical and medieval period archaeology. In *A companion to South Asia in the past*, ed. G.-R. Schug and S.R. Walimbe, 332–343. Hoboken: Wiley.

Stark, M.T. 2006. Early mainland Southeast Asian landscapes in the first millennium AD. *Annual Review of Anthropology* 35: 407–432.

Trautmann, T., and C. Sinopoli. 2002. In the beginning was the word: Excavating the relations between archaeology and history in South Asia. *Journal of the Economic and Social History of the Orient* 45: 492–523.

Further Readings

Abraham, S. 2003. Chera, Chola, Pandya: Using archaeological evidence to identify the Tamil kingdoms of early historic South India. *Asian Perspectives* 42: 207–223.

Barretto-Tesoro, G. 2013. The changing meanings of objects: Calatagan and archaeological research in the Philippines. *Philippine Studies: Historical and Ethnographic Viewpoints* 61 (3): 263–296.

Bulbeck, D., and I. Caldwell. 2000. *Land of iron: The historical archaeology of Luwu and the Cenrana valley*. Hull: University of Hull Centre for South-East Asian Studies.

Caldwell, I., and W. Bougas. 2004. The early history of Binamu and Bangkala, South Sulawesi. *Bijdragen tot de Taal-, Land- en Volkenkunde* 160: 456–510.

Carter, A.K., L. Dussubieux, and N. Beavan. 2015. Glass beads from 15th–17th century CE jar burial sites in Cambodia's Cardamom Mountains. *Archaeometry* 58: 401–412.

Clarke, W. 2014. The skeletons of Phong Tuek: Human remains in Dvāravatī ritual contexts. In *Before Siam: Essays in art and archaeology*, ed. N. Revire and S.A. Murphy, 205–223. Bangkok: River Books.

Coningham, R., P. Gunawardhana, M. Manuel, G. Adikari, M. Katugamplo, R. Young, A. Schmidt, K. Krishnan, I. Simpson, G. Mcdonnell, and C. Batt. 2007. The state of theocracy: Defining an early medieval hinterland in Sri Lanka. *Antiquity* 81: 699–719.

Dhavalikar, M. 1999. *Historical archaeology of India*. New Delhi: Books & Books.

Flecker, M. 1992. Excavation of an oriental vessel of c. 1690 off Con Dao, Vietnam. *The International Journal of Nautical Archaeology* 21: 221–244.

Flecker, M. 1999. Three 18th-century shipwrecks off Ujung Pandang, Southwest Sulawesi, Indonesia: A coincidence? *The International Journal of Nautical Archaeology* 28: 45–59.

Flecker, M. 2001. The Bakau wreck: An early example of Chinese shipping in Southeast Asia. *The International Journal of Nautical Archaeology* 30: 221–230.

Flecker, M. 2007. The South-China-Sea tradition: The hybrid hulls of South-East Asia. *The International Journal of Nautical Archaeology* 36: 75–90.

Grave, P., and M. Maccheroni. 2009. Characterizing Asian stoneware jar production at the transition to the early modern period (1550–1650 C.E.). In *Scientific research on historic Asian ceramics*, ed. B. McCarthy, E. Chase, L. Cort, J. Douglas, and J. Paul, 186–204. Washington, DC: Sackler Museum, Smithsonian Institution.

Halcrow, S.E., N.J. Harris, N. Beavan, and H.R. Buckley. 2014. First bioarchaeological evidence of probably scurvy in Southeast Asia: Multifactorial etiologies of vitamin C deficiency in a tropical environment. *International Journal of Paleopathology* 5: 63–71.

Haricharan, S., and N. Keerthi. 2014. Can the *tinai* help understand the iron age early historic landscape of Tamilnadu? *World Archaeology* 46 (5): 641–660.

Istiawan, B. 2012. New finds of the classical period in West Sumatra. In *Connecting empires and states: Selected papers from the 13th international conference of the European association of Southeast Asian*

S

Archaeologists, ed. M.L. Tjoa-Bonatz, A. Reinecke, and D. Bonatz, vol. 2, 43–52. Singapore: NUS Press.

Junker, L.L., and L. Niziolek. 2010. Food preparation and feasting in the household and political economy of pre-Hispanic Philippine chiefdoms. In *Inside ancient kitchens: New directions in the study of daily meals and feasts*, ed. E.A. Klarich, 17–53. Boulder: University Press of Colorado.

Lacey, H. 2014. Nandivardhana and Nagardhan: Preliminary analysis of the surface evidence from Nagardhan and Hamlapuri in the eastern Vākāṭaka territory near Rāmṭek, Maharashtra. *South Asian Studies* 30 (2): 116–132.

Lapeña, Q.G., and S.B. Acabado. 2017. Resistance through rituals: The role of Philippine "native pig" (*Sus scrofa*) in Ifugao feasting and socio-political organization. *Journal of Archaeological Science: Reports* 13: 583–594.

Kealhofer, L., and P. Grave. 2008. Land use, political complexity, and urbanism in mainland Southeast Asia. *American Antiquity* 73: 200–225.

Lape, P. 2002. On the use of archaeology and history in island Southeast Asia. *Journal of the Economic and Social History of the Orient* 45: 468–491.

Lape, P., and C.Y. Chao. 2008. Fortification as a human response to late Holocene climate change in East Timor. *Archaeology in Oceania* 43: 11–21.

Lewis, B. 2009. Village defenses of the Karnataka Maidan, AD 1600–1800. *South Asian Studies* 25 (1): 91–111.

Miksic, J. 2006. Chinese ceramics and the economics of early Southeast Asian urbanization, 14th to 16th centuries. *Bulletin of the Indo-Pacific Prehistory Association* 26: 147–153.

Miksic, J. 2010. Before and after Zheng He: Comparing some 384 Southeast Asian archaeological sites of the 14th and 15th centuries. In *Southeast Asia in the fifteenth century: The China factor*, ed. G. Wade and L. Sun, 384–408. Hong Kong: Hong Kong University Press and University Press of Singapore.

Mohanty, R., and M. Smith. 2008. *Excavations at Sisupalgarh (Orissa)*, Special Report No. 2. Delhi: Indian Archaeological Society.

Morrison, K.D. 1995. Trade, urbanism, and agricultural expansion: Buddhist monastic institutions and the state in the early historic western Deccan. *World Archaeology* 27: 203–221.

Murphy, S.A. 2015. How many monks? Quantitative and demographic archaeological approaches to Buddhism in Northeast Thailand and central Laos, sixth to eleventh centuries CE. In *Buddhist dynamics in premodern and early modern Southeast Asia*, ed. D.C. Lammerts, 80–119. Singapore: Institute of Southeast Asian Studies.

Murphy, S.A. 2013. The distribution of *Sema* Stones throughout the Khorat Plateau during the Dvaravati period. In *Unearthing southeast Asia's past: Selected papers from the 12th international conference of the European association of southeast Asian Archaeologists*, ed. M.J. Klokke and V. Degroot, vol. 1, 215–233. Singapore: NUS Press.

Ray, H.P. 1994. *The winds of change: Buddhism and the maritime links of early South Asia*. New Delhi: Oxford University Press.

Ray, H.P. 2004. The apsidal shrine in early Hinduism: Origins, cultic affiliation, patronage. *World Archaeology* 36: 343–359.

Ray, H.R., and C. Sinopoli, eds. 2004. *Archaeology as history in early South Asia*. New Delhi: Indian Council for Historical Research and Aryan Books International.

Shaw, J. 2000. Sanchi and its archaeological landscape: Buddhist monasteries, settlements and irrigation works in central India. *Antiquity* 74: 775–776.

Shaw, J. 2007. *Buddhist landscapes in Central India: Sanchi hill and archaeologies of religious and social change, c. 3rd century BC to 5th century AD*. London: British Association for South Asian Studies, The British Academy.

Shaw, J. 2011. Monasteries, monasticism, and patronage in ancient India: Mawasa, a recently documented hilltop Buddhist complex in the Sanchi area of Madhya Pradesh. *South Asian Studies* 27: 111–130.

Shaw, J., J. Sutcliffe, L. Lloyd-Smith, J.-L. Schwenninger, M. Chauhan, O. Misra, and E. Harvey. 2007. Ancient irrigation and Buddhist history in Central India: Optically stimulated luminescence dates and pollen sequences from the Sanchi dams. *Asian Perspectives* 46: 166–201.

Sinopoli, C. 2000. Lion throne: Political and social dynamics of the Vijayanagara empire. *Journal of the Economic and Social History of the Orient* 43: 364–398.

Sinopoli, C., and K. Morrison. 1995. Dimensions of imperial control: The Vijayanagara capital. *American Anthropologist* 97: 83–96.

Sinopoli, C., P.G. Johansen, and K.D. Morrison. 2009. Changing cultural landscapes of the Tungabhadra Valley, South India. In *Polities and power: Archaeological perspectives on the landscapes of early states*, ed. S.-E. Falconer and C.L. Redman, 11–41. Tucson: University of Arizona Press.

Smith, M.L. 1999. "Indianization" from the Indian point of view: Trade and cultural contacts with Southeast Asia in the early first millennium C.E. *Journal of the Economic and Social History of the Orient* 42: 1–26.

Smith, M.L. 2016. Historical and medieval period archaeology. In *A companion to South Asia in the past*, ed. G.-R. Schug and S.R. Walimbe, 332–343. Malden/Oxford: Wiley Blackwell.

Stargardt, J. 2015. Indian Ocean trade in the ninth and tenth centuries: Demand, distance, and profit. *South Asian Studies* 30 (1): 35–55.

Varun, M. 2005. *Champaner, a medieval capital*. Mumbai: Mindworks.

Willis, M. 2009. *The archaeology of Hindu ritual: Temples and the establishment of the gods*. Cambridge/New York: Cambridge University Press.

South Asia: Paleolithic

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Introduction

Numerous biological and technological milestones in hominin evolution have taken place within the last 2 Ma, one of the most important being the multiple dispersals out of Africa. In that regard, South Asia can yield valuable information regarding the adaptations of various *Homo* species as it critically lies in the center of the Old World, i.e., between important paleoanthropological evidence in Africa, Europe, China, and Australasia. It also significantly straddles the eastern end of the *Movius Line* and represents the highest easternmost distribution of *rich and classic* Acheulean localities in the Old World. (The Movius Line is named after a geographic boundary first recognized and proposed by H. Movius in the 1940s. It essentially represents the easternmost boundary or dispersal extent of Acheulean technology from Africa in the west. In recent years, however, Acheulean-like tools such as hand axes and cleavers have also been found beyond the boundary, mainly in Korea and China, thus fueling debates about whether those tools are Acheulean or represent independent parallel innovations.) The region is also known for the comparative lack of early hominin fossils, a dearth of excavated sites and associated chronometric dates. Consequently, critical information such as the timing of colonization, the factors responsible for techno-cultural change, and the earliest arrival of modern humans and identifying the various hominin specie(s) that occupied the region is not known. The South Asian landmass comprises a temperate/subtropical setting, dominated by a seasonal monsoon regime prevalent since the Miocene or at least the last 18 Ma. The physiographic configuration of India induces the behavior of both the Southwest and Northeast monsoons, during the summer and winter months, respectively. South Asia or the Indian subcontinent generally encompasses the political boundaries of Pakistan, India, Nepal, Sri Lanka, Bangladesh, and Bhutan. The north is dominated by the Greater Himalaya, the Lesser Himalaya, and the Siwalik Hills, all ranges almost geographically parallel and temporally successive to each other. The Gangetic plains are followed (to the south) by the great Thar Desert (in eastern Pakistan and northwestern India) and the Vindhyan range of hills. These hills are located north of the Deccan Plateau, which is a prominent landscape of peninsular India, and include the Western and Eastern Ghats. In the past, different ecozones provided access to different types and shapes of lithic raw material. For example, for fluvial sources in the Siwalik region, rounded and subrounded quartzite and sandstone clasts dominated the Pleistocene landscape. In parts of north-central India, Acheulean assemblages were made on pink granite. In the Western and Eastern Ghats, however, the primary raw material was basalt and doleritic dikes, occurring as fragments from bedrock outcrops and waterworn clasts belonging to the Deccan volcanic Traps. Further south, in parts of Karnataka, limestone bedrock was the dominant raw material type available in the form of tabular slabs (Fig. 1). The Rohri Hills in Pakistan is a rare occurrence of more or less continuous exploitation of the same raw material source – chert outcrops – from the Lower Paleolithic to Harappan times. From the variety of raw materials exploited extensively by South Asian hominins, quartzite was one of the more dominant types used during the Lower, Middle, and Upper Paleolithic and at various types of sites contexts – quarry, factory, workshop, and occupational.

The most obvious geographic areas of entry into the subcontinent (and subsequent population movements *from* India) are Afghanistan and Pakistan to the northwest and Myanmar in the northeast. Both zones offered coastal routes, as well inland mountain passes and ecologically rich tropical evergreen and deciduous forests,

South Asia: Paleolithic, Fig. 1 Two examples of diverse rock types for stone tool manufacture: limestone blocks from Karnataka (left) and quartzite cobbles from the Siwalik Hills (inset)

without any major mountain ranges or deserts impeding potential movements. The Thar Desert may have acted as a temporary ecological barrier but also contained numerous isolated raw material sources (e.g., Jayal Gravel Ridge), and once crossed, ample outcrops of Aravalli quartzites were available on the landscape. The northeast region has a rich record of younger non-biface assemblages, most of which may be related culturally to the comparatively younger lithic industries from Southeast Asia. Similar to the Indo-Gangetic landscape in the north and northwest, however, the Bay of Bengal and the Ganges-Brahmaputra drainage system may have also acted as temporary barriers during the Late Pliocene–Early Pleistocene, due to a low occurrence of raw materials in the region and general delta environment. From the current lack of older Paleolithic evidence in NE India, the main point of entry appears to have been NW India.

Definition

Lower Paleolithic

The South Asian Lower Paleolithic evidence has been traditionally divided into two facies or types of lithic assemblages: Soanian (non- or pre-Acheulean) and Acheulean industries, both often occurring independently as well in shared geographical, geomorphological, and stratigraphical contexts. However, most of the Soanian evidence is now known to postdate the Acheulean. Stone tools across South Asia are found in stratified or surface association with fine-grained fluvial and lacustrine sediments, ferricretes, laterites, and gravel or conglomerate deposits. Most of the Indian localities have been directly dated through the uranium-thorium (^{234}Th-^{230}U) and thermoluminescence (TL) or optically stimulated luminescence (OSL) methods and include a predominance of Acheulean sites (Mishra 1995). Ages for other occurrences such as Riwat, Dina, Jalapur, Pabbi Hills, Morgaon, and Satpati Hill have been estimated using paleomagnetism and geostratigraphic correlations. With some possible exceptions in Nepal and in western India, the only unequivocal evidence of Acheulean occupation prior to the Middle Pleistocene in the subcontinent comes from Attirampakkam at between 1.07 Ma and 1.5 Ma. Other Acheulean sites have also been reported to be of comparable age but most indicate problems with the dating results, site contexts, or general interpretations. The majority of evidence in Sri Lanka belongs to the Upper Paleolithic, and some Middle Paleolithic lithic assemblages have been reported (Deraniyagala 1992), thus

signifying a relatively late colonization of that region from southernmost peninsular India, when perhaps the sea levels were significantly lower. The terminal Acheulean evidence is not well established, and the use of diminutive bifaces persisted well into the Upper Pleistocene as parts of early Middle Paleolithic assemblages (Chauhan 2009). Indeed, the Lower-to-Middle Paleolithic transition in South Asia appears to be significantly older (>300 ka) than previously thought – discussed below.

Some unique features of the South Asian Lower Paleolithic record include possible stone alignments and postholes at Paisra and stone alignments at Bhimbetka and Hunsgi. Though viewed as being controversial, a rock-shelter at Bhimbetka has yielded cupule marks thought to be contemporary with the Late Acheulean. At Singi Talav, an Early Acheulean level – layer 4 – yielded six complete and unmodified quartz crystals (though one may have some use-wear), possibly suggesting the transport of non-utilitarian objects from elsewhere. A similar example comes from the Acheulean layer at Hunsgi, which yielded almost 20 hematite pebbles, geologically exotic to the region, including one with striations interpreted as a sign of utilization. The only known premodern hominin fossils in the subcontinent may be contemporary with or younger than the Late Acheulean and come from Hathnora in the central Narmada Valley (see Patnaik et al. 2009). The Narmada fossil evidence includes a partial calvarium (possibly female) and possibly associated clavicles and a rib fragment. The calvarium was originally identified as an "advanced" *Homo erectus* and later reclassified as an archaic or early form of *H. sapiens*; most recently it has been classified as *Homo* sp. indet. Modern human fossils and subfossils are more abundant in South Asia. In India, examples are known from Baghai Khor, Bagor, Pachmarhi, Mahara-Pahar, Tilwara, Valasna, Sarai Nahar Rai, Mahadaha, Damdama, and Lekhahia. In Sri Lanka, they come from Fa Hien, Batadomba Lena, Beli Lena Kitulgala, Bellanbandi Palassa, Hambantota, Alu Galge, Ravan Alle, and Beli Lena Athula (Kennedy 2003).

The South Asian "Oldowan"

In the 1960s, A.P. Khatri was the first to argue for an indigenous origin of the Indian Acheulean from the Mahadevian industry, equated to the Oldowan, at Mahadeo Piparia in the Upper Narmada Valley. A similar claim was later made by Armand (1983) who reported a comparable assemblage at Durkadi from excavated contexts in the lower part of the valley. Subsequent research has demonstrated that the cultural sequence at Durkadi ranges only from the Middle Paleolithic to the microlithic (Chauhan et al. 2013). Numerous core-and-flake assemblages have also been reported from the Konkan coast, Karnataka, Uttar Pradesh, Bihar and West Bengal, Orissa, Andhra Pradesh, and northeastern India. Unfortunately, none of these assemblages have been dated and remain techno-chronologically undiagnostic; most appear to postdate the Acheulean (Chauhan 2009). The most systematically studied pre-Acheulean evidence in the subcontinent is also the most controversial and comes from the Siwalik deposits of northern Pakistan. The oldest archaeological evidence here is represented by the c. 2.0 Ma finds from Riwat and the 2.2–0.9 Ma old Mode 1 assemblages from the nearby Pabbi Hills. At Riwat, only 3 out of 23 specimens have been promoted as being most convincing as artifacts (Fig. 2) Rendell and Dennell (1985). The assemblages from the Pabbi Hills comprise a total of 607 lithics (Fig. 3), and the investigators chronologically divided them based on the underlying strata and associated vertebrate faunal assemblages: 102 specimens dated to 0.9–1.2 Ma, 307 specimens to between 1.2 Ma and 1.4 Ma and 198 specimens to between 2.2 Ma and 1.7 Ma. Unfortunately, the Riwat and Pabbi Hills material come from gravel and surface contexts, respectively, and comparable evidence in excavated contexts is required. The oldest paleoanthropological evidence in the subcontinent was recently reported from the Siwalik region of Masol near Chandigarh, northern India. This controversial evidence includes cut-marked fossils and "simple" choppers, both interpreted to be about 2.6 Ma (Malassé 2016). Despite using experimental cut-marks for comparisons, the cut-marks on the fossil specimens may actually

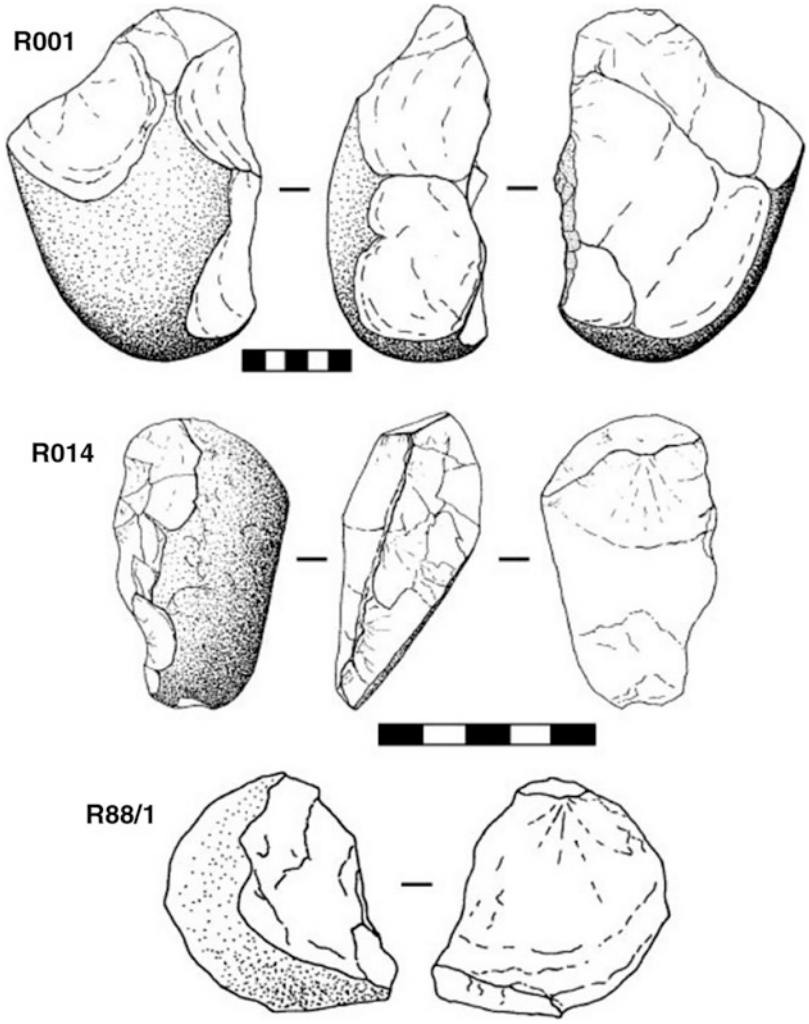

South Asia: Paleolithic, Fig. 2 The main stone tool specimens reported from Riwat, Pakistan

represent modification by the teeth of prehistoric predators or other processes such as fluvial abrasion. The contextual integrity of the artifacts also requires further substantiation as the Siwalik region is notorious for the geomorphological mixing of Siwalik-age vertebrate fossils and post-Siwalik stone tools. In short, unequivocal pre-Acheulean evidence in South Asia has yet to be excavated from primary fine-grained contexts and well-dated, such as key examples in other parts of the Old World.

The South Asian Acheulean

With the exception of northeast India and parts of Konkan Maharashtra, western Kerala, south of the Cauvery River in Tamil Nadu, and Sri Lanka, Acheulean assemblages are found throughout most of the Indian subcontinent (Pappu 2001). The South Asian Acheulean is generally divided into Early or Late developmental phases, based primarily on typo-technological features, assemblage compositions, comparative stratigraphy, and associated metrical analyses. Early Acheulean assemblages are known to comprise hand axes, choppers, polyhedrons, and spheroids, usually a lower number of cleavers (but not always) and flake tools, the predominant use of the stone-hammer technique, and a marked absence of the Levallois technique. The Early Acheulean bifaces are often asymmetrical, large with thick butts or

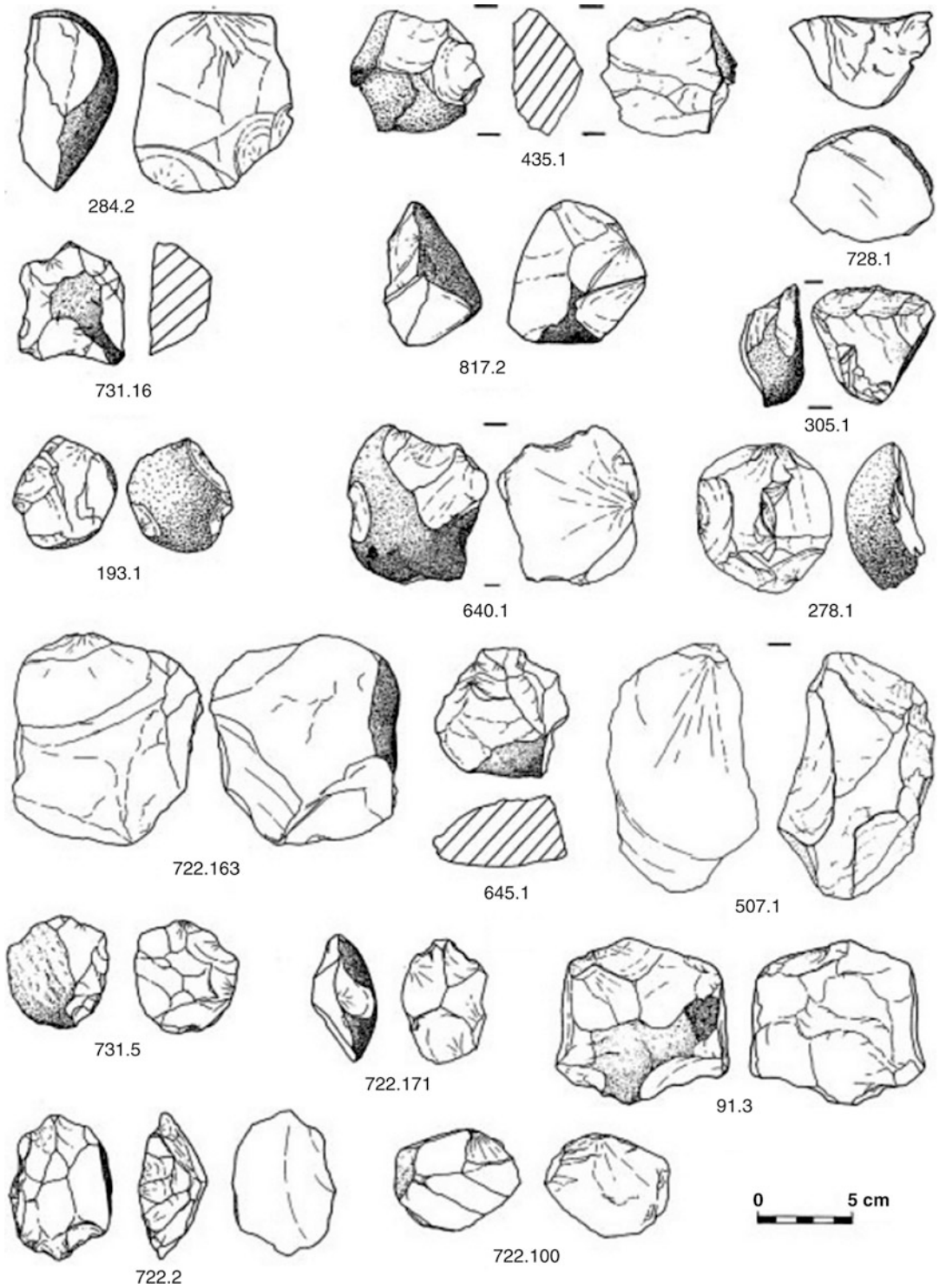

South Asia: Paleolithic, Fig. 3 Some representative stone tool specimens from the Pabbi Hills, Pakistan

midsections, and possess large, bold, and irregular flake scars, indicative of hard-hammer percussion. In contrast, Late Acheulean assemblages are defined by the low proportion of bifaces, the high ratio of cleavers to hand axes, the very high ratio of flake tools such as scrapers, and the extensive employment of the soft-hammer technique and the Levallois and discoid-core techniques. These bifaces are also generally smaller, thinner, and morphologically more refined, with a significant increase in the degree of retouching and controlled bifacial thinning/flaking.

The Earlier Acheulean

The Early Acheulean phase is typologically and chrono-stratigraphically represented by several occurrences, including Nepal, the Thar Desert, and parts of Maharashtra, Karnataka, and Madhya Pradesh. From the available geochronological information and comparative geology and typology, most of these assemblages appear to be older than the Brunhes-Matuyama boundary. Currently, the oldest securely dated Acheulean evidence in the Siwaliks comes from findspots at Dina and Jalalpur in northern Pakistan (700–400 ka). In the Hunsgi-Baichbal valleys (Karnataka), systematic surveys and excavations were conducted since the mid-1960s by K. Paddayya, revealing numerous occurrences belonging to all Paleolithic phases (Paddayya 2001). Probably the most important Early Acheulean site from the Hunsgi complex is Isampur, representing the first-known occurrence of in situ artifacts in a quarry context in India. Although this site was reported to be 1.2 Ma using ESR (Paddayya et al. 2002), the artifacts do not typologically match with the well-dated Attirampakkam evidence (1.5 Ma) and nor with other contemporaneous sites outside India. The region of Tamil Nadu, where stone tools were first reported in India, has been studied for over a century by various researchers (Pappu et al. 2003). The most significant site in the region is Attirampakkam, located in the Kortallayar Valley and investigated intermittently for several decades. Cultural levels at the site derive from a 7 m section and unlike the 16R dune in Rajasthan (Fig. 4) preserve only Early Acheulean and Early Middle Paleolithic levels. Preliminary lithic analyses reveal that a part of the Attirampakkam assemblage exhibits both Early and Late Acheulean characters, and the oldest evidence is between 1.07 Ma and 1.5 Ma in age from paleomagnetic and cosmogenic dating (Pappu et al. 2011). Indeed, this work signifies the first comprehensive interdisciplinary study in recent years in India. Other earlier Acheulean examples

South Asia: Paleolithic, Fig. 4 A view of the 16R dune (multicultural Paleolithic site) near Didwana and quartz crystals (inset) found in Acheulean levels at nearby Singi Talav (both in Rajasthan, NW India)

include Chirki and Morgaon in Maharashtra, Singi Talav in Rajasthan, and Pilikarar in Madhya Pradesh.

The Later Acheulean

The South Asian Late Acheulean sites occur in greater numbers, possibly reflecting population dynamics and associated land-use intensity during the later Middle Pleistocene. This evidence marks the earliest, but undated, employment of the prepared-core and Levallois technology in the region, which are in the form of discoidal cores and the Victoria West technique, as well as the initial production of large blades at sites such as Bhimbetka. The Rohri Hills in southern Pakistan are one of the few South Asian Lower Paleolithic occurrences produced on chert (Fig. 5), and the assemblages come from numerous localities comprised of hundreds of artifacts. In Nepal, the site of Gadari indicates occupation along the banks of the Babai River, as the hand axes were recovered from the basal gravels of the alluvium, the oldest period of the Dang dun, a shallow intermontane post-Siwalik Valley (Corvinus 2006). Most of the South Asian Late Acheulean evidence, however, is located in central and peninsular India, including parts of Rajasthan, Gujarat, Maharashtra, Madhya Pradesh, Bihar, Karnataka, Andhra Pradesh, and Tamil Nadu (Pappu 2001). Some of the best-known Late Acheulean assemblages in north-central India come from Bhimbetka, where hundreds of rock-shelters (many with rock paintings) are situated in a hilly and forested area in Madhya Pradesh (Misra 2001). Trenches in a cave (III-F-24) yielded a 3.8 m Lower and Middle Paleolithic sequence as well as Mesolithic material at the top (Fig. 6). It is unclear exactly when hand axes and cleavers disappeared from the South Asian archaeological record but occur as late as 110 ka and 60 ka in central and western India, respectively.

The Middle Paleolithic

The South Asian Middle Paleolithic has been clearly defined from a large number of occurrences found throughout the entire region, and H.D. Sankalia was the first to formally recognize and define the South Asian Middle Paleolithic at Nevasa (Pal 2002). However, separating the Middle Paleolithic horizons from the terminal Acheulean ones has proved to be challenging because the Levallois technique (Fig. 7) and other forms of prepared-core technology originate in the Late Acheulean phase of the subcontinent. Additionally, the South Asian Middle Paleolithic sites often overlap geographically with the Late Acheulean occurrences and indicate successful adaptations and exploitation of a range of ecological and topographic settings. Older assemblages often appear to contain diminutive hand axes, and

South Asia: Paleolithic, Fig. 5 Example of an Acheulean biface on chert in the Rohri Hills, Pakistan

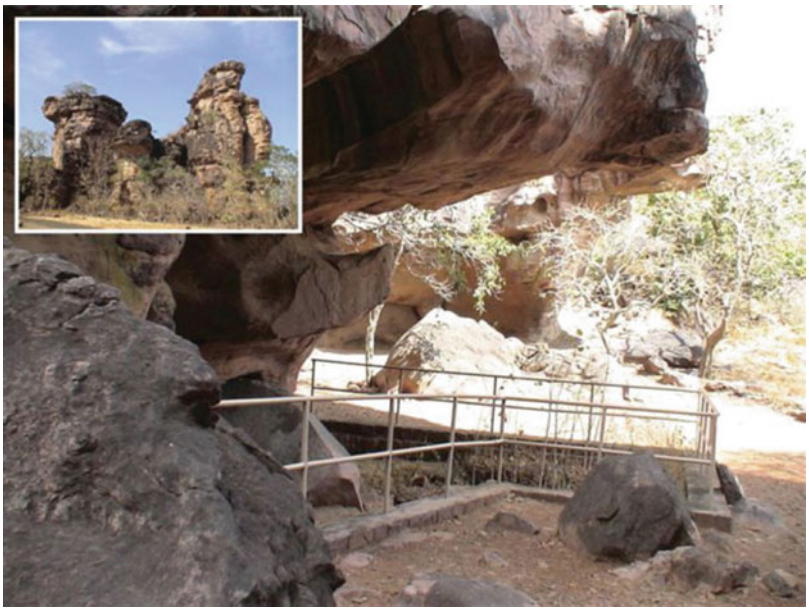

South Asia: Paleolithic, Fig. 6 One of the excavated rockshelters at Bhimbetka in central India

South Asia: Paleolithic, Fig. 7 A Levallois flake from the Narmada Basin, central India

younger assemblages may have an increasing blade component. These observations, however, need to be verified through a more robust chronological framework. The features that distinguish Middle Paleolithic assemblages are the following: (a) a decrease in size of the artifacts; (b) a noticeable shift from large Acheulean bifaces to more smaller, specialized tools; (c) an increase in the prepared-core technique; and (d) a preference for fine-grained raw material (such as quartz, fine-grained quartzite, chert, jasper, chalcedony, flint, agate, cryptocrystalline silica, lydianite, and bloodstone). The South Asian Middle Paleolithic sites vary in their assemblage compositions, which generally include cores, choppers, discoids, scrapers, flakes, points, debitage, and so forth. Some well-studied stratified examples are Nevasa in Maharashtra and Samnapur in Madhya Pradesh, evidence from the Kortallayar Basin in Tamil Nadu, and the Jwalapuram lithic assemblages associated with Younger Toba Tephra in Andhra Pradesh (Petraglia et al. 2007). In Rajasthan, they have been found to be stratified in stabilized paleo-sand dunes and fluvial contexts (e.g., Luni and Berach Basins; 16R dune at Didwana). Absolute dating methods on different materials from different sites suggest that the Indian Middle Paleolithic is provisionally bracketed between 385 ka and 38 ka, although assemblage compositions vary in frequency over time including bifaces of different sizes, Levallois elements, points, and blades.

The latest research on the South Asian Middle Paleolithic demonstrates that the technological transition following the terminal Acheulean is much more complex and older than previously thought for this region. Akilesh et al. (2018) report new data on the Early Middle Paleolithic from Attirampakkam dated to between 385 and 74 ka using infrared-stimulated luminescence. These

assemblages include predominantly diminutive bifaces, Levallois and tanged points, Levallois cores, and a few blades, all of which are distributed throughout the stratigraphy in varying frequencies. The bottom-most assemblage is currently the oldest Middle Paleolithic evidence outside of Africa and may suggest multiregional evolution of this technology across the Old World (e.g., the Mousterian by the Neanderthals). Earlier, some younger Indian Middle Paleolithic sites (e.g., Jwalapuram, Kataoti) were interpreted to have been a result of modern human dispersals. While this new study does not reveal which hominin species was responsible for the Indian Early Middle Paleolithic, it clearly challenges previous hypotheses that (i) the Indian Middle Paleolithic is younger than 120 ka and (ii) that it was brought in exclusively by *Homo sapiens*. The most likely possibility is that the oldest South Asian Middle Paleolithic assemblages were produced by archaic hominins who survived late in India before being replaced by modern humans with younger and more advanced technologies soon after 60 ka. However, one additional possibility should not be ruled out: that there were multiple waves of Middle Paleolithic technological dispersals across the Old World by different species over time – at first by archaics and later by moderns. A major challenge in Paleolithic archaeology has been, and still is, to reliably differentiate between these mixed Middle Paleolithic technologies (indigenous vs. dispersed).

Though difficult to classify exclusively as Middle or Upper Paleolithic, archaeological evidence at about 45 ka is represented by Kalpi in the Ganga Plains which yielded vertebrate fossil remains as well as core tools and by Site 55 in Pakistan in loess context. Also in Pakistan, Sanghao Cave of Mousterian and Upper Paleolithic cultural affinities also shows broadly comparable ages ranging from 42 ka to 22 ka.

The Upper Paleolithic

The South Asian Upper Paleolithic is also not clearly defined, due to lack of absolute dates and detailed technological analyses/classification. This entity was first recognized based on specific tool types already known from Africa and Europe. Its dominating and defining features include a notable increase in the production of more specialized tools such as blades, burins, borers, and, at some sites, an early occurrence of microliths. Additional tool types of this period include flakes, knives, awls, scrapers, and cores including cylindrical types, choppers, and bone tools. At Bhimbetka, for example, end scrapers dominate the Upper Paleolithic assemblages and are often made from the bases of blades and burins. The use of pressure flaking and the soft-hammer technique for flake detachment appears to increase significantly as compared with the older lithic traditions. The degree or intensity of retouch also appears to increase in general. The South Asian Upper Paleolithic shows a greater degree of regional typo-technological variation as well as an increase in different types of scrapers (e.g., steep, convex, convergent) and backed blades. Additional unique features include (a) the exploitation of ostrich eggshell fragments for making beads at Patne, Mehtakheri, Bhimbetka, Batadomba Lena, and Jwalapuram rock-shelter and non-utilitarian artifacts such as engraved geometric or crosshatched patterns; (b) possibly the oldest prehistoric shrine in the region at Baghor II; and (c) stone platforms at Bhimbetka and Site 55, and bone harpoons from the Belan Valley and Jwalapuram rock-shelter. Some of the later Paleolithic assemblages, such as Badatomba-lena and Sites 49 and 50 (Sri Lanka) and Jwalapuram rock-shelter (India), comprise the earliest geometric microlithic evidence in South Asia (see Clarkson et al. 2009). A sound chronological framework for the South Asian Upper Paleolithic is lacking, but a broad estimate can be provisionally assigned as 50 ka to 15 ka before the Mesolithic proper starts. The best-known sites (or stratigraphic sequences reported with Upper Paleolithic assemblages) include the Son Valley sites and the Bhimbetka rock-shelters (shelters III-F-23 and III-A-28) in Madhya Pradesh, the Kurnool caves and several river basins in Andhra Pradesh, the Belan Valley sites in Uttar Pradesh, the Singhbhum region of Bihar, Patne in Maharashtra, Mehtakheri in the Narmada Valley, the Budha Pushkar region in Rajasthan, the Rohri Hills in Pakistan, the Chota Nagpur region in

Bihar, the Sanghao rock-shelter and Site 55 in Pakistan, and Batadomba Lena and Fa Hien Cave in Sri Lanka. Rock art and other forms of symbolic behavior appear to have started during this time before becoming prolific during the subsequent Mesolithic phase (Table 1). It is important to note that some Upper Paleolithic evidence and the earliest microlithic assemblages appear to mix and chronologically overlap across South Asia; this evidence has been labeled as Late Paleolithic (James and Petraglia 2005). In some regions, a classic or exclusive Upper Paleolithic record is completely missing, and the Middle Paleolithic evidence is followed directly by microlithic assemblages.

The Siwalik Hills and the Soanian Industry

The most enigmatic and prominent non-bifacial techno-complex is represented by the Soanian industry, found throughout the Siwalik Hills region in Pakistan, India, and Nepal. As first defined by de Terra and Paterson (1939) from the Soan terrace sequence in northern Pakistan, Soanian artifacts were manufactured on quartzite pebbles, cobbles, and occasionally on boulders, all derived from various fluvial sources on the surrounding landscape. These assemblages generally comprise varieties of choppers, discoids, scrapers, cores, and numerous flake types (Fig. 8), all occurring in varying typo-technological frequencies at individual sites. Such attributes as bifacial reduction, acortical finished tools, extensive platform preparation (i.e., facetted platforms), and plan form and lateral symmetry are absent within the Soanian. The primary issues in accurately characterizing Soanian assemblages include lack of primary contexts and absolute dates and low numbers of diagnostic assemblages. The dynamic sedimentary and tectonic history of the Siwalik region has prevented preservation of Paleolithic sites. Most occur in non-dateable surface contexts with stray artifacts strewn randomly across Siwalik landscapes. Excluding some localities in the Soan Valley of Pakistan, the site complexes of Guler (Beas Valley) and Toka (Kala Amb area) in India, and the Arjun-3 site in Nepal, Soanian assemblages rarely comprise more than a few dozen artifacts. Rendell and colleagues (1989) have shown the Soanian "terraces" observed by de Terra and Paterson to be erosional features in the Soan Valley, rather than true river terraces. Although this challenges the validity of Soanian technological progression based on terrace sequences, current geological evidence suggests a post-Acheulean age for the earliest Soanian assemblages, also supported by preliminary dates from Arjun-3 in Nepal (e.g., Zöller 2000). Although the techno-cultural origins of the Soanian and associated chronologies are obscure, it is clear that the regionally dominant raw material (fluvially rounded quartzite clasts) and associated technology continued to be manifested into the Holocene.

Historical Background

The development of Quaternary and Paleolithic research in India can be divided into three phases: (1) from 1863 to 1964, (2) from 1964 to the early 1980s (see Korisettar and Rajaguru 1998), and (3) from the 1980s to the present day. During the first phase, inferences relating to paleoclimates and paleoenvironments depended on the characteristics of lithological units (such as coarse-grained and fine-grained clastic sediments) and the associated faunal material. Methodology and interpretative frameworks that were prominent in Europe were applied to the Indian context (most especially the glacial climatic sequence). Due to this massive influx of European influence between 1940 and 1960, many regional surveys were conducted to eradicate theoretical gaps, which included Pleistocene chronology and cultural successions. The 1960s formed a decade of important methodological and theoretical applications in the earth sciences and archaeology, all over the world. Numerous geographic zones of study were introduced, and they included littoral, aeoline, lacustrine, and offshore environments. The first discovery (in 1863) of Lower Paleolithic artifacts was made at Pallavaram near Madras (now Chennai) by Robert Bruce Foote (Kennedy 2003). He was probably the first investigator to attempt establishing their ages as well as reconstructing contemporary climatic conditions and also the

South Asia: Paleolithic, Table 1 Salient paleoanthropological features in the Indian subcontinent (see Harrod 2007; Petraglia 2007)

Period	Site or region	Age	Significance	References
Lower and early? Middle Paleolithic feature				
O?	Masol[a]	c. 2.6 Ma	Possible cut-marks and "Mode 1" assemblages	Malassé (2016)
O	Riwat	c. 2.0 Ma	Best studied pre-Acheulean evidence	Rendell et al. (1987)
O	(Pabbi Hills)	2.2–1.0 Ma	Oldest Mode 1 evidence in contextual association with vertebrate fossils	Dennell (2004)
EA	Attirampakkam	1.5–1.07 Ma	Oldest Acheulean evidence in Eurasia; buried bifaces found in vertical and oblique positions; bovid and elephant footprints and shell impressions; second site in clay context	Pappu et al. (2011)
A	Isampur[a]	1.27–0.73 Ma	First known Paleolithic quarry site	Paddayya et al. (2002)
EA	Singi Talav	>800 ka	Transport of nonutilitarian quartz crystals; one of two sites in clay context	Gaillard (2006)
EA	Chirki-on-Pravara	>350 ka	Preservation of fossilized tree fragments	Corvinus (1971)
A	Kuliana		First Lower Paleolithic site to be excavated	Bose and Sen (1948)
A	Hunsgi Valley		Twenty hematite nodules, one with striations (from use)	Paddayya (1982)
A	Hunsgi locality V		Possible stone alignment	Paddayya (1984)
LA	Multiple sites		Levallois or prepared-core technique	Multiple publications
LA	Bhimbetka[b]		Cupule and engraving on rock-shelter wall	Bednarik (2003)
LA	Bhimbetka		Stratigraphically oldest known blade production	Misra (1982)
LA-M	Bhimbetka		Largest, lengthiest and earliest stratified rock-shelter complex with rock art	Wakanker (1973)
LA	Paisra		Possible stone alignment and postholes	Pant and Jayaswal (1991)
LA	Zia Piarat Shaban		The only chert bifaces known and in quarry context	Biagi and Cremaschi (1988)
LA	Maihar		Flat sandstone disc, centripetally flaked	See Bednarik (2003)
LA-MP	Hathnora		Oldest premodern fossil hominin, attributed to various species of *Homo*	See Athreya (2007)
LA-MP	Hathnora		Oldest postcranial fossil specimens (clavicles and rib fragment)	Sankhyan (1997, 2005)
LA-MP	Daraki-Chattan		500+ cupules, 2 engraved grooves, stone floors	See Bednarik (2003)
LA	Bamburi 1 and Patpara	140–120 ka	Youngest dated Late Acheulean assemblages	Haslam et al. (2011)
LA-MP	Adi Chadi Wao	~69 ka	Youngest dated diminutive hand axes	Marathe (1981)
Late Middle, and Upper Paleolithic features				
MP	Attirampakkam	~385–74 ka	Oldest and lengthiest Middle Paleolithic sequence in Eurasia; second known site to yield quartz crystals	Akilesh et al. (2018)
LP-M	16R (Didwana)	~187–4.4 ka	Lengthiest prehistoric sequence in open-air context	Singhvi et al. (2010)
MP	Katoati	~95 ka	Oldest dated Middle Paleolithic in the Thar Desert	Blinkhorn et al. (2013)

(continued)

S

South Asia: Paleolithic, Table 1 (continued)

Period	Site or region	Age	Significance	References
MP	Jwalapuram	~77–38 ka	Open-air stratified lithic assemblages above and below Youngest Toba Tuff (YTT)	Petraglia et al. (2007)
MP	Hathnora	>33 ka	Possible engraved lithic artifact	Patnaik et al. (2009)
LP-M	Bhimbetka		Lengthiest prehistoric sequence in rock-shelter context; earliest stone structure in rock-shelter context	Misra (1989)
MP	Kalpi	45 ka	Burnt bones and diminutive choppers; possible cut-marks	Tewari et al. (2002)
MO-UP	Site 55	45 ka	Stone-lined pit, low wall, blades, microblades in open-air context	Dennell et al. (1992)
UP	>40 Indian sites	40–20 ka	Numerous sites with ostrich eggshells	Multiple publications
	Chandrasal	39 ka	Oldest engraved ostrich eggshell fragment	Kumar et al. (1988)
MP-UP	Fa Hien cave	31 ka	Earliest known modern human fossils and geometric microliths	Deraniyagala (1992)
	Khaparkheda		OEB production site	Kumar (2000–2001)
UP	Bhimbetka III A-28		Two OEBs found with modern human burial	Kumar et al. (1988)
UP	Batadomba-lena	28.5 ka	Geometric microlithic tools; bone points and OEB present	Deraniyagala (1992)
UP	Kurnool Caves[c]		Earliest known use of controlled fire, bone tools, cut-marked bones	Nambi and Murty (1983)
UP	Patne	25 ka	Incised ostrich eggshell fragment; lengthiest post-Acheulean prehistoric sequence	Sali (1989)
UP	Baghor	8–9 ka	Oldest Paleolithic shrine (still practiced in the region today)	Kenoyer et al. (1983)
	Belan Valley		Bone harpoon point	Bednarik (2003)
LLP	Jwalapuram 9	35 ka	Burial, microliths, beads, worked bone and harpoon in rock-shelter	Clarkson et al. (2009)

O Oldowan, *EA* Early Acheulean, *A* Acheulean, *LA* Late Acheulean, *LP* Lower Paleolithic, *MP* Middle Paleolithic, *UP* Upper Paleolithic, *M* Mesolithic, *LLP* Later Paleolithic, *OEB* ostrich eggshell beads
[a]Denotes controversial or ambiguous evidence
[b]Viewed as controversial by James and Petraglia (2005)
[c]Called into question by Petraglia (1995)

first to apply a geoarchaeological perspective with an emphasis on site formation. A few decades later, the Yale-Cambridge expedition was launched by de Terra and Paterson (1939) to seek evidence of Pleistocene glaciation phases in the sub-Himalayan region and to highlight its impact on early human cultures, both in concordance with the European model. Following their fieldwork in the Kashmir Valley (Jhelum), on the Potwar plateau (Soan Valley in modern-day Pakistan, discussed below in greater detail), in the central Narmada Valley (between the towns of Hoshangabad and Narsinghpur), and around Chennai, they arrived at a fourfold glacial-interglacial model first established in Europe in 1909. This glacial-interglacial model became a standard for subsequent Pleistocene research in India and prevailed for several decades, until revised by other researchers in the 1980s. In the greater part of the twentieth century, H. D. Sankalia and his colleagues and students placed great emphasis on correlating paleoenvironmental parameters and corresponding technological and behavioral adaptations of early hominids in the subcontinent. An interesting point to be noted is the emphasis placed (at that time) on river valleys and basins for the investigation of Paleolithic sites. Later efforts were directed at sites between

South Asia: Paleolithic, Fig. 8 Representative stone tool specimen from a Soanian site in the Siwalik Hills of northern India

river valleys or away from river valleys and expanded the potential of these sites in peninsular India (Fig. 9 and Table 2). Comprehensive multidisciplinary approaches have been applied only in the last two decades and at very few Paleolithic sites in South Asia. As a result, it is unknown whether various transitions represent technological influences of incoming populations (dispersal of *Homo sapiens* from Africa) or represent indigenous biocultural continuities (independent of external influence). These dynamic transitions probably reflect the collective impact of a suite of factors: demography, raw material type, topographical prominence, water resources, cognitive capabilities, mobility and settlement patterns, and subsequent hominin dispersals from peripheral regions. Research efforts in the last few years have centered on identifying technological dispersals from Africa, pinpointing Early Pleistocene occupations, pinpointing the initial arrival of modern humans, understanding the regional ecological impact of the Toba super-eruption at 74 ka on hominin populations, and establishing the earliest occurrence of microlithic technology.

Key Issues/Current Debates

Most regions of the subcontinent contain assemblages belonging to almost all three Paleolithic phases of techno-chronology, reflecting continuous occupation in various regions but at different levels (e.g., Rohri Hills in southern Pakistan, Hunsgi-Baichbal basins in southern India, the Son Valley in Madhya Pradesh). However, continuous stratigraphic and archaeological sequences from the Lower Paleolithic to the Upper Paleolithic and Mesolithic phases at single

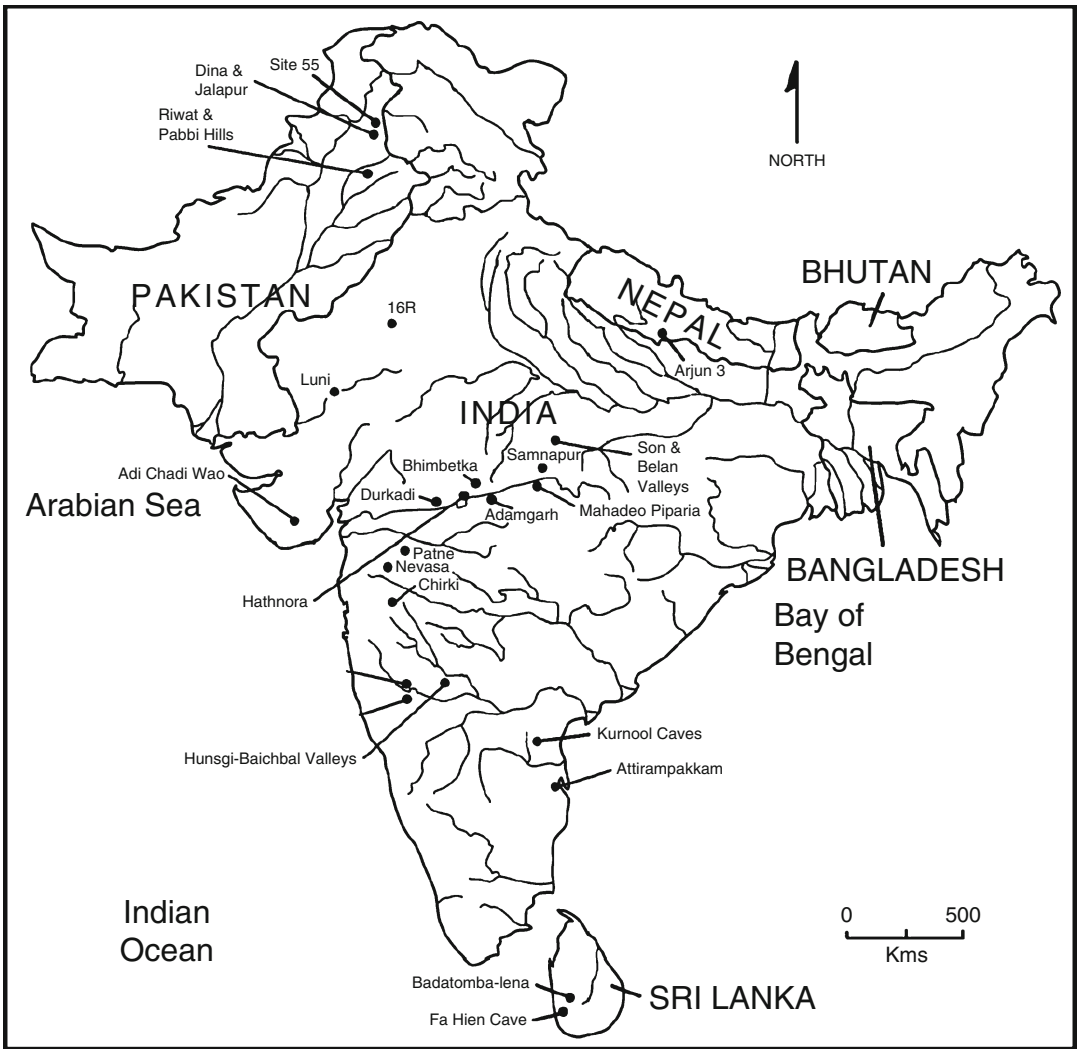

South Asia: Paleolithic, Fig. 9 Map of key paleoanthropological localities in South Asia

locations are rare in South Asia. Exceptional occurrences have been reported from the 16R dune (Rajasthan) and the Bhimbetka and Adamgarh rock-shelter complexes (Madhya Pradesh), all of which preserve continuous archaeological sequences. Some sites have shorter behavioral sequences, such as Patne (Maharashtra), which has Middle and Upper Paleolithic and Mesolithic assemblages but no evidence of Lower Paleolithic occupation. Though these sites have variably preserved multiple techno-chronological horizons ranging from the Lower Paleolithic to the Mesolithic, the sequences are not stratigraphically (i.e., chronologically) continuous. Some of these occurrences represent no visible hiatus during the Late Acheulean to Middle Paleolithic transition, while other sites have yielded sterile layers between cultural horizons. The South Asian Middle Paleolithic and South Asian Upper Paleolithic may represent a combination of indigenous development as well as technological and behavioral influences from incoming populations. The Lower-to-Middle Paleolithic transition is often defined by some by the presence/absence of bifaces. Likewise, the regional Upper Paleolithic-to-Mesolithic

South Asia: Paleolithic, Table 2 Key South Asian paleoanthropological sites and their significances. For further details and relevant reference sources, see Chauhan (2009) and other citations in text

Site name	Age	Significance
Riwat	– c. 2.0 Ma	Possibly the oldest Oldowan evidence in South Asia
Pabbi Hills	– 2.2–1.0 Ma	Oldest Mode 1 evidence in contextual association with vertebrate fossils
Attirampakkam	1.07–1.5 Ma	Oldest Acheulean occurrence in South Asia; possible bovid and elephant footprints and shell impressions preserved
Isampur	– 1.27–0.73 Ma	First-known Acheulean quarry
Bhimbetka	– Late Middle Pleistocene to Holocene	Largest, lengthiest, earliest, and stratified rockshelter complex with rock art
Hathnora	– Late Middle Pleistocene or Late Quaternary	Oldest premodern fossil hominin; attributed to various species of *Homo*
Adi Chadi Wao	69 ka	Youngest dated handaxes
Jwalapuram	c. 74 ka	Oldest well-dated Middle Paleolithic assemblages and in association with Younger Toba tephra (note: below YTT only; the assemblages above YTT are in secondary context)
Kurnool Caves	– Late Quaternary	Earliest known use of controlled fire, bone tools, cutmarked bones
Patne	25 ka	Incised ostrich eggshell fragment

transition is becoming difficult to characterize because the antiquity of microlithic technology is being pushed back. In fact, there is high typo-technological variation across the subcontinent after 400 ka with respective sites having variable numbers (including complete absence at times) of Large Flake Acheulean bifaces, diminutive bifaces as well as flake-dominated, blade-dominated, and microlithic-dominated assemblages (Fig. 10). This technological diversity appears to increase after about 120 ka and reaches its peak with contemporaneous Middle Paleolithic, Upper Paleolithic, and microlithic typo-technologies at about 45 ka, at Kalpi (northern India), Site 55 (Pakistan), and Mehtakheri (central India), respectively. The absence of Paleolithic evidence in some parts of the Indian subcontinent may be related to unique climatic and topographic features. For example, parts of northeastern India are known to receive the highest amount of rainfall in the world, a climatic feature that may have affected regional environmental conditions during the Pleistocene, including sedimentation rates, seasonal raw material availability, and access to required resources for subsistence (as compared to other regions of the subcontinent). One reason for the dearth of Paleolithic archaeological evidence in such regions may be poor visibility for survey purposes or a limited occurrence of time-specific deposits in this thickly vegetated zone.

Many tool types within the South Asian Paleolithic are also known from other regions of the Old World, thus suggesting broad similarities in their overall functional and behavioral aspects, as well as shared subsistence strategies. At the same time, the comparatively low profile of specific tool types, such as classic tanged bifacial (projectile) points (Costa 2012) and preferential Levallois elements, may reflect the absence of associated behaviors (e.g., hunting of large mammals with hafted points on short thrusting spears) in the subcontinent. No convincing evidence of butchery has been clearly demonstrated in South Asia earlier than the evidence from the Kurnool Caves and possibly Kalpi at about 45 ka. Though rare, there appear to be some regional typo-technological variants within the South Asian Paleolithic. For example, the cleaver manufacturing technique from Chiri-on-Pravara is not found anywhere else in the subcontinent. Likewise, the Middle Paleolithic Jamalpur industry from Bihar shows higher than "normal" frequencies of end scrapers, notched tools, and denticulates, as well as typo-morphologically unique knife and scraper types. The paleoanthropological record of the island country of Sri Lanka is comparatively less well known but has a significant bearing on the

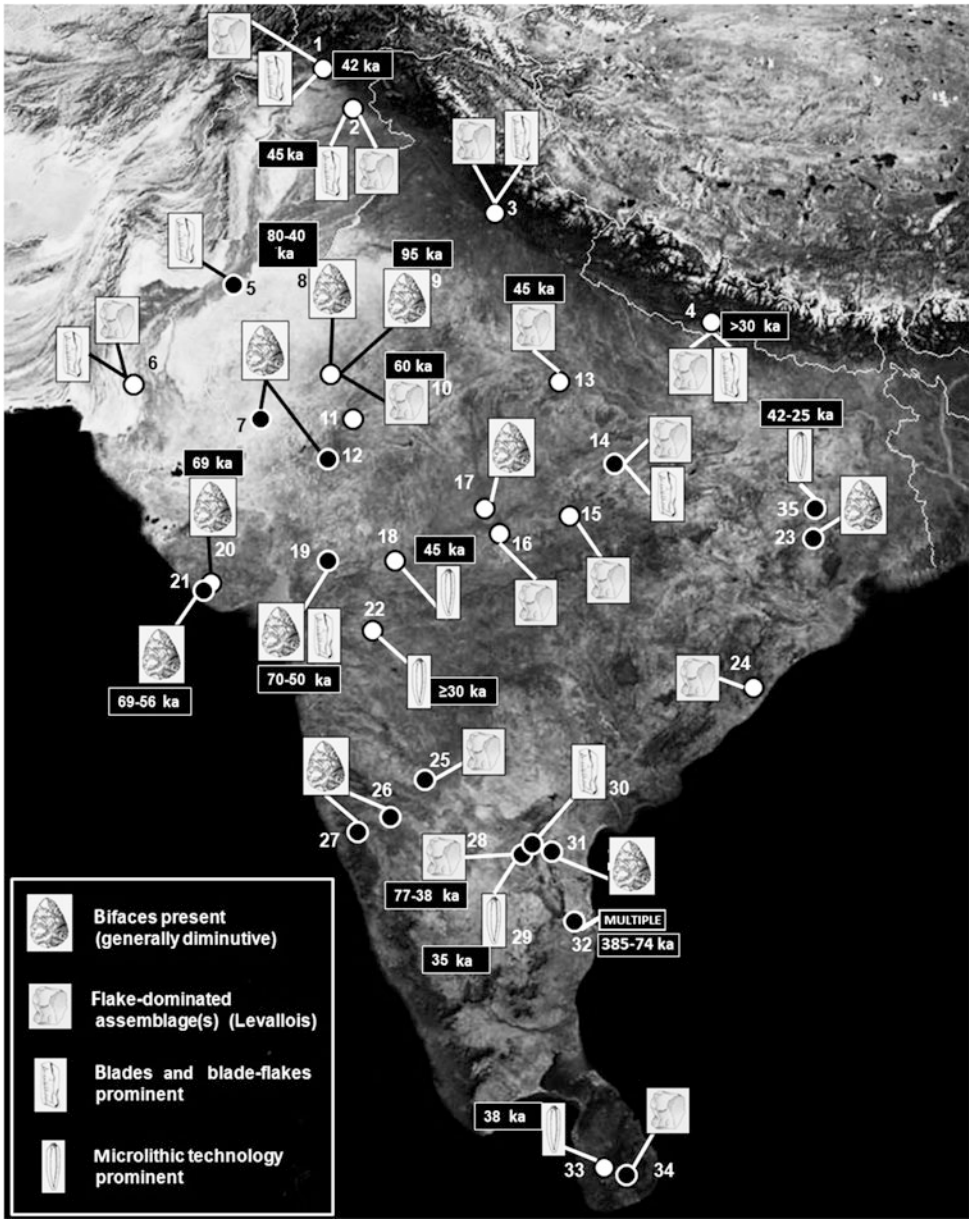

South Asia: Paleolithic, Fig. 10 Key Middle/Upper Paleolithic and early microlithic assemblages across South Asia (385–35 ka). Available dates are indicated next to site locations, and the undated assemblages are presumed to be younger than 100 ka. Site numbers: 1 = Sanghao Cave; 2 = Site 55; 3 = Toka; 4 = Arjun-3; 5 = Chancha Baluch; 6 = Ongar; 7 = Luni; 8 = 16R; 9 = Katoati-a; 10; Katoati-b; 11 = Budha Pushkar; 12 = Berach; 13 = Kalpi; 14 = Son and Belan valleys (including Dhaba); 15 = Samnapur; 16 = Adamgarh; 17 = Bhimbetka; 18 = Mehtakheri; 19 = Orsang Valley; 20 = Adi Chadi Wao; 21 = Hiran Valley including Adi Chadi Wao; 22 = Patne; 23 = Singhbhum; 24 = Ramayogi Agraharam; 25 = Hunsgi-Baichbal; 26 = Kaladgi Basin (including Lakhmapur); 27 = Konkan; 28 = Jwalapuram Toba localities; 29 = Jwalapuram 9 rock-shelter; 30 = Kurnool Caves; 31 = Gunjana Valley; 32 = Attirmpakkam; 33 = Batadomba-lena; 34 = Ratnapura industry; 35 = Kana and Mahadebbera. (Modified after Chauhan et al. 2017)

evolution of modern humans in the subcontinent. Some of the most well-preserved South Asian fossils of modern *Homo sapiens* come from various cave deposits in Sri Lanka such as Fa Hien Cave. Renewed paleoanthropological research is critically required, however, to identify and date the earliest occupation in this region, which currently appears to be no older than 30 ka. The Ratnapura region in the southwestern wet lowlands (Deraniyagala 1992) has yielded quartz and quartzite lithic artifacts, but these remain undated and ambiguous.

Future Directions

Despite over a century of Paleolithic research in South Asia or the Indian subcontinent, a large number of important issues require to be addressed and explained. Some examples include (a) the lack of premodern hominin fossils as compared with other Old World regions, (b) the lack of unambiguous Oldowan evidence (especially if South Asia was a route during Out of Africa I migration from eastern Africa to SE Asia during the early Pleistocene), (c) the potential impact of the Toba super-eruption at 74 ka on regional (and global) climate and hominin adaptations/survival, (d) the number of dispersals and hominin species in the region during the last 2 Ma, and (e) specific subsistence strategies and land-use patterns in relation to the differing ecologies across the entire region. More systematic surveys, multidisciplinary investigations, and rigorous absolute dating projects are crucially required to address all of these problems and related questions (see Dennell 2000–2001). A more increased focus on paleoanthropology in South Asia is all the more important as numerous areas with Paleolithic evidence are under constant threat from population increase, growing infrastructure, widespread agriculture, and other destructive agents.

On the lack of hominin fossils: One of the most significant deficiencies in South Asian paleoanthropology is the virtual lack of hominin fossils older than the Upper Pleistocene. This insufficiency appears to be related to a number of possible factors: (1) geological factors such as low rates of preservation and high rates of erosion, (2) the fossils are exposed or preserved in very rare contexts and have not been recovered as of yet, (3) the fossils, especially fragmentary or weathered specimens, have not been recognized as being hominin by nonspecialists, since most investigators in the field are archaeologists, prehistorians, and geologists. Qualified physical anthropologists have rarely carried out long-term and systematic surveys for hominin fossils in South Asia.

On lack of unequivocal Oldowan evidence: Though numerous "Oldowan" assemblages have been reported throughout the subcontinent, unequivocal evidence (if any) continues to remain elusive. Because there is a considerable faunal overlap between the Siwalik Hills region and various early Homo sites, it appears that the Pliocene conditions in India during the Pinjore Fm. times were conducive to possibly allow dispersion of early hominin through the region. Moreover, sediments older than the Middle Pleistocene occur only in pockets south of the Siwalik Hills, suggesting that associated Oldowan evidence has not been preserved in primary context or is deeply buried at places. If early hominins with Oldowan technology passed through this region on the way to SE Asia, associated evidence should be (theoretically) preserved in South Asia, even if marginally.

On the possible impacts of the Toba super-eruption: The Toba volcano, located in Indonesia, erupted at least three times in the last 1 Ma. The largest eruption, or super-eruption, is known to have occurred at ~74 ka, and resulting ash was widely deposited in India due to the wind direction following the eruption. Primary deposits of this ash or tephra can be used as chrono- stratigraphic marker in the field. Current debates are centered on the potential ecological impact(s) of the eruption on Indian Pleistocene flora, fauna, and hominin populations (Williams 2012). A key hindrance has been the challenge in finding undisturbed Paleolithic assemblages in

stratigraphic association above, below, and within primary context Younger Toba Tephra deposits.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Art, Paleolithic
- ▶ Central Asia: Paleolithic
- ▶ *Homo erectus*
- ▶ *Homo sapiens*
- ▶ Lithic Technology, Paleolithic
- ▶ Misra, Virendra Nath
- ▶ Movius Line
- ▶ Paddayya, Katragadda
- ▶ Sankalia, Hasmukh Dhirajlal
- ▶ Sharma, Govardhan Rai
- ▶ Zeuner, Frederick Everard

References

Akilesh, K., S. Pappu, H.M. Rajapara, Y. Gunnell, A.-D. Shukla, and A.K. Singhvi. 2018. Early Middle Palaeolithic culture in India around 385–172 ka reframes Out of Africa models. *Nature* 554: 97–101.

Armand, J. 1983. *Archaeological excavations in the Durkadi Nala- an early Palaeolithic pebble–tool workshop in central India*. Delhi: Munshiram Manoharlal Publishers.

Athreya, S. 2007. Was Homo heidelbergensis in South Asia? A test using the Narmada fossil from central India. In *The Evolution and History of Human Populations in South Asia Inter-disciplinary Studies in Archaeology, Biological Anthropology, Linguistics and Genetics*. Editors: Petraglia, Michael D., Allchin, Bridget (Eds.), pp. 137–170.

Bednarik, R.G. 2003. A global perspective of Indian palaeoart. Available at: http://mc2.vicnet.net.au/user_files/e/eip1/myfiles/newsletters/reddy3.pdf

Biagi, P., and M. Cremaschi. 1988. The early Palaeolithic sites of the Rohri Hills (Sind, Pakistan) and their environmental significance. *World Archaeology* 19 (3): 421–433.

Blinkhorn, J., H. Achyuthan, M. Petraglia, and P. Ditchfield. 2013. Middle Palaeolithic occupation in the Thar Desert during the Upper Pleistocene: The signature of a modern human exit out of Africa? *Quaternary Science Reviews* 77: 233–238.

Bose, N.K., and D. Sen. 1948. *Excavations at Mayurbhanj*. Calcutta: Calcutta University.

Chauhan, P.R. 2009. The South Asian Paleolithic record and its potential for transitions studies. In *Sourcebook of Paleolithic transitions: Methods, theories and interpretations*, ed. M. Camps and P.R. Chauhan, 121–139. New York: Springer.

Chauhan, P.R., V. Sathe, and S. Shaik. 2013. A short note on prehistoric reinvestigations at Durkadi, central India. *Indian Journal of Physical Anthropology and Human Genetics* 32 (1): 185–193. (Guest Eds. D.K. Bhattacharya and P.R. Chauhan).

Chauhan, P.R., S. Ozarkar, and S. Kulkarni. 2017. Genes, stone tools, and modern human dispersals in the center of the Old World. In *Emergence and diversity of modern human behavior in Paleolithic Asia*, ed. K. Yōsuke, I. Masami, T. Goebel, S. Hiroyuki, and A. Ono, 94–113. College Station: Texas A&M University Press.

Clarkson, C., M. Petraglia, R. Korisettar, M. Haslam, N. Boivin, A. Crowther, P. Ditchfield, D. Fuller, P. Miracle, C. Harris, K. Connell, H. James, and J. Koshy. 2009. The oldest and longest enduring microlithic sequence in India: 35000 years of modern human occupation and change at the Jwalapuram Locality 9 rockshelter. *Antiquity* 83: 326–348.

Corvinus, G. 1971. Pleistocene fossil wood from Chirki on Pravara. *Current Anthropology* 12: 283.

Corvinus, G. 2006. Acheulian handaxes from the Upper Siwalik in Nepal. In *Axe age: Acheulian tool-making from quarry to discard*, ed. N. Goren-Inbar and G. Sharon. London: Equinox.

Costa, A. 2012. Were there stone-tipped armatures in the South Asian Middle Paleolithic? *Quaternary International* 269: 22–30.

De Terra, H., and T.T. Paterson. 1939. *Studies on the Ice Age in India and associated human cultures*, Carnegie Institute publication 493. Washington, DC: Carnegie Institute.

Dennell, R.W. 2000–2001. Palaeolithic studies in India since Independence: From an outsider's point of view. *Bulletin of the Deccan College Post-Graduate and Research Institute* 60–61: 175–187.

Dennell, R., H. Rendell, M. Halim, and E. Moth. 1992. A 45,000-year-old open-air Paleolithic site at Riwat, northern Pakistan. *Journal of Field Archaeology* 19: 17–33.

Deraniyagala, S.U. 1992. *The prehistory of Sri Lanka: An ecological perspective*. Vols. 1 & 2. Colombo: Department of the Archaeological Survey, Government of Sri Lanka.

Gaillard, C. 2006. Les premiers peuplements d' Asie du Sud: vestiges culturels. *Comptes Rendus Palevol* 5: 359–369.

Harrod, J.B. 2007. Available at: http://www.originsnet.org/SYNOPSIS%20OF%20PALEO%20INDIA.pdf

Haslam, M., R.G. Roberts, C. Shipton, J.N. Pal, J.L. Fenwick, P. Ditchfield, N. Boivin, A.K. Dubey, M.C. Gupta, and M. Petraglia. 2011. Late Acheulean

hominins at the Marine Isotope Stage 6/5e transition in north-central India. *Quaternary Research* 75 (3): 670–682.

James, H.V.A., and M.D. Petraglia. 2005. Modern human origins and the evolution of behavior in the later Pleistocene record of South Asia. *Current Anthropology* 46: S3–S27.

Kennedy, K.A.R. 2003. *God-apes and fossil men: Paleoanthropology of South Asia*. Ann Arbor: University of Michigan Press.

Kenoyer, J.M., J.D. Clark, J.N. Pal, and G.R. Sharma. 1983. An Upper Palaeolithic shrine in India? Antiquity LVII: 88–94.

Korisettar, R., and S.N. Rajaguru. 1998. Quaternary stratigraphy, palaeoclimate and the Lower Palaeolithic of India. In *Early human behavior in global context: The rise and diversity of the Lower Palaeolithic record*, ed. M. Petraglia and R. Korisettar, 304–342. New York: Routledge.

Kumar, G. 2000–2001. Chronology of Indian rock art: A fresh attempt. *Purakala* 11–12: 5–35.

Kumar, G., G. Narvare, and R.K. Pancholi. 1988. Engraved ostrich eggshell objects: New evidence of Upper Palaeolithic art in India. *Rock Art Research* 5: 43–53.

Malassé, D.A. 2016. The first Indo-French Prehistorical Mission in Siwaliks and the discovery of anthropic activities at 2.6 million years. *Comptes Rendus Palevol* 15: 281–294.

Marathe, A.R. 1981. *Geoarchaeology of the Hiran Valley, Saurashtra, India*. Pune: Deccan College Post-Graduate and Research Institute.

Mishra, S. 1995. Chronology of the Indian Stone Age: The impact of recent absolute and relative dating attempts. *Man and Environment* 20 (2): 11–16.

Misra, V.N. 1982. Evolution of the blade element in the stone industries of the rock shelter III F-23, Bhimbetka. In *Indian archaeology: New perspectives*, ed. R.-K. Sharma, 7–13. Delhi: Agam Kala Prakashan.

Misra, V.N. 1989. Stone Age India: An ecological perspective. *Man and Environment* XIV: 17–64.

Misra, V.N. 2001. Prehistoric human colonization of India. *Journal of Biosciences* 26 (4): 491–531.

Nambi, K.V.S., and M.L.K. Murty. 1983. An Upper Paleolithic fireplace in the Kurnool Caves. *Bulletin of the Deccan College Research Institute* 42: 110–113.

Paddayya, K. 1984. Stone Age India. In *Neue Forschungen zur Altsteinzeit*, ed. H. Müller-Karp. Munich: C.H. Beck Verlag.

Paddayya, K. 2001. The Acheulian culture project of the Hunsgi and Baichbal Valleys, peninsular India. In *Human roots: Africa and Asia in the Middle Pleistocene*, ed. L. Barham and K. Robson-Brown, 235–258. Bristol: Western Academic & Specialist Press.

Paddayya, K., B.A.B.. Blackwell, R. Jhaldiyal, M.-D. Petraglia, S. Fevrier, D.A. Chaderton II, J.I.B. Blickstein, and A.R. Skinner. 2002. Recent findings on the Acheulian of the Hunsgi and Baichbal Valleys, Karnataka, with special reference to the Isampur excavation and its dating. *Current Science* 83 (5): 641–647.

Pal, J.N. 2002. The Middle Palaeolithic culture of South Asia. In *Indian archeology in retrospect – Archaeology and interactive disciplines*, ed. S. Settar and R. Korisettar, vol. 1, 67–83. New Delhi: Manohar and Indian Council of Historical Research.

Pant, P.C., and V. Jayaswal. 1991. *Paisra: The Stone Age settlement of Bihar*. New Delhi: Agam Kala Prakashan.

Pappu, R.S. 2001. *Acheulian culture in peninsular India*. New Delhi: D.K. Printworld.

Pappu, S., Y. Gunnell, M. Taieb, J.P. Brugal, and Y. Touchard. 2003. Excavations at the Palaeolithic site of Attirampakkam, South India: Preliminary findings. *Current Anthropology* 44 (4): 591–597.

Pappu, S., Y. Gunnell, K. Akhilesh, R. Braucher, M. Taieb, F. Demory, and N. Thouveny. 2011. Early Pleistocene presence of Acheulian hominins in South India. *Science* 331: 1596–1600.

Patnaik, R., P.R. Chauhan, M.R. Rao, B.A.B.. Blackwell, A.R. Skinner, A. Sahni, M.S. Chauhan, and H.S. Khan. 2009. New geochronological, palaeoclimatological and Palaeolithic data from the Narmada Valley hominin locality, central India. *Journal of Human Evolution* 56: 114–133.

Petraglia, M.D. 1995. Pursuing site formation research in India. In *Quaternary environments and geoarchaeology of India*, ed. S. Wadia, R. Korisettar, and V.S. Kale, 446–465. Bangalore: Geological Society of India.

Petraglia, M.D. 2007. Mind the gap: Factoring the Arabian Peninsula and the Indian subcontinent into out of Africa models. In *The human revolution revisited*, ed. P. Mellars, O. Bar-Yosef, K. Boyle, and C. Stringer, 383–394. Cambridge: McDonald Institute Archaeological Publications.

Petraglia, M.D., R. Korisettar, N. Boivin, C. Clarkson, P. Ditchfield, S. Jones, J. Koshy, M.M. Lahr, C. Oppenheimer, D. Pyle, R. Roberts, J.-L. Schwenninger, L. Arnold, and K. White. 2007. Middle Paleolithic assemblages from the Indian subcontinent before and after the Toba super-eruption. *Science* 317 (5834): 114–116.

Rendell, H., and R.W. Dennell. 1985. Dated Lower Palaeolithic artefacts from northern Pakistan. *Current Anthropology* 26 (3): 293.

Rendell, H., W. Hailwood, and R.W. Dennell. 1987. Magnetic polarity stratigraphy of Upper Siwalik Sub-Group, Soan Valley, Pakistan: Implications for early human occupance of Asia. *Earth and Planetary Science Letters* 85: 488–496.

Rendell, H.M., R.W. Dennell, and M.A. Halim. 1989. *Pleistocene and Palaeolithic investigations in the Soan Valley, northern Pakistan*, British Archaeological

Mission to Pakistan series 2; BAR international series 544. Oxford: Archaeopress.
Sankhyan, A.R. 1997. A new human fossil from the Central Narmada Basin and its chronology. *Current Science* 73 (12): 1110–1111.
Sankhyan, A.R. 2005. New fossils of early Stone Age man from Central Narmada Valley. *Current Science* 88 (5): 704–707.
Singhvi, A.K., M.A.J. Williams, S.N. Rajaguru, V.N. Misra, S. Chawla, S. Stokes, N. Chauhan, T. Francis, R.K. Ganjoo, and G.S. Humphreys. 2010. A ~200 ka record of climatic change and dune activity in the Thar Desert, India. *Quaternary Science Reviews* 29: 3095–3105.
Tewari, R., P.C. Pant, I.B. Singh, S. Sharma, M. Sharma, P. Srivastava, A.K. Singhvi, P.K. Mishra, and H.J. Tobschall. 2002. Middle Palaeolithic human activity and palaeoclimate at Kalpi in Yamuna Valley, Ganga Plain. *Man and Environment* 27 (2): 1–13.
Wakanker, V.S. 1973. Bhim-betka excavations. *Journal of Indian History* LI (1): 23–33.
Williams, M.A.J. 2012. Did the 73 ka Toba super-eruption have an enduring effect? Insights from genetics, prehistoric archaeology, pollen analysis, stable isotope geochemistry, geomorphology, ice cores, and climate models. *Quaternary International* 269: 87–93.
Zöller, L. 2000. Chronology of Upper Pleistocene "red silts" in the Siwalik system and constraints for the timing of the Upper Palaeolithic in Nepal. *CATENA* 41 (1–3): 229–235.

Further Reading

Allchin, B., A. Goudie, and K.T.M. Hegde. 1978. *Prehistory and palaeogeography of the Great Indian Desert*. London: Academic.
Corvinus, G. 2007. *Prehistoric cultures in Nepal: From the early Palaeolithic to the Neolithic and the Quaternary geology of the Dang-Deokhuri Dun Valleys*. Wiesbaden: Harrassowitz.
Dennell, R.W. 2004. *Early hominin landscapes in northern Pakistan: Investigations in the Pabbi Hills*, BAR international series 1265. Oxford: Archaeopress.
Man & Environment. n.d. Available at: http://researchguides.library.wisc.edu/content.php?pid=57581&sid=430857
Paddayya, K. 1982. *The Acheulian culture of the Hunsgi Valley (peninsular India) – A settlement system perspective*. Pune: Deccan College Post-Graduate and Research Institute.
Petraglia, M.D., and B. Allchin, eds. 2007. *The evolution and history of human populations in South Asia*. New York: Springer.
Sali, S.A. 1989. *The Upper Palaeolithic and Mesolithic cultures of Maharashtra*. Pune: Deccan College Post-Graduate and Research Institute.
Sharma, G.R., and J.D. Clark, eds. 1983. *Paleoenvironments and prehistory of the Middle Son Valley*. Allahabad: Abinash Prakashan.
Wadia, S., R. Korisettar, and V.S. Kale, eds. 1995. *Quaternary environments and geoarchaeology of India*. Bangalore: Geological Society of India.

South, Stanley A.

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Basic Biographical Information

Stanley A. South is one of the most complex and fascinating archaeologists of the past 60 years. Born on February 2, 1928, Stanley was the only son among the four children of Austin E. South and Mae Belle Casey South of Boone, North Carolina. A child of the Great Depression, South grew up in a loving multigenerational family filled with music, singing, poetry, art, and a profound respect for the people and culture of the Appalachian Mountains. In 1934 when others were migrating westward, the South family traveled across the United States to Carlsbad Caverns, the Grand Canyon, Yosemite, and the Chicago World's fair. His formative years ended with service in the US Navy during the final months of WWII followed by photography school and a brief stint as a professional photographer before matriculating at Appalachian State Teachers College (now Appalachian State University) in Boone, NC (1946–1949). After graduation South did some acting and was a public school teacher in a junior high school in Greensboro, NC. There he taught a class on the American Indian, and he began recording archaeological sites in the region.

It was as a student at Appalachian State that South was first exposed to Darwinian evolutionary theory and the then cutting-edge cultural evolutionary theorists Julian Steward and Leslie White. South found his muse in the evolutionary approach and its application to anthropology. He left teaching and entered the graduate program in anthropology at the University of North Carolina. There, under the tutelage of Joffre Coe, he fully embraced the application of evolutionary theory in archaeology (South 1955). Fifty years later he is still an outspoken proponent (South 2005; South and Green 2005).

Major Accomplishments

Over the past five decades, South has made significant contributions in prehistoric and historical archaeology of the Carolinas and the interpretation of same to the general public. This included work at such prehistoric sites as Town Creek Indian Mound in North Carolina and at Charles Towne Landing in South Carolina. He has worked on English (e.g., Brunswick Town [South 2008]; Bethabara [South 1999]; Charles Towne Landing [South 2005]; Ninety-Six), French (Port Royal), Spanish (Santa Elena), and American (Edgefield, Columbia [South 2010]) sites in the Carolinas dating from the sixteenth to twentieth centuries. Known for his exacting field techniques, South drew on his background in photography and drawing and admonished his colleagues to do likewise. This would include the quantifying of findings and their interpretation to the public through reconstruction (South 2002). Significantly South was an early proponent for the timely analysis and reporting of fieldwork. Over the course of his career, he has completed more than 200 reports, articles, monographs, and books detailing his findings. He was the founder of the Conference on Historic Sites Archaeology in 1959 and a cofounder of the Society for Historical Archaeology in 1967. Through his efforts and the support of the Conference on Historic Sites Archaeology, South compiled and published 15 volumes of papers delivered at the annual meetings and later created two other publication series, *Volumes in Historical Archaeology* and *Historical Archaeology in Latin America*. These number 51 and 16 volumes, respectively.

Just before his fiftieth birthday in 1977, South crossed a watershed in his career with the publication of *Method and Theory in Historical Archaeology*. In it South the anthropologist said that to go beyond simple antiquarianism, we must explicitly engage in scientific archaeology. That is, its foundation must rest on evolutionary theory, using the hypothetico-deductive-inductive paradigm (South 1977: 6). Simply put, the humanistic and particularistic paradigms did not meet the criteria necessary for scientific research.

By using the scientific paradigm, South believed that the historic archaeological record would reveal valuable patterning linked to behavior. Thus began his search for patterning to demonstrate that. Built on two decades of research on English-colonial era sites in the Carolinas, its quantitative approach led to the definition of a variety of material patterns reflecting the behaviors associated with the resident cultures of the past. Embraced by the field for making explicit what was implicit, it would be required reading for a generation of students and would transform the field (South 1978). Today pattern recognition is a de rigueur aspect of the methods associated with historical archaeology. While many have turned to humanistic post-processual "storytelling" or other impressionistic approaches, South and many others continue to recognize that pattern delineation holds great promise for comparing differing cultural adaptations in similar natural and social environments. South sums up his basic philosophical belief as "Science: Seek life's truths to set you free" (Joseph 2010: 135, 141).

Beginning in 1978 and continuing for the next quarter of a century, South worked at the sixteenth-century capital of Spanish La Florida Santa Elena. Now a National Historic Landmark, the site, located on the US Marine Corps Recruit Depot, Parris Island, South Carolina, is one of the most completely investigated and best preserved sixteenth-century town sites in the Americas. A detailed publication on the European material culture from the site is widely cited throughout the hemisphere (South et al. 1988). Information from this site will continue to influence our knowledge of sixteenth-century adaptations for decades to come.

Stanley South has been repeatedly honored for his many contributions to the field of historical archaeology, regional history, and scholarship. In 1987 South was awarded the J. C. Harrington medal in Historical Archaeology, the most prestigious award the profession has to offer by the Society for Historical Archaeology (Ferguson 1987). This was followed with the "Order of the Palmettos" and "The Old North State Award" by the states of South and North Carolina. In 1997 he was awarded an Honorary Doctor of Humanities

from the University of South Carolina Trustees for his then four decades of research.

In 2012, at the age of 84, Stanley South retired after 43 years at the South Carolina Institute of Archaeology and Anthropology in Columbia, South Carolina.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Dating Methods in Historical Archaeology
- ▶ Historical Archaeology
- ▶ Historical Archaeology in Latin America
- ▶ North America (USA): Historical Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

References

Ferguson, L. 1987. J.C. Harrington medal in historical archaeology, Stanley A. South 1987. *Historical Archaeology* 21: 1–5.

Joseph, J.W. 2010. An interview with Stanley A. South. *Historical Archaeology* 44: 132–144.

South, S.A. 1955. Evolutionary theory in archaeology. *Southern Indian Studies* 7: 10–32.

South, S.A. 1977. *Method and theory in historical archaeology*. New York: Academic.

South, S.A. 1978. Pattern recognition in historical archaeology. *American Antiquity* 44: 213–237.

South, S.A. 1999. *Historical Archaeology in Wachovia, Excavating Eighteenth-Century Bethabara and Moravia Pottery*. New York: Kluwer Academic/Plenum Publishers.

South, S.A. 2002. *Archaeological pathways to historic site development*. New York: Kluwer Academic/Plenum Publishers.

South, S.A. 2005. *An archaeological evolution*. New York: Springer Science + Business Media.

South, S.A. 2008. *Colonial Brunswick: Archaeology of a British colonial town*. Raleigh: Historical Publications Section, North Carolina Office of Archives and History.

South, S.A. 2010. *Talking artifacts: The 20th century legacy*. Columbia: The University of South Carolina College of Arts and Sciences, South Carolina Institute of Archaeology and Anthropology.

South, S.A., and H.P. Green. 2005. Evolutionary theory in archaeology at mid-century and at the millennium. In *In praise of the poet archaeologist: papers in honor of Stanley South and his five decades of historical archaeology*, Publications in South Carolina archaeology, ed. L.F. Carnes-McNaughton and C. Steen, vol. 1, 154–189. South Carolina: The Council of South Carolina Professional Archaeologists.

South, S.A., R.K. Skowronek, and R.E. Johnson. 1988. *Spanish artifacts from Santa Elena*, Anthropological studies 7, Occasional papers of the South Carolina institute of archaeology and anthropology. Columbia: University of South Carolina.

Southeast Asian Ceramics

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Introduction

The origin of ceramics and their associated technologies – that of the manipulation of clay and pyrotechnology – in Southeast Asia is an important archaeological question that has yet to be researched in detail. Recent fossil and archaeological evidence suggest that the initial colonization of Southeast Asia by *H. sapiens* must have occurred sometime between the *terminus ante quem* of their arrival on Sundaland around 73 ka BP and that of their eventual migration to Sahul at 65 ka (Bellwood 2013: 67, 72, 2017: 89–92; Clarkson et al. 2017; Westaway et al. 2017), with a more conservative estimate placing this migration between 45–50 ka BP (O'Connell et al. 2018). It was to take, however, at least another 65,000–60,000 years before the emergence of the first ceramic artifacts within the bands of hunter-gatherer societies populating the region at that time. This perceptibly long delay in the development of ceramic technology in Southeast Asia is even more perplexing, given that the earliest ceramic artifacts in southern China at the cave sites of Xianrendong (仙人洞 Xiān Rén Dòng) in Jiangxi (江西 Jiāng Xī) province and Yuchanyan (玉蟾岩 Yù Chán Yán) in Hunan (湖南 Hú Nán) province date to c. 20 ka BP and

c. 18 ka BP, respectively (Boaretto et al. 2009; Cohen et al. 2017; Kuzmin 2017; Wu et al. 2012).

To date, the earliest evidence for ceramic technology is found at the Spirit Cave in Northwest Thailand which has been dated to around 7500 BP (7622 ± 300 BP, cal. BP 7193-5900), but this early Holocene date has been disputed in recent years (Gorman 1970: 96, 98; Lampert et al. 2003; Solheim II 1972; White 2004). Outside the Spirit Cave, ceramic artifacts recovered from isolated hunter-gatherer Hoabinhian contexts at Banyan Valley Cave (5360 ± 120 BP, cal. BP 4406-3960) in Thailand, Laang Spean (c. 4290 BC or 6240 ± 70 BP, cal. BP 5616-5461) in Cambodia, Da But in Vietnam (6540 ± 60 BP, cal. BP 5616-5461), and the Pada-Lin Caves in Myanmar (7740 ± 125 BP, cal. BP 6864-6393) collectively document the mid-Holocene appearance of ceramic technology in Mainland Southeast Asia (Bronson and White 1992a: 495–496, b: 478; Bui 1991: 128; Ha 1984–1985: 135; Mourer and Mourer 1971: 36; Nguyen 2005: 91; Reynolds 1992: 84; Zeitoun et al. 2012: 530). In comparison, the earliest known earthenware ceramics found in Island Southeast Asia to date are located at the sites of Sanga Sanga in southern Philippines (6650 ± 180 BP, cal. BP 5912-5291), the Niah Caves in west Malaysia (6850 ± 600 BP, cal. BP 7056-4460), as well as an assortment of plain and burnished pottery recovered in East Timor has been estimated to date to a much later horizon of 4500-3700 BP (Bronson and White 1992a, b; Glover 1986: 204; Solheim II 2003: 3). (Recalibrated by present author with Calib7.10 using IntCal13 curve at 2 Sigma, with the range covering largest relative area under probability distribution cited; see Stuiver and Reimer 1993.)

Definition

For heuristic purposes, "Southeast Asian ceramics" refer to any form of ceramic artifacts – typically, but not limited to, vessels – produced by potters and artisans within the geographical boundaries of the region presently occupied by the 10 member states of the Association of Southeast Asian Nations (ASEAN). In this article, earthenware ceramics refer to any clay artifact fired between 800–1000 °C, whereas stoneware ceramics are usually produced around 1200–1300 °C whereupon clay minerals melt and fuse into a glass-like matrix in a process known as vitrification (Rice 2015: 3–6). As with the rest of the world outside of China during the premodern period, Southeast Asian potters did not produce true porcelain but nonetheless, developed the technology and respective *chaînes opératoires* for the production of a wide variety of "porcelaneous" glazed stoneware ceramics that resemble the significant quantities of Chinese porcelain imported into the region during the historical period.

Historical Background

Prehistoric Ceramics in Southeast Asia

The earliest pottery decorative technique applied on "Hoabinhian" ceramics appears to be paddle-impressions of either "vine or bark" (Ha 1991: 135), followed shortly after by a variety of other techniques including paddle-impressions with basket- or cord-marked patterns, carved-paddle impressions, cord or net-marking, incising, burnishing, slipping, and appliqué (Solheim II 2003: 1–3). These early decorative techniques are hypothesized to be subsequently integrated and distributed across Southeast Asia by the "Neolithic Nusantao Maritime Trading Network" (Solheim II 2006). Both the "Sa-Huynh-Kalanay" and"'Bau-Malay" pottery traditions as well as that of the "Lapita" in the Pacific region have been hypothesized to have developed out of this common "Neolithic" ancestry which, in turn, is thought to have originated in Southern China (Solheim II 1990, 2003: 14–21). Named by Solheim after two prehistoric sites in Vietnam and the Philippines, respectively, he defined the "Sa Huynh-Kalanay" tradition primarily by its decorative motif that typically includes "scallop designs on carinations and rims, friezes of paired diagonals, sequences of alternating triangles and horizontal 'S' interlocking triangles and rectangles, and repeated scrolls or waves" (Favereau and Bellina 2016: 220).

Thereafter, the "Bau-Malay" tradition – characterized specifically by a range of decorative motifs applied using the carved-paddle impressed technique – is observed to gradually replace the "Sa-Huynh-Kalanay" tradition during the first millennium AD in Island Southeast Asia and established itself firmly in the southern Philippines, west Borneo, western Indonesian islands, and the Malay Peninsula from AD 700 onwards (Solheim II 1990: 28–29). Aside from the "Bau-Malay" tradition, "Tanjong Kubor" earthenware – named after the area in Sarawak where many sites with this pottery were found – is the only other major pottery typology in Island Southeast Asia which affiliates earthenware ceramics from sites in Brunei, south Philippines, Sarawak, and Johor Lama during the precolonial period (AD 700–1500) (Bellwood and Omar 1980). Significantly, Bellwood and Omar (1980: 173) have argued that "the distribution pattern [of 'Tanjong Kubor' ware] is related to the development of the Malay language as a trading language in those areas where it is most commonly spoken today."

Back in Mainland Southeast Asia, the "sudden" appearance of pottery decorated using incised and impressed techniques, alongside rice and millet cultivation, domesticated dogs and pigs, small polished stone tools, stone or shell bracelets, bead necklaces, textiles made from spinning yarn with spindle whorls and a mortuary ritual involving extended burials, led archaeologists to hypothesize that this "Neolithic cultural package" represents the expansion of agricultural communities from Southern China into the region (Higham 2014: 103; Rispoli 2007: 235–243). Just like Solheim's "Sa-Huynh-Kalanay" and "Bau-Malay" pottery traditions in Island Southeast Asia, "incised and impressed earthenware" are primarily defined by the decorations they bear which Rispoli characterizes as a "finite repertory of designs" made by incised and impressed techniques (Rispoli 2007: 235–236). While the "incised and impressed" tradition flourished during the "Neolithic" (c. 2000–1000 BC), it did not appear to survive past the subsequent "Bronze" (c. 1000–500 BC) and "Iron" Ages (c. 500 BC–AD 500) in Mainland Southeast Asia, whereas older decorative techniques – especially cord and carved paddle-marking as well as burnishing – persisted alongside the emergence of new subregional decorative techniques, vessel forms (Solheim II 2003: 17–18; White and Eyre 2010: 67), and more importantly, *chaînes opératoires*.

The ceramic tradition at the prehistoric site of Ban Chiang embodies this stylistic transition from the "Neolithic" to the "Metal" Ages in Mainland Southeast Asia. A long mortuary sequence at the site located in the Sakorn Nakhon Basin of the Khorat Plateau in Northeast Thailand revealed the use of ceramic artifacts as part the mortuary assemblage across three broad periods in succession: "Early" (c. 1600–505 BC), "Middle" (c. 760–200 BC), and "Late" (c. 200 BC–AD 200) (Higham et al. 2015: 7–10; White 2008). During the "Early Period" covering the "Neolithic" and early to middle "Bronze Age," complete globular or beaker ceramic vessels decorated with "densely incised designs" and cord-markings were placed near the head or feet of flexed, crouched, or extended adult burials, whereas fetuses and infants were interred within similarly decorated jars (Labbé 1985: 51–52; White 1982: 20, 23–25). By the "Middle Period" or late "Bronze" to early "Iron" Ages however, changes in mortuary rituals saw the interment of only extended adult and child burials mostly above, but sometimes also below, a layer of fragmented ceramic sherds from one to as many as 11 individual vessels (Labbé 1985: 52; White 1982: 20, 25–27). Painting was adopted as a new decorative technique and applied together with incised decorations alongside new vessel forms that included carinated and white-bodied vessels (Labbé 1985: 52; White 1982: 20, 25–27). At the onset of the "Late Period" or mid to late "Iron Age," the extended burial practice persisted but the mortuary ritual involving ceramic goods reverted to the "Early Period" practice of interring complete vessels, albeit directly above the body instead of around it (Labbé 1985: 52; White 1982: 20–28). The "classic" and internationally renowned "red-on-buff" painted Ban Chiang ceramic vessels emerges during this period, along with other vessels including red-fired

vessels with painted red decorations as well as red-fired burnished vessels; cord-marking is also identified on ceramics across both "Middle" and "Late Period" ceramic vessels (Labbé 1985: 52).

The decorative and surface treatment technique of burnishing becomes a hallmark of another significant prehistoric ceramic tradition: "Phimai Black." Identified and described by Solheim in 1965, "Phimai Black" ceramics are earthenware ceramics that were produced during the "Iron Age" in the Phimai region of the upper Mun River valley of the Khorat Plateau (Welch 1985: 194). The diagnostic features of the "Phimai Black" are twofold: a range of geometric or curvilinear streak-burnishing patterns of a dull to bright lustre set upon a grey to black surface color achieved from reduction firing (Welch 1985: 195–197). A wide range of vessel forms appear to constitute the "Phimai Black," but ovaloid jars and bowls are the supposed archetypes of this tradition. Significantly, it is hypothesized that the "Phimai Black" constitutes part of a wider, cultural horizon of reduced-fired and pattern-burnished ceramic production that encompassed the Mekong delta, northern Cambodia, as well as northeast and central Thailand during the Iron Age (Fehrenbach 2009: 134–135). Reduced-fired "blackware" pottery have also been recovered from the "Early Period" stratums at Ban Chiang, but are typically decorated with incised and cord-marked patterns reminiscent of – if not descended from – the "Neolithic" "incised and impressed" tradition (Labbé 1985: 55–56). The recent discovery of small circular updraft ceramic kilns associated with supposedly "Phimai Black" vessels at the late "Iron Age" site of Non Ban Jak in the Phimai region (Higham et al. 2014: 9, 31–33) not only supports the hypothesis of higher firing temperatures (than the average prehistoric earthenware vessel) involved in their production but also heralds a significant change in the *chaînes opératoires* of Southeast Asian ceramic production in the centuries to come.

High-Fired Stoneware and Porcelaneous Glazed Ceramics in Southeast Asia

In spite of the development of wheel-throwing and kiln-firing techniques during the historical period in Southeast Asia, local potters did not manage to produce true porcelain, an accomplishment which required a specific set of raw materials and techniques that was solely achieved by the Chinese during the Tang dynasty (AD 618–906) (Kingery and Vandiver 1986: 10). Nonetheless, potters in various parts of Mainland Southeast Asia eventually managed to achieve firing temperatures high-enough to produce both unglazed and porcelaneous glazed stoneware ceramic artifacts. While small circular, updraft kilns may have been an autochthonous innovation, it has been hypothesized that the larger, high-temperature cross-draft stoneware kilns during the historic period in Southeast Asia were derived from two separate sources from China (Hein 2008), where stoneware ceramics have been produced as early as the Shang Dynasty (c. 1027–771 BC) (Kingery and Vandiver 1986: 10).

Vietnamese Ceramics

Having had a long history of political and cultural interactions with the Chinese beginning as early as 111 BC, the Vietnamese started to produce high-fired ceramics as early as the second century AD at the high temperate kiln complex of Tam Tho in Thanh Hóa province (Hein 2008: 13–14). At the same time, a variety of glazes began to be applied on the surfaces of these high-fired ceramics which included "thin whitish glaze" and "glassy-green ash-glaze drips" (Stevenson 1997: 28–29). Developments in the Vietnamese ceramic tradition remains unclear in the intervening centuries until the Lý (AD 1009–1225) and Trần (AD 1225–1400) dynasties where Vietnamese potters produced a "happy anarchy" of ceramics by localizing the shapes, glazes, and decorative motifs of Chinese vessels in an original manner (Stevenson 1997: 30–31). Ceramics typically produced during the Lý and Trần dynasties include jars, beakers, bowls, and ewers with an assortment of decorations such as incised or moulded friezes of animals, plants, and human figures as well as zoomorphic spouts (Stevenson 1997: 32–33). "Ivory-colored" ash glazing is characteristically applied to Lý ceramics, whereas Trần ceramics usually bore green glazing due to its higher iron content (Stevenson 1997: 34).

Other types of monochrome glazing that occurred during the Lý–Trần period included variations of the green "celadon" glaze ranging between yellow to olive colors, dark "apple-green" glaze composed of copper oxides within a lead flux as well as a brown iron-oxide glaze (Stevenson 1997: 34). Polychrome ceramics bearing a brown and ivory-colored glazing on the exterior and interior surfaces, respectively, are also a distinctive typology produced by Vietnamese kilns during the thirteenth and fourteenth centuries AD (Stevenson 1997: 34).

Following the development of white-bodied ceramics bearing underglaze cobalt blue decorations at the Jingdezhen (景德镇 Jǐng Dé Zhèn) kilns in China during the fourteenth century AD, Vietnamese potters began to produce Blue-and-White ceramics sometime towards the late Trần period as well (Bùi 2001: 137). Vessels that were produced included bowls, dishes, jarlets, vases, and ewers featuring decorations inspired by Chinese designs and motifs such as chrysanthemum and peony flowers, vegetal scrolls, lotus leaves, bamboo, as well as animals and mythical creatures such as fish and lions, dragons and phoenixes (Bùi 2001: 138–142). Glazes commonly applied on the Blue-and-White ceramics during this period include light blue, greyish white, and ivory white colors (Bùi 2001: 138). Four to five spur marks can typically be seen on the unglazed bases of these vessels indicating the use of stacking supports between vessels during the kiln-firing process in this period (Bùi 2001: 138).

By the fifteenth century AD, an "explosion" of new vessel forms and decorations saw the production of basins, large vases, bottles, stem cups, small bowls, zoomorphic and fruit-shaped ewers, covered boxes, *kendis,* as well as non-vessel artifacts such as human statues and tiles (Bùi 2001: 143–145). Glazes applied on ceramics during this period are generally clear and glossy, but appear white, bluish white, or opaque white as they lie above a layer of slip on the ceramic surface (Bùi 2001: 148). The presence of unglazed rings on the bases and feet as well as rims indicates a shift to the direct stacking of vessels during kiln-firing from the use of kiln supports characteristic of the fourteenth century (Bùi 2001: 148). The renowned Blue-and-White globular vase on display at the Topkapı Palace Museum in Istanbul, Turkey, is a product of the Chu Dau kiln complex in the Nam Sách district of North Vietnam during this time (Miksic 2009a: 59–60). Vietnamese potters also made overglaze polychrome ceramics with decorations painted in red, green, and yellow enamel colors at this time, but these ceramics appears to be produced solely for export as they were mostly recovered outside of the country (Stevenson 1997: 38).

In spite of the political turmoil and civil unrest during the Lê (AD 1428–1788) and Mạc (AD 1527–1677) dynasties, Blue-and-White ceramics continued to be produced by Vietnamese kilns through the sixteenth century AD. Although new vessel forms such as the large water basins, planters with three kneeling legs as well as high-footed bowls and dishes with equally ornate underglaze cobalt blue painted decorations emerged, it was observed that some fifteenth century forms such as the *kendi* and covered boxes had abruptly ceased production as well (Bùi 2001: 149–150). Landscape paintings featuring uncluttered compositions of humans, animals, and scenery emerged as a new style of decoration for Blue-and-White ceramics in this time (Bùi 2001: 150). With a few exceptions such as the Bát Tràng kiln complex near Hanoi, the production of Vietnamese ceramics went into decline by the seventeenth century AD in spite of local economic growth in Vietnam and the development of international maritime trade and relations between Europe and Southeast Asia at that time (Bùi 2001: 153; Stevenson 1997: 40). Blue-and-White ceramics, in particular, suffered a deterioration in both "technical and decorative" aspects (Bùi 2001: 153) in the face of mass-produced Chinese ceramics of relatively higher quality. The lifting of maritime trade restrictions by the Chinese Ming Dynasty (AD 1368–1644) leading to the re-entry of exported Chinese ceramics into Southeast Asia, and its concomitant imposition by the Lê dynasty and its successors the Trịnh (AD 1545–1787 AD) and Nguyễn (AD 1558–1777) lords is likely to have contributed to the decline of the Vietnamese ceramic industry by the eighteenth century AD (Stevenson 1997: 39–40).

Cham Ceramics

Prior to the southward expansion of Vietnamese culture and polities from the Red River Delta, an ethno-linguistic group of Chamic speakers belonging to the Austronesian language family distinct from their Austroasiatic ethno-linguistic Vietic and Mon-Khmer neighbors to the north and south, respectively, resided along the coasts of present-day central Vietnam (Vickery 2009: 45). Occupying the same region previously held by the late "Iron Age" "Sa-Huynh" archaeological culture in prehistoric times, the Chamic peoples established a series of Indianized urban centers and polities along the central coast between the second and eighth centuries AD at various sites including Trà Kiệu, Mỹ Sơn, Đồng Dương, Pô Nagar, Pô Klaung Garai, Pô Rômê, and Quy Nhơn (Vickery 2009: 46–48). Collectively known as "Champa," the tides and fortunes of these polities waxed and waned through the centuries until their eventual conquest by the Vietnamese in the seventeenth century AD (Vickery 2009: 46–57).

The earliest high-fired Cham ceramic kilns discovered to date are located at the Gò Sành kiln complex in Bình Định province – then under the control of the Cham polity of Vijaya (c. twelfthy–fifteenth centuries AD) – where production is estimated to have occurred between the fourteenth and fifteenth centuries AD (Miksic 2009a: 61). At least four other Vijayan kiln complexes have been identified within Bình Định: Gò Hời, Gò Ké, Cây Me, and Trường Cửu (Diem 2011: 209). A wide range of ceramic vessels including dishes, bowls, basins, cups, bottles, *kendis*, pots, and jars were produced at the kilns of Bình Định (Diem 2011: 210). Glazes that are commonly applied included brown, green, and grey colors (Brown 1988: 37; Diem 2011: 210). Developments in kiln-firing techniques parallel to that of Vietnamese kilns in the north also saw the shift from indirect stacking to a *chaîne opératoire* involving the direct stacking of vessels on unglazed rims and bases at the Gò Sành kiln complex (Diem 2011: 211).

Lao Ceramics

The earliest high-fired ceramic kilns discovered in Laos to date belong to the kiln complex located at the village of Ban Mae Tao Hai – also known as Si Sattanak – 3 km east of Vientiane (Brown 1988: 94; Hein 2008: 24–25). The presence of associated Chinese Blue-and-White ceramics assigns a relative *terminus post quem* date of 1563 AD to the kiln complex (Brown 1988: 95; Hein 2008: 24). Ceramics produced at the Ban Mae Tao Hai complex included jars, bowls, cups, oil lamps, *kendis*, roof finials, as well as both tobacco pipes and bowls (Brown 1988: 94; Hein 2008: 24). Only one type of glazing – a "thin, translucent greenish" ash glaze which was applied over a white slip – has been identified at the complex (Brown 1988: 94; Hein 2008: 24). Vessels with this thin green glaze sometimes have underglaze decorations of circles or dots as well (Brown 1988: 94).

Two more kiln complexes have been identified since the initial discovery of the Ban Mae Tao Hai complex in 1970. The first complex comprising of at least 20 kilns have been identified at Ban Xang Hai along the banks of the Mekong River about 20 km north of Luang Prabang (Hein 2008: 23). Ceramic artifacts produced at this site primarily consist of unglazed bowls, jars bearing incised and appliqué decorations, mortars, fishnet weights, spindle whorls, plum bobs, and even animal figurines (Hein 2008: 24). The remains of another kiln complex at a village – also named Ban Tao Hai ("Village of Jar Kilns") – near Luang Prabang has also been reported in recent years (Hein 2008: 24). Ceramics produced in this village include a range of unglazed grey jars as well as architectural roof tiles and finials, while a number of green-glazed ceramics bearing impressed geometric and animal decorations have also been found on the surface of the site (Hein 2008: 24).

Khmer Ceramics

High-fired ceramics are traditionally thought to be produced by the Khmers when they established the Indianized kingdom of Angkor (c. ninth–fifteenth centuries AD) on the Kulen Plateau next to the floodplains of the great Tonlé Sap lake sometime during the ninth century AD. Aside from the hypothesized Chinese origins of Khmer kilns (Hein 2008: 16–17), it has been observed that high-fired Khmer ceramics share many similarities with contemporaneous products from the Xicun (西村 Xī Cūn) and Chao-an (潮安

Cháo Ān) kilns in the southern Chinese province of Guangdong (广东 Guǎng Dōng) (Brown 1989). Nevertheless, Khmer ceramics exhibited far less Chinese influences than their Vietnamese counterparts, and eventually developed into the "most un-Chinese-like" ceramic tradition in Southeast Asia (Brown 1988: 42).

The earliest high-fired glazed ceramics recovered to date were found at present-day Roluos, the site of Hariharalaya, the first capital of the Angkorian kingdom, in the form of green-glazed tiles and stoneware vessels during the reign of Indravarman I (c. AD 877–899) (Brown 1988: 42). Wasters of similar ceramics located at the Thnal Mrech kiln complex located on Phnom Kulen to the north of Roluos suggests that these early Khmer ceramics were produced at that site (Brown 1988: 43). Firing supports in the form of "sausage-like" coils, semi-cylindrical supports, and small balls of clay were used to stack vessels indirectly during firing (Miksic 2009a: 54). The oldest kiln complex to date, however, is located at the site of Bang Kong in the vicinity of Roluos where one of 39 identified kilns have returned a calibrated radiocarbon date ranging between AD 893–985 (Miksic 2009a: 54). Green-glazed ceramics produced at Bang Kong, however, were observed to be made of a higher quality clay, glaze, and firing technique than those fired at the Thnal Mrech kiln complex (Miksic 2009a: 54). Green-glazed vessels produced in this period includes forms such as bottles, small covered boxes, and bowls, which bear a variety of incised, carved, and moulded decorations and, in some cases, the mark of their potters on the exterior base surfaces (Brown 1988: 51). Other kiln complexes located near Hariharalaya and later, the great Khmer city of Angkor, that are known to produce green-glazed ceramics include Tani, Sarsey, and Khnar Po (Miksic 2009a: 54).

Another type of Khmer ceramic – "*Lie de Vin*" (named by French archaeologist Bernard-Philippe Groslier after their resemblance in surface color to that of the residue left in old wine bottles) – began to be produced sometime during the tenth century AD (Brown 1988: 44–51). *Lie de Vin* vessels are not strictly "glazed" per se, as the dark reddish-purple color usually permeates the clay body as well; where "glazing" occurs, it only appears as a very thin slip or "gloss" (Brown 1988: 44). Pending further research on the subject, it is more likely that *Lie de Vin* "glaze" is a result of intrinsic chemical processes between the clay body, fuel combustion, and the firing atmosphere as opposed to a deliberate application of glaze on the vessel by the potters themselves. The provenance of *Lie de Vin* ceramics also remains unknown as the kilns producing these ceramics have yet to be found. *Lie de Vin* vessels typically consist of large basins and jars bearing a mixture of carved, incised, and combed decorations (Brown 1988: 44).

Production of both green-glazed and *Lie de Vin* ceramics continued unabated until sometime between the tenth and eleventh centuries when a new type of Khmer ceramic – brown-glazed vessels – emerged into the market (Brown 1988: 51–52; Miksic 2009a: 55). The best-known examples of Khmer brown-glazed ceramics are the large "baluster vases" produced by the Angkorian kilns located in Buriram province of present-day Thailand (Miksic 2009a: 55). More than 200 individual kilns alone were identified by the archaeologists of the Thai Fine Arts Department by the 1980s in the province, while hundreds more have reportedly been destroyed by various agricultural and deforestation activities (Brown 1988: 45–46). Aside from the baluster vases, other brown-glazed vessel forms includes basins, jars, pots, and bottles (Brown 1988: 51–52). Brown-glazed ceramics were also produced at the Thnal Mrech kiln complex as well as at various kiln sites located along the Angkorian highways – such as Ban Kruat and Teap Chei – that emanated from the Angkorian heartland out towards the outer provinces of the empire (Miksic 2009a: 54). While *Lie de Vin* vessels appears to have ceased production after the proliferation of brown-glaze vessels during the eleventh century AD, green-glazed ceramics continued to be produced, albeit in smaller quantities, alongside brown-glazed ceramics up to the thirteenth century AD (Brown 1988: 52–53). New forms of Khmer ceramics that emerged at this time includes green and brown-glazed vessels and zoomorphic lime pots (Brown 1988: 52–53).

It is hitherto unclear what happened to the Angkorian ceramic industry after the thirteenth century AD due to the lack of archaeological evidence (Miksic 2009a: 55). As the Angkorian empire declined in the face of invasions by the Siamese and Cham and the capital shifted away from the Tonle Sap floodplains towards the south further down the Mekong River, activity at the aforementioned kilns appears to have all but ceased (Brown 1988: 53). Aside from the waning fortunes of the empire, the demise of the Angkorian ceramic industry may also be expedited by the influx of mass-produced ceramics from the provincial kilns of southern China into the region (Brown 1988: 54). The recent discovery of large stoneware jars used at various jar burial rock shelter and cave sites on the Cardamom Mountains to the south, however, suggests the continuation of the craft up to the fifteenth century AD as they were found in association with Chinese and Thai ceramics from the same period (Miksic 2009a: 56).

Thai Ceramics

The origins of Thai high-fired ceramics and kilns are as hazy as that of the decline of their counterparts in neighboring Angkor. The rise of the Tai principalities – especially that of Sukhothai – in present-day Thailand between the thirteenth and fourteenth centuries AD saw the emergence of the best-known, if not earliest, high-fired kiln complexes at the sites of Sawankhalok and Si Satchanalai (previously called "Chalieng") (Brown 1988: 57, 61–62). Although Thai folklore attributes high-fired ceramic and kiln technologies to the arrival of Chinese potters in Sukhothai (Miksic 2009a: 62), archaeological research have demonstrated that both technologies have largely evolved autochthonously while receiving external stylistic influences which lead to the introduction of white clay, underglaze iron black painted decorations and green glazing (Hein 2008: 11–12). The excavation of eleven kilns at the site of Ban Kao Noi near the old Sukhothai city of Si Satchanalai have also revealed evidence of an even earlier phase of low-fired, lead-glazed ceramic production which has been attributed to the Mon, an ethnolinguistic group that preceded the Tais in present-day Thailand (Brown 1988: 62–63).

The earliest, pre-Sukhothai, high-fired glazed Sawankhalok wares were "transitional" (as they were found in association with "Mon" ceramics) underglaze iron black dishes and plates bearing the characteristic stylized fish and flower painted motifs on the interior vessel wall and base surfaces (Brown 1988: 63). These underglaze decorations are also observed to be more formalized and "stilted," more "intricate and complex" than those of the Sukhothai period (Brown 1988: 64). Glazes of these "transitional" wares range from clear to "slightly cloudy" with a bluish or greenish color (Brown 1988: 65).

Ceramic production at Sawankhalok kilns became more varied during the early Sukhothai period (c. thirteenth–fourteenth centuries AD). Aside from the continued production of underglazed iron black and brown decorated plates and bowls, other types of Sukhothai ceramics include undecorated monochrome creamish-white slip with clear glaze, unglazed stoneware vessels such as storage jars and basins as well as unglazed earthenware vessels including *kendis* (Brown 1988: 67, 70). Early Sukhothai plates and bowls also had spur marks on the interior base surfaces as they were stacked upon each other through the use of disc-shaped supports during the firing process (Brown 1988: 69). The entire stack of ceramics, in turn, was placed on top of a tubular support that leaves a characteristic "blackish circular scar" on the exterior base surface of the lowest dish or plate (Brown 1988: 69).

A greater variety of ceramics were produced from the middle to late Sukhothai period (c. fourteenth–sixteenth centuries AD), the most notable being the classic "celadon" (green-glazed) ceramic plates and dishes as well as bowls, bottles, jars, jarlets, figurines, and *kendis* (Brown 1988: 65–66). Other new types and forms of ceramics produced in this period includes underglaze iron black-covered boxes, brown-glazed figurines, "Brown-and-Pearl" ceramic architectural fixtures with inlaid white incised decoration, opaque matt-white glazed ceramics, and architectural fixtures, black-glazed storage jars, bottles, and roof finials and small olive-glazed jars and

jarlets (Brown 1988: 70–71). Unglazed stoneware mortars, baluster jars, and basins as well as high-fired earthenware *kendis* continued to be produced in this period as well (Brown 1988: 71).

The discovery of other kiln sites aside from the Sukhothai kiln complexes revealed the production of other contemporaneous Tai high-fired ceramics sometime between the thirteenth and fifteenth centuries AD (Brown 1988: 82). These kiln complexes include Kalong, Sankampaeng, Phayao, Phan, Wang Nua Lampang, San Sai, Nan, Khun Yuam-Mae Hong Son in northern Thailand, Pitsanulok, Nakorn Thai and Pitchit in north-central Thailand, as well as Singburi and Supanburi in central Thailand (Brown 1988: 81–96).

Ceramics in Myanmar

The development of high-fired glazed ceramic and kiln technology in present-day Myanmar remains the least understood high-fired pottery tradition in Southeast Asia. Early twentieth-century research on the subject documented the contemporaneous existence of various types of green lead and wood ash-glazed ceramics across various parts of the country (Brown 1988: 104). While lead-glazed earthenware ceramics were being produced by kilns and used as architectural fittings and bricks as early as the ninth century AD (Hein 2008: 18), the earliest and best-known high-fired ceramics produced from this region to date remains large brown-glazed stoneware storage jars eponymously named "Martaban" (or "Martavan") after the port and sister city of Pegu between the thirteenth and fourteenth centuries AD (Brown 1988: 103). The records of the famous fourteenth century AD Moroccan scholar and traveller Ibn Battuta and subsequent Europeans who visited this part of the world mentioned the initial use of these "Martaban" jars as storage vessels for various trade goods – such as pepper, preserved fruit and opium – and were themselves shipped as trade goods in their own right (Brown 1988: 101; Miksic 2009a: 66). The specific kilns producing these famous stoneware vessels, however, have yet to be found or identified to date, though it has been hypothesized that they may have been produced at the kiln complex in the neighboring region of Twante (Brown 1988: 103; Hein 2008: 21).

Pending further research into the subject, it is estimated that the high-fired kilns and ceramics of the lower Irrawaddy region date approximately to the fifteenth century AD (Miksic 2009a: 67). Recent research at the Twante kiln complex have revealed "hundreds of brick-built surface crossdraft kilns" (Hein 2008: 19) that largely produce green-glazed "celadons" in the form of plates, bowls, zoomorphic figurines, as well as jarlets, double gourd vessels, and wall tiles (Miksic 2009a: 67). Brown-glazed as well as "Green-and-White" ceramics have also been recovered at these kiln sites, albeit in smaller quantities (Miksic 2009a: 67). Green-and-White ceramics are thought to be produced by the application of a green paint above a "milky opaque white" lead glaze which, upon firing, sinks into the glaze (Brown 1988: 103). White-glazed monochrome ceramics have also been recovered from various Tak or Omkoi burial sites located in the border region between Thailand and Myanmar (Brown 1988), but their precise provenance remains as elusive as the rest of the high-fired glazed ceramics in the country to date.

Traditional Chinese Kilns in Southeast Asia

During the early twentieth century, several groups of Chinese potters from various provinces in southern China such as Fujian (福建 Fú Jiàn) and Guangxi (广西, Guǎngxī) were known to have migrated into and established ceramic kiln in various parts of Southeast Asia including Vietnam and Cambodia (Miksic 2009a: 69) as part of the wider Chinese diaspora into various European colonies around the world. The products of these Southeast Asian-Chinese kilns included utilitarian ceramic dishes and bowls decorated with underglaze cobalt blue and overglaze polychrome enamel motifs, ornamental and architectural finishing and reportedly even porcelain in "Qingbai" glaze (青白, Qīng Bái) and underglaze blue decoration (Miksic 2009a: 69). Little else is known of these Southeast Asian-Chinese kilns and the topic warrants further research in the future (Miksic 2009a: 69).

Key Issues

The Origin of Southeast Asian Ceramics

Given the early Holocene appearance of ceramics within a seemingly hunter-gatherer milieu characterized by the "Hoabinhian" and other similar stone tool industries, it has been observed that the appearance of ceramics in Southeast do not seem to correlate with either social or demographic changes typically accompanying their invention (or introduction) in the "Old World" (Miksic 2003b: xix; Zeitoun et al. 2012: 530). As these early ceramic artifacts are also often recovered alongside flaked and ground stone artifacts across many prehistoric sites in the region (Bronson and White 1992a: 496), it has also been observed that the technique of grinding and polishing working surfaces on stone tools had occurred together with the development of ceramic technology at many "Hoabinhian" sites across Mainland Southeast Asia (Higham 2014: 55). Significantly, this trajectory of development in ceramic technology in the region appears to follow that experienced by the rest of East Asia, where pottery production has been found to "predate sedentism, cultivating cereals, and producing polished stone axes or adzes" (Cohen 2013; Cohen et al. 2017: 36; Jordan and Zvelebil 2009: 39–45). More importantly, these Palaeolithic dates for ceramic technology firmly decouples pottery production from the "Neolithic" paradigm as proposed by Childe (1936) in both East and Southeast Asia (Cohen et al. 2017; Gibbs and Jordan 2016; Jordan and Zvelebil 2009: 33–39).

Open and Kiln-Firing in Southeast Asia

Not only do the circular updraft kilns at Non Ban Jak represent the earliest evidence of kiln technology found within a firm "Iron Age" context to date, they also highlight a shift in the firing of earthenware ceramics from using an open bonfire during the late Holocene through the "Neolithic" and "Bronze" Ages to kiln-firing in the "Iron Age." What remains to be understood, however, is whether the prehistoric kilns at Non Ban Jak represent an autochthonous evolution in ceramic technology or technological transfer through cultural diffusion by means of trade and exchange. While the dynamics of regional and long-distance trade and exchange during the prehistoric period in Southeast Asia remains poorly understood to date, it is evident that trade and exchange was firmly established by the Iron Age due to the abundance of "exotic" goods that have been recovered from various sites across the region at that time (Higham 2014). In particular, recent research on prehistoric stone and glass beads as well as copper-based metal goods and imported ceramics from South Asia and Southern China recovered from these sites has demonstrated that intra-regional trade and exchange networks – which are, in turn, connected with extra-regional trading connections such as the South China Sea network and those with South Asia and the Roman world – have managed to redistribute these goods across various "Iron Age" sites in the region (Bellina and Glover 2004; Favereau and Bellina 2016).

Fine-Paste Ceramics in Southeast Asia

What is also evidently clear is that long-distance maritime trade and exchange during the turn of the millennium between Southeast Asia and the Indian subcontinent lead to the appearance of another significant ceramic tradition and cultural horizon: fine-paste earthenware ceramics and its most prolific typology, the "*kendi*" (Bellina and Glover 2004: 80; Miksic and Yap 1988–1989: 46). Fine-paste earthenware ceramics can be understood as artifacts made of clay with little to no sand-sized inclusions, resulting a relatively smooth (and in some cases, "soapy") surface texture on both exterior and interior surfaces (Miksic and Yap 1988–1989: 47). *Kendi* is a Malay term thought to be derived from "*kundika*," the Sanskrit word for smaller versions of the "*kundi*" (indicated by the diminutive suffix "*-k*"") which describes, in turn, "a pot with a spout" (Khoo 1991: 4). Fine-paste earthenware and the distinct morphology of the *kendi* form during the "Iron Age" represents an abrupt and distinctive break from prehistoric Southeast Asian earthenware *chaînes opératoires* since the advent of ceramic technology in this region. The *kendi* form, in particular, is a distinct morphology foreign to prehistoric Southeast Asia but strongly associated

with the Indian subcontinent and more importantly, Hindu-Buddhist culture where they were used as a ritual vessel for "sprinkling lustral water in Brahmanic or Buddhist ceremonies" (Khoo 1991: 4).

Wheel-Throwing in Southeast Asia

More importantly, the concomitant appearance of wheel-throwing alongside kilns during the late "Iron Age" and proto-historic period also heralds another significant change in the *chaînes opératoires* of Southeast Asian ceramic production. Hitherto, prehistoric ceramic vessels in the region were formed using a variety of hand moulding, coiling as well as paddle and anvil techniques, whereas the majority of fine-paste earthenware ceramics were formed using wheel-throwing. To date, the earliest evidence of wheel-throwing and kiln-firing remains that of a pivot for a potter's wheel and kiln supports at one the earliest Southeast Asian urban site of Óc Eo (c. AD 200–600) on the Mekong Delta by French archaeologist Louis Malleret in 1960 (Malleret 1960: XIX, LIV; Miksic 2003a: 21; Miksic and Goh 2017a: 163). The appearance of a completely new ceramic *chaîne opératoire* – characterized by the use of a fine-paste clay recipe, wheel-throwing and kiln-firing – at a center of the first Indianized polity known toponymically to the Chinese as "Funan" (扶南 Fú Nán) is indicative of both cultural and technological transfer and interaction between Southeast Asia, India, and China at this time. Based on these inferences, it has been concluded that "dual technological traditions" of ceramic manufacture emerged by the mid-first millennium AD on the Mekong Delta, characterized by an indigenous open-fired, paddle-and-anvil earthenware and a "newer, foreign tradition" involving fine-paste, wheel-thrown, and most likely kiln-fired earthenware ceramics (Stark 2003: 225).

Intra-Regional Maritime Trade in Southeast Asian Ceramics

More importantly, the archaeological record suggests that Southeast Asian potters were not only producing ceramic artifacts for domestic consumption but also appeared to be producing them for intra-regional trade and exchange as well. Between the ninth and sixteenth centuries AD, five distinct ceramic "interaction spheres" which saw the circulation of a variety of both Southeast Asian earthenware and stoneware ceramics within the region have been identified by Miksic and Goh (2017b). The first refers to the production of domestic earthenware pottery and not so much to the circulation of actual ceramic artifacts themselves but rather that of their *chaînes opératoires* as there appeared to be a "broad distribution of similar pottery over a wide area" (Miksic and Goh 2017b: 812). Nonetheless, the exchange of earthenware pottery between Malayo-Polynesians and Melanesians in eastern Indonesia and Papua New Guinea during ritual trading voyages called "*hiri*" observed in the nineteenth and early twentieth centuries (Miksic 2009b: 95) suggest that earthenware pottery may have been traded – albeit in a smaller scale – in the region as well, especially between communities within Island Southeast Asia which do not have the technology to produce high-fired, glazed stoneware ceramics like their mainland counterparts. The second sphere refers to the trade and exchange of fine-paste earthenware ceramics aforementioned, whereas the last three spheres refer to the trade and exchange of high-fired stoneware ceramics produced by the kilns of mainland Southeast Asia (Miksic and Goh 2017b: 814).

The intra-regional trade and exchange of Southeast Asian earthenware and stoneware ceramics is best represented by the ceramic cargos of two shipwrecks: the Intan and Cirebon. The Intan wreck is thought to be a Southeast Asian vessel which carried close to 8000 ceramic vessels when it sank south of the Bangka Strait sometime in the tenth century AD (Flecker 2009: 38). While half its ceramic cargo consists of Chinese stoneware and porcelain goods, the remainder comprises of hundreds of fine-paste earthenware bottles and kendis thought to have been produced by early Southeast Asian kilns located in present-day southern Thailand (Flecker 2009: 38; Miksic and Goh 2017b: 817). The Cirebon wreck, a Southeast Asian ship of lashed-lugged construction, was also found carrying earthenware jars and kendis that are likely to have a Southeast Asian

provenance amidst a large cargo of Chinese ceramics when it sank sometime between the tenth and eleventh centuries AD (Liebner 2014; Miksic and Goh 2017b: 817). During a period of shortage of Chinese ceramics precipitated by intermittent imperial restrictions on private maritime trade in the fifteenth century AD (commonly known as the "Ming Gap"), high-fired Thai, Vietnamese, Cham, and Burmese ceramics were found to have filled the void in the market as testified by the cargoes of shipwrecks recovered from this period (Brown 2009). These shipwrecks, such as the Rang Kwien which sank off the coast of Thailand, the Turiang off the eastern coast of peninsular Malaysia, the Pandanan wreck off the southern Palawan coasts in the Philippines and the Belanakan wreck off the coast of west Java in Indonesia collectively carried tens of thousands of mainland Southeast Asian ceramics and demonstrated the extent of their trade across the region (Brown 2009: 38–45).

Ceramics in Southeast Asian Culture

Aside from domestic consumption, Southeast Asian ceramics have long been used in both mortuary and religious rituals in the region. Ceramic vessels and artifacts began to be interred as part of the mortuary ritual not long after their appearance in the region, with the earliest evidence of this practice discovered at the Buang Bap cave complex in the Surat Thani Province of Thailand, where "cord-marked cups" were found interred with a burial reportedly dated to c. 5250 BP by Srisuchat and Srisuchat (1992). Thereafter, ceramics began to emerge as a common part of the mortuary assemblage in Southeast Asia throughout prehistory (Bellwood 2017; Higham 2014). With the arrival of Hinduism and Buddhism in the region during the late prehistoric and early historic periods, ceramics were adopted as part of various Hindu-Buddhist rituals as represented by the aforementioned adoption of fine-paste kendis as lustral vessels (Miksic 2009b: 97). Aside from kendis, other earthenware vessels are also likely to have been used in these ceremonies as seen in the recovery of "several hundred" vessels such as "large spherical water jars" and "abulation bottles" thought to be ritually damaged and buried at the pre-Angkorian city of Sambor Prei Kuk (Miksic 2009b: 96). The significance of ceramics in both sociocultural and religious spheres is also represented by a wide variety of non-utilitarian ceramic forms and artifacts including anthropomorphic and zoomorphic sculptures as well as elaborate architectural fittings such as roof finials and tiles which are usually high-fired and glazed stoneware ceramics (Rooney 2013: 15–17).

International Perspectives

Aside from the familiar tropes of its role in the Palaeolithic migration of humans from Asia into Australia, early agriculture and long-distance maritime exchange between the Mediterranean world, India, and China, the history and archaeology of Southeast Asia, let alone Southeast Asian ceramics, receive relatively little attention among the global academic community outside of the specialists in the field themselves. While there is some evidence of their circulation further afield across the Indian Ocean and South China Sea into sites in the Middle East and Japan (Miksic and Goh 2017b: 826–827), the nature and dynamics of the trade of Southeast Asian ceramics outside the region remains relatively understudied and unknown. Future research into the import and consumption of Southeast Asian ceramics at these international sites will undoubtedly reveal significant socioeconomic interactions between these regions and Southeast Asia and thereby, reinforce its position as the maritime crossroads of a globalized world.

Future Directions

Ceramic artifacts are ubiquitous throughout Southeast Asian archaeological sites, but archaeological research in Southeast Asian ceramics remains in its infancy compared to the study of these artifacts in art history. To date, the analysis of archaeological ceramics seldom exceeds their utility in reconstructing cultural histories

through typological classification as well as a supplementary – albeit useful – tool for intra- and inter-site chronological sequencing and relative dating. The study of Southeast Asian earthenware ceramics, in particular, has also been overshadowed by that of its more aesthetically attractive high-fired ceramic cousins. Although earthenware sherds make up the majority of artifacts recovered from archaeological sites in the region, they still remain "neglected in reported finds, analyses, and published references" (Rooney 1987: 1). At the same time, ethnographic records of traditional or rural earthenware potters remain few and sporadic (i.e. Cort and Lefferts Jr. 2010–2011; Stark 1991) because research is narrowly concentrated on selected Southeast Asian ceramics which are "recognized as having great cultural and monetary value, such as the famous prehistoric Ban Chiang pottery and the high-fired celadon wares of Sukhothai and Sawankhalok" (Shippen 2005: 11). Consequently, any identification and analysis of earthenware ceramics can only rely on comparisons with the few existing published catalogues and be informed by the existing archaeological record and historical context that surrounds these artifacts.

The potential and importance of ceramics in understanding socio-economic and political organization in Southeast Asia also remains overshadowed by the structural and monumental remains found across the region, and the pervasiveness of historical narratives reconstructed from epigraphic and textual sources. Consequently, archaeological research in the social organization of these historic polities remains generally oriented towards the study of major orthogenetic precolonial urban centers largely defined by the presence of architectural, statuary, and epigraphic remains (Miksic 2000). Conversely, there are relatively few archaeological studies of material cultural remains and their crucial role in the dynamics behind "evolving wealth differentials and social stratification" in prehistoric and early historic period societies (Junker 1999: 151).

The lack of research dedicated to the archaeological study of Southeast Asian earthenware was still endemic in the region as late as 2003 (Miksic 2003b). In an effort to remedy the situation and create a regional archaeological framework of earthenware analysis, Miksic's (2003) seminal study *Earthenware in Southeast Asia* encompassed the latest earthenware research across the major Southeast Asian nations. To date, it remains not only the sole publication that focuses solely on earthenware ceramics in Southeast Asia but also the only attempt to understand the development of the technology its use within a regional framework.

Nonetheless, the efforts of archaeologists over the last few decades have produced considerable – albeit disparate – data and literature on archaeological ceramics that have advanced the knowledge of socioeconomic, trade, and settlement patterns of precolonial societies in both mainland and island Southeast Asia. In particular, ceramic research has demonstrated that greater socioeconomic and political complexity in precolonial Southeast Asian societies is typically accompanied by the development of a "political economy" where certain goods function as a "material fund of power" which is used to "reinforce social inequality and political authority," with hereditary "elites" controlling the specialized production and exchange of such goods (Junker 1994: 3). Ceramics were often used in precolonial Southeast Asia as a measure and indicator of social rank distinction. Stylistic, technological, and distribution analyses of decorative earthenware pottery found in the Philippines have also suggested that some decorative styles could have been iconographic representations of inter-chiefly elite alliances or shared identity in the late prehistoric and proto-historic period (Bacus 2003). While much more remains to be done, the potential of ceramic artifacts in revealing more answers to our human past is slowly coming to the fore in Southeast Asian Archaeology.

Cross-References

► Chinese Ceramics in Southeast Asia

References

Bacus, E.A. 2003. Styles of alliance?: Decorated earthenware in late prehistoric and protohistoric polities. In *Earthenware in Southeast Asia. Proceedings of the Singapore Symposium on Premodern Southeast Asian Earthenwares*, ed. J.N. Miksic, 39–51. Singapore: Singapore University Press.

Bellina, B., and I. Glover. 2004. The archaeology of early contact with India and the Mediterranean world, from the fourth century BC to the fourth century AD. In *Southeast Asia. From prehistory to history*, ed. I. Glover and P. Bellwood, 68–88. London: RoutledgeCurzon.

Bellwood, P.S. 2013. *First migrants. Ancient migration in global perspective*. Chichester: Wiley-Blackwell.

Bellwood, P.S. 2017. *First islanders. Prehistory and human migration in Island Southeast Asia*. Hoboken: Wiley-Blackwell.

Bellwood, P.S., and M. Omar. 1980. Trade patterns and political developments in Brunei and adjacent areas, A.D. 700–1500. *Brunei Museum Journal* 4 (4): 155–179.

Boaretto, E., X. Wu, J. Yuan, O. Bar-Yosef, V. Chu, Y. Pan, K. Liu, D. Cohen, T. Jiao, S. Li, H. Gu, P. Goldberg, and S. Weiner. 2009. Radiocarbon dating of charcoal and bone collagen associated with early pottery at Yuchanyan Cave, Hunan Province, China. *Proceedings of the National Academy of Sciences* 106 (24): 9595–9600.

Bronson, B., and J.C. White. 1992a. Radiocarbon and chronology in Southeast Asia. In *Chronologies in old world archaeology*, ed. R.W. Ehrich, vol. I, 3rd ed., 491–503. Chicago: The University of Chicago Press.

Bronson, B., and J.C. White. 1992b. Southeast Asia. In *Chronologies in old world archaeology*, ed. R.W. Ehrich, vol. II, 3rd ed., 475–515. Chicago: The University of Chicago Press.

Brown, R.M. 1988. *The ceramics of South-East Asia. Their dating and identification*. 2nd ed. Singapore: Oxford University Press.

Brown, R.M. 1989. Guangdong. A missing link to Southeast Asia. In *Guangdong ceramics from Butuan and other Philippine sites*, ed. R.M. Brown, 81–85. Manila: The Oriental Ceramic Society of the Philippines, Inc.

Brown, R.M. 2009. *The Ming gap and shipwreck ceramics in Southeast Asia. Towards a chronology of Thai trade ware*. Bangkok: The Siam Society under Royal Patronage.

Bui, V. 1991. The Da But culture in the Stone Age of Vietnam. *Bulletin of the Indo-Pacific Prehistory Association* 10: 127–131.

Bùi, M.T. 2001. Basic characteristics of Vietnamese blue and white. In *Gốm Hoa Lam Việt Nam. Vietnamese blue & white ceramics*, ed. M.T. Bùi and K. Nguyễn-Long, 137–161. Hà Nội: Nhà Xuất Bản Khoa Học Xã Hội.

Childe, V.G. 1936. *Man makes himself*. London: Watts and Co.

Clarkson, C., Z. Jacobs, B. Marwick, R. Fullagar, L. Wallis, M. Smith, R.G. Roberts, E. Hayes, K. Lowe, X. Carah, S.A. Florin, J. McNeil, D. Cox, L.J. Arnold, Q. Hua, J. Huntley, H.E.A. Brand, T. Manne, A. Fairbairn, J. Shulmeister, L. Lyle, M. Salinas, M. Page, K. Connell, G. Park, K. Norman, T. Murphy, and C. Pardoe. 2017. Human occupation of northern Australia by 65,000 years ago. *Nature* 547 (7663): 306–310.

Cohen, D.J. 2013. The advent and spread of early pottery in East Asia: New dates and new considerations for the world's earliest ceramic vessels. *Journal of Austronesian Studies* 4 (2): 55–92.

Cohen, D.J., O. Bar-Yosef, X. Wu, I. Patania, and P. Goldberg. 2017. The emergence of pottery in China: Recent dating of two early pottery cave sites in South China. *Quaternary International* 441: 36–48.

Cort, L.A., and H.L. Lefferts Jr. 2010–2011. Pots and how they are made in mainland Southeast Asia. *Transactions of the Oriental Ceramic Society* 75: 1–15.

Diem, A.I. 2011. The significance of ceramic evidence for assessing contacts between Vijaya and Other Southeast Asian polities in the fourteenth and fifteenth centuries CE. In *The Cham of Vietnam. History, society and art*, ed. K.P. Trần and B.M. Lockhart, 204–237. Singapore: NUS Press.

Favereau, A., and B. Bellina. 2016. Thai-Malay Peninsula and South China Sea networks (500 BC–AD 200), based on a reappraisal of "Sa Huynh-Kalanay"-related ceramics. *Quaternary International* 416: 219–227.

Fehrenbach, S.S. 2009. *Traditions of ceramic technology: An analysis of the assemblages from Angkor Borei, Cambodia, thesis submitted to the Graduate Division of the University of Hawai'i in Partial fulfillment of the requirements for the degree of Master of Arts in Anthropology*. Honolulu: University of Hawai'i at Mānoa.

Flecker, M. 2009. Maritime archaeology in Southeast Asia. In *Southeast Asian ceramics. New light on old pottery*, ed. J.N. Miksic, 34–47. Singapore: Southeast Asian Ceramic Society.

Gibbs, K., and P. Jordan. 2016. A comparative perspective on the 'western' and 'eastern' Neolithics of Eurasia: Ceramics; agriculture and sedentism. *Quaternary International* 419: 27–35.

Glover, I.C. 1986. *Archaeology in Eastern Timor, 1966–67*. Canberra: Department of Prehistory, Research School of Pacific Studies, The Australian National University.

Gorman, C.F. 1970. Excavations at the Spirit Cave, north Thailand: Some interim interpretations. *Asian Perspectives* 13: 79–107.

Ha, V.T. 1984–1985. Prehistoric pottery in Viet Nam and its relationships with Southeast Asia. *Asian Perspectives* 26(1): 135–146.

Ha, V.T. 1991. Adzes, pottery and language in prehistoric Viet Nam. *Bulletin of the Indo-Pacific Prehistory Association* 11: 353–362.

Hein, D. 2008. Ceramic Kiln Lineages in mainland Southeast Asia. Smithsonian Institution. Ceramics in

mainland Southeast Asia: Collections in the Freer Gallery of Art and Arthur M. Sackler Gallery 1–38.

Higham, C.F.W. 2014. *Early mainland Southeast Asia: From first humans to Angkor*. Bangkok: River Books.

Higham, C.F.W., J. Cameron, N.J. Chang, C. Castillo, S. Halcrow, D.J.W. O'Reilly, F. Petchey, and L. Shewan. 2014. The excavation of Non Ban Jak, Northeast Thailand – A report on the first three seasons. *Journal of Indo-Pacific Archaeology* 34: 1–41.

Higham, C.F.W., K. Douka, and T.F.G. Higham. 2015. A new chronology for the Bronze Age of Northeastern Thailand and its implications for Southeast Asian prehistory. *PLoS One* 10 (9): e0137542.

Jordan, P., and M. Zvelebil. 2009. Ex Oriente Lux: The prehistory of hunter-gatherer ceramic dispersals. In *Ceramics before farming: The dispersal of pottery among prehistoric Eurasian hunter-gatherers*,- ed. P. Jordan and M. Zvelebil, 33–89. Walnut Creek: UCL Institute of Archaeology Publications/Routledge.

Junker, L.L. 1994. The development of centralized craft production systems in A.D. 500–1600 Philippine chiefdoms. *Journal of Southeast Asian Studies* 25 (1): 1–30.

Junker, L.L. 1999. *Raiding, trading and feasting. The political economy of Philippine chiefdoms*. Honolulu: University of Hawai'i Press.

Khoo, J.E. 1991. *Kendi. Pouring vessels in the University of Malaya Collection*. Singapore: Oxford University Press.

Kingery, W.D., and P.B. Vandiver. 1986. *Ceramic masterpieces. Art, structure, technology*. New York: The Free Press.

Kuzmin, Y.V. 2017. The origins of pottery in East Asia and neighboring regions: An analysis based on radiocarbon data. *Quaternary International* 441: 29–35.

Labbé, A.J. 1985. *Ban Chiang: Art and prehistory of Northeast Thailand*. Santa Ana: Bowers Museum.

Lampert, C.D., I.C. Glover, R.E.M. Hedges, and C.P. Heron. 2003. Dating resin coating on pottery: The Spirit Cave early ceramic dates revised. *Antiquity* 77 (295): 126–133.

Liebner, H.H. 2014. The Siren of Cirebon. A tenth-century trading vessel lost in the Java Sea, thesis submitted in accordance with the requirements for the degree of Doctor of Philiosophy at the School of Modern Languages and Cultures, University of Leeds, Leeds.

Malleret, L. 1960. *L'archéologie du delta du Mékong. Tome Second. La Civilisation Matérielle D'Oc-Èo. Planches*. Paris: École française d'Extrême-Orient.

Miksic, J.N. 2000. Heterogenetic cities in premodern Southeast Asia. *World Archaeology* 32 (1): 106–120.

Miksic, J.N. 2003a. The beginning of trade in ancient Southeast Asia: The role of Oc Eo and the lower Mekong river. In *Art & archaeology of Fu Nan. Pre-Khmer kingdom of the lower Mekong valley*, ed. J.C.-M. Khoo, 1–33. Bangkok: Orchid Press.

Miksic, J.N. 2003b. Introduction. In *Earthenware in Southeast Asia. Proceedings of the Singapore Symposium on Premodern Southeast Asian Earthenwares*, ed. J.N. Miksic, xix–xxiii. Singapore: Singapore University Press.

Miksic, J.N. 2009a. Kilns of Southeast Asia. In *Southeast Asian Ceramics. New light on old pottery*, ed. J.-N. Miksic, 48–69. Singapore: Southeast Asian Ceramic Society.

Miksic, J.N. 2009b. Research on ceramic trade, within Southeast Asia and between Southeast Asia and China. In *Southeast Asian ceramics. New light on old pottery*, ed. J.N. Miksic, 70–99. Singapore: Southeast Asian Ceramic Society.

Miksic, J.N., and G.Y. Goh. 2017a. *Ancient Southeast Asia*. London: Routlege.

Miksic, J.N., and G.Y. Goh. 2017b. Spheres of ceramic exchange in Southeast Asia, ninth to sixteenth centuries CE. In *The Routledge handbook of archaeology and globalization*, ed. T. Hodos, 808–831. New York: Routledge.

Miksic, J.N., and C.T. Yap. 1988–1989. Fine-bodied white earthenwares of Southeast Asia: Some x-ray fluorescence tests. *Asian Perspectives* 28(1): 45–60.

Mourer, C., and R. Mourer. 1971. Prehistoric research in Cambodia during the last ten years. *Asian Perspectives* 14: 35.

Nguyen, V. 2005. The da but culture: Evidence for cultural development in Vietnam during the middle Holocene. *Bulletin of the Indo-Pacific Prehistory Association* 25: 89–93.

O'Connell, J.F., J. Allen, M.A.J. Williams, A.N. Williams, C.S.M. Turney, N.A. Spooner, J. Kamminga, G. Brown, and A. Cooper. 2018. When did *Homo sapiens* first reach Southeast Asia and Sahul? *Proceedings of the National Academy of Sciences United States of America* 115: 8482.

Reynolds, T.E.G. 1992. Excavations at Banyan Valley Cave, Northern Thailand: A report on the 1972 Season. *Asian Perspectives* 31 (1): 77–97.

Rice, P.M. 2015. *Pottery analysis. A sourcebook*. 2nd ed. Chicago: The University of Chicago Press.

Rispoli, F. 2007. The incised & impressed pottery style of mainland Southeast Asia: Following the paths of neolithization. *East and West* 57 (1/4): 235–304.

Rooney, D.F. 1987. *Folk pottery in South-East Asia*. Singapore: Oxford University Press.

Rooney, D.F. 2013. *Ceramics of seduction. Glazed wares from Southeast Asia*. Bangkok: River Books.

Shippen, M. 2005. *The traditional ceramics of Southeast Asia*. Honolulu: University of Hawai'i Press.

Solheim, W.G., II. 1972. An earlier agricultural revolution. *Scientific American* 206: 34–41.

Solheim, W.G., II. 1990. Earthenware pottery, the T'ai and the Malay. *Asian Perspectives* 29 (1): 25–36.

Solheim, W.G., II. 2003. Southeast Asian earthenware pottery and its spread. In *Earthenware in Southeast Asia*, ed. J.N. Miksic, 1–21. Singapore: Singapore University Press.

Solheim, W.G., II. 2006. *Archaeology and culture in Southeast Asia: Unravelling the Nusantao*. Quezon City: The University of the Philippines Press, Diliman.

Srisuchat, T., and A. Srisuchat. 1992. *Archaeological analysis no. 1: An application of technology and science in archaeological work in Thailand*. Bangkok: Division of Fine Arts, Archaeology Division.

Stark, M.T. 1991. Ceramic production and community specialization: A Kalinga ethnoarchaeological study. *World Archaeology* 23 (1): 64–78.

Stark, M.T. 2003. The chronology, technology and contexts of earthenware ceramics in Cambodia. In *Earthenware in Southeast Asia*, ed. J.N. Miksic, 208–229. Singapore: Singapore University Press.

Stevenson, J. 1997. The evolution of Vietnamese ceramics. In *Vietnamese ceramics. A separate tradition*, ed. J. Stevenson and J.S. Guy, 22–45. Chicago: Art Media Resources.

Stuiver, M., and P.J. Reimer. 1993. Extended ^{14}C data base and revised Calib 3.0 ^{14}C age calibration program. *Radiocarbon* 35 (1): 215–230.

Vickery, M. 2009. A short history of Champa. In *Champa and the archaeology of Mỹ Sơn*, ed. A. Hardy, M. Cucarzi, and P. Zolese, 45–60. Singapore: NUS Press.

Welch, D.J. 1985. *Adaptation to environmental unpredictability: Intensive agriculture and regional exchange at late prehistoric centers in the Phimai region, Thailand*. Honolulu: University of Hawai'i at Mānoa.

Westaway, K.E., J. Louys, R.D. Awe, M.J. Morwood, G.J. Price, J.X. Zhao, M. Aubert, R. Joannes-Boyau, T.M. Smith, M.M. Skinner, T. Compton, R.M. Bailey, G.D. van den Bergh, J. de Vos, A.W.G. Pike, C. Stringer, E.W. Saptomo, Y. Rizal, J. Zaim, W.D. Santoso, A. Trihascaryo, L. Kinsley, and B. Sulistyanto. 2017. An early modern human presence in Sumatra 73,000–63,000 years ago. *Nature* 548: 322. Advance online publication.

White, J.C. 1982. The Ban Chiang Tradition: Artists and Innovators in Prehistoric Northeast Thailand. In *Ban Chiang. Discovery of a lost Bronze Age. An exhibition organized by The University Museum, University of Pennsylvania*, ed. J.C. White, 12–51. Philadelphia: The University Museun, University of Pennsylvania, and the Smithosonian Institution Traveling Exhibition Service (SITES).

White, J.C. 2004. Comment on dates from a resin-coated sherd from Spirit Cave, Thailand. *Antiquity* 78: 184–187.

White, J.C. 2008. Dating early bronze at Ban Chiang, Thailand. In *Archaeology in Southeast Asia. From homo erectus to the living traditions. Choice of papers from the 11th international conference of the European Association of Southeat Asian Archaeologists*, ed. J.-P. Pautreau, A.-S. Coupey, V. Zeitoun, and E. Rambault, 91–104. Chiang Mai: 11th International Conference of the European Association of Southeat Asian Archaeologists.

White, J.C., and C.O. Eyre. 2010. Residential burial and the metal age of Thailand. *Archeological Papers of the American Anthropological Association* 20 (1): 59–78.

Wu, X., C. Zhang, P. Goldberg, D. Cohen, Y. Pan, T. Arpin, and O. Bar-Yosef. 2012. Early pottery at 20,000 years ago in Xianrendong Cave, China. *Science* 336 (6089): 1696.

Zeitoun, V., H. Forestier, H. Sophady, S. Puaud, and L. Billault. 2012. Direct dating of a Neolithic burial in the Laang Spean cave (Battambang Province, Cambodia): First regional chrono-cultural implications. *Comptes Rendus Palevol* 11 (7): 529–537.

Further Reading

Brown, R.M. 1988. *The ceramics of South-East Asia. Their dating and identification*. 2nd ed. Singapore: Oxford University Press.

Cort, L.A., and H.L. Lefferts Jr. 2010–2011. Pots and how they are made in mainland Southeast Asia. *Transactions of the Oriental Ceramic Society* 75: 1–15.

Miksic, J.N., ed. 2003. *Earthenware in Southeast Asia. Proceedings of the Singapore Symposium on Premodern Southeast Asian Earthenwares*. Singapore: Singapore University Press.

Southeast Europe: Archaeological Museums

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Introduction

The establishment of archaeological museums in Southeast Europe is tightly interwoven with the modern, often turbulent, political history of this highly diverse territory, its people, and cultural traditions. The gradual dissolution of the Ottoman Empire through the nineteenth to the early twentieth century and the creation of independent nation-states throughout the Balkan Peninsula (Hobsbawm 1990) – an ongoing process marked in a most traumatic way in the 1990s by the breakup of the former Yugoslavia – inevitably meant that deep history was conceptualized and interpreted in a linear, evolutionary, effectively nationalist perspective. The past, discontinuous and fragmented as it was, was nonetheless put on a high pedestal, as in many other parts of Europe, to be glorified and broadcast as an

"entity." This "pure", "innocent" and "protected" image of the past served legitimize and negotiate various, often conflicting, goals and aspirations (e.g., territorial, political, ideological and aesthetical) of the present.

Definition

Archaeological museums in Southeast Europe to a large extent still maintain the focus on artifact-centered, art history, "idealist" narratives, and only recently, since the late 1990s, did some of them begin to explore a different trajectory: one, which departs from the doctrine of proving, confirming or propagating historical continuity, "uniqueness" or remoteness. A reformed scope, admittedly of disparate pace and ideological tendency depending on the country or tradition in question, is emerging which attempts to bring to the forefront the *variability* of past cultural formations, the circumstances and the contingencies of particular socioeconomic contexts and processes and one, that seeks to give room to the *agents or actors* of history, the ancient people, their communities, ideologies, institutions, technologies, etc. However, despite this newer trend, archaeological museums in the Balkans continue to hold the lion's share in the domain of mainstream, top-down, identity-building. Nevertheless, some recent exhibitions explored evolving critical reevaluations and/or redefinitions of the past and a number of them have received international recognition.

Key Issues/Current Debates/Future Directions/Examples

The *singular* past rationale was, and to some extent still is, nowhere better exemplified than in the case of Greek archaeological and museum displays (Hamilakis 2007; Damaskos and Plantzos 2008). Not least, and this needs to be highlighted, because Classical ruins, especially *white* – yet initially polychrome-painted – marbled architecture and sculpture, not only served as the foundations *par excellence* of Hellenism, but equally, if not even more so as a fundamental image of European identity since the Enlightenment (Settis 2006). However, in a country which is an overwhelming palimpsest of ancient relics, curated at no fewer than 150 museums, the way has been opened to more public-oriented and democratic museum scenarios and practices. Put in other words, the intention is widespread – yet not fully implemented – to break with the tradition of repository-type exhibitions useful only to the *élite* "experts" and pleasing to educated aesthetes. No doubt, the recent influx of European Union support funds for carrying out extensive renovation and re-exhibition projects has greatly contributed to this trend as well as the *loss of innocence* of Greek archaeological theory and museology (Kotsakis 1991; Mouliou 2008). Interestingly, this wave of reform was initiated by two state-run museums not having as a subject matter the "golden" Classical past, but, instead, the somewhat less esteemed and specialized religious art history of the Byzantine (medieval) epoch. The Museum of Byzantine Culture, Thessaloniki, and its annex, the White Tower Museum, which hosts a multimedia enhanced itinerary into the multicultural, cosmopolitan history of that city, the second largest in the country, and the Byzantine and Christian Museum, Athens, constitute groundbreaking, open-minded interpretative exhibitions. In these, ancient peoples and their beliefs are center stage. Thematically instead of being taxonomically organized (Fig. 1), these displays offer sharp insights on long established national historiographies (Gazi 2011). In the last decade or so, among the many rearranged and refurbished and greatly improved regional Greek museums dedicated to antiquity, the Ioannina Archaeological Museum, Northwestern Greece, stands out for its cutting-edge, dialectical approach and appropriate design. In it, material cultural remains, whether of semi-nomadic mountain shepherds or of pilgrims to the oldest oracle site of Greece, that of Zeus (Jupiter) at Dodona, are used as vehicles, and not as self-evident, axiomatic values (artistic, technological or other) for the visitors to explore a multilayered past (Fig. 2) and to question *how* the past relates to the present and vice versa. This issue is most challenging for museums worldwide: it is an

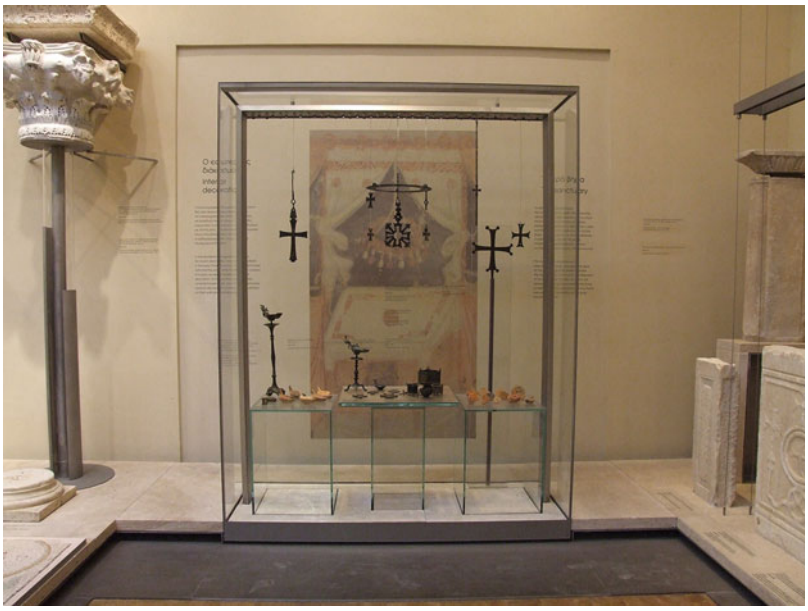

Southeast Europe: Archaeological Museums, Fig. 1 Byzantine and Christian Museum, Athens, Greece. Aspect of the exhibition section "From Antiquity to Byzantium: the Temples of the New Religion". (Photo by E. Kotjabopoulou)

Southeast Europe: Archaeological Museums, Fig. 2 Archaeological Museum of Ioannina, Greece. Aspect of the exhibition section "The Archaeology of Death". (Photo by E. Kotjabopoulou)

issue which touches on various aspects of epistemology as much as of museography, and one which has not been adequately addressed in the recently opened (2009), heavily visited New Acropolis Museum, Athens. Some of the textbook masterpieces of ancient Greek art production – notably votive statues in which the historically contingent anthropocentric spirit of fifth century BCE democracy was encoded – are now housed in an imposing glass-and-concrete building, albeit elegantly emplaced in direct visual contact with the Athenian sacred hilltop (Fig. 3). Even though the exhibits remain largely un-contextualized (Plantzos 2011), the juxtaposition of the few *original* Parthenon friezes – which escaped Lord Elgin's dismantling project – with *plaster copies* from those on display at the British Museum (London), the Louvre (Paris) and elsewhere, do, however, make an eloquently strong, constructive argument in the debate on the

Southeast Europe: Archaeological Museums, Fig. 3 Exterior view of The New Acropolis Museum, Athens, Greece. In the background (*right*), the Acropolis hill and the Parthenon. (Photo by C. Economides)

repatriation and illicit circulation of antiquities internationally.

In the rest of the Balkan countries which experienced the former so-called eastern-bloc (communist) regimes, collections of antiquities, whether national or regional, have as a rule formed part of what can be called *diachronic* knowledge building institutions, focusing on the construction and legitimization of national/ethnic identities and visions. In Bulgaria, Rumania, and other new nation-states, relics of antiquity formed part of an "evolutionary" heritage continuum; until recently, in many cases, they were displayed under the same roof as artifacts from medieval times and ethnographic, cartographic, miscellaneous collections, even including those of natural history specimens, in the model of analogous nineteenth century central European establishments (e.g., Guzin Lukic 2011; Lozic 2011; Vukov 2011). In spite of the grave financial and other structural problems currently faced by these countries, some attempts are being made to review form, content, and layout. Site-specific archaeology museums stand at the forefront of this trend, which directs great emphasis on the educational aspect. A most informative case, the Krapina Neanderthal Museum, is situated in Croatia. It is associated with a famous cave site rich in internationally significant remains of Neanderthals and ice age fauna which have been researched for over a century. This contextual exhibition relies on a "simulation of life in the past" model. Modern interactive technology aims to create a sensual experience for the visitor. Because of its core content, the display embraces a rarely portrayed pan-European perspective on the past. The exhibition challenges the now obsolete paradigm which saw the Neanderthal lineage as marginal to mainstream human history. In Albania, where archaeological remains have been overtly manipulated by its leadership to advance territorial agendas, the Butrint Museum offers a holistic, in contrast to what was formerly a selective, approach to represent the past. In this small local museum, the focus is not overwhelmingly on the important large Roman seashore colony, Buthrotum, a UNESCO World Heritage Site since 1993; instead, even though the display genre remains effectively an artifact-oriented conservative one, a more balanced, *diachronic*,

narrative is presented which charts the many transformations that the locale underwent, from its modest status as an Iron Age settlement down to its strategic fortification by Venetian and Ottoman rulers.

Turkey currently invests much energy and funds in modernizing some of its leading archaeological museums (e.g., the Topkapi Palace, Instanbul); a comparable, yet on a much grander scale, reconceptualization of the past is clearly evident at the Museum of Anatolian Civilizations, Ankara. With the aim of validating the new, westernized, Turkish identity, this, the first museum of archaeology of Republican Turkey, was originally assembled (1938–1941) to "construct" a deep national, i.e., autochthonous, past by "acculturating" the remains of the Hittite civilization – an empire born and developed in Anatolia and with no "obvious" descendants (Gürol 2008). After the museum's renovation in the 1990s, an impressive array of artifact collections were often displayed in a "reconstruction" mode – that is, they were arranged in a manner that recreated how they were used in the past. The exhibition encompasses an amplified chronological scheme, from early prehistory to the early twentieth century. Due attention and a more even representation is now placed on the many other cultural manifestations – e.g., Phrygian, Lydian, Greek, Roman, Byzantine, Ottoman – that left their rich imprint on the vast expanses of this westernmost Asian peninsula. This dynamic institution is currently being rearranged.

The traumatic recent history of Cyprus and still unresolved partition of the island has prevented renovation of its archaeological museums on either side of the Green Line (Bounia and Stylianou-Lambert 2011). However, a site-specific museum innovative for its time (the 1990s) is located at Maa-Palaiokastro, in the remote southwest countryside near Paphos. Although this exhibition does not, for security reasons, hold collections of original artifacts, it does provide in its modern building an insightful outlook on everyday life at this Late Bronze settlement and the key-role this resource-rich island played in the wider trading and cultural networks throughout antiquity.

From the above eclectic survey, it becomes evident that there is immense potential for the future development of archaeological museums in Southeast Europe especially intellectually by disregarding old- or neo-nationalist modes of thought. In this portion of the Continent, which incontestably holds a deep and rich past, archaeological museums can and perhaps urgently need to set challenging goals by turning away from unproductive policies which have haunted the modern history of the area and to explore the *tremendous* cultural variability of the region, in time and space. Powerfully singular, archaic, medieval or other, selective or utopian narratives become all the less appealing in the increasingly competitive tourist industry on which these institutions increasingly rely upon for their very existence. Besides, any kind of culturally monolithic and simplistic museum narrative of the past entails dangers for the communities and citizens of today and jeopardizes their future. As some of the examples reviewed above demonstrate, archaeological museums in this diverse region can become bridging rather than dividing institutions of memory.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Heritage: Public Perceptions
- ▶ International Council of Museums (ICOM)
- ▶ Museums and Memory Experiences
- ▶ Nationalism and Archaeology
- ▶ Parthenon (Elgin) Marbles: Case Study

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References

Bounia, A., and T. Stylianou-lambert. 2011. National museums in Cyprus: A story of heritage and conflict. In *Building national museums in Europe 1750–2010. Conference proceedings from EuNaMus, European National Museums: Identity politics, the uses of the past and the European citizen.* EuNaMus report 1, ed. P. Aronsson and G. Elgenius, 165–201. Linköping: Linköping University Electronic Press. Available at http://www.ep.liu.se/ecp_home/index.en.aspx?issue=064. Accessed 14 Jan 2013.

Damaskos, D., and D. Plantzos, eds. 2008. *A singular antiquity. Archaeology and Hellenic identity in twentieth-century Greece*. Athens: Benaki Museum (3rd Supplement).

Gazi, A. 2011. National museums in Greece: History, ideology, narratives. In *Building national museums in Europe 1750–2010. Conference proceedings from EuNaMus, European National Museums: Identity politics, the uses of the past and the European citizen.* EuNaMus report 1, ed. P. Aronsson and G. Elgenius, 363–400. Linköping: Linköping University Electronic Press. Available at http://www.ep.liu.se/ecp_home/index.en.aspx?issue=064. Accessed 14 Jan 2013.

Gürol, P. 2008. Conflicting visualities on display: National museums from the Ottoman empire to the Turkish republic. In *Comparing: National museums, territories, nation-building and change. NaMu IV*, ed. P. Aronsson and A. Nyblom, 121–127. Norrköping: Linköping University Electronic Press. Available at http://www.ep.liu.se/ecp_home/index.en.aspx?issue=030. Accessed 14 Jan 2013.

Guzin Lukic, N. 2011. National museums in Croatia. In *Building national museums in Europe 1750–2010. Conference proceedings from EuNaMus, European national museums: Identity politics, the uses of the past and the European citizen.* EuNaMus report 1, ed. P. Aronsson and G. Elgenius, 151–164. Linköping: Linköping University Electronic Press. Available at http://www.ep.liu.se/ecp_home/index.en.aspx?issue=064. Accessed 14 Jan 2013.

Hamilakis, Y. 2007. *The nation and its ruins: Antiquity, archaeology, and national imagination in Greece*. Oxford: Oxford University Press.

Hobsbawm, E.J. 1990. *Nations and nationalism since 1780. Programme, myth, reality.* Cambridge: Cambridge University Press.

Kotsakis, K. 1991. The powerful past: Theoretical trends in Greek archaeology. In *Archaeological theory in Europe*, ed. I. Hodder, 65–90. London/New York: Routledge.

Lozic, V. 2011. National museums in Bosnia-Herzegovina and Slovenia: A story of making' us'. In *Building national museums in Europe 1750–2010. Conference proceedings from EuNaMus, European national museums: Identity politics, the uses of the past and the European citizen.* EuNaMus report 1, ed. P. Aronsson and G. Elgenius, 69–98. Linköping: Linköping University Electronic Press. Available at http://www.ep.liu.se/ecp_home/index.en.aspx?issue=064. Accessed 14 Jan 2013.

Mouliou, M. 2008. Museum representations of the classical past in post-war Greece: A critical analysis. In *A singular antiquity. Archaeology and Hellenic identity in twentieth-century Greece*, ed. D. Damaskos and D. Plantzos, 83–109. Athens: Benaki Museum (3rd Supplement).

Plantzos, D. 2011. Behold the raking geison: The new acropolis museum and its context-free archaeologies. *Antiquity* 85: 613–630.

Settis, S. 2006. *The future of the classical*. Trans. A. Cameron. Cambridge: Polity Press.

Vukov, N. 2011. National museums in Bulgaria: A story of identity politics and uses of the past. In *Building national museums in Europe 1750–2010. Conference proceedings from EuNaMus, European national museums: Identity politics, the uses of the past and the European citizen.* EuNaMus report 1, ed. P. Aronsson and G. Elgenius, 133–150. Linköping: Linköping University Electronic Press. Available at http://www.ep.liu.se/ecp_home/index.en.aspx?issue=064. Accessed 14 Jan 2013.

Further Reading

Shaw, W.M. 2003. *Possessors and possessed: Museums, archaeology and the visualization of history in late Ottoman empire*. Berkeley: University of California Press.

Yalouri, E. 2001. *The acropolis: Global fame, local claim*. Oxford/New York: Berg.

Southern Africa: Cultural Heritage Tourism Development and Management

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Introduction

Cultural heritage tourism is travel that focuses on admiring and learning about historical landscapes, past monuments, cultural landscapes, archaeological sites, historical artifacts, and most of all the local communities who are hosts of these treasures that are sought for travel. These features and material culture can be situated in their places of origin, such as Egyptian pyramids, or can be packaged and placed in a museum setting, e.g., a hub of Smithsonian Museums in Washington DC, USA. The process of deliberate travel to and seeking of interpretation of these features adds to the tourism experience of these cultural and heritage landscapes and associated material culture.

Cultural heritage resources that sustain cultural heritage tourism are of two categories:

1. *Tangible* (UNESCO 1972) – These include among others archaeological artifacts as well as archaeo-historical sites, monuments, and landscapes.
2. *Intangible heritage* (UNESCO 2003) – These constitute cultural skills, knowledge, and expressions associated with material culture, i.e., the intellect that informs the production of tangible heritage.

The development of heritage tourism in southern Africa needs to be assessed through four key processes in order to come up with a balanced representation of heritage at any particular site:

1. The process of heritage knowledge production (i.e., placement of meanings and values associated with material culture, in a country). Read case study research on interpretation at Keitumetse (2016b)
2. Sociocultural, sociopolitical, and socioeconomic landscape within which heritage knowledge is identified, selected, and expressed through tourism
3. The broader context within which tourism developed and resulted in cultural and heritage tourism (cf. Keitumetse 2016d)
4. Extent of local community involvement and development – which in archaeology is represented by what is popularly referred to as public archaeology (Little 2005; Keitumetse 2016a)

Cultural heritage tourism commercializes historical events related to people's historical lives. Unlike safari tourism currently taking place in most of southern African countries, the use of cultural and heritage resources in an open-market setting requires more attention toward the sensitivity of the cultural resources. Conservation indicators that are specific to cultural and heritage resources are therefore necessary (Cf. Keitumetse 2016a, d).

Like the broader tourism, the origins of cultural heritage tourism in the south can be attributed to nineteenth-century European travel that inspired exotic travel to most regions including southern Africa. Particular to southern Africa, this travel was largely triggered by the advent of missionaries, ancient traders, and explorers seeking alternative trade routes, all of which exposed African communities and cultures to the outside world. Colonial anthropological research also played a significant role as it placed a spotlight on what came to be termed "exotic" cultures.

In post-nineteenth-century period, environmental protection awareness policies such as the 1972 World Heritage Convention and the 1987 World Convention on Environment and Development (WCED) resulted in natural resources tourism (safari tourism) that became dominant in African wilderness environments that were populated by people, some of whom had to be relocated to created wilderness and wildlife environmental spots. However, the formal incorporation of cultural heritage resources in safari tourism remained limited or haphazardly incorporated, if not neglected.

The twenty-first century has seen the development of concepts such as ecotourism (Drumm and Moore 2002), responsible tourism (cf. Revitt and Sanders 2002), and pro-poor tourism, all of whom are mistaken to represent cultural heritage tourism. Some of the aims of these concepts are to promote tourism that encourages direct interaction and responsibility toward local communities, thus exposing African local cultures to international visitors. However, of concern is the lack of attention accorded the management of cultural heritage resources as stand-alone products. Within the broader rural and local development studies, tourism is gradually being perceived as a medium through which the local "publics" (in archaeological heritage language) or local communities (in social development literature) represent and express themselves to a global world in order to acquire financial gain.

In sub-Saharan Africa, a prerequisite to selecting heritage for tourism is to analyze issues of ownership/affiliation identification, selection, and interpretation of heritage resources (Keitumetse 2016a, b). In addition, a broader theory of the concept of "community" and cultural resources use in tourism also has to be established.

In cultural heritage tourism, a balanced point of departure that considers political, social, economic, as well as cultural meanings and affiliations that are imbued within existing archaeological interpretations is necessary to balance presented identities. Case studies in Boxes 1 and 2 provide examples of issues to be considered in packaging cultural heritage resources for tourism in southern African contexts. Others are discussed in detail in a section below, under the heading "Key Issues/Current Debates."

In most cases, the tourism aspect of cultural heritage is not addressed by specific cultural heritage professionals from disciplines such as archaeology, but rather by business-based disciplines. In this regard, cultural resources become vulnerable to destruction as their conservation needs are not attended to.

Definition

Tourism is travel to places that can be termed "exotic" from the traveler's place of abode. Cultural heritage tourism is a branch of tourism that extends the symbolic value of cultural and heritage resources to economic significance. The extended value is however dependent on conservation of historical sites, archaeological remains, monuments, sites, and cultural landscapes. Archaeological and historical heritage tourism can take place in museums, interpretation facilities, in situ archaeological sites, and historical landscapes, among others.

Smith (1995) provides a summary of salient features that characterize definitions and descriptions of twentieth-century tourism within the mandate of the 1970 World Tourism Organization (UNWTO) as follows:

1937 – Key indicator was 24-h stay.
1950 – Inclusion of student on study tours as tourists and less than 24-h traveler called excursionist.
1963 – Distinction between tourists staying 24-h and those staying less recognized.
1967 – Distinction between tourists who stay overnight and those that do not was drawn as well as recognition of transit travelers as tourists.
1991 – International definitions of tourism emphasized and developed.
1993 – Tourism concepts at the center stage – identification and refining of these.

In addition to developments on tourism description and definition, The International Ecotourism Society (TIES) was launched in 1990 to guide and control tourism activities in ecologically sensitive areas. Ecotourism is defined as travel to pristine places to experience both environment and cultures of the people without jeopardizing opportunities for others to have similar experiences in the future – in other words, the sustainable aspect of travel. In 1997 TIES included "Ecotourism and community participation" as one of its operational principles which ultimately kick-started a process for recognition of local community with associated cultural and heritage resources.

The concept of *community participation* is significant in both conservation and tourism product interpretation. There are various definitions surrounding the use of the phrase "the public" and/or community in approaches toward cultural and heritage resources management. In cultural heritage literature, a community is composed of people residing in close proximity to a heritage site and has direct affiliation and emotional connection with the site, hence has acquired a significant level of commitment to the overall cultural landscape (Keitumetse 2005, 2009). In tourism literature, the generic term, "hosts," represents this group well. Within the development field, a community is composed of a group of people who share geographical affiliation and may or may not have historical ties to a particular cultural heritage.

On a more international scale, tourists represent "a public" or a "community" that is neither historically affiliated to a geographical space nor a particular form of heritage but acknowledge certain cultural heritage as significant enough to be visited, and enjoyed, hence placing tourism values on those. In protected areas of southern Africa, a consciously guided cultural/

archaeological heritage is yet to be established, and in this instance, the development of heritage tourism faces two options: adopt the existing notions of the public (local community) as per natural resources management processes or modify the existing to suit the needs of the relatively new field of cultural heritage resources management and tourism. While pondering on this dilemma, it is important to consider the public in the context within which each disciplinary research has developed.

Box 1 Botswana Case Study: Examples of Issues to Consider When Initiating Cultural Heritage for Tourism

Botswana: 1900–Present

Bechuanaland Protectorate became independent in 1966. Pre-independence archaeological heritage protection in the country included Proclamation No. 40, of 18 November 1911 cited as "The Bushmen Relics and Ancient Ruins Protection (Bechuanaland Protectorate)" – highlighting the Bushmen/San/Basarwa as a perceived "local community" at the time. This perception of "Bushmen" as the public in what later became heritage management emanated from South Africa where Bushmen rock art was protected from European expedition members who supposedly vandalized it for souvenir purposes as well as protection from resident communities who used the caves in which rock art was found for livestock rearing and shelter. Government of the Republic of South Africa, National Monuments Council (1970–1977).

The heritage "management" approach, as it were, prohibited the perceived "public" from interacting with tangible heritage. Emphasis on the *"Bushmen"* also indicates perception of whose heritage was selected and presented as well as by whom.

It appears that perception of the Bushmen as "ancient" perpetuated their image as a community that could not manage (select, interpret, and present) their heritage to visitors, a characteristic that still prevails to a certain extent in southern African heritage management to date. "Bushmen" heritage is currently managed by either NGOs or governments on their behalf (see Fig. 1 below).

The case study shows that whereas earlier focus on the Bushmen established a basic framework approach for public/local community recognition, their placement as passive participants rather than custodians of heritage has set a negative precedence that they are not empowered to lead a process of identification, selection, and presentation of their heritage through tourism. The question of who places tourism value on the San/Bushmen/Basarwa or any community, heritage and for what purpose becomes relevant. In developing heritage tourism, these

Southern Africa: Cultural Heritage Tourism Development and Management, Fig. 1 San/Bushmen of southern Africa depicted in international playing cards by other stakeholders

(continued)

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Box 1 Botswana Case Study: Examples of Issues to Consider When Initiating Cultural Heritage for Tourism (continued)

historical nuances become very significant in achieving an ethical and sustainable tourism product.

The most substantive archaeological legislation in present-day Botswana came into effect after the revision of the 1934 *Antiquities* Act, and it was named *The Monuments and Relics Act, 1970 chapter 59:03*. In contrast with the Bushmen Relics Act of 1911, any feature "...known or believed to have been erected, constructed or used before 1st June, 1902..." was considered of importance. This characteristic broadened the scope of the concept of the public to include those who were not represented in the 1911 and 1934 legislation. Three decades later, the 1970 Act has been revised and reenacted as the *Monuments and Relics Act 2001*, which is currently in operation.

Box 2 The Republic of South Africa Case Study: History of Cultural Heritage Legislation and the Development of Tourism Identities

The Republic of South Africa: 1900s–Present

A number of institutions have had either a general interest or a legal mandate for heritage management in RSA over the years. These are the South African National Society (1905–1934), the Historical Monuments Commission (1934–1969), and the National Monuments Council (1969–1999). Since the promulgation of the NHRA, heritage management has been restructured along the national, provincial, and local levels. The South African Heritage Resources Agency (2000–present) is currently tasked with the management of Grade I sites, while the Provincial Heritage Resources Authorities and Local Heritage Resource Authorities are responsible for Grade II and Grade III heritage sites, respectively. Historical accounts from these institutions highlight the events that shaped the selection, presentation, and representation of cultural heritage, some of which is currently used in cultural heritage tourism in the country. In the early 1900s, the South African National Society (1905–1934) was more biased on Bushmen heritage (cf. *The 1911 Bushmen Relics and Ancient Ruins Protection*). By the mid-1930s, focus shifted to the cultural heritage of European origin. This is well illustrated by the quote from van Riet Lowe who was the Secretary of the Historical Monuments Commission:

> The intrepid Portuguese navigators who originally discovered and explored our coast; the courageous and freedom-loving Dutch settlers who first made South Africa their home and braved the dangers of colonizing a remote and barbarous country; the Huguenots who for the sake of their ideals, sacrificed their all; and the British settlers, who assisted in colonizing the border districts and who gave us the institutions of democracy, including a free press. They have all left us a heritage which should serve as a nerve-ending source of inspiration to our growing nation... (Van Riet 1941: 08)

The narrow definition of heritage communities from the example above illustrates a common mistake by most heritage managers to fail to proactively inquire, prior to selection, about the type of heritage represented, by whom, and how (Figs. 1 and 2). An all-encompassing approach has to always be consciously sought.

Another aspect highlighted by this account is that which concerns the question of whose heritage. Since 1986, however, conceptualizations of public heritage in RSA legislation and practice broadened to encompass social inclusion. Heritages that "...constituted historical, aesthetic...

(continued)

Southern Africa: Cultural Heritage Tourism Development and Management, Fig. 2 A cultural village setup where members of the local communities become employees hired to perform their cultural heritage aspects to tourists

Box 2 The Republic of South Africa Case Study: History of Cultural Heritage Legislation and the Development of Tourism Identities (continued)

value" (Annual report 18 1987: 03) were considered under the *War Graves and National Monuments Amendment Act of 1986* (Annual report 21 1990: 03). This 1986 legislation made allowance for a sub-committee which was formulated to coordinate the interpretation of historical sites in a way that encompassed and enhanced all types of community participation in rural areas of the Republic (Annual report 26 1994: 11).

An aspect that the RSA history brings out is one that is common to all countries in sub-Saharan Africa – that of selecting only tangible heritage (monuments, relics, archaeological, and paleontological remains, marked landscapes) for heritage expression through tourism. This was mostly the case in the 1970s as the excerpts from the 1970 *National Monument Council* (1970–1998) illustrate: "...Indeed, owing to this extreme youth of our culture in SA and the absence of folklore and traditions one finds in older countries, it is perhaps more necessary for us... to preserve the relics we have" (Van Riet 1941: 07). Intangible heritage (UNESCO 2003) in the form of folklore was not recognized as representative of heritage identity of the country.

However, after independence and into the present, the South African Heritage Resources Agency (SAHRA), under the National Heritage Resources Act No. 25 of 1999, aims to *redress past inequities* relating to identification, recognition, selection, and expression of heritage belonging to all forms of "communities" or "publics" in RSA by consciously *promoting* what officials refer to as: "...new and previously neglected research into our rich oral traditions and customs" (SAHRA annual report 2001: 03).

The once neglected research include material culture that attest to historical archaeologies of Bantu-speaking groups as well as cultural material pointing to interaction between Bantu and San cultures. These identities provide a balanced cultural identity that could be expressed through heritage tourism in the present.

Historical Background

Cultural heritage is an offshoot of the discipline of archaeology, from which heritage studies emanated in most European and American universities. Subsequently, cultural heritage tourism falls within the same category although there is reluctance by archaeologists, historians, and anthropologists to directly push the development of cultural heritage tourism due to a lack of knowledge on the subject of tourism in particular. On the other hand, cultural heritage tourism has been hijacked by business management departments, although there is very limited knowledge about conservation needs of cultural resources in these departments. Cultural heritage tourism influences values placed on cultural resources as it provides an interface between the sociocultural and the socioeconomic aspects.

The trend in the demand for cultural heritage tourism is common among a sector of tourists known as *ecotourists*. Ecotourism is travel that respects both the environment and the cultures being visited, with a keen attempt to contribute to the welfare of communities in touristic places. Therefore, in addition to wilderness and wildlife, ecotourists are looking for an interaction with host communities as a way to understand their history, archaeology, and overall culture.

Cultural heritage tourism as a subdiscipline of both the heritage studies and broader tourism has achieved very limited, if any, formal recognition and home in southern African disciplinary discourses and research. In almost all instances, it is adopted within a department in a haphazard rather than a planned manner.

Boxes 1 and 2 are case studies from Botswana and the Republic of South Africa, presented below, provide indicators to look out for in the process of developing a cultural heritage tourism package in southern Africa. Preliminary focus on theorization of several concepts in order to situate its development within sub-Saharan approaches toward identification, selection, interpretation, and presentation is necessary.

As already mentioned, cultural heritage tourism as a subdiscipline of cultural heritage studies is still at its infancy in southern Africa. Archaeology, the discipline within which heritage studies originated in Europe, is not public oriented in Africa, hence alienates other groups that are not of academic focus that could use archaeological products to develop cultural heritage tourism. The alienation of the discipline from the local people is due to technical approaches to archaeological heritage research that focuses on hardcore science approach and neglects to articulate archaeology as a medium between science and construction of social histories and identities.

Against this background, a development of tourism interpretation has to be aware of a basic framework guiding identification, selection, and choice of cultural heritage, anchored upon three main archaeological research approaches being the culture history (1950s), processual (1960s), and post-processual (1980s) approaches. To balance tourism interpretation of African histories, more research on the sociocultural and socioeconomic significance of material culture using alternative methodological approaches is required. Examples of alternative methodological approaches that are more relevant for African heritage contexts include research by scholars such as Cleere (1989), Alison Wylie (1993), Conkey and Gero (1991a), Kohl and Fawcett (1995), and Palmer (2009).

Key Issues/Current Debates

Issues surrounding development of cultural heritage tourism in southern Africa are several, but those that deserve a heightened attention are those that relate to the following:

(a) Processes and indicators for identification and selection of cultural heritage for tourism
(b) Conservation of cultural resources relative to the overall environment
(c) Mechanisms of sustainable production and consumption of cultural and heritage resources
(d) Processes that enable host communities to identify, select, and present their own heritage to the tourists

Boxes 1 and 2 present case studies that illuminate on issues (a) to (d) above. The presented scenarios on Botswana and the Republic of South Africa illustrate angles to be covered in order to exhaust hidden aspects that may influence a practitioner's point of departure when developing a tourism product. The angles include political, social, economic, communal, intellectual, historical, academic research, and others.

One of the key issues that dominate packaging and presentation of cultural heritage resources for tourism is the relationship between the resources and the various stakeholders. This is not unique to countries in southern Africa. In some parts of sub-Saharan Africa such as Kenya, a prolonged focus on prehistory or "early man" meant to create and project a national identity to the outside world (tourists) have had a negative effect of delaying development of local cultural heritage within the country (Schmidt and Patterson 1995). An added focus on safari tourism in the same country, as well as in most parts of southern Africa, provides yet another example of packaging a somewhat "neutral" and nationalistic heritage for outside tourists. These examples illustrate earlier approaches to packaging cultural heritage resources for tourism to influence tourist consumption. Further examples from other regions include the ". . .racial and imperialistic policies in archaeological research under the Nazis" (Arnold and Hassmann 1995: 73), during the Third Reich in Germany, as well as an example of the use of the history of the farming class in Denmark to create national identity (Kristiansen 1992). In all these cases, the relationship between archaeology, the state, and the local community affects communities' attitudes and perceptions toward a heritage which is consequently extended to the "tourist public" through tourism experience.

Another key aspect in the development of cultural heritage tourism is the need to engage local communities, an approach which emanates from a participatory approach principle of sustainable development (cf. Midgley 1986) within the broader conservation debate. As a starting point, heritage legislation (particularly national) is an indicator of a direction that a budding field such as heritage tourism is taking within a country as shown in Boxes 1 and 2 where the development of heritage legislation illuminates colonial aspects of heritage management that that have to be aligned to the present. Key basic questions that are brought out by the two case studies are:

What indicators are used to identify and select a particular heritage as significant?
What is selected? Why?
By whom is it selected and presented?

International Perspectives

International institutions that deal with cultural and heritage resources conservation are beginning to incorporate tourism into cultural resources management. However, a lot still needs to be done in coming up with tourism procedures that speak to cultural heritage tourism as opposed to tourism in general.

The United Nations (UN) has several institutions that are relevant to the development of cultural heritage tourism in southern Africa. The United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations World Tourism Organization (UNWTO) are two of the most relevant institutions in this regard. Other international institutions include the International Council on Museums and Sites (ICOMOS) and the World Commission on Environment and Development (WCED), otherwise known as the Brundtland Commission.

UNESCO's focus on world heritage in the 1970s added a conventional management approach to heritage which was later expanded from tangible (1972 Convention) to intangible (2003 Convention) cultural heritage. In 2008, UNESCO came up with a Sustainable Tourism Programme which is being augmented by the 2011 World Heritage and Sustainable Tourism Programme. Still within UNESCO, the 2005 Convention on the Protection and Promotion of the Diversity of Cultural Expressions that addresses policies and measures relating to conservation of cultural diversity and cultural expressions (www.unesco.org) is yet another convention that

augments cultural initiatives toward cultural heritage tourism development.

In addition to UNESCO, the International Council on Monuments and Sites (ICOMOS) provides insight on matters relating to cultural heritage resources management within which principles governing tourism applications on cultural sites are considered (www.icomos.org). In particular to tourism, ICOMOS adopted an "International Cultural Tourism Charter" in 1999, in which it is recognized that "Tourism promotion programmes should protect and enhance Natural and Cultural Heritage characteristics" (ICOMOS Tourism Charter, principle 6).

One other convention that supplements UNESCO and ICOMOS conservation measures is the 1971 Ramsar Convention on Wetlands (www.ramsar.org). In 2002, the convention secretariat, through its Culture Working Group, came up with Resolution VIII.19 on "Guiding principles for taking into account the cultural values of wetlands for the effective management of sites", followed in 2005 by the Resolution IX.21 on "Taking into account the cultural values of wetlands." All of these culminated into a 2009 document titled "The future of the WHC: Ramsar contribution," a bilateral cooperation between the international organizations.

Overlooking the implementation of conservation measures is the popular *sustainable development* framework initiated under the World Commission on Environment and Development (1987) model but with conservation guidelines that are compatible with both cultural and natural resources. The WCED's emphasis on development of conservation indicators provide for resources monitoring strategies to ensure that cultural resources are not vandalized nor depleted in a way that deprive future generations a chance to experience them. However production and consumption indicators for cultural and heritage resources are currently not available (Keitumetse 2005, 2009), although there are plenty of those for natural resources such as forests, wildlife, and others. Cultural heritage practitioners and associated professionals have to kick-start this process to ensure conservation of cultural heritage resources.

The ecotourism conservation model has brought attention to cultural heritage as a component of tourism in Africa.

With time, tourists are gradually developing interest in cultural landscapes where resident communities live in proximity to monuments and national parks of southern Africa. The realization is that "The unique selling point for destinations in developing countries is likely to be increasingly associated with the uniqueness of unusual cultures, as opposed to the physical environment. . ." (Burns 1995: 12). A framework similar to sustainable development (SD), where production and consumption indicators relating to cultural resources and applicable to sustainable heritage tourism are developed, is needed to achieve sustainable tourism using cultural heritage resources.

Future Directions

Cultural heritage tourism in southern Africa is growing at a very high rate. The concern however is that it is spearheaded by travel and tourism professionals that are not well versed and/or are not concerned much with conservation needs of cultural heritage resources such as archaeological heritage, museums, and social culture, community anthropology, and others. Due to its appeal to tourism commercial business, cultural heritage tourism is currently pursued within the commodification sectors at a superficial context fueled by the desperate need to diversify the tourism product. It is imperative that cultural specialists (archaeologists, anthropologists, and social scientists in general) and practitioners (local communities that host the culture and its heritage) take the responsibility to situate the direction of growth of cultural heritage tourism. This will enable a sustainable framework that recognizes conservation needs of cultural resources.

One direction that could guide the use of cultural heritage resources in tourism is to consider significant placement of cultural heritage resources within the sustainable development framework (cf. WCED 1987; Hall 1992;

Keitumetse 2005). Sustainable development emphasizes current use of resources in a way that ensures their continuity for future generations. The question is how can this be achieved?

A way forward may be to align conservation ideals of cultural heritage resources with the processes of sustainable development framework whereby production and consumption indicators specific to cultural resources are identified to enable monitoring of use in order to limit destruction. Currently, very few, if any, of these indicators exist for cultural and heritage resources, let alone a clear guidance on what constitutes cultural resources suitable for use in tourism. Preliminary research discourses have been attempted in this regard though at a very localized and limited level as evidenced in Keitumetse (2009) on "Ecotourism of Cultural Heritage Management."

At an operational level, eco-certification of tourism establishments is becoming popular within hotels, game lodges, camping areas, and game reserves. For example, the Botswana eco-certification system for ecotour standards as well as accommodation standards (Botswana Tourism Board 2009) is one such initiative whereby cultural aspects of tourism can be infused (cf. Keitumetse 2016c). Within such operational frameworks, once devised, indicators that support sustainable use of cultural heritage resources can be mainstreamed to enhance conservation of cultural heritage resources. For a detailed understanding of eco-certification, refer to Leslie (2001) on serviced accommodation and environmental performance, Sasidharan et al. (2002) on developing countries and eco-labels, Drumm and Moore (2002) on ecotourism development manual, and Botswana Tourism Organization (2010) on Botswana eco-certification grading. The equivalent of eco-certification program is necessary in cultural heritage tourism that takes place in protected areas such as world heritage sites that may be in danger due to large numbers of tourists. Keitumetse (2016c) articulates initiatives toward this approach.

Particular to southern Africa is the issue of community involvement. What is a community culture? How is a community culture identified in tourism setup and benefits? Who chooses community heritage for use in commercial endeavors? And many other topics that can be reflected upon.

Digital technology provides conservation opportunities that may reduce threat to cultural resources. Virtual exhibitions of sites in open-air museums as well as housed museums have potential to support future development of cultural heritage tourism in southern Africa.

At a scholarly level, cultural heritage studies is still lacking a theoretical framework within which subfields such as cultural heritage tourism could source guidance. Cultural heritage studies are still haphazardly placed in terms of theory and so is the implementation of cultural heritage tourism.

Amid all the opportunities however, it is important to acknowledge that the relationship between cultural resources and the commercial service that is tourism is impressionable, hence requires constant alignment.

Cross-References

- ▶ Community and Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and Communities
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Ethnic Identity and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage and Society
- ▶ Heritage Landscapes
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage: History and Context
- ▶ Intangible Cultural Heritage
- ▶ Nationalism and Archaeology
- ▶ Tangible Heritage in Archaeology
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective

References

Arnold, B., and H. Hassmann. 1995. Archaeology in Nazi Germany: The legacy of the Faustian bargain. In *Nationalism, politics, and the practice of archaeology*, ed. P.L. Kohl and C. Fawcett, 70–81. Cambridge: Cambridge University Press.

Burns, P. 1995. Tourism: In search of paradox and paradigms. In *Tourism and minorities' heritage: Impacts and prospects*, Papers in Leisure and Tourism Studies 6, ed. P. Burns, 9–12. London: University of North London.

Cleere, H. 1989. Introduction: The rationale of archaeological heritage management. In *Archaeological heritage management in the modern world*, ed. H. Cleere, 5–17. London: Routledge.

Conkey, M., and J. Gero. 1991. Tensions, pluralities, and engendering archaeology: An introduction to women and prehistory. In *Engendering archaeology: Women and prehistory*, ed. J. Gero and M. Conkey, 3–30. Oxford: Basil Blackwell.

Drumm, A., and A. Moore. 2002. *Ecotourism development: A manual for conservation planners and managers, volume 1: An introduction to ecotourism planning*. Arlington: The Nature Conservancy.

Hall, D. 1992. *A dialogue of cultures for sustainable development*. London: Commonwealth Human Ecology Council.

Keitumetse, S.O. 2005. Sustainable development and archaeological heritage management: Local community participation and monument tourism in Botswana. Unpublished PhD dissertation, University of Cambridge.

Keitumetse, S.O. 2009. The ecotourism of cultural heritage management: Linking heritage and the 'environment' in the Okavango Delta region of Botswana. *International Journal of Heritage Studies* 15 (2): 223–244.

Keitumetse, S. O. 2016a. Towards sustainable communities: Community-based cultural heritage resources management (COBACHREM) model. In *African cultural heritage conservation and management,* 89–111. Springer International Publishing.

Keitumetse, S. O. 2016b. Interpretation: Dealing with multiple identities. In *African cultural heritage conservation and management*, 113–133. Springer International Publishing.

Keitumetse, S. O. 2016c. Grading and certification: Implications for cultural heritage management. In *African cultural heritage conservation and management,* 135–155. Springer International Publishing.

Keitumetse, S. O. 2016d. Heritage enterprising: Cultural heritage and sustainable tourism in Southern Africa. In *African cultural heritage conservation and management*, 157–179. Springer International Publishing.

Kohl, P.L., and C. Fawcett. 1995. Archaeology in the service of the state: Theoretical considerations. In *Nationalism, politics, and the practice of archaeology*, ed. P.L. Kohl and C. Fawcett, 3–18. Cambridge: Cambridge University Press.

Kristiansen, K. 1992. The strength of the past and its great might: An essay on the use of the past. *Journal of European Archaeology* 1: 03–32.

Leslie, D. 2001. Serviced accommodation, environmental performance and benchmarks. *Journal of Quality Assurance in Hospitality and Tourism* 2 (3): 127–147.

Little, B. 2005. Archaeologists and interpreters. *SAA Archaeological Record* 3 (5): 19–21.

Midgley, J. 1986. Community participation: History, concepts and controversies. In *Community participation, social development and the state*, ed. J. Midgley, 13–44. London: Methuen.

Palmer, C. 2009. Reflections on the practice of ethnography within heritage tourism. In *Heritage studies: Methods and approaches*, ed. M.L.S.S. Sorensen and J. Carman, 123–136. London: Routledge.

Revitt, M.R., and D. Sanders. 2002. Ecotourism on Lancelin Island, Western Australia. *Journal of Ecotourism* 1 (2&3): 190–195.

Sasidharan, V., E. Sirikaya, and D. Kerstetter. 2002. Developing countries and tourism ecolabels. *Tourism Management* 23: 161–174.

Schmidt, P.R., and C.T. Patterson, eds. 1995. *Making alternative histories: The practice of archaeology and history in non-western settings*. New Mexico: School of American Research Press.

Smith, S.L.J. 1995. *Tourism analysis: A handbook*. 2nd ed. London: Longman.

UNESCO. 1972. The general conference of the United Nations Educational, Scientific and Cultural Organisation (UNESCO), 17th session. *Convention for the Protection of the World Cultural and Natural Heritage*. Paris: UNESCO.

UNESCO. 2003. The general conference of the United Nations Educational, Scientific and Cultural Organisation (UNESCO), 32nd Session. *Convention for the Safeguarding of the Intangible Cultural Heritage*. Paris: UNESCO.

Van Riet, L. 1941. *The monuments of South Africa*. Pretoria: Government Printer.

World Commission on Environment and Development (WCED). 1987. *Our common future*. Oxford: Oxford University Press.

Wylie, A. 1993. A proliferation of new archaeologies: "Beyond objectivism and relativism". In *Archaeological theory: Who sets the agenda?* ed. N. Yoffee and A. Sherratt, 20–26. Cambridge: Cambridge University Press.

Further Readings

BNA S. *175/2/1-2: Ruins: Preservation of in Bechuanaland*. Vol. I 1930–51, Vol. II 1951–56. Mafikeng: Secretariat Department.

Conkey, M., and J. Gero. 1991. Tensions, pluralities, and engendering archaeology: An introduction to women and prehistory. In *Engendering archaeology: Women and prehistory*, ed. J. Gero and M. Conkey, 3–30. Oxford: Basil Blackwell.

Fowler, D. 1987. Uses of the past: Archaeology in the service of the state. *American Antiquity* 52 (2): 229–248.
Koutra, C. 2008. Capacity-building for a socially responsible cultural heritage tourism. Paper presented at 3rd ESRC Conference on "International Conference on African Culture and Development. 'Cultural Dynamics: Greasing the Wheels of Africa's Development', Kumasi. 21–26 Apr 2008.
RAMSAR Convention. 1972. Convention on Wetlands of International Importance especially as Waterfowl Habitat. Ramsar (Iran), 2 February 1971. UN Treaty Series No. 14583. As amended by the Paris Protocol, 3 December 1982, and Regina Amendments, 28 May 1987.
Republic of Botswana, Ministry of Home Affairs. n.d. *Monument and Relics Act No. 12 of 2001*. Gaborone: Government Printer.
Republic of South Africa. 1931. *First report of the natural and historical monuments commission*. Cape Town: Citadel Press.
Republic of South Africa. 1969. March 1935–March 1969. *Vol. 1–34. National Monuments Council Annual Reports*.
Republic of South Africa. 1970. *National monuments council*, Annual Reports Vol. II. No. 1–8, 1970–1977. Pretoria: Government of the Republic of South Africa.
Republic of South Africa. 1978. *National monuments council, March 1978–March 1999*, Annual Reports Volume III. (9–31). Pretoria: Government of the Republic of South Africa.
Republic of South Africa. 1999. *South African Heritage Resources Agency*. Pretoria: Government of the Republic of South Africa.
Republic of South Africa. 2000. *South African Heritage Resources Agency (SAHRA), 2000–2002*, Annual Reports Vol. IV. No. 1–8. Pretoria: Government of the Republic of South Africa.
United Nations Tourism Organisation (UNWTO). n.d. Available at: http://www2.unwto.org/

Southern Africa: Historical Archaeology

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Introduction

Several trends and themes in the discipline of historical archaeology are apparent in southern Africa since the early 1990s. These include, and are not limited to, the study of African-European contact and interaction, the study of the emergence of the modern (post-1500) world, the study of the origins of modern historical identities, and the study of heritage and the recent and contemporary past. These trends and themes are not mutually exclusive but rather demonstrate considerable convergence and overlap with one another. They are largely influenced not only by an emerging postcolonial academic critique in a region where European colonization had a major impact on African societies but also by emerging global trends in archaeological theory.

Meanings and Approaches

While studies up to the early 1990s regarded historical archaeology as essentially the archaeological study of documented African societies primarily by Western sources (see, e.g., Pikirayi 1993), subsequently approaches take a radically different view (Hall et al. 1993). This is conditioned by problems arising from the dichotomization arising from our intellectual perceptions of human development, conveniently divided across much of Africa into traditional cultural stages of Stone Age, Iron Age, and the historical period. This approach, which perceives society as having a prehistory prior to history, compromises understanding of the past, largely negating cultural continuities which European colonialism attempted to disrupt after 1500 AD. A major constraint is the narrow time depth and limited spatial coverage of European sources and the exclusion of pre-European, oral histories from many, although not all, such studies. There is an increasing need toward accessing the "voiceless" through the study of their material culture, as these were underrepresented and often falsely represented in written texts (Reid and Lane 2004; Schmidt and Mrozowski 2013).

In southern Africa, European documentary sources have dominated studies in historical archaeology. European travelers', traders', and visitors' descriptions of the coast and inland regions date from the fifteenth century onward. Though limited in nature, Arabic sources refer to

the Indian Ocean coast and parts of the hinterland from the early tenth century. However, southern African scholars have not considered periods prior to the fifteenth century strictly as defining a historical period, and thus there is a divide around 1500 AD (see Swanepoel et al. 2008), when prehistory supposedly comes to an end. The use of "external" texts in framing African societies in this way has been questioned (Schmidt and Mrozowski 2013; Pikirayi 2013).

An alternative approach to historical archaeology in Africa comes from the use of "internal" sources, dominated mainly by oral traditions, local histories, and folklore, all of which constitute the primary means of preserving and passing on traditional information and knowledge systems. Oral traditions have been criticized for their narrow time depth, selective coverage of information, central focus on ruling dynasties, and narrow content verging on myth. The general perception by many historians is that they are less reliable than written, "external" sources. However, some African historians such as Beach (1994) have shown the usefulness of these "internal" sources, especially if approached more critically (see also Vansina 1985).

Into the Twenty-First Century

At the beginning of the present millennium, southern African historical archaeology focused on the study of African-European contact and interaction over the last 500 years, with particular emphasis on European expansion, modernization, and the relationship between colonialism and the formation of local identities (Pikirayi 2004; Swanepoel et al. 2008). A number of research themes developed from this, including the rise of merchant capital in Europe, the development of plantation economies in the Mediterranean, European arrival, and expansion into southern Africa post-1500 AD (Elphick and Giliomee 1980; Schrire 1988; 1992a, b; 1995; Schrire and Deacon 1989; Schrire et al. 1993). Gold prompted the Portuguese to outflank the trans-Saharan trade and the trade involving the Zimbabwe plateau and eastern Africa. The migration of plantation economies from the Mediterranean to the Atlantic and later the Indian oceans promoted trade in slaves, initially to the offshore islands and, subsequently, the Americas. This impacted southern African social formations, as new complex societies emerged in response to changed circumstances. Contacts were both beneficial and destructive to the parties concerned, although Europeans always wanted to manipulate them for maximum gain. Some societies resisted strongly for their survival, while others adapted to the colonial settings, manipulating them to their own advantage. This process continued until the late nineteenth century following renewed European colonization of the region.

These developments constitute historical archaeology as an archaeological study of the origins of the modern world (Hall and Silliman 2006), dominated by European colonization. However, historical archaeology was not framed primarily in terms of external agents which impact on indigenous African societies in some of the ways already described. Rather, studies on the origins of modernity sought to understand the colonization process in terms of agency – interpreting the "the absent present" behind the artifacts – as a force driving the historical process. (Pikirayi 2009).

Another dominant theme which emerged in southern African historical archaeology during the time was the origins of modern identities. This approach demonstrated that modernity should not be framed in European terms but, rather, conditioned by deep, long-term histories severely punctuated by colonization. The disciplinary identity of historical archaeology, in this regard, went beyond the last five centuries, as some contributors in Swanepoel et al. (2008) demonstrate. Southern African societies do show remarkable cultural continuities going beyond 1500 AD. The origins of the Nguni and Sotho Tswana are examples (Huffman 2004). Other studies have managed to re-interrogate the nature of cultural and other identities presented in written texts as historical. The study of the Mutapa state in northern Zimbabwe (Pikirayi 2009) shows considerable dualities in archaeological sites often identified in written

texts essentially as Portuguese trading fortifications. Such studies have also demonstrated the need to conduct archaeological investigations for situations where primacy is given to either written or oral texts (see Parkington and Cronin 1979; Pikirayi 1997, 1999; Pikirayi and Pwiti 1999). Such approaches were extremely helpful as they invoked the element of agency, echoing earlier studies on the foundations of Cape Town (Abrahams 1993; Hall 1992, 1993, 1994, 1999; Hall and Markell 1993; Hall et al. 1993), including consideration of the enslaved (e.g., Markell et al. 1995; Cox et al. 2001). Other examples where material and other identities were explored include the expansion of the European "frontier" into the hinterland, and how encounters were negotiated with indigenous people at points of contact (Swanepoel et al. 2008), and the variable responses of different African communities to the expansion on Christianity and the work of nonconformist missions (e.g., Lane 1999; Reid et al. 1997).

Historical archaeology also focused on cultural landscapes and documenting memories imprinted therein. Some of these memories include, but are not limited to, warfare, social formation, movement and migrations, and settlement. Examples include studies of the Ndwandwe kingdom, the Swazi origins, and the *mfecane*, the South African war of 1899–1902, the history of the origins of major urban centers such as Pretoria and Cape Town, and industrialization. In this way, historical archaeology may be regarded as a study of contemporary history or heritage, which directly affects people's lives, and this represents living histories. Thus such approaches dealt with "the past in the present" (Orser and Fagan 1995), a living archaeology affected by contemporary issues such as politics and economics. Here, archaeological research reclaims pasts that may have been denied in one way or the other, given the region's highly checkered colonial histories. South Africa, which identified itself as the "Rainbow Nation" post-1994, in reference to the diversity of its peoples and cultures, has successfully integrated archaeology into the education curriculum, recognizing the deep historical roots, where current complex politics derive from many centuries of cooperation and conflict between Europeans and Africans.

Emerging Trends

A workshop on historical archaeology in southern Africa, focusing on the theme "Local Sites/Global Intersections" and held at the University of South Africa (UNISA) in October 2014, set the trend and way forward for the region. Several themes emerged, which went beyond material culture studies of sites categorized as belonging to the "historical period," and include engaging with scholars elsewhere across the globe, material culture identities, and early Christian missionary activity. The conference engaged with scholars from Australia and Europe to understand better issues of indigeneity, identity formation, the changing nature of patriarchy during the nineteenth century as new opportunities emerged, and European settlement and colonialization of southern Africa. Discussions around this theme realized how limited dualisms were, e.g., labelling of artifacts as indigenous/European may shape the way in which we interpret such objects, when we may be looking at the results or outcomes of entanglement and bricolage. Not very much has been studied in terms of resilience and capacity of indigenous/local populations. Beyond the identification of material culture in contexts considered historical, there were discussions on collections management, care, and access, including human remains. This brought historical archaeologists into the domain of cultural heritage management, which is legislative driven as much as it is highly politicized. Some papers covered topics on the collapse of settlement systems; the spread of maize, ivory, and other forms of trade; and the dynamics of, and on, the moving colonial and other frontiers.

A dominant theme that is also part of global conversations emphasizes the profoundly material dimensions of early Christian missionary activity. The objective is to understand the role of missionaries, whose influence is global in nature, and very

much a significant component of European expansion, in the remaking of the modern world. Beyond this, missionaries have transformed the region in so many ways tangible and intangible and, as such, are critical role-players in narratives of modernity and modernization. The global networks of exchange established by missionary organizations, the materials that circulated through these, and the effects these exchanges had in many different parts of the world, beyond Europe, were highly transformational. Researchers are now investigating the missionary landscapes by exploring missionary architecture; mission sites; missionary education institutions; missionary impact in the region; missionary material culture, especially the printed word and the archival record that goes with it; modes of travel and transport; and missionary heritage such as museums and memorials and the agency associated with it.

A session in the Association of Southern African Professional Archaeologists (ASAPA) biennial meeting held at the University of Pretoria in July 2017 highlighted the use of high-tech aerial surveys to understand the proto-urban landscape of southern Africa. This involved the use of LiDAR to make population estimates that lived in some of the large seventeenth- to nineteenth-century Sotho-Tswana stone-walled settlements, as well as their inter- and intra-settlement organizations through time and space. These studies recognize that large aggregations of people in urban settings have profound sociopolitical and environmental implications. There is also a loss of some of these settlements due to modern urban sprawl, as is the case with the stone-walled settlements south of Johannesburg.

An interesting research conducted on the Mpumalanga Escarpment of South Africa integrates archaeology with the oral histories of the Koni people and early European expansion and subsequent settlement in the area to understand stone-walled terraces, homesteads, footpaths, fortifications, and other structures, covering more than 10,000 km^2 (Delius et al. 2015). This research can be contextualized in a continent-wide focus on the development of "islands of intensive agriculture" (Widgren and Sutton 2004) in broadly similar geographical locations during the last 500 years, in response to the impact of the Little Ice Age (Hannaford. et al. 2014; Pikirayi 2016).

Another interesting development is closely linked to community and public archaeology and involves to '"listening" to oral accounts relating to specific places such as Great Zimbabwe. The development and demise of Great Zimbabwe are poorly understood because of the lack of appreciation of local and regional histories of the southern Zimbabwe plateau, post-1500 AD (Pikirayi 2006). Paying attention to some of these extant histories and living narratives is key to understanding developments around Great Zimbabwe from 1500 AD onward. These histories and narratives are connected with the adjacent landscape and regions beyond, revealing interesting local dynamics that connect Great Zimbabwe with developments in distant parts of the Zimbabwe plateau (Pikirayi 2017).

Conclusion

Southern African historical archaeology is an emerging discipline. Researchers involved realize that "everything is history," following the problematization of terms such as prehistory, precontact, and colonial. They see the need to widen the concept and scope of the discipline beyond the narrow, founding framework of historical archaeology being the archaeology of European colonial expansion. There is also the recognition that the integrity of the archive is central to the interplay between evidence and interpretation and in moving through contested concepts of the past. As such, adequate attention must be paid toward data collection and documentation since archaeology is a discipline that destroys in the process of discovery. Missions and other themes are critical in understanding frontiers, which are rich with cultural and other meanings, as well as material culture identities. Historical archaeology should play a more distinctive methodology in adding toward these meanings.

Archaeology can help better inform the history of southern Africa, since it is a vital source of evidence. Such history is critical to

understand the origins of the present. Challenges remain in terms of developing methodologies and theoretical frames, more critical being what it means to do archaeology in a context that is also informed by other sources – oral histories, written accounts, oral traditions, memories, etc. Scholars must also engage with the historical archaeologists from other regions of the world. A major problem facing North American approaches to historical archaeology, for example, is the exclusionary manner in which the discipline is framed. By confining historical archaeology to the era of capitalism and colonialism, the indigenous histories of many areas of the globe including Africa are of no interest to such an intellectual agenda. If we practice an historical archaeology that only valorizes the colonial experience, then we must explain what happens to history making that engaged cultures in the precapitalist and premodern era.

References

Abrahams, G. 1993. The grand parade, cape town: Archaeological excavations of the seventeenth century Fort de Goede Hoop. *South African Archaeological Bulletin* 48: 3–15.

Beach, D.N. 1994. *The Shona and their neighbours*. Oxford: Blackwell.

Cox, J., J. Sealy, C. Schrire, and A. Morris. 2001. Stable carbon and nitrogen isotopic analyses of the underclass at the colonial cape of good hope in the eighteenth and nineteenth centuries. *World Archaeology* 33: 73–97.

Delius, P., T. Maggs, and A. Schoeman. 2015. *Forgotten world: The stone walled settlements of the Mpumalanga escarpment*. Johannesburg: Wits University Press.

Elphick, R., and H. Giliomee. 1980. *The shaping of south African society, 1652–1820*. London: Longman Penguin Southern Africa.

Hall, M. 1992. Small things and the mobile, conflictual fusion of power, fear, and desire. In *The art and mystery of historical archaeology: Essays in honor of James Deetz*, ed. A.E. Yentsch and M.C. Beaudry, 373–400. Boca Raton: CRC Press.

Hall, M. 1999. Subaltern voices? Finding spaces between things and words. In *Historical archaeology: Back from the edge*, ed. P.P.A. Funari, S. Jones, and M. Hall, 193–203. London: Routledge.

Hall, M., and S.W. Silliman. 2006. *Historical archaeology*, Blackwell Studies in Global Archaeology series. Vol. 9. Massachusetts: Blackwell Publishing.

Hall, M., A. Malan, S. Amann, L. Honeyman, T. Kiser, and G. Ritchie. 1993. The archaeology of Paradys. *South African Archaeological Society Goodwin Series* 7: 40–58.

Hannaford, M., G.R. Bigg, J.M. Jones, M. Staub, and I. Phimister. 2014. Climate variability and societal dynamics in pre-colonial southern African history (AD 900–1840): A synthesis and critique. *Environment and History* 20 (3): 411–445.

Huffman, T.N. 2004. The archaeology of the Nguni past. *Southern African Humanities.* 16: 79–111.

Markell, A.B.., M. Hall, and C. Schrire. 1995. The historical archaeology of Vergelegen, an early farmstead at the cape of good hope. *Historical Archaeology* 29: 10–34.

Orser, C.E., Jr., and B.M. Fagan. 1995. *Historical archaeology.* New York: Harper Collins College Publishers.

Pikirayi, I. 1993. *The archaeological identity of the Mutapa state: Towards an historical archaeology of northern Zimbabwe*. Vol. 6. Uppsala: Societas Archeologica Upsaliensis, Studies in African Archaeology.

Pikirayi, I. 2004. Less implicit historical archaeologies: Oral traditions and later Karanga settlements in south-Central Zimbabwe. In *African historical archaeologies*, ed. A.M. Reid and P.J. Lane, 243–267. New York: Kluwer Academic/Plenum Publishers.

Pikirayi, I. 2006. The demise of Great Zimbabwe, AD 1420–1550: an environmental re-appraisal. *Cities in the World, 1500–2000*, ed. A. Green and R. Leech, 31–47. The Society for Post-Medieval Archaeology Monograph 3. Leeds, UK: Maney Publishing.

Pikirayi, I. 2013. Great Zimbabwe in historical archaeology: Reconceptualizing decline, abandonment, and reoccupation of an ancient polity, A.D. 1450–1900. *Historical Archaeology* 47: 26–37.

Pikirayi, I. 2016. Book review. "Forgotten worlds. The stone-walled settlements of the Mpumalanga escarpment". *South African Archaeological Bulletin* 71 (203): 103–104.

Pikirayi, I. 2017. Listening to great Zimbabwe's local histories and it's Toponyms. *The SAA Archaeological Record: The Magazine for the Society of American Archaeology* 17 (4): 33–34.

Reid, A., and P.J. Lane. 2004. African historical archaeologies. In *African historical archaeologies*, ed. A.M. Reid and P.J. Lane, 1–32. New York: Kluwer Academic/Plenum Publishers.

Reid, A., P. Lane, A. Segobye, L. Börgeson, N. Mathibidi, and P. Sekgarametso. 1997. Tswana architecture and responses to colonialism. *World Archaeology* 28: 96–118.

Schmidt, P.R., and S. Mrozowski. 2013. *The death of prehistory.* Oxford: Oxford University Press.

Schrire, C. 1988. The historical archaeology of the impact of colonialism in 17th century South Africa. *Antiquity* 62: 214–225.

Schrire, C. 1995. *Digging through darkness: Chronicles of an archaeologist*. Richmond: University of Virginia Press.

Swanepoel, N., A. Esterhuysen, and P. Bonner. 2008. *Five hundred years rediscovered: Southern African precedents and prospects. 500 year initiative conference proceedings*, 2007. Johannesburg: Wits University Press.

Vansina, J. 1985. *Oral tradition as history*. Wisconsin: Wisconsin University Press.

Widgren, M., and J.E.G. Sutton, eds. 2004. *Islands of Intensive Agriculture in Eastern Africa*. Oxford: James Currey and Ohio University Press.

Further Readings

Hall, M. 1993. The archaeology of colonial settlement in southern Africa. *Annual Review of Anthropology* 22: 172–200.

Hall, M. 1994. The secret lives of houses: Women and gables in the eighteenth century cape. *Social Dynamics* 20: 1–48.

Hall, M., and A. Markell. 1993. *Historical archaeology in the Western Cape*. Vol. 7. Johannesburg: South African Archaeological Society, Goodwin Series.

Hall, M., D. Halkett, J. Klose, and G. Ritchie. 1990. The barrack street well: Images of a cape town household in the nineteenth century. *South African Archaeological Bulletin* 152: 73–92.

Lane, P.J. 1999. Archaeology, nonconformist missions and the 'colonisation of consciousness' in Southern Africa, c.1820–1900. In *Case studies in archaeology and world religions*, ed. T. Insoll, 153–165. Archaeopress: BAR S755.

Parkington, J., and M. Cronin. 1979. The size and layout of Mgungundlovu 1829–1838. *South African Archaeological Society, Goodwin Series* 3: 133–148.

Pikirayi, I. 1997. Research trends in historical archaeology on the Zimbabwe plateau and adjacent margins. In *Caves, monuments and texts: Zimbabwean archaeology today*, ed. G. Pwiti, 14: 69–97. Uppsala: Department of Archaeology and Ancient History, Uppsala University, Studies in African Archaeology.

Pikirayi, I. 1999. Research trends in the historical archaeology of Zimbabwe. In *Historical archaeology: Back from the edge*, ed. P.P.A. Funari, S. Jones, and M. Hall, 67–84. London: Routledge.

Pikirayi, I. 2006. Gold, black ivory and houses of stone: Historical archaeology in Africa. In *Historical archaeology*, ed. M. Hall and S.W. Silliman, 230–250. Oxford: Blackwell.

Pikirayi, I. 2009. Palaces, feiras and prazos: An historical archaeological perspective of African Portuguese contacts in northern Zimbabwe. *African Archaeological Review* 26 (3): 163–185.

Pikirayi, I., and G. Pwiti. 1999. States, traders and colonists: Historical archaeology in Zimbabwe. *Historical Archaeology* 33: 73–89.

Schrire, C. 1992a. The archaeological identity of hunters and herders at the cape over the last 2000 years: A critique. *South African Archaeological Bulletin* 47: 62–64.

Schrire, C. 1992b. Digging archives at Oudepost 1, Cape, South Africa. In *The art and mystery of historical archaeology: Essays in honor of James Deetz*, ed. A.-E. Yentsch and M.C. Beaudry, 361–372. Boca Raton: CRC Press.

Schrire, C., and J. Deacon. 1989. The indigenous artefacts from Oudepost 1, a colonial outpost of the VOC at Saldanha Bay, Cape. *South African Archaeological Bulletin* 44: 105–113.

Schrire, C., K. Cruz-uribe, and J. Klose. 1993. The site history of the historical site at Oudepost 1, cape. *South African Archaeological Society Goodwin Series* 7: 21–32.

Southern Africa: Origins and Development of Agriculture

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Introduction

Some 2500 years ago in southern Africa – the subcontinent of Africa subsuming the basins of Kunene, Okavango, Zambezi, Kafue, Luangwa and Shire rivers, and Lake Malawi and all the regions to the south of these – foragers were drawn toward a process by which greater control over plants and animals gave rise to domestic forms. Gradually, some of these foragers became involved in metal production. These developments ushered in significant social, cultural, economic, ideological, and political changes on the societies involved. Most of the evidence for farming comes from archaeology through actual remains of cultivated plants and domestic animals and artistic representations of the latter in rock paintings or engravings. Although direct archaeological evidence remains poor due to the limited number of samples directly subjected to scientific analyses, a key factor remains the preservation of the evidence itself. While the biological evidence suggests that the process of animal and crop domestication was introduced from elsewhere, it appears the inhabitants of the subcontinent

continued to exercise greater, though not full, control of wild resources, a process which required no domestication. This may explain the continued reliance of both wild and plant resources, as the subcontinent's biomes allowed such interaction to take place.

Key Issues/Current Debates/Future Directions/Examples

Archaeological and Linguistic Background

Up to and until about 1500 years ago, the inhabitants of southern Africa were largely stone-using hunter-gatherers and most probably the ancestors of the modern San and Khoe (Mitchell 2002). Some 2000–2500 years ago, some of these hunter-gatherers became cattle and sheep herders. Archaeological evidence attesting to their presence in the region has been found in what is now southern Angola, Namibia, Botswana, and the Northern and the Western Cape regions of South Africa (Sadir 2013). They also made pottery, with some scholars suggesting they could have ushered in a form of "pastoral Neolithic" comparable to that from the more northerly and eastern parts of the African continent. However, this interpretation remains debatable (see, e.g., Robertshaw 2012; Russell et al. 2014). What is interesting though is the appearance of domestic sheep in the Western Cape region more than 2000 years ago, and how they were introduced into the region, most probably from eastern Africa, remains unresolved.

Subsistence practices directly associated with farming seem to have gathered momentum during the first and second centuries CE (Phillipson 2005). Communities linked to these developments cultivated millets, sorghum, lentils, melons, kept cattle, sheep, or goats. Initially, the farmers did not fundamentally change the subsistence patterns of the autochthonous communities. However, they were to leave their mark on the southern African landscape through pottery-making traditions that were so distinct that some Iron Age archaeologists have equated them to early forms of ethnic entities (Huffman 1989, 2007). Archaeological sites of the Chifumbaze complex or tradition, also referred to as Early Iron Age or Early Farming Community sites, are directly attributed to this development. The spatial pattern points initially to a gradual expansion of the farming population in the subcontinent (Vansina 1994/1995, 1989), resulting in substantial village settlements whose inhabitants also specialized in the production of metal, mainly iron. It remains unclear whether these farmers dispersed from the northerly part of the African continent or the knowledge reached the southern African herders and hunter-gatherers, the latter representing an internal transformation within such communities, moving toward a sedentary subsistence lifestyle. Linguistically, they are identified with the ancestors of Bantu speakers, who populate the region today (Huffman and Herbert 1994/1995; Ehret 2001), suggesting that the dispersal of ceramic traditions associated with early farmers correlates with the spread Bantu languages.

Physiography of Southern Africa

The subcontinent of southern Africa is made up of a number of biomes ranging from extreme desert to the west, to savannah in the east, sub-equatorial woodlands to the north, and temperate zones further south (Rutherford and Westfall 1994; Rutherford et al. 2006). The eastern half of the region is summer rainfall area, with the savannah biome the largest, covering over 45% of the area, characterized by open grassland and woodlands. Brachystegia and acacia are the dominant species. Altitude ranges from sea level to over 2000 m, where montane forest grows. Summer rainfall ranges from 200 to 1000 mm per annum. The region also has almost every major geological and soil type contained in it.

It is in these biomes that a wide range of plant and animal foods exist, both wild and domestic; these were at the disposal of the hunter-gatherers, herders, and farmers during the last two millennia or slightly more. Specifically, the savannah biome is home to seasonal forest fires and grazing which is ideal for wild animals, cattle, sheep, and goats, though the latter are highly tolerant of drier, hotter, and lower-lying altitudes (see, e.g., Vogel 1986; Hannaford et al. 2014).

Intensification of Farming

The intensification of crop cultivation must have started in the fifth century CE, with the expansion of farming communities in much of the southern African region. The region also witnessed gradual but significant transformations which shaped the character of early farmers. The second half of the first millennium CE saw the region opening up to the Indian Ocean trade, gold mining, and exploitation of wild animals such as elephants for ivory. This triggered economic specialization, with the society becoming differentiated following the development of chiefdoms and states. The middle Limpopo valley witnessed some of these developments at Schroda, Ratho, Bambandyanalo, Mmamagwe, and Mapungubwe, and there are indications that much of the Shashe-Limpopo experienced similar developments, as suggested by archaeological evidence associated with the Zhizo/Toutswe (CE 700–1300) and Leopard's Kopje (CE 900–1500) tradition sites in Western Zimbabwe and adjacent eastern Botswana.

A significant development from the late first millennium to the early second millennium CE is the increase in the number of cattle. This development is particularly notable within the Toutswe and Leopard's Kopje traditions. Toutswe sites show a definite hierarchy, with large settlements on the tops of hills being occupied for up to 300 years or more and smaller villages and homesteads scattered around near water sources and grazing. Well-investigated sites include Toutswemogala, Bosutswe, and Shoshong, and these could have been at the helm of chiefdom societies that existed in what is now eastern Botswana and trading with the Indian Ocean coast. These seem to have lost this trade to villages and towns now attributed to the Leopard's Kopje tradition, clustered further east in the middle Limpopo and Shashe river basins, and who also kept substantial cattle herds, as attested by large middens of vitrified dung located on the central parts of their settlements. One of these centers, Mapungubwe, developed a fully fledged state society during the thirteenth century (Huffman 2007).

The need for storage of agricultural produce becomes apparent, as attested by grain bins on sites associated with the Leopard's Kopje tradition. The state societies at Mapungubwe (CE 1100–1300) and Great Zimbabwe (CE 1200–1600) evidently became dependent on a rich agricultural hinterland to support their ruling elites and craft specialists, as well as large towns with a burgeoning population, all of which needed food. Storage was also an added insurance especially in times of droughts or periods of prolonged aridity, given the fragility of the savannah biomes in relation to global weather systems. Storage was also necessary during conflict situations, as later historically documented events show.

The Introduction of Maize

Maize, *Zea mays*, was introduced in Africa in the 1500s following the continent's contacts with the Atlantic world, the Americas – a process triggered by the Columbus voyages and Portuguese seafaring activities and the slave trade (McCann 2005). Since then, it has become one of the most dominant food crops on the continent. Maize is rich in vitamins, is a carbohydrate, and also contains essential minerals and protein. It is also a digestive, containing dietary fiber and calories. No doubt, given its origins in Central America, its cultivation was easier compared to that of sorghum and carried significantly higher yields. Maize seems to have displaced sorghum and millets in medium to high rainfall regions of southern Africa. Its impact in southern Africa was huge, as it increasingly became a staple for so many societies, but sometimes with negative consequences. A number of events associated with the Portuguese in Western and south-central Africa, during the sixteenth and seventeenth centuries, and the development of state formation among the Nguni in southeastern Africa followed by the migrations of the first half of the nineteenth century may be linked to the increased adoption as well as failure of maize due to climate fluctuations (Pikirayi 2016).

Issues and Debates

Several topics require answers when discussing the origins of agriculture in southern Africa. The first issue is whether the region may have

experienced earlier forms of food production among stone-using hunter-gatherers and herder-herders as opposed to the Iron Age farmers as is widely thought. Evidence demonstrating more direct connections with eastern Africa and the southerly parts of the Sahara is crucial in this regard. A potential area of study is the assessment of both domestic and wild prototypes, if any, in southern Africa, to determine why there is a limited range of domestic animals and plants, given the abundance of wild fauna and flora. Was domestication really necessary in this case? A third issue is the role of climate change on domestication of both plants and animals, and human subsistence patterns, given the known shifts from hunting to farming and back. For the more recent periods, it would also be interesting to assess the impact of the introduction of maize on southern African societies. Some of the major population shifts triggered by environmental stress and human conflict are speculatively linked with the introduction of maize on the subcontinent. The only challenge is the limited oral histories with direct references to southern African hinterland societies that may provide crucial testimony to this; otherwise, all the answers have to come from archaeology.

Cross-References

- ► Agriculture: Definition and Overview
- ► East and Southern African Neolithic: Geography and Overview

References

Ehret, C. 2001. Bantu expansions: Re-envisioning a central problem of early African history. *The International Journal of African Historical Studies* 34 (1): 5–41.

Hannaford, M., G.R. Bigg, J.M. Jones, M. Staub, and I. Phimister. 2014. Climate variability and societal dynamics in pre-colonial southern African history (AD 900–1840): A synthesis and critique. *Environment and History* 20 (3): 411–445.

Huffman, T.N. 1989. Ceramics, settlements and Iron age migrations. *African Archaeological Review* 7: 155–182.

Huffman, T.N. 2007. *A handbook to the iron age: The archaeology of pre-colonial farming societies in southern Africa*. Scottsville: University of KwaZulu-Natal Press.

Huffman, T.N., and R.K. Herbert. 1994/1995. New perspectives on Eastern Bantu. In *The growth of farming communities in Africa from the Equator southwards*, ed. J.E.G. Sutton. Proceedings of the British Institute in Eastern Africa (in association with the African Studies Centre of Cambridge University, Newnham College, Cambridge, 4–8 July 1994). *Azania* special volume 29–30, 27–36.

Mccann, J.C. 2005. *Maize and grace: Africa's encounter with a new world crop, 1500–2000*. Cambridge, MA: Harvard University Press.

Mitchell, P. 2002. *The archaeology of southern Africa*. Cambridge: Cambridge University Press.

Pikirayi, I. 2016. Food production in southern Africa with a specific focus on the introduction, spread and consequences of maize (*Zea mays*). In *The origins of food production*, ed. N. Sanz, 300–309. UNESCO Mexico Office: Mexico.

Phillipson, D.W. 2005. *African archaeology*. Cambridge: Cambridge University Press.

Robertshaw, P. 2012. Archaeology, multidisciplinary reconstructions of Africa's recent past, and archaeology's role in future collaborative research. *African Archaeological Review* 29: 95–108.

Russell, T., F. Silva, and J. Steele. 2014. Modelling the spread of farming in the Bantu-speaking regions of Africa: An archaeology-based phylogeography. *PLoS One* 9 (1): e87854. https://doi.org/10.1371/journal.pone.0087854.

Rutherford, M.C., and R.H. Westfall. 1994. Biomes of southern Africa: An objective characterization. *Memoirs of the Botanical Survey of South Africa* 54: 1–98.

Rutherford, M.C., L. Mucina, and L. Powrie. 2006. Biomes and bioregions of southern Africa. In *The vegetation of South Africa, Lesotho and Swaziland*, ed. L. Mucina and M.C. Rutherford, 30–51. Pretoria: SANBI.

Vansina, J. 1994/1995. A slow revolution: Farming in subequatorial Africa. In *The growth of farming communities in Africa from the Equator southwards*, ed. J.-E.G. Sutton. Being the proceedings of the British Institute in Eastern Africa (in association with the African Studies Centre of Cambridge University, Newnham College, Cambridge, 4–8 July 1994). Azania special volume 29–30, 15–26.

Vansina, J. 1989. Savannah farmers on the sandveldt. *Azania* 24: 38–50.

Further Reading

Maggs, T., and G. Whitelaw. 1991. A review of recent archaeological research on food-producing communities in southern Africa. *Journal of African History* 32: 3–24.

Sadir, K. 2013. A short history of herding in southern Africa. In *Pastoralism in Africa: Past, present and*

futures, ed. M. Bollig, J. Pauli, and H.-P. Wotzka. New York/Oxford: Berghahn Books.
Vogel, J.O. 1986. Microenvironments, swidden and early Iron age settlement in south-western Zambia. *Azania* 21: 85–97.

Southern and East African Middle Stone Age: Geography and Culture

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State of Knowledge and Current Debate

Introduction

The "Middle Stone Age" (MSA) is a temporal stage term used to describe sub-Saharan assemblages of the late Middle and Late Pleistocene. It was originally introduced by South African pioneer archaeologists Goodwin and Van Riet Lowe in 1929 to describe stone tool assemblages technologically distinct from those of the Early Stone Age (ESA) and Later Stone Age (LSA) periods. At that time it referred to assemblages in which convergent flaking on prepared cores was used to produce unretouched and retouched pointed flakes with faceted platforms. It is now known that the Middle Stone Age involves a much wider range of technological and typological variability, but the term still has currency as a historical and technological stage division. There is however no consensus on the definition of the Middle Stone Age (Wadley 2015), and transitions and differences between the ESA, MSA, and LSA are not clear cut. The Mode system, created by Clark in 1969 (Graham Clarke), is an alternative way to describe Paleolithic variability in terms of key innovations independent of temporal association. Modes 2–5 are associated with the Middle Stone Age with Mode 2 referring to bifacially worked tools such as hand axes and cleavers (▶ Handaxes and Biface Technology), Mode 3 to flake tools produced from prepared cores (Levallois), and Mode 4 to "punch-struck" blades sometimes retouched into various specialized tool types (Backed Geometrics). Mode 5 assemblages contain microlithic components of composite tools, often backed or retouched. "Modes" may be useful for describing key lithic innovations but have little further explanatory significance (Shea 2011). In Southern and East Africa, the first typical Middle Stone Age or Mode 3 elements emerge some time before the Middle Pleistocene (~430 kya–127 kya). The transition between the Early and Middle Stone Age was an extended process, and Acheulean and Middle Stone Age assemblages overlap in time. In Southern Africa the most recent Acheulean elements occur between 125 and 300 kya at Duinefontein 2 (Klein 2009), broadly the same time range as in East Africa where the youngest Acheulean artefacts are from the surface at Herto dating to around 160 kya and from Abdur, Eritrea, where 125 kya in situ hand axes occur (Tryon and Faith 2013). In both Southern and East Africa, the earliest Middle Stone Age assemblages without hand axes and picks are found around 280 kya, at interior sites like Florisbad, Kathu Pan, and Haaskraal in the former and Gademotta in the latter region (Wurz 2013; Tryon and Faith 2013; Bousman and Brink in press) (Fig. 1).

Southern Africa encompasses the area south of the Zambezi and the Kunene rivers and incorporates the countries discussed here, mainly South Africa, Namibia, Botswana, Zimbabwe, and Lesotho, but also Southern Mozambique and Swaziland. A wide variety of ecological zones and habitats occur in the vast Southern African region and includes savannah, arid and semiarid, grassland, and coastal environments. The coastal areas from the Cape contain a number of caves with extensive stratified deposits, indicating that between ~160 and 50 kya this area, with its high biodiversity and predictable resources, was favored in the MSA. The southern Cape coast may have been a refugium in Marine Isotope Stage (MIS) 6 (Marean et al. 2014) and thus

Southern and East African Middle Stone Age: Geography and Culture, Fig. 1 Map of sites in Southern and East Africa mentioned in the text

could have played an important role in the evolution of the human phenotype or evolution of typical morphology, development, and behaviors (▶ Human Evolution: Theory and Progress). Similar productive environments associated with significant water bodies such as lakes or pans also occurred in the interior of South Africa during MIS 6 when sites like Florisbad and those associated with the early Pietersburg technocomplex were inhabited. The Southern African interior is dominated by the Kalahari Basin, the largest continuous sea sand in the world (Burrough 2016). It

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covers the area north of the Orange River and encompasses large parts of Angola, Botswana, Zimbabwe, Zambia, and Namibia. Predictability of water sources such as the large lakes found in the Kalahari would have been a significant factor in influencing occupation patterns and cultural adaptive patterns (Burrough 2016). The MSA of Tanzania, Kenya, and Ethiopia is most intensively researched in East Africa and forms the focus of this review, but cursory reference is also made to other sites in the region. Rifting has caused the relatively small Eastern African area to be divided into small localized habitats ranging from very high escarpments to lake basins. This high habitat heterogeneity increased the availability of refugia throughout the Quaternary and consequently might have influenced the development of modern humans (Lahr and Foley 2016).

The MSA is covered by Marine Isotope Stages (MIS) 13-1. For the past 450,000 years, the extremes between cold and warm phases became more pronounced, and the warm interglacials became shorter than in earlier time periods. Marine and ice cores from the northern hemisphere provide information on global climatic changes of the past, whereas southern hemispheric changes reflect in the Dome C ice record from Antarctica. On a general level, terrestrial and marine records suggest that Africa experienced increasing aridity during cold glacial phases and wetter conditions during interglacials. It is further evident that brief interstadials (Dansgaard-Oeschger events) influenced climate for the last ~100,000 years. These rapid warming periods took place on a decadal scale and were followed by gradual cooling periods. Contemporaneous but less intense and rapid change is reflected in the Antarctic ice record. The Heinrich events that occurred after ~70 kya in the North Atlantic and resulted in cold dry stadials had an uncertain impact in sub-Saharan Africa (Barham and Mitchell 2008). There is no deterministic cause and effect relationship between climate and evolutionary change, but climate influences environmental conditions and populations' evolutionary context and in this way play a role in shaping human adaptive patterns (Lahr 2016). The relationship between climatic and environmental change is nuanced and context specific and regions within Africa are differently influenced by climatic change (Blome et al. 2012). Overarching climatic theories are less useful to understand past population dynamics as it is influenced by regional environmental variability and especially the availability and predictability of surface water (Burrough 2016). Data from multiple regional terrestrial proxies that indicate changes on a regional scale are needed to productively explore the effect of past climatic and environmental change on Southern and East African Middle Stone Age populations ("▶ Environmental Reconstruction in Archaeological Science," "▶ Geoarchaeology," "Climate Studies").

Modern Human Origins

Homo sapiens, also informally referred to as "anatomically modern humans" (AMH), developed as part of a protracted process of more than 250,000 years in Africa (Lahr and Foley 2016). Molecular genetic data are crucial for exploring the origins of *Homo sapiens* (▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology). According to genome-wide autosomal DNA, the Y chromosome, and mitochondrial DNA (mtDNA), extant African populations have the highest levels of genetic variation (Soares et al. 2016), indicating an African origin for all modern humans. It is probable that fossil evidence for early *Homo sapiens* would be found in the African Middle Pleistocene fossil record (Stringer 2016). There is debate, however, on exactly where in Africa the first modern humans developed and how populations dispersed. AMH likely did not descend from a single group of people from a specific area and time period but developed from a network of groups that interacted with each other (Soares et al. 2016). Southern Africa presents evidence for particularly early human groups. The analyses of the complete genome of a 2000-year-old boy from Ballito Bay, from the KwaZulu-Natal coast, indicate that the population divergence time between him and 42 other groups dates to beyond 260 kya (Schlebusch et al. 2017). mtDNA and genome-wide data further suggest that such early Southern African groups, ancestral to the Khoe-San people,

were isolated in this region prior to 140 kya. The variability in two basal haplogroups, or clades that represent clusters of lineages that descend from a common ancestor in the mtDNA tree, L0 and L1, shows that by 140 kya two groups of modern humans lived in Africa. The L0 haplogroup has a Southern African origin and the related L1'6 haplogroup a Central or Eastern African origin. The distribution of haplogroup L0 further implies gene flow from Southern Africa to Eastern Africa between ca 130 and 70 kya. The migration out of Africa by modern humans is a different event and concerned the expansion of, for example, haplogroup L3 ca. 60–70 kya (Soares et al. 2016).

The fossil record relevant to the evolution of humans is sparse and not well dated. Some regions, such as the Kalahari, are not represented at all (Robbins et al. 2016). The *Homo sapiens* hypodigm, or sample available for a specific taxon, is complex and highly variable. Although there is debate on precisely which traits constitute anatomical modernity, uniquely *Homo sapiens*-derived traits include a more globular shape of the cranial vault and a reduction in the projection and size of the face, as well as a chin or mental eminence (Lahr and Foley 2016). Morphologically distinct populations probably co-existed in Africa during the early phases of modern human origins (Stringer 2016). An early group with relatively more robust features from East Africa is from Eliye Springs and Ngaloba (Stringer 2016, "▶ Fossil Records of Early Modern Humans"). In Southern Africa *Homo helmei* from Florisbad, South Africa, dating ~260 kya is part of the early archaic *Homo sapiens* clade (Stringer 2016). A tooth with archaic characteristics from Lincoln Cave Sterkfontein possibly belongs to the same group (Wadley 2015).

The fossil remains from Omo and Herto, Ethiopia, represent another cluster within the *Homo sapiens* hypodigm (Tryon and Faith 2013). The Omo I calvarium, from Kyamoya's Hominid Site (KHS) in the Kibish Formation, southern Ethiopia, dates to ~195 kya, whereas the four individuals from the Herto member of the Bouri Formation are associated with ages ranging of between 160 and 154 kya. These remains have long been considered the earliest members of *Homo sapiens*, but they reflect many archaic traits. Archaic traits are also present in Late Pleistocene *Homo sapiens* in East Africa that include fossils from, for example, Aduma, Porc Epic, and Mumba (McBrearty and Brooks 2000). No human fossils seem to occur between MIS 4 and MIS 3 (Lahr and Foley 2016), and archaic elements can be found into the Late Pleistocene (Stringer 2016).

The earliest representatives of anatomically modern *Homo sapiens* in Southern Africa come from Klasies River (Klasies River Mouth and Related Sites) where a relative large collection of cranial and postcranial fossils have been found (Grine 2016). Two maxillary fragments that date to ~120 kya are the oldest hominins from the site, with the majority of the fossils dating to between ~100 and 80 kya. A few also relates to MIS 4. These fossils show cut marks and burning, consistent with cannibalistic practices (Deacon and Deacon 1999). Border Cave provides an enigmatic collection of human fossils, with the earliest reliably dated individual dating to ~70 kya (Wadley 2015). Fossils with no particular diagnostic traits, all probably post-dating 80 kya, occur at Cape sites such as Klipdrift Rock Shelter, Blombos Cave (Blombos), Pinnacle Point (Cave at Pinnacle Point, S Africa), Diepkloof Rock Shelter, Die Kelders, Hoedjiespunt, and at inland sites further north at Plovers Lake and Bushman Rock Shelter (Wadley 2015). The infant from Border Cave dating to 74 ± 4 BP, excavated from the base of the Howiesons Poort, is of particular interest as it is considered to be the first burial of a modern human recorded in Africa. The burial is associated with a perforated *Conus* shell (d'Errico and Backwell 2016). The 36 kya Hofmeyr skull is distinct from other contemporaneous humans in Africa, underscoring the diversity within the later Pleistocene modern human populations in the continent (Grine 2016).

Middle Stone Age Lithic Variability

Middle Stone Age stone artefacts provide the most ubiquitous clues to the behavior and population dynamics of early humans in Africa, relating to adaptive changes over an extended period of time involving different populations. MSA groups frequently used Levallois or prepared

core technology (McBrearty and Brooks 2000; Wurz 2013; Tryon and Faith 2013). The Levallois method originated within the ESA. In Southern Africa older prepared cores are associated with the million year old Victoria West industry at the site of Canteen Kopje, Northern Cape, in which large preferential flakes were retouched into Acheulean hand axes (▶ Acheulean Industrial Complex). Prepared or Levallois cores are designed to produce preformed flake blanks with little or no further shaping by retouch (▶ Lithic Technology, Paleolithic). In Levallois technology the core is conceived of as two opposing volumes that play different roles in the production process. The non-production volume serves as striking platform, and "end products" or "intended products" are only removed from the upper surface that is methodically prepared. The convexities created by the preparation guide the fracture path during knapping and design the shape of the removed flakes. In the preferential method, a single blade, flake, or point is removed before repreparation, and in the recurrent method, a series of products are knapped before repreparation. Preparatory and predesigned flakes can be removed unidirectionally, bidirectionally, or centripetally. The Nubian type 1 method is a specific variant of Levallois technology in which the convexities of the production surface are prepared by removing two elongated flakes from the distal end of the core (Tryon and Faith 2013). This technology is frequently used to follow connections between populations that moved between the north Nile Valley and parts of the Arabian Peninsula during Out of Africa events. Nubian type 1 technology also occurs in the MSA of East Africa, at or near sites of the Nile drainage basin, at K'one and Aduma in Ethiopia, and the Rusinga Island in Kenya indicating that this variant was widespread (Tryon and Faith 2013). That the Nubian type 1 technology is found at sites like Mertenhof and Uitspankraal 7 in southwestern South Africa suggests that similar types of technologies do not always indicate diffusion or dispersal but rather technological convergence (Will et al. 2015).

MSA knappers were competent and resourceful technologists and reduced cores in a variety of ways, depending on the raw material and types of flakes needed. They used discoidal technology to produce flakes through alternate flaking from both sides of (usually) a cobble blank. Single- and multiple-platform core technology, where one or more edges of a core were used as striking platforms without preparation, and bipolar technology in which a core is flaked on an anvil were also utilized. Blade and bladelet production was an established part of MSA technology that occurred already around 500 kya in Southern and East Africa (Tryon and Faith 2013; Wilkins and Chazan 2012). The blade technologies encompass a wide range of approaches, including volumetric, Hummal, and adapted Levallois. Truncated faceted pieces, used for the production of small blades, have been reported from East Africa (Tryon and Faith 2013) but not Southern Africa.

Goodwin and Van Riet Lowe considered convergent flakes or points with faceted platforms especially different types of worked points as the "typical implement" of the Middle Stone Age of Southern Africa (Wurz 2013). Almost a century of research has shown that unretouched, unifacial, and bifacial points, produced by a variety of methods, are indeed characteristic of the MSA of both Southern and Eastern Africa. There are stylistic differences in the shape and degree of modification of the points, and this reflects regional differences, as JD Clark suggested (McBrearty and Brooks 2000). The analysis of the technological procedures used in point production in addition to the morphological aspects would allow recognizing further regional variability (Douze and Delagnes 2016). In addition to retouched and unretouched convergent pieces or points with faceted platforms, flake and blade blanks and various types of preparatory products with many different platform types also occur. The retouched element in the MSA is small, and notched and denticulated pieces, unifacial and bifacial points, scrapers, and backed artefacts occur in low frequencies. Backed artefacts and retouched points are frequently used as culture stratigraphic markers, especially when adequate dating is not available. A variety of methods, including radiocarbon dating, optically stimulated luminescence (OSL), thermoluminescence, electron spin resonance (ESR), amino acid

racemisation (AAR), and U-series dating, are applied to determine cultural change through time in the MSA. The temporal framework in Southern Africa is better established than in East Africa where change through time largely relates to bedrock geology dated through, for example, $^{40}Ar/^{39}Ar$ dating of tuffs. The MSA sequence of Southern Africa is consequently discussed in more detail than that of East Africa.

The Middle Stone Age Lithic Sequence From Southern Africa

Most of the recent information on the MSA sequence in Southern Africa comes from long sequence sites in South Africa and Lesotho and relates to MIS 6–2 (Lombard et al. 2012). The earlier phases are represented by open-air sites, especially in the northern areas of Southern Africa, where the Sangoan and Lupemban industries document the transition to the MSA. The Sangoan is characterized by core axes and picks, blades, and many scrapers. The Lupemban also contains core axes and picks, in addition to its marker tools, large elongated bifacially retouched lanceolate points > 10 cm long, and backed blades (Barham and Mitchell 2008). These industries were once considered to be regionally restricted phenomena only present in the Pleistocene forested areas of Central Africa. Kalambo Falls in Zambia, initially excavated by J.D. Clark (▶ Clark, John Desmond) and now investigated by L. Barham, is an important stratified site where both industries occur. Sites with Sangoan-like picks and core axes also occur in Namibia and the Matopos region from Zimbabwe (McBrearty and Brooks 2000). Kuman and colleagues further describe Sangoan assemblages from open-air sites in the Mapungubwe National Park and surrounding farms situated on the border with Zimbabwe and Botswana. These are the oldest archaeological sites known from this area and contain small bifaces and picks, cleaver-like tools, denticulates, and denticulated scrapers, as well as prepared cores with Levallois-like traits (Wadley 2015).

The Fauresmith industry from South Africa contains small ovate finely made hand axes, frequently associated with Levallois cores, large blades, and points (Deacon and Deacon 1999). Well-known Fauresmith assemblages, with ages of between 600 and 300 kya, are from Northern Cape open-air sites such as Rooidam, Kathu Pan, and Bundu Farm with Wonderwerk Cave the only cave site occupied (Watts et al. 2016). In the Kathu Pan 1 assemblage from the 500 kya stratum 4a (Wilkins and Chazan 2012), hard hammer percussion was used to remove blades from methodically centripetally prepared cores. Numerous unifacial points and unretouched triangular flakes and blades also occur. The pointed flakes carry diagnostic impact fractures, and through experimentation using the same type of raw material, banded ironstone, Wilkins et al. (2012) show, not uncontroversially so, that they were hafted and used in projectile weapons such as spears.

In South Africa and Lesotho, MSA assemblages with ages of between ~300 and 130 kya are known as the Early Middle Stone Age (EMSA). Generally, assemblages from the EMSA are small and await detailed description, but they are associated with low frequencies of retouched tools and blades and flakes sometimes produced with the Levallois technique. At Kathu Pan, Haaskraal, and Florisbad in the interior, the EMSA are associated with ages of between 290 and 260 kya (Bousman and Brink in press). The Florisbad ~280 kya assemblage is dominated by small broad flakes from multiple-platform cores with little evidence of Levallois technology or points. The EMSA is perhaps best represented by the Pietersburg technocomplex, a regional phenomenon restricted to the interior of South Africa south of the Limpopo River. It contains Levallois cores and flakes, large blades, as well as elongated unifacial and bifacial points, often in hornfels. The triangular or leaf-shaped bifacial points with rounded bases are especially striking. At Border Cave the Pietersburg is found in layers with ages of between 227 and 82 kya (Wadley 2015). This technocomplex is also present at other stratified sites, for example, Cave of Hearths, Wonderwerk Cave, and Bushman Rock Shelter. As the Pietersburg covers such a large time span, it is possible that it contains several phases, as suggested by scholars such as Mason and Sampson (Wadley 2015).

During glacial MIS 6 MSA sites occurred on the coast and in the interior. At Elands Bay cave

situated on the West Coast, quartzite slabs were selected to produce flakes using the Planar-Orthogonal-Linear (POL) reduction system, the marker technology of this assemblage. These cores were not prepared as such, but the natural geometry of slabs was exploited to produce trapezoidal short as well as elongated blanks (Schmid et al. 2016). The earliest layers from Peers cave, also from the West Coast, document a similar technology, but here it occurs together with points and blades from Levallois cores. This type of technology has not been recorded at the ~162 kya cave 13B assemblage from Pinnacle Point on the southern Cape coast. This assemblage contains Levallois components and bladelets in association with shellfish, hinting at the earliest evidence for coastal occupation in South Africa (Marean et al. 2014). At Florisbad, an eponymous hornfels industry from Unit M, dating to ~157 kya, is "highly retouched" and has sidescrapers, blades, and flakes produced from multiple-platform cores and Levallois and discoidal technology (Wurz 2013). This "Florisbad industry" is broadly contemporaneous with the Pinnacle Point and West Coast assemblages, but there seems to be few technological or typological similarities between them. On current evidence inland South Africa was more highly populated than the coastal areas, but populations were fragmented and did not share technological strategies on a subcontinental scale.

In South Africa and Lesotho, there is a noticeable increase in the number of Middle Stone Age sites from MIS 5 onward (Wurz 2013), but spatial and chronological patterning remains obscure. The earliest interglacial assemblages from the coast may be those from the West Coast sites of Ysterfontein 1, Hoedjiespunt 1, and Sea Harvest in which short flakes in raw materials such as silcrete, calcrete, and quartz occur in association with rarer relatively thick blades that are frequently denticulated. The point component is almost nonexistent (Wurz 2013). The deposits from Klasies River contain one of the largest assemblages of MIS 5e-a artefacts in Southern Africa, made almost exclusively in quartzite. The early MIS 5e assemblage, the MSA l, Klasies River, or MSA 2a technocomplex, is characterized by blade technology (Wurz 2013) with characteristic denticulates. The MSA II, Mossel Bay, or MSA 2b technocomplex, dating to ~100–80 kya, is technologically related to the earliest technocomplex, but its distinguishing feature is the dominance of the unipolar recurrent Levallois reduction process for the production of relatively thick unretouched points. Other broadly contemporaneous assemblages from the Cape, from for example, Cape St Blaize, Pinnacle Point, Diepkloof, Nelson Bay Cave, and Blombos Cave, share some of the Klasies River Mossel Bay industry's technological characteristics, especially in relation to point production (Douze et al. 2015). Unretouched points are also well represented in the later Pietersburg from the north and Orangian assemblages from the Karoo region (Wurz 2013). A further example of a point-rich assemblage is a 125 kya hornfels industry from an open-air site at Florisbad in which 35 sets of artefacts could be refitted. The artefacts occur in primary context in association with fauna and hearths in distinct spatial patterns (Henderson and Brink 2001).

The Stillbay and Howiesons Poort technocomplexes are associated with glacial MIS 4. These are the most intensively analyzed phenomena in South Africa, and subsequently there is more knowledge on the reduction sequences, lithic techniques used, and associated non-lithic materials than for the other periods of the MSA (Wurz 2013). Double-pointed bifacial foliate points, occurring in a wide range of raw materials and sizes, are the marker type for the Stillbay technocomplex. Hard and soft hammer techniques, as well as occasional pressure flaking and heat treatment, were used to produce these points. Stillbay assemblages occur at Cape sites such as Blombos Cave, Peers Cave, Hollow Rock Shelter, Diepkloof, Varsche Rivier 003, and in KwaZulu-Natal at Sibudu and Umhlatuzana. Most sites are dated to around 71 kya, but earlier ages of around 80 kya at Hollow Rock Shelter and > 100 kya from Diepkloof have been reported (Wadley 2015).

The Howiesons Poort technocomplex has, since its inception, attracted much attention for its "Upper Paleolithic"-like backed geometrics

("East and Southern Africa: Howiesons Poort industry", "▶ Europe: Early Upper Paleolithic" (1)). It is the most widespread Middle Stone Age industry recorded in Southern Africa and is known from more than 32 sites south of the Zambezi River. Howiesons Poort sites in South Africa include the Howiesons Poort name site, Boomplaas Cave, Border Cave, Diepkloof Rock Shelter, Klasies Rivier cave 1A and 2, Klipdrift Shelter, Pinnacle Point, Klein Kliphuis, Varsche Rivier 003, Rose Cottage Cave, Sibudu, and Umhlatuzana. It also occurs at Melikane and Ntloana Tsoana in Lesotho and at Apollo 11 in Namibia. The dates for most Howiesons Poort assemblages range between 58 and 65 kya, but later dates 48 kya at, for example, Klasies River and earlier dates of up to 100 kya at Diepkloof occur (Wadley 2015). In the Howiesons Poort Levallois, blade and bladelet and flake reduction strategies were used (Delagnes et al. 2016). Often, but not always, fine-grained raw materials like silcrete or opaline were selected for the bladelets, blades, and backed artefacts. Smaller blade blanks, and sometimes flake blanks, were retouched by marginal backing into geometric shapes such as segments and trapezes. At Klipdrift Shelter methodical heating of silcrete formed an integral part of the reduction sequence (Delagnes et al. 2016). The Howiesons Poort backed artefacts are larger than those from the Later Stone Age Wilton industry and are on average around 40 mm in length. Another characteristic typological component of the Howiesons Poort, especially for the earlier phases, is denticulated and notched blades. The Stillbay and Howiesons Poort are associated with an increase in non-lithic innovations as discussed below. These shared innovations and lithic conventions over different regions of South Africa most likely indicate increased communication and connections of coalescent populations (Mackay et al. 2014) that occupied sites more intensively for longer periods (Wilkins et al. 2017). At Pinnacle Point MIS 4, communities responded to changing climatic conditions with increased utilization of quartz and outcrop quartzite and silcrete raw materials, on site reduction of raw materials, and a focus on flaking efficiency. Place provisioning (Mackay et al. 2014) where raw material such as silcrete was transported and stocked at base camps was probably a feature of the technological system.

In the post-Howiesons Poort period in Southern Africa, a contraction of populations and less interaction between groups occurred again. There is a dearth of sites in the southern Cape from this time period but a continued presence in the interior and high altitude sites. Unifacially retouched points frequently occur in post-Howiesons Poort assemblages. This is the case at Border Cave, Klein Kliphuis, Sibudu Cave, Diepkloof, Klasies Rivier, Umhlatuzana, Rose Cottage Cave in South Africa, and Melikane, Ntloana Tsoana, and Sehonghong in Lesotho. Post-Howiesons Poort sites have been described using various labels, including "MSA lll," "MSA 3," "post Howiesons Poort," "Sibudu," "Sibudan," and "informal late Middle Stone Age." The end of the MSA, represented by the period between 45 and 20 kya, contains "final Middle Stone Age" (Lombard et al. 2012) assemblages, and subcontinental or even regional patterns seem nonexistent. Characteristic Middle Stone Age elements such as points and blades persist until ~25 kya at sites like Boomplaas and Strathalan Cave (Deacon and Deacon 1999) and Apollo 11 in Namibia (Vogelsang et al. 2010). Other final Middle Stone Age assemblages are associated with a wide variety of types including hollow-based points and bifacial and unifacial points that occur at Rose Cottage Cave, Sibudu Cave, Heuningneskrans, Klein Kliphuis, Umhlatuzana, Melikane, and Sehonghong. The transition between the MSA and the LSA took place over a period of more than 20 kya (Bousman and Brink in press). At Border Cave, a ~43 kya old assemblage with small or microlithic flakes produced with bipolar knapping represents the first Early LSA (ELSA) assemblage in South Africa. Such assemblages occur in increasingly younger contexts toward the west, with the youngest dates recorded in Namibia around 23 kya. There is a lack of homogeneity in these assemblages, but bipolar technology and *pieces esquillee*s occur at sites such as Umhlatuzana, Kathu Pan, Rose Cottage, Putslaatge 8, Apollo 11, and Elands Bay Cave (Bousman and Brink in press).

The Middle Stone Age of Zimbabwe, Botswana, and Namibia is described using nomenclatures different from that used in South Africa and Lesotho, and this complicates drawing regional comparisons. Yet, it is a research priority to focus on the integration of human behavioral traces on a subcontinental level as the genetic evidence indicates a southern coalescence of early modern humans. Namibia's longest sequence site is Apollo 11 Cave (Vogelsang et al. 2010), and it contains elements such as bifacial points and backed artefacts in MIS 4 and 3, similar to contemporaneous technocomplexes from South Africa. There are not many stratified sites in the Kalahari region, but open-air sites abound. In Botswana, for example, there are more than 50 documented open-air MSA occurrences, especially in the areas around the Thamalakane and Boteti Rivers and the Makgadikgadi basin (Burrough 2016). Multisequence sites in Botswana in the Tsodilo Hills include the White Paintings Shelter, with 7 meters of deposits dating to the last 90,000 years, and Rhino Cave. Stratified sites in Zimbabwe include the Nswatugi Cave, Tshangula Cave, and Pomongwe Cave (Katsamudanga and Nhamo 2016). In Zimbabwe, Zambia, Namibia, and Botswana, many MSA assemblages are referred to as the Bambata industry. This industry may have occurred since the EMSA (Chiwara et al. 2017). At the open-air site #Gi in Botswana, for example, the 77 kya Bambata industry yields various types of retouched points, including short, broad foliate, triangular unifacial, and bifacial points (McBrearty and Brooks 2000). The Bambata technocomplex has also been identified in the Hwange National Park and at stratified sites such as Redcliff and Zombepata caves in Zimbabwe (Chiwara et al. 2017). In Botswana a late expression of the MSA occurs with the 45–55 kya Large Blade Industry at White Paintings Shelter, with artefacts similar to those found in the South African Howiesons Poort technocomplex (Robbins et al. 2016). The transition to the LSA in northern Southern Africa is associated with the Tshangula industry dating to around 35 kya (Katsamudanga and Nhamo 2016).

The Middle Stone Age Sequence Of East Africa

The MSA from East Africa is known mostly from low-density open-air sites, with lithic characteristics and variability from many areas still unknown (Tryon and Faith 2013). Due to geological exposure, MSA sites are concentrated within the East African Rift Valley system. In East Africa the transitional Sangoan industry is, as in other regions, also characterized by heavy-duty tools, such as choppers, pick axes, core scrapers, and core axes, in addition to small flake tools and Levallois cores. The Olkesiteti Formation at Olorgesailie, dating to around 220 kya, contains Sangoan-like picks, core axes, elongate bifacials, and Levallois cores interstratified with conventional Middle Stone Age artefacts. In Tanzania Sangoan artefacts are found at Isimila and Lake Eyasi (McBrearty and Brooks 2000), whereas the Lupemban's regional distribution extends from Central Africa to the Lake Victoria region of Kenya at, for example, Muguruk (Tryon and Faith 2013). The Gademotta and Kulkuletti site complex and the Kapthurin formation provide stratigraphic information for the earlier parts of the MSA. The Kapthurin formation is a Pleistocene sedimentary sequence in the Tugen Hills of the Kenya Rift Valley, west of Lake Baringo. It is visible over an area of ~150 km^2 and is about 125 m thick. This formation is divided into five members, from K1 at the bottom to K5 at the top, with the chronological framework determined by $^{40}Ar/^{39}Ar$ dating of tuffs. In the Kapthurin formation, assemblages with small Levallois cores are interstratified with those containing cleavers. MSA elements, including blades from cylindrical cores, Levallois flakes, and Acheulean tools, occur together. The earliest blade assemblages, dating to between 545 and 509 kya, come from the base of the K3 deposits. Blades have also been recovered from three younger sites in the Kapthurin formation that date to between 509 and 285 kya. This suggests that the development of blade technology in this region had its origins in the Acheulean and that blades formed a persistent, if small, part of the technological repertoire in the Middle Pleistocene.

"Early" MSA (EMSA) sites occur prior to the Last Interglacial and "Later" MSA (LMSA) sites

within or after MIS 5e. As in South Africa, EMSA sites are not many, but Levallois reduction methods are important in them. At the ~200 kya Koimilot site in the Kapthurin formation, for example, the preferential centripetal recurrent method for flakes and unidirectional and convergent strategies for Levallois points has been recorded. There is a change through time in the technological strategies followed to produce convergent tools in the EMSA at some sites. This is demonstrated in the central Rift Valley of Ethiopia at three obsidian rich sites at Gademotta and Kulkuletti with ages ranging from 280 to 100 kya. In the oldest sites, ETH-72-8B and ETH-72-1, there is continuity with the Acheulean, and convergent tools have been produced through a shaping process that involved the tranchet blow process for edge sharpening (Douze and Delagnes 2016). At the younger ETH-72-6 site, however, predetermined Levallois procedures, including the Nubian type 1 method, have been used for making convergent tools. The early *Homo sapiens* fossil sites in the Omo and Middle Awash valleys are associated with mixed Middle Stone Age and Acheulean assemblages. Foliate bifaces, hand axes, picks, and lanceolates are common in surface finds but rare in stratified contexts in these sites. The MSA tools are in high-quality raw material such as cryptocrystalline silicate and chert, and core reduction was through the radial or centripetal Levallois and discoidal methods. A somewhat different pattern occurs in the Kapedo Tuff sites in Kenya, dating to ~135–123 kya, as well as the Turkana and the Baringo basins. Here different raw materials, for example, elongated lava cobbles, facilitated the inclusion of more elongated and larger products in assemblages (Tryon et al. 2008).

LMSA sites in East Africa typically contain Levallois flakes, blades, and a variety of types of points, including small carefully worked points, for example, at GvJm16 at Lukenya Hill, Songhor, Prolonged Drift, and Cartwright's Site in Kenya and the Nasera Rockshelter in Tanzania (Tryon and Faith 2013). It remains a challenge to document lithic technological geographical and temporal variation in East Africa, but statistical analysis of the variation within major artefact classes (Tryon and Faith 2013) indicates a unity in assemblages <75 kya. These assemblages are characterized by increased frequencies of backed pieces, bipolar technology, blades, grindstones, anvils, as well as beads and ochre. This is the case at sites like Nasera Rockshelter, Mumba, Porc Epic Cave, Mochena Borago, and the undated assemblages from Mtongwe (Tryon and Faith 2013). Very small bifacial points, of between 2 and 4 cm in length, occur from the Rusinga and Mfangano islands to the East African Rift System. This large distribution likely represents a shared technology of groups that inhabited tropical grasslands (Faith et al. 2016). The transition to the LSA is varied across the East African region and occurred over a period of 30–60 kya (Tryon and Faith 2016). Elements such as backed pieces, bipolar technology, ochre, grindstones, and anvils are continuous between the LMSA and LSA, but there is a marked proliferation of ostrich eggshell beads, and the long-distance movement of obsidian intensifies (Faith et al. 2016). In Tanzania at the Mumba Rockshelter, the transition occurs either at 55 kya or 40–35 kya (depending on the interpretation of the dating and stratigraphy) and at Kisese II rockshelter from 40 to 35 kya. In Kenya, at Enkyapune ya Muto, the transition relates to 40–50 kya assemblages, while at GvJm-22 at Lukenya Hill, the transition is between 26 and 50 kya. The Middle Stone Age persists until later in other regions, for example, until 36 kya in the Lake Victoria basin of western Kenya and until 29 kya in Mozambique (Blegen et al. 2017).

Behavioral Milestones and the MSA

One of the major issues discussed for the Middle Stone Age, especially for South Africa, is whether early humans acted in ways that could be considered "modern" or typically human. Terms such as "symbolic" and "complex" are used to evaluate cognition and behaviors associated with these groups. There is, however, debate on whether such terms are appropriate and whether archaeological evidence can even shed light on this topic (Shea 2011). The behavioral and cognitive strategies of present-day and ethnographically known people are hyper flexible and intimately linked to

specific environmental and social contexts. Moreover, the archaeological record very rarely preserves perishable items and structures that might have been used in the past in such behaviors and strategies. Until recently, the criteria used to recognize "modern behavior" were decidedly Eurocentric, sourced from the archaeological signals associated with the Upper Paleolithic (Deacon and Deacon 1999). According to some authorities (e.g., Klein 2009), art; ornamentation; the widespread shaping of bone, ivory, and shell; and spatial organization of camp floors appeared relatively sudden as a "package" in the Upper Paleolithic of Europe. From this perspective it is only when this package of behaviors can be detected in the MSA of Africa, from around 50,000 years ago, that behavioral "modernity" can be inferred. Klein (2009) suggests that a genetic mutation occurred at ~50 kya in African populations that enabled language and symbol use. Some of these types of behaviors already occur in the early MSA of Africa, but they disappear again. This fluctuation may be related to population dynamics and the rate at which innovations are spread and maintained rather than cognitive capabilities per se. The ongoing transmission and maintenance of innovations rely on highly connected populations (Mackay et al. 2014).

A distinct possibility is that many of the traits associated with "modernity" were present at least from the mid-Pleistocene after 600 kya. Prepared core technology, for example, entails hierarchical behavior and cognitive demands similar to those involved in complex language (Muller et al. 2017). The transport and transformation of lithic raw material through heat or fire also indicate complexity of thought and behavior. Provenancing studies of lithic raw materials that use geochemical fingerprinting of silcrete and obsidian in Southern Africa and East Africa, respectively (Nash et al. 2016; Tryon and Faith 2013), indicate that MSA populations were highly mobile and transported raw materials in excess of 300 km. Silcrete and other raw materials were heat treated to improve its flaking capability (Schmidt et al. 2017; Wadley et al. 2017). Hafting represents a major innovation and an early milestone in the development of complex cognition (Wadley 2015). Bone or stone artefacts are hafted when they are set in handles of organic material to produce multicomponent tools. During this process different types of materials are combined, and the series of decisions and activities imply complexity or even an "industrial revolution" (Barham 2013). In the MSA various forms of unretouched pieces, Levallois points, and backed artefacts were hafted and propelled by hand. Hafting of Levallois points occurred at ~279 kya in East Africa (Sahle et al. 2013) and somewhat earlier in Southern Africa at Kathu Pan 1(Wilkins et al. 2012). The origins of bow and arrow technology, long associated with the Upper Paleolithic of Europe, are linked to the Howiesons Poort. Metric analyses, use wear, and microtrace studies have shown that microlithic quartz backed artefacts from Umhlatuzana and Sibudu Cave were hafted and used as arrow inserts (Wadley 2015; Figs. 2 and 3) (▶ Stone Tool Usewear and Residue Analysis). MIS 4 bone points, from Peers Cave, Sibudu, and Klasies River, were also used to tip arrows (Bone Technology). Experimental research is one of the most promising avenues to explore ancient cognition (▶ Cognitive Archaeology) and plays an important role in investigating the early use of projectile systems in the MSA. Experiments were, for example, done to investigate how mastic was produced to facilitate hafting of Howiesons Poort backed artefacts. Microresidues on the Sibudu Cave backed artefacts provided the clues for identifying the components of the prehistoric adhesives. Several ingredients including ochre, gum, and a fatty substance had to be mixed and heated to a specific temperature to ensure the correct degree of elasticity for successful hafting. Keeping this complex chain of decision-making steps in mind is typical of the thought processes guiding modern day technological procedures (Wadley 2015).

These hafting procedures and hunting technologies imply a sophisticated level of cognitive and behavioral adaptability, similar to that of current hunter-gatherer groups (▶ Hunter-Gatherers, Archaeology of). MSA hunters, like their modern counterparts, displayed flexibility when choosing a particular hunting technique and weaponry. They selected, for example, snares, bows and

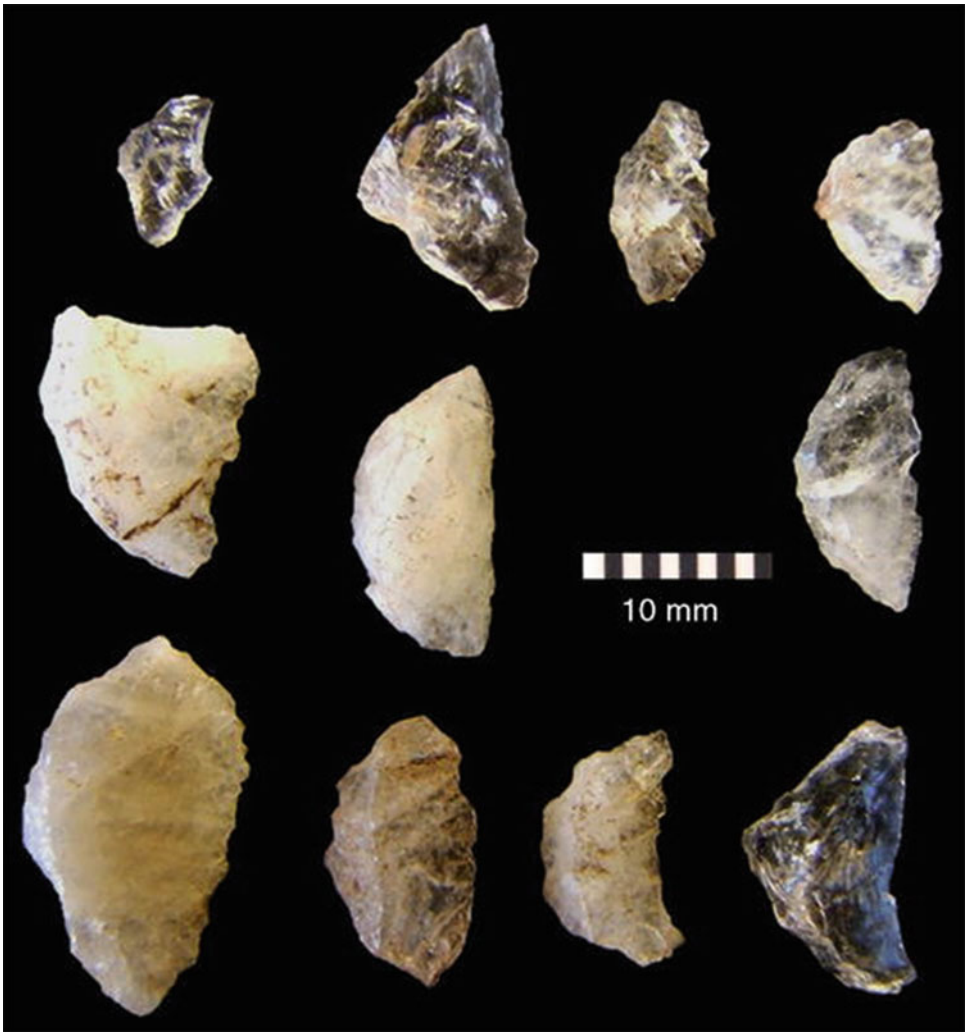

Southern and East African Middle Stone Age: Geography and Culture, Fig. 2 Quartz segments and backed pieces from Sibudu Cave, KwaZulu-Natal, South Africa (Lombard and Phillipson 2010)

arrows, or spears depending on the prey desired (Wadley 2015). The choice of prey on the other hand has led to the interpretation that MSA people from the Cape coast were technologically less advanced and efficient, and therefore less competent hunters, than those from the LSA (Klein 2009). In the LSA more dangerous game, such as wild pigs and buffalo, and in the MSA more docile species, like the eland, were hunted. LSA people also exploited marine mollusks, tortoises, airborne birds, young seals, and fish more extensively and intensively than MSA people. These contrasting behaviors are based on assemblages dated to before 60 kya and after 20 kya. The period between these dates has not been documented as there is a general lack of sites in the southern Cape during this period. The differences in species abundance in the MSA and LSA do not necessarily reflect cognitive capabilities but simply resource intensification imposed by higher population densities in the LSA (Deacon and Deacon 1999). Faith and others also point out that environmental changes associated with the onset of the last interglacial, starting after 18 kya, led to the shrinking of grassland habitat that supported grazing taxa and hence the

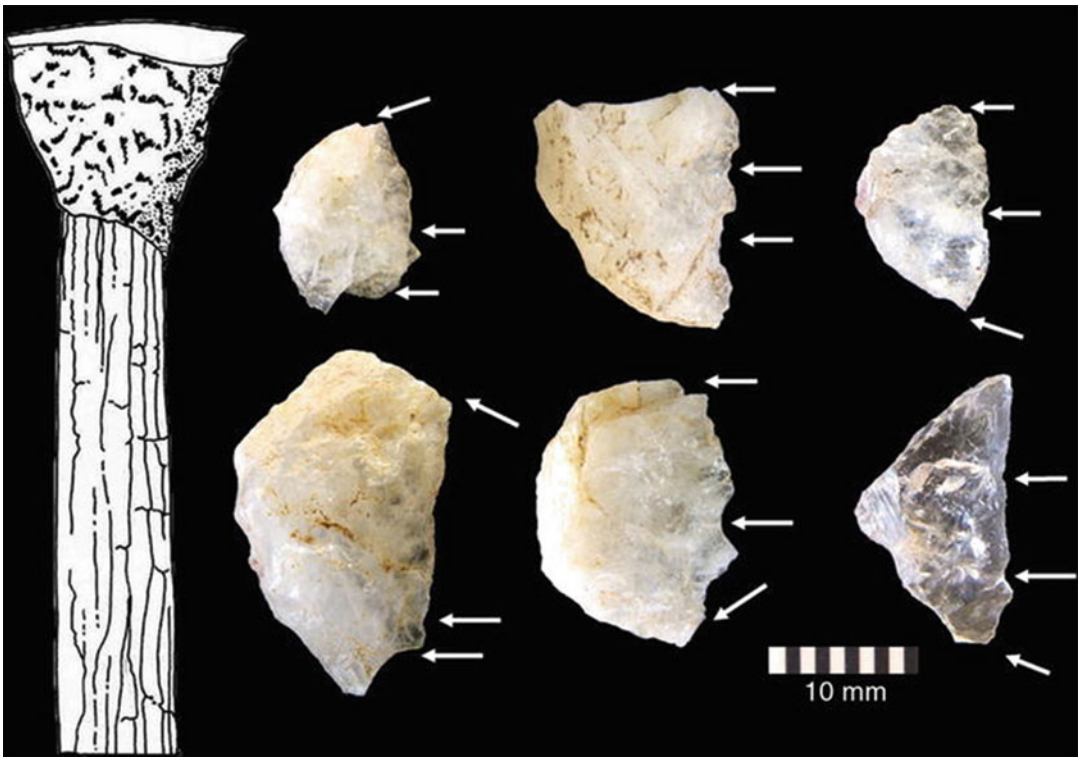

Southern and East African Middle Stone Age: Geography and Culture, Fig. 3 Left: reconstructed arrow, tipped with a transversely hafted segment. Right: segments and backed pieces from Sibudu Cave and Umhlatuzana Rockshelter with impact fractures consistent to those observed on similar artefacts that were used as transverse tips in experimental arrows (Lombard and Phillipson 2010)

availability of these large ungulates to hunt. This necessitated an expansion of diet breadth to include more intensive exploitation of shellfish, flying seabirds, tortoises, and fish in the LSA. In East Africa, vegetation changes driven by Quaternary climate cycles also influenced grassland expansion and contraction. During periods that grasslands were more extensive, certain ungulates, and perhaps also human groups, dispersed more widely. The increased presence of diagnostic technological markers such as very small bifacial points at Late Pleistocene or MSA/LSA sites such as Rusinga and Mfangano Islands, GvJm-16 at Lukenya Hill in Kenya, Nasera Rockshelter in Tanzania, and Aduma in Ethiopia may indicate such connections between populations (Faith et al. 2016).

Like hafting, the utilization of pigments also harks back to the Middle Pleistocene. Even the earliest identified pigments were modified and bear striations on their surfaces. In the Fauresmith from Kathu Pan 1, Wonderwerk Cave and Canteen Kopje pigments, especially specularite and also hematite, have been used, a practice that became more widespread by 300 kya in the Northern Cape region (Watts et al. 2016). The earliest ochre use in East Africa has been documented in the Kapthurin formation, Kenya, at GnJh-15, dating to ~284–500 kya (Tryon and Faith 2013). At Pinnacle Point striated ochre occurs at 162 kya introducing a period of more frequent ochre use at South African sites (Marean et al. 2014). In the MSA pigments were intensively worked, and this resulted in fragments and crayons with smoothed edges, such as the ~90 kya subtriangular ochre crayon from Klasies River (Fig. 4). There are grindstones from South and East African Middle Stone Age sites that retain traces of pigment indicating that it was sometimes powdered before use. Pigments like ochre could also have been

Southern and East African Middle Stone Age: Geography and Culture, Fig. 4 Ochre crayon, Mossel Bay technocomplex, Klasies River

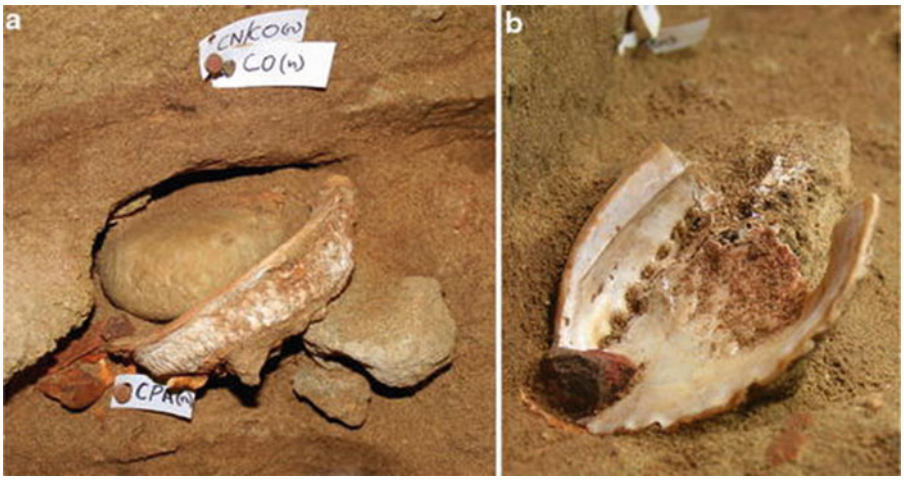

Southern and East African Middle Stone Age: Geography and Culture, Fig. 5 (**a** and **b**) In situ ochre-processing toolkits from Blombos Cave

processed and used in a liquid form. Two ~100 kya ochre-processing toolkits have been recovered from Blombos Cave (▶ Blombos Cave: The Middle Stone Age Levels). The coeval and spatially related toolkits consist of *Haliotis midae* (abalone) shells and are associated with grinders, stone artefacts, bone, and ochre (Fig. 5a, b). Inside the abalone shell of toolkit A (Fig. 5a), a 5-mm-thick red compound adheres to the inner surface. The compound consists of ochre, fragments of spongy bone, probably the origin of fat that may have acted as a binder, charcoal fragments, and quartz and quartzite microflakes. A quartzite cobble that was used as percussor and grinder were also found inside the toolkit. The other abalone toolkit (Fig. 5b) also contains a thick red compound sticking to the inside of the shell. It is not known what the ochre liquid was used for, but it may have been applied as paint on a surface. This find shows that the conceptual capability to source, combine, and store substances was present *in some populations* 100 kya.

Pigments played a crucial role in MSA societies. Large quantities of hematite have been, for example, extracted at the Lion Cavern site in Swaziland, probably dating to ~40 kya (Wadley 2015). Another indication of its importance,

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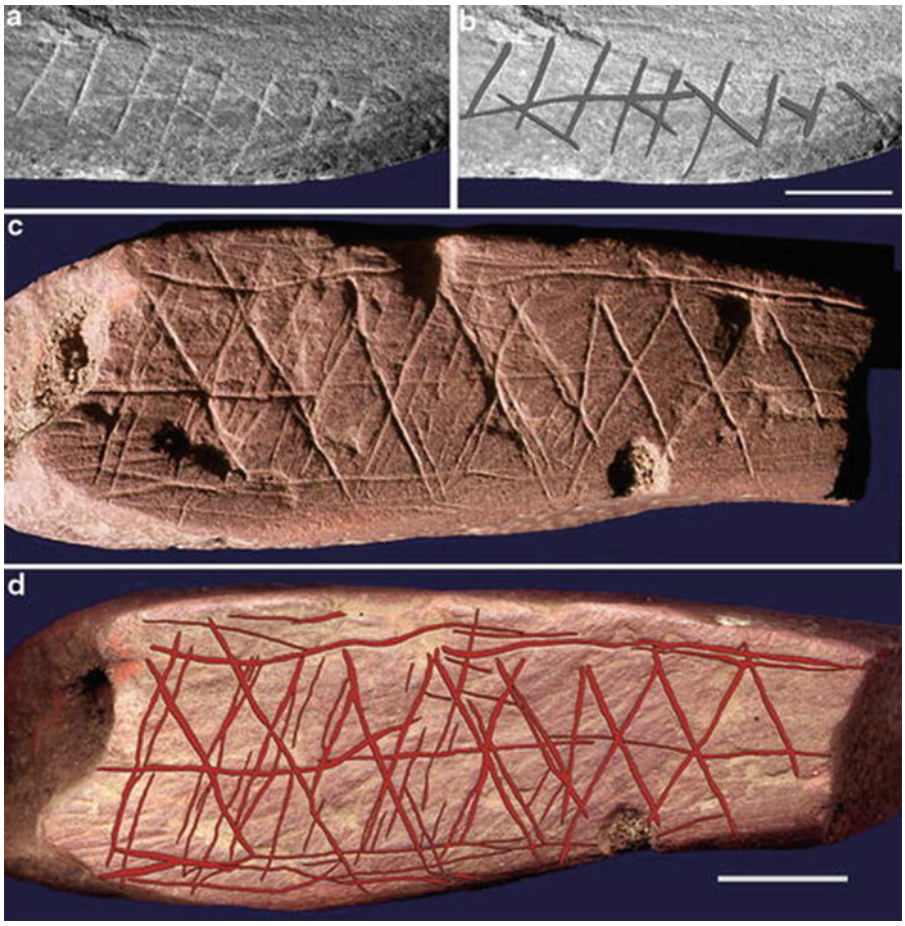

Southern and East African Middle Stone Age: Geography and Culture, Fig. 6 Engraved ochre, Stillbay techno-complex, Blombos Cave

perhaps in the social lives of MSA people, comes from Porc Epic, Dire Dawa, Ethiopia. Here 21 ochre-processing tools, including upper and lower grindstones, were found in association with numerous fragments of ochre, concentrated in an area specifically focused on ochre processing. The technical steps used in reducing and processing the ochre illustrate considerable behavioral complexity and sophistication (Rosso et al. 2017). The earliest representational art in Africa, dating to around 30 kya, is the well-known painted slabs from Apollo 11 cave. These drawings, executed with pigment crayon, are on seven loose slabs ("art mobilier"), and they depict a therianthrope, geometric patterns and animals (Vogelsang et al. 2010).

Several pieces of ochre with engravings, dating to between ~72 and 100 kya, have been recovered from sites in South Africa. The signature piece is a small ~77 kya slab of dark red ochre from Blombos Cave. It shows a stone tool engraved cross-hatched pattern bounded by parallel lines (Fig. 6). A comparable engraving on a smaller ochre fragment was found at Klein Kliphuis in a layer that dates to between ~80 and 50 kya (Wadley 2015). In the MSA of South Africa, the convention of engraving extends to other raw materials such as bone and ostrich eggshell. At Klasies River four parallel lines have been engraved with a lithic point on a midshaft fragment of a limb bone associated with the early Howiesons Poort (Fig. 7). More spectacular are

Southern and East African Middle Stone Age: Geography and Culture, Fig. 7 Engraved bone, Howieson's Poort technocomplex, Klasies River

the engravings on ostrich eggshell from Diepkloof and Klipdrift shelter in the Cape uncovered in investigations led by Texier and Henshilwood. It is interesting that a finite number of abstract geometric motifs have been identified. At Diepkloof a cross-hatched band and sub-parallel and converging lines dominate. At Klipdrift the same set of patterns, in addition to a diamond-shaped motif, occurs. There is a strong possibility that the engravings were made on eggshell containers (Wadley 2015). In the Howiesons Poort levels from Apollo 11 in Namibia, potential eggshell flask apertures (represented by 23 pieces) have been found, together with 2 small fragments of ostrich eggshell (OES) with intentionally engraved patterns (Vogelsang et al. 2010). The oldest engraved OES found in Eastern Africa is from Goda Buticha, Ethiopia, dating to between ~43 and ~34 kya. Some of the motifs are similar to those from the South African sites, and the engraved lines also align along similar axes (Assefa et al. 2018).

Beads are artefacts that serve as personal ornaments in current and recently known societies and might have had a similar symbolic function in the MSA. The earliest beads, made from marine shell, occur around 100 kya in North Africa and the Near East. There are also early beads, dating to MIS 4, from the South African MSA, and these have been described in papers by Vanhaeren, Van Niekerk, Henshilwood, d'Errico, and Wadley, among others (Wadley 2015). More than 68 *Nassarius kraussianus* shell beads have been found from Stillbay layers dating to ~72 kya at Blombos Cave (Fig. 8). Microscopic study revealed that these tick shells were pierced with a bone tool to create a perforation. Discrete use-wear facets on the beads indicate that the shells were strung, possibly on cord or sinew, and worn as personal ornaments. The beads have been arranged in different patterns through time. Very small residues of ochre inside some beads may have been caused by deliberate coloring or transference of ochre when worn. Three *Afrolittorina africana* shells from Sibudu, also in the Stillbay levels, were also deliberately pierced and might have been worn as beads. The first ostrich eggshell beads appear earlier than 40 kya in deposits in Southern and East Africa. The earliest indication of the use of OES may be from Apollo 11. Three OES pieces with smoothed edges, similar to LSA OES pendants, have been described from the Howiesons Poort technocomplex (Vogelsang et al. 2010). Other early examples dating to ~50 kya are from level V at Mumba Rockshelter and Magubike Rockshelter in Tanzania (Wadley 2015). Around ~ 40 kya there is an increase in the number of OES beads at Enkyapune ya Muto in Kenya, Nswatugi in Zimbabwe, and Boomplaas, Bushman Rock Shelter, Cave of Hearths, and Border Cave in South Africa (McBrearty and Brooks 2000). OES beads become very commonplace in the Later Stone Age of Southern and East Africa.

Formal bone tools were also produced in the Middle Stone Age. These are tools or bone implements that have been modified with techniques such as grinding, scraping, or cutting (▶ Bone Tools, Paleolithic). The barbed and unbarbed bone points from the Katanda sites in the Semliki Valley dating to ~90 kya ago are the

Southern and East African Middle Stone Age: Geography and Culture, Fig. 8 *Nassarius kraussianus* beads, Stillbay technocomplex, Blombos Cave

oldest formal bone tools discovered in Africa yet (McBrearty and Brooks 2000), whereas the largest collection of bone tools is from Blombos Cave, from the Stillbay technocomplex. Bone tools also occur at Sibudu Cave where d'Errico and colleagues identified specialized types such as wedges, *pièces esquillées*, pressure flakers, smoothers, sequentially notched pieces, awls, and a projectile point (Wadley 2015). Notched bone, most probably with a nonfunctional purpose, occurs in the Mossel Bay levels at Klasies River (Fig. 9), at Apollo 11 in the Stillbay levels (Vogelsang et al. 2010), and at Sibudu Cave in the Howiesons Poort levels (Wadley 2015). There are also MSA bone tools from White Paintings Shelter dating to ~38–50 kya. The bone implements such as awls and points and a wooden digging stick from a ~44 kya Border Cave assemblage show remarkable similarities to current San material culture (d'Errico et al. 2012).

Investigations into the organization and use of space also provide insights into the minds and behavior of MSA people. In Wonderwerk Cave the Fauresmith layers built up in a dark space at the very back of this deep cave. This area may

Southern and East African Middle Stone Age: Geography and Culture, Fig. 9 Notched bone, Mossel Bay technocomplex, Klasies River

have been specifically selected for occupation due to the sensory experience that it may have facilitated. Watts et al. (2016: 299) speculate that activities such as "fire-lit, body-painted, song- and dance performances, the performers glittering and red" may have taken place here. At MSA sites where preservation is less than ideal, it is generally problematical to detect whether space was structured according to the same social and cognitive rules as those used by modern people. Micromorphological and geomorphological have been used to show that, at Sibudu Cave in the ~ 58 kya layers, combustion features such as hearths and bedding heaps were maintained. Phytoliths from ~77 kya layers at this cave further indicate cultural use of space through the use of sedges and aromatic leaves to construct bedding (Wadley 2015). The clearest organization of space in the MSA occurs at a site investigated by Opperman, Strathalan Cave B, dating to ~22 kya. Here bedding heaps were concentrated against one sheltered wall of the cave, and four hearths were built in the central area. Bone fragments and lithics were discarded in this area (Deacon and Deacon 1999). Plant materials such as *Watsonia*, sagewood, and aloe were also preserved. Other Southern African MSA sites also yielded plant material such as seeds, corms, and charcoal (Wadley 2015). Grindstones from the MSA hold much potential for understanding past plant processing (Shoemaker et al. 2017). Starch granules have, for example, been preserved on 105 kya grinding stones at Ngalue in Mozambique, as Mercader and colleagues have shown. Even though plant gathering and use must have been of the most pervasive and important activities in the MSA, it remains an understudied aspect of African archaeology (Wadley 2015).

Conclusion

In Southern and East Africa, the transition from the ESA to the MSA occurred from ~500 to 285 kya ago, but the absence of good chronometric control and scarcity of multi-sequence sites prevent a precise grasp of this process. During the transition Middle Stone Age and Acheulean elements frequently appear together in sites. The transition to the LSA was similarly a protracted process that took place between

60 and 20 kya in East Africa and between 40 and 20 kya in Southern Africa. The earliest date for Middle Stone Age occurrences without LCTs in Southern and East Africa is around ~285 kya. Due to the presence of more deeply stratified cave sites in Southern African MSA, more progress has been made toward creating an overarching regional culture-historical framework for this region. The MSA is typified by prepared core or Levallois technology and in addition discoidal, blade and platform reduction processes were used. Flakes, blades, and points were frequently hafted and used in projectile weapons. MSA assemblages do not contain many retouched artefacts, but scrapers, notched, denticulated and backed artefacts, and bifacial and unifacial points occur. Backed geometrics and retouched points are used to document regional and temporal patterns in Southern and East Africa. In the Stillbay and Howiesons Poort technocomplexes, for example, these marker types, together with other complex artefacts, occur on a subcontinental level. This is thought to reflect the cultural signal of coalescent populations in MIS 4 in South Africa. Similarly, the very small bifacial points that occur over an extensive geographical area within East Africa in the Late Pleistocene may indicate a regional system of connection between groups. MSA stone, bone, and pigment technologies reveal remarkable extended production sequences and complexity. Lithic raw materials were obtained from far away sources and heat treated to achieve desired results. Much effort was invested in artisan activities such as engraving of geometric designs on pigment and shell, producing shell beads, formal bone tools, and processing ochre. In addition hunting technologies were highly flexible, and specific hafting configurations and types of insets in composite weapons were consciously selected. There are also indications that plants were used as food and medicine and that MSA groups organized and maintained their living spaces. The research discussed here reveals that modern humans' evolutionary roots reach into the Middle Pleistocene and that these hunter-gatherers were able to execute complex behavioral actions.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Bone Tools, Paleolithic
- ▶ Clark, John Desmond
- ▶ Cognitive Archaeology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Europe: Early Upper Paleolithic
- ▶ Fossil Records of Early Modern Humans
- ▶ Geoarchaeology
- ▶ Handaxes and Biface Technology
- ▶ Human Evolution: Theory and Progress
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Lithic Technology, Paleolithic
- ▶ Stone Tool Usewear and Residue Analysis

References

Assefa, Z., A. Asrat, E. Hovers, Y. Lam, O. Pearson, and D. Pleurdeau. 2018. Engraved ostrich eggshell from the Middle Stone Age contexts of Goda Buticha, Ethiopia. *Journal of Archaeological Science: Reports* 17: 723–729.

Barham, L. 2013. *From hand to handle: The first industrial revolution*. Oxford: Oxford University Press.

Barham, L., and P. Mitchell. 2008. *The first Africans: African archaeology from the earliest toolmakers to most recent foragers*. Cambridge: Cambridge University Press.

Blegen, Faith J.T., A. Mant-Melville, D.J. Peppe, and C.A. Tryon. 2017. The middle stone age after 50,000 years ago: New evidence from the late Pleistocene sediments of the eastern Lake Victoria Basin, Western Kenya. *PaleoAnthropology* 2017: 139–169.

Blome, M.W., A.S. Cohen, C.A. Tryon, A.S. Brooks, and J. Russell. 2012. The environmental context for the origins of modern human diversity: A synthesis of regional variability in African climate 150,000–30,000 years ago. *Journal of Human Evolution* 62 (5): 563–592.

Bousman, C.B., and J.S. Brink. (in press). The emergence, spread, and termination of the early later stone age event in South Africa and southern Namibia. *Quaternary International*.

Burrough, S.L. 2016. Late quaternary environmental change and human occupation of the southern African interior. In *Africa from MIS 6-2*, ed. S.C. Jones and B.A. Steward, 161–174. Dordrecht: Springer.

Chiwara, P., A. Nhamo, and J. Chikumbirike. 2017. A functional analysis of lithic material from Redcliff Cave, Central Zimbabwe. In *Archives, objects, places and landscapes: Multidisciplinary approaches to decolonised Zimbabwean pasts*, ed. M. Manyanga and S. Chirikure, 83–102. Bamenda: Langaa RPCIG.

d'Errico, F., and L. Backwell. 2016. Earliest evidence of personal ornaments associated with burial: The Conus shells from Border Cave. *Journal of Human Evolution* 30 (93): 91–108.

d'Errico, F., L. Backwell, P. Villa, I. Degano, J.J. Lucejko, M.K. Bamford, T.F. Higham, M.P. Colombini, and P.B. Beaumont. 2012. Early evidence of San material culture represented by organic artifacts from Border Cave, South Africa. *PNAS* 109 (33): 13214–13219.

Deacon, H.J., and J. Deacon. 1999. *Human beginnings in South Africa: Uncovering the secrets of the stone age*. Rowman Altamira: Maryland.

Delagnes, A., P. Schmidt, K. Douze, S. Wurz, L. Bellot-Gurlet, N.J. Conard, K.G. Nickel, K.L. Van Niekerk, and C.S. Henshilwood. 2016. Early evidence for the extensive heat treatment of silcrete in the Howiesons Poort at Klipdrift Shelter (Layer PBD, 65 ka), South Africa. *PLoS One* 11 (10): e0163874.

Douze, K., and A. Delagnes. 2016. The pattern of emergence of a Middle Stone Age tradition at Gademotta and Kulkuletti (Ethiopia) through convergent tool and point technologies. *Journal of Human Evolution* 91: 93–121.

Douze, K., S. Wurz, and C.S. Henshilwood. 2015. Techno-cultural characterization of the MIS 5 (c. 105–90 Ka) Lithic Industries at Blombos Cave, Southern Cape, South Africa. *PLoS One* 10 (11): e0142151.

Faith, J.T., C.A. Tryon, and D.J. Peppe. 2016. Environmental change, ungulate biogeography, and their implications for early human dispersals in equatorial East Africa. In *Africa from MIS 6-2*, ed. S.C. Jones and B.A. Steward, 233–245. Dordrecht: Springer.

Grine, F.E. 2016. The late quaternary hominins of Africa: The skeletal evidence from MIS 6-2. In *Africa from MIS 6-2*, ed. S.C. Jones and B.A. Steward, 323–381. Dordrecht: Springer.

Henderson, Z., and J. Brink. 2001. A high-resolution last interglacial MSA horizon at Florisbad in the context of other open-air occurrences in the central interior of southern Africa: An interim statement. In *Middle Palaeolithic and middle stone age settlement systems*, ed. N.J. Conard, 1–20. Tuebingen: Kerns.

Katsamudanga, S., and A. Nhamo. 2016. A review of the reconstructed palaeoenvironmental record of Zimbabwe and call for multidisciplinary research. *Palaeo* 3 (461): 460–471.

Klein, R.G. 2009. *The human career: Human biological and cultural origins*. Chicago: University of Chicago Press.

Lahr, M.M. 2016. The shaping of human diversity: Filters, boundaries and transitions. *Philosophical Transactions of the Royal Society B: Biological Sciences* 371 (1698): 20150241.

Lahr, M.M., and R.A. Foley. 2016. Human evolution in late quaternary eastern Africa. In *Africa from MIS 6-2*, ed. S.C. Jones and B.A. Steward, 215–231. Dordrecht: Springer.

Lombard, M., and L. Phillipson. 2010. Indications of bow and stone-tipped arrow use 64 000 years ago in KwaZulu-Natal, South Africa. *Antiquity* 84 (325): 635–648.

Lombard, M.L., L. Wadley, J. Deacon, S. Wurz, I. Parsons, M. Mohapi, J. Swart, and P. Mitchell. 2012. South African and Lesotho Stone Age sequence updated. *South African Archaeological Bulletin* 67 (195): 123–144.

Mackay, A., Stewart, B.A. and Chase, B.M., 2014. Coalescence and fragmentation in the late Pleistocene archaeology of southernmost Africa. *Journal of Human Evolution* 72: pp. 26–51.

Marean, C.W., H.C. Cawthra, R.M. Cowling, K.J. Esler, E. Fisher, A. Milewski, A.J. Potts, E. Singels, and J. De Vynck. 2014. Stone Age people in a changing South African greater Cape Floristic Region. In *Fynbos: Ecology, evolution, and conservation of a megadiverse region*, ed. N. Allsopp, J.F. Colville, and G.A. Verboom, 164–199. Oxford: Oxford University Press.

McBrearty, A., and A.S. Brooks. 2000. The revolution that wasn't: A new interpretation of the origin of modern human behavior. *Journal of Human Evolution* 39: 453–563.

Muller, A., C. Clarkson, and C. Shipton. 2017. Measuring behavioural and cognitive complexity in lithic technology throughout human evolution. *Journal of Anthropological Archaeology* 48: 166–180.

Nash, D.J., S. Coulson, S. Staurset, J.S. Ullyott, M. Babutsi, and M.P. Smith. 2016. Going the distance: Mapping mobility in the Kalahari Desert during the Middle Stone Age through multi-site geochemical provenancing of silcrete artefacts. *Journal of Human Evolution* 96: 113–133.

Robbins, L.H., G.A. Brook, M.L. Murphy, A.H. Ivester, and A.C. Campbell. 2016. The Kalahari During MIS 6-2 (190–12 ka): Archaeology, Paleoenvironment, and Population Dynamics. In *Africa from MIS 6-2*, ed. S.-C. Jones and B.A. Steward, 175–193. Dordrecht: Springer.

Rosso, D.E., F. d'Errico, and A. Queffelec. 2017. Patterns of change and continuity in ochre use during the late Middle Stone Age of the Horn of Africa: The Porc-Epic Cave record. *PLoS One* 12 (5): e0177298.

Sahle, Y., W.K. Hutchings, D.R. Braun, J.C. Sealy, L.E. Morgan, A. Negash, and B. Atnafu. 2013. Earliest stone-tipped projectiles from the Ethiopian rift date to > 279,000 years ago. *PLoS One* 8 (11): e78092.

Schlebusch, C.M., H. Malmström, T. Günther, P. Sjödin, A. Coutinho, H. Edlund, A.R. Munters, M. Vicente, M. Steyn, H. Soodyall, and M. Lombard. 2017. Southern African ancient genomes estimate modern human divergence to 350,000 to 260,000 years ago. *Science* 358: 652.

Schmid, V.C., N.J. Conard, J.E. Parkington, P.J. Texier, and G. Porraz. 2016. The 'MSA 1'of Elands Bay Cave (South Africa) in the context of the southern African Early MSA technologies. *Southern African Humanities* 29 (1): 153–201.

Schmidt, P., D.J. Nash, S. Coulson, M.B. Göden, and G.J. Awcock. 2017. Heat treatment as a universal technical solution for silcrete use? A comparison between silcrete from the Western Cape (South Africa) and the Kalahari (Botswana). *PLoS One* 12 (7): e0181586.

Shea, J.J. 2011. Homo sapiens is as Homo sapiens was: Behavioral variability versus "behavioral modernity" in Paleolithic archaeology. *Current Anthropology* 52 (1): 1–35.

Shoemaker, A.C., M.I. Davies, and H.L. Moore. 2017. Back to the grindstone? The archaeological potential of grinding-stone studies in Africa with reference to contemporary grinding practices in Marakwet, Northwest Kenya. *African Archaeological Review* 34 (3): 415–435.

Soares, P., T. Rito, L. Pereira, and M.B. Richards. 2016. A genetic perspective on African prehistory. In *Africa from MIS 6-2*, ed. S.C. Jones and B.A. Steward, 383–405. Dordrecht: Springer.

Stringer, C. 2016. The origin and evolution of Homo sapiens. *Philosophical Transactions of the Royal Society B: Biological Sciences* 371 (1698): 20150237.

Tryon, C.A., and J.T. Faith. 2013. Variability in the Middle Stone Age of Eastern Africa. *Current Anthropology* 54 (S8): S234–S254.

Tryon, C.A., and J.T. Faith. 2016. A demographic perspective on the Middle to Later Stone Age transition from Nasera rockshelter, Tanzania. *Philosophical Transactions of the Royal Society B: Biological Sciences* 371 (1698): 20150238.

Tryon, C.A., N.T. Roach, and M.A. Logan. 2008. The Middle Stone Age of the northern Kenyan Rift: Age and context of new archaeological sites from the Kapedo Tuffs. *Journal of Human Evolution* 55 (4): 652–664.

Vogelsang, R., J. Richter, Z. Jacobs, B. Eichhorn, V. Linseele, and R.G. Roberts. 2010. New excavations of Middle Stone Age deposits at Apollo 11 Rockshelter, Namibia: Stratigraphy, archaeology, chronology and past environments. *Journal of Anthropological Archaeology* 8 (2): 185–218.

Wadley, L. 2015. Those marvellous millennia: The Middle Stone Age of southern Africa. *Azania: Archaeological Research in Africa* 50 (2): 155–226.

Wadley, L., P. de la Peña, and L.C. Prinsloo. 2017. Responses of South African Agate and Chalcedony when heated experimentally, and the broader implications for heated archaeological minerals. *Journal of Field Archaeology* 42 (4): 364–377.

Watts, I., M. Chazan, J. Wilkins, L. Barham, S. Coulson, S.L. Kuhn, C. Power, I. Watts, M. Chazan, and J. Wilkins. 2016. Early evidence for brilliant ritualized display: Specularite use in the Northern Cape (South Africa) between ~500 and ~300 ka. *Current Anthropology* 57 (3): 287–310.

Wilkins, J., and M. Chazan. 2012. Blade production-~ 500 thousand years ago at Kathu Pan 1, South Africa: Support for a multiple origins hypothesis for early Middle Pleistocene blade technologies. *Journal of Archaeological Science* 39 (6): 1883–1900.

Wilkins, J., B.J. Schoville, K.S. Brown, and M. Chazan. 2012. Evidence for early hafted hunting technology. *Science* 338 (6109): 942–946.

Wilkins, J., K.S. Brown, S. Oestmo, T. Pereira, K.L. Ranhorn, B.J. Schoville, and C.W. Marean. 2017. Lithic technological responses to late Pleistocene glacial cycling at Pinnacle Point site 5–6, South Africa. *PLoS One* 12 (3): e0174051.

Will, M., A. Mackay, and N. Phillips. 2015. Implications of Nubian-like core reduction systems in southern Africa for the identification of early modern human dispersals. *PLoS One* 10 (6): e0131824.

Wurz, S. 2013. Technological trends in the Middle Stone Age of South Africa between MIS 7 and MIS 3. *Current Anthropology* 54 (S8): S305–S319.

Southern Ocean and Antarctic Maritime Archaeology

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Introduction

Professional archaeology has been practiced in the Southern Ocean and Antarctic region since the 1970s with archaeologists from Australia, Argentina, Brazil, Chile, New Zealand, the United Kingdom, and the United States undertaking the survey, recording, and excavating a number of maritime sites. This work has been undertaken primarily to create inventories of historic places and to aid in the conservation of historic buildings, and as a result, this work has been almost exclusively terrestrially based.

Definition

The Southern Ocean and Antarctic cover more than one-eleventh of the Earth's surface. Antarctica is the fifth largest continent in the world, while

the Southern Ocean is the fourth largest ocean, extending from the shores of Antarctica to 60° south to the approximate extent of the Antarctic Convergence (although this definition is often broadened to include the Subantarctic Islands south of 45° latitude).

The Southern Ocean comprises the world's southernmost body of water and includes parts of the Drake Passage, the Scotia Sea, the Weddell Sea, the King Haakon VII Sea, the Cosmonaut Sea, the Cooperation Sea, the Davis Sea, the Mawson Sea, the D'Urville Sea, the Ross Sea, the Amundsen Sea, and the Bellingshausen Sea. Throughout its waters are islands within the Antarctic continental shelf such as the South Orkney Islands, South Shetland Islands, Balleny Islands, and Scott Islands and outside this area the Subantarctic Islands of the Falkland Islands, South Georgia and the South Sandwich Islands, Bouvet Island, the Prince Edward Islands, the Crozet Islands, the Kerguelen Archipelago, Heard Island, the McDonald Islands, Macquarie Island, the Auckland Islands, Bounty Island, Campbell Island, the Antipodes, and the Snares.

The amount of ice within the Southern Ocean is enormously variable and fluctuates seasonally; in winter the ocean freezes outward from Antarctica to approximately 65° south latitude in the Pacific sector and 55° south latitude in the Atlantic sector a greater than a sixfold increase in area. At some coastal points, intense persistent drainage winds from the interior keep the Antarctic shoreline ice-free throughout the winter.

The Southern Ocean is 4000–5000 m deep over most of its extent with only limited areas of shallow water with even the Antarctic continental shelf being generally narrow and deep, its edge lying at depths of 400–800 m. The ocean's greatest depth is 7235 m at the southern end of the South Sandwich Trench.

The Southern Ocean and Antarctic is characterized by frequent intense cyclonic storms caused by the temperature contrast between ice and open ocean with the area from about latitude 40 south to the Antarctic Circle recording the strongest average winds anywhere on Earth.

World Heritage Sites and Legislation

The islands in the Southern Ocean and their surrounding waters are protected by an interwoven web of legislation aimed at protecting both natural and cultural resources. Each island comes under the legislation of its sovereign nation which provides the framework for the management and protection of heritage sites. In addition, many of the islands including Auckland Island, Campbell Island, Heard Island, and Macquarie Island have been designated as "nature reserves," and in the last two decades, the waters surrounding these islands have been also made into marine reserves further restricting activities that may be harmful to natural and cultural resources. Significantly, the Heard Island, the New Zealand Subantarctic Islands, the Macquarie Island, and the Tristan da Cunha Islands are all UNESCO world heritage sites based on their outstanding universal natural values.

The Antarctic Treaty System (ATS) is one of the most successful examples of international law ever created. Ratified in 1959 by 25 consultative parties including those previously involved in Antarctic action (highly active signatories include Australia, Argentina, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, Russia, the United Kingdom, and the United States), the Antarctic Treaty created rules and regulations for exploration and exploitation of the Southern Continent. Drafted in the spirit of peaceful scientific international agreement, all activities may be monitored or "observed" by any nation, and disputes must be settled by common vote. Consultative parties cannot resign or be expelled from membership, although nations are allowed to ratify and become a consultative party if conducting research in Antarctica.

Seven nations (Australia, New Zealand, the United Kingdom, Argentina, Chile, France, and Norway) claim sovereign rights to territory in Antarctica. Under the 1959 Antarctic Treaty and subsequent 1999 Protocol on Environmental Protection to the Antarctic Treaty, or Madrid Protocol, territorial claimant nations are responsible for protection of cultural heritage under pertinent national legislation. However, signatories remain

at odds over recognition of marine claims, an issue that has implications for Antarctica's submerged cultural heritage sites. Marine areas (e.g., the Australian Antarctic Territory [AAT] Exclusive Economic Zone [EEZ]) may not be recognized by states other than the claimant nation, a dubious measure of protection for heritage sites in disputed waters.

Documents within the ATS that relate to cultural heritage are the Antarctic Treaty Recommendation VII-9, which regulates scientific endeavor, and the Madrid Protocol. The Madrid Protocol entered into force on 14 January 1998, with the goal to, as per Article 3, avoid "degradation of, or substantial risk to, areas of biological, scientific, historic, aesthetic or wilderness significance." Annex V on Area Protection and Management outlines the procedures for site nomination as an Antarctic Specially Protected Area (ASPA) or Antarctic Specially Managed Area (ASMA) and provides for permitting procedures. In order to be recognized as a historic site or monument, sites must first be accepted as (or be located within) an ASPA or ASMA, which requires a process of nomination. All sites are then entered on the Antarctic Sites and Monuments List. Guidelines (Resolution 5) were submitted at the 2001 Antarctic Treaty Consultative Meeting (ATCH) that offer blanket protection for all pre-1958 historic sites and artifacts and recommend best archaeological practice for necessary disturbance of remains. Oversight is through the ATS and the Scientific Committee on Antarctic Research (SCAR) and can be accessed via the International Polar Heritage Committee website (www.polarheritage.com).

Maritime Sites on the Antarctic Sites and Monuments List

While many sites on the Antarctic mainland have associations with maritime activities (such as whaling and sealing sites and research stations), only three dedicated maritime archaeological sites are currently located on the Antarctic Sites and Monuments List. These sites are the whaling station at Whalers Bay, Deception Island (No.71), nineteenth-century wreckage located on the beach at Elephant Island by a naval expedition in the 1990s (No.74), and Cape Denison, Commonwealth Bay (No.77), which is the only listed site that incorporates an underwater object (a bow anchor associated with Mawson's vessel *Aurora*) that has not yet been located. Commonwealth Bay is managed as ASMA 3. Two sites (Whalers Bay and Elephant Island) fall within the UK territory. The third site (ASMA 3) is located within the AAT and managed by Australia.

Historical Background

Polynesian seafarers were the first humans to venture into the Southern Ocean region with archaeological evidence suggesting that they discovered and briefly occupied the Auckland Islands in the Subantarctic Island group some 650 years ago (Anderson in Dingwell et al. 2009: 35). European exploration in the Southern Ocean, and the eventual discovery of Antarctica, began with the voyages sponsored by the Portuguese Prince Henry the Navigator in the early fifteenth century. The Portuguese rounding of the Cape of Good Hope in 1487–1488 and the crossing of the Indian Ocean in 1497–1499 distanced both Africa and Southern Asia from the hypothesized *Terra australis incognita*, and later, the discovery of the Strait of Magellan 1519–1522 and Drake Passage 1577–1580 also separated South America from the fabled southern land confirming the possibility of world circumnavigation via the southern hemisphere. The surveying of the coast of Australia by the Dutch explorer Abel Tasman in 1644–1645 provided further information as to the extent of the Southern Continent, while almost a century later, French expeditions from 1738 onward began to discover isolated islands in the Southern Indian Ocean. Identification of the Southern Ocean however is credited to Captain James Cook who during three expeditions between 1771 and 1780 discovered South Georgia and the South Sandwich Islands and crossed the Antarctic Circle for the first time. The subsequent publication of accounts of Cook's voyages heralded the start of both sealing and whaling in the Southern Ocean

region. Descriptions of the abundance of seals on South Georgia led to a rush of sealing vessels into the Southern Ocean from the late 1780s. The search for unexploited stocks of seals led to the discovery of many other Southern Ocean island groups such as the Antipodes (1800), Auckland Islands (1805–1806), Bounty Islands (1807), and Campbell and Macquarie Islands (1809–1810). Each island was stripped of its stocks so that by 1850s there were few southern fur seals left; however, the use of the Great Circle sailing routes by naval and merchant ships travelling through the Southern Ocean from around this time continued the discovery of islands between the latitudes of 50° and 60° south.

Discovering Antarctica

Early Western exploration of the Antarctica continent was attempted for a number of reasons: some nations were interested in locating new fertile whaling grounds; others sought to locate the South Magnetic Pole, and others to acquire territory. The first recorded sighting of the Antarctica continent was by Russian explorer Thaddeus von Bellingshausen who circumnavigated the Antarctic south of Cook's route in 1819–1821, yet American whaler *Nathaniel Palmer* is the first to land men on the Antarctica continent in 1821. French explorer Jules Dumont D'Urville was instructed to reach and claim the South Magnetic Pole for France. He relied on coordinates predicted by mathematician Carl Gauss, but ended up west of the mark. With ships *Astrolabe* and *Zelee*, he sighted a section of the Antarctic coast and claimed Terre Adelie for France in 1840. Charles Wilkes' US Exploring Expedition also searched for the South Magnetic Pole in 1838–1842, encountering the French ship *Astrolabe* in Antarctic waters. Bipolar adventurer James Clark Ross led the British bid for the South Magnetic Pole from 1839 to 1843, with the ships *Erebus* and *Terror*. Ross noted his rivals' routes and headed the other direction, narrowly missing the pole. Ross explored more of Antarctica than any previous adventurers, naming features such as Mounts Erebus and Terror and the Ross Sea. A British scientific expedition in 1872–1876 on *Challenger* circumnavigated the continent, produced valuable deep sea soundings and helped initate the next phase of Antarctic exploration.

The First International Polar Year (1882–1883) saw an increase in expeditions, leading to what is known as the "Heroic Age" of polar exploration. Eight nations sent exploratory expeditions to the south lands for national honor, pride, and scientific endeavor. Not until the Space Race of the 1960s would such a feat be seen again. This period is usually said to end with the tragic voyage of Ernest Shackleton in 1914–1916 which resulted in the loss of *Endurance* to pack ice. Only a few survived by rowing to South Georgia (Elephant Island) in the tender *James Caird.*

In 1898, *Belgica* was the first vessel to overwinter in Antarctica, and in 1899, Carsten Borchgrevink's *Southern Cross* was the first to set up a temporary camp on the mainland. Erich von Drygalski's Gauss 1901–1903 Expedition became trapped in the pack ice. This expedition charted part of Antarctica, including Drygalski Island. Baron Otto Nordensköld and the 1901–1903 Swedish Antarctic Expedition resulted in the loss of vessel *Antarctic*, which was crushed in pack ice. Robert Falcon Scott's first expedition (in vessel *Discovery*) was from 1901 to 1904, setting a new farthest south record and charting territory. The Scottish National Antarctic Expedition (1902–1904) charted portions of Coats Land along the Weddell Sea, and in 1903, a French team led by Jean-Baptiste Charcot set sail in *Français* to rescue the Nordensköld party. While Nordensköld was eventually rescued by Argentinean vessel *Uruguay*, Charcot charted portions of Graham Land and Loubet Land.

The South Magnetic Pole was finally achieved in 1909 by the Northern Party of the British Antarctic Expedition on *Nimrod,* Ernest Shackleton in command. Charcot returned to Antarctica in 1908–1910 to continue exploration of the continent. In 1910, Nobu Shirase led the Japanese Antarctic Expedition in *Kainan Maru.* It all came to a head on 15 December 1911, when Roald Amundsen's South Pole Expedition beat Robert Falcon Scott, of the British *Terra Nova* Expedition to the South Pole. On the return

journey, Scott and his party succumbed to the elements. The 1911–1914 Australasian Antarctic Expedition (under Douglas Mawson in vessel *Aurora*) charted the coastline between Cape Adare and Mount Gauss. Shackleton's Imperial 1914–1917 Trans-Antarctic Expedition (*Endurance*) was 1915–1917. Supported by the Ross Sea Party with Aeneas Mackintosh in charge, they succeed in laying depots across the Great Ice Barrier. Shackleton's final voyage 1921–1922 on vessel *Quest* continuously mapping the Antarctic continent but resulting in Shackleton's death and burial at South Georgia Island. A final footnote is the first Antarctic flight, made by Hubert Wilkins in 1928. For further information, see Headland (2009).

By the 1870s the falling number of whales in northern waters saw German, Scottish, and Norwegian whalers exploring and taking whales from the waters of the Southern Ocean down as far as the Antarctic Peninsula. In 1904 this interest was cemented by the establishment of the first Antarctic land-based whaling station on Georgia Island. This success of this station soon saw the establishment of other whaling operations on South Georgia and the extending of their range southward to the southern Scotia Sea and Antarctic Peninsula. By 1912 Norwegian whaling factory ships were operating in the open waters or the Southern Ocean using the edge of the Antarctic ice field to provide the calm waters they needed to hunt and process their prey. The 1920s saw a massive increase in demand for whale oil which saw the rapid growth of the industry; however, overproduction caused the market to collapse, and in 1931 an International Convention for the Regulation of Whaling was established.

After the Second World War, scientific exploration of the Antarctic continent again increased. Fifty-five research stations were established as a result of the First International Geophysical Year (1957–1958). A third cycle of resource extraction (modern fishing and whaling), led by Soviet, Chilean, and Japanese vessels, began in the 1960s and continues today. Fishing below 60° south latitude is now regulated by the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) (Fig. 1).

Archaeology

The relatively recent exploration and settlement of the islands in the Southern Ocean and of the Antarctic continent itself, the rugged conditions, and the loss of many vessels have combined to create a rich maritime archaeological record which has only recently become the subject of archaeological investigation.

The archaeological remains from various sealing expeditions in the Southern Ocean and Antarctic have been investigated by researchers from Australia, Chile, South Africa, and New Zealand. This work has included the survey of sealing sites on Campbell Island (Palmer and Judd 1981; Prickett et al. 2012), the Prince Edward Islands (Cooper and Avery 1986), and Kerguelen Island (Le Mouël 2004), while excavations have been undertaken on Auckland Island (Dingwell et al. 2009), Heard Island (Lazer and McGowan 1990), Macquarie Island (Townrow 1989), and the South Shetland Islands (Stehberg and Cabeza 1987). The transient nature of most sealing expeditions means that the archaeological remains from this industry are typically slight; however the investigation of sealing sites in this area has covered not only the camps that the sealers used but also production and storage sites providing insights into both the domestic and industrial aspects of this industry. The majority of archaeological work directed toward sealing on these islands has been undertaken by government agencies in order to create inventories of historic sites and to gain sufficient information to make appropriate management recommendations for these sites. These surveys and excavations have also raised a number of academic questions including the role of sealing in the expansion of capitalism in the nineteenth century, the organization of the sealing industry, the technology and the international commercial networks, and the archaeology of communities in isolation.

Shore-based whaling sites have been investigated at a number of sites within the region. The earliest whaling station investigated is the 1850 Southern Whale Fishery Company's whaling station at Port Ross in the Auckland Islands. In 2003 a New Zealand Department of Conservation

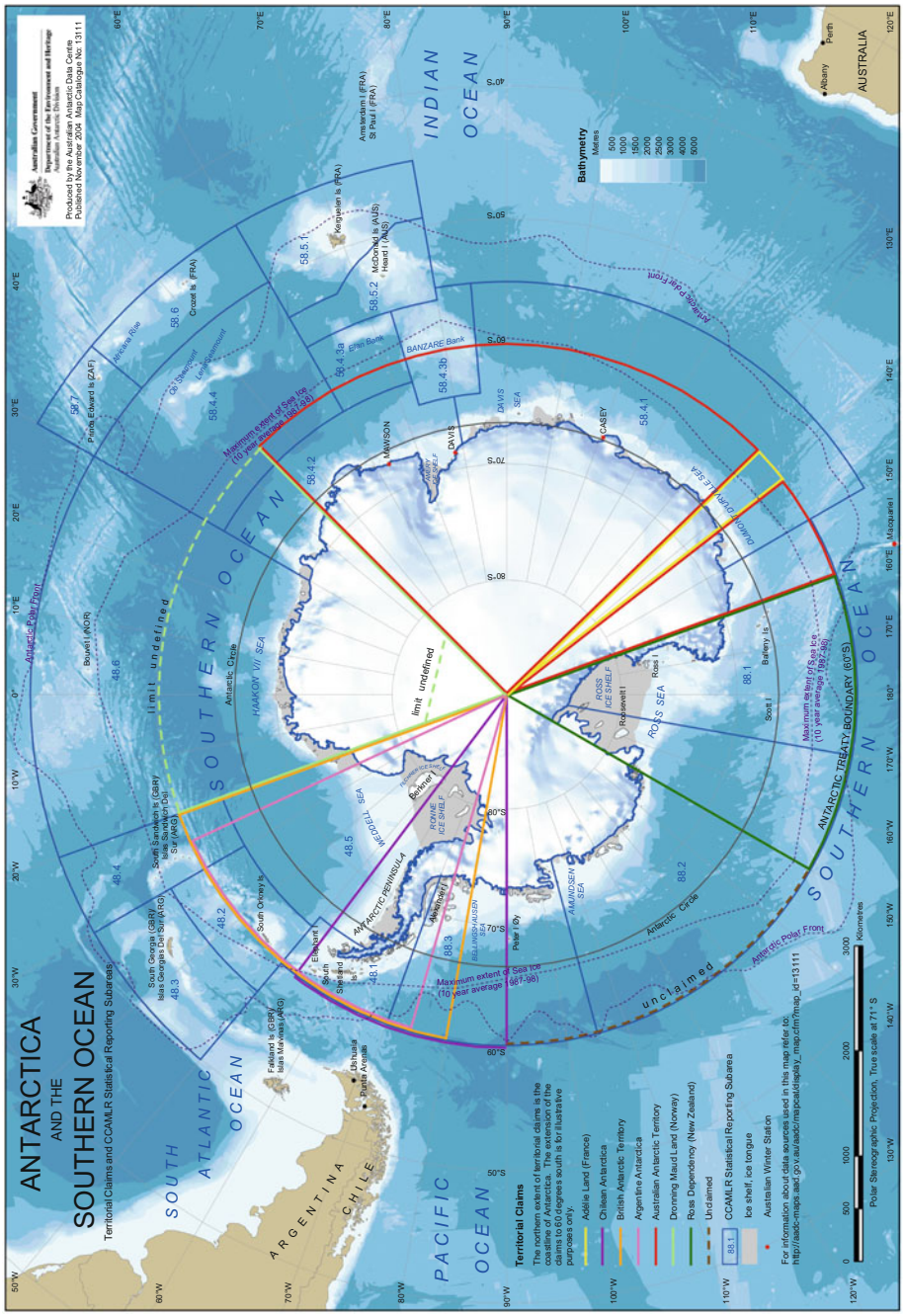

Southern Ocean and Antarctic Maritime Archaeology, Fig. 1 National claims to Antarctic Territory. Map produced by the Australian Antarctic Data Centre, 2004. Hobart: Australian Antarctic Division

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expedition to the Auckland Islands surveyed the remains of this settlement which at its height comprised some 30 buildings and around 200 colonists (Dingwell et al. 2009). This archaeological survey reconstructed from the surface evidenced the general layout and many of the features of the settlement providing insights into the character and composition of this failed colonial enterprise. Whaling stations from the early twentieth century have also been investigated including the Te Awaiti whaling station (1909) and Cook's whaling station (1911) on Campbell Island (Palmer and Judd 1981; Prickett et al. 2012), the whaling station on Deception Island (1906) (Hacquebord 1992), the Jeanne d'Arc whaling station (1908) on Kerguelen Island (Le Mouël 2004), and the whaling stations at Husvik (1910), Stromness (1912), Grytviken (1904), and Leith Harbour (1909) on South Georgia (Basberg 2004). The investigation of these sites has generally involved the recording of the above-ground evidence in order to establish the functions of the various parts of the whaling stations. At Kerguelen Island archaeology accompanied the restoration of a number of buildings at the Jeanne d'Arc whaling station, while the whaling stations on South Georgia were investigated for their functional relationships to one another in an industrial archaeological context.

A notable component of the maritime archaeological record of the Southern Ocean and Antarctic is the presence of numerous shipwrecks which relate to all phases of the discovery and exploitation of the region. Despite the considerable number and importance of such archaeological sites, very few shipwrecks have been investigated in this region, and no scientific underwater archaeological investigations have yet taken place. In the Auckland Islands 11 ships are historically recorded as being wrecked, only 1 of which has been the subject of archaeological attention (notably, the wreck of the *Rifleman* sunk in 1833 was destroyed by salvage in 1996). The 56-ton schooner *Grafton* was wrecked in 1864, and in 2003 a small section of the vessel's hull timbering, found above the tide mark, was recorded and two timber samples taken and subsequently analyzed (Dingwell et al. 2009; Petchey et al. 2015). The most famous Auckland Island shipwreck is that of *General Grant* which sank in 1866 reputedly with a cargo of gold bullion and as a result has been the target of many salvage expeditions, fortunately, none of which has been successful in locating the wreck. Archaeologists, however, have had more success in recording the various castaway depots, boatsheds, and finger posts found throughout the Auckland Islands. In 2007 an expedition to Campbell Island mapped and took samples from two maritime artifacts described as most likely being from an unknown shipwreck that predated the known history of the island (Judd 2007). The subsequent report to the New Zealand Historic Places Trust outlined the possible origins for such material and stresses the need for further research of the maritime archaeology of the island. At least 12 shipwrecks are known to have occurred at Macquarie Island, none of which has been relocated. During an expedition to the island in 1988, archaeologists took 65 samples from exposed, partially buried, and buried timbers from around the island including the remains of sealers' huts (Townrow and Nash 1990). The analysis of these samples revealed that much of the timber excavated from sealers' huts came from the remains of the ships wrecked around the island providing insights into the postdepositional processes affecting these sites.

Archaeology on the Antarctic mainland began in the late 1960s with a focus on the conservation and preservation of huts and shelters associated with the Heroic Age of Exploration. A number of scholars have completed exceptional studies of aspects of Antarctic and Subantarctic maritime history, archaeology, and heritage assessment. For an overview of maritime sites located within the Antarctic regions, see Headland (2009). For a review of archaeology in Antarctica, see Harrowfield (2005). For current work, see the IPHC website.

Sea level change and coastal erosion provide opportunities for underwater recovery of materials associated with heroic expeditions. During the 2010 Mawson's Huts Foundation expedition, a combination of a low tide and receding ice revealed four fragments from the tail section of a Vickers REP Monoplane near Boat Harbour adjacent to Cape Denison. This "air tractor" was the

first brought to the continent as part of the 1911–1914 Australian Antarctic Expedition. Mawson's Huts Foundation staff began surveying in 2008. Terrestrial ground penetrating radar and magnetometer surveys were conducted in 2009 and 2010, and future investigation is planned (Henderson 2010; Lucas et al. 2011).

Key Issues/Current Debates

Key issues with maritime archaeology in the Southern Ocean and Antarctic regions are project funding and design, managed growth of cultural tourism, cultural heritage in relation to environmental protection, and interpretation of relevant legislation. To date, all proposed projects to survey for submerged shipwreck sites have been unsuccessful. In the 1990s, the University of Zaragoza and the Chilean Antarctic Institute attempted to fund underwater archaeological research to locate the shipwrecked vessel *San Telmo*, lost after reaching the Antarctic mainland in 1819 (Zarankin and Senatore 2005). Numerous private and public entities in Australia and the United Kingdom have attempted to fund expeditions to search for Shackleton's lost vessel *Endurance*. Expedition costs for Antarctic expeditions are well above the funding threshold for most humanities-related projects, and so far, no grants to fund underwater archaeology on the Antarctic continent have been successful. Private sponsorship has also failed to provide the funds needed to survey and recover materials from a southern marine environment. With the introduction of research vessels such as the Australian CSIRO ship RV *Investigator* – which is rated to Southern Oceans and can accommodate up to 40 scientists – more opportunities arise to "piggyback" a small maritime archaeological project on an existing Southern Ocean or Antarctic scientific voyage.

Cultural tourism in Antarctica is an ever-expanding market. The Antarctic mainland is a short 2-h flight from South America, and cruise ships regularly run to the Subantarctic Islands from Australia, NZ, and Argentina. General guidelines for Antarctic visitors (Resolution 3) were adopted at the 2011 Antarctic Treaty Consultative Meeting that recommends a "take only pictures, leave only bubbles" approach to terrestrial heritage tourism in Polar Regions. However, limited access as protection for maritime heritage located within Polar Regions should not be seen to stand alone as a viable method of in situ preservation. Cultural tourism in Antarctica is advised by the International Association of Antarctic Tour Operators (IAATO). Most heritage tourism operators place emphasis on a mix of heroic exploration and natural scenery; downplaying the role of whaling and sealing operations or addressing sites as relics of past negative behaviors (Basberg 2008). IAATO also regularly contributes to heritage funding projects.

Current interpretation of Annex III of the Madrid Protocol places emphasis on "cleanup" of the Antarctic environment. In certain cases, this can lead to negative impacts on the cultural heritage, a perception of artifacts as rubbish, and a need to include cultural resources as part of the environment (Pearson 2004; Evans 2007; Evans 2011). In 2003 and 2004, vessels *Petrel, Dias*, and *Albatros* were re-floated, emptied of oil, and *Dias* and *Albatros* beached as part of a major environmental cleanup at Grytviken, South Georgia; the station had previously been closed to tourism as a result of asbestos and oil concerns (Basberg 2004). Limited funds prevented further conservation or restoration; the vessels are now managed by the South Georgia Heritage Trust.

International Perspectives

Under the Antarctic Treaty System, the Antarctic continent is internationally legislated and managed. However, as with the islands in the Southern Ocean, all sites should be protected under relevant national legislation – as long as the claimant nation has adequate cultural heritage legislation. For example, all Australian Antarctic Territory (AAT) cultural heritage sites are protected under Commonwealth Heritage legislation and the *Environment Protection and Biodiversity Conservation Act* (as amended 2003) which also require that conservation and management plans be drafted for heritage places. This would include

submerged cultural heritage as protected under the Commonwealth *Historic Shipwrecks Act* 1976 or blanket protection to all shipwrecks over 75 years located within territorial waters up to the continental shelf.

Prior to UNCLOS, Antarctic territorial seas were only recognized to extend to three nautical miles from the coastline. Extension of territorial seas to the UNCLOS defined territorial limit of 12 nautical miles *can* be seen as a violation of the Antarctic Treaty (although all claimant nations have since extended their territorial waters to the full 12 nm limit). Continental shelf claims of 200 nm were asserted by Australia and Chile prior to the Antarctic Treaty – although only Argentina and France have made post-treaty claims to further land. EEZs have been claimed by Australia, Argentina, and Chile, mostly for fisheries purposes. The EEZ extension was not recognized under international law until 1961 – after the ATS was formed – and may also be considered a violation of the treaty. Exploitation of the "Area" (commonly used to define international waters) may be an issue as a result of overlapping territorial EEZ claims. If the Area begins at 60° south latitude, then all waters between this mark and the Antarctic convergence could be seen to fall outside the Antarctic Treaty area and relevant jurisdiction. Any cultural heritage sites located within this area may not be protected if there is no recognized EEZ claim.

Only nationals and their vessels are subject to laws mandated by their parent nation within "proclaimed waters" – as few of the other claimant nations or non-Treaty nations recognize rival claims. The United States and Russia consistently deny that any nation has territorial rights to any portion of the Antarctic landmass – although both nations have established research stations in both claimed and unclaimed Antarctic territory. Argentina, Chile, and the United Kingdom have overlapping claims. Attempts to resolve this dispute in 1956 resulted in a stalemate – as both Argentina and Chile refused to acknowledge the jurisdiction of the International Court of Justice.

With unresolved overlapping claims in the balance, investigation of known and unknown submerged sites within Antarctic waters could become an issue – if territories with overlapping claims were to disagree as to dispensation of heritage materials. However, bilateral agreements are a possibility for the "common heritage of mankind" approach international exploration of submerged heritage in Antarctic waters, in line with the original aims of the ATS.

Future Directions

Recent research has shown that there is a high probability for locating shipwrecks in Antarctic waters. Some territory nations have oversight bodies in place: Australia, New Zealand, and the United Kingdom have programs in place (Antarctic Heritage Trust [NZ], Australian Antarctic Division, Antarctic Heritage Trust [UK]), while others do not: Argentina, Chile, France, and Norway of these three have instigated investigations for shipwreck sites in Antarctic waters (*Aurora*'s anchor, *Endurance, San Telmo*), and all have instigated some heritage conservation programs and provided for management of maritime cultural sites (including whaling and sealing sites, shipwrecked timbers, and abandoned vessels) located on the mainland and associated islands. What has yet to take place in Antarctica or the Subantarctic Islands is the "traditional" maritime archaeological project – the full-scale investigation of a submerged shipwrecked vessel.

Recent efforts are focused on the development of archaeological best practice principles for polar archaeology projects. The Antarctic Treaty System is currently assessing the management of Historic Sites and Monuments, and the International Polar Heritage Committee convened a Polar Archaeology Working Group in 2017 with the aim to develop polar archaeology principles and an accompanying set of guidelines.

Standard archaeological best practice has moved away from full-scale excavation as a first option. However, Antarctic waters are an untapped resource, nominally protected, and provide an excellent opportunity to use current best practice to regulate future investigation of underwater cultural heritage. In 2010, a Parks Canada team located the HMS *Investigator* – lost while

searching for Sir John Franklin's exploration vessels HMS *Erebus* and HMS *Terror* – in Mercy Bay, offshore from the Aulavik National Park in the Arctic Ocean. Local Inuit knowledge led Parks Canada discovered the wreck of HMS Erebus in 2014 and Inuit knowledge led to the discovery of HMS Terror soon thereafter (2016). Britain transferred ownership of the vessels to Canada in 2017. Research conducted by Parks Canada demonstrates the feasibility of deep-ocean and diver-based shipwreck investigation in the Polar Regions (Parks Canada 2017).

Cross-References

- ▶ Antarctica: Historical Archaeology
- ▶ Arctic Ocean and Bering Sea: Maritime Archaeology

References

Basberg, B.L. 2004. *The shore whaling stations at South Georgia: A study in Antarctic industrial archaeology.* Oslo: Novus Forlag.

Basberg, B.L. 2008. Antarctic tourism and the maritime heritage: Discussion paper. Paper presented at The 5th International Congress of Maritime History, University of Greenwich, 23–27 June 2008.

Parks Canada. 2017. Searching for Franklin's lost ships. 28 Oct 2017. Available: http://www.pc.gc.ca/en/culture/franklin/recherche-search/

Cooper, J., and G. Avery. 1986. *Historic sites at the Prince Edward Islands*, South African National Scientific Programmes report no. 128. Pretoria: Council for Scientific and Industrial Research.

Dingwell, P.R., K.L. Jones, and R. Egerton, eds. 2009. *In care of the Southern Ocean: An archaeological and historical survey of the Auckland Islands*, New Zealand archaeological association monograph. Vol. 27. Auckland: New Zealand Archaeological Association.

Evans, S-L. 2007. Heritage at risk: Cultural heritage management in the Antarctic. Paper presented at ICOMOS-eXtreme heritage The Heritage of Polar Landscapes, James Cook University, Cairns, 19–21 July 2007.

Evans, S.-L. 2011. Icy heritage: Managing historic sites in the Antarctic: Pristine wilderness, anthropogenic degradations or cultural landscape? *The Polar Journal* 1 (1): 87–100.

Hacquebord, L. 1992. Hector station on deception Island (South Shetland Islands, Antarctica): An environmental assessment study of a whaling station. *Circumpolar Journal* 7 (1–2): 72–97.

Harrowfield, D.L. 2005. Archaeology in Antarctica. *New Zealand Journal of Archaeology* 26: 5–28.

Headland, R.K. 2009. *Chronological list of Antarctic expeditions and related events*. London: Bernard Quaritch, Ltd.

Henderson, C. 2010. The search for Mawson's air tractor. *Australian Antarctic Magazine* 18: 30–32.

Judd, N. 2007. A report to historic places trust and department of conservation, in fulfilment of authority no. 2007/132, "to investigate an archaeological site at Monument Harbour, Campbell Island". Unpublished report to the New Zealand Historic Places Trust.

Lazer, E., and A. McGowan. 1990. *Heard Island archaeological survey (1986–1987)*. (2nd revised ed.). Sydney: Department of Architectural and Design Science, University of Sydney.

Le Mouël, J.-F. 2004. Heritage in the French sub-Antarctic territory: Between urgency and emergency. In *Cultural heritage in the Arctic and Antarctic regions*, International polar heritage committee of ICOMOS, monuments and sites, ed. S. Barr and P. Chaplin, vol. VIII, 60–64. Lørenskog: Norway Grimshei Grafiske.

Lucas, A., C. Henderson, E. Leane, and L. Kriwoken. 2011. A flight of the imagination: Mawson's Antarctic aeroplane. *The Polar Record* 1 (1): 63–75.

Palmer, J.D.., and N.J. Judd. 1981. *Campbell Island archaeological survey 1981*. Wellington: Department of Lands and Survey.

Parks Canada. 2019. Accessed: 20 September 2019. https://www.pc.gc.ca/en/lhn-nhs/nu/epaveswrecks/info/plan

Pearson, M. 2004. Artefact or rubbish – A dilemma for Antarctic managers. In *Cultural heritage in the Arctic and Antarctic regions*, ed. S. Barr and P. Chapin, 39–43. Norway: ICOMOS.

Petchey, P., R. Egerton, and W. Boyd. 2015. A Spanish man-o-war in New Zealand? The 1864 wreck of Grafton and its lessons for pre-cook shipwreck claims. *International Journal of Nautical Archaeology* 44 (2): 362–370.

Prickett, N, S. Bagley, and N. Judd. 2012. Campbell Island Archaeological Survey January – February 2011. Unpublished report to the New Zealand Historic Places Trust.

South Georgia Archaeology Project (SGAP). 2019. Accessed: 20 September 2019. http://www.sght.org/sealing-archaeological-project/

Stehberg, R.L., and A. Cabeza. 1987. Comienzos de la arqueología histórica antártica en el sitio Cuatro Pircas. *Revista Chilena de Antropología* 6: 83–111.

Townrow, K. 1989. *Survey and excavation of historic sites on Macquarie Island*. Hobart: Department of Lands, Parks and Wildlife.

Townrow, K., and M. Nash. 1990. Close shave from the sub-Antarctic: An analysis of timber samples from archaeological sites on Macquarie Island. *Bulletin of the Australasian Institute for Maritime Archaeology* 14 (2): 9–16.

Zarankin, A., and M.X. Senatore. 2005. Archaeology in Antarctica: Nineteenth century capitalism expansion strategies. *International Journal of Historical Archaeology* 9 (1): 43–56.

Southwest United States and Northwestern Mexico: Geography and Culture

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State of Knowledge and Current Debates

The Archaeological Southwest

The Southwest region (Fig. 1) reflects colonial history perhaps more than Native prehistory. The ancient Southwest is seen as a cultural "island" related to, but distant from Mesoamerican civilizations – much like colonial New Mexico vis-a-vis old Mexico. The ancient Southwest was "simpler" than Mesoamerican civilizations, avoiding their complicated political histories. In the received view, modern Pueblos tribes of Arizona and New Mexico are essentially unchanging; thus, Pueblo practices of the nineteenth century can be readily transposed onto ancient sites. That view of the Southwest was crafted in large part by American cultural entrepreneurs in the early twentieth century, building on the work of early archaeologists who sought to link exotic ruins (e.g., cliff dwellings) to modern Pueblos, rather than to vanished Aztecs (the then-popular view). *Continuity in isolation* underwrote Southwestern archaeology through most of the twentieth century.

It has become clear, however, that the ancient Southwest had a diverse and dynamic history, much like human history everywhere. This entry is based on *A History of the Ancient Southwest* (Lekson 2009), which presents a recent reading of that history. Due to editorial limits, detailed citations and extended arguments supporting this

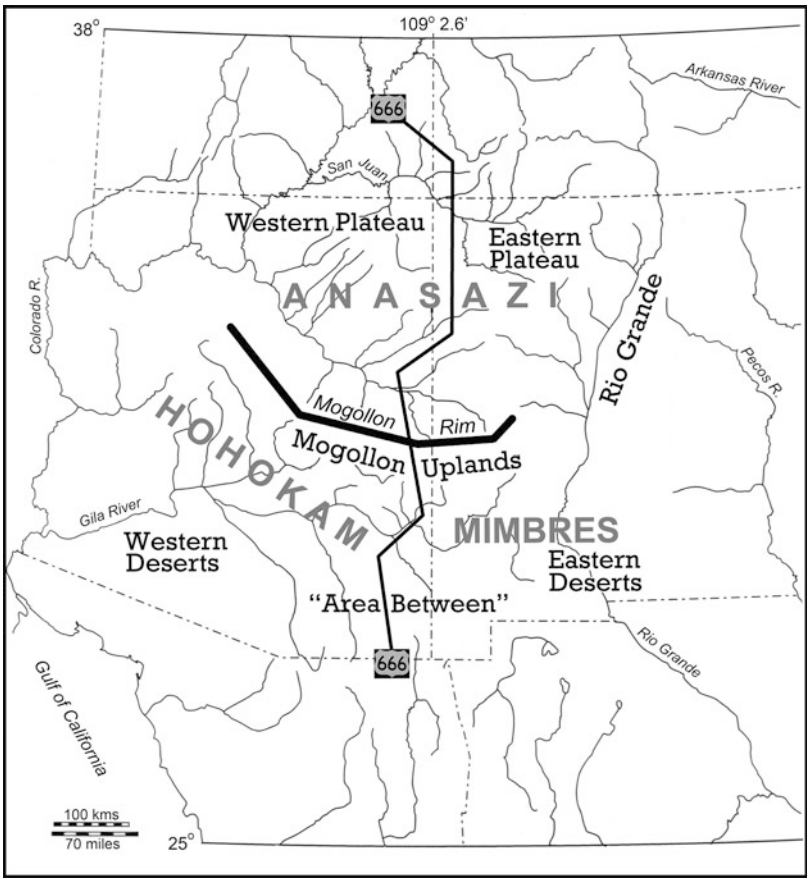

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 1 Map of the Southwest. Four quarters defined by the Mogollon Rim and old Highway 666, which approximates the Continental Divide. The northeastern and northwestern quarters correspond to Anasazi or Ancestral Pueblo; the southwestern quarter to Hohokam; the southeastern quarter to Mimbres Mogollon

entry will be found in that volume. References here identify recent major synthetic works, some of which propose alternate readings of the ancient Southwest.

Southwestern archaeology has enjoyed remarkable investments of funds, energies, talents, and public recognition for a relatively straightforward archaeology (Fowler 2000). Many sites remain clearly visible; preservation is generally excellent; and tree-ring dating provides cheap and accurate chronology. After 1960, large Cultural Resource Management (rescue) archaeology projects in the Hohokam and Anasazi regions have far surpassed academic research; CRM data are fundamental to our understanding of these areas (Roberts et al. 2004).

In recent years, archaeology has attempted to work more closely with indigenous Pueblo and other Native groups in the Southwest, with mixed results. Many collaborations are successful, but Native views of history are sometimes at odds with archaeological data. That conundrum confronts archaeology globally; the Southwest may be a place where these cultural and intellectual challenges can be usefully explored and, perhaps, resolved.

The Region and Its Nomenclature

Most of the Southwest is too dry for farming. Yet many areas were farmed, through chancy rainfall farming (aptly termed "dry farming"), or with more reliable canal irrigation from streams and rivers. The key subsistence crops included maize, beans, and squash; cotton was grown at lower elevations. Large game included elk, deer, pronghorn, mountain sheep and, on region's eastern boundary with the Great Plains, bison. Rabbits and small mammals were eaten, especially when large game resources were hunted out; and domesticated turkey substituted for game in some times and areas. Turkeys and dogs were the only domesticated animals.

Two geographic lines quarter the region (Fig. 1). An escarpment called the "Mogollon Rim" runs roughly from west to east, separating the higher Colorado Plateau (hereafter, Plateau) on the north from the lower Deserts to the south. A line along old Highway 666 (and roughly approximating the Continental Divide) separates western and eastern Plateaus, and western and eastern Deserts.

Archaeological "cultures" correspond roughly to those quarters: Anasazi (or, Ancestral Pueblo) Culture developed on the Plateau, with significant differences east and west. The Western Desert corresponds to the Sonoran Desert and the Hohokam Culture, with its core in the Phoenix Basin. The Eastern Desert corresponds to the Chihuahuan Desert and two key Mogollon Culture districts, Mimbres and Casas Grandes. Upland Mogollon societies occupied the mountainous Rim.

The Early Agricultural Period (1500 BCE to CE 400)

Maize arrived from western Mesoamerica well before 2000 BCE (Staller et al. 2006). Maize spread rapidly through the four quarters of the Southwest, but the relatively small cobs of early maize did not transform the region (Vierra 2005). Five centuries passed before farming villages took root in the Western Deserts around 1500. New strains arrived, perhaps together with new people from the south, already committed to agriculture. It took special knowledge to grow maize – originally a tropical crop – and to adapt it to new settings. Irrigation was necessary as maize moved from wetter to drier climes. Desert farmers planted first in naturally wet bottomlands (*cienegas*) in the Eastern and Western Deserts. As favored settings filled, farmers created new fields by diverting water from streams through small ditches to terraces above the floodplain.

Knowledge of maize may have been embedded in social structures, ceremonial practices, political relationships, and languages: a Uto-Aztecan mother stock that later became Piman, Hopi, and other Southwestern languages (Hill 2006; see also Merrill et al. 2009). A chain of Uto-Aztecan-speaking groups linked the Western Deserts and West Mexico. Shared histories ensured that desert communities looked south throughout the following centuries.

The Early Agricultural period in the Southwest was part of a much larger, continental phenomenon: from Poverty Point in the lower Mississippi

Valley to Olmec in Veracruz, North American was waking up. Villages in the Western Desert, by 1000 BCE, consisted of 20 or more small, shallow pit structures – family homes – around a plaza. Near the center of some villages stood a single large building, a place for community affairs. Defensive sites such as Cerro Juanaqueña (1250 BCE) – a large village on an impressively terraced and walled mountain in the Eastern Deserts – attest to frictions in the Early Agricultural period. Its massive terrace walls were the Southwest's first monumental construction.

Boom times in the Deserts: Uto-Aztecan speakers spilled up over the Mogollon Rim and on to the Plateau. The indigenous peoples of the Plateau – people (presumably) speaking languages that would become Zuni, Keres, and Tanoan – noticed the thriving villages around Tucson and the terraced mountain of Cerro Juanaqueña. Small canals were constructed around Zuni as early as 1000 BCE. But early maize did not prosper on the Plateau. When maize-based villages finally appeared on the Plateau, they probably owed much to the Western Deserts, perhaps a final push of Uto-Aztecan migrations around 500 BCE. The Western Desert people moved north onto the western Plateau, displacing Plateau natives to the east (LeBlanc 2002). The divide between the Uto-Aztecan west and the Zuni–Keres–Tanoan east cast long shadows. Many centuries later, hierarchical governments would rise in the east, among the "locals," but not among the peoples of the west, who harked back to different, desert ways.

Brownware pottery spread throughout both Deserts and the Plateau between CE 200 and 400. Its initial appearance, in the Deserts, may hark back to the South – there must have been constant comings and goings between the Deserts and West Mexico. A brownware "foundation" formed across the region, a craft shared among villages with different histories and backgrounds. After mastering the basics, potters invented techniques and created styles increasingly characteristic of each area. By CE 500, different traditions marked the Plateau (graywares), the Western Desert (buffwares), and the Eastern Desert (brownwares).

Maize fueled southwestern civilizations, but in fact, the Southwest was a tough place to grow maize. Maize's failures were as important as its successes. The mismatch between maize and the Southwest played out in unequal production, agrarian tensions, droughts, famines, and – above all – the many measures, social and political, taken to support maize-based societies in blistering deserts. Most importantly: canal irrigation systems in the Western Desert. It is not so much that maize worked in the Southwest; it is that *they made it work* – most of the time.

Early Villages (CE 400–750)

By about CE 400, more than a millennium after farming villages first appeared in the Deserts, a few hundred small settlements flanked small steams, irrigating crops with small, simple ditches. Three short centuries later, the western deserts were crossed by a dozen massive canals systems – main canals 10 m wide and up to 30 km long, hundreds of distribution canals, intakes, drains, etc. – taking water from major rivers, the Salt and the Gila. Western Desert irrigation was the largest canal system in North America. Small farming villages grew to become very large towns. The remarkable increase in scale probably demanded new political structures, or perhaps new political structures allowed larger village sizes, or a bit of both. New political practices replaced the older, inclusive village-council level of governance.

New ways of living in the Southwest reflected, distantly, a new idea in North America: urbanism at Teotihuacán, far to the south. It was not the first Mesoamerican city but Teotihuacán was by far the greatest. Teotihuacán redefined the possible. No one in the Southwest had to "invent" villages, towns, or cities. Every wandering hunter-gatherer, far into the northern tundra, was at least dimly aware that people could live in densely packed, permanent cities.

The Desert farming villages succeeded and grew. Small, simple ditches got deeper and longer, bringing water out to upper terraces to meet the need for new farmlands. Irrigation – even on these modest levels – demanded centralized decision making, a few making decisions for the many.

Southwest United States and Northwestern Mexico: Geography and Culture,
Fig. 2 Community House at Las Capas, Early Agricultural Period site, near Tucson AZ

Around CE 500, at larger villages, a few prominent families with more lands, more wealth, and more power built notably larger residences ("Big Houses") which incorporated ritual features. A ring of multiple Big Houses were built around and immediately adjacent to the central plaza (Fig. 2). Other families built their smaller houses behind the inner circle of Big Houses, farther away from the plaza. The council houses of earlier times disappeared, their governance functions evidently shifting to Big House families. Importantly, the half-dozen Big Houses in each village appear to be equals: no one Big House bigger than the others.

Big House political power was modest, scaled to small, early ditches – insignificant by Mesoamerican measures. When irrigation tapped larger rivers – the Gila and the Salt rivers in the Phoenix Basin – the scope of decision making expanded exponentially. Canals got big and Big Houses got bigger, at towns/sites today called Snaketown, Grewe, and a score of others in the Phoenix Basin. Their spheres of interest and control surely expanded beyond farming and irrigation.

At Snaketown and Grewe, leaders legitimized themselves with exotic objects, badges of office: copper bells and other Mesoamerica regalia. Big House leaders may have traveled to the source, to western Mexico and Mesoamerica, returning with these impressive objects. It seems likely that people to the far south knew of the fertile farmlands, impressively irrigated, of the Western Deserts. People on the Plateau doubtless noticed too. Plateau villages of any size were few and far between and relatively impermanent – short lived and semi sedentary. Plateau farmers discovered that, unlike the Deserts, it was possible to farm away from streams, relying on precipitation: rainfall farming. Rainfall farming was risky, but it reshaped life on the Plateau, for both the Uto-Aztecans of the west and the local populations of the east. The two groups were increasingly difficult to tell apart, but the old divisions remained in language and history.

Plateau peoples had not yet developed centralized political institutions. Decisions were probably made in a large community or council house: the "Great Kiva." Great Kivas were round chambers, often roofed but sometimes not, and big enough for representatives of families or clans to meet and make decisions, presumably in the context of ritual.

Unlike Desert farming, tied to canal systems, rainfall farming required no investment in infrastructure and therefore no commitment to any particular place. Rainfall varied from year to

year and place to place. Groups moved often, on cycles of a generation or less – a fluidity that discouraged political leadership.

Yet, in the end, leaders put themselves forward. Perhaps inspired by desert Big House elites, ambitious Plateau families apparently decided to try it too. In the Deserts, political leaders lived in Big Houses prestigiously near the plaza. And at a few Plateau villages around 500 – such as the remarkably large Shabik'eschee site in Chaco Canyon – the first attempts at political leadership appeared as exceptionally large pit houses, built near the village center and the Great Kiva – much like Desert Big Houses.

Big House-manqué elites at Shabik'eschee and other Plateau villages were not needed to control and coordinate canal systems. Indeed, they may not have been *needed* for any economic or agricultural reasons. Tensions between the eastern and western Plateau may have promoted political leadership. Remarkable things – perhaps alarming things – were happening in Western Deserts, marked by Big House elites. Western Plateau villages had historical and linguistic ties to the deserts. But the East did not. Eastern Plateau societies might have needed (or accepted) tighter organization, but political leadership did not "take" on the Plateau. Unlike canal communities of the deserts, Plateau families – if annoyed by would-be leaders – could simply leave, move to a better or at least different place. Rainfall was equally spotty everywhere. If a leader became obnoxious, the led could leave.

It was different in the Deserts. People were tied to canals – the investment in infrastructure created true sedentism. Canals were essential for farming, so leaving was not an option. Consequently, Desert towns got bigger and bigger; towns in both Western and Eastern Deserts spanned centuries, compared to a generation or two on the Plateau.

Canals on the Salt and Gila rivers created a breadbasket, the richest farming economy in the Southwest. The confluence of those two rivers was the setting, a thousand years later, of the modern city of Phoenix – which "rose from the ashes" of the ruins of the earlier Desert civilization. Phoenix had maize adapted to irrigation, long-growing seasons, abundant water from the rivers, canal technologies to capture that water, and a Big House political system to make it all work. Deserts farming economies needed leadership. Phoenix at 700 was a civilization waiting to happen. The region was primed to produce the food surpluses needed to fuel great things: kings, empires, whatever. But Big House rulers did not become kings. Desert civilizations took a different path.

Hohokam (CE 750–900)

Hohokam, as a set of practices, began around 700 perhaps with another wave of people, or a new wave of ideas from western Mesoamerica, drawn by the thriving irrigated farmlands of Phoenix. The ideology united many groups – newcomers, long-settled migrants, and converted locals. It was a supra-governmental or anti-governmental or instead-of-governmental ideology that united large areas and many (perhaps ethnically distinct) people, and got big things done – all without kings.

In the Phoenix core of the Western Deserts, Hohokam presented new ways of life manifested as oval, earthen ball courts (Fig. 3), elaborate (but largely democratic) cremation burial rituals, bold new styles of art, and, apparently, decision-making structures that disguised or diffused political power (Gumerman 1991; Fish and Fish 2007). As at Teotihuacán (but on a far smaller scale), individual political leaders in Big Houses were replaced by a government of bureaus and committees – in the guise, perhaps, of priesthoods and councils. For a few brilliant centuries, Hohokam ideologies allowed an enormous, elaborate irrigation economy without evident centralized political power – and propelled a remarkable cultural explosion out from Phoenix and across the deserts.

Some elements of what became Hohokam already existed in the deserts, part of the continuous interchange from the deserts to western coastal Mexico and back again. Some parts of Hohokam were endemic, local developments. But the key elements were new to the Deserts, introduced almost certainly from the south. Hohokam ideologies replaced and overshadowed

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 3 Ball court at Wupatki, near Flagstaff AZ

conventional Big House leadership (which remained for few more centuries at the village level).

It seems fair to say that people *became* Hohokam. Perhaps the most conspicuous and widespread markers of Hohokam were bracelets or more likely armlets of *Glycimeris* shell. Bivalve shells from the Gulf of California were carefully shaped into armlets and sometimes carved with symbols – birds carrying snakes, desert toads, and the like. They had once been rarities, but after 700, they were ubiquitous. People in every sizable settlement had this badge of membership prominently displayed on an upper arm.

Inward-facing clusters of three or four shallow pit houses, around a small courtyard, formed the typical home – in both the Western Deserts and in northern Mesoamerica. A dozen or two dozen courtyard clusters were grouped into small neighborhoods or "village segments." Multiple neighborhoods encircled a large plaza which, as in earlier periods, marked the center or core of the villages. Ball courts displaced Big Houses as the iconic architecture, the key monument. Not *re*placed: Big Houses and their elite families continued, but their leadership functions were transferred, apparently, to another arena. The whole village could witness the ball "game" that (as in Mesoamerica) probably played out political issues, territorial dilemmas, and difficult decisions. Each village of sufficient size had a ball court; large villages had two, usually at the edge of town, away from the old central plaza (Wilcox 1991).

Around the central plaza was a ring of low earthen mounds, usually round or oval. Mounds were architecture: A site was selected, fill was brought in and sculpted to shape, and a smooth plaster surface applied. Might these be Big Houses, elevated? No evidence has been found of houses atop these mounds, but most have been trenched as "trash mounds," not excavated as architecture. But, on the evidence, these mounds were not residential. They were relatively low – waist-high, well below the peaked roofs of surrounding houses. These low mounds supported ceremonies and small presentations, presumably performed for comparatively large audiences. The village could view actions or performances atop the mound's elevation, like a stage. Mounds were inclusive; events that would be restricted in the old community house or private in Big Houses were now public.

Hohokam did not emphasize elite individuals or families. Not a return to village councils – Hohokam society was probably far too large and complex for that – but rather a decentralized, inclusive stew of ritual, power, and decision making. Individuals surely had power, but they did not flaunt it with Big Houses, palaces, or tombs.

Whatever Hohokam was, it controlled individual political ambitions and curtailed social stratification and hierarchy.

To the south, it was a time of kings and nobles – the Epi-Classic, and the beginning of an age of city-state polities (*altepetl*, in Nahua) and, later, empires. The fall of Teotihuacán (about 550/600) sent ripples – tsunamis – of political power outward, ruling houses looking for places to rule (Nelson 2000). Displaced noble families transformed towns throughout Mesoamerica into small city-states. The aftershocks of Teotihuacán's fall reached the Pacific Coast with the temple-towns of the Aztatlan horizon and reached the very northernmost frontiers of Mesoamerica at La Quemada.

Petty chiefs and Big House leaders must have been tempted to emulate southern kings. As Mesoamerican polities popped up nearer and nearer to home, they provided models of hierarchy. Hohokam apparently rejected seventh- and eighth-century Mesoamerican political models – while using a wide range of Mesoamerican forms and symbols.

For almost three centuries, Hohokam worked. More than worked: Hohokam prospered and expanded – exploded – out from Phoenix in one of the most remarkable events in the history of the ancient Southwest. Ball courts, distinctive pottery, and burial rituals pushed rapidly upstream, up to the very edges of the Plateau. Surprisingly, Hohokam did not go far downstream, stopping at Gila Bend a short distance west of Phoenix.

By 900, there were hints of hierarchy not within but between and among towns, with the largest occupying positions of control at the heads of canal systems. A geographic pecking order emerged. The very largest towns, such as Snaketown, Grewe, and Aztatlan, had the very largest ball courts.

One of the largest ball courts was built at Pueblo Viejo, high up the Gila River, 250 km east of Phoenix. Beyond Pueblo Viejo, Hohokam elements reached deep into the Mimbres region of the Eastern Deserts, where mountain streams flowed out of the Mogollon highlands into the Chihuahuan Desert (Nelson and Hegmon 2010). Mimbres settlements were initially less permanent than the villages of Western Deserts. Pit house groups moved from one valley to the next, allowing depleted soils, hunted-out game, and gallery forests to replenish and regrow. It was a successful way of life – so successful that rising numbers filled the valleys.

Like the Hohokam societies of the Western Desert, Mimbres farmers dug ditches to water their fields. They almost certainly learned the tricks of irrigation from Hohokam, but Mimbres canals were modest compared to the huge Phoenix systems. Mimbres accepted, selectively, Hohokam beliefs: cremation burial (for some), ideologically charged naturalistic designs on pottery, and – conspicuously – Hohokam *Glycimeris* armlets. Not every Mimbres person wore them, but some were buried with dozens.

Canals pinned Mimbres villages in place. Pit houses, which had a fairly short use-life, stacked up (insofar as pit structures can stack). Newer houses cut into older abandoned structures. Some villages grew large, with several scores of houses – untroubled, it seems, by hierarchy (Hegmon 2002). Much like Hohokam, Mimbres ideologies discouraged conspicuous leadership. Mimbres, however, did not accept the whole Hohokam package; ball courts, essential to Hohokam, were absent. Instead, Great Kivas (a form shared with Plateau pithouse villages) held communities together, serving some of the purposes that ball courts played for Hohokam.

Hohokam reached as far north as east. Western Plateau peoples and Phoenix shared linguistic and historical connections – so deep (by this time) to perhaps be mythical. Hohokam ball courts were built far north in the western Plateau, in the dormant volcanic fields west of Hopi.

With increasingly sophisticated knowledge of land and maize (and decades of favorable weather), Plateau populations grew and villages got larger (Reed 2000). Over generations, people became accustomed to the structures and strictures of village life. They had to: There were fewer open valleys, fewer places to start over – and, thus, more possibilities for hierarchical leadership. Inter-village squabbles escalated after 700, reaching levels approaching warfare by

850. Increasing violence called for leaders, to lead or to avoid war.

Over the short term, shifting rainfall favored some areas over others. In the ninth century, rains fell on the great Sage Plains, northwest of Mesa Verde and population concentrated there. Towns expanded, and lasted longer (Lipe et al. 1999; Noble 2006). There, ambitious families built the first Big Houses on the Plateau since the false start at Shabik'eschee, three centuries before.

Basic house forms had changed, somewhat, since the pit houses of Shabik'eschee. Plateau peoples now used more stone masonry in their architectural repertoire. Behind the pit structure (which remained the primary living space), they added a small masonry building of a half-dozen low rooms used mainly for storage. With food and gear housed safely above, the pit structure itself could be smaller and easier to heat. That combination – six rooms and a pit structure – became the standard for Plateau housing (and a clear contrast to the courtyard homes of the Western Deserts). The new, ninth- and tenth-century Big Houses used that same form: six rooms and a pit house modules, built *really* big: *Great Houses*.

Great Houses – Big Houses by another name – were essentially residences, built on the same ground plan as other houses, but larger, more substantial, and built with greater craft and care. Just like the early Big Houses of the Western Deserts, Plateau Great Houses combined secular and ritual architecture in conspicuous, even (modestly) monumental elite residences. Both Desert Big Houses and Plateau Great Houses were, importantly, *houses – not* public facilities like ball courts or Great Kivas.

Great Kivas – the people's council chambers – continued to be built, especially in villages evidently lacking Great House elites. One village might have a Great Kiva but no Great House. Another might have a notable Great House but no Great Kiva. Often both were present but at some distance apart. It seems likely that Great Kivas were buildings of the people, while Great Houses were buildings of elites.

Great Houses eventually appeared over much of the Eastern Plateau. The Western Plateau stayed out of it, for a while. In western villages, homes were often jammed together in long rows. Each home was essentially identical to the next. Those villages often (usually?) had Great Kivas. Eastern villages were more dispersed, with clusters of freestanding homes or scattered short segments of three or four conjoined homes. Large settlements had scores of these separate housing segments and one or more Great Houses – and no Great Kiva. The people were architecturally fragmented, without a common hall or communal center. Looming over them, the Great House offered the coherence and regulation needed, perhaps, for village life.

Plateau peoples still moved, shifting villages as they had for centuries, but in larger groups and longer cycles than in earlier times. Rising violence urged safety in numbers. Elite lineages – noble families – probably emerged as important families maintained their status from old village to new village, from one generation to the next. They may have begun to think it was their right, or their duty, to rule.

Chaco (CE 900–1150)

The decades from 900 to 1150 were momentous in North America. Three centuries of uncertainty and reorganization that followed Teotihuacán's fall ended with the rise of Tula and the beginning of Mesoamerica's Post-Classic Period (950–1500; Smith and Berdan 2003), an era of small polities and long-distance interactions. Mesoamerica was dotted with hundreds of city-states. Short-lived "empires" encompassed multiple city-states, but not until the Aztecs (in the Late Post-Classic) was empire-building truly successful. Yet the Early Post-Classic was notable for long-distance trade and interaction – ideologically charged "international" styles of pottery and architecture that linked cities that are a thousand kilometer apart. In eastern North America, the great city of Cahokia urbanized the middle Mississippi Valley and set the course for subsequent political history, much as Teotihuacán had set the agenda for Mesoamerican urbanism five centuries before. Cahokia was larger than most Post-Classic Mesoamerican cities.

On the Plateau, Great House families had several generations to become accustomed to

their status and duties – not unlike Mesoamerican noble families. Great House families moved south of the San Juan River and into Chaco Canyon. Perhaps Chaco was simply the last empty, isolated valley. Perhaps Great House leaders saw themselves as the heirs of Shabik'eschee. At any rate, the people who promoted Great Houses at Dolores and Blue Mesa – their direct descendants or their spiritual heirs – built three Great Houses in Chaco Canyon by 900. Unlike earlier, short-lived Great Houses, these lasted. After a century-long germination, Chaco burst forth to dominate the Plateau from 1020 to 1125 (Noble 2004; Lekson 2006).

Pueblo Bonito was the largest Chaco Great House, a giant "D"-shaped building with massive sandstone masonry walls standing up to five stories tall. Its 600-plus rooms and enclosed plaza covered almost one hectare. It appears that perhaps a dozen or so families (presumably extended families) lived at Pueblo Bonito. They were very important families: elite or noble families. And much of the building was not residential, as was the case at most Great Houses. Chaco's Great Houses were in part elite residences and in part monuments. Eventually, eight major Great Houses were built at Chaco, presumably representing eight elite or noble lineages. Planning, coordination, and labor rivaled Phoenix canals. There was an important difference between Desert canals and Plateau Great Houses: Canals delineated an economy; Great Houses manifested an ideology of power.

Great House families lived privileged lives. They probably did not farm or hunt – maize and meat were brought into Chaco. They probably did not make pottery or chip arrowheads or grind maize. Those too were imported into the canyon. They probably traveled far to the south (almost certainly to Mimbres and very likely to western Mexico and Mesoamerica) and brought back macaws, metals, cacao, and other wonders (see, e.g., Crown and Hurst 2009). When they died, they were buried with pomp and ritual in the oldest parts of the building (Akins 1986; Plog and Heitman 2010), becoming part of its history. Great Houses were the houses of generations of elites – noble families of the Plateau. Or so they might have seen themselves, modeling their polity on the Mesoamerican *altepetl* – or city-state, the ubiquitous political formation in Mesoamerica during Chaco's era, translated into Plateau idioms, architectures, and cosmologies.

With the rise of noble families at Chaco, the people found themselves redefined as commoners. Villages with dozens of separate individual homes – six rooms and a pit house – dotted the landscape. Set on a low hill or prominence above the village stood a small, secondary Great House, and off among the commoners' homes a Great Kiva – the traditional community center of the people. The two forms coexisted, perhaps uneasily, throughout Chaco's reign.

Chaco created a degree of political integration over most of the Plateau, offering economic and political security. Escalating inter-village violence ended with Chaco's rise (LeBlanc 1999). And there was the fact of the Hohokam. Plateau peoples must have known of the remarkable Hohokam expansion of 750–900. Western Plateau peoples shared (distantly) a language with the Desert civilization. Eastern Plateau peoples remembered the earlier Uto-Aztecan expansion onto the Western Plateau. On some level, Chaco itself may have been a geopolitical response to Hohokam.

Chaco's success was in part a gift of geography and climate. Chaco Canyon itself was a dry and cheerless place, unfit for extensive agriculture, but it was central to a ring of villages, 80–150 km from the capital, around the better-watered margins of what would become Chaco's interior region. Chaco, from its beginnings, served as a center for the interior region, evening out the short-term agricultural problems of surrounding villages. Bulk goods – building timbers, pottery, maize – moved freely within that 150-km radius. Many things came to Chaco and stayed there, in the service of the elites. Maize moved into and through the canyon, perhaps from places that had plenty to places that had none.

Chaco's influence soon reached far beyond that original region. Colony or copy Great Houses popped up, up to 250 km away. Local leaders almost everywhere on the Plateau joined with or deferred to Chaco. And it worked – ultimately,

about 150 second-tier Great Houses marked Chaco's greater region (Kantner 2003). They represented local, second-tier elites or noble families who undoubtedly acknowledged and visited Chaco, perhaps regularly, on a network of "roads" radiating out from, and in to Chaco Canyon.

Chaco Canyon itself was decidedly top-heavy – a city of palaces – but the tip of the social pyramid was in fact rather small: perhaps a thousand or fifteen hundred elites. And the pyramid had a broad base: tens of thousands of commoners across the wide Plateau. At a guess, commoners numbered perhaps 40 or 50,000, about the same size as a Mesoamerican city-state, but spread over a much larger region.

As Chaco waxed, Hohokam waned. The high water mark in the deserts came between 900 and 1050; on the Plateau between 1020 and 1250. In the decades after 1000, Hohokam's remarkable expansion reversed and shrank back in on the Phoenix Basin. The hallmarks of Hohokam civilization – ball courts, shell insignia, elaborate cremation burials, low mounds, and (most importantly) polity without kings – continued into the early 1100s, but the energy was gone. Most ball courts fell out of use. Hohokam fragmented into multiple local polities. Phoenix and Tucson went separate and unequal ways.

Even in decline, Hohokam remained far more impressive as an economic landscape than Chaco – or anything else, then or thereafter, on the Plateau or the Rio Grande. The canal systems continued to expand, bringing more of the desert under cultivation. Each canal system was apparently independent, with key social dynamics among multiple settlements strung along the same canal. A dozen independent "irrigation communities" emerged within the Phoenix Basin, and the Hohokam ideology ensured that power was diffused within those communities. Hohokam political life – and social life – was relentlessly modular (Abbott 2000).

Population in the Phoenix towns increased, less from local growth than from in-migration into Phoenix. Thousands of people retreated from the edges of the Hohokam world back into the heartland. The demographic implosion accelerated through CE 1300 (Abbott 2003). With all those new people, the farmlands of Phoenix were perhaps reaching their limits.

Mimbres, in the Eastern Deserts, registered the shift from Desert to the Plateau, like a weather vane swinging to the winds. Mimbres pit house villages once looked west to Hohokam; after 1000, they looked north to Chaco. Pit houses were quickly replaced by small masonry homes of a half-dozen rooms, not unlike the Plateau house form, and spectacular black-on-white pottery (Fig. 4) (Hegmon 2002; Shafer 2003). Something like Great Houses, 400 km from Chaco, were built at a few villages, with much larger rooms, more formal layouts, and more massive masonry than was customary in Mimbres pueblos.

Would-be Great House elites never took hold. Through a remarkable combination of old Hohokam ideologies, new Plateau forms, an influx of Mesoamerican ideas, and their own local genius, Mimbres people developed new ways of living that allowed for large towns, complicated canal systems, and interactions with the Chaco world – but that avoided Chaco's hierarchies and political complications.

Going around Hohokam, Mimbres villages evidently established direct trade relations, over the Sierra Madre, with western Mexico and perhaps even the Aztatlan cities of Mexico's Pacific Coast. Mimbres had a straight shot down the east

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 4 Mimbres Black-on-white bowl, c. CE 1050. UCM 9366. (Courtesy University of Colorado Museum of Natural History)

flanks of the mountains to the Post-Classic states of central Mexico.

Mimbres middlemen supplied Plateau rulers. Long-distance trade shifted from the Pacific side of the Sierra Madre to the inland side. Inland routes pioneered by Mimbres reached their fullest expression with the rise, two centuries later, of Paquimé.

Chaco prospered. Then, 300 km west of Chaco Canyon in the western Plateau, a wonderful awful thing happened. A volcano erupted, at the northernmost edge of the Hohokam world and westernmost reaches of Chaco. Sunset Crater was a small volcano, but it was spectacular (Elson 2003; Downum 2012). Its plume of fire was visible from highpoints on the Eastern Plateau – possibly from Chaco – and from Phoenix. The volcano became an important place, perhaps more important than Chaco Canyon.

An extraordinary collection of structures and monuments converged at the volcano's flank, at a safe distance: Wupatki. The place was known to Chaco; a small Great House there preceded the eruption by perhaps a decade. After the eruption, a larger Great House rose after 1135. (By then, Chaco was gone and Aztec Ruins was ascendant on the Plateau.) Wupatki had elaborate turquoise artifacts, macaws, and Mesoamerican objects that rivaled Chaco and eclipsed Aztec. And more: at Wupatki, a Great Kiva was built next to a large masonry-walled Hohokam ball court, perhaps the last ball courts ever built. Chaco and Hohokam met, at last, under the volcano. But by 1135, when Wupatki was built, Hohokam was greatly diminished and Chaco Canyon was at its end.

Chaco ended with political strife. The orientations of major Great Houses marked two competing cosmologies. The old, original worldview (of 850 and perhaps even earlier) was represented by a loose southeastern (solstitial?) alignment. A newer, tighter north–south (cardinal?) cosmology was introduced at several Great Houses around 1020. A crisis may have come around 1070, with the construction of a new capital far to the north at Aztec Ruins. The location of the new Chaco was fixed by cardinal direction: due north, up the Great North Road, to the San Juan River. About 1110 construction began at Aztec Ruins. Its plan was profoundly solstitial. It seems that the cardinal party prevailed in the location of the new capital, but the solstitial bloc determined the new capital's form and cosmic vision. The cardinal noble families quite possibly turned away from Aztec, and reversed directions, going south (Lekson 1999).

Retrenchment and Reorganization (CE 1150–1300)

The cosmological schism – manifest as solstitial versus cardinal – had real political consequences. Aztec was, literally, only half the capital that Chaco had been (Lekson 1999). And its region was reduced to less than half of Chaco's. Aztec's polity, however, included Mesa Verde and, more importantly, the densely settled Great Sage Plains of southwestern Colorado (Noble 2006; Lipe et al. 1999; Varien and Wilshusen 2002).

Things that worked at Chaco failed at Aztec. The new capital was unable to keep the peace or to bring the rain, as Chaco had done. A major drought hit from 1135 to 1180 – a drought, while Wupatki flourished! A second burst of monumental construction at Aztec marked a brief rebound. But by about 1250, rainfall became erratic and unpredictable. Violence spun out of control. Farmsteads – previously scattered freely among their fields – clustered into large, walled towns or huddled together in alcoves high on the cliffs of Mesa Verde (Fig. 5), defensive patterns seen across the Plateau (Adler 1996).

To enforce its failing rule, Aztec unleashed lethal force (Turner and Turner 1999). At farmsteads, squads of warriors fell upon families failing in their tributary duties. Men, women, and children were brutally and publicly killed and left to rot, unburied, in the ruins of their homes. But even terror could not hold together.

It was a classic case of unintended consequences. Aztec's use of force apparently drove away already-wavering groups. Beginning as early as 1220 (decades before the "Great Drought" of 1275–1300), villages began leaving Aztec's troubled region. Movement and

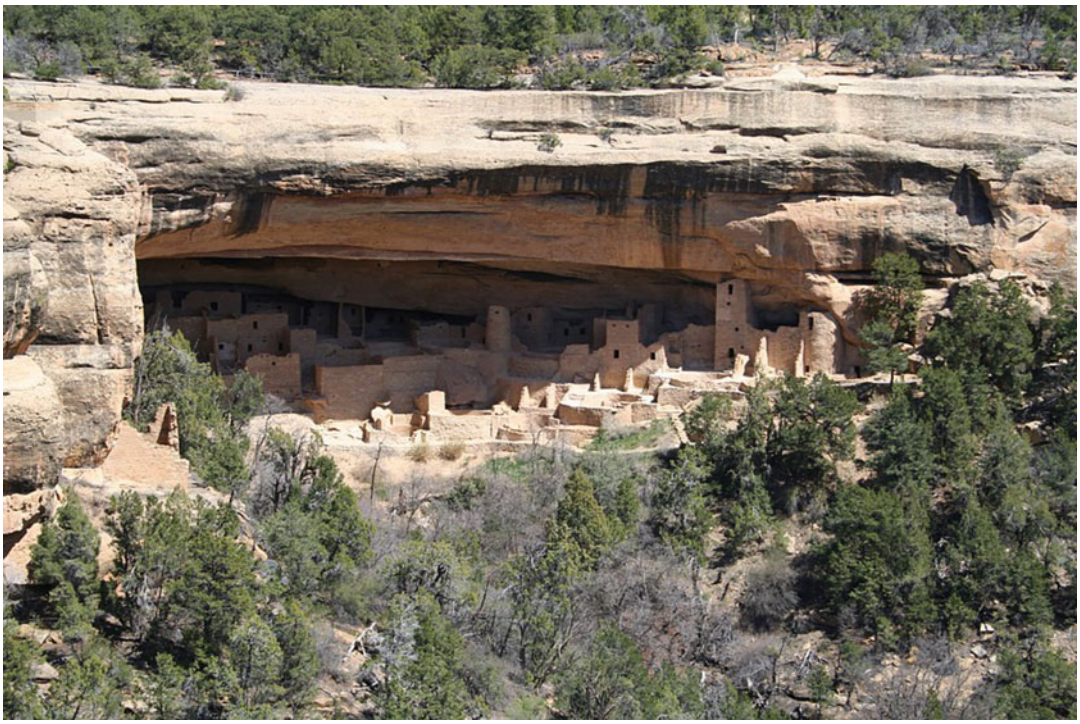

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 5 Cliff Palace, Mesa Verde CO

relocation had always been typical, but within the confines of the Plateau. Now, people moved farther, setting off cascades that rippled out from the Plateau into the Deserts.

Aztec and its region were abandoned, an exodus of tens of thousands of people, complete and permanent, seldom paralleled in human history. A final "Great Drought" from 1275 to 1300 was merely the final punctuation on a story already told – most people were already gone. Only a few of their descendants returned as pilgrims praying over ancestors, never to reestablish villages or farms.

Most who left the Plateau went to the southern fringes of Chaco, the regions of modern pueblos: Hopi, Zuni, Acoma, Laguna, and the many towns of the Rio Grande, spiking Pueblo populations around 1325 (Adams and Duff 2004). Some went farther: whole villages relocated far to the south in the East and West Deserts. In the west, Mogollon pueblos and Hohokam towns grudgingly accepted newcomers. Migrants sometimes settled atop defensive buttes and mesas. A generation later, they were joined by more people from the north, following paths into the upper Gila and the Salt drainages. These newcomers integrated into fading Hohokam societies – on their own terms.

The old order passed. Chacoan nobles, perhaps, and Chacoan ideas of hierarchy survived Chaco and Aztec's fall. Chaco lineages in the deepest south (beyond Acoma and Zuni) maintained their status decades after Chaco removed to distant Aztec. Perhaps, to commoners, Chaco was always a remote, near-mythical place – Rome to an ancient Pict, Jerusalem to a medieval serf. In any event, southern elites kept up appearances, brooding in their Great Houses on hills above their towns. The second wave of immigrants – who knew what was really happening

up north and wanted no more Great Houses – drove those relic elites out, and south.

Authority vanished, refugees arrived, and violence ensued. Two centuries of Chacoan peace ended after 1175. Fighting quickly escalated to village-on-village warfare. As in the Mesa Verde region, scattered farmsteads clustered into larger and larger villages. But unlike those in the north, southern villages were not hodgepodge affairs. They were carefully planned, with the organizing principles of Chacoan architecture applied to thousand-room pueblos, with tall perimeter walls laid out as precise squares and circles. Homes in-filled those geometric spaces in a jumble; but within those impressive walls, no single house was "great." From the Rio Grande on the east to the mountains of central Arizona on the west, aggregated towns employed elements of Chacoan planning but rejected Chaco-style ruling elites.

We do not know the fates of the northernmost elites – the lords of Aztec and their allies. Not all who died in the violence of the thirteenth century were commoners. What of the southern Great House leaders, elites, and noble families around Zuni and Acoma? Their lives were disrupted first by the end of Chaco, then by the fall of distant Aztec, and finally by a popular movement – literally a migration – away from hierarchy and toward a new social order. Some elites surely converted; many moved. North – a region and direction of ill omen – was no longer possible. There was no one left to rule. To the south, Hohokam beckoned from the deserts – a civilization without kings.

The causes of warfare on the Plateau did not obtain in the Deserts, but refugees from the violence brought the means and perhaps the disposition. The revival of defensive *trincheras* communities (massively terraced hills) in the twelfth and thirteenth centuries reflects cracks in the tottering Hohokam edifice. For many generations, Hohokam ideologies supported diffuse governance, collaboration, cooperation – at least, no obvious rulers. Desert dwellers lacked clear leaders who could react quickly and decisively. Hohokam institutions could not turn the violence spilling out of the Plateau – or displaced Plateau noble families looking for someplace to rule.

Architecture tells the tale. For centuries, Hohokam homes were loosely clustered in small courtyard groups, and those groups into open neighborhoods. The pervasive modularity of these units reflected the nonhierarchical nature of Hohokam society. By about 1150, the modular house clusters were replaced by adobe walled "compounds": enclosing pueblo-like houses built of puddled adobe. In marked contrast to the open house clusters, compounds were closed, rigid, exclusive spaces. That architectural development (inspired at least in part by Plateau building traditions) marked the breakdown of the old Hohokam way of life (Fish and Fish 2007).

Ball courts – the *sine qua non* of Hohokam – were replaced, around 1150, by platform mounds (Fig. 6). The old courts were not leveled or razed; they were simply forsaken, left open and unused. The contrast between the sunken surfaces of ball courts and the raised surfaces of platforms was a clear indication of new ways of doing business.

Nor could platforms be confused, architecturally, with the earlier Hohokam mounds. In contrast to the low, rounded mounds – which had served as stages for public viewing of ceremonies and rituals – the new platform mounds were large, tall, sheer-sided, and sharply rectangular structures. Some platforms – square, massive, controlling – were built directly over earlier low mounds, making a statement. The height of the platforms lifted their upper surfaces (and the buildings and activities they supported) far above the people. People below could see figures only at the platform's edge – criers, priests, those who reported, ordered, and communicated. Events at the center of the platform were effectively screened from public view. Priests and leaders did their work above and beyond ordinary people's reach. Platforms were the architectural antithesis of both earlier low mounds and ball courts – both of which allowed many to see the activity or performance. Platforms paralleled the shift from open courtyard groups to closed compounds. Something had changed in Hohokam thinking. Indeed,

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 6 Curtis Site platform mound, near Gila Bend AZ

"Hohokam," as a suite of beliefs and practices, effectively ended.

Hohokam fell apart just as Plateau populations spilled into the deserts, into the upper reaches of the Gila River and Salt River. On the upper Salt River (and perhaps elsewhere), massively walled, small, rectangular masonry buildings were built in existing towns. They had no precedent in the deserts – perhaps distant variations on the Great House theme? But the desert peoples did not want Great Houses. Tonto Basin quasi–Great Houses were quickly converted into rectangular platform mounds – filled with rocks and capped with a flat adobe surface. The old Hohokam world, for at least a few decades, fended off Plateau adventurers and displaced nobility.

While Hohokam shifted shape, Mimbres went through parallel changes. It was probably no coincidence that when Chaco's move to Aztec was complete and construction at the old center ceased around 1130, Mimbres societies rejected, completely, the ideological and political forms that had held them together for a century. The change was sudden and complete – as if someone had thrown a switch. Once-bustling Mimbres towns emptied. Mimbres pottery – for a century, the focus of intense artistic energies, depicting scenes of myth and history – became anti-designs: black, burnished interiors, dimly reflecting the viewer's eyes and nothing more. The people formerly known as Mimbres changed how they built their homes – from stone masonry to puddle adobe, usually at new towns some distance removed from the old pueblos. Many Mimbres people moved up into the hills and declined; others probably moved north and joined the big towns around Zuni and Acoma (see also Gregory and Wilcox 2007). But most Mimbres apparently moved south, out of their valleys and into the desert.

New adobe towns with black burnished pottery were built where there were no permanent streams – just dry desert channels. With no streams, there were no canals. It is not entirely clear how people supported themselves – at small cienegas, perhaps, a throwback to the very earliest farming villages. These short-lived post-Mimbres settlements skipped from valley to valley in a fast-tempo dance. When the music stopped, around 1250, many probably came to rest in the valley of the Rio Casas Grandes, 100 km south of the Mimbres Valley. They apparently became part of the base population, the commoners of the Southwest's last and greatest city, Paquimé.

Not only a push from the north, but a draw to the south: the Middle Post-Classic of Mesoamerica (Smith and Berdan 2003). Tula fell by about 1150. The implications of that fall are a matter of debate: truly momentous or merely

legendary? In any event, with Tula's end, the Post-Classic pattern came into focus in vibrant clarity: expansive politics, long-distance dynamics, power plays and upheavals, and a swirling world of migrations, invasions, expulsions, and fragmentation into even more small city-states. That was the world the Southwest knew, of which it was a part.

Paquimé (CE 1250–1450)

The influx of migrants fleeing the troubled north strained the existing Pueblo communities at Hopi, Zuni, Acoma, and the Rio Grande. Violence flared. Wars broke out, with villages sacking other villages. Larger towns were safer but – without rulers – inherently unstable and often split apart. How to hold together big towns? Native histories suggest that no one wanted the kind of leaders who had created cities like Chaco and Aztec. New ideologies rose and old ideologies were revived to replace political power with ritual authority. The explosion of ideas is reflected in art. The older, Chaco-era, grimly geometric black-on-white pottery gave way to a polychrome revolution. Unprecedented pigments, dynamic symmetries, and new icons mirrored changes in worldview and cosmology (Fig. 7). Images of kachinas and new supernaturals bloomed on pottery and rock art like flowers after rain (Schaafsma 1994, 2007; VanPool et al. 2006). After several centuries of experiments – competing cults and cures – the foundations of modern Puebloan society emerged from the crucible of post-Chaco chaos: communal, egalitarian, ritually based, purposefully antihierarchical.

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 7 White Mountain Redware, c. CE 1350. UCM 9634. (Courtesy University of Colorado Museum of Natural History)

Chaco faded to a (bad) memory. For many Pueblos, Chaco and Aztec became White House, remembered as a great city led by rulers who, improperly, had power over other people. White House was a lesson: It came to a bad end, with violence, famine, and forced migration. For Navajo people who lived later in those same lands, Chaco was remembered as a place where a kinglike ruler – neither Navajo nor Pueblo – enslaved all the peoples of the region and forced them to build palatial homes for his family. In this history, the people rose up and overthrew the tyrannical rule.

New town plans and new iconography reflected new ways of living. But the larger picture remained grim. Regionally, population began to fall sharply after 1300 and continued to fall for several centuries. Paradoxically, fewer and fewer people jammed into bigger and bigger towns (Adams and Duff 2004). Several towns might group into a defensive alliance or cluster. Clustering put safe distances between battered populations – de facto demilitarized zones. The frequency of violent incidents declined, but not their severity. Wars still raged between villages, between clusters.

The Plateau's trouble accelerated Hohokam's transformation, but on the opposite tack – away from faceless bureaucracies and toward more visible hierarchy (Fish and Fish 2007). Large areas within the old Hohokam sphere emptied as people retreated back into Phoenix, taxing the diminishing productivity of those long-farmed lands (Abbott 2003). At the largest Phoenix towns, health suffered. Most babies died; those who survived died young. The old Hohokam way of life was gone, the intricate web of beliefs abandoned or discredited. New forms of governance were needed to stem the downward spiral.

Out on the margins of the old Hohokam world, there were out-of-work rulers: Great House nobles

pushed off the Plateau. In the upper Gila and the Tonto Basin, local people had earlier rejected Great Houses, filling their rooms with rocks and rubble and converting them to platform mounds. Would-be rulers, either from the north or inspired by the north, riposted by building new houses – Great Houses – atop those same platforms. Great Houses rose from platform mounds along the Desert–Plateau borderlands, and soon after in the Phoenix heartland and the Tucson Basin. Elites had come to the deserts.

Just as platform mounds were built over earlier low mounds, Great Houses atop platform mounds were a blunt architectural statement, a stratigraphy of power. Pima people who live today amid the empty ball courts and eroding mounds of Phoenix and Tucson recall in their histories the elites who lived atop platforms. They were foreigners, even supernatural – certainly not Piman. They came into the heartlands and imposed their rule, tyrannical and oppressive. But the new regime could not reverse the social and economic decline. The people suffered under these rulers for a time and then rose in revolt. They went from platform mound to platform mound, killing the kings. The Pima stories ring true. Something like a class revolt toppled the new governments.

The drought of 1135–1180 marked the end of Chaco. The Great Drought of 1275–1300 closed the book on Aztec. The Phoenix Basin's bitter end was punctuated by huge floods on the Salt River in 1357–1359 and again in 1381–1384 (Graybill et al. 2006). Equally disastrous floods hit the Gila River in 1420. These floods destroyed the canal systems. After centuries of decline, the heartlands were unlivable.

Plateau and Pueblo peoples took themselves out of the Post-Classic world. One Eastern Desert, society more closely engaged the south. Paquimé rose on the Rio Casas Grandes, in the southern Eastern Deserts, while Pueblos jelled and Hohokam fell. Prior to Paquimé, the Casas Grandes Valley had been a quiet backwater with a scattering of pit house villages (for another view, see Whalen and Minnis 2001, 2009) – the southern margin of the densely populated Mimbres region.

A century later, by 1250, the Mimbres valleys were empty and the Rio Casas Grandes teemed with people – in large part Mimbres peoples, shifted south through a string of short-lived desert town. They knew the Casas Grandes Valley and would have recognized that it was perfect for irrigation, but in their desert hegira, they probably lost the technical skills to tap the large river. The remarkable ideologies that had united Mimbres villages for major public works, such as canals, had been left behind, dramatically rejected a century before. If large populations were to live on the Rio Casas Grandes, major irrigation would have to be grafted into the valley – lock, stock, and barrel.

New towns on the Rio Casas Grandes surely sought help from the West, perhaps from experts fleeing Phoenix. But Hohokam canal irrigation was an intricate balance of enormous public works administered by deliberately diffuse governance, fine-tuned to Phoenix Basin societies. It might be possible to transfer technology, but not that administrative culture (even then on the skids in its homelands). Neither Hohokam nor Mimbres had traditions and institutions of strong central leadership. In the Southwest, Chaco (and its successor, Aztec) had those skills. Chacoan elites knew how to get big things built. They dug canals at Aztec Ruins, their final Plateau capital. And the heirs of Chaco and Aztec Ruins nobility – or at least its cardinal factions – were conveniently available.

Pueblo histories tell us that, after the fall of White House, the people were instructed to go south, (in part) to find macaws. Most stopped at Acoma, Zuni, and other pueblos. But others continued straight south beyond the arc of modern pueblos, in search of macaws (we are told). If they continued south, they probably proceeded through the empty Mimbres Valley, once Chaco's source for macaws and other regalia (Lekson 1999).

Native peoples in southern Chihuahua told Spanish conquistadors of two large groups coming into the region from the north, led by two brothers. The brothers found an old hag perched on a huge iron boulder. At this omen, one brother

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 8 Paquimé (aka Casas Grandes) in northern Chihuahua, Mexico

stopped to found a city. The second brother and his people continued south. An exceptionally large, boulder-sized iron meteorite was found at Paquimé. Was that the omen? Paquimé became a famous breeder of macaws, on commercial scales.

The people who became the modern Pueblos voted with their feet against hierarchy – by moving away from Aztec and by *not* moving on to Paquimé. But many northerners joined the journey to the south. The late thirteenth/early fourteenth century saw extraordinary population increase in Chihuahua – a combination of local populations, Mimbres migrants, Plateau northerners, and other peoples attracted to the new city from south and west. The region became one of the most densely settled areas in the Southwest. Paquimé was a new and brilliant city (Fig. 8) (Di Peso 1974).

Many architectural and organizational details – for example, the verticality of multistoried Great Houses – recalled Chaco, Aztec, and the now fabled cities of the north. Paquimé was constructed of poured adobe, a desert technology adopted by Mimbres people in their wanderings after they had ceased being Mimbres. Adobe was a poor fabric for Paquimé's towering five-story walls. Form trumped function – or, rather, symbolism trumped compressive strength. The city was an aggregate of separate, multistoried compounds, each the scale of an old Chaco Great House. The compounds were palatial – expansive and expensive and filled with treasures. Around the urban core were platform mounds and masonry pyramids, at least three I-shaped masonry ball courts (direct copies of Mesoamerican models, not the peculiarly Hohokam earthen ovals), and, most remarkably, monumental effigy mounds, unique in the Southwest. At least two of these, a four-armed cross and a long north–south snake, commemorated cardinality.

Paquimé was more closely tied to Mesoamerica – both west and central – than any previous southwestern polity. Architectural forms – colonnades, ball courts, and (modest) pyramids – and astonishing quantities of ideologically charged Mesoamerican objects far surpassed Chaco, Mimbres, and Hohokam. While all three southwestern traditions played parts in Paquimé, the city's leaders redefined (or refined) themselves as truly Mesoamerican nobility – not Chaco's wannabes. Southern objects and architecture were no longer simply props or window dressing, reinterpreted in local contexts for local politics.

Paquimé and Phoenix were "peer polities" – one on the way up, the other on the way down. Paquimé undercut Hohokam's commerce. The Plateau's demographic center of gravity shifted dramatically east to the Rio Grande (Adams and

Duff 2004; Kohler 2004; Powers 2005; Schaafsma 2007), well away from Hohokam's established trading circuits, but a straight shot north for Paquimé. Phoenix's western sphere was reduced to Hopi – its linguistic cousin – and a dozen large but short-lived towns in the Mogollon uplands that soon were abandoned, one after the other. Paquimé had an up market and Phoenix did not. By 1450, little was left of Hohokam's earlier glories, save stories and histories.

Pueblos and Others (CE 1450–1600)

Paquimé fell, sacked by unknown parties shortly after 1450, the last episode in the political history of the Southwest. The densely populated Casas Grandes region emptied. Some may have gone to Hopi or other Pueblos, but many survivors did not return to the north. They probably went west over the mountains to the Rio Sonora, or followed factions gone south centuries earlier. The people who came out of Casas Grandes could not have been the Mexica Aztecs, who founded their empire in 1427. Rather, southwestern peoples were sub-currents in a vast swirl of migrations, mostly north to south, which created a complex patchwork of northern and western Mesoamerican societies later conquered by Spain.

Population continued to plummet over the entire Southwest. The number of towns decreased. Whole districts were depopulated. Scores of towns – big towns! – in the Western Deserts, in the Mogollon uplands, and along the southern Rio Grande were abandoned a century before Spanish conquistadors entered the region in 1540.

The Pueblos from Hopi to Taos absorbed new peoples, not always of the same language or history. The unsettled social conditions must have tempted Pueblos (and Pueblo individuals) to reassert a degree of political authority, to bring order out of chaos. There are hints, even today, of that kind of authority in Rio Grande Pueblos. But the bitter lessons of Chaco and Aztec were still fresh. After 1300, Pueblos avoided political hierarchy and suppressed would-be leaders through a complex mesh of ritual and social practices. In one researcher's words, they "defeated hierarchy" (Mills 2004).

The fifteenth century saw renewed trade with Mexico, almost certainly tied to the fall of Paquimé, which had controlled inland trade routes. Turquoise was still much in demand in Late Post-Classic Mesoamerica. The eastern Pueblos also forged economic connections to and across southern Plains groups (Adams and Duff 2004).

The people who would become Navajos and Apaches arrived from the north, after the fall of Chaco and probably after the end of Aztec – but not long after. Athabaskan speakers may well have been on the Plateau during Aztec's reign. Navajo clans have detailed knowledge of the times and places of the ancient Plateau cities.

Piman peoples recovered slowly from the final, tumultuous centuries of Hohokam and their rebellion against the platform mound rulers. It would take deserts many years to rebound from centuries of intense canal irrigation, overhunting and overgathering, and the depletion of firewood and other resources. Before they could revive completely, Europe arrived.

Coronado's army entered the deserts in 1540, looking for cities of gold. The memory of a rich, urban Southwest lived on in the stories of Mesoamerican traders. Traders guided conquistadors into what should have been the new Mexico. The stories were true: There had been cities, rich cities. But the Spaniards came a century too late for Paquimé and the Phoenix Basin, two centuries too late for Aztec and Chaco. The pueblos they found were nothing like cities: no gold, no wealth, no commerce, no kings. Discouraged, the conquistadors returned to Old Mexico. Sixty years later, Don Juan de Oñate returned with colonists seeking not cities but farmlands and metals. They stayed. Not without incident of course: Native revolts, political revolutions, Yankee invasions, and all the alarms and excursions of modern history.

The history of the ancient Southwest ends at 1600. After 1600, the Southwest was no longer Native, no longer aboriginal, no longer "ancient." Native people remained, of course, and their stories continued in the face of crushing colonization.

Key Issues in Southwestern Archaeology

Recent research has greatly clarified Chaco (e.g., Lekson 2006) and Hohokam (e.g., Fish and Fish 2007) – two key episodes in Southwestern archaeology. The nature of Hohokam governance pre-1150 remains enigmatic; indeed, what was "Hohokam," as a cluster of beliefs and practices? A horizon of great importance recently emerged with the Early Agricultural Period (Vierra 2005). Agricultural societies (we once thought) began around CE 200 in the Deserts and CE 500 on the Plateau, but now we know that farming towns began a millennium earlier in the Deserts. Equally important are new research and new understandings of the Casas Grandes region in the Chihuahua Desert. In an understudied area, interpretations vary remarkably. One school sees Paquimé (Casas Grandes) as relatively small and local (e.g., Whalen and Minnis 2001, 2009); another school follows the site's original excavator (Di Peso 1974), emphasizing Paquime's role in the larger Post-Classic world (Riley 2005; Lekson 2006). Early Agriculture and Paquimé "bookend" Southwestern prehistory: the first farming villages and the last great city. While many other key questions remain in the Southwest, Early Agriculture and Paquimé stand out as epochal events – as yet, far from fully understood.

Cross-References

- ▶ Chaco Canyon, Archaeology of
- ▶ Mesa Verde
- ▶ North American Plains: Geography and Culture
- ▶ Pueblo Bonito

References

Abbott, D.R. 2000. *Ceramics and community organization among the Hohokam*. Tucson: University of Arizona Press.

Abbott, D.R., ed. 2003. *Centuries of decline during the Hohokam classic period at Pueblo Grande*. Tucson: University of Arizona Press.

Adams, E.C., and A.I. Duff, eds. 2004. *The protohistoric Pueblo world, A.D. 1275–1600*. Tucson: University of Arizona Press.

Adler, M.A., ed. 1996. *The prehistoric Pueblo world, A.D. 1150–1350*. Tucson: University of Arizona Press.

Akins, N.J. 1986. *A biocultural approach to human burials from Chaco Canyon, New Mexico (Reports of the Chaco Center 9)*. Albuquerque: National Park Service.

Crown, P.L., and W.J. Hurst. 2009. Evidence of Cacao use in the prehispanic American Southwest. *Proceedings of the National Academy of Science* 106: 2110–2113.

Di Peso, C. C. 1974. *Casas Grandes: a fallen trading center of the Gran Chichimeca*. Vols. 1–3. Dragoon: Amerind Foundation.

Downum, C.E., ed. 2012. *Hisat'sinom*. Santa Fe: School of American Research Press.

Elson, M. D., ed. 2003. In the shadow of the volcano: recent research at Sunset Crater. Special issue, *Archaeology Southwest* 17(1).

Fish, S.K., and P.R. Fish, eds. 2007. *The Hohokam millennium*. Santa Fe: School of American Research Press.

Fowler, D.D. 2000. *Laboratory for anthropology: science and romanticism in the American Southwest, 1846–1930*. Albuquerque: University of New Mexico Press.

Graybill, D.A., D.A. Gregory, G.S. Funkhouser, and L.N. Fred. 2006. Long-term streamflow reconstructions, river channel morphology, and Aboriginal irrigation systems along the Salt and Gila Rivers. In *Environmental change and human adaptation in the ancient American Southwest*, ed. D.E. Doyel and J.S. Dean, 69–123. Salt Lake City: University of Utah Press.

Gregory, D.A., and D.R. Wilcox, eds. 2007. *Zuni origins: toward a new synthesis of southwestern archaeology*. Tucson: University of Arizona Press.

Gumerman, G.J., ed. 1991. *Exploring the Hohokam: prehistoric desert peoples of the American Southwest*. Albuquerque: University of New Mexico Press.

Hegmon, M. 2002. Recent issues in the archaeology of the Mimbres region of the North American Southwest. *Journal of Archaeological Research* 10: 307–357.

Hill, J.H. 2006. The historical linguistics of maize cultivation in Mesoamerica and North America. In *Histories of maize*, ed. J.E. Staller, R.H. Tykot, and B.F. Benz, 631–645. Burlington: Academic Press.

Kantner, J., ed. 2003. The Chaco world. Special issue, *Kiva* 69: 83–227.

Kohler, T.A., ed. 2004. *Archaeology of Bandelier national monument: village formation on the Pajarito Plateau, New Mexico*. Albuquerque: University of New Mexico Press.

LeBlanc, S.A. 1999. *Prehistoric warfare in the American Southwest*. Salt Lake City: University of Utah Press.

LeBlanc, S.A. 2002. Conflict and language dispersal: issues and a new world example. In *Examining the farming/language dispersal hypothesis*, ed. P. Bellwood and C. Renfrew, 357–365. Cambridge: McDonald Institute for Archaeological Research.

Lekson, S.H. 1999. *The Chaco meridian: centers of political power in the ancient Southwest*. Walnut Creek: AltaMira Press.

Lekson, S.H. 2006. *The archaeology of Chaco Canyon: an eleventh-century Pueblo regional center*. Santa Fe: School of American Research Press.

Lekson, S.H. 2009. *A history of the ancient Southwest*. Santa Fe: School of American Research Press.

Lipe, W.D., M.D. Varien, and R.H. Wilshusen, eds. 1999. *Prehistory: a context for the southern Colorado River Basin*. Denver: Colorado Council of Professional Archaeologists.

Merrill, W.L., R.J. Hard, J.B. Mabry, G.J. Fritz, K.R. Adams, J.R. Roney, and A.C. MacWilliams. 2009. The diffusion of maize to the southwestern United States and its impact. *Proceedings of the National Academy of Science* 106: 21019–21026.

Mills, B.J. 2004. The establishment and defeat of hierarchy: inalienable possessions and the history of collective prestige structures in the Pueblo Southwest. *American Anthropologist* 106: 238–251.

Nelson, B.A. 2000. Aggregation, warfare, and the spread of the Mesoamerican tradition. In *The archaeology of regional interaction: religion, warfare, and exchange across the American Southwest and beyond*, ed. M. Hegmon, 317–337. Boulder: University Press of Colorado.

Nelson, M.C., and M. Hegmon, eds. 2010. *Mimbres lives and landscapes*. Santa Fe (NM): School of American Research Press.

Noble, D.G. 2004. *In search of Chaco*. Santa Fe (NM): School of American Research Press.

Noble, D.G. 2006. *The Mesa Verde world*. Santa Fe (NM): School of American Research Press.

Plog, S., and C. Heitman. 2010. Hierarchy and social inequality in the American Southwest, A.D. 800–1200. *Proceedings of the National Academy of Science* 107: 19619–19626.

Powers, R.P., ed. 2005. *The peopling of Bandelier*. Santa Fe (NM): School of American Research Press.

Reed, P.F., ed. 2000. *Foundations of Anasazi culture: the basketmaker-Pueblo transition*. Salt Lake City: University of Utah Press.

Riley, C. L. 2005. *Becoming Aztlan: Mesoamerican influence in the greater Southwest, A.D. 1200–1500*. Salt Lake City: University of Utah Press.

Roberts, H., R.A.V. Ahlstrom, and B. Roth, eds. 2004. *From campus to corporation: the emergence of contract archaeology in the southwestern United States*. Washington, DC: Society for American Archaeology.

Schaafsma, P., ed. 1994. *Kachinas in the Pueblo world*. Albuquerque: University of New Mexico Press.

Schaafsma, P., ed. 2007. *New perspectives on Pottery Mound Pueblo*. Albuquerque: University of New Mexico Press.

Shafer, H.J. 2003. *Mimbres archaeology at the NAN Ranch Ruin*. Albuquerque: University of New Mexico Press.

Smith, M.E., and F.F. Berdan, eds. 2003. *The postclassic Mesoamerican world*. Salt Lake City: University of Utah Press.

Staller, J.E., R.H. Tykot, and B.F. Benz, eds. 2006. *Histories of maize: multidisciplinary approaches to the prehistory, linguistics, biogeography, domestication and evolution of maize*. Burlington: Academic Press.

Turner, C.G., II, and J.A. Turner. 1999. *Man corn: cannibalism and violence in the prehistoric American Southwest*. Salt Lake City: University of Utah Press.

VanPool, C.S., T.L. VanPool, and D.A. Phillips Jr., eds. 2006. *Religion in the prehispanic Southwest*. Lanham: Altamira Press.

Varien, M.D., and R.H. Wilshusen, eds. 2002. *Seeking the center place: archaeology and ancient communities in the Mesa Verde region*. Salt Lake City: University of Utah Press.

Vierra, B.J., ed. 2005. *The late archaic across the borderlands: from foraging to farming*. Austin: University of Texas Press.

Whalen, M.E., and P.E. Minnis. 2001. *Casas Grandes and its hinterland: prehistoric regional organization in northwest Mexico*. Tucson: University of Arizona Press.

Whalen, M.E., and P.E. Minnis. 2009. *The neighbors of Casas Grandes: excavating Medio period communities of northwest Chihuahua, Mexico*. Tucson: University of Arizona Press.

Wilcox, D.E. 1991. The Mesoamerican ballgame in the American Southwest. In *The Mesoamerican ballgame*, ed. V.L. Scarborough and D.R. Wilcox, 101–125. Tucson: University of Arizona Press.

Further Reading

Archaeology Southwest. n.d. Available at: http://www.archaeologysouthwest.org/what-we-do/information/asw/

Chaco Research Archive. n.d. Available at: http://www.chacoarchive.org/cra/

Cordell, L.S. 1997. *Archaeology of the Southwest*. Walnut Creek: Left Coast Press.

Cordell, L.S., and M.E. McBrinn. 2012. *Archaeology of the Southwest*. 3rd ed. Walnut Creek: Left Coast Press.

Crow Canyon Archaeological Center. n.d. Available at: http://www.crowcanyon.org/research/research.asp

Kantner, J. 2004. *Ancient Puebloan Southwest*. Cambridge: Cambridge University Press.

Kiva. Tucson: Arizona Archaeological and Historical Society. Available at: http://www.az-arch-and-hist.org/publications/kiva/

Ortiz, A., ed. 1979. *Southwest. Handbook of North American Indians*. Vols. 9 & 10. Washington: Smithsonian Institution.

Plog, S. 1997. *Ancient peoples of the American Southwest*. London: Thames and Hudson.

Reid, J.J., and S. Whittlesey. 1997. *The archaeology of ancient Arizona*. Tucson: University of Arizona Press.

Stuart, D.E., and R.P. Gauthier. 1988. *Prehistoric New Mexico*. Albuquerque: University of New Mexico Press.

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Basic Biographical Information

Prof. M.A. Sowunmi (nee Jadesimi) is known to many as both a botanist and an environmental archaeologist. But it is in palynology that she is a household name in Nigeria. In fact she is the country's foremost palynologist and environmental archaeologist (archaeobotanist).

Prof. M.A. Sowunmi was born on September 24, 1939, in Kano, Northern Nigeria, where her father, Revd (later bishop), had been posted to pastor the northern province of the Church of Nigeria (Anglican Communion). The young 'Bisi was admitted into the Department of Botany, University College Ibadan (now University of Ibadan) in October 1959 and graduated B.Sc. (Special Botany) (Lond.) in June 1962. She was awarded a University of Ibadan Postgraduate Scholarship in October 1963 to undertake Ph.D. research work in palynology. At that time, because palynology was not taught in Nigeria, 'Bisi had to be sent abroad. So in April 1964 she travelled to Stockholm, Sweden, and spent six months studying palynology in the laboratory of Prof. Gunnar Erdtman, the *Father of Modern Palynology* (Sowunmi 2004). Her Ph.D. work was supervised by Prof. Erdtman. On July 27, 1967, M. Adebisi Sowunmi earned a Ph.D. (botany) degree from the University of Ibadan. She thus became the first Nigerian to obtain such a degree.

In December 1967, at the instance of Prof. Thurstan Shaw, the doyen of archaeology in Nigeria, she was appointed as a postdoctoral research fellow at the Archaeology Unit of the Institute of African Studies, University of Ibadan; she held this position until his unfortunate death in 2006. When she became a lecturer in the newly created Department of Archaeology (now Archaeology and Anthropology), University of Ibadan. She became Professor of Palynology and Environmental Archaeology in October 1982 and officially retired from the University of Ibadan in 2004, having attained the statutory age of 65 years.

Prof Adebisi Sowunmi was a visiting professor at the Department of African Archaeology, Uppsala University, Sweden, from October 1 to December 23, 1997, and visiting professor at the Institute of Archaeology, University College London, England (January 4 to March 23, 1998). Between April and June 1998, she was a visiting professor at the Departments of African Archaeology and African Archaeobotany, Johann Wolfgang Goethe-Universität, Frankfurt am Main, Germany. She has travelled to at least 23 countries to attend scientific conferences, meetings, and workshops. She is a member of several international organizations, such as the Archaeological Association of Nigeria (member, Board of Trustees), Palynological Association of Nigeria (Foundation and current President), Science Association of Nigeria (life member), West African Archaeological Association (past president), World Archaeological Congress, International Association of African Palynology, Nigerian Environmental Study/Action Team, and the Nigerian Field Society. Prof. Sowunmi has published 31 scholarly papers in scientific journals, four books, ten chapters in books, and six technical reports and delivered over 30 public lectures and conference papers.

Major Accomplishments

Prof. M. Adebisi Sowunmi, having been awarded a postgraduate scholarship by the University of Ibadan (1963–1967), became the first person to earn a Ph.D. degree in Botany from the University of Ibadan, Ibadan, Nigeria. She pioneered the paleo-ethnobotanical and environmental archaeology research in Nigeria and the university palynological research with the

setting up in 1971 of the first Nigerian University Palynology Laboratory. The laboratory contains over 3,600 reference pollen slides of present-day Nigerian and some other West African plants; albums of original descriptions, hand-drawn diagrams, and photomicrographs of the pollen grains important Nigerian plants; and 151 overhead transparencies covering various topics in palynology, Nigerian and West African archaeology, and environmental archaeology. Prof Sowunmi supervised the second Ph. D. in botany (palynology) and the first Nigerian Ph.D. in environmental archaeology (with Dr. Phillip Allsworth-Jones) in 1981 and 1991, respectively.

She (with Kogbe, C.A.) was the first to indicate the age and paleoenvironment of the Gwandu Formation (Continental Terminal), Northwestern Nigeria. With two others she produced the first descriptions of some Eocene pollen of the Ogwashi-Asaba Formation, Southeastern Nigeria. She published the first paper on the Late Quaternary vegetation and environmental history of Nigeria and the pollen morphology of extant Nigerian plants which are ecological indicators. Prof. Sowunmi also carried out the first pollen analysis of honey from the forest and savanna zones of Nigeria, obtained the first botanical evidence of the beginning of agriculture in Nigeria, made the first pollen analysis of an archaeological site in Nigeria (with E.O. Awosina), and indicated the relevance of archaeology in national development.

In January 2003, M.A. Sowunmi was conferred with an honorary Doctor of Philosophy degree in the Humanities by Uppsala University, Uppsala, Sweden, in recognition of her outstanding scholarship and contributions in research and teaching in the fields of environmental archaeology and paleobotany (Sowunmi 2012). In July 2005, she was one of the keynote speakers (long-term and short-term socio-environmental dynamics in West Africa: the challenge of environmental archaeology) at the Pan African Association for Prehistory and Related Studies Conference, Gaborone, Botswana.

During her academic career at the University of Ibadan, she produced seven Ph.D.s and over 20 M.Sc.s. She was involved in the supervision of Ph.D.s in the Department of Archaeology and Anthropology, University of Ibadan, from 2007 till February 2013. Prof. Sowunmi returned to teaching, being an adjunct lecturer for one undergraduate course, three M. Sc. courses, and the supervision of two M. Sc. research projects in the Botany Department, University of Ibadan. It is of common knowledge that Sowunmi is a feminist (Folorunso 2004) and has a high degree of intolerance for indolence. She is reputed to be an exceptionally thorough and effective teacher (Egunyomi 2004). At Ibadan and elsewhere, she has taught palynology, paleobotany, environmental archaeology, and ethnobotany. She is revered as the Matriarch of Nigerian Palynology and preaches that to be a good palynologist, one must think, dream, and feel pollen.

Prof Bisi Sowunmi's husband was late Prof. Segun Sowunmi, and they have three children and one grandchild.

Cross-References

► Archaeobotany
► West and Central Africa: Historical Archaeology

References

Egunyomi, A. 2004. Margaret Adebisi Sowunmi: A perennial beacon of light in the academia. *Journal of Environment and Culture* 1 (2): 121–133.

Folorunso, C.A. 2004. Margaret Adebisi Sowunmi: Her stint in African archaeology. *Journal of Environment and Culture* 1 (2): 134–143.

Sowunmi, M.A. 2004. "When I consider your heavens . . ." And so, what? Valedictory lecture delivered in the Faculty of Science, University of Ibadan on December 7, 2004.

Sowunmi, M.A. 2012. Curriculum Vitae: M. Adebisi Sowunmi.

Space Archaeology

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Introduction

Space archaeology is the study of the material culture associated with space exploration from the twentieth century onwards. This includes terrestrial infrastructure related to the development, manufacturing, operation, and use of space systems, spacecraft and space debris located throughout the solar system and the landing sites of robotic and crewed missions on other planets and celestial bodies. Space archaeology sits within the field known as "archaeology of the contemporary past."

The era of modern rocketry, which created the first real capacity to break free of Earth's gravity, had its roots in the amateur rocket societies of the first half of the twentieth century. In World War II (1939–1945), Germany developed missiles capable of reaching other continents and, hence, also capable of reaching space. The V2 rocket drew on the expertise of the amateur rocketeers such as Wernher von Braun, and following the war, a diaspora of German rocket scientists and materials seeded the space industries of the nascent spacefaring nations.

Four rocket test and launch sites were established in 1947: White Sands (USA), Woomera (UK/Australia), Kapustin Yar (USSR/Kazakhstan), and Colomb-Béchar (France/Algeria). While these were all military sites, the first satellite launches occurred against the backdrop of international cooperation for the International Geophysical Year of 1957–1958. In 1957, the USSR successfully injected the aluminum sphere Sputnik 1 into Low Earth Orbit. Within the emerging Cold War, the demonstration of superior ideology through space technology became a central feature.

Within six years, the rapid growth of technology enabled the USA to launch the first telecommunications satellite into geostationary orbit, about 35,000 km above the Earth. This ushered in the era of modern telecommunications. Telephone and television were now able to achieve global coverage using just three satellites, as predicted by legendary science fiction writer Sir Arthur C. Clarke in 1945. The "space club" expanded as more nations across the world began to develop their own industries, as both suppliers and consumers of space services.

The landing of humans on the Moon in 1969 captured the imagination of the world. However, this remarkable achievement had less impact on terrestrial life than the developing industries of telecommunications, navigation, meteorology, and Earth observation, provided by an ever-evolving population of satellites in Earth orbit and their ground infrastructure. Nonetheless, the series of Apollo lunar landings between 1969 and 1972 made humans active agents in shaping an interplanetary cultural landscape (Gorman 2005a).

With over 7,000 spacecraft launched since 1957, there is a growing population of space hardware in the solar system, with most of it located in Earth orbit. In the twenty-first century, private and commercial space enterprises are in the ascendancy, and space tourism is poised to become a major industry. The study of this distinct technology and its social correlates has the potential to offer new insights into contemporary life on Earth.

A Brief History of Space Archaeology

Turning the archaeological gaze on space exploration is far from a recent development. In 1967, historical archaeologist James Deetz suggested that one day archaeologists would look at spaceships as part of the archaeological record. In the late 1990s, William Rathje (1999) extended his investigation of the role of garbage in contemporary human society to include orbital debris. Around the same time, NASA funded the Lunar Legacy Project, for which Beth Laura O'Leary (2009) and her team created an archaeological inventory of the Tranquility Base lunar landing site, where humans first set foot on another celestial body in 1969.

The first decade of the new millennium saw interest in space archaeology gain momentum. Gregory Fewer (2002) explored issues surrounding the protection of historic planetary landing sites on the Moon and Mars, proposing a system of heritage listing. Alice Gorman (2005a, b, 2009a), in her study of orbital debris, proposed a cultural landscape approach to space and applied the Burra Charter (1999) heritage management guidelines to spacecraft in orbit in order to understand their cultural significance. She also highlighted the impacts of space industry on Indigenous people through the location of launch sites on their lands, configuring launch sites such as Woomera and Kourou in French Guiana as places of cultural contact and exchange. Robotic landing sites on Mars were considered by Dirk Spenneman (Spennemann & Murphy 2009). The *Handbook of Space Engineering, Archaeology, and Heritage* (Darrin & O'Leary 2009) provides a comprehensive overview of the entire field.

With India and China planning human missions to the Moon, determining appropriate management strategies for Tranquility Base became more urgent, and O'Leary and others spearheaded a successful campaign in 2010 to have artifacts at the site registered at state level in the USA, preparatory to a nomination for the World Heritage List. In 2011, NASA responded to the growing awareness of lunar heritage issues by creating a set of guidelines for future missions. Both the World Archaeological Congress (WAC) and the International Council on Monuments and Sites (ICOMOS) have recognized that space heritage is a distinct area requiring consideration.

Definition

Characterizing the Archaeological Record in Space and Time

Space archaeology deals with human physical and material interactions with microgravity, technology, and interplanetary environments. Gravity regimes very different to those on Earth have a profound structuring effect on the distribution of space artifacts throughout the solar system. The material of space archaeology could be divided into several zones, all connected to the surface of the Earth through launch and tracking sites:

- Earth (terrestrial infrastructure, terrestrial and marine orbital debris reentry sites)
- Earth orbit (Low Earth Orbit, Medium Earth Orbit, geosynchronous and geostationary orbit, Molniya orbit, Sun-synchronous orbit, and various others)
- Cislunar space (the region of space between the Earth's atmosphere and the Moon)
- Lunar orbit and surface
- Heliocentric orbit (around the Sun)
- Venusian orbit and surface
- Martian orbit and surface
- Miscellaneous orbital, landing, and encounter sites
- Interplanetary space

The Earth orbits are most dense in material, with over 19,000 trackable spacecraft and pieces of debris, from Low Earth Orbit up to the "graveyard" orbit above 35,000 km (Fig. 1). This debris includes the Vanguard 1 satellite, launched in 1958 and now the oldest human object in space. Gorman (2005a, b) has argued that orbital debris forms an organically evolved cultural landscape with value in its own right. In doing this, she has proposed a new frame of reference for archaeology, structured by gravity, rather than the

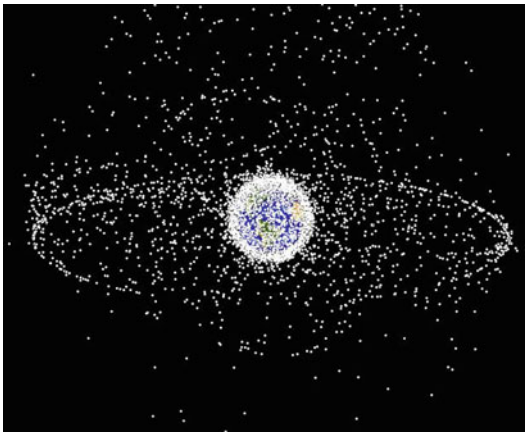

Space Archaeology, Fig. 1 Orbital debris (Image courtesy of NASA)

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traditional division into terrestrial and celestial spheres (Gorman 2009b).

In the rest of the solar system, human material is present on the Moon, Mars, Venus, Titan (a moon of Saturn), two asteroids and a comet, and in orbit around most celestial bodies (Capelotti 2010). Of particular significance are the Martian, Venusian, and lunar sites where crewed or robotic missions have landed. Tranquility Base on the Moon, with its iconic astronaut bootprints, can be compared to the Paleolithic footprints of *Australopithecus afarensis* in volcanic tuff at Laetoli in Tanzania: both can be argued to represent evidence of major evolutionary turning points. At the farthest reaches of the solar system, there are four spacecraft, only two of which are in communication (Voyager 1 and 2; Fig. 2).

The distance from the Earth creates requirements for the ground segments, in terms of their location on Earth and the types of receiving and command antennas. The technology of spacecraft is inseparable from the infrastructure required to send and receive signals, so neither can be studied in isolation. Many early generations of launch and tracking sites are now abandoned, such as the Colomb-Béchar launch site in Algeria and the Orroral Valley tracking station in Australia (Fig. 3), overtaken by changing technology and politics. There are a myriad of satellites which are no longer functioning and other defunct spacecraft, such as rocket bodies, in Earth orbit.

Early Cold War launch sites are also frequently associated with nuclear testing, as this requires similar infrastructure and environmental conditions. In Australia, the USA, the Pacific, and other places, many of these sites are now abandoned. Rockets were originally developed as nuclear warhead-bearing missiles, and early satellites were ideological weapons in the Cold War, as Gorman and O'Leary (2007) have argued. The Cold War (1945–1991) can be regarded as the first stage of the Space Age, encompassing the "Space Race" and the "conquest" of space as matters of national prestige.

While launch sites tend to be distributed among the spacefaring states (e.g., USA, Russia, Europe, India, China, Japan) and their colonies, most countries have some level of space infrastructure, and all are now users of space-based services. Most nations maintain satellite downlink facilities, even if only at the level of domestic satellite dishes and telephones (Gorman 2009a). The cultural footprint of satellite data can also be considered as the domain of space archaeology. This is particularly so in the period from 1991 until the present, the second stage of the Space Age, when space activities are driven by the telecommunications requirements of globalized economies.

Commercial and private space enterprises, including tourism, are likely to characterize the next phase of space activities. We can expect new

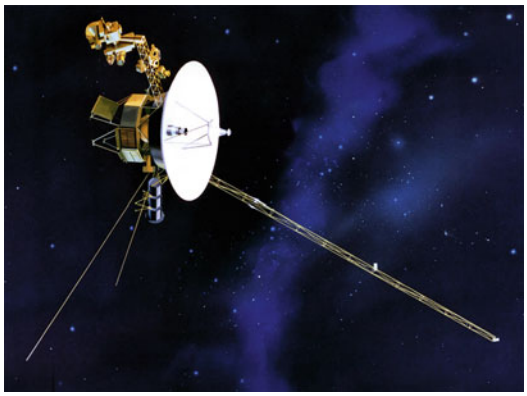

Space Archaeology, Fig. 2 Voyager 2, launched in 1977 by the USA (Image courtesy of NASA)

Space Archaeology, Fig. 3 Antenna pylons at the former Orroral Valley NASA tracking station, Australia (Author's image)

forms of propulsion and new ways in which humans relate to technology. They will not arise sui generis: they will be built on the "heritage" of past space activities. Nevertheless, one can imagine a time when the spacecraft of the twenty-first century appear as quaint and outdated as a horse and cart or a biplane. Considering space exploration as an expression of cultural change invites and inspires long-term visions of the future.

Key Issues/Current Debates/Future Directions/Examples

Methods, Theories, and Applications

Space archaeology employs the same methods as historical and industrial archaeology in using survey, excavation, artifact analysis, oral history, documentary research, aerial imagery, and geographical information systems (GIS) to characterize and analyze material remains and landscapes. However, specialist knowledge in areas such as electronics, propulsion systems, telecommunications, aerospace engineering, materials science, and planetary science is required in order to recognize and record features of significance. A limitation is that usually sites and objects in orbit and on celestial bodies can only be accessed by remote sensing, and there is much that is unknown about what actually survives in these locations. Several space agencies and organizations track debris in Earth orbit within the limits of their observation and modelling capacities. Reconnaissance missions have located and filmed previous landing sites on the Moon and Mars. Less frequented parts of the solar system can only be speculated about.

Studying the material record of the contemporary past presents some unique challenges. Because we are immersed in it, we may not be the best judges of what is significant and what is not: we are implicated in the ideologies of our time and place. Theorists of contemporary archaeology speak of the necessity of making the familiar unfamiliar. Techniques used to do this often trespass into the realm of the artist, using juxtaposition, montage, performance, and changes of scale to bring into focus objects and the relationships between them that are normally obscured. Another method of historical and contemporary archaeology is the use of oral history and personal narratives to augment and stand alongside the physical material. Frequently, there is a disjunction between individual memories and knowledge and the published or officially sanctioned histories. In these gaps, we can discern something about human engagement with the contemporary past and the social memories constructed around high technology.

A significant application of space archaeology is in heritage and environmental management. While remoteness has, in the past, protected many space sites from human impacts, this is rapidly changing. For example, the level of orbital debris has now reached a critical point where it threatens functioning satellites, and plans are being devised to remove or destroy portions of it, while renewed interest in lunar, Martian, and Venusian exploration raises the question of how sites such as Tranquility Base can be best managed. Creating an inventory of space sites, landscapes, and objects and assessing their cultural significance prior to impacts arising from orbital debris cleanup, future missions, and space tourism is a priority for space archaeologists.

The Dublin Principles for the Conservation of Industrial Heritage Sites, Structures, Areas, and Landscapes (ICOMOS and the International Committee for the Conservation of the Industrial Heritage or TICCIH) provide some guidance here. The principles stress the interconnectedness of industrial places across multiple sites, from the extraction of raw materials to the systems of energy and transport. This is particularly applicable to space, where a single strand of operation can span the distance from Earth to orbit and back again across, for example, tracking stations, satellites, and downlinks. To conserve this heritage, inventories of all physical and intangible elements, including documents, objects, and landscapes, need to be made.

Since its inception, space exploration has tended to be the province of industrial elites and has been dominated by the USA and the former USSR. However, given the agenda of historical archaeology to uncover the lives of those often

overlooked in official histories, such as women, working classes, ethnic minorities, and Indigenous people, an archaeological approach to space exploration has the potential to tell very different stories than those captured in the popular account of the "Space Race." For example, Indigenous people were frequently contributors to the success of space exploration through the forced surrender of their lands for launch sites, in a form of late industrial colonialism. Rocket launch sites can be conceived as places where ongoing cross-cultural engagements and tight security requirements structured new types of cultural landscape.

In turning a lens on the contemporary or recent past, space archaeology can illuminate aspects of twentieth- and twenty-first-century human existence. Despite a general public lack of awareness of their dependency on satellite-based services such as PNT (Position, Navigation, and Timing), the capacity for global telecommunications and Earth observation has transformed personal experiences of space and time, cultural transmission and hybridization, and national and transnational economies. While it is common for historians, economists, and other scholars of the contemporary world to analyze the movement of information and capital and their cultural consequences, few acknowledge the role that the *material* culture of space plays in enabling these late industrial transformations. In this regard space archaeology intersects with Science and Technology Studies (STS) and Social Construction of Technology (SCOT) studies. Archaeology brings to the investigation of space exploration the traditional focus on material culture, deep-time perspectives, and an understanding of the resilience and flexibility of cultural responses to change.

With the world divided into spacefaring and non-spacefaring states, the United Nations has called for the inclusion of those usually excluded from space: women, Indigenous people, and "developing" nations. Space archaeology can contribute to redressing the imbalance between the haves and have-nots of space by highlighting alternative narratives accessible only through an analysis of what is left behind and discarded and the material impacts of new technologies both in space and on Earth.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Cold War
- ▶ Contemporary Past, Archaeology of the
- ▶ Deetz, James (Historical Archaeology)
- ▶ Historical Archaeology
- ▶ Modern Material Culture, Archaeology of
- ▶ Nevada Test Site
- ▶ Rathje, William Laurens
- ▶ Space Heritage Protection
- ▶ World Archaeological Congress (WAC)

References

Capelotti, P.J. 2010. *The human archaeology of space: lunar, planetary and interstellar relics of exploration*. Jefferson: McFarland & Company.

Fewer, G. 2002. Toward an LSMR and MSMR (Lunar and Martian Sites & Monuments Records): Recording planetary spacecraft landing sites as archaeological monuments of the future. In *Digging holes in popular culture. Archaeology and science fiction*, ed. M. Russell, 112–120. Oxford: Oxbow Books.

Gorman, A.C. 2005a. The cultural landscape of interplanetary space. *Journal of Social Archaeology* 5 (1): 85–107.

Gorman, A.C. 2005b. The archaeology of orbital space. In *Australian Space Science Conference 2005*, 338–357. Melbourne: RMIT University.

Gorman, A.C. 2009a. Beyond the space race: The significance of space sites in a new global context. In *Contemporary archaeologies: Excavating now*, ed. A. Piccini and C. Holtorf, 161–180. Bern: Peter Lang.

Gorman, A.C. 2009b. The gravity of archaeology. *Archaeologies: The Journal of the World Archaeological Congress* 5 (2): 344–359.

Gorman, A.C., and B.L. O'Leary. 2007. An ideological vacuum: The Cold War in space. In *A fearsome heritage: Diverse legacies of the Cold War*, ed. J. Schofield and W. Cocroft, 73–92. Walnut Creek: Left Coast Press.

O'Leary, B.L. 2009. Historic preservation at the edge: archaeology on the moon, in space and on other celestial bodies. *Historic Environment* 22 (1): 13–18.

Rathje, W. 1999. An archaeology of space garbage. *Discovering Archaeology*, October, 108–112.

Spennemann, D.H.R., and G. Murphy. 2009. Failed Mars mission landing sites: heritage places or forensic investigation scenes? In *The handbook of space engineering, archaeology and heritage*, ed. A. Darrin and B.-L. O'Leary, 457–480. Boca Raton: CRC Press.

Further Reading

Campbell, J.B. 2009. Developing exoarchaeology in the solar system and beyond. In *The handbook of space engineering, archaeology and heritage*, ed. A. Darrin and B.L. O'Leary, 873–886. Boca Raton: CRC Press.

Clarke, A.C. 1945. Extra-terrestrial relays. Can rocket stations give world-wide radio coverage? *Wireless World* October: 305-308.

Darrin, A.G., and B.L. O'Leary, eds. 2009. *Handbook of space engineering, Archaeology and heritage*. Boca Raton: CRC Press.

Deetz, J. 1967. *Invitation to archaeology*. Garden City: Natural History Press.

Gorman, A.C. 2009. Heritage of earth orbit: orbital debris – its mitigation and heritage. In *The handbook of space engineering, archaeology and heritage*, ed. A. Darrin and B.L. O'Leary, 381–398. Boca Raton: CRC Press.

ICOMOS & TICCIH. 2011 Joint ICOMOS – TICCIH principles for the conservation of industrial heritage sites, structures, areas and landscapes. (The Dublin Principles). Available at http://www.icomos.org/Paris2011/GA2011_ICOMOS_TICCIH_joint_principles_EN_FR_final_20120110.pdf.

O'Leary, B.L. 2006. The cultural heritage of space, the moon and other celestial bodies. *Antiquity* 80 (307) Available at http://antiquity.ac.uk/Projgall/oleary/.

O'Leary, B.L. 2009. The evolution of space archaeology and heritage. In *The handbook of space engineering, archaeology and heritage*, ed. A. Darrin and B.-L. O'Leary, 29–48. Boca Raton: CRC Press.

NASA. 2011. NASA's recommendations to space-faring entities: how to protect and preserve the historic and scientific value of US Government lunar artifacts. Human exploration and operations mission directorate strategic analysis and integration division. Available at http://www.collectspace.com/news/NASA-USG_lunar_historic_sites.pdf.

Spennenmann, D.H.R. 2004. The ethics of treading on Neil Armstrong's footprints. *Space Policy* 20: 279–290.

Spennenmann, D.H.R. 2006. Out of this world: Issues of managing tourism and humanity's heritage on the moon. *International Journal of Heritage Studies* 12: 356–371.

Space Heritage Protection

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Introduction

The heavens and the night sky have always belonged to humanity. Celestial bodies have been named and are present in the narratives, calendars, and rituals of the world's cultures. The Moon, especially, features in stories created by cultures from Africa to the Arctic since prehistoric times. In a real sense, everyone owns the Moon. However, it is only within the last 50 years that humans have created technology that has taken them into outer space and onto the lunar surface. Cultural resources exist on the Earth's surface, in space, on the Moon, and on other celestial bodies (O'Leary 2006: 307). There are archaeological sites, structures, and objects, both on Earth and in space, which are within an enormous cultural landscape. All are linked by humanity's extraordinary scientific achievements in space exploration. Objects and sites in space can be looked at as part of a much larger assemblage that until the Space Age – a particular time and level of technological development – were confined to Earth but then entered the archaeological record somewhere else (Staski 2009: 23).

Definition

Space Archaeology is a new field which focuses on the "material culture relevant to space exploration that is found on earth and in outer space (i.e., exoatmospheric material) and that is clearly the result of human behavior" (Darrin and O'Leary 2009: 5). It began with and is most strongly linked to the Cold War and post-Cold War period. The Cold War was played out by military, social, and political maneuvers in space as well as on Earth. In 1945, the USA and USSR engaged in a race to acquire both German rockets and rocket scientists and engineers (Gorman and O'Leary 2007: 73). The descendants of the V-2 rocket launched the first satellites and later propelled the first humans into space and onto the Moon. Apollo 8 astronaut Col. Frank Borman called the Apollo Program a battle in the Cold War (Borman 2001). These events changed history and provided the basis for the associated technologies that currently include a satellite-based telecommunication industry and spacecraft from many nations that continue to explore farther and farther away from Earth.

The term Space Archaeology is usually paired with space heritage which focuses on ways to identify, evaluate, and protect significant places and artifacts associated with space exploration that may be lost through destruction, looting, recycling, or neglect and environmental degradation. In some ways, the remoteness of, for example, sites on the Moon or Mars and the costs associated with visitation have provided a form of protection, at least from human impacts. The preservation of objects in space and on other celestial bodies is, for the most part, in a gray legal area as ownership and the varied post depositional contexts lie within zones of many contested and evolving international treaties and agreements. The goals of space archaeology and heritage are to illuminate the interaction of human behavior associated with space in order to understand both the past and the present, provide for preservation of significant sites and objects, and, perhaps, be useful for future space missions (Gorman and O'Leary 2013; O'Leary 2015).

Historical Background

The earliest behavior and material evidence for Space Archaeology begins with two astronauts. As part of the Apollo 12 mission in November 1969, astronauts Conrad and Bean were instructed to survey and record information about *Surveyor 3*, a robotic probe that had landed on the Moon's surface almost 3 years earlier (Fig. 1). Conrad and Bean landed their spacecraft 180 m from *Surveyor 3* and conducted the first "archaeological" studies on the Moon by photographing and collecting samples and returning them to Earth for analyses. Although the analyses were designed to help NASA detect changes to the materials from *Surveyor* caused by the lunar environment, Capelotti (2004: 51) notes this as the first example of extraterrestrial archaeology and "formational archaeology, the study of environmental and cultural forces upon the life history of human artifacts in space."

The Space Age is different from other periods in humanity's technological evolution, both in its speed and the global nature of the massive amount

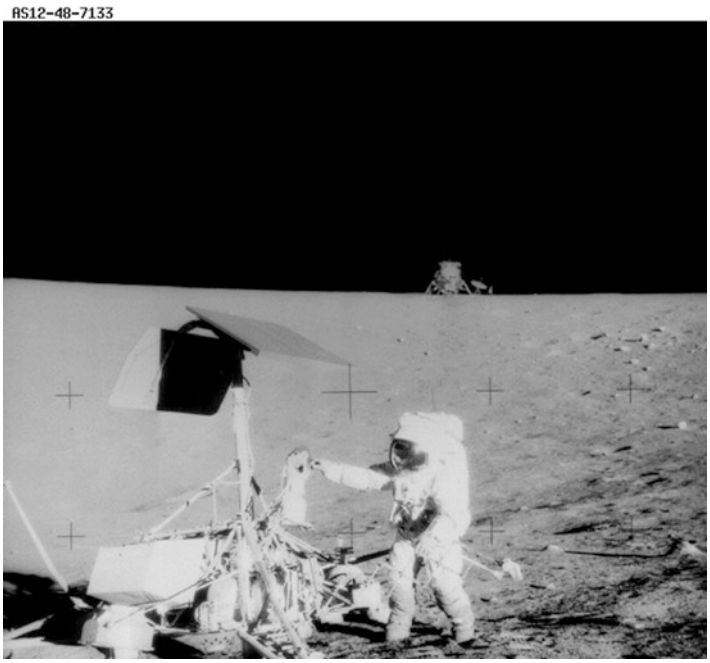

Space Heritage Protection, Fig. 1 Apollo 12 Astronaut Alan Bean and Surveyor 3 on the lunar surface November 19, 1969. (Courtesy of NASA)

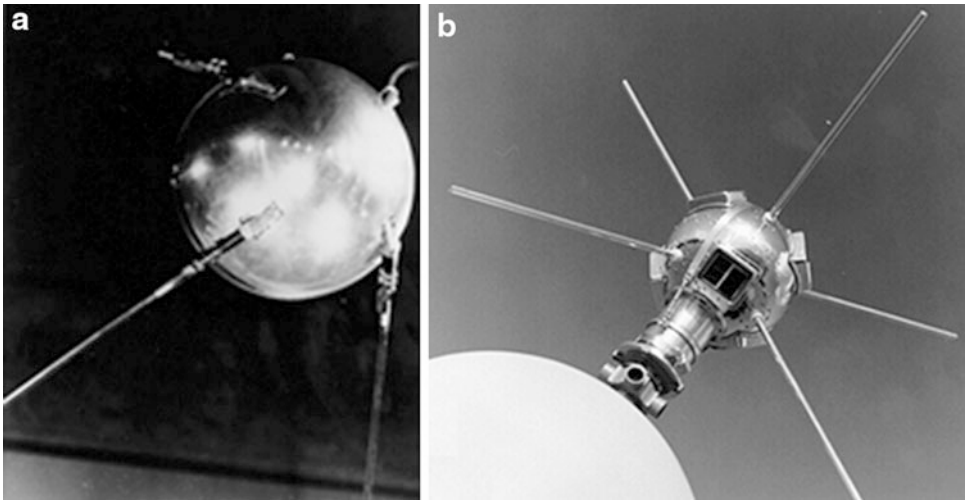

Space Heritage Protection, Fig. 2 Sputnik and Vanguard 1. (Courtesy of NASA)

of research and development by nation- states that delivered material culture to very remote regions. The Space Age usually begins with the launch of the first satellite, USSR's *Sputnik 1* in 1957, followed by the successful launch of *Vanguard 1* by the USA (Fig. 2). *Sputnik 1* remained aloft only several months after its launch, but created the first object and orbital debris which expanded the archaeological frontier into space. *Vanguard 1*, a 15.2 cm sphere with antennae weighing about 1.5 kg, was launched on March 17, 1958 and continues to circle the Earth every 2 h. It is expected by NASA to remain aloft for the next 600 years (O'Leary 2009a: 771). *Vanguard 1* is currently the oldest human object in orbit, and its orbit will allow it to be essentially preserved in space.

Space exploration is ongoing and includes many kinds of robotics. What lies at the edge of the subdiscipline is interest in the cultural heritage of robots (O'Leary 2009b: 41). Spennemann (2007) focuses on emergent heritage or technologies that are still in use and form an ongoing technological investment. This area includes heritage created by robots in the form of their artificial intelligence. The lunar surface, Mars, asteroids, and other celestial bodies are rife with all kinds of robotics and the places they impacted or modified, especially during the early stages of exploration (e.g., *Ranger, Luna, and Beagle 2*). It is a heritage that continues to be part human and part machine.

Key Issues/Current Debates

Space Archaeology also concerns itself with orbital debris. For archaeological purposes, orbital debris has been defined by Gorman (2009: 382) as "any human manufactured object in orbit that does not currently serve a useful purpose and is not anticipated to in the foreseeable future." There are currently huge amounts of orbital debris varying from small flakes of paint to large defunct satellites and all pieces of spacecraft jettisoned, or crashed, continue to exist and are increasing exponentially in space. Low Earth orbit(LEO) and Medium (MEO) and Geosynchronous Orbit (c. 160–37,000 km from the Earth's surface) contain the most debris, while vehicles like the *Pioneer* and *Voyager* spacecrafts are currently the farthest away from Earth in interstellar space. The amount of orbital debris increases yearly as more satellites and exploration vehicles

continue to be launched into space. NASA currently tracks over 34,000 pieces of debris over 10 cm in size, with millions of pieces of debris smaller than 1–10 cm. Referred to in the popular media as "space junk," collisions of debris can cause future spacecraft to fail, be damaged, explode, and create more space junk. The methods to "clean up" or even to evaluate the "junk" are dependent on finding ways to accomplish this and secure international agreements.

Space Archaeology lends itself well to the concept of a cultural landscape, which has become more prevalent in archaeological and cultural resource management studies, but needs to be broadened to include cultural resources off the Earth. UNESCO's World Heritage Convention describes a cultural landscape as the combined works of nature and man (WHC). It focuses on the idea of a site as part of a larger system. For example, the first lunar landing site at Tranquility Base created in 1969, is embedded within a landscape that includes launch Complex 39 at Cape Canaveral, the tracking station in Australia (Honeysuckle Creek), and the myriad facilities that were critical to developing the rocketry (e.g., the Saturn V Test Stand). It can be argued that the Tranquility Base site on the lunar surface is a critical component of the cultural landscape of space exploration. A cultural landscape approach allows for the perception of broad chronological, technological, and geographical patterns in the human interactions with space. Space ceased being a vacuum when humans entered it (Gorman and O'Leary 2007). In effect, it became a place that could be managed and studied in many of the ways that historic places are on Earth. However, in most cases, objects in space or on other celestial bodies present complexities that supersede the disposition of sites on Earth (O'Leary 2009a: 774).

In order to protect heritage in space, approaches must navigate a complex, intertwined area of national and international laws, regulations, treaties, and policies. The archaeological assemblage from the Space Age is from a period that is relatively young and has not been usually considered worthy of preservation. Also, the exploration and use of space is still a functioning, ongoing, and increasingly complex system. Critical components in space have been, for the most part, inaccessible to the public. The field of Space Archaeology and Heritage requires ways to address interpretation, evaluation, and preservation of this legacy. If it is indeed humanity's heritage – one giant leap for humankind – its protection needs to be ultimately international or universal in scope. The World Heritage Convention (WHC) does provide criteria for places on Earth that have "outstanding universal value" under which many space sites and objects would qualify, but they are not on Earth World Heritage Convention (1998). Outer space has not been addressed by the WHC. Because the control and management of space heritage lies in a contested legal arena without specific guidance or laws on cultural preservation written into international conventions, agreements, and treaties, most efforts so far have been within nations (especially the USA). The National Historic Preservation Act (NHPA) in the USA of 1966 came 3 years before the height of the Space Race between the USA and USSR that brought the first humans to the Moon. Historic preservation efforts to date that address space follow USA federal and state laws and the United Nations Outer Space Treaty of 1967 (OST). The Outer Space Treaty asserts that nations which place objects in space or on the surface of celestial bodies such as the Moon are not subject to national appropriation by claims of sovereignty. Essentially, no one nation can own space or, for example, the Moon. But as governed by the Treaty's Article VII, the objects launched into space or on another celestial body are and remain under the jurisdiction of those who put them there (OST; O'Leary 2009a: 774). The Outer Space Treaty also states that space activities should forward humankind's use of space for peaceful and scientific purposes, which could include historic preservation. NHPA, the Outer Space Treaty, and WHC do not explicitly cover the preservation of historic sites and artifacts in space. These cultural resources are not on the Earth; they are a recent past property for which archaeologists do not have a large body of expertise and are at a scale different from which most archaeologists work. The

resources in space and on other celestial bodies are not within any nation's territorial boundaries. Initial and ongoing costs are factors in any preservation strategy and alternatives for space may be expensive, but these costs and preservation strategies can become part of future mission planning. For the Moon as an ad hoc solution, Stooke (2008) suggests that all early lunar sites (CE 1959–1976) be considered significant and protected from any human impacts in the future. Capelotti (2009: 433) has advocated for lunar parks founded on the same principles that currently guide the protection of sites in extreme environments like Antarctica.

The earliest effort to consider preservation issues of space began with the Lunar Legacy Project in 1999 (Lunar Legacy Project n.d.). It is one of the first instances of funded space archaeological research. The New Mexico Space Grant Consortium (NASA) at New Mexico State University, USA, granted monies to B.L. O'Leary and students to focus on the archaeological assemblage at one site, the first lunar landing site created by the Apollo 11 astronauts at Tranquility Base on July 20, 1969. The site was chosen because it is the most iconic of humanity's visits to another celestial body. Also, it was the best test case for the application of US federal preservation law, and one avenue was proposing that Tranquility Base be nominated as a National Historic Landmark (NHL) (O'Leary 2009a: 775). It is the first time archaeologists looked at a site on the Moon as a historic property and evaluated how it could be preserved for the future. These early efforts presented challenges to NASA, who as a federal agency was responsible for complying with the NHPA, and the USA's Keeper of the National Register of Historic Places, who determines the eligibility of significant cultural properties. There was no doubt that the site was significant but the responses in 2000 of these two entities centered on the perception that the Moon could not have NHLs because it would be perceived as a claim of sovereignty and the USA Keeper did not have sufficient jurisdiction or authority (O'Leary 2009a).

Protection efforts for the objects and structures on the lunar surface at Tranquility Base – not the surface itself – began in three different arenas. The first was involving states within the USA to list these resources on their own registers of significant cultural resources. The objects and structures at Tranquility Base were placed on both the California and New Mexico State Registers of Cultural Properties in 2010 (Westwood et al. 2010; O'Leary et al. 2010).California and New Mexico and later Hawaii recognized the artifacts (Westwood et al. 2017). Although largely symbolic, these acts acknowledged that these states had historic associations with the creation of those artifacts and the successful first lunar landing and fit protections under state law. Other states are considering similar actions. An earlier draft bill was drafted for the US Congress to declare the Tranquility Base artifacts an NHL but was not considered. In 2019 Senate bill, S.1694 includes requirements relating to the preservation and protection of the Apollo 11 landing site for licenses to conduct activities in outer space and has been introduced to be considered by committee for debate.

The second arena is at the international level. A resolution by the World Archaeological Congress in 2003 recognized the material culture and places associated with space exploration, and an international Space Heritage Task Force was created that continues to investigate ways of identifying and assessing significance at local, national, and international levels of the cultural material in space whose preservation would benefit humankind (O'Leary 2009a: 777). The International Committee on Monuments and Sites (ICOMOS), an advisory body to the World Heritage Convention for placing sites on the World Heritage List, has become involved in space heritage by initiating a scientific committee. A legal effort for international protection of space heritage is also being currently (2019) undertaken by a nonprofit organization For All Moonkind.

Also finally, NASA itself has acknowledged the problem of preserving space heritage on the Moon and has become involved in the protection solutions. "NASA's Recommendations to Space-Faring Entities: How to Protect and Preserve the Historic and Scientific Value of U.S. Government Lunar Artifacts" (NASA 2011) recognizes that

there are increased technical abilities of space-faring groups including other nations and commercial entities who will go back to the Moon in the near future and provides guidance on visitation to protect both the historic and scientific values at those lunar sites. Interim guidance is provided on lunar design, mission planning, and sanctioning actions which would mitigate damage to significant lunar cultural resources until such time as a more multilateral approach is developed which includes other nations (NASA 2011, 2018).

One of the most exciting areas of research that assists in space archaeology conducted by NASA is the Lunar Reconnaissance Orbiter (LRO) which is in use, in part, to map the surface of the Moon. Although not designed for such use, its digital imaging capacities provide archaeologists with the best remote sensing of the sites created by the Apollo Program on the Moon from 1969 to 1972 (Fig. 3). The scope and ability of this tool is critical to accurately locate and look at the condition of all early lunar sites and document and evaluate the objects, foot and rover trails, and structures on the Moon and plan for their management in the future.

Future Directions

Space and the environment on the lunar surface especially are relatively benign when it comes to preservation. No erosive forces such as wind, water, and organic processes exist on the lunar surface as on Earth. With the exception of the effects of temperature changes and micrometeorite bombardment on the artifacts, they are largely unchanged. The foot trails and rover tracks from over 40 years ago are clearly demarcated. The tools that were developed to explore the universe may be used to greatly enhance the preservation of humanity's first steps off Earth and into the universe. The need for an international legal

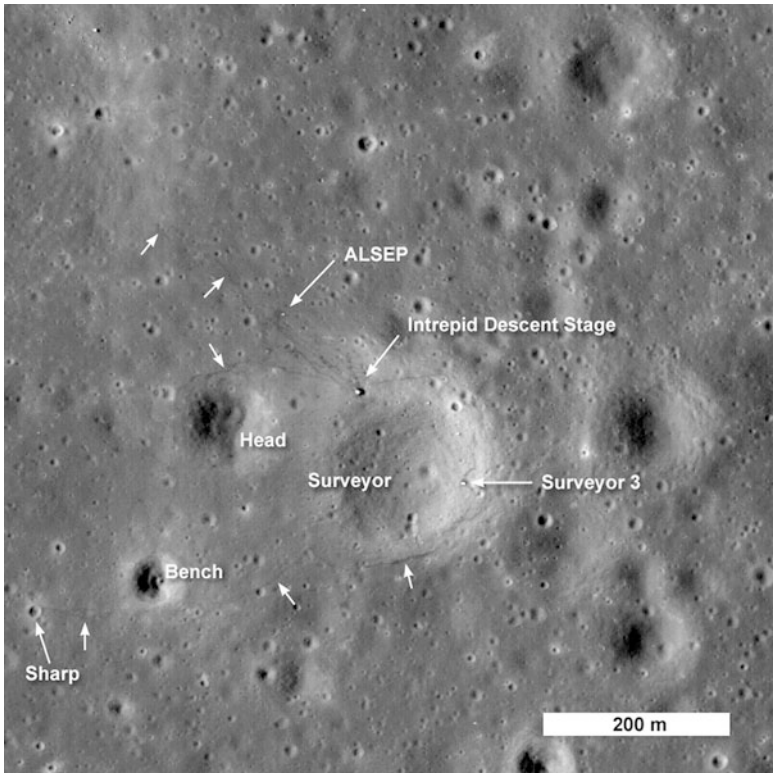

Space Heritage Protection, Fig. 3 LRO Image of Apollo 12 site on the lunar surface (August 2011). (Courtesy of NASA)

framework to protect all of humanity's significant archaeological sites and objects on the Moon and in space is critical at this time. With the fiftieth anniversary of the Apollo 11 landing, the commercial development of space, and the participation of many nations in space exploration, the mandate to seek agreements for protection of the material culture of space is clear.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Antarctica: Historical Archaeology
- ▶ Behavioral Archaeology
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage and Archaeology
- ▶ Landscape Archaeology
- ▶ Legislation in Archaeology: Overview and Introduction
- ▶ Space Heritage Protection
- ▶ UNESCO World Heritage Convention (1972)
- ▶ United States: Cultural Heritage Management
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management

References

Borman, F. 2001. Interview with former Apollo 8 Astronaut Col Frank Borman. January 23, 2001. In *Videotape and transcription on file at Rio Grande Archives*. Las Cruces: New Mexico State University.

Capelotti, P.J. 2004. Space: The final [archaeological] frontier. *Archaeology* 57(2): 48–55. http://www.archaeology.org/0411/etc/space.html. Accessed 10 Sept 2011.

Capelotti, P.J. 2009. Culture of Apollo: A catalogue of manned exploration of the moon. In *Handbook of space engineering, archaeology and heritage*, ed. A.G. Darrin and B.L. O'Leary, 421–441. Boca Raton: CRC Taylor & Francis.

Darrin, A.G., and B.L. O'Leary, eds. 2009. *Handbook of space engineering, archaeology and heritage*. Boca Raton: CRC Taylor & Francis.

Gorman, A.C. 2009. Heritage of earth orbit: Orbital debris – Its mitigation and cultural heritage. In *Handbook of space engineering, archaeology and heritage*, ed. A.G. Darrin and B.L. O'Leary, 381–397. Boca Raton: CRC Taylor & Francis.

Gorman, A.C., and B.L. O'Leary. 2007. An ideological vacuum: The Cold War in outer space. In *A fearsome heritage: Diverse legacies of the Cold War*, ed. W. Cocroft and J. Schofield, 73–92. Walnut Creek: Left Coast Press.

Gorman, A.C., and B.L. O'Leary. 2013. The archaeology of space exploration. In *The Oxford handbook of the archaeology of the contemporary world*, ed. P. Graves-Brown, R. Harrison, and A. Piccini. Oxford: Oxford University Press.

Lunar Legacy Project. n.d. http://spacegrant.nmsu.edu/lunarlegacies. Accessed 12 June 2019.

NASA. 2011. NASA's recommendations to space-faring entities: How to protect and preserve the historic and scientific value of U.S. Government lunar artifacts, 20 July 2011.

NASA. 2018. "Protecting & preserving apollo program lunar landing sites & artifacts" Office of Science and Technology report. March.

O'Leary, B.L. 2006. The cultural heritage of space, the moon and other celestial bodies. *Antiquity* 80(307). http://antiquity.ac.uk/ProjGall/oleary/index.html. Accessed 10 Sept 2011.

O'Leary, B.L. 2009a. One giant leap: Preserving cultural resources on the moon. In *Handbook of space engineering, archaeology and heritage*, ed. A.G. Darrin and B.L. O'Leary, 757–780. Boca Raton: CRC Taylor & Francis.

O'Leary, B.L. 2009b. Evolution of space archaeology and heritage. In *Handbook of space engineering, archaeology and heritage*, ed. A.G. Darrin and B.L. O'Leary, 29–47. Boca Raton: CRC Taylor & Francis.

O'Leary, B.L. 2015. To boldly go where no man [sic] has gone before. In *Archaeology and heritage of the human moverment into Space*, ed. B.L. O'Leary and P.J. Capelotti, 1–12. Cham: Springer.

O'Leary, B.L., S. Bliss, R. Debry, R. Gibson, M. Punke, D. Sam, R. Slocum, J. Vela, J. Versluis, and L. Westwood. 2010. *Nomination of the artifacts and structures at tranquility base to the New Mexico register of cultural properties*. Santa Fe: New Mexico Historic Preservation Division. Accepted 10 Apr 2010. On file.

Spennemann, D. 2007. On the cultural heritage of robots. *International Journal of Heritage Studies* 13 (1): 4–21.

Staski, E. 2009. Archaeology: the basics. In *Handbook of space engineering, archaeology and heritage*, ed. A.G. Darrin and B.L. O'Leary, 17–28. Boca Raton: CRC Taylor & Francis.

Stooke, P.J. 2008. Preserving exploration heritage in the Moon 2.0 Era. Poster presented at the NASA Lunar Science conference, 20–23 July, Moffat Field CA NASA Research Center.

United Nations. 1967. Outer space treaty (OST) – The treaty on the principles governing the activities of states in the exploration and use of outer space, including the moon and other celestial bodies. http://www.oosa.unvienna.org/oosa/en/SpaceLaw/html/gares_21_2222.html. Accessed 25 Sept 2011.

Westwood, L.R., R. Gibson, B.L. O'Leary, and J. Versluis. 2010. *Nomination of objects associated with tranquility base to the California state register of historical resources*. Sacramento: California Historical Resource Commission. Accepted 29 Jan 2010 on file.

Westwood, L., B.L. O'Leary, and M.W. Donaldson. 2017. *The final mission: Preserving NASA's Apollo sites*. Gainesville: University Press of Florida.

Further Reading

World Heritage Convention. 1998. Operational guidelines for implementation of the World Heritage Convention. http://whc.unesco.org/archive/opguide08-en.pdf. Accessed 25 Sept 2011.

Space, Place, and Architecture in Historical Archaeology

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Introduction and Definitions

Space, place, and architecture have a rich and varied history within historical archaeology.

Because Historical Archaeology span over 500 years, much of the data used combine not only artifacts and features but documents and buildings/the built environment as well as folklore, myth, oral history, and ethnography. The influence of Western, capitalist, and colonialist processes remains a dominant undercurrent, and while much research of the past has been filtered through this Western perspective, a renaissance in indigenous archaeologies and the insertion of indigenous perspectives stands to challenge our scientifically grounded constructions of space and place, and with good reason. While many historical archaeologists have been conscious of indigenous epistemologies, it is only within the past 20 years that both indigenous archaeologists and archaeologies have established themselves and their approach in their own right.

Archaeological research attempts to understand relationships between people and things and those relationships are created, maintained, and resisted within a spatial context. Archaeologists categorize and label space when formulating where research will take place (our sites) and during excavation with test pits and trenches. Our choices quantify our limits of enquiry. We determine how space was used based on the materials we pull out of the ground and from our experience in the field. At the same time, we are attempting to understand these areas in a social and cultural context and thusly creating places of meaning. Tuan writes: "Space and place are basic components of the lived world; we take them for granted. When we think about them, however, they may assume unexpected meanings and raise questions we have not thought to ask" (1977: 3). These unexpected meanings and unknown questions are what drives us.

Space has often been defined in terms of a container or vessel which bounds human action. It is detached and without meaning; it is to be mapped and measured; it is an object and has physicality. Lefebrve (1974) in the seminal *The Production of Space* offered three axes of understanding of space in what he defined as the perceived or spatial practice of every day life; the conceived or representations of space created by cartographers and planners; and the lived or representational space which is derived from the imagination. David Harvey chose to take space further, removing the absoluteness of it, and instead looking to relationships. Harvey expanded on this triad through his "grid" of spatial practices. Here, Harvey creates conditions that when used in relation to particular social relations, space can be more clearly understood: "Under the social relations of capitalism, for example, the spatial practices portrayed in the grid become imbued with class meanings. To put it this way is not, however, to argue that spatial practices are derivative of capitalism. They take on their meanings under specific social relations of class, gender, community, ethnicity, or race and get 'used up' or 'worked over' in the course of social action" (1989: 223).

Historical archaeologists have developed approaches which address the ideas of place and space. The aim of this entry is not to compare or contrast these approaches, but instead, flesh out

the data upon which historical archaeologists base their claims. This entry considers the landscape as the container, if you will, of the physical, social, and cognitive data gleaned from relationships between people and their material world. Because landscape, in its broadest definition, is where human action is carried out, a large portion of this entry is devoted to landscape as a space upon which archaeologists carry out their work.

Space and Place on the Landscape

Parts of the sections on Space and Place on the Landscape, Landscape and Power, Texts as Spatial Practices, and Social mory represent material from my unpublished dissertation [Anderson, Christine Broughton Anderson "Uncovering and Recovering Cleared Galloway: The Lowland Clearances and Improvement in Scotland." PhD diss., University of Massachusetts Amherst, 2015]. Building off the early use of settlements within New Archaeology, some theoretical approaches have sought to bridge the gap between space, the culturally bare, quantifiable, backdrop to and product of human action always in process, and place, the more static, fixed emotive "location of past actions, experiences, and memories. . ." that define an individual or group of people (Smith 2008: 16). The works of Hoskins (1954) for example, laid the groundwork for a critical assessment of landscape, but his approach did not fully engage the concept that landscape is a cause for and effect of human behavior or the "medium for and outcome of action and previous histories of action" (Tilley 1994: 23).

Landscapes are complex with infinite meanings constructed around individual and collective experiences and situated in a physical context – space and/or place. This "materiality of social relations" for Bender means landscape is dynamic – just as social relations are in constant process so too are landscapes (2002: 104). Landscape can be conceptualized in a multitude of ways including as an idea that frames how space is constructed and reconstructed and as what Cosgrove describes as "a blend of land and life," that which gives an area meaning (2006: 50). Overarching these perceptions is the notion that landscape is relational to the illustrative – how its aesthetic value marks and demarcates space in social, economic, and political terms. In essence, the process by which landscapes are altered to broadcast or hide information, experiences, and relationships is wrapped up in the visual nature of them.

Time is a crucial element of the visual: "Landscape is time materializing" (Bender 2002: 103). The urge as an archaeologist is to freeze time to locate one landscape (it, too, being frozen with definitive cultural material that informs us of social phenomena). However, it is almost impossible to situate one landscape in a moment with one outcome; "the" landscape becomes "many" landscapes as they are perceived, experienced, and imagined on a variety of scales, including at any given time. "Nested landscapes" is another way of looking at the diversity of people and their experiences (Ashemore and Knapp 1999). As such, the idea of multiple landscapes becomes more concrete: "people create their sense of identity through engaging and re-engaging, appropriating and contesting the sedimented pasts that make up the landscape" (Bender 1998: 25).

Landscape and Power

The perception of landscape within a capitalist system hides its multivocality because of the ways in which it has been constructed around specific needs. As the integral component of the means of production, land as private property becomes the space of power/domination/resistance. In other words, it is the central locus of changing attitudes because "power is manifest in social relations where there is asymmetry in the ability to command material resources" (Driscoll 1988: 169). Physically, power is exercised in the disciplining of space: the building of walls, for example, demonstrates power to alter movement across the landscape.

Cognitively, the interrupting of the "social fabric" around which the population had constructed their lives is carried out by the severing of people's access to public land, the changing of farming practices, the breaking-up of communal living arrangements (see Lelong 2000). Counter to this,

resistance too is practiced as physical and cognitive attachments to land are challenged. Land, then, is the space in which power/domination/resistance is played out. Research that explores the ways in which stakeholders have worked within this process is of crucial importance to understanding processes which remove or clear disenfranchised people from the landscape (see Strang 2001; Harrison 2004; Rigney and Hemming 2008; Paterson 2008; Wiynjorroc et al. 2005; May et al. 2005; Given 2004; Nairouz 2008, White 2008; Nicholas 2005).

Clearing is apparent in its design to create an empty landscape, void of humans. What may appear as culturally bare is not. Archaeologically these landscapes are crucial markers of changes in human behavior modified through physical and ideological representations of power. Physical representations of power, from field walls to elaborate architectural structures, indicate shifts in the ways space was reorganized, reconstituted, and reassigned for specific purposes. Ideological changes accompany physical ones. Processes of "ideological clearing": the act of writing people off their indigenous lands to create an empty and available landscape flesh out the ongoing process of erasing ethnically, racially, or economically diverse groups from both physical and mental landscapes. Clearing encompasses both past and present processes of erasure of particular groups of people. While the removal of people is evident in what is or is not present on the landscape, the process is rooted in written documentation.

Texts and Spatial Practices

Texts, for historical archaeologists, are contextually significant and include a range of material culture from written documentation to maps to images. In all forms, texts are embedded with social meaning and reflect power as well as resistance. However, with a shift from the text as material culture to the language of the text as producers of material culture, space and place in particular, texts have a dual role.

The dual role of documents in modifying space and behavior follows previous research on spaces of confinement within urban settings during industrialization (see Beaudry et al. 1991; McGuire 1991; Mrozowski 1991; Casella 2001; Garman 2005). Documents maintain a power relationship between people, but more importantly, it is the language of the document, which requires one segment of the population to produce materials designed to modify their space and thus their behavior. In essence, documents require people to produce their own spaces of domination and control. As metaphysical representations of power, documents promote domination or control in two critical ways: the act of recording, thus legitimizing an idea; and cultivating a sense of "power to" transform by offering constructive guidelines concerning behavior while also covertly disciplining (Anderson 2016; Garman 2005: 7). The ways in which these discourses are translated onto the landscape demarcate a dynamic and dramatic shift in both the perception and use of land within colonial and capital ventures. Engagements with discourses of power result in "spatial overwriting" a practice of indelibly linking stakeholders to or severing them from landscapes, producing and reproducing them in ways that support or deny dominant perceptions (Rubertone 2008: 15). All texts can assist in the exploitation and domination of specific groups of people by writing them out of the story or off the land. Though one focus of historical archaeology is to seek out the "voiceless" population, that population often remains difficult to find (Moreland 2001: 105). By changing focus from simply finding these populations to critically analyzing strategies or tactics that can be or have been used to erase them, disenfranchised groups become less elusive. One such strategy of erasing is through the restructuring of social memory and the reformulation of history.

Social Memory: Invisibility and Multiplicity in Place Making

Embedded within group dynamics are the roots of hegemony. The power to construct specific places through commemorations, celebrations, and performances is held by those who dominate, and it constructs the conditions that help enable domination. Halbwachs reflects upon this when he writes, "...the mind reconstructs its memories under the pressures of society" (1992: 51). He concludes this line of thought by stating society

also requires of its members a touching up of memories, altering them in some fashion so that "we give them a prestige that reality did not possess" (51).

It is a critical point that memories become an agent of materiality. In Lowenthal's chapters on memory, history, and relics, he writes that these three "...offer routes to the past best traversed in combination" (1985: 249). While Connerton (1989) and Halbwachs (1992) offer insight into how memory is constructed, transmitted, and maintained, Lowenthal explores how the combination of history, memory, and relics can produce a more "credible" story. Memory, history, and relics act as "mutual metaphors" where memories are simply traces of things recalled; artifacts and "things," however, are products of and precedent for culture (Wobst 2001). It is the artifact, space, place that brings history to life, retranslates it into memory and changes its power and influence.

Lowenthal goes deeper by suggesting that we consciously alter history and/or artifacts – most often improving it – to produce a desired result or interpretation (1985: 326). And, in doing so, we convince ourselves, through fabricated memories that events happened much differently than perhaps they actually did. The importance in constructing a history that tells a desired story and a place for that history to exist far outweighs the marginalization of people to whom the events are intimately linked.

More importantly, the acts to "improve" history are not limited to individuals but are conscious and deliberate practices of states, especially in transitional periods of identity. Making traditions, assigning holidays, and enacting commemorative performances in which a nation finds cause to remember are intricately linked to how we, as members of a state, perceive our history and our identity towards and with others. This hegemonic rewriting of history privileges the bourgeois "story" by making it plausible and thus erasing the lower classes or making them less visible in spaces that are important. All subsequent material constructions in relation to filling the void produce an emotive, ideological experience for the dominant groups. However, and following Lowenthal's argument, if these processes do not fully succeed in maintaining a particular trajectory, reinvention, or fabrication of particular stories assist in achieving the desired outcomes.

The mobilization of specific histories, traditions, and cultures to legitimate a meta-narrative about nations support the compartmentalizing of national history (Finlay 2001: 386). Identity and the use of history and other aspects like language and culture is not about establishing a space for "being" but a guideline for "becoming" a particular place in the future (Hall and du Gay 1996: 151). The politics of history and place-making have prioritized certain areas and their histories and excluded others, namely, those that are at the periphery. Though these peripheries are situated within territorial boundaries that make up a nation, their contextual "place" within the nation is complex as they struggle to cope with often having little "historical or mythical capital" (Popular Memory Group 1982: 209).

Oral history – with its unique mix of memory, myth, and "fact" – can challenge the validity of the written record and increase the dimensionality of research. Archaeologists engaged with oral history find a dynamic link to knowledge not recognized in other sources. In the United Kingdom and Ireland, for example, Rotman (cf2008) has employed oral history on both sides of the Atlantic to explore the role of place in the Irish Diaspora. Bender (1998) and others have all included myth, folklore, poetry and song, heritage interpretation, and/or oral history as means of exploring the vast array of alternatives that are informing locals about their world. Ethnography also offers a dimension to archaeological research that includes both the interpretation of the past in the present. For example, in Bender's (1992) efforts to move beyond the static-ness of place in time in her work with Stonehenge, she includes conversations or ethnographic moments to explore how no one story or bit of information is necessarily more authentic or right than another. Employing oral history opens the door for what the Popular Memory Group elaborates as becoming archaeologists of the present as well as of the past (PMG 1982).

Contemporary historical sites, whether manufactured heritage attractions, specific

architectural examples, or ruins, offer a glimpse into social, economic, and political constructions thus providing a richly contextualized site of study. The exploration into local experiences with memory and materiality at contemporary sites help tease out how these encounters reflect underlying tensions generated from a nation coming out of colonial relationships. Materiality and memory are embedded in the processes of everyday life as well as the more broadly reaching construction of place within the developing national identities. The "excavation" of contemporary sites as an alternative to understanding past constructions of history and its role in identity and place making is critical. Contemporary sites are artifacts. They are material dimensions produced through and by social relations and are part and parcel of wider, more encompassing landscapes imbued with power.

Because there is a constant "network of power" engaged with context and the landscape, contestation is ever present. Functioning at the local level, landscape is the terrain on which political, economic, social, and cultural forces play out and it is here where we see how, as Maryon MacDonald states, "Identity is forged out of the structures of the present, and turns to the past for self-derivation" (1989: 97). Social interaction with and between local inhabitants, their interests, and intentions as members of a place are indicative of such forces as boundaries designed to include and exclude are constructed through social interaction. As agents in their locale, individuals and groups practice strategic processes, which are representative of their position in hegemonic and counter-hegemonic dynamics. The product of such practices thus becomes symbolic of past and present process.

Global Directions for the Future

The above outlines the physical, social, and cognitive spaces at play in historical archaeology. Analyzing texts, constructing and reconstructing history and/or heritage, and working with memory are central to our understanding of past and present on a global scale. To return to Harvey at this juncture is prudent. His ideas on "spatial consciousness" or "geographical imagination" clarify our engagement with texts, histories, heritages, and commemorations. To quote Harvey at length:

> This imagination enables the individual to recognize the role of space and place in his own biography, to relate to the spaces he sees around him, and to recognize how transactions between individuals and between organizations are affected by the space that separates them. It allows him to recognize the relationship which exists between him and his neighbourhood, his territory, or, to use the language of the street gangs, his "turf". It allows him to judge the relevance of events in other places (on other peoples' "turf")—to judge whether the march of communism in Vietnam, Thailand, and Laos is or is not relevant to him wherever he is now. It allows him also to fashion and use space creatively and to appreciate the meaning of the spatial forms created by others (1973: 24).

Further, Harvey's "grid of spatial practices" gives depth and analytical structure to our relationships with space and place, especially in terms of capitalism (and for that matter colonialism). Within the framework are refinements, axes by which work within historical archaeology can better flesh out the immense social networking of groups functioning within the culture of capitalism. These conditions – *Accessibility and Distanciation, Appropriation and Use of Space, Domination and Control of Space, Production of Space* – add nuance to our interpretations of the material world. In combination with the ever-growing technologies of spatial analysis, historical archaeologists have, more than ever, powerful tools with which to query the past and present (1989: 219–222).

With the integration of distinct spatial analysis technology from ground penetrating radar to LiDAR data, spatial analysis has developed into its own subdiscipline within historical archaeology and deepens research. With the application of such data, the level of analysis and synthesizing of larger spaces (for comparative purposes) allows for a greater understanding of the use of space within early historical settings. Within indigenous communities, such tools also can support land right claims, for example, and can locate sites of potential occupation as well as combat standard

colonial spatial barriers like architectural structures, walls, foundations, and the like. However, none of these tools can be used in isolation.

Work in Scotland and Ireland demonstrates the breadth of research in which space and place are a focus. For example, Dalglish's (2003) work centered on home lot and interior domestic spaces and the routine of daily life on the Mull of Kintyre during Improvement. This work illuminates the strategies of adapting to and resisting Improvement within spaces in the southern Highlands. Michael Givens' (2004) work on Highland resistance landscapes focuses on the illicit making of whisky as a means of recreating the communities that had been disrupted by clearing. Bangor-Jones (2000), Basu (2000), Lelong (2000), and Symonds (2000) demonstrate innovative archaeological methodologies as a means to better contextualize understudied populations, drawing on documentary sources, social memory, and settlement patterning variation. Gazin-Schwartz's (2008) work focuses on visualizing the "empty" landscape on Raasay, in the western islands of Scotland, and the problems faced by archaeologists who attempt to work in these cleared spaces. In parallel, Angele Smith's work on Irish maps as critical interpretative tools for visualizing the "colonizing" of the region is integral when such maps tend to make the lower classes invisible and where scant documentary evidence is available on them (Smith 2001, 2008). Two larger-scaled projects conducted by RCAHMS (Royal Commission on Ancient and Historic Monuments Scotland) involved a range of methods, including historic land characterization schemes as well as oral histories and textual analysis. *But the Walls Remain* and *Well Watered and Sheltered* set the standard for such projects.

Historical archaeologists are in a powerful position to continue to challenge the direction in which archaeology, in general, heads. Research from schemes such as IPinCH (Intellectual Property Issues in Cultural Heritage), for example, out of Simon Fraser University and continued work in Australia and New Zealand with Aboriginal and Maori descendant populations, trajectories which involve all stakeholders must be continued. In terms of space, place, and the built environment of which landscape is a part, work with indigenous groups will deepen our personal "geographical imagination" as well as aid us in our work to inform a global audience.

Cross-References

- ▶ Agrarian Landscapes of the Historic Period
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Heritage Landscapes
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
- ▶ Landscape Archaeology
- ▶ Landscape Mapping at West Heslerton
- ▶ Non-Places in Archaeology
- ▶ Space Archaeology
- ▶ Space Heritage Protection

References

Anderson, 2016. Uncovering and Recovering Cleared Galloway: The Use of Documents in Rural 18th and 19th Century Lowland Scotland. In *Nineteenth–Century Material Culture Studies from Britain*, edited by Alasdair Brooks, Material Culture Series. Society for Historical Archaeology and University of Nebraska Press 137–161.

Ashmore, W., and Knapp AB. 1999. *Archaeology of landscapes: Contemporary perspectives*. Malden: Blackwell.

Bender, B. 1992. Theorising landscapes, and the prehistoric landscapes of Stonehenge. *Man* 27 (4): 735–755.

Bender, B. 1998. *Stonehenge : Making space*. Oxford: Berg.

Bender, B. 2002. Time and landscape. *Current Anthropology* 43: 103–112.

Connerton, P. 1989. *How societies remember*. Cambridge: Cambridge University Press.

Cosgrove, D. 2006. Modernity, community, and the landscape idea. *Journal of Material Culture* 11 (1/2): 49–66.

Driscoll, S.T. 1988. *The relationship between history and archaeology: Artefacts, documents and power in ST*

S

Driscoll and MR Nieke power and politics in early medieval Britain and Ireland, 162–187. Edinburgh: Edinburgh University Press.

Finlay, R.J. 2001. New Britain, new Scotland, new history? The impact of devolution on the development of Scottish historiography (review article). *Journal of Contemporary History* 36 (2): 383–393.

Garman, J. 2005. *Detention castles of stone and steel: Landscape, labor and the urban penitentiary.* Knoxville: University of Tennessee Press.

Halbwachs, M. (ed.) 1992. *On collective memory.* Trans. L. Coser. Chicago: University of Chicago Press.

Hall, S., and Gay P du. 1996. *Questions of cultural Idenity.* London: Sage.

Harrison, R. 2004. Contact archaeology and the landscapes of pastoralism in the north-west of Australia in The archaeology of contact in settler societies, ed. T. Murray, 109–142. Cambridge: Cambridge University Press.

Harvey, D. 1989. *The condition of postmodernity an enquiry in to the origins of cultural change*. Oxford: Blackwell. 2009 *Social Justice and the City.* Athens: University of Georgia Press.

Hoskins, W.G. 1954. *Devon*. Newton Abbott: David and Charles.

Keane, W. 2003. Semiotics and the social analysis of material things. *Language and Communication* 23: 409–425.

Lefebrve, H. 1974. *The production of space*. Oxford: Blackwell.

Lowenthal, D. 1985. *The past is a foreign country.* Cambridge: Cambridge University Press.

Macdonald, M. 1989. *We are not French!: Language, culture, and identity in Brittany.* London: Routlege.

Moreland, J. 2001. *Archaeology and text*. London: Duckworth.

Popular Memory Group. 1982. Popular memory: Theory, politics, method. In *Making histories: Studies in history writing and politics*, ed. R. Johnson, G. McLennan, B. Schwartz, and D. Sutton, 205–252. Minneapolis: University of Minnesota Press.

Rubertone, P. 2008. Memorializing the Narragansett: Placemaking and memory keeping in the aftermath of detribalization. In *Archaeologies of placemaking monuments, memories, and engagement in native North America*, ed. P. Rubertone, 195–216. Walnut Creek: Left Coast Press.

Strang, V. 2001. Negotiating the river: Cultural tributaries in far north Queensland. In *Contested landscapes: Movement, exile, and place*, ed. B. Bender, and M. Winer, pp 69–86, Berg: New York.

Tilley, C. 1994. *A phenomenology of landscape: Places, paths and monuments*. Oxford: Berg.

Tuan, Y.F. 1977. *Space and place: The perspective of experience*. Minneapolis: University of Minnesota Press.

Voss, B.L. 2007. Image, text, object: Interpreting documents and artifacts as "labors of representation". *Historical Archaeology* 41 (4): 144–168.

White, P.J. 2008. Claiming an unpossessed country: Monuments to ownership and land loss in Death Valley. In Archaeologies of placemaking Monuments, memories, and engagement in Native North America, ed. P. Rubertone, pp 135–160, Left Coast Press, Walnut Creek: CA.

Wobst, H.M. 2001. Matter over mind: Perishables and the glorification of materiality in archaeology. In *Fleeting identities: Perishable material culture in archaeological research*, Center for Archaeological Investigations, ed. P.B. Drooker, 43–57. Carbondale: Southern Illinois University.

Further Reading

Bangor-Jones, M. 2000. Settlement history of Assynt, Scotland. In *Townships to farmsteads: Rural settlement in Scotland, England and Wales*, ed. J. Atkinson, I. Banks, and G. MacGregor, 216–223. Oxford: Holywell.

Basu, P. 2000. Sites of memory – sources of identity: Landscape-narratives of the Sutherland clearances. In *Townships to farmsteads: Rural settlement in Scotland, England and Wales*, ed. J. Atkinson, I. Banks, and G. MacGregor, 216–223. Oxford: Holywell.

Beaudry, M.C., Cook LJ, and Mrozowski SA. 1991. Artifacts and active voices: Material culture as social discourse. In *The archaeology of inequality*, ed. R.H. McGuire and R. Paynter, pp150–pp191. Oxford: Blackwell.

Bruchac, M.M., S.M. Hart, and H.M. Wobst, eds. 2010. *Indigenous archaeologies: A reader on decolonization*. Walnut Creek: Left Coast.

Casella, E.C. 2001. Landscapes of punishment and resistance; a female convict settlement in Tasmania, Australia. In *Contested landscapes: Movement, exile, and place*, ed. B. Bender, and M. Winer, 103–120. New York: Berg.

Colwell-Chanthaphonh, C. 2012. Archaeology and indigenous collaboration. In *Archaeological theory today*, ed. I. Hodder, 2nd ed., 267–291. Cambridge, UK: Polity.

Dalglish, C. 2003. *Rural society in the age of reason an archaeology of the emergence of modern life in southern Scottish highlands*. New York: Kluwer Academic/ Plenum Publishers.

Gazin-Schwartz, A. 2008. Abandoned, avoided, expelled: The creation of "empty" landscapes. In *Landscapes of clearance*, ed. A. Gazin-Schwartz and A. Smith, 25–46. Walnut Creek: Left Coast Press.

Given, M. 2004. *The archaeology of the colonized*. New York: Routledge.

Lelong, O. 2000. The prospect of the sea: Responses to forced coastal resettlement in nineteenth century Sutherland. In *Townships to farmsteads: Rural settlement in Scotland, England and Wales*, ed. J. Atkinson, I. Banks, and G. MacGregor, 216–223. Oxford: Holywell.

May, S.K., D. Gumurdul, J. Manakgu, G. Maralngurra, and W. Nawirridj. 2005. 'You write it down and bring it

back. . .that's what we want' – Revisiting the 1948 removal of human remains from Kunbarlanja (Oenpelli), Australia. In *Indigenous archaeologies decolonizing theory and practice*, ed. Claire Smith and H. Martin Wobst, 110–128. New York: Routledge.
Mcguire, R. 1991. Building power in the cultural landscape of Broome County, New York 1880–1940. In *The archaeology of inequality*, ed. R.H. McGuire and R. Paynter, 102–124. Oxford: Blackwell.
Mcniven, I., and L. Russell. 2005. *Appropriated pasts: Indigenous peoples and the colonial culture of archaeology.* Walnut Creek: Alta Mira.
Mrozowski, S.A. 1991. Landscapes of inequality. In *The archaeology of inequality*, ed. R.H. McGuire and R. Paynter, 79–101. Oxford: Blackwell.
Murray, T. 2011. Archaeologists and indigenous people: A maturing relationship? *Annual Review of Anthropology* 40 (1): 363–381.
Nairouz, J. 2008. Ethnoarchaeological study of clearance. In *Palestine in landscapes of clearance*, ed. A. Smith and A. Gazin-Schwartz, 127–138. Walnut Creek: Left Coast Press.
Nicholas, G.P. 2005. The persistence of memory; the politics of desire: Archaeological impacts on aboriginal peoples and their response. In *Indigenous archaeologies decolonizing theory and practice*, ed. Claire Smith and H. Martin Wobst, 110–128. New York: Routledge.
Nicholas, G.P. 2008. Native peoples and archaeology. In *Encyclopedia of archaeology*, ed. D. Pearsall, vol. 3, 1660–1669. New York: Academic Press.
Paterson, A. 2008. *The lost legions culture contact in colonial Australia*. New York: Alta Mira.
RCAHMS (Royal Commission on the Ancient and Historical Monuments of Scotland). 2002. *But the walls remained*. Edinburgh: HMSO.
RCAHMS (Royal Commission on the Ancient and Historical Monuments of Scotland). 2008. '*Well sheltered and watered' Menstrie Glen, a farming landscape near Stirling*. Edinburgh: HMSO.
Rigney, D. and S. Hemming. 2008. *Encountering the Common Knobby Club Rush: Reconciliation, public art and whiteness*. Paper given at WAC-6, Dublin, Ireland, July.
Smith, A. 2001. *Mapping cultural and archaeological meanings: representing landscapes and past in 19th century Ireland*. Unpublished dissertation: University of Massachusetts Amherst Department of Anthropology.
Smith, A. 2003. Landscape representation: Place and identity in nineteenth-century ordnance survey maps of Ireland. In *Landscape, memory and history*, ed. P. Stewart and A. Strathern, 71–88. London: Pluto Press.
Smith, A. 2008. Landscapes of clearance: Archaeological and anthropological perspectives. In *Landscapes of clearance*, ed. A. Smith and A. Gazin-Schwartz, 13–24. Walnut Creek: Left Coast Press.
Symonds, J. 2000. The dark island revisited: An approach to the historical archaeology of Milton, south Uist. In *Townships to farmsteads: Rural settlement in Scotland, England and Wales*, ed. J. Atkinson, I. Banks, and G. MacGregor, 196–209. Oxford: Holywell.
Watkins, J. 2005. Through wary eyes: Indigenous perspectives on archaeology. *Annual Review of Anthropology* 34: 429–449.
Wiynjorroc, P., P. Manabaru, N. Brown, and A. Warner. 2005. We just have to show you: Research ethics blekblalwei. In *Indigenous archaeologies decolonizing theory and practice*, ed. Claire Smith and H. Martin Wobst, 316–326. New York: Routledge.

Spain and North Africa: Islamic Archaeology

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Introduction and Definition

Interest in the Western Islamic world, essentially the Iberian Peninsula and North Africa, is long-standing. The presence of well-preserved buildings and monuments and numerous works of art has generated a particular approach since the mid-nineteenth century, sometimes close to exoticism. Appreciation of the arts and antiquities of these societies, whether wiped out and existing only in memory as is the case with Spain, or still present as with North Africa, contributed to the considerable increase and development of studies on Islamic history in these regions. Without doubt, in the case of North Africa, the fact that the area had fallen under the control of Western political powers, mainly France and Spain, helped the development of research, although frequently with a focus on local custom.

However, archaeology was involved only slightly in this process of historical reconstruction until well into the twentieth century. Indeed, at least regarding Spain, it was not until the 1970s that archaeological studies would bring new ways of developing knowledge of these Islamic societies.

Despite this, the excellent advances and the indispensable works that appeared from disciplines such as history of art and history of architecture by authors such as Georges Marçais (1954), Henri Terrasse (1932), Manuel Gómez-Moreno (1951), or Leopoldo Torres Balbás (1949) in the first half of the century should not be forgotten. These authors, the most outstanding among a considerable group, established the fundamentals of the study of the art, archaeology, and architecture of Western Islam. These authors' perspectives cannot be considered strictly archaeological, for it is still firmly rooted in art history and, as such, chiefly focused on architecture and urbanism. Somewhat later, authors such as K. A. C. Creswell (1959) presented a renovated positivist perspective. K. A. C. Creswell focused most of his work on the Eastern Islamic world, although he also did some research in the Alcazaba of Balaguer (Lérida); in palaces such as the Aljafería, in Zaragoza, and Medina Azahara; and in mosques such as Córdoba and Toledo, as well as in the Maghreb, specifically in Marrakech, Kairouan, and Tinmal, and O. Grabar (1973), who centered his research in Spanish monuments such as the Alhambra (Grabar 1980).

From the 1970s, the situation changed considerably. Theoretical and methodological progress in the discipline of archaeology throughout the 1960s, particularly regarding the chronological sphere of prehistory, had allowed for the development of the discipline in the Mediterranean area, albeit with a certain delay. The archaeology of the Islamic world was no exception. In the case of Spain and North Africa, many researchers – mostly coming from the fields of medieval history or prehistory – became involved in applying archaeological and anthropological methodology with a view to enriching knowledge of medieval Islamic society. This was an important catalyst for advancement in historical and archaeological research carried out in al-Andalus. It led to the birth of a new discipline, medieval archaeology, hitherto scarcely explored, which was to develop into pioneering and innovative work on al-Andalus, and a vehicle by which to introduce new streams of research.

For North Africa, the influence of countries external to the region was essential. The pioneer in this respect was without doubt the French school, notably improved since the end of the 1960s, which continued to act as an engine for research with the participation of some local collaborators. The first projects that were put into action were directed at increasing knowledge of ancient times and failed to properly appreciate medieval Islamic levels. It was not until the end of the 1970s and beginning of the 1980s that work specifically addressing the medieval era began. These first studies, applying the so-called extensive archaeology, concentrated on the analysis of territory by means of broad archaeological surveys in northern Morocco. Other teams of diverse origin rapidly became involved, including Americans (Sijilmasa, Basra, Djerba, Qsar el Segir), British (Volubilis), Italians (Rif), French (Rif), and Spanish (Sus-Tekna), and successfully formed mixed teams. The work carried out in the context of these projects has served as a catalyst for the development of Maghrebian research in recent decades. Some of the projects are still active today (Sabra al-Mansuriya) providing information of great interest. In spite of this, research in North Africa shows a certain delay in comparison to developments in the Iberian Peninsula.

From this time onward, those involved in this research began to intervene as of right in the process of the historical reconstruction of Western Islamic societies and not only in the limited fields of art and architecture (Sénac 2007, 2012). With a new technical language, at times no doubt incomprehensible to their historian colleagues, they rejuvenated the academic field. Their work began to open new debates of great importance that today continue to arouse scientific discussion, spur the development of the discipline, and increase our knowledge of medieval Islamic history in this region. We will refer to some of these debates in the following section as they serve to highlight the state of current knowledge.

Historical Background

From the Ancient World to Western Islam

At the turn of the seventh to eighth century, the Iberian Peninsula and North Africa were conquered by Muslims. Until then, the evolution of these territories had been similar, although with some distinctions, to that of the rest of the territories that had been integrated into the Roman Empire. In late antiquity the area underwent considerable upheaval due to barbarian invasions (mostly Visigoths and Vandals, with lesser incursions by Suebis and Alans), and a whole series of transformations of the structures of organization belonging to the Roman era took place. These, however, had already begun to be modified before the fall of the last Western emperor. If any single thing characterizes this field of study, it is the presence and influence, in varying degrees, of the Byzantine Empire which saw itself as affected by the Iberian Peninsula and North Africa, lands that would later be controlled by Muslims.

Regarding the Iberian Peninsula, work on this period has centered on various fundamental aspects (Gutiérrez 2012; Macias 2012). First is the study of cemeteries, with particular interest in the analysis of their organization, location, and funerary practices based on the associated material culture, with a view to clarifying the identity of the buried. Second is a focus on Visigothic architecture, especially that used in known churches, and the transformation of rural settlements (the end of the late Roman *villae*, the emergence of new kinds of settlement such as farms and small towns) and in the cities, which underwent a process of significant transformation, especially evident in metropolis as distinct as Mérida, Cartagena, Tolmo de Minateda, or Recópolis, all of which have been subject to rigorous archaeological intervention (Fig. 1). Third is the characterization of rural settlement patterns and their transformation over time throughout the early medieval period, including not only domestic structures but also peasant landscapes and defensive structures, some of which are hard to recognize. Finally, the analysis of material culture, especially pottery, where large technical and morphological changes are observed in the ceramic

Spain and North Africa: Islamic Archaeology, Fig. 1 El Tolmo de Minateda, Hellín, Albacete (Abad Casal et al. 2012: 362)

repertoires that need to be correctly explained. Importantly, all of these aspects have been analyzed as markers for the process of social Islamization that began with the conquest of Hispania by the Berbers.

For North Africa, research has concentrated especially on the second of these themes, the cities and changes that took place in their rural hinterlands. This includes isolated case studies of great interest. A few of these are located in Libya (Leone and Mattingly 2004 and Leone 2007). In Tunisia, most work has traditionally revolved around three early cities, al-Abbasiyya, Raqqada, and Sabra al-Mansuriya (and partially in Mahdiya and Tunis) (Cressier 2012). In 2003, an ambitious, and theoretically novel, project was undertaken in Sabra al-Mansuriya (Cressier and Rammah 2008), and the results have been excellent. Something similar has occurred in Uchi Maius (Gelichi and Milanese 2002). In the central Maghreb, especially Algeria, we must stress the archaeological works carried out in the Qala of the Banu Hammad and in Sedrata (and partially also in Hunayn and Agadir). In Morocco, in contrast, archaeology had little presence in otherwise comprehensive studies about great cities such as Fez, Rabat, and Marrakech, and early attempts to give archaeology a more prominent position, for instance, in Zagora and Nakur, went largely unnoticed. The first cooperative projects began in the 1970s in Qars al-Seguir (American-Moroccan) and Belyounech (French-Moroccan). This trend continued with the projects undertaken in Jbala-Gomara and Basra and continues in our days, in Sus-Tekna (Spanish-Moroccan) (Onrubia 2004), Sijilmasa (American-Moroccan, Messier and Fili 2002), Volubilis (British-Moroccan, Fentress and Limane 2007), and Nakur-Aghmat-Tamdult (Cressier 2007, 2010). We cannot forget the interesting results, at different levels, including ceramic studies, domestic areas, urbanism, military architecture, etc. yielded by the projects undertaken by the Spanish city of Ceuta (Hita and Villada 2012).

The prosperity of these North African cities outlasted the fall of the Roman Empire, although changes are evident as early as the fifth and sixth century (abandonment, transformation of certain public spaces, the building of churches, development of fortified elements). The Arabs established themselves in this network of transformed cities at the time of the conquest, and these settlements lasted into the first centuries of the medieval period, due to their continued occupation by urban elites. In any case, we must not forget that, in contrast with what happened in the Iberian Peninsula, most of the Maghreb had not been Romanized and the indigenous substratum, which was essentially tribal in nature, was clearly predominant, resulting in social processes that had little resemblance with those taking place in Hispania. The involvement of tribal groups in the development of cities was substantial, which explains the early morphology of some of these urban nuclei. Other factors, such as the creation of exchange hubs and the exploitation of certain resources (mineral or agricultural), also played a role in the location of these cities (Cressier 2012).

At any rate these issues were directly linked with lines of investigation that had developed some time previously in the rest of Europe, although each with their own local characteristics. This wider debate analyzed the changes that took place after the fall of the Western Roman Empire and into the beginning of the early Middle Ages (Wickham 2005: 902–945). After the Arab invasion and conquest of these territories, the situation changed substantially. The factual account and the archaeological discourse changed to the same degree.

Islam in the West: Al-Andalus and the Maghreb

Transformations in Patterns of Settlement After the Muslim Conquest

The Arab conquest of North Africa and the Iberian Peninsula is a watershed in terms of approaches to research. Traditional theories, at least in the case of Spain, accepted only with difficulty the incorporation of this area into the Islamic world. For a long time, it was considered that Islam did not result in more than a few superficial cultural or religious changes in this territory, without implying radical developments to the society of the Iberian Peninsula. There were even those who denied that the invasion occurred, considering it more an "orientalization" of society than a

conquest and Islamization of the Peninsula (García Sanjuán 2013).

The work of Pierre Guichard, from the late 1970s, came to deny this view, acting as a starting point for a comprehensive revision of studies on al-Andalus. Influenced by structuralist/functionalist social anthropology, he argued that medieval society in al-Andalus and North Africa presented a social and familial structure belonging to the Islamic world, very different to that which existed in the feudal-Christian area of the Peninsula. This would confirm that the social impact of the Arab-Berber invasion and conquest of Hispania was wide and profound (Guichard 1976, 1990–1991). Initially based on written documentation, he subsequently undertook archaeological research, carried out in collaboration with other French colleagues (Bazzana et al. 1988), to observe and interpret the documented changes to the organization of settlement and material culture of al-Andalus. The work initiated by these researchers served as strong motivation for the creation of a new school of archaeology, dedicated to the study of al-Andalus, which has made new and rich contributions to the process of historical reconstruction (Fig. 2) (Bazzana 1992; Boone 2009).

The analysis of landholding initially occupied the core of these authors' investigations. Originally focused on the study of the various documented settlements in al-Andalus, research soon began to center on the relationships that existed between them, especially between the fortified settlements; the castles (*hisn*/*husun*), very common in Andalusian geography; and the rural settlements under their influence, the farmhouses, as well as those linking rural settlements and the flourishing early Andalusi cities. A common perspective was that this organization reflected the society established in the Peninsula after the Islamic conquest. The fortifications were central to the organization of rural territories in al-Andalus, but instead of showing a morphology and structure similar to the older (feudal) fortifications, analysis of the settlements showed that they were to a greater extent a reflection of a segmented society, tribally organized, and at the same time an expression of the fiscal implementation of the state in rural territory. Settlement organization was thus a reflection of the delicate balance existing between the Islamic state, the most representative spaces of which are to be found in urban contexts and the rural communities

Spain and North Africa: Islamic Archaeology, Fig. 2 Tirieza Castle, Murcia (Eiroa Rodríguez et al. 2009)

that organized the cultivation of the land and defended it in case of danger.

The model suggested by these French authors was contested at the time, as much for the chronology of its proposed implementations as for the functions it attributed to a fortified space. Despite including a varied typology of fortified settlements, it seems clear that the model suffered from a certain inflexibility and stagnation, so that as studies developed, some of its aspects underwent revision and development.

Rural territories have been documented where the presence of fortified settlements is minor or practically nonexistent. However, in some regions, it has been possible to sequence the development of fortifications through the Middle Ages, from an initial stage in which diversity indicates a process of social transition between the Visigothic period and a fully Islamized one. Here, the introduction of Arab-Berber population groups played a fundamental role alongside the integration of the diverse communities present in the initial Andalusian phases, moving toward Islamization not only in religious terms but also as regards linguistic, cultural, and social practices (Acién 1989).

Authors such as M. Acién (1995), E. Manzano (2006), or S. Gutiérrez (1996) have emphasized this process, including the changes that can be observed in the material culture of this period as well as the fortified settlements and rural centers, in their discourse. These changes refer especially to the practices and centers of production of ceramics and their networks of distribution, as well as to the importance and influence of urban centers, all of which reflect the degree of continuity or disruption between the late Roman and Muslim worlds.

This process of Islamization, which was not without conflict and resistance, started from an advanced stage of destructuralization within the Roman world, which is generally confirmed in various ways: in the transformation of late Roman settlement patterns, with documentation of a clear tendency to occupy high ground and occasionally "marginal" zones, in new forms of cultivation in productive areas, and in the transformation of the urban network, with decline, abandonment, and new foundations. All this was accompanied by profound changes to artisanal productive structures and in networks for the exchange of products. These are most clearly demonstrated by changes to the ceramic corpus, with the appearance of nonstandardized repertoires made using basic techniques and with relatively localized distribution. This transitional process continued until the end of the tenth century, when it is generally agreed that the process of Islamization of al-Andalus society was largely complete (Gutiérrez 2012).

The culmination of the process coincides, according to this view, with the establishment of the Umayyad Caliphate of Córdoba and is visible in the consolidation of the settlement model discussed above, as well as in changes to material culture, especially in the ceramic record. From this moment wheel-made vessels and glazed dishes appear more frequently.

Clearly this interpretive model, incorporating new factors and variables, brings greater complexity to the general discourse, while the localized studies that developed during the 1990s in Andalusian geographic zones particularly have shown that the rhythms and profiles of the process vary from one area to another, presenting specific regional characteristics.

This model of land use underwent important transformations over time. During the Almohad era, a process emphasizing the construction of fortresses apparently played out, especially in the east (Azuar 1988, 2016), although this phenomenon could equally apply to the rest of al-Andalus. Other changes related to occupation and in places cultivation of the land. For the final stage, the Nasrid period saw fortified nucleation of notable complexity, with the appearance of new materials and elements in these structures indicating the penetration by urban influences of these areas (Malpica 1996, 2008), along with the more obvious presence of Nasrid power (Acién 1999) (Fig. 3).

Regarding North Africa, research has not allowed similar conclusions to be drawn. The rural settlements, still incompletely studied, do not evidence similar organization. Although the Arab invasion and conquest initiated a process of

Spain and North Africa: Islamic Archaeology, Fig. 3 Moclín castle (Granada)

profound social and cultural transformation, the result in terms of settlement is not comparable. Fortifications, while still numerous in this territory, do not assume the same importance; they apparently reached in al-Andalus. However, the occupation of space by small nucleated settlements dedicated to the cultivation of their hinterland and based largely on the use of irrigation techniques does seem to extend through North Africa, although the scales vary at a regional level.

It should be noted that this interpretative change can be attributed as much to developments in archaeological methodology as to the fields of inquiry themselves. If at first, research was fundamentally based on territorial analyses, beginning with extensive landscape surveys from the middle of the 1980s, the development of techniques of spatial analysis, the emergence of urban archaeology, and the development of ceramic analysis have permitted the incorporation of new elements into the discourse. These elements have favored the development of new theories and a surge in new fields of study. We will focus on these below.

Key Issues/Current Debates

Settlement and Resource Exploitation: Hydraulic Archaeology

The explanatory model outlined above was initially directed to a great extent toward rural settlement, without actually excluding cities. It was because of this that some researchers naturally departed from the model and began to highlight the close link between fortifications and the exploitation of resources, in particular cultivated fields and irrigated agriculture (Cressier 1991).

The configuration of Andalusian territory in terms of these parameters from the tenth and eleventh centuries meant the construction of a new rural landscape featuring smaller units of population in the form of small nucleated towns called *alquerías* (from the Arabic *al-qarya*) and their associated hinterlands. The analysis of these small towns, little known due to their long occupation and difficulties of archaeological analysis, has contributed some knowledge of these productive spaces.

In this way the field of hydraulic archaeology has emerged and broadly developed within

Andalusian studies. The works of T. F. Glick (1970) and, above all, of M. Barceló (Barceló et al. 1988, 1997) and H. Kirchner (Kirchner and Navarro 1993), developed primarily in the eastern area of the Peninsula and in the Balearic Islands, have laid the foundations of this new discipline.

Following the proposals of P. Guichard, these researchers have linked the design, construction, and management of these irrigated spaces to the farming communities, generally organized in clans. From this perspective, the existence of these spaces, rather than solely being determined by geographical character or similar variables, is considered to be a social choice, and the criteria that govern them have been developed and should thus be explained by rural communities' own characteristics. The design of these spaces indicates a considerable organizational effort on the part of these communities, and their management cannot be understood unless from cooperation and collective effort within the community. The development and evolution of irrigated land thus denote strategies and formulas for growth in these groups.

The creation of these agricultural systems (Malpica 2012–2013) marked a considerable modification of Andalusian rural ways of life, although on a local scale. This involved the application of catchment, distribution, and complex storage techniques, on occasion originating from the east. At the same time came the introduction and acclimatization of new crops, previously unknown in the Iberian Peninsula or North Africa, the products of which were not suitable for prolonged storage. This can only be explained in light of an economic context facilitating their dispersal.

Without casting doubt upon the importance of these agricultural areas in medieval al-Andalus and the Maghreb, in recent times, new paths of investigation are being explored that incorporate problems associated with nonirrigated land and livestock in the rural Andalusian lifestyle. These issues are currently little known.

The "Alquerías" and Modes of Habitation

These rural groups, which were characterized by high homogeneity and social cohesion as well as administrative autonomy, were established in the alquerías. The settlements' morphology, as far as we know, reflected the characteristics of its community of rural landowners or workers. They appear to be very distinct from settlement forms occurring in the rest of the European continent (Guichard 1988). The alquerías are perhaps one of the least archaeologically known aspects of the rural Andalusian world. Very few have been carefully investigated archaeologically (Jolopos, Castillo del Río, Torre Bufilla, El Castillejo, Ponta do Castelo – Carrapateira – etc.) and those that have shown diverse characteristics (open or walled fields, concentrated or dispersed, etc.), although they present a similar urban organization, comprising various cores connected by intricate lines of communication, which do not follow an orthogonal organization, and where large public spaces are virtually absent (Fig. 4). All of them seem to have a similar relationship with productive areas, be them irrigated or dryland agricultural fields, grazing meadows, or wooded areas.

The inhabitants of these small nucleated villages managed a vaguely delimited territory in which were located areas exploited for agriculture or livestock or as woodlands. These spaces or lands were framed by statutes and particular legal recognitions (Lagardère 1993; Trillo 2004).

The dwellings that made up these small towns, despite the existence of variation in dimensions and typological form, reflect a single model from the tenth century onward. In recent times, the emergence and transformation of this process, as well as its social implications, have been analyzed in detail (Gutiérrez 2013). This model is based on the existence of a central courtyard around which were rooms in an L- or U-shape (Bazzana 1992). The presence of a hall, a space reserved at the heart of the home for the intimate activities of the familial sphere, appears to be a specific feature. The rooms, while still presenting a marked multifunctional character, emphatically separate areas of private repose from those designated as the kitchen or as rooms for daily life. The profiles of these dwellings, where they have been analyzed in detail and in light of data concerning the domestic assemblage, are those of an extended family where characteristics of relatedness were clearly present (García Porras 2001). The materials used for their construction were

Spain and North Africa: Islamic Archaeology, Fig. 4 El Castillejo, Los Guájares, Granada

varied, although walls of rammed earth appear most frequently. In any case, their construction made use of materials found close to the settlements and did not require any complex techniques so that it could be undertaken within the community.

The Urban Sphere

The city is one of the most extensively studied aspects of Andalusian archaeology in recent years and could even be considered to be one of the most dynamic, as the flow of new data coming from archaeological interventions has been continuous; syntheses of the subject, however, have been more scarce. In any case, research has managed to move beyond the milestone that was in its day marked by the work of L. Torres Balbás (1970), who emphasized the topographical characteristics that were present: the planning of roads, the forms of water supply, the presence of certain characteristic elements, etc.

The majority of authors that have dealt with this subject have agreed that there was a lack of continuity between the ancient or late Roman and the Andalusian cities, even where topographical or occupational levels of both periods exist. At this time, changes to the urban network were substantial, erasing any functional heritage and changing its characteristics in a fundamental way that barely conserved the memory of what had gone before.

One of the preoccupations of recent times has been the origin of these cities (Cressier and García 1998). There is no doubt that the Arab-Berber invasion and conquest resulted from the occupation of existing urban centers in the Peninsula, whether or not they were already immersed in a process of marked decline. The formation of the first cities in al-Andalus during the amiral period was a result of the transformation of certain existing centers, as happened in the case of Toledo; the Visigothic capital itself, Sevilla; Córdoba; Mérida; Valencia; or Zaragoza, among others, and of foundations connected to the new power that emerged in a spontaneous way from preexisting rural settlements. Foundations linked to the process of conquest do not seem to be documented on the Peninsula, as were Kufa and Basra in Iraq, Fustat-Misr in Egypt, or Qayrawan in Ifriqiya (Fig. 5).

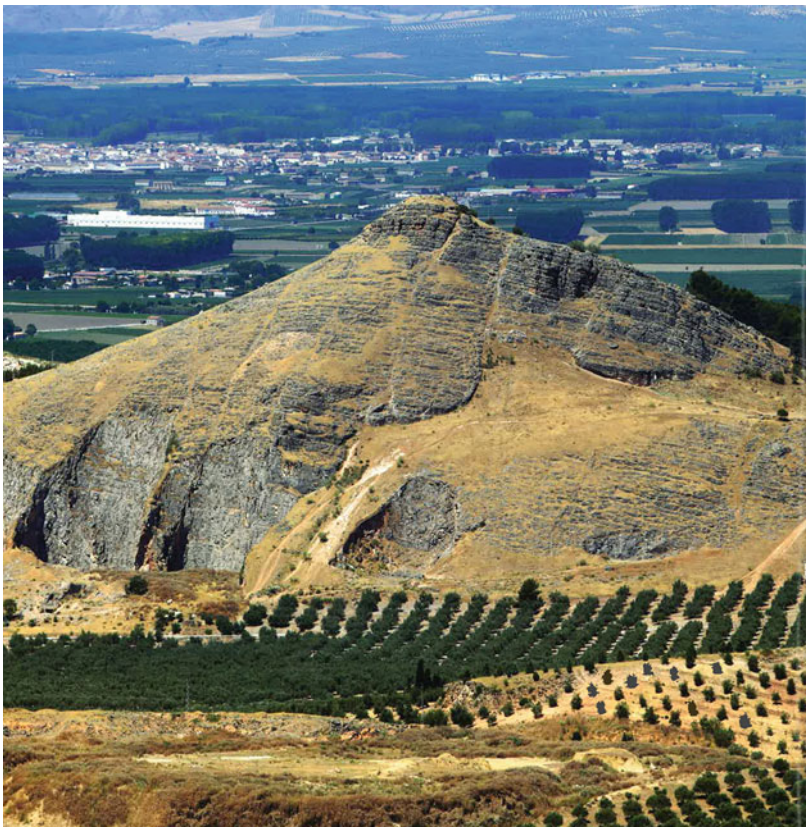

Spain and North Africa: Islamic Archaeology, Fig. 5 Suburbs of Córdoba

As noted, the fact that ancient cities remained in occupation after the conquest has not been interpreted by those authors that have studied them as a result of continuity (Gutiérrez Lloret 1998, 2012). The documented changes in these cities radically modified their structure and urban physiognomy and have been interpreted as a symptom of a break with the urban past, reflecting a new society, very different from the original. The most typical example is Córdoba, capital of al-Andalus, which experienced spectacular growth, especially in the surroundings closest to the location of an intricate network of recreational houses or suburbs. Some of these have been the object of archaeological intervention, which has allowed us to bring to light a large portion of the city, with planned urbanism, probably a result of the arrival of a new population attracted by the conversion of the city into the residence of amiral and caliphal power. Transformations can likewise be observed at a smaller scale in the other aforementioned cities.

Some cities emerged as a result of the evolution of a more or less complex rural space. One of the most well-studied examples and the current object of an ambitious research project is Madinat Ilbira (Granada). This city, located just a few kilometers from Granada, is currently buried. Recent archaeological interventions indicate that it originated from a group of distinct dispersed nucleations (Fig. 6) (Malpica 2006, 2013).

Thus, the cities of al-Andalus again show the huge changes produced in the settlement network over the two centuries following the Arab-Berber conquest (as seen above in the case of the fortifications). They highlight the milestones of the process by which Andalusian society was transformed, not in itself dissimilar to that observed in other Islamic areas (Guichard 1998).

Spain and North Africa: Islamic Archaeology, Fig. 6 Location of Madīnat Ilbīra, Atarfe, Granada (Malpica Cuello 2013: 20)

Cities, in any case, did not remain unchanging through the Andalusian period. Various authors have considered the evolutionary process of the urban context in recent times, presenting a descriptive and explanatory scheme of its forms of growth and topography (Navarro and Jiménez 2007). A great increase in urbanization occurred during the eleventh and twelfth centuries, lasting until the end of the Middle Ages, during the Nasrid era, when certain specific and differentiated characteristics developed, just before the definitive conquest of the Peninsula by Christians (Malpica and Garcia 2011).

As in the Iberian Peninsula, urban archaeology is one of the most developed areas in North Africa (Cressier 2012). The cities of Ifriqiya and the Maghreb, as indicated, had survived with some strength during the first medieval centuries, in spite of being occupied by Vandals and Byzantines. The Arabs occupied these cities, privileging some over others or founding new centers as in the case of Qayrawan (670). The present urban forms maintain a direct relationship, as happened in al-Andalus, with the structure of this new tribal society. This society assumed a protagonistic role with consolidating elements such as the mosque and the palace, the seat of power, which as political center acquired major dimensions (Guichard 1998). These cities based their growth and strength on cultivation of the land, converting themselves into nuclei receiving the rural surplus (Boone and Benco 1999). Thus, a dense network of cities of various dimensions was established and hierarchically organized. The transfer of trade routes for ivory, slaves, and sub-Saharan gold from the eastern edge of the desert to the west impacted on this urban network, creating various ideal spaces for the establishment of cities linked to the commerce of these goods, while the old centers linked to agricultural cultivation suffered notable decline (Boone et al. 1990). Ceramics found in various archaeological excavations have shed light on this process (Redman 1983–1984), especially in the settlement of Qsar

el Seghir, in the north of Morocco (Redman 1986), Ceuta (Hita and Villada 2003), Sijilmasa (Taouchikht 1996), and Túnez (Daoulatli 1978). The pattern can equally been seen in the north of Morocco, in the mountains of Rif, where, following a broad and extensive program of archaeological surveys, it has been observed that the urban centers that emerged in the interior maintained close links with the rural communities of their hinterlands, for the most part occupied by Berbers. The rise of Almoravid and Almohad power, which extended through the Maghreb and the Iberian Peninsula, contributed to the emergence of port cities on the northern coasts of Morocco (Cressier 1992).

Material Culture: The Production of Ceramics

Another development of recent decades in the Peninsula has been the study of the ceramic production. Great advances in this research took place at the end of the 1970s, when G. Rosselló (1978) published the results of studies on the ceramics of Mallorca. This signified a substantial revision of the field, acting as a catalyst for countless subsequent publications in conference proceedings and specialist journals that offered an overview of ceramic production in al-Andalus. Initially, the primary concern of researchers was to construct a new analytical methodology specific to these materials and to create a morphological corpus. This established a firm basis from which successive studies have been launched.

Within only a few years, particular aspects of analysis began to emerge and develop. One of these concerned the ceramics of the first Andalusian era. The work of S. Gutiérrez (1988) in Eastern Spain produced a group of material previously unknown in scientific literature, which was given the name "paleoandalusı" ceramics. These comprised a group of crude, handmade, or wheel-turned ceramics that in many cases show mixed characteristics. Chronologically, the group is placed during the eighth and ninth centuries in the early Andalusian period and has been interpreted by archaeologists as a manifestation of this transitional amiral period. Similar wares have been documented in North Africa of the same date.

It was not until the consolidation of the caliphate that glazed or varnished material of eastern origin appeared (Cano 1996). Thereafter, we see a diversification of forms, the development of specific functional groups (table ceramic, cooking and storage wares, etc.). Well-formed and well-fired ceramics with complex finishes indicate the establishment of production centers in al-Andalus, with complex techniques applied in each phase of manufacture (selection and manipulation of clays, turning, coating, and firing). This resulted in a new economic and social context. The materials created in these new workshops, located in urban centers of medium and large size, were widely distributed throughout al-Andalus, although it would be the eleventh and twelfth centuries before they reached the last corner (Fig. 7).

At this time, and during the last Andalusian centuries, ceramic materials in various forms reached the highest levels of technological sophistication, both as highly decorated luxury pieces and as domestic utensils (Fernández 2008; García Porras 2006b). These products, of high formal, decorative, and technological quality, would be the object of regular trade throughout the twelfth, thirteenth, fourteenth, and fifteenth centuries when the commercial processes of the West were

Spain and North Africa: Islamic Archaeology, Fig. 7 Dish of Madīnat Ilbīra, Atarfe, Granada (Malpica Cuello 2013: 131)

Spain and North Africa: Islamic Archaeology, Fig. 8 Gazelle vase, Alhambra Museum, Granada (Villafranca Jiménez 2006: 135)

developing (Fig. 8). High demand for these articles explains the frequent appearance of Tunisian and Andalusian materials in eastern contexts and in various faraway places (Italy, France, England and the Northern and Baltic Seas, etc.). In the Nasrid period, the impact of this trade on ceramic manufacture is clearer, with the production of luxuries becoming to some extent detached from that of domestic products. It was during this period that the ceramic artworks known as the "jarrones de la Alhambra" (vases of the Alhambra) and the tiles that decorated Nasrid palaces were created (García Porras 2006).

Future Directions

It should be noted that medieval archaeology in al-Andalus and the Maghreb exhibits very uneven levels of development. In North Africa, archaeological research still lacks depth in some of the areas outlined above (material culture, rural settlement, exploitation of resources, etc.), requiring a greater volume of basic studies. In al-Andalus, research is developing along new lines as some existing fields of study show signs of exhaustion. Among those aspects that show promise for future development, we should highlight landscape archaeology, material culture studies (especially underdeveloped aspects such as archaeometrical analyses), the archaeology of production, the archaeology of agriculture, zooarchaeology, etc. All these fields of investigation, as yet largely unexplored for the medieval Iberian Peninsula and North Africa but on which there are already publications of interest, offer enriching perspectives on historical and archaeological research.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Medieval Archaeology
- ▶ Medieval Urbanism
- ▶ Military Activity in Islamic Archaeology
- ▶ North Africa: Historical Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Spain: Nationalism and Archaeology
- ▶ West Africa: Islamic Archaeology

References

Abad Casal, L., P. CÁnovas Guillén, B. Gamo Parras, and S. Gutiérrez Lloret. 2012. El Tolmo de Minateda (Hellín, Albacete, España): un proyecto de investigación y puesta en valor del patrimonio. *Debates de Arqueología Medieval* 2: 351–381.

Acién Almansa, M. 1989. Poblamiento y fortificación en el sur de al-Andalus. La formación de un país de ḥusun. In *Actas del III Congreso de Arqueología Medieval Española*, ed. F.J. Fernández Conde, 135–150. Oviedo: Universidad de Oviedo.

Acién Almansa, M. 1995. La fortificación en al-Andalus. *Archeologia Medievale* 22: 7–36.

Acién Almansa, M. 1999. Los ṯugur del reino nazarí. Ensayo de identificación. In *Castrum 5. Archéologie des espaces agraires méditerranéens au Moyen Âge*, ed. A. Bazzana, 427–438. Madrid/Roma: Casa de Velázquez-EFRM.

Azuar Ruiz, R. 1988. *Denia islámica. Arqueología y poblamiento*. Alicante: Instituto de Cultura "Juan Gil-Albert".

Azuar Ruiz, R. 2016. *Castillos, ciudades y campesionos en el Sharq al-Andalus*. Alicante: Instituto de Cultura "Juan Gil-Albert".

Barceló, M. 1997. *El sol que salió por Occidente. Estudios sobre el estado Omeya en al-Andalus*. Jaén: Universidad de Jaén.

Barceló, M., H. Kirchner, R. Martí, and J.M. Torres. 1988. *The design of irrigation system in al-Andalus*. Barcelona: Universidad Autónoma de Barcelona.

Bazzana, A. 1992. *Maisons d'al-Andalus: habitat médiévale et structures du peuplement dans l'Espagne orientale*. Madrid: Casa de Velázquez.

Bazzana, A., P. Cressier, and P. Guichard. 1988. *Les chateaux ruraux d'al-Andalus. Histoire et archéologie des ḥusun du Sud-Est de l'Espagne*. Madrid: Casa de Velázquez.

Boone, J.L. 2009. *Lost civilization? The contested Islamic past in Spain and Portugal*. London: Duckworth.

Boone, J.L., and N.L. Benco. 1999. Islamic settlement in North Africa and the Iberian Peninsula. *Annual Review of Anthropology* 28: 51–71.

Boone, J.L., J.E. Myers, and C.L. Redman. 1990. Archeological and historical approaches to complex societies: The Islamic states of medieval Morocco. *American Anthropologist* 92: 630–646.

Cano Piedra, C. 1996. *La cerámica verde-manganeso de Madinat Al-Zahra*. Granada: Legado Andalusí.

Cressier, P. 1991. Agua, fortificaciones y poblamiento: el aporte de la arqueología a los estudios sobre el sureste peninsular. *Aragón en la Edad Media* 9: 403–427.

Cressier, P. 1992. Le développement Urbain des côtes septentrionales du Maroc au Moyen Age: frontière intérieure et frontière extérieure. In *Castrum 4: Frontière et peoplement dans le monde méditerranéen au Moyen Age*, 173–187. Madrid: Casa de Velázquez.

Cressier, P. 2007. Aghmat. Une question de territorire(s). In *Le Maghreb, al-Andalus et la Méditerranée occidentale (VIIIe-XIIIe siècle)*, ed. P. Sénac, 81–95. Toulouse: Université de Toulouse – Le Mirail.

Cressier, P. 2010. Nakur (IXe-Xe siècles). une ville berbère ou ville andalouse ? In *La ciudad mediterránea: sedimentos y reflejos de la memoria*, ed. A.N. Arnal Gély and J.A. González Alcantud, 127–142. Granada: Universidad de Granada.

Cressier, P. 2012. Ville médiévale au Maghreb. Recherches archéologiques. In *Histoire et archéologie de l'Occident musulman (VIIe-XVe siècles). Al-Andalus, Maghreb, Sicilie*, ed. P. Sénac, 117–140. Toulouse: CNRS-Université de Toulouse-Le Mirail.

Cressier, P., and M. García Arenal, eds. 1998. *Genèse de la ville islamique en al-Andalus et au Maghreb occidental*. Madrid: Casa de Velázquez-CSIC.

Cressier, P., and M. Rammah. 2008. Sabra al-Mansuriya. Une nouvelle approche archéologique. In *Kairouan et sa région. Nouvelles découvertes, nouvelles approches*, ed. A. El Bahi, 155–170. Kairouan: Miskiliani éditions.

Creswell, K.A.C. 1959. *The Muslim architecture of Egypt, II, Ayyubids and early Bahrite Mamluks, A.D.*, 1171–1326. Oxford: Oxford University Press.

Daoulatli, A. 1978. La ceramique ifriqiyenne du IXau XV siècle. In *La céramique médievale en Méditernée occidentale. Xe-XVe siécles*, 197–201. Paris: Editions CNRS.

Eiroa Rodríguez, J., A. MartÍnez Rodriguez, and J. Ponce García, eds. 2009. *El otro lado. Asentamientos rurales en la frontera oriental nazarí*. Murcia: Ayuntamiento de Lorca-Universidad de Murcia.

Fentress, E., and H. Limane. 2007. Excavations in medieval settlements at Volubilis. 2000–2004. In *Le Maghreb, al-Andalus et la Méditerranée occidentale (VIIIe-XIIIe siècle)*, ed. P. Sénac, 37–56. Toulouse: Université de Toulouse – Le Mirail.

Fernández Navarro, E. 2008. *Tradición tecnológica de la cerámica de cocina almohade-nazarí*. Granada: Grupo de Investigación THARG.

García Porras, A. 2001. *La cerámica del poblado fortificado medieval de "El Castillejo" (Los Guájares, Granada)*. Granada: Athos-Pérgamos.

García Porras, A. 2006. Transmisiones tecnológicas entre el área islámica y cristiana en la Península Ibérica. El caso de la producción cerámica esmaltada de lujo bajomedieval (ss. XIII-XV). In *Trentottesima Settimana di Studi. Istituto Internazionale di Storia Economica. Relazioni Economiche tra Europa e Mondo Islamico Secc. XIII-XVIII*, ed. S. Cavaciocchi, 825–842. Florence: Le Monnier.

García Porras, A. 2006b. La cerámica de uso doméstico de época nazarí. In *Los Jarrones de la Alhambra. Simbología y poder*, ed. M.M. Villafranca, 89–96. Madrid: Patronato de la Alhambra-Generalife.

García Sanjuán, A. 2013. *La conquista islámica de la Península Ibérica y la tergiversación del pasado*. Madrid: Marcial Pons.

Gelichi, S., and M. Milanese. 2002. The transformation of the ancient towns in Central Tunisia during the Islamic period: The example of Uchi Maius. *Al-Masaq* 14 (1): 33–45.

Glick, T.F. 1970. *Irrigation and society in medieval Valencia*. Cambridge, MA: Harvard University Press.

Gómez Moreno, M. 1951. *Arte español hasta los almohades (Ars Hispaniae 3)*. Madrid: Plus Ultra.

Grabar, O. 1973. *The formation of Islamic art*. New Haven/Londres: Yale University Press.

Grabar, O. 1980. *La Alhambra: Iconografía, formas y valores*. Madrid: Alianza Editorial.

Guichard, P. 1976. *Al-Andalus. Estructura antropológica de una sociedad islámica en Occidente*. Barcelona: Barral.

Guichard, P. 1988. Le problème des structures agraires en al-Andalus avant la conquete chrétienne. In *Andalucía entre oriente y occidente (1236–1492). Actas del V coloquio internacional de Historia Medieval de Andalucía*, ed. E. Cabrera, 161–170. Córdoba: Diputación de Córdoba.

Guichard, P. 1990–1991. *Les musulmans de Valence et la Reconquête (XIe-XIIIe siècles)*. Damasco: Institut Français de Damas.

Guichard, P. 1998. Les villes d'al-Andalus et de l'Occident musulman aux premiers siècles de leur histoire. Une hypothèse récente. In *Genèse de la ville islamique en al-Andalus et au Maghreb occidental*, ed. P. Cressier and M. García-Arenal, 37–52. Madrid: Casa de Velázquez.

Gutiérrez Lloret, S. 1988. *Cerámica común paleoandalusí del sur de Alicante (siglos VII-X)*. Alicante: Caja de Ahorros Provincial.

Gutiérrez Lloret, S. 1996. *La cora de Tudmir: de la antigüedad tardía al mundo islámico: poblamiento y cultura material*. Madrid: Casa de Velázquez.

Gutiérrez Lloret, S. 1998. Ciudades y conquista: el fin de la *civitates* visigodas y la génesis de las *mudun* islámicas en el surested e al-Andalus. In *Genèse de la ville islamique en al-Andalus et au Maghreb occidental*, ed. P. Cressier and M. García Arenal, 137–157. Madrid: Casa de Velázquez-CSIC.

Gutiérrez Lloret, S. 2012. La arqueología en la historia del temprano al-Andalus: espacios sociales, cerámica e islamización. In *Histoire et archéologie de l'Occident musulman (VIIe-XVe siècles). Al-Andalus, Maghreb, Sicilie*, ed. P. Sénac, 35–66. Toulouse: CNRS-Université de Toulouse-Le Mirail.

Gutiérrez Lloret, S. 2013. Coming back to grammar of the house: Social meaning of medieval households. In *De la estructura doméstica al espacio social. Lecturas arqueológicas del uso social del espacio*, ed. S. Gutiérrez and I. Grau, 245–264. Alicante: Publiaciones Universidad de Alicante.

Hita Ruiz, J.M., and F. Villada Paredes. 2003. Entre el islam y la cristiandad: cerámica del siglo XV en Ceuta. Avance preliminar. In *Cerámicas islámicas y cristianas a finales de la Edad Media. Influencias e intercambios*, 367–405. Ceuta: Museo de Ceuta.

Hita Ruiz, J.M., and F. Villada Paredes. 2012. Arqueología medieval islámica en Ceuta entre 1987 y 2011. *Boletín de Arqueología medieval* 16: 21–66.

Kirchner, H., and C. Navarro. 1993. Objetivos, métodos y práctica de la arqueología hidráulica. *Archeologia Medievale* 20: 121–150.

Lagardère, V. 1993. *Campagnes et paysans d'Al-Andalus. (VIIIe-XVe s.)*. París: Maisonneuve et Larose.

Leone, A. 2007. *Changing townscapes in North Africa from late antiquity to the Arab conquest*. Bari: Edipuglia.

Leone, A., and D.J. Mattingly. 2004. Vandal, byzantine and Arab rural landscapes in North Africa. In *Landscapes of change: Rural evolutions in late antiquity and the early middle ages*, 135–162. Aldershot: Ashgate.

Macias, S. 2012. Archéologie islamique au Portugal: bila et thémes de recherche. In *Histoire et archéologie de l'Occident musulman (VIIe-XVe siècles). Al-Andalus, Maghreb, Sicilie*, ed. P. Sénac, 101–115. Toulouse: CNRS-Université de Toulouse-Le Mirail.

Malpica Cuello, A. 1996. *Poblamiento y castillos en Granada*. Barcelona: Legado Andalusí.

Malpica Cuello, A. 2006. La formación de una ciudad islámica: Madinat Ilbira. In *Ciudad y Arqueología Medieval*, ed. A. Malpica Cuello, 65–86. Granada: Alhulia.

Malpica Cuello, A. 2008. Las villas de la frontera granadina ¿Ciudades o alquerías fortificadas? In *Castrum 8. Le château et la ville. Espaces et réseaux*, ed. P. Cressier, 151–173. Madrid: Casa de Velázquez.

Malpica Cuello, A. 2012–2013. Formación y desarrollo del agroecosistema irrigado en al-Ándalus. *Norba. Revista de Historia* 25–26: 41–60.

Malpica Cuello, A., ed. 2013. *Mil años de Madinat Ilbira*. Granada: Legado Andalusí.

Malpica Cuello, A., and A. García Porras, eds. 2011. *Las ciudades nazaríes. Nuevas aportaciones desde la arqueología*. Granada: Alhulia.

Manzano Moreno, E. 2006. *Conquistadores, emires y califas: los Omeyas y la formación de al-Andalus*. Barcelona: Crítica.

Marçais, G. 1954. *L'architecture musulamne d'Occident*. Paris: Arts et métiers graphiques.

Messier, R., and A. Fili. 2002. La ville caravannière de Sijilmasa : du mythe historique à la réalité archéologique. In *II Congreso internacional. La ciudad en al-Andalus y el Magreb*, ed. A. Torremocha Silva and V. Martínez Enamorado, 502–510. Granada: Fundación Legado Andalusí.

Navarro Palazón, J., and P. JimÉnez Castillo. 2007. *Las ciudades de Alandalús. Nuevas perspectivas*. Zaragoza: Instituto de Estudios Islámicos y del Próximo Oriente.

Onrubia Pintado, J. 2004. El programa de cooperación hispano-marroquí en materia de arqueología y patrimonio. Investigaciones arqueológicas (1998–1999). *Bienes culturales. Revista del Instituto del Patrimonio Histórico Español* 3: 183–189.

Redman, C.L. 1983–1984. Survey and test excavation of six medieval Islamic sites in northern Morocco. *Bulletin d'Archéologie Marocaine* 15: 311–360.

Redman, C.L. 1986. *Qsar es-Seghir: an archaeological view of medieval life*. Orlando: Academic.

Rossello Bordoy, G. 1978. *Ensayo de sistematización de la cerámica árabe en Mallorca*. Palma de Mallorca: Diputación Provincial de Baleares.

Sénac, P., ed. 2007. *Le Maghreb, al-Andalus et la Méditerranée occidentale (VIIIe-XIIIe siècle)*. Toulouse: Université de Toulouse – Le Mirail.

Sénac, P., ed. 2012. *Histoire et Archéologie de l'Occident musulman (VIIe-XVe siècle): al-Andalus, Maghreb, Sicile*. Toulouse: CNRS – Université.
Taouchikht, L. 1996. Siyilmasa: Estudio ceramológico. *Arqueología y Territorio Medieval* 3: 221–252.
Terrasse, H. 1932. *L'art hispano-mauresque des origines au XIIIe siècle*. París: G. Van Oest.
Torres Balbás, L. 1949. *Arte almohade. Arte nazarí. Arte mudéjar (Ars Hispaniae 4)*. Madrid: Plus Ultra.
Torres Balbás, L. 1970. *Ciudades hispano musulmanas*. Madrid: Instituto Hispano-Árabe de Cultura.
Trillo San José, C. 2004. *Agua, tierra y hombres en al-Andalus. La dimensión agrícola del mundo nazarí*. Granada: Alhulia.
Villafranca Jiménez, M.M., ed. 2006. *Los Jarrones de la Alhambra. Simbología y Poder*. Granada: Patronato de la Alhambra-Generalife.
Wickham, C. 2005. *Framing the early Middle Ages. Europe and the Mediterranean, 400–800*. London: Oxford University Press. 888.

Spain: Archaeological Heritage Management

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Introduction and Definition

After the fall of the dictatorship and the adoption of a democratic political system in 1977, Spain was divided into different regions called autonomous communities. These regions are responsible for managing the archaeological heritage located in their territory, and although there is a national framework law – *Ley de Patrimonio Histórico Español*, LPHE – dating to 1985, each one of them has since passed its own legislation. The way that heritage is defined in these texts, using different adjectives such as cultural, historic, and artistic-historic, has implications for the way archaeological remains are considered and preserved. Ultimately, the regional government decides the general policy and actions that are very much related to their general political tendency in a specific region. For instance, if a region has its own language (e.g., Cataluña or Galicia), the archaeological policy will emphasize local and indigenous sites rather than more recent ones or those that deal with a more homogeneous idea of culture, i.e., the Roman period.

The main responsibilities of the Spanish central government with respect to archaeological heritage management, through its Ministry of Culture, are the looting of sites and the export/import of cultural property (LPHE 16/85, article 6b). This issue has become a very sensitive one since the ratification of the Treaty of Maastricht in 1993, which opened up the borders between the European Union member states. If goods can travel freely throughout Europe, does that include archaeological heritage objects as well? The Spanish law is very clear about this: it is forbidden to export archaeological objects more than one hundred years old or inscribed in the General Inventory of Movable Property (*Inventario General de Bienes Muebles*) without authorization from the Ministry of Culture (LPHE 16/85, articles 5.2 and 30). But then again, what do we do with Spanish Civil War remains (1936–1939) found during an archaeological excavation that are younger than a hundred years old? Are they not eligible to receive the same protection? Some of the regional governments have passed their own legislation regarding this issue, and there is a very engaging intellectual debate about using age as a means to catalog, and therefore protect, archaeological remains (Pérez-Juez 2012).

The other principal contribution of the LPHE 16/85 is the creation of different databases, registers, and legal instruments that provide protection to situations and cases forgotten in previous legal frameworks. Among the new legal instruments, the main one is the BIC – *Bien de Interés Cultural* – that could be translated as property of cultural interest (LPHE 16/85, arts. 9–13). It is a narrowly defined tool which, after compliance with a specific administrative procedure, becomes the subject of very strict protection. The concept of BIC has given rise to doubts and has not prevented the destruction of heritage not listed in the inventory or any of the rest of the categories created in the law (Perez-Juez 2006).

Key Issues

The new regional administrative model, which transferred almost all cultural responsibilities to the regions, has led to an increased investment in local archaeological sites. Since the first decades of its implementation, investment was focused primarily in those sites that deal with indigenous cultures from before the Roman arrival (Celts in the north or Iberians in the east). Issues of identity and the desire to promote a decentralized political and administrative system influenced the sites that were chosen to be excavated and opened to the public. This policy has resulted in the restoration and interpretation of numerous archaeological sites throughout Spain, many of which are difficult to preserve but necessary to foster local involvement and community awareness. Some of the sites have also been grouped in itineraries or routes that integrate different regions, promoting the touristic side of archaeology. The "Via de la Plata Route," The "*al-Andalus*. Routes: the Andalusian Legacy," or The "Iberian Route" are some good examples of the regional governments' goal to preserve archaeological heritage within a more inter-regional landscape (Fig. 1).

The regional governments have created diverse ways of preserving and managing their archaeological remains, but all are based on the idea that heritage belongs to the entire community, despite location on private or public land. This means that any archaeological site must be open to the public if deemed necessary by local authorities. Landowners of the site are also obliged to preserve it, and the destruction of archaeological remains, even those on private land, is a crime that is already generating some interesting legal verdicts. In this regard, the destruction of part of the Phoenician/Carthaginian necropolis of Puig des Molins, Ibiza, by private constructors provides the best – and first – example of a court decision for crimes against cultural property. In 1994, the final verdict sent the defendants to jail as well as condemned them to the payment of three hundred and fifty million pesetas, or 2.103.542,37 euros (Costa et al. 1996). This decision established a precedent for future cases and finished with the impunity that crimes against heritage had enjoyed for a long time.

Sites on public land can be managed both privately and publicly. This choice is generally made with regard to the specific location of the site, i.e., near a tourist center, in a place with easy

Spain: Archaeological Heritage Management, Fig. 1 Talayotic site in Menorca. This Iron Age settlement is a good example of recent monumental sites excavated and restored in order to incorporate them in tourist itineraries. In this case, Menorca, one of the Balearic Island, receives a high number of tourists that visit restored archaeological sites during the summer

access, close to a big city, etc. As tourism is Spain's most important industry, there has been an important effort to restore and present some monumental sites located near coastal tourist regions. Therefore, Roman and Islamic sites, e.g., Ampurias, Segobriga, or Madinat al-Zahra, with their beautiful architecture, have been the main focus of public investment. However, a renewed interest in prehistoric sites and local cultures has resulted in the restoration and interpretation of non-monumental sites in the last few decades. This is the case for all the caves in northern Spain with rock art (Cueva del Castillo, el Pendo, Covalanas, or Tito Bustillo) and other sites with Paleolithic remains like Atapuerca.

European Union Legislation

In addition to the division of the country into regions, one of the recent major forces of archaeological heritage management has been the compliance of Spanish legislation with that of the European Union. The main piece of legislation is the Council Directive 97/11/EC of 3 March 1997, amending Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment, generally known as EIA (environmental impact assessment). These directives have been transposed into Spanish national law in the *Ley 6/2001, de 8 de mayo (BOE n° 111, de 09.05.01)*. and Real Decreto Legislativo *1/2008*, de 11 de enero.

This piece of legislation is based on the principle of preventive action and requires, among other things, that archaeological investigation occur before any new construction proceeds, either private or public. The construction of the high-speed train system, airports, and other types of infrastructure has generated numerous archaeological excavations that have yielded an abundance of archaeological data that need to be preserved and studied. The challenge is where to store and exhibit these millions of pieces, whether to build or expand museums or other cultural institutions, and the means to curate the new collections. Public authorities are responsible for seeking out ways of storing, preserving, and showing all the materials that come from the removal of tons of deposits, but in most cases, it becomes a question of budget and space. Some regions, like the Balearic Islands, are assessing their own ways of dealing with this material that has been produced by the economic growth of Spain. Purging some of the findings is one of the proposals on the table, which entails both positive and negative aspects, but might be against the general idea of preserving the past (Fig. 2).

Spain has ratified almost all of the conventions on archaeological heritage preservation and management (e.g., Lausanne, Malta). However, these documents are not always enforced and in many cases they are an indication of the most common practices or remain pure inspiration for internal decisions. In other words, the recommendations made in these conventions will not always be enforced by national or regional policies.

Current Debates

Despite all the new challenges that democracy, economic growth, development, and new European legislation have brought to Spanish archaeological heritage management, the future looks promising. Thanks to the investment in research, restoration, and opening of sites, there has been an increase in public awareness and, therefore, community involvement and private investment. Foundations, local associations, and even corporate engagement are changing the way in which we look at the entire preservation and enjoyment of our heritage. Research has also benefited from this change and new projects are focusing on non-monumental sites. In fact, projects that include research and public outreach are the ones being most supported both by public and private institutions (Pérez-Juez 2010).

A good example of such a joint venture is the project on the paleoanthropological sites of Atapuerca, Burgos, included on UNESCO World Heritage list because of the importance of its fossils for the study of human evolution. In this amazing site, fossils belonging to three different hominin species (*Homo antecessor*,

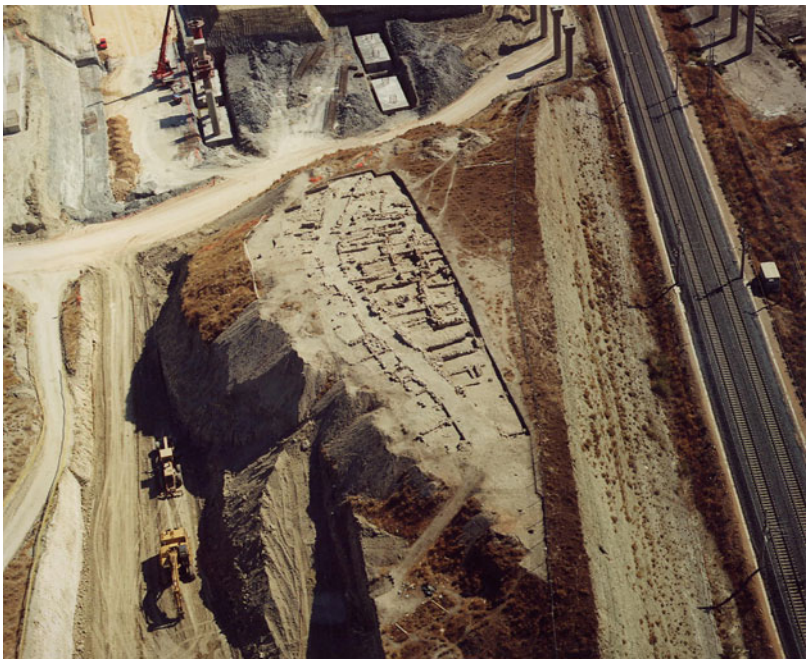

Spain: Archaeological Heritage Management, Fig. 2 El Cerro de la Gavia, Madrid. This Iron Age site was discovered and excavated during the construction of the high speed train tracks in the outskirts of Madrid. The excavation was paid for by public works funds

heidelbergensis, and *sapiens*.) have yielded important information about the arrival of humans in Europe and their survival and adaptation in the last 1.2 Ma (Arsuaga et al. 2003).

As it relates to heritage management, the sites of Atapuerca have inspired a dual management strategy in which public outreach is equally as important as scientific research, and public outreach programs partially fund research while also promoting community awareness and support. Atapuerca's administration structure involves many entities, including a foundation dedicated to managing private funds and providing legal status to the project. There are also visitor centers, an experimental archaeology park, a research center, and a museum, all of which have promoted the sustainable development of the region, helped to preserve the site, and engaged the community in its preservation.

In 2007, the regional government of Castilla and León (the autonomous community in which Atapuerca is located) created the legal instrument of "Cultural Space" in order to provide a better management framework by expanding the protection of the area beyond the actual sites. In 2009, this same government developed a specific management model with the idea of protection but also of making the sites the epicenter of an economic development in the region: the "Atapuerca System, Culture of Evolution." The Atapuerca System has implemented a more coherent way of managing different bodies and institutions providing a common goal: preservation and sustainable development of the region. It includes most of the abovementioned infrastructure: visitor centers (existing and new ones), the National Center for Research on Human Evolution (CENIEH), the Human Evolution Museum, and others. This integrative formula is new to Spanish heritage management but reveals a current trend that will probably become very successful in the near future (Figs. 3 and 4).

Finally, the recently approved "Historical Memory Law" (2007) has raised new questions about archaeological heritage because the excavation of burial sites, bunkers, trenches, battle fields, and other remains from the Spanish Civil War unearths archaeological material that must not only be preserved but also interpreted, displayed, or reburied. The challenge for managing this new heritage not only concerns preservation but also deals with family stories and

Spain: Archaeological Heritage Management, Fig. 3 Atapuerca site, Burgos. Atapuerca is a good example of a scientifically productive site combined with a very intense public outreach program. In fact, some of the funding comes from private donors that request specific outreach activities for their companies

Spain: Archaeological Heritage Management, Fig. 4 Atapuerca: archaeological summer camps. School kids identifying animal bone. The archaeological camps were developed by the Atapuerca Foundation as part of the public outreach program

political messages that can be sent along with the historical information. Although the method used is clearly archaeological, there is still some debate about the remains being unearthed – bullets, water bottles, buttons, buckles, or even guns –some of which will end up in museums and some of which will be reburied, namely, human remains (Fig. 5).

Future Directions

The management of archaeological heritage in Spain has evolved from the idea of protecting only beautiful monuments in the nineteenth century to a very broad understanding of what archaeological heritage means. New legal instruments to protect both movable and nonmovable heritage

Spain: Archaeological Heritage Management, Fig. 5 Excavated Civil War remains in the Madrid region (1936–1939). These trenches were excavated during the construction of the high speed railway, as part of a contract archaeology project, and shed light on a very important historic period that had not received any attention before the end of the 20th century

are key for the future, as regional governments gain more responsibility and decentralized policies seem to dictate the actual actions. The challenge for the twenty-first century is to harmonize all the existing legislation – regional, national, and international – and enforce it in a way that brings research and public outreach together.

Another important challenge for the twenty-first century is the revision of the legislation that deals with fiscal incentives in the research and preservation of cultural heritage. The current Law of Patronage approved in 2002 (Ley de Mecenazgo 2002) is short on benefits given to private investment and does not really promote private engagement.

Finally, the new approach to archaeological heritage management within a specific landscape, tightly linked to a community that takes into account all the stakeholders around it, is probably the main idea for the future. Some new challenges arise from this holistic vision of heritage, such as the sustainable development of a region, social cohesion around it, or the construction of an identity. Archaeological heritage management, then, becomes a cultural, social, economic, and political tool that needs some cautious understanding. Heritage can foster a very unique feeling of cohesion within a territory that implies a need and a challenge to use this as a means to preserve and study a site, not to use it as a political weapon (Pérez-Juez 2010).

Cross-References

- ► Conservation and Management of Archaeological Sites
- ► Conservation and Preservation in Archaeology in the Twenty-First Century
- ► Cultural Heritage and the Public

References

Arsuaga, J.L., J.M. Bermúdez de Castro, and E. Carbonell, eds. 2003. *Atapuerca. The first Europeans: Treasures from the hills of Atapuerca*. Junta de Castilla y León.

Costa, B., J.E. Fernández, and R.M. de Hoyos. 1996. La Ley 16/1985 y la defensa del patrimonio arqueológico en Ibiza: El caso de CanPartit. In *Complutum,* 6–11.

Directiva 97/11/CE, de 3 de marzo, por la que se modifica la Directiva 85/337/CEE, relativa a la evaluación de las repercusiones de determinados proyectos públicos y privados sobre el medio ambiente, (DOCE n° L 73, de 14.03.97), traspuesta en la Ley 6/2001, de 8 de mayo (BOE n° 111, de 09.05.01). y el Real Decreto Legislativo 1/2008, de 11 de enero, por el que se aprueba el texto refundido de la Ley de evaluación de impacto ambiental de proyectos.

Ley de Mecenazgo. 2002. Ley 49/2002 de régimen fiscal de las entidades sin fines lucrativos y de los incentivos fiscales al mecenazgo.

Pérez-Juez, A. 2006. *Gestión del patrimonio arqueológico*. Barcelona: Editorial Ariel.

Pérez-Juez, A. 2010. La gestión del patrimonio arqueológico: de a tradición al nuevo panorama del siglo XXI. In *La ciudad dentro de la ciudad: la gestión y conservación del patrimonio arqueológico en ámbito urbano,* coord. R. Hidalgo, 9–16. Seminario de Arqueología, Universidad Pablo de Olavide.

Pérez-Juez, A. 2012. El museo fuera del museo: la gestión de patrimonio arqueológico in situ. In *Construcciones y usos del pasado. Patrimonio arqueológico, territorio y museo*, ed. C. Ferrer and J. Vives-Ferrándiz, 115–136. Valencia: Museo de Prehistòria de València.

Further Reading

Ballart Hernández, J., and J. Jordi Tresseras. 2001. *Gestión del patrimonio cultural*. Cantabria: Editorial Gobierno de Cantabria.

Ley 16/1985, de 25 de junio, del Patrimonio Histórico Español.

Ley de la Memoria Histórica. 2007. Ley 52/2007, de 26 de diciembre, por la que se reconocen y amplían derechos y se establecen medidas en favor de quienes padecieron persecución o violencia durante la guerra civil y la dictadura.

Spain: Nationalism and Archaeology

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Introduction and Definition

Spain is a nation of nations. It was not always so and this is not an assertion that everybody would agree with. However, it better describes today's political reality than any other possible model. In this entry, the relationship between archaeology and nationalism in Spain will be analyzed, paying particular attention to how this has changed over the last 200 years.

Nationalism is based on the idea that "humanity is naturally divided into nations, that nations are known by certain characteristics which can be ascertained, and that the only legitimate type of government is national self-government" (Kedourie 1993: 1). Although this definition seems to indicate a direct relationship between one nation and one type of self-government, in practice the way in which these two concepts are connected is very flexible and there is a wide range of options on how this link is modelled. At one extreme, it is possible to find nation-states such as the Czech Republic in which a single national feeling exists. In contrast, other nation-states have followed a very different model, and in them several nationalisms exist side by side, complementing another level of nationalism. One example of the latter is the United Kingdom of Great Britain and Northern Ireland, formed by England, Scotland, Wales, and a fourth more problematic nation, Northern Ireland.

In the last two centuries, Spain has moved from one model to the other. The debates about the nature of nationalism in Spain are not unrelated to the development of archaeological practice in the country. These debates are in the background of archaeologists, work. At the same time, new proposals archaeologists make impacts the way in which the nature of nationalism is perceived but through this work archaeologists are also involved in these debates, thus becoming active participants in the negotiations shaping the future of the nation.

Historical Background and Key Issues

Christopher Columbus' arrival in America in 1492 thanks to the sponsorship of the Catholic Monarchs was the beginning of a series of historical events that turned Spain – or, more accurately, the different kingdoms on the Iberian Peninsula reigned over by the Catholic Monarchs and their descendants – into a mighty early modern empire. After many decades of decadence, the opportunity created by the Napoleonic invasion of Spain (1808–1814) was seized by many colonies to proclaim independence from the metropolis.

Spain thus entered the nationalism era as an impoverished country with only a few remaining colonies. Before this, from the sixteenth to the eighteenth century, Spanish antiquarians had actively shared the interest of much of the Western world in the classics and classical archaeology. Excavations of Roman monuments and the search for statues, inscriptions, and coins dominated this research. It was combined with an interest in their own national past, as reflected in Ambrosio de Morales' *Relaciones Topográficas* (1575, 1578). The monumental past left behind by the major civilizations in the Mesoamerican and Andean areas was also the focus of attention of both Spanish and local scholars. Information about American ruins had been known since the sixteenth century, and some archaeological monuments, including Palenque in Mexico, were excavated at the time partly thanks to royal funding. The language of the past became a new way of expressing power, abandoning in this way the religious discourse.

The end of the Enlightenment saw the first signs of the regulation of antiquities within the framework of the creation of the modern state. From 1752 the Royal Academies of History and of Fine Arts had been in charge of archaeological excavations and the Academy of History proposed the first ban on the illegal export of antiquities in 1779. The law passed in 1803 to protect monuments and antiquities would be in place for a century, despite the Napoleonic invasion and the many political changes in the history of Spain.

Nineteenth-Century Archaeology in Spain and Nationalism

Spain satisfied the four criteria that nations had to fulfill to be accepted as such (Hobsbawm 1990: 18). The first was the threshold principle, by which only states dominating large territories could qualify as nations. This principle allowed countries such as France, Britain, and Spain to be considered as nations and included others in the Americas, such as the United States and the new countries born out of the decolonization of Latin America. Spain also met the other three criteria: having a long-established elite with a literate and administrative vernacular, having the ability to conquer, and being a historical state (Hobsbawm 1990: 37–38). It was this last condition that convinced politicians and learned individuals all over the Western world of the importance of history and archaeology. Archaeology was – and is – important to nationalism, because by definition nations have a past. This past is constructed through a narrative with data coming from archival documents, philological genealogies, and antiquities. Archaeology, therefore, was one of a range of disciplines that fed national history and national identity. However, in the nineteenth century, the professionalization of archaeology was only partial, as there was a widespread belief in the preeminence of historical documents over material culture remains. At that time, therefore, most scholars dealing with antiquities generally earned their living by other means and satisfied their curiosity regarding the historical roots of their nation in their leisure time. Spain was no exception to this.

King Fernando VII's death in 1833 brought to an end the attempt to continue with the Ancient Regime status quo that had begun with the defeat of the Napoleonic troops in 1814. The modernization of the country led to the dissolution of the monasteries as a way of controlling ecclesiastical power. This involved a change in the ownership of many buildings and in some cases of large territories previously owned by the Church, as well as a sudden increase in the number of antiquities and works of art in circulation. All over Spain two types of institution were set up to deal with this situation: provincial museums and Provincial Commissions for Historic and Artistic Monuments (Comisiones de Monumentos Históricos y Artísticos). The responsibility of the latter was to care for and protect buildings, monuments, and artistic objects that, because of the "beauty of their construction, their antiquity, their origin, their particular use or the historical memories (recuerdos) they impart," should be preserved (Royal Order 2 April 1844). The first learned archaeological societies, including the Spanish Academy of Archaeology and the Archaeological Society of Tarragona, were also founded during this period. Antiquities were also discussed in

new learned journals such as *El Artista* and *Semanario Pintoresco Español*.

The building of the modern state went one step further in 1856 with the establishment of the Higher School of Diplomacy (ESD, Escuela Superior de Diplomática), set up to educate archivists, librarians, and museum curators (first called antiquarians and then, from 1900, archaeologists). This school would be the main learning center for professional archaeologists until 1900, when its lecturers were integrated into the mainstream university system. Most of those taught there went on to work in museums and also children's secondary schools, and from their posts many engaged in archaeological activities and published in the journal related to the ESD and the professional body for museum curators, archivists, and librarians.

In addition to this institutionalization, the influence of nationalism on Spanish archaeology can be seen in the geographical areas and fields of research and the interpretations proposed. The dominant Madrid-based model of Spanish nationalism, which emphasized the Castile-Andalusia axis as the embodiment of the Spanish national spirit, was clearly reflected in the first major national history, Modesto Lafuente's *General History of Spain* (1850–1867), which would become a key factor in the formation of a Spanish national consciousness. Lafuente's work stressed a series of heroes such as the native Viriatus, one of the "unschooled warriors that Spanish soil has always bred" (Lafuente 1850: 22). It highlighted the heroic resistance of Saguntum and Numantia against the Romans but also showed pride in the Spanish contribution to the Roman Empire. However, Lafuente's account of the medieval period occupied many more pages than those devoted to the previous epochs, giving pride of place to the reconquest of the Christian kingdoms in the territory under Muslim rule. The discourse so well expressed by Lafuente and followed by most contemporary scholars was not however devoid of contradictions. Together with the emphasis on Christianity as a key element in the Spanish spirit came a penchant for the reminiscences of Islamic Spain, including Andalusian folklore and Islamic monuments and antiquities. There were also contradictions regarding earlier periods: whereas Roman ruins were perceived as the embodiment of the pedigree of civilization on Spanish soil, the protohistoric deeds of the Celtiberian town of Numantia were hailed as an early demonstration of the brave and resilient character of Spaniards.

The unification of Italy in 1860 (completed in 1870 with the inclusion of Rome) and Germany in 1871 made it much more acceptable for previously divided territories to claim a common ancestry and to be recognized in the international arena as such. Importantly for Spain, the key role played by the vernacular language in both Italy and Germany also made it conceivable for areas that already formed part of a nation-state, but in which a different language was spoken, to claim their right to political independence. In Spain such areas existed in the most developed industrial regions including Catalonia and the Basque Country (as well as in less prosperous areas such as Galicia, the Balearic Islands, and the Valencian Country and in many other areas of Spain where peasants spoke dialects that were not easy for Spanish speakers to understand). Barcelona, and to a great extent also Bilbao, became culture hubs and in them cultural and social elites developed a sense of a separate ethnic identity. Alternative versions to Lafuente's unitary understanding of Spain emerged, all of them stressing the plural nature of the Spanish nation. Catalan historians delved into one of the most important periods in their own history, the flourishing Middle Ages, and recalled Catalonia's role in the reconquest. The attraction towards the Catalan past as a whole was reflected in the appearance of learned societies whose interests covered not only the province of Barcelona but also the four Catalan provinces and, to a great extent, all the areas of Spain where Catalan was spoken, including the Valencian Country and the Balearic Islands. Examples of these learned associations were two rival Catalan Societies of Excursions established in 1876 and 1878.

Professional archaeology, however, was still directed from Madrid: official training continued to take place at the Madrid-based ESD and the National Archaeological Museum, opened in 1867, had the largest number of professional archaeologists. The areas in which scholars

undertook their studies were revealing – whereas throughout the Spanish territory scholars limited themselves to studying the antiquities found in their own provinces (or language areas as in Catalonia), Madrid-based archaeologists managed to deal with the whole of the Spanish territory, thus mirroring the centralized administration of Spain. Interestingly, most of the studies undertaken by members of the National Archaeological Museum dealt with antiquities from Castile and Andalusia.

Monarchy, Republic, and Dictatorship: The Changing Context of Archaeology in the Twentieth-Century Spain

The twentieth century started in Spain with a sense of gloom –Prime Minister Cánovas had been assassinated in 1897 and the last colonies of the once mighty Spanish empire had been lost the following year. The Spanish role in the scramble for Africa had also been minimal. Politically, however, the regime created by Cánovas in 1875, the Restoration, continued seemingly unaffected for two more decades until 1923. Thus, Spanish politics remained anchored in a *caciquismo* that systematically riddled parliamentary elections and allowed the two major parties to alternate in power. However, this status quo was increasingly challenged, especially by the growth of Catalan and Basque nationalism. A mixed formula was proposed, particularly in the case of Catalonia, where it was not necessarily independence that was being sought but self-rule within a Spanish federal state.

Catalan nationalism had emerged in the last third of the nineteenth century, beginning with a strong sense of regionalism that was increasingly transformed into nationalism. In his seminal book, *The Catalan Nationality* (1906), the Catalan politician Enric Prat de la Riba claimed that the origin of the Catalan nation lay in the pre-Roman Iberian peoples who spread over the whole area where Catalan was spoken, from Murcia to the Rhône. He suggested that even then a special phonetic system seemed to indicate the distinctiveness of the language spoken at the time in comparison to neighboring areas. The Roman conquest had regrettably meant the disappearance of the Iberian peoples, whose ethnos would only be revived during the medieval period.

The new atmosphere in Catalonia encouraged the institutionalization of historical and archaeological research. The Institute for Catalan Studies (Institut d'Estudis Catalans, IEC) was founded in 1907. Its remit was to investigate everything to do with Catalan culture, language, and history and its sections included one for archaeology. One of its founders and presidents, the architect Josep Puig i Cadafalch, began the excavation of the ancient Greek colony of Emporion, seen as the origin of the superior intellectual prowess of the Catalan nation in comparison with other areas of Spain. In 1917 Puig i Cadafalch succeeded Prat de la Riba as president of the Mancomunitat de Catalunya, a limited form of self-government enjoyed by Catalonia between 1909 and 1923. Both the Mancomunitat and the excavations in Emporion came to an end with the imposition of General Primo de Rivera's dictatorship (1923–1930).

Also associated to the IEC was Pere Bosch Gimpera. He became interested in archaeology while in Germany on a training grant and was given the first chair in the field shortly after his return in 1916. Significantly, his Ph.D. dealt with the Iberian culture. Until he had to leave Spain and go into exile in 1939, he was able to develop the teaching of prehistory at the university and form a group of students – mainly Pericot, Castillo, and the Serra Rafols brothers – and in 1935 he had also managed to open a museum with collections coming from older institutions. In his writings Bosch Gimpera clearly followed Prat de la Riva in considering Spanish prehistory as a precursor of a multicultural Spain. This thesis was best expressed in his major work *Ethnology of the Iberian Peninsula* (1932).

In the Basque country, the study of prehistoric archaeology was also encouraged, although the main institution was a learned society, the Sociedad de Estudios Vascos (SEV), known in Basque as Eusko Ikaskuntza (Society of Basque Studies). This meant that the three main experts in prehistoric archaeology had to combine their interest in archaeology with the activities involved in their own jobs. Although two of them, Telesforo de Aranzadi and Enrique Eguren, worked in

universities; they taught areas other than archaeology and therefore were not able to train future Basque practitioners of prehistoric archaeology. The third, Father José Miguel de Barandiarán, tried to organize the infrastructure of Basque archaeology from 1916 onwards. He founded the Laboratory of Ethnology and Basque Folklore (Laboratorio de Etnología y Folklore Euskera, in 1916) and the Seminar of Ikuska Prehistory (El Seminario de Prehistoria Ikuska in 1921), later known as the Centre for Prehistoric Research (Centro de Investigaciones Prehistóricas, in 1925, part of the SEV) (Barandiarán 1988: 44). He also fostered the journals Euskalarriaren Alde and Anuario de Eusko-Folklore (created in 1921), which from 1927 included a section on prehistory. Like Bosch Gimpera in Catalonia, Barandiarán stressed a straightforward relationship between prehistoric and modern Basque culture.

Madrid had many more archaeologists than anywhere else in Spain. The university was an example of this. Whereas other universities in Spain had either one chair or none at all, Madrid had one until 1911 and then three: one of Epigraphy and Numismatics for Antonio Vives; one of Archaeology for someone who had long experience in museums and would eventually become the director of the National Archaeological Museum, José Ramón Mélida; and a third of Islamic Archaeology, given to the Andalusian, Manuel Gómez-Moreno. The last two were also involved in setting up a research center, the Center for Historical Studies (Centro de Estudios Históricos). As happened in France, those dealing with the earliest periods of prehistory were involved more in the natural sciences. The person in charge of organizing prehistoric archaeology was Francisco Hernández-Pacheco, Professor of Geology at the University of Madrid from 1910. His alliance with the Count of Cerralbo led to the establishment of the Commission for Paleontological and Prehistoric Research (Comisión de Investigaciones Paleontológicas y Prehistóricas, CIPP 1914). However, during the First World War the exile to Spain of one of the scholars who had held a chair at the Institute of Human Paleontology in Paris, the German Hugo Obermaier, changed the balance of power. Tensions between Obermaier and Hernández-Pacheco led to the creation of a chair of Prehistory for Obermaier at the University of Madrid and the effective isolation of Hernández-Pacheco and the CIPP. Nationalism not only was an influence in politicians', decisions to provide with more funding for the instittutionalization of archaeology in Madrid, as the capital of the Spanish nation-state but also encouraged archaeologists from Madrid to undertake research in the whole of the Spain, unlike their Catalan or Basque counterparts.

The Franco Dictatorship

The tensions of the first three decades of the century resulted in a bloody Civil War in 1936–1939. In contrast to the abuses of archaeology that would take place in both Italy and Germany, in Spain there are relatively few major examples of misuse of archaeological data. This was simply because the periods archaeologists were researching were not part of the nationalist discourse and politicians did not find it necessary to make use of archaeology to the same degree. However, this does not mean that it was not affected. Despite of only three major archaeologists – Obermaier, Bosch Gimpera, and Barandiarán – having to go into exile, a few died and, significantly, all those who remained in their posts had to survive a political purge. The new regime created an office to organize archaeology. This would have been an excellent idea had the person chosen to preside over it not turned out to be highly incompetent. Prof. Julio Martínez Santa-Olalla proved to be a manager influenced by his own likes and dislikes and lived in fear of anybody who tried to overshadow his newly acquired power. He kept for himself and his cronies much of the state funding on excavations. The funds he gave himself were related to archaeological projects about which very little was ever published. He also promoted nonprofessionals by funding their fieldwork while starving those working in universities of much needed funds. As a consequence, a divide was created between

professionals and amateurs, one that still survives today. The anti-Santa-Olalla alliance brought together professors from Madrid (Antonio García Bellido, Martín Almagro Basch), Barcelona (Luis Pericot, Alberto del Castillo) and other young professors from elsewhere in Spain who had trained in Valencia-Madrid and Barcelona (Antonio Beltrán, Juan Maluquer). They were also the ones involved in the International Congresses of Prehistoric and Protohistoric Sciences.

Declarations of support for the Spanish nation as the regime understood it were very explicit, especially in its first years. They came in the form of exhibitions and introductions and prefaces to publications. Alternative nationalisms were hidden under the rubric of regionalism in Catalonia and the Basque Country. To complicate the situation, the professor in Barcelona for the first 15 years of the regime, Martín Almagro Basch, was not Catalan. He trained most of the future generation of Catalan archaeologists and skillfully placed them in the newly created chairs at universities all over Spain. The Catalan professor, Luis Pericot, mainly devoted his time to finding funds to allow others to work. He managed to convince private sponsors (the British and American magnates Leslie Good and William L. Bryant) and also obtained much funding from the American Wenner-Gren Foundation. In the Basque country, Barandiarán returned from exile in 1953 and some institutions were founded, some similar to those mushrooming in other parts of Spain – mainly the Vizcaya Provincial Government Department of Archaeological Research in1958 and the Province of Alava Archaeological Institute in 1966. There were others that focused more on the Basque country, such as the Aranzadi Institute for Archaeological Research (Instituto de Investigaciones Arqueológicas Aranzadi, created in 1962). Archaeology was first taught at a Basque university in 1964.

The Last Forty Years

It has been almost 40 years since the dictator Francisco Franco passed away in his sick bed and Spain went through a relatively smooth transition to democracy. The country is now a quasi-federal state with many of the state areas of responsibility devolved to the 17 Autonomous Communities. Archaeology is, therefore, managed in 17 similar but distinctive ways, each with its own heritage law which is, however, governed by the Spanish Historic Heritage Law of 1985. At first the Autonomous Communities enthusiastically encouraged archaeology in their territories, either in the form of excavations, research, or museum exhibitions. Gradually, however, with the introduction of commercial archaeology, governments began to realize that they could save money by making building contractors pay for it. The loss of politicians' zeal for archaeology may also be related to the way in which the discipline presents its results today – characterized by a high degree of technicality resulting in a distancing of the knowledge archaeologists are producing from the attention of the general public. National histories need an understandable and credible past in the form of a discrete number of archaeological cultures. These are then identified with a particular ethnic group considered as the origin of the modern inhabitants of the nation. This is not what archaeologists write about in their more specialized publications, and consequently both politicians and the general public favor a more "Disneyfied" version of the past. In the current economic climate, it is not surprising that many archaeologists without permanent positions working for the Autonomous Communities and other bodies, as well as in contract archaeology, are seeing their careers curtailed. It looks like we may be entering a new period in the relationship between archaeology and nationalism in Spain.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Archaeology and Politics
- ▶ Nationalism and Archaeology
- ▶ Spain and North Africa: Islamic Archaeology
- ▶ Spain: Archaeological Heritage Management

References

Barandiarán, I. 1988. *Enciclopedia general ilustrada del País Vasco. I. prehistoria: Paleolítico*. San Sebastián: Auñamendi.

Díaz-Andreu, M. 1997. Conflict and innovation: The development of archaeological traditions in Iberia. In *The archaeology of Iberia. The dynamics of change*, ed. M. Díaz-Andreu and S. Keay, 6–33. London: Routledge.

Díaz-Andreu, M. 2010. Nationalism and archaeology. Spanish archaeology in the Europe of nationalities. In *Contemporary archaeology in theory and practice*, ed. R. Preucel and S. Mrozowksi, 432–444. London: Blackwell.

Díaz-Andreu, M., G. Mora, and J. Cortadella. 2009. Introducción. In *Diccionario histórico de la arqueología en España (siglos XV–XX)*, ed. M. Díaz-Andreu, G. Mora, and J. Cortadella, 13–57. Madrid: Marcial Pons.

Gilman, A. 1995. Recent trends in the archaeology of Spain. In *The origin of complex societies in late prehistoric Iberia*, Archaeological series, ed. K. Lillios, vol. 8, 1–6. Ann Arbor: International Monographs in Prehistory.

Gracia Alonso, F. 2008. Relations between Spanish archaeologists and Nazi Germany (1939–1945). A preliminary examination of the influence of "Das Ahnenerbe" in Spain. *Bulletin of the History of Archaeology* 18: 4–24.

Gracia Alonso, F. 2009. *La arqueología durante el primer franquismo (1939–1956)*. Barcelona: Bellaterra.

Hobsbawm, E.J. 1990. *Nations and nationalism since 1780: Programme, myth, reality*. Cambridge: Cambridge University Press.

Kedourie, E. 1993. *Nationalism*. 4th ed. Oxford: Blackwell.

Lafuente, M. 1850. *Historia general de España*. Vol. 1. Madrid: Tip. Mellado.

Martínez Navarrete, M.I. 2001. Spain. In *Encyclopedia of archaeology. History and discoveries*, ed. T. Murray, 1194–1207. Santa Barbara: ABC-CLIO.

Mederos Martín, A. 2010. Análisis de unadecadencia. La arqueologíaespañola del siglo XIX. I. El impulso isabelino (1830–1867). *Cuadernos de Prehistoria y Arqueología de la Universidad Autónoma de Madrid* 36: 159–216.

Ruiz Rodríguez, A., J.P. Bellón, and A. Sánchez. 2008. La construction archéologique des Ibères. Entre Orient et Occident. In *Construire le temps. Histoire et méthodes des chronologies et calendriers des derniers millénaires avant notre ère en Europe occidentale. Actes du XXXe colloque international de Halma-Ipel, 7–9 décembre 2006, Lille*, Collection Bibracte, ed. A. Lehoërff, vol. 16, 307–323. Glux-en-Glenne: Centre Archéologique Européen.

Wulff Alonso, F. 2003. *Las esencias patrias. Historiografía e historia antigua en la construcción de la identidad española (siglos XVI–XX)*. Barcelona: Crítica.

Spanish Lustreware

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Lustrewares are undoubtedly the most outstanding ceramic wares to ever emerge from the Islamic world. The more characteristic feature of lustrewares is their opaque, not transparent, glazing, which was often produced using tin oxide.

Under the generic term Lustrewares, we include a broad group of ceramic and earthenwares, characterized by their tin glaze and a painted decoration. The paints, which were applied in separate firing, were produced using the complex combination of different metallic compounds (the proportions of which varied depending on the workshop and period) and other products such as iron oxide-rich clays, sulfur, and vinegar. After the application of these elements, the piece was fired a second time under highly controlled conditions. The firing had to take place in small kilns, at a low temperature (550–600 °C) and under reducing conditions (the absence of oxygen in the chamber where the piece was being fired), in order for the oxides to retain their metallic nature, especially metallic copper and silver nanoparticles are responsible for the color and shine.

The application of the glaze and the other techniques involved in the production of lustrewares has been the subject of much previous research. In the twentieth century, Oliver Watson (1985), Arthur Lane (1947, 1971), Fehérváry (1973), and Alan Caiger-Smith (1985) analyzed these typologies in detail and included them in their general overviews of Islamic ceramics. These studies, which focused especially on the East, only mentioned Western productions tangentially, although it was clear that lustrewares had also developed in al-Andalus (the regions in the Iberian Peninsula and the Balearic Islands under Islamic rule). Since then, Several Spanish scholars, for instance Balbina Martínez (Martínez Caviró 1982, 1991), have joined the

debate, and more attention has been paid to the Andalusi productions.

Origins of Lusterware

There are two reasons behind the application of opaque glazes on Islamic wares. First, to make them more impermeable so they are better suited to holding drinks or liquid foodstuffs. Secondly, and this is especially applicable to tin glazes wares, to create a white surface as a background for decorative motifs in different colors. These colored paints were made using a combination of a series of metal compounds. The evidence suggests that the production of these sorts of wares started in the East, specifically in the post-Islamic invasion Mesopotamian workshops, following the old glazing traditions in the Islamic East and the Persian Empire. Recent studies have revealed the circulation, along the coasts of the Persian Gulf, and also inland, of porcelains from the Far East. These white porcelains may have encouraged Mesopotamian artisans to find a formula for white glazes onto which decoration could be applied, for example, via opacification of the glaze through the application of tin oxide. Lustrewares were among the first decorative techniques to be applied.

Some lustre on glass can be traced back to Egyptian Coptic and Classical period, but not lustreware ceramics were being produced in Egyptian workshops at that time. The evidence points towards Mesopotamia during the Abbasid period (ninth century) (Fig. 1). The earliest examples have been found in Sāmārra, but there are no known workshops in this city, and thus these productions are assumed to have been produced in Bagdad or Basora. Later, Abbasid ceramics were distributed throughout the whole Islamic world. In Egypt, some lustrewares that predate the Fatimids have been found, but it is not until the triumph of this regime that lustrewares started to be produced in the workshops of al-Fusṭāṭ. The technique was brought there and further developed by a large group of Iraqi artisans. Egypt's central position within the Islamic world played a crucial role in the dissemination and transference of the different

Spanish Lustreware, Fig. 1 Lustreware bowl from Iraq. Tenth century

techniques between the East and the West. The presence of lustrewares has been attested in different North African locations, for example, the still in situ tiles used to decorate the miḥrāb of Sīdi ʻUqba, in Qayrawān (former capital of Ifriqiya, in modern Tunisia), during the ninth century. These tiles were imported from the East; in 862, in fact, a potter from Bagdad was summoned to repair and add pieces to the mosaic, although it is possible that he took his work much further and introduced the technique of lustreware to Ifriqiya, as suggested by some evidence found in Raqqada and Sabra-Mansouriya (Heidenreich 2014: 347; Waksman et al. 2014). In the late tenth and early eleventh centuries, these lustrewares are attested in the nearby Qalāt of the Banū Hammad (Algeria), and in the coastal city of Bugia (Algeria) some decades later.

The emergence and consolidation of these productions followed in the wake of the Islamic invasion in the seventh and eighth centuries, and reflected the integration of the different territories under Islamic rule. Islam was a very extensive empire; it was both diverse and unified, and the presence of these productions in places that played a significant role in the consolidation of the Islamic Empire, such as Qayrawān, Fusṭāṭ, Qalāt of the Banū Hammad, and Bugia is

ideologically meaningful. Their presence cannot merely be interpreted as a reflection of the material demand posed by a given social group but as evidence for the progressive integration of the conquered lands into the Islamic orbit; it is a proxy for the Islamization of the different territories.

Introduction and Earliest Lustreware Production in al-Andalus

Like the Islamic regions in North Africa, al-Andalus was the recipient of a constant stream of Eastern lustrewares from the beginning of Islamic rule. Traditionally, the earliest Andalusi productions of lustrewares were dated to the twelfth century in Malaga (Gómez Moreno 1940) owing to the existence of an assemblage with distinct decorative motifs in the Alcazaba. The earliest written mentions of lustrewares, however, point to other cities, such as Calatayud. The reference is found in the work of the geographer al-Idrīsi (Martínez Caviró 1982: 50). In recent years, as we shall see shortly, this view has been completely superseded, and the earliest lustrewares in the Iberian Peninsula have been pushed back to the ninth century.

As previously noted, the adoption of the technique was preceded by the arrival of a significant volume of imported material. This is for example the case of an assemblage found in Madīnat al Zahrā', the palace-city founded by the Umayyad caliph Abd al-Raḥmān III near Cordoba in the second half of the tenth century. The decoration on these pieces is reminiscent of that found on pieces in Sāmārra, and although the chronologies do not coincide (Sāmārra was the official residence between 836 and 892), everything suggests that the typology and production continued for some time afterwards (Polvorinos del Río et al. 2010). This led to the belief that lustrewares were being produced in the Abbasid city. In any case, we must add that similarity of the Cordoban and Egyptian assemblages have suggested some authors that the pieces found in Madīnat al Zahrā', and similar assemblages found in other palatial or aristocratic sites in al-Andalus, could have a Egyptian origin (Heidenreich 2007: 408).

Some pieces of what is now considered to be the earliest lustrewares in al-Andalus were identified in Seville and its hinterland. These productions include *ataifores* (large plates or bowls) decorated with motifs which are clearly related to Egyptian decorative models; an inscription with golden paint mentions two Abbadid *taifa* kings of Seville – al- Mu'taḍid, who ruled between 1041 and 1069, and al-Mu'tamid, who was king between 1088 and 1092 (Barceló and Heidenreich 2014). These palatial productions started in the mid-eleventh century and must not be understood as an isolated instance, but rather as a reflection of the broader dissemination process of this technique in al-Andalus.

The political fragmentation suffered by al-Andalus after the fall of the Umayyads in Cordoba led to the wider distribution of lustrewares and other green- and purple-decorated wares which, until then, had been restricted to the capital of the Caliphate. Cultural and material features became, upon the disaggregation of the caliphate into multiple lesser polities, mechanisms with which to affirm and legitimise different identities. Although the evidence has not been collected systematically, from the mid-eleventh century onwards lustrewares appear in many *taifa* capitals and other important cities: Zaragoza, Albarracín, Tudela, Onda, Valencia, Murcia, Almería, Malaga, Silves, Mértola, and Seville. The implicit message is that these wares conveyed to the Umayyad capital were now being flaunted by the newly created dynasties. However, during this period these productions were no longer limited to palatial complexes but have also been found in urban centres, castles, and even rural settlements (Ortega Ortega et al. 2014: 316). This seems to point to substantial changes in consumption and demand patterns, and also in scale; the high demand in certain areas appears to have triggered the concentration of workshops.

One city in which the evidence is especially eloquent is Almeria, where excavation and discoveries made in recent decades have revealed the location of workshops and the kind of wares that these workshops produced (Flores Escobosa

2011; Flores Escobosa and Navarro Ortega 2014). Almeria's workshops produced thrown or moulded lustrewares; the evidence indicates that Almeria, which was the caliphate's main harbor because of its strategic position relative to the routes frequented by North African traders, was the point of entry for this and other techniques (García Porras 2014). It is, therefore, not surprising that Almeria was mentioned in al-Aḥmad al-Maqqarī's quote on Ibn Sa'īd: "En Murcia, Almería y Málaga se fabrica vidrio maravilloso y alfarería vidriada y dorada" (Lirola Delgado 2005: 203).

Spanish Lustreware, Fig. 2 Lustreware bowl from Murcia. Twelfth century

Andalusi Lustrewares

Sometime after the earliest productions in the *taifa* period, in the late eleventh and early twelfth centuries, the lustrewares produce in al-Andalus began to develop their own characteristic features which distinguished them from other Mediterranean productions. Their presence in the Mediterranean markets soon became significant, for example in Pisa, which was one of the earliest Mediterranean commercial powers. The analysis of the so-called "bacini" – plates used to decorate church walls in Pisa – indicate the growing presence of ceramics produced in the Iberian Peninsula in the commercial flows (Berti and Tongiorgi 1981, 1985; Berti 2002b). A good proportion of *bacini* were manufactured in al-Andalus. According to chemical analysis carried out on certain Pisan specimens, some twelfth-century productions come from Murcia (Navarro Palazón 1986; Picon and Navarro Palazón 1986) (Fig. 2). Workshops, however, must have existed elsewhere in al-Andalus, for example, in Almeria. Lustrewares dating to the Almoravid and Almohad periods were characterized by vegetal motifs, such as stalks and leaves, which formed crosses, wheels, etc., or occupied the centre of plates. Often, the main leaves were accompanied by smaller ones. Sometimes, the band around the inner perimeter presented epigraphic, pseudo-epigraphic, or other secondary motifs. On others, to give these ornaments some relief, they were finished with a sgraffito technique, which removes part of the pigment. This technique was well known by the artisans of south-east al-Andalus, who used it to decorate black-painted wares. In addition to the examples from Pisa and Murcia, we must include others from Almeria, Malaga, and Mallorca. An especially interesting example was found in the cave of Amagatalls (Trias 1981), in the Balearic Islands, where a group of Muslims hid their belongings during the Aragonese conquest around 1229.

The first half of the thirteenth century was a period of upheaval, during which al-Andalus lost a good deal of its territory. The eastern coast and the Balearic Islands fell into the hands of the Crown of Aragon, the southern half of the central plateau and the Guadalquivir were conquered by Castile, and the south-west was occupied by Portugal. Al-Andalus was thus reduced to a small kingdom in the south-east of the Peninsula; this kingdom was ruled by the Nasrid Dynasty and was under the political influence of Castile.

Nasrid Lustreware

During the Nasrid period, lustrewares became a key manufacture for the kingdom. From the start, lustrewares were used as a sign of dynastic

identity and political propaganda (García Porras 2012). The Nasrid artisans continued the technical Andalusi traditions, as demonstrated by the blue tiles used to decorate the Cuarto Real de Santo Domingo, one of the dynasty's earliest palaces; such evidence indicates the strong link between the twelfth-century lustrewares and the early Nasrid wares. The vegetal motif with sgraffito is one of their many common features.

The greatest innovation introduced by the Nasrid workshops in al-Andalus glazed pottery was the combination of gold and blue (made with cobalt oxide), combination already known in Syria, Egypt, and Iran workshops from thirteenth century (Pradell et al. 2013, 2016). This combination had already been tried in the East, but was hitherto unknown in the West. For a long time, in fact, it was believed that the introduction of cobalt blue in the Nasrid Kingdom was due to the arrival of Iranian artisans who were attracted by the lustreware industry in Malaga, and their methods, techniques, and decorative models (Frothingham 1951: 21–23). A detailed comparison of the decorative motif used in these initial Nasrid productions and those used elsewhere in the Islamic world suggests, however, that the most direct decorative influences came from Tunisia, not Iran (García Porras 2002) – more specifically from the so-called blue-and-black wares dating to the Hafsid period. These wares had enjoyed some success in Western Mediterranean markets just before the emergence of Nasrid lustrewares (Berti 2002a), and it seems that the Nasrids attempted to reproduce this success with little-known blue-and-black wares and, especially, with the gold-and-blue lustrewares that followed. In this endeavor, based on the evidence available, they were successful, and their wares pushed the Tunisian ones out of the market. It seems likely that this process was fuelled by the agents in charge of the distribution of commercial flows (García Porras and Fábregas García 2010).

All these factors led to the development of a luxury pottery industry in the kingdom in the late Middle Ages, the apex of which was, without doubt, the so-called Alhambra vases – large containers of unknown function (Fig. 5). It is likely that they were simply used to decorate palaces, just like a sculpture (Jiménez and Mar 2006). Undoubtedly, each step of their production, shaping, decorating, grazing, firing, etc. involved highly skilled artisans. Their decoration follows the fashions of the period: geometrical, vegetal, epigraphic, and figurative motifs were used. These motifs were also employed for the decoration of items of table ware, such as large bowls and plates, the most representative examples of which are those from "la nave," currently in the Victoria & Albert Museum (Fig. 3) and the Alcazaba of Malaga, or those from San Jorge, currently in the Metropolitan Museum of Art of New York; other significant examples are the jars in the Instituto Valencia de Don Juan (Fig. 4) or architectural ceramics, tiles and plaques, for example, the so-called Fortuny or the plaque in the Museo Arqueológico Nacional. Many more of these pieces are currently in the Museum of the Alhambra (Flores Escobosa 1988). Since these pieces were representative of the whole ruling dynasty, it is likely that many of them were produced in the Alhambra itself, in the Dār al-tirāz, where production remains have been preserved. In terms of volume, however, the most important productions came from the district of Fontanella, in Malaga, where a number of kilns have been excavated (López Chamizo et al. 2009). It is likely

Spanish Lustreware, Fig. 3 Nazarí Lustreware bowl of "La Nave". Victoria & Albert Museum. Fifteenth century

Spanish Lustreware, Fig. 4 Nazarí Lustreware pitcher from Los Bérchules (Granada). Instituto Valencia de Don Juan. Fifteenth century

Spanish Lustreware, Fig. 5 Nazarí vase of "Las Gacelas." Museo de la Alhambra. Fifteenth century

that Malaga's lustrewares were boosted by the vicinity of the harbor, the most important in the Nasrid Kingdom, from whence these lustrewares, known as "opera di Malica," were distributed throughout the Mediterranean, the Northern Sea, and the Baltic Sea.

As demonstrated by archaeological evidence, the commercial success of the Nasrid lustrewares was short-lived, as they came to be replaced in the markets in the mid-fourteenth century by lustrewares produced in the Kingdom of Valencia (García Porras and Fábregas García 2010: 46).

Mudejar Lustrewares in Valencia

In 1232, following the collapse of the Almohad Empire, James I of Aragón conquered Valencia. After the conquest, many Muslims remained in the territory of the kingdom under the new regime. After a period of economic readjustment, Valencian workshops started producing tin glazed wares in the late thirteenth century.

Lustrewares, however, did not start to emerge from these workshops until the 1310s. These early productions were inspired by Nasrid models (in some Valencian documents we can read *operis terre picte consimilis operis Maleche.* López Elum 1984: 30–33), but the process of the transference of technology that took place between Granada and Valencia is still not fully known (García Porras 2006). The earliest productions, therefore, shared many decorative features with the Nasrid productions from the same period, but the Islamic influence progressively vanished over time (García Porras 2009). This progression can be divided into three styles (González Martí 1944; Ferrer 1988; Lerma and Badía Capilla 1992; Coll Conesa 2009): "Malagueño Primitivo," "Pula," and "Clásicas." The first and second styles used geometric motifs; stars blue or golden in color played a prominent decorative role. "Pula" was named after the Sardinian town, near Cagliari, where the first examples of this style were found (Blake 1986) (Fig. 6). The style is heavily reminiscent of Andalusi models and motifs (tree of life, pinecones, arabesques, schematic epigraphy). The Pula style represents the earliest process of large-scale dissemination of Mudejar ceramics from Valencia, especially the workshops in Paterna and Manises; it is likely that these

workshops soon overtook their Nasrid counterparts in terms of volume of production. Specimens have been found in Sicily, Sardinia, the Italian Peninsula, and Southern France, as well as many other European places. This style declined in the late fourteenth century, giving way to the so-called classic style, which still used some decorative motifs that were similar, although only vaguely, to Andalusi ones, alongside other motifs of a clear Gothic filiation and Western scenes (courtly love, knights, hunting scenes). This was the golden age of Valencian lustrewares, which at that time took the European markets by storm (Fig. 7).

Spanish Lustreware, Fig. 6 Valencian Lustreware albarello (Pula type). Instituto Valencia de Don Juan. Fourteenth century

This process of technological transmission, and the substitution of Valencia for Malaga in the ceramic trade during the fourteenth century, is no more than a consequence of the enormous changes that took place in the economic structures of the medieval West. During these centuries, the center of gravity of the Mediterranean economy shifted from the Islamic areas to the Christian ones.

These ceramic types, which became a must-have for European nobles and burgesses, flooded European markets between the late fourteenth and the early sixteenth centuries, when the Valencian wares began to be replaced by Italian pieces from Gubbio and Deruta. These were decorated using the same techniques and colors, gold and cobalt blue, but with Renaissance motifs.

Spanish Lustreware, Fig. 7 Valencian Lustreware bowl (Clasical type). Instituto Valencia de Don Juan. Fifteenth century

Spanish Modern Lustrewares

In spite of being displaced by Italian wares and their new decorative language, the Spanish workshops continued producing lustrewares between the sixteenth and eighteenth centuries.

Lustrewares were still very important for the workshops in Paterna and Manises (Coll Conesa 2009). Islamic motifs disappeared in the sixteenth century and were replaced by smaller, more schematic motifs, which covered the surface of the plates in repetitive patterns (ribbons, circles, embroideries, flaps, etc.). Some maintained the vegetal theme, but others replaced them with abstract motifs (bushes, thistles, etc.). Very often, these motifs merely accompanied the main themes, which were figurative in nature (crests, animals, natural scenes, etc.).

In any case, the most characteristic novelty of this period was the introduction of relief on the surface of the pieces. Often, relief appears in the form of bulbs and undulations, made with the use of a mould or by pressure, in imitation of metal objects, including the reproduction of small nail heads, bars, or handles. This is the so-called "goldsmith" or "silversmith" style. Other styles are the so-called "cordoncillo," in which the decoration is separated into different fields by thin ropes in relief, the "style of golden bands," "dented leaves," "outlines leaves," etc. (Fig. 8).

In addition to the productions from Valencia, other workshops were also active during this period, for example, in Muel, Barcelona, Reus, and Seville. Generally, the style of the productions emerging from the workshops in the Aragonese town of Muel was reminiscent of that of the Valencian products, although a new independent style developed over time. Relief was not quite as common as in the Valencian examples, and the compositions were less motley; also, the white background has a creamier hue and the golden tones are more coppery (Martínez Caviró 1991: 238).

Catalonian lustrewares emerged in the second half of the fifteenth century, and they were of some importance in the sixteenth century; the main workshops were located in Barcelona and Reus (Tarragona). Like those from Muel, the Catalonian productions were closely related to their Valencian precedents, but again the motifs are more loosely distributed. The workshops in Triana (Seville) also started producing this kind of ware in the late sixteenth century (Pleguezuelo Hernández 2014).

Spanish Lustreware, Fig. 8 Valencian Lustreware bowl (Cordoncillo type). Victoria & Albert Mueeum. Fifteenth–sixteenth centuries

As pointed out by Jaume Coll, the sixteenth century was a century of upheaval for society, marked by the issue of the Moriscos and the forced conversion of the Muslims who had decided to remain in the Iberian Peninsula. The Mudejar presence in the ceramic sector was very significant, and this is reflected in ceramic production. The recurrent presence of religious messages such as "surge domine" or "in principio erat Verbum," indicates the manifest intention of stressing the identity of producers and consumers. A similar role was played by the depiction of human figures and aristocratic scenes with knights and couples, which were forbidden by Islam. Only a few motifs are reminiscent of those used by Mudejar potters in the fourteenth century and are perhaps the manifestation of a residual and hidden Islam (Coll Conesa 2009: 124–125).

From the seventeenth century onwards, Valencian lustrewares went into sharp decline, partially as a consequence of the final expulsion of the Moriscos in 1609 (Martínez Caviró 1982: 175). The disappearance of the lustreware workshops in Muel is generally associated with this event, although it is also possible that "the loss of the technical edge"compared to Chinese porcelain, which was already available in the whole of Europe; the Italian wares and the Spanish wares from other centres, such as Talavera de la Reina, was also related Coll Conesa 2009: 130).

Despite the commotion that the expulsion of the Moriscos undoubtedly caused, during the opening decades of the seventeenth century, the workshops in Valencia and Reus (the latter seems to have taken Muel's baton in the production of lustrewares) remained in operation. Their style continued the traditions of the previous century, for example, with the "l'Ugla" series. It is only from the second third of the century that new, looser decorative motifs emerge, with flowers, bulbs, fern leaves, and, from the mid-century, starry backgrounds, semicircles, and leaves framing the central, figurative scenes, for example the "pardalot." (Figs. 9 and 10)

Many of these motifs, for example, the vegetal ones, survived throughout the eighteenth century, when, under pressure posed by new productions from Talavera de la Reina, Puente del Arzobispo, and Alcora, lustrewares were forced to introduce new decorative motifs, such as rows of ovals, pinks, and poppies.

Spanish Lustreware, Fig. 9 Valencian Lustreware pitcher (Pardalot). Instituto Valencia de Don Juan. Seventeenth century

Spanish Lustreware, Fig. 10 Catalonian Lustreware. bowl. Instituto Valencia de Don Juan. Dated 1599

Thereafter, lustrewares would play a marginal role in Spanish ceramic productions; they were a

relic from a past that were quickly displaced by a new reality. Only the Romantic revival of the second half of the nineteenth century, which recovered some Oriental and Medieval traditions, rekindled lustreware for a brief period of time.

Cross-References

- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Islamic Archaeology
- ▶ Islamic Archaeology and Art History
- ▶ Islamic Industry, Archaeology of
- ▶ Spain and North Africa: Islamic Archaeology
- ▶ West Africa: Islamic Archaeology
- ▶ Western Europe: Historical Archaeology

References

Barceló, C., and A. Heidenreich. 2014. Lusterware made in the Abbasid taifa of Seville (eleventh century) and its early production in the Mediterranean region. *Muqarnas* 31: 245–276.

Berti, G. 2002a. La ceramica tunisina "a cobalto e manganee" in Toscana. In *Atti XXXV Convegno internazionale della ceramica*, 89–102. Florence: All'Insegna del Giglio.

Berti, G. 2002b. Le rule des *bacini* dans l'étude des céramiques à lustre métallique. In *Le califa, le prince et le potier*, ed. J. Rose-Albrecht, 220–227. París: Musée des Beaux-Arts et Réunion des musées nationaux.

Berti, G., and L. Tongiorgi. 1981. *I bacini ceramica medievali delle chiese di Pisa*. Rome: L'Erma di Bretschneider.

Berti, G., and E. Tongiorgi. 1985. *Ceramiche importate dalla Spagna nell'area pisana dal XII al XV secolo*. Florence: All'Insegna del Giglio.

Blake, H. 1986. The ceramic hoard from Pula (prov. Cagliari) and the Pula type of Spanish lusterware. In *Segundo Coloquio Internacional de Cerámica Medieval en el Mediterráneo Occidental*, ed. J. Zozaya Stabel-Hansen, 365–407. Madrid: Ministerio de Cultura.

Caiger-Smith, A. 1985. *Lustre Pottery. Technique, tradition and innovation in Islam and the Western World*. London: Faber and Faber Ltd.

Coll Conesa, J. 2009. *La cerámica valenciana (apuntes para una síntesis)*. Valencia: Avec-Gremio.

Fehérváry, G. 1973. *Islamic Pottery. A comprehensive study based on the Barlow Collection*. London: Faber and Faber Ltd.

Soler Ferrer, M.P. 1988. *Historia de la cerámica valenciana*. Valencia: Vicent García Editores.

Flores Escobosa, I. 1988. *Estudio preliminar sobre la loza azul y dorada nazarí de la Alhambra*. Madrid: Instituto Hispano-Árabe de Cultura.

Flores Escobosa, I. 2011. La fabricación de cerámica islámica en Almería: la loza dorada. *Tudmir* 2: 9–28.

Flores Escobosa, I., and A.M. Navarro Ortega. 2014. Moldes y cerámica moldada y dorada fabricada en Almería. In *I Congreso Internacional Red de Museos de Arte Islámico*, 325–342. Granada: Patronato de la Alhambra y Generalife.

Frothingham, A.W. 1951. *Lustreware of Spain*. New York: The Hispanic society of America.

García Porras, A. 2002. Los orígenes de la cerámica nazarí decorada en azul y dorado. In *Atti XXXV Convegno Internazionale della Ceramica*, 53–61. Florence: All'Insegna del Giglio.

García Porras, A. 2006. Transmisiones tecnológicas entre el área islámica y cristiana en la Península Ibérica. El caso de la producción cerámica esmaltada de lujo bajomedieval (ss. XIII-XV). In *Relazioni Economiche tra Europa e Mondo Islamico Secc. XIII-XVIII*,- ed. S. Cavaciocchi, 825–884. Florence: Le Monnier.

García Porras, A. 2009. *La cerámica en azul y dorado valenciana del siglo XIV e inicios del XV*. Valencia: Museo Nacional de Cerámica y Artes Suntuarias "González Martí".

García Porras, A. 2012. Producción cerámica y organización política: el caso de la cerámica nazarí. In *Mundos medievales: espacios, sociedades y poder. Homenaje al profesor José Ángel García de Cortázar y Ruiz de Aguirre*, ed. Arízaga Bolumburu et al., 1379–1390. Santander: Ediciones Universidad de Cantabria.

García Porras, A. (2014) Un largo viaje de Almería a Málaga. Algunas consideraciones sobre la cerámica andalusí del sureste de la Península Ibérica (s. IX-XIV). Paper presented at the XVII Congreso de la Asociación de Ceramología, Ojós (Murcia), 13–16 Nov 2014.

García Porras, A., and A. Fábregas García. 2010. Genoese trade networks in the southern Iberian peninsula: Trade, transmission of technical knowledge and economic interactions. *Mediterranean Historical Review* 25-1: 35–51.

Gómez Moreno, M. 1940. La loza dorada primitiva de Málaga. *Al-Andalus* 5: 384–398.

González Martí, M. 1944. *Cerámica del Levantes español*. Barcelona: Labor.

Heidenreich, A. 2007. La Loza Dorada medieval en la Península Ibérica. Aportaciones recientes en su evolución y nuevos datos para su cronología. *Anales de Arqueología Cordobesa* 18: 401–423.

Heidenreich, A. 2014. La loza dorada temprana en el ámbito Mediterráneo y la implementación de la nueva técnica en la Península Ibérica. In *I Congreso Internacional Red de Museos de Arte Islámico*, 345–369. Granada: Patronato de la Alhambra y Generalife.

Jiménez, Villafranca, and Ma Mar, eds. 2006. *Los Jarrones de la Alhambra. Simbología y Poder*. Madrid: Ediciones Akal.
Lane, A. 1947. *Early islamic pottery*. London: Faber and Faber Ltd.
Lane, A. 1971. *Later islamic pottery. Persia, Syria, Egypt, Turkey*. London: Faber and Faber Ltd.
Lerma, J.V., and A. Badía Capilla. 1992. *La loza gótico-mudéjar en la ciudad de Valencia*. Valencia: Ministerio de Cultura.
Lirola Delgado, J. 2005. *Almería andalusí y su territorio. Textos geográficos*. Almería: Fundación Ibn Tufayl de Estudios Árabes.
López Chamizo, S., C. Marfil Lopera, A. Pérez Narváez, A. Cumpián Rodríguez, and P.J. Sánchez Bandera. 2009. La industria de la alfarería Málaga. Un estado de la cuestión. In *Atti XLII Convegno Internazionale della Ceramica*, 77–85. Florence: All'Insegna del Giglio.
López Elum, P. 1984. *Los orígenes de la cerámica de Manises y Paterna*. Valencia: Federico Domenech, D.L.
Martínez Caviró, B. 1982. *La loza dorada*. Madrid: Editora Nacional.
Martínez Caviró, B. 1991. *Cerámica Hispanomusulmana. Andalusí y Mudéjar*. Madrid: Ediciones El Viso.
Navarro Palazón, J. 1986. Murcia como centro productor de loza dorada. In *La ceramica medievale nel Mediterraneo Occidentale*, 123–1443. Florence: All'Insegna del Giglio.
Ortega Ortega, J.M., F.J. Gutiérrez González, J. Pérez-Arentegui, and C. Déléry. 2014. La cerámica dorada en el noreste de la Península Ibérica: las taifas de Zaragoza y Albarracín. In *I Congreso Internacional Red de Museos de Arte Islámico*, 291–324. Granada: Patronato de la Alhambra y Generalife.
Picon, M., and J. Navarro Palazón. 1986. La loza dorada de la Province de Murcie: étude de laboratoire. In *La ceramica medievale nel Mediterraneo Occidentale*, 144–146. Florence: All'Insegna del Giglio.
Pleguezuelo Hernández, A. 2014. Loza dorada de Sevilla en el siglo XVI: Testimonios documentales, analíticos y materiales. In *A Herança de Santos Simões. Novas Perspectivas para o Estudo da Azulejaria e da Cerâmica*, ed. S. Varela Flor. Lisbon: Edições Colibri.
Polvorinos del Río, A., S. Roehrs, M. Aucouturier, J. Castaing, and A. Bouqillon. 2010. Medina Al-Zahra lustre ceramics: 10th century local nanotechnology or importation from Middle East. *Arabian Journal for Science and Engineering* 35: 157–168.
Pradell, T., J. Molera, G. Molina, and M.S. Tite. 2013. Analysis of Syrian lustre pottery (12th–14th centuries AD). *Applied Clay Science* 82: 106–112.
Pradell, T., G. Molina, J. Molera, and M.S. Tite. 2016. Composition of the Lustre pigment used in the production of 13th century AD Raqqa Lustreware from Syria. *Archaeometry* 58 (6): 979–986.
Trias, M. 1981. Notícia preliminar del jacimen islàmic de la Cova dels Amagatalls. *Endins* 8: 59–74.
Waksman, Y., C. Capelli, T. Pradell, and Judit Molera. 2014. The ways of the lustre: Looking for the Tunisian connection. In *Craft and science: International perspectives on archaeological ceramics*, ed. M. Martinón-Torres, 109–116. Doha: Bloomsbury Qatar Foundation.
Watson, O. 1985. *Persian lustre ware*. London: Faber and Faber Ltd.

Spanish World Heritage Sites

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State of Knowledge and Current Debates

Introduction

Spain became a member of UNESCO in 1953. The General Conference of UNESCO adopted the Convention Concerning the Protection of the World Cultural and Natural Heritage in 1972, which came into force in 1975. Spain signed this convention on the 4th of May 1982.

As of August 2017, Spain has 46 listed World Heritage sites before France (43) and Germany (42); only Italy (53) and China (52) have more.

Forty of the Spanish sites are cultural heritage sites, four are natural, and two are mixed. Three sites are shared: one with France, one with Portugal, and one with Slovenia (Spain 2017).

The sites are quite evenly distributed over the whole Spanish territory.

In this entry we will treat only the cultural and mixed heritage sites.

In 12 of the sites, we have as one of the most important features of the heritage property a whole town or city, in 11 sites Roman Catholic religious buildings, in 10 sites civil buildings, in 6 sites a landscape, in 6 sites archaeological remains, in 5 sites fortifications, in 4 sites palaces, in 3 sites prehistoric rock art, and in 1 site an Islamic religious building.

Most sites comprise features from different periods, but in 13 sites the features are mainly from the Late Middle Ages, in 10 sites from the

Renaissance, and in 7 from the Baroque, which means that in 30 sites the features are mainly from the development of the Spanish Empire on the basis of the Kingdom of Castile or of the Spanish Empire itself, the so-called *Spanish Golden Age*. Seven sites are principally from the Early Middle Ages, six sites from Antiquity (five Roman, one Carthaginian), and five from prehistoric times. Six sites developed mainly under Islamic rule between the eighth and fourteenth century. Only three sites are from the nineteenth or twentieth centuries. Most of the 30 sites, where the main features are from the Spanish imperial period, we find in Central and Southern Spain and Galicia, while the three sites from the nineteenth to twentieth centuries are in the Basque Country and Catalonia.

From the 42 cultural sites, 5 were declared in 1984, 5 in 1985, 3 in 1986, 1 in 1987, 1 in 1988, 1 in 1991, 3 in 1993, 2 in 1996, 4 in 1997, 3 in 1998, 2 in 1999, 5 in 2000, 1 in 2001, 1 in 2003, 1 in 2006, 1 in 2009, 1 in 2011, 1 in 2012, and 1 in 2016 (Spain 2017).

In August 2017 there were 29 sites on the Spanish Tentative List for inscription as World Heritage sites (Spain 2017).

The Spanish contribution to the World Heritage Fund was $79,764 USD in 2016 (Statement of Compulsory and Voluntary Contributions 2016).

Alhambra, Generalife, and Albayzín Quarter, Granada

The Alhambra and the Generalife palaces were declared World Cultural Heritage in 1984, and in 1994 the quarter of Albayzín was added. The two palaces were included in the World Heritage list as unique examples for royal Arab residences from medieval Islamic Spain (Advisory Body Evaluation 314 1984, p. 3), while the Albayzín quarter as a typical medieval Moorish settlement with its urban fabric, the architecture, and its main characteristics (form, materials, colors) (Advisory Body Evaluation 314bis 1994, p. 63).

Being for a long time a Muslim stronghold, Granada became the capital city of the Nasrid dynasty, from the fall of Cordoba in 1236 until 1492. During this time the city was embellished with palaces like the Alhambra, and the Generalife and Muslim and Jewish culture flourished in quarters such as the Albayzín.

The Alhambra is a massive fortress enclosed by a wall of 2 km with towers. It includes palaces, gardens, workshops, baths, and a mosque. The palaces are mainly from the fourteenth century and built around two monumental squares. In the buildings we find marble, plaster, wood, ceramics, and leather used in an overwhelming composition for walls, columns, stalactite cupolas, doors, windows, floors, ornamental decoration, and calligraphic inscriptions. Nature, too, has been used lavishly as a decorative element, especially gardens and water in fountains, basins, cascades, and canals, all made possible by highly developed hydraulic infrastructures (Advisory Body Evaluation 314 1984, pp. 1–2).

The Albayzín quarter, on the hill adjacent to the Alhambra hill, exemplifies a typical medieval Spanish Muslim town plan with its narrow streets and Moorish-style houses (Advisory Body Evaluation 314bis 1994, p. 64).

The total World Heritage site expands over 450 ha (Alhambra, Generalife and Albayzín, Granada 2011).

Burgos Cathedral

The Cathedral of Santa María of Burgos was declared World Cultural Heritage in 1984. It was inscribed into the World Heritage as being very influential on the evolution of architecture and the plastic arts through the spread of French Gothic from the thirteenth century in Spain, due to the importance of its workshop and school during the fifteenth and sixteenth centuries with craftsmen and artists from the Rhineland, Burgundy, and Flanders and as model in the nineteenth century. The church and its cloister are seen as important examples of an integral Gothic cathedral (Advisory Body Evaluation 316 1984, p. 3).

The Cathedral was constructed between 1221 and 1567, divided into two phases: the first between 1221 and 1293 following mainly French models and the second from the middle of the fifteenth century undertaken by a very international workshop (Advisory Body Evaluation 316 1984, pp. 1–2).

Historic Center of Cordoba

The Mosque of Cordoba was declared World Cultural Heritage in 1984, and in 1994 the whole historic center of Cordoba was included in this heritage site. The Mosque became part of the list of World Cultural Heritage as an outstanding example of religious Islamic architecture from the caliphate of Cordoba (929–1031) which, with its dimensions and design, had a great influence on western Muslim art and the "neo-moresque" styles of the nineteenth century (Advisory Body Evaluation 313 1984, p. 3). The historic center of Cordoba was added for the same reasons. The World Heritage site now contains an important part of the historic center, the Alcázar, the river Guadalquivir, the Roman bridge, and the Calahorra Tower, a total of 80 ha (Advisory Body Evaluation 313bis 1994, pp. 60–61; Historic Centre of Cordoba 2015).

Cordoba had been an important city since Roman times. It was the capital of Muslim Spain in the eighth century, depending on Damascus, and the capital of an independent caliphate since 929. The city became one of the most extensive examples of a medieval Muslim capital city, with its narrow street network, its Great Mosque (built between 785 and 1009), palaces, dwellings, and a riverport. Having been an important city before and being one of the most important urban and cultural centers of Europe, Northern Africa, and the Middle East from the tenth to the twelfth century, it also reflects the coexistence of three cultures/religions during the Middle Ages: Islam, Judaism, and Christianity.

Monastery and Site of the Escorial, Madrid

The Monastery of San Lorenzo del Escorial was declared World Cultural Heritage in 1984. It forms part of the World Heritage list as an example of human creative genius, the ideological and artistic ideas dominant in architecture, monumental arts, and landscape design during the Spanish Golden Age and common for palace complexes and their urban and landscape design created by the European monarchies. Because of its close association with the Spanish rulers of the House of Austria and the House of Bourbon, it has been also seen as of great importance for European and world history since the early modern times (WHC-14/38.COM/8E 2014, p. 130).

Built between 1563 and 1584, the Escorial was envisioned by the Spanish King Philip II and his architect Juan Bautista de Toledo as the directing center of the Spanish Empire at the apogee of its power in the sixteenth and seventeenth century. It became the muscular declaration of Spanish world power, of the oneness of the Spanish Monarchy and the Catholic Church, an ideological and artistic expression of the Spanish Monarchy and its Catholic kings. This is why it was planned from the start as monastery and royal residence and also as the pantheon for the Spanish kings and queens from Charles V (1500–1558) until today.

The different parts of the Escorial (the monastery, the royal palace, the library, the school, the seminary, the service buildings) are ordered around different courtyards and centered in the basilica. The whole complex is a massive and austere stone building, a quadrangle of approximately 153 m by 224 m, built in the Spanish Renaissance style with latter Baroque incorporations. The Escorial also houses a rich art collection including works from Titian, Tintoretto, El Greco, Velázquez, Paolo Veronese, and others. The complex covers 94 ha (Monastery and Site of the Escurial 2017)

Works of Antoni Gaudí

In total seven works of the Catalan architect Antoni Gaudí (1852–1926) were declared World Cultural Heritage: Park Güell (1904–1916), Palau Güell (1886–1890), and Casa Milà (1906–1910) in 1984 and Casa Battló (1904–1906), Casa Vicens (1883–1885), the Nativity Façade and the Crypt of the Sagrada Familia (1883–1926) and the Crypt of the Colònia Güell (1898–1905) in 2005, all of them located in or near to Barcelona. They were inscribed into the World Heritage list as an exceptional creative contribution to nineteenth and twentieth century architecture and building technology, exemplifying cultural currents of the time, as, for example, the Catalan *Modernisme*. (Advisory Body Evaluation 320bis 2005, p. 173).

Gaudí's work is exceptional for being inspired by traditional and patriotic Catalan ideas, while using the technical progress of modern industry, economy, and society, which also makes him the

most outstanding representative of the Catalan *Modernisme* movement from the end of the nineteenth and start of the twentieth century: the apogee of Catalan culture. He developed a very eclectic style, which draws in a revolutionary way from the different styles from all over the world and different periods, borrowing in a very imaginative and creative manner, all of which only makes his work more universal. He produced a very personal, unique and individualistic synthesis of different literary and artistic movements of his time, such as the Arts and Crafts movement, Symbolism, Expressionism, and Rationalism (Advisory Body Evaluation 320bis 2005, p. 173).

Cave of Altamira and the Paleolithic Cave Art of Northern Spain

The Cave of Altamira was declared World Cultural Heritage in 1985, and the site was extended to 17 more caves (La Peña de Candamo, Tito Bustillo, Covaciella, Llonín, El Pindal, Chufín, Hornos de la Peña, El Castillo, Las Monedas, Las Chimeneas, Las Pasiega, El Pendo, La Garma, Covalanas, Santimamine, Ekain, and Altxerri) in 2008. They were included in the World Heritage list as eminent examples of cave art from the Upper Paleolithic and testimony of the origins of human civilization (WHC.08/32.COM/24rev 2008, p. 182).

All 18 caves lie inside the small strip between the Cantabrian Mountains and the Cantabrian Coast in Northern Spain. The caves preserved on their walls and ceilings astonishingly well depictions of animals (bison, horse, hind, etc.), humans, and signs painted in the period between 35,000 and 11,000 BC, with its high point during the Magdalenian period (17,000–13,000 BC). The depictions are sometimes realistic, sometimes schematic; they are painted with lines, dotted lines, color wash, or spraying; or they are engraved. The dominant colors are ochres, reds, and blacks (Advisory Body Evaluation 310bis 2008, pp. 217–218).

The Paleolithic cave art from this area has its singularities which render it different from other exceptional cave arts of the same period in the Périgord (France), Portugal, Andalusia, and the Ebro Valley.

Monuments of Oviedo and the Kingdom of the Asturias

The churches of Santa Maria del Naranco, San Miguel de Lillo, and Santa Cristina de Lena in the area of the capital of the Spanish region of Asturias, Oviedo, were declared World Cultural Heritage in 1985. The site was extended in 1998 to the Cámara Santa of the Cathedral in Oviedo, the Basilica of San Julián de los Prados, and the Foncalada. These monuments were integrated into the World Heritage list because of their pre-Romanesque Asturian style with the basilica layout, entirely vaulted, use of columns instead of piers, and rich decorations with Visigothic and Arabic elements and forms associable to the sanctuaries of Asia Minor. It is also seen as testimony to the small Christian Kingdom of Asturias existing during the dominance of the Emirate of Cordoba (Advisory Body Evaluation 312 1985, pp. 2–3).

All the monuments were built during the ninth century, when most of the Iberian peninsula was part of the Islamic cultural area, but Oviedo was the capital of the Christian Kingdom of the Asturias, which in Spanish historiography has often been seen as the primal nucleus of what was to become in the sixteenth century the Spanish Empire of the Catholic Kings and the Kingdom of Spain today.

The four churches and the Cámara Santa of the Cathedral of Oviedo are most representative for a pre-Romanesque style which combines elements from classical Rome, Late Antiquity, Paleo-Christian, Paleo-Byzantine, and Visigothic Mozarabic, but also local, designs. The Foncalada is a first-rate example for hydraulic engineering of the early Middle Ages (WHC-14/38.COM/8E 2014, pp. 131–133).

Old Town of Ávila with Its Extra-Muros Churches

The Old Town of Ávila and four churches outside of the city walls were declared World Cultural Heritage in 1985, and in 2007 the site was extended to three churches more and three convents. They were inscribed into the World Heritage list as an exceptional urban ensemble of a fortified medieval city with intact walls and a high

density of religious and secular buildings (Advisory Body Evaluation 348rev 1985, p. 2).

The city of Ávila was in the eleventh century established as a stronghold of the expanding Kingdom of Castile against the Muslim territories to the south. So, it was an important part of the policies of the Kingdom of Castile, what were to become latter Spain, to settle the newly won territories with Christians mainly from Northern Spain.

The walls which surround the Old Town are nearly entirely preserved; they have a length of more than 2.5 km, 82 towers, and 9 gates, all built during the eleventh and twelfth century. The seven extra-muros churches (San Segundo, San Andrés, San Vicente, San Pedro, San Nicolás, Santa María de la Cabeza, and San Martín) are of Romanesque style and from the twelfth century. The three convents (La Encarnación, San José, and the Real Monasterio de Santo Tomás) are from the fifteenth and sixteenth centuries. The total World Heritage site has 36 ha (Advisory Body Evaluation 348bis 2007; Old Town of Avila 2017).

Old Town of Segovia and Its Aqueduct

The Old Town of Segovia and its aqueduct were declared World Cultural Heritage in 1985. They were inscribed as World Heritage site because Segovia and its plenty monuments are seen as historically important and a testimony of a Western city with a social structure where hierarchy was overshadowed by the belonging to one of the different cultural communities: Muslims, Christians, and Jews. This is reflected in the ensemble of its buildings, from domestic architecture to the great religious and military structures, where the most diverse construction techniques and styles are present (Advisory Body Evaluation 311rev 1985, pp. 1–2).

Segovia has been erected on a rocky cliff between two rivers. As a whole, the city is an example of the complex historical reality of Spain during the Middle Ages and early modern times. On this World Heritage site, we find a Roman aqueduct, one of the best preserved worldwide, from the first or second century; the Alcázar built between the eleventh and sixteenth century; the Gothic cathedral from the sixteenth century; Romanesque churches from the eleventh, twelfth, and thirteenth centuries; palaces from the fifteenth and sixteenth centuries; and the Royal Mint from the sixteenth century. The World Heritage site totals 134 ha (Old Town of Segovia 2011).

Santiago de Compostela (Old Town)

Santiago de Compostela Old Town was declared World Cultural Heritage in 1985. It was included in the World Heritage list because of its historic center and its mainly Romanesque and Baroque Cathedral, both cultural and artistic masterpieces and intimately linked to one of the major themes of medieval European history: the pilgrimage to the supposed burial place of Saint James the Greater (Advisory Body Evaluation 347 1985, p. 3).

Since the ninth century, Santiago de Compostela, a town in Galicia in the northwestern corner of Spain, became famous for being the supposed burial place of Saint James the Greater, apostle of Jesus Christ. It developed over the following centuries into the third most important pilgrimage place of all Christianity. Furthermore it became strongly connected to the struggle of Christian Spain against Islam through the legendary figure of Santiago Matamoros (Saint James the Moor-slayer).

Inside the Old Town, we find the cathedral with the Holy Tomb, masterpiece of Romanesque and Baroque architecture, and other buildings in the Romanesque, Gothic, Renaissance, Baroque, and Neoclassical styles, testimony of the ongoing strength of faith. The World Heritage site covers 108 ha (WHC-14/38.COM/8E 2014, pp. 147–148) (Santiago de Compostela 2017).

Historic City of Toledo

The historic city of Toledo was declared World Cultural Heritage in 1986. It was included in the World Heritage list in its entirety as a unique artistic achievement, from Visigothic times to the Baroque of the early eighteenth century, including a Mudéjar style, which combined Visigothic and Muslim elements, and eminent monuments from the fifteenth and sixteenth centuries (Advisory Body Evaluation 379 1986, p. 2).

Located geographically right in the center of Spain, Toledo had been since Roman times an important crossroad and strategic location. It became the capital city of nearly the whole Iberian Peninsula in Visigothic times and was politically and militarily one of the most important places in Spain during Islamic rule and after the conquest by Christians (1085). Until Philip II it was one of the capital cities of Castile and Spain, and until today it was the center of the Spanish Catholic Church.

From Roman times we find in Toledo the remains of a circus, an aqueduct, and a sewer, from the Visigothic period we find parts of the walls, and from the period of Islamic rule, we find, for example, the old Gate of Bisagra, the gate of Bab al-Mardum, the mosque of the Tornerías, and the mosque of El Cristo de la Luz. From after the Christian conquest of the city and the later Middle Ages, we find, for example, two important Jewish synagogues (Santa Maria la Blanca, El Transito), churches (the mainly Gothic Cathedral, the Romanesque San Roman), but also civil buildings like walls, bridges, and houses. We find buildings in Mudéjar style (Santiago del Arrabal, Galiana palace) and, from the fifteenth and sixteenth centuries, the churches of San Juan de los Reyes, San Juan Bautista, parts of the cathedral, and the hospital of the Santa Cruz (Advisory Body Evaluation 379 1986, p. 2).

Toledo was also home to El Greco and houses various paintings of his, the most famous being *The Burial of the Count of Orgaz* in the church of Santo Tomé. The World Heritage site covers in total 260 ha (Historic City of Toledo 2013).

Mudéjar Architecture of Aragón

Four buildings in the city of Teruel were declared World Cultural Heritage in 1986. This was extended to six more in 2001. They were included in the World Heritage list as testimonies of Aragonese Mudéjar art which came out of the coexistence of Islamic and Christian societies after the Reconquest (the conquest of Islamic territories by the Spanish Christian kingdoms) between the twelfth and seventeenth century. It has important influences from the Islamic world and various European styles that developed during the same centuries, particularly from Gothic (Advisory Body Evaluation 378bis 2001, p. 103).

The ensemble includes ten monuments in total: the Cathedral of Santa María de Mediavilla at Teruel, the church of San Pedro at Teruel, the church of San Martín at Teruel, the church of Salvador at Teruel, the church of Santa María at Calatayud, the church of Santa Tecla at Cervera de la Cañada, the church of Santa María at Tobed, the Mudéjar features of the Aljafería Palace at Zaragoza, the church of San Pablo at Zaragoza, and the Cathedral of La Seo del Salvador at Zaragoza. The Mudéjar style appears specially pronounced in the towers, ceilings, domes, and apses of the religious monuments (Advisory Body Evaluation 378bis 2001, p. 101).

Old Town of Cáceres

The Old Town of Cáceres in the Spanish region of Extremadura was declared World Cultural Heritage in 1986. It was included in the World Heritage list as an important example of the fortifications built in Spain by the Almohades during the twelfth and thirteenth centuries and a city which was dominated from the fourteenth to sixteenth century by powerful rival clans with their fortified houses, palaces, and towers which dominate the Old Town today. The city bears witness to very diverse cultural influences as different Islamic styles, Northern Gothic, Italian Renaissance, and arts of the New World (Advisory Body Evaluation 384 1986, p. 3).

In its layout and the churches, palaces, towers, walls, gates, and houses, the Old Town is a typical example of a Spanish medieval city formed on the frontier between Islam and Christianity. The site covers 9 ha (Old Town of Cáceres 2017).

Cathedral, Alcázar, and Archivo de Indias in Seville

The cathedral, the Alcázar, and the Archivo de Indias in Seville were declared World Cultural Heritage in 1987. They were included in the World Heritage list because the Cathedral and its tower (and former minaret), the Giralda, are seen as unique artistic achievements of the Almohad, Gothic and Renaissance styles. Furthermore all three buildings are directly associated with the

discovery of the New World by Christopher Columbus in 1492–1493 and its colonization during the centuries afterward (Advisory Body Evaluation 383rev 1987, p. 3).

The complex of the three buildings together symbolizes in an inspiring way also the essence of the Spanish Monarchy as a world power at its apogee: royal, ecclesiastical, and trading power. The first parts of the Alcázar were built during the tenth century as a residence of the Muslim governor; it became the home of Muslim and Christian rulers and is still today the palace of the Spanish royal family in Seville. It brings together Almohad, Mudéjar, Renaissance, Baroque, and Neoclassical styles. The Cathedral with its five naves is the largest Gothic building in Europe and houses the tomb of Christopher Columbus. Its bell tower, the Giralda, was erected as an Almohad style minaret and is today topped by Renaissance architecture. The building of the Archivo de las Indias, the Lonja, was established in 1585 as a merchants' consulate and houses today the greatest collection of documents concerning the discovery and colonization of the New World (Advisory Body Evaluation 383rev 1987, pp. 1–3).

The site covers in total 13 ha (Cathedral, Alcázar and Archivo de Indias in Seville 2017)

Old City of Salamanca

The Old City of Salamanca was declared World Cultural Heritage in 1988. It was included in the World Heritage list as one of the first places with an important university in Europe. Although not as old as Bologna, Oxford, and Paris, it was already well established around 1250 and conserves an important heritage which bears witness to this. The second important feature is Salamanca's remarkable monuments in the *Churrigueresque* style, a Baroque style of the eighteenth century developed by the Churriguera family dynasty of architects. This style was also exported with considerable influence to Latin America (Advisory Body Evaluation 381rev 1988, p. 3).

The Old City of Salamanca is essentially one of the first university cities of Europe with its roots in the eleventh century and owes to this fact important Gothic, Renaissance, and Baroque buildings from the fifteenth to eighteenth century (the Hospital del Estudio, the Escuelas Mayores, the Escuelas Menores, the Colegio de los Irlandeses, and various other colleges, which multiplied between the fifteenth and eighteenth centuries). It also retains other structures as testimony of more than 2000 years of history, for example, the Roman bridge over the River Tormes, the Cathedral and the church of San Marcos from the twelfth century, the Salinas and Monterrey Palaces from the sixteenth century, and the *Churrigueresque* style ensembles like the Plaza Mayor (1729–1755), one of the most important ensembles of eighteenth century Europe, the Clerecía (the Jesuit seminary), the college of Calatrava, the Colegio San Ambrosio, the churches of San Sebastián and Santa Cruz de Cañizares, the New Cathedral, and San Esteban all from the eighteenth century (Advisory Body Evaluation 381rev 1988, pp. 2–3).

It covers 51 ha (Old City of Salamanca 2017).

The Poblet Monastery

The monastery of Santa Maria of Poblet was declared World Cultural Heritage in 1991. It was included in the World Heritage list as one of the most perfect examples of Cistercian style from the twelfth, thirteenth, and fourteenth centuries. Furthermore Poblet was one of the largest and most complete of the Cistercian abbeys, a military complex, and a royal palace, residence, and pantheon (Advisory Body Evaluation 518rev 1991, p. 3).

The monastery is located in southern Catalonia and was first settled by Cistercian monks in 1153. Most of the buildings were erected during the twelfth to fifteenth centuries. The land had been given to the Cistercian order by the powerful and influential Count of Barcelona, Ramón Berenguer IV, in 1150. For the following centuries, the monastery received many donations from the kings, queens, and nobility of Catalonia and Aragon and served first also as a fortified royal residence and from 1340 as the royal pantheon. The community of monks ended in 1835 but was reinstalled in 1940 (Advisory Body Evaluation 518rev 1991, pp. 1–2).

The monastery is a key example for the repopulation and new agricultural exploitation by Christian kingdoms of former Muslim-dominated territories and a symbol for the ruling houses of Catalonia and Aragon.

The monastery consists of three enclosures all encircled by a defensive wall. These contain the church, cloister and monastic rooms (chapter house, refectory, kitchen, calefactory, library, scriptorium, dormitory), chapels, a hospital for the poor, royal chambers, a guesthouse, the abbot's residence, the prior's lodgings, storehouses, workshops, an oil mill, and housings for lay persons. The innermost enclosure is heavily fortified with battlements, walkways, towers, and an impressing gatehouse. The constructions are built in the Romanesque, Gothic, and Renaissance styles. The most notable features of the church are the royal tombs (Advisory Body Evaluation 518rev 1991, pp. 1–2).

The site covers 18 ha (Poblet Monastery 2017).

The Archaeological Ensemble of Mérida

The Archaeological Ensemble of Mérida was declared World Cultural Heritage in 1993. It was included in the World Heritage list as outstanding example of a major Roman provincial capital (Advisory Body Evaluation 664 1993, p. 52).

Mérida in the Spanish region of Extremadura was founded in 25 BC by the Romans as Augustus Emerita. It became the capital city of the Roman province of Lusitania and was designed after the Roman ideas of an ideal capital city. Later in the third century, it became the capital of all of Hispania. After the fall of the Roman Empire, it was for some time the capital of the Germanic tribes of the Suebi and Visigoths before it fell under Muslim rule.

The archaeological remains of Mérida's past are well preserved, but also monuments from later periods have been included as World Heritage. In total there are 22 sites with their public civil, religious (Roman and Christian), and private buildings, water management infrastructures, and museums: the Milagros aqueduct, the San Lázaro aqueduct, the Alcantarilla Bridge, the Guadiana River Dam, the bridge over the Guadiana River, the Alcazaba, the Roman theater, the amphitheater, the amphitheater house, the Trajan's Arch, the Concordia Temple, the Sta. Catalina Basilica, the Casa Herrera Basilica, the Sta. Eulalia Basilica with its Interpretation Centre, the Temple of Mars, the Roman Circus, the Mithraeum House and the Columbaria Funerary Area, the Church of Sta. Clara and its Visigothic Art Collection, the Cornalvo Dam, the Proserpina Dam, the Forum, the Roman Wall and the Albarrana Islamic Tower, the National Museum of Roman Art, the Sta. Eulalia Obelisk, the bridge over the Albarregas River, the Temple of Diana, the Thermal Baths at Reyes Huertas St., and the Thermal Baths at Alange. The ensemble comprises 31 ha (Archaeological Ensemble of Mérida 2017).

Routes of Santiago de Compostela: *Camino Francés* and Routes of Northern Spain

The Routes of Santiago de Compostela were declared World Cultural Heritage in 1993, and the declaration was extended in 2015. They were incorporated into the World Heritage list as a testimony to the pilgrimage route of St James of Compostela which helped the cultural interchange between the Iberian Peninsula and the rest of Europe in medieval times, which were at the same moment an essential part of European spiritual and cultural life and which still today is a manifestation of the power of faith among people of all classes and countries in Europe during the Middle Ages (Advisory Body Evaluation 669 1993, p. 63).

The Routes of Santiago de Compostela are different routes in Northern Spain which lead about 800 km from the French border (the Pyrenees) to the supposed burial place of the apostle St. James the Greater in Santiago de Compostela, being the Camino Francés (the French route) the main one. The route developed from the ninth century into one of the most important pilgrimage routes of Christianity and persists until today. Established over centuries on the route was an enormous infrastructure to care for the worldly and spiritual needs of the pilgrims and to make the passage possible. We find churches, hospitals, hostels, and civil engineering structures like bridges in the Romanesque, Mudéjar, Gothic, Renaissance, Baroque, Neoclassical, and more contemporary styles.

The Routes of Santiago de Compostela in France are also World Heritage sites in their own right as is the city of Santiago de Compostela and the Cathedral of Burgos.

Royal Monastery of Santa María de Guadalupe

The Monastery of Santa María de Guadalupe was declared World Cultural Heritage in 1993. It was included in the World Heritage list as an ensemble of religious architecture erected during four centuries and as symbolizing two historically important events: the expulsion of Muslim power from Spain and the discovery of America by Christopher Columbus, both in 1492. The Virgin of Guadalupe also became the symbol the Christianization of the New World (Advisory Body Evaluation 665 1993, pp. 56–57).

At the end of the thirteenth century, a shepherd claimed to have found the statue of the Virgin Maria beside the Guadalupe River, and a chapel was erected dedicated to Our Lady of Guadalupe. King Alfonso XI declared this chapel a Royal Sanctuary after winning the battle of the Salado River (1340) having invoked the help of "Santa Maria de Guadalupe." In 1389 the sanctuary, which by then had developed into an important pilgrim destiny, was declared a monastery and taken over by Hieronymite monks. It became the most important monastery in Spain. In 1835 it was dissolved but revived in 1908 by Franciscan monks (García 1993, pp. 12–27).

The monastic complex comprises the main church in Gothic style from the fourteenth and sixteenth centuries, the Baroque sacristy built between 1638 and 1647 with paintings from Zurbarán, the chapel of Santa Catalina from the fifteenth century, the Reliquaries Chapel from the end of the sixteenth century, the Baroque Chamber of the Virgin built between 1687 and 1696, the Mudéjar cloister built between 1389 and 1405, the Gothic cloister built between 1531 and 1533, and the New Church built between 1730 and 1735 (Advisory Body Evaluation 665 1993, pp. 54–55).

Historic Walled Town of Cuenca

The Historic Walled Town of Cuenca was declared World Cultural Heritage in 1996. It was included in the World Heritage list as an essentially intact example of a fortress town from the Middle Ages, with all its religious and secular buildings from the twelfth to the eighteenth century, which integrates perfectly into the rural and natural landscape (WHC.96/CONF.201/21 1996, p. 72).

Cuenca was established as a fortified town after the Muslim conquest of the area during the eighth century and as a provincial capital. In the twelfth century, it was conquered by Castile. From the fifteenth to the seventeenth centuries, it was one of the important textile- and livestock-producing cities in Spain, before its subsequent decline. Especially significant are the first Gothic cathedral of Spain, the so-called *Hanging Houses*, which are built on a cliff over the Huéscar River, and the fortifications. The World Heritage site extends over 23 ha (Historic Walled Town of Cuenca 2017).

La Lonja de la Seda de Valencia

The Lonja de la Seda in Valencia (the Silk Exchange) was declared World Cultural Heritage in 1996. It was included in the World Heritage list as an exceptional example of a secular building in Late Gothic style which bears witness to the power and wealth of a great mercantile city (WHC.96/CONF.201/21 1996, p. 72).

The *Lonja* was built between 1482 and 1533, during the Middle Ages and early modern times in one of the most important trading ports on the Mediterranean Sea. The *Lonja* became the commercial center of the city and housed also the institutions of the *Consolat de Mar* (commercial) and the *Taula de Canvis i Diposits* (banking) (Advisory Body Evaluation 782 1996, p. 88).

The *Lonja* has been built in Late Gothic style, the two most notable parts being the facades and interior of the *Sala de Contratació* (contracting hall) in Flamboyant Gothic and the *Cambra Dourada* (Gilded Chamber) with carved, gilded, and painted decoration (Advisory Body Evaluation 782 1996, p. 89).

Las Médulas

The human-made Las Médulas landscape in Galicia in northwestern Spain was declared World Cultural Heritage in 1997. It was included in the World Heritage list as an example of an ancient landscape

resulting from innovative Roman gold-mining technology (WHC.97/CONF.208/17 1997, p. 48).

The gold deposits of the region had been exploited on a small scale long before the Romans conquered the area in 19 BC. During the first century AD, the Romans started to exploit the deposits of the Las Médulas area on a large scale using very innovative though environmentally destructive engineering techniques, with hydraulic works with dams, channels, and road building, leaving behind the landscape and archaeological site we find today. The extraction of gold was stopped at the beginning of the third century (Advisory Body Evaluation 803 1997, pp. 103–104).

The World Heritage site expands over 2,208 ha (Las Médulas 2017)

The technique used consisted in collecting water in large reservoirs, which was led by a system of well-built gravity canals to the mines. Galleries were cut into the rock above the gold-bearing strata. After opening the dams, great quantities of water flowed into the galleries, which were closed at their ends, pressure built up and caused the rock to explode and to be washed away, forming enormous areas of tailings. Afterward the galleries in the gold-bearing strata were flooded in the same way, but then the auriferous material led through canals where the gold would separate under gravity from the rest of the material and sink to be extracted at the end (Advisory Body Evaluation 803 1997, p. 104).

Palau de la Música Catalana and Hospital de Sant Pau, Barcelona

The Palau de la Música Catalana and the Hospital de Sant Pau were declared World Cultural Heritage in 1997. They are the outstanding works of the Catalan architect Lluís Domènech i Montaner. They were inscribed in the World Heritage list as masterpieces of the imaginative and exuberant Art Nouveau from the early twentieth century (WHC.97/CONF.208/17 1997, p. 48).

The Palau de la Música and the Hospital de Sant Pau are the most outstanding examples of the *Modernisme* (Catalan Modernist Style or Art Nouveau) which tries to bring tradition and modernity together in an artistic style (Advisory Body Evaluation 804 1997, p. 106).

The Palau de la Música was erected between 1905 and 1908 and is a very good example of an early steel skeleton with curtain walls mainly of glass and large open spaces inside. The building is exuberantly decorated with European musical traditions as motifs.

The Hospital de Sant Pau was started by Lluís Domènech i Montaner in 1901 and finished by his son, Pere Domènech i Roura, in 1930 following the plans of his father. Like the Palau de la Música, the Hospital de Sant Pau brings functionality and the decorative arts together. From the beginning the idea was not simply to decorate the buildings with glazed tiles, bright-colored paintings, sculptures, and stained-glass windows but to use decorative beauty, and green spaces, to help the recovery of the sick. With its 14 ha, it is the largest hospital complex in the world in the Modernist style. It consists of 19 independent buildings which are connected through underground galleries with a total length of nearly 2 km (Advisory Body Evaluation 804 1997, pp. 106–107; L'Hospital 2017).

Pyrénées: Mont Perdu

The site of Pyrénées – Mont Perdu – was declared World Heritage in 1997 as a mixed site: cultural and natural. In 1999 the site was extended. It is also a site which includes two state parties: France and Spain. It was included in the World Heritage list as a cultural landscape with an outstanding beauty and an ancient socioeconomic structure of the mountains which, today, is rare in Europe (WHC.97/CONF.208/17 1997, p. 39).

The Mont Perdu massif is located in the Pyrénées on the French-Spanish border. On its southern side, it is characterized by deeply incised canyons and on its northern side by cirque walls. There are remains of human activity from the Upper Paleolithic (40,000–10,000 BC): the Añisclo and Escuain caves, the stone circles at Gavarnie, and the dolmen at Tella. The first documented settlements are from the Middle Ages and still perceptible in tracks and roads, bridges, houses, and hospices. Seven villages with their pastures and meadows still practice today an economic system based on the transhumance of sheep, cows, and horses, which was

once widespread in Europe but has nearly totally disappeared today. This system has brought the communities on both sides of the mountains and border closer to each other than to the communities in the plains north and south of the mountains. The site encompasses 30,639 ha (Advisory Body Evaluation 773 1997, p. 1).

San Millán Yuso and Suso Monasteries

The two monasteries of San Millán de Suso and San Millán de Yuso in North Central Spain were declared World Cultural Heritage site in 1997. They were included in the World Heritage list as a testimony to the Christian monasticism existing from the sixth century until today. Furthermore they are seen as the birthplace of the modern written and spoken Spanish language (WHC.97/CONF.208/17 1997, p. 48).

In the Suso Monastery, we find traces of monastic buildings from the sixth century (Visigothic), while the main parts are built in Romanesque and Mozarabic style. Not far away from the Suso Monastery, the Yuso Monastery was inaugurated in 1067. Until the twelfth century, both monasteries existed independently side by side, since then we find only one community of Benedictine monks. The Yuso Monastery is mainly in Renaissance and Baroque style. The site covers 19 ha (Advisory Body Evaluation 805 1997, p. 110; San Millán Yuso and Suso Monasteries 2017).

Although there is no proof that these monasteries have been literally the birthplace of the Spanish language, it is the place where the oldest known written document with Castilian parts has been produced: the Codex Aemilianensis 60 from the ninth and tenth centuries. The text is in Latin but with annotations in Castilian and Basque (Advisory Body Evaluation 805 1997, p. 110).

Prehistoric Rock Art Sites in the Côa Valley and Siega Verde

The prehistoric rock art site in the Côa Valley in Portugal was declared World Cultural Heritage in 1997. In 2010 the site was extended to the Siega Verde site in Spain. Both sites were included in the World Heritage list as unique examples of rock engravings from the Upper Paleolithic to the final Magdalenian/Epipaleolithic (22,000–8,000 BC), and as first manifestations of human symbolic creation from the beginning of human cultural development, and as an unrivalled source for understanding Paleolithic art, which helps to understand the social, economic, and spiritual life of our early ancestors (WHC-10/34.COM/20 2010, pp. 229–230).

The engravings on both locations were made on the rocky cliffs of the banks of the Águeda and Côa Rivers over several thousands of years starting on the Spanish site around 21,000 BC and ending between 10,000 and 7,000 BC. The techniques used were incisions or pecking. On the Spanish site, we find 645 rock surfaces engraved with subjects including animal groups like horses, bovids, and cervids, though sometimes we find human or geometric forms (Advisory Body Evaluation 866bis 2010, p. 324).

Rock Art of the Mediterranean Basin on the Iberian Peninsula

The prehistoric rock art sites on the seaboard or far inland of the Spanish Mediterranean basin were declared World Cultural Heritage in 1998. They were inscribed into the World Heritage list as the largest group of rock art sites in Europe, which help to form a picture of human life in late prehistoric times (WHC.98/CONF.203/18 1998, p. 31).

A total of 758 rock art sites in rock shelters and open rock surfaces stretches over more than 1,000 km from Catalonia in the North to Andalusia in the south. The painted subjects are naturalistic animal figures, stylized human figures, and dynamic hunting, combat, and social scenes in red, black, yellow, and white. The paintings, especially those with the hunting, combat, and social scenes, give valuable information about different aspects of human life and activity in prehistoric times: hunting, trapping, tracking of wounded animals, harvesting, and beekeeping, a first evidence of organized military confrontations and executions, social differences, clothes, personal adornments, funeral rites and other rituals, healers, divinities, and fantastic figures that combine human and animal characteristics. The dating of the paintings is still debated as the subject matters include typical scenes from the lives of hunter-gatherers of the Epipaleolithic (10,000–5,000 BC)

but also the first forms of Neolithic sedentary, agricultural life from the period after (until 3,500 BC) (Advisory Body Evaluation 874 1998, pp. 51–52; Rock Art 2017).

University and Historic Precinct of Alcalá de Henares

The University and Historic Precinct of Alcalá de Henares were declared World Cultural Heritage in 1998. They were included in the World Heritage list as the first city to be established solely as the seat of a university, which became the model for other such places in Europe and America, as the first place where it was intended to realize the concept of the ideal city, *The City of God* (*Civitas Dei*), and because of its contribution to intellectual development in the field of linguistics (e.g., definition of the Spanish language) and Miguel de Cervantes Saavedra (*Don Quixote*) who was born there (WHC.98/CONF.203/18 1998, p. 31).

Cardinal Francisco Jimenéz de Cisneros established the university in the city of Alcalá de Henares in 1499 with the project to build a university city dedicated entirely to the task of learning and teaching following the humanistic idea of the *Civitas Dei*. The old medieval town of Alcalá de Henares was during the following decades expanded to the east adding new institutions of learning, streets, sewer systems, houses for professors and students, printing workshops, and other services. In the sixteenth century, the university had more than 12,000 students, but this number declined during the seventeenth century in favor of Madrid, and in 1836 the university was closed. In 1977 a new university was inaugurated using the buildings of the old one.

The most outstanding buildings are the *Universidad y Colegio Mayor de San Ildefonso*, built between 1537 and 1553 in Plateresque style; the *Iglesia Magistral*, finished in 1515 in Gothic style; the Archbishop's Palace with its central part built during the sixteenth century in Plateresque style; the *Convento de San Bernardo* from the beginning of the seventeenth century in Baroque style; the *Patio Trilingüe* built between 1564 and 1570; *Paraninfo Universitario* built between 1516 and 1520 in Mudéjar and Plateresque style; and *the Iglesia de Jesuitas* built between 1602 and 1620 in Baroque style (Advisory Body Evaluation 876 1998, pp. 56–57).

The whole World Heritage site comprises 79 ha (University 2015).

Ibiza, Biodiversity and Culture

The site of Ibiza was declared World Heritage in 1999 as a mixed site. The natural is an example for the interaction between marine and coastal ecosystems. It was included as a cultural site in the World Heritage list because its intact sixteenth-century fortifications are valued as a testimony and example to the military architecture, the engineering, and the aesthetics of the Renaissance. Furthermore it was included as an exceptional evidence of urbanization and life in the Phoenician colonies because of the Phoenician ruins of Sa Caleta and the Phoenician-Punic cemetery of Puig des Molins (WHC.99/CONF.209/22 1999, p. 11).

The town of Ibiza, on the Spanish island of Ibiza, was founded as *Ebysos* in 654 BC by the Carthaginians. Local economy has been until the mid-twentieth century based on salt, wool, and figs. The island and its fortified harbor had been an important strategic location in the Western Mediterranean used by Romans, Arabs, Catalans, and Spaniards. This is why under Philip II of Spain in 1584–1585 new Renaissance fortifications were erected which were to become a model for many sites in the New World. The World Heritage site comprises 11,231 ha (Advisory Body Evaluation 417rev 1999, pp. 11–12; (Ibiza 2017).

San Cristóbal de La Laguna

The town of San Cristóbal de La Laguna on the Spanish Canary Islands was declared World Cultural Heritage in 1999. It was included in the World Heritage list as the first non-fortified Spanish colonial town and model for many newly established towns in America (WHC.99/CONF.209/22 1999, p. 17).

San Cristóbal de La Laguna was founded in 1497 on the Canary Island of Tenerife. The Canary Islands had been the first Spanish overseas territory conquered between 1402 and 1495 by the Kingdom of Castile which was the founding

nucleus of the Spanish Empire. It was the first territory on the way to the New World.

The first settlement was erected without any town-planning concept: today's Upper Town. This changed in 1502 when a plan following the plan for Imola in Italy by Leonardo da Vinci was implanted. Separated from the Upper Town, the Lower Town had a grid plan where major streets linked the open public spaces, with smaller streets superimposed in between. The new town attracted many new dwellers, and new public buildings, religious edifications, and private houses were erected. The town became the political, religious, and economic center of the islands until at the end of eighteenth century this position was lost. The outstanding position of San Cristóbal becomes explicit in its rich monumental heritage from the sixteenth to the eighteenth centuries (Advisory Body Evaluation 929 1999, pp. 105–106).

The site comprises 60 ha (San Cristóbal 2017).

Archaeological Ensemble of Tárraco

The Archaeological Ensemble of Tárraco (the modern city of Tarragona in Catalonia/Spain) was declared World Cultural Heritage in 2000. It was incorporated into the World Heritage list as an exceptional testimony and example of an important period in Mediterranean antiquity and as a model of Roman urban planning for provincial capitals (WHC.00/CONF.204/21 2000, p. 48).

There was a settlement on the site of Tárraco before the Roman conquest. In 218 BC the Roman Proconsul Scipio Africanus fortified this site, and it developed into the base of Roman power and culture on the Iberian Peninsula. Under Augustus it became the capital of the province of *Hispania Citerior* (*Tarraconensis*) and central place of the Imperial cult in Iberia. Until the end of the Roman rule, it was administratively, commercially, and culturally one of the most important cities on the Iberian Peninsula.

Many of the Roman remains are beneath existing buildings. The Roman buildings or parts of them preserved over the last two millennia or revealed in excavations are the ramparts mainly from the second century BC; the imperial cult enclosure built in the first century; the provincial forum with the *praetorium*; the circus built in the first century AD; the colonial forum from the first century BC; the theater from the beginning of the first century AD; the amphitheater with space for 14,000 people, built at the beginning of the second century AD, abandoned in the mid-fourth century, and reused as a location first of a Visigothic and then Romanesque church; and the Paleochristian cemetery from the third century with more than 2,000 tombs. Further away from the city itself, we find a part of the aqueduct which brought water to the Roman colony, the Tower of the Scipios, a funerary monument from the first half of the first century AD; the Médol Quarry from where many of the material for the constructions in Tárraco came; the Centcelles Villa-Mausoleum which had been a *villa rustica* established during the second century and changed into a mausoleum during the fourth century; the Dels Munts Villa, a luxurious suburban villa first constructed at the start of the first century AD and enhanced during the third century AD; and finally the Triumphal Arch of Berá, probably a territorial marker from around 13 BC (Advisory Body Evaluation 875rev 2000, pp. 141–143).

Archaeological Site of Atapuerca

The Archaeological Site of Atapuerca was declared World Cultural Heritage in 2000. It was included in the World Heritage list as the earliest and most abundant evidence of humankind in Europe whose fossil remains give extraordinary information about the physical nature and way of life of the earliest human communities there (WHC.00/CONF.204/21 2000, p. 49).

The site of Atapuerca near the city of Burgos encompasses deposits of human fossils from the Pleistocene (Trinchera del Ferrocarril, including the Gran Dolina, the Galería-Tres Simas, and the Sima del Elefante, and the Cueva Mayor including the Sima de los Huesos) with fossils from 1,200,000 BP onward and from the Holocene (El Portalón de Cueva Mayor, Galería del Sílex, Cueva del Silo, and Cueva del Mirador) with fossils from 10,000 BP until the Common Era. These human fossils are accompanied by animal fossils and stone tools. Besides, there have been made other archaeological findings in Atapuerca from the Paleolithic, Neolithic,

Bronze Age, and Iron Age. The site covers a total of 284 ha (Advisory Body Evaluation 989 2000, pp. 181–182; Bermudez de Castro et al. 1997, pp. 1392–1395; Archaeological Site of Atapuerca 2013).

In 1997 various archaeologists and anthropologists claimed that the human fossils they found belonged to a new, separate human species; they named *Homo antecessor*. Since then it has been an ongoing debate on the link between this and the other human species (the last common ancestor of the *Homo neanderthalensis* and the *Homo sapiens*, the link between the *Homo ergaster/erectus* and the *Homo heidelbergensis*, a separate species that evolved from *Homo ergaster/erectus*, actually not a separate species but just a *Homo heidelbergensis*) (Bermudez de Castro et al. 1997, pp. 1392–1395; (Klein 2013, pp. 107–110; Sarmiento et al. 2007, pp. 185–221).

Catalan Romanesque Churches of the Vall de Boí

The Catalan Romanesque churches of the Vall de Boí, high in the Catalan part of the Pyrenees mountains, were declared World Cultural Heritage in 2000. They were inscribed into the World Heritage list as testimony to the important cultural interchange in medieval Europe expressed in the Romanesque architecture of these churches and as a consistent example of Romanesque art in a nearly untouched rural setting (WHC.00/CONF.204/21 2000, p. 48).

The Vall de Boí is a narrow valley surrounded by mountains with typical small Pyrenean villages embedded in enclosed fields, of which each has its own small Romanesque church. The ensemble consists of nine churches: Sant Feliú at Barruera, Sant Joan at Boí, Santa Maria, and Sant Climent (the largest, best preserved and architecturally best example of all) at Taüll, the Church of the Assumption at Coll, Santa Maria at Cardet, the Church of the Nativity and the Hermitage of Sant Quirç at Durro, and Santa Eulàlia at Erill la Vall. The Lombard Romanesque style and interior artworks make Sant Climent at Taüll the symbol of Catalan Romanesque architecture (Advisory Body Evaluation 988 2000, pp. 176–177).

Built during the eleventh and twelfth centuries, the churches are all in the Lombard Romanesque style brought to the valley by itinerant monks and merchants and adapted to the mountain environment developing its own strong and expressive personality. The entrance of the Lombard Romanesque style into this region (Catalonia) of the Iberian Peninsula and its later expansion to other parts of it shows how Catalonia with its nominal Frankish overlords from the north of the Pyrenees was better connected to the rest of Christian Europe and to cultural influences from Italy than the other Christian kingdoms of the Iberian Peninsula (Advisory Body Evaluation 988 2000, pp. 175–176).

Most of the original mural art works were moved for conservation reasons to Barcelona during the 1920s, where they are exhibited in the Museu Nacional d'Art de Catalunya (MNAC).

Palmeral of Elche

The Palmeral (palm grove) of Elche was declared World Cultural Heritage in 2000. It was incorporated into the World Heritage list as an outstanding example of the transference of a characteristic landscape from one culture and continent to another, from North Africa to Europe, and because of its irrigation system (WHC.00/CONF.204/21 2000, p. 48).

The palm groves of Elche in the south of the Spanish region of Valencia were planned and implanted under Muslim rule from the eighth century AD. Date palms had existed in the area long before, but palm groves as oasis, typical Northern African and Arab agricultural production system for arid regions based on sophisticated irrigation systems, were introduced at this moment. There are in total 67 palm groves which together cover 144 ha (Advisory Body Evaluation 930 2000, pp. 137–138).

Roman Walls of Lugo

The Roman Walls of Lugo, a town in the Spanish region of Galicia, were declared World Cultural Heritage in 2000. They were included in the World Heritage list as the best intact example of a late Roman military structure (WHC.00/CONF.204/21 2000, p. 48).

The Romans founded the town of Lugo (*Lucus Augusti*) in 15/13 BC after the military occupation of the area. The town was laid out following Roman town planning principles. This first settlement had no special fortifications but after the first invasions of Roman territory by Germanic tribes many cities of the Empire received fortifications, which was also the case of Lugo. The walls were built between 263 and 276 AD (Advisory Body Evaluation 987 2000, p. 134).

The walls of Lugo are the most complete and original Roman military fortifications to be found today. They have a length of 2,117 m and enclose an area of 34 ha. They are 4.2 m thick, in some places up to 7 m; their height lies between 8 and 12 m. There are 46 towers intact and the remains of another 39, and 10 gates, from which 5 are original Roman. There are still internal stairways and internal and external walkways (Advisory Body Evaluation 987 2000, p. 135).

Aranjuez Cultural Landscape

The Aranjuez Cultural Landscape in Central Spain was declared World Cultural Heritage in 2001. It was incorporated into the World Heritage list as a cultural landscape created out of different cultural influences, which was a landmark in landscape design and became influential in further developments (WHC.01/CONF.208/24 2001, p. 46).

Aranjuez, placed on the Tagus and Jarama rivers, was a Royal Site from the fifteenth century, but it was Philip II who, in the sixteenth century, built the first palace and planted the first ornamental and vegetable gardens with plants from all over his worldwide empire following practices (hydraulic engineering) from Central Europe and Italy. During the seventeenth century, Aranjuez became a retreat for the royal court for pageantry and hunting. In the eighteenth century, a newly planned town was added to the palace, and under Charles III it was made an experimental ground for physiocratic, agricultural, scientific, and social ideas (Advisory Body Evaluation 1044 2001, p. 129).

The site of Aranjuez comprises different zones: the Palace with the Island Garden (ornamental, geometric or irregular), the Great Historic Garden (vegetable gardens, tree-lined avenues and groves, with irrigation systems), the planned town from the eighteenth century, and the Prince's Garden (designed in different periods). Together, the different zones conceptually create different landscapes which altogether make up the cultural landscape of Aranjuez: a water landscape with rivers, ponds, dams, ditches, and fountains; an agricultural landscape with vegetable gardens, orchards, plant nurseries, and stock-breeding farms; a beautiful landscape for leisure designed in Renaissance style with Arab touches, in Baroque style, in French Classicism style, in English style, or in nineteenth-century bourgeois style; an ordered geometrical landscape with the ornamental geometric gardens, the irrigation systems, and agricultural gardening plots; the geometry of the streets and squares; and a constructed landscape with the palace, the planned town, the roads, the agricultural buildings, and the irrigation systems. The site has an extension of 2,048 ha (Advisory Body Evaluation 1044 2001, pp. 130–131; Aranjuez Cultural Landscape 2017).

Renaissance Monumental Ensembles of Úbeda and Baeza

The Renaissance Monumental Ensembles of Úbeda and Baeza in the Spanish region of Andalusia were declared World Cultural Heritage in 2003. They were included in the World Heritage list as outstanding examples of architecture and town planning during the Renaissance and instrumental in the introduction of Renaissance ideas to Spain and their diffusion to America (WHC.03/27.COM/24 2003, p. 121).

The two towns of Úbeda and Baeza lie only 9 km from each other. Both had been smaller settlements until the conquest by the Muslims in the eighth century. From there they develop into more important fortress towns following the building pattern of Islamic Northern Africa and the Middle East. In the thirteenth century, the towns were conquered by Christian Castile but stayed with their main function as fortress towns. After the fall of the last Muslim stronghold on the Iberian Peninsula, Granada, in 1492, they lost this function, but they underwent an important economic growth

during the sixteenth century, putting the latifundist aristocracy and the church in the position to renovate and embellish them with new palaces, churches, and other buildings, even if the urban layout remains until today essentially Islamic (Advisory Body Evaluation 522rev 2003, pp. 153–154).

The most important buildings of the ensembles are in Úbeda, the Palace of Francisco de los Cobos (1531), the funerary chapel of El Salvador del Mundo (1532–1553), the Palace of Vázquez de Molina (1546), the Hospital Honrados Viejos (1548), the Palace of the Déan Ortega (1550), the Pósito (1558), the Palace of the Marqués de Mancera (1580–1600), the Cárcel del Obispo (late sixteenth century), and the Church of Santa María (thirteenth to nineteenth centuries), and in Baeza the Cathedral (1570s), the Casas Consistoriales Altas (1511–1526), the Fountain of Santa María (1564), the Seminary of St. Philip Neri (1598–1660), the Jabalquinto Palace (late fifteenth century), the Church of Santa Cruz (thirteenth century), and the University (second half of the sixteenth century) (Advisory Body Evaluation 522rev 2003, p. 153).

The site covers in total 9 ha (WHC.03/27.COM/24 2003, p. 121).

Vizcaya Bridge

The Vizcaya Bridge near the industrial Basque city of Bilbao was declared World Cultural Heritage in 2006. It was incorporated into the World Heritage list as an example of technical creativity with a satisfactory relationship between form and function, to create a hanging transporter mechanism that influenced other similar systems in the world (WHC.06/30.COM/19 2006, p. 154).

The Vizcaya Bridge is today a symbol of the Industrial Revolution. Built between 1887 and 1893, it is 45 m high and spans 160 m. It brings together nineteenth-century ironworking know-how with the at this moment new technologies of lightweight twisted steel ropes. It was the first bridge to transport people and goods in a hanging gondola above passing ships. It made it possible to build a bridge for communication between the two banks of the river without obstructing the ships or the need for long ramps even if the land was flat. It is still in use today (Advisory Body Evaluation 1217 2006, pp. 120–121).

Tower of Hercules

The Tower of Hercules, a lighthouse on the Spanish Galician coast at La Coruña, was declared World Cultural Heritage in 2009. It was included in the World Heritage list as a testimony to lighthouses from antiquity and to the continuity of the Atlantic shipping route since Roman times (WHC.09/33.COM/20 2009, p. 206).

The Tower of Hercules, originally called *Farum Brigantium*, was probably built at the end of the first century AD to mark the entrance to La Coruña's harbor. It is the only preserved Roman lighthouse still in use today. Over the centuries it has been renovated several times, the most important adaption coming in the eighteenth century. The Roman section measures 14 m^2 by 34 m high, the 21 m on the top corresponding to later renovations (Advisory Body Evaluation 1312 2009, pp. 168–169).

Cultural Landscape of the Serra de Tramuntana

The Cultural Landscape of the Serra de Tramuntana on the island of Mallorca was declared World Cultural Heritage in 2011. It was included in the World Heritage list as an exceptional cultural landscape created by the introduction of complex Arab irrigation systems, to make orchards and vegetable gardening possible on an island with many droughts, and the later expansion of the terraced and irrigation systems (including a drainage system which avoids erosion of the little soil available) to the hillsides by the Christian conquerors who introduced a feudal model. It developed a landscape characterized by rocky areas, strips of woodland, hillside terraces of olive trees, terraces with other crops, grazing land, fields for reaping, vineyards or different nonirrigated fruit crops, bigger estate houses, long walls enclosing estates, cobbled roads, towns and villages with an urban design of irregular little streets with steps and cul-de-sacs, complex water supply systems, public washing places, orchards, mills, and well-type water tanks amid stone houses, altogether in a Mediterranean

drystone architectural style. The site covers an area of 30,745 ha (WHC-11/35.COM/20 2011, pp. 223–224; Cultural Landscape 2017).

Heritage of Mercury: Almadén and Idrija

These are actually two sites (one in Central Southern Spain, one in Slovenia) which were declared World Cultural Heritage site as one under the name of *Heritage of Mercury: Almadén and Idrija* in 2012. They were included in the World Heritage list as the heritage left by the extraction of mercury, which was undertaken in only a few mines worldwide of which Almadén and Idrija were the largest. Since the Renaissance the importance of mercury had increased strongly because of its role in the extraction of gold and silver, mainly in America (WHC-12/36.COM/19 2012, pp. 205–206).

On the Spanish site of Almadén mercury had been extracted since ancient times. It became of very high importance during the sixteenth century with the conquest of Mexico and Peru by Spain because of the amounts of gold and silver to be extracted there. The mercury was shipped through the ports of Seville and Cadiz to the New World but also other European mining areas. The mines in Almadén closed in 2002/2004. It has been estimated that Almadén has provided during the last 2000 years about one third of the world's mercury (Advisory Body Evaluation 1313rev 2012, pp. 341–342).

The site of Almadén comprises the essential elements of mercury mining and the associated mining town: on the extraction site itself the mines with shafts, galleries, access and transport tunnels, mercury stores, furnaces from the seventeenth and eighteenth centuries, administrative and social buildings, in the mining town the Retamar Castle, the Chapel of San Miguel, the Mining Academy building, the superintendent's house, the Inquisitor's House, the San Sebastian el Nuevo church, the Carlos IV and Carros gates, the Miners' Hospital, the forced labour gaol and other dwellings. The Almadén site covers a total of 50 ha (Advisory Body Evaluation 1313rev 2012, p. 340; Heritage of Mercury 2017).

Antequera Dolmens Site

The Antequera Dolmens Site was declared World Cultural Heritage in 2016. It was incorporated into the World Heritage list as one of the most important engineering and architectural works of European Prehistory and an example of European Megalithism. The dimensions of the stone blocks employed using rudimentary technology, and the characteristics of the megaliths, are representative of the two great Iberian megalithic traditions (lintelled architecture in the cases of Menga and Viera and the architecture of El Romeral's false cupola ceiling) and have a special relation to the surrounding landscape of Antequera (the monuments are buried beneath earth tumuli, and two megaliths are oriented toward the natural landmarks of La Peña de los Enamorados and El Torcal). Furthermore, the megaliths in their natural context help to understand funerary and ritual practices of highly organized Neolithic and Bronze Age societies (WHC/16/40.COM/19 2016, p. 224).

The Antequera Dolmens Site comprises three human-made megalithic tombs (the dolmens of Menga and Viera and the tholos of El Romeral) and two natural landmarks (the mountain of La Peña de los Enamorados and the Sierra de El Torcal). All three tombs have still their tumulus. The Menga and the Viera dolmens are passage tombs with lintelled roofs, while the tholos of El Romeral is a corbel dome tomb with a false cupola. Menga consists of a mound (tumulus) of about 50 m in diameter and a megalithic gallery 27.5 m long and up to 6 m wide and a height rising from 2.7 to 3.5 m. It is oriented to the mountain of La Peña de los Enamorados where we find similar prehistoric symbolic art as in the dolmen itself. Viera consists of a mound of about 50 m in diameter with a long corridor which leads to a chamber with graphic and sculptural elements. The corridor and chamber together are 19 m long and 1.3 m wide with a height of about 2 m. El Romeral consists of a 26 m long and 1.5 m wide passage which leads to a circular chamber with a diameter of 5.2 m at its base and a vaulted ceiling with a height of 4 m. El Romeral faces to the highest point of the Sierra de El Torcal. La Peña de los Enamordos is a

mountain which since ever has been of high importance because of its location and anthropomorphic shape. The mountain range of El Torcal has various caves with archaeological sites from the Neolithic period and the Copper Age. It has been estimated that the Menga and Viera dolmens were erected during the fourth millennium BC, while the tholos of El Romeral in the period between 3,300 and 2,200 BC. The archaeological findings from La Peña de los Enamorados and la Sierra de El Torcal are probably from the same periods. The site covers a total of 2,446 ha (Advisory Body Evaluation 1501 2016, pp. 165–167).

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Archaeology of Mining
- ▶ Architecture, Roman
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Christian Archaeology in Spain
- ▶ Conservation and Management of Archaeological Sites
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- ▶ Western Roman Provinces, Archaeology of the
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme
- ▶ Zoning: Boundary Areas and Buffer Zones

References

Advisory Body Evaluation 1044. 2001. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/151604. Accessed 9 Sept 2017.

Advisory Body Evaluation 1217. 2006. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/152070. Accessed 9 Sept 2017.

Advisory Body Evaluation 1312. 2009. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/152327. Accessed 9 Sept 2017.

Advisory Body Evaluation 1313rev. 2012. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/152333. Accessed 9 Sept 2017.

Advisory Body Evaluation 1501. 2016. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/152811. Accessed 9 Sept 2017.

Advisory Body Evaluation 310bis. 2008. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153163. Accessed 7 Sept 2017.

Advisory Body Evaluation 311rev. 1985. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153169. Accessed 8 Sept 2017.

Advisory Body Evaluation 312. 1985. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153170. Accessed 8 Sept 2017.
Advisory Body Evaluation 313. 1984. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153175. Accessed 7 Sept 2017.
Advisory Body Evaluation 313bis. 1994. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153176. Accessed 7 Sept 2017.
Advisory Body Evaluation 314. 1984. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153178. Accessed 7 Sept 2017.
Advisory Body Evaluation 314bis. 1994. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153179. Accessed 7 Sept 2017.
Advisory Body Evaluation 316. 1984. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153181. Accessed 7 Sept 2017.
Advisory Body Evaluation 320bis. 2005. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153189. Accessed 7 Sept 2017.
Advisory Body Evaluation 347. 1985. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153235. Accessed 8 Sept 2017.
Advisory Body Evaluation 348bis. 2007. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153237. Accessed 8 Sept 2017.
Advisory Body Evaluation 348rev. 1985. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153241. Accessed 8 Sept 2017.
Advisory Body Evaluation 378bis. 2001. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153317. Accessed 8 Sept 2017.
Advisory Body Evaluation 379. 1986. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153319. Accessed 8 Sept 2017.
Advisory Body Evaluation 381rev. 1988. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153326. Accessed 8 Sep 2017.
Advisory Body Evaluation 383rev. 1987. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153330. Accessed 8 Sept 2017.
Advisory Body Evaluation 384. 1986. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153332. Accessed 8 Sept 2017.
Advisory Body Evaluation 417rev. 1999. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153417. Accessed 9 Sept 2017.
Advisory Body Evaluation 518rev. 1991. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153642. Accessed 8 Sept 2017.
Advisory Body Evaluation 522rev. 2003. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153656. Accessed 9 Sept 2017.
Advisory Body Evaluation 664. 1993. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153981. Accessed 8 Sept 2017.
Advisory Body Evaluation 665. 1993. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153983. Accessed 8 Sept 2017.
Advisory Body Evaluation 669. 1993. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/153996. Accessed 8 Sept 2017.
Advisory Body Evaluation 773. 1997. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154230. Accessed 8 Sept 2017.
Advisory Body Evaluation 782. 1996. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154262. Accessed 8 Sept 2017.
Advisory Body Evaluation 803. 1997. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154315. Accessed 8 Sept 2017.
Advisory Body Evaluation 804. 1997. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154317. Accessed 8 Sept 2017.
Advisory Body Evaluation 805. 1997. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154321. Accessed 8 Sept 2017.
Advisory Body Evaluation 866bis. 2010. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154477. Accessed 9 Sept 2017.
Advisory Body Evaluation 874. 1998. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154497. Accessed 9 Sept 2017.
Advisory Body Evaluation 875rev. 2000. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154499. Accessed 9 Sept 2017.

Advisory Body Evaluation 876. 1998. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154501. Accessed 9 Sept 2017.

Advisory Body Evaluation 929. 1999. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154607. Accessed 9 Sept 2017.

Advisory Body Evaluation 930. 2000. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154611. Accessed 9 Sept 2017.

Advisory Body Evaluation 987. 2000. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154768. Accessed 9 Sept 2017.

Advisory Body Evaluation 988. 2000. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154770. Accessed 9 Sept 2017.

Advisory Body Evaluation 989. 2000. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/en/documents/154772. Accessed 9 Sept 2017.

Alhambra, Generalife and Albayzín, Granada. 2011. *Map of the inscribed property and its buffer zone. UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Alhambra, Generalife and Albayzín Quarter, Granada. Maps. http://whc.unesco.org/en/list/314/multiple=1&unique_number=357. Accessed 7 Sept 2017.

Aranjuez Cultural Landscape. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Aranjuez Cultural Landscape. Description. http://whc.unesco.org/en/list/1044. Accessed 9 Sept 2017.

Archaeological Ensemble of Mérida. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Archaeological Ensemble of Mérida. Maps. http://whc.unesco.org/en/list/664/multiple=1&unique_number=785. Accessed 8 Sept 2017.

Archaeological Site of Atapuerca – map of the inscribed property. 2013. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Archaeological Site of Atapuerca. Maps. http://whc.unesco.org/en/list/989/multiple=1&unique_number=1153. Accessed 9 Sept 2017.

Cathedral, Alcázar and Archivo de Indias in Seville. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Cathedral, Alcázar and Archivo de Indias in Seville. Maps. http://whc.unesco.org/en/list/383/multiple=1&unique_number=1747. Accessed 8 Sept 2017.

Cultural Landscape of the Serra de Tramuntana. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Cultural Landscape of the Serra de Tramuntana. Maps. http://whc.unesco.org/en/list/1371/multiple=1&unique_number=1781. Accessed 9 Sept 2017.

de Castro, Bermudez, M. José, Juan L. Arsuaga, Eudald Carbonell, Antonio Rosas, Ignacio Martínez, and Marina Mosquera. 1997. A hominid from the lower pleistocene of Atapuerca, Spain: Possible ancestor to neandertals and modern humans. *Science* 276: 1392–1395.

García, Sebastián. 1993. *Monasterio de Guadalupe, centro de fe y de cultura*. Madrid: Guadalupe.

Heritage of Mercury, Almadén and Idrija. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Heritage of Mercury, Almadén and Idrija. Maps. http://whc.unesco.org/en/list/1313/multiple=1&unique_number=1841. Accessed 9 Sept 2017.

Historic Centre of Cordoba – map of inscribed property. 2015. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Historic Centre of Cordoba. Maps. http://whc.unesco.org/en/list/313/multiple=1&unique_number=355. Accessed 7 Sept 2017.

Historic City of Toledo – map of inscribed property. 2013. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Historic City of Toledo. Maps. http://whc.unesco.org/en/list/379/multiple=1&unique_number=435. Accessed 8 Sept 2017.

Historic Walled Town of Cuenca. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Historic Walled Town of Cuenca. Description. http://whc.unesco.org/en/list/781. Accessed 8 Sept 2017.

Ibiza, Biodiversity and Culture. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Ibiza, Biodiversity and Culture. Description. http://whc.unesco.org/en/list/417. Accessed 9 Sept 2017.

Klein, Richard G. 2013. Hominin disperals in the old world. In *The human past*, ed. Chris Scarre, 3rd ed., 84–123. London: Thames & Hudson.

L'Hospital de la Santa Creu i Sant Pau. 2017. Arquitectura, art, cultura. Hospital de la Santa Creu i Sant Pau. Hospital. Història. Arquitectura i art. http://www.santpau.cat/documents/125011/131535/%C3%80mbit+4+Arquitectura%2C+art.pdf/8ece7314-6739-4cc1-b685-8bf4b3c98410. Accessed 8 Sept 2017.

Las Médulas. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Las Médulas. Maps. http://whc.unesco.org/en/list/803/multiple=1&unique_number=949. Accessed 8 Sep 2017.

Monastery and Site of the Escurial, Madrid. 2017. *UNESCO World Heritage Centre. The list. World heritage list*. Spain: Monastery and Site of the Escurial, Madrid. Description. http://whc.unesco.org/en/list/318. Accessed 7 Sept 2017.

Old City of Salamanca. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Old City of Salamanca. Maps. http://whc.unesco.org/en/list/381/multiple=1&unique_number=439. Accessed 8 Sept 2017.

Old Town of Avila with its Extra-Muros Churches. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Old Town of Ávila with its Extra-Muros Churches. Maps. http://whc.unesco.org/en/list/

348/multiple=1&unique_number=1562. Accessed 7 Sept 2017.

Old Town of Cáceres. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Old Town of Cáceres. Description. http://whc.unesco.org/en/list/384. Accessed 8 Sept 2017.

Old Town of Segovia and its Aqueduct. 2011. *Situation map. UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Old Town of Segovia and its Aqueduct. Maps. http://whc.unesco.org/en/list/311/multiple=1&unique_number=2124. Accessed 8 Sept 2017.

Poblet Monastery. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Poblet Monastery. Description. http://whc.unesco.org/en/list/518. Accessed 8 Sept 2017.

Rock Art of the Mediterranean Basin on the Iberian Peninsula. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Rock Art of the Mediterranean Basin on the Iberian Peninsula. Maps. http://whc.unesco.org/en/list/874/multiple=1&unique_number=1026. Accessed 9 Sept 2017.

San Cristóbal de La Laguna. 2017. *UNESCO World Heritage Centre. The List. World Heritage list*. Spain: San Cristóbal de La Laguna. Description. http://whc.unesco.org/en/list/929. Accessed 9 Sept 2017.

San Millán Yuso and Suso Monasteries. 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: San Millán Yuso and Suso Monasteries. Maps. http://whc.unesco.org/en/list/805/multiple=1&unique_number=951. Accessed 8 Sept 2017.

Santiago de Compostela (Old Town). 2017. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: Santiago de Compostela (Old Town). Maps. http://whc.unesco.org/en/list/347/multiple=1&unique_number=395. Accessed 8 Sept 2017.

Sarmiento, Esteban E., Gary J. Sawyer, Richard Milner, Viktor Deak, and Ian Tattersall. 2007. *The last human: A guide to twenty-two species of extinct humans*. New Haven: Yale University Press.

Spain. 2017. UNESCO World Heritage Centre. About world heritage. The state parties. http://whc.unesco.org/en/statesparties/es. Accessed 7 Sept 2017.

Statement of Compulsory and Voluntary Contributions 31 December 2016. 2016. UNESCO World Heritage Centre. About world heritage. Funding. World Heritage Fund. http://whc.unesco.org/en/world-heritage-fund/#y2016. Accessed 7 Sept 2017.

University and Historic Precinct of Alcalá de Henares – map of inscribed property. 2015. *UNESCO World Heritage Centre. The list. World Heritage list*. Spain: University and Historic Precinct of Alcalá de Henares. Maps. http://whc.unesco.org/en/list/876/multiple=1&unique_number=1028. Accessed 9 Sept 2017.

WHC.00/CONF.204/21. 2000. Report of the twenty-fourth session of the World Heritage Committee (Cairns, Australia, 27 November – 2 December 2000). UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/2000/whc-00-conf204-21e.pdf. Accessed 9 Sept 2017.

WHC.01/CONF.208/24. 2001. Report of the twenty-fifth session of the World Heritage Committee (Helsinki, Finland, 11–16 December 2001). UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/2001/whc-01-conf208-24e.pdf. Accessed 9 Sept 2017.

WHC.03/27.COM/24. 2003. Decisions adopted by the 27th session of the World Heritage Committee in 2003. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/2003/whc03-27com-24e.pdf. Accessed 9 Sept 2017.

WHC.06/30.COM/19. 2006. Decisions adopted at the 30th session of the World Heritage Committee (Vilnius, 2006). UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/2006/whc06-30com-19e.pdf. Accessed 9 Sept 2017.

WHC.08/32.COM/24rev. 2008. Decisions adopted at the 32nd session of the World Heritage Committee (Quebec City, 2008). UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/2008/whc08-32com-24reve.pdf. Accessed 7 Sept 2017.

WHC.09/33.COM/20. 2009. Final decisions of the 33rd session of the World Heritage Committee (Seville, 2009). UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/2009/whc09-33com-20e.pdf. Accessed 9 Sept 2017.

WHC.96/CONF.201/21. 1996. Report of the Rapporteur. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/1996/whc-96-conf201-21e.pdf. Accessed 8 Sept 2017.

WHC.97/CONF.208/17. 1997. Report. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/1997/whc-97-conf208-17e.pdf. Accessed 8 Sept 2017.

WHC.98/CONF.203/18. 1998. Report of the 22nd session of the World Heritage Committee. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/1998/whc-98-conf203-18e.pdf. Accessed 9 Sept 2017.

WHC.99/CONF.209/22. 1999. Report of the Rapporteur. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/1999/whc-99-conf209-22e.pdf. Accessed 9 Sept 2017.

WHC/16/40.COM/19. 2016. Report of the decisions adopted during the 40th session of the World Heritage Committee (Istanbul/UNESCO, 2016). UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/2016/whc16-40com-19-en.pdf. Accessed 9 Sept 2017.

WHC-10/34.COM/20. 2010. Report of the decisions adopted by the World Heritage Committee at its 34th session (Brasilia, 2010). UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/2010/whc10-34com-20e.pdf. Accessed 9 Sept 2017.

WHC-11/35.COM/20. 2011. Decisions adopted by the Word Heritage committee at its 35th session (UNESCO, 2011). UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/2011/whc11-35com-20e.pdf. Accessed 9 Sept 2017.
WHC-12/36.COM/19. 2012. Decisions adopted by the World Heritage Committee at its 36th session (Saint-Petersburg, 2012). UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/2012/whc12-36com-19e.pdf. Accessed 9 Sept 2017.
WHC-14/38.COM/8E. 2014. Adoption of retrospective statements of outstanding universal value. UNESCO World Heritage Centre. Resources. Documents. http://whc.unesco.org/archive/2014/whc14-38com-8E-en.pdf. Accessed 7 Sept 2017.

Further Reading

Ars Hispaniae. 1946–1977. 22 vols. Madrid: Plus-Ultra.
Historia del Arte Español. 1995–2004. Ed. Joan Sureda, 10 vols. Barcelona: Planeta.
Spain. UNESCO World Heritage Centre. About World Heritage. The state parties. http://whc.unesco.org/en/statesparties/es.

Spatial Analysis in Field Archaeology

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Introduction and Definition

Spatial analysis deals with the use of space in the past. Such analyses are performed at two main scales: (a) *intra-site level* (some archaeologists argue for further differentiation within a site, defining micro and semimicro levels) and (b) *inter-site* or landscape level. Both analyses are concerned with finding patterns of distribution, whether of finds and features (usually at site level) or of sites and monuments. Spatial analysis at both site and inter-site level may also contribute to the elucidation of *sequence*. While the employment of some methods at both levels is broadly similar – e.g., *GIS*-based mapping or various statistical analyses, others are unique for each level. For example, GPR is more suitable for the establishment of intra-site patterns, while digital terrain modeling is more cost-effective on a landscape level. The number of methods and techniques used in spatial analyses is ever-growing and diversifying.

Key Issues

On Site (Intra-site)

On site, the plotting of artifacts and features allow the identification of certain activity areas (marked by objects), sleeping areas (blank spaces in a building), community areas (open spaces in a settlement), and so on. The mapping of finds may also indicate intrusions that are natural (the course of a stream) or anthropogenic (the line of a ditch) that are otherwise hard to see. Most often the analyses are performed after excavation and fieldwork is finished, which is why proper recording of locations during the investigations is crucial (see the entry on ▶ Recording in Archaeology in this encyclopedia). Analysis of the context records and an understanding of taphonomy and deposition (see also the entry on ▶ Site Formation Processes in this encyclopedia) is key for the correct understanding of, e.g., whether matching fragments of artifacts found in different contexts alludes to contemporaneity of the features (Kobyliński and Moszczyński 1992) or to the social practice of curation (Garrow et al. 2005). The relative size and disposition of structures and the routes between them are used to infer the relative importance (hierarchy) of buildings and the social routines practiced within a settlement.

At a smaller scale, *access analysis* explores the use of space by mapping the relative ease with which rooms may be approached within a house, allowing archaeologists to propose the location of high-ranking or special users. An eloquent example of access analysis was used to study social inequality on Bulgarian tells (Chapman 1990). Four more or less fully excavated tells (Ovcharovo, Targovishte, Radingrad, Poljanica) served as the basis for an analysis of the development of social space throughout their use (Fig. 1). The settlement maps showed the houses, the

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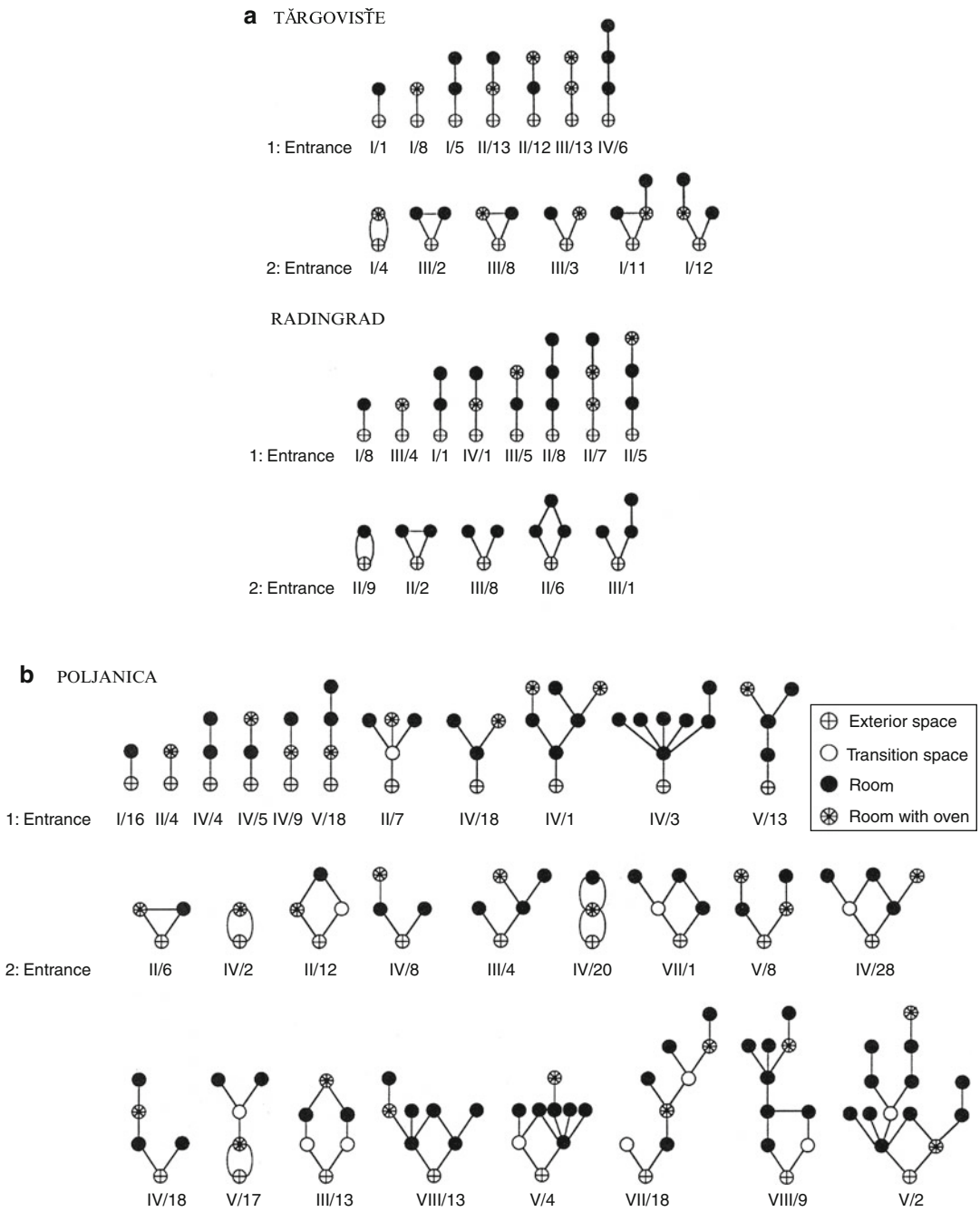

Spatial Analysis in Field Archaeology, Fig. 1 Access levels of Bulgarian tells showing number of rooms and complexity of house organization (**a**) Targovishte and Radingrad; (**b**) Poljanitsa

number of rooms within them, and access to each room from the main entrance. At Targovishte and Radingrad (Fig. 1a), one or two rooms were accessible from the entrance and two or three further rooms reached in succession with minimal choice. By contrast at Ovcharovo and Poljanica (Fig. 1b), houses eventually contained up to 11 rooms with multiple choice of access, a pattern that was held

to reveal to the successful reproduction of social inequality. The simpler access pattern at Targovishte and Radingrad was interpreted as being owed to a relatively unstratified community, and it was suggested that failure to find an adequate material way to contain social rivalry led to the relatively short lifetime of these two tells.

In the Landscape (Inter-site)

In one of the most commonly practiced types of landscape investigation, the documentation of surface finds can provide information about the intensity of discard and, thereby, infer occupation (see the entry on ▶ Surface Survey: Method and Strategies). The mapping of features registered by noninvasive techniques (such as *aerial archaeology* and *subsurface investigations*), supplemented by detailed archival research (including historical records), is also used to create a narrative picture of landscape habitation. In most modern studies, a combination of survey methods is applied. The spatial particularities of the mapped distribution of features and artifacts in a landscape usually provide the basis for studies of settlement patterns; subsistence strategies; political, military, and ideological utilization; and reorganization of the landscape. The recognition of time depth is important in a landscape, as it is in an excavated site. The idea of a *palimpsest* (Aston and Rowley 1974) acknowledges that landscapes are "layered" as century follows century, giving so-called diachronic patterns. Thus, the establishment of changes over time by interrogating the evidence for erased episodes of human occupation, or identification of multiple phases of occupation, is a major task assisted by spatial analysis.

Early examples of spatial analysis at the landscape level generated maps with dots, representing sites and/or finds to which various analyses would be applied to improve the pattern using statistical packages such as *cluster analysis*. Such analyses set out to define not only the location of sites, but their relative importance (from their size or the quality of finds). The sites discovered are most often seen as settlements, but the same principles have been applied to cemeteries, burial mounds, and hill forts. *Central place theory* uses the size of settlements to construct dependent territories around them. The land was also routinely modeled by surveying the surface in three-dimensions and representing it in the form of *contours* or *hachures*.

More recent landscape studies have added to the power of spatial analysis by collecting different variables (for example, placenames, surface finds, settlement locations) and entering their coordinates into a computerized data base to make a series of digital maps. The stack of digital maps forms a *geographic information system* (GIS), which can be interrogated in a large number of ways in order to bring out spatial relationships between variables that are often unsuspected. The surface of the landscape itself can also be digitized using *LiDAR* imaging. The data collected from the air is used to generate a three-dimensional surface on the computer – a *digital terrain model* (DTM). Using graphics programs, the DTM can be viewed from different angles to offer a realistic vision of the landscape from different locations, in different periods (*hillshade models*). The same database can be used to generate models showing which parts of the land could be seen at other parts (*viewshed*). These new tools enable the ancient landscape, its settlement patterns, and the routes through it to be envisioned in considerable detail.

A recent project in the area of Homs in Northern Syria examining the distribution of settlement types was able to group them in revealing new combinations (Philip et al. 2011). Traditionally, the area of southwest Asia is perceived as a tell-dominated landscape and the southern marl-based part of the study area confirmed this observation. The northern study area, however, with its basalt environment seemed to have facilitated a different type of occupation. Single and clustered irregular and rectilinear units of different sizes, a stone enclosure, and many cairns mostly on slopes and ridges were mapped, revealing settlement clusters (Fig. 2). Functional and chronological differentiation was established between the grouped irregular and the grouped rectilinear structures, thus suggesting changing strategies of engagement with the landscape. Several "waves" of occupation/settling have been proposed, starting with the well-documented settlement expansion in

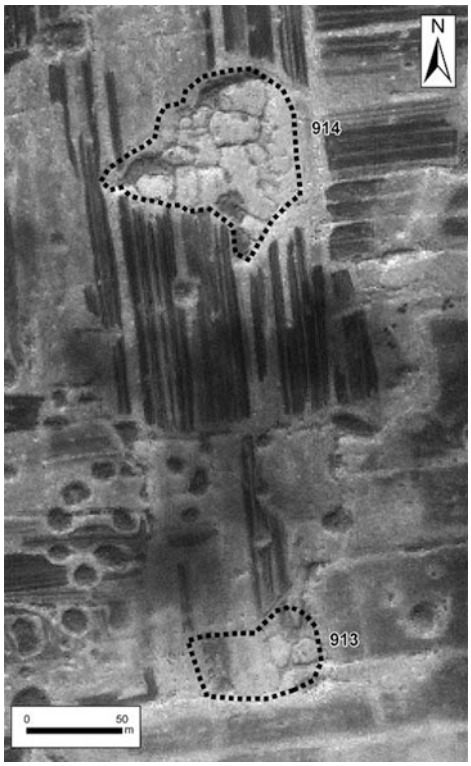

Spatial Analysis in Field Archaeology, Fig. 2 Structures in the North basalt study area of Homs, Syria, showing settlement clusters. (After Philip et al. 2011)

southern Syria during the Chalcolithic/Early Bronze Age and reoccurring in Roman and Byzantine periods, mostly associated with field systems – a pattern of land use that remained in place till modern times. The presence and mapping of thousands of hitherto overlooked cairns poses questions about the long-term landscape management of a stony environment that is intimately related to perpetuated social practices. The main result of this project is the demonstration of the diversification of the settlement patterns in Northern Syria in both space and time.

Cross-References

► Aerial Archaeology
► Recording in Archaeology
► Site Formation Processes
► Surface Survey: Method and Strategies

References

Aston, M., and T. Rowley. 1974. *Landscape archaeology: An introduction to fieldwork techniques on post-Roman landscapes*. Newton Abbot: David and Charles.

Chapman, J. 1990. Social inequality on Bulgarian tells and the Varna problem. In *The social archaeology of houses*, ed. R. Samson, 49–92. Edinburgh: Edinburgh University Press.

Garrow, D., E. Beadsmoore, and M. Knight. 2005. Pit clusters and the temporality of occupation: An earlier Neolithic pit site at Kilverstone, Thetford, Norfolk. *Proceedings of the Prehistoric Society* 71: 139–158.

Kobyliński, Z., and W.A. Moszczyński. 1992. Conjoinable sherds and stratification processes: An example from Wyszogród, Poland. *Archaeologia Polona* 30: 109–126.

Philip, G., J. Bradbury, and F. Jabbur. 2011. The archaeology of the Homs basalt, Syria, the main site types. *Studia Orontica* 9: 38–55.

"Speculative Phase" of Archaeology

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Introduction

The "Speculative Phase" is so named due to the nature of speculation that was involved in archaeology before it was formed as an academic discipline and established professional practice and training. Archaeology was speculative in every way: financial, individual, exploratory, for publicity, and to aggrandize nationhood. (Unfortunately financial speculation has never left the practice of collecting antiquities.) Many of these factors continued beyond the "Speculative Phase" and played a part before it. This entry covers the move from the collection of antiquities to archaeological excavation during the nineteenth century and also considers how archaeology was sponsored as well as the role of the "explorer-archaeologist." It argues that a shift to classificatory systems and detailed observation was informed by developments in the natural sciences. Further, it contends

that "informal imperialism" in Europe and North America was crucial to the development of archaeology in this phase and the role of archaeology in more formalized and military colonialism is examined in this regard.

From my perspective as a museum professional in Britain, I point to the legacy of the "Speculative Phase" in museums in debates around restitution as well as the display and repatriation of human remains. Related to these contentious issues is a greater curatorial comprehension of our own history, which is in turn presented to the wider public, and the re-emergence of the importance of amateurs and local societies in contemporary practice within British archaeology. There is a vast scope for future directions within this field and as a result this entry can only point to the importance of cross-disciplinary and international connections within scholarship, the continuing impact of "hero archaeology" and how this is related to the study of the role of the workforce in this period.

Definition

The "Speculative Phase" of archaeology is defined as covering the move toward excavation in the field and the construction of archaeology as a professional and academic discipline. It describes the shift away from amateur antiquarian organizations and "armchair" scholars to a more formalized involvement of institutions, such as museums, universities, and learned societies as well as the role of related individuals (Diaz-Andreu 2007). These institutions and individuals had an impact on archaeology across the world, but were based in Europe and North America during this period. Nationalist and imperial motivations also became more important in the collection of antiquities for display in museums (Trigger 1989).

The "Speculative Phase" of archaeology could encompass an extremely broad historical period and geographical area, extending from interest in the past in antiquity and ending with the formation of the study of archaeology as a discipline in universities in the early twentieth century. It has been defined previously in relation to American archaeology as lasting from 1492 to 1840 (Willey and Sabloff 1993). This definition begins with the removal of antiquities from monuments and rudimentary excavations in the early nineteenth century, but positions the main "Speculative Phase" as covering excavations from the 1840s to the 1870s. It gradually finishes in the 1880s and 1890s when archaeology was established as a subject in universities in Europe and North America. This period sees a gradual growth of more descriptive analysis and advanced methods in excavation.

A defining feature of the "Speculative Phase" is the intertwining of archaeology, the history of art and anthropology. These areas were formed as separate academic disciplines at around the same time. Classical archaeology and art history, for example, were closely interlinked due to the aesthetic writings of Winckelmann and Hegel. The Parthenon Sculptures, removed by Lord Elgin and his associates from Athens during the 1800s and bought for the British nation in 1816, were placed within "the territory of art through the deployment of concomitant discourses" through references to the marbles as "works" associated with the artist Pheidias (Whitehead 2009: 83). Archaeology was allied to anthropology in other areas, particularly in North American, Southeast Asian, and African archaeology (Christenson 1989).

Ethnography and archaeology were particularly intertwined with regard to prehistoric periods in all areas of archaeology. This intertwining can be seen clearly in the work of the anthropologist and archaeologist General Augustus Henry Lane Fox Pitt-Rivers. Pitt-Rivers' theory of the "evolution of culture," based on Darwin's *On the Origin of the Species* and ideas around "social Darwinism," was reliant on the idea of typology. Typologies were based on objects with similar functions being placed in a chronological sequence on the basis of design. An idea that was later crucial to the work of the archaeologist William Matthew Flinders Petrie. The Pitt Rivers Museum in Oxford still organizes Pitt-Rivers' collections and objects from across the world in these typologies. Pitt-Rivers also applied this idea to his

work in field archaeology on Paleolithic, and other, sites in England and Ireland.

Historical Background

Collections of classical sculpture had been made by wealthy patrons in Europe since the Renaissance (Haskell and Penny 1981). The "Speculative Phase" moves from armchair scholars to excavation and mapping of actual antiquities and sites in the field. An early example of this shift is the scientific expedition of artists, antiquarians and engineers, known as the "savants," who were sent to assist the army in the French military invasion of Egypt in 1798–1801. The savants also mapped archaeological sites, making accurate drawings and collected antiquities. Their observations and findings were published as the *Description de l'Égypte* between 1809 and 1820. The impact was as much on contemporary style and fashion as archaeological practice. However, the *Description* set an exceptional standard for recording investigations of ancient sites and monuments. Arguably, though, the more immediate influence of the French expedition was on the removal of antiquities from sites elsewhere, usually from the South or Eastern Mediterranean, for public display in national museums.

The removal of the sculptures from the Parthenon and other monuments on the Acropolis by the British peer Lord Elgin and his team in the early 1800s was accompanied by a less well-known collection of drawings and maps of the buildings on the Acropolis (Gallo 2009). The subsequent sale of the so-called Elgin Marbles marked a shift from a private collection of antiquities built up through auctions in Italy and elsewhere and the removal of objects either from a building in situ or excavated from the ground. The group of architects and antiquarians known as the Xenion Society excavated sculptures from the Temple of Aphaia in the Greek Island of Aegina and from the Temple of Apollo in Bassae in the Greek Peloponnese. They sold the antiquities at public auction: the Aegina sculptures to the Crown Prince of Bavaria in the first instance for display in his new museum the Glyptothek in 1812 and the Bassae sculptures to the British Commandant of the Ionian Islands for display in the British Museum in 1815. These rudimentary excavations and removals were speculative in a financial sense as well as in a theoretical one and were dictated by contemporary artistic taste for Greek sculpture. Nevertheless, they mark an important shift from collection to excavation, however rudimentary.

Travel and related literary observation was important in developing early archaeology. It was such literary speculation made by travellers around the mounds and ruins found in western parts of North America that gave rise to the myth of the "mound builders." This myth held that the "mounds" could not have been built by Native Americans but must have been erected by a "more civilized race" that had since migrated or disappeared (Willey and Sabloff 1993). This myth continued until late into the nineteenth century, despite surveying of the mounds by E.G. Squier and E.H. Davis in the 1840s, later published as *Ancient Monuments of the Mississippi Valley* in 1848. Squier and Davis' work had the support of the American Ethnological Society and was published by the newly formed Smithsonian Institution. This institutional support for the surveying and connection to a learned society was indicative of the move from an amateur to a more professional focus. The mound builder controversy was also typical of theories around migration and archaeology based on ideas of "racial" hierarchies and diffusionism that existed well beyond the "Speculative Phase."

Emphasis on successive development was supported by the use of classification systems. For example, the periodization of "prehistory" was put into three ages: the Stone Age, the Bronze Age, and the Iron Age by the Danish curator and archaeologist Christian Jürgensen Thomsen. Thomsen based these three ages on accounts from archaeological reports and typologies of different grave goods in the early 1800s. He equated these with different layers in the ground. Thomsen's "three ages" had a profound effect on the understanding of prehistory and typologies more generally; in fact, these ages are still reflected in the display of objects in the Pre-History Galleries of the National Museum of

Denmark in Copenhagen today. The publication of Thomsen's *Primeval Antiquities of Denmark* by J.J. Worsaae in 1849 meant that the "three ages" would have a major impact in the English speaking world (Stocking 1985: 72–73). The shift from speculative to systematic archaeology was also assisted by developments in the natural sciences such as Charles Lyell's *Principles of Geology* (1830–1833), which defined geology as "the science which investigates the successive changes that have taken place in the organic and inorganic kingdoms of nature." Lyell's *Principles* illustrated how fledgling disciplines with aspirations to scientific status could define themselves. The process of successive phases of geological development also influenced the idea of the "great chain of being" within art, anthropology, and archaeology. The "great chain of being," or "chain of art," defined civilizations in successive phases of excellence and merit, with the Greek art of fifth-century BCE Athens at the top.

Key Issues/Current Debates

One of the key issues in this period is national aggrandizement and the role of the state in funding international archaeological excavations characterized by the "informal imperialism" of northern European countries. The Eastern Mediterranean particularly documents the move toward large-scale excavation in the 1840s through the expeditions of Charles Texier in Turkey (1833) for the French Ministry of Culture, Charles Fellows in Lycia Turkey (1841–1843) for the British Museum, and Paul Emille Botta in Assyria (1842–1845) for the Louvre and Austen Henry Layard (1845–1851) for the British Museum. Although it should be noted that Britain and France had very different approaches toward funding and the role of the state in archaeological sponsorship. The French Ministry of Culture had a far more direct approach, while the British had a "public-private partnership" between individual "explorer-archaeologists," the British Museum and the Foreign Office (Hoock 2007) for which careful diplomacy was essential. The interest of German States in excavation and purchasing antiquities had already been illustrated by the sale of the Aegina sculptures in 1812. After German unification in 1871, the German Archaeological Institute and related national museums played a much larger role in competing for excavation permits at sites and antiquities well into the twentieth century. Similarly, the formation of societies and museums in the United States of America as well as increasing interest of the Ottomans in the ancient past of their own Empire meant that from the 1870s Britain and France no longer carved up the Eastern Mediterranean between themselves.

The nebulous role of diplomacy within "informal imperialism" was an important factor of the "Speculative Phase" of archaeology and has not been fully investigated. A good example of the connections between excavation, collecting for the nation and diplomacy is in the 1852 appointment of Charles Newton, a former assistant curator at the British Museum, as vice-consul in Lesvos, at that time part of the Ottoman Empire, with a remit to collect antiquities (Gunning 2009). Newton's appointment and subsequent excavations at the Mausoleum of Halicarnassus and surrounding area in 1856–1858 heralded a different approach to archaeological excavation (Fig. 1).

Newton created a team to excavate that was composed of professional engineers, artists, surveyors, and photographers, as well as local Turkish workers and British sailors from the Royal Navy. He made tentative steps in field excavation through mapping and photography, which was followed by Richard Popplewell Pullan's excavation at Priene in Turkey in the 1860s and his grid-mapping system (Fig. 2).

Newton took the credit for the discovery of the Mausoleum of Halicarnassus, a lost "wonder of the world," though it has since been proved that the engineer Robert Murdoch Smith located the site of the Mausoleum. This subsequent discovery damaged Newton's posthumous reputation but illustrates the importance of claiming credit for discoveries.

The "Indiana Jones" image of a charismatic heroic archaeologist was also formed during this "Speculative Phase." The display of these

"Speculative Phase" of Archaeology,
Fig. 1 "Lions in the Court of Konak," from Newton and Pullan (1862), Plate XV

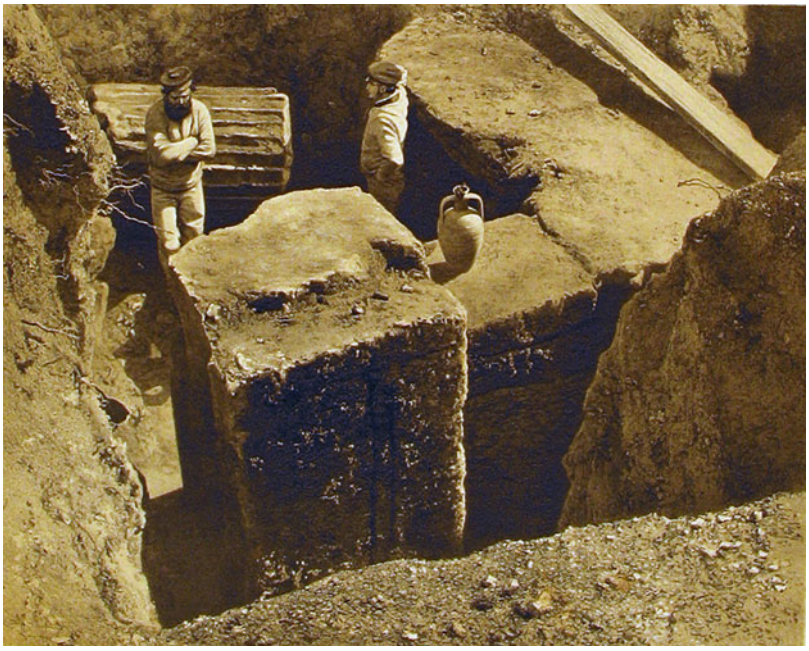

"Speculative Phase" of Archaeology,
Fig. 2 "Great Stone Outer Face," from Newton and Pullan (1862), Plate VIII

antiquities in a museum, and usually in the national museum, led to public interest fuelled by media coverage as well as the lionizing of the archaeologists themselves (Stiebling 1994). Giovanni Battista Belzonni was an earlier example of a "showman archaeologist" and was literally a showman before travelling to Egypt in 1815 and collecting antiquities.

As noted above, a key emphasis in the "Speculative Phase" is on the archaeologist as

heroic explorer. Archaeologists in Britain in particular needed to campaign to get funding and public support for their excavations from government and museum bodies. Austen Henry Layard is probably the most high profile example of this kind of "explorer-archaeologist" and he energetically publicized his discoveries in Assyria through publications of travel/archaeological books, lecture tours, newspapers and magazines (Fig. 3).

Layard tapped into public interest in biblical archaeology to gain support from an apathetic establishment at the British Museum. Although these budding archaeologists made claims in advancing scientific methods, and in many cases did so, the hasty practice of Heinrich Schliemann

"Speculative Phase" of Archaeology, Fig. 3 An example of magazine interest. "Our artist sketching the entrance gate of the Acropolis at Mycenae," from Illustrated London News (1877)

at Troy and the fabricated evidence of Louis Palma di Cesnola in Cyprus undermined their importance in the role of professionalizing archaeology (Challis 2008). Explorer-archaeologists continued in importance after archaeology had been established as a discipline, such as Hiram Bingham III searching for Machu Picchu in Peru in 1911. Archaeologists who also had professional positions in the late nineteenth and early twentieth century, such as William Matthew Flinders Petrie, Arthur Evans or Howard Carter, are still individually associated with particular sites or areas of archaeology (Fig. 4).

The combination of creating teams of people with different areas of expertise as illustrated by Newton's excavations in Halicarnassus combined with public interest in archaeological excavation led to the "big digs" of archaeology, which were "generally centered on a major site of great historical and cultural importance (Dyson 2006: 124)." The term "big scholarship" more properly describes the Olympia excavation carried out under the direction of Ernest Curtius by the German Archaeological Institute between 1875 and 1881 (Marchand 1996). The excavations at Olympia pointed to the future of classical archaeology with an excavation team of around 500 workers with different areas of expertise. At the same time, the charismatic if controversial Heinrich Schliemann was carrying out far less exacting excavations at the site of Hisarlik (Troy) in Turkey (1870–1873, 1878–1879, 1882–1883, and 1888–1890) and then Mycenae in Greece (1876–1878). These were "big digs" in every sense: big in scope, ambition, publicity, ego, and controversy (Traill 1995). Yet even Schliemann's last excavation at Troy was informed by new methodologies in archaeological stratigraphy.

The German Archaeological Institute is an example of the growing professionalization of learned societies and their part in establishing the discipline of archaeology. Formed out of the "Instituto di corrispondenza archeologica," founded in Rome in 1829, by 1871, it was a Prussian state institute and then in 1874 it became an imperial institute and a linked department, or "school," was also opened in Athens. The French Academy of Science had been established in the seventeenth century but had become particularly important in disseminating archaeological study and excavation reports after the French expedition to Egypt. It was the "German model" that guided efforts in Britain and America in establishing archaeology as a scientific profession (Kehoe and Emmerions 1999). The British Archaeological Association was formed in 1844 and the British Association for the Advancement of Science, founded in 1831, and its yearly conference covered many areas of both British and international archaeology. Societies around

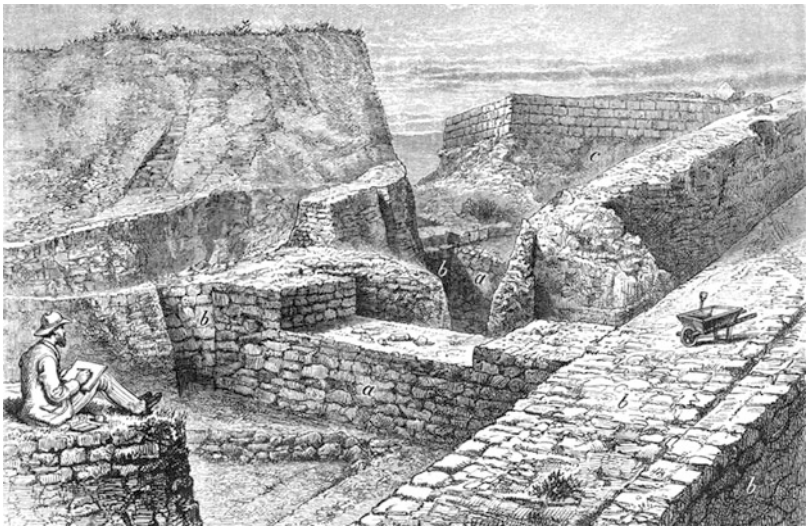

"Speculative Phase" of Archaeology, Fig. 4 Heinrich Schliemann recording Troy, from Schliemann (1886), Plate 19

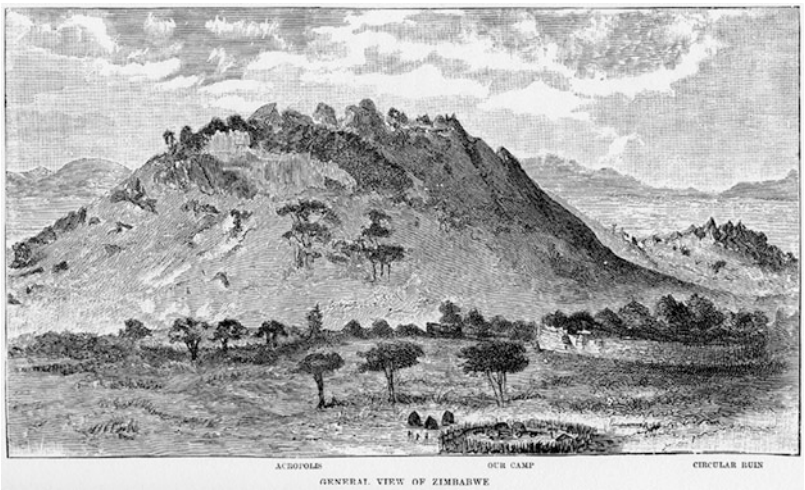

"Speculative Phase" of Archaeology,
Fig. 5 "General Views of Zimbabwe," from Bent 1892: 91

bespoke geographical or historical areas tended to develop separately, such as the Palestinian Exploration Fund in 1865 or the Egypt Exploration Society in 1882.

Positioning archaeology as a science was key in this period. Development in the natural sciences continued to influence the formation of professional archaeology. Charles Darwin's evolutionary evidence in *On the Origin of the Species by means of Natural Selection* (1859) and the work of Alfred Russel Wallace stimulated a change in classification and descriptive procedures as much as the application of Darwinian ideas. Darwinian evolutionism was hugely influential when archaeology began to establish itself as a discipline in universities during the 1880s and 1890s. The advocation of progress predicated in evolutionism was bound up with ideas around the hierarchy of "races" and civilizations, with "white" European races and civilizations considered most advanced. The "mound builders" controversy in North America illustrated that these ideas were entrenched before evolutionism. A "speculative" but culturally diffusionist example of a similar belief that had serious political consequences was the "discovery" of the medieval site (eleventh to fifteenth centuries CE) in Southern Africa known as Great Zimbabwe (Robertshaw 1990). The site was "discovered" by the German explorer Karl Mauch in 1871 and his publication was followed by the surveying work of the British archaeologist J. Theodore Bent in 1891–1892. Both Mauch and Bent considered the large stone city to be too architecturally complex to be built by the African Shona people who lived in that area and claimed that it must have been built by a northern Semitic race, akin to the Phoenicians, who migrated in antiquity (Fig. 5).

This was not based on any empirical evidence. It is a sign of the increased emphasis on evidence and the professionalization of archaeology that Bent's (1892) *Ruined Cities of Mashonaland* was a popular success but criticized for "sketchy records" by scholars. Despite this the colonial impact of his archaeological theory was dramatic. Cecil Rhodes' British South Africa Company occupied the lands around the Great Zimbabwe and "the site became a symbol of the justice of European colonization, which was portrayed as the white race returning to a land that it had formerly ruled" (Kuklick 1991: 135). Although Gertrude Caton Thompson proved Bent and Mauch wrong in 1928, their views held currency amongst "white" settlers until well into the late twentieth century. Formal colonial policies and land ownership were parallel with the greater professionalization of archaeology.

International Perspectives

One of the greatest legacies of the "Speculative Phase" of archaeology though is perhaps the acquisition of antiquities for museums – an area

that would be worthy of another entry in itself. One of the pressing issues for museums today, in Europe and North America in particular, is the issue of restitution or the repatriation of antiquities from museums to source communities and nations. This is particularly pertinent to museums in Britain with regards to the British Museum. Many of the excavations carried out by explorer-archaeologists were covered by related legal agreements made within the networks of diplomatic links and "informal imperialism" that were at work during this period. Some of these agreements, such as the firman with the Ottoman Empire about the "Elgin Marbles," were made between countries or empires that no longer exist and are not recognized as legally binding by the successor modern nation state. Other collections were taken without such agreements, such as punitive expeditionary forces by the British in Ethiopia in 1867–1868, or under a system now considered defunct by the modern nation state, such as the "partage" system in Egypt.

The emphasis in debates about restitution is generally placed on anthropological items, particularly on human remains or items of religious importance, but these claims affect archaeological collections as well and not just cause célèbres such as the Rosetta Stone. The development of nationalisms and the use of heritage in defining a nation has become important in post-colonial societies and nations. Many calls for the demand of antiquities, even if not made formally, are well-known. For example, a punitive expeditionary force was sent by the British government to the Kingdom of Benin in 1897 and took intricate bronze plaques, among other items, from the city. Known as the "Benin bronzes," Nigerian officials and others have condemned their retention in various museums in Britain. There is a vast literature on this area. The point here is that the complexity of these cases requires knowledge of this "Speculative Phase" of archaeology and what impact it has on contemporary ideas about cultural knowledge and ownership.

A related area to the above is the collection, retention and display of human remains for archaeological purposes made during this phase. The overlapping of archaeology and anthropology is particularly important in this area. Skulls and other human remains were amassed for research around human development and "racial" theory in museums and related research institutions (Fabian 2010). Indigenous communities were/are particularly affected by the collection of both ancestral and recent human remains during the "Speculative Phase" and beyond. Many countries now have ethical codes around the retention and display of human remains in museums and institutions, for example the *Native American Graves Protection and Repatriation Act* (NAGPRA) in North America. In Britain the Department of Culture Media and Sport issued "Guidance for the Care of Human Remains in Museums" in 2005 which was drawn up in relation to the 2004 *Human Tissues Act* and issued on behalf of the museum sector. The *Human Tissues Act* covers material under 1000 years old but there are also growing sensibilities within the sector and amongst the public about the display of older human remains, such as mummies and bog bodies. Again this is an issue that is not simply limited to current understanding of the "Speculative Phase."

The impact of the "Speculative Phase" on forming disciplines of archaeology and classical archaeology in university museums has become of greater interest for curators trying to understand the history of their collections in order to interpret them within the history of the institution for a wider public. This can be seen in the 2011 redisplay of the Greek and Roman antiquities at the Fitzwilliam Museum, University of Cambridge, in which the collecting history and connecting disciplines of the history of art and philology are considered. The major revamp of the Ashmolean Museum at the University of Oxford, which reopened in 2009, placed the history of the collection of its objects at the center of its museum narrative, including a display on Arthur Evans in Crete that incorporated Schliemann in Mycanae and other related archaeological discoveries made before the discipline of archaeology was formed.

Another direction in Britain related to museums, both the British Museum and local museums, and local archaeological services is

the Portable Antiquities Scheme (www.finds.org.uk). The Portable Antiquities Scheme is a voluntary scheme to record archaeological objects found by members of the public in England and Wales. Finds Liasion Officers positioned at museums or archaeological services around the country actively work with metal-detector users and people within their area to record finds. This is partly due to the 1996 *Treasure Act* which means people have a legal obligation to report any finds of material over 300 years old. In some ways this heralds a return to the importance of the amateur through metal-detector users carrying out "speculative" archaeology, but combined with professional expertise and support.

Future Directions

Much of the research around the "Speculative Phase" of archaeology is relatively recent, dating to the last few decades with a surge of scholarly interest from the late 1980s. As a result there are a great many future directions for the study of this area, which are facilitated by cross-disciplinary international groups such as the History of Archaeology Research Network (HARN). Also, as "International Perspectives" records, there are many contentious areas that attract wider public attention needing careful examination and reflection. The future directions highlighted here are just a few of many possible areas.

A current and future direction of work is on the influence of "showman archaeology" from the "Speculative Phase" to the present. The idea of "showman archaeology" (and the male gendering is a feature of interest in itself) has never really disappeared even after the professionalization of archaeology and the formation of different disciplinary areas. Explorer-archaeologists cultivated a public persona to generate more publicity to get recognition for their excavations, objects and themselves. They needed to do this before there was formal government and institutional funding. Arguably "showman archaeology" became even more important in the film and television age as it gives a personal focus and narrative to the distant past. Mortimer Wheeler was one of the first to use film reel to raise awareness of excavations in Britain in the 1920s and 1930s, and then enhanced his celebrity by appearing on radio and TV quiz shows in the 1950s and 1960s. Wheeler himself stated that he did this to gather funding and public interest. With the *Indiana Jones* film franchise and other "archaeological" films and games such as *Lara Croft: Tomb Raider* and *National Treasure*, archaeology and adventure are molded together in public consciousness. Zahi Hawass, the former Minister of State for Antiquities in Egypt, presented himself as an "explorer-archaeologist" on television and to the public, even merchandising related clothes. Arguably by doing this he attracted more funding and tourists to Egypt, but along the way also generated fierce criticism.

An important future direction is consideration of the role of the workforce in the archaeological excavations carried out during the "Speculative Phase," both the people recruited from the local area around the excavation site and those drafted in by the leading archaeologist to take part, such as members of the armed forces. The continued focus on the explorer-archaeologist neglects the importance of these other people that were directed on excavations, particularly those in colonial or "informal" colonial conditions, and their role in both finding and interpreting material (Quirke 2010). Researching this information is hard, particularly for the "Speculative Phase" in which formal lists of workforces are not frequently retained in archives. However, archaeological reports and journals as well as other media from the period can often give information about the workforce. This information would add to greater understanding about the workforce's role in the "Speculative Phase" of archaeology and give a more nuanced account of the role of European and American explorer-archaeologists and the institutions that supported them (Fig. 6).

Research should be continually interrogating how many of the assumptions made during the "Speculative Phase" are still with us, implicitly or explicitly, particularly those based on out-moded

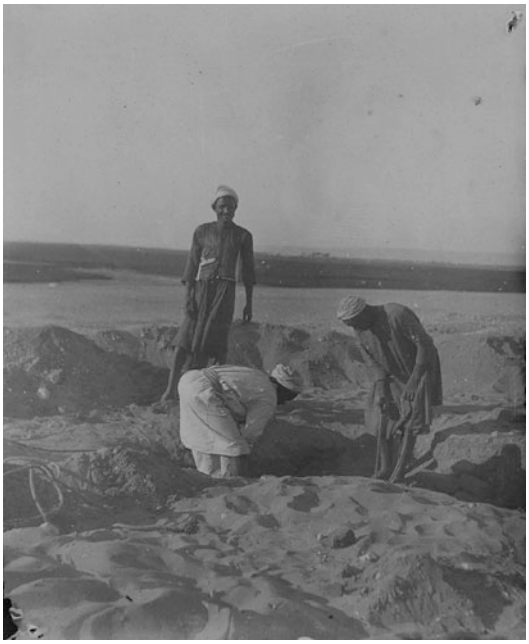

"Speculative Phase" of Archaeology, Fig. 6 Hussein Osman excavating at Abydos, 1899–1900 (On a Flinders Petrie excavation). Photograph Album belonging to Margaret Murray. Petrie Museum of Egyptian Archaeology Archives

classification systems and ideas of "racial" hierarchies. It is important to point out that the contemporary illicit trade in antiquities, for example, continues to be reliant on speculation in every respect.

Cross-References

► Nationalism and Archaeology
► Spain: Nationalism and Archaeology

References

Bent, J.T. 1892. *The ruined cities of Mashonaland*. London: Spottiswoode.

Challis, D. 2008. *From the Harpy tomb to the wonders of Ephesus. British archaeologists in the Ottoman empire 1840–1880*. London: Duckworth.

Christenson, A.L., ed. 1989. *Tracing archaeology's past: The historiography of archaeology*. Carbondale: Southern Illinois University Press.

Diaz-Andreu, M. 2007. *A world history of nineteenth-century archaeology. Nationalism, colonialism, and the past*. Oxford: Oxford University Press.

Dyson, S.L. 2006. *In pursuit of ancient pasts: A history of classical archaeology in the nineteenth and twentieth centuries*. Yale: Yale University Press.

Fabian, A. 2010. *The skull collectors: Race, science and America's unburied dead*. Chicago: University of Chicago Press.

Gallo, L. 2009. *Lord Elgin and ancient Greek architecture: The Elgin drawings at the British Museum*. Cambridge: Cambridge University Press.

Gunning, L.P. 2009. *The British consular service in the Aegean and the collection of antiquities for the British Museum*. Surrey: Ashgate Publishing.

Haskell, F., and N. Penny. 1981. *Taste and the antique. The lure of classical sculpture 1500–1900*. Yale: Yale University Press.

Hoock, H. 2007. The British state and the Anglo-French wars over antiquities 1798–1858. *The Historical Journal* 50: 49–72.

Illustrated London News. 1877. Our artist sketching the entrance gate of the Acropolis at Mycenae. 3 Feb 1877.

Kehoe, A.B.., and M.B. Emmerions, eds. 1999. *Assembling the past. Studies in the professionalisation of archaeology*. Albuqueque: University of New Mexico Press.

Kuklick, H. 1991. Contested monuments. The politics of archaeology in Southern Africa. In *Colonial situations. Essays on the contextualisation of ethnographic knowledge*, History of anthropology, vol. 7, ed. G. Stocking Jr, 135–169. Wisconsin: University of Wisconsin Press.

Marchand, S.L. 1996. *Down from Olympus. Archaeology and philhellenism in Germany 1750–1970*. Princeton: Princeton University Press.

Newton, C.T., and R.P. Pullan. 1862. *A history of discoveries at Halicarnassus, Cnidus and Branchidae*. London: Day & Son.

Quirke, S. 2010. *Hidden hands. Egyptian workforces in Petrie excavation archives, 1880–1924*. London: Duckworth.

Robertshaw, P., ed. 1990. *A history of African archaeology*. Oxford: James Currey Ltd.

Schliemann, H. 1886. *Troja. Results of the latest researches and discoveries on the site of Homer's Troy*. London: Murray.

Stiebling, W.H. 1994. *Uncovering the past. A history of archaeology*. Oxford: Oxford University Press.

Stocking, G.W. 1985. *Victorian anthropology*. New York: The Free Press.

Traill, D. 1995. *Schliemann of Troy. Treasure and deceit*. London: John Murray.

Trigger, B.G. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.

Whitehead, C. 2009. *Museums and the construction of disciplines of art and archaeology in nineteenth century Britain*. London: Duckworth.

Willey, G.R., and J.A. Sabloff. 1993. *A history of American archaeology*. London: Thames & Hudson.

Squash: Origins and Development

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Basic Species Information

Multiple species of *Cucurbita* underwent domestication in the Americas (e.g., Sanjur et al. 2002). The most significant group of crop plants is descended from *Cucurbita pepo*, including pumpkins, acorn–summer squashes, marrow, and zucchini. Today, these vegetables have multilayered cultural associations and significance in the regions around the world in which they are grown.

The reconstruction of the processes involved in the early stages of domestication of *Cucurbita pepo* is complex. However, several key stages of early domestication in the Americas have been documented archaeobotanically and, together with genetic data (e.g., Decker-Walters et al. 1993; Sanjur et al. 2002), suggest multiple "independent" domestication events.

Major Domestication Traits

The archaeobotany of squash domestication has been based on macrobotanical remains of rind fragments, fruit stems or peduncles, and seeds (Smith 2006). Wild and cultivated forms of *Cucurbita pepo* are differentiated in archaeobotanical assemblages based upon seed size and the size and morphology of peduncles. Individual specimens are then directly radiocarbon dated (AMS) to provide a robust chronology, thereby avoiding taphonomic problems arising through the dating of archaeobotanical finds by association (Smith 1997; also see Dillehay et al. 2007). Using this method, two independent domestications of squash have been inferred: "the pumpkin lineage (*Cucurbita pepo* ssp. *pepo*) in Mexico by 10,000 years ago, and the acorn–summer squash lineage (*Cucurbita pepo* ssp. *ovifera*) in the eastern United States by 5,000 years ago" (Smith 2006: 29).

Timing and Tracking Domestication

A large-seeded form of *Cucurbita pepo* was cultivated in the vicinity of Guilà Naquitz Cave in the Oaxaca Valley of Mexico around 10,000 cal BP (Smith 1997, 1998, 2006). At this time, people also harvested wild *Cucurbita* gourds. The increase in seed size is characteristic of domesticated *Cucurbita pepo* ssp. *pepo* and is considered "good evidence for the adaptive syndrome of domestication—an automatic adaptive response by squash plants to new seed bed selective pressures associated with deliberate and sustained planting" (Smith 2006: 28). By 8,400 cal BP, over 1,000 years after initial cultivation, the increased size of fruit peduncles suggests selection for larger fruits, with a steady rise in fruit size continuing thereafter (Smith 2006).

Another large-seeded form of *Cucurbita pepo* has been identified and inferred to have been cultivated in the vicinity of Phillips Spring, Missouri, United States of America, around 5,000 cal BP (Smith 2000, 2006). The archaeobotanical assemblage indicated exploitation of wild *Cucurbita* gourds and domestication of *Cucurbita pepo* ssp. *ovifera*. Variations in fruit morphology, fruit size, and rind thickness suggest sustained human selection for c. 2,000 years after initial domestication of *Cucurbita pepo* ssp. *ovifera* (Smith 2006: 29). Fritz (2007) and others have postulated that acorn–summer squash was dispersed and planted in North America before 5,000 cal BP.

Microfossil techniques, principally phytolith analysis, have also proven useful to document the exploitation and dispersal of squash in the Americas (e.g., Piperno et al. 2009). Many species of *Cucurbita* were widely exploited by foragers and farmers in the Americas (Piperno and Pearsall 1998), making the differentiation of species and domestication status important aspects of phytolith research (e.g., Piperno and Stothert 2003). Additionally, gourd and squash artifacts have

themselves provided evidence, in the form of starch residues, for other plants consumed during Preceramic times in the Americas (Duncan et al. 2009).

By the time of European conquest and colonization, squash was part of the maize–bean–squash diet that sustained communities across the Americas. Bruce Smith (1998: 147) has stated that this domesticate triad was cultivated from "Argentina to Ecuador, up through Central America and Mexico, and as far north as southern Ontario" (Smith 1998: 147). Not only were these crops nutritionally balanced, but they also complemented one another agronomically and were beneficially planted together in mixed plots.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Beans: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Eastern North America: An Independent Center of Agricultural Origins
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Maize: Origins and Development
- ▶ Phillips Spring: Agriculture and Domestication
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Decker-Walters, D.S., T.W. Walters, C.W. Cowan, and B.-D. Smith. 1993. Isozymic characterisation of wild populations of *Cucurbita pepo*. *Journal of Ethnobiology* 13: 55–72.

Dillehay, T., J. Rossen, T.C. Andres, and D.E. Williams. 2007. Preceramic adoption of peanut, squash and cotton in northern Peru. *Science* 316: 1890–1893.

Duncan, N.A., D.M. Pearsall, and R.A. Benfer. 2009. Gourd and squash artefacts yield starch grains of feasting foods from preceramic Peru. *Proceedings of the National Academy of Sciences (USA)* 106: 13202–13206.

Fritz, G.J. 2007. Keepers of Louisiana's levees: Early mound builders and forest managers. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T.P. Denham, J. Iriarte, and L. Vrydaghs, 189–209. Walnut Creek: Left Coast Press.

Piperno, D.R., and D.M. Pearsall. 1998. *The origins of agriculture in the lowland neotropics*. San Diego: Academic Press.

Piperno, D.R., and K.E. Stothert. 2003. Phytolith evidence for early Holocene *Cucurbita* domestication in Southwest Ecuador. *Science* 299: 1054–1057.

Piperno, D.R., A.J. Ranere, I. Holst, J. Iriarte, and R. Dickau. 2009. Starch grain and phytolith evidence for early ninth millennium B.P. maize from the Central Balsas River Valley, Mexico. *Proceedings of the National Academy of Sciences (USA)* 106: 5019–5024.

Sanjur, O., D.R. Piperno, T.C. Andres, and L. Wessel-Beaver. 2002. Phylogenetic relationships among domesticated and wild species of *Cucurbita* (Cucurbitaceae) inferred from a mitochondrial gene: Implications for crop plant evolution and areas of origin. *Proceedings of the National Academy of Sciences (USA)* 99: 535–540.

Smith, B.D. 1997. The initial domestication of *Cucurbita pepo* in the Americas 10,000 years ago. *Science* 276: 932–934.

Smith, B.D. 1998. *The emergence of agriculture*. New York: Scientific American Library.

Smith, B.D. 2000. Guilá Naquitz revisited. In *Cultural evolution: Contemporary viewpoints*, ed. G. Feinman and L. Manzanilla, 15–59. New York: Kluwer Academic/Plenum.

Smith, B.D. 2006. Seed size increase as a marker of domestication in squash (*Cucurbita pepo*). In *Documenting domestication: New genetic and archaeological paradigms*, ed. M.A. Zeder, D.G. Bradley, E. Emshwiller, and B.D. Smith, 25–31. Berkeley/Los Angeles: University of California Press.

Further Reading

Zeder, M.A., E. Emshwiller, B.D. Smith, and D.G. Bradley. 2006. Documenting domestication: The intersection of genetics and archaeology. *Trends in Genetics* 22: 139–155.

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Basic Biographical Information

Peter William Stahl is an archaeologist and zooarchaeologist with primary interests in New World archaeology and ethnography and a

geographical emphasis in the Northern Andes and tropical lowlands of South America. Stahl was born December 10, 1953, in Val-D'Or, Quebec, Canada. He is married to Ann B. Stahl, an anthropological archaeologist with research interests in Africa. They have two children.

Peter Stahl received his B.A. in 1975 from the University of Toronto (Victoria College) and M.A. in Archaeology in 1978 from the University of Calgary, where he worked with J. H. Kelley. He attended the University of Illinois, Urbana-Champaign, for the Ph.D., working with D. W. Lathrap. Stahl's dissertation, *Tropical Forest Cosmology: The Cultural Context of the Early Valdivia Occupations at Loma Alta*, was completed in 1984. After positions as a Research Fellow at the University of California, Berkeley (1984–1985), and University College, London (1985–1988), Stahl began a long association with the Department of Anthropology at Binghamton University (SUNY), Binghamton, New York, from which he retired in 2011 as Director of the Archaeological Analytical Research Facility and Professor of Anthropology. He is currently with the Department of Anthropology at the University of Victoria.

Major Accomplishments

Peter Stahl has practiced zooarchaeology – the identification and interpretation of preserved bone assemblages from archaeological sites – for some 35 years. Zooarchaeology assumed a prominent role in archaeology during the final quarter of the twentieth century with the emergence of cultural ecology and ecological anthropology (Reitz and Wing 2008: 11–30). Stahl has participated in significant developments in each of the facets of modern zooarchaeological research, methodology, anthropological research, and biological research.

As faunal data have become increasingly important in archaeological research, understanding the processes of accumulation and deposition of faunal remains, or taphonomy, became a central methodological issue in the interpretation of archaeological faunal assemblages. Stahl has contributed to this line of research. For example, he studied the structural density of camelid skeletal elements to explore the archaeological correlates for *ch'arki* (dried meat) production in the prehistoric Andes, concluding that faunal data from the Chavin site, Peru, did not support the consumption of imported *ch'arki* (Stahl 1999). His study of faunal materials from a large bell-shaped pit at the Pechichal site, Ecuador, is a textbook illustration of how understanding assemblage accumulation and deposition allows inference of both hunting practices and ecology, the latter inferred from the natural histories of naturally entrapped fauna (Stahl 2000).

Investigating relationships between human populations and animals contributes to anthropological research in diverse and significant ways. Peter Stahl's contributions in this area are many. He has most recently investigated the association between humans and native foxes in early Holocene South America, arguing that humans had an intimate relationship with foxes that predated the introduction of domesticated dogs and which represented an early example of an indigenous cosmology that considers selected animals as social beings (Stahl 2012). Native South American domesticated camelids and *cuy* (guinea pig) appear in Andean Ecuador well before the area was occupied by the Inca Empire, but were not domesticated there (Stahl 2003). Stahl argues from the rarity and the elite context of these finds in Ecuador that animal domesticates were part of ancient terrestrial and later maritime trade linking Ecuador and the Central Andes of Peru, trade controlled by, and benefiting, elites.

Stahl is an articulate advocate for revising standard Amazonian archaeology. In his 2002 invited article in *The Review of Archaeology*, he argues cogently for a perspective on Amazonian prehistory that recognizes the importance of historical circumstance in shaping prehistoric and contemporary cultures and that emphasizes the environmental, cultural, and agricultural heterogeneity of the lowland tropics. He advocates research using complementary sources and methodologies, which "...demonstrate the potential of an integrated anthropological research paradigm for producing nuanced and sophisticated interpretations of a least-known continent and people" (Stahl 2010: 218).

Peter Stahl was an early voice for the contributions of archaeology (1996) and zooarchaeology (2008) for exploring issues related to Holocene biodiversity in the Americas. The archaeological record of environmental transformations during the 10,000 years of the Holocene, while far from perfect, illustrates the dynamism of prehistoric biodiversity and the interplay of environmental events and anthropogenic effects. Zooarchaeologists can contribute greatly to understanding biodiversity through the study of past human landscapes; this is the perspective of historical ecology:

> When we consider humans as conservationists and resource managers or epiphenomenal optimal foragers, we avoid the real position that indigenous populations created the very ecosystems that we wish to conserve. . .. Archaeologists, by definition, excavate and explore anthropogenic landscapes through time and space; therefore we are historical ecologists. (Stahl 2008: 12, 13).

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Guinea Pig: Domestication
- ▶ Historical Ecology in Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Site Formation Processes
- ▶ Vertebrate Taphonomy in Archaeological Research
- ▶ Zooarchaeology

References

Reitz, E.J., and E.S. Wing. 1999. Structural density of domesticated South American camelid skeletal elements and the archaeological investigation of prehistoric Andean *ch'arki*. *Journal of Archaeological Science* 26: 1347–1368.

Reitz, E.J., and E.S. Wing. 2000. Archaeofaunal accumulation, fragmented forests, and anthropogenic landscape mosaics in the tropical lowlands of prehispanic Ecuador. *Latin American Antiquity* 11: 241–257.

Reitz, E.J., and E.S. Wing. 2002. Paradigms in paradise: Revising standard Amazonian prehistory. *The Review of Archaeology* 23: 39–50.

Reitz, E.J., and E.S. Wing. 2003. Pre-Columbian Andean animal domesticates at the edge of empire. *World Archaeology* 34: 470–483.

Reitz, E.J., and E.S. Wing. 2008a. *Zooarchaeology*. 2nd ed. Cambridge: Cambridge University Press.

Reitz, E.J., and E.S. Wing. 2008b. The contributions of zooarchaeology to historical ecology in the Neotropics. *Quaternary International* 180: 5–16.

Reitz, E.J., and E.S. Wing. 2010. The Arawak diaspora. *Latin American Antiquity* 21: 217–223.

Reitz, E.J., and E.S. Wing. 2012. Interactions between humans and endemic canids in Holocene South America. *Journal of Ethnobiology* 32: 108–127.

Stahl, P.W. 1996. Holocene biodiversity: an archaeological perspective from the Americas. *Annual Review of Anthropology* 25: 105–126.

Stakeholders and Community Participation

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Introduction

From the 1970s, there has been growing momentum in the discipline of archaeology to share significant discoveries with the public. The types of public archaeology programs have changed since this time, from public tours, to public participation at archaeology sites, to stakeholders playing a role in the development of research programs in their communities. Barbara Little's (2002) edited volume on the *Public Benefits of Archaeology* shows how archaeology is becoming much more broadly perceived by the public and practitioners. She writes that archaeologists are increasingly using the discipline for "purposes of education, community cohesion, entertainment, and economic development" (Little 2002: 1). Following is a brief overview of the development of community archaeology programs and the archaeologists' changing role with stakeholder. With several international examples, this overview provides a conceptual framework for why it is important to work with stakeholders and the benefits to the discipline and community. It does not provide a complete overview of the literature. An interactive wiki on community archaeology – http://en.

wikipedia.org/wiki/Public_archaeology – furnishes an overview of the growing literature on this topic.

Definition

Community archaeology involves communities in the planning and the implementation of the project. The goal of community archaeology is to make a difference and/or a contribution to the community. Noel Chrisman (2006: 168) provides seven broad principles for scholars collaborating with communities. They are valuable for helping to develop bonds with communities and descendant groups. To summarize, these principles state:

1. Proposals and procedures must be consistent with community's culture, values, and beliefs.
2. Collaboration with the community is necessary in identifying its wants and needs.
3. The participation of community members is integral to realistic planning, delivery, and evaluation of a project.
4. Collaboration with existing organizations and their leaders is a must.
5. The design and implementation of projects must make sense to the community.
6. Anthropologists must respect the people with whom they work.
7. Anthropologists must be agents for change by working with people, not on them.

Key Issues/Current Debates/Future Directions/Examples

The discipline's growing ethical accountability encourages us to include stakeholders in the decision-making process of the research design, fieldwork, and, at times, the interpretation of the archaeological findings, thereby empowering communities to identify and connect to their past. The basis for a well-run community archaeology program is sharing the decision-making processes between the archaeologist and the stakeholder. The archaeology program at Ozette, a late prehistoric/historic whaling village in northwestern Washington State, is one of the earliest internationally known community archaeology programs. The Makah Tribal Council invited archaeologists to examine archaeological features uncovered by a mud slide. The project ran from 1970 to 1981 with the Makah Tribe playing a major role in the decision-making process along with the archaeologists throughout the project (Kirk and Daugherty 1974). At about the same time, Australian archaeologists were developing a dialogue with indigenous communities. These communications developed as the government recognized that indigenous people had the right to control their cultural resources through the "land rights" movement. This form of inclusion was more about obtaining consent for research rather than developing broader dialogue, greater community participation, and sharing in the decision-making process (Greer et al. 2002: 266).

The sharing of the decision-making process and the building of social capital between different communities and between community and professional is an important matter for archaeologists to consider when working with communities. There are, however, different views about what social capital is and how it can be used. For instance, sociologist Pierre Bourdieu (1977) explains that social capital can be used to produce or reproduce inequality. Bourdieu demonstrates how individuals can gain power through social connections. Robert Putnam (2000) uses the concept in a different way. He shows how social capital produces civic engagement, which can lead to a broad societal measure of communal health. Social capital develops in collectives and it is important for building and maintaining democracy. Putnam believes that social capital can be measured by the amount of trust and reciprocity exists in a community or between individuals.

Putnam also writes about bonding and bridging social capital. Bonding social capital is exclusive and homogenizing and is often exclusionary. Bridging social capital refers to the networking between socially heterogeneous groups. It can help create many benefits for societies, governments, individuals, and communities. The relationships and networks that bring people and

communities together are essential for a healthy self and a vital community (Hirzy 2002: 14). Connectedness through social networking is essential for the social, physical, and economic endurance of a community, and a sense of heritage can develop with consensus building between the different stakeholders.

In many ways, Bourdieu and Putnum's divergent views of social capital can help describe many public archaeology programs and how archaeologists view community participation in them. If a community archaeology program is developed from the outside, or the top down, it stands the chance of alienating people by not recognizing the inequalities that exist in the contemporary community. For instance, when a corporation or a university comes into an unfamiliar place, creates a research design for excavations, and develops a public archaeology program without input from the local population, they are creating a strategy that can alienate a community and separate them from their past. Democracy is not in play, and bridging between communities is not effective. When outsiders control the meaning of a community's past and only emphasize the exotic, or reinforce the consensus history, the public interpretation of an archaeology site stands a greater chance of alienating and disenfranchising the local community.

In 1997, Karolyn Smardz (1997: 103) wrote that archaeology should "stop taking archaeology to the public for archaeology's sake and start doing it to meet the general public's educational, social, and cultural needs." Civic engagement can be one way to address this imbalance. The civic engagement movement in archaeology is about the creation of a shared past. It is a growing trend in many professions, and its implications run much deeper than traditional public outreach programs. Civic engagement can take many forms and designs, but in all cases, it is a collaborative effort that does not presume what the community needs. Therefore, there is a deliberate shifting from the practice of *outreach* to the practice of *inreach*. *Inreach* is the practice of working with communities on research projects and reinforcing the ideals of collaboration. It is a way of making the discipline relevant to a broader audience. *Inreach* also becomes important when we challenge the consensus views of the past. For instance, archaeologists working with the Northern Cheyenne developed an important collaborative project that challenged the consensus history of a significant event related to their tribal history. Working with the tribe, archaeologists set out to find the escape route and eventual slaughter of many Northern Cheyenne. History relates that they escaped their imprisonment at Fort Robinson and were pursued by the US Calvary. Commonly held accounts, supplied by the military, differed significantly from Northern Cheyenne oral history regarding routes taken. Through this collaborative work, archaeological findings confirmed the correctness of oral history accounts related to the Outbreak of 1879, which differed from the military account. This work allowed for the commemoration of this trail and massacre (McDonald et al. 1991).

Community archaeology programs that develop on a grassroot level can help foster a form of democracy building by creating connections between different groups to present a common past. Carol McDavid (2004: 164–165) proposes that archaeologists should use available media, like the internet, to hold conversations between archaeologists and the public rather than developing presentations for the public. Community participation can become part of a democratizing process whereby the control over the interpretation of the past is decentralized and made more egalitarian. Pearson and Ramilisonina (2004: 236–237) use case studies from the Outer Hebrides and southern Madagascar to propose that archaeologists can work hand-in-hand with indigenous groups, breaking down the cultural and political barriers and work with a common interest in the study of the past.

There are many examples of archaeologists working with American Indian communities, and recently there has been a profusion of historical archaeologists engaged in local communities and making a difference, some addressing questions related to social justice (Swidler et al. 1997; Dongoske et al. 2000; Watkins 2001; Little 2002; Derry and Malloy 2003; Shackel and Chambers 2004; Colwell-Chanthaphonh and Ferguson

2007; Little and Shackel 2007). These works include many of the principles noted by Chrisman.

Moser et al. (2002: 229), working in the ancient Port of Quseir, Egypt, detail a unique community project. Traditionally, outsiders have come into Egypt to perform archaeology and the local communities have been excluded from the discovery process. They have also been omitted from developing their own local heritage. The project at the Port of Quseir provides another set of guidelines for the development of a community archaeology program. They include:

1. Communication and collaboration
2. Employment and training
3. Public presentation
4. Interviews and oral history
5. Educational resources
6. Photographic and video archives
7. Community-controlled merchandising

Much like other community archaeology programs being developed around the world, this archaeology project has developed whereby the local community can benefit from the research by participating in the development of their local heritage and also receiving financial gains (Marshall 2002).

Community groups and organizations have significant assets that can lend to the success of any archaeology program. Communities have "a deep knowledge of their communities and constituencies, the capacity to seek nontraditional outcomes, and experience with community building. We have to resist the impulse to dictate the agenda, and ensure that all questions relating to attitude, approach, ownership, access, and trust are resolved to everyone's satisfaction" (Kertzner 2002: 41; also see Archibald 2002: 3). While some archaeologists are increasingly taking into consideration the needs and desires of the communities, the goal of inclusiveness and developing bridging social capital can be a complex matter, especially when research strategies and interpretations are negotiated with the various stakeholders. Choices are made about research goals, issues of significance, and what issues, interpretations, and conclusions are worth sharing with the larger audience. In every project, archaeologists make decisions about the politics of their research agenda. They are faced with questions of either supporting the consensus history or changing the status quo.

Lisa Breglia (2007: 98), working with communities in the Yucatan, cautions us to recognize that "1) archaeology does not always represent what the local people understand as their heritage; and, what's more 2) public or community outreach, though it may be practiced with the best of intentions always carries the potential danger of ethnocentrism." A case study of a collaborative project whereby the archaeologists were in danger of not understanding the local heritage is situated in Saskatchewan, Canada. There, thousands of Doukhobors fled Tsarist persecution in Russia in 1899. One sect of Doukhobors practices communalism, pacifism, vegetarianism, and the avoidance of alcohol and tobacco. Archaeologists found alcohol bottles and butchered bones in the archaeological assemblage. The descendants were upset with the findings because they were proud of their ancestor's convictions. One descendant told the story that her grandparents had to feed the non-Doukhobor farm workers meat, or they would leave the farms. Therefore, the descendant proposed that the evidence of meat was a product of her grandparents serving farm hands, rather than her grandparents breaking religious prohibitions (Brooks 2007).

Archaeologists can take a role in either a participatory or a collaborative approach. The former develops from the outside, when the latter is part of a shared activity. An increasing number of archaeologists are committed to the idea that communities have a sense of their own past and they want to be part of decision-making process regarding their own heritage development. This changing perspective in the discipline is paralleled by changes in anthropology as a whole, and while the discipline has changed significantly, archaeologists are only beginning to realize the importance of community involvement. Community participation means that scientists are no longer the cultural brokers. Practitioners are beginning to recognize that many histories can exist in any

one place, and these stories of the past are continually being shaped and reconstructed. Archaeologists are in a good place to address these changing perspectives and they need to respond effectively to these challenges and opportunities. As practicing archaeologists, our charge can be to help change society for the better.

Cross-References

- ▶ Community and Archaeology
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Indigenous Peoples, Working with and for

References

Archibald, R.R. 2002. Introduction. In *Mastering civic engagement: A challenge to museums*, 1–6. Washington, DC: American Association of Museums.

Bourdieu, P. 1977. *Outline of a theory of practice*. Cambridge: Cambridge University Press.

Breglia, L.C. 2007. Engaging local communities in archaeology: Observations from a Maya site in Yucatan, Mexico. In *Past meets present: Archaeologists partnering with museum curators, teachers, and community groups*, ed. J.H. Jamesson Jr. and S. Baugher, 89–99. New York: Springer.

Brooks, M. 2007. Reconnecting the present with its past: The Doukhobor pit house public archaeology project. In *Archaeology as a tool of civic engagement*, ed. B.-J. Little and P.A. Shackel, 203–222. Lanham: AltaMira.

Chrisman, N.J. 2006. Community building for health. In *Community building in the twenty-first century*, ed. S.-E. Hyland, 167–189. Santa Fe: School of American Research Press.

Colwell-Chanthaphonh, C., and T.J. Ferguson, eds. 2007. *Collaboration in archaeological practice: Engaging descendant communities*. Lanham: AltaMira.

Derry, L., and M. Malloy. 2003. *Archaeologists and local communities: Partners in exploring the past*. Washington, DC: Society for American Archaeology.

Dongoske, K.E., M. Aldenderfer, and K. Doehner. 2000. *Working together: Native Americans and archaeologists*. Washington, DC: Society for American Archaeology.

Greer, S., R. Harrison, and S. McIntyre-Tamwoy. 2002. Community-based archaeology in Australia. *World Archaeology* 34: 265–287.

Hirzy, E. 2002. Mastering civic engagement: A report from the American Association of Museums. In *Mastering civic engagement: A challenge to museums*, 9–20. Washington, DC: American Association of Museums.

Kertzner, D. 2002. The lens of organizational culture. In *Mastering civic engagement: A challenge to museums*, 39–48. Washington, DC: American Association of Museums.

Kirk, R., and R.D. Daugherty. 1974. *Hunters and whales*. New York: Morrow.

Little, B.J., ed. 2002. *Public benefits of archaeology*. Gainesville: University Press of Florida.

Little, B.J., and P.A. Shackel, eds. 2007. *Archaeology as a tool of civic engagement*. Lanham: AltaMira.

Marshall, Y. 2002. What is community archaeology? *World Archaeology* 34: 211–219.

McDavid, C. 2004. Towards a more democratic archaeology? The internet and public archaeological practice. In *Public archaeology*, ed. N. Merriman, 159–187. New York: Routledge.

McDonald, J.D., L.J. Zimmerman, A.L. McDonald, W. Tall Bull, and T. Rising Sun. 1991. The northern Cheyenne outbreak of 1879: Using oral history and archaeology as tools of resistance. In *The archaeology of inequality*, ed. R.H. McGuire and R. Paynter, 64–78. Cambridge: Basil Blackwell.

Moser, S., D. Glazier, J. Philips, L. Nasser El Nemr, M. Saleh Mousa, R. Nasr Aiesh, S. Richardson, A. Conner, and M. Seymour. 2002. Transforming archaeology through practice: Strategies for collaborative archaeology and the community archaeology project at Quseir, Egypt. *World Archaeology* 34: 220–248.

Pearson, P.M., and Ramilisonina. 2004. Public archaeology and indigenous communities. In *Public archaeology*, ed. N. Merriman, 224–239. London: Routledge.

Putnam, R.D. 2000. *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.

Shackel, P.A., and E. Chambers, eds. 2004. *Places in mind: Public archaeology as applied anthropology*. New York: Routledge.

Smardz, K. 1997. The past through tomorrow: Interpreting Toronto's heritage to a multicultural public. In *Presenting archaeology to the public: Digging for truths*, ed. J. Jamison, 101–113. Walnut Creek: AltaMira.

Swidler, N., K. Dongoske, R. Anyon, and A. Downer. 1997. *Native Americans and archaeologists: Stepping stones to common ground*. Walnut Creek: AltaMira.

Watkins, J. 2001. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: AltaMira.

Further Reading

McDavid, C. 2002. Archaeologies that hurt; descendants that matter: A pragmatic approach to collaboration in the public interpretation of African-American archaeology. *World Archaeology* 34 (2): 303–314.

Merriman, N. 2004. *Public archaeology*. London: Routledge.
Pyburn, A.K. 2008. Public archaeology, Indiana Jones, and honesty. *Archaeologies: Journal of the World Archaeological Congress* 4 (2): 201–204.
Smith, L.J., and E. Waterton 2009. *Heritage, communities and archaeology*. Duckworth Debates in Archaeology. London: Duckworth Press.
Zimmerman, L.J., K.D. Vitelli, and J. Hollowell-Zimmer. 2003. *Ethical issues in archaeology*. Walnut Creek: AltaMira.

Standardization, Storage, and Dissemination of Environmental Archaeological Data

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Introduction

Archaeological researchers rely on computers for many data collection, analysis, presentation, and scholarly communication needs. Through the Web, researchers can now disseminate all the information they collect in excavations and analyses, not just the resulting synthetic reports. However, while technologies can store and transmit these data, approaches to data documentation, quality improvement, semantic description, and data preservation see active research and development.

Definition

Most datasets are now "born-digital," giving the researcher community new opportunities for sharing them via the Web. Despite hesitation and incentive concerns (see Harley et al. 2010), there is a growing expectation for access to primary datasets so that other scholars can reanalyze them with new questions and perspectives (Kansa and Kansa 2011). However, as data sharing assumes greater primacy in professional communications, researchers need supporting services to adequately describe and document, preserve, disseminate, and understand and reuse digital data.

Documentation, use of appropriate standards, storage, and dissemination are all aspects of "data stewardship." These help ensure that data are sufficiently described and preserved in a way that allows for well-informed future use. To guide researchers in data stewardship, the Archaeology Data Service (http://archaeologydataservice.ac.uk/) and Digital Antiquity (http://www.digitalantiquity.org/) have authored invaluable guides to good practice (http://guides.archaeologydataservice.ac.uk/). These guides introduce metadata ("information about information") requirements, recommended practices for data formats (especially recommendations for use of open and nonproprietary file formats), and archival practices.

Key Issues/Current Debates/Future Directions/Examples

Standards

The term "environmental archaeological data" encompasses a wide range of data pertaining to the study of past human interactions with the environment. These data come from highly multidisciplinary investigations and analyses, including (but not limited to) paleobotany, zooarchaeology, soil chemistry, micromorphology, archaeomalacology, geomorphology, and isotopic analyses. Datasets vary widely in terms of size and character. Some data result directly from the output of instrumentation, and others are created by individual researchers and may include both quantitative and qualitative data.

In order to facilitate informed reuse and preservation, all of these data need alignment to certain standards. However, there are many kinds of "standards." Some standards refer to technical specifics of data formats, instrumentation settings, and the like. Metadata description and documentation represents another type of standard. Finally, some types of standards reflect concerns over the appropriateness of data collection methods and data quality. In all cases, conforming to

community expectations regarding standards facilitates data reuse.

As is the case with most archaeological data, metadata about context, broadly defined, is required to make use of paleoenvironmental datasets. Given that resources and human effort are scarce, certain forms of documentation should be prioritized. For example, published data should include some fundamentals, including discussion of methods, research aims, and data collection practices. Baseline contextual information (geographic, stratigraphic, and chronological) also needs to be provided. Shared data need to be decoded (or coding systems need detailed documentation) to facilitate informed reuse and comparison with other datasets. In many cases, it will be important to provide key technical metadata documenting the specifics of instruments used, geographic coordinate systems, other aspects of data collection methods, and information about postprocessing software and algorithms. In addition, the "scholarly" provenance and context is also critical. Who collected the data and under what sponsorship and institutional setting? What are the licensing conditions on sharing and using a dataset? Many of these attributes are recorded using the Dublin Core metadata standard.

Different repositories may have different specific technical requirements for expressing these metadata. Variability in data documentation results from different institutional settings in research as well as different research needs and traditions. Also, data documentation and metadata needs will not likely stay fixed. Researcher needs and expectations change, and this will drive changes in how data need to be documented. Thus, while standards can be very useful in helping others understand and reuse data (Atici et al. 2012; Kansa et al. 2014), data repositories and dissemination services need to accommodate diverse and changing needs and expectations in different disciplinary communities. Thus, standards and research designs will coevolve, particularly once data dissemination and reuse becomes a more commonplace practice.

Standards can be extremely useful for meta-analyses and collaborative research (see, for example, Arbuckle et al. 2014). While many researchers recognize the value of shared standards, data are often very heterogeneously developed and described, as noted above. In many areas of environmental archaeology, there are only a few instances where researchers adhere to common data collection standards and protocols. For instance, the suite of measurements proposed by Angela von den Driesch in her 1976 *A Guide to the Measurement of Animal Bones from Archaeological Sites* is widely used by zooarchaeologists. However, though many researchers may use this protocol; they may express and encode these measurements in very different ways.

Because it is unlikely (and even ill-advised) for researchers to use only one data collection protocol and database structure, other methods need to be developed to relate researcher datasets together. Most commonly, researchers use ontologies to relate different datasets together. Ontologies are formally described conceptual systems, usually expressed in such standards such as RDF/OWL or RDF/SKOS. Ontologies define different concepts and various logical relationships between concepts. Different datasets can be related to a common ontology so that these data can be compared, even though these datasets individually may have idiosyncratic terminologies and organizations. It is often a goal to use the logical rules and relations expressed in an ontology to make inferences on datasets related to the ontology. Digital Antiquity, with the tDAR system (http://www.tdar.org/), is doing pioneering research in relating datasets together using different ontologies. Their initial experiments have focused on zooarchaeology. This approach toward data integration is more feasible in this subdiscipline because of the widespread use of common data documentation conventions.

The use of ontologies in archaeology varies widely. Open Context (http://opencontext.org) uses a highly generalized ontology to model and index all data it publishes. In addition, Open Context also uses more specific ontologies and controlled vocabularies to relate different datasets published by Open Context with data curated across the Web. On the other hand, tDAR

facilitates use of ontologies for users to integrate data within tDAR. But tDAR does not relate all data it archives to a common ontology, which means search and indexing services emphasize metadata, and less the content of tDAR archived data. Different ontology strategies have different costs and benefits. Generalized ontologies lack the specificity needed for many research applications, while specific ontologies can often be very complicated, difficult, and costly to apply. Research applications will probably help identify the "right" mix between generalized and specific ontological models. In the case of zooarchaeology, some aspects of recording probably can and should see more specific modeling (such as taxonomic identification, bone element identification, and fusion data), while other aspects of zooarchaeological data may see less need to for such specific modeling.

In addition to ontologies, the architecture of data repositories in environmental archaeology plays a role in data interoperability and reuse. tDAR offers powerful features to give researchers options to use multiple ontologies to relate different datasets found within the tDAR repository. Open Context takes a different approach by exposing data on the Web to make it easier to use with Linked Open Data (LOD) methods. With LOD, Open Context data can be referenced to common vocabularies and ontologies via Web URIs (stable Web addresses that serve as identifiers) and related to other data sources published to the Web. For example, Open Context uses LOD methods to identify biological taxa according to Web identifiers published by the Encyclopedia of Life (http://eol.org), a major database of biological taxa. Again, the different approaches taken by tDAR and Open Context involve different sets of tradeoffs (see also Sheehan 2015). Open Context's use of EOL identifiers helps relate data across the open Web, enabling researchers to reference and use data curated by large, global, and interdisciplinary communities. On the other hand, tDAR's ontology tools make it more convenient for users to experiment with different ontologies but only datasets found within tDAR. While different, these approaches are not mutually exclusive and can be complementary. These differences highlight how the semantic interoperability of environmental archaeological data remains an active area of research.

Explicitly-recorded data documentation and formal ontologies are important and often critical needs. However, they are not the only issues involved in data preservation, reuse, and interoperability. Human factors are also critical needs. The background and tacit knowledge of experienced specialists can be invaluable to understanding an old dataset, even without detailed documentation (see Atici et al. 2012; Faniel and Yakel 2017). In addition to understanding domain-specific problems in data collection practices and research methods, the research community also needs to develop informatics skills and expertise, so that they can better understand the use and limitations of different approaches to semantics and data integration. For example, the importance of reproducible research, or sharing both data and the analytical steps used to process the data, has become a concern in light of increasing interest in data sharing in the archaeological community. Python "data science" code libraries and R language offer two examples of open source statistical analysis and visualization software that are popular among the growing number of researchers engaged in reproducible research (Marwick 2016).

Preservation and Dissemination

Researchers tend to have poor data curation practices. Most individuals keep data on personal hard drives, perhaps backing them up intermittently on some form of external digital media. Such devices are prone to failure and obsolescence in very short time horizons. Not only do digital media degrade quickly, but file formats and supporting software also rapidly change. For digital data to be usable for the long term, they need continual and active curation by dedicated professionals.

Formal digital repositories have developed specifically for archaeology, including the Archaeology Data Service in the UK and Digital

Antiquity in the USA. Both of these organizations actively curate data, migrate files to new formats as required, and perform other vital repository functions. A somewhat different approach is taken by Open Context, where it does not act as a digital repository itself, but rather archives data with the digital repository maintained by the University of California, through the California Digital Library (http://www.cdlib.org/). Digital repositories, whether discipline-based or based in a "memory institution" like a library, play an essential role in the long-term secure storage of environmental archaeological data. At the same time, data preservation is complemented by data reuse. Data that sees active use will likely see more investment in preservation.

With regard to data dissemination and reuse, professional expectations are rapidly evolving. Though archaeologists routinely manage complex and highly structured digital data, dissemination and communication objectives traditionally remained decidedly oriented toward print or digital analogs of printed documents (such as PDFs). The prevailing norms and expectations for print publication mean that researchers tend not to share the primary data they collect, thus precluding reuse and reexamination of these data. Though data sharing is still rare, it is gaining traction as a key issue in scientific communications (Costello 2009; Nature Editors 2009) and an increasing number of publishers request supporting data to be shared with conventional publications. Scholars have discussed a multitude of semantic (Kintigh 2006), technological (Snow et al. 2006), data preservation and longevity (Richards 2004; Carraway 2011), intellectual property (Kansa et al. 2005), and professional incentive concerns (Costello 2009; Kansa 2010) regarding data sharing. Increasingly, funders of research expect greater data professionalism, archiving, and transparency. For archaeology in the US, the National Science Foundation set early expectations in 2010 by requiring a "data management plan" from grant-seekers (see NSF press release on May 10, 2010: https://www.nsf.gov/news/news_summ.jsp?cntn_id=116928).

Since use can promote data preservation, the research community also needs innovative approaches in scholarly communication that promote data dissemination and reuse. Many of the data preservation repositories discussed above also emphasize services for data dissemination and reuse. Different dissemination services require different levels of investment in data documentation and data quality verification and improvement. As discussed above, common data and semantic standards can help make data dissemination and reuse much more efficient. However, semantic standards can be complex and time-consuming to apply, and overly rigid or misapplied standards can also constrain interpretive choices and inhibit methodological innovation. Therefore, the application of different metadata and semantic standards is not necessarily straightforward, and data dissemination services will vary in their expectations.

Besides standards alignment, data dissemination may also involve some degree of editorial review and quality improvement. In some environmental science disciplines, journals require authors to deposit the data related to their articles in Dryad (http://datadryad.org), a disciplinary data repository. While journal editors and reviewers may or may not review the actual datasets deposited in Dryad, policies requiring the dissemination of datasets aim to improve the scientific reproducibility of the analyses and interpretations presented in journal articles. So far, no archaeological journals require dataset dissemination, but the Digital Antiquity and Open Context teams are in active discussions with various archaeological publication venues to encourage such dissemination.

In the case of Dryad, most datasets entering this repository supplement the content of a journal article. This approach helps align researcher incentives, which reward journal publications, with community interest in data dissemination and preservation. However, this approach may have a disadvantage in that datasets are of secondary importance and are shared mainly to comply with policy requirements. These data may not be

reviewed or subjected to editorial scrutiny, and they may not see much effort in data cleanup or documentation beyond the minimal requirements of the repository.

Another approach to data dissemination is to make data publication a primary goal of scholarly communication in itself. If data dissemination provided some of the same professional rewards and recognition as conventional journal and book publication, then researchers may invest more effort in improving data quality and aligning data to appropriate standards. Editorially supervised "data publishing" models can make data dissemination reach the levels of quality needed to enable confidence in reuse (see Costello 2009). Editorial review processes may help researchers improve data integrity and intelligibility, promoting greater data quality and facilitating informed reuse. The Journal of Open Archaeology Data (http://openarchaeologydata.metajnl.com/), Internet Archaeology, and Open Context are currently developing data publishing services where datasets see editorial and peer review prior to dissemination.

It is likely that multiple models for data dissemination will be needed to serve the needs of environmental archaeology. In some cases, data repositories will take data directly from researchers, and in other cases data dissemination may follow more elaborate editorial review and quality improvement processes. Appropriate dissemination choices will vary depending on the nature of the data. There may be less need for editorial review for data automatically generated by instrumentation, whereas editorial processes may be more appropriate for data manually created by researchers.

However, in all cases, the goal of data sharing and archiving is to facilitate reuse, possibly including integration of data from multiple sources. In order to facilitate data reuse, the research community needs to pay particular attention to the legal and licensing requirements of data reuse and interoperability. Copyright and other intellectual property restrictions may greatly complicate, if not altogether prohibit, many uses of data expected by the scientific community. To encourage reuse, datasets need to be released either to the public domain, or under very liberal and open licensing conditions. For instance, Digital Antiquity and Open Context both require deposit of data under the Creative Commons Attribution license (https://creativecommons.org/licenses/by/4.0/), which freely permits reuse provided attribution is provided to the data creators. Dryad mandates even greater openness, requiring dedication of datasets to the public domain using Creative Commons' CC0 "no rights reserved" framework (https://creativecommons.org/share-your-work/public-domain/cc0). Use of Creative Commons licenses is especially encouraged because these widely used standard licenses facilitate legal interoperability of data. In addition, Creative Commons licenses are also represented as standard metadata, facilitating the discovery and explicit identification of legally interoperable content.

Cross-References

- ▶ Archaeological Informatics
- ▶ Archaeology Data Service (ADS)
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Management Technology and Training
- ▶ Digital Archaeological Data: Ensuring Discovery, Access, Use, and Preservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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References

Arbuckle, B., S.W. Kansa, E. Kansa, D. Orton, C. Çakırlar, L. Gourichon, L. Atici, A. Galik, A. Marciniak, J. Mulville, H. Buitenhuis, D. Carruthers, B. De Cupere, A. Demirergi, S. Frame, D. Helmer, L. Martin, J. Peters, N. Pöllath, K. Pawłowska, N. Russell, K. Twiss, and D. Würtenberger. 2014. Data sharing reveals complexity in the westward spread of domestic animals across Neolithic Turkey. *PLoS One* 9 (6): e99845.

Atici, L., S. Whitcher Kansa, J. Lev-Tov, and E.C. Kansa. 2012. Other people's data: A demonstration of the imperative of publishing primary data. *Journal of Archaeological Method and Theory* 1 (3): 1–19.

Carraway, L.N. 2011. On preserving knowledge. *American Midland Naturalist* 166: 1–12.

Costello, M.J. 2009. Motivating online publication of data. *Bioscience* 59(5): 418–427. https://doi.org/10.1525/bio.2009.59.5.9.

Faniel, I.M., and E. Yakel. 2017. Practices do not make perfect: Disciplinary data sharing and reuse practices and their implications for repository data curation. In *Curating research data*. Vol. 1, *Practical strategies for your digital repository*, 103–126. Chicago: Association of College and Research Libraries.

Harley, D., S.K. Acord, S. Earl-Novell, S. Lawrence, and C.J. King. 2010. *Assessing the future landscape of scholarly communication: An exploration of faculty values and needs in seven disciplines* (Research and Occasional Papers Report 10). Berkeley: UC Berkeley.

Kansa, E.C. 2010. Open context in context: Cyberinfrastructure and distributed approaches to publish and preserve archaeological data. *SAA Archaeological Record* 10: 12–16.

Kansa, E.C., and S. Whitcher Kansa. 2011. Towards a do-it-yourself cyberinfrastructure: Open data, incentives, and reducing costs and complexities of data sharing. In *Archaeology 2.0 and beyond: New tools for collaboration and communication*, ed. E.C. Kansa, S. Whitcher Kansa, and E. Watrall, 57–91. Los Angeles: Cotsen Institute of Archaeology Press.

Kansa, E.C., J. Schultz, and A.N. Bissell. 2005. Protecting traditional knowledge and expanding access to scientific data. *International Journal of Cultural Property* 12: 285–314.

Kansa, E.C., S. Whitcher Kansa, and B. Arbuckle. 2014. Publishing and pushing: Mixing models for communicating research data in archaeology. *International Journal of Digital Curation* 9 (1): 57–70.

Kintigh, K.W. 2006. The promise and challenge of archaeological data integration. *American Antiquity* 71: 567–578.

Marwick, B. 2016. Computational reproducibility in archaeological research: Basic principles and a case study of their implementation. *Journal of Archaeological Method and Theory*: 1–27.

Nature Editors. 2009. Data's shameful neglect. *Nature* 461: 145.

Richards, J. 2004. Online archives. *Internet Archaeology.* http://intarch.ac.uk/journal/issue15/richards_index.html. Accessed 18 Mar 2008.

Sheehan, B. 2015. Comparing digital archaeological repositories: tDAR versus open context. *Behavioral & Social Sciences Librarian* 34 (4): 173–213.

Snow, D.R., M. Gahegan, C.L. Giles, K.G. Hirth, G.R. Milner, P. Mitra, and J.Z. Wang. 2006. Cybertools and archaeology. *Science* 311: 958–959.

Von den Driesch, A.. 1976. *A guide to the measurement of animal bones from archaeological sites* (Peabody Museum Bulletin 1). Cambridge, MA: Harvard University.

Stanish, Charles

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Basic Biographical Information

Charles Stanish was born in Pittsburg, Pennsylvania, in 1956. His interest in past societies developed as a high school student when he was introduced to Ancient Rome and Greece. This initial passion continued to his college years at Pennsylvania State University where he was introduced to ancient civilizations in Mexico and Central America by William T. Sanders, one of the leading Mesoamericanist of his time. Continuing his graduate education at the University of Chicago, Stanish studied under Don Rice, initially focusing his research on Maya sites in Guatemala. Due to political instability in Central America at the time, Stanish was invited in 1982 by Andean archaeologist Michael E. Moseley to work in the South Central Andes. In Peru, he worked on political economies of Andean societies, and this research served as the basis for his dissertation and postgraduate studies.

Completing his PhD in 1985, Stanish taught at the University of Illinois of Chicago. He joined

the Field Museum in Chicago in 1998 and served as chair of the Department of Anthropology 1994–1998. In 1998, Stanish moved to UCLA where he became the director of the Cotsen Institute of Archaeology at UCLA (2001–2016), and where he has mentored multiple students both at the undergraduate and graduate levels. Stanish was elected as a fellow of the American Academy of Sciences in 2006 and a member of the National Academy of Sciences in 2010 in recognition of his unique contributions to anthropology. He is currently the editor in chief of *Ñawpa Pacha*: Journal of Andean Archaeology and member of the editorial board of the Chilean journal *Estudios Atacameños.*

Major Accomplishments

Stanish emerged as a dominant figure in Andean archaeology in the latter years of his graduate career. The extended version of his dissertation was published under the title of *Ancient Andean Political Economy* (1992), and the book represents one of the first attempts to evaluate systematically John Murra's ethnohistorical model of "ecological complementarity" in the Andes from an archaeological perspective. In this book, Stanish examines the rationale of Murra's paradigm in multiple, distinct contexts, and in the process creating a much needed theoretical framework that critically examine indigenous economic systems in a global context. Based on the excavation of 17 pre-Hispanic sites in the Otora branch of the Moquegua drainage and comparison with data published from the Titicaca Basin, Stanish documents economic complementarity between highland and lowland societies as was originally proposed by Murra. In addition, he acknowledges a competing model of resource exchange between coastal communities based on craft specialization advocated by the Peruvian scholar María Rostworswski. In this context, he discusses the evolution of such systems within various sociopolitical contexts at least a hundred years before they were historically documented. While conducting his field research, Stanish warned against the unwarranted use of mortuary contexts, which represented highly ritualized behavior, to address questions regarding other spheres of ancient behavior, such as political economy. In his view, the methodological inclusion of household archaeology was imperative as it represented a fundamental unit of analysis that, unlike the funerary data, provided direct evidence of past economic activities.

Following his interest in the reconstruction of past economic models, Stanish initiated a multifaceted research program in the Lake Titicaca Basin. For about two decades, he systematically surveyed and excavated pre-Hispanic sites to study the origins and evolution of complex societies through 3000 years. In his seminal book *Ancient Titicaca: The Evolution of Complex Society in Southern Peru and Northern Bolivia* (2003) he integrates a variety of geological, ethnohistorical, linguistic, and archaeological sources to reconstruct the rich prehistory of the Titicaca Basin from 2000 BCE until the arrival of the Spaniards in the sixteenth century. The most significant result of this effort is, perhaps, the detailed interpretation of the local economies and political systems that lead to the emergence of the Tiwanaku polity. Unlike previous Tiwanaku studies, Stanish's rigorous diachronic studies suggested that multiple factors led to the development of the Tiwanaku polity in 400 CE, including competition for economic resources, political power, and ideological dominance among rival political entities throughout the basin. His theoretical framework and robust archaeological data became a model for comparative studies in other sociopolitical settings both within and outside the Andes. Beginning in 2011, Stanish shifted his regional research focus to the coastal valley of Chincha, where he continues to ask challenging questions and apply innovative multidisciplinary techniques in the field. Along with a team of collaborators and students, he is currently evaluating the emergence of early complex societies in coastal settings in an effort to evaluate the convergence or divergence of factors that lead to the development of the state in the Andes.

Apart from the impact of his research on understanding complex societies in the Andes, Stanish has had an equally important impact on issues

relevant to the archaeological community at large. In 2009, Stanish described how the emergence of eBay reduced the market for looted archaeological materials by supporting local artisans who produce faithful reproductions of antiquities which are sold for less, and are accessible to a wider international audience. Since 2010 he has been a board member of the Sustainable Preservation Initiative (SPI), an organization that uses market forces to create economic incentives for local communities to preserve archaeological sites. In Peru, he has also served in multiple ways as a policy consultant to the *Ministerio de Cultura*. In brief, Charles Stanish legacy is not only imprinted in his significant intellectual contribution to our understanding of ancient Andean civilizations, but also his continued efforts to support generations of emerging local and international scholars and his effective attempts for bringing the cause of archaeology to the general public and the importance of its preservation for future generations.

References

Bauer, Brian, and Charles Stanish. 2001. *Ritual and pilgrimage in the ancient Andes. The islands of the sun and moon*. Austin: University of Texas Press.

Marcus, Joyce, and Charles Stanish, eds. 2006. *Agricultural strategies*. Los Angeles: Cotsen Institute of Archaeology Press.

Stanish, Charles. 1992. *Ancient Andean political economy.* Austin: University of Texas Press.

Stanish, Charles. 2003. *Ancient Titicaca: The evolution of complex society in southern Peru and northern Bolivia*. Berkeley: University of California Press.

Stanish, Charles. 2011. *Lake Titicaca. Legend, myth and science*. Los Angeles: Cotsen Institute of Archaeology Press.

Stanish, Charles, and Brian S. Bauer, eds. 2004. *Archaeological research on the islands of the sun and moon, lake Titicaca Bolivia: Final results from the Proyecto Tiksi Kjarka*. Los Angeles: Cotsen Institute of Archaeology Press.

Stanish, Charles, and Abigail Levine. 2011. War and early state formation in the northern Titicaca Basin, Peru. *Proceedings of the National Academy of Science* 108 (34): 13901–13906.

Stanish, Charles, Amanda B. Cohen, and Mark S. Aldenderfer, eds. 2005. *Advances in the archaeology of the Titicaca Basin-I*. Los Angeles: Cotsen Institute of Archaeology Press.

Stanish, Charles, Cecilia Chavez, Aimée Plourde, and Karl LaFavre. 2014a. *The northern Titicaca basin survey: Huancané-Putina*, Museum of anthropology monographs. Ann Arbor: University of Michigan.

Stanish, Charles, Tantaleán Henry, Benjamin Nigra, and Laura Griffin. 2014b. A 2,300-year-old architectural and astronomical complex in the Chincha Valley, Peru. *Proceedings of the National Academy of Science* 111 (20): 7218–7223.

Vranich, Alexei, and Charles Stanish, eds. 2013. *Visions of Tiwanaku*. Los Angeles: Cotsen Institute of Archaeology Press.

Vranich, Alexei, Elizabeth Klarich, and Charles Stanish, eds. 2012. *Advances in Titicaca basin archaeology-III*. Ann Arbor: University of Michigan Press.

Star Carr, Archaeology of

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Introduction

Star Carr is an Early Mesolithic site, dating to c. 9000–8500 BCE. The site is located in the Vale of Pickering, North Yorkshire, UK, near to the coastal town of Scarborough (Fig. 1). During the early Holocene, a large body of water, known as Lake Flixton, was situated at the eastern end of the Vale of Pickering. Star Carr was located on the western shore of this lake. The lake gradually infilled with peat, resulting in excellent preservation of organic remains.

Definition

Star Carr has dominated understandings of the British Mesolithic. This is partly due to the wide variety of organic finds recovered from this waterlogged site, but also due to the influence and interpretation of the original excavator, Grahame Clark. The site has been reanalyzed numerous times, with interpretations varying from a base camp, to a hunting camp, to a ritual site. In addition to Clark's excavations (1949–1951),

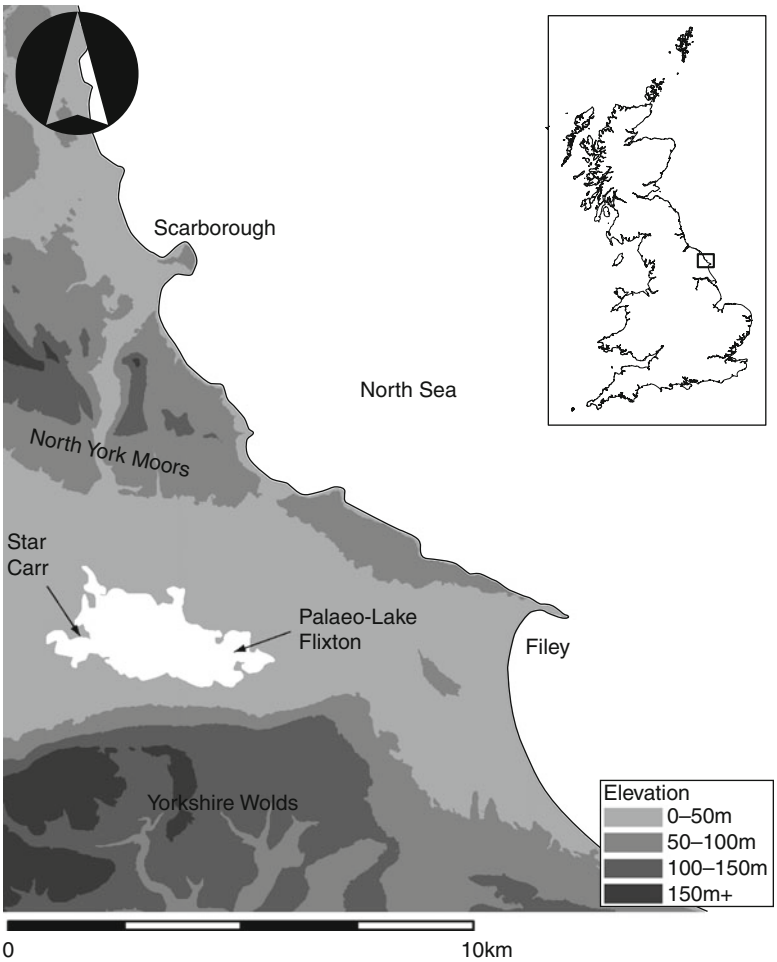

Star Carr, Archaeology of, Fig. 1 Location of the site. (Image: Barry Taylor)

fieldwork has been undertaken at the site in 1985 and 1989, and more recently between 2004 and 2011. These new excavations uncovered a large timber platform and a small dwelling structure.

Key Issues/Current Debates/Future Directions/Examples

The discovery of Star Carr was due to the exemplary work of a local archaeologist, John Moore, who had been surveying the Vale of Pickering for prehistoric flints since 1947. Star Carr was Moore's site 4, discovered when flint and bone was seen eroding from the edge of a drainage ditch. Moore sent some of the flints he had recovered to Grahame Clark at Cambridge (Clark 1954). Since the late 1930s, Clark had been dissatisfied with the sort of culture-history accounts he himself had undertaken for his Ph.D. Influenced by Scandinavian archaeology which had a long-standing history of interdisciplinary collaboration with the natural sciences, Clark sought a waterlogged site on which to test his new economic theories. Star Carr seemed the ideal candidate.

Clark spent three summer seasons between 1949 and 1951 at Star Carr. While Moore's excavations next to the drainage ditch revealed an extremely dense scatter of lithic material in the dryland area of the site, Clark focused on the wetland deposits because he was predominantly interested in the recovery of organic material (Fig. 2). A density of 36 pieces of flint per square

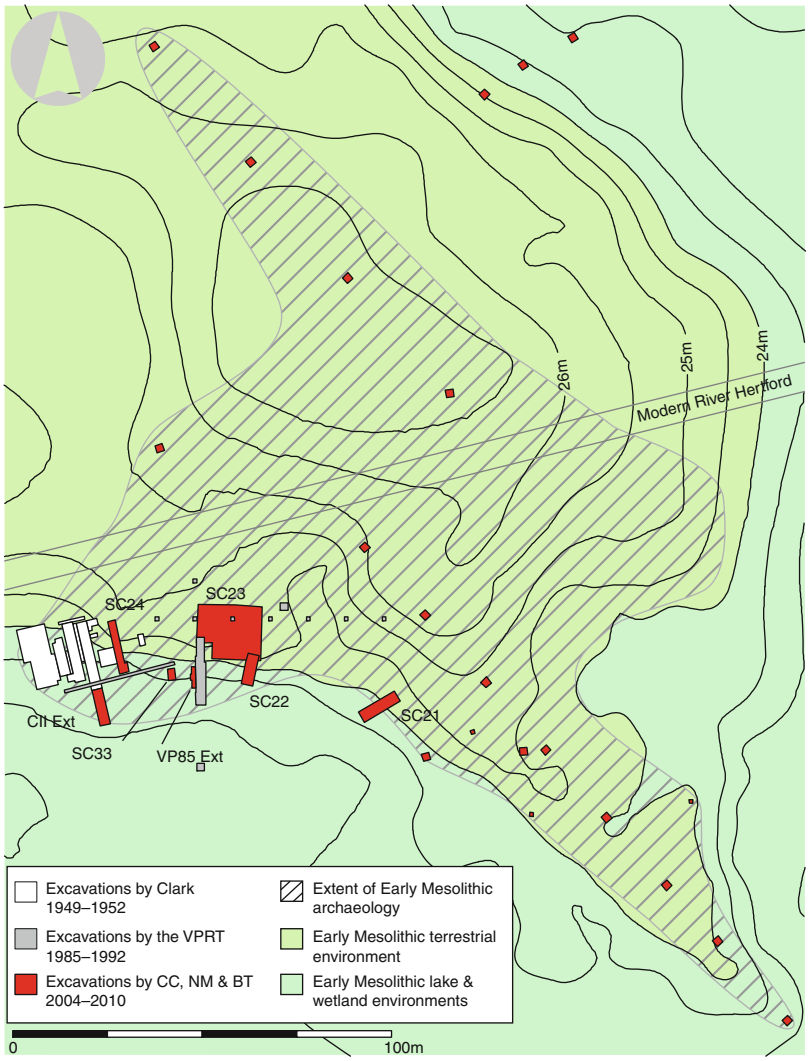

Star Carr, Archaeology of, Fig. 2 Excavations at Star Carr. (Image: Barry Taylor)

yard was taken to delimit the limits of the occupied area, making a settlement 18 × 18 m in extent (Clark 1954). Using these criteria, Clark believed he had excavated the entire site and his subsequent interpretations were predicated on this supposition.

The excavation yielded an extremely broad range of material culture, while the waterlogged deposits, as Clark had hoped, produced numerous organic artifacts. Particularly impressive were 21 antler frontlets. These consisted of trimmed and attenuated red deer antlers, still attached to part of the skull. The interior of the skull had been smoothed, and two holes perforated, presumably to facilitate their use as headgear. Using ethnographic analogy, Clark suggested these could either be interpreted as hunting aids, or as costumes in ritual dances. In addition to the frontlets, stone, bone and tooth beads, elk antler mattocks, bone scrapers and bodkins and 191 barbed antler points were found. To give an indication of how significant these finds were, previously only six barbed points had been known from the whole of Britain. Also recovered were more than a hundred grooved antler blanks, presumably intermediate stages in the manufacture of barbed points. Also present was an accumulation of wood, which Clark interpreted as an "occupation platform."

In addition to the worked wood, bone, and antler, faunal remains revealed that a wide variety of animals had been exploited: red deer, roe deer, elk, pig, and aurochs; also smaller creatures – hedgehog, hare, and beaver; a number of fur-bearing carnivores – pine marten, fox, dog, badger, and bear; and a great variety of different birds – crane, stork, red breasted mergaster, red throated diver, great crested grebe, little grebe, lapwing, buzzard, and duck. No fish bones were recovered. Pollen analysis revealed that the lake was surrounded by woodland of birch and pine, with willows by the lake edge. The lake itself was fringed with reedswamp, while waterlillies grew in the open water (Clark 1954).

The original site report (Clark 1954) sealed Star Carr's reputation. Clark interpreted Star Carr as a seasonal site, occupied by not more than four or five families for periods of midwinter and spring and abandoned in the summer. He inferred the presence of men by the recovery of hunting equipment, and women (and thus children), on the basis of analogy with Eskimo groups, from skin working equipment. Particularly important for the future directions of archaeological thought were Clark's considerations of seasonality and subsistence. He placed considerable emphasis on the seasonality data (Clark 1972), which Frazer and King inferred from the antlers of red and roe deer and elk to indicate winter occupation. Clark suggested the site had been occupied at least twice, on the basis of the observation that some charcoal spreads were separated by organic mud and also on vertical patterning in the distribution of barbed point types. The food remains would, it was estimated, have been sufficient to feed the occupants for 6 1/4 years; Clark, thus envisioned repeated visits at particular seasons over a period of years.

Although the site of Star Carr has subsequently undergone many revisions and reinterpretations, Clark's investigations remain an impressively vivid picture of the way of life of a group of Mesolithic hunter-gatherers. As an example of what can be achieved by asking new questions and examining new classes of data, they seemed to call into question the value of earlier excavations.

Two decades later, Clark returned to the Star Carr data in order to expand his interpretation of the site (Clark 1972). Influenced by the concept of the ecosystem, he undertook a site catchment analysis of Star Carr, listing the available resources during the supposed winter stay and relating the number of red deer in this territory to the calorific requirements of a human group and thus deducing the necessary level of the annual cull. Clark attempted to reconstruct the whole settlement system by suggesting, on the basis of the migration patterns of red deer, that human groups had a similar upland/summer, lowland/winter pattern as their prey and that the people who wintered at Star Carr spent their summers hunting deer on the North York Moors.

Following Clark's retirement in 1973, the site was the subject of numerous reinterpretations during the late 1970s and 1980s. Over these, the shadow of Clark's work loomed large, as subsequent commentators focused on similar concerns, namely, seasonality, site function, and the relationship of Star Carr to the surrounding environment.

Caulfield (1978), in an early review, made the point that the red deer MNI indicated by antlers substantially exceeds the MNI represented by postcranial remains. This suggests that, because of their use as raw material, red deer antlers were collected and cached, and thus should not be used to indicate the season of inhabitation. More recent authors have pointed out that though Star Carr was originally interpreted as a site of winter occupation, substantial evidence exists for a human presence at other times of the year. Jacobi (1978) pointed to the presence of newborn elk and roe deer, which were likely to have been killed in May or June and of unshed roe deer antlers, a feature habitually used to indicate summer seasonality in southern Scandinavia. Grigson (1981) noted the presence of migratory birds which probably visited the area between May and June. The macrobotanical evidence reveals burnt reed shoots and aspen catkins which would have grown between March and June (Mellars and Dark 1998).

In their classic study of the site, Legge and Rowley-Conwy (1988) analyzed tooth-wear to assess seasonality of occupation. They found a

clear pattern in the roe deer age structure, with all ageable animals appearing to have been killed in May or June, when the youngest animals were about one year old. The pattern among the other animals appears slightly more ambiguous, though Legge and Rowley-Conwy believe none are incompatible with an occupation lasting between May and September, or if an elk mandible is disregarded, between mid-May and the end of June. More recent work by Carter (1997, 1998) based on radiographs of red and roe deer tooth development suggests winter occupation, a return, after half a century to Clark's thesis. It should be noted though that these interpretations follow Clark in attempting to pin down a minimum season of occupation into which all evidence can be fitted; the evidence as it stands could equally encompass visits at a number of different seasons of the year, or even year round occupation.

Site function has equally been an area of some controversy. Some commentators have followed Clark in interpreting the site as a residential base camp (Pitts 1979; Price 1982). Others have suggested more specialist use as a camp for tanning hides (Pitts 1979), a butchery camp (Caulfield 1978), or as a kill site (Andresen et al. 1981). The main support for the interpretation of the site as a base camp is the rich material inventory and evidence of varied activities; the main evidence against is the faunal assemblage, which, with an emphasis on scapulae, mandibles, and lower limb bones does not suggest the sort of prime cuts of meat expected for a base camp. Legge and Rowley-Conwy (1988) compared the faunal assemblage with those recorded by Binford (1978) during his ethnoarchaeological work with the Nunamiut. They found closest similarity between Star Carr and a Nunamiut hunting camp. A hunting camp is a location where faunal remains are brought following minimal processing at the kill site. At the hunting camp more extensive processing of carcasses is carried out and the prime cuts and joints of meat removed to be consumed at the residential site.

While the faunal assemblage is undoubtedly unusual for a base camp, recent excavations at the site and the oral histories of site excavators indicate that Clark was extremely selective in his recovery of faunal remains. Only the best preserved pieces that were identifiable to species were retained. As a result, not too much should be read into the patterns of faunal representation. As many authors have commented (Jacobi 1978; Pitts 1979; Price 1982; Mellars and Dark 1998), attempts to find a single function or a single seasonality of occupation for such a large and complex site are doomed to failure.

In 1985 and 1989, small-scale excavations were undertaken at the site (Fig. 2). The 1985 trench was excavated by Tim Schadla-Hall and the Vale of Pickering Research Trust in order to collect environmental samples. Because it was believed that Star Carr had been excavated in its entirety, artifactual material was unexpected. However lithics, fauna, and a single barbed point were recovered. Most significant was the discovery of a platform of hewn aspen timbers. These were split timbers, lain parallel and perpendicular to the shore. Schadla-Hall's trench was extended in 1989 by Paul Mellars and a series of small testpits were excavated in the dryland area of the site; all produced lithic material, indicating the site was even larger than Clark had envisaged (Mellars and Dark 1998).

In addition to the discovery of the timber platform, the main achievement of the 1980s work came from Petra Dark's program of environmental work that accompanied it. As well as refining knowledge of the vegetation sequence, Dark used close interval radiocarbon dating of charcoal from her cores to elucidate the periodicity of occupation. She suggested, assuming macrocharcoal as a proxy of human activity, that the site was visited for a period of around 80 years, followed by a gap of around 100 years, when occupation was rare, followed by a period of rather more intermittent occupation lasting around 150 years (Mellars and Dark 1998). These findings further highlight the complexity of the site and the problems associated with a single monolithic interpretation of the activity that generated it.

Further light has been thrown on Star Carr as a result of a long-term survey of the shore of palaeolake Flixton by Tim Schadla-Hall between 1976 and 2005. In addition to the reconstruction of the palaeotopography through auger survey,

2 × 2 m testpits were excavated around the shore of the lake at 15 m intervals. This program has revealed numerous additional Mesolithic sites, and a greater understanding of the local context of Star Carr (Connellier and Schadla-Hall 2003). What is clear from this work is that Star Carr is unique in its local landscape. No other site has the same range of material culture. Clark recovered 191 barbed points at Star Carr; only two additional examples have been recovered from sites elsewhere in the Vale of Pickering, one from Moore's site Flixton 1 and one from Schadla-Hall's site, No Name Hill. No further beads or antler frontlets have been found.

Star Carr thus seems to represent a special place within the landscape of the Vale of Pickering. The site appears to have been a focus for the deposition of animal remains in the shallow waters of the lake edge (Connellier and Schadla-Hall 2003). The respectful, patterned deposition of animal remains can be witnessed among other early Mesolithic groups (e.g., Hansen 2003) and among contemporary hunter-gatherer groups, where it is seen as essential in order to ensure that animals continue to give themselves up to the hunter (e.g., Jordan 2003). At Star Carr, these actions appear most focused on the deposition of red deer antler, suggesting both that red deer was the most spiritually important animal and that the antlers (or perhaps the head more generally) were considered to represent the soul or essence of the deer (Connellier 2004).

In 2004, excavations led by Chantal Conneller, Nicky Milner, and Barry Taylor recommenced at Star Carr (Fig. 2). The first large-scale excavations of the dry land area of the site have revealed a small dwelling structure, consisting of a 2.5-m pit surrounded by a ring of posts 3.5 m in diameter. This structure is surrounded by dense scatters of lithic material and animal bone, indicating a wide range of activities were undertaken on the dry land. Furthermore, fieldwalking and testpitting indicate that a continuous spread of lithic material extends for c250 m. In the wetland area of the site, the wooden platform glimpsed in the 1980s excavations has been found to extend for at least 20 m along the lake edge, suggesting the sort of communal endeavor more commonly associated with Neolithic communities. However, the recent excavations have also revealed that Star Carr is under threat. Recent agricultural drainage has resulted in considerable peat shrinkage. Oxidation of the upper deposits, combined with a seasonally fluctuating water table, has concentrated highly acidic sulfates at the level of the wetland organic artifacts (Boreham et al. 2011). As a result, almost all the bone and antler has entirely decayed, while worked wood is now relatively poorly preserved. Though Star Carr is still yielding new information, in a relatively short period of time, the organic material that made it so famous will be lost forever.

Cross-References

- ▶ Clark, John Grahame Douglas
- ▶ Dog: Domestication
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ European Mesolithic: Geography and Culture
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Star Carr: Environmental Archaeology

References

Andresen, J.M., B.F. Byrd, M.D. Elson, R.H. McGuire, R.G. Mendoza, E. Staski, and J.P. White. 1981. The deer hunters: Star Carr reconsidered. *World Archaeology* 13: 31–46.

Binford, L.R. 1978. *Nunamuit ethnoarchaeology*. New York: Academic.

Boreham, S., C. Conneller, N. Milner, B. Taylor, A. Needham, S. Boreham, and C. Rolfe. 2011. Geochemical indicators of preservation status and site deterioration at Star Carr. *Journal of Archaeological Science* 38: 2833–2857.

Carter, R.J. 1997. Age estimation of the roe deer (*Capreolus capreolus*) mandibles from the Mesolithic site of Star Carr, Yorkshire, based on radiographs of mandibular tooth development. *Journal of the Zoological Society of London* 241: 495–502.

Carter, R.J. 1998. Reassessment of seasonality at the early Mesolithic site of Star Carr, Yorkshire based on radiographs of mandibular tooth development in Red Deer (*Cervus elaphus*). *Journal of Archaeological Science* 25: 851–856.

Caulfield, S. 1978. Star Carr – An alternative view. *Irish Archaeological Research Forum* 5: 15–22.
Clark, J.G.D. 1954. *Excavations at Star Carr*. Cambridge: Cambridge University Press.
Clark, J.G.D. 1972. *Star Carr: A case study in bioarchaeology*. Addison-Wesley Modular Publications, Module, Vol. 10. Reading: Addison-Wesley.
Connellier, C. 2004. Becoming deer: Corporeal transformations at Star Carr. *Archaeological Dialogues* 11: 37–56.
Connellier, C., and T. Schadla-Hall. 2003. Beyond Star Carr: The Vale of Pickering in the tenth millennium BP. *Proceedings of the Prehistoric Society* 69: 85–105.
Grigson, C. 1981. Fauna. In *The environment in British prehistory*, ed. I. Simmons and M. Tooley, 110–124. London: Duckworth.
Hansen, K.M. 2003. Pre-Boreal elk bones from Lundby Mose. In *Mesolithic on the move*, ed. L. Larsson, K. Knutsson, D. Loeffer, and A. Åkerlund, 521–526. Oxford: Oxbow.
Jacobi, R. 1978. Northern England in the eighth millennium b.c. In *The early post-glacial settlement of northern Europe*, ed. P. Mellars, 295–332. London: Duckworth.
Jordan, P. 2003. Investigating post-glacial hunter-gatherer landscape enculturation: Ethnographic analogy and interpretative methodologies. In *Mesolithic on the move*, ed. L. Larsson, K. Knutsson, D. Loeffer, and A. Åkerlund, 128–138. Oxford: Oxbow.
Legge, A., and P. Rowley-Conwy. 1988. *Star Carr revisited*. London: Birkbeck College.
Mellars, P., and P. Dark. 1998. *Star Carr in context*. Cambridge: McDonald Institute Monograph.
Pitts, M. 1979. Hide and antlers: A new look at the gatherer-hunter site at Star Carr, N. Yorks, England. *World Archaeology* 11: 32–42.
Price, T.D. 1982. Willow tales and dog smoke. *Quarterly Review of Archaeology* 3: 4–8.

Star Carr: Environmental Archaeology

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State of Knowledge and Current Debates

Introduction

Since its discovery in the late 1940s, Star Carr has remained one of the most famous, and perhaps most important, early Mesolithic sites in Britain. The wealth of archaeological material, including well-preserved organic remains, recorded at the site has revolutionized our understanding of the period. Analysis of the artifact assemblages has led to a new understanding of technological processes, such as antler working (Clark 1954; Elliot and Milner 2010), depositional practices (Chatterton 2003), and even the way Mesolithic people may have perceived and understood their world (Conneller 2004). The discovery of large structures, such as buildings and timber trackways, has also challenged traditional views of early Mesolithic society (Conneller et al. 2012). However, the importance of Star Carr also lies in the long tradition of paleoenvironmental research that has been carried out at the site. From the first excavations in 1949 to the current program of fieldwork, paleoenvironmental analysis has been undertaken as an integral component of the archaeological investigations. As well as describing the nature of the environments that formed at Star Carr, this work has helped to provide a chronology for the human occupation of the site, detected evidence for the deliberate management of plant communities, and described the way in which people responded to changes in the local environment. The result is a detailed record of how early prehistoric hunter-gatherers interacted with the world around them.

Background

Star Carr is an early Mesolithic wetland site located in the eastern Vale of Pickering (North Yorkshire, UK), a low-lying valley separating the uplands of the North York Moors and the Yorkshire Wolds (Fig. 1a). During the time the site was occupied (c. 9000–c. 8600 cal BCE), it lay on the shores of a large lake (the paleo-Lake Flixton) (Fig. 1b). By c. 6000 cal BCE, the lake had in-filled with deposits of marl, lake mud, and peat, while peat-forming wetlands had expanded across the dry ground, burying the site and much of the surrounding landscape. This has helped to preserve a range of organic materials, including artifacts made from bone, wood, and antler, faunal remains, and plants and insects, that have provided a wealth of information on the lives of the people who lived at the site.

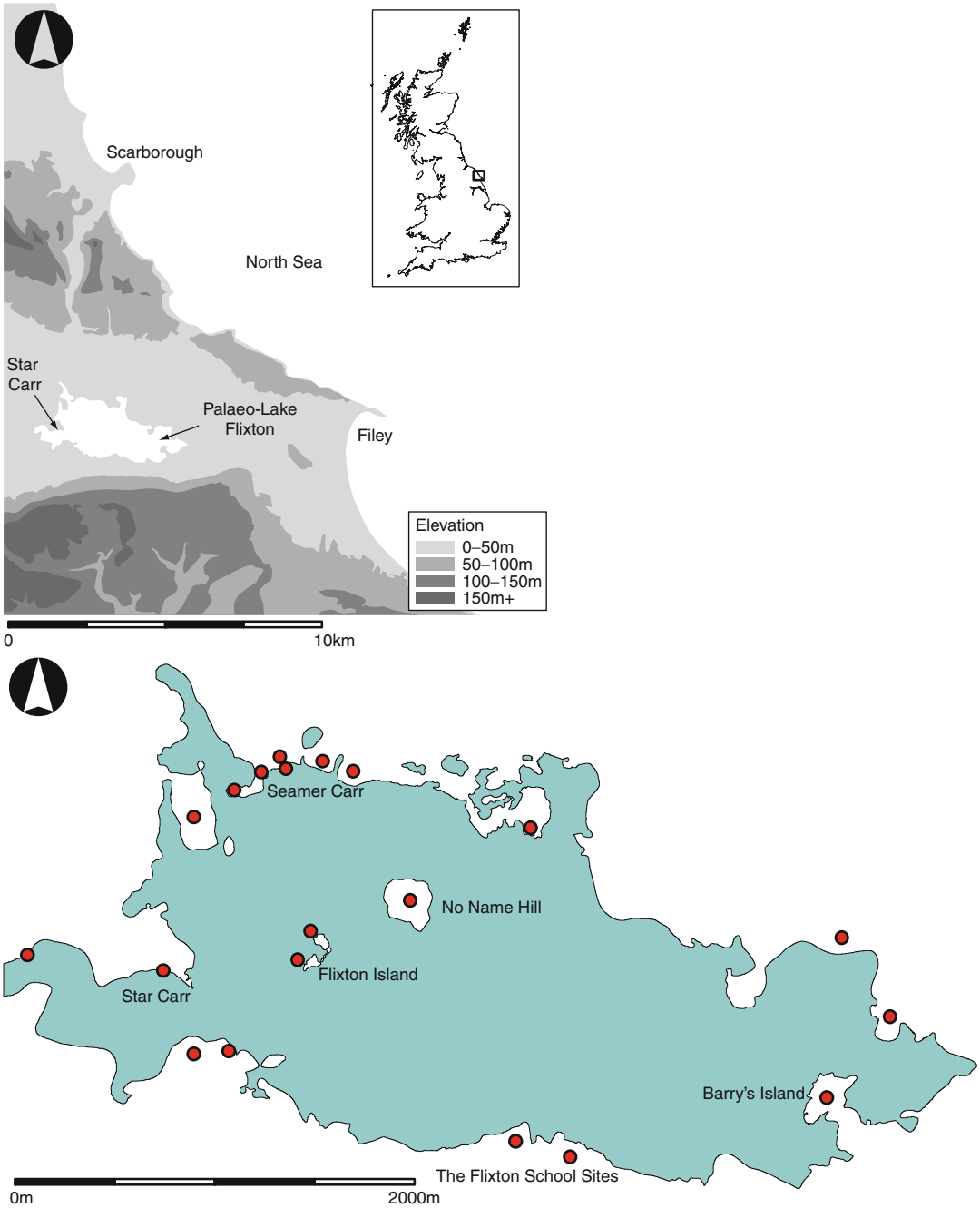

Star Carr: Environmental Archaeology, Fig. 1 (**a**) Location of Star Carr and the paleo-Lake Flixton in relation to Britain and (**b**) the relationship between Star Carr and other early Mesolithic sites around the paleo-Lake Flixton

Evidence for Mesolithic activity at Star Carr was first recorded in the late 1940s by John Moore, but the site came to international attention through the excavations carried out by Grahame Clark between 1949 and 1951 (Clark 1954). For Clark, the importance of wetland sites to the understanding of the Mesolithic had been demonstrated by excavations in southern Scandinavia

(such as Mullerup and Holmegård) and northern Germany (particularly Duvensee). The excavators of these sites had recorded a wealth of material culture made from bone, antler, and wood and had employed relatively new paleoenvironmental techniques, such as pollen analysis, to reconstruct the environmental conditions contemporary with the periods of occupation. Lamenting the absence of such sites in Britain and the lack of information they provided, Clark argued that it was necessary to "*. . . excavate in water-logged deposits*, *either in a bog settlement or immediately contiguous to a settlement on dry land*, *since here alone were the physical conditions necessary for the survival of a broad range of organic materials. . .*" (Clark 1954: xxi).

Clark's involvement with the Fenland Research Committee (FRC) in the 1930s had also shown how wetland sites could provide entirely new forms of evidence for past societies through the integration of archaeological and paleoenvironmental studies. The careful, systematic excavation of sites such as Peacock's Farm (Cambridgeshire) had allowed archaeological material to be related directly to the analysis of peat and other wetland sediments, pollen, and plant macrofossils. As well as providing information on the ecological setting of the sites, this also allowed archaeologists to consider how changes to the environment had affected patterns of human activity and how prehistoric communities had shaped and manipulated the local vegetation.

The preservation of pollen was particularly important as it provided a means to date sites by relating them to the known succession of vegetation that had developed across northern Europe. Such work had already been undertaken in Scandinavia, where a relative chronology for many of the Maglemosian sites, such as Mullerup, Svædborg, and Holmegård, had been established through the pioneering work of Knud Jessen, Tage Nilsson, and Johs Iverson (e.g., Nilsson 1947). By the late 1930s, Harry Godwin had established a comparable record of British vegetation and, with his wife Mary, had shown that pollen stratigraphy could be used to date artifacts in relation to the well-documented sites in Denmark and Sweden (Godwin and Godwin 1933). In the absence of direct forms of dating, this provided Clark with a method to relate artifact assemblages from Britain with those from continental Europe on the basis of chronology rather than the less reliable methods of typology.

Research into the environmental history of the lake had already begun several years before Clark's first excavations at Star Carr. During the mid-1940s, John Moore had started to record the sedimentary sequence within the basin, successfully identifying the presence of the paleo-lake (Moore 1951), and Harry Godwin had recorded a pollen profile from the area in 1948 (Clark 1954). However, Clark's work was at an altogether different scale, combining the techniques of archaeological and paleoenvironmental research to create a detailed record of the human occupation of the site. In this, Clark was heavily influenced by his work on the FRC, resuming his collaboration with Harry Godwin and engaging a range of other specialists from the Subdepartment of Quaternary Research at the University of Cambridge as well as individuals from numerous other institutions. He was also supported by several members of the zoology department at the British Museum, particularly Francis Fraser and Judith King who undertook the analysis of the faunal remains. This truly interdisciplinary study set a new standard for Mesolithic archaeology and began an era of well-integrated research that continues to this day.

A History of Environmental Research

Clark, Godwin, and Walker 1949–1951

From the summer of 1949, Clark undertook three seasons of fieldwork at Star Carr, excavating a series of long trenches (referred to as cuttings), through the sediments that had formed at the edge of the lake (Clark 1954) (Fig. 2). During the course of these excavations, Clark recorded an incredible assemblage of bone and antler artifacts, as well as worked flint, antler-working waste, animal bone, and antler. Much of this material was associated with a deposit of largely unworked "birchwood," which Clark suggested had been deliberately laid down to form a stable surface, upon which the inhabitants of the site had lived (Clark 1954: 9).

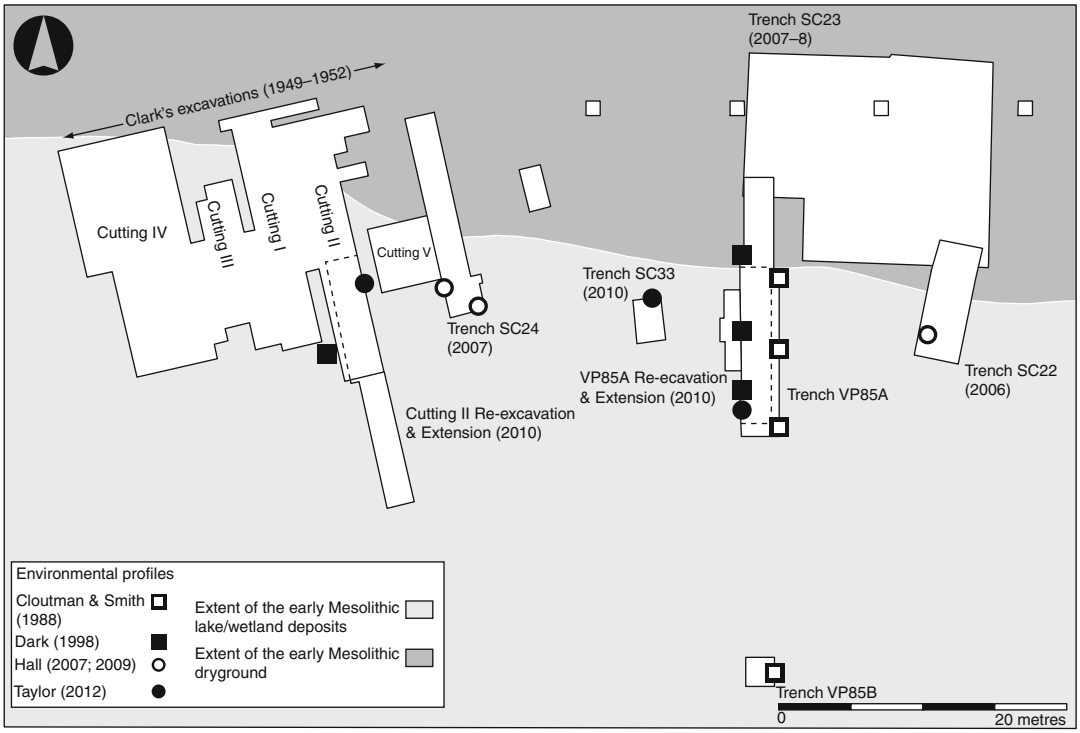

Star Carr: Environmental Archaeology, Fig. 2 The main areas of excavation and the environmental sampling points at Star Carr (excavated areas are colored *white*)

While Clark undertook the excavations, Godwin and his student Donald Walker set about establishing the environmental history of the site through the analysis of the peat and lake sediments exposed in the trenches and the pollen and plant macrofossils that had been preserved within them (Clark 1954: 56–61). By relating the artifacts recorded by Clark to the site's stratigraphy, they were able to place the evidence for human activity within the environmental sequence and establish the ecological setting of the site during the time it was occupied (Clark 1954: 58) (Fig. 3). A series of cores were also taken through the sediments beyond the extent of the excavations, and the results were brought together to map the spatial extents of the environments that were contemporary with the occupation of the site (Clark 1954: 58).

The results of this work not only established the ecological context of the human inhabitation of Star Carr but also provided information on the site's economy and the timing and frequency of occupation. The paleoenvironmental analysis indicated that activity had taken place within an area of reedswamp that had formed at the edge of the lake, with aquatic vegetation growing in the deeper water and a wood of birch, willow, and aspen growing on the drier ground at the shore (Clark 1954). Although there was no evidence for deliberate management of the local vegetation (Clark 1954: 67), Clark suggested that at least some of the plant species present at the site may have been exploited for food, drawing parallels with other sites where plant remains had been recorded from domestic contexts (Clark 1954: 13–15). Godwin and Walker also noted that reeds had been able to grow within the main areas of activity (Clark 1954: 58), suggesting that the site had been uninhabited during the spring months (Clark 1954: 67).

As well as establishing the character of the environment at the site, Clark used the results of

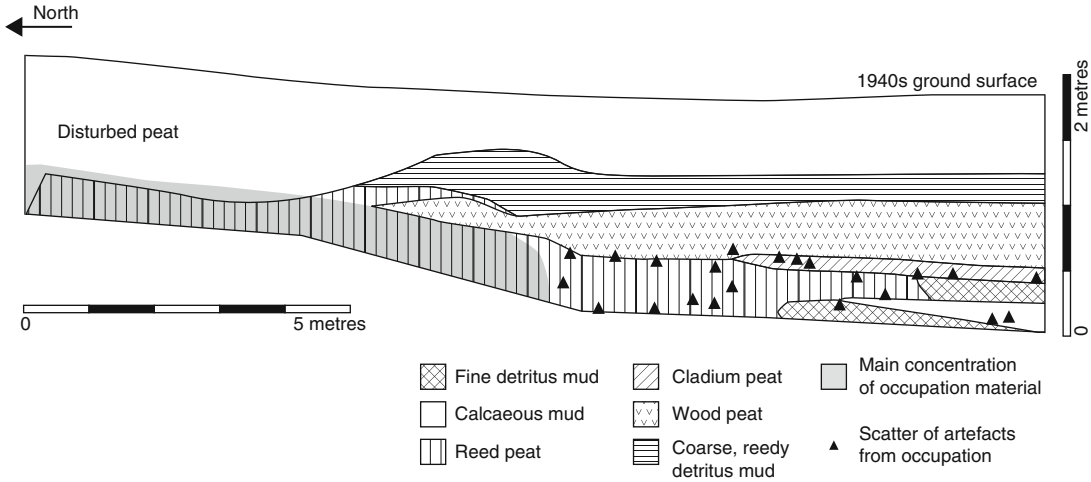

Star Carr: Environmental Archaeology, Fig. 3 The peat stratigraphy recorded by Godwin and Walker and its relationship to the archaeological evidence for human activity (After Clark 1954: 59 Fig. 27a)

the pollen analysis to relate Star Carr chronologically to the Maglemosian sites of Northern Europe. Typological similarities had already been noted between these and sites in England on the basis of flint technologies, while Mary and Harry Godwin had used comparative pollen analysis to show that two antler harpoon points discovered in North Yorkshire were contemporary with Maglemosian examples from Denmark (Godwin and Godwin 1933). A comparison of the pollen data from Star Carr, however, showed that the site was earlier than many of the Danish sites, a finding that appeared to be supported by differences in both flint and antler-working techniques (Clark 1954: 179–180). This led Clark to conclude that Star Carr represented an earlier form of the Maglemosian "culture" that was still influenced by traits from the Upper Paleolithic (Clark 1954: 191).

In addition to the evidence from the ecological studies, Clark also made good use of the faunal remains that he had recorded from the excavations and that had been analyzed by Fraser and King. They identified the species of animals that were present and established the minimum number of individuals that were represented within the assemblage. On the basis of this analysis, they showed that the inhabitants of Star Carr had hunted a wide range of different animals but that red deer were the most important to the economy of the site. By calculating the approximate amount of meat produced by butchering these animals and estimating the dietary requirement of a postglacial hunter-gatherer, Clark also estimated the total length of time the site had been in use, which he placed at six and a quarter years (Clark 1954: 14–15).

However, by far the most significant (and highly debated) use of the faunal assemblage was in establishing the seasonality of the site. Based on the time of year that red deer are known to lose their antlers, Fraser and King argued that the unshed material must have come from animals that were hunted between October and April (Clark 1954: 93), while shed antler could only have been collected in April (Clark 1954). From this it was argued that the site was occupied during the winter and spring months (Clark 1954) and that the inhabitants had moved to other locations during the summer. While this idea of seasonal mobility was largely implicit in Clark's original publications, he developed the idea further in his subsequent reanalysis of the site (Clark 1972). Here, he argued that the occupants of Star Carr had moved annually between lowland and upland locations as they followed migrating herds of red deer, an argument that was based upon behavioral studies of modern animal populations.

The Vale of Pickering Research Trust: 1985

In 1985 a new program of work was begun at the site, under the auspices of the Vale of Pickering Research Trust (Cloutman and Smith 1988). The Trust had been formed following the successful completion of the Seamer Carr Project, which had carried out extensive archaeological and paleoenvironmental surveys of the Mesolithic landscape along the northwest shore of Lake Flixton (Cloutman 1988a, b; Milner et al. 2011; Lane and Schadla-Hall Forthcoming). Using the skills and experiences that had been gained from this, the Trust aimed to expand upon the work of Godwin and Walker by creating a more detailed pollen record at Star Carr (Mellars and Dark 1998: 14).

Although the work of Godwin and Walker was exemplary for its time, the scope of their interpretations was limited by some of the approaches they adopted. In particular, the pollen analysis, which had only been carried out on a single profile and recorded at a very low resolution, was unlikely to detect subtle or gradual changes to the local vegetation. This, combined with the lack of radiocarbon dates from the environmental sequence, made it impossible to determine the timing and nature of environmental change at the site. However, advances in the techniques of paleoecology, and particularly palynology, and the wider availability of radiocarbon dating provided the opportunity to establish a more comprehensive record of the environments at Star Carr.

Much of this work was carried out by Edward Cloutman, who had undertaken the surveys at Seamer Carr, and was supervised by Alan Smith, who had formerly worked with Godwin at the Subdepartment of Quaternary Research. Based on work they had carried out at other sites, Cloutman and Smith argued that pollen profiles from lake-edge deposits were heavily influenced by the local vegetation and provided an accurate record of the environment that had formed close to the point where the samples were obtained (Cloutman and Smith 1988: 43 & 53). As such, a series of pollen profiles recorded at intervals from the lake edge and into the basin would document the spatial extents of the wetland vegetation and its development through time (Cloutman and Smith 1988). To achieve this, two new trenches (VP85A & B) were excavated through the lake-edge deposits, approximately 25 m to the east of the area investigated by Clark, and a series of pollen profiles were recorded from points along their length (Cloutman and Smith 1988: 38) (Fig. 2). These were correlated using common horizons within the pollen and peat stratigraphies (Cloutman and Smith 1988: 48–51), and an absolute chronology was established by radiocarbon dating.

In contrast to the work carried out by Godwin and Walker, Cloutman and Smith showed that the lake-edge environments had developed throughout the time that Star Carr was occupied. The reedswamp, which had traditionally been associated with the occupation of the site, had expanded into the deeper parts of the lake during the first few centuries of the Mesolithic, and a drier, fern-dominated fen had developed closer to the shore (Cloutman and Smith 1988: 52). Based on the relationship between the pollen and peat stratigraphies and a small assemblage of artifacts recorded during the excavations, Cloutman and Smith argued that it was in this environment that activity had taken place. The pollen analysis also detected an area of wetter ground that had formed around the time the site was first inhabited. This appeared to have been stabilized by the construction of a timber platform, the remains of which had been recorded during the excavation of the trench (Cloutman and Smith 1988).

However, while Cloutman and Smith provided a very detailed record of the changing environments at Star Carr, the chronology established by the radiocarbon dates was problematic. To begin with, the samples taken from the base of the profiles predated the start of the Holocene, leading Cloutman to suggest that older material had become reworked and incorporated into the basal sediments (Cloutman and Smith 1988: 45). Furthermore, many of the dates clustered at c. 9500 BP, which Mellars, drawing on the results of recent dendrochronological work, subsequently argued, were the result of a radiocarbon plateau (Mellars 1990). This, along with the large error range of many of the determinations and the relatively low sample interval of the pollen analysis, made it difficult to establish the date and

timing of environmental change in certain parts of the sequence (Cloutman and Smith 1988: 840).

Paul Mellars and Petra Dark (Née Day): 1989–1992

It was partly in response to these concerns that a new program of research was undertaken at the site in the 1990s by Paul Mellars and Petra Dark, again with the support of the VPRT (Mellars and Dark 1998). As well as dealing with the issues of chronology, Dark also sought to refine the environmental record for the site through high-resolution pollen analysis (Mellars and Dark 1998: 112). This, she argued, had the potential to detect discrete changes to the local vegetation, which, if related to human action, could be used to establish the duration and season of occupation, as well as providing evidence for the exploitation of the local flora (Mellars and Dark 1998).

Between 1989 and 1992, three new pollen profiles were recorded from samples taken from Trench VP85A, while a fourth profile was recorded just to the south of Clark's excavations (Cutting II) (Fig. 2). As well as the analysis of pollen, micro- and macro-charcoal were recorded from all of the profiles to identify episodes of localized burning and relate this to evidence for vegetation disturbance (Mellars and Dark 1998: 115–6). A new radiocarbon chronology was also established from AMS dates obtained on terrestrial macrofossils (Mellars and Dark 1998: 117), and "wiggle matching" and Bayesian analysis were used to overcome the difficulties caused by the plateau in the calibration curve (Mellars and Dark 1998: 119–121).

Dark's research broadly supported the environmental sequence that had been outlined in previous work at the site, documenting the expansion of fen and carr across the former lake edge. However, Dark also argued that some of the changes to the wetland vegetation recorded by Cloutman and Smith were unlikely to be the result of natural plant succession (Mellars and Dark 1998: 155) but had, instead, resulted from the deliberate clearance of the lake-edge flora. The most significant of these was a rapid decline in grass (Poaceae) pollen, much of which was thought to have derived from *Phragmites* reeds, which corresponded with an increase in micro- and macro-charcoal (Mellars and Dark 1998: 130). This, Dark argued, had been caused by the deliberate clearance of the reedbeds by fire (Mellars and Dark 1998). A similar decline in grass pollen and a corresponding increase in charcoal was recorded from the profile to the south of Clark's Cutting II, suggesting that the reedswamp in this area was also cleared at around the same time (Mellars and Dark 1998: 158) and a second phase of burning occurred approximately a century later in both parts of the site (Mellars and Dark 1998: 157).

Dark also established the time of year that the first phase of burning occurred, based on the presence of carbonized fruits, bud scales, and juvenile reed tissue within the deposits, and used this to infer the season of occupation at the site (Dark 2004). She argued that the *minimum* period during which the burning took place was between late April and the end of August but that it could have occurred as early as late winter (February) and as late as the end of September (Dark 2004: 41–2). However, Dark noted that occupation did not have to be continuous and that the site may have been revisited at different times of the year. She also pointed out that plant remains would not be able to detect evidence for burning during the winter, as they do not produce identifiable structures, such as fruits or bud scales at this time of the year (Dark 2004: 42).

Both the evidence for burning and the revised dating of the environmental sequence were also used to establish a chronology for human activity at Star Carr. First, Paul Mellars compared the vertical distribution of the artifacts in VP85A with the dated peat stratigraphy, which suggested that the archaeological assemblage had been deposited over a period from c. 8700 to c. 8400 cal BCE (Mellars and Dark 1998: 210). Subsequently, Dark used the deliberate burning of the local vegetation to establish a more detailed chronology of the site (Dark et al. 2006). Based on the dating of the charcoal record, she argued that the first phase of burning began c. 8970 cal BCE, lasted for approximately 80 years (slightly longer at Clark's site), and was broadly synchronous across the site (Mellars and

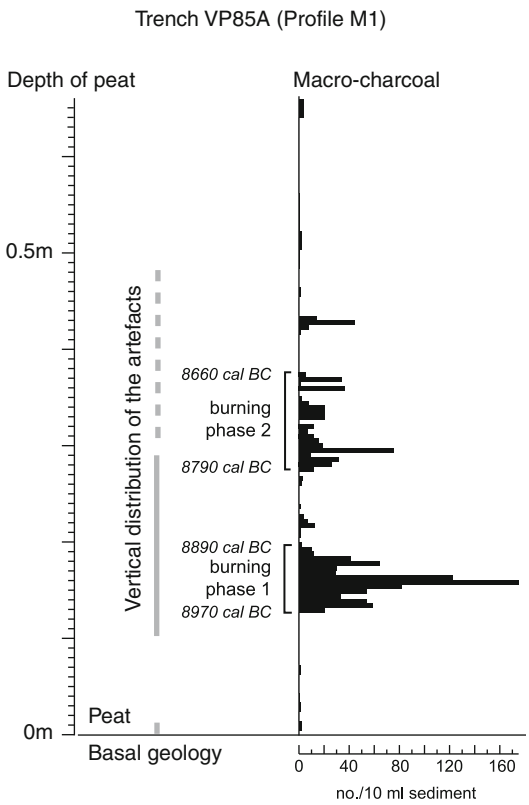

Star Carr: Environmental Archaeology, Fig. 4 Concentrations of charcoal and the vertical distribution of artifacts in Trench VP85A (After Dark et al. 2006: 189)

Dark 1998: 159; Dark et al. 2006: 191). In both of the trenches, it also coincided stratigraphically with the larger part of the artifact assemblage, leading Dark et al. to suggest that it represented the main period of occupation (Dark et al. 2006: 191) (Fig. 4). A second phase of burning occurred in the area around VP85A from c. 8790 cal BCE, lasting 130 years, while a further episode occurred approximately a century later in the area covered by Clark's excavations. As these both corresponded with smaller quantities of artifacts, Dark et al. suggested that there had been "a shift in the main focus of activity to other parts of the lake edge zone" (Dark et al. 2006: 198). Crucially, direct dating of the faunal assemblage and material culture has broadly supported these interpretations (Dark et al. 2006; Conneller et al. 2009), indicating that the charcoal record is a reasonable proxy for human activity at the site.

Reinterpretations and Debates

In the decades following the publication of his excavations at Star Carr, Clark's interpretation of the site remained largely unchallenged. However, from the late 1970s, several key points of his work became the subject of extensive critique: the interpretation of the faunal assemblage and what this said about the time of year the site was occupied, and the seasonal basis for mobility and the depositional context of the artifact assemblage. In both cases, the debates surrounding these issues led to new interpretations of the function of the site and its relationship to the wider pattern of activity within the surrounding landscape.

Changing Interpretations of the Faunal Assemblage

Species Representation and the Season of Occupation

The analysis of the faunal assemblage from Star Carr formed the basis for Clark's interpretation of the site as a winter base camp, inhabited by seasonally mobile hunters following herds of migrating red deer. However, in the late 1970s, Seamus Caulfield (1978) argued that the original analysis and the conclusions drawn from it were fundamentally flawed. The central point of his argument was that Fraser and King had included the shed and unshed red deer antler when calculating the number of animals represented in the assemblage and the time of year they had been killed (Caulfield 1978: 15). However, a reassessment of the data showed that the antler was overrepresented in comparison to the postcranial elements of the skeleton, suggesting that it had been brought onto the site, possibly for use as raw material (Caulfield 1978: 18). As such, its inclusion by Fraser and King had over emphasized the importance of red deer and had produced a potentially inaccurate record of the time of year the site was occupied.

However, subsequent attempts to establish the seasonality of Star Carr based on the existing data met with mixed success. Discounting the red deer

from the assemblage, Roger Jacobi (1978) argued that the faunal evidence indicated that activity had extended into the early summer. In contrast, Mike Pitts (1979) and John Andersen et al. (1981) used a combination of the botanical and the faunal evidence to argue that there was no single season of activity and that the site had either been occupied all year round (Pitts 1979: 33) or had been visited at different times of the year (Andresen et al. 1981). Based in part on the reassessment of the faunal assemblage, Andersen et al. also suggested that Star Carr had acted as a temporary hunting site, where animals had been killed and subsequently butchered, rather than an area of settlement (Andresen et al. 1981).

In the face of these varied and contradictory readings of the data, a comprehensive reanalysis of the faunal assemblage was carried out by Tony Legge and Peter Rowley-Conwy (1988). Accepting that the adult red deer crania with unshed antlers were an unreliable indicator of seasonality, they focused instead on the age-at-death profile of the younger animals based on tooth eruption data. This showed that young roe deer and, where age could be established, young red deer were being killed in the summer (Legge and Rowley-Conwy 1988: 25 & 38), while the presence of adult red deer crania that had shed their antler indicated a kill around April or May (Rowley-Conwy 1988: 30). Furthermore, only one individual (a juvenile elk) showed conclusive evidence for a kill later in the year (Rowley-Conwy 1988: 31–2), leading Legge and Rowley-Conwy to conclude that a summer occupation was most likely (Rowley-Conwy 1988: 94). These conclusions have since been refined through work carried out by Richard Carter who used radiographs of juvenile roe and red deer jaws to establish a more precise season of death. This showed that the young roe deer were killed slightly earlier in the year (Carter 1997 cited in Mellars and Dark 1998: 216), while at least one juvenile red deer was probably killed in the winter (Carter 1998: 855).

Drawing together the work of Carter, Legge and Rowley-Conwy, and Dark, Mellars argued that Star Carr was probably occupied between late spring (April/March) and early summer (June or early July) (Mellars and Dark 1998: 216). However, the ability to draw such conclusions from faunal and botanical data has been criticized by a number of researchers. Nicky Milner, for example, has argued that inferring the season of occupation on the basis of faunal data is fraught with difficulties, noting in particular that seasonally diagnostic material can be imported onto a site (as was the case with the red deer antlers) and that some activities leave no evidence of when they were undertaken (Milner 2005a: 34). Furthermore, indicators of activity at different times of the year are often assumed to form part of the same phase of occupation, rather than separate episodes of activity carried out on separate visits to the site (Milner 2005b: 58). As such, they tend to reduce variable and complex behavior into a single seasonal event (Milner 2005b).

With this in mind, the data from Star Carr could easily reflect multiple visits to the site at different times of the year, especially if the apparently anomalous evidence for the hunting of animals in autumn and winter that was recorded by both Legge and Rowley-Conwy (1988) and Carter (1998) is considered. This point has also been made by Dark, who has stated that while the evidence for burning at Star Carr spanned several months of the year, occupation at the site may have been more intermittent and that the data could reflect a series of discrete events (Dark 2004: 42). It is also important to note that none of the seasonally diagnostic material has been dated and that the evidence for activities in different months may not be contemporary. Overall, the evidence for a single season of occupation is far from unambiguous, and it remains possible that the site was visited on multiple occasions throughout much, if not all, of the year.

The Economic and Seasonal Basis for Mobility

Clark's model of a seasonal pattern of upland-lowland migration has also been critiqued, most notably by Legge and Rowley-Conwy (1988). They argued that the studies of red deer behavior that Clark drew upon were not applicable to Star Carr as they were based on open rather than wooded landscapes (Legge and Rowley-Conwy

1988: 13). Furthermore, they noted that deer in wooded environments do not migrate over long distances and would not necessarily have been absent from the vicinity of Star Carr during the summer season (Legge and Rowley-Conwy 1988). Similarly, they argued that the other animals that were being hunted and killed at Star Carr either were nonmigratory or would have been present in the area during the time of year the site was occupied (Legge and Rowley-Conwy 1988: 38).

But while the specific details of Clark's argument have been critiqued, the underlying assumption that Star Carr related to a wider pattern of seasonal mobility and resource procurement has persisted. Legge and Rowley-Conwy, for example, suggested contact between Lake Flixton and the nearby coastal areas, stating that these would have provided a range of resources "at seasons complimentary to that in which Star Carr is known to have been occupied" (Legge and Rowley-Conwy 1988: 95). This initially found some support from carbon isotope analysis carried out on the remains of a Mesolithic dog at Seamer Carr (Site K), just 1,200 m to the northeast of Star Carr, which showed evidence for a significant marine component to its diet (Clutton-Brock and Noe-Nygaard 1990) (see Fig. 1b). Arguing that the results could serve as a proxy for the diet of humans (Clutton-Brock and Noe-Nygaard 1990: 649), Clutton-Brock and Noe-Nygaard suggested that the inhabitants of Seamer Carr spent most of their time at the coast and that the sites around Lake Flixton (including Star Carr) represented temporary inland hunting stations (Clutton-Brock and Noe-Nygaard 1990: 650).

However, the veracity of this argument has been questioned on both methodological and interpretive grounds. To begin with, Petra Dark argued that the marine values were the result of carbon from the lake water entering the food chain via animals grazing on aquatic plants (Day 1996), though this has been refuted by Rick Schulting and Mike Richards (2002, 2009). Schulting and Richards (2002) have also questioned whether the diet of a single animal is representative of patterns of human activity spanning several centuries. As they note, visits to the coast may have occurred infrequently and not necessarily as part of a seasonal inland-coastal migration, while the dog itself may have been traded and need not reflect the movement of a human population (Schulting and Richards 2002: 331). These critiques have been supported by a more recent isotopic study on the remains of two dogs from Star Carr, neither of which showed evidence for a marine diet (Schulting and Richards 2009: 502).

Alternative Interpretations of the Faunal Remains

While the interpretation of the faunal assemblage has been dominated by the debates surrounding seasonality, several researchers have focused on the cultural attitudes towards the animals themselves. In particular Pollard (2000), Chatterton (2003), and Conneller (2003, 2004; Conneller and Schadla-Hall 2003) have all suggested that elements of the faunal assemblage and the artifacts made from bone and antler may have been deposited through deliberate acts of disposal that were related to concepts of animal agency. Pollard and Chatterton have separately argued that this involved treating the remains of animals with respect in order to ensure successful hunts in the future (Pollard 2000: 125–6; Chatterton 2003: 78). Conneller has also taken a slightly different view, arguing that the artifacts made from red deer, and particularly the barbed points and the antler frontlets, were used in transformative practices in which aspects of animal identity could be taken on by humans (Conneller and Schadla-Hall 2003: 102–3; Conneller 2004).

The Context of Deposition and Site Function

The depositional context of the material culture recorded by Clark has also been debated, leading to a number of reinterpretations of the forms of activity that the assemblage represents. Clark himself had argued that the artifacts had been deposited into an area of reedswamp that lay at the edge of the lake and represented an area of occupation (Clark 1954: 12). However, since the late 1970s, several archaeologists have argued that the assemblage was actually deposited into standing water, making it an unlikely place for inhabitation (e.g., Price 1982; Chatterton 2003). As a result, the assemblage has been variously

reinterpreted as a dump of material discarded as waste, the remains of specialized craft activity (particularly tanning and antler working), or the results of culturally prescribed acts of deposition and disposal (e.g., Price 1982; Pitts 1979; Chatterton 2003; Conneller 2004). These reinterpretations have themselves been critiqued by Paul Mellars, who has argued strenuously in favor of Clark's original narrative (Mellars and Dark 1998; Mellars 2009).

Unfortunately, Clark's excavation records lack the necessary contextual detail to resolve this debate, and researchers have had to rely upon other, less direct, forms of evidence often leading to contradictory conclusions. Doug Price, for example, cited the preservation of the bone and antler to argue that they were deposited into standing water, while Paul Mellars used the spatial distribution of the flint artifacts to argue for in situ activity in a relatively drier environment (Price 1982; Mellars and Dark 1998: 218–221). Richard Chatterton has pointed out that the deposits from which much of the archaeological material was recorded contained aquatic plant material (Chatterton 2003: 70 citing Clark 1954: 58), though Mellars has countered this, suggesting that this could have been washed in by periodic flooding or represented the waste from plants collected for food (Mellars 2009: 506). Finally, both Chatterton and Mellars have used the paleoenvironmental work carried out by Dark to determine whether the area investigated by Clark would have been beneath or beyond the water level of the early Mesolithic lake (Chatterton 2003: 70; Mellars and Dark 1998: 221; Mellars 2009: 506). Unfortunately, alleged discrepancies in the topographic survey of the site (Mellars 2009: 506) have meant that the two authors came to very different conclusions.

However, recent archaeological and paleoenvironmental research at Star Carr has begun to resolve this issue. Since 2004 a new program of fieldwork has been carried out at the site, which has included the excavation of trenches through the lake-edge deposits and the re-excavation of some of the areas investigated by Clark and the VPRT (Milner et al. 2011; Conneller et al. 2012). This has recorded further evidence for Mesolithic activity, including timber platforms and artifact assemblages, as well as providing an opportunity for new paleoenvironmental investigations. In particular, the analysis of plant macrofossils taken from the section of Clark's Cutting II, VP85A, and several of the new trenches has provided a very detailed picture of the environments that were forming at the site (Hall et al. 2007; Hall 2009; Taylor 2012). By relating this work stratigraphically to the archaeological evidence, it has been possible to develop a precise contextual record of the various episodes of human activity (Taylor 2012).

This work has shown that there was no single context of deposition and that artifacts were deposited into a range of different environments, the nature and extent of which changed during the time the site was inhabited (Taylor 2012: 351; see also Taylor 2011: 78–80). The earliest artifacts were deposited into shallow standing water close to the lake shore, with swamp vegetation growing in situ. However, as the peat began to accumulate, the depth of water at the lake edge became shallower until the area eventually became terrestrialized, and trees and fen plants became established (Taylor 2012: 360). Yet despite the changing nature of these environments, artifacts continued to be deposited across the lake-edge wetlands. In some places, the material appears to have been discarded as waste from nearby areas of craft activity; in others, it may have been deposited more deliberately, while in some parts of the site, the artifacts represent tasks that were being carried out in situ within the wetland environments (Taylor 2012: 351–2). What is more, the nature of activity associated with the wetlands changed as these environments developed. The use of the timber platforms, for example, occurs at a time when the depth of water was becoming shallower and conditions at the lake-edge boggier (Conneller et al. 2012). As the deposits began to form above the level of the lake and the wetlands became more terrestrialized, activities that had formerly taken place on the dry ground, such as antler working, were carried out within the fen itself (Taylor 2007). This explains some of the very contradictory interpretations of the site. Clark and subsequent researchers have treated

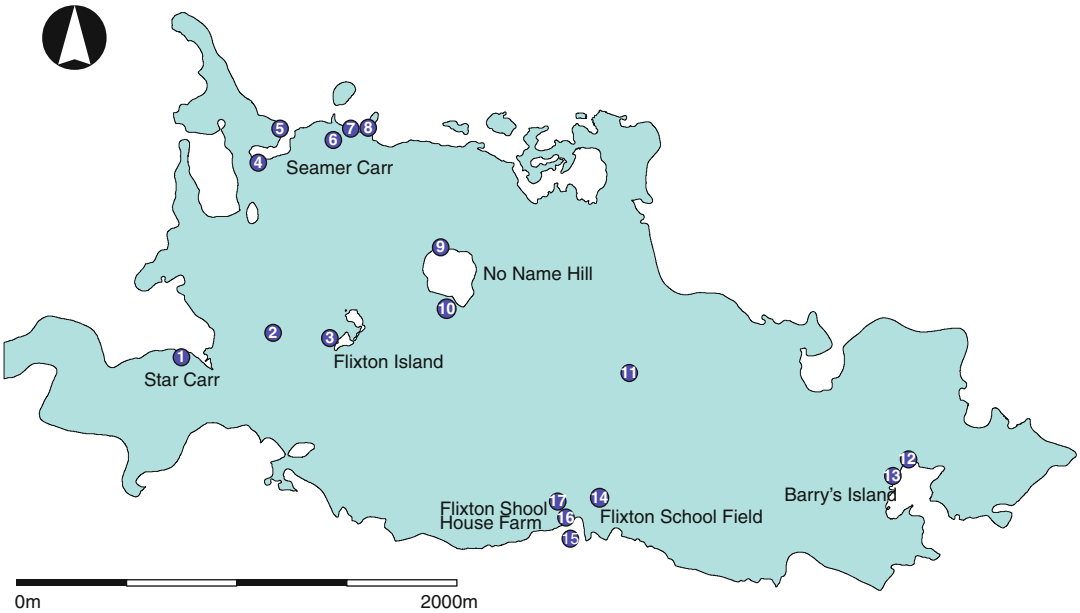

Star Carr: Environmental Archaeology, Fig. 5 Location of environmental profiles within the Lake Flixton basin (excluding those recorded by Godwin and Walker). *1* VP85A1–3 and VP85B (Cloutman and Smith 1988) and M1–3 and "Clark's site profile" (Mellars and Dark 1998), *2* deep lake profile (Mellars and Dark 1998), *3* AK87 (Lane and Schadla-Hall Forthcoming), *4* D1 (Cloutman 1988b), *5* K2 and 5 (Cloutman 1988b), *6* M285 (Cloutman 1988b), *7* CV, CVII, and CVIII (Cloutman 1988b), *8* E77 (Cloutman 1988b), *9* NAQ and NAZ (Cummins 2003, Taylor 2011, 2012); *10* NM (Cummins 2003); *11* profile D (Cummins 2003); *12* LAL (Cummins 2003); *13* LAP (Cummins 2003); *14* FS95 (Cummins 2003); *15* PCC (Cummins 2003); *16* Trench F (Taylor 2011, 2012); and *17* core 1(Taylor 2011, 2012)

the faunal and artifactual material as a single assemblage. However, the recent work has shown that the site is, in fact, a palimpsest, reflecting successive phases of activity, taking place in very different environments, and spanning several centuries. It is not, therefore, surprising that studies of the animal bone have been unable to show a single season of occupation nor that the material culture reflects very different forms of activity indicative of different types of environmental conditions. The key to understanding Star Carr is to appreciate the diverse character of activity and its relationship with the changing character of the wetland environments.

Paleoenvironmental Research in the Wider Landscape

Since the late 1940s, paleoenvironmental investigations have also been carried out across much of the basin, documenting the environmental history of the lake and establishing the ecological context of other areas of Mesolithic activity (Fig. 5). As at Star Carr, much of this work has been carried out as part of archaeological investigations, creating a well-integrated record of both the human and environmental histories of the landscape.

The first large-scale investigations were carried out by Godwin and Walker who recorded the stratigraphy of the basin through a series of auger transects and used pollen and plant macrofossils to document the changing character of the wetland and terrestrial vegetation. Their results showed that the lake had formed at the start of the late glacial interstadial but had been colonized by swamp and fen environments during the Mesolithic, leading to the eventual in-filling of the basin (Clark 1954: 61–9). Since the mid-1970s, however, more intensive programs of work have been undertaken, first under the auspices of the Seamer Carr Project and then the VPRT, which have created a far more precise record of both the topography and the vegetational history of the area.

To begin with, large-scale auger surveys have been carried out across the former lake, mapping much of the buried Mesolithic land surface including almost all of the shore, the adjacent terrestrial landscape, and substantial parts of the basin (Cloutman 1988a; Lane and Schadla-Hall Forthcoming). The augering has also recorded the sequence of sediments that formed within the lake, while pollen analysis has been carried out in order to document the changing patterns of vegetation. Perhaps the most intensive program of work was carried out at Seamer Carr by Cloutman, who recorded eight pollen profiles from locations along the shore, within the deeper lake margins and on the terrestrial landscape (Cloutman 1988b). By correlating these on the basis of common horizons within the pollen stratigraphies, Cloutman was able to map the expansion of different wetland environments into the lake as well as documenting changes to the adjacent terrestrial vegetation (Fig. 6). Since then, pollen profiles have been recorded by Jim Innes at Flixton Island (Lane and Schadla-Hall Forthcoming) and by Gaynor Cummins at No Name Hill, Barry's Island, and Flixton School Field (Cummins 2003), establishing the character of the vegetation around each of these sites. Both Cummins (2003) and Dark (Mellars and Dark 1998) have also documented the regional pattern of vegetation through the analysis of pollen from the deepest parts of the basin. More recently plant macrofossil analysis has been carried out at Flixton School House Farm and No Name Hill (Taylor 2011, 2012). At both sites profiles were recorded at intervals from the lake edge into the deeper lake margins and correlated using radiocarbon dates to provide a precise record of the timing of wetland succession (Taylor 2011, 2012).

When brought together, this work has created a very detailed record of the environments that were forming within and around the lake at the time that Star Carr was occupied. The lake itself was over 4.5 km long, with a complex and varied shoreline interspersed with embayments, small promontories, and larger hilly peninsulas (Taylor 2011: 65).

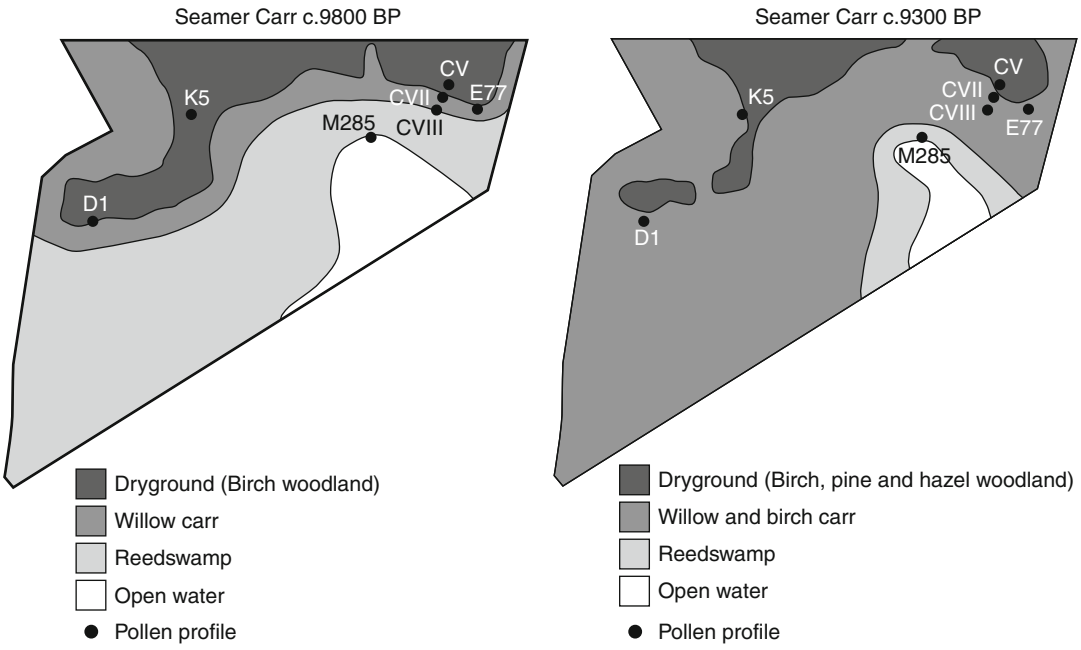

Star Carr: Environmental Archaeology, Fig. 6 The spatial extents of the early Mesolithic wetland environments at Seamer Carr (After Cloutman 1988b: 33 Fig. 7)

Around much of the shore, low hills overlooked the lake, while areas of low-lying ground created small boggy hollows and seasonal ponds (Taylor 2011). By the start of the Mesolithic beds of *Phragmites* reed, sedges and other wetland plants were well established along much of the shore, with floating aquatic plants growing in the deeper water (e.g., Cummins 2003: 281). Along the shore, willow, aspen, and birch were growing at the water's edge, and birch woodland, interspersed with areas of open grassland, covered the surrounding terrestrial landscape (Cummins 2003: 280). As at Star Carr, these environments developed rapidly as the accumulation of sediments caused the lake to become shallower, allowing swamp vegetation to expand into the basin (e.g., Taylor 2011: 76). By c. 8500 cal BCE, the sediments at the lake edge were forming above the level of the lake, and fen plants and trees had begun to colonize the wetlands (Taylor 2011).

These analyses have also helped to show how Mesolithic people engaged with their environment. In a detailed study of the lithic assemblages from sites around the lake, Conneller observed that the assemblages that were recorded from the wetland deposits lacked evidence for in situ knapping and were dominated by flakes and blades (e.g., Conneller and Schadla-Hall 2003: 100). These, she argued, reflected the use of flint at the wetland's edge for tasks that included the cutting of material (Conneller and Schadla-Hall 2003: 100). Macrofossil analysis at one of these sites (No Name Hill) showed that some of the flint had been deposited into reedswamp that was growing in shallow standing water over 5 m from the shore (Taylor 2011: 77). This, it has been argued, showed that people were carrying out tasks *within* the wetlands, possibly including the clearance or collection of reeds for use as food or raw materials (Taylor 2011). Other parts of the flint assemblage, again dominated by flakes and blades, had been deposited in waterlogged sediments that had formed at or close to the shore (Taylor 2011). Although this material may reflect a range of different activities, it is possible that part of the assemblage was deposited while working antler, as several pieces of antler-working waste were recorded nearby (Taylor 2011).

As at Star Carr, there is also evidence that Mesolithic people were deliberately manipulating and managing the wetland vegetation in the wider landscape. High-resolution pollen and charcoal analysis carried out by Cummins has shown that the reed and sedge beds at No Name Hill and Flixton School Field were cleared by burning for prolonged periods and on multiple occasions (Cummins 2003). Although the reason for the burning is debated, the most common argument is that it formed part of an economic strategy that was designed to maintain predictable and reliable resources around the landscape. Regular burning of the reed beds would, for example, increase their biomass and encourage their expansion while at the same time preventing other plants from colonizing the area (e.g., Mellars and Dark 1998: 231; Cummins 2003: 297). This would create large, productive, stands of reeds that could then be exploited for either food or raw materials. Alternatively, it has been argued that the burning of the reeds would promote the growth of young shoots and create openings at the edge of the lake, attracting animals to the area and making them easier to hunt (Cummins 298–9; Mellars and Dark 1998: 231–2).

The environmental work that has taken place around the former lake has also helped to relate Star Carr to the pattern of activity within the surrounding landscape. Cummins, for example, showed that activity at other locations around the lake (No Name Hill and Flixton School Field) was broadly contemporary with Star Carr, based on the dates for the charcoal sequences at each of the sites (Cummins 2003: 292). As at Star Carr, the dating of the charcoal records from these sites also showed that they were occupied (or revisited) for decades at a time (Cummins 2003: 291–2). Similarly, the macrofossil analysis at No Name Hill has shown that activity within the wetlands spanned the period over which these environments changed, with evidence for tool use within the swamp and the later fen and carr (Taylor 2011: 77–8). It also demonstrated that very similar kinds of activity were taking place in the same sorts of environment at the two sites. When seen in this context, it becomes clear

that activity at Star Carr was part of a much broader pattern of occupation that was focused around the shores of the lake.

Conclusions

In the closing sentences of the Star Carr monograph, Clark wrote that his excavations had "opened up rather than closed a field of prehistoric research" (Clark 1954: 191), and it is a testament to the importance of the site that this statement remains true to this day. While Clark's work at Star Carr laid the foundations for Mesolithic archaeology in Britain, the subsequent reinterpretations and the new excavations they inspired not only have refined our knowledge of the site but also have changed the way we understand the period as a whole (Conneller 2003). The issues of seasonality that dominated discussions of the faunal assemblage throughout the 1970s and 1980s have led to more critical debates surrounding the idea of seasonal mobility during the early Mesolithic (e.g., Milner 2005a, b). Furthermore, renewed analyses of the faunal assemblage as well as the material culture from the site have led to altogether new approaches to the study of animals and how they may have been perceived by humans (e.g., Conneller 2004). Similarly, the traditional view of Mesolithic society as consisting of small, highly mobile groups has been challenged by many of the new discoveries at Star Carr: the deliberate manipulation of the environment, the temporally extensive nature of occupation, and the construction of large structural features such as trackways (Conneller et al. 2012). Writing almost 50 years after Clark, Conneller wrote that "to change our understanding of Star Carr is to change our understanding of the British Mesolithic itself" (Conneller 2003: 82). Let us hope that over the next 50 years, Star Carr will continue to challenge our perception of early Mesolithic societies.

Cross-References

- ▶ Clark, John Grahame Douglas
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ European Mesolithic: Geography and Culture
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Star Carr, Archaeology of

References

Andresen, J., B. Byrd, M. Elson, R. McGuire, R. Mendoza, E. Staski, and P. White. 1981. The deer hunters: Star Carr reconsidered. *World Archaeology* 13 (1): 31–46.

Carter, R.J. 1997. Age estimation of the roe deer (*Capreolus capreolus*) mandibles from the Mesolithic site of Star Carr, Yorkshire, based on radiographs of mandibular tooth development. *Journal of Zoology* 241 (3): 495–502.

Carter, R.J. 1998. Reassessment of seasonality at the early Mesolithic site of Star Carr, Yorkshire, based on radiographs of mandibular tooth development in red deer (*Cervuselaphus*). *Journal of Archaeological Science* 25: 851–856.

Caulfield, S. 1978. Star Carr – An alternative view. *Irish Archaeological Research Forum* 5: 15–22.

Chatterton, R. 2003. Star Carr reanalysed. In *Peopling the Mesolithic in a northern environment*. BAR International series 1157, ed. J. Moore, and L. Bevan, 69–80. Oxford: Archaeopress.

Clark, J.G.D. 1954. *Excavations at Star Carr*. Cambridge: Cambridge University Press.

Clark, J.G.D. 1972. *Star Carr: A case study in bioarchaeology*. Reading: Addison-Wesley Publishing Co.

Cloutman, E. 1988a. Palaeoenvironments in the Vale of Pickering, Part 1: Stratigraphy and palaeogeography of Seamer Carr, Star Carr and Flixton Carr. *Proceedings of the Prehistoric Society* 54: 52–69.

Cloutman, E. 1988b. Palaeoenvironments in the Vale of Pickering, Part 2: Environmental history at Seamer Carr. *Proceedings of the Prehistoric Society* 54: 21–36.

Cloutman, E., and A.G. Smith. 1988. Palaeoenvironments in the Vale of Pickering, Part 3: Environmental history at Star Carr. *Proceedings of the Prehistoric Society* 54: 37–58.

Clutton-Brock, J., and N. Noe-Nygaard. 1990. New osteological and C-isotope evidence on Mesolithic dogs: Companions to hunters and fishers at Star Carr, Seamer Carr and Kongemose. *Journal of Archaeological Science* 17: 643–653.

Conneller, C. 2003. Star Carr recontextualised. In *Peopling the Mesolithic in a northern environment.* BAR International series 1157, ed. J. Moore, and L. Bevan. Oxford: Archaeopress.

Conneller, C. 2004. Becoming deer: Corporeal transformations at Star Carr. *Archaeological Dialogues* 11: 37–56.

Conneller, C., and R.T. Schadla-Hall. 2003. Beyond Star Carr: The Vale of Pickering in the tenth millennium BP. *Proceedings of the Prehistoric Society* 69: 85–105.

Conneller, C., N. Milner, T. Schadla-Hall, and B. Taylor. 2009. The temporality of the Mesolithic landscape: New work at Star Carr. In *Chronology and evolution within the Mesolithic of North-West Europe. Proceedings of an international meeting, Brussels*, ed. P. Crombé, M. Van Strydonck, J. Sergant, M. Boudin, and M. Bats, 77–94. Newcastle: Cambridge Scholars Publishing.

Conneller, C., N. Milner, B. Taylor, and M. Taylor. 2012. Substantial settlement in the European early Mesolithic: New research at Star Carr. *Antiquity* 86 (334): 1004–1020.

Cummins, G. 2003. Impacts of hunter-gatherers on the vegetation history of the Eastern Vale of Pickering, Yorkshire. Unpublished PhD dissertation, Durham University.

Dark, P. 2004. Plant remains as evidence for seasonality of site use in the Mesolithic period. *Environmental Archaeology* 9: 39–45.

Dark, P., T.F.G. Higham, R. Jacobi, and T. Lord. 2006. New radiocarbon accelerator dates on artefacts from the early Mesolithic site of Star Carr, North Yorkshire. *Archaeometry* 48 (1): 185–200.

Day, S.P. 1996. Dogs, deer and diet at Star Carr: A reconsideration of C-isotope evidence from early Mesolithic dog remains from the Vale of Pickering, Yorkshire, England. *Journal of Archaeological Science* 23: 783–787.

Elliot, B.J., and N. Milner. 2010. Making a point. A critical review of the barbed point manufacturing process practiced at Star Carr. *Proceedings of the Prehistoric Society* 76: 75–94.

Godwin, H., and M.E. Godwin. 1933. British Maglemose harpoon Sites. *Antiquity* 7 (25): 39–48.

Hall, A. 2009. Assessment of macrofossil plant remains and peat matrix in samples from excavations at Star Carr, N. Yorkshire, in 2007. Reports from the Centre for Human Palaeoecology, University of York 2009/05.

Hall, A., H. Kenward, L. Girvan, R. McKenna, and G.A. King. 2007. An assessment of the palaeoecological potential of biological remains from a site at Star Carr, Vale of Pickering, North Yorkshire. Reports from the Centre for Human Palaeoecology, University of York.

Jacobi, R. 1978. Northern England in the eighth millennium BC: An essay. In *The early post glacial in Europe. An ecological perspective*, ed. P. Mellars. London: Duckworth.

Lane, P., and R.T. Schadla-Hall. Forthcoming. *Hunter-gatherers in the landscape: Investigations of the early Mesolithic in the Vale of Pickering, North Yorkshire 1976–2000*. Cambridge: McDonald Institute for Archaeological Research.

Legge, A., and P. Rowley-Conwy. 1988. *Star Carr revisited: A re-analysis of the large mammals*. London: Centre for Extra-Mural Studies.

Mellars, P. 1990. A major 'plateau' in the radiocarbon timescale at *c*.9650 BP: The evidence from Star Carr (North Yorkshire). *Antiquity* 64: 836–841.

Mellars, P. 2009. Moonshine over Star Carr: Post-processualism, Mesolithic myths and archaeological realities. *Antiquity* 83: 502–517.

Mellars, P., and P. Dark. 1998. *Star Carr in context: New archaeological and palaeoecological investigations at the early Mesolithic site of Star Carr, North Yorkshire*. Cambridge: McDonald Institute for Archaeological Research.

Milner, N. 2005a. Can seasonality studies be used to identify sedentism in the past? In *(Un)settling the Neolithic*, ed. D. Bailey, A. Whittle, and V. Cummings. Oxford: Oxbow.

Milner, N. 2005b. Pitfalls and problems in analysing and interpreting the seasonality of faunal remains. In *Contending with bones*, ed. N. Milner, D. Fuller, and M. Baxter. *Archaeological Review from Cambridge* 16, 31–67.

Milner, N., P. Lane, B. Taylor, C. Conneller, and T. Schadla-Hall. 2011. Star Carr in a post-glacial lakescape: 60 years of research. *Journal of Wetland Archaeology* 11: 1–19.

Moore, J. 1951. *Lake Flixton. A late glacial structure*. Scarborough: Scarborough & District Archaeological Society.

Nilsson, T. 1947. A pollen analytical investigation of Holmegaards Mose with considerations as to the age of the dwelling places of the Maglemosean period in Denmark and surrounding areas. *Meddelelserfra Dansk Geologisk Forening* 11 (2): 201–217.

Pitts, M. 1979. Hides and antlers: A new look at the gatherer-hunter site at Star Carr, North Yorkshire, England. *World Archaeology* 11: 32–42.

Pollard, J. 2000. Ancestral places in the Mesolithic landscape. In *New approaches to the Palaeolithic and Mesolithic,* ed. C. Conneller. *Archaeological Review from Cambridge* 17(1): 123–138.

Price, T. 1982. Willow tales and dog smoke. *Quarterly Review of Archaeology* 3: 4–7.

Schulting, R.J., and M.P. Richards. 2002. Dogs, ducks, deer and diet: A reappraisal of the stable isotope evidence on early domestic dogs from the Vale of Pickering, north-east England. *Journal of Archaeological Science* 29: 327–333.

Schulting, R.J., and M.P. Richards. 2009. Dogs, divers, deer and diet. Stable isotope results from Star Carr and a response to Dark. *Journal of Archaeological Science* 36: 498–503.

Taylor, B. 2007. Recent excavations at Star Carr, North Yorkshire. *Mesolithic Miscellany* 18 (2): 12–16.

Taylor, B. 2011. Early Mesolithic activity in the wetlands of the Lake Flixton basin. *Journal of Wetland Archaeology* 11: 63–84.

Taylor, B. 2012. The occupation of wetland landscapes during the British Mesolithic: Case studies from the Vale of Pickering. Unpublished PhD dissertation, University of Manchester.

Stark, Miriam

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Basic Biographical Information

Miriam T. Stark is an American Archaeologist and Professor of Anthropology at the University of Hawai'i at Mānoa (Fig. 1). She grew up in East Lansing, Michigan, earning a B.A. in Anthropology and English from the University of Michigan in 1984. From an early age, Stark's mother exposed her to archaeology, signing her up for a 6-week archaeology-themed summer trip to Israel in 1978 where she worked on the site of Tel Afek. In 1982, her study of archaeology began in earnest when she volunteered to work with graduate student Tristine Smart on a field survey in the Hocking Valley, Ohio, and became interested in archaeology as a career. She began pursuing Southwestern archaeology through participation in two field schools in New Mexico in 1983: first with the University of New Mexico/New Mexico State University Field School at Rowe Pueblo (under the direction of Linda Cordell, Fred Plog, and Steadman Upham) and then at Ladder Ranch (under the direction of Margaret Nelson).

She earned her Master's (1987) and Ph.D. (1993) from The University of Arizona, where she wrote her doctoral dissertation on "Pottery Economics: A Kalinga Ethnoarchaeological Study" under the supervision of William Longacre. Following completion of her doctoral degree, she was a Materials Analysis Postdoctoral Fellow in the Conservation Analytical Laboratory at the Smithsonian in Washington, D.C. She joined the Anthropology Department at the University of Hawai'i at Mānoa as an Assistant Professor in 1995 and was promoted to Associate Professor in 2000 and then to Professor in 2006. She currently directs the university's Center for Southeast Asian Studies (2018–2022).

Major Accomplishments

Dr. Stark has worked extensively on political economy in premodern Southeast Asia, beginning with her graduate school studies as a participant in the Kalinga Ethnoarchaeology Project during the 1987–1988 field season. Her Ph.D. research used an ethnoarchaeological case study based in the village of Dalupa, Philippines (Fig. 2), to explore a study on pottery economics including the production, use, and distribution of pottery across a landscape. She has published extensively on

Stark, Miriam, Fig. 1 Photo of Miriam Stark. (Photo provided by Miriam Stark)

Stark, Miriam, Fig. 2 Miriam Stark interviews a Kalinga potter in the village of Dalupa. (Photo provided by Miriam Stark)

this work (e.g., Stark 1991a) as well as related topics such as the archaeology of social boundaries (e.g., Stark 1998) and ceramic ethnoarchaeology (e.g., Stark 2003). Her more recent ceramics research includes a collaborative project aimed at understanding the production and exchange of stoneware ceramics in the Angkorian Empire.

Although her Ph.D. focus was on the Philippines, Dr. Stark maintained an interest in Southwestern archaeology, working as a Research Archaeologist with Desert Archaeology (Tucson, AZ) and as part of the Homol'ovi Research Program (Arizona State Museum). She has also published on Southwestern ceramics (e.g., Stark and Heidke 1998).

Stark has long been concerned with issues related to gender equity in archaeology. She co-authored an examination on "The Status of Women in Archaeology" (Kramer and Stark 1988), and a later publication (Stark 1991b) scrutinized the gender differences between men and women in academic and nonacademic archaeology as part of a research assistantship with Dr. Carol Kramer. Dr. Stark served on the Committee on the Status of Women in Anthropology for the Society for American Archaeology (1992–1997) and for the American Anthropological Association (1997–2000) and continues to speak on these issues at academic conferences.

In 1992 and later in 1994, Dr. Stark worked in mainland Southeast Asia as a participant in the Thailand Archaeometallurgy Project (TAP). In 1996, her attentions shifted to Cambodia where she co-directed the Lower Mekong Archaeological Project (LOMAP) in collaboration with Cambodia's Ministry of Culture and Fine Arts (Fig. 3). This project grew out of an earlier collaboration between the Royal University of Fine Arts in Phnom Penh, the University of Hawai'i, and the East-West Center focused on training and rebuilding the Cambodian archaeology program following Cambodia's Khmer Rouge period (Stark and Heng 2018). Capacity building has been a core component of Dr. Stark's research in Cambodia, with over 80 Cambodian Royal University of Fine Arts students and interns having been trained on her projects between 1995 and 2015.

Stark, Miriam, Fig. 3 Miriam Stark (right) and Cambodian Archaeologist Dr. Piphal Heng (left) undertake field survey in Takeo Province, Cambodia, as part of the LOMAP project. (Photo provided by Miriam Stark)

Nine seasons of excavation, survey, and interdisciplinary fieldwork at and around Angkor Borei have done much to shed light on the processes of early state formation in the region. Dr. Stark developed a preliminary typology of earthenware ceramics for the Mekong Delta, as well as elucidating settlement patterns, emerging urbanism, and sociopolitical complexity in Early Historic Southeast Asia. From 2010 to 2015, Stark extended her Cambodian research to include the Angkorian period as a co-investigator with the Greater Angkor Project (GAP) and led field projects at multiple sites throughout the Greater Angkor region. Her political economy research focused on residential patterning within state temple enclosures. Since 2018, Stark has co-directed the Pteah Cambodia Project, whose current research, in collaboration with Cambodia's Ministry of Culture and Fine Arts, is on examining

Angkorian and Pre-Angkorian habitation areas and temple communities outside Greater Angkor, in Battambang Province, Cambodia. Dr. Stark has received funding from the Australian Research Council, the Center for Khmer Studies, Earthwatch Institute, the Henry Luce Foundation, the NASA Space Archaeology Program, National Endowment for the Humanities, National Geographic, National Science Foundation, and Wenner-Gren Foundation, among others.

Dr. Stark is a major promotor of Asian and Southeast Asian archaeology as a field. She served as Editor-in-Chief of the journal *Asian Perspectives* from 2002 to 2006 and edited the *Archaeology of Asia* (Stark 2006). Recent scholarly work has focused on synthesizing long-term historical trends in Cambodia and Southeast Asia more broadly. These syntheses have been published in venues accessible to a wide range of scholars, which has served to promote and emphasize the relevance of this work to those outside the region and outside archaeology. Additionally, Stark actively participates in interdisciplinary workshops and conferences, connecting diverse perspectives. This includes co-organizing a conference session at the Association of Asian Studies meeting that brought together archaeologists and historians of Southeast Asia and as a speaker at recent conferences on historical ecology and indigenous knowledge and science.

Dr. Stark is actively involved in cultural heritage preservation in Southeast Asia. In 2003 she contributed to the development of a bilateral memorandum of understanding between Cambodia and the United States to impose import restrictions on Cambodian archaeological materials and was involved in the renewal of this agreement in 2008, 2013, and 2018. She developed museum exhibits for the Angkor Borei site museum in 1999 and worked to upgrade the exhibits and organize funding for museum renovations from the US Embassy in Cambodia that were completed in 2019. In 2017, she facilitated the repatriation of archaeological materials from fieldwork in the 1960s held at the University of Hawai'i to the Ban Chiang Museum, Thailand.

Dr. Stark is actively working to decolonize Southeast Asian archaeology through opportunities for indigenous scholars. From 2007 to 2012, she directed the Luce Asian Archaeology Program (LAAP) funded by the Henry Luce Foundation, which provided English language and archaeological training and professional development skills to junior scholars from East and Southeast Asia. She regularly takes part in training programs and workshops to promote Southeast Asian scholarship on topics such as ceramics analysis, the use of GIS in archaeology, and Cultural Resource Management. Dr. Stark has worked tirelessly to foster indigenous scholars through these programs, as well as through the intangible support of mentorship, editing drafts of manuscripts and grant proposals, and building intra-regional connections of scholars across Southeast Asia. Many of these scholars have gone on to pursue advanced degrees, published their work in peer-reviewed journals, and received competitive funding awards for their own research projects.

In addition to her scholarship, Stark is committed to teaching and outreach. She has served on the committees for over 75 B.A. Honors degrees, Master's theses, and Ph.D. students. In 2016 she was the recipient of the University of Hawai'i Chancellor's Citation for Meritorious Teaching. She regularly speaks about archaeology to the general public, including lectures through the Archaeological Institute of America and the Girl Scouts of Hawai'i.

Cross-References

- ► Cambodia: Cultural Heritage Management
- ► Post-Khmer Rouge Cambodia, Archaeology in
- ► South and Southeast Asia: Historical Archaeology
- ► Southeast Asian Ceramics

References

Kramer, C., and M.T. Stark. 1988. The status of women in archaeology. *Anthropology Newsletter* 29 (1): 11–12.

Stark, M. 1991a. Ceramic production and community specialization: A Kalinga ethnoarchaeological study. *World Archaeology* 23: 64–78.

Stark, M.T. 1991b. A perspective on women's status in American archaeology. In *The archaeology of gender. Proceedings of the twenty-second annual conference of the Archaeological Association of the University of Calgary*, ed. D. Walde and N.D. Willows, 187–194. Calgary: The University of Calgary.
Stark, M.T. 1998. *The archaeology of social boundaries*. Washington, DC: Smithsonian Institution Press.
Stark, M. 2003. Current issues in ceramic ethnoarchaeology. *Journal of Archaeological Research* 11: 192–242.
Stark, M.T., ed. 2006. *Archaeology of Asia*. Malden: Blackwell.
Stark, M.T., and J.M. Heidke. 1998. Ceramic manufacture, productive specialization, and the early classic period in Arizona's Tonto Basin. *Journal of Anthropological Research* 54: 499–520.
Stark, M., and P. Heng. 2018. After Angkor: An archaeological perspective on heritage and capacity-building in Cambodia. In *Post-conflict archaeology and cultural heritage: Rebuilding knowledge, memory and community from war-damaged material culture*, ed. P. Newson and R. Young, 195–216. New York: Routledge.

Further Reading

Carter, A.K., P. Heng, M.T. Stark, R. Chhay, and D.H. Evans. 2018. Urbanism and residential patterning in Angkor. *Journal of Field Archaeology* 43: 492–506.
Grave, P., M.T. Stark, D. Ea, L. Kealhofer, B.S. Tan, and T. Tin. 2017. Differentiating Khmer Stoneware Production: An NAA pilot study from Siem Reap Province, Cambodia. *Archaeometry* 59: 13–24.
Stark, M.T. 2000. Pre-Angkor earthenware ceramics from Cambodia's Mekong Delta. *Udaya* 1: 69–89.
Stark, M.T. 2006a. Pre-Angkorian settlement trends in Cambodia's Mekong Delta and the Lower Mekong Archaeological Project. *Bulletin of the Indo-Pacific Prehistory Association* 26: 98–109.
Stark, M.T. 2006b. Early mainland Southeast Asian landscapes in the first millennium A.D. *Annual Review of Anthropology* 35: 407–432.
Stark, M.T. 2006c. From Funan to Angkor. Collapse and regeneration in ancient Cambodia. In *After collapse: The regeneration of complex societies*, ed. G.M. Schwartz and J.J. Nichols, 144–167. Tucson: The University of Arizona Press.
Stark, M.T. 2015a. Inscribing legitimacy and building power in the Mekong Delta. In *Social theory in archaeology and ancient history: The present and future of counternarratives*, ed. G. Emberling, 75–105. Cambridge: Cambridge University Press.
Stark, M.T. 2015b. Southeast Asian urbanism: From early city to classical state. In *The Cambridge world history*, ed. N. Yoffee, 74–93. Cambridge: Cambridge University Press.
Stark, M.T., and J.M. Skibo. 2007. A history of the Kalinga ethnoarchaeological project. In *Archaeological anthropology: Perspectives on method and theory*, ed. J.M. Skibo, M.W. Graves, and M.T. Stark, 93–110. Tucson: The University of Arizona Press.
Stark, M.T., R. Bishop, and E. Miksa. 2001. Ceramic technology and social boundaries: Cultural practices in Kalinga clay selection and use. *Journal of Archaeological Method and Theory* 7: 295–331.
Stark, M.T., D. Evans, C. Rachna, H. Piphal, and A. Carter. 2015. Residential patterning at Angkor Wat. *Antiquity* 89: 1439–1455.

Starosele Middle Paleolithic Site with Hominin Remains

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Introduction

The site of Starosele was discovered in the 1950s with Middle Paleolithic artifacts apparently associated with human child remains, possibly transitional to *Homo sapiens* or modern *Homo sapiens*. The discovery was seen as a kind of Eastern European sensation or mystery, mainly due to the Levantine Skhul/Qafzeh hominin discoveries also in Mousterian archaeological context, found in the 1930s. New excavations in the 1990s at Starosele have helped to clarify many archaeological, anthropological, and chronological aspects of the site's finds.

The site is located within the Kanly-Dere, a side, currently dry box canyon in Eocene limestones running north into the Bakhchisaraiskaya valley at the village of Starosele, now within the northern edge of the town of Bakhchisarai in southwestern Crimea. The site is not a cave as was suggested during its excavations in the 1950s but, as became certain during the 1990s excavations, rather an accumulation of sediments on a rock platform along the base of the eastern side of the canyon, 11–13 m above the canyon bottom.

Key Issues/Current Debates/Future Directions/Examples

Starosele: Discovery and the 1950s Excavations

The Middle Paleolithic flint artifacts were found in 1952 on a rock platform in Kanly-Dere canyon by N.P. Katsur, an associate of the Bakhchisarai Museum. A young archaeologist from Moscow, A.A. Formozov, then conducted excavations there from 1952 to 1956. The excavation data were described in a series of articles and a book (Formozov 1958) and can be summarized as follows (see also Demidenko 1998).

Formozov excavated a total area of c. 250 sq. m (Fig. 1). Only during the last two field seasons, in 1955 and 1956, when c. 140 sq. m. were excavated in the main site area, were both a 1-m^2 grid system and several datum points established. Vertical subdivision of the deposits (with an overall thickness of 2–4 m) albeit with no separation of different lithological horizons was also done in 1955–1956 when artifacts and fauna were collected separately from deposits above and below a level of thick limestone slabs. In addition to abundant flint artifacts (c. 12,000 pieces) and fauna (c. 60,000 items), a human child burial was discovered in 1953; separate bones of an adult woman were identified only after the 1954 excavations during analysis of the fauna. The burial came to be known as the famous "Starosele child," while the other remains with fully *Homo sapiens* morphology were generally ignored.

Formozov himself came to the following conclusions after the first Starosele excavations: despite considerable vertical stratigraphic artifact distribution, the site represented a continuous human occupation during the Last Interglacial, in the 1950s in Soviet archaeology considered to be Late Mousterian; the flint industry was homogeneous throughout the site and was Mousterian "with a bifacial tool tradition"; the Starosele humans were engaged in specialized hunting of

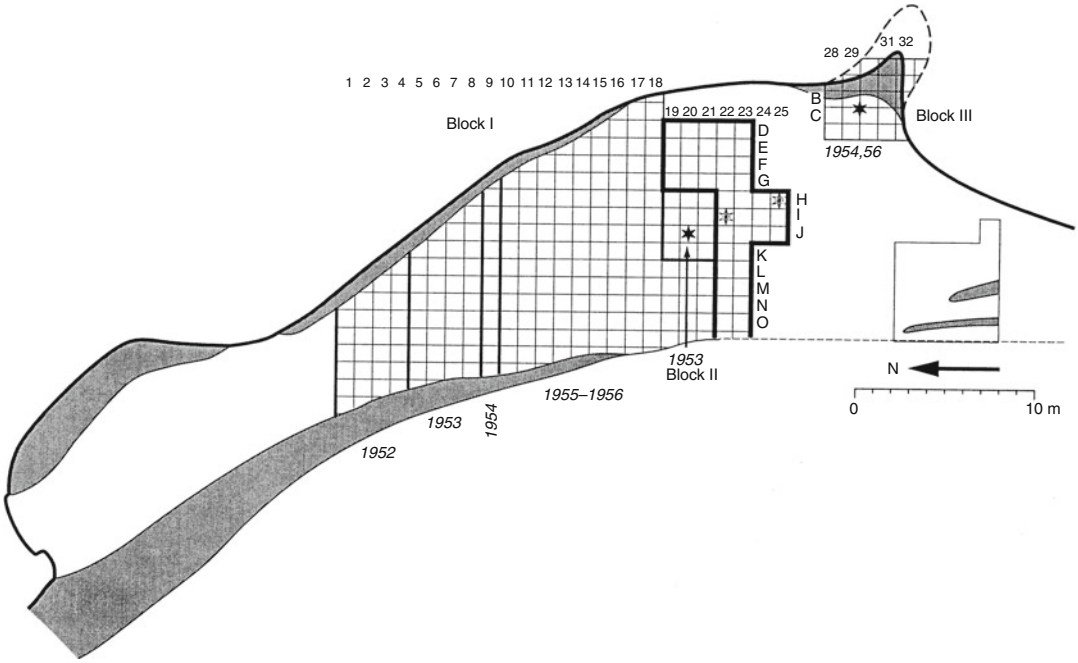

Starosele Middle Paleolithic Site with Hominin Remains, Fig. 1 Starosele site. Plan of the excavations at the site: the 1950s excavations, and the 1990s with heavier line. *Stars* indicate human burials: J-20 – 1953 Starosele child; C-29/30–1954 adult female remains found in fauna materials; I-22 – 1993 infant; H-25 – 1994 adult. (Modified after Marks et al. 1996: Fig. 2)

Equus hydruntinus; the "Starosele child" was contemporaneous with the site's Mousterian occupation; and the child was evolutionarily "transitional" between Neanderthals and modern *Homo sapiens*.

Starosele: Interpretations After the 1950s Excavations

The Starosele geochronology was considered to be mainly Last Glacial due to the presence of mammoth, woolly rhinoceros, reindeer, and arctic fox (Ivanova 1965; Klein 1965).

Archaeologically, V.N. Gladilin (1976, 1985) proposed the most interesting and valuable interpretations for the Starosele lithic assemblages. He considered the industry to be a separate Starosele type within the East European Micoquian. Although he discussed the site's flints as a single unit, he noted some differences for artifacts above and below the limestone slabs. Accordingly, he considered Starosele to contain two Mousterian layers and hoped for future lithic analyses by layers rather than a single assemblage.

Such analyses were done by V.P. Chabai in the late 1980s in Moscow for his doctorate (Chabai 1991). The presence of Levallois radial cores in "layer 2" (below the limestone slabs) and their absence in "layer 1" (above the limestone slabs) was the only significant difference observed between the two assemblages in the Moscow collections after the 1955–1956 excavations. At the same time, the abundance of both unifacial and bifacial convergent points in both assemblages allowed Chabai to exclude Starosele from the

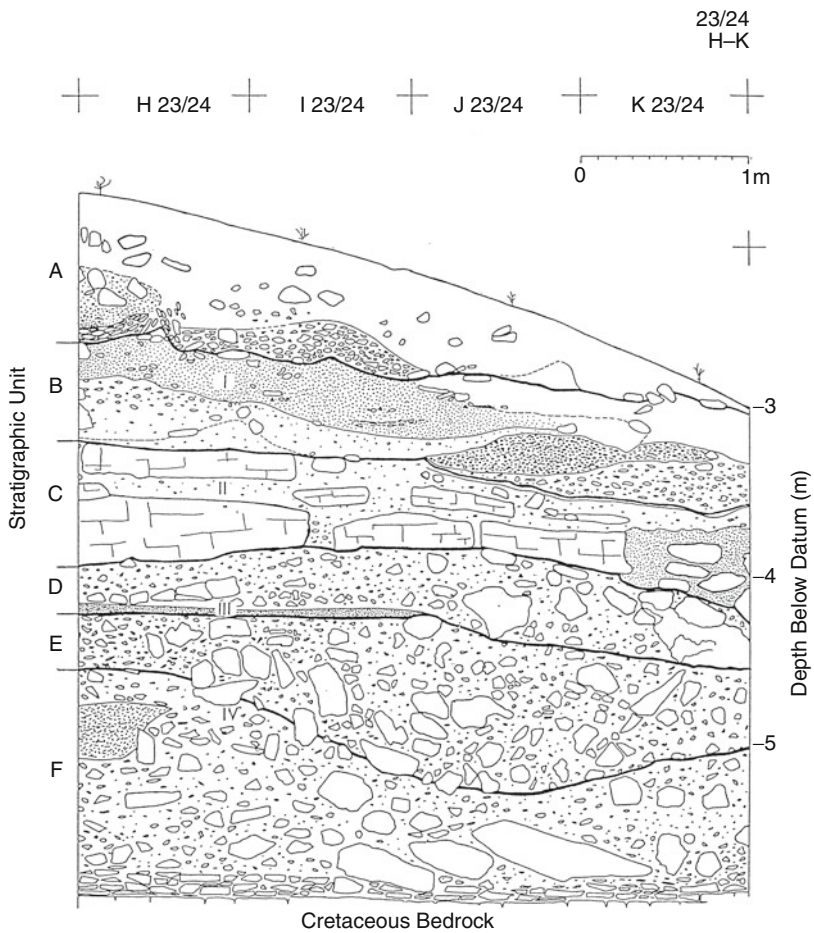

Starosele Middle Paleolithic Site with Hominin Remains, Fig. 2 Starosele site. East/west profile along line 23/24, squares H and K (2 m to the south of Formozov's 1956 profile). *I–IV* – archaeological levels; *A–F* – geological units (After C.R. Ferring) *A* – modern soil; *B* – complex of alluvial and colluvial sediments; *C* – exfoliated limestone slabs with layer of fine sediments in between; *D* – gravels and exfoliated limestone fragments; *E* – boulders in red clayey matrix. (Modified after Marks et al. 1996: Fig. 4)

Eastern Micoquian, defining it instead as a separate Crimean Mousterian industry of Starosele type with bifacial tools.

The Starosele child was also viewed differently by different specialists. Doubts were raised about the strict association of the child with the Mousterian layers (e.g., S.N. Zamyatnin, M. Gabori, R. Klein) as well as interpretation of its anatomic features as being transitional to modern *Homo sapiens* rather than fully modern (e.g., G.F. Debets, A. Thoma, V.P. Alexeev). There was thus no common agreement on either the nature of the archaeological context or the anthropological features of the child. It is also worth noting that the Starosele child was never anthropologically defined as a Neanderthal.

As a result, new excavations at Starosele were needed to clarify its geological and cultural stratigraphy, geochronology, and nature of the lithic assemblages throughout the stratigraphic sequence and potentially shed light on the nature of the human remains.

Starosele: The 1990s Excavations

A joint Ukrainian-American research program directed by A.E. Marks was carried out in 1993–1995 (see also Marks et al. 1996, 1997; Marks and Chabai 1998; Marks and Monigal 1998; Chabai et al. 1999; Chabai 2004). An area of c. 40 m^2 was excavated near the southern edge of the 1956 excavation zone (Fig. 1). The c. 4-m-thick profile analyzed by R. Ferring showed the presence

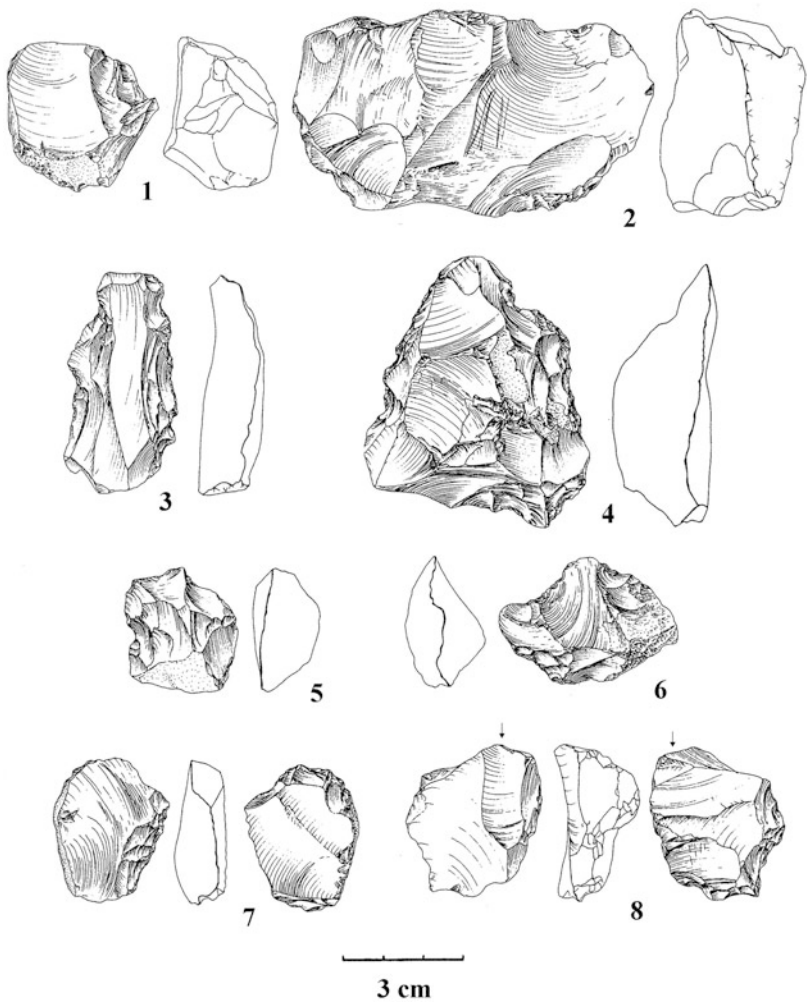

Starosele Middle Paleolithic Site with Hominin Remains, Fig. 3 Starosele, level I – selected flint artifacts. *1–2* – cores; *3–4* – denticulates; *5–6* – notches; *7* – lateral end-scraper + ventral side-scraper; *8* – burin + perforator. (Modified after Marks and Monigal 1998)

of various deposits of different origin (Fig. 2). Four stratigraphically distinct archaeological levels were identified within the sequence. Three of these levels – IV, II, and I (from bottom to top) – are comparable to the 1950s Middle Paleolithic flint industry, containing mainly points among bifacial tools, now attributed as the Starosele industry type of Crimean Micoquian Tradition (Fig. 3). But surprisingly, the level III assemblage lacks any such bifacial tools and at the time had no comparisons within the range of Crimean Middle Paleolithic industrial variability. It was only in the 2000s that the present author (Demidenko 2003–2004) demonstrated that the Starosele level III assemblage (Fig. 4) was quite similar to the assemblage from the lower layer at Kiik-Koba. A systematic dating program was also carried out, as well as analyses of the fauna, microfauna, and malacofauna recovered from the different archaeological levels. The proposed discontinuous geochronological sequence can be presented as follows: Early Last Glacial Interstadials (Amersfoort-Broerup & Odderade) for level IV, Lower Pleniglacial for level III, Moershoofd Interstadial for level II, and Hengelo Interstadial for level I.

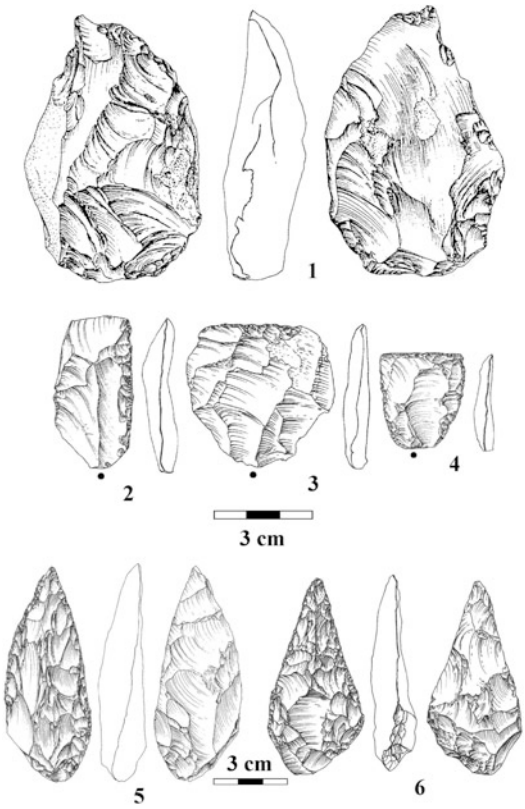

Starosele Middle Paleolithic Site with Hominin Remains, Fig. 4 Starosele, level III – selected flint artifacts. *1* – bifacial perform; *2–4* – various unifacial side-scrapers on bifacial reduction debitage; *5–6* – bifacial leaf points. (Modified after Marks and Monigal 1998)

Finally, new remains of modern humans were discovered during the 1990s excavations. A destroyed infant burial was found in 1993 protruding from Formozov's 1956 line 21 profile. An additional burial of a middle-aged adult was exposed in 1994, some 2 m south of this infant burial (Fig. 5). The infant burial had no clearly visible pit, but the skeleton lay fully within modern sediments, the top of Middle Paleolithic level 1 being some 10 cm below it. The adult burial had a clear burial pit originating in modern sediment and cutting through the Middle Paleolithic level I sediments, ending on the top of the exposed exfoliated limestone slabs. The infant burial included only the legs and feet, while the rest of the remains were most likely destroyed by Formozov's team when they sealed the 1956 southern profile. The infant's legs and feet indicate that the infant was buried in a semi-flexed position on its right side, with its head oriented to the west. The adult burial, with a complete skeleton in extended anatomical position, was oriented east–west with the head to the west and the face to the south. There were no grave goods, but some Middle Paleolithic flint artifacts and fauna were mixed into the pit fill.

There are many similarities between the 1950s Starosele child and the 1990s modern human burials that make their association highly likely (Fig. 5). All three burials are located within a small area in a line of c. 5 m. Both the 1950s child and the 1990s adult burials were in the same stratigraphic positions – below the uppermost Middle Paleolithic level, resting on top of the exfoliated limestone slabs. There were no grave goods, but some Middle Paleolithic artifacts and animal bones were found above them in the sediments. In addition, both skeletons were in the same position, with the same orientation. Such similarities between the 1990s clearly recent

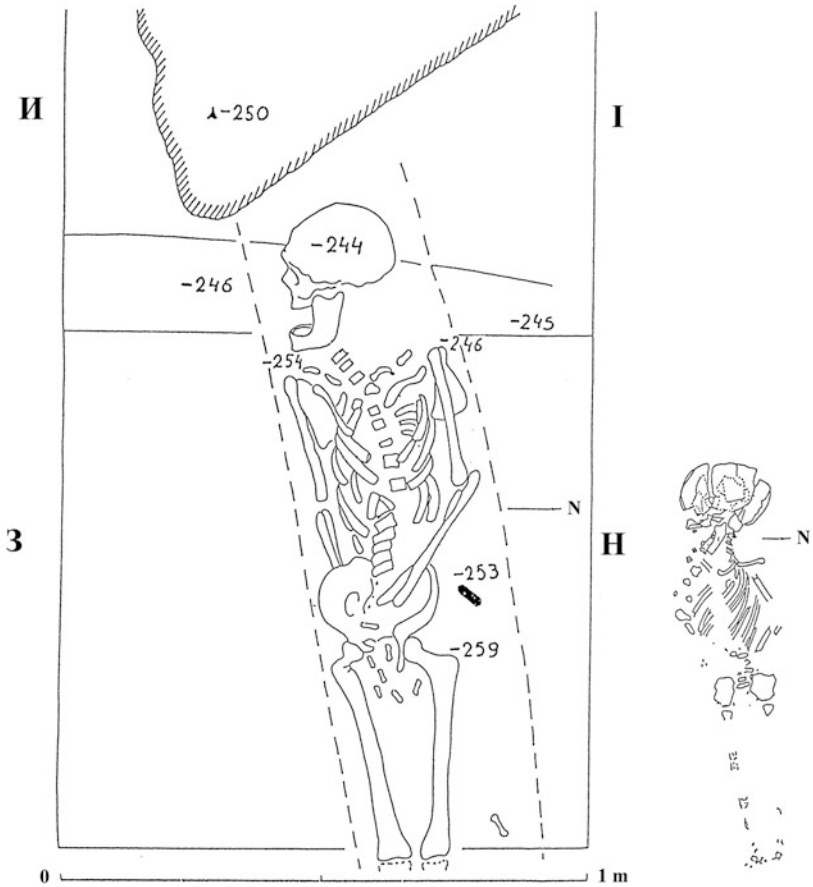

Starosele Middle Paleolithic Site with Hominin Remains, Fig. 5 Starosele. Drawings of the 1994 adult burial and the 1953 child to scale, showing comparable body orientations and positions. (Modified after Marks et al. 1996: Fig. 7)

adult burial and the 1950s child burial considered to be of Middle Paleolithic age and being only 3 m apart seriously question the Middle Paleolithic affinity of the 1950s child. Moreover, it is well known that Kanly-Dere canyon was a traditional burial area during late medieval times and a seventeenth–/eighteenth-century Muslim cemetery existed about 100 m from the Starosele site. The two complete 1950s and 1990s human burials at Starosele reflect traditional Muslim burial practices with an extended position on the back, head to the west and face to the south, toward Mecca. Thus, both direct and indirect data strongly support the argument that all of the Starosele human burials, including the 1950s child, are of quite recent, clearly post-Paleolithic age.

Short Summary

The 1990s excavations at Starosele have led to many clarification of site context. Sediment deposition took place during the Last Glacial period over a long period from c. 100,000 to c. 40,000 BP. Human visits of the site were both frequent and episodic, likely separated one from another by no less than 5–10,000 years. Industrially, the Middle Paleolithic assemblages are grouped into two very different industry types – Micoquian (levels I, II, and IV) and Kiik-Koba, lower layer (level III) ones. Finally, the famous 1950s Starosele child is now accepted to be an intrusive late medieval burial with Muslim burial practices, like the other modern human burials discovered at the site.

Cross-References

- ► Crimean Middle Paleolithic
- ► Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union

References

Chabai, V.P. 1991. The Early Paleolithic of the southwestern Crimea. Unpublished PhD dissertation, Institute of Archeology, Kiev (in Russian).

Chabai, V.P. 2004. *The Middle Paleolithic of Crimea: Stratigraphy, chronology, typological variability & eastern European context*. Simferopol: Shlyakh (in Russian).

Chabai, V.P., A.E. Marks, and K. Monigal. 1999. Middle Paleolithic paleoenvironment and paleoeconomy. In *The Middle Paleolithic of western Crimea*, ERAUL 87, ed. V.P. Chabai and K. Monigal, vol. 2, 211–233. Liege: Université de Liège.

Demidenko, Y.E. 1998. Starosele: The early excavations and unanswered questions. In *The Middle Paleolithic of western Crimea*, ERAUL 84, ed. A.E. Marks and V.P. Chabai, vol. 1, 53–65. Liege: Université de Liège.

Demidenko, Y.E. 2003–2004. Problems of epochal and industrial attribution for Kiik-Koba grotto, lower layer type complexes in the Crimea. *Stratum Plus* 1: 271–300 (in Russian).

Formozov, A.A. 1958. *The cave site Starosele and its place in the Paleolithic*, Materials and Investigations of the Archeology of the USSR 71. Moscow (in Russian).

Gladilin, V.N. 1976. *The problems of the Early Paleolithic of eastern Europe*. Kiev: Naukova Dumka (in Russian).

Gladilin, V.N. 1985. The Early Paleolithic. *Archeology of the Ukrainian SSR* 1: 12–53 (in Russian).

Ivanova, I.K. 1965. *Geological age of fossil man*. Moscow: Nauka (in Russian).

Klein, R. 1965. The Middle Paleolithic of the Crimea. *Arctic Anthropology* 3: 34–68.

Marks, A.E., and V.P. Chabai, eds. 1998. *The Middle Paleolithic of western Crimea*, ERAUL 84. Vol. 1. Liège: Université de Liège.

Marks, A.E., and K. Monigal. 1998. Starosele 1993–1995: The lithic artifacts. In *The Middle Paleolithic of western Crimea*, ERAUL 84, ed. A.E. Marks and V.P. Chabai, vol. 1, 117–165. Liege: Université de Liège.

Marks, A.E., Y.E. Demidenko, V. Usik, K. Monigal, and M. Kay. 1996. The "chaine operatoire" in the Middle Paleolithic of level 1, Starosele, Crimea. *Quaternaria Nova* VI: 57–82.

Marks, A.E., Y.E. Demidenko, K. Monigal, V.I. Usik, C.R. Ferring, A. Burke, J. Rink, and C. McKinney. 1997. Starosele and the Starosele child: New excavations, new results. *Current Anthropology* 38: 112–123.

Marks, A.E., Y.E. Demidenko, K. Monigal, and V.I. Usik. 1998. Starosele: The 1993–95 excavations. In *The Middle Paleolithic of western Crimea*, ERAUL 84, ed. A.E. Marks and V.P. Chabai, vol. 1, 67–99. Liege: Université de Liège.

Statues and Monumental Art in Archaeology

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Introduction

This entry samples a limited range of monumental art from selected archaeological sites in discrete environments within both continental and island settings. All are unique, yet there are discernible threads of common or contrasting human experience and expression. Monumental architecture and sculptural objects, no matter where they occur, are most often the original products of shared social and aesthetic values or religious belief. The upright bluestones of Stonehenge, the repeated notes echoed by the aligned stone statues of Easter Island, and the buried ceramic legions of Xi'an, China, were all inspired by an intensity of human commitment within societies that differed radically in terms of population size, natural resources, food production, and social organization.

Definition

Monumental art is defined here within the context of megalithic structures. It occurs widely, at all levels of social complexity and in differing local environments; as such, a universality of monumental art is claimed. Nonetheless, discrete development sequences vary according to regional phases or patterns (Mohen 1989: 285). Megalithic sites in Western Europe postdate the oldest painted caves of France, most of which were built c. 5,000 to 3,000 years before the Christian era. Megalithic cultures existed in the British Isles, Northern and Central Europe, the Near East, and the Central Mediterranean. Earthworks and burial mounds reaching megalithic standards occur widely at pre-Columbian sites in the Western Hemisphere. Kalasasaya is

an architectural complex near Pucara, Peru, including early zoomorphic stelae and later anthropomorphic sculpture. El Infiernito near the town of Ráquira, Colombia, produced megalithic burial structures. The Fraile stela and other monumental art objects in the Tiwanaku region are world famous. Megalithic sites in such places as Madagascar date to the eighteenth century.

Simply stated, a megalith is a large block of standing or upright stone (from the Greek *mega*, large, and *lithos*, stone). A single, isolated upright stone is a monolith (from the Greek *mono*, one, and *lithos*, stone; Fig. 1). Some upright stones in southern Spain, Portugal, Ireland, Scotland, and certain areas of France, whether isolated or clustered in groups, are embellished by incised or bas-relief symbols (petroglyphs), most of which are curvilinear abstractions. Highly stylized representations of a corpulent female figure or the outlines of tools associated with male tasks or activities are also sometimes depicted. An iconographic continuity in such simplified two-dimensional art over a wide area is evident. Explanations for similarities in basic symbols are often hotly contested; one interpretation draws on neuroscience and attributes such similarities to the ancient spiritual practice of shamanism (Lewis-Williams and Dowson 1988, 1990).

Statues and Monumental Art in Archaeology, Fig. 1 Near Crear, Scotland, 2005, David Scheinbaum, 2012. (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

Megalithic structures are most often a function of burial practices and associated with peoples who were sedentary and practiced agriculture. Population and food production models for Neolithic societies are estimated in relation to the size and extent of associated megalithic remains. It is suggested that populations ranging from 100 to 10,000 persons created megalithic grave sites while living within areas of 3–100 km, respectively (Mohen 1989: 205). The trend over time is from multiple burials to individual graves, suggesting an evolution toward greater social stratification.

Monumental art evolved out of megalithism (Fig. 2). "Monument" and "monumental" are variously defined. Monument is defined here as an object that is of or related to a sepulcher and may include free-standing, three-dimensional figures as well as architectural embellishment. Figures may be either anthropomorphic or zoomorphic, although distinguishing features of both may be combined, and variant stylistic categories are defined for discrete societies or areas of the world (Van Tilburg 1991). Monumental art is characterized as being of good-quality material, immense in bulk or size, durable, and invoking memory. The precise size range varies with individual study areas or regions, and in nearly all cases, relative scale is a far better indicator of monumentality than is total length or height.

The monumental art that is the most lasting and of greatest archaeological interest is most often wrought in stone but also fabricated of less durable clay, wood, fiber, and textiles. It is stone, however, that embodies, as material and medium, the virtues of density and durability that translate into symbolic values of power and longevity

Statues and Monumental Art in Archaeology, Fig. 2 Rano Raraku, Easter Island (Rapa Nui), 2003, David Scheinbaum, 2012. (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

which, in turn, signal tradition and continuity (Van Tilburg 2006). These inherent qualities have made stone the material in which human culture groups of varying complexity have expressed a denial of time and rejection of death, asserted status, preserved memory, and professed belief.

Historical Background

Discerning the interaction of ancient architectural sites within discrete environments reveals an instructive range of practical, political, and aesthetic variables, as well as patterns of human choice and ecological stasis or change. Modern archaeologists are concerned with how natural resources were exploited by builders and pay close attention to how monumental art objects are situated relative to their respective ancient and contemporary landscape features. Most natural scientists today understand that climates are capable of radical change over long periods of time, and archaeologists, in turn, are concerned with how such changes impact the landscape within which megalithic art objects are situated or were once perceived.

For example, it has been shown in American deserts that basaltic and other hard and dense rocks, when their surface "skin" is broken, subsequently interact with the environment to, in effect, gradually "heal." This takes place over generations and is the result of the surface formation of a patina known as desert varnish. Petroglyphs, created by carvers who incised, scratched, or otherwise pecked away stone surfaces with stone tools, are often re-varnished. More recently made petroglyphs are perceptively different in color, hue, and texture than older ones. This suggests that the stone's changing surface characteristics may be indicators of iconographic progression.

Enduring monumental art objects and architecture in many ancient cultures were produced when observation of the natural world was experimentally combined with human talent, experience, or belief. Nature's extravagant displays of shape and form, for example, may suggest to the perceptive artisan inherent and underlying principles of order. The wind-driven sand dunes of California's Death Valley are natural sculpture in motion. Monument Valley in Utah and the Grand Canyon of Arizona, to even the most unromantic eye, appear to be sensitive and captivating natural sculptural installations. The deep, dark caves of Paleolithic France and Spain surely played a role in the aesthetic development and ritual behavior of those who created the paintings on their walls.

In many cultures, the organizing strategy of supernatural belief and social interaction that produced religion was fundamentally related to nature and to the transformative power of nature (Hunt et al. 2010). Many of the world's ancient religions appear to have revered nature. Even today, the Japanese religion Shintō teaches that rocks are endowed with special qualities deserving of respect. Rocks placed sensitively in the

Statues and Monumental Art in Archaeology, Fig. 3 Tofuku-Ji Temple, Kyoto, Japan, 2000, David Scheinbaum, 2012. (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

Statues and Monumental Art in Archaeology, Fig. 4 Kanchipuram, India, 2000, David Scheinbaum, 2012. (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

landscape are basic elements of Zen gardens (Fig. 3), and complex symbolic meanings are associated with their size, shape, color, texture, and position. A standing stone symbolizes the heavenly realm; a horizontally placed rock symbolizes earth, and a rock placed diagonally represents the whole of humanity.

Creation, procreation, fertility, fecundity, and human sexuality are often referenced in stone carvings embellishing mortuary or temple buildings, with monolithic male and female figures staged independently or paired (Figs. 4 and 5). Male and female genitalia are depicted both graphically and symbolically in two-dimensional rock art and three-dimensional sculpture of many cultures. At other times, the genitalia on sculptural objects are conspicuous in their absence. Major landscape features in some Pacific Island cultures were conceptualized as parts of the human body, including especially male genitalia. Entire landscapes are sometimes seen as reclining or standing human figures, usually named for mythic heroes or gods. On the island of Tongareva in the Cook Islands, a sprawling, complicated, and sacred site (*marae*) called Te Papa-o-Sokoau was constructed of stone walls laid out in the form of a headless, sexless human body (Kaeppler et al. 1993; Kaeppler 2008: 151).

The ancient Olmec emphasized the human head in their megalithic stone sculptural objects (Coe and Diehl 1980). They sculpted massive, elaborate portrait sculpture of ruling male personages embellished with the bas-relief signs and symbols of social status and leadership. These

Statues and Monumental Art in Archaeology, Fig. 5 Kanchipuram, India, 2000, David Scheinbaum, 2012. (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

heavy objects, moved over great distances, were carved of specially quarried, dense, and dark basalt.

Social organization and the means of food production are two fundamental variables associated with monumental art. Easter Island (Rapa Nui) was organized as an Eastern Polynesian-type chiefdom, with 10 or 12 individual patrilineal groups (usually described as "clans" or "tribes") descended from the sons of the founding ancestor. Over time, these lineages aligned as two large political entities characterized as confederations (Routledge 1919; Van Tilburg 1994). The ancient carvers created over 1000 monumental sculptures in human form under this system, with about half of them transported to lineage agricultural lands bordered by traditional fishing grounds. There they were erected on stone platforms (*ahu*) and presided over what is inferred to be mortuary rituals. Most researchers agree that the vertical stone statues of Rapa Nui evolved from stone backrests raised on other Polynesian sacred sites.

Micronesia, on the other side of the Pacific, includes the Republic of Belau (Palau), the Yap Islands, Kosrae, and the Mariana Islands, among others. The matrilineal society of Belau raised large stone monoliths, some of which are carved with combined anthropomorphic and zoomorphic features. At Melekeok on the island of Babeldaob, a group of nine ancient and grotesque stone monoliths is known as the "Great Faces" (Van Tilburg 1991). Massive terraced earthworks on the same island were sculpted from natural hill formations.

In the Mariana Islands c. 1000 CE, elaborate wood structures known as *latte* houses were raised on monolithic stone columns and capstones that are, in fact, an abstraction of the upright human form. The largest of these structures, most of which served as community meeting houses, is found on the island of Tinian, northeast of Guam. There, one of 18 aligned *latte* is known as the House of Taga.

The megalithic, elite ceremonial center of Nan Madol is on the island of Pohnpei. The mortuary enclosure of Nandauwas is at the heart of the complex and its greatest megalithic achievement. Built sometime around 1200–1300 CE, Nan Madol is a sprawling marvel constructed of stacked prismatic basalt upon artificially created islets, canals, and inlets (Morgan 1988: 58–85).

In island Southeast Asia megalithic stone and wood statues, stone seats, and ornately embellished sacrificial posts are all known.

The Lapita culture emerged at least 2,000 years before the Christian era, and its proximate center is in the Bismarck Archipelago. Lapita people spoke Austronesian languages, developed maritime traditions, and became the founding culture of parts of Melanesia and Polynesia. On the Southeast Asian island of Nias, off the Sumatra coast, vertical stones, isolated or in groups, were called *behu* (Feldman 1988: 39, 49) and often carved as human figures and associated with chiefly houses and burials.

The ancient Aztec, in contrast to the less stratified societies of the Pacific island groups, created a vast and nearly unmanageable continental empire ruled by fearsome deities conceptualized in dual, quadruple, or quintuple forms (Pohl and Lyons 2010). Ornately carved and painted sculptural objects in clay and stone, as well as complex architectural figures, adorned monuments commissioned by rulers who demanded and extracted extravagant tribute from conquered peoples. Human sacrifice was considered a sacred duty and debt to the gods, and festivals were dedicated to warfare and the promotion of agricultural fertility. Religious ideology was inextricably linked to political supremacy, and monumental art supported rituals of idealistic communication and social domination.

Whether the project is a monumental, communal building task of epic social meaning, or a single statue carved at the behest of a powerful benefactor or commissioning chief, stone carving is a challenging task and valued skill in all cultures. Mastery of tools and technique is required but so, too, is a sensitive discernment of cultural values. Ancient craftspeople were required by the norms of their societies to capture and realize key emotional and spiritual content shared by their entire cultures. Most ancient stone sculpting traditions probably grew out of woodcarving, and large wood pole sculptures are the precursors to stone figures in many megalithic cultures. Quarrying, carving, and sculpting any stone require the reduction of resistant material rather than the building up of form that is the goal when other more pliable mediums such as clay or plaster are used. Stone carving was a profession of high status and power. Carvers formed guilds and secret societies with their own proprietary gods, goddesses, and priests. Members had their own emblems and insignia.

The aesthetic success of a three-dimensional carving requires the participation of the viewer as well as the creator. People brought up in Western cultures generally think they perceive three-dimensional form, but few realize that full perception is also the result of being trained to comprehend the empty spaces of landscape or architecture that give shape to objects. Contemplation of an ancient sculpture as an art object in a museum gallery, where it is far removed from its original context, cannot reveal the object's original charismatic or iconographic role and often leads to stereotypical conclusions of dubious value to understanding the past.

Sculpture that is truly three-dimensional should vary when it is looked at from different angles. Sculptures of the human form that are nearly symmetrical provide only half of the potential opportunity the viewer needs to perceive the relationship between space and form and setting and object. Fully symmetrical human forms, however, are also unnatural, as anyone can see by studying their own face in a mirror. Symmetry analysis in anthropological perspective has relevance in our attempt to understand the patterns of communications established and facilitated by megalithic and other art forms (Washburn and Crowe 1988).

Sculptures that are presented as architectural relief are most successful when at least some of their elements project outward from the wall (Fig. 6). On some sites the architects and sculptors of the past seem to have used the interplay of sun and shadow on walls carved in relief to create substantial visual drama. That achievement was probably an aspect of stating or creating power through the implied status of the building owners or through ideology.

The natural surface irregularities of unpolished stone are often incorporated into or enhanced as features of two-dimensional rock carvings. Nonrepresentational or supernatural figures of many types are common in the rock art and relief sculpture of many cultures. Uneven, coarse surfaces, natural stone texture, color discontinuation, and other stone surface anomalies often become valuable aesthetic or symbolic assets in carvings that blend opposite imagery (e.g., male/female or human/animal characteristics).

When prehistoric architecture passes into ruin yet continues to remain in the natural landscape of sun and shadow, it inevitably becomes aesthetically the same as a three-dimensional sculpture. Well-constructed stone walls are almost always sculptural, whether they are propped and chinked with skill and an eye to aesthetics or

Statues and Monumental Art in Archaeology, Fig. 6 Bayon, Cambodia, 2009, David Scheinbaum, 2012. (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

running in linear patterns across a challenging landscape. The ruins of Hadrian's Wall in northeastern England and the more intact Great Wall of China both elicit in modern viewers similar feelings of technological and aesthetic awe.

Key Issues/Current Debates

The study of megalithic cultures is concerned with reconstructing methods of sociopolitical complexity and mechanical engineering, the creation and implementation of ideological structures, iconographic analysis, the natural settings of sites, human and natural resources, and spatial and landscape analysis. Research questions are often posed within such theoretical constructs as experimental archaeology, cognitive archaeology, landscape and ecological archaeology, and iconography. Within each of these subfields are key issues and current debates.

A certain universality of symbol types common in two-dimensional rock art has been discerned in similar natural environments. The neuropsychology of iconography, as noted above, deals with these similarities and their longevity in human culture in the context of the religious beliefs of shamanism. However, also as noted, this interpretation has been aggressively challenged.

The engineering expertise of megalithic societies is often examined within the research structure known as experimental archaeology. Sculptural replicas have been devised and manipulated to suggest ancient transport methods. In nearly all cases, common sense has prevailed or provided adequate guidance for these experiments, and variables are usually limited to wood, rope, and countless hours of motivated human effort. Such research is most insightful when it seeks to elucidate patterns of social organization, religious belief, resource territory size, and food production methods within well-structured population models (Van Tilburg 1993; Van Tilburg and Arévalo Pakarati 2002; www.pbs.org/wgbh/nova/easter).

All archaeological sites, including megalithic sites especially, must be considered within the physical conditions that prevailed when the site was active (Vita-Finzi 1978). Modern archaeologists often survey large areas and conduct systematic studies of monumental object distribution and spatial patterning (Hodder and

Orton 1976). Debate in recent years has dealt not only with the occurrence of monumental art but also its relationship to natural resource depletion or environmental destruction and social structure collapse. Key issues of global conservation in our modern world have been projected upon the peoples and cultures of the past. The trajectory of stylistic and other changes in monumental art is often related to political complexity but must be anchored by carefully constructed time frames.

International Perspectives

The stone architecture of Cambodia and the toppled statues of Rapa Nui are instantly recognizable as iconic symbols and graphic reminders that however durable stone is as a material, all prehistoric and other ancient stone buildings and sculpture will diminish with time (Fig. 7). Without strenuous and enlightened global preservation efforts, the forces of weather and time will inexorably wear away the surface of megalithic objects, and the sculptural material itself will ultimately be returned to the natural matrix from which it came. Loss of any part of our shared human heritage is indefensible because science and art pose as yet unanswered questions.

Future Directions

Monumental art often encourages cross-cultural comparisons. This is due to broad pattern similarities such as placement relative to mortuary sites. Yet each culture interacted with the immediate natural environment in its own unique way. Each flourished because food production strategies resulted in surpluses allowing redistribution systems that underpinned building projects. Failure to sustain productivity and to integrate it with social growth is a recurring theme, and the theory of social and political systems collapse is based, in part, on the inferred mismanagement

Statues and Monumental Art in Archaeology, Fig. 7 Ta Prohm, Cambodia, 2009, David Scheinbaum, 2012. (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

of human and natural resources. The cultures that produced monumental art include chiefly societies and states. Understanding the motivations of humans living with differing social structures and who created monumental art may provide insight into a more sustainable future for us all.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Andes: Prehistoric Art
- ▶ Europe: Paleolithic Art
- ▶ Form in the Archaeology of Art
- ▶ "Motif" in the Archaeology of Art

References

Coe, M.D., and R.A. Diehl. 1980. *In the land of the Olmec*. Austin: University of Texas Press.

Feldman, J. 1988. The seat of the ancestors in the homeland of the Nias people. In *Islands and ancestors: Indigenous styles of Southeast Asia*, 34–50. New York: The Metropolitan Museum of Art.

Hodder, I., and C. Orton. 1976. *Spatial analysis in archaeology*, New studies in archaeology. Cambridge: Cambridge University Press.

Hunt, L., M. Jacob, and W. Mijnhardt, eds. 2010. *Bernard Picart and the first global vision of religion*. Los Angeles: Getty Research Institute.

Kaeppler, A.L. 2008. *The Pacific arts of Polynesia and Micronesia*. Oxford: The Oxford University Press.

Kaeppler, A.L., C. Kaufmann, and D. Newton. 1993. *Oceanic art*. New York: Harry N. Abrams.

Lewis-Williams, D., and T.A. Dowson. 1988. The signs of all times: Entoptic phenomena in Upper Paleolithic art. *Current Anthropology* 29 (2): 201–245.

Lewis-Williams, D., and T.A. Dowson. 1990. On neuropsychology and shamanism in rock art. In *Current anthropology*, ed. Wenner-Gren Foundation for Anthropological Research, vol. 31(1), 77–84. Chicago: University of Chicago Press.

Mohen, J.-P. 1989. *The world of megaliths*. New York: Facts on File.

Morgan, W.N. 1988. *Prehistoric architecture in Micronesia*. Austin: University of Texas Press.

Pohl, J.M.D., and C.L. Lyons. 2010. *The Aztec pantheon and the art of empire*. Los Angeles: The J. Paul Getty Museum.

Routledge, K.S. 1919. *The mystery of Easter Island*. London: Sifton, Praed and Co.

Van Tilburg, J. 1991. *Anthropomorphic stone monoliths on the islands of Oreor and Babeldaob, Republic of Belau (Palau), Micronesia*, Occasional Paper. Vol. 31, 3–62. Honolulu: Bernice P. Bishop Museum.

Van Tilburg, J. 1993. The use of photogrammetry, laser scan and computer assisted drafting to define relationships between Easter Island statue morphology, transport technology and social organization. In *The evolution and organisation of prehistoric society in Polynesia*, Monograph, ed. M.W. Graves and R.C. Green, vol. 19, 87–102. Auckland: New Zealand Archaeological Association.

Van Tilburg, J. 1994. *Easter Island archaeology ecology and culture*. London: British Museum Press.

Van Tilburg, J. 2006. Rock of ages. In *Stone: A substantial witness*, D. Scheinbaum (photographs), 3–19. Santa Fe: Museum of New Mexico Press.

Van Tilburg, J., and C. Arévalo Pakarati. 2002. Reconstructing the Rapa Nui carver's perspective: Observations on the experimental replication of moai on Easter Island. In *Pacific art: Persistence, change and meaning*, ed. A. Hearle, N. Stanley, K. Stevenson, and R.L. Welsch, 280–290. Crawford House: Adelaide.

Vita-Finzi, C. 1978. *Archaeological sites in their setting*. London: Thames and Hudson.

Washburn, D.K., and D.W. Crowe. 1988. *Symmetries of culture: Theory and practice of plane pattern analysis*. Seattle/London: University of Washington Press.

Stature Estimation

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Introduction

Estimating stature from human remains is important for understanding the human osteoarchaeology of past populations as well as providing information for forensic comparisons with recent missing persons.

Stature consists of a living person's standing height. It is measured from the top of the head (vertex) to the ground surface while the person stands in an upright posture, heels placed together, and head positioned in the Frankfort Horizontal.

In the first subdiscipline, human osteoarchaeologists analyze and interpret samples of human remains, skeletons from archaeological sites. They use stature estimations as an indication of overall size, searching heights for trends,

documenting evolutionary and secular changes, and revealing geographic variation, sexual dimorphism, and health. With those data in hand, osteoarchaeologists employ the relationship between stress and stature to contrast better adapted with more poorly adapted populations, and more affluent times with more stressful periods.

In the secondary subdiscipline, contemporary forensic anthropological applications use stature estimations to assist identification of deceased unknown individuals. Forensic anthropologists estimate stature as part of a biological profile, other biological parameters including sex, age, and ancestry. Combined with other biological characteristics, estimated stature of recovered remains supports inclusion or exclusion of a missing person as a potential match for the unidentified remains.

Adult stature results from the influences of genetics, environment and their interactions that affect linear growth and culminate in height attained during early adulthood. Genetic influences have a considerable impact on stature (see Visscher 2008; Weedon et al. 2008).

In addition to genetic affects, environmental perturbations influence growth and ultimately attained adult stature. Those distresses may stimulate the developmental plasticity associated with stressful and beneficial periods. Stresses may interrupt, retard, and delay growth. If compensatory catchup growth is sufficient to compensate for these delays, growth deviations show little permanent mark, affecting growth only temporarily. On the other hand, long-term, persistent, and major growth insults may have a pronounced sway. When rebound growth is insufficient for complete compensation, the growth insults result in reduced attained adult height. Generally poorer environmental conditions during growth cause slowed, incomplete growth and result in shorter persons.

These principles are employed by many disciplines for various ends. They include economists (e.g., Komlos 1994), medical specialists (e.g., de Onis and Habicht 1996), human rights proponents (e.g., Kent 2009; Toebes 2009), and social political advocates (e.g., Boix and Rosenbluth 2014). Human osteoarchaeologists and forensic anthropologists ally themselves with these other disciplines when including stature estimation in their studies and practices.

State of Knowledge

Although the goals of osteoarchaeologists and forensic anthropologists differ, both fields use two methods to estimate stature. The two fundamental approaches consist of measurements of a whole skeleton or measurements of separate limb bones.

Whole Skeleton Approach

The first approach is the whole skeleton or "anatomical" method (e.g., Fully and Pineau 1960; Raxter et al. 2006). The method requires a complete – or at least a relatively complete – skeleton. All bone lengths and element heights contributing to stature are measured (Fig.1). Required measurements include skull height (basion-bregma), all vertebral body heights, first sacral segment, femur, tibia, and joined calcaneus-talus lengths. The atlas and axis require special attention. The axis (Cervical 2) body and dens epistrophis height are included in the sum, the latter serving as an approximation for the nonexistent atlas (Cervical 1) "body" height. After summing these skeletal measurements, the soft tissue component contributing to living stature is then added to the total. Additional soft tissue is estimated based on the sum of skeletal elements as a set figure based on the summation's interval (Fully and Pineau 1960) or estimated with a regression formula (Raxter et al. 2006).

Advantages of the whole skeleton approach include its accuracy of stature estimation regardless of sex, ancestry, time period, and anomalous numbers of vertebrae (e.g., Raxter and Ruff 2010). On the other hand, disadvantages of the approach involve it requiring a complete or almost complete skeleton, and the patience and time needed to measure and sum all element measurements contributing to height. Considering that missing elements often occur, an innovative step involves using regression to estimate missing

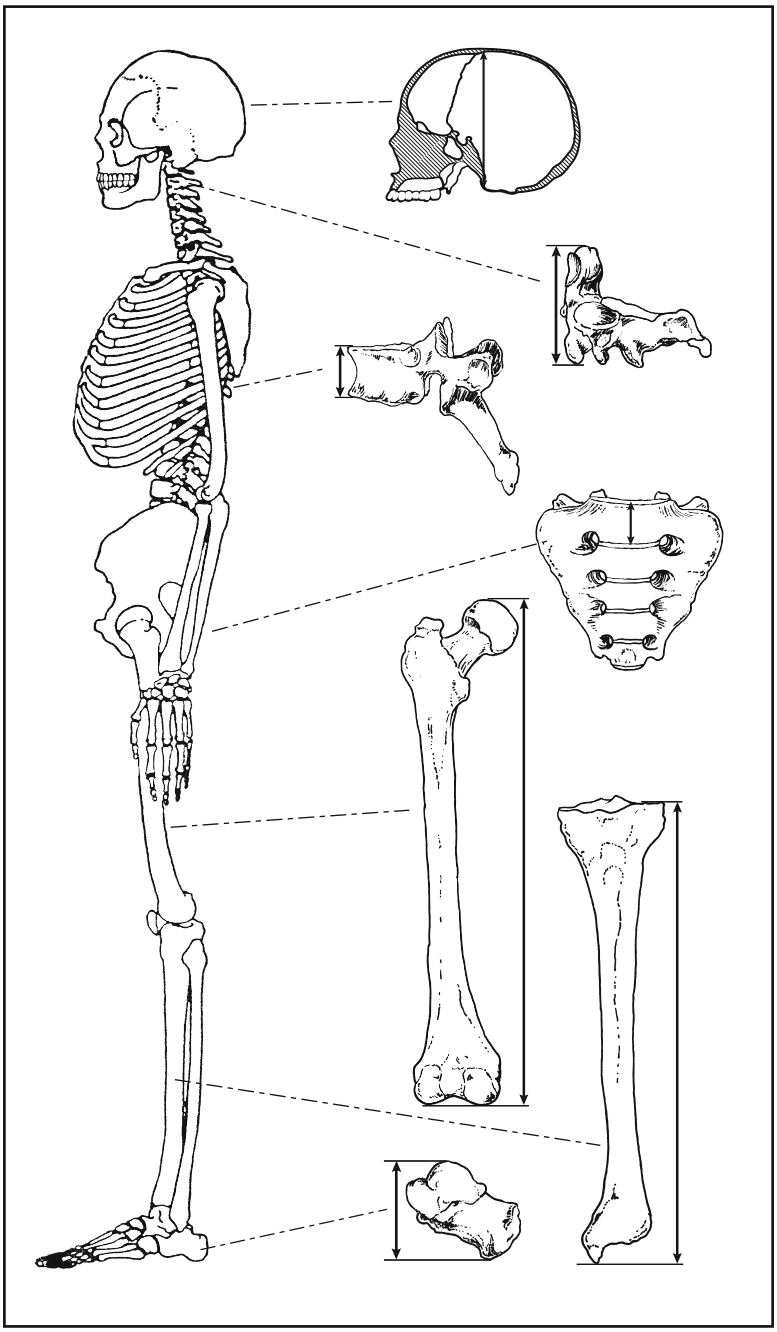

Stature Estimation, Fig. 1 Measurements needed to estimate stature using the whole skeleton approach. (Illustration by Judy Stolen, reproduced from Willey (2009)).

elements' lengths (Auerbach 2011), thus circumventing the first disadvantage.

Regression Approach

The second stature estimation approach is the linear regression or "mathematical" method. One of Karl Pearson's earliest applications of regression statistics involved estimating stature of archaeological remains, an approach that continues in widespread use today. The regression approach is mathematically straightforward and usually involves a complete limb bone's length

or multiple limb bones' lengths (e.g., Trotter 1970).

The analyst measures the limb bone length; chooses the most appropriate regression formula based on the individual's sex, ancestry, and time period; inserts the measurement into the formula; and computes the estimated stature. The standard formula consists of the following.

Estimated stature = a + bx ± SE.

Where **a** represents the line's Y-axis intercept (when x is zero),
b represents the line's slope (amount of increase or decrease in Y with one unit change in x),
x represents the limb bone length or sum of bone lengths, and
SE represents the standard error.

The regression approach provides accurate stature estimations when sex, ancestry, and time period are known, and when an appropriate standard for those parameters/groups exists.

Stature estimations employing this approach are most accurate for the middle of the founding sample's distribution, those individuals approaching the middle height of the base sample. It is also most accurate for those individuals with "normal" body proportions. Stature estimations for shorter and taller individuals and those people displaying unusual body proportions prove less accurate.

The regression formula with the smallest standard error is the most accurate estimation of an individual's stature. It should be employed above all others. Formulae involving the lower limb bone lengths usually have the smallest standard errors.

The regression approach has advantages over the whole skeleton approach if the skeleton is incomplete, and when time for measurements and summation is limited. On the other hand, its disadvantages relate to identifying the skeleton's correct sex, ancestry, and time period, and having an appropriate standard available for those parameters.

In the absence of complete limb bones, alternate approaches to these standards have been developed. Some regression formulae employ fragmentary limb bone dimensions (e.g., Steele 1970). Other formulae use short, nonlimb bone elements dimensions (e.g., Holland 1995; Klein et al. 2015; Torimitsu et al. 2015; Wilbur 1998).

In addition to regression, alternative statistical approaches have been recommended. The simplest stature estimation method employs a ratio. The stature-femur length ratio has been established (i.e., Feldesman and Fountain 1996). The femur length is multiplied by that ratio to estimate stature. Some researchers promote the ratio approach as superior to regression formulae (Feldesman and Fountain 1996). However, other authorities question this approach. The femur/stature ratio overestimates statures, especially those of tall individuals. It has a greater prediction interval, and therefore, is less precise than estimations associated with regression estimations (Meadows and Jantz 1995).

At a more sophisticated statistical level, Sjøvold (1990) proposes a weighted line of organic correlation. It minimizes the influences of sex, ancestry, and presumably secular trend. So when appropriate formulae do not exist or those biological parameters cannot be established reliably, Sjøvold claims his approach proves more accurate.

Konigsberg et al. (1998) recommend inverse calibration. Inverse calibration is more accurate when stature estimation of an individual employs a base sample with similar parameters as the individual whose stature is being estimated. If no comparable parameters can be established or an appropriate formula exists, then they recommend using the standard classical calibration.

Sometimes both whole skeleton and regression approaches are combined to estimate stature. Skeletal or body components are measured and those measurements used in regression formulae to estimate living stature. Most often, this combination of approaches has been employed using the spine to estimate stature (e.g., Jason and Taylor 1995; Terezawa et al. 1990; Zhang et al. 2015).

Key Issues and Future Directions

Archaeological and forensic anthropological applications of stature estimation hold some

limitations/challenges in common. Because goals of the two endeavors differ, however, other issues diverge between the two approaches. Those specific challenges will be considered latter.

Issues Common to Both Forensic Anthropology and Human Osteoarchaeology

A person's living stature varies by time of day (e.g., taller following a night's rest, Tyrrell et al. 1985, Krishan and Vij 2007) and the method of measuring (e.g., taller with neck stretched). Presumably stature measurements also show effects of inter- and intra-observer errors. These challenges, however, pale beside other impacts on stature estimations.

Few stature estimation techniques employ base samples with known, measured statures of living people and those same individuals' bone lengths following death. This dearth may prove profound. Many stature estimation standards rely on adjusting corpse length to approximate living stature. Depending on the congruencies between corpse length and stature during life, this analytical step may adversely alter the accuracy of stature estimations based on these standards.

Another challenge to accurate stature estimation involves the height decrease that older adults experience. As individuals pass through adulthood, their statures diminish from their young adult maximums. Such "shrinkage" is attributed to osseous tissue compression, particularly vertebral body decrease, and loss of soft tissue, especially intervertebral disc compression. If an accurate stature estimation of the person's height at the time of death is required, then age-related decreases must be considered.

The debates related to adult stature decrease include when this onset of decrease begins, and once begun, the rate that it occurs. Both onset and rate are variously reported by different researchers (Fig.2). The claimed age when stature decrease commences differs from 30 to 45 years. After commencement of stature decrease, the claimed rate of decrease varies from a steady 0.6 to 1.6 mm/year, while other studies find the decrease accelerates in an exponential manner. Consensus occurs on one issue, however; researchers find

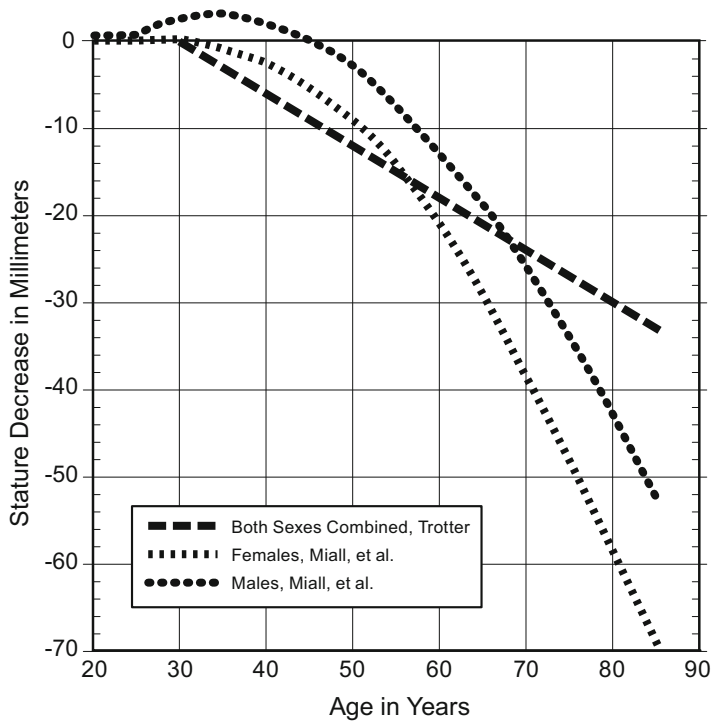

Stature Estimation, Fig. 2 Different claims of age-related decrease in adult stature according to selected authorities. Note differences in commencement and rate of stature decrease. Trotter US cadaver sample (Trotter 1970). Miall et al. Welsh samples (Miall et al. 1968). (Illustration by Judy Stolen)

that older females lose more height annually than their comparably old male counterparts.

For accurate stature estimation of middle-aged and older individuals, the onset and rate of stature decline must be established. Onset and decline of stature probably differ depending on variation associated with the individual, sex, ancestry, and socioeconomic status. Those parameters need to be assessed and documented.

Issues Specific to Forensic Anthropology

Of the several major goals of forensic anthropology, the foremost is to aid identification of unknown human remains. That identification is supported, in part, by similarities between a missing person's antemortem stature and postmortem stature estimation of a skeleton. Challenges to making accurate comparisons of stature between the living and dead include reliability of antemortem stature records, absence of standards for under-studied groups, potential for estimating stature from tissue-covered remains, estimating subadult statures, and the scientific reliability of conclusions.

Antemortem records usually consist of self-reported heights, including dimensions recorded on a person's driver's license (e.g., Willey and Falsetti 1991). Those person's self-reported records often misrepresent actual stature, usually exaggerating an individual's measured stature. An approach to deal with these potential discrepancies between self-reported documents and actual measurements is "Forensic stature" (Ousley 1995; Wilson et al. 2010). Forensic stature estimates the height recorded on self-reported documents rather than actual measured stature.

On the other extreme from the often inaccurate, suspect self-reported statures are measured heights in antemortem criminal, medical, and military personnel records. They may prove more accurate sources of living stature than self-reported heights.

Recent unrest in many lands poses an additional challenge. Forensic emphasis on previously understudied groups requires specialized stature estimation standards to estimate their heights. As international attention turns to areas of recent strife, many groups from Latin America, southeastern Europe, southwest and central Asia, and Africa will require attention.

Estimating stature from soft-tissue-covered bodies and body segments continues to be a research area ripe for investigation. In mass fatalities, soft tissues often cover the skeleton. Lacking time, equipment, or authorization for maceration, stature may not be estimated. Recent studies use body segment dimensions to estimate height (e.g., Adams and Herrmann 2009). Such approaches employ vertebral column segments, fleshed limb lengths, and smaller body segments (e.g., feet, Pablos et al. 2013). Existing anthropometric surveys for many living groups provide the raw data needed for stature estimations based on body segments.

Subadult stature estimation methods need attention too. Infants, children, and adolescents die in forensic situations. As adults, subadults require identification too. Their identification may be aided by accurate, up-to-date living stature measurements made by family members and health practitioners. The whole-skeleton technique may be applicable to estimating stature of subadult remains, but only when the skeleton is complete, includes all epiphyses, and if an accurate soft tissue figure can be established. In most cases, however, practical problems confound this approach, especially from loss of smaller, fragile elements. Employing limb bone diaphyseal lengths in mathematical formulae to estimate stature may prove a more fruitful approach (e.g., Brits and Bidmos 2017; Ruff 2007).

At least as applied in the USA, the reliability of the forensic sciences has been questioned (National Academy of Sciences [NAS] 2009). Among the NAS's recommendations were establishment of best practices, formation of techniques' reliability and limitations, standardization of terms, and documentation of bias and human error. Established a year before the NAS's scathing critique, the Scientific Working Group in Anthropology (SWGANTH) anticipated many of the NAS's criticisms. SWGANTH's documents, including one on stature estimation, addressed many of those issues. With SWGANTH's dissolution in 2013, the National Institute of Standards and Technology, Forensic Standards Board, Organization of

Scientific Area Committees (OSAC), Anthropology Subcommittee took over those responsibilities and is in the process of establishing standards for the discipline, including stature estimation. Until OSAC's recommendations are published, the SWG documents remain in effect. Note, however, that SWGANTH's website has been removed from the web and its documents are no longer readily available.

Issues Specific to Human Osteoarchaeology

In addition to problems common to both subdisciplines and those specific to forensic anthropology, some issues remain particular to human osteoarchaeology. Those challenges include applying regression approaches to prehistoric skeletal series and the use of whole skeleton approach.

Archaeological skeletal samples often differ by time period and ancestry from the regression standards employed to estimate stature. Therefore, archaeological applications using the regression approach usually pose additional challenges beyond those difficulties associated with forensic cases. The whole skeleton approach, on the other hand, should be more accurate than the regression for most archaeological series. It should prove accurate regardless of body proportions that may change from one time period to another (representing secular change) and differing ancestries. Unfortunately, complete skeletons are rare in archaeological series. As a consequence, additional methodological modifications are required for accurate stature estimation.

Some practitioners combine the advantages of both approaches (e.g., Ruff et al. 2012; Pomeroy and Stock 2012). They apply the anatomical method to those few complete archaeological skeletons available to estimate stature using the whole skeleton approach. Then, they calculate regression formulae from whole skeleton statures and limb bone lengths. The derived regression formulae are applied to other, less complete skeletons from the same time period, ancestral group, and geographic region where those standards are established.

Alternately, other applications have used prone skeleton length. That length is measured in the grave to approximate stature. One study, however, shows that prone skeletal lengths measure less than the whole skeleton approach, thus apparently underrepresenting actual statures and presumably those formulae providing less accurate estimations (Petersen 2011).

Because applicability of sex, age, and temporally related body portions from modern standards to prehistoric specimens is poorly known, unique approaches have been suggested to overcome these deficiencies. Avoiding the uncertainty and incompleteness of most archaeological skeletons, limb bone lengths (usually femur or tibia) may serve as a proxy for size and overall height. The bone lengths are presented alone, without estimating stature. The problem with this approach includes possible allometric changes in trunk-limb and/or interlimb bone ratios through time. Such allometric changes may mask sexual dimorphism changes and secular trends.

Summary

Stature estimation of remains contributes to human osteoarchaeology and forensic identification of recent unknown individuals. The two most common approaches to stature estimation consist of using the whole skeleton and regression formulae involving limb bones. Both approaches provide relatively accurate estimations, although secular trends and the effects of age, sex, and ancestry must be considered, particularly when applying regression formulae. For less complete remains, less accurate techniques may prove useful. Those techniques rely on fragmentary limb bones and nonlimb bone elements. The future holds great promise for continued improvements of traditional approaches to stature estimation and wonderful potential for new ones.

Cross-References

► Osteology: Definition
► Skeletal Biology: Definition

References

Adams, B.J., and N.P. Herrmann. 2009. Estimation of living stature from selected anthropometric (soft tissue) measurements: Application for forensic anthropology. *Journal of Forensic Sciences* 54: 753–760.

Auerbach, B.M. 2011. Methods for estimating missing human skeletal element osteometric dimensions employed in the revised fully technique for estimating stature. *American Journal of Physical Anthropology* 145: 67–80.

Boix, C., and F. Rosenbluth. 2014. Bones of contention: The political economy of height inequality. *American Political Science Review* 108: 1–22.

Brits, D.M., and M.A. Bidmos Manger. 2017. Stature estimation from the femur and tibia in black south African sub-adults. *Forensic Science International* 270:277-e1.

de Onis, M., and J.P. Habicht. 1996. Anthropometric reference data for international use: Recommendations from a World Health Organization expert committee. *The American Journal of Clinical Nutrition* 64 (4): 650–658.

Feldesman, M.R., and R.L. Fountain. 1996. "Race" specificity and the femur/stature ratio. *American Journal of Physical Anthropology* 100: 207–224.

Fully, G., and H. Pineau. 1960. Determination de la stature au moyen de squelette. *Annales de Medecine Legale* 40: 145–154.

Holland, T.D. 1995. Estimation of adult stature from the calcaneus and talus. *American Journal of Physical Anthropology* 96: 315–320.

Jason, D.R., and K. Taylor. 1995. Estimation of stature from the length of the cervical, thoracic, and lumbar segments of the spine in American whites and blacks. *Journal of Forensic Sciences* 40 (1): 59–62.

Kent, G. 2009. Food and adequate standard of living. In *Encyclopedia of human rights*, ed. D.P. Forsythe, vol. 2, 225–236. Oxford: Oxford University Press.

Klein, A., K. Nagel, J. Gührs, et al. 2015. On the relationship between stature and anthropometric measurements of lumbar vertebrae. *Science and Justice* 55 (6): 383–387.

Komlos, J., ed. 1994. *The biological standard of living in Europe and America, 1700–1900: Studies in anthropometric history.* Brookfield: Variorum.

Konigsberg, L.W., S.M. Hens, L.M. Jantz, et al. 1998. Stature estimation and calibration: Bayesian and maximum likelihood perspectives in physical anthropology. *Yearbook of Physical Anthropology* 41: 65–92.

Krishan, K., and K. Vij. 2007. Diurnal variation of stature in three adults and one child. *Anthropologist* 9 (2): 113–117.

Meadows, L., and R.L. Jantz. 1995. Allometric secular change in the long bones from the 1800s to the present. *Journal of Forensic Sciences* 40 (5): 762–767.

Miall, W.E., M.T. Ashcroft, H.G. Lovell, et al. 1968. A longitudinal study of the decline of adult height with age in two welsh communities. *Human Biology* 39: 445–454.

National Academy of Science (NAS). 2009. *Strengthening forensic science in the United States: A path forward*. Washington, DC: Department of Justice.

Ousley, S. 1995. Should we estimate biological or forensic stature? *Journal of Forensic Sciences* 40: 768–773.

Pablos, A., A. Gómez-Olivencia, A. García-Pérez, et al. 2013. From toe to head: Use of robust regression methods in stature estimation based on foot remains. *Forensic Science International* 226 (1–3): 299.e1.

Petersen, H.C. 2011. Technical note: A re-evaluation of stature estimation from skeletal length in the grave. *American Journal of Physical Anthropology* 144: 327–330.

Pomeroy, E., and J.T. Stock. 2012. Estimation of stature and body mass from the skeleton among coastal and mid-altitude Andean populations. *American Journal of Physical Anthropology* 147 (2): 264–279.

Raxter, M.H., B.M. Auerbach, and C.B. Ruff. 2006. Revision of the fully technique for estimating stature. *American Journal of Physical Anthropology* 130: 374–384.

Raxter, M.H., and C.B. Ruff. 2010. The effect of vertebral numerical variation on anatomical stature estimates. *Journal of Forensic Sciences* 55 (2): 464–466.

Ruff, C. 2007. Body size prediction from juvenile skeletal remains. *American Journal of Physical Anthropology* 133: 698–716.

Ruff, C.B., B.M. Holt, M. Niskanen, et al. 2012. Stature and body mass estimation from skeletal remains in the European Holocene. *American Journal of Physical Anthropology* 148 (4): 601–617.

Sjøvold, T. 1990. Estimation of stature from long bones utilizing the line of organic correlation. *Human Evolution* 5 (5): 431–447.

Steele, D.G. 1970. Estimation of stature from fragments of long limb bones. In *Personal identification in mass disasters*, ed. T.D. Stewart, 85–97. Washington, DC: Smithsonian Institution Press.

Terezawa, K., H. Akabane, H. Gotouda, et al. 1990. Estimating stature from the length of the lumbar part of the spine in Japanese. *Medicine, Science, and the Law* 30: 354–357.

Toebes, B. 2009. Right to health and health care. In *Encyclopedia of human rights*, ed. D.P. Forsythe, vol. 2, 365–376. Oxford: Oxford University Press.

Torimitsu, S., Y. Makino, H. Saitoh, A. Sakuma, et al. 2015. Stature estimation in Japanese cadavers based on pelvic measurements in three-dimensional multidetector computed tomographic images. *International Journal of Legal Medicine* 129 (3): 633–639.

Trotter, M. 1970. Estimation of stature from intact long limb bones. In *Personal identification in mass disasters*, ed. T.D. Stewart, 71–84. Washington, DC: Smithsonian Institution Press.

Tyrrell, A.R., T. Reilly, and J.D.G. Troup. 1985. Circadian variation in stature and the effects of spinal loading. *Spine* 10 (2): 161–164.
Visscher, P.M. 2008. Sizing up human height variation. *Nature Genetics* 40 (5): 489–490.
Weedon, M.N., H. Lango, C.M. Lindgren, et al. 2008. Genome-wide association analysis identifies 20 loci that influence adult height. *Nature Genetics* 40 (5): 575–583.
Wilbur, A.K. 1998. The utility of hand and foot bones for the determination of sex and the estimation of stature in a prehistoric population from west-Central Illinois. *International Journal of Osteoarchaeology* 8 (3): 180–191.
Willey, P. 2009. Stature estimation. In *World archaeological congress handbook of forensic anthropology and archaeology*, ed. S. Blau and D.H. Ubelaker, 236–245. Walnut Creek: Left Coast Press.
Willey, P., and T. Falsetti. 1991. Inaccuracy of height information on driver's licenses. *Journal of Forensic Sciences* 36 (3): 813–819.
Wilson, R.J., N.P. Herrmann, and L.M. Jantz. 2010. Evaluation of stature estimation from the database for forensic anthropology. *Journal of Forensic Sciences* 55 (3): 684–689.
Zhang, K., Y.F. Chang, F. Fan, et al. 2015. Estimation of stature from radiologic anthropometry of the lumbar vertebral dimensions in Chinese. *Legal Medicine* 17 (6): 483–488.

Further Reading

Albanese, J., S.E. Osley, and A. Tuck. 2016. Do group-specific equations provide the best estimates of stature? *Forensic Science International* 261: 154–158.
Cardoso, H.F. 2009. A test of three methods for estimating stature from immature skeletal remains using long bone lengths. *Journal of Forensic Sciences* 54 (1): 13–19.
Cardoso, H.F.V., L. Marinho, and J. Albanese. 2016. The relationship between cadaver, living and forensic stature: A review of current knowledge and a test using a sample of adult Portuguese males. *Forensic Science International* 258: 55–63.
Maijanen, H. 2009. Testing anatomical methods for stature estimation on individuals from the W. M. Bass donated skeletal collection. *Journal of Forensic Sciences* 54 (4): 746–752.
Ousley, S.D. 2012. Estimating stature. In *A companion to forensic anthropology*, ed. D.C. Dirkmat, 330–339. Malden: Willey-Blackwell.
Vercellotti, G., B.A. Piperata, A.M. Agnew, et al. 2014. Exploring the multidimensionality of stature variation in the past through comparisons of archaeological and living populations. *American Journal of Physical Anthropology* 155 (2): 229–242.

Steffy, J. Richard

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Basic Biographical Information

J. Richard Steffy was born on May 1, 1924, in Lancaster, Pennsylvania, and grew up in the nearby town of Denver. From 1942, Dick, as he was known, served in the US Navy, mostly on a destroyer escort in the North Atlantic; he was discharged in December 1945 with the rank of electrician's mate, first class. After earning an associate's degree from the Milwaukee School of Engineering, he joined his brother in his father's local business, which initially did residential electrical work but expanded under Dick to design, install, and maintain electrical systems for factories. He married Lucille Koch in 1951.

From childhood Dick had enormous curiosity about ships. Uninterested in making models for display, his passion was to learn how ships worked, building and destroying research models in order to understand them. Thus, when he read a 1963 *National Geographic* article about a seventh-century Byzantine shipwreck excavated off Turkey, he wrote to George Bass, author of the article, and asked if he might built a research model of the vessel on the basis of its scanty seabed remains. Bass introduced him to Frederick van Doorninck, who was reconstructing the ship's hull on paper for his doctoral dissertation, thereby establishing a collaboration of more than four decades between the three. Steffy was soon lecturing annually to a graduate course on ancient seafaring established by Bass at the University of Pennsylvania.

A visit to Cyprus in 1971, at the invitation of Michael Katzev to study the hull of a fourth-century B.C. Greek ship Katzev had excavated

off Kyrenia, led Steffy to abandon his secure job, at age 47 with a wife and two young sons, to make a career as an "ancient ship reconstructor." Partly supported by a UNESCO grant, he spent the next 2 years reassembling the Kyrenia ship's hull from 10,000 fragments of polyethylene-glycol-treated wood, the first such restoration of a Mediterranean shipwreck.

Major Accomplishments

In 1973 he joined the Institute of Nautical Archaeology (INA) Bass and Katzev had created. When INA affiliated with Texas A&M University in 1976, Steffy, Bass, and van Doorninck established a graduate program in nautical archaeology. In addition to teaching a generation of "ship reconstructors," Steffy was soon the "ship expert" on the excavation of the American Revolutionary War *Defence* in Maine, and a colonial vessel raised from South Carolina's Black River. Research as a visiting professor at the University of Haifa in 1981 led to his book, with Lionel Casson, on the Athlit ram. In 1986 he returned to Israel to interpret a first-century BCE boat salvaged from the Sea of Galilee by Shelley Wachsmann. Later he was a consultant for the construction in Greece of a full-scale sailing replica of the Kyrenia ship.

In 1985 Steffy received a prestigious McArthur Award. His 1994 *Wooden Ship Building and the Interpretation of Shipwrecks* is considered the bible of the field he established. Later he coauthored the first volume on the eleventh-century Serçe Limanı wreck. An acclaimed public speaker, he retired from teaching in 1990. He died on November 29, 2007.

Cross-References

- ▶ Bass, George Fletcher
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Hellenistic and Roman Egypt, Archaeology of

Further Reading

Bass, G.F., S.D. Matthews, J.R. Steffy, and F.H. van Doorninck Jr. 2004. *Serçe Limanı, an eleventh-century shipwreck, Volume I: The ship and its anchorage, crew, and passengers*. College Station: Texas A&M University Press.

Casson, L., and J.R. Steffy. 1991. *The Athlit Ram*. College Station: Texas A&M University Press.

Steffy, J.R. 1994. *Wooden ship building and the interpretation of shipwrecks*. College Station: Texas A&M University Press.

Steffy, L. 2012. *The man who thought like a ship*. College Station: Texas A&M University Press.

Stein, Marc Aurel

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Basic Biographical Information

Born in Budapest, Stein's family life and early education at the Lutheran school in Dresden nurtured his linguistic skills, useful for Central Asia with its polyglot Silk Road past. These were further developed by his university education in Vienna, where he studied Sanskrit and comparative philology, and Tubingen, for a Ph.D. on Old Persian and Indology. After receiving his Ph.D. in 1883, he studied Punjabi in London. He returned to Hungary for military service, equipping him with surveying skills that were to prove essential for desert explorations. Following his return to London in 1887, he secured a post in Lahore. He was to remain in British India for all of his life (Walker 1995; Mirsky 1998).

Major Accomplishments

Aurel Stein was the consummate desert archaeologist, but not of those "tame deserts" of Arabia, America, or South Africa "which might impress the town dweller . . . and in which whole tribes can wander about for long periods sure of finding water and grazing." He fell in love rather with the Taklamakan and Lop Deserts, where "the

absence of moisture bans not only human existence but practically all animal and plant life" (Stein 1933: 4–5). His love for these deserts' solitude and harshness was rivaled by that of his passion for interpreting the interaction between history and geography as revealed by archaeology. At their glacier-fed fringes, the Taklamakan and Lop both provided rich evidence of human existence conquering the extreme environments from the second millennium BCE through to the end of the first millennium CE. This was the arena in which Stein spent 30 years of his life exploring and excavating (Whitfield 2004).

He read voraciously from childhood, both of the travels of early travelers, such as Alexander the Great and the seventh-century Chinese monk, Xuanzang, who crossed the Taklamakan on his way to India, and of the excavations of contemporary archaeologists. Among the latter was Flinders Petrie (1853–1942), and Stein noted well the developing archaeological methodology including stratigraphy, seriation, and, most especially, attention to the smallest details. Stein quoted him in the introduction to his first major expedition, "To leave a site merely plundered, without any attempt to work out its history, to see the meaning of the remains found, or to publish what may serve future students of the place or the subject, is to throw away the opportunities" (Stein 1907: ix).

Stein wanted to be a pioneer and set his sights on an expedition to the southern oases of the Taklamakan desert in Western China: it "is not a part of the earth as easily accessible as Greece or Egypt or India" (Stein 1907: x). Among Europeans, only Sven Hedin preceded him to the region, but he had not carried out systematic archaeology.

Steins's First Central Asian Expedition (1900–1901) was meticulously planned and yielded rich finds and documentation about the first millennium Silk Road kingdoms of Khotan and Kroraina (Stein 1907). A second (1906–1908) and third (1913–1916) followed and were equally successful before political changes in China curtailed the fourth (1930–1931) (Stein 1921, 1928). On these he traveled further east into the Gobi and to the sites of Kharakhoto and Dunhuang, where he acquired his most famous manuscript finds (though not through archaeology) (Figs. 1, 2 and 3).

In the desert, the constantly shifting sands ensured there was little chance for stratigraphy. But Stein was meticulous in his record-keeping, taking notes, plans, surveys, and photographs. Of the Central Asian collections from this period – for Stein was soon followed by others – only Stein's all have a detailed provenance. This feat is the more remarkable, given the difficult conditions, and was achieved by prodigious energy and

Stein, Marc Aurel, Fig. 1 Stein on his third Central Asian expedition in the Taklamakan surveying using a plane table with his dog, Dash. (The British Library, Photo 392/28(739))

Stein, Marc Aurel, Fig. 2 House at Niya, a Silk Road kingdom in the Taklamakan, during excavation by Stein on his second expedition. (The British Library, Photo 392/26(191))

Stein, Marc Aurel, Fig. 3 The site of Niya today showing the remains of a Buddhist stupa nearby which Stein made his camp on his first visit. (Photographer: John Falconer. The British Library, Photo 1235/1(186))

commitment. His recurring malarial fever and constant dyspepsia did not stop him from working from before dawn to late into the night.

He planned his excavations for the autumn through to the spring: It was not possible to carry enough water for work in the searing summer heat. The winters were equally extreme but he used this to his advantage, taking blocks of ice for water supplies: The settlements he excavated also showed evidence of icehouses. Constantly shifting sands required large teams of local diggers. It is testament to Stein's foresight, preparation, and calm leadership that he managed these expeditions with no loss of human life and minimal loss of animals.

In order to reach the Taklamakan, Stein had to cross over the formidable passes of the Hindu Kush, Karakorum, and Pamir. He planned a different route on each of his expeditions and took advantage to carry out surveys of ancient ruins en route.

But none of these mountains were as challenging as the Kunlun, whose northern slopes provided almost no pasture. It was on a survey here that he had a rare moment when his caution was overruled by enthusiasm, leading to frostbite. He went on forced marches strapped to the back of a yak back across the mountains to Leh, where several toes were amputated (Stein 1921: 1326–7).

His finds in the Taklamakan uncovered unknown languages and cultures and put the eastern Silk Road kingdoms on the map of world history. But Stein did not stop archaeology after 1930. He led four tours of Iran and Iraq (Stein 1940), exploited new technologies in his aerial surveys of the limes of Jordan (Gregory and Kennedy 1985), and in his 81st year finally realized his lifelong dream of archaeology in Afghanistan. Unfortunately, he caught a chill and died within a week of arriving in Kabul: His grave is in the British Cemetery. His Iranian colleague on his fourth Iran tour noted: "Before finishing this report I must inform you of the following: one cannot call this tour a promenade. It should be called a journey of difficulty, of pain, of bitterness, of danger and illness." Stein, on the contrary, wrote that "compared with the Taklamakan and the Kun-lun travel both in these valleys and across the mountains seems very 'tame' work" (Whitfield 2004: 106).

Cross-References

► Aerial Archaeology

References

Mirsky, J. 1998. *Sir Aurel Stein: Archaeological explorer*. Chicago: Chicago University Press.
Shelagh, G., and D. Kennedy, eds. 1985. *Sir Aurel Stein's Limes reports: The full text of M. A. Stein's unpublished Limes reports (his aerial and ground reconnaissances in Iraq and Transjordan in 1938–9)*. Oxford: British Archaeological Reports.
Stein, M. A. 1907. *Ancient Khotan*. Oxford: Clarendon Press. Available at: http://idp.bl.uk/
Stein, M.A. 1921. *Serindia*. Oxford: Clarendon Press.
Stein, M.A. 1928. *Innermost Asia: Detailed report of explorations in central Asia, Kansu, and eastern Iran*. Oxford: Clarendon Press.
Stein, M.A. 1933. *On central Asian tracks*. London: Macmillan & Co.
Stein, M.A. 1940. *Old routes of western Iran*. London: MacMillan and Co.
Walker, A. 1995. *Aurel Stein: Pioneer of the Silk Road*. London: John Murray.
Whitfield, S. 2004. *Aurel Stein on the Silk Road*. London: The British Museum.

Stewardship, Concept of

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Introduction

Stewardship is today a concept that concerns the ownership, property, control, and promotion of a broad set of material and intangible goods, which include cultural heritage resources.

Definition

A Classic Definition

The role of steward, as in "steward of the castle" or "steward of the palace," is as ancient as the need to have supervision and organization of household or estate affairs. This administrative role probably occurs very early in prehistory as societies create hierarchical and complex administrations. Many references exist in historical documents to their economic and political role in Egypt of the Pharaohs both in the palace and the temples, in the urban settings of early Mesopotamia and its temples, and, more recently, in England in medieval monarchic times. The function of the steward is often exalted in Shakespeare plays: its importance in the management of the riches, gifts, tribute, and taxes making their way to the treasury of the sovereign or, often, in palatial intrigues.

A Current Definition

An intrinsic historical feature to the role of steward is that it manages property and wealth that belong to their masters and rulers. In this sense, the role of steward has changed entirely in the last two centuries. The tendency in contemporary times is that stewards own the heritage, goods, or valuables that they admire. A vital part of the current stewardship scenario is to have a close control over those goods. While the argument is

often that they hold the goods in custody for the public good, the fact is that those goods are held under a private property system and are obtained by the acquisition of goods in the free market or, more specifically, cultural heritage markets in auction houses or privately where objects are obtained from looting, commissions, theft, and legal exports (Kimmelman et al. 2006; Renfrew 2009).

Historical Background

The shift in the role of the steward, and therefore the concept of stewardship, is related to change in the economic structure of Western societies. The role of steward has continued to be a prestigious one, albeit its role has moved away from the governmental or the real estate spheres in which it originated (Cline 2003). The role of the "steward" in the period of rising capitalism of the nineteenth century, in contrast to its traditional role in a land-based economy controlling tenants, moved to spheres of urban settings with the predominance of new wealth based on industrial and trading economies with profits invested in cultural endeavors.

The founding of state museums open to the public in Europe in the nineteenth century, and art museums in the United States at the turn of the twentieth century, reveal the intentions of the new stewards: to show their private rooms with their private possessions and to display their antiquities and art in public spaces (and more rarely in their own homes). The crucial difference between Europe and the United States, along general lines of state versus private property, is that the latter reflects the will of their private holdings to be shown, not unlike the humanists of the fifteenth century in Europe and Italy in particular.

The new museums that opened in the United States in brand new buildings designed in neoclassical style had as their core attraction private collections displayed in custody and often bequeathed to them by the new "stewards" (e.g., the Mellon family as the core of the National Gallery in Washington D.C.). These museums would start building their own collections by various means: financing "research parties" to obtain the goods, buying collections or single artifacts at home and abroad, and continuing to promote to the collectors their image as a worthy depository for private collections to be displayed for the public good. The exact provenience of the objects is often not an issue: it is their artistic worthiness that is central.

UNESCO Über-Steward of World Heritage

The role of UNESCO in setting the bar for the protection of cultural heritage is crucial. UNESCO became the rightful global steward by setting rules at a time when rules of the game of heritage possession were sketchy, lax, and circumstantial. The UNESCO conventions served as the turning point in the legal backup for combating traffic and heritage smuggling. However, the enforcement power of UNESCO or its training and execution capacity is very limited. Physical management of heritage corresponds to others: national, private, academic, or nongovernmental entities.

In the transition from museum-oriented towards a community-oriented trend in stewardship, some important (but non-binding) UNESCO conventions in the late twentieth century changed the way cultural heritage is protected: The Hague in 1954 for cultural heritage in wartime, after World War II, and, in 1970, the convention on preventing the illicit traffic of cultural property. This latter convention would be crucial in the courts in determining which objects enriching the museums are legal or not. In the process, despite the conventions, cultural heritage becomes an ideal target in wartime for the psychological defeat of the enemy (Gerstenblith 2006; Marlowe 2011).

Later on, the UNESCO conventions of 1972 on *World Heritage*, both cultural and natural, and in 2003 on *Intangible Heritage* drastically improved the breath of the concept of cultural heritage (Francioni 2011). In addition, the 2001 Convention on the *Protection of the Underwater Cultural Heritage* was aimed at tackling the most important source of looting and generation of traffic of cultural heritage: the sunken ships along Mediterranean shores.

The process of acquisition of heritage will not stop with the laws promulgated by UNESCO. It is simply the means of the transactions that change, by increasing smuggling and illegal ways to ensure the continuing buildup of museum collections. The recent controversy between Italy and US museums is an example of the diversification of the ways to not stop such collecting drives.

Key Issues/Current Debates

Stewardship, Ownership, and Philanthropy

Since the creation of UNESCO and the concern over heritage, a strong debate has confronted museum managers and academics over the future directions of property of heritage (Merryman 1986). Under the premise that looting continues and museums are constantly adding to their collections, this debate evaluates the damage caused by this continuing will to keep the pace in artifact acquisition. This trend does not necessarily refer to less controversial acquisitions from in-country collections (which often are not exempt of controversy) but from different, often shady, proveniences, especially from overseas locations. A most memorable and enlightening debate in this regard is between the archaeologist Colin Renfrew (Brodie and Renfrew 2005; Renfrew 2010) and art historian John Boardman (Boardman 2006). These two experts do not agree on how tight the control on the trade of antiquities should be (high, according to Renfrew) nor on the primary role of museums should have for the protection of heritage (a leading role, according to Boardman).

The public exposed to this debate see as many benefits in the role of the museums and their *modus operandi* as they see in the strong will for a moratorium and zero tolerance to museum acquisitions, let alone looting and smuggling (see Bauer 2008). The fact that the latter two events continue to co-occur and are very hard to fight enhances the scenario of museums as ideal repositories of what is found in those same lootings – as they are "stewards" with the financial and physical means to secure the future of those artifacts. However, it is not that museums have a first option over the acquisition of heritage. Rather, there is a strong competition with market-driven forces between world museums and private collectors. The free-market rules of this trade are increasingly negative for cultural heritage as there is a sizeable financial gain to be obtained from the traffic in cultural heritage. The argument of museums as "stewards" and their commitment to the public are only good as long they are able to secure possession of the cultural heritage they deem important to their collections.

Therefore, museums and states that wish to be stewards of cultural heritage will do so by different means. This scenario depends, of course, on the legal system: some countries consider that heritage found on private property belongs to the owner, whereas another set of countries believes that all heritage resources found above and below ground belong to the state. On the one hand, private stewards curate existing heritage but are geared towards acquiring new holdings. On the other, states, often cash-strapped, are geared towards preventing and stopping traffic of cultural heritage, using the arguments of the 1970 UNESCO Convention and helped by bilateral agreements to reduce the smuggling of heritage. A considerable number of heritage resources have been returned to Peru, for example, thanks to its time-limited agreements with the United States.

Stewardship in the Realm of Cultural Heritage

Stewardship in the realm of cultural heritage is not as recognized today as is the role of state institutions, private foundations, or individuals in dealing with health, animal, or environmental issues as key factors in the current wave of sustainable projects in the social realm.

The essence of the concept of stewardship of antiquities (today regarded as heritage) has been at the core of the philosophy of museums and collectors since the nineteenth century. It is apparent that museums are not pursuing this image anymore. In the news, museums involved with legal issues of heritage ownership seem reluctant to increase their presence in the media. Again, in contrast with other institutions, while zoos have become centers for biodiversity, few museums have become centers for cultural dialogue (e.g.,

the Quai Branly museum in Paris advertises itself as a place "for dialogue between cultures"). This seems the case in ethnographic museums but not in art museums.

In the realm of cultural heritage, the concept of stewardship translates to different scenarios through time. First of all, it changes in the way the "object" of collection is referred to. This parallels the evolution of the clout, stance, and power of the traditional "steward," owner and caretaker of his/her prized possessions, and their dwindling power replaced by other rightful new actors. The "object" of collection then changes from "antiquities" in the nineteenth century, to "material culture" in the twentieth century, and ultimately to "cultural heritage" in the twenty-first century. These three historical assertions relate to how the artifacts and monuments are considered through time. Sites and burials are depleted of their artifacts to be housed in museums in the nineteenth century, while artifacts and skeletal remains are returned to native groups to be stewarded by their ancestors in the twenty-first century. There is a transition from a museum-oriented towards a community-oriented trend in stewardship, passing by a middle stage of broad academic studies of heritage in the twentieth century.

Stewardship in the Twenty-First Century

The role of a stewardship in the twenty-first century (fueled by a new philanthropic drive: the financial basis to stewardship strategies; see Henaff 2003) is as much a role of prime importance in the social sphere as it is a figure of an actor in strategic decisions regarding heritage or, more often, the environment or health issues. Stewardship has indeed diversified, and the fields of action range now from the closed encapsulated spaces of a museum to the open and dynamic areas of archaeological sites.

An intrinsic feature of the current concept of stewardship is that care of material or immaterial good is made despite not holding property rights of those goods. It is the moral concept of considering those goods valuable to society that leads to the investment and patronage in their preservation, integrity, and sustainability.

This is, therefore, a difficult subject because museums are stewards of their own holdings, obtained in property through the years by different means, including acquisitions from proveniences and means that may not have been well thought-out.

Due to this pattern of acquisitions, museums as stewards of cultural heritage have had important confrontations with national governments in the last decade. No museum or country is exempt of "reclamation" issues and often there are contradictions in the debate. For instance, while Turkey has claims over the Pergamon temple housed in Berlin, the Istanbul museum houses the Alexander sarcophagus from Lebanon. This is due to the geopolitics of the time when the Ottoman Empire had control over Lebanon (Waxman 2006). However, neither England nor Germany or the United States had such control over a region rich in cultural heritage (at least those that interested Western museums) as to warrant a "historical" explanation to the presence of those artifacts in their museums.

Issues with Stewardship in the Twenty-First Century

Two issues are especially important for stewardship as the safeguarding of cultural heritage and for the public dissemination of the importance of stewardship in today's society. These two issues concern, first, the strategies that museums will put in place as they ideally reduce their acquisition of cultural heritage that may be tainted by a shady looting provenience and, second, how stewardship is presented to the wider public by the new stewards, namely, communities of local populations interested in preserving and promoting their heritage.

Academic research is crucial in enhancing the public reach of heritage studies. While stewards aim to control (but do seldom manage) cultural heritage, it is the academic study of that cultural heritage from an art history to an anthropological perspective that are a value-added wealth to the monument, artifacts, or site in consideration. In academic studies, researchers do not own the object of study but do build its knowledge database that may or may not be used in strategies of

dissemination. It is not always clear to stewards that a good story to enhance the richness of heritage can come from academic sources. Quite often, the script comes from nationalistic or political sources (Cuno 2008). Academics therefore are not very proficient actors in the public process of creating a solid stewardship of cultural heritage.

On the contrary, it is rather the agenda of stewards that influences the acquisitions, research, and display that a museum might present to the public. What right do stewards have to direct the public display of cultural heritage, art in their eyes, and determine the outcome of that display? Might stewards overlook the wealth of information produced by academics? It would seem apparent that stewards have other values with which to measure their possessions, reflecting the aesthetics rather than the social frameworks directing their "contributions" to heritage. I have a specific case in mind: the recent and expensive renovation of the Roman wing at the Metropolitan Museum of Art that fails, at every level, to set the record straight on the decorative patterns in Roman architecture.

The second issue regards the stewardship drive undertaken by communities to preserve their own heritage, whether because it is inherited from their ancestors or because it lies in their current communal lands and they see it in a proprietarily way (as in the case of immigrated populations) (Stapp and Burney 2002; Welch et al. 2009). Is heritage less their concern because they are recent immigrants? Many attitudes by government agencies have alienated the local populations as they use the "ancestry" argument to lead to legal decisions.

Overall, however, the scenarios of communal concern over heritage do not necessarily imply a positive attitude or adequate management of their heritage. The most relevant point in this debate is that today stewardship requires a central concern for sustainability of the heritage not only for the community but for society at large. Believing that stewards have sole control and profit of that heritage has a negative impact, whereas consideration of usufruct of that heritage for society at large should be of prime concern. By the same token, it is apparent that museums use the concept of public usufruct in a much more convincing way.

In addition, to complicate the case of future growth of community stewardship, a set of internal factors may lead to these enthusiastic but sometimes disorganized scenarios of managing heritage: scarce education levels in local communities; limited knowledge of potential, risks, and obligations at managing heritage; and a too high political input into decision making procedures (Fennell 2008).

I underline the issue of poor risk management because it is not restricted to small, developing communities that wish to steward their heritage. Complex societies such as the case of the city of Rome face chaos in their stewardship role by not establishing long-term management plans to address in an organic manner the risks and needs of an overwhelmingly complex setting for cultural heritage.

Future Directions

Final Thoughts: Strategies in the Twenty-First Century

I suggest that museums may have to change their strategy of stewardship in future decades. Hopefully they will convince themselves that depleting burials and sites so as to have the artifacts adorning their displays or stacking their storerooms is poor policy. Certainly there is a wealth of heritage in storage rooms with which to create novel and attractive exhibits for years to come. What does the recent evidence show in this regard? If contentious arguments between sovereign nations and museums are any indication, perhaps the latter have not renounced to their old ways.

On the other hand, indigenous, native stewardship is on the rise – but with many caveats. The tendency of the last two decades is to have communities and nongovernmental organizations defend their heritage against encroachment of their lands. These communities have had a difficult time, however, dealing with governments, mainly for their lack of strategies to prove the existence of valuable and worthy heritage. This

scenario stems, of course, from ignorance in government circles. For instance to prove the existence of intangible heritage with no apparent commercial value is a difficult task. How to prove that a nomadic society which relies for their survival on large extensions of land for a hunting and gathering economy and that such strategy, that land, *is* their intangible heritage?

These questions are clearly important as we live today in a period where the property of cultural heritage (both in the material and intellectual realms) is fiercely debated. In this scenario, more often than not, societies reach the conclusion that artifacts are the property of the first nations, aboriginals, or natives. But this is not a given in young democratic societies. The number of social conflicts stemming from top-down unilateral decisions by governments impinging on local populations shows the high risk for conflict preserving their heritage (Alderman 2009). Governments are hardly steadfast stewards of the heritage in their very own country. Their attitude towards monumental heritage sites is often a reflection of those same market principles at as well.

The stewardship of the future will continue to develop at both the private level and the community level as both groups claim they are "stakeholders" to portions of heritage. However, the strategies they apply will need to change, not the least because both groups often will be stepping on each others' arenas. Both groups will still claim property over heritage. While aboriginal populations will be greatly favored by the legal baggage behind the issue of heritage claims, museums will persevere, as they do own heritage that is, arguably, beyond the control of native communities and countries of origin. Museums will not disappear, but their stewardship goals and strategies must change in these times of a greater awareness of cultural heritage and their original property.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Site Stewardship Programs

References

Alderman, K.L. 2009. Ethical issues in cultural property law pertaining to indigenous peoples. *Idaho Law Review* 45: 2–20.

Bauer, A.A. 2008. New ways of thinking about cultural property: A critical appraisal of the antiquities trade debates. *Fordham International Law Journal* 31: 690–724. Available at: http://ir.lawnet.fordham.edu/ilj/vol31/iss3/4 (accessed 4 July 2011).

Boardman, J. 2006. Archaeologists, collectors, and museums. In *Who owns objects? The ethics and politics of collecting cultural artefacts*, ed. E. Robson, L. Treadwell, and C. Gosden, 33–46. Oxford: Oxbow Books.

Brodie, N., and C. Renfrew. 2005. Looting and the world's archaeological heritage: The inadequate response. *Annual Review of Anthropology* 34: 343–361.

Cline, N.M. 2003. Stewardship: The Janus factor. In *To preserve and protect. The strategic stewardship of cultural resources*, ed. A.T. Merrill, 7–18. London: Routledge. Available at: http://www.nps.gov/history/history/online_books/presidents/chap1.html (accessed 4 July 2011).

Cuno, J. 2008. *Who owns antiquity? Museums and the battle over our ancient heritage*. Princeton: Princeton University Press.

Fennell, D.A. 2008. Ecotourism and the myth of indigenous stewardship. *Journal of Sustainable Tourism* 16: 129–149.

Francioni, F. 2011. The human dimension of international cultural heritage law: An introduction. *European Journal of International Law* 22: 9–16.

Gerstenblith, P. 2006. From Bamiyan to Baghdad: Warfare and the preservation of cultural heritage at the beginning of the 21st century. *Georgetown Journal of International Law* 37: 245–352.

Henaff, M. 2003. La nouvelle philanthropie capitaliste. *L'Homme* 167–168: 307–313. Available at: http://lhomme.revues.org/index20092.html (accessed 4 July 2011).

Kimmelman, M. et al. 2006. Is it all loot? Tackling the antiquities problem. *New York Times*, 29 March 2006. Available at: http://www.nytimes.com/2006/03/29/arts/artsspecial/29panel.html (accessed 4 July 2011).

Marlowe, A. 2011. A heritage in ruins. *New York Times*, 2 June 2011. Available at: http://www.nytimes.com/2011/06/03/opinion/03Marlowe.html (accessed 4 July 2011).

Merryman, J. 1986. Two ways of thinking about cultural property. *The American Journal of International Law* 80: 831–853.
Renfrew, C. 2009. *Loot legitimacy and ownership. The ethical crisis in archaeology*. London: Duckworth.
Renfrew, C. 2010. Combating the illicit antiquities trade: Progress and problems. *Newsletter 10*. Ministero per I Beni e le Attività Culturali. Available at: http://tinyurl.com/64z6doy (accessed 4 July 2011).
Stapp, D.C., and M.S. Burney. 2002. *Tribal cultural resource management: The full circle to stewardship*. Lanham: AltaMira Press.
Waxman, S. 2006. *Loot: The battle over the stolen treasures of the ancient world*. New York: Times Books.
Welch, J.R., M.K. Altaha, K.A. Hoerig, and R. Riley. 2009. Best cultural heritage stewardship practices by and for the White Mountain Apache tribe. *Conservation and Management of Archaeological Sites* 11: 148–160.

Further Reading

Brown, J.L., and B.A. Mitchell. 1998. Stewardship: A working definition. *Environments* 26: 8–17.
Brown, J.L., and B.A. Mitchell. 2000. The stewardship approach and its relevance for protected landscapes. In *Landscape stewardship: New directions in conservation of nature and culture.* The George Wright Forum 17, 70–79. The George Wright Society.

Stoa

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Introduction

Stoa is an ancient Greek term applied to a type of long, narrow, free-standing building with a colonnaded façade. The stoa developed as an architectural form in Archaic Greece, and was most popular from the fifth through first centuries BCE. The stoa can be compared in its architectural impact with the colonnaded avenues typical of late Hellenistic and Roman cities and with the Roman *porticus*.

Definition

The stoa is a distinctly Greek architectural form of the portico that appears in a variety of forms from the Archaic (c. 650–480 BCE) through the Hellenistic periods (c. 323–50 BCE) and is found in sites throughout the Greek world. The simplest stoa was composed of three walls and a colonnaded front, yet this simplest form does not appear often in the archaeological record. Typically, the stoa form had a second inner colonnade that supported a ridge roof. Some stoas had small rooms behind the portico, some had two or more storeys, and some had projecting wings at either end, forming L or Pi shapes. The stoa had a variety of civic and religious functions: although the earliest examples appear in religious sanctuaries, the development of the stoa in the Classical period is linked to Athens, where stoas appeared at the margins of the Agora, the marketplace and civic center of the radical democracy. The characteristic appearance of a Hellenistic Agora came from the stoas that framed it. The stoa served a wide variety of purposes: at the sanctuary of Asklepios at Epidauros, the stoa served as the *abaton*, or sleeping dormitory, for the patients. In sanctuary spaces, stoas frequently housed dedications and offered shelter to priests and priestesses. In the Athenian Agora, stoas housed magistrates, functioned as public indoor space, held dining rooms, and served as display space for art and military spoils while the uniquely shaped South Stoa in Corinth served commercial functions. The growth of the stoa as a typical architectural feature of Greek cities mirrors sociopolitical transformations accompanying the rise of Greek urbanism (Aylward, 7552, *Urban Planning in the Greek World*). The stoa was thus an integral architectural building block of the Greek agora and sanctuary, central to Greek civic and religious life. The function and use of the stoa was multipurpose, but Vitruvius (*De arch*. 5.9.1) offers a basic ancient definition when he states that the stoa was a colonnaded building that serves to protect visitors from both the rain and the heat of the sun.

The stoa and the Greek temple share many architectural elements, but the monumentalized stoa, constructed of stone or marble, appears after the first all-marble Greek temples. In general, the building materials of the Greek stoa are more functional than those of the temple. The tendency in construction overall was to use less expensive

materials. Marble was frequently reserved for the façade, while walls were often built of local stone, mud brick, or rubble masonry (Coulton 1976: 142–143). In form, the stoa typically had a Doric exterior colonnade and an Ionic interior colonnade, thus forming a two-aisled interior. Multi-storeyed stoas also used the Doric and Ionic orders, along with interior half-columns with Pergamene capitals, and as time went on, a preference for the more elaborate use of the orders predominates. The single-storeyed form predominates, however.

As the building type developed, the columns began to be built in marble carrying a wooden entablature. The earliest stone porticos employed the Doric order, and this order dominates the archaeological record. The first monumental examples appear in the sixth century BCE, and are concentrated in Athens and Attica, where the radical democracy demanded new purpose-built architecture to support its governmental functions. The Athenian Agora, with its sequence of stoas built between the late Archaic and Hellenistic periods, provides a good example of the architectural form, and includes the first stoa with projecting wings, and one of the first stoas to incorporate rooms. In the Peloponnese, the South Stoa at Corinth and the Echo Stoa at Olympia are particularly noteworthy for their respective form and function. Ionia and the Hellenistic east present the fullest integration of the stoa into the Greek civic center, and forecast the development of the Roman use of the basilica and the *porticus* used to frame Roman *fora* and Roman colonial centers. The construction of a stoa was an expensive undertaking, and literary and epigraphic evidence demonstrate that most of the notable examples built in and after the fourth century BCE were funded by the Macedonian and Attalid dynasties established after the death of Alexander the Great (Schmidt-Dounas 1995: 23–52).

Key Issues/Current Debates/Future Directions/Examples

There is some debate as to whether Mycenaean porticos provided architectural origins for the classical Greek stoa. Origins in Near Eastern and Egyptian building types have also been suggested, but Coulton argues that the form has its origins in Archaic Greece (Coulton 1976: 18–23). In the Archaic period, the stoa became an autonomous structure, whose building components develop in parallel with temple architecture. Most known sixth-century stoas were small in dimension, and of lower architectural status than temples. In the sixth century, complete stone architecture became typical for temples, while only two known archaic stoas had stone entablatures. Most stoas of this period were found in sanctuaries, where they served as shelter for pilgrims and as places to display dedications. The two exceptions are the Royal Stoa, the earliest of the stoas in the Athenian Agora, and the stoa on the agora at Sikyon.

The earliest known example of the Greek stoa occurs at the sanctuary of Hera in Samos, and dates from the seventh century BCE. In form, the South Stoa at Samos was a long rectangular building, 70 m in length, with a back wall in rubble masonry, turning at either end, and two rows of wooden posts, one internal supporting the ridge roof, and 29 external columns forming the façade. In structure, the stoa was similar in size and shape to the cella of the Second Temple of Hera, and it anticipates the development of the Ionic order with the elements of base, capital, and dentils present (Coulton 1976: 27). In c. 478–470 BCE, the Athenians built an Ionic stoa at Delphi. This building incorporated the polygonal retaining wall of the Apollo Temple and was erected to display Athenian spoils from the Persian wars. The stoa used seven monolithic Ionic columns that bore a wooden entablature and carried an inscription on the stylobate.

The development of the stoa in the Classical period (c. 480–323 BCE) is exemplified by the series of stoas in the Doric order built around the Athenian Agora. Each was modest in construction but increased in size and in the sophistication of their interior design. These served to define the borders of the agora space: on the west by the Royal Stoa (c. 500 BCE) and the Stoa of Zeus (c. 430–420 BCE), and on the north by a row of herms, the Stoa of the Herms, and the Stoa Poikile (c. 475–460). When South Stoa I was built

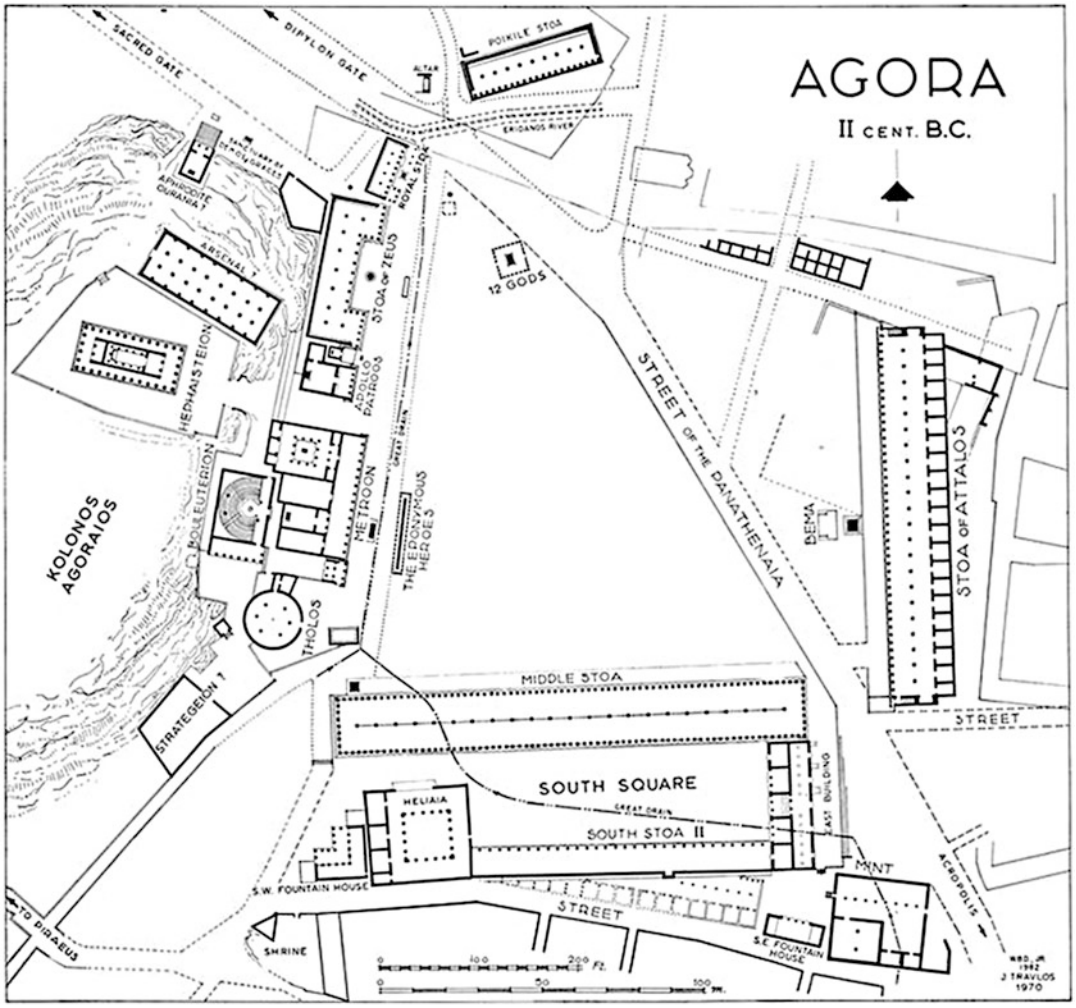

Stoa, Fig. 1 Restored plan of the Athenian Agora in the second century BCE from Camp (1990: 27, Fig. 6)

(c. 430–420 BCE), it created a long uniform façade in the middle of the south side of the agora (Fig. 1).

The Athenian Agora, while it does not have the orthogonal corners of the Hellenistic agora, was nonetheless the first agora closely coordinated in design (Winter 2006: 54).

The Royal Stoa is the first stoa of the Agora and one of the earliest with a stone entablature. Dating from the mid-sixth century, it had a two-aisled interior, with stone columns in the Doric order on the façade and an inner Doric colonnade located behind every third outer column supporting lighter interior wooden beams, while the outer colonnade bore the stone entablature. The stoa was the headquarters for the *archon basileus*, the official in charge of religious matters and law in the democracy, and was where the laws of Solon were displayed. This building has been securely identified by Pausanias' description and by two inscribed bases, dedicated by king archons, found in situ on the building's steps (Camp 2001: 45). The Painted Stoa, or the Stoa Poikile, is located along the northern side of the Agora, and was built c. 475–460 BCE in the Doric order, with internal Ionic columns. The westernmost end of this stoa was discovered during excavations of the Athenian Agora in the mid-1990s,

and is currently under excavation by the American School of Classical Studies in Athens. This stoa was decorated with a series of panel paintings depicting mythological and historical scenes of Athenian military exploits, including the Greeks at Troy, an Amazonomachy, and the Battle of Marathon. The Painted Stoa was a public building without a particular function, open to everyone. The philosopher Zeno, who flourished c. 300 BCE, taught his followers, the Stoics, in the colonnade of this stoa (Camp 2001: 68–69).

The Stoa of Zeus Eleutherios, dated c. 430–420 BCE and built in the Doric order, is one of the first stoas to incorporate short projecting hexastyle wings. These wings were capped with triangular pediments crowned by sculptured acroteria. This stoa is also the first to use a three metope span, a structural device that reduced strain on the architrave. In this stoa, the architects made the frieze out of poros with inset marble metopes to further lighten the load on the columns. Here, too, the interior Ionic columns are spaced twice as far apart as the Doric columns, as will become standard in later stoas. The building is distinguished by the high quality of its workmanship, by the extensive use of marble, and by its dedication to a god. The stoa is the setting for three Socratic dialogues, and according to Pausanias was adorned with paintings celebrating the freedom the Greeks won at the Battle of Plataia, the final battle against the Persians on Greek soil. South Stoa I, a more inexpensive structure built c. 430–420 and dismantled for a replacement c. 100 BCE, featured a Doric colonnade and Ionic interior colonnade in front of 16 rooms. These rooms have off-center doors that allow the space to be identified as dining rooms equipped with couches. Coins found in situ point to the stoa's commercial function, and inscriptional evidence shows that the officials in charge of weights and measures worked here (Wycherley 1957: 46).

The stoas of the Athenian Agora show many of the most significant architectural developments of the stoa in the Classical period, but the stoa in Athens also served a variety of functions, and served to commemorate political and religious events within a secular building, housing magistrates and their governmental functions; displaying military spoils, decrees, and statues; offering ample public space for general recreation; and acting as dining spaces as well as serving commercial functions.

The Hellenistic period marked the appearance of much larger stoas used to define the space of the agora and the sanctuary. "The stoa is perhaps the most characteristic expression of the spirit of Hellenistic architecture, and determines the architectural form of the Hellenistic agora" (Winter 2006: 55). Some were very long, such as the winged stoa of Phillip II at Megalopolis, which was 155 m in length, or the Echo Stoa at Olympia. Begun in the third quarter of the fourth century, and completed by the mid-third century, the 100 m long Echo Hall at Olympia, located on the east side of the sanctuary, served to divide the Altis into distinct spaces. This stoa is remarkable for its lack of an interior colonnade and its wide roof span (9.97 m), with massive horizontal wooden beams running across the roof above each exterior Doric column. The Echo Hall was intended for viewing the great processions that passed in front of the building, and forecasts the importance of the view toward, as well as the view from, important buildings that is common in Hellenistic design (Winter 2006: 54). The stoa of Phillip II at Megalopolis is the largest and longest of the fourth-century stoas, and can be securely assigned to the years between 338 and 330 BCE, after Phillip II of Macedon's invasion of Laconia. In addition to the external Doric colonnade and projecting wings, this stoa unusually had two interior Ionic colonnades to balance the great length of the building.

The orthogonally aligned Hellenistic agoras gained their characteristic form through the framing devices of stoas. While the first Pi-shaped stoa was built at the sanctuary of Artemis at Brauron (c. 420–415 BCE), the most important of the Ionian stoas were found at Miletos, Priene, and Magnesia on the Maeander and were common throughout Asia Minor towns built on the Hippodamian model (Winter 2006: 56). In Ionia in Asia Minor especially, the agora was made into

a rectangular space through the use of L- or Pi-shaped stoas built on three sides of a rectangular open space with a street along the fourth. The effect was to create a continuous colonnaded façade. Such architectural framing also controlled pedestrian traffic, pacing, and access to agora spaces. The architecture of a colonnaded stoa encouraged ordered walking, where the regular spacing of columns regulates pedestrian pace and proposes an ideal rhythm that contrasted with the unregulated movement of pedestrian traffic in minor streets (Macdonald 1986: 48; Macaulay-Lewis 2011).

Height proved a design issue in stoas, utilitarian buildings where space could not be wasted. As stoas grew longer, the height of a single colonnade would tend to disappear into the vastness of the agora space (Winter 2006: 55). In order to create a more pleasing height-to-length ratio, architects adopted two-storey or multiple-storey designs, creating an exterior tall enough to overlook the rooms below. One of the largest known examples of two-storeyed design is the South Stoa at Corinth (c. 165 m in length), expanded in its second phase in the early third century BCE, with 33 shops with rear chambers and a unique water feature. The stoa was two-aisled, with 71 Doric columns outside and Ionic within; behind these columns was a row of 33 shops connected to a second row of storerooms featuring cold storage wells chilled with water from the Priene spring.

The use of two-storeyed stoas grew widespread in the fourth century, and in the Hellenistic period, we also have evidence for multi-storeyed stoas, many of which are associated with the Attalid dynasty at Pergamon. Large multi-storeyed stoas were placed along the terraces of hilly landscapes, and could be created either by placing a second portico above the main one at ground level, or by placing one or more storeys with basement rooms and porticos below the main portico to raise its floor to a higher ground level on the downhill side of a slope and to help retain the terraced ground level. The earliest of these is the East Stoa of the Athenian Asklepieion, built in the mid-fourth century BCE, where there were two superposed Doric colonnades on the façade of a two-aisled portico. The two-storeyed form appears to have developed here to meet the needs of those men and women worshipping and sleeping overnight in the stoa, but is later employed in buildings with a variety of functions.

In the Hellenistic period, there is a special category of Pergamene stoas, built during the reigns of Eumenes II (197–160 BCE) and Attalos II (160–139 BCE), which have distinctive features. Typically, the Pergamene style preferred a stoa with two storeys and two aisles, and made use of Doric columns on the lower façade and Ionic interior columns, while the upper storey used Ionic columns on the façade and interior double half-columns with palm capitals, supporting a mixed Doric-Ionic entablature (Coulton 1976: 66–72, 126–129). Athens has two representative Attalid stoas, the Stoa of Eumenes II and the Stoa of Attalos II, restored between 1953 and 1956 on the basis of Travlos' drawings by the American School of Classical Studies in Athens and now serving as the museum and warehouse for the Agora Excavations.

Eumenes II built a long stoa, just west of the theater of Dionysus on the south slope of the Acropolis, to shelter the thousands of people who attended the festival and theatrical events (Vitr. *De arch*. 5.9.1). This stoa was built into the steep south side of the Acropolis, so one of its most characteristic features is the large retaining wall and buttresses connected by semicircular arches still visible today. The stoa shows Pergamene style and also the direct influence of Pergamene architects in its construction. The palm capitals and cornice on the upper storey use gray Pergamene marble characterized by large crystalline inclusions, and the mason's marks on the blocks suggest that the stones were carved in Pergamon and imported to Athens after they had been worked. The Stoa of Attalos in the east side of the Athenian Agora was donated by Attalos II of Pergamon to the people of Athens (Thompson and Wycherley 1972: 78). This stoa is also in the Pergamene style but uses Athenian limestone and Attic marble. Like the South Stoa

at Corinth, this stoa had a row of 21 shops behind the colonnades on each storey, and served as the chief market building of the Agora in the Hellenistic period.

Large stoas were also built at the sanctuaries of Samothrace, Delphi, and Delos by Macedonian and Attalid dynasts, such as the Macedonian stoas of Antigonos II on the north side of the sanctuary of Apollo at Delos and of Phillip V on the southwestern corner of the same sanctuary. Comparable in the Hellenistic period are the multi-storeyed market halls exemplified at Aigai, Alinda, and Assos, where the agoras were formed on hillsides with artificial terracing (Dinsmoor 1975: 293). The South Stoa of the Agora at Assos in the Troad in Asia Minor, built in the mid-second century BCE, was one of the tallest buildings in the Greek world with a total height of five storeys, or 22 m, since it was built with two floors below the Agora ground level and two superposed porticos above ground level (Coulton 1976: 70).

Small two-storeyed stoas from late Hellenistic Delos, such as the L-shaped stoa of the Agora and the Agora of the Italians, may have inspired the two-storeyed porticos and arcades of late Republican and early Imperial Rome (Winter 2006: 56; on the Agora of the Italians, see Trümper 2008). Stoa building declines by the first century BCE. Although new stoas continued to be built throughout the Greek and Roman world, the Roman basilica and portico and the Hellenistic colonnaded avenues largely took over the function of the stoa. As the Roman Empire spread, architectural Romanization with its *fora*, framing basilica, and porticos tended to replace the Greek stoa in urban plazas (Macdonald 1986: 131). Colonnaded thoroughfares, including long porticos, are distinctive hallmarks of Hellenistic cities and Romanized ones both in the east and west of the Roman world.

Cross-References

- ▶ Agora in the Greek World
- ▶ American School of Classical Studies at Athens (ASCSA)
- ▶ Basilica in Classical Archaeology
- ▶ Forum
- ▶ Urban Planning in the Greek World

References

Camp, J. 1990. *The Athenian agora. A guide to the excavation and museum*. Athens: American School of Classical Studies at Athens.

Camp, J. 2001. *The archaeology of Athens*. New Haven: Yale University Press.

Coulton, J. 1976. *The architectural development of the Greek stoa*. Oxford: Clarendon Press.

Dinsmoor, W. 1975. *The architecture of ancient Greece; an account of its historic development*. 3rd ed. New York: Norton.

Schmidt-Dounas, B. 1995. *Geschenke erhalten die Freundschaft: Politik und Selbstdarstellung im Spiegel der Monumente*. Berlin: Akademie Verlag.

Thompson, H., and R. Wycherley. 1972. *The agora of Athens. The history, shape, and uses of an ancient city center*. Princeton: American School of Classical Studies at Athens.

Trümper, M. 2008. *Die 'Agora des Italiens' in Delos: Baugeschichte, Architektur, Ausstattung und Funktion einer späthellenistischen Porticus-Anlage*. Rahden/Westf: VML, Verlag Marie Leidorf.

Winter, F. 2006. *Studies in Hellenistic architecture*. Toronto: University of Toronto Press.

Wycherley, R. 1957. *The Athenian agora, volume 3: Literary and epigraphical testimonia*. Princeton: American School of Classical Studies at Athens.

Further Reading

Bringmann, K., and H. von Steuben. 1995. *Schenkungen hellenistischer Herrscher an griechische Stat Athens. aty center*. Berlin: Akademie Verlag.

Broneer, O. 1954. *The South Stoa and its Roman successors*. *Corinth* V1. Part 4. Princeton: American School of Classical Studies at Athens.

Lawrence, A. W. 1996. *Greek architecture*. 5th. edn., revised by R. A. Tomlinson. New Haven: Yale University Press.

Macaulay- Lewis, E. 2011. The city in motion: Walking for transport and leisure in the City of Rome. In *Rome, Ostia, Pompeii. Movement and space*, ed. R. Laurence and D.J. Newsome, 262–289. Oxford: Oxford University Press.

Macdonald, W. 1986. *The architecture of the Roman Empire II. An urban appraisal*. New Haven: Yale University Press.

Roux, G. 1987. *La terrasse d7. le Uni. Fouilles de Delphes II. Topographie et architecture*. Paris: Boccard.

Vallois, R. 1923. *Le Portique de Philippe*. *D Po* VII. 1. Paris: Boccard.

Stone Structures in the Highlands of Uruguay

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State of Knowledge and Current Debates

Introduction

> . . .if it is not properly built, a rain comes and it all falls apart.
> Hugo (2014), a stonecutter from the north of Uruguay

Uruguayan highland landscapes are characterized by the presence of a variety of stone structures which are grouped according to their origin and construction technique. Some of them have an indigenous origin; some have a colonial origin (linked to the European settlement in America), and others are yet to be circumscribed in time. On this occasion, locally known indigenous constructions such as *cairnes* (cairns) and *vichaderos* (ring cairns) are presented. Stone, as well as earth, has been used since pre-colonial times for architectural purposes. This makes both cairns and ring cairns visible and permanent anthropic constructions that constitute a well-defined and delimited example of Uruguay's archaeological registry.

Until recent times, their study had not been a main topic in the agenda of Uruguayan scientific archaeology. As from 2010 to 2011, new research has been conducted, which has made their classification possible according to three main axes: (a) location, the kind of landscape chosen for their construction; (b) their spatial distribution, as there are some special features in the spatial configuration of clustered and isolated structures; and (c) their shape, as there is a standardization in the morphology, construction techniques, and size. Current work delves into when and why they were built.

What Do They Look Like?

According to their morphology, these structures can be classified as follows:

- **Mounds** are compact, semispherical structures that at times tend to be cone-shaped. Their base is circular to elliptical and at times rather large. Their size ranges from 2 to 6 m of diameter and is usually less than 1 m tall (Figs. 1 and 2). In Uruguayan literature, these stone mounds are often referred to as "cairnes" (Figueira 1898). In this text, the term *cairn* refers to a broad category that comprises stone mound structures used for different purposes.
- **Rings** are ring-shaped wall structures of circular base. Sizes vary between 6 and 10 m of diameter and 1 m of height (Fig. 3). These circular enclosures are locally known as "vichaderos." For this work, in a broad sense and for easier reference, they will be referred to as *ring cairns*.
- Some authors (e.g., Palermo et al. 2004) also use the word "cairne" to refer to conical/pyramidal structures of up to 2 m of height with a construction technique which is different from the previous two (Fig. 4). These structures have not been studied and require specific research. Within the **cone** category, there is a wide variety of constructions, and their exact genesis is yet to be determined. The main discussion revolves around their origin – whether indigenous or European.

Where Are They Found?

In Uruguay, cairns and ring cairns are found in the highlands of the northern-central and eastern regions of the country (Fig. 5). Despite the country's lack of high elevations, the singularity of this territory lies in the almost uninterrupted presence of long undulations that stand in the way of several waterways, which constitutes a varied landscape. This sequence of ranges and hills

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Stone Structures in the Highlands of Uruguay, Fig. 1 Cairn on the Charrúa Hill (Department of Tacuarembó, Uruguay)

Stone Structures in the Highlands of Uruguay, Fig. 2 Cairn on the Aguirre Range (Department of Rocha, Uruguay). (Picture: Pablo La Rosa – LAPPU Archive)

creates a dense hydrographic mesh composed of rivers and streams of permanent flow and innumerable creeks and sporadic waterways. Within this context, ranges (locally known as "cuchillas" or "sierras") and hills ("cerros" in Spanish) are the most typical Uruguayan topographic features, with heights between 150 and 500 MAMSL. The indigenous populations that built the cairns chose these high and stable places for their construction. These locations are characterized by their unique beauty and a high heritage value, as well as by their excellent visibility to monitor the surrounding landscape.

So far 60 references are made (both from bibliography and from archaeological survey) to places where cairns and/or ring cairns are located, which coincide with those portions of the land where hills and ranges predominate (Fig. 5) (Sotelo 2012, 2014). Fifteen of these places have been surveyed, and a total of 91 structures

Stone Structures in the Highlands of Uruguay, Fig. 3 Ring cairn on the Charrúa Hill (Department of Tacuarembó, Uruguay)

Stone Structures in the Highlands of Uruguay, Fig. 4 Cone on the Aguirre Range (Department of Rocha, Uruguay). (Picture: Sebastián Santana – LAPPU Archive)

(76 cairns and 15 ring cairns) have been identified (Table 1).

How Are They Made?

Cairns and ring cairns are stone structures built using a dry stone construction technique in which stone blocks are manually placed. Rough blocks are laid in a juxtaposed, imbricated fashion (emulating fish scales) without using mortar or any other kind of bonding material. The friction between the interlocking blocks distributes pressure, enhancing the stability of the structure while preventing it from collapsing. Consecutive layers are bound in such a way that they create ring- and mound-shaped structures.

Blocks available in the surrounding environment were chosen for their construction, of 20–50 cm of size (some even larger) that can

usually be carried by one person or a few more people. Stones were chosen one by one so as to obtain an overall stable structure, using blocks in good condition (that were not eroded or cracked) and according to their complexion, density, hardness, and durability. In some cases, blocks were carved, or cracked surfaces were taken advantage of so as to accomplish ideal shape and placement. Structures were usually built on rocky outcrops, which is why it was often necessary to level the ground by quarrying it.

In the Aguirre Range, in the Department of Rocha (Fig. 9), two structures were archaeologically surveyed by using geometric registry, digging, and restitution: the Mario Chafalote mound (MCH) and the Ester Chafalote ring (ECH) (Sotelo and Gianotti 2015–2016). (Works conducted on the Aguirre Range and the Chafalote Valley were co-directed by Dr. Camila Gianotti and the author of this entry, Moira Sotelo, and funded by the R&D project: *Landscapes built since pre-colonial times. Settlement logics and use of the environment by indigenous populations in the highland-lowland transition*, of the Committee of Scientific Research of the University of the Republic (Uruguay). Such work is also part of Moira Sotelo's doctoral thesis.) The documentation and analysis strategy merged diverse geospatial technologies (geo-location digital records with DGPS, Total Station, GIS, and photogrammetric records) so as to approach two different spatial scales: a medium scale, defined by the location and position of the sites, which aims at determining the topography, position, and morphology of the structures, and a small high-frequency topographic scale, which contemplated

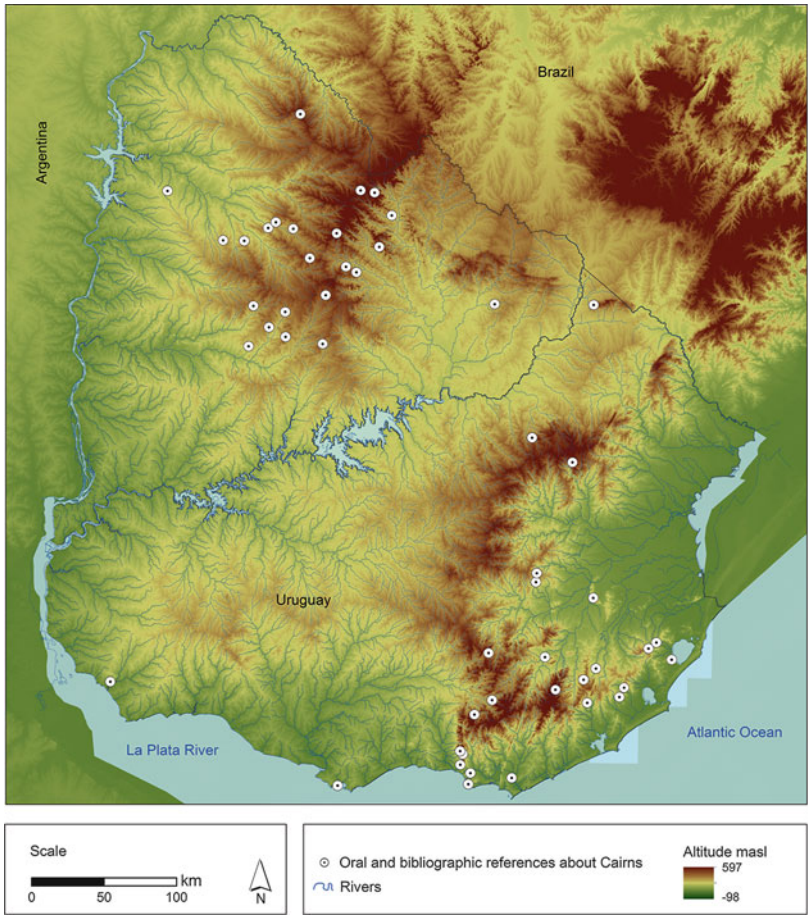

Stone Structures in the Highlands of Uruguay, Fig. 5 (continued)

construction features and a detailed record of the elements that compose it. Data processing permitted the elaboration of digital models of the land, photogrammetric models, plane measurements of the structures and their construction features, stratigraphic sections, and spatial distribution of archaeological materials located at the planned excavation sites (Machado et al. 2016).

The MCH site is located on a hilltop at 220 MAMSL, one of the highest points in the Aguirre Range, where a stone mound was identified. It was found at the highest point of the top in a privileged location, dominating the surrounding landscape and providing a visual control of 360°. The structure consists of a stone and earth mound built on a rocky outcrop (used as part of the structure), covered by an outer shell made of imbricated stone blocks. Geological studies have shown that the blocks used in the masonry are ignimbrite blocks found in the range (Chiglino

Stone Structures in the Highlands of Uruguay, Fig. 5 Topographic map of Uruguay. Places where evidence of indigenous stone structures is found. Locations are grouped in hills and ranges, the highest lands in the territory. Either structures or partial remains were found in all the locations

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Stone Structures in the Highlands of Uruguay, Table 1 Surveyed structures are grouped as follows

Clustered pattern (conspicuous)	Clustered pattern (rows)	Disperse pattern	Single pattern
Charrúa hill	Pacheco	Itacabó hill	Chapea hill
10 cairns	7 cairns	2 cairns (unfinished survey)	1 ring cairn
1 ring cairn			
1 corridor			
Minuano hill	Rufino	Aguirre range	Lunarejo hill
7 cairns	7 cairns	7 cairns	1 cairn
2 ring cairns		1 ring cairn	
1 corridor		1 cone	
Del Maestro hill	Raffo	De Rocha range	De la Sepultura range
5 cairns	10 cairns	5 cairns	1 cairn
1 or 2 ring cairns		1 ring cairn	
Del Pastoreo hill		Travieso hill	Cerro Vichadero
2 cairns		6 cairns	1 ring cairn
1 ring cairn		3 ring cairns	
		3 small cones	
Cementerio hill			
5 cairns			
2 ring cairns			

2016), which were combined with smaller quartz and phyllite blocks to make the outer shell.

Indigenous tools found at the MCH excavation site were made of raw materials different from those used in construction: a broken *bolas* ball made of basalt (not available in the area), instruments, cores, and flakes made of quartz and tuff (available in the area). The lack of bone remains in the excavated area resulted in the implementation of a strategy that searched for signs of hydroxyapatite in the sediments. The results of the analyses showed that no burials ever took place (Rodríguez 2016). The structure was dated at around 1700 of our era (230 ± 30 BP. Beta – 442,081) (Sotelo and Gianotti 2015–2016).

The ECH site is located at 140 MAMSL on a ridge at the northern end of the Aguirre Range. A ring-shaped structure is found on the slope with a NE-SE arch view of 180°. The ring is composed of medium-sized, flattened, semi-rounded stones of local ignimbrite, laid out in a shell-like fashion and creating an outer ring. This shell is built directly on the outcrop and reinforced toward the slope by retaining walls placed under the outer row of stones. To layer the larger blocks toward the slope, smaller stones (rubble and chocks) were used, wedging the blocks and filling the holes in between the rocks. On the NEbN side of the structure, there is a row of rounded, flattened, apparently fallen stones of around 1 m of diameter, which might have been driven into the ground (Fig. 6). At the excavation site, tuff and quartz cores and flakes from the range and its surroundings were found. Again, human remains were not found.

How Are They Arranged? How Do They Relate with Each Other?

There are different ways in which structures are spatially distributed and arranged with each other. In some cases, they appear isolated, whereas they are sometimes found in clusters. Works carried out so far allow us to propose three categories or patterns of placement and configuration: clustered, disperse, and single. These categories are likely to be modified or broadened as further research is conducted.

The **clustered pattern** consists of clusters of structures in which two different displays are observed: (i) clusters in conspicuous hills and (ii) rows in hillocks.

i. The first clusters are located on hills that stand out in the landscape; they are conspicuous and

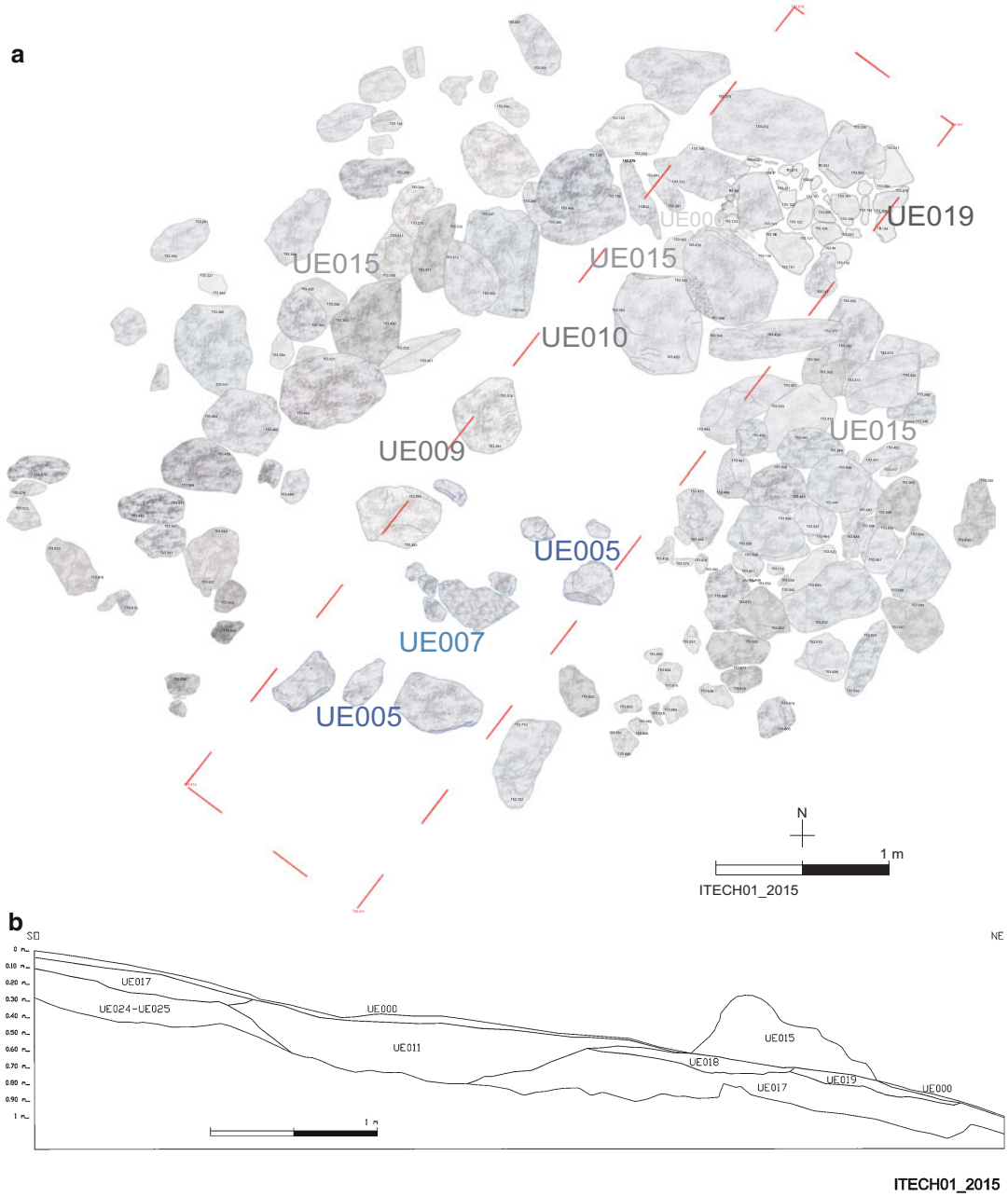

Stone Structures in the Highlands of Uruguay, Fig. 6 Planimetrics of the Ester Chafalote Site (ECH, Aguirre Range, (Department of Rocha, Uruguay) done with georeferenced Total Station as part of an R&D project named *Landscapes built since pre-colonial times. Settlement logics and use of the environment by indigenous populations in the highland-lowland transition* (CSIC/UdelaR)

prominent and have elliptical, flattened tops. The structures that have been identified so far through archaeological survey have 1 or 2 rings, between 3 and 20 mounds, and, occasionally, walls that interconnect these structures. They crown the hilltops in open and flat areas and have a wide visibility spectrum (of up to 360°). The inward spatial

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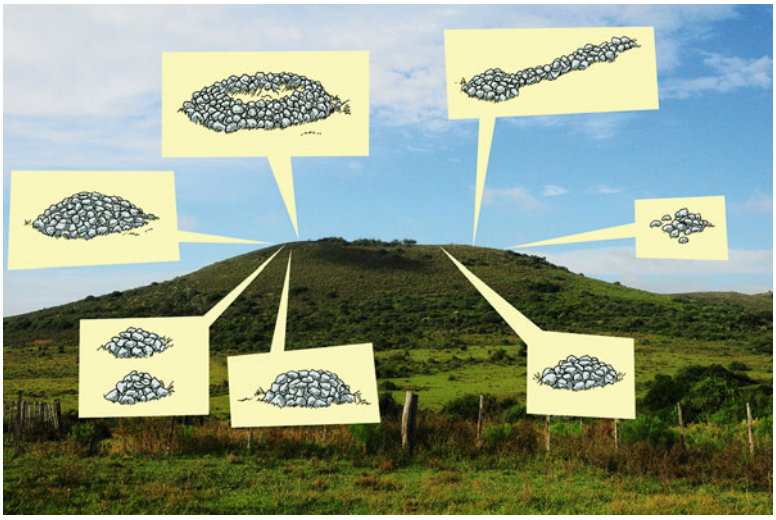

Stone Structures in the Highlands of Uruguay, Fig. 7 Charrúa Hill, Department of Tacuarembó, Uruguay. The hill reaches the 280 MAMSL and has a 360° view over its surroundings. A cluster of nine mounds, one ring, and some walls are found at the top. On the east side of the hilltop there is a sub-cluster with one ring and eight mounds. On the opposite side, there are at least three more mounds and a long wall. Native vegetation at the top makes the full observation of the structure difficult, and some parts are likely to remain hidden under the grass. Archaeological remains such as bolas, racloirs, and a projectile point found at the base of the hill are kept at the Indian and Gaucho Museum and were also found by Omar Michoelsson. (Picture and drawing: Sebastián Santana – LAPPU Archive)

distribution of the cluster has different configurations: an open *U* shape facing southeast, sub-clusters, and rows (Figs. 7 and 8).

ii. Rows are another way in which clusters are distributed. This configuration implies that structures are found in lines, a few meters apart from each other at roughly regular intervals. These structures seem to have a conic rather than a mound-like shape, with a rather small base. This type of configuration has not been studied in detail, and its identification results from preliminary field observation.

The **single pattern** is made of a single structure located at the top of a hill or hillock, more or less isolated from other hill formations. They may be a ring or a mound with the same average dimensions of the other structures present in cluster formations.

In the **disperse pattern**, structures are found along the many hilltops that compose long ranges and have a wider structure diversity. Not only rings and mounds are present but also cones, four-sided structures of piledriven stones, pens, and walls built in colonial times, among others. Cairns and ring cairns are usually located along the highest points of the watersheds (Figs. 9 and 10).

High Archaeological Landscapes: The Hill Range as a Space Built by Uruguayan Indigenous Populations

What Were They Built and Used for?

Why indigenous populations built cairns and ring cairns is yet to be determined. However, archaeological and historical research makes it possible to discuss some hypotheses regarding their use and their true origin.

After the Europeans arrived to the River Plate in the early sixteenth century and until the first decades of the nineteenth century, a number of manuscripts and maps on the newly found territories were written and drawn. Sailors, explorers, journalists, priests, military, cartographers, colonial officers, and naturalists, among others, witnessed the lives of the hunters and gatherers who lived in the area. Until the second half of the seventeenth century, most of the documentation

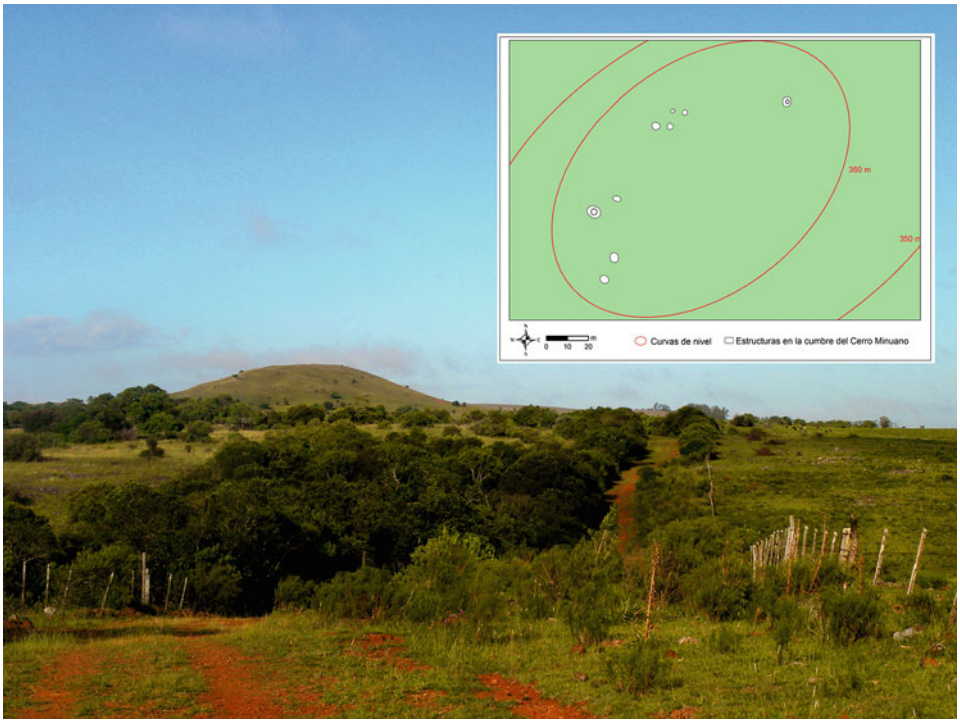

Stone Structures in the Highlands of Uruguay, Fig. 8 The Minuane Hill and a sketch of a cluster of structures built on its flat hilltop (Department of Rivera, Uruguay). It has an altitude of 360 MAMSL and a 360° view over its surroundings. The cluster consists of nine stone structures (two rings and seven mounds) which form a horseshoe that opens toward the southeast, with four inward sub-clusters. Two flakes were found on the surface during archaeological survey at the site

was written near coastal areas – and not so much inland – especially at the mouths of the Paraná and Uruguay rivers. When reports on the inner lands became more abundant, local populations had already been massively affected by illnesses brought from Europe and by the migration of indigenous populations who attempted to prevent their women and children from being kidnapped (Bracco 2004, 2013). In Uruguay, the advance of European settlers across the territory was based on a strategy known as "settler colonialism." This kind of colonialism was not based on capital gain relying on the exploitation of native workers in conditions of slavery or semi-slavery (as was the case of early colonialism in areas such as the Andes or Mesoamerica). When indigenous populations were banished or exterminated through planned campaigns, the very settlers were in charge of exploiting the conquered lands. This context brought extremely negative consequences for native groups such as the loss of their practices, concepts, and traditions, making their preservation very difficult (Verdesio 2014).

Based on documentation dating from colonial times, it has been often said that cairns and ring cairns would be the result of local burial traditions before European settlement (Figueira 1898; Femenías 1983; Sotelo 2014). According to these sources, indigenous populations had the custom of burying their dead and then covering them with stones, especially on hilltops and their surroundings. It is in this sense that the word "cairn" is often used in Spanish to refer to burial mounds.

Cairns are locally known as "cairnes," a curious Spanish form for "cairn" (Sotelo and Soler 2015). It may have first appeared during Charles Darwin's journey across South America in 1832 on board of his ship, the *HMS Beagle*. While visiting the *Sierra de las Ánimas* (Range of

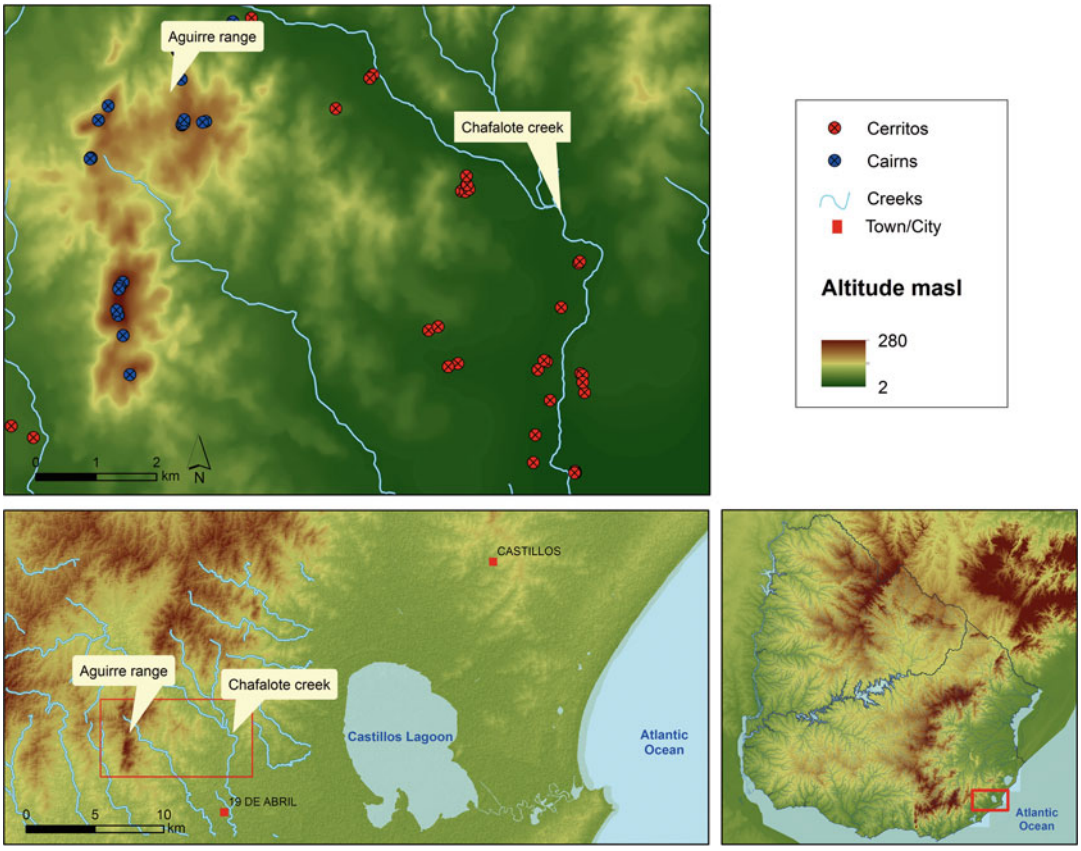

Stone Structures in the Highlands of Uruguay, Fig. 9 Map with the location of cairns on the Aguirre Range in the Department of Rocha, Uruguay. Structures in a disperse pattern were found at the site, which was designated as an experimental area to conduct further site and intra-site research on cairns at a local scale through the application of different methodologies and techniques. Along this range, a number of structures were identified: a cone, three conic mounds, two rectangular structures of piledriven stones, at least four mounds (MCH and others), a ring (ECH), and three stone stacks that fill a crack in the outcrop with small- and middle-sized stones of sharp gravel (among which a quartz core was found on the surface)

Souls) in the Department of Maldonado, Darwin (1921 [1832]) wrote in his travel log about the finding of stone piles, which he found similar to the cairns built in the British Isles. A local guide who walked with him along the range mentioned that they were used by the natives to bury their dead. Stone piles found on hilltops are linked to indigenous graves both in documents and oral accounts of the time.

In Darwin's words:

> At the top of the hill range we found piled stones in different locations, which had clearly been there for many years. My partner claimed that they had been built long ago by the Indians. The piles were similar, though at a smaller scale, to those often found in Wales. Seeking to leave behind a reminder of a specific event at the highest point in the surroundings seems to be a universal passion among the human race. There are currently no Indians of any species, either civilized or not, in this part of the province... Darwin. (1921[1832]: 68–69)

So far, there are very few and inaccurate references to the presence of human remains linked to these structures. J.J. Figueira (1965) wrote, without giving further details, that the only objects found inside and near these structures are bolas and parts of human remains. As for Femenías (1983), he mentioned that very few materials were found near these "piles" and that in the departments of Salto and Paysandú, some

Stone Structures in the Highlands of Uruguay, Fig. 10 Panoramic view toward the east side of the Aguirre Range in the Department of Rocha (Uruguay). Archaeological works carried out in Laguna Castillos identified 30 monticular structures of earth (cerritos) of which two were excavated Cráneo Marcado and Guardia del Monte (Capdepont 2006; Pintos 1999). (Picture: Pablo La Rosa – LAPPU Archive)

reference is made to bolas and human remains by the side of these structures, yet their features have not been detailed, and therefore such information must be carefully considered. Archaeological excavations carried out at the MCH mound and the ECH ring were unable to find human or animal bone remains (Sotelo and Gianotti 2015–2016) or any other sign that might indicate earlier bone presence. The excavation carried out at the Horqueta ring cairn was also unable to find bone materials.

However, the fragmented piece of bolas found at the excavation of MCH site is contextualized as an object that, apart from being used for hunting and for war, had symbolic connotations in the everyday lives of hunters and gatherers. Bolas are part of a group of objects with a strong symbolic meaning in the beliefs, myths, oral accounts, customs, and rites of these populations and are sometimes found in funerary contexts of the Pampas (see Bonomo 2006).

As per ethnographic sources, a first reference to the use of stones in burials was found in 1687: a description by the Jesuit Francisco Jarque of the native Guenoa nation, located on the Uruguay River. Jarque (1687, Chap. 23) accounted that this indigenous population buried their dead under big stones or logs and that when they moved, they carried along the bones of their dead. Afterward, references to stone-made Indian tombs become frequent (Femenías 1983; Sotelo 2014), such as in the diaries and travel logs written by the members of the Spain-Portugal Boundary Demarcation Commission. In the 1750s, and again in the 1780s, these two crowns commanded mapping expeditions to demark the boundaries of their colonies in the American continent, hoping to settle their disputes on these boundaries. In many travel logs and diaries, "stone mounds" are mentioned by members of the Commission, found at the highest points while measuring the land. Also, they provided detailed information on their location (Oyarvide 1865 [1784]; Alvear y Ponce de León 1784 of the Spanish parties; Saldanha 1929 [1786–1787] of the Portuguese court). While Alvear y Ponce de León was traveling around the Arequita Range and the Penitente hills, he wrote: "On top of almost every hill you can still find today many tombs of Indian pagans. They basically consist of an enclosure of stones scattered within a diameter of 7 feet and are between 4 and 6 feet high. This seems to be a general Indian tradition, as described by Mr. Antonio de Ulloa during his expedition to measure a degree of meridian arc" (Alvear and Ponce de León 1784 s.p.).

Another construable use according to these sources is related to the elevations and structures as places of faith and spiritual and religious Indian practices (Femenías 1983). Rituals and

ceremonies such as fasting, the worship of deities and of the dead, as well as shamanism, among others, were celebrated. The documents and cartography written by the Jesuit missionaries of the Society of Jesus are a good example. They arrived in South America searching for a "spiritual conquest" and the "salvation of souls and the establishment of Christian culture" among the peoples of the New World (Furlong 1984 [1936]: 22, 26). These are some of the accounts of that time:

> On the Yaceguá hill, Guenoa pagans celebrate their funerals; they bring their dead from many leagues away to be buried.
>
> On the Ybití María hill, Guenoa pagans formally become sorcerers; there they gather, they make their quivers, they pierce themselves, drill their bodies and do evil things until the very devil appears at the top of the hill. The Ybití María hill is located at the headwaters of the Yarapei River. (B. Nussdorffer 1754 in Furlong 1936: 80–81)

Altogether, documents refer to the use of stones as an indigenous custom to bury the dead and as eventual places for rituals. However, no records have been found on anyone having ever directly witnessed interment ceremonies or rituals of any kind.

Colonial documents also describe the systematic activity of sentinels and spies in enemy territory as part of the military and territorial strategies back in those days (López Mazz and Bracco 2010). In geographical terms, the locations where the indigenous populations built stone structures are areas of visual land control used for surveillance and to monitor animal flocks for hunting as well as the arrival of people, among others. In the area of the River Plate (Argentina and Uruguay), the term *vichar*, according to the Royal Spanish Academy (RAE 2012), means "to observe," "to invigilate," and "to watch while hiding." Hence, *vichaderos* (literally watching points in Spanish) are high places used to watch and monitor the land.

An interesting aspect related to the research of stone structures in Uruguay is the toponymy of the places where they are found. For instance, archaeological surveys resulted in the finding of large clusters of cairns and ring cairns at the top of the Minuano and Charrúa hills (current names used in national cartography). According to colonial documents, the Guenoa-Minuane and Charrúa peoples were the main native nations in these lands at the time of European settlement. Likewise, the most important clusters of structures that appear in the records – with clusters of up to 200 structures – are found on the Betete and Tupambaé hills, named like two Minuane caciques (Figueira 1958). In this sense, current names for various landforms where several stone monuments can be observed derive from indigenous words. However, how far back in time these terms go still remains unknown. On the other hand, there are hills with cairns whose names are associated to an early function, such as the Cerro Cementerio (Cemetery hill) and the Sierra de la Sepultura (Burial Range), clearly associated to death, or even hills like the Centinela (Sentinel) and the Vichadero (Watching Point), referring to the surveillance and monitoring over the territory.

By colonial times, after the mid-nineteenth century (with severely decimated and transformed populations) and during the twentieth century, *criollos* (European descendants) and Europeans with an interest in pre-colonial history began to tour around the country and record their archaeological findings. In 1882, Julio Piquet published on a newspaper an article on his expedition with José H. Figueira's to the Tupambaé hill in the Department of Maldonado. He pointed out that stone mounds covered the hilltop and that there were no fewer than 200 of them. "[. . .] We got off and began to demolish one of those mysterious tombs. We destroyed 6 or 8. . .but found nothing. . ., nothing at all" (Piquet 1882 in Figueira 1958: 16).

"At the tops and on the sides of the highest hills and hillocks of Uruguay, piles of rough stones can often be found. They are rounded or cone-shaped, erected by men and known as "Indian graves," as they were presumably built by aboriginal peoples for the same purpose of their name. Such mounds have a round or elliptical base and are rather small, with a maximum of 2–3 m of diameter and between 50 cm and 1 m of height. Some of these structures lie directly on the ground, while others lie on metamorphic rock, which makes up the majority of our hills and ranges. These mounds

may appear isolated or in clusters. The most important ones that I have seen are found on the Tupambaé hill [...], around 200 stone piles which are regularly distributed in rows". – José H. Figueira (Figueira 1898: 309–310.).

The press of that time also echoed and began to publish the new archaeological findings. In the city of San Fructuoso (nowadays Tacuarembó), the *El Noticioso* newspaper published in 1898 an article titled "The cairns of Tacuarembó" (El Noticioso 1898).

By Whom and When Were They Built?

One of the most interesting aspects regarding cairns and ring cairns is linked to their builders and to the time when they were built. Once again, the arguments for debate are provided by archaeological and historical research. There is a spatial correlation between the areas described in documents and the places where the archaeological sites with stone structures were actually found. In particular, there is a spatial coincidence between the area where the structures are found according to the records (later on corroborated through archaeological survey) and the territory inhabited by Guenoa-Minuane populations in colonial times (Acosta and Lara 1989; López Mazz and Bracco 2010). It is worth remembering the examples given by Jarque in 1687 (Guenoa burials with stones) or Nussdorffer in 1754 (Guenoa burials and rituals on hills).

Guenoa-Minuane settlement in the Uruguayan territory between the seventeenth and nineteenth centuries was well recorded in colonial documents, in which a pattern in the lands they populated and the changes that took place for two centuries were observed. In some cases, occupation is incidental and is related to a passing group. In other cases, there is evidence of large settlements with a number of the *toldos* (Indian tents) on lands that, according to chroniclers, were used and belonged to the Minuanes. Also, places where they used to fish, bury their dead, and perform rituals are mentioned. These Minuane communities were led by respectable caciques and are scattered throughout the territory, yet in constant movement and contact with other communities from the region to whom they are related and with whom they share alliances and other kinds of bonds (López Mazz and Bracco 2010).

The territory occupied by the Minuanes was reconstructed based on the analysis of maps and documents of that time. The limit toward the east is the Atlantic Ocean. These ethnohistoric studies show, among the many places where they are found, the presence of Guenoa-Minuane *tolderías* (group of *toldos*) between the area of Castillos Lagoon and the Chafalote Creek around the seventeenth and eighteenth centuries (López Mazz and Bracco 2010) (Fig. 9). The Minuanes are "the nation of savage Indians who dwell in that region" or, more accurately, "who have long lived in the area of Castillos" (General Archive of the Indies, Charcas 221. The city of Buenos Aires to the King 1721, in López Mazz and Bracco 2010: 104).

In 1750, the areas of Chafalote Creek and Castillos are still occupied by several communities, and the Castillos Lagoon is identified as a field where the Minuanes hunt deer (López Mazz and Bracco 2010):

> To the Governor and Captain General. Dear Sir. The officer of the Maldonado Guard informed me on a letter dated the 1st day of this month that, having a party set out to scout the fields within some 25 or 30 leagues away, and having spotted a rider with some horses ahead, believing him to be someone on his way to Rio Grande they followed him, unable to see anything else due to smoke coming from burning grass, and unexpectedly ran into a group of Indian tents. He could not distinguish to which nation they belong, but they are a great many, located between the Chafalote Creek and Castillos Grande. Our party being too few and they being too many and armed, they continued to steal the supplies from a cart. Our men finally retreated, leaving behind 13 royal horses (...) and fearing for their lives. This location becomes a regular seasonal Minuane settlement due to the large number of deer available for hunting, where also rebel tapes usually gather, and we do not know whether they might be fugitives of the last battle near the removal. . ..(General Archive of the Nation [Argentina] Room IX File 1(2–1–4); File 2 (2–1–5). Francisco Gorriti log, in Martínez Rovira 1982)

The excavated cairn MCH, dated c. 1700 of our era, is located at exactly 1000 m from the Chafalote Creek, an area which was evidently populated at that time by Guenoa-Minuane Indians. The discussion focuses on the following

question: Are we standing in front of a landscape built by Guenoa-Minuanes between the seventeenth and eighteenth century?

Final Discussion: Structures That Semanticize the Landscape and Configure the Territory

The sociocultural phenomenon of building cairns and ring cairns has an underlying spatial and symbolic rationality which is materialized in this kind of structures. The spatial logics appear through some consistencies in the location, distribution, and shapes: topography as a key factor in the choice of a certain location, the repetition of spatial configurations at a territorial and intra-site scale (clustered, disperse, and single), and a standardization of forms (mounds, cones, or rings), sizes, and types of rocks, with people who specialized in the construction techniques as well as in how and where to place them.

Cairns and ring cairns, together with their geographical surroundings at the hilltops, probably acted as structuring elements of the land. These elements were created by a certain culture and possess a special significance for those who built it. They may be regarded as socially active spatial symbols (Criado Boado 1991), considering that societies without a written language tend to take symbolic ownership of certain places which usually stand out in the landscape and have a cultural spatial significance (Ingold 1986). In these groups without a writing system, memory resides in oral accounts and material culture, particularly the one that best resists the deterioration caused by the course of time (García Sanjuán 2008). Indigenous populations might have turned the tops of several hills and ranges into places for rituals, land markers, or places for land surveillance. Further research on the different uses linked to the different shapes is still needed, but they are in fact evidence of something that has been materialized, of a system of symbols by which beliefs, concepts, and/or events are represented. The fact that some structures were used as tombs does not rule out the possibility of their being used for other purposes, even for specific occasions.

Further dating in order to obtain a more accurate chronology – when were the structures built and when did their construction cease – is a key aspect in the research of cairns and ring cairns. The reports written by European settlers as well as the dating of the MCH structure (mainly around the seventeenth and eighteenth centuries) dated these structures at a specific historic time in which the Charrúa and Guenoa-Minuane indigenous resistance struggled to survive. European conquest and colonization processes in the current Uruguayan territory led to the extermination of the indigenous groups as communities and the slaughter of much of their population. However, the genocide was not absolute. Those who survived either scattered or blended with the colonial society (Cabrera Pérez and Barreto 2006; Cabrera 2011). Eventually, the official history of Uruguay was written as a country without Indians, claiming the European origin of its society. Nowadays, ethnic minorities are reclaiming their indigenous roots and promoting the search and acknowledgement of the Charrúa culture (Verdesio 2014). Genetic studies (Sans et al. 1997) show that indigenous – and Afro – populations are a component to be considered when analyzing the configuration of the Uruguayan population. Archaeology and the studies of indigenous stone architecture focus at the moment on the context of social transformation of colonial times and are destined to make contributions through the archaeological record of those who wrote not on paper but on the landscape.

Cross-References

- ▶ Archaeology and Geography
- ▶ Buildings, Archaeological Study of
- ▶ Burial Practices in Europe
- ▶ Cult Stones of the Ancient Eastern Mediterranean
- ▶ Early Complex Society in South America, The Development of

▶ Landmarks Foundation: Protecting Sacred Sites Globally
▶ Megalithic Art: A Visual Repertoire for the Dead
▶ Spatial Analysis in Field Archaeology
▶ Stone Treatments in Archaeological Conservation and Preservation
▶ Stone: Preservation and Conservation
▶ Surface Survey: Method and Strategies

References

Acosta, and E. Lara. 1989. *La Guerra de los Charrúas en la Banda Oriental*. Montevideo: Librería Linardi y Risso.

Bonomo, M. 2006. Un acercamiento a la dimensión simbólica de la cultura material en la región pampeana. *Relaciones de la Sociedad Argentina de Antropología* XXXI: 89–115.

Bracco, D. 2004. Los errores Charrúa y Guenoa-Minuán. *Jahrbuch für Geschichte Lateinamerikas = Anuario de Historia de América Latina (JbLA)* 41: 11–136. https://dialnet.unirioja.es/servlet/articulo?codigo=2202187.

Bracco, D. 2013. *Con las armas en las manos: charrúas, guenoa-minuanos y guaraníes*. Montevideo: Editorial Planeta.

Cabrera Pérez, L. 2011. La incorporación del indígena de la Banda Oriental a la sociedad colonial/nacional urbana. *Revista Tefros* 9 (1–2): 1–23. http://www.hum.unrc.edu.ar/ojs/index.php/tefros/article/view/233/214.

Cabrera Pérez, L., and I. Barreto. 2006. El ocaso del mundo indígena y las formas de integración a la sociedad urbana montevideana. *Revista Tefros* 4(2). http://www.hum.unrc.edu.ar/ojs/index.php/tefros/article/view/126/107.

Capdepont, I. 2006. Manejo y aprovechamiento del medio por parte de los grupos constructores de montículos: cuenca de la laguna de Ccastillos, Rocha – Uruguay. *Relaciones de la Sociedad Argentina de Antropología* XXXI: 117–132.

Chiglino. 2016. Estudios geológicos y petrográficos en Fm Cerros de Aguirre y sus sitios arqueológicos. In *Memorias de excavación: sitios arqueológicos Mario Chafalote y Ester Chafalote*, Informe de Proyecto: Paisajes construidos desde la Prehistoria. Lógicas de ocupación y uso del espacio por poblaciones indígenas en la transición tierras altas/tierras bajas, ed. M. Sotelo and C. Gianotti. Uruguay: LAPPU/FHCE/CURE/CSIC/UDELAR.

Criado Boado, F. 1991. Tiempos megalíticos y espacios modernos. *Historia y Crítica* 1: 85–108.

Darwin, C. 1921 (1832). *Diario del viaje de un naturalista alrededor del mundo*. Tomo I. Madrid: Calpe.

Diego de Alvear y Ponce de León. 1784. *Diario Oficial de la segunda división de límites*. sin datos.

Femenías, J. 1983. Amontonamientos artificiales de piedras en cerros y elevaciones de nuestro territorio. *Revista Antropológica* 1 (1): 13–16. Montevideo.

Figueira, J.H. 1898. Los cairnes del Uruguay. Boletín de Enseñanza Primaria, Año X, Tomo XVIII, Nros. 107–108, pp. 309–314.

Figueira, J.J. 1965. Brevario de Etnografía y Arqueología del Uruguay. *Boletín Histórico del Estado Mayor General del Ejército* 104–105: 29–68.

Figueira, J.J. 1958. Una excursión arqueológica al Cerro Tupambay realizada en los comienzos de 1881. Separata de la Revista Nacional, Tomo III, Año III: Nº 195. Montevideo, Ministerio de Instrucción Pública.

Furlong, G. 1936. *Cartografía jesuítica del Río de la Plata*. Buenos Aires: Jacobo Peuser.

Furlong, G. 1984 (1936). *Los Jesuitas y la Cultura Rioplatense*. Buenos Aires: Ediciones Universidad del Salvador.

García Sanjuán, L. 2008. Muerte, tiempo, memoria. Los megalitos como memoriales culturales. In *Patrimonio Megalítico*, PH 67 Boletín del Instituto Andaluz del Patrimonio Histórico, ed. L. García Sanjuán, 34–45. Sevilla: Consejería de Cultura de la Junta de Andalucía.

Ingold, T. 1986. *The appropriation of nature: Essays on human ecology and social relations*. Manchester: Manchester University Press.

Jarque, F. 1687. *Insignes missioneros de la Compañía de Jesus en la provincia del Paraguay: estado presente de sus missiones en Tucuman, Paraguay, y Rio de la Plata, que comprehende su distrito* (Cap. XXIII - Entrada a los Barbaros Guanoás). Pamplona. Impreffor.

López Mazz, J., and D. Bracco. 2010. *Minuanos. Apuntes y notas para la historia y la arqueología del territorio guenoa-minúan*. Montevideo: Editorial Linardi y Risso.

Machado, A., C. Cancela, C. Bica, C. Gianotti, and M. Sotelo. 2016. *Aplicación de tecnologías geoespaciales para el estudio de paisajes construidos: escalas, técnicas y formas de registro*. Caderno de Resumos X Encontro Sab Sul. Pelotas R/S, Brasil.

Martínez Rovira, E. 1982. *Entre el Olvido y la Memoria*. Montevideo: Universidad de la República, Dirección General de Extensión Universitaria, División Publicaciones y Ediciones.

Oyárvide, A. 1865 (1784). Memoria Geográfica de los viajes practicados desde Buenos Aires hasta el Salto Grande del Paraná por las primeras y segundas partidas de demarcación de límites en la América meridional. In *Colección Histórica Completa de los Tratados*, ed. C. Calvo. Primer período Límites, Tomo Séptimo. Besanzon: Imprenta de J. Jacquin.

Palermo, E., C. Prigioni, and O. Santos. 2004. Construcciones Indígenas en piedra de Uruguay, nuevos hallazgos. Congreso Virtual de Antropología,

S

Naya. http://www.equiponaya.com.ar/congreso2004/ponencias/carlos_prigioni.htm.
Periodico El Noticioso. 1898. *Los cairnes de Tacuarembó*. Año II, N° 102, San Fructuoso.
Pintos, S. 1999. Túmulos, Caciques y otras Historias. Cazadores recolectores complejos en la Cuenca de la Laguna de Castillos, Uruguay. *Complutum* 10: 213–226.
Piquet, J. 1882. Al Tupambay! Una excursión arqueológica. *Diario La Razón* 1020.
Rodríguez, M. 2016. Análisis de sedimentos mediante Espectroscopia Infrarroja por Transformadas de Fourier (FTIR) en Sierra de Aguirre (Rocha). In *Memorias de excavación: sitios arqueológicos Mario Chafalote y Ester Chafalote*, Informe de Proyecto: Paisajes construidos desde la Prehistoria. Lógicas de ocupación y uso del espacio por poblaciones indígenas en la transición tierras altas/tierras bajas, ed. M. Sotelo and C. Gianotti. Uruguay: LAPPU/FHCE/CURE/CSIC/UDELAR.
Royal Spanish Academy. 2012. Diccionario de la lengua española [Dictionary of the Spanish Language], (22.a ed.). Consultado en http://www.rae.es/rae.html.
Saldanha, J. de. 1929 (1786–1787). *Diário rezumido e historico*, Anais da Biblioteca Nacional do Río de Janeiro, vol. LI, 134–301. Río de Janeiro: M.E.S. Servicio Gráfico.
Sans, M., F. Salzano, and R. Chakraborty. 1997. Historical genetics in Uruguay: Estimates of biological origins and their problems. *Human Biology* 69 (2): 161–170.
Sotelo, M. 2012. *Paisaje y Monumentalidad en la Prehistoria de Uruguay. Contribución al inventario de cairnes y vichaderos en las tierras altas uruguayas*. Trabajo de Fin de Máster, Universidad de Sevilla, unpublished.
Sotelo, M. 2014. Cairnes y vichaderos en las tierras altas de Uruguay. *Revista del Museo de Antropología* 7 (2): 309–316. https://revistas.unc.edu.ar/index.php/antropologia/article/view/9181.
Sotelo, M., and C. Gianotti. 2015–2016. *Memorias de excavación: sitios arqueológicos Mario Chafalote y Ester Chafalote*. Informe de Proyecto: Paisajes construidos desde la Prehistoria. Lógicas de ocupación y uso del espacio por poblaciones indígenas en la transición tierras altas/tierras bajas. Uruguay: Laboratorio de Arqueología del Paisaje y Patrimonio (LAPPU), Departamento de Arqueología/Facultad de Humanidades y Ciencias de la Educación, unidad asociada al Centro Universitario de Región Este, Universidad de la República.
Sotelo, M., and S. Soler 2015. La divulgación científica como herramienta en los procesos de patrimonialización. La experiencia de Más Cerca Del Cielo. *XI Reunión de Antropología del Mercosur*, Montevideo.
Verdesio, G. 2014. Un fantasma recorre el Uruguay: la reemergencia charrúa en un "país sin indios". *Cuadernos de Literatura* 18 (36): 86–107. http://revistas.javeriana.edu.co/index.php/cualit/article/view/10927.

Stone Tool Usewear and Residue Analysis

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Introduction

Although strictly speaking the concept of *artifact* refers to what is actually manufactured (e.g., by flaking or grinding), in archaeology the term *stone artifact* commonly refers to any stones that are made, modified, or used by humans (other primates also make and use artifacts; see Mercader et al. 2007). The by-products of manufacture are often also called artifacts in the sense that humans produced them. *Stone tools* are usually defined as those artifacts that actually have evidence of use. For reliable identification of archaeological stone tools and determination of specific functions, analysts rely on *multiple lines of evidence* that might include tool design, usewear, residues, breakage patterns, hafting traces, and archaeological context. Ethnographic and experimental evidence is also important. Usewear and residue analyses have the potential to provide a reliable basis for reconstructing and evaluating the nature of prehistoric tasks, resource utilization, and settlement history.

Definition

Residues in this context generally refer to materials that are transferred and adhere to implements in the course of use or preparation for use. We are particularly interested in residues that are transferred to stone tools (Briuer 1976;

Hayden 1979; Loy 1993). Of particular interest is the transfer of residues linked with a specific task (e.g., harvesting cereals or hunting) or processing a particular material (e.g., woodworking or grinding seeds). However, some residues are unrelated to utilization and may reflect incidental contact, burial processes, or even modern contaminants. Some tool residues can survive intact on artifacts for millions of years, while others may deteriorate rapidly and undergo chemical changes depending on their structure and specific taphonomic conditions. Consequently, specific methods of extraction, identification, and analysis have been developed for particular conditions, particular artifact types (e.g., ceramics), and specific kinds of residues (Evershed et al. 1992; Pollard and Heron 1996). The principles of residue analysis are based on the identification of diagnostic microfossils, chemical signatures, atomic structure, and genetic composition, as well as of other properties.

Usewear (or "use-wear") refers to the wear on the edges and surfaces of an implement that is linked with its utilization (Odell 2004). *Microwear studies* sometimes refer to a particular approach that employs metallographic microscopes at high magnification, especially (but not exclusively) aiming to observe and interpret polishes on stone tools (see below). *Traceology* is a term that may refer to the study of any traces (whether residues or surface alterations), usually in the context of tool use, and can be synonymous with microwear studies. However, these terms are often used synonymously to refer to surface modifications that arise during use, hafting, handling, and storage. Some forms of usewear may incorporate or absorb residues within surface layers, providing a mixture of additive residue and usewear traces. The general principles of usewear analysis are experimentally based and derived from fracture mechanics, tribology, and related sciences. While potentially applicable to all material classes (including artifacts made of wood, bone, stone, glass, shell, antler, ceramic and metal), specific methods and interpretive rules have been developed for particular tool materials (e.g., flint).

Key Issues/Current Debates/Future Directions/Examples

The main forms of usewear on flaked stone tools include scarring, striations, edge rounding, smoothing and polish, and bevelling (Hayden 1979; Kamminga 1982). Each form of usewear provides evidence of function but is rarely sufficient on its own to reconstruct particular tasks. Striations, for example, clearly indicate directionality or motion of tool use but are not diagnostic on their own of particular processed materials such as wood, shell, or skin. On the other hand, hafted flint flakes used for hide scraping sustain highly distinctive edge rounding along with a low incidence of edge scarring and abundant striations perpendicular to the utilized working edge.

The fracture mechanics of flaking indicate that particular properties of scars (e.g., initiation, termination type, orientation, and size) are linked with force application, edge morphology, and the nature of materials worked. For example, low-angled tool edges used to cut even soft tissue are particularly prone to produce scars with bending initiations and axial terminations. Bending scars on low-angled edges like this are rarely diagnostic of particular raw materials. However, low-angled tool edges used to saw bone sustain a highly distinctive bending scar pattern with crushed, rounded prominences, and uniform scar spacing (Kamminga 1982). Particular functional tool types known ethnographically sometimes sustain diagnostic scarring in association with other forms of usewear. For example, stone points used as drills sustain characteristically angled scars oriented at right angles to the circular drilling motion. Stone arrow and spear tips sometimes sustain burin-like impact fractures that, in conjunction with other features (e.g., microscopic striations/polish alignments), may be crucial in determining a projectile's function.

Polish on flint tools has been studied extensively and can be a diagnostic indicator of material worked (e.g., van Gijn 2010). Stone segments hafted as sickle blades sustain a highly characteristic gloss that indicates highly siliceous plants. However, particular forms of usewear are not studied in isolation but in combination with

other forms of usewear, other traces of use (e.g., residues), and other lines of evidence such as tool design, breakage, and consideration of the archaeological context.

Grinding and pounding implements (upper and lower stones) sustain surface modifications that include smoothing, striations, and pitting rather than the edge damage that is found on flaked stone tools. Crushing and grinding minerals (e.g., ochre), plants, and animal tissue force residues (including liquids, chemical compounds, and particles) into cracks and imperfections on the tool surfaces. Some grinding stones are selected for the composition of their cemented particles and their suitability for processing particular foods (e.g., grass seeds). Other stones are selected for their toughness and suitability for edge ground tools. Grinding stones and ground stone implements (like axes) with a porous surface or deep cracks provide, under suitable preservation conditions, a reservoir of deeply impacted and absorbed residues related to utilization.

Haft traces can be indicative of particular handles and tool function (Rots 2010). Experiments show that combinations of bindings, sockets, and adhesives affect the type, location, and abundance of scars, striations, and polish.

Residues in archaeology are the minute remains that are transferred to an artifact. The presence of a residue follows Locard's exchange principle which states "with contact between two items, there will be an exchange" (Thornton 1997). There is a range of residues currently studied by archaeologists, chemists, and archaeometrists. These can include microfossils, fibers, scales, particles, pigments, traces, amorphous residues, and biomolecules. The microfossils studied are predominantly plant microfossils represented by pollen, phytoliths, starch grains, and other inorganic crystals (e.g., schlerieds, raphides, and druzes). The fibers will include natural plant fibers (e.g., cellulose), animal fibers (e.g., collagen and hair), insect fibers (e.g., silk), and historical synthetic fibers. Scales can be observed from fish and reptiles in residues. Particles can include organic particles (e.g., charcoal) or inorganic particles (e.g., metals) which can be found in a residue to indicate metal working. Pigments can also be inorganic or organic but are predominantly inorganic in the archaeological record (e.g., ochre and cinnabar), while traces can include tissues and cells from plants or animals.

Amorphous or absorbed residues can be very difficult to characterize or identify. These amorphous residues can be formed by degraded trace residues including fat from adipose tissues, dried fluids (e.g., blood, milk, egg), or plant exudates (e.g., resins, gums, oleoresins). Many biomolecules can be found in a residue. The most widely analyzed are fatty acids as these are slightly hydrophobic, well preserved, and can be found in large amounts. Many other categories of biomolecules can also be studied, including hydrocarbons, carbohydrates, proteins, nucleic acids, lipids, resin acids, drugs, alkaloids and hormones.

Residue analysis begins with low-power incident light microscopy, continues with high-powered incident light microscopy, and culminates with the removal of the residue off the surface of the artifact for polarized light microscopy and further analysis. This archaeological microscopy approach to residue analysis is usually capable of identifying microfossils, fibers, scales, particles, pigments, and some traces. Further analysis employing histology, immunology, simple biochemical test, absorbance spectroscopy, Fourier transform infrared (FTIR) spectroscopy, Raman spectroscopy, UV luminescence, gas chromatography mass spectroscopy (GCMS), liquid chromatography mass spectroscopy (LCMS), and elemental, genetic, or protein analysis can characterize and identify archaeological residue even amorphous residues and residual biomolecules. Many of these techniques have been developed for specific residues under specific conditions on a definitive artifact type, for instance, absorbed residues on ceramic (which can appear invisible). Residue analysis can be performed on artifacts made from the following materials: wood, bone, stone, textile, metal, shell, ceramic, glass, antler, horn, and feather. Some key residue types include food, resin, antler, wood, bone, lipids, adhesives, sealants, and blood.

Residue analysis characterizes a residue with sufficient detail to interpret the function or process of a particular tool. This interpretation can include post-excavation contamination, environmental contamination, incidental contact, and non-functionally related transfer. This will allow the archaeologist to define the tasks with which the tool has been associated. Most residue and usewear analysts will begin by first identifying if there is a residue present on an artifact. This is important in order to identify if an artifact has been used. There are two steps – inorganic or organic and anthropogenic or environmental – that follow the confirmation of a residue. These are critical to determine if the residue is the cause of environmental contamination. Determining if the residue is plant or animal, as well as the tissue and taxa of origin, is critical to establish the association of residue and artifact.

Usewear/residue studies of stone, bone, shell, ceramic, and other implements provide key evidence in the history of hunting technology, food processing, resource utilization, and settlement history. Complex hafting of flaked stone tools (whether projectile tips or craft tools) may provide an archaeological indicator of technological sophistication and hence human intelligence, with evident implications for tracking aspects of human evolution (e.g., Lombard and Haidle 2012). Similarly, the history of grinding stone functions may provide an indicator of sophisticated resource utilization and the complex processing of toxic foods and medicines, again with implications for the study of human evolution.

Cross-References

- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Ceramics: Scientific Analysis
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology
- ▶ Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology
- ▶ Pigment Analysis in Archaeology

References

Briuer, F.L. 1976. New clues to stone tool function: Plant and animal residues. *American Antiquity* 41 (4): 478–484.

Evershed, R., C. Heron, S. Charters, and L.J. Gaod. 1992. The survival of food residues: New methods of analysis, interpretation and application. In *New developments in archaeological science*, ed. A.M. Pollard, 187–208. Oxford: Oxford University Press.

Hayden, B., ed. 1979. *Lithic use-wear analysis*, 1–13. London: Academic Press.

Kamminga, J. 1982. *Over the edge*. Occasional papers in anthropology, Vol. 12. St. Lucia: Anthropological Museum, University of Queensland.

Lombard, M., and M.L. Haidle. 2012. Thinking a bow-and-arrow set: Cognitive implications of middle stone age bow and stone-tipped arrow technology. *Cambridge Archaeological Journal* 22 (2): 237–264.

Loy, T.L. 1993. The artefact as site: An example of the biomolecular analysis of organic residues on prehistoric stone tools. *World Archaeology* 25: 44–63.

Mercader, J., H. Barton, J. Gillespie, J. Harris, S. Kuhn, R. Tyler, and C. Boesch. 2007. 4300-year-old chimpanzee sites and the origins of percussive stone technology. *Proceedings for the National Academy of Sciences* 104 (9): 3043–3048.

Odell, G. 2004. *Lithic analysis*. New York: Springer.

Pollard, A.M., and C. Heron. 1996. *Archeological chemistry*. Washington, DC: Royal Society of Chemistry.

Rots, V. 2010. *Prehension and hafting traces on flint tools: A methodology*. Leuven: Leuven University Press.

Thornton, J.I. 1997. The general assumptions and rationale of forensic identification. In *Modern scientific evidence: The law and science of expert testimony*, ed. D.L. Faigman, D.H. Kaye, M.J. Saks, and J. Sander, vol. 2. St. Paul (MN): West Publishing Company.

van Gijn, A. 2010. *Flint in focus*. Leiden: Sidestone Press.

Stone Treatments in Archaeological Conservation and Preservation

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Introduction

Since antiquity, treatments of damaged stone have been carried out with the aim to delay the deterioration of buildings and monuments. Today, the

objective of stone conservation is the preservation of these historic and/or artistic values for future generations in the best possible state without compromising the value of authenticity and access. The approach that has been taken to address this challenge has direct links to the emergence of chemistry in the nineteenth century. Chemicals such as water glass, fluorosilicates, linseed oil, and later ethyl silicate were applied as consolidants for stone shortly after their discovery and first synthesis. After World War II, organic compounds, such as acrylic and epoxy resins, were introduced into conservation practice. Nowadays, ethyl silicate and derivatives make up the most prominent group of stone conservation products.

A sound knowledge of the chemical and physical characteristics and of the mechanism through which conservation treatments interact with the stone is the basis for the selection of the most suitable solution for any conservation intervention. However, only rarely are the products available on the market tailored to meet the specific needs of the field of cultural heritage. Moreover, the extremely wide range of porous building materials (both natural and man-made) corresponds to an equally wide range of decay problems and conservation needs which limits the validity of any hurried, superficial appraisal. Therefore specific, cautious evaluation is needed before choosing any product or equipment for each specific case.

There are two main ways to collect the information needed for such careful evaluation: (1) to survey the condition of monuments that have been treated in the past and for which reasonably good documentation exists regarding the methods and materials that were used and (2) to carry out ad hoc tests (either in the laboratory, in situ, or in both contexts, by outdoor exposure programs). Studying the condition of monuments treated in the past is the closest we can get to a real assessment of the performance of products and methods, after a known time interval and under known environmental conditions. The sine qua non condition is, however, the availability of exhaustive, or at least sufficient, documentation of the work that was carried out. The parameters to measure, the measuring methods, and the evaluation criteria have been under continuous discussion in order to improve the evaluation of the long-term performance of treatments through the past decades.

Definition

The primary goal of a stone conservation treatment is to restore in an efficient and durable way the integrity of weathered zones of the object, improve its mechanical and physical properties to the same level as the sound core, while considering the primacy of "retreatability" over the requirement of "reversibility." Stone treatments, whether for consolidation or protection, involve the use of special products for stone conservation.

Key Issues/Current Debates/Future Directions/Examples

The Athens Charter for the Restoration of Historic Monuments (1931) is the first international document which outlines the principles for the conservation of historic monuments. It recommends "... the judicious use of all resources at disposal of modern technique" to delay the decay, while these measures "should be concealed in order not to impair the aesthetic integrity of the monument."

Thirty-three years later, 1964, the Venice Charter calls in article 10: "[...] Where traditional techniques prove inadequate, the consolidation of a monument can be achieved by the use of any modern technique for conservation and construction, the efficacy of which has been shown by scientific data and proved by experience." Article 2 states that "the conservation and restoration of monuments must have recourse to all the sciences and techniques which can contribute to the study and safeguarding of the architectural heritage."

Often, the primacy of reversibility is attributed to the Venice Charter. However, in stone treatment, reversibility remains an only theoretical option. As most treatments, if not all, cannot be considered as reversible, "retreatability" is the desired characteristic of a conservation intervention (Petzet 1993; Giusti 2006), which has been

replacing the concept of reversibility in conservation ethics.

Many papers continued to be published on the results of laboratory tests for stone treatments, both specifically referring to the treatment of specific monuments and to the assessment of a given conservation product or method. Requirements have been specified for different treatments. The research aims assumed that the main objective was not the selection of the "best" product but rather the identification and testing of criteria determined by the stone itself that might lead to that selection (Delgado Rodrigues 1996). Tests for cleaning methods and on the effectiveness of biocides were proposed. The growth in the use of laser cleaning has influenced the experimental studies to evaluate its effects and possible damages.

Since 1985, the Italian NORMAL Committee had dedicated a working group to the problem of evaluating water-repellent products with the specific aim of defining a detailed testing methodology. Evaluation procedures for stone treatments have been discussed at length during the International Colloquium organized by ICCROM in 1995 on "Methods of Evaluating Products for the Conservation of Porous Building Materials in Monuments." The five sessions of the Colloquium were dedicated to the specific problems of testing restoration mortars, biocidal treatments, consolidation treatments, treatments with water repellents, and finally to the important issue of weathering. Each session was followed by a Round Table. A critical evaluation of the papers and of the Round Table discussions was published 1 year later, in 1996, by the experts who chaired the sessions.

H. R. Sasse and R. Snethlage (1997) have proposed a very comprehensive and detailed methodology for the evaluation of stone consolidation treatments based on their own experience and on a previous proposal by D. Honsinger (1990).

Besides the properties to be measured and the related testing methods, Sasse and Snethlage propose to evaluate the results obtained for each parameter making reference to the unweathered stone and to assess them as "% of the optimum." Limits of acceptability are also proposed. According to these authors, penetration depth, hygric dilatation, and E-modulus have the highest priority among the listed properties. The penetration depth must be related to the thickness of the damaged stone or of the zone of maximum mean moisture; hygric dilatation must not increase against the untreated stone, and the E-modulus must not exceed the E-modulus of the unweathered stone by more than 1.5 times.

Accelerated laboratory tests and field-exposure studies, though considered useful and frequently applied, cannot be directly translated into the prediction of the long-term behavior of stone treatments. Nonetheless, many of the difficult points related to field-exposure and to laboratory-accelerated studies are also valid when these conditions are applied to test the durability of treatments. The limited validity of field-exposure tests, as they are constrained by the existing climatic and environmental parameters, and the risk that too high concentration of damage components in accelerated chamber experiments or too high frequency of weathering cycles may lead to results which are far from reality and therefore not useful for the intended purpose are among the main challenges.

For a critical evaluation of the present situation of testing procedures, as they are nowadays commonly carried out, the various steps of the process can be briefly discussed. The aim of the study must be clearly defined in order to select the products (or equipment) to test, the parameters to measure, the type and number of samples, and all the other experimental details.

Once this has been decided, it will be possible to estimate the time needed for the study and its cost. These two points are not insignificant, considering that time and budget constraints frequently limit the possibility to carry out the study, especially when it is aimed at the selection of products for the conservation of a specific monument, within a conservation project where budget and deadlines have already been fixed.

When this is the aim, it is of the utmost importance to refer to the results of preliminary diagnostic studies (characteristics and condition of the stone, main factors of decay, surface typology,

etc.) when planning the experimental details of the testing procedure. To that purpose a strict contact between the laboratory where tests are planned and carried out and the project site is always advisable in order to facilitate the exchange of opinions between conservation scientists and conservator/restorers. This collaboration is especially important when testing cleaning methods. Actually, while their harmfulness could even be evaluated on laboratory samples of the same stone type as the monument, their efficacy has to be tested on the real surfaces, due to the complexity of the various forms of deposits or other dangerous materials to be removed and which are impossible to reproduce artificially.

The last important point of the planning phase concerns the products to test. In the large majority of cases, several products are tested together and compared, as such the results have a relative validity rather than an absolute significance. Whichever the aim and category of the evaluation, the products must be clearly identified (nature and concentration of principal components, solvents, catalysts, additives if any, etc.). Unfortunately, it is not compulsory for producers and retail dealers to declare the detailed composition of products used in conservation; moreover, to characterize these products is not easy for unspecialized laboratories, especially in the case of organic products. It is, however, advisable to reject products that are only vaguely described and to have at least a "fingerprint" of the product to test, such as a FTIR spectrum. This will also help to check afterwards the quality of the product that, having been tested and selected, will be used for a conservation treatment.

When the tests are carried out on stone laboratory samples, they are obtained either from a monument or from the quarry. The first case, however, is not very common, as the amount of samples required for the testing cannot be obtained from a monument, unless some dismantling has to be carried out. In the second case, the quarry stone condition is usually better than the condition of a stone in need of conservation. This may require a preliminary artificial weathering which will, however, introduce an element of uncertainty in the test results.

The problem is even tougher if the tests concern bricks and mortars. If old, damaged samples are not available, as is very frequently the case especially with mortars, it is necessary to produce new samples similar to the damaged ones, and this requires extra work for their production and the subsequent characterization.

Cubes, parallelepipeds, and cylinders are the sample shapes most frequently used; depending upon the different parameters to measure, different shapes may be needed within a single study. The sample size generally ranges from 3 to 7 cm. The more homogeneous the stone, the smaller can be the size. However, when the depth of penetration and bulk properties are considered important in order to assess the efficacy of the treatment, the use of very small samples should be avoided. Working Group 3 within the Technical Committee 346 of the European Committee for Standardization (CEN) is currently preparing further standards for the evaluation of methods and products for conservation works on porous inorganic materials constituting cultural heritage (http://www.cen.eu/).

Nondestructive tests, such as ultrasonic pulse velocity, are given priority over destructive tests, such as for mechanical strength. Parameters that can be measured in profile along the weathered zones are preferred over bulk parameters of the stone as a whole.

Cross-References

- ▶ Architectural Sites: Monitoring
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Historic Site and Historic Building Preservation: Overview

▶ International Heritage Conservation Principles: Historical Overview
▶ Nonstructural Sites: Monitoring
▶ Stone: Preservation and Conservation

References

CEN. n.d. Available at: http://www.cen.eu/CEN/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/Pages/TCStruc.aspx?param=411453&title=CEN%2FTC+346. Accessed 21 Oct 2012.

Delgado Rodrigues, J. 1996. Study on stone treatments. In *Project STEP CT90-110: conservation of granitic rocks with application to the megalithic monuments*. EC DG XII, Research Report 5, 225–242. Brussels.

Giusti, A. 2006. Brandi's "reversibility" forty years later. In *Proceedings of the international seminar Theory and practice in conservation Lisbon, May 4–5*, ed. J. Delgado Rodrigues and J.M. Mimoso, 139–144. Lisbon: LNEC.

Honsinger, D. 1990. Strukturuntersuchungen polymerimprägnierter Sandsteine. Dissertation RWTH, Aachen.

International Colloquium. 1995. *Methods of Evaluating Products for the Conservation of Porous Building Materials in Monuments*. Rome: ICCROM.

Petzet, M. 1993. *Denkmalpflege heute*. Arbeitsheft 60. München: Bayerisches Landesamt für Denkmalpflege.

Sasse, H.R., and R. Snethlage. 1997. Methods for the evaluation of stone conservation treatments. In *Dahlem workshop on saving our architectural heritage – The conservation of historic stone structures*, ed. N.S. Baer and R. Snethlage, 223–243. Chichester/New York: Wiley.

Science and Technology for Cultural Heritage 5(1) (Special Issue on the ICCROM Colloquium 1996).

Further Reading

Doehne, E., and C.A. Price. 2010. *Stone conservation: an overview of current research*, 2nd ed. Research in Conservation. Los Angeles: The Getty Conservation Institute.

Laurenzi Tabasso, M., and S. Simon. 2006. *Testing methods and criteria for the selection/evaluation of products for the conservation of porous building materials*. Reviews in Conservation IIC, 67–82. London: IIC.

Lazzarini, L., and M. Laurenzi Tabasso. 1986. *Il Restaurodella Pietra*. Padova: Cedam.

Siegesmund, S., and R. Snethlage, eds. 2011. *Stone in architecture*. 4th ed. Berlin/Heidelberg: Springer. https://doi.org/10.1007/978-3-642-14475-2_7.

Snethlage, R. 1997. *Leitfaden Steinkonservierung*. Stuttgart: Fraunhofer IRB Verlag.

Torraca, G. 1988. *Porous building materials*. Rome: ICCROM.

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Basic Biographical Information

Peter G. Stone was born in Manchester, UK, in 1957. After school, he first studied at the University of Stirling, gaining both a bachelor's (BA) degree in history and a Diploma of Education (DipEd) in 1979. Over the next few years, he worked as a schoolteacher, teaching history in England, but also teaching English in Greece. In the school summer holidays of 1978 and 1979, and before going to Greece in 1979, he worked as a volunteer at the Coppergate excavations in York with York Archaeological Trust. He was soon drawn even closer to archaeology, completing in 1983 a master's (MA) degree in archaeological method and theory at the University of Southampton. This was followed by a PhD at the same university, supervised by Professor Peter Ucko, with the thesis entitled *Teaching the Past, with Special Reference to Prehistory, in English Primary Education*, combining both his pedagogical experience and his archaeological interests.

Major Accomplishments

Due to working in a number of posts, including as a Project Manager and Coordinator at the University of Southampton for the Archaeology and Education Project set up with Ucko and then in various posts at English Heritage, and with a young family, Peter had the challenging task of carrying out his PhD research on a part-time basis. This achievement both developed in him a wider knowledge and experience of the heritage sector than a full-time student would have gained and also demonstrated his ability to focus on academic research despite many other commitments. It was during his time with English Heritage that he was directly involved

with the infamous controversies surrounding the Summer Solstice at Stonehenge, dealing with this issue in the early to mid-1990s, including while working as Acting Regional Administrator for the South West. His experience with Stonehenge helped establish him as an authority on the site, with numerous publications looking at issues around the site's treatment and management (e.g., Stone 1999, 2006), leading to his appointment in 1997 as the Council for British Archaeology's (CBA's) Special Advisor on Stonehenge (later appointing him CBA representative for Hadrian's Wall, another significant World Heritage Site). The CBA also took advantage of Peter's educational expertise, appointing him Chair of the CBA Education Committee from 1997 to 2003, and he had been a member of the Schools Committee and then the Education Board for the CBA since the mid-1980s.

However, Peter's involvement in heritage reached beyond the UK into international issues from an early stage; he was instrumental, again with Peter Ucko, in driving the formation of the World Archaeological Congress (WAC). From 1998 to 2008, he was the Chief Executive Officer of WAC, and his continued involvement has been credited with providing WAC with administrative continuity and institutional memory (Smith, *pers. comm*. 2011), working from 1986 as head of the unpaid secretariat that enabled the organization to function. During this time too, he was the Executive Series Editor for the One World Archaeology (OWA) Series (1999–2003). He also produced as part of the OWA Series several seminal publications on education and interpretation of archaeological and cultural heritage that are still core textbooks (e.g., Stone and MacKenzie 1990; Stone and Molyneaux 1994; Stone and Planel 1999).

He has also been involved with international heritage management issues for much of his career, for example, through extensive involvement with the United Nations Educational, Scientific and Cultural Organization (UNESCO). For example, in 1996 he was appointed as a member of the Advisory and Drafting Team for the World Heritage Education Project and Kit. His work with UNESCO has also included extensive work overseas. He was personally approached by National Museums and Monuments of Zimbabwe (NMMZ) to carry out a review of their education service, compile a report on its future development, and then implement some of that development – in particular a 7-week training program for education and interpretation staff in NMMZ. In addition, sabbatical visits to Australia and New Zealand as visiting lecturer at Flinders and Auckland Universities in 2004 and work in China in 2008 with the International Centre for Chinese Heritage and Archaeology (ICCHA) reinforce the regard in which his expertise is held internationally.

In 1997 Peter joined Newcastle University as a lecturer in heritage studies at the Department of Archaeology. He developed the popular MA program in Heritage Education and Interpretation and was the Director of the International Centre for Cultural and Heritage Studies at Newcastle University from its formation in 2001–2005. Following this, he moved to becoming Head of School of Arts and Cultures at Newcastle University, also becoming a Professor in 2005. In 2016 he became UNESCO Chair in Cultural Property Protection and Peace at Newcastle University.

From a research perspective, Peter has recently been involved with exploring the controversial issues around heritage management during armed conflict, stemming from his appointment in 2003 as advisor to the Ministry of Defence with regard to safeguarding the archaeological heritage in Iraq in light of the impending conflict. As well as an award-winning publication coedited with Stone and Bajjaly (2008) and the development of a touring exhibition in partnership with the Oriental Institute in Chicago exploring the impact of the destruction of cultural heritage in Iraq, this experience has also led to Peter's continued lobbying of the UK government to ratify the Convention for the Protection of Cultural Property in the Event of Armed Conflict with Regulations for the Execution of the Convention 1954. Related to this, he is also the Chair of the UK Committee of the Blue Shield. Peter also continues to

be interested in other heritage management issues, chairing the Hadrian's Wall World Heritage Site Management Plan Committee and sitting on the National Trust's Archaeology Advisory Panel.

Peter Stone's career has been highlighted with much esteem for his influential and groundbreaking contribution to international heritage studies. In 2011 he was awarded the Order of the British Empire (OBE) in the Queen's Birthday Honours list for services to heritage education. In 2013 Peter was awarded the Peter Ucko Memorial Award and a Lifetime Achievement Award by the World Archaeological Congress – both for services to world archaeology. Peter currently lives in Northumberland with his wife and four children.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Ucko, Peter (Cultural Heritage Management)
- ▶ World Archaeological Congress (WAC)

References

Stone, P.G. 1999. The Stonehenge we deserve? *Minerva* 10: 22–25.

Stone, P.G. 2006. Stonehenge – A final solution? *Public Archaeology* 3: 139–149.

Stone, P.G., and J.F. Bajjaly, eds. 2008. *The destruction of cultural heritage in Iraq*. Woodbridge: The Boydell Press.

Stone, P.G., and R. MacKenzie, eds. 1990. *The excluded past: Archaeology in education*. London: Unwin Hyman.

Stone, P.G., and B. Molyneaux, eds. 1994. *The presented past: Heritage, museums and education*. London: Routledge.

Stone, P.G., and P. Planel, eds. 1999. *The constructed past: Experimental archaeology, education and the public*. London: Routledge.

Further Readings

For many of Peter's publications. See www.ncl.ac.uk/sacs/staff/profile/peter.stone#tab_publications

Stone: Preservation and Conservation

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Introduction and Definitions

Stone represents a hard substance typically composed of mineral and/or rock matter, which is quarried, or simply found, and worked into a specific form and size for a particular purpose such as construction, paving, and adornment, or as powders (e.g., pigments). Stone is exceedingly varied in its distribution, characteristics, and application; however before its broad diversity can be discussed, important definitions must first be addressed.

***Mineral*:** a class of naturally occurring substances comprised of inorganic compounds (carbonate) and elements (carbon) that exhibit a specific chemical composition, crystal structure, and optical characteristic. Specific minerals may include diamond, feldspar, quartz, and talc. ***Rock*:** substance comprised of varied minerals either as individual mineral materials (e.g., graphite) or variable minerals constituents (e.g., granite). Rock can be created in nature through heat and/or pressure (marble) or through the actions of water and time (e.g., limestone). Rocks are basically composed of one massive mineral, or simply a mosaic of many. ***Weathering*:** rock surface deterioration caused by various mechanical and chemical processes through in situ influences. Causes are grouped as intrinsic and include characteristics of rock type, permeability, and surface texture, while extrinsic agents represent external or noninherent factors such as sunlight and rainfall. ***Erosion*:** rock surface deterioration and weathering specifically due to the moving action of water and/or wind (e.g., waves, rainfall).

To understand stone use and treatment, it is crucial to understand their classifications that are based upon their primary environments of formation: heat, water, and pressure. Rocks are divided into three rock types of igneous (primarily fire), sedimentary (primarily through secondary deposition), and metamorphic (primarily through heat and/or pressure alteration).

Igneous Rock

These rock materials are often the least likely to deteriorate quickly in art, archaeological, and architectural settings. They typically develop in high-temperature environments (crust, mantle) and are divided into two basic groups: intrusive and extrusive. These rocks are classified based on their formation and composition. ***Intrusive rocks*** and minerals include those materials that are formed in high temperature settings deep within the Earth, or near the Earth's surface (e.g., volcanoes). In general, those rocks forming deep below the surface develop coarse particle sizes (like diamonds and granite), while those forming near the surface have smaller particles. Intrusive stones include granite, gabbro, and porphyry. For example, the stone blocks of Machu Picchu (Peru) were cut from granite, while Pyramids of Giza (Egypt) were originally faced in red granite from Aswan. However, the granite sheets were robbed over the years to leave the limestone core blocks remaining. The monumental columns of the Pantheon in Rome (Italy) were hewn from granite, while its interior's large circular floor panels were composed of a rare, blood-red porphyry. ***Extrusive (or volcanic) rocks*** form near or on the Earth's surface and have a fine-grain size often as "lava" materials including rhyolite (light colored), andesite (gray, brown), or basalt (dark colored). Volcanic rock may be ejected as well (supercooled) to form igneous glasses like obsidian or scorious (with cavities) materials like pumice. For example, rhyolite (tuff) was used for the popular "peperino" building material in Rome (Italy) and the mo'ai statues of Easter Island (Rapa Nui).

Although all extrusive and intrusive rock materials are found in construction or as artifacts, their overall hardness makes them often difficult to work as structural masonry. However their hardness also makes them resistant to scratching and ideal in adornment and as small tools.

Sedimentary Rock

These rock materials include some of the most widely used rocks in construction and conservation and include limestone and sandstone. Although most of the Earth's crust is composed of igneous rock, most of it is covered by a thin veneer of sediments and sedimentary rock. These rocks are formed as layers of our crustal sediments become compacted, cemented, and hardened (indurated, lithified). Sedimentary rocks are considered secondary, because they are formed as the result of the accumulation of smaller portions of pre-existing rock materials like other sedimentary or igneous and metamorphic rocks. There are three categories of sedimentary rocks that are based upon the type of particle from which it developed. ***Clastic*** sedimentary rocks are comprised of accumulations of small pieces of broken-up rock (or clasts) that have accumulated and lithified over time through compaction and/or cementation. For example, accumulated and cemented beach sand develops into sandstone over time. ***Chemical*** sedimentary rocks develop when chemically rich water evaporates, leaving floating or dissolved minerals to concentrate. Chemical-type rocks are most prevalent in arid environments where seasonal or ephemeral ponds (playa lakes) develop in closed depressions. For example, salt and gypsum deposits form from repeated flooding and evaporation over long periods. ***Organic*** sedimentary rocks represent the accumulation of organic debris such as large shells (cochina), fine shell material (chalk), and plant material (coal).

Sedimentary rock materials represent one of the most widely used building materials and include the limestone blocks of the Pyramids at Giza (Egypt), the carved sandstone Buddha of Leshan (China), and the architecture of Petra (Jordan), the travertine of Saint Peter's Colonnade (Italy), and the elaborately carved salt mine architecture of Wieliczka (Poland).

Metamorphic Rock

From "meta" (change) and "morph" (form), any rock can develop into metamorphic rock through a

change in heat and/or pressure. Over time, with increased pressure limestone becomes marble, the most popular sculptural and statuary material, and mudstone and shale alter into slate. This change may involve the rock moving into a different environment, or the environment changing around the rock material. These re-cooked and restressed rocks include marble, slate, gneiss, and schist. For example, the Taj Mahal in Agra (India), Il Vittoriale in Rome (Italy), and the US Supreme Court Building (USA) are all constructed of white marble. Other metamorphic building materials are much less common; however schist, phyllite, and gneiss are used in stone architecture. We must be reminded as well that many rock materials do not confirm to one classification, since the transformation processes may be localized or incomplete. Hence, limestone may have marbleized portions, or granites may have gneissic margins.

Weathering and Deterioration

Since stone materials are so varied in composition, texture, density, and integrity, their rates of weathering, influences on weathering, deterioration features, and change in integrity over time are as diverse. So to address stone preservation, one must first examine the broad factors involved in stone deterioration as well.

Weathering is the breakdown of rocks (and minerals, soils, metals, glass, etc.) through the interaction with the atmosphere, climate, biota, and anthropogenic factors (e.g., pollution). The processes of weathering occur in situ and are not to be confused with erosion, which involves deterioration and degradation by influences that involve movement including moving water, wind, ice, and gravity. Weathering is conventionally classified into (a) physical and (b) chemical weathering. **Physical** (or mechanical) weathering involves the breakdown or disintegration of stone through direct contact with climatic influences, whereby the weathering by-product is the same as the pre-weathered material. Physical weathering causes the disintegration of rocks without chemical change. For example, freezing water can expand surface cracks in rocks that cause the material to breakdown and off. **Chemical** weathering however involves the breakdown of rock surfaces through chemical reactions influenced directly by the atmosphere, biota, and climate. It is a gradual process as the mineralogy of the stone adjusts to the surface environment, and/or to the contact changes (wind, water, humans). New or secondary minerals can develop from the original rock minerals – the processes of oxidation and hydrolysis being the most prevalent. For example, acid rain eroding the surface of a marble statue produces a by-product unlike the pre-weathered rock.

Chemical and physical weathering, however, most often work in tandem. One process is rarely the only weathering agent, but instead the two influences work together to breakdown rock material. For example, cracks expanded by physical frost action (cryo-fracturing) will increase the surface area of the weathering rock, exposing more material to chemical reactions and further breakdown. Biologic weathering is a term used for the influence of plants and animals on rock breakdown. Plants and animals may create chemical weathering through release of acidic compounds. For example, lichen overgrowth on rock produces fine roots (rhizines) that physically attach, penetrate, and disaggregate the rock substrate, while oxalic acids released from the lichen roots can chemically deteriorate the substrate as well (Paradise 1997).

Many of Earth's landforms, surface features, and landscapes are the result of weathering processes, in conjunction with erosional forces. In the fields of material conservation/preservation, and heritage management, it is imperative that an identification and understanding of weathering and erosional characteristics is addressed before assessment and treatment may be undertaken. Questions as to why sandstone weathers differently than limestone or granite, for example, are crucial in stone conservation and preservation. Hence, a discussion of the diverse weathering influences on the assorted stone materials follows.

Physical weathering phenomena include a number of influences that can degrade the surface of stone and ultimately lead to decreasing the integrity of the structure as well. *Disaggregation and*

spalling: in rock materials made up of particles (cochina), minerals (granite), or clasts bound by matrix (sandstone), weathering agents can cause decay through disaggregation. With repeated heating-cooling (thermal stress), and freezing-thawing, the aggregate may loosen from the rock material, and fall away, causing surface recession. The expansion of freezing water ($\leq$10%) may be enough to pry a particle from its substrate. Also, the expansion of a heated surface particle, crystal, or clast may also cause its disaggregation. Disaggregation can be common in environments where temperature ranges are greatest, like deserts. Similarly salt heaving occurs when salts within or adjacent to the weathering material can migrate (when soluble) into the surface particles to evaporate, crystallize, and expand, causing salt heaving and disaggregation as well. Hydration occurs when rock and minerals expand upon saturation and are pried from the substrate and deterioration as well; this can be a process that involves both physical and chemical weathering processes as well. When rock minerals take up water, the increased volume creates physical stresses within the rock and act again to pry apart particles, crystals, and rock materials.

Since some rock materials (e.g., sandstone, granite) formed deep below the Earth's surface, when erosion and/or uplift exposes them, this removal of overburden represents a huge decrease in material pressure. Hence, the material will expand causing small (micron) to moderate (centimeter) fractures to develop. This "unloading" can cause large-scale surface deterioration and structural damage through sheeting, peeling, and spalling (Smith and Warke 1996).

Chemical weathering influences include a number of influences that can deteriorate the surface of stone, leading to overall deterioration, surface recession, and damage as well. *Dissolution and hydrolysis* is the weathering process whereby acidic solutions (e.g., acid rain, groundwater) degrade rock material through the acidic breakdown of some rocks (e.g., limestone, marble) and minerals. In many cases, hydration is also a chemical process, for example iron, when iron oxides change to iron hydroxides and the hydration of anhydrite forms gypsum. Hydrolysis commonly affects silicate (e.g., arenite) and carbonate minerals in rock (e.g., limestone). For example, water can ionize/acidify to react with silicate minerals resulting in the dissolution of the original mineral. *Oxidation* typically involves the transformation of metals and metallic components. In stone, most process involves the oxidation of iron or copper through the combination of water and oxygen. This change to iron or copper oxides produces a rust-like stain in iron from the development of new minerals like hematite and limonite, or a green stain (verdigris) in copper with the transformation into new minerals like chalcopyrite. This rusting or verdigris decreases the overall rock integrity and hardness.

Conservation Applications and Treatments

Contemporary conservation efforts now often examine and monitor deterioration influences and conservation at four different scales: (a) molecular material scales (e.g., microscopic examinations, submillimeter), (b) surface material scales (e.g., rock surface detail, millimeter-centimeter), (c) structural levels (e.g., for partial restoration of a temple, centimeter-meter), and at (d) the broadest urban/regional scales (e.g., classical period city reconstruction, meter-kilometer). All examination, conservation, and monitoring levels must address both extrinsic (i.e., climate, humans) and intrinsic (i.e., stone composition, integrity) influences on stone deterioration, so the techniques used in their conservation must affect these factors directly. Conservation procedures can then (i) reduce material susceptibility to weathering and erosion forces and/or (ii) increase its resistance to them. At many sensitive sites like Petra (Jordan), or Machu Picchu (Peru), extrinsic deterioration factors such as human touching, climbing, and treading, may be diminished simply through enforced policies that either prohibit or require certain aspects of behavior, banning entrance, prohibiting climbing, or simply climbing over, on, or near sensitive materials and sites. These simple policies have proved effective in

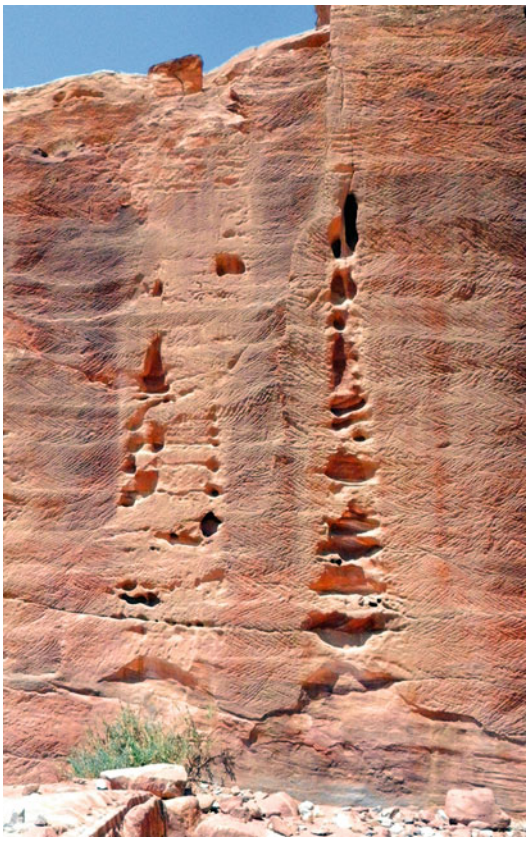

Stone: Preservation and Conservation, Fig. 1 Erosional rillen from rainwater-entrained sand, Petra, Jordan. Rushing water from torrential rainfall entrains and mobilizes sandgrains from the sandstone, which then in turn further abrade the substrate sandstone producing these channels (or karren, rillen). The sandstone substrate was hewn by the Nabataeans approximately 2000 years ago

Stone: Preservation and Conservation, Fig. 2 Tafoni (stonelace, alveoli) in Petra, Jordan. Complex feedback cycles of wetting and drying, hardening, and disaggregation are responsible for this characteristic cavity development. This alveolar weathering is observed here on a surface dressed 2000 years ago, so the surface recession from weathering may be determined at 1–2 cm/millennia

Stone: Preservation and Conservation, Fig. 3 Natural limestone decay in Malhamshire, UK. The pavement-like appearance is due to the deterioration of the surface limestone through dissolution and its acceleration from rock fractures and natural cavities in these karst landscapes

decreasing deterioration including human-induced abrasion, and humidity shifts (from respiration, perspiration, and transpiration). Such restrictions may act not only to decrease overall stone weathering and erosion but to also create a sense of patrimony and caring among visitors to these sites. Understanding that all people are a part of our Earth's patrimony, protection, and salvation may in fact instill a sense of legacy and heritage – a more pervasive conservation concept.

In addition to policies related to restricting or facilitating behavior, the first step in effective stone conservation and material/structural maintenance involves the removal of salts (efflorescence), plants, and lichens from the surface, whereby their removal, in many cases, can decrease the rate of erosion and weathering. New applications are now being tested (e.g., "cocoons") where a

Stone: Preservation and Conservation, Fig. 4 Comparative sandstone capitals hewn from the Pietra Serena Sandstone in the Ospedale degli Innocenti, Florence, Italy, designed by Filippo Brunelleschi (15th C). The disparity in weathering in the sandstone architecture can be attributed to variations in insolation, thermal stress, and environmental fluctuation

Stone: Preservation and Conservation, Fig. 5 Lichen-induced weathering/spalling of sandstone, Lamlash Church, Arran Isle, Scotland. Lichen attachment and rhizine penetration of the red sandstone substrate is accelerating the spalling and disaggregation of the architectural stone. Lichen overgrowth can temporarily facilitate surface induration and then subsequently cause large sheet spalling

Stone: Preservation and Conservation, Fig. 6 Travertine (tivoli limestone) deterioration is evident across Bernini's Colonnade at St. Peter's Basilica, Vatican City, as observed in the uneven pitting and surface recession of the column drum. Accelerated weathering of the travertine has been attributed to a number of factors including biotic (cyanobacteria, moss, lichen) overgrowth and penetration, biogenic acid production, urban-generated acid rain, and environmental agents (e.g., thermal stress, wetting-drying)

thick poultice is applied to the stone surface to absorb salts and particulates, so that upon their removal, surface pollutants and salts are removed as well. However, early tests have indicated that some of the stone substrate is also removed – a dangerous and detrimental circumstance in stone conservation practices, however the technique shows great promise.

Once the deteriorating materials have been appropriately cleaned, the use of surface consolidants is increasingly conventional in strengthening stone integrity and fabric. Conservation methods and application are meant to address the influences of intrinsic weaknesses that can accelerate rock weathering and erosion. Over the millennia, on rock and mineral structures, artwork, and monuments, liquids and waxes have been applied in the hopes that disaggregation can be controlled through the

better adherence of the components of the stone materials. Vitruvius (15 BC) described the use of beeswax as a means of consolidating and waterproofing stone, and similar applications have been tried since. These organic applications are increasingly rare; however inorganic washes such as calcium carbonate plaster and slurry were also widely used then and now. In fact, in sensitive stone materials like Petra's sandstones, plaster applications (for consolidation and/or fresco overlay) were widely applied and are still visible today on chamber walls, façades, couloirs, and staircases, where the carbonate coating has been protected from the destructive influences of sunlight, extreme temperature cycles, touching, precipitation, and woodfire sooting (Paradise 2011).

Contemporary stone surface and near-surface consolidants are categorized as synthetic (organic) polymers, silanes (alkoxy), epoxies, and waxes. Early experimental trials from the 1970s utilizing polymer consolidants (i.e., Paraloid©) are still often evident on limestone and sandstone applications across Asia, Europe, and the Mediterranean (Wheeler et al. 1984). Organic resins are typically irretrievable, and over time they tend to discolor, bleach, and peel (Paradise 2015).

Silane applications have been used since the 1980s (e.g., Wacker OH©) and are organosilicon compounds that permeate the voids in stone (e.g., sandstone) strengthening its mineral fabric, and decreasing its overall permeability (and active porosity) by creating a silica gel that fills the voids, binds the clasts, and "waterproofs" the stone. Silane applications have proven to be effective consolidating agents when the whole object may be immersed, so that the solutions may penetrate all portions of the sandstone in question, such as a statue. However, when applied to stone such as sandstone in situ, like the façade of a monument, variability in penetration depths and coverage permits moisture to become trapped or enter and mobilize behind the silica skins. Once this occurs, rather than the normal disaggregation of the clast from the rock, spalling and sheet collapse can occur. The results of silane use in conservation will either represent an exemplary warning against future use, or an excellent model for continued applications on important deteriorating stone architecture (Paradise 2011).

Overall, the field of rock weathering and stone conservation is relatively new, and theoretical research and applied innovation will continue to help us to more effectively and efficiently protect our stone cultural heritage. Since our architectural and archaeological rock and mineral materials are so diverse, treatments and applications used to decrease their weathering and deterioration must also be as varied. So as research and technology grows and develops, our ability to preserve our precious past will grow, and our stone heritage will remain for us to experience and cherish longer and longer.

References

Paradise, T.R. 1997. Sandstone weathering from lichen overgrowth, Red Mountain, Arizona. *Geografiska Annaler (Stockholm)* 79 (3): 177–184.

Paradise, T.R. 2011. Architecture and deterioration in Petra: Issues, trends and warnings. In *Archaeological heritage at Petra: Drive to development or destruction?* ed. Doug Comer, 87–119. New York: UNESCO-ICOMOS-ICAHM Publications through Springer.

Paradise, T.R. 2015. Analysis of sandstone deterioration on petroglyphs, architecture, inscriptions, and dressed surfaces in Wadi Rum, Jordan. In *Desert & Man II*, ed. S. Fares, 21. Nancy: University of Lorraine Publications.

Smith, B.J., and P.A. Warke, eds. 1996. *Processes of urban stone decay*, 150. Shaftesbury: Donhead Publishing.

Wheeler, G.E., Dinsmore, J.K., Ransick, L.J., Charola A. E., and R.J. Koestler. 1984. Treatment of the Abydos Reliefs: Consolidation and Cleaning. *Studies in Conservation* 29(1): 42–48.

Related Readings

Pope, G.A., R.I. Dorn, and J.C. Dixon. 1995. A new conceptual model for understanding geographical variations in weathering. *AAG Annals* 85 (1): 38–64.

Prikryl, R., and B.J. Smith. 2007. *Building stone decay: From diagnosis to conservation (special publication #271)*, 344. London: Geological Society.

Turkington, A.V., and T.R. Paradise. 2005. Sandstone weathering: A century of progress & innovation. *Geomorphology* 67: 229–253.

Winkler, E.M. 2002. *Stone in architecture: Properties, durability*, 313. Berlin: Springer Publishing.

Strategic Environmental Archaeology Database (SEAD)

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Introduction

Environmental archaeology encompasses a wide range of scientific methods for analyzing the results of past human activities, environments, climates, and perhaps, most importantly, the relationships between these. Many of these methods are referred to as *proxy analyses*, denoting the illumination of the past as interpreted indirectly through the evidence of fossil organisms or properties. These lines of evidence, or proxy data sources, are assumed to reflect past conditions by way of their dependence on them. For example, a species of beetle may only survive within a specific climate range, and thus its presence in samples indicates this climate at the time of deposition; organic waste deposited around a farmstead will raise soil phosphate levels above those of the surrounding land; and the presence of cereal grains in postholes suggests their local cultivation or import, usage, or storage. While it is easier to store, manage, and analyze the data produced by these methods individually, there is much to be gained from multi-proxy integration at the raw data level, especially with respect to providing a framework for a more holistic interpretation of evidence.

Despite the considerable methodological diversity in environmental archaeology, the common factors of space, time, and sampling/archaeological context should allow us to cross-correlate and integrate the results of analyses. This is, however, easier said than done, and without efficient data handling, the data rapidly become unmanageable. SEAD (n.d.) represents one solution to this problem, and forms a node in an international web of open-access paleoenvironmental and archaeological databases which are driving archaeological science into new realms of more complex, multi-site, multi-proxy analyses and meta-analyses. This entry sets out to describe the system, the scientific goals of which were set out in Buckland et al. (2010) and Buckland (2013).

Definition

The Strategic Environmental Archaeology Database (SEAD, http://www.sead.se) is a research data infrastructure for the storage, management, analysis, and dissemination of environmental archaeology and Quaternary science data. The database covers a large number of proxy data sources, ranging from insects and dendrochronology to ceramic thin sections and ^{14}C dating (Table 1). It is an open-access project, initially financed by the Swedish Research Council and Umeå University, Sweden, with subprojects funded by Lund University. Further development has been financed through The Swedish Foundation for Humanities and Social Sciences VISEAD infrastructure project (www.visead.se), and additional funds from Umeå University. The system provides unrestricted access to raw data from archaeological and Quaternary science investigations, and has technically no geographical or chronological limits. Although its scope is international, SEAD is registered as a national research infrastructure at the Swedish National Data Service (SND 2017). SEAD is multidisciplinary in nature, and the project aims to encourage, support, and empower research that transgresses traditional disciplinary boundaries, just as the data do.

SEAD is interfaced either by a downloadable software package (which will be eventually replaced by an online system) for data management and offline use, or an online faceted browser system for data retrieval only ("QSEAD", http://qsead.sead.se, Fig. 2). Analysis tools are planned in collaboration with partner systems (see section

Strategic Environmental Archaeology Database (SEAD), Table 1 Scope of the proxy data currently stored in SEAD as well as potential for expansion and limits. At the time of writing, SEAD contains approximately 2000 sites from 4 data sources (Table 2; Fig. 1), each of which is continually being updated

Proxy data sources	
Biological proxies	*Current:* Fossil occurrences of insects/arthropods, plant macrofossils, pollen
	Future: Any organism or pseudotaxon can be added to the taxonomic list. Osteological material may be better catered for in other systems (e.g., Neotoma 2009), but North Atlantic animal bone data is being entered
Geoarchaeology	*Current:* Soil chemistry (pH, phosphates) and physical properties (conductivity, magnetic susceptibility, organic content, color)
	Future: Any quantified or qualified chemical or physical property can be stored
Ceramics	*Current:* Thin section quantification and properties (clay content, tempering, grain size, firing temp., firing atmosphere, melting point)
	Future: XRF and (summarized?) multispectral data
Dendrochronology	*Current:* Ages, supporting analysis data, historical building metadata, sampling location
Organic biomarkers	*Planned:* Through the Archaeological Research Lab, Stockholm (AFL), and the VISEAD project (www.visead.se)
Compound-specific stable isotopes	*Planned:* Through the Archaeological Research Lab, Stockholm (AFL), and the VISEAD project (www.visead.se)
Methods	Detailed descriptions and references are stored for all methods (e.g., preparation methods, dating methods, analysis methods), and method variations are stored as separate methods. Sample pretreatments may be stored parallel to analysis and sampling methods
Dating evidence	
Scope	*Current:* ^{14}C and other radiometric methods, dendrochronology, archaeological typological dates, period classifications, calendar dates, and ranges
	Future: Any method and period systems compatible with the current structure
Chronological extent	Theoretically unlimited, but current data range from 2.4 MyBP to present day
Bibliographic data	
References	May be linked to site, sample group, sample, and dataset levels as well as to methods, ecological codes, and more
Modern reference data	
Abstracted text	*Current:* Insect habitats and distributions, abstracted from trusted sources, with citations
	Future: Any amount of abstracted text-citation couplets may be entered for a taxon (taxa are currently biological organisms, but this is not necessarily restricted)
Coded descriptors, classifications, or species traits	*Current:* Insect ecology (traits/classifications and abstracted texts – see "Paleoentomology" in cross-references), plant functional types/traits, and archeo-/ethnobotanical classifications
	Future: Any taxon may be classified according to any number of user-defined coding systems
Climate	*Current:* Beetle species thermal envelopes – Mutual Climatic Range (MCR) temperature reference data (see "Paleoentomology" in cross-references)
	Future: MCR, or potentially other types of climate reference data, for more insect species and plants
Locational data	
Coordinates	Three dimensional at site, sample group, and sample levels (latitude, longitude, altitude, and project survey grids)
Geographical extent	Mainly European, but potentially global

(continued)

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Strategic Environmental Archaeology Database (SEAD), Table 1 (continued)

Archaeological data	
	Current: Site, feature, and sample metadata to allow correlation between environmental and archaeological or lithology datasets. Any number of features can be added, and they may be given multiple names (e.g., field label, lab number, museum number). Descriptive information may also be added for structures and ceramics as required
	Exceptions: Coordinates can be stored for samples or groups of samples, but not features or contexts
	Future: True geospatial/geographical object storage

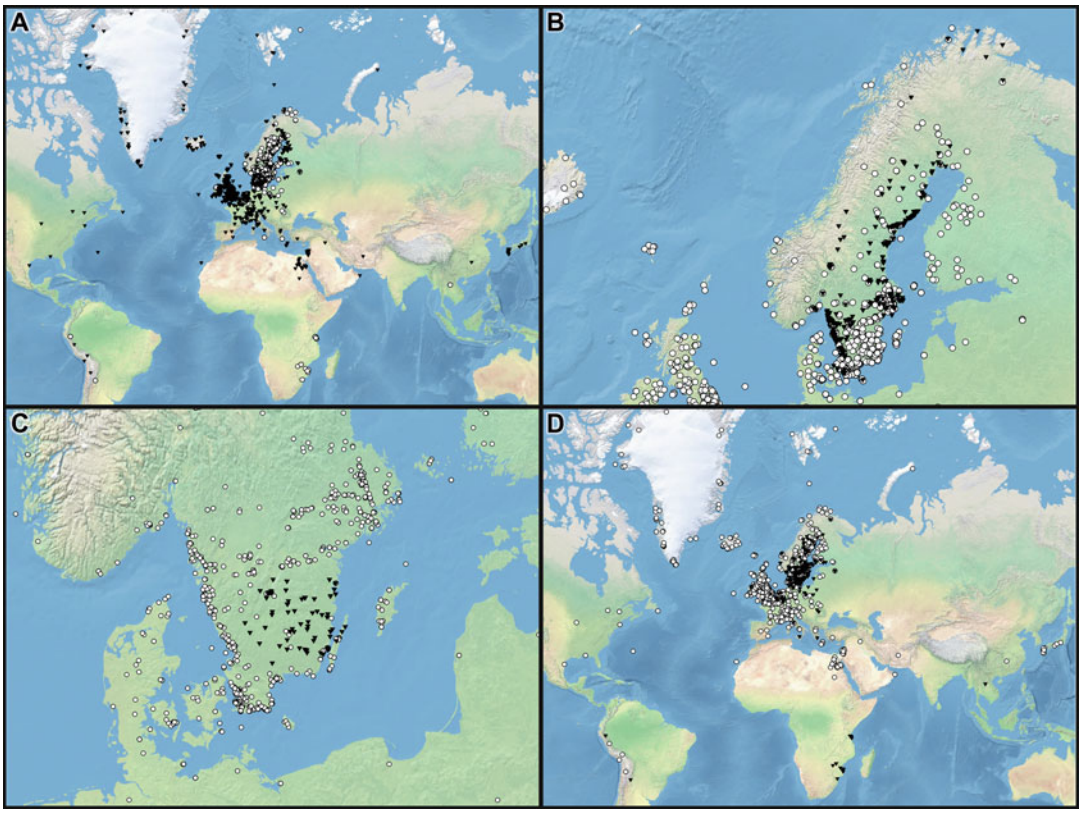

Strategic Environmental Archaeology Database (SEAD), Fig. 1 Geographical location of sites stored in SEAD (as of 24 August 2017), categorized by data source (see Table 2 for clarification). Black triangles indicate sites in the dataset against a backdrop of white circles showing all sites in SEAD. Note that individual MAL sites generally include several proxies and Dendro and Ceramics lab sites include multiple variables

"Future Directions"), but at the moment users may download query results from the browser and undertake further analyses in other software. The browser facilitates research that goes beyond the scope of the projects which have contributed data in that, while maintaining full traceability in terms of source publications and authors, it searches in ignorance of the origin or purpose of the datasets. For example, a user may ask for all incidences of a species (e.g., the grain weevil, *Sitophilus*

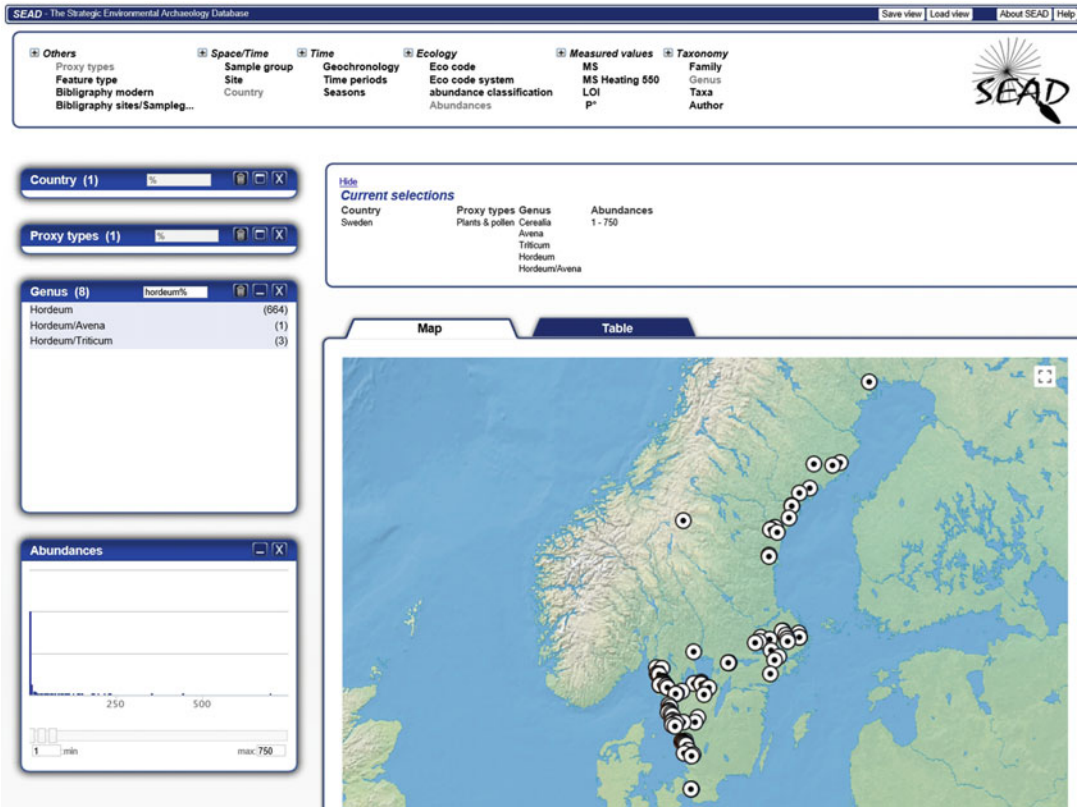

Strategic Environmental Archaeology Database (SEAD), Fig. 2 The SEAD online faceted browser and data map, QSEAD. Available filters (facets) are labeled across the top of the window. Clicking on a label makes the filter available on the left, showing the available content for (multi-)selection. In this example four filters have been activated: Country (Sweden), Proxy type (Plants and pollen), Genus (several cereal genera), and Abundances. The first three have been used to reduce the data, and thus limit the display of points on the map, to the occurrence of cereal grains in Sweden. The Abundances facet shows the frequency of these finds in samples, but can also be used to restrict the results to a range of numbers (e.g., >10 seeds). The pattern of points in the map suggests that, in Sweden, these fossils are most often found during excavations connected to infrastructure (road or railway) projects

granarius, Fig. 3), and retrieve data from multiple investigations, be they research or consultancy excavations, or Quaternary geological investigations. They may then, in the same interface, narrow their search geographically or chronologically, expand it by adding other taxa (animals or plants) or soil properties, or just export the data, which is fully referenced. An alternative approach, which is possible in the same browser and may or may not produce the same results, would be to filter by ecological traits to reduce the initial scope of inquiry to only "Stored grain pests," retrieving information on the past distribution several species which have similar habitat traits to the grain weevil. The system can thus be used to investigate similar data from the perspectives of both paleobiogeography and cultural history (more discussion on this particular example can be found in Panagiotakopulu and Buckland 2017, where the BugsCEP dataset is used to help in a wider synthesis of pest dispersal).

The classification of plant and animal species according to their traits or habitat preferences, or with reference to ethnographic records (Table 1), and the provision of facetted browsing, allows the same online interface to be used for the interrogation of the data from multiple angles. This capacity to reverse the point of inquiry increases opportunities for the classic "outside the box" thinking, and may stimulate new and interesting

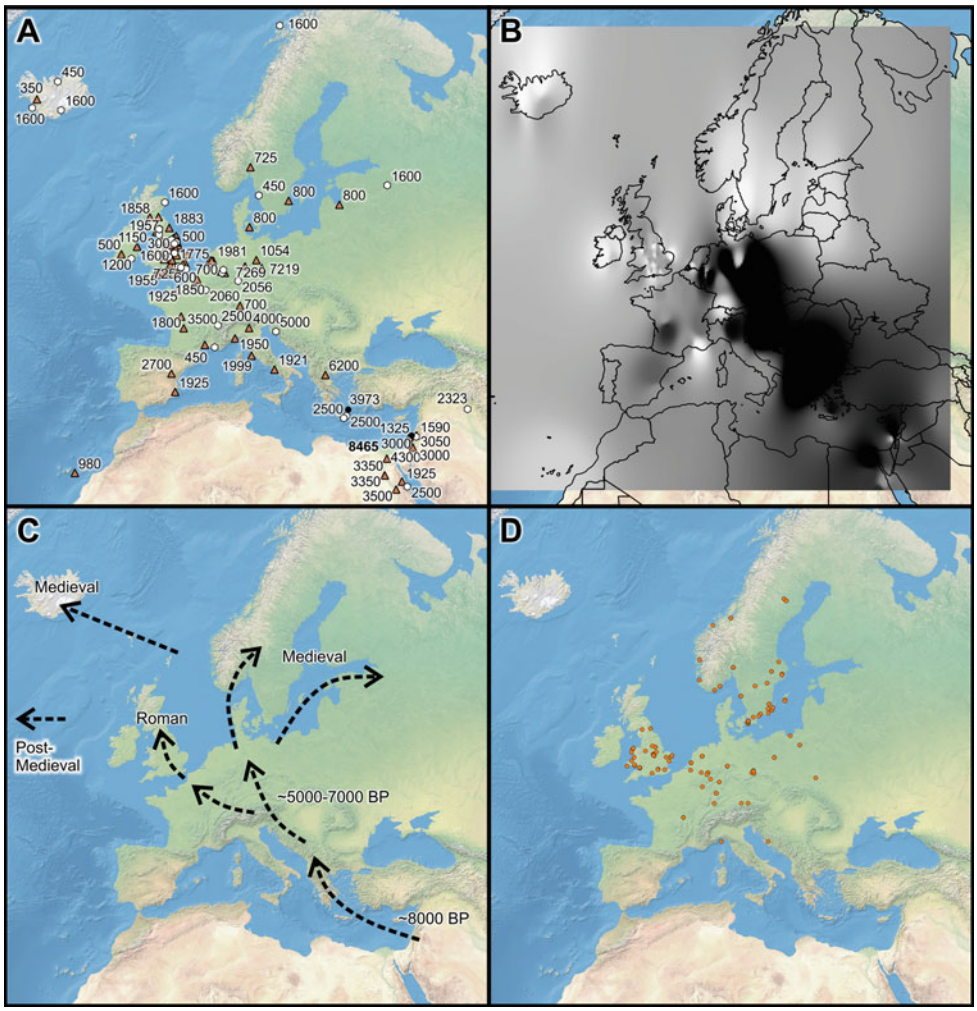

Strategic Environmental Archaeology Database (SEAD), Fig. 3 Four maps showing the archaeological data in SEAD (extracted 24 August 2017) for the spread of the (flightless) grain weevil, *Sitophilus granarius*, from its probable origins in the Eastern Mediterranean. The figure serves as an illustration of both the power of the database for understanding the relationships between cultures and animals, and the importance of understanding the nature and quality of the data before drawing conclusions. (**a**) Shows the oldest date (BP) for each site, with triangles indicating calendar dates (e.g., dendrochronological or coin based), white circles indicating broad period limits (e.g., start of medieval period), and black circles the older two standard deviation limits of calibrated radiocarbon dates. Note that the inclusion of broad and geographically vague periods (e.g., medieval) where no secure dating is available leads to the appearance of either too old or too young dates – the apparent appearance of the beetle in Iceland *before* it was colonized in the ninth century is clearly incorrect. Chronological periods need to be assigned with care over their geographical relevance if there is a risk of the data being used out of context, and there is an apparent need for updating the database here. (**b**) Shows an inverse distance weighted interpolation of the dates, with darker areas representing older dates, and where the frequency/density of sites is at least partially confounding the known story of dispersal with crop storage which is expressed in (**c**) (see Panagiotakapulu and Buckland 2017 for more discussion of the spread of insect pests). (**d**) Shows the 262 GBIF (Global Biodiversity Information Facility, www.gbif.org, accessed 24 August 2017) occurrence records for *Sitophilus granarius* L. (https://doi.org/10.15468/dl.b1vqs6) and *Sitophilus granarius* Gyllenhal (https://doi.org/10.15468/dl.dgzndm) (see text). Although modern pesticides have undoubtedly reduced the prevalence of the species, in the light of the historical data, it is doubtful that this represents its true modern distribution. "*Sitophilus granarius* Gyllenhal" is also an incorrect designation for the species which could cause problems for automated data harvesting systems, or users unfamiliar with the species

insights (such as looking for a reduction in the prevalence of multiple proxy indicators for trees, then looking in other databases for the co-occurrence of agricultural artefacts). The ecology angle is potentially very powerful, in that it allows rapid visualization of sites where specific environments/habitats/species traits are represented from multiple sites, and may thus provide data for more advanced GIS analyses (see, e.g., Buckland 2017). The power of this system derives partly from a flexible query engine, designed at HUMlab in Umeå, and partly from a highly normalized relational database structure which allows intuitive cross-querying between the smallest divisible, structured data entities.

Historical Background and Related Systems

The development of SEAD was initiated at the Environmental Archaeology Lab (MAL) and implemented in collaboration with the Humanities Computing Lab (HUMlab), at Umeå University, in 2008. The database design and user requirements were outlined primarily in discussions with MAL's research network partners and benefitted considerably from close communication with the ongoing BugsCEP (Buckland and Buckland 2006) and Neotoma (2009) projects. Discussions and skill sharing between these projects have ensured compatibility between the databases and will help to ensure the efficient use of public funds by negating the inevitable reinventing of the wheel when similar projects run independently (albeit directed at different user groups). A dialogue has also been maintained with a number of local and regional database projects and archive centers, especially the UK's ADS (n.d.; Archaeological Data Service, http://archaeologydataservice.ac.uk/) and the Swedish SND (Swedish National Data Service, https://snd.gu.se/en), as well as the international archaeological and Quaternary science community at large.

The Swedish National Archaeological Resource labs for dendrochronology (VDL) and ceramic research (KFL), in Lund (Table 2), joined the project in 2011 and expanded the scope beyond the original design. After some database redesign, this enabled the entry of large amounts of thin section ceramics data (see below), and initial test datasets of dendrochronological data from archaeological and building heritage management sites. The Archaeological Research Laboratory (AFL) in Stockholm joined SEAD in 2016 through the VISEAD project. These laboratories are members of the incipient Consortium of Swedish Archaeological Research Laboratories (ArchLab, http://www.archlab.se), for which SEAD will be the research data infrastructure.

SEAD's focus is on environmental archaeology data in its broadest definition, including the ecological and archaeological reference data which are necessary for its interpretation. Where the latter are outside of the scope of SEAD (e.g., detailed

Strategic Environmental Archaeology Database (SEAD), Table 2 Initial data sources ingested into SEAD originate from the partners in the Consortium of Swedish Archaeological Research Laboratories (http://archlab.se/), and the BugsCEP database. Sites currently digitized (although not all are available online) and with locational data are shown in Fig. 1, with the letters A–D in this table corresponding to the letters on Fig. 1

Current and *planned* source databases (but no limits to submissions)	
(A) BugsCEP	Bugs Coleopteran Ecology Package database (BugsCEP) (http://www.bugscep.com) Buckland and Buckland 2006. See also "Paleoentomology" in cross-references
(B) MAL	Environmental Archaeology Lab, Umeå University (http://www.idesam.umu.se/english/mal/)
(C) Dendro (VDL)	National Laboratory for Wood Anatomy and Dendrochronology, Lund University (http://www.geology.lu.se/research/laboratories-equipment/the-laboratory-for-wood-anatomy-and-dendrochronology)
(D) Ceramics (KFL)	National Laboratory for Ceramic Research, Lund University (http://www.geology.lu.se/research/laboratories-equipment/the-laboratory-for-ceramic-research)
Biomarkers and isotopes (AFL)	*Archaeological Research Lab, Stockholm University* (http://www.archaeology.su.se/english/archaeological-research-laboratory)

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excavation data, modern species distributions point data), it must provide sufficient metadata for a user or automated system to form the appropriate links or extract data. In this respect, all archaeological and biological databases or repositories could be seen as related systems, and the SEAD team engages in continual dialogue with a number of these. At the time of writing, there are still few databases available with a similar multi-proxy, multi-site scope to SEAD (a fact which most likely reflects the difficulty in acquiring the considerable amount of funding required). Neotoma (2009) is perhaps the closest system, the primary differences being that the latter is more orientated toward Quaternary geology than archaeology, and does not currently aim to store modern reference data to the same extent as SEAD. However, Neotoma can technically store coded habitat data or traits, and it thus has a potentially similar functionality to SEAD's habitat summarizing capacity. Neotoma is also able to plot pollen diagrams and age-depth curves online, something which SEAD is not yet capable of doing, and there are clear opportunities for collaboration and tool sharing. The transfer of data is enabled through Neotoma's well-developed API (Goring et al. 2015) and the equivalent in SEAD, and there are plans for mirroring a subset of SEAD's data in Neotoma. The US-based Digital Archaeological Record (tDAR 2017) also overlaps the scope of SEAD to an extent, providing an excellent and well-supported infrastructure for archaeological data with the facility for storing environmental archaeology results. tDAR is perhaps, at least at the moment, more orientated toward project/site archiving than site-independent and inter-site analyses than SEAD. Both Neotoma and tDAR feature advanced interfaces for data management and data interrogation, but currently without the flexibility of faceted browsing.

Relating Archaeological and Environmental Data

An essential capacity of an environmental archaeology database is the ability to store metadata which will allow users to relate sample data and analysis results to the archaeological features from which they are derived. SEAD is not an excavation database, and stores only enough information as necessary to locate a sample in an archaeological plan, report, or another database. These data are frequently missing in both the scientific and gray literature, and may often have to be collated from other archive sources (such as county records, original lab reports). While excavation databases commonly allow the logging of sample names, locations, and purposes (e.g., macrofossil sample, ^{14}C sample), they are generally not designed to hold the results of any analyses. Similarly, archaeological sites and monuments records (e.g., the Swedish FMIS, 2017), archiving systems (e.g., the UK's ADS, 2017), and inter-archiving portals (e.g., Europeana, n.d.) do not as yet explicitly store sample metadata, environmental data, or results in a cross-queryable form. However, some systems, such as ADS, do store or link to a number of reports which do hold these data, and there is potential for more interaction between these systems. As well as catering for multiple alternative sample names (e.g., field number, museum number, lab reference), SEAD provides multiple levels of metadata storage for archaeological features, contexts, and objects. Due to the multi-subject scope of the system, this has had to be flexibly implemented with sets of tables for free text descriptions which are defined by selection from list of predefined types (to which advanced users can add). This also allows for some level of interpreted data into the sample and sample group metadata, setting the context for the environmental data independently of external sources (Table 3). It also makes the development of simple user interfaces problematic.

Taxonomies

A problem for international databases containing biodiversity data is the maintaining of consistency of taxonomic records and providing lists of species in taxonomic, rather than alphabetical, order when required. SEAD's approach is to provide a taxonomic master list which allows the entry of any taxon, providing it is approved by the clearing house (see below), as well as synonyms and multiple taxonomic ordering systems. This allows, for

Strategic Environmental Archaeology Database (SEAD), Table 3 Samples and groups of samples can be assigned descriptive metadata of specific types, to help relate them to excavation (field or report) or antiquarian objects. This capacity also provides key data for inter-archive linking. Multiple samples can come from the same feature, and in some cases, where the stratigraphy is complex or has been revised, a sample can come from multiple features

Data context	Field	Example data
Archaeological	Feature type	Hearth
	Feature type description	Feature with evidence of burning, the base of a fireplace, probably used for cooking, heating, or metallurgy
	Feature name	H1
	Feature description	Sami hearth at top of ridge
Dendrochronological: building antiquities	Object description type	Building category
	Object description	Secular
	Object description type	Building category
	Object description	Residential building
	Object description type	Building function
	Object description	Mangårdsbyggnad
	Object description type	Building function
	Object description	Two-floor
Ceramic	Object description type	Vessel
	Object description	Trattbägare (funnel-neck beaker)
	Sample description type	Vessel part
	Sample description	Mynning (rim)
	Sample description type	Surface treatment
	Sample description	Grafitbelagt kärl (graphite coated)
	Sample description type	Decoration
	Sample description	Grafit (graphite)

example, a species which is present in both the British and North American beetle catalogues to be stored, with the lists having their own exclusive content. Two species which are unequivocally matched can be related to each other in a separate taxonomic list, thus allowing for cross-correlation, but preserving the original separation for the sake of transparency. If data are entered using a taxonomic list which has water beetles after ground beetles, rather than before (which is important for some entomologists), then separate taxonomic coding systems can be implemented to provide for the differences. In such an event, the difficult task is defining the coding system rather than making it fit into the database.

Open Access and Datasets

SEAD is committed to open access and transparency, with all datasets being uniquely identified so that updates can be traced, with unique dataset DOIs (Data Object Identifiers) acquired through the Swedish National Data Service (SND). Modified datasets are given a new local identifier and DOI. This allows a user to see exactly on which datasets, and which versions of the datasets, analyses have been undertaken. It allows future users to redo old analyses after adding new data, and allows for a transparent reproducibility of any analyses using the database. All data are also attributed to their authors, the originating publications, and source databases or archives, and released under Creative Commons licensing (http://creativecommons.org/). The SEAD software will also be released under the GPLv2 with classpath exception licensing system (http://netbeans.org/gplv2-faqs.html for information about classpath exception) so that others may easily expand on the original development work. Instances of the database itself may be

downloaded by anyone from the project website (http://www.sead.se/downloads).

Quality Assurance and Data Cleaning

Standard data entry is currently performed through the downloadable SEAD application, which essentially duplicates the public database on the user's desktop, and initially stores newly entered data locally. The local database may be updated to the latest available public data at any time, and users may choose to submit their own data at will. This flexible synchronization system allows work in progress to be kept private while the user has access to the latest public database, and can thus analyze their data in the context of the latest global results (Neotoma uses a similar system, but where data on the public server can be placed under embargo until a set date). Prior to public release, submitted datasets and accompanying metadata are sent to a web-based clearing house for quality assurance by peer review. The clearing house vets the data for mistakes, questionable values, duplications, and missing metadata, in dialogue with the submitting user, and finally makes it available online. These three activities, data entry, clearing, and publication (Fig. 4), are performed in the same downloadable software, removing the need for the understanding of complex data structures at all but the developer levels. Maintenance of this software does, however, come with a cost, and migration to a simpler online system is in underway in order to adapt to the current climate of constant development platform and operating system updates.

Data Quality, Accuracy, and the Limits of Automated Harvesting

While much effort is expended on cleaning data, mistakes inevitably occur. The users of any database should always ensure they critically evaluate the data they use, especially in terms of its suitability for the task at hand. Even cleaned data can be problematic if it is used without considering its origins and the implications of these. It is possible, for example, through a few simple queries and a bit of work in a spreadsheet, to extract the dates of the earliest find of any species with records in SEAD. Figure 3 shows these data for the grain weevil, *Sitophilus granarius* L., an important pest of stored products historically and today. SEAD contains 164 records of the species from archaeological sites in Europe and the Near East, with the

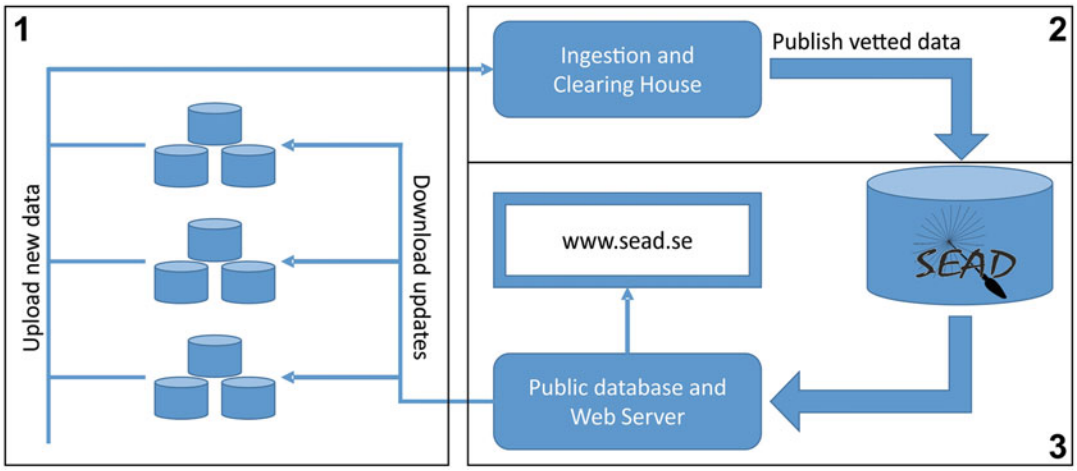

Strategic Environmental Archaeology Database (SEAD), Fig. 4 An outline of SEAD's data management paths, showing the three-tier system for (1) data entry, (2) quality assurance, and (3) publication

oldest finds associated with deposits at Atlit Yam in Israel. An examination of the dates in Fig. 3a shows that there are clearly some issues with the data stored in SEAD (see figure text), a consequence of the limits and focus of the published sources. A paper on insects in Iceland listing finds from the medieval period may not necessarily explain that the medieval period in Iceland starts around AD 1100, as opposed to the more general fifth-century understanding of the term from a broader European perspective. Clearly the use of such chronological periods requires their geographical relevance to be specified (or separate periods defined), and SEAD, along with many other archaeological databases, needs to address this fact if incorrect conclusions, drawn from the naïve use of the data, are to be avoided. Figure 3b illustrates what happens if the *S. granarius* dates are taken at face value, and used to create a surface representing date of establishment of the species over Europe. Unfortunately, the map is of little use, due to the skewed distribution of sites, and more preprocessing in terms of site selection and grouping would be required before the surface reflects the current state of knowledge, as expressed more qualitatively in Fig. 3c. The modern occurrence data provided by GBIF (2017; Global Biodiversity Information Facility, http://www.gbif.org) is shown in Fig. 3d to show that our quantitative knowledge of the species distribution at the present day, as far as our databases are concerned, is little better than that for the fossils.

The ceramic geochemistry (thin section) data available through SEAD provides an interesting insight in the quantification of potential data cleaning losses when dealing with legacy data. An Excel file with 5098 rows and 78 columns of analysis results, collated from records of over 40 years of work, was submitted by KFL (Table 2) for ingestion into SEAD. Of these, and after a considerable amount of data detective work, only 3499 rows were evaluated as being of good enough quality for ingestion into the database. (All of the intermediate stages in the evaluation of these data have been archived for future reference).

Future Directions

While an increasingly large number of archaeological, paleoclimatological, and paleoenvironmental research projects include multiple proxies, these are often interpreted independently. They also tend to be published either in different journals from the archaeological results or as a series of independent lab reports appended to the main archaeological report. By collating data from these, and providing proxy-independent querying system and data aggregation tools, it is hoped that SEAD will promote a more integrated approach to environmental reconstruction, especially at the multi-site level. It is also hoped that by providing the tools for spatially and chronologically aggregating data from multiple proxies, the often contrasting signals from different proxies may be interpreted together so as to illuminate the complex nature of reality rather than simplifying the past by discarding less easily interpretable results.

Databases gain more potential through links to other databases, and the ability to simultaneously interrogate both modern and fossil biodiversity data would be a powerful tool for understanding modern biodiversity patterns, faunal origins, and human impacts and provide key data for predicting the implications of future climate and environmental change. Closer cooperation with biodiversity portals is therefore desirable, an ideal situation being that international maps of fossil and modern species distributions could be overlain. For much of the available modern biodiversity data, the resolution and quality is as yet too poor to be of use in paleoenvironmental reconstruction (see Fig. 3), and many researchers even maintain their own, disconnected, databases for research in ecology (especially as numerous GBIF records give occurrence coordinates which are museum collections rather than sampling locations). Many national archives (e.g., Artdatabanken 2017; BRC 2017), however, may hold appropriate raw data which is in the process of being uploaded to international portals such as GBIF (2017), and there is potential for a significant improvement in the extent and quality of the

data if sufficient funds are invested in trained quality control experts.

Past and present changes in biodiversity and landscapes cannot realistically be investigated without reference to human, and thus archaeological, impacts on the landscape. Paleoenvironmental databases and the software for interacting with them are therefore key components in the process of integrating the wide range of fields required to effectively study these issues (e.g., Brewer et al. 2012). They also provide us with empirical evidence to back the *scientific facts* of the human component in climate change and species extinctions. Future collaboration between SEAD and the Swedish LifeWatch (http://www.slu.se/en/subweb/swedish-lifewatch/) consortium, with an aim toward integrating past and present biodiversity data, and developing tools for their analysis and visualization, will hopefully improve the possibilities for more integrated research, and true socio-ecologically orientated projects.

The US-led, National Science Foundation-funded, but international DataArc project (http://www.data-arc.org) aims to build a portal which will allow users to discover data across multiple databases, through the common use of space, time, and "concepts" (see Strawhacker et al. 2015). The latter of these represents a new approach, and involves the construction of an intermediate layer which allows for the tagging of data elements, or indicators, in the different systems according to a common conceptual model stretching across the humanities and natural sciences. Naturally, not all of the databases will be mapped to all of the concepts, but the approach allows for some interesting thought exercises, such as the relationship between literary water wizards and geological flood deposits in Iceland, or the potential to look for hide eating beetles as a proxy for parchment preparation. The concept-linking model takes the construction of portals beyond the more common (but necessary) data indexing approach, which is more appropriate for cataloguing and exposing archives than creating research tools for transdisciplinary science. It could be that such ideas represent the difference between systems for normal science and those which may encourage paradigm shifts; both of which are needed.

Closer collaboration with archaeological database management systems and authorities is always desirable, and discussions are ongoing to ensure compatibility with and promote the joint use of the Swedish National Heritage Board's databases and online services, especially the sites and monuments records (FMIS 2017). There has, as yet, been little movement on this front, and the lack of time and funds for joint tool development is a hindrance to progress.

SEAD is intended to be an international resource for any science where paleoenvironmental or paleoclimatic data are of interest. The project aims not only to become a more securely established link in the archiving of these data but also to provide a set of well-respected online tools for their analysis, and be instrumental in the development of new theories and methods for examining past climates, environments, and human activities. In order to achieve these goals, SEAD needs users, and it is hoped that the project's open-access policies, along with a large database of linked-open data and efficient tools, will encourage a broad and productive audience. The VISEAD project is designed to help expand the usefulness of SEAD for archaeological consultancies and government bodies involved with cultural heritage data (e.g., county councils and transport authorities). The SEAD team and its partners are actively committed to seeking funding and collaboration for projects where the system is either used as an archive or analysis tool, as well as developing the existing tools further.

SEAD's initial development phase ended in 2013, after which it entered a routine management phase where data entry, support, and quality assurance have prioritized over development. In 2017–2018 the existing platform and interfaces have been overhauled in order to cater to changes in software environments, new user requirements, and an expanded data scope. Further development projects are planned, including the development of advanced online tools, teaching tools, inter-archive connectivity and Arctic archaeology, and cultural heritage. As an open-access project,

SEAD actively encourages the independent development of tools using the database.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Archaeology Data Service (ADS)
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Environmental Archaeology and Conservation
- ▶ Environmental Education and Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Paleoentomology: Insects and Other Arthropods in Environmental Archaeology
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data

References

ADS. 2017. Archaeological data service. Available at http://archaeologydataservice.ac.uk/

Artdatabanken. 2017. The Swedish Species Information Centre. Available at http://www.slu.se/en/collaborative-centres-and-projects/artdatabanken/

BRC. 2017. Biological Records Centre. Available at http://www.brc.ac.uk/

Brewer, S., S.T. Jackson, and J.W. Williams. 2012. Paleoecoinformatics: Applying geohistorical data to ecological questions. *Trends in Ecology & Evolution* 27 (2): 104–112.

Buckland, P.I. 2013. SEAD – The strategic environmental archaeology database. Inter-linking multiproxy environmental data with archaeological investigations and ecology. In *CAA2012, Proceedings of the 40th Annual Conference of Computer Applications and Quantitative Methods in Archaeology (CAA), Southampton, England*, 320–331. Amsterdam.

Buckland, P.I. 2017. Lessons from extinctions. In *Wood wise, beguiling beetles. Woodland Conservation News, Summer 2017*, ed. K. Haw and K. Hornigold, 22–27. Woodland Trust. www.woodlandtrust.org.uk/mediafile/100819343/j-wt-200717-summer-2017.pdf

Buckland, P.I., and P.C. Buckland. 2006. *BugsCEP coleopteran ecology package*, IGBP PAGES/World Data Center for Paleoclimatology Data Contribution Series # 2006-116. Boulder: NOAA/NCDC Paleoclimatology Program. Available at http://www.ncdc.noaa.gov/paleo/insect.html and http://www.bugscep.com. Accessed 24 Aug 2017.

Buckland, P.I., E.J. Eriksson, J. Linderholm, K. Viklund, R. Engelmark, F. Palm, P. Svensson, P.C. Buckland, E. Panagiotakopulu, and J. Olofsson. 2010. Integrating human dimensions of arctic palaeoenvironmental science: SEAD – the strategic environmental archaeology database. *Journal of Archaeological Science* 38 (2): 345–351. https://doi.org/10.1016/j.jas.2010.09.011.

Europeana. n.d. Available at http://www.europeana.eu/

FMIS. 2017. The Swedish National Heritage Board online sites and monuments record. Available at http://www.fmis.raa.se/

GBIF. 2017. The Global Biodiversity Information Facility. Available at http://www.gbif.org/. Accessed 24 Aug 2017.

Goring, S., A. Dawson, G. Simpson, K. Ram, R. Graham, E. Grimm, and J. Williams. 2015. Neotoma: A programmatic interface to the neotoma paleoecological database. *Open Quaternary* 1 (1).

NEOTOMA. 2009. The neotoma multiproxy palaeoecology database. Available at http://www.neotomadb.org/. Accessed 14 August 2018.

Panagiotakopulu, E., and P.C. Buckland. 2017. A thousand bites–Insect introductions and late Holocene environments. *Quaternary Science Reviews* 156: 23–35.

SEAD. n.d. The strategic environmental archaeology database. Available at http://sead.se/. Accessed 24 Aug 2017.

SND. 2017. The Swedish National Data Service, SEAD project entry: http://snd.gu.se/en/catalogue/study/62. Accessed 28 Aug 2017.

Strawhacker, C., P.I. Buckland, G. Palsson, A. Fridrikkson, E. Lethbridge, A. Brin, R. Opitz, and T. Dawson. 2015. Building cyberinfrastructure from the ground up for the North Atlantic Biocultural Organization: Introducing the cyberNABO Project. In 2015 *Digital Heritage International Congress, vol 2: Analysis & Interpretation Theory, Methodologies, Preservation & Standards Digital Heritage Projects & Applications*, 2: 457–460. https://doi.org/10.1109/DigitalHeritage.2015.7419547.

tDAR. 2017. The digital archaeological record. Available at http://www.tdar.org/

Further Reading

Buckland, P.I. 2010a. SEAD – The Strategic Environmental Archaeology Database. An international research cyber-infrastructure for studying past changes in climate, environment and human activities. *Journal of Northern Studies* 1 (2010): 113–126.

Buckland, P.I. 2010b. Environmental archaeology, climate change and e-science. *Skytteanska Samfundets årsbok 2010, Thule*, 55–69.

Buckland, P.I. 2011. Freeing information to the people. *International Innovation, EuroFocus* 4: 51–53. Nordic Spotlight.

Buckland, P.I., E.J. Eriksson, and F. Palm. 2014. SEAD – The strategic environmental archaeology database: Progress report spring 2014. Miljöarkeologiska Laboratoriets Rapporter 2014–013. http://urn.kb.se/resolve?urn=urn:nbn:se:umu:diva-88711
SEAD related publications will be made available at http://sead.se/publications/index.html

Stratigraphy in Archaeology: A Brief History

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Introduction

The story told here is a summary of some of the actions that gave form to the scientific field that is archaeological stratigraphy. A story whose true nature lies latent, overlaid by a superficial enumeration of chronological dates, superimposed and outdated by social events, an encyclopedic history records the process of development of the current use of stratigraphy in the majority of archaeological investigations. The reading of this history should be viewed from two perspectives which crosscut this narrative. The first relates to the numerous conflicts that reflect a criticism of modern science. The second refers to a history of excavation techniques that define a decisive point in the scientific nature of archaeological practice.

Historical Background

In the seventeenth-century Europe, a uniformitarian vision of Earth's geological history gave rise to the argument that stratigraphy could be explained from principles of superpositioning and chronology, from types of sediment and forms of strata, or through association with fossil remains. This was a naturalistic model of stratigraphy, which gained strength halfway through the nineteenth century when Lyell proposed his methodology for determining the relative sequence of geological strata based on the study of its fossil remains. After this, European archaeology appropriated the model in order to date archaeological strata by the types of products they contained, treating certain diagnostic artifacts as *guide fossils* (Carandini 1997; Roskams 2003). (There are two exceptions to this statement: (1) Towards the end of the eighteenth century, Jefferson (the North American President) is purported to be among the first to use a stratigraphic view in an archaeological context, in reference to a funerary mound (Wheeler 1995 [1954]); and (2) in an 1816 publication, Smith announces the stratigraphic ordering of fossils according to the strata they belonged to, carried out in excavations in the south of Great Britain, using the term "*stratum*" for the first time (Harris 1991; Wheeler 1995 [1954]).) In that context the meaning of stratigraphy was related to chronological problems in the historical and evolutionary interpretation of prehistory. In the dawn of the twentieth century, all of these ideas crossed the Atlantic, particularly to North America and Mexico, forming the basis by which stratigraphy would be conceptualized as a modern excavation method that would facilitate temporal interpretation and assignation; for many, this meant a revolution in the archaeological vision of the past, arguing in favor of the first New Archaeology (Browman and Givens 1996; Lyman and O'Brian 1999; Schávelzon 1999).

From these first events, the study of stratigraphy in archaeological deposits would always be dominated by both a naturalist vision oriented by the sedimentary content and an instrumentalist vision using it as an excavation technique. Both perspectives were based on a single naturalist-instrumental strategy, in which the use of stratigraphy in archaeological contexts is justified as the only way to build an objective historical scientific knowledge of the past.

To better understand this historical view of stratigraphy, this entry will outline three distinct schools of thought. The first is linked to archaeology's initial approaches towards introducing the study of stratigraphy: a distinctive vertical observation of the past, associated with particular excavation techniques. The second corresponds to the vision of geoarchaeology, which

favors the *sedimentary content* of stratigraphy. And, finally, the third is generated from the perspectives of Wheeler and Harris around the study of *interfacial forms and stratigraphic relationships*. In all these, stratigraphy is perceived as representing a temporal metaphor for building archaeological chronologies, regardless of the subject matter used in those sequences (set of artifacts, sediments and interfaces). (The order of these three currents of thought is not a precise temporal sequence, seeing the proposals of Wheeler as contemporary with the perspectives of the first trend and the proposals of Harris as on par with those of geoarchaeology. Nonetheless, each of the three conceptions has their temporal and geographic reference point: the first began towards the end of the nineteenth century, waning halfway through the twentieth century; at first it flourished in Europe but was methodically instituted into the American scene. The second train of thought was established in North America and was becoming known at the start of the 1960s; and the third current occurred in the United Kingdom in the middle of the twentieth century. Development of the last two ideas occurred unevenly in different parts of the world (the Harris Method excelled in the European continent and certain parts of Asia, while geoarchaeology spread across the American continent), and they spread as opposing points of view relative to each other, a position which continues to this day (Waters 1992; Holliday 1992; Harris et al. 1993; O'Brian et al. 2005)).

Key Issues/Current Debates

Verticality

Stratigraphy rapidly came to be associated with the theory of the linear evolution of species, marked by the fossils, which meant interpreting the archaeological discoveries contained in the strata as belonging to distinct stages of human evolutionary development. This perspective was strongly criticized in North America by historical particularism, especially for its use of stratigraphy as evidence for the progress from primitivism to civilized phases. The debate turned on whether the stratigraphic succession of archaeological discoveries reflected stages of evolutionary development, but the criticisms and queries were not directed at the evolutionary model but at its application in case studies in North America (Lyman and O'Brian 1999; O'Brian et al. 2005). This was a transition period for the strategies and modes of field work, in which importance was being placed on the context of the discoveries (the deposit, the stratum, the cap, the bed, the arbitrary cut), and not just the providing of samples intended for museums (Lucas 2001; Roskams 2003). In Europe, the meaning of context was related to problems of the interpretation of prehistory (Carandini 1997); while across the Atlantic, in North America and Mexico, it was related to an excavation system which gave scientific validity to the explanations of archaeologists (Browman and Givens 1996; Schávelzon 1999). (The considerations of Pitt-Rivers and Petrie are also pertinent. Their work in Europe and the Middle East stimulated interest in America concerning a sectioning method which would consist of excavating trenches on archaeological sites following arbitrary levels; the recovery of artifacts, innovating a three-dimensional recording method for each discovery and positioning them in projection and in profile in the drawings; and the construction of typologies using seriation (Lucas 2001).) It was in this latter research area that stratigraphy was thought of as an analytical tool for an archaeological method and as such there was a gradual awareness of a change in the techniques for excavating stratified deposits.

The study of stratigraphy was introduced by observing the profiles exposed on the walls of excavated trenches or vertical columns of sediment (sample cores). From diagrams of those profiles, the content was observed by levels, interpreting similarities and differences in the overlaying of objects, fossils, and strata. The aim of these observations was to specify the chronological bearing of archaeological cultures in sequences of horizons, but they did not focus on questions of cultural change (Lyman and O'Brian 1999). Stratigraphy was identified with a structure of simple vertical units, from which discoveries were perceived between vertical limits given by

discrete and real entities (arbitrary levels or natural strata), rather than from a possible fortuitous cause of sedimentation. These vertical units were not considered geological, but were used as units of archaeological deposition that were incorporated into a time line of the history of the site. In particular, stratigraphy was thought of as an analytical tool from which inferences were obtained once excavation is finished; it consisted of post-excavation observations or ex post facto interpretations, where the reading of stratigraphic profiles confirmed data from the excavation. From this point the systematic incorporation of stratigraphic method into field practices was instituted (Praetzellis 1993; Browman and Givens 1996; Lyman and O'Brian 1999; Schávelzon 1999), signaling the metaphorical use of stratigraphy to represent the passing of time in the constructive history of an archaeological site. But paradoxically this vertical vision of stratigraphy was not sustained by any stratigraphic excavation. (The excavation technique associated with this stratigraphic view was founded on an arbitrary strategy defined by metered levels of a predetermined thickness. The objective was to identify the different depths of the artifacts, without depending on any distinction associated with observation of the caps or the strata during the excavation. In opposition to [this] strong emphasis on the metric [measured], another excavation technique was proposed which consisted of dividing the deposits according to the natural strata that constitute it, such as sand, ashes, gravel, and other types (Praetzellis 1993; D'Amore 2002)).

The vertical view of the stratigraphic superposition was verified and reinforced by diagnostic chronological sequences of pottery groups, developed using the seriation technique applied to data obtained from excavations (Praetzellis 1993). The seriation of ceramic styles was considered a form of stratigraphic vision (e.g., in the proposals of Kidder; O'Brian et al. 2005), but the vertical vision of the profile and the horizontal vision of the excavation remained separate instances of interpretation. All this simplified the idea of stratigraphy to the superpositioning of artifacts and, principally, to a visible, analytical superpositioning related to the requirements demanded of archaeology as a positivist science: to resolve questions of diachrony and cultural change.

The use of the notion *cultural stratigraphy*, which defined an arbitrary stratigraphy of occupation phases and cultural components, was associated with the term *stratification* without considering the stratigraphic superposition relationships. The process by which the physical structure of a site is separated and organized in strata or caps, horizontal cuts of a predetermined thickness, was not found to have an analytical correlation with the term *stratigraphy*, which would be the interpretation of the deposition sequence and of the stratigraphic relationships of superpositioned strata (D'Amore 2002). This methodological tendency created a permanent conflict by separating into two analyses that which would be only one field of study (superposition relationships). Despite the many complications of these instrumental and naturalistic representational proposals concerning stratigraphy, it was from both its criticisms and the truths attributed to it that a foundation was laid for the later theoretical and methodological premises of two subsequent schools of thought. In this way, the concept of stratigraphy was gradually introduced in relation to its content, but only because of its archaeological or cultural inclusions, and not the contents of the sediment or any other operative entity such as the stratum, coating, or facies. (Maybe an exception would be the idea of sedimentary content that was held in the cases that came from an artificial excavation through natural layers).

Content

In its opposition to historical–cultural procedures, processual archaeology disregarded archaeological stratigraphy (O'Brian et al. 2005). So that, fearful of once more creating a mistaken and hasty causal relationship between sediment and culture, it resolved to incorporate geology in an interdisciplinary way, in order to take care of the excavation sediments, on the one hand, and the explanations of cultural processes in the dynamics of the past on the other (Lyman and O'Brian 1999; O'Brian et al. 2005). In this intellectual context, oriented by an ecological, geographical, and

environmental perspective, geoarchaeology was shaped. A subdiscipline viewed the archaeological record as a natural deposit that incorporates, in its sedimentary matrix, the cultural material of successive past human occupations (Butzer 1989 [1982]; Waters 1992); and it raised awareness of a new way to explain the contextual association of sedimentary particulates in archaeological deposits (Stein 1987). (This arises from the uniformitarian premise that the archaeological record has been formed by the same processes that molded the natural landscape (Butzer 1989 [1982]; Holliday 1992; Waters 1992, Waters and Kuehn 1996). The idea beneath this logic is the following: the terrestrial landscape changes constantly, but the laws of physics and chemistry that govern the processes are immutable over time. This uniformitarian principle is based on the interpretation that those absolute processes produce uniform attributes in past, present, and future strata. Sedimentology presupposes that one can reconstruct the processes that formed ancient sediments, because the forces they are subjected to in the present operated just as uniformly in the past (gravity, thermodynamics, fluid dynamics)).

The unit of analysis was the sediment, which is incorporated through the study of the sedimentary particulates, arising from the sedimentological vision of geology. The stratigraphic interpretation is fixed in a rigorous objective description of the differences in sedimentary content of the archaeological site deposits; it consisted of a sedimentological study that based itself in nomenclatures of geological stratigraphy (Gasche and Tunca 1983; Farrand 1984; Stein 1987). The formation of archaeological sediments is thus reduced to the study of human impact over natural soil formation (Butzer 1989 [1982]; Holliday 1992; French 2003). From the depositional study of sediments (sedimentology) and postdepositional study given for soil formation (pedology) comes the interpretation of the stratigraphy of an archaeological deposit (Holliday 1992; Waters 1992). The stratigraphy of an archaeological site was understood to be constituted of cultural remains (surfaces of occupation) buried by a sedimentation that was, almost always, considered natural (burial between high and low rates of natural sedimentation). Consequently, the archaeological record is found preserved in a stratification of rock sediments (lithostratigraphy), in a soil or paleosoil horizon (pedostratigraphic unit), and also sedimented between the contact of a sediment and the surface of a soil (Waters 1992; French 2003). In this specialized literature, stratigraphy had a secondary application, complementary to sedimentology, where the key was explaining an archaeological site's sedimentation through evidence derived from the geomorphological formation of the landscape where the human settlement was located.

The program of geoarchaeological study was supported by objectives postulated by Schiffer (1987) to investigate processes of formation, preservation, and destruction of archaeological sites: the study of the physical and chemical properties of the soils and sediments, incorporation of ethnographic and comparative studies of modern sedimentary deposits, and the study obtained by experimental replication of sedimentary processes. The driving importance of formation processes meant that geoarchaeology would concentrate on examining the formation of artifact content in the archaeological record, as regards the N (natural) transformations (Stein 1992, 2001). (Compression of the postdepositional processes of formation centers on environmental modifications to the archaeological remains, as defined by dispersion before burial, the postdepositional alteration, the geochemical modification, and even as far as processes that totally destroy the archaeological site. Within the range of site formation processes are included the geomorphological processes of the Late Quaternary associated with changes in the landscape that significantly altered or preserved, spatially or temporally, the archaeological record's evidence of human occupancy (Waters and Kuehn 1996).) From there followed an emphasis on relating a history of human interaction with the environment, to explain economic and ecological behaviors between episodes of environmental fluctuation. (This was the aim of the contextual perspective initiated by Butzer (1989 [1982]), by which he proposes a study of archaeology that hierarchically contextualizes three units of

analysis, the landscape, the sediment, and the artifact, and treats the cultural material as an indicator of the human being as a geomorphological agent in the sedimentary cycle of an archaeological deposit).

One stance even included establishing as a problem the lack of standardization in the stratigraphic method, which could have reduced the pejorative conflicts implicated in using many chosen criteria to form a nomenclature (Farrand 1984; Stein 1992). The solution was to adopt a stratigraphic nomenclature associated with a standard excavation procedure, which would permit a precise and objective naming of distinct sedimentary units and would mediate over a plurality of case studies.

For geoarchaeology, this nomenclature represented a classification tool appropriate to the scientific view of archaeology, because the principal units of stratigraphic analysis were distinguished using lithological criteria based on direct observation of the sediment's tangible attributes and fixed in descriptions that were independent of any interpretive discussions about meaning (Stein 1987, 1992; Courty 2001).

The objective was for the stratigraphy of an archaeological site to be observed as multiple sequences independent from one another (lithostratigraphy, ethnostratigraphy, and chronostratigraphy) but analyzed under a singular standardized nomenclature (Stein 1992). (The stratigraphic classification codes of geology, and those created for geoarchaeology, are supported by a sedimentological and pedological classification above any other type of distinguishing criteria. The fundamental unit is lithostratigraphic, while the ethnostratigraphic and chronostratigraphic units are lithological units grouped firstly by type of cultural content and then by correspondence to a particular time period (Stein 1987; Lucas 2001). The lithostratigraphic units are hierarchically more important than the other two, because they result from rigorous objective descriptions of the sedimentary particulates' attributes (they are observational) while the remaining units are defined by interpretation (they are inferential) (Gasche and Tunca 1983; Stein 1992)).

The use of this classification system meant that, in terms of objective rigor, artifacts would be considered as sediment, or one more particulate of sediment (in essence they continue being *fossils*), the people would be biological agents of sediment formation, and prehistorical and historical time periods would be geological eras. In the beginning it was assumed that archaeology did not require theoretical and methodological premises just for studying stratigraphy; at the most it would require different units of analysis on a smaller scale (Farrand 1984; Stein 1992). This was because it was thought that if they set up a separation, with one archaeological classification and another geological, there would be conflict when carrying out correlations between the microstratigraphy of an archaeological site and the regional geological stratigraphy (Waters and Kuehn 1996).

For geoarchaeology, in the analytical terms of sedimentary *content*, stratigraphy was becoming established as a study of the vertical order of physical contacts (superpositional relationships) between sediments and soils (observable physical units) and recorded by the order of deposition (aggradation) and stability and erosion (degradation). The different types of elements that make up the cultural material were conceived as archaeo-sedimentary particulates or intrusive archaeological inclusions of the natural sedimentary matrix (Stein 1987). The cultural material was treated as if it were one more component among others: physiogenically and biogenically (Butzer 1989 [1982]). Anthropogenic sediment, from its process of sedimentation (or stratification), was considered natural geological sediment (Farrand 1984, Stein 1987). In this context, archaeological sediment was defined as one which contains particles that are affected and altered by cultural processes and therefore contain information about human occupational activity (Butzer 1989 [1982]; Stein 1987). Also, sediments were different when not affected by human beings but could possess archaeological inclusions among its particulates. Various names were given to this category: anthropogenic facies, anthropic soils and sediments, anthrop-soils, archaeo-sediments, anthropic epipedon, cultural

cap or layer, archaeological levels, etc. All those terms try to be empirical in the sense that they manifest the material existence of human intervention at the site. Specifically, the archaeological site was defined by *aggregates of sedimentary particulates*, and those aggregates were defined as deposits distinguished by content or homogenous physical properties, of which one could recognize behaviors and patterns at the artifact level and depositional processes at the level of the sedimentary particles (Schiffer 1987). (Each deposit would be the result of a depositional event that made up the sediment's history: the source, the transport agents, and the deposition environment (Waters 1992). The depositional event is a sedimentation formed under constant physical conditions during a specific interval of time (Courty 2001)). The concept of *deposit* and its extension to the category of *sediment* (the content of the deposit) were considered to be the minimal and basic empirical–analytical contexts for identifying and recording exposed excavation profiles.

Forms

Ever since the school of thought begun by Mortimer Wheeler (1995 [1954]) but consolidated and deepened by Edward C. Harris (1991 [1979]), the unit of analysis was no longer the *content* in terms of the sediment or deposit but the *form* of the stratigraphic units as interpretation of the interfaces. More importantly, one no longer dealt with the isolated interpretation of stratigraphy and its archaeological content, but with an understanding of stratigraphy and its archaeological nature as part of one feasible entity to be studied: *archaeological stratigraphy.*

Incorporation of the term "interface" to designate the contact and relational surface that all stratigraphic units have with one another has prompted a relational study of stratigraphy: the interpretation of types of stratigraphic relationships and their configuration in an archaeological sequence diagram (the Harris Matrix). Principally, the idea of an *archaeological interpretation* of the stratigraphy was established, one that would not be restricted to the nature of sediment and artifact relationships but would account for the many stratigraphic relationships interpreted that were social relations between actions and practices produced at a certain moment during human occupation of the site.

Harris' intellectual approach gained meaning with the idea of denominating an archaeological stratigraphy in its own formal terms, applied only to archaeology (Lucas 2001; D'Amore 2002). His proposal to define four basic principles for archaeological stratigraphy (Harris 1991 [1979]), adapted from the principles of geological superpositioning, began a race by arguing: (1) in favor of identification and interpretation of a stratigraphy of an archaeological nature independent from a geological superposition and (2) the introduction of stratigraphy into a body of theory which encompasses the relationship dynamic of such singular deposits as the archaeological. (Harris had in mind a scientific tool to particularize archaeology as a distinct discipline in two ways: (1) that archaeology would consciously shake loose from certain realities that only made sense for geology and (2) that would question the theoretical reach of certain problems and interpretations surrounding the practice of archaeological excavation (Harris 1991 [1979])). Many supporters of these theoretical–methodological proposals went on to pronounce in favor of a paradigm that treated archaeological stratigraphy as a science in its own right (Harris et al. 1993; Carandini 1997; Roskams 2003). The paradigm took form from six distinctive aspects.

First, it facilitated the introduction, to the stratigraphic record, of archaeological features that had previously not been considered as stratigraphic units, archaeologically speaking, such as pits, ashes, any soil disturbance (chemical or physical), ramparts, depressions, walls, and other features (Harris 1991 [1979]; Lucas 2001).

Secondly, construction of an archaeological stratigraphic sequence in the Harris Matrix format implied a specific stratigraphic excavation process. This meticulous stratigraphic methodology differed from other types of excavation, which was along arbitrary, naturally occurring levels associated with recording the sections, cuts, and exposed profiles; this will gradually be replaced by the introduction of an *open area* strategy and a

record by singular context using diagrammatic plans (Barker 1977; Praetzellis 1993).

Thirdly, it gives importance to the horizontality of archaeological stratigraphy, specifically the incorporation of a horizontal view of the projected surface outline of the interfaces. This broke the persistent norm imposed by the vertical perspective of drawings and sketches of exposed cores in profiles, sections, and stratigraphic columns (Harris 1991 [1979]). Deciphering the formation sequence of the archaeological deposits came to depend on the interpretation of the stratigraphic relationships, not from mere observation of the exposed profiles but from how those relationships are recorded while excavating, starting from their horizontal extent in space and time.

Fourth is the configuration of archaeological stratigraphy in a multilineal diagram known as the *Harris Matrix*, which expounded a methodology of graphing on a two-dimensional plane to show distinct types of stratigraphic relationships across time, as a three-dimensional representation, and to deal with the various post-excavation problems of stratigraphic interpretation (Lucas 2001; Roskams 2003). (Relationships of superposition (A is behind and later than B; B is before and earlier than A), of contemporariness (A and B belong to the same moment of formation), and of equivalence (A is B) or, in any case, without a direct stratigraphic relationship.) The Harris Matrix consisted of a structure with the form and content of a sequence, where space does not appear to be bifurcated by the trajectory of the time, but that establishes a colligation of the verticality of time (sections) with the horizontality of space (record plans) (Harris 1991 [1979]; D'Amore 2002).

Fifth is the transforming basis of the Harris Matrix sequence in that it principally represents the stratigraphic nature of the superposition, before the topographic order, thus avoiding having to transfer, to the diagram, physical relationships between the units. Then, the archaeological stratigraphic representation came to be the interpretation of stratigraphic relationships, the symbolic dimension of relative time, and not directly an empirical or realistic record of the physical–topographic superposition (Harris 1991 [1979]; Carandini 1997; D'Amore 2002).

Sixth, and most important of all, was the interpreting and correlating of *interfaces* as separate circumscribed units in an archaeological stratigraphic sequence (Harris 1991 [1979]). (A first approach to the idea of *interface* was Wheeler's proposal to excavate following *the natural contour* of the superpositioned strata and to adopt specific criteria for drawing irregular interfacial lines; this type of record was called the *Wheeler-Kenyon System of Archaeological Stratigraphy* (Harris 1991 [1979]; Lucas 2001). However, the visual representation of the interfaces played a second role, given that they were not recorded with a number, as what was done with the strata and its contents (D'Amore 2002). Otherwise the interfaces would continue to be observed and recorded solely from the verticality of the sections and profiles). In its analytical correlation with the excavation record, the interfaces were the surfaces of the horizontal and vertical strata equal to its total area (surfaces of positive accumulation) and were also the cut or extraction surfaces of the preexisting stratification in the sedimentary matrix (surfaces of negative destruction, or *interfacial elements*). (In geology, in the study of natural soil formation, the positive surfaces are associated with beds, deposits or formations, and the negative with discontinuities (Butzer 1989 [1982]; Stein 1987; Waters 1992). In their stratified state, these surfaces remain semiconsolidated and somewhat stable compared to the dynamics of being exposed to the elements during occupation of the site.) In its interpretative correlation, the surfaces were in direct contact with the gradual formation of the strata. Once these interfaces, through a process of stratification, became buried by other strata and incorporated into a sedimentary matrix forming a stratigraphy, they became the possible interpretive correlation of a level of occupation on which took place human actions and practices (Harris et al. 1993; Haber 1996), or the final extension of a sedimentation and natural degradation, in a given moment of site formation (Schiffer 1987; Carandini 1997). From this view of stratigraphy, the artifacts as much as the sediment's particulates were bound by the interfacial limits of the stratigraphic units; and, furthermore, in an archaeological site, the interface was a much more numerous stratigraphic unit than the strata

(Harris et al. 1993). Therefore, the character of the interfaces was the principal unit of analysis for constructing a sequence in terms of the Harris Matrix, and not the artifact or sedimentary content of the deposits. Harris and some of his supporters defined the interfaces together as units that denote surfaces *without content* (neither artifacts nor sediments). Unlike a stratum of positive deposition, the interface did not possess depth or substance (Harris 1991 [1979]; Lucas 2001), but did represent time and the stratigraphic relationships. Thus, the interfaces were not identified by their material content, but because they were *action surfaces*, of either deposition or extraction (Haber 1996; D'Amore 2002). Here arose a new way of thinking about stratigraphy, no longer founded in the nature of the sediment, but in the action that produced it, by humans or by nature.

In this way, it was recognized that even when archaeological stratigraphy was a "*heuristic device,"* it allowed, theoretically and methodologically, the definition of patterns significantly linked to human action and natural events, at the level of superposition of stratigraphic units as much as from the cultural content. Arising from this way of thinking, comprehension of an archaeological site began to view it as a palimpsest of action and discrete events. The archaeological site was fractioned into units or contexts that were excavated according to their position and stratigraphic relationships, but it was being defined by limits in time and space, as simple actions and events that leave a positive record (stratum) and a negative one (the cut). Archaeological stratigraphy was no longer a mere repository of objects, of cultural groups or of a direct normative representation of cultures, or cultural epochs; neither did it deal only with overlaid sedimentary caps. Rather, it was conceived as a deposit of actions and events which, given its relationships, form part of a history or histories that can involve material behaviors or leading patterns of sedimentation, representing sequences of rhythms and natural and cultural changes. (Harris' principles of archaeological stratigraphy were well received in the realm of the formation processes of Schiffer (see preface in Harris 1991 [1979]). With the theoretical–methodological framework of the Harris Matrix, the formation processes obtained a scientific rigor, supported by a type of archaeological excavation practice. The leading alternative was no longer based solely on a different form of building archaeological theory, but from that, the theoretical entities of formation processes tackled their corresponding material in the archaeological sites, aided by the working categories of the excavation record proposed by Harris: strata, interfaces, and interfacial elements. More importantly, these units of study proved to be potential actions and events (natural and cultural) visually identifiable or materially represented in the context of archaeological practice).

Future Directions

Within the archaeological discipline, stratigraphy has become a structure of thought regarding time and linearity, and as such it conditions and restrains the archaeological interpretation of the past. It is a modern metaphor for representing historical time (narrative) and physical time (relative chronology), but this metaphor would be nothing if stratigraphy were not structured by the modern belief in *succession* in a *sequence*. In the daily tasks of archaeological practice, time is naturalized by the temporal metaphor of the sequence and of the stratigraphy: the passage of time is both vertical and sequential.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ British Pioneers and Fieldwork Traditions
- ▶ Çatalhöyük Archaeological Site
- ▶ Dating Methods in Historical Archaeology
- ▶ Dating Techniques in Archaeological Science
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Field Schools, Archaeological
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Geoarchaeology
- ▶ Site Formation Processes
- ▶ Tells in Archaeology

References

Barker, P. 1977. *Techniques of archaeological excavation*. London: Batsford.

Browman, D.L., and D.R. Givens. 1996. Stratigraphic excavation: The first "new archaeology". *American Anthropologist* 98 (1): 80–95.

Butzer, K.W. 1989 [1982]. *Arqueología. Una ecología del hombre: método y teoría para un enfoque contextual*. Barcelona: Ediciones Bellaterra.

Carandini, A. 1997 [1991]. *Historias en la tierra. Manual de excavación arqueológica*. Traducción de X. Dupré Raventós. Barcelona: Crítica (Grijalbo Mondadori).

Courty, M.A. 2001. Microfacies analysis assisting archaeology stratigraphy. In *Earth science and archaeology*, ed. P. Goldberg, V.T. Holliday, and C.R. Ferring, 205–240. New York: Kluwer Academic/Plenum Publishers.

D'Amore, L. 2002. *Secuencia de Estratigrafía Arqueológica y Prácticas Sociales. Historia de una unidad doméstica del Oasis de Tebenquiche Chico*. Tesis de Licenciatura inédita. Escuela de arqueología, Universidad Nacional de Catamarca, Catamarca.

Farrand, W.R. 1984. Stratigraphic classification: Living within the law. *Quarterly Review of Archaeology* 5 (1): 1–5.

French, C. 2003. *Geoarchaeology in action*. London: Routledge.

Gasche, H., and O. Tunca. 1983. Guide to archeostratigraphic classification and terminology: Definitions and principles. *Journal of Field Archaeology* 10: 325–335.

Haber, A. 1996. La estratigrafía y la construcción del tiempo en arqueología. *Comentarios sobre la teoría de Harris. Shincal* 5: 27–34.

Harris, E.C. 1991 [1979, 1989]. *Principios de estratigrafía arqueológica*. Traducción de E. Junyent. Barcelona: Crítica.

Harris, E.C., M.R. Brown III, and G.J. Brown, eds. 1993. *Practices of archaeological stratigraphy*. London/San Diego: Academic.

Holliday, V.T., ed. 1992. *Soils in archaeology: Landscape, evolution and human occupation*. Washington, DC: Smithsonian Institution Press.

Lucas, G. 2001. *Critical approaches to fieldwork*. London: Routledge.

Lyman, R.L., and M.J. O'Brien. 1999. Americanist stratigraphic excavation and the measurement of Cultura Change. *Journal of Archaeological Method and Theory* 6 (1): 55–107.

O'Brien, M.J., R.L. Lyman, and M.B. Schiffer. 2005. *Archaeology as a process. Processualism and its progeny*. Salt Lake City: The University of Utah Press.

Praetzellis, A. 1993. The limits of arbitrary excavation. In *Practices of archaeological stratigraphy*, ed. E.C. Harris, M.R. Brown III, and G.J. Brown. London/San Diego: Academic.

Roskams, S. 2003. *Teoría y práctica de la excavación*. Barcelona: Crítica.

Schávelzon, D. 1999. The history of stratigraphic excavations in Latin American archaeology: A new look. *Bulletin of the History of Archaeology* 9 (2): 1–10.

Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico Press.

Stein, J.K. 1987. Deposits for archaeologists. *Advances in Archaeological Method and Theory* 11: 337–395.

Stein, J.K. 1992. Interpreting stratification of a shell midden. In *Deciphering a shell midden*, ed. J.K. Stein, 71–94. San Diego: Academic.

Stein, J.K. 2001. A review of site formation processes and their relevance to geoarchaeology. In *Earth science and archaeology*, ed. P. Goldberg, V.T. Holliday, and C.R. Ferring, 37–50. New York: Kluwer Academic/Plenum Publishers.

Waters, M.R. 1992. *Principles of geoarchaeology. A North American perspective*. Tucson/London: The University of Arizona Press.

Waters, M.R., and D.D. Kuehn. 1996. The geoarchaeology of place: The effect of geological processes on the preservation and interpretation of the archaeological record. *American Antiquity* 61 (3): 483–497.

Wheeler, M. 1995 [1954]. *Arqueología de Campo*. Mexico: Fonde de Cultura Económica.

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Basic Biographical Information

Chris Stringer studied Anthropology at University College London and subsequently completed his Ph.D. in Anatomical Science at Bristol University in 1974.

He has worked at the Natural History Museum in London since 1973, where he is now a Research Leader in Human Origins and he is also a Visiting Professor at Royal Holloway, University of London. Stringer was awarded a D.Sc. in Anatomical Science by Bristol University in 1990.

Major Accomplishments

Chris Stringer was elected Fellow of the Royal Society in 2004, Fellow of the American

Association for the Advancement of Science in 2011 and Honorary Fellow of the Society of Antiquaries in 2010.

For his Ph.D., Stringer studied Neanderthal and anatomically modern human crania in collections across Europe and the Middle East, concluding that anatomically modern humans had not evolved from Neanderthals but had migrated into Europe replacing the earlier Neanderthal inhabitants. As a result he was an early proponent of the Recent African Origin model (also known as Out of Africa) of human evolution which holds that anatomically modern humans evolved in Africa and subsequently migrated across the globe replacing any previous archaic inhabitants.

Recent genetic evidence reveals that living people carry small amounts of archaic DNA and that this is regionally variable, consistent with an African origin for modern humans and limited interbreeding with archaic groups at a local level. Stringer has recently proposed a new model for modern human origins in Africa, which has been termed "coalescent African origin".

Stringer has also had a major role in promoting and collaborating in efforts to produce a sound chronological framework for modern human origins by establishing new dates for key specimens and archaeological sites. This has involved working with specialists in radiocarbon, luminescence, electron spin resonance, and uranium-series dating techniques. Stringer has directed or co-directed excavations at sites such as Westbury-sub-Mendip and Gough's Cave in the UK and Ibex, Vanguard, and Gorham's Caves in Gibraltar.

Since 2001 he has directed the Ancient Human Occupation of Britain (AHOB) projects, bringing together a team of paleontologists, archaeologists and earth scientists to investigate successive human occupations of Britain and to reconstruct the environments in which these early people lived.

In 2005, the AHOB team revealed new evidence suggesting that humans reached Britain about 700,000 years ago based on the presence of worked flint at a site in Pakefield, Suffolk dating to Marine Isotope Stage 17.

Since then the discovery of more than 70 flint tools and flakes from Happisburgh in Norfolk has pushed back the date for the earliest occupation of Britain and northern Europe to more than 800,000 years.

Stringer has taken a leading role in co-organizing conferences such as:

- "The Origins and Dispersal of Modern Humans" (Cambridge 1987)
- "The Origin of *Homo sapiens* and the Impact of Science-based Dating" (Royal Society 1992)
- "Gibraltar and the Neanderthals 1848–1998" (Gibraltar 1998)
- "Human Origins" (Cold Spring Harbor 2000)
- "The Human Revolution Revisited" (Cambridge 2005)
- "The first four million years of human evolution" (Royal Society 2009)
- "Culture Evolves" (Royal Society and British Academy 2010)

Stringer's books include:

- In Search of the Neanderthals (1993 with Clive Gamble)
- African Exodus (1996 with Robin McKie)
- The Complete World of Human Evolution (2005 with Peter Andrews)
- Homo britannicus (2006)
- The Origin of Our Species (2011)
- Lone Survivors: How We Came to Be the Only Humans on Earth (2012)

Cross-References

► *Homo neanderthalensis*
► *Homo sapiens*
► Neanderthals and Their Contemporaries
► Out-of-Africa Origins

References

Stringer, C. 2006. Homo britannicus. *The incredible story of human life in Britain*. London: Penguin.

Stringer, C. 2011. *The origin of our species*. London: Allen Lane.

Stringer, C., and P. Andrews. 2005. *The complete world of human evolution*, 2011. London/New York: Thames & Hudson.
Stringer, C.B., and C. Gamble. 1993. *In search of the Neanderthals*. London: Thames & Hudson.
Stringer, C.B., and R. McKie. 1998. *African exodus*. London: Cape.

Structural Archaeology

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Introduction

To write about the field of "structural archaeology" – where it comes from, what it does, and where we are now – means we must consider structuralism as an intellectual movement and how it impacted archaeology, although this is not all there is to it. It might seem at first that writing about structuralism in archaeology in these first decades of the twenty-first century can only be a historical commentary on an approach, a theory, and a method that we have gone through and beyond. Some researchers today might opine that a structural archaeology has been bypassed by other approaches and subsequent critiques. There are even terms for what developed supposedly "after" structuralist thinking and research, namely, post-structuralism and even structuration. And there are those who might suppose that even these afterlives of structuralism are faded and discarded paradigms and frameworks for the analysis and interpretation of archaeological materials and situations. Furthermore, some would even argue that all of these approaches were never "mainstream" archaeology or, if undertaken, produced only transitory results that have not really stayed with us. But in reviewing what structuralism has been for archaeology, the case can be made that its influences have been more far-reaching than one might suppose, even in the reactions and rejections of what some structuralist research might appear to be. Robert Preucel (2006: 95) even takes the view that structuralism in archaeology can now be viewed as an "intellectual bridge spanning radically different theoretical programs." Indeed, we are not yet finished with a structuralist legacy and imprint on the archaeology of the twenty-first century.

In this entry, I consider what is meant by structuralism, both in general and especially structuralism in and for archaeology; the historical background to the structuralist movement (what Gellner (1982) called "structuralisme") and to its appearance in archaeology. In some ways, this account will be one in which we can chart the rise of structuralist concerns in archaeology, their impact or what I have called a structuralist "breakout" (Conkey 1989), and then what might be viewed as their "going underground" where they continue to undergird some research and remain a somewhat silent but detectable presence in how archaeologists work. As Alison Wylie (1982) pointed out so astutely in her still salient review and argument for the epistemological issues of structuralism in and for archaeology, archaeology must employ some form of structuralist analysis. From its inception, structuralist theory and analysis have been international in origin and scope, even if they are less manifest in those traditions of archaeological practice that have been primarily cultural historical in approach. But can we consider there to be – to still be – a structural archaeology?

Definition

To begin to cover the definitions and history of Structuralism, with a capital "S," as a major intellectual movement is a daunting task for the landscape of this movement stretches far and wide – from its core incubation in the fields of linguistics and the study of languages to epistemological if not ontological debates and treatises. In this discussion, I take the view that while there is a body of theory and philosophy called *Structuralism*, with its associated methods and analytical imperatives, we can also talk about "structural approaches" that do not necessarily accept all or most of high or "capital S" Structuralism,

especially that which is considered to be classic Structuralism. Many entire books about Structuralism have been written over the decades (e.g., Hawkes 1977; Pettit 1977; Eagleton 1983 among dozens), and anthropology has played a prominent role in the history and development of Structuralism especially through the scholarship of Claude Levi-Strauss (e.g., 1963) and his predecessors in French sociology such as Durkheim and Mauss. Critiques of Structuralism have also been strong in anthropology (e.g., Sperber 1974; Fabian 1983), but as the archaeologist, Chris Tilley (1990), pointed out, Levi-Strauss is indeed a required reading, especially for an archaeology that takes seriously material and visual culture.

As Robert Layton writes in his most useful and admirably succinct chapter on "Structuralism and Semiotics" in the *Handbook of Material Culture*, these two approaches "provide ways of studying human cognition and communication" (Layton 2006: 29). As such, as we will see, there has been some disdain or dismissal (or just plain an ignoring) by many archaeologists who do not believe that archaeology can "recover" cognition or communication of past societies and perhaps certainly not any "meaning," but this is to jump ahead in our account. Structuralist assumptions include a core idea that there are underlying cultural premises to cultural practice and production and that these can be discovered by the analyst. In classic structural thought one might anticipate that the working out of specific cultural structures drew on some universal concerns, usually expressed in the form of binary dualisms, such as male/female, dark/light, wild/tame, public/private, and life/death – dualisms that were often mediated through various cultural acts, productions, or practices, such as myths, or, in the case of Leroi-Gourhan's well-known structuralist study of Paleolithic cave art (Leroi-Gourhan 1965), through image making or art. In this pathbreaking analysis, Leroi-Gourhan was attempting to identify the underlying structures and even "grammars" for the making and placing of specific images of animals or signs in the caves. While recognizing that the meanings of these structural manifestations are not immediately (or ever?) available to us some 20,000 years later, Leroi-Gourhan links the underlying structural generation to cultural mythologies, leading him to suggest that we could understand the patterning of Paleolithic cave art as a kind of "mythogram."

Of course, Structuralism is much more complicated than seeking and finding universals, polarities, and mytho-grammatical structures. Deep debates abound in the literature about fundamental assumptions and subsequent analytical methods by which Structuralists proceed. For example, Gellner (1982) probed this notion of "structuralisme" and its methods with such issues as just how the relevant polarities are to be identified and confirmed: "Not only are the polar extremes (of a text) simply plucked out and then treated as somehow explanatory of the world that the users of said text live in, but no criteria are offered for how one is to identify the crucial polarities of a world from any old contrast that a willing and imaginative observer may locate in it" (Gellner 1982: 122). And he goes on to say, "A descriptive account of the spectra or polarities of a given society or language works with is *not* the same as a generative account of how these spectra are produced. In other words, one should not confuse, so to speak, descriptive or phenomenological structuralisme with a genuinely explanatory kind" (Gellner 1982: 123). So, while strongly critical, Gellner concludes that his criticisms "merely amount to a recommendation of caution in the application of these ideas to fields other than those in which they were originally fruitful" (1982: 123). When we survey the applications of structuralist concepts and methods as put to use in archaeology, we can evaluate them with such critiques and cautions in mind. As we will see below, the "plucking out of polarities" critique is not the only one that archaeologists should take seriously.

Historical Background

There is no doubt that structuralism and one of its handmaidens, symbolic analysis, was one of the more potent theoretical frameworks in the 1960s and into the 1970s in the social sciences and especially anthropology. Although many would

readily note that structuralism played an important role in the "turn" to more symbolic archaeologies of the 1980s, structuralism was also an important – but "underappreciated" – role in the development of the processual archaeology of the late 1960s and 1970s (see Preucel 2006: 93–121).

The question here is what is a structural archaeology, as this is a particular approach that first emerged most explicitly by the 1970s. In Anglo-American archaeology it might best be represented by the now-classic work of James Deetz (1977), although structuralism for archaeology was already put forth by André Leroi-Gourhan in France. To a great extent, the kind of structural approach put forth by Deetz (1977) was less concerned with the referential dimension – that is, how the structural patterns that underlay cultural phenomena impact back on the symbolic structure(s) – and more concerned with reconstructing the rules or cognitive patterns that undergirded expressions of folk material culture in early American societies, especially as manifest in such material culture as architecture, gravestone designs, and ceramic preferences. In this classic structuralist study, Deetz was able to take us to a "synthesis of the profound conceptual changes that occurred in America during the 18th century" (Leone 1986: 426) by using oppositions in Middle Virginia folk housing (as analyzed by Henry Glassie (1975)) and using them as a framework for the analysis of many classes of material culture including music. The oppositions included scattered/clustered, framed/open, and artificial substance/natural. With such an analytical framework, the connection to the Levi-Straussian structuralism/*structuralisme* is obvious.

The first sustained archaeological engagement with Structuralism took place at Cambridge University in 1979–1980. Ian Hodder and his students organized several graduate seminars, the goal of which was to interrogate the dominant views of archaeology, especially the Paleoeconomy school and the New Archaeology more generally. The participants in the seminar included Mary Braithwaite, Steve Cogbill, Sheena Crawford, Linda Donley, Ian Hodder, Paul Lane, Danny Miller, Henrietta Moore, Elen Pader, Mike Parker Pearson, Alison Sheridan, Chris Tilley, and Alice Welbourn, many of whom have gone on to distinguished careers. American scholars were also invited to give presentations including Meg Conkey, Susan Kus, Mark Leone, and Alison Wylie. This seminar resulted in the publication of *Symbolic and Structural Archaeology* (Hodder 1982a), a powerful critique of the New Archaeology. Despite the assertiveness of many of the participants, there was no clear agreement on the ways forward. As Hodder put it in his introduction to the volume, "there are many differences of opinion concerning, for example, the nature of ideology, the degree of determinancy in social changes, the types of structure that should be analysed, and the value of any reference to structuralism" (1982b: 14).

By the 1985 celebration of the 50th anniversary of the Society for American Archaeology, an edited volume was produced that had chapters on what were then considered core topics of contemporary archaeology. One chapter addressed "Symbolic, Structural and Critical Archaeology" (Leone 1986) attesting the recognition of these related but often quite different approaches as having come onto the scene enough in archaeology so as to be included in the volume, along with what might be considered more traditional topics, such as middle-range research, origins of food production, and hunter-gatherer archaeology. In Leone's 1986 chapter, he notes that a key feature of the three archaeologies that he discusses was the recognition and engagement with the idea that the material world (that archaeologists study) is not merely a reflection of past lives and cultures, but that there is a recursive quality to culture: the uses of cultural phenomena "shape our lives, and our lives would be shapeless without" them (Leone 1986: 416).

Thus, a structural archaeology might have several levels at which it would work. The Glassie-Deetz model, along with the Leroi-Gourhan model for Paleolithic cave art discussed above, has focused on trying to discern the underlying patterns or structuring principles that have generated what we can observe today, directly or indirectly, with (in the case of Deetz) or without (Leroi-Gourhan) informing texts. Other analyses

in archaeology were also provocative in making inferences regarding the codes or underlying generative patterns that might have produced material culture, ranging from regional wide settlement patterns and architecture, such as at Chaco Canyon in the US Southwest (Fritz 1978), to the making of designs on ceramics. In the latter studies, we would include the work of Dorothy Washburn (e.g., 1977) that identified underlying principles of symmetry for the generation of painted ceramic designs on Southwestern pots. At this level – the making of ceramic designs – Washburn has undertaken a formal analysis of structure and the structuring principles of design, with the suggestion that it is such underlying structures, more so than the use of the actual specific designs, or design elements, that has more potential to inform on the participation by ceramic makers in a "style" and as part of a related social group. Still others began to investigate the idea of practice inspired in different ways by Anthony Giddens and Pierre Bourdieu. Here we can mention the work of Linda Donley (1982) and the Swahili house and the studies of Mary Braithwaite (1982) on design among the Azande in Southern Sudan.

One key feature of these earlier structural approaches in archaeology that derives directly from more classic structural premises is the centrality of *relationships*. In fact, it has been argued by those who have been bold enough to survey the fields of structuralism and semiotics that structuralism induced, as a kind of first principle, a "momentous shift in the nature of perception" (Hawkes 1977: 17–8) that recognized that the nature of things lies not in the things themselves. Rather, the "world is made up of relationships" – those that we construct and then those that we perceive between things (Hawkes 1977: 17–8). Thus, for the archaeologist, it has been the relationships – between design elements on a pot, between architectural features and concepts of the individual, and between men, what and where they hunt and what they hunt with in comparison with women, what animals they hunt, and what tools they work with – that form the underlying network among "things" that have allowed insightful structural analyses. Seeking out the relationships, the patterns of the relationships and perhaps the cultural referents of the patterns have mobilized many a structural approach in archaeology. On the one hand, this search for/identification of structural relationships has allowed for a recognition and revelation of the connectedness and constructedness of human meaning, especially as a system of signs at a given point in time. Yet, paradoxically, especially for the archaeologist who so often is trying to track changes through time, this feature of the marked synchronicity of a structural analysis – at one point in time – reveals a serious flaw of structuralism, namely, that it was not a social and historical theory of meaning and meaning making; it has been "hair-raisingly ahistorical" (Eagleton 1983: 109). As we will see, with the rise of the 1980s theoretical influences both external to and within archaeology that turned attention onto agency, practice, and the "content" of the cultural productions more so than the "form," such a delimited approach as the more classic structuralist one was subject to serious critique.

Yet before we look at what emerged from structuralism and structuralist approaches to archaeological phenomena, there are important critiques that have been made both more widely and specifically for what archaeology has come to take more seriously since both processualism and early structural studies in archaeology. First, and not surprisingly, as noted above, it was the ahistoricity of much structural analysis that bothered many an archaeologist, and this lack of history and concomitant engagement with change is part of what might be noted as a false contextuality of structuralism. At its most extreme, underlying structures are represented as almost frozen and as static. As such, there is little space or place for the actions of humans; "they play the games but they can't change the rules." That is, many structural analyses sidestep (or ignore) the fact of practical action and the intentions of social actors (which has been a similar critique of the systems approaches of processual archaeology). In fact, the individual subject is "decentered" and the new subject tends to become the system itself (after Eagleton 1983: 112–3).

This concern is also manifest in the usually formalist analyses of structural approaches. As noted (Conkey 1989: 139), the structuralist method, in general, brackets off content and focuses more on forms; it is the structure of relations that is scrutinized. The method, furthermore, is said to be "quite indifferent" to the cultural value of (what might be called) "the text": it is an analytical not evaluative method (Eagleton 1983: 96). While some of the archaeological applications of structural assumptions and premises have attempted to address this and other weaknesses (see in Hodder 1982b; Hodder 1986) in some of the pioneering applications of structuralism to archaeological phenomena (e.g., Leroi-Gourhan 1965), there is no doubt that among the missing are individuals, intentions, and an inquiry into the *contexts* of making and using material culture (in Conkey 1989).

But this is to get ahead of the discussion and to anticipate the retrospectives of the 1980s on inquiry of the 1960s and 1970s, perspectives that view the making of art, architecture, and material culture as a practice rather than as an object. Yet, it could be argued that to take the new views might not have been possible without what can be called the "structuralist breakout." I have previously made (Conkey 1989) an observation that is neither novel nor unique, namely, that inherent in the very nature of what structuralism is predicated upon is the emergence of what became "post-structuralism" in wider theoretical circles and post-processualism in archaeology. For example, with the study of Paleolithic art, what a structuralist approach opened up was that if the images could be understood as a system of signification, as a system of meanings, then many potential significations were possible. Specific to the studies of Paleolithic art that had previously been dominated by single, all-encompassing "explanations" (such as that the art was "art for art's sake" or it was "hunting magic") was the opening up of the imagery to multiple approaches: the art as a way to solve socio-spatial relationships, as a way to mark time and seasons, and as a way to establish and maintain alliances, among others. Thus, it was then possible to suggest that what we have lumped under one broad category of "Paleolithic art" may well be not just one, but several – and possibly interpenetrating – sign systems.

The wall art of caves – among many other domains of archaeological inquiry – was not something out of scope or reach of a scientific archaeology because now it could be studied systematically and even quantitatively and it put such a previously marginal archaeological phenomenon into a conceptual framework for archaeology that could seriously engage with the cognitive and the symbolic aspects of the human mind. Structural analysis of these images (as with structural analyses of other materials and objects) displaced the question of meaning from the individual boundaries of particular images ("what does this painted horse mean?") to the relationship (s) among the images and their placements within the cave. One could also displace the question of meaning in a different direction, from the individual boundaries of objects, images, and forms to the productive contexts within which the imagery or whatever had become invested with meaning. This displacement anticipated the subsequent concern and focus with the very contexts – and practices, including those of individual agents – that more traditional structural analysis had left out. A "structural breakout" led to more interest not with the structuralism, but with a structural analysis that could begin to make sense of how and why the structures "made sense" in particular historical contexts of social action. To understand the "intentions" that most classic structuralist studies did not really ask about was however another redirection of inquiry. While not inquiring into "intentions" in the sense of getting into the mind of the maker(s), a structural approach could be interested in the intentions of a cultural product so as to "interpret it as being in some sense oriented, structured to achieve certain effects" (Eagleton 1983: 114).

Key Issues

Under the rubric of what constitutes a "structural approach" in archaeology, one can see how many of the goals and perspectives of various different theoretical perspectives can be attempted. Much

of the "early" structuralism of the 1970s was congruent with the processual assumptions that understood culture to be an adaptation and to have been systemically organized, including in terms of not just energy and matter but also information. Thus, several studies showed how certain underlying structural patterns – of architecture, material culture – could have been "adaptive" and solutions that contributed to the maintenance of cultural systems. Others suggested that the structures were crucial to the production and continuation of key information, information that was manifest by a kind of resonance among multiple levels at which a structure was operating, from how one arranges people and objects in the local arena to how overarching systems of relationships between polities were played out.

To some extent, the kind of cultural world views that were embedded in and manifest by the architecture of houses and by the kinds of serving dishes used – as expounded by Deetz for colonial America – was structural premises that integrated within and yet differentiated between cultural systems. And above all, one might suggest, despite the objection some might raise about how processual archaeologies were not about the "recovery of mind," the structural studies were simultaneously providing a framework whereby the place of the human mind in constructing meaningful worlds could be within archaeological inquiry. Thus, it is readily argued that one key contribution from earlier structural archaeologies is that material culture – a key focus of archaeological research and inquiry – was now understood to be meaningfully constituted and that it is formed and ordered by systems of meaning. Further, it conveyed the important idea that categorization and classification organize the social construction(s) of reality. These understandings are, in many ways, integral to some fundamentals of what was to become a post-processual archaeology and the current focus on cognitive archaeology and materiality (Renfrew 1994; Abramiuk 2012).

One current issue is the reexamination of the relationship between Structuralism and the field of semiotics (Conkey 2001; Layton 2006), which simply can be called the "science of signs." Interestingly, in his first version of summarizing and evaluating structural approaches in archaeology (Hodder 1986), Hodder addresses only structural approaches, but by the 3rd edition (Hodder and Hutson 2003), the chapter has expanded to "Structuralist, post-structuralist and semiotic archaeologies." Simplistically, semiotics uses structuralist methods, which treat cultural phenomena that may not be thought of as a system of signs as if it were one. As one of the premier scholars responsible for the formation and elaboration of semiotics, Saussure (a Swiss linguist) has noted: "A science that studies the life of signs within a society is conceivable. . . I shall call it *semiology*" (Saussure 1959: 16). On the one hand, Saussure understandably developed his ideas in terms of language, recognizing that the linguistic sign has two components: the *signified* or idea and the *signifier* or the spoken sound(s) that conventionally express that idea. On the other hand, he already saw that "there were many other sign systems in human culture that could be studied using the same methods" (Layton 2006: 30).

To use again the example of Paleolithic cave art, a structuralist-semiotic approach meant that one could treat the imagery as a system of signs, and thus attempts at reading the *signification* of the imagery in and on the rock were possible. But as has been noted by many (e.g., Hodder and Hutson 2003: 59–65; Preucel 2006), there are substantively important limitations to the Saussurean semiotics for the study of the material and visual worlds of archaeology, such as the "focus on codes and rules at the expense of social practice" (Preucel 2006: 3). It is a much longer story to discuss the subsequent development of semiotics and how the work of Charles S. Peirce went in important new and different directions that have been shown to have much more viable applications in archaeology (e.g., Preucel 2006). In many ways, semiotic or semiotic-inspired archaeologies are more explicit and more visible on the landscape of contemporary archaeology than are structural ones, which makes for an interesting analysis of why this might be the case.

Another issue is the emerging engagements with theories of practice. Nowhere is this better seen than in the archaeological inquiry regarding

gender. This inquiry more fully emerged in the later 1980s and is usually considered as one dimension of the post-processual archaeologies. As with most feminist-inspired theory and research, the trajectory of understanding and studying gender for archaeology has been an evolving one, although one cannot neatly categorize engendered archaeology into subsequent "waves" or even schools. To many, taking on gender has long been a simple expansion of the variables to look at, along with status, class, and ethnic groups, a version of just adding, in this case, gender, with little or no theoretical or methodological ruptures. Often, gender was taken on primarily as yet another structure, as a set of underlying principles or rules about what men do, what women do and how the division of labor was to be organized, and how this, in turn, structured activities and social status. Yet some of the very same critiques of structural assumptions and approaches could be applied to the investigation of gender as structure. In fact, related developments in feminist theory can be said, in their own concerns, to have converged with the critiques of structural approaches as "missing" the social actions, the agency, the practices, and performances of social life. Although classical "practice theory" cannot be heralded for its engagement with gender, performance theory and performing gender (e.g. Butler 1990) were important inspirations for conceptualizing the workings of gender that went beyond the gender-as-structure and gender-as-structuring approaches, even if some of those were crucial to getting gender on the table as a viable topic for archaeological research.

Future Directions

One of the strongest arguments for what a structural approach can do – and does do – for archaeology was that of Wylie (1982), who advocates that there are various "compelling reasons why archaeologists should adopt some form of structuralist approach" (1982: 39). If you are interested to "the epistemological questions that a structural archaeology raises about the kind of scientific or other knowledge that archaeologists should be striving to realize," you will find in this chapter a still-valid and important discussion. She notes how structural analyses (even those only up to 1980) have opened up domains of not just inquiry but insight and why structural archaeology need not be set aside or dismissed because "its theories are empirically under-determined" (1982: 39). Writing this, on the cusp of what would become post-processual approaches in archaeology, Wylie concludes that the "great value" of a structural archaeology is that archaeologists are now face to face with having to engage with "the cognitive, semiological and symbolic significance of their data as distinctively cultural materials" (1982: 46) and, not insignificantly, of having to figure out methodological ways to do this that, in her view, would help move the discipline of archaeology "decisively beyond" the kind of skepticism and even narrow empiricism that had not just controlled but compromised the potential of archaeological understandings.

Yet some 24 years after the Wylie chapter, Layton notes that archaeology (still) needs to "develop systematic procedures for assessing reconstructions of meanings from past cultures" (Layton 2006: 40). Even though the practice of focusing on dualisms and polarities has been displaced, the critique of Gellner (1982: 123) that the description of the structures is not the same as an explanation of how they came about and were generated may still plague some, but not all, approaches in archaeology that are inspired by structuralisms. At a wider level of inquiry, there has been much debate and discussion about the legacy of the concept of "text" that derives from the early structuralist approaches (and their roots in linguistic theories). As one core concept in the debates and discussion that emerged under the label of "post-structuralism," archaeologists have variously engaged with the relative utility and limitations of the idea that we can "read" the materials of the archaeological record and their relationships "as text" (see in Preucel 2006: 135–46). One legacy of structuralism has been that it often provided an account that was essentializing and totalizing, as in characterizing an entire past culture in terms of a generative underlying structure that itself structured cultural

practices. Within-group variations in the construction and reception of meaning(s) were suppressed, along with the already-mentioned features of much original structuralism, namely, history, agency, and the contingency of meaning making.

Yet many of the assumptions and especially the goals of structuralist approaches in archaeology not only did provide the new insights that Wylie was heralding, but also they fused into a variety of approaches that many may see as separate from structuralist ones. Preucel (2006: 120–1) has been especially concerned to note the various seemingly different archaeological programs that have been influenced, if not in part spawned, by a structural archaeology. While partially congruent with many tenets of processual archaeology and, in fact, actually contributors to the formation of processualisms, structural archaeologies also brought an array of new perspectives and insightful other ways of framing archaeological inquiry: information exchange, structural Marxism, World Systems Theory, cognitive archaeology, and even gender. With some of these allied approaches, as with structural ones themselves, there is an inherent critique of the assumptions and an emergence of critiques that move the research framework to another domain (as in the conception of ideology by structural Marxists that becomes a critique of processual archaeology).

And thus, we can return to an opening point of this summary, namely, that not only have the influence and scope of structural approaches in archaeology been underappreciated but in such initial structural approaches have been the seeds of new and more expansive ways of understanding the past. As such, in the very approaches under the rubric of structuralism in archaeology exist the critiques and a generation of the "beyond structuralism" and, along with it, a "beyond processualism." There continues today a structural archaeology in new forms and with new lines of inquiry.

Cross-References

- ▶ Conkey, Margaret Wright
- ▶ Deetz, James (Theory)
- ▶ Hodder, Ian (Theory)
- ▶ Leone, Mark P.
- ▶ Leroi-Gourhan, André
- ▶ Post-processualism, Development of
- ▶ Preucel, Robert W.
- ▶ Processualism in Archaeological Theory
- ▶ Wylie, Alison

References

Abramiuk, M.A. 2012. *The foundations of cognitive archaeology*. Cambridge: MIT Press.

Braithwaite, M. 1982. Decoration as ritual symbol: A theoretical proposal and an ethnographic study in southern Sudan. In *Symbolic and structural archaeology*, ed. I. Hodder, 80–88. Cambridge: Cambridge University Press.

Butler, J. 1990. *Gender trouble: Feminism and the subversion of identity*. London/New York: Routledge.

Conkey, M.W. 1989. The structural analysis of Paleolithic art. In *Archaeological thought in America*, ed. C.-C. Lamberg-Karlovsky, 115–128. Cambridge: Cambridge University Press.

Conkey, M.W. 2001. Structural and semiotic approaches. In *Handbook of rock art research*, ed. D. Whitley, 273–310. Walnut Creek: AltaMira Press.

Deetz, J. 1977. *In small things forgotten*. New York: Anchor Press.

Donley, L.W. 1982. House power: Swahili space and symbolic markers. In *Symbolic and structural archaeology*, ed. I. Hodder, 63–73. Cambridge: Cambridge University Press.

Eagleton, T. 1983. *Literary theory: An introduction*. Minneapolis: University of Minnesota Press.

Fabian, J. 1983. *Time and the other: How anthropology makes its object*. New York: Columbia University Press.

Fritz, J.M. 1978. Paleopsychology today: Ideational systems and human adaptation in prehistory. In *Social archaeology: Beyond subsistence and dating*, ed. C.-L. Redman, M.J. Berman, E.V. Curtin, W.T. Langhorne Jr., N.M. Versaggi, and J.C. Wanser, 37–60. New York: Academic Press.

Gellner, E. 1982. What is structuralism? In *Theory and explanation in archaeology*, ed. C. Renfew, M. Rowlands, and B. Seagraves, 97–123. New York: Academic.

Glassie, H. 1975. *Middle Virginia folk housing*. Knoxville: University of Tennessee Press.

Hawkes, T. 1977. *Structuralism and semiotics*. Berkeley: University of California Press.

Hodder, I., ed. 1982a. *Structural and symbolic archaeology*. Cambridge: Cambridge University Press.

Hodder, I., ed. 1982b. Theoretical archaeology: A reactionary view. In *Symbolic and structural archaeology*, ed. I. Hodder, 1–16. Cambridge: Cambridge University Press.

Hodder, I., ed. 1986. *Reading the past*. Cambridge: Cambridge University Press.
Hodder, I., and S. Hudson. 2003. *Reading the past: Current approaches to interpretation in archaeology*. 3rd ed. Cambridge: Cambridge University Press.
Layton, R. 2006. Structuralism and semiotics. In *Handbook of material culture*, ed. C. Tilley, W. Keane, S. Küchler, M. Rowlands, and P. Spyer, 29–42. London: Sage Publishing.
Leone, M. 1986. Symbolic, structural and critical archaeology. In *American archaeology, past and future*, ed. D. Meltzer, D. Fowler, and J. Sabloff, 415–438. Washington, DC: Smithsonian Institution Press.
Leroi-Gourhan, A. 1965. *Treasures of prehistoric art*. New York: Abrams.
Levi-Strauss, C. 1963. *Structural anthropology*. New York: Doubleday-Anchor Books.
Pettit, P. 1977. *The concept of structuralism: A critical analysis*. Berkeley/Los Angeles: University of California Press.
Preucel, R. 2006. *Archaeological semiotics*. Oxford: Blackwell.
Renfrew, C. 1994. Towards a cognitive archaeology. In *The ancient mind: Elements of cognitive archaeology*, ed. C. Renfrew and E.B.W. Zubrow, 3–12. Cambridge: Cambridge University Press.
Saussure, F. 1959 (1915). *Course in general linguistics*. Trans. C. Bally and A. Sechehaye. London: Owen.
Sperber, D. 1974. *Rethinking symbolism*. Cambridge: Cambridge University Press.
Tilley, C. 1990. Claude Levi-Strauss: Structuralism and beyond. In *Reading material culture*, ed. C. Tilley, 3–81. Oxford: Blackwell.
Washburn, D. 1977. *A symmetry analysis of Upper Gila Area ceramic design*, Papers of the Peabody Museum. Vol. 68. Cambridge, MA: Peabody Museum.
Wylie, A. 1982. Epistemological issues raised by a structuralist archaeology. In *Symbolic and structural archaeology*, ed. I. Hodder, 39–46. Cambridge: Cambridge University Press.

Further Reading

Bapty, I., and T. Yates, eds. 1990. *Archaeology after structuralism: Post-structuralism and the practice of archaeology*. London: Routledge.
Caws, P. 1968. What is structuralism? *Partisan Review* 35 (1): 75–91.
Clarke, D.L. 1972. A provisional model of an Iron Age society and its settlement system. In *Models in archaeology*, ed. D.L. Clarke, 801–870. London: Methuen.
Conkey, M.W., and J.M. Gero. 1997. Programme to practice: Gender and feminism in archaeology. *Annual Review of Anthropology* 26: 411–437.
Culler, J. 1975. *Structuralist poetics: Structuralism, linguistics and the study of literature*. London: Routledge and Kegan Paul.
Friedrich, M.H. 1970. Design structure and social interaction: Archeological implications of an ethnographic analysis. *American Antiquity* 35 (3): 332–343.
Huffman, T. 1981. Snakes and birds: Expressive space at Great Zimbabwe. *African Studies* 40: 131–140.
Leone, M.P. 1984. Interpreting ideology in historical archaeology: The William Paca Garden in Annapolis, Maryland. In *Ideology, power and prehistory*, ed. D. Miller and C. Tilley, 25–36. Cambridge: Cambridge University Press.
Leroi-Gourhan, A. 1966. La religion des grottes: Magic or metaphysique? *Sciences et Avenir* 22: 105–111, 140.
McGhee, R. 1977. Ivory for the sea woman: The symbolic attributes of a prehistoric technology. *Canadian Journal of Archaeology* 1: 141–159.
Muller, J. 1979. Structural studies of art styles. In *The visual arts: Plastic and graphic*, ed. J.M. Cordwell, 139–211. The Hague: Mouton.
Ortner, S. 1984. Theory in anthropology since the sixties. *The Comparative Study of Society and History* 10: 126–166.
Robey, D. 1973. *Structuralism: An introduction*. Oxford: Clarendon Press.
Schmidt, P. 1978. *Historical archaeology: A structural approach in an African culture*. Wesport: Greenwood Press.
Small, D.B. 1987. Toward a competent structuralist archaeology: A contribution from historical studies. *Journal of Anthropological Archaeology* 6: 105–121.
Tilley, C. 1991. *Material culture and text: The art of ambiguity*. London: Routledge.
Wynn, T. 1979. The intelligence of later Acheulean hominids. *Man* 14: 371–391.

Style: Its Role in the Archaeology of Art

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Introduction

The Relevance of the Concept of Style in the Archaeology of Art

Style has been and still is a core concept in the field of the archaeology of art for several reasons, including the fact that it is a twofold term: on the one hand, it refers to a quality of past human

actions which is perceptible in material culture, and on the other hand, it is also an analytical tool that allows archaeologists to find continuities and discontinuities in the archaeological record which are relevant to answering questions about the spatial and temporal distribution and qualities of cultural practices.

The concept of style is particularly relevant to the archaeology of art because, among other material culture products, the creation of artworks (be them artifacts or structures) entails the manipulation of form, color, size, texture, volume, etc. in the creation process, which often show recurrent patterns that evidence the underlying operation of stylistic rules and habits. Thus, style studies tackle numerous aspects of image making and display, including the trends underneath the design of visual motifs, their combinations and layout, the techniques used in their production, as well as the types of objects and contexts in which such images were created and displayed, the functions that they had for their creators, and the effects they generated over their users-viewers (Conkey and Hastorf 1990).

Yet, style has also been an analytical tool used by archaeologists to pinpoint visual similarities between artworks, in order to map their spatial distribution and/or to create stylistic sequences. In turn, these have often been interpreted as evidence of underlying archaeological cultures, which produced such similar traits, although such interpretations have also been challenged and much debated in the last 30 years (Conkey and Hastorf 1990). Such theoretical approaches and debates are reviewed in this entry.

Definition

What Is Style in the Archaeology of Art

Many archaeological research projects on art materials (rock art, portable art, pottery decoration, sculptures, friezes, etc.) have relied heavily on the concept of style, as a tool to classify artistic assemblages, create evolutionary sequences, and explore the distribution of specific artistic traditions in order to discern past identities. Although commonly understood as a way of doing, particular to a specific time and place, this concept has been defined from different and sometimes conflicting theoretical frameworks (Conkey and Hastorf 1990). Some key elements are explicitly or implicitly common to most definitions of the term *style*, which is recognizable when *comparing* a sample of *archaeological images* which show *shared features*, including (a) a common *repertoire of motifs*, e.g., their form, color, and size; (b) a common way of *displaying such motifs* on the media on which they are laid out (ceramic vessel, bedrock, bone artifact, etc.), e.g., their position, orientation, symmetric arrangement, and use of media features (its concavity/convexity/flatness, volume, topography); and (c) a common set of *image-making techniques* (including raw materials, tools, and technical operations to use them). Other features, such as the contexts in which these artifacts or structures were produced and used, as well as the functions and effects they had on their creators and viewers, do not appear in every definition of "style" and are more dependent on each theoretical approach to this concept (see below).

Historical Background

Style from a Normative Culture-History Framework

The first formal use of the concept of style in archaeology and thus in the archaeology of art was developed by the culture-history framework: it conceived style as a set of mental rules that operated within a broader set of cultural norms and which were projected into the creation of images with certain recurrent features that were recognizable in the archaeological record: types of decorative motifs, color choices, artifact shapes, depicted themes, decorative techniques, etc. (e.g., Breuil 1952; Leroi-Gourhan 1968). Hence, style became a diagnostic trait by which archaeologists identified/created "archaeological cultures." Thus, styles' spatial distribution became key indicators of the diffusion of cultural norms from one site or region to another, while stylistic sequences formed by the diachronic succession of styles became the backbone of archaeological

periodifications. In turn, styles became chronological indicators for relative dating, motif types, and forms being used in some cases as "fossil guides" to date artworks.

The shortcomings of such theoretical framework are many and have been clearly pinpointed by several authors (see their contributions below). Firstly, these normative approaches to style clearly saw it as a reflection of a mental set of shared rules and, as such, as a passive factor in human life: persons were seen more as the passive "bearers" of style rather than as its producers and manipulators. Secondly, style was mainly separated from function insofar as it was regarded more as the result of repeated norms than as the result of a social practice with certain practical purposes. Thirdly, this perspective was clearly homeostatic since its emphasis on the *shared* rules disregarded the possibility of manipulations, impositions, negotiations, and/or contradictions within the people who produced, circulated, and consumed specific style-bearing artifacts and structures. These issues where to be tackled by the following theoretical approaches.

Style from a Processual Framework

The deep breakthrough generated by the processual framework in archaeology through its explicit and thorough criticism towards culture-history did have a clear effect on the way style was conceived in art analyses. The pioneer work by Binford (1965) led to two key new ideas about culture, which was now conceived: (1) as "a system composed of subsystems" (Binford 1965: 203) in which "different classes of archaeological remains reflect different subsystems" (Binford 1965: 203) and (2) as "man's extrasomatic means of adaptation (White 1959: 8)" to the environment (Binford 1965: 205). This meant that "people, things, and places are components in a field that consists of environmental and sociocultural subsystems, and the locus of cultural process is in the dynamic articulations of these subsystems" (Binford 1965: 205). Thus, culture "is not necessarily shared; it is participated in by men" (Binford 1965: 205). Such ideas had a deep impact on the way style was conceived by processual archaeologists: culture – and style within it – was not just in people's minds, was not necessarily shared, and was not detached from the environment: culture involved practice and had adaptive functions to the environment. Did style have functions too? The answers to this question had a broad variety of replies within the processual framework.

Binford himself proposed that stylistic variability could be defined as the continuity of "formal attributes, which vary with the social context of manufacture exclusive of the variability of the use of the item" (Binford 1965: 208); that is, style and use (or function) of an item were seen as separate but interrelated realms. To pursue their study, he devised a complex set of interrelated variables to be approached through a multivariate perspective:

(a) *Formal variation* was seen as integrated by morphological variation and decorative variation, which in turn were intersected by the technical dimension and the design dimension (Binford 1965: 205).
(b) *Cultural variation* was conceived as integrated by four variables: techno-morphological, morphological design, decorative techniques, and decorative designs, which, in turn, were intersected by the primary functional variation (directly related to the specific use of an artifact) and the secondary functional variation (a by-product of the social context of production and use of the artifact) (Binford 1965: 206). This multivariate approach was foundational in the analytical separation between style and function, which was later reelaborated by other authors.

Sackett (1977) also made a clear distinction between the style and function operating in three scales: entire archaeological assemblages, artifacts, and attributes that characterize them (1977: 371–372). Yet he did remark that both were contrasting and complementary features. Function was conceived as a feature perceived in the actions, ends, and roles that an artifact performed within its context, while style was conceived as the choices made by a society within a broad range of equally valid alternate

means of achieving the same end (i.e., the same artifact) (1977: 371–372). Such choices were socially transmitted and thus had diagnostic value in the archaeological identification of cultural traditions and of the degree of intensity of social interaction between two historically related loci (1977: 371–372).

Breaking away from the processual framework and proposing a neoevolutionist approach, Dunnell (1978) focused on the concept of natural selection as a key to addressing evolutionary processes underlying cultural change. In doing so, and contradicting the processual approach, he noted that "a substantial segment of the archaeological record is not best understood in terms of adaptation" (Dunnell 1978: 192), because stylistic features of material culture were not adaptive. Thus, he proposed that there existed a fundamental dichotomy between function – accountable in terms of evolutionary processes – and style, accountable in terms of stochastic processes, that is, not subject to the bias of natural selection (Dunnell 1978: 192). These concepts have been challenged as well as revisited and refined (e.g., Hurt and Rakita 2001; Shennan and Wilkinson 2001).

Following Dunnell, Meltzer restricts the term style to refer to "those forms in a cultural system that do not have detectable value: those forms are adaptively 'neutral'" (Meltzer 1981: 314). Style, as a residual attribute, is interpreted as added for purely social purposes. On the contrary, functional features do not depend directly on transmission factors or interaction between groups but may result from adaptations or the development of similar activities in similar environments.

Contrary to these views, a number of researchers have suggested the coexistence of different styles with different functions within the same culture, with differences between religious and secular art, or between civil and domestic art (Schapiro 1952: 294). Similarly, Smith observes the use of two different styles among the Aboriginal people from Barunga (Arnhem Land, Australia) with different functions: a figurative style for non-ceremonial contexts and a geometric style for ceremonial contexts (Smith 1994: 241).

A different approach to style was developed by Wobst, who defined it as "that part of the formal variability in material culture that can be related to the participation of artifacts in processes of information exchange" (Wobst 1977: 321). The author broke the style/function opposition and proposed instead that "stylistic behaviour does have functions" (Wobst 1977: 321). Following core concepts of communication theory, Wobst viewed artifact styles as media through which messages could be encoded by emitters even in the absence of receivers, while, in turn, messages could later be decoded in the absence of emitters. The longevity of artifacts (though clearly some are highly perishable) and the control of the emission of messages via the use of rare materials or high-cost energy investment in the signals were conceived as particular features of this mode of information communication. He also pointed out that the archaeological expectations of stylistic behavior include:

(a) Artifacts with high visibility.
(b) Artifacts which are "potentially encountered by more individuals" and most accessible to them.
(c) "social-group-specific stylistic form[s] should occur only among those messages that are most widely broadcast, that broadcast group affiliation, and that enter into processes of boundary maintenance" (Wobst 1977: 330).

Yet social interaction interpretations done by other authors were severely challenged by Plog (1978), who pinpointed numerous false assumptions underlying several stylistic ceramic studies (e.g., that "all households made the pottery they used" and that "manufacture of ceramics was a female activity") and thus proposed that "one should not simply calculate a similarity coefficient between design frequencies at two sites and assume that it measures interaction and nothing else" (Plog 1978: 368). Following the work of Wobst (1977), Plog (1978), and others, in the 1980s several authors addressed style as a process of social interaction and exchange, both in the analysis of portable art (e.g., Gamble 1982) and

rock art (e.g., Jochim 1983; Schaafsma 1985; Smith 1992a, b, 1994).

Style from Post-processual and Social Frameworks

The post-processual and social frameworks challenged several of the ideas about style mentioned above: they share in common the fact that they see style as an active factor in the production and manipulation of material culture, a factor that stems from human agency, can be used as a source of power to do things and over people and resources, and thus, having crucial effects on the social lives of those involved in the creation, circulation, and display of artifacts and structures fashioned with a particular style, operating within a particular context. However, as will be noted below, these approaches do strongly differ in their epistemology: those labeled here as "social" being more prone to neopositivist and dialectical epistemologies combining induction and deduction, while the post-processual ones being more prone to hermeneutic and interpretive epistemologies.

As a pioneer of post-processual archaeology, Hodder contested the adaptationist and functionalist notions of culture and style and proposed that material culture was better conceived as "the environment within which individuals find their places and learn the places of others, their goals and expectations. Yet it also produces new situations and is . . . the medium through which individuals achieve their ends" (Hodder 1985: 5). Thus, as part of any material culture item, style involved social action, including simultaneously "meaning and experience, subject and object, interpretation and observation" (Hodder 1985: 4). Moreover, the political dimension of style was stressed by pointing out that pottery decoration, for example, could be interpreted as "part of the negotiation of power, defining boundaries, and producing social differences" (Hodder 1985: 4). Many of these ideas are still in use.

From a more social and ethnographic point of view, Wiessner (1983, 1989) defined two key concepts related to the links between style and identity that have generated an important debate in archaeology: emblemic style was defined as the formal variation that consciously transmits information about affiliation to a group, while assertive style was defined as the formal variation that carries information about individual identity. While this distinction is extremely meaningful in terms of the multiple social implications of style as an identity marker, it also has some shortcomings when applied to certain prehistoric archaeological contexts in which the distinction between assertive or emblemic becomes untestable.

A similar set of concepts was devised by Macdonald (1990), who stated that protocol referred to the set of steps undergone in the production of an item within a stylistic framework, while panache referred to the ability of an individual to negotiate and push the boundaries of such protocol for his/her own aims.

In turn, Sackett (1990) elaborated his previous ideas about style and function and proposed a set of concepts: *isochrestic variation* was related to the choices made between variants that are functionally equivalent and transmitted neither intentionally nor consciously through enculturation within social groups, but rather passively and inadvertently (hence, challenging Wiessner's notion of an emblemic style consciously informing about identity); *iconological variation* was related to the active and intentional communication of contents through the creation and selection of specific images and/or designs. Thus, Sackett had proposed a more complex dichotomy:

(i) passive style = isochrestic variation = function

versus

(ii) active style = iconological variation = communication

To this, Wiessner (1989) replied that both aspects of style – functional and communicative – could be passive and/or active, hence breaking such strict dichotomy.

Finally, from a more openly social and materialist theoretical point of view, Earle has analyzed the manipulative uses of style as a justification of

social inequality (Earle 1990). The author has pointed out that, among other factors, artifacts and structures created using elaborated art styles, luxury items, and durable materials generate aesthetic, and affective reactions can be very effective means of conferring individual's roles, status, and power due to the fact that they look not just visually appealing but also solid, permanent, and thus unquestionable (Earle 1990).

Key Issues/Current Debates

Current Uses of the Concepts of Style: Key Elements in Style Analysis

In the twenty-first century, style still plays a significant role as a tool to discern social identities and to establish relative chronologies when analyzing art materials and more particularly rock art. While portable forms of art can be dated through the archaeological context where they are found, direct rock art dating is still problematic, and when possible, it generally dates a particular motif or artwork. But an absolute date would only be meaningful to the archaeological study of art if the motif or the artwork can be assigned to a specific stylistic assemblage or unit defined by the reproduction of a certain set of common principles. Only then will we be able to identify artistic traditions, assign them to specific time periods, and explore their geographic distribution, to study the duration and intensity of specific occupations, the boundaries and interactions of specific human groups, and other aspects related with human geography and exchange networks and their evolution over time (Domingo 2005, 2012).

In order to obtain information about the past through the analysis of artworks, we need to systematically describe and quantify their main characteristics and compare them, looking for similarities and differences to classify them in meaningful units.

But what are the key elements in style analysis?

Style, or the particular way of doing of a specific individual or group, can be found in any step of the process of production (Leroi-Gourhan's 1964 notion of *Chaine Operatoire*), of an artwork, whether technological, formal, or functional. When producing an artwork, there is a range of choices from which the artist can select, either intentionally or simply by following a set of instructions learned in a specific context. The artists' choices can be unique to them or their group, and thus they become stylistic.

To find traces of identity through the analysis of artworks, it is necessary to systematically decompose their process of production, since stylistic behavior can be identified in different steps of this process:

1. Style can be identified in the formal features of an artwork (form and decoration). The study of the formal features is usually approached through visual analysis, including systematic description of different descriptive categories (always adapted to the type of artwork under analysis, whether rock art, portable art, body art, and so forth) and quantification of their frequency to observe if they change over time and/or space. Some of these categories include:
   (a) Motif types (abstract, geometric, or figurative and their subcategories, such as humans, animals, plants, and objects).
   (b) Shape (proportions, modelling, animation, perspective, and so forth).
   (c) Size.
   (d) Formal relations in space (patterns of composition and scenes). Once motifs have been analyzed, it is important to look for regularities in the way they are distributed through the panel or artifact, in order to discover if different rules of composition and arrangement exist. Similarly, compositions and scenes have to be carefully analyzed looking for changes in subject matter.
   (e) Patterns of addition and superimposition. The way the motifs are added to the panels or artifacts can also be specific to a particular individual or group. Do they use specific areas of the panel or artifact? Do they use new sites or surfaces, or do they reuse previously used ones? Do they respect previous motifs or overlap them? How is the morphology of the decorated

surface integrated in the composition or scene? Superimpositions of motifs that are stylistically similar may simply be an artistic license to show group perspective. But those including different styles are quite significant for stylistic analysis since they offer a sequence of events, and thus, they are useful to establish relative sequences.

(f) Analysis of the spatial distribution in the natural and cultural context. The distribution of portable art may provide information on the geography of specific traditions but also on exchange networks. But rock art is fixed to place, and thus it is a relevant source of data to understand the way space was defined and used by a specific group, the duration and intensity of the occupation, and how the perception of a specific place changed over time in the construction of social identities (Lenssen-Erz 2008; Domingo et al. 2008). When talking about rock art, this is usually explored through landscape analysis.

2. Technological features (medium and production techniques).The way the artworks are made can also be stylistic. From raw materials and resources to produce binders, paintings, and tools, to the selection and preparation of the decorative surface (rock or portable art), the selection of the techniques (paintings, engravings, or carvings), and so forth may all be constraint by cultural practices. While some aspects of the technological process of production can be explored through visual analysis (selection of canvas, preliminary preparation of the working surface, decoration techniques), others need to be explored through archaeometry (like pigment analysis) or experimentation (like analysis of gestures, potential tools, and so on). Interestingly, as suggested by Gosselain (1992: 90), while the visual aspects of an artwork can be easily replicated by different cultures, non-visual aspects, such as pigment recipes, are more difficult to reproduce and thus provide the opportunity to explore the more stable aspects of social identities. As an example, Groenen suggests that the identification of different painting recipes and different application techniques in the analysis of the hand stencils from Gargas results from different artistic events, in contrast to the single intervention deduced by Leroi-Gourhan through formal analysis (Groenen 2000: 60).
3. Function. When talking about function, we refer to both the utilitarian function (related to the material use of an object) and the non-utilitarian function (related to social, ideological, or spiritual spheres) (Sackett 1977: 370). The same human group can potentially use different styles for different functions, and thus, two different styles do not necessarily refer to two different periods or cultures. Here, the analysis of the context would be central.

To summarize, any integral stylistic study should combine formal, functional, and technological analysis, in order to achieve a more objective approach to style, trying to define different social units and to determine their limits in space and time (Domingo 2012).

Future Directions

The Archaeology of Style in Art Materials

A review of the concept of style and its use in the archaeological study of art confirms its value as a tool to explore past social identities and to construct relative chronologies of different sorts of artworks. Together with the systematic description, quantification, and classification of the artworks, future stylistic studies would certainly need to be complemented with more accurate absolute dates (especially in rock art) to provide a more precise chronological control of the art traditions; more accurate recording methods, in terms of the images, their spatial setting (landscape, topography, bedrock in rock art, or other materials in portable art), and production techniques; and, finally, controlled uses of ethnographic and historical resources as sources of hypotheses or as analytical tools to search for stylistic trends.

Cross-References

- ▶ Art Studies: Normative Approaches
- ▶ Binford, Lewis R. (Theory)
- ▶ Conkey, Margaret Wright
- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ Hodder, Ian (Theory)
- ▶ Leroi-Gourhan, André
- ▶ Paleoart Studies: Scientific Methods
- ▶ Smith, Claire
- ▶ Wobst, H. Martin

References

Binford, L. 1965. Archaeological systematics and the study of culture process. *American Antiquity* 31 (2–1): 203–210.

Breuil, H. 1952. *400 Siéclesd'Art Pariétal*. Paris: Editions Max Fourny.

Conkey, M., and C. Hastorf. 1990. Introduction. In *The uses of style in archaeology*, ed. M. Conkey and C. Hastorf, 1–4. Cambridge: Cambridge University Press.

Dunnell, R. 1978. Style and function a fundamental dichotomy. *American Antiquity* 43 (2): 192–202.

Earle, T. 1990. Style and iconography as legitimation in complex chiefdoms. In *The uses of style in archaeology*, ed. M. Conkey and C. Hastorf, 73–81. Cambridge: Cambridge University Press.

Gamble, C. 1982. Interaction and alliance in Palaeolithic society. *Man* 17: 92–107.

Hodder, I. 1985. Postprocessual archaeology. *Advances in Archaeological Method and Theory* 8: 1–26.

Jochim, M. 1983. Palaeolithic cave art in ecological perspective. In *Hunter-gatherer economy in prehistory*, ed. G. Bailey, 212–219. Cambridge: Cambridge University Press.

Leroi-Gourhan, A. 1964. *Le gest et la parole I: Technique et language*. Paris: A. Michel.

Leroi-Gourhan, A. 1968. The evolution of Paleolithic art. *Scientific American* 218 (2): 58–70.

Macdonald, W.K. 1990. Investigating style: An exploratory analysis of some Plains burials. In *The uses of style in archaeology*, ed. M. Conkey and C. Hastorf, 105–112. Cambridge University Press.

Meltzer, D.J. 1981. A study of style and function in a class of tools. *Journal of Field Archaeology* 8 (3): 313–326.

Plog, S. 1978. Social interaction and stylistic similarity: A reanalysis. *Advances in Archaeological Method and Theory* 1: 143–182.

Sackett, J. 1977. The meaning of style in archaeology: A general model. *American Antiquity* 42: 362–380.

Sackett, J. 1990. Style and ethnicity in archaeology: A case for isochrestism. In *The uses of style in archaeology*, ed. M. Conkey and C. Hastorf, 32–43. Cambridge: Cambridge University Press.

Schaafsma, P. 1985. Form, content and function: Theory and method in North American rock art studies. *Advances in Archaeological Method and Theory* 8: 237–277.

Schapiro, M. 1952. Style. In *Anthropology today*, ed. A.-L. Kroeber, 287–312. Chicago: University of Chicago Press.

Smith, C. 1992a. Colonising with style: reviewing the nexus between rock art, territoriality and the colonisation and occupation of Saul. *Australian Archaeology* 34: 34–42.

Smith, C. 1992b. The articulation of style and social structure in Australian Aboriginal art. *Australian Aboriginal Studies* 1: 28–34.

Smith, C. 1994. *Situating style. An ethnoarchaeological study of social and material context in an Australian Aboriginal artistic system*. Unpublished Ph.D. dissertation, University of New England.

Wiessner, P. 1983. Style and social information in the Kalahari San projectile points. *American Antiquity* 48 (2): 253–276.

Wiessner, P. 1989. Is there a unity to style? In *The uses of style in archaeology*, ed. M. Conkey and C. Hastorf, 105–112. Cambridge: Cambridge University Press.

Wobst, H.M. 1977. Stylistic behavior and information exchange. In *Papers for the Director: Research essays in honor of J. Griffin*, Anthropological Papers, ed. C. Cleland, vol. 61, 317–342. Ann Arbor: University of Michigan, Museum of Anthropology.

Further Reading

Bettinger, R., R. Boyd, and P. Richerson. 1996. Style, function and cultural evolutionary processes. In *Darwinian archaeologies*, ed. H. Maschner, 133–164. New York: Plenum.

Domingo, I. 2005. *Técnica y ejecución de la figura en el arte rupestre Levantino. Hacia una definición actualizada del concepto de estilo: validez y limitaciones*. València: Servei de Publicacions de la Universitat de València.

Domingo, I. 2012. A theoretical approach to style in Levantine rock art. In *A companion to rock art*, Blackwell Companions to Anthropology series, ed. J. McDonald and P. Veth, 306–322. Oxford: Blackwell.

Domingo, I., D. Fiore, and S.K. May, eds. 2008. *Archaeologies of art: Time, place and identity*. Walnut Creek: Left Coast Press.

Gosselain, O.P. 1992. Technology and style: Potters and pottery among the Bafia of Cameroon. *Man* 27: 559–586.

Groenen, M. 2000. *Sombra y luz en el Arte Paleolítico*. Madrid: Ariel.

Hurt, T., and G. Rakita, eds. 2001. *Style and function. Conceptual issues in evolutionary archaeology*. London: Bergin & Garvey.

Lenssen-Erz, T. 2008. Space and discourse as constituents of past identities. In *Archaeologies of art: Time, place and identity*, ed. I. Domingo, D. Fiore, and S.K. May, 29–50. Walnut Creek: Left Coast Press.
Shennan, S., and J. Wilkinson. 2001. Ceramic style change and neutral evolution: A case study from Neolithic Europe. *American Antiquity* 66 (4): 577–593.

Su Bingqi

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Basic Biographical Information

Su Bingqi 蘇秉琦 (1908–1997) was born in Gaoyang County, Hebei province, China, in 1908 (Wang 1997; Falkenhausen 1999). He studied history at Beiping Normal University from 1928 to 1934 before joining the archaeological team of the Society of Historical Studies (after 1936, the Institute) of the National Beiping Academy and excavating the Doujitai site in Baoji, Shaanxi province. After the establishment of the People's Republic of China in 1949, Su was employed as a research fellow at the Institute of Archaeology under the Chinese Academy of Sciences, and later, the Chinese Academy of Social Sciences. In 1952, he was appointed professor in the history department of Peking University, where he founded, and served as chair of, China's first archaeology program. He was elected president of the Association for Chinese Archaeology in 1986, succeeding the former director Xia Nai (1910–1985).

Major Accomplishments

Su had a profound influence on modern Chinese archaeology (Wang 1997; Yu 2001; Hein 2016). He popularized the typological method refined by Swedish archaeologist Oscar Montelius (1834–1921). By using this method, which arranges materials in developmental sequences based on changes in forms, Su developed a chronological sequence of pottery *li*-tripods found at Doujitai. He also demonstrated that the Banpo and Majiayao cultural types were two contemporaneous branches of the Yangshao culture, instead of two sequential branches as generally thought. His chronology of the late Zhou tombs at Luoyang, Henan province, has long served as an important source for relative chronologies (Falkenhausen 1999).

Su's multiregional model for Neolithic and early Bronze Age cultures has shaped current archaeological thoughts in China. He suggested that there were six major cultural regions: the northern region centering on the Great Wall; the eastern region centering on Shandong province; the central plain adjoining part of Shaanxi, Shanxi, and Henan provinces; the southeast region centering on Taihu Lake; the southwestern region centering on Dongting Lake and the Sichuan Basin; and, finally, the southern region including Poyang Lake and the Pearl River Delta as its axis. He argued that these cultural regions had its own origin and developmental trajectory, and each interacted constantly with the others. This regionalist model challenged the conventional view that Chinese civilization originated and diffused from the area along the Middle Yellow River Valley, and it has found wide acceptance in recent years.

Su also advanced the theoretical foundation of the field by formulating the "Three Stages" and "Three Models" theories. He suggested that Chinese civilization evolved from "early cultures" (*guwenhau* 古文化), to "early cities" (*gucheng* 古城), to "early states" (*guguo* 古國). Early states were the first stage of a three-stage development hierarchy and were followed by "regional states" (*fangguo* 方國) and "empires" (*diguo* 帝國), represented by the Hongshan culture, Lower Xiajiadian culture, and Qin empire, respectively. He also proposed the "Three Models" theory that synthesized the dynamics of state formation. The "Original Model" applied to early and regional states in the northern region that emerged as a result of labor division and social differentiation. He argued that Hongshan was the earliest manifestation of a complex social organization; thus, it marked the "dawn of Chinese civilization." The "Secondary Model" denoted states in the central plain, including the archaic states of Yao, Shun, Xia, Shang, Zhou, and Qin that emerged from interactions between influences from other regions

and divisions of labor for water control projects. The "Extended Model" applied to states formed by steppe peoples, such as the Xianbei, Khitan, and Manchu, through influences from China. According to Su, Chinese civilization was the result of "divisions," "clashes," and "integrations" of different cultures.

Su also contributed by setting a clear direction for the development of the field of archaeology. He proposed to establish a Chinese school of archaeology with the aim of reconstructing Chinese prehistory through collaboration between archaeology, history, and anthropology. He also advocated the integration of Chinese and world archaeology, in order to advance the understanding of the histories of both sides. His regionalist model categorized the six cultural areas (see above) into two clusters, which emphasized their connections with either the continents or the oceans. He drew attention to people living in periphery areas and their role in creating a bridge between China and the outside world, which has become a heated research subject in current Chinese archaeology.

Su is praised for his contribution to the popularization of archaeology. Not only was he involved in the production of archaeological documentaries broadcast by China Central Television, his final book, *New Investigation of the Rise of Chinese Civilization* (Zhongguo wenming qiyuan xintan 中國文明起源新探), later translated into Japanese, was published with a primary goal of addressing both scholars and the general audience.

References

Hein, Anke. 2016. The problem of typology in Chinese archaeology. *Early China* 39: 1–32.

von Falkenhausen, Lothar. 1999. Su Bingqi. In *Encyclopedia of archaeology: The great archaeologists I*, ed. Tim Murray, 601–613. Santa Barbara: ABC-CLIO.

Wang, Tao. 1997. Establishing the Chinese archaeological school: Su Bingqi and contemporary Chinese archaeology. *Antiquity* 71: 31–39.

Yu, Weichao. 2001. Ershi shiji Zhongguo kaoguxue de yige lichengbei (a milestone of Chinese archaeology during the 20th century). In *Su Binhqi yu dangdai Zhongguo kaoguxue (Su Bingqi and modern Chinese archaeology)*, ed. Su Bai, 3–9. Beijing: Kexue chubanshe.

Further Reading

Su, Bingqi. 1984. *Su bingqi kaoguxue lunshu xuanji*蘇秉琦考古學論述選集 *(selection of archaeological writings by Su Bingqi)*. Beijing: Wenwu chubanshe.

Su, Bingqi. 1994. *Huaren – long de chuanren – zhongguoren: Kaogu xungen ji* 華人 – 龍的傳人 – 中國人:考古尋根記 *(Hua people–descendants of the dragon–Chinese: An archaeological search for roots)*. Shenyang: Liaoning daxue chubanshe.

Su, Bingqi. 1997. *Zhongguo wenming qiyuan xintan*中國文明起源新探 *(new investigation of the rise of Chinese civilization)*. Hong Kong: Shangwu yinshuguan.

Submerged Indigenous Sites

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Introduction

Land-based archaeological sites may be inundated through a variety of processes, resulting in submerged and potentially buried evidence of past human behavior. Submerged environments create unique conditions of archaeological preservation, especially for fragile materials such as textiles. In some cases, submerged sites on continental shelves or lake shores that were formerly exposed as dry land may represent evidence that predates the terrestrial archaeological record for that same area. Submerged indigenous sites are particularly informative in studies of human migration and patterns of early colonization and occupation but can be challenging to locate.

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Definition

A submerged indigenous site is defined as a spatially defined accumulation of cultural material or anthropogenically altered ecofacts, of sufficient quality and quantity to allow for inferences about past human behavior at that location, that through eustatic (changes in water volume) or isostatic (changes in crustal plate elevation caused by sediment loading, or tectonic rebound) processes or intentional inundation are presently located below water.

Historical Background

In the United States, some branches of the federal government have required systematic surveys for the identification of submerged indigenous sites on the outer continental shelf since 1973. In order to develop accurate survey guidelines and assessment requirements, the U.S. Department of the Interior's National Park Service (NPS) funded a study to determine the archaeological potential of the Gulf of Mexico (GOM) continental shelf for both historic resources and submerged indigenous sites (Coastal Environmentals, Inc. [CEI] 1977). The goals of the study included development of a predictive model for the identification of the most likely resources to be found in an open marine environment, and the highest probability areas for the occurrence of these resources. The methodology outlined by the authors is one early example of research specific to submerged indigenous sites, and their recommendations still serve as the basis for methodologies used in modern studies.

According to the study's authors, submerged indigenous sites do not occur randomly, and the authors argued that correlations exist between specific landform types and artifacts or other evidence of past human behavior (CEI 1977: 331). The authors then made correlations between types of landforms and the effectiveness of different survey techniques in identifying these same features in submerged contexts (Table 1). The 1977 study examined landforms in environments across the entire GOM, but not all of the recommendations are applicable to all environments. The authors suggested that any investigation of submerged prehistoric resources take a three-step approach beginning with remote sensing of the area through either small-scale bathymetry or sub-bottom profiling to resolve the upper 9 m (30 ft) of sediment and acquisition of a grab or drag sample of seafloor sediments. If a probable site was indicated by the data acquired in Step 1, then subsequent data should be collected, either in the form of side scan sonar imagery of the area, bottom cores, and or additional grab or drag samples. The final step, if warranted, was recommended as underwater photography/videography, box core sampling, and or diver investigation (CEI 1977: 341). The majority of the recommendations, such as bathymetric survey or diver photography, assume that the landform or site is exposed at the seafloor, which is appropriate for environments that include sinkholes and river channels that are readily apparent on bathymetry and side scan sonar data (e.g., Gaffney and Thomson 2007). For sites or landforms that are buried by subsequent sediment accretion, these methods are insufficient; initial survey requires techniques that image the subseafloor, such as boomer systems or other sub-bottom profiler systems.

The methodologies created as a result of this study were developed specifically for landforms

Submerged Indigenous Sites, Table 1 Correlation of terrestrial landforms, cultural period, and effectiveness of survey techniques from the northwestern Gulf of Mexico

	Cultural period		Survey effectiveness	
Landform	Early archaic	Paleo-Indian	Sub-bottom profiler	Piston corer
Quarry sites	V	V	Low	Not effective
Salt dome sites	V	V	High	Medium
Spring/sinkhole sites	V	V	High	Medium
Valley margin sites	V	P	Low	Not effective – low
Natural levee sites	V	V	High	Not effective – low
Point bar sites	V	V	High	Not effective – low
Bay margin sites	V	V	Low	Not effective – low
Coastal Dune lake sites	V	V	High	Medium
Shell middens	U	U	High	Not effective

Source: CEI 1977: 333, 340
Key: *V* verified or known correlation, *P* probable correlation, *U* unknown

correlating with prehistoric indigenous sites in the United States. This includes highly mobile hunter gatherers of the Paleo-Indian and Archaic periods, groups that are not associated with extensive types of material culture. The predictive model included geological reconstruction and landscape change modeling, but it was recognized that few artifacts would likely exist at submerged indigenous sites on the continental shelf. Cultural signatures of human occupation were therefore identified that went beyond artifacts, such as potsherds and lithics, to include signatures more likely to be recovered in core samples, such as shells, faunal fragments, black earth, burned rock, charcoal, and pollen (CEI 1977: 172).

In the years since the creation of the submerged indigenous site prediction and preservation model used on the United States' continental shelf, subsequent studies have been conducted worldwide that add to the theory and methodology of investigating submerged indigenous sites. In 1981, in recognition of advances in paleocoastline reconstruction, archaeologists, anthropologists, geologists, and oceanographers were invited to participate in a symposium addressing Quaternary coastlines and prehistoric archaeology; the resulting papers were published in one of the first edited volumes on the subject (Masters and Flemming 1983). The participants in this symposium noted that, at that time, the majority of identified submerged indigenous sites were the result of chance finds by recreational SCUBA divers, fishermen, or activities related to offshore construction. Site discovery, they maintained, depended on both physical preservation of the site and ease of detection. The participants presented diverse case studies ranging in location from Siberia to Australia, but concluded that several methodologies could be universally applied to site prediction and detection. At the minimum, local geomorphology has to be modeled to identify areas of probable feature preservation; recognizable features (such as shell middens) must exist; and the landscape had to have offered basic requirements such as access to fresh water, protection from environmental exposure, and or availability of food (Masters and Flemming 1983: 611, 622–623). Recommendations for survey and identification of indigenous features were similar to those outlined by CEI (1977): chiefly, bathymetric or subseafloor survey conducted at tight intervals (no greater than 150 m). The authors stressed, however, that this type of survey cannot prove without doubt the existence of submerged indigenous sites, it can only identify the most probable areas in which sites could be preserved (Masters and Flemming 1983: 624).

Parallel to the Quaternary coastlines and prehistoric archaeology symposium, a follow-up study was being conducted in the United States to analyze terrestrial analogues for potential offshore deposits (Gagliano et al. 1982). The results, developed under contract for the National Park Service, analyzed core samples from verified terrestrial prehistoric sites along the northern Gulf of Mexico coast. Lab analyses of sediment core data indicated that the following variables were credible indicators of human activity and habitation: grain size, pollen content, geochemical composition, point-counts, foraminifera species identification, and radiocarbon dating of appropriate samples. Recognizing that site identification could not be dependent upon the presence of anthropogenic artifacts, the terrestrial corollaries were developed so that landscape features could be tested for indicators of indigenous site occurrence without the presence of obvious anthropogenic artifacts such as projectile points (Gagliano et al. 1982: 115).

In order to test the effectiveness of the predictive model and recommended methodology proposed by the 1977 and 1982 reports, the U.S. Department of the Interior's Minerals Management Service (MMS) funded a study in the early 1980s, concentrated in the relict Sabine River Valley on the Gulf of Mexico outer continental shelf (Pearson et al. 1986). This area was identified as ideal for testing because of a wealth of preexisting geologic data and existing subseafloor surveys conducted on behalf of oil and gas operators that were available to the researchers through the funding agency (Pearson et al. 1986: xix). Eight targeted areas were selected for inclusion in the project based on a review of existing shallow high-resolution seismic data, and then subjected to tight interval

seismic survey over the areas of interest to both relocate and further delineate the features of interest (Pearson et al. 1986: 53–76). Survey grids were located in areas where modern water depths range from approximately 8 to 16 m (27–54 ft). Vibracores were acquired from five of the surveyed areas, each measuring 12 m (40 ft) in length. The collected cores, 76 in total, were subjected to a series of laboratory analyses in efforts to identify potential signatures of anthropogenic activity, based on those identified by previous studies (Gagliano et al. 1982). No artifacts, or distinctly man-made materials, were recovered within the cores; however, two cored features included sediments exhibiting characteristics of archaeological deposits. One was interpreted as a possible shell midden, dating to approximately 8,055 +/− 90 BP and the second was interpreted as an area of burnt bone dating to approximately 8,500 BP. The study's authors were hesitant to identify the features as concrete evidence of human occupation, but stated "that they more closely resemble archaeological deposits than known natural deposits" (Pearson et al. 1986: 76–80, 127–162). The results of the Sabine River Valley study supported the theories behind the predictive model created for use in the Gulf of Mexico, and demonstrated the complicated task of identifying submerged indigenous sites from buried contexts offshore. The study area represents a unique type of submerged indigenous context in that archaeological data is not simply submerged, but also buried underneath a seafloor which gives no indication of the underlying features.

The Sabine River Valley is one example of a study to investigate submerged indigenous sites. Numerous studies have been conducted around the world, but are distinct from the Sabine River Valley study in that these other sites are either exposed at the seafloor, located in relatively shallow water depths, or some combination thereof (e.g., Johnson and Stright 1992; Browne 1994; Faught and Donoghue 1997; Momber 2000; Dix et al. 2004; Benjamin et al. 2011). Some research projects have avoided the complications of working in submerged environments by using evidence from terrestrial contexts to address changes in human subsistence and coastal settlement patterns instigated by changing climate conditions (Bailey and Parkington 1988). Estimates from the late 1990s suggested that approximately 550 submerged indigenous sites have been identified globally, dating from the Lower Paleolithic/Early Pleistocene periods, or approximately within the last 2.5 million years (Dix et al. 2004: 5).

Despite 30 years of research in locations ranging from Beringea to Argentina, the methodology used in submerged indigenous site research has remained relatively unchanged from the 1977 recommendations. As outlined by Gaffney and Thomson (2007: 4), the most common techniques used in the investigation of submerged indigenous contexts include seabed sampling and shallow coring, high-resolution 2-D seismic (sub-bottom) profiling, high-resolution 3-D seismic profiling, and high-resolution bathymetric mapping. The acquired remote sensing data or sediment samples/cores are then put into a locally specific context. These paleolandscape reconstructions remain critically dependent upon accurate understandings of sea-level, including isostatic and eustatic changes, and rates of sedimentation or erosion (Dix et al. 2004: 13–30).

Key Issues/Current Debates

The search for submerged indigenous sites is predicated on an accurate assessment of the landscape from the point in time it could have been occupied through to the present. The synchronic reconstruction of the landscape, or reconstruction of place at a given point in time, provides information about exploitable resources that would have been necessary to support populations, and discrete areas within the landscape where evidence of past occupation is most likely to be found. Diachronic reconstruction of that same place provides information about changes to the site over time that influence preservation of any archaeological materials from their time of deposition, and influence secondary site formation processes.

Sea-level change has altered the extent and shape of the world's coastlines and river-fed lakes repeatedly throughout the Pleistocene. The

landscape available to indigenous populations was expanded and minimized by these transgressions and progradations, but was also altered and reworked by these same mechanisms. Sea-level curve data is used to determine the possible time period of exposure for a given sediment horizon. Final inundation, or the most recent inundation as sea-level approached the present high-stand, marks the last possible date for potential occupation by indigenous populations as the landscape became part of a submerged environment.

Early sea-level studies were characterized by an assumption that the interconnectedness of the earth's oceans would result in uniform eustatic sea-level change, and that data from any tectonically stable region was representative of global sea-level at that point in time. It is now understood that sea-level is highly geographically and temporally dynamic. Factors that influence eustatic sea-level at any given time may include changes in ocean volume, water mass, and water density. Overall global patterns are influenced locally by relative changes associated with regional land uplift or subsidence, meteorological or atmospheric events, gravity, and eccentricity (Pirazolli 1991: 4–6).

Sea-level change can be assessed by identifying evidence of former shoreline stands and related environments, and by absolute dating of samples taken from sediment and ice. Many sea curves are created by extrapolating change between discrete data points, without regard to estimates of error (Pirazolli 1991: 21). Line graphs of age/depth below modern sea-level represent an oversimplified interpretation of sea-level change. Error ranges for individual data points allow for a more comprehensive, although more complex, visualization of sea-level change within a given data set (e.g., Balsillie and Donoghue 2004). Furthermore, oscillations and reversals become exaggerated at smaller time intervals. Positive and negative alternations of sea-level observed at a timescale on the order of a thousand years are likely to become insignificant within the overall pattern of sea-level change when viewed on a scale of tens of thousands of years (Pirazolli 1991: 21). The issue of scale becomes pertinent when sea-level curves are applied to archaeology. Sea-level curves may provide significantly different dates for a single given depth, or provide insufficient resolution for sites occupied over a span of hundreds or even thousands of years (Fig. 1).

The majority of researchers now agree that sea-level change is a locally specific phenomenon, and reconstructions must assume some measure of local variability within trends that would otherwise suggest uniform rates of global sea-level change. Factors that complicate the construction of sea-level curves include, but are not limited to, sediment compaction and local subsidence, recognition of marsh and swamp peats, water depth range of peat formation, sediment load compaction, fluid extraction, and other localized changes in conditions. Awareness of these complications has led to reevaluations of regions once considered to reflect homogenous rates of sea-level rise, and has demonstrated high rates of local variability (Lewis 2000). Archaeological studies of submerged indigenous sites must consider the applicability of sea-level curves selected for use in reconstructing the site's environment. In order to be useful in archaeological settings, rates of sea-level rise must be accurate at the site-specific level.

Technology is an important component of submerged indigenous sites research. As discussed previously, the identification of this type of site requires the use of underwater remote sensing. This is useful in lakes and coastal waters where depths exceed 1 m below sea-level (BSL); however, many sites are located in the transitional shorezone, where water depths are too shallow to allow access by boats. Archaeologists working in these environments must often use a combination of terrestrial and underwater techniques. For example, studies along coastlines often combine terrestrial pedestrian survey and probing with coring and, if possible, remote sensing. This is effective in areas where indigenous sites such as shell middens are present, but would not necessarily identify a hearth or postmold. Magnetometers, which are used to successfully identify indigenous features in terrestrial settings, are not effective in submerged contexts where water depths may not allow for acquisition of data at the intervals

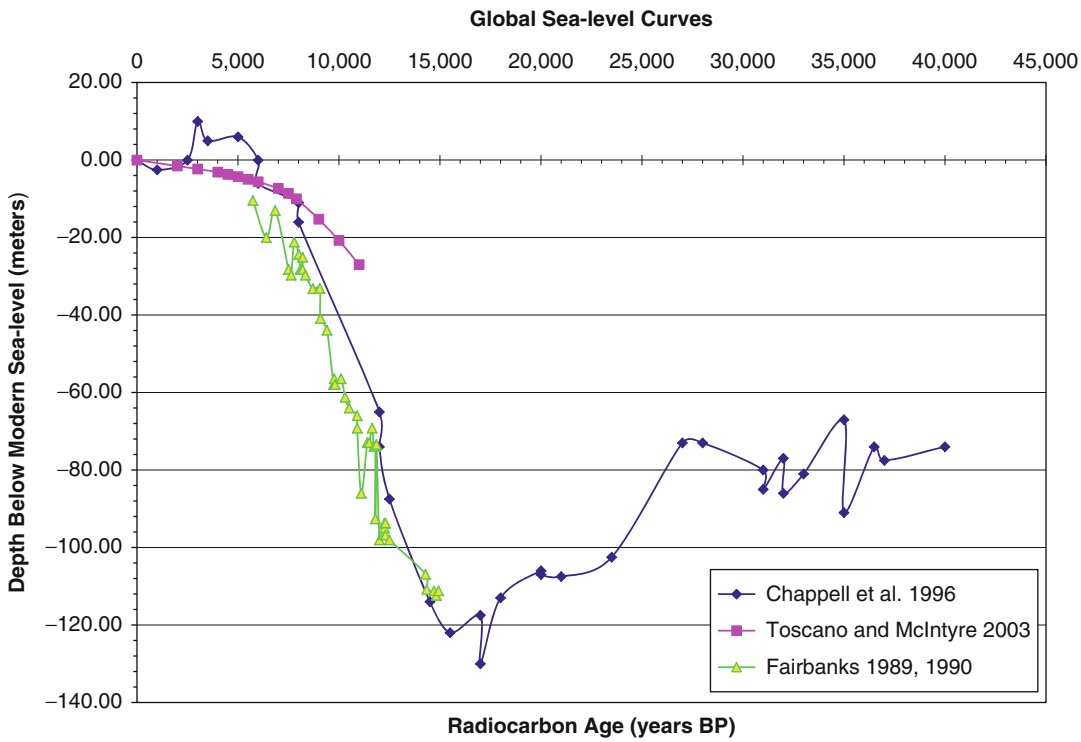

Submerged Indigenous Sites, Fig. 1 Global sea-level curves demonstrate the variability within the record at different positions on the earth in the recent past. (Data recreated from Fairbanks 1989, 1990; Chappell et al. 1996; and Toscano and MacIntyre 2003)

required. The reliance on technology in submerged sites research can also make the research too expensive to conduct. Remote sensing equipment, boats, and diving equipment may escalate project budgets beyond that of a similar project conducted in a terrestrial setting.

International Perspectives

Submerged indigenous sites worldwide are beginning to receive increased attention for their potential to contribute information about early coastal populations as well as population migrations. Until recently, submerged indigenous sites research has consisted of studies of individual sites. Recent publications, particularly focusing on submerged sites in the North Sea and northern Europe, have incorporated multiple sites into regional discussions of culture at the time these now-submerged sites were occupied (e.g., Benjamin et al. 2011). Archaeologists in Europe and the United Kingdom have demonstrated the importance of data from submerged contexts. Survey requirements protecting submerged indigenous sites are also more stringent in this part of the world.

In the United States, submerged indigenous sites receive various levels of legal protection and research interest. Increasing numbers of federal and state agencies are incorporating submerged indigenous site survey and research into their management plans. In places were survey is required in order to avoid inadvertent damage to the submerged cultural resource, requirements focus on remote sensing. Particularly in the Gulf of Mexico region, where earlier studies have demonstrated the potential for submerged indigenous sites, coring is not a requirement. In most cases where a potential submerged indigenous site is identified, the responsible government agency assigns an avoidance mitigation on the target,

and no subsequent testing is required. In the United Kingdom, submerged indigenous sites are protected during offshore ground-disturbing activities such as aggregates extraction, and surveys require both remote sensing and physical samples, such as cores (Evans et al. 2009).

Future Directions

Submerged indigenous sites research is receiving increased attention in part because of climate change, and related sea-level rise. The same processes that now threaten coastal indigenous sites inundated sites in the past. Studies of submerged indigenous sites can be used to add to the archaeological record of places, but the mechanisms of inundation may also be used to protect modern sites from erosion related to modern sea-level rise.

Archaeologists must continue to investigate submerged indigenous sites. Although previous studies have focused on the methods used to locate and investigate such sites, there must be new emphasis of the context of these sites and what they mean to the local archaeological record. Sites studied in isolation are interesting anomalies. Sites discussed within the context of their spatial or temporal context provide a more complete story, and help to demonstrate the need for submerged indigenous sites research.

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Geoarchaeology
- ▶ Human Impacts on Ancient Marine Ecosystems
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Landscape Archaeology
- ▶ Peopling of the Americas
- ▶ Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia
- ▶ Submerged Prehistoric Landscapes
- ▶ United States: Cultural Heritage Management
- ▶ Waterlogged Finds: Conservation

References

Bailey, G., and J. Parkington. 1988. *The archaeology of prehistoric coastlines*. Cambridge: Cambridge University Press.

Balsillie, J.H., and J.F. Donoghue. 2004. *High resolution sea-level history for the Gulf of Mexico since the Last Glacial Maximum*. Tallahassee: Report Prepared for Florida Geological Survey.

Benjamin, J., C. Bonsall, C. Pickard, and A. Fischer. 2011. *Submerged prehistory*. Oxford: Oxbow Books.

Browne, I. 1994. Seismic stratigraphy and relict coastal deposits off the East Coast of Australia. *Marine Geology* 121: 81–107.

Chappell, J., A. Omura, T. Esat, M. McCulloch, J. Pandolfi, Y. Ota, and B. Pillans. 1996. Reconciliation of Late Quaternary sea levels derived from coral terraces at Huon Peninsula with deep sea oxygen isotope records. *Earth and Planetary Science Letters* 141: 227–236.

Coastal Environments, Inc. (CEI). 1977. *Cultural resources evaluation of the northern Gulf of Mexico continental shelf*. Baton Rouge: Report Prepared for Interagency Archaeological Services Office of Archaeology and Historical Preservation, National Park Service.

Dix, J., R. Quinn, and K. Westley. 2004. *A reassessment of the archaeological potential of continental shelves*. Southampton: Report Prepared for English Heritage.

Evans, A.M., A. Firth, and M. Staniforth. 2009. Old and new threats to submerged cultural landscapes: Fishing, farming and energy development. *Conservation and Management of Archaeological Sites, Special Issue: Conserving Marine Cultural Heritage* 11: 43–53.

Fairbanks, R.G. 1989. A 17,000-year glacio-eustatic sea level record: Influence of glacial melting rates on the Younger Dryas event and deep ocean circulation. *Nature* 342: 637–642.

Fairbanks, R.G. 1990. The age and origin of the "Younger Dryas climate event" in Greenland ice cores. *Paléo* 5: 937–948.

Faught, M.K., and J.F. Donoghue. 1997. Marine inundated archaeological sites and paleofluvial systems: Examples from a karst-controlled continental shelf setting in Apalachee Bay, northeastern Gulf of Mexico. *Geoarchaeology* 12: 417–458.

Gaffney, V., and K. Thomson. 2007. Mapping Doggerland. In *Mapping Doggerland: The Mesolithic landscapes of the southern North Sea*, ed. V. Gaffney and K. Thomson, 1–9. Oxford: Archaeopress.

Gagliano, S.M., C.E. Pearson, R.A. Weinstein, D.E. Wiseman, and C.M. McClendon. 1982. *Sedimentary studies of prehistoric archaeological sites: Criteria for the identification of submerged*

S

archaeological sites of the northern Gulf of Mexico continental shelf. Baton Rouge: Report Prepared for National Park Service, Division of State Plans and Grants.

Johnson, L.L., and M. Stright. 1992. *Paleoshorelines and prehistory: An investigation of method*. Boca Raton: CRC Press.

Lewis, R.B. 2000. Sea-level rise and subsidence effects on Gulf coast archaeological site distributions. *American Antiquity* 65: 525–541.

Masters, P.M., and N.C. Flemming. 1983. *Quaternary coastlines and marine archaeology: Towards the prehistory of land bridges and continental shelves*. New York: Academic.

Momber, G. 2000. Drowned and deserted: A submerged prehistoric landscape in the Solent. *International Journal of Nautical Archaeology* 29: 86–99.

Pearson, C.E., D.B. Kelley, R.A. Weinstein, and S.M. Gagliano. 1986. *Archaeological investigations on the outer continental shelf: A study within the Sabine River Valley, Offshore Louisiana and Texas*. Reston: Report Prepared for Minerals Management Service.

Pirazolli, P.A. 1991. *World atlas of Holocene sea-level changes*. Elsevier Oceanography Series 58. Amsterdam: Elsevier.

Toscano, M.A., and I.G. MacIntyre. 2003. Corrected western Atlantic sea-level curve for the last 11,000 years based on calibrated 14C dates from *Acropora palmata* framework and intertidal mangrove peat. *Coral Reefs* 22: 257–270.

Submerged Prehistoric Landscapes

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Introduction and Definition

Submerged prehistoric landscapes are those areas of former dry land that have been submerged due to both long-term and short-term processes of environmental change, most commonly sea-level rise since the end of the Last Glacial Maximum (LGM) (c. 26,500 and 19,000–20,000 years ago) during the Late Glacial Maximum (c. 13,000–10,000 years ago) (see Mithen 2004). At the height of its extent, sea levels during the LGM were as much as 120 m lower than the present day, exposing large areas of the continental shelves of the world to human habitation. These submerged prehistoric landscapes have been known about since the late nineteenth century and scientifically analyzed since the 1970s (see, for example, UNESCO 1972; Masters and Flemming 1983). One of the most famous and early excavations of such a site is that of Tybrind Vig in Denmark, where a well-preserved Late Mesolithic (Ertebølle Culture) settlement was excavated during the late 1970s and early 1980s (see Malm 1995). Submerged prehistoric landscapes also include inland prehistoric sites in inundated freshwater environments, such as Little Salt Spring in central Florida (Clausen et al. 1979) and the submerged caves of Yucatan, Mexico (González González et al. 2008). More recently, submerged prehistoric landscape studies have tended to move away from such site-specific analyses to wider landscape analyses of the palaeogeography of the entire submerged regions (see Benjamin et al. 2011).

Alongside areas submerged as a consequence of long-term sea level rise, some submerged prehistoric sites have been submerged due to more sudden events relating to shifts in local plate tectonics, especially earthquakes and volcanic eruptions that have changed, sometimes quite dramatically, local topography (see Flemming 1971). The former, for example, are the cause of the submergence of the 5,000-year-old city of Pavlopetri that lies off the coast of southern Laconia in the Greek Peloponnese; the latter the cause of the destruction of the settlement of Akrotiri, a Bronze Age Minoan settlement on the Greek island of Santorini.

The loss of prehistoric sites either through long-term change or short-term catastrophe is thought to be the origin of many myths and legends of "lost" civilizations, most famously that of Atlantis, and more broadly of the many "inundation" stories that survive in numerous cultures' oral histories, most famously that of the Genesis flood narrative involving the tale of Noah's Ark in the Book of Genesis in the Hebrew Bible and the Christian Old Testament.

Examples

The best-understood submerged prehistoric landscapes at present are those of the European North Sea. Here, work since 1998 onwards (see Coles 1998) has analyzed with ever-increasing accuracy the range and extent of a former submerged prehistoric landscape known as "Doggerland" that used to lie between (and link) Britain with northwest Europe until flooded around 6,000 BCE (see Flemming 2004; Gaffney et al. 2009). A combination of relatively accessible sites, an extremely active marine industry focused on marine mineral extraction, and a proactive legal/management regime (especially funding provided between 2002 and 2011 by the British government under the terms of the Aggregates Levy Sustainability Fund or ALSF) all combined to provide both site-specific and broader landscape analyses for Doggerland that could be compared to relevant terrestrial datasets. The result was an unparalleled understanding of the range and significance of sites in Doggerland as well as a model for the international management of such locations. Much less well understood but arguably more famous than Doggerland is the submerged prehistoric landscape of Beringia that used to link Asia and the Americas and which functioned as the "land bridge" allowing the peopling of the Americas from c. 20,000 years ago onwards. The extreme cold and inaccessibility of this area, especially those parts of Beringia now flooded by the Bering Sea, has led to relatively limited archaeological fieldwork taking place here, although the basic extent and principle of the Beringian landmass has been known since the 1930s (see Hoffecker and Elias 2012).

Key Issues and Current Debates

The tools and techniques required to access and analyze the submerged prehistoric landscapes are now well refined and understood, and the data from such sites sits within a broader matrix of data from terrestrial prehistoric sites. As a consequence, the key issues and current debates of such sites focus most often on [a] mapping the global extent of such sites, especially in lesser-known locations and [b] agreeing the management of such landscapes, especially in relation, where present, to Indigenous Communities who may have ancestral links to the former occupants of these areas. Submerged prehistoric landscapes frequently cross modern international territorial boundaries, and as a consequence, their management is often confused (see Flatman 2012). In addition, existing domestic and international heritage management models and laws are frequently ill suited to the geographical extent and physical sensitivity of such sites. Most such heritage laws are designed to protect relatively well-preserved historic-era wreck sites that lie within a small and usually easily defined area, not characteristics common to submerged prehistoric landscapes that may cover, at an albeit low density of data, thousands or even hundreds of thousands of square miles of seabed.

Future Directions

Beyond the examples discussed above, many other submerged prehistoric landscapes are known to exist around the world, many barely explored. For example, on the basis of known sea-level changes since prehistory, large sections of the continental shelves of Central and South America, southern Africa, and the Indian Subcontinent must all have originally been dry land and were, presumably, settled by prehistoric communities. Little is known of the archaeology of such areas, although Bailey (2004) has outlined their potential. Some of the most dramatic archaeological discoveries of the twenty-first century are likely to come from such sites, where the range and extent of submerged materials may in time redraw our understanding of the date and nature of early human occupation and migration. In particular, the submerged prehistoric landscapes of Southeast Asia (commonly referred to as Sunda and Sahul – see Allen et al. 1977) may provide new dates for the earliest human occupation of Australia, potentially revising our understanding of when and precisely how that continent was occupied.

Ongoing changes in global climate leading to the warming of the Arctic and seasonal and/or permanent loss of pack ice may in particular lead to the discovery of new data for Beringia in the twenty-first century. As the Bering Straits and surrounding coastlines of Alaska, Chukotka, and Kamchatka are rendered relatively more accessible through this process, industrial developments (especially the search for oil and gas reserves) and more broadly shipping routes (especially the regular commercial use of the Northwest Passage) seem likely to lead to the discovery of significant remains from this prehistoric landscape. How such industrial impacts on these landscapes will be managed (if at all) and what part the Indigenous Communities of these areas will play in that management remains to be seen, but the worry has to be that the demands of industry will sweep concern for the past as well as present communities of such regions aside in the pursuit of short-term financial gain.

Cross-References

- ▶ Arctic Ocean and Bering Sea: Maritime Archaeology
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Peopling of the Americas
- ▶ Submerged Indigenous Sites

References

Allen, J., J. Golson, and R. Jones, eds. 1977. *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia and Australia*. London: Academic.

Bailey, G. 2004. The wider significance of submerged archaeological sites and their relevance to world prehistory. In *Submarine prehistoric archaeology of the North Sea: research priorities and collaboration with industry*. Research Report 141, ed. N.C. Flemming, 3–10. London: Council for British Archaeology.

Benjamin, J., C. Bonsall, A. Fischer, and C. Pickard, eds. 2011. *Submerged prehistory*. Oxford: Oxbow Books.

Clausen, C.J., et al. 1979. Little Salt Spring, Florida: A unique underwater site. *Science* 203: 609–614.

Coles, B.J. 1998. Doggerland: A speculative survey. *Proceedings of the Prehistoric Society* 64: 45–81.

Flatman, J. 2012. What the walrus and the carpenter didn't talk about: Maritime archaeology and the near future of energy. In *Archaeology in society: Its relevance in the modern world*, ed. M. Rockman and J. Flatman, 167–192. New York: Springer.

Flemming, N.C. 1971. *Cities in the sea*. Garden City: Doubleday.

Flemming, N.C., ed. 2004. *Submarine prehistoric archaeology of the North Sea*. Research Report 141. York: Council for British Archaeology.

Gaffney, V., S. Fitch, and D. Smith. 2009. *Europe's lost world, the rediscovery of Doggerland*. York: Council for British Archaeology.

González González, A.H., et al. 2008. Evidence of early inhabitants in submerged caves in Yucatan, Mexico. In *Underwater and maritime archaeology in Latin America and the Caribbean*, ed. M.E. Leshikar-Denton and P.L. Erreguerena, 127–142. Walnut Creek: Left Coast Press.

Hoffecker, J.F., and S.A. Elias. 2012. *Human ecology of Beringia*. New York: Columbia University Press.

Malm, T. 1995. Excavating submerged Stone Age sites in Denmark – The Tybrind Vig example. In *Man and sea in the Mesolithic: Coastal settlement above and below present sea level*, ed. A. Fisher, 385–396. Oxford: Oxford University Press.

Masters, P.M., and N.C. Flemming. 1983. *Quaternary coastlines and marine archaeology: Towards a prehistory of land bridges and continental shelves*. New York: Academic.

Mithen, S. 2004. *After the ice: A global human history, 20.000–5.000 BC*. Cambridge: Harvard University Press.

UNESCO. 1972. *Underwater archaeology: A nascent discipline*. Paris: UNESCO.

Further Reading

Momber, G., D. Tomalin, and R. Scaife, eds. 2011. *Mesolithic occupation at Bouldnor Cliff and the submerged prehistoric landscapes of the Solent*. York: Council for British Archaeology.

Sugarcane: Origins and Development

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Basic Species Information

Sugarcane (*Saccharum officinarum L.*) is one of the world's most important crops, primarily to refine into sugar and increasingly for biofuel.

Sugarcane is cultivated for sucrose that accumulates in its stalk, although it was also traditionally grown for its edible inflorescences, for medicine, and as a raw material for weaving and a variety of other uses. Sugarcane is cultivated vegetatively by planting a stalk segment that contains a reproductively viable bud. Although widely perceived to be a traditional snack food, sugarcane has been documented as a staple in parts of the eastern highlands of New Guinea (Daniels and Daniels 1993), and its importance in other regions in the past should not be underestimated, especially for fodder (Fig. 1).

Sugarcane is an interspecific cultivar predominantly derived from the hybridization of *S. robustum* and *S. spontaneum*. The domestication of sugarcane has not been fully defined, and alternative scenarios exist (Daniels and Daniels 1993). In lieu of more intensive genetic investigations, the dominant scenario suggests initial domestication in the New Guinea region with subsequent westward dispersal and interspecific hybridization in Southeast Asia (Grivet et al. 2004).

Sugarcane: Origins and Development, Fig. 1 Bound stands of sugarcane growing in a cultivated plot in the highlands of Papua New Guinea. (Photo: Tim Denham, 1990)

Major Domestication Traits

The initial stages of sugarcane domestication have been proposed to involve the anthropic selection and domestication of a wild ancestor of *Saccharum robustum* in New Guinea (Simmonds 1976: 104–108). Lebot advanced the same scenario in his evaluation of the molecular evidence to suggest (1999: 622–623):

> … *S. robustum* is the most likely precursor of sugarcane and was domesticated in New Guinea where human selection of chewing plants with sweet juice and low fibre produced the *S. officinarum* clones. Cultivars were subsequently differentiated in numerous distinct morphotypes via vegetative propagation and selection of somatic mutants.

Lebot (1999: 623) concluded that "*S. officinarum* cultivars are derived from introgressions between wild forms of *S. robustum* and *S. spontaneum* in Melanesia." Lebot envisaged a similar domestication scenario for *Saccharum edule*, a plant cultivated in New Guinea for its aborted inflorescences.

While agreeing that initial domestication of *S. robustum* occurred in New Guinea, Grivet et al. (2004) consider that the resultant cultivar dispersed westward to Island Southeast Asia where it hybridized primarily with wild populations of *S. spontaneum* to produce *S. officinarum*, as well as with other species in various regions to produce other cultivars. Grivet et al. (2004) consider *S. spontaneum* to be a recent introduction to New Guinea.

Timing and Tracking Domestication

Archaeobotanical evidence of any antiquity for sugarcane is almost nonexistent. A putative macrobotanical find from Yuku rock shelter in the New Guinea highlands has been dated by association to 5750–4800 years ago (GX-3111B; Bulmer 1975: 31). However, the

identification of that find is uncertain (Yen 1998: 31), and its antiquity is also open to question due to disturbance at the site (author's research). A macrobotanical find from Kuk Swamp, collected from a domestic context dating to the last few hundred years, was originally identified as *Saccharum officinarum* by John Hather (Jack Golson *pers. comm*. to Tim Denham, 2012), and the veracity of this identification is still being investigated. Major problems in seeking to identify archaeobotanical samples have been the lack of reference material from other *Saccharum* species and related grasses and the current inability to differentiate *S. officinarum* phytoliths from similar grass morphotypes.

In the absence of reliable archaeobotanical identifications, an inferential method for approximating the antiquity of sugarcane cultivation and domestication comes from historical linguistics. Any derived chronological information is, however, at best tenuous. For example, a cognate term for sugarcane, namely, ∗CebuS, reconstructs to Proto-Austronesian, the languages on Taiwan before the subsequent differentiation and dispersal of Austronesian languages southward to Island Southeast Asia after c. 4500–4000 years ago (e.g., Pawley 2007). Significantly, the word for "chew on sugarcane," which is how the sugar is traditionally extracted within Island Southeast Asia and New Guinea and probably why it was originally selected by people (following Lebot 1999), only reconstructs to Proto Malayo-Polynesian (Pawley 2007); namely, the term was integrated into the Austronesian lexicon only after the languages dispersed southward to Island Southeast Asia.

It is uncertain if the linguistic reconstructions are sufficiently specific, either botanically or chronologically, to anchor an interpretation of sugarcane geodomestication. If they are reliable, then several stages in the domestication of sugarcane occurred before Austronesian language dispersal from Taiwan, including initial domestication of *S. robustum* in New Guinea, westward movement of the derived cultivar to Island Southeast Asia, and subsequent hybridization with *S. spontaneum* to form *S. officinarum*. Linguistic evidence also indicates that the practice of chewing on sugarcane to extract the sucrose-rich juice occurred in Island Southeast Asia before Austronesian languages dispersed there.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Bananas: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Vegeculture: General Principles

References

Bulmer, S. 1975. Settlement and economy in prehistoric Papua New Guinea: A review of the archaeological evidence. *Journal de la Société des Océanistes* 31: 7–75.

Daniels, J., and C. Daniels. 1993. Sugarcane in prehistory. *Archaeology in Oceania* 28: 1–7.

Grivet, L., C. Daniels, J.C. Glaszman, and A. D'Hont. 2004. A review of recent molecular genetics evidence for sugarcane evolution and domestication. *Ethnobotany Research and Applications* 2: 9–17.

Lebot, V. 1999. Biomolecular evidence for plant domestication in Sahul. *Genetic Resources and Crop Evolution* 46: 619–628.

Pawley, A. 2007. The origins of early Lapita culture: The testimony of historical linguistics. In *Oceanic explorations: Lapita and Western Pacific settlement*, ed. S. Bedford, C. Sand, and S.P. Connaughton, 17–49. Canberra: Australian National University.

Simmonds, N.W. 1976. Sugarcanes: Saccharum (Gramineae-Andropogoneae). In *Evolution of crop plants*, ed. N.W. Simmonds, 104–108. London: Longman.

Yen, D. 1998. Subsistence to commerce in Pacific agriculture: Some four thousand years of plant exchange. In *Plants for food and medicine*, ed. H.D.V. Pendergast, N.L. Etkin, D.R. Harris, and P.J. Houghton, 161–183. Kew: Royal Botanic Gardens.

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Basic Biographical Information

Sharon Sullivan is an Australian archaeologist and heritage planning and management advisor and former senior public servant. She grew up in northern NSW, going to school in Glen Innes and Armidale before taking an honors degree in Prehistory, Ancient History, and Australian History at the University of New England (1964). Her honors thesis was on the Aborigines of the Richmond-Tweed River valleys. She completed a Diploma in Education (1965) and a master's degree with honors (1972) with a thesis titled *The Material Culture of the Aborigines of North Western New South Wales*, also at UNE. During her undergraduate and postgraduate studies, Sharon took part in extensive fieldwork locating, recording, and excavating Aboriginal prehistoric sites throughout NSW with Dr. Isabel McBryde and worked as her research assistant in 1966–1967.

In 1969 Sharon joined the Resources Division within the National Parks and Wildlife Service of New South Wales, where she was responsible for the location, recording, and management of Aboriginal sites throughout the state and technical advice on the acquisition and management of historic sites by the service. The success of this work led to the establishment of a dedicated Aboriginal and Historic Resources Section in 1976, which later became the Cultural Resources Section in 1983. During this period she also won a Public Service Board scholarship to study heritage site management in the USA for 3 months (1973). In 1985 Sharon was promoted to Acting Regional Director Central Region of National Parks with a staff of 320, this position being confirmed in 1986. In 1989 she became Deputy Director (Field Operations) of the NSW National Parks and Wildlife Service.

In 1985–1986 Sharon was appointed as a co-opted Commissioner of the Australian Heritage Commission, in which she coordinated a national workshop on a National Cultural Conservation Strategy. In 1990 she became the Executive Director of the Australian Heritage Commission in Canberra, subsequently promoted to Group Head of the Australian and World Heritage Group of the Australian Government's heritage and environment department. Sharon left the public service in 1999 and established Sullivan Blazejowski and Associates Heritage Consultants. Since then she has played a major role in the development of heritage management philosophy and management in Australia and internationally (particularly in relation to World Heritage management) and has run training courses in these issues in many countries.

Major Accomplishments

Sharon Sullivan's leading role in the NSW National Parks and Wildlife Service and the Australian Heritage Commission was during a period of seminal developments in the philosophy and practice of heritage identification and management in Australia. She made many significant contributions to the field, including initiation of the first agency-supported research by Aboriginal people into sites of significance in eastern Australia and developing subsequent approaches with Aboriginal people in methodology and the protection and management of Aboriginal sites. These pioneering protocols and programs in heritage management were the basis for what is taken for granted in Australian Aboriginal site management today. She played a major role in developing national systems of regional and thematic assessment of heritage and cooperative and problem-solving approaches to land-use conflicts that have been reflected in evolving legislation at state and national levels and in heritage management practice at all levels.

Sharon's expertise and heritage management skills have resulted in her appointment to many prestigious positions. She worked with the World Heritage Bureau and the World Heritage

Committee reviewing nominations, technical guidelines, and the operations of the committee as well as being for a period the Australian Government's main adviser and international representative on the World Heritage Committee. She is the Chair of the Port Arthur Historic Site Authority (a World Heritage site), Acting Commissioner in the NSW Land and Environment Court, Deputy Chair of the NSW Heritage Council, Executive Councilor of the Australian Institute of Aboriginal Studies, a member of the Australian Heritage Council, a National Committee member of Australia ICOMOS, a member of the Australian Research Council's College of Experts on the Humanities and Creative Arts Panel, and a member of the Institute for Professional Practice in Heritage and the Arts at the Australian National University. In 2001 she completed a Getty Conservation Institute Senior Residential Fellowship. She has done consulting work for the World Monuments Fund (Africa, Cambodia), World Bank (China), ICCROM (Africa), and the Getty Conservation Institute (Africa and China). Sharon was Australian project leader of the Australia-China-Getty Conservation Institute partnership in 1999–2000 to develop a set of heritage principles for Chinese site management, which were promulgated by China ICOMOS. She worked subsequently with two Chinese World Heritage sites to implement these principles. Sharon has taught and guided site managers in Australia, the USA, Cambodia, Africa, and China and is currently part of a multidisciplinary team working together with UNESCO, the Cambodian Government, and the consulting firm Godden Mackay Logan to prepare a Heritage Management Framework for the World Heritage site of Angkor.

Sharon Sullivan's contribution and standing in the heritage field has been acknowledged in many ways. She is an Adjunct Professor in the School of Natural and Rural Systems, University of Queensland; in the Department of Archaeology and Paleoanthropology, University of New England; and in the School of Anthropology, Archaeology, and Sociology, James Cook University, North Queensland. Sharon was elected a Fellow of the Australian Academy of the Humanities in 1996 and made an Officer of the Order of Australia in 2004 for her "service to cultural heritage conservation, including Indigenous heritage, and to influencing conservation practices worldwide." The prestigious Rhys Jones Medal for Outstanding Contribution to Australian Archaeology was awarded to her by the Australian Archaeological Association in 2005; Honorary Life Membership of international ICOMOS was conferred in 2005, and she was presented with an Honorary Doctorate by James Cook University in 2003 and an Honorary Doctor of Letters by University of New England in 2011.

Cross-References

- ▶ Australia: Cultural Heritage Management Education
- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Australia's Archaeological Heritage
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Getty Foundation
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ McBryde, Isabel

References

Department of Environment, Climate Change and Water. 2009. *Challenges in the landscape: Memories of conserving historic heritage in the NSW park system 1967–2000*. Sydney: Department of Environment, Climate Change and Water (New South Wales). Available at: http://www.environment.nsw.gov.au/nswcultureheritage/NPWSCorporateHistory.htm. Accessed 24 July 2012.

Kijas, J. 2005. *Revival, renewal and return: Ray Kelly and the NSW sites of significance survey*. Sydney: Department of Environment and Conservation (NSW). Available at http://www.environment.nsw.gov.au/resources/cultureheritage/RevivalRenewalReturnPreliminaries.pdf. Accessed 16th Aug 2012.

Pearson, M., and S. Sullivan. 1995. *Looking after heritage places: The basics of heritage planning for managers,*

land owners and administrators. Carlton: Melbourne University Press. Reprinted 1996, 1998, 2001, 2004.
Sullivan, S. 1993a. The custodianship of Aboriginal sites in south-eastern Australia. In *Who owns the past?* ed. I. McBryde, 139–156. Melbourne: Oxford University Press.
Sullivan, S. 1993b. Conservation policy delivery. In *Cultural heritage in Asia and the Pacific: conservation and policy*, ed. M. MacLean, 13–26. Los Angeles: The Getty Conservation Institute.
Sullivan, S. 1996. The management of ancient Chinese cave temples. In *Conservation of ancient sites on the Silk Road*, ed. N. Agnew, 28–40. Los Angeles: Getty Conservation Institute.
Sullivan, S. 2001. A well baked charter – the Chinese development of heritage conservation guidelines. *The Historic Environment* 15 (3): 11–19.
Sullivan, S. 2005. Loving the ancient in Australia and China. In *Object lessons*, ed. T. Ireland and J. Lydon, 265–285. Sydney: Australian Scholarly Publishing.
Sullivan, S., and S. Bowdler, eds. 1984. *Site surveys and significance assessment in Australian archaeology*. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University.
Sullivan, S., and R. McKay, eds. 2013. *Archaeological sites: conservation and management*. Los Angeles: Getty Conservation Institute.

Supermodernity and Archaeology

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Introduction and Definition

The term supermodernity (*surmodernité*) was coined by French anthropologist Marc Augé in 1992 to define the period commonly known as late modernity. The usefulness of the concept of supermodernity, as compared to other definitions of the later part of modernity, rests on two things: the idea of exaggeration and the retention of the concept of modernity. Regarding the first point, Augé (2002: 26–45) talks of three excesses: factual overabundance (which is associated with an acceleration of historical time), spatial overabundance (the abolishing of distance by electronic media and transportation), and an excess of self-reflexive individuality. We can add a fourth excess: material overabundance. In relation to the idea of modernity that Augé keeps in his definition, it can be said that while some of the notions of modernity might seem to be outdated, as the defendants of postmodernity argue, its core categories are certainly not. I consider that postmodernity is, in fact, a period characterized by an awareness of the risks and flaws of being modern but which has not been able to overcome modernity's troubles. Our current concern with ecological and social catastrophe at a global scale is the demonstration that the process which started during the fifteenth century is far from finished: we are probably just witnessing its climax.

Key Issues/Current Debates

The term "supermodernity," then, captures well the essence of our present period of modern exaggeration. Another question is when to start such a period. Augé does not give clear indications, although it is implicitly understood that it covers the same time span that others identify with post-, high, late, or liquid modernity (Giddens 1991; Jameson 1991; Bauman 2000) and which begins around the end of the Second World War or later depending on the authors. This is the periodization that some researchers follow to define the archaeology of the contemporary as the study of the time that goes "after modernity" (Harrison and Schofield 2010). Although trying to parcel time may seem to be a fruitless historicist exercise, I think that it can also be a way of reflecting on history and time differently. What we need is a periodization of modernity that fits the archaeological record. It is necessary to privilege in our periodizations not the phenomena identified by sociologists, culture historians, or philosophers but the processes of creation and destruction of matter that archaeology has traditionally employed to make sense of time and change. We have to follow the time(s) of things (Olivier 2008: 247–252).

From this point of view, a moment that seems best suited to start supermodernity is the early twentieth century. It has been pointed out that the transition between the late nineteenth and the early twentieth century inaugurates a period in which globalization reaches its first apex and becomes truly global. Globalization is not just the circulation of people, images, or ideas, it is also (perhaps primarily) the circulation of material objects. This was made possible by technologies of transport and communication that abolished distance in the service of an ever-expanding global capitalism (Harvey 1990). The materiality of the world became more and more integrated – more and more similar – and the mass production of objects played an outstanding role in this process. More importantly, and perhaps not sufficiently appraised, the period that begins in 1914 is marked by mass destruction of human lives, societies, things, and the environment at an unprecedented scale in the history of humankind. Interestingly, although the relationship between globalization, production, and consumption has often been emphasized, the globalization of death has been less discussed. Thus, historians agree that the 1914–1945 period witnessed the collapse of the first globalization (Obstfeld and Taylor 2003: 125–126) as opposed to the late nineteenth century, but this is only the case if we pay attention to the movement of free citizens, capital, and consumer goods. If we look at the circulation of soldiers, refugees, war machinery, and destruction, 1914–1945 is actually a period of astonishing global integration (Fig. 1). High explosive has probably contributed as much to globalization as Coca-Cola, if not more.

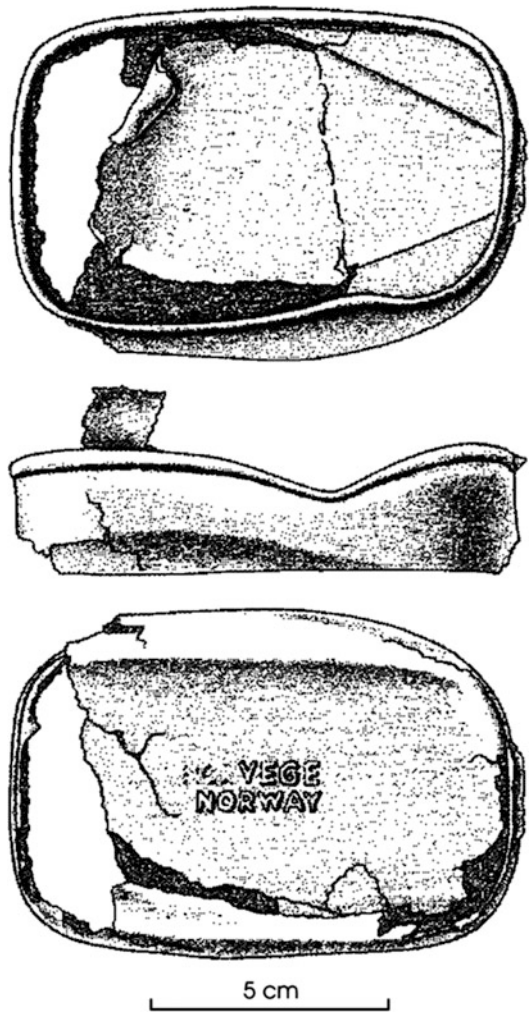

Supermodernity and Archaeology, Fig. 1 Another kind of globalization: a tin can from Norway consumed by Eritrean soldiers at the service of fascist Italy in the frontier between Sudan and Ethiopia

In fact, should supermodernity end tomorrow, it would be perfectly identifiable from an archaeological point of view, thanks to global destructive processes. The things that demand the attention of intellectual gurus, social commentators, and their many followers seem somewhat banal compared to other issues that are leaving an indelible archaeological imprint in the world. In the long run, postmodern architecture would seem just like an anecdote (like the difference between Baroque and Rococo), and without new media, the pace of global integration and social change would perhaps be a little bit slower, but it would happen nonetheless. It is on the destructive operations of supermodernity that archaeology can provide a distinct and necessary critical perspective. After all, the transformations that archaeology documents more easily are changes in material organizations with high irreversibility (Lucas 2008), and these are also the ones that have further-reaching consequences historically: consider the collapse of the communist regimes, the Second World War, or the end of peasant

societies, all of which have left a wake of razed landscapes behind.

If instead of looking at destruction, we focus on creation, the situation is not different. The supermodern landscapes of creation (Penrose 2007) are also landscapes of oblivion and devastation. Urbicide is not only inflicted during wars (Coward 2008), it can also take the shape of urban renewal (Mullins 2006). In fact, destruction and construction should not be opposed; they are inextricably linked. This is obvious in slash-and-burn agriculture: the forest is felled, burnt down, and cultivated, but later the fields are fallowed and the trees revive with further strength. Similarly, the Neolithic houses of Anatolia and the Balkans were regularly destroyed only to be rebuilt again, energized by the seeds of the ancestors. The Neolithic probably marks the beginning of the strong interdependence between construction and destruction and death and the regeneration of life (Stevanovic 1997; Kuijt 2008). In this context, the destruction of houses would be "a matter of continuity rather than ending" (Hodder 2010: 150). It is not strange that this rationality emerged with the appearance of cultivation, which is also based on cycles of life and death.

Yet with modernity, this logic is no longer sustainable: unlike in Neolithic and other non-modern societies (e.g., Küchler 2002), destruction is no longer a form of continuity, regeneration, and remembrance but of rupture and forgetting. Destruction is neither a form of creating and maintaining relations but of cutting them off: death has become an end in itself. In non-modern societies, even war and predation are ways of extending relations (Harrison 1993; Fausto 1999). The change in the nature of destruction in supermodernity is no better exemplified than in the mass production of nuclear weapons that can wipe out the entire humanity: death for death's sake. Robert Oppenheimer's words epitomize the sense of a new age of total destruction: "Now, I am become Death, the destroyer of worlds." Oppenheimer's famous misquotation is meaningful: the original cite from the Bhagavad Gita is "I am become Time, the destroyer of worlds." But time can no longer destroy things with its slow rhythm as it used to. Augé (2003: 110) says that "only a catastrophe can produce today comparable effects to the slow action of time," only Hiroshima or Katrina.

Spatial Excess

One of the points that makes Marc Augé's definition appealing for archaeologists is his concern with places. According to Augé (2002), the time of supermodernity is marked by a shift from places to non-places: "If place can be defined as relational, historical and concerned with identity, a space that cannot be defined as relational, historical or concerned with identity can be defined as a non-place" (Augé 2002: 83). Non-places do not foster symbolic relationships or a shared heritage. Their purpose is only to facilitate circulation and consumption in a global world (Augé 2003: 101). Non-places have all the appearance of a dejà vu, which is not innocent: their mission is precisely to neutralize the sense of alienation in a foreign environment (Harrison and Schofield 2010: 256). They eliminate the place-ness of places. Airports, highways, malls, and hotels are typical non-places. Elsewhere, Augé (2003: 71) distinguishes between two categories: non-places of refuge and non-places of image (simulacra). The non-places of refuge are related to emigration and escape. We could include here detention centers for immigrants, customs posts, and refugee camps. The non-places of image are best exemplified in theme parks and tourist resorts – all virtually identical from one corner of the globe to the other.

The idea that the supermodern world is filled with simulacra is shared by other thinkers. It was another French scholar, Jean Baudrillard (1994), who employed the term *simulacrum* to define something which is not a copy of the Real but that actually exceeds reality and creates its own truth. This hyperreality of the supermodern Augé finds it not just in new constructions but also in the restoration of heritage, which creates a sort of historical hyperreality. What is interesting is what the anthropologist opposes to heritage sites: ruins. "The contemplation of ruins," writes Augé (2003: 7), "allows us to catch a fleeting glimpse of the existence of a time that is not the one about which history books speak or the one

that restoration works try to resuscitate. It is a pure time, to which no date can be assigned."

Although the existence of non-places has been questioned (Bender 2001: 78), it can still be argued that there are certainly spaces in supermodernity that if not totally devoid of identity, relationality, or historicality are at least hostile to the idea of memory and belonging. Archaeologists have started to study non-places in a way that is akin to de Certeau's (1984) approach to everyday tactics of resistance. Against the idea of monolithic non-places, researchers reveal the practices through which non-places can be appropriated and resisted. "The alienating qualities of these places are fragile: they can be challenged," argue Hicks and Hicks (2006). Without negating the dismal aspects of non-places, in this case a retail center in Wales, Graves-Brown (2007) also points out ways in which the physical barriers that enclose the "concrete islands" that are malls are circumvented in practice. Harrison and Schofield (2010: 256–257), in turn, suggest that archaeology itself can become a critical practice: if non-places are presented as neutral and ahistorical, archaeology has to reveal "the specific histories of these places and the ways in which they are concealed from the public. The peeling carpet, the layers of paint, and the traces of previous styles of airport furniture all carry a sense of the specific history of the airport departure lounge, signaling to the passenger that he or she is in 'this' place rather than some other." A similar approach is that of geographer Tim Edensor (2005), whose work has focused on another kind of non-places: abandoned industrial spaces. Although they are commonly perceived as a black hole in the urban fabric, Edensor shows that they are also arenas for creative engagements with materiality, where the regimented space of the supermodern city is actively subverted. The heterodox uses to which these ruins are put are a hint of another possible city and alternative urban experiences. While this is a valuable approach that can reveal an unexpected side to supermodern spatiality, we can wonder: do we not run the risk of overlooking the power structures that support the existence of non-places by trying to find small cracks in the system? How destabilizing to supermodern power actually are the paths open in the gardens of a shopping center, a peeling carpet, or the teenagers smashing windows in a derelict factory?

Non-places are just a variable of supermodern geographies. Other kinds of spaces exist. Bauman (2000: 98-104), following different authors, proposes a typology of mostly dystopic places, which he labels *emic*, *phagic*, and *empty* (in addition to non-places). Emic places create spatial separations (prisons, ghettos), whereas phagic spaces digest people and suspend otherness – consumer spaces fit in this category. Empty places are those that lack meaning, "leftover places." I have suggested a category of place that tries to make sense of the politics involved in the spatial excesses of supermodernity: places of abjection. Like empty places, they are also a leftover and a memory gap. However, it is important to emphasize that places of abjection are characterized by an excess of wasted materiality: battlefields, scenarios of massacres, industrial disasters, and shanty towns. When one walks around a war site of the last 100 years, one is struck by the enormity of material waste: concrete, cans, and shells litter vast expanses of empty, forgotten land (Fig. 2). A similar impression can be obtained in slums, whose messy material overabundance stands in stark contrast to the sanitized, empty spaces of privatopias (Penrose 2007: 34–35). Unlike other spaces of supermodernity, places of abjection are only produced by political processes of marginalization and exclusion of (subaltern) people, (abject) matter, and (dissonant) memories.

Time Excess

"The time is out of joint." Hamlet's words resound along Derrida's book, *Specters of Marx* (2006). "Time is disarticulated, dislocated, dislodged, time is run down, on the run and run down, deranged, both out of order and mad. Time is off its hinges, time is off course, beside itself, disadjusted" (Derrida 2006: 20). This is a more eloquent way of describing the state of time in supermodernity than the usual idea of accelerated time. Because it is not only that things go faster or that there is a factual excess, as Augé and others suggest. It is also, more precisely, that time is out of joint, which is also saying that time is both

Supermodernity and Archaeology, Fig. 2 An abandoned radar-guided antiaircraft weapon system (ZSU-23) in the rainforests of southwestern Ethiopia

unjust and anachronic (Derrida 2006: 25). Derrida, then, links temporality and morality, both of which are put into crisis by supermodernity.

It is probably this feeling that has led archaeologists to focus on alternative, heterogeneous temporalities (Witmore 2007; Hamilakis 2011), which are also a matter of concern in other fields (De Landa 2000). Archaeologists working in the recent past have to be, more than any other practitioners, ready to appraise nonlinear time to make sense of a world where time is deranged. They have to revalue other temporalities, those of subaltern and non-modern communities, which still survive in the interstices of the supermodern world. They have to make visible these slower, bodily temporalities, as a way to challenge the disarticulated ephemerality of supermodern time. A good way of reclaiming other temporalities is showing its persistence in the present, the time of objects that anchor time, instead of disintegrating it: the time of immutable things, which has been forgotten. Think of a knife, an axe, or a stone wall. They do not call the attention of students of material culture, which are fascinated by cell phones and tablet computers. An archaeology of supermodernity does not only study what is new and changing; it should also vindicate the subaltern artifact that resists the annihilation of time: the humble, elementary object (Olivier 2008: 288) (Fig. 3).

Because the time of supermodernity is not only disjointed and accelerated, it is also a time that continuously abolishes itself. For supermodern societies, there is no past or future: only the instant (Bauman 2000: 125). There is an excess of present. From the point of view of material culture, the relationship of this temporality with planned obsolescence and fashion has already been noticed. Archaeology can, of course, study the ephemeral temporality of supermodern technologies, but it can do something else. Archaeology can show the collateral damages of instantaneity: living the instant, with a total disregard for sustainability in the long term, requires an intensified predation on the environment, which leaves a far-from-ephemeral trail of devastation (cf. González-Ruibal and Hernando 2010). The ephemerality of material culture is certainly not new: it was already noticed at the beginning of the supermodern period, when skyscrapers in New York were torn down almost as fast as they were being built, over a 100 years ago (Yablon 2009: 244–246). The supermodern metropolis is hollowed out of a past; it inhabits an amnesic present. Connerton (2009: 88) talks about "the reign of a perpetual present." Here lies another possible contribution of archaeology: by excavating the foundations of post-mnemonic cities, the discipline can simultaneously show that other worlds are possible and that *there exists* a past.

Supermodernity and Archaeology, Fig. 3 Ephemeral consumption in the West, durable devastation in the rest: an illegal logging camp dismantled by the police in the Brazilian Amazon rainforest

Such an assertion, under the prevailing memory regime, can become a truly political one, especially if this past destabilizes the cleansed histories of progress or romanticized heritage pastiches (Hall and Bombardella 2005).

Material Excess

Material excess is one of the defining characteristics of supermodernity. However, sociologists and theorists have tended to downplay the relevance of matter and have preferred to focus instead on the less tangible aspects of supermodernity, either from a critical or celebratory point of view: networks (Castells 1996), fluidity (Bauman 2000), speed (Virilio 2002), and the virtual more generally. Capital flow, fast consumption, new media, and intercontinental travel give the impression that we are leaving a dematerialized existence: Bauman (2000: 113-118) talks about the shift from a "heavy" to a "light modernity." But is supermodernity truly that light? I would contend that, on the contrary, society has never been heavier and that to consider it light is the result of a process of purification, sensu Latour (1993), that black boxes the material foundations of supermodernity. I do not intend to rule out the metaphor of liquid modernity altogether, which I think is apt and insightful. The problem is that the metaphor can lead us to forget both the true weight of our present time and that this weight is not equally distributed. There are some regions of the world (those who suffer war or capitalist depredation) where supermodernity is heavier than in others.

The problem is that media gurus and journalists always tend to emphasize processes of virtualization. A good case in point is war, which is usually presented as a high-tech video game. Yet the combat gear of supermodern soldiers is bulkier than ever: only their body armor can weigh up to 15 k (Tyson 2009). And it does not matter how light a Predator drone is and that it is operated remotely; its effects are still strongly material and situated: rubble and splintered bones in a Pakistani or Yemeni village. Archaeology can be a counterbalance to the generalized perception of the world as plastic (Olsen 2003; González-Ruibal 2008: 252–254). An emphasis on fluidity and movement, in fact, may lead us to forget all the material strategies of fixation and circumscription deployed by supermodern powers: movement is always controlled. Those who move and the things that circulate have to be allowed to do so. It is a historical paradox that moments of high globalization come hand in hand with walls and fences: Hadrian's Wall, the Great Chinese Wall, the US-Mexico border fence, and the Israeli West Bank barrier.

Archaeologists have not been the only ones to have paid attention to materiality. Art has shown a

fascination with material excess for the last three decades at least. Godfrey Reggio's *Koyaanisqatsi* (1982) is a powerful audiovisual account of supermodernity, in which the mass production and mass destruction of materiality are repeatedly overlapped. A similar aesthetics is deployed by Andreas Gursky (2008) in his monumental photographs of cities, buildings, and crowded spaces and Burtynsky's (2009) equally vast depictions of supermodern landscapes altered to the extreme by heavy industry. These and similar works convey the impression of a deeply material world gone excessive, of superhuman scale and irreparable ecological damage and loss – things for which words alone cannot suffice: "a world beyond words" is the tagline of another visual experiment along this line (Fricke 1992). However, it is important to bear in mind that the art of supermodern destruction is an art of the sublime, with the ethical problems that this entails.

Burke (1834: 32) famously defined the sublime as "Whatever is fitted in any sort to excite the ideas of pain and danger, that is to say, whatever is in any sort terrible, or is conversant about terrible objects, or operates in a manner analogous to terror." Terror, in turn, is associated to power: power is sublime because it can inflict pain and terror and only when power is deprived of this ability, "you spoil it of everything sublime and it immediately becomes contemptible" (Burke 1834: 40). Yet the sublime is not only linked to terror and power but also to pleasure and beauty: "When danger or pain press to nearly, they are incapable of giving any delight, and are simply terrible; but at certain distances, and with certain modifications, they may be, and they are, delightful" (Burke 1834: 33). This is what the art of supermodernity achieves: it creates a distance with terror and pain that renders the destruction of the world produced by supermodern power aesthetically pleasurable and in the last instance, safe and consumable. This can be noticed in Dan Dubowitz and architect Patrick Duerden's exhibition: *Fascismo Abbandonato*. They have been documenting abandoned buildings of the fascist period in northern Italy, particularly youth camps. Theirs is an evocative vision of a failed modernist dream. As it happens with other similar undertakings, the exhibition is aesthetically powerful – but perhaps too much. There is an unabashed aestheticization of the subject. Thus, Duerden and Dubowitz describe the ruins as "huge and sublime" (http://www.fermynwoods.co.uk/archive/water-tower/dan-dubowitz-patrick-duerden/) – a description that would have pleased Mussolini. Herein lays the difference between the work of art and the work of archaeology. Although aesthetics are not absent – and do not have to be – in the archaeology of supermodernity (see Andreassen et al. 2010) as well as in critical artistic practice (Blocker 2009), in the balance between terror and beauty, it is terror and power that should prevail: disgust rather than pleasure. Consider two examples of supermodern excess: garbage and violence.

In William Rathje's research on garbage, there is little room left for beauty (of the conventional kind, at least): what we have are mountains of highly polluting rubbish or daily garbage fresh from the bin (Rathje and Murphy 1992). Likewise, the exhumations of victims of political violence disclose piles of bodies, an excess of shattered human matter, which has become a fossil guide for supermodernity (Montero 2009) (Fig. 4). However, archaeology does not only excel at revealing the abject: it also creates stories out of things – all things, no matter how humble or abject. With Gursky's photographs, we are left in awe, but this is a sublime awe similar to that produced by the manicured space of a military cemetery (Augé 2003: 103). Instead, by carefully dissecting ruins, locating artifacts, studying the relation of small objects and structures, and exploring the sites' afterlife, archaeologists can come up not just with a potent imagery but also with detailed narratives. It is powerful stories that we obtain out of garbage from a landfill, a mass grave, or the place of a disaster (Gould 2007). It is also this production of narratives that allows archaeology to construct a critical discourse on supermodernity, not just to stare at it in astonishment and powerlessness. Archaeology, thus, combines a concern for the manifestation of materiality, akin to art, and a commitment to analyzing reality, which relates it to other social sciences.

Supermodernity and Archaeology, Fig. 4 Victims of fascist violence during the Spanish Civil War. Exhumation by Juan Montero (2009)

Future Directions

Supermodernity has been defined here as a period within modernity characterized by excess. I have defended that archaeology can make a contribution to understanding supermodernity by looking into the excesses of time, space, and, particularly, materiality. While the overabundance of the spatial and the factual has often come under scrutiny, material excess has repeatedly escaped the gaze of theorists and it has mostly fallen to artists the task of manifesting it. Archaeologists, however, are in a good position to join artists in the examination of supermodern materialities. The study of late modernity has been too focused on the ethereal realms of hyperreality and virtuality: the complex semiotics of simulacra and networks have captured all the attention of scholars and philosophers. As opposed to this, I would argue that the mission of archaeology is to address the Real, sensu Slavoj Žižek: the Real is what resists symbolization, "the traumatic point which is always missed but none the less always returns, although we try – through a set of different strategies – to neutralize it, to integrate it into the symbolic order" (Žižek 1989: 69). Culture students abhor the Real precisely because it escapes hermeneutic efforts, but archaeologists are continuously facing the unconstituted, which is "not simply the unsaid, but the unsayable – it lies outside the said, outside discourse" (Buchli and Lucas 2001: 12). Referring to the Titanic, which has been transformed into a sublime object, Žižek (71) argues that "all the effort to articulate the metaphorical meaning of the Titanic is nothing but an attempt to domesticate the Thing by reducing it to its symbolic status, by providing it with a meaning." What archaeologists have to do is to expose the excess of supermodernity beyond symbolization: the raw, traumatic Thing at the core of the Real.

Cross-References

- ▶ Chronopolitics and Archaeology
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Contemporary Past, Archaeology of the
- ▶ Industrial Archaeology
- ▶ Modern Material Culture, Archaeology of
- ▶ Modern Ruins: Remembrance, Resistance, and Ruin Value
- ▶ Non-places in Archaeology
- ▶ Rathje, William Laurens
- ▶ Urban Heritage

References

Andreassen, E., H.B. Bjerck, and B. Olsen. 2002. [1992] *Los no lugares. Espacios del anonimato. Una antropología de la sobremodernidad*. Translated by M. Mizraji. Barcelona: Gedisa.

Andreassen, E., H.B. Bjerck, and B. Olsen. 2003. *El tiempo en ruinas*. Translated by T. Fernández and B. Eguibar. Barcelona: Gedisa.

Andreassen, E., H.B. Bjerck, and B. Olsen. 2010. *Persistent memories. Pyramiden – a Soviet mining town in the High Arctic*. Trondheim: Tapir Academic Press.

Baudrillard, J. 1994 [1981]. *Simulacra and simulation*. Translated by S. Glaser. Ann Arbor: Michigan University Press.

Bauman, Z. 2000. *Liquid modernity*. Cambridge: Polity.

Bender, B. 2001. Landscapes on-the-move. *Journal of Social Archaeology* 1 (1): 75–89.

Blocker, J. 2009. *Seeing witness. Visuality and the ethics of testimony*. Minneapolis: University of Minnesota Press.

Buchli, V., and G. Lucas. 2001. The absent present: Archaeologies of the contemporary past. In *Archaeologies of the contemporary past*, ed. V. Buchli and G. Lucas, 3–18. London: Routledge.

Burke, E. 1834. *The works of Edmund Burke, volume 1*. London: Holdsworth and Ball.

Burtynksy, E. 2009. *Oil*. Washington, DC: Corcoran Gallery of Art.

Castells, M. 1996. *The rise of the network society, volume 1: The information age: economy, society and culture*. Oxford: Blackwell.

Connerton, P. 2009. *How modernity forgets*. Cambridge: Cambridge University Press.

Coward, M. 2008. *Urbicide: The politics of urban destruction*. London: Routledge.

De Certeau, M. 1984. *The practice of everyday life*. Berkeley: University of California Press.

De Landa, M. 2000. *A thousand years of nonlinear history*. New York: Swerve.

Derrida, J. 2006. *Specters of Marx. The state of the debt, the work of mourning and the New International*. London: Routledge.

Edensor, T. 2005. *Industrial ruins: Aesthetics, materiality and memory*. Oxford: Berg.

Fausto, C. 1999. Of enemies and pets: Warfare and shamanism in Amazonia. *American Anthropologist* 26 (4): 933–956.

Fricke, R. 1992. *Baraka*. Magidson Films.

Giddens, A. 1991. *Modernity and self-identity: Self and society in late modernity*. Stanford: Stanford University Press.

González-Ruibal, A. 2008. Time to destroy. An archaeology of supermodernity. *Current Anthropology* 49 (2): 247–279.

González-Ruibal, A., and A. Hernando. 2010. Genealogies of destruction: An archaeology of the contemporary past in the Amazon Forest. *Archaeologies* 6 (1): 5–28.

Gould, R. 2007. *Disaster archaeology*. Salt Lake City: The University of Utah Press.

Graves-Brown, P. 2007. Concrete islands. In *Contemporary and historical archaeology in theory: Papers from the 2003 and 2004 CHAT conferences*, BAR International series, ed. L. McAtackney, M. Palus, and A. Piccini, vol. 1677, 5–82. Oxford: Archaeopress.

Gursky, A. 2008. In *Andreas Gursky: Architecture*, ed. R. Beil and S. Fessel. Ostfildern: Hatje Cantz.

Hall, M., and P. Bombardella. 2005. Las Vegas in Africa. *Journal of Social Archaeology* 5 (1): 5–24.

Hamilakis, Y. 2011. Archaeological ethnography: A multitemporal meeting ground for archaeology and anthropology. *Annual Review of Anthropology* 40: 399–414.

Harrison, S. 1993. *The mask of war. Violence, ritual and self in Melanesia*. Manchester: Manchester University Press.

Harrison, R., and J. Schofield. 2010. *After modernity. Archaeological approaches to the contemporary past*. Oxford: Oxford University Press.

Harvey, D. 1990. Between space and time: Reflections on the geographical imagination. *Annals of the Association of American Geographers* 80 (3): 418–434.

Hicks, D., and O. Hicks. 2006. Urban ecologies of hope: Heather and Ivan Morison at the British Art Show. Available at: http://www.bris.ac.uk/archanth/staff/hicks/Hicks_and_Hicks_on_Morison_and_Morison.pdf.

Hodder, I. 2010. *Religion in the emergence of civilization: Çatalhöyük as a case study*. Cambridge: Cambridge University Press.

Jameson, F. 1991. *Postmodernism or, the cultural logic of late capitalism*. Durham: Duke University Press.

Küchler, S. 2002. *Malanggan: Art, memory and sacrifice*. Oxford: Berg.

Kuijt, I. 2008. The regeneration of life. Neolithic structures of symbolic remembering and forgetting. *Current Anthropology* 49 (2): 171–197.

Latour, B. 1993. *We have never been modern*. Translated by C. Porter. Cambridge, MA: Harvard University Press.

Lucas, G. 2008. Time and archaeological event. *Cambridge Archaeological Journal* 18 (1): 59–65.

Montero, J. 2009. La visibilidad arqueológica de un conflicto inconcluso: la exhumación de fosas comunes de la Guerra Civil española a debate. *Munibe* 60: 289–308.

Mullins, P. 2006. Racializing the commonplace landscape: An archaeology of urban renewal along the color line. *World Archaeology* 38 (1): 60–71.

Obstfeld, M., and A.M. Taylor. 2003. Globalization and capital markets. In *Globalization in historical perspective*, ed. M.D. Bordo, A.M. Taylor, and J.G. Williamson, 121–187. Chicago: University of Chicago Press.

Olivier, L. 2008. *Le sombre abîme du temps. Archéologie et mémoire*. Paris: Seuil.

Olsen, B. 2003. Material culture after text: Remembering things. *Norwegian Archaeological Review* 36 (2): 87–104.

Penrose, S. 2007. *Images of change*. Swindon: English Heritage.
Rathje, W., and C. Murphy. 1992. *Rubbish!: The archaeology of garbage*. New York: HarperCollins Publishers.
Reggio, G. 1982. *Koyaanisqatsi. Life out of balance*. IRE Productions, Santa Fe Institute for Regional Education.
Stevanovic, M. 1997. The age of clay: The social dynamics of house destruction. *Journal of Anthropological Archaeology* 16 (4): 334–395.
Tyson, A.S. 2009. Weight of combat gear is taking toll. *The Washington Post*, 1 February 2009. http://www.washingtonpost.com/wp-dyn/content/article/2009/01/31/AR2 009013101717.html.
Virilio, P. 2002. *Desert screen: War at the speed of light*. Translated by M. Degener. London/New York: Continuum.
Witmore, C. 2007. Landscape, time, topology: An archaeological account of the southern Argolid, Greece. In *Envisioning landscape: Situations and standpoints in archaeology and heritage*, ed. D. Hicks, G. Fairclough, and L. McAtackney, 209–225. Walnut Creek: Left Coast.
Yablon, N. 2009. *Untimely ruins: An archaeology of American urban modernity, 1819–1919*. Chicago: The University of Chicago Press.
Žižek, S. 1989. *The sublime object of ideology*. London: Verso.

Further Reading

Augé, M. 1998. *Las formas del olvido*. Translated by M. Tricàs and G. Andújar. Barcelona: Gedisa.
Hobsbawm, E.J. 1994. *The age of extremes: The short twentieth century, 1914–1991*. London: Michael Joseph.

Surface Survey: Method and Strategies

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Introduction

Archaeologists developed surface survey methods in regions with abundant surface artifacts where these artifacts are visible today because of the action of a variety of geomorphic processes often leading to deflation (see ▶ Deflation Archaeology) or due to the concentration of artifacts near the surface. In regions of the Mediterranean, for example, cultivation means that fragmentary ceramics are often abundant and highly visible. Surface survey in the form of "plow zone" archaeology developed accordingly, allowing mapping of the distribution of ceramics as well as other artifact types and features like house mounds. In some regions of Central and North America, good surface visibility led to the development of similar approaches. In other regions, stone artifacts are abundant, and at times hyper-abundant, in surface deposits (Foley and Lahr 2015). In these cases, surface survey strategies have developed to analyze stone artifact distributions. More recently, the advent of technologies capable of detecting features like mounds beneath vegetation cover has enabled archaeologists to undertake surface survey in areas where surface visibility is poor because of vegetation cover. Surface surveys increasingly make use of electronic survey equipment, data loggers, and geographic information system (GIS) software.

Two broad strategies characterize surface surveys. Macroscale surveys seek to use the nature and distribution of sites to investigate political and economic relationships that operated over regional scales. These surveys are often based on recording the location, size, and composition of archaeological sites through the use of techniques described as "full-coverage settlement pattern survey." They make use of recording methods that enable the rapid acquisition of large numbers of records over areas measured in tens to hundreds of square kilometers (Feinman and Nicholas 2013). An alternative approach, named *Distributional Archaeology* by Ebert (1992) and *Off-Site Archaeology* by Foley (1981), adopted the artifact rather than the archaeological site as the recording unit. Here methods are used to characterize the differential density of artifacts as well as features across extensive spatial areas without the need to identify site boundaries. However, while the areas considered can be extensive, they are generally smaller than is possible with full-coverage type surveys.

Changes in the intensity of field survey correlate with the number of observations recorded.

However, increasing survey intensity comes at a cost since the more time spent surveying in one area potentially leads to a smaller spatial extent of coverage. Criticisms leveled at *Distributional Archaeology* reflected the issues dealing with this relationship (Bettinger 1993), and surveys directed at recording artifact density in the Mediterranean region attracted similar criticisms. Critics commenting on studies from this area complained that some intensive surveys were too small in extent to reveal useful socioeconomic interpretations (e.g., Blanton 2001; Kowalewski 2008). Caraher et al. (2006) summarized the subsequent debates concerning whether a myopia, to use Blanton's (2001) term, in favor of intensive data collecting led to surveys that covered insufficient spatial extent to identify regional patterns.

The ability to conduct surface survey certainly relates to visibility and spatial extent, but the strategies and methods adopted depend on how data acquired during survey are analyzed, and this of course depends on the types of research questions asked. In the following, we consider three broad topics. First, we review examples of surface survey noting the techniques that archaeologists have adopted to characterize surface archaeological remains. We compare studies conducted in the Mediterranean region with those undertaken in both the Mesoamerican highlands and lowlands. Second, we consider methods of analysis applied to these observations. Surface archaeological remains are frequently more abundant than buried remains simply because of their accessibility. It takes more time to excavate material than it does to record material that is visible on the surface. Large numbers of observations from surface deposits make it possible to detect patterns in the distribution of both objects and sites. However, the processes that lead to formation of the archaeological record are often complex and not always directly related to the activities of people. Blanton's interest in understanding macroscale patterns therefore relies on the ability to define an unambiguous set of analytical procedures that progress from the form and abundance of surface artifacts and features up to inferences about such things as the numbers of people who occupied different parts of the landscape at different times or the nature of hierarchy in social organization. Analytically, it is important to understand the degree to which it is possible to upscale from the distribution of archaeological materials to infer sociocultural process. Third, the quantity of data acquired through surface survey produces logistical challenges but also new opportunities. Using case studies based on our own research, we review the application of new technologies, the use of which means that both the number and the types of observations made have greatly increased. Technological developments also mean that the types of analyses open to archaeologists have also expanded.

Archaeological Surface Survey

Archaeological surface survey in the Mediterranean region is now more than three decades old with good consensus on methods used, the types of sampling employed, and the significance of off-site versus site-based survey (Given 2013). In an earlier study, Cherry (2003), for instance, combined probabilistic designs with systematic, pedestrian survey on Melos, Greece, involving surveyors separated by regular intervals, walking across the land surface, recording exposed artifacts. Transect lines 1000 m wide, orientated north-south, were staggered across the island. The typology of artifacts, established through earlier excavations, provided a chronology, while the assessment of the probable function of the artifacts in the field provided an indication of the functional status of the sites identified. In another example, the Troodos Archaeological and Environmental Survey Project (TAESP), archaeologists surveyed an area of 164 km^2 broken into six zones that represented different topographic regions. Within these, recording focused on survey units rather than sites. With dimensions of 25×50 m, the survey units were spaced in long transects at right angles to the main water courses. Collection involved obtaining a representative sample of pottery, all chipped stone, and a selection of other cultural materials from within these units. Where the identification was made of dense

concentrations of material, artifacts were collected across contiguous units (Given 2013).

This basic scheme characterized later projects although the intensity of survey (as measured, e.g., by the spacing between field walkers) and the tendency to survey continuous blocks rather than transects changed as did the concern for processes that might have altered or obscured the surface archaeological record (Bintliff 2000). Tataron et al. (2006), for example, reported on the methods used in the Eastern Korinthia Archaeological Survey (EKAS) where investigation involved an area of 350 km^2 east of the ancient city of Corinth, Greece. The survey design paid particular attention to the geomorphology of the region including consideration of the post-depositional processes that had a potential impact of the position and preservation of artifacts and features. In advance of the archaeological survey, geomorphologists mapped soils, sediments, and faults at a range of scales, from drainage basins to localized geomorphic units. Use of a GIS enabled the integration of contours, landforms, geology, hydraulics, and tectonics with cultural features like sites, burials, and roads. The survey used a stratified sampling design, with the study area divided into environmental zones initially based on six major drainage systems permitting a regional survey. This allowed the definition of what were termed morphostratigraphic units, landforms reflecting tectonic, alluvial, colluvial, or littoral processes. Within these, survey involved the identification of geomorphic units defined as distinct pieces of the landscape that reflected the action of a single geomorphic process either natural or cultural (e.g., bulldozing). Archaeological survey involving three different approaches made use of these geomorphic units. Initially, survey involved the use of tracts called Discovery Units, where surveyors spaced at 10-m intervals inspected 2-m-wide swaths counting the artifacts they encountered and collecting samples according to a chronotype system (described below). Investigation of these Discovery Units occurred within a selection of environmental strata. In addition to the Discovery Units, Localized Cultural Anomalies provided the means to describe clusters of artifacts and/or features different in extent to the surrounding density of material and where this clustering was not due to geomorphic processes. The third investigation unit, the Extensive Discovery Unit, described areas where it was not possible to implement the intensive, systematic, Discovery Unit approach. The system allowed the integration of geomorphic processes in different parts of the survey area with records of the number and nature of archaeological objects and features. These data in turn permitted assessments of landscape stability, and therefore the depositional history of the artifact surface scatters at a fine spatial scale.

Within the Discovery Units, pedestrian surveyors walked 10 m apart counting and collecting artifacts using the chronotype collection system. This system provided both a classification method for artifacts and a collection protocol. Following the system, surveyors picked up one example of all artifacts encountered leaving behind those with the same material, shape, and decoration. Collection involved all items in the case of rarer types such as lithics, metal, and glass. For classification, the seven classes initially identified, pottery, stone/lithics, metal, glass, terracotta, shell/bone, and other, were further subdivided reflecting function and chronology. A separate team considered the artifacts retrieved and conducted further analysis, classifying these and removing any duplicates. According to the authors, the system works well in regions with large quantities of pottery where total collection is not feasible (e.g., Meyer and Gregory 2003; Gregory 2004). Analyses of the data acquired in this way involved calculations of the number of artifacts per area surveyed in relation to environmental data sets collated using GIS software.

In Mesoamerica, William Sanders, as part of the Teotihuacan Valley Project, first implemented regional surveys in 1960 with the methods he developed. Sanders expanded the use of these methods to other parts of the Valley of Mexico over the ensuing decade in collaboration with others like Jeffrey Parsons and Richard Blanton. The Valley of Mexico project set the standard for Mesoamerican regional surveys with subsequent surveys extended to the central and southern Mexican highlands (Feinman and Nicholas

2013). For example, survey in highland Oaxaca and the adjacent Mixteca Alta reached a combined area of approximately 8,000 km^2. Working in one part of this area, Feinman and Nicholas (2013) reported on the results of a survey of the Ejutla Valley, adjacent to Oaxaca, conducted during the 1980s, before the widespread use of mechanized farming machinery. Vegetation at the time that the survey was undertaken was light, and consequently, the majority of the land surfaces had high visibility, permitting rapid identification of archaeological materials. Survey involved crews systematically walking fields and marking sites identified onto aerial photograph mosaics. It also involved mapping features such as mounds, platforms, plazas, walls, and terraces directly onto the photographs together with their site boundaries. Recording consisted of descriptions of artifact form, frequency, and location, together with datable diagnostic pottery and sherd density. In addition, a series of observations were made concerning contemporary land use and erosion/deposition, as well as environmental variables like distance to water and soil color and texture.

In these surveys, less attention was given to the type of fine-scale details related to artifact visibility recorded, for example, by Tartaron and colleagues (2016) working in Eastern Korinthia, Greece. In the surveys like those conducted by Feinman and Nicholas (2013), following the methods developed in the Basin of Mexico, increasing spatial extent provided the primary motivation rather than investment in the extended study of the influence of fine-scale differences in visibility. Stark and Garraty (2008), however, did investigate the impact of visibility conditions on their landscape survey results for the western Lower Papaloapan Basin in the Gulf lowlands of Mexico. They used visibility records to help estimate the number of archaeological features not recorded during survey when considering residential earthen mounds and concentrations of domestic artifacts. Stark and Garraty recorded a variety of vegetation categories and showed how, even in what they referred to as "full-coverage survey," the area investigated should be considered as a sample, dependent on the size and obtrusiveness of artifacts and features, the intensity of survey coverage, and the variation in visibility across the landscape.

Other studies have shown how different processes affect survivorship of the archaeological record and hence its visibility, both at the scale of the archaeological site and at that of the individual artifact (Bintliff 2000; Terrenato 2004). Pottery, for instance, degrades with age, depending to some extent on its manufacture. Therefore, ancient sites may be less visible than those that are more recent. The complexity of the natural processes involved in any one region means that their impact needs consideration on a case-by-case basis. Equally important, some activities in the past led to the deposition of many artifacts, while others produced many fewer objects. Therefore, comparisons require careful consideration of density measures.

Varieties of approaches have developed to assess the processes that pattern the surface archaeological record. Some of these relate to cultural behavior in the past, but patterning may also result from natural processes, and different patterns are visible at different spatial scales. Markofsky and Bevan (2012), for example, report on techniques used to assess differential visibility in the Murghan Delta in southeastern Turkmenistan. In this region, alluvial fans result in complex patterns of hydrology and dune cover that complicate interpretations of artifact density. Infrequent heavy rains combined with winds act to deflate sediments and thereby redistribute surface material. Markofsky and Bevan illustrate analyses designed to assess the degree to which ceramic sherd counts show patterning in some directions more than others do (i.e., are anisotropic). Two techniques are used, directional and surface variograms, both of which permit the assessment of spatial variation over multiple distances and in different directions and angular wavelet analysis that permits the analysis of angular variation between individual surface sherds. Within the Murghan region, sand dunes are orientated north-south, while the paleo-delta is orientated northwest, with paleo-channels approximately following this orientation. Visual assessment of these anisotropy were checked using Advanced Spaceborne Thermal Emission

and Reflection (ASTER) satellite data with variograms showing the strongest autocorrelation in the directions ranging from N-S to NNW-SSE. Application of the variogram technique enabled assessment of the distribution of ceramic sherds recorded in the study area. The analysis showed anisotropy at distances up to 4–500 m but with considerable local variability. Application of wavelet analysis to pottery assemblages separated chronologically showed change in the nature of anisotropy through time. Bronze Age pottery showed no clear anisotropy in the northern part of the survey area; however, Sasanian and Islamic pottery showed strong east-west anisotropy in the same region. The authors propose that this difference in pattern may relate to a present-day road that might have followed the route of more ancient tracks, perhaps reflecting an east-west trading corridor. Pottery concentrations aligned to this road.

In our own work, we have also paid particular attention to the types of geomorphic as well as cultural processes that might have an impact on the visible surface archaeological record. In western New South Wales, Australia, for example, eroded areas termed scalds were formed when the uppermost sediment layer was removed by erosion, exposing the underlying layer which is commonly saline (Fig. 1). A soft, puffy, crust typically forms which readily breaks down with trampling by modern domestic stock (Charman and Murphy 2000). Erosion removes fine sediments but typically leaves the larger clasts intact including stone artifacts. Scalds therefore form physically bounded areas that have high archaeological visibility. In effect, they act as small excavations distributed across the landscape with the majority of the artifactual material remaining in place. Since the scalds formed because of erosion, their location is effectively independent of the activities of the Aboriginal people who were responsible for manufacturing and discarding the artifacts. They therefore form suitable ready-made sampling units with which to investigate large areas.

Surface Survey: Method and Strategies, Fig. 1 Scald from western New South Wales, Australia, used as a sampling unit in survey. Erosion provides a window into the distribution of artifacts across large areas

In our survey work, we studied a random sample of the scalds from one drainage feature, Rutherford's Creek. In each scald, a geomorphologist drew a line separating eroded from intact sediment. Within this perimeter, lines were drawn to indicate patches of soil, vegetation, and ant nests together with any modern activity such as vehicle tracks. As well, the boundaries of any watercourses were marked out (Fig. 2). All lines were digitized by a total station positioned using a differential GPS. Once the digitization of lines was complete, artifacts over 20 mm in maximum clast dimension were identified and described and their locations mapped. In a series of studies, we assessed the impact of these localized geomorphic features on artifact visibility and location (e.g., Fanning and Holdaway 2004), scaling the processes up to account for both the presence and absence of artifacts at different points in the landscape (e.g., Fanning et al. 2009) and to patterns in the chronology of cultural materials (e.g., Davies et al. 2016). Analysis of the pattern created when radiocarbon dates obtained from surface hearths were combined showed that both the increase in the frequency of dates toward the present and oscillations in the number of dates in adjacent periods are likely reflected periods of erosion and burial as a result of episodic rainfall rather than culturally related processes like local population shifts (see ▶ Deflation Archaeology). Thus, in the case of western New South Wales, it is possible to show that visibility at the microscale accounts for some of the patterning visible at the macroscale. In such situations, it is important that

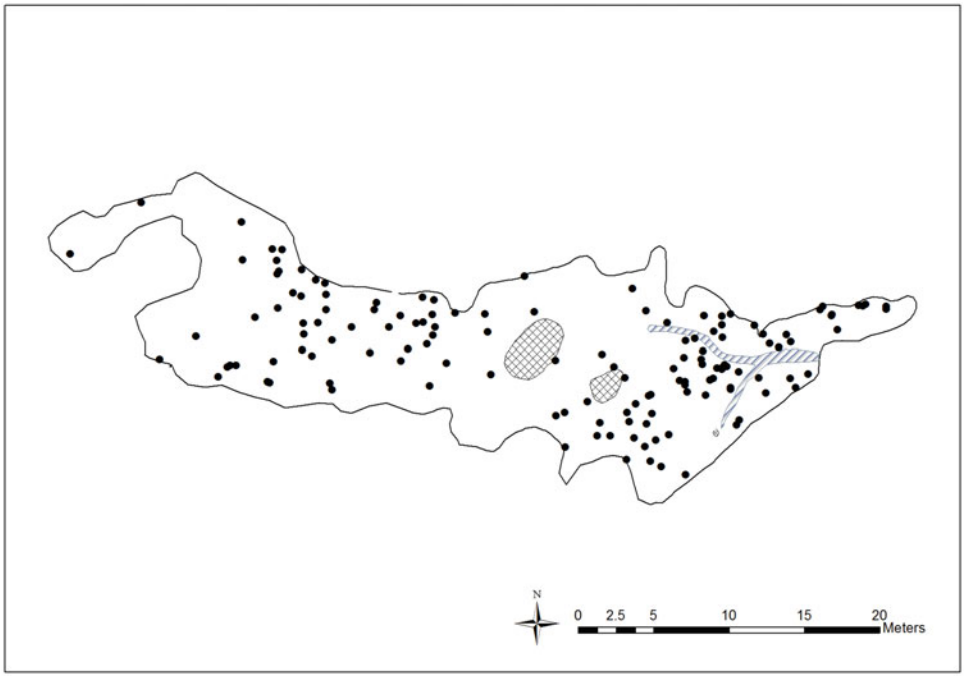

Surface Survey: Method and Strategies, Fig. 2 Surface features together with stone artifact locations mapped in a scald used as a surface survey-sampling unit in western New South Wales, Australia. Black dots represent artifacts and hatched area represents sediment islands and single line shade water courses

archaeologists undertake local-scale visibility studies before making cultural inferences from the nature of macroscale patterning.

Comparing patterns generated by natural and cultural processes exposes archaeologists to the challenges posed by **equifinality** (following Dincauze 2000 rather than the strict definition – see Rogers 2000). People certainly created artifacts and features in the past, but the patterns these items form in the archaeological deposits on both the surface and in buried deposits do not necessarily relate solely to past human activities. The way the archaeological record accumulates and is transformed forms patterns in material remains that may at times appear as though they relate to human activity when in fact they relate to geomorphic processes. It is therefore important to understand how processes that affect visibility scale up to have an impact on broad-scale inferences that archaeologists make about things like past settlement patterns, social hierarchies, and population numbers. As studies like those we conducted in Rutherford's Creek and more generally in western New South Wales, Australia, show, increasing the spatial scale does not always negate the impact of differential visibility. To use Blanton's analogy, while detailed study of the impact of differential local visibility may appear myopic, such studies must be undertaken since interpreting regional patterns at face value, without considering the impact of local processes, may lead archaeologists to incorrectly interpret regional patterns that relate to natural processes as if they reflected large scale, human behavior.

One of the most dramatic examples of the significance of dealing with the impact of differential visibility comes from recent work on surface archaeological remains in lowland regions of Mesoamerica. In some of these areas, dense forest has led to limited opportunities for surface survey and therefore site identification. However, new technology in the form of airborne LiDAR (see ► Aerial Archaeology) is changing this, since it is now possible to visualize not only larger architectural examples but also quite low features

including mounds, terracing, and underground storage units. This new evidence is changing previously held beliefs about the nature and extent of occupation in previously inaccessible areas (Chase et al. 2012). Rosenswig et al. (2013), for example, used LiDAR data to locate 670 mounds in the Soconusco region of southern Mexico. They checked identified mounds using foot survey across an area of 43.1 km^2. Based on the correlations obtained comparing LiDAR and conventional survey, size estimates for the area of the site of Izapa utilized during the Late Classic period tripled. In a separate study, Fisher et al. (2016) reported on the archaeological settlement pattern for the Mosquitia region of Honduras. Using airborne LiDAR permitted the detection of anomalies on the surface larger than 1 m on a side and greater than 50 cm height. Results of the LiDAR survey indicated considerable cultural modification of the area in the past with both terraces for agriculture and habitation together with water control features constructed. The identification of 19 settlements was possible in a variety of geographic settings in addition to a single larger site with an area of 142 ha composed of 10 plaza complexes. As with similar studies, discovering the number and extent of features in areas today covered by vegetation is changing previous conceptions of the nature and extent of past settlement patterns.

The increase in precision obtainable with LiDAR data is also changing estimates of the numbers of archaeological sites from those based on direct field observation using older technologies like aerial photographs. In a LiDAR study of the Kohala field system, Hawaii Island, for example, Ladefoged et al. (2011) reported how, compared to an earlier study, the use of LiDAR increased estimates of the density of alignments in field systems from 614 m/ha to 850 m/ha. They also reported how the LiDAR data permitted greater understanding of the distribution of alignments than was previously possible, as well as the accurate identification of the relationships between trails and agricultural alignments.

As illustrated by Mosquitia study, it is important to understand when archaeological features are truly absent versus those simply hidden from view. However, as some of the other examples also illustrate, it is also important to understand how the distribution of archaeological materials may result from the action of processes other than peoples' past behavior. In some studies, there is evidence that differential visibility as well as increased accuracy of recording of archaeological features may scale up from the micro to the macro leading to different conclusions about the distribution and complexity of past activities. This indicates that the visibility of the surface archaeological record needs to be carefully analyzed before making inferences about past use of the landscape.

Analysis of Surface Survey Results

Menze and Ur (2012) introduced their study of mound sites from the Upper Khabur Basin of Hassake Province, northeastern Syria, with the observation that survey archaeology involves a trade-off between the need to survey areas extensive enough to discover pattern with the need to survey intensively at the local scale to discover small sites. As they suggested, initially many archaeologists dealt with the first half of this dichotomy, while in more recent times, the latter half has also become of interest. Their solution to resolving the dichotomy is to adopt the use of satellite imagery, which they used to investigate an area in Mesopotamia measuring 22,000 km^2. In their study, they focus on the volume of mounds since calculation is possible from a digital elevation model derived from the satellite data. Volume provides a proxy for the long-term attractiveness of settlement locations. They made use of multiple satellite images taken at different times to verify that mounds identified in the images were similar to nearby known archaeological sites and to remove short-term surface variation. When combined, the results from the analysis of multiple satellite images resulted in the identification of 14,312 sites. Verification compared high-resolution Satellite Pour l'Observation de la Terre (SPOT) and Central Intelligence Agency Directorate of Science and Technology (CORONA – a code word not an acronym)

satellite image data and with data derived from archaeological surveys in the region. Use of the Shuttle Radar Topography Mission (SRTM) digital elevation model enabled mound volumes to be calculated. Using the number of sites per area, the volume of all sites per area, and the average volume of sites per area, comparisons were made with drainage classification, all three quantities showing a positive correlation.

The patterns that Menze and Ur (2012) detected suggest long-term arrangements in the way settlements were located in Mesopotamia. However, as the Markofsky and Bevan (2012) study outlined above shows, macro-regional patterns do not always reflect the actions of people in the past. Processes that lead to differential visibility in the location of archaeological materials but also their size and form can create distributions that look as though they represent past settlement patterns. Simply increasing the spatial scale of observations, as advocated by some (e.g., Kowalewski 2008), does not overcome this problem.

Bevan and Conolly (2009) discuss the issues involved in understanding patterns observable at different spatial scales using the concept of the **modifiable area unit problem**. The "problem" in this concept arises because with aggregated data, observable spatial patterns are dependent on the spatial scale used, and therefore the choice of aggregation unit becomes important in determining the nature of the patterns seen. Where densities of material culture vary, relationships that may be apparent at a particular spatial scale in one area may not be apparent when the scale and/or the area is changed. Bevan and Conolly report on the results of the survey of the entirety of the Greek island of Antikythera. Here they note that two patterns in the distribution of pottery are apparent when measured at different scales. At the local scale, differential pottery density relates to the existence of small, dense areas approximately 100 m across which tend to cluster together with clusters separated by emptier areas. At a regional scale, higher and lower densities align with prevailing tectonic fault lines running in a NW-SE direction. The later pattern also correlates with a number of environmental variables like soils, slope, elevation, and hydrology. Behavioral inferences based on these different patterns need to be carefully made. The choices people made in the past to locate their activities in different places were certainly at times influenced by environmental variables, but these same variables may influence archaeological site visibility, and these two processes need to be carefully considered if they are to be differentiated.

Bintliff et al. (2006) discuss examples from survey work in Boeotia, southern Greece. Here patterns of ceramic visibility relate to chronology and sherd survival. In their study, investigation was based on Sherratt's (1980) suggestions about site distributions as part of his early farming model. According to the Sherratt model, both the secondary products revolution (i.e., the development of dairy and wool production) and olive cultivation provided opportunities for increased agricultural production in southern Greece. However, the results obtained from surface survey produced pottery concentrations from Classical Greek and Roman age sites without such pottery concentrations identified dating from the Neolithic or Early Bronze Age periods. Bintliff et al. (2006) explain this absence by considering both the nature of pottery discarded at different periods and the processes that led to pottery discard. Classical Greek pottery survives well in contemporary plowed soils, whereas Neolithic and Bronze Age potsherds were made from a coarse pottery fabric and therefore have poor survival. As well, during Classical times, large quantities of sherds transported away from Greek cities were included in the manure deposited in fields adjacent to settlements. Within the area surveyed, numbers of these sherds exceed one million. Therefore, they tend to swamp the small number of sherds that survive from earlier periods. Bintliff et al. (2006) note how only small numbers of Bronze Age sherds are present in collections retrieved from areas with dense concentrations of sherds with later dates. They argue, therefore, that surface scatters with small numbers of older aged sherds may today represent early farmsteads, with the sherds found being in poor condition. These sherds provide the evidence for Sherratt's (1980) early farming. Following this line of

argument, Bintliff et al. (2006) modified their strategy when undertaking survey near Tanagra where manuring has also led to the deposition of many sherds from Classical times. Collections were made of all sherds with particular emphasis on the identification of coarse body sherds. Analysis of the resulting distribution indicated a 2-km-long stretch where Neolithic sherds were recovered in an area with perennial streams that conformed to some degree with the predictions from the Sherratt model.

In the Ejutla Valley example discussed above, Feinman and Nicholas (2013) estimated population numbers represented by every site following the procedures developed by Sanders and Parsons for the Valley of Mexico survey. The calculations used the assumption that the area of a site and consequently the ceramic density on the site related to the number of people who occupied it. With the addition of mound volume, these measures provided population size estimates organized by temporal phase and geographic location, which in turn provided the means to infer mound and population size hierarchies for each temporal phase. These allowed the consideration of social organizational change through time including the centralization of political power.

While analyses of the type used by Feinman and Nicholas (2013) provide the means to investigate macro-regional settlement pattern change, using ceramic typologies to provide chronologies, care is needed in assessing the analytical steps that lead to estimates of past population levels and political complexity. An increase in the frequency of observations through time may appear to show population increase. However, as the Australian hearth example discussed above illustrates, geomorphic processes that determine the burial and exposure of hearths, and therefore the ability to obtain radiocarbon determinations, can create patterns very similar to those that are attributed to population increases when analyzed in some macro-regional studies (Davies et al. 2016). Even if differential visibility can be accounted for, including such things as the survivability of the artifactual material, as Duffy (2015) points out, there are varieties of behavioral causes for distributions of sites that display site size hierarchies that do not involve examples of political centralization. Duffy's study illustrates some of the issues surrounding equifinality that are of a concern in archaeological interpretation. It is important to consider how the "modifiable unit area problem" discussed above may have an impact on the patterns generated at different spatial scales and therefore the types of explanation that archaeologists derive from surface survey.

Case Studies

In our own research in Australia and Egypt, we have confronted the issue of how to assess both the distribution and composition of artifacts recorded in the sampling units in ways that reflect some of the issues discussed above. At Rutherford's Creek, western New South Wales, Australia, for example, the composition of the artifact assemblages in the scald sampling units recorded from the headwaters of Rutherford's Creek to where it discharges into Peery Lake showed variability in artifact density but not in a way that aligned with the length of the creek line (Holdaway et al. 2012, 2015). Instead, analytical results related variability in density to two processes, one linked to the nature of environmental change and the other being a result of human behavior. Artifacts accumulated on surfaces along the valley floor of Rutherford's Creek and were visible following erosion, enhanced in recent times by the presence of European introduced domestic livestock that created the scalds used as sampling units discussed above. However, analysis of the surface area and volume of the stone artifacts recorded throughout the length of the valley indicated that a considerable proportion of the flakes originally struck from locally available cores were missing (Douglass et al. 2008). These flakes, likely selected for their size, were transported over distances, and therefore for periods representing their useable life, of such a magnitude to ensure that they were never returned. Transport in this way acted as a proxy for human movement. The stone artifact assemblages that remained reflected assemblages of objects left behind after flake removal. Items carried away

indicated those artifacts deemed to be useful for activities conducted elsewhere in the wider landscape. Obviously in this situation, using counts of the artifacts that remained, or the degree to which they were concentrated or dispersed, as a measure of the intensity of occupation or the size of the population that occupied a location would not be wise. The artifacts that remained represented only a sample of those manufactured, and indeed, many of the retouched tools found abandoned by people as they moved through the valley deposited at the end of their uselife may have been made and used at locations well away from Rutherford's Creek (Douglass et al. 2017).

In understanding how to analyze the relationship between the surface artifact distributions we recovered from Rutherford's Creek in relation to aspects of the environment, attention focused on both manufacture and the processes that led to their visibility. Understanding of the patterns in the spatial distribution of artifacts identified through surface survey in this case study derives from what is missing as well as what is present. Similarly, the environmental context needs to be interpreted in relation to the outcome of a series of processes operating through time rather than a constant state. Analysis of satellite data, SRTM and Landsat Enhanced Thematic Mapper (ETM), provided measures of the topographic complexity of the study area as well as contemporary variability in vegetation and regolith. These data sets, in combination with past and present environmental assessments (Holdaway et al. 2013), indicated the context of past environmental resource abundance. In western New South Wales, resource heterogeneity did not translate into the formation of regularly recurring resource patches, largely because of low soil fertility combined with climatic variability. Australia is characterized as having an "infertile, well sorted landscape" (Stafford Smith and Morton 1990: 261). Long periods with little or no rain separate short periods of very abrupt rainfall. At the same time, Australian soils are depleted in nitrogen and phosphorous, largely because of the continent's tectonic history (Morton et al. 2011: 317). Lack of fertility and intermittent rainfall thus combined to produce a landscape that varies both spatially but also temporally in ways that were not easy to predict. This lack of predictability in environmental resource heterogeneity meant that a location rich in resources at one moment in time might become depleted at another, with little way of predicting when such a change might occur. If resources were episodic in their availability, both spatially and temporally, many places would see at least some use and therefore would see the creation of an archaeological record. Using a "dots on maps" approach, where the location and abundance of past activity are interpreted directly from survey results, the landscape would appear to consist of a carpet of occupation debris, as though all places were used at once. In fact, the opposite is the case; this carpet of dots is instead a signature of high mobility by small numbers of people in a landscape where the ecology and topography lead to the wide dispersal of the material remains of occupation.

Image analysis gives the wider landscape context to the archaeological record from Rutherford's Creek. The low redundancy in place use, as evidenced by the variety of ages and the abundance of hearths, indicates how multiple places saw use, but no one place at levels significantly higher than its neighbor. Similarities in assemblage composition also indicate low redundancy in place use. Analysis of the stone artifacts indicates movement through flake removal, suggesting high mobility consistent with the need to move often, and far, to find the resources that became available through time, rather than the prolonged used of residential occupation sites.

In a different study, we considered the evidence for movement in the composition of artifact assemblages from the Fayum, Egypt. The Fayum consists of a depression with a lake, Lake Qarun, and the near lake-edge surrounding environment. Caton-Thompson and Gardner (1934) made the Fayum famous because of their work during the 1920s close to Lake Qarun's northern shore. They discovered a record of both stratified and surface sites, the latter consisting of extensive distributions of stone artifacts, ceramic sherds, animal bones, and hearths. However, their publications described the stratified deposits, with only a brief

description of the composition of some of the surface scatters. Most recently the area was reinvestigated by the University of California, Rijksuniversiteit Groningen, University of Auckland (URU) Fayum Project (Holdaway and Wendrich 2017). The project extended approximately 20 km along the north Fayum lakeshore with an area of circa 142 km^2.

While some new excavation occurred, one of the main objectives was to survey and understand the distribution of surface material away from stratified deposits. Also investigated was the potential relationship between the nature and extent of settlement and the extent of Lake Qarun that fluctuated in size in the past during the early and middle Holocene.

Caton-Thompson and Gardner identified six basins along the north shore with these incorporated into the survey design. Assessment of the size and extent of these basins was made using data from the ASTER global digital elevation map and a 1 m resolution digital elevation model generated from satellite-derived Worldview-2 stereo imagery (Phillipps et al. 2016). To determine changes in assemblage composition and density away from the basins and the paleoshoreline, four corridors were surveyed orientated north-south from the Lake Qarun paleoshoreline. These corridors were 100 m wide and were walked by surveyors spaced 10 m apart. Survey along the corridors enabled hearths and grinding stones to be located using differential GPS. In addition, detailed survey for portable material culture was made using transect survey units located using a logarithmic scale at 100 m, 200 m, 400 m, 800 m, 1600 m, 3200 m, and 6400 m north from the paleoshoreline (Figs. 3 and 4). Survey transects consisted of a cross, 10 m wide with four

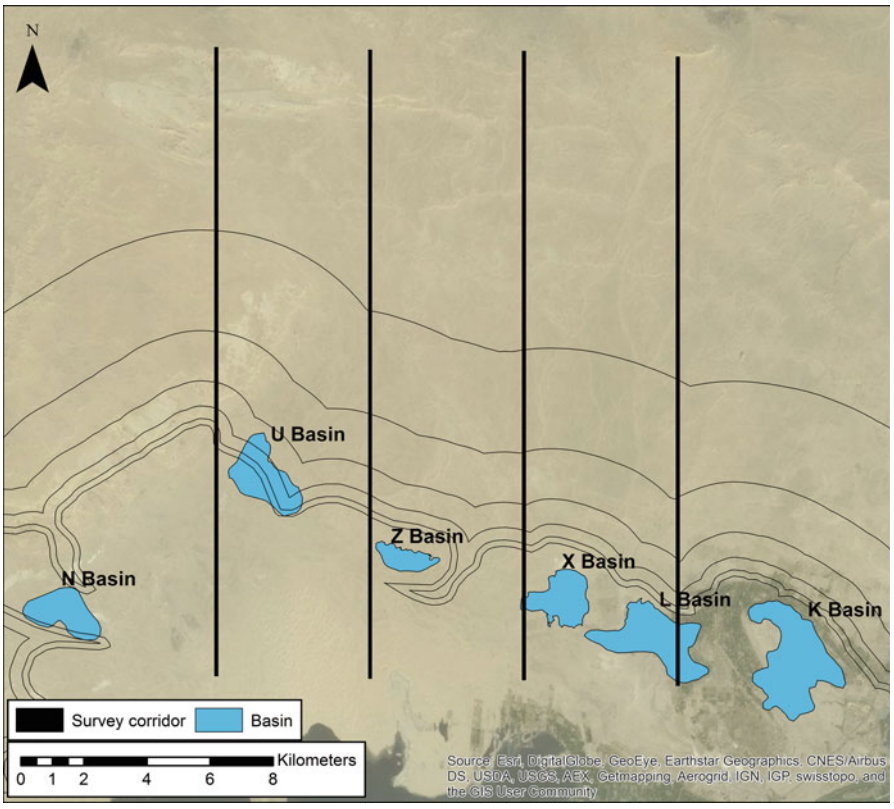

Surface Survey: Method and Strategies, Fig. 3 The basins on the Fayum north shore with the four corridors placed along the concession area with the positions of the transect survey units at a logarithmic scale away from the basins. (Figure courtesy of S. J. Holdaway, Fayum URU Project)

Surface Survey: Method and Strategies, Fig. 4 Walking survey in the Fayum. (Photo courtesy of S. J. Holdaway, Fayum URU Project)

arms 50 m long, orientated north-south, east-west. Transect units were recorded in two ways. Following a similar method to that employed with the eroded scalds described above in the Australian case study, different sediment types and areas of surface disturbance were initially drawn on the surface and subsequently recorded with a total station positioned with coordinates derived from a differential GPS. Second, every artifact within the transects with a maximum dimension size over 20 mm was recorded in position. To investigate the potential issues related to visibility and preservation, the differential densities of artifacts were calculated for each surface type and for each transect. Results indicated that artifact densities varied considerably according to sediment type. Wind-blown sand, for example, covered artifacts thereby reducing artifact densities. For this reason, artifact densities from high-visibility surfaces (e.g., consolidated sand and gravel surfaces) were used to compare artifact densities within transects in each of the corridors. Many transects contained either none or very few artifacts, even accounting for surface type. This showed that taking account of differential visibility, artifacts were concentrated near the lake basins originally identified by Caton-Thompson and Gardner.

Transects were also used to survey areas close to the K, L, and X Basins (Fig. 5) (Holdaway and Wendrich 2017). In these areas, transects were spaced around the basins and stratified deposits, such as Kom W, forming a systematic grid with additional transects used to survey areas of artifact concentration. Similar patterns of artifact visibility were observed based on mapping sediment types within the cross-shaped transects. After mapping sediment types and artifact locations, artifacts from sample transects were fully analyzed. Data loggers in the form of portable computers enabled recording of the size, shape, and technological variables on all artifacts with a maximum dimension of 20 mm or more. Once recorded, artifacts were returned to the place from where they were found, a practice used in other projects (e.g., Tartaron et al. 2006). Treating artifacts in this way has obvious positive heritage management implications since the archaeological record remains for others to study in the future

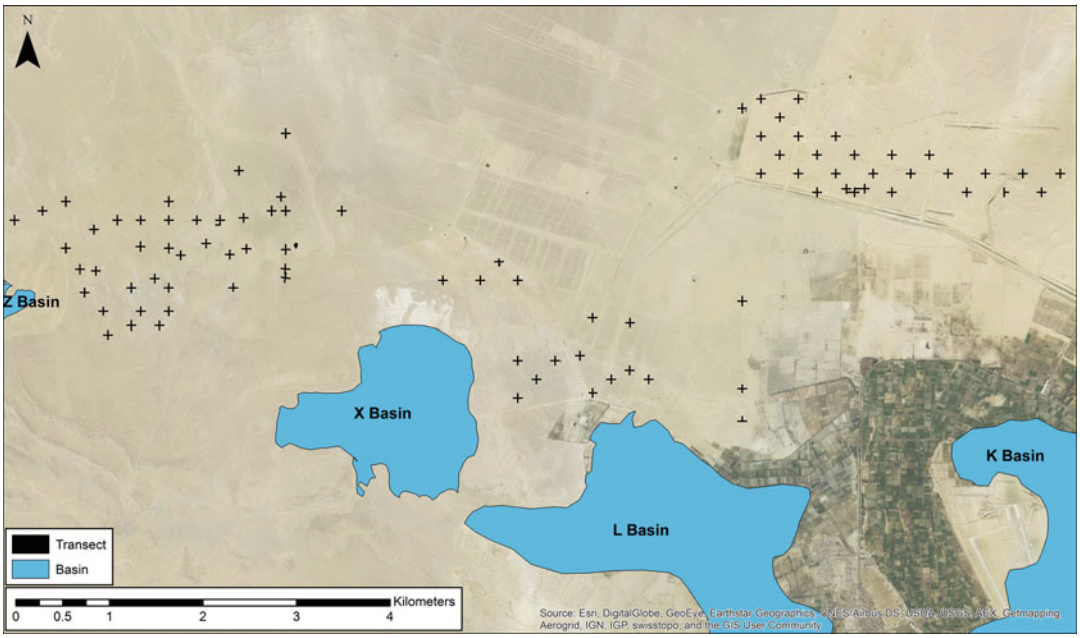

Surface Survey: Method and Strategies, Fig. 5 Transects positioned around the K, L, and X Basins. (Figure courtesy of S. J. Holdaway, Fayum URU Project)

Surface Survey: Method and Strategies, Fig. 6 Infield stone artifact analysis in the Fayum. (Photo courtesy of S. J. Holdaway, Fayum URU Project)

but also has significant logistical advantages since there is no need to curate large artifact samples (Fig. 6). However, recording in this way is very dependent on technology with a combination of raid and precise surveying equipment to locate artifacts and portable data loggers with which to record observations about the artifacts. The other key technology is GIS software that enables the organization, display, and analysis of multiple types of data (from satellite imagery and elevation models to artifact dimensions and material source data). This software has greatly enhanced the ability to move seamlessly between the scale involved in assessing local visibility and the scale needed for regional environmental reconstruction.

Stone artifacts dominated the Fayum assemblages recorded with the majority manufactured from flint. This material does not occur naturally in the Fayum Basin, indicating the movement of raw material for flaking into the area from elsewhere. Like the stone artifacts from surface deposits in Australia, measurements of stone surface area and volume indicated the movement of stone artifacts into, within, and away from the Fayum Basin. When combined with the results of the analyses of pottery, faunal, and floral material, movement, possibly on a seasonal basis, is indicated in the Fayum, following a settlement pattern like that which Wengrow (2006) characterized as a horizontal tell, rather than prolonged occupation of individual villages.

Discussion and Conclusion

Surface archaeological deposits have the potential to answer questions concerning how people used space in the past providing the data needed to answer the types of research questions, for example, posed by landscape archaeology. However, the same exposure that provides archaeologists with access to extended spatial distributions of artifacts without the need to undertake time-consuming excavation has also encouraged methods that are spatially extensive rather than locally intensive. Artifacts often show pattern at different spatial scales leading to the problems posed by equifinality as well as issues connected with the modifiable area unit problem. There are multiple processes that lead to objects showing spatial patterning, and while some of these relate directly to human behavior, others relate instead to the operation of natural processes or indeed to some combination of the two. While it is often tempting to look for the types of broad-scale pattern that suggest potential inferences about past population levels, social complexity, and occupation duration, it is often not possible to assume that an increase in spatial scale will offset pattern induced by differential visibility caused by natural processes. The number of studies that document the alteration of the visibility of surface archaeological deposits (or indeed buried deposits) by non-cultural processes indicates that claims of myopia when studies concentrate on documenting the local impact of artifact visibility may be misplaced.

Dealing with spatially extensive surface deposits involves the integration of many forms of data making the application of GIS increasingly fundamental in surface survey. To some degree, these same software systems are helping to overcome the perceived dichotomy between spatially extensive and locally intensive survey (McCoy and Ladefoged 2009). When combined with modern survey equipment, like GPS and total stations but also portable data loggers, it is now possible to record rapidly a wide range of information. Moreover, with GIS it is also possible to move seamlessly from the local to the regional spatial scales. Adding satellite and LiDAR data to the mix, it is also possible to acquire regional data sets including in some instances data that was previously irretrievable because of dense vegetation. These technologies mean that there is much less need to see study at the local scale as achievable only at the expense of the macroscale. Archaeologists have the potential to gain the best from both scales although of course this means they need to acquire multi-scale data. As the examples and case studies discussed here help to illustrate, at worst the issues raised by equifinality and the modifiable area unit problem can be better defined, and at best they can be solved. Ultimately, this will lead to better answers to the interesting questions that archaeologists ask about the past, how settlement patterns varied through time in relation to changing socio-economies and social relations. Surface archaeological deposits are abundant in many regions of the world, and with advances in survey and recording technology, their potential to inform about the past has only just begun to be realized.

References

Bettinger, R. 1993. Archaeology: Distributional archaeology. James I. Ebert. *American Anthropologist* 95 (3): 749–750. https://doi.org/10.1525/aa.1993.95.3.02a00400.

Bevan, A., and J. Conolly. 2009. Modelling spatial heterogeneity and nonstationarity in artifact-rich landscapes. *Journal of Archaeological Science* 36 (4): 956–964. https://doi.org/10.1016/j.jas.2008.11.023.

Bintliff, J.L. 2000. The concepts of 'site' and 'offsite' archaeology in surface artefact survey. In *Non-destructive techniques applied to landscape archaeology*, ed. M. Pasquinucci and F. Trement, 200–215. Oxford: Oxbow Books.

Bintliff, J., E. Farinetti, K. Sarri, and R. Sebastiani. 2006. Landscape and early farming settlement dynamics in central Greece. *Geoarchaeology* 21 (7): 665–674. https://doi.org/10.1002/gea.20132.

Blanton, R.E. 2001. Mediterranean myopia. *Antiquity* 75 (289): 627–629. https://doi.org/10.1017/S0003598X00088918.

Caraher, W.R., D. Nakassis, and D.K. Pettigrew. 2006. Siteless survey and intensive data collection in an artifact-rich environment: Case studies from the Eastern Corinthia, Greece. *Journal of Mediterranean Archaeology* 19 (1): 7–43. https://doi.org/10.1558/jmea.2006.19.1.7.

Caton-Thompson, G., and E.W. Gardner. 1934. *The desert Fayum*. London: The Royal Anthropological Institute of Great Britian and Ireland.

Charman, P.E.V., and B.W. Murphy, eds. 2000. *Soils: Their properties and management*. Melbourne: Oxford University Press.

Chase, A.F., D.Z. Chase, C.T. Fisher, S.J. Leisz, and J.F. Weishampel. 2012. Geospatial revolution and remote sensing LiDAR in Mesoamerican archaeology. *Proceedings of the National Academy of Sciences* 109 (32): 12916–12921. https://doi.org/10.1073/pnas.1205198109.

Cherry, J.F. 2003. Archaeology beyond the site: Regional survey and its future. In *Theory and practice in Mediterranean archaeology*, ed. J.K. Papadopoulos and R.M. Leventhal, 137–160. Los Angeles: Cotsen Institute of Archaeology.

Davies, B., S.J. Holdaway, and P.C. Fanning. 2016. Modelling the palimpsest: An exploratory agent-based model of surface archaeological deposit formation in a fluvial landscape. *The Holocene* 26 (3): 450–463. https://doi.org/10.1177/0959683615609754

Dincauze, D.F. 2000. *Environmental archaeology: Principles and practice*. Cambridge: Cambridge University Press.

Douglass, M.J., S.J. Holdaway, P.C. Fanning, and J.I. Shiner. 2008. An assessment and archaeological application of cortex measurement in lithic assemblages. *American Antiquity* 73 (3): 513–526. https://doi.org/10.1017/S0002731600046849.

Douglass, M.J., S.J. Holdaway, and P.C. Fanning. 2017. Selected samples: The nature of silcrete adzes in the formation of Australian stone artefact assemblages. *Journal of Archaeological Science: Reports* 15: 578. https://doi.org/10.1016/j.jasrep.2017.04.013.

Duffy, P.R. 2015. Site size hierarchy in middle-range societies. *Journal of Anthropological Archaeology* 37 (Suppl C): 85–99. https://doi.org/10.1016/j.jaa.2014.12.001.

Ebert, J.I. 1992. *Distributional archaeology*. Salt Lake City: University of Utah Press.

Fanning, P.C., and S.J. Holdaway. 2004. Artifact visibility at open sites in Western New South Wales, Australia. *Journal of Field Archaeology* 29 (3–4): 255–271. https://doi.org/10.1179/jfa.2004.29.3-4.255.

Fanning, P.C., S.J. Holdaway, E.J. Rhodes, and T.G. Bryant. 2009. The surface archaeological record in arid Australia: Geomorphic controls on preservation, exposure, and visibility. *Geoarchaeology* 24 (2): 121–146. https://doi.org/10.1002/gea.20259.

Feinman, G.M., and L.M. Nicholas. 2013. Settlement patterns of the Ejutla Valley, Oaxaca, Mexico: A diachronic macroscale perspective. *Fieldiana Anthropology* 43: 1–330. https://doi.org/10.3158/0071-4739-43.00.1.

Fisher, C.T., J.C. Fernández-Diaz, A.S. Cohen, O. Neil Cruz, A.M. Gonzáles, S.J. Leisz, F. Pezzutti, R. Shrestha, and W. Carter. 2016. Identifying ancient settlement patterns through LiDAR in the Mosquitia region of Honduras. *PLoS One* 11 (8): e0159890. https://doi.org/10.1371/journal.pone.0159890.

Foley, R.A. 1981. Off-site archaeology: An alternative approach for the short-sited. In *Pattern of the past: Studies in Honour of David Clarke*, ed. Ian Hodder, Glynn L. Isaac, and Norman Hammond, 157–183. Cambridge: Cambridge University Press.

Foley, R.A., and M.M. Lahr. 2015. Lithic landscapes: Early human impact from stone tool production on the central Saharan environment. *PLoS One* 10 (3): e0116482. https://doi.org/10.1371/journal.pone.01164 82.

Given, M. 2013. Commotion, collaboration, conviviality: Mediterranean survey and the interpretation of landscape. *Journal of Mediterranean Archaeology* 26 (1): 3–26. https://doi.org/10.1558/jmea.v26i1.3.

Gregory, T.E. 2004. Less is better: The quality of ceramic evidence from archaeological survey and practical proposals for low impact survey in a Mediterranean context. In *Mediterranean archaeological landscapes: Current issues*, ed. E. Athanassopoulos and L. Wandsnider, 15–36. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Holdaway, S.J., and W. Wendrich, eds. 2017. *The desert Fayum reinvestigated: The early to mid-Holocene landscape archaeology of the Fayum North Shore, Egypt*, Monumenta archaeologica. Vol. 39. Los Angeles: Cotsen Institute of Archaeology Press.

Holdaway, S.J., M.J. Douglass, and P.C. Fanning. 2012. Landscape scale and human mobility: Geoarchaeological evidence from Rutherfords Creek, New South Wales, Australia. In *Landscape archaeology between art and science from a multi- to an interdisciplinary approach*, ed. S.J. Kluiving and E.B. Guttmann-Bond, 279–294. Amsterdam: Amsterdam University Press.

Holdaway, S.J., M.J. Douglass, and P.C. Fanning. 2013. A new ecological framework for understanding human-environment interactions in arid Australia. In *Archaeology in environment and technology intersections and transformations*, ed. D. Frankel, S. Lawrence, and J. Webb, 51–68. Melbourne: Routledge.

Holdaway, S.J., G. King, M. Douglass, and P.C. Fanning. 2015. Human–environment interactions at regional scales: The complex topography hypothesis applied to surface archaeological records in Australia and North America. *Archaeology in Oceania* 50: 57–68. https://doi.org/10.1002/arco.5054

Kowalewski, S. 2008. Regional Settlement Pattern Studies. *Journal of Archaeological Research* 16 (3): 225–285. https://doi.org/10.1007/s10814-008-9020-8.

Ladefoged, T.N., M.D. McCoy, G.P. Asner, P.V. Kirch, C.O. Puleston, O.A. Chadwick, and P.M. Vitousek. 2011. Agricultural potential and actualized development in Hawai'i: An airborne LiDAR survey of the leeward Kohala field system (Hawai'i Island). *Journal of Archaeological Science* 38 (12): 3605–3619. https://doi.org/10.1016/j.jas.2011.08.031.

Markofsky, S., and A. Bevan. 2012. Directional analysis of artefact distributions: A case study from the Murghab

Delta, Turkmenistan. *Journal of Archaeological Science* 39: 428–439. https://doi.org/10.1016/j.jas.2011.09.031.

McCoy, M.D., and T.N. Ladefoged. 2009. New developments in the use of spatial technology in archaeology. *Journal of Archaeological Research* 17: 263–296. https://doi.org/10.1007/s10814-009-9030-1.

Menze, B.H., and J.A. Ur. 2012. Mapping patterns of long-term settlement in Northern Mesopotamia at a large scale. *Proceedings of the National Academy of Sciences* 109 (14): E778–E787. https://doi.org/10.1073/pnas.1115472109.

Meyer, N., and T.E. Gregory. 2003. Pottery collection, pottery analysis, and GIS mapping. In *The Sydney Cyprus survey project: Social approaches to regional archaeological survey*, ed. M. Given and A.B.. Knapp, 48–52. Los Angeles: Cotsen Institute of Archaeology.

Morton, S.R., D.M. Stafford Smith, C.R. Dickman, D.L. Dunkerley, M.H. Friedel, R.R.J. McAllister, J.R.W. Reid, D.A. Roshier, M.A. Smith, F.J. Walsh, G.M. Wardle, I.W. Watson, and M. Westoby. 2011. A fresh framework for the ecology of arid Australia. *Journal of Arid Environments* 75 (4): 313–329. https://doi.org/10.1016/j.jaridenv.2010.11.001.

Phillipps, R., S.J. Holdaway, R. Ramsey, J. Emmitt, W. Wendrich, and V. Linseele. 2016. Lake level changes, lake edge basins and the paleoenvironment of the Fayum north shore, Egypt, during the early to mid-Holocene. *Open Quaternary* 2 (2): 1–12. https://doi.org/10.5334/oq.19.

Rogers, A.R. 2000. On equifinality in faunal analysis. *American Antiquity* 65: 709–723. https://doi.org/10.2307/2694423.

Rosenswig, R.M., R. López-Torrijos, C.E. Antonelli, and R.R. Mendelsohn. 2013. Lidar mapping and surface survey of the Izapa state on the tropical piedmont of Chiapas, Mexico. *Journal of Archaeological Science* 40 (3): 1493–1507. https://doi.org/10.1016/j.jas.2012.10.034.

Sherratt, A. 1980. Water, soil and seasonality in early cereal cultivation. *World Archaeology* 11 (3): 313–330. https://doi.org/10.1080/00438243.1980.9979770.

Stafford Smith, D.M., and S.R. Morton. 1990. A framework for the ecology of arid Australia. *Journal of Arid Environments* 18: 255–278.

Stark, B.L., and C.P. Garraty. 2008. Parallel archaeological and visibility survey in the western lower Papaloapan Basin, Veracruz, Mexico. *Journal of Field Archaeology* 33 (2): 177–196. https://doi.org/10.1179/009346908791071286.

Tartaron, T.F., T.E. Gregory, D.J. Pullen, J.S. Noller, R.M. Rothaus, J.L. Rife, L. Tzortzopoulou-Gregory, R. Schon, W.R. Caraher, D.K. Pettegrew, and D. Nakassis. 2006. The eastern Korinthia archaeological survey: Integrated methods for a dynamic landscape. *Hesperia: The Journal of the American School of Classical Studies at Athens* 75 (4): 453–523. http://www.jstor.org/stable/25068001

Terrenato, N. 2004. Sample size matters! The paradox of global trends and local surveys. In *Side-by-side survey: Comparative regional studies in the Mediterranean*, ed. S.E. Alcock and J.F. Cherry, 36–48. Oxford: Oxbow Books.

Wengrow, D. 2006. *The archaeology of early Egypt: Social transformations in North-East Africa, 10,000 to 2650 BC*. Cambridge: Cambridge University Press.

Survey Archaeology in the Greek Aegean World

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The development and current nature of Greek field survey can be divided into chronological stages and a number of contemporary methodological and theoretical issues. We define field survey as the systematic study of the surface remains of past human activity across the landscape, comprising chiefly potsherds and lithics but including building remains and field systems.

THE FIRST ERA, from the seventeenth to mid-nineteenth centuries, is the age of the "Travellers" and their "topographic round" in search of visible remains of sites known from their reading of the Greco-Roman sources. These detailed travelogues (e.g., Wheler and Spon 1682; Leake 1830; Ross 1851) are still useful in the field as they indicate ruins since demolished and ancient sites that frequently are found to have been first occupied in prehistoric times. Moreover, they can provide detailed records of contemporary society and lifeways in the communities they visited. In essence scholars of the Classics wished to find material traces of the towns and landscapes, sanctuaries, or battlefields, known to them in their libraries of ancient authors. This was for their own enjoyment but also to offer travels in the imagination to armchair readers of their travel guides back in temperate non-Mediterranean Europe.

Caution is required if one uses them today: some merely copy what others had written or

offer fanciful reports. However additionally many sketched or painted what they saw or took artists along with them, and these both assist us to identify monuments, usually in a better state at that time than today, and record the landscape, land use, and settlement forms of the final centuries before the modern era (Tsigakou 1981). Moreover, they can still offer surprise discoveries: in 1805 the English traveller Edward Dodwell with his Italian artist visited the ancient city of Haliartos in Central Greece (Dodwell 1819). Among the commissioned views, quite a few were left out of the subsequent volume but have since become available. One shows within the city walls what is clearly a medieval tower fragment, hitherto unknown to archaeology. It can now be linked into a post-Roman defense wall around this hill, suggesting, together with the ceramic finds at this location achieved through a recent surface survey, that in Crusader times a minor fortified place controlled what was once the main road linking southern and northern Greece.

THE SECOND ERA, late nineteenth century until the late 1950s. With the late nineteenth-century and early twentieth-century recognition of the prehistoric pottery sequences of Greece, the customary "topographic field trip" could now add a prehistoric depth to regional pioneer research and even at times be primarily interested in ascertaining the whereabouts of prehistoric settlements and cemeteries. Regional team research such as that at the British School in Athens, in Laconia (cf. *Annual of the British School at Athens* vols. 12–13 (1906–1907) 15–16 (1909–1910), and 24, 26, 28 (1921, 1925, 1927) and even more clearly on the island of Melos (cf. *Annual of the British School at Athens* vols. 2–5 (1896–1899), *Journal of Hellenic Studies* 17–18 (1897–1898), in its keen interest in every period of the past, in the geography and sociology of each area, shows that catholic intellectual sweep characteristic of a vanishing Victorian scholarship. On the other hand, these were still unsystematic surveys concentrating on known historic locations or "likely" prehistoric locations, combined with rather random travels punctuated by "spot checks" for sites. Villagers might be asked to point to likely settlements.

Also striking was the work of Christos Tsountas (1908), Alan Wace and Maurice Thompson (1912), and Walter Heurtley (1939) in Central and Northern Greece, identifying and refining the pottery from the abundant and easily recognizable settlement mound or prehistoric "tells" that carpet the large plains of Thessaly, Macedonia, and Thrace. On Crete, the distinctive Minoan Bronze Age fabrics and an indefatigable energy in the field allowed John Pendlebury (1939 (1971)), by the opening of World War II, to compile and analyze a remarkable density of sites over many subdivisions from Neolithic to Iron Age. Pendlebury walked the length of the island more than once, but the extraordinary density of mapped sites for sub-phases of the Bronze Age is rather misleading, as they show any location where he observed Minoan sherds, even as few as one (Gkiasta 2008). On Crete, after important German, Italian, and French contributions to this tradition (e.g., by Fritz Schachermeyr 1938), the final flowering came as late as the 1960s with the extensive field trips of Sinclair Hood, Peter Warren, Gerald Cadogan, and Paul Faure into parts of this large island where prehistoric sites were little known or poorly recorded (cf. *Annual of the British School at Athens* vols. 50–63 (1964–1967), and *Bulletin de Correspondance Hellénique* 84 (1960), 86–87 (1962–1963), 89, 91, 93 (1965, 1967, 1969)). Although current approaches will find such work difficult to use, since the countryside is visited rather patchily and randomly, the results have been important in documenting the variety of landscapes used at specific eras (although attention to the post-Roman era was often very limited).

Some of those undertaking extensive field survey were following the German tradition of historical geography, or "Landeskunde." With the outstanding example of Alfred Philippson (1892; Philippson et al. 1950–1959), before them, his students and followers analyzed both the geography of settlement and distribution at particular time periods, as well as the factors underlying the striking changes in settlement location observable over millennia in circumscribed landscapes. Particularly noteworthy are the studies by Herbert Lehmann of the Plain of Argos (Lehmann 1937) and of Eastern

Crete (Lehmann 1939). In the latter example, overall trends for the region were analyzed via a cumulative series of micro-regional natural settlement chambers (Siedlungskammern), in which it was shown that the key resource zones remained the same against a shifting micro-location of settlements. Lehmann's volume on the Argos region is noteworthy in addition for the intellectual breadth of his approach: from raw geology via geomorphology, soils and vegetation, climate, and land use potential, he moves to prehistoric and historic human engagements with the landscape, at times anticipating the social, symbolic, and emotional perspectives which have become only recently popular in landscape archaeology as the "phenomenological approach" (Bintliff 2009).

Regrettably this was the endpoint of extensive work within that nineteenth-century tradition in Continental scholarship, and although a limited amount of similar work continued after the Second World War on Classical Greek settlement patterns, notably by Ernst Kirsten (e.g., 1956), there is little of note on prehistoric human geography till the 1970s. Kirsten's analysis of the Greek polis or Classical city-state utilized many generations of German Landeskunde experience and the patterns of cities across the Aegean to argue that in essence they were essentially not towns in a modern or even medieval sense but rather large villages, coining the term "Dorfstaat" or "village-state" for them. Although his volume is almost entirely neglected, the concept of a small-scale community distribution has not only been usefully employed in the analysis of the origins of settlement hierarchies exposed by survey (Bintliff 1999) but has been mathematically confirmed by a first analysis from Eberhard Ruschenbusch (1985) and since by the major project led by Mogens Herman Hansen on the ancient Greek city-state in the Aegean and throughout the Greek colonial world (Hansen 2004).

THE THIRD ERA, the 1960s to the early 1970s. By the 1960s, we have entered an era of far more detailed regional site survey. A well-defined area is crisscrossed extensively on foot at wide intervals or with a vehicle, and all "likely" locations are investigated together with every previously recorded findspot. The date range and period-by-period extent of prehistoric and historic surface sites are roughly estimated and settlement distributions and site plans published.

One figure stands out for this era in the vast amount of ground he covered, the number of sites he discovered, and the meticulous presentation of survey results, Richard Hope-Simpson. In addition to site prospection in Laconia (cf. *Annual of the British School at Athens* vols. 55–56 (1960–1961) and the Dodecanese (cf. *Annual of the British School at Athens* vols. 57,65,68 (1962, 1970, 1973), often with supporting colleagues, this pioneer spearheaded the massive, 10-year survey of the province of Messenia which became the fundamental source of settlement data for what is now considered to be a classic interdisciplinary investigation into the Late Bronze Age kingdom of Pylos under the direction of Prof. William McDonald. Here for the first time, potential site locations were identified for visits from aerial photographs, which in the special case of Bronze Age fortified hilltop sites was remarkably successful. The Messenia volume (McDonald and Rapp 1972) used the results of some 10-year extensive survey of this large province (3800 km^2) to analyze the settlement, economy, and political organization of a Mycenaean state. Secondary attention was given to the pre-Mycenaean and historic periods in the same region, while the geographical component was broad-sweep rather than detailed at the site level. Created along the lines of major regional projects in Mesopotamia and Mesoamerica, "UMME" demonstrated a whole new battery of research techniques and specialist support. It has changed the nature of Aegean archaeology and set the pattern for all subsequent regional projects. The inclusion of experts in geology, mineralogy, land use, social anthropology, paleobotany, and history set a new pattern for Aegean survey teams to emulate. However, in terms of field survey methodology, the Messenia approach went little beyond the extensive tradition typical of this era. The overall achievements of the Hope-Simpson climax phase of extensive survey as far as prehistory is concerned were summarized in his *A Gazetteer and Atlas of Mycenaean Sites in Greece*, which appeared in 1965 and which was updated with the

assistance of Oliver Dickinson in the form of a *Gazetteer of Aegean civilisation in the Bronze Age* (Crete excluded) in 1979 (Hope-Simpson and Dickinson 1979).

The last-named volume has remained central to all discussions of later Greek prehistory. Its intentional limitation to the Mycenaean mainland and islands was compensated for by using Pendlebury's pre-war (1939, *op.cit.*) compendium of Minoan Bronze Age sites on Crete and David French's impressive extensive surveys of Neolithic and Bronze Age sites in Central and Northwest Greece (French 1967, 1972).

Colin Renfrew, for example, in his magnificent 1972 blockbuster book *The Emergence of Civilisation in the Bronze Age Aegean*, relied heavily on these sources. He compared regional growth curves for Southern Greece and the Islands in known sites from Neolithic to Late Bronze Age times, based on the extensive survey data. Two modes were identified, a straight line demographic growth (Crete and Messenia) (A) and a mode with two growth phases punctuated by a standstill or decline in the Middle Bronze Age (the norm elsewhere) (B).

During the early 1970s, my own research into the relationship between environment and human settlement in later Greek prehistory based itself, for several regions analyzed, on the extensive survey data of Hope-Simpson and his predecessors, including the analysis of landscapes they had surveyed. I also consciously sought to revive the almost defunct historical geography approach of the Philippson School, combining this with the new approach of catchment analysis and other borrowings from locational theory in geography. The influence of the Cambridge Palaeoeconomy movement was at that time introducing the mapping of land potential at varying distances and in varying directions from archaeological settlement sites to suggest locational preferences ("Catchment Analysis," cf. Vita Finzi and Higgs 1970), an approach since commonly applied to the analysis of settlement systems in pre-Modern Greece revealed by survey. I took a series of regional landscapes in Mainland Greece, Crete, and the Cyclades (Bintliff 1977), compiled geology, geomorphology, soil, and land use potential maps for each region, and then studied every recorded prehistoric site in its physical landscape and in relation to its neighbors, employing in the field a detailed catchment approach on a site-by-site basis. Well over 200 sites and their context were thus analyzed, providing a useful database for defining preferences in terms of soils and suggesting the patterns of settlement hierarchy in relation to resources and to territorial space. An approach which focusses on landscapes over time inevitably finds comparative patterns of interest in many phases of human use of the same landscape, especially when influenced by the long-term viewpoint of the German Landeskunde movement, so my regional studies anticipated much later regional survey work by including settlement patterns of the ancient, medieval, and post-medieval periods as comparanda for the prehistoric networks and locations.

THE FOURTH ERA, early 1970s to the early 1980s. However already during my years in the field as a research student, a new survey phase had been inaugurated in Greece, one which I was lucky enough to be involved with through my participation in the "new wave" of Greek survey (a term I invented to mark a critical change in methodology, borrowed from French cinema history). The crucial novelty was the method: intensive, field-by-field survey without preconceptions about favorable site locations. Teams of students led by trained staff walked the land surface at close intervals, 15–30 m apart, to record surface traces of past activity, primarily ceramic sherds.

The source of the intensive survey approach lay in empirical advances in the United States, especially from surveys in its southwest, where it had been shown that increasing spatial cover and time devoted to each square kilometer produced unparalleled new site densities (e.g., Plog et al. 1978).

The results in Greece were predictable: a vastly increased number and variety of sites of all periods were encountered, with a striking proliferation of smaller and less conspicuous sites than were normally encountered in extensive survey. This revolutionary advance was pioneered by Michael Jameson's survey of the South-West Argolid (Jameson et al. 1994) and David

Blackman and Keith Branigan's survey of the Agiopharango Valley in Crete (Blackman and Branigan 1978).

The greater local resolution achievable through intensive survey allowed social archaeology to develop at the local community scale. Thus, in the Agiopharango Valley, the correlation of small Minoan Bronze Age sites with potential cultivable land led to the hypothesis of a social module of several related families sharing the use of a single communal stone tomb (tholos), this monument being placed so as to mark the group's lands and often being associated with dispersed settlement units (Bintliff in Blackman and Branigan 1978 *op.cit.*; Bintliff 1977 *op.cit.*). An analysis of the number of bodies claimed for tombs of this kind elsewhere, applied to the average number of tholoi in use in the Agiopharango, suggested both the number of families per tomb and in total compared favorably with estimates of the potential carrying capacity of the valley soils. In addition, the data and location of rural shrines (several being identified within this valley) were incorporated into a broader theory concerning the mechanisms behind the rise of Minoan palace society, in particular postulating a rural-central place integration via expanding cult systems.

In the light of the vigorous debate in the United States over the selection of survey areas, their size and number, and indeed the whole business of sampling strategies in survey archaeology, it is not surprising to find considerable variability in the exact approach to these problems among the "new wave" of intensive Aegean surveys. The Argolid Survey tackled the region of the southwestern Argolid via a series of manageable blocks, totally surveyed, combined with extensive prospection in the intervening areas. John Cherry's survey strategy for the Cycladic island of Melos involved a 20% sample arranged in staggered transects across the island, each block intensively surveyed (Cherry 1982). In contrast the Boeotia Survey (Bintliff and Snodgrass 1985; Bintliff 2000a) deliberately avoided small survey units and expanded outward in all directions from a modern village, although subsequently smaller landscapes spread widely across the province were surveyed for comparative reasons. Following the Boeotia model was the "expanding core" of the Laconia Survey (Cavanagh et al. 1996, 2002). Further landmark surveys include that of Kea (Cherry et al. 1991); the Atene deme, Attica (Lohmann 1993); Berbati (Wells and Runnels 1996); Methana (Mee and Forbes 1997); Asea (Forsen and Forsen 2003); and the Mesara (Watrous et al. 2004).

THE FIFTH ERA, from the late 1980s. A characteristic innovation of this phase was the mapping of non-site or "offsite" surface pottery, the almost continuous scatter, including post-medieval, medieval, ancient, and prehistoric artefacts, that lies between those peaks of surface debris traditionally defined as "sites." Once again it was further field research in the United States into the "non-site" phenomenon that spearheaded change in Mediterranean survey techniques (Powell and Klesert 1980; Nance 1981). Mapping of artefacts between those concentrations traditionally identified as "sites" (foci of human activity such as settlements, burial areas, sanctuaries, herding shelters, etc.) had revealed a distribution of scattered pieces, from a few score to (most commonly) one or two pieces, which required explanation for their presence in the landscape. This led to a widespread shift within the survey community in Greece and elsewhere in the Mediterranean to taking the individual artefact as the focus of recording, whose distributional patterns led to an analysis of permanent or temporary activity foci as well as "taskscapes" where landscapes of work left visible surface traces. Generally surface finds were quantified using handheld counters, which are now being replaced by GPS-linked (Global Positioning Systems) palmtops.

Part of the "offsite" scatters is known to be due to the presence of vestigial sites, whose surface appearance may well not immediately attract site designation. Moreover sites once discovered can vanish in subsequent seasons, while new sites can emerge in localities previously field-walked and then pronounced to be "siteless" – particularly as a result of shifts in land use across them. It is therefore clear that the distribution of recorded artefact concentrations (sites) in any particular season is only a partial sample of all surviving sites.

Graeme Barker (1984), describing this situation from his Italian survey experience, memorably wrote that small sites "come and go like traffic-lights." To understand the surface sites as a phenomenon, it now became clear that surveys should practice replicable non-site recording on all future Greek surveys, as well as revisiting of areas previously surveyed. The deeper implication is that surface survey cannot expect to recover all the sites that once existed, so that compensation has to be made for those invisible during the study of a region. For demographic reconstructions, this is highly significant, although the fact that smaller and less long-lived sites are mostly those affected by discontinuous appearance, while larger and longer-lived occupational foci tend always to be visible, helps to limit the distortions caused.

It is also appeared likely that land use patterns might be illuminated through the analysis of non-site scatters, where they may include the debris of temporary shelters or areas of manuring (Bintliff and Snodgrass 1988b; Bintliff et al. 2007). Generally historic sources for Greece neglect everyday life in the countryside for larger centers and summary records of population or economic production, so that maps of sites found by survey are not directly relatable to land use. Site locational analysis can give strong indications about land use preferences, but offsite survey adds evidence directly from fields or pastures exploited at particular periods. In Greece as elsewhere in Europe and the Near East, extensive carpets of potsherds can be interpreted as the fossil trace of intensive manuring using household and farmyard waste (organic and inorganic), primarily from villages and towns. The fact that the chronology of such activity is limited to certain periods in each landscape (e.g., the Classical-Hellenistic era in Central Greece) implies special historic conditions stimulating very intensive food production, such as overpopulation, as first argued by Tony Wilkinson in the Near East (Wilkinson1989).

The economic interpretation of sherd carpets did not go unchallenged however. Skeptics suggested that they could be caused by erosion or plowing, for example, spreading sherds outward from sites (cf. Alcock et al. 1994), or even mark the houses of the very poor (Pettegrew 2001). Practical considerations as well as subsequent evidence make such critiques unsustainable, however. Pottery carpets extending for kilometers outward from ancient cities, running uphill and across rivers, can hardly be accounted for through the unintentional disturbance of surface sites, while the very focused surface signal of even the poorest ancient farms and their disturbed finds reaching only a limited distance from their occupational core is clearly distinguishable from the uniform carpet of debris characterizing the sherd carpet phenomenon. As a coup de grâce to objections to ancient manuring carpets, large-scale rural survey in the territory of ancient Tanagra city in Central Greece gave definitive evidence for the sourcing of such carpets from human settlement agglomerations (cf. Bintliff 2012, Plates 11.2a, b). In all directions from the ancient city, dense ceramics littered the fields for up to two kilometers, decreasing in intensity with distance due to the increasing labor needed to haul heavy loads of urban waste. But in the outer territory of the same city, some seven kilometers distant – too far for cost-effective transport of such material – field survey found almost no offsite material between sites, merely recording the small haloes around each site due to its gardens, sheds, graves, and waste dumps.

Finally, similar offsite carpets have now been documented almost ubiquitously in the Mediterranean, while tellingly in Croatia and Spain, the practice of total organic and inorganic waste disposal for field manuring survives in living memory among local farming communities.

The way sites are studied, once identified as anomalous concentrations of finds, has tended to fall into two models since this time. One is a structured sample, where strips, squares, or circles are laid out discretely across the site for density counts and find collection. The other is to grid the entire site and study it as completely as possible. Unfortunately, little experimentation exists to compare the two methods, although what has been done suggests that partial samples, at least where they cover just a minor part of the site surface, are less representative of the periods of

use and the density trends across sites (Bintliff and Snodgrass 1985 *op.cit.*). It appears advisable therefore to follow total study, but a very dense mesh of subsamples, as is used in Todd Whitelaw's very large-scale current Knossos Survey (Whitelaw et al. 2006–2007), may avoid these difficulties.

An important new focus of this phase of Aegean survey evolution was the tackling of large nucleations, including ancient cities, through surface survey (Bintliff and Snodgrass 1988a; Cherry et al. 1991). The city-survey of Thespiai, which required some 100 ha of gridded landscape to complete, took just 2 months to accomplish, requiring some 1000 larger and smaller grid units, although the existence of over 25 periods of occupation and the inherent complexities of unraveling their copresence on the surface have delayed the final publication till 2017 (Bintliff et al. 2017). Perhaps the majority of ancient Greek towns lie in part or whole in agricultural or pastoral land and hence are suitable for surface prospection. While a detailed understanding of house construction or the architectural details of public monuments requires excavation, obtaining a broad understanding of the long-term development of an entire town is feasible through urban surface survey within just a few years of seasonal study. Since the first intensive surveys at Aegean towns were undertaken, analysis of the results has driven a much larger collection of finds to be gathered in more recent urban survey. The city of Koroneia, for example, in Central Greece (around 35 ha), took 6 years of survey to complete (Bintliff et al. 2013), but the comparison with urban excavation is still illuminating: over the same period, some half dozen ancient houses were being excavated at an ancient town in Thessaly.

The practice of urban survey brings serious problems of scale into fieldwork. It remains unclear how large a sample is needed to ensure that each period represented is adequately covered in the collection of finds. The first group of such city surveys in Greece, in the early 1980s, gathered what now seem very small collections: at Koressia on Kea, for example, little more than 100 potsherds were catalogued (Cherry et al. 1991), while at Haliartos in Central Greece, some 700 pieces were collected (cf. Bintliff and Snodgrass 1988a). From the mid- to late 1980s onward, however, it had already become clear that sample size was a big issue in such complex and long-lived sites. Numbers on our Central Greek city surveys went up to 14–16,000 sherds for Hyettos and Thespiai to 40–60,000 for Tanagra and Koroneia. On Crete the current urban survey at Knossos, directed by Todd Whitelaw (op.cit.), has some half a million potsherds collected, but he already has observed that this is inadequate for fine study of the material evidence for each subphase at the long-lived urban site.

Making sense of an urban site requires more than mapping finds of each period as a simple image of city history. The accumulation of buildings naturally buries the oldest levels and privileges the youngest, while some eras such as the Roman Imperial or High Medieval provide hard-wearing and easily recognizable finds compared with others which are more fragmented and hard to date. In some eras, surrounding cemeteries have distinctive ceramics (e.g., the Classical-Hellenistic centuries), but in Roman and especially Late Roman times, pottery deposited in burials is very similar to domestic wares. Urban manuring complicates the surface further, as its density in the city suburbs reaches the levels normally associated with the actual occupation zone further inward. Clearly a multiple approach is needed. Often there have been some localized excavations, including illegal robbing, while in agricultural areas, every year farmers disturb the ground and can reveal structures too. Geophysics and aerial photography often reveal details such as street plans, houses, city walls, monumental burials, and kiln areas, but these methods vary in their success rate on a case-by-case basis, and such "remote sensing" works best for a single period city, since no dating of the features seen can be offered by simply viewing the images alone.

The number of finds available for surface study of Greek cities, if still kept open through farming or grazing, tends to be huge, in the millions for a medium to large town. Thus, the survey collection can only sample a small proportion, but this must

come from a dense grid of sample areas to allow one to see the local changes in size and function of each small area within the town and its suburbs. Generally, a town has a few phases of maximum size and flourishing, and finds of these periods will dominate a collection which focusses on feature pottery (rims, bases, and handles, the most diagnostic fragments). The phases with fewer finds, either because the site shrank to a village or the period involved is very early and hence its material is rarely found on the younger surface of the site, need careful attention. If the Classical Greek finds, for example, are some 10,000 of a city collection, while Early Iron Age pottery makes up a mere 100 or less, we cannot merely take these figures as a surrogate for the level of activity. Firstly, the Iron Age is buried under the historic city so less is coming up from its levels to the surface during plowing and the building of later foundations or because of other ancient and modern disturbances. Secondly, we need to calculate the sample factor, i.e., what proportion of the estimated total pottery on the city surface is being collected. Usually this is far less than 1%, so other things being equal, the true number of Iron Age finds in our imaginary case-study, were we to "hoover" (practice total collection of) the whole site surface, could be well over 10,000.

THE SIXTH ERA, the 1990s to the present. Three major trends typify this latest stage (Bintliff 2000b). Firstly, the appearance of synthetic survey articles and monographs for diverse regions of Greece has encouraged comparison of results (Alcock 1993; Bintliff 1997a; Alcock and Cherry 2004). The aim has been not only to identify methodological issues but also to gain a wider understanding of particular eras of Greek prehistory or history.

Secondly there has been recognized an urgent need to carry out a stricter *Quellenkritik* or source criticism of Aegean survey. Although the enormous flow of results of previous decades provided new and unexpected data, their quality, limitations, and interpretation have raised fundamental questions about methods and how we can create "history" out of them. A series of issues can be mentioned briefly:

(a) It has long been recognized, initially by Jeremy Rutter (1983), that some periods of the past have less well-preserved and/or recognizable surface ceramics. Moreover, most Greek sites are multiperiod, where earlier levels are less likely to be plentiful on the surface. I have suggested for Mainland Greece, for example, that much of the prehistoric record is a "hidden landscape" (Bintliff et al. 1999) where small scatters of finds may be all that is left of richer settlements or even be undetected in intensive surveys. The Iron Age, Archaic, and Early Byzantine eras may suffer similar discrimination. Special methods must be applied to tackle such situations.

(b) The rise of offsite survey in the preceding era did not curiously lead to a systematic publication and analysis of finds outside sites. A linked problem is the evidence that settlements themselves seem to consist of occupational cores and haloes of peripheral finds (rubbish dumps, smears of finds pushed out of sites by the weather and plowing, kitchen gardens, graves, craft areas, etc.), so that estimates of site size and by implication human populations vary considerably on the basis of where to place an assumed "site edge." As we have seen, analysis of the inter-site taskscape finds moreover became bogged down into a, for long, unresolved dispute on the existence of manuring scatters in the wider landscape (cf. Alcock et al. 1994, with Snodgrass 1994), often discouraging treatment of offsite densities at all. The present writer hopes that the exhaustive treatment of all these problems in the survey monograph *Testing the Hinterland* (Bintliff et al. 2007) has clarified the situation.

(c) An important corollary of the inclusion of offsite finds into the analysis of sites is the need to ensure that material found, for example, on a rural farm actually belongs to the period when it saw occupation. Let us take the case of a landscape with much urban or village manuring in period A. A certain field received a significant scatter of ceramics from one of these nearby agglomerations. In period B, a farm is established on the same field. The survey archaeologist recovers material of

periods A and B, and perhaps that of A is enough to suggest occupation in both periods. A solution to this problem is to record the offsite finds in sufficient detail so that one can summarize the density of finds of any period in the district of the site. To support site use in any period, then, it would be necessary to show that the density of finds was clearly elevated over that which can be found in fields in the general area of the site. It is however also necessary during this procedure, which is called residual analysis, to identify from overall ceramic densities out from the site core its "halo area," i.e., a zone impacted by the site occupants through local rubbish disposal, sheds and yards, kitchen gardens, and burial and minor industrial areas. Beyond the site core and halo, we average sherd densities per period in the further landscape and use these as a control over what has been picked up at the site (see Bintliff and Howard 2004 for applications of this method).

(d) An issue that is becoming central to the current active survey community is the conducting of experiments to examine the effects of varying methods of fieldwork and analysis. New projects tend to follow older ones rather arbitrarily without there being a firm basis of experimental data to judge the advantages and disadvantages of the chosen techniques. It is not clear how much material needs to be collected to form a representative assemblage of finds from a site, surprising since it should be clear that the number of periods found there and the size of the site naturally raise such issues. City surveys can be analyzed on the basis of anything from a couple of hundred to tens of thousands of sherds, depending on the decision of the project leaders. In preparation for the publication of the city of Thespiai survey, we recently calculated that some 600 sherds for *each period* of a large multiperiod site would be needed to ensure a realistic map of activity foci per phase (Bintliff 2014). It is necessary to aim for the "cultural biography" of each site, however small, where intensive field study and analysis of finds should be complex enough to reveal the often very different ways each location has been used in the long term. Such an exercise reveals that most multiperiod surface sites undergo considerable changes in their size and function (cf. *Testing the Hinterland* op.cit.). However, to achieve such an approach requires the collection of significant assemblages of finds as well as their detailed mapping across the site.

(e) A more penetrating approach to survey is being immensely aided by the advent of new technical aids. Geographical Information Systems (GIS) speed up and make far more accurate the laying out of fieldwalking units in the landscape and across sites, while handheld computers can record both study units and their contents in real time. Differential GPS devices allow highly accurate location of both sites and surface objects in all three dimensions, while laser recording can provide images of standing ruins or field sections (road or stream cuttings, etc.). The study of the "phenomenology of landscape," whether that means practical matters of estimating how people moved around the landscape or investigating more emotional issues of human perception of space, can be speedily estimated through GIS. Considered a surface technology but, in reality, a subsurface one, the increasing use of geophysical methods offers a nondestructive way of looking beneath the surface finds into the complexity of the underlying built environment. Results can be both spectacularly illuminating (where, e.g., the entire street and house-block plan of an ancient city is revealed; cf. Music et al. 2008) and be a failure, being highly dependent on geology, soil conditions, climate, and the type of built environment being examined.

(f) The relatively poor recovery of remote prehistoric sites even through intensive survey, by which we mean Paleolithic and Mesolithic hunter-gatherer sites, has encouraged specific adaptations to field techniques. Curtis Runnels has used predictive modelling to identify locations most favorable for hunter-gatherer activities and then focused research in such small districts, with remarkable success (e.g.,

Runnels et al. 2005). New field projects in presently marginal landscapes such as the high uplands of Greece have also discovered a far greater density of prehistoric sites where later burial, erosion, or human activities have not been active in concealing or destroying their traces (Efstratiou et al. 2006).

(g) In the extensive and early intensive survey decades, ceramic and lithic collections were primarily made to provide chronology for a site. Key artefacts which could be linked to published finds from excavations were central. This meant, for ceramics, that locally produced cooking wares and everyday domestic wares were neglected. With the recognition that larger assemblages should be gathered to offer more information on social and economic questions, came a shift to the creation of regional finds' collections to form a reference base for analysis. A modern survey will accumulate such a reference collection of local and imported ware types and shapes for all periods, constantly updating it as new types come to light, especially specifically local forms. Fabric analysis has become a major area of advance here, using visual inspection but also tools like portable XRF machines and digital microscopes, to identify distinctive ceramic fabrics. It is often possible to recognize a pottery fabric distinctive for a local area of production, so that body sherds (the commonest fragment in survey) can be given a provenance, and even at times date, if the fabric has a confined use in time. It seems now likely from such work that most cities in Greco-Roman antiquity made the majority of their own pottery.

(h) If a project has a full reference collection of local and exotic types and fabrics, it is now feasible to track the degree to which any urban, village, or farm site participated in ceramic trade at varying distances. In the case of the Roman Imperial period, for example, tableware and storage amphorae can appear in the countryside from the region, the wider Aegean, the Eastern Mediterranean and Black Sea, and even Tunisia. An ongoing research field maps imports as they are found across the landscape surveyed, showing that some towns in Greece were far more integrated into interregional commerce than others (Peeters et al. in press). Additionally, and in the hinterland of such towns, we can also see that rural sites vary considerably in the degree of their participation in the market. Here survey can offer exciting new evidence for the economic history of Greece in all periods.

The third major theme in the last generation of field survey has been a far greater investment in the landscape history of the post-Roman periods and the medieval and postmedieval eras of Greece. Increasing success in identifying typical ceramics of subperiods of 1–200 years' duration within these eras has allowed integration with historical sources. Moreover, there exist many thousands of deserted villages and installations such as waterworks, roads, and churches which offer documentation of the built environment in connection with often abundant surface artefact finds (Lock and Sanders 1996; Bintliff 2000c, 2012; Sigalos 2004; Davies and Davis 2007; Vionis 2008; Bintliff and Stoeger 2009).

Central Topics Where Survey Has Contributed to Greek Prehistory and History

Survey may once have been the means to "put dots onto maps," so as to provide a view of settlement change in Greece over time, but now it clearly wishes to offer insights into past social, economic, and cultural systems. We might suggest a series of examples from diverse periods to illustrate how surface prospection is deeply involved with the wider reconstruction of the Greek past.

The Bronze Age

The blanket term Minoan-Mycenaean civilization has long offered the impression of a uniform landscape with high levels of population living within a shared political framework of hierarchical palace-states. Survey has allowed us to critique

this picture, both extensive and intensive, and confirmed Oliver Dickinson's proposal (1982) that these landscapes were far more varied one to another: some are indeed high density and others well below the level of local food sustainability (the "carrying capacity" in ecological terms). This can tie in with another suggestion that palatial states may have formed only one mode of organization of those societies sharing Minoan or Mycenaean cultural forms. In regions well away from the great palace centers, chieftain or "big man" social organization could have prevailed.

The growing density of survey projects allows provisional estimates of population variation across Greece at particular phases of the Bronze Age. Thus, a recent analysis (Bintliff in press) suggests that the mature Minoan civilization on Crete was dangerously close to maximum population for the island's resources, while Mycenaean Messenia was comfortably below its human carrying capacity. The Argos region with its cluster of towns was not so sustainable a society unless it could rely on controlling the surplus food from its hilly hinterlands and the adjacent region of the Corinthia.

The Classical-Hellenistic Greek Period

Survey has been especially successful at revealing the forms of rural life which are only indirectly portrayed in ancient Greek texts. In particular on the Southern Mainland and Aegean Islands, a prominent phenomenon is a modest to medium-sized estate center, mostly less than 1 ha, often referred to as a "family farm." Their ubiquity has surprised some ancient historians, who envisaged farmers as based in cities and villages, and indeed in Greece such small-scale dispersed estate centers have been extremely rare over the millennia covered by survey. Some doubt was raised initially as to whether these farms were permanently occupied or merely used seasonally, but the majority reveals artefacts indicating a broad-based residence (weaving equipment, associated graves, tablewares, large storage vessels, etc.). A minority which has very limited types of ceramics may well help us identify seasonal agricultural bases in the countryside. In one survey, that of the deme of Atene in Attica, no village center has been found, so that here all occupation must have been in dispersed estate centers in the Classical Greek era (Lohmann 1993). Nonetheless, further reflection has added a more nuanced reading of these rural sites. Urban survey has indicated (Bintliff 1997b), and this is confirmed by the Polis Project of Mogens Hansen (2004), that some 70–80% of population in Classical-Hellenistic times lived in the cities, which were typically only 1 hour or so from their territorial borders, so that only a minority of citizens dwelt in the countryside proper; the majority (who were farmers) therefore commuted daily to their fields. This raises the interesting suggestion that family farms represent a desire to maximize estate production for some families, especially important since in many city-states, maintaining a healthy size of farm was a requirement for full participation in the affairs of the city.

In Messenia, dominated by Sparta in Classical times, its inhabitants reduced to serf status, survey shows in contrast a general absence of family farms till after Sparta lost its grip on the province (Davis 1998). It seems likely that the oppressive form of land use inhibited the kind of investment in the landscape seen in more democratic regimes.

The Roman Era

Ancient authors (e.g., Polybius, Strabo), portray Greece under Rome often in very negative terms, suggesting depopulation of town and country in many regions, although the religious centers are still thriving. Historians were very skeptical of these images, considering them as a "topos" or literary convention, designed to explain how the Greek city-states and kingdoms fell under Roman rule. Survey has shown very clearly that over much of Greece, there was indeed a dramatic depopulation of the countryside in the last two centuries BC, while many towns were abandoned or shrank. At the same time, survey has demonstrated that a few regions entered a new expansion of town and country, such as at the Roman colony of Patras and in its hinterland in Achaia. Such discoveries allow us to get closer to the varied ways in which the expansion of Roman power and its more commercial economy

transformed the Aegean world (Bintliff 2013a). The replacement in the landscape of the Classical family farm by larger villa-type establishments, also well-evidenced by survey, reinforces the picture of a dramatic period of change for Greek society.

Late Antiquity

If survey has caused significant modifications to accepted views in prehistory and Greco-Roman times, its impact for Late Antiquity (for Greece ca. 400–650 CE) has been even more notable. "The Fall of the Roman Empire" has been expected to have been accompanied by universal decline throughout the provinces, Greece included. For those more familiar with the divergent trajectory of its Eastern half however (the Eastern Roman Empire), our ancient sources make clear that, centered on Constantinople, a powerful if weakened state survived major attacks from hostile powers till the early seventh century CE. The reality which has emerged from numerous surveys throughout the Aegean goes further, in showing that the frequent decline in town and country associated with the Early Roman Empire is reversed in the rural world at least, where a revival of settlement is visible, particularly associated with enlarged numbers and sizes of villas and associated villages. The fate of towns however shows a different story: most remain at their reduced size of earlier centuries or disappear. A powerful explanation for the more positive picture of the Eastern Empire compared to the Western provinces after the fourth century CE is the reorientation of the Roman world to the new capital at Constantinople and the stimulus this gave to the landscapes supplying its huge population and the more resilient standing army on its eastern borders (Abadie-Raynal 1989).

Nonetheless, survey is proud of its reputation for almost annual reconsideration of its methods and theories, and this model has not been without critique from within the survey practitioner field. David Pettegrew (2007) has argued persuasively that the extraordinarily high recognizability of Late Antique ceramics, and in particular the fact that often some 50% of surface assemblages of this phase consist of innumerable fragments of large diagnostic transport amphorae, has led to a major exaggeration of the "busyness" of the contemporary sites and landscapes, compared to preceding periods. In Central Greece moreover, large villa sites seem to show much storage evidence from surface collections but limited evidence for large resident domestic populations, suggesting that these estates were little populated, with their labor force coming from associated village sites and the shrunken towns (Bintliff et al. 2007). Nonetheless, a significant revival compared to the Early Empire, in the rural world at least, is incontestable, even if the emphasis on larger villa estates supplying a vibrant interregional commercial market is a fragile specialization which will not survive the near-breakdown of trade in the later seventh to eighth centuries.

Medieval Rural Life

As with Classical Greece, our understanding of the Greek countryside between 700 and 1400 CE has for long depended on quite limited references in Byzantine and Frankish Crusader sources, with occasional spotlight windows provided by a small number of late Byzantine records of villages and estates owned by monasteries (especially those on Mount Athos) (Laiou-Thomadakis 1977). The growing interest in long-term landscape archaeology within the surface survey community in Greece from the start of the intensive prospection phase was at first hindered by the lack of specialists in the ceramics of this long era, so that sites were at first merely dated to the "medieval," or "Byzantine" or just "post-Roman" periods. The wares which were datable were those fine tablewares suitable for museum display rather than the bulk of finds which were roof tiles, domestic, and cooking wares. A breakthrough occurred through the involvement of one unique scholar, John Hayes, whose ability to work with all classes of pottery from the geometric to the early twentieth century CE revolutionized surveys in Greece within which he was active from the later 1980s onward. A deserted village was no longer "medieval" or "postmedieval" but could now be shown to be twelfth to fourteenth or seventeenth to eighteenth century CE. Younger followers of his work

now expanded the regions where such detailed historical archaeology could be reconstructed, such as Guy Sanders, Athanasios Vionis, Effie Athanassopoulos, Pamela Armstrong, and Joanita Vroom (cf. Sanders 2000; Vionis 2012; Athanassopoulos 2010; Armstrong 2002; Vroom 2003).

The focus on villages was due to a general fact of post-Roman Greece: towns declined dramatically in number and often survive today and so are accessible to limited excavation but not usually urban survey, while in their place came a landscape of villages (farm sites became rare and a regional element). It soon was clear with the new refined chronology that the villages of the period 700–1400 CE were often confined to certain periods of use, before most became permanently abandoned; especially a great rise in their number from ca. 1000 CE was followed by a florescence till a massive abandonment during the fourteenth century. This sequence could be related well to the rise and climax of the Byzantine Empire, but surprisingly the conquest and subdivision of Greece by the Fourth Crusade and the imposition of a Western European feudal economy did not cause any visible effects on the prosperous village landscapes established already. An exception to this generalization is the occasional localized displacement of an existing Byzantine peasant settlement to a more defensible position beside or inside a new Crusader fortification, as at Mount Tsaliko in the Peloponnese (Gregory 1996) or at the deserted village of Palaiopanagia in Central Greece (Bintliff 2012, chapter 19).

Survey archaeologists working in this period were emboldened by the large number of such DMVS (deserted medieval villages) discovered in their regions and the plentiful surface finds they provided, to look at the commercial links of such communities and their social and economic structures, taking their lead from the much longer established tradition of DMV research in Western Europe. Most recently, the evidence of air photographs and mapping of field systems has allowed survey archaeologists to associated particular field systems to medieval settlements (Crow et al. 2011).

The Ottoman Era

If medieval archaeology in Greece had always at least a basis in the tradition of Byzantine architecture and art history, as well as archival history, the same could not be said of the subsequent lengthy era of Ottoman Turkish rule in Greece (fourteenth to nineteenth centuries CE). The extremely negative image of the Ottoman centuries common in Greek historical studies, deriving chiefly from the era of general decline in the late eighteenth- and early nineteenth-century Empire, had never inspired a community of archaeologists to devote themselves to its surviving remains in town and country (with a few notable exceptions, cf. Bintliff 2012, chapters 20 and 21). Once again it would be the result of the neutral, long-term approach to landscape archaeology typical of intensive survey projects in Greece that changed the situation permanently. Based on the inspiration of John Hayes, numerous rural sites, mostly villages or hamlets, discovered by regional projects, could be assigned their place in subdivisions of Early, Middle and Late Ottoman, allowing a picture of the changing settled rural landscapes of Greece to be built up.

If Byzantine and Frankish Greece have only scanty archival and historical texts to link to rural life, a fortunate association with a notable Ottoman historian, Machiel Kiel, opened up a perspective undreamt of by survey specialists. The Ottoman Imperial archives, especially in the grand centuries of the Empire (ca. 1400–1600), were very detailed at the village level, listing population, crop and animal production, and additional information on associated monasteries, mills, and fairs (Kiel 1997). Once a deserted village could be given a name to be found in the regional tax registers (in Central Greece, some 70–80% could be linked in this way, Bintliff 1995), survey archaeologists were able to compare the statistics to the site size, date range, and ceramic finds from the village's survey.

This confirmed the previously often disputed claim of Ottoman specialists that the Early Empire, under the "Pax Ottomanica," was a long period of rapid population growth and a flourishing economy in Greece. The subsequent gradual decline of the countryside through the seventeenth to early eighteenth centuries attested

by historical and archival sources was also clearly revealed by the disappearance or shrinkage of villages. At this point, a new discovery added depth to the work of survey: village sites still active in the Middle to Late Ottoman centuries often contained the visible remains of houses, of types well-known to Greek Folklore and Vernacular Architecture specialists from the post-Ottoman era (Philippides 1983–1990). A natural extension then led to the recording of such houses and a new interest in traditional houses which was taken into the package of survey approaches for the last and final era, the Early Modern period (nineteenth to twenty-first centuries CE). A major program recording the fast vanishing traditional domestic houses of the Peloponnese grew out of the Minnesota Messenia Project and the work of its architect Fred Cooper (Cooper 2002), while in Central Greece, houses have been recorded as part of the ongoing Boeotia Project both from deserted villages (beginning with examples from the fourteenth century CE) and existing rural settlements (cf. Bintliff 2012, chapters. 21–22), and arising from this work, a general synthesis was published by Sigalos for the whole of Greece 2004.

In a very recent development, Athanasios Vionis made use of the combination of survey ceramics, Ottoman tax records, and house remains from two deserted villages in Central Greece to contrast the economic strategy, wealth, and relationship to wider economic links of two contemporary Ottoman era villages (Vionis 2016).

Early Modern Landscape Archaeology

It might seem that the period ca. 1800 to today would be well-known enough to prevent survey archaeology from adding new evidence to the narrative, but since postmedieval archaeology is still in its infancy in Greece, surface prospection has been a leading sector in this period for some 20 years. The emphasis has been again on the rural world, since the troubled young Greek state saw many new village abandonments and displacements, offering a large number of DMVs for surface study, mostly now providing standing building remains for recording of lifestyles. The paintings and sketches of the Western European Travellers of such communities were replaced by photographs by the end of the nineteenth century, accompanied by descriptions of village life continuing up till the presentday, recorded memories of the oldest inhabitants of surviving modern communities. Survey can add significant extra features: the types of pottery indicate levels of wealth, eating habits, and the degree to which a rural community is interacting with the wider world through commerce and fashion. Moreover, the clear continuity which can be made to current rural society allows a way for regional projects to show their involvement in creating a vivid sense of local heritage for the communities they work within (see further below).

Future Directions

I suspect that the current source-critical phase, coupled with advances in digital data collection, recording, and analysis, will make much clearer how we can reach stronger conclusions on the nature and history of surface sites and the evidence of human activities in the surrounding taskscapes. This will offer historians greater confidence in combining survey results with their own textual reconstructions of dynamic landscapes and townscapes. It seems necessary to propose to future surveys that they cover large contiguous areas, quantify surface finds both off- and onsites, collect large samples of both of the latter environments, and conduct experiments with different field techniques. Improvements in the resolution of ceramic study through moving from diagnostic wares dated by excavations elsewhere, to classification following a local fabric series, will allow local assemblages to be identified more appropriate to the district under study, as well as bringing to light contrasts between local production and imports.

Comparative studies of survey results should increase so that localized scenarios can be compared with the wider picture of a particular era of the past. A neglected theme here is long-term comparison: can we compare population and land use levels at different phases of occupation of the same landscape, and what are the

implications of such an analysis (cf. Bintliff 2005 for Boeotia)?

It cannot be stressed enough that current archaeological research in Europe and the wider Mediterranean has turned away from large-scale excavation in order to focus on sites which are under threat of destruction from engineering works, house and hotel construction, and intensive agriculture. This means that the vast majority of prehistoric and ancient to pre-modern sites will not be researched by invasive procedures. It is here that the non-destructive approach of surface prospection will be playing an ever more vital role, including surface artefact survey, geophysics, and air photography. This is relevant especially for Greece, where almost every village and even field have traces of past human activity waiting to be recorded.

This leads us to a final theme for future development, a closer involvement of local communities in landscape research. Greece is a country with an especially famous Classical past, preceded by the earliest civilizations in Europe with the Cycladic, Minoan, and Mycenaean societies. Subsequent post-Roman periods are slowly becoming better-known with the results of numerous field surveys which intentionally aim to reveal the long-term history of the landscape. Yet knowledge of this multimillennial story, concluding with the contemporary towns and villages, is exceedingly poorly integrated into the educational program of Greek schools and universities. The rural population finds very little to attach the story of their own landscape and settlement to, when the focus remains on Classical Athens and the Panhellenic sanctuaries. Thus, they seek their own "place in history" through identifying monuments, usually of recent age, sometimes much older, which reflect the involvement of their ancestors in great events such as the Greek War of Independence or even imaginary events such as a visit to their community by notable historic figures such as Alexander the Great or the Ottoman Sultan Suleyman the Magnificent (Forbes 2009; Bintliff 2013b). The mayor of the village of Aghios Georgios in Central Greece, for example, aware that the ancient city of Koroneia lay in village territory, wished to make a monumental connection to the Classical heritage of his community by building a replica, at the entry to his village of the one very visible standing monument at the ancient city site – a tower. Sadly, it lies outside the ancient town and represents the remains of a Crusader feudal tower, the mark on the landscape of an alien power from the thirteenth century CE.

Survey projects will need to engage with local society to make their knowledge of landscape history accessible to the people who live and work there today and across whose fields they walk. Excavations in Greece still focus on the Greco-Roman and prehistoric eras, remote in time and connection to modern communities. Survey has the particular advantage that it gives equal attention to the medieval and postmedieval centuries during which contemporary settlements generally came into being or took their present form and hence is uniquely in a position to situate local towns and villages into a reliable local historical perspective. Moreover, as the Greek state, through its public archaeological service, is usually unable to fund research into locations not at risk from imminent destruction, it is local communities who may need to take greater responsibility for protecting sites and monuments in their territory, especially the remains of structures and infrastructure of the recent centuries (examples of traditional houses, water management systems, etc.). Transferring the results of intensive survey into local history, made easily available to the relevant local groups, seems an urgent task and perhaps even more important than contributing to academic knowledge accumulation.

References

Abadie-Raynal, C. 1989. Céramique et commerce dans le bassin égéen du IVe au VIIe siècle. In *Ommes et Richesses dans l'Empire Byzantine, IVe-VIIe Siècle*, ed. C. Morrisson and J. Lefort, 143–159. Paris: Editions P. Lethielleux.

Alcock, S.E. 1993. *Graecia Capta. The landscapes of roman Greece*. Cambridge: Cambridge University Press.

Alcock, S.E., and J. Cherry, eds. 2004. *Side by side survey. Comparative regional study in the Mediterranean world*. Oxford: Oxbow.

Alcock, S.E., J.F. Cherry, and J.L. Davis. 1994. Intensive survey, agricultural practice and the classical landscape of Greece. In *Classical Greece. Ancient histories and modern archaeologies*, ed. I. Morris, 137–170. Cambridge: Cambridge University Press.

Armstrong, P. 2002. The survey area in the byzantine and Ottoman periods. In *Continuity and change in a Greek rural landscape. The Laconia survey*, ed. W. Cavanagh and J. Crouwel, vol. 1, 330–402. London: The British School at Athens.

Athanassopoulos, E.F. 2010. Landscape archaeology and the medieval countryside: Settlement and abandonment in the Nemea region. *International Journal of Historical Archaeology* 14: 255–270.

Barker, G. 1984. The Montarrenti survey, 1982–83. *Archeologia Medievale* 11: 278–289.

Bintliff, J.L. 1977. *Natural environment and human settlement in prehistoric Greece: Based on original fieldwork*, BAR Supplementary series 28. Oxford: Archaeopress.

Bintliff, J.L. 1995. The two transitions: Current research on the origins of the traditional village in Central Greece. In *Europe between late antiquity and the middle ages. Recent archaeological and historical research in western and southern Europe*, BAR International series 617, ed. J.L. Bintliff and H. Hamerow, 111–130. Oxford: Tempus Reparatum.

Bintliff, J.L. 1997a. Regional survey, demography, and the rise of complex societies in the ancient Aegean: Core-periphery, neo-Malthusian, and other interpretive models. *Journal of Field Archaeology* 24: 1–38.

Bintliff, J.L. 1997b. Further considerations on the population of ancient Boeotia. In *Recent developments in the history and archaeology of Central Greece*, BAR Int. Ser.666, ed. J.L. Bintliff, 231–252. Oxford: Tempus Reparatum.

Bintliff, J.L. 1999. Chapter 13: Settlement and territory. In *The Routledge companion encyclopedia of archaeology*, ed. G. Barker, 505–545. London: Routledge.

Bintliff, J.L. 2000a. Deconstructing 'the sense of place'? Settlement systems, field survey, and the historic record: A case-study from Central Greece. *Proceedings of the Prehistoric Society* 66: 123–149.

Bintliff, J.L. 2000b. Beyond dots on the map: The future of artefact survey in Greece. In *The future of archaeological field survey in Europe*, ed. J. Bintliff, M. Kuna, and N. Venclova, 3–20. Sheffield: Sheffield Academic Press.

Bintliff, J.L. 2000c. Reconstructing the byzantine countryside: New approaches from landscape archaeology. In *Byzanz als Raum*, ed. K. Blelke, F. Hild, J. Koder, and P. Soustal, 37–63. Wien: Österreichische Akademie der Wissenschaften.

Bintliff, J.L. 2005. Explorations in Boeotian population history. In *Festschrift for J.M. Fossey. The Ancient World 36.1*, ed. P. L. Smith, 5–17.

Bintliff, J.L. 2009. The implications of a phenomenology of landscape. In *Die Landschaft und die Religion. Stuttgarter Kolloquium zur Historischen Geographie des Altertums 9, 2005*, ed. E. Olshausen and V. Sauer, 27–45. Stuttgart: Franz Steiner Verlag.

Bintliff, J.L. 2012. *The complete archaeology of Greece*. Chichester/Malden: Wiley-Blackwell.

Bintliff, J.L. 2013a. The Hellenistic to roman Mediterranean: A proto-capitalist revolution? In *Economic archaeology*, ed. T. Kerig and A. Zimmermann, 285–292. Bonn: Rudolf Habelt.

Bintliff, J.L. 2013b. Public versus professional perceptions of an invisible heritage: A Greek case study. In *Appropriate narratives. Archaeologists, publics and stories*, ed. E. Niklasson and T. Meier, 237–247. Budapest: Archaeolingua.

Bintliff, J.L. 2014. Ch. 11: Intra-site artefact surveys. In *Good practice in archaeological diagnostics*, ed. C. Corsi et al., 193–207. Switzerland: Springer Verlag.

Bintliff, J.L., and P. Howard. 2004. A radical rethink on approaches to surface survey and the rural landscape of Central Greece in Roman times. In *Chora und polis*, ed. F. Kolb and E. Müller-Luckner, 43–78. München: R. Oldenbourg Verlag.

Bintliff, J.L., and A.M. Snodgrass. 1985. The Cambridge/Bradford Boeotian expedition: The first four years. *Journal of Field Archaeology* 12: 123–161.

Bintliff, J.L., and A.M. Snodgrass. 1988a. Mediterranean survey and the city. *Antiquity* 62: 57–71.

Bintliff, J.L., and A.M. Snodgrass. 1988b. Off-site pottery distributions: A regional and inter-regional perspective. *Current Anthropology* 29: 506–513.

Bintliff, J.L. In press. Chapter 1.2 Natural and human ecology: Geography, climate, resources and demography. In *A companion to the archaeology of Early Greece and the Mediterranean*, ed. A. Kotsonas, and I. Lemos. Oxford/New York: Wiley-Blackwell.

Bintliff, J.L., and H. Stoeger, eds. 2009. *Medieval and post-medieval Greece. The Corfu papers*, BAR International series 2023. Oxford: Archaeopress.

Bintliff, J.L., P. Howard, et al. 1999. The hidden landscape of prehistoric Greece. *Journal of Mediterranean Archaeology* 12: 139–168.

Bintliff, J.L., P. Howard, et al., eds. 2007. *Testing the hinterland: The work of the Boeotia survey (1989–1991) in the southern approaches to the city of Thespiai*. Cambridge: MacDonald Institute Monographs, University of Cambridge.

Bintliff, J.L., B. Noordervliet, et al. 2013. The Leiden-Ljubljana ancient cities of Boeotia project, 2010–2012 seasons. *Pharos* 19: 1–34.

Bintliff, J. L., E. Farinetti, et al. 2017. *The ancient city from the surface: The work of the Boeotia Survey (1985–2009) at the city of Thespiae*. Cambridge: McDonald Institute Monographs, University of Cambridge.

Blackman, D., and K. Branigan, eds. 1978. An archaeological survey of the Ayiofarango valley. *Annual of the British School at Athens* 72: 1–84.

Cavanagh, W., J. Crouwel et al. 1996, 2002. *Continuity and change in a Greek rural landscape: The Laconia Survey*, vols. 1–2. London: The British School at Athens.

Cherry, J.F. 1982. A preliminary definition of site distribution on Melos. In *An island polity. The archaeology of exploitation in Melos*, ed. C. Renfrew and M. Wagstaff, 10–23. Cambridge: Cambridge University Press.

Cherry, J.F., J.C. Davis, et al., eds. 1991. *Landscape archaeology as long-term history*. Los Angeles: Institute of Archaeology, University of California Los Angeles.

Cooper, F. 2002. *Houses of the Morea: Vernacular architecture of the Northwest Peloponnesos (1205–1955)*. Athens: Melissa Press.

Crow, J., Turner, S. and Vionis, A. 2011. Characterizing the historic landscapes of Naxos. *Journal of Mediterranean Archaeology* 24: 111–137.

Davies, S., and J.L. Davis, eds. 2007. *Between Venice and Istanbul. Colonial landscapes in early modern Greece*, Hesperia Supplement 40. Princeton: American School of Classical Studies.

Davis, J.L., ed. 1998. *Sandy Pylos*. Austin: University of Texas.

Dickinson, O.T.P.K. 1982. Parallels and contrasts in the Bronze Age of the Peloponnese. *Oxford Journal of Archaeology* 1: 125–138.

Dodwell, E. 1819. *A classical and topographical tour through Greece, during the years 1801, 1805, and 1806/2*. London: Rodwell & Martin.

Efstratiou, N., P. Biagi, et al. 2006. Prehistoric exploitation of Grevena highland zones: Hunters and herders along the Pindus chain of western Macedonia (Greece). *World Archaeology* 38: 415–435.

Forbes, H. 2009. Researching Ekina ta Khronia [times past] in a rural Greek community. *Public Archaeology* 8: 88–107.

Forsen, J., and B. Forsen, eds. 2003. *The Asea Valley survey. An Arcadian mountain valley from the Paleolithic period until modern times*. Stockholm: Swedish Institute in Athens.

French, D.H. 1967. *Index of prehistoric sites in Central Macedonia*. Athens: Unpublished manuscript.

French, D.H. 1972. *Notes on prehistoric pottery groups from Central Greece*. Athens: Eget Forlag.

Gkiasta, M. 2008. *The historiography of landscape research on Crete*. Vol. 16. Leiden: Archaeological Studies from Leiden University (ASLU).

Gregory, T.E. 1996. The medieval site on Mt Tsalika near Sophiko. In *The archaeology of medieval Greece*, ed. P. Lock and G.D.R. Sanders, 61–76. Oxford: Oxbow.

Hansen, M.H. 2004. The concept of the consumption city applied to the Greek Polis. In *Once again: Studies in the ancient Greek polis*, ed. T.H. Nielsen, 9–47. Stuttgart: Franz Steiner Verlag.

Heurtley, W.A. 1939. *Prehistoric Macedonia*. Cambridge: Cambridge University Press.

Hope-Simpson, R. 1965. *A gazetteer and atlas of Mycenaean sites*. London: The Institute of Classical Studies.

Hope-Simpson, R., and O.T.P.K. Dickinson. 1979. *A gazetteer of Aegean civilisation in the bronze age, volume I: The mainland and islands*, SIMA 52. Göteborg: Paul Åströms Förlag.

Jameson, M.H., C.N. Runnels, et al., eds. 1994. *A Greek countryside. The southern Argolid from prehistory to the present day*. Stanford: Stanford University Press.

Kiel, M. 1997. The rise and decline of Turkish Boeotia, 15th–19th century. In *Recent developments in the history and archaeology of Central Greece*, ed. J.L. Bintliff, 315–358. Oxford: Tempus Reparatum.

Kirsten, E. 1956. *Die griechische Polis als historisch-geographisches Problem des Mittelmeerraumes*. Vol. 5. Bonn: Colloquium Geographicum.

Laiou-Thomadakis, A.E. 1977. *Peasant Society in the Late Byzantine Empire: A social and demographic study*. Princeton: Princeton University Press.

Leake, W. 1830. *Travels in the Morea*. London: J. Murray.

Lehmann, H. 1937. *Argolis. Landeskunde der Ebene von Argos und ihrer Randgebiete*. Athen: Deutsches Archäologisches Institut.

Lehmann, H. 1939. Die Siedlungsräume Ostkretas. *Geographische Zeitschrift* 45: 212–228.

Lock, P., and G.D.R. Sanders, eds. 1996. *The archaeology of medieval Greece*. Oxford: Oxbow.

Lohmann, H. 1993. *Atene: Forschungen zur Siedlungs- und Wirtschaftsstruktur*. Köln: Böhlau Verlag.

McDonald, W.A., and G.R. Rapp Jr., eds. 1972. *The Minnesota Messenia expedition. Reconstructing a bronze age regional environment*. Minneapolis: University of Minnesota Press.

Mee, C., and H. Forbes, eds. 1997. *A rough and rocky place. The landscape and settlement history of the Methana peninsula, Greece*. Liverpool: Liverpool University Press.

Music, B., D. Kramberger, et al. 2008. Geophysical and architectural survey. *Bulletin de Correspondence Hellènique* 2004–5: 579–582.

Nance, J.D. 1981. Statistical fact and archaeological faith: Two models in small-site sampling. *Journal of Field Archaeology* 8: 151–165.

Peeters, D., P. Bes et al. In press. Making use of time and space – Using African red slip ware as an indicator of economic activity in mid- and late Roman Thespiae and Tanagra. In *Island, Mainland, Coastland and Hinterland: Ceramic perspectives on connectivity in the ancient Mediterranean,* ed. J. Hilditch, A. Kotsonas, C. Beestman-Kruijshaar et al. Amsterdam: Amsterdam University Press.

Pendlebury, J.D.S. 1939 (1971). *The archaeology of Crete. An introduction*. New York: Biblo and Tannen.

Pettegrew, D.K. 2001. Chasing the family farmstead: Assessing the formation and signature of rural settlement in Greek landscape archaeology. *Journal of Mediterranean Archaeology* 14: 189–209.

Pettegrew, D.K. 2007. The busy countryside of Late Roman Corinth: Interpreting ceramic data produced

by regional archaeological surveys. *Hesperia* 76: 743–784.
Philippides, D. 1983–1990. *Elliniki Paradosiaki Architektoniki* (Greek vernacular architecture). Athens: Melissa Press.
Philippson, A. 1892. *Der Peloponnes. Versuch einer Landeskunde*. Berlin: R. Friedländer & Sohn.
Philippson, A., H. Lehmann, and E. Kirsten. 1950–1959. *Die griechischen Landschaften: eine Landeskunde.* Frankfurt am Main: Klostermann.
Plog, S., F. Plog, et al. 1978. Decision making in modern surveys. In *Advances in archaeological method and theory I*, ed. M.B. Schiffer, 383–421. New York: Academic.
Powell, S., and A.L. Klesert. 1980. Predicting the presence of structures on small sites. *Current Anthropology* 21: 367–369.
Renfrew, A.C. 1972. *The emergence of civilisation. The Cyclades and the Aegean in the third millennium B.C*. London: Methuen.
Ross, L. 1851. *Wanderungen in Griechenland*. Halle: Schwetschke.
Runnels, C., K. Panagopoulou, et al. 2005. A Mesolithic landscape in Greece: Testing a site-location model in the Argolid at Kandia. *Journal of Mediterranean Archaeology* 18: 259–285.
Ruschenbusch, E. 1985. Die Zahl der griechischen Staaten und Arealgrosse und Burgerzahl der 'Normalpolis'. *Zeitschrift fur Papyrologie und Epigraphik* 59: 253–263.
Rutter, J.B. 1983. Some thoughts on the ceramic data generated by site surveys. In *Archaeological survey in the Mediterranean area*, BAR International series 155, ed. D.R. Keller and D.W. Rupp, 137–148. Oxford: Archaeopress.
Sanders, G.D.R. 2000. New relative and absolute chronologies for 9th to 13th century glazed wares at Corinth: Methodology and social conclusions. In *Byzanz als Raum*, ed. K. Belke, J. Koder, and P. Soustal, 153–173. Wien: Österreichische Akademie der Wissenschaften.
Schachermeyr, F. 1938. Vorbericht über eine Expedition nach Ostkreta. *Archäologischer Anzeiger* 466–480.
Sigalos, E. 2004. *Housing in medieval and post-medieval Greece*, BAR International series 1291. Oxford: Archaeopress.
Snodgrass, A. 1994. Response: The archaeological aspect. In *Classical Greece. Ancient histories and modern archaeologies*, ed. I. Morris, 197–200. Cambridge: Cambridge University Press.
Tsigakou, F.M. 1981. *The rediscovery of Greece*. London: Thames and Hudson.
Tsountas, C. 1908. *Ai proistorikai akropoleis Diminiou kai Sesklou [The prehistoric Acropoleis of Dimini and Sesklo]*. Athens: The Archaeological Society at Athens.
Vionis, A.K. 2008. Current archaeological research on settlement and provincial life in the Byzantine and Ottoman Aegean. A case study from Boeotia, Greece. *Medieval Settlement Research* 23: 28–41.
Vionis, A. 2012. *A crusader, Ottoman, and early modern Aegean archaeology. Built environment and domestic material culture in the medieval and post-medieval Cyclades, Greece (13th–20th century AD)*. Vol. 22. Leiden: Archaeological Studies Leiden University.
Vionis, A. 2016. A boom-bust cycle in Ottoman Greece and the ceramic legacy of two Boeotian villages. *Journal of Greek Archaeology* 1: 353–384.
Vita-Finzi, C., and E.S. HIGGS. 1970. Prehistoric economy in the Mt. Carmel area of Palestine: Site catchment analysis. *Proceedings of the Prehistoric Society* 36: 1–37.
Vroom, J. 2003. *After antiquity: Ceramics and Society in the Aegean from the 7th to the 20th century A.C*. Vol. 10. Leiden: Archaeological Studies Leiden University.
Wace, A.J.B., and M.S. Thompson. 1912. *Prehistoric Thessaly*. Cambridge: Cambridge University Press.
Watrous, L.V., D. Hadzi-Vallianou, et al. 2004. *The plain of Phaistos. Cycles of social complexity in the Mesara region of Crete*. Los Angeles: The Cotsen Institute, UCLA.
Wells, B., and C. Runnels, eds. 1996. *The Berbati-Limnes archaeological survey 1988–1990*. Jonsered: Paul Astroms Forlag.
Wheler, G., and J. Spon. 1682. *A journey into Greece*. London: Folio.
Whitelaw, T., M. Bredaki, et al. 2006–7. The Knossos urban landscape project. *Archaeology International* 10: 28–31.
Wilkinson, T.J. 1989. Extensive sherd scatters and land-use intensity: Some recent results. *The Journal of Field Archaeology* 16: 31–46.

Survey Archaeology in the Roman World

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Introduction

A considerable feature of Roman civilization was the creation and support of a dense network of urban settlements. In this respect, the case of Italy is even more remarkable if one considers that – besides the presence of a megalopolis like Rome (with its one million inhabitants) – there existed about 430 urban centers scattered all over the peninsula. The thousands of cities and towns of the Roman Empire were connected and supplied

by a much-celebrated and highly effective infrastructure made up of ports, roads, and aqueducts. More crucially, each urban polity possessed a well-defined territory (ager): it was (in part) laid out as a regular grid network of squared cadastral plots (*centuriatio*), and it was specifically meant to provide the inhabitants with most of the resources they needed (e.g., foodstuffs, raw materials). Preindustrial urban populations always required a comparatively higher rural counterpart to support them, and in this regard, the highly urbanized Roman world was no exception. That is precisely why a large number of farmsteads and villages populated the countryside and took active part in the social and economic life of nearby towns (De Haas and Tol 2017).

This balanced account, however reasonable it might sound, is actually a rather recent achievement. Whereas the archaeological remains of Roman towns, roads, and aqueducts have for long been – and in many places still are – a prominent feature of the landscape, most traces of rural occupation have gradually faded away or disappeared altogether. Indeed, unlike more imposing stone or brickwork buildings, most rural houses were simpler structures, often made from perishable materials (e.g., half-timbered wattlework known as *opus craticium*). If it were not for the occasional remains of monumental villas, one would be left to wonder whether the Roman countryside was settled at all. Textual evidence could not be expected to fill such a gap and, in general, generations of scholars became persuaded that the "Graeco-Roman world was a world of cites" where the "agrarian population, always a majority, most often lived in communities of some kind, hamlets, villages, towns, not in isolated farm homesteads" (Finley 1977: 305).

This would be still the dominant view if it were not for a combination of largely unrelated events that took place following the end of the Second World War (see section "Historical Background"). For the very first time, those meager archaeological traces of ancient rural settlements were surveyed and identified as such. A systematic approach gradually developed, and survey archaeology has since provided incontrovertible evidence as to the impressive scale of rural occupation and to the vitality of the ancient Mediterranean landscape (hence it being often referred to as "landscape archaeology"). Given the strong bonds between human settlement and its environmental context, this discipline could have not but embraced a marked holistic attitude and therefore exhibited, since quite early on, a very strong interdisciplinary character. In this way, survey archaeology has not just widened our understanding of the Roman world, it has profoundly transformed the way we look at it.

Definition

Survey archaeology is a (sub)discipline which is primarily concerned with the record, analysis, and interpretation of material remains pertaining to past human settlement patterns across *both* rural and urban landscapes (Johnson and Millett 2013). It relies on a body of techniques that include fieldwalking, aerial survey, and geophysical prospection. It also benefits from its close connection with the environmental sciences (e.g., geoarchaeology, archaeobotany) and further integrates the spatial analysis potential of modern geographic information systems (GIS). When engaged with Roman landscapes, it avails itself of the sheer amount of contextual information which is often available in the form of ancient documents (e.g., literary works, inscriptions, *itineraria*/road maps), later historical accounts (e.g., reporting features that were then visible but are no more), and modern place-names (e.g., often reminiscent of an ancient origin).

Fieldwalking (or field survey) is certainly the cornerstone of survey archaeology everywhere. It requires a group of surveyors to walk across a field in parallel lines set at a regular distance from each other and to look for archaeological materials laying on its surface (Fig. 1). It is based on the awareness that such materials are spread all over the landscape and that artifact density varies in relation to the intensity of past human occupation.

Although there are several depositional and post-depositional processes involved, this is a phenomenon which is primarily related to the

Survey Archaeology in the Roman World, Fig. 1 Systematic fieldwalking in Central Italy

Survey Archaeology in the Roman World, Fig. 2 A dense plowsoil assemblage over a freshly plowed field in Central Italy

spread of mechanized agriculture: by reaching deep soil layers (up to 1.5 m), modern plows have disturbed or truncated otherwise sealed archaeological contexts, turning them upside down and therefore making them visible on surface (Haselgrove 1985). This "plowsoil assemblage" (Fig. 2) does indeed provide a sample what is buried below and when the density of material is especially notable – whether in absolute terms or relative to the surrounding context – they are taken to signal the presence of a site (i.e., a proper settlement). Of course, the visibility and potential for recovery of a site are hugely affected by the nature of the material culture originally associated with it and left over when it was abandoned (in terms of both quantity and quality). From this point of view, the Roman period is exceptionally well attested, thanks to its everyday use of pottery and the widespread employment of bricks/tiles in buildings (once fired, clay becomes extremely resistant to decay). Roman finewares are an especially relevant case. Besides their relatively sturdy quality and vast distribution network, their shiny gloss colors (black, red, and orange) have made them extremely visible in the plowsoil and relatively easy to recognize as such (Fig. 3). Furthermore, because such features are specific to well-dated productions (Republican black gloss, early Imperial terra sigillata, and mid-/late Imperial African red slip), even heavily eroded sherds do present a significant dating potential. This chronological pattern is mirrored

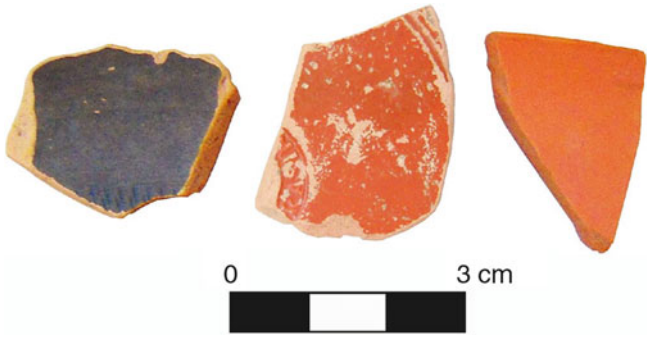

Survey Archaeology in the Roman World, Fig. 3 Color comparison of potsherds of black gloss (black), terra sigillata (red), and African red slip (orange)

by specific types of amphorae and all these elements taken together help to explain why most surveys have adopted a Roman periodization that is broadly the same (Republican, early Imperial, and mid/late Imperial) (Launaro 2011: 85–87).

Aerial photography (vertical or oblique) has provided another hugely impressive contribution to our understanding of the Roman landscape. Indeed, more or less substantial buried features can turn out pretty neat from above if the right conditions are met (e.g., crop marks), even though general practice seems to favor some degree of verification in the form of aimed fieldwalking. Among the more recent remote sensing techniques (e.g., processing of satellite imagery), LIDAR (Light Detection and Ranging) is certainly adding a further level to aerial survey as it allows the identification of barely perceptible surface variations over extensive areas (e.g., structures or earthworks of various kinds, even obscured by the cover of deep vegetation). In general, traces of Roman field systems (as still preserved/marked by secondary roads, boundaries, and ditches) are especially recognizable, thanks to their regular grid pattern and consistent (Roman) measures. Remarkable work has been carried out which has combined aerial photographs, cartography, and the original prescriptions of the Roman land surveyors (*Corpus Agrimensorum Romanorum*) to identify large tracts of the landscape wherein centuriation is still preserved (e.g., Chouquer et al. 1987).

Geophysical survey is another approach which is now widely employed – and with outstanding results, especially when combined with fieldwalking (e.g., Keay et al. 2000; Johnson and Millett 2013). A suite of available remote sensing techniques (e.g., georadar, magnetometry, resistivity testing) that aim to identify notable variations in the physical qualities of the (sub)soil. In this respect, structural remains will often stand in stark contrast to the context they are buried within, and once mapped, they are likely to provide a draft plan of the site. More specifically, magnetometry has proved a very favored choice across Roman archaeology as it allows a cost-effective prospection of extensive/complex sites and it is especially suited to detect brickwork (strong magnetic signature), from which many Roman buildings were built. It is often paired with on-site fieldwalking and test excavation.

Survey projects usually aim at reconstructing the long-term settlement history of a given landscape (Cherry 1983). As such they adopt a diachronic approach, cutting across several periods of human prehistory/history and thus requiring the collaboration of several experts from different fields. Study areas are usually defined as well-bounded and self-contained environmental regions (e.g., a river valley, an inland basin), the main objective being to recover, analyze, and interpret the way different human societies have engaged with a consistent landscape over time, thus highlighting long-term constants (similarities) and period-specific variables (differences). Although this diachronic approach is duly observed in terms of data collection and analysis, research design tends to make some periods more prominent as a result of the interests – and expertise – of the individual scholars involved. This is especially evident when the study area is instead defined according to period-specific political boundaries

(e.g., the territory (*ager*) of a Roman town) or when survey is meant to provide a wider context to a prominent site (e.g., the neighborhood of a villa). A case apart is represented by those projects that are launched by local or national institutions in order to improve knowledge, preservation, and management of the cultural heritage within their own territorial jurisdiction (e.g., official archaeological maps). As such, they employ modern administrative boundaries that might bear little or no relationship with both environmental units and ancient territories, while (in principle) they are less inclined to favor one period over the others. Broadly speaking, however, the majority of surveys across the Mediterranean basin – whatever their stated goals – show the tendency to be primarily focused on the Classical period, with further emphasis on either the Greek phase (in the East) or the Roman one (in the West).

Historical Background

The origins of survey archaeology in the Roman world lay in a long tradition of studies concerned with the landscapes of Roman Italy. As such they developed out of the Italian humanism of the late fourteenth century (early Renaissance): indeed, with the rediscovery and philological reappraisal of Greek and Latin literature, there came an interest in the sites and places that had been mentioned by ancient authors. This prompted early scholars like Flavio Biondo (1392–1463) to research the ancient topography of Rome and the historical geography of Italy. By their very nature, these approaches were heavily informed by textual evidence and therefore primarily biased toward those features which arose more prominently as the setting of ancient narratives: Rome and the other named cities, together with the main roads which connected them. Such an interest further developed into the early modern era (well into the nineteenth century) as local antiquarians and learned travelers from the Grand Tour strove to explore suburban landscapes in search of ancient monumental remains. By this time the "landscape with ruins" had gained much popularity (e.g., in paintings) and, therefore, such early "surveyors" were primarily attracted in their wanderings by the most prominent (i.e., visible) sites, where standing structures could be actually observed (e.g., necropoleis, mausoleums, aqueducts, rural sanctuaries, or major rural villas). By the late nineteenth century, this attitude had evolved into "ancient topography," a more structured enquiry which involved a thorough documentation (e.g., mapping, survey) and a systematic analysis of monumental remains (Potter and Stoddart 2001: 4–10). Nonetheless, the resulting picture was still biased toward urban spaces. The rural landscape – set aside as the idyllic setting of so many works of poetry – was then perceived as nothing more than the territorial extension of primarily urban communities, whose population worked the land by commuting everyday between town and country. This is hardly surprising given the fact that these earlier studies were still strongly inspired by and rooted in ancient literary accounts – from which they also derived the very same urban elite bias.

Things were about to change with the end of the Second World War (Potter and Stoddart 2001: 10–16). During the conflict, the Royal Air Force had extensively photographed large tracts of Italy from above in order to monitor military activities and targets. This marked the first large-scale introduction of aerial photography in the archaeology of Italy as hundreds of previously unnoticed features in the landscape were discovered and recorded. Furthermore, following the war, a strong process of extensive urbanization invaded the suburban areas of most Italian cities, especially Rome. This brought about an impressive alteration of the landscape together with an equally impressive destruction of still-standing archaeological remains, the very same remains that had been the focus of earlier topographic surveys. Aware of this critical situation, John Bryan Ward-Perkins (1912–1981), the director of the British School at Rome at the time, launched teams of surveyors across South Etruria (hence the much-celebrated "South Etruria Survey") to record as much archaeological evidence as possible, before it was too late. This took place at the same time as the first large-scale introduction of mechanical heavy plowing (see section "Definition"), and it did not take much time before

these early surveyors noticed how such an impressive destruction had the unexpected result of bringing to the surface a vast array of buried archaeology which otherwise would have gone completely undetected, especially as it pertained to small rural sites. Although lacking the imposing structural remains which signaled the presence of major sites (e.g., rural villas), such smaller occurrences were made prominent by the quantity of archaeological materials (e.g., potsherds, fragments of tiles and bricks). This plowsoil assemblage signaled thousands of sites across the landscape, often interpreted as evidence of farms and, therefore, of an extensive rural population (i.e., settled in the countryside).

The South Etruria Survey did contribute to a "revolution" in landscape studies as a new, formal methodology was eventually developed and introduced all across the Mediterranean region, aimed at a systematic archaeological survey of plowed fields. Rapidly, it also became clear that an exclusively urban-oriented understanding of the rural landscape was misleading and that these rural settlement patterns had to be understood in their own (environmental) setting. This opened the way to the integration of a specific expertise devoted to environmental reconstruction (e.g., geomorphology) and affirmed landscape archaeology as a fundamentally interdisciplinary endeavor (see section "Definition"). Research on Roman landscapes has since benefitted overall from such attitudes as more and more projects have followed – in Italy and beyond (Barker and Lloyd 1991; Potter and Stoddart 2001: 16–23). This has called for a more balanced understanding of the complex relationship between town and country and has warned scholars against the indiscriminate use of just one set of potentially biased evidence.

Key Issues/Current Debates

Landscape has provided a most fertile context where to explore several important aspects of the Roman world, from economy to imperialism and from demography to urbanization. As already pointed out, the crucial contribution has been represented by the recovery of a lively and densely populated countryside, thus prompting a significant reconsideration of the integrated relationship between town and country. Cities are no longer merely seen as passive "consumers" of the resources provided by their territories but rather as actively engaged in a complex symbiotic pattern of production, distribution, and consumption of goods and services. They obviously created demand for local rural production, but, being also part of a wider network of towns, roads, and ports, they in turn supplied their hinterland with imported goods and created a gateway through which further surplus could be sent/sold elsewhere. The notion that landscape and cities must be approached as distinct features of a unitary process is today firmly established (e.g., Patterson 2006).

Another important achievement of survey archaeology is having brought about the awareness that there existed several Roman landscapes (Barker and Lloyd 1991). As Roman rule gradually extended over many different regions with different environmental characteristics and long histories of previous human occupation, landscape patterns came to reflect a creative combination of imported ideas and local situations. Therefore, survey archaeology has contributed to effectively undermine easy generalizations about the nature of Roman imperialism, and the actual dynamics of these relationships are now understood to have varied as a result of the political and economic place each region occupied within a growing empire (Mattingly 2011: 123–99).

Placing such an emphasis on what is distinctive and different, however, is at risk of ingenerating a kind of relativistic attitude, an empirical myopia that impedes synthesis at a higher level. After all, what is distinctive emerges more clearly once similarities are appreciated. The need to compare, contrast, and combine data from different surveys is a long-debated issue among practitioners of Mediterranean archaeology. The problem rests on the fact that each project is designed in accordance with specific questions and that each research context will prompt the adoption of appropriate methodological choices to cope with its unique conditions (e.g., intensive/extensive,

total coverage/sampling). Such a variety of approaches does result in data whose uniqueness might not necessarily relate to original conditions and that would make comparisons difficult – if possible at all. What is remarkable is that a huge amount of data has been collected over the years and scholars increasingly feel the need to employ them in a way or another (Alcock and Cherry 2004; Attema and Schörner 2012).

From this point of view, Roman Italy has provided a much favored case study, having been extensively explored by a sheer amount of survey projects (Patterson 2006: 72–88). With all their possible differences, it is quite remarkable that most researches have classified Roman settlements according to broadly similar typologies: villas, farms, and villages. It is indeed possible to recognize two main working criteria: quantity and quality of finds. The former refers to the size of the surface spread, the number of finds, and therefore their density. The latter, on the other hand, is more concerned with what classes of material are recovered as indicative of function, status, and place of the site within the settlement hierarchy. Although the actual definitions might slightly change, villas are generally understood as large-size and high-status sites, farms as small-/mid-size and low-/mid-status sites, and villages as large-size and low-/mid-status sites.

Whereas farms and villages have been related with the Italian free peasantry, villas have been traditionally connected with large estates, owned by the elite and primarily worked with slaves. Traditional historical narratives pointing to the decline of the Italian free population, being in turn supplanted by slaves, would therefore require both a gradual disappearance of farms and a coeval growth of villas to have occurred. Remarkably, although this seems to have indeed occurred in some areas (central coastal Etruria, southeastern Italy), in the majority of cases, farms appear to have been much more resilient, usually growing in numbers at the same time as villas did (Launaro 2011: 149–164; Launaro 2017). Although this can reasonably be taken to suggest a growth of the free peasantry, it does not say anything in terms of actual numbers. Deriving absolute population figures from survey evidence is indeed a traditional ambition of Mediterranean landscape archaeology (Witcher 2011). In principle, it might sound like a rather straightforward exercise by which one multiplies the average number of occupiers by the number of sites. Besides the fact that there is no reliable way to guess such an average, the insurmountable obstacle is that surveyors simply cannot know how many sites they have actually missed. Although the inability to engage with both these crucial variables seems to seriously undermine any such effort, this has been repeatedly attempted following seminal work on the *suburbium* of Rome (Witcher 2005).

Recovery rates have always represented a critical issue. Surveyors have been frequently surprised by the rather limited amount of evidence for rural occupation dating to earlier phases of Roman colonization, and this was made more striking when contrasted with the number of actual colonists as reported by ancient authors. Although fieldwalking does still represent the best possible choice to detect smaller/poorer sites, it is ultimately dependent on archaeological visibility (Witcher 2011). By relying on fineware pottery or amphorae as the main diagnostic materials, surveyors often assume such goods/objects to have been evenly supplied in the first place. This has been shown to be not always the case, especially as one moves down the settlement hierarchy and away from the main distribution centers/networks (Millett 1991). This increasing awareness has brought about a general reconsideration of what surveyors should look for, and it has eventually become clear that commonware pottery could really make a difference as it was more readily accessed by all levels of urban and rural society (being mostly produced locally and at cheaper prices) (MacDonald 1995). Although commonware have always constituted the larger part of any plowsoil assemblage, their systematic and comprehensive study is yet to come. Some regional synthesis has indeed started to appear, but their general application is somewhat limited

by the very local character of the objects they endeavor to describe.

International Perspectives

As already mentioned (see section "Historical Background"), survey archaeology has its own origins in a long-established tradition of ancient topography to which scholars of many nationalities have since contributed to. Of course, one can identify some recurring patterns among practitioners and might be tempted to ascribe them to the existence of specific national traditions. For example, the impressive presence of still-standing archaeological structures across the Mediterranean countryside can in part explain the remarkable resilience of more traditional forms of ancient topography in those countries. It is fair to say, however, that such an attitude has evolved over the last 30 years and has since broadly merged with survey archaeology.

If a real opposition ever existed, it is perhaps that between the intensive survey championed by British archaeologists and the more extensive approaches favored by others (most notably, although not exclusively, American scholars) (Terrenato 2004). It is not specific to "Roman" surveys, but it represents the tension – latent in any archaeological fieldwork – between resolution and coverage. Ideally, both are needed. In practice, however, one comes at the expense of the other. If intensive fieldwalking is the only way to detect smaller/poorer sites, too limited a study area is at risk of being insufficient to represent the wider landscape. On the other hand, an extensive survey will certainly convey a much more global picture, but it is also likely to skew it towards the upper end of the settlement hierarchy, thus failing to provide a fair representation of it. The debate has never been settled and sampling strategies have only provided a partial solution to it. Relevant field practice across the Roman world has thus varied a great deal and is one of the reasons that have often prevented worthwhile comparisons from being achieved at the regional level.

Future Directions

Comparative regional syntheses do indeed represent the necessary step forward for survey archaeology in the Roman world. Although new data keep being recovered as new survey projects arise, the lack of integration and coordination between them – even within same regions – runs the risk of narrowing the perspective, thus leading to many unrelated local histories. In fact, if survey archaeology is to contribute to far-reaching debates about general historical processes whose scale transcended the individual landscape (see section "Key Issues/Current Debates"), scholars have to accept the challenge and envision ways in which these data can be profitably integrated. Although definitive results are still ahead of us, the last 20 years have witnessed an increasing number of attempts that – whatever their limitations or flaws – are demonstrating the way forward (Alcock and Cherry 2004; Launaro 2011: 80–83; Attema and Schörner 2012).

The role and significance ascribed to the plowsoil assemblage is also evolving. Although quantity and quality of finds are still eagerly employed to derive chronologies (i.e., in order to date sites), their distribution patterns across the landscape can be viewed from different angles accounting not only for supply but also for deeper social and cultural meanings mediated by choice or preference (Witcher 2006). In this view, the increasing knowledge of local Roman commonwares might not only provide more refined ways to date "marginal" sites but also could allow scholars to uncover a complex network of human relationships across the landscape(s) that would otherwise remain largely invisible.

Another growing tendency is to recognize the informative potential of "legacy data" (i.e., old data from past projects). While plowing brings to the surface otherwise hidden evidence, it keeps eroding and consuming such evidence until not only its visibility but its very existence is irremediably affected. The same goes for urbanization: it has never stopped and many more areas have been increasingly built over. This is further

complicated by the fact that the process of agricultural expansion of the post–Second World War era has now begun to reverse: lands are increasingly turned (back) to pasture or woodland, therefore dramatically affecting archaeological visibility. From this point of view, older surveys (from the 1950s, 1960s, to 1970s) do represent a mine of invaluable information: they documented surface evidence soon after it was plowed for the first time (i.e., higher integrity and better visibility) and explored extensive areas which are by now "concreted over" or, more generally, made unsuitable to survey. As new knowledge (e.g., more refined pottery classifications) and new techniques (e.g., GIS analysis) are made available, it becomes therefore possible to process the evidence again by answering questions and test theories which were not considered in the original research design (Witcher 2008).

Cross-References

- ▶ Centuriation and Roman Land Surveying (Republic Through Empire)
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Demography of the Ancient Roman World
- ▶ Economy, Roman
- ▶ Landscape Archaeology
- ▶ Maps, Cartography, and Worldview in the Roman World
- ▶ Surface Survey: Method and Strategies
- ▶ Survey Archaeology in the Greek Aegean World

References

Attema, P., and G. Schörner, eds. 2012. *Comparative issues in the archaeology of the Roman rural landscape: Site classification between survey, excavation and historical categories*, Journal of Roman Archaeology supplementary series. Vol. 88. Portsmouth: Journal of Roman Archaeology.

Barker, G., and J. Lloyd, eds. 1991. *Roman landscapes: Archaeological survey in the Mediterranean Region*, Archaeological monographs of the British School at Rome. Vol. 2. London: British School at Rome.

Cherry, J.F. 1983. Frogs round the pond: Perspectives on current archaeological survey projects in the Mediterranean region. In *Archaeological survey in the Mediterranean area*, British archaeological reports international series, ed. D.J. Keller and D.W. Rupp, vol. 155, 375–416. Oxford: British Archaeological Reports.

Chouquer, G., M. Clavel-Lévêque, F. Favory, and J.-P. Vallat. 1987. *Structures agraires en Italie centro-méridionale: cadastres et paysages ruraux*, Collection de l'École Française de Rome. Vol. 100. Rome: École Française de Rome.

De Haas, T., and G. Tol, eds. 2017. *The economic integration of Roman Italy: Rural communities in a globalizing world*, Mnemosyne supplement. Vol. 404. Leiden/Boston: Brill.

Finley, M.I. 1977. The Ancient City: From Fustel de Coulanges to Max Weber and beyond. *Comparative Studies in Society and History* 19 (3): 305–327.

Haselgrove, C. 1985. Inference from ploughsoil artefact samples. In *Archaeology from the Ploughsoil: Studies in the collection and interpretation of field survey data*, ed. C. Haselgrove, M. Millett, and I. Smith, 7–29. Sheffield: Department of Archaeology and Prehistory.

Johnson, P., and M. Millett, eds. 2013. *Archaeological survey and the city*. Oxford: Oxbow.

Keay, S., M. Millett, S. Poppy, J. Robinson, J. Taylor, and N. Terrenato. 2000. Falerii Novi: A new survey of the walled area. *Papers of the British School at Rome* 68: 1–93.

Launaro, A. 2011. *Peasants and slaves: The rural population of Roman Italy (200 BC to AD 100)*. Cambridge: Cambridge University Press.

Launaro, A. 2017. Something old, something new: Social and economic developments in the countryside of Roman Italy between republic and empire. In *The economic integration of Roman Italy: Rural communities in a globalizing world*, Mnemosyne supplement, ed. T. de Haas and G. Tol, vol. 404, 85–111. Leiden/Boston: Brill.

MacDonald, A. 1995. All or nothing at all? Criteria for the analysis of pottery from surface survey. In *Settlement and economy in Italy, 1500 BC – AD 1500*, ed. N. Christie, 25–29. Oxford: Oxbow.

Mattingly, D.J. 2011. *Imperialism, power, and identity: Experiencing the Roman Empire*. Princeton: Princeton University Press.

Millett, M. 1991. Pottery: Population or supply patterns? The *ager Tarraconensis* approach. In *Roman landscapes: Archaeological survey in the Mediterranean region*, Archaeological monographs of the British School at Rome, ed. G. Barker and J. Lloyd, vol. 2, 18–26. London: British School at Rome.

Patterson, J.R. 2006. *Landscapes and cities. Rural settlement and civic transformation in early imperial Italy*. Oxford: Oxford University Press.

Potter, T.W., and S. Stoddart. 2001. A century of prehistory and landscape studies at the British School at Rome. *Papers of the British School at Rome* 69: 3–34.
Terrenato, N. 2004. Sample size matters! The paradox of global trends and local surveys. In *Side-by-side survey: Comparative regional studies in the Mediterranean world*, ed. S.E. Alcock and J.F. Cherry, 36–48. Oxford: Oxbow.
Witcher, R.E. 2005. The extended metropolis: *Urbs*, *suburbium* and population. *Journal of Roman Archaeology* 18: 120–138.
Witcher, R.E. 2006. Broken pots and meaningless dots? Surveying the rural landscapes of Roman Italy. *Papers of the British School at Rome* 74: 39–72.
Witcher, R.E. 2008. (Re)surveying Mediterranean rural landscapes: GIS and legacy survey Data. *Internet Archaeology* 24.
Witcher, R.E. 2011. Missing persons? Models of Mediterranean regional survey and ancient populations. In *Settlement, urbanization, and population*, ed. A. Bowman and A. Wilson. Oxford: Oxford University Press.

Further Reading

Alcock, S.E. 1993. *Graecia Capta: The landscapes of Roman Greece*. Cambridge: Cambridge University Press.
Alcock, S.E., and J.F. Cherry, eds. 2004. *Side-by-side survey. Comparative regional studies in the Mediterranean world*. Oxford: Oxbow.
Barker, G., and D.J. Mattingly, eds. 1999–2000. *The archaeology of Mediterranean landscapes*. 5 vols. Oxford: Oxbow.
Bintliff, J., and K. Sbonias, eds. 1999. *Reconstructing past population trends in Mediterranean Europe (3000 BC–AD 1800)*, The archaeology of Mediterranean landscapes. Vol. 1. Oxford: Oxbow.
Cambi, F., and N. Terrenato. 1994. *Introduzione all'archeologia dei paesaggi*. Roma: Carocci.
Keller, D.J., and D.W. Rupp, eds. *Archaeological survey in the Mediterranean area*, British archaeological reports international series. Vol. 155. Oxford: British Archaeological Reports.
Mattingly, D.J. 2009. Peopling ancient landscapes: Potential and problems. In *Quantifying the Roman economy: Methods and problems*, ed. A. Bowman and A. Wilson, 163–174. Oxford: Oxford University Press.
Millett, M. 2010. Town and country in the early Roman West – A perspective. In *Changing landscapes. The impact of Roman Towns in Western Mediterranean*, ed. C. Corsi and F. Vermeulen, 17–25. Bologna: Ante Quem.
Terrenato, N. 2012. The essential countryside: The Roman world. In *Classical archaeology*, ed. S.E. Alcock and R. Osborne, 2nd ed., 144–167. Oxford: Blackwell.

Sustainability and Cultural Heritage

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Introduction

The term "sustainability" has multiple meanings and uses in relation to cultural heritage. Most frequently, the term is employed in conjunction with or as part of such concepts as sustainable preservation, sustainable development, or sustainable tourism, though these concepts in practice overlap and are closely intertwined.

Definition

Sustainable Development

These concepts of sustainability derive from and grow out of the World Commission on Environment and Development's (the Brundtland Commission) 1986 report Our *Common Future*. That report defined sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs." (The term sustainable development first appeared in 1972 at the United Nations Conference on Human Environment in Stockholm.) This definition, while vague, called attention well to the problem of overexploitation and damage of natural resources in the pursuit of economic development and implicitly called for the practice of forms of economic development that better utilize and leave adequate natural resources for future generations. Sustainable development thus merges perpetual economic growth with the maintenance and enhancement of environmental values (Throsby 2002), thereby providing sufficient resources for both current and future economic development. The Brundtland Commission's discussion of

sustainability also included social and economic responsibility as important components of sustainable development, though in many discussions these components played a secondary role to the environmental one.

Key Issues/Current Debates/Future Directions

Sustainable Development in Cultural Heritage

In the latter part of the twentieth century and early part of the twenty-first century, scholars and governments began to consider and apply a modified concept of sustainable development to cultural heritage (see, e.g., Endresen 1999; MacDonald 2004). At times referred to as sustainable preservation, this discussion of sustainability has followed two distinct though related paths: first, the environmental and energy conservation benefits of the preservation and reuse of historic structures and, second, the potential economic and social benefits of the development of cultural heritage sites as touristic attractions or drivers of economic development.

Sustainable Development and Preservation-Historic Structures

Advocates of sustainable preservation argue that there are tangible ecological and environmental benefits from the reuse and redevelopment of existing historic structures. Such reuse may provide enormous energy savings and preserve resources by obviating the need to mine, harvest, produce, and transport new building materials. These savings may dwarf those of so-called "green" or LEED (Leadership in Energy and Environmental Design)-certified construction, particularly since the energy used to construct an average building is 15–30 times greater than its annual energy use (Rypkema and Cheong 2011a). Similarly, a 2011 report of the Preservation Green Lab of the National Trust for Historic Preservation noted, "Building reuse almost always yields fewer environmental impacts than new construction when comparing buildings of similar size and functionality." Current LEED standards give little credit for the environmental benefits of the reuse of historic or existing structures and none for the social and economic benefits.

Various metrics have been developed to measure the environmental benefits of historic preservation, including a building's embodied energy, lifecycle costing, avoided impacts, and reduced carbon footprint. All of these seek to measure energy usage, efficiency, and carbon footprint through the entire process of planning, constructing, and operating a building.

Sustainable Development and Preservation-Economic Development

Recognizing the increasing destruction of cultural heritage and sites from economic development and the potential to create jobs and revenues through tourism and preservation, governments, NGOs, and heritage practitioners have begun to consider the cultural heritage's potential as a driver of economic activity and poverty alleviation. The World Bank in numerous presentations has described its evolving approach toward cultural heritage as one that began with "do not harm," avoiding damaging cultural heritage while implementing other projects (1970–1980), to "specific intervention," investing in particular sites to develop tourism (1980–2000), to the current "integrated approach" that integratescultural heritage in local economic development with a focus on historic cities rehabilitation and sustainable tourism. The Inter-American Development Bank's approach has followed a similar arc.

These economic development projects all state that one of their goals is the sustainability or preservation of cultural heritage assets, allowing their use while preserving them for future generations. In addition to the environmental benefits described above, other suggested benefits include the creation of jobs; increased retail and handicraft sales and ancillary revenues, serving as a catalyst for local and regional development; the rejuvenation of declining towns and neighborhoods; gender inclusiveness; and a greater sense of cultural identity for local communities.

Metrics of project success have included jobs and household income, tourism visits and expenditures, and property values, as well as less directly economic social and environmental

impact studies (Rypkema and Cheong 2011b – see this article for a more detailed discussion of metrics and methodologies). However, measurement of the economic impact of sustainable development has been described as "nebulous" due to the difficulties of data collection (Rypkema and Cheong 2011b: 754), and data has been described as "hard to come by" (Silberman 2011: 48). While much anecdotal evidence of the economic benefits of sustainable development exists, to date there is almost no systematic analysis of the economic, social, or preservation benefits or return on investment of these expenditures.

In addition to disputing the economic benefits of sustainable development, critics have argued that sustainable development devalues the conservation and interpretation of cultural heritage. Other critiques of sustainable development have included the funding of projects that are not economically sustainable, damage and potential loss of access to sites as a result of touristic use and development, the commodification of heritage, displacement of local residents and other changes to local communities, and its lack of applicability to sites without touristic potential.

More recently, sustainability has also been used as a synonym for the stand-alone economic viability of development projects. Organizations such as the Sustainable Preservation Initiative define a sustainable project as one that is self-supporting after an initial grant or investment, in contrast to projects that will not survive without continued funding, normally by an NGO or governmental entity. Sustainable projects do not depend on the continued involvement of such an organization.

Sustainable Tourism

Almost every cultural heritage project includes a tourism component as one of its central features. In response to the potential damage caused by increased tourism, UNESCO, national governments, NGOs, and the travel industry have sought to create a form of tourism that respects and maintains cultural heritage. Sustainable tourism seeks to ensure that travelers conserve and protect both the natural environment and heritage assets, while promoting cross-cultural understanding. In some cases, an important component of this concept is that the tourism supports the community visited and patronizes entities that are locally owned or organized, particularly in poor regions. This issue of who should manage and benefit from tourism and economic development is frequently debated in discussions of sustainability. Many of the benefits and problems associated with this economic development are similar to those described above for sustainable economic development.

Cross-References

- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Heritage Tourism and the Marketplace
- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
- ▶ Iran: Heritage Preservation and Tourism
- ▶ Journal of Heritage Tourism
- ▶ Southern Africa: Cultural Heritage Tourism Development and Management
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

References

Endresen, K. 1999. *Sustainable tourism and cultural heritage: A review of development assistance and its potential to promote sustainability*. Oslo: Norwegian World Heritage Office.

MacDonald, S. 2004. *Heritage and sustainability, a discussion paper*. New South Wales: Heritage Office.

Preservation Lab of the National Historic Trust. 2011. The Greenest building: Quantifying the environmental value of building reuse. Available at: http://www.archdaily.com/204449/the-greenest-building-quantifying-the-environmental-value-of-building-reuse/

Rypkema, D., and C. Cheong. 2011a. Heritage conservation: The real sustainable development. In *Heritage, a driver of development*, 319–320. Proceedings of the 17th ICOMOS General Assembly Symposium, Paris. Available at: http://www.icomos.org/en/what-we-do/disseminating-knowledge/newsletters/157-articles-en-francais/ressources/publications/477-icomos-17th-general-assembly-scientific-symposium-proceedings.

Rypkema, D., and C. Cheong. 2011b. Measurements and indicators of heritage as development. In *Heritage, a driver of development*, 752–759. Proceedings of the 17th ICOMOS General Assembly Symposium, Paris. Available at: http://www.icomos.org/en/what-we-do/disseminating-knowledge/newsletters/157-articles-en-francais/ressources/publications/477-icomos-17th-general-assembly-scientific-symposium-proceedings.

Silberman, N. 2011. Heritage as a driver of development? Some questions of cause and effect. In *Heritage, a driver of development*, 48–50. Proceedings of the 17th ICOMOS General Assembly Symposium. Paris. Available at: http://www.icomos.org/en/what-we-do/disseminating-knowledge/newsletters/157-articles-en-francais/ressources/publications/477-icomos-17th-general-assembly-scientific-symposium-proceedings.

Throsby, D. 2002. Cultural capital and sustainability concepts in the economics of cultural heritage. In *Assessing the values of cultural heritage*, ed. M. de la Torre, 101–117. Los Angeles: Getty Conservation Institute.

Sustainable Cultural Tourism Policies: Overview

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Introduction

For millennia, culture has been an integral part of travel and tourism. Travel to cultural and historical sites as well as to festivals, performances, and events has been recorded since antiquity (McKercher and Du Cros 2002). However, up until 20–30 years ago, tourism was largely seen as a benign industry with little negative environmental, social, economic, or cultural impact (Murphy and Price 2005). This lack of sustainable tourism planning and preparedness has resulted in cultural, economic, and ecological damage at many tourist destinations. As a way to address these problems, various nations and international entities have created policies calling for increased sustainable tourism planning and management. This entry will briefly discuss the relationship between culture and tourism, the development of international sustainable cultural tourism policy, and several of its prominent charters.

Definition and Historical Background

The relationship between culture and tourism first must be explained and historically traced in order to achieve a deeper understanding of sustainable cultural tourism policy. Cultural tourism can be defined as "visits by persons from outside the host community motivated wholly or in part by interest in historical, artistic, scientific or lifestyle/heritage offerings of a community, region, group or institution" (Silberberg 1995: 361). Even though a great percentage of travelers often have some element of cultural tourism in their travel itinerary, cultural tourism was originally associated as an activity of highly affluent and well-educated travelers (McKercher and Du Cros 2002: 151; Richards 2007). In the late 1970s, the tourism industry began to market travel for cultural reasons as a new and specialized form of tourism to the general public (McKercher and Du Cros 2002: 1). Then, by the 1990s, it began to be widely accepted and promoted as a mass tourist activity (McKercher and Du Cros 2002).

Tourism and culture have a dynamic and symbiotic relationship. An increase in tourism has a potential to benefit a site, a culture, its surrounding community, and the nation in which it is located. Its economic revenue can encourage the conservation and economic development of a cultural site, tradition, or community. For instance, intangible traditions on the verge of being forgotten in the community can become reinvigorated and preserved.

However, an increase in tourism can also cause substantial harm to a site and its host community. Since cultural and natural resources are finite, a surge of tourists and inadequate tourism planning may lead to cultural and natural resource damage and depletion, cultural and community exploitation, economic leakage, etc.

Thus, the regulation of cultural tourism is necessary to mitigate these negative impacts. Considering this, it is not surprising that the increased marketing of cultural tourism activities by the tourism industry coincided with the popular dawn of sustainable tourism and a spur in the creation of sustainable tourism policies (Butler 1998: 25).

Sustainable tourism falls under the multifarious sustainable development umbrella. It has been synthesized from the cultural and environmental concerns and the principles of sustainable economic development of the 1970s and 1980s. Sustainable tourism is not univocally defined; its definition and usage vary not only between stakeholders but also within and across disciplines. Among social scientists, sustainable tourism can be generally defined as the incorporation and monitoring of economic, social, and cultural goals in the planning and management of tourism at a site (Hall and Lew 1998; Murphy and Price 2005; Saarinen 2006). In addition, all sustainable tourism plans and policies, as Edgell states, should ideally strive to "integrate the economic, political, cultural and intellectual benefits of tourism cohesively with people, destinations, and countries in order to improve the global quality of life and provide a foundation for peace and prosperity" (1990: 1).

Key Issues

Sustainable cultural tourism policy has been influenced and evolved based on the international community's changing prevalent perceptions of and attitudes toward sustainable and cultural tourism. This section provides a chronological overview of key international sustainable and cultural tourism policies.

The first international cultural tourism policy, the Charter on Cultural Tourism, dates to 1976. It was preceded by substantial growth in the tourism industry and an increase in many governments and political entities' involvement in it due to their discovery of tourism's earning potential (Hall and Page 2006: 397). This increase in tourism's popularity and related discussions led to the United Nations XXI General Assembly designating 1967 as the "International Tourism Year," during which it passed a resolution called the "Importance of Tourism" stating that "tourism is a basic and most desirable human activity deserving the praise and encouragement of all peoples and all Governments" (United Nations 1967). However, cultural and sustainable tourism policy discussions did not become prevalent until the 1970s.

ICOMOS Charter on Cultural Tourism

In 1976, the International Council on Monuments and Sites (ICOMOS) held an International Seminar on Contemporary Tourism and Humanism. The Charter on Cultural Tourism is the result of this seminar. This charter was a revolutionary document in that it acknowledges tourism's irreversible "social, human, economic and cultural" effects, which had not been addressed before by an international body in writing (ICOMOS 1976). It also recognizes tourism as an important growing industry, but opposes "tourism's anarchical growth" and its negative consequences (ICOMOS 1976). To counteract tourism's negative effects on cultural and natural resources, it distinctly calls for conscientious tourism planning and policy regulation. It states, "with the future in mind. . .cultural and natural heritage which must take precedence over any other considerations however justified these may be from a social, political or economic point of view" (ICOMOS 1976).

In contrast, the charter also notes that tourism can have economic and cultural education benefits. It calls for the education of tourists, especially children, regarding the importance of the monuments and sites. Also, it recommends training for community members regarding how to evaluate and develop their relevant tourism site in order to safeguard it from tourism-related threats.

Unfortunately, this document focuses its cultural-based discussion primarily on tangible and monumental sites, which is referred to as "that privileged part of the human heritage" (ICOMOS 1976). Discussion regarding intangible cultural heritage tourism is notably absent, but this issue was developed in later policies over the next 20 years.

Manila Declaration on World Tourism

In October of 1980, Manila Declaration on World Tourism was developed at the World Tourism Conference. The declaration states that everyone should have the right to engage in travel and tourism (WTO 1980). It argues that states should encourage and support their populace's

engagement in domestic and international tourism in order to increase the following: social solidarity; national and heritage pride; cultural awareness; and international economic, sociocultural, and political cooperation. The declaration also advises states to provide tourism education and training for their populace (especially their youth). The Manila Declaration ultimately views world tourism as a means of promoting further steps toward world peace.

Furthermore, it asserts that world tourism is more than a "purely economic activity" and should not be the only reason a government chooses to endorse it (WTO 1980). Governments are encouraged to look beyond economic development to also consider and advance the social, human, and cultural dimensions of tourism (WTO 1980). Heritage tourism in this document is still perceived as and limited to physical and site tourism.

Brundtland Report and Agenda 21

By the mid-1980s, discussions concerning cultural tourism and sustainable development became prolific (Hall and Page 2006: 397). In 1987, the World Commission on Environment and Development (WCED) developed the Brundtland Report entitled "Our Common Future." The concepts of sustainability and sustainable development discussed in this document were later adapted for the tourism industry and influential in its sustainable tourism policies. A large concern of the WCED was intergenerational fairness and ethics (Butler 1998: 33). It states that current resource use and development should not compromise the future generation's ability to "meet their own [resource] needs" (World Commission on Environment and Development 1987).

This document and the later Agenda 21 developed at the 1992 United Nations Conference on Environment and Development (UNCED) helped spark sustainability discussions in the tourism field (Saarinen 2006: 1122). UNCED's Agenda 21 identified travel and tourism as a key economic sector with the possibility to make a positive contribution toward achieving sustainable development. It then spurred the formation of the Travel and Tourism Industry's Agenda 21 in 1996 (USAID 2005). Even though these policies primarily refer to the physical and natural environment, their perspectives on sustainable development also influenced future sustainable cultural tourism discussions and policies (USAID 2005).

Charter for Sustainable Tourism

In 1995, the Charter for Sustainable Tourism was created by the World Conference for Sustainable Tourism. It is influenced by the "principles set forth in the Rio Declaration on the Environment and Development and the recommendations arising from Agenda 21" (WCST 1995). The charter states that tourism must respect not only the economic and environmental structure of a destination but also the human dimensions and dignity of the local community in order to avoid negative impacts within the region.

The charter proclaims that the sustainable tourism effort should be a respectful and collaborative one with cooperation throughout all the tourism industry levels, including local, national, regional, and global. It calls for all tourism stakeholders and participants to work together toward the implementation of sustainable tourism activities. Moreover, it recommends that all governments and the United Nations try to develop sustainable tourism plans of action.

It advocates for tourism to "be integrated with the natural, cultural and human environment" (WCST 1995). Tourism projects and strategies should consider their effect on a local community's cultural heritage, aiming to protect not only their physical cultural sites but also their intangible elements such as local traditions and identity. In addition, it proposes that environmentally and culturally vulnerable areas as well as areas that have been degraded by high impact tourism receive special priority for aid and technical assistance.

Ultimately, the charter proposes that tourism planning and management should conserve and protect the natural and cultural heritage of a destination and its host community as well as enhance the local economic conditions while concurrently satisfying tourists' needs (WCST 1995).

The International Cultural Tourism Charter

The International Cultural Tourism Charter was established in October of 1999 by ICOMOS at its

Twelfth General Assembly meeting in Mexico. The Charter's ethos states that "a primary objective for managing heritage is to communicate its significance and need for its conservation to its host community" (ICOMOS 1999).

The charter notes the presence of a dynamic and reciprocal relationship between tourism and cultural heritage relating to economics, management, protection, and cooperation. It declares that there should be a tourism planning process dialogue between stakeholders, which focuses on the equitable treatment of present-day host community, indigenous custodians or the owners of historic property, and the descendant communities and cultures from which that heritage evolved.

Additionally, it proposes that cultural tourism activities should be enjoyable and educational for visitors while also respecting and enhancing the heritage and economic conditions of the host community.

The charter proclaims a duty of respect for heritage objects and values and promotes their management in a sustainable manner for current and future generations. It also discusses the importance of protecting a site and community's "authentic" tangible and intangible cultural heritage (ICOMOS 1999). Moreover, it encourages the use of "detailed, measurable goals" in the cultural tourism planning and policy-making process, especially with regard to the promotion, presentation, interpretation, and protection of heritage areas and cultural activities (ICOMOS 1999).

This charter implicitly suggests that when cultural heritage tourism is adequately managed and planned, it will result in economic and community benefits. As a result, it tries to anticipate and mitigate any possible problems. However, in this short document, it is impossible to analyze and cover all the possible factors that can lead to tourism complications and negative outcomes.

Global Code of Ethics for Tourism

In 1999, the General Assembly of the United Nations World Tourism Organization (UNWTO) adopted the Global Code of Ethics for Tourism. This code of ethics advocates "maximiz[ing] the positive economic, social and cultural effects of tourism . . . while minimizing its negative social and environmental impacts" (UNWTO 1999). It states that all tourism participants should be responsible to uphold this code of ethics and to practice ethical tourism. Thus, tourists should try to protect not only themselves but also the environment, culture, and people of their destination's host communities. In addition, governments and other authorities need to be attentive to and spread awareness about the social, cultural, and environmental vulnerabilities that affect host communities as well as tourists. Local communities should be able to express their culture, livelihoods, and religion, but they should be careful to avoid infringing upon the tourists' beliefs and security.

The UNWTO believes "tourism is a user of cultural heritage of mankind and a contributor to its enhancement" (UNWTO 1999). This code promotes a global human heritage of which everyone is a part and shares, but the local community has specific rights and obligations to the maintenance, profits, and safeguarding of its heritage resources (UNWTO 1999). It promotes the use of sustainable policies and plans that will protect and support cultural heritage resources, traditions, performances, and crafts in order to allow them to thrive and flourish and be accessible for future generations to experience.

Future Directions

Since 1999, there have not been any new prominent international sustainable cultural tourism charters. However, there is a need for change since the implementation of the aforementioned sustainable development and cultural tourism policies has proven to be difficult. They have been sporadically and erratically applied, if at all. This is partly due to their vague and fluctuating policy criteria, assessment standards, and definitions (Font 2005; Murphy and Price 2005).

There is a need for a more consistent framework for which to evaluate tourism programs in order to ensure operation is in accordance to international standards. However, the framework would have to be flexible enough to fit the unique needs of each tourism program. Also, the concepts

that would be involved in that assessment are quite complex, and one has to be cautious in employing them (Murphy and Price 2005: 178). For instance, it may be found difficult to set a minimum level for sustainability, and if one is set, it can discourage others from going above and beyond that level especially if financial incentives are involved.

Furthermore, there are often a plethora of tourism stakeholders at various power levels who can negatively affect the regulation of sustainable cultural tourism. The regulation can be viewed as a local, regional, national, and global issue simultaneously, which can result in a higher likelihood of overlapping regulatory agencies and policies. Ultimately, the best way to ensure the utilization of international sustainable cultural tourism policy is through the collaboration and corroboration of all stakeholders.

Cross-References

- ▶ Heritage Tourism and the Marketplace
- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
- ▶ Journal of Heritage Tourism

References

Butler, R. 1998. Sustainable tourism-looking backwards in order to progress? In *Sustainable tourism: A geographical perspective*, ed. M. Hall and A. Lew, 25–34. New York: Addison Wesley Longman Limited.

Edgell, D.L. 1990. *International tourism policy.* New York: Van Nostrand Reinhold.

Font, X. 2005. Sustainable tourism standards in the global economy. In *Global tourism*, ed. W. Theobald, 3rd ed., 213–229. Amsterdam: Elsevier.

Hall, C.M., and A.A. Lew. 1998. The geography of sustainable tourism development: An introduction. In *Sustainable tourism: A geographical perspective*, ed. M. Hall and A. Lew, 1–12. New York: Addison Wesley Longman Limited.

Hall, C.M., and S.J. Page. 2006. *The geography of tourism and recreation: Environment, place, and space*. 3rd ed. New York: Routledge.

ICOMOS. 1976. The Charter on Cultural Tourism. Available at: http://www.icomos.org/tourism/tourism_charter.html. Accessed 20 June 2011.

ICOMOS. 1999. International cultural tourism charter: Managing tourism at places of heritage significance. Available at: http://www.icomos.org/tourism/charter.html. Accessed 20 June 2011.

McKercher, B., and H. Du Cros. 2002. *The partnership between tourism and cultural heritage management*. New York: Haworth Press.

Murphy, P.E., and G.G. Price. 2005. Tourism and sustainable development. In *Global tourism*, ed. W. Theobald, 3rd ed., 167–193. Amsterdam: Elsevier.

Richards, G. 2007. Introduction: Global trends in cultural tourism. In *Cultural tourism: Global and local perspectives*, ed. G. Richards, 1–24. New York: Haworth Press.

Saarinen, J. 2006. Traditions of sustainability in tourism studies. *Annals of Tourism Research* 33: 1121–1140.

Silberberg, T. 1995. Cultural tourism and business opportunities for museums and heritage places. *Tourism Management* 16: 361–365.

United Nations. 1967. General Assembly – Twenty-first session. Available at: www.undemocracy.com/A-RES-2152(XXI).pdf. Accessed 10 Dec 2010.

UNWTO. 1999. WTO Global Code of Ethics for Tourism – World tourism. Available at: www.world-tourism.org/code_ethics/eng.html. Accessed 20 June 2011.

USAID. 2005. USAID and sustainable tourism: Meeting development objectives. USAID. June 2005. Available at: usaid.gov/pdf_docs/PNADE710.pdf. Accessed 10 Dec 2010.

World Commission On Environment And Development. 1987. *Our common future*. Oxford: Oxford University Press.

World Conference For Sustainable Tourism (WCST). 1995. Charter for Sustainable Tourism. Available at: http://www.gdrc.org/uem/eco-tour/charter.html.

WTO. 1980. Manila Declaration on World Tourism. Available at: www.world-tourism.org/sustainable/doc/1980%20Manila-eng.pdf. Accessed 20 June 2011.

Swahili Archaeology

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Worldwide Historical Perspectives

Relations between Egypt and sub-Saharan Africa had already been established since the Pharaonic period. Sailors set sail for the land of "Punt" (Meeks 2002; Tuchscherer 2004), to the south of the Red Sea, in order to bring back incense, ivory,

and slaves. At the beginning of the first millennium CE, the discovery of monsoon winds and how they could be used started a veritable nautical revolution which meant that very long journeys to India and Ceylon were possible. The Egyptian port of Berenice maintained trading relations with the Indian port of Barygaza and the African port of Rhapta (Keswani 1980: 41). Throughout Antiquity, the coastline from Somalia to Zanzibar had been known as Azania. For knowledge of the African coastline during the Greco-Roman period, the two major texts that are used are the "Periplus of the Erythraean Sea," an anonymous document drawn up in Alexandria in 60 of "our era," and the book written in 150 AD by Claudius Ptolemy, a Greek from Alexandria, entitled "Ptolemy's Geography" (Freeman-Grenville 1962: 1–3; Gray 1963: 9–30). Ptolemy mentions the lands of Zengis to the south of the Aromatic Cape (Cape Guardafui). Zengis/Zeng is apparently a term derived from the Greek for "arid" and thus denotes the African lands and black people. In 547–549 AD, another Egyptian (a native Greek merchant from Alexandria), Cosmas Indicopleustes, talks about Zingion, to the south of the land of the Barbarians (Devic 1883: 18). These authors mention numerous trading entrepôts located along the East Coast of Africa. Further on than the Barbaric land is Port Opone which heralds the beginning of the Aromatic Coast (the coast of the Somalis), and then the land curves southward and the ships reach the Azanian coastline (Desanges 1999: 348). The first port on this coast is called Sarapion followed by Nikon (Barawa or Bur Gao) (Freeman-Grenville 1962: 21–22) and the mouths of several rivers. The ships reach the Pyraliean islands (the Lamu Archipelago) (Mathew 1963), and after 2 days travelling along the Ausanitic Coast ("Azania"), the travellers catch sight of the flat and forested island of Menouthias (Zanzibar) (Clark and Horton 1985: 34). Another 2 days travelling are needed to reach the final marketplace on the coast, known as Rhapta.

The Sassanians became great trading intermediaries, following the weakening of the Roman Empire and the collapse of the Parthian Empire. They controlled the majority of the maritime routes of the Persian Gulf from the third century of "our era." The Sassanians and the Aksumites became the predominant navigators of the Red Sea and the Persian Gulf, and this was the case up until the sixth century (Desanges 1999: 351; Keswani 1980: 41). The Sassanian King Ardashir I established his capital at Ctesiphon and subjugated the Kingdoms of Kushan, Turan, Makran, and Bahrain (Fiorani and Besenval 1990: 133–134 and 136–140; Piacentini and Besenval 1990). At that time, the large Sassanian ports of Sohar and Siraf channeled all the wealth that was transiting between Africa and India. Moreover, the Sassanian King Vahram V (r. 421–438) even married an Indian princess from whom he received a dowry in the form of the city of Daybul; this Indus Delta port was the meeting point between Aden and Sri Lanka (Carswell et al. 2013: 40–52). The Christian Aksumite Kingdom was at its height between the fourth and sixth centuries and the large Aksumite port of Adulis acted as a relay from Alexandria on the Red Sea before the advent of Aden. Cosmas Indicopleustes recounted his journey through Adulis en route to Ceylon in 525 AD (Freeman-Grenville 1962: 5). Once the ships arrived in the Gulf of Aden, they did not travel directly toward India or Africa, but were replaced by either Aksumite or Yemenite ships (Desanges 1999: 323). It appears that Roman trade was relayed indirectly by Yemenite, Indian, and African intermediaries.

Although trade between East Africa and the Persian Gulf was disrupted in the seventh century, it saw a resurgence in the eighth century. However, the relationships with the merchants were different as the Muslims started to settle in Africa and to stimulate African urbanization. Among the earliest medieval testimonies, one of the most extraordinary is that of Du Huan, an officer in the Chinese Army. Captured during a battle at Tashkent in 751, Du Huan was enslaved and led into the region of Baghdad. In 761, he accompanied some Persian dignitaries along the coasts of Sudan and Eritrea. The following year, he managed to return to Canton where he wrote an account of his travels, the "Jingxingji" (Smidt 2001: 17–28). From this adventure we learn that

crews from the area around Baghdad visited the African coasts from the eighth century.

In the ninth century, Persian ships departed principally from Sohar and from Siraf, the port of Shiraz. The most famous tale of a Persian navigator is still "The Adventures of Sinbad the Sailor." The adventures of this sailor-cum-merchant apparently took place between 806 and 807 (Casanova 1922: 172). During his second voyage, Sinbad reached the region of al-Qumr which includes the Comoros Archipelago and the north of Madagascar. Many myths and legendary characters still remain like these dog-headed cannibals (Devic 1883: 111–113), which were possibly the Lemurians of Anjouan or of Mayotte in the Comoros Archipelago. Of course, there is the "Roc," the legendary giant bird of prey which was undoubtedly the Aepyornis of Madagascar. In Hormuz Port, Sinbad mentions that African ivory tusks were sold. During his fifth voyage, Sinbad visits Somalia and the eastern coast up to Anjouan and the island of Mouyâ (Mayotte?) where both cinnamon and pepper grow (Khawam 1985: 67, 170–171 and 211). Aloeswood apparently comes from the island of Chadjî located 5 days' journey time from Comoros and was, undoubtedly, the Maldives. Sinbad travelled along the African coasts, and then, via Comoros, he directly rejoined the Maldives up to the Indian coasts. This important information is corroborated by other texts written by contemporary Arab geographers (Planhol 2000: 93) such as Oubayd Allah Ibn Khorradâdhbih in 846 and Dja'far al-Marwazî in 887. Thus, from the ninth century, there were two great maritime routes between Asia and Africa (Sauvaget 1954), one which ran along the Arabian Peninsula and conveyed the ships which depended on the Omani and Yemenite coasts and the other which headed straight across the ocean (Fig. 1). These sources indicate that as early as the ninth century, there were major shipping routes between Asia and Africa.

Written Arabic sources became more frequent during the tenth century. From al-Masudi's testimony in 916, we learn that many ships belonged to the Omani and Sirafi sailors Masûdi. Xth c. (Meynard ed. 1970). From the tenth century, the Arabs noticed that the Zanj were speaking in a different dialect than that of the blacks who lived inland, something which could mean that the Swahili language traced its origins to this precise moment (Freeman-Grenville 1962: 16). According to the Kilwa Chronicles (Freeman-Grenville 1962: 34–49), the first Shirazi princes arrived on the island in the tenth century. Not all the Africans living on the coastline were Muslims, and there were still many idolatrous pagans left. It was only the city of Qanbalû that had an Islamized population with a king known as the Mfalme. The city of Qanbalû is mentioned in 945 by Ja'far b. Râchid, also known as Ibn Lâkîs, the famous captain. Ibn Lâkîs recounted the attack on Qanbalû by about a thousand pirate ships from the land of Waq-Waq (Planhol 2000: 113–114 and Bacqué-Grammont 2007) which it seems came from Madagascar and apparently travelled up the African coast for a year and pillaged many cities along the Zanj Coast, notably Sofala. The city of Qanbalû was apparently built in the middle of an estuary, on a peninsula/island, and surrounded by a city wall (Freeman-Grenville 1962: 9–17; 39–40 Shepherd 1982: 133; Horton and Middleton 2000: 66).

Another sailor's account from the Persian Gulf was written in the middle of the tenth century (Buzurg b. Shahriyâr 953 [1954]: 189–309). Buzurg ibn Shahriyâr was originally from Hormuz Port and he wrote 'The Book of the Wonders of India' (Planhol 2000: 101; Ibn Khurradadhbeh 885 and Ibn Ḥawqal 988; Freeman-Grenville 1962: 9–13). The text provides very important information on the products traded between Africa and Persia. In the text he mentions not only the gold mines of the Zanj country, but also the African slave trade in the tenth century. Having left Oman en route to Qanbalû in 922, Buzurg ibn Shahriyâr's ship was driven off course toward Sofala (a city in the Zanj land) by the ferocity of the winds. The sailors were warmly welcomed there and they began bartering. Taking advantage of the hospitality and naivety of their hosts, Buzurg decided to abduct the king of the Zanj people and seven of his followers when their ship was departing. The king was placed down in the hold with 200 other captives and was then sold as a slave at al-Basrah where he converted to

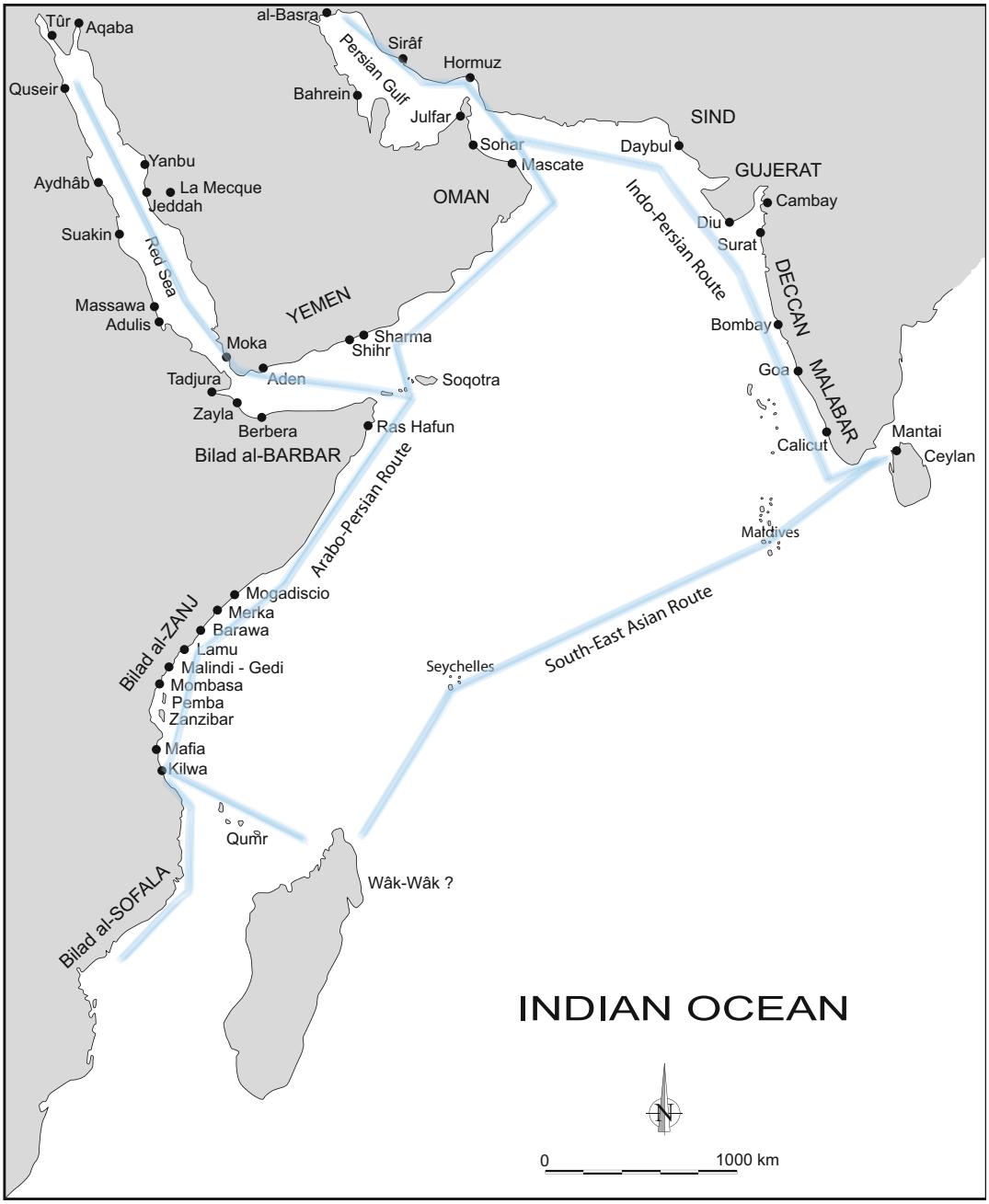

Swahili Archaeology, Fig. 1 Map of the Indian Ocean marking the locations of the principal medieval ports

Islam; then he was sent to Baghdad. Following a pilgrimage to Mecca, he escaped and headed for Egypt and, after a long journey, returned to his country. By coincidence, years later, the winds carried Buzurg and his fellow travellers back into the same African area, where, faced with their cowardice and the crime committed, they took fright when they recognized the king whom

they had previously captured. However, the king, full of grace, forgave those who had sold him as a slave: was it not predestined anyway that he should become Muslim? The *Book of Wonders* also indicates that the king converted his people. This very short story of conversion is extremely interesting as it is one of the earliest accounts of Islamization in East Africa and also a testimony of the slave trade for this period.

The period from the eleventh to the twelfth century was a period of transition, with the prestige of Baghdad on the decline in favor of Fatimid Cairo, the great new Islamic metropolis. Also, the Sulayhid Dynasty of the Yemen was to maintain close ties with Fatimid Egypt from 1084 to 1138 (al-Bakri 1094 (1965) and Moncelon 1995: 29–30). The merchants of the Persian Gulf remained very active, but they preferred other ports, often on islands such as Qish, Hormuz, and Bahrain. The earthquake that destroyed Siraf, the port of Shiraz, in 977 and the fall of the Bûyides in the eleventh century led to a massive exodus of Persians who emigrated toward the island of Qish and the island of Hormuz in the Persian Gulf, but also to Jeddah in the Red Sea. It appears that this exodus of the Shirazis was a phenomenon that affected all the Indian Ocean as the majority of old Swahili cities were apparently founded by the Shirazis. Axelle Rougeulle also stated that the Yemenite port of Sharma, on the banks of the Hadramawt (Rougeulle 2015), was founded and occupied from 980 to 1150. Many African urban centers were created between the eleventh and twelfth centuries, and the stone architecture was developing with coral sea stones (*Porites*) cut in small regular ashlars first for the mosques and the storehouses (Pradines 2009: 67–70). The Swahili city-states were being set up at this time. Al-Idrîsî, working at the Court of the King of Sicily, is our main contributor when it comes to information about the East Coast (Idrisi 1154 (1968)). His geographic compilation *Nuzhat al-Mushtaq fi Ikhtiraq al-Afaq*, dating from 1154, describes Malindi and Mombasa as great African cities and also speaks about the island of Angazidja (Anjouan) and of Sufala, the Golden Land (Freeman-Grenville 1962: 19; Guillain 1856: 205–206 and Ferrand 1891). Most of his descriptions are probably knowledge collected earlier by the Fatimids who knew very well the coast of East Africa that they described in *The Book of Curiosities: An Eleventh-Century Egyptian Guide to the Universe* (Rapoport and Savage-Smith 2014: 437–446).

The thirteenth century was a period of political changes in the Muslim world. The stability was established with the Ayyubids and then the Mamluks in Egypt and the Rasûlids in the Yemen (Freeman-Grenville 1962: 45). The Shirazi Dynasty of Kilwa was replaced by the Mahdali Dynasty, a Hadhrami tribe from the south-west of the Yemen. This new power is linked to the Seljuqs of the Persian Gulf as well as to the Indians of the Indus Delta and the Deccan. The Arabian Peninsula's position strengthened therefore from the thirteenth century with the ports of Aden and Shihr. The Swahili coastline was divided into several independent sultanates (Barros 1552 II, 21), including Kilwa, Mombasa¸ Malindi, Pate, Merka, and Mogadishu, which were described briefly by Yâkût in 1212–1229 (Yâkût 1224 (1964)). Other more confused sources spoke about the African coast; for example, in 1295, Marco Polo provided a Chinese description of Mogadishu and Zanzibar (Freeman-Grenville 1962: 42). However, we had to wait for Ibn Battûta to have, in Battûta 1331, and Abulfida in 1342 (1848) a detailed and precise description of the cities on the Zanj Coast (Ibn Battuta 1854 edition: 179–196 and Freeman-Grenville 1962: 27). Ibn Battûta provided us with a detailed description of the East Coast (Reinaud 1848: 206–208; Guillain 1856: 299–300). The city of Zeila was the capital of the Berbers, the Shafi'ite blacks. Then came Mogadishu and the city was ruled by Sultan Sheikh Abu Bakr ibn Sheikh Omar, and his qadi was an Egyptian eunuch. The religious rituals were identical to those of the Yemen. Ibn Battûta noted that Mombasa was a great city. Apparently, Kilwa was one of the most beautiful cities in the world with its stone houses, mosques, and palaces (Freeman-Grenville 1962: 25–33). The inhabitants of Kilwa, like all the coastal dwellers, were Sunni Shafi'ites. From the fourteenth to the fifteenth century, Kilwa held the monopoly on gold trading, and Ibn Battûta

specified that the Sofala gold came from Yufi, in the land of the Limis, located within 1 month's walking distance from the coast. Sofala, which was a vassal of Kilwa, maintained trading relations with the Shona kingdom of Great Zimbabwe, where the gold mines were situated. The rise of Great Zimbabwe was intimately linked to the trading of gold with Muslim merchants and not due to the cattle theories.

The coast's political situation was still evolving at the beginning of the fifteenth century, and certain city-states were beginning to have very important territories; attempts at state control of the principalities of Pate, Mombasa, and Kilwa were being seen here. Toward the end of the fifteenth century, technical literature relating to navigation appeared, and these works described the African coasts in detail. The most famous nautical route maps were those of Ibn Madjîd (1475–1478 and 1495–1496) and those of Sulayman al-Mâhrî (1511–1512). Apart from a geographic description of the places, these texts provided much information on the main trading players in the Indian Ocean. In the Sofâliyya, Ahmed Ibn Madjîd noted that numerous captains came from the Zanj (Ducatez 2003: 139; de Planhol 2000: 115–117). This observation is noteworthy, and it teaches us that the African sailors crisscrossed the Indian Ocean alongside the masters of navigation who, according to Sulayman al-Mâhrî, were the Arabs from Hormuz, the Gujarati, and the Cholas from India.

In 1498, Vasco de Gama opened the route to India, and, at this time, his scribe, Alvaro Velho, recorded a lot of information on the state of the Swahili cities prior to the Portuguese domination. In 1505–1506, the anonymous journal of Francisco d'Almeida's voyage described the rebel cities of Kilwa and Mombasa. The Portuguese sources of the sixteenth and seventeenth centuries, such as João de Barros, Castanheda, Correa, Duarte Barbosa, João dos Santos, and Francisco de Monclaro, were plentiful and contained extensive detail of the commercial and political alliances of the coastal people (Strandes 1899). The European objective was to control eastern trade markets. They possessed two important technological advantages that ensured their domination of the Indian Ocean: the use of firearms and large, fast boats, caravels. The Portuguese built some 50 forts around the Indian Ocean, from Mozambique to Malacca, occupying the coasts of Kenya and Tanzania during the sixteenth and seventeenth century (Pradines et al. 2016: 50–75). Despite founding some trading posts, they quickly abandoned any attempt at political hegemony and were content keeping control of the sea routes.

At the end of the seventeenth century, the area saw significant conflict involving Portuguese and Omani forces. After the fall of Mombasa in 1697, the Imam of Oman sent governors and garrisons to large cities such as Pate, Lamu, Mombasa, Zanzibar, and Kilwa. In 1832, the Omani capital was transferred to East Africa and the Sultanate of Zanzibar was founded (Anene 1966: 440–457). The Sultanate of Zanzibar required a lot of slaves to maintain its clove plantations, the main export product. Large caravans were organized by the Omanis who destroyed the indigenous populations' economy and introduced firearms in exchange for slaves and ivory. These slave caravans were funded by wealthy Indian merchants, the *banian*s (Alpers 1976: 22–44). But the commercial force of the Sultanate of Zanzibar was also its weakness, its plundering economy being based solely on slavery and the export of tropical products such as ivory and cloves and the limited number of these products increasing the precariousness of the economic system (Burton 1872; Miège 1982: 293–318). The direct slave trade brought about important social changes, with Swahilis using landward populations rather than venturing beyond the coastline. For the first time in the history of East Africa, Islam took root in the interior lands of Kenya and Tanzania, right up to the Great Lakes region. In 1876, the movement of slaves toward the coast was strictly prohibited. The prohibition of the slave trade and the development of steam navigation eventually destroyed the supremacy of the Omani fleet. The opening of the Suez Canal imposed one last blow on the Sultanate causing it to lose its primary markets. The last sultan, Sa'îd Barghash, died in 1888 and Zanzibar became a British protectorate on 1 July 1890.

The Swahili: A Muslim Culture from East Africa

The Swahili coast is a stretch of land that extends from Mogadishu in Somalia to the Bay of Sofala in present-day Mozambique. The Muslim geographers divided the coast into four regions: firstly, the navigators reached the *land of the Barbarians*, the Bilâd al-Barbar, and then came the *land of the blacks*, known as the Bilâd al-Zanj, located between the Shebelle River and the island of Zanzibar; then they arrived at the land of the Sofala, the Bilâd al-Sufâla, also called *Sofala the Golden* or Sufâla al-Dhahab, the area between the mouths of the Zambezi and Limpopo rivers, and finally some sailors travelled right up to the land of the "Waq-Waq," a land that comprises Comoros and the large island of Madagascar.

Etymologically speaking, "wa-swahili" means the people of the "Sahel," the Arabic term for the "shore." This appellation dates back to the colonial period and the nineteenth century, with the Muslim geographers (al-Masûdi, Idrîsî, Yâkût, Ibn Battûta to Ibn Khaldûn) preferring the appellation "Zanj" which not only referred to the inhabitants of the East African coasts but also to black people in general (Freeman-Grenville 1962: 29). This term comes from antiquity and from the Greeks who used the name "Azania" to denote the African coasts. The Portuguese also noticed a difference between continental Africans and the people of the coast, who in light of their religion and customs they equated with "Moors" or "Kaffirs." The Swahilis have defined between themselves according to their region, island, or town of origin. For example, the people from Mombasa refer to themselves as wa-Mvita. Despite some common ground, Swahili identity remains multiple, incorporating populations of diverse background, Nilotic Cushitic, Bantu, and Austronesian.

The Swahili civilization stands at the periphery of the Muslim and African worlds, resulting in the development of a unique coastal culture based on trade. In fact, its marginal position is linked to our vision of the Indian Ocean, which separates Africa, Arabia, and Asia. But the ocean also provides a connection between these very different cultures: the Swahilis are thus dynamic players, equal to Arab, Persian, and Indian traders. As well as religion and language, these coastal populations share the same social organization and architecture. More than 450 Swahili archaeological sites have been registered spread over 3000 km of the coastline (Pradines 2004: 18–20). The lifestyles on the East Coast, Comoros and Madagascar, were homogenous due to the dissemination of new ideas and techniques by maritime travellers. Swahili culture reflects neither a specific ethnic group nor a particular nationality.

Historiography of the Research

The precursors of Islamic archaeology in East Africa are the explorers of the late nineteenth century who did what we call today pluri- or multidisciplinary research. They recorded information's and data about people and monuments, describing indistinctively nature and culture in an encyclopedic manner. In 1856, Charles Guillain wrote the first historical report on the east coast of Africa, while R. Brenner visited sites in the archipelago of Lamu, Mambrui, and Malindi in 1868. Richard Burton mentioned ruins in Zanzibar and Tanganyika in 1872. But it was Georges Révoil who carried out the first research, digging several trenches in Mogadishu in 1882. Révoil's contribution is very important for archaeology, as he published many buildings that today have disappeared or fallen into ruin (Révoil 1885/1888). Photographs were also taken by Sir John Kirk who visited Gedi and Lamu in 1897. Captain J. Stigand published photographs of Lamu, Takwa, and Pate in Stigand 1913. F.B. Pearce initiated the first research into Zanzibar and Pemba in 1920; he was followed by W.H. Ingrams in Ingrams 1931 and L. Buchanan 1 year later. The ruins of Kilwa were declared heritage-listed monuments and were restored by a German team in 1935. The pre-WWII period was thus characterized by a rising awareness of the historical value of Swahili archaeological sites.

The first scientific archaeological excavation on a medieval Swahili site can be traced to 1948. A disciple of Mortimer Wheeler, James Kirkman, was sent to Kenya to excavate and protect the site of Gedi. Mythic stories had been circulating about this lost city, which was believed to be the work of Phoenicians or Egyptians lost on the African coast. The excavations lasted 10 years, until 1958, and the results were published in 1954 and 1963 (Kirkman 1954, 1963, 1964). Kirkman also investigated two other major sites, the city of Ungwana in north Kenya and the Fort Jesus in Mombasa (Kirkman 1966, 1974). The museum of Fort Jesus opened to the public in 1960 and was managed by Kirkman until 1972. As early as 1948, Kirkman founded the Coastal Archaeology Unit of the National Museums of Kenya. This department was originally based in Lamu but was later transferred to Fort Jesus. Its current offices are located in the former courthouse of East Africa, in Mombasa. The role of this department is to record, monitor, and protect more than 120 historical and archaeological sites along the coast of Kenya, with its researchers conducting rescue and research operations on endangered sites. Kirkman made numerous excavations and topographical surveys in Takwa, Kilepwa, Kioni, Mnarani of Kilifi, Jumba la Mtwana, Kinuni, and Ras Mkumbuu on Pemba Island. The 1950s was also marked by archaeological surveys conducted by Mortimer Wheeler and Gervase Mathew in Kilwa and Songo Mnara. In 1964, James Kirkman published the first monograph on Swahili archaeological sites: *Men and Monuments on the East African Coast*. Significantly, he refused to attribute the invention and use of coral limestone architecture to Africans, preferring to see it as the result of Arab or Persian colonies. According to Kirkman, only foreigners could be the cause of urbanization, where towns were established as Arab trading posts, not as African cities.

A second important figure in Swahili archaeology, Neville Chittick, was appointed director of the *British Institute in Eastern Africa* in 1962. This Institute, founded in 1960, had as its principal goal, the promotion of archaeological research in East Africa. Chittick was particularly interested in the medieval cities on the Kenyan and Tanzanian coasts. During the 1960s and 1970s, he undertook two major excavations, one in Kilwa in south Tanzania and the other in Manda in north Kenya (Chittick 1974, 1984). Chittick also initiated excavations in Songo Mnara, in Kisimani on the island of Mafia, and in Pate in the Lamu Archipelago, explorations in Somalia, and surveys in Mogadishu. Problems with Chittick's work were his lack of interest in the ancient pre-Islamic occupations of Kilwa and his classification of African pottery called "cooking pots." Nevertheless Chittick published more African ceramics than most of the scholars who nowadays criticize him. Unfortunately the job of an archaeologist is to collect data first and then to write about them. Ceramic drawings are not an option but a part of the job.

In 1966, the work of Peter Garlake, *The Early Islamic Architecture of the East African Coast*, was published and is considered a milestone in the study of Swahili architecture (Garlake 1966). Garlake did a systematic inventory of all the ruins on the Tanzanian, Kenyan, and Somali coasts. He analyzed the evolution of local Swahili architecture and integrated it into the wider Islamic world. Unfortunately he stayed focused mainly on mosques and palaces (except for the town of Songo Mnara that he described in detail). In the 1970s, Thomas Wilson identified 450 to 500 stone establishments extending from Warsheikh to the north of Mogadishu and to the Bay of Sofala in Mozambique. Wilson's work arguably initiated reflection on the articulation of Swahili territories and Swahili urbanism (Wilson 1978, 1980, 1982).

In a 1962 publication, the famous historian Freeman-Grenville conceded that Swahili towns could be of African origin. But it's in 1974 that James de Vere Allen affirmed the African origin of the Swahili towns in his talk, "Town and Country in Swahili Culture," during the Leo Frobenius symposium in Cologne. In a 1981 article, he argued that Swahili urbanization and culture were exclusively Africans (Allen 1981: 306–334). Unfortunately, this research on "African roots" resulted in aberrations during the 1980s and later (Kusimba 1999; Chami 2006). The posthumous work of James de Vere Allen mentions the presence of an African state in the ninth

century, the Great Shungwaya. Allen argued that this state, located in what is now southern Somalia, consisted of Cushitic-speaking peoples who later dispersed and founded the Swahili towns. This Afrocentrist vision was pure fantasy and not based on any archaeological or historical evidence. The same views were presented in the *General History of Africa* published by UNESCO; Henry Mutoro declared: "The material forms assumed by Swahili culture present no analogy with Arab or Persian civilizations. There is no exact correlation between Swahili stone constructions and Middle Eastern, Arabic and Persian architecture, which leads one to suppose that it drew its inspiration from the latter" (Masao and Mutoro 1990: 645). After the colonialist vision of Arab-Persian trading posts, the postcolonial Europeans and Africans both became engaged in the elaboration of a new ideological model, the Africanization of Swahili cities, a theory supported by the myth of Shungwaya (Mutoro 1987; Chami 1998: 199–218).

In the meantime regional studies were conducted. In the 1970s, Pierre Vérin initiated archaeological research in the north of Madagascar (Vérin 1975). His team engaged too with the study of the Comoros, with Claude Allibert and Daniel Liskowsky who continued the research started by Henry Wright in the 1980s (Wright 1984). In 1980, Mark Horton undertook excavations in Shanga, in the Lamu Archipelago (Horton 1996). His excavations, held between 1980 and 1988, focused on the Islamization of this coastal area. Horton was the first archaeologist to focus on the early phases of coastal sites, in line with Africanist views of his time, but bearing in mind the historical continuity linking the African indigenous populations to the new Muslim settlers at the end of the first millennium CE.

In 1986, Paul Sinclair launched a project looking at the urbanization of East Africa and in particular of Mozambique. This project united institutions in Botswana, Comoros, Kenya, Madagascar, Mozambique, Namibia, Somalia, Zimbabwe, Tanzania, and Zanzibar, strengthening archaeological research in these developing countries and collecting and publishing the results of excavations carried out by local researchers (Sinclair et al. 1993). Due to this ambitious project, major African archaeologists emerged in the 1990s, including Félix Chami in Tanzania, Ricardo Duarte in Mozambique, Ahmed Jama in Somalia, Chantal Radimilahy, and more recently Abdurahman Juma *in Zanzibar* (Duarte 1993; Chami 1994; Jama 1996; Radimilahy 1998; Juma 2004). Finally in the late 1990s and the early twenty-first century, Adria LaViolette started to work on Swahili domestic architecture of the mud and thatch houses (La Violette and Fleisher 2009: 433–455). She developed an archaeology of the poors, "the invisible majority." Pradines started new excavations in Gedi in Kenya and Songo Mnara in Tanzania with a focus on urbanization, Islamization, and international trade in the Indian Ocean (Pradines and Blanchard 2005: 25–80). Jeff Fleischer and Stephanie Wynne-Jones continued LaViolette's approach by looking at spatial analysis and developing a social archaeology based on theoretical models mainly in the Kilwa region. Very recently excellent studies were conducted in understudied regions and themes by young scholars such as Edward Pollard on the foreshore and intertidal zones of Swahili landscapes, Martial Pauly in Mayotte (French Comoros), and Jorge de Torres in Somalia (Pollard 2008; Pauly 2014; Torres 2017). Except Chittick, Horton, and Pradines, most of the archaeologists who worked on the Swahili coast were Africanists by training, and this influenced a lot the research themes developed since the last 30 years.

Key Issues/Current Debates: Architecture and Muslim Identity in Sub-Saharan Africa

The origins of Islam in East Africa and the study of the first Swahili mosques were investigated by Horton's excavations in Shanga (Lamu, Kenya) and Pradines in Gedi (Kenya), in Songo Mnara, and Sanjé ya Kati (Kilwa, Tanzania) (Horton 1996; Pradines 2009, 2010) (Figs. 2 and 3). According to oral traditions on the Swahili coast, the first stone mosques were associated with the Shirazis. The so-called Shirazi mosques date back

Swahili Archaeology, Fig. 2 Excavations of the Great Mosque of Gedi (Malindi, Kenya)

Swahili Archaeology, Fig. 3 Excavations in front of the *mihrab* of the mosque of Songo Mnara (Kilwa islands, Tanzania)

from the eleventh to the twelfth century; these mosques seem to have had consistent proportions; in Gedi, the first mosque was *c*. 10 by 7 m. In Tanzania, the Great Mosque of Kilwa was erected between 1131 and 1170, and its initial rectangular plan does not differ from the model previously described, measuring 11.8 by 7.8 m. Also in the Bay of Kilwa, the island of Sanjé ya Kati houses a large mosque founded in the second half of the eleventh century, measuring 10.21 by 9.46 m. In Shanga, the mosque, constructed in Shanga between 1015 and 1035, forms a rectangle measuring 11.22 by 7.21 m. The Islamization of the African coasts was connected with Shi'a communities from the Persian Gulf (Pradines 2009). The oldest-known Swahili *mihrab* is indicative of these transoceanic influences. The *mihrab* of Kizimkazi on the island of Zanzibar is decorated with a passage from the Qur'an and bears the date 1107 (Flury 1922). The niche is decorated with

floral Kufic inscriptions along the capitals and within the apse. The islands of Bahrain and Zanzibar share this particular type of *mihrab* (Kervran 1990: 31, 48). In Bahrain, the Suq al-Khamis Mosque has a floral Kufic inscription with a Shi'a inscription mentioning the Twelver imams.

In the thirteenth to the fourteenth century, stone architecture became widespread. And eventually mosques reached large dimensions, such as that in Gedi, 26 m long at the end of the fourteenth century. From this period, the walls of the buildings were erected using a formwork of irregular stones embedded in lime mortar. Swahili mosques have a rectangular prayer hall flanked by narrow lateral wings usually comprising one-third of the width of the central hall. These mosques do not have a minaret and are bordered by a small courtyard where ablutions are practiced (generally to the South or East). Some mosques comprise a central row of pillars, facing the mihrab. The niche of the mihrab is in the form of a square, not integrated into the wall but jutting outside the mosque. The plans of Swahili mosques have a number of similarities with their counterparts in Southern Arabia, notably on the shores of the Hadramawt and Oman. In the fifteenth century, the mihrab of the Great Mosque of Gedi was decorated with 13 blue and white porcelain vessels inserted into the tympanum and the lower side of the apse. This use of ceramics as a decorative element of the qibla or the Swahili mihrab is also very present in many mosques of Oman, for example, in the Shawâdhnâ of Nizwa mosque, dated 1530 and decorated with an inlay of cut blue and white porcelain (Pradines 2011: 131–149).

From the fifteenth century onward, Swahili cities were surrounded by fortified stone walls, as notably at the Kenyan sites of Pate, Ungwana, Gedi, and Songo Mnara (Pradines 2004: 328–334). These urban fortifications support the centralization of the political power with local sultanates and reinforced the distinction between town and country, the coast, and the hinterland. The same dichotomy appears also in the emergence of a domestic architecture in stone differentiated from traditional African houses which symbolized hierarchy among the Swahili community. Only rich merchants and individuals from powerful lineages could live in stone houses. This social change is confirmed by anthropology and our observations in Gedi where architecture was profoundly altered at the beginning of the fifteenth century. Stone buildings became emblematic of the power of the *wa-ungwana* patricians/nobility and represented the very notion of the Swahili city (Fig. 4 and 5).

The genesis of the Swahili house is still subject to discussion, between supporters of a local evolution, including Mark Horton, Jeffrey Fleisher, and Stephanie Wynne-Jones (Fleisher and La Violette 1999; Horton and Middleton 2000: 119; Wynne-Jones 2016: 158–168), and those favoring exogenous influences, including Linda Donley-Reid, Abdul Sheriff, and Pradines (Donley-Reid 1990: 114–126; Sheriff 2002: 76; Pradines 2004: 111–112). According to Horton the use of coral stone architecture was first reserved for mosques, before becoming more widespread, being used for a group of large private houses in the fourteenth century. Mark Horton has argued for continuity in the evolution of Swahili houses, from traditional earth-built dwellings to large houses in stone, in terms of consistent traits in the plans of the buildings and in the use of space. Horton also asserts that stone architecture is a local invention reinforced by Fatimid technologies from the Red Sea. He cites multiple examples of architecture in coral limestone in the Dahlak Islands, Er Rih, Aydhab, and Suakin. However, this technology was not only found on Egyptian and Sudanese shores, with examples existing on the coast of the Hadramawt and in the Persian Gulf, in Bahrain, and in Qatar where coral blocks are called *hagar al-bahr*, or "stones of the sea." A further problem is the existence of very similar architecture in Yemen, the occupation of which by Indian merchants is confirmed by historical sources.

Archaeological excavations in Sanjé ya Kati demonstrate that the first stone houses were built with the same technology as the earliest mosques on the East African coast. The model proposed by Horton that first the mosques were built in stone then the Swahili adopted stone for their domestic architecture is not valid anymore. The coral *Porites* masonry was introduced in East Africa

Swahili Archaeology, Fig. 4 Pillar tomb of Kunduchi with Chinese porcelains, Tanzania

Swahili Archaeology, Fig. 5 Survey of the stone houses of Gedi (Malindi, Kenya)

by sailors, most probably from the Persian Gulf. Africans adopted this technology and material to create their own architecture, the Swahili architecture. The first stone buildings are recorded from the ninth to the tenth century in Shanga (Horton 1996: 224–242) and Dembeni (Pradines and alii 2015: 44–54). These buildings were made of simple undressed fresh sea coral blocks inserted in earthen walls. It was during the eleventh century that Swahili builders adopted coral *Porites* cut in small ashlars and set on regular courses to construct their mosques and their storehouses like in Sanjé ya Kati and Gedi (Pradines 2009, 2010: 27). These first buildings were very well made using exclusively dressed porite coral stones bounded with a very fine lime mortar. This technique was used until the twelfth century. But this technique was long and difficult to build many buildings; fresh porite coral blocks needed to be dragged from the shore during the low tide or for bigger blocks fished directly from the sea. The use of fresh coral was abandoned in favor of fossil coral limestone during the thirteenth century. This fossil coral limestone forms the geological substratum of the entire eastern coast. The blocks were taken from open-air quarries, not far from the construction site. The limestone was not cut in regular ashlar with horizontal courses as before, but rather constituted of small irregular blocks bounded in large masonry walls made with the rammed earth technique between wooden planks. Some walls were made of red mud and coral limestone like in Gedi (Pradines 2010: 111–157), and other walls were made of lime mortar and coral limestone like in Kilwa Kisiwani or Songo Mnara, for example (Pradines and Blanchard 2015, pp. 9–33). Fresh sea coral was still in use for fine sculptures around the *mihrab* in the mosques and the door frames and niches in large stone houses and palaces (Pradines 2010: 159–180). This technique was totally abandoned after the Portuguese occupation; the door frames, niches (vi-zidaka), and mihrab were done with thick stuccoes.

The plan of domestic Swahili architecture from the thirteen to the fifteenth century was strongly influenced by Indian culture. Two elements reflect the role of India in the genesis of Swahili habitations: the division of space into narrow, parallel rooms and the use of niches for wall ornamentation. Linda Donley-Reid (1990) identified three types of Indian house, which are very similar to Swahili habitations. The southern region of Gujarat, from Mumbai to Broach, exhibits houses with two or three parallel rooms and a lateral circulation zone. Women live at the back of the building, which has an exit separate from the main entry situated in the façade. Houses to the north of Gujarat, from Broach to Cambay, have three parallel rooms with a central passage. There is no door at the back, and the walls are decorated with niches in a style very close to that found in Lamu. The plans of the houses in Gedi are very significant: they present narrow, elongated rooms, all parallel except for one forming a side corridor (Pradines 2010: 125–157). Some rooms have symmetrically arranged niches in the walls. As just noted, the room layout and the wall decorations are characteristic of Gujarati dwelling. Houses in Shanga had similar niches during the fourteenth century (Horton and Middleton 2000: 118). These cavities were organized in a symmetrical fashion, with a balancing of space still found in Swahili houses today. From this we infer that the organization of central secluded rooms (*ndani*) and of niches in modern, traditional Swahili homes dates back to the fourteenth century. The origin of this form of niche comes from Gujarat and not from the African coast, as ornamentation with niches is found in Zabid and Mocha in Yemen, towns strongly influenced by Indian architecture from Surat. Niches found inside homes in Gujarat and Kutch obey a certain harmony, a regularity of space. This balance is based on symmetry of architectural elements. The plaster niches in Indian Bohras' houses are like miniature *mihrab*s; the alcoves, called *gokala*, are often associated with magical squares containing the name of Allah.

In the sixteenth century, many Swahili ports were abandoned by commercial traffic because of the Portuguese intrusion in the Indian Ocean. From the eighteenth century to the nineteenth century, the Arab presence led to a renaissance in Swahili architecture and urbanism. The towns gained height with multistorey buildings

influenced by South Arabian architecture from Yemen and Oman.

Future Directions and International Perspectives: Ports and Maritime Trade

Islamic archaeology in East Africa is strongly linked to navigation and trade in the Indian Ocean. International trade was at the center of Swahili society and was dependent on long-distance networks (Chaudhuri 1985). The port cities formed a link between the Africans of the High Plateau and the merchants of the Indian Ocean. The Swahilis were linked to the populations from the hinterland that supplied them with the products necessary for international trade and for the survival of their cities. The Swahili cities were, primarily, located at the mouths of rivers or of islands which formed good anchorages for ships. Positioned on the communication routes of deep-sea navigation and river cabotage, the Swahili cities used rivers as major thoroughfares to penetrate right in the hinterland. Communication between the coast and inland was effected by the rivers, and these waterways formed veritable corridors through the jungle and the bush. For example, the city of Mogadishu was dependent upon the Shabelle and Jubba rivers (Jama 1996: 28). In Kenya, the major rivers are the Tana connected to Mwana and Ungwana and the Galana connected to Gedi-Malindi. In the seventeenth century, the city of Pate had links with the Pokomo people who engaged in cabotage trade all along the Tana River in order to bring ivory to the city (Spear 1981: 82–85; Abungu 1989: 167).

The Swahili received manufactured goods produced in bulk and cheaply on the oriental markets. Nevertheless, firstly it is the exchange itself and the demand which determines the economic value of an object. This is why Swahili considered these objects as very valuable. Kilwa imported fabrics, and the inhabitants of Dembeni traded their rock crystal for Chinese and Islamic ceramics and glasses. More generally, the Swahili imported, in bulk, materials, ceramics, and glassworks and glass beads, which they used as money. In exchange they were exporting raw materials, but unfortunately, for archaeologists, these commercial products were invisible in that they were made of organic material, for example, leopards' skins, copal resin, ambergris (from the cachalot), mangrove wood, and tortoise shells. According to al-Masudi (Al-Masudi in Devic 1883: 179–188), the tortoise scales ("dhabl") were used to make combs, bracelets, and ornaments. Zeila was the port which handled the exports, although the scales came from the Comoro Islands and from the islands at the mouth of the Ufidji, no doubt the Rufiji and Mafia islands. According to the "Book of Wonders" (Sauvaget 1954: 189–309), the Waq-Waq people attacked the island of Qanbalû (probably Mafia) for its ivory and tortoise scales, and they also pillaged the islands located 6 days' travelling time away from Qanbalû, most certainly the Comoros Archipelago. Three other important products that were traded at the same time as ivory were gold, rock crystal, and slaves.

First of all, the slave trade formed an important part of African exportation. Ibn Battûta explained that the holy wars of Kilwa waged against the infidels were mainly aimed at finding slaves (Moffa 1995: 96–97), and not just domestic ones, they wanted slaves they could trade. Before the fifteenth century, most of the slaves came from Kenya and from the Horn of Africa where the ports of Zeila and Berbera were renowned for this merchandise (Freeman-Grenville 1963: 152). The amount of slaves exported to the Persian Gulf must have been very significant from early Islam as this led to the Zanj rebellion under the Abbasids. In 869, Ali ibn Muhamed al-Basri, the zaidite, managed to convince several hundred slaves to raise up against the central government, based at Samarra, by highlighting the injustice of their plight and promising them freedom and wealth. These black slaves were used to irrigate the land. The Zanj rebellion did not only involve black Africans, but brought together all the colored slaves and the Shiite minorities. Nicknamed Sâhib ez-Zanj, el-Basri proclaimed himself heir of the Shiites and fought for them against the Abbasids (Devic 1883: 160–166). The Zanj won several battles against the Khalif's armies, notably at al-Basrah, which they destroyed. This rebellion

was to last for 14 years, and al-Masudi teaches us that, apparently, it resulted in nearly 500,000 deaths. Thanks to the reinforcement of Egyptian troops, Vizier al-Muwaffaq quashed the rebellion in 883. The Zanj retrenched in their capital at al-Mukhtâra, in Lower Iraq where they were defeated and their leader executed.

Gold is undoubtedly the best-known African export. According to Muktahar ibn Tahir al Maqdisî, the land of the Zanj supplied a lot of gold to the Arabs, and this was the case from the tenth century. The extracted gold was sent to Sofala, a vassal of Kilwa Kisiwani as from the twelfth century. The gold was redistributed by Kilwa which thus ensured for itself a monopoly position until the fifteenth century (Mathew 1963: 112). In 1501, the Portuguese captain Cabral apprehended two boats from Kilwa which were full of gold (Freeman-Grenville 1962: 59–60). The commercial profits played a significant role in the prosperity of the Kingdom of Great Zimbabwe which exploited many mines (Beach 1980). The mining apparently began in the seventh century, and, in the beginning, it was probably in response to a regional demand.

Ivory was a major export of the Swahili coastline. Despite the competition with Asian elephants, it was the African ivory that the Indians and Chinese preferred. African ivory was considered superior in both size and quality. As specified by al-Masudi (Freeman-Grenville 1962: 15–16), ivory came from Africa and was normally exported to Oman toward India and China. This saddened al-Masudi because, without these market destinations, there would have been more ivory in the Muslim countries (Devic 1883: 179–188). Still in the tenth century, Al-Muqaddasi also speaks about the exportation of ivory to Oman, with Aden more likely receiving gold and slaves (Al-Muqaddasi, 1901: 51 and 147–148). According to the Cairo Genizah archives (Goitein 1966: 339; Bramoullé 2012: 131–135), the Jewish merchants traded in ivory, crystal, and ambergris in the cities of Aden and Kish. Included in the list of objects imported from India can be found Chinese porcelain, Yemenite soapstone, and African ivory. The ivory was worked in the countries of importation. Ernst Kühnel identified 60 ivories from Fatimid Egypt in the museums of Berlin, Paris, and Florence, consisting mainly of small engraved ivory panels, used as decoration on small boxes, furniture, thrones, and door frames. The Genizah archives (Goitein 1983: 38) provide lists of wedding trousseaux of the Jewish merchants which contained furniture with mother-of-pearl and ivory marquetry, indicating that ivory was not only reserved for the Fatimid princes but also for the upper classes. There is also a second group of small ivory objects dating from the beginning of the eleventh century, such as chess and backgammon pieces and dice. These small ivory kohl containers cost three dinars and were cheaper than the rock crystal bottles (Goitein 1983: 224). According to Contadini (Contadini 1998: 109–111), these small objects were carved from the offcuts of large objects.

Finally the most convincing elements of this early Islamic trade were found during the excavations carried out at Dembeni, on the island of Mayotte in the Comoros Archipelago. Dembeni is one of the oldest, largest, and richest Islamic archaeological sites in the Western Indian Ocean. Its apogee in the ninth–twelfth centuries was a period of intensive trade, first with the Abbasids in the Persian Gulf then with the Fatimid Caliphate in Egypt. Dembeni delivered an archaeological material of unprecedented wealth for the time, with a large amount of imported Chinese and Persian ceramics, as well as glassware from all over the Islamic world. This accumulation of richness was not made by chance, and during many years, archaeologists were seeking the origin of the wealth of this site. According to Pradines's excavations, the site at Dembeni appears to be a major distribution center for rock crystal in the Indian Ocean (Pradines 2013: 59–72). The fragments of rock crystal discovered are not from Mayotte, where the mineral is unknown, but were imported from Madagascar. The rock crystal was exported to Comoros together with other products, notably steatite

(or soapstone). The large island of Madagascar has long been recognized as one of the principal sources of natural crystal in the world, and this was probably the case from the Sassanian period. According to Horton the rock crystal was associated with the Fatimid period. This, in his opinion, was testimony of the Fatimid presence in East Africa via the Red Sea. The theory developed by Mark Horton (Horton and Middleton 2000: 79–80) is no longer valid and cannot be applied to the first centuries of Islam. Thus, if the Fatimids had known the geography of the African coasts very well (Rapoport 2014: 437–446), the merchants would not have been bypassing the Yemen where they had intermediaries and entrepôts plus the rock crystal was not coming from the Tsavo region (Kenya) but from Madagascar.

The rock crystal was imported to Mayotte from Madagascar in draft form and then exported to the capital cities of Baghdad (ninth–tenth c.) and Cairo (eleventh–twelfth c.) via Persian merchants who travelled with Omani boats and sailors (Pradines 2009: 49–73). On arrival in the island of Mayotte, the merchants exchanged ceramics and other items for the precious rock crystal, which only the best parts were retained. Arab and Persian written sources mentioned rock crystal from the islands of the Zanj in East Africa. According to al-Birûnî (973–1048) (Contadini 1998: 17–20), the crystal that was imported came from the islands of the Zanj. The port city of Basra was the main trading center during the Abbasid period and connected to the capital Baghdad from the ninth to the tenth century. In the middle of the eleventh century (1046–50), Nasir-i Khusraw spoke about the rock crystal sold at the lamp market to the old Cairo close by Amr Mosque (Bab al-Jawami). The el-Qanadil Souk was known for its rare and precious objects, such as tortoise shell small boxes and combs, enormous elephant tusks from Zangbar, and the most exquisite and expertly crafted rock crystal (Nasir-i Khusraw 1881: 149). This information was corroborated by the texts of the Jewish merchants of the Cairo Genizah. The crystal, known as Billawr, transited through Aden and on to the Yemen (Goitein 1983: 223–224). The products were then transferred and redirected toward the ports of Aydhab and Quseir on the Red Sea. The valuables were loaded onto camels and donkeys heading toward the Valley of the Nile and then transferred onto Fellucas in the direction of Cairo and Alexandria, where the rock crystal was finally worked on by expert craftsmen in the old Cairo called Misr-Fustat. The rock crystal was then shaped by skilled craftsmen to produce beautiful ewers and other Fatimid masterpieces.

The study of these exportations such as the rock crystal and the imports, in particular the ceramics, allows us to draw a new history of the Swahili coast and its contacts with other cultures of the Indian Ocean world. Even if the weight of African archaeology is still pressing over the Swahili culture, the recent researches provide new data on Indian Ocean trade and mark the coming of age of a reconnaissance of East Africa not as a periphery but as a center for Muslim culture studies.

Cross-References

- ▶ Abungu, George H.O.
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Chami, Felix Arkard
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Fortifications, Archaeology of
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- ▶ Orientalism: Islamic Archaeology and Its Colonial Context
- ▶ Urban Archaeology

References

Primary Sources

Abulfida. *Géographie d'Aboulféda* Edited by Reinaud (M.). 1848 [1342]. Imprimerie nationale, Paris, vol. 2, pp. 206–208.

Anonymous, 11th c. [2014]. *Gharā'ib al-funūn wa-mulaḥ al-'uyūn*, Edited by Rapoport, Y., Brill.

Bakri. 1094 [1965]. *Description de l'Afrique septentrionale par Abou-Obeid el-Bekri* Maisonneuve, Paris.

Barros, J. 1552 [1945]. *Decadas Da Ásia, dos feitos qie os Portuguezes fizeram no descubrimento, e conquista dos mares, e terras do Oriente* Ministério das colonias, Lisboa.

Battûta. 1331 [1853]. *Voyages d'Ibn Battuta* trad. Defremery C. et Sanguinetti B., Imprimerie Nationale, Paris.

Buzurg b. Shahriyâr. 953 [1954]. *'Akhbâr as-Sîn wa l-Hind, Les Merveilles de l'Inde*, ed. J. Sauvaget, 189–309. Damascus: IFEAD.

Idrisi. 1154 [1968]. *Description de l'Afrique et de l'Espagne*, ed. R. Dozy et M.J. Goeje. Leiden: Brill.

Masûdi. Xth c. [1970]. *Les Prairies d'or* trad. de Meynard B. et Courteille P., Société asiatique, Paris.

Nasir-i Khusraw, 1040 [1881]. Sefer Nameh. *Relation du voyage de Nassiri Khosrau*, édition critique de Charles Schefer, Phili Press, Ecole des langues orientales, Paris.

Yâkût. 1224 [1964]. *Dictionnaire géographique.* Paris: Maisonneuve.

Studies

Abungu, G. 1989. *Communities on the River Tana, Kenya : An archaeological study of relations between the delta and the river basin, 700–1890 A.D.*, Ph.D., University of Cambridge.

Alpers, E. 1976. Gujarat and the trade of East Africa c. 1500–1800. *International Journal of African Historical Studies* 9 (1): 22–44.

Anene, J.-C. 1966. The Omani Empire and its impact on East African societes. In *Africa in the nineteenth and twentieth century*, ed. J.-C. Anene and G.N. Brown, 40–457. Ibadan: University Press.

Anonymous, 11th c. 2014. *Gharā'ib al-funūn wa-mulaḥ al-'uyūn, An Eleventh-Century Egyptian Guide to the Universe: The Book of Curiosities*, Rapoport, Y. and Savage-Smith, E. eds. Leiden: Brill.

Allen, J. de V. 1981. Swahili culture and the nature of east coast settlement. *International Journal of African Historical Studies* 14 (2): 306–334.

Bacqué-Grammont, J.-L. 2007. *L'arbre anthropogène du Waqwaq, les femmes-fruits et les îles des femmes. Recherches sur un mythe à large diffusion dans le temps et l'espace*. Napoli: Università degli Studi di Napoli "L'Orientale", Institut Français d'Études Anatoliennes.

Beach, D. 1980. *The Shona and Zimbabwe, 900–1850*. New York: Africana Pub.

Bramoullé, D. 2012. The Fatimids and the Red Sea (969–1171). In *Navigated spaces, connected places. Proceedings of Red Sea Project V*, ed. Dionisius Agius and alii. BAR, 127–136. Oxford: Archaeo Press.

Burton, R. 1872. *Zanzibar city, island and coast*. London: Finsley Brothers.

Carswell, J., Deraniyagala, S., and Graham, A. 2013. *Mantai. City by the sea,* Aichwald, Linden soft.

Casanova, P. 1922. *Notes sur les voyages de Sindbad le marin*, dans *BIFAO* 20, 113–98. Le Caire: IFAO.

Chami, F. 1994. *The Tanzanian coast in the first millennium AD*. Uppsala: Societas Archaeologica Upsaliensis.

Chami, F. 1998. A review of Swahili archaeology. *African Archaeological Review* 15: 199–218.

Chami, F. 2006. *The unity of African ancient history 3000 BC to AD 500*. Dar es-Salaam: E&D.

Chaudhuri, K. 1985. *Trade and civilisation in the Indian Ocean. An economic history from the rise of Islam to 1750*. Cambridge: CUP.

Chittick, N. 1974. *Kilwa: An Islamic Trading City on the East African coast*. Nairobi: British Institute in Eastern Africa.

Chittick, N. 1984. *Manda: Excavations at an island port on the Kenya Coast*. Nairobi: British Institute in Eastern Africa.

Clark, C., et Horton, M. 1985. *Zanzibar Archaeological Survey 1984/85*, Zanzibar: Report for the Ministry of Information, Culture and Sport, 79 p.

Desanges, J. 1999. *Toujours Afrique apporte fait nouveau*. Paris: De Boccard.

Devic, M. 1883. *Le Pays des Zendjs (ou la Côte Orientale d'Afrique au Moyen-Age)*. Paris: Hachette.

Donley-Reid, L. 1990. A structuring structure: The Swahili house. In *New directions in archaeology*, ed. S. Kent, 114–126. Cambridge: Cambridge University Press.

Duarte, R. 1993. *Northern Mozambique in the Swahili World: An archaeological approach*, Studies in African archaeology 4. Uppsala: Central Board of National Antiquities.

Ducatez, G. 2003. Aden et l'océan Indien au XIIIe siècle : navigation et commerce d'après Ibn al-Mugâwir. dans *Annales Islamologiques* 37, 137–156. Le Caire: IFAO.

Ferrand, G. 1891. Les Musulmans à Madagascar et aux îles Comores. dans *Bulletin de correspondance de l'école des lettres d'Alger.* Paris: Leroux.

Fiorani, V., et Besenval, R. 1990. International Indian Ocean routes and Gwadar Kuh-Batil settlement in Makran. In *Pakistan Archaeology*, n°25, 126–162. Karachi : Department of Archaeology and Museums.

Fleisher, J., and A. La Violette. 1999. Elusive wattle-and-daub: Finding the hidden majority in the archaeology of the Swahili. *Azania* 34: 87–108.

Fleisher, J., and alii. 2015. When did the Swahili become maritime? *American Anthropologist* 117 (1): 100–115.

Flury, S. 1922. The kufic inscriptions of Kizimkazi Mosque, Zanzibar, 1107 A.D. *Journal of the Royal Asiatic Society* 21: 257–264.

Freeman-Grenville, G.S.P. 1962. *The East African coast (select documents from the first to the earlier nineteenth century)*. Oxford: Clarendon Press.

Garlake, P. 1966. *The early Islamic architecture of the East African coast*. Nairobi: British Institute in Eastern Africa.

Goitein, S. 1983. Mediterranean society. In *The Jewish communities of the Arab world as portrayed in the documents of the Cairo Geniza, volume IV: Daily life*. Berkeley: University of California Press.

Gray, J. 1963. Zanzibar and the Coastal Belt, 1840–1884. In *History of East Africa*, ed. Oliver and Mathew, vol. 1, 212–251. Oxford: Clarendon Press.

Guillain, C. 1856. *Documents sur l'histoire, la géographie et le commerce de l'Afrique Orientale*. Paris: Arthus Bertrand, 3 vols.

Horton, M. 1996. *Shanga. The archaeology of a Muslim trading community on the coast of East Africa*. Nairobi: British Institute in Eastern Africa.

Horton, M., and J. Middleton. 2000. *The Swahili*. Oxford: Blackwell.

Ibn Ḥawqal, *Kitāb ṣūrat al-arḍ*, (988), G. Wiet Ed., Paris-Beyrouth, 1964.

Ibn Khurradadhbeh (885), *Le Livre des routes et des royaumes* (Kitab al-masalik wa l-mamalik), éd. et trad. en français Michael Johan de Goeje, Leyde, 1889.

Ingrams, W.H. 1931. *Zanzibar, its history and its people*. London: Frank Cass.

Jama, A. 1996. *The origins and development of Mogadishu AD 1000 to 1850*, Studies in African archaeology 12. Uppsala: Uppsala University Department of Archaeology.

Juma, A. 2004. *Unguja Ukuu on Zanzibar. An archaeological study of early urbanism*. Uppsala: Department of Archaeology and Ancient History, Uppsala University.

Kervran, M. 1990. La mosquée al-Khamis à Bahrain: son histoire et ses inscriptions. *Archéologie Islamique* 1: 7–51.

Keswani, D. G. 1980. Influences culturelles et commerciales indiennes dans l'océan Indien, de l'Afrique et Madagascar à l'Asie du sud-est. dans *Relations historiques à travers l'océan Indien*, 37–50. Paris: UNESCO.

Khawam, R. 1985. *Les Aventures de Sindbad le Marin*, [840]. Paris: Phébus.

Kirkman, J. 1954. *The Arab City of Gedi: Excavations at the Great Mosque, architecture and finds*. London: Oxford University Press.

Kirkman, J. 1963. *Gedi, the palace*. The Hague: Mouton.

Kirkman, J. 1964. *Men and monuments on the East African coast*. London: Lutterworth Press.

Kirkman, J. 1966. *Ungwana on the Tana*. The Hague: Mouton.

Kirkman, J. 1974. *Fort Jesus: A Portuguese fortress on the East African coast*. Oxford: Clarendon Press.

Kusimba, C. 1999. *The rise and fall of Swahili states*. Walnut Creek: AltaMira Press.

La Violette, A., and J. Fleisher. 2009. The urban history of a rural place: Swahili archaeology on Pemba Island, Tanzania, 700-1500 AD. *International Journal of African Historical Studies* 42: 433–455.

Masao, F., and H. Mutoro. 1990. La côte d'Afrique orientale et les Comores. In *Histoire Générale de l'Afrique 3: L'Afrique du VIIe au XIe siècle*, 625–656. Paris: UNESCO.

Mathew, G. 1963. The East African coast until the coming of the Portuguese. In *History of east Africa*, ed. R. Oliver and G. Mathew, vol. 1, 94–127. Oxford: Clarendon Press.

Meeks, D. 2002. Coptos et les chemins de Pount. dans *Topoi* 3, 267–335. Lyon: Maison de l'Orient Méditerranéen.

Meynard B. et Courteille eds. 1970. Al-Masudi, *Les Prairies d'or* [Xe siècle], trad. de Meynard B. et Courteille P., Paris : Société asiatique, 9 vols.

Miège, J.-L. 1982. L'Oman et l'Afrique orientale au XIXe siècle. dans *La Péninsule Arabique d'aujoud'hui*, ed. P. Bonnenfant, vol. 2, 293–318. Paris: CNRS. Ḥ

Moffa, C. 1995. *L'Afrique à la périphérie de l'histoire*. Paris: L'Harmattan.

Moncelon, J. 1995. La Da'wa fatimide au Yémen. dans *Chroniques Yéménites 3*, 26–37. Sanaa.

Mutoro, H. 1987. *An archaeological study of the Mijikenda Kaya settlements on the hinterland Kenya coast*, Ph.D., University of California, Los Angeles.

Pauly, M. 2014. La diffusion de l'Islam à Mayotte à l'époque médiévale. *Taarifa, Revue des Archives départementales de Mayotte* 4: 63–89.

Piacentini, V., and R. Besenval. 1990. International Indian Ocean routes and Gwadar Kuh-Batil settlement in Makran. In *Pakistan archaeology*, vol. 25, 126–162. Karachi: Department of Archaeology and Museums.

Planhol, X. 2000. *L'Islam et la mer. La mosquée et le matelot VIIe-XXe siecle*. Paris: Perrin.

Pradines, S. 2004. *Fortifications et urbanisation en Afrique orientale*, Cambridge monographs in African archaeology 58, British archaeological reports. Oxford: Archaeopress.

Pradines, S. 2009. L'île de Sanjé ya Kati (Kilwa, Tanzanie). Un mythe Shirâzi bien réel. *Azania* 44 (1): 49–73.

Pradines, S. 2010. *Gedi, une cité portuaire swahilie. Islam médiéval en Afrique orientale*, Monographies d'archéologie islamique. Cairo: Institut Français d'Archéologie Orientale.

Pradines, S. 2011. Commerce maritime et islamisation dans l'océan Indien : les premières mosquées swahilies (XIe-XIIIe siècles). dans *La mer et le sacré dans le monde musulman*, Revue des Mondes Musulmans et de la Méditerranée n°130, 131–149. Presses universitaires de Provence, Aix-en-Provence.

Pradines, S. 2013. The rock crystal of Dembeni, Mayotte mission report 2013. *Nyame Akuma 80*, SAFA 59–72.

Pradines S., and Blanchard, P. 2005. Kilwa al-Mulûk. Premier bilan des travaux de conservation-restauration et des fouilles archéologiques dans la baie de Kilwa, Tanzanie. dans *Annales Islamologiques* 39, 25–80. Le Caire: IFAO.

Pradines S., and Blanchard, P. 2015. Songo Mnara. Etude architecturale d'une ville swahilie médiévale. dans *Taarifa* 5, 9–33. Mamoudzou: Publication des archives départementales de Mayotte.

Pradines, S. Renel, H., Veyssier D., and Zhao, B. 2016. Irone Be (Dembeni, Mayotte) Rapport de mission 2015. In *Nyame Akuma 85*, June, 44–56. Calgary, University of Alberta.

Pollard, E. 2008. *The archaeology of Tanzanian coastal landscapes in the 6th to 15th centuries AD*, Cambridge monographs in African archaeology 76, British Archaeological Reports. Oxford: Archaeopress.

Radimilahy, C. 1998. *Mahilaka: An archaeological investigation of an early town in northwestern Madagascar*. Uppsala: Department of Archaeology.

Révoil, G. 1885/1888. Voyage chez les Bénadirs, les Çomalis et les Bayouns, en 1882–1883. *Le Tour du Monde* 1–80; 129–208 and 385–416.

Rougeulle, A. 2015. *Sharma. Un entrepôt de commerce médiéval sur la côte du Hadramawt (Yémen, ca. 980–1180)*. Oxford: ArchaeoPress.

Sauvaget, ed. 1954. Buzurg ibn Shahriyâr, 953. *Kitâb Adjâib al-Hind* (the Book of Wonders of India), Ed. Sauvaget, J. [1954], Tome I, Damas: IFD, 189–309.

Shepherd, G. 1982. The making of the Swahili (a view from the southern end of the East African coast). dans *Paideuma* 28, 129–147. Wiesbaden: Franz Steiner.

Sheriff, A. 2002. The spatial dichotomy of Swahili towns: The case of Zanzibar in the nineteenth century. *Azania* 37: 63–81.

Spear, T. 1981. *Traditions of origin and their interpretation: The Mijikenda of Kenya*, Papers in International Studies Africa Series 42, Ohio University.

Stigand, C.H. 1913. *The Land of Zinj, being an account of British East Africa, its ancient history and present inhabitants*. London: Frank Cass.

Strandes, J. 1899. *The Portuguese period in east Africa*. Nairobi: East African Literature Bureau.

Sinclair, P., J.M.F. Morais, L. Adamowicz, and R.T. Duarte. 1993. A perspective on archaeological research in Mozambique. In *The archaeology of Africa: Food, metals and towns*, ed. T. Shaw, P.J.J. Sinclair, B.W. Andah, and A. Okpoko, 409–431. London: Routledge.

Smidt, W. 2001. A Chinese in the Nubian and Abyssinian Kingdoms (8th Century). The visit of Du Huan to Molin-guo and Laobosa, Chroniques Yéménites, Sanaa : Centre Français d'Archéologie et de Sciences Sociales, 17–28.

Torres, J. 2017. Sherds of a kingdom. Medieval and modern pottery in the Amhara region (northern Ethiopia). *African Archaeological Review* 34 (2): 225–248.

Tuchscherer, M. 2004. Les échanges commerciaux entre les rives africaine et arabe de l'espace mer Rouge – golfe d'Aden aux seizième et dix-septième siècles. dans *Trade and Travel in the Red Sea Region*, eds. P. Lunde, et A. Porter, 157–163. Oxford: Archaeopress.

Vérin, P. 1975. *Les Echelles Anciennes du Commerce sur les côtes nord de Madagascar*. Unpublished Ph.D. dissertation, Université de Lille III.

Wilson, T. 1978. *The monumental architecture and archaeology, North of the Tana River*. Report prepared for National Museums of Kenya.

Wilson, T. 1980. *The monumental architecture and archaeology of the central and Southern Kenyan Coast*. Report prepared for National Museums of Kenya.

Wilson, T. 1982. Spatial analysis and settlement patterns on the East African coast. dans *Paideuma* 28, 201–219. Wiesbaden: Franz Steiner.

Wright, H. 1984. Early seafarers of the Comoro Islands: The Dembeni Phase of the IXth-Xth centuries AD. *Azania* 19: 13–39.

Wynne-Jones, S. 2016. *A material culture. Consumption and materiality on the coast of precolonial East Africa*. Oxford: Oxford university press.

Sweden: Cultural Heritage Management

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Introduction

Heritage management in Sweden has a long history dating back to at least. This history can be viewed from two perspectives – continuity or discontinuity. The first perspective is the official view, but not without problems. When viewed as a continuing enterprise, heritage management becomes a heritage in itself. This keeps the power over heritage linked to authorities claiming long historical continuity, which conserves the management of Swedish heritage. I will therefore approach Swedish heritage management from the second perspective, namely, discontinuity. Viewed from this point, heritage management can be seen as contextual and dynamic and closely linked to an active society that has a need and desire for heritage because of political and social reasons. Heritage management in Sweden is the history of its legislation, of those institutions that have been and are responsible, and the country's position in a broader context, at first in a European context and later in a global context. Legislation is always related to moral and norms, to identity and being, to power and majority (Derrida 2005). Behind the explicit civic structures of heritage

Sweden: Cultural Heritage Management, Fig. 1 The Museum of National Antiquities, 1967. Social Democratic minister of Culture Olof Palme with scull of Stone Age "ancestor" in his hand. Palme later became Prime Minister and in 1986 he was assassinated on the streets of Stockholm. (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

legislation discussed here, a complicated and often hidden idea of ethnic continuity and identity can be found – the idea of a pure Swedish race and a united nation (Hegardt 2011a, b; Hegardt and Källén 2011; Svanberg in press) (Fig. 1).

Definition

Swedish heritage management can be classified into three historical contexts, Heritage as myth, Heritage as genealogy, Heritage as science and nation-narration, and a fourth – Heritage in a cosmopolitan world. Heritage is represented differently in each of these categories. Even the idea of Swedishness and a united nation is expressed differently, because of social, religious, and political needs and desires. Throughout history, many different institutions, academic subjects, museums, and authorities have been engaged in the management of Swedish heritage. The leading actor today is the National Heritage Board founded in the 1930s, but present legislation and centralized power is questioned and debated.

In 2005, I conducted a study with the department Sociology of Education and Culture at Uppsala University to find out who studies cultural historical subjects and heritage management related subjects at the different universities in Sweden (Hegardt 2005; Hegardt and Källén 2011). It turned out that the majority of the students came from native Swedish middle-class families with a desire for cultural capital. Finding a job in the heritage management system was the first wish for these students. This means, in short, that these individuals will reproduce and guard the narratives of Swedish heritage and history, because it is through these narratives that they gain their cultural capital and because they will do this inside a system organized by the State and civil society. The narratives thus become State governed and managed by people employed by the different authorities.

Swedish heritage spans over several millennia, starting with Stone Age remains dating back to at least 14,000 BP and ending in present-day industrial structures, for example. However, cultural heritage cannot be separated from nature and intangible and material cultural heritage exists within environmental contexts. Heritage thus becomes a metaphysical concept inscribed into structures, things, expressions, memories, and nature and has, because of this, been used and is used as a barrier against the outside world. Today,

Sweden: Cultural Heritage Management, Fig. 2 The Museum of National Antiquities, 1967. "Stone Age Swedes". (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

it, in a very problematic way, defines and encloses the Swedish and becomes a safe harbor in a dynamic world (Fig. 2).

Historical Background

Heritage as Myth: Seventeenth Century

Swedish heritage management has an ambiguous origin in the laws of the provinces from the fourteenth and fifteenth centuries (Swedish: landskapslagarna). Some of these laws settled what should be done with ancient objects found on someone's property (Jensen 2002). However, there existed no clear historical narrative connected to the laws or to the ancient objects and monuments. The point with these medieval laws was nevertheless to secure the present rather than to guard the past. In the mid-sixteenth century, Archbishop Olaus Magnus (1490–1557) stressed that ancient monuments should be preserved since they were constructed with the aim of commemorating the deceased or an important event (Jensen 2010: 153). In 1523, Sweden became an independent Protestant State after 500 years of Catholic governance, Danish oppression, and the Hanseatic League's control over the economy, according to established historical narratives. Being Catholic, Magnus was in a difficult situation. He had to connect himself to the new society with the help of ancient monuments and historical myths. (It did not help. He died in Rome.) For Magnus and others, heritage signified a mythological and heroic past, present in the landscape as symbols. The present past became useful in the political, religious, and social context of the time. In 1630, Johannes Bureus (1568–1652) was appointed Riksantikvarie (Custodian of Heritage). Being the first, he has had 29 successors up to present date, out of which two have been women. The first explicit heritage legislation was published in 1666. Sweden was a major imperial power in the Baltic region at that time, and myths of Swedish history are presented in thick volumes emphasizing patriotic perspectives and heroic narratives. The most bizarre of these was published in 1675

by Olof Rudbeck (1630–1702), claiming that Sweden was the lost Atlantis.

Heritage as Genealogy: Eighteenth Century

In 1753, Queen Lovisa Ulrika (1720–1782) founded The Royal Swedish Academy of Belles-Lettres with the purpose to encourage historical research, rhetoric, poetry, and the Swedish language. A few decades later, in 1786, King Gustav III (1746–1792) restructured his mother's Academy and moved Swedish language and literature to The Swedish Academy (later becoming responsible for the Nobel Prize in literature) (Jonsson 2003). The Riksantikvarie was linked to the new Academy, named The Royal Swedish Academy of Letters, History and Antiquities. A utilitarian approach, reason, and specialized historical research opened a new approach to heritage and history – genealogy and chronology. Historians such as Olof von Dalin (1708–1763) and Sven Lagerbring (1707–1787) questioned, together with a new generation antiquarians, earlier historians for not being scientific enough. The chronology of the nation and the genealogy of the King and the nobility became important. The legislation from 1666 was still at work and heritage was viewed as genealogical facts rather than symbols for a mythological and patriotic past.

Heritage as Science and Nation-Narration: Nineteenth Century and Early Twentieth Century

Sweden lost Finland to Russia in 1807, which was a traumatic blow to Swedish's self-confidence. The country was also in need of a new king. In 1814, Sweden gained Norway from Denmark, a great triumph. (Norway became an independent state 1905 and took with it an enormous amount of oil). During the nineteenth century, the Parliament obtained more power. The capacity to control and organize the society through civil servants had, however, been significant for Sweden since the mid-seventeenth century. Nevertheless, during early nineteenth century, new sciences such as archaeology, ideas of progression launched by German Enlightenment philosophers, such as Hegel and Kant, positivism and natural science, the idea that the nation is an ethnic and linguistic entity proposed by, for example, Fichte and Herder, contributed to chronological studies of Swedish heritage. An important boost was given to this process by the Dane Christian Jürgensen Thomsen's (1788–1865) publication of his Three Age System, featuring the Stone Age, the Bronze Age, and the Iron Age (Thomsen 1836). In the late nineteenth century, heritage management became centralized and related to bureaucratic institutions and museums in Stockholm, a process criticized by private actors in the provinces. The heritage legislation from the late sixteenth century was rewritten and will again be rewritten several times during the twentieth century to adjust to a changing society and centralized bureaucracy (Fig. 3).

Bror Emil Hildebrand (1806–1884) was impressed by Thomsen's museum and reorganized the Historical Museum in the university city of Lund after Thomsen's Three Age System. In the early 1830s, Hildebrand was called to

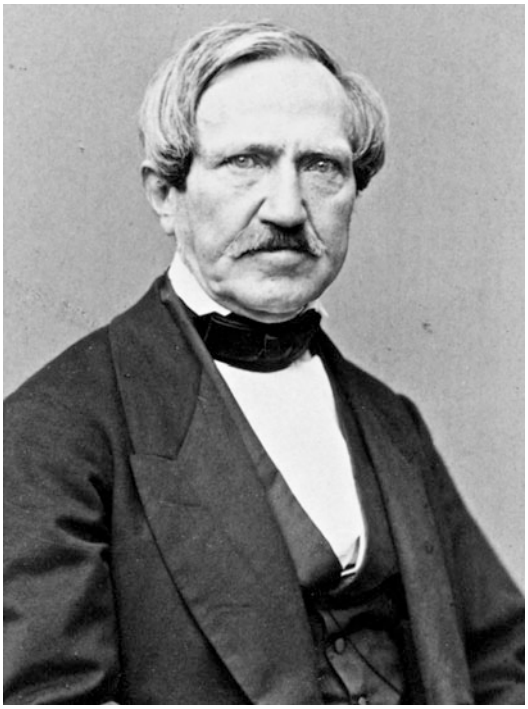

Sweden: Cultural Heritage Management, Fig. 3 B. E. Hildebrand, the grand old man of Swedish heritage management. (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

Stockholm to help Riksantikvarie Johan Gustaf Liljegren (1791–1837) at the Museum of Antiquities, a small museum in the Royal Palace. In 1837, Hildebrand was appointed Riksantikvarie and began to rework the museum following the same principles he used in Lund. In 1845, the Parliament decided to build a new National Museum and Hildebrand responded immediately with a memorandum (Hildebrand 1845) to the Academy explaining how the new museum should be organized. The National Museum stood finished in 1866 and the Museum of National Antiquities was placed on the ground floor. It followed Thomsen's ideas in detail, with the Three Age System as the main chronological principle. The galleries illustrated, like pictures in a book and in a proper chronological order, the progression of the nation. Narration was crucial when explaining how the nation has come into being through its heritage and Hildebrand and later Oscar Montelius (1843–1921) and Hildebrand's son Hans Hildebrand (1842–1913) never ceased to emphasize social and cultural progression. It was important to show a united people – one race – through prehistory and history. The museum would become the center for heritage management and archaeological research until the late 1930s.

However, already in the 1920s, the Museum of National Antiquities was bursting at the seams, being overfilled with objects. The bits and pieces of the nation coming into being, once glued together, were now slowly falling apart. At the same time, the Swedish society went through political and economical crises. According to Nina Witoszek (2002), these crises became a proof of temporariness, eliminating the idea of a secure and infinite historical process. To meet these crises, a welfare society – the folkhome – was introduced. Europe was viewed with skepticism as neofeudal, patriarchal, and unequal. Conflicts and tensions were to be avoided by the "imperative of harmony" and the society was to be built on rationalism, compromises, and consensus. According to Witoszek, Sweden from that time defined itself as the nation of goodness. Heritage management and the museums followed (Fig. 4).

Per Albin Hanson (1885–1946), the leader of the Social Democratic Party, introduced the welfare society and the "folkhem" (folkhome), and in the mid-1920s, Sigurd Curman (1879–1966) took over the Museum of National Antiquities, launching new museum policies and heritage politics based on the "folkhem." It was also decided that a new museum must be built, standing at the

Sweden: Cultural Heritage Management, Fig. 4 The Museum of National Antiquities, 1943. A place for consensus and compromise. (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

end of the 1930s. It was time to glue the bits and pieces of history back together again, this time on the principles of the folkhome, which was consensus, compromise, rationalism, and the society of goodness. To make this happen, heritage management and museums had to be reorganized. Until that time, the Riksantikvarie had been associated with the museum, but Curman introduced a new authority, the National Heritage Board (Riksantikvarieämbetet). The Board and the Riksantikvarie became responsible for the Nation's heritage, and the museum was made responsible for the collections of antiquities. The Academy was a third important actor (Fig. 5).

The Museum of National Antiquities worked with an advanced chronological perspective illustrating the united Swedes and how their special race came into being (see also Svanberg in press). In the 1920s and 1930s, these perspectives were emphasized and moved into heritage management under the authority of the Heritage Board. National consensus based on rationalistic epistemology became important, and heritage legislation and organization was founded on civic organization rather than on an explicit ethnic or linguistic principle. Nevertheless, the capacity of civic society to organize heritage is related to the ethnic and linguistic idea of a united Swedish race. Swedishness has been inscribed and narrated as heritage with the aim of guaranteeing stability and the homogenous nation, first disturbed when faced with cosmopolitan diversity and global economies in later decades of the twentieth century. Color consciousness (Appiah and Gutmann 1996) in Sweden is based on the idea that Swedes are a stable historical race of blond and blue-eyed people with a common heritage. Implicit racism is the outcome of such perspectives, becoming a

Sweden: Cultural Heritage Management, Fig. 5 Sigurd Curman in his office 1926. The painting behind Curman shows Gutav II Adolf, a seventeenth century hero King. (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

practical reality (if the Sami are not included) in the late twentieth century due to increasing immigration to Sweden. Through heritage and the "good" society, Swedes have viewed themselves as superior without having to face the people classified as inferior from a standpoint of a racialized discourse. When these "inferior" people suddenly turned up in Sweden as immigrants, Sweden has had to face itself, its history, and its idea of heritage. Swedish public-service authorities have rightly been accused of having profound problems with structural racism (de los Reyes and Kamali 2005; Pred 2000; Hegardt and Källén 2011).

Key Issues/Current Debates

The key issue for heritage management in Sweden since the early seventeeth century has been the definition of heritage as a state-controlled signifier of Swedishness, but without explicit narratives, heritage is rather pointless. Narratives produced by scholars in state-governed universities, academies, and museums have – through history – shaped the idea of a united nation, one people, and one race. The latest debate on archaeology and heritage management in Sweden has been published in Current Swedish Archaeology (Hansson and Källén 2010; Högberg and Källén 2011). Commercialization of contract archaeology and the relationship between heritage and a right-wing party that has come into parliament has been discussed. In both cases, it is the relationship between heritage and Swedishness, the historical continuity and authority of heritage management, the society as a stable united nation of one people and one race that is the crucial problem. The critical point made is that heritage management and archaeology can no longer build its existence on the idea of national continuity. The question is what to do. Heritage authorities, with their idea of a long historical continuity, the political parties, and the parliament, have few answers to the problem. Yet, heritage as a national and ethnical signifier has shown to be both obsolete and dangerous (Hegardt 2011c).

International Perspectives

As mentioned, Swedish heritage management, archaeology, and the legislation is under pressure in a changing world. Immigrants and cosmopolitan movements play their parts, but a more open Swedish society, the market economy, and political and economical crises have been influential as well. Continuity and Swedishness does not work in a society marching into a global world with cosmopolitan responsibilities. The uncertainty that has followed has opened for right-wing parties, but also for other political groups, local organizations, museums and authorities, and the public to appropriate heritage in line with the old idea of historical continuity, a united nation and Swedishness, and building their arguments on traditional heritage narratives, for example, by replacing the word race with the word culture and striving to enclose Sweden, regions or local areas through its heritage.

Future Directions

Heritage management in Sweden must find a new definition of what it means to be Swedish. From my point of departure, the word "cosmopolitan" (Appiah 2007) describes the situation best. If one looks closer into what is called Swedish heritage, one finds that only a small part of it can be defined as Swedish in accordance with the national definition of the word. Material heritage has been brought to Sweden from all parts of the world by people from all parts of the world. Historical buildings and other structures have been built by workers and paid for by wealthy people who have come from all parts of the world. Intangible heritage is a consequence of people meeting with people from many parts of the world. Every museum in Sweden is filled with objects that strengthen this perspective. What is needed is a definition of being Swedish that expands the boarders of the nation-state, perhaps in line with Bhabha's (2004) ideas of hybridity. Nonetheless, true and authentic Swedishness and heritage only exists inside a very narrow and imagined construction, and as

Appiah (2007) has stated it: Cosmopolitanism is not hard work, repudiating it is.

Cross-References

- ▶ Canada: Cultural Heritage Management
- ▶ Netherlands: Cultural Heritage Management
- ▶ Poland: Cultural Heritage Management
- ▶ Russia: Management of Archaeological Heritage

References

Appiah, K.A. 2007. *Cosmopolitanism: Ethics in a world of strangers*. London: Penguin Group.

Appiah, K.A., and A. Gutmann. 1996. *Color conscious: The political morality of race*. Princeton: Princeton University Press.

Bhabha, H.K. 2004. *The location of culture. With a new preface by the author*. London: Routledge.

de los Reyes, P., and M. Kamali. 2005. Bortom vi och dom: Teoretiska reflektioner om makt, integration och strukturell diskriminering, Rapport/av Utredningen om makt, integration och strukturell diskriminering. Serie, Statens offentliga utredningar, 0375-250X; 2005:41.

Derrida, J. 2005. *Lagens kraft: "Auktoritetens mystiska fundament". I översättning av Fredrika Spindler. Med förord av Hans Ruin*. Stockholm: Brutus Östlings Bokförlag Symposion.

Hansson, M., and A. Källén. 2010. *Current Swedish Archaeology* 18.

Hegardt, J. 2005. Den existentiella möjligheten. En studie över arkeologins samtidsrelevans. Available at: http://www.raa.se/publicerat/den_existentiella_mojligheten.pdf

Hegardt, J. 2011a. Walking through history: Archaeology and ethnography in museum narration. In *Rethinking time. Essays on historical consciousness, memory, and representation.* Södertörn Philosophical Studies 10, ed. H. Ruin and A. Ers. Huddinge: Södertörns högskola.: 2011.

Hegardt, J. 2011b. The museum of national antiquities, Stockholm, Sweden: narrating a (new) nation. The museum between 1990 and 2010.

Hegardt, J. 2011c. The marvel of cauldrons: A reflection on the united stories of archaeology. *Current Swedish Archaeology* 19.

Hegardt, J., and A. Källén. 2011. Being through the past. Reflections on Swedish archaeology and heritage management. In *Comparative archaeologies. A sociological view of the science of the past*, ed. L.-R. Lozny. New York: Springer.

Hildebrand, B.E. 1845. *Utdrag ur Academiens Protocoller 1844–45. Bengt Tordemans arkiv. F2:2*. Stockholm: Antikvarisk-topografiska arkivet.

Högberg, A. & A. Källén (ed.) 2011. Current Swedish Archaeology 19.

Jensen, O. 2002. *Forntid i historien: en arkeologihistorisk studie av synen på forntid och forntida lämningar, från medeltiden till och med förupplysningen.* GOTARC. Serie B. Gothenburg Archaeological Theses 19. Göteborg: Göteborgs Universitet. Institutionen för Arkeologi.

Jensen, O. 2010. The art of valuating a heritage: From a Swedish management perspective with past and present examples. *Current Swedish Archaeology* 18: 151–176.

Jonsson, I. 2003. *Vitterhetsakademien: 1753–2003. Kungl. Vitterhets Historie och Antikvitets Akademien*. Stockholm: MMIII.

Pred, A. 2000. *Even in Sweden: Racism, racialized space, and the popular geographical imagination*. Berkeley: University of California Press.

Svanberg, F. in press. The world as collected: Or museum collections as situated materialities. In *Museum theory: An expanded field, international handbook of museum studies*, ed. K. Message and A. Witcomb. Malden: Blackwell.

Thomsen, C.J. 1836. *Ledetraad til nordisk oldkyndighed, udgiven af det kongelige Nordiske oldskrift-selskab*. Kjöbenhavn: Molles bogtr.

Witoszek, N. 2002. Moral community and the crisis of the enlightenment: Sweden and Germany in the 1920s and 1930s. In *Culture and crisis: The case of Germany and Sweden*, ed. N. Witoszek and L. Trägårdh, 48–74. New York/Oxford: Berghahn Books.

Further Reading

Aronsson, P. 2009. *National cultural heritage - Nordic cultural memory: Negotiating politics, identity and knowledge (Transnationale Erinnerungsorte: Nord- und Südeuropeische Perspektiven)*, 71–90. Berlin: Berliner Wissenschafts-Verlag.

Aronsson, P. 2010. Uses of the past; Nordic historical cultures in a comparative perspective. *Culture Unbound. Journal of Current Cultural Research* 2: 553–563.

Aronsson, P. 2012. *Exhibiting Scandinavian culture: The national museums of Denmark and Sweden. Popularizing National Pasts. 1800 to the present*, 169–195. London: Routledge. (Forthcoming).

Aronsson, P., and G. Elgenius, ed. 2011. Building national museums in Europe 1750–2010. Conference proceedings from EuNaMus, European National Museums: Identity politics, the uses of the past and the European citizen, Bologna 28–30 April 2011. EuNaMus Report No. 1 http://www.ep.liu.se/ecp_home/index.en.aspx?issue=064

Axelsson, B. 2011. History on the web: Museums, digital media, and participation. In *History of participatory media: Politics and publics*, ed. A. Ekström, 1750–2000. New York: Routledge.

Harvard, J., and M. Hillström. 2013. Mobilizing transnational opinion: The media strategies of the Scandinavism movement. In *The Nordic experience,*

S

volume 3: Communicating the north: Media and marketing in the making of the Nordic region, ed. J. Harvard and P. Stadius. Surrey: Ashgate.
Hillström, M. 2010. Contested boundaries. *Culture Unbound* 2: 583–607. Hosted by Linköping University Electronic Press: http://www.cultureunbound.ep.liu.se.
Holtorf, C. 2007. What does not move any hearts - why should it be saved? The Denkmalpflegediskussion in Germany. *International Journal of Cultural Property* 14: 33–55.
Högberg, A. 2007. The past is the present - prehistory and preservation from a children's point of view. *Public Archaeology* 6: 28–46.
Högberg, A. 2011. Asbestos and heritage. The development of Lomma Eternit into a luxury residential area. *Museum International*.

Swedish Institute of Classical Studies at Rome

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Basic Information

The Swedish Institute of Classical Studies at Rome (Via Omero, 14, 00197 Rome, Italy, http://www.isvroma.it) is a research institute devoted to classical studies with a special emphasis on archaeology. It is the base for Swedish archaeological excavations and academic activities in Italy. In collaboration with Swedish universities, the Institute gives annual courses in classics, art history, and related subjects. The Institute is located in central Rome and has a research library with c. 60,000 volumes. Twenty guest rooms and apartments are at the disposal of visiting researchers and holders of scholarships. The Institute is a state-financed foundation, with its board and secretariat situated in Stockholm, Sweden. The Institute's activities in Rome are supervised by a director educated in classics and a vice director trained in art history.

Major Impact

History, Facilities, and Activities of the Institute

The Institute was founded in 1925 on the initiative of Swedish Crown Prince Gustav Adolf (1882–1973), who was a professional archaeologist with a special interest in classical studies. As King Gustav VI Adolf, he maintained his interest in the Institute's activities, not least the archaeological excavation projects, and his lifelong commitment has been of the utmost importance to the institute.

The original aim behind the foundation of the Institute was to enable Swedish university students, and teachers in classical languages, to study the ancient topography of Rome and Italy, as well as the art and monuments of the same. A main objective of the Institute has always been its educational activities, as manifested in annual courses given to students from Swedish universities. These include courses in archaeology (offered since 1926) and in art history (offered since 1959), as well as other, more temporary, courses.

The Institute awards annual scholarships to support major research in Rome during the academic year in the subjects of architecture, art history, archaeology, philology, and conservation and heritage research. Thanks to a donation from Fondazione Famiglia Rausing, the Institute has broadened its research in other humanities as well, such as the Italian language, comparative literature, social anthropology, history, and the aesthetic disciplines.

The library is primarily devoted to archaeology, classical studies, and art history. The publication series Acta Instituti Romani Regni Sueciae was founded in 1932, and in 1992 the series Suecoromana, specializing in art history, saw the light. Since 2004 the Institute also possesses an on-line publication series, called Projects and Seminars. In collaboration with the Swedish Institute in Athens, the Institute publishes an annual journal called Opuscula.

Since 1940 the Institute has been located on Via Omero 14 in the Villa Borghese Park in Rome, in an area nearby several other international

institutes. The Italian government placed the site at the disposal of the Institute for free, on condition that Sweden make the grounds available for the Italian Cultural Institute in Stockholm. The Institute building was designed by the famous Swedish architect Ivar Tengbom (1878–1968), while several distinguished Swedish designers and artists were responsible for the furniture, textiles, and works of art that furnish the Institute. A new guest wing was added in 1964, an auditorium in 1988, and a new library wing in 2008.

Archaeological Research

The Institute has since its foundation been devoted to the study of Italy's ancient cultures. The research undertaken may be generally divided into following areas: Italic prehistory, Etruscan culture, the topography of the city of Rome, Pompeii, landscape studies, and the cultural heritage of Mediterranean antiquity.

The study of central Italy's prehistoric cultures, primarily the Etruscan and Latin cultures, has long been at the center of the activities of the Institute. The first Swedish excavation in Italy took place in the Latin town of Ardea south of Rome in the 1930s. The period after World War II saw a dramatic increase in the archaeological activity of the Institute, with important excavations in the Etruscan towns of San Giovenale and Acquarossa and the prehistoric site of Luni sul Mignone, in the years 1956–1978, with the aim to explore settlement patterns in Etruria. Moreover, in the 1970s, a joint Nordic excavation was carried out at Ficana south of Rome. Since then, more limited fieldwork has been undertaken, primarily in the form of surface survey and aerial photography.

The Institute also has pursued research on the ancient city of Rome and its hinterland. An important study of the Republican city wall of Rome was followed in 1939–1954 by excavation of the earliest phases of the Forum Romanum and, in the 1980s, by a joint Nordic exploration of the Temple of Castor and Pollux in the Forum Romanum. Other archaeological projects have focused on documentation and survey by nondestructive methods, complemented in some cases with limited excavation. Fieldwork of this character has been done at San Lorenzo in Lucina and the Lateran Baptistery in central Rome and at the imperial villa at Prima Porta on the outskirts of Rome. In the city's hinterland, joint Nordic excavations were undertaken at the imperial villa at Lake Nemi. The recently concluded research project Via Tiburtina studied the road with this name between Rome and Tivoli. It was an interdisciplinary project involving architecture, urban planning, archaeology, history, art history, and conservation and cultural heritage which contributed new perspectives on communication, cultural history, as well as urban and suburban development from the Bronze Age until modern times.

Since 2000 the Institute has pursued an archaeological project at Pompeii, aiming to analyze and comprehensively document a residential block, Insula V 1. Previously excavated and non-published areas are being documented and systematized to make this information available in a new publication and on-line (www.pompejiprojektet.se).

In recent years, the Institute has been focusing more on questions concerning cultural heritage and classical reception. Within this area, research has been undertaken on the preservation, dissemination, and understanding of ancient remains and cultures in modern society.

Cross-References

- ▶ American Academy in Rome
- ▶ Deutsches Archäologisches Institut (DAI), Rome Department
- ▶ École française de Rome

S

Further Reading

Acquarossa. 1982–1994. Acta Instituti Romani Regni Sueciae series prima in 4°, XXXVIII, 7 vols. Rome: Swedish Institute in Rome.

Bjur H., and B. Santillo Frizell, ed. 2009. Via *Tiburtina: Space, movement & artefacts in the urban landscape* (Acta Instituti Romani Regni Sueciae series prima in 4°, LX). Rome: Swedish Institute in Rome.

Gjerstad, E. 1953–1973. Early Rome, 6 vols. (Acta Instituti Romani Regni Sueciae series prima in 4°, XVII). Rome: Swedish Institute in Rome.

Luni sul Mignone. 1969–1975. Acta Instituti Romani Regni Sueciae. Series prima in 4°, XXVII, 2 vols. Rome: Swedish Institute in Rome.
Magnusson, B., ed. 2002. *Humanist vid Medelhavet. Reflektioner och studier samlade med anledning av Svenska Institutet i Roms 75-årsjubileum*. Stockholm: Rubicon.
Magnusson, B., and J. Ahlklo, eds. 2010. *L'Istituto svedese di studi classici a Roma. The Swedish Institute of classical studies in Rome*. Rome: Swedish Institute in Rome.
Moltesen, M., and B. Poulsen, eds. 2010. *A Roman villa by Lake Nemi (Occasional Papers of the Nordic Institutes in Rome)*. Rome: Quasar.
Östenberg, C.-E., ed. 1976. *Svenska institutet i Rom 1926–1976*. Viterbo: Agnesotti.
San Giovenale. 1967–2011. Acta Instituti Romani Regni Sueciae series prima in 4°, XXVI, 6 vols. Rome: Swedish Institute in Rome.
Scavi di Ficana. 1990–1997. 2 vols. Rome: Istituto poligrafico e zecca dello stato.
The Temple of Castor and Pollux. 1992–2009. Occasional papers of the Nordic Institutes in Rome, 3 vols. Rome: "L'Erma" di Bretschneider.

Sweet Potato: Origins and Development

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Basic Species Information

The botanical name for the sweet potato is *Ipomoea batatas* [L.] (Lam). The most common indigenous names for the sweet potato tuber in Central and South America include *batata*, *boniato*, *camote*, *batata doce*, and *apichu*. From Peru, Hawaii, and Samoa to the Philippines, sweet potato is known by a broad range of cognates: *kumar*, *uala*, *umala*, and *kamote*, respectively. The sweet potato is called *kumara* in New Zealand. Eastern Africans know the sweet potato as *cileraabana*, "protector of the children," and it is called *ubhatata* in South Africa. It is known as *kara-imo*, "Chinese potato" in southern Kyushu, and in most other parts of Japan, it is known as *satsuma-imo*, "Japanese potato."

Timing and Tracking Domestication

The sweet potato is considered to originate in the New World, although its precise origin is not well defined. Archaeological remains of the storage roots, or tubers, of sweet potato show it was long used as a food source by the inhabitants of Peru. Preserved remains and samples from ancient tombs and burial sites have yielded cloth tapestries and ceramic vessels that occasionally bear woven images and artistic representation, respectively, of the sweet potato (Sauer 1951). Steinhold (2008) states that Peruvian sweet potato remains date back to 10,000 years ago in South America. Towle (1961) reports that dried sweet potato roots have also been found in more recent grave sites at Ocucaje dating to CE 1–600. Alternatively, Austin (1988) proposed a more eastward origin for the sweet potato between the Yucatán Peninsula of Mexico and the Orinoco River in Venezuela.

The sweet potato was domesticated roughly 10,000 years ago in a period when environmental and climatic conditions were completely different to today. During the early postglacial period, several factors, including increasingly arid climate and decreased natural resources, influenced the change from hunting and fishing to the planting of food crops. This intervention led to the domestication of the wild species of sweet potato by humans.

Commercial cultivation of sweet potato began in Hawaii in 1849. However, Asia is now the largest sweet potato-producing region in the world, with an annual production of 125 million tons. China produces roughly 80% of the world's sweet potato (117 million tons annually), making it the leading supplier of sweet potatoes in the world. Latin America and North America produce about 1.9 million and 600,000 t annually, respectively.

Today, the sweet potato is a staple food source for many indigenous populations in Central and South America, Ryukyu Island, Africa, the Caribbean, the Maori people, Hawaiians, and Papua New Guineans. The sweet potato contains many nutrients including protein, carbohydrates, minerals (calcium, iron, and potassium), carotenoids, dietary fiber, and vitamins (especially C, folate, and B_6); it contains very little fat and sodium. The chemical composition of the sweet potato varies greatly according to genetic and environmental factors. Protein contents of sweet potato leaves and roots range from 4.0% to 27.0% and 1.0 to 9.0%, respectively. The root has high concentrations of anthocyanin and β-carotene.

Botanical Classification

The sweet potato is a creeping dicotyledonous plant with the following systematic classification (Huamán 1999):

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Solanales
Family: Convolvulaceae
Tribe: Ipomoeae
Genus: Ipomoea
Subgenus: Eriospermum
Section: Eriospermum
Series: Batatas
Species: *Ipomoea batatas* (L.) Lam.

Within the Series Batatas, there are 13 wild species, which are considered to be related to the sweet potato (Austin and Huamán 1996). The number of chromosomes in the sweet potato plant is $2n = 6x = 90$, indicating it as a hexaploid plant with a basic chromosome number $x = 15$. Although the Series *Batatas* constantly undergoes revision, it contains roughly 12 other species, which are predominantly diploid ($2n = 2x = 30$) and a few tetraploids ($4x = 60$), which are wild.

Polyploid species are *I. cordatotriloba* with 2x and 4x and *I. trifida* with 2x, 3x, 4x, and 6x (Huamán and Zhang 1997).

There are diverse theories regarding the evolution of *I. batatas*. For example, Japanese researchers have considered it an autopolyploid derivative of *I. trifida*. On the other hand, American researchers posit an allopolyploid origin involving *I. trifida* and an unidentified tetraploid parent (Collins 1995). Zhang et al. (1998) suggests northern Peru and southern Ecuador as a secondary center of sweet potato diversity for *I. batata*s. Other important centers of diversity exist in sub-Saharan Africa, Papua New Guinea, and Indonesia. The geographic distribution of the wild species of Series Batatas is within the Americas, with the exception of *I. littoralis*, which is found in Australia and Asia. The cultivated species *I. batatas* includes plants that are very variable in their morphology.

Currently, thousands of cultivars are grown throughout the world and are unique to countries or to smaller regions within countries. All cultivars are more or less sweet flavored. Sweet potato cultivars exist in many colors of skin and flesh, ranging from almost pure white through cream, yellow, orange, or pink, to a very deep purple. For example, white- to cream-colored flesh sweet potatoes are common in the South Pacific, Africa, the Caribbean, and most other developing countries. In contrast, sweet potatoes commonly consumed in the developed countries, normally have yellow to orange flesh. The commercial sweet potato varieties in Hawaii have white, cream, purple, and yellow to orange color flesh.

The sweet potato is among the world's most important root crops today, especially in the developing world. Information on its archaeology, distribution, and genetic variations in ancient times has given scientists a better understanding of how this crop evolved under the selective and protective influences of human.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants

▶ Domestication: Definition and Overview
▶ Genetics of Early Plant Domestication: DNA and aDNA
▶ Plant Domestication and Cultivation in Archaeology
▶ Plant Processing Technologies in Archaeology
▶ Vegeculture: General Principles

References

Austin, D.F. 1988. The taxonomy, evolution and genetic diversity of sweet potatoes and related wild species. In *Exploration, maintenance, and utilization of sweet potato genetic resources*, ed. P. Gregory, 27–60. Lima: CIP.

Austin, D.F., and Z. Huamán. 1996. A synopsis of Ipomoea (Convolvulaceae) in the Americas. *Taxon* 45: 3–38.

Collins, W. 1995. Sweet potato. NewCROPFactSHEET. http://www.hort.purdue.edu/newcrop/cropfactsheets/sweetpotato. Accessed 26 May 2012.

Huamán, Z., ed. 1999. Systematic botany and morphology of the sweet potato plant. In *Sweetpotato germplasm management (Ipomoea batatas) training manual*. International Sweetpotato Center (CIP).

Huamán, Z., and D.P. Zhang. 1997. Sweetpotato. In *Biodiversity in trust – Conservation and use of genetic resources in CGIAR centers*, ed. D. Fucillo et al., 29–38. Cambridge: Cambridge University Press.

Sauer, J.D. 1951. Crop plants of ancient Peru modelled in pottery. *Missouri Botanical Garden Bulletin* 39: 187–194.

Steinhold, A.C. 2008. The uber tuber. *Hana Hou* 11: 2.

Towle, M.A. 1961. *The ethnobotany of pre-Columbian Peru.* Anthropo\. 30. Chicago: Viking Fund Pub.

Zhang, D.P., M. Ghislain, Z. Huamán, J.C. Cervantes, & E.E. Carey. 1998. AFLP assessment of sweetpotato genetic diversity in four tropical American regions. CIP program report 1997–1998, 303–310.

Further Reading

Bovell-Benjamin, A.C. 2007. Sweet potato: A review of its past, present and future role in human nutrition. *Recent Advances in Food & Nutrition Research* 52: 1–59.

Bovell-Benjamin, A.C. 2009. Sweetpotato utilization in human health, industry and animal feed systems. In *Sweet potato: Postharvest aspects in food feed and industries*, ed. R.C. Ray and K.I. Tomlins, 193–224. New York: Nova Science Publishers.

Hirst, K.K. n.d. Sweet potato (*Ipomoea batatas*) domestication. Domestication and spread of the sweet potato. http://archaeology.about.com/od/domestications/qt/sweet_potato.htm. Accessed 12 June 2012.

Ugent, D., and L.W. Peterson. 1988. Archaeological remains of potato and sweetpotato in Peru. *CIPCircular* 16: 1–9.

Switzerland: Upper Paleolithic Living Floor Investigations

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Introduction

Upper Paleolithic living floors represent moments in the life of hunter-gatherers in the form of scattered finds and ephemeral features. Such sites are naturally vulnerable to later activities and well-preserved examples are rare.

Key Issues/Current Debates/Future Directions/Examples

Investigating how such a site was composed is primarily achieved by fine stratigraphic observation and later by refitting of the recovered flint artifacts, bone fragments, and fire-cracked rocks. The network of lines created by conjoined pieces whose location is recorded three dimensionally allows us to visualize intra-site dynamics and to establish the relative chronology of a site's use. Further crucial information on the time depth of an archaeological horizon is obtained by studying the period(s) of the year during which a site was occupied. Special attention is therefore paid to screening the excavated sediments in order to recover all fragile organic elements that may be used for season determination, notably the teeth from very young animals, less than one year old, and the remains from small hibernating mammals such as ground squirrel and marmot. Another major concern is to differentiate anthropogenic structures (e.g., pits and post holes) from natural features dug by burrowing animals (e. g., collared lemmings or narrow-headed voles). Similarly, it is important to correctly identify naturally accumulated stones or other geological phenomena that may evoke human-made structures. For that reason, the horizontal view of a living floor, however impressive it may be, needs to be completed by detailed

Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 1 The Magdalenian open-air site Monruz (Neuchâtel, Switzerland). The living floor yielded more than 40 well-preserved hearths and remains from at least 56 horses. The layer, though only c. 2–3-cm thick, has proved to be the result of repeated occupation episodes after successful horse hunts. (© photo Y. André, Office et Musée d'archéologie Neuchâtel)

stratigraphic documentation of all structures and features observed on the surface.

Hearths are of special interest because they acted as focal points around which most of the technical, domestic, and social activities took place. In the vast majority of sites, however, charcoal has been destroyed and the soil shows no traces of heat action, thus making it difficult to precisely locate the combustion areas and other hearth-related structures. The approximate position of the hearths is then endorsed by confronting the spatial distribution of all thermally altered objects, notably flints, bones, and stones. In the rare cases of hearths still containing black sediment, the residues are screened separately in the laboratory and sorted under the microscope in order to extract all discrete remains such as charcoal fragments, charred seeds, bones, and fish scales, relevant for reconstructing the use of the hearths.

An exceptionally well-preserved Magdalenian living floor excavated in Monruz, at the edge of Lake Neuchâtel (Switzerland) in advance of motorway construction, offers an example of these techniques in action. The floor belongs to an open-air living and processing site dated to c. 15,500 years ago. Due to high stratigraphic resolution, it was easy in this case to follow the micro-topography of the thin covering layer (c. 2.5-cm thick), so exposing the intact living surface at the very moment of its abandon (Fig. 1). Since the detailed distribution of finds and features is of paramount importance, it is necessary to avoid treading on the excavated surface: excavators work from platforms supported by scaffolding (Fig. 2). Dense bone and flint scatters, together with extended patches of red ochre, were associated with more than 40 hearths of various types and dimensions (bowl-shaped and flat structures). By refitting several thousands of fractured stones, it could be demonstrated that all had been originally brought onto the site to cover hearths, so conserving heat – a combustion system characteristic of the Upper Paleolithic period. At that time, fuel was scarce and included only twigs of wood species, such as dwarf willow and dwarf birch, that grow low to the ground. By placing stones on top of the brushwood, the use of the hearths slowly released the heat they had accumulated during the short combustion phase. Stones that fractured in the heat were subsequently dispersed. Through precise mapping of the activity areas, it could also be demonstrated that most of the hearths were of multifunctional character. Maintenance of hunting weapons was

Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 2 In order to not disturb the original position of the finds, excavation of Paleolithic living floors is operated from a slightly elevated platform made from planks. The sediments are filled into buckets to be wet-sieved per ¼ of square meters, a well-adapted spatial unit for interpreting even discrete find scatters. (© photo Y. André, Office et Musée d'archéologie Neuchâtel)

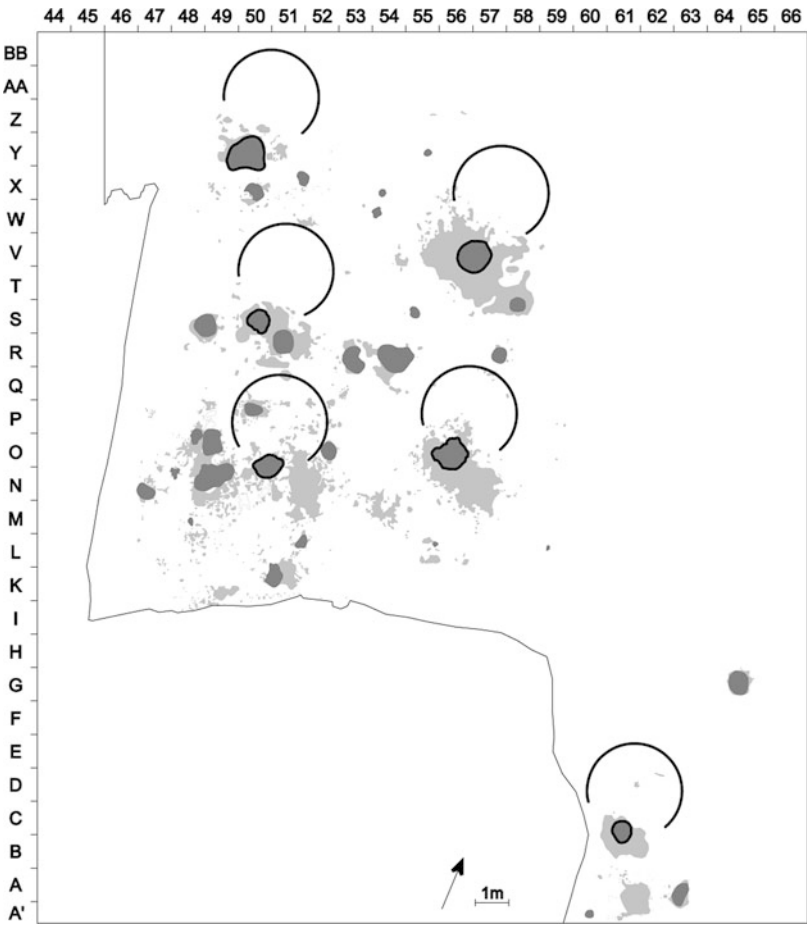

Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 3 Model of dwelling units based on the location of the large pit-hearths and charcoal scatters (Leesch and Bullinger 2012, Fig. 11)

Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 4 Transport of a portion of a Magdalenian open-air site. This unusual operation was entirely financed by the Swiss Federal Roads Office. (© photo Y. André, Office et Musée d'archéologie Neuchâtel)

systematically performed less than 50 cm from the heat source, and sewing, as shown by the fractured bone needles, less than 1 m away. Hide treatment, probably because it required more space, took place at a slightly greater distance from the hearth. With the focus on the larger hearths, it was possible to propose living units within the overall pattern of debris (Fig. 3).

The Magdalenian site of Monruz is interpreted as a site that was occupied repeatedly following successful horse hunts. During each hunting event, only one to a maximum of three horses was killed. After the hunt, the whole group moved from its former camp location to this point where the horses were butchered and consumed. According to the number of killed animals, the occupation lasted for one to a few weeks. While staying at this place, diverse smaller species such as ibex, marmot, alpine hare, and various birds and fishes were hunted in the surrounding area and brought to the camp where they were processed and eaten in the immediate vicinity of the fireplaces. No more than three large hearths functioned simultaneously. Thus, what appeared at first sight to represent a single-occupation level was shown by careful excavation to correspond to a palimpsest created by repeated short habitation episodes during spring and summer.

So perfect an Upper Paleolithic picture did the Monruz deposit provide that part of it was extracted as a single block and removed out of the path of the motorway. It was enclosed in a container made from metal sheet piles and underlain by large pipes filled with concrete (dimensions of the block: 11 × 6 m × 2.5 m; weight: 400 t). The "box" was then loaded onto the platform of a trailer and taken to a new location where it could be studied without time constraint (Fig. 4).

Cross-References

- ▶ Excavation Methods in Archaeology
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Leroi-Gourhan, André
- ▶ Site Formation Processes

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References

Leesch, D. & J. Bullinger. 2012. Identifying dwellings in Upper Palaeolithic open-air sites: The Magdalenian site at Monruz and its contribution to analysing palimpsests. In *A mind set on flint. Studies in honour of Dick Stapert*. Groningen Archaeological Studies 16, ed. M. Niekus, R. Barton, M. Street, and T. Terberger, 165–181. Groningen: Barkhuis.

Further Reading

Bullinger, J., D. Leesch & N. Plumettaz. 2006. *Le site magdalénien de Monruz, 1. Premiers éléments pour l'analyse d'un habitat de plein air*. Archéologie neuchâteloise 33. Neuchâtel: Service et Musée cantonal d'archéologie.

Symmetrical Archaeology

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Introduction

If archaeology is the study of things with an aim to understand pasts and their relevance for life, then the addition of the adjectival qualifier "symmetrical" constituted a provisional step to help render it so. With its popular definition as "the study of the human past through its material remains," archaeology relegates its objects to the subordinate position of means and bestows upon its ends a spurious precedence, ultimately denying those throngs of ceramic fragments, hand axes, wall foundations, buried road surfaces, or rusty sardine cans their role as protagonists. Without things, any understanding of past worlds would be impossible (Olsen et al. 2012). And yet, the common definition of archaeology limits its objects to the status of mere vehicles. Symptomatic of this overly reductive, end-oriented (telocentric) definition are a series of compulsory disclaimers, sounded throughout the field's history, to remind practitioners of the need to reach beyond the thing itself. If the words of Mortimer Wheeler (1954, v) – "not *things*, but *people*" – or Robert Braidwood (1959, 734) – "the Indian behind the artifact" – took on mantric hues within archaeology, then it was because they encapsulated the habit of consecrating that modern fiction of a humanity without things within an elevated echelon of reality. Symmetrical archaeology began as a modest proposal to remember those increasingly neglected nonhumans consigned to the wings as props for humans among themselves, what archaeological practitioners viewed as the privileged participants within those "meaning-laden," "social" spectacles that must have comprised past worlds (Olsen 2003).

Of course, just as there is more to the marginalization of the nonhuman than a question of emphases, there is more to symmetrical archaeology than a rescue operation on behalf of nonhuman things. Beyond desperately simplified bifurcations of the world into subjects and objects or cultures and nature, there is a broader tendency to view humans as dominating the pliant substratum of objects which passively accepts its lot. Such a pathos opens archaeology to a fundamental expressive fallacy – the presumption of a human agency behind objects rendered from the angle of material memories encountered in the present (Olivier 2011; Olsen et al. 2012; Witmore 2014). Symmetrical archaeology aims to safeguard practitioners from such prejudicial reasoning by reinjecting a measure of analytical agnosticism. So long as ontological distinctions are doled out to specific kinds of entities in advance, one will remain blind to the long roster of objects – oak trees, goats, ox-pulled plows, flash floods laden with debris, or backhoes – that make a difference in the formation of the archaeological record.

What once seemed to be an ineluctable gulf between science and the humanities was scoured out through a taxonomic tendency to sort entities into two separate realms (for a renewed assertion of such an ontotaxonomy, see Nativ 2018). Azotobacter and water-logged cypress wood, phosphate concentrations, buried soils, animal bones, and carbonized seeds were consigned to the natural sciences, while throughout the humanities humans were regarded as fundamental ingredients to be found in every situation (Harman 2010, 146–147). Those who assume rapports between stonemasons and the Phonias tower to be of a *sui generis* variety, while placing into a different caste those relations between the storm-infused river and the structure's foundations (leading to its partial collapse in 2017), continue to reinforce this melodramatic scheme (Fig. 1). Rather than arbitrarily elevating humans among themselves to a privileged position in relation to nonhumans from the start, a symmetrical archaeology recomposes all beings as entities among other entities. The principle of symmetry does not imply that all entities exist equally – asymmetries are legion – rather, it humbly suggests that all entities equally be granted dignity as concrete and autonomous *things* at the outset

Symmetrical Archaeology, Fig. 1 Phonias tower and river in 2018

of any analysis (Olsen and Witmore 2015; Witmore 2014).

Symmetrical archaeology is often incorrectly assumed to constitute a full-blown theoretical platform, a replacement for post-processual and contextual archaeology (cf. Wallace 2014). But symmetrical archaeology doesn't provide any applicable theory. It simply offers a series of propositions for approaching abandoned bastions or buried corridors. It embraces a disposition to care for ancient olive trees or disused oil presses. It aspires to generate more faithful, more inclusive, accounts where things – what hold suggestions of their pasts – are recognized as mediators over mere intermediaries. It recognizes pasts not as separated off from any present by ruptures or revolutions (something reinforced by an image a linear, successive, and externalized time), but as lingering amidst perishing, gathering amidst dispersion, and enduring amidst transformation within a dynamic ecology of coextensive, actual entities. Associated with symmetrical archaeology is a shift from questions of epistemology, "what this awl means," to questions of ontology, "what this awl is." While this line of questioning does not imply, as it is often assumed, that symmetry is an ontological maxim, it should be stressed that pressing questions in terms of the ontological grounds of archaeology constitutes a longstanding aspiration of the field (Clarke 1968).

Symmetrical archaeology eschews that critical gesture of dialectical upheaval where other practices, concepts, or questions are ousted to the realm of the outmoded (González-Ruibal 2007). It avoids that disciplinary amnesia associated with a paradigmatic image of progress. Rather than exaggerating differences with other subdisciplines, symmetrical archaeology excavates to what is common for archaeologists everywhere – *things* (Olsen et al. 2012). If a one is to dispense with ready-made categories which obscure and betray what things suggest then one cannot begin by seeking out relevance, political or otherwise, for their objects of study as a starting point. Our fidelity begins with the object at hand which makes a difference in a given situation. At the start, symmetry reminds us that nothing should be excluded due to arbitrary hierarchies of value or preformed dogmas concerning the nature of the real.

To deny a carved rock surface, the position of vehicle in social relations among Scandinavian

hunters is neither to dismiss the possibility of the memory that the rock surface holds nor to reject its importance to erstwhile groups in the past. Symmetrical archaeology submits that any description of what was, or what might have been, should be put at risk in light of what of things themselves suggest. For symmetrical archaeology, any account that aims to disclose suggestions of the past should remain open to surprise and uncertainty. In this, thick description cannot be severed from explanation (*pace* Barrett 2016, 1683), for an account unfolds in the course of engagement whereby things reveal something of themselves. If abandoned surfaces cannot be reduced to an erstwhile equestrian barrack, animal enclosure, or ruin, then painstaking work must be done to explain one in terms of the other. In order to connect a portion of polygonal walling to the psychopolitical well-being of a Hellenistic polis, significant labor must be invested and this work is always open to reassessment.

Symmetry and Asymmetries

Symmetry is a key proposition at the heart of a symmetrical archaeology. Looking back to its formulation as a principle in David Bloor's *Knowledge and Social Imagery* (1991[1976]), symmetry offered a way of understanding both rationality and irrationality, truth and falsity, and success and failure in the same terms. Whereas this first principle of symmetry operated within the exclusive realm of society, Bruno Latour's generalized principle of symmetry sought to breach the so-called great divide of culture and nature, and harness the same principles of explanation for both humans and nonhumans (1993). After Latour, agency cannot be monopolized as an exclusive capacity of millers, for it may belong to stream channels, grinding stones, and grain. After Latour, self-affirmation should not be restricted a priori to priests of the Delphic oracle, for it may be a characteristic of the stylobate, Doric columns, and cella walls of the temple of Apollo. One now not only has to be prepared to speak about humans and nonhumans in the same terms, but also acknowledge how woefully disingenuous it is to make an attempt at disentangling reality into only two types of entities at the expense of others.

Whether one is concerned with better descriptions of archaeological practice, the astonishing stability of the archaeological record, or the formation of the Argive polis, a generalized principle of symmetry is at most a disposition meant to remind us not to decide in advance what role concrete entities play in a given situation by subsuming them to interpretive schemes or melodramatic abstractions. Rather, symmetry injects a level of agnosticism from the start. To embrace a learned ignorance is neither to avoid a story concerning past worlds nor evade questions of meaning, but rather to put archaeological accounts at risk in light of what things suggest concerning *their* pasts. To state it another way, the solution for what a thing may, or may not, have been should not drive its realization. An archaeologist cannot begin with the answer that a series of wall foundations under excavation at Binchester was a barrack block for an auxiliary cavalry unit. To approach these objects as the Roman past from outset is to cede to oblivion what becomes of a former barrack as an erstwhile animal fold, quarry or grass-covered mound of tumbled stone. To begin with what was, is to disregard what has become of it – things that hold memories of other pasts (Olivier 2011; Witmore 2013). Only by suspending the solution, which relates to a classic issue of assumed versus justified identifications for archaeological objects, can we ultimately better serve our ends.

If a weakness of the term "symmetry" relates to the fact that it cannot be taken too literally – that is, as an erroneously simple balance in the distribution of people and things or a misguided sense of equivalence in the values we accord different entities – then its strength rests upon its awkwardness as a proposition upon which one should place no empirical weight. Thus, to be symmetrical is not to champion mutual exchange, balanced co-living, or reciprocity between all entities, but to remain open to such a possibility without declaring dependencies in advance (*pace* Hodder 2014). Herein lies a common reaction to symmetrical archaeology, which is seen as eschewing

questions of power – indeed, Latour's own work is often lambasted for its supposed indifference to morality and politics (e.g., Van Dyke 2015). Yet such patent misreadings or misunderstandings miss the whole point of symmetry, which is to find power lurking in places one would not have otherwise looked. By withholding the melodrama of politics as first philosophy and the improbable position of always being right, by avoiding spurious and deceptive attempts to shift emphasis elsewhere, and by taking leave of dialectical conflicts that always attempt to fight power head on with power (Webmoor and Witmore 2008), symmetrical archaeology invests in diplomatic parleys that root through the hidden recesses of influence and inequity so that another path may open.

To be symmetrical is not to foreclose on asymmetries, which are pervasive, but to better root them out. One might assume asymmetries to have existed between German soldiers and PoWs at the coastal bastion of Svaerholt. And yet by placing such assumptions aside one begins to gain a sense of what alcohol bottles, smoking pipes, and pipe cleaners within the camp suggest: some deviation from expected behavior was accepted among those on either side of the fence (Grabowski et al. 2014). Exchange and sharing seems to have occurred; perhaps in being dependent on each other, they developed a sense of sympathy. Such hesitation also leads one to ponder an even larger asymmetry whereby all these foreign immigrants, PoWs and soldiers alike, shared a common fate as prisoners to a distant cape in the high-arctic; a land of harsh weather conditions under the alteration of protracted light and protracted dark.

Initial work under the colors of symmetrical archaeology drew heavily upon actor–network theory with its emphasis on imbroglios/mixtures of humans and things, with its overemphasis on action at the expense of other qualities of objects (also see Watts 2007; Whitridge 2005). Many of these early examples (i.e., Olsen 2003; Witmore 2007) remained asymmetrical by placing more emphasis on relations, assemblages, and entanglements at the expense of the being, autonomy, and integrity of things. Yet, unlike Latour's symmetric anthropology, symmetrical archaeology eventually took the additional step of conceiving of a thing's relations and autonomies in symmetric fashion (Olsen 2010). One must be prepared to speak of a ceramic jug *in-itself* and a ceramic jug *for us* or *for others* with equal favor. In other words, a generalized principle of symmetry demands that we also do not decide in advance whether an object's relations, actions, or effects should be elevated over its own idiosyncratic being (see Harman 2014, 41). It would make little sense to undertake archaeological research if our objects were a priori entangled in their pasts, if they already pointed beyond themselves to other things. It takes substantial work to articulate connections between objects, which can only provide hints as to their erstwhile rapports. Archaeology requires a trust in things to reveal something of themselves and in its own practices to disclose more than what is immediately given over in experience. Archaeology requires significant effort to apprehend something of its objects' pasts along with the creativity and imagination to piece together a story of what might have been, however tenuous it may be.

Approaching Things

Symmetrical archaeology initially regarded things, according to Bjørnar Olsen, as "those enormously varied physical entities, … [as] beings in the world alongside other beings such as humans, plants, and animals" (2012, 212; also 2003, 88). Positive emphasis was placed on "thing" in its etymological sense stemming from the German root "ding," a "gathering," "assembly," or "matter of concern" (Olsen 2003). An internal combustion engine is a gathering of achievements executed centuries and even millennia earlier in far off lands by anonymous strangers among other things – consider the flywheel and the potter's wheel of ancient Egypt or the camshaft and fifteenth century forges driven by vertical waterwheels (Dartnell 2014, 201–206). The ancient Greek polis of Argos is a heterogeneous assemblage of open spaces for mutual coexistence; specific areas for assembly; pride-engendering architectures and exhibitions

of esteem-inducing objects; abodes for favored gods who might or might not return their favor; accommodated citizens with their houses and households; protective walls; media holding otherwise fleeting words and archival repositories; an infrastructure of streets, roads, and paths; an encompassing territory; and much more (Witmore 2017a). The superfund site of the Jackpile-Paguate uranium mine is a common matter of concern for the community of Laguna Pueblo, the Environmental Protection Agency, and the Atlantic Richfield Company – for some, it is a radioactive wasteland requiring constant monitoring and containment; for others, it is the largest open-pit uranium mine in the United States, holding vast stores of untapped uranium; and yet for others, it is a dark site of erstwhile labor and loss in the midst of an ancestral homeland (Kuletz 1998, 19–37). Still, any definition of things alongside other entities remained a taxonomic formulation so long as it specified ontological differences between various kinds of entities in advance.

To speak of things or objects for a symmetrical archaeology is not to speak of things in opposition to people, or objects in contradistinction to subjects. To speak of things or objects for a symmetrical archaeology is not to invest in an ontotaxonomy of bifurcation true to a purified partitioning of the world into different kingdoms – one occupied by transcendent humans, the other by languid objects. Both things and ideas have to be dislodged from that old sorting of the world into abusively reductive dualities of humans and the rest. But to recognize models of state formation and Teotihuacan as equally things is to leave aside those old assumptions and arguments that regard empirical engagements with walls on the ground as more archaeological than abstractions concerning how those walls came to be situated around a gigantic ceremonial center. Practical exploits tend to abuse things as much as theoretical concerns (Harman 2011; Webmoor 2012). Whether an engagement with walls or a model of state formation is better or worse will rest entirely on the object itself and the purposes for which serves a given archaeological engagement.

Thus, things are not, as Leo Stein had it, "what we encounter," to be distinguished from ideas, "what we project" (Brown 2003, 11). Utopian dreams of the ideal state, ruined aqueducts, the cow-eyed goddess Hera, turf embankments, thunderbolts, centaurs, porcelain plates, Pausanias's *Periegesis Hellados*, riparian deposits, plane trees, lithic scatters, drift beaches, goats, Roman auxiliary units, and shovels are all equally things. This litany should not be read as an appeal to an undifferentiated world. All entities are placed a priori upon the same footing as *things* without presupposing arbitrary ontological distinctions. From this ground, it follows that things should be allowed to define themselves, to assert their differences, their otherness, however subtle. One has to respect the integrity and autonomy of things from the beginning (Olsen 2010).

Things have no opposites. They are best defined as assemblages that cannot be broken down into their parts or reduced to their effects (Olsen and Witmore 2015, 191; Witmore 2014, 4). This means that things are neither mere aggregates of their pieces nor bundles of their qualities or properties (cf. Harman 2011, 8–13). Things withhold something of themselves from their relations – there is always an excess that remains untapped by any interaction. There is more to a photograph than efficacy; there is more to a foundation than form; there is more to a wooden barn than material; there is more to a ruined farmhouse than memory. To manifest something of a turf embankment without reducing it to its properties, qualities, actions, or effects is to respect its surplus reality and remain true to its richness of being. Still, one can never gain more than an oblique purchase or indirect access to the legion objects that constitute what has become of a ruined farm on the Langanes peninsula, for they will always exceed any articulation of them. Any understanding of the term, "thing," must begin with an acknowledgement of its radical recomposition outside of any modernist partitioning of the world. This definition of "thing" resonates with the concept of "object" deployed within object-oriented philosophy (Harman 2011) and both terms are far too useful to be thrown out to the scrap pile of abandoned nomenclature. What is

productive about the term "thing" is the gathered reality of an entity; that is, how an internal combustion engine draws together a motley array of other things. What is productive about the word "object" is the *objectum*; that is, an obstruction, that which is exposed, thrown, or cast before anything else.

Still, if all entities are accorded dignity as things from the start, then what makes an object of concern archaeological? Widely accepted among practitioners and the public are objects experienced from the angle of absence – a rusted iron spearpoint without its shaft, a ruined farmhouse without its roof, a section of wall without its extensions, an abandoned village without its inhabitants (see Lucas 2012, 178–184). Though framed from the angle of lack, these things lack nothing in their integrity or being, for if a concrete bastion is not derivative of the engineering outfit that built it during WWII, then once released to its own trajectories it persists on, outlasting the intentions of its makers, offering its rock-solid qualities and dark recesses as a foundation and basement for a house in Kirkenes (Fig. 2). What makes an object archaeological is not what it is, for things exceed their pasts, but how it is deployed toward a telos that is implied by the etymological root, *archaios*, a quality or attribute of the erstwhile or bygone, and of memory or pastness (Witmore 2017b; also see discussion in Nativ 2018).

Again, archaeologists are obliged to resist appropriating things over to neat stories of the past, or rendering them as detached from their present situation. Such an obligation demands a constant struggle for ways to speak of things, to articulate things, without subsuming them to interpretive burdens they are unfit to carry (Olsen 2010). An ethics encompassing all things demands an attitude of care combined with a sense of fidelity (Olsen et al. 2012). An attitude of care implies an appreciation for an entity's well-being and a respect for it in its own being (Olsen 2012). A sense of fidelity suggests a faithfulness to the propensities of things, which demands a different species of theory, one that cannot be applied in the abstract, one that is not forced onto a situation, or which buries the differences made by a given entity under the excesses of its own weighty dictums. Such an ethics implies a generous disposition with respect to the independence and otherness of an abandoned herring factory in Iceland without discursively packaging it with a contrived intimacy for a community of interest (Pétursdóttir 2012). Care for

Symmetrical Archaeology, Fig. 2 House-bunker in Kirkenes, 2016

things in themselves may even demand letting them be, without that obligatory recourse to the *for us* (ibid.).

Approaching things involves feral work. In beginning with things, one cannot be afraid to venture wherever one is led. One has to dare to remain open to suggestions, to being nudged along by idiosyncratic hints while trusting that a solution will emerge. Approaching things is less about being confident, that is, carrying on with the attitude that we have everything at our disposal to confront any situation (Stengers 2011). It is more about having trust, keeping faith that a possibility will reveal itself. In approaching the cape at Svaerholt, it matters whether one aims to undertake an ecological study of the falling population of kittiwakes or to investigate archaeological remains associated with WWII, for suggestions occur within a zone, and a zone disposes one to be attuned to some objects, but not others (compare Lingis 1998). Over the iterative course of a project, brick piers, wooden beams, or rotten floors, soil-encrusted tools, discarded bottles, or tattered bits of fabric suggest aspects of themselves to archaeologists with training and accumulated experience, who carry the expectation of production toward archives, collections, and the fine edge that is a book or article, among other things.

Because the stonewalls of erstwhile barrack blocks are placed under the burden of archaeological relevance, one has to strive to understand their peculiarities, even aside from that which is apparent. Habit, routine, and procedure can make one inattentive to the ambiguities and ineffable qualities of things rendered as background noise. Requisite is an openness tempered by a deep patience, granted the propensity of things to present aspects of themselves apart from what is given over in experience. Becoming attuned to some objects may open the floodgates to other things formerly unobtrusively fused together within the background of immediate awareness. Requisite is repeated research under different weather conditions combined with a cultivated familiarity shaped through accumulated experience including an understanding of the subsurface within different zones, or spaces of disposition. Requisite is creative saturation through other modes of engagement, including photography or video diaries. Still, we will only ever gain some oblique sense of that surplus reality that resists translation. Archaeological practice raises its own problems, which, to repeat, must always be put at risk in light of the situation at hand.

If things are irreducible to other things, if they are more than a standing reserve, then they cannot be replaced by substitutions (Olsen 2010, 2012). If things hold a surplus reality, which can never be exhausted by their interactions, glossed as fetishes, distorted as intermediaries, or limited to the role of mediators, then one must seek to render them in terms of their own idiosyncratic being. One way forward is to focus on their positive differences (Olsen 2010, 156). The positive difference that a wooden fishing boat makes in stormy sea means that it cannot be replaced by a dingy, a life ring, or flippers. The positive difference that precisely joined basalt slabs raised upon four distinct foundation layers makes for Roman traffic means that the Via Appia is patient of supporting a Mercedes-Benz M-class SUV in the twenty-first century (Fig. 3). Such positive differences serve to remind one of the sheer specificity of things and how they exceed any attempts to paraphrase them (Harman 2016, 3).

Again, symmetrical archaeology does not aim to provide a generic body of theory applicable in every situation. Such work runs the risk of succumbing to synthetic routine. Such work limits one to a consistent formula, so that looking for evidence of authority begins to make Chaco Canyon sound like Chavin de Huantar. Rather, symmetrical archaeology offers a series of propositions – symmetry, irreduction, suggestions, and positive differences – to aid in being as subtle as the case at hand; to remain true to the utter peculiarities of each absolutely unique situation. With these aids, it is left to archaeologists to dare to think carefully through what they confront; to remain open to relinquishing an interpretation, what has often been black-boxed as abstracted theory (a tendency among many processualist and post-processualist archaeologists); to trust in the polygonal wall turned Byzantine bastion, the former bathhouse turned garbage pit, or the

Symmetrical Archaeology, Fig. 3 The Via Appia Antiqua, 2010

shattered concrete bunker to lead us on. There are other paths to archaeological knowledge besides prepackaged ideas to be applied in every situation. Symmetrical archaeology provides a benchmark, a common ground from which to root out differences in order to open archaeology to the articulation of diverse pasts.

Pasts Otherwise

Legion are those things which object to a modern historicism where the past is held to be completed, circumscribed within the boundaries of its own delimitation and, thereby, detached from the present (see entry, *Chronopolitics and Archaeology*, for a detailed discussion of this form of historicism). Whereas the Atlantic Wall bastion of Svaerholt was abandoned in the late fall of 1944, shattered concrete casemates, encompassing stonewalls, cannon platforms, roads, turf embankments, and barbed-wire obstacles nonetheless linger on (Grabowski et al. 2014). Here, coextensive in the present, a compulsory past stands still, driven by the tenacious propensities of concrete platforms, broken porcelain plates, or melted glass bottles to persist. Against such an obstinate background, change may be witnessed through the juxtaposition of that which gathers and disperses. Over portions of the Svaerholt headland, a wreckage of plastic fish boxes, footballs, Christmas trees, and floats — all wind-blown debris supplied by drift matter (Pétursdóttir 2018) — accumulates in low lying areas to be buried by grass and heather, bestowing upon the present an increasing diversity of pasts, erratic, fragmentary, and unruly though they are. A symmetrical archaeology recognizes these pasts to be neither successive nor ordered within a series of replacements, but as simultaneous, as coincidental among the legion things that hold something of what was and the myriad relations that seek to release such memories.

Though uninterrupted progress and unrelenting advancement seem to occur along a linear and supercessive trajectory, neither the march of technology nor the unremitting pace of development manifests a definitive break with the past. Even as motors were placed in every conceivable tool, from dentist drills to battery-operated hedge trimers, they continued to be used next to hammers and handsaws. Even though the Allied bombing of Germany ceased in 1945, Frankfurt officials had to still evacuate 70,000 inhabitants due to

the enduring presence of British bombs in 2017. Even though the Western Roman Empire collapsed over the course of the fifth century – throughout the eternal city, and beyond – architectures of the Flavians, Trajan, and Diocletian continue to assert themselves in the present, pressing into the future, far beyond the desires of designers, affecting others irrespective of the aspirations of long-dead Romans. This latency is not only a matter of material, but also of form. Hellenistic roads buried under two meters of accumulation, nevertheless, persevere at the surface in the orientation and dimensions of streets in the Greek city of Argos. Such examples speak more to the topological pleating, folding, and enmeshment of disparate pasts, which gives rise to a sense of time less akin to linear flow than to weather-like percolation (Witmore 2006).

The weight of history, which holds a monopoly on how the past is conceived, burdens things with the expectation that they speak to lived events sealed off in another period. Such expectations are partially tied to the overdramatized relationship (often seen as a conflict) between texts and nontextual material objects. It is indeed the case that the past is shaped through writing about events, and objects that remain, or what becomes of them. But pasts are also produced apart from language or texts: in how the ruination of a building occurs through interactions with rain, microbes, or tree roots; in how we, whether archaeologists or agrarians, recognize change in that which is unfamiliar, in architectures out of place, in confronting strange and alien ceramic forms that are no longer in use, or in grasping a figurine dredged up from dark depths of the soil. Yet to focus on things present should not be confused with presentism (Bangstad 2017), for hammers, handsaws, blockbuster bombs, Trajan's column, or buried road surfaces possess a capacity for manifesting their own peculiar pastness, which may be profitably understood as a species of memory (Olivier 2011). However prevalent may be the conflation of the term with a conscious and wanton act of recollection, this form of memory can cannot be called voluntary. Rather, the inscription of object memories arises amidst adventures with other objects – nails, numerous oak boards, RAF Landcaster heavy bombers, chisels, or oxen-pulled stonerollers. Though expository, such memories may or may not offer suggestions as to the identity of other objects that gave rise to them. We could treat calcium carbonate-encrusted, *opus-incertum* arches – what has become of the Hadrianic aqueduct – as a blank canvas upon which to convey meanings or expressions related to "the slave economies of the classical world" (Barrett 2016, 1685), but remnants standing on the slopes of Ntourmiza or Megalovouni suggest nothing as to whom belonged the hands that set the stones – slave, free mason, soldier, or engineer. Still, what we lose from the angle of history, we gain in another form of memory – in the grade of an *opus signinum*-lined channel, in cutmarks left at the top of a limestone precipice, in the form of stones set within mortar. The memories held within and between things belong to them and are involuntary artifacts of their own past.

It is the tenacity of stone circles that do not shift in the wind, the persistence of Egyptian cosmetic palettes that do not rot, the obstinacy of millennium-old iron tools in Sogndal soils that allows change to be glimpsed through their comparative presence. In grappling with change, archaeology has long struggled with issues of synchronicity or diachronicity (Lucas 2015), terms familiar to history (terms which continue to drive the field of Mediterranean archaeological survey, for example), but understanding change demands a sense of *polychronicity*. This involves a motley array of objects and relations that endure on, that possess within themselves different continua. While subsequent Samothracian generations continue to live amidst a diversity of pasts – what becomes of medieval stone houses, disused water channels, relic terraces, or erstwhile ancient enclosures – they also enact millennia-old rapports, working soil, planting crops in plots delimited by channels, and maintaining water conduits.

Long have archaeologists conceived of change in terms of dynamic processes, where what becomes of the past is regarded as the outcome of a protracted course of entropy and accumulation. Widely understood in terms of formational

processes (Schiffer 1987), according to these precepts actual entities encountered in the present are the result of continual shaping and transformation – corrosion and compaction, decomposition and deposition, erosion and aeolian accretion. Whereas this conception situates ruined aqueducts, buried foundations, erstwhile surfaces, or the accumulated fills above them, as derivative of processes, symmetrical archaeology takes a different stance on the evolution of these old things. For any perspective on dynamism can only occur against backdrop of stability. There are several more points to be made with respect to change.

First, ruins, walls, buried surfaces, or fills do not exist because they change – they change because they exist (Harman 2016, 7). Organic remains, bacteria, and rubble walls are things rather than processes (Witmore 2014); and things change depending on their interactions with other things. If a thick layer of clay is deposited over rubbish-filled ditch, sealing it below the water table, then bacteria will no longer find a hospitable milieu in which to enjoy their wood fodder. Second, formational processes suggest a gradualist image of change. Whether over the long or short term, it is implied that every instant should be accorded equal interest. Yet, not all instances are the same. Some changes are of more consequence for the emergence of what is left of the past than others. With the deposition of a thick layer of clay, an anaerobic bubble emerges to redefine how wood tablets persist in absence of nitrogen-fixing bacteria, as is the case at the Roman fort of Vindolanda. As such, change is often more sporadic and the transformations that occur over the life of a thing is saltational. Finally, the past that was does not exist as an authentic and privileged bedrock situated in a resultant, causal relation to what is present; rather, the things present are what make the past, including processes, possible. Understanding how things give rise to pasts demands a different understanding of causation. Here, *emergent* causation takes over from that which was considered *resultant* (Witmore 2017a). Emergence specifies how objects, whether a Roman auxiliary fort on the Stanegate, the Vindolanda tablets, or the prefect Flavius Cerialis, exceed the components that gave rise to them, and once formed they retroactively define their ingredients as well as their own morphogenetic history (see DeLanda 2006). After organic objects are fully consumed by bacteria, new soils emerge to enter into their own chthonic adventures with hobnails, ceramic jugs, or relic walls (Nativ 2018). No longer derivative of intentional humans, historical processes, or heterogeneous entanglements, wood tablets, buried walls, or accumulated soils now share the stage as generative components in the articulation of pasts.

Criticisms and Clarifications

The foregoing narrative has already highlighted a number of common criticisms and wonton misreadings as points of contrast and prompts for clarification. What follows expands on routine critiques of symmetrical archaeology. Beginning with questions of agency, meaning, and intentionality and moving on to charges of progressive subjectification, this final section works through several critical examples, indicating points of deliberate misreading, and offers further clarifications.

If oak trees, goats, ox-pulled plows, flash floods laden with debris, or backhoes make a difference in the formation of the archaeological record, then it is because they root, inhabit, and furrow; they scour, deposit, and excavate. All these things possess, among other attributes, the capacity for activity; that is, the capacity to modify another object's course of action (Latour 2005, 71). Against such a motley roster of agencies, rash accusations of animism are commonly made. For such critics (e.g., Lindstrøm 2015), symmetrical archaeology succumbs to the same wayward tendencies that possessed those bereaved sons who prosecuted the statue of Theagenes for the murder of their father; the same irrational behavior displayed by the Thasians who, following Draconic law, found the statue guilty and banished it to the bottom of the sea; the same pagan sentiments as the oracle-informed Delphic priests who attributed land barren of fruit to the statue's exile or those who, after it was fished out of the sea, returned the statue to its place and

sacrificed to it as a god (Pausanias 6.11.6–8). Instead, these critics hold object agency to be just another species of projection by an ontologically privileged entity onto inert matter, which lacks one ounce of autonomy (Lindstrøm 2015).

In analogous fashion, others have taken issue with a supposed debasement of intentionality and meaning with a so-called turn away from people. In absence of intentionality, the guilty, we are warned, cannot be held accountable (Van Dyke 2015, 20). By evading the problem of free will, symmetrical archaeology, we are advised, misses how some "non-humans can *originate* action and some cannot" (Graves-Brown 2013, 184). Both critiques conflate symmetry, which is an analytical proposition, with an ethical and axiological declaration of equivalence – no need to rehash early examples that went to lengths to forestall this confusion (Witmore 2007, 547; also see Olsen and Witmore 2015, 192–194). Such cynical reasoning, moreover, abstracts from the specificities of archaeological objects and practices. In archaeology, the explanation cannot be laid out in advance, yet this is precisely what those who campaign for intentionality and free will seek to do. We are left to take recourse in a billiard-ball realism where action is initiated by an esteemed agent to be merely transferred down the causal chain among objects that lack any ability to inflict autonomous blows to each other. This species of reductionism fails to account for concrete bunkers that outlive their makers; for well-built walls of a bygone polis that underpin an eighteenth-century library in Ermioni, Greece; for water conduits that are released to their own trajectories, that form new alliances and offer up unpredicted qualities. Whatever differences these things make cannot be explained by reducing everything to a supposedly primary rapport with a favored interlocutor, thus sidelining bunkers, 2400-year-old trapezoidal walls, or water conduits as merely derivative.

"We cannot escape," others contend, "talking about meanings be they the meanings of past actors, present interpreters, cultural practices, evolutionary trajectories, actants, or assemblages" (Preucel 2016). It is, of course, the case that the world is saturated with meaning, most of which, as archaeology has long recognized, is unvoiced – the precise joints within a stretch of polygonal masonry, the placement of a window in a lookout tower facing an erstwhile harbor, ruins of gate in the saddle of a ridge. Reasserting the importance of such a "pragmatic archaeology," Robert Preucel contends "that a truly 'symmetrical' approach should not oppose people and things, but rather consider how humans combine the material (artifacts) and immaterial (words) in cultural performances to achieve specific semiotic effects" (ibid.). By now, it should be clear that, for a symmetrical archaeology, the relationship between human and world cannot be emphasized at the expense of others. Just as it would be absurd to remove the human element from archaeology, it would be absurd to claim there is no more to portions of polygonal walls, towers, or former gates than their semiotic effects. Preucel's pragmatic archaeology remains fixated on humans as its central concern and, in so doing, it conflates human as observer with human as ingredient and denies things that surplus reality that exists beyond human observation. While "meaning-making practices in the present" or considerations of cultural performances with semiotic effects do not exist free of a human observer, the material pasts shaped out of former timber buildings by nitrogen-fixing bacteria, as we must suppose, do. Myriad are the archaeological objects that exist without humans as necessary ingredients in their emergence. Pervasive are those *non-discursive* aspects of things that exceed their relations to any human observer.

The reasoning advanced by such critics posits a more genuine, more definitive, and purified reality, but this would provide us with insufficient traction in understanding the differences made to former timber buildings by nitrogen-fixing bacteria, to crystalline minerals in exposed agricultural soils by the sun, or to an ancient theater-turned-quarry by oak roots (Fig. 4). Furthermore, these quips over issues of agency, intentionality, free-will, and meaning completely miss the larger point. We need a different metaphysics to provide some purchase on our catastrophic times, when greater-than-gargantuan objects exceed the human ability to master them. Relations between permafrost and methane, between CO_2 and

Symmetrical Archaeology, Fig. 4 Oak roots conspire with foundation stones in a theater-turned-quarry, 2018

seawater, between atmosphere and sun require a very different empirical metaphysics than what we find in reductionist schemes that would situate all nonliving objects as pawns in a game played exclusively by sentient beings. Whether or not scholars are willing to concede this schematic legacy is now of less concern than how it is that coal-fired power plants, glaciers, abandoned uranium mines, landslides, hurricanes, or weighty urban infrastructures have refused to comply with their expectations.

Symptomatic of a wider turn to things, symmetrical archaeology has been subsumed to symmetric anthropology's last ditch effort to reclaim Western authority in the wake of its demise (Fowles 2016). "As it became more and more difficult for Western scholars to make authoritative claims about other people," according to Severin Fowles, "anthropologists began to explore the advantages of treating (non-human) objects like (quasi-human) subjects" (ibid., 12). In keeping with his appraisal that the turn to things amounts to a simultaneous turn away from people, Fowles contends that nonhuman objects "have the advantage of being safer" (ibid.). Suffering from an incurable longing for a loquacious anthropological informant, those scholars who apparently have fallen prey to a renewed interest in things have progressively transformed non-human objects into the perfect subject. Like those Thasians who sacrificed to the false-god of Theagenes, no clemency shall be given – their idols have mouths but do not speak; they have eyes but do not see; they have ears but do not hear; they have noses but do not smell; they have hands but do not handle; they have feet but do not walk (Psalms 115, 5–7).

Such critiques can only stand out against the very background which is rendered null and void by symmetrical archaeology. If we eliminate the opposed realms of culture and nature or subject and object, then why appeal to that familiar valorization of one side above the other? For critics to argue for a process of progressive subjectification is to directly violate the principle of symmetry. Such a frivolous critique offers a better view of the colonial attitude Fowles wishes to unmask in the work of others; for in subsuming the turn to things to deeper historical processes, he must ignore the specific arguments, explanations, and motivations put forth by his colleagues, and thereby deny them a voice – "like so many chessmen available for

anyone to play with" (ibid., 16). One might cast this as yet another case of projection by those who believe nonhumans to be nothing and human politics everything. Yet again, archaeological objects are threatened with being trivialized and ignored in critical misrepresentation. Symmetry reminds us never to make this mistake.

Participants, memories, suggestions: on the surface, the terminology of symmetrical archaeology might seem to redistribute formerly human qualities to that which lacked them, and, thereby, reaffirm human narcissism by reconceiving of the world in our own image (Pétursdóttir 2012). Such suspicions can only be bolstered when we encounter descriptions of plants that communicate through roots, retain memory, and distinguish on the basis of "kin" through rhizomes. And yet, the use of such terminology runs the risk of anthropomorphism only if humans are maintained at center. Indeed, it is the case that the choice of concepts within symmetrical archaeology targeted the premise that memory, agency, interpretation were never exclusive to humans themselves; thus, such vocabulary was deployed in making this assertion (e.g., Olsen et al. 2012, 13). Still, when it comes to understanding the idiosyncrasies of things, this terminology actually blurs the positive differences that autonomous entities make, and which all archaeology seeks to manifest. Incessant is the struggle to cultivate vocabularies and modes of expression as delicate as the situation at hand.

Whatever one makes of the novelty of symmetrical archaeology's contributions, it is worth repeating that the adjectival label "symmetrical" was always recognized as provisional (Witmore 2007, 547; Olsen 2012, 223). Once its liberating effects were expended as a qualifier, it was ready to be shed. However, it remains a challenge for archaeology to fully recognize that we begin, not with a detached past, not with bits of ceramic that act as intermediaries to artisans or PoWs, but with what becomes of what was, with things. Symmetrical archaeology is an inheritor of that longstanding archaeological aspiration to dig to what is fundamental as our objects of study, but not at the expense of sorting out what is real and what is not in advance. It aspires not so much to greater certainty as to making positive gains amidst every present uncertainty. Its stories are diverse, from gatherings of different times in the fabric of Greek city-states or Ethiopian landscapes of abandonment to bovine urbanites living within their own cities on the high plains of Texas or material memories present in a PoW camp in Finnmark, Norway. Ultimately, symmetrical archaeology strives for an archaeology that is not subsumed to history, but is held to be of equal scope; that is, an archaeology that stands as both history's complement and alternative.

References

Bangstad, T.R. 2017. Nærvær og presentisme. Om synet på fortiden i nyere historieteori. *Tidsskrift for kulturforskning* 16 (2): 31–45.

Barrett, J. 2016. The new antiquarianism? *Antiquity* 90 (354): 1681–1686.

Bloor, D. 1991[1976]. *Knowledge and social imagery.* Chicago: The University of Chicago Press.

Braidwood, R.J. 1959. Archeology and the evolutionary theory. In *Evolution and anthropology: A centennial appraisal*, ed. B.J. Meggers, 76–89. Washington, DC: Anthropological Society of Washington.

Brown, B. 2003. *A sense of things. The object matter of American literature*. Chicago: The University of Chicago Press.

Clarke, D. 1968. *Analytical archaeology*. London: Methuen.

Dartnell, L. 2014. *The knowledge: How to rebuild our world from scratch*. New York: The Penguin Press.

Delanda, M. 2006. *A new philosophy of society: Assemblage theory and social complexity.* New York: Continuum.

Van Dyke, R. ed. 2015. Practicing materiality. Tucson: University of Arizona Press.

Fowles, S. 2016. The perfect subject (postcolonial object studies). *Journal of Material Culture* 21 (1): 9–27.

González-Ruibal, A. 2007. Arqueología Simétrica. Un Giro Teorico sin Revolucion Paradigmática. *Complutum* 18: 283–285.

Grabowski, R., B. Olsen, Þ. Pétursdóttir, and C. Witmore. 2014. Teillager 6 Sværholt: The archaeology of a World War II prisoner of war camp in Finnmark, Arctic Norway. *Fennoscandia Archaeologica* 31: 3–24.

Graves-Brown, P. 2013. Review of In defense of things. *The Journal of the Royal Anthropological Institute* 19: 183–184.

Harman, G. 2010. *Towards speculative realism: Essays and lectures*. Winchester: Zero Books.

Harman, G. 2011. *The quadruple object*. Winchester: Zero Books.

Harman, G. 2014. Entanglement and relation: A response to Bruno Latour and Ian Hodder. *New Literary History* 45 (1): 37–49.

Harman, G. 2016. *Immaterialism*. Cambridge: Polity Press.
Hodder, I. 2014. The asymmetries of symmetrical archaeology. *Journal of Contemporary Archaeology* 1 (2): 228–230.
Kuletz, V.L. 1998. *The tainted desert: Environmental ruin in the American West*. New York: Routledge.
Latour, B. 1993. *We have never been modern*. Trans. C. Porter. Cambridge, MA: Harvard University Press.
Latour, B. 2005. *Reassembling the social: An introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
Lingis, A. 1998. *The imperative*. Bloomington: Indiana University Press.
Lucas, G. 2012. *Understanding the archaeological record*. Cambridge: Cambridge University Press.
Lucas, G. 2015. Archaeology and contemporaneity. *Archaeological Dialogues* 22: 1–15.
Nativ, A. 2018. On the object of archaeology. With comments and reply. *Archaeological Dialogues* 25 (1): 1–47.
Olivier, L. 2011. *The dark abyss of time: Memory and archaeology*. Trans. A. Greenspan. Lanham: AltaMira Press.
Olsen, B. 2003. Material culture after text. Re-membering things. *Norwegian Archaeological Review* 36: 87–104.
Olsen, B. 2010. *Defense of things: Archaeology and the ontology of objects*. Lanham: AltaMira Press.
Olsen, B. 2012. Symmetrical archaeology. In *Archaeological theory today*, ed. I. Hodder, 208–228. Cambridge: Polity.
Olsen, B., and C. Witmore. 2015. Archaeology, symmetry and the ontology of things. A response to critics. *Archaeological Dialogues* 22 (2): 187–197.
Olsen, B., M. Shanks, T. Webmoor, and C. Witmore. 2012. *Archaeology: The discipline of things*. Berkeley: The University of California Press.
Pétursdóttir, Þ. 2012. Small things forgotten now included, or what else do things deserve? *International Journal of Historical Archaeology* 16: 577–603.
Pétursdóttir, Þ. 2018. Drift. In *Multispecies archaeology*, ed. S.E. Pilaar Birch, 85–101. New York: Routledge.
Preucel, R.W. 2016. Pragmatic archaeology and semiotic mediation. *Semiotic Review* 4: 1. https://semioticreview.com/ojs/index.php/sr/article/view/11.
Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico Press.
Stengers, I. 2011. Wondering about materialism. In *The speculative turn: Continental materialism and realism*, ed. L. Bryant, N. Srnicek, and G. Harman, 368–380. Melbourne: Re.press.
Wallace, S. 2014. *Contradictions of archaeological theory: Engaging critical realism and archaeological theory*. New York: Routledge.
Watts, C. 2007. From purification to mediation: Overcoming artifactual 'otherness' with and in Actor-Network Theory. *Journal of Iberian Archaeology* 9/10: 39–54.
Webmoor, T. 2012. STS, symmetry, archaeology. In *The Oxford handbook of the archaeology of the contemporary world*, ed. P. Graves-Brown, R. Harrison, and A. Piccini, 105–120. Oxford: Oxford University Press.
Webmoor, T., and C. Witmore. 2008. Things are us! A commentary on human/things relations under the banner of a 'social' archaeology. *Norwegian Archaeology Review* 41: 53–70.
Whitridge, P. 2005. Whales, harpoons, and other actors: Actor-Network-Theory and Hunter-gatherer archaeology. In *Hunters and gatherers in theory and archaeology*, Center for Archaeological Investigations, Occasional paper, ed. G.M. Crothers, vol. 31, 445–474. Carbondale: Southern Illinois University.
Witmore, C. 2006. Vision, noise and the percolation of time: Symmetrical approaches to the mediation of the material world. *Journal of Material Culture* 11 (3): 267–292.
Witmore, C. 2007. Symmetrical archaeology. Excerpts of a manifesto. *World Archaeology* 39 (4): 546–562.
Witmore, C. 2014. Archaeology and the new materialisms. *Journal of Contemporary Archaeology* 1 (2): 203–224.
Witmore, C. 2017a. Complexities and emergence: The case of Argos. In *Regional approaches to society and complexity studies in honor of John F. Cherry*, ed. A.R. Knodell and T.P. Leppard, 268–287. London: Equinox.
Witmore, C. 2017b. Things are the grounds of all archaeology. In *Clashes of times: The contemporary past as a challenge for archaeology*, ed. J.M. Blaising, J. Driessen, J.P. Legendre, and L. Olivier, 231–246. Louvain: Louvain University Press.

Further Reading

Alberti, B. 2016. Archaeologies of ontology. *Annual Review of Anthropology* 45: 163–214.
Alberti, B., A.M. Jones, and J. Pollard, eds. 2013. *Archaeology after interpretation: Returning materials to archaeological theory*. Walnut Creek: Left Coast Press.
Bryant, L.R. 2011. *The democracy of objects*. Ann Arbor: Open Humanities Press.
Fowler, C. 2013. *The emergent past: A relational realist archaeology of early Bronze Age mortuary practices*. Oxford, UK: Oxford University Press.
Harris, O.J.T., and C.N. Cipolla. 2017. *Archaeological theory in the new millennium*. New York: Routledge.
Hodder, I., and G. Lucas. 2017. The symmetries and asymmetries of human–thing relations. A dialogue. *Archaeological Dialogues* 24 (2): 119–137.
Knappett, C., and L. Malafouris. 2008. *Material agency: Towards a non-anthropocentric approach*. New York: Springer.
Martin, A.M. 2013. *Archaeology beyond postmodernity: A science of the social*. Lanham: AltaMira.
Shanks, M. 2007. Symmetrical archaeology. *World Archaeology* 39 (4): 589–596.
Sørensen, T.F. 2016. Hammers and nails. A response to Lindstrom and to Olsen and Witmore. *Archaeological Dialogues* 23 (1): 115–127.
Webmoor, T. 2007. What about 'one more turn after the social' in archaeological reasoning? Taking things seriously. *World Archaeology* 39 (4): 563–578.

Symposion

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Introduction

Since the 1980s, the "symposion," or drinking party, has been studied intensively as a major socio-political phenomenon in ancient Greece. Its origins probably lie in the fusion of local drinking culture with practices learned from the Near East in areas where trade opened up not just the transfer of goods but practices and ideas. However, as part of an Archaic Greek culture it developed its own distinctive rituals, forms, and functions. To understand its sociological, political, and psychological dimensions we must look at written, archaeological and iconographic material together.

Definition

"Let us drink!" With this opening invitation, the late seventh/early sixth-century BCE poet Alcaeus from the island of Lesbos (fr. 346) encapsulates the essence of the symposion imbedded in the name: to drink (*poteô*) in company (*sun-*, "with"). As the poem continues, further features emerge. With night only a fraction away, a beloved youth is instructed to take down large painted cups. Reminded first that the god Dionysus gave care-banishing wine to mankind, the boy is urged to fill them up to the brim with one measure of water to two of wine, as one cup jostles with another. Alcaeus' commands draw attention to some specific accoutrements and processes – a serving boy, decorated wine cups, and the mixing of wine –, and aim at a carefree, eroticized, exuberant atmosphere. Here, then, is one symposion.

Step forward in time to the early fifth century and travel across the Aegean Sea to mainland Athens, and a red-figure drinking cup attributed to the Painter of the Paris Gigantomachy provides a glimpse of another party in progress. On one exterior scene (Fig. 1), many of the same attributes are visible. The presence of four young men reclining side-by-side, facing one another in pairs creates a communal dimension. Cups hang behind them on the walls, or rest in their hands, or stand silhouetted on a border below (this border perhaps stands for the table or the floor). If the appearance of stylized semi-naked, beardless youths is not enough to convey an erotic tone, then the bent elbow, outstretched arm, and raised cups of the youths to the far left and right certainly do. They are playing kottabos, a toasting game in which each player aimed the dregs of his wine cup at a target (here, two high poles) in order to claim kisses. A penis cup also stands cheekily to attention below. In addition, the scene contains signs of luxury. The symposiasts recline upon sumptuous striped cushions. They are apparently on the floor, but this may be a visual shorthand for the raised

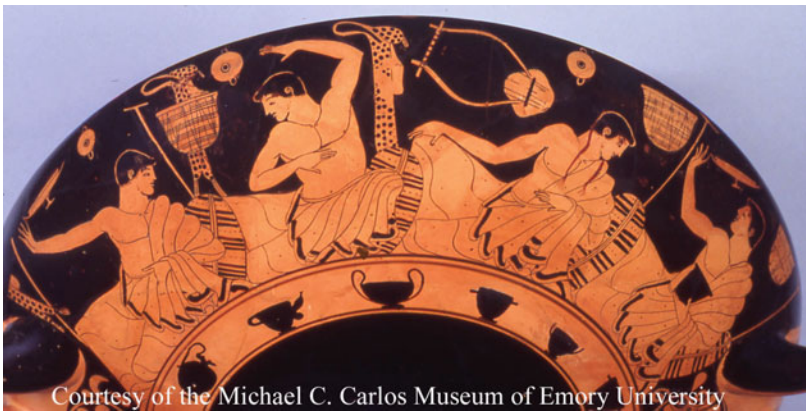

Symposion, Fig. 1 Painter of the Paris Gigantomachy. Kylix: symposion scene. Greek, Attic. C. 480 BC. Terracotta. 1998.8. (© Michael C. Carlos Museum, Emory University. Photo by Bruce M. White, 2005)

couch (*klinê*) upon which two more symposiasts lie on the interior of the cup. The potential extravagance of this furniture is hinted at by the molded legs and decorative arm of a bronze couch in Athens' National Archaeological Museum (X18922), which, although from the second century BCE, accords with representations of *klinai* from Archaic Painted pottery (discussed by Boardman 1990). Depicted on the wall behind our nubile youths, furthermore, are animal-skin cases for the pipes (*aulos*) and a lyre, symbols of musical performance. Alcaeus might focus on the drinking, but his poem constituted a musical contribution to the symposion, most probably sung to the accompaniment of the lyre.

Taken from the written and material record, these two snapshots of the symposion provide a cumulative vision of a male homosocial occasion characterized by communal drinking, (homo)eroticism, music, luxury, and game-play. Add to this the archaeological evidence of the andron – the distinctive "men's room" that appears at civic-religious then domestic sites from the sixth century onwards, which is identifiable by its dimensions, architectural details, and more elaborate decoration – and you also have an event that took place within closed walls. These walls were lined with 7 or 11 couches in a circle. Like the figures spread around the exterior of our red-figure cup (the symposion continues on the reverse), the occupants' attention was automatically turned towards one another, away from outside. This lent the symposion an inclusive and exclusive air. The communality attested in the name symposion and its shared ventures was reinforced via the dynamics of the architectural space in which it took place.

Key Issues and Current Debates

To understand the symposion it is necessary to read different types of evidence in tandem. Each has a distinct focus and purpose: monodic poetry of the type attributed to Alcaeus was sung at the symposion; figured drinking vessels circulated amongst symposiasts at Athens and beyond; and excavated sites provide access to the physical space they inhabited. Together they construct a composite form. Yet, approached individually, each can shed independent light on the phenomenon; and from the divides arise discontinuities and differences. For, as is shown by poems composed not only by Alcaeus of Lesbos but also, moving from the late seventh to fifth centuries, Archilochus of Paros, Tyrtaeus of Sparta, Theognis of Megara, Solon of Athens, Anacreon of Abdera (who sang at the court of the tyrants Polycrates of Samos and Hipparchus of Athens), Xenophanes of Colophon, Ion of Chios, Dionysius Chalcus and Critias of Athens, the symposion was a multifaceted affair. Composed on the spot, introduced by the original poet, or memorized and performed by others, their songs may survive mainly in fragments. None the less, they preserve the conversations of the event. Through poetry symposiasts might express political sentiments, outline moral positions, praise or criticize a companion's conduct, pursue erotic relationships (especially with younger males), offer hymns, and make statements about themselves. Moreover, verses could be uttered in self-promotion, challenge, or defense. The symposion could therefore be a place for consolidating political alignments, educating young members of the community, forming personal social and sexual bonds, and expressing one's identity with regards to the present group and the outside world – and also disrupting or disputing these.

Of course, pushing together all this written evidence, generated orally at different parties in different towns and at different times, minimizes the diversity of opinions and interests between the poets and their audiences. One ongoing task, then, is to understand the particular agendas of sympotic poets, to understand their corpuses as a whole, and also how their verses (however fragmentary they are now) might have been effective at gatherings beyond their original performance occasion. Ceramic drinking vessels can be similarly interrogated. Many are not only decorated with images of drinking parties, like the red-figure cup above, but were in all likelihood used on convivial occasions. We can therefore think about the items themselves, and about the images on them. There is one problem here. Many of the

cups, kraters, jugs, amphorae and hydrias that we encounter now in museums have no recorded findspot (Lewis 2002: 5 estimates 50%), or were excavated in Etruria (Italy), where they may have been used by local elites before being deposited as grave goods. Thus, we need to put the majority of pots back into the Greek andron, but of course we have no direct evidence of who used them, where or when.

There is therefore an unavoidable risk of circularity when approaching the visual evidence: of understanding how the imagery on pots contributed to the symposion's social and psychological dynamics by bringing to bear one's preconceptions of what these might be, based in part on that imagery. For François Lissarrague, close attention to iconographical detail allowed a way through the problem, and demonstrated the role of sympotic imagery in self-exploration and identity construction by the symposiast. His seminal monograph, *The Aesthetics of the Greek Banquet* (1990), set the vessels and their images circulating around the andron in the hands and before the eyes of symposiasts. As drinkers encountered reflections of their own activities, sometimes idealized to fit a generic model, sometimes vulgarized, sometimes undertaken by raucous satyrs or hat-wearing foreigners, they were confronted through association and humor with the pleasures and difficulties of their own drinking practices (see, for example, Sutton 2000; Osborne 2007; Steiner 2007: 231–264). Wine could be a powerful and transformative potion, as reflected in the character of Dionysus, its transgressive, boundary-blurring, and boundary-pushing deity. The images on the pots thus acted as Dionysian mirrors, showing drinkers how they were and how they might be. They thereby echoed the discussion of appropriate modes of drinking and the attendant dangers expressed in sympotic poetry.

However, the imagery on Greek pots extended beyond sympotic themes, to include mythological and "everyday" scenes. In tandem with oral storytelling through poetry, for example the tales of giants and strife that the philosopher-poet Xenophanes (F1) wished to eject from the symposion, painted pots drew symposiasts towards narratives about the (heroic) past and present. Like Tyrtaeus' martial elegy, scenes of Homeric-style fighting might contribute to the creation of shared memory – linking modern-day warriors to their heroic ancestors – or reinforce a martial ethic. Or scenes of men "courting" boys could titillate as much as Anacreon's poetic expressions of his homoerotic desires. Or sexually explicit scenes of men with women might also excite, whether as fantasies or anticipating real-life action; or in the most graphic or violent scenes they may even express gender power hierarchies. (Archilochus' "iambic" poetry similarly subjected women to sexual exposure through verbal abuse). These are only a few examples; the scenes on Athenian figured pottery are multifarious. It is frustrating not to know more about the precise encounter contexts for specific images, and difficult to avoid speculation when proposing the responses of imagined drinkers – even if that is grounded in what we know about Greek society generally, and through other evidence from the symposion. However, contemplating this limited selection already indicates some potential resonances, and highlights the symposion once more as a venue for conversations about self and society.

Occasionally, however, imaginative leaps are not required. Some drinking vessels are preserved in situ in Greek settlements in androne, or close by in rubbish tips or graves. When this does occur, the results are fascinating. By studying the shapes and images and inscriptions on pottery found in the fifth-century Athenian Agora, Steiner (2002) has demonstrated the incorporation of "élite" sympotic elements into the dining practices of democratic officials (see previously Rotroff and Oakley 1992). Also in the Agora, deposits from the well (J 2:4) of a late Archaic house have revealed more about how Athenians drank at home: the shapes used by inhabitants and the iconographic themes they enjoyed are set by Lynch (2011) within the context of wider household activities and the new democracy. And the physical and chronological dispersal of kraters across three Greek cities in Sicily – Megara Hyblaea, Himera, and Silenus – shows a shift in sympotic activity from public to private events during the sixth to fifth centuries. Rabinowitz

(2009) sets this progression against the political tenor of a proportion of sympotic verse, making the symposion a venue for expressing the tensions amongst members of developing communities, between bids for equality and power (On the basis of Doric practice at Sicily, he also argues that Spartan convivial practice of the *syssition*, far from being atypical as is often thought, was an extreme version of the standard symposion). Site-specific analyses of the archaeological evidence afford new glimpses into the practicalities of Greek drinking, and the sympotic experiences of individuals and communities.

The particular focus on the symposion's civic dimension reanimates Schmitt Pantel's (1992) argument that the symposion – and its ceramic ware – belonged within the wider sphere of civic commensality. It also fits with revisionist interpretations of the poetic evidence. Earlier studies of the symposion evaluated political comments in Alcaeus and Theognis as evidence for the symposion as an aristocratic activity of separation and opposition (Murray 1983). Or they divided poetry into two types – "élite" and "middling" – according to whether its singers reveled in or rejected luxury, and correlated this to a divide in political ideology (Kurke 1992). "Élite" symposiasts rejected the dissemination of their culture and power to less wealthy and less worthy citizens; "middling" symposiasts towed a middle line in their ethics and political relationships (Morris 1996). Hammer (2004) has challenged the very basis for this distinction, attributing it to the erroneous imposition of ideological divisions, while Corner (2010) shows that the symposion could act as a microcosm of the polis, linking its socialization processes to the individual within the community as a whole. By this reading, the symposion bridges the (private) household and (public) city.

The ramifications of this new work for understanding the symposion as a socio-political phenomenon need further consideration. On the one hand, the symposion was clearly enjoyed by a wider selection of individuals on a broader range of occasions than the inward-focused, oppositional "aristocratic Männerbund" formerly postulated (Murray 1983). But the relationship between the event articulated through the poetry and pot-paintings and the potential settings for sympotic performances intimated by the archaeological record could be sharpened by closer attention to specific archaeological settings. For example, allowing that standard issues regarding preservation, excavation, and interpretation may influence the picture, the majority of andrones in the Archaic period appear to have been situated in public buildings, especially at religious sanctuaries. Symposia here automatically took place in cultic contexts, presumably amongst specific individuals on particular occasions. How can this setting help us understand individual and group experiences? Hobden (2011) reminds us of the indivisibility of religion from other areas of life in ancient Greece, and, bringing together the poetry and imagery of the symposion, suggests some ways in which a religious dimension might facilitate the communal dynamics. But it would be interesting also to explore the (related) religious-political dimension.

Together, these studies demonstrate the pervasiveness of sympotic culture. Drinking in company is not merely the preserve of disaffected aristocratic élites; it was part of "mainstream" Greek culture. Or at least, there were occasions when non-élite citizens enjoyed communal drinking, and civic occasions when groups might come together in various guises. Given also variations in settings, membership, and activities from town to town and across time, any single event could be quite distinct. The symposion may have been a major cultural phenomenon, but it was also diverse in expression. Furthermore, the poetic and visual evidence point towards an event that was potentially disputatious, disruptive and dangerous as much as a positive affirmation of identity and facilitator of group bonding. One of the greatest pleasures of the symposion is the continuing challenge to unpack that diversity of experience.

Cross-References

► Andron
► Polis
► Religion, Greek, Archaeology of

References

Boardman, J. 1990. *Symposion* furniture. In *Sympotica: A symposium on the symposion*, ed. O. Murray, 122–131. Oxford: Oxford University Press.

Corner, S. 2010. Transcendent drinking: The symposium at sea reconsidered. *Classical Quarterly* 60: 352–375.

Hammer, D. 2004. Ideology, the symposium and Archaic politics. *American Journal of Philology* 125: 479–512.

Hobden, F. 2011. Enter the divine: Sympotic performance and religious experience. In *Sacred words: Orality, literacy and religion*, ed. A.P.M.H. Lardinois, J.H. Blok, and M.G.M. van der Poel, 37–57. Leiden: Brill.

Kurke, L. 1992. The politics of ἁβροσύνη in Archaic Greece. *Classical Antiquity* 11: 91–120.

Lewis, S. 2002. *The Athenian woman: An iconographical handbook*. London: Routledge.

Lissarrague, F. 1990. *The aesthetics of the Greek banquet: Images of wine and ritual*. Trans. A. Szegedy Maszak. Princeton: Princeton University Press.

Lynch, K. 2011. *The symposium in context: Pottery from a late Archaic house near the Athenian Agora*. American School of Classical Studies at Athens: Princeton.

Morris, I. 1996. The strong principle of equality and the Archaic origins of Greek democracy. In *Dêmokratia: A conversation on democracies, ancient and modern*, ed. J. Ober and C. Hedrick, 19–48. Princeton: Princeton University Press.

Murray, O. 1983. The *symposion* in history. In *Tria corda: Scritti in onore di Arnaldo Momigliano*, ed. E. Gabba, 257–272. Como: New Press.

Osborne, R. 2007. Projecting identities in the Greek symposion. In *Material identities*, ed. J. Sofaer, 31–52. Oxford: Blackwell.

Rabinowitz, A. 2009. Drinking from the same cup: Sparta and Late Archaic commensality. In *Sparta: Comparative approaches*, ed. S. Hodkinson, 113–191. Swansea: Classical Press of Wales.

Rotroff, S.I., and J.R. Oakley. 1992. *Debris from a dining place in the Athenian Agora*. Princeton: Princeton University Press.

Schmitt Pantel, P. 1992. *La cité au banquet: Histoire des repas publics dans les cités grecques*. Rome: Ecole française de Rome.

Steiner, A. 2002. Private and public: Links between symposion and syssition in fifth-century Athens. *Classical Antiquity* 21: 347–380.

Steiner, A. 2007. *Reading Greek vases*. Cambridge: Cambridge University Press.

Sutton, R.F. 2000. The good, the base, and the ugly: The drunken orgy in Attic vase painting and the Athenian self. In *Not the Classical ideal: Athens and the construction of the other in Greek art*, ed. B. Cohen, 180–202. Leiden: Brill.

Further Reading

Catoni, M.L. 2010. *Bere vino puro: Immagini del simposio*. Milan: Feltrinelli.

Hobden, F. In press. *The symposion in ancient Greek society and thought*. Cambridge: Cambridge University Press.

Murray, O., ed. 1990. *Sympotica: A symposium on the symposion*. Oxford: Oxford University Press.

Murray, O., and M. Tecuşan, eds. 1995. *In vino veritas*. London: British School at Rome.

Neer, R. 2002. *Style and politics in Athenian vase-painting: The craft of democracy, ca. 530–460 B.C.E.* Cambridge: Cambridge University Press.

Orfanos, C., and J.-C. Carrière, eds. 2003. *Symposium: Banquet et représentations en Grèce et à Rome*. Toulouse: Presses Universitaires du Mirail. [= *Pallas* 61].

Schäfer, A. 1997. *Unterhaltung beim griechischen Symposion*. Mainz: Verlag Philipp von Zabern.

Slater, W.J., ed. 1991. *Dining in a Classical context*. Ann Arbor: University of Michigan Press.

Topper, K. In press. *The imagery of the Athenian symposium*. Cambridge: Cambridge University Press.

West, M.L. 1993. *Greek lyric poetry*. Oxford: Oxford University Press.

Syrian Archaeological Heritage Management: "Dead Cities" and Living Communities

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Introduction

Heritage management is at the epicenter of community cohesion and identity construction in modern Syria. Founded as an independent nation-state in 1946, after a significant era of Ottoman and French colonization, the Syrian Arab Republic manages millennia of Syrian heritage, from some of the world's oldest continually occupied cities to transforming expressions of intangible culture. Modern Syria is negotiating the dialectic between tradition and innovation, utilizing the legacy of the past to meet the challenges of the future.

Syria's vast archaeological heritage is managed by the Directorate-General of Antiquities and Museums (DGAM) under the auspices of

the Ministry of Culture. The DGAM was founded soon after Syrian independence and serves an integral role in managing the nation's archaeological patrimony and structuring heritage narratives. The national narrative is one of legitimization through antiquity and the assertion of national identity in the postcolonial era. National museum and archaeological site narratives emphasize majority culture over diversity, minimizing difference by highlighting elements of a perceived shared past and striving toward a common future. It is through the medium of archaeological heritage that the past is recontextualized and the process of identity formation negotiated.

Key Issues/Current Debates/Future Directions/Examples

Archaeological Site Excavation and Protection

Syria's cultural patrimony encompasses a rich tapestry of archaeological and historical sites that illustrate the region's ancient and diverse past. These sites represent human settlement and culture in the Near East from the earliest occupations in ancient Mesopotamia to Hellenization and Islam. Many of Syria's archaeological sites have been scientifically excavated through a combination of national efforts and international partnerships with foreign scholars. Excavated artifacts are curated in one of a network of Syrian national museums, where the past is recontextualized in the construction of present identities through regional and national narratives.

Archaeological sites in Syria are protected by strict national laws against looting and destruction. Local branches of the DGAM operate in each of 14 provinces, often from the offices of a national museum. Permanent site guards are required at all archaeological sites under current excavation. All sites are regularly visited by provincial officials of the DGAM to ensure that they are in stable condition, but consistent coverage is difficult with a lack of financial resources.

The rural locations of many sites offer a unique set of conservation challenges. Many of the environmental factors that motivated ancient settlement in these rural regions are equally attractive to modern occupants. Thus, villages are frequently located nearby, if not directly surmounting, ancient settlements. In the ideal scenario, the ubiquity of modern settlement near ancient sites could foster a community of local stewards to protect archaeological heritage and participate in scientific excavation. Presently, it is a continuing challenge to balance modern concerns with the preservation of cultural patrimony.

Syrian law protects archaeological sites from modern cultivation and construction. Archaeological *tells*, or settlement mounds, are the most evident type of site morphology in Syria, which frequently results in legal protection extending solely to the more visible high mound. Lower mounds or ancient outer towns are not as topographically obvious and are thus often hidden or destroyed under modern agricultural cultivation. Irrigation agriculture is most prevalent, as many regions in Syria are in either marginal environmental zones or reside below rainfall requirements for successful dry farming. Agricultural reliance on irrigation in these regions has artificially raised the water table surrounding many archaeological sites that are not themselves under cultivation. Thus, tells may appear intact on the surface, while access to deep archaeological deposits is rendered effectively impossible by water and salinity. The popularity and economic growth of cotton cultivation, which requires considerably more water than other crops, has only accelerated this process. Numerous well-preserved sites remain, though many have not yet been scientifically excavated.

The DGAM has identified "salvage zones" in regions where archaeological sites require special protections. These salvage zones are usually regions where modern developments threaten to destroy or obfuscate ancient sites. The directorate-general issues new excavation permits to foreign expeditions only in "salvage zones," which carry the incentive of official dispensation of half the excavated material to foreign scholars at the end of the scientific mission. In 1968–1973, the Tabqa Dam Project constructed a hydroelectric dam on the Euphrates River, which created Lake Assad.

Prior to completion of the impound lake, a cooperative Syrian and international effort was undertaken in concert with UNESCO to excavate sites that would be flooded (Freedman 1977). As part of this initiative, standing architecture at sites such as Qala'at Jaabr were conserved and reinforced; a brick minaret from the thirteenth-century mosque at Siffin was relocated to Meskene (Bounni 1977; Burns 1992: 204), along with the relocation of a similar minaret from Abu Hureyra (Bounni 1977). Recently, the DGAM designated a salvage zone in the Halebiye-Zalebiye region of eastern Syria in response to the planned construction of a dam and resultant flooding of nearby archaeological sites.

Many famous and historically important sites have undergone extensive conservation efforts. In 1999, the DGAM partnered with the Aga Khan Trust for Culture under the latter's Historic Cities Programme (AGHCP) to conserve and restore a selection of Syria's historic fortresses, including Qala'at Salah ad-Din and the Aleppo and Masyaf Citadels. The AGHCP provided technical assistance with the restorations, which "encompassed the refurbishment of public spaces, the provision of tourism infrastructure and a number of socio-economic programmes" (Aga Khan Development Network 2007). In 2004, the Syrian Ministry of Culture signed a similar agreement with Italy's Ministry of Foreign Affairs to renovate the Damascus Citadel and the National Museum of Damascus.

In addition to national laws protecting Syria's archaeological heritage, six sites in the Syrian Arab Republic are currently protected by UNESCO's Convention Concerning the Protection of the World Cultural and Natural Heritage (1972). These are, in order of acceptance to the World Heritage List, the Old City of Damascus (1979), Bosra (1980), Palmyra (1980), the Old City of Aleppo (1986), Krak des Chevaliers and Qala'at Salah ad-Din (2006), and the Ancient Villages of Northern Syria (2011), more commonly known as the Dead Cities. There are also a dozen other cultural heritage sites submitted to UNESCO's Tentative List for possible future inclusion. The sites that currently reside on the list are some of the most popular and heavily trafficked tourist destinations in Syria.

Syrian National Museums

Syrian national museums preserve and present the archaeological past, recontextualizing Syria's vibrant cultural heritage for a modern audience. The national museums were created as nationalist enterprises during Ottoman rule, expanded and modified for colonial purposes under the French Mandate, and finally adopted by the nascent Syrian Arab Republic as a means of contextualizing and presenting their cultural heritage in a post-colonial era. The two oldest Syrian museums, the National Museum of Damascus and the National Museum of Aleppo, were both formed from collections of independent nationalist societies (the Arab Academy and the Archaeological Society, respectively), before being subsumed under the government-operated *Service des Antiquités* around 1920.

Today, the DGAM maintains national museums in many of Syria's provinces, each of which draws upon the same corpus of archaeological heritage. Although the network of national museums display similar artifacts exemplifying millennia of Syrian settlement, each museum presents a distinct narrative of Syrian national identity (see Zobler 2011). Several of Syria's archaeological sites, including Palmyra and Mari (modern Tell Hariri), contain small site museums showcasing some of the artifacts discovered. These museums allow visitors to examine artifacts recovered during excavation and provide a broader historical context for archaeological sites and regional histories. These site museums are far more specialized in scope in comparison with the more conglomerate national museums.

Tourism and Historic Site Management

Syria's rich archaeological heritage is presented to tourists with a particular focus on a few sites and national museums. At Syria's most famous and heavily trafficked tourist destinations, local and foreign tourists mingle to explore Syria's cultural patrimony. The drastically reduced entry fees for Syrian citizens encourage national patronage of archaeological sites and museums. In addition to extant ruins, there are also related intangible heritage events such as the Festival of le Crac des

Chevaliers and the Valley for Arts and Culture, which was held in Homs in the summer of 2010.

Many of these sites have ongoing excavations and restoration projects, which contribute to the corpus of archaeological data, while opening new tourism opportunities and conserving sites for future visitors. Ongoing research at these sites affords tourists the opportunity to witness excavation and restoration programs in progress, thereby de-abstracting the work of heritage management and highlighting its importance in the responsible stewardship of archaeological resources.

Visitor Flow at Archaeological Heritage Sites

Syrian management of large sites with significant tourist traffic involves a segmented organization of multiple checkpoints at key areas of interest, usually involving separate entrance fees for high-profile monuments. These checkpoints may be used to manage the number of tourists able to enter an area at any one time for conservation purposes. In practice, only a small percentage of a large archaeological complex is visited by a significant number of tourists, usually in direct correlation with tour bus accessibility. Syrian officials have concentrated their management efforts in these popular zones, but are virtually absent in other parts of a large site. Thus, the more persistent visitor can often experience sites virtually in isolation (and without official supervision) by walking beyond the most commonly visited sectors of a site. Syrian officials combat this tourist tendency in remote zones by restricting access to unguarded structures with locked gates, making them only accessible by guided tour.

Even with large numbers of tourists arriving daily at a few select sites, there is minimal effort to direct tourist movement patterns in Syrian site management planning. The paucity of cordoned-off sections (for either safety or site preservation) or directional signs to suggest a route, by which visitors may experience the site, engenders a management strategy significantly reliant on individual responsibility. Syrian site officials frequently adopt a warden-esque approach to site protection from damage, issuing frequent verbal reminders to tourists as to which portions of the site are off-limits. From a conservation and safety standpoint, this often leads to more limited and inconsistent site coverage, particularly when spread over a large surface area, than more integrative methods utilizing barriers and signage in addition to roving guardians.

It is predominantly the responsibility of individual tour guides to ferry their visitors around sites and give them historical context in the absence of signage. Syrian tour guides require an official license to practice in Syria, thus ensuring relative standardization in the quality of information presented. Foreign tour guides are allowed in Syria, but the majority of foreign tour companies usually outsource to local agencies for Syrian guides. Within the framework of the guided tour, tour guides are comparatively free to construct the narrative for visitors and chart their own course through a site.

Heritage Narratives: Scripting the Past

The narratives presented at Syrian archaeological and historical sites are intimately tied to tourist movement and signage. Small or isolated sites are usually connected in tourist routes by local tour companies or hotels, often constructed as day-trips from a major city. Packaged tours for multiple site visitations reveal how heritage narratives structure tourism marketing. For example, a combination of Byzantine sites outside of Hama has been dubbed the "Dead Cities" and is commonly visited in a single excursion. Sites that may draw a particular audience, such as Krak des Chevaliers and the Saint George Monastery are also frequently packaged together.

Tourists are almost completely reliant on either guided tours or their own tour books to understand the composition and history of a site, particularly at smaller attractions. Signage is often minimal, even at many of the largest and most frequently visited sites, which instead rely on optional tour guides to provide a narrative framework. Print media is relatively scarce at many historic sites and national museums (with a few notable exceptions; see Bonatz et al. 1998; Faraj al-Ush et al. 1999; al Moadin et al. 2006) and virtually absent at smaller sites. Thus, modest or remote sites form a part of Syria's heritage that is often underappreciated because there is so little structuring of the

tourist experience. Additionally, the ability of foreign tourists to visit many of the smaller sites is hampered by Syrian tourist visas, which are valid for only short stays. Thus, it is usually only the extremely dedicated traveler, usually one who has visited the country multiple times, who visits these sites.

The appeal of these smaller sites for many tourists is the opportunity to encounter incredibly well-preserved ruins in virtual solitude. For many foreign visitors, this conjures the romance of exploration that was so prevalent in the nineteenth century. Syrian entrepreneurs often capitalize on the Orientalist mythos in the structuring of the tourist experience. Overtly, vendors offer camel rides (terrain permitting) and meals at "traditional" restaurants designed for tourist consumption. In more subtle manifestations, such as the display of T.E. Lawrence's unpaid bill at the Baron Hotel in Aleppo, Syrian heritage tourism is recontextualized as exotic adventure in a grand tradition.

The site of Serjilla represents an exception to the general lack of signage in Syrian site management. The Byzantine Period site includes astonishingly well-preserved ruins of houses, baths, a church, and tombs, and is perhaps the most impressive of the so-called dead cities. Signage is evenly spaced throughout the major buildings in unobtrusive locations, so as not to detract from the experience of encountering the ruined Byzantine settlement. Information is presented in concise, multilingual plaques (in Arabic, English, and French) with accompanying illustrations. The script places the site in broader historical context and offers summaries of important historical and anthropological concepts related to subsistence and environment, trade, and political organization. Text panels offer architectural reconstructions of a few of the structures to aid visitors in imaging how these buildings might have looked and functioned in antiquity. These illustrative reconstructions are an extremely effective method of disseminating the results of archaeological scholarship without physically altering the sites themselves, which is infinitely more costly and open to editorial interpretation.

Souvenirs and Popular Culture

Syria has enjoyed a long history of souvenir production based on its cultural heritage for domestic and international consumption. International souvenirs began with the postcard industry. These images of historic monuments, traditional costume, and Orientalist themes not only disseminated images of the region to a broadening interested public, but also structured expectations of travel in the Near East for future travelers and provided a framework through which existing travelers conceptualized their own experiences. More cynically, postcards also functioned as instruments of propaganda, particularly during the French Mandate. Today, souvenirs marketed to foreign tourists reference traditional Islamic society, particularly Bedouin culture. Commonly sold souvenirs relate to traditional culture or handicrafts, including woven rugs, water pipes, Bedouin jewelry and metalworking, as well as kitschy Assad memorabilia and wards against the Evil Eye.

Souvenirs produced for a domestic audience often highlight local interests. Among these are the scale models of the water wheels of Hama, one of Syria's most popular destinations for domestic travel. The wheels are fashioned into children's toys, fountains and decorative conversation pieces at varying scales. They are sold in tourist stalls and shops as well as the main bus terminal: the epicenter of Syrian middle-class travel. Another popular icon of Syrian heritage is the so-called Mari Lady, from a fountain statue in the Palace of Zimri-Lim at Mari. Reproductions of the enigmatic, mono-browed goddess of ancient Mesopotamia adorn public squares and private home gardens alike.

Souvenirs are sold in official gift shops at popular sites and in the national museums, but the majority are produced and sold by entrepreneurial vendors. Syria's tourist market supports a thriving kitsch industry, as enterprising individuals sell independently produced handicrafts and postcards (often at a discount from the official site stores) and refreshments to ambling tourists. Traditional-style goods, such as textiles and metalworking, are most commonly sold in the tourist sectors of *souqs* (markets), though today, they are

frequently mass-produced outside of Syria instead of handcrafted by traditional artisans.

Vendor entrepreneurship allows a broad community to benefit from tourist revenues. This cottage industry provides a vehicle for individuals to capitalize on their tangible heritage in a way that is nondestructive to sites. However, the majority of sellers reach their customers by motorcycle across large archaeological sites, which is problematic for effective site preservation. The relationship between independent vendors and site officials is tolerant, though site planners might work in concert with vendors to develop a strategy for effectively reaching customers, while protecting the archaeological heritage on which souvenirs are based.

The Future of Syrian Heritage Management

Syrian management of their archaeological heritage encompasses excavation and preservation initiatives, a complex system of national museums, and a burgeoning tourism industry. The DGAM governs the nation's cultural patrimony through a combination of local efforts and international partnerships. Modern communities thrive beside ancient cities, and entrepreneurial tour guides and vendors capitalize on Syria's past, while economically providing for the present.

The discourse of Syrian heritage has, until recently, been framed as a global assertion of unified national identity and as a mechanism for the communication of provincial identities internally, rather than serving as a means for heritage introspection. Perhaps future heritage narratives will address more contemporary sociopolitical conditions, as Syrian identity continues to be negotiated. The nation's archaeological heritage will surely be an important medium through which such conversations take place.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation in Museums
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Objects and their Contexts
- ▶ Experiencing Cultural Heritage
- ▶ Heritage and Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ Postcolonial Archaeologies
- ▶ Site Visitation and Interpretation: Management

References

Aga Khan Development Network. 2007. *Syria: Revitalizing historic sites. Aga Khan Trust for Culture: Historic cities programme*. Available at: http://www.akdn.org/hcp/syria.asp. Accessed 21 June 2011.

Al Moadin, M., H. Al Sahkei, M. Fattal, and N. Kabbani. 2006. *Highlights of the National Museum of Damascus*. Lebanon: Media Minds LLC.

Bonatz, D., H. Kühne, and A. Mahmoud. 1998. *Rivers and steppes: Cultural heritage and environment of the Syrian Jezireh. Catalogue to the Museum of Deir ez-Zor*. Damascus: Ministry of Culture.

Bounni, A. 1977. Campaign and exhibition from the Euphrates in Syria. In *Archeological reports from the Tabqa Dam project: Euphrates Valley, Syria*: 1–7. The Annual of the American Schools of Oriental Research 44, ed. D. N. Freedman. Cambridge: American Schools of Oriental Research.

Burns, R. 1992. *The monuments of Syria: A guide*. New York: I.B. Tauris.

Faraj Al-Ush, M.A., A. Joundi, and B. Zouhdi. 1999. *A concise guide to the National Museum of Damascus*. Damascus: Ministry of Culture Press.

Freedman, D.N., ed. 1977. *Archeological reports from the Tabqa Dam project: Euphrates Valley, Syria*. The Annual of the American Schools of Oriental Research 44. Cambridge: American Schools of Oriental Research.

UNESCO. 1972. Convention Concerning the Protection of the World Cultural and Natural Heritage. UNESCO World Heritage Centre. Available at: http://whc.unesco.org/archive/opguide08-en.pdf. Accessed 16 June 2011.

UNESCO. 2011. Syrian Arab Republic: Properties inscribed on the World Heritage List. UNESCO World Heritage Centre. Available at: http://whc.unesco.org/en/statesparties/sy. Accessed 16 June 2011.

Zobler, K.A. 2011. Syrian national museums: Regional politics and the imagined community. In *Contested cultural heritage: Religion, nationalism, erasure, and exclusion in a global world*, ed. H. Silverman, 171–192. New York: Springer.

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Tabio, Ernesto Palma

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Basic Biographical Information

Ernesto Tabío Palma was born on September 29, 1911, in the town of Santiago de Las Vegas, Havana; he died in the city of Havana in 1984. His first studies were carried out in a state school in his hometown. After that, he completed his primary education at Colegio La Salle in the neighborhood of Vedado. In 1928, he entered the Institute of Secondary Education in Havana. He was very fond of aeronautics, and that is why, in 1935, he began working at the National Observatory where he became head of the department. In 1939, he was appointed as meteorology teacher in the Naval School and in 1940 as meteorology teacher at the National Academy of Civil Aviation (Graciella Tabío comunicación personal 12 de Sept. 2011). At the end of the 1940s, Palma joined the Grupo Arqueológico Guamá, which also included the renowned researchers René Herrera Fritot, Carlos García Robiou, Fernando Royo Guardia, and Luis Howell Rivero, among others. At that time, Palma worked with René Herrera Fritot in the investigations at La Caleta site in the Dominican Republic, collaborating on the review of everything published on archeology at funerary sites in the Antilles and translating it into Spanish.

Being a member of the Cuban Company of Aviation, he was appointed to organize the meteorological service; he was the chief until 1946.

In the 1950s, Palma was selected as member of the Junta Nacional de Arqueología y Etnología. In 1951, he published the article "Culturas más primitivas de Cuba precolombina" in the *Revista de la Junta Nacional de Arqueología y Etnología*, where he made a critical analysis of the periodization applied at that time for the groups that populated the island. It was not until 1953 that he was promoted to the United Nations International Civil Aviation Organization; in this new post, he moved to Lima, Peru, as regional vice director of the South American office. In 1954 he undertook extensive exploration of the Chillón River Valley, identifying the Huanchok Gorge, and a population site in Tembladeras, with domestic stone and adobe constructions. Other sites explored in this campaign were the Quillcab cemetery and in Collique, the well-known fortress of Pukara at the top of a hill, in which segments of wall faces of considerable dimensions were still preserved. However, the most important investigations were carried out in the area of Playa Grande, near Ancon, on the central coast

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Fernández and Calzada, 2012. During his long stay in Peru, Palma participated in excavations and explorations with prestigious Peruvian archaeologists such as Dr. Duccio Bonavia, with whom he built an appreciable friendship; Yataco and Hernández, 2013. Dr. Jorge C. Muelle, director of Archaeology and History of Peru; Dr. Toribio Mejía Xesspe, sub-director of the National Museum of Anthropology and Archaeology; American Louis M. Stumer; and German Hans Horkheimer.

Palma collaborated with the Museo de Antropología de la Universidad Nacional Mayor de San Marcos and the National Museum of Anthropology and Archaeology, both in Lima, as well as with Ica Regional Museum. In 1955, he was appointed as an honorary member of the Anthropological Research Institute of Lima. His stay of almost 8 years in Peru would be decisive and transcendental for his recognition as an archaeologist. In 1960, he returned to Cuba and was soon invited to be part of the Comisión para la fundación de la Academia de Ciencias; from the moment of its creation in 1964, he was appointed director of the Department of Anthropology, a position he held until 1969. Since 1966, he was recognized as a permanent member of the Council of the International Union of Prehistoric and Protohistoric Sciences. In his work *Prehistoria de Cuba* (1966) written in collaboration with Dra. Estrella Rey, taking a Marxist approach, he recapitulated the archaeological research developed in the country, trying to reconstruct the social context of indigenous communities. In the process, he set a milestone that would revolutionize the national scene forever.

In 1971, Palma defended his PhD dissertation in order to opt for the doctoral degree in historical sciences, before the Scientific Council of the Institute of Ethnography "Miklukho-Maklai" of the Academy of Sciences of the Union of Soviet Socialist Republics (USSR), precisely with the results of the excavations in the central coast of Peru. He carried out archaeological excavations in Cuba for more than 30 years. He stood out due to his theoretical contributions to the design and discussion of the periodization schemes of the indigenous communities that populated the Caribbean, as well as in the choice of a Marxist-based theoretical position that opened new paths in Latin American archaeology. His research was recognized by national and foreign archaeologists, mainly by some founders of the Latin American social archaeology, with whom he had important and inflamed controversies of a theoretical nature. His work, *Arqueología Espeleológica de Cuba*, Editorial Academia, 1972, is a compendium of the archaeological work developed in the Cuban caves from the nineteenth century to that date, the work that was carried out by national and foreign specialists and institutions, which were not linked to Cuba's Speleological Society. In *Excavaciones en la costa central del Perú*, Editorial Academia 1976, he recollected the activities that he developed during his stay in Peru, and his criteria in relation to the cultures that populated the area are displayed. In February 1977, the XIV Congress of the Andean Man was held in Lima, where the closing session was dedicated to pay homage to his scientific work; he also received a diploma of honor from San Marcos National University for his scientific work; Yataco and Hernández, 2013. The same year *Prehistoria de la Costa del Perú* appeared, published by Editorial Academia with part of the text of his PhD dissertation to obtain the degree of doctor in historical sciences. In the *Introducción a la arqueología de las Antillas*, Editorial Científico Técnica 1977, Palma dealt with the regional analysis of the results of the research carried out up to that date, with a Marxist approach that distanced him from the proposal presented by Irving Rouse (1961).

Palma was distinguished by his teaching activity in his major field of study in universities and academic centers of Cuba, Peru, and the former USSR, as well as his expertise inside and outside the country. He was distinguished as an honorary member of a dozen scientific associations from France, the United States, Jamaica, Peru, and Cuba. For his important contributions to the development of the social sciences and in particular to archaeology, he was awarded with the Carlos J. Finlay Order, the highest distinction granted by the Cuban State to workers connected with research. Graciella Tabío comunicación

personal 12 de Sept. 2011. He also has extensive work published in a popular science journal for the general public. He died on February 5, 1984, at the age of 72, serving as senior researcher at the Institute of Social Sciences of the Cuban Academy of Sciences.

Cross-References

- ▶ Bonavia, Duccio
- ▶ Dupree, Louis B.
- ▶ Lumbreras, Luis Guillermo
- ▶ Niemeyer, Hans

References

Fernández Ortega, Racso and Anderson Calzada Escalona. 2012 Relación de los investigadores cubanos con la arqueología peruana (1953-2008). *Historia de la Arqueología en el Perú*, 443–468. Lima: Editado por Henry Tantaleán y César Astuhuamán, Fondo Editorial del Instituto Francés de Estudios Andinos.

Yataco Capcha, Juan José and Odlanyer Hernández de Lara. 2013. Apuntes para la historia de la arqueología de Cuba y el Perú. La correspondencia de Ernesto Tabío enviada a Duccio Bonavia. *Cuba Arqueológica. Revista digital de Arqueología de Cuba y el Caribe*. Año VI, núm. 2: 38–4. http://cubaarqueologica.org/document/ra6n2-06.pdf. Consultado el 8 de enero de 2014.

Tadrart Acacus Rock Art Sites

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Introduction

The Tadrart Acacus is a sandstone massif range located in the southwestern side of Libya, in the core of the Sahara, close to the Algerian border. The area is today a harsh and dry landscape, inhabited by a few Tuareg families, but it has not always been a desert. During the humid climatic fluctuations occurring mainly in the Holocene, the area was greener and suited for animal and human life. Evidence of the ancient occupations is spread all over the massif and the neighboring areas in the form of open-air sites (isolated finds, scatters of artifacts, or megalithic structures) as well as stratified archaeological deposits preserved in rock shelters and caves. It is in these same contexts that one of the richest concentrations of Saharan rock art is hosted. In 1985, the rock art sites of Tadrart Acacus were inserted in the UNESCO list of World Heritage Sites as an example of "a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared" (Criterion III: http://whc.unesco.org/en/criteria/).

Definition

Rock art sites of Tadrart Acacus represent an outstanding record of ancient human groups who lived in the central Saharan region during the Holocene, from the early hunting-gathering communities to the emergence of the first Pastoral society, to the development of the Garamantian state (Mori 1965; Barich 1987; Muzzolini 1995; Cremaschi and di Lernia 1998; di Lernia 1999; di Lernia and Zampetti 2008; Le Quellec 1998; Liverani 2005; Mori 2013), until the Tuareg occupation (Biagetti and Chalcraft 2012; Biagetti 2014). The subjects and scenes are painted and engraved on cliffs, isolated boulders or the walls of rock shelters and the rare deep caves. They mainly represent animals and humans, both isolated, in groups and performing daily or ritual activities. Set into the wider archaeological and paleoclimatic framework, rock art adds important elements to the reconstruction of the environmental, sociocultural, and ideological dynamics of the past cultures.

Key Issues/Current Debates/Future Directions/Examples

Discovery and Outline of Research

The presence of rock art evidence from the Sahara was first reported by European militaries and travelers crossing the region since the late nineteenth

and the mid-twentieth centuries. Until recent times, the Tadrart Acacus massif was almost unknown to the international community.

In 1894, F. Foureau reported the first notice about the presence of engravings in the area; in 1926, the Abbé Breuil and his collaborators published the site of In Ezzan, located southeast of Ghat, and about two decades later, Paolo Graziosi worked in the southern areas of Selfufet, In Arrechin, and Tachisset (all sites today in the Algerian Tadrart – Graziosi 1942). In 1955, Fabrizio Mori crossed the western cliff edge of the Acacus, discovering the prehistoric paintings and engravings hosted on the walls of rock shelters and caves. Mori's team explored and documented the northern and central area of the massif, focusing on the area of Ti-n-Lalan (1955–1959) and later mainly on the central and southern wadis. Since 1960, for the first time in North Africa, the study of rock art was supported by excavations, a modern multidisciplinary approach, and new methodologies, including radiocarbon dating (Mori 1965).

In the 1990s, the research in the area was characterized by a new territorial scale, aimed at enhancing the knowledge of the paleoenvironmental and sociocultural dynamics occurring in the massif and its surroundings (Cremaschi and di Lernia 1998; Mori 1998). The conservation issue was one of the research topics of this phase. Since the 2000s, the main aims of research are devoted to a landscape approach and to the contextualization and systematic recording of the rock art. Emphasis on the state of preservation led to identify various causes of decay due to natural and anthropic factors (Cremaschi et al. 2005; di Lernia and Zampetti 2008). Huge efforts are directed toward active actions for the preservation and management of the rock art sites and the wider cultural landscape of the Tadrart Acacus, to tackle the changes taking place in Libya (Cremaschi et al. 2005; di Lernia 2006; di Lernia and Gallinaro 2011).

Nature and Location of the Art

The Tadrart Acacus is dissected by a fossil drainage network resulting in wide valleys and deep canyons – relicts of a landscape shaped by the tertiary equatorial climate – where prolonged processes of fluvial and pseudo-karst actions caused the formation of rock shelters and caves. These morphological features, located on terraces at different altitudes along the steep slopes flanking the wadis and canyons, hosted the human groups since the Late Pleistocene (Cremaschi and di Lernia 1998).

Rock art in the area takes the form of both paintings and engravings and occurs on the walls of the rock shelters and in the rare caves, as well as in open-air locations like cliffs or isolated boulders.

More than 700 rock art sites have been recognized in the whole massif as a result of the specific research projects carried out by the Archaeological Mission in the Sahara (the first archaeological mission was carried out in the massif by Fabrizio Mori between 1955 and 1990s (Mori 1965, 1998); the geoarchaeological surveys in the 1990s by Cremaschi and di Lernia (1998); the systematic rock art surveys between 2001 and 2008 by di Lernia, Zampetti, and colleagues (Cremaschi et al. 2005; di Lernia and Zampetti 2008; Zampetti 2008); the Tifinagh rock inscriptions Project in 2009 (Biagetti et al. 2012); the Saharan Waterscapes Project between 2008 and 2010 (di Lernia et al. 2012)) and by independent researchers (e.g., Choppy et al. 2002).

Rock art sites reflect the geomorphological settings of the massif: small shelters and rock walls characterize the northern area, whereas the presence of a more complex fluvial network in the central and southern areas favored the formation of a higher number of wider rock shelters and caves (Fig. 1).

Around 60% of rock art is presently found inside the rock shelters – which are partially protected from sunlight and main weathering factors – mainly located close to the wadi bottom. The cliffs and the isolated boulders host almost exclusively engravings. The artworks occur as isolated subjects, scenes, or, most commonly, palimpsests of overlapping subjects or scenes differing in technique, style, and chronology.

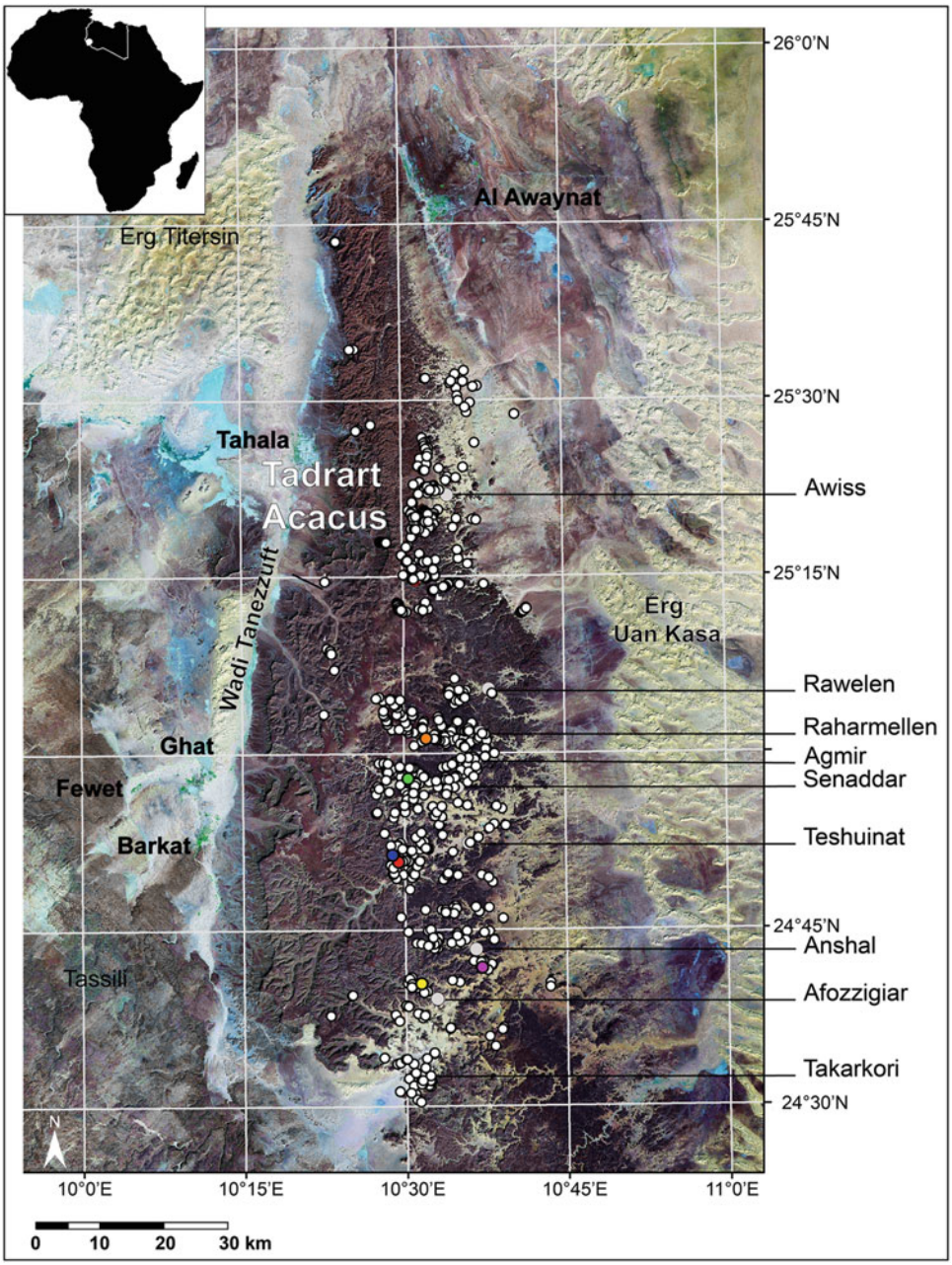

Tadrart Acacus Rock Art Sites, Fig. 1 Satellite image of the Tadrart Acacus, SW Libya, showing the distribution of rock art sites. (GIS elaboration of M. Gallinaro – base map: Landsat imagery)

Styles and Chronology

The definition of styles and their chronology represents one of the main traditional topics of the rock art research. In the Central Saharan massifs, including Tadrart Acacus and the nearby Messak Settafet in Libya and the Algerian Tassili N'Ajjer, the debate has been particularly heated, thanks to the richness of the evidence and the intensity of research. The main controversy spreads about the definition of the chronological depth of rock art.

A long chronology proposed by Mori (1965) was opposed by a short one, mainly developed by Muzzolini (1991). Mori identified the earliest rock art as a Late Pleistocene/Early Holocene production, realized by hunter-gatherers, whereas Muzzolini referred all the rock art evidence to the Holocene, starting with the Pastoral Neolithic. Until recently, the arguments were mainly based on the animal portrayed, stylistic and iconographic considerations, and the presence of patina and superimpositions, while few archaeological or environmental data were analytically considered. Even if a precise chronology is still unavailable, the recent archaeological and paleoenvironmental investigations in the area and its surroundings are contributing to better fix the chrono-cultural associations of the rock art, suggesting a development at least along the entire Holocene, since pre-pastoral times (Cremaschi et al. 2008; di Lernia and Gallinaro 2010). The definition of "styles" here proposed takes into account the terminologies used by Lhote (1958) and Mori (1965). The proposed chronology is correlated with the main phases of human occupation archaeologically recognized in the last decade of multidisciplinary research. The "styles" can be summarized as follows (*contra* – both terminology and chronology – Muzzolini 1991; Le Quellec 1998):

Wild Fauna: only engravings representing wild animals, typical of more humid, southern environments. Big mammals like elephants, rhinoceros, giraffes, wild bovids, and rarely felines and reptiles are represented, isolated, or in groups. These subjects are often represented almost natural size and occur on cliffs and rock shelters located at the wadi bottom. The sites are widespread in the central wadis of the massifs, with a main concentration along the wadi Rahrmellen. On the basis of superimpositions, the nature and weathering of the rock varnish, the type of subjects, and specific stylistic aspects, these engravings are thought to be the earliest form of Saharan rock art. There are possible cultural associations with Early Acacus hunter-gatherers, archaeologically dated to the beginning of the Holocene, after the hyperarid Pleistocene phase (*ca* IX millennium BCE). A type site of the Wild Fauna style is Ti-n-Ascigh, a rock shelter located along Wadi Senaddar (Fig. 1: green dot), where a wide panel with a complex superimposition of engravings shows subjects referable to different styles, from the Wild Fauna to the *Tifinagh* inscriptions (Mori 1965; Cremaschi et al. 2008).

Round Heads: paintings and some engravings decorating the walls of rock shelters and caves. Anthropomorphic figures with rounded heads are often associated with wild animals, especially Barbary sheep and antelopes. The traits are steady; the figures are generally represented in profile and can be realized with different techniques: a simple contour, in flat color, or polychromy. This "style" is characterized by the presence of hunting scenes and complex scenes of dance and ritual activities, traditionally referred to as sacred and symbolic sphere. The Round Head artworks are spread all over the massif, with major clusters along the middle course of Wadi Teshuinat and the southernmost wadis (Gallinaro 2016). The Late Acacus foragers, performing a delayed use of food and a first taming of the Barbary sheep (di Lernia 2001), radiocarbon dated in the area to around eighth to seventh millennia BCE, represent a possible cultural and chronological frame for this art form. The painted couple of Afozzigiar I (Fig. 2), a rock shelter in the middle course of the eponymous wadi (Fig. 1: yellow dot), is a masterpiece of this style (Mori 1998: 191–192; Gallinaro et al. 2008: 218–220).

Pastoral: paintings and engravings representing the most common type of rock art, with thousands of sites throughout the Sahara. The main subjects refer to domestic cattle and pastoral life. Scenes of daily activities, as well as milking and management of herds, alternating with hunting or ritual scenes, emphasize the complexity of these pastoral groups. The artworks are in naturalistic style in flat color or polychromy; the subjects are reproduced in various attitudes and with many details like body paintings, clothing, and hairstyles.

Tadrart Acacus Rock Art Sites, Fig. 2 Couple in Round Head style painted in Afozzigiar I rock shelter. (Photo © The Archaeological Mission in the Sahara, Sapienza University of Rome)

Pastoral rock art contexts are nearly 50% of the total; they are widespread all over the massif with dense concentrations along the main fluvial systems. Indications from excavations both in the Tadrart Acacus (Mori 1965, 1998; Dunne et al. 2012) and Messak, together with radiocarbon determinations on paint samples (di Lernia and Gallinaro 2010, here references), indicate the fifth millennium BCE as the apex of this art style. On the basis of archaeological data, it is possible that this style lasted from around sixth to mid-third to fourth millennium BCE. Uan Amil cave, along Wadi Teshuinat (Fig. 1: red dot – Mori 1965: 124–131; Gallinaro et al. 2008: 157–163), is one of the most famous rock art sites of Pastoral style (Fig. 3).

Horse/Bitriangular: mostly paintings with some engravings. This style features the bitriangular geometric representation of human figures in flat color and records the appearance of domestic horses. Humans are engaged in different activities: pastoral scenes, domestic activities, and conviviality, often in an oasis context, alternate with hunting/war scenes with flying gallop chariots, or fights were humans wield spear or lance. The artworks are mainly located

Tadrart Acacus Rock Art Sites, Fig. 3 Hairdressing scene in Pastoral style in Uan Amil cave. (Photo © The Archaeological Mission in the Sahara, Sapienza University of Rome)

on the walls of rock shelters and are widespread over the whole massif, with major clustering along the central and southern wadis, especially along the course of Wadi Senaddar. The represented scenes reflect the final phases of the Pastoral period and the early Garamantian culture, approximately between the mid-third millennium BCE to first millennium BCE. The chariot of T-Afozzigiar-t site (Fig. 4), along the eponymous wadi (Fig. 1: pink dot), is a good example of this style (Mori 1998: 219; Gallinaro et al. 2008: 210–211). The earliest occurrence of Libyco-Berber inscriptions has been dated to this phase, as first testimony of writing (e.g., Liverani 2005). Those texts carved or painted on the stone walls of the Tadrart Acacus are hardly datable with precision: they cover a long chronological span, ranging from Garamantian to present times and to present day, as "Tifinagh" alphabet is still used by local Tuareg groups (Biagetti et al. 2012, here references).

Camel: widespread style, featured by the representation of camel (*Camelus dromedarius*). Bitriangular highly stylized, human figures, flocks of goats, caravans, palm trees, and hunting or battle scene, painted or engraved, are the typical subjects represented. The high schematism and the low accuracy of the representations and its late date determined a scarce interest by the scholars. The phase is traditionally associated with the classic and final phases of Garamantian culture (third century BCE to sixth century CE), but a more appropriate study of the evidence can open new scenarios about the most recent phases of the massif's occupation. Ti-n-Abrukin site, along Wadi Teshuinat (Fig. 1: blue dot), shows a heterogeneous set of paintings in different styles, where Camel artworks are well represented (Fig. 5 – Gallinaro et al. 2008: 170–174).

Recently the definition of a new "style," labeled as *Modern Camel*, has been proposed to include the highly schematic drawings, both painted and incised, among which are subjects referable to the modern age, like four-wheel drive cars (Gallinaro 2013: 361–362). This evidence is significant both for its heritage value and for the archaeological potential in opening new scenarios about the most recent phases of the massif's occupation (di Lernia Gallinaro 2010; di Lernia et al. 2013). A notable occurrence of four-wheel drive cars (Fig. 6) has been recorded in open-air sites or in rock shelters along Wadi Raharmellen (Fig. 1: orange dot).

Threats to the Rock Art

The rock art is by its nature one of the most fragile aspects of the cultural heritage. It is affected by natural and anthropic threats that can continuously damage it, and the Tadrart Acacus rock art

Tadrart Acacus Rock Art Sites, Fig. 4 Chariot in Bitriangular/Horse style, painted in T-Afozzigiar-t rock shelter. (Photo © The Archaeological Mission in the Sahara, Sapienza University of Rome)

Tadrart Acacus Rock Art Sites, Fig. 5 Caravan in Camel style along the rock wall of Ti-n-Abrukin rock shelter. (Photo © The Archaeological Mission in the Sahara, Sapienza University of Rome)

Tadrart Acacus Rock Art Sites, Fig. 6 Four-wheel drive car, Modern Camel style, engraved on a rock shelter in Wadi Rahrmellen. (Photo © The Archaeological Mission in the Sahara, Sapienza University of Rome)

sites are not an exception. Natural factors, like erosional and chemical processes, determined, according to recent estimates (Cremaschi et al. 2008), the vanishing of nearly 50% of the artworks. High risks have been represented by the uncontrolled access to the sites by thousands of tourists and even scholars, washing, scraping, and touching the art, therefore accelerating the natural process of vanishing. Vandalism has been recorded as well. Several actions to reduce these threats have been proposed and partially realized, but the major project to create a national park has never been implemented (di Lernia and Gallinaro 2011, here references). The isolation of the region, after the 2011 uprising in Libya, represents a new and uncontrolled threat to the heritage. In 2016, due to the continuous political instability in Libya, the UNESCO inscribed all the Libyan sites on the List of World Heritage in Danger (https://whc.unesco.org/en/news/1523/).

Future Directions

The region is currently inaccessible, and the future of the rock art is highly problematic. The immediate actions have to be directed to the preservation, monitoring, and dissemination of this fragile heritage that needs a broader involvement of the local authorities and communities. Short- and medium-term actions need to be addressed to improve the available documentation, implementing and expanding digital online repositories. This would have a twofold result, both on the preservation and managements issues and on the archaeological and anthropological research. On the side of rock art research, the systematic analysis of the artworks will allow an in-depth analysis of the sites, favoring a contextual approach and a broader analysis of local dynamics within the Saharan framework.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ North and Saharan Africa: Geography and Chronology
- ▶ Rock Art Sites: Management and Conservation
- ▶ Rock Art, Forms of

References

Barich, B.E., ed. 1987. *Archaeology and environment of the Libyan Sahara. The excavations in the Tadrart Acacus*, British Archaeological Reports international series 368. Oxford: Archaeopress.

Biagetti, S. 2014. Ethnoarchaeology of the Kel Tadrart Tuareg. New York: Springer.

Biagetti, S., and J.M. Chalcraft. 2012. Imagining aridity: Human environment interactions in the Acacus Mountains (SW Libya). In *Imagining landscapes. Anthropological studies of creativities and perception*, ed. T. Ingold and M. Janowski, 77–96. Aldershot: Ashgate Publishing.

Biagetti, S., K. Ait, L. Mori, and S. di Lernia. 2012. Writing the desert: The 'Tifinagh' rock inscriptions of the Tadrart Acacus (southwestern Libya). *Azania: Archaeological Research in Africa* 47 (2): 153–174.

Choppy, J., B. Choppy, J.L. Le Quellec, S. Scarpa Falce, and A. Scarpa Falce. 2002. *Images rupestres en Libye*. Paris: Aouis.

Cremaschi, M.S., and di Lernia, eds. 1998. *Wadi Teshuinat. Palaeoenvironment and prehistory in south western Fezzan (Libyan Sahara)*, 7. Milano: CNR Quaderni di Geodinamica Alpina e Quaternaria.

Cremaschi, M., D. Zampetti, and A. Zerboni. 2005. Different paths: Rock art, sites and territories in Wadi Raharmellen (Tadrart Acacus- Libyan Sahara). *Origini* 27: 191–207.

Cremaschi, M., C. Pizzi, and A. Zerboni. 2008. L'arte rupestre. del Tadrart Acacus: testimone e vittima dei cambiamenti climatici. In *La memoria dell'arte. Le pitture rupestri dell'Acacus tra passato e futuro*, ed. S. di Lernia and D. Zampetti, 361–369. Firenze: Ed. All'Insegna del Giglio.

di Lernia, S. 1999. *The Uan Afuda Cave. Hunter gatherer societies of central Sahara*, Arid zone archaeology monograph 1. Firenze: Ed. All'Insegna del Giglio.

di Lernia, S. 2001. Dismantling dung: Delayed use of food resources among early Holocene foragers of the Libyan Sahara. *Journal of Anthropological Archaeology* 20: 408–441.

di Lernia, S. 2006. Cultural landscape and local knowledge: A new vision of Saharan archaeology. *Libyan Studies* 37: 5–20.

di Lernia, S., and M. Gallinaro. 2010. Dating Saharan rock art. Pastoral Neolithic ceremonial sites and associated engravings from Messak Settafet (SW Libya). *Antiquity* 84 (326): 954–975.

di Lernia, S., and M. Gallinaro. 2011. Reassessing a UNESCO WH site. Problems and practices towards the Acacus cultural landscape (SW Libya, Central Sahara). *Journal of African Archaeology* 9 (2): 159–175.

di Lernia, S., and D. Zampetti, eds. 2008. *La memoria dell'arte. Le pitture rupestri dell'Acacus tra passato e futuro*. Firenze: Ed. All'Insegna del Giglio.

di Lernia, S., I. Massamba N'Siala, and A. Zerboni. 2012. 'Saharan waterscapes'. Traditional knowledge and historical depth of water management in the Akakus Mts. (SW Libya). In *Changing deserts: Integrating people and their environment*, ed. L. Mol and T. Sternberg, 101–128. Cambridge: The White Horse Press.

di Lernia, S., M.A. Tafuri, M. Gallinaro, F. Alhaique, M. Balasse, L. Cavorsi, P.D. Fullagar, A.M. Mercuri, A. Monaco, A. Perego, and A. Zerboni. 2013. Inside the "African cattle complex": Animal burials in the Holocene Central Sahara. *PLoS One* 2013 (8): e56879.

Dunne, J., R.P. Evershed, M. Salque, L. Cramp, S. Bruni, K. Ryan, S. Biagetti, and S. di Lernia. 2012. First dairying in green Saharan Africa in the fifth millennium BC. *Nature* 486: 390–394.

Gallinaro, M. 2013. Saharan rock art: Local dynamics and wider perspectives. *Arts* 2: 350–382. https://doi.org/10.3390/arts2040350. Special Issue 'World Rock Art', Guest editor: Robert G. Bednarik.

Gallinaro, M. 2016. Rock art landscape of the central Saharan massifs: a contextual analysis of Round Heads style. In *L'art rupestre d'Afrique. Actualité de la recherche*, Actes du colloque international, ed. M. Gutierrez & E. Honoré, 121–136. Paris: Editions L'Harmattan. Paris 15-16-17 janvier 2014.

Gallinaro, M., D. Zampetti, and S. di Lernia. 2008. Dalle riproduzioni ai contesti: l'arte dell'Acacus rivisitata. In *La memoria dell'arte. Le pitture rupestri dell'Acacus tra passato e futuro*, ed. S. di Lernia and D. Zampetti, 73–255. Firenze: Ed. All'Insegna del Giglio.

Graziosi, P. 1942. *L'arte rupestre della Libia*. Napoli: Mostra d'Oltremare.

Le Quellec, J.-L. 1998. *Art rupestre et prehistoire du Sahara*. Le Messak Libyen. Paris: Editions Payot et Rivages, Biblioteque Scientifique Payot.

Lhote, H. 1958. *Á la découverte des fresques du Tassili*. Paris: Arthaud.

Liverani, M. 2005. *Aghram Nadharif: The Barkat oasis (Shabiya of Ghat, Libyan Sahara) in Garamantian times*, The archaeology of Libyan Sahara volume 2; Arid zone archaeology monograph 5. Firenze: Ed. All'Insegna del Giglio.

Mori, F. 1965. *Tadrart Acacus. Arte rupestre e culture del Sahara preistorico*. Torino: Einaudi.

Mori, F. 1998. *The great civilizations of the ancient Sahara*. Roma: L'Erma di Bretschneider.

Mori, L. 2013. *Life and death of a rural village in Garamantian times. Archaeological investigations in the oasis of Fewet (Libyan Sahara)*, Arid zone archaeology monograph 6. Firenze: Ed. All'Insegna del Giglio.

Muzzolini, A. 1991. Proposals for updating the rock-drawing sequence of the Akakus. *Libyan Studies* 22: 7–30.

Muzzolini, A. 1995. *Les images rupestres du Sahara*. Toulouse: Chez l'auteur.

Zampetti, D. 2008. Le nuove ricerche sull'arte rupestre dell'Acacus: Il senso del paesaggio, il senso della figura. In *La memoria dell'arte. Le pitture rupestri dell'Acacus tra passato e futuro*, ed. S. di Lernia and D. Zampetti, 339–349. Firenze: Ed. All'Insegna del Giglio.

Taiwan: Archaeological Museums

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Brief Definition of the Topic

Taiwan has a vibrant museums sector which has seen recent capital developments of older museums and the creation of new ones, both site and regional museums, with strong archaeological and ethnographical departments and exhibitions. At the top of the hierarchy are the national museums in Taipei of which the National Palace Museum (NPM) (National Palace Museum n.d.) is the largest, most visited, and internationally best known. This museum has at its core the very substantial collection of antiquities and works of art from the Palace Museum in the Forbidden City in Beijing. The Palace became a museum in 1925 on the departure of the Puyi Emperor. Much of the collection was taken away by the Kuomintang authorities from 1931 for safekeeping in the face of the Japanese invasion and moved about China for two decades before approximately a quarter of the collections still in their control were taken to Taiwan during the evacuation of the mainland by forces and people loyal to Chiang Kai-shek. This marked the end of the Chinese Civil War and the establishment of the Peoples' Republic on the mainland. The collection includes a great range of objects derived from archaeological sites and casual discoveries to works of art and craft created for the Imperial Court or collected by the Imperial families throughout the centuries. The NPM houses, in recently renovated and extended galleries, extensive exhibitions illustrative of the history and archaeology of China with a strong emphasis on prestige objects of high aesthetic value. The guiding principles are art historical and culture historical. The museum has a strong presence in scholarship, and its activities are supported by a research library which contains many manuscripts and early Chinese printed books of importance, laboratories, and restoration and conservation facilities. The PRC maintains a continuing claim to the island as part of its territory and to the collections in the NPM.

The collections in the possession of the Institute of History and Philology of Academia Sinica in Taipei are of the highest archaeological importance and derive from fieldwork carried out in China under the auspices of the Academy (founded 1928) (Museum of the Institute of History and Philology n.d.). Members of the Academy, who moved to Taiwan following the Chinese Civil War, established the institution in Taipei where, after an initial period of difficulty, it began to flourish with the expansion of the economy. The Academy maintains a strong interest in

Chinese archaeology and ethnology, and its collections reflect recent fieldwork as well as the inheritance from the institution's past.

The National History Museum, Taipei, founded in 1955 has at its core material brought from mainland China principally from Henan Museum and includes substantial amounts of archaeological material. Its wide remit covers history, art history, and decorative arts. It maintains strong links with museums in the PRC (National History Museum n.d.).

The National Taiwan Museum in Taipei, housed in a colonial Japanese building, has important ethnographical collections illustrating the material culture of the indigenous peoples of the island and has the earliest human remains from Taiwan dating to about 12,000 BCE. The scope of this museum encompasses natural history as well as ethnography (http://formosa.ntm.gov.tw/web/en/exhibition.aspx).

The National Museum of Taiwan History in Tainan City opened in 2011 explores the history and archaeology of Taiwan from the Paleolithic to the present day. It has a strong interest in folklife studies (National Museum of Taiwan History n.d.).

Important museums built to display the results of excavations include the Shihsanhang Museum (Shihsanhang Museum n.d.) and the National Prehistory Museum incorporating the results of excavations at Peinan, Tainan City (National Prehistory Museum n.d.). The museum is part of a wider heritage complex which includes a museum of human rights recalling the oppression of the early days of the Kuomintang government of the island (Explore Taiwan's first museum of archaeology n.d.).

Cross-References

- ▶ China: Museums
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Ethnic Identity and Archaeology
- ▶ Nationalism and Archaeology
- ▶ Overseas Chinese Archaeology

References

Explore Taiwan's first museum of archeology. n.d. Available at: http://eng.coa.gov.tw/content_view.php?catid=10084&hot_new=8860

Museum of the Institute of History and Philology. n.d. Available at: http://www.ihp.sinica.edu.tw/~museum/en/news.php

National History Museum. n.d. Available at: http://www.nmh.gov.tw/en-us/Home.aspx

National Museum of Taiwan History. n.d. Available at: http://taiwantoday.tw/ct.asp?xItem=181673&CtNode=430

National Palace Museum (NPM). n.d. Available at: http://www.npm.gov.tw/en/about/tradition.htm

National Prehistory Museum. n.d. Available at: http://en.nmp.gov.tw/park01-1.html

Shihsanhang Museum. n.d. Available at: http://en.sshm.tpc.gov.tw/html/ensshm/shcomment.jsp?cparentid=223&cid=234

Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)

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Introduction

The Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects was adopted by the World Archaeological Congress (WAC) in 2006. Drafted by indigenous and non-indigenous people with expertise including cultural heritage, museums, and archaeology, the Accord provides six key principles for decision making around the display of human remains and sacred objects. Developed and proposed in November 2005 at a WAC Inter-Congress held in Auckland on the "Uses and Abuses of Archaeology for Indigenous People," and adopted in January 2006 by the WAC Council, the Accord supplements two other WAC ethical codes that are also relevant to archaeology, museums, and the study of

indigenous human remains and cultural heritage: *The Vermillion Accord* (1989) and *The Code of Ethics of Members Obligations to Indigenous Peoples* (1990). It should therefore be seen as an additional example of development, by indigenous people and archaeologists, of guidelines to ensure consultative and collaborative ethical practice, although focused on display and exhibition rather than current and future research. In its preamble (see below), the Accord stipulates that its definition of "display" includes conference presentation or publications, and thus incorporates display of *images* of human remains and sacred objects as well as the human remains and sacred objects themselves.

Definition

The Tamaki Makau-Rau Accord consists of a preamble and a set of six principles:

> In recognition of the principles adopted by the Vermillion Accord, the display of human remains and sacred objects is recognized as a sensitive issue. Human remains include any organic remains and associated material. Sacred objects are those that are of special significance to a community. Display means the presentation in any media or form of human remains and sacred objects, whether on a single occasion or on an ongoing basis, including conference presentations or publications. Community may include, but is not limited to, ethnic, racial, religious, traditional, or Indigenous groups of people.
>
> WAC reiterates its commitment to scientific principles governing the study of the human past. We agree that the display of human remains or sacred objects may serve to illuminate our common humanity. As archaeologists, we believe that good science is guided by ethical principles and that our work must involve consultation and collaboration with communities. The members of the WAC council agree to assist with making contacts within the affected communities.
>
> Any person(s) or organization considering displaying such material or already doing so should take account of the following principles:
>
> 1. Permission should be obtained from the affected community or communities.
> 2. Should permission be refused that decision is final and should be respected.
> 3. Should permission be granted, any conditions to which that permission is subject should be complied with in full.
> 4. All display should be culturally appropriate.
> 5. Permission can be withdrawn or amended at any stage and such decisions should be respected.
> 6. Regular consultation with the affected community should ensure that the display remains culturally appropriate.

Key Issues

Many museums and other collecting institutions around the world hold human remains. With the rise of the reburial movement in the 1980s, there has been considerable debate about the repatriation of remains whose location in museums without the consent of source communities has been strongly contested by indigenous groups worldwide, but particularly from Australia, New Zealand, Scandinavia, and North America. The reburial movement has led to significant changes in museum policy in these countries and some others, particularly the UK (Simpson 2002; Fforde and Hubert 2006; Turnbull and Pickering 2010; Pickering 2011). Deep concern about the display and scientific use of human remains has been voiced by indigenous groups as a component of the reburial movement (Hammil and Cruz 1989; Fforde et al. 2002; Watkins 2002, 2010), with some groups requesting that remains be taken off display as a first step in negotiations for repatriation with the holding institution (Hubert 1989: 131). In Australia, the early 1970s witnessed the first shifts in museum policy, with some institutions resolving to no longer accept newly discovered Aboriginal remains without express permission from the source community, and to remove human remains and significant cultural material from display.

Analysis of the ethics of display and the adoption of new policy and guidelines has been in response to indigenous concerns (as has the development of particular policies – see Museums Australia 2005) and the Tamaki Makau-Rau Accord should be viewed mainly in this context. However, the preamble to the Accord makes it clear that these principles are not aimed at solely indigenous remains and the debate around display has had broader analysis. Indeed, over the past decade there has been increasing discussion

about the use of curated human remains of any geographical origin and the ethics of their display, including under what circumstances and how remains should be exhibited and viewed, particularly by the public (Sayer 2010: 95–109). Points of discussion have included, for example: respect for the wishes of the deceased; whether or not consent was given by kin; concerns and requests voiced by source communities and the public; the educational value of display; and the meaning of scientific and public interest in human remains and burial practices (Alberti et al. 2009; Sayer 2010: 95–109). In the UK, for example, discussion about Gunther van Hagen's Body Worlds (an exhibition of human and animal bodies in a variety of postures which have been preserved through plastination), arguments raised by Pagan groups about the treatment of the ancient British dead, internal and external debate by individual museums, government and professional organizations, and the work of the Human Tissue Authority (a nongovernmental public body in the UK created by the 2004 Human Tissue Act which, broadly, regulates the use of human bodies, organs, and tissue for purposes that include research, transplantation, education, and training), among others, all demonstrate the work conducted in this area (Swain 2002; Alberti et al. 2009; Sayer 2010: 95–109).

Policies and guidelines developed during this period by museums and professional bodies in relation to holdings of human remains frequently include sections relating to display as well as repatriation, although they vary in their advice (e.g., Wellcome Trust n.d.; Museum Ethnographers Group 1994; Department of Culture, Media and Sport 2005; Museums Australia 2005; and see Pickering 2011). While the international debate rarely deals with the display of images of human remains (whether in publication, exhibition, or presentation), those in countries with indigenous populations have addressed these issues. Thus, for example, the display of remains and images of remains (and replicas of them) is considered in section 1.4.10 of *Continuing Cultures, Ongoing Responsibilities: Principles and Guidelines for Australian Museums Working with Aboriginal and Torres Strait Islander Cultural Heritage* adopted by Museums Australia in 2005, which states that human remains:

> should not be displayed in public, except in special circumstances where parts of the remains are an integral part of other items, such as human teeth incorporated in an item of personal attire. In such cases the traditional custodians or those authorised by them, must agree to the display of such items. Equally, images and replicas of ancestral remains held in museums must not be exhibited or in any other way made available to the public without the prior permission of the traditional custodians or those authorised by them. (2005: 18)

Although the reburial debate has frequently focused solely on human remains, this by no means always reflects the viewpoint of those of indigenous source communities (e.g., Maddra 1996; Tapsell 2000). Thus, it is not surprising that the Tamaki Makau-Rau Accord also encompasses sacred objects. Like human remains, sacred objects in museums and other holding institutions have also been the subject of requests for repatriation and/or removal from display, and the formation of ethical guidelines around their display and exhibition is similarly contextualized. In some instances, issues surrounding display of sacred objects predates discussion about repatriation. Thus, restricted ceremonial objects were removed from display by the South Australian Museum certainly in the 1970s and there is some evidence that this had occurred in the 1930s (Clarke and Anderson 1998: 172, 173).

It is also important to note that national legislation and policy in the USA and Australia encompass both human remains and sacred objects. Thus in the USA, *The Native American Graves Protection and Repatriation Act* (1990) relates to human remains and cultural items (including funerary objects, sacred objects, and objects of cultural patrimony). In Australia, sections 1.5.9 and 1.5.10 of *Continuing Cultures, Ongoing Responsibilities* deals with the display of sacred objects as well as images and replicas of them, setting out that such items should not be displayed to the public without the express permission of traditional custodians, and that museums should make visitors aware of the presence of such items (2005: 19).

The Tamaki Makau-Rau Accord therefore reflects deliberation on the issues of display

around human remains and sacred objects that were driven initially by indigenous concerns about the continued curation of their ancestral remains in museum collections, but developed into a broader context internationally. It demonstrates continuing discussion around the ethics of archaeology, particular that of the indigenous past (e.g., Zimmerman et al. 2003; Phillips and Allen 2010). Considered together with the Vermillion Accord and the Code of Ethics on Members Obligations to Indigenous Peoples, the Tamaki Makau-Rau document also reflects the role of the World Archaeological Congress in this debate and the development of the ethics of professional practice in archaeology and related disciplines.

Cross-References

- ▶ Australia: Indigenous Cultural Property Return
- ▶ Australia: Repatriation Acts
- ▶ Ethics and Human Remains
- ▶ Human Remains in Museums
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Sacred Site Conservation and Preservation
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC): First Code of Ethics

References

Alberti, S.J.M.M., P. Bienkowski, M.J. Chapman, and R. Drew. 2009. Should we display the dead? *Museum and Society* 7: 133–149.

Clarke, P., and C. Anderson. 1998. A brief history of Aboriginal men's secret sacred objects in Australian museums. In *Unlocking museums: The proceedings of the 4th National Conference of Museums Australia*, 172–176. Darwin: Museums Australia.

Department of Culture, Media & Sport. 2005. *Guidance for the care of human remains in museums*. London: Department of Culture, Media & Sport.

Fforde, C., and J. Hubert. 2006. Indigenous human remains and changing museum ideology. In *A future for archaeology*, ed. R. Layton, S. Shennan, and P. Stone, 83–96. London: UCL Press.

Fforde, C., J. Hubert, and P. Turnbull, eds. 2002. *The dead and their possessions: Repatriation in principle, policy and practice*. London: Routledge.

Hammil, J., and R. Cruz. 1989. Statement of American Indians against desecration before the world archaeological congress. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 195–201. London: Routledge.

Hubert, J. 1989. A proper place for the dead: A critical review of the 'reburial' issue. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 131–166. London: Routledge.

Maddra, S. 1996. The Wounded Knee ghost dance shirt. *Journal of Museum Ethnography* 8: 41–58.

Museum Ethnographers Group. 1994. Guidelines on management of human remains. Available at: www.museumethnographersgroup.org.uk/index.php?option=com_content&view=article&id=7&Itemid=6. Accessed 4 June 2012.

Museums Australia. 2005. *Continuing cultures, ongoing responsibilities: Principles and guidelines for Australian museums working with Aboriginal and Torres Strait Islander cultural heritage*. Museums Australia.

Phillips, C., and H. Allen. 2010. *Bridging the divide: Indigenous communities and archaeology into the 21st century*. Walnut Creek: Left Coast Press.

Pickering, M. 2011. Dance through the minefield: The development of practical ethics for repatriation. In *The Routledge companion to museum ethics. Redefining ethics for the twenty-first century museum*, ed. J. Marstine, 256–274. London: Routledge.

Sayer, D. 2010. *Ethics and burial archaeology*. London: Duckworth.

Simpson, M. 2002. The plundered past: Britain's challenge for the future. In *The dead and their possessions: Repatriation in principle, policy and practice*, ed. C. Fforde, J. Hubert, and P. Turnbull, 199–217. London: Routledge.

Swain, H. 2002. The ethics of displaying human remains from British archaeological sites. *Public Archaeology* 2: 95–100.

Tapsell, P. 2000. *Pukaki: A comet returns*. Auckland: Reed Publishing.

Turnbull, P., and M. Pickering, eds. 2010. *The long way home: The meaning and values of repatriation*. New York: Berghahn Books.

Watkins, J. 2002. Artefactual awareness: Spiro Mounds, grave goods and politics. In *The dead and their possessions: Repatriation in principle, policy and practice*, ed. C. Fforde, J. Hubert, and P. Turnbull, 149–159. London: Routledge.

Watkins, J. 2010. Wake up! Repatriation is not the only indigenous issue in archaeology! In *Bridging the divide: Indigenous communities and archaeology into the 21st century*, ed. C. Phillips and H. Allen, 49–60. Walnut Creek: Left Coast Press.

Wellcome Trust. n.d. Policy on the care of human remains in museums and galleries. Available at: www.wellcome.ac.uk/About-us/Policy/Policy-and-position-statements/WTX033469.htm. Accessed 4 June 2012.

Zimmerman, L., K.D. Vitelli, and J. Hollowell-Zimmer. 2003. *Ethical issues in archaeology*. Plymouth: Alta-Mira Press.

Tamgaly (Kazakhstan), Petroglyphs within the Landscape

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Introduction

The world famous monument of rock art at Tamgaly (also known as Tanbaly in Kazakh) is located in the Zhambyl District of Almaty Region, 170 km from Almaty accessible via an asphalt road that to the northwest that follows the low Chu-Ili mountains stretching from the river Copa in the southeast toward the lake Balkhash. The Tanbaly Reserve Museum was created in 2003 and is responsible for managing the heritage of this archaeological complex. In 2004, Tanbaly was inscribed on the World Heritage List by the UNSECO, which placed the responsibility, mostly on the Republic of Kazakhstan, to preserve and develop the site. The monument is annually visited by thousands of tourists from near and far abroad, despite the distance from the highway and the relatively hard continental climate. A new visitor center is being built which will host a rock art museum (Figs. 1, 2, and 3).

Definition

Tanbaly – one of the most intricate structured petroglyph complexes – differs from many other larger and smaller rock art monuments in that the main part of the petroglyphs in the central part of the gorge is considered to be an open-air sanctuary composed of a layer of Middle Bronze Age petroglyphs made in the "Tanbaly's style" described by A.E. Rogozhinsky. This stratum is mostly noticeable in the central part (stamped on all convenient and noticeable stones). A small number of petroglyphs on the complex, both in Tanbaly and Shoshkaly, can be attributed to an earlier period, some of them attributed to the "Kulzhabasy type" though these are only single images. The petroglyphs in Tanbaly will receive many revisions and adaptations from the Bronze Age to today, which indicates the long evolution of the local tradition, despite significant chronological interruptions in the tradition of pecking.

Key Issues/Current Debates/Future Directions/Examples

The sacredness of the Tanbaly area has been determined by the presence of a unique "open-air exposition" – a synchronous and dense layer of petroglyphs, which has a diverse repertoire of scenes with bright anthropomorphic and zoomorphic figures, made in a single artistic style called "Tanbaly style" or "Tanbaly type petroglyphs." The rock art tradition in Tanbaly belongs to a very ancient art which has connections to neighboring regions in Central Asia and was probably brought by inhabitants of Central Kazakhstan. This is confirmed by the numerous and unique carvings of the later historical periods: the so-called Begazins, as well as Saks, Usuns, Syanbi, Huns, Iranians, ancient Turks, Dzungars, and Kazakhs. These petroglyphs are often among the best examples of their chronological periods in terms of artistic merit and the very uniqueness of images. Many of them find direct analogies in rock art and not only art on wide spaces from Transbaikalia and Mongolia to northeastern Iran

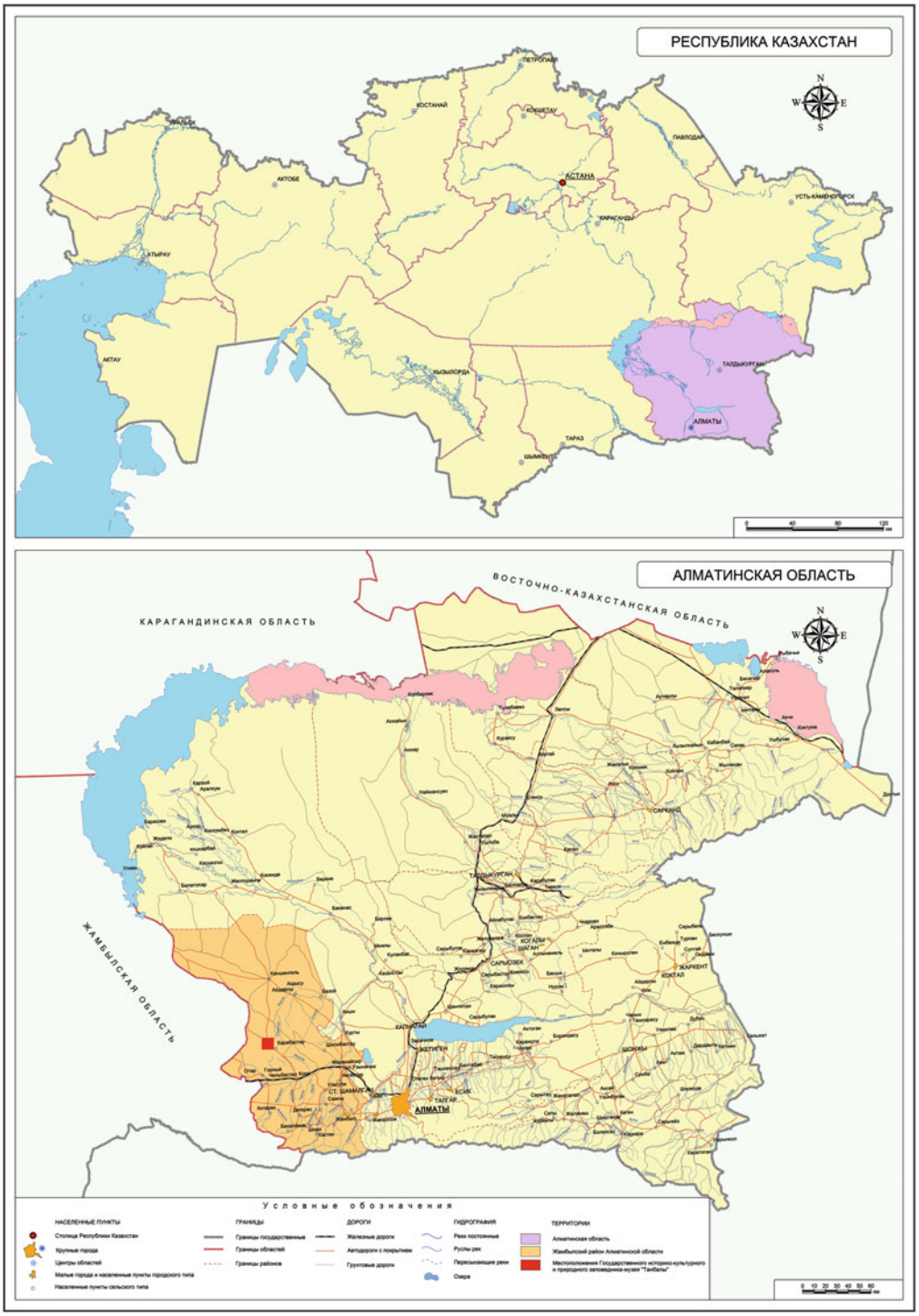

Tamgaly (Kazakhstan), Petroglyphs within the Landscape, Fig. 1 The location of the Tamgaly complex on the map of the Republic of Kazakhstan and Almaty region

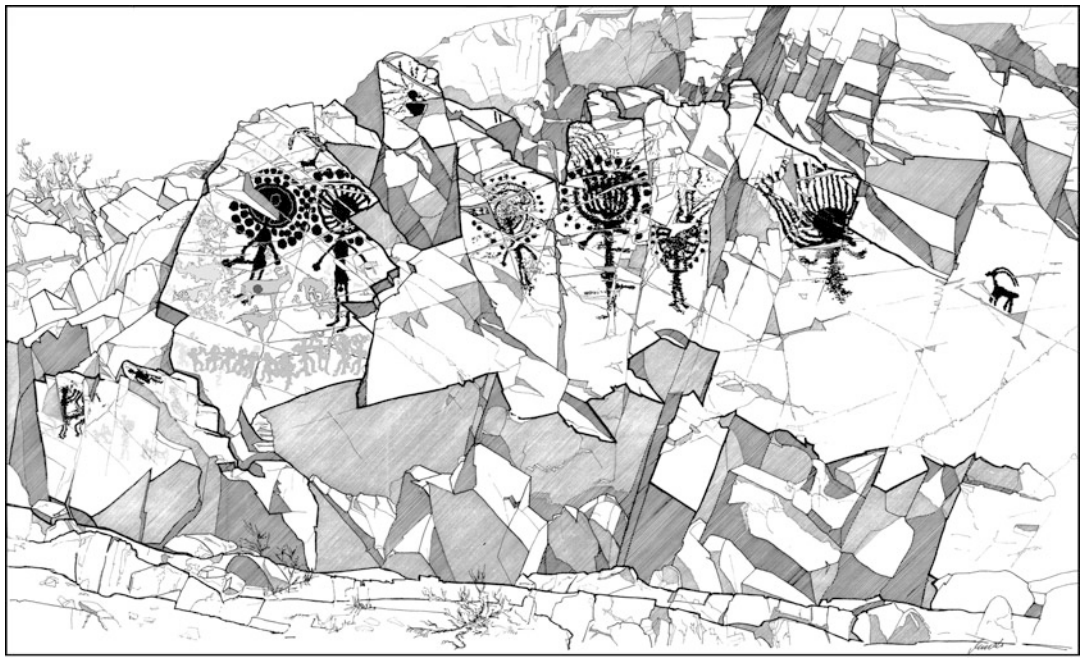

Tamgaly (Kazakhstan), Petroglyphs within the Landscape, Fig. 2 Detailed drawing of the plane 118, group IV (6 "sun-beam" and other petroglyphs of the Bronze Age are rendered in black)

Tamgaly (Kazakhstan), Petroglyphs within the Landscape, Fig. 3 "Sunhead" on the bull, a group of petroglyphs III

and Scandinavia. These petroglyphs are evidence that the late permanent and temporary inhabitants of Tanbaly worshiped the area. They worshiped the sacred landscape around the Tanbaly river that exists thanks to two sacred springs in the upper reaches of the gorge. In addition to the unique petroglyphs located directly on the rocks of the Tanbaly Canyon, divided between different 6 groups, there are up to 30 separate locations, subgroups, and subcomplexes in that area. The ancient and medieval history of Tanbaly's area has also been determined using the complete archaeological data consisting of excavations and studies about settlements and burial grounds, altars, and quarries.

Petroglyphs of Tanbaly were carved out using stone or metal tools in the pecking technique. All of them were divided into 48 separate complexes during documentation. The real masterpiece of rock art is considered to be a sizeable plane with an impressive six images of "sun-headed" deities (?), carved over small images of people dancing

and praying. The large size of the early petroglyphs, their unique visual content, and iconography put them on a par with the most valuable images of the rock art of Central Asia. Among the thousands of petroglyphs, Tanbaly stands out the homogeneous series of the most ancient images created at the turn of the thirteenth-fourteenth century BC. This period is related to the development of southeastern Kazakhstan (Semirechye) by the shepherd tribes of the Andronovo. Petroglyphs of the Bronze Age of Tanbaly testify to the highest level of cultural and artistic development in the widespread territory of Central Asia. The specificity of these drawings, as described by A.E. Rogozhinsky, i.e., large sizes from 25 cm up to a meter wide, technology, style, iconography, repertoire, and the presence of a narrative design, helps the visitor to attribute these to the Tanbaly type.

The central plane of Tanbaly is the frieze of the "sun-headed" characters of the Bronze Age: it is composed of six large anthropomorphic figures differing in height (from 52 to 74 cm), showing a "nimbus," with different hand positions (raised or lowered) and facing the left (west) or the right (east) or forward (south or north). Above them is a figure composed of a torso and a head which could be interpreted as a seventh (?) "sun-headed" character. From the bottom left, one can see two opposing figures of people in a prayer pose ("adorants") and above – a fragment of the scene of the "sacred marriage."

The panel contains all the main types of Tanbaly sun-headed characters, depicting a collection of "gods" (?) as well as scenes of ritual worship. This composition has not yet been documented anywhere else.

Eleven anthropomorphic figures can be attributed to the early Iron Age: ten dancing warriors with axes and, in the center, the figure of a woman in labor. Above a horseman, a wild boar, and other animals in the Saka "animal" style can be seen. Some figures overlap the images of "sun-heads," but in general they harmoniously complement the composition of the Bronze Age and convey the Picture of the Universe in the ideas of the ancient nomads. The rest of the petroglyphs were created in the Middle Age and later.

The landscape at Tanbaly is particularly typical for the vast region of Chu-Ili. The most probable reason why the people of the Middle Bronze Age chose Tanbaly for these rock carvings lies in the esthetic qualities of this area. The beautiful landscapes of Tanbaly that are concentrated around Tanbaly's river were canonized by the inhabitants and transformed the area into a cultural region. The images composing the rock art were selected because of the sacred value they held in that period for these populations.

Today, mainly the cultural landscapes are "exploited" in Tanbaly though this exploitation should be extremely careful. The general organization and disposition of tourist routes were created by architects Imanbekova K.I. and Yatsenko Ye.L. who wished to "open this site and make it accessible [. . .], give access to the site while avoiding degradations and provides good management methods of the site.[. . .]".

Situated on Tanbaly's territory can be found seven burial grounds of the Bronze Age (Tanbaly I and II, IV–VII, Karakuduk II), arranged mainly along the main valley, on the right and left banks of the river Tanbaly, whereas Tanbaly I and II and Karakuduk II are located on the foothill plain. All the monuments occupy elevated areas in relief (cones, gentle slopes of the hills) and are covered by an alluvial layer. Tanbaly I, IV, V, and VII burial grounds are relatively small (250–400 m^2) and foster a limited number of graves (15–20). In the largest burial grounds of Tanbaly II, VI and Karakuduk II, a total of 30–50 graves have been found in the area ranging from 500 to 1500 m^2.

Over the years, excavations were carried out on all the mentioned sites, and, although their degree of study varies, the data obtained, including the determination of the absolute age, made it possible to carry out cultural and chronological attribution.

All the burial grounds of the Bronze Age at Tanbaly belong to the Andronovo culture and historical community. These monuments belong to Atasu (Central Kazakhstan) and Semirechye variants of the Andronovo culture. They reflect the migration processes of the population in Southeast Kazakhstan in the Middle Bronze Age.

The most ancient sites of the complex are the burial grounds of Tanbaly I, V, and VI, which were used simultaneously from the second half of the thirteenth to the fourteenth century BC. The particularity of the burials relies on the position of the bodies, lying on their side in large stone boxes. These boxes are buried inside round or square fences formed by vertical stone slabs. Burial inventory is represented by elegant ornamented ceramics and bronze ornaments.

Settlements in Tanbaly are located exclusively in the mountainous part of this region. Settlements occupy a small area of 300–1200 m^2 and are located in different geomorphological conditions: on wide sections of valleys, gentle slopes of small canyons (sai), or on elevated sections of so-called "hanging" valleys. Despite differences in topography, all sites have a south, southwest, or southeast exposure. The presence of remnants of stationary buildings (dwellings, livestock pens) in most of these settlements, as well as their location, indicates their long-term, mainly seasonal (winter), use by ancient pastoral communities in Tanbaly.

Many of the famous settlements of Tanbaly are multilayered containing cultural remains of several historical eras. Excavations were carried out only in two settlements – Tanbaly I and V. The most important stratigraphic data was obtained in the settlement of Tanbaly I, where cultural strata of four historical periods were revealed.

Study History

Among the most famous monuments of rock art, the most striking and significant one is the complex of rock carvings of Tanbaly. Undoubtedly, the discovery of Tanbaly is, to this day, one of the most outstanding achievements of Kazakhstan archaeology. The discovery was made in 1957 by archaeologist A.G. Maximova, who published her research in 1958 in an article illustrated with high-quality photographs taken by A.A. Popov. This article provides chronological periodization and dating of the petroglyphs. It can be considered that the discovery of the Tanbaly petroglyphs became the starting point for the scientific study of rock carvings and gave a new direction to Kazakhstan's archaeology. Years later, A.G. Maximova together with A.N. Maryashev and A.S. Yermolayeva published a joint monograph on this site, thus assembling the results of numerous studies and giving a description of more than 2000 petroglyphs, as well as highlights of the main groups.

The research topic of Tanbaly petroglyphs was developed by the works of A.G. Medoeva – one of the first archaeologists to study petroglyphs in Kazakhstan. Today, one of the main topics of study in Kazakhstan is still the documentation and publication of petroglyphs with attempts to interpret them in their context.

Works by A.G. Medoeva, A.G. Maximova, A.N. Maryashev, and A.S. Yermolayeva attracted the attention of scientists and the general public. As a result, Tanbaly became one of the most famous and iconic cultural heritage sites in Kazakhstan, a center of archaeological tourism for both local and international visitors. The UNESCO project "The Great Silk Road: the way of the dialogue of cultures," international expeditions organized along the Silk Road, seminars, and conferences, and literature on this topic also greatly contributed to Tanbaly's fame. Today, Tanbaly has been included in the UNESCO World Heritage List, and as a result, a museum-reserve has been created on the area.

Ever since 1982, A.N. Maryashev has led extensive archaeological research of the monuments of Tanbaly's gorge and its vicinity. Excavations were carried out on the Bronze Age burial grounds, which accumulated important materials which helped solving the issues related to petroglyphs' chronology and the general historical situation in the Zhetysu region. The description of petroglyphs in Kazakhstan has been published by a French archaeological mission in Central Asia.

From the 1990s to today, research in the Tanbaly gorge has been conducted by the Research Institute of Material Culture Monuments. These works were associated with the study of petroglyphs and their conservation. Considerable work has been carried out on the geomorphology of the gorge, the documentation of drawings, and their chronology; a set of conservation works was also carried out, including the "freezing" of cracks, removal of modern inscriptions, and the pasting of exfoliated pieces of stone.

An extremely important role in the study and preservation of the cultural heritage of Tanbaly was played by the UNESCO-Kazakhstan-Norway international project (2001–2004).

With the discovery of an ancient sanctuary with rock carvings of several epochs in the scientific world, attitudes toward the phenomenon of rock art have changed. In the 1950s and 1960s, archaeologists were still skeptical about petroglyphs being a valuable historical source. Back then, it was still believed that the datation of what seemed to be the oldest petroglyphs of Kazakhstan could not be established. Over time, such ideas have changed. This was primarily preceded by persistent research by archaeologists who worked on the monument over a very long period of time. Today, Tanbaly is well known far beyond the borders of Kazakhstan. The site is an area of interest for experts, archaeologists, art historians, and religious scholars. Tanbaly petroglyphs attract professionals and tourists from around the world as these petroglyphs are considered to be unique.

What contributes to this uniqueness? In recent years, archaeologists have found many new monuments that are not inferior to Tanbaly both in the number of drawings or in their expressiveness. For instance, in the Kulzhabasy mountains, ancient drawings reaching 2 or 3 meters have been discovered covering diverse scenes. In Akainar, the image of a bull with horns reaches almost 4 m long. In the mountains of Eškeolmes, there are more varied scenes: petroglyphs from different eras allow us to trace the evolution of rock art for a long period, including many drawings from the early Iron Age.

Compared to these sites, the Tanbaly petroglyphs compose a bright monument and a sanctuary, which has now become an open-air museum of outstanding global significance. Bright pictures are the creations of unknown, brilliant artists of their time. The image of sun deities, characters dressed in animal skins, images of animals, and hunting scenes – they are all gathered together and easily accessible for all to see. Famous researchers have developed a periodization of drawings, found out when and what tribes populated the gorges of these mountains. But this does not mean that many controversial issues in the study of drawings have already been resolved. Every year, archaeologists find new monuments and clarify the time of the appearance of drawings, the influence of neighboring regions, on the culture, and art of the Zhetysu tribes. The Tanbaly region has become a kind of training ground for the study of rock art. Here is the scientific and educational work. Employees of the museum-reserve explore petroglyphs, preserve and promote them, and show the contribution of the people of Kazakhstan to the treasury of world culture.

Tangible Heritage in Archaeology

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Introduction and Definition

The term tangible heritage refers in general to all the material traces such as archaeological sites, historical monuments, artifacts, and objects that are significant to a community, a nation, or/and humanity. The term is often used to distinguish such heritage elements from "intangible heritage," recognized by UNESCO in 2003, to refer to practices, representations, expressions, knowledge skills, as well as instruments, objects, artifacts, and cultural spaces associated therewith of living communities. The term "intangible heritage" replaced what was referred to in an earlier UNESCO document in 1989 as traditional culture and folklore. The designation of an intangible category of heritage led to the distinction of varieties of "material" archaeological and historical elements of heritage – "tangible heritage."

In the UNESCO 1972 convention, what is now called tangible heritage included monuments, sites, and buildings. This designation goes back to the Venice Charter (1964). Mostly concerned initially with archaeological sites, the term was later broadened to refer to groups of

buildings, vernacular architecture, and industrial and twentieth-century-built heritage.

By 1992, the UNESCO World Heritage List recognized a category referred to as "cultural landscapes," which included places and areas shaped through human activities over numerous generations such as terraced cultivated fields or desert oases, whether inhabited by living communities or abandoned; natural sacred sites of mountains, springs, wells, rivers, and other natural features; historical gardens; and other landscapes designed and maintained intentionally.

Key Issues/Current Debates/Future Directions/Examples

The emergence and popularity of the term "non-tangible" (later intangible) heritage and hence "tangible heritage" was due to an increasing awareness of the role of culture in politics and economics in the 1960s. The growing interest in culture as a means of defining ethnic identities popularized the use of [cultural] heritage to refer to the "cultural background" of a group. Most of the ethnic groups seeking recognition and equity were distinguished mostly by their language, "folklore," and customs, i.e., more by what came to be known as intangible heritage vis-a-vis tangible heritage.

The recognition of intangible heritage within a sociopolitical context in the twentieth century and consequently the emergence of the term "tangible" heritage were defined previously on the basis of distinguished architectural buildings and monuments. Although the [tangible] cultural heritage was broadened to include "sites," the criteria for selecting tangible heritage on the world heritage list are predominantly biased toward architecture, buildings, human settlements, land use, technology, monumental arts, town planning, or landscape design and refer to the human values, ideas, and beliefs that tangible elements exemplify.

It may be recalled that the World Heritage List has been conceived as a means of celebrating the monuments and sites of outstanding *universal* (transcultural) value as a follow-up to the salvage of the Abu Simbel Temple and other monuments of Nubia, in the context of the UNESCO mission for peace and intercultural understanding. However, heritage – as the cultural endowment handed down from preceding generations – may be conceptualized on the level of a nation, a society, or a community. Consequently, the sociocultural dimension embedded in the notion of heritage and the inherent attribution of heritage to a "group" of people necessitates not only a reconsideration of the types of tangible heritage but also the relationship between tangible and intangible heritage.

The material remains often selected as tangible heritage consist not only of buildings or groups of buildings, historical towns and gardens, and cultural landscapes but also of any objects or places which have been significantly modified by human actions. This includes objects made from a variety of materials (e.g., glass, textiles, stone, ceramics, metals, wood, paper) and locales such as quarries and rock art sites.

Evidently, the materials regarded as heritage are those deemed to be of *value* by a living group of peoples who *perceive* themselves as inheritors of that heritage. Accordingly what is regarded as tangible heritage is inseparable from an intangible intellectual value judgment. On an international level as in UNESCO, the community that makes the selection of items of "universal" value consists of experts working from their own professional traditions as architects, geographers, art historians, or archaeologists. By contrast, what is regarded as national heritage is often an expression of a state policy (that may or may not be representative of the nation). Thus, in this and other cases, tangible heritage, particularly monuments, is bound not only with a value judgment but also with an "objective." Castles, forts, palaces, and cathedrals and grand mosques signal state supremacy and the preeminence of religion and serve as nodes for symbolic actions, visits, performances, and literary discourses that perpetuate the socialization of people as national subjects and religious followers. On a community level, tangible heritage may be associated with tombs, religious shrines, or ancestral sites and objects. This multilevel conceptualization of heritage explains how in a modern nation state the

heritage of ethnic groups or minorities has been marginalized in favor of an "invented" (or "discovered") so-called "common" national heritage as a means for unifying the nation. Monuments, especially buildings; museums displaying certain collections; and specific places have been designed to proclaim national identity. In Europe, for example, tangible heritage in capital cities affirmed an affiliation with the Graeco-Roman civilizations. In modern Egypt, Cairo was redesigned to become a European city to forge a new identity at variance with the traditional "oriental" culture. In this period of cultural transformation (especially the nineteenth century), tangible heritage was intensively manipulated to create the current notion of "West" and "East" preparing the stage for the proponents of the clash of civilizations.

From another point of view, with the growing importance of tourism as an industry with profitable revenues, certain heritage elements were marketed as properties, commodities, and commercial assets. Although heritage is indeed a valuable resource for economic development, the economic exploitation of sites, museums, and buildings may undermine indigenous human development and disrupts existing social structures.

Tourism flourished after the advent of rapid means of travel, in the context of colonialism, industrialization, and a world divided between the industrial rich and the rural poor. As such, tourism engendered feelings of inequity on the basis of material differences in clothing and modes of transportation and places of residence between tourists and locals. It encouraged illicit digging and illegal sale of antiquities, and it favored the selection of specific elements of tangible heritage (exotic, grandiose, mysterious) as heritage icons. The linkage between tourism and "vacation" led to an emphasis on recreation and entertainment, contrary to the initial notion of tourism during the Enlightenment which centered on "cultural pilgrimage." In the making of our modern world, the role of tourism in manipulating tangible heritage can hardly be ignored.

The effect of tourism has also infiltrated academia as books by archaeologists and historians on treasures and TV series on "discoveries" and "adventures" abound. Here again, tangible heritage is selected and valorized through [intangible] narratives and practices. The objectives in this case are tinted with gaining wealth and fame.

The study of tangible heritage in academia suffers from other problems. Traditionally the study of archaeological or historical objects has focused on categorization, classification, and description with the aim of recognizing "periods" and "cultural areas." Although this has been superseded since the 1960s, with an emphasis on explanation and process, tangible heritage remains culturally under-theorized when it comes to how it articulates with the society it came from or how it can inform us of the role of tangible heritage in the making of history. Beyond an interest in tangible heritage for religious, aesthetic/artistic, technical (dating back to certain stages in the cultural evolution of Europe), is a new horizon for a new agenda, by which it can contribute to a culture of peace, reconciliation, cultural continuities, intercultural coevolution, and creativity. The latter requires a rethinking of "authenticity" and what it implies for a reinterpretation of tangible heritage as a source of innovation and renewal.

In sum, the notion of tangible heritage is inseparable from that of intangible heritage (previously called folklore, customs, and traditions). The previous neglect and current valorization of intangible heritage are related to changing sociopolitical conditions before and after the 1960s. However, tangible and intangible heritage are still regarded as separate categories given the disciplinary divide between those interested in tangible heritage (architects, archaeologists, geographers) and intangible heritage (folklorists). It is therefore crucial to recognize the intangible component of tangible heritage and the materiality associated with most intangible cultural heritage activities. The road ahead depends on how a new generation of scholars, freed from the restrictive fences of professional grounds and equipped with a comprehensive, dynamic view of heritage, will develop new interpretive and curatorial approaches that integrate tangible and intangible strands of cultural heritage elements and how they will contend with conflicts within and

between communities, nations, and international organization concerning the criteria of selecting heritage and why we need heritage in the first place.

Cross-References

▶ Intangible Cultural Heritage
▶ International Conventions Pertaining to Heritage Policy: Introduction

Further Reading

Munjeri, D. 2004. Tangible and intangible heritage – from difference to convergence. *Museum* 56 (1–2): 12–20.

Tanzania's History and Heritage

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Introduction

Tanzania was founded on April 26, 1964, from the union between the former British protectorate of Tanganyika and the Zanzibar archipelago that consists of Unguja, also commonly called Zanzibar Island, and Pemba Island. After 42 years under British rule, Tanganyika gained its independence in 1961 and, similar to the former People's Republic of Zanzibar and Pemba, remained a sovereign state until the two independent countries signed the Articles of the Union treaty to create the United Republic of Tanzania. The second head of state and former Minister of Natural Resources and Tourism, Ali Hassan Mwinyi (1985–1995), reformed the failing economy from his predecessor Julius Nyerere's socialist administration by promoting the private sector, "free market forces," and export-producing businesses.

It was Mwinyi's reforms that encouraged the growth of tourism and heritage protection. The Ministry of Natural Resources and Tourism (MNRT) adopted the republic's first National Tourism Policy, and the Tanzanian Tourism Board (TTB) was established during Mwinyi's tenure as president. The MNRT oversees the nation's cultural and natural resources along with the tourism sector and enacts policies to ensure sustainable natural and cultural heritage management. The MNRT is charged with protecting Tanzania's cultural and natural resources and developing tourism. It is divided into five divisions: Antiquities, Fisheries, Forestry and Beekeeping, and Tourism and Wildlife.

The National Museum of Tanzania, an institution under the MNRT, is a consortium of five museums charged with "collecting, conserving, displaying and researching" Tanzania's cultural and natural history (MNRT 1999). The Museum and House of Culture's vision is to repurpose Tanzania's culture and heritage to create a "strong sense of value and pride" in current and future generations of Tanzanians. In concurrence with this mission, the museum boasts that the famous fossil skull of Australopithecus boisei "Zinj" in its collection is the pride of Tanzania. Dr. Louis Leakey and his wife discovered Zinj in 1959 at Olduvai Gorge, a ravine with numerous hominid fossils.

Key Issues/Current Debates/Future Directions/Examples

Mainland Tanzania

Northern Tanzania, together with southern Kenya, is known as Africa's "Safariland" (Salazar 2006). Over 28% of Tanzania's 945,234 km^2 is set aside to safeguard the country's rich natural heritage (Mabula and Bower 2010). This network comprises the Ngorongoro Conservation Area Authority (NCAA) based in Northern Tanzania and national parks including the often visited Serengeti National Park (SENAPA), with most of the protected land dedicated to game reserves and game controlled areas – 15% and 8%, respectively (Mabula and Bower 2010). In response to

the popularity of nature exploration and the "big five" African animals (Salazar 2006), Tanzania privileges nature preservation and wildlife conservation over cultural heritage management.

The 1964 Antiquities Act of Tanzania vested The Department of Antiquities with the ownership of Tanzania's "tangible cultural heritage resources" (Mabula and Bower 2010). Under the Act, the Director of Antiquities authorizes and manages tangible heritage resources and grants licenses to research heritage sites.

According to ICCROM's legal frameworks for the protection of immovable cultural heritage, the 1964 Antiquities Act of Tanzania vested The Department of Antiquities with the ownership of Tanzania's "tangible cultural heritage resources" (Mabula and Bower 2010). Under the Act, the Director of Antiquities authorizes and manages tangible heritage resources and grants licenses to research heritage sites. ICCROM's legal frameworks for the protection of immovable cultural heritage describe the 1964 Antiquities Act as the "basic legislation" mandating the protection of the following categories of cultural heritage: conservation areas, monuments, protected (ethnographic) objects, and relics. Under this Act, the Minister has the authority to place any area, object, or structure with cultural value under protection (Kamamba 2009).

The Act defines monuments as structures, carvings, incisions, paintings, or modifications to the earth made by humans before 1863 or the remaining ruins. Protected objects are Swahili-style wooden doors and doorframes dated before 1940 or, according to Kamamba, any object the Minister declares merits protection. Ornately carved nineteenth-century doors and doorframes symbolize artistic sophistication and wealth and are particularly at risk for being sold to tourists and hotels for their beauty (Sheriff 2001). A relic is any movable object including human, fauna, and floral remains that predate 1863 along with fossils and impressions produced by humans before 1863 (Kamamba 2009). The Act charges anyone who locates objects, relics, or sites that may be culturally significant with reporting their "discovery to the appropriate authorities" (Kamamba 2009), but this law is not stringently enforced, and instructions on legally handling cultural objects are unclear. Legal ambiguities allow the destruction, neglect, exploitation, or illegal selling of many heritage objects and sites.

Before commencing development projects, the Tanzanian government recognizes the importance of carrying out environmental impact assessments (EIAs); in fact both UNESCO and the World Bank require investors to conduct EIAs "to ascertain expected impacts on the environment . . . and to prevent destruction damage," but "Cultural Heritage Impact Assessments (CHIA) are not often conducted because they are "not explicit in Tanzania's cultural heritage legislation" (Mabula and Bower 2010). For example, the Ngorongoro Conservation Area Authority (NCAA) is in place to protect the area's rich natural heritage, but no equivalent organizations to safeguard archaeological heritage.

The Ngorongoro Pastoralist Project constructed an earth dam in 2000 in the culturally significant Laetoli site, only 2 km from the famous Australopithecine footprints. Laetoli has a rich deposit of early human and hominid fossils and artifacts – now compromised by rising water levels. The dam was built for the local Maasai to collect water for themselves and their livestock during the rainy season. The NCAA attempted to make the Laetoli hominids more visible and relevant to the local Maasai by inviting local officials, elders, and other community members to perform "a traditional ceremony to bless the site" (Mabula and Bower 2010). Gaining local support for such projects is often challenging because investing in cultural heritage management is often treated as a luxury and only considered after primary needs such as healthcare, food, and "political stability" are met (Mabula 2000).

The Ngorongoro Conservation Area, the only world heritage site in Tanzania categorized under UNESCO's "mixed" criterion with both outstanding cultural and natural heritage, attracts the most visitors of all the tourist destinations in the republic, and nearly 40% of foreign tourists visited the NCA in 2001 (Charnley 2005). The NCA was added to the UNESCO World Heritage List in 1978 as a natural heritage site and inscribed under the cultural criterion in 2010. In terms of natural heritage, this site contains the Ngorongoro

Crater, described by UNESCO to be the world's largest caldera (the collapsed mouth of a volcano), as well as Olduvai Gorge – home to nearly 25,000 animals (UNESCO n.d.) and one of the very most important archaeological sites in the world. This ravine contains the fossils of a series of modern human predecessors including, but not limited to, Australopithecus, Homo habilis, and Homo erectus; each hominid represents stages of human evolution spanning 4 million years. Archaeologists also found handmade tools and animal bones in the gorge; the tools are testaments to human ingenuity and the bones helped shape ideas about early hominid diets. Another noteworthy archaeological site located 45 km south of the gorge is Laetoli, famous for the three sets of bipedal Australopithecus afarensis footprints preserved in volcanic ash. Unfortunately Olduvai Gorge has fallen into disrepair because the fossils and museums have been neglected and vandalized. Grasses and acacia trees have grown over and endangered the Laetoli footprints (Mabula 2000), and although Olduvai Gorge brings in revenue (in 1998 nearly 39,108 tourists spent $60,000 in entry fees), little of the economic gain was reinvested into developing the site (Mabula 2000).

The Kondoa Rock Art cultural sites, added to the World Heritage List in 2006, are collections of painted images found in more than 150 shelters on the sedimentary rock formations that border the Great Rift Valley spanning more than 2336 km^2 (UNESCO n.d.); several of the rock sites have been repurposed as ritual sites by the nearby Maasai communities. According to UNESCO these sites "provide a unique testimony to the changing socio-economic base of the area from hunter-gatherer to agro-pastoralist, and the beliefs and ideas associated with the different societies." The Department of Antiquities does not have up-to-date records on the scope of paintings within these sites, so UNESCO encourages any surveys or assessments "to ascertain the scope of the site[s]" (n.d.).

The Ruins of Kilwa Kisiwani and the Ruins of Songo Mnara are on the World Heritage List (in 1981) as well as UNESCO's List of World Heritage in Danger in 2004. These cultural sites are the remains of two trading ports on islands near the coast (nearly 300 km south of Dar es Salaam) where goods such as gold, pearls, perfumes, and porcelain were sold from the thirteenth to the sixteenth century. Housing complexes, public squares, mosques, and domestic dwellings on the islands serve as a chapter in Swahili culture and architecture, "offering important insights regarding economic, social and political dynamics in this region" (n.d.). The Great Mosque of Kilwa Kisiwani is the oldest mosque on the East African coast. Although the two sites are protected under the Antiquities Act and a 2004 Management Plan, uncontrolled urban expansion, coastal damage by beach erosion, and inadequate conservation efforts have resulted in long-term threats.

The Central Slave and Ivory Trade Route was submitted by the Antiquities Department in 2006 as a testimony to the cruel treatment of African slaves in Central and East Africa, including Tanzania. Slaves were held on the coast and many times sent to Zanzibar and then sold to Arab countries. The recommendation for this site to be inducted into the World Heritage List is based on engaging the tragic history of the slave trade, preserving the visible, physical reminders of this trade route remain in Tanzania's landscape and researching and documenting the "memories" of human suffering and enslavement to preserve the cultures and traditions of the people who live along the trade route (UNESCO n.d.).

Zanzibar

The Stone Town of Zanzibar is Zanzibar's most popular attraction. The town is a large, well-preserved former slave-trading port on Unguja Island that was inscribed in UNESCOs World Heritage List in 2000. The stone town of nearly 2000 buildings is noteworthy for its historic urban landscape developed from more than two centuries of Swahili, Portuguese, Arabic, and Yemeni cultural influences and architectural traditions (Mohamed 2001; Sheriff 2001). UNESCO describes the Stone Town as an example of cultural fusion as its architecture demonstrates the melding of African, Arab, and European cultures. This site is characterized by survivals of Portuguese churches and forts, and Islamic mansions that were eventually "amalgamated and homogenized into a characteristic [vernacular] Swahili architecture" and over time influenced by new styles brought by immigrants to Zanzibar (UNESCO n.d.)

In 2009 the Flemish government helped coordinate and launch a series of historic urban landscape (HUL) workshops on Africa's east coast by introducing HUL to governments and host communities in "World Heritage-designated cities" including the Stone Town of Zanzibar. These workshops are to include training for government officials and the community at large on urban landscape conservation and facilitators to promote research for the development of a "toolkit for urban conservation," revisiting the groundwork of the 1972 World Heritage Convention for establishing urban development, and "management of the World Heritage Cities Programme" (UNESCO n.d.). Domestic as well as international agencies are vested in the Stone City. The Zanzibar Stone Town Heritage Society "Jumuiya Ya Uhifadhi Mji Mkongwe" is an NGO established in 2002. The society's mission is to promote the conservation of the Stone Town's heritage, environment, and the "cultural welfare of its inhabitants" (2010); it works towards this mission with a list of objectives that include raising awareness of the Stone Town's conservation concerns, and, similar to UNESCO's HUL workshops, the society provides community outreach activities, training, services, research, and technical support to improve the Stone Town's urban landscape. The society also lobbies for conservation policies and builds relationships with other organizations interested in conservation.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Olduvai Gorge Archaeological Site
- ▶ Tangible Heritage in Archaeology
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective
- ▶ World Heritage and Human Rights

References

Charnley, S. 2005. From nature tourism to ecotourism? The case of the Ngorongoro Conservation Area, Tanzania. *Human Organization* 64: 75–88.

Kamamba, D. 2009. Cultural heritage legislation in Tanzania. In *Legal frameworks for the protection of immovable cultural heritage in Africa (ICCROM Conservation Studies 5)*, ed. W. Ndoro and G. Pwiti, 13–17. ICCROM.

Mabula, A.Z.P. 2000. Strategy for cultural heritage management (CHM) in Africa: A case study. *The African Archaeological Review* 17: 211–233.

Mabula, A.Z.P., and J.F.R. Bower. 2010. Cultural heritage management in Tanzania's protected areas: Challenges and prospects. *CRM: The Journal of Heritage Stewardship* 7: 27–45.

Ministry of Natural Resources and Tourism. 1999. *National tourism policy*. Dar es Salaam: United Republic of Tanzania, Ministry of Natural Resources and Tourism.

Salazar, N.B. 2006. Touristifying Tanzania. *Annals of Tourism Research* 33: 833–852.

Unesco. n.d.-a Tanzania, United Republic of. Available at: whc.unesco.org/en/statesparties/TZ. Accessed 26 Nov 2011.

Unesco. n.d.-b Historic urban landscapes workshops on the Swahili coast of Africa. Available at: whc.unesco.org/en/activities/661/. Accessed 4 Dec 2011.

Unesco. n.d.-c The central slave and ivory trade route. Available at: whc.unesco.org/en/tentativelists/2005/. Accessed 3 Dec 2011.

Zanzibar Stone Town Heritage Society. 2010. About us. Available at: www.zanzibarstonetown.org/about.htm. Accessed 4 Dec 2011.

Further Reading

Mwinyi, A.H. 1995. *Current biography*. Vol. 56, 33.

Sheriff, A. 1998. *Zanzibar stone town: An architectural exploration*. Zanzibar: Gallery Publications.

Taphonomy in Bioarchaeology and Human Osteology

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Introduction

Classical Taphonomy

Traditionally, taphonomy was studied by paleontologists to interpret the processes that operate on organic remains that comprise a part of the fossil record. A major focus of taphonomy was to understand the effects of those processes in order to reconstruct the past as it pertains to a particular fossil assemblage (Shipman 1981).

Years later, archaeologists began to study taphonomy in order to determine how and why floral and faunal remain accumulated and differentially preserved within the archaeological record. Interpretation of the postmortem, pre-, and post-burial histories of faunal assemblages is critical in determining their association with hominid activity and behavior. Archaeologists typically separate natural from cultural processes when identifying evidence of human interaction with faunal remains (Lyman 1994).

Various models of fossil assemblage formation have been proposed, depicting a general taphonomic history. The *taphonomic history* defines the chronology of taphonomic agents and processes affecting the faunal remains and may include a cyclic sequence of events (e.g., a bone may be buried, exposed, gnawed, transported, and reburied). A *taphonomic agent* refers to the source of modification to the faunal remains (e.g., hyena), while a *taphonomic process* describes the dynamic action of that agent on the remains (e.g., gnawing). The *taphonomic effect* is the result of a taphonomic process (Lyman 1994). The basis of taphonomy is therefore the qualitative and, where possible, quantitative analysis of the taphonomic effects, processes, and agents acting on carcasses and skeletal tissues.

The geological context in which faunal remains are discovered and their distribution in the stratigraphy may provide important information about the paleoenvironment and formation of the site. However, information about the taphonomic history of faunal remains comes specifically from the recovered animal carcasses and skeletal tissues (Shipman 1981). Postmortem processes affecting skeletal remains, and subsequently the state of preservation of the bone, reflect the sequence of taphonomic events which comprise the taphonomic history. An understanding of the taphonomic history of faunal remains aids archaeologists in explaining their interaction with prehistoric human populations (Micozzi 1991; Lyman 1994).

Figure 1 provides an overview of the transformation from living organism to fossil (based on Behrensmeyer and Kidwell 1985; Martin 1999).

Organisms must pass through three distinct and separate stages to become a part of the fossil record. These stages span the time frame from death to discovery and/or recovery. The first stage involves the death or loss of a part of an organism and is referred to as necrology. Necrology can be denoted by T_0 and represents the initial stage of the taphonomic history. Processes that occur from death through to burial represent the second stage and are referred to as biostratinomy. These processes result from reworking and destruction of the remains and may include decomposition, scavenging, bioturbation, and postmortem transport. The third stage is termed diagenesis and refers to the physical and chemical processes occurring after burial. Diagenetic processes result in the transformation of organic material to mineral in sediments and include dissolution, leaching, and recrystallization (Micozzi

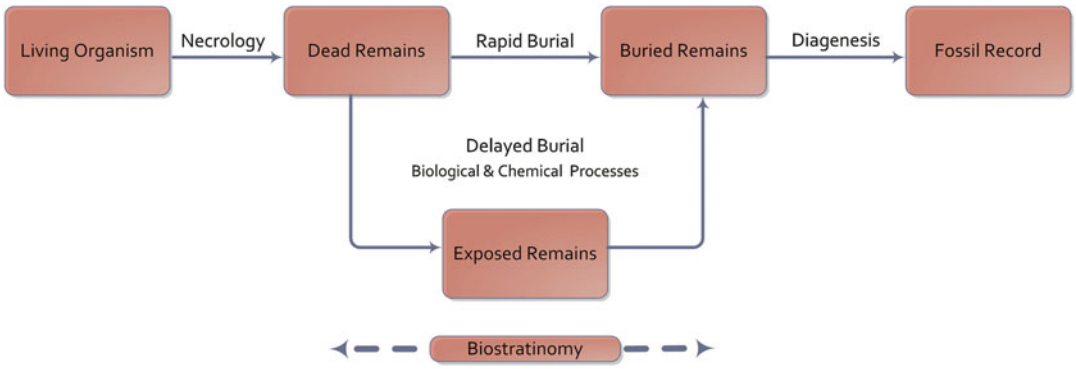

Taphonomy in Bioarchaeology and Human Osteology, Fig. 1 Transformation stages from living organism to fossil. (Based on Behrensmeyer and Kidwell 1985; Martin 1999)

1991). Mineralization will only occur if the natural decay process does not lead to complete destruction of the remains (Allison 1990). This process allows for the discovery of preserved material in the archaeological record, whereby T_1 represents the time of discovery.

One of the many challenges of taphonomic analysis is to identify the processes and agents acting on the remains during the time frame to fossilization (i.e., $T_1 - T_0$). The postmortem factors that can act on faunal remains are numerous and include physical, chemical, and biotic agents (Brett 1990; Ubelaker 1997). Broadly speaking, the destruction of a skeleton can be categorized sequentially as follows (Brett 1990): (1) disarticulation, (2) fragmentation, (3) abrasion, (4) bioerosion, and (5) corrosion and dissolution. Disarticulation occurs through the postmortem action of enzymes and bacteria in the organism leading to the biochemical breakdown of tissues including connective tissues and ligaments. When this degradation occurs along pre-existing joints or articulations, the skeleton becomes disarticulated naturally. Biotic agents such as scavengers and faunal burrowers can physically accelerate disarticulation through their actions. Physical agents such as water currents and turbulence can also result in disarticulation of skeletons that have commenced the decay process (Brett 1990). Fragmentation can result from physical factors such as rock fall, weathering, burial, shockwaves, diagenesis, and cryoturbation, as well as biotic animal-related processes including trampling, gnawing, and digestion (Marshall 1989; Micozzi 1991). Abrasion involves physical grinding and/or polishing of skeletal elements causing a rounding of their edges and loss of detail. The extent of abrasion will be highly dependent on the sedimentary environment and particularly the particle size of the abrasive agent. Bioerosion is seen most commonly in shallow marine environments, while corrosion and dissolution are commonly observed in seawater or in sediment pore waters through the action of bioturbation. Dispersal and postmortem transport of remains may also involve animals or may result from gravity or fluvial processes. Discriminating between nonhuman and human agents of bone modification with respect to human subsistence patterns involves analyzing taphonomic factors such as scavenging, hunting, butchering, and transport of prey (Bonnichsen and Sorg 1989).

Forensic Taphonomy

Many of these taphonomic processes are also important in the analysis of more recently skeletonized remains. As a result, the principles of taphonomy are now utilized in the field of forensic science. Forensic taphonomy involves the use of taphonomic models and approaches to estimate time since death, reconstruct the events surrounding death and before and after burial, and discriminate between bone modifications resulting from human behavior and those caused by the earth's physical, chemical, biological, and geological processes (Haglund and Sorg 1997; Ubelaker 1997; Schotsmans et al. 2017). Due to the multidisciplinary approach required in a forensic investigation, forensic taphonomy may encompass experts in anthropology, archaeology, soil science, palynology, and many other disciplines based on the particular requirements of the crime scene. The main goal of applying taphonomic investigations to a crime scene is to assist with locating, recovering, and identifying human remains, as well as estimating the postmortem interval and determining the cause and manner of death (Schotsmans et al. 2017).

In a forensic context, taphonomy is used to define all events acting on human remains between death and discovery. This time frame (i.e., $T_1 - T_0$) will be considerably shorter for forensically relevant remains when compared to remains of paleontological or archaeological significance. Due to the shorter time frame of forensic investigations, forensic anthropologists are concerned with soft tissue decomposition rates and patterns, in addition to bone modification, disarticulation, and dispersal (Haglund and Sorg 1997). Postmortem decomposition varies considerably between geographical regions and can also demonstrate significant variation across and within microenvironments (Ubelaker 1997). It is important to recognize that both intrinsic and extrinsic factors can impact the rate and process of tissue decay. Intrinsic factors result from the

physiology of the individual at the time of death, including age, gender, body mass, physical health, and modifications such as the ingestion of medications. Extrinsic factors may result from the depositional environment such as water, soil, temperature, oxygen, flora, and fauna or from human behavior such as the cause of death, body deposition, and other modifications such as dismemberment and treatment with chemicals or through the action of burning (Schotsmans et al. 2017). Consideration must be given to all of these parameters and many more when interpreting the taphonomic history of human remains in a forensic investigation.

Definition

Taphonomy is the study of the transition of organic remains from the biosphere into the lithosphere as a result of geological, biological, and chemical processes which act on the remains (Shipman 1981; Lyman 1994; Martin 1999). The science of taphonomy has been practiced for centuries. However, the term "taphonomy" was first defined by Russian paleontologist, I.A. Efremov (1940), to denote a subdiscipline of paleontology which studied the events that occur between death and fossilization. The term was derived from Greek roots *taphos*, meaning burial, and *nomos*, meaning laws (Micozzi 1991; Lyman 1994; Martin 1999).

The definition of taphonomy has since been extended to incorporate the study of bone accumulation and modification from a site formation perspective (Bonnichsen and Sorg 1989) and interpret the life history of a fossil from the time of death to the time of recovery (Olson 1980). The latter definition recognizes the importance of understanding the circumstances surrounding the event and the time since death or deposition.

Key Issues and Current Debates

Early Taphonomic Research

Taphonomic research in the fields of paleontology and archaeology has predominantly been directed toward reconstructing paleoenvironments, identifying factors which cause destruction or modification of bone, understanding dispersal and transport of remains, and discriminating between nonhuman and human agents of soft tissue preservation and bone modification (Haglund and Sorg 1997).

A key issue and one of the major foci of taphonomic research is to understand the biases inherent in the fossil record. A major bias is the lack of organic soft tissue preserved over time and subsequently recovered. Given the percentage of soft tissue found on many organisms, the natural and rapid decay of this material can represent a significant bias in the recoverable data which is predominantly hard or mineralized tissue (Allison 1990). When interpreting a fossil assemblage, it is necessary to determine how that collection of skeletal remains was derived from the animal community that once populated the area. Since not all animals, and even fewer plants, are preserved through time, the fossil record provides an incomplete picture of the original ecosystem. Where organic remains are recovered, this typically occurs in an exceptional preservation environment such as the recovery of "bog bodies" in Northern Europe. These conditions, while ideal for soft tissue preservation, can often lead to the dissolution of other parts of the organism such as hard tissue. The bog bodies provide an excellent example, whereby the skin, muscle, and hair were exceptionally well preserved but the body-like structures often lacked bones and other hard parts (Allison 1990).

The process of recovering faunal remains is also a biasing factor. Researchers may affect the assemblage by differentially sampling, collecting, and recording the data based on personal observation and expertise. Archaeologists must therefore be aware of the taphonomic significance of the stratigraphic and sedimentary context of faunal remains when sampling (Lyman 1994).

When the term was first defined, Efremov (1940) determined that the study of taphonomy would focus on four major problems encountered in paleontology. First, the state of preservation of fossils is often poor and the number of skeletons few, due to the increased destruction experienced

over time and the variations in the size of fauna sampled. Second, a faunal assemblage may not have been associated in life but rather may have accumulated accidentally either at death (known as thanatocoenose) or after death (known as taphocoenose). Third, the appearance of a presumably new fauna without identifiable ancestors in the site formation may not necessarily represent a new group of species as ancestral species may not have been preserved under the prior environmental conditions. And finally, the preservation of species and skeletal elements will vary in different sedimentary environments, and assemblages may not resemble the same species due to fossilization of a select sample of the original community (Shipman 1981).

For many years, it was incorrectly assumed that a fossil record was a snapshot of an animal community which had been preserved through the processes of fossilization. Taphonomic studies have assisted in reducing the assumptions once made about fossil assemblages. It is now understood that animals do not necessarily die in the environment within which they lived and that an abundance of one fossilized species in the fossil record does not represent an abundance of that species in the original community.

It is no longer assumed that two species found in the same assemblage lived together in the same environment or that the lack of a species in an assemblage represents their rarity or absence in the original community (Shipman 1981). By studying taphonomic data and observing taphonomic patterns, paleontologists and archaeologists are now able to provide more meaningful interpretations of the fossil record.

Recent Taphonomic Research

During the period 1970–1986, the field of taphonomy expanded beyond the focus on bias and placed a strong emphasis on actualistic, process-oriented research. Scientists recognized that the original definition of taphonomy failed to encompass the broader focus of how fossil assemblages change during preservation as a result of both the addition and loss of information (Behrensmeyer and Kidwell 1985). Behrensmeyer and Kidwell proposed a new definition for the field as "the study of processes of preservation and how they affect information in the fossil record" (Behrensmeyer and Kidwell 1985: 105).

During this same period, actualistic studies between life and death assemblages became important, and the processes of death and decomposition were extensively studied by Behrensmeyer and colleagues in African terrestrial environments (Behrensmeyer 1978; Behrensmeyer et al. 1979). Despite the difficulties experienced in reconstructing the past using fossil assemblages, their studies demonstrated that modern bone assemblages can resemble the living animal community (Behrensmeyer et al. 1979). This new perspective led to research in middle-to-large-scale taphonomic phenomena and the dynamic interactions between biological and geological processes.

After decades of taphonomic research and much debate, the following rules are generally accepted as empirical principles of taphonomy (based on Martin 1999) but by no means represent a complete list.

1. An organism is more likely to be preserved if it comprises hard parts.
2. Preservation is considerably enhanced if the remains are rapidly buried in fine-grained sediment.
3. Preservation is considerably enhanced in the absence of decomposition and scavengers.
4. Chemical and physical destruction resulting from decay, abrasion, transportation, predation, scavenging, and dissolution will cause a loss of information about community structure and species abundance.
5. Taphonomic information loss in terrestrial and fluvial environments predominantly results from transport, disarticulation, and breakage by water, predators, scavengers, trampling, etc.
6. Bioturbation and physical alteration preferentially mix sediments upward causing temporal mixing of different communities and leading to an increased diversity in morphological features of fossil ancestries.
7. Taphonomic transformation can lead to information gain for reconstructing the environment and past community dynamics.

8. Catastrophic burials (e.g., Lagerstätten – fossil deposits demonstrating remarkable diversity or preservation) are valuable for providing a snapshot of the population dynamics but are not representative of the temporal variation in populations.

Since taphonomic processes can act on biological remains during the period of death and discovery, it is recognized that some skeletal remains may survive better than others with time. The ultimate goal of taphonomy is thus to identify and quantify the biases associated with the process of fossilization to allow for accurate interpretations of the relative abundance of organisms in a fossil assemblage.

Forensic Taphonomic Research

Taphonomic research in the field of forensic taphonomy faces additional challenges in deciphering the effects of human behavior on human remains since that behavior can impact the cause and manner of death as well as the rate and biochemical processes of decomposition and/or preservation. The structural differences between human remains and nonhuman remains will cause variation in their response to taphonomic agents. In addition to analyzing the taphonomic effects such as weathering, gnawing, and trampling, forensic anthropologists must also interpret the effects of cultural processes such as embalming, burial, and cremation (Ubelaker 1997).

While the forensic anthropologist may draw parallels with some of the principles of paleotaphonomy (e.g., Behrensmeyer's (1978) stages of bone weathering), many of these effects must be individually studied on forensic remains in order to understand their taphonomic impact. One of the main challenges in forensic taphonomy today is understanding how postmortem changes to human remains will affect the estimation of time since death. The range of intrinsic and extrinsic factors that can act as taphonomic agents means that no two sets of remains will decompose in the same way even when placed in the same environment, further adding to the challenge of using the rate of decay to estimate this time frame. Research in this complex area has many complications, but advances are being made by researchers employing observational and experimental taphonomic studies in a range of forensic environments. Until recently, the utilization of donated human cadavers for forensic taphonomic research was limited to a select few facilities in the USA (Vidoli et al. 2017). More recently, additional facilities have opened in Australia and the Netherlands, and there appears to be an increase in interest in establishing human taphonomy facilities in many regions of Europe and the UK. Such facilities will allow forensic taphonomic studies to advance beyond the use of animal analogues and provide a greater understanding of the taphonomic history of human remains in our local environments (Forbes 2017).

Future Directions and Examples

Over the past two decades, process-based research has provided a valuable understanding of the taphonomic bias in modern environments. However, a key issue that remains is the extent to which taphonomic bias varies with time. Much research has gone into understanding how the taphonomic bias varies with depositional environment (Schotsmans et al. 2017), but there is little understanding of how this same bias has changed through time, although there are examples that it potentially has (Allison and Bottjer 2010).

Examples of biomolecular and biological evolution highlight the fact that some organic remains and skeletons are more likely to preserve than others and that this has changed over time. The evolution of burrowing organisms can alter taphonomic bias by disturbing and potentially degrading faunal remains buried in the sedimentary environment, as it has been shown that the depth of burrowing has increased with time. Additionally, fossil Lagerstätten represent snapshots of preservation that clearly demonstrate temporal variation in fossilization (Allison and Briggs 1991).

Fossil Lagerstätten refer to rare fossil deposits which have undergone exceptional preservation and include evidence of soft tissues. This concept was first popularized by Seilacher's group at the University of Tübingen (Behrensmeyer and Kidwell 1985; Allison and Bottjer 2010) and led to extensive efforts to investigate current and new

Lagerstätten. Research in this area focused on understanding the taphonomic processes leading to exceptional preservation of soft tissue which advanced a new field of experimental taphonomy. Fossil Lagerstätten represent unique but excellent examples of preservation in the fossil record.

Taphonomic research now benefits from a diversity of approaches including field, laboratory, and database studies. Allison and Bottjer (2010) predict that database studies will be more frequently used in the future but also highlight the need for ongoing field studies to populate those databases. They propose that the major gaps still remaining in taphonomic knowledge relate to Precambrian taphonomy, organic geochemistry, and global biodiversity. Future research in these fields will help to elucidate a better understanding of the early history of Earth, the pathways between organic molecules and the preservation of organic carbon, and the impact of mass extinction events on taphonomic processes.

Although the field of taphonomy is now considered to be well established, the field of forensic taphonomy is still in its infancy. During the past two decades, considerable advances have been made in forensic taphonomy (Micozzi 1991; Haglund and Sorg 1997; Schotsmans et al. 2017). However, further research is required to understand the effect of taphonomic processes and agents on soft tissue and hard tissue in the numerous environments in which decomposition can and does occur. The random nature by which many crimes are committed means that almost any environment can be utilized to dispose of human remains. These environments must continue to be the focus of taphonomic studies to assist forensic anthropologists in accurately understanding the processes of tissue decomposition and preservation.

Cross-References

- ▶ Forensic Anthropology and Archaeology in Disaster Response
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Skeletal Biology: Definition
- ▶ Time Since Death in Bioarchaeology and Human Osteology

References

Allison, P.A. 1990. Decay processes. In *Paleobiology: A synthesis*, ed. D.E.G. Briggs and P.R. Crowther, 213–216. Oxford: Blackwell Science Ltd.

Allison, P.A., and D.J. Bottjer. 2010. Taphonomy: Bias and process through time. In *Taphonomy second edition: Process and bias through time. volume 32: Topics in geobiology*, ed. P.A. Allison and D.J. Bottjer, 1–18. New York: Springer.

Allison, P.A., and D.E.G. Briggs. 1991. *Taphonomy: Releasing the data locked in the fossil record*. New York: Plenum.

Behrensmeyer, A.K. 1978. Taphonomic and ecologic information from bone weathering. *Paleobiology* 4: 150–162.

Behrensmeyer, A.K., and S.M. Kidwell. 1985. Taphonomy's contribution to paleobiology. *Paleobiology* 11: 105–119.

Behrensmeyer, A.K., D. Western, and D.E. Dechant Boaz. 1979. New perspectives in vertebrate paleoecology from a recent bone assemblage. *Paleobiology* 5: 12–21.

Bonnichsen, R., and M.H. Sorg. 1989. *Bone modification*. Orono: Center for the Study of First Americans.

Brett, C.E. 1990. Destructive taphonomic processes and skeletal durability. In *Paleobiology: A synthesis*, ed. D.E.G. Briggs and P.R. Crowther, 223–226. Oxford: Blackwell Science Ltd.

Efremov, I.A. 1940. Taphonomy: A new branch of paleontology. *Pan-American Geologist* 74: 81–93.

Forbes, S.L. 2017. Body farms. *Forensic Sci Med Pathol*. https://doi.org/10.1007/s12024-017-9924-z. Published online 25 September 2017.

Haglund, W.D., and M.H. Sorg. 1997. Introduction to forensic taphonomy. In *Forensic taphonomy: The postmortem fate of human remains*, ed. W.D. Haglund and M.H. Sorg, 77–90. Boca Raton: CRC Press.

Lyman, R.L. 1994. *Vertebrate taphonomy*, Cambridge manuals in archaeology series. Cambridge: Cambridge University Press.

Marshall, L.G. 1989. Bone modification and "the laws of burial". In *Bone modification*, ed. R. Bonnichsen and M.H. Sorg, 7–24. Orono: Center for the Study of First Americans.

Martin, R.E. 1999. *Taphonomy: A process approach*, Cambridge paleobiology series. Cambridge: Cambridge University Press.

Micozzi, M.S. 1991. *Postmortem change in human and animal remains: A systematic approach*. Springfield: Charles C. Thomas.

Olson, E.C. 1980. Taphonomy: Its history and role in community evolution. In *Fossils in the making: Vertebrate taphonomy and paleoecology*, ed. A.K. Behrensmeyer and A.P. Hill, 5–19. Chicago: University of Chicago Press.

Schotsmans, E.M.J., N. Marquez-Grant, and S.L. Forbes. 2017. *Taphonomy of human remains: Forensic analysis of the dead and depositional environment*. Oxford: Wiley.

Shipman, P. 1981. *Life history of a fossil: An introduction to taphonomy and paleoecology*. Cambridge: Harvard University Press.

Ubelaker, D.H. 1997. Taphonomic applications in forensic anthropology. In *Forensic taphonomy: The postmortem fate of human remains*, ed. W.D. Haglund and M.H. Sorg, 77–90. Boca Raton: CRC Press.

Vidoli, G.M., D.W. Steadman, J.B. Devlin, and L.M. Jantz. 2017. History and development of the first anthropology research facility, Knoxville, Tennessee. In *Taphonomy of human remains: Forensic analysis of the dead and the depositional environment*, ed. E.M.J. Schotsmans, M. Marquez-Grant, and S.L. Forbes, 606–621. Oxford: Wiley.

Further Reading

Behrensmeyer, A.K., and A.P. Hill. 1980. *Fossils in the making: Vertebrate taphonomy and paleoecology.* Chicago: University of Chicago Press.

Donovan, S.K. 1991. *The process of fossilization*. New York: Columbia University Press.

Gifford, D.P. 1981. Taphonomy and paleoecology: A critical review of archaeology's sister discipline. In *Advances in archaeological method and theory*, ed. M.B. Schiffer, vol. 4, 365–438. New York: Academic.

Haglund, W.D., and M.H. Sorg. 1997. *Advances in forensic taphonomy: Method, theory, and archaeological perspectives*. Boca Raton: CRC Press.

Pokines, J.T., S.A. Symes, and C. Roper. 2013. *Manual of forensic taphonomy.* Boca Raton: CRC Press.

Tibbett, M., and D.O. Carter. 2008. *Soil analysis in forensic taphonomy: Chemical and biological effects of buried human remains*. Boca Raton: CRC Press.

Taphonomy in Human Evolution

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Introduction

Taphonomic research is essential for the interpretation of fossil plant or animal assemblages that are recovered from early archaeological sites. Within human evolutionary studies, it provides a way to reconstruct past processes that have acted on fossil assemblages of direct relevance to our understanding of early hominin and early modern human behavior. Taphonomic research may be applied to the fossil remains of human ancestors themselves, the remains of the animals and plants that were part of their ecological surroundings, or the material remnants of their behavior (e.g., the discarded remains of their meals). Without taphonomy, the many processes that can operate on an assemblage over the long time periods represented by the human evolutionary record could not be reliably untangled.

Taphonomic processes are typically viewed as reductive and destructive, taking away information from a complete picture of the forms and ecologies of living things in the past. However, taphonomic processes can also add information about the circumstances of deposition and subsequent modification of what are now fossil remains. Each intervening taphonomic process that alters a fossil or an assemblage also has the potential to leave a trace, thus allowing information about the processes themselves to be reconstructed. This kind of research has sparked several debates within human evolutionary studies, leading to the interpretation and reinterpretation of some of the most significant early sites over the course of the last four decades.

Definition

Taphonomy in human evolution is taphonomic research mainly used to aid interpretation of the subsistence behavior of early humans and our ancestors. In this context, it is most often used in reference to fossil animal bones. However, it may also be applied to hominin bones to discover how they came to rest in a given context, or it may be used to interpret other remains that are of relevance to understanding the behavior of ancient human relatives or their ecologies.

Historical Background

Key Historical Figures

Charles K. (Bob) Brain was a pioneer in taphonomic research within a human evolutionary framework. In the 1960s, he used observations of how dogs modified bones discarded by people to formulate ideas of what this would look like in

the fossil record. He later (Brain 1981) wrote a book entitled "The Hunters or the Hunted?" in which he used these observations to interpret the faunal assemblages from Sterkfontein and other early hominin-bearing cave sites from South Africa. Previously, the fossil animal bones from these sites were thought by authors such as **Raymond Dart** to have been either food debris or even weapons used by early hominins such as **australopithecines**. Brain's taphonomic work debunked many of these ideas by demonstrating that in fact the majority of the fossil remains – including the remains of hominins – were the result of carnivore predation (Fig. 1). This interpretation has stood the test of time and is currently still accepted as the most parsimonious explanation.

In the same year, another landmark book was written by **Lewis R. Binford** (1981), entitled *Bones: Ancient Men and Modern Myths*. Binford argued that within Paleolithic research, many of the interpretations about how fossil faunal assemblages were formed were made post hoc, resulting in the perpetuation of unevaluated "myths" about the past. He had spent several years studying how modern hunter-gatherers obtain and discard faunal remains, with a particular focus on understanding how bone accumulations at archaeological sites are created. He also noticed that such accumulations may be modified or independently created by nonhuman processes, such as carnivore denning and scavenging. Binford used these observations to stress the importance of applying **Middle-Range Theory** to link interpretations of the past directly to observations made in the present. This theoretical framework continues to play an essential role in taphonomic research today.

Taphonomy in Human Evolution, Fig. 1 The classic illustration by Dr. C.K. "Bob" Brain of a fossil hominin skull exhibiting two puncture marks that fit the tooth spacing of a fossil leopard found at the same site. Image courtesy of the Ditsong National Museum of Natural History

Development of Actualistic Research as an Interpretive Framework

The experiments and observations performed by Binford and Brain are, respectively, examples of **ethnoarchaeology** and actualistic research. Such research is performed under the uniformitarian assumption that modern processes we observe today also happened in the past. Therefore, by the observing the traces or impacts certain behaviors leave in the modern day, one can infer that the same behaviors also caused similar traces or impacts on fossil assemblages in ancient times (Fig. 2).

Within human evolutionary studies, actualistic taphonomic research has taken three major forms: basic experimentation, naturalistic experimentation, and ethnographic observation. Basic **experimental archaeology** offers the most control to the researcher. Bones or other objects of interest are subjected to taphonomic processes under simulated conditions where a wide variety of variables can be known and manipulated. Naturalistic experimentation is similar, except that the bone or other object of interest is introduced into a natural setting and the transformation it undergoes is observed more passively as several variables within the system may operate simultaneously upon it.

Arguably, modern hunter-gatherers are not a perfect analogue for all early archaeological sites, which have been created by a range of hominins in the genus *Homo* and potentially other genera such as ***Paranthropus***, *Australopithecus*, or *Kenyanthropus*. However, ethnographic observation of how living humans acquire, process, and discard bones does provide essential information on human decision-making and archaeological **site formation processes**. Notable examples that have been applied to the human evolutionary record are Binford's (1981) book, which drew heavily on his experiences with

Taphonomy in Human Evolution, Fig. 2 An actualistic study in progress. The image above shows some goat bones laid outside a camp on the Serengeti Plain, Tanzania, just after dark. The image below shows those same bones just before dawn. Hyenas were heard through the night, and almost all of the bones have disappeared, leaving a few small shaft fragments. From this, similar degrees of ravaging might be expected at ancient sites

the Nunamiut of Alaska, and the work of Bunn et al. (1988) with the Hadza of the Eyasi Basin of Tanzania. All three forms of actualistic research and ethnoarchaeological work have underlain some of the largest debates in zooarchaeology and taphonomy as they have been executed in a human evolutionary context. In all cases, major changes in site interpretation have been inextricably intertwined with challenges to the existing methodological status quo.

Key Historical Debates: Hunting Versus Scavenging

The ability to regularly acquire meat and fat from large animal sources was an important watershed in the diet and behavior of our ancestors. Prior to the actualistic work that became prominent in the 1980s, it was frequently taken for granted that if fossil animal remains were found in association with stone artifacts, then the fossils were also there as the result of hominin activity. A famous example is the FLK Zinjanthropus, or "Zinj" site at **Olduvai Gorge**, Tanzania, which dates to approximately 1.84 million years ago. Excavations in the 1960s by Mary **Leakey** revealed a rich and well-preserved fossil faunal assemblage in association with stone artifacts, which was interpreted by many archaeologists as evidence that the site was a "home base" or "living floor" used by early hominins. Binford's (1981) book took this assumption to task, concluding on the basis of bone breakage and skeletal part representation that there was little evidence of the site being used as a home base, analogous to a modern hunter-gatherer camp. Binford argued that the bone accumulations in association with stone tools could be explained simply by hominins scavenging after carnivore kills.

Subsequent researchers such as Shipman and Rose (1983) emphasized the use of microscopic techniques to reliably identify signatures of hominin modification such as cut marks from stone tools. They further cautioned against the assumption that bone accumulations such as that at Zinj represented the remains of hunted meals. However, when Bunn and Kroll (1986) reanalyzed the assemblage they argued that both skeletal element abundances and bone surface modification suggested that early hominins were actually capable of hunting large mammals and bringing them back to particular sites on the landscape to be butchered. This debate became known as the "Hunting versus Scavenging" debate.

In a naturalistic study conducted in Serengeti National Park, Blumenschine (1988) simulated a series of "hominin-first" and "carnivore-first" scenarios by leaving bones for scavenging by wild hyenas. Both hominins and carnivores would have broken bones for the fat-rich marrow inside, but the study showed that they would have left different traces on the bone surfaces when they did so, and in different proportions. When hominins were first, there would have been more hammerstone percussion marks and when carnivores were first, there would have been more carnivore tooth marks. When applied to the Zinj assemblage, the large numbers of tooth marks suggested it had been heavily modified by carnivore activity. The implication for human evolutionary studies was that our earliest tool-using ancestors would have only gotten access to meat and marrow through scavenging.

The case seemed to have been closed, until Domínguez-Rodrigo and Barba (2006) introduced a new element to the debate. They argued that full account had not been taken of other agents that can produce marks on bones. Specifically, fungus and bacteria can etch bone surfaces in such a way that they may resemble tooth marks – thus leading to an overestimate of the role carnivores had in modifying the assemblage. Again they turned to the Zinj assemblage as an example.

The debate is not yet settled, with a new generation of taphonomists now arguing that the evidence for scavenging at the site is still stronger than any evidence of early hominins having first access. Although most researchers doubt that early **Oldowan** tool-using hominins such as ***Homo habilis*** were as proficient at hunting as modern humans, no agreement has been reached about how all the bones came to be accumulated at Zinj. However, the debate has spurred the development of taphonomy forward as a discipline by demanding new and more rigorous interpretive models, experimental designs, and actualistic analogues.

Key Historical Debates: Hunting Proficiency of Early Humans

Taphonomic research has also been instrumental in investigations not just of the origins of hunting per se, but the origins of modern hunting ability. The **modern human origins** debate began to escalate during the 1980s as researchers sought to understand when, where, and how our species first emerged sometime after about 400,000 years ago, only to later disperse around the globe. The debate has since encompassed both the fossil hominin and archaeological records, with archaeologists focusing on uncovering evidence of the origins of modern human behavior, including subsistence. Because fossil animal bones are some of the most commonly preserved material remnants of subsistence behavior, much of the focus has been on large **zooarchaeological** assemblages from early modern human sites such as Klasies River Mouth in South Africa. Part of the debate also revolved around questions of the subsistence behavior of our extinct close relatives that were not anatomically modern; for example, the **Neanderthals** in Europe.

Initial work by Klein (1975) at Klasies River Mouth suggested that early people were able to hunt some animals, but not the most dangerous ones. This was based on straightforward interpretation of faunal abundances at the site, which showed that more dangerous animals such as Cape buffalo (*Syncerus caffer*) and bushpig (*Potamochoerus porcus*) only became common during the Later **Stone Age**, which variably dates to between 20,000 and 40,000 years ago across the African continent. Again, Binford (1984) had a different interpretation. He proposed

instead that most of the faunal remains at Klasies showed evidence of being scavenged by people and that early anatomically modern humans could not have been adept hunters at all. Because no modern hunting and gathering group is known to purely obtain meat through scavenging, interpretations such as these set up a dichotomy between the evolution of modern anatomy (which was already in place) and modern behavior (which was interpreted by Binford to have evolved later).

Stiner's (1994) study of the faunal remains from Neanderthal sites in Europe also suggested that Neanderthals periodically used scavenging as a primary mode of meat acquisition. A major component to the interpretations by all these researchers was the fact that primary meat-bearing limb elements were uncommon relative to head-and-foot elements at each of the sites they had identified as containing scavenged assemblages. The reasoning was that head-and-foot elements represent the nutritionally poor "leftover" carcass portions and that a hunted assemblage should contain higher abundances of meaty limb parts. Before the scavenging interpretation, the common head-and-foot pattern had been explained by the "schlepp effect," which was based on an intuitive interpretation ungrounded in either ethnoarchaeology or actualism that hunters would cut meat from bones, lay it on a hide, and then "schlepp" it back to a home base with the foot bones still intact. Stiner's work challenged the schlepp effect, but this challenge soon came under fire itself when a third possibility emerged.

Marean and Kim (1998) noted that sites in Stiner's sample that exhibited the strongest head-and-foot patterns were the same sites that had been excavated when it was not common practice to analyze or sometimes even retain long bone shaft fragments. They also noted similar problems with other sites that had been studied by Binford and Klein – including Klasies River Mouth. The rationale for discarding long bone shaft fragments was that they are not taxonomically diagnostic and can even be difficult to place on a specific skeletal part. Therefore, excavator bias may explain why meaty long bones appear to be missing from sites where long bone shaft fragments were not studied. This interpretation rests on one key observation: that long bone abundances cannot be reliably reconstructed from the more taxonomically identifiable long bone end portions, which were consistently kept and counted (Fig. 3).

In Marean et al.'s (1992) basic experimental study on hyena ravaging of modern bone assemblages in a captive setting, they found that hyenas preferentially consume greasy skeletal elements or element portions compared to other portions, such as dense long bone shafts. Therefore, an archaeological assemblage that has been ravaged by hyenas – or by extension other bone-modifying carnivores – would be expected to have most of the limb elements represented by shaft fragments rather than the greasy (but unfortunately more taxonomically diagnostic) end portions. At sites where shaft fragments had been preferentially discarded by the excavator, most of the remaining evidence for meat-bearing limb bones would have been discarded with them. Without the shaft fragments available, the observed "head-and-foot" pattern could be explained equally by carnivores scavenging after hominins or by hominins scavenging after carnivores. This sparked a debate about the role of bone density in the preferential destruction of certain skeletal parts that was still being joined by researchers such as Pickering et al. (2003), over a decade after the original hyena study had been published.

Since the early 2000s, the debate has cooled, and an array of research has been conducted at other South African early modern human and European Neanderthal sites of similar or even older age. When complete assemblages are used for analysis and bone surfaces are scrutinized for evidence of hominin butchery, the taphonomic research shows that both hominin species enjoyed early access to carcasses. Both were also likely adept hunters of large ungulates, although they may have used different apparatus to do so. The emphasis of current research is now on exploring the variability that existed within subsistence strategies during this time period and using taphonomy to untangle the specific depositional histories of bone accumulations at these sites.

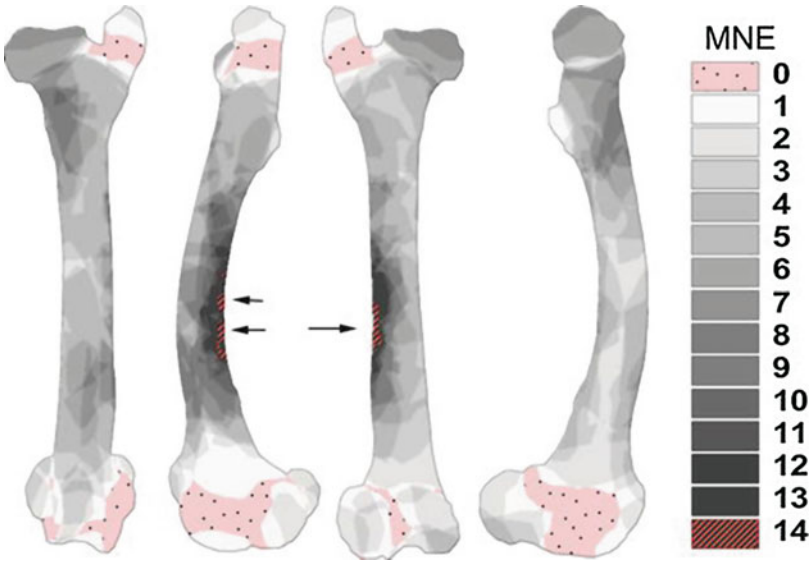

Taphonomy in Human Evolution, Fig. 3 Generic template of the left femur of an ungulate showing differences in preservation between the shaft and the ends. All femoral fragments drawn onto the image were recovered from the South African cave site of Pinnacle Point Cave 13B, which is partially contemporaneous with Klasies River Mouth. Darker areas represent parts of the bone that have several specimens representing that portion, red striped areas (with arrows) indicate the portions with the most preserved specimens, and pink spotted areas indicate regions that are not represented at all in the assemblage. In this case, twice as many individual left femora are represented by the shafts as by the ends. This is apparent in the MNE, or Minimum Number of Elements, represented by each part

Key Issues/Current Debates

Current Debates: Origins of Hominin Meat-Eating Behavior

Despite the interpretive strength offered by actualistic research, it is not always a straightforward matter to apply it to a fossil assemblage. It is commonly the case that one taphonomic process may imprint over another, and ancient bones have had a lot more time to be exposed to different processes than modern bones. More dangerously, some processes result in equifinality in fossil assemblages, whereby different pathways produce the same end result. In these cases, the many potential processes leading to the point at which a fossil is studied cannot be reliably reconstructed, and this can have a major impact on the overall behavioral interpretation of a site. This problem has lain at the root of historical debates about hunting versus scavenging and early modern hunting behavior. It continues to instigate debate today.

One of the key lines of evidence researchers have used to argue for or against the presence and timing of hominin butchery at fossil sites is bone surface modification (Fig. 4). Cut, percussion, and tooth marks were initially all thought to be diagnostic of either hominin or carnivore activity. The timing of carcass access was thought to be able to be directly read from relative proportions of these marks or by the locations or intensities of these marks. For example, cut marks superimposed over tooth marks could be taken as evidence of hominins scavenging after carnivores and the reverse could also be true for tooth marks superimposed over cut marks. The ongoing debate about hunting and scavenging at Olduvai Gorge exemplifies how any change to the relative proportions of different kinds of marks can have an enormous impact on site interpretation.

This principle of using bone surface modification in taphonomy hinges on the ability of researchers to accurately tie a trace on a fossil to its underlying cause. Fossils are found in a variety

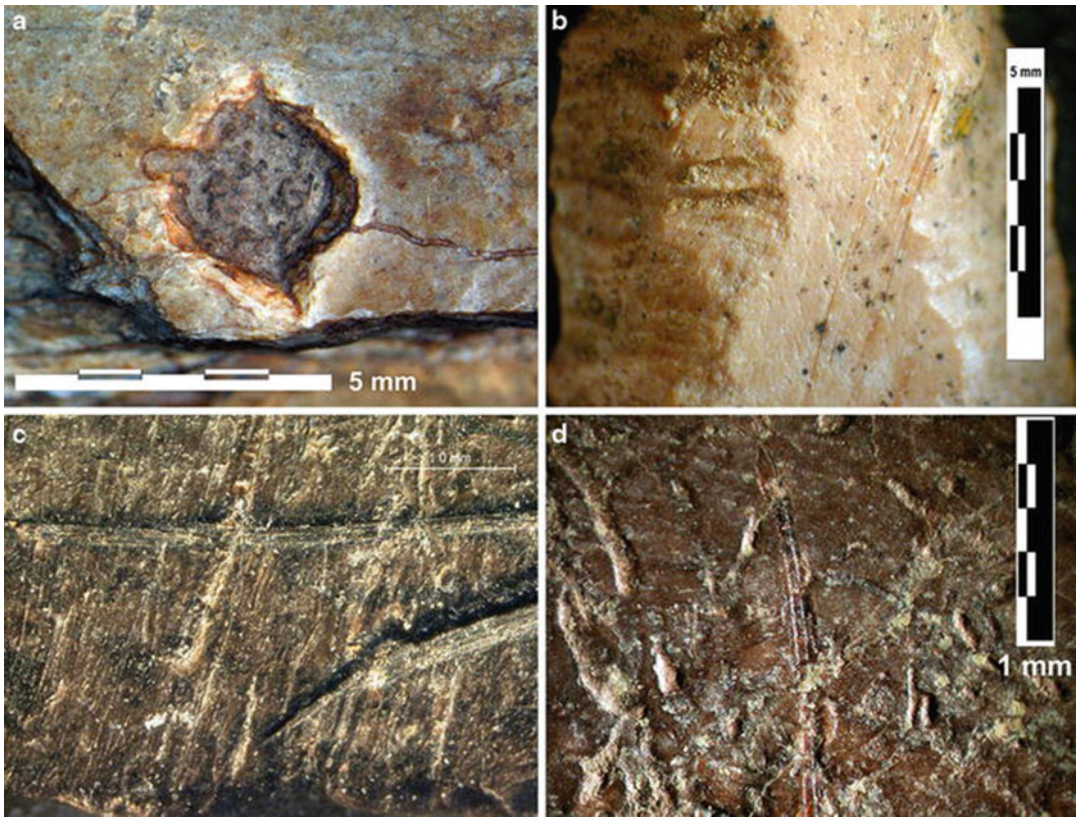

Taphonomy in Human Evolution, Fig. 4 Examples of bone surface modification on fossils, showing the potential overprinting of taphonomic processes in sequence from negligible to extreme: (**a**) a bisected pit filled with matrix thought to be typical of crocodile modification on a fossil specimen from the Ledi-Geraru study area in Ethiopia; (**b**) a cut mark that has been partially erased by rodent gnawing from Sandia Cave, New Mexico; (**c**) a cut mark that has been completely covered by a percussion mark (fine striations) from the site of Blombos Cave, South Africa; and (**d**) a cut mark that has been extensively covered by root or fungus etching and emplacement of matrix from the Loiyangalani site in Tanzania

of depositional contexts, and the number of possible processes that can damage their surfaces is overwhelming and often site-specific. In the 1980s, there was much debate over the best criteria (microscopic and macroscopic) one could use to confidently identify cut marks. Behrensmeyer et al. (1986) showed that even cut marks, which were thought to be diagnostic of stone tool-wielding hominins, may be mimicked by natural processes such as trampling. Such uncertainties have led to some of the most heated debates in archaeological research pertaining to early hominin diet, and over the last decade many of the debates from the 1980s have been resurrected in the context of both old and new discoveries.

In 2010, McPherron et al. reported two fossil specimens from the Dikika DIK-55 site in the Afar region of Ethiopia that bore 12 surface modifications interpreted to have been caused by hominin butchery with stone tools (Fig. 5). The two specimens, dated to ~3.4 million years ago, predated the earliest flaked stone artifacts known at the time by more than 800,000 years, suggesting that taphonomic analysis – rather than stone tools themselves – might be the best way to reveal the earliest evidence for tool-assisted subsistence behavior in the archaeological record. Furthermore, if the marks were produced through butchery, it would mean that hominin exploitation of large animal meat and fat resources – and the confrontation this would

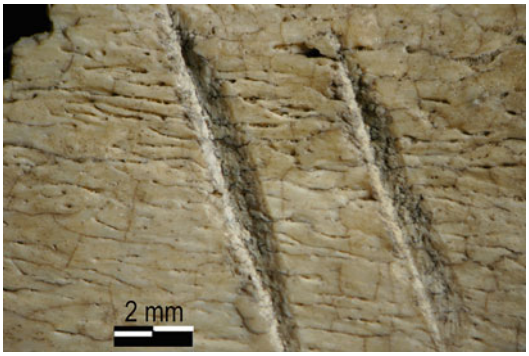

Taphonomy in Human Evolution, Fig. 5 The most prominent and widely publicized marks from the DIK-55 site of the Afar region of Ethiopia, dating to ~3.4 million years ago. Photo credit: Curtis Marean

have engendered with large carnivores over the same resources – began much earlier in our lineage than previously thought. Indeed, it would have meant that our relatively small-brained australopith ancestors represented by fossils such as **Lucy** or the **Dikika baby** were already entering into novel subsistence niches and leaving an early archaeological record as they did so.

However, researchers such as Domínguez-Rodrigo et al. (2010) questioned the identification of the marks as being produced by stone-wielding hominins. Instead, they proposed that they are mimics of butchery marks and that they have been produced through natural means, such as trampling. A subsequent study by Thompson et al. (2015) found that the marks on the DIK-55 fossils were outliers in terms of size and shape compared to a large sample of other marks on fossils from the same landscape. Together with the discovery of early stone tools from the Lomekwi-3 site in Kenya dating to 3.3 million years ago, the possibility of these marks being caused by trampling seems increasingly less likely. Although the debate continues, several important new developments have directly stemmed from the controversy.

During debates in the 1980s and 1990s, the issue of how to diagnose bone surface modification was tackled through actualistic research, blind tests, and the use of advanced methods such as scanning electron microscopy. However, there is a growing awareness in taphonomy that the expert knowledge-based approach to identifying surface marks is inconsistent and subject to specific and unknowable biases (e.g., the background of the expert, their experience, and the reference collections they have studied). It is also problematic that surface modifications are given a firm "yes or no" identification as a given type of mark, when in reality marks may fall along a continuum of likelihood of the agency that caused them. One solution is to employ a statistical Bayesian model to assign a probability that a given mark was caused by any of several possible agents (Harris et al. 2017). Such a model is trained on a large sample of marks caused by forces such as butchery, trampling, carnivore gnawing, and crocodile activity, and then a fossil mark of unknown origin is fed into the model – thus removing human decision-making largely from the process of identification. The output is probabilistic, assigning a degree of certainty – rather than a simple yes/no answer – that the mark was caused by each of the agents encompassed within the model. Other new approaches involve the use of 3D scanning to further remove the human element from analysis (Pante et al. 2017).

International Perspectives

Debates about early hominin subsistence – and the methodological problems that have been revealed through these debates – illustrate how taphonomy in human evolution is an ever-growing yet still relatively nascent field of study. What is also clear is that although taphonomy is a widely employed tool in zooarchaeology, only a handful of intellectual lineages have weighed substantively in on the problems of how it is applied to the human evolutionary record. Researchers from the United States and Spain working at a limited number of sites in Africa have dominated this work, apparently going through cycles of broad agreement and fierce disagreement regarding the interpretation of early zooarchaeological assemblages. It is potentially problematic that most areas of taphonomy outside of the human evolutionary sphere have not been host to such extensive controversies, because it suggests that there is less critical

inquiry about the impact of taphonomic method on zooarchaeological interpretation. These debates have fundamentally shaped Africanist taphonomy, whereas other traditions have followed different trajectories and methodological emphases. However, the problems highlighted in African contexts are not unique to Africa, nor even to early assemblages. Freshly reported controversial sites such as a purported mastodon butchery location in North America dating to >130,000 years ago, or a claimed 2.4-million-year-old butchery site in India, would also benefit from cross-fertilization of the Africanist research tradition. In spite of the association of Africa with most events in human evolution, the field of taphonomy has much to gain from a larger global conversation about equifinality and best practice in the interpretation of bone surface marks, skeletal element abundances, and other taphonomic indicators.

Future Directions

Debates in taphonomy provide valuable insight and historical perspective into how changing views of human ancestors have shifted along with the prevailing research climate. With respect to early modern human behavior, new discoveries have been accompanied by a new willingness by archaeologists to accept that members of our species *Homo sapiens* engaged in complex behaviors far earlier than the recent Stone Ages. Deeper in time, researchers have alternatively used the Olduvai sites as evidence for home bases analogous to hunter-gatherer camps, opportunistic scavenging sites, or something in between. Fresh interpretations of old evidence have also brought older ideas back to the forefront, and in many cases (as at Zinj) more than five different researchers have used the same fossil datasets to argue for completely contradictory interpretations of past hominin behavior. They have accompanied each interpretation with inbuilt assumptions about the skills our ancestors had, their social relationships, and their role in the broader ecosystem. The unavoidable truth is that new sites are needed and that this requires field research in unexplored areas. In some cases, new sites are already yielding new and unexpected results, such as the discovery of an entirely new kind of hominin at Rising Star Cave in South Africa that lived at the same time as modern humans (Dirks et al. 2017). Taphonomic work will be crucial for understanding how those remains came to rest in the cave complex and if there is any evidence of intentional deposition of the dead.

New fieldwork must also take on a different character. It has long been assumed that archaeological field methods (detailed survey and systematic collection across a landscape) would not be useful in deposits that predate the origin of our genus *Homo*, which until recently was considered to be the first stone tool maker. However, with the possibility that other (and earlier) hominins may have created an archaeological record – possibly through subtle indicators such as marks on fossils – comes the need for such systematic work. Collection of fossils can no longer be restricted only to those that are likely to be taxonomically informative, such as complete long bones. Instead, many decades of actualistic research have shown that long bone shaft fragments may be key to detecting past hominin interactions with bones. Future fieldwork in Pliocene deposits is likely, therefore, to include more archaeologists (rather than mainly paleontologists) and be burdened less by assumptions about what is and is not possible to be found.

There is also much useful actualistic research remaining to be done. Most work to date only addresses one or a handful of the potential processes that can impact a bone from the time an organism dies until the time the fossil is studied. How longer-term processes such as fossilization can impact patterns of marks, fragmentation, and skeletal part representation remain very poorly understood, in part because they are so difficult to replicate in modern settings. Overprinting of processes may create unique traces that have not yet been replicated or may not be possible to replicate with great fidelity. The full range of variability in marks created by extinct organisms in the past (such as saber-toothed cats or large extinct crocodiles) is also under-studied and should be approached through a combination of

mechanical modeling and studies of fossil collections. Future work will result in clear tests of the evidence for australopith meat-eating through new theoretical frameworks, empirical data, and analytical and field methods. Ultimately, it matters less what caused the marks on the DIK-55 bones than the fact that long-held paradigms about early hominin ecology are shifting. Taphonomy in human evolution is already seeing the start of such a surge of new information, and its adherents will soon be confronted with the need to establish standard protocols about how we can know what we think we know – along with an honest assessment of what is perhaps in the end unknowable.

Cross-References

- ▶ African Stone Age
- ▶ Australopithecines
- ▶ Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)
- ▶ Dart, Raymond Arthur
- ▶ Ethnoarchaeology
- ▶ Experimental Maritime Archaeology
- ▶ *Homo habilis*
- ▶ Leakey Family
- ▶ Lucy
- ▶ Middle-Range Theory in Archaeology
- ▶ Neanderthals and Their Contemporaries
- ▶ Oldowan Industrial Complex
- ▶ Olduvai Gorge Archaeological Site
- ▶ *Paranthropus*
- ▶ Site Formation Processes
- ▶ Taphonomy: Definition
- ▶ Zooarchaeology

References

Behrensmeyer, A.K., K.D. Gordon, and G.T. Yanagi. 1986. Trampling as a cause of bone surface damage and pseudo-cutmarks. *Nature* 319: 768–771.

Binford, L.R. 1981. *Bones: Ancient men and modern myths*. New York: Academic.

Binford, L.R. 1984. *The faunal remains from Klasies River mouth*. New York: Academic.

Blumenschine, R.J. 1988. An experimental model of the timing of hominid and carnivore influence on archaeological bone assemblages. *Journal of Archaeological Science* 15: 483–502.

Brain, C.K. 1981. *The hunters or the hunted?* Chicago: University of Chicago Press.

Bunn, H.T., and E.M. Kroll. 1986. Systematic butchery by Plio-Pleistocene hominids at Olduvai Gorge, Tanzania. *Current Anthropology* 27: 431–452.

Bunn, H.T., L. Bartram, and E.M. Kroll. 1988. Variability in bone assemblage formation from hadza hunting, scavenging, and carcass processing. *Journal of Anthropological Archaeology* 7: 412–457.

Dirks, P.H.G.M., E.M. Roberts, H. Hilbert-Wolf, J.D. Kramers, J. Hawks, A. Dosseto, M. Duval, M. Elliott, M. Evans, R. Grün, J. Hellstrom, A.I.R. Herries, R. Joannes-Boyau, T.V. Makhubela, C.J. Placzek, J. Robbins, C. Spandler, J. Wiersma, J. Woodhead, and L.R. Berger. 2017. The age of *Homo naledi* and associated sediments in the Rising Star Cave South Africa. *eLife* 6: e24231.

Domínguez-Rodrigo, M., and R. Barba. 2006. New estimates of tooth mark and percussion mark frequencies at the FLK Zinj site: The carnivore-hominid-carnivore hypothesis falsified. *Journal of Human Evolution* 50: 170–194.

Domínguez-Rodrigo, M., T.R. Pickering, and H.T. Bunn. 2010. Configurational approach to identifying the earliest hominin butchers. *Proceedings of the National Academy of Sciences* 107: 20929–20934.

Harris, J.A., C.W. Marean, K. Ogle, and J.C. Thompson. 2017. The trajectory of bone surface modification studies in paleoanthropology and a new Bayesian solution to the identification controversy. *Journal of Human Evolution* 110: 69–81.

Klein, R.G. 1975. Middle stone age man-animal relationships in southern africa: Evidence from Die Kelders and Klasies River Mouth. *Science* 190: 265–267.

Marean, C.W., and S.Y. Kim. 1998. Mousterian large-mammal remains from Kobeh Cave: Behavioural implications for Neanderthals and early modern humans. *Current Anthropology* 39 (S): S79–S113.

Marean, C.W., L.M. Spencer, R.J. Blumenschine, and S.D. Capaldo. 1992. Captive hyena bone choice and destruction, the schlepp effect, and Olduvai archaeofaunas. *Journal of Archaeological Science* 19: 101–121.

McPherron, S.P., Z. Alemseged, C.W. Marean, J.G. Wynn, D. Reed, D. Geraads, R. Bobe, and H.A. Bearat. 2010. Evidence for stone-tool-assisted consumption of animal tissues before 3.39 million years ago at Dikika, Ethiopia. *Nature* 466: 857–860.

Pante, M.C., M.V. Muttart, T.L. Keevil, R.J. Blumenschine, J.K. Njau, and S.R. Merritt. 2017. A new high-resolution 3-D quantitative method for identifying bone surface modifications with implications for the Early Stone Age archaeological record. *Journal of Human Evolution* 102: 1–11.

Pickering, T.R., C.W. Marean, and M. Domínguez-Rodrigo. 2003. Importance of limb bone shaft fragments in zooarchaeology: A response to "On in situ

attrition and vertebrate body part profiles" (2002), by M.C. Stiner. *Journal of Archaeological Science* 30: 1469–1482.

Shipman, P., and J. Rose. 1983. Early hominid hunting, butchering, and carcass-processing behaviours: Approaches to the fossil record. *Journal of Anthropological Archaeology* 2: 57–98.

Stiner, M.C. 1994. *Honor among thieves: A zooarchaeological study of neandertal ecology.* Princeton: Princeton University Press.

Thompson, J.C., S.P. McPherron, R. Bobe, D. Reed, W.A. Barr, J. Wynn, C.W. Marean, D. Geraads, and Z. Alemseged. 2015. Taphonomy of fossils from the hominin-bearing deposits at Dikika, Ethiopia. *Journal of Human Evolution* 86: 112–135.

Further Reading

Binford, L.R. 1978. *Nunamiut ethnoarchaeology.* New York: Academic.

Blumenschine, R.J., C.W. Marean, and S.D. Capaldo. 1996. Blind tests on inter-analyst correspondence and accuracy in the identification of cut marks, percussion marks, and carnivore tooth marks on bone surfaces. *Journal of Archaeological Science* 23: 493–507.

Domínguez-Rodrigo, M. 2002. Hunting and scavenging by early humans: The state of the debate. *Journal of World Prehistory* 16: 1–54.

Domínguez-Rodrigo, M., and L. Alcalá. 2016. 3.3-million-year-old stone tools and butchery traces? More evidence needed. *PaleoAnthropology* 2016: 46–53.

Fisher, J.W. 1995. Bone surface modifications in zooarchaeology. *Journal of Archaeological Method and Theory* 2: 7–68.

Gifford-Gonzalez, D. 1991. Bones are not enough: Analogues, knowledge, and interpretive strategies in zooarchaeology. *Journal of Anthropological Archaeology* 10: 215–254.

Harmand, S., J.E. Lewis, C.S. Feibel, C.J. Lepre, S. Prat, A. Lenoble, X. Boes, R.L. Quinn, M. Brenet, A. Arroyo, N. Taylor, S. Clement, G. Daver, J.-P. Brugal, L. Leakey, R.A. Mortlock, J.D. Wright, S. Lokorodi, C. Kirwa, D.V. Kent, and H. Roche. 2015. 3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya. *Nature* 521 (7552): 310–315.

Klein, R.G., K. Cruz-Uribe, and R.G. Milo. 1999. Skeletal part representation in archaeofaunas: Comments on "Explaining the 'Klasies pattern': Kua Ethnoarchaeology, the Die Kelders Middle Stone Age archaeofauna, long bone fragmentation and carnivore ravaging" by Bartram & Marean. *Journal of Archaeological Science* 26: 1225–1234.

Lupo, K.D., and J.F. O'connell. 2002. Cut and tooth mark distributions on large animal bones: Ethnoarchaeological data from the Hadza and their implications for current ideas about early human carnivory. *Journal of Archaeological Science* 29: 85–109.

Njau, J. 2012. Reading Pliocene bones. *Science* 336: 46–47.

Pickering, T.R., R.J. Clarke, and J. Moggi-Cecchi. 2004. Role of carnivores in the accumulation of the Sterkfontein Member 4 hominid assemblage: A taphonomic reassessment of the complete hominid fossil sample (1936–1999). *American Journal of Physical Anthropology* 125: 1–15.

Thompson, J.C. 2010. Taphonomic analysis of the faunal assemblage from Pinnacle Point Cave 13B, Western Cape, South Africa. *Journal of Human Evolution* 59: 321–339.

Taphonomy of Plant Micro-remains in Environmental Archaeology

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Introduction

The analysis of plant micro-remains, such as starch granules, phytoliths, and pollen, is now well established among the suite of analytical tools employed by environmental archaeologists to document past human-plant interactions. These micro-remains can occur as residues on pots and other plant-processing tools, in sediments from agricultural features or on-site activity areas, or trapped in dental calculus, food remains, coprolites, and stomach contents. Accurate archaeological reconstructions rely on a firm understanding of the taphonomic processes affecting plant microfossil assemblages at all stages of their depositional history. Broadly speaking, there have been two main areas of archaeological enquiry in this direction. The first examines how plant micro-remains are deposited in the archaeological record through cultural and natural processes, and the second examines how they survive archaeological time periods in their burial environment, including the possibility of post-depositional movement. Common to both is the need to understand the potential biases in the deposition, preservation, and recovery of micro-

remains, depending on variables such as the plant part from which they originate (e.g., seeds, tubers, leaves, etc.), the method by which they are processed, altered, or transformed prior to deposition, the nature of the burial context and local microenvironmental conditions, and the post-excavation methods employed during analysis.

Definition

Taphonomy was originally defined by the palaeontologist, Efremov (1940), as "the study of the transition (in all its details) of animal remains from the biosphere into the lithosphere." This definition was later broadened to include plant remains (Lyman 2010). As applied within archaeology, it is generally taken to include all natural and cultural formation processes occurring both before and after burial. Following Madella and Lancelotti (2011), taphonomy is taken here to refer to all transformations occurring to plant micro-remains before deposition, during burial, and after excavation that may bias the recovery and interpretation of micro-botanical assemblages.

Plant micro-remains, which are sometimes referred to as microfossils, comprise a range of microscopic plant components that accumulate in archaeological deposits through daily human actions, such as cultivation, food- or crop processing, storage, consumption, discard, and craft activities. Owing to their small size, they usually require the use of a microscope for identification, which is based on morphological variations between plant families, genera, and species. The most common plant micro-remains analyzed in environmental archaeological settings are phytoliths, starch grains, and pollen, as well as a variety of non-pollen palynomorphs (e.g., microscopic remains of algae, cyanobacteria, fungi, and cormophytes). Phytoliths are opaline silica deposits that form in the cells and tissues of plants. Starch granules are composed of semicrystalline, complex carbohydrates, and are produced in plant tissues for energy storage. Pollen is the male reproductive cell of a plant. A variety of other plant tissues, fibers, and crystals (e.g., calcium oxalates) are also frequently analyzed, particularly when preserved as micro-residues on plant processing tools or in water-logged deposits. However, these tend to have less diagnostic potential and have also been subject to less intensive taphonomic investigation (cf. Crowther 2009a, b). This entry focuses on starch and phytoliths, which are now commonly analyzed in tandem and offer a useful contrast between how taphonomic processes differentially affect remains of organic and biomineral composition. Pollen is also discussed in some examples.

Historical Background

Interest in plant micro-remain taphonomy generally developed out of the processual movement of the 1960s and 1970s. At this time, archaeologists began to recognize the importance of understanding site formation processes for making accurate archaeological reconstructions, including the potential for multiple stages of burial, exposure, and transportation of remains. They also began adopting a more rigorous scientific approach to the investigation of these processes, often within the framework of middle-range theory.

In early studies of plant micro-remains on stone tools, the main taphonomic questions concerned whether residues were cultural or natural in origin. Experiments addressing the persistence of plant micro-remains over long timeframes, particularly starch granules, began to appear in the late 1990s (e.g., Barton et al. 1998; Lu 2003). Recent studies have begun exploring more systematically the effects of food and crop processing on micro-botanical assemblages through experimental and ethno-archaeological programs (e.g., Harvey and Fuller 2005; Henry et al. 2009; Crowther 2012). The emphasis of current research continues in this direction, stressing the integration of experimental studies, ethno-archaeological data, and archaeological findings, in order to provide greater insights into the taphonomic biases that are likely to affect micro-botanical preservation. With the development of more sophisticated molecular

techniques, researchers are also starting to investigate the molecular taphonomy of plant micro-remains to better understand long-term preservation, particularly of organic plant components such as starch (e.g., Collins and Copeland 2011).

Key Issues/Current Debates

A range of taphonomic processes can affect archaeological plant micro-remains at all stages of deposition, burial, and post-excavation. These factors can be broadly grouped into physical, chemical, or biological in origin. Because different types of micro-remains have different morphological and molecular structures and chemical compositions, they also have different susceptibilities to taphonomic agents. As the following discussion demonstrates, the variables influencing these processes can also interact with one another in complex ways, making the preservation of micro-remains over archaeological time periods difficult to predict.

Pre-burial Depositional Processes

Both human and natural processes play an active role in the formation of the micro-botanical record. The first question that archaeologists might ask, therefore, is whether plant micro-remains were deposited naturally or through cultural activities. The most direct nonhuman trajectory for micro-remains such as starch and phytoliths to enter the archaeological record involves the natural death and decay of plants leading to the localized deposition of micro-remains in the soil. However, they can also be subject to wind-, fire-, and water-borne deposition (Piperno 2006: 21). The main dispersal mechanisms for pollen is wind, with transportation distances ranging widely between taxa. Animal vectors also contribute to ancient plant micro-remain assemblages. While animals such as insects, birds, bats, and mammals are widely recognized as being major agents in pollination, recent studies are also drawing attention to animal dung as a natural source of pollen and phytoliths in archaeological deposits, particularly in biologically rich caves where droppings can create distinct depositional zones (e.g., Hunt and Rushworth 2005). Among the most significant of these agents are owls and raptors in temperate regions, hyaenas and other terrestrial predators and scavengers in the Old World, and bats and birds in the tropics. Domestic animal dung can also introduce micro-remains from consumed plant foods (Piperno 2006: 21). These natural depositional pathways can be complex and unpredictable, and can be influenced by a range of secondary processes such as sedimentary transportation through wash or mudflow (Madella and Lancelotti 2011). While these processes have been studied extensively by palynologists and phytolith analysts (e.g., Pearsall 2015: 190–191; Piperno 2006: 21), they have generally been given far less consideration by starch analysts. The potential for starch-containing pollen grains to be a natural vector for starch dispersal (Laurence et al. 2011) has also only recently been investigated. Airborne dispersal of micro-remains raises a number of issues for archaeologists. Not only does it further complicate differentiation between cultural and natural accumulation but it also raises the possibility of modern contamination during excavation and sampling (an issue discussed further below in relation to postdepositional movement). Mechanical stress such as attrition, rounding, or breakage may be an important indicator that phytoliths have been transported long distances by water or wind.

Targeting plant micro-residues on tools that were used for plant processing (cutting, grinding, pounding, cooking) as opposed to those accumulated in sediments can, to an extent, circumvent these issues. In these types of studies, however, the potential for micro-remains preserved in sediments to be redeposited onto tools also needs to be accounted for (discussed further below). Physical modifications to plant micro-remains arising from cultural activities such as food processing are another important indicator for differentiating anthropic from natural input.

Plant-Processing Activities

Human activities such as crop- or food processing can bias assemblage compositions, particularly

through the differential removal or deposition of micro-remains. Studies have approached this problem from two main directions. The first has been to attempt to understand how different food-processing techniques create diagnostic patterns in the micro-botanical record, which can then be used to reconstruct activities in the past. For example, Harvey and Fuller (2005) have developed models for reconstructing rice and millet processing stages based on the composition of phytolith assemblages created at different stages of processing (harvesting, threshing and winnowing, storing, parching, milling and pounding, cooking). Starch granules have been found to be particularly useful for identifying past food-processing methods based on granule modification patterns (e.g., Henry et al. 2009; Crowther 2012). For example, mechanical processing methods such as grinding and pounding cause starch granules to crack, break, and tear, and also alter their surface texture (Fig. 1). Cooking (heating in the presence of moisture) causes granules to gelatinize, by which they swell and rupture, losing their morphology and semicrystalline structure (Fig. 2). During fermentation, starch is broken down by a specific type of enzyme called amylase, which corrodes the granule's concentric growth layers either from the surface (exo-corrosion) or from the inside-out through channels digested into the center of the grain (endo-corrosion) (Fig. 3).

The second approach has been to examine how different food-processing methods can bias the survival of certain types of micro-remains over others. For example, during cooking, starch granules will undergo different degrees of gelatinization depending on the amount of accessible moisture in the cooking system (Fig. 2). As a result, granules are more likely to survive when dry cooking methods are used (e.g., toasting, baking) as opposed to wet cooking methods (e.g., boiling, steaming). Granules from relatively dry plant parts, such as seeds and nuts, will be less gelatinized than those from moisture-rich roots and tubers when whole foods are cooked (Crowther 2012). These taphonomic biases are seen as likely having an effect on the differential recovery of starches from ancient cooking pot residues, with root and tuber starches being significantly underrepresented in comparison to those from cereals and legumes in some cases (Zarrillo et al. 2008). Starch granules that have been physically modified during food processing, particularly during cooking, are also as much as 4000 times more susceptible to enzymatic degradation in the burial environment (Barton and Matthews 2006: 86). These taphonomic issues highlight the importance of integrating multiple micro- (and macro-) botanical approaches to overcoming differential biases during deposition.

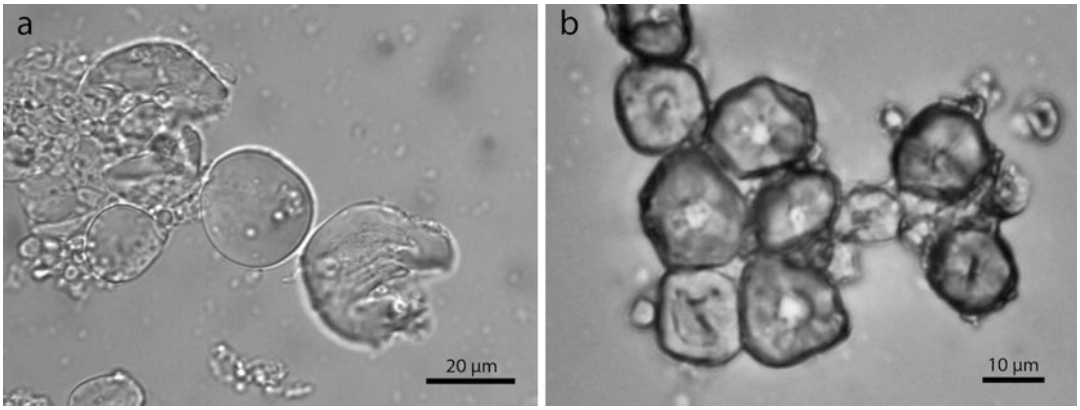

Taphonomy of Plant Micro-remains in Environmental Archaeology, Fig. 1 Starch granules from (**a**) wheat and (**b**) maize showing mechanical alterations from grinding. Note the torn granules in (**a**), and the opened and enlarged central hila (growth initiation points) and roughened surfaces of the granules in (**b**)

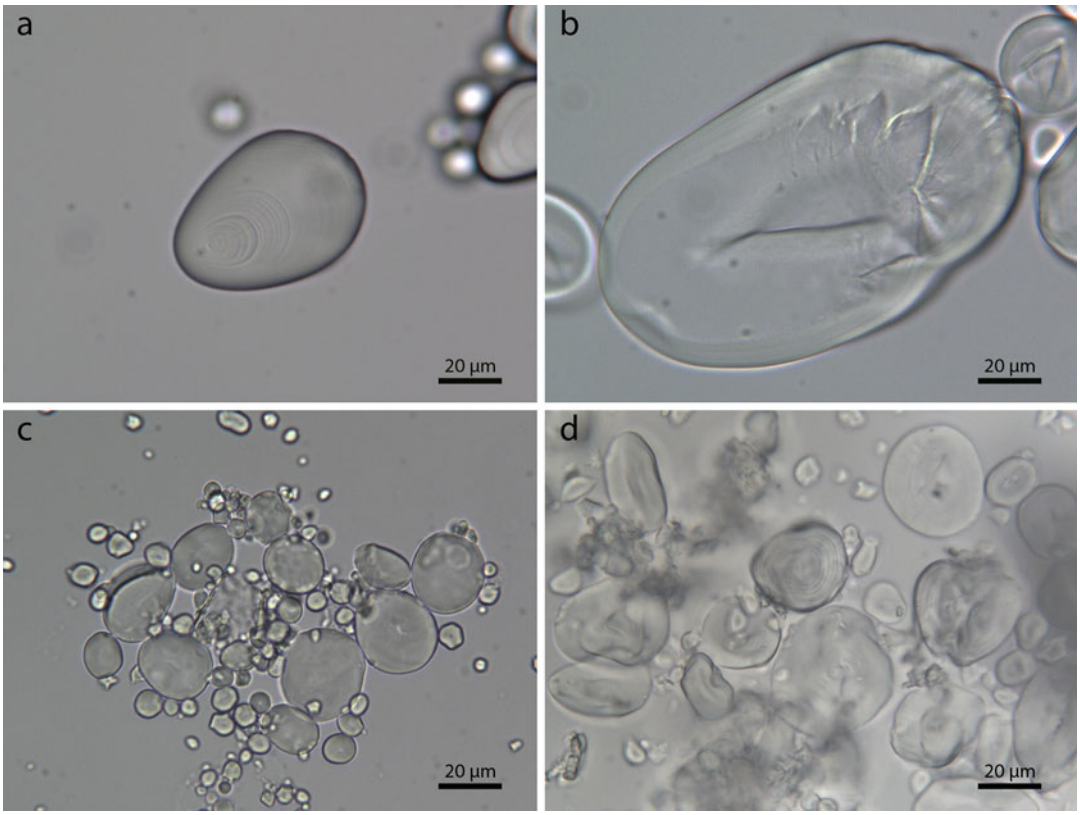

Taphonomy of Plant Micro-remains in Environmental Archaeology, Fig. 2 Starch granules from potato (**a**–**b**) and wheat (**c**–**d**) showing unaltered (**a**, **c**) and gelatinized (**b**, **d**) forms. Note the swelling and distorted morphology of the gelatinized granules compared to the unaltered forms. The potato starch granule is more gelatinized than the wheat starches because it had access to more moisture during heating, and swelling was not physically restricted (the wheat starches were cooked in situ within the wheat grain, whereas the potato starch granules were dispersed in water then heated)

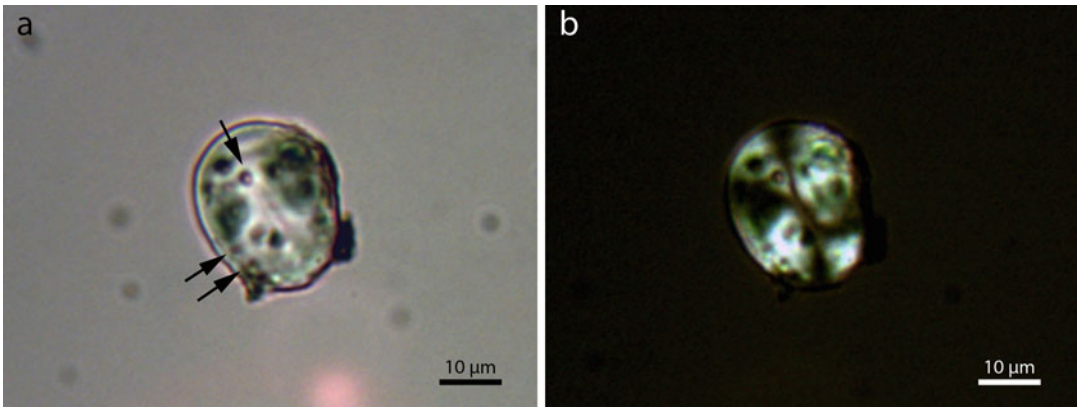

Taphonomy of Plant Micro-remains in Environmental Archaeology, Fig. 3 Triticeae-type starch granule with surface pits from enzymatic corrosion (indicated by arrows); (**a**) plane- and (**b**) cross-polarized light

Postdepositional Preservation and Decay

The questions of how plant micro-remains survive archaeological time periods after burial, how they are physically and chemically modified during this process, and whether there is the potential for differential preservation have undoubtedly dominated taphonomic discussions in recent years. Even so, for some types of micro-remains – particularly starch granules, which are organic and thus highly susceptible to degradation – these issues are still far from being fully understood (Mercader et al. 2018). Part of the difficulty in answering these questions lies in the wide range of physical, chemical, and biological variables that have the potential to influence preservation and decay. These variables can interact in complex and often unpredictable ways to either promote or inhibit microfossil degradation within the burial microenvironment. These factors include acid-base status (pH), temperature, moisture content, inorganic sediment components, plant degrading microorganisms, and physical processes that can either cause damage through mechanical attrition or inhibit degradation through the entrapment of the micro-remains in soil aggregates or mineralized deposits (e.g., dental calculus). The susceptibility of plant microfossils to degradation also varies significantly within and between types of remains, creating many challenges for environmental archaeologists attempting to reconstruct past assemblages from their present compositions.

Phytoliths are considered to be among the most durable of all plant micro-remains. Being inorganic, they do not rely on exceptional preservation conditions such as carbonization, waterlogging, or freezing to survive. They have been found to preserve in a wide range of burial environments, from heavily weathered soils in open-air sites to protected lake or cave deposits, and can endure for many hundreds of thousands and even millions of years (Piperno 2006: 21–22). They are stable in a wide pH range (3–9) but are rapidly dissolved once conditions exceed pH 9, particularly in warm and moist conditions. Evidence of chemical weathering is often visible in the form of surface pitting and etching (Fig. 4a). Phytoliths are also susceptible to mechanical damage, which can occur during transportation by wind or water, trampling or sediment compaction, and, as discussed above, during food processing such as grinding. Typical damage patterns include breakage of fine appendages and along weak points (Fig. 4b), chipping, pitting, and abrasion (Madella and Lancelotti 2011). In extreme cases, these morphological alterations can affect the accuracy of taxonomic and typological identifications. Phytoliths also begin to melt and distort at temperatures above about 1000 °C (Piperno 2006: 89). Phytolith degradation is not

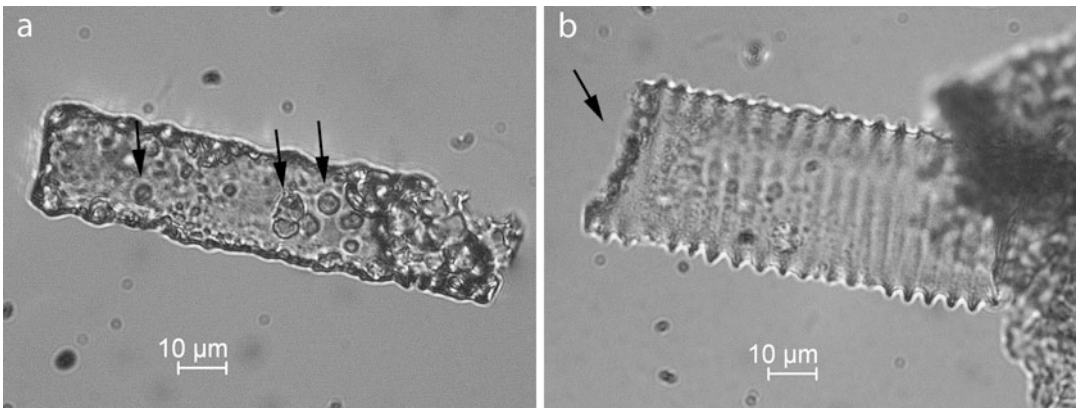

Taphonomy of Plant Micro-remains in Environmental Archaeology, Fig. 4 Taphonomically altered phytoliths from the Tunel VII site, Tierra del Fuego, Argentina: (**a**) elongate smooth phytolith with surface erosion pits (indicated by arrows); (**b**) tracheid broken at one of its extremes (indicated by arrow). Photos courtesy of Débora Zurro

an even process, however, and a key issue for environmental archaeologists is to understand how phytoliths degrade differentially altering the composition and taxonomic diversity of an assemblage over time. Key variables that have been investigated include size and shape (i.e., surface area relative to volume), the degree of silicification (whether the phytolith was fully formed prior to the death of the cell), and the level of impurities incorporated in the opal structure or adsorbed to the surface, particularly aluminum, which appears to inhibit chemical dissolution (Strömberg 2004; Piperno 2006; Cabanes and Shahack-Gross 2015). Overall, these studies have suggested that larger and more fragile forms such as elongates and epidermal sheets are generally more susceptible to mechanical damage than smaller and more robust types like rondels and trapezoids. Forms with greater surface to bulk ratios are more prone to dissolution, as are those from deciduous trees (compared to grasses and conifers).

While the long-term durability of phytoliths can be readily explained as a function of their mineral composition, the survival of starch granules is not nearly as well understood and remains a highly controversial subject in micro-botanical analysis (Mercader et al. 2018). Composed of glucose polysaccharides, starch granules are susceptible to postdepositional degradation by a range of physical, chemical, and biological mechanisms. These include enzymatic hydrolysis by soil-borne microorganisms, mechanical attrition by movement or compaction of the sediment, stress fracturing from freezing or repeated cycles of wetting and drying, chemical dissolution caused by very acidic or alkaline conditions, and thermal decomposition caused by exposure to extremely high dry heat (>180 °C) or moderate heat (>40–50 °C) in the presence of moisture (Haslam 2004; Barton and Matthews 2006; Henry 2015). Despite having a seemingly low potential for long-term preservation, a growing number of archaeological studies has clearly demonstrated that starch granules can in fact preserve for very long periods – more than 100,000 years on the surface of stone tools and up to 200,000 years in mineralized dental calculus (Mercader 2009; Henry et al. 2011) – in a wide variety of contexts and depositional environments, including harsh tropical conditions. Consequently, there has been considerable discussion and debate in the literature concerning the possible preservative mechanisms of ancient starch (e.g., Haslam 2004; Barton and Matthews 2006; Barton 2009; Henry 2015) and the influence that diagenetic alterations might have on taxonomic identifications and behavioral reconstructions (e.g., Collins and Copeland 2011; Henry et al. 2011).

One of the main hypotheses for explaining archaeological starch longevity draws on the general observation that granules seem to survive best in protected microenvironments, such as embedded in pits and cracks on artifact surfaces, or encapsulated in mineralized dental calculus, in charred residues on pottery, or in soil aggregates. Such depositional contexts may physically restrict starch-degrading enzymes (amylases) from accessing granules (though this hypothesis generally lacks empirical support; see Mercader et al. 2018: 780) and could also protect them to some extent from fluctuations in soil moisture, temperature, and pH (Haslam 2004; Barton and Matthews 2006). Conditions in the burial microenvironment can also have an effect on bioactivity. Factors likely to slow biological decay include low moisture content, high or low pH (amylases have a pH-optimum around neutral), low oxygen, low temperature (amylases are optimal around 35–40 °C and deactivate below about 5 °C and above 50 °C), and the presence of heavy metals (e.g., copper, lead, manganese), clays, tannic acids, and soil aggregates (Haslam 2004; Barton and Matthews 2006; Langejans 2010; Mercader et al. 2018). Peri-mineralization or fossilization of starch granules may play a role in long-term preservation (Mercader et al. 2018: 782). However, some studies observe that ancient granules remain reactive to starch-specific stains (iodine potassium-iodide) and enzymes (Barton and Matthews 2006; Hardy et al. 2009), suggesting mineralization is either incomplete or not relevant to all cases. Molecular changes that might promote preservation such as polysaccharide cross-linking have been proposed but not yet tested (Barton and Matthews 2006).

Burial experiments have also shown the importance of protected depositional settings in shielding starch from degradation and have highlighted the highly variable nature of decay processes depending on local burial microenvironment (Lu 2003; Barton 2009; Langejans 2010). For example, a study by Barton (2009) showed that even when left on the ground surface and exposed to the elements, starch residues on stone tools survive better than when buried in loose, aerated, and biologically active A-horizon soil, where conditions are conducive to rapid microbial decay. Barton (2009; see also Langejans 2010) proposed that the formation and rapid desiccation of an organic residue complex (composed not only of starches but also of other plant matter including hydrophobic lipids) on tool surfaces during plant processing could further protect starches from microbial degradation. Experimental studies have also shown that decay rates can slow down over long depositional periods, particularly in stable environments where organic micro-remains and degrading mechanisms are more likely to reach equilibrium (Langejans 2010).

Like phytoliths, ancient starch assemblages can also be biased by differential degradation based on intrinsic, species-specific properties such as grain size, shape, and composition (amylose and amylopectin ratio). In general, granules with smaller diameters (and thus higher relative surface areas), lower amylose contents, greater numbers of surface pores, and physical modifications or damage (particularly by gelatinization) are more susceptible to biotic degradation (Haslam 2004). Smaller granules, on the other hand, are more likely to be protected from mechanical damage than larger grains. Overall, however, differential decay and preservation processes in starches are still not well understood, and such biases are still rarely factored into archaeological interpretations. Long-term diagenetic effects on starch morphology and structure are also significantly under-researched (Mercader et al. 2018). This issue was highlighted during a recent debate where the gelatinized appearance of starch granules recovered from Neanderthal dental calculus was interpreted on the one hand as evidence of cooking (Henry et al. 2011) and on the other as the result of taphonomic alterations (Collins and Copeland 2011). As Collins and Copeland (2011) argue, much more rigorous biomolecular studies of starch diagenesis are needed to understand not only how starch molecules survive but also how they are altered by chemical and hydrothermal processes through deep time.

Like starch, pollen granules are organic and thus vulnerable to a similar range of postdepositional decay mechanisms. However, they are generally considered more resilient than starch owing to the presence of sporopollenin in their tough outer walls (exine), which affords them resistance to chemical and bacterial attack. Pollen is nonetheless still prone to microbial decay, as well as oxidative damage in conditions of high redox potential (Eh), chemical corrosion in neutral or alkaline pH, and physical weathering from mechanical forces (e.g., movement, compaction, wet and dry/freeze, and thaw cycles) (Pearsall 2015: 260–261). Similar protective mechanisms that inhibit microbial activity as outlined above for starch have also been cited for pollen, with waterlogged conditions being considered optimal overall. Pollen assemblages are also subject to differential preservation depending on taxonomic variation in the sporopollenin content of grains, with grass pollen being noted among those that tend to preserve poorly (Strömberg 2004).

Overall, a stable and physically protective microenvironment in which fluctuations in temperature and moisture are minimized and movement is restricted will be favorable for the longevity of all types of plant micro-remains.

Postdepositional Movement

The question of whether plant micro-remains are in their original (primary) depositional context, or if they represent a younger (or older) contaminant that has moved into that context, is critical to archaeological reconstructions. The main mechanisms causing postdepositional movement are water percolation and bioturbation by animals (worms, insects, reptiles, mammals) and plants roots. Owing to their small size, micro-remains are often considered to have high potential for moving between stratigraphic contexts, including

from the depositional sediment onto the surface of a buried artifact. Experiments have shown that there is a great deal of variation in the extent to which micro-remains move, depending on the characteristics of the archaeological matrix (e.g., pore size, degree of compaction), the size and shape of the microfossil, and the intensity of water flow (Hart and Humphries 2003). The degree of bioturbation tends to be affected by the aerobicity of the sediments, with more aerobic sediments supporting greater bioactivity.

Experimental studies aimed at quantifying the water-borne movement of starch grains in sediment columns (Therin 1998; Haslam 2009) have shown that, even in relatively porous sands and under tropical rainfall conditions, few granules of any size move. Furthermore, while small particles (<5 μm) are more likely to move overall, large particles tend to move further once mobile, presumably because of their greater density. Some lateral and upward movement can also occur owing to capillary forces. While field and laboratory experiments with phytoliths have found similar results, showing the higher mobility of small-sized particles, as well as those with elongate shapes (aspect ratio >3), they have also highlighted the importance of soil microstructure in either facilitating or inhibiting the displacement of plant micro-remains (Fishkis et al. 2010). In particular, the presence and size of macropore channels and the intensity of aggregate formation with clay particles, organic substances, and oxides appear to play an important role. Fishkis et al. (2010) suggest that these types of natural soil conditions have not been adequately simulated in many laboratory experiments, which typically use homogenous packed-sand matrices that may in fact retard microfossil mobility. While experimental studies serve as a useful guide for understanding the influence of key variables under controlled conditions, the degree of microfossil movement is clearly dependent on a range of interacting field and sedimentary conditions, and must be assessed on a case by case basis.

Archaeologists have more commonly relied on patterns in the archaeological record to assess the likelihood of postdepositional movement, particularly by comparing the composition of micro-remain assemblages across multiple spatial and temporal contexts. For example, phytolith and starch studies in the Pacific Islands have analyzed sterile subsoils underlying archaeological layers or tephra deposits alternating with palaeosols to assess the down-washing of microfossils (Horrocks and Weisler 2006; Lentfer and Torrence 2007). In both cases, movement was found to be minimal. In their multi-proxy analysis of maize use at Late Archaic sites in Peru, Haas et al. (2013) argued that the pollen found in prehistoric contexts was unlikely to be modern contamination because grains from a recently introduced invasive genus, which were prevalent along with maize in modern control samples, were absent from the archaeological samples. Stratigraphic evidence of bioturbation such as burrows, insect channels, or worm cases, or other major disturbances such as pits or channels can also be useful in assessing the degree of mixing and can be assisted by micromorphological studies (Madella and Lancelotti 2011).

Spatial distribution patterns are also assessed during residue studies to determine if micro-remains have migrated from the surrounding sediment to the surface of an artifact. The typical approach is to compare the frequency and types of micro-remains found on the used edges of tools to those in the surrounding sediment and in other control samples (e.g., Piperno et al. 2000). For example, Barton et al. (1998) found significantly higher quantities of starch on used obsidian flakes (which was determined independently by use-wear analysis) than on unused flakes or in the surrounding sediment at sites in Papua New Guinea. "Sealed" contexts such as dental calculus or charred food crusts on ceramics are also considered to be less susceptible to contamination, although this has yet to be thoroughly tested (though see Soto et al. 2019). Charred food crusts, for one, are likely to contain an interconnecting network of micro-cracks, pores, and channels that form during charring, which may be readily penetrated by water-mobilized micro-remains in the burial environment. To address this issue, Saul et al. (2012) compared starch frequencies in charred food residues on potsherds to those occurring in soot deposits on the same sherds to

demonstrate that the starch granules had not percolated into the food crust. Detailed context-based analyses such as these provide a strong basis for assessing the stratigraphic integrity of plant micro-remains and are now considered an essential component of micro-botanical studies.

Post-excavation Processes

Increasing attention is also being paid to the taphonomic processes that affect micro-botanical remains after they have been excavated, particularly during laboratory processing and analysis. Some form of extraction is usually required to recover plant micro-remains from archaeological samples, whether they are sediments, tool residues, or dental calculus. Most techniques use either mechanical or chemical methods, which can physically transform or degrade the microfossils and in some cases selectively remove certain types from the sample such as through size separation. For example, the extraction protocol recommended by Therin and Lentfer (2006) for separating starch granules using heavy liquid flotation is designed to recover granules >5 μm in diameter. Studies using this method may therefore be biased against recovering evidence of major economic crops such as rice and taro, which produce starch granules smaller than this threshold size. Such technical limitations must be fully understood and taken into account in archaeological reconstructions. Analysts have also recognized the potential for biases to be introduced during phytolith extraction. For example, acid extraction procedures as well as mechanical crushing have been shown to cause conjoined (multicelled) phytoliths to break down into single-celled forms during laboratory processing, while dry ashing can cause them to fuse together (Jenkins 2009). Slide preparation methods are also a potential source of bias, particularly through differential size sorting (Strömberg 2007).

It is now also common for micro-botanical studies to extract multiple types of microfossils such as both starch and phytoliths from one sample (Piperno 2006). Extraction techniques therefore have to be designed and implemented carefully to avoid damaging or destroying the more fragile types, particularly starch. This includes limiting the use of heat (>35 °C), strong acids and oxidizers, and excessive mechanical processing such as grinding and sonication. Some analysts have even observed the long-term degradation of samples during storage, including damage caused to ancient starch granules by certain mounting media (e.g., Piperno 2006). These issues are particularly important given that many types of damage caused during laboratory processing can resemble modifications induced during food processing, potentially leading to the misidentification of these culinary practices in the archaeological record (cf. Collins and Copeland 2011).

International Perspectives

The analysis of archaeological plant micro-remains has been most commonly applied as an integrated methodological approach in tropical regions such as Australasia and the New World, where macro-botanical remains tend to be poorly preserved. As a result, much of our present understanding of the taphonomy of plant microfossils has also tended to focus on these regions. In recent years, however, there has been a major geographical expansion of research in areas such as South and East Asia, Europe, and Africa. Each of these regions has different environments, different food plants, and different culinary traditions that can differently affect the taphonomic pathways of plant micro-remains. Plant micro-analysts are therefore not only beginning to appreciate the full scope of archaeological conditions under which micro-remains can be deposited, altered, preserved, and recovered over various time scales, but are also increasingly conducting regionally specific experimental studies and developing taphonomic models designed to understand these processes in their local setting.

Future Directions

While much progress has been made towards understanding the taphonomy of plant micro-

remains, there are still large gaps in our knowledge, as well as major deficiencies in the way we apply this knowledge in archaeological reconstructions. Taphonomic studies of modern analogues, such as experimental or ethnoarchaeological research, in which relevant cause and effect relationships are known, are still the cornerstone of much of our current knowledge and should continue to be so in the future. An important area for further consideration is the development of long-term actualistic studies that simulate more realistically the complexities of pre- and postdepositional processes operating over archaeological time scales. Broader consideration should also be given to the noncultural vectors by which plant micro-remains can enter the archaeological record, including modern post-excavation contaminants that may enter samples inadvertently during field sampling or laboratory processing (Crowther et al. 2014; Mercader et al. 2017).

As the analysis of plant micro-remains becomes more routine in archaeological studies, so too should the recording of taphonomic factors important to the reconstruction of the human past. This includes the physical and chemical properties, and biotic composition of burial soils, and the collecting and reporting of field and laboratory control samples. Further, the reporting of negative results or cases where taphonomic constraints have precluded reliable reconstructions of past human-plant interactions should be encouraged. Such data sets are critical for developing a more robust understanding of the environmental conditions under which different micro-remains should be expected to survive or degrade, and for assessing contamination. As case studies worldwide have increasingly demonstrated, archaeological reconstructions are also much more robust in the face of taphonomic biases when multiple lines of evidence are employed. Integrated multi-proxy approaches to reconstructing human-plant interactions should therefore be adopted where possible.

One of the final frontiers in plant micro-remain taphonomic studies is the building of better understandings of their molecular taphonomy, particularly of organic remains such as starch granules. Factors affecting the long-term preservation and diagenesis of starch and other organic molecules are still only poorly understood, fueling much debate about the reliability of archaeological identifications and interpretations. In addition to intrinsic molecular alterations, the potential for organic plant remains to form molecular bonds or cross-links with other components in the soil (e.g., clays, hydroxides, oxides, and humic substances) or micro-residues on tool surfaces (e.g., hydrophobic lipids) also requires systematic investigation (Barton 2009; Barton and Matthews 2006: 85; Mercader et al. 2018). The ongoing recognition and investigation of taphonomic processes such as these will ensure confident and reliable reconstructions of past relationships between people, plants, and the environment from archaeological plant micro-remains.

Cross-References

- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ Organic Residue Analysis in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Stone Tool Usewear and Residue Analysis
- ▶ Taphonomy: Definition

References

Barton, H. 2009. Starch granule taphonomy: The results of a two year field experiment. In *Archaeological science under a microscope: Studies in residue and ancient DNA analysis in honour of Thomas H. Loy*, Terra Australis 30, ed. M. Haslam, G. Robertson, A. Crowther, S. Nugent, and L. Kirkwood, 129–140. Canberra: ANU E-Press.

Barton, H., and P. Matthews. 2006. Taphonomy. In *Ancient starch research*, ed. R. Torrence and H. Barton, 75–94. Walnut Creek: Left Coast Press.

Barton, H., R. Torrence, and R.L. Fullagar. 1998. Clues to stone tool function re-examined: Comparing starch grain frequencies on used and unused obsidian artefacts. *Journal of Archaeological Science* 25: 1231–1238.

Cabanes, D., and R. Shahack-Gross. 2015. Understanding Fossil Phytolith Preservation: The Role of Partial Dissolution in Paleoecology and Archaeology. *PlosOne* 10 (5): e0125532.

Collins, M.J., and L. Copeland. 2011. Ancient starch: Cooked or just old? *Proceedings of the National Academy of Sciences of the United States of America* 108: E145.

Crowther, A. 2009a. Reviewing raphides: Issues with the identification and interpretation of calcium oxalate crystals in microfossil assemblages. In *New directions in archaeological science*, ed. A. Fairbairn, S. O'Connor, and B. Marwick, 105–118. Canberra: ANU E Press.

Crowther, A. 2009b. Morphometric analysis of calcium oxalate raphides and assessment of their taxonomic value for archaeological microfossil studies. In *Archaeological science under a microscope: studies in residue and ancient DNA analysis in honour of Thomas H. Loy*, Terra Australis 30, ed. M. Haslam, G. Robertson, A. Crowther, S. Nugent, and L. Kirkwood, 102–128. Canberra: ANU E-Press.

Crowther, A. 2012. The differential survival of native starch during cooking and implications for archaeological analyses: A review. *Archaeological and Anthropological Sciences* 4: 221–235.

Crowther, A., M. Haslam, N. Oakden, D. Walde, and J. Mercader. 2014. Documenting contamination in ancient starch laboratories. *Journal of Archaeological Science* 49: 90–104.

Efremov, I.A. 1940. Taphonomy: A new branch of paleontology. *Pan American Geologist* 74: 81–93.

Fishkis, O., J. Ingwersen, M. Lamers, D. Denysenko, and T. Streck. 2010. Phytolith transport in soil: A field study using fluorescent labelling. *Geoderma* 157: 27–36.

Haas, J., W. Creamer, L.H. Mesía, D. Goldstein, K. Reinhard, and C.V. Rodríguez. 2013. Evidence for maize (*Zea mays*) in the Late Archaic (3000–1800 B. C.) in the Norte Chico region of Peru. *Proceedings of the National Academy of Sciences of the United States of America* 110: 4945–4949.

Hardy, K., T. Blakeney, L. Copeland, J. Kirkham, R. Wrangham, and M. Collins. 2009. Starch granules, dental calculus and new perspectives on ancient diet. *Journal of Archaeological Science* 36: 248–255.

Hart, D.M., and G.S. Humphries. 2003. Phytolith depth functions in surface regolith materials. In *Advances in regolith*, ed. I.C. Roach, 159–163. Perth: CRC LEME.

Harvey, E., and D.Q. Fuller. 2005. Investigating crop processing using phytolith analysis: The example of rice and millets. *Journal of Archaeological Science* 32: 739–752.

Haslam, M. 2004. The decomposition of starch grains in soils: Implications for archaeological residue analyses. *Journal of Archaeological Science* 31: 1715–1734.

Haslam, M. 2009. Initial tests on the three-dimensional movement of starch in sediments. In *New directions in archaeological science*, Terra Australis 29, ed. A.S. Fairbairn, S. O'Connor, and B. Marwick, 93–103. Canberra: ANU E-Press.

Henry, A.G. 2015. Formation and taphonomic processes affecting starch granules. In *Method and theory in paleoethnobotany*, ed. J.M. Marston and C. Warriner, 35–50. Boulder: University Press of Colorado.

Henry, A.G., H.F. Hudson, and D.R. Piperno. 2009. Changes in starch grain morphologies from cooking. *Journal of Archaeological Science* 36: 915–922.

Henry, A.G., A.S. Brooks, and D.R. Piperno. 2011. Reply to Collins and Copeland: Spontaneous gelatinization not supported by evidence. *Proceedings of the National Academy of Sciences of the United States of America* 108: E146.

Horrocks, M., and M. Weisler. 2006. Analysis of plant microfossils in archaeological deposits from two remote archipelagos: the Marshall Islands, Eastern Micronesia, and the Pitcairn Group, Southeast Polynesia. *Pacific Science* 60: 261–280.

Hunt, C.O., and G. Rushworth. 2005. Pollen taphonomy and airfall sedimentation in a tropical cave: the West Mouth of The Great Cave of Niah in Sarawak, Malaysian Borneo. *Journal of Archaeological Science* 32: 465–473.

Jenkins, E. 2009. Phytolith taphonomy: A comparison of dry ashing and acid extraction on the breakdown of conjoined phytoliths formed in *Triticum durum*. *Journal of Archaeological Science* 36: 2402–2407.

Langejans, G.H.J. 2010. Remains of the day-preservation of organic micro-residues on stone tools. *Journal of Archaeological Science* 37: 971–985.

Laurence, A.R., A.V. Thoms, V.M. Bryant, and C. McDonough. 2011. Airborne starch granules as a potential contamination source at archaeological sites. *Journal of Ethnobiology* 31: 213–232.

Lentfer, C., and R. Torrence. 2007. Holocene volcanic activity, vegetation succession, and ancient human land use: Unraveling the interactions on Garua Island, Papua New Guinea. *Review of Palaeobotany and Palynology* 143: 83–105.

Lu, T. 2003. The survival of starch residue in a subtropical environment. In *Proceedings of the state-of-the-art in phytolith and starch research in the Australian, Pacific and South East Asian regions*, Terra Australis 19, ed. D.M. Hart and L.A. Wallis, 119–126. Canberra: Pandanus Press.

Lyman, R.L. 2010. What taphonomy is, what it isn't, and why taphonomists should care about the difference. *Journal of Taphonomy* 8: 1–16.

Madella, M., and C. Lancelotti. 2011. Taphonomy and phytoliths: A user manual. *Quaternary International* 275: 76–83.

Mercader, J. 2009. Mozambican grass seed consumption during the Middle Stone Age. *Science* 326: 1680–1683.

Mercader, J., M. Abtosway, E. Baquedano, R.W. Bird, F. Díez-Martín, M. Domínguez-Rodrigo, J. Favreau,

M. Itambu, P. Lee, A. Mabulla, R. Patalano, A. Pérez-González, M. Santonja, L. Tucker, and D. Walde. 2017. Starch contamination landscapes in field archaeology: Olduvai Gorge, Tanzania. *Boreas* 46: 918–934.

Mercader, J., T. Akeju, M. Brown, M. Bundala, M.J. Collins, L. Copeland, A. Crowther, P. Dunfield, A.G. Henry, J. Inwood, M. Itambu, J.-J. Kim, S. Larter, L. Longo, T. Oldenburg, R. Patalano, R. Sammynaiken, M. Soto, R. Tyler, and H. Xhauflair. 2018. Exaggerated expectations in ancient starch research and the need for new taphonomic and authenticity criteria. *Facets* 3: 777–798.

Pearsall, D. 2015. *Palaeoethnobotany: A handbook of procedures*. 3rd ed. Walnut Creek: Left Coast Press, Inc.

Piperno, D. 2006. *Phytoliths: A comprehensive guide for archaeologists and paleoecologists*. Oxford: AltaMira Press.

Piperno, D.R., A. Ranere, I. Holst, and P. Hansell. 2000. Starch grains reveal early root crop horticulture in the Panamanian tropical forest. *Nature* 407: 894–897.

Saul, H., J. Wilson, C.P. Heron, A. Glykou, S. Hartz, and O.E. Craig. 2012. A systematic approach to the recovery and identification of starches from carbonised deposits on ceramic vessels. *Journal of Archaeological Science* 39: 3483–3492.

Soto, M., J. Inwood, S. Clarke, A. Crowther, D. Covelli, J. Favreau, M. Itambu, S. Larter, P. Lee, M. Lozano, J. Maley, A. Mwambwiga, R. Patalano, R. Sammynaiken, J.M. Vergés, J. Zhu, and J. Mercader. 2019. Structural characterization and decontamination of dental calculus for ancient starch research. *Archaeological and Anthropological Sciences* 11: 4847–4872.

Strömberg, C. 2004. Using phytolith assemblages to reconstruct the origin and spread of grass-dominated habitats in the great plains of North America during the late Eocene to early Miocene. *Palaeogeography, Palaeoclimatology, Palaeoecology* 207: 239–275.

Strömberg, C. 2007. Can slide preparation methods cause size biases in phytolith assemblages? Results from a preliminary study. In *Plants, people and places: Recent studies in phytolith analysis*, ed. M. Madella and D. Zurro, 1–11. Oxford: Oxbow Books.

Therin, M. 1998. The movement of starch grains in sediments. In *A closer look: Recent Australian studies of stone tools*, ed. R. Fullagar, 61–72. Sydney: Archaeological Computing Laboratory, University of Sydney.

Therin, M., and C. Lentfer. 2006. A protocol for extraction of starch from sediments. In *Ancient starch research*, ed. R. Torrence and H. Barton, 159–161. Walnut Creek: Left Coast Press.

Zarrillo, S., D.M. Pearsall, J. Raymond, M. Tisdale, and D. Quon. 2008. Directly dated starch residues document early formative maize (*Zea mays* L.) in tropical Ecuador. *Proceedings of the National Academy of Sciences of the United States of America* 105: 5006–5011.

Taphonomy, Regional

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Introduction

Taphonomy is a discipline common to many fields, like paleontology, geology, paleoecology, or archaeology. Its basic goal is to understand the transition of organic materials, for example, bones or soft tissues, from the biosphere to the lithosphere (Lyman 1994). Taphonomic information is routinely used by archaeologists to assess the quality of archaeological data, to evaluate the loss of cultural and ecological information, to pursue paleobiological questions, and sometimes also to acquire paleoecological information (Gifford 1981; Behrensmeyer 1993; Lyman 1994; Marean 1995). In other words, the conditions which are adequate for the formation of fossils are a central concern of taphonomy. Archaeological applications are usually focused on the preservation of bones, but they also cover cases involving transformations of lithic tools, pottery, or other kinds of materials. In most cases, local scales of analysis are used – usually, the site – and indeed those scales are adequate to perform most of these tasks. The literature is full of successful examples of application of taphonomic analysis at a local scale (Pickering et al. 2007; Stuart and Larkin 2010). However, the fact that the scale at which most archaeological problems are usually stated is regional is a valid reason to also advocate for a regional scale of taphonomic analysis (Borrero 1988).

Definition

The basic goal of regional taphonomy is to understand the dynamics of environments at large spatial scales, particularly the processes responsible of bone accumulations. An accumulation of bones is usually defined as any surface or stratigraphy

occurrence of vertebrate remains of more than one individual in a well-circumscribed area, around 100 m^2 (Behrensmeyer 1991: 293), and it is the result of a variety of processes. The regional distribution of bone accumulations and its causes constitutes the central subject of the analysis (Haynes 1982; Behrensmeyer 1983; Borrero 1988). These bone accumulations may be the result of the activities of one or more agents, and one important task is that of separating those agents in an effort toward understanding the causes behind the different bone accumulations. Taphonomic analysis can help to separate fossil bone accumulations created by hominins, carnivores, water, or other varied agents (Haynes 1980; Behrensmeyer 1991; Gutiérrez et al. 2010). On the other hand, beyond the identification of the depositional agents, a regional taphonomy may provide an understanding of the impact of the recent natural "bone rain" on the regional archaeological record. The formation of palimpsests and other issues of contamination of archaeological and recent bone assemblages can be assessed in this way. In other words, an understanding of what bones can be used for a cultural discussion and what bones inform on modern and fossil natural processes at different loci is the expected result of a regional taphonomy.

Historical Background

Taphonomic research in Tierra del Fuego provides a substantial example of some of the properties of a regional taphonomy. This example highlights the importance of the processes of contamination of archaeological sites with modern bones and the necessity to understand the causes creating those palimpsests. The San Pablo region in the Atlantic coast of Tierra del Fuego, Argentina, is characterized by extensive Nothofagus sp. forests that alternate with peats and prairies. This region was actively used by hunter-gatherers during the Late Holocene. It is also a place regularly inhabited by guanacos (Lama guanicoe). This study showed that most of the known archaeological sites of that region dated between approximately 300 BP and present were contaminated with recently deposited guanaco bones. Longitudinal observations made along several years confirmed the vertical migration of recently deposited guanaco bones contaminated many archaeological assemblages (Borrero 1990). This problem was aggravated by the fact that the modern bones that were contaminating the archaeological assemblages were highly fragmented. Similar mixes of old and recent bones were also noted when other archaeological assemblages were studied on the island or in Patagonia. Given the fact that guanacos were also the main prey for prehistoric hunter-gatherers, the separation of archaeological and "natural" bones is generally difficult to achieve. Generally speaking, taphonomic research produced a suite of taphonomic principles – rates of weathering, ranking of bone destruction, bone selectivity by different carnivores or by running water, etc. – that can be used to separate recently deposited bones from archaeological bones (Borrero 2007). This separation is crucial to acquire a trustable list of the guanaco parts selected for human consumption. Similar problems involve other species in other places (Behrensmeyer 1991; Lyman 1994).

Key Issues/Current Debates

Knowledge about the regional distribution of the archaeological materials is important for any regionally oriented taphonomic research program (Dunnell and Dancey 1983). In other words, this is the only way to know at which places artifacts and natural bones had the potential to overlap in space and also at which places good bone preservation is to be expected. The best way to do this combines taphonomic and geoarchaeological work.

The more useful data collection strategies are those that at the same time will record both archaeological and taphonomic information. Surface bones recorded in transects or blocks (Behrensmeyer 1983) need to be classified by species, element, completeness, degree of disarticulation, abrasion stage, weathering stage, and

classes of damage (carnivores, rodents, etc.) (Lyman 1994). When possible, evidence of cause of death, age at death, presence of associated tracks, feathers or scats, and type of substrate must also be recorded. The potential for burial can be evaluated not only by using soil probes but also by analyzing the correlation between weathering stages and bone burial – usually defined as 50% or more of the element covered by sediments (Behrensmeyer 1991). Frequency information is usually transformed into densities per square meter to facilitate comparisons. The archaeology of the places that show high risk of bone contamination needs to be stratigraphically examined using test pits. In this way, by using the locally recorded fossil and taphonomic information and general taphonomic principles, the degree of bone contamination can be assessed.

Other regional approaches to taphonomy exist, some of which rely almost exclusively on naturalistic data. One example is the work of Blumenschine (1987) at Serengeti and Ngorongoro, Kenya. This particular study was oriented toward the identification of the scavenger opportunities offered by modern environments. The research goal was to use them as analogs for the Plio-Pleistocene hominin landscapes. This study was criticized for two main reasons. First, it was observed that even the best modern analogs differ significantly from the habitats of the Plio-Pleistocene in the variety and distribution of carnivores and herbivores. Second, it was suggested that places like Serengeti cannot be considered as the best analog for that period in East Africa (Tappen 2001). Anyway, this is an extreme situation in which environments separated by c. two million years or more are compared. In spite of the tremendous differences imposed by this situation, regional naturalistic observations have proved important in the evaluation of many similar situations (Haynes 1982; Behrensmeyer 1983). This is particularly true when these observations are complemented with experimental taphonomic work (Dominguez-Rodrigo 2012). An understanding of the basic processes that govern the deposition and preservation of organic remains provides ways of separating those components of the fossil record that can be attributed to human activities.

Most of the approaches that try to identify regional taphonomic signals principally work with surface records, but there are conditions under which stratigraphic approaches can be used as well. One example is the work at Olorgesailie, Kenya, where the spatial distribution of at least two different time periods was examined and compared using regional taphonomic properties (Potts et al. 1999). In the ideal case, both surface and stratigraphic samples should be employed, and it is their comparative integration that proves to be more informative.

Future Directions

Regional taphonomy is a way to study and understand potential biases affecting archaeological assemblages. It is also a useful way to acquire paleoecological information and to select the most adequate places to answer specific research questions. Effectively, an understanding of the formation of palimpsests can be used to select places with better integrity or with the capacity to inform about particular activities, like scavenging or hunting. In turn, the knowledge about the aggregational history of the deposits can be used to study paleoclimatic and palaeoenvironmental issues (Bobe et al. 2007). For these reasons, regional taphonomy is a research strategy that appears to be especially not only useful during the early phases of archaeological research but also capable of obtaining primary information. Most places in the world offer conditions for contamination of older bone assemblages with more recent bones. Regional taphonomy offers one way to respond effectively to that challenge.

Cross-References

- ▶ Taphonomy: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Vertebrate Taphonomy in Archaeological Research

References

Behrensmeyer, A.K. 1983. Natural bone distributions on recent land surfaces: Implications for archeological site formation. In *Animals and archeology: l. Hunters and their prey*, British archeological reports international series, ed. J. Clutton-Brock and C. Grigson, vol. 63, 93–106. Oxford: Archaeopress.

Behrensmeyer, A.K. 1991. Terrestrial vertebrate accumulations. In *Taphonomy: Releasing the data locked in the fossil record*, ed. P.A. Allison and D.E.K. Briggs, 291–335. New York: Plenum Press.

Behrensmeyer, A.K. 1993. The bones of Amboseli: Bone assemblages and ecological change in modern African ecosystem. *National Geographic Research* 9: 402–421.

Blumenschine, R.J. 1987. Characteristics of an early hominid scavenging niche. *Current Anthropology* 28: 383–407.

Bobe, R., A.K. Behrensmeyer, G.G. Eck, and J.M. Harris. 2007. Patterns of abundance and diversity in late Cenozoic bovids from the Turkana and Hadar Basins, Kenya and Ethiopia. In *Hominin environments in the East African Pliocene. An assessment of the faunal evidence*, ed. R. Bobe, Z. Alemseged, and A.K. Behrensmeyer, 129–157. Dordrecht: Springer.

Borrero, L.A. 1988. Tafonomía regional. In *De procesos, contextos y otros huesos*, ed. N.R. Ratto and A.F. Haber, 9–15. Buenos Aires: Instituto de Ciencias Antropológicas, Universidad de Buenos Aires.

Borrero, L.A. 1990. Taphonomy of guanaco bones in Tierra del Fuego. *Quaternary Research* 34: 361–171.

Borrero, L.A. 2007. Longitudinal taphonomic studies in Tierra del Fuego, Argentina. In *Taphonomy and zooarchaeology in Argentina*, British Archeological Reports International Series, ed. M. Gutiérrez, L. Miotti, G. Barrientos, G. Mengoni Goñalons, and M. Salemme, 219–233. Oxford: Archaeopress.

Dominguez-Rodrigo, M. 2012. Toward a scientific-realistic theory on the origin of human behavior. In *Stone tools and fossil bones. Debates in the archaeology of human origins*, ed. M. Dominguez-Rodrigo, 11–45. Cambridge: Cambridge University Press.

Dunnell, R.C., and W.S. Dancey. 1983. The siteless survey: A regional scale data collection strategy. *Advances in Archaeological Method and Theory* 6: 267–287.

Gifford, D.P. 1981. Taphonomy and paleoecology: A critical review of archaeology's sister disciplines. *Advances in Archaeological Method and Theory* 4: 365–438.

Gutiérrez, M., C. Kaufmann, M. González, A. Massigoge, and M.C. Alvarez. 2010. Intrataxonomic variability in metapodial and femur bone density related to age in guanaco (Lama guanicoe). Zooarchaeological and taphonomical implications. *Journal of Archaeological Science* 37: 3226–3238.

Haynes, G. 1980. Prey bones and predators: Potential ecologic information from analysis of bone sites. *OSSA* 7: 75–97.

Haynes, G., 1982. Utilization and skeletal disturbances of North American prey carcasses. Arctic 35: 266–281

Lyman, R.L. 1994. *Vertebrate taphonomy.* Cambridge: Cambridge University Press.

Marean, C. 1995. Of taphonomy and zooarchaeology. *Evolutionary Anthropology* 4: 64–72.

Pickering, T.R., M. Dominguez-Rodrigo, C.P. Egeland, and C.K. Brain. 2007. Carcass foraging by early hominids at Swartkrans Cave (South Africa): A new investigation of the zooarchaeology and taphonomy of Member 3. In *Breathing life into fossils: Taphonomic studies in honor of C.K. (Bob) Brain*, ed. T. Pickering, J. Schick, and N. Toth, 233–254. Gosport: Stone Age Institute Press.

Potts, R., A.K. Behrensmeyer, and P. Ditchfield. 1999. Paleolandscape variation and early Pleistocene hominid activities: Members 1 and 7, Olorgesailie Formation. *Kenya. Journal of Human Evolution* 37: 747–788.

Stuart, A.J., and N.R. Larkin. 2010. Taphonomy of the West Runton Mammoth. *Quaternary International* 228: 217–232.

Tappen, M. 2001. Deconstructing the Serengeti. In *Meat-eating and human evolution*, ed. C.B. Stanford and H.T. Bunn, 13–31. Oxford: Oxford University Press.

Taphonomy: Definition

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The term taphonomy (from the Greek *taphos*-τάφος meaning burial and *nomos*-νόμος meaning law) is defined as the study of the transition of plant and animal organisms after death from the biosphere (living surfaces) to the lithosphere (underground). Taphonomists study processes such as decomposition or burial that affect organisms after death and which ultimately result in animals and plants becoming part of the fossil record.

Cross-References

► Time Since Death in Bioarchaeology and Human Osteology

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Basic Biographical Information

Sarah Tarlow is a historical archaeologist based in the United Kingdom. She received her B.A. in English Literature from Sheffield University in 1989 and her M.Phil. (1990) and Ph.D. (1995) in Archaeology from the University of Cambridge. She taught at the University of Wales, Lampeter, between 1995 and 2000, before taking up a position as lecturer in Historical Archaeology at the University of Leicester. She was appointed to senior lecturer in 2006 and was appointed to a personal chair in spring 2012.

Among many high-profile professional duties, Tarlow has been an active editorial contributor to the journal *Archaeological Dialogues* and the leading figure in the development of the teaching and research programs in Historical Archaeology at the University of Leicester.

Major Accomplishments

Tarlow's doctoral thesis, supervised by Ian Hodder, was titled *Metaphors of Death in Orkney, CE 1600–1945* and explored how early modern and modern gravestones could be studied by archaeologists as evidence of attitudes to death, and especially to the history of emotion and affect. Developed into a book-length study of *Bereavement and Commemoration* in 1999, Tarlow's Orkney research pioneered research into the archaeology of emotion, actively critiquing previous (especially Marxist) archaeological studies of funerary practices from a distinctive perspective that holds some commonalities with feminist archaeologies.

During the 2000s, Tarlow's studies of modern death came to engage more with social history: both through her account of Oliver Cromwell's head (Tarlow 2008) and her book-length study of *Ritual, Belief and the Dead in Early Modern Britain and Ireland* (Tarlow 2011). In 2011, this led to the award of a large research grant for a groundbreaking interdisciplinary project "Harnessing the Power of the Criminal Corpse" (funded by the Wellcome Trust), which brings archaeological thinking together with medical and criminal history, folklore, literature, and philosophy.

At the same time, she has contributed significantly to methodological and theoretical debates about the relationships between archaeology and history: in her pioneering edited volume *The Familiar Past?* (with Susie West 1999), in her groundbreaking studies of utopian communities, and in her book-length account of the archaeology of improvement in the eighteenth and nineteenth centuries (Tarlow 2007). Tarlow also played an active role in the early development of the CHAT conference group, hosting the second (2004) meeting at the University of Leicester.

Cross-References

▶ Churchyard Archaeology
▶ Contemporary and Historical Archaeology in Theory (CHAT)
▶ Critical Historical Archaeology
▶ Death, Burial, and Commemoration in Historical Archaeology
▶ Post-Medieval Archaeology (Europe)
▶ Social Identity in Historical Archaeology
▶ Western Europe: Historical Archaeology

References

Tarlow, S. 1999. *Bereavement and commemoration: An archaeology of mortality*. Oxford: Blackwell.
Tarlow, S. 2007. *The archaeology of improvement: Britain 1750–1850*. Cambridge: Cambridge University Press.
Tarlow, S. 2008. The extraordinary story of Oliver Cromwell's Head. In *Past bodies: Body-centred research in archaeology*, ed. J. Robb and D. Borić, 69–78. Oxford: Oxbow Books.
Tarlow, S. 2011. *Ritual, belief and the dead in early modern Britain and Ireland*. Cambridge: Cambridge University Press.

Tarlow, S., and S. West, eds. 1999. *The familiar past? Archaeologies of later historical Britain*. London: Routledge.

Further Reading

Cherryson, A., Z. Crossland, and S.Tarlow. 2011. *A fine and private place: The archaeology of death and burial in post-medieval Britain and Ireland,* Leicester Archaeological Monograph 22. Leicester: University of Leicester.

Hamilakis, Y., M. Pluciennik, and S. Tarlow, eds. 2001. *Thinking through the body: Archaeologies of corporeality*. New York: Kluwer Academic.

Tarlow, S. 1997. An archaeology of remembering: Death, bereavement and the First World War. *Cambridge Archaeological Journal* 7: 105–121.

Tarlow, S. 2000. Emotion in archaeology. *Current Anthropology* 41: 713–745.

Tarlow, S. 2003. Excavating Utopia: Why archaeologists should study 'ideal' communities of the nineteenth century. *International Journal of Historical Archaeology* 6: 299–323.

Taro: Origins and Development

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Basic Species Information

Taro (less commonly: *cocoyam, dasheen, eddoe*) (English), *kolokasi* (Greek), *qolqas* (Arabic), *kachu* (Bengalese), *arvi* (Hindi), *pein-u* (Burmese), *yu* (Chinese), *satoimo* (Japanese), *khoai nuoc* (Vietnamese), *gabi* (Tagalog), *kaladi* (Malay), *talas* (Palawan, Bahasa), *taro* (Maori, Samoan), *ma* (Papua New Guinea), *gwaza* (Hausa), *iso koko* (Yoruba), *ede epi* (Igbo), and *mayugwa* (Zanzibar). The genus *Colocasia* (L.) contains at least nine and perhaps many more distinct species, all of which are found in humid to semiaquatic habitats in Southeast Asia to Southern China. They are soft acrid herbs, often 0.5–2 m tall, leaves large, heart-shaped, with blades supported on long centrally inserted petioles (hence peltate) above an erect or underground corm. Male and female flowers appear on the same inflorescence (spadix with spathe, raised on a peduncle). After pollination by insects, numerous berries with many small seeds are produced. Some species, including taro (*C. esculenta*, Figs. 1 and 2), display waxy, non-shining leaves that repel water (wax is on micro-hairs that reduce reflection), while others display non-waxy, shiny, wettable leaves (e.g., *C. lihengiae*, Fig. 3). On taro, two to several fruiting heads may appear in sequence in one season from a single axil. Vegetative propagation of taro is by side-corms with many buds (many or most cultivars) or by long stolons with many nodes (some cultivars and most wild forms).

Taro: Origins and Development, Fig. 1 Wild taro (*C. esculenta*) in swamp with *Pandanus* in lowland rainforest, Daintree National Park, Australia. (Photo: Matthews 2008)

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Taro: Origins and Development, Fig. 2 Removing acrid skin from the starchy corm of cultivated taro, Kokoda Valley, Papua New Guinea. (Photo: Matthews 2008). Starchy residues like those attached to the knife here have been reported archaeologically on stone tools

Taro: Origins and Development, Fig. 3 *Colocasia lihengiae* Long and Liu, wild in Ba Vi National Park, Vietnam. (Nguyen 2005; Photo: Matthews and Nguyen 2011)

Taxonomy and Geographical Distribution

Taro was first described by Linnaeus in 1753 based on material derived from the Mediterranean region, where it has been cultivated since antiquity. He put the species in genus *Arum* under the name *Arum esculentum* L. In 1832, Schott transferred taro from *Arum* to a new genus, *Colocasia* Schott, based on the type species *Colocasia antiquorum* Schott, a name later understood as a synonym for *C. esculenta* (L.) Schott. Many different names have existed for the same plant, including *Caladium esculentum* (L.) Vent. 1801, *Colocasia esculenta* var. *aquatilis* Hassk. 1840, *C. antiquorum* var. *aquatilis* (Hassk.) Krause 1920, and *C. esculenta* var. *antiquorum* (Schott) Hubb. and Rehder 1932. Early taxonomists erected many species of *Colocasia* based on collections of wild plants and diverse cultivated forms of what is now called taro (*C. esculenta*). Recent work in mountainous regions of Southeast Asia has led to the discovery and description of further wild species. Consensus is lacking on the full number of distinct species; nine are noted here and more certainly exist:

1. *Colocasia esculenta* (L.) Schott 1832, highly polymorphic (Plucknett 1983) with diverse wild-type and domesticated forms; cultivated in most tropical to warm-temperate regions of the world; possibly evolved in low mountains of Southeast Asia (vicinity of other wild species in mountains), now distributed in natural and disturbed habitats in subtropical to tropical regions from India to China, Australia, and Melanesia (the likely natural range, Matthews et al. 2017) and notably absent from Taiwan as a wild plant
2. *C. formosana* Hayata 1919, abundant and widespread in Taiwan; also present in Luzon; forms a morphologically homogeneous wild population and is not known in domesticated form; morphologically distinct, but minimally so, from wild *C. esculenta* (Matthews et al. 2015).
3. *C. fallax*, Schott 1859, wild in Himalaya
4. *C. affinis* Schott 1859, wild in mainland Southeast Asia, lower altitudes

5. *C. lihengiae* Long and Liu 2001 wild in mountains, northern Vietnam to Yunnan, China, and Northeast India
6. *C. menglaensis* Yin, Li, and Xu 2004, wild in mountains, northern Vietnam to Yunnan, China
7. *C. yunnanensis* Long and Cai 2006, wild in mountains, northern Vietnam to Yunnan, China
8. *C. oresbia* Hay 1996, wild on Mt. Kinabalu, Borneo.
9. *C. gigantea* (Blume) J. D. Hook. 1893, a leaf vegetable (petiole only) in Southeast to East Asia and especially popular in Vietnam; wild in karst landscapes of mainland Southeast Asia; a taxonomic and genetic outlier, distant from other *Colocasia* species

Major Domestication Traits

Rumphius (seventeenth century) may have been the first author to describe with words and illustration a natural wild form of taro (*Caladium aquatile;* syn. *C. esculenta* var. *aquatilis;* cf. Matthews 1991) in Ambon, eastern Indonesia; he saw wild taro growing along rivers, and it was used as fodder for pigs, a usage that is widespread today in Southeast Asia. Wild taro is very acrid, like most Araceae, and is widely known as a famine food that requires special care in the selection and preparation of parts eaten (corms, leaves, stolons). Major domestication traits are:

1. Reduction in acridity of raw tissue or an increase in the susceptibility of the acrid factor (an enzyme) to heat (cooking) or both.
2. Increase in the bulk of the starchy corms, with diverse associated changes in flavor and texture.
3. Distinctive green-white, purple-red, and yellow-orange colors in leaves, stolons, corms, and inflorescences; color variation aids cultivar identification and has aesthetic appeal in gardens and on plate.
4. Cold adaptation (many small side-corms) and day-length sensitivity in northern temperate cultivars.

Acridity helps protect against herbivores, reducing costs for cultivation and storage but increasing costs for processing and consumption. In some cultivars the reduction favors consumption of starchy corms and green vegetable parts (leaves, stolons); in others it may favor corms or green parts but not both. According to cultivar, the corms, side-corms, or leaves (blade or petiole) are main parts eaten; the stolons and spathes of some cultivars are also eaten. Throughout Southeast Asia, commensal wild taro populations with relatively low acridity are harvested as a green vegetable food and as a fodder for pig, making taro perhaps the most abundant green vegetable in the region.

Timing and Tracking Domestication

Cultivars in Eurasia are very ancient since taro is mentioned in ancient texts that date back to around 2000 years ago in both China and the eastern Mediterranean (Matthews 2006). Northern, temperate-adapted cultivars of taro may have originated in the northern margins of the natural range, in eastern Himalaya, where taro could breed, where triploids often appeared, and where farmers could select traits favorable to winter storage, spring propagation, and summer cultivation. The earliest association of taro with human settlement, from 10,000 years ago, has been found at Kuk Swamp in Papua New Guinea (Golson et al. 2017). In Papua New Guinea, taro used at early dates could have been a natural wild form or could have been undergoing domestication in response to changes in landscape management, cultivation methods, cooking methods, and food preferences.

Genetic studies have shown that taro cultivars are very diverse and form a number of distinct gene pools; the great diversity within diploid and triploid cultivars ($2n = 28$, $2n = 42$) indicates domestication many times. Wild populations have not been studied in enough detail, or in enough places, to identify source regions and routes of movement. Since cultivars are carefully maintained as clones, some may be hundreds if not thousands of years old. Clones identified by the analysis of multi-locus genotypes have spread in many different directions, over vast distances,

with trade and human migration (Chair et al. 2016). The antiquity of taro in Africa is much debated. Wild populations are not known there, and the crop was possibly introduced from multiple directions at different times: overland from West Asia, via the Indian Ocean from Southeast Asia, and via the Mediterranean Sea to North Africa and the Iberian Peninsula. Taro first reached the Caribbean and Central America as a food of slaves carried from West Africa.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Niah Cave (The West Mouth)
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Vegeculture: General principles

References

Chaïr, H., R.E. Traore, M.F. Duval, R. Rivallan, A. Mukherjee, and L.M. Aboagye. 2016. Genetic diversification and dispersal of taro (*Colocasia esculenta* (L.) Schott). *PLoS One* 11 (6): e0157712. https://doi.org/10.1371/journal.pone.0157712.

Golson, J., T. Denham, P. Hughes, J.D. Muke, and P. Swadling. 2017. *Ten thousand years of cultivation at Kuk Swamp in the highlands of Papua New Guinea*, Terra Australis 46. Acton: A.C.T. ANU Press.

Matthews, P.J. 1991. A possible tropical wildtype taro: *Colocasia esculenta* var. *aquatilis*. *Bulletin of the Indo-Pacific Prehistory Association* 11: 69–81.

Matthews, P.J. 2006. Written records of taro in the eastern Mediterranean. In *Proceedings of the fourth international congress of ethnobotany (ICEB 2005)*, ed. Z.-F. Ertug, 419–426. Istanbul: Yayinlari.

Matthews, P.J., V.D. Nguyen, D. Tandang, E.M. Agoo, and D.A. Madulid. 2015. Taxonomy and ethnobotany of *Colocasia esculenta* and *C. formosana* (Araceae): Implications for the evolution, natural range, and domestication of taro. *Aroideana* 38E: 153–176.

Matthews, P.J., P.J. Lockhart, and I. Ahmed. 2017. Phylogeography, ethnobotany and linguistics: Issues arising from research on the natural and cultural history of taro, *Colocasia esculenta* (L.) Schott. *Man in India* 97: 353–380.

Nguyen, V.D. 2005. New species of genus *Colocasia* (Araceae) for flora of Vietnam. *VNU Journal of Science* 11 (3): 54–56.

Plucknett, D.L. 1983. Taxonomy of the genus *Colocasia*. In *Taro: A review of Colocasia esculenta and its potentials*, ed. J.-K. Wang, 14–19. Honolulu: University of Hawaii Press.

Further Reading

Grimaldi, I.M. Taro across the oceans: Journeys of one of our oldest crops. In *News from the past: Progress in African archaeobotany*, Advances in archaeobotany, ed. U. Thanheiser, vol. 3, 67–82. Eelde: Barkhuis.

Rao, V.R., P.J. Matthews, P.B. Eyzaguirre, and D. Hunter, eds. 2010. *The global diversity of taro: Ethnobotany and conservation*. Rome: Bioversity International.

Rumphius, G. E. 2011. *(17th C) The Ambonese herbal*. Translated, annotated and introduced by E. M. Beekman. New Haven: Yale University Press.

Spriggs, M., D.A. Addison, and P.J. Matthews, eds. 2012. *Irrigated taro (Colocasia esculenta) in the Indo-Pacific: Biological, social and historical perspectives*, 307–340. Osaka: National Museum of Ethnology.

Tavares da Silva, Carlos

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Basic Biographical Information

Carlos Tavares da Silva (Fig. 1) was born in Portugal in 1944. He obtained his academic qualifications in geology (1967) and biology (1975) from the Universidade de Lisboa. Between 1967 and 1974, Carlos Tavares da Silva was an archaeological adviser of the Educational Ministry (Junta Nacional de Educação) in the municipalities of Setúbal and Palmela. He was an archaeologist in Gabinete da Área de Sines, from 1972 to 1974, and he was Director of the

Tavares da Silva, Carlos, Fig. 1 Carlos Tavares da Silva (Castro de Chibanes 2012)

Archaeological Service of Gabinete da Área de Sines, from 1974 to 1988 (Tavares da Silva and Soares 1981), and he coordinated the archaeological unit of the Natural Park of Sudoeste Alentejano e Costa Vicentina between 1988 and 2000. He has been Director of the Archaeological Center of the Museum of Archaeology and Ethnography in the District of Setúbal since 1974 and co-director of the archaeological review, *Setúbal Arqueológica*, since 1974. He lectures in prehistory at the Universidade de Lisboa.

Carlos Tavares da Silva had been a member of the Scientific Committee of the Portuguese Institute for Archaeology and Cultural Heritage and of the International Union of Pre- and Protohistoric Commission on Neolithic civilizations of the Mediterranean and Europe. He is also a member of the Academia da História in Portugal and researcher of the Archaeological Center of the Universidade de Lisboa. He is the President of the Scientific Committee of the archaeological site of Tróia. He is the author and coauthor of some two hundred publications. In 2004 he was awarded the Gulbenkian Archaeological Award in recognition of his services to archaeology in Portugal.

Major Accomplishments

Carlos Tavares da Silva has directed and co-directed more than 100 archaeological excavations based on research projects and rescue programs. From 1997 to 2002, he worked on the largest archaeological project of Southern Portugal, in Alqueva, (dam of the Guadiana River) and also worked on the preceding archaeological and cultural heritage survey to evaluate the environmental impact of the dam's construction, with Joaquina Soares and José Manuel Mascarenhas.

Carlos Tavares da Silva has played an important role in the development of Portuguese urban and rescue archaeology. With Joaquina Soares, he convened the first national congress on this matter "I Encontro Nacional de Arqueologia Urbana" at Setúbal in 1985. Carlos Tavares da Silva's main contributions in the field of archaeology research are (I) formulation of the first periodization model for the Chalcolithic of Portuguese Estremadura (Tavares da Silva and Soares 1986); (II) identification of the first Chalcolithic fortifications from the III millennium cal BC in Southern Portugal, with Joaquina Soares (Ferreira da Silva et al. 1993); (III) Neolithization process in the Southwest Portuguese Coast, with Joaquina Soares (Tavares da Silva and Soares 2006); (IV) discovery and study of the settlement strategy of the Middle Bronze Age of SW Iberia (Cultura do Bronze do Sudoeste), with Joaquina Soares; (V) identification and excavation of the first Phoenician factory (Abul, in the Sado estuary) currently known in the Atlantic façade of Iberian Peninsula, with Francoise Mayet (Mayet and Tavares da Silva 2000); (VI) the urban archaeology of Setúbal; and (VII) salted fish and fish sauce industry in the Roman Period on the Southwest Portuguese Coast (Tavares da Silva and Soares 1993; Mayet and Tavares da Silva 1998, 2002).

Cross-References

- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Fortifications, Archaeology of
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Social Archaeology
- ▶ Urban Archaeology

References

Ferreira Da Silva, A.C., L. Raposo, and C. Tavares Da Silva. 1993. *Pré-história de Portugal*. Lisboa: Universidade Aberta.

Mayet, F., and C. Tavares Da Silva. 1998. *L'atelier d'amphores de Pinheiro (Portugal)*. Paris: Diffusion E. De Boccard.

Mayet, F., and C. Tavares Da Silva. 2000. *Le site phénicien d'Abul (Portugal). Comptoir et santuaire*. Paris: Diffusion E. De Boccard.

Mayet, F., and C. Tavares Da Silva. 2002. *L'atelier d'amphores d'Abul (Portugal)*. Paris: Diffusion E. De Boccard.

Tavares Da Silva, C., and J. Soares. 1981. *Pré-história da Área de Sines*. Lisboa: Gabinete da Área de Sines.

Tavares Da Silva, C., and J. Soares. 1986. *Arqueologia da Arrábida*. Lisboa: Serviço Nacional de Parques, Reservas e Conservação da Natureza.

Tavares Da Silva, C., and J. Soares. 1993. *Ilha do Pessegueiro. Porto Romano da Costa Alentejana*. Lisboa: Instituto de Conservação da Natureza.

Tavares Da Silva, C., and J. Soares. 2006. *Territórios da Pré-história em Portugal. Setúbal e Alentejo Litoral*. Tomar: Centro de Pré-história do Instituto Politécnico de Tomar.

Further Reading

Soares, J., and C. Tavares Da Silva. 1984. Le Groupe de Palmela dans le cadre da la céramique campaniforme au Portugal. In *L'Age du Cuivre Européen. Civilisations a vases campaniformes*, ed. J. Guillaine. Toulouse: CNRS.

Soares, J., and C. Tavares Da Silva. 2010. Campaniforme do Porto das Carretas (Médio Guadiana). A procura de novos quadros de referência. In *Transformação e mudança no Centro e Sul de Portugal: o 4° e o 3° milénios a.n.e*, ed. V.-S. Goncalves and A.C. Sousa, 225–261. Cascais: Câmara Municipal de Cascais e Uniarq.

Tavares Da Silva, C. 1997. O Neolítico antigo e a origem do Megalitismo no Sul de Portugal. In *O Neolítico Atlântico e as orixens do Megalitismo*, ed. A. Rodrigues Casal, 575–585. Santiago de Compostela.

Tavares Da Silva, C. 2005. A presença fenícia e o processo de orientalização nos estuários do Tejo e do Sado. In *Actas del III Simposio Internacional de Arqueologia de Mérida*, 749–765. Mérida: Instituto de Arqueologia.

Tavares Da Silva, C., and J. Soares. 1976–77. Contribuição para o conhecimento dos povoados calcolíticos do Baixo Alentejo e Algarve. *Setúbal Arqueológica* 2–3: 179–272.

Tavares Da Silva, C., and J. Soares. 1997. Economias costeiras na Pré-história do Sudoeste português. O concheiro de Montes de Baixo. *Setúbal Arqueológica* 11–12: 69–108.

Tavares Da Silva, C., and J. Soares. 1998. Le Portugal. In *Atlas du Néolithique Européen*, ed. J. Guilaine. Liège: Université de Liège.

Tavares Da Silva, C., J. Soares, and L.N.C. Wrench. 2011. Les premières mosaïques romaines découvertes à Caetobriga (Setúbal, Portugal). In *11th International Colloquium on Ancient Mosaics,* 295–308. 16th–20th Oct 2009. Bursa Turkey.

Taylor, R. E. (Erv)

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Basic Biographical Information

R. E. (Erv) Taylor (1938–) is an American archaeologist best known for his work in radiocarbon dating (^{14}C). He received his Ph.D. in anthropology at the University of California, Los Angeles (UCLA), in 1970 with an emphasis on archaeology and archaeological sciences/archaeometry. His doctoral research, under the direction of C. W. Meighan, was undertaken in the laboratory of Nobel laureate Willard F. Libby. From 1972 to 1973, he was an NSF postdoctoral fellow in chemistry at UCLA working with Daniel Kivelson.

From 1969 to 2005, he rose to professor in the Department of Anthropology at the University of California, Riverside (UCR), and has been professor emeritus since 2005. He served as chairperson of that department from 1993 to 2000. He was director of the radiocarbon laboratory at UCR from 1973 to 2003. Since 2003, he has been a Visiting Professor at the Cotsen Institute of Archaeology, UCLA, and, since 2004, has also been a visiting scientist at the Keck Accelerator Mass Spectrometer Laboratory, University of California, Irvine.

Major Accomplishments

Taylor's research has focused on examining the application of dating and analytical techniques in archaeology, with particular emphasis on radiocarbon. He is recognized for his work involving the ^{14}C dating of bone, particularly human bone samples associated or thought to be associated with the earliest human populations in the New World.

In the early part of his career, Taylor published a series of papers focused on the evaluation of ^{14}C data from various sites in West Mexico. In

connection with these studies, he published some of the first papers concerned with defining marine reservoir effects in the ^{14}C dating of shell from the Pacific coasts of North, Central, and South America and the first large suite of ^{14}C dates on organics extracted from ceramics.

In the 1980s and extending into the early 1990s, Taylor was involved in pioneering applications of the use of accelerator mass spectrometry (AMS) technology to ^{14}C dating of archaeological materials, in association with the then newly established AMS laboratory at the University of Arizona. Later, he was instrumental in developing support for establishing the Center for Accelerator Mass Spectrometry for the University of California at the Lawrence Livermore National Laboratory. More recently, he has collaborated with scientists at the W. M. Keck Carbon Cycle Accelerator Mass Spectrometry Laboratory, Department of Earth System Science, University of California, Irvine.

Taylor initiated studies with a number of collaborators resulting in major downward revisions in the Pleistocene ages assigned to a series of California Paleoindian skeletons, particularly Sunnyvale, Yuha, Los Angeles, and Haverty. The UCR laboratory was also responsible for ^{14}C dates on the Calaveras Skull, the "Piltdown" of the New World (Taylor et al. 1992a). His laboratory obtained the first ^{14}C age determinations on the Kennewick skeleton (Taylor et al. 1998). He has also been involved in continuing studies focused on the accuracy of ^{14}C dates from the site of Monte Verde in Chile and possible regional offsets in ^{14}C calibration data for the mid-1st millennium BCE (Taylor et al. 1999).

In the 1970s, Taylor was involved in early studies in obsidian sourcing and hydration dating and edited the first volume addressing archaeological and geochemical issues involving obsidian (Taylor 1976).

Taylor has authored over 100 journal articles in a wide range of scholarly journals including *Science*, *Nature*, *American Antiquity*, *Antiquity*, *Historical Archaeology*, *World Archaeology*, and *Radiocarbon*. He is the author/editor of several significant books: *Chronologies in New World Archaeology* (Taylor and Meighan 1978), *Radiocarbon Dating: An Archaeological Perspective* (Taylor and Bar-Yosef 2014), *Radiocarbon After Four Decades: An Interdisciplinary Perspective* (Taylor et al. 1992b), and *Chronometric Dating in Archaeology* (Taylor and Aitken 1997). He also has written on the history of the development of ^{14}C dating with particular attention to its early application in archaeology (Taylor 1985, 2000).

Taylor's career accomplishments were recognized with the awarding of the 2004 Fryxell Award for Interdisciplinary Research, from the Society for American Archaeology, of which he is a longtime member. He is a fellow of the American Association for the Advancement of Science and the American Anthropological Association. He was a cofounder of the Society for Archaeological Sciences, as well as its first president (1980–1981) and general secretary for 20 years (1982–2002).

Cross-References

- ▶ Archaeology: Definition
- ▶ Bone: Chemical Analysis
- ▶ Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues
- ▶ Monte Verde, Archaeology of
- ▶ Paleoindians
- ▶ Peopling of the Americas
- ▶ Radiocarbon Dating in Archaeology
- ▶ Society for Archaeological Sciences (SAS)

References

Taylor, R.E., ed. 1976. *Advances in obsidian glass studies: Archaeological and geochemical perspectives*. Park Ridge: Noyes Press.

Taylor, R.E. 1985. The beginnings of radiocarbon dating in *American Antiquity*: A historical perspective. *American Antiquity* 50: 309–325.

Taylor, R.E. 2000. The introduction of radiocarbon dating in American archaeology. In *Archaeological dating and the history of North American archaeology*, ed. S.-E. Nash, 84–104. Salt Lake City: University of Utah Press.

Taylor, R.E., and M.J. Aitken, eds. 1997. *Chronometric dating in archaeology*. New York: Plenum Press.

Taylor, R.E., and O. Bar-Yosef. 2014. *Radiocarbon dating; An archaeological perspective*. 2nd ed. Walnut Creek/London: Left Coast Press/Routledge.
Taylor, R.E., and C.W. Meighan, eds. 1978. *Chronologies in New World archaeology*. New York: Academic.
Taylor, R.E., L.A. Payen, and P.J. Slota Jr. 1992a. The age of the Calaveras skull: Dating the "Piltdown man" of the New World. *American Antiquity* 57: 269–275.
Taylor, R.E., A. Long, and R. Kra, eds. 1992b. *Radiocarbon after four decades: An interdisciplinary perspective*. New York: Springer.
Taylor, R.E., D.L. Kirner, J.R. Southon, and J.C. Chatters. 1998. Radiocarbon age of Kennewick Man. *Science* 280: 1171–1172.
Taylor, R.E., C.V. Haynes Jr., D.L. Kirner, and J.R. Southon. 1999. Radiocarbon analysis of modern organics at Monte Verde, Chile: No evidence for a local reservoir effect. *American Antiquity* 64: 455–460.

Techniques of Paleolithic Art

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Brief Definition of the Topic

Techniques used by Upper Paleolithic groups to produce their graphic works of art provide almost inexhaustible sources on "ways of doing." They also enable us to reflect on the levels of practice of "artists," on the internal organization of societies, and on the implication of the individuals in the procurement of pigments, tools, and mediums.

In studying the techniques of Paleolithic artists, we seek to identify the set of processes of formal construction from the level of a single trace, to their combination into the form of a drawing all the way to the use of the graphic space whether it be on a restricted medium like an object or on a wall.

The study of techniques allows for the understanding of the artists' gestures and the mediums used in the different graphic works.

The mediums of prehistoric representations are multiple and varied from objects of portable art (including bone, stone tablet, ivory, antler) to cave walls, shelters under rock, and rocky blocks in the open air. It is possible to distinguish two main categories of techniques employed: those that add material during the course of the work and those that proceed by removing matter.

In the first category we find the use of pigment for drawing or painting. The coloring is deposited on the medium (bone, rock, or others). The state of the coloring material allows us to distinguish a drawing from a painting. A painting requires a liquid pigment which is applied with a paintbrush, a brush, with the tips of the fingers, or even blown with the mouth, while drawings require a compact pigment, prepared in the form of chalk, pencil, or pastel.

The second category of techniques of Paleolithic art is illustrated by the removal of matter such as engraving, sculpture, and some types of modeling.

These general principles are applicable to all forms of prehistoric art. We see them being implemented on the first decorated representations, for example, the drawings and paintings on the Chauvet-Pont-d'Arc Cave – at 36,000 cal BP.

Upon this theoretical basis, Paleolithic techniques seem relatively simple. It is important to understand as a follow-up how the "artists" combine their gestures and whether the results obtained seem to conform to the goals that we imagine they had set for themselves.

Generally, the fundamental actions of engraving are relatively easy to master if we take into consideration some physical constraints associated with the support (bone, stone, antler) and the tool (flint, finger, stick). Once the bases are acquired, we can evaluate the quality of the designers according to two criteria: the mastery of the drawing and the technical skill. All the know-how of the Paleolithic artist resides in the acquisition of these two foundations.

The most beautiful examples of drawings in the Chauvet Cave perfectly illustrate this double mastery. Admittedly, one should not underestimate the creative imagination of the individual and its capacity for invention or for breaking the rules. Nevertheless, the expertise and graphic innovations remain in the large majority of cases subject to the social codes that govern the artistic

production of this cultural group, and the control of society over the individual is highlighted throughout the duration of the Upper Paleolithic.

From the appearance of the first graphic manifestations, all techniques (engravings, sculpture, drawing, painting, modeling) are present and acquired. They persist throughout the Upper Paleolithic.

In Chauvet Cave, the combination of graphic and technical expertise, which characterized the important compositions of black paintings during the Aurignacian, along with the very early dates, destabilized some researchers. To summarize, we can say that all adaptations to the medium are present in Chauvet Cave: the drawing incised with the finger tips, with the flint tool on hard surfaces or softer limestone all the way to the use of more complex techniques requiring combined successive gestures (i.e., on the Panneau des Cheveaux). To start, the artist prepared the surface, removing a portion of the fine film of ochre clay that covers the rock surface. Next, the artist set up the figures by species beginning with the rhinoceros, aurochs, and finally the horses. The contours of the animals are first made with charcoal and then the inner surface of silhouettes is hand faded by mixing directly on the wall, charcoal, chalk, and clay remains. The colors obtained thus present nuances that fade from dark gray to light gray and dark brown gray. The next phase is a clipping of figures with a chisel made of flint to clarify the contours and highlight the black animal heads in contrast to the white limestone.

Throughout the Upper Paleolithic, the prehistoric peoples adapted these processes as well on objects as on cave walls and rock shelters. Thus, in the Magdalenian, we see in some regions the development of monumental friezes carved on hard limestone deep inside rock shelters such as Angles-sur-l'Anglin (Vienne) and Cap Blanc (Dordogne). In the Pyrenees, a specialty of clay modeling is evidenced in several neighboring caves such as Le Tuc d'Audoubert in Ariege and Montespan (Haute-Garonne).

According to 14C dating, portable art shortly precedes parietal art but, from the origin, we note that the same patterns (in technique and symbols) govern the works, with no noticeable difference. However, it is principally during the Magdalenian that we find a large diversity of objects, illustrating the range of techniques and supporting media. And as with parietal art, we find variable expertise according to the authors. Here again, it is the combination of criteria that establishes a qualitative difference. A number of objects of portable art stand out because of the choice of material, such as the tooth of a sperm whale sculptured at Mas d'Azil, or in matching of theme and support, such as the self-licking bison at La Madeleine, not to mention the Aurignacian figurines in Germany or the Gravettian female statuettes.

Today we know that graphic techniques and their degree of elaboration do not have a chronological value. We cannot qualify a culture based only on our reflection of the procedural techniques employed in the realization of images, both abstract and figurative. We must also forget the notion of "technical progress" in the sense of an evolution in artistic knowledge that would improve over time. In rock art, evolutionary progress does not exist and we must rethink our paradigms.

Cross-References

► Europe: Paleolithic Art
► Europe: Prehistoric Rock Art
► Rock Art, Forms of

Further Reading

Aujoulat, N. 2004. *Lascaux, le geste, l'espace et le temps*. Paris: Le Seuil.

Bégouën, R., C. Fritz, G. Tosello, J. Clottes, A. Pastoors, F. Faist, et al. 2009. *Le sanctuaire secret des Bisons. Il y a 14000 ans, dans la caverne du Tuc d'Audoubert*. Paris: Ed. d'art Somogy et Assoc. L. Bégouën.

Fritz, C. 1999. *La gravure dans l'art mobilier magdalénien. Du geste à la représentation.* Documents d'Archéologie Française (D.A.F.) 75. Paris: édition de la Maison des Sciences de l'Homme.

Fritz, C., and G. Tosello. 2007a. The hidden meaning of forms: Methods of recording Paleolithic parietal art. *Journal of Archaeology Method and Theory* 14 (1): 48–80.

Fritz, C., and G. Tosello. 2007b. Le secteur de la Salle Hillaire et de la Salle du Crâne: diversité, styles et

datations de l'art paléolithique dans la grotte Chauvet. In *Les chemins de l'art aurignacien en Europe.* cahier 4; Actes du colloque international d'Aurignac 2005, dir. N. Rouquerol and H. Floss, 393–408. Aurignac: éditions Musée-Forum d'Aurignac.

Lorblanchet, M. 2010. *Art pariétal – Grottes ornées en Quercy*. Rodez: Editions du Rouergue.

Rivero, O. 2007. Aproximación al estudio de las cadenas operativas del grabado sobre soporte pétreo: Análisis tecnológico de una representación de équido del Magdaleniense Medio de la cueva de Las Caldas (Asturias, España). *Zephyrus* LX: 97–111.

Tosello, G. 2003. *Pierres gravées du Périgord magdalénien: art, symboles, territoires*. 36e supplément à Gallia Préhistoire. Paris: CNRS éditions.

Technological Studies in Archaeological Science

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Introduction

Technological studies are concerned with many of the big questions of archaeology: Who made the objects we find? What materials did ancient people use? Where did they obtain their raw materials, and how did they craft pottery, stone tools, buildings, clothing, and other useful items? How did they communicate technological knowledge to each other, and how and where did they trade raw materials and finished objects? Why did people value certain materials and products over others?

The extent to which scholars can answer these questions depends upon the physical evidence left behind (e.g., pottery kilns, potsherds and broken glass vessels, chert debitage, and scraps of preserved textiles), the context of the finds, and the nature of historical information, if any. For example, when dealing with the Roman pottery industry in Italy, France, and Germany, scholars find stamps (Fig. 1) of potters and manufacturers and literary evidence in addition to physical pottery installations for interpretation. In contrast, prehistoric stone pipe and figurine production in North America must be reconstructed from the physical remains (quarry sites and finished objects) alone.

Technological Studies in Archaeological Science, Fig. 1 Manufacturer's stamp on Roman *terra sigillata* (Photo by S. Wisseman, University of Illinois)

Evaluating the evidence is a multidisciplinary endeavor, with teams of specialists collaborating to use appropriate analytical techniques and other approaches such as experimental replication of artifacts to reconstruct early technologies. Success, defined here as arriving at the most likely construction methods and materials used by ancient craftsmen, requires asking the right questions throughout the research process and following a coherent research strategy.

Definition

The study of ancient technologies is really about processes and patterns of human behavior and

about tracing the journey of an object from its beginning as a lump of wet clay or a chunk of obsidian to a finished product used and valued by human beings. This research starts with provenance studies (see separate entry) that examine the question of source (where people found their raw materials) and the trade and exchange of materials and products across the landscape. Technological studies, the primary focus of this entry, reveal material properties and some of the reasons people chose particular materials to fashion into pots, tools, figurines, and cloth, plus the methods they used for fabrication. Such studies are conducted today using a sequence of archaeometric methods (analyzing composition, structure, date, etc., using imaging, microscopic, mineralogical, and chemical techniques). To be cost-effective, most researchers move from macro to micro examination and from simplest techniques (e.g., light microscopy, X-ray radiography) to more complex ones (e.g., neutron activation analysis or inductively coupled plasma spectrometry). Depending on the nature of the research questions posed, it is often useful to perform mineralogical analysis (e.g., petrography, X-ray diffraction) prior to elemental analyses (e.g., X-ray fluorescence) (Emerson et al. 2005).

Understanding the decisions craftsmen made during production (such as how to compensate for bad weather or insufficient fuel during a pottery firing) requires research that goes beyond using instruments for materials analysis. Ethnoarchaeology is the study of living craftsmen who still use traditional practices that can sometimes clarify ancient procedures, and experimental archaeology is the careful replication of artifacts using, as much as possible, materials and methods available to ancient people. Such experiments teach the researchers about the limitations of specific materials, how much skill was required to make tools such as obsidian knives or large ceramic storage jars, and the pitfalls of assuming one knows how something was made just from casual observation or book learning.

For societies who left no written record, detailed examination of the location, layout, and debris of a production site can reveal patterns of behavior that contribute to our understanding of *chaîne opératoire*, or sequence of operations. Social organization and status of craftsmen can sometimes be inferred, although such research is much easier with written or artistic records (e.g., literary sources describing Greek ceramic manufacture and images of potters at work on vases). Cognitive archaeology is the recreation of decision-making and teaching processes used by early craftsmen (e.g., how to judge the correct temperature of an iron forge) through imitation by modern craftsmen. Another area of research is use-wear or use-alteration analysis: the examination of items such as potsherds, cooking pots, or stone tools using magnification, organic residue analysis, and other techniques to determine how artifacts were used and reused over time.

Historical Background

During the early years of archaeometric research, the focus of technological studies was primarily on inorganic materials: clay, metal, and stone. The field was dominated by compositional and authenticity studies using techniques borrowed from chemistry and the physical sciences (various types of microscopy, spectroscopy, radiography, neutron activation analysis, etc.). Early research (in part because some of it was conducted by chemists and physicists rather than archaeologists) focused more on questions of what and how (composition and methods of construction) than on who and why. As archaeologists and anthropologists became increasingly involved in interdisciplinary projects, emphasis shifted to strategies for determining function of artifacts, processes of the craftsmen, and patterns of use and discard.

In the United States, the work of archaeologist Anna O. Shepard (Bishop and Lange 1991) set the stage for careful interdisciplinary studies of ceramics, while physicist Michael Tite's research in Britain applied scientific techniques to the study of composition and structure of ceramics, enamels, glass, stone, and metals. Today, with a host of newer techniques available from the biological sciences, researchers are including organic materials (e.g., textiles, bone, and ivory) in their

quest to reconstruct ancient technologies of every sort and set the materials and methods used by craftsmen into a broader human context.

This broader human context requires expanding our definition of what was important to the people who made the artifacts we study. For example, a craftsman's choice of raw material depends not only upon physical properties (e.g., color, hardness, or behavior when heated) but location relative to production sites and perceived value of a material. Early researchers such as Dean Arnold considered factors such as the weight (of wet clay), the method of transport available, and the amount of manpower required to collect raw materials. However, people's choices of material are also influenced by a desire for exotica, even when the cost of transport of labor is high. For example, researchers in the mid-continental United States have proven that pipestone workers often chose raw material from far away for reasons that are not always clear to modern archaeologists, selecting Minnesota red catlinite over locally available Ohio flint clay (Emerson et al. 2005).

Key Issues and Current Debates

Archaeologists are interdisciplinary scholars out of necessity. Because excavation usually produces only fragmentary physical evidence, archaeologists must be creative about combining approaches to extract the maximum amount of information from potsherds, stone flakes, and scraps of deteriorated textiles. When time and budgets permit, examination of the technologies employed in making a ceramic or glass container, a stone or metal tool, or a piece of cloth often includes the full range of compositional and structural studies (archaeometry), experimental replication, and ethnographic analogy.

Experimental archaeology (see separate section) is one way to illuminate factors in selection or manufacture of artifacts that are not immediately obvious. Although this approach gives the archaeologist firsthand experience of materials and processes, extrapolation of this experience into the past is fraught with difficulties. The researcher needs to understand the processes well enough to identify the variables involved (e.g., choice of raw materials, type of fuel, time, temperature, and atmosphere in a ceramic firing or iron smelting) and then control as many independent variables as possible (Hamilton 2007). If modern materials or tools are employed in the experiments, these additional variables must be taken into account in evaluating the success of the experiments (Claassen 1981). Also, it is easy for the replicator to assume that because he has discovered one way something could be done (e.g., throwing a large vase in three sections), that it was the only way it was done in antiquity. Experimental archaeology helps researchers narrow down possibilities: Finding out that a method of construction is impossible is useful information when it forces them to consider other methods. It also teaches archaeologists the value of hands-on experiments (Buchanan et al. 2016). For example, it becomes clear when making round-bottomed cooking vessels out of clay that using a shallow, already-fired bowl as a mold for the base speeds up the coiling process and thus increases the rate of production of multiple molded-bottom, coiled-body bowls. Similarly, burnishing a pot with a smooth pebble for half an hour in many directions makes classical archaeologists appreciate the value of the slave labor used in ancient Athens.

An example of a thoughtful and well-designed ceramic project is Eric Hostetter's recreation of Lydian terracotta roofing tiles from the site of Sardis in Turkey (Hostetter 1994). Local clays and slips and detailed molds were used for authenticity, but a compromise was reached on the nature of the kilns due to time constraints. After an experimental wood kiln produced reducing conditions that affected the clarity of colors of the finished tiles, electric and gas kilns were employed to achieve a consistent final product that could be displayed to site visitors.

One of the best examples of experimental archaeology is Peter Schmidt's study of ironworking in East Africa. This study successfully blended ethnographic observation of traditional blacksmithing techniques, replication of ancient artifacts, and materials analyses of both

the replicates and the artifacts (Schmidt 1997). In addition to conducting his own experiments with other archaeologists in collaboration with a metallurgist, Schmidt organized several modern smelts that were performed by living Haya craftsmen in Buhaya, Tanzania. He comments, "we needed a method of investigation that exploited the evidence of modern smelts but did not assume that ancient practices were identical to modern ones." This meant the team had to "determine the fingerprints that technological behaviors such as preheating leave behind and then to look for these and other fingerprints in the physical remains of historic or prehistoric smelts" (Schmidt 1997: 129). This approach produced useful information on where slag accumulated in the furnace, temperature ranges, and reuse of some types of slags. Izumi Shimada used a similar combined approach of archaeometric analyses and experimental archaeology to reconstruct the processes and furnace construction used by copper alloy metalworkers at Batán Grande, Peru. Shimada also built a replica pottery kiln at Sícan, Peru, as part of a larger ceramic study (Shimada 2005).

Another example of a metalworking study that combines replication of artifacts with ethnographic observation is Charles Keller's work on African and North American ironworking. While in Africa, Keller served as an apprentice to a blacksmith because he wanted to learn how people learn and how craftsmen communicate valuable technological information nonverbally: by showing or telling rather than using blueprints. This illustrates one of the aspects of cognitive archaeology, trying to understand what a craftsman knows and how he knows it. For example, judging the heat of the forge is often done by color ("red" heat vs. "white" heat), and an apprentice quickly learns by watching someone more experienced about what works and what does not. Or, when making a replica of an eighteenth-century skimmer, a blacksmith holding the historical artifacts but possessing no set of step-by-step instructions must use prior experience and trial and error to achieve the desired result (Keller 1994). Similarly, Raku potters learn that visual cues are the best indicators for when to pull a pot out of the kiln and put it in sawdust: when the glaze looks "like melted ice cream" (Ron Kovatch, *personal communication*).

Other examples of combined approaches (experimental replication, archaeometry, and use-wear analysis) include flintknapping and butchering experiments conducted by scholars such as Nicholas Toth. Toth recreated his own Oldowan tool kit at Koobi Fora, Kenya, learning by experience which rocks and methods (e.g., percussion, anvil) worked best to produce hammerstones, choppers, and scrapers. Then he used his tools to butcher elephants and other animals. Such work informs the archaeologist about which tools are best for which tasks (removing skin, stripping flesh, scraping or cutting bone or plant fibers), and microscopy reveals polishes left by different materials. A more recent study examines hard versus soft percussion traces on chert from central Texas (Buchanan et al. 2016).

When researchers are more concerned with materials and their properties than processes of manufacture, traditional laboratory analysis can answer many questions. Compositional and structural analyses reveal constituents of dyes and pigments in textiles, enamels, ceramic glazes, and glass. Textile chemists such as Kathryn Jakes and Pamela Martoglio have used infrared spectroscopy, scanning electron microscopy (SEM), and other techniques to identify fibers, coatings, and finishes on textiles (Martoglio and Jakes 1990). These methods work particularly well on well-preserved cloth from environments such as Peru or Egypt; SEM has been used to characterize layers of wrappings (Fig. 2) on Egyptian mummies (Proefke et al. 1992). Balms and bitumens used in preserving Egyptian mummies have also been analyzed chemically (Lucejko et al. 2017).

Many scholars (e.g., Tite 1987) have employed surface analytical techniques such as X-ray fluorescence (XRF) to identify the elements (e.g., cobalt for blue, copper for green, iron for red) used to color Roman glass and medieval enamels. Since many extant pieces of ancient glass were isolated from their original contexts and preserved in museum collections, the question of authenticity occurs frequently. For example, the British Museum wondered if the famous Portland Vase,

Technological Studies in Archaeological Science, Fig. 2 SEM of flax fibers from Egyptian mummy wrappings (Photo by M. Raheel, University of Illinois)

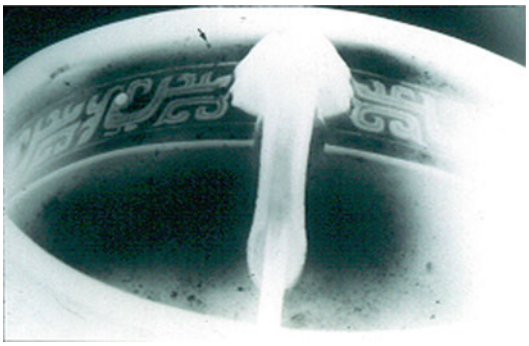

Technological Studies in Archaeological Science, Fig. 3 X-ray of Chinese bowl (Photo by R. Keen, University of Illinois)

a spectacular luxury piece with cutout white glass overlaying a blue body, was really Roman or much later, of Renaissance date. Tiny fragments left over from an earlier repair allowed researchers to examine structure and composition using scanning electron microscopy/energy-dispersive spectroscopy (SEM/EDS) and determine that the glass' low potash and magnesia content were consistent with Roman production (Freestone 1991).

Glass was often used in combination with other materials, for example, faience (a ceramic body composed mostly of crushed quartz with an alkaline glaze). A true ceramic glaze is a thin layer of glass bonded to clay, and this layering can be seen easily with an SEM examination. Fluxes (e.g., alkalis, iron oxides) were used to lower the melting point of silica in the glaze material so it would vitrify before the rest of the pot. Other crossover technology is enameling, invented by ancient Egyptians, because it involves melting glass over a metal substrate (Lambert 1997).

The black surface finish of Greek vases confounded archaeometrists and experimental archaeologists for many years. Is it a slip (a suspension of clay in water) or a true glaze? The term for Attic "glaze" is sometimes replaced by "gloss" because it was initially assumed to be a fine suspension of the same clay used for the body of the vase. Greek clay naturally contains illite and iron oxide, minerals that act as fluxes to lower the melting temperature of the surface coating. While some researchers believe that this composition explains the glossy finish so prized by the Athenians and their customers, one study indicates that the surface coating really is a glaze and that the composition was not accidental. Kingery (1991) concluded that the Greeks probably employed special glaze clays and carefully controlled additions of potassium and iron oxide and demonstrated that there is actually a thin layer of glass on the fired surface.

X-ray radiography and other imaging techniques continue to help archaeologists and museum curators answer questions about structure and dating of objects that cannot be destructively sampled. For example, X-rays confirmed the late twelfth century CE date of a Japanese wooden statue and the late tenth century BCE date of a Chinese bronze *gui* bowl. In the former case, the issue was one-piece construction versus multipiece construction, and in the latter case, the X-rays revealed that the Chinese bronze bowl had been cast upside down in a multipiece mold. Also present were bubbles (Fig. 3) in the metal from trapped gas, a feature often present in ancient bronzes but not in modern ones. A pinpoint analysis of the metal (sample taken from the base) showed a leaded bronze with 10–20% tin and no zinc composition consistent with the early date (Vitali et al. 1986). One of the advantages of X-ray technology is that it is less expensive than CT scanning or other advanced medical imaging and is more widely available (at the University of Illinois, researchers have examined everything from Byzantine necklaces to Egyptian mummies at an on-campus veterinary facility).

Current research includes experimental archaeology in new areas, such as ceramic production and cooking methods for North American grains and seeds in periods before European contact. At the Illinois State Archaeological Survey, replicate cooking pots were used to compare two cooking methods used by Woodland peoples: rock boiling (inserting preheated rocks into a grain/water mix) and direct heat (placing the grain-and-water-filled pot directly in the fire) to compare speed of heating and cooking efficiency. The experiments demonstrated that both methods worked for cooking quinoa (a modern descendant of *Chenopodium*, a grain used in the Midwest before about 800 CE) to an edible state in about 20 min and that the necessity of reheating the rocks explained spillover marks, charring, and residues near the lips of the vessels and grit in the gruel (Wisseman 2005).

Colorants used in ancient North American textiles have been examined by comparing fragmentary, barely colored archaeological samples with replicate cloth using close approximations of ancient ingredients: ferrous oxide, ground bloodroot, beef fat, etc. Various types of microscopy, ICP-MS (inductively coupled plasma mass spectrometry), and forensic photography were used to establish a protocol for identification of trace amounts of both inorganic and organic colorants (Baldia and Jakes 2007). This study is a good example of a research project that has broader implications than a single, focused study: It sets up future research by demonstrating a workable selection of processes and a sequence of analyses to achieve useable results.

Future Directions

Archaeologists will continue to use combined approaches (laboratory analysis, ethnographic observation, and experimental replication of artifacts) to extract the maximum information out of fragmentary archaeological materials, especially organics. Larger projects that cut across technologies may become more common. For example, a metalworking study of silver production at Rio Tinto, Spain, during Roman times has produced surprising results that impact analyses of Egyptian mummies. Some of the lead oxides that are by-products of the process form the red pigment *minium*, recently found by a team from the Getty Conservation Institute to be the major colorant in approximately ten Roman-period "red shroud" mummies now in museums around the world. The red pigment was analyzed by inductively coupled plasma time-of-flight mass spectrometry (ICP-TOFMS) and Raman microspectroscopy (Corcoran et al. 2010). This discovery of an exotic and expensive ingredient (in addition to gold leaf) confirms that the "red shroud" mummies were commissioned by well-to-do families in Roman Egypt. The ever-expanding field of mummy studies combines analyses of human remains for health and dietary information with studies of wrappings (e.g., Egyptian linens and Peruvian textiles), resins, amulets, and tools used in embalming procedures and burial rituals.

As the instrumentation available to researchers becomes ever more sophisticated, new possibilities for analysis open up. However, such innovations can be extremely expensive and inaccessible to all but select research teams. One example is synchrotron radiation-based X-ray fluorescence and X-ray diffraction (available at only a few locations in the world such as Argonne National Laboratory), used by Elizabeth Friedman and colleagues at the Illinois Institute of Technology to obtain subsurface data from metal artifacts that cannot be destructively sampled. Other examples include micro-CT scanning for extremely high resolution imaging of tiny samples and next-generation DNA sequencing, currently employed by European researchers to analyze the genome of the Italian Iceman mummy.

One has to keep in mind that the latest techniques are not always required to answer simple questions: For example, distinguishing between brass and bronze requires identifying only three elements: copper plus either tin or zinc. Thus a technique such as energy-dispersive X-ray analysis may be sufficient and a much more cost-effective choice than synchrotron XRF. Similarly, older techniques such as metallography, the microscopic examination of polished sections of metal artifacts, are still extremely useful for

detecting craftsmen's methods, for example, cold working versus repeated heating and cooling of a copper artifact. Appropriate application of archaeometric techniques requires a sequential approach, beginning with the simplest and most cost-effective techniques, with frequent collaborative discussion at each stage to evaluate not only the results but whether and how to proceed with further tests.

Another future trend is combining traditional laboratory-based instrumentation with portable instruments, for example, X-ray fluorescence spectrometers that can rapidly and nondestructively collect data in the field or museum setting. Protocols are still being developed, and the performance of different portable instruments is being compared for accuracy and precision (Shackley 2010).

Despite all the modern instrumentation available today for the study of ancient artifacts and technologies, there are still questions researchers cannot answer, often because archaeological context or other information is missing. For example, in Mississippian archaeology in North America, a mysterious ceramic artifact continues to baffle archaeologists. Called "stumpware," it is a two- or three-legged fired clay piece (Fig. 4) that may be either a funnel for draining lime-treated maize or a firedog used to support cooking pots. Sometimes the stumpware is perforated, but not always in the same place. Some stumpware has a chalky white residue on the exterior, some does not. Could the holes be added by the potter to speed drying time of these thick ceramic pieces? What is the correct function of stumpware, and does it change function over time? Residue analysis, such as that performed by Richard Evershed at Bristol University in the UK to identify embalming resins in Egyptian mummies, may eventually produce an answer.

Technological Studies in Archaeological Science, Fig. 4 Experimental stumpware used as firedogs (Photo by S. Wisseman, University of Illinois)

Finally, the interdisciplinary nature of research on ancient technologies requires more cross-training of archaeologists. While most archaeologists cannot be equally well versed in archaeology and chemistry or the other natural and physical sciences, more than a passing familiarity with available analytical techniques and their advantages and disadvantages is a necessity. Only then can the kind of sustained and fruitful dialogue between specialists of different backgrounds produce results that help scholars successfully interpret the technological behavior of past cultures.

Cross-References

- ▶ Ceramics, Ancient Greek
- ▶ Ceramics: Scientific Analysis
- ▶ Classical (Greek) Archaeology
- ▶ Cognitive Archaeology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Ethnoarchaeology
- ▶ Experimental Maritime Archaeology
- ▶ Pigment Analysis in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Quinoa: Origins and Development
- ▶ Stone Tool Usewear and Residue Analysis
- ▶ Woodland and Mississippian Cultures of the North American Heartland
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Baldia, C.M., and K.A. Jakes. 2007. Toward the classification of colorants in archaeological textiles of eastern North America. In *Archaeological chemistry ACS symposium series*, ed. M. Glascock, 15–43. Washington, DC: American Chemical Society.

Bishop, R.L., and F.W. Lange. 1991. *The ceramic legacy of Anna O. Shephard*. Niwot: University Press of Colorado.
Buchanan, B., V. Mraz, and M.I. EREN. 2016. On identifying stone tool production techniques: An experimental and statistical assessment of pressure vs. soft hammer percussion flake form. *American Antiquity* 81 (4): 737–751.
Claassen, C.P. 1981. Experimentation with modern materials. In *Modern material culture*, ed. R.A. Gould and M.B. Schiffer, 239–246. New York: Academic.
Corcoran, L.H., M. Svoboda, and M. Walton. 2010. *Herakleides: A portrait mummy from Roman Egypt*. Los Angeles: The J. Paul Getty Museum.
Emerson, T., R.E. Huges, K.B. Farnsworth, S. Wisseman, and M. Hynes. 2005. Tremper Mound, Hopewell catlinite, and PIMA technology. *Midcontinental Journal of Archaeology* 30: 189–216.
Freestone, I. 1991. Looking into glass. In *Science and the past*, ed. S. Bowman, 37–56. London: Trustees of the British Museum.
Hamilton, E.G. 2007. Adventures in experimental smelting: Iron the old-fashioned way. *Expedition* 49 (3): 13–19.
Hostetter, E. 1994. *Lydian architectural terracottas: A study in tile replication, display and technique*, Illinois classical studies, Supplemental monograph. Vol. 4. Atlanta: Scholars Press.
Keller, C. 1994. Invention, thought, and process: Strategies in iron tool production. In *Ancient technologies and archaeologicalmaterials*, ed. S. Wisseman and W. Williams, 59–70. Amsterdam: Gordon and Breach Science Publishers.
Kingery, D. 1991. Attic pottery gloss technology. *Archeomaterials* 5: 47–54.
Lambert, J.B. 1997. *Traces of the past: Unraveling the secrets of archaeology through chemistry*. Reading: Perseus Books.
Lucejko, J., J. Connan, S. Orsini, E. Ribechini, and F. Modugno. 2017. Chemical analyses of Egyptian mummification balms and organic residues from storage jars dated from the Old Kingdom to the Copto-Byzantine period. *Journal of Archaeological Science* 85: 1–12.
Martoglio, P.A., and K.A. Jakes. 1990. Unlocking the secrets of the past: The analysis of archaeological textiles and dyes. *Archaeological Chemistry* 62: 1123A–1128A.
Proefke, M., K.L. Rinehart, M. Raheel, S.H. Ambrose, and S.U. Wisseman. 1992. Probing the mysteries of ancient Egypt: Chemical analysis of a Roman period Egyptian mummy. *Analytical Chemistry* 64: 105A–111A.
Schmidt, P. 1997. *Iron technology in East Africa: Symbolism, science, and archaeology*. Bloomington: Indiana University Press.
Shackley, M.S. 2010. Is there reliability and validity in portable X-ray fluorescence spectrometry (PXRF)? *The SAA Archaeological Record* 10: 17–20.
Shimada, I. 2005. Experimental archaeology. In *Handbook of archaeological methods*, ed. H.D.G. Mashner and C. Chippindale, vol. 1, 603–642. Lanham: Altamira.
Tite, M.S. 1987. Characterisation of early vitreous materials. *Archaeometry* 29: 21–34.
Vitali, V., J. Darcovich, and W. Williams. 1986. X-ray radiography of a gui vessel in the Krannert Art Museum collection. *Journal of the International Institute of Conservation-Canadian Group* 10–11: 3–7.
Wisseman, S. 2005. True grit: Middle Woodland cooking and pottery production. *Illinois Archaeology* 17: 189–200.

Further Reading

Rice, P.M. 1987. *Pottery analysis: A sourcebook*. Chicago: University of Chicago Press.
Wisseman, S., and W.S. Williams, eds. 1994. *Ancient technologies and archaeological materials*. Amsterdam: Gordon and Breach Science Publishers.

Television and Archaeology: Views from the UK and Beyond

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Introduction

For millions of people, their primary engagement with archaeology is through the now-traditional medium of linear broadcast television (Merriman 1991: 119–120; Holtorf 2007: 52–54). Though undoubtedly challenged by newer ubiquitous information technologies with rapidly evolving modes of reception, after more than half a century, this largely remains the case (Pokotylo and Guppy 1999; Payton 2002; Clack and Brittain 2007: 14). However, any archaeological message on any media platform is generated, transmitted, and received within a particular sociocultural technological environment. Viewed as material culture, the historical, economic, political, and ideological context of broadcasting might itself be considered as an anthropological or indeed archaeological meta-narrative (see Huhtamo and Parrika 2011).

Furthermore, archaeology, a project almost wholly funded directly or indirectly from the public purse, is granted singular public trust (Hodder 1987: 166). Yet, the TV broadcasts of the twentieth century's economically developed countries –

those that created mass audiences for electronic media – inevitably reflected particular geo-historical views of both scientific method and world culture. This context for the establishment of many of the most enduring themes, formats, and common tropes of TV archaeology must be pertinent to any understanding of a dynamic interacting relationship.

As a subject, archaeology perfectly answered the call of Lord Reith – founder and first director general of the British Broadcasting Corporation (1927) – to "educate, inform and entertain." Accordingly, the decades from the early 1950s – especially in the United Kingdom with this public service remit for its publically funded broadcaster – generated a recognizable genre for TV archaeology. If many of the formats then created have survived because they are somehow fit for purpose, we might still ask if or how this purpose has changed. TV archaeology could certainly be said to have consolidated, if not originated, new areas of research, to have widened public interest and involved new communities in the archaeological process. Nevertheless, we might consider that in the intervening years, beyond methodological advance, archaeological thinking has also evolved.

Definition

Archaeology, ancient story
Television, far sight
Broadcast, to scatter seed

1. Single TV program or series whose content deals with archaeological research or opinion or the historiography of archaeology or otherwise substantially relies on archaeological data or theory to inform a broadcast narrative.
2. Single TV program or series whose content contains archaeological research or opinion or the historiography of archaeology or otherwise deals with or utilizes archaeological data or theory to form some part of a broadcast narrative.
3. Archaeologies of broadcast media, broadcast networks, or associated television technologies.

Historical Background

Archaeology first impacted a popular television audience as that most recognizable and enduring TV staple: the panel game. Broadcast from Philadelphia USA, the long-running Peabody Award-winning network quiz show *What in the World*? ran from 1951 to 1965 (WCAU TV; CBS). The (necessarily) studio-based series saw a distinguished panel of experts asked to identify artifacts from the worldwide collection of the *University of Pennsylvania Museum of Archaeology and Anthropology*. Clearly offered as entertainment – over opening titles, the camera tracked through swirling mist to reveal the first mystery object while a portentous commentator "your offscreen voice," identified the item for viewers – the show did not lack academic substance. The Penn Museum acted as coproducer, and its director, Dr. Froelich Rainey, fronted each program as on-screen host. Eminent archaeologists and anthropologists (and in episode four, celebrity guest, actor Vincent Price) readily tested their expertise – and reputation – while recognizing relics on live TV before viewing millions.

Nor was jeopardy lacking in the UK's more staid response though, BBC's *Animal Vegetable Mineral* (1952–1959) strived less for dramatic effect. Gone were dry-ice, offscreen voices and celebrity guests, or indeed the freedom of panelists to stroll across the studio to a rotating plinth and the article in question. Artifacts were now handed to panelists sat solidly behind their stage-set desk. Whether different production values were due to institutional reticence, seriousness of intent or less developed studio techniques, AVM's guests, and mystery artifacts – picked from the British Museum, regional galleries, and university collections – were as distinguished as those of its American counterpart.

Leading archaeologists of their day, Cambridge professor, editor of the Antiquity journal, and question-master Glyn Daniel, Mortimer

Wheeler, Gordon Childe, and Jacquetta Hawkes all played the game. These luminaries, whose collective scholarly publication was unequaled, evidently understood this popular entertainment as a logical extension of their normal educational remit. Just how popular may be judged by Mortimer Wheeler and Glyn Daniel being voted TV Personality of the Year in two successive years (1954, 1955). While following transmissions of AVM, "libraries found that neglected shelves of archaeological books were suddenly empty" (Paul Johnstone: Times obituary of 17.3.1976).

The runaway success of *Animal Vegetable Mineral* established archaeology as a television fixture, and its producers proceeded to set an agenda that determined our views.

Paul Johnstone, Mary Adams "Head of Talks" (factual broadcasting), and then new recruit, assistant producer David Attenborough, helped establish the language and syntax of TV archaeology with a genre which (exceptionally) has never left British television screens.

With *Buried Treasure* (1954–1958), the production team shifted the archaeological question from "what" to "how." If inspired by John Lubbock and Augustus Pitt Rivers, the series introduced experimental archaeology to television. So, Mortimer Wheeler duly grimaced at tasting the last meal of Tollund Man as identified from remains in the gut of the Iron Age bog body. Viewers saw how a prehistoric round house was built and – an enduring TV fascination – how the builders of Stonehenge might have transported 60 blue dolerite stones some two hundred miles from the Preseli Hills of Pembrokeshire to Salisbury Plain.

A defining moment came in 1965 when David Attenborough abandoned his doctorate in social anthropology to return to television as controller of a new color TV channel. Arriving with a mission, Attenborough promptly invited Johnstone, his former boss, to create a unique department dedicated to archaeology and history.

This confluence of a ready audience, the personal support of management within a well-resourced public institution at a turbulent yet broadly progressive historical moment coincided with emergent technologies (for Actor Network Theory see Latour 1993). Development in the design of the Arriflex BL provided a lighter, silent camera that could be handheld, while faster 16 mm colour film stocks allowed for minimal lighting. These together with the introduction of portable Nagra III magnetic tape recorders and an ability to record synchronous sound and picture meant Johnstone's specialist unit could economically film the process as well as the product of archaeology.

Chronicle, BBC 2's flagship series, ran from 1966 to 1991, coinciding with formative years for archaeology. Again, practitioners at the leading edge of archaeology including Colin Renfrew and Barry Cunliffe played their part, but it was the subject matter of *Chronicle* that did much to widen the scope and ambition of archaeological discourse in Britain.

While *Chronicle* was anything but parochial, frequently traveling worldwide to film iconic sites, the series also acted locally as an early forum for community archaeology. In 1970, *Chronicle* helped mobilize amateur enthusiasts to champion nineteenth- and twentieth-century industrial archaeology – a discipline not yet universally accepted by professional archaeologists. Local societies, founded to conserve particular factories or machines, were invited to compete in order to feature in a special series of *Chronicle* films. Consequently, film segments on the restoration of an abandoned needle-making factory at Redditch, research into the history of Manx lead mines, the Faversham gunpowder mill, and salvaging of steam engines from nineteenth-century cotton mills were duly transmitted.

Likewise, Johnstone's enthusiasm for maritime archaeology provided a recurring theme, which helped establish another academic subdiscipline. This saw ever more ambitious archaeological experiment, including the building and sea trial of a 21 foot long replica Bronze Age skin boat. Chronicle also contributed to some of the most daunting industrial/maritime rescue archaeology ever undertaken.

The 1970 return of Isambard Kingdom Brunel's iron steamship SS Great Britain to Bristol and her surprisingly intact construction dock 127 years to the day after the vessel's outward

voyage became headline news. Towed from her ignominious berth as a guano-storing hulk ship in the Falkland Islands/Malvinas, the 69-day trip was filmed by onboard Chronicle producer Ray Sutcliffe. Two years in the making, the program on the SS Great Britain (now refurbished and one of Bristol's favorite tourist attractions) had been a major investment but by no means *Chronicle*'s greatest.

From 1968 to 1970, the BBC funded three seasons of excavation at Silbury Hill, Wiltshire Richard Atkinson's investigations into the reputedly largest prehistoric earthwork in Europe meant tunneling through chalk and clay to the core of the 37 m high, late Neolithic mound. This involved not just large-scale archaeology and specialized mine engineering but for the broadcaster, an ongoing commitment of resources. To supplement filming over 4 years, outside broadcast (OB) units – newly designed for BBC 2's sports coverage – with their mobile control rooms, live-feed transmitters, lights, generator trucks, camera and sound crews, electricians, riggers and drivers, were regularly commandeered for live updates on the excavation's progress. Although for some journalists not an unqualified success – few artifacts were found and no King Sil on a golden horse – *Chronicle*'s dedication to the Silbury Hill project speaks volumes for how former British television executives valued archaeology.

It might seem extraordinary that archaeology could rank with moon landings, state occasions, or international sporting fixtures as landmark television, but in 1970 and again 10 years later with the raising of the Tudor battleship Mary Rose, archaeology was presented as rolling news and live TV event.

Key Issues

Formatting Archaeology

Television has long held a special place in British culture. Moreover, in the four last decades of the century, a protected UK broadcasting industry could encourage bold experiment allowing controversy or even failure. In this environment, a blueprint for TV archaeology was formulated and much since could be thought variations on a theme. Considering 590 UK programs broadcast between 1999 and 2002 during its millennial "golden age," Karol Kulik identified six distinct categories of TV archaeology (2006: 75–88).

Time Team now in its final season (broadcast 1994–2013) exemplifies the first of these: archaeology as process or "backstage." Despite an emphasis on professional and technological know-how, the Channel 4 format retained an element of jeopardy inherited from its game show origin: the arbitrary time limit of a three 3-day dig. Featuring a different location every week, each show targets a particular period or site type. Archaeological questions are posed and *Time Team* viewers follow the progress of excavation and site interpretation and are offered insight into practical fieldwork. Realistically enough, professional disagreement is not uncommon, and results can be unpredictable. Widely accepted as the market leader with consistent audience brand loyalty, the process-driven "behind-the-scenes" approach of *Time Team* along with protagonists Mick Aston (until 2012) and Phil Harding, for many, came to define TV archaeology.

Particularly popular with cable and satellite networks, Kulik's "detective" format poses a mystery or riddle that – it is proposed – archaeology alone can solve. On-screen archaeologists may offer and evaluate evidence, but the detective story narrative begs solution. Unlike programs focusing on the investigative process, here a script is prewritten to reach a foregone conclusion. The question asked may be more or less valid in presupposing that any single meaningful answer is possible. Its underlying premise – Atlantis, ancient aliens, "lost" civilizations – might also be questionable.

Less overtly sensational, the "expository" model follows John Grierson's documentary style (see Winston 1995). Taking a seriously minded, educational overview, typically of large-scale cultural phenomena, an illustrated lecture is delivered by omniscient "voice-of-god" commentary, which links authoritative screened interviews.

An increasingly ubiquitous format, the "essay" differs from the above in that it is narrated by an

on-screen presenter offering a (supposedly) personal point of view on some general archaeological theme. If expert opinion is sought, the presenter asks the questions and – despite taking a greater or lesser part in the scriptwriting – records voice-over commentary. It is not always apparent whose views we really hear.

Kulik describes programs that consist wholly of archaeological experiment as "how-to." These may reconstruct buildings or lifeways, recreate ancient technologies, or solve an ancient engineering conundrum. BBC's *Living in the Past* (1978) in which volunteer families lived for a year in a simulated Iron Age Village is claimed to have invented "reality TV." This was the prototype for the German *Steinzeit: Das Experiment* (Stone Age: The Experiment SWR/ARD 2007), the biggest TV archaeology event ever. The climactic episode, which saw two reenactors leave their newly built Neolithic pile dwelling on Lake Constance to retrace Otzi's last journey across the Alps, reached a truly astonishing 30.4 million viewers over two consecutive evenings (Bailey et al. 2009).

Lastly, "reconstruction" refers to a TV narrative, which based on archaeological research relies on actors with appropriate costume and sets to dramatize some past event(s). Particularly popular in non-Anglophone continental Europe and while costly, being commentary driven, these lend themselves to language "versioning," thus facilitating resale and universal distribution.

Marketing Archaeology

Commoditization in a globalized television market have seen international coproduction become the norm. These products are characterized by periodic narrative cliff-hangers for the ready insertion of frequent commercial breaks. Meanwhile, an accompanying tendency for multinational corporations to acquire medium sized independent production companies whose chief asset is the exploitation of existing intellectual property – TV format rights – will favor homogenization over experiment and uneconomic risk (Kretschmer et al. 2009).

While game show and "reality television" – the most commercial international formats – have historical associations with TV archaeology, these are perhaps less likely to shape its future. Rather, "pop" archaeology's proven themes of pyramids, mummies, skeletons, treasure, unsolved mystery, or notions of heritage and cultural identity presented as high-gloss factual television may endure as readily tradable commodities.

Since Kulik developed her typology, few archaeology programs defy niche categorization. Among these, BBC 1's costly ill-fated drama series *Bonekickers*, which had a fictionalized university archaeology department as setting for a high-concept adventure serial, is memorable. A second series was not commissioned (Bailey et al. 2009).

Although informed and refreshingly different, the guerrilla-film approach and montage editing of Canadian Simcha Jacobovici's *Naked Archaeologist* (Vision TV) challenged orthodox ideas of both television and archaeology. The show's mischievous humor made it particularly difficult for European terrestrial broadcasters to understand or schedule.

However, up to a third of all Swedish viewers regularly watched the series *Utgrävarna* (Excavators SVT 2005). The reflexive "post-memory work" of archaeologist Jonna Ulin demonstrated that screening views not just of, but from, the subaltern could make popular TV. Inspired by the excavation of her own grandmother's childhood home, Ulin based each episode on an abandoned contemporary site and the memories of neighbors, family photograph albums, and the discarded or treasured things of everyday life – archaeology as evocation.

Some other TV programs dealing with material culture or heritage are not explicitly badged as archaeology (see *Saving Britain's Past* BBC 2; 2010) while magazine formats may include just some archaeological content (*Coast* BBC 2; 2005 to present).

Discussion

Archaeology gripped public imagination long before any dominant TV narrative. Best-selling books, accounts of excavation, fabulous finds, and forgotten civilizations from Egypt or the Near East were popular since at least the 1920s.

For their archaeologist authors, such publications needed only to adapt and edit the familiar conventions of report or scholarly monograph with explanatory text and discussion illustrated by drawings and photographs. In the first half of the twentieth century, archaeologists could transmit their message directly.

With the emergence of TV as focus of family life, as electronic hearth in the living rooms of the postwar western world, such communication became a more collaborative venture. Millions, who perhaps rarely explored museums or pored over books on great excavations or paused to think about how or why one might relate to abandoned things, found analogous enquiry transmitted unbidden into their home. If a historic opportunity for those who considered public communication a central disciplinary concern, archaeologists necessarily approached the small screen on its own terms.

It is the responsibility of the television producer(s) to oversee a protracted, creative, technical process and who is contracted to manage and deliver programs to a licensed broadcast network with access to a complex telecommunications infrastructure. As such, the lead author or final editor of a TV show could rarely if ever be a working archaeologist. Given this, any productive collaboration depends not just on trust and acceptance of different cultures, traditions, and professional imperatives but how producer and archaeologist each *imagine* medium and message. To what extent archaeology is visualized as method, practice, sanctioned treasure hunt, or platform for ideas, or again, television approached as powerful but superficial medium, animated textbook, opportunity for reflexive exercise, or vehicle for original research, determines the outcome.

Any dissonance in academic restraint and lively popular storytelling might be resolved – or in skillful hands even harnessed to creative effect – if the nature of a particular narrative is mutually agreed and understood.

Today, the early adopters of mass media in those same affluent countries broadcast to an increasingly skeptical public. However, for their audiences, which have since come to question many traditional secular or religious authorities, faith in the status of archaeological proof – as seen on TV – seems to be unshaken. This may have much to do with different perceptions of archaeology and what – in the minds of broadcasters – archaeology offers television viewers.

Thus, in what we are constantly reminded is a visual medium, image needs description rather than critique. In this view archaeology is self-explanatory, an end in itself requiring no further justification or contextualization. Seeing is believing, while TV archaeology avoids overt theory and the politics of archaeology remain subliminal.

If any such uncritical accounts – however well intentioned – act as an authoritative source for founding mythologies or help establish dubious notions of identity, this is problematic. The possibility of inferring any special historical or territorial claim from archaeological research must make its popular representation a central disciplinary concern. Or indeed of general concern, for as Stephanie Moser notes, disciplinary boundaries are permeable, and a continuum exists between the interacting spheres of archaeological practice, representations of archaeology, and its public reception (Moser 2004: 262–283; also see Shanks 2007: 274).

Public Image, Public Effect

While a direct causal relationship between TV archaeology and active participation in heritage or archaeological pursuits is difficult to prove (for a critique of the media "effects model," see Gauntlett 1998), limited data suggest a strong correlation. In the UK, negative evidence, at least, suggests that preexisting self-selection was instrumental, in that ethnic minorities have very largely chosen not to watch "heritage" themed TV (Piccini 2006), or join the archaeological profession in any capacity (Aitchison and Edwards 2008: 11, 14), or apply to study archaeology at university (UCAS figures 1995–2006).

Yet, sampling of prospective candidates and first-year undergraduate students at archaeology departments in Bristol and Southampton overwhelmingly suggests previous interest in televised

archaeology (Bailey 2007–11, unpublished). For this generation, *Time Team*, frequently watched in the company of at least one parent, was most often cited as favored viewing. So these partial data might suggest the show's consolidation of archaeology's long-standing appeal within the family rather than as initial inspiration.

English Heritage statistics too confirm family background as highly influential but also indicate that intensive generalised TV viewing (over 5 h a day) reduced this groups probability of visits to "historic attractions" by up to 13%, while for viewers of "heritage TV," including archaeology, visits to "monuments, castles, and ruins" increased by a significant 12% (Wineinger 2011).

It seems that rather than simple cause and effect, TV archaeology relates to other archaeologies as part of a network of interdependent practices, a key relationship that helps shape a collective cultural consciousness.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Archaeology and Politics
- ▶ Film, Archaeology in
- ▶ Media and Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Reflexivity in Archaeology
- ▶ Silbury Hill: Environmental Archaeology

References

Aitchison, K., and R. Edwards. 2008. *Archaeology labour market intelligence: Profiling the profession 2007–2008*. Reading: Institute of Field Archaeologists.

Bailey, G., D. Henson, and A. Piccini. 2009. Bonekickers: Informing, educating, entertaining? In *How do the media represent archaeology, what is at stake?* ed. S. Lemaitre and C. Schall, 31–44. Brussels: Kineon.

Clack, T., and M. Brittain. 2007. *Archaeology and the media*. Walnut Creek: Left Coast Press.

Gauntlett, D. 1998. *Ten things wrong with the effects model*. Available at: http://www.theory.org.uk/david/effects.htm. Accessed 11 Jan 2013.

Hodder, I. 1987. *Reading the past*. Cambridge: Cambridge University Press.

Holtorf, C. 2007. *Archaeology is a brand*. Oxford: Archaeopress.

Huhtamo, E., and J. Parrika, eds. 2011. *Media archaeology*. Berkeley: University of California Press.

Kretschmer, M., S. Singh, and J. Wardle. 2009. The exploitation of television formats. ESRC Digital Resource, Bournemouth University. Available at: http://tvformats.bournemouth.ac.uk/index.html. Accessed 30 May 2012.

Kulik, K. 2006. Archaeology and British television. *Public Archaeology* 5 (2): 75–90.

Latour, B. 1993. *We have never been modern*. Trans. C. Porter. Cambridge, MA: Harvard University Press.

Law, J., and J. Hassard, eds. 1999. *Actor network theory and after*. Oxford: Blackwell and Sociological Review.

Merriman, N. 1991. *Beyond the glass case: The past, the heritage and the public in Britain*. Leicester: Leicester University Press.

Moser, S. 2004. Archaeological representation: The visual conventions for constructing knowledge about the past. In *Archaeological theory today*, ed. I. Hodder, 262–283. Cambridge: Polity Press.

Payton, C. 2002. Public perception and 'pop archaeology': A survey towards current attitudes toward televised archaeology in Britain. *The SAA Archaeological Record* March: 33–44.

Piccini, A. 2006. *Survey of heritage television viewing 2005–2006*. Swindon: English Heritage. Available at: http://hc.english-heritage.org.uk/content/pub/eh_tvcounts_report_final.pdf. Accessed 14 Jan 2013.

Pokotylo, D., and N. Guppy. 1999. Public opinion and archaeological heritage: Views from outside the profession. *American Antiquity* 64: 400–416.

Shanks, M. 2007. Digital media, agile design, and the politics of archaeological authorship. In *Archaeology and the media*, ed. T. Clack and M. Brittain, 273–289. Walnut Creek: Left Coast Press.

Wineinger, N. 2011. *Visiting the past: An analysis of the drivers of visiting historic attractions*. Swindon: English Heritage. Available at: http://www.english-heritage.org.uk/content/imported-docs/u-z/visiting-the-past.pdf. Accessed 14 Jan 2013.

Winston, B. 1995. *Claiming the real*. London: British Film Institute.

Further Reading

Atkinson, R., D. Collison, B. Greenhill, J. Hale, R.G. Harrison, K. Hudson, P. Jordan, H. Lincoln, M. Magnusson, J.J. Norwich, and C. Renfrew. 1978. In *Chronicle*, ed. R. Sutcliffe. London: British Broadcasting Corporation.

Bailey, G. 2010–2013. *Broadcasting*. In *British archaeology*, ed. M. Pitts.

Holtorf, C. 2005. *From Stonehenge to Las Vegas: Archaeology as popular culture*. Walnut Creek: AltaMira Press.

Johnstone, P. 1957. *Buried treasure*. London: Phoenix House.

Tello, Julio C.

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In the beginning of the twentieth century, Peruvian archaeology was emerging within a hostile context: there was a lack of any proper institutional organization, absence of indigenous scholars, depredation of archaeological sites, and deficiency of state support in both economic and legal terms. In addition, a weak national identity caused the segregation of pre-Hispanic history. In these circumstances, Julio César Tello Rojas emerged and became a prominent national icon, an international anthropologist, and the father of Peruvian archaeology.

Tello was born in Huarochirí (highlands of Lima) on April 11th of 1880. He was given financial assistance from his family to go to college in Lima, where he was further supported by Ricardo Palma. Likewise, working in the national library enabled him to attend to San Marcos University, where he studied medicine. In 1908 he submitted his thesis on the antiquity of syphilis in Peru suggesting that it was ancient syphilis which prompted the need for trepanation evident on many pre-Columbian skulls. This was a pioneering interdisciplinary study, which was also expressed in his later work *Wiracocha*, where Tello creatively draws from ethnohistory, linguistics, medicine, and anthropology in order to interpret the archaeological remains. The research questions of his thesis shed light on the origins of Andean civilization. Exploring the younger Tello allows to understand the older Tello, his changes and continuities.

Ancient trepanation and skull deformation were topics that continued to fascinate Tello and to which he later returned for his doctoral thesis submitted in 1918 to San Marcos University. In 1909 Tello was given a grant by the Peruvian government for further study, and rather than continue his career in medicine, he chose to attend to Harvard University to study anthropology. In 1911 and with another grant from the Peruvian government, Tello traveled to Britain, where he gave a presentation on pre-Hispanic trepanation at the 18th Congress of Americanists in London, and he also married Mabel Cheesman in 1912.

Tello participated in early expeditions to collect materials for American museums: 1913 (Lima Region), 1915 (Peruvian South Coast), and 1916 (Harvard Peruvian Expedition to Northern Peru). During his participation in these expeditions, Tello learned directive skills that will provide him with the experience and maturity to direct great projects as Chavín de Huantar (1919).

By 1913 Tello proposed the creation of the National Museum of Archaeology in his report "The Present and Future of the National Museum." In this work Tello challenges the dominant vision of Peruvian European elite in the historical explanation of ancient Peru. Tello promoted an indigenous and anthropological view of the Andean past. Pursuing his ideals, he created the Museum of Anthropology and Archaeology, taught the first courses of archaeology at San Marcos University, worked as editor of anthropological journals, and participated in national and international academic meetings. Thus, Tello notably improved Peruvian archaeology and our vision of the Andean past in both national and international contexts and became an inspirational figure for the Peruvian *indigenismo* movement.

Tello was also engaged in politics and was strongly linked to presidents Billinghurst, Leguía, and Benavides. He even worked as Deputy of the National Congress during Leguía's government (1919–1930). The interplay between archaeology and politics, past and present, was a constant in Tello's praxis; thus, he gained support to develop his anthropological projects from national and foreign politicians.

Some of Tello's major contributions for the development of Andean archaeology were related to chronology (before radiocarbon dates), recording archaeological sites, artefactual analysis, and the importance of the relationship between historic process and geographical areas. Tello proposed a chronological sequence for the Central Andes in *Antiguo Perú: Primera Época* (Tello 1929) and *Origen y desarrollo de las*

civilizaciones prehistóricas andinas (Tello 1942), he described and illustrated – with maps and charts – the spatial and chronological distribution of Andean cultures and civilizations in the drainage basins of the region. Currently, his field notes are being published by San Marcos University.

Tello's proposal for the Andean chronological sequence was based on four stages of civilization developed on different regions: Andes Orientales, Andes Occidentales, Litoral del Pacífico, and Tahuantinsuyu (Tello 1942: 111–126).

In a time when the origins of Peruvian civilization were linked to Mesoamerica, Tello (1921, 1942) proposed the autochthonous emergence of the Andean civilization and the existence of a "mother culture" (Tello and Mejía 1960). This is a theoretical legacy for Peruvian archaeology.

Tello also explored the spatial distribution of provincial centers during the Inca expansion in the drainage basins of the Central Andes. He summarized and pictured his proposal in two maps, "Peru Precolombino, III Epoca, Tawantinsuyu" (Tello 1930) and "Las principales naciones incorporadas al Tahuantinsuyu" (Tello 1942). The latter was mainly focused on locating the ethnic groups dominated by the Inca. Tello argued that the main feature of the Inca Empire was that the great cities distributed along the Central Andes had similar settlement planning and were built with rocks and adobe (Tello 1942: 93–108). Tello stated that the Inca civilization was the last stage of a long historical development; it was a confederation of nations linked by strong and traditional ties which were harmoniously coordinated by the Inca nation (Tello 1942).

Tello's archaeological interpretations were partially influenced by the increasing Peruvian nationalism, but this can be better understood in the historical context of his proposals about spatial, cultural, and chronological divisions that were elaborated to explain pre-Hispanic historical processes in the Central Andes. Tello's works, discourses, and praxes placed the pre-Hispanic societies in the center of the historical explanation, empowered contemporary Andean societies, and contributed to build a Peruvian national identity.

On June 3rd of 1947, after a long disease, Tello passed away and was buried in the National Museum of Anthropology and Archaeology. The day of his birthday was proclaimed the Peruvian Archaeologist's day.

References

Tello, J.C. 1921. *Introducción a la Historia Antigua del Perú*. Lima: Editorial Euforion.

Tello, J.C. 1929. *Antiguo Perú: Primera Época*. Lima: Comisión Organizadora del Segundo Congreso Sudamericano de Turismo – Excélsior.

Tello, J.C. 1930. *Andean civilization: Some problems of Peruvian archaeology*, Proceedings of the XXIII International Congress of Americanists, New York City, 1928, 259–290. New York: International Congress of Americanists.

Tello, J.C. 1942. *Origen y desarrollo de las civilizaciones prehistóricas andinas*. Lima: Librería e Imprenta Gil.

Tello, J.C., and T. Mejía, eds. 1960. *Chavín. Cultura matriz de la civilización andina: Primera parte*. Lima: Archivo Julio C. Tello. Universidad Nacional Mayor de San Marcos.

Further Readings

Astuhuaman, C., and R. Daggett. 2005. Julio César Tello Rojas; Una biografía. In *Paracas Primera Parte*, ed. J.-C. Tello, 17–61. Lima: Museo de Arqueología y Antropología de San Marcos. UNMSM.

Burger, R., ed. 2009. *The life and writings of Julio C. Tello: America's first indigenous archaeologist*. Iowa City: University of Iowa Press.

Carrión, R. 1948. Julio C. Tello y la Arqueología Peruana. *Revista del Museo Nacional* 2 (1): 7–34.

Mejia, T. 1948. Apuntes biográficos sobre el Dr. Julio C. Tello. *Revista del Museo Nacional* 2 (1): 35–50.

Tells in Archaeology

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Introduction and Definition

Archaeological mounds form when activities and settlement were conducted at a site over time and

sediment and material accumulation rates exceed those of truncation or erosion. In Southwest Asia an archaeological mound is called a "tell" in Arabic, "tepe" or "chogha" in Farsi, and "höyük" in Turkish. In the ancient Near East, mounds may vary in size from c. 30 m to 1 km in diameter and in height from c. 1 to >43 m (Fig. 1). The archaeological investigation of these mounds presents a range of major challenges: (1) low mounds and the bases of mounds may be masked by several meters of sediments from rivers, hill-wash, or erosion; (2) early levels may be buried below many meters of later settlement and difficult to access; (3) materials may be recycled and redeposited throughout a mound by successive construction and digging of pits or graves, for example; (4) with shifting settlement patterns and variations in construction and leveling, mounds are not uniform "layer cakes" and include truncated or eroded areas; and (5) mounds may represent only one aspect of settlement patterns and strategies, but may be overrepresented in field investigations due to their predominance in the landscape. Mound sites nevertheless often provide rich sequences of well-preserved deposits and many aspects of ecological and social strategies. The examples below are largely from interdisciplinary excavations in Syria.

Key Issues/Current Debates/Future Directions/Examples

Satellite imagery, aerial photography, surface survey, and *geomorphology* have been applied to study the extensive networks and landscapes of large and small sites in the steppe regions of northern Syria, as in the Tell Hamoukar survey (Ur 2010). Here, satellite pictures showed that many tell sites were connected by radial routeways that formed from at least the fourth millennium BCE. Surveys of artifacts, notably pottery, on large and small tell sites, have identified several major peaks in settlement in northern Syria, notably in the mid-late fourth and mid-third millennia BCE, as well as decline, as in the late third millennium BCE during a period of climatic stress, when many large sites were partially abandoned and smaller sites along watercourses were frequented (Wilkinson 2003).

At the scale of individual tell sites, specific periods and types of activity areas have been *evaluated* by close integration of studies of *surface materials* and tell *geomorphology* and *topography* to detect in situ materials in actively eroding areas of mounds. By these methods, previously unexplored and otherwise deeply buried levels from the Ninevite five periods of the early third millennium BCE were excavated at several points around the large mound of Tell Brak, including a small temple/shrine (Fig. 1; Matthews 2003).

Rapid extensive investigation of subsurface features and buildings at tell sites have been very effectively investigated by *geophysics*, as in the recovery of the whole plan of the lower town of the mid-third millennium BCE at Chuera, by *surface scraping*, as at Tell Brak (Matthews 2003), and by *mechanized sweeping*, as at Sheikh Hamad. Walls, features, and floors were often constructed from compressed mud or mud brick and mud plaster. These may show clearly (Fig. 2), but when the fill around them is from similar materials (e.g., from leveling or collapse), they may be more difficult to detect.

The definition of walls and surfaces depends on close observation of the characteristics of deposits and interfaces between layers. The edges of walls can be identified in plan by shaving clean the excavation surface with a hoe or trowel if deposits are moist or by cleaning briskly with a large brush if dry. During excavation, wall and surface faces can be detected by looking and feeling for changes in composition, texture, structure, and fractures along edges or surfaces using a small pick or trowel. Section profiles provide an important *reflexive* record of deposits and features as they are being excavated and should be kept clean (an artist's palette knife is particularly effective) and regularly examined at the edge of trenches or in strategic sections through features and floors. Records are made of structures (buildings), features (walls, hearths), and layers (floor deposits or fills) using digital photography and videos, high-precision architectural survey, plans, section drawings, and written descriptions.

Tells in Archaeology, Fig. 1 Aerial view of excavations and large monumental buildings at Tell Brak, Syria (43 m high, >800 m long, and 40 ha in size). (After Gerster 2003: Fig. 32)

Tells in Archaeology, Fig. 2 Micro-history of a large walled building and surfaces in a street in area HS3, Tell Brak. Location of blocks for microscopic analysis of sequences also shown

The detailed histories of buildings and settlements have also been studied using techniques for analyzing sequences of floors and activity residues, such as *microstratigraphy* and *micromorphology* (microscopic analysis of layer content and sequences) (Fig. 2; Matthews 2003) and *chemical mapping* (as at Çatalhöyük, Turkey). An increasing range of analyses can be conducted in the field. These include portable X-ray fluorescence to characterize architectural and artifactual materials and activity residues (e.g., high phosphorus concentrations), and microscopic analysis of spot samples of sediment to look for plant phytoliths and dung spherulites to identify animal pens, for example, and thereby inform excavation and sampling strategies (as conducted by the Central Zagros Archaeological Project (http://www.czap.org/)). Exemplary interdisciplinary scientific analyses of spectacular burials at the mid-second millennium BCE site of Qatna, in western Syria, include study of the human remains, artifact materials and technology, and organic residues within the vessels.

Large-scale long-term research excavations at major tell sites are providing major insights into the diverse structure and histories of these settlements including changing social and political organization, economies, and ritual practices, which are becoming increasingly well defined. Examples in Syria, from regional and local centers, include Ebla, Tell Brak (Oates et al. 2001), and Tell Beydar in the third millennium; Tell Leilan in the second millennium BCE; and Sheikh Hamad in the first millennium BCE. Rescue excavations are also contributing to research. For example, the integration of the archaeobotanical and archaeozoological data

from rescue excavations at several small sites along the Khabur river, sampled prior to their flooding by dam waters, has enabled study of major developments in the intensification of agriculture in the fifth-third millennia BCE in this region (Fortin and Aurenche 1998).

The results from many of these projects have been closely integrated in regional conferences, workshops, and major chronological and environmental research projects and frameworks, such as ARCANE (http://www.arcane.uni-tuebingen.de), and extensively published. Some sites have been conserved and presented for public display and dissemination in situ, within museums and on websites.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Aerial Archaeology
- ▶ Çatalhöyük Archaeological Site
- ▶ Surface Survey: Method and Strategies

References

Fortin, M., and O. Aurenche, ed. 1998. Espace naturel, Espace habité en Syrie du Nord (10e-2e millénaires av. J-C.), Natural space, inhabited space in northern Syria (10th-2nd millennium B.C.). Québec and Lyon: Canadian Society for Mesopotamian Studies and Maison de l'Orient Méditerranéen Lyon.

Gerster, G. 2003. *The past from above*. London: Frances Lincoln Ltd.

Matthews, R., ed. 2003. *Excavations at Tell Brak, volume 4: Exploring an Upper Mesopotamian regional centre, 1994–1996*. Cambridge: The McDonald Institute of Archaeological Research and The British School of Archaeology in Iraq.

Oates, D., J. Oates, and H. MacDonald, eds. 2001. *Excavations at Tell Brak, volume 2: Nagar in the third millennium BC*. Cambridge: The McDonald Institute of Archaeological Research and the British School of Archaeology in Iraq.

Ur, J., ed. 2010. *Urbanism and cultural landscapes in northeastern Syria: The Tell Hamoukar Survey 1999–2001*. Chicago: The Oriental Institute of the University of Chicago.

Wilkinson, T.J. 2003. *Archaeological landscapes of the Near East*. Tucson: The University of Arizona Press.

Tenochtitlan (Aztec): Geography and Culture

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The terms "geography" and "culture" for the people of Tenochtitlan entail the development of a culture whose diversity and richness in ecosystems, species, and genes is derived from climatic, geologic, and relief conditions. Developing an identity according to the resources in which it takes place therefore is an argument based on interpretation of a culture on the basis of concepts and ideas that may belong to another culture being used to interpret this one. Therefore, the names used by authors – such as gods, empires, or nobility – might be not right. Nonetheless, authors have strived to become quite objective for their interpretations, yet have to rely on this use. We owe the peoples of this valley, the geography, and thereby their gods, for leaving behind a legacy to be learned, yet to be understood (aside from simple concepts), and yet to be compared with one another.

Introduction

According to Flores Garcia, consideration of the Aztec culture – when it is about power and law – should not be viewed within the appreciation of what Morgan calls savagery, barbarism, and civilization.

Important aspects to consider, and based on the judicial system at a global level – a point made by Flores Garcia (1980: 62) – are high maintenance of social order, good costumes, respect for legal institutions, and education. These depict a system, evidenced by academics for decades, held to a high level of a sense of justice, impartiality, and equity for those chartered with administering it in those times.

To understand part by part what Tenochtitlan was, we will look first into knowing how Tenochtitlan was initiated and how it was organized. The geography of this culture entails an intrinsic clue to its development. At the very top of the gods who occupied the most prominent space within the temple of their city was Huitzilopochtli. He represented the solar cult, but in this city, there was a long list of gods who were recognized by the people who built it and lived there. His pyramid was built as a dual pyramid and had a shrine in the south of the site (*huitzil* means "hummingbird," in relation to the sun at birth – "tender like a hummingbird"), and another for a god named Tlaloc was built in the north; he rose from a spring and represented legitimacy and antiquity, as well as rain, lightening, fertility, and earth. According to Miller and Taube (1993: 93), Tlaloc welcomed Huitzilopochtli when the Aztecs fled the mainland and went to the island in the middle of Lake Texcoco in 1345. Between these two gods was born the concept of war in the shape of fire and water, but it was under Huizilopochtli (hummingbird of the south) started the human sacrifice within the war (the "hummingbird of the south" as symbol of bravery, perseverance, and patience, which helped them find this place), while Tlaloc was known as "the provider."

Authors suggest (Miller and Taube 1993: 25) that this tribute of human sacrifice became unfavorable at the time of the Spanish conquest, as the Aztecs never imagined this practice of taking enemies from their surroundings to sacrifice through their special type of war would take a toll at end of their culture.

It is possible that since these times the Aztecs or the people who had arrived at Aztlán were traditionally practicing the *xochiyaoyotl*, or the "flowery war."

As Miller and Taube (1993: 42) have pointed out, the name Aztec become popularized by William Prescott in his book *Conquest of Mexico*. It had been introduced earlier by Alexander von Humboldt in the nineteenth century; he gave the meaning of "people of Aztlán." Aztlán means "place of whiteness." But these people rarely called themselves; by this name; instead, they called themselves Mexica, or sometimes Culhua Mexica, to denote their linkage with Culhuacan as old Toltec lineages. The lineages are thought to be understood according to Romero Vargas Yturbide (1959). Individuals being representatives or administrators were chosen according to the day of birth and merits such as honesty, responsibility, integrity, knowledge, and bravery, in a way that any member of the society could become governor, not only the sons of representatives in turn. These were merits that guided the Mexica to find the appropriate place, under the ecologic and geographic conditions, for the development of their culture. This being said, pilgrimage guides were identified according to certain elements of identity such as the level of knowledge and the day of birth. Pilgrims were depicted carrying a sack, which represented their responsibility, and Chimalma, as their guide, was the government representative. Lastly, their justice system has no parallel in our present world, being based on the abovementioned virtues yet obscure to our understanding, based on the happiness of others rather than of oneself (Flores Garcia 1980).

Definition

The founding of Tenochtitlan historically belongs to the very late Postclassic time (AD 1345), and through history, it has been recognized as a large city almost comparable to Venice in Italy. This is why geography is very important when seating this group in time and place. Formed by a city sketched under a square pattern street and an agricultural system within and related to water. It even had public bathrooms at the end of its streets, which cleaned and utilized the solid waste for agricultural crops. Therefore, the types of native fruits and edibles varied accordingly to the geography.

The city of Tenochtitlan developed into a complex organization, which allowed for the construction of amazing temples and gardens, exotic animals, and an excellent cuisine. The increase in tributes or regalia allowed their economy to form a settlement pattern that incorporated

buildings, bridges, and streets along channels; boatmen in canoes made transportation a commodity to navigate from place to place. It is said that the bridges were so wide that ten horsemen could cross them abreast (Hofstadter 2005).

Although there is no record of what type of people were there before the arrival of the Aztec or Mexica, the type of people who built this city did not take long to build such a large and beautiful place that it amazed the Spanish. As they advanced in the making of the magnificence and efficiency of the city, they advanced geographically, incorporating two specific things: trade and tribute. In order to be in one end skillfully, and the other to keep a tradition, by allowing themselves to incorporate more gods such as Xipe Totec from the area of Oaxaca, although sometimes they humiliated their gods by placing them within the dark, designed to be their prison (Miller and Taube 1993: 24). They traded with the Pochtecas long distance and become commerce specialists as far as Guatemala and the Veracruz coast, leading the way for the Mexica to become an empire, struggle in battles, and defeat their neighbors the Tepanecs in 1428.

A key issue for understanding of power is that the Mexica replaced their traditional tribal administrative system of four heads with one *tlatoani*, who was the supreme ruler in political and religious affairs. As in many societies around the globe, the power was passed from father to son (as in the case of Motecuhzoma I to Motecuhzoma II); even though the system allowed for a new *tlatoani* to be selected by the council from one of hundreds of male nobles, it is believed by some that it was in practice blood related (Miller and Taube 1993: 168). Other sources contradict this idea (see Romero Vargas Yturbide (1959)) and support a dual political system based on both sexes, with females as innate administrators, while males could develop this skill, and either could be selected as a *tlatoani*. One known female was Ilancuetl, the first *tlatoani* from Tenochtitlan.

One of the amazing aspects of life, noted by the Spanish, was a type of baptism among the Mexica. This tradition consisted of removing any type of pollution from the parents and was more associated with purification. In the bath ritual, the midwife poured water from a vessel, placed on a reed mat, over the infant and was presented with the tools necessary for adult life. In the sixteenth century, the Mendoza Codex showed illustrations of a sculptor, feather worker, painter, and goldsmith, each accompanied by feathers and shields of a warrior. With illustrations of females came sweeping and cotton-spinning tools (Miller and Taube 1993: 44).

The Spanish conqueror Hernan Cortes describes in his accounts that they had a market where over 60,000 people could trade in goods. One of the rulers was known as Motecuhzoma II, who lived along with his retinue in one of the large palaces to the west of the city. The rest of the people lived in clans; the group of administrators were the *calpullis* and there were barrios or neighborhoods for foreigners and craftsmen.

The city of Tenochtitlan might have been founded under two different migrations of the Mexicas, led by Huitzilopochtli. Fray Bernardino de Sahagun recounts that this god was born in 1 pedernal AD 1168 under the *teomama* of Cuauhtlequetzqui. Then the Mexicas settled in Tullan, Atitalaquia, and Tequixquiac, and built the chinampas or *chinamitl*, which is an agricultural system based on a raised clay bed above a lake. It might be that originally, they were going to Coatepec, but there was a period of conflicts between Huitzilopochtli and the Mexicas. Huitzilopochtli ordered that all lakes and channels be dried up, so all native plants and animals perished, registered in the year 2 caña.

There is a large number of historical accounts about migrations. Migrations were not histories of people leading and leaving one physical space for another but of gods themselves who led the way for specific tribes.

An earlier migration, described also by Fray Bernardino de Sahagun, was based on the narration of the birth of Huitzilopochtli on a hill named Coatepec, located next to Tula. In this place, a woman named Coatlicue was the mother of the brothers Centzon Huitznahua and the sister Coyolxauhqui. The brothers were ashamed of their sisters to sacrifice through their special type of wartheir mother. Huitzilopochtli was born and helped the brothers to light up a snake made out of **teas**, called Xiuhcoatl, to wound Coyolxauhqui, who was then cut up in pieces up on the mountain and thrown down from it.

In Miller and Taube's account (1993: 94), Huitzilopochtli led his people into the valley of Mexico in Chapultepec at the end of the thirteenth century. As his people were unwelcome in the region, war was made among the neighbors, this time led by Copil, the son of Malinalxochitl, the betrayed sister of Huitzilopochtli left behind at Chicomoztoc. Later, Huitzilopochtli sacrificed Copil, and his heart was hurled onto a rock in Lake Texcoco, giving birth to the city of the Aztecs.

Years later, Huitzilopochtli was forced to lead his people to Culhuacan, on the other side of the lake, where the noble ancestors of the Toltec lived, and they become little more than slaves. Huitzilopochtli saw that this land was not their promised destination and that Tizapan had much more to offer. He suggested to the noble lords of Culhuacan that they ask their gods for a noble bride; in fear of the Aztec mercenaries, the lords complied, but the Aztecs flayed her, and a priest put on her skin. During a celebration for the arrival of a new goddess, they saw the priest wearing the princess's skin. The Culhua fiercely responded to the Aztecs' barbarism and forced the Aztecs to leave the lake. The survivors took refuge on an island, where they found an eagle sitting on a cactus growing from a rock – the very image Huitzilopochtli had told them to seek generations before. The migrations – or, as some authors call them, the wanderings of Huitzilopochtli – came to an end, according to most sources, in 1345, with the founding of Tenochtitlan.

Another chronicle called Mexicayotl gives an account that after leaving several towns, the Mexicas settled in Coatepec and Tula, along with the Chichimecas. The Otomies, being early occupants, allowed the Mexicas to **build** their temples and put their gods in them. Huitzilopochtli was the main god among them. The ball games, the *tzompantli*, and a dam to plant a variety of **cultivars**, water animals, and native trees gave way to the building of a large city.

The Ramirez Codex mentions the migration of the Mexica to Coatepec during the first pilgrimage, adding that they had a first division of the group in Michoacán and a second one in Malinalco; the rest arrived **at** Tula, settling on a mountain called Coatepec ("Hill of the Serpent"). The codex narrates the reasons why Huitzilopochtli got into conflict with his own people, as they wanted to remain in Coatepec after seeing the bountiful and prosperous life they had achieved, but this was against the desires of Huitzilopochtli, who executed them all by opening and eating their hearts.

Fray Diego de Duran precisely describes the reason why Huitzilopochtli killed and opened the chest of Coyolxau, the older sister of Coyolxauhqui and the brothers Centzon Huitznahua; it was because of their desires to stay and live in the beautiful place they had built and because they tried to convince Huitzilopochtli to stay there, provoking with this the drought of the channels and lakes they had developed into an agricultural system, achieving economic and social power.

Key Issues/Current Debates/Future Directions/Examples

Other chronicles such as those of Tezozomoc and Tovar repeat the same history. According to current debates, some authors state that Huitzilopochtli led his people out of Aztlán but to an unknown place located in the same region of Aztlán (Hofstadter 2005), and others suggest he led them to Coatepec (Miller and Taube 1993).

Geography becomes important for the discussion of these issue. For example, the Boutorini code makes remarks on the ethnic groups of pilgrimages by the *aztlameca* led by four *teteutiin* or *teomama*, who had specific names – Mixcoatl, Cuauhcoatl, Apanecatl, and Chimalma – glyphs, and functions according to the organization of the Tenochtitlan state. Each chiefdom of the Tenochtitlan state had its own war, tax and relationship with religion, a woman called Chimalma, as a priest – numen – two nephews and granddaughter, nieces and grandnieces, all relatives of Huitzilopochtli. Some authors argue that the name Chimalma is also a rivalry title among the descendants of Huitzilopochtli, related to rights to lands. Culhua rituals were addressed specifically to sacrifice daughters of the señores, or lords. Nonetheless, this aspect was amended by the Boutorini code, which addressed a change in

the political structure by the elimination of the feminine power, based on the historical and mythical events in Malinalco and Coatepec, marked by the killing of Coyolxauhqui.

Another example is based on the fall of Tula at the end of a period called the early Postclassic for the valley of Mexico. This event marked a change in the ethnic sociopolitical structure. Deities belonging to ethnic groups also changed their importance accordingly; for example, Quetzalcoatl in his representation as Ehecatl and Tlahuizcalpantecuhtli no longer had importance as Venus – in correlation with natural reproductive cycles. Also, Tlaloc is replaced with Xipe Totec, as a god related to earth fertility, and Xolotl, as deities belonging to dominated ethnias.

To understand the depth of the Aztec, a key issue might be a version that during the fifth sun, according to the legend of the suns, the fight between Quetzalcoatl and Tezcatlipoca, the death of Itzpapalotl by Mixocoatl, and the death of Coyolxauhqui all implicate the birth of Huitzilopochtli as the myth. Interestingly enough, a socioeconomic summit of Tenochtitlan occurred with the birth and life of Huitzilopochtli, as explained by an author under a materialist conceptualization, like the cycle of life, reproduction, cosmogony, and the necessary energy and sacrifice involved in it (Corona 1981: 22–25).

The legend of the suns was related to the first creation; each sun presided over a race of people, who were either destroyed or transformed into particular creatures. Tezcatlipoca was the god of the first sun; the people were giants who got devoured by jaguars. The second sun was presided over by Ehecatl, the god of wind; the people were destroyed by the wind and they became monkeys. The third sun was consumed by rain and lightning, presided over by Tlaloc, the rain god; the people became butterflies, dogs, and turkeys. The fourth sun was presided over by Chalchiuhtlicue; a flood transformed the people into fish. In the time of the fifth sun, Tezcatlipoca and Quetzalcoatl raised the heavens by transforming themselves into great trees. They created the earth by slaying a huge earth monster, described as a caiman deity called Tlaltecutli. Quetzalcoatl and Xolotl descended to the underworld to retrieve the remains of the people destroyed in the flood, tricking the god of death, Mictlantecuhtli. The bones were carried to Tamoanchan, where the gods ground the bones and added blood to create the flesh of the current race of people.

A compendium of books that allowed the Aztecs to receive various interpretations about their ethnic composition and certain aspects of their socioeconomic and political systems, pertaining to myths within chronological events, the magnificence of their settlement patterns to understand their religion, and the level of ideology as far as the dominium of a group within a state (Corona 1981: 13).

Likewise, the span and cult life under which the god Huitzilopochtli existed is a key issue in understanding the patrons, leaders, and long-standing lineages of the Aztec or Mexica. For example, the 18 *veintenas* of the Aztec calendar were based on festivals of primary agriculture dedicated to the rain and maize gods, but for four of those *veintenas*, the principal deity was Huitzilopochtli; a few other deities repeated, such as Xiuhtecutli and Tlaloque. The principal celebrations were feasts: feasts of merchants, small feasts for death, and bloodletting; for the second are amaranth tamales, feast of the *xocotl* pole; for the third deity including sacrifice to Xochiquetzal and other feasts for water deities (Miller and Taube 1993: 178).

Future Directions

Future directions and questions, are based in take initial departures related to migrations, cults, ethnic groups, and socioeconomic aspects of development in order that, separate, and/or join myth from history.

Cult study must incorporate the ideology of ethnic groups who went from adoring the sun, with Huitzilopochtli, to adoring the moon, with Coyolxauhqui, or both at the same time, but as it was Huitzilopochtli who allowed Coyolxauhqui to exist, what was the pervading sociopolitical situation that led Huitzilopochtli to destroy her? Was it based on the economic tribute or zones that gave less tribute to Huitzilopochtli because Coyolxauhqui was an older fertility goddess in Central Mexico?

One important matter to take into consideration is the time issue – how long it was before Huitzilopochtli allowed her existence, along with that of many other central gods, to come to decay within a controlled zone versus a time with less control and/or payment of tributes and regalia, on behalf of Huitzilopochtli.

Future studies might touch on issues based, for example, on the categorization of tributes or products that were handled according to the spatial and geographic distribution of ethnic groups. One of the key issues for such an endeavor consists of more closely analyzing the use of the sun calendar among the Mexicas and the large region it had an influence upon. Each linguistic group had different names for the 365-day calendar. Among the Mexica, it was called *xíhuiltl*; it was called *yza* by the Zapotec, *cuiya* by the Mixtec, and *Haab* by the Maya (Marcus 2000: 15).

Cross-References

- ▶ Battlefield Archaeology
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Mexico: Historical Archaeology
- ▶ Oral Sources and Oral History
- ▶ Peopling of the Americas
- ▶ Teotihuacan (La Ventilla): Field Method

References

De Sahagun, F.B. 1969. *Historia general de cosas de Nueva EspaNu* (SA. Biblioteca 8, 2). Mexico: Editorial Porrua.

Boutorini, C. 1969. *Tira de la Peregrinacion en Antiguedades de Mexico. Basada en la recopilación de Lord Kinsborough*, vol. 2. México: Secretaria de Hacienda y Credito Publico.

Chimalpopoca, C. 1975. *Anales de Cuautitlan y leyenda de los soles*. Mexico: Universidad Nacional Autonoma de Mexico/Instituto de Investigaciones Históricas.

Corona, E. S. 1981. La importancia de la Coyolxauhqui en la historia e ideologia Mexica (Boletin de la Escuela de Ciencias Antropologicas de la Universidad de Yucatan). *Boletin Bimestral September-December* 3 (50): 51.

de Sahagún, Bernardino. 2005. Historia General de las Cosas de Nueva España. Revista de Geografía [online]. http://www.redalyc.org/articulo.oa?id=75703409. Accessed 2 Jan 2018. ISSN: 0186–4394.

Duran, F. D. 1967. *Historia de las Indias de la Nueva España e Islas de Tierra Firme*, vol. 2, ed. Garibay Angel M. Mexico: Porrúa.

Flores Garcia, F. 1956. La Administracion de Justicia en Mexico en la Epoca Precolonial. en Boletín del Instituto de Derecho Comparado de México, año IX, núm, vol. 27. México: UNAM.

Flores García, Fernando. 1980. Algunos Aspectos de la Organización Judicial Azteca en: *Memoria del II Congreso de Historia del Derecho México*, ed. Fernández Soberanes, José Luís Coord, Universidad Nacional Autónoma de México. Instituto de Investigaciones Jurídicas. Serie C, Estudios Históricos Núm 10: 41–48.

Hofstadter, D. 2005. The Aztecs: blood and glory. Smithsonian Magazine. https://www.smithsonianmag.com/history/the-aztecs-blood-and-glory-81378723/. Accessed Jan 2017.

Marcus, J. 2000. Los calendarios prehispánicos. *Arqueologia Mexicana* VII(41): 15.

Miller, M. and K. Taube. 1993. *An illustrated dictionary of the gods and symbols of ancient Mexico and the Maya*. London: Thames and Hudson.

Ramirez, C. 1975. *Relacion del origen de los Indios que habitan esta Nueva España, según sus historias*. México: Edit. Porrúa/Biblioteca Porrúa.

Romero Vargas Yturbide, I. 1959. Las instituciones. In *Esplendor del México Antiguo*, vol. II, 729–776. México: Centro de Investigaciones Antropológicas de México.

Tezozomoc, F.A. 1975. *Cronica Mexicayotol*. Mexico: Instituto de Investigaciones Historicas/UNAM.

Teotihuacan (La Ventilla): Field Method

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Brief Definition of the Topic

Teotihuacan was a great metropolis during the Classic Mesoamerican period, and its importance and influence marked the political, ideological, and economic development of a great part of the

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Central Mexican Plateau. The study of the city's architecture and town planning, as well as its internal and external social relationships, is key to understanding the cultural development of this culture. Fieldwork began with detailed mapping of the upstanding monuments, and a high-precision survey of pottery discarded on the surface (Millon 1973). This work aimed to discover as much as possible about the town without damaging the monuments or disturbing the strata by excavation. The pottery distribution proved very informative: the quantities recorded were displayed in the form of contour maps that showed the primary areas of discard (all pottery) and the areas of high-status residence (the distribution of the fine ware: regular thin orange) (Cowgill et al. 1984).

Investigations in the neighborhood of La Ventilla conducted since 1992 have identified a number of structures that are fundamental to understanding social relationships in the city; together, they make up the greatest area excavated and researched of any neighborhood in Teotihuacan (Fig. 1).

The neighborhood temple (4814 m^2) is defined by a block of houses of 60 × 70 m, integrated by three temples arranged around a central square (1). The Compound of the Glyphs (4758 m^2) corresponds to an elite monumental complex with political and administrative functions (1A). The residential compounds are defined as a group of houses and workshops mainly involved in lapidary and shell working (3). Between the two elite complexes and the compound of artisans is the Public Square, an area of more than a hectare, without any apparent buildings (2).

The excavation in La Ventilla follows the parameters set by the *Teotihuacan Mapping*

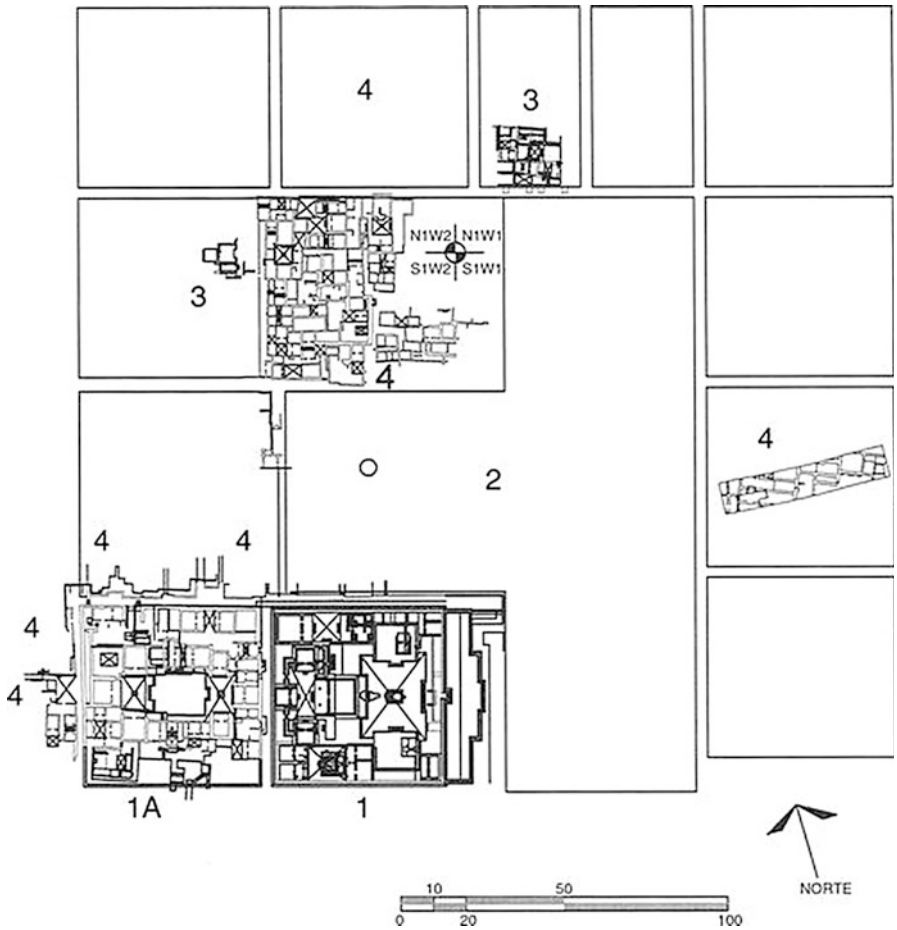

Teotihuacan (La Ventilla): Field Method, Fig. 1 *1*. Neighborhood temple, *1A*. Compound of the Glyphs, *2*. Public Square, *3*. Residential compounds, *4*. Living quarters, *5*. Streets that surround the departmental compounds

Project (Millon 1973). The general grid, oriented towards the Teotihuacan north, is divided into 1 m^2. The wide area of excavation will allow us to study the full extent of a neighborhood in detail.

All the archaeological strata and objects are excavated stratigraphically and located in three dimensions. Except in cases that merit it, the excavated area is backfilled once all the information has been recorded. The study of the different materials is conducted in specific areas and labs allocated in the archaeological area, although the support of other Mexican institutions, according to arrangements of the Archaeological Council of the National Institute of Anthropology and History of México, is also fundamental.

Cross-References

► Field Method in Archaeology: Overview
► Teotihuacan: Geography and Culture

References

Cowgill, G.L., J.H. Altschul, and R.S. Sload. 1984. Spatial analysis at Teotihuacan. In *Intrasite spatial analysis in archaeology*, ed. H.-J. Hietala, 154–195. Cambridge: Cambridge University Press.

Millon, R. 1973. *The Teotihuacán map, part 1: Text. volume 1: Urbanization at Teotihuacán, México*. Austin: University of Texas Press.

Teotihuacan: Geography and Culture

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Introduction

The city of Teotihuacan is located in the northeast part of the Valley of Mexico. It is delineated by the Cerro Gordo and Cerro de Malinalco to the north, Cerro Patlachique to the south, the Cerro de Cuautlancingo to the east, and Cerro de Tlahuilco to the west. The Teotihuacan Valley contains approximately 600 km^2 of land area and is located at a height of between 2,240 and 2,300 m above sea level.

Definition

Teotihuacan was an essentially urban culture, a multiethnic society arranged according to a precise model of town planning, linked by family relationships and lines of descent (Millon 1973). However, beneath this is concealed a series of complex questions on sociopolitical organization and integration, within a single urban space over six centuries of cultural development. Over the last few years, scholars have drawn attention to the multiethnicity of the inhabitants of Teotihuacan, which is demonstrated by the different ethnic quarters found in the city. During the classical period, the city contained almost 80% of the population of the Valley of Mexico. However, the rural population experienced exponential growth and had a tendency toward small settlements located throughout the territory (Sanders et al. 1979).

The Pyramids of the Sun and the Moon that are located in the central area of the city are understood as an expression of religious, political, and ideological power (Fig. 1). In addition, a political administrative area has been identified southeast of the archaeological area. This is the magnificent collection of the Citadel and contains the Temple of the Feathered Serpent. Control of the production of green obsidian from the Sierra de las Navajas (Hidalgo) had a decisive role in the expansion of the city (Spence 1981).

Key Issues

Teotihuacan provides an opportunity to study a densely populated, long-lasting city with inhabitants of various origins. This scenario leads to a number of questions regarding the way the city was organized and governed and its expansion across Mesoamerica. While it cannot be said that

Teotihuacan: Geography and Culture, Fig. 1 Pyramids of the Sun and the Moon photo by Miguel Morales INAH-ZAT

Teotihuacan is where the Mesoamerican city was "invented," we can say it is where it achieved a high degree of complexity.

There are various interpretations as to the origin of Teotihuacan. In a process of cultural consolidation, these can be grouped into the Altiplano Late Preclassic period, the successive volcanic eruptions that occurred in the Altiplano and the Valley of Mexico, and the subsequent movements of people who would find the Teotihuacan Valley to be not only a habitable but also a religious place to live (Sanders et al. 1979: 106–107; Angulo 1997: 147; Carballo and Pluckhan 2007; Uruñuela and Plunket 2007). However, we should remember that it is not easy to find early traces of occupation and urban growth due to the way the city itself was constructed, which involved constant architectural restructuring and alterations to the evidence in situ. The Tzacualli (1–150 d.C.) and Miccaotli phases (150–200 d.C.) indicate a society with well-defined cultural complexity. However, its political forms of organization are difficult to interpret due to the apparent unwillingness of the Teotihuacanos to highlight individuality. This characteristic differentiates them from their contemporaries such as the Mayas, whose governing elite maintained a public program that depicted their triumphs and established their legitimacy along with personal and family successes and their links with ancestors and the gods. Rather than a royal dynasty, in Teotihuacan we should imagine a tightly knit elite group which superimposed a corporate model for exercising power onto individual interests that were established along family lines of descent (Fig. 2). Research into this corporate model has been carried out by various scholars, with some outstanding work being produced by Linda Manzanilla (2006).

The Tlamimilolpa phase (200–350 d.C.) provides a clear example of a far-reaching program of architectural reorganization for the city, though this is not exclusive to the Classic period. This architectural reorganization can be seen from research carried out in caves to the east and southeast of the Pyramid of the Sun, which show the use of quarries and a large-scale post-Teotihuacan process of reoccupation, altering earlier signs of construction (Moragas 1995; Manzanilla 2006). One of the questions that arise concerns when the town planning model of the Late Preclassic period in the Valley of Mexico changed to the multifamily model that took shape in Teotihuacan during the Classic period. During the Late Preclassic period, each group of housing followed some common patterns (Fig. 3). Many Teotihuacanists believe that during this period each local district became the center of socioeconomic and ideological activity for groups of families linked by a

Teotihuacan: Geography and Culture, Fig. 2 Teotihuacan elite member, Tepantitla (complex photo taken by Miguel Morales INAH-ZAT)

Teotihuacan: Geography and Culture, Fig. 3 Yayahuala complex photo taken by Miguel Morales INAH-ZAT

common origin. However, this emergent model can be connected to the city's expansion and the consolidation of the Teotihuacan town planning model, which broke with the previous socioeconomic structure found in the Valley of Mexico, as demonstrated by Manzanilla in a research she carried out in Cuanalan. The same pattern occurs in the structure of Teotihuacan domestic organization if it is compared with that of the Maya (Cowgill 1997; Manzanilla 1985).

The Xolalpan phase (350/400–550 d.C.) shows the consolidation of all aspects of Teotihuacan culture. The presence of Teotihuacan in Mesoamerica expanded during this period. This has been interpreted as the success of the Teotihuacan model and therefore is associated with cultural success and growth. A competing interpretation is that, on the contrary, this expansion was due to the migration of certain groups from the city to live outside of the territory that was under the control of the city and that this was the first evidence of a profound crisis that led to the collapse of the city (García Chávez 1998).

The Metepec phase (550–650 d.C.) encompasses the collapse of the city. There have been a many different explanations for the fall of

Teotihuacan. They can be grouped into two general lines of interpretation: internal reasons (sociopolitical crisis) and external reasons (ecological-invasionist crisis). These interpretations attempt to identify the key factor that triggered the events that lead to the collapse of the city and the consequences of this for the surrounding area. Although it should be recognized that a single factor will not explain the collapse of Teotihuacan, it is also true that interpretations pointing to multiple causes are not completely satisfactory as they meet the same problem of having to identify an initial factor that prompted the great final crisis. The collapse phenomenon, therefore, also needs to be reassessed from other perspectives, not so much to find its immediate causes but to characterize the different processes that emerge from each study of the case. Some elements that need to be included in a nuanced understanding of the collapse of Teotihuacan include social stratification, the presence of Coyotlatelco culture inside the city during Teotihuacan times, and the contraction of the Teotihuacan state during the Xolalpan phase (Moragas 2005).

Cross-References

► Mesoamerica: Complex Society Development
► Teotihuacan (La Ventilla): Field Method

References

Angulo, J. 1997. Teotihuacan: el proceso de evolución cultural reflejado en su desarrollo urbano-arquitectónico. Unpublished PhD diss., Facultad de Arquitectura. División de Estudios de Posgrado e Investigación. UNAM.

Carballo, D., and T. Pluckhan. 2007. Transportation corridors and political evolution in highland Mesoamerica: Settlement analyses incorporating GIS for northern tlaxcala, mexico. *Journal of Anthropological Archaeology* 26: 607–629.

Cowgill, G. 1997. State and society at Teotihuacan. *Annual Review of Anthropology* 26: 126–161.

García Chávez, R. 1998. Evidencias Teotihuacanas en Mesoamérica y su posible significado para la cronología de Teotihuacan. In *Los ritmos de cambio en Teotihuacan: reflexiones y discusiones de su cronología (Colección Científica 366)*, ed. R. Cabrera and R. Brambila, 477–503. México: INAH.

Manzanilla, L. 1985. El sitio de Cuanalan en el marco de las comunidades pre-urbanas del Valle de Teotihuacan. In *Mesoamérica y el centro de México*, ed. J. Monjarás-Ruiz, R. Brambila, and E. Pérez Rocha, 133–178. México: INAH.

Manzanilla, L. 2006. La producción artesanal en Mesoamérica. *Arqueología Mexicana* 80: 28–35.

Millon, R. 1973. *The Teotihuacan mapping project*. Austin: University of Texas Press.

Moragas Segura, N. 1995. *Aportaciones cronológicas y ceremoniales en dos cuevas al sudeste de la Pirámide del Sol, Teotihuacan, México*. Tesis de Licenciatura: Universitat de Barcelona.

Moragas Segura, N. 2005. Sobreviviendo al colapso: teotihuacanos y coyotlatelcos en Teotihuacán. *Revista Española de Antropología Americana* 35: 33–50.

Sanders, W., J. Parsons, and R. Santley. 1979. *The basin of Mexico: The cultural ecology of a civilization*. New York: Academic Press.

Spence, M. 1981. Obsidian production and the state of Teotihuacan. *American Antiquity* 46: 769–788.

Uruñuela y Ladrón de Guevara, G, and P. Plunket. 2007. Tradition and transformation: Village ritual at Tetimpa as a template for early Teotihuacan. In *Commoner ritual and ideology in ancient Mesoamerica*, ed. N. Gonlin and J.C. Lohse, 33–54. Boulder: University Press of Colorado.

Terp Excavation in the Netherlands

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Introduction

Before the first sea dykes were constructed in the twelfth or thirteenth century CE, the coastal area of the Northern Netherlands was dominated by extensive salt-marsh. Habitation in this unstable maritime landscape was concentrated on relatively high ridges, often along tidal gullies. Because such ridges were still subject to flooding several times a year, people had constructed artificial dwelling mounds or *terps* (in Dutch: *terpen* or *wierden*) from the first colonization of the salt-marsh area in seventh century BCE. They started

with one or more small house platforms, which were gradually raised and extended with layers of sods, dung, and trash. The present-day terps, often still clearly visible in the flat landscape, represent the final phase of their development. Although being constructed for a different reason and in a different landscape, terps can be compared to *tells* in the Eastern Mediterranean, also comprising many overlapping habitation layers that may cover a period of several thousand of years at the same site.

Key Issues/Current Debates/Future Directions/Examples

The current method of excavating terps was largely developed during a research project at the site of Wijnaldum-"Tjitsma," in the northwestern part of Friesland (Besteman et al. 1999). Following the discovery of an 17 cm long, gold disc-on-bow brooch (c. CE 600), the universities of Groningen and Amsterdam joined forces to get a better understanding of the archaeological context of this exceptional, probably royal find. Between 1991 and 1993, a total of 8000 m^2 was excavated, 7% of the terp's total volume. This project pioneered a new strategy, which involved *stripping* with a mechanical excavator, the systematic use of a *metal detector* (resulting in the unprecedented number of c. 5000 metal finds), and *wet screening* (e.g., resulting in the discovery of gold drops, sherds of glass vessels, and numerous fishbones).

A cross of two areas was opened, measuring 210 × 76 m. The top soil was removed by a mechanical excavator in layers of 5 cm or less at a time and the surface checked for metal finds with a detector. The first archaeological horizon generally appeared at a depth of 40–60 cm below the present ground surface, whereupon it was cleaned by hand, drawn, and photographed (Fig. 1). All *negative features* and *sod-walls* were *sectioned* and documented, and the soil from all features was wet screened with a mesh width of 4 mm. Organic- or find-rich features were also sampled for zoological and botanical remains. This process was repeated at the next level, which was usually

Terp Excavation in the Netherlands, Fig. 1 Excavating a horizontal level at the terp site of Wijnaldum-"Tjitsma" (Friesland): After the top soil is removed with a mechanical digger, the archaeological level is cleaned using a flat shovel, revealing the outlines of features cut into the clayey soil. Today, precision machining with a grading bucket may leave a surface clean enough to excavate. (Photo: University of Groningen, Groningen Institute of Archaeology)

20–25 cm below the previous one. Locations of exceptional finds, like sherds concentrations or human and animal skeletons, were examined in greater detail.

Some reflections on this methodology suggest future developments. The recording of the site using the *planum method* has the disadvantage of disconnecting finds and features belonging to the same cultural layer and disconnecting the horizontal horizons and the vertical sections, since these are recorded separately. The Wijnaldum experience showed that such links can only partly be made afterwards, even by using three-dimensional reconstructions of digitized drawings. Ideally, the original surface of the cultural layers should be excavated, and recorded in three

Terp Excavation in the Netherlands, Fig. 2 Recording a "free section" at Anjum (Friesland). Interfaces between layers are outlined on the surface of the cleaned section and labeled, before being recorded with written descriptions, measured drawings, and photographs. Objects disturbed or located by metal detector are assigned to their layer of origin. The stratified sequence seen in section provides a basic narrative for the occupation of the terp. (Photo: University of Groningen, Groningen Institute of Archaeology)

dimensions. In practice, large-scale terp excavations have already become too time-consuming and too expensive to encourage the extra burden of stratigraphic excavation.

One new research method that is economic and effective makes use of existing sections already cut through known terp sites. Between 1840 and 1945, about two-thirds of all terp sites in the Northern Netherlands were completely or partly dug away, to be sold as humus to enrich the sand and peat soils in the hinterland. These sites can be investigated by cleaning the escarpment of the surviving intact mound (Fig. 2). In this way sections of 100–200 m long and 3–4 m high can be studied in only 4–5 weeks without eroding the remaining terp. Added to the results of "traditional" excavations, these *free sections* give valuable insights into the structure, chronology, and conservation of terp sites in different parts of the Northern Netherlands (see Nicolay 2010).

Cross-References

- ► Adaptation in Archaeology
- ► Human Impacts on Ancient Marine Ecosystems
- ► Maritime Landscapes
- ► Tells in Archaeology

References

Besteman, J.C., J.M. Bos, D.A. Gerrets, H.A. Heidinga, and J. de Koning, eds. 1999. *The excavations at Wijnaldum*, Reports on Frisia in Roman and medieval times 1. Rotterdam/Brookfield: Taylor & Francis.

Nicolay, J.A.W., ed. 2010. *Terpbewoning in oostelijk Friesland. Twee opgravingen in het voormalige kweldergebied van Oostergo*, Groningen Archaeological Studies 10. Groningen: Barkhuis Publishing and the Groningen University Library.

Terracotta Architectural Sculpture in Classical Archaeology

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Introduction

In Central Italy, hardly anything survives of the buildings and temples, except for the stone foundations and many tons of architectural terracottas. Easily broken and damaged, the decoration had to be replaced frequently, with styles that varied

throughout the different regions of Etruria, Latium, and Campania. Each area had important centers for the production of architectural terracottas and even entire roofs, and exported these to different sites by sea.

To protect the wooden superstructure of houses and temples from weathering, architects adopted the Greek invention of terracotta roof tiles and antefixes to cover and embellish the sloping roofs, revetment plaques to cover horizontal beams, and simas for the raking pedimental and lateral elements. The end of the gables remained open, thus creating space for small pedimental roofs with additional tiles and antefixes. Indeed, the roofs of Etruscan buildings were among the most complex and decorative in the ancient world. Private houses too were regularly adorned with decorative terracotta roofs, although from the middle of the sixth century BCE onward, only temples or public buildings were given decorated roofs. One of the many particular features of Central-Italic architectural decoration that distinguishes it from that in mainland Greece is the presence of figural decoration in the pediments and on the roofs themselves, in the shape of acroteria and ridgepole statues.

Key Issues/Current Debates/Future Directions/Examples

Terracotta Roofs in Etruria

The earliest roofs known to us today had only painted decoration with mould-made elements such as small antefixes with female heads. This early phenomenon appeared primarily in Etruria, mainly at Murlo, Acquarossa, and Tarquinia. In the early Archaic period up to the end of the sixth century BCE, Southern Etruria, with Caere and Veii, seems to have been predominant in producing roofs and roof decoration, Caere being the first center working in a specific Ionian style. This style coincided with the so-called First Phase roofs with mould-made decoration using figural scenes and antefixes with gorgon masks or female heads. During the sixth century BCE, the simple female head was by far the most common type used, with several different types datable to the second half of the century, mostly coming from Caere. The female-head antefixes were very popular, their moulds being much used, varied, and altered. This was not only because of their attractiveness, but also undoubtedly because of the power of the image as such. Their significance must surely be connected to the goddesses venerated in the temples they decorated, who were represented by images of nymphs, priestesses, or perhaps even by an image of the goddess herself. Popular especially during the second quarter of the sixth century BCE were military scenes of departing warriors or armed riders, but later such scenes more commonly included banquets, processions of chariots, and, for the pedimental slopes, chariot and horse races. The open pediments were given reliefs, protecting and covering the ends of the *columen* and *mutuli*. The lateral corners of the roof, as well as the *apex*, were usually given decoration in the shape of acroteria, terracotta sculpture in-the-round. In Etruria especially, the ridgepoles were decorated with abundant terracotta statuary.

Terracotta Roofs in Campania

Overlapping to a degree, but certainly by the end of the sixth century, Campania, with centers like Cumae and Capua, seems to have taken over the market with an especially popular but short-lived roof system, with antefixes set in tongue frames and revetments with floral elements like hanging palmettes and chains of lotuses. The first *columen* and *mutulus* plaques derive from the Campanian system. Modest acroteria in the shape of sphinxes, disks, or single winged figures were placed up on the roof. This style was adopted all over Central Italy, only to be copied and in the end replaced by the local styles and techniques of traveling workshops in Latium; there, local styles and techniques dominated the area until 480 BCE. It is called the Second or Late Archaic Phase, beginning in the last quarter of the sixth century BCE and showing a marked change in the style of the decorative system. This was influenced by the Campanian system, with floral elements replacing figural scenes, and large antefixes with female heads or gorgon masks surrounded by tongue frames slowly developing into entire figures or pairs of

figures up to a height of half a meter. The format of the revetment plaques for the pediments and the lateral sides of the buildings was also enlarged with tall tongues above a flat painted frieze with meander or *guilloche*, under which there was a moulded frieze with palmettes and lotus flowers, or *anthemion* chains linked by volute bands. The pediments were filled with large *columen* and *mutulus* plaques showing hand-made reliefs with figural and mythological scenes. On top of the roofs appeared large statues of gods and warriors, set in pairs or in otherwise complex scenes. This completely new style of revetment was introduced in conjunction with the development of larger temple architecture and continued well into the fifth century BCE. By then, only temples were given these rich decorative roofs.

Terracotta Roofs in Southern Italy

Archaic architectural terracottas from Southern Italy and Sicily are famous for their richness in quality and quantity, and their "transitional" position between the terracotta roofs of mainland Greece and those of Central Italy. It is said that they represent the best of both traditions, showing a rich variation in painted decorative motifs and a fully fledged Greek-oriented styling. Both Sicily and Southern Italy employ two different and incompatible roof systems, one with lateral simas along the eaves and a second with antefixes and eaves tiles. The system using antefix plus eaves tile seems to have been cheaper in production than that with lateral simas along the eaves, and was said to have originated in northwestern Greece. It was particularly popular for modest buildings, such as small temples, *naiskoi*, and grave monuments. Southern Italy in particular quickly adopted the idea of decorative antefixes with eaves tiles for its buildings. These antefixes are invariably combined with horseshoe-shaped cover tiles and a hybrid roof system with flat pan tiles. For the Tarantine antefixes, this has not always been the case. Circular antefixes were used also to cover the *kalypter* in the pediment of small temples. The prime period of production in Southern Italy started around the middle of the sixth century BCE. It continued, especially in the main production center of architectural terracottas in Tarentum, well into the fourth century BCE. The main source of influence on roofs and their characteristics (antefixes and simas) came from Asia Minor (Ionia). Through Sicily its influence permeated into Southern Italy. Corfu, on the other hand, had a direct influence on the production of antefixes in Southern Italy, at Sybaris, Lecce, and Tarentum. After about 550 BCE, both Sicily and Asia Minor seem to have been dominant in influencing the typology in decoration and images in Southern Italy.

Terracotta Roofs in Italy, After 500 BCE

By the end of the Archaic period, this new roof system had developed in Central Italy that was exclusive to religious buildings. The change of political rule, the dominance of Rome, and the impulse from Greek immigrants from Southern Italy, all contributed to influence this process. This new system is known as the Second Phase. The roofs of private houses and elite buildings were no longer given terracotta decoration. Temples grew larger and more monumental than before, and their roofs became more elaborate and complex. The dimensions of each individual roof element became larger, with antefixes, for instance, reaching heights of about half a meter. Large terracotta sculpture was placed on the roof. Reliefs in the open pediments which covered the ends of the beams grew larger, and carried mythological figures and scenes that almost completely filled the pediment. Revetment plaques and raking simas were given floral decoration instead of figural scenes and became more complex in construction. This new style with full-figure antefixes became popular and the most common decoration was a group of dancing satyrs and maenads, *Mischwesen*, along with full-size heads of mythological figures and goddesses. Around the middle of the fifth century BCE, the centers of central and inland Etruria gained in importance at the expense of the coastal cities. Orvieto and Cività Castellana in particular became large production centers for roofs. The models from these workshops spread over a large area, including cities such as Arezzo, Perugia, Talamone, and Tarquinia. This development into monumentality on a large scale continued in the periods after the fourth century BCE, at pace with the revival of the Etruscan centers after a short period of decline.

The previously inset roofs placed on the floor of open pediments (the recessed gable) that had formed part of Archaic temple architecture gradually disappeared, to be replaced by fully fledged pedimental groups set against a closed background. The first of these appeared in Rome itself and is dated to the end of the fourth century BCE. During the Classical period, decoration consisted of large heads of satyrs and females surrounded by large concave frames decorated with floral motifs in relief which alternated along the eaves of large temples. For smaller buildings or for use on the floor of recessed gables, smaller heads surrounded by a frame of long, concave tongues continued to be used, and heads wearing floral wreaths became very popular. In contrast to the nymphs of the Archaic period, the female heads now represented maenads. They were accompanied by heads of satyrs identifiable by their animal ears, and characterized by their ivy wreaths or frames with ivy and bunches of grapes as followers of Dionysos. The same types continued into the fourth century and the Hellenistic period, the heads reflecting contemporary styles of sculpture. Third-century terracotta production was strongly influenced by the destruction of two important Etruscan sites, Volsinii (264 BCE) and Cività Castellana (241 BCE), and by the foundation of the Roman colony in Cosa (273 BCE), where a new important production center of roofs was set up. Subsequently, it was in the newly reinforced Latin colonies everywhere in Northern and Central Italy, where the organized urban centers were provided with temples of the Etrusco-Italic type. With the rich decoration of their pediments and mould-made elements, they represented instruments of Roman propaganda. In the following period, between the third and second centuries BCE, when Roman Italy was itself being constructed, Etrusco-Italic temples and roof systems, and their figured terracotta decorations were true *fictiles fabulae*. Placed in a program of renovation that was especially important for the local elites, they underscored the people's Roman citizenship. This period was marked by a strong economic and cultural renewal, when Etruscan cities like Falerii, Telamone, Cosa, Vulci, Luni, and Cività Alba commissioned monumental temples with rich pedimental decoration in terracotta. The pediments were filled with statuary groups, taking Greek-Hellenistic pedimental sculpture as an example of style, composition, and *themata*. The scenes displayed were quiet scenes of standing or seated figures from the pantheon (like the myths of Ariadne and Andromeda), or complex scenes from legendary wars and fights, complete with chariots, horses, and monsters (like scenes from the Trojan War or the Theban cycle). Often these scenes represented actual wars and victories, and had a strong political impact.

Terracotta Roofs in Roman Italy

Romanization forged ahead throughout Central Italy influencing the imagery and quality of the old Etruscan models in roof decoration, replacing it slowly but surely by a standardized Roman roof system. In the more southern regions, especially in Campania and Lucania, the decoration of temples was more modest in comparison to that of the temples in Etruria and Latium, the only images used being those in antefixes of a Campanian type with female heads and revetment plaques with Medusa heads. The final monumental stage in the development of architectural decoration was reached in the second century BCE, with the introduction of some new types of antefixes, mostly *Potnia Theroon* antefixes and antefixes with heads of Athena. The closed pediment was now apparent everywhere; its complex and rich statuary groups changed the overall appearance of the temples, fully providing them with Roman political propaganda and a frontal aspect of prime importance. Themes reflected historical events in religious and mythological contexts. It has been called the "Latin triumphal art" and was executed in the Hellenistic, "Neo-Attic" style, a *koine* in an artistic sense, which was omnipresent and dominated the whole of the Mediterranean world. In all Italic territories, architectural terracottas became widely distributed, both in the areas surrounding the great cities and in many distant places on the peninsula. In Roman times, the terracotta decoration of temples was still much admired. Pedimental decoration in terracotta was visible both in Rome itself as well as in provincial towns Architectural terracottas from the Roman period are plentiful, but in comparison with roofs from the Archaic, Classical and

Hellenistic periods, they are much less complex in variation and type. The Etruscan tradition of protecting and decorating temples with terracotta elements was slowly abandoned in favor of the embellishment of public and sacred buildings with stone and marble. Large antefixes disappeared altogether. The dominant production centers of architectural terracottas Città Castellana and Orvieto diminished in importance, and production returned mainly to Rome, where workshops developed new models of Hellenistic origin. Greek artists and artisans dominated the artistic scene and production from the second century BCE onward. They acquired complete autonomy and distributed their products throughout the whole of Central Italy and beyond. One group is predominant, the revetment plaques of the "Campana" type which were produced from the first century BCE onward and which by far outweighed the production of other roof decoration and decorated the exterior of sacred, and other public buildings, as well as private ones, such as villas. Roman antefixes have not received so much attention as "Campana" reliefs, probably due to their simplicity and modest artistic value. Their dimensions are small and their figural motifs limited. Medusa seems to have remained a popular type for both antefixes and other revetments in the Roman period. Production reached its peak in the Augustan and Julian-Claudian periods, coinciding with the explosion in building activities in the early imperial period. Decorative architectural terracottas became unusual after Imperial times, after the second century CE; marble was preferred then everywhere over decoration in terracotta.

Technique and Manufacture

A mould or *matrix*, like no other object in terracotta, informs us about both the production process and the distribution of architectural terracottas in Antiquity. Moulds were used to produce decorative elements when several were needed: raking and lateral simas, antefixes, or revetment plaques. They show the first phase of the creation of parts of the roof decoration, as well as the reproduction of other elements. Moulds were important tools for coroplasts, enabling them to reproduce hundreds of roof elements of the same quality at the same time, as well as enabling distribution over a vast region. Moreover, creating new moulds of existing revetment plaques or antefixes made it possible to use one type of roof decoration over several generations. Moulds are rarely preserved. Not many workshops producing roofs have been located during excavations, so the chance of finding workman's tools is relatively small. It also seems that moulds were not thrown away immediately but kept in use for a long period of time. They were sometimes even repaired. Today, some twenty moulds for antefixes and a few for relief plaques or other roof parts are known, namely, those from Città Castellana, Orvieto, and Capua. Only in one case, that of the Amsterdam mould Cat. no. 36, was a cast ever found during excavations, although some casts seem to have derived from the same type. Reconstructing the production process of terracotta objects is relatively easy, since working in clay has not changed over the centuries. The process of the creation of a mould and its subsequent use is as follows. The perfect model or *patrix*, created by a master coroplast, was covered with wax or oil after firing. Then a thick layer of soft clay was pressed over the *patrix*, thus creating a copy in negative, a mould. Presumably the same clay was used for both moulds and final products. After drying, the mould could easily be taken apart, thanks to the oily layer dividing it from the model. The mould was cut into a manageable format. Thus, all details of the model were copied in the mould. Sometimes extra details were added to the final product, but the moulds we know are all very detailed as regards hairdo, facial features, and decoration. After using the mould for the production of, for instance, the antefixes of a roof (a single mould could be sufficient), they were slipped, and then painted with a mixture of slip and natural pigments such as iron oxides and calcium. The products were fired between 800 °C and 1050 °C, thus fixing the colors to the surface so as to withstand the weather. In this way, some colors have been preserved right up to the present day.

Cross-References

► Central Italy: Etrusco-Italic Sanctuaries
► Religion, Italo-Roman, Archaeology of

Further Reading

Andrén, A. 1940. *Architectural terracottas from Etrusco-Italic temples*. SkrRom, 4°, 6. Lund: Gleerup.

Bellelli, V., F. Delpino, P. Moscati, and P. Santoro, eds. 2008. *Munera Caeretana. In ricordo di Mauro Cristofani. Atti dell'incontro di studio. Roma, 1 febbraio 2008 (Mediterranea 5)*. Pisa-Rome: Serra.

Christiansen, J. 2008. *Etruria in the archaic period. Catalogue of the NyCarlsberg Glyptotek*. Copenhagen: Ny Carlsberg Glyptotek.

Cristofani, M., ed. 1990. *La grande Roma dei Tarquini* (exh. cat.) Rome: Palazzo delle Esposizioni.

Colonna, G., ed. 1985. *Santuari d'Etruria* (exh. cat.). Milan: Arezzo.

Della Seta, A. 1918. *Museo di Villa Giulia*. Rome: Danesi.

Di Mario, F., ed. 2007. *Ardea, la terra dei Rutuli, tra mito e archeologia: alle radici della romanità*. Rome: Nuovi dati dai recenti scavi archeologici.

Edlund Berry, I.E.M., G. Greco, and J. Kenfield, eds. 2006. *Deliciae Fictiles III, Proceedings of the International Conference on Architectural Terracottas in Ancient Italy: New Discoveries and Interpretations held at the American Academy in Rome, 7–9 November 2002*. Oxford: Oxbow.

Ferrea, L. 2001. *Gli dei di terracotta. La ricomposizione del frontone da via di San Gregorio* (exh. cat.). Rome: Musei Capitolini.

Koch, H. 1912. *Dachterrakotten aus Campanien mit Ausschluss von Pompeji*. Berlin: Reimer.

Kunze, M., and V. Kästner, eds. 1988. *Die Welt der Etrusker. Archäologische Denkmäler aus Museen der sozialistischen Länder* (exh. cat.). Berlin: Altes Museum.

Lang, M. 2010. *Untersuchungen zu den Tondächern westgriechischer Typologie*. BAR International series 2098. Oxford: Archaeopress.

Lulof, P.S. 2007. *Architectural terracottas in the Allard Pierson Museum Amsterdam*. Amsterdam.

Lulof, P.S., and E.M. Moormann, eds. 1997. *Deliciae Fictiles II. Proceedings of the 2nd International Conference on Archaic Architectural Terracottas from Italy. Held at the Netherlands Institute in Rome 12–13 June 1996*. Amsterdam.

Lulof, P.S. & C. Rescigno, eds. 2011. Deliciae Fictiles IV, images of gods, monsters and heroes. In *Proceedings of the 4th International Conference on Architectural Terracottas from Ancient Italy, Rome, Syracuse Sicily 21–25 October 2009*. Oxford: Oxbow.

Maetzke, G., ed. 1992. *La coroplastica templare etrusca fra il IV ed il II secolo a.C.* Atti del XVI convegno di Studi etruschi ed italici, Orbetello 1988. Florence.

Marroni, E., ed. 2011. *Sacra Nominis Latini. Un trentennio di scoperte nei santuari di area latina tra l'età arcaica e la tarda repubblica*. Atti del Convegno Roma, 19–21 febbraio 2009, = Ostraka 2011, 427–440.

Moretti Sgubini, A.M., ed. 2001. Veio, Cerveteri, Vulci. Città d'Etruria a confronto. In *Roma, Museo Nazionale Etrusco di Villa Giulia, Villa Poniatowski, 1 ottobre–30 dicembre 2001*. Rome: L'Erma di Bretschneider.

Moretti Sgubini, A.M. 2004. *Scavo nello scavo. Gli Etruschi non visti. Ricerche e "riscoperte" nei depositi dei Musei Archeologici dell'Etruria meridionale, Viterbo, 5 marzo-30 giugno 2004*. Rome.

Palombi, D., ed. 2010. *Il tempio arcaico di Caprifico di Torrecchia (Cisterna di Latina). I materiali e il contesto*. Rome: Pontinia.

Rescigno, C. 1998. *Tetti Campani. Età arcaica. Cuma, Pitecusa e gli altri contesti*. Rome: Giorgio Bretschneider.

Rystedt, I. E., C. Wikander & O. Wikander, eds. 1993. *Deliciae Fictiles. Proceedings of the 1st International Conference on Central Italic Architectural Terracottas at the Swedish Institute of Rome 10–12 December 1990*. Stockholm.

Strazzulla, M.J. 1997. Terrecotte architettoniche. *EAA* 2 (suppl. V): 701–719.

Strazzulla, M.J. 2006. Le terrecotte architettoniche nei territori italici. In *Deliciae Fictiles III*, ed. I.E.M. Edlund Berry, G. Greco, and J. Kenfield, 25–41. Oxford: Oxbow.

Torelli, M. 1999. *Tota Italia. Essays in the cultural formation of Roman Italy.* Oxford: Oxford University Press.

Torelli, M., and A.M. Moretti Sgubini, eds. 2008. *Etruschi. Le antiche metropoli del Lazio*. Milan: Electa.

Turfa, J. 2005. *Catalogue of the Etruscan gallery of the University of Pennsylvania Museum of Archaeology and Anthropology.* Philadelphia: UPenn Museum of Archaeology.

Winter, N.A. 1993. *Greek Architectural terracottas from the prehistoric to the end of the archaic period*. Oxford Monographs on Classical Archaeology. Oxford: Clarendon Press.

Winter, N.A., ed. 1994. *Proceedings of the International Conference on Greek Architectural Terracottas of the Classical and Hellenistic Periods, December 12–15, 1991*. Princeton: American School of Classical Studies at Athens.

Winter, N.A. 2009. *Symbols of wealth and power. Architectural terracotta decoration in Etruria and central Italy, 640–510 B.C.* Ann Arbor: University of Michigan Press.

T

Terramara Santa Rosa di Poviglio Alluvial Site

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Introduction

The "Terramare" are banked and moated villages dating to the Middle and Recent Bronze ages

(1600–1150 year BCE), located in the alluvial plain of the Po river, northern Italy. They are witness to a complex society, whose subsistence was based on intensive agriculture, pastoralism, and long-range trade (Barfield 1994). The Terramare people first carried out a radical clearing of the Po plain to provide land for intensive agriculture, and changed the natural drainage by digging canals and ditches to feed moats surrounding the villages and to irrigate the fields in the countryside (Cremaschi et al. 2006). The culture reached its apogee, along with a prolific population, at the beginning of the Recent Bronze age, but at the end of this period suffered a societal collapse that led to the abandonment of the villages in a few generations (Cardarelli 2010).

Key Issues/Current Debates/Future Directions/Examples

The Terramare have been a major subject of research by the Italian pioneers of prehistoric archaeology (Pearce 1998), but had been neglected for at least sixty years, and were thought to be almost destroyed by quarrying for soil during the nineteenth century. But at the beginning of the 1970s, geomorphological mapping of the Po plain, using aerial photography, demonstrated that the Terramare had largely survived quarrying. From that period onward, several projects have marked a new stage in their study (Bernabò Brea et al. 1997).

In the framework of this renewed interest, the archaeological excavation of Santa Rosa took on the task of extensively exploring a Terramara village, with the explicit aim of shedding light on its architectural structures and its development over the 400 years that the village lasted. The Santa Rosa site was selected by virtue of its good state of preservation and because it was threatened with destruction by agricultural work. The site was defined by aerial photography, which revealed its limits in outline (Fig. 1a). Subsequent geophysical survey showed up areas of high and low conductivity, indicating areas dominated by wet and dry features (color coded on Fig. 1b). The interpretation is of two settlements, each surrounded by clay ramparts and moats.

Excavation has been carried out under the aegis of the SoprintendenzaaiBeniArcheologici of Emilia Romagna and the local authority, and performed by a professional team, which also trains archaeology students for the principal research institution (University of Milan). The

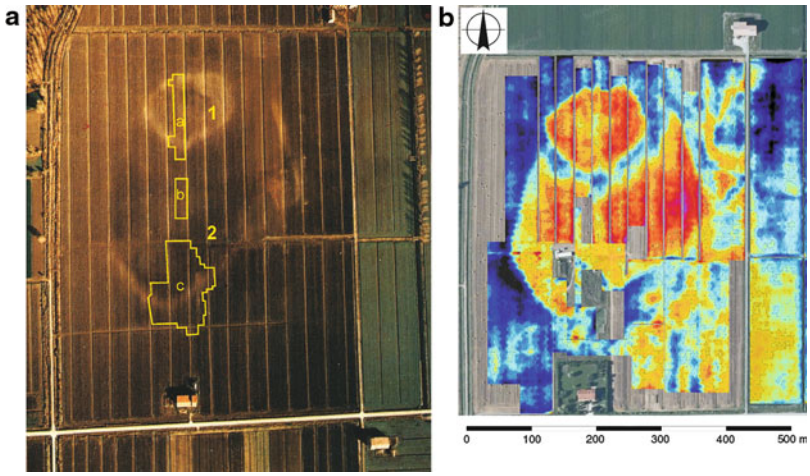

Terramara Santa Rosa di Poviglio Alluvial Site, Fig. 1 The Terramara Santa Rosa as seen on the aerial photograph (*left*) and on the base of near-surface geophysical prospection (*right*). Aerial photograph: *1* – small village; *2* – large village. *Yellow lines* delimitate the areas excavated up to now: (**a**) area in the small village 1984–1992; (**b**) area between the two villages 2008–2011; (**c**) area in the large village and in the moat 1993–2011. Geophysical prospection: *blue colors* indicate conductive media (*clayey deposits*) indicating moat ditches and flood deposits surrounding the site; yellowish/reddish colors indicate resistive media (*sandy-silty deposits*) putting in evidence the Terramara shape (Mele et al. 2011)

Terramara Santa Rosa di Poviglio Alluvial Site, Fig. 2 The area excavated in the large village. The buildings, indicated by clusters of post *holes*, are delimited by peripheral moat. Note the high concentration of *circular wells*

aims of the excavation are to map the detailed occupation of the larger (7 ha) settlement and explore the relationship between the two. The first 28 seasons have opened an area of 1 hectare, revealing the defenses, post-rows of buildings, and numerous wells (Bernabò Brea and Cremaschi 2004; Fig. 2). The excavation period is limited to the summer season; during the winter/spring seasons, the water tables rise very close to the ground surface, make digging difficult (Fig. 3).

The original settlement was built at the edge of the Po river during the Middle Bronze Age, and consisted of a group of rectangular houses on piles protected by a timber palisade. At the beginning of the Later Bronze age, the Terramara reached its maximum expansion with the construction of the large village. Inside it, the houses were still on piles, but arranged along specific alignments and organized into quarters bounded by roads going through the village and crossing the surrounding moat over wooden bridges thereupon reaching the countryside (Cremaschi and Pizzi 2011). At the end of the Late Bronze Age, the village underwent a radical renovation: the houses were no longer built on piles, but rested on the ground according to the block-house technique. The peripheral wooden fences were replaced by massive earth ramparts.

The region in which the Terramare previously flourished was abandoned for at least five

Terramara Santa Rosa di Poviglio Alluvial Site, Fig. 3 Archaeologists at work in the course of a field season in the Terramara Poviglio Santa Rosa

centuries. The Santa Rosa village area became a mound, covered with forest and surrounded by marshes which colonized the former ditches. It was settled again only in the sixth century BCE by Etruscan colonists.

Cross-References

► Excavation Methods in Archaeology

References

Barfield, L. 1994. The Bronze Age of northern Italy: Recent work and social interpretation. In *Development and decline in the Mediterranean Bronze Age*, Sheffield archaeological monographs, ed. C. Mathers and S. Stoddart, vol. 8, 129–144. Sheffield: Collis J.R. publications.

BernabòBrea, M., and M. Cremaschi. 2004. La terramara di Santa Rosa di Poviglio nel corso del Bronzo Recente. In *Atti del Convegno L'età del Bronzo Recente in Italia, Lido di Camaiore 26–29 ottobre 2000*, 101–111.

BernabòBrea, M., A. Cardarelli, and M. Cremaschi, eds. 1997. *Le terramare. La più antica civiltà padana*. Milano: Electa.

Cardarelli, A. 2010. The collapse of the Terramare culture and growth of new economic and social systems during the Bronze Age in Italy. *Scienze dell'Antichità. Storia, Archeologia, Antropologia* 15: 449–520.

Cremaschi, M., and C. Pizzi. 2011. Exploiting water resource in the Bronze Age villages (terramare) of the Po plain (northern Italy). Recent investigation in the terramara Santa Rosa of Poviglio. *Antiquity* Project Gallery 85 (327). Available at: http://antiquity.ac.uk/projgall/cremaschi327/.

Cremaschi, M., C. Pizzi, and V. Valsecchi. 2006. Water management and land use in the terramare and a possible climatic co-factor in their collapse. The case study of the Terramara S. Rosa (northern Italy). *Quaternary International* 151: 87–98.

Mele, M., M. Cremaschi, M. Giudici, A. Bassi, C. Pizzi, and A. Lozej. 2011. Near-surface geophysical prospection to reveal the hidden structure of the Terramara Santa Rosa, Poviglio (Italy). Abstract in: *Epitome*, p 339.

Pearce, M. 1998. New research on the terramare of northern Italy. *Antiquity* 72: 743–746.

Textiles and Fabrics: Conservation and Preservation

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Introduction

A textile is a binary system of fibers or other materials worked into threads. In essence a textile

is formed by weaving, but the term can also be used more generically and thus covers flexible products made in other techniques, as, for instance, twining, needle binding, knotting, and knitting. Felting and basketry are also techniques related to textiles. Thus, textiles can be seen as one part of an overall cloth culture, which may include many different materials and techniques (Harris 2012).

Around the world and throughout time, humans have created textiles by exploiting different natural resources and inventing tools and methodologies to change these resources into a viable product. Some areas are rich in traditional textile resources, like materials for fibers, dyes, and tools, but also in less resource plentiful areas, humans have found solutions for fulfilling the demand for textiles.

Definition

Until very recent times, textiles were primarily made from natural fibers of either plant or animal origin. The most well-known plant fibers are flax, hemp, nettle, and cotton, while the most well-known animal fibers are sheep wool and silk. Like any perishable organic material, these fibers are subject to rapid decomposition in archaeological contexts, and their preservation requires special conditions to prohibit their destruction by microorganisms.

Key Issues/Current Debates/Future Directions/Examples

Contexts

Environmental conditions affect the survival of plant and animal fiber materials in various ways. In general, an acidic environment favors the preservation of proteinaceous fibers, while a alcaline environment does the same for fibers of vegetal origin. As most degradation requires the presence of air, many textiles have been found in contexts where anaerobic and/or waterlogged conditions occur. Other conditions like extreme dryness or permanent frost; the presence of salt; exposure to fire, which leads to the creation of carbonized samples; or through mineralization when coming into contact with metal salts have also preserved many textiles.

The find context influences the preservation of archaeological textiles. In Europe, most textile remains have been found in connection with burials, such as costumes, wrappings of human remains and/or grave goods, furnishing, and other utility textiles. In inhumation graves, the organic materials are often exposed to heavy and fast degradation, and, in most cases, it takes special conditions as, for instance, the presence of metal salts from copper or iron to prevent the degradation (e.g., Bender Jørgensen 1992; Rast-Eicher 2008; Gleba and Mannering 2012). Though these textiles are often very small and in a stage where further organic analyses are excluded, they still offer due to their number and firm structure an important source to European textile technology. In dry climates as in Egypt, many textiles have been preserved by desiccation and aided by the burial custom of embalming the dead. In a similar way, the special tradition of embalming and placing the dead in caves, which was performed in the pre-Columbian Inca kingdom, has preserved many colorful textiles made of cotton and wool in South America. Frozen environments like the Norse burials in Greenland have left fabrics almost unaltered, and in the recent years, the melting of glaciers in, for instance, Switzerland and Norway have also revealed well-preserved textile finds. In Denmark, the waterlogged, anaerobic, and acidic environment in burial mounds has favored the preservation of a large collection of complete Bronze Age textiles and costumes.

Other important contexts where textiles may occur are settlements, harbor areas, garbage dumps, and earth fillings. Many excavations in medieval towns around Europe have revealed new and important textile corpuses that supplement and challenge information based on written sources, and also textiles found in churches and relics provide important perspectives to our textile history. Especially in Northern Europe, many textiles have been found in connection with ritual offerings, as in weapons deposits, or together with mummified human remains. From these

lake and bog contexts, many complete wool textiles and other objects made of skin and fur dated to the Iron Age have been preserved. Until recently, it was believed that this acidic environment in the North European high bogs only favored preservation of proteinaceous origin, while it was only larger objects of plant origin like cords and ropes made of tree bast, stems of flax, and wooden objects that could be preserved in bogs. Nevertheless, during the reexamination of the Huldremose Woman (Fig. 1), the last remains of a textile in plant fiber was discovered on her back, and threads from this weave could also be located in many folds in her skin (Frei et al. 2009). This is the first time that a plant fiber textile has been recorded from a bog context in Denmark. This example shows that although a specific context and environment in general favors a specific material, every archaeological find is in itself unique. When excavating new finds or researching already excavated finds, it is important to be open for all possibilities in order not to overlook important archaeological materials.

Textiles and Fabrics: Conservation and Preservation, Fig. 1 The Huldremose Woman's costume consists of two skin capes, a woven skirt and a scarf in wool, and an undergarment in plant fiber. The woman and her fantastic well-preserved costume were found in a bog on Djursland in Denmark in 1879 and belong to the National Museum of Denmark. The find is 14C dated to 350–341 BCE

The scarcity and poor preservation of archaeological textiles are two factors usually cited for the absence of focus on textile studies. Although valid to a certain extent, such reasoning has obscured the fact that textiles are much more abundant in archaeological contexts than generally assumed and should, whenever present, be studied in the same way as any other archaeological finds.

Textile Research and Scientific Analyses

Textiles have an enormous potential in archaeological research, being able to tell about social, chronological, and cultural aspects of past societies, and at the same time providing us with a unique opportunity to come very close to the prehistoric or historic individual. Substantial information about past societies can be gained from the study of textiles, but this information depends on the analytical tools and methods used. A textile contains information about the process and the tools used in the various stage of its production. The decoding of a textile is imperative for the understanding of the many different processes involved in its production, and the methods may vary according to the state of preservation (Andersson Strand et al. 2010). For instance, the processing of a fiber material from the source to the final thread and the weaving and sewing will not only tell about breeding systems and the technological knowledge of that time but also indicate more subtle information about visual preferences and human desires.

Fiber identification is an important starting point in textile research as it indicates the properties of this material as well as the possible use. The identification of fibers is in most cases based on morphological characteristics performed by various types of microscopy. The optical microscopy is the most basic tool which together with scanning electron microscopy (SEM) enables precise photographing and measuring. In these cases sampling is necessary. Fiber identification can be difficult in cases of highly aged and deteriorated samples where fiber characteristics have been changed and/or where sampling is complicated by the fragility or the scarcity of the fibers. In such cases, scanning electron microscopy is especially useful and combined with energy dispersive X-ray spectroscopy (SEM/EDX) inorganic elements in the fibers such as pigments, mordants, and salts, and proteins in animal fibers can also be analyzed. Transmitted electron microscopy (TEM) can provide information on the internal fiber structure such as the pigmentation of wool fibers. Gas chromatography/mass spectrometry (GC/MS) and infrared microspectroscopy (FTIR) are useful analytical methods for the identification of resins, oils, and balsams that can have been applied to textiles. High-performance liquid chromatography (HPLC) is used to obtain information about dyes or dye components that are not visually detectable anymore. Especially, dye analysis provides important information to the archaeological interpretation that characterize visual preferences, technology, and exchange of know-how and goods (Vanden Berghe et al. 2009). Radiocarbon dating (^{14}C) can be used for textiles from disturbed contexts or contexts where no other datable object exists (Mannering et al. 2010). Textile materials are, in general, well suited and reliable for ^{14}C dating, although the presence of conservation substances should be evaluated before sampling. Stable isotopes can reveal facts about the nutrition (Wilson et al. 2001), while strontium isotopic analysis, which has now been adapted to fibrous material, can reveal whether the textiles are of local or nonlocal origin (Frei et al. 2008). DNA sequencing is useful for the identification of specific species, which are otherwise hard to identify, but the results highly depend on the preservation conditions (Ørsted Brandt et al. 2011). Detection of species of animal origin can also be done with mass spectrometry-based protein sequencing (MSPS) (Schmidt et al. 2011).

The constant improvement of scientific analytical methods and the development of new ones will often inspire further analyses. Yet, most analytical tools require sampling, and it is important to develop more nondestructive methods in order to secure our common world heritage, and to improve working conditions and the scientific outcome. The importance of taking samples should be evaluated prior to analysis, and sampling should preferably be done before any contamination has occurred. Accurate documentation, preferably

by photographs, of where samples have been taken is imperative.

Preservation and Conservation

The aim of an active conservation treatment is to improve the condition of the textile by trying to eliminate some of the causes of deterioration, and the aim of preventive conservation is to slow down the rate of further degradation (Skals 1996). Textiles preserved in archaeological contexts are often weak and tend to be fragile and decompose easily when exposed to changes in the climatic conditions and to touching and handling. A general rule is that dry textiles should be kept dry, wet textiles kept wet, and textiles should be stored in a cool place until the conservation treatment can commence. Adding consolidants during retrieval or biocides to avoid bacterial or fungus growth should be avoided as future scientific analyses thereby will be complicated or prevented (Gillis and Nosch 2007).

The method of drying waterlogged archaeological textiles and the questions of pretreatment with lubricating additives such as polyethylene glycol (PEG) or glycerol are factors which has been the focus of much discussion and research. Freeze drying has been evaluated as the gentlest form of drying. It can be done under vacuum or at atmospheric pressure. The discussions regarding pretreatment are somewhat unresolved because the additives in theory are soluble and the treatment reversible. Nevertheless, it can be very difficult to completely remove additives from archaeological fibers. Lubricants are often added to waterlogged wood to replace the water that has filled the empty spaces in the cell structure. Adding lubricants to textile fibers with the aim of replacing the water in the fiber structure is a different matter. The molecular structure is different from wood, and the empty spaces inside fibers are very tiny. Furthermore, the yarn structure, consisting of many fine fibers twisted together, will cause the liquid additives to run into all the air spaces and coat the fibers. Completely removing them is impossible without much damaging manipulation of the textiles. Also future scientific analyses will be unreliable. Avoiding the use of lubricants is therefore recommended (Peacock 2005).

Cleaning of textiles is an irreversible process, and the effect of cleaning on the condition of the textile must be evaluated before a treatment is chosen. Thorough cleaning of wet archaeological textiles prior to drying should be avoided as should also wet cleaning of dry archaeological textiles. Dirt can be the cause of long-term degradation but also be part of the history of the object. Likewise, the cleaning process may remove less stable substances like dyes and paint which may not be visible to the naked eye, or pollen assemblages stored in the textile, which in turn contain information about human activities and the environment.

The long-term preservation of textiles will be enhanced by good, clean, and cool storage. Fragile textiles should be supported, and shelves and drawers should be well fixed to eliminate mechanical damage. The textiles should be protected from deteriorating effects of light, heat, and high humidity, and regular monitoring for insect infestation is recommended.

Due to the fragile nature of textiles, they will inevitably degrade. Careful handling and ideal storage are preventive methods that can slow down the degradation, but they can never prohibit or stop it. Therefore, it is of utmost importance that archaeological textiles are analyzed and studied when possible. In this work, a useful tool is high-resolution digital photography which provides accurate documentation of the object and its condition at a certain time. At the same time, this technique also opens for a wider scientific use and dissemination of these fragile objects, which reaches beyond their physical presence.

Conclusion

Textile research is a worldwide occupation which is performed within many different disciplines. This is also the case within archaeological textile research where the theoretical and methodological approach, to a large extent, depends on the research traditions in the different geographical and cultural historical areas. Research in archaeological textiles are performed by, among others, archaeologist, historians, art historians, textile designers, conservators, and crafts people, and each in their way, they are able to contribute

with important aspects to the understanding of the production and use of textiles.

Textiles and fabrics are an important part of our common world heritage. Most cultures and peoples around the world use textiles for multiple purposes and the same are true for past societies. Common for this worldwide endeavor is first and foremost the wish to keep warm and comfortable, but textiles also have an important role in expressing who we are – our gender, age, family affiliation, status, occupation, religion, and ethnicity. Knowledge of textile history is hence a key to our understanding of a multitude of human issues.

Cross-References

- ▶ Authentication and Conservation in Archaeological Science
- ▶ Domestic Archeology: Textiles of Northern Mediterranean

References

Andersson Strand, E., K.M. Frei, M. Gleba, U. Mannering, M.-L. Nosch, and I. Skals. 2010. Old textiles – New possibilities. *European Journal of Archaeology* 13: 149–173.

Bender Jørgensen, L. 1992. *North European textiles until AD 1000*. Aarhus: Aarhus University Press.

Frei, K., R. Frei, U. Mannering, M. Gleba, M.-L. Nosch, and H. Lyngstrøm. 2008. Provenance of ancient textiles – A pilot study evaluating the Sr isotope system in wool. *Archaeometry* 51: 252–276.

Frei, K., R. Frei, U. Mannering, M. Gleba, M.-L. Nosch, and H. Lyngstrøm. 2009. The Huldremose Iron Age textiles, Denmark: An attempt to define their provenance applying the strontium isotope system. *Journal of Archaeological Science* 2009: 1–7.

Gillis, C., and M.-L.B. Nosch, eds. 2007. *First aid for the excavation of archaeological textiles*. Ancient Textiles series 2. Oxford: Oxbow Books.

Gleba, M., and U. Mannering. 2012. *Textiles and textile production in Europe from prehistory to AD 400*. Ancient Textiles series 11. Oxford: Oxbow Books.

Harris, S. 2012. From the parochial to the universal: Comparing cloth cultures in the Bronze Age. *European Journal of Archaeology* 15: 61–97.

Mannering, U., G. Possnert, J. Heinemeier, and M. Gleba. 2010. Dating Danish textiles and skins from bog finds by means of ^{14}C AMS. *Journal of Archaeological Science* 37: 261–268.

Ørsted Brandt, L., L.D. Tranekjer, U. Mannering, M. Ringgaard, K.M. Frei, E. Willerslev, M. Gleba, and M.T.P. Gilbert. 2011. Characterising the potential of sheep wool for ancient DNA analyses. *Archaeological and Anthropological Sciences* 3: 209–221.

Peacock, E.E. 2005. Investigation of conservation methods for a textile recovered from the American Civil War submarine H.L. Hunley (1864). In *Proceedings of the 9th ICOM Group on Wet Organic Archaeological Materials Conference*, ed. P. Hoffmann, K. Strætkvern, J.A. Spriggs, and D. Gregory, 497–512. WOAM: Bremerhaven.

Rast-Eicher, A. 2008. *Textilien, Wolle, Schafe der Eisenzeit in der Schweiz*. Antiqua 44. Basel: Archäologie Schweiz.

Schmidt, A.L., M.T.P. Gilbert, E. Cappellini, and J.V. Olsen. 2011. Identification of animal species in skin clothing from museum collections. *ICOM-CC 16th Triennial Conference Lisbon, Portugal, September 19–23, 2011*, 1–8.

Skals, I. 1996. From grave to showcase: Modern care for ancient textiles. *Archaeological conservation and its consequences*. IIC Preprints of the Contribution to the Copenhagen Congress.

Vanden Berghe, I., M. Gleba, and U. Mannering. 2009. Towards the identification of dyestuffs in early Iron Age Scandinavian peat bog textiles. *Journal of Archaeological Science* 36: 1910–1921.

Wilson, A.S., R.A. Dixon, H.I. Dodson, R.C. Janaway, A.-M. Pollard, B. Stern, and D.J. Tobin. 2001. Yesterday's hair – Human hair in archaeology. *Biologist* 48: 213–217.

Further Reading

Banck-Burgess, J. 1999. *Hochdorf IV, die Textilfunde aus dem späthallstattischen Fürstengrab von Eberdingen-Hochdorf (Kreis Ludwigsburg) und weitere Grabtextilien aus Hallstatt- und Latenezeitlichen Kulturgruppen*. Stuttgart.

Barber, E.J.W. 1991. *Prehistoric textiles. The development of cloth in the Neolithic and Bronze Ages*. Princeton: Princeton University Press.

Bender Jørgensen, L. 1986. *Forhistoriske textiler i Skandinavien. Prehistoric Scandinavian textiles*. Nordiske Fortidsminder ser. B 9. Copenhagen: Det Kgl. Nordiske Oldskriftselskab.

Bjerregaard, L., ed. 2007. *Chachapoya textiles*. Copenhagen: Museum Tusculanum Press.

Grömer, K. 2010. *Prähistorische Textilkunst in Mitteleuropa. Geschichte des Handwerkes und der Kleidung vor den Römern*. Wien: Naturhistorisches Museum Wien.

Hald, M. 1980. *Ancient Danish textiles from bogs and burials*. Copenhagen: National Museum of Denmark.

Möller-Wiering, S. 2011. *War and worship. Textiles from 3rd to 4th-century AD weapon deposits in Denmark and northern Germany*. Ancient Textiles series 9. Oxford: Oxbow Books.

Østergård, E. 2004. *Woven into the earth. Textiles from Norse Greenland*. Aarhus Universitetsforlag.

Schlabow, K. 1976. *Textilfunde der Eisenzeit in Norddeutschland*. Göttinger Schriften zur Vor- und Frühgeschichte 15. Neumünster: K. Wachholtz.

Tímár-Balázsy, A., and D. Eastop. 1998. *Chemical principles of textile conservation*. Oxford: Butterworth Heinemann.
Walton, P., and G. Eastwood. 1983. *A brief guide to the cataloguing of archaeological textiles*. London: Institute of Archaeology Publications.

Thailand: Cultural Heritage Management

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Introduction and Definition

Thailand has a long history of cultural development, but the management of cultural heritage under a protective framework did not begin until fairly recently.

It is interesting to note that throughout its history of cultural development, perceptions of the past varied from place to place depending upon influences such as religions, beliefs, and political situations. For example, Thai people as Buddhists generally perceive the past as something that represents change and becoming. It may be abandoned quickly and easily. It is expected that new things can be created, invented, or established. Thus, restoration or reconstruction of old pagodas or stupas, pavilions, and other religious buildings is not culturally wrong. Byrne (1995) brilliantly discussed the use of stupa and conservation conflicts in Thailand. Strictly speaking, the past as interpreted by King Rama VI, during his reign, was a key tool in building nationalism. He convinced the people to be proud of their culture and past (Vella 1978).

Historical Background

Regarding concern about the destruction of cultural heritage in terms of archaeological resource management in modern sense, the first protection law called "Pra Kaad Khet Rang Wat Poo Rai Khut Wat" or "Proclamation on Temple Boundary and Temple Looters" was issued in 1851 during the reign of King Rama IV (Fine Arts Department 1968). The main objective of the law was to prevent temples from being looted.

It should be noted that during his reign (1851–1868), Thailand (or Siam, as it was known at that time) was in an early stage of its development of international relations. While the king wanted to open the country to forge relationships with developed countries such as the United States, England, and France (see Symananda 1993), he was aware of the negative slide of colonization. For this reason, he revived an awareness of the past as a way of supporting nation building or developing a sense of national unity and pride (Symananda 1993).

Through his reign, a number of archaeological research projects, including the preparation of museum displays, were carried out. However, since the works were the result of the king's personal interests – not of government policies – they were conducted only by small groups of elites who worked only on royal projects. Nevertheless, the value and meaning of cultural resources were interpreted as important heritage of the nation, deserving protection.

The revival of the past was continued during the reign of King Rama V, (1868–1910). King Chulalongkorn, as he was also called, was not only a well-known reformer but also a great scholar. He was interested in a variety of disciplines such as archaeology, ethnography, and history; wrote a number of books concerning archaeology; set up a museum hall in his palace (1874); solicited the return of stolen objects from Museum of Ethnology in Berlin, Germany (1886); established the Museum Department (1888) which was a government agency; founded the Antiquity Club (1907), which promoted the study of archaeology, art, and history; and established the Literature Club (1914) (Fine Arts Department 1989; Charoenwongsa 1994; Ketudhat 1995). It should also be noted that the first scientific excavations that were conducted by Phraya Boranrajathanin in Ayutthaya were another important point that marks the progress in archaeological heritage management.

These greatly increased public awareness of the significance of cultural heritage and eventually led to the development of culture heritage management in the country. It should be stated that in the king's sense, cultural heritage referred to everything that was old. Thus, it is not surprising that, even at the present time, there is no clear and specific definition of cultural heritage used in the legislative context. The commonly used references are ancient monuments, ancient objects, and art objects.

In 1926, 6 years after the end of King Chulalongkorn's reign, the Bangkok Museum Act was enacted. This brought about the establishment of Thailand's first public museum, the Bangkok Museum. In addition, the regulations concerning "transportation of ancient objects and art objects" were promulgated in response to the immense trafficking and smuggling of antiquities. It should be noted that the management of cultural resources mainly involved the protection of archaeological remains.

A remarkable change occurred in the time of Prime Minister Field Marshal Pibulsonggram (1897–1964). Pibulsonggram clarified his role in the government, and tried to use elements of culture as tools to cultivate nationalism and patriotism. For example, he encouraged the people to use and buy only Thai products and required them to be in – what he called "civilized" – dressing, that is, coats, trousers, blouses, shirts, hats, gloves, and ties (Suwannathat-Pian 1995: 135–151).

Furthermore, Luang Wichitwathakan (1898–1962), a prominent scholar and prolific history writer in this period, asserted in one of his studies on the ethnic history of the Tai people that the Thais were the most ancient race, instead of "one of the most ancient" (Charoenwongsa 1994: 1). Kasetsiri (1979: 166–168) interpreted Luang Wichitwathakan's history as an ideological weapon of the new ruling elite, particularly the military, to seek justification for ruling the country.

During Pibulsonggram's government, a large number of acts, regulations, and laws that applied to cultural heritage were passed; the most effective ones were the National Culture Act of 1940, the 1940 Council of Culture, and the 1945 Act of the Ministry of Culture. In 1979, when General Kriangsak Chamananda was the Prime Minister, the Office of the National Culture Commission was established. Later, Prime Minister General Prem Tinsulanonda announced the national culture policy. Most recently, under the administration of Chuan Leekphai's cabinet, the government declared the year 1994 as the Thai Culture Promotion Year to promote public awareness of the value of Thai traditions and customs. This nationwide campaign dealt mostly with nonmaterial aspects of the culture such as beliefs, ideologies, religion, and folklore. In regard to the management of archaeological resources, the Fine Arts Department's Office of Archaeology, Ministry of Culture has taken responsibility since 1926.

Key Issues/Current Debates

The Administration of Cultural Heritage

The "official" management of cultural heritage in Thailand is a government duty operated by the two major departments of the Ministry of Culture: the Fine Arts Department and the Office of Cultural Promotion. The first organization is mainly responsible for tangible heritage preservation and management, particularly through the administration by the two offices of the Fine Arts Department, the Office of Archaeology and the Office National Museums, while the latter is largely taking care of intangible heritage. As for the tangible or physical cultural heritage, the Office of Archaeology is "the key agency working on the restoration of ancient monuments and archaeological sites. It is also responsible for the preservation and investigation of archaeological remains for the benefit of the nation, for the sake of the study of the nation's history, and for the perpetuation of the cultural heritage of the nation" (Fine Arts Department 1990: 24).

Administratively, the Office of Archaeology is one of the ten agencies of the Fine Arts Department in the Ministry of Culture, which is the only organization responsible for the management of cultural resources in the country. The Office of Archaeology was first formed as a club in 1908 – the Antiquity Club. It was gradually reformed and

its status was later changed from a private club to a government agency. In its administrative structure, the Office of Archaeology is divided into seven sections: General Affairs, Planning and Evaluation, Research, Restoration and Preservation of Ancient Monuments, Preservation and Restoration of Mural Painting and Nonremovable Sculptures, Control and Maintenance, and Historical Park Projects.

Furthermore, according to the law, the Office of Archaeology is given full authority to grant permission or reject proposals for undertaking archaeological investigations on public land. In 1995, the Office of Archaeology was merged with the Office of National Museums into the Office of Archaeology and National Museums but was later separated as an individual agency under the umbrella of the Fine Arts Department as is the Office of National Museums.

Broadly speaking, there are two major groups of archaeologists in Thailand. One group, whose work is mostly concentrated on restoration, preservation, and inventory of archaeological sites, districts, and ancient cities, is associated with the Fine Arts Department (FAD), while the other is associated with academic institutions such as universities and colleges. In response to the Historical Park Projects, a great number of surveys of archaeological sites and monuments by FAD's archaeologists during the past ten years were primarily and specifically designed to rescue major archaeological sites and then develop them into "historical parks." Charoenwongsa (1994: 2) remark: "administrators/managers enjoy themselves more towards restoration of ancient monuments. The situation has not changed very much. . . ." This seems ironical because Musigakama (1995: 38), a former director of the Office of Archaeology, stated that the Office of Archaeology is responsible not only for survey, maintenance, restoration, and preservation of archaeological heritage but also for scientific study of archaeological records.

After joint expedition projects with foreign counterparts during the 1960s, the Thailand's Fine Arts Department initiated many mobile projects to counter looting activities in the 1970s. Under the direction of Pisit Charoenwongsa, the Northeast Thailand Archaeological Project was established in 1975 out of its predecessor, the Ban Chiang Excavation Project (a joint effort between the Fine Arts Department and the University Museum, University of Pennsylvania which was carried out under the coordination of Pisit Charoenwongsa and the late Dr. Chester F. Gorman). With the success of the Northeast Thailand Archaeological Project, the Office of Archaeology (then called as Archaeology Division) created another three regional – northern, central, and southern Thailand – archaeological projects.

Following that, regional field projects were brought under the central administration of Thailand Archaeological Project (TAP). As director of TAP and the Research Section of Archaeology Division, Pisit advised his younger colleagues to choose among themselves their own project directions. In 1980s, Khemchart Thepchai, Tarapong Srisuchart (current director of the Office of Archaeology as of 2012–2013), Bovornvate Rungruchee, Amphan Kijngam, Sathaporn Khanyuen, Sayan Pricharnchit, and Niti Saengwan were directors of these regional projects. To enrich their experiences, some of them moved or rotated from one project to another.

In the 1980s, the Thailand Archaeological Projects and its regional field projects produced several hundred site survey reports for the first time and with that came a large data collection which resulted in about 50 publications in book form during the late 1980s and beginning of 1990s.

There are both pros and cons in the cooperation between western and Thai archaeologists. Many good elements brought by western colleagues include the concept of multidiscipline/problem-oriented research programs and systematic study of archaeological remains. However, some projects caused misunderstandings and negative feelings between participants, due largely to differences in culture/traditions and the self-centeredness of certain individuals.

Legislation Relating to the Protection of Cultural Heritage

As mentioned earlier, the first protection law issued in the reign of King Rama IV was short lived and was limited to the protection of royal temples. In 1934, the first comprehensive legislation was drafted and was later amended three times – in 1943, 1961, and 1992. The last amendment was announced in the Royal Gazette on March 29, 1992 in the reign of the present king. This has been called Ancient Monuments, Ancient Objects, Art Objects and National Museum Act of 1961. In addition, a number of separate regulations such as the Act of the Ministry of Education and the Announcement of the Fine Arts Department have been occasionally issued in line with the Act of 1961 (for details, see Fine Arts Department 2005).

The 1961 Act, together with additional amendments and regulations, has broad coverage: it includes definitions of specific terms, regulations, permit applications, ownership, lists of endangered sites, national museum, and illegal trafficking, transportation of ancient objects, and penalties.

Unlike such other countries as the United States and Australia, Thailand has no particular law on burial sites, underwater archaeological sites, and properties belonging to particular ethnic or indigenous peoples. According to the act, any objects buried or left on public land belong to the nation.

Public Education

Public interest in cultural heritage is powerful, as the public becomes the driving force behind efforts to conserve the past. In Thailand, the first formal center for public education in archaeology is the Faculty of Archaeology, Silpakorn University. This institution has the only center of training and recruitment of archaeologists for over a decade. Most Thai archaeologists have been trained at this institution. The courses focus mainly on Thai archaeology and a basic understanding of archaeological practices, and the degrees offered are B.A., M.A., and Ph.D. It was as recent as just in 2006 that an undergraduate course entitled "Cultural Resource Management" was included and taught for the first time in Thailand by the faculty members and experts from other government and private organization throughout the country at Silpakorn University Department of Archaeology. An M.A. program in Cultural Resource Management at Silpakorn University has been offered since 2007, and it has been well received, judging by the increasing number of students.

Interestingly, during the past few decades, many other public schools, colleges, and universities, for example, Thammasat University, Chulalongkorn University, Khon Kaen University, Chiang Mai University, Srinakharinwirot University, Burapha University, and several other colleges (mostly former teachers' colleges which are now known as Rajabhat University Complexes), have developed archaeology programs and have introduced archaeology courses in their curriculum, but none offers degrees in archaeology. Archaeology programs have yet to be introduced to the elementary and secondary schools. Therefore, school children learn very little about Thai history and culture in schools.

Besides formal education, knowledge about the past has been transmitted to the public through various kinds of nonformal educational mediums. Museums are one type of nonformal education centers; throughout the country, there are more than 30 public museums operated by the Office of Archaeology and National Museum. In 1995, for example, the Thai government granted a budget of about 2 billion baht (about $80 million) to build provincial museums throughout the country.

In addition to the government-owned museums, there are a number of private museums and public organizations such as the Museum of the Siam Society, the Ancient City Co. Ltd, the Jim Thompson House, Princess Maha Chakri Sirindhorn Anthropology Centre, Museum Siam, and the Museum of Prehistory in Siriraj Hospital of Mahidol University. There are also groups of archaeological volunteers who occasionally organize field trips to archaeological and historic sites

around Thailand, as well as neighboring countries such as Laos, Burma, Cambodia, and Vietnam. It is an indication that archaeological study tours are now becoming popular in Thailand. It should also be noted that during the past 5 years, there has been an increase in numbers of public magazines promoting natural and cultural tourism in Thailand and neighboring countries.

Major Contemporary Problems

Major problems concerning the management of archaeological heritage in Thailand are basically similar to those found in other countries in the world.

Looting

Looting is probably a never ending problem in Thailand. Through time, many archaeological prehistoric and historic sites have been illegally unearthed. In many cases, the looters are asked by middlemen who are merchants from Bangkok to hunt for antiquities. The ideal sites for looting are prehistoric sites in central and northeastern Thailand where they can easily gain access and where the sites cover large areas. The artifacts hunted in clued pottery, stone bracelets, beads, and bronze weapons. Surprisingly, a man in a team of looters confessed, when arrested, that he learned how to dig by observing archaeologists while they were at work. Another woman in the same team said that they have no choice but to hunt for antiquities for money because they were poor and did not own any pieces of land (Pumathon 1994: 28). In the case of historic sites, the favored artifact classes would be Buddha images and architectural decorative elements (e.g., stone lintels, wooden windows, and doors of Buddhist monasteries).

Government Officials Versus Local People

This problem arises mostly in the context of restoration of monuments which are currently used as shrines or sacred sites. This may be due to different understanding of the value of archaeological resources between government officials and local people. For example, most recently, there was a movement of people in Lopburi Province to protest the restoration of an ancient monument in the city. Archaeologists from the Office of Archaeology wanted to dissemble the monument and restore it by the so-called "anastylosis" method, but the people in the province wanted to know why the monument had to be taken apart first. They were very concerned about the destruction of the monument because it has great spiritual value for the people in the province.

In another case, the Office of Archaeology reshaped a giant pagoda, Wat Chedi Luang, in Chiang Mai, northern Thailand, without enough investigation and public hearings. The restoration resulted in the deformation of a pagoda which disappointed the locals and the scholars so much that they called a meeting to stop the work (Suksawasdi 1993).

There are few well-trained archaeologists working in government agencies, most of them received only basic training and have limited experience in doing archaeology. They often face problems because, many times, they are assigned to carry out work for which they are not trained.

Problem of Contract Work

At present, the preservation and restoration of archaeological remains and historic buildings is in the hands of technicians, rather than archaeologists. Archaeologists should research essential informational before the restoration begins, as a practical and academic approach, but often that task is left to the technicians. Probably due to the lack of sufficient evidence, a clear explanation of why this problem still remains is impossible. It is strongly recommended that a code of ethics of practitioners must be prepared. These technicians are lacking in basic archaeological knowledge, and they are even lacking in appreciation for the value of cultural resources. They just want to finish their work as soon as possible because of constraints of time and money. Thus, a lot of valuable information has been lost. For example, in the restoration of an ancient ruin in Ratchaburi, workers of a contract company reconstructed the ruin by first disassembling it and then reconstructing it. Unfortunately, the workers did not know what the original shape of the monument had been. The result of their work is archaeologically wrong, and the monument looks very ugly.

Different Perception of the Value of Cultural Heritage

Conflicts between cultural heritage practitioners and the local people have occurred due to different understanding of the value of cultural resources. Archaeologists of the Office of Archaeology and cultural heritage practitioners tend to focus on the informational and economic value of the archaeological resources, while the local people consider their spiritual or symbolic value. A good example is a small simple hillock near a temple in a village of Nakhon Phanom Province. Outsiders may view it as just a normal natural setting in the area, but for people in the village, it is a "sacred place" according to their myth. Annually, the villagers perform religious rites and celebrations at the place which has also been an important meeting area between people from Laos and Thailand (Vallibhotama 1992: 211). My recent pilot research (Lertcharnrit and Niyomsap 2008), conducted in a remote village where archaeological site museum is located in central Thailand, on indigenous perceptions and knowledge about archaeology revealed that when asked what archaeology is, the majority of respondents (41%) perceived that archaeology is human skeletal remains (see Table 1).

Thailand: Cultural Heritage Management, Table 1 Public knowledge and perception about archaeology in a Thai village in central Thailand when asked "what do you think of when you hear the word "archaeology?" (N = 85)

Archaeology in villagers' perceptions	Percentage of answers
Human skeletal remains	41.18
Artifacts	23.53
Ancient history/the past	17.65
Ceramics/ancient ornaments (beads, bracelets)	14.12
Ban Chiang[a]	9.41
Ban Pong Manao[b]	2.35

[a]Ban Chiang is a widely known prehistoric site in the northeast because it is a cultural world heritage site
[b]Ban Pong Manao is an Iron Age site where an archaeological site museum is located and also the name of the village I conducted the research

Future Directions

The "professional" management of cultural heritage in Thailand has long been developed, and it is still in need of further development. It needs a lot of change especially in term of legislation and policy. To reduce controversy, the protection law should be open for public participation, providing opportunity for the public to offer input into decisions and actions.

Cooperation between the Fine Arts Department and other private and government agencies/organizations and public audiences, on both local and national levels (i.e., the Ministry of Agriculture, Ministry of Education, Department of Highways, Department of Religious Affairs, Royal Irrigation Department, Amateur Cultural Heritage Conservation Clubs, Subdistrict Administration Organizations, village heads, provincial governors, etc.), will help upgrade the quality of the management program.

The Fine Arts Department's Office of Archaeology desperately needs to build nationwide and worldwide networks in the coming years, while a strong public education program should be considered as part of an essential strategy to change public attitudes toward the past.

It should be remembered that the people who live near the sites are the best protectors of cultural resources. Once people have recognized the value and meaning of cultural resources, protection and management will be more successful.

Lastly, in the globalization era, the Fine Arts Department's Office of Archaeology should also build global alliance with international organizations and professionals, not only the UNESCO and ICOMOS which Thailand is a member but also other nonprofit organizations located in southeast Asian countries, such as the Heritage Watch in Cambodia, and in broader regions of the world (e.g., the Getty Foundation, the World Archaeological Congress, the Southeast archaeological Center). In addition, local and public participation and cultural education programs must be developed as well.

Cross-References

► Charoenwongsa, Pisit

References

Byrne, D. 1995. Buddhist stupa and Thai social practice. *World Archaeology* 27 (2): 266–281.

Charoenwongsa, P. 1994. *Managing Thailand's archaeological resources*. Paper presented in the 15th IPPA Congress, 5–12 Jan 1994, Chiang Mai.

Fine Arts Department. 1968. *A compilation of royal proclamations of King Rama IV, B.E. 2394–2404*. Published on the occasion of royal cremation ceremony of Phra Mahaphodhiwongsacharn Inthachotathern, 9 Nov 1968. Bangkok. (in Thai).

Fine Arts Department. 1989. *National museums in Thailand*. Bangkok: Fine Arts Department. (in Thai).

Fine Arts Department. 1990. *Theory and practice in preservation and restoration of ancient monuments and archaeological sites,* Technical series 1/2532(1989). Office of Archaeology. (in Thai).

Fine Arts Department. 2005. *Ancient monuments, ancient objects, art objects and National Museum Act of 1961*. Bangkok: Fine Arts Department. (in Thai).

Kasetsiri, Ch. 1979. Thai historiography from ancient times to the modern period. In *Perceptions of the past in Southeast Asia*, ed. A. Reid and D. Marr. Singapore: Heinemann Educational Books.

Ketudhat, P. 1995. Development of archaeology in Thailand. *Muang Boran Journal* 21 (1–4): 15–44.

Lertcharnrit, Th., and S. Niyomsap. 2008. Public perceptions and opinions about archaeology in Thailand: A case of rural villagers in central Thailand. *Muang Boran Journal* 34 (3): 95–108. (in Thai).

Musigakama, N. 1995. *A practical guide to the preservation and restoration of ancient monument*. Bangkok: Fine Arts Department. (in Thai).

Pumathon, P. 1994. The treasure hunter at Ban Wang Sai, Lopburi: A problem of archaeological site in Thailand. *Matichon Newspaper,* September 17, p. 28. (in Thai).

Suksawasdi, S.M.L. 1993. The recent restoration of Phra Chedi Luang: Problems and solutions. *Muang Boran Journal* 19 (2): 155–171.

Suwannathat-Pian, K. 1995. *Thailand's durable Premier: Phibun through three decades 1932–1957*. Kuala Lumpur: Oxford University Press.

Symananda, R. 1993. *A history of Thailand*. 3rd ed. Bangkok: Thai Watana Panish Press.

Vallibhotama, S. 1992. Preservation of ancient monuments and objects: Problems and solutions. In *3rd conservation of natural resources and environments of Thailand*, ed. P. Nutalai et al. Fare: Bangkok. (in Thai).

Vella, W.F. 1978. *Chaiyo!: King Vajiravudh and the development of Thai nationalism*. Honolulu: University of Hawaii Press.

Further Reading

Glover, I. 1993. Other people's past: Western archaeologists and Thai prehistory. *Journal of the Siam Society* 80 (1): 45–53.

Praicharnjit, S. 2003. *Community archaeology: Past management and community development*. Bangkok: Thailand Community Archaeology Project.

Theoretical Archaeology Group (TAG)

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Brief Definition of the Topic

A conference that is known as much for its social life as its cutting-edge theory, the Theoretical Archaeology Group (TAG), is a successful and idiosyncratic institution in the prime of life. The organization has a distinctive and somewhat anarchic ethos, consisting of an annual conference that meets once a year, with no membership requirements or dues. The meeting moves from one university to another annually (the Republic of Ireland is included) and is organized by volunteers from the host institution. Efforts are made to keep costs down for each meeting and to provide cheap or free accommodation for students, so that the conference is affordable and available to all. Each conference is run entirely by the sponsoring institution, so that each one differs according to the priorities and interests of the department that hosts it. Representatives of institutions that have previously hosted TAG gather for an informal committee meeting at the annual conference. This committee hears pitches and makes decisions as to where the conference will next be held. In the UK TAG is now in its fourth decade of meetings, with attendances generally in the range of 400–600 participants, including some from overseas. TAG has produced healthy offspring, including Nordic TAG, held biennially in Scandinavia, and TAG-USA, which began in 2008 at Columbia University. Other conferences that have been influenced by the TAG model include the Theoretical Roman Archaeology Conference (TRAC) and, most recently, STAG, the Scottish Theoretical Archaeology Group and

TAG Turkey, held at Ege University, Ä°zmir in May 2013. In this entry we will provide a brief overview of TAG's history and development in the UK and the USA.

TAG emerged at the end of the 1970s, in a search for a British venue to discuss archaeological theory. A conversation between Colin Renfrew, then at Southampton University, and Andrew Fleming at Sheffield led to the formation of a Sheffield-Southampton colloquium. Its third meeting, held in Sheffield in 1979, was open to all, and from 1981, when it was hosted by Reading University, the conference started its current pattern of being held at a different sponsoring university every year (a more detailed history may be found in Fleming and Johnson 1990). TAG has developed into a venue where a postgraduate student can give his or her first academic paper and also mingle with established academics on the dance floor or in the conference room. The conference aims to open a productive space for dialog, with the emphasis on the theoretical and political implications of a topic. Sessions are kept open to encourage participation and to foster a diverse range of perspectives. Since the late 1980s the conference has been something of a nursery for post-processual and interpretive archaeologies (e.g., Bintliff 1991 and response by Thomas and Tilley 1992). It is sometimes said that TAG participants can become obsessed with the quest for new theoretical perspectives (Chippindale 1990: 464), but then again, TAG is a great place to get a sense of the questions that are animating the field at any particular moment; its agenda is driven by its participants. The British meeting has seen less intense debate in recent years, perhaps because of the growth in the number and size of sessions. Experimentation is not restricted to the topics of papers; in recent years participants have tried out a variety of formats and venues for their contributions. Memorable sessions include the video installation "Neolithic Stories Untold" at the 2003 conference at the University of Wales Lampeter (van Rossenberg 2004: 56), a poetry poster session on landscape and archaeology at Sheffield TAG in 2005, and an "intervention" organized by Ian Russell and Andrew Cochrane at York TAG in 2007. This included the placement of 150 replica Cycladic figurines around the conference buildings and grounds (http://www.iarchitectures.com/irac2.html#show). Reactions varied from enthusiastic collection of the objects to nonplussed indifference.

The US TAG was started in 2008 at Columbia University, where it was imported by two British archaeologists Brian Boyd and Zoë Crossland. Although the US TAG was modeled on the British conference in terms of ethos and organization, it has gone on to develop its own character and theoretical interests. British TAG has a strong core focus on British and European prehistory, whereas the US conference deals with a more eclectic range of regions and time periods and is quite interdisciplinary in feel. Sociocultural anthropologists, geographers, philosophers, historians, and social theorists are regularly included in sessions, whether as discussants or presenters. TAG-USA also has a substantial proportion of international participants, with around 40% coming from outside the USA at the first conference at Columbia University. Severin Fowles' Thing Theory session from the same conference gives a sense of the feel of TAG in the USA. This session included participants from the USA, Canada, Europe, and South America and counted students and established scholars among the people involved. Participants came from a range of backgrounds, including contributions from outside archaeology, such as those by Jane Bennett and Brian Larkin. The session also had an associated art exhibit entitled "nomadic dresses," a project by Mariana Frochtengarten that used the circulation and modification of clothing between artists to explore the role of material culture in social interactions and exchange.

Links to all the conference websites (some no longer in operation unfortunately) can be found on Antiquity's website (http://www.antiquity.ac.uk/tag/index.html), which also lists publications arising from the conference, as well as articles about TAG, many of which are affectionate and critical reviews of particular annual meetings. There is also a US website that provides links and information about TAG in the USA (http://www.tag-usa.org). Pamela Jane Smith has started to record and archive the oral history of TAG, carrying out interviews with archaeologists who were involved in its early days (http://www.arch.cam.ac.uk/

personal-histories/tag.html), and recently archaeologists have started to study the history of the conference itself as a means to track the changing profile of archaeology over the years (Gaydarska 2009).

Cross-References

- ▶ Archaeology and Politics
- ▶ Critical Theory in Archaeology
- ▶ Interpretation in Archaeological Theory
- ▶ Practice Theory in Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Renfrew, Colin

References

Chippindale, C. 1990. Theoretical Archaeology Group: 11th conference. *Current Anthropology* 31 (4): 463–466.

Fleming, A., and M. Johnson. 1990. The Theoretical Archaeology Group (TAG): Origins, retrospect, prospect. *Antiquity* 64: 303–306.

Gaydarska, B. 2009. A brief history of TAG. *Antiquity* 83: 1152–1162.

Thomas, J., and C. Tilley. 1992. TAG and "post-modernism": A reply to John Bintliff. *Antiquity* 66: 106–114.

van Rossenberg, E. 2004. Celebrating TAG. The 25th Annual Conference of the Theoretical Archaeology Group, 17th-19th December at the University of Wales, Lampeter. *Profiel* 11 (1): 51–63.

Thomas, Julian

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Basic Biographical Information

Professor Julian Stewart Thomas, born 1959, is a British archaeologist who specializes in the archaeology of Neolithic Britain as well as archaeological philosophy and theory, particularly in regard to modernity (Thomas 2004), postprocessualism (Thomas 1996) and archaeological theory (Thomas 2015). He undertook a Bachelor of Technology in Archaeological Sciences at Bradford University from 1977 to 1981. Later, at Sheffield University, he completed his Masters of Arts in Environmental Archaeology and Palaeoleconomy from 1981 until 1982, and then a PhD in Archaeology which he completed in 1986. Between 1987 and 2000, he held a variety of lecturing positions in archaeology at the University of Wales, Lampeter, and at Southampton University. He is currently a Professor of Archaeology at Manchester University.

Major Accomplishments

Julian Thomas has many accomplishments in terms of significant publications and the development of archaeological theory, as well as important and noteworthy fieldwork.

Thomas is well-known for his work on Neolithic Britain, publishing several major works on the subject such as the book *Rethinking the Neolithic* (Thomas 1991) and the follow-up, *Understanding the Neolithic* (Thomas 1999), as well a series of papers on the subject. He has discussed the "Neolithic" as a concept in his major works and in journal articles on Neolithic burial practices, landscapes, and approaches to landscape, housing, societal organization, rituals and religions, and more.

Another field of Thomas' expertise is archaeological philosophy and theory, with several papers by him appearing on subjects as diverse as the future of archaeology theory and practice, the apparent trend towards a "death of theory," and archaeology's place in the modern world. Other topics that Thomas has discussed include issues associated with a "materialist" approach to contemporary archaeology, phenomenology and material culture, the hermeneutics of "megalithic space," archaeological humanism, and megalithic art design. He is classed by Trigger (2006: 470, 472) as a post-processual archaeologist with a humanist approach, along with others from the so-called "Third Wave" of post-processual interpretation,

such as Christopher Tilley, John Barret, Christopher Gosden, and Cornelius Holtorf.

Julian Thomas has directed ten archaeological field projects since 1989 at places such as Banc Rhosgoch Fach, Pict's Knowe, Holywood, Holm Farm, and Dunragit. He has co-directed 22 field projects since 1983 at places that include Avebury, Anglesey, Durrington Walls, and Dorstone Hill.

One of Thomas' recent projects is the Dorstone Hill Neolithic Landscape. He has been excavating as part of this project since 2011 in southwest Herefordshire. Another key project is the Stonehenge Riverside Project, undertaken between 2004 and 2009 with Mike Parker Pearson and Chris Tilley.

At the time of writing, Thomas has written nine published books either as primary author or with collaborators and has two additional books in press. He has been the co-editor of 11 books on topics that include the European Neolithic, interpretive archaeology, and landscape archaeology. Since 1984, Thomas has authored or co-authored 68 academic journal articles and 81 book chapters. In 1999, with Prof. R. Layton, he authored a report to the Executive of the World Archaeological Congress on *Proposals for a tunnel at Stonehenge: an assessment of the alternatives*. In 2015, together with R. Van Dyke, S. Lekson, and C. Heitman, Thomas authored an official report to the US National Parks Department entitled *Chaco Landscapes: Data, Theory and Management.*

Thomas has been on the editorial board of a number of journals including the *Journal of the Royal Anthropological Institute* (1992–2004), the *Journal of Material Culture* (1995–present), *Time and Mind* (2005–present), the *Journal of Social Archaeology* (2010–present), and *Current Swedish Archaeology* (2011–present).

During his career, Julian Thomas has served on many national and international archaeology and anthropology bodies. From 1994 to 1999, he played a major role in the democratization of archaeology globally in his role as Secretary of the World Archaeological Congress. He has also made major contributions to archaeology as Vice Chair of the United Kingdom Subject Committee for Archaeology and as Vice President of the Royal Anthropological Institute from 2007 to 2010. Since 2017, Thomas has been on the Finance Committee of the Royal Anthropological Institute, and since 2018, he has been a Member of Council and on the Honours and Awards Committee for the same.

The excellence of Julian Thomas' work has been recognized in a several high prestige awards. These include the Arts and Humanities Research Board (AHRB) Research Leave Award in 2003, the 1999 Curl Lectureship of the Royal Anthropological Institute, and the 1995 Bob Smith Award from the Prehistoric Society. At the University of Manchester, he was nominated for the 2015–2016 "Best Supervision (Postgraduate Research)" and for the 2014–2015 "Most Inspiring Lecturer" and "Best Humanities Lecturer."

Julian Thomas is an outstanding researcher and committed teacher. Though still young, he has had a major impact on archaeology in Britain and globally (Figs. 1, 2, and 3).

Thomas, Julian, Fig. 1 Excavating at Stonehenge Greater Cursus, 2007

Thomas, Julian, Fig. 2 With Alice Roberts on BBCTV's *Digging for Britain*, 2016

Thomas, Julian, Fig. 3 Lecturing in London, 2010

Cross-References

► World Archaeological Congress (WAC)

References

Thomas, J. 1991. *Rethinking the neolithic*. Cambridge: Cambridge University Press.
Thomas, J. 1999. *Understanding the neolithic*. London: Routledge.
Thomas, J. 2004. *Archaeology and modernity*. London: Routledge.
Thomas, J. 2015. The future of archaeological theory. *Antiquity* 89 (348): 1287–1296.
Trigger, B. 2006. *A history of archaeological thought*. Cambridge: Cambridge University Press.

Further Reading

Thomas, J. 1996. *Time, culture and identity: An interpretive archaeology*. London: Routledge.
Thomas, J. 2004. Archaeology's place in modernity. *Modernism/Modernity* 11: 17–34.
Thomas, J., and K. Ray. 2018. *Neolithic Britain: The transformation of social worlds*. Oxford: Oxford University Press.

Thompson, Homer

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Basic Biographical Information

Homer Thompson (1906–2000) is best known for his formative contribution to the excavation of the civic center of ancient Athens. He was born in Ontario and raised in British Columbia, the son of classically minded parents. He received his B.A. and M.A. in Classics from the University of British Columbia, Vancouver, in 1925 and 1927, respectively, and his Ph.D. from the University of Michigan in 1929. That same year he collaborated

with the Greek archaeologist Konstantinos Kourouniotes on an investigation of the Athenian Pnyx. On the recommendation of Benjamin Dean Meritt, Thompson was appointed one of the first two fellows of the American School of Classical Studies at Athens' excavations in the Athenian Agora, in 1931. At the Agora he met and married another fellow, Dorothy Burr, a prominent archaeologist in her own right.

Major Accomplishments

From 1933 to 1947 Thompson held the position of Professor of Classical Archaeology at the University of Toronto, concurrently acting as an assistant curator of the classical collection at the Royal Ontario Museum. This term was interrupted by World War II, during which Thompson served as an intelligence officer with the Royal Navy, stationed at Bari. Visiting Athens in 1944, during the Greek Civil War, he was briefly held captive, but talked his way out and parted from his captors on friendly terms. He was appointed field director of the Agora Excavations in 1945, a position he held until 1967. In 1947 Thompson became Professor of Classical Archaeology at the Institute for Advanced Study in Princeton, a position he retained for over 50 years – as emeritus from 1977 onward – until his death in 2000. He received the Archaeological Institute of America's Gold Medal for Distinguished Archaeological Achievement in 1972.

Thompson devoted his career to the study of the Athenian Agora and played a tremendous part in the formation of its current physical and intellectual state. He authored numerous scholarly articles as well as two monographs, including 1972's *The Agora of Athens* (with R. E. Wycherley). He supervised the publication of the first 11 volumes of the Agora excavation series, as well as a series of Agora Picture Books, designed to be easily accessible to a general audience. Thompson was insistent that archaeologists had a responsibility to the public to present and publish the results of their work. Above and beyond his own publications, Thompson's great accomplishment was in bringing together and overseeing a large and diverse group of scholars for over 20 years.

Cross-References

- ▶ American School of Classical Studies at Athens (ASCSA)
- ▶ Epigraphy, Greek
- ▶ Stoa
- ▶ Urban Planning in the Greek World

Further Reading

Bibliography of Homer Thompson. 1982. *Hesperia Supplements, volume 20: Studies in Athenian architecture, sculpture and topography presented to Homer A. Thompson*, vii–xii.

Dyson, S.L. 1998. *Ancient marbles to American shores. Classical archaeology in the United States*. Philadelphia: University of Pennsylvania Press.

Martin, D. 2000. Homer Thompson dies at 93; led excavation of the Agora. *New York Times*, 13 May 2000.

Mauzy, C. 2006. *Agora excavations, 1931–2006: A pictorial history.* Princeton: American School of Classical Studies at Athens.

McCredie, J.R. 2002. Homer Armstrong Thompson: 7 September 1906–7 May 2000. *Proceedings of the American Philosophical Society* 146: 411–414.

Meritt, L.S. 1984. *History of the American School of Classical Studies at Athens, 1939–1980*. Princeton: American School of Classical Studies at Athens.

Rotroff, S.I. 2001. Homer Armstrong Thompson, 1906–2000. *American Journal of Archaeology* 105: 99–100.

Wertime, R.A. 1988. The ingenious Homer Thompson. *Archaeology* 41 (6): 36–43.

Wiseman, J. 2000. An American presence in Greece. *Archaeology* 53 (4): 8.

Thomsen, Christian Jürgensen

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Basic Biographical Information

Christian Jürgensen Thomsen (1788–1865) organized the major Danish museum collections in the mid-nineteenth century and became famous for introducing the Three-Age System, the division

Thomsen, Christian Jürgensen, Fig. 1 C.J. Thomsen (1788–1865). (Painting by J.V. Gertner. The Danish National Museum)

of prehistoric time in a Stone, Bronze, and Iron Age (Fig. 1). He was born in Copenhagen as son of a wealthy merchant, whose business he carried on after the death of his father in 1833. As a young man, he developed an excellent knowledge of numismatics, history, and art, and he made personal acquaintance with many of the young artists of that time. In spite of having no academic background, in 1816, he became secretary of the Royal Commission for the Preservation of Antiquities, established in 1807, obtaining official membership of the Commission in 1827. Besides being responsible for the Museum for Nordic Antiquities (Fig. 2), Thomsen became the organizer of other museum collections in the 1840s and 1950s. From 1830, he was a member of a commission organizing the Royal Armory Collection. In 1832, he was attached to the Coin Cabinet as inspector and became its director in 1842. From 1839, he also worked as an inspector at the Royal Museum of Art. For his extraordinary efforts to organize the most important Danish museums, he obtained the order of high-ranking councilor. He was succeeded as director for the Museum for Nordic Antiquities by J.J.A. Worsaae.

Thomsen, Christian Jürgensen, Fig. 2 C.J. Thomsen showing the Museum for Nordic Antiquities to visitors at the Christiansborg Castle in 1846. (Drawing by Magnus Petersen. The Danish National Museum)

Major Accomplishments

As secretary of the Antiquities Commission, Thomsen started to catalogue the collection of the Museum for Nordic Antiquities, the embryo of the later National Museum, in 1817. In 1819, he arranged an exhibition of antiquities in a limited space adjacent to the University Library on the upper floor of the Holy Trinity Church in Copenhagen. It was during recording and arranging the collection that Thomsen developed the Three-Age System, not only as a technological model but as a chronological sequence based on the combination of finds (Gräslund 1981). He emphasized the importance of careful recording of find circumstances during archaeological excavations and thereby introduced a principle fundamental to archaeological practice. In 1825, Thomsen had worked out a definition of the Stone, Bronze, and Iron Ages, which was initially disseminated through his correspondence with learned colleagues. One of them was Bror Emil Hildebrand

(1806–1884) at the Historical Museum of the University of Lund, Sweden, who visited Thomsen in 1830 and subsequently arranged the collection of the Historical Museum in Lund according to the Three-Age System (Stjernquist 2005). In 1833, the Museum for Nordic Antiquities had been moved to new premises at the Christiansborg Castle in Copenhagen, where Thomsen could arrange the prehistoric and medieval collections under more favorable conditions and where the Three-Age System came to justice. Thomsen's own description of the Three Ages was not published before 1836 in his contribution to *Ledetraad til nordisk Oldkyndighed*, which was translated into German (1837) and English (1848) and thereby obtained international attention. Thomsen's own literary production was limited, but his work can be followed in his correspondence with colleagues. In 1856–1857, he issued a publication about Nordic gold bracteates with a classification that laid the foundation for later research.

Thomsen became responsible for establishing other museum collections, when the Royal Danish *Kunstkammer* was broken up in the 1840s (Gundestrup 1985): the Ethnographical Museum in 1841 (Hermansen 1941), the Classical Antiquities Cabinet in 1851, and the Museum of Sculpture and Handicraft in 1852. Under Thomsen's leadership, these collections, the Museum for Nordic Antiquities and the Coin Cabinet, were brought together during the 1850s and 1860s under one roof in *Prinsens Palais*, since 1892 the permanent residence of the National Museum. Thomsen was also actively engaged in the establishment of local museums in major provincial towns such as Odense (in 1818), Kiel (in 1834), and Flensburg (in 1852).

Of Thomsen's own collection of coins, the largest in private ownership at that time, more than 12,000 medieval coins were purchased by benefactors after his death and donated to the Coin Cabinet.

Cross-References

► Worsaae, Jens Jacob Asmussen

References

Gräslund, B. 1981. The background to C.J. Thomsen's three age system. In *Towards a history of archaeology*, ed. G. Daniel, 45–50. London: Thames and Hudson.

Gundestrup, B. 1985. From the Royal *Kunstkammer* to the modern museums of Copenhagen. In *The origins of museums. The cabinet of curiosities in sixteenth- and seventeenth-century Europe*, ed. O. Impey and A. MacGregor, 128–134. Oxford: Clarendon Press. (2nd edn. 2001).

Hermansen, V. 1941. C.J. Thomsen and the founding of the ethnographical museum. In *Ethnographical studies, published on the occasion the centenary of the ethnographical department, the National Museum*, Nationalmuseets Skrifter, Etnografisk Række, vol. I, 11–27.

Stjernquist, B. 2005. *The historical museum and archaeological research at Lund University 1805–2005*, Papers of the Historical Museum, University of Lund 1. Lund: The Historical Museum.

Thomsen, C.J. 1848. *A guide to northern archaeology.* Edited for the use of English readers by the Earl of Ellesmere. London.

Further Reading

Christian Jürgensen Thomsen 1788 – 29. December – 1988. *Aarbøger for Nordisk Oldkyndighed og Historie* 1988. Copenhagen: Det Kongelige Nordiske Oldskriftselskab (with English summaries).

Jensen, J. 1992. *Thomsens museum. Historien om Nationalmuseet*. Copenhagen: Gyldendal.

Klindt-Jensen, O. 1975. *A history of Scandinavian archaeology.* London: Thames and Hudson.

Rowley-Conwy, P. 2007. *From genesis to prehistory. The archaeological three age system and its contested reception in Denmark, Britain, and Ireland*. Oxford: Oxford University Press.

Trigger, B. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.

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Throckmorton, Peter

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Basic Biographical Information

Peter Throckmorton (1928–1990) played an enormous role in the creation of the field of nautical

archaeology. Born in New York, he eventually rebelled against his privileged background, running away from boarding school in Colorado to seek adventure. He worked on various vessels in the Pacific, finally reaching Hawaii, where he learned to dive. After four years in the army, in Japan and Korea, he enrolled in the University of Hawaii and worked on a terrestrial archaeological excavation. Although he never graduated from college, he also studied at the Musée de l'Homme in Paris.

Major Accomplishments

Working as photojournalists, Throckmorton and Herb Greer covered the Algerian War dressed as rebels. In 1958, on returning overland to Europe from shooting a tiger-hunt story in India, he stopped in Bodrum, Turkey, to write about local sponge divers. Sailing and diving with Kemal Aras, he was shown ancient wrecks and was told about the most intriguing, which lay near Cape Gelidonya on the southern coast. He reached that site the following year while guiding an American sailing expedition. Recognizing that the wreck dated to the Bronze Age, he convinced the University of Pennsylvania Museum to organize an expedition, which led in 1960 to Throckmorton and George Bass conducting the first complete excavation of an ancient shipwreck on the seabed.

Throckmorton then moved to Greece where, beginning in 1962, he mapped the remains of two Roman stone carriers near Methone. He sailed his *Archangel* to Italy to explore other Roman stone carriers and, in 1967–1968, with his wife Joan, excavated one at Torre Sgaratta that carried sarcophagi from the late second or early third century. By then he and Gerhard Kapitän had excavated a seventh-century hull partly preserved in a marsh at Pantano Longarini in Sicily.

Back in Greece in 1970, he recognized that an old motor ship was a converted square rigger and determined that she was the *Elissa*, built in Liverpool in 1877; he and Karl Kortum of the San Francisco Maritime Museum acquired the vessel and arranged for her to be purchased in 1975 and restored by the Galveston Historical Foundation; she is now a major tourist attraction and sail-training ship in Galveston, one of her original ports of call. Also in 1970 he partially excavated a cargo containing twelfth-century Byzantine plates at Pelagos in the Northern Sporades and in 1975 located another Bronze Age wreck (2500 BCE) at Dokos near Hydra.

He recognized the importance of the many nineteenth-century hulks preserved in the Falkland Islands and in 1976 explored and surveyed the clipper ship *Snow Squall* (1851), the *Charles Cooper* (1856), and the Maine-built *St. Mary* (1890), a section of which he sent to the Maine State Museum in 1978.

From 1986 to 1988, Throckmorton was an adjunct professor at Nova Southeastern University. He died at his last home, in Newcastle, Maine.

His books include *The Lost Ships* (1964), the misleadingly titled *Diving for Treasure* (1965), *Shipwrecks and Archaeology* (1970), *The Sea Remembers: Shipwrecks and Archaeology* (1987), and *Spiro and the Sponge Fleet* (1964) for children.

Cross-References

- ▶ Bass, George Fletcher
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Late Antique Anatolia, Archaeology of
- ▶ Mediterranean Sea: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ Underwater Archaeology
- ▶ Visualizing Mediterranean Archaeology

Further Reading

Bass, G.F. 2005. *Beneath the Seven Seas: Adventures with the Institute of Nautical Archaeology*. London: Thames and Hudson.

Throckmorton, P. 1987. *The sea remembers: Shipwrecks and archaeology*. New York: Grove.

Tibetan Plateau, Archaeology of

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Introduction

Considering the relatively short history of archaeological research on the Tibetan Plateau, this field is remarkably contested. Major problems that vex the field are a lack of reliable dates, the dearth of archaeological material, the unevenness of research in various parts of the Plateau, and political issues. Nevertheless, recent multi-method research involving archaeology, genetics, linguistics, paleobotany, zooarchaeology, and isotope studies has thrown new light on the question of the early peopling of the Tibetan Plateau, human adaptations to local environment(s), and connections between the Plateau and surrounding regions.

Definition and Background

The term "Tibetan Plateau" (also Qinghai-Tibet Plateau or Himalayan Plateau) refers to a geographic unit rather than the political entity of the Tibetan Autonomous Region (referred to as "Tibet" in the following) or Greater Tibet as claimed by Tibetan exile groups. The Tibetan Plateau encompasses parts of northern India (Ladakh, Lahaul and Spiti, northern Sikkim, parts of Arunachal Pradesh), northeast Kashmir, Bhutan, northern Nepal, and parts of western China (Tibet, Qinghai, parts of western Gansu, eastern Sichuan, Northwest Yunnan). The southern border is formed by the inner Himalayan range; the Kunlun Mountains provide the northern limits beyond which lie the Hexi Corridor, the main contact route from China to the West; the East is described by the forested ridges of the foothills of the Qilian and Hengduan Mountain Ranges, and the western border is the Kashmiri Karakoram range.

The Tibetan Plateau is an elevated plateau covering an area of about 2,500,000 km^2 and has an average elevation of over 4,500 masl. The headwaters of most streams in the surrounding areas originate in this plateau, and it is also rich in glaciers. Over the millennia, it has been subject to desertification and other changes, making it an important study ground for the impact of climate change. The local environment is highly varied, including deserts, steppes, forests, salt lakes, mountains of up to over 7,000 m in elevation, and a wide range of plant and animal species. The climate in the center of the Plateau is arid, the southern and eastern margins are characterized by grasslands, and on the edges forests abound. There is strong seasonal variability, and climate changes have affected the region greatly, but the Plateau itself has also shaped global climate patterns due to its extreme height, influencing especially monsoonal patterns and the jet stream (Lehmkuhl and Haselein 2000).

Around 50,000 BP, the climate was colder and more arid than today and vegetation was sparse. Between 50,000 and 25,000 BP, temperatures increased, lake levels rose, and the climate became less dry, leading to steppe formation and greater species diversity. Conditions deteriorated during the Last Glacial Maximum (22,000–18,000 BP), starting a process of desiccation that continued into the Holocene (15,000–9,000 BP). Developments varied regionally, the east and south becoming warmer and more humid, leading to forest growths 13,000–10,000 BP. The western part became wetter and warmer only in 10,000–9,500 BP, with another arid period until 3,000 BP with two wet interludes (9,500–8,700 BP, 7,200–6,300 BP). From 6,000 BP, forests were greatly reduced, be it due to diminished rainfalls and lower temperatures, especially from 3,000 BP, or the expansion of agriculture or both (Miehe 1996). Due to the inhospitable conditions, today and probably in the past, the utmost West of the Plateau belongs

to the least populated regions of the world. Overall, the Plateau is characterized by much variability and great extremes, leading to varied human responses and thus much variability in the archaeological record over space and time.

Historical Background

The Tibetan Plateau is difficult to work in, not just because of the challenging environment and variety of languages involved but also for political reasons. The Plateau is unevenly split between different countries (mostly China, India, Nepal, Bhutan), and some areas are under dispute, most importantly Arunachal Pradesh, Kashmir, and to a certain extent Tibet.

Nevertheless, the extreme conditions and breathtaking scenery of the Plateau have attracted adventurers and scientists for centuries. Western explorers of the 1930s and 1940s remarked upon the presence of archaeological sites in various parts of Tibet. Prior to the 1980s, research in Tibet focused on environmental studies and geology. Nevertheless, related surveys of the 1960s and 1970s recorded some archaeological sites as well. While the national archaeological surveys of 1956 and 1981 covered all other Chinese provinces, it was only in 1984–1992 that a systematic survey of Tibet was conducted. The results appeared in 2010 in the series *Atlas of Chinese Cultural Relics* 中国文物地图集 (Guojia 2010), recording more Buddhist temples and historical buildings than prehistoric or early historic settlements or grave sites. The most recent Nationwide Cultural Relics Survey 第三次全国文物普查 included Tibet and leads to the discovery of many new sites, but the results are as yet unpublished.

Archaeology in Tibet is administered by the Tibetan Bureau of Cultural Relics 西藏自治区文物局 and since 1999 also facilitated by the Tibet Museum in Lhasa, but field research is largely conducted by other institutions, such as the Academy of Social Sciences 社会科学院, Sichuan University which has a designated Center for Tibetan Studies 四川大学中国藏学研究所, Peking University, and individual researchers from other institutions, always in cooperation with the Tibetan units themselves.

The exploration of prehistoric monuments in India started in the nineteenth century, officially with the establishment in 1861 of the Archaeological Survey of India (ASI), which exists until the present day as part of the Ministry of Culture administering monuments and archaeological sites (ASI 2018). In 1895, the ASI consisted of five so-called circles, regional units headed by a superintending archaeologist; now there are 27 circles, four of them covering parts of the Plateau. Archaeological research in these northern territories is limited, mostly due to the volatile situation on the border and territorial disputes but also because the harsh environment makes fieldwork difficult.

Research in Nepal is likewise hampered by the harsh environment and political situation, but fieldwork at Buddhist sites there commenced in 1896. In 1953, the Department of Archaeology (DOA) was established for cultural heritage protection and archaeological work. Most work has focused on the Kathmandu Valley, the most thriving part of Nepal located on the northern foothills of the Tibetan Plateau, and most discussions revolve around four topics: the life of Buddha, historical buildings, Paleolithic populations in the lower-elevation areas of Nepal, and connections with other parts of South Asia. Since the 1980s, high-elevation sites in Mustang have been explored in international multidisciplinary projects (e.g., a Sino-Japanese survey in 1986; excavations in Muktinath in the late 1980s and the "High Mountain Archaeology Project" in 1992–1998 by Nepali-German teams; and a long-term project in Samdzong by Mark Aldenderfer and colleagues focusing on the peopling of the Plateau). Taking advantage of the good preservation, much paleobotanical research has been conducted on remains from 1,000 BC to AD 700. Another area of research is the petroglyphs spanning a wide range of dates from the late Holocene to late historic period, studied especially by German teams.

Until recently, archaeological research in Bhutan was not permitted. However, in 2005, the former Prime Minister, supported by the king,

initiated the Bhutan-Swiss Archaeology Project to record and preserve cultural heritage and establish the field of archaeology in Bhutan. So far, most research has concentrated on Buddhist buildings and other aboveground monuments of the sixteenth to twentieth century, but it is to be hoped that in the coming years, some insights will be gained into earlier local developments.

Until fairly recently, there was hardly any contact between scholars from the different countries occupying parts of the Plateau. A first step toward more international collaboration was taken in 2011 when Sichuan University, sponsored by the Harvard-Yenching Institute, organized an international conference on the Prehistory of the Tibetan Plateau in Chengdu, inviting over a hundred scholars from all countries laying claim to parts of the Plateau (mostly China but also Nepal, India, and Bhutan) and a few foreign scholars from Belgium, Germany, Korea, Taiwan, and the USA (Bellezza 2018: Oct. 2011). The 2011 conference raised awareness of research across the borders and established contacts that led to the exchange of publications and unpublished information. Some of the fruits of this exchange can be seen in the 2016 special issue of *Archaeological Research in Asia* which focuses on the Tibetan Plateau.

Key Issues and Current Debates

First Peopling and Human Adaptation

At present, the most contested questions in the archaeology of the Tibetan Plateau revolve around the when, how, who, and why of its peopling. No homo fossils have been found on the Plateau. Absolute dates gained from ostracods on the central Qaidam Basin (c. 31,000 masl) have been dated to 33,000 BP, but some scholars doubt the early date, instead suggesting an occupation from 22,000 BP at the earliest. Human hand and footprints found at Chusang (4,200 masl, NW of Lhasa; Fig. 1, 6) have been dated to 21,700–20,600 BP, but no stone tools or other human-made artifacts have been found at the site. The Dang Valley in Nepal (c. 2,500 masl) has sites with early Acheulean stone tool types; similar stone tools dating to 70,000–40,000 BP have been found in Pakistan but at lower elevations (Darnal 2016). A considerable number of sites from various parts of the Plateau associated with core and flake tools have been assigned to the Paleolithic on typological grounds, suggesting dates of around 30,000–23,00 BP, but direct scientific dates are still lacking for most of these sites. For Xidatan 2, located at 4,300 masl in Qinghai (Fig. 1, 30), recent radiocarbon and luminescence dates have shown that the stone tool assemblages described as late Upper Paleolithic in character date to only 9,200–6,400 BP (Brantingham et al. 2013).

Another point of discussion is the direction of human migration onto the Plateau. Using mitochondrial DNA, Qian et al. (2000) suggest a north/central Asian origin of parts of the genetic pool of modern-day Tibetans but without suggesting any dates. Recently, the discussion has taken a political turn, with several scholars proposing that the ancestors of present-day Tibetans had moved from the Yellow River to the Plateau around 10,000 BP (Su et al. 2000) and that a clear genetic split between the Han Chinese and Tibetans emerged only after 2,750 BP (Yi et al. 2010). The argument for a unidirectional migration from Gansu is based on DNA, linguistic, and archaeological evidence. Su argues that a "Proto-Chinese" group moved into the Yellow River basin between 40,000 and 20,000 BP, developing genetically and linguistically into "Proto-Sino-Tibetan" and moving west in 10,000 BP where around 6,000 BP they became "Proto-Tibeto-Burmans." Van Driem (2002) equates them with the archaeological remains of the Dadiwan agriculturalists in Gansu (Fig. 1, 28) which he sees as "Northern Tibeto-Burmese speakers" who brought cord-marked pottery and polished stone tools, first giving rise to the Majiayao Neolithic in Gansu and eastern Qinghai and moving further onto the Plateau (Fig. 1, 29). Diverging from Su et al., who see all human migration onto the Plateau as coming from the Yellow Rive via Gansu, van Driem sees Kashmir as a second important source of movement onto the Plateau, albeit mostly into its western reaches and its southern rim.

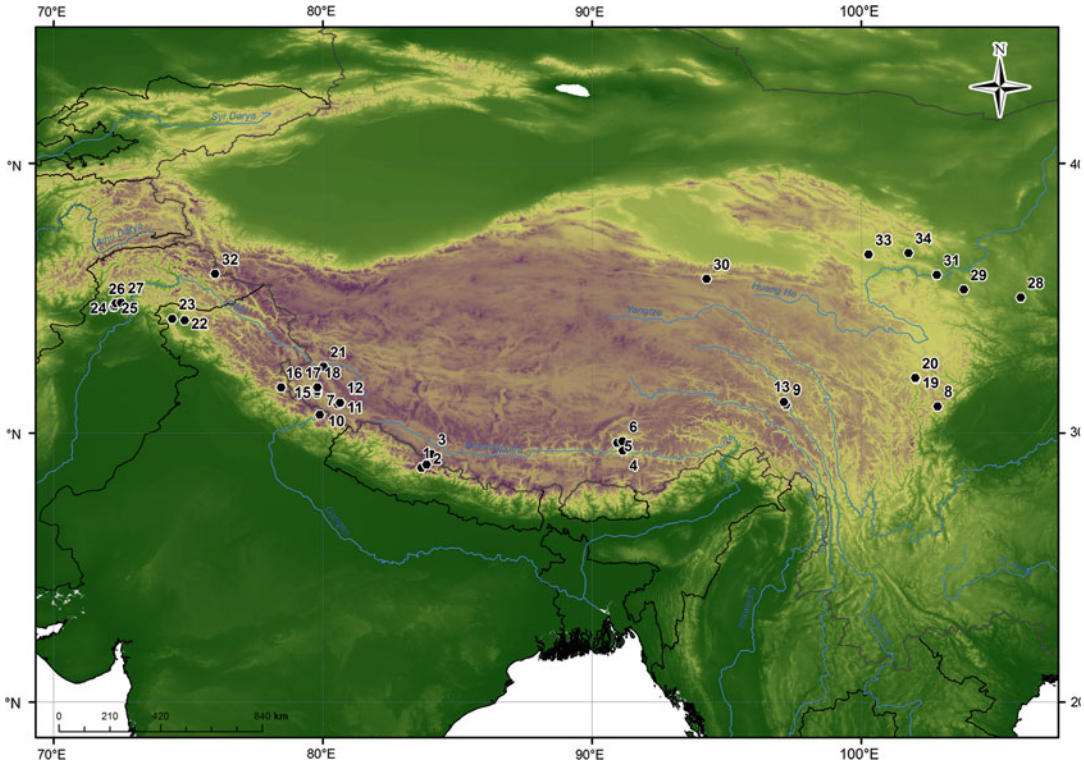

Tibetan Plateau, Archaeology of, Fig. 1 Map of sites mentioned in the text: (1) Chokhopani, (2) Mebrak, (3) Samdzong, (4) Phrang Mgo, (5) Chusang, (6) Chugong, (7) Malari, (8) Yingpanshan, (9) Kharub, (10) Kyunglung, (11) Mkhar gdong, (12) Gurugyam, (13) Xiao'enda, (14) Chufthag, (15) Gebuaisailu, (16) Kanam, (17) Sasongtang, (18) Gelintang, (19) Baishe, (20) Konglong, (21) Dingzhong Zhuizhuzi, (22) Burzahom, (23) Kanishkapura, (24) Bir-Kot-Ghwandai, (25) Ghaligai, (26) Aligrama, (27) Kalaloderay, (28) Dadiwan, (29) Majiayao, (30) Xidatan 2, (31) Lajia, (32) Gufkral, (33) Jiangxigou 2, (34) Taojiazhai

Major problems here are the nature of the evidence and the underlying assumptions. From the archaeological and linguistic point of view, the notion that DNA, language, and ceramic assemblages come in one unified bundle is highly problematic. Furthermore, the model does not explore the reasons for these suggested movements, details of the routes taken, or interactions with people already living on the Plateau. Su et al. and van Driem furthermore ignore the evidence for the presence of Central Asian genes on the Plateau. Analysis on graves from the central Plateau or surrounding areas in statistically significant numbers is likewise lacking (Aldenderfer 2011).

In their argument for a recent genetic split of Tibetans and Han, Yi et al. focus on data from the Northeast with lower-elevation sites such as Lajia (4,000–3,800 BP; c. 1,800 masl; Fig. 1, 31) and Taojiazhai (1,900–1,700 BP; 2,330 masl, Fig. 1, 34) located at the edge of the Plateau and characterized by assemblages showing close connection to the neighboring Yellow River Valley. However, recent genetic data suggests a long-term genetic stability of the inhabitants of Nepal at least from 3,000 BP to the present, as shown by the greater affinity of human remains from Upper Mustang dating between 3,150 and 1,250 BP (Chokhopani, Mebrak, and Samdzong, Fig. 1, 1, 2, 3) to modern Tibetans and Sherpa than to low-altitude East Asian populations (Jeong et al. 2016). Further research on DNA from various periods and parts of the Plateau and surrounding areas will be needed to answer the question of the genetic origin of the people inhabiting the Plateau now and in the past.

Genetic evidence is also of interest for discussions concerning physical adaptations to high-altitude environments. Humans are not naturally suited for hypoxia but have to adapt to it. The exact form of this adaptation seems to differ, as comparative studies between the Tibetan Plateau, the Andes, and Ethiopia suggest. The reasons for those differences are unclear: many depend on the genetic makeup prior to the movement to higher altitudes, elevation, and/or time passed since the initial move.

Based on these genetic processes combined with the archaeological evidence, Aldenderfer (2007) suggests that the movement to higher levels of the Plateau occurred prior to 10,000 BP. This date as well as the sequence and origin of these human movements are contested. Brantingham and colleagues (Brantingham et al. 2013) developed a three-step model: (1) initial stage of occupation below 3,000 masl by mobile foragers moving higher from the Northeast around 30,000–25,000 BP; (2) movement of low-elevation foragers onto the mid-elevation areas (3,000–4,000 masl), pushed higher by agriculturalists after 25,000 BP; and (3) full-scale year-round occupation at elevations over 4,000 masl on the central Tibetan Plateau after 10,000 BP with a system of movement between middle- and high-elevation areas by pastoralists.

Chen et al. (2015) model the advent of agriculture to the Plateau in a similar three-step process: (1) pre-5,200 cal. BP occasional forays of hunter-gatherers onto the Plateau; (2) 5,200–3,600 cal. BP, gradual movement of millet farmers from the Yellow River up to 2,500 m; and (3) arrival of barley and wheat allowing agriculturalists to move over 4,000 masl even under a colder and drier climate.

Both Brantingham et al. (2013) and Chen et al. (2015) have been criticized for their assumption of a unidirectional movement from the northeastern lowlands to the uplands, their disregard for the contribution of local hunter-gatherers, and their extrapolation from a small number of sites in the Northeast to the whole Plateau (Lü 2016). A new set of radiocarbon dates from Chusang at 4,270 masl on the central Plateau suggests that the site may have been part of permanent pre-agricultural occupation around 8,400–7,400 BP (Meyer et al. 2017a) or even 20,000 BP (Zhang and Li 2017).

The Chen et al. model has furthermore been criticized for exaggerating the altitudes at which agriculture would have been possible: d'Alpoim Guedes et al. (2015a) use climatic modeling to argue that millet could not have been grown above 4,000 masl at certain sites as the required number of growing degree-days at minimum temperature could not have been reached. Though it might have been possible to grow millet or barley at some sites, the risk of failure would have been high, so they suggest that barley and millet found in high-altitude sites may have been traded in. For later periods, they suggest that it was only the advent of wheat and barley that allowed for settlement at higher altitudes. In response, Dong et al. (2015) point out that historical records reflect the planting of barley at over 4,200 masl since the early twentieth century. Lü (2016) points to the presence of considerable amounts of millets at the site of Kharub (Karub or Karuo in Chinese; 5,200–3,500 BP; Fig. 1, 9) in eastern Tibet, which he sees as a strong indicator that these were grown locally by settled agriculturalists. He furthermore questions the suggestion that permanent settlement was possible only after the advent of wheat in 3,600 BP, as evidence from sites such as Phrang mgo (Changguogou in Chinese; Fig. 1, 4) in Gonggar, Kharub, and Xiao'enda (Fig. 1, 13) suggests permanent settlement already between 5,000 and 3,600 BP. Lü argues that the models suggested so far may apply to the Northeast, while in the Southeast hunter-gatherer subsistence combined with incipient agriculture was practiced as early as 5,200 BP, with increasing reliance on millets until wheat agriculture entered around 3,600 cal. BP, allowing local populations to withstand the sudden climate cooling.

The main issue in this discussion lies in the small number and uneven distribution of excavated sites, combined with a lack of an established chronology, and a disagreement on methods of modeling. Another issue is the great variability in ecological niches and human adaptations across the Plateau and continued uncertainties about overall climate patterns in prehistoric and early historic periods, combined with the tendency of

scholars to claim that their results won from a limited number of sites apply to the whole Plateau. Another issue not sufficiently explored is the human and cultural component, the choice of specific crops over others, or the potential special use of certain crops in ritual context rather than subsistence, influencing demands on planting success and the amount of crops.

Local Cultures and Shared Traditions

From the material culture point of view, for the Neolithic period, it is clear that there are a number of local traditions in various parts of the Plateau. The most well-researched Neolithic sites on the Plateau are Kharub (3,100 masl, eastern Tibet) and Chugong (Qugong in Chinese, Lhasa, c. 4,000–3,000 BP; 3,680 masl; Fig. 1, 6). Kharub is characterized by a considerable number of houses and large amounts of ceramics and stone and bone tools, the tool assemblages showing similarity to assemblages at lower-elevation sites in western Sichuan. The pottery resembles finds from Majiayao in Gansu, but the nature of this connection is debated. There is evidence for agriculture but also for hunting and in the later phases probably herding and possibly pig domestication. As there are several sites of similar characteristics in eastern Tibet, they are now seen as part of a Kharub culture.

Similarly, Chugong is the type site of the Chugong culture, a phenomenon associated with domesticated sheep, pig, and yak, burnished and often painted fine ware, as well as grinding stones, bone tools, and bronze arrows. The site is interpreted as a local phenomenon loosely connected with Kharub but of later date. Kharub is seen as connected with Majiayao-type sites in lower-elevations Qinghai and Gansu. The connection with lower-elevation Yangshao- or Majiayao-type sites is clear for Jiangxigou 2 (Fig. 1, 33), located at 3,310 masl in Qinghai and characterized by thin cord-marked pottery (from c. 6,900 cal. BP) and millet use (from c. 5,500 cal. BP). The ceramic assemblages at the lower-elevation sites in Qinghai are either attributed to Yangshao (5,000–3,400 BC) or Majiayao (3,400–2,800 BC) influence, but this is likewise a point of contention (Aldenderfer and Yinong 2004).

On the northern Plateau, on highlands of the Qaidam basin, the earliest sites at 2,700–4,700 masl date significantly later (3,400–2,450 cal. BP) and show evidence of barley, wheat, and broomcorn millet growing as well as domestication of sheep, cattle, yak, dog, and horse. Here, too, connections with lower-elevation areas of Gansu have been suggested, in this case with Kayue (c. 900–600 BC), especially in the simple metal axes and knives and to a lesser extent in ceramic assemblages, but the differences are likewise pronounced, suggesting both outside connections and local developments.

A recent survey in Ngawa Prefecture, Southwest Sichuan, has shown an interplay between outside connections and local developments and also on the eastern rim of the Plateau (d'Alpoim Guedes and Hein 2018). The earliest remains found there are settlement sites dating to 3,400–2,000 cal. BC which are exclusively located on the bottom of river valley (below 2,600 masl). They have small house features, polished stone tools, and cord-marked as well as small amounts of painted pottery with likely Yangshao or Majiayao connection (e.g., Baishe, Konglong, Yingpanshan; Fig. 1, 8, 19, 20) combined with evidence for an agricultural way of life (millet, domesticated pig). Medium elevations (2,600–2,900 masl) hold stone-cist graves dating to 1,450–800 ca. BC and lacking any identifiable associated settlement features. High elevations over 3,000 masl are scattered with fragmented pottery sherds dating to 500–1,500 cal. BC with no clear settlement layers. Previously, higher altitudes had been excluded from surveys, working under the assumption that people would avoid such high elevations – an assumption which has now been disproven at least for parts of Barkam. For decades, it has been clear that a dense network of interaction ran along the whole eastern rim of the Plateau, connecting communities living at elevations of c. 1,500–2,800 masl from Qinghai to Yunnan and probably beyond into the Steppe and Central Asia on the one end and Southeast Asia on the other and partially also connecting with lower-elevation locales at least in Qinghai and Gansu (Hein 2014). More fieldwork is needed to assess connections with higher-altitude areas of the Plateau.

For the western part of the Plateau, evidence for permanent agricultural settlement is lacking; what can be seen instead are surface scatters of stone tools, both microliths and polished stone tools, sometimes with heavily fragmented pottery, at altitudes of sometimes over 4,000 masl (e.g., at Dingzhong Zhuizhuzi in Gar County, Burzahom in Kashmir; Fig. 1, 21, 22). Stone tool assemblages usually associated with agriculture have been found across the southern and western rim of the Plateau from western Nepal to Sikkim and have been dated to 1,000–200 BC, though only based on typology (Darnal 2016). In Nepal, Mustang holds sites dating from around 1,000 BC that contain evidence for barley and buckwheat, while wheat, millet, and peas appeared from around 400 BC (Knörzer 2000).

Kashmir has evidence of much earlier human habitation, albeit in its southern reaches. In Ladakh, part of Jammu and Kashmir, Neolithic sites have been found at over 3,000 masl and in great number (e.g., Kiari and Gaik), but excavations so far have been limited. An aceramic Neolithic appears around 2,700 BC. The best researched among the sites located between 1,600 and 1,800 masl are Burzahom (3,000–1,000 BC), Gufkral (aceramic Neolithic 3rd mill. BC, megalithic period 2nd mill. BC, and historic period; Fig. 1, 32), and Kanishkapura/Kanispur (aceramic phase 3rd-2nd mill. BC; ceramic Neolithic 2nd-1st mill. BC; and historic period; Fig. 1, 23), all close together on the foot of the Himalayas (Yatoo 2012). Since the 1980s, several scholars have remarked how different the material from these sites is compared to lower-elevation sites in northern India, while there are notable similarities with contemporary sites in Swat, Pakistan, (especially Aligrama, Bir-Kot-Ghwandai, Ghaligai, Kalaloderay; around 1,900 masl; c. 3,000–500 BC; Fig. 1, 24, 25, 26, 27) (Dani and Masson 1992) but also around Lhasa (Phrang mgo in Gonggar; Yinba in Nedong) and even on the eastern rim of the Plateau at Kharub.

The main connections are the perforated stone knives interpreted as harvesting tools that appear in many sites in eastern Tibet, around Kashmir, the Swat Valley, and Sikkim, associated cultivars such as barley, wheat, millet, lentils, and peas, crops often seen as part of the "Near Eastern package." Lü (2014) argues that, considering the dates of the sites in question, millet must have reached the Lhasa region coming from eastern Tibet which in turn may have received the Near Eastern crop from groups in the upper Yellow River Valley (i.e., Majiayao). Buckwheat, on the other hand, may first have been cultivated on the Plateau, probably before 6,000 BP, be it on its eastern rim or elsewhere. Other evidence for the connection is bone hairpins and jade beads of similar shapes. The ceramic assemblages from eastern Tibet, however, differ markedly from those in the other regions. The assemblages at Chugong and related areas show closer similarities with finds in faraway Kashmir than with nearby Kharub. The nature of these connections between the different regions is unclear, as are the routes that connected them.

It is also remarkable that the stone knives appear in Sikkim as well as Kashmir, but Nepal, located between the two of them, seems to have been "skipped." Most high-elevation material from Nepal known at the present time comes from Mustang (c. 2,500 masl), an area that – in spite of its remoteness – seems to have been integrated into long-distance exchange networks from the mid-first millennium BC at the latest. In Mebrak (c. 400 BC–AD 100), new staples appear such as wheat, millet, rice, and peas for local planting as well as imported plants and plant products such as bamboo, hemp, and lentils (Knörzer 2000). It has been suggested that the earliest inhabitants of Upper Mustang may have come from the lowlands of northern India in the prehistoric period bringing those crops with them (Aldenderfer and Eng 2016), but later migrants may have come from the western Plateau (Lü 2016).

Burial Traditions

Much of the discussion of burial traditions on the Tibetan Plateau hinges on poorly dated burial evidence. Huo (1995) proposed a typology of stone-construction graves, earth-pit graves, and stone-mound and earth-mound graves. He sees the first long phase from the late Neolithic to the sixth c. BC, as characterized by earth-pit graves

and graves with various amounts of stone installations and very few burial goods. In Huo's second phase, stone-cist graves containing double-handled vessels and small stone mounds then become more common from around the fifth c. BC. The third phase is characterized by mounded tombs containing ceramics, stone, bone, and metal items showing close connections to Xinjiang and dating to the 1st–6th c. AD. It is difficult to reach a coherent typochronology for the stone-construction tombs, in particular, due to the lack of absolute dates and the vast range of different grave forms. Furthermore, graves with various amounts of stone installations have been observed over large parts of the mountains of western China and beyond, ranging in date from the second millennium BC to the first millennium AD and associated with a variety of object types and interment practices.

Focusing on reliably dated graves, Aldenderfer (2013) distinguishes two customs: (1) belowground structures appearing from the second millennium BC to the 7th c. AD and occurring over central Tibet, Upper Mustang, the southern Flank of the Himalayas, and the westernmost Plateau; and (2) grave mounds appearing from around 500 BC and in increasing number over the first millennium AD, be it due to outside stimulation or as a local development. Aldenderfer interprets the latter as signs of growing social complexity, expressions of control over landscape and people, culminating in the tomb of the eighth king of the Yarlung Dynasty (c. AD 600). All of these graves differ markedly from mortuary evidence from southern Gansu, challenging the common assumption that new developments on the Plateau mostly originated from the upper Yellow River.

The earliest belowground burials on the Tibetan Plateau proper are known from Chugong in central Tibet, dating to 17,000 BC. They have various amounts of stone installations, containing either primary flexed or more often secondary interments but hardly any objects apart from a few ceramics and in one of the later graves (c. 800–500 BC) a bronze mirror pointing to Central Asian connections (Huo 1995). The tombs of Upper Mustang in Nepal – represented by Chokhopani (c. 1,200–450 BC), Mebrak (400 BC–100 AD), and Samdzong (c. 200–700 AD) – show close similarities with shaft tombs in the far western part of the Plateau and neighboring parts of high-elevation India, all of them showing evidence for secondary burial and at Samdzong de-fleshing, a curious custom not seen in other parts of the Plateau and potentially related to Zoroastrian beliefs (Aldenderfer and Eng 2016) and/or forerunners of sky burial practices emerging around the 9th c. AD.

In contrast to the Chugong finds, both contemporary and later graves in Nepal and the western Plateau are richly equipped. The Chokhopani graves held metal and tooth ornaments, stone tools, ceramics, and copper sheets potentially related to northern India. The Mebrak graves held glass and carnelian beads of South or Southeast Asian origin, bronze ornaments, textiles, wooden items, and sheep and goat bones. Even more animal remains (sheep, goat, caprids, bovids, horse) were found in the Samdzong graves together with metal ornaments, glass beads of Iranian/Sassanian or South Indian/Southeast Asian origin, vessels of bamboo or wood, silk, and in one grave a gold-and-silver mask, finds bearing close resemblance to the assemblages of contemporary graves in the extreme west of the Plateau (e.g., Mkhar gdong Chufthat/Quta, Gelintang, Gurugyam; Fig. 1, 11, 12, 14, 18) and in northern India (e.g., Malari, Kanam, all c. 500–100 BC; Fig. 1, 7, 16) as well as Xinjiang (Aldenderfer 2013).

For the westernmost part of the Plateau, textual evidence attests to the presence of a number of groups along the Yarlung Tsangpo prior to the emergence of the Zhangzhung polity (500 BC – AD 625). In the first c. BC, another political entity arose in the Yarlung Valley, the Yarlung Kingdom or Tubo/Tufan Dynasty. Yarlung and Zhanghuang fought over dominance over the region until the founding of the Tibetan Empire under Songtsen Gampo (604–650 AD). There is a plethora of evidence for this later period, both in Chinese and local text and religious architecture, but there is very little archaeological evidence for the period from c. 1,000 BC to AD 500. Bellezza collected much material for that period through extensive travels, recording hundreds of fortresses, residential and religious building, standing stones, and tombs, unfortunately without

being able to date them reliably. Excavations at the Dindun settlement site and the grave sites of Gebuaisailu and Sasongtang (Fig. 1, 14, 17) provided first radiocarbon dates in western Tibet falling into the Zhangzhung period, c. 400–100 BC (Aldenderfer and Yinong 2004). These sties held various types of stone graves, stone residential structures, and a standing stone. The function and meaning of such stones are debated, especially in their potential connection with deer stones in Central Asia and Mongolia and similarities to megalithic structures in other parts of the world (e.g., Bellezza 2018). Aldenderfer and Zhang (2004) argue that the Central Asian standing stones date to c. 2,000 BC, while those on the Plateau seem to be much younger and look different; the deer stones in Mongolia, on the other hand, are closer in date (c. 1,000 BC–AD 500) as well as form and decoration, potential connections that need to be explored further.

The probable center of Zhangzhung, Kyunglung (also Khyunglung, Qulong, or Qulongcun; Fig. 1, 10) and other residential and mortuary sites in the vicinity are undergoing investigation. In 2012–2014, two cemeteries in Ngari Prefecture dating to the second c. BC and the third c. AD were excavated. Both sites revealed barley seeds and bones of cattle, sheep/goat, and horse, indicating a mixed economy for both locales. Burial customs and contents differ markedly between the two sites. The four cave burials excavated at Chuvthag (Quta; 3,710 masl) in the extreme west of the Plateau resemble graves at other sites in Zanda both in construction and in the high-quality pottery. The excavators argue that these wares resemblance finds in northern India and Ladakh, showing the overall integration of the various parts of the western Plateau now divided by national borders (Tong et al. 2015). The three stone-lined rectangular cave burials containing wooden coffins found at Gurugyam (Guru Jiamu; 4,300 masl) held only few pottery vessels showing some similarity to those from Chuvthag, as well as an iron sword, iron horse bits and arrowheads, bone ornaments, gilt silver ornaments, and glass beads. They have none of the riches found in the Chuvthag cemeteries such as a gold mask, silk items, intricately carved wooden ornaments and containers, complex and numerous metal ornaments and weapons, basketry, and beads made of agate and job's tear seeds. Gold masks have been found in a few other graves on the Plateau (e.g., in Mustang) and in the northern steppe, and the steppe-style handled bronze mirror, wooden-hilted iron dagger, and wooden and basketry items show close ties to Xinjiang and Central Asia, while other items point to connections with Ladakh, similar to the pottery. The beads likewise point to South Asia and the Indian Ocean, reflecting the integration of Chuvthag into a far-flung exchange network in spite of its remoteness. That Gurugyam, located close to the Zhangzhung capital of Kyunglung, should not have been integrated into that network seems strange, but this may simply be a matter of misrepresentation, considering the small number of graves excavated.

Conclusion

Overall, at present genetic as well as historical, archaeological, and linguistic evidence suggest that there were many instances of small- and large-scale movements onto the Tibetan Plateau and between its various parts, partially due to climate change, political instability, wars, or within trade networks. This led to a staggering number of different archaeological phenomena in various parts of the Plateau that are simultaneously uniquely local and closely connected to the outside world.

International Perspectives

As discussed above, the archaeology of the Tibetan Plateau is inevitably an international affair because parts of the Plateau are claimed by a number of countries. Participation in excavations has been difficult for foreigners, especially in Tibet itself. Foreigners are sometimes involved in laboratory analysis, and the archaeologists of Sichuan University, especially, have granted foreign scholars' access to material from Tibet. Research in collaboration with the Academy of Sciences has also been possible focusing on early periods rather than the Academy of Social Sciences usually in charge of archaeological explorations (Chinese-American projects, e.g., by

P. Jeff Brantingham, Richard E. Hughes, David B. Madsen, John W. Olsen, David E. Rhode). Excavations involving foreigners are occasionally possible on the eastern rim of the Plateau in Sichuan (Jade d'Alpoim Guedes and Anke Hein). Non-Chinese areas of the Plateau have seen foreign research involvement, especially Nepal (e.g., Sino-Japanese, German, and American teams, especially Mark Aldenderfer). Most foreign scholars interested in the Plateau, however, either have to repair to Central Asia or lower-elevation regions in Gansu that are politically not contested or rely on published literature. Nevertheless, discussions on the date and direction of the peopling of the Plateau and the movement of agriculture onto the Plateau mainly take place in English and with much involvement of foreign scholars.

Collaboration and indeed communication between scholars from different political entities occupying part of the Tibetan Plateau is rare, partially because of language barriers. The international conference on the Prehistory of the Tibetan Plateau held at Sichuan University in 2011 made great strides toward solving this issue. At the time, hardly anything on the archaeology of the Tibetan Plateau had been published in languages other than that of the country on whose territory the finds were made, but since the 2011 conference, a large number of publications in English have appeared, many of them coauthored by scholars from a number of countries. Most of these collaborations – like most research published in English – focus on the prehistoric period, especially the Paleolithic and early Neolithic, discussing timing of the peopling of the Plateau and human adaptation to the local environment, as reflected in a recent special issue of the journal *Archaeological Research in Asia* (2016 issue 5).

Future Directions

In spite of the recent spike in interest in the Tibetan Plateau, it is difficult to predict where the field is headed. The large number of excavations, surveys, and archaeological discoveries on various parts of the Plateau over recent decades, the increasing number of available absolute dates, the considerable amount of research under way, and the improved possibilities through advancements in genetic research and various forms of scientific analysis suggest that the upcoming years will greatly enlarge the amount of material available, helping us to push forward our understandings of the prehistory and early history of the Plateau. At the same time, the increasingly tight governmental control of research in China and the limitations imposed on foreign involvement in such undertakings as well as the increasing pressure on Chinese scholars to focus on specific state-mandated topics may slow progress. Nevertheless, research in previously neglected areas has recently seen an increase in fieldwork activity such as in western Tibet, eastern India, Nepal, and recently also Bhutan. This can be expected to add much new data in upcoming years, hopefully leading to a better grasp of the chronology of sites and events throughout the Plateau. Given the current trajectory, it can be expected that the great diversity of ecological niches, forms of their exploitation, range of outside contacts, and various cultural expressions throughout space and time will become increasingly more apparent. With such progress, the old tendencies to propose mono-causal, mono-directional models based on observations made at a few sites in a single region of the Plateau will hopefully make way for complex, multicausal models that initially limit their explanation to small, well-researched areas and groups of material with good chronological control and only then engage in multiregional comparisons.

Cross-References

► Altitude Environments in Archaeology
► Early State Formation in China
► India: Historical Archaeology

References

Aldenderfer, M. 2007. Modeling the Neolithic on the Tibetan Plateau. In *Late quaternary climate change and human adaptation in arid China*, ed. D.B. Madsen, Chen Fahu, and Gao Xing, 151–166. Amsterdam: Elsevier.

Aldenderfer, M. 2011. Peopling the Tibetan Plateau: Insights from archaeology. *High Altitude Medicine & Biology* 12 (2): 141–147.

Aldenderfer, M. 2013. Variation in mortuary practice on the early Tibetan plateau and the high Himalayas. *Journal of the International Society for Bon Studies* 1: 273–298.

Aldenderfer, M., and J. Eng. 2016. Death and burial at two ancient high altitude communities of Nepal. In *Companion to South Asian prehistory: Archaeological and bioarchaeological perspectives*, ed. G. Schug and S. Walimbe, 374–398. New York: Wiley-Blackwell.

Aldenderfer, M., and Zhang Yinong. 2004. The prehistory of the Tibetan Plateau to the seventh century A.D.: Perspectives and research from China and the West since 1950. *Journal of World Prehistory* 18 (1): 1–55.

Bellezza, J.V. 2018. Tibet archaeology and all things Tibetan. http://www.tibetarchaeology.com/. Accessed 3 Feb 2018.

Brantingham, P.J., G. Xing, D.B. Madsen, D. Rhode, C. Perreault, J. Woerd, et al. 2013. Late occupation of the high-elevation Northern Tibetan Plateau based on cosmogenic, luminescence, and radiocarbon ages. *Geoarchaeology* 28 (5): 413–431.

Chen, F.H., D.J. Zhang, X.Y. Liu, X. Jia, C.B. An, et al. 2015. Agriculture facilitated permanent human occupation of the Tibetan Plateau after 3600 B.P. *Science (New York, N.Y.)* 347 (6219): 248–250.

d'Alpoim Guedes, J., and A. Hein. 2018. Landscapes of prehistoric Northwestern Sichuan: From early agriculture to pastoralist lifestyles. *Journal of Field Archaeology* 43: 121–135.

d'Alpoim Guedes, J., R.K. Bocinsky, and E.E. Butler. 2015a. Comment on "Agriculture facilitated permanent human occupation of the Tibetan Plateau after 3600 B. P.". *Science* 348 (6237): 872.

Dani, A.H., and V.M. Masson. 1992. *History of civilizations of Central Asia*. Vol. 1. Paris: UNESCO.

Darnal, P. 2016. Archaeology of Nepal. In *A companion to South Asia in the past*, Wiley Blackwell companions to anthropology series, ed. S.R. Walimbe and G. Robbins Shug, 412–425. Chichester: Wiley-Blackwell.

Dong, G., D. Zhang, X. Liu, F. Liu, F. Chen, and M. Jones. 2015. Response to comment on "Agriculture facilitated permanent human occupation of the Tibetan Plateau after 3600 B.P.". *Science (New York, N.Y.)* 348 (6237): 872.

Guojia Wenwuju 國家文物侷 (Ed.). 2010. *Zhongguo wenwu dituji: Xizang zizhiqu fence* 中國文物地圖集: 西藏自治區分冊. Beijing: Wenwu Chubanshe 文物出版社.

Hein, A. (Ed.). 2014. *Reconsidering the crescent-shaped exchange belt – Methodological, theoretical and material concerns of long-distance interactions in East Asia thirty years after Tong Enzheng*. Oxford: Archaeopress.

Huo, Wei 霍巍. 1995. *Xizang gudai muzang zhidu yanjiu* 西藏古代墓葬制度研究. Chengdu: Sichuan Renmin Chubanshe 四川人民出版社.

Jeong, C., A.T. Ozga, D.B. Witonsky, H. Malmström, H. Edlund, C.A. Hofman, et al. 2016. Long-term genetic stability and a high-altitude East Asian origin for the peoples of the high valleys of the Himalayan arc. *Proceedings of the National Academy of Sciences of the United States of America* 113 (27): 7485–7490.

Knörzer, K.-H. 2000. 3000 years of agriculture in a valley of the High Himalayas. *Vegetation History and Archaeobotany* 9 (4): 219–222.

Lehmkuhl, F., and F. Haselein. 2000. Quaternary paleoenvironmental change on the Tibetan Plateau and adjacent areas (Western China and Western Mongolia). *Quaternary International* 65/66: 121–145.

Lü, Hongliang 呂紅亮. 2014. Kua Xiamalya shijiao xia de Xizang xibu xinshiqi shidai 跨喜瑪拉雅視角下的西藏西部新石器時代. *Kaogu* 考古 (12): 77–89.

Lü, Hongliang. 2016. Colonization of the Tibetan Plateau, permanent settlement, and the spread of agriculture: Reflection on current debates on the prehistoric archeology of the Tibetan Plateau. *Archaeological Research in Asia* 5: 12–15.

Meyer, M.C., M.S. Aldenderfer, Z. Wang, D.L. Hoffmann, J.A. Dahl, D. Degering, et al. 2017a. Permanent human occupation of the central Tibetan Plateau in the early Holocene. *Science* 355 (6320): 64–67.

Miehe, G. 1996. On the connection of vegetation dynamics with climate changes in High Asia. *Palaeogeography, Paaleoclimatology, Palaeoecology* 120: 5–24.

Qian, Y., B. Qian, B. Su, J. Yu, Y. Ke, Z. Chu, et al. 2000. Multiple origins of Tibetan Y chromosomes. *Human Genetics* 106 (4): 453–454.

Su, B., C. Xiao, R. Deka, M.T. Seielstad, D. Kangwanpong, J. Xiao, et al. 2000. Y chromosome haplotypes reveal prehistorical migrations to the Himalayas. *Human Genetics* 107 (6): 582–590.

Tong Tao 仝濤, Li Linhui 李林煇, Trinley Tsering 赤列次仁, and Yao Ya 姚婭. 2015. Xizang Ali diqu Guru Jiamu mudi he Quta mudi 西藏阿裏地區故如甲木墓地和曲踏墓地. *Kaogu* 考古 (7): 29–50.

van Driem, G. 2002. Tibeto-Burman phylogeny and prehistory: Languages, material culture, and genes. In *Examining the farming/language dispersal hypothesis*, ed. P.S. Bellwood and A.C. Renfrew, 233–249. Cambridge: McDonald Insitute for Archaeological Research.

Yatoo, M.A. 2012. *Characterising material culture to determine settlement patterns in Northwest Kashmir*. PhD Thesis, University of Leicester, Leicester.

Yi, X., Y. Liang, E. Huerta-Sanchez, X. Jin, Z.X.P. Cuo, J.E. Pool, et al. 2010. Sequencing of fifty human exomes reveals adaptation to high altitude. *Science (New York, N.Y.)* 329 (5987): 75–78.

Zhang, D.D., and S.-H. Li. 2017. Comment on "Permanent human occupation of the central Tibetan Plateau in the early Holocene". *Science* 357 (6351): 1–2.

Further Reading

Aldenderfer, M. 2012. Peopling the Tibetan Plateau: Migrants, genes, and genetic adaptation. In *Causes and consequences of human migration*, ed. M.H. Crawford and B.C. Campbell, 342–372. Cambridge: Cambridge University Press.

Alt, K.W., J. Burger, A. Simons, W. Schön, G. Grupe, S. Hummel, et al. 2003. Climbing into the past: First Himalayan mummies discovered in Nepal. *Journal of Archaeological Science* 30 (11): 1529–1535.

ASI (Archaeological Survey of India). 2018. Archaeological survey of India. http://asi.nic.in/asi_aboutus.asp. Accessed 3 Feb 2018.

Barton, L. 2016. The cultural context of biological adaptation to high elevation Tibet. *Archaeological Research in Asia* 5: 4–11.

Beall, C.M. 2001. Adaptions to altitude: A current assessment. *Annual Review of Anthropology* 30: 423–456.

Beckwith, C.I. 1993. *The Tibetan empire in central Asia: A history of the struggle for great power among Tibetans, Turks, Arabs, and Chinese during the early Middle Ages*. Princeton: Princeton University Press.

Bellezza, J.V. 2001. *Antiquities of northern Tibet: Pre-Buddhist archaeological discoveries on the high plateau: Findings of the Changthang circuit expedition, 1999*. Delhi: Adroit Publishers.

Bellezza, J.V. 2002. *Antiquities of upper Tibet: An inventory of pre-Buddhist archaeological sites on the high plateau: Findings of the Upper Tibet Circumnavigation Expedition, 2000*. Delhi: Adroit Publishers.

Bellezza, J.V. 2008. *Zhang Zhung: Foundations of civilization in Tibet: A historical and ethnoarchaeological study of the monuments, rock art, texts, and oral tradition of the ancient Tibetan upland*. Wien: Östereichischen Akademie der Wissenschaften.

Brantingham, P.J., J.W. Olsen, and G.B. Schaller. 2001. Lithic assemblages from the Chang Tang Region, Northern Tibet. *Antiquity* 75: 319–327.

Brantingham, P.J., Gao Xing, J.W. Olsen, Ma Haizhou, D. Rhode, Zhang Haiying, et al. 2007. A short chronology for the peopling of the Tibetan Plateau. In *Late quaternary climate change and human adaptation in arid China*, ed. D.B. Madsen, Chen Fahu, and Gao Xing, 129–150. Amsterdam: Elsevier.

d'Alpoim Guedes, J. 2015. Rethinking the spread of agriculture to the Tibetan Plateau. *Holocene* 25 (9): 1498.

d'Alpoim Guedes, J., H. Lu, Y. Li, R.N. Spengler, X. Wu, and M.S. Aldenderfer. 2014. Moving agriculture onto the Tibetan plateau: The archaeobotanical evidence. *Archaeological and Anthropological Sciences* 6 (3): 255–269.

d'Alpoim Guedes, J.A., H. Lu, A.M. Hein, and A.H. Schmidt. 2015b. Early evidence for the use of wheat and barley as staple crops on the margins of the Tibetan Plateau. *Proceedings of the National Academy of Sciences of the United States of America* 112 (18): 5625–5630.

Flad, R. 2016. Recent research on the archeology of the Tibetan Plateau and surrounding areas. *Archaeological Research in Asia* 5: 1–3.

Flad, R.K., J. Yuan, and S. Li. 2007. Zooarcheological evidence for animal domestication in northwest China. *Developments in quaternary sciences*, vol. 9, 167–203. Amsterdam: Elsevier.

Ge, R.-L., T.S. Simonson, V. Gordeuk, J.T. Prchal, and D.A. McClain. 2015. Metabolic aspects of high-altitude adaptation in Tibetans. *EPH Experimental Physiology* 100 (11): 1247–1255.

Gruschke, A. 2001. *The cultural monuments of Tibet's outer provinces*, 2 vols. Bangkok: White Lotus Press.

Hazarika, M. 2016. Tracing post-Pleistocene human movements and cultural connections of the eastern Himalayan region with the Tibetan plateau. *Archaeological Research in Asia* 5: 44–53.

Hazarika, M. 2017. *Prehistory and archaeology of North-east India*. Oxford: Oxford University Press.

Hazod, G. 2007. The grave on the 'cool plane': On the identification of 'Tibet's first tomb' in Nga-ra-thang of 'Phyong-po'. In *Pramāṇakīrtiḥ: Papers dedicated to Ernst Steinkellner on the occasion of his 70th birthday*, Wiener Studein zur tibetologei und Buddhismuskunde, ed. B. Kellner, H. Krasser, H. Lasic, M.T. Wieser-Much, and H. Tauscher, vol. 70.1, 259–283. Wien: Arbeitskreis für tibetische und buddhistische Studien der Universität Wien.

Hein, A. 2017. Early cultural developments on the Eastern Rim of the Tibetan Plateau: Establishing a new chronological scheme for southwest Sichuan. *Asian Perspectives* 56 (1): 2–54.

Hou, G., Z. Ma, E. Chongyi, W. Zhang, and H. Wei. 2016. Plant utilization at the Jiangxigou site during the middle Holocene. *Archaeological Research in Asia* 5: 54–62.

Huang, W. 1994. The prehistoric human occupation of the Qinghai-Xizang Plateau. *Göttinger Geographische Abhandlungen* 95: 201–219.

Hunt, H.V., X. Shang, and M.K. Jones. 2017. Buckwheat: A crop from outside the major Chinese domestication centres? A review of the archaeobotanical, palynological and genetic evidence. *Vegetation History and Archaeobotany* (Suppl 1): 493–506.

Janik, L. 2002. Wandering weed: the journey of buckwheat (*Fagopyrum* sp.) as an indicator of human movement in Eurasia. In *Ancient interactions: East and West in Eurasia*, ed. K.V. Boyle, A.C. Renfrew, and M. Levine, 299–307. Cambridge: McDonald Institute for Archaeological Research.

Liu, X., D.L. Lister, Z. Zhao, C.A. Petrie, X. Zeng, P.J. Jones, et al. 2017. Journey to the east: Diverse routes and variable flowering times for wheat and barley en route to prehistoric China. *PLoS One* 12 (11): e0187405.

Lü, Hongliang 呂紅亮. 2011. Xizang jiushiqi shidai kaogu de xin moshi 西藏旧石器时代考古的新模式. *Kaogu* 考古 3: 59–68.

Madsen, D.B. 2016. Conceptualizing the Tibetan Plateau: Environmental constraints on the peopling of the "Third Pole". *Archaeological Research in Asia* 5: 24–32.

Madsen, D.B., M. Haizhou, P.J. Brantingham, G. Xing, D. Rhode, Z. Haiying, et al. 2006. The Late Upper Paleolithic occupation of the northern Tibetan Plateau margin. *YJASC Journal of Archaeological Science* 33 (10): 1433–1444.

Madsen, D.B., F.-H. Chen, and X. Gao, eds. 2007. *Late quaternary climate change and human adaptation in arid China*. Amsterdam/London: Elsevier.
Mani, B.R. 2004. Further evidence on Kashmir Neolithic in light of recent excavations at Kanishkapura. *Journal of Interdisciplinary Studies in History and Archaeology* 1 (1): 137–142.
Meyer, M.C., D.L. Hoffmann, M.S. Aldenderfer, W.R. Haas, J.A. Dahl, Z. Wang, et al. 2017b. Response to comment on permanent human occupation of the central Tibetan Plateau in the early Holocene. *Science* 357 (6351): eaan8575.
Mishra, T.N. 1994. The archaeological research in the high mountains of Mustang District. *Ancient Nepal* 136: 147–160.
Paray, A.A. 2016. The geology and the earliest evidences of man in Kashmir. *International Journal of Engineering Science and Computing* 6 (4): 3899–3906.
Pohle, P. 2000. *Historisch-geographische Untersuchungen im Tibetischen Himalaya: Felsbilder und Wüstungen als Quelle zur Besiedlungs- und Kulturgeschichte von Mustang (Nepal)*. Giessen: Institut für Geographie der Justus-Liebig-Universität.
Pradhan, R. 1983. A glimpse of archaeological studies in Nepal. *Ancient Nepal* 77: 1–6.
Qi, X., C. Cui, Y. Peng, X. Zhang, Z. Yang, H. Zhong, et al. 2013. Genetic evidence of Paleolithic colonization and Neolithic expansion of modern humans on the Tibetan plateau. *Molecular Biology and Evolution* 30 (8): 1761–1778.
Rhode, D. 2016. A biogeographic perspective on early human colonization of the Tibetan Plateau. *Archaeological Research in Asia* 5: 33–43.
Schug, G.R., and S.R. Walimbe. 2016. *A companion to South Asia in the past*, Blackwell companions to anthropology. Chichester: Wiley-Blackwell.
Sharma, A.K. 2000. *Early man in Jammu Kashmir and Ladakh*. Delhi: Agam Kala Prakashan.
Shrestha, K.M., T. Mishra, R. Pradan, and S. Amatya. (Eds.). 1999. *Archaeological, historical and geographical reports on research activities in the Nepal-Tibetan border area of Mustang during the years 1992–1998. Results of the Nepal German Project on high mountain archaeology part IV. Ancient Nepal, journal of the Department of Archaeology numbers 130–133, 134, 136, 137, 138, 140,* Archiv für Zentralasiatische Geschichtsforschung, vol. 14. Bonn: VHG Wissenschaftsverlag.
Sichuan Daxue Zhongguo Zangxue Yanjiusuo 四川大學中國藏學研究所, Sichuan Daxue Kaoguxue Xi 四川大學考古學習, and Xizang Zangzu Zizhihou Wenwuju 西藏藏族自治州文物侷. 2007. Xizang Ali diqu Dingdong juzhu yizhi fajue jianbao 西藏阿裏地區丁東居住遺址發掘簡報. *Kaogu* 考古 (11): 36–46.
Simonson, T.S., Y. Yang, C.D. Huff, H. Yun, G. Qin, D.J. Witherspoon, et al. 2010. Genetic evidence for high-altitude adaptation in Tibet. *Science* 329 (5987): 72.
SLSA (Schweizerisch-Liechtensteinische Stiftung für archäologische Forschungen im Ausland). 2018. Bhutan-Swiss archaeology project: Institutionalization of Archaeology in Bhutan. http://www.slsa.ch/projects/current-projects/bhutan-capacity-building/?lang=en. Accessed 3 Feb 2018.
Tong Enzheng 童恩正. 1985. Xizang kaogu zongshu 西藏考古綜述. *Wenwu* 文物 (9): 9–19.
Williams, T. 2016. Silk roads in the Kingdom of Bhutan and the development of a national heritage inventory. *Archaeology International* 19: 122–133.
Xu Chaolong 徐朝龍. 1988. Ximalayashan nanlu suojian de Zhongguo beifan xinshiqi shidai wenhua yinsu. *Nongye kaogu* 農業考古 (2): 137–144.
Zhang, D.D., and S.H. Li. 2002. Optical dating of Tibetan human hand- and footprints: An implication for the palaeoenvironment of the last glaciation of the Tibetan Plateau. *Geophysical Research Letters* 29 (5): 16-1–16-3.

Tikal (Maya): Geography and Culture

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Introduction

Tikal is one of the most famous and important cities of the Mayan area (Fig. 1), and Mesoamerica in general, and is the largest pre-Hispanic city that exists in Guatemala (Gómez 2013: 10). In addition, it has been one of the most studied by researchers of this culture and has a large corpus of inscriptions that covers from the Early Classic to the Late Classic. It was discovered on February 26, 1848 by the Corregidor de Petén, Colonel Modesto Méndez, guided by the Governor of Petén Ambrosio Tut, who were accompanied by the artist Eusebio Lara to draw the findings (Gómez 2013: 10).

Projects and Scientific Researches

Since it was discovered in the mid-nineteenth century to the present, Tikal has been studied by various researchers and scientific projects. The first plan and the first photographs of Tikal were made by the Englishman Alfred Maudslay, between 1881 and 1882. Between 1895 and 1904, the German Teobert Maler, of

Tikal (Maya): Geography and Culture, Fig. 1 Map of the Maya territory, with the location of Tikal. (Map by Harri Kettunen)

the Peabody Museum of the University of Harvard, increased the photographic registry and of drawings. Alfred Tozzer, from the same museum, made the map of Tikal, which was published in 1911 (Gómez 2013: 10–11). From 1914 to 1937, Sylvanus Morley conducted research in the northwest area of Petén, including Tikal. Scientific studies in this city began in 1956, with the Tikal project, by the Museum of the University of Pennsylvania. This project focused mainly on the core of Tikal (Great Plaza, Temples I and II, and the North and Central Acropolis) (Fig. 2) and in some housing groups. In 1961, the Tikal project published an excellent plan of the city (Tikal Report No. 11) (Fig. 3). Later, in the 1970s, a group of Guatemalan researchers continued with scientific investigations (excavated and restored Group G or 5E-11), and during the years 1979 to 1985, the Institute of Anthropology and History organized the National Project Tikal, under the direction of the archaeologist Juan Pedro Laporte. The Tikal National Project focused especially on the Plaza of Lost World and various interesting housing groups south of the Plaza (Iglesias, July 2019, personal communication). From 1992 to 1996, some works continued in the city, with international cooperation agreements with Spain, through the Spanish Agency for Cooperation. These works focused on the consolidation of Temple I and the excavation and restoration of Temple V.

During the years 2003–2006, the "Project Study of the Archaeological Fortifications of Tikal" was developed, directed by David Webster and other researchers. In 2002, another agreement was signed with Spain to investigate and preserve the Plaza of the Seven Temples. In 2005, the Archeology Unit of the Tikal National

Tikal (Maya): Geography and Culture, Fig. 2 View of the North Acropolis (on the left) and Temple I and the Great Plaza (on the right). (Photograph of the author)

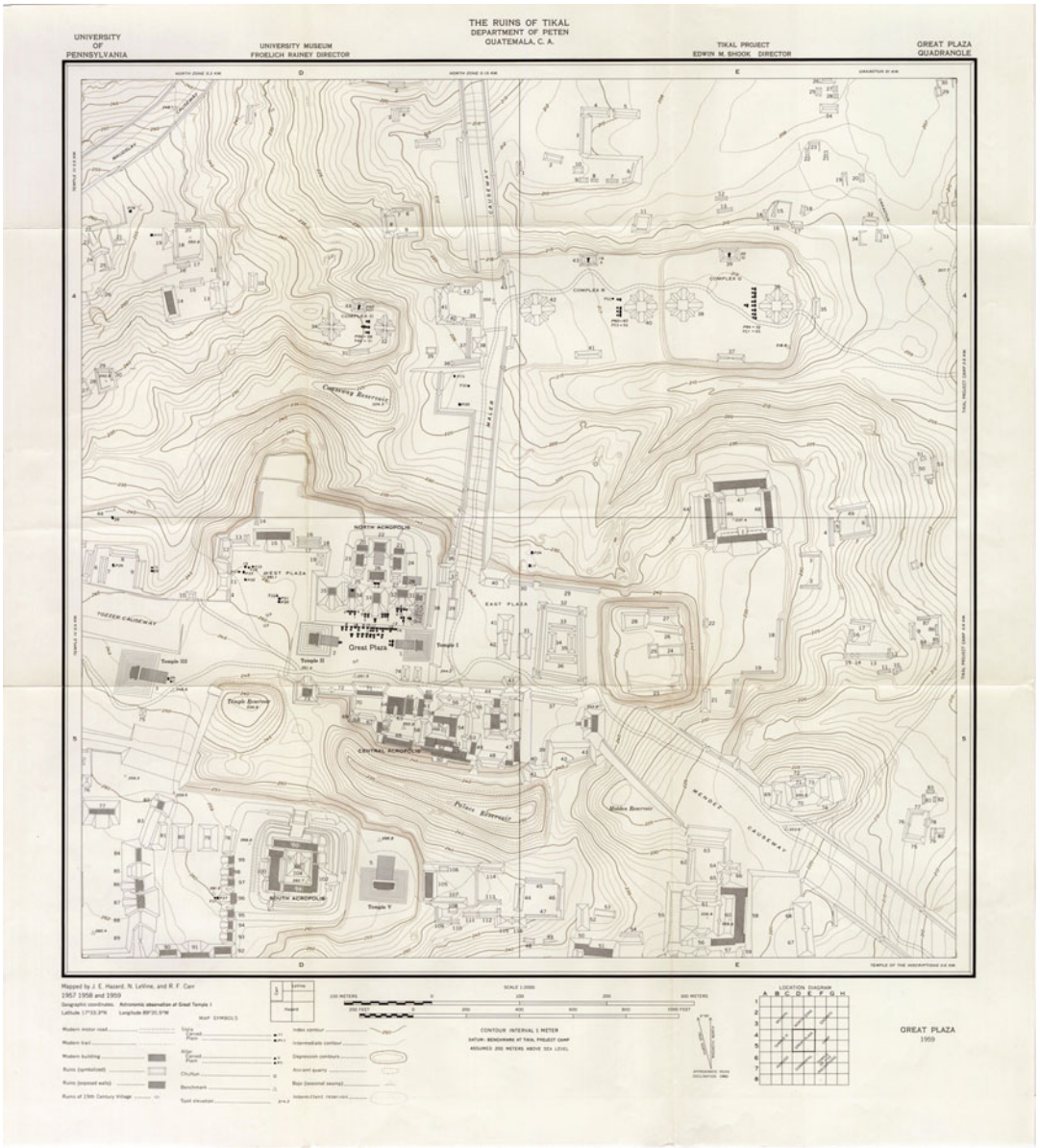

Tikal (Maya): Geography and Culture, Fig. 3 Plan of the nuclear area of Tikal. From *Tikal Report 11: Map of the Ruins of Tikal, El Peten, Guatemala.* Robert F. Carr and James E. Hazard (1961). The University Museum, Philadelphia

Park began the restoration and research works of Temple IV, the largest building constructed by the Mayan culture in a single moment. In 2009, several researchers (Lentz et al. 2015) started a new project to investigate silvicultural and water management practices of the ancient Tikal (Gómez 2013: 11–13). Since 2013, the "Petén Epigraphic Atlas Project" has been developed, with the collaboration of the Russian-Guatemalan Center for Mayan Studies Yuri Knórosov (CEMYK); the Institute of Anthropology and History (IDAEH), of the Ministry of Culture and Sports; and some researchers of the Center for Mesoamerican

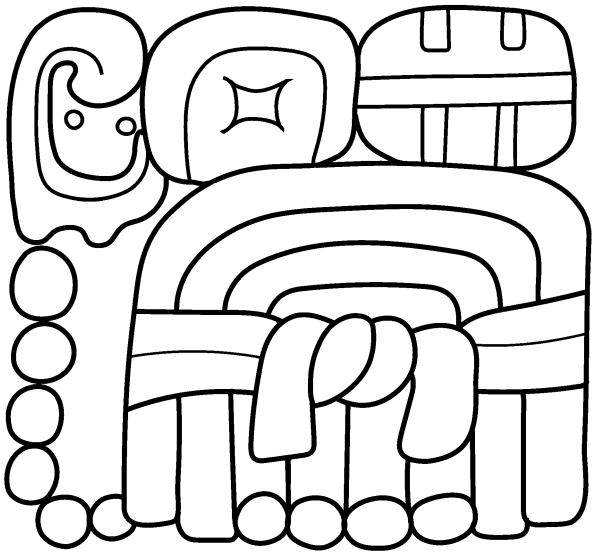

Tikal (Maya): Geography and Culture,
Fig. 4 Emblem glyph of Tikal, known as Mutu$^{?}$l in the Classic, with its main sign, the Logogram **MUT**. Stela 5 detail, drawing by Diego Ruiz Pérez

Studies of the Russian State University for the Humanities (Moscow); the Corpus of Maya Hieroglyphic Inscriptions Program of the Peabody Museum, Harvard University; and the University of San Carlos from Guatemala (Beliaev and De León 2013: 13).

All these investigations and many more have contributed to build the extensive knowledge that is currently known about this city.

Definition

The toponym of Tikal is relatively modern, and according to Martin and Grube (2008: 30), it derives from the Yucatec Maya *ti ak'al*, meaning "at the water hole," maybe in reference to one of the city's ancient reservoirs; however, it could also come from *ti' 'ik'al*, which in the same language means "place of spirits" or "place of winds." Legend says that the inhabitants "of the 19th century settlement were driven out of their humble houses in the ruins by a combination of fear of the 'spirit voices' and a plague of bats (…) It is possible that an outbreak of rabies may account for the virtual abandonment of the site by the Maya re-occupants in the mid-19th century" (Harrison 1999: 30).

Apart from this name, there was another toponym with which the ancient Maya identified the site; this toponym conformed part of the emblem glyph (Fig. 4), known in the Classic (250–900 AD) as Mutu$^{?}$l. The Tikal emblem glyph main sign, the logogram MUT – deciphered independently, in the year 1993, by Stuart and Prager, thanks to the phonetic complementation **mu-**, **-tu** – originated as a representation of a tied hair (Stuart 2013), and the meaning of that word could be "hair" or "type of hairstyle"; nevertheless, the precise meaning of this word remains uncertain. In addition, some years ago Beliaev, based on the text of Stela 31, proposed a new reading of the emblem glyph of Tikal as **KUK** instead of **MUT**. According to him, the ancient name of Tikal should be read *Kuku$^{?}$l* or *Yax Kuku$^{?}$l* (Beliaev and De León 2013: 45), but this proposal is still under discussion.

Tikal is located in the central zone of the Petén Department, Guatemala, in an extension of territory with low population density (9.19 inhabitants per km^2, which represents 2.7% of the total population), which contributes to maintaining the largest virgin forest reserve in the region; for this reason, it was declared a National Park in 1955. The Tikal National Park covers an area of 576 km^2 of tropical rain forest, in whose center the old Mayan city of Tikal is located and some other small cities that were controlled by the Tikaleños governors. This park, together with other protected areas, forms the largest natural reserve in

Mesoamerica, called the Mayan Biosphere, of approximately 21,000 km^2 (Gómez 2013: 9). In the National Park inhabits a great diversity of flora and fauna, including important wetlands recognized worldwide and a series of limestone hills that rise over swampy or lowlands, with a rolling terrain ranging between 100 and 300 m a.s.l. (Beliaev and De León 2013: 15). The geographical situation of Tikal allowed it to develop into a Mayan city of great extension and outstanding architecture. The city is located on a meseta in the hydrographic zone of the Yucatan Peninsula. "With the construction of Tikal in that location, through which passed one of the interurban roadways that linked the network of tributaries of the Usumacinta, to the west, with the Caribbean, to the east, the inhabitants of the city took control of long distance trade" (Harrison 2011: 219). The main architecture of the site is grouped in the highest areas that are interconnected by roads that cross the marshes (Beliaev and De León 2013: 15). Because of its indisputable cultural and natural importance, Tikal was declared a World Heritage Site by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 1979, constituting the first Mixed Cultural Heritage Site (cultural and natural) in the world (Gómez 2013: 9).

The archaeological site Tikal was one of the most important Mayan cities of the Classic period; it extends for more than 16 km^2 and houses about 3,000 structures of different functions: temples, palaces, ball games, residential structures, and astronomical commemoration complexes, among others (Fig. 3). The site is located at 283 m a.s.l. and at a distance of 495 km north of Guatemala City, 64 km from the city of Flores, 19 km south of the Uaxactún archaeological site, 30 km northwest of Yaxhá, and 100 km southeast of Calakmul, the city which perpetuated a fierce struggle for the political hegemony of the Maya Lowlands throughout the Classic period (Beliaev and De León 2013: 15).

Historical Background

The first occupation of Tikal corresponds to the Middle Preclassic (900–600 BC) (Laporte and Fialko 1993: 9), also known as the Pre-Mamon Horizon, in the area known as the Lost World. Although the first settlements correspond to that time, the area had an uninterrupted activity until the Terminal Classic (800–950 AD).

In the earliest moments of his occupation, the Lost World had an important ritual character, reflected in the first development known for a complex specialized in astronomical commemoration (Laporte and Fialko 1993: 9), through the construction of a relatively small group of buildings, known as "E-Groups" (Harrison 1999: 53). Later, in the Late Classic (600–900 AD), the function of this complex changed toward another type of civic manifestations (Laporte and Fialko 1993: 9).

Very little is known about the occupation of the Preclassic in Tikal, due to the few housing centers that have been investigated. This is perhaps related to the massive leveling and construction caused by the constant growth of the ceremonial sectors, which perhaps destroyed nearby and earlier housing areas, to use their material as a filling of squares and structures (Laporte and Fialko 1993: 9).

The pioneers of Tikal established the basis of their civilization at this site with most of its basic characteristics by 350 BC. Toward I AD, Tikal manifested all the character traits of the Maya high civilization. A big change affected their population during the last three-and-one-half centuries BC, lasting for the next 250 years (Harrison 1999: 53).

During the Late Preclassic (350 BC–250 AD), the North Acropolis (Fig. 2) remained the largest constant focus of architectural growth on the site, establishing this part as the heart of Tikal and as a place of burial of kings and a growing cosmic expression. "The Lost World Pyramid group to the southwest of the North Acropolis was the other location of important growth" (Harrison 1999: 53).

The dynastic history of Tikal, and of many Mayan cities, has been reconstructed, thanks to the narrations in the monuments (mainly stelae) written in hieroglyphs: the deciphering of the hieroglyphic writing and the later development of the Mayan epigraphy have been and are fundamental, to understand the past of this complex culture.

The dynastic history of Tikal, which begins in the Early Classic (250–600 AD), includes a succession of 33 kings who ruled their political territory for 800 years (Martin and Grube 2008: 25). The dynasty was founded in 90 AD, with Yax ʔEhb' Xook, who perhaps came from the dynasty of the neighboring city of Uaxactún, with which Tikal maintained good relations throughout its history (Gómez and Kováč 2016: 38–40, 42).

Stela 29 is the earliest of those found in this era (292 AD), and in it is mentioned for the first time the *ʔajaw* or "lord" of Tikal, the title used by the Mayan kings (Martin and Grube 2008: 26–27).

Very little is known of the first 13 kings of the Tikal dynasty; of the 13th, K'inich Muwaan Jol, it is only known that he was the father of his successor (indicated on Stela 39), Chak Tok ʔIch'aak I (14th Ruler), a king with whom, and despite him, the story of Tikal in the Early Classic changed drastically. This king probably enthroned the 360 AD and "presided over the largest and most progressive of the new Classic Maya cities. Part of this success was undoubtedly due to long-distance trade, not only that with the Maya highlands to the south but with distant Mexico and the powerful city of Teotihuacan. There are signs that imported Mexican architectural styles had already taken root at Tikal by this time and even hints of intermarriage between the two ruling elites. But Tikal's relationship with its western partners was about to change dramatically, and the lowland Maya would soon be drawn into a much wider Mesoamerican scheme" (Martin and Grube 2008: 28).

Toward the end of the fourth century, in 8.17.1.4.12 11 ʔEb' 15 Mak (January 16, 378 AD), Tikal fell under the power of Teotihuacan with the arrival of Sihyaj K'ahk' to this political capital. This Teotihuacan political conquest was supported by Mayan allies, since 2 days before the famous date – which indicates the arrival of Sihyaj K'ahk' to Tikal and the death of the ruler of that city, Chak Tok ʔIch'aak I – the king of Naachtún declares himself, on Stela 24 of his city, the yajawteʔ or "captain of war" of Sihyaj K'ahk' (Nondédéo et al. 2016). These facts meant, on the one hand, that both Tikal and a large sector of the central area were more involved in the political, cultural, and economic sphere of Teotihuacan, at that time in its heyday, and, on the other, that a new Mayan-Teotihuacan dynasty consolidated Tikal as a leader in the region (Martin and Grube 2008: 29).

The death of Chak Tok ʔIch'aak I ended his entire lineage, as he was replaced by a new male lineage, probably originally from the ruling house of Teotihuacan (Martin 2003: 12). The impact of the conquest was noted, since most of the monuments of Tikal were destroyed and others were dispersed to peripheral cities, such as El Encanto, Corozal (Martin 2003: 15), El Temblor, and Uolantún, where Stela 36 was found.

Although Sihyaj K'ahk' became the master of Tikal, he was never enthroned, since he installed as ruler Spearthrower Owl's son (Martin 2003: 15) – another important Teotihuacan character who apparently married a lady from Tikal – Yax Nuʔn ʔAhiin I, the king who established a new Teotihuacan dynasty in the city and who performed the first impersonation ritual recorded in Tikal and throughout the Mayan area, thus inaugurating the practice of that ritual, on November 5, 406 AD (López 2018: 45, 47, 826: Tabla XI.4, 940). The impersonation ritual is a universal religious phenomenon and consists of the incarnation, through the possession, of a god or supernatural being in a person's body. It was done to achieve a theophany, that is, the concrete manifestation of a deity or a supernatural being in the world of human beings. The establishment of this ritual originated the conception of a sacred, divine monarchy, that is, a theocracy, and it became a political factor of the first order in the Mayan area (López 2018: 928–929, 931).

After the death of Yax Nuʔn ʔAhiin I, on November 27, 411, his son was enthroned, Sihyaj Chan K'awiil II. On Stela 31 he carries a complex headdress with the crest of Yax ʔEhb' Xook, thus explaining his declaration of dynastic restoration, since in it he "proclaims the rebirth of orthodox kingship, neither sullied nor diluted by its foreign blood, but reinvigorated" (Martin and Grube 2008: 34). But this situation changes with the government of his son, K'an Chitam, who assumed power in the year 458, after the death of his father. K'an Chitam's texts do not

mention external matters, but if he was still in power in August 486 (the date of death of this king is unknown), he would have directed the attack of Tikal against the northern city of Maasal. This is one of the first wars described in the Maya inscriptions (Martin 2003: 16–17). In addition, with K'an Chitam the use of the staff stelae monuments began (Guenter 2002: 26).

This king was in charge of continuing the legacy of his grandfather Yax Nuʔn ʔAhiin I, ignoring the dynastic restoration that his father intended to establish, and for this he made the second impersonation attested in Tikal, recorded on Stela 9 (López 2018: 61), with which the practice of this ritual is standardized.

After K'an Chitam his son governed in Tikal, Chak Tok ʔIch'aak II, who died in July 508, and, later, Lady York'in of Tikal, who almost certainly was his daughter and was enthroned in 511 at 6 years of age, but apparently never governed by herself, but co-ruled with one or more men. After the death of Chak Tok ʔIch'aak II, the next half century was a time of dynastic riots, period also known as the "Middle Classic" of Tikal (508–562), since it took 30 years for the son of this king, Wak Chan K'awiil (the 21st Ruler), to claim his position. The "Middle Classic" of Tikal was a problematic time and little is known about, since the monuments are poorly preserved and some were deliberately damaged (Martin and Grube 2008: 37–38).

K'inich Waw?, possible 20th Ruler of Tikal, would have ruled sometime between 527 and 537 (Martin and Grube 2008: 39). In the only monument of his government, Stela 8, appears the third impersonation registered in Tikal (López 2018: 70):

> Architecturally, we know that there were major developments during the Middle Classic era, with the building of the large East Acropolis platform and new plaza floorings throughout the central zone. The first twin-pyramid complex, a special arena for K'atun-ending ceremonies, was also added in the East Plaza at this time. (Martin and Grube 2008: 39)

Under the reign of Wak Chan K'awiil, Tikal was defeated in a war in 562, apparently by Dzibanché, the lords of K'anuʔl at that time. With this event Tikal's dominance in Petén ended, and the city sank into a long dark epoch; possibly Wak Chan K'awiil was sacrificed (Sharer 1999: 218). For the next 130 years, no monuments dating from Tikal have been found; this silence is known as the hiatus from 592 to 692, which has been linked to the fall of Teotihuacan in this period and with the idea of a "small collapse" or perhaps a "domino effect" in the Mayan area. But the military submission of Tikal coincides with the rise of a great rival in Petén: Calakmul (Martin and Grube 2008: 40).

Wak Chan K'awiil was succeeded after the year 562, by "Animal Skull" or K'nich Waaw according to Guenter (2002: 96), the 22nd Ruler. The maternal lineage of this king was the sustenance of his legitimacy to the throne (Martin 2003: 25), breaking with the previous lineage, established with the arrival of the Teotihuacans. Shortly after his death, in the year 629, Tikal founded the city of Dos Pilas and sent his future king, B'alaj Chan K'awiil (Demarest y Fahsen 2003: 165). This period, which was under the reign of Nuʔn ʔUjol Chaahk of Tikal, was characterized by diverse fights between Tikal, Calakamul, and Dos Pilas, the latter supporting at the beginning Tikal, but later, under the supremacy of Calakmul after being conquered in 659, it acted against Tikal (Fahsen et al. 2003: 686, 690).

Nuʔn ʔUjol Chaahk's son, Jasaw Chan K'awiil I, succeeded him on the throne in 682. Under his direction "the city grew as never before and its army managed to placate its enemies and stabilize the region" (Gómez and Kováč 2016: 43). In addition, this ruler linked his kingdom to the heyday of Tikal's past associated with Teotihuacan and had a decisive victory over Calakamul in 695, which began the decline of the hegemony of Calakmul and the rebirth of Tikal as a war power (Martin and Grube 2008: 44).

After the death of this king, in the year 734, his son was enthroned, the 27th Ruler, Yik'in Chan K'awiil, who continued with the imperial ambitions of his father and transformed the city, overshadowing those of his rivals: he built a new tomb for his father and probably erected almost all the causeways that interconnected the main areas

of the city; he built and remodeled Temples IV and VI, Group 3D-2, and the East Market complex, made important additions to the Central Acropolis, and built or renovated almost all the great palaces surrounding the center of Tikal (Harrison 1999: 149, 158–159, 162).

This king was one of the greatest military heroes of Tikal. On Stela 21, his image appears with a captive from Calakmul, maybe the same king, since at that time there was a change of power in that city. In 743 he attacked Yaxa?, a satellite of El Perú, defeating his king; almost 200 days after, Yik'in Chan K'awiil attacked Naranjo and captured his king, Yax Mayuy Chan Chaahk. These victories broke the hostile encirclement of the kingdom that endured for at least a century. As both cities were important allies of Calakmul, their rapid defeat apparently is explained due to the diminishing powers of Calakmul. This new supremacy over the Petén fostered the construction boom through perhaps booties, tributes, or conscript labor (Martin and Grube 2008: 48–50).

During the government of this king, the last impersonation, known until now, is recorded in Tikal, in Lintel 3 of Temple IV, or Structure 5C-4 (López 2018: 77–98), Yik'in Chan K'awiil's biggest temple (64.6 m high) and the highest pyramid in America (Fig. 5) (Harrison 1999: 153–154).

The duration of the government of Yik'in Chan K'awiil is unknown, but later, his sons succeeded him, the 28th Ruler – who very little is known – and Yax Nu?n ?Ahiin II, who was enthroned in 768 and built the twin pyramids Q and R during his tenure (Martin 2003: 32). By this time, the Tikal dominion over the Central Petén begins to diminish.

At the beginning of the ninth century, in the Terminal Classic, signs of a deep crisis appeared, with the disappearance of the dynasties of the region and the vertiginous diminution of the

Tikal (Maya): Geography and Culture, Fig. 5 Temple IV of Tikal in the far distance. (Photograph by Diego Ruiz Pérez)

population. This greatly affected the Tikal dynasty, of whose four kings (Nuʔun ʔUjol K'inich, "Dark Sun," "Jewel" K'awiil, and Jasaw Chan K'awiil II) very little is known (Martin and Grube 2008: 52–53).

In the late ninth century, Tikal suffered the same fate as his contemporaries in the Mayan area. All vestiges of royal power disappeared, and the elite neighborhoods remained semi-deserted, being occupied by squatters who built huts in ceremonial plazas. These last inhabitants continued with their complex ritual activities reusing and moving the ancient monuments; also no consideration of sanctity of the old order disappeared, since several tombs of the North Acropolis were sacked. The city was abandoned in the tenth or eleventh century, being finally buried by the jungle (Martin and Grube 2008: 53).

Key Issues/Current Debates

The arrival of the Teotihuacan to Tikal is quite controversial because the epigraphic version, according to some authors, is not supported by the archaeological record of the city (Iglesias 2003).

After analyzing problematical deposits and some Tikal tombs, Iglesias concludes that "The data derived from the problematical deposits and burials reflect the dominant culture of the elites of Tikal during the late Early Classic period, a material culture that is overwhelmingly of local origin. In contrast, the presence of foreign elements is extremely minimal (. . .) Archaeological data supporting the notion that Tikal contained a Teotihuacan 'enclave' or was an important 'interactive node' in a large-scale, Teotihuacan-focused network have been greatly exaggerated. Assuming that inter-elite contacts existed, their effects on both sociopolitical and cultural development at Tikal were quite literally immaterial (. . .) What is lacking at Tikal is evidence that Teotihuacan had any lasting impact on material culture" (Iglesias 2003: 192–195).

These data lead to Iglesias to reevaluate the importance of Teotihuacan's influence on Tikal and the Mayan area in general, although it is confirmed by certain findings (Iglesias, 2017, personal communication), including the possibility of the physical presence of Teotihuacanos in certain Mayan cities (Iglesias 2003: 191). Contrary to these approaches, there are archaeologists and epigraphists who endorse the presence and influence of Teotihuacan in the Mayan area and in Tikal, based, on the one hand, on the hieroglyphic inscriptions of various Mayan cities that mention the arrival of foreigners from Central Mexico in the zone, at the end of the fourth century (Stuart 2000), and, on the other hand, in the archaeological evidence of Teotihuacan influence, such as talud-tablero temples; typical Teotihuacan architecture; royal burials in Teotihuacan style, for example, in the city of El Zotz – located 20 km west of Tikal (Garrison en Dashwood et al. 2018: 45'-51'); stone monuments; ceramics; and other types of portable material culture (Coggins 1975: 253). All this would indicate that the Maya of this region began to adopt the Teotihuacan culture, the influence of which is evident. On the other hand, the establishment of the impersonation ritual in the Mayan zone, which begins with Tikal, strongly points to having been imported by Teotihuacanos (López 2018). Within this controversy Yax Nuʔn ʔAhiin I king is directly inserted and with him, the possible establishment of a new Teotihuacana dynasty in Tikal: the discussion is still open.

International Perspectives

The dynamic system of the Maya Lowlands extended slowly from its core of the central area, Petén. After the period of Teotihuacana intervention, toward the end of the fourth century, the rate of expansion increased markedly. The new kingdoms, many already established since the Preclassic, occupied most of the productive lands of the Mayan area. They were extremely individualistic; they had their own pantheons of divinities and mythical history, inherited from the preclassical traditions. These political entities were the largest stable units that emerged during the six centuries of the Classic; however, due to the

constant conflicts, the Mayan territory was never unified under a single authority (Martin and Grube 2008: 18).

In this context, there were pervasive and enduring systems of "overkingship" that influenced almost all facets of the Classic panorama. This scheme agrees with a widespread practice in Mesoamerica and explains the overwhelming evidence of numerous small kingdoms with the great inequality observed in the size of their capitals (Martin and Grube 2008: 19).

Although Tikal was one of the most important political entities of the Classic, it was not the only one, since Dzibanché and Calakmul (cities ruled by the kings of the K'anuʔl lineage at different times) always disputed with Tikal the hegemony of the Mayan zone. These political entities were the main twin superpowers of the Mayan area and had a significant influence on the political relations of most of the cities in the area. These relationships were reflected through the various events that occurred throughout history, where wars, marriage alliances, rival factions, and allies abounded. But these relationships were generally not lasting and depended on various economic, political factors, family ties, etc. In this way, many political entities were allied with Tikal in one moment, but in another, with Calakmul and vice versa. This reflects the complex political landscape that the Maya lived throughout their history in the Classic.

Future Directions

The knowledge of Tikal and the Maya culture in general is due mainly to two great disciplines: epigraphy and archeology. However, in recent years, with the great advances of Maya hieroglyphic writing, epigraphy has stood out and greatly influenced the interpretation of the history of Tikal, sometimes even to the detriment of archeology. This has caused, at times, that both disciplines distance themselves and even face each other, with opposing postulates, as, for example, the one analyzed on the Teotihuacana influence. According to Guenter (2002) and Moholy-Nagy (2016), currently, the archaeological evidence of Tikal contradicts the supposed general decline that would have occurred during its longest hiatus (527 to 692, also known as the hiatus from 592 to 692), as well as the historical explanation of its cause, widely accepted by the Mayanists, which would indicate, according to the epigraphic texts, that it occurred due to the wars and the structural political instability that affected the Mayan zone, being Tikal one of its main protagonists. On the contrary, the archaeological evidence indicates that this period was a general period of material prosperity and cultural innovation (Guenter 2002: 96; Moholy-Nagy 2016: 255) and that the causes of the hiatus would have been internal (probably caused by fights between rival lineages of Tikal) and independent of the military defeats recorded in the texts (Moholy-Nagy 2016: 260, 262).

These contradictions between epigraphy and archeology must be evaluated together, to try to unify the discordant evidences that sometimes appear in both disciplines.

Cross-References

- ▶ Classic Maya Collapse: An Alternative View
- ▶ Maya Forest Garden
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mesoamerica in the Classical Period
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Mesoamerica: Complex Society Development
- ▶ Mundo Maya
- ▶ Teotihuacan: Geography and Culture
- ▶ The Maya

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References

Beliaev, D. & M. De León. 2013. Proyecto Atlas Epigráfico de Petén, Fase I. Informe Final No. 1. Temporada abril-mayo 2013. Report prepared for Instituto de Antropología e Historia de Guatemala.

Coggins, C. 1975. Painting and drawing styles at Tikal: An historical and iconographic reconstruction. Unpublished PhD dissertation, Harvard University.

Dashwood, R., D. Batty, and T. Cebula (directs.). 2018. War, in wall to wall media (products.) In *First civilizations*. Serie Documentary. Part 1. Warner Bross Television Production UK Company.

Demarest, A., and F. Fahsen. 2003. Nuevos datos e interpretaciones de los reinos occidentales del Clásico Tardío: Hacia una visión sintética de la historia Pasión/Usumacinta. In *XVI Simposio de Investigaciones Arqueológicas en Guatemala, 2002*, ed. J.P. Laporte, B. Arroyo, H. Escobedo, and H. Mejía, 160–176. Guatemala: Museo Nacional de Arqueología y Etnología.

Fahsen, F., J. Castellanos, J. Ortiz, and F. Luin. 2003. La Escalinata 2 de Dos Pilas, Petén: los nuevos escalones. In *XVI Simposio de Investigaciones Arqueológicas en Guatemala, 2002*, ed. J.P. Laporte, B. Arroyo, H. Escobedo, and H. Mejía, 687–700. Guatemala: Museo Nacional de Arqueología y Etnología.

Gómez, O. 2013. *Nuevos datos para la historia de Tikal*. Ciudad de Guatemala: Dirección General del Patrimonio Cultural y Natural.

Gómez, O., and M. Kováč. 2016. Las relaciones entre Tikal y Uaxactún. Investigaciones actuales. *Arqueología Mexicana* XXIII (137): 38–45.

Guenter, S. 2002. Under a falling star: The hiatus at Tikal. Unpublished Master's thesis, La Trobe University.

Harrison, P. 1999. *The lords of Tikal. Rulers of an ancient Maya city*. New York: Thames and Hudson.

Harrison, P. 2011. La arquitectura maya en Tikal, Guatemala. In *Los mayas. Una civilización milenaria*, ed. N. Grube, 219–231. Postdam: H.F. Ullmann.

Iglesias, M.J. 2003. Problematical deposits and the problem of interaction: The material culture of Tikal during the early classic period. In *The Maya and Teotihuacan. Reinterpreting early classic interaction*, ed. G.E. Braswell, 167–198. Austin: University of Texas Press.

Laporte, J.P., and V. Fialko. 1993. El Preclásico de Mundo Perdido: Algunos aportes sobre los orígenes de Tikal. In *Tikal y Uaxactún en el Preclásico*, ed. J.P. Laporte and J.A. Valdés, 9–38. México: Instituto de Investigaciones Antropológicas, UNAM.

Lentz, D., N. Dunning, and V. Scarborough. 2015. *Tikal. Paleoecology of an ancient Maya City*. Cambridge: Cambridge University Press.

López, M. 2018. Las personificaciones (*ʔub'aahil ʔaʔn*) de seres sobrenaturales entre los mayas de Tierras Bajas del Clásico. Unpublished PhD dissertation, Universidad Complutense de Madrid.

Martin, S. 2003. In line of the founder: A view of dynastic politics at Tikal. In *Tikal: Dynasties, foreigners, and affairs of state*, ed. J.A. Sabloff, 3–45. Santa Fe: School of American Research Advanced Seminar Series. School of American Research Press.

Martin, S., and N. Grube. 2008. *Chronicle of the Maya kings and queens: Deciphering the dynasties of the ancient Maya*. Londres: Thames and Hudson.

Moholy-Nagy, H. 2016. Set in stone: Hiatuses and dynastic politics at Tikal, Guatemala. *Ancient Mesoamerica* 27: 255–266.

Nondédéo, P., A. Lacadena, J. I. Cases, J. Hiquet, and D. Michelet. 2016. Teotihuacanos y mayas en la entrada de 11 Eb (378 d.C.): nuevos datos de Naachtún, Petén, Guatemala. Paper presented at the 21st European Maya Conference, "Hierarchy and Power in the Maya Worlds", Moscow, 21–22 October 2016.

Sharer, R. 1999. *La civilización maya*. México: Fondo de Cultura Económica.

Stuart, D. 2000. "The arrival of strangers". Teotihuacan and Tollan in classic Maya history. In *Mesoamerica's classic heritage. From Teotihuacan to the Aztecs*, ed. D. Carrasco, L. Jones, and S. Sessions, 465–513. Colorado: University Press of Colorado.

Stuart, D. 2013. Deciphering the Tikal Emblem Glyph. Available at: https://decipherment.wordpress.com/2013/11/08/deciphering-the-tikal-emblem-glyph/#comments. Accessed 22 Apr 2019.

Further Reading

Clancy, F. 1990. A genealogy for freestanding Maya monuments. In *Vision and revision in Maya studies*, ed. F. Clancy and P. Harrison, 21–32. Albuquerque: University of New Mexico Press.

Coe, W. 1988. *Tikal: guía de las antiguas ruinas mayas*. Guatemala: Centro Impresor Piedra Santa para la Asociación Tikal.

Jones, C., and L. Satterthwaite. 1982. In *The monuments and inscriptions of Tikal. The carved monuments*, Tikal reports no. 33 Part A, University Museum monograph 44, ed. W. Coe and W. Haviland. Philadelphia: The University Museum, University of Pennsylvania.

Schele, L., and D. Freidel. 1990. *A forest of kings: The untold story of the ancient Maya*. New York: William Morrow and Company, Inc.

Willey, Gordon R. 1974. The classic Maya hiatus: A rehearsal for the collapse? In *Mesoamerican archaeology: New approaches*, ed. N. Hammond, 417–430. Austin: Duckworth.

Time Since Death in Bioarchaeology and Human Osteology

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Introduction and Definition

Time since death (TSD) is defined as the time frame between death and discovery of an organism. When estimated in an archaeological context,

this time frame may be referred to as time since deposition and in a forensic context can be termed postmortem interval. Time since death cannot be established with certainty and for this reason is provided as an estimate of the range of time encompassing the period when death occurred. A shorter postmortem interval is typically associated with a narrower time range, while a longer postmortem interval has a broader time range and includes a wider margin of error. Presently, there is no single indicator which provides a reliable or accurate measure of the time since death of an organism.

Key Issues and Current Debates

Current Methods for Estimating Time Since Death

In a forensic investigation, the most reliable estimates of time since death are based upon observations and measurements made by a forensic pathologist during an autopsy. Physical and anatomical changes such as algor mortis (process of body cooling), rigor mortis (process of muscle stiffening), and livor mortis (gravitational blood settling) can be used for TSD estimation. In addition the analysis of the gastric contents and vitreous humor may also assist in estimating the time frame of death. Depending on the surrounding environmental conditions at the time of death, these indicators are often only applicable for the first few hours to days following death. During this period, the process of decomposition will commence, and the pathologist will use collective biochemical indicators such as autolysis, putrefaction, and liquefaction to assess the stage of decomposition and thus approximate time since death.

The process of decomposition will attract insects to the remains if the body is in an accessible location. The life cycle of insects can also be used to estimate time since death through the discipline of forensic entomology. The TSD estimate may span days, weeks, or months but becomes limited once insect activity has ceased. Forensic entomologists typically use alternative terminology to denote the stages of decomposition which includes fresh, bloat, active decay, advanced decay, and dry/remains or skeletonization. Until the point of skeletonization, both the forensic pathologist and entomologist rely on the biochemical degradation of soft tissue to assist with the estimation of a minimum TSD.

Effect of Decomposition on the Estimation of Time Since Death

Once soft tissue has completely decomposed and the remains are partially or completely skeletonized with only hard tissue (i.e., bone) remaining, the estimation of TSD becomes increasingly difficult, with longer estimation windows and larger uncertainties. When analyzing evidence that is very old, the archaeologist or anthropologist must interpret how the condition of the remains at the time of discovery has varied since the time of deposition. This requires an understanding of decay rates and the taphonomic processes which can act on the remains over time.

Nawrocki (1995) identifies three major classes of taphonomic processes when dealing with human remains recovered from a historical period: environmental, individual, and cultural factors. Environmental factors (e.g., temperature) are external variables which can act on the remains and are specific to the geographical region and microenvironment in which the process of decay occurred. Individual factors (e.g., body weight) originate with the deceased person and can also contribute to the decomposition process. Cultural factors (e.g., embalming) relate to the mortuary activities following one's death. Most of the time, these classes are mutually exclusive; however, certain factors may be classified under more than one class.

Environmental factors can be further divided into biotic and abiotic factors (Nawrocki 1995). A biotic factor refers to any living component that acts on another organism. Biotic factors which can act on soft and hard tissues are numerous and include scavenging and chewing by carnivorous animals, dispersal and fracturing by burrowing animals, tunneling by plant roots, and microbiological degradation by bacteria and fungi. Abiotic

factors are the nonliving components which act on the organism such as temperature, moisture, light, wind, altitude, and soil pH (Ubelaker 1997).

There are many factors specific to an individual which cause variation in bone decomposition and subsequently hinder the estimation of time since death. Different bones within the body, and even different areas of the same bone, will show variation across an individual. Some bones will be dense (cortical), while other bones will be spongy (trabecular) yielding a larger surface area per volume of bone which is subjected to degradation. As a result, cortical bone tends to resist degradation better than trabecular bone. Additional factors which may affect the degree of skeletal degradation or preservation include antemortem disease, perimortem trauma, and body size differences resulting from age and gender (Nawrocki 1995).

Cultural factors are unique to humans and can include the preparation of the individual following death, burial below ground or in vaults or tombs, or cremation of the remains. The process of burial in a coffin can enhance soft and hard tissue preservation. Burial is known to slow the rate of decomposition when compared to remains left on the soil surface (Forbes 2008). Reduced decomposition is predominantly the result of restricted access to vertebrate and invertebrate activity; however, the coffin can also act as a barrier, thus protecting the bone from the impact of surrounding soil and vegetation. Since animal carcasses on the surface are often rapidly scavenged, scattered, and dispersed, only buried remains typically become part of the archaeological record. The act of burial may improve the estimation of time since death by preserving the skeletal material but, in doing so, also makes the study of human remains considerably more complex.

Behrensmeyer's (1978) stages of bone weathering represent one of the more commonly utilized methods for estimating time since deposition of bone. During research investigating mammal bones in the Amboseli Basin of southern Kenya, Behrensmeyer identified six stages of bone weathering. This model has been used to better understand and reconstruct the archaeological record of animal remains. While not commonly employed in a forensic context, the model can assist in differentiating weathering effects on bone from perimortem trauma (Ubelaker 1997).

Effect of Preservation on the Estimation of Time Since Death

Preservation of human remains as a result of natural or cultural processes can reduce the accuracy of time since death estimations if not accounted for. Natural preservation of soft tissue can result from desiccation (rapid drying), freezing and sublimation (freeze drying), adipocere formation, and fixation by tannic acids (Sledzik and Micozzi 1997). Cultural preservation may involve elaborate methods for preserving both soft and hard tissue or may simply involve the injection of chemicals for embalming and funeral purposes. In the archaeological record, one or more of these factors can act on the body over time, and it is not uncommon for archaeological human remains to be mistaken for forensically significant remains when first discovered due to their excellent preservation.

The processes of desiccation and sublimation rely on the rapid loss of moisture. Desiccation results from the drying out of soft tissue in hot, dry climatological regions and can affect the entire body or specific areas of the body depending on the degree of exposure. Mummification is the product of desiccation which restricts postmortem decomposition and promotes preservation of both soft and hard tissue. Climates conducive to mummification have been found in South America (e.g., Chile and Peru), southwestern USA, the desert regions of Africa, and the outback of Australia (Sledzik and Micozzi 1997). Mummification can also occur in enclosed environments, and an understanding of this process is important in forensic investigations when estimating time since death. Mummification of recently deceased remains can occur in apartments or houses whereby the continuous heating during winter months produces a hot, dry internal environment.

Sublimation is typically observed in cold or freezing environments and results from the transformation of frozen water to a gaseous phase in soft tissue coupled with the inhibition of

decomposer organisms. Regions conducive to natural sublimation include the Arctic and Antarctic circles as well as cold, high-altitude environments. One of the best known natural mummies of the world, "Ötzi – the Iceman," was discovered in a cold, dry environment in the Ötztal Alps along the Italian-Austrian border (Fleckinger 2010). The excellent preservation of soft tissue allowed for the dating of his remains, demonstrating that he is among the oldest, and most well-preserved, natural mummies ever discovered. Dating remains of archaeological significance is readily achieved as typically only an approximate estimation is required (±100 years). On occasion, forensically significant remains are discovered in cold or freezing environments, demonstrating a "fresh" appearance which contradicts their true postmortem interval. However, it is unlikely that sublimation would occur in a forensic context, simply due to the length of time required for the process to be complete (Sledzik and Micozzi 1997).

Adipocere formation is a commonly encountered phenomenon in wet environments; however, its formation is not restricted to waterlogged locations (Forbes 2008). Adipocere results from the chemical degradation of adipose tissue to produce a solid, stable product comprising predominantly saturated fatty acids. Adipocere formation is associated with the inhibition of decay, and as a result adipocere-laden corpses are resistant to decomposition. Adipocere can form over the entire body or can be restricted to specific parts of the body depending on the amount and translocation of neutral fats within an individual. Similar to other types of natural preservation, its preserving effects can aid the recovery of soft tissue in the archaeological record, but can complicate the estimation of time since death in a forensic investigation. Adipocere formation can be valuable for suggesting a minimum amount of time since decomposition and can also provide information about the depositional environment (Forbes 2008).

Peat bogs represent an alternative preservation environment often encountered in the archaeological record. Both human and animal remains have been discovered in wetland peat deposits, demonstrating varying degrees of preservation and a range of trauma and pathology (Brothwell and Gill-Robinson 2002). Preservation is thought to result from the action of humic acids and the reduced aerobic and bacterial nature of bogs. To date, more than 2,000 finds have been recorded with the majority of bodies discovered across Northern Europe. Estimating the time of deposition for bog bodies is achieved using radiocarbon dating so as to place the remains in a particular time sequence or era. Many of the recovered bodies have been dated between 800 BCE and 100 CE, and there still remains considerable debate about the reason for their deposition. More recently deceased victims are occasionally discovered in peat bogs; however, they rarely display the same level of preservation as historical discoveries.

Future Directions

Research over the past century has focused on improving the accuracy of time since death estimations. Thanatochemistry is a term commonly used in forensic pathology to describe the postmortem chemical processes which occur in the body. Studies in this area have focused on chemical, biochemical, biological, and microbiological methods for accurately determining the time of death. Forensic entomology has also emerged as an acceptable method for estimating TSD. However, there are still errors associated with this method due to the lack of well-established databases and the fact that the attraction mechanism of insects to the body is still unknown. The combination of a range of these methodologies is currently the most accurately available to the field of forensic science.

A range of alternative methods have been investigated to assist with estimating time since death in forensic investigations. A large focus has been placed on developing semiquantitative methods of estimating TSD, rather than observations of decay. Several scoring systems based on the physical changes have been developed. These include empirical formulas such as the universal formulas developed by Vass (2011) and total body

scoring (TBS) systems such as that developed by Megyesi et al. (2005). TBS divides the body into three regions (head, trunk, and limbs), and the visual decomposition changes are scored according to a rubric for each region. Both the universal formulas and TBS provide good estimations of TSD in the geographical region where they were created; however, when they are attempted in different geographical regions, they often over- or underestimate the TSD (Cockle and Bell 2015). One trend that is becoming norm for time since death investigations is the use of accumulated degree days (ADD) to compensate for temperature differences during different seasons or climates. ADD is the cumulative total of the average daily temperatures that the body has been exposed to over time and has been found to explain much of the variation in decomposition observed between different bodies (Megyesi et al. 2005).

Decomposition chemistry represents a variation of the field of thanatochemistry whereby studies focus on the chemical and biochemical degradation of soft tissue across the entire decomposition period. Studies have investigated the use of a variety of chemical classes such as volatile-, short-, and long-chain fatty acids, amino acids, nitrogen, and other decomposition by-products for estimating time since death. All have shown some potential as indictors for TSD over extended postmortem periods. A recently emerging area of interest in decomposition chemistry is the analysis of volatile organic compounds (VOCs) or the scent of death as it is colloquially referred to. These scent molecules can be collected from the soil surrounding the remains (Perrault et al. 2014), from clothing (Nizio et al. 2017), or from the headspace above the remains (Dekeirsschieter et al. 2012) and are used to class the different stages of decomposition that can then be related to TSD.

However, in the field of archaeology, methods based on soft tissue analysis are rarely useful as only skeletal elements are typically recovered. The majority of research in this area has thus focused on improving the methods used for dating anthropological skeletal remains. A range of morphological, chemical, immunological, and radiological studies have been conducted over the past century (Forbes and Nugent 2016). Morphological studies investigated physical characteristics such as bone density, specific gravity, and weight, while the chemical and immunological studies focused on organic components of bone, bone extracts, and bone diagenesis. The major challenge in all of these studies was an inability to account for the effect of taphonomic processes on bone degradation.

One of the more promising areas of investigation has been the use of radioactive isotopes to date archaeological and forensic bone samples. Radiocarbon (^{14}C) dating is commonly employed for dating historical and archaeological material, including human and animal remains. More recently, radiocarbon dating with reference to the modern bomb curve has been employed to determine the date of birth and death of recently skeletonized human remains (Ubelaker et al. 2006). The method uses the "bomb pulse" produced in the atmosphere between 1950 and 1963 as a result of extensive nuclear weapons testing. The temporal decay of radiocarbon in cortical and trabecular bone has been successfully employed on adults of known birth and death dates, demonstrating the value of this method for estimating time since death of forensically relevant skeletal remains (Ubelaker et al. 2006, 2015).

Cross-References

- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology

References

Behrensmeyer, A.K. 1978. Taphonomic and ecologic information from bone weathering. *Paleobiology* 4: 150–162.

Brothwell, D., and H. Gill-Robinson. 2002. Taphonomic and forensic aspects of bog bodies. In *Advances in*

forensic taphonomy: Method, theory, and archaeological perspectives, ed. W.D. Haglund and M.H. Sorg, 119–132. Boca Raton: CRC Press.

Cockle, D.L., and L.S. Bell. 2015. Human decomposition and the reliability of a 'Universal' model for post mortem interval estimations. *Forensic Science International* 253: 136.e131–136.e139.

Dekeirsschieter, J., P.-H. Stefanuto, C. Brasseur, E. Haubruge, and J.-F. Focant. 2012. Enhanced characterization of the smell of death by comprehensive two-dimensional gas chromatography-time-of-flight mass spectrometry (GCxGC-TOFMS). *PLoS One* 7: e39005.

Fleckinger, A. 2010. People from the ice. In *Mummies of the world*, ed. A. Wieczorek and W. Rosendahl, 42–59. Munich: Prestel Verlag.

Forbes, S.L. 2008. Decomposition chemistry in a burial environment. In *Soil analysis in forensic taphonomy: Chemical and biological effects of buried human remains*, ed. M. Tibbett and D.O. Carter, 203–224. Boca Raton: CRC Press.

Forbes, S.L., and K. Nugent. 2016. Dating of anthropological skeletal remains of forensic interest. In *Handbook of forensic anthropology and archaeology*, ed. S. Blau and D. Ubelaker, 2nd ed., 213–225. New York: Taylor and Francis.

Megyesi, M.S., S.P. Nawrocki, and N.H. Haskell. 2005. Using accumulated degree-days to estimate the post-mortem interval from decomposed human remains. *Journal of Forensic Sciences* 50 (3): 1–9.

Nawrocki, S.P. 1995. Taphonomic processes in historic cemeteries. In *Bodies of evidence: Reconstructing history through skeletal analysis*, ed. A.L. Grauer, 49–66. New York: Wiley-Liss.

Nizio, K.D., M. Ueland, B.H. Stuart, and S.L. Forbes. 2017. The analysis of textiles associated with decomposing remains as a natural training aid for cadaver-detection dogs. *Forensic Chemistry* 5: 33–45.

Perrault, K.A., B.H. Stuart, and S.L. Forbes. 2014. A longitudinal study of decomposition odour in soil using sorbent tubes and solid phase microextraction. *Chromatography* 1: 120–140.

Sledzik, P.S., and M.S. Micozzi. 1997. Autopsied, embalmed, and preserved human remains: Distinguishing features in forensic and historic contexts. In *Forensic taphonomy: The postmortem fate of human remains*, ed. W.D. Haglund and M.H. Sorg, 77–90. Boca Raton: CRC Press.

Ubelaker, D.H. 1997. Taphonomic applications in forensic anthropology. In *Forensic taphonomy: The postmortem fate of human remains*, ed. W.D. Haglund and M.H. Sorg, 77–90. Boca Raton: CRC Press.

Ubelaker, D.H., B.A. Buchholz, and J.E. Stewart. 2006. Analysis of artificial radiocarbon in different skeletal and dental tissue types to evaluate date of death. *Journal of Forensic Sciences* 51: 484–488.

Ubelaker, D.H., C. Thomas, and J.E. Olson. 2015. The impact of age at death on the lag time of radiocarbon values in human bone. *Forensic Science International* 251: 56–60.

Vass, A.A. 2011. The elusive universal post-mortem interval formula. *Forensic Science International* 204: 34–40.

Further Reading

Blau, S., and D. Ubelaker, eds. 2009. *Handbook of forensic anthropology and archaeology*. Walnut Creek: Left Coast Press.

Goff, M.L. 2009. Early post-mortem changes and stages of decomposition in exposed cadavers. *Experimental and Applied Acarology* 49: 21–36.

Haglund, W.D., and M.H. Sorg. 1997. *Advances in forensic taphonomy: Method, theory, and archaeological perspectives*. Boca Raton: CRC Press.

Hunter, J., C. Roberts, and A. Martin. 1997. *Studies in crime: An introduction to forensic archaeology*. London: Routledge. Reprint.

Tibbett, M., and D.O. Carter. 2008. *Soil analysis in forensic taphonomy: Chemical and biological effects of buried human remains*. Boca Raton: CRC Press.

Wieczorek, A., and W. Rosendahl. 2010. *Mummies of the world*. Munich: Prestel Verlag.

Tiwanaku, Geography and Culture of

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History

The site of Tiwanaku was known by human groups that occupied the Andean Highlands after the fall of that culture to 1150 AD. The Incas understood this as a sacred place created by the gods and built myths about its creation.

The famous ruins of Tiwanaku were known to the Western world after the Spanish invasion of American territory. The chronicler Pedro Cieza de León, who visited them around 1549, was showing curiosity towards the ruins and to know who had left them, assuming that they had been the Incas, something that the natives were quick to deny (Cieza s/d: 458).

After Cieza many other Spaniards referred to Tiwanaku in their writings. To 1605 frier

Reginaldo de Lizárraga writes that "almost no curious man goes through the Desaguadero [River] who does not go to see the old buildings of carved stone of Tiwanaku" (Lizárraga 1909).

In fact, thousands of people visited Tiwanaku moved by curiosity and set in providing it with magic or extra continental origin.

These strange ideas multiplied even during the Republican era (of Bolivia). The US diplomat George Squier, for example, found kinship between Tiwanaku and the distant ruins of Baalbec, and Stonehenge (Squier 1974: 147–162).

During the nineteenth century, travelers came to Tiwanaku of very different trades, such as Artists, geologists, naturalists, diplomats that could not avoid drawing, describing, and in some cases, interpreting the ancient ruins.

Several of these travelers formed important archaeological collections that they took to their countries of origin. Among these explorers, figures like d'Orbigny, Rugendas, Castelnau, Tschudi, Markham, Squier, Mitre, Wiener, Ber, Nadaillac, Middendorf, and several others stand out (Ponce 1995). Unfortunately, many were limited to interpreting Tiwanaku based on the stone buildings, nothing else. This led them to think that Tiwanaku was only a Ceremonial Center (e.g., Squier 1974). That idea was kept by Bennett (1956), Alden Mason, and several other researchers, particularly Americans, well into the twentieth century (Figs. 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10).

But turning back, it is convenient to refer to the expedition that starred French Alcides d'Orbigny, who in 1833 spent 2 days in Tiwanaku. He recognized three monuments: Kalasasaya, Akapana, and Pumapunku. At that moment, Kalasasaya was partially covered by earth, from which only the stone pillars protruded, which we now know kept the smaller ashlars. He drew Pumapunku floor plan and believed this building to be the Council room. He concentrated his efforts towards describing the sculpture which is known as the "Gateway of the Sun" which at the time was dropped and split into two, pointing out that it is observed "an all-powerful King whose two scepters that symbolize both religious and political power." He thought he saw in that character, the representation of the Sun, whose worship belongs, instead to the Incas, although he thought that Tiwanaku "is indeed the cradle of the civilization of the Incas and the cult of the Sun" (D'Orbigny 2002: 1682). Perhaps it is due to that this door frame is called "of the Sun."

For this researcher, "the first religious and monarchical Government was born in the heart of this society" (D'Orbigny 2002: 1688).

Tiwanaku, Geography and Culture of, Fig. 1 Conservation at Akapana Pyramid

Tiwanaku, Geography and Culture of, Fig. 2 Restored Kalasasaya

Tiwanaku, Geography and Culture of, Fig. 3 Restored semi subterranean Temple

At the same time have other, almost anecdotal writings, such as that of Francisco de la Porte, count of Castelnau, who was in Tiwanaku up to 1845. Like most men from his time, this Frenchman believed that the civilization that built Tiwanaku disappeared without a trace and it had nothing to do with the "stupid race inhabiting this country today" (Sagárnaga 2003: 294).

George Squier was a US diplomat whose professional work brought him to South America in 1863. In June of 1864, he stayed a week in Tiwanaku. In his writings, he called it "The Baalbec from the new world" and believed it to be a "uninhabited ceremonial center," in other words "a shrine or sacred place, whose position was determined, by a wish or a dream." His

Tiwanaku, Geography and Culture of, Fig. 4 Conservation at Kantatayita

statements, as we shall see, found echo in other North American researchers like Bennett and Mason but were later refuted by Lanning, Ponce, Browman, and researchers of the Wilajawira Project.

Between the end of nineteenth century and the first third of the twentieth century, four personalities stand out in the investigation referred to Tiwanaku. Ponce called them "pioneers archaeologists" (Ponce 1995).

The German Max Uhle (1856–1944) was one of the most prominent pioneers. Even before knowing Tiwanaku, he wrote a thick volume that was co-authored with Stubel (Stübel and Uhle 1892). In this book called *Akapana to Kalasasaya*, confusing both buildings. Anyway, and this is apparent, he notes that toponymy is not old, but actually recent. Noting that Kalasasaya seemed only an alignment of standing stones, noticing the similarity with Stonehenge in Salisbury (England). He was wrong, as we will see later. He attributed it the function of temple.

Speaking of Akapana, he thought that it was a simple natural Hill. In this assumption, he committed an error of interpretation. He tersely speaks about Pumapunku, pointing out that it is a natural Hill, cut in such a way that served as the basis for another old building.

Tiwanaku, Geography and Culture of, Fig. 5 Sculpture of Pukara style, founded in Tiwanaku

Tiwanaku, Geography and Culture of, Fig. 6 Pre-classic incensary (III of Ponce)

Tiwanaku, Geography and Culture of, Fig. 8 Polychrome textile, from Pulacayo

Tiwanaku, Geography and Culture of, Fig. 7 Classic clay jar, from Pariti

All that Uhle wrote, he did so without having never visited Tiwanaku. Just 2 years later, in April 1894, and due to the criticism of contemporary researchers, he arrives at Tiwanaku and remains in Bolivia 2 years researching this and other sites (Ponce 1995).

Then another scholar, Posnansky, had published a guide to Tiwanaku, which Uhle criticized gaining an enemy with whom he argued with at great length. Uhle surmised that the roots of Tiwanaku were in the ancient Maya empire, something that today has no support. He also said that Tiwanaku had a single time period, and it unfolded between 500 and 800 of our time. In any case, he said that a culture was pre-Inca. He thought that the Tiwanaku culture spoke aymaran, notion that several scholars agreed with, including Ponce. He correctly pointed out that Tiwanaku had expanded to the Pacific coast. In one of his writings mentioned the "ancient Tiwanaku Empire" (Ponce 1995).

As it was the "fashion" at the time, Uhle brought back to Germany an important archaeological collection, which meant a significant loss of cultural heritage for Bolivia.

For his part, Adolph Bandelier (1840–1914), of Swiss birth and American citizen, was an empirical archaeologist. He came to Bolivia in an effort to study the pre-Hispanic culture. From 29 August 1894, he was in Tiwanaku 19 days, limiting himself to make a reconnaissance of the ruins of Tiwanaku. A Government provision forbade him to execute archaeological excavations there as he intended. It proceeded, then, to collect archaeological objects acquiring them by stealing them from farmers at night, according to his own confessions.

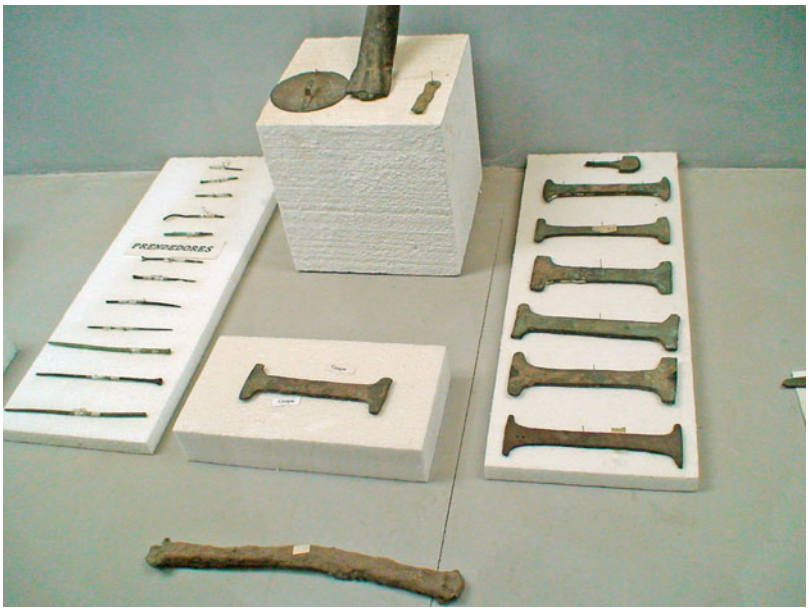

Tiwanaku, Geography and Culture of, Fig. 9 Copper-arsenic cramps to join large stone blocks (Museum of Tiwanaku)

Tiwanaku, Geography and Culture of, Fig. 10 Basketry from Pulacayo

Then he did an about-turn and went to the Copacabana peninsula and the Lake Titicaca islands, where he stayed 5 months in 1895 carrying out research and archaeological excavations (Sagárnaga 2013).

Bandelier argued that Tiwanaku was an ancient human settlement, a village where dwelt a "tribe." The "Tribal" perception was inherited from his teacher Lewis Morgan (Sagárnaga 2013). He also said that it housed about 6000 inhabitants, although not indications about how he made his calculations were recorded.

Among the more important monuments in Tiwanaku, Akapana clearly stood out. He considered it – same as Uhle – a natural eminence. Also he considered Pumapunku as a hill, a mistaken appreciation. He is the first author who mentions the name "Kalasasaya," although somewhat wrong in his spelling designates it "Kalisasaya." Does not support names that was popularly attached then, as the Court of Justice, strength, etc. He drew a site plan from the ruins, which he left unreleased and unaccounted for.

Possibly his most important contribution is to have identified that the area was divided into two.

He thought, moreover, that this dualistic organization could be traced back to pre-Hispanic periods and that it could have lasted until now, which is later evidenced more clearly (Sagárnaga 2008).

The third pioneer to which we will refer was the Swedish Erland Nordenskiöld (1877–1932), who conducted six expeditions to American lands. During the third of which (1904–1905) he probably visited Tiwanaku. The greatest merit of this researcher consists in having recovered evidence of the expansion of the Tiwanaku culture, both towards the North in Keara (canton Pelechuco) to more than 200 km and towards the Southeast in Mizque, Caballero, and Saipina, of the states of Cochabamba and Santa Cruz, to more than 390 km outside the capital of that social formation.

The fourth character of this group is Arthur Posnansky (1873–1946). Born in Austria, he became a Bolivian national, he lived until his last days in the Andean country and devoted his life to the study of Tiwanaku. He was a naval engineer and became a self-taught archaeologist.

He conceptualized Tiwanaku as a cultural seed for America based on the diffusion of the staggered sign as a religious symbol. It also believed that Tiwanaku was a Lake port; that there existed a class division based on caste: the superior caste (kolla) and the lower caste (arawak); and that its age was between 10 and 13,000. He also established a sequence of three periods for the Tiwanaku culture. He also pointed out that the tiwanaku had knowledge of accurate calendars. Although many of his theories have already been refuted, science should not only thank him for the valuable drawings that he left us but also for having taken the first steps in the systematic study of our pre-Columbian past and have it disseminated as few have before him (Sagárnaga 2003).

Following the sequence proposed by Ponce Sanginés (Ponce 1995), this stage is followed by what he would call "excavators in small scale and collectors."

Before anything else, we must refer to the French scientific mission G. de Créqui-Montfort and E. Sénéchal de la Grange. Between its members you find the geologist Georges Courty who, in an almost casual way, excavated in Tiwanaku between 1903 and 1904, taking to France a significant archaeological collection which caused a formal complaint from the Bolivian Government. Among the publications of the mission which were announced, you find the article "Fouilles archéologiques to Tiwanaku" by Courty and Mortillet. However, for reasons that are unknown, it was never printed (Ponce 1995). It is likely that it had never been drafted. Also Courty's field notes were lost and the only thing that was published was a short article whose author is Créqui-Montfort.

According to Ponce, the work that the French made was deplorable and even devastating, as evidenced by the serious damage that was caused to the "cabezas clavas" (ornaments) encased in the walls of the small semi subterranean Temple, chipping them without any consideration. The Brooklyn Museum has published 61 photographs from photographer Sintich resident in La Paz and hired by the Mission (http://www.brooklynmuseum.org/opencollection/archives/mission_scientifique_fran%C3%A7aise_en_am%C3%A9rique_du_sud__travaux_et_fouilles_de_tiahuanaco_1903). It is the most important document which remains of the French intervention in Tiwanaku.

The first thing done was to open a trench from the north to the south transversal to the Akapana pyramid from the visible base. He found parts of a Grand canal. From the photographs, it can be established that they were deficient excavations.

Close to the railway line which goes to Guaqui, a collapsed stone stele was coincidentally found. Digging there, two other steles were found. Which were probably inside an enclosure that was not clearly visible.

Ponce then inferred from these photographs (Ponce 1995) that Courty excavated the small semi-subterranean Temple, which by then was covered by sediment. He dug a trench along the four retaining walls. It seems that his sole purpose was to extract the cabezas clavas which were embedded in the walls, and did not have the care needed to maintain the structural integrity of these walls. Luckily, due to lack of time, he did not dig inside this small temple.

With regard to Kalasasaya, he discovered the main access stairway of towards the East and he excavated partially using a trench. It is also inferred that he practiced more excavations in another building of Tiwanaku: Putuni. Through the pictures, we can infer that after the excavations of Courty, a noticeable amount of vandalism occurred, probably from the local population, which caused great destruction, given to the fact that today the structures, whose images were a unique witness of their former existence, no longer exist.

Without any real evidence, Courty proposed a Mayan origin to Tiwanaku (Ponce 1995), most likely agreeing with Uhle. He also had no scientific basis for the comparison he did between Kalasasaya and the Crucuno Dolmen (in France).

Guaqui – La Paz (1902–1903) railroad construction made the ruins into a quarry, which contributed to an even greater material degradation of the remains of Tiwanaku. The intellectuals of the era, such as Camacho, protested against such acts.

The Bolivian Belisario Díaz Romero (1870–1940) was a physician by profession and one of the main exponents of the Darwinian current in Bolivia, visited Tiwanaku towards 1897, and dared to say that it had been founded as a colony by White men and Aryan lineage from the enigmatic Atlantis (Ponce 1995). His writings only have anecdotal value.

The Congress of Americanists in Buenos Aires was held in 1910. Attendees received an invitation from the Bolivian Government to visit Tiwanaku. Thus, a group of scholars were cited in the ruins. Among them was the Argentinian Salvador Debenedetti, German Max Uhle, Lehmann-Nitsche, Posnansky, the outstanding intellectual Manuel Vicente Ballivián, and several others, including former President José Manuel Pando. It is known that Max Uhle, who had visited Tiwanaku 16 years ago, was upset by the ruins that were in worse condition. In any case Debenedetti biographers have pointed out that of all the South American cultures of the Andes, the one which attracted his spirit the most was that of Tiwanaku. Surely its ruins excited him.

Continuing with the story, Julius Nestler, Professor at a high school in Prague, was also interested in Tiwanaku and got assigned as the Austro-Hungarian consul in Bolivia. In this country he amassed a collection of 3644 specimens, most from Tiwanaku, which are now exhibited in Prague in the Naprstek Museum.

Among the things that archaeologists would like to forget are excavations of Otto Buchtien, who was hired by the Bolivian Government as Director of the National Museum and whose specialty was Botany. Without any knowledge of archaeology, he decided to dig in Tiwanaku in 1913 for a period of 8 weeks, his intervention resulted direr than Courty's excavation, because less data are available from this excavation. Among them is featuring a report signed by M.V. Ballivián, then director of the office of statistics and geographical studies, where it is written: "the archeological section's collection has grown thanks to the excavations realized by the director and Assistant to the Museum, which were done in the ruins of Tiwanaku, with specific instructions to carry out such works. Funds have been provided by the Ministry of public instruction and agriculture. The results of the excavations to which we have referred, have been the most satisfying, many hundreds of perfectly preserved pieces of pottery have been found; numerous skulls, bone tools and objects made of stone have been extracted. With these quotas the National Museum currently owns a complete collection and can be considered as the most notable of the world" (Ponce 1995).

Unfortunately, is not written who did the excavations or where they were done during the 8 weeks it lasted, though you can guess is that it was in the vicinity of the current cemetery.

Otto von Buchwald in his article published in Quito in 1918 defended the position that Tiwanaku was an empire consisting of the aymaras and that if you observed its remains "it is understood that only a strong and solid monarchy could have produced similar advances." It also advocated the origin of the inkas was in Tiwanaku (Ponce 1995). So in these few lines we can see three elements of discussion: was Tiwanaku an Empire? Was it composed by the

aymaras? Did Tiwanaku give origin to the Incas? Will address these questions one at a time.

The Bolivian José María Camacho was a lawyer, political leader of the liberal party, landowner, and historian (Ponce 1995). Apparently he was the first to refer to Kantatayita, which in his opinion was just a quadrangular enclosure. Curiously not mentioned was the lintel which was in the center of the area and whose image was already published by Squier.

With respect to Kalasasaya, he rejects the role of temple, but he was inclined to believe that the wall structure was formed by pillars under the guise of buttresses and by dry blocks in even intervals. He is most successful in his appreciation of Akapana, which was defined as an artificial mound, with a succession of terraces that were made at different heights with their own retaining walls. In terms of Pumapunku, it was judged that it could be a temple or Palace of Justice, with regards to Putuni, noting that the entrance was a staircase of only three steps, aiming to "rebuilding it wouldn't be impossible work for patient and knowledgeable observers." In relation to the small semi-subterranean temple, his opinion is completely wrong because thought that it housed galleries. Lastly, he saw Tiwanaku as a "sacred capital" (Ponce 1995).

Although in 1838 a public museum was created in La Paz under the leadership of the Bishop from La Paz José Manuel Indaburu, it was in 1919 that it was authorized under Executive power to rent the building known as the "Tiwanaku Palace" which was owned by Arthur Posnansky, from whom the building was bought, and Posnansky was appointed as the first Director.

Various personalities followed in office, among them Maks Portugal Zamora who made important contribution to Bolivian archaeology.

We arrive to 1932, and we have a unique character. Wendell Clark Bennett (1905–1953) was the most serious exponent in the first half of the twentieth century to try and trace a cultural sequence based on the ceramic pieces from Tiwanaku. In 1927 he receives his title from the University of Chicago and he obtained his master's degree in 1929 and his Ph.D. in 1930. He accepted a position at the American Museum of Natural History in New York in 1932 to head the department of Andean archaeology and remained in office until 1938. Then he moved to the University of Madison as an associate professor of anthropology. In 1940 he entered Yale University, also as associate professor, he was named professor in 1945 and became head of the Department of Archaeology in 1949, where he remained until his death in an unfortunate accident.

That year (1932), Bennett approached the Bolivian High Plateau and from June 15 to July 10 he undertook small scale excavations in Tiwanaku. He was authorized to realize 16 units of excavation each of which had to be 10 m^2. Actually he carried out only a dozen of these excavations, whose total area reached 120 m^2. It was agreed that valuable exhumed objects would then be handed over to the National Museum, but that duplicates would be taken by him in his capacity as member of the American Museum to which he belonged, something that was inconvenient for Bolivia. A Supreme resolution was issued in July of 1932, by which it was authorized to export archaeological findings on loan for a year to the Museum where Bennett worked, only referring to the relevant inventory. The return was never carried out and Bennett broke this agreement.

The methodology adopted for small-scale excavation by Bennett in Tiwanaku followed the imposed criteria of arbitrary levels, each 0.5 m deep and not subject to natural stratification or separation of the sediments by individual layers. These arbitrarily thick levels obviously cut more than one stratum and materials of different stages in the cultural succession were then mixed together which led to a state of confusion; it can be said that this did not allow a more refined identification of the pieces.

Bennett proceeded to the open 10 units of excavation or pits as he called them, whose main characteristics are resumed here. The first is located at 420.3 m from the railway station and following the Railroad, next to the modern cemetery of Tiwanaku, with an area of 5 × 2 m, and a depth of 2.50 m, and he discovered a layer of ash and coal that corresponded to a stratum that is normally found at a depth of 1.50 m. The second,

on the embankment of Kalasasaya, 38 m from the southwest corner, with an area of 3.3 × 3 m, with a maximum depth of 3.50 m. Their field observations were inadequate, since he found some rubble belonging to a building at the top, as well as having located the high stratum of the embankment, but he failed to interpret it. If he had dug more carefully, he would have discovered the strata corresponding to I and II eras of Tiwanaku (described by Ponce), an inexcusable omission. The third was excavated 245 m Northwest of Kalasasaya, with an area of 3 × 3.30 m, which finished with a depth of 1 m. He did not publish the case section. The fourth is located almost opposite to the first, separated by the railway, 15 m from it, with an area 3 × 3.30 m, which reached a depth of 3 m. It can be deduced that at 1 m he found traces of the Foundation of a building. The fifth pit is located near Kantatayita and 126 m east of Akapana, with an area of 3 × 3.3 m and a depth of 4.5 m. He found at least two locations, with remains of some buildings and almost at the bottom a floor with domestic remains. Pit 6 East of Pumapunku produced no significant results. The seventh pit was opened in the small semi-subterranean temple and resulted in the discovery of the 10th Stela, where it became necessary to expand the excavation to an area of 4 × 2.5 m in order to fully reveal the wonderful sculpture, a certainly sensational finding and that was subsequently appointed the Bennett monolith, in homage to the archaeologist. The aforementioned researcher confused the filling of the temple with its date of construction, as it was later determined by the excavation carried out by Tiwanaku Archaeological Research Center on the precise spot that was just mentioned, as well as the stele whose main face is aimed towards the south, towards Akapana. The 8th pit is located south of Putuni and 112.7 m southwest of the southwest corner of balcony wall or Chunchukala of Kalasasaya. There was a foundation of wall that Bennett assumed was a channel, with two parallel stone blocks but devoid of a background, associated with an occupational layer that had abundant pottery, with an area of 3 × 3.3 m and a depth of 2.50 m. Below, it is likely that there were domestic remains. The ninth pit is located next to the train station and the tenth in the modern cemetery, but neither offered new information (Bennett 1956).

As noteworthy results, it can be mentioned that Bennett obtained approximately 14,500 fragments in their excavations, of which 69.78% were smooth pots, 22.24% were painted, and the remaining 7.98% were miscellaneous, with noticeable predominance of functional pottery. As far as ceramic morphology is concerned, he stressed the preponderance of five forms, two of them unrestricted – the cup and the Bowl – the censer with annular base and double-sided handle, the basin, and a vase with an ovoid body and a neck. He established a cultural sequence with three epochs: ancient, classical, and in decay. He pointed out that the difference between the classic and decadent was only stylistic.

Bennett led the explanation that Tiwanaku was just a ceremonial center, controlled by a powerful religious organization. That was built at intervals and not in a continuous fashion, and many of the buildings were never completed. In his view, it was primarily composed by four major architectural structural units: Akapana, Kalasasaya, Pumapunku, and Putuni. He thought that it welcomed pilgrimages, with human masses who flocked in certain seasons of the year to contribute with offerings of work or by transporting building materials. The art, he considered symbolic and formal. Bennett only managed to distinguish the visible buildings and not the adobe buildings underground, covering a much larger expansion. Neither could he understand the urban layout that had a residential portion. His statement about the expansion thanks to the indoctrination of religious missionaries would have an impact in the sense that the phenomenon would be reflected in intrusive cultural elements from another culture and not to justify cultural uniformity that prevailed. To Ponce, his vision of Tiwanaku is too narrow (Ponce 1995).

With successes and failures certainly Bennett, in a fair balance, did advance scientific knowledge of Tiwanaku.

The Argentinian Eduardo Casanova came to Tiwanaku in 1933. It is known that his intervention in the ruins was due to an invitation that Posnansky extended so that an Argentinian

mission could study them. Casanova was not adjusted to any plan and dug anywhere by opening about 25 pits of approximately 2 m^2, without any real order. His eagerness was simply to obtain artifacts. He found layers of ash 5–20 cm thick, the more superficial to 80 cm, and the deepest up to 4 m, which can be understood as a byproduct of human activity, although he did not know how to interpret them. He also discovered underground drainage canals on the embankment of Kalasasaya, which later had to be destroyed by the vandal activity that occurred there. Referring to Akapana, called it "pukara," i.e., fortress. Big mistake, as a fortress in the middle of the city is inconceivable (Ponce 1995).

Unfortunately, it has only three short articles of Casanova and not a serious publication about his excavations. Therefore, little is known about its intervention in Tiwanaku.

About Fritz Buck (1877–1961) it is known he was a German immigrant who took up residence in La Paz. He was in Tiwanaku, for the first time in 1908, and 4 years later installed a jewelry store in the seat of power of Bolivia. Although economic activity was jewelry, he became a tireless collector of archaeological artifacts, activity that was his passion. He even had a small house built close to the ruins where he apparently carried out the purchase of antiques from the surrounding farmers, who discovered all kinds of objects in their lands. Around 1930 he left his jewelry store in the hands of her brother-in-law to devote himself completely to his work of collector. He came to assemble a collection that later comes in to 3834 specimens of pottery, metal, stone, and organic origin. The majority of which came from Tiwanaku, but also objects from other parts of Bolivia, even some from Peru and other neighboring countries. Despite everything, his inventory is rather incomplete and it has almost no accurate source of the pieces. He only wrote a handful of newspaper articles lacking scientific rigor, and therefore of little use. Only in 1937 does he write his first and only book *The Mayan Calendar in the Tiahuanacu Culture*, based on the symbology of the Tiwanaku art that was registered in different types of media, as well as complex astronomical calculations. Despite this, and despite the analogies between the Andean and Mesoamerican cultures, it cannot be concluded that the Mayan culture had any influence on the culture of Tiwanaku. The Buck collection is preserved today at the Museum of pre-Columbian Precious Metals from the city of La Paz (Sagárnaga 1987).

It is advisable to refer to Stig Rydén (1908–1965), disciple of Nordenskiöld, who also practiced in Tiwanaku small-scale excavations in 1938 where he made the opening of seven boreholes covering a total area of just 22.41 m^2. The defect of the excavation by Rydén consisted on using arbitrary levels of 50 and up to 75 cm in thickness, which was too thick. He established the existence of three different types of ceramic based on the finish and in its function: a rough ceramic for cooking food, another for the storage of liquids, and one that was artistically made for ceremonial purposes. After the Second World War, Rydén would publish his thick volume titled "Archaeological Researches in the Highlands of Bolivia" (Ponce 1995). Ponce, who was very hard in his opinions regarding the actions of certain researchers, was softer when it came to Rydén, probably because they had established a close friendship, in 1951 they dug together in Mollo. Either way, it is important to note that Nordenskiöld took a collection of 3.390 artifacts from Bolivia to Sweden, his disciple – Rydén – overtaking him, who took 11.760 objects from the same country (Muñoz 2012).

Another collector, certainly more noteworthy than Buck, was Federico Diez de Medina (1882–1963), true lover of pre-Hispanic art. He wrote a dozen archaeological newspaper articles between 1942 and 1953. He maintained a friendly relationship with Posnansky who led the Archaeological Society of Bolivia and who influenced his vision of Tiwanaku, only difference being that Diez de Medina exaggerated saying not only that Tiwanaku was a port, but a port of the Atlantic Ocean and with a direct connection with Atlantis. Also that Tiwanaku was up to 18,000 years old. He also speaks of large earthquakes and volcanoes forming following a catastrophic event, all of this was discarded by geology. But he had the good sense to identify the use of trophy-heads in Tiwanaku (Ponce 1995).

He accumulated one of the most important archaeological collections in Bolivia, later acquired by the Bolivian State, which today is located in premises of the National Museum of archaeology, in La Paz. Subsequent to his death, the cataloging of this collection brings the figure to 18.662 specimens including non-pre-Hispanic objects. (Sagárnaga 2003).

Alfred Kidder II (1911–1984) came to Peru and Bolivia for the first time in 1937. He returned to Bolivia in 1955 and in Tiwanaku dug a couple of Stratigraphic pits, with a total area of 20 m^2. Kidder published only one article in a newspaper detailing his mission in Bolivia, and it was Gregory lamb Miranda, in his capacity as Assistant Director of the Tiwanaku Museum, who came to supervise the work of the North American and write a 4-page report regarding his activities. Thanks to this, it is known that Kidder's work was deplorable because he failed to disperse layers or to interpret the stratigraphic sequence (Ponce 1995). Kidder places Tiwanaku at the stage of builders of cities, which is located between the 600 and 1000 AD, sustaining that in Tiwanaku, there emerged a powerful force joined to a religious cult with emerging military leadership.

Another curious character was Ruben Vela, poet and Argentine diplomat, first Secretary of the Embassy of his country in La Paz to 1955. He formed almost surreptitiously and quietly a collection of approximately 928 pre-Hispanic items from Bolivia which, conspicuously, was later donated to the Service of Prehistoric Research of the provincial Council of Valencia (Spain) (Ponce 1995). He not only looted Bolivia's assets but acted in a servile manner by donating the collection to Spain.

The 1952 National Revolution of Bolivia sought to restore rights which had been stripped from the indigenous almost since the Spanish conquest. It also laid the Foundation for the search on ancestral roots. It was necessary to bring together scholars from the past who worked in the national territory so that at the end of 1953 was held the first Roundtable of Bolivian Archeology in order to assess the State of the situation and set goals from there onwards (Ponce 1995).

All this constituted the propitious scenario that in 1957 started the archaeological excavations at Tiwanaku under the direction of the Bolivian Carlos Ponce Sanginés. The following year the Centre for Archaeological Researches in Tiwanaku is officially created. This event was a milestone in the research on Tiwanaku which used to be the privilege of foreigners who stayed for short periods in the country until then. The first report of work was published in 1961 (Ponce 1961). The institutionalization of the Bolivian archaeology supported by State action arose; this spread to other points of archaeological interest in the Bolivian territory, which enabled the creation of the National Institute of Archaeology (INAR) in 1975.

Among the most important achievements of the INAR the intense field work, the hundreds of surveys, verification of systematic excavations, defense of the cultural heritage, stopping the illegal export of items, adequate equipment, construction of museums, preservation of sites, etc., should all be noted.

Among the measures of protection that were taken is the placement of a mesh fence around the two most important sectors of Tiwanaku (the Akapana and Pumapunku), covering about 34 ha, the cataloging with scientific basis of archaeological artifacts (until 1980 it had listed 45.870 objects, belonging to the National Museums of Archaeology of Aukapata, of pre-Columbian precious metals, of Copacabana, of Samaipata, of ethnography, the Medina and Buck collections (and other smaller collections); excavations were carried out on a large scale (in Kalasasaya, in the small semi-subterranean temple, Kherikala, Lakkakollu, a portion of Putuni the eastern side of Akapana and the south-east corner of Pumapunku); the Kalasasaya and the small semi-subterranean temple buildings have been restored. In 1989, Carlos Urquizo, director of the INAR, resumed excavations at Pumapunku with the participations of Juan Faldín, Sonia Alconini, Max Portugal, Oswaldo Rivera, Javier Escalante, Leocadio Tic. . .

Ponce Sanginés established a cultural sequence in three stages of development: villager (epochs I and II), urban (epochs III and IV), and Imperial (epoch V).

The villager, the economy was based on self-sufficient agriculture of Andean plants. There was no distinction of social classes. The dead were buried in holes in a kneeling position. Copper was already being smelted. We found an artistic ceramic called "Kalasasaya," associated with a rough micaceous polish (Ponce 1995).

The urban phase, according to Ponce, is divided into early and late. The city and state appear in the early urban phase. At the same moment we have the division of society into social classes. The surplus of production sustains the State apparatus. The big buildings that have remained to the present day are constructed: the Akapana pyramid, Kalasasaya, and Pumapunku. An urban planning with dualistic conception in two halves is concluded. Polychrome ceramics are produced, with feline like paintings and geometric pottery. Both the architecture and sculptures used the red sandstone as a raw material. This stone comes from nearby quarries in the mountainous South.

The late urban stage, characterized by the beautification of buildings, use of andesite as lithic material which was much finer than sandstone and was transported from the peninsula of Copacabana. As for metallurgy, copper alloys with arsenic were developed. Ceramics production reaches an exceptional quality; hence, it is known as "classic." Also the stone sculptures reached a high degree of perfection. An expansion of the Tiwanaku model begins.

In the third and final phase, there was an expansion on a vast scale. Tiwanaku became the imperial or Pan-Andean Universal State with a vast subject territory. Ponce estimated that the population of the city was 100,000 inhabitants. Bronze is discovered. The pottery quality drops. At the end of the twelfth century of our era, the Tiwanaku Empire entered its decline, apparently for climatic reasons which led to drought with the consequent decrease of crops and increase of the political crisis. The regional estates then appear (Ponce 1995).

Sixty-three radiocarbon dates were obtained with the following averages: 237 BC to the period I, 43 AD II, 299 AD for III, 667 for the IV, and 1050 for the V. The oldest date obtained gave 1680 BC and, most recently, 1172 AD.

The city reached an area of 420 ha and was divided into two halves. The buildings obey a rigorous astronomical orientation according to the cardinal points were a network of roads would come out in various directions.

Ponce called "Integrator" model to that which was imposed in Tiwanaku, because – according to him – various ecological floors were integrated as well as the highland areas from north to south.

From 1988 a joint project between the National Institute of Archaeology and the University of Chicago was held. The "international seminar of archaeological excavations in Tiwanaku" (1988–1989), co-directed by Carlos Ponce and Alan Kolata at the University of Chicago, led new excavations to Akapana (1988–1989). The work was entrusted to Linda Manzanilla (Mexican) and María René Baudoin (Bolivian). Thanks to them, different retaining walls within a tiered system that set up the pyramid were identified. On the second terrace a gigantic offering of intentionally cracked ceramic was discovered, as well as dismembered human skeletons. Atop the socket containing a housing complex with rectangular rooms and two spacious rooms was excavated. Another remarkable finding was that of a sculpture of blackish rock representing a man with mask of feline, a Tiwanaku piece which is known as "chachapuma."

Escalante excavated an area of 228 m^2 on the site called Lakkaraña (1990–1991). He discovered a retaining wall, a circular structure, and the foundations of a rectangular House as well as a tiny anthropomorphic figure made of copper.

On March 23, 1990, an agreement was signed between Oswaldo Rivera, Director of the National Institute of archaeology of Bolivia and Kolata by the University of Chicago, to carry forward the Wilajawira Project, which provided "comprehensive research and analysis of the pre-Columbian cities" Lukurmata, Pajchiri, Wankani, and Tiwanaku, a multidisciplinary team, with emphasis on the study of pre-Hispanic agriculture and its relationship with the tiwanaku State. Field work included two seasons during 1990 and 1991.

Between 2004 and 2008, and under the command of the National Unit of Archaeology (which had changed its name from National Institute of

Archaeology), Javier Escalante – understanding institutional boom era was that of Ponce – pretended to re-edit the efforts of this archaeologist undertaking four archaeological projects and that had to do with Akapana, Pumapunku, Putuni, and Kantatayita. In the project of Akapana became clear most of the N and W of the stepped structure flank walls. Pumapunku became work of monumental blocks leveling and S walls and part of the W freed themselves from their coverage. Putuni carried out excavations and conservation on the S and W walls work; and finally, next to the polish-italian mission excavations at Kantatayita were started for their respective work of conservation (Escalante 2012: 265).

At the present time, research being developed around Tiwanaku is scarce.

A Particular Vision of Tiwanaku

The word Tiwanaku has two meanings: on the one hand it refers to the pre-Columbian town located 71 km from the current seat of the Bolivian Government. On the other hand, it refers to the Social Formation whose center of primitive cultural irradiation was mentioned, which expanded all over the western part of Bolivia, the South of Peru, and Northern Chile and Argentina.

The phase that Ponce called villager, in the light of current evidence, would seem that it was part of a much more extensive process in the northern highlands and which Chiripa in the southern basin of Lake Titicaca and Qaluyo, in the North region, were also part of. This certain stylistic unity was promoted, probably, by a common religious substrate.

In the same way that the Tiwanaku phenomenon had its background in an early formative horizon, you also have another cultural expression that was also developed in the northern basin during the Middle formative period, which is known as Pukara. But itself Tiwanaku as such would begin just to the first century of the era, during which Ponce called early-urban. If there were a village, as it seems to have been proven, it is turned to city with the construction of buildings on the basis of lithic material (the red sandstone), the establishment of an elite caste administrating surplus production, a middle class composed of specialists (sculptors, potters, weavers, metallurgists, etc.), and around the city, a mass of peasants engaged in farming. The anthropomorphic sculpture does not have even the level of preciousness reached in the subsequent time (urban late or classic) but is a precedent. The morphological history of pottery (known as Qeya) is clear; this determines some of the forms of corporate Tiwanaku ceramics, just as censers of wavy edges characterized the classical Tiwanaku ceramics, so do the kerus. Janusek called it late formative period, but the above can be considered as an initial Tiwanaku. In this sense, and rather casually, Bennett would have been successful with the cultural sequence of three times that proposed to Tiwanaku: early (epoch III in the sequence of Ponce), classic (IV of Ponce), and decadent (Imperial or Ponce V).

The classical period meant the heyday of High Plateau culture in the political, economic, and religious aspects which are expressed in the material culture that can be studied. Their cultural expressions were very peculiar. They developed a monumental architecture, a very elaborate sculpture, very fine ceramics, a highly advanced state of metallurgy, and other aesthetic and technological indicators that show a very complex social formation.

In its final stage, its expansion was admirably large. Territorially, it expanded by Sierra and south coast of the Peru from Chile, from Argentina and the Highlands and valleys of Bolivia.

It seems that the fine ceramics that characterized the previous time continued to produce at this stage, but probably for the exclusive use of the ruling class or the nuclear area, while less fine ceramics – which are known as expansive – was the most popular and was sent to the farthest edges of the empire.

Its development is parallel with the Ayacucho village: Wari who unfolded synchronously to the Tiwanaku and had its area of influence the north of them. In the light of current research, it is said that Wari was an Empire (the first of the Andes) and Tiwanaku was not so. If we define "Empire" as a social formation that conquered and absorbed

unprecedented social formations, and to exert political and political control above a vast territorial expansion, also Tiwanaku was imposed on other people and spread in an area of 600,000 km^2, according to calculation of Ponce. On the other hand, there is an unfortunate imbalance in the investigation that is underway around Wari (in Peru) and which is made around Tiwanaku (in Bolivia), favorable to the most northern culture. Be that as it may, Tiwanaku was a powerful State of the Middle Horizon.

The city of Tiwanaku, whose ruins are the most important of the Bolivian territory, is 16 km from the banks of Titicaca by the West and just 12 in the North. It occupied an area of 240 ha. and it had a population of at least 40,000 inhabitants, in its heyday.

The figure of 100,000 inhabitants, which was given by ponce before, seemed to be too high, and most scholars were doubted that the population reached even a quarter of said amount, because it was not clear where they could have obtained the necessary amount of crops for so many people. However, in 1979, Alan Kolata and Oswaldo Rivera reported about an extensive area of farmland located at the north of Tiwanaku. This farmland would have had an extraordinary production capacity, based on raised fields in the Pampa Koani area, whose production could have supplied even more people than what was originally estimated, although not necessarily all production served for the sustenance of Tiwanaku, any production surplus could have been used to undertake new tasks.

Tiwanaku shows a very clear urban outline and boasts advanced and unique technology. They erected a large and sumptuous buildings of stone in its ceremonial sector, such as Akapana, Kalasasaya, the small semi-subterranean Temple, Putuni, Kheriqala, Kantayita, Laka Kollu, Pumapunku, and others remaining to be discovered.

Bermann, Goldstein, Stanish, and Watanabe argue that the Tiwanaku unfolded gradually over a Millennium and that its economy was based on the spur agricultural technique, production of tubers, intense stockbreeding of camelids, the establishment of colonies, and an extensive network of Exchange, which comes in its economic and political high point towards the 900 AD.

There is new evidence that when at the end of tenth century, the Tiwanaku elite knew that the – hitherto – successful model was beginning to crumble, and they understood that this was due to a disagreement of the gods who sent his punishment. In an effort to reconcile with them, the Tiwanaku carried out a series of sacrifices. This may explain the human sacrifices that were placed on the second terrace of the Akapana pyramid, and various ceramic offerings and from animals that have been located in some sites. The discovery of Pariti, carried out in 2004 by the archaeological bolivian-finn mission and headed by Antti Korpisaari and Jédu Sagárnaga, could be explained as an offering of this type (Korpisaari and Sagárnaga 2007, Sagárnaga 2015).

In relation to the language that would have been spoken in Tiwanaku, it is very difficult to determine what it was. Uhle, Ponce, Montaño, Albarracín, and several others believed that it was the Aymara. However, every time we are more convinced of the ideas of Rodolfo Cerrón Palomino and Alfredo Torero, who proposed – each on their own – the Aymaras invaded the Tiwanaku territory contributing to his downfall, and that – rather than it happening – in the Andean Highlands, Pukina was probably spoken.

In December 2000, Tiwanaku was declared site, Natural and Cultural Heritage by the United Nations for Education, Science, and Culture Organization (UNESCO).

References

Bennett, W. 1956. *Excavaciones en Tiwanaku*. La Paz: Biblioteca Paceña – Alcaldía Municipal.

Cieza, P. s/d. La crónica del Perú. Crónicas de la Conquista del Perú: 127–497. Edit. Nueva España. México.

D'Orbigny, A. 2002. *Viaje a la América Meridional. Tomo IV*. La Paz: Ambassade de France en Bolivia – PLURAL – IFEA – IRD.

Escalante, J. 2012. *La Historia antes de la Historia en Bolivia*. La Paz: Instituto Internacional de Integración Convenio Andrés Bello.

Korpisaari, A., and J. Sagárnaga. 2007. Investigaciones Arqueológicas en la Isla Pariti, Bolivia, en *Chachapuma. revista de Arqueología Boliviana* 1: 7–30. Producciones CIMA: La Paz.

Lizárraga, R. 1909. *Descripción Breve de toda la Tierra del Perú.* Historiadores de Indias, tomo II, pp. 485.660. Madrid.
Muñoz, A. 2012. Bolivians in Gothenburg: The archaeological and ethnographic collections at the Museum of World Culture. In *The past ahead: Language, culture, and identity in the neotropics.* Uppsala University.
Ponce, C. 1961. *Informe de Labores*. Tiwanaku: Centro de Investigaciones Arqueológicas Tiwanaku. Publicación #1.
Ponce, C. 1995. *Tiwanaku: 200 años de investigaciones arqueológicas*. La Paz: Producciones CIMA.
Sagárnaga, J. 1987. *Fritz Buck: Un Hombre, Una Colección*. La Paz/Cochabamba: Los Amigos del Libro.
Sagárnaga, J. 2003. *Breve Diccionario de la Cultura Nativa en Bolivia*. La Paz: Producciones CIMA.
Sagárnaga, J. 2008. Alianza y Ritualidad en Tiwanaku, en *Chachapuma, revista de Arqueología Boliviana 4*: 5–25. Producciones CIMA. La Paz.
Sagárnaga, J. 2013. *Adolph Bandelier: Un Hombre, Una Colección*. La Paz: Universidad Mayor de San Andrés.
Sagárnaga, J. 2015. Presagio de un ocaso: El conjuro de la caída de Tiwanaku. en *Chachapuma, revista de Arqueología Boliviana 7*: 10–16. Producciones CIMA. La Paz.
Squier, G. 1974. *Un viaje por tierras incaicas*. Cochabamba: Edit. Los Amigos del Libro.
Stübel, A., and M. Uhle. 1892. *Die Ruinenstaette von Tiahuanaco im hochlande des alten Perú*. Leipzig: Verlag von Karl W. Hiersemann.

Tobias, Phillip V.

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Basic Biographical Information

Phillip Vallentine Tobias was a South African paleoanthropologist and human biologist. He was born in Durban, South Africa, in 1925 to Joseph Newman Tobias and Fanny (née) Rosendorff. His father was a toyshop owner and his mother was a piano teacher. Tobias was fascinated by natural history from a young age. His wolf-cub scout leader introduced him to osteology and anatomy. His interests in genetics, zoology, and archaeology followed from frequent visits to the Durban Natural History Museum during his teenage years.

Tobias entered the University of the Witwatersrand (Wits) in 1942, where he earned B.Sc. and B.Sc. Honours degrees (1946, 1947), the medical degrees M.B., B.Ch. (1950), and a Ph.D. (1953) in cytogenetics under the tutelage of Joseph Gillman. He then held fellowships to continue his work at Cambridge University (1955) and various academic institutions in the United States (1956). After his return to South Africa, Tobias was mentored by Raymond Dart and was later awarded a D.Sc. degree (1967) for his research on hominin evolution. He was appointed demonstrator and instructor in histology and physiology at Wits in 1945 and subsequently served as Lecturer (1951–1952), Senior Lecturer (1953–1958), Professor and Head of the Department of Anatomy and Human Biology (1959–1990), and as Dean of the Faculty of Medicine (1980–1982). He remained active as Professor Emeritus at the university until his death on June 7, 2012.

Major Accomplishments

Tobias made many contributions to Science, with nearly 1,200 published works on topics including genetics, human evolution, anatomy, growth and development, and the history and philosophy of science. He is particularly well known for his descriptions of early hominins from Olduvai Gorge in Tanzania, especially *Paranthropus boisei*, and for co-naming *Homo habilis* with Louis Leakey and John Napier in 1964. He supervised excavations at the South African fossil hominin site of Sterkfontein for four decades beginning in 1966. Tobias also conducted fieldwork at a number of other fossil sites in southern Africa and studied human variation and cytogenetics of living people and other mammals.

Tobias also worked assiduously on the meaning and political ramifications of race and fought indefatigably against racism. He was elected President of the National Union of South African Students in 1948, the year the Nationalist Government enacted apartheid legislation to define and enforce segregation. Tobias soon after began the first anti-apartheid campaign in a South African University to keep enrollment open to all, participating in protests against these oppressive laws. His activism continued throughout the apartheid era. For example, he coauthored a formal complaint to the South African Medical Council that

brought world attention to the mishandling of the Steven Biko case. Biko, the founder of the Black Consciousness Movement, died from injuries sustained during interrogation by police. He also lobbied for repatriation from France of the remains of Saartjie Baartman, a Khoikhoi slave that had been exhibited around Europe as "the Hottentot Venus" in the early nineteenth century.

Tobias is likewise known for his efforts toward reconciliation between science and religion, particularly in the relationship between evolution and theology. He participated in two working groups organized by the Pontifical Academy that contributed to the revision by Pope John Paul II of the Church's attitude toward evolution. Tobias was in fact born into a Jewish family and served during his youth as President of the Junior Hebrew Congregation in Durban. Indeed, the young Tobias even evinced an interest in studying for the rabbinate.

Tobias received numerous accolades for his scientific and humanitarian accomplishments. These include numerous distinguished metals, prizes, awards, and honorary degrees. He was a Fellow of the Royal Society (London) and a Foreign Associate of the National Academy of Sciences of the United States and the American Philosophical Society, Commander of the Order of Merit of France, and Commander of the National Order of Merit of Italy.

Cross-References

► Australopithecines
► *Homo habilis*
► Human Evolution: Theory and Progress

Further Reading

Conroy, G.C. 1997. Presentation of the lifetime achievement award at the annual meeting of the American Association of Physical Anthropologists. Speech transcribed in *American Journal of Physical Anthropology* 104: 541–543.

Grine, F.E., and P.S. Ungar. 2012. Phillip Vallentine Tobias, October 14, 1925 – June 7, 2012. *Evolutionary Anthropology* 21: 127–129.

Tobias, P.V. 2003. Twenty questions about human evolution. *Human Evolution* 18: 9–63.

Tobias, P.V. 2005. *Into the past: A memoir*. Johannesburg: Picador Africa.

Ungar, P.S., and P.V. Tobias. 2012. Academic genealogy. In *African genesis: Perspectives on hominin evolution*, ed. S.C. Reynolds and A. Gallagher, 19–41. Cambridge: Cambridge University Press.

Wood, B. 2012. Phillip Vallentine Tobias (1925–2012). *Journal of Human Evolution* 63: 759–763.

Togola, Téréba

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Basic Biographical Information

Téréba Togola (Figs. 1 and 2), who died November 5, 2005, was a tireless advocate of Malian cultural heritage. An expert in the field, Téréba Togola distinguished himself by his thirst for knowledge and strong sense of sharing. This open spirit strongly influenced the new generation of Malian archaeologists, who still take him as a reference point in their own activities.

Born in 1948, Téréba Togola began his professional career as a primary school teacher. In 1976, he entered the Ecole Normale Supérieure of Bamako (ENSUP) where he took his first courses in archaeology, a discipline that he would follow for the remainder of his life. The thesis he completed at the end of his studies at ENSUP in 1982, entitled *Inventaire analytique des sites archéologiques du Cercle de Bougouni (Région de Sikasso)*, is testament to his commitment to archaeology. Téréba Togola subsequently worked at the Institut des Sciences Humaines (ISH), where he actively participated in numerous archaeological missions across Mali, including the Mema region. He was a member of the team that worked on a project to create an inventory of archaeological sites in the lakes region and the Inner Niger Delta (Togola and Raimbault 1991). It was here that he met Roderick J. McIntosh and Susan K. McIntosh, who integrated him into their team of archaeological researchers working in the Timbuktu region of northern Mali (1983) and at Dia (1986). In 1986, Téréba Togola was awarded a

Togola, Téréba, Fig. 1 Téréba Togola. (Photo taken during a conference)

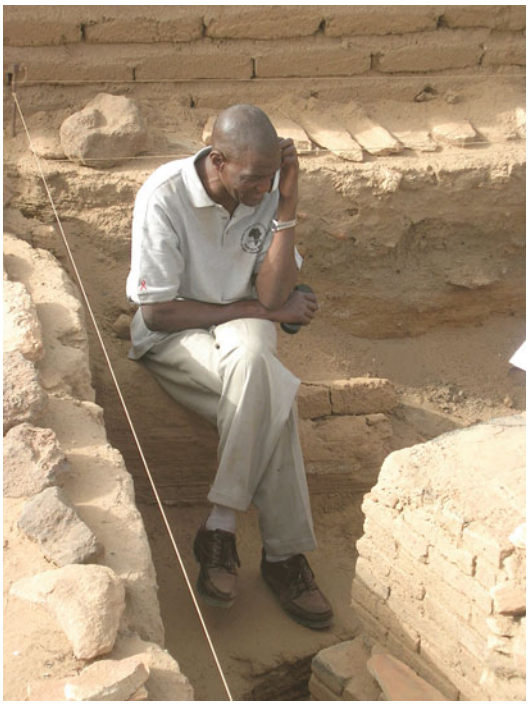

Togola, Téréba, Fig. 2 Téréba Togola. (Photo taken at the site of the Kankou Moussa mosque in Gao)

Fulbright Scholarship (USA) (1986–1993), which enabled him to further his studies at the Department of Anthropology at Rice University, Houston, Texas, where he obtained a Master of Arts in archaeology in 1988 and a Ph.D. in Archaeology in 1993. His doctoral thesis on the theme: *Investigations of Iron Age Sites in the Mema Region (Mali)* was published posthumously (Togola 2008). On his return to Mali in 1994, Téréba Togola joined the ISH and became the head of the archaeology section. In 1998, he was appointed the Director of National Arts and Culture (DNAC) in Mali, and subsequently the head of the National Directorate of Cultural Heritage (DNPC).

Téréba Togola was an active member of the following professional organizations and associations: the Society of Africanist Archaeologists (SAFA), the West African Association of Archaeology (AOAA), and the Mande Studies Association (MANSA). He was one of the main organizers of the 11th Congress of the PanAfrican Association of Prehistory and Related Studies (PANAF) in Bamako in 2001, the proceedings of which he coedited and co-published with Klena Sanogo (Sanogo and Togola 2004).

Major Accomplishments

In this capacity as the head of the archaeology section at the ISH, Téréba Togola directed the archaeological components of the environmental impact studies in the gold mining areas of Keniéba, Sadiola, Tabakoto (Kayes region), and Kalana et Yanfolila (Sikasso region) between 1994 and 1997. In 1995, archaeological research carried out under his supervision in the Boucle du Baoulé region revealed the richness and the diversity of archaeological sites in the National Park of the Boucle du Baoulé. Téréba Togola also took an active part in initiating and implementing an archaeological research program in the southwest region of Gourma, directed by Kevin MacDonald (1993–1996). Funded by the World Monument Funds, Téréba Togola codirected archaeological excavations at Jenné-jeno from December 1996 to February 1997.

After Téréba Togola became the Director of National Arts and Culture (DNAC) his tasks included the preservation and promotion of cultural heritage. Under his leadership, the DNAC was restructured. This led in 2001 to the creation of two different entities: the National Directorate of Cultural Heritage (DNPC), which manages the inventory, protection, restoration, and the

dissemination of national cultural heritage, and the National Directorate for Cultural Action (CAA), which works to promote the creation of artistic works and their dissemination.

Dr. Togola became the head of the DNPC, where under his direction some outstanding actions were undertaken, including the design and realization of the Cultural Map of Mali (2004), the inscription in 2004 of the Tomb of Askia on the World Heritage List, the withdrawal of the ancient city of Timbuktu from the List of World Heritage in Danger (2005), and the listing of the Jaaral and Degal cultural space (i.e., the crossing of the river *Diaka* in Diafarabé and the descent of cattle in the *bourgoutières* in Dialloubé-Téninkoun) in 2005 as a masterpiece of oral and intangible world heritage. Dr. Togola largely contributed to the restoration of the Komoguel mosque in Mopti, classified as national heritage in 2005, and of the historic city of Hamdallaye, classified as national heritage in 2007. In addition, he contributed to fundraising for the restoration of Fort Medina (Kayes), which was classified as a national heritage site in 1992. Téréba Togola also continued archaeological research, such as on the site of the Kankou Moussa mosque, where an ongoing research program was initiated in 2003–2004 in collaboration with the Swedish International Development Agency (SIDA-SAREC) and the National Museum of Ethnology, Osaka (Japan).

Cross-References

- ▶ African World Heritage Fund (AWHF)
- ▶ Sanogo, Kléna
- ▶ West Africa: Museums
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Monuments Fund (WMF)

References

Sanogo, K., and T. Togola. 2004. *11ème Congrès de l'Association panafricaine de Préhistoire et disciplines assimilées, Bamako, 7–12 février 2001*. Bamako: Institut des Sciences humaines.

Togola, T. 2008. *Archaeological investigations of Iron Age sites in the Mema region, Mali (West Africa)*, BAR International series 1736, Cambridge monographs in African archaeology, 73. Oxford: Archaeopress.

Togola, T., and M. Raimbault. 1991. Les missions d'inventaire dans le Méma, Karéri et Farimaké (1984 et 1985). In *Recherches archéologiques au Mali*, ed. M. Raimbault and K. Sanogo, 81–85. Paris: Editions Karthala.

Further Reading

Connah, G. 2001. *African civilizations: An archaeological perspective*. Cambridge: Cambridge University Press.

Joy, C., and B. Butler. 2011. *The politics of heritage management in Mali: From UNESCO to Djenné*. Walnut Creek: Left Coast Press.

Macdonald, K.C. 2006. Dr. Téréba Togola, National Director of Cultural Heritage (Mali) A personal remembrance. *African Archaeological Review* 23 (1): 1–3.

Togola, T. 1997. The Inland Delta and the Manding Mountains. In *Museums and archaeology in West Africa*, ed. C.D. Ardouin, 59–67. Washington, DC: The Smithsonian Institution Press in association with the African International Institute.

Togola, T. 1999a. Archaeology of the soul. *Archaeology* 52 (3): 59.

Togola, T. 1999b. Iron Age occupation in the Méma region (Mali). *African Archaeological Review* 13 (2): 91–110.

Togola, T. 2002. The rape of Mali's only resource. In *Illicit antiquities: Theft of culture and the extinction of archaeology*, ed. N. Brodie and K.W. Tubb, 250–256. London: Routledge.

Togola, T. 2005. *Carte Culturelle du Mali, esquisse d'un inventaire du Patrimoine culturel national*. Bamako: Ministère de la Culture, Impression IMPRIM COLOR.

Togola, T., M. Cissé, and Y. Fané. 2004. Reconnaissance archéologique à Gao (Mali) et environs. *Nyame Akuma* 62: 50–61.

Tomatoes: Origins and Development

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Basic Species Information

Although Linnaeus (1753) classified tomato as *Solanum lycopersicum*, the taxonomy of tomato has been subject to great debate. Various

alternative taxonomic classifications have been proposed, principally as *Lycopersicon esculentum*, which is still in common usage (e.g., Doebley et al. 2006). Multiple genetic studies now unequivocally confirm the tomato as belonging to the genus *Solanum*. Confusingly, some researchers split tomatoes into the weedy *S. lycopersicum* var. *cerasiforme* and the cultivated *S. lycopersicum var. lycopersicum*, whereas others refer solely to *Solanum lycopersicum*. The latter classification is followed here.

Tomatoes are one of the most significant, in terms of production, crop plants in the world. Although generally considered to be a fruit, the tomato is also classified as a vegetable. Tomatoes are rich sources of several nutrients and vitamins. Tomatoes are herbaceous perennials, although in many growing environments they behave as annuals; for example, they tend to die off after frost or dry periods (Peralta and Spooner 2007). Tomatoes exhibit a wide climatic tolerance, although cultivated varieties require regular watering. They are diploids, are grown from seed, and exhibit considerable morphological variability. Tomatoes are considered a model plant to study the genetics of diploid plants (Peralta and Spooner 2007) and for studying fruit development (The Tomato Genome Consortium 2012).

Wild tomatoes are native to western South America, extending in altitude from near the coast to the high Andes (above 3,000 m altitude) and extending from central Ecuador, across Peru, to northern Chile. The climatic and environmental diversity of environments has contributed to the diversity of wild tomatoes.

Major Domestication Traits

Different theories have been proposed for the region of tomato domestication (following Peralta and Spooner 2007: 14–17). Since De Candolle (1884), a Peruvian hypothesis has predominated based on a combination of botanical, historical, and linguistic inferences. However, Jenkins (1948) proposed an alternative Mexican hypothesis based on multidisciplinary evidence, primarily the center of cultivar diversity (using morphological criteria), as well as more anecdotal historical sources and linguistic inferences. Questions regarding the origin and domestication history of tomato have only recently been clarified by genetic analyses.

Although there are several hundred varieties of cultivated tomato, they exhibit extremely limited genetic variability from each other and from the closest wild ancestor. For example, genomic sequences of an inbred (domesticated) tomato cultivar 'Heinz 1706' and the closest wild relative, *Solanum pimpinellifolium*, exhibit limited genetic divergence and recent admixture (The Tomato Genome Consortium 2012). Despite limited genetic variation, there is considerable morphological variation among cultivated varieties and between cultivars and wild types.

Hybridization between wild and cultivated species of tomato has been documented for *Solanum pimpinellifolium* and *Solanum lycopersicum*. As Peralta and Spooner (2007: 13) observe: "The reciprocal introgression of traits into both taxa generates complex morphological [and presumably genetic] gradation between them that makes their taxonomic identification difficult." Against this backdrop of complexity, specific genetic attributes of cultivated tomatoes have been identified that control for domestication traits, primarily fruit size (*fw2.2*, the "domestication gene" in tomatoes; Zeder et al. 2006), as well as differences between cultivated varieties, such as synchronicity and timing of fruit ripening and fruit shape (Doebley et al. 2006). Although these genetic attributes may be present in wild plants, they are more frequent in cultivated varieties of tomato (Nesbitt and Tanksley 2002). Significantly, recent genetic improvement of tomato has been designed for increased shelf life and synchronous fruiting, which has seemingly occurred at the expense of flavor (ACTI 1989).

Despite limited genetic variation, there is phylogenetic structure that enables aspects of the geodomestication process to be inferred:

> . . . we hypothesize that, based on the molecular and morphological data presented, *S. l. cerasiforme* originated from *S. pimpinellifolium*. The tomato was later domesticated [to *S. l. lycopersicum*] from *S. l. cerasiforme* in a process composed of several

phases: first, a predomestication was carried out in the Andean region, during which *S. l. cerasiforme* developed a notable morphological diversity that included bigger fruits, which are even today being cultivated as small-fruited tomatoes. Those materials were then carried to Mesoamerica and it was there that the true domestication occurred, thus creating the traditional big-fruited tomato varieties. From there, the Spaniards took tomatoes to Spain and Italy, and from there they spread to the rest of the world (Blanca et al. 2012: e48198).

Although the terminology of predomestication and "true domestication" may not be helpful and may best be characterized as stages of domestication, Blanca et al. (2012) clearly identify a domestication cline from the most closely related wild tomato species (*S. pimpinellifolium*) to the weedy *S. lycopersicum* var. *cerasiforme*, to the cultivated *S. lycopersicum var. lycopersicum*. Additionally, the staged interpretation of tomato domestication encompasses aspects of both De Candolle's Peruvian and Jenkins' Mexican hypotheses.

Timing and Tracking Domestication

Unfortunately, there is extremely sparse archaeological data for tomatoes to clarify genetically based or earlier scenarios of domestication. No pertinent data predate approximately 1,000 years ago. There are also uncertain claims for depictions of tomatoes on ceramic spindle whorls dating to 500–1000 CE in Columbia (McMeekin 1992), but these may represent other flowering *Solanum* species, including potatoes (Peralta and Spooner 2007: 16–17). Sufficient taxonomic specificity in archaeobotanical and stylistic interpretations is also lacking to assess the relevance, if any, of these finds for understanding tomato domestication.

Historical sources show that tomatoes were grown in Mexico at the time of Spanish conquest. Tomatoes were subsequently introduced to Europe in the early to mid-sixteenth century, in the decades immediately following that conquest. Initially, plants were grown as curios, medicinal plants or ornamentals because they were considered inedible or poisonous (Peralta and Spooner 2007: 17–19). Tomatoes were first grown for food during the seventeenth and eighteenth centuries in southern Europe, especially in Italy.

Although De Candolle (1884) speculated that tomatoes may not have been domesticated long before European colonization of the Americas, in the absence of robust archaeological evidence, this is an open question. At present, the geodomestication pathways of tomato domestication can be tracked using genetics and other botanical attributes. The historical time depth for these processes is unclear. Although historical linguistics can offer valuable insights (e.g., Campbell and Kaufman 1976), the history of tomato domestication awaits an archaeobotanically derived chronology.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Potato: Origins and Development

References

Advisory Committee on Technology Innovation (ACTI), Board on Science and Technology for International Development, National Research Council. 1989. *Lost crops of the Incas: Little-known plants of the Andes with promise for worldwide cultivation*. Washington, DC: National Academy Press.

Blanca, J., J. Cañizares, L. Cordero, L. Pascual, M.J. Diez, and F. Nuez. 2012. Variation revealed by SNP genotyping and morphology provides insight into the origin of the tomato. *PLoS One* 7: e48198.

Campbell, L., and T. Kaufman. 1976. A linguistic look at the Olmecs. *American Antiquity* 41: 80–89.

De Candolle, A. 1884. *Origin of cultivated plants*. London: Kegan Paul.

Doebley, J.F., B.S. Gaut, and B.D. Smith. 2006. The molecular genetics of crop domestication. *Cell* 127: 1309–1321.

Jenkins, J.A. 1948. The origin of the cultivated tomato. *Economic Botany* 2: 379–392.

Linnaeus, C. 1753. *Species plantarum*. Stockholm: Holmiae.

McMeekin, D. 1992. Representations of pre-Columbian spindle whorls of the floral and fruit structure of economic plants. *Economic Botany* 46: 171–180.
Nesbitt, T.C., and S.D. Tanksley. 2002. Comparative sequencing in the genus *Lycopersicon*: Implications for the evolution of fruit size in the domestication of cultivated tomatoes. *Genetics* 162: 365–379.
Peralta, I.E., and D.M. Spooner. 2007. History, origin and early cultivation of tomato (*Solanaceae*). In *Genetic improvement of Solanaceous crops, volume 2: Tomato*, ed. M.K. Razdan and A.K. Mattoo, 1–27. Enfield: Science Publishers.
The Tomato Genome Consortium. 2012. The tomato gene sequence provides insights into freshy fruit evolution. *Nature* 485: 635–641.
Zeder, M.A., E. Emshwiller, B.D. Smith, and D.G. Bradley. 2006. Documenting domestication: The intersection of genetics and archaeology. *Trends in Genetics* 22: 139–155.

Tombs, Etruscan

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Introduction

Etruscan tombs, Etruscan necropoleis/cemeteries, and Etruscan tomb architecture belong to the most interesting, exciting, and expressive groups of monuments of Etruscan civilization. They furnish a great deal of precious information about Etruscan culture, art, architecture, life, burial customs, funeral rites, and religion. They often reflect historical, economic, and social changes as well. Undoubtedly, the Etruscans invested many financial resources and architectural, technical, and artistic skill in their necropoleis and tombs. Thanks to the discoveries and excavations of thousands of tombs since the Renaissance period, we know much more about the world of the dead than the world of the living in Etruria.

The first discoveries of important Etruscan tombs and tomb monuments date to the Renaissance (late fifteenth–early sixteenth century CE), especially in Tuscany and in the area of Viterbo. It is possible that even great Renaissance artists such as Leonardo da Vinci and Michelangelo drew inspiration from some Etruscan tomb or tomb monument. The second half of the eighteenth century CE (the period of the so-called Etruscheria) and the nineteenth century CE (the period of Romanticism and Neoclassicism) were particularly rich in terms of discoveries (Dennis 1848). Even today, new tombs are discovered both by regular and clandestine excavations, although the main scholarly interest in recent decades lies more in the archaeology of Etruscan settlements and sanctuaries.

Among the most recent and important discoveries we can mention the Cutu Tomb at Perugia, the new excavations around the Tomb of the Five Chairs at Cerveteri (Fig. 1), the Tumulo del Sodo II at Cortona-Camucia, the two Doganaccia Tumuli at Tarquinia (Fig. 2), the Tomb of the Demons at Cerveteri-Greppe Sant'Angelo, the painted Tombs of the Blue Demons at Tarquinia, of the Infernal Quadriga at Sarteano near Chiusi, and of the Roaring Lions at Veii, as well as the restoration of the Cuccumella Tumulus at Vulci and the "Little Petra" (rock tombs) in a former quarry at Populonia. There are only a few general, overview publications on Etruscan necropoleis and tombs which we owe mainly to archaeologists such as F. Prayon and J. P. Oleson (Akerström 1934; Demus-Quatember 1958; Prayon 1975; Oleson 1982; Colonna 1986; Prayon 1986; Prayon 2000; Steingräber 2010).

Definition

We have to deal with an enormous amount of monuments and materials dating from the ninth to the first century BCE in all areas of Etruria including even the "colonial" areas in northern Italy (Emilia-Romagna) and Campania in the south. We can distinguish between single tombs, small groups of tombs, and true necropoleis. Some of the Etruscan necropoleis such as the Banditaccia of Cerveteri belong among the most extensive of the ancient Mediterranean world (Drago Troccoli 2006). Concerning typology, we

Tombs, Etruscan, Fig. 1 Cerveteri, Banditaccia necropolis: Tomba delle Cinque Sedie = Tomb of the Five Chairs (seventh century BCE)

Tombs, Etruscan, Fig. 2 Tarquinia, Monterozzi necropolis: chamber tomb partly reconstructed in the Doganaccia Tumulus (seventh century BCE)

must distinguish strictly between "tombs" on the one hand and "tomb/burial monuments" on the other hand. The most important aspects regard typology, chronology, topographical diffusion/extension, context in the necropolis, architectural elements, decoration elements, elements for the ancestor cult, and burial gifts. It also must be noted that for Etruria, tomb architecture is a partial and precious source of proxy evidence for the largely destroyed and lost Etruscan domestic architecture (Prayon 1975). There are of course different approaches to this extremely extensive and complex topic – a more technical-architectural one, a more art-historical one, a more religious one, and a more social-economic one.

Historical Background

Etruscan tombs cover a long period from the early Iron Age (so-called Villanovan period) to the late Hellenistic period, which means from the ninth and eighth to the second and first centuries BCE. Often they clearly reflect political, economic, social, and religious changes of Etruscan civilization (Izzet 2007; Riva 2010). Thus, the most robust periods of Etruscan civilization such as the Orientalizing and Archaic phases (seventh–sixth century BCE) and the late Classical and early Hellenistic phases (fourth–third century BCE) offer us particularly monumental and rich examples of tomb architecture and burial gifts both in North and South Etruria. Concerning Etruscan tomb architecture, we must distinguish strictly between the different territories of Etruria characterized by different geological, cultural, and social-economic situations.

Key Issues/Current Debates

The key issues of current research are:

Necropoleis: Planning, Organization, Extension, and Development

In the Villanovan period (ninth–eighth century BCE), the necropoleis were still isolated from each other, but during the Orientalizing and Archaic periods, they extended until they entirely surrounded the inhabited area and even outstripped it in area. The different geological and geographical conditions in South and North Etruria resulted often in different forms of cemeteries and tombs. In Cerveteri, the Banditaccia necropolis – the most impressive and best preserved necropolis of Etruria – and in Orvieto, the Crocifisso del Tufo necropolis are outstanding and extremely instructive examples, reflecting in part the layout of the cities themselves. During the sixth century with the rise of a new middle class, hundreds of small tumuli (tumuletti), and later cube tombs, were planned and erected according to the direction of the necropolis' streets and accessible directly from them. After the middle of the sixth century, parts of the cemeteries are characterized by a kind of Hippodamian system with an orthogonal network of roads and rectangular squares and mostly uniform cube tombs which is not only a sign of a more intensive use of space but also a clear reflection of new tendencies in urban system (such as in Marzabotto near Bologna after 500 BCE) (Steingräber 2003). At the same time, the necropoleis reflect social changes and probably new laws and norms intended to limit conspicuous consumption as part of the funeral ritual.

Tombs: Typology, Chronology, Diffusion, Architectural Elements, and Decorations

The Etruscan word for tomb is "*suthi*." Among the main tomb types, we have to mention pozzo/pozzetto tombs (well/pit tombs) for cremation burials, fossa tombs, loculus tombs, niche tombs, chamber tombs, cassone tombs (Vulci), sarcophagus, and stone cist tombs. According to the different regions, sites, geological conditions, local traditions, and social status, there is a greatly varied typology (Steingräber 1981). A very important change in burial custom took place in the early seventh century with the transformation of larger fossa tombs into chamber tombs destined for the burial of family groups. We can observe this change from single to collective burial particularly well in the extended cemeteries of Cerveteri. The general tendency of monumentalization is well documented in South Etruria not only in Cerveteri and its territory (Blera, San Giuliano, San Giovenale) but also in Vulci, Tarquinia, and Veii, too. In North Etruria, the chamber tombs and the tumuli are mostly built in limestone or sandstone blocks and slabs (Populonia (Fig. 3), Vetulonia, Artimino, Quinto Fiorentino, Castellina in Chianti, Cortona), whereas in South Etruria, hollowed-out structures in the soft volcanic tufa stone prevail (Fig. 4). Characteristic for North Etruria (especially between Volterra and Florence) in the later Orientalizing period (second half of seventh and early sixth century) are round burial chambers with a false cupola and sometimes a central pillar (the so-called tholos tombs). While these are reminiscent of Bronze Age Mycenaean tholoi from the Aegean world, they in fact reveal special

Tombs, Etruscan, Fig. 3 Populonia, San Cerbone necropolis: Tomba dei Letti funebri = Tomb of the Funeral Beds with stone beds (seventh century BCE)

Tombs, Etruscan, Fig. 4 San Giuliano, Valle Cappellana: chamber tomb of Valle Cappellana I with two columns (around 600 BCE)

architectural connections with the Sardinian nuraghe. An earlier predecessor, we find only in Populonia toward the end of the ninth and the beginning of the eighth century in a much smaller size but already characterized by a circle of slabs and a small tumulus, a single entrance, a circular chamber, and a false cupola. During the Orientalizing period in Vetulonia and Populonia, the circular false cupola rests atop a square chamber. The tombs of Cortona, Castellina in Chianti, and Artimino are characterized mainly by the arrangement of rectangular chambers with corbelled vaults along a longitudinal axis. The development of tomb architecture during the seventh and sixth centuries BCE in South Etruria – particularly at Cerveteri – is extremely varied and instructive.

Prayon (1975) divided these tombs into six main types (A–F) according to their ground plans, type of entrance corridor (dromos), door, and window shapes; types of roofs, ceilings, and "furniture" such as tomb beds, sarcophagus beds, benches, thrones, chairs, baskets and altars, columns, pillars, capitals, and profile bases, and type of monument and exterior architecture. Those tombs often reproduce many details of the interiors of Etruscan houses (Drago Troccoli 2006). The Regolini-Galassi Tomb and the Tomb of the Hut or Thached Roof belong to the oldest chamber tombs in Cerveteri with a long open dromos and the chambers situated on the longitudinal axis. Whereas the corbelled vault of the Regolini-Galassi Tomb is built in tufa slabs, the two chambers of the other tomb are completely hollowed out and – concerning the vaults – clearly influenced by contemporaneous hut architecture. A very characteristic tomb type (Prayon type D) was common in Cerveteri and its territory during the late seventh and the first half of the sixth century and is clearly influenced by house and palace architecture (as in Veii and Acquarossa). It is characterized by a large antechamber and three burial chambers behind it, often with a rich "furnishing" (as in the Tomb of the Shields and Chairs in Cerveteri). The same ground plan is documented after the middle of the sixth century in temple architecture, too (the so-called templum tuscanicum of Vitruvius, *Arch*. 4.7). A major change occurs toward the end of the sixth century when the tombs – especially in the Cerveteri area – no longer imitated actual houses and consisted normally only of one square chamber with simple benches along the walls. This quite simple and monotonous one room type remained typical for the following centuries. Only after the middle of the fourth century BCE some tombs of new aristocratic families – especially in Cerveteri, Tarquinia, and Vulci – become again more richly decorated with architectural elements (pilasters, loculi/wall niches, beds) and painted or stuccoed elements (as in the famous Tomb of the Reliefs in Cerveteri belonging to the Matuna family). These imitated in an abstract way the central part of contemporary dwellings (atrium houses), while the smaller rooms reflected the bed chambers (*cubicula*) of those houses; in the tombs, these are reduced to simple loculi used for burials. The burial of the tomb's founding couple was particularly emphasized normally by a huge alcove in the center of the back wall according to the idea of heroization of the deceased (as in the Tombs of the Reliefs, Alcova, and Torlonia in Cerveteri and in the Mercareccia Tomb in Tarquinia). The huge number of burials of several generations underlines the continuity of the gentilician groups. Quite different is the tomb type with the barrel vaulting built in stone blocks which is documented first in the early Hellenistic period in Cerveteri (Tomb of the Demons in Località Greppe Sant'Angelo) and Orvieto and in the middle Hellenistic period mainly in the territories of Chiusi, Cortona, and Perugia. Completely different is the Velimna/Volumni Tomb at Perugia (second century BCE), with its symmetrical layout of several chambers grouped around a T-shaped nucleus resembling the patrician *atrium-tablinum* house type, which was obviously of Etrusco-Italic origin and goes back to the Archaic period.

Tomb Monuments: Typology, Chronology, Diffusion, and Elements of Decoration

The Etruscan word for a tomb monument, cippus, or sema is "*cana*" (Steingräber 2010). Among the tomb monuments, we have to distinguish between stone circles (interrupted and continuous, especially in Vetulonia and Marsiliana d'Albegna); tumuli and tumuletti (especially in the seventh and first half of the sixth century); cubes, half cubes, and false cubes (from the second half of the sixth century to the third century); houses (mainly in the sixth century); porticus (mainly in the sixth and third centuries); and temples, aediculae, and tholoi (mainly in the third century). A great change was connected with the construction of large tumuli (diameters up to 80 m) both in South and North Etruria (Fig. 5) replacing the small "Archaic tumuli" and with the definitive confirmation of a new leading aristocratic class, the so-called principes. The large tumuli of the Orientalizing period – characterized normally by a base with a profile – often contain more chamber tombs, in a few cases as many as six or seven.

Tombs, Etruscan, Fig. 5 Cerveteri, Banditaccia necropolis: tumulus with chamber tomb (seventh century BCE)

Tombs, Etruscan, Fig. 6 Populonia, San Cerbone necropolis: Aedicula tomb (sixth century BCE)

These tombs go back often to different periods and present a different typology. Each tumulus belonged to a particular family or *gens* and served for several generations. The oldest tomb in a tumulus is always oriented toward the northwest, which means toward the section of the underworld gods on the Etruscan celestial partition. After the middle of the sixth century BCE, the cube tombs with their square appearance prevailed particularly in Cerveteri, in the South Etruscan rock tomb area (Blera, San Giuliano, Tuscania), and in Orvieto. In Populonia, the tumuli were replaced by built aedicula tombs with characteristic gabled roofs (Fig. 6) and smaller sarcophagus and stone cist tombs. Tomb monuments of the second half of the fourth and the third century became richer

again as their external facades were often revaluated by architectural and sculptural decorations. In some cases, the old fashioned tumulus was used again as a tomb monument (Tomba Torlonia at Cerveteri).

Elements for the Cult of the Dead: Typology, Functions, and Materials for the Rites and Sacrifices

Etruscan tombs and tomb monuments did not serve only as burial places but also as sites for funeral rites and for the worship of the dead. Particular – mostly architectural – elements were destined exclusively for the cult and rites in honor of the deceased and ancestors (Steingräber 1997). Some of these elements are of monumental character and size. In Cerveteri (Tomb of the Five Chairs) (Fig. 1), Vulci, and San Giuliano (Cima Tomb), we find tomb chambers with remains of altars, thrones and chairs, tables, and chests in stone, but without any burials which functioned exclusively as cult rooms for sacrifices and burial rites. Many tumuli – specially in Cerveteri – have ramps or added platforms (like in Artimino) or terraces. Most cube tombs have lateral stairs which allow one to climb to the top of the monument, obviously for ritual purposes. The upper platforms of the cube tombs have the size and function of monumental altars. Some special areas with benches could be used for funeral banquets. The most impressive example is the so-called terrace altar of the Tumulo del Sodo II in Cortona-Camucia decorated with palmettes of Ionic style and two sculptural groups dating from the late Orientalizing period. From this monumental terrace altar, one could climb up to a naiskos/aedicula on the top of the huge tumulus. Both structures were clearly intended for funeral rites and ceremonies. Open squares and "ritual theaters" are documented also in Grotta Porcina near Blera (in combination with a round altar), Vulci (in front of the Cuccumella tomb), and Tarquinia (in front of the Luzi tomb).

Rock Tomb Architecture: Diffusion, Typology, Chronology, and "Ideology"

This phenomenon is unique in Italy and characteristic of the inner parts of South Etruria (today mainly the Province of Viterbo) from the first half of the sixth to the third/second century BCE (Colonna di Paolo 1978; Steingräber 2009). We find the most important examples of rock tombs – with a rich typology including cube, house, aedicula, temple, porticus, and tholos tombs – in the Archaic period in Tuscania (Fig. 7), San Giuliano, and Blera and in the Hellenistic period in Norchia, Castel d'Asso, and Sovana (Figs. 8, 9, and 10). The most common type was the cube or

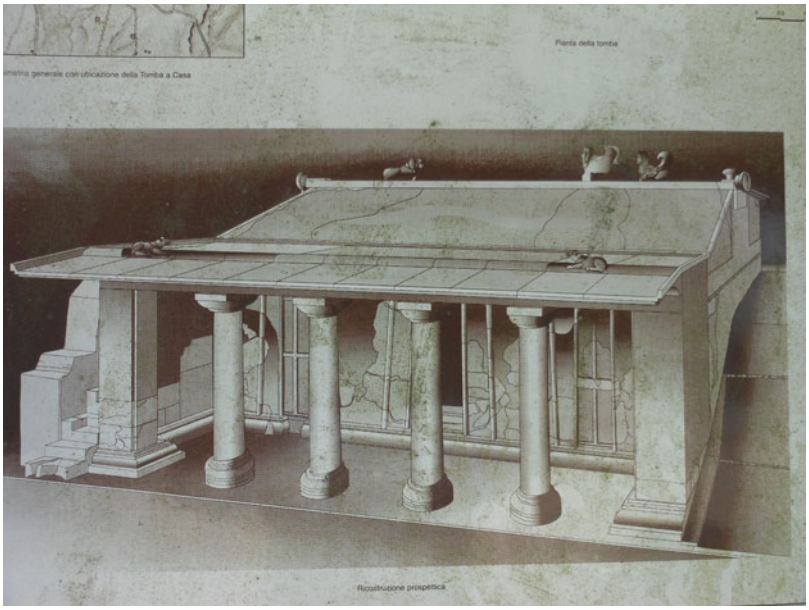

Tombs, Etruscan, Fig. 7 Tuscania, Pian di Mola: rock tomb in house shape with porticus (sixth century BCE)

Tombs, Etruscan, Fig. 8 Sovana: model of the Ildebranda Tomb = rock temple tomb (third century BCE)

Tombs, Etruscan, Fig. 9 Sovana: pediment of the Tomba dei Demoni alati = Tomb of the Winged Demons (third century BCE)

half cube tomb most probably inspired by the – partly constructed – cube tombs of Cerveteri. Influences of palace architecture manifest themselves particularly in the facade of the house tomb with porticus at Pian di Mola near Tuscania of the early Archaic period (Fig. 7). The most noble rock tombs such as the temple and porticus tombs of Norchia (Doric tombs, Lattanzi Tomb) and Sovana (Ildebranda (Fig. 8) and Pola Tomb) reveal influences from temple and palace architecture. Great attention and care were paid especially to the external appearance of the rock monuments and facades characterized by profiles, doors, and false doors of the so-called Doric type and by painted and sculpted decorations (Figs. 9 and 10). Most of them not only served as burials but also as cult places and monumental altars.

Tombs, Etruscan, Fig. 10 Sovana: Tomba della Sirena = Tomb of the Siren, an aedicula tomb with a Skylla relief in the pediment and a sculpture of a demon (third century BCE)

Tombs, Etruscan, Fig. 11 Bomarzo: "Piramide" = "Pyramid," a monumental rock altar (first century BCE–first century CE)

Rock Monuments of the Late Etruscan and Roman Period

The Etruscan tradition of rock monuments mostly of funerary character continues even in Roman times, specially in the first century BCE and the first century CE and particularly in the area between the Monti Cimini and the Tiber valley around Bomarzo (Fig. 11), Soriano nel Cimino, and Vitorchiano. They offer a rich typology and are partly characterized by Latin inscriptions indicating the names – often of Etruscan origin – of the deceased, the patrons, and some divinities such as the Bona Dea (Steingräber and Prayon 2011).

Tombs, Etruscan, Fig. 12 Cerveteri, Banditaccia necropolis: monumental stone cippus in house shape near the Tomba delle Cinque Sedie = Tomb of the Five Chairs (seventh century BCE)

Burial Gifts: Composition, Materials, Quantity/Amount, Quality/Value, Provenance, Local and Foreign Elements, and "Ideology"

The composition, materials, quantity, and quality of the burial gifts – in most cases unfortunately, not more complete and intact – give us a lot of information about age, sex, social status, and taste of the deceased and of course about chronology and duration of the use of a tomb. In addition, the composition of the burial gifts including often both local and foreign objects informs us about the economic and cultural relations between the respective Etruscan town and other Etruscan towns and foreign areas. Especially in the Orientalizing period, the burial gifts of the aristocratic tombs (*principes*), such as Regolini-Galassi Tomb in Cerveteri, were particularly rich including numerous imported exotic objects from different areas in the Near East, Egypt, and different areas of the Greek world.

Varia

Other important aspects concern tomb inscriptions, cippi, tomb sculptures, and tomb paintings. Tomb inscriptions are quite rare in the early periods apart from the Orvieto tombs (sixth century) but later documented on cippi and facades such as in Norchia and Castel d'Asso and in the painted tombs (mainly in Tarquinia). In the case of Orvieto's Crocifisso del Tufo necropolis, the inscriptions give us information about the different provenance of the tomb owners (from Umbria and even from the Celtic area). Stone cippi could be erected in front of the tomb entrance, upon the tomb monument, or sometimes even in the tomb and indicate specific burials (Fig. 12). Their size, material, and typology differ according to local customs and different periods in Etruria. Sculptures of wild animals and monsters as "guardians" in front of the tomb monument or tomb entrance – particularly in Vulci – were probably of an apotropaic character and especially common in the Archaic period. The phenomenon of tomb painting is typically Etruscan but was mainly concentrated in Tarquinia. Painted chamber tombs are documented in Etruria from the early seventh century until the late third century BCE. In addition to those painted tombs at Tarquinia, examples are also known from Veii, Cerveteri, Vulci, Orvieto, Chiusi, and some smaller sites. The rich and colorful iconography of these tomb paintings furnishes us with a great deal of information about Etruscan life and afterlife (Naso 1996; Steingräber 2006).

International Perspectives

Concerning the international/Mediterranean context of Etruscan tomb architecture and burial gifts, the following aspects are of particular interest:

1. Foreign influences, models, and parallels from/in Asia Minor (particularly in Phrygia, Lydia, Lycia, and Caria), Cyprus (Salamis), Syria (Ugarit), Macedonia, Apulia, Campania, Umbria, Sabina, and *Latium vetus*.
2. The spread of the so-called Macedonian barrel-vaulted tomb type via North Apulia/Daunia and Campania to South Etruria (Cerveteri, Orvieto) and later to North Etruria (Chiusi, Cortona, and Perugia).
3. Hellenistic temple and porticus tombs in the South Etruscan rock tomb area (Norchia, Sovana) clearly influenced partly by the mausolea and heroa of Asia Minor (concerning the general conception and "ideology") connected with the idea of heroization of the deceased and partly by decoration elements from Magna Graecia and Apulia.
4. The burial gifts in Etruscan tombs – especially those of the seventh and sixth centuries BCE – offer us a lot of information about the international connections between Etruria and the Near Eastern areas (Cyprus, Phoenicia, North Syria, Assyria, Urartu, Egypt), the Greek world (Attica, Corinth, Euboea, Aegean islands, Eastern Greece/Ionia, Magna Graecia, and Sicily), Asia Minor, Carthage, and Sardinia.

Future Directions

Some of the main Etruscan necropoleis such as the Banditaccia necropolis of Cerveteri are not yet completely and sufficiently published. We should make every possible effort to close these painful gaps. Main desiderata should be considered by the way more international cooperation, the creation of valid and helpful databases, and still more paleoanthropological, paleozoological, and paleobotanical research for the reconstruction of general living conditions in Etruria and the preparation and publication of a well-organized handbook/manual on Etruscan necropoleis, tombs, and tomb architecture including the most recent excavations, discoveries, and research.

Cross-References

- ▶ Burial Practices and Tombs in the Roman World
- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ Iconography, Etruscan
- ▶ Tombs, Greek (Iron Age)

References

Akerström, A. 1934. *Studien über die etruskischen Gräber*. Uppsala: Almqvist & Wiksell.

Colonna, G. 1986. Urbanistica e architettura. In *Rasenna. Storia e civiltà degli Etruschi*, ed. G. Pugliese Carratelli, 369–530. Milano: Libri Scheiwiller.

Colonna di Paolo, E. 1978. *Necropoli rupestri del Viterbese*. Novara: Instituto Geografico de Agostini.

Demus-Quatember, M. 1958. *Etruskische Grabarchitektur*. Baden-Baden: Grimm.

Dennis, G. 1848. *The cities and cemeteries of Etruria*. London: J. Murray.

Drago Troccoli, L. 2006. *Cerveteri*. Roma: Istituto Poligrafico.

Izzet, V. 2007. *The archaeology of Etruscan society*. Cambridge: Cambridge University Press.

Naso, A. 1996. *Architetture dipinte: Decorazioni parietali non figurate nelle tombe a camera dell'Etruria meridionale (VII – V secolo a.C.)*. Roma: L'Erma di Bretschneider.

Oleson, J.P. 1982. *The sources of innovation in later Etruscan tomb design (ca. 350–100 BCE)*. Roma: Giorgio Bretschneider Editore.

Prayon, F. 1975. *Frühetruskische Grab- und Hausarchitektur*. Heidelberg: F. H. Kerle.

Prayon, F. 1986. Architecture. In *Etruscan life and afterlife*, ed. L. Bonfante, 174–202. Detroit.

Prayon, F. 2000. Tomb architecture. In *The Etruscans*, ed. M. Torelli, 334–343. Milano: Bompiani.

Riva, C. 2010. *Urbanization of Etruria – funerary practices and social change, 700–600 BC*. Cambridge: Cambridge University Press.

Steingräber, S. 1981. *Etrurien. Städte, Heiligtümer, Nekropolen*. München: Hirmer.

Steingräber, S. 1997. Le culte des morts et les monuments de pierre des nécropoles étrusques. In *Les Etrusques: les plus religieux des hommes. Etat de la recherche sur la religion étrusque*. Actes du colloque International, ed. F. Gaultier and D. Briquel, 97–116. Paris: Rencontres de l'École du Louvre.

Steingräber, S. 2003. The process of urbanization of Etruscan settlements from the late Villanovan to the late archaic period. *Etruscan Studies* 8: 7–33.
Steingräber, S. 2006. *Abundance of life. Etruscan wall painting*. Los Angeles: Paul Getty Trust.
Steingräber, S. 2009. Etruscan rock-cut chamber tombs: Origins, characteristics, local and foreign elements. In *Etruscan by definition. Papers in honour of Sybille Haynes*, ed. J. Swaddling and P. Perkins, 64–68. London: British Museum Press.
Steingräber, S. 2010. Il monumento funerario etrusco dal VII al III secolo a.C.: genesi, sviluppo, significato. In *Monumento e memoria. Dall'antichità al aontemporaneo. Atti del Convegno, Bologna, 11–13 Ottobre 2006*, ed. S. De Maria and V. Fortunati, 7–15. Bologna.
Steingräber, S., and F. Prayon. 2011. *Monumenti rupestri etrusco-romani fra la Valle del Tevere e i Monti Cimini*. Canino Info Onlus: Grotte di Castro.

Further Reading

Barbieri, G., ed. 2010. *La Tomba dei Demoni alati di Sovana. Un capolavoro dell'architettura rupestre in Etruria*. Siena: Nuova Immagine.
Bartoloni, G. 2000. La tomba. In *Principi etruschi tra Mediterraneo ed Europa*, 163–190. Venezia: Comune di Bologna, Museo Civico Archeologico.
Bartoloni, G. 2012. L'architettura. In *Introduzione all'Etruscologia*, ed. G. Bartoloni, 253–308. Milano: Hoepli.
Becker, M.J., J. MacIntosh Turfa, and B. Algee-Hewitt. 2009. *Human remains from Etruscan and Italic tomb groups in the University of Pennsylvania Museum*. Biblioteca di Studi Etruschi, Vol. 48. Pisa: Istituto di Studi Etruschi ed. Italici, Fabrizio Serra Editore.
Boethius, A. 1978. *Etruscan and early Roman architecture*. Harmondsworth: Penguin Books.
Colonna, G., and F.W. von Hase. 1984. Alle origini della statuaria etrusca: la Tomba delle Statue presso Ceri. *Studi Etruschi LII*: 13–59.
Fedak, J. 1990. *Monumental tombs of the Hellenistic Age: A study of selected tombs from the pre-classical to the early imperial era*. Toronto: University of Toronto Press.
Gaugler, W.M. 2002. *The tomb of Lars Porsenna at Clusium and its religious and political implications*. Bangor: Laureate Press.
Haynes, S. 2000. *Etruscan civilization. A cultural history.* London: British Museum Press and the J. Paul Getty Trust.
Izzet, V. 1996. Exploring space and surface in Etruscan funerary architecture. In *Approaches to the study of ritual. Italy and the ancient Mediterranean*, ed. J.-B. Wilkins, 55–72. London: Accordia.
Mandolesi, A. 2008. Ricerca sui tumuli principeschi orientalizzanti di Tarquinia. Prime indagini nell'area della Doganaccia. *Orizzonti* 9: 11–25.
Martinelli, M., and G. Paolucci. 2006. *Luoghi Etruschi*. Firenze: Scala.
Moscatelli, G., and G. Mazzuoli. 2008. *Le necropoli rupestri della Tuscia*. Grotte di Castro: Canino Info Onlus.
Naso, A. 1996. Osservazioni sull'origine dei tumuli monumentali nell'Italia centrale. *Opuscula Romana* 20: 69–85.
Naso, A. 1998. Tumuli monumentali in Etruria meridionale: Caratteri propri e possibili ascendenze orientali. In *Archäologische Untersuchungen zu den Beziehungen zwischen Altitalien und der Zone nordwärts der Alpen während der frühen Eisenzeit Alteuropas*. Akten des Kolloquiums Regensburg, 117–157. Regensburg.
Naso, A. 2007. Etruscan style of dying. Funerary architecture, tomb groups and social range at Caere and its hinterland during the seventh–sixth centuries BCE. In *Performing death. Social analyses of funerary traditions in the ancient Near East and Mediterranean*, 141–162. Chicago: Oriental Institute.
Prayon, F. 2006. *Die Etrusker. Jenseitsvorstellungen und Ahnenkult*. Mainz: Zabern.
Steingräber, S. 1996. New discoveries and research in southern Etruscan rock tombs. *Etruscan Studies* 3: 75–104.
Steingräber, S., ed. 2000. *Investing in the afterlife – royal and aristocratic tombs in ancient Etruria, Southern Italy, Macedonia and Thrace*. Exhibition catalogue. Tokyo: The University of Tokyo Museum.
Zifferero, A. 2000. *L'architettura funeraria a Populonia tra IX e VI secolo a.C. Atti del Convegno, 30–31 Ottobre 1997*. Firenze: All'Insegna del Giglio.

Tombs, Greek (Iron Age)

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Introduction

Funerary evidence is one of the traditional fields of Greek archaeology, but only in relatively recent times has it developed as a major source in its own right for the study of Greek culture and society, the focus being traditionally on great public architecture and figurative art.

Historical Background

Among the many changes that took place in Greece between the end of the Bronze Age and the beginning of the Iron Age are those in burial

customs. Multiple burials disappear and individual pit or cist tombs become the new standard. Cremation also establishes itself, even though not across the whole Greek world and not all at the same time. In important regions such as Argolis, Boeotia, and some of the islands (Sporades, northern Cyclades, Kos), inhumation was still in use until the end of the eighth century BCE. In the Peloponnesus, cremation remains a minority practice. On Crete cremation is prevalent, but there the traditional collective graves remained in use. In many regions, the two practices coexist, with a ratio variable from one site to another. The adoption of one rather than the other ritual also depends on sex and age, as illustrated by an exceptional burial of the tenth century BCE, the so-called *heroon* of Lefkandi, a monumental apsidal building with two deep trenches, one for horse burials and the other for a cremated man and a inhumated woman. In general, cremation was reserved for adults, while children were inhumed and infants buried in large pots (*enchytrismos*).

Athens is the best known case study for the development of Iron Age burial customs (Morris 1987). Starting from the Protogeometric period (1050–900 BCE), cremation is standard for adults, or at least the vast majority of them, while children are inhumed. It appears that some burial grounds are used predominantly for adults and others for children. Indicators of sex are objects – weapons and ornaments – and the shape of the ash container, neck-handled amphorae for men and shoulder-handled or belly-handled for women. The cinerary urn is buried in a trench along with pyre debris and burnt offerings. Grave goods are usually few, chiefly pottery vases, pins, fibulae, rings, and bracelets. In the Early Geometric (900–850 BCE) graves, markers appear, undecorated stones and/or large vases, amphorae or craters, the latter reserved for men. Over the ninth century BCE and especially in its second half appear elite tombs with rich sets of grave goods including weapons, metal objects, gold jewelry, and ivory and faience imports, (Fig. 1) while child tombs become rare and the overall number of graves decreases. In the eighth century BCE, inhumation returns as the main ritual, but cremation is also found, in some cases in burials with bronze cauldrons as ash containers. These may allude not only to banquets and consumption of boiled meat, but also to myths in which cauldrons are used for magic rituals of regeneration and rebirth. Vases used as grave markers grow to monumental size and are decorated with scenes of funerary ritual such as the laying out of the body, and its being borne out to the grave. The second half of the eighth century BCE brings about many changes. Large family burial grounds featuring many tombs of children appear, and there is high variability in the composition of sets of grave goods and in the details of funerary behavior. In the last decade of the century, elite tombs are found mostly in the rural districts, while burials become more standardized in the city cemeteries. These new developments have been interpreted against the background of the formation of the polis and its ideology.

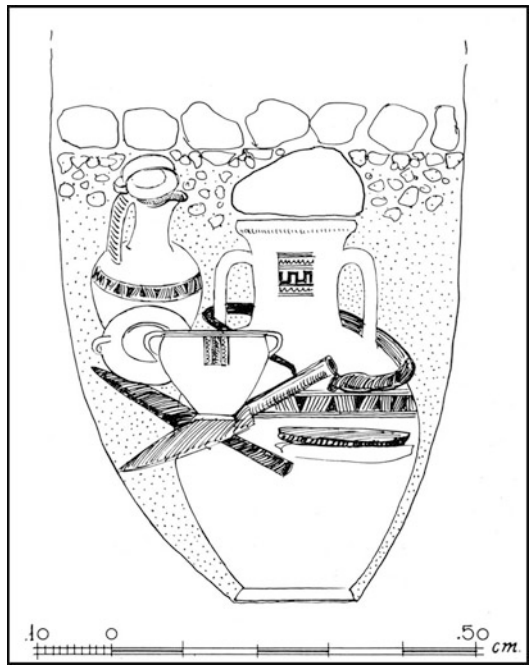

Tombs, Greek (Iron Age), Fig. 1 Athens, male cremation burial, c. 900 BCE. (From *Hesperia* 21, 1952)

A very different trend is visible in the seventh century BCE, not only in the number of graves, but also in the burial customs. Cremation returns and there is a strong increase of practices that give the dead a heroic status (e.g., Houby-Nielsen

1996). The body is burnt directly inside the trench (a ritual that in the *Iliad* is reserved to Patroclus), together with very few or no objects, while other offerings are found in deposits separated from the grave, among which the so-called offering ditches. These are remains of table-like structures made of wood and bricks on which food and fine banquet pottery was burnt. After the fire had died down, the ditches were sealed and covered by mounds or funerary buildings topped by large vases or stone markers. Mounds of the seventh century are clustered in family plots and remain in use sometimes for a very long time.

In the sixth century BCE, some aspects of the funerary ritual become simpler (end of the offering ditches, smaller mounds), perhaps as the result of laws against luxury in funerals mentioned by Cicero (*de Leg*. 2.64). However, stone stelai and statues are now largely used as a permanent sign of elite status, which ensure the lasting memory of the name and the rank of the dead. Two new large mounds are also built, one according to some scholars for the *genos* of the Alcmeonids, the other for foreign ambassadors of the period of the tyrants. The archaic cemetery near the agora, used between c. 560 and 500 BCE, has been attributed to the Peisistratids because of its location. However, it seems unlikely that these tombs, which were protected by a wall that was repaired after the Persian invasion and were respected for centuries, actually belonged to the tyrants. More likely this is a burial ground relative to the Areopagus that ceased to be used when the city space was more rigorously defined.

Outside of Athens evidence is less abundant, but some trends are visible. In the eighth century BCE at Argos, where inhumation was the norm, the upper classes used large cist tombs, among which some had full panoplies of weapons, probably alluding to the ideal of the Homeric hero, while ordinary burials are in large jars. In the same period, exceptional offerings, including monumental bronze tripods, were dedicated in the city sanctuaries as a clear demonstration of the emergence of an aristocratic class that publicly displays its status. At the end of the eighth century BCE, weapons are not included in burials anymore, a trend that is also found in the rest of the Greek world. With the disappearance of the tombs of hero warriors, exceptional offerings are exclusively reserved for the sanctuary, the common space where the aristocracy can display its status in a less strictly personal and familiar setting. The formation of an egalitarian ideology within the ruling class may also be reflected in the standardized Argive burial practices of the seventh century BCE, based on multiple burials inside large jars.

The model of the Homeric hero warrior is also important in Euboea. At Lefkandi, tombs cluster around the tumulus built on the Protogeometric *heroon*. At Eretria, adults are cremated either directly in pits or on pyres and their remains are collected in bronze cauldrons. A small group of seven adult graves arranged around a central male burial is exceptional not only because of the use of bronze cauldrons for men and women alike and their select grave goods – weapons and ornaments only – but also because of their location and their later history. When the city wall was built in about 680 BCE, the small cemetery, now just inside the West gate, was transformed into a hero shrine protected by an enclosure and marked by a triangular monument. This transformation is considered by some a strategy of the polis to appropriate the ancient "heroes" turning them into public figures, while others think that it was actually their own *genos* who, by making the tombs of their ancestors the object of public cult, claimed for the family a permanently prominent role in the developing polis.

Aspects of this funerary tradition are passed to the Euboean western colonies in Italy. At Pithecusa, there are no "hero" graves, but the burial customs are similar, with cremation for adults, inhumation in pits for adolescents, and *enchytrismos* for infants. The cemetery is organized in tight family clusters. At Cuma, however, are also present elite cremation burials with bronze cauldron. Tomb 103 of Fondo Artiaco stands out for its rich set of personal ornaments and silver vases, which compares with princely burials of contemporary Etruria, Latium, and Campania. Between the late eighth and the early seventh century BCE, Euboean funerary customs influenced those of the elites of central Tyrrhenian Italy and constituted one of the components of a

common culture which crossed ethnic difference and emphasized common class belonging.

The development of strong aristocracies in the Archaic age may also account for the reappearance of chamber tombs in some regions of the Greek world such as Cyrene, Thera, Aegina, Samos, Miletus, and Rhodes. Crete is a special case because of its traditionalism, which is the reason for the continuing use or reuse of *tholos* tombs and the fortune of chamber tombs. In some Eastern Greek poleis (Chios, Clazomenae, Ephesus, Smyrna, Larissa-on-the-Hermos, Pitane), elite tombs, frequently in sarcophagi, are covered by tumuli, perhaps after the Lydian model. Chamber tombs, some of which imitate banquet halls (Fig. 2), are also found at Taras until c. 470 BCE, when these and other manifestations of aristocratic culture fall into disuse, probably because of local political developments (Lippolis 1994). More isolated occurrences are found in other areas, such as the monument of Menekrates on Corfu, a massive cylindrical building of a type which is also known at Athens.

In the fifth century, there is a general decrease of funerary luxury while the city structures develop and increase their control. In Athens, funerary sculpture declines sharply and monumental tombs cease, the exception being the continuing use of ancient mounds, probably a surviving privilege of aristocratic *genoi*. In the cemeteries of Athens, inhumation is the prevailing ritual, but cremation does not disappear and is found in variable ratios in different burial grounds. Adults are buried in individual pit tombs, pits lined with slabs, tile graves, and sarcophagi, while children are buried in reused

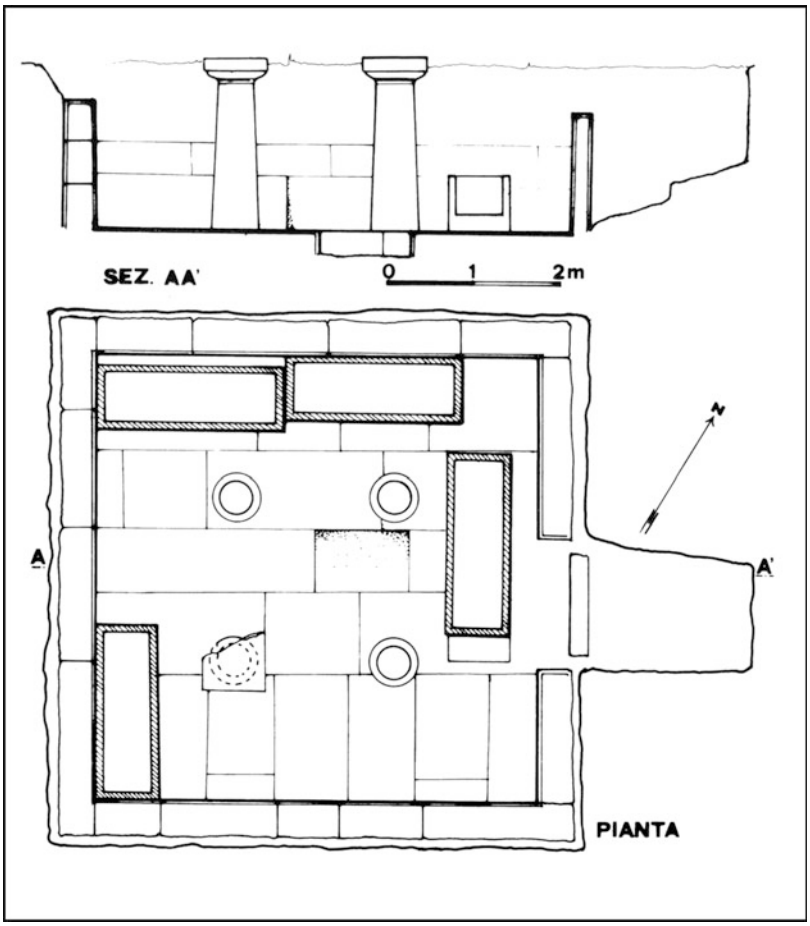

Tombs, Greek (Iron Age), Fig. 2 Taras, chamber tomb. (From Lippolis 1994)

amphorae, pots, clay tubs, small tile graves, and small sarcophagi. Cremation is both primary and secondary, with a variety of ash containers including bronze vases. The overall impression of homogeneity is in part contradicted by the differences between cemeteries both in ritual and selection of grave goods, for instance, in the presence or absence of *lekythoi* (bottles for perfumed oil), on which tombs and grave markers are frequently represented (Fig. 3). In general, burials are accompanied by only a few objects, including vases for perfumed oil, cups, bowls, and jugs, and small lidded containers.

In the last quarter of the fifth century BCE, when the polis structures are under pressure because of the Peloponnesian War, leveling ideology seems to be less effective. Funerary luxury reappears in form of figured stelai, monumental tombs and family enclosures lined along the roads entering the city. Selection of individuals with formal burial is now stricter and the number of tombs of children drops.

Tombs, Greek (Iron Age), Fig. 3 Athenian white-ground lekythos with woman at a tomb. (From *Annali dell'Istituto Orientale di Napoli, sezione di Archeologia e Storia Antica* 1988)

In the fifth century BCE, similar trends of standardization of burial practices are also found in the rest of Greece. One of the most spectacular cases is the South cemetery of Poseidonia (Italy), established in the early fifth century BCE following an extremely regular layout (Cipriani 1989) (Fig. 4). Graves uniform in type and size (pits and cists) and arranged in parallel rows occupy intensively all space available. There is no distinction between family plots, which are however visible in the North cemeteries, established when the city was founded c. 600 BCE. When present, objects in tombs are few and mark sex and age of the dead, and its related social role. Strigils and oil flasks alluding to the gymnasium are reserved for young men. This image of an ordered and egalitarian community, where differences depend on age and sex, not on birth and status, is projected at the time when the urban area undergoes significant transformations emphasizing collective identity, such as the construction of a hero shrine of the founder in the late sixth century BCE and of a round assembly building in the early fifth century BCE.

The most striking exceptions to the general rule are mostly limited to peripheral areas at the margins of the polis world, such as Sindos on the Thermaic Gulf, where burials are exceptionally rich. Tombs feature bronze objects, gold jewelry, weapons, miniature models of banquet instruments and wagons (four-wheeled for women and two-wheeled for men), and gold-leaf masks covering the face of the deceased. The burials of Sindos still represent the traditional image of the aristocratic *oikos* based on war, banquet, and luxurious lifestyle, which had disappeared in the rest of Greece with the full development of city structures.

However, as mentioned for Athens, in the last decades of the fifth century BCE, signs of the crisis of the egalitarian model of classical polis are visible in several areas of Greece, along with the diffusion of practices aimed at individual salvation such as the "Charon's fee." Coins are first found in burials at Corinth and other cities of Peloponnesus, and soon after in the rest of the Greek world including the Western colonies. The interpretation of this practice is not univocal, but

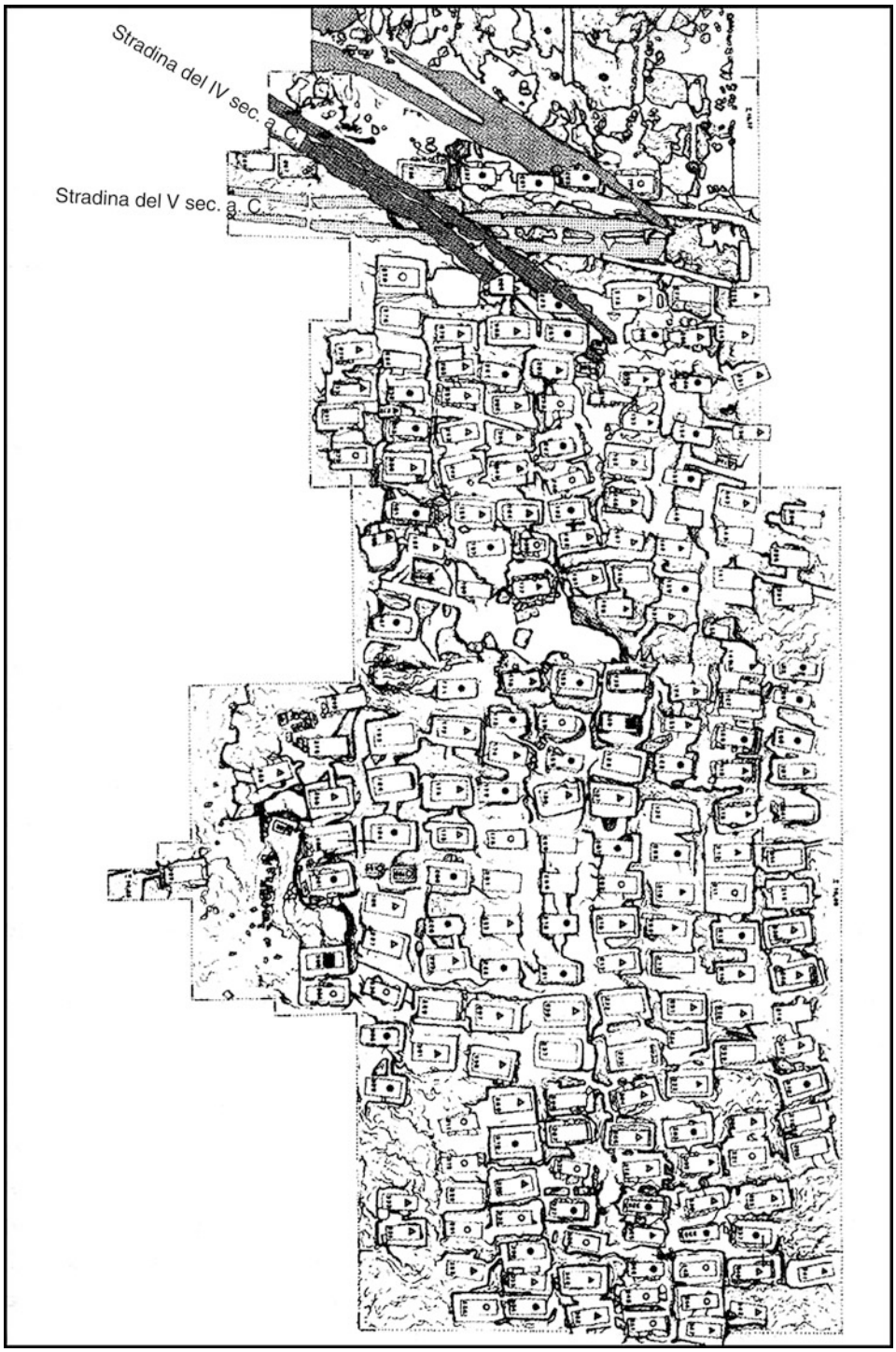

Tombs, Greek (Iron Age), Fig. 4 Poseidonia, cemetery of S. Venera. (From Cipriani 1989)

Tombs, Greek (Iron Age), Fig. 5 Athens, Kerameikos cemetery. (Photo by Giovanni Dall'Orto, Nov 12, 2009, copyright free – public domain on Wikipedia Commons)

its first literary mention in the *Frogs* of Aristophanes (vv. 140 and 270) sounds like the parody of a custom that was well known to the audience and was perceived as alien from the traditional polis culture supported by the playwright.

The fourth century BCE is a period of transition and continuing crisis in the egalitarian principles of the classical polis, as demonstrated by the blooming of Athenian funerary sculpture. The elites compete in the construction of impressive family tomb enclosures, with the wall facing the road in fine ashlar masonry topped by stelai, other markers of different shape, and sculptures of sirens, lions, and dogs (Fig. 5).

Demetrius of Phaleron, governor of the city established by Cassander, reacted against these trends in his laws, probably influenced by ideas developed within the Peripatetic school. Theophrastus, the successor of Aristotle, is said to have explicitly forbidden any ostentation and unnecessary expense for his own burial (Diog. Laert. 5.53). Cicero (*de Leg*. 2.66) mentions the legislation of Demetrius against funerary luxury, which included restrictions on grave markers. The effect of these measures was apparently serious and may have been a major factor in the sudden crisis of Attic funerary sculpture, which did not recover visibly even after the end of his rule. The political and economic decline of the city probably also played a role. In the Hellenistic age, tomb enclosures were still in use, but were not as monumental as they used to be. In Hellenistic Attica, cremation became more frequent, but in general, burial customs did not change much. Among the new elements are gold wreaths that mark the heroic status of the dead, following the cultural trends of the period, and the diffusion of the "Charon's fee."

It is not in Athens but in other regions of the Hellenistic world that change in burial customs is most apparent, frequently influenced by trends that had developed outside the Greek world, in regions where Greek architecture and art had been adapted to meet the needs of very different societies (Fedak 1990).

In Macedonia, the aristocracy was buried in tombs marked by monumental mounds. The "heroic" ritual of cremation in metal urns (including gold and silver) probably alludes to the model of the Homeric poems, which were an integral part of the culture of the Macedonian elite. References to the "Homeric" customs were combined with eschatologic doctrines. The crater used as ash container in a tomb of Derveni is

decorated with scenes of complex Dionysiac symbology, and in the pyre debris were fragments of a papyrus containing a philosophical and religious treatise. Grave goods, when they have escaped looting, are very rich. The royal burials were accompanied by precious weapons, sets of silver and bronze vessels, and luxury items of all kinds. In the second half of the fourth century BCE, a specific tomb architecture developed in Macedonia, consisting of a mound covering a barrel-vaulted chamber with an architectural facade, and often enriched by wall paintings and sculptured stone beds and thrones (Fig. 6). This typology remained typical of Macedonia and had limited influence outside the kingdom, mostly in the bordering regions of Thrace, Epirus, and Thessaly, but it might have influenced the development of chamber tombs with architectural facade in other areas of the Hellenistic world.

Another influential tradition is that of the monumental tomb-heroon which had developed in Asia, where local elites had long adopted Greek architectural and stylistic models for original creations. An early example is the Monument of the Nereids at Xanthos in Lycia, a synthesis of the local tradition of tombs set at the top of a rectangular pillar, and Greek temple architecture and sculpture (Fig. 7). This trend is also seen in the Mausoleum of Halicarnassus, an awe-inspiring dynastic tomb decorated by Greek artists, built in the center of the new capital of the Hecatomnids, which would be the inescapable model and comparison for every later monumental tomb. Monuments influenced by the Mausoleum typology – stepped base, tall podium, temple-like upper level with free or engaged columns, pyramid with sculpture group at the top – are, for instance, the Lion tomb at Knidos and the mausoleum of Belevi. The tomb of Mausolos is also the ultimate model of the many types of towering tombs of the late Hellenistic period, such as the "Tomb of Theron" at Akragas and the tower tombs of Numidia. This typology was also successfully adopted in Roman Italy (Coarelli and Thébert 1988).

In Asia, another kind of tomb architecture developed as well, rock-cut chamber tombs with an architectural facade. They were already known

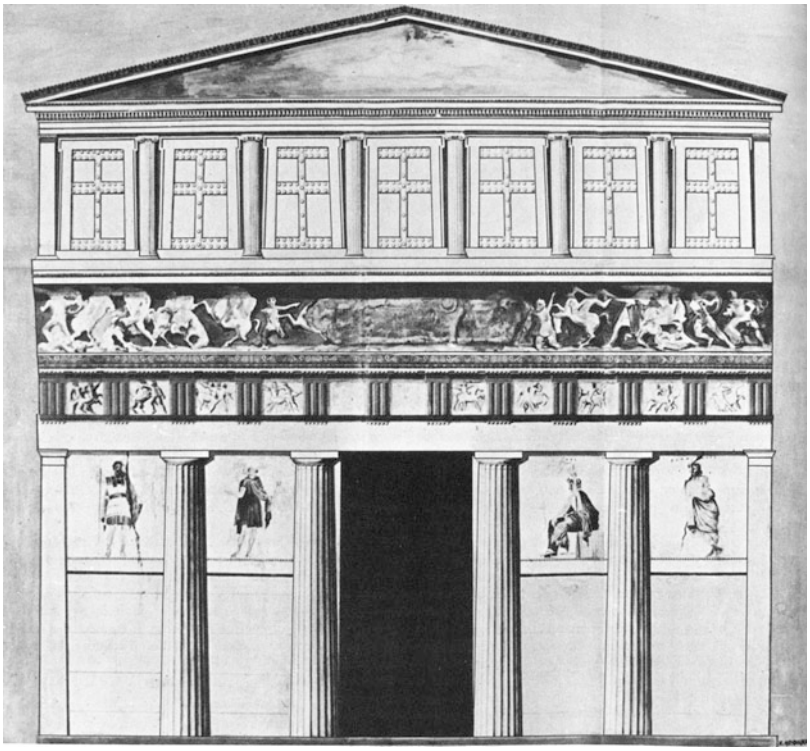

Tombs, Greek (Iron Age), Fig. 6 Facade of the Great Tomb of Leucadia. (From Charboneau et al. 1978)

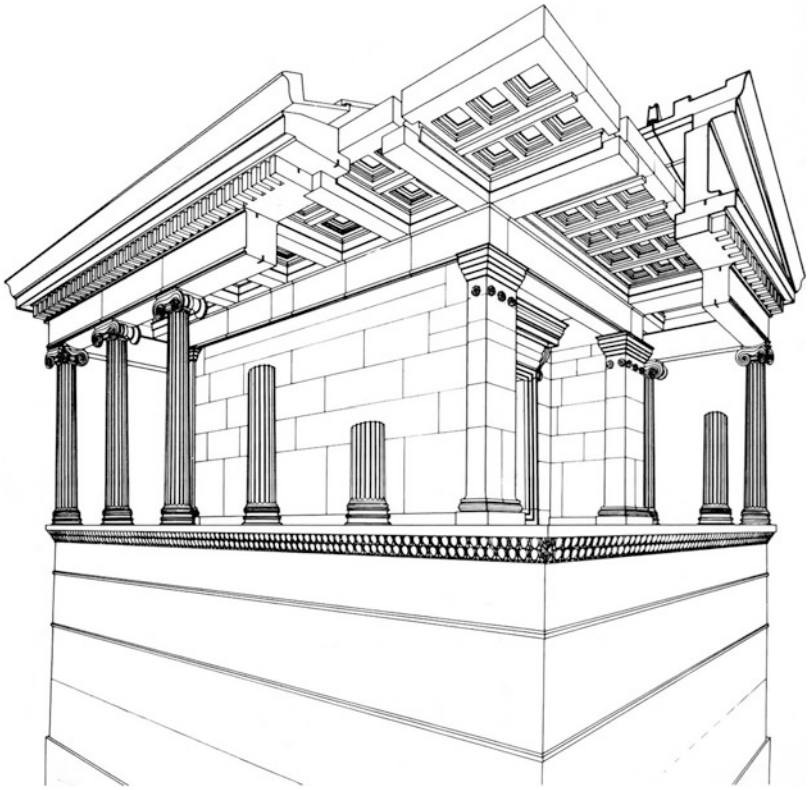

Tombs, Greek (Iron Age), Fig. 7 Reconstruction of the Monument of the Nereids of Xanthos. (From Bianchi Bandinelli and Paribeni 1976)

in the Persian Empire, for instance, in the royal necropolis of Naqsh-e Rustem. Elements of Greek architecture are progressively incorporated and their facade assumes the appearance of a temple-like architecture. These tombs are found over a large part of Anatolia, where suitable rock formations exist. The most conspicuous ones are in Lycia and Pisidia.

The tombs of the Hellenistic kings are largely unknown. Our main source of information on most of them is short and not very informative literary accounts. The most famous, the tomb of Alexander the Great in Alexandria, was probably covered by a tumulus and, after the renovation decided by Ptolemy IV, was incorporated into a complex also including the graves of the Ptolemies. The most reliable image of the monument is probably preserved by the Mausoleum of Augustus, who visited the tomb of Alexander and regarded him as a great model. If the tomb in its last version was actually a round monument with cylindrical podium, it may be the model of a series of round monumental tombs found both in the Hellenistic and Roman world. Except for the tombs of Vergina and the tombs of the vassal kings of Rome of the latest Hellenistic period, the archaeological record is quite small. The mausoleum of Belevi near Ephesus, which closely follows the model of Halicarnassus, might originally have been planned for Lysimachus, and some believe it was used for Antiochus II.

In the Hellenistic period, there is tension between the egalitarian classical tradition, which was still a revered ideological model in the Greek cities, and the rise of a select elite who was eager to express its status. In the cities of Asia Minor, the upper classes frequently limit their funerary representation to family enclosures with stelai following the tradition of late classical Attic sculpture, with the addition of banquet scenes where the deceased is accompanied by family and servants. Representations and epitaphs focus on the traditional moral and civic virtues. Nonetheless, especially in the advanced Hellenistic period, urban elites are more and more willing to follow different models of funerary

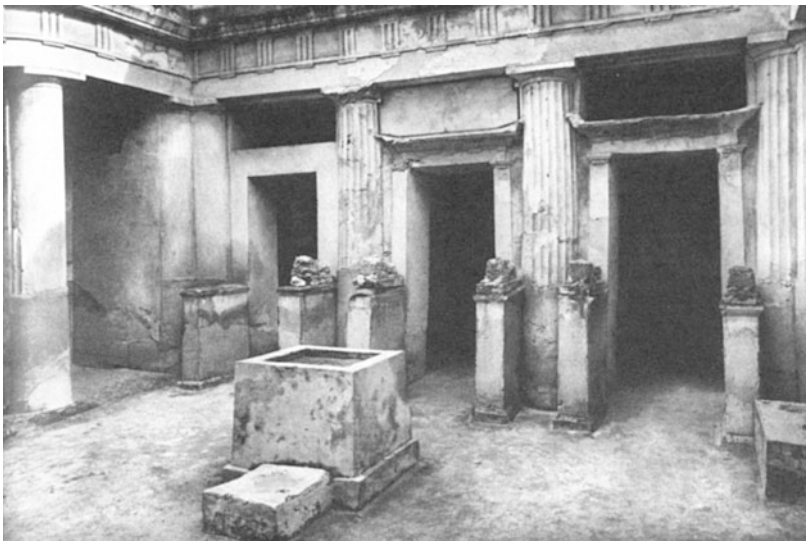

Tombs, Greek (Iron Age), Fig. 8 Alexandria, tomb 1 of the necropolis of Mustafa Pasha. (From Charboneau et al. 1978)

self-representation. The members of the elite are celebrated in cemeteries as heroes and receive exceptional honors (statues and inscriptions) in the urban setting. In the ancient Spartan colony of Taras, a new funerary tradition develops, featuring tomb monuments with complex architectural and figural decoration, chamber tombs, and richer sets of grave goods, while the earlier system, based on very standardized tomb typology and grave goods, slowly disintegrates (Lippolis 1994). In the family tomb of Archokrates on Rhodes, the model of the rock-cut tomb with architectural facade is expanded to form a sort of two-level theatrical stage including altars, a design which fits in with the general "theatralization" of many aspects of public life in the Hellenistic cities. Another monument exemplary of the developing trends is the tomb of Charmylos on Kos, with a semi-subterranean chamber and a two-storey upper building, including an inscription which states that the monument and the surrounding garden are sacred to the Twelve Gods and Charmylos, "hero of the Charmyloi."

In Alexandria, a metropolis of recent foundation, funerary customs are as diverse as its population. One of the most common is secondary cremation in urns of different types, among which is a type of *hydria* (water pitcher) with painted decoration and sometimes inscriptions. Inhumation is also practiced. There are both individual tombs and chamber tombs of different sizes, the largest with open courtyard arranged as a pseudo-peristyle with architectural facades, on which burial chambers open (Fig. 8). These are also found in areas under Ptolemaic authority (Cyprus and Cyrene). Other collective tombs are long corridors with a number of small loculi closed by slabs. Sometimes, especially in the later Hellenistic period, decoration is a blend of Greek and Egyptian elements.

The great variability of funerary behaviors and strategies of the Hellenistic periods, with some general trends and a number of local traditions, is not interrupted by the Roman conquest. Instead, it becomes a major component of the funerary culture of the Roman world.

Key Issues/Current Debates

In the last half century, the funerary rituals and the attitude to death of Greek society have been investigated by scholars of different schools. Both the Anglo-American Post-Processual Archaeology and the French and Italian Anthropology of the Ancient World have strongly criticized the search for universally valid "laws" in the interpretation of funerary evidence attempted by Processual Archaeology in the 1960s and 1970s (e.g., Saxe 1970; Binford 1971). From different points of view, both schools have stressed the complexity

of the relationship between burial customs and society. Funerary rituals, of which burials are the main evidence available to us, are considered as a complex system of symbols, which does not constitute an immediate and reliable representation of the society that produced it. Rather, in those rituals, the image of that society is constructed and re-interpreted through the filter of ideology, using a specific code of symbols (e.g., Hodder 1984; D'Agostino 1985). As a result, funerary practices reflect the identity of the dead as it is constructed and represented by the living based on their vision of life, death, and the relationship between these two dimensions. Therefore, burials, rather than representing the individual, are a major source of information on the group he/she belonged to. The two schools also agree on the need for integration of the funerary record with all other categories of evidence available in order to place it in its specific context and decipher its language.

Burials have been largely used as a major source for the study of Greek society in all its phases, but have played an especially important role for its earliest period, when literary and epigraphic evidence is scanty and the non-funerary archaeological record very incomplete. As a result, burial analysis has been central in the recent debate on polis formation. Scholars have outlined general trends which can be interpreted as products of the developing collective ideology of the polis, such as the abandonment of ostentatious funerary practices and the transfer of the richest offerings from the grave to the common space of the sanctuary. These are very stimulating results, even though the model of classical polis should not be automatically applied to the study of much earlier periods when social dynamics were substantially different (Polignac 1996).

International Perspectives

In the field of the study of Greek burials, the contribution of the Anglo-Saxon school – where theoretical debate has developed especially within Prehistoric archaeology and anthropology – has concentrated especially on the study of the so-called Dark Age. The work of I. Morris on the cemeteries of Athens between Submycenaean and the Archaic age still follows some principles of the Processual approach, namely, the use of quantitative analysis, but takes into account the great problem of representativity of funerary evidence, at least from the demographic point of view. In some phases, the Athenian cemeteries present an acceptable representation neither of the demographic nor of the social structure of the population. This picture is explained by assuming that access to a formal burial was restricted, and in some periods, it became the exclusive privilege of the elite. Statistic methods have been used by J. Whitley in his study of the relationship between artisanal production and social level in the grave goods of the Athenian Dark Age (Whitley 1991). Both works have received appreciation and criticism, especially regarding the issue of quantitative analysis (Shanks 1991; D'Agostino and D'Onofrio 1993). The utility of such methods was defended by Morris, although his theoretical position has become closer to Post-processual archaeology (Morris 1992). The French and Italian schools have focused especially on the most complex and structured aspects of Greek funerary evidence, such as the iconography of figured monuments, and its relationship to literary sources (e.g., Gnoli and Vernant 1982). Other important academic traditions, such as the German one, have also produced valuable contributions – e.g., the excavation of the Kerameikos cemetery – but the theoretical aspect has been less developed, particularly in classical archaeology. However, in the last decades, German classical archaeology has been more active in this field, with a special interest in the potential of quantitative methods (e.g., Graepler 1997).

Future Directions

In light of the current views of the nature and limits of the evidence, the prevailing attitude today leans toward the selection of relatively homogeneous and sufficiently large samples, especially if the data of the cemeteries can be integrated with those from settlements, cult spaces, literary tradition, etc. The actual availability of such samples has been scarce, though.

A very few Greek cemeteries have been extensively excavated, and even fewer are those where adequate procedures have been used, the majority of information being from salvage excavations. Cases like the necropolis of Pantanello in the territory of Metaponto, fully and accurately excavated, studied, and published (Carter et al. 1998), are still exceptions. Therefore, the state of the evidence often obstructs the use of Greek funerary evidence to its full potential. The systematic diffusion of analysis of human skeletal remains – still not a standard practice – is likely to have a dramatic impact. Current debates on demographic trends and representativity of funerary evidence are in fact largely based on reasonable but arguable assumptions about the archaeological indicators of sex and age. It is also to be expected that the increase of quality and quantity of data produced by the advancement of methods of analysis and the refinement of theoretical background will make the issue of the use of quantitative methods especially relevant in the near future.

Cross-References

- ▶ Burial Practices and Tombs in the Roman World
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Polis

References

Bianchi Bandinell, R., and E. Paribeni. 1976. *L'arte dell'antichita' classica. Grecia*. Torino: UTET.

Binford, L.R. 1971. Mortuary practices: Their study and their potential. *Memoirs of the Society for American Archaeology* 25: 6–29.

Carter, J.C., et al. 1998. *The Chora of Metaponto. The necropoleis*. Austin: University of Texas Press.

Charboneau, J., R. Martin, and F. Villard. 1978. *La Grecia Ellenistica*. Milano: ed. Rizzoli-Bur Arte.

Cipriani, M. 1989. Morire a Poseidonia nel V sec. a.-C. *Dialoghi di Archeologia s III* 7 (2): 71–91.

Coarelli, F., and Y. Thébert. 1988. Architecture funéraire et pouvoir: réflections sur l'hellénisme en Numidie. *Mélanges de l'École Française de Rome, Antiquité* 100: 761–818.

D'Agostino, B. 1985. Società dei vivi, comunità dei morti. Un rapporto difficile. *Dialoghi di Archeologia* 3: 47–58.

D'Agostino, B., and A.M. D'Onofrio. 1993. Review of I. Morris. Burial and ancient society: the rise of the Greek city-state. *Gnomon* 65: 41–51.

de Polignac, F. 1996. Entre le dieux et les morts. Status individuel et rites collectives dans la cite archaïque. In *The role of religion in the early Greek polis. Proceedings of the third international seminar on ancient Greek cult, Athens 1992*, ed. R. Hägg, 31–40. Stockholm: P. Aströms Förlag.

Fedak, J. 1990. *Monumental tombs of the Hellenistic age. A study of selected tombs from the pre-classical to the early imperial era*. Phoenix Supplementary Volumes series 27. Toronto: University of Toronto Press.

Gnoli, G., and J.P. Vernant, eds. 1982. *La mort, les morts dans les sociétés anciennes*. Cambridge: Cambridge University Press.

Graepler, D. 1997. *Tonfiguren im Grab. Fundkontexte hellenistischer Terrakotten aus der Nekropole von Tarent*. München: Biering & Brinkmann.

Hodder, I. 1984. Burials, houses, women and men in the European Neolithic. In *Ideology, power and prehistory*, ed. D. Miller and C. Tilley, 51–58. Cambridge: Cambridge University Press.

Houby-Nielsen, S. 1996. The archaeology of ideology in the Kerameikos: new interpretations of "Opferinnen". In *The role of religion in the early Greek polis: Proceedings of the Third International Seminar on Ancient Greek Cult*, ed. R. Hägg, 41–54. Stockholm: Svenska institutet i Athen.

Lippolis, E., ed. 1994. *Catalogo del museo nazionale archeologico di Taranto, 3.1. Taranto. La necropoli. Aspetti e problemi della documentazione archeologica tra VII e I secolo a.C*. Taranto: Scorpione.

Morris, I. 1987. *Burial and ancient society. The rise of the Greek city-state*. Cambridge: Cambridge University Press.

Morris, I. 1992. *Death ritual and social structure in classical antiquity*. Cambridge: Cambridge University Press.

Saxe, A. 1970. Social dimensions of mortuary practices. Unpublished PhD dissertation, Ann Arbor, University of Michigan.

Shanks, M. 1991. Some recent approaches to style and social reconstruction in classical archaeology. *Archaeological Review from Cambridge* 10: 164–174.

Whitley, J. 1991. *Style and society in Dark Age Greece*. Cambridge: Cambridge University Press.

Further Reading

D'Agostino, B. 1996. Le necropoli e i rituali della morte. In *I Greci. Storia, cultura, arte e società*, ed. S. Settis, vol. 2.1, 435–470. Torino: Einaudi.

Kurtz, D.C., and J. Boardman. 1971. *Greek burial customs*. London: Thames and Hudson.

Pontrandolfo, A. 1999. Le necropoli e i riti funerari. In *La città greca antica. Istituzioni, società e forme urbane*, ed. E. Greco, 55–81. Roma: Donzelli.

Tong Enzheng

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Basic Biographical Information

Tong Enzheng (1935–1997) was born in Hunan Province, Southern China, and obtained his BA and MA degrees in archeology from Sichuan University. He served as the Director of the University Museum and as Professor in the Department of History at Sichuan University. After moving to the United States in 1989, he held some short-term positions in a few universities in the United States with the last position being the Luther Gregg Sullivan Fellow of the Art Department at Wesleyan University. He passed away in 1997. Compared with the same generation of archeologists who were educated in China in the 1950s and 1960s, Tong achieved wide recognition due to his contributions to the archaeology of Southwest China. He also gained widespread recognition from the general public for his fiction novel and international fame for his involvements with western scholarship (Higham 2004; Von Falkenhausen 2014).

Major Accomplishments

In 1956, Tong was admitted to the history department of Sichuan University. In the summer of 1959, he followed his mentor Professor Feng Hanji, who obtained his PhD from University of Pennsylvania and founded archaeology at Sichuan University, to visit some Neolithic sites in the Three Georges area. After the trip, he wrote the novel *Ghost of the Ancient Fog* in a week and published it the next year. The novel was very popular in China at the time, and many young students learned and even admired the mysterious profession of "archeology" after reading the "fog of the ancient gorge."

During the "Cultural Revolution," Tong, as with most Chinese scholars, was unfairly treated, and his research was interrupted. In 1978, Tong directed the excavation of Karuo site, the first Neolithic site in Tibet, and published archaeological reports with detailed information on the data and provided more than 40 carbon-14 dates. This was the first time the ancient nature of human activities on the Tibetan Plateau was revealed, and Tong is considered the founder of Tibet's modern archeology.

In 1984, Tong served as professor of history and the curator of Sichuan University Museum, which was established by Americans in the 1920s. He launched a series of renewal projects for the university museum exhibition and contributed to the very good reputation of this museum. He also founded an academic journal *Southern Ethnoarchaeology* with a special focus on South China and Southeast Asia and published work from scholars based outside China, which afford a different scope compared with the main archaeological journals of China at that time.

At the Chinese Archeology Annual Conference held in Changsha in 1989, he was elected as an executive committee member of the Chinese Archeology Society. At the same time, he actively supported the Tiananmen student movement and attracted widespread attention. In the autumn of that year, he worried about political persecution because of his bitter experiences during the Cultural Revolution, and so he immigrated to the United States. During his stay in the United States, he worked in several universities and continued to publish academic papers in Chinese and English.

Professor Tong's academic career can be broadly divided into two stages, with the first stage from 1964 to 1979. During this time, his research emphasized the Ba-Shu origin of local cultures as well as their close relationship with cultural traits from the Central Plains, celebrating the unity of early Chinese culture. Tong saw these connections as extending from the Bronze Age all the way back to the Paleolithic, which is exactly what he himself later criticizes in his review of "Thirty Years of Chinese Archaeology" as the expression of nationalistic trends within Chinese Archaeology (Tong 1995).

The second and last 17 years began as he visited scholars in the United States in 1980 and before his death in 1997. During this period, his

attitude clearly underwent a major transformation, and he emphasized the importance of Southern China and assigned the area an independent role within the story of cultural origins. The changes described above are strongly related to the excavations at Karuo as well as his research trip to the United States. The encounter with Tibetan sites made him aware of the potential that the archaeological material of the border regions held. His research stays at Harvard, on the other hand, brought him into contact with the developments of western archaeological research which had continued from the 1930s (Lü and Zha, 2014).

The main hallmark of Tong Enzheng's scholarly work is the model of the crescent-shaped cultural-contact belt proposed in 1987 (Tong 1987). As a research notion, this cultural belt stretched from Northeast China and Korea along the Tibetan borderlands all the way to Yunnan and is still widely used and cited by present-day archaeologists working in Southwest China and beyond (Hein 2014). In recent years the rising interests in far-reaching exchange networks in global discourse, Tong's crescent-shaped cultural-contact belt has been widely cited in contemporary archaeology (Rawson 2017).

Cross-References

- ▶ Chinese Archaeology in the Twenty-First Century
- ▶ Chang, Kwang-chih
- ▶ Marxism and Archaeology in the Soviet Union and China
- ▶ Tibetan Plateau, Archaeology of
- ▶ Wang Ningsheng

References

Hein, A. 2014. Diffusionism, migration, and the archaeology of the Chinese border region. In *The 'crescent-shaped cultural-communication belt': Tong Enzheng's model in retrospect*, ed. A. Hein, 1–17. Oxford: Archaeopress.

Higham, C. 2004. Crossing national boundaries: Southern China and Southeast Asia in prehistory. In *Uncovering Southeast Asia's past*, ed. A. B. Elisabeth, Ian C. Glover, Vincent C. Piggot, 13–21. The British Museum, London. Nus Press Singapore.

Lü, Hongliang, and Xiaoying Zha. 2014. Rethinking the crescent-shaped cultural-contact belt. In *The 'crescent-shaped cultural-communication belt': Tong Enzheng's model in retrospect*, ed. A. Hein, 49–56. Oxford: Archaeopress.

Rawson, J.M. 2017. China and the steppe: Reception and resistance. *Antiquity* 91 (356): 375–388.

Tong, Enzheng. 1987. Shilun Woguo cong dongbei zhi xinan de biandi banyuexing wenhua chuanbodai. In *Wenwu yu kaogu lunji,* ed. Wenwu Chunbanshe Bianjibu, 17–43. Beijing: Wenwu chubanshe.

Tong, Enzheng. 1995. Thirty years of Chinese archaeology (1949–1979). In *Nationalism, politics, and the practice of archaeology*, ed. P.L. Kohl and C. Fawcet, 177–197. Cambridge, UK: Cambridge University Press.

Von Falkenhausen, L. 2014. The life and work of Tong Enzheng. In *The 'crescent-shaped cultural-communication belt': Tong Enzheng's model in retrospect*, ed. A. Hein, 18–48. Oxford: Archaeopress.

Further Readings

Enzheng, Tong. 1998. *Tong Enzheng wenji (Five volumes.)*. Chongqing: Chongqing Chubanshe.

Topography of Rome

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Introduction

Since the topography of Rome is concerned with a range of evidentiary material, any approach must involve a detailed consideration both of landscape and cultural-historical material. It is also notable that while the textual and epigraphic corpora are static (by virtue of being ancient), archaeological material continues to emerge that has direct bearing on the study of the city's topography, as clearly demonstrated by the excavations undertaken for the construction of Rome's newest metro train line (Egidi et al. 2010). Such new discoveries always carry with them the possibility of rewriting in substantial ways the topography of the city.

Definition

Derived from Greek, topography literally means "place writing" and has, since the Renaissance, constituted a major branch of Roman studies. The topography of the city of Rome has come to be defined as its own subdiscipline within the field of Roman archaeology. As such, this area, by necessity, combines the study of the ancient literary and epigraphic record with the archaeological, architectural, and spatial study of the ancient city. The field is narrow in its purview but extremely interdisciplinary and involves the study of the city from its origins in the early first millennium BCE to the present day. Advances in digital recording and modeling promise to expand the scope of topographic studies.

Key Issues and Current Debates

The Site of Rome

The site of Rome comprises a number of steep-sided hills with relatively flat tops and subsummits in the valley of the Tiber River. The Tiber and Rome are essentially linked in that not only did the river help determine the site ideal for settlement and facilitate commerce, but its frequent flooding also provided continual challenges for managing and mitigating flood waters and the damage they caused (Le Gall 1953; Aldrete 2007). From the early Iron Age onward, these hills served as *loci* for human settlement. The initial instances of settlement in the Tiber valley came in the form of small village communities, distinguished in the archaeological record by means of the remains of domestic architecture (often executed in wattle and daub) as well as by means of burials. Prominent villages have been identified on the Palatine, Capitoline, and Esquiline hills, mostly by means of the discovery of outlying necropoleis related thereto; of special note is the Iron Age cemetery known as the *Sepolcretum* (Gjerstad *Early Rome II* 1956). The swampy and seasonally flooded valley surrounded by these hills initially served as a necropolis (a key area of which is known as the *Sepolcretum*) but later came to be transformed into a central civic space, the *Forum Romanum* (Coarelli 1983–1992). This formerly inundated space was made usable by a massive program of artificial landfills; those anthropic layers have been sampled and studied by archaeologists, including Giacomo Boni, Einar Gjerstad, and, most recently, Albert Ammerman (Gjerstad *Early Rome III* 1960; Ammerman 1990, 1996), leading to the conclusion that the intentional landfill project occurred during the seventh and sixth centuries BCE.

Early and Archaic Rome

The origins of the settlement we call Rome date to the Iron Age when independent village-sized communities gradually coalesced into a state-level archaic community. The state formation mechanisms remain a matter of scholarly debate, although recent proposals include theories that point to the sharing of power, resources, and territory among tribal leaders (Terrenato 2011). The foundation story perpetuated in antiquity from at least the third century BCE onward focused on legendary figures such as Romulus, making him the responsible party for Rome's foundation (Liv. 1.9–13; Ovid *Fast*. 3.167–258; Ovid *Ars* 1.101–34; Plut. *Rom*. 14–15). While some scholars relegate Romulus to the mythical margin, others embrace his historicity wholeheartedly (Carandini 1997, 2007). By the sixth century BCE, Rome was a powerful state, and the elite architecture of the city – both private and sacred – had achieved monumentality, with the poliadic temple of the city (*Iuppiter Optimus Maximus*) being the largest structure of peninsular Italy.

Republican Rome

The Republican period (fifth through first centuries BCE) may be characterized by Rome's growth, both in terms of human population and architectural elaboration. Overall, however, the Republican period often witnessed haphazard architectural development as even extensive projects often represented the interests and prerogatives of individuals rather than the organized efforts of a centralized, state-level program. To this end leading aristocrats and those attempting

to climb the ladder of the social hierarchy utilized Rome's physical space as a mechanism of message making in order to solidify personal and familial status in full view of the Roman populace. Showy personal monuments such as the *fornix Fabianus* (Val. Max. 3.2.17; Appian, *BellCiv* 1.16), the *sepulcrum Scipionum* (Cic. *Tusc*. 1.13; Coarelli 1972), or the *columna rostrata* of Gaius Duilius (Plin. *HN* 34.20) all served to cue collective memory responses on the part of the Roman viewership, all the while appropriately celebrating the dedicant and/or honorand. The commemorative force of Republican public monuments would be reinforced by Augustan dedications like the *summi viri* in the Forum of Augustus (Suet. *Aug*. 31) and the *fasti triumphales* (Degrassi 1954).

During the Republican period (fifth through first centuries BCE), the topographic development of the city of Rome can perhaps best be described as haphazard, given that during some periods (e.g., the fifth century), there is evidence of very little construction, while at other points (e.g., second and first centuries), an enormous amount of development unfolded. Various scholars have been able to produce fairly comprehensive listings of information on monumental building in the Republican period based on the study of the textual and archaeological records (Crawford and Coarelli 1977; Ziółkowski 1992).

The middle of the first century BCE altered the arc of Rome's topographic growth forever as the political arena spawned a series of powerful, charismatic leaders who deftly employed programs of public construction as a means to bolster claims of political legitimacy and endear themselves to the urban populace. Among these men Pompey the Great, Julius Caesar, and Augustus are notable, not only in that their building programs were well conceived (and generally well received) but also in that they provided a paradigm on the basis of which later imperial patrons would operate. Augustus' building program, described in his own words in his list of achievements (*Res Gestae Divi Augusti*), transformed the city, particularly with respect to its public and sacred architecture (Favro 1996).

Imperial Rome

The imperial city from the time of Augustus onward may be best characterized by programs of civic architectural patronage interrupted by periodic unrest that generally disrupted the city's fabric and its upkeep. The aforementioned Augustan building program created a high standard of achievement, as the scope and scale of this program would have been difficult to equal. Augustan complexes transformed the city, totaling hundreds of thousands of square meters of built surface in the form of civic, sacred, and familial buildings, not to mention infrastructure projects. Augustus' successors struggled with their roles as civic patrons, although the emperor Claudius notably expanded the *pomerium* of the city (Tac. *Ann*. 12.23.2–24). The great fire of Rome under Nero (64 CE) radically altered the imperial city as, in wreaking havoc in the city center, it cleared a large amount of land that was subsequently reallocated for imperial usage, most famously in the construction of the Neronian palace park known as the *Domus Aurea* (Plin. *HN* 36.111; Suet. *Nero* 31; Ball 2003). While the Neronian fire and subsequent program were radical, it was short-lived as the subsequent building programs of the Flavian emperors reallocated a good deal of space for public usage, some in quite ostentatious ways – notably the Flavian Amphitheater, *Templum Pacis*, and the Baths of Titus (Suet. *Vesp*. 9; Darwall-Smith 1996). The Flavian program moved Rome into the second century CE in a stable and reasonably well-maintained state, in spite of a second major urban fire in 80 CE. The second century, Rome's most stable and prosperous period, saw Rome benefit directly from the patronage from a string of adoptive emperors stretching from Trajan to the Antonines. Key monumental programs like the Forum of Trajan and its honorific column articulated imperial ideology while taking full advantage of the tableaux of Rome's urban landscape (Packer 1997; Meneghini 2006). Even after the end of the Antonine line, the model of the ideologically informed imperial building program continued to inform the actions of subsequent emperors, even those who found themselves in office in turbulent and uncertain times in the later second and third

century CE (DeLaine 1997; Cooley 2007); this continuity is also evident in public, commemorative monuments such as the Decennalia monument (*CIL* 6.1204).

Rome in Late Antiquity

The arrival of the fourth century CE signaled significant changes for the city of Rome. Its diminishing strategic and economic importance spelled a gradual end to monumental public building programs, especially after Constantine I transferred the center of administration to the city of Constantinople in the eastern Mediterranean. Nevertheless, the first third of the century witnessed massive building at Rome, in part to help bolster Constantine's claim to power. These programs included the completion of projects belonging to his predecessors, notably the *Basilica Nova* (Pol. *Silv.* 545), alongside new programs such as the Arch of Constantine adjacent to the Flavian Amphitheater (*CIL* 6.1139). All the while Constantine was further altering Rome's topographic history by making way for Christianity in the public sphere, creating a series of Christian basilicae at the urban periphery; these sites would prove vital in Rome's history as their role as pilgrimage locales would continue to make Rome relevant even after the fall of the western empire. It seems that the notoriety of Rome's monuments continued in Late Antiquity, as demonstrated by notable episodes such as the visit of Constantius II to Rome in the middle of the fourth century when he stopped and marveled at the Forum of Trajan (Amm. Marc. 16.10.15). Ex novo construction tapered off after the fourth century; the last ancient monument to be erected in the Forum Romanum was the Column of Phocas in 608 CE. The ancient city, with greatly contracted population, gave way to the Medieval city, wherein ties to the past were broken and ancient monuments both reused and cannibalized (Arena et al. 2001–2004). It would take the force of the Renaissance to reestablish links to the past.

Organization of the Ancient City

The organization of the ancient city of Rome began with the demarcation of its ritual boundary (*pomerium*), an act ascribed to Romulus. The *pomerium* was an essential and inviolable aspect of an Italic city, as it regulated actions connected to the settlement and the conduct of business inside and outside the limit. The regulation against adult intramural burial stems from the pomerial tradition. The same traditional foundation story holds that Romulus created a settlement centered on the Palatine Hill, referred to as *Roma quadrata* (Tacitus *Ann*. 12.24). The meaning of this term remains obscure, and scholars debate whether it refers to the *pomerium* of early Rome or perhaps to an augural *templum* of sorts. The growing city of Rome was eventually divided into districts (*regiones*), an act ascribed to Servius Tullius (r. 578–535 BCE). These regions (*regiones quattuor*) were named *Suburana*, *Esquilina*, *Collina*, and *Palatina* (Varro *LL* 5.45; Liv. 1.43; Dion. Hal. *Ant. Rom*. 4.14) and may have corresponded to latent tribal or familial identities in the early city. The 14 Augustan regions established in 7 BCE replaced these Servian districts (Lott 2004). Each district was further subdivided into neighborhoods (*vici*). This redistricting reflected a need for increased administration in a city whose burgeoning population must have stressed the central authority's resources. These regions (and their neighborhoods) served as administrative districts in the city and also may be connected to the creation of shared, place-based memory and identity. The ancient boundaries of the districts can be determined, although not with absolute certainty, by means of the late antique documents known as *Curiosum et Notitia* (The *Curiosum* (Vat. Lat. 1984, 3321, 3227) and the *Notitia* (Vienna *Latinus* 162)). These documents could have originated from the city's administrative apparatus, as the office of the urban prefect (*praefectus urbanus*) was responsible for city administration (for the documents, see Arce 1999).

Rediscovering Rome's Topography

It is difficult to pinpoint the time at which an awareness of Rome's topography started, but Athanasius Kircher (vix. 1601/1602–1680), the Jesuit polymath, certainly had an awareness of spatial studies vis-à-vis the archaeology of Rome, as demonstrated by his mapping of the Roman

Campagna (Kircher 1671; Evans 2012). This topographic awareness involved the exploration of ruins in the landscape, exemplified by the aqueduct hunter (and Kircher's contemporary) Raffaello Fabretti (vix. 1618–1700) and followed on the previous century in which papal authority had begun to direct the creation of plans of the city of Rome that came to include ancient ruins. The landmark plan of Leonardo Bufalini, published in 1551 under Pope Julius III, included reconstructed plotting of the ruins in the city and represented a new milestone in the mapping of the ancient city (see edition of Bufalini and Ehrle 1911). Bufalini's work would inspire the great topographers Giambattista Nolli (vix. 1701–1756) and Giovanni Battista Piranesi (vix. 1720–1778). The former's *Pianta Grande di Roma* was engraved on 12 copper plates and published in 1748. It is simultaneously an aesthetic masterpiece and a hyper-detailed rendering of the city of Rome from a bird's-eye perspective. It, along with Bufalini's plan, proved fundamental, influencing Piranesi in his creation of his various views – both fantastical and realistic – of the ancient city. Piranesi published his *Pianta di Roma e del Campo Marzio* in 1774 and his *Le antichità romane* in 1784. These cartographers certainly changed popular perception of Rome and began the process of contextualizing her many ancient ruins; they perhaps also carry forward an ancient worldview that also had an awareness of the city's topography. The rediscovery of the first fragments of the Severan marble plan or *Forma Urbis Romae* in 1562 represents a major milestone in the study of Rome's topography (viz., Bellori 1673). Incised on marble slabs, the Severan plan presents a view of third-century CE Rome at a scale of 1:240 and provides many clues as to how the Romans conceived of their own world (Reynolds 1996; Trimble 2008). The plan has been studied exhaustively and continues to be the focus of ongoing digital scholarship undertaken by Stanford University (Carettoni 1960; Rodriguez Almeida 2002). It is not clear whether the Severan marble plan was meant to be a functional map or a decorative installation; what is clear is that the orientation of the city differs radically from the traditional north-oriented maps used today. The Severan marble plan served as an enormously important influence in the nineteenth century when the pioneering Roman archaeologist and topographer Rodolfo Lanciani (vix. 1845–1929) produced his own landmark *Forma Urbis Romae* between 1893 and 1901. Lanciani's map, divided into 46 sheets, presented the city at a scale of 1:1000 and plotted the ancient topographic features (in black ink) and the modern urban features (in red ink). The *Forma Urbis Romae* influenced the twentieth-century projects, including Italo Gismondi's famous model of Rome ("Il Plastico") produced for the Museo della Civiltà Romana from 1935 onward. That model, at a scale of 1:250, shows the city of Rome at the time of Constantine I in the fourth century CE. Lanciani's map remains an important source for topographic studies. Ongoing efforts to publish and digitize Lanciani's papers represent important assets in this field.

Topographic Scholarship

The early to middle twentieth century saw the creation of other major topographic compendia, including the *Topographical Dictionary of Ancient Rome* produced by S. B. Platner and T. Ashby (1929), that built on the major nineteenth-century scholarship (Jordan and Hülsen 1871–1907). In the *Fontes ad topographiam veteris urbis Romae pertinentes* (1952), G. Lugli collected the relevant literary and epigraphic resources for the study of the topography of the city of Rome; these were organized in eight volumes according to the Augustan regions of the city. The *Fontes* are essential for the study of the city and its monuments in that a great deal of the specific, place-based knowledge that survives is preserved in textual form. The later twentieth century saw the publication of two major topographic lexica, one for the city of Rome itself (Steinby 1993–2000; continuing now in supplementary volumes) and another for its *suburbium* or hinterland (La Regina 2001–2008). These lexica record entries for named topographic features; an additional companion series has now been established to document the history of urban excavation at Rome (e.g., Coarelli and Battaglini 2004; Coarelli 2006), which taken along with Lanciani's fieldwork diaries (Buonocore 1997–present) that

provide invaluable insight into the process by which the topography of the city has been explored and, in many cases, clarified. Also worthy of mention is a pictorial compendium to the topography of the city compiled by E. Nash using the photographic archive of the Deutsches Archäologische Institut (Nash 1962). These photographs remain an invaluable resource for the study of the city and its archaeological remains. Series of twentieth-century excavations have produced numerous site- and/or monument-based studies that are invaluable for the study of the city and, in particular, its topographic problems. The *Atlante di Roma antica* (Carandini 2012) draws on this wealth of excavation information and presents reconstructed plan and elevation views for the ancient city. Reconstruction has also been the focus of targeted topographical studies, notably in the work of James Packer who has published exhaustive studies of the Forum of Trajan and the Forum Romanum (Packer 1997; Gorski and Packer 2015).

International Perspectives and Future Directions

The study of Rome's topography has always been possessed of an international dimension, as the collaboration between English, German, and Italian scholars drove the major advances in Roman topographic scholarship during the nineteenth century. The Anglo-Italian connection in topographic studies remains strong, cemented in the early twentieth century by Thomas Ashby, then director of the British School at Rome. In the twenty-first century, topographic scholarship continues to benefit from international cooperation; this is particularly true as digital initiatives, including linked data projects, continue to widen the reach of traditional scholarship. Projects such as Stanford University's digitization of the fragments of the Severan marble plan and the digital modeling of Rome undertaken by the University of California, Los Angeles, and the University of Virginia demonstrate that not only is the study of Rome's topography international in nature but that digital applications represent an important new phase field in this field of archaeological scholarship. These visualization studies move the wealth of topographic information and site-based knowledge into the virtual space, allowing for various modeling exercises (e.g., Johanson 2009; Favro and Johanson 2010). Just as field archaeologists have embraced the power and potential of digital visualization approaches, so too has Roman topography. This is true not only in terms of 3D modeling but also in terms of employing geographic information systems (GIS) as an instrument for field recording and post-excavation analysis. The potential of light detection and ranging (LIDAR) is now emerging as a revolutionary tool for studying both landscape and topography; in the case of a built environment like Rome, LIDAR allows for the construction of digital elevation models (DEM) and digital terrain models (DTM) that allow for ancient landscapes to be reconstructed. While these technologies represent the lead edge of today's scholarship, their aim is perfectly in line with the long history of the study of Rome's topography, from the sculptors of the Severan marble plan; to Bufalini, Nolli, and Piranesi; to Lanciani and Gismondi; and to the scholars of today. Scholarship focused on visualizing the topography of the ancient city is steadily moving not only into more detailed reconstructive illustrations and graphics (e.g., Digitales Forum Romanum http://www.digitales-forum-romanum.de) but also into the realm of virtual and augmented reality (e.g., Rome Reborn).

Cross-References

- ▶ Ashby, Thomas
- ▶ Boni, Giacomo
- ▶ Domestic Architecture, Roman
- ▶ Forum
- ▶ Lanciani, Rodolfo
- ▶ Vicus

References

Aldrete, G.S. 2007. *Floods of the Tiber in ancient Rome*. Baltimore: Johns Hopkins University Press.

Ammerman, A.J. 1990. On the origins of the forum Romanum. *American Journal of Archaeology* 94 (4): 627–645.

Ammerman, A.J. 1996. The Comitium in Rome from the beginning. *American Journal of Archaeology* 100 (1): 121–136.

Arce, J. 1999. El inventario de Roma: Curiosum y Notitia. In *The transformation of Urbs Roma in late antiquity*, Journal of Roman Archaeology, supplementary series 33, ed. W.V. Harris, 15–22. Portsmouth: Journal of Roman Archaeology.

Arena, M.S., et al. 2001–2004. *Roma: dall'antichità al Medioevo: archeologia e storia nel Museo nazionale romano Crypta Balbi*. 2 vol. Milan: Electa.

Ball, L. 2003. *The Domus Aurea and the Roman architectural revolution*. Cambridge, UK: Cambridge University Press.

Bufalini, L., and F. Ehrle. 1911. *Roma al tempo di Giulio III: la pianta di Roma*. Rome: Danesi.

Buonocore, M., ed. 1997. *Appunti di topografia romana nei Codici Lanciani della Biblioteca apostolica vaticana*. 5 vol. Rome: Quasar.

Carandini, A. 1997. *La nascita di Roma: dèi, lari, eroi e uomini all'alba di una civiltà*. Turin: Einaudi.

Carandini, A. 2007. *Roma: il primo giorno*. Rome: GLF editori Laterza.

Carandini, A., ed. 2012. *Atlante di Roma antica: biografia e ritratti della città*. 2 vol. Milan: Electa.

Carettoni, G. 1960. *La pianta marmorea di Roma antica (Forma urbis Romae)*. 2 vol. Rome: Ripartizione del Comune di Roma.

Coarelli, F. 1972. *Il sepolcro degli Scipioni*. Rome: Assessorato per le antichità, belle arti e problemi della cultura.

Coarelli, F. 1983–1992. *Il foro romano*. 2 vol. Rome: Quasar.

Coarelli, F. 2006. *Gli scavi di Roma 2, 1922–1975*. Rome: Quasar.

Coarelli, F., and G. Battaglini. 2004. *Gli scavi di Roma 1, 1878–1921*. Rome: Quasar.

Cooley, A. 2007. Septimius Severus: The Augustan emperor. In *Severan culture*, ed. S. Swain, S. Harrison, and J. Elsner, 381–393. Cambridge, UK: Cambridge University Press.

Crawford, M.H., and F. Coarelli. 1977. Public building in Rome between the Second Punic War and Sulla. *Papers of the British School at Rome* 45: 1–23.

Darwall-Smith, R.H. 1996. *Emperors and architecture: A study of Flavian Rome*. Brussels: Latomus.

Degrassi, A. 1954. *Fasti Capitolini*. Turin: G. B. Paravia.

DeLaine, J. 1997. *The baths of Caracalla: A study in the design, construction, and economics of large-scale building projects in imperial Rome*. Portsmouth: Journal of Roman Archaeology.

Egidi, R., F. Filippi, and S. Martone, eds. 2010. *Archeologia e infrastrutture: il tracciato fondamentale della linea C della metropolitana di Roma: prime indagini archeologiche*. Florence: Leo S. Olschki.

Evans, H. 2012. *Exploring the kingdom of Saturn: Kircher's Latium and its legacy*. Ann Arbor: University of Michigan Press.

Favro, D.G. 1996. *The urban image of Augustan Rome*. Cambridge, UK: Cambridge University Press.

Favro, D.G., and C. Johanson. 2010. Death in motion: Funeral processions in the Roman Forum. *Journal of the Society of Architectural Historians* 69 (1): 12–37.

Gorski, G., and J.E. Packer. 2015. *The roman forum: A reconstruction and architectural guide*. New York/Cambridge: Cambridge University Press.

Johanson, C. 2009. Visualizing history: Modeling in the eternal city. *Visual Resources: An International Journal of Documentation* 25 (4): 403–418.

Jordan, H., and C. Hülsen. 1871–1907. *Topographie der Stadt Rom im Alterthum*. Berlin: Weidmannsche Buchhandlung.

Kircher, A. 1671. *Latium, id est nova & parallela Latii tum veteris tum novi descriptio: Qua Quaecunque vel Natura, vel Veterum Romanorum Ingenium admiranda effecit, Geographico-Historico-Physico Ratiocinio, juxta rerum gestarum, Temporumque seriem exponitur & enucleatur*. Amsterdam: Apud Joannem Janssonium a Waeberge & haeredes Elizei Weyerstraet.

La Regina, A. 2001–2008. *Lexicon Topographicum Urbis Romae: Suburbium*. 5 vol. Rome: Quasar.

Le Gall, J. 1953. *Le Tibre, fleuve de Rome dans l'antiquité*. Paris: Presses Universitaires de France.

Lott, J.B. 2004. *The neighborhoods of Augustan Rome*. Cambridge, UK: Cambridge University Press.

Lugli, G., ed. 1952. *Fontes ad topographiam veteris urbis Romae pertinentes*. 8 vol. Rome: Università di Roma, Istituto di topografia antica.

Meneghini, R. 2006. I Fori Imperiali: ipotesi ricostruttive ed evidenza archeologica. In *Imaging ancient Rome: Documentation-visualization-imagination. Proceedings of the third Williams symposium on classical architecture, held at the American Academy in Rome, the British School at Rome, and the Deutsches Archäologisches Institut, Rome, on May 20–23, 2004*, Journal of Roman Archaeology Supplementary series, vol. 61, ed. L. Haselberger et al., 145–161. Portsmouth: Journal of Roman Archaeology.

Nash, E. 1962. *Pictorial dictionary of ancient Rome*. 2 vol. New York: Praeger.

Packer, J.E. 1997. *The forum of Trajan in Rome: A study of the monuments*. 2 vol. Berkeley: University of California Press.

Platner, S.B., and T. Ashby. 1929. *A topographical dictionary of ancient Rome*. Oxford: Clarendon Press.

Reynolds, D.W. 1996. Forma Urbis Romae: The Severan Marble Plan and the urban form of ancient Rome. Unpublished Ph.D. dissertation, University of Michigan.

Rodriguez Almeida, E. 2002. *Formae urbis antiquae: le mappe marmoree di Roma tra la Repubblica e Settimio Severo*. Rome: École française de Rome.

Steinby, E.M. 1993–2000. *Lexicon Topographicum Urbis Romae*. 6 vol. Rome: Quasar.

Terrenato, N. 2011. The versatile clans. The nature of power in early Rome. In *State formation in Italy and Greece. Questioning the neoevolutionist paradigm*, ed. N. Terrenato and D.C. Haggis, 231–244. Oxford: Oxbow.

Trimble, J. 2008. Process and transformation on the Severan Marble Plan. In *Cartography in antiquity and the Middle Ages: Fresh perspectives, new methods*, ed. R.J.A. Talbert and R.W. Unger, 67–97. Leiden: E. J. Brill.

Ziółkowski, A. 1992. *The temples of Mid-Republican Rome and their historical and topographical context*. Rome: "L'Erma" di Bretschneider.

Further Reading

Aronen, J., et al. 1989. *Lacus Iuturnae*. Rome: Edizioni De Luca.

Ashby, T., and I.A. Richmond. 1935. *The aqueducts of ancient Rome*. Oxford: Clarendon Press.

Augenti, A. 1996. *Il Palatino nel Medioevo: archeologia e topografia (secoli VI–XIII)*. Rome: "L'Erma" di Bretschneider.

Bellori, G.P. 1673. *Fragmenta vestigii veteris Romae ex lapidibus Farnesianis nunc primum in lucem edita cum notis*. Roma: typis Iosephi Corvi.

Carafa, P., and A. Carandini, eds. 1995. *Palatium e Sacra via I: prima delle mura, l'età delle mura e l'età delle case arcaiche*. Rome: Istituto poligrafico e zecca dello Stato. Libreria dello Stato.

Carandini, A. 2006. *Remo e Romolo: dai rioni dei Quiriti alla città dei Romani: 775/750–700/675 a.C. c*. Turin: Einaudi.

Castagnoli, F. 1980. *Topografia di Roma antica*. Turin: Società Editrice Internazionale.

Cecamore, C. 2002. *Palatium: topografia storica del Palatino tra III sec. a.C. e I sec. d.C*. Rome: "L'Erma" di Bretschneider.

Claridge, A., and C. Holleran, eds. 2014. *A companion to the city of Rome*, Blackwell Companions to the Ancient World. London: Wiley-Blackwell.

Claridge, A., et al. 2011. *Rome: An Oxford archaeological guide*. 2nd ed. Oxford: Oxford University Press.

Coarelli, F. 2012. *Palatium: il Palatino dalle origini all'impero*. Rome: Quasar.

Coulston, J., and H. Dodge, eds. *Ancient Rome: The archaeology of the eternal city*. Oxford: Oxford University School of Archaeology.

Digital Augustan Rome. n.d.. Available at: http://digitalaugustanrome.org/.

Erdkamp, P., ed. 2013. *The Cambridge companion to ancient Rome*. Cambridge, UK: Cambridge University Press.

Gjerstad, E. 1953–1973. *Early Rome*. 6 vol. Lund: C. W. K. Gleerup.

Haselberger, L., et al., eds. 2008. *Mapping Augustan Rome*, Journal of Roman Archaeology, supplementary series 50. Updated ed. Portsmouth: Journal of Roman Archaeology.

Hurst, H., and D. Cirone. 2003. Excavations of the pre - Neronian Nova Via, Rome. *Papers of the British School in Rome* 71: 17–84.

Lanciani, R. 1893–1901. *Forma Urbis Romae*. Milan: Hoepli.

Lugli, G. 1930–1938. *I monumenti antichi di Roma e suburbio*. 3 vol. Rome: G. Bardi.

Maier, J. 2007. Mapping past and present: Leonardo Bufalini's plan of Rome (1551). *Imago Mundi: The International Journal for the History of Cartography* 59 (1): 1–23.

Meneghini, R., and R.S. Valenzani, eds. 2006. *Formae Urbis Romae: nuovi frammenti di piante marmoree dallo scavo dei Fori Imperiali*. Rome: "L'Erma" di Bretschneider.

Nibby, A. 1848–1849. *Analisi storico-topografico-antiquaria della carta de' dintorni di Roma*. Rome: Tip. delle Belle arti.

Nielsen, I., et al., eds. 1992. *The temple of Castor and Pollux*. 3 vol. Rome: Edizioni De Luca.

Notizie degli Scavi di Antichità. n.d.. Rome: Tip. della R. Accademia dei Lincei.

Pinto, J. 2012. *Speaking ruins: Piranesi, architects, and antiquity in eighteenth-century Rome*. Ann Arbor: University of Michigan Press.

Richardson, L., Jr. 1992. *A new topographical dictionary of ancient Rome*. Baltimore: Johns Hopkins University Press.

Ridley, R. 2000. *The Pope's archaeologist: The life and times of Carlo Fea*. Rome: Quasar.

Robinson, O.F. 1992. *Ancient Rome: City planning and administration*. London: Routledge.

Rodríguez Almeida, E. 1977. *Forma Urbis marmorea*. Nuovi elementi di analisi e nuove ipotesi di lavoro. *MEFRA* 89: 219–256.

Rodríguez Almeida, E. 1981. *Forma urbis marmorea: aggiornamento generale 1980*. 2 vol. Rome: Quasar.

Rome Reborn VR. n.d.. Available at: https://romereborn.org/.

Scott, R.T. 2009. *Excavations in the Area Sacra of Vesta (1987–1996)*. Ann Arbor: University of Michigan Press.

Stanford Digital Forma Urbis Romae Project. n.d.. Available at: http://formaurbis.stanford.edu/.

Tortorici, E. 1991. *Argiletum: commercio speculazione edilizia e lotta politica dall'analisi topografica di un quartiere di Roma di età repubblicana*. Rome: "L'Erma" di Bretschneider.

Ziółkowski, A. 2004. *Sacra Via: Twenty years after*. Warsaw: Fundacja im. Rafała Taubenschlaga.

Torii, Ryūzō

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Basic Biographical Information

Ryuzo Torii (1870–1953) (Fig. 1) was a Japanese archaeologist and anthropologist. He was born in Tokushima in 1870, as the second son of a

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Torii, Ryūzō, Fig. 1 Ryuzo Torii. (Photo courtesy of Tokushima Prefectural Torii Memorial Museum)

wealthy tobacco merchant. He left elementary school in the second grade and studied anthropology by himself. He became a member of the newly established Tokyo Anthropological Society when he was 16 years old and moved to Tokyo in 1892. He obtained a job organizing specimens for anthropology classes at the Tokyo Imperial University (now the University of Tokyo). Torii undertook his first fieldwork abroad at the Liaodong Peninsula in 1895 by chance and became fascinated with dolmens. This was the beginning of his tireless fieldwork in many areas of East Asia such as Taiwan, Siberia, northeast China, Mongol, the Chishima Islands, and Okinawa, conducted over 50 years. Torii married Kimiko in 1901. She often accompanied him on fieldwork and helped with his research.

Ryuzo Torii's academic career was not smooth. In 1905 he was appointed as a lecturer with the College of Science, Tokyo Imperial University. He obtained a doctorate degree in 1921 and became an associate professor at the Tokyo Imperial University in 1922, then professor at Kokugakuin University in 1923. However, he left his post at the Tokyo Imperial University and established a private anthropology research center in 1924. He was instrumental in the founding of Sophia University in Tokyo and became a professor and Head of the Department of Literature at this university in 1928. Torii quit teaching at Kokugakuin University in 1933. He was a visiting professor of Yanjing University in Beijing from 1939 to 1951 and continued active fieldwork in Shandong province in China. From 1941 to 1945 he was held under house arrest while the university was closed due to the Second World War. He died in Tokyo in 1953 at the age of 82.

Major Accomplishments

Ryuzo Torii is a unique figure in the history of Japanese archaeology and anthropology because of his lack of formal education. No one equals him in terms of the geographic range of his fieldwork and the width of his research interests, which included prehistoric archaeology, historic archaeology, physical anthropology, cultural anthropology, and folklore. Torii learned observation-centered research methods from Shogoro Tsuboi, who he respected as a teacher. Torii was quick to adopt the new technologies of the day, such as photography and the gramophone for recording audiovisual data. He took the first anthropological photos of the native people of Taiwan during his fieldwork there in 1896. The vast amounts of ethnographic record and photographs that he collected are regarded as important first-rate data today and are now housed in the National Museum of Ethnology, Japan.

Torii was interested in archaeology and carried out a number of excavations in Korea, China, Mongolia, and Japan. Through his archaeological research, he recognized close interregional relationships in prehistory and insisted that Japanese ancient culture had been under significant influence from the continent. In his fieldwork on the Chishima Islands, Torii found that the Chishima Ainu had been using stone tools and pottery and lived in pit houses until the recent past. He concluded that the Ainu people were descendants of the prehistoric inhabitants on the Japanese Archipelago. This hypothesis ran counter to the Koropokkur hypothesis advocated by Shogoro Tsuboi concerning indigenous inhabitants of

Japan. At the time of Torii's fieldwork, the Chishima Ainu were on the verge of ethnic extinction due to the emigration policy of the Japanese government. Torii felt deeply sorry for the situation and tried to do his best to record their life and culture. He took part in research in Korea from 1911 for the Japanese government after Japan's annexation of Korea in 1910 and conducted both ethnographic research and archaeological excavations of Stone Age sites and burial mounds. His archaeological collections are now stored at the University Museum, the University of Tokyo.

As with archaeologists from other parts of the world, Ryuzo Torii's work is inextricably linked to colonial processes. He has been criticized as an accomplice of Japan's colonialism. Although he did not intentionally support militaristic colonial policies, his fieldwork was inseparable from the colonization process. His theory that Japanese and Koreans are descended from the same ancestors was used to justify Japan's annexation of Korea.

Cross-References

- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Japan: Indigenous Occupation
- ▶ Tsuboi, Shogoro

Further Reading

Nakazono, E. 2005. *Torii Ryuzo: Ajiawosoha-shitajinrui-gakusha. [Ryuzo Torii: an anthropologist who walked across the Asia.]*. Tokyo: Iwanami Shoten. (in Japanese).

Tabata, H. 1997. *Minzoku-gakusha Torii Ryūzo: Ajiachosa no kiseki. [Ryūzo Torii as an ethnologist: trajectory of his fieldworks in Asia.]*. Tokyo: Kokon Shoin. (in Japanese).

Torii, R. 1918. *Yushiizen no Nippon. [Prehistoric Japan.]*. Tokyo: Isobe Koyo-do. (in Japanese).

Torii, R. 1953. *Arukoko-gakuto no shuki. [A personal account of an archaeologist.]*. Tokyo: Asahi Shinbun-sha. (in Japanese).

Yamaji, K. 2006. *Kindai Nihon no kaigaigakujutsuchosa. [Academic researches abroad by modern Japan.]*. Tokyo: Yamakawashuppan-sha. (in Japanese).

Torrence, Robin

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Basic Biographical Information

Robin Torrence is an archaeologist and a senior principal research scientist at the Australian Museum, Sydney, Australia. She grew up in Illinois, USA, and graduated magna cum laude from Bryn Mawr College, Pennsylvania, gaining an B.A. in 1971. She completed a Master's degree (1974) and a Ph.D. (1981) in Anthropology at the University of New Mexico, USA. Between the years of 1969 and 2013, she has been involved in extensive archaeological field and laboratory and museum projects in the USA, Europe, Papua New Guinea, and Far East Russia. More recently, she has turned her attention to the archaeology of ethnographic museum collections.

Early in her career Dr. Torrence undertook graduate teaching roles in the University of New Mexico and later held academic appointments at several universities in the USA, Great Britain, and Australia as lecturer and associate professor. While at the University of Sheffield, UK, she participated in a field school in excavation and surveying at Roystone Grange, Derbyshire. During her career she has taught a wide range of subjects concerning archaeological theory and practice including practical courses in lithics, quantitative data analysis, and computing in archaeology and theoretical subjects predominantly in anthropology, exchange, hunter-gatherer studies, and stone tool technology.

Current research interests include method and theory in lithic studies, archaeology of the Pacific region, prehistoric exchange (with special reference to obsidian), role of natural disasters and risk

avoidance in long-term history, Indigenous agency within colonial societies (with special reference to Papua New Guinea), and complexity and diversity of material culture and hunter-gatherers.

Major Accomplishments

Throughout her career, Dr. Torrence has been on national committees such as the Pompeii Committee, UK (1979); Executive Committee, Theoretical Archaeology Group, UK (1979–1989); National Committee for the International Union of Pre- and Proto-historic Sciences, London (1982–1986); Committee on Archaeology and Anthropology, Royal Anthropological Institute, London (1982–1989); Council, Royal Anthropological Institute, London (1983–1986); Institute of Field Archaeology, Committee on Theoretical Archaeology (1984–1985); and Steering Committee, Southampton-York Archaeological Simulation System, Science Research Council (1987–1988).

Dr. Torrence has been on editorial boards of major peer-reviewed journals such as *Man* (1983–1989), the *Journal of Mediterranean Archaeology* (1987–1991), *Bulletin of the Indo-Pacific Prehistory Association* (2007–2009), and *Museum Anthropology* (2009–2012), with current editorial board appointments in *Archaeology in Oceania*, *Lithic Technology*, *Journal of Field Archaeology*, *Australian Archaeology*, and *Heritage Management*. She is a senior editor of the *Journal of Archaeological Science*.

From the years 1973 to 2012, Dr. Torrence has published 1 single authored and 12 edited books and over 100 articles in archaeology and anthropology. She was the founder and chairperson of the Ancient Starch Research Group (1998–2000) and was the treasurer of the World Archaeological Congress (1995–2003).

She has had a key role in developing new methods for studying trade, stone tool use, and ancient starch analysis and currently conducts interdisciplinary research into understanding changes in the nature of western Pacific societies over the past 50,000 years.

Cross-References

▶ Pacific Islands: Finding the Earliest Sites
▶ Pacific Islands: World Heritage
▶ Pacific Ocean: Maritime Archaeology

Further Reading

Australian Museum. n.d. Robin Torrence. Available at: http://australianmuseum.net.au/staff/robin-torrence. Accessed 6 Dec 2012.

Tourism and Archaeological Education

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Introduction

Visiting the ancient ruins of southern Europe and the eastern Mediterranean was a hallmark of the Grand Tour, the convention of travel in sixteenth- through nineteenth-century Western Europe. The children of the elite visited Rome, Athens, the Pyramids of Giza, and, if possible, Jerusalem to see antiquity, exemplified by archaeological remains. The goal was social polish, with education being the focus of the experience for when these travelers returned to their homes for launching their careers. Mark Twain, whose mid-nineteenth-century travels from the United States to the Mediterranean came as travel gave way to tourism, expressed the educational aspect of such visitations with his famous remark (1869: 650): "Travel is fatal to prejudice, bigotry, and narrow-mindedness." Traveling to see the past, particularly a past understood as part of one's heritage, is an ideological endeavor that can encourage xenophobia or cosmopolitanism, be driven by education or entertainment (Baram 2018); today traveling is encompassed within tourism. According to the World Tourism and Travel Council (2018), tourism is one of the world's largest

economic sectors, more than 10% of global GDP and nearly 10% of total employment. The intersection of tourism and heritage, particularly the representations of the archaeological past in the form of educational programs, is developing into challenging ethical concerns for archaeologists.

Definition

The United Nations World Tourism Organization (2018) defines tourism in terms of travel and visitors. The anthropologist Chambers refines (2010: 6) the term as "any kind of travel activity that includes the self-conscious experience of another place." A major focus for tourist experiences is heritage, the cultural and historical aspects presented for the present, and the major component of heritage is the finds and findings from archaeological research. Interpreting the archaeological materials for the public, especially those identifiable as tourists, is an ethical concern as well as an educational imperative.

Many archaeologists have recognized the importance and potential of educating the public about the past, particularly the lessons that come from humanity's common origins. In the mid-twentieth century, Grahame Clark (1943: 113) wrote: "What is needed above all is an overriding sense of human solidarity such as can come only from consciousness of common origins. Divided we fall victims to tribal leaders: united we may yet move forward to a life of elementary decency." Similarly Glyn Daniel and Colin Renfrew (1988: 52) stated in *The Idea of Prehistory*: "Whether we are Americans, Russians, Indians, or Chinese we share a universal human historical heritage. I do not pretend, or imagine, that a recognition of this fact will alter present-day differences but if people really had an awareness of human history it should put present-day differences in a different perspective and one that made for tolerance." The theme of the past as a resource for educating on human potential is expanded upon in Robert MacKenzie and Peter Stone (1990) *The Excluded Past: Archaeology in Education* and more examples are found in *The Presented Past: Heritage, Museums and Education* edited by B. L. Molyneaux and P. G. Stone (1994). Both are volumes in One World Archaeology, the World Archaeology Congress publication series. The idealism has been sustained by archaeologists around the world, with the sense that sharing the insights of archaeology can contribute to coexistence and peace, a sense of community, and ecological awareness.

With the broad goals clear, some archaeologists have moved to provide instruction to meet educational goals using either archaeology as excavation, as material culture, or as history to convey the findings of the field (Fig. 1). The main focus in the USA has been educating to prevent looting and vandalism, to protect the past for the future. A key volume for archaeology and education is *The Archaeology Education Handbook: Sharing the Past with Kids* by Karolyn Smardz and Shelley Smith (2000). The handbook offered examples and suggestions for developing a subfield of archaeological education, stressing the need to work with teachers. As standardized testing became policy across the USA, meeting grade-level standards became a central concern for archaeologists wanting to offer opportunities for children. Practical examples can now be found online, for instance, the Society for American Archaeology (SAA) has an online resource titled *Education and Outreach – Resources for Archaeologists* with multiple links to resources and the Florida Public Archaeology Network has lesson plans available on its website. A new academic journal began in 2017 *The Journal of Archaeology and Education* is a forum for educators to share experiences and research as well as wrestle with theoretical concerns.

Archaeological education for children has a clear sense that the rising generation will be intrigued and engaged with the materials and will retain those perspectives when they reach adulthood. Since, in the early twenty-first century, we seem to have reached what Neil Postman's (1982) thought would happen to the line between childhood and adulthood: it has been erased by new technologies. Programs that successfully engage and educate children are rarely limited to children; their guardians/parents may be as interested. And with the goal of sharing the insights

Tourism and Archaeological Education, Fig. 1 Elementary school student using an atlatl during an educational outreach program to experience ancient lifeways

and information, to teach respect for the archaeological record and encourage the recognition of a common humanity, audiences can be, even should be, broad. One of the productive avenues for attracting a broad audience is tourism, in the sense of the creation of marketing and infrastructure for visiting a place for an experience; archaeology fits heritage tourism, a niche within tourism that many associate with time travel. Experiencing the materiality of the past is as much about difference as traveling to geographically distant places. That sense of difference becomes a productive avenue for educating a broad audience, including children. As with much of the research on tourism, the divide between tourism as educational opportunity and tourism as accelerating political economic inequalities marks assessments of trends and programs.

Key Issues/Current Debates/Examples

Archaeological education faces the intersection of the two terms that make up the concept. For some, the focus is educating the public on archaeology, archaeological investigations, and the science of archaeological findings. The representations can be performative – a live lecture or video of a presentation, signs explaining the excavations and its results, and published through a wide range of possibilities from books to artwork. The alternative is employing archaeological techniques and methods to convey how the science of archaeology work and the insights into material culture (making objects using preindustrial technology), social change, and the history for a particular place at a specific epoch or historical moment. Archaeology is used as a means to convey lessons about inquiry and research. The divide plays out in archaeological education for tourism.

Anthropological studies around the world have described the dichotomies involved with tourism, including heritage tourism that focuses on archaeology. Tourism encourages understanding of human differences, the human past, and a common human heritage. Tourism accelerates social inequalities. Both dynamics are occurring concurrently in today's world.

Visiting archaeological sites is educational. Sustaining the interest of tourists requires entertainment. Debates over tourism to archaeological sites revolve around the tension between education and entertainment, or as an early observer of the trend Mike Wallace (1996) noted: edutainment.

The question of edutainment haunts the range of possibilities for educating on the past. Some programs teach archaeological techniques. In the 1960s, Yigael Yadin asked for volunteers to come

to excavate the challenging location of Masada for its Roman-era fortress; in his popular book on the project, Yadin (1966) expressed delight that 300 volunteers, at a time, worked on the excavations. The project received volunteer labor and those individuals gained experiences; archaeological expeditions continue to provide fieldwork opportunities for volunteers and for students to gain academic credit and experiences. Such research-oriented projects are education-based and several organizations continue encouraging informed participation in archaeological projects, for instance, at the place-centered Crow Canyon Archaeological Center in Colorado, USA, or the Archaeological Conservancy with its tours of archaeological locations. In 1978, D. V Clarke questioned the effectiveness of excavations, focused on volunteers at Kara Brae, Orkney, Scotland; the unevenness of recovery of lithics led to a plea for evaluation. The scale of volunteers working on archaeological projects has increased, whether as volunteers for research or as entertainment, yet as Kaminski et al. (2011) state, the implications for archaeology are important. Some volunteer opportunities are focused on local communities (Baram and Austin 2011), but with voluntourism being a growing niche endeavor within tourism, especially the dynamics that require the participants to pay for the opportunity to volunteer, new implications need to be considered and assessed. One implications are programs where tourists can experience excavations as Dig for a Day: at Tel Maresha, in Israel, according to the Archaeological Seminars website states, thousands have excavated the Hellenistic remains at Beit Guvrin and Texas, in the United States, has multiple locations where the public can, as their webpages state: dig for arrowheads. The expansion of such edutainment programs is a challenge to professional ethics.

Travelers on the Grand Tour took relics; tourists expect souvenirs. Gift shops can offer reproductions that are educational – the reminder of something seen, the opportunity to examine an artifact replica closely at home, and the opportunity to spark memories through an object are the positive aspects of souvenirs. The replica can be local crafts or products of the neoliberal global economy, most likely as Made in China and be a caricature of heritage (Fig. 2). When the replica is

Tourism and Archaeological Education, Fig. 2 Items in a gift shop in Georgia, USA

educational, the want for the authentic can encourage other visitors to seek out artifact and facilitate the antiquities trade. Beyond souvenirs, to meet interest in remembrances of tourist experiences more places are offering not only gift shops but also spots for selfies, photographs of the visitor at the place in an iconic manner.

Finally, in today's experience economy the stories gained from docents can be the value sought and received by the tourist. The line between responsibility for accurate and engaging information and capturing and sustaining visitors' interests in the past raises ethical concerns. The USA National Park Service follows Freeman Tilden's (1957) call to inspire visitors, to express more than facts, and to create memorable stories that the visitor can share.

Future Directions

Some archaeologists use insights from research to inspire knowledge of a place or material culture, to teach history through displays of finds and findings. There is a wide range of displays, from the physical to the virtual, with increasing opportunities in the digital realm for interactive learning experiences. Some use archaeology to teach ecology, hands-on activities that give participants a sense of the place, connecting present and past. The divide between historical particularly and creating connections across time is a challenge for continuing consideration in archaeological education, especially for visitors to a location.

Archaeologists are developing specialized skill sets for presenting information to public audiences including tourists even as archaeological discoveries have a long tradition of being put on display. Where once the visitation to an archaeological site versus a museum could be differentiated, contemporary opportunities allow the line to be blurred through digital technologies as well as archaeological sites reproduced in museums and museums built at archaeological sites. Herreman (1998) recognized tourism transforms museums and museum professionals have to be up for the challenges, a useful lesson for archaeological education programs and continuing efforts by archaeologists at public outreach and community engagement.

For tourists, archaeological educational programs are opportunities to receive special access to or insights into sites, led by a scholar or an interpreter skilled with engaging the public. The special access can cause tensions, as Bruner (1996) described for the Elmina Castle in Ghana. The national government saw the historic site as a draw for tourism, particularly African-American tourists interested in the slave trade. Tourism would bring economic development while the tourists would engage the location as an educational experience with the emotional connection to the Door of No Return. For the Ghanaians, the long history for the place became essentialized to represent one, significant epoch. But the dynamic go beyond simplification of history into heritage. A sign at Elmina Castle stated that the area is for tourists only (Bruner 1996:298); the separation is ideological and physical.

Signage is the materialization of information for an archaeological site. Travelers on the Grand Tour would bring back relics and other objects for displays in their homes and such cabinets of curiosities were one forerunner of museums. Museums have a long tradition of having labels for their collections, information on the object displayed. Labeling features on an archaeological site is edifying, providing basic information on architecture and time period so that the visitor to the site can make sure of the stones and other remains (Fig. 3). As heritage tourism increases, more interpretative signs are being placed by archaeological sites in order to inspire interest (Fig. 4) and others are creative, meant to encourage curiosity about the archaeological research. And similar to the dynamics for tourism, the shift from education to entertainment is seen in signs. Visitors notice and read signage and even fake signs, such as Walt Disney World's recently opened Disney Springs, a shopping complex that has signs for a town that never existed (Fig. 5). Signage can be informative, engaging, and misleading and a matter of ethics for the presentation of the past for the present. Who creates and maintains the signage is an ethical matter for those committed to archaeological education in an age of expanding tourism.

Tourism and Archaeological Education, Fig. 3 Label for altar at San Gervasio ruins on Cozumel, Mexico

Tourism and Archaeological Education, Fig. 4 Heritage interpretative sign for Fort Mosé Historic State Site, USA

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Tourism and Archaeological Education, Fig. 5 Disney springs, Orlando, Florida, USA

Archaeologists will continue to use the opportunities provided by tourism, with the potential for using the insights from the past to encourage coexistence and peace, as well as grapple with the dynamics stimulated by neoliberal globalization that commodifies and simplifies scholarship to provide consumerist opportunities for experiences and entertainment. In both theory and practice, the challenges of tourism for archaeological education are part of the process to convey the archaeological past to the present in effective, engaging, and meaningful ways.

Cross-References

- ▶ Adult Education in Archaeology
- ▶ Heritage Tourism and the Marketplace
- ▶ Marketing Heritage
- ▶ Public Archaeology and Education: Present Relevance to the Past

References

Baram, U. 2018. Value and values in heritage tourism from the Grand Tour to the experience economy. In *Relevance and application of cultural heritage in contemporary society*, ed. P.-L. Yu, C. Shen, and G.S. Smith, 66–78. New York: Routledge.

Baram, U., and R. Austin. 2011. Neighborhood archaeology: Exploring the significance of volunteers, communities, and local politics for contemporary archaeology. *Present Pasts* 3 (1): 9–11.

Bruner, E. 1996. Tourism in Ghana: The representation of slavery and the return of the black diaspora. *American Anthropologist* 98 (2): 290–304.

Chambers, E. 2010. *Native tours: The anthropology of travel and tourism*. Boulder: Waveland Press.

Clark, G. 1943. Education and the study of man. *Antiquity* 27 (67): 113–121.

Clarke, D.V. 1978. Excavation and volunteers: A cautionary tale. *World Archaeology* 10 (1): 63–70.

Daniel, G., and C. Renfrew. 1988. *The idea of prehistory*. Edinburgh: Edinburgh University Press.

Herreman, Y. 1998. Museums and tourism: Culture and consumption. *Museum International* 59 (3): 4–12.

Kaminski, J., D. Arnold, and A. Benson. 2011. Volunteer archaeological tourism: An overview. In *Volunteer tourism: Theoretical frameworks and practical applications*, ed. A. Benson, 157–174. New York: Routledge.

MacKenzie, R., and P. Stone, eds. 1990. *The excluded past: Archaeology in education*. London: Routledge.

Molyneaux, B., and P. Stone, eds. 1994. *The presented past: Heritage, museums and education*. London: Routledge.

Postman, N. 1982. *The disappearance of childhood*. New York: Delacorte Press.

Smardz, K., and S. Smith, eds. 2000. *The archaeology education handbook: Sharing the past with kids*. Walnut Creek: AltaMira Press.

Tilden, F. 1957. *Interpreting our heritage*. Chapel Hill: University of North Carolina Press.

Twain, M. 1869. *The innocents abroad, or the new pilgrims' progress being some account of the steamship Quaker City's pleasure excursion to Europe and the Holy Land; with Descriptions of countries, nations, incidents and adventures, as they appeared to the author*. Hartford: American Publishing Company. Available at http://xtf.lib.virginia.edu/xtf/view?docId=2007_02/uvaBook/tei/eaf500.xml. Accessed July 2018.

United Nations World Tourism Organization. 2018. Glossary of tourism terms. http://statistics.unwto.org/sites/all/files/docpdf/glossaryterms.pdf. Accessed July 2018.
Wallace, M. 1996. *Mickey Mouse history and other essays on American memory*. Philadelphia: Temple University Press.
World Tourism and Travel Council. 2018. Travel & tourism global economic impact & issues 2018. https://www.wttc.org/-/media/files/reports/economic-impact-research/documents-2018/global-economic-impact-and-issues-2018-eng.pdf. Accessed July 2018.
Yadin, Y. 1966. *Masada: Herod's fortress and the zealots' last stand*. London: Weidenfelf and Nicolson.

Further Reading

Benson, A., ed. 2011. *Volunteer tourism: Theoretical frameworks and practical applications*. New York: Routledge.
Gmelch, S. 2010. *Tourists and tourism: A reader*. Boulder: Waveland Press.
Ham, S. 2013. *Interpretation: Making a difference on purpose*. Golden: Fulcrum Publishing.
Herr, S., and C. Rieth, eds. 2016. Designing and assessing public education programs in archaeology. Special issue of *Advances in Archaeological Practice* 4(4). https://www.cambridge.org/core/journals/advances-in-archaeological-practice/issue/D398F024F4AF1A7EC33FBCF97BA782BC. Accessed July 2018.
Little, B. 2009. What can archaeology do for justice, peace, community, and the earth? *Historical Archaeology* 43 (4): 115–119.
Rowan, Y., and U. Baram, eds. 2004. *Marketing heritage: Archaeology and the consumption of the past*. Walnut Creek: AltaMira.
Skeates, R., C. McDavid, and J. Carman, eds. 2012. *The Oxford handbook of public archaeology*. New York: Oxford University Press.

Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

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Introduction and Definition

Ethics is a feature found in seemingly every discussable topic. It guides moral decision-making, informs strategic thought, and ultimately influences human behavior. Ethics is based upon the principle that individuals are members of a community, cogs in a much larger machine. There is hence a fundamental responsibility for individual motives to align with the needs of the larger community. This entry briefly elaborates on this concept with a particular focus on the ethical relationship between tourism and archaeology. Key themes that are considered include the respective ethical frameworks for tourism and archaeology and the relationship between their unification. Also examined is how this relationship can effectively be developed within an emerging tourism and understudied archaeological site: the Rupununi region of Guyana.

Key Issues/Current Debates/Future Directions/Examples

Ethics, Tourism, and Sustainability

As one of the world's largest industries, tourism involves much of the world's natural and cultural heritage resources. In 2010 alone, there were 935 million international tourism arrivals who spent an estimated US$ 919 billion worldwide (UNWTO 2011). Within an industry of this magnitude, there has been, and continues to be, a plethora of impacts on the local economy, communities, and natural and cultural heritage. Moreover, there exists a multitude of stakeholders with their own varied interests. Thus, there is an essential need to consider the role of ethics in tourism development (Payne and Dimanche 1996: 998; Malloy and Fennell 1998: 454). Yet, what ethical framework can be used that universally appeals to all tourism stakeholders? How do you balance the interests of one group with another? Ultimately, it is argued that these questions can be answered by referring back to the well-established notion of sustainability.

Defining sustainability has been regarded as an ambiguous process and varied in relation to the context (Shearman 1990: 1). However, Shearman (1990: 2–3) asserts that the contextual definition is irrelevant and the "meaning of sustainability is far from ambiguous." Indeed, the concept, quite simply, revolves around techniques that utilize resources in a manner which does not deplete or

permanently damage them. It is a concept which has existed for hundreds, if not thousands, of years and goes beyond the current exploitation of its namesake. Moreover, sustainability does not relate specifically to the natural environment, society, or corporate economic frameworks – instead it is a concept which is broad enough to be applicable to all. But why is sustainability important? What are the ethical reasons for wanting to use sustainable management structures? Ultimately, this desire for sustainability refers to the prolonged positive impacts for present and future anthropocentric and biocentric systems (Shearman 1990: 5).

Sustainability is in alignment with an ethical framework known as teleology. Within this system of ethical thought, moral conduct is determined by the end result (Malloy and Fennell 1998: 455). Teleology is guided by two governing "schools of thought" – hedonism and utilitarianism (Malloy and Fennell 1998: 455). Both of these disciplines are concerned with maximizing benefits and minimizing negative impacts – delivering the notion of "good." However, while hedonism focuses on individual priorities, utilitarianism deals with the "greatest good for the greatest number" (Malloy and Fennell 1998: 455). Sustainability is a pursued end result because it endeavors for the prolonged life of resources for present and future generations – the greatest good for the greatest number.

Teleology does not argue that one should simply "be good" and follow ethical rules as the concept of deontology does. Instead, teleology emphasizes that a desired outcome (such as sustainability) is better for all of mankind. Similarly, American philosopher Henry David Thoreau (1817–1862) once wrote that people should "be not simply good, be good for something." In this manner, teleological utilitarianism demonstrates why tourism resources should be safeguarded and used ethically by all generations. Furthermore, tourism possesses several stakeholders whose interest should be valued equally, and teleology presents a framework to accomplish this task. The following paragraphs discuss the role and placement of archaeological resources in alignment with this ethical tourism framework.

Archaeological Resource Education and Preservation

Archaeology also utilizes a teleological framework but positions this ethical structure with a focus on the greatest good for the archaeological record. Indeed, Lynott (1997: 593–594) argues that first and foremost, archaeologists should promote "stewardship" of archaeological resources to improve their understanding and preservation for future generations. However, he (Lynott 1997: 593–594) also asserts that within the need to conserve and safeguard the record, there is a dual need to use it for educational and interpretation purposes (see also Meskell 2000: 161). It is in this capacity where archaeological resources can be a significant and viable tourism product.

Cultural heritage tourism is one of the fastest growing sectors in the tourism industry and encompasses archaeotourism, a form of tourism focusing on archaeological resources (du Cros 2001: 165; Wurz and van der Merwe 2005: 10; Levine et al. 2005: 401; Karki et al. 2006: 47; Ramsey and Everitt 2008: 909). However, archaeological resources are unique and "highly sensitive" to tourism use and consequently require vigilant preservation (Wurz and van der Merwe 2005: 10; Ramsey and Everitt 2008: 913). The needs of such a growing tourism sector hence require to be balanced with the management of the archaeological record (Wurz and van der Merwe 2005: 11). Whereas equality is usually promoted among stakeholders in sustainable tourism frameworks, Wurz and van der Merwe (2005: 11) argue that when archaeological resources are involved, the record's preservation must always receive priority over tourism objectives. This is justified by the fragile nature of archaeological assets and their importance in representing the heritage of living communities for present and future generations (du Cros 2001: 166; Atalay 2006: 283).

This view echoes the same principles found in a teleological framework for tourism. There is an ethical obligation for archaeologists to protect the record for all generations to benefit and learn from, yet this can often conflict with tourism priorities. However, the need to ensure the "greatest good for the greatest number" has superiority and gives archaeologists the ethical "right"

to shelter heritage resources away from tourism development. The sustainable use of archaeological resources is still the targeted end result, and the manner in which this target is achieved is irrelevant (du Cros 2001: 166). Archaeologists do have a responsibility to present their findings to the public today, but they have an equally important responsibility to safeguard material heritage for future generations. In essence, archaeologists should work congruently with sustainable tourism frameworks in order to actively contribute to the preservation of heritage resources while working to interpret their meaning for visitors (Wurz and van der Merwe 2005: 11). This next section examines a contextual location where tourism development is increasing in an area where there are significant but unknown archaeological resources.

Finding the Right Way Forward: Archaeotourism in the Rupununi

The Rupununi is a vast tract of land in central Guyana. The landscape is composed of naturally occurring savannah wetlands and tropical rainforests, and the region has been largely inaccessible until recently. The small population of 16,000 inhabitants is predominantly comprised of three main indigenous groups who occupy most of the land: the Makushi in the north and the Wapishana and Wai-Wai in the south (Nycander et al. 2010: 13). Various archaeological studies have proven that Amerindians have been living in the region for over 7,000 years, initially as hunter gatherers with land cultivation occurring around 2,000 BCE (Williams 2003: 3–11).

The Rupununi is rich in both natural and cultural heritage resources. As a result, several communities have been increasingly developing tourism programs as their primary source of revenue in an area struggling with diversifying its economic activity. However, with one to two thousand visitors a year, tourism is still in its infancy and remains a low-impact activity. Local cultural heritage used for tourism includes a number of archaeological resources. These resources are primarily comprised of pictographs and petroglyphs (Fig. 1) but also include stone tools, chipping stations, rock circles, and polissoirs (Williams 1979).

Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana, Fig. 1 Amerindian petroglyphs. (Photo by Jared Bowers)

Plew (2004: 12) revealed that the Rupununi is host to a wealth of archaeological resources which remain "relatively unexplored." Indigenous Amerindian communities have occupied and used both the savannah and rainforest environments for thousands of years. An exploration of the archaeological record in the region could consequently be useful in addressing significant research questions in northeastern South America (Plew 2004: 7). These questions refer to topics such as ritual sites, food procurement, and hunting strategies among the Rupununi's transient communities. Long-term environmental patterns inside the region could also be documented (Plew 2004: 7). Despite remaining mostly unexplored, the utilization of these archaeological resources for tourism is currently on the increase. This underlines the need for an effective management structure.

As both tourism and archaeology seek to progress their development in the region, the use of a teleological framework will become increasingly important. Within this framework, defining how to simultaneously safeguard and use archaeological resources for economic gain will be the primary focus. However, the guiding principle should be how to use this resource for the greatest good for the greatest number. It is essential that management figures establish both sustainable visitation guidelines such as limits of acceptable change and maximum visitor cap and research tactics with, for instance, community archaeology and public participation. These methods will ensure that the resource remains protected for

present and future generations (Marshall 2002: 218; Wurz and van der Merwe 2005: 15).

Conclusion

This entry set out to gain an understanding on the ethical relationship between tourism and archaeology. Individual ethical frameworks for tourism and archaeology were explored, as well as how the unification of both disciplines can be used to achieve a similar ethical goal. This ethical goal is the ingrained concept of sustainability and can be reached through a teleological system of thought. This entry briefly investigated this relationship in the Rupununi region of Guyana and stressed the importance for sustainability in the education and preservation of archaeological resources. The author argues that it is essential for all future use of archaeological resources for tourism to consider and prioritize sustainability – in order to ensure that all are able to experience our cultural heritage.

Cross-References

- ▶ Cyprus: Cultural Heritage Management
- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
- ▶ Iran: Heritage Preservation and Tourism
- ▶ Journal of Cultural Heritage Management and Sustainable Development
- ▶ Sustainable Cultural Tourism Policies: Overview

References

Atalay, S. 2006. Indigenous archaeology as decolonizing practice. *The American Indian Quarterly* 30 (3–4): 280–310.

Du Cros, H. 2001. A new model to assist in planning for sustainable cultural heritage tourism. *International Journal of Tourism Research* 3: 165–170.

Karki, M., V. Immonen, and J. Taavitsainen. 2006. Welding theory with tourism: Past and present of industrial archaeology in Finland. *Industrial Archaeology Review* XXVIII (1): 47–58.

Levine, M., K. Britt, and J. Delle. 2005. Heritage tourism and community outreach: Public archaeology at the Thaddeus Stevens and Lydia Hamilton Smith Site in Lancaster, Pennsylvania, USA. *International Journal of Heritage Studies* 11 (5): 399–414.

Lynott, M. 1997. Ethical principles and archaeological practice: Development of an ethics policy. *American Antiquity* 62 (4): 589–599.

Malloy, D., and D. Fennell. 1998. Codes of ethics and tourism: An exploratory content analysis. *Tourism Management* 19 (5): 453–461.

Marshall, Y. 2002. What is community archaeology? *World Archaeology* 34 (2): 211–219.

Meskell, L. 2000. The practice and politics of archaeology in Egypt. *Annals New York Academy of Sciences* 925: 146–169.

Nycander, E., C. Hutchinson, J. Karwacki, V. Welch, C. Bernard, and G. Albert, eds. 2010. *Community tourism enterprise development in the Rupununi: A blueprint*. Guyana: Conservation International Foundation Guyana, Inc.

Payne, D., and F. Dimanche. 1996. Towards a code of conduct for the tourism industry: An ethics model. *Journal of Business Ethics* 15: 997–1007.

Plew, M. 2004. The archaeology of Iwokrama and the North Rupununi. *Proceedings of the Academy of Natural Sciences of Philadelphia* 154: 7–28.

Ramsey, D., and J. Everitt. 2008. If you dig it, they will come! Archaeology heritage sites and tourism development in Belize, Central America. *Tourism Management* 29: 909–916.

Shearman, R. 1990. The meaning and ethics of sustainability. *Environmental Management* 14 (1): 1–8.

United Nations World Tourism Organization (UNWTO). 2011. Available at http://www.unwto.org/ (accessed November 2011).

Williams, D. 1979. A report on lithic artifacts in the South Rupununi Savannas. *Journal of Archaeology and Anthropology* 2 (1): 10–52.

Williams, D. 2003. *Prehistoric Guiana*. Kingston: Ian Randle Publishers Inc.

Wurz, S., and J. Van Der Merwe. 2005. Gauging Site sensitivity for sustainable archaeotourism in the Western Cape province of South Africa. *South African Archaeological Bulletin* 60 (181): 10–19.

Tracking in Caves: Indigenous Ichnology

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Introduction

In prehistoric research the importance of the archaeological as well as the natural context of

rock art has been underestimated over long periods. Only recently has research begun to take this context into focus for documentation, analysis, interpretation, and understanding. Human footprints are most prominent among the long-time under-researched features of the context of cave art. In order to compensate for this neglect, a special research program has focused on the merging of indigenous knowledge and Western archaeological science for the benefit of both sides. With the expert assistance of indigenous San hunters from the Namibian Kalahari, this "Tracking in Caves" project endeavored to better understand aspects of the Upper Paleolithic human behavior, traces of which are preserved in footprints in painted caves in southern France. The three professional indigenous trackers were invited to Europe and conducted in-depth research in the caves Niaux, Pech Merle, Fontanet, Tuc d'Audoubert, and Aldène (Fig. 1).

The preservation of footprints from the Pleistocene depends on advantageous taphonomic circumstances and on careful treatment of the caves after modern rediscovery. Accordingly Pech Merle has less than 20 footprints, but the other caves each have at least several dozen and some several hundred. In Aldène they were left behind by visitors during the Mesolithic, Niaux is hardly dated, and all others are of Upper Paleolithic origin.

The documentation of the interpretations of the indigenous ichnologists is indispensable, but it is no less important to cross-check the results obtained with the results of the studies of Western sciences. The circumstance that the results of indigenous ichnologists are difficult to evaluate does not imply that they are worthless assumptions. They have to be verified or falsified with quantitative analyses and integrated into the discussion of prehistoric human footprints.

Definition

Tracking, or reading tracks, is a special skill that is a precondition for human hunting and therefore may be considered "the beginning of science" (Liebenberg 1990). As such, it is related to ichnology, the science of tracks and traces, which originally was mainly occupied with fossil tracks (such as of dinosaurs) but since the discovery of the earliest hominid footprints in Laetoli (Tanzania) has also turned to humans (Lockley 1999). In current research of prehistoric human footprints, Western science reveals essentially two approaches: first, footprint outline and landmark-based geometric-morphometric analyses (Bennett et al. 2009; Bennett et al. 2016) and, second, pixel-based quantitative analysis of the whole foot pressure (Crompton et al. 2011).

In pre-industrial societies of hunter-gatherers and herders, mastery of track reading is an existential necessity. It is being learned from early childhood onward, requiring lifelong learning and constant practice. Therefore tracking is also "tacit knowledge" (Polanyi 1966) that cannot be expressed in words but is acquired through experience and direct exposure to the object of

Tracking in Caves: Indigenous Ichnology, Fig. 1 Reading of human footprints in Niaux by Kxunta and Thao. (Photo Tracking in Caves)

learning. The indigenous ichnology of hunter-gatherers is linked to Western ichnology in that it implies inductive and deductive as well as abductive methods (Liebenberg 1990). Moreover, for the differentiation of, e.g., male and female footprints, trackers assess the same markers on a foot as orthopedists.

Presently indigenous ichnology has a much finer resolution of tracks than modern morphometric methods since trackers are normally able to determine from a footprint the sex and the approximate age class of a person, where the latter is not a factor of body height but based on overall foot proportions and traces of aging. It also means that they are able to follow the tracks of an individual – be that person, game, or herd – under changing soil conditions and even if mixed with imprints of other individuals of the same species.

This capability was the basis for analyses of human footprints in the Paleolithic caves.

The results of the certified indigenous ichnologists compiled in the course of the various studies are surprisingly detailed and precise, and they go beyond the results produced by Western science. This fact is perceived differently by the public. If exposed to the results, one part of the public shows scientific curiosity, wishing to learn more about the capabilities of indigenous ichnologists and to verify or falsify the results through their own investigations. Others, however, show great skepticism to the extent of rejection. Such rejection does not seem appropriate without empirical falsifications, because indigenous ichnologists have verified skills in reading tracks. Strictly speaking, their methodological approach is not so alien to Western scientific approaches. Even though Erwin Panofsky's iconographic interpretation method refers to images, there are parallels between reading tracks and interpreting images. According to Panofsky, in the case of a natural subject as the object of interpretation, a pre-iconographic description of the motifs takes first place (Panofsky 1962). Practical experience (familiarity with objects and phenomena) is an absolute prerequisite for a successful description, from which a positive correlation between experience and descriptive accuracy can be derived. In the event that the spectrum of personal experience is not sufficient, this spectrum must be extended by consulting publications or experts. Practical experience, in turn, helps to determine which publication or professional is to be consulted (Panofsky 1962: 9). This practical experience results not least from personal experiences in the world in which we live and which "provides the ground for all cognition and for all scientific purpose" (Husserl 1939: 38). The concept of the "lifeworld" that is evoked here describes the realm of reality in which every human being inevitably participates (Schutz and Luckmann 1973). With the fundamental trust that the world has not changed since the production of the imprints or the making of the image to the extent that trees have always been trees and birds have always been birds, one's own practical experience is valid regardless of the respective cultural attributions to trees and birds. The reference to personal experiences and personal exposure to the object of description is at the same time a reference to the fact that "tacit knowledge" (Polanyi 1966) is also required to a considerable extent. These are knowledge and cognitive possibilities that cannot be made explicit but rather are specifically available to each individual through an embodiment of experience.

In archaeology, already at the beginning of the twentieth century, a certain helplessness and a lack of experience with regard to the reading of tracks in the interpretations of prehistoric footprints by Western scientists became apparent. Thus, not the recognition of a specific sequence of footprints was responsible for the interpretation as ritual dance, but the transfer of the generally perceived ritual status of the surrounding cave to the footprints. At this point, a lack of experience in reading tracks was masked by the corrective principle of interpreting cultural-historical processes. Not only the lack of practical experience in reading tracks proves to be problematic but also the existence of methodological limits of modern analytical procedures. This is particularly evident in the difficulty of making the sequence of steps of one and the same person morphometrically visible, even though it is obviously from one person.

Against the background of interpretations favoring ritual activities, the results of the

indigenous ichnologists appear unspectacular. But they fill a vacuum of description with content. An accumulation of footprints on a spatially limited area seems like a chaotic mixture. This confusion dissolves when the indigenous ichnologists combine footprints into sequences of steps of single individuals. If only those footprints are taken into account that the indigenous ichnologists can use to determine demographic data, rather many footprints have to be ignored since variable quantities cannot be assigned to sex and age class. The demographic data is ultimately established by using morpho-classificatory factors, which are essentially based on the same features that Western science also uses.

Contextual information is also included in the track data collection: the nature of the ground, room height, inclination, gradient, curvature, possible obstacles, and much more. The identified footprints are mapped and recorded in a data sheet. As mentioned above, the result of the work of the indigenous ichnologists is not an inventory of all footprints but of footprints about which they can give dependable information. In this way, the indigenous ichnologists' approach differs from that of Western science, in which each individual footprint is recorded by using specific attribute systems, thus favoring description over interpretation. Ultimately, the discussions about these two approaches are comparable to the dichotomy in archaeology between two well-established methods of object analysis: the attribute analysis and the analysis of the chaîne opératoire.

The results reported below are based on data collected in a pilot study in the Fontanet, Niaux, Pech Merle, and Tuc d'Audoubert caves in 2013 (Lenssen-Erz et al. 2018; Pastoors et al. 2015, 2017). Those from the last field study in Aldène and Tuc d'Audoubert in 2018 have not yet been fully processed. Accordingly, 17 individuals were documented in Fontanet, 5 in Pech Merle, 2 in Tuc d'Audoubert, and 1 in Niaux, where these numbers are to be understood as minimum number of individuals (MNI). On the one hand, not all footprints have been examined, while on the other hand, probably not all individuals who entered the caves have left footprints. Nevertheless, the MNI produces different pictures of the composition of the groups of cave visitors. While individuals of different ages and sex can represent several families in Fontanet, in Pech Merle it is at most one family. In Niaux and Tuc d'Audoubert, only a few individuals negotiated the caves.

The investigations have shown that children with an age between 0.5 and 6 years (infans I after Martin 1928) were also in the caves and left their own traces there. Whether younger children were also present cannot be determined, because at this age children are usually carried by their mothers and therefore leave no traces of their own.

All individuals were walking barefoot in the caves. Even in Fontanet the only footprint from the Upper Paleolithic so far interpreted as a shod foot was shown by the indigenous ichnologists to having been produced with a bare foot. This is only consistent, because a single imprint deviating from the rule is difficult to explain.

In addition to the demographic data, the footprints contain further information on walking speed and the type of locomotion or the formation of the footprint. According to this, people were mainly careful when walking. The tracks of slow walking speed testify to this. Only a few individuals had it in a hurry, but there was no running at all. Slip marks testify to the short-term loss of balance, but also to the immediate recovery of control, because traces of falling have not yet been found. However, other activities were carried out as well, for which it was at least temporarily necessary to put the knee on the ground. Only in exceptional cases – as in Tuc d'Audoubert – do we know what has been done on the ground (Bégouën et al. 2009). There the coincidence of a number of extraordinary circumstances led to the recognition of a longer sequence of activities carried out by ice age cave visitors. Deep inside the cave, clay was tested, found to be good, removed, transported, and a few meters away transformed into sculptures (Fig. 2). The imprints in the clay ground show where protagonists knelt down to remove the clay and how they moved over to the place where sculptures were made – details that could only be discovered by the indigenous ichnologists.

Most of the individuals walked unspectacularly through the respective caves. Only a few tracks contain different information, for example, a person – in Pech Merle a woman between 21 and 40 years old (adultus after Martin 1928) – who carried an additional weight (Fig. 3) and in Niaux one who deliberately created the footprints by rolling slowly from the heel to the toes and, furthermore, two people who consciously walked on their heels. All individuals were physically healthy and showed no walking disabilities.

At an archaeological site, the absolute simultaneity of different activities can only be proven in special situations. This also applies to footprints which are usually difficult to associate with the archaeological finds and other findings surrounding them. For this reason, the footprints primarily document the presence and movement of people in the cave. However, in the case of the clay sculptures in Tuc d'Audoubert, a complex sequence of operations could be reconstructed from tracks.

In the course of the two field studies in 2013 and 2018, especially the last, there were no inconsistencies or contradictions in the interpretation of the approximately 1000 prehistoric human footprints examined. This expresses the professionalism and quality of the work of the indigenous ichnologists.

Currently, most of the footprints examined by indigenous ichnologists are analyzed using quantitative methods in order to verify or falsify their results in the form of a cross-test. It will be a central task to combine Western science with indigenous ichnology and to discuss the results

Tracking in Caves: Indigenous Ichnology, Fig. 2 Reading of human footprints by Kxunta, Thao, and Ciqae in Tuc d'Audoubert. (Photo Association Louis Bégouën)

Tracking in Caves: Indigenous Ichnology, Fig. 3 Female human footprint in Pech Merle. (Photo Tracking in Caves)

of both approaches. A main problem is certainly the difficulty of evaluating the results obtained by the indigenous ichnologists. But their integration into the interpretation of prehistoric footprints is still in its infancy. Following the principle of Aristotle, where the whole is more than the sum of its parts, indigenous ichnologists include the behavior of the track-maker in their interpretations from the beginning. For Western scientists, footprints are individual morphological features that are quantified as such, disconnected from the other footprints. The question of the behavior of the track-maker is handled separately and comes at the end of the statistical analyses. This methodical contrast offers great potential, and its analysis promises benefits for both sides.

For the future, these experiences mean that by applying indigenous knowledge, selected source genres of archaeology can be explored in greater depth than would be the case with conventional methods alone. While the case described here was about the knowledge of hunter-gatherers, it is to be expected that the addition of, for example, pastoral nomads in other fields of research and for other epochs will also lead to new and deeper insights.

Cross-References

- ▶ Art, Paleolithic
- ▶ Europe: Prehistoric Rock Art
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Prehistoric Human Footprint Sites

References

Bégouën, R., C. Fritz, G. Tosello, J. Clottes, A. Pastoors, and F. Faist. 2009. *Le sanctuaire secret des bisons. Il y a 14 000 ans dans la caverne du Tuc d'Audoubert* . . . . Paris: Somogy.

Bennett, M.R., J.W. Harris, B.G. Richmond, D.R. Braun, E. Mbua, P. Kiura, et al. 2009. Early hominin foot morphology based on 1.5-million-year-old footprints from Ileret, Kenya. *Science* 323: 1197–1201.

Bennett, M.R., S.C. Reynolds, S.A. Morse, and M. Budka. 2016. Laetoli's lost tracks. 3D generated mean shape and missing footprints. *Scientific Reports* 6: 21916.

Crompton, R.H., T.C. Pataky, R. Savage, K. D'Août, M.R. Bennett, M.H. Day, et al. 2011. Human-like external function of the foot, and fully upright gait, confirmed in the 3.66 million year old Laetoli hominin footprints by topographic statistics, experimental footprint-formation and computer simulation. *Journal of the Royal Society, Interface* 9: 707–719.

Husserl, E. 1939. *Erfahrung und Urteil. Untersuchungen zur Genealogie der Logik*. Prag: Academia.

Lenssen-Erz, T., A. Pastoors, T. Ciqae, U. Kxunta, T. Thao, R. Bégouën, M. Biesele, and J. Clottes. 2018. Tracking in caves. Reading human spoor in ice age caves with San hunters. In *Research and activism among Kalahari San today. Ideas, challenges, and debates*, ed. R.F. Puckett and K. Ikeya, 103–128. Osaka: Yubunsha Co.

Liebenberg, L.W. 1990. *The art of tracking: The origin of science*. Cape Town: David Philip.

Lockley, M.G. 1999. *The eternal trail. A tracker looks at evolution*. Reading: Perseus Books.

Martin, R. 1928. *Lehrbuch der Anthropologie in systematischer Darstellung mit besonderer Berücksichtigung der anthropologischen Methoden für Studierende Ärtze und Forschungsreisende*. Jena: Fischer.

Panofsky, E. 1962. *Studies in iconology. Humanistic themes in the art of the renaissance*. New York: Harper & Row.

Pastoors, A., T. Lenssen-Erz, T. Ciqae, U. Kxunta, T. Thao, R. Bégouën, M. Biesele, and J. Clottes. 2015. Tracking in caves. Experience based reading of Pleistocene human footprints in French caves. *Cambridge Archaeological Journal* 25: 551–564.

Pastoors, A., T. Lenssen-Erz, B. Breuckmann, T. Ciqae, U. Kxunta, D. Rieke-Zapp, and T. Thao. 2017. Experience based reading of Pleistocene human footprints in Pech-Merle. *Quaternary International* 430: 155–162.

Polanyi, M. 1966. The logic of tacit inference. *Philosophy* 41: 1–18.

Schutz, A., and T. Luckmann. 1973. *The structures of the life-world*. Evanston: Northwestern University Press.

Trackways in Archaeological Conservation and Preservation

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Introduction

Ichnology is the branch of paleontology that studies human and animal fossil tracks and trackways,

both of which are widespread across the world. That trackway sites are quite common is not surprising: an animal makes many tracks and traces during its life but leaves only one set of remains which, if skeletal, may be preserved in the fossil record. This entry is concerned with the preservation of trackway sites. Through the ICHNOS Project, Lockley and colleagues provide a record of some 63 hominid and human footprint sites, ordered by approximate age (Lockley et al. 2007). All of these are, needless to say, younger by far than the many known dinosaur track sites and the vastly older invertebrate trackway sites from the Paleozoic era. From a preservation point of view, it is not relevant to distinguish between categories of track maker. Hominid and dinosaur track sites in particular fascinate the public and are good exemplars pertaining to preservation and public access to exposed sites.

Definition

A number of aspects make trackways important as sources of scientific, social, and behavioral information: the size of the track maker, stride, soft tissue morphology, predatory or flight behavior, and so on. Essentially there is no substance to a track, only the imprint of tissue on the surface carries information, and it is this that is the object of preservation. Preservation thus poses challenges. Trackways are found across a spectrum of substrate types. The track surface depends on the geology of the site and varies from soil or mud to hard, weather-resistant rock in some cases of fossilized tracks. However, almost all rock types in which tracks are impressed were soft sediments, although metamorphic or secondary depositional processes after burial (e.g., limonite or calcite formation on the track surface) may alter the petrology. It is obvious that the substrate must have characteristics capable of retaining detail of the track. Thus, mud or volcanic ash fall cannot be too wet or too dry or tracks will not survive or they will be ill resolved and of little value. A further requirement for survival is protection of the tracks by rapid burial through natural processes, or through having been made in a cave as in Chauvet (Clottes 2001: 37), where erosional processes do not erase the prints. That so many traces and tracks survive in the palaeontological and archaeological record is indicative of the frequency and ubiquity of their creation; many more sites than those existing today must have been lost through erosion and clearly many are yet to be found.

Key Issues/Current Debates/Future Directions/Examples

From a preservation perspective two aspects of how trackways are valued by various constituencies are relevant. Scientific and archaeological values, falling under the disciplines of ichnology and palaeoanthropology, derive from the unique information trackways can yield that fossil bones or other archaeological evidence may not afford. Social and symbolic values emanate from public education and the way people respond to these frail traces of the past. Tracks evoke a moment in time, recent or tens of thousands or millions of years ago, and invite musings about the maker of the tracks, whether human or animal, and the circumstances under which they were formed. People thus relate powerfully to tracks, such as the iconic image of Neil Armstrong's footprint on the moon and the Laetoli hominid trails, which bracket a time span of 3.6 Ma and symbolize the journey of the human species (Figs. 1 and 2).

Essentially three options exist for the conservation and preservation of trackways. All have been undertaken at various sites. These are to lift the trackway or some of the individual prints for removal to a museum or place of safekeeping; to bury or rebury the site; to shelter it and open it to visitors; or to leave it exposed without an attempt at preservation. In each of these scenarios, high-level documentation is an essential starting point. Photogrammetry and laser scanning provide noncontact recording of surfaces in three dimensions. This is especially useful in cases where the surface is too fragile to allow molding for replication as a cast. The photographic and digital records of surfaces are a fundamental research tool and provide a standard for future condition monitoring.

Trackways in Archaeological Conservation and Preservation, Fig. 1 When Neil Armstrong trod on the surface of the moon, July 20, 1969, images of his footprints were instantly recognizable as symbolic of humankind's first tentative steps into the cosmos. (Photo courtesy of NASA)

Trackways in Archaeological Conservation and Preservation, Fig. 2 At the site of Laetoli, trails of three hominids, two walking in tandem, and crossed by hipparion tracks (*bottom* of image), were imprinted 3.6 Ma ago. The southern part of the trackway is shown after re-excavation and conservation in 1995. (Photo: 1995, J. Paul Getty Trust)

The decision-making process as to whether the site is to be lifted, buried, sheltered, or left exposed can be contentious when different stakeholders or constituencies are involved if, for example, either the scientific or social values, including economic ones, take the foreground to the detriment of the others. Significance issues that need to be weighed in the decision include the environment and landscape in which the trackway exists. To move a site in toto, or to remove only individual prints which destroy the relationship between them (gait, stride length), is contrary to the accepted ethic of conservation in context. Both are irreversible interventions. Removal ascribes scientific value only and overlooks the cultural and natural significance in the landscape. On the other hand, leaving a trackway in situ requires protection. If exposed, inevitably weather and erosion will destroy the site. Consequently, for many preservationists, the options then become sheltering (Stanley-Price and Matero 2001) or reburial (Nixon 2001; Stanley-Price and Burch 2004). The excavator, scientific community, and the public often regard reburial as the less desirable option: it removes the evidence from access and view. If the trackway site is of high significance, there is a tendency for a decision to be taken for the site to be opened for visitation, usually under a structure that serves a protective and interpretive function. This is a time of great risk for an excavated site since temporary protection and security may not be adequate while design and funding for a shelter are being sought. As a number of case studies reveal, none of these options is ideal, and each has advantages and disadvantages. Examples are considered below.

Lifting a Trackway Site: Glen Rose Dinosaur Trackways

The dinosaur footprints in the lower Cretaceous deposits of the Paluxy River near Glen Rose in Texas serve to illustrate problems that may arise when a trackway site is relocated. The site has been known since 1908 and comprises exceptionally well-preserved carnosaur and sauropod footprints in immediate proximity to each other. A large section of the dolomitic trackway was removed in 1939 and taken to the American Museum of Natural History (AMNH), and a further part went to the Texas Memorial Museum (TMM) where it is housed in a special building. The section in the TMM has displayed severe deterioration, including surface spalling and exfoliation associated with the crystal growth of soluble salts, principally epsomite. The environmental conditions in the building, including excessive humidity and capillary rise from ground water, are reportedly responsible for the condition of the trackways (Shelton et al. 1993).

It is apparent that the inadequate monitoring of the condition of the tracks in the TMM permitted deterioration to occur to an advanced stage before the damage was fully realized. The other part of the contiguous trackway in the AMNH apparently has not suffered damage. The remaining trackways, still in situ, have also shown no deterioration and are protected by the Texas Parks and Wildlife Department in what is now Dinosaur Valley National Monument (Farlow 1993).

A related example is from South Africa: The human footprint site is situated about 130 km north of Cape Town on the Langebaan Lagoon. Here a few tracks were found in dune rock dating to 120,000 years BP. Because the site is frequented by visitors who habitually carve graffiti into the soft dune rock and also because of vulnerability to wave erosion, the tracks were removed by helicopter and transported to the Iziko Museum in Cape Town (Roberts 2008). The fragmentary front print was lost during this rescue, though a cast exists.

Reburial: Laetoli Hominid Trackway Site

The earliest hominid trackway, 3.6 Ma old, is at the site of Laetoli in Tanzania (Fig. 2). The Laetoli tracks exemplify many of the issues and controversies that bear upon highly significant sites and their preservation. When, in 1978, fossil footprints of a purported human ancestor (*Australopithecus afarensis)* were discovered during a palaeontological expedition led by Mary Leakey, scientific and public attention was immense, reflecting both their scientific and symbolic significance. The prints, partly exposed through erosion, were found at the site of Laetoli, to the south of Olduvai Gorge, where Louis and Mary Leakey did their pioneering work researching human evolution. Securely dated, the footprints resolved one of the major debates in palaeoanthropology. At Olduvai and other sites in Africa and beyond, the search for evidence of human evolution has focused on fossil bones; but while fossils have been the primary means of understanding our origins, they cannot answer all the scientific questions. One debate had been the development of the brain in relation to bipedalism. The Laetoli trackway was evidence that bipedalism preceded development of the brain. Excavated in 1978 and 1979, the trackway consists of footprints of three individuals in two parallel trails some 30 m long, preserved in volcanic ash. The Leakey team used various techniques to document the trackway, including molding, casting, and photogrammetry, before reburying the trails in 1979 as a means of protection. After reburial the site revegetated. Although its condition was not known, nor was it monitored because of its remoteness, there was concern that root growth from Acacia trees was damaging the tracks. A multiyear conservation project involved re-excavation, removal of trees and roots, stabilization of the trackway and site, scientific restudy, and reburial (Fig. 3) (Demas and Agnew 2006). A small-scale replica reburial trench was created adjacent to the site to provide surrogate monitoring through periodic re-excavation (Agnew and Demas 2004). Reburial removed the trackway from future public access. As a means of compensation, a cast of the trackways and interpretive material was created at the nearby Olduvai Museum. More than 10 years later, a political decision was taken, but yet to be implemented, to reexpose the tracks for tourism.

Another example is from the Willandra Lakes Region World Heritage area. The Willandra Lakes

Trackways in Archaeological Conservation and Preservation, Fig. 3 Southern part of the Laetoli trackway during reburial in 1995 showing the reburial stratigraphy incorporating sieved local sands and geosynthetic materials with a final boulder capping. (Photo: 1995, J. Paul Getty Trust)

area was the site of discovery in 2003 of human footprints dated to 20,000 years BP (Webb et al. 2006). The site has revealed over 700 prints and 23 trackways of men, women, and children. Apart from the tracks themselves, the Willandra Lakes World Heritage area is also important for an understanding of Australia's prehistory through the skeletal collections (http://www.visitmungo.com.au/world-heritage). Three traditional tribal groups maintain responsibility for the site with the assistance of the New South Wales National Park Service and other organizations. After documentation and scientific study, the footprints were buried under sand and a covering of a synthetic textile as protection from wind scour and to provide insulation against damaging freeze-thaw (Fig. 4). Considerable discussion took place among the traditional communities and professionals regarding the future of the site: whether it should be replicated for display, on site or nearby, or buried permanently, or opened to visitation under a shelter. Based on clear photographic evidence of rapid deterioration of exposed tracks, the decision was made to keep the site buried. Interpretation of the tracks is done off-site.

Sheltering: Lark Quarry Dinosaur Stampede

Known today as the Dinosaur Stampede National Monument, in central Queensland, Australia, the site was one of the first three places to be listed on the National Heritage List in July 2004. Located 100 km south of the town of Winton, the site features unique evidence of a dinosaur stampede, with almost 4000 tracks clearly visible in an area of some 210 m^2 (Fig. 5). The footprints are interpreted as a fossilized record of a predator stalking and causing the chaotic stampede of around 150 bipedal dinosaurs, varying in size from that of a chicken to larger types about the size of Australia's flightless bird the emu.

The site is claimed to be the only known dinosaur stampede and a record of a few minutes in time during the Cretaceous era, 95 Ma ago. Today an ecologically sustainable building covers the trackways protecting the footprints from weather, humans, and wildlife. The state-of-the-art building is, however, not the first shelter to be built over the site. Excavated in 1977–1978, the significance of the site resulted in a decision, despite its remoteness and lack of infrastructure and personnel, to open it to the public. A number of organizations were appointed as joint trustees of the site, and while funding was being secured for a roof, the site was protected with straw under plastic sheeting. The problems that subsequently arose, during and after construction of the flat pentagonal roof, are numerous. They range from burning of the straw and loss of a holotype footprint during unsupervised construction of the roof, to the occupation by kangaroos seeking shade, to souveniring by visitors since the site was not staffed for security or interpretation. Additional problems were flooding of the site from the uphill slope, dust accumulation in the prints, and a general inability of the trackway to be understood by visitors (Agnew et al. 1989).

Nor was the new building (Fig. 6), erected in 2001, without problems. Collapse of a large

Trackways in Archaeological Conservation and Preservation, Fig. 4 In the flat barren landscape of the Willandra Lakes, the 20,000-year-old human prints are shallowly buried by layers of permeable synthetic textile to protect them from freeze-thaw cycles and wind scour. (Photo: 2007, J. Paul Getty Trust)

Trackways in Archaeological Conservation and Preservation, Fig. 5 Some of the 4000 individual tracks of dinosaurs dating to 95 Ma ago at the Lark Quarry site. Image shows ornithopod and coelurosaur and two of the eleven carnosaur tracks. (Photo: 2007, J. Paul Getty Trust)

rammed earth internal wall, intended to provide thermal stability of the interior environment, onto the visitors' walkway and trackway, occurred not long after the site had been opened to the public (Meiklejohn 2003).

Unprotected Sites: Formby Point

Trackways may be too extensive for practicable preservation measures to be warranted. Nor would the high cost justify attempts to save them from erosion. Under such circumstances, full documentation and recording is the only option. There are many such sites. Well known are the intertidal coastal trackway sites on the west coast of Britain. The Formby site, dated about 5500 BP, is of high scientific value and the prints of children, women, men, and a number of animals, including deer, aurochs, and birds, have been recorded. About 145 different trails at Formby alone have been noted, and as the succession of silts and sands become exposed during accelerated beach erosion, the imprint bearing sediments are revealed. Photography of the footprints, recording their positions, and lifting and making casts of selected

Trackways in Archaeological Conservation and Preservation, Fig. 6 The second protective structure built in 2001 over the Lark Quarry dinosaur stampede trackway. (Photo: 2007, J. Paul Getty Trust)

specimens has been an ongoing research project (Roberts et al. 1996).

Discussion

All exposed remains are subject to the vicissitudes of weather and damage, none more than tracks, which are essentially ephemeral traces comprised only of the substrate itself. Stabilizing fragile tracks may require treatments, such as surface consolidation, reversible crack filling, and edge buttressing of the Lark Quarry trackway (Agnew et al. 1989), but should be undertaken with due caution; strengthening of the substrate for purposes of molding is of particular concern, as the experience with the application of Bedacryl on the Laetoli tracks in 1978 demonstrated (Demas et al. 1996). The use of 3-D technologies to capture virtual reconstructions and create physical replicas now offers a noninvasive alternative to molding. Precise, accurate, and accessible archived documentation and periodic monitoring are the most important measures that can be taken for the preservation of these fragile and unique traces regardless of other interventions undertaken.

When the significance of a site is high, the desire to open it to visitation may override sustainable considerations of preservation. Seldom are all the threats or limitations taken fully into account. These may include, to name a few, damage to the site while fundraising and preparations are being made for sheltering and interpretation; lack of security and long-term maintenance of a protective structure; insufficient staffing and infrastructure; and unanticipated consequences of sheltering such as dust accumulation obscuring the tracks, birds and animals in the shelter, accumulation of damaging soluble salts, plant growth, and so on. It is unusual too for an objective assessment of the visitation potential to guide the decision. Thus, when visitor numbers do not meet expectations, there may be a decline in funding and inevitable neglect over the long term.

Trackways of significance will continue to be discovered. Their preservation requires a complex decision-making process based on thorough understanding of significance, investigation of environmental conditions, careful assessment of threats, and long-term human and financial resources.

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Australopithecines
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage and the Public
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ First Australians: Origins
- ▶ Hominids, Earliest African
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ Ileret Footprints
- ▶ Leakey Family
- ▶ Lucy
- ▶ Olduvai Gorge Archaeological Site
- ▶ Sustainability and Cultural Heritage
- ▶ Uses of Heritage

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References

Agnew, N., and M. Demas. 2004. Monitoring through replication: Design and evaluation of the monitoring reburial at the Laetoli trackway site. *Conservation and Management of Archaeological Sites* 6: 295–303.

Agnew, N., H. Griffin, M. Wade, T. Tebble, and W. Oxnam. 1989. Strategies and techniques for the preservation of fossil tracksites: An Australian example. In *Dinosaur tracks and traces*, ed. D.D. Gillette and M.G. Lockley, 397–407. Cambridge: Cambridge University Press.

Clottes, J. 2001. *La grotte Chauvet: l'art des origins*. Paris: Seuil.

Demas, M., and N. Agnew. 2006. Decision making for conservation of archaeological sites: The example of the Laetoli Hominid Trackway, Tanzania. In *Of the past, for the future: Integrating archaeology & conservation. Proceedings of the conservation theme at the 5th World Archaeological Congress, Washington, DC, 22–26 June, 2003*, ed. N. Agnew and J. Bridgland, 64–72.

Demas, M., N. Agnew, S. Waane, J. Podany, A. Bass, and D. Kamamba. 1996. Preservation of the Laetoli hominid trackway in Tanzania. In *Archaeological conservation and its consequences. Preprints of the contributions to the Copenhagen Congress, 26–30 August 1996*, ed. A. Roy and P. Smith, 38–42. London: International Institute for Conservation.

Farlow, J.O. 1993. *The dinosaurs of Dinosaur Valley State Park*. Austin: Texas Parks and Wildlife Dept.

Lockley, M., J. Kim, and G. Roberts. 2007. The *Ichnos* project: A re-evaluation of the hominid track record. *New Mexico Museum of Natural History and Science Bulletin* 42: 79–88.

Meiklejohn, D. 2003. The ghosts of Lark Quarry. *Australian Age of Dinosaurs* 2: 19–31.

Nixon, T., ed. 2001. *Preserving archaeological remains in situ? Proceedings of the 2nd Conference 12–14 September 2001*. London: Museum of London Archaeology Service.

Roberts, D.L. 2008. Last interglacial hominid and associated vertebrate fossil trackways in coastal eolianites, South Africa. *Ichnos* 15: 190–207.

Roberts, G., S. Gonzalez, and D. Huddart. 1996. Intertidal Holocene footprints and their archaeological significance. *Antiquity* 70: 647–651.

Shelton, S.Y., R.C. Barnett, and M.D. Magruder. 1993. Conservation of a dinosaur trackway exhibit. *Collection Forum* 9 (1): 17–26.

Stanley-Price, N., and R. Burch, eds. 2004. *Conservation and Management of Archaeological Sites*, 6. Special Issue on Site Reburial. London: James & James.

Stanley-Price, N., and F. Matero, eds. 2001. *Conservation and Management of Archaeological Sites*, 5 (1 & 2). Special Issue on Protective Shelters. London: James & James.

Webb, S., M.L. Cupper, and R. Robins. 2006. Pleistocene human footprints from the Willandra Lakes, southeastern Australia. *Journal of Human Evolution* 50 (4): 405–413.

Trade and Exchange in Precontact East Polynesia

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State of Knowledge and Current Debates

The vast Eastern Polynesian triangle where 40 island communities live is delineated by the Hawaiian Islands, Easter Island (Rapa Nui), and New Zealand (Fig. 1). Eastern Polynesia includes the central archipelagoes of the Society, Cooks, Australs, Marquesas, Tuamotu, and Mangareva Islands which are collectively known as Central East Polynesia (CEP), with the more remote islands of Hawaii, Rapa Nui, and New Zealand found at the margins. Eastern Polynesian islands are more isolated than those found in the Western Pacific. As an example, the remote Hawaiian Islands are separated by c. 4000 km from their nearest neighbors, the Tuamotu Islands.

Background

Questions of how the islands in Eastern Polynesia were first colonized, whether by drift voyaging or intentional navigation, have long been debated by scholars ever since the time of Captain Cook's first voyages to the region. From an ethnographic perspective, Eastern Polynesia differs from Western Polynesia in terms of religion, material culture, and kinship (Burrows 1938). Kirch and Green's phylogenetic approach (2001), combining linguistic, genetic, archaeological, and ethnographic data, illustrates that Eastern Polynesian cultures share many cultural innovations and language traits, arguing for the presence of an Eastern Polynesian homeland prior to the settlement of the remote margins of Eastern Polynesia. Experimental voyaging, computer simulation models, and newly refined Eastern Polynesia chronologies argue for a rapid settlement of CEP and the Hawaiian archipelago c. AD 900–1100, with

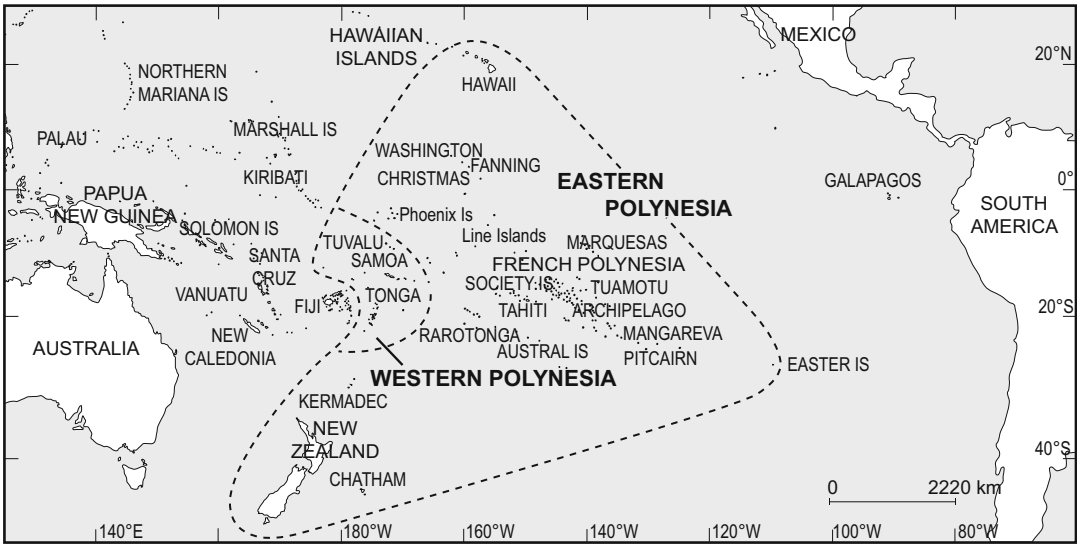

Trade and Exchange in Precontact East Polynesia, Fig. 1 Map of the Polynesian triangle

New Zealand being the last island settled in the thirteenth century (Kahn in press; Kirch 2017a). This supports Eastern Polynesian oral histories and early European explorer accounts which document expert navigators and periods of widespread long-distance voyaging in the precontact period (Di Piazza and Pearthree 2007; Finney 1997).

Chronology and Scale of Long-Distance Voyaging, Trade, and Exchange

While it is now recognized that the remote archipelagoes of Eastern Polynesia were intentionally settled using sophisticated watercraft and navigational techniques, to what extent did long-distance voyaging continue after first island settlement in Eastern Polynesia? What long-term benefits might trade have offered isolated island communities and to what extent did such communication spur regional patterns of social change? And to what extent did exchange at the intra-archipelago level, namely, between islands within the same archipelago, perhaps spur or support the development of status differentiation? These are questions continually debated by archaeologists in the region and touch upon larger global archaeology themes, including the role of trade and communication in establishing and maintaining socioeconomic relations, their role as a colonizing strategy, and their role in the development of cultural change (Weisler and Walter 2017).

Archaeologists in Polynesia have focused on documenting the trade of durable material culture. Numerous studies have demonstrated the movement of adzes, stone tools fashioned from fine-grained basalt, basalt oven stones, and pearl shell, a large bivalve prized as a material for fabricating fishhooks and body ornaments. These highly prized materials had restricted spatial distributions, lending themselves readily to transport and trade. Analyses of adzes have most commonly been used, including X-ray fluorescence (EDXRF, WDXRF), inductively coupled plasma-atomic emission spectrometry (ICP-AES), and radiogenic isotope analyses to geochemically characterize artifacts and link them back to their geological source of origin. Yet archaeologically we can only track the movement of highly durable goods, which was likely only a small portion of the total amount of goods traded (Kirch and Green 2001).

Ethnohistoric and archaeological data suggest that a wide range of durable and nondurable

goods were traded in Eastern Polynesia. In addition to marriage partners, traded items included long white dog hair and bird feathers used in elite regalia; animals such as turtles, pig, dog, and chicken; plants such as coconut, taro, and candlenut; plaited vegetal mats; bark cloth for clothing; shell tools; basalt adzes and poi pounders (the latter were for preparing foodstuffs and medicines); and obsidian (Weisler 1997; Weisler and Walter 2017). Many of these goods had limited spatial distribution or were more readily produced on younger high islands rich in resources versus older atolls with more marginal environments lacking highly productive soil, easy access to water, and raw materials such as basalt. Thus, to some extent post-colonization trade was likely key for balancing out resource differences among the different island types (and island ages) found in the Eastern Polynesian region. It was also likely instrumental to the sustainability of island communities in resource-poor contexts, where daughter communities had to rely heavily on ties to motherland communities, particularly after profound climatic events such as cyclones and droughts.

But what about other social benefits of trade vis-à-vis group identity and status differentiation within chiefdoms? Ethnographic data widens our understanding of the meaning of exchange, prompting archaeologists to look beyond purely functionalist interpretations. Modern ethnographies of Austronesian societies, whose cultures speak languages in the same language family as those found in Polynesia, support the notion that gift exchange plays critical sociopolitical roles in regional and community contexts. The frequency of local domestic exchange and gift giving, including the quantity and quality of the goods presented, confers certain kin groups distinct advantages over others (McKinnon 2000:170–171; Parmentier 1987:114). Weiner (1992) emphasizes that the possession and exchange of inalienable objects or heirlooms, such as mats and adzes, both establish and maintain group identity. Gift exchange offers kin groups, and particularly high-status kin groups, an avenue to create and establish social difference and to widen their alliance networks. This, in turn, maintains and perpetuates the status of the involved kin groups through time. This implies that comparative archaeological investigation of gift exchange activities has relevance to understanding social relations at the local, community, and regional scales, both within and between archipelagoes.

As archaeological models and ethnographic models attest, the frequency, extent, and scale of trade among and between archipelagoes, as well as their change through time, are important elements to understanding regional diversity in Eastern Polynesia. Below I provide case studies documenting (1) early East Polynesian inter-archipelago long-distance exchange and its diminution through time, (2) the role of intra-archipelago exchange in supporting elite identities and hierarchies, and (3) trans-regional contacts between Eastern Polynesia and South America. The first two case studies provide examples of organized and sustained exchange systems that lasted for several centuries, while the last case study is rather unique in documenting a short period of contact with sporadic exchange.

Early Eastern Polynesian Inter-archipelago Exchange and Its Diminution Through Time

In examining the role of inter-archipelago exchange, I will first turn to the Eiao adze quarry, situated at the northwest end of the Marquesas Islands (Fig. 2). The island is currently uninhabited and, given its lack of natural water resources, was likely not permanently inhabited in the precontact period. Yet the island is home to abundant sources of fine-grained, tool-quality basalts and has copious evidence for in situ tool manufacture (Charleux et al. 2014; Rolett et al. 1997).

Early XRF studies in Eastern Polynesia documented the impressively long reach of the Eiao quarry, with adzes transported and exchanged into the Society Islands (Weisler 1998) and the northern Marquesan group (Rolett 1998; Rolett et al. 1997). Subsequent studies have provided abundant evidence for the movement of Eiao adze material into CEP and throughout the Marquesan archipelago (Fig. 2; see Allen 2014; McAlister and Allen 2017). These include imports into the Tuamotu Islands (Collerson and Weisler 2007), the Line Islands (Di Piazza and Pearthree 2001), the Cook Islands (McAlister et al. 2013; Weisler

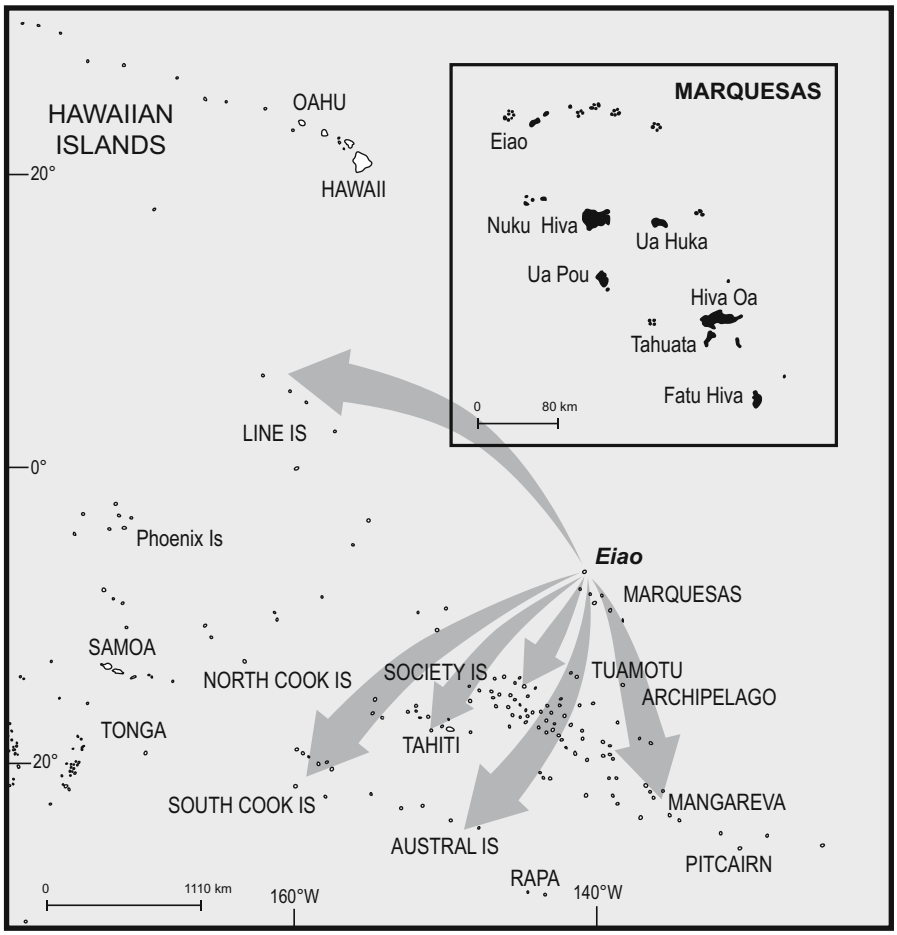

Trade and Exchange in Precontact East Polynesia, Fig. 2 The Eiao Adze quarry and networks of long-distance exchange

et al. 2016), and the Austral Islands (Hermann 2013, 2016; Hermann et al. 2017). The distribution of Eiao adze material provides direct evidence for precontact long-distance exchange and interaction between CEP archipelagoes. The most remote corners of East Polynesia, including Easter Island, New Zealand, and the Hawaiian Islands, have limited evidence for long-distance exchange and do not appear to have played a central role in the CEP interaction sphere. Materials evidence for items moving in or out of remote East Polynesia are restricted to a Tuamotuan adze sourced to the Hawaiian Islands (Collerson and Weisler 2007) and a New Zealand shell chisel made from an exotic shell (Davidson et al. 2011).

Archaeologists have attempted to model the scale and timing of long-distance trade and interaction in CEP using dated contexts where Eiao adze material has been found. While sample sizes of Eiao imported material are still low, there is a broad consensus that CEP long-distance trade and exchange was most frequent in the centuries just after island colonization. As several researchers have noted, Eiao material and other imported adze material are most prevalent in early settlement period sites, with frequency rates falling off c. AD 1400 (Rolett 2002; Weisler 2002). However, in some areas such as the Cook Islands, long-distance interaction seems to have continued up until the late AD 1500s (Weisler et al. 2016).

Following this, archaeologists have argued that CEP long-distance voyaging seems to have been an important colonization strategy, linking archipelagoes with varying resource bases as well as parent and daughter communities (Weisler 2002). Over time as human populations increased, local aggression and chiefly competition rose and local resources were diminished. It is likely that the somewhat risky and expensive patterns of long-distance voyaging in CEP were replaced with greater economic inputs into local economies (Rolett 2002). Once the larger central nodes of the CEP exchange network, such as the Society Islands, diminished their role in long-distance exchange, this likely had widespread effects on the entire CEP interaction sphere. This cessation adversely effected the more remote and resource-poor communities involved in the CEP interaction sphere, such as Pitcairn and Henderson Islands, whose connections to the mother community of Mangareva were necessary for survival (Weisler and Walter 2016). Ultimately Henderson and the Pitcairn Islands were abandoned, becoming "mystery islands" with precontact evidence of Polynesian settlement but lacking habitation at the time of European contact.

The timing of the cessation of long-distance voyaging in particular archipelagoes in CEP remains unresolved, while broad patterns suggest contraction of regional networks c. AD 1400. Weisler et al. (2016) have argued that the cessation of long-distance trade likely differed among CEP archipelagoes and was dependent on island geography (age, type, size, accessibility, resources), dates of colonization, growth of human populations, and local evolution of social conditions, including human-environment interactions and ecosystem sustainability.

Intra-archipelago Exchange in Eastern Polynesia: Elite Identities and Hierarchies

In examining the role of intra-archipelago exchange, I will first turn to the Society Island case study. The Society Islands are the largest high-island archipelago in CEP. Like all hotspot formations, the Society archipelago has a clear age/resource gradient, with the older, drier islands found in the Leeward group and the younger, wetter islands in the Windward group (Fig. 3). The Leeward and Windward groups are separated by a 2–3-day sail by traditional outrigger canoe. The Leeward group and Windward group each formed a unified chiefdom in the period just prior to European contact, following an earlier period whereby several independent chiefdoms on separate islands were unified via coercive consolidation. During the Classic Period (AD 1650–1767), each group saw the development of regional styles of temple architecture and forms of material culture (Kahn in press; Kahn and Kirch 2014). The Society Islands are the only CEP culture to develop into a complex chiefdom with three-plus social classes (elite paramount chiefs, secondary chiefs, administrators, commoners), highly formalized status differences, large centralized polities, and high overall population (c. 120,000).

Ethnohistoric sources document that there was considerable exchange and movement of goods and ideas between the Windward and Leeward groups. The Leeward group produced coconut oil and plank boats for exchange, while the Windward group traded surplus bark cloth and starchy foodstuffs (Fig. 3). While incomplete, the sources record how Maupiti exported adzes and stone food pounders (*poi* pounders), while Tahiti also exchanged adzes. Intermarriages of chiefly lines were found between all islands within the archipelago, but were pronounced between Mooréa and Tahiti and between Tahiti and the Leeward group. The movement of *marae* (temple) stones, particularly cornerstones (*ofa'i faoa*) from Leeward group *marae*, and using these as "founder stones" for Windward group *marae* was a material manifestation of intermarriages that legitimated chiefly rank and elite alliances (Henry 1928; Kahn and Kirch 2014).

Given the Society Island ethnohistoric accounts, many exchange items may have circulated in part during gift exchange ceremonies commemorating the joining of chiefly lineages in marriage. There has been only one detailed analysis of the circulation and movement of Society Island adzes in the development/expansion and Classic Periods. Data from Mo'orea Island indicate intra-archipelago trade in adzes began as

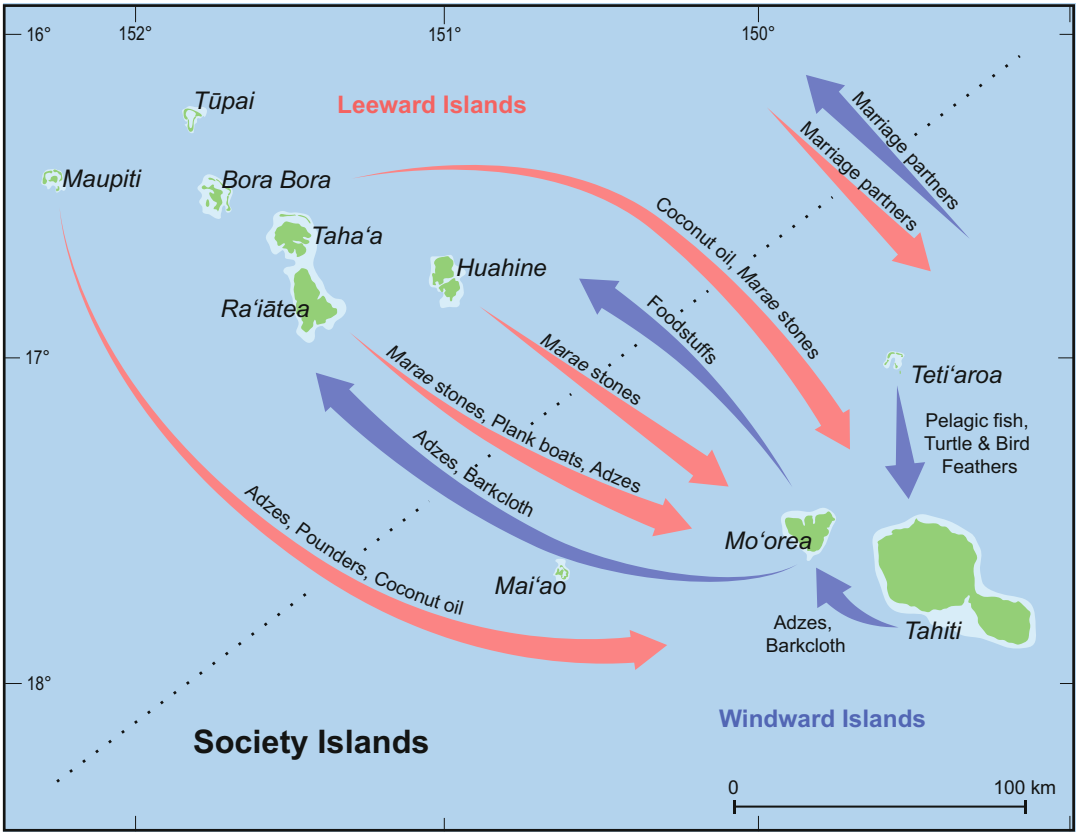

Trade and Exchange in Precontact East Polynesia, Fig. 3 Intra-archipelago exchange between the Windward and Leeward Society Islands

early as AD 1350 and continued up until European contact (Kahn et al. 2013). These 'Opunohu Valley stone tool artifact assemblages lacked evidence for inter-archipelago exchange, with no imports coming in from major Western Polynesia adze quarries or major CEP quarries such as Eiao. Yet they had high frequencies of off-island imports coming from within the archipelago (30%), with c. 26% likely coming from Tahiti and c. 4% likely coming from Ra'iātea. Elite and commoner residences did not differ in their distributions of local and exotic (off-island source) stone tools. However, 67% of these imports were recovered in ritual sites with ceremonial function (*marae*, shrines) or sites with specialized function (feasting, craft production, community use, priests' use). This suggests that socio-ritual elites, including chiefs and craft specialists (*tahua*), practiced local prestige-good gift exchange, some of which included adzes. Such interactions would have solidified sociopolitical and ideological alliances between Windward and Leeward group elites, in effect both creating and maintaining formalized social hierarchies.

These data suggest that Polynesian adzes had more than a strictly utilitarian function, a theme that is hinted at in the ethnohistoric records of many island groups. Adzes were often used in the production of ritually charged material items including canoes and god figures as well as houses and offering platforms found in and around temples (Firth 1967a; Lass 1998; Malo 1951). In the Society Islands, specialist canoe builders used adzes in a highly ritualized manner. Chants record how specialists placed their adzes "to sleep" in the

walls of the temple at the end of the day while asking the god Tane to consecrate the tool for the next day's work.

> Go and take hold of the axe, In the aperture in Havai'i, Hold, that it be taken out enchanted, Made light; that it may produce sparks in doing varied work. It is whetted with fine sand, Made smooth with loose-grained sand; It is set in a firm handle of sacred *miro*, United with many-stranded sennit of Tane. The axe will become sacred in the brilliant sennit of the artisan *(tahu 'a),* Which touches and holds as a girdle for the axe, For the handle of the axe, The back of the axe, To make one the axe and the handle, To make light the axe, To consecrate the axe, To impel the axe, To complete the axe, To give power to the axe. (Henry 1928: 146–147)

Other traditional chants (Henry 1928: 406–407, 414) and the Tahitian lexicon (Davies 1851: 37) document the practice of naming and curating "ancestral" adzes (for an example of this practice elsewhere in Oceania, see Firth (1959)). Gift exchange of valued adzes "from afar" and their ongoing use in ritualized production activities likely formed one element of much larger alliance-building strategies exploited by Society Island elites. Similar correlations between nonlocal stone tools and elite ceremonial sites are expressed in some later period. Hawaiian case studies (Kirch et al. 2012) demonstrating the importance of intra-archipelago and intradistrict adze exchange in the elite wealth economies of Polynesian chiefdoms and Archaic states (Hermann 2015). While some Eastern Polynesian stone tool assemblages late in the chronological sequence likewise show continued intra-archipelago exchange (Allen and Johnson 1997; Rolett 1998), others, including some Austral Island and Cook Island assemblages, have a majority of locally produced stone tools (Hermann 2013; Weisler et al. 2016). While sample sizes remain small, current data suggest that patterns of intra-archipelago exchange late in the sequence may differ among different Eastern Polynesian archipelagoes.

Transpacific Contacts Between Eastern Polynesia and South America

Sweet potato ultimately originated and was domesticated in South America (Austin 1988; Yen 1974), but it has long been an important staple food item in Polynesia, indicating that it was a transpacific introduction. How exactly was sweet potato first brought to Polynesia, when did this occur (i.e., was it brought by the first Polynesian colonists, or was it a secondary introduction, either by Polynesians or by European explorers?), and why was it introduced? Current genetic and linguistic data indicate that this tuber was introduced during the prehistoric (pre-European contact) era into Polynesia through the dispersal of human agents (Ballard et al. 2005). Genetic analysis of sweet potato herbarium samples collected by early European explorers supports that the cultivar represents a precontact diffusion from South America (Peru-Ecuador area) into Polynesia (Roullier et al. 2013). Ethnohistoric and linguistic evidence suggests that the Polynesian word for sweet potato, *kumara*, comes from Quechua speakers of northwestern South America who were intensive sweet potato cultivators (Fig. 4, Scaglion 2005).

When it was first realized that sweet potato originated in South America and was introduced into Polynesia, one argument was that sweet potato was a precontact (pre-European contact) introduction into Polynesia. Other evidence suggested that sweet potato may have been a later introduction, perhaps brought by European explorers. In the last 30 years, fragments of carbonized sweet potato have been found in several Eastern Polynesian archaeological sites. These include well-dated prehistoric contexts in Mangaia (Cook Islands), Easter Island, and the Hawaiian archipelago (Hather and Kirch 1991; Kirch 2017b; Ladefoged et al. 2005; O'Brien 2000). Archaeologists now accept that sweet potato was imported into central Eastern Polynesia by c. AD 1000–1100, and it is most likely that it spread into the margins of Eastern Polynesia several centuries thereafter. Sweet potato is then a secondary introduction, brought to Eastern Polynesia a century or two after the region had first been colonized, but many centuries before European contact. These data support the tripartite hypothesis, articulated by Yen (1974) and Green (2005) and further developed by Clarke (2009), where the first event was the prehistoric dispersal of sweet potato to Eastern Polynesia, followed by later historic events with the dispersal of sweet potato into the Western Pacific by European explorers.

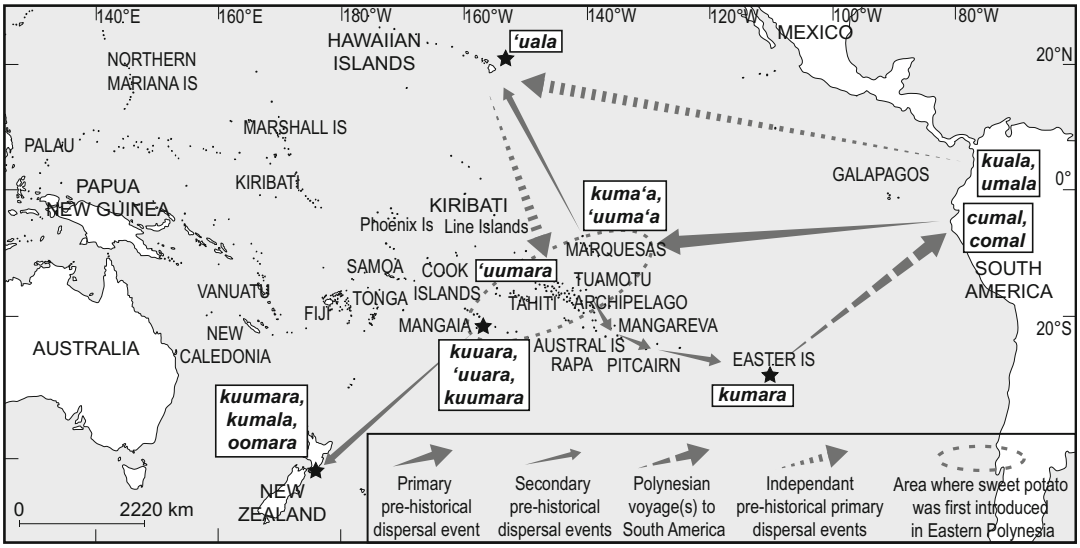

Trade and Exchange in Precontact East Polynesia, Fig. 4 The Eastern Polynesian triangle and South America: word glosses and archaeological evidence for precontact sweet potato. modified from Roullier et al. 2013

The question remains: did natives from South America bring sweet potato to Polynesia, or did Polynesians make contact with South America and return with the sweet potato? Most agree that it was Polynesians who made a two-way voyage and were responsible for the initial transfer of sweet potato, rather than South American voyagers, given the extensive evidence for long-distance voyaging capabilities for Polynesians (Fitzpatrick and Callaghan 2009). After this initial transfer to Eastern Polynesia, this food item spread westward into Central Polynesia, both by Polynesian and later European traders. The prehistoric circulation of sweet potato within Eastern Polynesia and to the west broadly supports that Eastern Polynesians were carrying out long-distance voyaging up until c. AD 1400. Other direct data for transpacific contacts are limited and include the possible transfer of bottle gourd from South America into Polynesia (Clarke 2009). Based on chronological data and genetic data, Storey et al. (2007) have argued that chicken bone from the El Arenal site in south-central Chile is evidence for Polynesian introduction of chickens into South America, but this continues to be debated (Gongora et al. 2008; Storey et al. 2007, 2012; see Horsburgh and McCoy 2017). Genetic analysis of human skeletons has proved inconclusive (Fehren-Schmitz et al. 2017; Gonçalves et al. 2013; Moreno-Mayar et al. 2014).

But why was sweet potato adopted when Polynesians already had a series of good crops? It is quite similar in appearance to yam, which already was a Polynesian cultivar when sweet potato was introduced. However, unlike yam, sweet potato can be planted year round; thus it was easily adopted by Polynesians who already had experience with a similar food crop. Perhaps a canoe load of East Polynesians were taken off course by a large storm and landed in South America. Once there, they would have sought out foodstuffs like sweet potato which were similar to plants they had already cultivated. They then brought sweet potato back to East Polynesia with them on their successful return voyage (likely as a foodstuff to eat on the voyage). Once they returned, they had leftover sweet potato which they continued to cultivate and trade because the plant had a high yield and was well adapted to Polynesian styles of cultivation.

Cross-References

- ▶ Pacific Ocean: Maritime Archaeology
- ▶ Provenance Studies in Archaeology

▶ Trade and Transport in the Ancient Mediterranean
▶ X-Ray Fluorescence (XRF): Applications in Archaeology

References

Allen, M.S. 2014. Marquesan colonisation chronologies and post-colonisation interaction: Implications for Hawaiian origins and the 'Marquesan Homeland hypothesis. *Journal of Pacific Archaeology* 5 (2): 1–17.

Allen, M.S., and K.T.M. Johnson. 1997. Tracking ancient patterns of interaction: Recent geochemical studies in the southern Cook Islands. In *Prehistoric long-distance interaction in Oceania: An interdisciplinary approach*, Monograph 21, ed. M.W. Weisler, 111–133. Auckland: New Zealand Archaeological Association.

Austin, D.F. 1988. The taxonomy, evolution and genetic diversity of sweet potatoes and related wild species. In *Exploration, maintenance and utilization of sweet potato genetic resources: Report of the first sweet potato planning conference 1987*, 27–59. Lima: International Potato Center.

Ballard, C., P. Brown, R.M. Bourke, and T. Harwood, eds. 2005. *The sweet potato in Oceania: A reappraisal*, Oceania Monograph 56, Ethnology Monographs 19. Sydney: Oceania Publications.

Burrows, E.G. 1938. *Western Polynesia: A study in cultural differentiation*, Sweden, Ethnological Studies 7: 1–192.

Charleux, M., A. McAlister, P.R. Mills, and S.P. Lundblad. 2014. Non-destructive XRF analyses of fine-grained basalts from Eiao, Marquesas Islands. *Journal of Pacific Archaeology* 5 (1): 75–89.

Clarke A.C. 2009. *Origins and dispersal of the Sweet potato and bottle gourd in Oceania: Implications for prehistoric human mobility.* PhD thesis, Massey University.

Collerson, K.D., and M.I. Weisler. 2007. Stone adze compositions and the extent of ancient Polynesian voyaging and trade. *Science* 317 (5846): 1907–1911.

Davidson, J., A. Findlater, R. Fyfe, J. MacDonald, and B. Marshall. 2011. Connections with Hawaiki: The evidence of a shell tool from Wairau Bar, Marlborough, New Zealand. *Journal of Pacific Archaeology* 2 (2): 93–102.

Davies, J. 1851. *A tahitian and english dictionary: With introductory remarks on the Polynesian langauge and a short grammar of the Tahitian dialect*. 2nd ed. Papeete: Haere Po No Tahiti [1823].

DiPiazza, A., and E. Pearthree. 2001. Voyaging and basalt exchange in the Phoenix and line archipelagoes: The viewpoint from three mystery islands. *Archaeology in Oceania* 36 (3): 146–152.

Di Piazza, A., and E. Pearthree. 2007. A new reading of Tupaia's chart. *The Journal of the Polynesian Society* 116 (3): 321–340.

Fehren-Schmitz, L., C.L. Jarman, K.M. Harkins, M. Kayser, B.N. Popp, and P. Skoglund. 2017. Genetic ancestry of Rapanui before and after European contact. *Current Biology* 27 (20): 3209–3215.

Finney, B. 1997. Experimental voyaging, oral traditions, and long-distance interaction in Polynesia. In *Prehistoric long-distance interaction in Oceania: An interdisciplinary approach*, Monograph 21, ed. M.I. Weisler, 38–52. Auckland: New Zealand Archaeological Association.

Firth, R. 1959. Ritual Adzes in Tikopia. In *Anthropology in the South Seas*, ed. J.E. Freeman and W.R. Geddes, 149–159. New Plymouth: Thomas Avery and Sons.

Firth, R. 1967a. *The work of the gods in Tikopia*. 2nd ed. New York: Humanities Press.

Firth, R. 1967b. *Tikopia ritual and belief*. London: Allen and Unwin.

Fitzpatrick, S.M., and R. Callaghan. 2009. Examining dispersal mechanisms for the translocation of chicken (*Gallus gallus*) from Polynesia to South America. *Journal of Archaeological Science* 36 (2): 214–223.

Gonçalves, V.F., J. Stenderup, C. Rodrigues-Carvalho, H.P. Silva, H. Goncalves-Dornelas, A. Liryo, T. Kivisild, A.S. Malaspinas, P.F. Campos, M. Rasmussen, and E. Willerslev. 2013. Identification of Polynesian mtDNA haplogroups in remains of Botocudo Amerindians from Brazil. *Proceedings of the National Academy of Sciences* 110 (16): 6465–6469.

Gongora, J., N.J. Rawlence, V.A. Mobegi, H. Jianlin, J.A. Alcalde, J.T. Matus, O. Hanotte, J.J. Austin, S. Ulm, and A.J. Anderson. 2008. Indo-European and Asian origins for Chilean and Pacific chickens revealed by mtDNA. *Proceedings of the National Academy of Sciences* 105 (30): 10308–10313.

Green, R.C. 2005. Sweet potato transfers in Polynesian prehistory. In *The sweet potato in Oceania: A reappraisal*, Oceania Monograph 56, ed. C. Ballard, P. Brown, R.M. Bourke, and T. Harwood, 43–62. Sydney: The University of Sydney.

Hather, J.G., and P.V. Kirch. 1991. Prehistoric sweet potato (*Ipomoea batatas*) from Mangaia Island, central Polynesia. *Antiquity* 65 (249): 887–893.

Henry, T. 1928. *Ancient Tahiti*, Bernice P. Bishop Museum Bulletin 48. Honolulu: Bernice P. Bishop Museum.

Hermann, A. 2013. *Les industries lithiques pré--européennes de Polynésie centrale: Savoir-faire et dynamiques techno-économiques*. Unpublished PhD thesis, Université de la Polynésie française.

Hermann, A. 2015. Dynamique de peuplement et évolution des réseaux d'échange à longue distance en Océanie. In Les Systèmes de Mobilité de la Préhistoire au Moyen Âge XXXV, edited by N. Naudinot, L. Meignen, D. Binder Éditions APDCA, Antibes.

Hermann, A. 2016. Production et échange des lames d'herminette en pierre en Polynésie centrale: Les dynamiques techno-économiques dans l'île de Tubuai (archipel des Australes). *Séances de la Société Préhistorique* 7: 205–221.

Hermann, A., L. Sauzeat, H. Guillou, Rene Maury, C. Chauvel, C. Liorzou, and E. Conte. 2017. Combined geochemical and geochronological analyses of stone artefacts provide unambiguous evidence of intra- and inter-island interactions in Polynesia. *Journal of Archaeological Science: Reports* 13: 75–87.

Horsburgh, K., and Mark D. McCoy. 2017. Dispersal, Isolation, and Interaction in the Islands of Polynesia: A Critical Review of Archaeological and Genetic Evidence. Diversity 9 (3): 37.

Kahn, J.G. in press. *Fare and fenua, marae and mana: The society islands as a complex chiefdom*. Honolulu: University of Hawai'i Press.

Kahn, J.G., and P.V. Kirch. 2014. *Monumentality and ritual materialization in the Society Islands*, Bishop Museum Bulletin in Anthropology 13. Honolulu: Bishop Museum Press.

Kahn, J.G., J. Sinton, P.R. Mills, and S.P. Lundblad. 2013. X-ray fluorescence analysis and intra-island exchange in the Society Island Archipelago. *Journal of Archaeological Science* 40 (2): 1194–1202.

Kirch, P.V. 2017a. *On the road of the winds*. 2nd ed. Berkeley: University of California Press.

Kirch, P.V., ed. 2017b. *Tangatatau rockshelter: The evolution of an eastern Polynesian socio-ecosystem. Monumenta archaeologica 40*. Los Angeles: Costen Institute of Archeaology Press.

Kirch, P.V., and R.C. Green. 2001. *Hawaiki: Ancestral Polynesia. An essay in historical anthropology.* Cambridge, UK: Cambridge University Press.

Kirch, P.V., P.R. Mills, S.P. Lundblad, J. Sinton, and J. Kahn. 2012. Inter-polity exchange of basalt tools facilitated via elite control in Hawaiian archaic states. *Proceedings of the National Academy of Science* 109 (4): 1056–1061.

Ladefoged, T.N., M.W. Graves, and J.H. Coil. 2005. The introduction of sweet potato in Polynesia: Early remains in Hawai'i. *The Journal of the Polynesian Society* 114 (4): 359–373.

Lass, B. 1998. Crafts, chiefs, and commoners: Production and control in precontact Hawai'i. In *Craft and social identity*, Archeological Papers of the American Anthropological Association 8, ed. C.L. Costin and R.P. Wright, 19–30. Santa Fe: American Anthropological Association.

Malo, D. 1951. *Hawaiian antiquities*. Honolulu: Bernice P. Bishop Museum.

McAlister, A., and M.S. Allen. 2017. Basalt geochemistry reveals high frequency of prehistoric tool exchange in low hierarchy Marquesas Islands (Polynesia). *PLoSONE* 12 (12): e0188207. https://doi.org/10.1371/journal.pone.0188207.

McAlister, A., P.J. Sheppard, and M.S. Allen. 2013. The identification of a Marquesan adze in the Cook Islands. *The Journal of the Polynesian Society* 122 (3): 257–273.

McKinnon, S. 2000. The Tanimbarese *Tavu*: The ideology of growth and the material configurations of houses and hierarchy in an Indonesian society. In *Beyond kinship: Social and material reproduction in house societies*, ed. R.A. Joyce and S.D. Gillespie, 161–176. Philadelphia: University of Pennsylvania Press.

Moreno-Mayar, J.V., S. Rasmussen, A. Seguin-Orlando, M. Rasmussen, M. Liang, S.T. Flåm, B.A. Lie, G.D. Gilfillan, R. Nielsen, E. Thorsby, and E. Willerslev. 2014. Genome-wide ancestry patterns in Rapanui suggest pre-European admixture with native Americans. *Current Biology* 24: 2518–2525.

O'Brien, P. 2000. Sweet potatoes and yams. In *The Cambridge world history of food*, ed. K.F. Kiple and K.C. Ornelas, 207–218. New York: Cambridge University Press.

Parmentier, R.J. 1987. *The sacred remains: Myth, history, and polity in Belau*. Chicago: University of Chicago Press.

Rolett, B.V. 1998. *Hanamiai: Prehistoric colonization and cultural change in the Marquesas Islands (East Polynesia)*. New Haven: Dept. of Anthropology and The Peabody Museum.

Rolett, B.V. 2002. Voyaging and interaction in ancient East Polynesia. *Asian Perspectives* 41 (2): 182–194.

Rolett, B.V., E. Conte, E. Pearthree, and J.M. Sinton. 1997. Marquesan voyaging: Archaeometric evidence for inter-island contact. In *Prehistoric long-distance interaction in Oceania: An interdisciplinary approach*, Monograph 21, ed. M.I. Weisler, 134–148. Auckland: New Zealand Archaeological Association.

Roullier, C., L. Benoit, D.B. McKey, and V. Lebot. 2013. Historical collections reveal patterns of diffusion of sweet potato in Oceania obscured by modern plant movements and recombination. *Proceedings of the National Academy of Sciences* 110 (6): 2205–2210.

Scaglion, R. 2005. Kumara in the Ecuadorian gulf of Guayaquil. In *The sweet potato in Oceania: A reappraisal*, Oceania Monograph 56, ed. C. Ballard, P. Brown, R.M. Bourke, and T. Harwood, 35–42. Sydney: The University of Sydney.

Storey, A.A., J.M. Ramírez, D. Quiroz, D.V. Burley, D.J. Addison, R. Walter, A.J. Anderson, T.L. Hunt, J.S. Athens, L. Huynen, and L. Matisso-Smith. 2007. Radiocarbon and DNA evidence for a pre-Columbian introduction of Polynesian chickens to Chile. *Proceedings of the National Academy of Sciences* 104 (25): 10335–10339.

Storey, A.A., J.S. Athens, D. Bryant, M. Carson, K. Emery, S. de France, C. Higham, L. Huynen, M. Intoh, S. Jones, P.V. Kirch, and T. Ladefoged. 2012. Investigating the global dispersal of chickens in prehistory using ancient mitochondrial DNA signatures. *PLoS One* 7: e39171. https://doi.org/10.1371/journal.pone.0039171.

Weiner, A.B.. 1992. *Inalienable possessions: The paradox of keeping while giving*. Berkeley: University of California Press.

Weisler, M.I., ed. 1997. *Prehistoric long-distance interaction in Oceania: An interdisciplinary approach*, Monograph 21. Auckalnd: New Zealand Archaeological Association.

Weisler, M.I. 1998. Hard evidence for prehistoric interaction in Polynesia. *Current Anthropology* 39 (4): 521–532.
Weisler, M.I. 2002. Centrality and the collapse of long-distance voyaging in East Polynesia. In *Geochemical evidence for long-distance exchange*, ed. M. Glascock, 257–273. London: Bergin and Garvey.
Weisler, M., and R. Walter. 2017. East Polynesian connectivity. In *The Routledge handbook of archaeology and globalization*, ed. T. Hodos, 369–384. London: Routledge.
Weisler, M.I., R. Bolhar, M. Jinlong, E. St Pierre, P. Sheppard, R.K. Walter, Y. Feng, J-x. Zhao, and P.V. Kirch. 2016. Cook Island artifact geochemistry demonstrates spatial and temporal extent of pre-European interarchipelago voyaging in East Polynesia. *Proceedings of the National Academy of Sciences* 113 (29): 8150–8155.
Yen, D.E. 1974. The sweet potato and Oceania: An essay in ethno-botany. *Bernice P. Bishop Museum Bulletin* 236 (1974): 1–7.

Trade and Transport in the Ancient Mediterranean

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Introduction

The subject of trade and transport leads into different questions and forms of analysis depending on the perspective adopted. From an economic point of view, trade is part of developing systems of exchange by which the production and consumption of goods are linked over small and longer distances. Major questions include which and what quantities of goods were traded where and by what means, how much of a surplus was available for trade, and how effectively trade, transport, and currency fulfilled their purposes within a specified geographical range. Which social, political, and technological circumstances affected volumes of trade, and what factors stimulated or prohibited the development and expansion of markets? The emergence of price-setting markets is central for economic history. Economic historians are aware that trade via markets is only one possible way of moving goods and services from their place of production to that of consumption, but it is the one with the greatest net profit and thus the condition for growth. Anthropologists do not look for the evolution of markets. From this perspective, exchange is an index for different types of social and political organization. Trade via price-setting markets controlled by supply and demand is only one type of exchange mechanism that developed under particular social and political circumstances in early modern Europe. In other social and political settings, distribution controlled by states (such as tribute and redistribution), or by social networks (in which gift exchange and other morally controlled reciprocal exchanges are practiced), is more suitable for linking production, consumption, and people. Trade itself can take different forms of organization, shading into barter, redistribution, or gift exchange, depending on the type of social organization in which it develops. For archaeologists, finally, trade is above all a sign of cultural exchange, interaction, and contact. Traded artifacts, their style, and material composition signify the combined flow of resources, ideas, and information between groups of distinct identities and resource endowments. Archaeologists investigate the directions and scope of such flows in order to identify the geographical range of cultural influence and development. Economic questions, especially links of production and consumption, are analyzed too, but the nature of archaeological evidence points to quantitative and technological rather than to institutional and social characteristics of trade. In the last quarter of the twentieth century, economic, anthropological, and archaeological perspectives have been fruitfully combined in order to investigate ancient trade not just as a simpler version of later European trade but as a subset of competing and interdependent forms of exchange which characterize and reflect different types of social organization, cultural interaction, and economic development at different periods of time (Bang 2008; Wilson et al. 2012).

Definition

Trade can be defined in different ways. It may refer to the peaceful buying and selling of goods

in contrast to moneyless barter, gift exchange, piracy, and violent forms of appropriation; it may refer to transactions external to a society rather than to their internal ones; it may refer to an exchange of resources where the material value of the goods exchanged is more central than the celebration of the relationship in which the valuables are exchanged; or it may be defined as a commercial exchange in the hands of a clearly defined social group guided principally by profit rather than other motives. Each of these definitions has been contested in recent years, but they are equally valid as long as they are not regarded as the very essence of trade across cultures and time. For classical antiquity, it is most suitable to define trade as the external exchange of material goods (which included slaves and animals) distinct from either barter or gift exchange. It can then be asked how trade, and the social groups undertaking it, interacted and how trade overlapped with barter, gift exchange, piracy, plunder, and their respective representatives. It is not helpful, however, to define ancient trade by the involvement of money, markets, professional traders, or the profit motive. Although all of the aforementioned factors played some, and at times important, roles in ancient trade, their absence did not mean an absence of trade.

The terms closest to the proposed definition of trade are in Greek *emporiē* (seaborne commerce) and in Latin *negotiatio* or *commercium* (commerce). In the early writings of Hesiod and Homer (eighth/seventh century BCE), we also find the term *prēxis* which referred to the kind of trade Greek aristocrats practiced in contrast to the trade pursued by lesser people and foreigners (Tandy 1997: 75). Yet the distinction is no longer found in the sixth century BCE, confirming that it was a social and cultural polemic emerging from social threats associated with anonymous trading contacts.

Key Issues and Current Debates

Sea transport was the cheapest way of carrying goods over distance. From c. 1400 BCE, deep-hulled ships are attested from the Near East and Egypt, which were propelled by a sail, rather than oars, to allow space for the cargo. Ships could vary in size considerably. Some were fairly small (e.g., less than 14 m), carrying loads of 20 t or less. By the Hellenistic period, ships of a carrying capacity of c. 150 t were quite normal, and those of 350–500 t not rare (Parker 1992). Transport by land was long regarded by scholars as too expensive in comparison to seaborne trade. For a bulky commodity like grain, a sea voyage added c. 2% per 100 miles to the costs, whereas freight charges over land by mule or cart could add over 50% (Morley 2007b: 26). But costs of transport varied considerably according to both commodity and region. From the fourth century BCE onward, the road system in Italy facilitated the transport of goods over land, while extensive finds of wine amphorae on sites in Gaul and southern Germany from the early second century show that land transport did not prohibit exchange networks from developing where demand emerged (Patterson 1998). It should be noted, however, that the Greeks in the Hellenistic period were quick to establish their own sea routes to India and Arabia via the Red Sea and the Arabian Gulf to reduce the amount of distance to be covered by over land caravan routes (Sidebotham 2011).

The vitality of Greco-Roman trade emerged within a particular ecosystem and successful human attempts to overcome ecological constraints. The Mediterranean is an ecological zone with similar climate, fauna, and flora that support similar strategies of production, consumption, and risk management. At the same time, the zone has a great diversity of landscapes, microclimates, and resource endowments, which fosters agricultural specialization and diversification. There is, for example, a great diversity of annual rainfall, which means that droughts and crop failure in one region may not affect another nearby. Raw materials, such as metals, stone, wood, or clay, are not evenly distributed, while the soil produces very different qualities and quantities of staple foods (grain, vine, and olives). The indented Mediterranean coastline, moreover, encourages small-scale autarkic settlement, while the sea with its many islands supports communication and exchange. Large numbers of rivers open up into the sea, connecting dispersed hinterlands with Mediterranean Sea routes and, conversely,

facilitate transport of goods from continental sites. The possibilities of transgressing a local ecosystem successfully are thus comparatively easy and at the same time rewarding. "Connectivity" is the term that has been coined for this typical Mediterranean pattern of settlement and communication, providing a helpful concept for understanding the political and ecological conditions of Mediterranean trade during classical antiquity (Horden and Purcell 2000).

Mycenaean Linear B tablets of the Bronze Age are virtually silent about trade, although self-definition through exotic materials is characteristic of the Mycenaean elite from the Shaft Grave period onward (Bennet 2007: 201). Trade and exchange concentrated, rather, in the Eastern Mediterranean between Egypt, the Levantine coast, and its hinterland (Broodbank 2013). Crete also plaid some part in it. Four documents from the Knossos Ld (i) series mention *xenwia* (cloth), which probably referred to cloth "for export." Three Bronze Age shipwrecks, two found off the southern coast of Turkey and one at Point Iria in the southern Argolid, provide archaeological evidence for the substantial movement of goods in the Aegean during that period. The largest of the three, which was perhaps 16–17 m long, carried 10 t of copper, a ton of tin, 175 blue glass ingots, 150 Canaanite jars, and 10 large Cypriot containers containing over 100 pieces of Cypriot fine-ware pottery. Lead isotope analysis of the copper ingots in combination with the Cypriot pottery suggests that the ship was on its voyage from Cyprus into the Aegean, after having stopped for ivory in Syria and possibly Egypt. High-value objects (glass, copper, and tin) indicate that it moved goods at the highest level of social interaction (ibid.). Contemporary literary evidence from el-Amarna in Egypt suggests, moreover, that such valuables were presented as gifts or tribute to maintain diplomatic ties between royal houses (Aubet 2001: 134–135), although the involvement of professional middlemen or agents in such exchanges is not unlikely.

Archaeological and literary evidence for the movement of goods and people across the expanse of the Mediterranean basin increases in the late ninth and early eighth centuries BCE after a period of rather more localized interaction during the Early Iron Age. Greek settlements participating in this movement were above all Corinth, Chalkis, Eretria, Miletus, and Phokaia. Yet undoubtedly pioneering were the Phoenician cities of the Levant, above all Tyre. By the end of the ninth century, Phoenicians had founded trading colonies in Cyprus (c. 820 BCE), Spain (early eighth century), North Africa, Sicily, and Sardinia. The Greeks followed with their earliest colonial foundation at Pithecusae/Ischia in c. 750 BCE and some kind of regular presence at Al Mina at the mouth of the river Orontes in Syria. Both of the so-called Lyre-Player seals, originating probably in North Syria, and Euboean pendent-semicircle *skyphoi* and plates attest regular Greek contacts with Syria, the Levant, and the western coast of Italy during this period (Osborne 2007). The directions of trade, shipwrecks, and literary evidence in combination suggest that the Greek demand for minerals continued to dominate the exchange of goods abroad, while manufactured products, above all pottery and textiles, as well as slaves, perfume, foodstuffs, and a range of raw materials completed what were mostly mixed cargoes. Etruscan cities such as Caere, Tarquinia, and Populonia entered interregional trade by the end of the seventh century BCE with contacts concentrating around Massilia and along the southern coast of France (Dietler 2007: 248–250). Much of their activity seems to have been stimulated by the Greek colonists' demand for wine.

The texts of Homer and Hesiod help to understand the social organization of trade and exchange in the archaic period (Tandy 1997). Among the Greeks, most long-distance exchange of high-value goods seems to have been controlled by aristocratic landlords (*basileis*) and took the form of gift exchange in relationships of guest-friendship (xenia, Herman 1987). In addition, small local journeys were undertaken intermittently by well-off peasants, such as the Boeotian poet Hesiod, who had enough surplus to dispose of along the nearby coasts in the dead season after the harvest. While this so-called cabotage mattered little in terms of aggregate value in comparison with the large-scale ventures of

wealthy chiefs, it is assumed to have made up the bulk of archaic trade (Horden and Purcell 2000). A third type of trade was in the hands of professional traders. In the *Odyssey*, these are always foreigners (Phoenicians or "Taphians"; e.g., *Od*. 8.14 ff.), but the Greek trading settlements (*emporia*) abroad, such as at Pithecusae and, from the seventh century BCE onward, Naucratis (Egypt), Gravisca (Italy), Massilia (France), and Emporion (Spain), show that there were large numbers of Greek professional traders as well. These towns or settlement areas have been identified as trading diasporas of populations that had no social ties among the communities with whom they traded and interacted in special institutional environments (Curtin 1984). One such environment was the port of trade, best exemplified by the Greek town Naucratis in Egypt. This town in the west of the Nile Delta was granted by Psammetichus I to Greek traders in the last quarter of the seventh century BCE and served as an enclave for Greek communities who could establish here places of worship and markets. There is some indication that markets were strongly controlled by the host administration, partly to link different economic systems and languages (Möller 2000) but also for the purpose of taxation. In practice, these trading communities provided a breeding space for knowledge about interregional supply and demand (Osborne 2007). In archaic Naucratis, we find Chian chalices which seem to have been produced to order (Möller 2000: 136–140), while still in the fourth century BCE it was in Naucratis that a business consortium able to control grain trade and prices between Rhodes, Egypt, and Athens emerged (von Reden 2010: 131).

By the sixth century BCE, migration had dispersed Greeks in settlements around the Black Sea, Sicily, Southern Italy, and the southern coasts of France and Spain. Although the vast majority of these were dominated by agrarian subsistence economies, their urban centers created new demand for Greek products and a supply of raw materials and products from these areas at lesser costs. A series of technological changes both reflected and stimulated further the expansion of trade during the sixth century BCE. Firstly, the traditional Egyptian rigging with a square boom to which the sail was fixed developed into a loose-footed square sail fitted with brails at regular intervals. This made it possible to lift the sail up and shift it to the sides, which allowed full control over the sail according to the strength and direction of winds (Casson 1994: 43–44). Secondly, although some maritime installations are known from the Early Iron Age, the first permanent harbor facilities (breakwaters, ship sheds, and dockyards) appear in the sixth century BCE. There was at first no functional differentiation of military and commercial harbors. But other infrastructural innovations, such as the stone trackway (*diolkos*) for transporting ships and cargoes across the Isthmus of Corinth dating c. 600 BCE, show the general value attached to infrastructural improvement in the demonstration of power between individuals and poleis. The third technical innovation was coinage. Invented in Lydia at the end of the seventh century BCE, it soon spread into Greece where the first coins were struck by about 550 BCE. Monetary payment had been possible for centuries on the basis of bullion and ingots cut to size and certified by local temples, but coinage facilitated monetary transactions and at the same time created a new linkage between trade and the identity of *poleis* and their political allies (von Reden 2010). Gradually, moreover, coinage paved the way for greater monetary coherence and better comparability of prices and value.

The Athenian naval confederacy of 479 BCE was another influence on trade with enormous economic consequences. It began with the expansion of the Athenian fleet in the 480s that was possible only with the supply of an unsuspected windfall of silver from the Athenian mines minted into coinage and with the import of timber from foreign resources. It is unlikely that wood and pitch were imported into Athens via the market rather than through the channels of personal political guest-friendship ties which provided the elite with economic resources to be invested into social and political power (Herman 1987); but coined silver was certainly used for the payment of the labor force. There followed the fortification of the Piraeus at around the same time, and the Athenian control of the sea routes as an immediate

consequence of her sea power. Other consequences were more gradual: firstly, a massive expansion of Athenian coinage and the gradual supersession of competing, especially Aeginetan, coinages (Figueira 1998); secondly, the growth of the Piraeus into a central harbor and marketplace for Greek and foreign products; and thirdly, the emergence of Athens as a center of consumption at an unprecedented scale. The Athenian League was not a tributary empire where the power to extract goods and services in kind puts limits to the growth of trade. Instead, Athens' commitment to monetary payment stimulated trade and a larger amount of poleis and people to earn and spend money in markets. A substantial part of regular imports in Athens (and presumably other *poleis* of which we are less well informed) was grain with which the cities could compensate for recurring shortages of locally grown cereals and ensure the provision of better-quality wheat available especially from the Black Sea area. A host of other goods, both luxuries and semiluxuries (staples of better quality from elsewhere), made up the substantial volume of imports. Important institutions developed during this period (Bresson 2016). Money changers, followed by banks (*trapezai*), appear in the second and the last quarter of the fifth century BCE, respectively. Lending and borrowing for commercial purposes increased and led to the invention of a particular kind of maritime credit (*nautica daneia*; first attested in the late fifth century, Eup. *CAF* fr. 43). In such contracts, the cargo of the ship, rather than personal surety or landed property, serves as security for a loan. By 415 BCE, the revenues from harbor tolls, levied as a 2% tax on the value of the cargo, were so substantial both in Athens and the harbors of her allies that they could substitute for the tribute Athens was no longer able to extract. In the fourth century, maritime courts were established which provided quick solutions of legal conflicts under the special condition of foreigners being involved (Cohen 2005). For, despite the enormous economic importance trade had gained during the fifth century, both in aggregate value and in social terms, trade and banking was mostly in the hands of foreigners and resident aliens (*metoikoi*). Athens also tightened the control over its coinage to increase trust in what had become an interregional currency. In addition, we hear of the possibility of making monetary orders in writing to bankers in other places, which, though not being a proper form of giro, allowed the transfer of credit from one place to another (von Reden 2010).

The combined effects of the Athenian Empire, its silver resources, political organization (leading to particularly effective ways of collective decision-making and legislation), and commitment to coinage created an institutional structure for the development of trade in the following centuries. The Macedonians modeled their coinage and law on that of Athens and showed the same commitment to coinage and markets in their payment of mercenaries and the provision of military supplies via local markets. The Macedonian conquest of the Persian Empire also led to the foundation of new cities in which the Greek military settlers and civilians lived a markedly Greek lifestyle. At the same time, the Macedonian kings took over from the Persians a treasure and tribute system which put at their disposal levels of wealth incomparable to those of Greek *poleis*. The fusion of Near Eastern resources, Greek economic structures (including coinage), and the demand for Greek products outside the Greek mainland boosted the level of trade, measurable by the increase of sea travel, minting, and size of cities. Alexandria's total population is estimated at around 200,000 by the third century BCE, which is almost twice as much as the estimated total population of all Attica in the classical period and four times as much as that of the biggest towns of the former Persian Empire. The fact that the fabulous monetary wealth of the Ptolemies was dependent on silver that, because of the lack of silver mines in Egypt, must have come into the country by circulation shows that their prosperity rested as much on tribute as on export (von Reden 2007). A corollary of Alexandria's role in Mediterranean trade is the movement of the major port of transit from Piraeus to Delos by the end of the fourth and to Rhodes in the third and second centuries BCE, leading the Roman government to declare Delos a tax-free port in 166 BCE again. In much of Hellenistic trade, kings, their administrations, and

managers of royal estates were involved. But given that all of them acted in tandem with, and through, agents who pursued their own economic business at the side, it is impossible to disentangle fully trade under royal control from private enterprise. The link between private and public/royal enterprise and control is probably one of the reasons for grain prices staying at surprisingly similar levels from the classical through to the Roman period (Rathbone 2014). Given the unparalleled role of this staple for peace and prosperity, the grain supply of urban markets was a political issue influenced economically by kings, emperors, and local benefactors rather than the supply-and-demand mechanism. For other commodities traded in the Mediterranean, we are lacking the data to analyze price formation. But in the rare cases where this is possible, there seems to have been a regional, rather than a Mediterranean-wide, pattern (Reger 1994).

By the beginning of the third century BCE, the Romans had expanded their trading contacts into the Italian peninsula, the Western Mediterranean, and the Adriatic region. Greeks from Massilia, Northern Greece, and Phokaia had established in continental Europe from the late sixth to the fourth centuries BCE contacts which were dominated by some Italian imports, especially of wine and fine pottery, from the early second century BCE onward (Woolf 1998: 174–176). The end of the Second Punic War in 218 BCE created Roman hegemony over the Carthaginian sphere of influence in the West. Roman trade in the Adriatic in 229/8 BCE was conspicuous enough to suggest that the conflict with the Illyrians resulted from Roman intervention on traders' request against Illyrian piracy (Polyb. 2.2–6). The gradual increase of Roman participation in Greek trading networks is shown by the gradual spread of Roman amphorae into the Greek East, by commercial settlements of Romans and Italians on Delos and the presence of Roman merchants at Alexandria (Harris 2007). The most important effect of the expansion of Roman trade into the Greek sphere of influence was the spread of Greek financial sophistication into Rome and Italy (ibid.). Greek banking, credit operations, forms of monetary transfer, and transfer of debt claims to third parties became a vital condition for the economy of the Roman elite to function between Italy and the provinces (Andreau 1999). With the expansion of the Roman Empire, the scale of trade in the Mediterranean exploded (Wilson 2008). The number of shipwrecks dated to the period between 100 BCE and 300 CE is far greater than in the periods before and after, suggesting – despite some archaeological bias – a scale of maritime transport not reached again until the high Renaissance (Patterson 1998) or the nineteenth century even (Wilson 2008). Larger ships of 200–400 t were used more frequently. A certain type of amphora (so-called Lamboglia 2) produced in Apulia is now found everywhere in the Western Mediterranean, while some African amphorae occur on most sites between Britain and Egypt. Amphorae used in any type of interregional trade also became more standardized, which must be taken as another indicator for the regularity with which goods were moved (Morley 2007a). Access to new mines and foreign treasuries created a massive increase in the total volume of coinage circulating in the Roman Empire from the second century BCE onward. By the time of the first century CE, the Roman denarius currency had become an imperial coinage accepted throughout the Roman Empire (except Egypt), creating a fairly homogenous monetary zone. The growth of the city of Rome, finally, exceeded by far that of any royal capital in the Hellenistic world; this growth was demographically possible only if external resources kept pace with increasing consumption levels. The major zone of Roman trade was the empire, but there is now increasing research in Roman trade of considerable scale and value beyond the frontiers of the Roman world (Cunliffe 2015: 253–295; von Reden 2015; Wilson and Bowman 2018). Among the best attestations is the trade in spices, ivory, marble, and fine textiles with the east coast of Africa, as well as areas beyond the Red Sea and India (Tomber 2012; Cobb 2018).

The period from the late third century CE onward is generally regarded as a time of recession, distress, and transformation which affected trade in complex ways. There was recurring stress of the imperial currency and of enforcing central

law and taxation and a trend toward greater regionalization. As a result, the diversity of local economic situations becomes more visible, and there is a notable diversity of responses to central policy. There are, moreover, clear indications that the Roman government aimed to reduce the role of private intermediation in the trading of certain products, while maritime transport became a compulsory office (*munus*) rather than a profession left to private contractors (Giardina 2007). But there is as yet no clear indication that, despite changes in organization, the scale of trade declined in aggregate value. Moreover, answers to the question of the degree of change in late antiquity depend largely on how scholars assess the nature of the Roman economy in the preceding centuries. How much did trade conform to the model of an integrated market economy?

The first question to be addressed is whether in the first centuries of the Roman Empire there developed new structures of trade and finance. An increasingly differentiated system of banking and financial intermediation – most importantly, legally protected forms of cashless transfer of money over distance – emerged during the two centuries before and after the reign of Augustus (Andreau 1999; Harris 2007). But it seems fairly certain that any long-distance trade and transport continued to be based on midsize transport and maritime loans, while large-scale ventures were achieved by pooling the capacities of several financial and transport resources. Thus is the picture emerging from the evidence of maritime finance in the Roman empire (Rathbone 2003). Thus was also the strategy of Cato the Elder in the second century BCE who spread his credit among an association of 50 traders to reduce the risk of loss and increase his own profit (Plut. *Cat*. 21.6).

The second question relates to the system of exchange behind the movement of goods and money. According to an influential model, the Roman economy in the Mediterranean came to be more integrated than before through taxation, the requirements of the Roman army, and trade (Hopkins 1980). There was an uneven productivity in the provinces of the empire and an uneven demand for military supplies, since armies were stationed above all in the provinces at the frontiers, while the provinces with high productivity were those closer to the Roman center. Through monetary taxation, monetary army payment, and army supply via local markets, the Roman government mobilized a large amount of goods and money and thereby stimulated trade and a market economy. The model has been challenged on various grounds, for example, for its lack of consideration of economic activity that did not result, directly or indirectly, from the initiatives of the Roman state (Patterson 1998; Morley 2007a). Both the Roman and provincial elites, and the emperors themselves, had high stakes in long-distance trade in order to increase their wealth and dispose of their agrarian surplus. Though rarely running themselves financial business and trade enterprises, they participated in them through their agents, freedman, and slaves who were merchants, bankers, and business managers (Aubert 1994). Trade and financial business of the Roman elite, moreover, were inseparably intertwined with the financial administration of the provinces they governed (just as there was an overlap between the imperial economy and the economic business of the emperors), which makes it impossible to disentangle the interests of the state from private trade.

The third question is whether the Roman Empire was a single economic zone linked by price-setting markets. The empire-wide consumption of wine and its mass production for export in Italy, Gaul, and Africa have been at the center of intense research. Not only is the movement of these goods archaeologically well documented by the movement of amphorae but the production and distribution of wine, in contrast to that of grain, had always been in private hands and rarely been interfered with by governments. There does seem to be a notable increase of wine amphorae of provincial origin between 50 BCE and 100 CE that coincides with a decrease of Italian amphorae (both for wine and other agricultural products) during the same period (Panella and Tchernia 2002). But if Italian wine amphorae are taken as a category of their own, the coincidence is less marked, and it has been argued that the increase of provincial imports in Rome and elsewhere was driven by increased consumption rather than

price competition (Panella and Tchernia 2002). Moreover, the export of wine to provincial places seems to have petered out as soon as these places became able to meet new levels of demand by local production (Morley 2007a).

Future Directions

While the debates over the nature of markets in the Mediterranean are likely to continue, the future of research in ancient trade will lie in the analysis of the interdepence of trade at different scales (Wilson et al. 2012; Rice 2016). Thorough investigation of the institutional arrangements in which ancient trade and exchange developed is indispensable and will lead to a better understanding of the differences between ancient trade and trade in other periods and cultural contexts (Bresson 2016). Moreover, as global historical approaches and economic world systems analyses begin to influence research on Greco-Roman antiquity, the nature and consequences of trade across cultural frontiers receive increasing attention (Shaw 2009; Wilson and Bowman 2018; Cobb 2018; von Reden 2019).

Cross-References

- ▶ Ceramics, Roman Imperial
- ▶ Economy, Roman
- ▶ Emporion
- ▶ Numismatics, Ancient Greek
- ▶ Numismatics, Roman Imperial
- ▶ Numismatics, Roman Republican

References

Andreau, J. 1999. *Banking and business in the Roman world*. Cambridge, UK: Cambridge University Press.

Aubert, J.-J. 1994. *Business managers in ancient Rome: A social and economic study of institutores, 200 BCE–AD 250*. Leiden: Brill.

Aubet, M.E. 2001. *The Phoenicians and the west: Politics, colonies, and trade*. 2nd ed. Cambridge, UK: Cambridge University Press.

Bang, P. 2008. *The Roman bazaar. A comparative study of trade and markets in a tributary empire*. Cambridge, UK: Cambridge University Press.

Bennet, J. 2007. The Aegean Bronze Age. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 175–210. Cambridge, UK: Cambridge University Press.

Bresson, A. 2016. *The making of the ancient Greek economy. Institutions, markets and growth in the City States*. Princeton: University Press.

Broodbank, C. 2013. *The making of the Middle Sea. A history of the Mediterranean from the beginning to the emergence of the classical world*. Oxford: University Press.

Casson, L. 1994. *Ships and seafaring in ancient times*. Austin: University of Texas Press.

Cobb, M.A. 2018. *Rome and the Indian Ocean trade from Augustus to the early third century CE*. Leiden: Brill

Cohen, E.E. 2005. Commercial Law. In *The Cambridge companion to ancient greek law*, ed. Michael Gagarin and David Cohen, 290–302. Cambridge: Cambridge University Press.

Cunliffe, B. 2015. *By steppe, desert and ocean. The birth of Eurasia*. Oxford: University Press.

Curtin, P.D. 1984. *Cross-cultural trade in world history*. Cambridge, UK: Cambridge University Press.

Dietler, M. 2007. The Iron Age in the western Mediterranean. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 242–276. Cambridge, UK: Cambridge University Press.

Figueira, T. 1998. *The power of money. Coinage and politics in the Athenian empire*. Philadelphia: University of Pennsylvania Press.

Giardina, A. 2007. The transition to late antiquity. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 720–742. Cambridge, UK: Cambridge University Press.

Harris, W. 2007. The late republic. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 511–542. Cambridge, UK: Cambridge University Press.

Herman, G. 1987. *Ritualised friendship and the Greek city*. Cambridge, UK: Cambridge University Press.

Hopkins, K. 1980. Taxes and trade in the Roman empire (200 BCE to AD 400). *Journal of Roman Studies* 70: 101–125.

Horden, P., and N. Purcell. 2000. *The corrupting sea: A study of Mediterranean history*. Oxford: Wiley-Blackwell.

Möller, A. 2000. *Naucratis: Trade in archaic Greece*. Oxford: Oxford University Press.

Morley, N. 2007a. The early Roman empire: Distribution. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 570–591. Cambridge, UK: Cambridge University Press.

Morley, N. 2007b. *Trade in classical antiquity*. Cambridge, UK: Cambridge University Press.

Osborne, R. 2007. Archaic Greece. In *The Cambridge economic history of the Greco-Roman world*, ed. W. Scheidel, I. Morris, and R. Saller, 277–301. Cambridge, UK: Cambridge University Press.

Panella, C., and A. Tchernia. 2002. Agricultural products transported in amphorae: Oil and wine. In *The ancient economy*, ed. W. Scheidel and S. von Reden, 173–189. London: Routledge.

Parker, A. 1992. *Ancient shipwrecks of the Mediterranean and the Roman provinces*. Oxford: Tempus Reparatum, B.A.R.

Patterson, J.J. 1998. Trade and traders in the Roman word: Scale, structure and organization. In *Trade, traders and the ancient city*, ed. H. Parkins and C.J. Smith, 148–167. London: Routledge.

Rathbone, D.W. 2000. The Muziris papyrus (SB XVIII 13167): Financing Roman trade with India, in Alexandrian Studies II in Honour of Mostafa el Abbadi. *Bulletin de la Société Archéologique d'Alexandrie* 46: 39–50.

Rathbone, D.W. 2003. The financing of maritime commerce in the Roman empire. In *Credito e moneta nel mondo romano: atti degli Incontri Capresi di Storia dell'Economia Antica, Capri, 12–14 Ottobre 2000*, ed. E. Lo Cascio, 197–230. Bari: Edipuglia.

Rathbone, D.W. 2014. Mediterranean and near eastern grain prices c.300 to 31 BCE: Some preliminary conclusions. In *Documentary sources in ancient Near Eastern and Greco-Roman economic history. Methodology and practice*, ed. H. Baker and M. Jursa, 313–322. Oxford: Oxbow Books.

Reger, G. 1994. *Regionalism and change in the economy of independent Delos*. Berkeley: University of California Press.

Rice, C. 2016. Shipwreck cargoes in the Mediterranean and the organization of Roman maritime trade. In *Journal of Roman Archaeology* 29: 201–15

Shaw, B. 2009. *Rome's Mediterranean world system and its transformation*, Princeton/Stanford Working Papers 040801. Available at: http://www.princeton.edu/~pswpc/pdfs/shaw/040801.pdf

Sidebotham, S.E. 2011. *Berenike and the ancient Mediterranean spice route*. Berkeley: University of California Press.

Tandy, D.W. 1997. *Warriors into traders. The power of the market in early Greece*. Berkeley: University of California Press.

Tomber, R. 2012. *Indo-Roman trade. From pots to pepper.* Bristol: Bristol Classical Press.

Von Reden, S. 2007. *Money in Ptolemaic Egypt: From the Macedonian conquest to the end of the third century BC*. Cambridge, UK: Cambridge University Press.

Von Reden, S. 2010. *Money in classical antiquity.* Cambridge, UK: Cambridge University Press.

Von Reden, S. 2015. Global economic history. In *The Cambridge world history. vol IV: A world with states, empires and networks*, ed. C. Benjamin, 29–44. Cambridge, UK: Cambridge University Press.

Von Reden, S. 2019. ed. *Handbook of Afro-Eurasian economies*. Vol. 1: *Contexts*. Berlin: de Gruyter.

Wilson, A. 2008. Economy and trade. In *Roman Europe*, ed. E. Bispham, 170–201. Oxford: University Press.

Wilson, A., M. Silver, P.F. Bang, P. Erdkamp, and N. Morley. 2012. A forum on trade. In *The Cambridge companion to the Roman economy*, ed. W. Scheidel, 287–317. Cambridge, UK: Cambridge University Press.

Wilson, A. and A. Bowman. 2018. eds. *Trade, commerce and the the state in the Roman world*. Oxford, UK: Oxford University Press

Woolf, G. 1998. *Becoming Roman: The origins of provincial civilization in Gaul*. Cambridge, UK: Cambridge University Press.

Further Reading

McCormick, M. 2001. *Origins of the European economy: Communications and commerce, AD 300–900*. Cambridge, UK: Cambridge University Press.

Trade Beads in Historical Archaeology

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Introduction

During the last five centuries, European trade beads markedly influenced political economies at multiple scales. Columbus introduced glass trade beads to the New World, and the Portuguese introduced later European beads to much of sub-Saharan Africa, beginning with coastal regions in West Africa. Indo-Pacific, or Trade Wind, beads already dominated the market for trade beads in the Indian Ocean region (Wood 2011) and, in Asia, as far north as Japan (Francis 2002). Bead production in Amsterdam, in Venice, and at locations in Bohemia gained momentum in the seventeenth century. The Dutch, Spanish, English, and French widely distributed European glass trade beads and exchanged them for desired items, needed services, and slaves in the lands bordering the Atlantic and Indian oceans. The Spanish

mission period in Florida (1633–1704) and the late seventeenth-century to eighteenth-century fur trade of northwestern North America are notable examples. Explorers, such as Richard Burton, and the European and Islamic inspired slave and ivory caravans of the nineteenth century circulated tons of European trade beads into East and Central Africa.

Definition

Beads are small ornaments used singly or in groups. They are suspended from the body as personal adornments, worn in the hair, or sewn onto clothes or household objects. Beads are made from a variety of natural and synthetic materials – for later periods, notably from glass – and meet a range of social purposes. Glass beads and beads of shell deserve particular attention from historical archaeologists. Due to their variety and ease of transport, Europeans and indigenous Americans and Africans exchanged beads, gave them as gifts, or used them as currency. Thus, beads are key indicators of contact and culture change. Non-Europeans often gradually adopted glass beads into their social practices and systems of status. For this and other reasons, archaeologists commonly find glass beads in burials at sites that postdate CE1500 in the Americas. Different European powers and people living in the Americas, Africa, and Asia produced and consumed different beads based on changes in access to raw materials, trends in production and technique, shifts in distribution networks, and local desires for specific bead types (e.g., Wood 2011).

Key Issues and Examples

Trade beads are particularly useful in historical archaeology, but they also present challenges (Spector 1976). Beads of glass, shell, and semi-precious stone tend to preserve well and may serve as valued chronological markers. However, beads tend to migrate across site strata and require detailed comparative study. At a minimum, bead analysis requires a classificatory system based on size, manufacturing technique, structure, shape, and color/diaphaneity (Kidd and Kidd 1970; Karlkins 1985; Wood 2011). For European glass trade beads, artisans used three primary techniques: drawing, winding, and molding. They made red, blue, black, white, and multicolor tubes, barrels, doughnuts, and spheres. In structure, European trade beads are simple (one color/layer of glass), compound (layered multiple glasses), or complex (with applique or inset decorations). Shell beads from the Americas, Africa, and elsewhere during the last 500 years frequently appear as discs or tubes. The great variation in bead types and their shifts in use indicate the prominent role of trade beads in the emerging social entanglements of regional and global exchange.

Cross-References

- ▶ Consumption, Archaeology of
- ▶ Dating Methods in Historical Archaeology
- ▶ Deagan, Kathleen A.
- ▶ DeCorse, Christopher
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Mission Archaeology in North America
- ▶ West and Central Africa: Historical Archaeology

References

Francis, P., Jr. 2002. *Asia's maritime bead trade*. Honolulu: University of Hawai'i Press.

Karlkins, K.A. 1985. *Glass beads*. Ottawa: National Historic Parks and Sites Branch, Parks Canada.

Kidd, K.E., and M.A. Kidd. 1970. A classification system for glass beads for the use of field archaeologists. In *Canadian Historic Sites: Occasional Papers in Archaeology and History*, vol. 1, 45–89. Ottawa: National Historic Sites Service.

Spector, J.D. 1976. The interpretive potential of glass trade beads in historic archaeology. *Historical Archaeology* 10: 17–27.

Wood, M. 2011. *Interconnections: glass beads and trade in southern and eastern Africa and the Indian Ocean*, Studies in global archaeology. Vol. 17. Uppsala: Uppsala University.

Further Reading

Blair, E.H., L.S.A. Pendleton, and P. Francis Jr. 2009. *The beads of St. Catherines Island*, Anthropological papers. Vol. 89. New York: American Museum of Natural History.

Deagan, K.A. 1987. *Artifacts of the Spanish colonies of Florida and the Caribbean, 1500–1800, Volume I: Ceramics, glassware, and beads*. Washington, DC: Smithsonian Institution Press.

DeCorse, C.R., F.G. Richard, and I. Thiaw. 2003. Toward a systematic bead description system. *Journal of African Archaeology* 1: 77–109.

Smith, M.T., and M.E. Good. 1982. *Early sixteenth century glass beads in the Spanish colonial trade*. Greenwood: Cottonlandia Museum Publications.

Stine, L.F., M.A. Cabak, and M.D. Groover. 1996. Blue beads as African-American cultural symbols. *Historical Archaeology* 30: 49–75.

Tranquility Base on the Moon

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Humans and our direct ancestors have been looking at the night sky for millions of years. Our gaze has been from the Earth to the heavens and to the very same face of the Moon, unchanged except for its natural cycles. Humanity has a collective heritage in space through many different perspectives. This heritage ranges from including the Moon as part of indigenous cultural narratives about creation (e.g., the Southern Tutchone of Yukon, Canada, who have a story about how crow stole the Moon and threw it into the sky) to tracking phases and the seasonal setting of the Moon in prehistoric observatories at archaeological sites such as Stonehenge in Great Britain. The Moon serves as a point of reference for community knowledge; it is a place where memories are stored. Space is not a vacuum but is part of humanity's cultural landscape that only began to acquire material culture, relatively recently, within the last 60 years. How to interpret the human interaction with space, what to preserve, and how to preserve it is to tackle a huge landscape layered with cultural, religious, historical, and scientific meaning.

This cultural landscape, or what Gorman (2005) has called a "spacescape," contains facilities on Earth such as launch complexes, manufacturing locations, etc., a lot of trash invisibly moving above us in Earth's orbit and a few spacecraft like *Voyager 1* which is in interstellar space. There are an estimated 500,000 bits of human-made objects in orbit. There are over 4635 satellites currently orbiting the planet and the amount increases every year (NASA (2018)). Unfortunately, nobody knows exactly the amount and what is up there. Other essential components of this cultural landscape are the archaeological sites on celestial bodies including the Moon, Mars, a few asteroids, and comets which have been visited by robotic spacecraft and, in some cases, by actual humans. The Apollo missions 11, 12, 14, 15, 16, and 17 created an array of archaeological sites where 12 humans walked and left artifacts and features on its surface.

The field of space archaeology and heritage began in 1999. It was driven by a question that was posed by then graduate student, Ralph Gibson, in my cultural resource management seminar at the New Mexico State University (NMSU). He asked if the federal preservation laws and regulations we were studying applied on the Moon. I had no idea, but it was a great question. It intrigued us enough to apply for funding from the New Mexico Space Grant Consortium (NMSGC), a NASA educational outreach program on the campus of NMSU. We had two questions in our proposal: What archaeological sites, artifacts, and features were on the Moon and what, if any, preservation laws applied to them? There is an amazing amount of cultural material (now over 200 mt) on the lunar surface, and there were surprising inadequacies in the documentary records. Because of the number of lunar sites, currently in access of 90, and the amount of material, we decided to focus our archaeological investigation on one iconic site – the Apollo 11's Tranquility Base, the first lunar landing site. That site represents the first visit of humanity to another celestial body. The NMSGC grant was in no way large enough to go back to the Moon for a proper archaeological survey, but the funding for what became known as the Lunar Legacy Project did allow for travel and research to libraries, museums, and facilities in Houston, Florida, and Washington DC in 2001–2002

(Lunar Legacy website). The Lunar Legacy Project along with subsequent conferences in the USA, Canada, Great Britain, and Australia, where groups of similarly minded scholars convened, has helped to define the field of space archaeology and heritage. A group of published seminal books (Schofield and Cocroft 2007; Darrin and O'Leary 2009; Capelotti 2009; O'Leary and Capelotti 2015; Westwood et al. 2017) defined the field of space archaeology and heritage as a subdiscipline of archaeology.

Archaeology is defined as the study of the relationships between patterns of material culture and patterns of human behavior. The definition of archaeology does not set any spatial limitations on the discipline. Archaeological investigations can be performed on any place where humans live or have lived; it is not limited to Earth. The human exploration of space allows for archaeological method and theory to be practiced there. Also there are no temporal limits. Beginning with the study of recent urban trash at Fresh Kills, New York, dating to the 1970s and the study of orbital debris (Rathje and Murphy 1992), archaeologists have studied the present or very recent past. The foundations of space archaeology and heritage are rooted in the work of the late Ben Finney, who explored the technology of the exploration and settlement of Polynesians in the South Pacific. He suggested it was equally important to think about space sites created by the USSR and the USA during the Space Age (Capelotti 2009).

The most complete definition of space archaeology and heritage is "the archaeological study of material culture, that is, exoatmospheric material that is clearly the result of human behavior" (Staski 2009: 19). Those exoatmospheric cultural materials are part of a larger assemblage of materials which until a certain point in time and technological development were confined to Earth but entered the archaeological record somewhere else (Staski 2009: 19). It encompasses all material culture that relates to the development and support of exoatmospheric activities and human behavior on the Earth, which is the place to which all space materials are tied. Space archaeology crosses a number of subfields such as historical, industrial, and science and technology studies (Gorman and O'Leary 2013). Critical to determining the significance of places and artifacts associated with space exploration is a description and understanding of the historical context in which these events happened. It is necessary to evaluate a place within its historic context.

The historical period tied to the exploration of space is a post-World War II phenomenon. At the end of the war, both the USA and the USSR engaged in a competition to obtain both German rockets and German rocket scientists. The V-2 rocket became the basis for Cold War (c. 1946–1989) missile technology, and its descendants launched the earliest satellites and later propelled humans to the Moon. The Cold War was played out in space as well as on Earth (Gorman and O'Leary 2007). It was a period that was materially represented by unprecedented development in rocket and weapon technology which was accompanied by massive military construction efforts (Schofield and Cocroft 2007: 13).

Although in recent history, the Cold War appears to be well documented, it was a time of great secrecy and evidence may be sealed in various state archives. The wealth of recorded data and accessibility to living memory can mislead historians, archaeologists, and historic preservationists into thinking that everything is known. The proximity of the Cold War period and the types of data also reveals a tangible sense of different viewpoints and perspectives and thus contested or conflicting interpretations which should force archaeologists, at least, to question assumptions about data and its use from earlier periods that are taken uncritically as givens (Fairclough 2007: 22). The Cold War can be viewed as a time of a western-led fairly violent trend toward the globalization that is experienced today.

The Cold War was a period of geopolitical tensions and what many historians describe as a standoff imposed by a global division between communism and capitalism. It is interesting that early events in space history consisted of amazing scientific and technological breakthroughs – such as leaving the surface of the Earth and going into outer space – coupled with militarization of a post WWII world. One such event reveals the origins of both the scientific and military aspects of how humans first landed on the Moon.

An international competition in the 1950s was part of the follow-up to the International Polar Years to include the study of Earth as a whole. The International Geophysical Year (1957–1958) challenged national participants to create a satellite which would circle the Earth. The winner was the USSR, who launched *Sputnik* in 1957. The excitement of the first entry into space was coupled with the fear of imminent military threats from space. While *Sputniks* circled the Earth, the USA had a series of what was termed "flopniks" until finally *Explorer I,* developed by the US military, went into orbit in January of 1958, followed by *Vanguard I* later that same year. All three satellites can be seen as ideological weapons, presenting space ambitions as scientific and peaceful while at the same time demonstrating technological superiority (Gorman and O'Leary 2007: 81). Space became a technological battlefield during the majority of the Cold War. While the S*putniks* have de-orbited, *Vanguard I* is still in orbit and is predicted to be there for another 600 years. It is currently the oldest human artifact in space (O'Leary 2015). As an object, it has both cultural and scientific significance and is a critical part of the material record that is the evidence for humanity's venture into space.

The new era which began with the launch of *Sputnik* has been called "the Space Race" within the Space Age. It set the stage for a successful manned flight to the Moon which would be considered a decisive win in the battle for a new territory during the Cold War. At its inception and as this race developed, the Soviets appeared to be winning. The race to the Moon had many stages. The early Soviet *Luna* robotic space missions were mostly successful with *Luna 2* landing in 1959 on the lunar surface at Mare Serenitatis where it delivered a Soviet pennant to the surface. It was followed less than a month later by *Luna 3,* which was the first spacecraft to return images of the lunar farside (Stooke 2007: 15, 17). The Soviet's *Luna 10* was the first robotic spacecraft to be put into lunar orbit in 1966, duplicated a few months later by the USA's *Lunar Orbiter 1*, designed to find suitable landing sites for the manned missions of the Apollo program.

The Apollo program rode on the successes of the earlier Mercury and Gemini programs, although getting humans into space was done earlier by the USSR. In spite of the tragic setback of Apollo 1 in 1967, the Apollo program surged forward with three critical missions of 8, 9, and 10 that set the stage for the first lunar landing by Apollo 11. There was a change in Apollo 8's mission from earth orbit to lunar orbit because of the word that the Russians were planning on going around the moon before the end of 1968 (Borman 2001). Even after Apollo 8's crew successfully located a place for future missions to land, the Soviets continue to plan manned lunar missions. Four Soviet un-crewed launches ended in disaster with the third Soviet launch failure occurring only 13 days before the scheduled launch of Apollo 11 (Chaikin 1994: 197).

The final stage for winning the space race was to claim the Moon by standing on it. The event happened on July 20, 1969 (Fig. 1). Although hailed even by Apollo 11 astronaut Armstrong as a ". . . giant leap for mankind," it was an American who stepped on the Moon with much of material culture put there symbolic of the United States' presence. Although the legal tenets of the 1967 Outer Space Treaty and the rhetoric of Armstrong's statement point to the ownership and achievement by humanity, planting an American flag was one of first activities the astronauts engaged in after landing (Gorman and O'Leary 2007: 84) (Fig. 2). The act, set by historic precedent, was symbolic of claiming territory and victory. To the Soviets, it must have signaled a defeat in space.

The Tranquility Base site where two humans landed and stayed for approximately 21 h is an archaeological site. The 6700 m^2 (1.66 ac) site is located at lunar coordinates 0.67266° N Latitude, 23.47298° E longitude (Stooke 2007) which can act as its archaeological datum point. It has over 106 objects and features like footprints and trails. An inventory, probably not complete, is on the Lunar Legacy website (Lunar Legacy website). Although the majority of artifacts evidence the technology of the era and are scientific in nature, some are commemorative and symbolic. One of the first acts required of the Apollo 11 astronauts

Tranquility Base on the Moon, Fig. 1 Boot and footprint of Apollo 11 astronaut on the lunar surface. (Courtesy of NASA)

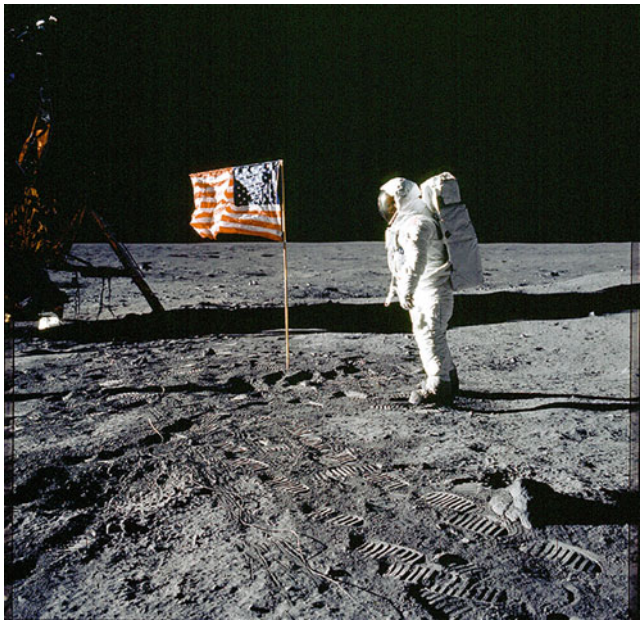

Tranquility Base on the Moon, Fig. 2 Apollo 11 astronaut Buzz Aldrin and American flag on the lunar surface. (Courtesy of NASA)

after landing was to plant an American flag on the lunar surface. If an archaeologist were to actually visit Tranquility Base in the future, the assemblage would be viewed as American material culture with representations of the international community (Gorman and O'Leary 2007: 86). For example, at the site on the Lunar Excursion Module (LEM) descent stage called "the Eagle" in reference to America's symbolic bird, there is a plaque which includes the words ". . .We came in peace for all mankind." There are good will messages from 73 nations etched on a silicon disk at the site containing messages of humanity's endeavors for peace, although there is no message

from the USSR (Gibson 2001: 66). It is filled with what was cutting-edge technology at the time. For example, there is a "scong" which was invented for the mission, a combination scoop and tong to collect samples of regolith and rocks from the lunar surface. These samples provided dates to the geological sediments to between 3.6 and 3.9 million years. There is also an abandoned television camera which helped to broadcast the first images of the astronauts on the Moon. There are many prosaic items, too. Before taking off from the surface of the Moon, Armstrong and Aldrin were told to jettison objects and refuse from the *Eagle*. For a period of 8 min, they stood and tossed out things such as overshoes, empty food bags, emesis bags, the plastic covering of the American flag, and various canisters. They created a toss zone of artifacts in one-sixth the Earth's gravity.

Other symbolic items left on the Moon include a gold replica of an olive branch, a traditional symbol of peace, and a small woven Apollo 1 mission patch, commemorating astronauts, Gus Grissom, Ed White, and Roger Chaffee, who had perished in the 1967 test on Earth. There are also artifacts left there that continue to function in 2018. Put on site is the lunar Laser Ranging RetroReflector (LRRR) which was purposefully placed so that observatories around the world could exactly calculate, among other endeavors, the changing distances from the Earth to the Moon. This small piece of scientific equipment, left in situ, is still in use, as are other LRRRs on several Apollo lunar sites.

The site boundaries are essentially a portion of the lunar landscape encompassing the areas of use, discard, and foot trails around the LEM descent stage to the Little West crater. It is a site that is what could be called an "extreme" single-component site in that only two people created and spent a limited time occupying it and it has never been returned to. Tranquility Base can also be considered extreme because it was done by individuals doing fairly planned and scripted behavior to an event never been done before (O'Leary 2009: 762–763). The site was, to a large extent self-documenting, a rarity in archaeological investigations as a whole. The cameras as well as the written documentation made before, during, and after the site's occupation recorded a significant amount of information about the assemblage and the human behavior (O'Leary 2009: 762). However, many of the photos made on the lunar surface capture only one astronaut's perspective. Many still images of the site, taken at the time of the event, were made by Neil Armstrong because he held the camera. We see Buzz Aldrin from his perspective with only one shot of Armstrong reflected in Aldrin's space helmet.

Most maps of the site were created later by piecing together various photos and images at the time of the event. The maps have never been archaeologically field checked. Reliance on remote sensing technology such as satellite imagery has increased in all fields of archaeology as the data become more refined, and this holds for the Moon as well. Recently, the Lunar Reconnaissance Orbiter, as part of the LCROSS mission, was sent to map the Moon and has taken images of Tranquility Base using remote imaging techniques that have provided archaeologists with details about the site in its present condition, although the resolution is not quite what archaeological survey requires.

The lunar environment is fairly benign. Natural formation processes on the archaeological record are those that result from environmental conditions. Natural forces on the Moon include great swings in temperature between the lunar day and night, micrometeoroids, radiation, and static electricity, but the erosional forces on Earth such as wind, water, and human disturbance have not affected Tranquility Base's condition. Staski and Gerke (2009: 519) have argued that the underwater environment which, at one time, was perceived as hostile and not capable of being archaeologically investigated has been revealed, in many cases (e.g., ship wrecks), to enhance the integrity and preservation of its archaeological resources. This also seems true for the objects when they were collected on the lunar surface from the earlier robotic *Surveyor 3* site by Apollo 12 astronauts. Astronauts Conrad and Bean acted as the first lunar archaeologists. It is still unclear how the natural formation forces operating in outer space have changed the cultural material left for almost 50 years at Tranquility Base. That question is only

resolved by future visits and exploration of the site using sophisticated archaeological field methods.

The reasons for the historic preservation of Tranquility Base seem to be self-evident. The site represents the first time humans actually landed on another celestial body. Tranquility Base contains artifacts from the earliest period and time of development when humanity left the Earth to explore what has been called the "ultimate" frontier. As such it represents in many ways the beginning of the use of space and one of the places that are critical to the current uses of space in the global economy, especially in the field of navigation and communication. It took over 60,000 people, working remotely from each other, to put two people on the Moon, an endeavor that rivals any monuments created on Earth. Tranquility Base is the landmark in the field of space archaeology and heritage. Since the late 1950s, humans have launched spacecraft which have flown toward and past many celestial bodies. Eight of these have been orbited and seven have had landers along with other material culture on their surfaces (Earth's Moon, Venus, Mars, two asteroids 433 Eros and 25143 Itokawa, Saturn's Moon Titan, and comet 67P Churyumov-Gerasimenko). Other missions have collided with or crash-landed on celestial bodies.

In terms of its legal significance, Tranquility Base meets all the criteria for listing on the USA's National Register of Historic Places and meets the more exclusive criteria for listing as a National Historic Landmark or a place which represents some "great ideal" of the American people. It also meets the criteria for being part of the World Heritage List, a part of UNESCO's World Heritage Convention (WHC) for a group of sites exhibiting "outstanding universal value." However, the WHC does not directly address cultural resources in outer space. The larger question is not if Tranquility Base or why Tranquility Base is significant; it is how to best preserve a place that ranks as extraordinary in a bricolage of state, national, and international preservation laws. None of these legal entities specifically address historic preservation on another celestial body. Currently all space sites and objects exist in a kind of legal historic preservation void.

Activity in space is governed by several international conventions colloquially known as the Outer Space Treaty, the Liability Convention, the Registration Convention, and the Rescue and Return Agreement. All are silent with respect to preservation and protection of human cultural heritage (Hanlon and Gray 2017: We Mustn't Allow History and Humanity to fall through the Gaps between the Space Conventions. Unpublished Ms). The Outer Space Treaty, ratified in 1967, 2 years before the lunar landing specifies space as a global commons, and not subject to territorial claims. It also specifies that cultural material (in the language of the treaty – equipment and personnel) remains under the jurisdiction, ownership, and control of the nation that puts them there.

The work by many dedicated archaeologists and historic preservationists has taken a number of avenues which indirectly and directly preserve sites on the Moon. In 1984 the US National Park Service commissioned a "Man in Space" Historic Landmark Theme study that inventoried sites within the USA that epitomized the space program, in order to list them on National Register of Historic Places. It had a fatal flaw: it neglected to include or even advocate for the sites on the Moon which are the most critical element in making the sites that were listed significant.

In 2000, the Lunar Legacy Project tested US federal preservation law by approaching NASA, as the federal agency responsible for Tranquility Base, and the US National Park Service (NPS) Keeper of the National Register of Historic Places by proposing Tranquility Base as a National Historic Landmark (NHL). The request was rejected by NASA's Deputy General Counsel as contrary to the Outer Space Treaty and as being perceived as a claim of sovereignty over a location in space by the international community and by the Keeper of the National Register who determined as matter of policy that an NHL was an inappropriate designation. And the Keeper also felt that NPS did not have sufficient jurisdiction. This request was both surprising and threatening, but it did bring the issue of lunar preservation to the relevant US historic preservation authorities (O'Leary 2009: 777). This roadblock affects listing on the World

Heritage List because although the USA is a signatory as a state party, it can only nominate a site to the list if it is already listed as an NHL.

Two strategies followed the rejections by American authorities. One was to make the international community aware of the importance of the concept of space archaeology and heritage by bringing it to a series of conferences for the professional national and international archaeological community. There were symposia at two World Archaeological Congress (2003, 2008) where a space heritage task force was created and a resolution passed to recognize cultural resources and places associated with space exploration and three symposia at the Society for American Archaeology (2004, 2011, 2013), as well as the Theoretical Archaeology Group in Great Britain (2007) and the International Council on Monuments and Sites in Australia (2007). It was important to also inform the astronomical and space engineering communities at conferences at the American Astronomical Society (2001) and Johns Hopkins University Applied Physics Laboratory (2008, 2015). Fortunately, the US national and international media were interested in the subject, and space archaeology and heritage were enthusiastically covered. In 2012, when one of the iconic figures in the Apollo program, Neil Armstrong, died, the public began to realize an epic era was ending which it helped spur the recognition of the need for Apollo 11 landing site preservation.

The efforts on a local preservation level were also made by two states. In 2010 they include successful nominations of the objects and structures at Tranquility Base made to the California Register of Historical Resources and to the New Mexico State Register of Cultural Properties. It was followed by recognition of Tranquility Base by the Hawaii State Legislature in 2014. The reason for coordination with states was the realization that almost all states in the USA had a connection, through research, testing, and/or manufacturing, with putting the Apollo 11 astronauts on the Moon in 1969.

The professional and grassroots efforts seemed to influence NASA to begin thinking about how to address historic preservation on the lunar surface. Space exploration and development are still a functioning, ongoing, and increasingly complex system. NASA does not focus on preservation; it continues space investigation and engineering. What has also changed in the last decade is the increased commercialism of space. There is a new space race that has nationalistic interests but includes more participants with commercial interests. One new approach to space is the concept of personal space flight. It is possible to buy your way into space and participate in what has been called "extreme tourism." Although now canceled, beginning in 2007, Google has had an X Prize competition that offered a $30 million (USD) award for sending a robotic vehicle back to the Moon, with a $5 million (USD) bonus for taking a picture of an Apollo site there. NASA, recognizing the increased technical capabilities of spacefaring entities to go back to the moon, created an unprecedented document. In 2011 NASA had a panel, including the author, help draft a series of guidelines and recommendations for those entities going back to the moon (NASA 2011). Although they do not carry the force of law, the guidelines seek to avoid damage to US property, and they recognize that future visits could destroy the historic and scientific values of the artifacts. NASA (2011) recommends a higher level of protection for Apollos 11 and 17 (the first and last Apollo lunar sites). Since 1969 many nations, India, ESA, Japan, and China, among others, have landed or crashed robotic spacecraft on the lunar surface. NASA's guidelines (2011) are a giant leap in attitude and commitment by NASA to space heritage than its initial response to the 2000 query to make Tranquility Base a National Historic Landmark.

There are definite risks to returning to the Moon. Future landings robotic or with humans onboard could damage the physical condition of the sites, inadvertently or otherwise. Without a commitment to preserve significant space sites, they are vulnerable to adverse impacts in the future. Ironically, the landing of the first commercial robotic spacecraft would itself create a significant archaeological site. The challenge is to preserve the sites which contribute to humanity's space legacy.

In 2013 a bill, HR 2617, the Lunar Landing Legacy Act, which proposed to designate all Apollo sites as a series of national parks, did not make it out of US Congressional Committee (U.S Congress 2013). The bill is legally flawed. It does not address the interests of other nations that have visited or will visit the Moon and would be perceived as a unilateral US attempt to control property on the Moon. Work continues with professional archaeologists and historic preservationists and groups like For All Moonkind Inc., to find ways to internationally protect the cultural material on the moon. Tranquility Base is a place that falls outside both the normal spatial and temporal boundaries of humanity. It involves the recent past for which we don't have the luxury of much of a retrospective view. As a whole, sites and artifacts in space or on other celestial bodies are the outcome of many minds and involve large-scale international competition and cooperation. Their study belittles the idea that there is a single, simple true past. Humanity has put artifacts off the Earth and over the last 60 years has created an archaeological realm of space heritage. The Space Era, however it is defined chronologically, has not been well studied archaeologically. Outer space is no longer an infinitely large place empty of material culture, as it was before c. AD 1957.

In conclusion, most of the presentations I give on space archaeology and heritage usually include a slide of the Moon with images of McDonalds and Starbucks on the lunar surface to jumpstart the conversation about Moon's future and heritage values (Fig. 3). Over the two decades, there has been an increase in the number of all aspects of space study, as well as courses on space archaeology and heritage. Graduate studies have embraced the field and focus on many areas: what human-made objects are in space, how to address the architecture of space-related facilities, how to design an archaeological study of the International Space Station, what are the challenges of dealing with significant orbital debris and future missions in space, and how space influences and affects globalization and non-spacefaring nations and peoples. Finally and most importantly, there is a recognition that most space heritage properties are without heritage protection. The Moon, its landscape, and cultural material record offer insight into all human exploratory behavior. Space archaeology can offer ways to evaluate the significance of space cultural material and provide input into future mission design and planning to avoid adverse effects to important artifacts and places off the Earth. Today, we are indebted to

Tranquility Base on the Moon, Fig. 3 Images of McDonalds and Starbucks imposed on the lunar surface. (Revised image by Beth O'Leary, image courtesy of NASA)

space as it allows us to navigate and communicate on Earth. There will be new paradigms for archaeological research that will affect our investigations of how material culture is used to mediate humanity's engagement with space. The cultural landscape of space is huge, the technology complex and moving at an accelerated pace. We have an opportunity to pause and look back at the last 50 or so years and consider how to preserve an extraordinary time in human history.

References

Borman, F. 2001. *Videotaped interview and transcription. 23 January 2001 with Beth O'Leary and Ralph Gibson. On file at the Rio Grande Archives*. Las Cruces: New Mexico State University.

Capelotti, P. J. 2009. Culture of Apollo: A catalogue of manned exploration of the moon. Darrin A. B. O'Leary, Handbook of space engineering, archaeology and heritage. Boca Raton: CRC Press. 421–441.

Chaiken, A. 1994. *A man on the moon*. Alexandria: Time-Life Books.

Fairclough, G. 2007. The cold war in context: Archaeological explorations of private, public and political complexity. In *A fearsome heritage: Diverse legacies of the cold war*, ed. J. Schofield and W. Cocroft, 19–32. Walnut Creek: Left Coast Press.

Gibson, R.D. 2001. Lunar archaeology: The application of federal historic preservation law to the site where humans first set foot upon the moon. Thesis, Department of Anthropology, New Mexico State University, Las Cruces.

Gorman, A. 2005. The cultural landscape of interplanetary space. *Journal of Social Anthropology.* 5 (1): 85–107.

Gorman, A., and B. O'Leary. 2007. An ideological vacuum: The cold war in outer space. In *A fearsome heritage: Diverse legacies of the cold war*, ed. J. Schofield and W. Cocroft, 73–92. Walnut Creek: Left Coast Press.

Gorman, A., and B. O'Leary. 2013. The archaeology of space exploration. In *The archaeology of the contemporary world*, ed. P. Graves-Brown, R. Harrison, and A. Piccini, 409–424. Oxford: Oxford University Press.

Lunar Legacy Website. 2001. http://spacegrant.nmsu.edu/lunarlegacies/. Accessed 27 Sept 2017.

NASA. 2011. NASA's recommendations to space-faring entities: How to protect and preserve the historic and scientific value of U.S. Government Lunar Artifacts. July 20, 2011. https://www.nasa.gov/directorates/heo/library/reports/lunar-artifacts.html. Accessed 27 Sept 2017.

NASA. 2018. Space debris and human spacecraft. http://www.nasa.gov/mission_pages/station/news/orbital_debris.html. Accessed 16 July 2018.

O'Leary, B. 2009. One giant leap: Preserving cultural resources on the moon. In *Handbook of space engineering, archaeology and heritage*, ed. A. Darrin and B. O'Leary, 757–780. Boca Raton: CRC Press.

O'Leary, B. 2015. To boldly go where no man [sic] has gone before: Approaches in space archaeology and heritage. In *Archaeology and heritage of the human movement into space*, ed. B. O'Leary and P.J. Capelotti, 1–12. Cham: Springer International Publishing.

Rathje, W., and C. Murphy. 1992. *Rubbish: The archaeology of garbage*. New York: HarperCollins.

Schofield, J., and W. Cocroft. 2007. Introduction: Cold war, diversity and contemporary archaeology. In *A fearsome heritage: Diverse legacies of the cold war*, ed. J. Schofield and W. Cocroft, 13–17. Walnut Creek: Left Coast Press.

Staski, E. 2009. Archaeology: The basics. In *Handbook of space engineering, archaeology and heritage*, ed. A. Darrin and B. O'Leary, 19–28. Boca Raton: CRC Press.

Staski, E., and R. Gerke. 2009. Natural formation processes and their effects on exoatmospheric objects, structures and sites. In *Handbook of space engineering, archaeology and heritage*, ed. A. Darrin and B. O'Leary, 509–520. Boca Raton: CRC Press.

Stooke, P.J. 2007. *The international atlas of lunar exploration*. Cambridge, U.K.: Cambridge University Press.

U.S. Congress House of Representative. 2013. A bill to establish the Apollo Lunar Landing Sites National Historical Park on the moon and for other purposes (HR 2617 July 6, 2013). http://thomas.loc.gov/cgi-bin/query/z?c113:H.R.2617. Accessed July 2017.

Westwood, O'Leary, and Donaldson. 2017. *The final mission: Preserving NASA's Apollo sites*. Orlando: University of Florida Press.

Translation and Indigenization

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Introduction

Translation, broadly speaking, lies at the heart of archaeology. Archaeologists translate their technical recordings of material finds and their contexts into understandings of past human thought and action. They translate the technical findings of other disciplines – geology, say, or physics – into

archaeological terms and vice versa. They also translate their work from one language to another, from Vietnamese to French, for instance. Finally, they translate their "technical talk" into lay terms for public consumption. This last is ultimately the most important, because without the understanding and support of the wider, nonprofessional community, it would be well-nigh impossible for archaeologists to access the sites and acquire the funding necessary for them to practice their craft. This entry concerns one special form of "translation for the public," namely, translation of archaeological approaches and results for Indigenous and other descendent communities. This kind of translation is often called "indigenization." It is special because the political and ethical dimensions of such translation are more pronounced than in other cases.

Definition

There are two basic forms of translation. The first is literal information transfer based on word-for-word interpreting. The second is literary transposition, which aims to convey the sense and sensibility of what is being translated, rather than a word-to-word conversion. According to Friedrich Schleiermacher, the nineteenth century German theologian who first drew the foregoing distinction, literary translation "moves the reader toward the writer," whereas literal interpretation "moves the writer toward the reader" (Schleiermacher 1813: 41–2, cited in Munday 2001: 28). The latter is obviously important; one cannot simply ignore the literal meaning(s) of the original words. Yet many translators and scholars of translation believe that it is even more important to capture coherently the significance or conceptual thrust of those original words taken as a whole rather than individually. Translation in this sense is seen as an original, creative act.

Translation for archaeologists working with Indigenous people actually entails something of both approaches, of "moving the (local) reader toward the (archaeological) writer," and "moving the (archaeological) writer toward the (local) reader." On the one hand, the archaeologist needs to know, as intimately as possible, the cultural context into which a translation is to be introduced so that the translation can be sufficiently culturally competent to be comprehensible to the target audience. On the other hand, there is no point in an archaeological intervention where the translation is undetectable, as many translations aim to be, so that the introduced material just slips unnoticed into the local cultural setting. The recipients of a translation need to "feel *das Fremde*," the foreignness, of the translation if it is to make a difference to them (Eco 2004: 192). As Eco (2004) recognizes, translation is thus not a matter of choosing between literalness or creativity or what Venuti in various publications discusses as "domestication and foreignization" (Munday 2001: 145–8). Rather, it is a matter of *negotiation* between the various parties involved.

Key Issues

The Problem of Negotiation

Any such negotiation is problematic because it must strike a delicate three-way balance between making something culturally competent and comprehensible, accurately representing the original meaning, and behaving ethically towards local perspectives. Misrepresentation of the original can be a "sin of commission" as well as omission, through mistranslation, oversimplification, censoring, or if one's "artistic license" drifts into editorializing. This is why it is often said that to translate is to betray – that it is impossible to translate something without betraying the truth of the original. Inadvertent betrayal is easy because it is often hard to divine the intention of the person who originally produced the words in question. If they are one's own words, it is one thing, but if they are those of another can be very hard to be confident that one's translation does in fact capture what was "really meant."

In translating archaeology for consumption by Indigenous people, there is also the issue of betraying the target audience, of behaving unethically towards local perspectives. This matter is not usually taken up by translators or scholars of translation other than those such as

Spivak (e.g., 1993) who are concerned with post-colonial politics. This betrayal can occur in either or both of two ways. The first is when archaeologists translate simply to impose their views more effectively on local people in a straightforward continuation of colonial domination. The second form of betrayal is more subtle. Its discussion is controversial, to the extent that it turns post-colonial wisdom on its head, and that is when archaeologists seek to make their translation "invisible" (Venuti cited in Munday 2001: 146) to its recipients. "Domestication," or what in other contexts is called seeking "resonance" (Lilley 2009), can in fact be insidious "colonization by stealth" rather than what it is presumably intended to be, namely, a strategy of decolonization, of making archaeology "community driven."

The Two-Way Ethics of Negotiated Translation

At root, archaeology is archaeology. The discipline is a theoretically and technically very broad church, and this is not the place to try to define it more closely. Plainly, though, it is not social work or community development work. Nor is it really able to be truly indigenized or domesticated: it is and in the final analysis will always remain part of the Western Enlightenment project. It can, however, be deeply sensitized to Indigenous perspectives and concerns while remaining true to itself. It must do both to be of interest and relevance to Indigenous communities. If it is not sensitized, it will not be culturally competent or comprehensible. Yet if archaeology betrays its own values by attempting to disguise if not eliminate its indispensible scientific basis, it will be without value to anyone, including Indigenous people, because it will not be able to offer anything that cannot be found elsewhere. If archaeologists cannot justify what archaeology is "for" without trying to pretend it is something else, Indigenous and other communities will not see any point to it (Sand et al. 2006).

A crucial question to ask at this juncture is how to advance a translational project in a manner that is ethical rather than just pragmatically effective in its approach both to the discipline of archaeology and to descendent communities. Ethics are central in the latter connection because encouraging people to "take archaeology into their lives" necessarily incurs some degree of change in their beliefs about their worlds. One must reflect in depth on one's rationale: why should I want to change people's minds in this way? What could possibly be the benefit for them? Would any such benefit outweigh any immediate or longer-term negative impact the changes might cause? A standard ethical checklist is a useful guide here. How does one's approach sit with questions of justice, autonomy, non-maleficence (doing no harm), and beneficence (doing good)? The critical thing to remember in making an assessment is that "the perfect is the enemy of the good." One will rarely, if ever, be able to develop an approach that gets a "perfect score" on all counts. Rather, one should aim for a negotiated settlement where everyone gets enough of what they need to satisfy the requirements they first brought to the negotiation (Eco 2004: 6).

Resonance

Conventional approaches to "translation as negotiation" usually seek to achieve what is known as "resonance" because a new perspective ostensibly "needs to be resonant with cultural traditions and narratives to be appealing" (Merry 2006: 39). Attempting to move the archaeological writer towards the descendent reader is undoubtedly seen to be more ethical insofar as it helps redress imbalances of power and reduces the conceptual violence done to local people. Anecdotally, at least some archaeologists seem to believe that this means they have to give up science and replace it with an application of archaeological techniques somehow shorn of the discipline's larger theoretical and methodological framework. Merry (2006: 41), paraphrasing Ferree, points out though that "resonant discourses are less radical than nonresonant ones... [so] resonance is a costly choice because it may limit the possibility for longterm change." This is because deeply ingrained traditions can profoundly restrict the negotiation, thus "ignoring the continual contestation over meanings, their ambiguity, and their susceptibility to change" (Merry 2006: 41).

On this basis, it can be contended that archaeologists should support "a more dialogic analysis

that sees the production of meaning as contested, shaped by both group conflict and by the internal dynamics of the discourse itself" Merry (2006: 41–2). Similar arguments can be heard from descendent communities. Even if local people are not interested in much (or anything) that archaeologists might say, they generally still expect archaeologists to "hold up their end" professionally and do reliable, scientifically credible archaeology. They emphatically do not want to see archaeological techniques applied in a theoretical and methodological vacuum in the hope that this or that empirical titbit might appeal to the local community or part(s) thereof. To paraphrase, the reaction is to ask why descendent communities should take archaeology seriously if archaeologists don't. If so-called professionals are not going to do proper scientific archaeology, why bother descendents with a half-baked version? What exactly do archaeologists stand for, if not the integrity of their discipline?

Archaeology will be much better placed to benefit from the intellectual and practical opportunities that dialogue can offer if archaeologists acknowledge rather than deny the inevitability of, first, some level of conflict or disagreement or dissonance between themselves and Indigenous people and other descendent communities and, second, the constant need to justify what constitutes best professional practice. To take full advantage of these insights, translation should ideally proceed from one particular end of a continuum of variation in the degree to which "local cultural forms and practices are incorporated into imported institutions" (Merry 2006: 44). The end from which the discipline should try to depart is hybridization, a negotiated form of syncretism "that merges imported institutions and symbols with local ones, sometimes uneasily" (Merry 2006: 44). Merry (2006: 48) portrays the resulting conceptual mergers as "thickly shaped by local institutions and structures." At the other end of the continuum, where many past and contemporary attempts at collaboration remained lodged, lies "replication," in which "the imported institution remains largely unchanged from its... prototype... [and the] adaptation is superficial and primarily decorative" (Merry 2006: 44). Replications are only "thinly adapted to local circumstances" (Merry 2006: 48).

Through Thick and Thin

It must be emphasized that nonresonant approaches do not have to be only "decorative. . .thinly adapted" replications. There are many ways to adapt "thickly" to local circumstances: archaeologists do not have to discard science, and local people do not have to give up their own understandings. Oral-historical and archaeological particulars do not have to match precisely to match effectively. Archaeologists should not feel obliged to prove the details of local narratives nor local communities to look to science to confirm their version of events. Such close congruence between accounts may be possible and even sought out in some contexts, but coherence of even profoundly divergent conceptions of the past can also be achieved at a more abstract, conceptual level. Archaeology and local narratives can agree, for instance, that certain broad forms of activity occurred, perhaps even in generically similar places in roughly equivalent sequences. We might see, for instance, shared interest in initial colonization, changes in specific technologies, introductions of specific domesticates or exotic fauna, or the presence or absence of ongoing population movement, perhaps to or from particular directions.

Thick links can also be created along ethical lines, by archaeologists and local communities accepting with humility and good grace rather than resignation or hostility what each may perceive as the other's willingness or unwillingness to vary or surrender certain aspects of their customary practice. A crucial aspect of this situation is archaeologists accepting that local people may be unwilling to share everything they know about the past, such as certain mythological accounts, genealogical details, or locations of particular sites or sorts of sites. Some archaeologists might believe that people will tell researchers everything they know provided the scientists ask the right questions in the right way and will accept what the researchers say provided the scientists use the right wording in the right language to explain themselves, thus enabling archaeologists to be

utterly familiar with local custom and practice. Language obviously plays a pivotal role in effective cross-cultural communication (Lilley 2009: 54–8), but in the end, no amount of eloquent translation or even fluency in local languages will convince people to divulge secret or sensitive knowledge they do not want to (or are not in a social or political position to) divulge. Nor will it make them accept archaeological interpretations they do not want to accept. Recognizing this fact rather than attempting to force the issue with locals or flagellating oneself or one's colleagues for failing to communicate effectively can go a long way towards creating a "thick" adaptation to local circumstances.

Meta-interests

One thing that should greatly assist all involved in this process of translation as negotiation is what observers as different as Andrew Fleming and Tim Ingold have identified as local people's and archaeology's shared interest in "the temporality of the landscape" (cf. Sheehan and Lilley 2008). Thus, Fleming (2006: 271–2, original emphasis) describes how archaeologists as well as native dwellers

> *work* in the field... in the open air. An outsider at first, the landscape archaeologist has no choice but to become engaged in the landscape, to become an insider as a consequence of acquired knowledge... Landscape archaeologists are not obsessed with the attainment of hard-edged objectivity always and everywhere, and our field discourse always and necessarily involves thinking about the intentionality and mindsets of people in the past'.

More lyrically, Ingold (2000: 189) understands that

> For both the archaeologist and the native dweller, the landscape tells – or rather is – a story, 'a chronicle of life and dwelling' (Adam 1998: 54). It enfolds the lives and times of predecessors who, over the generations, have moved around in it and played their part in its formation. To perceive the landscape is therefore to carry out an act of remembrance, and remembering is not so much a matter of calling up an internal image, stored in the mind, as of engaging perceptually with an environment that is itself pregnant with the past.

Coming to "translation as negotiation" from this shared "meta-interest" is surely key to the indigenization of archaeology.

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Heritage Values, Communication of

References

Eco, U. 2004. *Mouse or rat: Translation as negotiation*. London: Phoenix.

Fleming, A. 2006. Post-processual landscape archaeology: A critique. *Cambridge Archaeological Journal* 16: 267–280.

Ingold, T. 2000. *The perception of the environment*. London: Routledge.

Lilley, I. 2009. Strangers and brothers? Heritage, human rights and a cosmopolitan archaeology. In *Cosmopolitan archaeologies*, ed. L. Meskell, 48–67. Durham: Duke University Press.

Merry, S. 2006. Transnational human rights and local activism: Mapping the middle. *American Anthropologist* 108: 38–51.

Munday, J. 2001. *Introducing translation studies: Theories and applications*. London: Routledge.

Sand, C., J. Bole, and A. Ouetcho. 2006. What is archaeology for in the Pacific? History and politics in New Caledonia. In *Archaeology of Oceania: Australia and the Pacific Islands*, ed. I. Lilley, 321–345. Oxford: Blackwell.

Sheehan, N., and I. Lilley. 2008. Things are not always what they seem: Indigenous knowledge and pattern recognition in archaeological analysis. In *Collaboration in archaeological practice: Engaging descendent communities*, ed. C. Colwell-Chanthaphonh and T. Ferguson, 87–115. Walnut Creek: AltaMira.

Spivak, G. 1993. *Outside in the teaching machine*. New York: Routledge.

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Basic Biographical Information

Percy Trezise (1923–2005), who became a pioneer of Australian rock art research, was born in 1923 and raised in country Victoria. He trained as

an RAAF pilot in World War II and after the war became a commercial pilot. Following a stint in the Kimberley flying for the Air Beef scheme, he moved to Cairns in 1957 to take up a position with Ansett Airlines. As a pilot for Ansett and the Cairns Aerial Ambulance, Trezise flew regularly across Cape York Peninsula, the Gulf of Carpentaria, and the Torres Straits, transporting freight and passengers to and from remote cattle stations, bush settlements, and Indigenous communities. In his spare time, he developed his skills as an artist and embarked on a parallel career as a landscape painter and author and illustrator of children's books.

Although not professionally trained in anthropology (or archaeology), Trezise developed a serious interest in Aboriginal culture as a result of his experiences in the bush and was inspired to read the Australian anthropological literature, including the publications of Donald Thomson and Ursula McConnel who had worked in Cape York Peninsula. In 1962 at Karumba on the Gulf of Carpentaria, Trezise met Dick Roughsey (1920–1985), a Lardil man from Mornington Island. This was the beginning of a lasting friendship and professional collaboration between the two men. After retiring from flying in the late 1970s, Trezise engaged full-time in rock art research, writing, and painting until his death in 2005.

Major Accomplishments

Trezise was introduced to Aboriginal rock art in 1960 when he investigated reports of rock paintings south of Laura, in a locality which came to be known as Split Rock. Thereafter, he made unofficial aerial surveys for likely rock art locations while flying over the spectacular escarpments and gorges of the vast belt of sandstone country between Cooktown and the Great Divide. He followed up these aerial observations with arduous dry-season expeditions (on foot) to the remote plateaux and escarpments to locate and record the art.

From the early 1960s, Trezise was a recipient of research grants from the Australian Institute of Aboriginal Studies (AIAS, now AIATSIS, the Australian Institute of Aboriginal and Torres Strait Islander Studies) to document rock art in southeast Cape York Peninsula, following recording methods developed by Fred McCarthy, then Principal of AIAS. Trezise mapped major rock art sites and localities across the region and applied his artistic abilities to produce annotated, scaled drawings of the art in its various techniques (painting, engraving, and stencilling). Knowledgeable Aboriginal people identified rock art subjects (motifs) which became the basis for his classification system. Trezise was the first to report and document the ubiquitous Quinkan spirit figures of the Laura sandstones and to characterize the area as "the Quinkan region." From the 1960s to c. 1986, following his fieldwork, he deposited (variously) photographic, print, audiotape, and graphic records at AIAS/AIATSIS.

Without Dick Roughsey's assistance, it is unlikely that Trezise would have gained the trust of senior Aboriginal men (including Willy Long, George Pegus, Harry Mole, Caesar Lee Cheu, and Mitchell McGreen) whose contributions were crucial to his research. The men led Trezise to sites, provided insights into Aboriginal culture and rock art, related their traditional stories and languages, and narrated personal accounts of the devastating impacts of white colonization on Aboriginal people. As well as contributing to survey and recording in the Quinkan region, Dick Roughsey, who became a distinguished artist and public figure (he was awarded an OBE in 1978 for his services to Aboriginal art and culture), worked with Trezise in documenting the Lardil culture of Mornington Island (Roughsey 1975). With Wally O'Grady of the Cape York Conservation Council, Trezise and Roughsey lobbied state and commonwealth governments for the conservation and protection of Quinkan rock art. As a result of their extended campaign (see Trezise and Roughsey 1975), the Queensland government created the Quinkan Reserves and introduced cultural heritage management strategies in the region. Trezise's efforts also led to the Commonwealth government listing of "Quinkan Country" on the Register of the National Estate. In Cairns, he played a major role in preventing the establishment of a wood chip industry in the North Queensland rainforests.

Trezise's first major publication, *Quinkan Country* (1969), was intended for a general audience but was reviewed favorably in academic circles. According to MacIntosh (1970: 83) "(*Quinkan Country*) opens up an area practically untouched previously, for studies in Australian prehistory." Trezise's (1971) monograph *Rock Art of South-east Cape York Peninsula* was seminal in Australian rock art studies, and its classification scheme provided a basis for later typological analyses of Quinkan rock art. Trezise published numerous articles and papers, and his final account (Trezise 1993) presents an overview of a lifetime in rock art research. Some of Trezise's theories on Australian prehistory were controversial, e.g., his identification of extinct fauna in Quinkan rock art.

From the outset of his research, Trezise assisted, consulted, and worked with archaeologists and rock art specialists who came to work in the Laura/Quinkan region, including Richard Wright, Andrée Rosenfeld, Josephine Flood, Mike Morwood, Alan Watchman, and the author (NC). He was instrumental in having European rock art specialist Andrée Rosenfeld and her colleagues undertake the Early Man excavation in the early 1970s, a project which provided solid evidence for the late Pleistocene origins of Quinkan art. Stylistic analyses of Quinkan rock art conducted by Rosenfeld and other archaeologists have been much reliant on Trezise's graphic records.

In 1998 Trezise donated his personal archive of records to James Cook University, Cairns. In his lifetime, Trezise received various awards, including a Churchill Fellowship in 1972 for overseas rock art studies and an Order of Australia in 1996. In 2004, he was awarded an Honorary Doctor of Letters degree from James Cook University for contributions to Aboriginal studies and conservation. Trezise's legacy includes his many publications, a substantial rock art archive, and a body of ethnographic and ethno-historic work which is highly regarded (and often cited) by anthropologists and others preparing Aboriginal land claims and native title applications (Cole 2011).

Cross-References

- ▶ Australian Rock Art
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rosenfeld, Andrée

References

Cole, N. 2011. 'Rock paintings are stories': Rock art and ethnography in the Laura (Quinkan) region, Cape York Peninsula. *Rock Art Research* 28 (1): 107–116.

Cole, N., and A. Buhrich. 2012. Endangered rock art: 40 years of cultural heritage management in the Quinkan region, Cape York Peninsula, Queensland. *Australian Archaeology* 75: 66–77.

MacIntosh, N.W.G. 1970. Review of 'Quinkan Country'. *Archaeology and Physical Anthropology in Oceania* 5 (1): 81–83.

Roughsey, D. (Goobalathaldin). 1975. *Moon and rainbow: The autobiography of an Aboriginal*. Perth: Rigby.

Trezise, P. 1969. *Quinkan country*. Sydney: Reed.

Trezise, P. 1971. *Rock art of south-east Cape York Peninsula*. Canberra: Australian Institute of Aboriginal Studies.

Trezise, P. 1993. *Dream road: A journey of discovery*. St Leonards: Allen and Unwin.

Trezise, P., and D. Roughsey. 1975. The Cape York galleries: Development or destruction. In *The preservation of Australia's Aboriginal heritage*, ed. R. Edwards. Report of the National Seminar on 'Aboriginal Antiquity in Australia' 23–24 May 1972, 149–156. Canberra: Australian Institute of Aboriginal Studies.

Further Reading

Cole, N. 2005. Percy Trezise OA Obituary. *Australian Aboriginal Studies* 1: 131–133.

Cole, N., and A. Buhrich. 2012. Endangered rock art: 40 years of cultural heritage management in the Quinkan region, Cape York Peninsula, Queensland. *Australian Archaeology* 75: 66–77.

Morwood, M.J., and D.R. Hobbs, eds. 1992. *Quinkan prehistory: The archaeology of Aboriginal art in s.e. Cape York Peninsula (Tempus 3)*. St. Lucia: Anthropology Museum, University of Queensland.

Morwood, M., and P. Trezise. 1989. Edge-ground axes in Pleistocene Australia: New evidence from s.e. Cape York Peninsula. *Queensland Archaeological Research* 6: 77–90.

Rosenfeld, A., D. Horton, and J. Winter. 1981. *Early man in North Queensland: Art and archeology in the Laura area*. Canberra: Research School of Pacific Studies, Australian National University.

Trezise, P. 1973. *Last days of a wilderness*. London: Collins.

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Basic Biographical Information

Archaeologist, historian, theorist, activist-critic, Bruce Graham Trigger was born on June 18, 1937, in Preston, Ontario, and died on December 1, 2006, in Montreal, Quebec. He received his undergraduate education at the University of Toronto (B.A. in anthropology, 1959) and took his doctorate at Yale University (Ph.D. in anthropology, 1964) studying under George Murdock and Irving Rouse. He taught briefly at Northwestern University before joining the faculty of McGill University in 1964 as an Assistant Professor. He rose quickly through the ranks, promoted to Associate Professor in 1967 and then Professor in 1969. He was appointed the James McGill Professor of Anthropology in 2001.

Trigger was the recipient of numerous honors and prizes. He was a fellow of the Royal Society of Canada (elected 1976). He is the recipient of the Canadian Silver Jubilee Medal (1977), the Cornplanter Medal (1979), the Innis-Gérin Medal, Royal Society of Canada (1985), and the Prix de Québec (1991). In 2001 he was made an Officer of the National Order of Quebec and in 2005 an Officer of the Order of Canada for his sustained contributions to the social sciences. He received honorary degrees from the University of New Brunswick (1987), University of Waterloo (1990), University of Western Ontario (1995), McMaster University (1999), and the University of Toronto (2003). He was an honorary fellow of the Society of Antiquaries of Scotland (1981) and an honorary member of the Prehistoric Society (UK) (1991).

Trigger's contributions span the entire range of archaeological theory and practice. He carried out archaeological investigations in Egypt, Sudan, and Canada (e.g., Trigger 1965). He wrote extensively about the Huron and other First Peoples in Canada and their historical relations with early European settlers (e.g., Trigger 1976a). His study of the development of the concept of sociolcultural evolution (Trigger 1998) over the last three centuries and his writings on other theoretical topics (e.g., Trigger 1978, 2003a) stand as models of meticulous argumentation and clarity. So do his scathing commentary and criticism of universities that succumbing to pressures by the New Right have increasingly allowed business interests and government agencies to set their agendas and put profits ahead of open, critical thought (Trigger 1992).

Major Accomplishments

Trigger's archaeological writings move seamlessly from his monumental histories of archaeological thought through his analyses of contemporary issues in archaeological theory and praxis to his comparative studies of the rise of early civilizations. His histories were written at different scales. In some instances, he used a microscope to prepare a fine-grained analysis of the life and thought of individuals like Daniel Wilson or V. Gordon Childe (e.g., Trigger 1966, 1980a). In other instances, he peered through a somewhat wider lens to discern how particular patterns in the mosaic of archaeology appeared in the past and have developed along different pathways to the present day – such as nationalism, romanticism, or regional research traditions (e.g., Trigger 1984, 1995). Finally, in the two editions of *A History of Archaeological Thought* (Trigger and Glover 1989, 2006), he stepped back to see the larger picture composed of the mutual interactions and interconnections of the parts with one another and with the wider whole as these developed through time; here, the fine-grained texture derived from studying individuals or regional traditions is replaced by perspective, understanding, and appreciation of the totality as a whole.

Archaeology, for Trigger (1981), is an historical science. Consequently, his discussions of contemporary archaeological theory and praxis, their

connections with other disciplines, and their relations to the wider social concerns were typically framed in terms of conception of society and history that viewed them as processes involving emergence, formation, reproduction, and transformation. This was a dialectical conception of society and history that was finely tuned to structural inequalities (e.g., Trigger 1976b). He appreciated the significance of structural inequalities: the diverse understandings (standpoints) that groups with different relations to power have of society and the contested terrains of debate that occur as a result. It was apparent in his writings about ancient societies, how archaeologists understood and wrote about those societies, and how native peoples responded to those interpretations. This was perhaps most evident in his writings about the relations between archaeologists and native peoples – especially "Archaeology and the Image of the American Indian" (Trigger 1980b), "The Past as Power" (Trigger 1985), and "A Present of Their Past? Anthropologists, Native People and Their Heritage" (Trigger and Glover 1988). He believed that the accumulation of knowledge had potentially transformative effects, and his writings on the historiography of the relations between First Peoples and European settlers have had a profound effect on the way Canadian history is taught today.

Trigger's approach to archaeology was systematically comparative. This was as true of the collections he coedited with Ian Glover on regional traditions of archaeological research for *World Archaeology* (Trigger and Glover 1981, 1982) as it was of his *Understanding Early Civilizations* (Trigger 2003b). Here, he was less concerned with the rise of civilization per se than with understanding how the sociopolitical organization, economy, and cognitive and symbolic aspects of early state-based societies were articulated with one another; how these articulations came into being as earlier social institutions and practices were distorted, dissolved, and soon replaced by emergence forms; and the ways in which they provided the social cement that at least temporarily held together these structures of inequality. He paid close attention to the diversity of early civilizations, since he was well aware that they were not all the same. The book's wealth of empirical detail is matched by that of its theoretical underpinnings and comparisons of the standpoints different archaeologists have put forth concerning the rise of civilization. It is easy to imagine the debates Trigger was having with different colleagues and shows that knowledge is produced not merely through the accumulation of more facts but also honing and refining the frameworks we use to understand them.

Cross-References

- ▶ Archaeology and Politics
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Childe, Vere Gordon (Theory)
- ▶ Colonial Expansion and Nation-State Building: Influences on Archaeology
- ▶ Cultural Heritage Management and Native Americans
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ History and Archaeology: Relationship Over Time (US Perspective)
- ▶ Marx, Karl
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Nationalism and Archaeology
- ▶ Nationalism and Archaeology: Overview

References

Trigger, B.G. 1965. *History and settlement in Lower Nubia*. Yale University Publications in Anthropology 69. New Haven: Yale University.

Trigger, B.G. 1966. Sir Daniel Wilson: Canada's first anthropologist. *Anthropologica* 8: 3–28.

Trigger, B.G. 1976a. *The children of Aataentsic: A history of the Huron peoples to 1660*. 2 vols. Montréal: McGill-Queen's University Press.

Trigger, B.G. 1976b. Inequality and communication in early civilizations. *Anthropologica* 18: 27–52.

Trigger, B.G. 1978. *Time and traditions: Essays in archaeological interpretation*. New York: Columbia University Press.

Trigger, B.G. 1979. Egypt and the comparative study of early civilizations. In *Egyptology and the social*

sciences, ed. K. Weeks, 23–56. Cairo: American University of Cairo Press.
Trigger, B.G. 1980a. *Gordon Childe: Revolutions in archaeology*. New York: Columbia University Press.
Trigger, B.G. 1980b. Archaeology and the image of the American Indian. *American Antiquity* 45: 662–676.
Trigger, B.G. 1981. La arqueología como ciencia histórica. *Boletín de Antropología Americana* 4: 55–89.
Trigger, B.G. 1984. Alternative archaeologies: Nationalist, colonialist, imperialist. *Man* 19: 355–370.
Trigger, B.G. 1985. The past as power: Anthropology and the North American Indian. In *Who owns the past*, ed. I. McBryde, 11–40. Melbourne: Oxford University Press.
Trigger, B.G. 1995. Romanticism, nationalism, and archaeology. In *Nationalism, politics, and the practice of archaeology*, ed. P.L. Kohl and C. Fawcett, 262–279. Cambridge: Cambridge University Press.
Trigger, B.G. 1998. *Sociocultural evolution: Calculation and contingency*. Oxford: Blackwell Publishers.
Trigger, B.G. 2003a. *Artifacts and ideas: Essays in archaeology*. New Brunswick: Transaction Publishers.
Trigger, B.G. 2003b. *Understanding early civilizations: A comparative study*. Cambridge: Cambridge University Press.
Trigger, B.G., and I. Glover. 1981. Editorial: Regional traditions of archaeological research, I. *World Archaeology* 13: 133–137.
Trigger, B.G., and I. Glover. 1982. Editorial: Regional traditions of archaeological research, II. *World Archaeology* 13: 271.
Trigger, B.G., and I. Glover. 1988. A present of their past? Anthropologists, native people and their heritage. *Culture* 8 (1): 71–85.
Trigger, B.G., and I. Glover. 1989. *A history of archaeological thought*. 1st ed. Cambridge: Cambridge University Press.
Trigger, B.G., and I. Glover. 2006. *A history of archaeological thought*. 2nd ed. Cambridge: Cambridge University Press.

Further Reading

Pendergast, J.F., and B.G. Trigger. 1972. *Cartier's Hochelaga and the Dawson Site*. Montréal: McGill-Queen's University Press.
Trigger, B.G. 1985a. *Natives and newcomers: Canada's "heroic age" reconsidered*. Montréal: McGill-Queen's University Press.
Trigger, B.G. 1985b. Generalized coercion and inequality: The basis of state power in early civilizations. In *Development and decline: The evolution of sociopolitical organization*, ed. H. Claessen et al., 46–61. South Hadley: Bergin and Garvey.
Trigger, B.G. 1990. Maintaining economic equality in opposition to complexity: An Iroquoian case study. In *The evolution of political systems: Sociopolitics in small-scale sedentary societies*, ed. S. Upham, 119–143. Cambridge: Cambridge University Press.
Trigger, B.G. 2004. Cross-cultural comparison and archaeological theory. In *A companion to social archaeology*, ed. L. Meskell and R.W. Preucel, 43–65. Oxford: Basil Blackwell Publishers.
Williamson, R.F., and M.S. Bisson, eds. 2006. *The archaeology of Bruce Trigger: Theoretical empiricism*. Montréal: McGill-Queen's University Press.

Trinh, Hiep Hoang

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Basic Biographical Information

Hiep Hoang Trinh holds a Ph.D. in Archaeology from Vietnam Ministry of Training and Education; an M.A. in Archaeology from the University of Social Sciences and Humanities, National University, Hanoi; and B.A. in History from Hanoi University. He is the principal researcher and head of the Department for Metal Age Studies at the Vietnam Institute of Archaeology of the Vietnam Academy of Social Sciences (VASS).

Major Accomplishments

Since 1995, his work at the Institute of Archaeology has focused on several research areas such as pre-protohistorical archaeology of northern Vietnam, pre-Dong Son cultures in northern Vietnam, Neolithic and Metal Age cultural interaction between northeast Asia and northern Vietnam, and ancient social networks.

Cross-References

► Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
► UNESCO World Heritage Convention (1972)
► Vietnam's Archaeological World Heritage Sites
► World Archaeological Congress (WAC)

▶ World Heritage List: Criteria, Inscription, and Representation
▶ World Heritage Objectives and Outcomes

Further Reading

Kim, N.C., L. Van Toi, and H.H. Trinh. 2010a. Walls, warfare and political centralization: Recent excavation at Middle Wall and Ditch of Co Loa Citadel, Dong Anh, Hanoi, Vietnam. *Archaeology Journal* 3: 46–61.

Kim, N.C., L. Van Toi, and H.H. Trinh. 2010b. Co Loa: An investigation of Vietnam's ancient capital. *Antiquity* 84: 1011–1027.

Trinh, H.H. 2007a. Pottery technology at the Man Bac site (Ninh Binh) and some factor pottery technology pre-prohistorical archaeological on the Korean Peninsula. *New Archaeological Discoveries* 2006: 279–281.

Trinh, H.H. 2007b. Excavation at Cau Tu 1 temple and Cau Tu 2 temple (Bac Giang province). *Archaeology Journal* 4: 100–101.

Trinh, H.H. 2010. Man Bac site, a Neolithic settlement in northern Vietnam (Culture Resource Studies Asian Linkage Building Seminar Working papers). Japan: Graduate School of Human and Socio-Environment Studies Kanazawa University.

Trinh, H.H., and H. Van Phung. 2003. Dong Vuon site – data and perception. *Archaeology Journal* 1: 22–42.

Van Phung, H., H.H. Trinh, T. Van Lang, and N.H. Hanh. 2009. Cau Tu temple (Bac Giang) through data of the archaeological excavation in 2007. *Archaeology Journal* 4: 29–53.

Tsuboi, Shogoro

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Basic Biographical Information

Shogoro Tsuboi (1863–1913) was one of founders of Japanese anthropology and archaeology. He was born in Ryogoku, Tokyo, in 1863. He entered Tokyo University to study biology in 1883 and established the *Society of Anthropology* with his friends the following year. In 1886 he started publishing the "Anthropological Report" (presently known as the *Journal of the Anthropological Society of Nippon*). He studied abroad for three years, in the UK and France, from 1889. Returning to Japan in 1892, he became a professor at the National University of Science (later, the Department of Science, Tokyo University) and the following year, founded the first anthropology class in Japan. Dr. Tsuboi produced a number of excellent students in various disciplines, including anthropology, ethnology, archaeology, and geology. In 1899 he obtained a doctorate of science from Tokyo University. He died in 1913 while attending the Fifth Congress for the Union Académique International (UAI) in St Petersburg, Russia.

Major Accomplishments

Besides being a child prodigy, Shogoro Tsuboi liked collecting, observing, and sketching whatever he was interested in. He also began publishing a journal and setting up study societies as early as his teenage years. In 1883 he wrote his first essay titled "Consideration on Pottery from Meguro Village." After that, he wrote energetically for a variety of academic fields covering anthropology, ethnology, archaeology, folklore, and modernology (the study of modern social phenomena). Over his lifetime, he wrote more than 1,000 essays for a variety of books and magazines for the general public as well as for academic journals published by organizations such as the Tokyo Anthropological Society and the Anthropological Society of Nippon.

In the field of archaeology, besides studies covering all prehistoric times, Shogoro Tsuboi worked particularly on the manners and customs of ancient Japanese people, Ainu culture, *haniwa* figures, and ancient Egyptian culture. Among his numerous works, three stand out as his major contributions to Japanese archaeology.

Shogoro Tsuboi's first major accomplishment was the discovery and identification of Yayoi pottery, later associated with the culture of the first period of farming in Japanese. In 1884, Dr. Tsuboi and his friend recovered an unknown type reddish pot from the Mukogaoka shell mound in Yayoi-cho, Tokyo. They found it to be totally different to

Jomon pottery in style and decoration and named it "Yayoi"-type pottery after the place name of its discovery while placing it chronologically between pottery of Jomon and Kofun (burial mound) periods.

The second major accomplishment of Shogoro Tsuboi involved the genesis of scientific research and reporting on burial mounds. In 1886 he conducted a very systematic and elaborate excavation of burial mounds in Ashikaga Park, Tochigi. He recorded and sketched in situ every object in the stone chambers as well as the mound. He then published "An excavation report of Ashikaga burial mounds," which had a great impact, not only on later studies of burial mounds but also on excavation methods and techniques in general.

Thirdly, Shogoro Tsuboi did much to vitalize the fields of archaeology and anthropology through academic debates. Among them, the most well known is his "Koro-Pok-Guru" hypothesis. In 1887, Tsuboi proposed that the "Koro-Pok-Guru" (small people from the folklore of the Ainu people of the northern Japanese islands) were the original people of Japan. This initiated a hot discussion on the origin of Japanese people and culture, with his views pitted against those of scientists who supported the hypothesis that the Ainu were the original people. This debate continued until Tsuboi's death in 1913.

Shogoro Tsuboi not only promoted academic fields but also disseminated scholarly knowledge energetically to the general public through plain and clear explanations and with public lectures, sometimes in cooperation with Mitsukoshi Department Store. He loved objects, people, and humor and created a grand network of colleagues with the same interests. He was a titan of knowledge in the liberal atmosphere of the Meiji Period and may be called the first practitioner of public archaeology in Japan.

Cross-References

► Japan: Indigenous Occupation
► Torii, Ryūzō

Further Reading

Saito, T. 1971. *Nihon Kokogaku Senshu. [A series of selected papers of distinguished Japanese archaeologists.] Tsuboi Shogoro. volume 1*. Tokyo: Tsukiji shokan (in Japanese).

Saito, T. 1972. *Nihon Kokogaku Senshu. [A series of selected papers of distinguished Japanese archaeologists.] Tsuboi Shogoro, volume 2*. Tokyo: Tsukiji shokan (in Japanese).

Saito, T. 1985. *Kokogaku no hitobito. [People who grow Japanese archaeology.]*. Tokyo: Daiichi Shobo (in Japanese).

Tsude, Hiroshi

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Basic Biographical Information

Hiroshi Tsude is a Japanese archaeologist and historian. He was born in Osaka in 1942. He graduated from Kozu High School and entered Kyoto University to study archaeology under mainly Yukio Kobayashi, who was famed for his empirical research on chiefly tombs and society in Kofun period. After his undergraduate studies, Hiroshi Tsude worked as a research associate at Kyoto University, when he excavated several tumuli in Otokuni district, Kyoto prefecture, to launch his own research of Kofun period.

In 1977 Hiroshi Tsude was appointed to the post of Associate Professor of Shiga University near Kyoto. Shortly thereafter, he moved to Osaka University. As an Associate Professor in the Department of Japanese History at Osaka University, Dr. Tsude fostered many archaeologists working on the Yayoi and Kofun period prehistoric periods in Japan through his research and education. Dr. Tsude continued this work until his retirement in 2005. He was promoted to Professor of the newly established Department of Archaeology at Osaka University in 1988, and the following year, he obtained his doctoral degree in archaeology.

In 1989 Hiroshi Tsude received the Seiryo Hamada award, an award which is regarded as most honorable among Japanese archaeologists and historians.

Major Accomplishments

Hiroshi Tsude has made significant theoretical and practical contributions to the studies of social development and state formation in Japan through his use of Marxist theory and of an anthropological approach based on archaeological analysis.

Early in his career, Dr. Tsude attempted to reconstruct the development of an agricultural society in the Japanese archipelago. He undertook a Marxist analysis of iron farming implements, settlement systems, regionality of pottery in the Yayoi period, and reconsideration of farming families and their land ownership and published this in the volume *Nihon noko shakai no seiritsu katei* (*Formation Process of Agricultural Society in Japan*, see Tsude 1989). In the late 1990s, Dr. Tsude centered his research study on chiefly tumuli in the Kofun period. He attempted to reconstruct the political relationships among chiefs buried in these tumuli through a comparative analysis of the size and shape of the mounds and coffins and typological study of their offerings. This analysis was published in *Zenpokoenfun to Shakai* (*Keyhole Shaped Tumuli and Their Social Background*, see Tsude 2006). In this work Dr. Tsude argued that the Kofun period (third to sixth centuries) was an early state in Japan. This stimulated widespread discussions about state formation processes in prehistoric Japan.

Cross-References

► Japan: Indigenous Occupation

References

Tsude, H. 1989. *Nihon noko shakai no seiritsu katei*. [Formation process of agricultural society in Japan.] Tokyo: Iwanami Shoten (in Japanese).

Tsude, H. 2006. *Zenpo-koen-fun to shakai*. [Keyhole shaped tumuli and their social background.] Tokyo: Hanawa Shobo (in Japanese).

Further Reading

Tsude, H. 1995. Archaeological theory in Japan. In *Theory in archaeology a world perspective*, ed. P. Ucko, 298–311. London: Routledge.

Tupi-Guarani Archaeology in Brazil

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Introduction

Tupi-Guarani archaeology is one of the most studied themes in Brazil and South America, mainly because of Tupi-Guarani-speaking peoples, living along the Atlantic coast, were among the first contacted by Europeans around 1500 CE. Because of this early historical contact, a massive written record has been created about these Indigenous peoples. Ethnohistorical and ethnographic records provide a picture of the Tupi-Guarani as living in large villages organized in regional chiefdoms commanded by political leaders (*caciques*) and shamans (*pajés*). Their economy was heavily based on slash-and-burn agriculture (maize, manioc, beans, and squash, among many other crops), but hunting and collecting have always remained vital. The practice of war and anthropophagy has decisive social significance as a means of acquiring status and power as well as expanding territories through conquering, establishing political alliances, and, mainly after contact, enslaving other peoples.

From an archaeological perspective, the continental occupation of the Tupi-Guarani-speaking

peoples can be understood as long-term history, a formidable demographic expansion that interacted with other cultures from prehistoric times until today. The principal question for archaeology is, then, to understand the origins of the Tupi-Guarani culture and establish the archaeological correlates for such a deep historical process.

Definition

The Tupi-Guarani live in several groups and have more than 30 closely related languages. They are widely dispersed in the tropical and subtropical lowlands, a polygon that involves Brazil, southern Venezuela, eastern Peru and Bolivia, Paraguay, northern Argentina, and Uruguay. Although demographic data are unclear, there are estimates up to one million Tupi people just before contact (Fausto 1992: 382–383). Nowadays, Tupi-Guarani speakers compose no more than 250,000 people.

Key Issues and Current Debates

Despite the friendly first contacts with the Portuguese and other Europeans, the Tupi soon faced the hardship of slavery and genocide wars, as in most places of the New World. Even so, their widespread language and culture have provided common linguistic grounds (the *nheen gatu* or "general language") for the Jesuit and Portuguese expansion in the South American hinterland and have been persevered, throughout historical times, to this day.

Noelli (1993) has detected two academic trends in Tupi-Guarani archaeology, which he has named *ethnological imperialism* and *archaeological domain*. The first is related to ethnographers like Ehrenreich, Von Martius, Métraux, von den Steinen, Nimuendajú, and d'Orbigny, who synthesized written and iconographic historical documents from the colonial period (made by travelers, missionaries, and military) and which were sometimes supplemented by ethnographic observations. These approaches were accompanied by linguistic studies and focused on defining cultural traces and explaining the migratory waves across the continent. It did not take long to realize (e.g., by the accounts of the Jesuit priest Montoya and the French chronicler Jean de Léry) that the correlation between the geometric polychrome-painted style of pottery production and Tupian-speaking groups, highlighting the archaeological dimension of the Tupi-Guarani history.

One of the most important researchers of this period is the French ethnographer Alfred Métraux. His assumptions became rather paradigmatic and have had a strong influence on archaeological research, particularly as regards three focal points: (1) The Tupi-Guarani people's permanent search for the "land without evil," historically known as *yvy marane'y* in Tupian language. This ideology would explain the spreading out of the Tupi expansion throughout South American lowlands. (2) The polychrome pottery style would be linked to the Tupi-Guarani culture, thus indicating the extent of the Tupi-Guarani territory before contact (Métraux 1948). (3) The existence of a cultural boundary somewhere in the area of what is today the state of São Paulo, in Brazil. Such a linguistic boundary separates the Tupi peoples to the north from the Guarani speakers to the south. This linguistic and cultural split would inspire archaeologists to look for differences in technology and style of pottery (Fig. 1).

The beginning of the *archaeological domain* is related to the implementation of the National Program of Archaeological Research (PRONAPA), a research project with continental dimensions, coordinated by Betty Meggers and Clifford Evans, from the Smithsonian Institution in the USA, between 1965 and 1970. The PRONAPA, aiming at the large-scale mapping of archaeological cultures (organized in traditions and phases) by its material (mostly ceramic) correlates, has emphasized cultural (material) sequencing and did not put much effort in anthropological or linguistic perspectives. In this sense, the Tupi-Guarani tradition was considered "(. . .) a cultural tradition characterized by corrugated, brushed and polychrome pottery (red and/or black under engobe white or red), secondary burials in urns,

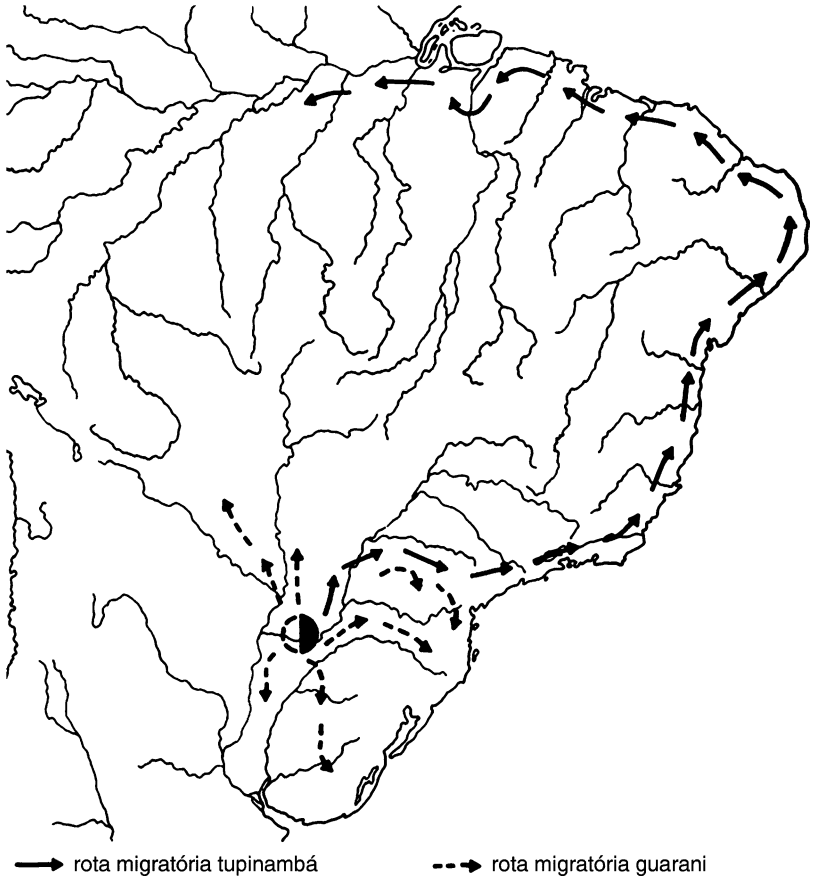

Tupi-Guarani Archaeology in Brazil, Fig. 1 Métraux (1927) expansion model for the Tupi-Guarani (Modified from Fausto 1992: 384)

polished stone axes and the use of *tembetás*" or labial adornments (Chmyz et al. 1976: 146). This dissociation of archaeological material culture from precolonial times and the ethnohistorical and ethnographic record of the (still alive) Tupi speakers has not taken into account the continuity of Indigenous historical processes and has disarticulated the perception of the native peoples' rights, with political consequences (Noelli 1993). This approach changed only after the 1980s when Brochado (1984), articulating radiocarbon chronology, archaeological, ethnohistorical, and linguistic data, sought a vertical historical long-term perspective relating the archaeological past to living native societies and ultimately recognizing that undertaking Tupi-Guarani archaeology in Brazil is to make Indigenous history.

In spite of its merits, the continuous-historical model suggested by Brochado (1984) has received several critiques as regards the relationships between archaeological cultures and ethnic groups. According to Lima (2011), it contributes to the conception of ethnic groups as internally homogeneous, historically continuous, and externally defined by cultural and linguistic characteristics. In the same way, according to Schiavetto (2003), the continuous-historical model has depicted the Tupi-Guarani culture as a homogeneous block unalterable and static, resulting from the indiscriminate use of archaeological, ethnohistorical, and ethnographic sources. Following this perspective, the continuous model has no resonance of contemporary cultural diversity, as considered from an "emic," fluid, and the dynamical concept of culture; thus, a variety of "peoples" would hide behind ceramic and linguistic continuity. The debate continues.

Another research focus is the origins of Tupi-Guarani culture, in both cultural and geographical terms. Based on the historical migrations of Tupi-

Guarani recorded by chroniclers and voyagers, Métraux (1927) proposed one of the first models in the twentieth century, suggesting the watershed of Paraná-Paraguay as the provenience area, with a migratory movement from south to north shortly before the arrival of the Europeans. More recently, Meggers (1987) suggested that the origin of this culture would be located somewhere on the Madeira River, with migrations to the south and, later, to the north. Following Métraux, Meggers also considered the Tupi-Guarani movement fast and relatively recent, around 500–1000 CE. From the point of view of historical linguistics (based on lexical-statistical method), Rodrigues (1964) suggested that the origin of the Proto-Tupi culture could be the region between the Madeira and Xingu rivers in the southwestern Amazon around 3000 BCE, with further developments and ramifications as they expanded to the east and south, acquiring distinct cultural characteristics.

Brochado (1984), following Lathrap's (1970) "cardiac model" (the idea that the Amazon was a radiating center of cultures), considers that the origins of the Proto-Tupi-Guarani are related to the Amazonian Polychrome Tradition. From the central Amazon, around 3000 BCE, demographic pressure would lead to a process of differentiation and expansion in two migratory waves. The Guarani went south via Madeira-Guapore watershed, ultimately reaching the Paraná-Paraguay Basin, being already well established around 100 BCE. Afterward, the Guarani reached the Atlantic coast in successive expansionist movements along the lower Parana (Plata) basin, turning north along the shore. On the other hand, around 500 BCE, the Tupi culture would have gone down the Amazon River to its mouth, in a movement from the west to the east, reaching the northeastern shores of Brazil, and then turning south along the coast (where they are usually called Tupinambás). This migration would have been linear and fast, following the Atlantic coastline. About a few hundred years before the arrival of Europeans, these two opposite migratory waves would have met, configuring a boundary around southeastern Brazil (Fig. 2).

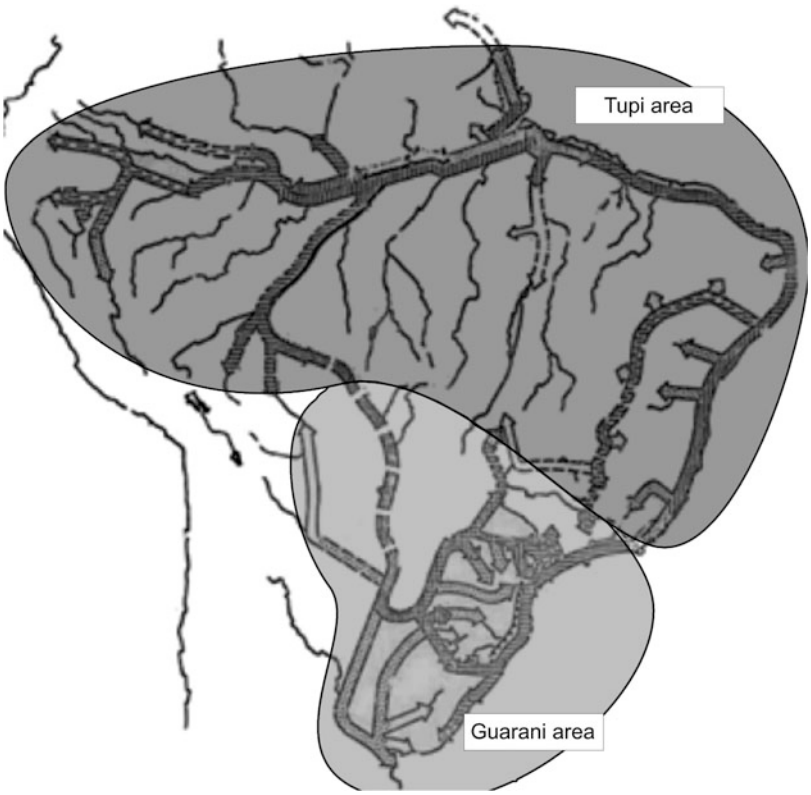

Tupi-Guarani Archaeology in Brazil, Fig. 2 The expansion routes of Tupi-Guarani, with Tupi and Guarani global areas (Modified from Noelli 2008)

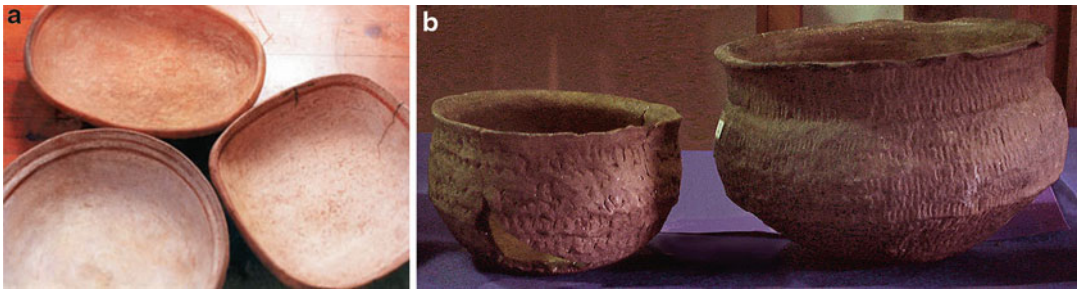

Tupi-Guarani Archaeology in Brazil, Fig. 3 (**a**) Typical Tupinambá-painted vessels with square and elliptical shapes from Araruama, Rio de Janeiro, Brazil (photo Beto Barcelos). (**b**) Typical Guarani-corrugated vessels with complex shapes from the Collection of Farroupilha Museum, Rio Grande do Sul, Brazil

Brochado (1984) and others have identified discrete stylistic differences between Tupi-Guarani pottery assemblages from the southern and northern parts of the country, in close correspondence to the linguistic boundary between the Guarani and the Tupinambá, respectively. Synthetically, Tupinambá ceramics are painted with geometric designs in red, black, and orange, with white or red engobe, in close proximity to the Polychrome Tradition in Amazonia. Tupinambá paintings are extremely well done, with technical refinement and accuracy. On the other side, the southern set called Guarani tradition covers part of the states of São Paulo, Paraná, Santa Catarina, Rio Grande do Sul in Brazil, as well as Uruguay, Paraguay, and the region of northern Argentina. The finishing style of Guarani pottery is predominantly plastic (although painted motifs are always present) with a strict set of vessel shapes and sizes. Pottery decoration employs a variety of finishing techniques such as smoothing, corrugating, ungulating, painting, brushing, slotting, and different kinds of incisions. Despite these differences, it is clear that they belong to the same cultural tradition. In both traditions, the enduring sophisticated iconography suggests enduring teaching-learning relations involving both experienced and beginner potters (Fig. 3).

Noelli (2008), following Brochado's model, states that the Tupi-Guarani culture has its origins in a wide region in the southern Amazon area, a polygon to the south of the middle and lower Amazon, between Tocantins and Madeira/Guapore rivers. This proposal was strongly debated by Fausto (1992), who adopted Métraux's ideas about a territorial expansion from south to north. Moreover, Buarque (2009) has dated Tupinambá sites in Rio de Janeiro coast around 900 BCE, suggesting that the territorial expansion of Tupi-Guarani was older than archaeologists had thought so far and that the origins of this culture should not be in the north, but rather toward southern Brazil. So, up to this point, there is still no consensus about the origins of the Tupi-Guarani culture and its obscure relationships with Amazonian polychrome tradition. From a cultural perspective, both models provide the Tupi-Guarani archaeology with an important sociological foundation, explaining the continental scale of the Tupi-Guarani territorial dispersion as a result of a diachronic historical long-term process of demographic expansion, only disrupted by the European conquest.

The Tupi-Guarani culture expands itself by splitting villages into cells systematically subdivided over time. This process, called "swarming" by Brochado (1984), produces a radial expansion of the territory in gradual population waves, thus occupying the territory in a systematic way, acting socially, politically, and economically in the shaping of the landscape; manipulating botanical species; domesticating animals; intervening on topography; and transforming the environment. According to Noelli (1993) and Assis (1996), the territorial organization of the Tupi-Guarani is constituted by the house (*oka*), where lies the nuclear family; by the village (*amundá* or *teýy*), where the extended family resides; by the set of villages included in a territory (*teko'á*); and by the set of *teko'á* that

configures a large territory as a nation (*guará*). By definition, *teko'á* constitutes a set of villages and camps (*tapyi*), interconnected by paths (*piabiru*). It configures a territory bordered by landforms such as rivers, hills, and streams. This territorial organization is defined by symbolic aspects and consolidated through political alliances that determine degrees of prestige and social status in relationships between villages (Fig. 4).

In the twenty-first century, Tupi-Guarani archaeology has adopted an Indigenous history approach, integrating and confronting archaeological, ethnohistorical, and ethnographic sources. There is also a concern with the observation of technology and behavioral patterns as a mechanism for understanding the archaeological record. In addition, there is a growing investment in political engagement, adding theoretical reasoning and scientific political agendas in defense of Indigenous heritage and civil rights as regards land reservations and the protection of environmentally threatened territories and heritage landscapes. In this sense, Tupi-Guarani

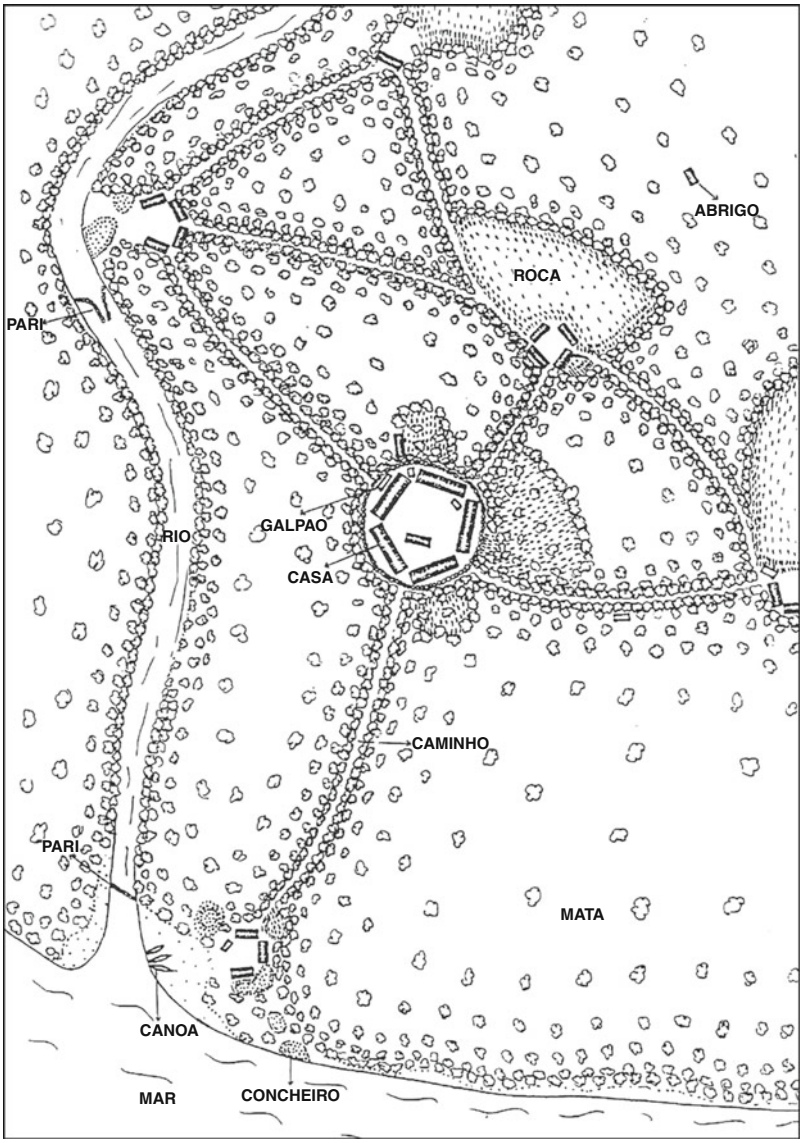

Tupi-Guarani Archaeology in Brazil, Fig. 4 Graphic idealization of a *teko'á*, showing the houses, traps, gardens, ports, jungle, and the pathways linking all the spaces (Modified from Assis 1996)

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archaeology has overcome the old divide between strict archaeological and anthropological/linguistic perspectives, making it possible to approach the Tupi-Guarani people's history and culture in a holistic way.

Cross-References

► Latin American Social Archaeology
► Meggers, Betty Jane

References

Assis, V.S. 1996. *Da espacialidade Tupinambá*. Porto Alegre: PUC-RS. (Dissertação de mestrado).
Brochado, J.J.P. 1984. An ecological model of the spread of pottery and agriculture into eastern South America. Unpublished PhD dissertation, University of Illinois at Urbana-Champaign.
Buarque, A. 2009. Litoral do Rio, há 3 mil anos. *Pesquisa FAPESP* 155: 38.
Chmyz et al. 1976. Terminologia Arqueológica Brasileira para a Cerâmica. *Cadernos de Arqueologia (Paranaguá)* 1 (1): 119–148.
Fausto, C. 1992. Fragmentos de história e cultura Tupinambá. Da etnologia como instrumento crítico de conhecimento etno-histórico. In *História dos Índios no Brasil*, org. M.C. da Cunha , 381–396. São Paulo: Companhia das Letras.
Lathrap, D. 1970. *The upper Amazon*. New York: Praeger.
Lima, T.A. 2011. O problema da atribuição de identidades étnicas a registros arqueológicos. In *Arqueología Tupiguaraní*, ed. D. Loponte and A. Acosta, 7–22. Buenos Aires: INAPL.
Meggers, B. 1987. *A Ilusão de um paraíso*. São Paulo: EDUSP.
Métraux, A. 1927. Migrations historiques des tupi-guarani. *Journal de la Société des Américanistes* 19: 1–45.
Métraux, A. 1948. The Guarani. In *Handbook of south American Indians, volume 3: The tropical forest tribes*, ed. J.H. Steward, 69–94. Washington: Smithsonian Institution.
Noelli, F.S. 1993. *Sem Tekohá não há Tekó (em busca de um modelo etnoarqueológico da subsistência e da aldeia Guarani aplicada a uma área de domínio no delta do Jacuí-RS)*. Porto Alegre: PUC-RS. (Dissertação de mestrado).
Noelli, F.S. 2008. The Tupi expansion. In *Handbook of south American archaeology*, ed. H. Silverman and W.H. Isbell, 659–670. New York: Springer.
Rodrigues, A.D. 1964. A classificação lingüística do tronco Tupi. *Revista de Antropologia* 12 (1–2): 99–104.
Schiavetto, S.N.O. 2003. *A Arqueologia guarani. Construção e desconstrução da identidade indígena*. São Paulo: Annablume.

Turkey: Archaeological Museums

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Introduction

As archaeological material in Turkey is legally state property, archaeological museums have played a crucial role in state museum policies. In recent years, the Ministry of Culture and Tourism has been investing heavily in the establishment of museums associated with important archaeological sites. The construction program aims to present the excavation results using modern technology to enrich the visitor experience. New museums also engage in educational programs for their communities and include workshops and other facilities aimed at attracting children's attention and enhancing the value of the museums in their respective regions.

Key Issues/Current Debates/Future Directions/Examples

Museums of Turkey

The first museum in Turkey was founded in 1846 by Fethi Ahmet Pasha at Hagia Eirene, which had previously been used as a military depot in Istanbul. The museum was later renamed *Müze-i Hûmâyun* (Imperial Museum), and Mr. Edward Goold, who had been teaching at *Mekteb-i Sultânî*, was appointed director. *Asar-ı Atika Nizamnamesi*, the first thorough legislation regarding protection of ancient artifacts, was passed in 1869. The legislation required all parties to apply for permission from the Ministry of Education for excavations on Ottoman soil and banned overseas sales and movement of material while permitting local sales. In 1872, Dr. Philipp Anton Dethier was appointed director of *Müze-i Hûmâyun*. During his directorate, artifacts from the Hagia Eirene were moved to the

Tiled Kiosk Museum. In 1874, a second law was passed, which was proved unsatisfactory in fighting (abuse). A new age for Turkish museology began after Osman Hamdi Bey was appointed director of the museum. He played a pivotal role in the preparation of the new legislation for ancient artifacts, which forbade all transactions and export overseas. Istanbul Archaeological Museum, Konya Museum (1902), and Bursa Museum (1904) were also built during his directorate. He also played a crucial role in the first scientific excavations in Ottoman territory as well as in the formation of modern museological standards. Following his death, his brother Halil Edhem Bey took up on the role of director. He particularly focused on the development of museums in Anatolia. The Museum of Turkish and Islamic Arts (1914) and The Ancient Orient Museum (1925), both in Istanbul, were also established during his period (Fig. 1).

Istanbul Archaeological Museums consist of the Archaeological Museum, the Ancient Orient Museum (Eski Şark Eserleri Müzesi), and the Tiled Kiosk Museum (Çinili Köşk Müzesi). The museum complex was opened to visitors in 1891. They house a large number of finds from the Ottoman territory, material from Seljuk and Ottoman eras, and a Children's Museum (Fig. 2).

Turkey: Archaeological Museums, Fig. 1 Osman Hamdi Bey is one of the most prominent figures in the development of museums and archaeology in Turkey. (Public Domain)

After the War of Independence, Atatürk paid a great deal of attention to museums and personally contributed to the foundation of several. During the early years of the Republic, numerous museums were made accessible through development and restoration operations on a national scale. Besides construction of new museums, several architecturally significant buildings were converted to museums. Ayasofya (Hagia Sophia), built by the Roman emperor Justinian in 537, was designated as a monument museum in 1935. Another Justinian period church, Chora, was also arranged as a museum in 1945. Topkapı Palace, the seat of the administration from the time of Mehmet the Conqueror was converted to a museum by Atatürk's directive in 1924. The museum in Manisa, the core Lydian territory, was created in 1937 in a *madrasa* built by the famous sixteenth-century Ottoman architect Sinan (Fig. 3).

Ankara Ethnographic Museum, the first museum of the Republic, was opened to visitors in 1930 to display and house the cultural heritage of Anatolia beginning from the first Turkish states and principates to more recent times. Stemming from Atatürk's idea to establish a museum devoted to Hittite civilization, the growing number of Hittite objects brought to Ankara necessitated a large building. For this purpose, two Ottoman buildings were restored to establish the Museum of Anatolian Civilizations, which took its final form in 1968, one building having been reserved for the administrative section. The museum houses various objects from Paleolithic times to the Ottoman period, including many prominent examples from Çatalhöyük, the Assyrian Colonies, and the Phrygian, Lydian, and Urartian periods. In the core Hittite territory, namely, Çorum province, the first museum was established in 1940 in Alacahöyük, the site of the Early Bronze Age royal tombs and a Hittite town. The year 1968 saw the opening of two museums in the region, one in Boğazköy, where capital Hattusa is located, and in Çorum. In the Phrygian capital Gordion, a museum was built beside the so-called Tumulus of Midas in 1964. In Uşak, another Lydian territory, a museum was established in 1970. The repatriated pieces from

Turkey: Archaeological Museums, Fig. 2 Founded in late nineteenth century, Istanbul Archaeological Museums complex is still one of the most visited national museums. (Photo: Soner Ateşoğulları)

Turkey: Archaeological Museums, Fig. 3 The Museum of Anatolian Civilizations, stemming from Atatürk's idea to establish a museum devoted to Hittite archaeology, later developed into a museum presenting the whole ancient civilizations in Turkey. (Photo: Soner Ateşoğulları)

the so-called Croesus Treasure are displayed in the museum.

The museum directorate in Van Province in Eastern Anatolia, the central town of which covers the Urartian capital Tushpa, was established in 1972 for display after decades of collecting and storage of artifacts under state control. A considerable number of museum directorates established close to ancient cities in Muğla, Aydın, and İzmir provinces provide for effective management of the Aegean heritage in Western Anatolia. Those directorates are responsible for numerous open-air museums just as the Nevşehir and Ürgüp museum directorates in Cappadocia, where many rock-cut churches and underground settlements are found.

The Hellenic and Roman past of Anatolia is present in almost all the archaeological museums in Turkey, but museums in the coastal provinces in the Mediterranean, Aegean, Marmara, and western Black Sea regions are exceptionally rich in this material; examples include Antalya, Adana, Mersin, Hatay, İzmir, Bursa, Kocaeli, Sinop, and Samsun museums. Several inland provinces that

Turkey: Archaeological Museums, Fig. 4 Three-storied Gaziantep Zeugma Mosaic Museum presents the rich collection of mosaics and other finds from the riverside Roman city of Zeugma

have the ruins of prosperous ancient cities like Sagalassos (Burdur), Hierapolis (Denizli), Zeugma (Gaziantep), Pessinus (Eskişehir), and Perre (Adıyaman) also have equally remarkable collections.

The museums in southeastern Anatolia (Diyarbakır, Kahramanmaraş, Elazığ, Şanlıurfa, Malatya, Mardin, Gaziantep), the region comprising a remarkable part of Mesopotamia, house rich Neolithic and Chalcolithic finds brought from numerous excavations in mounds, some of which shed light on the beginning of agriculture and the domestication of animals.

As a result of the careful and meticulous work during 1970s and 1980s, there has been an increase in the number and variety of museums. An Act of 1983 (Number 2863) allowed private museums to be established. Today, there are a total number of 364 museums, 190 of which are under jurisdiction of the Ministry and 174 of which are private museums audited by it, among which are some that have won international awards like European Museum of the Year Award. In addition to these, there are 130 open-air museums under jurisdiction of the Ministry. An increasing number of new museums are no longer alienating and cold spaces, but are structures that host conferences, seminars, social and cultural events, exhibitions, publications for the education, and advancement of the public.

New Archaeological Museums

The momentum that has been generated in the past decade has allowed the Ministry to restore over fifty museums and recently to construct several new ones including Gaziantep Zeugma Mosaic Museum (Fig. 4), the world's biggest mosaic museum (2011), Kırşehir Kaman Kalehöyük Archaeology Museum (2009) (the design and construction expenses of which were covered by the Japanese government), Sivas Museum (2009), Eskişehir Eti Archaeology Museum (2011), Aydın Museum (2012), and Tokat Archaeology and Ethnography Museum (2012).

Cross-References

- ► Cultural Heritage Management and Submerged Sites
- ► Hellenistic and Roman Anatolia, Archaeology of
- ► Regional/Site Museums
- ► Southeast Europe: Archaeological Museums

Further Reading

Atasoy, S. 1984. Türkiye'de Müzecilik. *Cumhuriyet Dönemi Türk Ansiklopedisi* 46: 1458–1471.

Başaran, C. 1996. Çağdaş Müzeciliğimiz. *Akademik Araştırmalar* 1: 16–18.

Eyİce, S. 1960. İstanbul Arkeoloji Müzelerinin İlk Müdürlerinden Dr. Ph. Anton Dethier Hakkında Notlar. *İstanbul Arkeloloji Müzeleri Yıllığı* IX: 45–52.
Eyİce, S. 1985. Arkeoloji Müzesi ve Kuruluşu. In *Tanzimat'tan Cumhuriyet'e Türkiye Ansiklopedisi*, 1596–1603. İstanbul: İletişim Yayınları.
Eyİce, S. 1990. Müzeciliğimizin Başlangıcı ve Türk-İslam Müzeleri. *Müze/Museum* 5–8, (Ed. İnci Bayburtluoğlu), 2–3, Temmuz 1989-Haziran 1990.
Gerçek, F. 1999. *Türk Müzeciliği*, Türk Tarih Kurumu Yayınları 1. Ankara: Baskı.
Mansel, A.M. 1960. Osman Hamdi Bey. *TTK Belleten* XXIV (94): 291–301.
Mumcu, A. 1969. Eski Eserler Hukuku ve Türkiye. *Ankara Üniversitesi Hukuk Fakültesi Dergisi* 3-4/XXVI, 1-2/XXVIII.
Ogan, A. 1947. Türk Müzeciliğinin Yüzüncü Yıldönümü. *T.T.O.K. Belleteni* 61: 8–19.
Ölçer, N. 2002. *Türk ve İslam Eserleri Müzesi*. İstanbul: Akbank Kültür ve Sanat Yayınları.
Ortaylİ, İ. 1985. Tanzimat'ta Vilayetlerde Eski Eser Taraması. In *Tanzimat'tan Cumhuriyet'e Türkiye Ansiklopedisi*, 1599–1600. İstanbul: İletişim Yayınları.
Pasİnlİ, A. 2002. *Türkiye Müzeleri*. T.C. Ankara: Kültür Bakanlığı Yayınları.
Su, K. 1965. *Osman Hamdi Bey'e Kadar Türk Müzesi*. İstanbul: ICOM Türkiye Milli Komitesi Yayınları.
Yücel, E. 1999. *Türkiye'de Müzecilik*. İstanbul: Arkeoloji ve Sanat Yayınları.

Turkey: Domestication

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The turkey (*Meleagris gallopavo*) is a member of the order Galliformes, which include chickens, guineas, peafowls, and other terrestrial birds. Within the family Meleagrididae, there is one living genus, *Meleagris*, with two living species: *Meleagris gallopavo*, the North American turkey (or common turkey), and *M. ocellata*, the smaller bodied and more brightly plumed ocellated turkey.

Five wild turkey subspecies currently occupy distinct territories in North and Central America (Fig. 1) (Dickson 1992; Schorger 1966): *M. g. silvestris* (Eastern wild turkey) inhabits the deciduous forest and oak savanna of the eastern half of the USA, *M. g. osceola* (Florida wild turkey) resides in evergreen and tropical areas of southern Florida, *M. g. intermedia* (Rio Grande wild turkey) ranges over the south central plains and northeastern Mexico, *M. g. merriami* (Merriam's wild turkey) ranges within the montane woodlands of the Southwest USA, and *M. g. mexicana* (Gould's wild turkey) occupies the pine-oak forests of Southern Arizona and New Mexico, and northwestern Mexico. A sixth subspecies, *M. g. gallopavo* (South Mexican wild turkey), which occupied south-central Mexico, is now thought to be extinct (Dickson 1992). The closely related ocellated turkey currently occupies Mexico's Yucatan Peninsula and parts of northern Belize and Guatemala.

The turkey represents only vertebrate domesticated within ancient North and Central America and played an important spiritual and secular role in precontact indigenous cultures of Mesoamerica and the American Southwest. Although the origins and timing of turkey domestication are still unclear, researchers are continuing to expand our understanding of turkey husbandry and domestication using a range of zooarchaeological, biomolecular, and ethnographic approaches (Thornton 2016). Current archaeological and genetic evidence suggests that the Mesoamerican turkey was locally domesticated from *M. g. gallopavo* populations within south-central Mexico. Sporadic evidence of turkey use in the central Mexican highlands, coupled with the human-mediated spread of turkeys outside of their natural range into Oaxaca, the Gulf coast Olmec area, and into the Yucatan suggests that turkeys were under some degree of human control by the first half of the Preclassic or Formative period (1800 BCE–250 CE) (Thornton et al. 2012; Thornton and Emery 2015). Intensification of turkey husbandry seems to have begun in the Classic and Postclassic periods (600–1500 CE), and from historical accounts, it is clear that turkeys were raised in large numbers at many Mexican sites for both food and tribute to local leaders (Schorger 1966). In spite of its early introduction, common turkeys were not widely raised by the ancient Maya until the Postclassic period (1000–1519 CE); here, domesticated common turkeys are identified alongside the local ocellated turkey (*M. ocellata*), although it is unclear the degree to which the latter

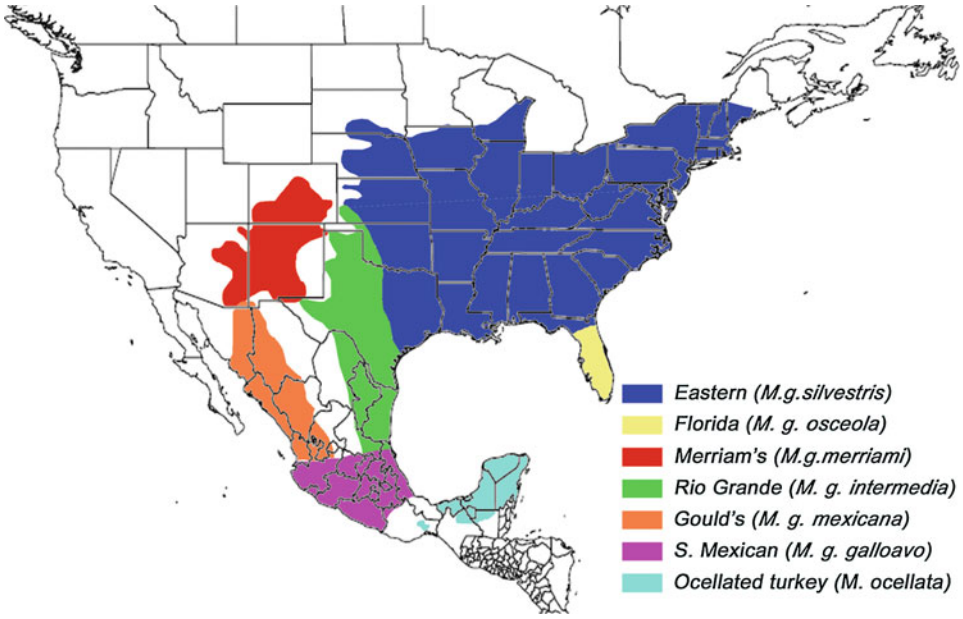

Turkey: Domestication, Fig. 1 Assumed original distribution of the wild turkey subspecies in North America (Based on Schorger 1966)

was managed through captive rearing or breeding. Turkeys were widely distributed within Central America by Columbian times, reaching Peru in the late 1400s, Ecuador around CE 1587, and Chile around CE 1650 (Crawford 1992).

The Southwest domestic turkey seems to have a separate origin from the Mesoamerican turkey. Previous hypotheses assumed that initial domestication either took place in situ (with *M. g. merriami* as the progenitor) or in Mesoamerica with subsequent dispersal of domestic turkeys into the Southwest (following the general pattern of cultigens like maize, squash, and beans). However, ancient and modern DNA analyses suggest that either the Eastern or Rio Grande wild turkeys (*M. g. silvestris* or *intermedia*) represent the wild progenitor of the Southwest domestic turkey, with previously domesticated stocks being introduced into the region by 200 BCE (Speller et al. 2010).

The Ancestral Pueblo, the subsistence horticulturalists of the Colorado Plateau, were the predominant exploiters of turkey in the region. The first concrete archaeological evidence for domestic stocks in the Southwest begins c. 200 BCE–CE 500, with the recovery of turkey coprolites from the site of Turkey Pen Ruin, UT, indicating that turkeys were being confined and raised within a human habitation (Munro 2006). During the Basketmaker phases (100 BCE–CE 750), evidence for turkey exploitation and husbandry is restricted to some loose feathers, feather blankets, a few turkey bones, and some complete desiccated bird, indicating that turkeys were prized more for their feathers rather than for their meat (Munro 2006). After CE 900, there is intensification in turkey husbandry, evidenced by greater quantities of turkey bones, as well as higher frequencies of butchery marks, suggesting that turkeys were playing a more important role as a food source, especially in the Northern San Juan region (Driver 2002). This pattern continues until the sixteenth century when the effects of disease and conflict associated with Spanish colonialism, as well as the introduction of sheep and chicken, all contributed to dramatic declines in local turkey husbandry during the eighteenth and nineteenth centuries, perhaps even resulting in the complete extirpation of the Southwest domestic turkey.

Modern domestic turkey breeds worldwide seem to be descended from the Mesoamerican

domestic turkey and not the Southwest domestic breed. Turkeys were transported from Mexico to Europe in the early sixteenth century, where they quickly spread across the continent. Over the following centuries, several varieties were developed in Europe and subsequently imported to the US Atlantic Seaboard in the eighteenth century. Hybridizations between the European domesticates and the wild turkeys were widespread with heterosis producing much larger and more vigorous animals (Crawford 1992). These hybrid varieties eventually become the forerunner to the Narragansett, Slate, and Bronze turkeys of today (Marsden 1971). Most heritage breeds developed in Europe (e.g., Norfolk Black, Cambridgeshire Bronze, White Austrian, Buff, Blue, and Ronquieres) are smaller than North American wild turkeys, while those raised commercially for consumption (e.g., Broad-Breasted Bronze and Broad-Breasted White) tend to be larger (Marsden 1971). In general, turkeys raised for meat have white plumage; are top-heavy, with hypertrophied breasts and thighs; and reach sexual maturity faster than wild turkeys. Since the 1940s, turkeys have been under intense selection for weight, conformation, and an ability to be raised efficiently in confinement, resulting in an overall decline in reproductive abilities and fitness and a reduction in genetic variability.

Cross-References

- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Southwest United States and Northwestern Mexico: Geography and Culture
- ▶ Tenochtitlan (Aztec): Geography and Culture

References

Crawford, R.D. 1992. Introduction to Europe and the diffusion of domesticated turkeys from the Americas. *Archivos de Zootecnia* 41: 307–314.

Dickson, J.G., ed. 1992. *The wild turkey: Biology and management*. Harrisburg: Stackpole Books.

Driver, J.C. 2002. Faunal variation and change in the Northern San Juan region. In *Seeking the center place: Archaeology and ancient communities in the Mesa Verde region*, ed. M.D. Varien and R.H. Wilshusen, 143–160. Salt Lake City: The University of Utah Press.

Marsden, S.J. 1971. *Turkey production, agriculture handbook no. 393*. Washington, DC: Agriculture Research Service, United States Department of Agriculture.

Munro, N.D. 2006. The role of turkey in the Southwest. In *Handbook of North American Indians, volume 3: Environment, origins and populations*, ed. W.-C. Sturtevant, 463–469. Washington, DC: Smithsonian Institution.

Schorger, A.W. 1966. *The wild turkey: Its history and domestication*. Norman: University of Oklahoma Press.

Speller, C.F., B.M. Kemp, S.D. Wyatt, C. Monroe, W.D. Lipe, U.M. Arndt, and D.Y. Yang. 2010. Ancient mitochondrial DNA analysis reveals complexity of indigenous North American turkey domestication. *Proceedings of the National Academy of Sciences* 107: 2807–2812.

Thornton, E.K. 2016. Introduction to the special issue – Turkey husbandry and domestication: Recent scientific advances. *Journal of Archaeological Science: Reports* 10: 514–519.

Thornton, E.K., and K.F. Emery. 2015. The uncertain origins of Mesoamerican turkey domestication. *Journal of Archaeological Method and Theory* 24 (2): 328–351.

Thornton, E.K., K.F. Emery, D.W. Steadman, C. Speller, R. Matheny, et al. 2012. Earliest Mexican Turkeys (*Meleagris gallopavo*) in the Maya region: Implications for pre-hispanic animal trade and the timing of turkey domestication. *PLoS One* 7 (8): e42630. https://doi.org/10.1371/journal.pone.0042630.

Further Reading

Breitburg, E. 1993. The evolution of turkey domestication in the greater Southwest and Mesoamerica. In *Culture and contact: Charles C. Di Pesoâ€™s Gran Chichimeca*, ed. A.I. Woosley and J.C. Ravesloot, 153–172. Albuquerque: The University of New Mexico Press.

Marsden, S.J., and J.H. Martin. 1946. *Turkey management*. 4th ed. Danville: The Interstate.

McKusick, C.R. 2001. Southwest birds of sacrifice. *The Arizona Archaeologist* 31: 1–198.

Thornton, E., K.F. Emery, and C. Speller. 2016. Ancient Maya turkey husbandry: Testing theories through stable isotope analysis. *Journal of Archaeological Science: Reports* 10: 584–595.

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Douglas H. Ubelaker is Curator in the Division of Physical Anthropology at the National Museum of Natural History, Smithsonian Institution in Washington DC. He received his B.A. with honors and his Ph.D. at the University of Kansas in 1968 and 1973, respectively. Dr. Ubelaker has served as a consultant in forensic anthropology to the FBI from 1978 to 2013 and has testified as an expert witness in numerous trials and hearings. Dr. Ubelaker has consulted in over 960 cases involving human skeletal remains since 1976. He holds the position of Adjunct Professorial Lecturer in the Department of Anatomy and the Department of Anthropology at The George Washington University in Washington DC and Adjunct Professor in the Department of Anthropology at Michigan State University in East Lansing, Michigan.

Dr. Ubelaker is a member of the American Academy of Forensic Sciences (AAFS) and became a Fellow of the Academy in the Physical Anthropology Division in 1987. He has served as President of the Academy two times, from 1995–1998 and 2010–2012. Dr. Ubelaker became a diplomate of the American Board of Forensic Anthropology in 1979. He established the AAFS Humanitarian and Human Rights Resource Center in 2015 and currently serves as its Chair. He is a member of the American Association of Physical Anthropologists, The Paleopathology Association, The Society of American Archaeology, Sigma Xi, the International Academy of Legal Medicine in the Forensic Anthropology Society of Europe Section and is a Fellow of the American Association for the Advancement of Science and the Washington Academy of Sciences. Dr. Ubelaker is also a member of the Ellis R. Kerley Forensic Sciences Foundation Board of Directors.

Dr. Ubelaker has published extensively in skeletal biology, with hundreds of publications since 1966, particularly in the areas of New World bioarchaeology and methods and techniques in forensic anthropology. He has served on the editorial boards of many publications including the Journal of Forensic Sciences, Forensic Science Communications, Homo: Journal of Comparative Human Biology, Anthropologie: International Journal of the Science of Man, Human Evolution, the International Journal of Anthropology, Global Bioethics, and Revista Española de Antropología Física.

Dr. Ubelaker has received numerus national and international honors; he was the recipient of the Memorial Medal of Dr. Ales Hrdlicka, Humpolec, Czech Republic in 1999, the Anthropology Award of the Washington Academy of Sciences in 2000, the T. Dale Stewart Award by the Physical Anthropology Section of the

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American Academy of Forensic Sciences in 2001, the FBI Director's Award for Exceptional Public Service in 2002, the Federal Highway Administration Pennsylvania Division Historic Preservation Excellence Award in 2003, a special recognition award by the FBI in 2004, he was elected Miembro Honorario of the Sociedad de Odontoestomatólogos Forenses Ibero Americanos in 2009, he was the recipient of the Hong Kong Forensic Foundation Award in 2014 and was elected Doctor (Honoris Causa) by the University of Cordoba, Argentina in 2015.

Ucko, Peter (Cultural Heritage Management)

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Basic Biographical Information

Peter John Ucko was one of the most influential archaeologists of his generation. He played a decisive role in the transformation of the discipline and the recognition that the past is profoundly political. During his career he challenged the way we understand and engage with cultural heritage, raising fundamental questions about ownership, identity, authenticity, and the role of the past in the present. He is perhaps most widely known for his role in the creation and development of the World Archaeological Congress, but the antipathy to racism and social injustice that informed this was an important strand throughout his entire career.

Peter was born in 1938 to intellectual Jewish emigrants from Germany. He was educated at Bryanston School in Dorset and North West London Polytechnic, before taking a degree in anthropology at University College London (1956–1959). He had been fascinated by Egyptian artifacts as a boy and took courses with a strong archaeological bias, subsequently staying on to complete a Ph.D. on Egyptian figurines in 1962. For the next 10 years he remained at UCL lecturing in anthropology. During this phase in his career, Peter's research focused on material culture studies, and he produced a number of brilliant and original pieces of work, including a comparative study of penis sheaths and his work on Paleolithic cave art with his then partner, Andrée Rosenfeld. Peter's intense, thorough, and questioning stance was already apparent, and he developed a profound understanding of cultural diversity. His legendary organizational and editorial talents were also evident in the two influential conferences he organized and published, *The Domestication and Exploitation of Plants and Animals* and *Man, Settlement and Urbanism*. However, it was his subsequent experience in Australia that crystallized a strong interest in the role of archaeology and anthropology in wider society.

Major Accomplishments

In 1972, Peter was appointed Principal of the Australian Institute of Aboriginal Studies, which proved an important radicalizing moment in his life. On arrival he found the institute was dominated by White people and preoccupied almost

entirely with recording the remnants of what was then perceived as a dying "race." Recognizing that the situation was untenable, Peter responded to increasing Aboriginal activism by transforming the internal structures of the institute and bringing in Aboriginal representatives. He also refocused its research culture on contemporary practical and political issues, in particular Aboriginal land claims. Today such matters might seem self-evident, but in the 1970s they marked the start of a seismic shift in the power relations between indigenous people and the predominantly White scholars who studied them (Ucko 1983). For Peter personally, the experience was to have a profound impact leading to a lifelong concern with the archaeology of indigenous societies and the impact of neocolonial relationships on the conservation, management, and interpretation of cultural heritage (Figs. 1 and 2).

In 1981, Peter returned to England with the anthropologist Jane Hubert, who became his long-term partner. She was an important influence on his subsequent career and a source of unswerving support in face of subsequent challenges. Peter was appointed Professor of Archaeology at the University of Southampton, but while waiting to take up the post, he worked briefly as a consultant on heritage to the newly independent government of Zimbabwe. There he proposed community-led "culture houses" that would be at the heart of community life (Ucko 1994), as an alternative to European-style museums. That same year, he was also asked to organize and host the 11th Congress of the International Union of Pre- and Protohistoric Sciences at the University of Southampton, which was scheduled for 1986. After some deliberation, he accepted, recognizing that it provided an opportunity to further a comparative and genuinely world archaeology that would include scholars from developing countries and indigenous peoples (Ucko 1987). With characteristic energy and determination, he set about realizing this vision, only to find the whole endeavor threatened by the growing crisis surrounding the South African apartheid regime. By 1984, it became clear that there was growing pressure for an academic boycott of South African scholars in protest at the racist policies of the apartheid government. Furthermore, if the South Africans attended, many of the organizations and individuals whom Peter had worked so hard to include would withdraw from the congress. Under immense pressure and with staunch support from Jane, Peter eventually decided to exclude the South Africans, leading to international outcry over the principle of academic freedom that would split the archaeological world for some time. The International Union withdrew its recognition and support, but a new committee was formed in early 1986 and the first World Archaeological Congress (WAC) took place later that year.

Ucko, Peter (Cultural Heritage Management), Fig. 1 Peter as Principal of The Australian Institute of Aboriginal Studies in the early 1970s. (Photo: Jane Hubert)

The congress was an enormous success with over 1,000 delegates from around the world, including indigenous speakers. It also marked a turning point in the history of archaeology, in the form of what Stephen Shennan (2007) called a very public loss of political innocence. The publications that ensued under the *One World Archaeology Series* represented a phenomenal

Ucko, Peter (Cultural Heritage Management), Fig. 2 Peter with Alex Okpoko and Thurstan Shaw in Nigeria in 1989. (Photo: Jane Hubert)

achievement (Wheatcroft 2007). Subject to Peter's keen editorial eye, as overarching Series Editor, they are a lasting testament to his vision of a comparative, inclusive, and politically engaged world archaeology. Among the many thematic titles, there are several that pertain to cultural heritage and which became seminal works. While not disregarding the work of individual editors and contributors, these works are ultimately a product of Peter's energy and foresight (e.g., Layton 1989a, b; Shennan 1989; Gathercole and Lowenthal 1990; Stone and Mackenzie 1990).

Peter remained committed to this vision for the rest of his academic career, leading the way with many new and often controversial developments in the realm of public archaeology and heritage. One area of note from the late 1980s onwards was his concern with the treatment of the dead, an issue of particular concern to many indigenous peoples. Here Peter collaborated very closely with Jane Hubert while also promoting doctoral and postdoctoral research on human remains collections. In 1989, WAC adopted the Vermillion Accord at an Inter-Congress in South Dakota, USA, making it the first organization to recognize the rights of local communities, descendants, or guardians alongside respect for scientific research in relation to human remains. Other areas that benefitted from Peter's penetrating questions and characteristic tenacity include archaeology and education; the archaeology of ethnicity; the history of the discipline, heritage legislation, and management; the treatment of sacred sites and places; the presentation of the past; and more broadly the sphere of public archaeology.

In 1996, Peter was appointed Director of the Institute of Archaeology at University College London. He set about transforming it into a leading international center of excellence in archaeology and inserted the contemporary significance of the past into almost every corner of the institution. New programs in cultural heritage and public archaeology were launched, and along with Neal Ascherson, Peter initiated the first journal dedicated to the ethics and politics of the profession, *Public Archaeology*. He returned to his early interest in Egyptian archaeology, acting as series editor for an eight-volume set, *Encounters With Ancient Egypt*, which included his own volume focusing on how Egyptian heritage has been represented and valued (Ucko and Champion 2003; also Ucko and Quirke 2006). He also built new international arenas of collaboration, particularly with the School of Archaeology and Museology at Peking University, and a joint *International Centre for Chinese Heritage and Archaeology* was founded. During this period, Peter also found time to return to his own research, publishing on a wide range of topics mostly in the realm of cultural heritage and

public archaeology. The same themes can be found including indigenous archaeology, repatriation, museum collections, the role of heritage in constructing ethnicity, and ethics of tourist presentations (e.g., Ucko 1998, 2000, 2001; Ucko and Layton 1999; Ucko et al. 2006).

Following his retirement in 2005, the Institute of Archaeology, in collaboration with WAC, organized a conference and edited book inspired by his work, both fittingly titled *A Future for Archaeology: the Past in the Present* (Layton et al. 2006). His untimely death in 2007 was an enormous loss to the discipline and the many people whose lives he had touched throughout his career. His legacy is the realization of his vision of archaeology as a discipline that is socially and politically engaged and in which archaeological heritage management is just one aspect of an all-encompassing public archaeology. Aside from his own research, he inspired and mobilized others, fashioned enormously ambitious and successful conferences and book series, and restructured the discipline of archaeology to make it more accessible to non-professionals with an interest in the past, particularly indigenous peoples. Very few would have had the force of personality, charisma, insight, and energy necessary to bring about such a lasting transformation.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Contemporary Past, Archaeology of the
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Human Remains in Museums
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives

References

Gathercole, P.W., and D. Lowenthal. 1990. *The politics of the past*. London: Routledge.

Layton, R., ed. 1989a. *Who needs the past? Indigenous values and archaeology*. London: Unwin Hyman.

Layton, R., ed. 1989b. *Conflict in the archaeology of living traditions*. London: Unwin Hyman.

Layton, R., S.J. Shennan, and P. Stone, eds. 2006. *A future for archaeology: The past in the present*. London: UCL Press.

Shennan, S.J., ed. 1989. *Archaeological approaches to cultural identity*. London: Unwin Hyman.

Shennan, S.J. 2007. Obituary: Peter Ucko. *The Guardian*, 9 July 2008, p. 34.

Stone, P., and R. MacKenzie, eds. 1990. *The excluded past: Archaeology in education*. London: Unwin Hyman.

Ucko, P.J. 1983. Australian academic archaeology: Aboriginal transformations of its aims and practices. *Australian Archaeology* 16: 11–26.

Ucko, P.J. 1987. *Academic freedom and apartheid: The story of the World Archaeological Congress*. London: Duckworth.

Ucko, P.J. 1994. Museums and sites: Cultures of the past within education-Zimbabwe, some ten years on. In *The presented past: Heritage, museums and education*, ed. P. Stone and B. Molyneux, 237–282. London: Routledge.

Ucko, P.J. 1998. The biography of a collection: The Sir Flinders Petrie Palestinian Collection and the role of university museums. *Museum Management and Curatorship* 17 (4): 351–399.

Ucko, P.J. 2000. Enlivening a 'dead' past. *Conservation and Management of Archaeological Sites* 4: 67–92.

Ucko, P.J. 2001. 'Heritage' and 'Indigenous Peoples' in the 21st century. *Public Archaeology* 4: 227–238.

Ucko, P.J., and T.C. Champion, eds. 2003. *Wisdom of Egypt: Changing visions through the ages*. London: UCL Press.

Ucko, P.J., and R. Layton, eds. 1999. *The archaeology and anthropology of landscape: Shaping your landscape*. London: Routledge.

Ucko, P.J., and S. Quirke. 2006. Living symbols of ancient Egypt: Introduction. *Public Archaeology* 5 (1): 5–14.

Ucko, P.J., S.Q. Quirke, and D. Sully. 2006. The past in the present and future: Concluding thoughts. *Public Archaeology* 5 (1): 58–72.

Wheatcroft, A. 2007. Letter: Peter Ucko. *The Guardian*, 25 July 2007.

Ucko, Peter (Indigenous Archaeology)

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Basic Biographical Information

Peter Ucko (1938–2007) was one of the most influential archaeologists of the second half of the twentieth century. He rejected the claim that

archaeology was an "objective science" and emphasized its subjective, frequently political; nature, stressing the central role of those affected by the past and in particular indigenous peoples.

A childhood fascination with Egyptology led Peter Ucko to undergraduate study in anthropology (the only way he could study Egyptology) in London followed by a Ph.D. on prehistoric figurines at the Institute of Archaeology. In 1962 he returned to the UCL anthropology department to teach material culture and later a course on "Primitive Art" that was the basis of the seminal *Paleolithic Cave Art* (Ucko and Rosenfeld 1967). Ucko's move from Egyptology, to anthropology, to the Institute, and back to anthropology foreshadowed his lifelong multidisciplinary approach to the study of the past, as one inextricably mixed-up with an understanding of the present.

Major Accomplishments

The discrepancies between the incomplete and unclear figures represented in the actual Paleolithic art in French caves and the very clear, precise reconstructions of the same art published by Breuil, led Ucko to carry out his own project – at the Spanish cave of Hornos de la Peña (1971–1973). Ucko found the lack of knowledge of the cultural context of Paleolithic art incredibly frustrating, and he began to study more recent hunter-gatherer rock art. This led him to accept the post of Principal of the Institute of Aboriginal Studies in Australia, an appointment that was a major catalyst for a change in the way archaeologists and anthropologists studied Aboriginal society. When Ucko arrived the Institute was a totally white, semigovernmental organization tasked with recording the languages and customs of Aboriginal people before they became extinct. However, Ucko was quickly confronted by active Aboriginal communities who had very strong views on the interpretation by western-trained "objective" scientists of the art that was still very much part of their social structure. Ucko left Australia after nearly a decade of working with Aboriginal people over the interpretation, management, and control of their art and, more fundamentally, of their past, and their present and future role in Australian society. That he was succeeded by an Aboriginal as Principal is a testimony to the astonishing change overseen by Ucko.

Ucko returned to the UK via the newly independent Zimbabwe where he was asked to advise the government on the reorganization of the museum service. Ucko's report recommended the development of 56 culture houses – an approach he had seen in practice in Papua New Guinea – effectively returning the heritage to the control of local communities. This was rejected and the colonial system of five regional museums retained: while unstated, the potentially unifying ideal of a homogeneous past presented through a group of nationally controlled museums was far preferable to the new government to the decentralizing of interpretation and loss of control to local communities.

In 1981 Ucko became Professor of Archaeology at the University of Southampton. He immediately instigated a revision of the traditional archaeological curriculum – introducing anthropology and sending key staff on sabbaticals to the USA, Australia, and the Cameroon. He also headed a national review of archaeology at university that advocated focussing teaching at a few big departments that could offer the wide-ranging world archaeology that he saw as the basis of a valid and stimulating study of the past that was of relevance to the present and future. As in Zimbabwe, his plan was rejected but had instigated a debate concerning the content and role of archaeology that continues to resonate. In accepting that archaeology at university would be the preserve of a tiny percentage of the population and noting the increasingly inward looking school history curriculum of the Thatcher government, Ucko also created a small team to provide support, and to develop educational resources, for teachers.

It was while at Southampton that the above strands came together in Ucko's greatest contribution to the discipline: the creation of the World Archaeological Congress (WAC). Ucko originally declined the invitation to organize the 11th

congress of UNESCO's International Union of Prehistoric and Protohistoric Sciences (IUSPP) but eventually agreed on the condition that anyone with a legitimate interest in the past, and not just academic scholars, would be allowed to participate and that funding would be found to enable those from poorer parts of the world to attend. Ucko planned a meeting that was to be academically robust and socially relevant. However, it was a meeting not without controversy as wider political events conspired to demand that WAC either allow colleagues from South Africa to participate or lose the contributions of many others from around the world who would refuse to attend if South Africans were present. It was an astonishingly difficult decision, but the overt and extreme manipulation of the past within schools to serve the political ends of a tiny white majority, coupled with the almost complete lack of access to education for the majority, set within the wider extremes of the abhorrent apartheid regime compelled the organizers, led by Ucko, to ban South African participation. This one act of exclusion opened discussion of the archaeological past to disparate groups from all over the world in an unprecedented way. At the end of the 1986 Congress, participants demanded that the organizers either come to reconciliation with IUSPP or create a new world organization. Reconciliation was impossible as IUSPP clung to an ideal of academic freedom, and Ucko turned his efforts from organizing a one-off conference to the creation of a world organization. It was little surprise that the next meeting of WAC focussed on the archaeological treatment of human remains nor that it was organized by archaeologists in cooperation with the elders at the Indian reservation at Wounded Knee.

In 1996 Ucko became Director of the Institute of Archaeology in London. He once again immediately set about a review of the curriculum and, with significantly more resources than had been available in Southampton, set about making the Institute an international hub of archaeology. He retired in 2005 and was still working on a variety of projects, including a major collaboration with China, on his untimely death in 2007.

Cross-References

- ▶ Andah, Bassey Wai
- ▶ Archaeology and Politics
- ▶ Archaeology as Anthropology
- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Australian Rock Art
- ▶ Contemporary Past, Archaeology of the
- ▶ Heritage and Higher Education
- ▶ Ucko, Peter (Cultural Heritage Management)
- ▶ World Archaeological Congress (WAC)

References

Ucko, P., and A. Rosenfeld. 1967. *Palaeolithic cave art*. London: Weidenfeld and Nicolson.

Further Reading

Ucko, P. 1987. *Academic freedom and apartheid: The story of the World Archaeological Congress*. London: Duckworth.

Ucko, P. 1994. Museums and sites: Cultures of the past within education – Zimbabwe some ten years on. In *The presented past: Heritage, museums and education*, ed. P.G. Stone and B. Molyneux, 237–282. London: Routledge.

Uhle, Friedrich Max

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Basic Biographical Information

Friedrich Max Uhle (1856–1944) (Fig. 1) was born on March 23, 1856, in Dresden (Sachsen) in Northern Germany. Because of his pioneer huge contribution to the Andean archaeology, he is considered by some archaeologists as the "father of the Peruvian archaeology (Hoeflein 2002; Kaulicke 1998)."

After his dissertation in linguistic in Leipzig, he met for the very first time Peru when working

Uhle, Friedrich Max, Fig. 1 Max Uhle (Photo: Ibero-Amerikanisches Institut – Preußischer Kulturbesitz, with permission)

as an assistant in the Royal Museum of Zoology, Anthropology, and Ethnography of Dresden. Next he moved to Berlin and therefore was able to study and examine the recent excavated remains from Ancón by Wilhelm Reiss and Alphons Stübel. This last scholar and the eminent ethnologist Adolph Bastian supported Uhle's endeavor to travel to the Andes.

Uhle arrived in South America in 1892 and 3 years later was hired by the University of California to form a collection of ancient Peruvian remains. In 1896 he traveled to Lima to gather archaeological remains from Ancón and the following year conducted excavations in the Pachacamac Ruins. The final report of this field research published in 1903 is considered by a number of archaeologists the very first scientific archaeological report in the history of Peru, especially because of its brilliant stratigraphical and contextual lessons, virtual basic notions ever in archaeology. Uhle's archaeological scientific pioneer contribution was previously recognized by his book on the Tiwanaku culture in Bolivia (1892).

On the rise of the twentieth century, Uhle undertook surveys in a number of valleys of the central and northern coast of Peru. Some years later, he conducted fieldwork in the Peruvian Highland. By that time span, he became director of the Museum of Archaeology of Peru. Between 1911 and 1919, he addressed to the Chilean archaeology publishing seminal papers on the archaeology of this country. Uhle also gathered archaeological remains to form the National Museum of Ethnology and Anthropology. Further, upon invitation of Jijón y Caamaño, he went to Ecuador where he also conducted excavations and surveys until 1932 discovering new cultures and contributing to the Andean past.

In 1933 he came back to Germany and held lessons as professor at the University of Berlin. Max Uhle finally in 1944 passed away in Loben, Alemania, muy cerca de la frontera con Polonia (Rowe 1954).

Major Accomplishments

Max Uhle contributed as a pioneer in Andean archaeology. Among his most transcendental contributions, we can mention:

Proposing and establishing the very earliest chronological frame to the Andean pre-Columbian times

Applying the basic principles of modern archaeology, namely, stratigraphy and contexts, in the Andean archaeology

Introducing the "Horizon concept" in the Andean archaeology to fusion similar cultural traits throughout the Andes

Publishing the very first complete archaeological reports based on his excavations in key *gisements* of the Andes, Pachacamac, and Tiwanaku

Applying a vast interdisciplinary study in his archaeological researches including geology, relative chronology, paleoclimate, ethnology, linguistic, and even archaeoastronomy

Assessing within a real concept some key past activities of the Andean people as ritual graves and "beyond dead" (this also implies the relevant importance of sanctuaries in the past Andes)
Promoting preservation and defense of the Andean archaeological heritage

Cross-References

- ▶ Bird, Junius
- ▶ Bonavia, Duccio
- ▶ Lumbreras, Luis Guillermo
- ▶ Pickersgill, Barbara
- ▶ Silverman, Helaine

References

Hoeflein, M. 2002. *Leben und Werk Max Uhles*, Ibero Bibliographien 1. Berlin: Iberoamerikanisches Institut. Preussischer Kulturbesitz.

Kaulicke, P. 1998. *Max Uhle y el Antiguo Peru*. Lima: Fondo Editorial de la Pontificia Universidad Católica del Perú.

Rowe, J.H. 1954. *Max Uhle, 1856–1944. A memoir of the father of Peruvian archaeology*, University of California Publications in American Archaeology and Ethnology 46(1). Berkeley: University of California Press.

uKhahlamba-Drakensberg Park (South Africa), Rock Art at

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Introduction

The study of rock art in southern Africa dates back to the early eighteenth century when rock art was first "discovered" and reported by early travellers (Mitchell 2002; Rust 2008). The Portuguese are credited with having made this first "discovery" in what was then known as the Portuguese East Africa (then a Portuguese colony and now Mozambique). It took another three decades before the same "discovery" could be repeated along the Fish River by an exploratory expedition under the leadership of Ensign August Frederic Beutler (Bahn 1998). These early "discoveries" were viewed within the political lenses of the time which put the "natives" at the bottom end of the human scale (see Anderson 1888, 1907; Arbousset and Daumas 1846; Bryant 1929; Dart 1925; Ellenberger 1912; Ergates 1905; Evans 1911; Fry 1910; Howard 1910; Moodie 1855; Moszeik 1910; Orpen 1874; Stanford 1910; Stow 1905). Since these early "discoveries," we have come to learn a lot about the identity of the authors behind this rock art and the reasons behind their existence. In this entry, I discuss rock art from the uKhahlamba Drakensberg Park (Fig. 1). I begin by offering a broad background before discussing rock art from this region in details. I conclude the entry by presenting some of the areas where visitors can have an opportunity to see these aesthetically pleasing images within the uKhahlamba Drakensberg Park.

Background

The uKhahlamba Drakensberg is the highest mountain range in southern Africa, rising to about 3000 m or more in places (Dodds 1975). uKhahlamba Drakensberg Park covers a land mass of about 242,813 ha. This landscape is characterized by majestic mountains with rock art that makes it the richly painted area south of the Sahara desert. Furthermore, uKhahlamba Drakensberg Park is one of the areas with the highest density of prehistoric rock art in the world, with an estimated 40,000 individual images in over 600 known sites, making up 35% of all of South Africa's San rock art sites (Derwent et al. 2001). This mountain range, the highest south of Kilimanjaro, is among the comprehensively researched areas in Southern Africa (Willcox 1956, 1963a, b, 1976, 1984; Rudner and Rudner 1970; Pager 1975; Lewis-Williams 1974; Vinnicombe 1976; Wright and Mazel 2007). Research over the years has shown that

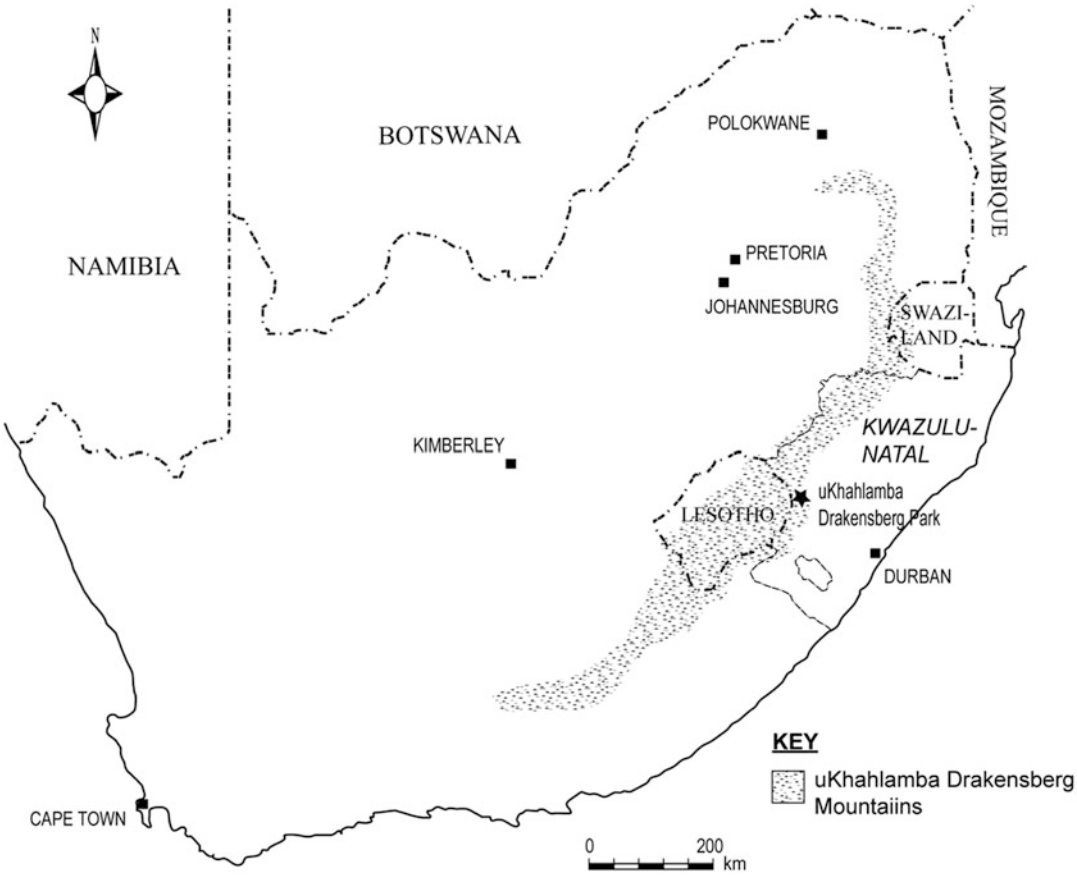

uKhahlamba-Drakensberg Park (South Africa), Rock Art at, Fig. 1 The location of uKhahlamba Drakensberg Park (indicated with a star) within the KwaZulu-Natal Province. The dots indicate the general extend of the Drakensberg mountains

Bushmen were authors of the paintings in the uKhahlamba Drakensberg Park. Estimations are that they began making this rock art in the uKhahlamba Drakensberg Park as early as 3000 BP, continuing until the twentieth century (Vinnicombe 1976; Mazel and Watchman 2003; Wright and Mazel 2007; Mazel 1982, 2009a, b). Archaeological evidence has suggested that hunter-gatherers began occupying the uKhahlamba Drakensberg Park around 5000 years ago (Mazel 1984, 1989, 2011). Many interpretations of this art have been provided over the years, largely informed by outsiders view on this rock art tradition. Particularly in the past five decades, research has shown that these paintings do not necessarily represent the daily life of Bushmen; instead, they reflect the complex spiritual life of the Bushmen (see Vinnicombe 1976; Lewis-Williams 1977, 1981, 1983, 1990; Pearse 1989; Deacon and Deacon 1999; Mguni 2002).

uKhahlamba Drakensberg Park was the second site to be accorded the universal status of significance, getting inscribed into the World Heritage List. The uKhahlamba Drakensberg Park was inscribed into the World Heritage Site list partly because of its well-known rock art. This followed South Africa's ratification of the World Heritage Convention in 1997 following the formal end of apartheid. It was during the 24th session of the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Committee on 29 November 2000 at Cairns in Australia that the uKhahlamba Drakensberg Park was so recognized for its natural and cultural

values (Derwent et al. 2001; Wright and Mazel 2007). The inscription was made under cultural criteria (i, iii) and natural criteria (vii, x), thus becoming the 23rd mixed World Heritage Site. Notably, the area proposed for inscription excluded the communally owned land to the north. The un-inscribed portion of the uKhahlamba Drakensberg Park is an area belonging to the amaNgwane and amaZizi Traditional Councils. This area lies between the northern and southern sections of the Park. The nomination of uKhahlamba Drakensberg Park was in line with the goals to rejuvenate the economy as set by the South African government in the White Paper on tourism gazetted in 1996. Therefore, having sites declared as World Heritage Sites was seen as an investment towards achieving that aspiration (Ndlovu 2005).

Since this inscription approved in 2000, the boundary of the World Heritage Site has since been amended. This decision was made during the 37th session held from 16–27 June 2013 at Phnom Penh in Cambodia. As a result, Sehlabathebe National Park in Lesotho has now been added to the uKhahlamba Drakensberg Park on the basis of criteria (i), (iii), (vii), and (x). The new, enlarged World Heritage Site is now known as Maloti-Drakensberg Park, Lesotho/South Africa.

Rock Art in the uKhahlamba Drakensberg Park

There is a significant variety in the motifs painted within the uKhahlamba Drakensberg Park. As in other parts of South Africa, there is a significant dominance of human figures followed by animal representations. For example, Vinnicombe (1976) recorded 150 sites in the southern uKhahlamba Drakensberg Park and surrounding areas where she identified 8478 paintings, of which 3606 were paintings of animals. Based on faunal analysis, it has been argued that the choices of animals in rock art has no relationship with their significance for subsistence purposes. Instead, animal representation relates more closely to Bushmen social practice and religious beliefs (Lewis-Williams 1972, 1974, 1981; Vinnicombe 1976; Chaloupka 1984; Flood 1989; Kinsey 1989; Waite 1989: 339; Mazel 1989; Lenssen-Erz 1994: 276; Rice and Paterson 1996; Deacon and Deacon 1999).

Representation of Human Figures

Human figures dominate in the uKhahlamba Drakensberg rock art. It is male figures that are best represented compared to women, who are easily identifiable by typical female features. These human figures are represented in a variety of scenes, involved in different activities from battle, hunting, to ritual events.

The context in which human figures are represented in hunting scenes once promoted a view that rock art was made as part of the so-called hunting magic. It was mainly through rock art conducted by Pager (1971, 1975) in the Didima Gorge that this theoretical interpretation was disproved. Didima Gorge has 17 recorded rock art shelters, composed of about 3909 paintings. Of these paintings, only 29 are hunting scenes. Their almost absence in rock art clearly challenges the thinking that people painted themselves in hunting scenes with the hope of being successful in a real hunt.

Besides hunting scenes, human elements have also been incorporated into representations commonly known as therianthropes. These are motifs that combine human and nonhuman features (Jolly 2002: 85). According to Jolly (2002: 86), "Antelope heads, torsos, legs, hooves, tails and postures may all be combined in different ways with humanheads, torsos, limbs, hands, feet and postures." There are also the so-called winged therianthropes, which have also been termed flying buck. As mentioned by Jolly (2002: 86), these types of therianthropes have "wing-like appendages or hold their arms in a wing-like position. These usually combine antelope features with those of humans and birds" (see also Lee and Woodhouse 1964; Pager 1971, 1975; Lewis-Williams 1981, 2003). The idea behind therianthropes is that when shamans went into trance, they got transformed. Generally, these motifs are not widely represented in

South African rock art. For example, of all the paintings recorded by Pager (1971) in Didima Gorge, only 4% were representative of therianthropes. The same percentage was recorded by Lewis-Williams (1981) in Barkly East. Vinnicombe (1976) recorded only 3% of therianthropes in her research study in the uKhahlamba Drakensberg.

uKhahlamba Drakensberg rock art has also been defined by a number of human figures involved in raiding scenes. This rock art was most probably produced during the contact period, during which other groups (African farmers about 2000 years ago, Voortrekkers in 1837, and the English in 1845) came to reside in the uKhahlamba Drakensberg (Pager 1971; Liebenberg 1972; Willcox 1976; Guest 1978; Wright and Mason 1983: 29; Willcox 1984: 9; Pearse 1989; Anderson and Wahl 1998). It has been argued that these arriving new communities significantly increased the competition for resources, thus impacting on the livelihood of Bushmen groups in the area. This saw the beginning of cattle and horse raiding conducted by the Bushmen in order to survive (Liebenberg 1972: 16; Willcox 1976, 1984; Anderson and Wahl 1998; Spencer 1999; Speirs 1999). The raiding worsened between 1840 and 1872 (Ergates 1905; Wright 1971; Vinnicombe 1976; Dowson 1995). During this period, there were three periods of raids: 1845–1852, 1856–1860, and 1868–1872 (Wright 1971; Mazel 1981). Bushmen were confronted with violent scenes (Campbell 1986). Evidence from the Southern uKhahlamba Drakensberg, for example, shows rock paintings depicting European and Nguni-speaking settlers on horseback and scenes of cattle raiding (Vinnicombe 1976; Johnson 1960; Campbell 1986; Lewis-Williams and Dowson 1989; Dowson 1994; Challis 2008, 2009, 2012). It can be very easy to read these rock art images historically. However, rock art researchers have argued that there was a deeper meaning behind these paintings rather than them being reservoirs of historical events in the areas where they were represented (see Hampson 2014). According to Hampson (2014), the depiction of Europeans and other agriculturalists should be interpreted as Bushmen negotiating power with these settles in the spirit world.

Animal Representation

There are a number of animal species represented in the uKhahlamba Drakensberg. Among these animals, eland are quantitatively the most dominant. There are over 2000 painted eland within the uKhahlamba Drakensberg Park. This quantitive dominance is followed by about 1000 painted rhebuck (Mazel's uKhahlamba Drakensberg Park rock art recording project from 1979 to 1981). As can be deduced, eland have about 50% numerical dominance over the second most painted animal species. This illustrates the significant dominance eland has in rock art from this region. This dominance is not consistent. The paintings of rhebuck at the Royal Natal Nature Reserve (RNNR) in the northern uKhahlamba Drakensberg Park outnumber those of eland. The numerical difference between the two animal species is relatively small. This is the only place in the uKhahlamba Drakensberg Park where rhebuck outnumber eland paintings. Moving southwards of the uKhahlamba Drakensberg Park, eland begin to take dominance over not only rhebuck but other painted animal species. Even when their percentage drops (e.g., Mkhomazana, Cobham) in certain areas moving southwards, they are still far dominant over other animal species.

It is not only eland and rhebuck that are characterized by an uneven distribution within the rock art of the uKhahlamba Drakensberg Park. For instance, there are more baboons at the Cathedral Peak Nature Reserve (CPNR), more snakes at Giants Castle Nature Reserve (GCNR), more hartebeest and elephants at Cathedral Peak and uMkhomazana, respectively, than anywhere in the uDP. These animals, baboons, snakes, hartebeest, and elephants, do not outnumber eland where they are painted. As indicated earlier, it is only the rhebuck THAT does so in the north, at the RNNP. Horses are significantly dominant in the southern regions of uKhahlamba Drakensberg Park as opposed to cattle which dominate in the northern portions (see Vinnicombe 1976).

Composition of Paint

Southern African rock art is generally defined by the use of a variety of colors, all of which came from naturally occurring pigments that were mined in the vicinity of painted landscapes. The same is applicable in the uKhahlamba Drakensberg Park. Most of the paintings are red, a colour that came from red ochre. Other colors used were yellow, black, orange, and white. Ochre, charcoal, and manganese, from which these colors largely originated from, was grounded into powder, then mixed with binders such as animal blood, fat, beeswax, egg white, water, and plant sap. White pigment, which fades away much quicker, was made from clays or animal droppings while black came from charcoal and manganese oxide. Besides these general colors, Bushmen were also able to produce a variety of other colors from mixing these different primary pigments. A large variety of such colors were generally used in the shaded polychromes. Brushes were made from different bird feathers or from animal hair.

As it is customary with other artistically produced works, the initial idea with rock art was that its production developed from simple, monochrome paintings to aesthetically pleasing polychrome paintings (see Solomon 2011). This viewpoint is no longer well supported.

Dating of Rock Art

In general, there has not been many attempts to date southern African rock art. The same is applicable in the uKhahlamba Drakensberg Park. The earliest actual dates for uKhahlamba Drakensberg Park paintings derives from a bichrome eland at Main Caves North, in the central uKhahlamba Drakensberg Park, where the associated crust has been dated to 2900 and 2760 years ago (Mazel and Watchman 1997, 2003; Mazel 1996a, b, 2009a, b). It is, therefore, possible that painting emerged here between 2500 and 3000 years ago, or perhaps earlier, and that this phenomenon is related to the intensification of hunter-gatherer occupation of the northern uKhahlamba Drakensberg Park. Other dating techniques that have been applied in the uKhahlamba Drakensberg Park rock art include the Harris Matrix (Russell 1997, 2000; see also Chippindale and Taçon 1993). This technique became important particularly in the absence of detailed chronologies created based on direct dating (Swart 2004). While acknowledging its potential significance in the rock art of uKhahlamba Drakensberg Park, this methodological approach has been criticized by Pearce (2002, 2006, 2010), resulting in an exchange between him and the proponents of this technique (Swart 2006; Russell 2012).

As Bonneau et al. (2017a: 659) notes, it has been difficult to create rock art chronologies chronologies "because of the frequent lack of datable material and the difficulty of removing contamination from samples." This challenge is not just applicable to the uKhahlamba Drakensberg Park, but it extends to other regions within southern Africa and beyond. With recent technological advancements, it seems there might be hope for the challenge of creating rock art chronologies from direct dating to be addressed (see also Bonneau et al. 2011, 2012, 2017b; Pearce and Bonneau 2018).

Presentation of Rock Art

To "tap" into the tourism market resulting from the designation of various portions of the uKhahlamba Drakensberg Park as nature reserves and the inscription of this area on the list of World Heritage Sites, rock art centers have been constructed. The aim has been to create areas where rock art can best be presented to the public (Duval and Smith 2012). There are two rock art centers in the uKhahlamba Drakensberg Park (Ndlovu 2012). One in the Kamberg Nature Reserve and the second one at Cathedral Peak Nature Reserve. The former was officially opened in 2002 and visitors can access an audiovisual facility where they watch a documentary on rock art of the area. They are also generally introduced to Game Pass Shelter which can be visited afterwards. The latter has a rock art center named after

the famous Didima Gorge. This center has a museum and an entertaining rock art documentary which addresses the ritual significance of rock art in general. Visitors have an opportunity of visiting few rock art sites in the vicinity of this rock art center but cannot officially be taken to Didima Gorge because it is considered inappropriate for management purposes. Besides these two centers, there are a number of rock art sites throughout the uKhahlamba Drakensberg Park that can be visited by tourists.

References

Bonneau, A., F. Brock, T. Higham, D.G. Pearce, and A.M. Pollard. 2011. An improved pretreatment protocol for radiocarbon dating black pigments in San rock art. *Radiocarbon* 53 (3): 419–428.

Bonneau, A., D.G. Pearce, and A.M. Pollard. 2012. A multi-technique characterization and provenance study of the pigments used in San rock art, South Africa. *Journal of Archaeological Science* 39 (2): 287–294.

Bonneau, A., R.A. Staff, T. Higham, F. Brock, D.G. Pearce, and P.J. Mitchell. 2017a. Successfully dating rock art in southern Africa using improved sampling methods and new characterization and pretreatment protocols. *Radiocarbon* 59 (3): 659–677.

Bonneau, A., D. Pearce, P. Mitchell, R. Staff, C. Arthur, L. Mallen, F. Brock, and T. Higham. 2017b. The earliest directly dated rock paintings from southern Africa: New AMS radiocarbon dates. *Antiquity* 91 (356): 322–333.

Challis, S. 2009. Taking the reins: The introduction of the horse in the nineteenth- century Maloti-Drakensberg and the protective medicine of baboons. In *The eland's people: Essays in memory of Patricia Vinnicombe*, ed. P. Mitchell and B. Smith, 104–107. Johannesburg: Witwatersrand University Press.

Challis, S. 2012. Creolisation on the nineteenth-century frontiers of southern Africa: A case study of the AmaTola 'Bushmen' in the Maloti-Drakensberg. *Journal of Southern African Studies* 38 (2): 265–280.

Chippindale, C. and Taçon, P.S., 1993. Two old painted panels from Kakadu: variation and sequence in Arnhem Land rock art. *Time and space: dating and spatial considerations in rock art research*, pp. 32–56.

Dowson, T.A. 1994. Reading art, writing history: rock art and social change in Southern Africa. *World Archaeology 25*: 332–344.

Dowson, T.A. 1995. Hunter-gathers, traders and slaves. The 'Mfecane' impact on Bushmen, their ritual and their art. In *The mfecane aftermath. Reconstructive debates in Southern African history*, ed. C. Hamilton, 51–70. Johannesburg/Pietermaritzburg: Witwatersrand University Press/University of Natal Press.

Duval, M. and Smith, B. 2012. Rock art tourism in the uKhahlamba/Drakensberg World Heritage Site: Obstacles to the development of sustainable tourism. *Journal of Sustainable Tourism* 21 (1): 134–53.

Jolly, P. 2002. Therianthropes in San rock art. The South African Archaeological Bulletin, 85–103.

Lee, D.N., and Woodhouse, H.C. 1964. Rock-paintings of'flying buck. *The South African Archaeological Bulletin, 19*(75): 71–74.

Lenssen-Erz, T. 1994. Jumping about: Springbok in the Brandberg rock paintings and in the Bleek and Lloyd Collection. An attempt at a correlation. In *Contested images. Diversity in Southern African rock-art research*, ed. T.A. Dowson and J.D. Lewis-Williams, 275–291. Johannesburg: Witwatersrand University Press.

Lewis-Williams, J.D. 1972. The syntax and function of the Giant's Castle rock-paintings. *South African Archaeological Bulletin* 27: 49–65.

Lewis-Williams, J.D. 1974. Rethinking the southern African rock paintings. *Origini* 8: 229–257.

Lewis-Williams, J.D. 1977. *Believing and Seeing*. Unpublished PhD thesis. Pietermaritzburg: University of Natal.

Lewis-Williams, J.D. 1981. *Believing and seeing: Symbolic meanings in southern San rock-paintings*. London: Academic.

Lewis-Williams, J.D. 2003. Images of mystery: rock art of the Drakensberg. Juta and Company Ltd.

Mazel, A.D. 1982. Distribution of painting themes in the Natal Drakensberg. *Annals of the Natal Museum* 25: 67–82.

Mazel, A.D. 1984. Diamond 1 and Clarke's shelter: Report on excavations in the northern Drakensberg, Natal, South Africa. *Annals of the Natal Museum* 26: 25–70.

Mazel, A.D. 1989. People making history: The last ten thousand years of hunter-gatherer communities in the Thukela Basin. *Natal Museum Journal of Humanities* 1: 1–168.

Mazel, A.D. 2009a. Images in time: advances in the dating of Drakensberg rock art since the 1970s. In *The eland's people: New perspectives on the rock art of the Maloti/ Drakensberg Bushmen. Essays in memory of Pat Vinnicombe*, ed. P. Mitchell and B. Smith, 81–96. Johannesburg: Wits University Press.

Mazel, A.D. 2009b. Unsettled times: Shaded polychrome paintings and hunter-gatherer history in the southeastern mountains of Southern Africa. *Southern African Humanities* 21: 85–115.

Mazel, A.D. 2011. Time, color, and sound: Revisiting the rock art of Didima Gorge, South Africa. *Time and Mind* 4 (3): 283–296.

Mazel, A.D., and A.L. Watchman. 1997. Accelerator radiocarbon dating of Natal Drakensberg paintings: Results and implications. *Antiquity* 71: 445–449.

Mazel, A.D., and A.L. Watchman. 2003. Dating rock paintings in the uKhahlamba-Drakensberg and the

Biggarsberg, KwaZulu-Natal, South Africa. *Southern African Humanities* 15 (1): 59–73.

Mguni, S. 2002. Continuity and change: Some aspects of the enigmatic tree and "formling" motifs in the rock art of Matopo Hills, Zimbabwe. Unpublished MA thesis, University of the Witwatersrand, South Africa.

Mitchell, P. 2002. *Archaeology of Southern Africa*. Cambridge: Cambridge University Press.

Ndlovu, N. 2005. Incorporating indigenous management in rock art sites in KwaZulu-Natal (Doctoral dissertation, Rhodes University).

Ndlovu, N. 2012. Archaeology and development at loggerheads: but should they be? South African Archaeological Bulletin 67: 262–272.

Pager, H. 1971. *Ndedema*. Graz: Akademische Druck Verlagsanstalt.

Pearce, D.G. 2002. Changing men, changing eland: Sequences in the rock paintings of Maclear District, Eastern Cape, South Africa. *American Indian Rock Art* 28: 129–138.

Pearce, D.G. 2006. A comment on Swart's rock art sequences and use of the Harris matrix in the Drakensberg. *Southern African Humanities* 18 (2): 173–177.

Pearce, D.G. 2010. The Harris matrix technique in the construction of relative chronologies of rock paintings in South Africa. *The South African Archaeological Bulletin* 148–153.

Pearce, D.G., and A. Bonneau. 2018. Trouble on the dating scene. *Nature Ecology & Evolution* 2 (6): 925.

Russell, T. 1997. *Sequencing rock paintings: The application of the Harris matrix to rock art at Main Caves North, Giant's Castle Game Reserve, KwaZulu-Natal*. Unpublished BSc (Hons) dissertation. Cape Town: University of Cape Town.

Russell, T. 2000. The application of the Harris Matrix to San Rock Art at Main Caves North, KwaZulu-Natal. *The South African Archaeological Bulletin* 55 (171): 60–70.

Russell, T. 2012. No one said it would be easy. Ordering San paintings using the Harris Matrix: Dangerously fallacious? A reply to David Pearce. *The South African Archaeological Bulletin* 67 (196): 267–272.

Rust, R. 2008. *Meta-tourism, sense of place and the rock art of the Little Karoo*. Unpublished PhD thesis. Cape Town: University of Stellenbosch.

Solomon, A. 2011. Towards visual histories: Style interdisciplinarity and Southern African rock art research. *South African Archaeological Bulletin* 66 (193): 51.

Speirs, R. 1999. That ever memorable over-berg commando of 1862. In *The naming of Hodgson's peak and the Underberg District's Beginning*, ed. R. Guy, 5–14. Underberg: Underberg Farmers Association.

Spencer, S.O. 1999. Thomas Hodgson of Hodgson's Peak. In *The naming of Hodgson's peak and the Underberg District's beginning*, ed. R. Guy, 14–16. Underberg: Underberg Farmers Association.

Stanford, W.E. 1910. Statement of Silayi, with reference to his life among the Bushmen. *Transvaal Royal Society of South Africa* 1: 435–440.

Stow, G.W. 1905. *The native races of South Africa*. London: Swan Sonnenschein & Co. Ltd.

Swart, J. 2004. Rock art sequences in the uKhahlamba-Drakensberg Park, South Africa. *Southern African Humanities* 16: 13–35.

Swart, J. 2006. Harassing the matrix: A reply to Pearce. *Southern African Humanities* 18 (2): 178–180.

Vinnicombe, P. 1976. *People of the Eland: Rock paintings of the Drakensberg Bushmen as a reflection of their life and thought*. Pietermaritzburg: Natal University Press.

Wright, J.B., and A.D. Mazel. 2007. *Tracks in a mountain range: Exploring the history of the uKhahlamba Drakensberg*. Johannesburg: Witwatersrand University Press.

Additional Readings

Anderson, A.A. 1888. *Twenty-five years in a wagon in the gold regions of Africa*. London: Chapman & Hall.

Anderson, W. 1907. *Geological survey of Natal and Zululand*. London: West, Newman and Co.

Anderson, G., and B. Wahl. 1998. *Bushman Art of the Drakensberg: A guide to the art, mythology and culture of the Drakensberg Bushmen*. Durban: Art Publishers.

Arbousset, T., and F. Daumas. 1846. *Narrative of an exploratory tour to the North-East of the Colony of the Cape of Good Hope*. London: John C. Bishop.

Bahn, P. 1998. *Prehistoric art*. Cambridge, UK: Cambridge University Press.

Bryant, A.T. 1929. *Olden times in Zululand and Natal*. London: Longmans Green.

Campbell, C. 1986. Images of war: A problem in San rock art research. *World Archaeology* 18 (2): 255–268.

Challis, S. 2008. *The impact of the horse on the AmaTola 'Bushmen': New identity in the Maloti-Drakensberg Mountains of Southern Africa*. PhD thesis. University of Oxford.

Chaloupka, G. 1984. *From paleoart to casual paintings*, Monograph series 1. Darwin: Northern Territory Museum of Arts and Sciences.

Dart, R.A. 1925. The historical succession of cultural impacts upon South Africa. *Nature* 115: 425–429.

Deacon, H.J., and J. Deacon. 1999. *Human beginnings in South Africa: Uncovering the secrets of the Stone Age*. Johannesburg/Cape Town: David Philip Publishers.

Derwent, S., R. Porter, and T. Sandwith. 2001. *Maloti-Drakensberg: Transfronteir conservation and development programme*. Pietermaritzburg: Ezemvelo KZN Wildlife.

Dodds, D.A. 1975. *A cradle of rivers: the Natal Drakensberg*. Cape Town: Purnell and Sons (S.A.) (Pty) Ltd.

Ellenberger, D.F. 1912. *History of the Basuto: Ancient and modern*. Lesotho: Morija Museum and Archives.

Ergates. 1905. Bushmen's stock raids in Natal. *Natal Agricultural Journal* 8 (2): 113–123.

Evans, M. 1911. Cave hunting in the Drakensberg. In *Natal descriptive guide and official handbook*, ed. A.H. Tatlow. Durban: South African Printing Works.

Flood, J. 1989. Animals and zoomorphs in rock art of the Koolburra region, north Queensland. In *Animals into art*, ed. H. Morphy, 287–300. London: Unwin Hyman Ltd.

Fry, R. 1910. The art of the Bushmen. Burlington Magazine, reprinted in Fry, R. *Art and design*. Harmondsworth: Penguin, 1937.

Guest, W.R. 1978. *Langalibalele: The crisis in Natal, 1873–1875*. Durban: University of Natal, Department of History and Political Science.

Hampson, J. 2014. Conflict on the frontier: San rock art, spirituality, and historical narrative in the Free State Province, South Africa. In *Rock art and sacred landscapes*, ed. D. Gillette, M. Greer, M. Hayward, and W. Murray, 103–115. New York: Springer.

Howard, J.W. 1910. *The 'Natal mercury' historical union souvenir*. Durban: Central News Agency Ltd.

Johnson, T. 1960. Rock paintings of ships. *South African Archaeological Bulletin* 15: 111–113.

Kinsey, W.F., III. 1989. Susquehannock animal art and iconography. In *Animals into art*, ed. H. Morphy, 301–316. London: Unwin Hyman Ltd.

Lewis-Williams, J.D. 1983. *The rock art of southern Africa*. Cambridge: Cambridge University Press.

Lewis-Williams, J.D. 1990. *Discovering southern African rock art*. Cape Town: David Phillip.

Lewis-Williams, J.D., and T.A. Dowson. 1989. *Images of power: Understanding Bushman rock art*. Johannesburg: Southern Book Publishers.

Liebenberg, D.P. 1972. *The Drakensberg of Natal*. Cape Town: Cape and Transvaal Printers Ltd.

Mazel, A.D. 1981. *Up and down the little berg: Archaeological resource management in the Natal Drakensberg*. MA thesis. University of Cape Town.

Mazel, A.D. 1996a. A special place: Maqonqo Shelter in the ThukeLa Basin, South Africa. In *Aspects of African archaeology: Papers from the 10th congress of the Pan African Association for prehistory and related studies*, ed. G. Pwiti and R. Soper, 343–354. Harare: University of Zimbabwe Publishers.

Mazel, A.D. 1996b. Maqonqo shelter: The excavation of Holocene deposits in the eastern Biggarsberg, Thukela Basin, South Africa. *Natal Museum Journal of Humanities* 8: 1–39.

Moodie, D. 1855. *A voice from the Kahlamba: Origin of the Bushmen*. Pietermaritzburg: May & Davies.

Moszeik, O. 1910. *Die Malereiender Buschmanner in Sud-Africa*.

Orpen, J. 1874. A glimpse into the mythology of the Maluti Bushmen. *Cape Monthly Magazine* 9 (49): 1–10.

Pager, H. 1975. *Stone age myth and magic*. Graz: Akademische Druck-u. Verlagansalt.

Pearse, R.O. 1989. *Barrier of spears: Drama of the Drakensberg*. Cape Town: Timmins.

Rice, P.C., and A.L. Paterson. 1996. Bone art in the upper paleolithic: Regional, temporal, and art class comparisons. *Cross-Cultural Research* 30 (3): 211–242.

Rudner, J., and I. Rudner. 1970. *The hunter and his art*. Cape Town: Struik.

Waite, D.B. 1989. Animal metaphor in art from the Solomon Islands. In *Animals into art*, ed. H. Morphy, 339–342. London: Unwin Hyman Ltd.

Willcox, A.R. 1956. *Rock paintings of the Drakensberg*. London: Parish.

Willcox, A.R. 1963a. *The rock art of South Africa*. London: Nelson.

Willcox, A.R. 1963b. Painted petroglyphs at Balerno in the Limpopo Valley, Transvaal. *South African Journal of Science* 59: 108–110.

Willcox, A.R. 1976. *Southern land: The prehistory and history of southern Africa*. Cape Town: Purnell.

Willcox, A.R. 1984. *The rock art of Africa*. New York: Holmes & Meier Publishers.

Wright, J.B. 1971. *Bushmen raiders of the Drakensberg 1840–1870*. Pietermaritzburg: University of Natal Press.

Wright, J.B., and A. Mason. 1983. *The Hlubi Chiefdom in Zululand-Natal: A history*. Ladysmith: Ladysmith Historical Society.

Underwater Archaeology

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Introduction

Some archaeological features lie under water, either because they were deposited there by accident (e.g., shipwrecks) or design (e.g., votive offerings), or because the ground in which they were originally preserved subsequently became inundated by rising water levels, subsidence, coastal erosion, seismic events, or human agency. The mere fact of submergence, however, does not of itself define the investigative disciplines applied to their study. Sunken cities, for example, are the preserve of investigators familiar with the principles of urban archaeology, who must relate their findings to a wider corpus of studies in this field irrespective of whether they were conducted above or below the water. Isolated finds of prehistoric material brought up from the seabed by trawling or dredging, and the survival of fragments of the now-submerged landscapes that

contained them, demand the attention of prehistorians and geomorphologists familiar with the wider contexts to which such evidence relates and can apply the appropriate techniques and resources to their analyses.

The fact that archaeological evidence may be found under water is not directly relevant to its interpretation, other than perhaps as a factor in its survival. "Underwater Archaeology" is thus a potentially misleading term, for it is no more than the descriptor of an environment in which a variety of archaeological work may be conducted. We do not speak of "desert" or "jungle" archaeology but categorize studies by period, region, or theme (e.g., "Iron Age"; "Polynesian" or "nautical").

Definition

This said, some archaeological themes often involve a significant amount of underwater work. These may include:

Maritime archaeology, which is the interpretation through surviving physical evidence of any activity associated with humankind's past relationship with the sea. Most obviously, it includes the investigation of seagoing ships, boats, and other floating craft, whether as surviving vessels, boat-burials, abandoned hulls, ship components and fittings, or sunken wrecks. It also deals with the purpose, operation, and management of watercraft, the technicalities of their construction, and their characteristics as self-contained social, economic, and political entities which in some (though not necessarily all) ways may be representative of their parent cultures ashore. More broadly, maritime archaeology is concerned with the wider infrastructures of human activities associated with the maritime environment, many of which may be situated wholly or partially on land. Such aspects might include harbors; shipbuilding and related resource extraction; shore structures associated with seagoing activities; navigational aids; exploration; cargoes and trade; predation (fishing and piracy); the projection of power and status; warfare; ritual; and recreation. Maritime topics frequently interface with what might be regarded as more overtly terrestrial activities but attempts to characterize such buffering zones (of which the coast itself is the most obvious) as hard lines of separation are illogical and self-defeating. It is connection and interaction across the interfaces that we seek, not the arbitrary setting of boundaries.

Nautical archaeology is the specialized study of ships, boats, and other past floating craft by examining their surviving remains. It includes freshwater as well as seagoing vessels. Documentary research, iconography, ethnology, and experimental techniques are often combined with archaeology in pursuing such studies.

Submerged-site archaeology is the investigation of any archaeological feature or structure once on land but now wholly or partly covered by water. It may include the study of submerged former landscapes and sunken habitation sites such as inundated cities or lake dwellings. Riverine or lacustrine sites such as the foundations of bridges and other structures built under water may also be included in this category, as may lost items, rubbish, or votive objects deposited in lakes, rivers, wells or *cenotes*. Wetland sites may be waterlogged but not wholly submerged, and techniques for investigating them are adapted accordingly.

Historical Background

Free diving to obtain food and other resources, or to recover lost items, has been practiced since antiquity, while equipment to extend the time spent under water and increase the depth reached has been available for many centuries. The most practical solution for early divers was the diving bell, and its many users over some two millennia supposedly include Alexander the Great. In the 1830s the closed diving helmet and attached watertight suit with air pumped via a hose from the surface was developed, and this practical combination (with many technical refinements) remains in use today.

Helmeted divers with surface-supplied air, usually heavily weighted to maintain contact with the bottom, were mainly employed for engineering and salvage work. Sometimes salvage

involved the recovery of valuables from historic shipwrecks, as from the *Mary Rose* in 1836 by John and Charles Deane, who had patented an early form of the helmet diving system (Rule 1982: 42–47). But such activities were primarily commercial, scant attention being paid to the archaeological significance of the finds. The salvage ethos, particularly treasure hunting, has created tensions between archaeologists and commercial salvers which endure to this day.

On 24 August 1854 three professors from the University of Geneva formed an archaeological diving team (surely the first ever) in which one acted as tender, another operated the air pump, while the third (Professor von Morlot) descended three meters to investigate the remains of prehistoric pile dwellings in Lake Zurich (Delgado 1997: 236–237). In 1867 Rev. R. J. Mapleton from Poltalloch on the west coast of Scotland investigated the submerged remains of a crannog (lake dwelling) in Loch Coille-Bharr using divers from the nearby Crinan Canal. Some years later Odo Blundell, a Dominican monk, dived on other crannogs in Scotland using standard diving equipment (Morrison 1985: 4–6). Blundell was a conventional archaeologist who recognized that the potential of sites under water could only be fully realized by archaeologists who were able to dive. Unfortunately, his example was not widely followed by others, and archaeology under water during the first half of the twentieth century was characterized by the activities of divers (by implication heroic but intellectually marginalized) who brought up uncontextualized finds for examination and study by learned but impractical surface-bound "experts."

In 1942 a French naval officer, Jacques Cousteau, collaborated with an engineer, Emile Gagnan, to produce a regulator which allowed a diver to breathe automatically on demand from a cylinder of compressed air strapped to his back. The "aqualung" (now generally known as Self-Contained Underwater Breathing Apparatus or SCUBA) has greatly simplified the process of diving by removing the need for a hose to the surface and providing three-dimensional freedom of movement in the water akin to weightlessness in space. For the discovery and investigation of sites under water, this system has many advantages, not least in that it has opened up the undersea world to many who might not otherwise have had access to it.

Unfortunately, the first generation of SCUBA explorers, headed by Cousteau, were divers rather than archaeologists, and their projects – perhaps understandably at the time – focused more on public appeal generated by spectacular discoveries than on systematic research. Major excavations of classical shipwrecks in the Mediterranean, notably at Grande Congloué in the south of France (Delgado 1997: 174–175), were disappointing in their outcomes and often destructive in their methodologies. Nevertheless, two of Cousteau's colleagues, Frederic Dumas and Philippe Talliez, subsequently developed strong archaeological sensitivities, and both made major contributions to the early history of the discipline (Dumas 1962).

It fell to a young American classical scholar, George Bass, to bridge the divide between divers and archaeologists. He had been approached by Peter Throckmorton, an experienced underwater explorer and photojournalist. Throckmorton had worked with sponge divers in the Aegean who told him of ancient wrecks off the southwest Turkish coast. One, at Cape Gelidonya, dated to the Late Bronze Age and was threatened by looting. In 1960, with the encouragement of the Turkish authorities, Throckmorton teamed up with Bass to mount an expedition to excavate it (Bass 1967). Bass, a conventional academic archaeologist, learned to dive so he could direct the work at firsthand. Thus, a vital principle was established – archaeology under water must be conducted by trained archaeologists who dive (Bass 1966).

Results of the Gelidonya project were outstanding. They were based on methodologies and recording techniques which followed the well-established precepts of practical field investigation and subsequent analysis, adapted to a watery environment. Much archaeology above and below the water still uses basic survey methods, such as tape measures and grids, while excavation is usually conducted with everyday hand tools (Figs. 1 and 2). Simple mechanical

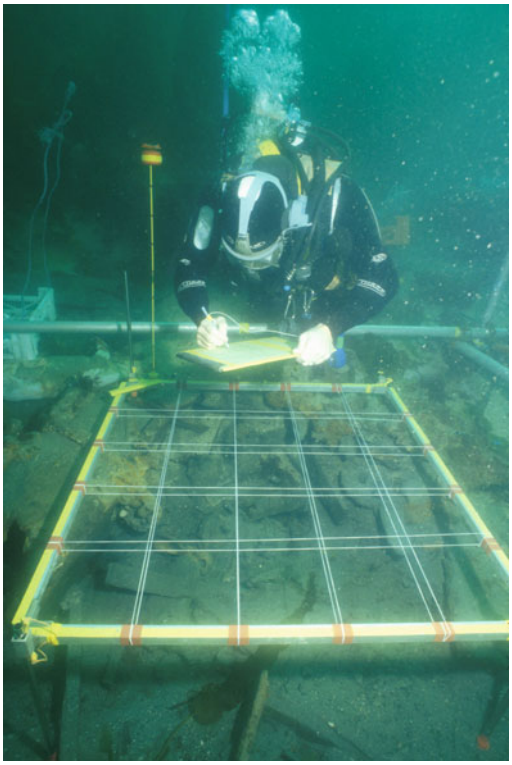

Underwater Archaeology, Fig. 1 Recording archaeological deposits on a shipwreck using a 1-m grid and plumbing device (Colin Martin)

devices, such as the water dredge and air lift, allow the controlled removal of spoil (Fig. 3). Such approaches, though more laborious and time-consuming than the deployment of remote technologies and industrial salvage methods, are more sensitive and bring the archaeologist into direct contact with the evidence as it unfolds. Archaeology, though a rigorous and systematic discipline, cannot be reduced to uncritical processes. Direct interaction between a sentient human mind trained in archaeological method and the material detritus left by former human activity is a necessary concomitant to interpreting and understanding it. Such an approach is also much cheaper and less likely to go wrong.

This is not to suggest that geophysics and other remote techniques should not be used for wider area searches, survey, and excavation, especially in deeper water where diving may be impractical. However, hightech solutions should not be applied uncritically to archaeological investigations, but brought in as necessary to support or enhance simpler "hands-on" techniques or where depth makes direct diver intervention impractical (Bowens 2009).

Since the late 1960s archaeology under water has been influenced by debates within the wider discipline, notably processual archaeology, with its characterization of cultural evolution as an objective quasi-scientific process driven by external stimuli which can ultimately be explained in absolute terms. This was later countered by a post-processual reaction which argued for more subjective and individualistic interpretations of human behavior, on the part both of past societies and of the archaeologists who seek to interpret them. These debates have influenced concepts of underwater archaeology, for which theoretical frameworks have been proposed by Muckelroy (1978) and Gould (2000). A wide-ranging debate among several leading practitioners in 1981 generated a number of important papers on the philosophy and goals of the discipline (Gould 1983).

Key Issues

Shipwrecks

The investigation of shipwrecks is a distinctive specialization within maritime archaeology. When a wreck's remains enter the archaeological record, they become a closed context created by a single catastrophic event. Everything associated with it was once part of a complex and highly organized human enterprise, frozen at the moment of disaster. From a shipwreck archaeologists can, by analyzing the natural processes of deconstruction, reconstruct to a greater or lesser extent interlocking aspects of the ship's original existence as a self-contained entity. The most significant of these is usually the vessel itself, which on occasion may be preserved almost intact. Examples include the *Vasa* (1627) in Stockholm harbor (Fig. 4), the fourteenth-century Bremen Cog, and the schooners *Hamilton* and *Scourge* lost in Lake Ontario during the War of 1812. (Delgado 1997: 454–456, 72–73, 187) The Baltic Sea, with its low salinity and temperatures, is a particularly rich

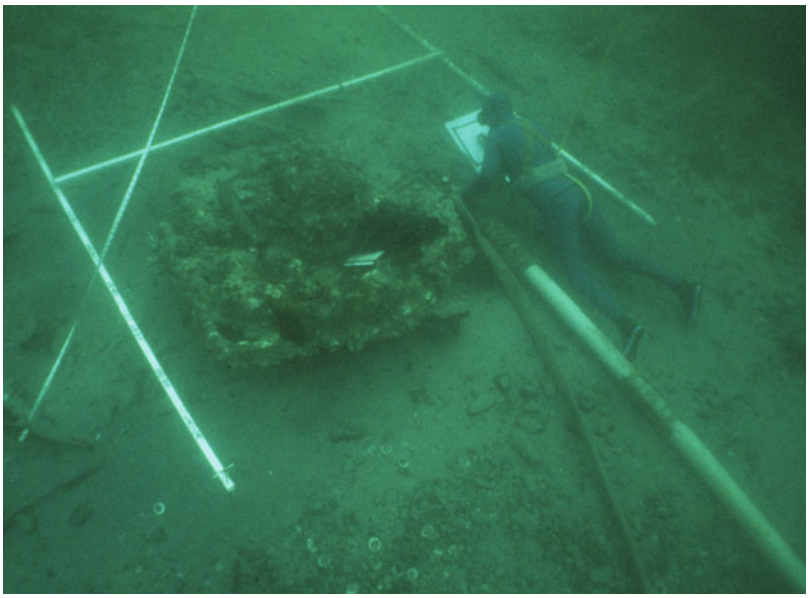

Underwater Archaeology, Fig. 2 Area excavation within a grid system on the Armada wreck *La Trinidad Valencera* (1588). A water dredge is being used to remove spoil (Colin Martin)

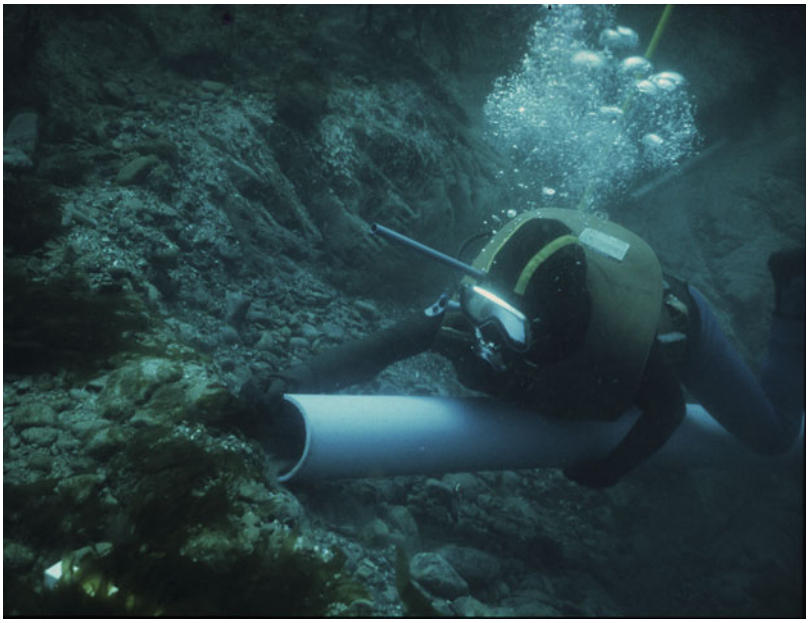

Underwater Archaeology, Fig. 3 An air lift providing heavy suction to remove sterile overburden on the Armada wreck *El Gran Grifón* (Colin Martin)

repository of near-intact wrecks. Sometimes wrecks settle or disintegrate in such a way as to allow confident reconstructions to be projected from their partial remains, as with the *Mary Rose* (1545) off Portsmouth or the sixteenth-century Basque whaling ship in Red Bay, Labrador (Delgado 1997: 264–266, 336–338).

More frequently, only a small percentage of the articulated hull survives, usually from the lower part which may be pinned to the seabed and protected by ballast or cargo (Fig. 5). In such cases the upper works often decay and disintegrate completely, although isolated components sometimes become buried and preserved during the

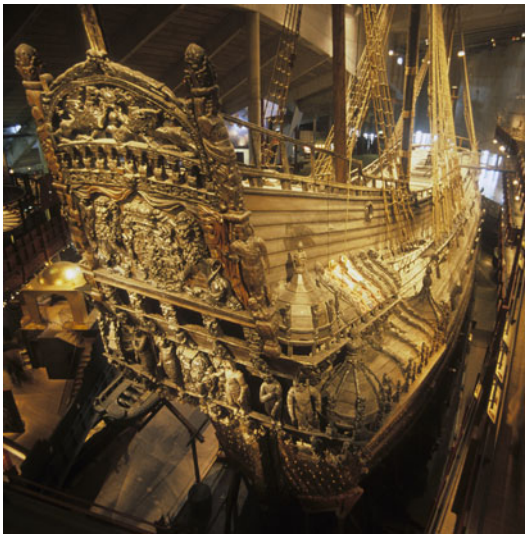

Underwater Archaeology, Fig. 4 The *Vasa*, found virtually intact on the seabed in Stockholm Harbor. Some reconstructive work is evident (Colin Martin)

wrecking process, and these may help inform reconstruction. The best-known examples of this category are amphora-carrying classical wrecks, mainly in the Mediterranean (e.g., the first-century BC Roman wreck at Madrague de Giens (Tchernia et al. 1978)), and early modern warships whose holds were often ballasted with boulders or gravel.

Other notable shipwreck excavations include the Bronze Age sites at Ulu Burun and Cape Gelidonya, the Byzantine wreck at Yassi Ada, and the early sixteenth-century Cattewater wreck at Plymouth, Devon (Delgado 1997: 430–432, 84–86, 469–471, 90–91).

A full understanding of the formation processes which have conditioned the characteristics of a wreck site is an essential prerequisite to the interpretation of its structural remains and internal organization. Even where no hull remains have survived, a careful analysis of other archaeological material and its distribution may still provide information about the nature, proportions, and layout of the wrecked ship.

The potential of examining ship remains extending from prehistory into the recent past has in many respects been under exploited by the archaeological community at large. While ship archaeology is a distinctive specialization, it has implications far beyond its immediate technicalities. Watercraft are among the most complex and resource-consuming structures most societies produce, so apart from their intrinsic interest, wrecks may be unique statements of a culture's technical capabilities, exploitation of resources, and social organization. Even for more recent periods, the examination of a wooden ship's hull is akin to speaking to the shipwright who built it and is thus more immediate and objective than the study of ship plans, models, documents, and pictures (though these too, if they exist, may have an important role in an investigation).

A wreck is also likely to produce evidence of a ship's function and sometimes minute details about its final voyage. Trade is probably the most common activity of seafarers, and underwater archaeology has made an enormous contribution to its study, from Bronze Age cargoes in the Aegean to the ubiquitous amphora-carriers of classical times and casualties incurred during the transoceanic voyaging of early modern European powers such as imperial Spain and the Dutch East India Company (Delgado 1997: 19–20, 26–28, 55–57, 221–222, 456–457). War is another function for which material evidence may be found on shipwrecks, from the classical ram found at Athlit in Israel to the integrated artillery-based tactics of the sixteenth century evidenced by the *Mary Rose* and the wrecks of the Spanish Armada (Delgado 1997: 43–44, 264–266, 399–402).

Wrecks often produce evidence of the ancillary equipment used on ships, whereby human power was utilized to row, work the sails, raise anchors, and pump out water. Information about provisioning, stowage, food preparation, and cooking may also be obtained. The monitoring of stores and the issue of rations required the use of weights and measures, and the standards employed often reflect the nationality and origins of the vessel. Shipboard activities such as navigation, medicine, and various craft skills will often be evidenced by specialized equipment, tools, and instruments.

Finally, a ship is home to a socially stratified self-contained community, often for months on end. This generates evidence reflecting in many

Underwater Archaeology, Fig. 5 The wreck of a small Cromwellian warship of 1653 off Duart Point, Mull, Scotland, partially excavated. Although the hull has collapsed, the wreck has sufficient integrity to allow partial reconstruction (Colin Martin)

ways the everyday life, work patterns, and social structures of the parent society on shore. Personal possessions, domestic utensils, clothing, and footwear frequently survive, often in abundance, within a shipwreck context.

From a wider archaeological perspective, this is significant on two counts. First, wet buried environments are especially conducive to organic preservation, and thus material which rarely survives on terrestrial sites may be found in shipwreck assemblages (Fig. 6). Since the material culture of most societies, past and present, is overwhelmingly organic in its makeup (wood, leather, bone, fiber, textile), such survival helps correct a skew towards the inorganic and durable which terrestrial recoveries often imply. This skew is exacerbated by the fact that valuable or attractive items are rarely discarded on land, while (unless salvaged) their survival on a wreck is neutrally determined.

Second, a wreck represents a tightly dated assemblage within a single context. Its date may be established archaeologically by the latest object identified (e.g., a coin) or sometimes, if the event is recorded in documentary sources, as a precise calendar date. Collections of artifacts and samples derived from shipwrecks thus define a secure terminus ante quem, that is, nothing can be later than the determined date of the event unless it is a subsequent intrusion. While some objects may have been old when lost, wreck assemblages, if critically studied, can make valuable contributions to the testing and refinement of established chronological typologies, especially for commonplace items like pottery and clay pipes.

Underwater Archaeology, Fig. 6 An intact mariner's compass of wood with brass fittings uncovered on the Duart Point wreck

It should be emphasized, though it is sometimes argued otherwise, that shipwreck archaeology and commercial salvage are not compatible. From the perspectives of each side, the motives and anticipated outcomes of the other are contradictory and irreconcilable. Salvage seeks to maximize profit for investors by making valuable recoveries (and by implication ignoring or discarding "worthless" ones), while archaeology aims to maximize the disciplined acquisition of knowledge, irrespective of the monetary value of what may be found. The mind-set which drives each activity reflects these very different expectations. Neither side can properly accommodate the goals of the other, and it is up to society through its legislatures to decide in which ways the two activities (each of which may be valid and desirable on its own terms) should be separated and regulated. The superficially appealing argument often advocated by the salvage lobby that shipwreck archaeology can be paid for by selling the recoveries (itself an unacceptable diminution of the heritage resource) is deeply flawed. Most responsibly conducted underwater archaeological projects cost more in rigorous fieldwork, conservation, study, and curation than their recoveries could ever yield in a sale room, while the conflict between returns on investment and archaeological ethics creates a divide which neither side can realistically bridge. In any case most treasure-oriented projects, despite (or perhaps because of) the hype which often accompanies their inception, ultimately fail to hit the jackpot, and any intention to provide archaeological mitigation, however inadequate, is usually first to be abandoned when the going gets tough (Keisling 1994). The reality is that no treasure-motivated salvage of a historic shipwreck (whether or not accompanied by a "tame" archaeologist) has yet produced a final report that would pass rigorous archaeological peer scrutiny. That said, otherwise reputable

archaeologists (above or below the water) who fail to publish their work are just as bad.

Submerged Marine Sites

Rising sea levels due to melting ice, geomorphological processes, or cataclysmic events such as earthquakes have in many parts of the world inundated previously dry land, sometimes preserving elements of former landscapes and the archaeology contained within them. Britain was once joined to the continent by a landmass now known as Doggerland, and until about 6 or 7,000 years ago, some 23,000 km^2 of the southern North Sea extending from Yorkshire to Denmark was still a rolling landscape of hills, rivers, swamps, and coastal margins. Its existence began to be suspected in the early twentieth century when plants, animal bones, and worked flints were brought up in trawl nets. In 1931 the fishing boat *Colinda* recovered a mass of peat from the Ower Bank, 25 miles off Norfolk, in which a barbed antler harpoon point was found. This indicated a former landscape in which Mesolithic hunter-gatherers had been active. Systematic investigation of the area was at first impractical and relied on further chance finds, but in the 1990s Professor Byrony Coles attempted to reconstruct the region by working backwards from its present undersea topography.

These pioneering approaches were dramatically refined by Professor Vince Gaffney of Birmingham University, who with the help of the oil industry has been conducting seismic surveys over the area since 2002. This has allowed detailed 3D mapping of the former landscape, in which topography can be modeled to suggest how it was exploited by its human population and the progress of its slow inundation quantified. The picture has been fleshed out with palaeobotanical and faunal evidence, and the eventual aim is to create a virtual landscape within which probable sites of human activity can be predicted before being investigated in reality underwater (Gaffney et al. 2009).

The potential of this approach has already been demonstrated at Bouldnor Cliff in the western Solent near Southampton, where archaeologists led by Garry Momber are investigating an eroding cliff 11 m beneath the surface which has revealed a buried archaeological landscape incorporating Mesolithic material containing worked wood, hearths, flint tools, food remains, and plant fibers dating to around 8,100 BP. Already, the variety of material evidence – much greater than that normally encountered on terrestrial sites – is suggesting levels of technical competence for this period and region some 2,000 years ahead of what had previously been hypothesized (Momber et al. 2011).

A large number of submerged Mesolithic sites assigned to the distinctive Ertebølle culture have been found off the southern part of Funen Island in Denmark (Andersen 1987). This area may be characterized as the eastern part of Doggerland. One of the sites, at Tybrind Vig, has yielded logboats, paddle blades with complex geometric ornamentation, and a range of artifacts including fish hooks, harpoons, and eelspear prongs (Andersen 1987, 2011). These finds are helping to characterize the Northern European Mesolithic as a far more dynamic and socially advanced culture than studies based on terrestrial sites had previously suggested. The possibility of whole prehistoric landscapes preserved under water awaiting discovery and investigation is currently one of archaeology's most exciting and challenging prospects.

Inundated urban sites have long fired public imagination, and these too are now becoming reality. In 1968 Dr. Nic Flemming discovered a vast complex of submerged walls, rock-cut tombs, and other features in shallow water at Pavlopetri in Laconia near the southern tip of mainland Greece. He returned in 2007 with a team from Nottingham University led by Dr. Jon Henderson and Dr. Chrysanthi Gallou. Over the following years (the project is due to finish in 2013), using a combination of conventional mapping and digital survey, the team has revealed an almost complete town plan covering 9,000 m^2 (Fig. 7). Originally thought to date to the early Mycenaean period (c. 1,600 BCE), pottery now indicates occupation extending back to the Minoan Bronze Age (c. 2,800 BCE), making Pavlopetri the world's oldest known submerged city. Its date range, covering the transition from the Minoan

Underwater Archaeology, Fig. 7 An archaeologist inspects house foundations at the submerged ancient city of Pavlopetri in Greece (University of Nottingham)

to the Mycenaean periods, makes it a key site for investigating urban cultural evolution in the eastern Mediterranean (Henderson et al. 2011). Its role as a harbor adds to its potential for study and links it to the Bronze Age wrecks at Uluburun and Cape Gelidonya (of c. 1,300 and 1,200 BCE, respectively) some 400 km to the east.

A much later submerged urban site is at Port Royal, Jamaica, parts of which were engulfed by an earthquake in 1692. Serious underwater archaeological work has been undertaken there by the Nautical Archaeology Program of Texas A&M University since 1981, in conjunction with the Institute of Nautical Archaeology and the Jamaican National Heritage Trust. The area immediately around the former harbor slid and jumbled as it sank, destroying much of its archaeological context, but other parts collapsed more or less intact, retaining much of their stratigraphic integrity. Catastrophic underwater deposition of this nature, as with shipwrecks, ensures the preservation of a rich sampling of what was in current use, including organics. The remains of brick and timber buildings, together with their contents, thus provide a unique and comprehensive snapshot of one of the largest late seventeenth-century English colonial ports in the Americas (Hamilton 1984).

Submerged Freshwater Sites

In June 2011 six European nations – France, Switzerland, Germany, Austria, Italy, and Slovenia – were awarded composite World Heritage Site status in respect of 111 sites incorporating prehistoric lake dwellings in the Alpine region. This enormous resource, which provides a link between hunter-gatherer societies, early farmers, and the first European civilizations, has been investigated by underwater archaeologists since the mid-nineteenth century. It is now sustaining one of the most productive programs of modern archaeological research (Suter and Schlichtherle 2009).

Buildings on artificial islands or piles in lakes or estuarine margins are known in many parts of the world. Scotland is particularly rich in such structures, which are known as crannogs (Fig. 8). In recent years their investigation using underwater archaeological techniques and enhanced methodologies has increased. Like the lake dwellings of the Alpine region, they are no longer regarded as marginal or exotic, but as typical habitation sites set within contemporary landscapes with an exceptional capacity to retain a wide range of organic material and environmental evidence (Dixon 2004). They lead into areas of knowledge and understanding their terrestrial counterparts often cannot reach.

Underwater Archaeology, Fig. 8 Modern reconstruction of a crannog in Loch Tay, Scotland (Colin Martin)

Future Directions

Underwater archaeology is not, as it is still sometimes portrayed, a peripheral and slightly suspect domain of macho people in rubber suits, whose work is of little relevance to "real" archaeologists. On the contrary, it should permeate to the core of its parent discipline in all possible ways. It is in the underwater environment – distinguished from other archaeological matrices only by its wonderfully preservative wetness, anaerobic sediments, and relative freedom from human interference – that many of the discipline's most consequential advances will in future be made.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Bass, George Fletcher
- ▶ Crannog Investigations in Scotland
- ▶ Crumlin-Pedersen, Ole
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Deep-Water Archaeology
- ▶ Experimental Maritime Archaeology
- ▶ Freshwater Archaeology
- ▶ Frost, Honor
- ▶ Gould, Richard A.
- ▶ Green, Jeremy N.
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Maritime Historic Site Management for the Public
- ▶ Martin, Colin
- ▶ McGrail, Seán
- ▶ Modern Vessel Archaeology (Iron and Steel Wrecks)
- ▶ Muckelroy, Keith (Underwater and Maritime Archaeology)
- ▶ Ship Archaeology
- ▶ Steffy, J. Richard
- ▶ Throckmorton, Peter
- ▶ War at Sea Archaeology

References

Andersen, S.H. 1987. Tybrind Vig: A submerged Ertebølle settlement in Denmark. In *European wetlands in prehistory*, ed. J. Coles and A.J. Lawson, 253–280. Oxford: Oxford University Press.

Andersen, S.H. 2011. Ertebølle canoes and paddles from the submerged habitation site of Tybrind Vig, Denmark. In *Submerged prehistory*, ed. J. Benjamin, C. Bonsall, C. Pickard, and A. Fischer, 1–14. Oxford/Oakville: Oxbow.

Bass, G.F. 1966. *Archaeology under water*. London: Thames and Hudson.
Bass, G.F. 1967. Cape Gelidonya: A Bronze Age shipwreck. *Transactions of the American Philosophical Society* 57 (8).
Bowens, A. 2009. *Underwater archaeology: The Nautical Archaeology Society guide to principles and practice*. Oxford: Blackwell Publishing.
Delgado, J. 1997. *Encyclopedia of underwater and maritime archaeology*. London: British Museum Press.
Dixon, N. 2004. *The crannogs of Scotland: An underwater archaeology*. Stroud: Tempus.
Dumas, F. 1962. *Deep-water archaeology*. London: Routledge and Kegan Paul.
Gaffney, V., S. Fitch, and D. Smith. 2009. *Europe's lost world: The discovery of Doggerland*. York: Council for British Archaeology.
Gould, R. 1983. *Shipwreck anthropology*. Albuquerque: University of New Mexico.
Gould, R. 2000. *Archaeology and the social history of ships*. Cambridge: Cambridge University Press.
Hamilton, D.L. 1984. Preliminary report on the archaeological investigation on the submerged remains of Port Royal, Jamaica, 1981–1982. *International Journal of Nautical Archaeology* 13 (1): 11–25.
Henderson, J.C., C. Gallou, N.C. Flemming, and E. Spondylis. 2011. The Pavlopetri Underwater Archaeology Project: Investigating an ancient submerged town. In *Submerged prehistory*, ed. B. Ford, C. Bonsall, C. Pickard, and A. Fischer, 207–218. Oxford/Oakville: Oxbow.
Keisling, S. 1994. *Walking the plank: A true adventure among pirates*. Ashland: Nordic Knight.
Momber, G., D. Tomalin, R. Scaife, J. Satchell, and J. Gillespie, eds. 2011. *Mesolithic occupation at Bouldnor Cliff and the submerged prehistoric landscapes of the Solent*. York: Council for British Archaeology.
Morrison, I. 1985. *Landscape with lake dwellings*. Edinburgh: Edinburgh University Press.
Muckelroy, K. 1978. *Maritime archaeology*. Cambridge: Cambridge University Press.
Rule, M. 1982. *The Mary Rose: The excavation and raising of Henry VIII's flagship*. London: Conway Maritime Press.
Suter, P.J., and H. Schlichtherle. 2009. *UNESCO World Heritage candidature. Prehistoric pile dwellings around the Alps*. Bern: Palafittes.
Tchernia, A., P. Pomey, and A. Hesnard. 1978. L'épave romaine de la Madrague de Giens. *Gallia* (Supplement 34). Paris.

Further Reading

Bass, G.F. 2005. *Beneath the Seven Seas: Adventures with the Institute of Nautical Archaeology*. London: Thames and Hudson.
Benjamin, J., C. Bonsall, C. Pickard, and A. Fischer, eds. 2011. *Submerged prehistory*. Oxford/Oakville: Oxbow.
Catsambis, A., B. Ford, and D.L. Hamilton. 2011. *The Oxford handbook of maritime archaeology*. Oxford: Oxford University Press.
Gibbins, D., and J. Adams, eds. 2001. Shipwrecks. *World Archaeology* 32 (3).
Ruppé, C.V., and J.F. Barstad, eds. *International handbook of underwater archaeology*. New York: Plenum.
The International Journal of Nautical Archaeology, 1972–.

Underwater Archaeology in Bulgaria

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Geographical Settings

The coast line of the Bulgarian Black Sea has a length of 378 km. The coastal zone is seen as area which is genetically relevant with historical development of continental shelf as these territories were flooded and drying repeatedly.

The exclusive economic zone of the Republic of Bulgaria in the Black Sea has an area of about 35,000 km^2 as the bottom surface is approximately 44,000 km^2. The area of separate morphological components in the Bulgarian sector of the Black Sea is divided into continental shelf – 12,380 km^2, continental slope – 9380 km^2, continental foot – 12,970 km^2, and abyssal bottom – 8680 km^2. Considering that land territory of Bulgaria is about 111,000 km^2, it is clear that the prospects for underwater surveys of submerged landscapes and searching for sites related to human presence and utilization of marine resources are huge.

The Last Glacial Maximum shoreline of the Western Black Sea is thus believed to coincide with the 120 m isobath (Filipova-Marinova 2007), which is consistent with the figure reported for Mediterranean stable coastlines by Lambeck et al. (2011). This is a key to the ensuing geomorphological interpretations of the submerged landscapes of the Bulgarian continental shelf.

History of Maritime Archaeology in Bulgaria

Underwater archaeological fieldwork has taken place in Bulgaria since the end of the 1950s. The first underwater archaeological survey in Bulgaria has been held in 1959 at the aquatory of Cape Kallikara (Fig. 1). This expedition was accomplished by the Naval Museum – Varna but unfortunately the results are not published. In the same year, a few months later another expedition has been organized at the aquatory of Cape Maslen nos by National Archaeological Institute with Museum at the Bulgarian Academy of Sciences (Galabov 1960) (Fig. 2). Along the Strandzha mountain coast have been found for the first time lead stocks of antique wooden anchors in the Black Sea.

Between 1960 and the end of the 1980s, dozens of underwater archaeological expeditions took place to many sites in Bulgaria. At the aquatory of Nessebar peninsula, under the leadership of the researchers Ivan Venedikov and Lyuba Ognenova-Marinova, the study of the sunken quarters of ancient Messambria began. In the 1960s, Goranka Toncheva studied the remains of ancient wrecks, anchors, and port facilities on the North Bulgarian Black Sea coast in the areas of Cape Kaliakra, Kavarna, the Gulf of Varna, Cherni nos (Toncheva 1964). Again in the 1960s, Mihail Lazarov investigated the remains of ships and antique anchors on the Southern Bulgarian coast – Pomorie, Sozopol, Urdoviza (Lazarov 1975).

During this period, the Bulgarian underwater archaeology marks its beginning with field survey, which does not require the use of large amount of money. In Bulgaria, the first explorations are conducted entirely by Bulgarian investigators.

In the 1980s, the Bulgarian underwater archaeology started the active exploration of the sunken settlements on the coast, focusing on the issues related to palaeogeographical development of the Black Sea coast (Ivanov 1993; Lazarov 1993).

The most popular institutions for underwater archaeological investigations during this period are the Archaeological Museum in Varna, the Archaeological Museum – Burgas, the History Museum in Kavarna. The Thracology Institute of the Bulgarian Academy of Sciences and the

Underwater Archaeology in Bulgaria, Fig. 1 Western Bay of Cape Kaliakra, Bulgaria. (Photo: Author)

Underwater Archaeology in Bulgaria, Fig. 2 Finds from the first Bulgarian underwater archaeological survey. (Photo: Archaeological Museum – Varna, Bulgaria)

Center for underwater archaeology in Sozopol of the Ministry of Culture were founded in the 1970s.

Bulgarian underwater archaeology had hard days during the 1990s. Only episodic surveys of submerged prehistoric settlements (at Varna Lake, at the mouth of Ropotamo River and Sozopol) or wrecks (bay of Kiten – first half of the nineteenth century wreck) have been carried out.

For these more than 50 years, dozens of underwater archaeological surveys took place in many sites in Bulgaria. The investigations include submerged prehistoric settlements (Ivanov 1993; Draganov 1995; Angelova and Draganov 2003), quarters of ancient poleis (Lazarov 1975; Ognenova-Marinova 1975, 1980; Dimitrov et al. 1982), wrecks (Porozhanov 2000; Peev 2007, 2014). Over the years, the main achievements of Bulgarian maritime archaeology are discoveries of submerged Late Eneolithic and Early Bronze Age settlements, the first artificial harbor facilities along the Western Black Sea coast, which brought new architectural forms to the coastal cities, surveys of natural reefs used such port facilities, few Antique and Medieval wrecks, etc. In Bulgaria, underwater excavations are carried out on the wreck in Kiten bay (Batchvarov 2009) and on the prehistoric settlements Arsenala (Ivanov 1987), Sozopol, Ropotamo, and Kiten (Draganov 1995; Angelova and Draganov 2003).

A series of international scientific research projects which were dealing with a submerged archaeological heritage of Western part of the Black Sea are realized or ongoing. The results are published as chapters of several monographs (The Black Sea Flood Question 2017; Geology and Geoarchaeology of the Black Sea Region 2011; Submerged Prehistory 2011; Submerged Landscapes 2017, etc.). The scientific results of most recent Black Sea Maritime Archaeology Project are not published yet.

Deepwater Archaeology in Bulgaria

At the beginning of twenty-first century, deepwater archaeology starts to be the newest discipline in marine sciences. The main institution for deep sea archaeology in Bulgaria is the Institute of Oceanology of the Bulgarian Academy of Sciences as well as the Centre for Underwater Archaeology at the Ministry of Culture. Some of the recent deepwater archaeological projects at Skerki Bank in the Tyrrhenian Sea, off the coast of Ashkelon (Israel/Egypt), in the Aegean Sea, and in the Black Sea (Turkey, Bulgaria/Romania

and Ukraine) demonstrated that underwater archaeology can be accomplished with advanced techniques.

Among the principal aims in the Black Sea are the discovery and registration of submerged wooden vessels in the anoxic zone and the marking of targets on the continental shelf that might represent traces of submerged prehistoric settlements. This environment is exceptionally suitable for natural conservation of wood because anoxic waters are not suitable for existence of microorganisms decomposing wood, unlike in basins containing other kinds of water (Turner 1973). The archaeological research in deep sea waters poses a range of difficulties. These include but not are limited to sonar survey, target identification, and excavation (Mindell and Bingham 2001).

For the sonar search is used different types of facilities equipped with side scan sonar, sub-bottom profile, depressor, CTD sensor. Target identification and diagnostics in Bulgarian Black Sea are made by manned submersible equipped with round scan sonar and ROV. Remote excavation, even from ROVs, is still in its infancy and remains outside the range of current technology.

During 2001, the first deepwater archaeological survey was held on western Black Sea shelf (Peev 2004). It was wrought on five polygons in Romania and Bulgaria at depth between 70 and 350 m as more than 100 targets were registered. The main purpose of the sonar survey was registration of bottom-located sites, such as wrecks and submerged settlements.

Some recent deep sea archaeological projects demonstrated that maritime archaeology can be accomplished with advanced techniques.

Types of Underwater Cultural Sites in Bulgaria

In Bulgarian Black Sea, there are all of types of underwater historical and archaeological sites. They are united in four groups according to chronological periods and kinds.

The first group is submerged settlements and necropolis from Prehistoric times previously from the Eneolithic and the Early Bronze Age. The second group is antique quarters and harbor facilities. The third is shipwrecks. The fourth group is anchors.

Prehistoric Sites

The submerged prehistoric settlements bring valuable information about human societies along the sea coasts. The sites provide data of everyday life and human adaptation and also about environmental changes such as sea level fluctuations, climate change, etc. As a rule, they are found during building or dredging activities, and traces of them are house beams, pottery, bone objects. The problem of sunken prehistoric sites is a very serious topic and Bulgarian science has made a significant contribution.

Along the Bulgarian Black Sea coast, at least 18 submerged settlements are known dated to the second phase of the Late Eneolithic and Early Bronze Age (between 6500 and 4000 BP) (Ivanov 1993) and one prehistoric necropolis near Cape Shabla (Peev 2008) as all these sunken sites have been found at depth 6–9 m below present sea level (Fig. 3).

The sites have been defined in the scientific literature as "lake-dwellings" (Shkorpil and Shkorpil 1921). The modern researchers are unanimous that term "lake-dwelling" for the Western Black Sea should be used primarily as *terminus technicus.* Chronologically, they belong to the second phase of the Eneolithic Period and the Early Bronze Age (EAB). Since all of these sites have been damaged by construction work and none have been investigated with the methodology of underwater archaeology, the scientific analysis of these settlements has been limited to the determination of their cultural context and their chronological synchrony. The character and function of the sites have almost never been studied. All 18 settlements found to date lay 6–9 m below present sea level. Detailed analysis of existing results and some new data shows that all of these settlements were situated on the first unflooded river terraces, and not on wooden platforms or on pilots. This conclusion, to a great degree, determines the very characteristic of the habitations. Unfortunately, more sites have been

Underwater Archaeology in Bulgaria, Fig. 3 Clay find from Strashimirovo site. (Photo: Archaeological Museum – Varna, Bulgaria)

destroyed during building and trawling work, which has presented difficulties for the investigators. But despite these challenges, the first investigators of the submerged settlements were entirely correct in identifying the presence of four stratigraphical layers. Later, excavations using the methods of underwater archaeology confirmed these observations.

From the Varna-Beloslav firth, only the "Arsenala" site has undergone underwater investigations, on a small area of 25 m^2 (Ivanov 1987). The major result of these studies was the identification of two cultural layers (the Eneolithic and the EBA) without fixed house horizons, as determined from the cultural stratifications on the land. This is a result of the fast rising of the sea level (Peev 2014). The beams of the houses remain in situ and this led to the wrong conclusion that these beams were part of a wooden platform on which the ancient houses were built. Typical for the "Arsenala" site is the massive Early Bronze Age layer, which reaches a thickness of 3.5 m. Below it is situated a layer about 0.90 m thick, which is rich with sea mollusks. This layer is a hiatus for artifacts. The lower layer contains Eneolithic pottery, house beams, and animal bones. The thickness of this lower layer is also around 0.90 m.

Unlike the Varna-Beloslav Lake, along the South Bulgarian coast two of the sunken Prehistoric settlements have been investigated with comparative success: one at the aquatory of the harbor of Sozopol and one at Cape Urdoviza.

A data of prehistoric necropolis was obtained from the area of Cape Shabla (Peev 2008). Two burial sites are present, the first is at 6.5 m below present level, the other at 3.5 m below present level. These could be dated to the Eneolithic. The Sea level along the Bulgarian coast was at least 7 m below present (Peychev and Peev 2006). Without doubt the necropolis is related to the settlements Shabla I and/or Shabla II (Todorova 1984). The necropolis has not been studied.

Antique Sites

In Antiquity, especially after the Hellenic colonization, the port systems along the West Pontic coast expanded. From the Bulgarian Black Sea coast, a series of sunken ancient harbor artificial structure (Karantinata, at cape Galata, Sozopol) (Dimitrov et al. 1982) and parts of residential quarters of the Hellenic poleis are known (Bizone, Messambria) (Ognenova-Marinova 1975, 1980; Preshlenov 2008).

Until now, unequivocal evidence for an artificial harbor at Bizone has not been found (Toncheva 1970). Dimitrov and Orachev (1982) have described the harbour as being natural. There is evidence for the existence of an artificial structure in the eastern part of the Gulf of Kavarna at a depth of 3 m. During an underwater archaeological expedition in 2005, traces of buildings were found at depths of up to 3.5 m. In the modern port of Kavarna, a stone anchor, amphorae from the first c. AD and a coin from Hadrian's reign have been found (Salkin 2009). According to the findings, the harbor complex operated from the first to

second century AD until the end of the sixth century AD.

In the Gulf of Varna, four ancient ports are known (Kastritsi, Odessos, Karantinata, and Galata), and two of them have harbor structures – Karantinata and Galata (Toncheva 1964).

Shipwrecks

A preserved wooden wreck discovered at a depth of 171 m in the anoxic zone of the Black Sea is regarded as particularly intriguing from a scientific point of view. This is the first time that remains of ancient and medieval shipwrecks are registered at such depth in the Bulgarian Black Sea continental shelf. The site is located to the East of Cape Cherni nos on Bulgarian economic zone. The analysis showed that this is a ship from the end of sixteenth century.

A comparatively large wooden ship with a preserved length of 15 m was discovered at a depth of 81 m. The wreck is situated to the South-East of cape Kalliakra on the Varna parallel.

The most ancient wreck in deep-sea was found at depth 81 m to the East of Varna. The target is 13 × 4 m in size. The site is the amphorae cargo of an ancient ship (Fig. 4). The amphorae accumulation has a length of 7–8 m and a width of 1 m. Occurrences of amphorae are not rare in the Black sea region. The amphorae are made of yellow-brown to pink clay with a height of 101 cm and width 53 cm. This type of amphorae is distinctive for its outstanding height varying from 100 to 110 cm. The body is slim, set as a cone on a thick, high cylindrical foot. The mouth is also cylindrical and proportional to the size of the vessel. The crown is angularly building out. The handles are massive and oval in their cross-section. Chronologically, this type of amphorae is referred to the second–third century AD (Fig. 5).

The wreck site is located southeastern of cape Kaliakra on the parallel of Varna. The depth of wreck is 86 m. It presents an excellent preserved wooden sailing boat with length 52 m and width 8 m (Fig. 6). The ship is sunk on kell. The bowsprit was projecting to the bow and close under it could be seen the contours of the figurehead (probably female). The site presents two mast schooner. This type of ships is widespread in the nineteenth century including the Black Sea region. At this moment, more precise dating of the ship is impossible to be made, but according to the anchor type and ship structure, it could be referred to second half of the nineteenth century. The presence of female figure suggests that the origin of the ship is Western European.

Another one wreck has been found at depth 137 m. It is present a wooden sailing boat with length 35 m and width 6 m. The high of the site is

Underwater Archaeology in Bulgaria, Fig. 4 Amphorae cargo of ancient wreck. (Photo: Author)

Underwater Archaeology in Bulgaria, Fig. 5 Amphora dated second–third century AD. (Photo: Author)

up to 6 m over the surrounding relief. The shipwreck is lying on keel and there is no heel.

Anchors

Along the Western Black Sea coast are found a few hundred anchors including stone with groove and holes, wooden with stone and lead stocks, and iron (a several types) (Catalogue 1982; Hristov 2013) (Fig. 7). Most of them are coming from Bulgaria (especially stone anchors). Anchorages are very important for maritime history and archaeology because they provide additional information about navigation in the Black Sea region. It is frequent around anchorages be no findings in archaeological context.

The sites are located in area of intensive trawling of fishing vessels for hunting of rapana and turbots. Therefore, it is necessary the sites have to be studied prior to being caused damage to their integrity. The danger of destruction or injury of the sunken ancient ships is quite real.

Multidisciplinary marine investigations of archaeologists, oceanographers, and ocean engineers demonstrated that the deep-sea archeology has a great potential. It is appropriate that the areas where finds are expected to be declared as protected underwater areas. The outcome of the conducted research shows that the Bulgarian Black Sea region has a high potential for marine deepwater archaeological investigations. The use of contemporary underwater technology and equipment (ROVs and AUVs, sonar scans, etc.)

Underwater Archaeology in Bulgaria, Fig. 6 Wreck site located southeastern of cape Kaliakra (nineteenth century). (Photo: Author)

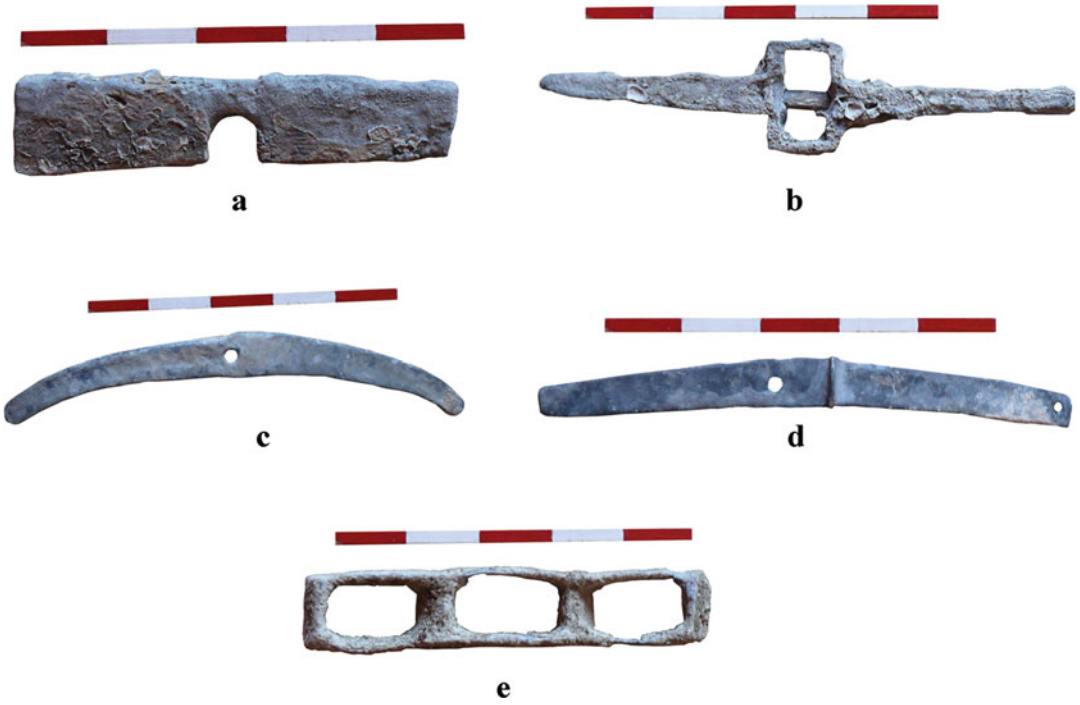

Underwater Archaeology in Bulgaria, Fig. 7 Types of lead stocks from wooden anchors from Bulgaria. (Photo: Author)

enables the collection of a large amount of data sufficiently adequate for the layout and chartering of the archaeological map of the deep sea part of the Black Sea.

Bulgaria: The National Legislation on Underwater Heritage

The first law on Bulgaria's underwater areas was adopted within the Fifth session of the Ninth Popular Congress of 08.07.1987 (SG, № 55/1987). On 28.01.2000, the Bulgarian Parliament adopts the Law on marine areas, internal waterways, and ports of Bulgaria (SG, № 12/2000). According to the Law, internal maritime waters include the area from the shore to the exit lines connecting Capes Caliacra, Tuzlata, and Ekrene; from the Gulf of Varna – between Cape St. Constantine and Cape Ilangik; from the Gulf of Burgas – between Cape Emine and Cape Maslen and between Cape Maslen and Cape Rohi.

Bulgaria's marine territorial waters stretch for 12 nautical miles, with a total area of 9000 km^2 over which Bulgaria exercises its sovereignty. The adjacent area stretches for 24 nautical miles from the exit lines, and represents the area where Bulgaria exercises control when customs, tax, border, or health procedures are infringed.

An area of major economic interest for Bulgaria is, according to Order № 77/07.01.1987 of the State Council, the area stretching over a distance of 200 nautical miles from the exit lines.

In 1997, an Agreement was concluded with Turkey, with a similar agreement pending with Romania. With regards to performing scientific research, Bulgarian legislation provisions that any scientific studies carried out in the abovementioned territories shall be performed by responsible Bulgarian institutions, based on programs and projects having prior approval from

competent Bulgarian authorities. The means of protecting cultural heritage are provisioned in the national legislation (laws and government decisions), as well as by the international conventions ratified by Bulgaria.

The most important law on the cultural heritage of the Republic of Bulgaria is the Law on Cultural Heritage (Published in SG № 19 of 13.03.2009, republished with changes in SG № 66 of 23.07.2013). In this law, the protection and conservation of cultural heritage, including nonmaterial, industrial, underwater, and cultural landscape, is provisioned in detail. The Law on Cultural Heritage provisions detailed measures of protecting the archaeological heritage on the territory of the Republic of Bulgaria. Through Ordinance № N-00-0001 of 14.02.2011 regarding the performance of on-site archaeological studies, issued by the Minister of Culture, published in the SG № 18 of 1.03.2011, with the latest changes and completions published in SG № 30 of 17.04.2012, there are established all the activities that can be performed on-site within the archaeological studies realized. Ordinance no. N-2 of 6.04.2011 stipulates the creation, maintenance, and provision of information within the automated informational system "Archaeological Map of Bulgaria," issued by the Minister of Culture and published in the SG № 32 of 19.04.2011.

The Centre for Underwater Archaeology at the Ministry of Culture operates in Bulgaria. In 1978, Base for maritime research was established in Bulgaria, which in 1986 was renamed as Center for maritime history and archaeology. Since ,1991 the Center has its current name. The first leaders are Kalin Porozhanov and Ventsislav Popov, followed by Hristina Angelova and Kalin Dimitrov (Porozhanov and Lazarov 1994–2002) This is a state cultural institute to protect the underwater archaeological heritage of the Republic of Bulgaria. Its activity is set up through the Law on Cultural Heritage. The Centre for Underwater Archaeology coordinates the activities related to the management and study of underwater archaeological heritage, having a Register of underwater cultural heritage.

Conclusions

The shelf zone of the Black Sea is subject of intense economic activities – fishing, *Rapana* hunting, dredging of ports and fairways, traces of oil and gas pipelines, underwater cables, yield of oil and gas, etc. This activity causes irreversible damage as to underwater cultural heritage as to biological diversity. In the littoral areas, the cultural heritage is subjected to continuous destructive waves. All this demands systematic surveys aiming studying, conservation, and preservation of the sites. Using of advanced underwater technologies and equipment (side-scan sonars, round-scan sonars, human operated vehicles, research submarines) allows the accumulation of sufficient data for the compilation of the archaeological map of the deep part of the Black Sea and the clarification and understanding of marine cultural processes relevant in this region.

The effect of the study of the Bulgarian underwater cultural heritage and submerged landscapes is expected to change the existing ideas about the nature of some geological events occurring through the Holocene on the Western Black Sea coast, which have reflected on the prehistoric cultures and historical development in the South-Eastern Europe. At the moment are known more than 100 submerged archaeological sites (settlements, wrecks) and potential archaeological landscapes on the littoral zone as well as on the continental shelf across Bulgarian marine territory. The preliminary results showed that the Western Black Sea continental shelf has a great potential for future marine exploration in the area of underwater archaeology in the Pan-European context.

References

Angelova, H., and V. Draganov. 2003. Underwater archaeological excavations of submerged Late Eneolithic and Early Bronze Age settlements in Kiten Sozopol (Soutn Bulgarian Black Sea coast). *Thracia Pontica* 6 (2): 9–22.

Batchvarov, K. 2009. Design and construction of a Black Sea ottoman ship. In *Wetween continents. Proceedings*

of the twelfth symposium on boat and ship archaeology, ed. N. Gunsenin, 175–182. Istanbul: Ege Yayinlari.

Benjamin, J., C. Bonsall, C. Pickard, and A. Fischer, eds. 2011. *Submerged Prehistory*. Oxford: Oxbow Books.

Buynevich, I., V. Yanko-Hombach, A. Gilbert, and R. Martin, eds. 2011. *Geology and Geoarchaeology of the Black Sea Region: Beyond the Flood Hypothesis*. Vol. 473. Boulder: Geological Society of America.

Catalogue of Stone Anchors. 1982. *Thracian monuments 3. The Megaliths in Thrace*, Sofia, 467–486.

Dimitrov, B., and A. Orachev. 1982. Пристанищната система по Западнопонтийското крайбрежие (средата на II – I хилядолетие пр. н. е.) The harbor system on the West Pontic coast (mid II – I millennium BC). *Arheologia* 1: 1–11 (in Bulgarian).

Dimitrov, B., K. Porozhanov, and A. Orachev. 1982. Пристанищата на Аполония и Месамбрия (The harbors of Appolonia and Mesambria) *Thracian monuments 3. The Megaliths in Thrace*, 438–458. (in Bulgarian).

Draganov, V. 1995. Submerged coastal settlements from the Final Eneolithic and the Early Bronze Age in the sea around Sozopol and Urdoviza Bay near Kiten. In *Prehistoric Bulgaria*, ed. D. Bailey and I. Panayotov, 225–241. Madison: Prehistory Press.

Filipova-Marinova, M. 2007. Archaeological and paleontological evidence of climate dynamics, sea-level change, and coastline migration of the Bulgarian sector of the Circum-Pontic region. In *The Black Sea flood question: Changes in coastline, climate, and human settlement*, ed. V. Yanko-Hombach, A. Gilbert, N. Panin, and P. Dolukhanov, 453–482. Dordrecht: Springer.

Flemming, N., J. Harff, D. Moura, A. Burgess, and G. Bailey, eds. 2017. *Submerged Landscapes of the European Continental Shelf: Quaternary Paleoenvironments*. Chichester: Wiley Blackwell.

Galabov, I. 1960. Експедиция Маслен нос (Expedition Maslen nos). *Podvoden sport* 7-8: 19–22 (in Bulgarian).

Hristov, I. 2013. *Antique stone anchors, stone and lead anchor stocks from the collection of the national museum of history (end of 2nd ml BC – 3rd century AD)*. Sofia: Unicart.

Ivanov, I. 1987. *Подводни археологически проучвания на селище Арсенала (Underwater archaeological investigation of Arsenala site). Arheologicheski otkritiya i razkopki prez 1986*, 281–283. Razgrad (in Bulgarian): Bulgarian Academy of Sciences.

Ivanov, I. 1993. A la question de la localisation et des etudes des sites submerges dans les lacs de Varna. *Pontica* 26: 19–26.

Lambeck, K., F. Antonioli, M. Anzidei, L. Ferranti, G. Leoni, G. Scicchitano, and S. Silenzi. 2011. Sea level change along the Italian coast during the Holocene and projections for the future. *Quaternary International* 232: 250–257.

Lazarov, M. 1975. *Потъналата флотилия (the sunken fleet)*. Varna: Georgi Bakalov (in Bulgarian).

Lazarov, M. 1993. Les sites submergés le long du Port Ouest dans le contexte de l'historie pontique et méditerranéenne. *Pontica* XXVI: 7–18.

Mindell, D., and B. Bingham. 2001. New archaeological uses of autonomous undersea vehicles. In *Oceans 2001 conference*. Honolulu: MTS/IEEE.

Ognenova-Marinova, L. 1975. Подовдни проучвания в Несебър (Underwater explorations in Nesebar). *Vekove* 3: 43–48 in Bulgarian.

Ognenova-Marinova, L. 1980. Le systeme de defense hellenique de Mesambria du cote nord a la lumiere des recherches sous-marines, Nessebre II, 96–109.

Peev, P. 2004. Българско – американска дълбоководна експедиция "Черно море 2002" (Bulgarian – American deepwater expedition "Black Sea 2002"). In: "Black Sea between east and West. IXth Pontic lectures", Varna, pp 295–299 (in Bulgarian).

Peev, P. 2007. Advanced technology in deep – Sea archaeology applied in the Black Sea region. In: *In Honorem Annorum LXX Mihaili Lazarov. Acta Musei Varnaensis*, V. Varna, 521–529.

Peev, P. 2008. Underwater sites in the area of cape Shabla (North-East Bulgaria). In *Geoarchaeology and Archaeomineralogy. Proceedings of the International Conference 29–30 October – Sofia*, ed. R. Kostov, B. Gaydarska, and M. Gurova, 303–304. Sofia: St. Ivan Rilski.

Peev, P. 2014. Палеогеография на пристанищните басейни в древната морска история и археология на Западното Черноморие (Palaeogeography of the harbor basins in the ancient maritime history and archaeology along the Western Black Sea). Unpublished PhD thesis. Institute of Oceanology, Varna (in Bulgarian).

Peychev, V., and P. Peev. 2006. *Еволюция на българското черноморско крайбрежие след ранния холоцен (Evolution of the Bulgarian Black Sea coast after the early Holocene)*. Varna: Slavena (in Bulgarian).

Porozhanov, K. 2000. Потъналият кораб при Урдовиза (предварителни бележки) The sunken ship near Urdoviza (preliminary notes). *Bulletin de Musee National de Bourgas* 3: 149–154 (in Bulgarian).

Porozhanov K, Lazarov M (1994/2002) Подводната археология в България и древната морска история на Западното Черноморие (Underwater archaeology in Bulgaria and ancient maritime history on the Western Black Sea). In *The Beginning*, ed. I. Gatsov, 202–221. Sofia: New Bulgarian University (in Bulgarian).

Preshlenov, Ch. 2008. Morphodynamics of the Coastal Zone of the Nessebar Peninsula (Bulgaria): Archaeological and Geological Benchmarks. In *Geoarchaeology and Archaeomineralogy. Proceedings of the International Conference 29–30 October – Sofia*, ed. R. Kostov, B. Gaydarska, and M. Gurova, 305–307. Sofia: St. Ivan Rilski.

Salkin, A. 2009. Underwater research in the Gulf of Kavarna, *50 Anniversary of Underwater* Archaeology *in Bulgaria 30 October 2009*, Varna.

Shkorpil, H., and K. Shkorpil. 1921. Наколни постройки в езерото (Lake-dwellings in the lake). *Izvestiya na Varnenskoto Arheologichesko Druzhestvo* 7: 79–80 (in Bulgarian).

Todorova, H. 1984. Добруджа през праисторическата епоха (Dobrudzha during Prehistoric Age). In *History of Dobrudzha tome 1*, ed. A. Fol and S. Dimitrov, 23–71. Sofia: BAS (in Bulgarian).

Toncheva, G. 1964. *Потънали пристаница (sunken harbours)*. Varna: Durzhavno izdatelstvo (in Bulgarian).

Toncheva, G. 1970. Подводни проучвания по западното черноморско крайбрежие (Underwater explorations on the Western Black Sea coast). *Podvoden svyat* 6: 10–15 (in Bulgarian).

Turner, R. 1973. Wood – Boring bivalves opportunistic species in the deep sea. *Science* 180 (4093): 1377–1379.

Yanko-Hombach, V., A. Gilbert, N. Panin, and P. Dolukhanov, eds. 2017. *The Black Sea Flood Question: Changes in coastline, climate, and human settlement*. Dordrecht: Springer.

Underwater Cultural Heritage: International Law Regime

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Introduction

The greatest museum of human civilization lies on the seabed. Until the nineteenth century, almost 5% of all seagoing ships were lost every year, be it for storms, incidents of navigation, or naval battles.

Today, the capacity of some states and private entities to use advanced technological means to explore the seabed at increasing depths – for instance, the wreck of the *Titanic* was found in 1985 at 3,798 m below the sea level – not only allows access to a huge cultural heritage but also entails the risk of such heritage being looted or used for private commercial gain.

Key Issues

Different Models in National Legislation

Different approaches can be found in national legislation, based on the priority that the states concerned give to public or to private interests. Two examples are given hereunder.

In Italy, the underwater cultural heritage found within the 12-mile territorial sea falls under the general regime set forth in the "Code of Cultural Properties and Landscape" (Legislative Decree 22 January 2004, No. 42). Research in the field of archaeological and cultural properties is reserved to the Ministry for Cultural Properties and Activities or to the public or private subjects who have been authorized by the ministry. Anyone who fortuitously discovers cultural properties is bound to inform within 24 h the competent public authority. The removal and taking into custody of the properties are permitted only where there is no other means to ensure their security until the intervention of the public authorities.

All the cultural properties found by anyone in the subsoil or on the seabed belong to the state demesne, if immovable, or to the inalienable patrimony of the state, if movable. The finder is entitled to a reward which is paid by the ministry and cannot exceed one-fourth of the value of the properties (if they are found at sea, the reward corresponds to one-third of their value, as provided by the 1942 Navigation Code). The reward may be paid either in money or through the cession of part of the properties.

The state and the other public institutions are bound to ensure the use of cultural properties for the public benefit. Initiatives for the preservation and promotion of cultural properties may be sponsored through contributions by private subjects.

The Italian legislation is a clear example of a regime based on priority given to the interest of the state to preserve the cultural heritage for the purposes of public interest, in particular, research and exhibition. Private interests are given a limited weight and are subject to state authorization.

The US courts apply to the underwater cultural heritage the law of salvage and law of finds, belonging to the body of admiralty law. In many countries, the notion of salvage is only related to the attempts to save a ship or property carried by it from imminent marine peril. But the US courts apply the concept of salvage also to ancient sunken ships and to objects removed from wrecks which, far from being in peril, have been lost since long time.

For example, the US Court of Appeals for the Fourth Circuit in the decision rendered on 24 March 1999 (case *R.M.S. Titanic, Inc. v. Haver*) stated that the law of salvage and finds is a "venerable law of the sea." It is said to have arisen from the custom among "seafaring men" and to have "been preserved from ancient Rhodes (900 BCE), Rome (Justinian's *Corpus Juris Civilis*) (533 CE), City of Trani (Italy) (1063), England (the Law of Oleron) (1189), the Hanse Towns or Hanseatic League (1597), and France (1681), all articulating similar principles." Coming to the practical result of such a display of legal erudition, the law of salvage, which applies where the owner of the wreck is known, gives the salvor a lien (or right in rem) over the object until a reward is paid to him by the owner. The law of finds, which applies when the owner of the wreck or the sunken objects is not known, means that "a person who discovers a shipwreck in navigable waters that has been long lost and abandoned and who reduces the property to actual or constructive possession becomes the property's owner."

The fact remains that the body of "the law of salvage and other rules of admiralty" is today typical of a few common law systems, but is a complete stranger to the legislation of the majority of other countries. For instance, no Italian lawyer (with the laudable exception of a few scholars) would today know what this "venerable" law is, despite the fact that the cities of Rome and Trani, which are said to have contributed to it, are located somewhere in the Italian territory. Nor is it understandable how a body of rules that is said to have developed in times when nobody cared about the underwater cultural heritage could today provide any sensible tool for the protection of the heritage in question. Yet it seems that some American courts are endowed with extraordinary qualities: They have access to all the ancient sources from where such a "venerable law of the sea" can be inferred, they know all the mysterious languages in which the relevant rules have been written, and they are able to interpret such rules correctly and seize the intrinsic consistency between one source and the other. This is impressive indeed.

But those who are not impressed by such a display of legal erudition are inclined to suppose that the almost theological expressions employed to support the application of the law of salvage and the law of finds (such as "return to the mainstream of commerce," "admiralty's diligence ethic," and "venerable law of the sea") are dubious euphemisms. They disguise a "first-come-first-served" or "freedom-of-fishing" approach based on the destination of underwater cultural heritage for the private interest of the finder. Private appropriation and commercial sale are the most likely destiny of the removed artifacts which are considered as "market instruments."

In a number of cases, American courts have granted rights on the basis of the law of finds to treasure hunter corporations which claimed ownership over gold, silver, and artifacts taken from sunken Spanish galleons, such as the *Nuestra Señora de Atocha* (sunk in 1622) or *San Christo del Valle* and *Nuestra Señora de la Concepción* (both sunk in 1715). However, by a judgment on 21 July 2000 on the case of the Spanish vessels *La Galga* and *Juno*, lost, respectively, in 1750 and 1802, the US Court of Appeals for the Fourth Circuit dismissed the claims of the salvor and decided that the rights of a the state of Spain over state ships and property carried by them are not subject to prescription unless they are explicitly renounced by the state concerned. More recently, the US District Court, Middle District of Florida, Tampa Division, by an order made on 22 December 2009, ordered the salvor to return to Spain 594,000 silver coins and other artifacts removed from the wreck of the Spanish galleon *Nuestra Señora de las Mercedes*.

Sometimes coastal states have resorted to regulations applying on a case-by-case basis. For example, by Order No. 14 of 1995, Ireland

defined the site of the wreck of the British liner *Lusitania*, hit in 1915 by a torpedo launched by a German submarine, as a restricted area where no person is allowed to "tamper with, damage, or remove any part of the wreck."

The Counterproductive UNCLOS Scheme

At the international level, the main instrument applying to all kinds of marine activities is the United Nations Convention on the Law of the Sea (hereinafter: UNCLOS), a treaty adopted in 1982 and today (August 2018) binding on 168 parties. Within such a comprehensive achievement of codification, composed of 320 articles and 9 annexes, only 2 provisions (Arts. 149 and 303) are devoted to the underwater cultural heritage (Strati 1995). Yet the UNCLOS regime for underwater cultural heritage is largely insufficient and, as regards the effects of Art. 303, para. 3, can even be considered as counterproductive.

Art. 303, para. 1, UNCLOS puts forward a very general obligation of protection of underwater cultural heritage, providing that "States have the duty to protect objects of an archaeological and historical nature found at sea and shall co-operate for this purpose." Although in a very convoluted wording, para. 2 grants the coastal states the right to establish a 24-mile contiguous zone (in most cases, 12 miles of territorial sea and 12 miles of contiguous zone) for the objective of protecting archaeological and historical objects. No specific provision is included in the UNCLOS for the underwater cultural heritage found within the 200-mile exclusive economic zone. However, para. 3, at least in its English official text, subjects any obligation of protection and conservation of the underwater cultural heritage to a completely different set of rules:

> "Nothing in this article affects the rights of identifiable owners, the law of salvage and other rules of admiralty or laws and practices with respect to cultural exchanges."

It thus appears that salvage law and other rules of admiralty are given an overarching status by the UNCLOS. If there were a conflict between the objective to protect the underwater cultural heritage, on the one hand, and the provisions of salvage law and other rules of admiralty, on the other, the latter would prevail. This means that, availing himself of the principle of freedom of the sea, any person on board a ship could explore the continental shelf adjacent to any coastal state, bring archaeological and historical objects to the surface, become their owner, carry them into certain countries, and sell them on the private market.

If this is the case, there is no guarantee that the objects are disposed of for the public benefit rather than for private commercial gain. Nor could a state which has a direct cultural link with the objects prevent the continuous pillage of its historical heritage. The danger of a "first-come-first-served" or "freedom-of-fishing" approach in the field of underwater cultural heritage is far from being only theoretical. Art. 303, para. 3, of the UNCLOS can be seen as oriented more to the protection of appropriation or looting of underwater cultural heritage than to the protection of the heritage itself.

The second relevant UNCLOS provision (Art. 149) deals with the underwater cultural heritage found in the so-called Area, that is, the seabed beyond the limits of the 200-mile exclusive economic zone of coastal states:

> "All objects of an archaeological and historical nature found in the Area shall be preserved or disposed of for the benefit of mankind as a whole, particular regard being paid to the preferential rights of the State or country of origin, or the State of cultural origin, or the State of historical and archaeological origin."

While vague in its content, Art. 149 shows a preference for those uses of archaeological and historical objects that ensure the "benefit of mankind as a whole." Private interests are given little weight, if any. Some categories of states which have a link with the objects are granted preferential rights, although Art. 149 does not specify the content of these rights and the manner in which they should be harmonized with the concept of "benefit of mankind as a whole."

The 2001 UNESCO Convention

On 2 November 2001, the Convention on the Protection of the Underwater Cultural Heritage (hereinafter: CPUCH) was adopted in Paris with the United Nations Educational, Scientific and Cultural Organization (UNESCO) (Camarda et al.

2002; O'Keefe 2002; Garabello et al. 2003; Dromgoole 2006, 2014). It applies to "all traces of human existence having a cultural, historical or archaeological character which have been partially or totally under water, periodically or continuously, for at least 100 years" (Art. 1, para. 1, *a*).

The CPUCH may be seen as a reasonable defense against the counterproductive regime of the UNCLOS. The basic defensive tools are the elimination of the undesirable effects of the law of salvage and finds and the exclusion of a "first-come-first-served" approach for the heritage found within the exclusive economic zone:

Under Art. 4 of the CPUCH:

> "Any activity relating to underwater cultural heritage to which this Convention applies shall not be subject to the law of salvage or law of finds, unless it:
> (a) is authorized by the competent authorities, and
> (b) is in full conformity with this Convention, and
> (c) ensures that any recovery of the underwater cultural heritage achieves its maximum protection."

This provision is to be understood in connection with Art. 2, para. 7, of the CPUCH ("underwater cultural heritage shall not be commercially exploited") and with the rules contained in the annex, which form an integral part of the CPUCH. In particular, according to rule 2 of the annex:

> "The commercial exploitation of underwater cultural heritage for trade or speculation or its irretrievable dispersal is fundamentally incompatible with the protection and proper management of underwater cultural heritage. Underwater cultural heritage shall not be traded, sold, bought or bartered as commercial goods."

While not totally excluding the application of law of salvage and law of finds, the CPUCH regime has the practical effect of preventing all its undesirable effects.

To fill the gap left open by the UNCLOS, the majority of the countries participating in the negotiation for the CPUCH were ready to extend the jurisdiction of the coastal state to the underwater cultural heritage found within the exclusive economic zone. However, a minority of states assumed that the extension of the jurisdiction of coastal states beyond the 12-mile limit of the territorial sea would have altered the delicate balance embodied in the UNCLOS between the rights and obligations of the coastal state and those of other states within the exclusive economic zone.

To find a compromise, the CPUCH includes a three-step procedure, based on, first, reporting; second, consultations among the states having a verifiable interest to the underwater cultural heritage concerned; and, third, urgent measures to be taken by the coastal state, acting on behalf of the state parties as a whole and not in its own interest.

The annex to the CPUCH sets forth a number of rules concerning activities directed at underwater cultural heritage. They are divided into different sections, namely, general principles; project design; preliminary work; project objective, methodology, and techniques; funding; project duration/timetable; competence and qualifications; conservation and site management; documentation; safety; environment; reporting; curation of project archives; and dissemination.

The text of the CPUCH, which was the outcome of a long-lasting negotiation, could not be adopted by consensus. It was put to vote (87 states in favor, 4 against, and 15 abstentions). Some states could not accept the coastal state's right to adopt provisional measures and the regime applying to warships. However, not only the great majority of developing countries but also several among the industrialized countries cast a positive vote (e.g., Australia, Canada, China, Japan, New Zealand, the Republic of Korea, Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, Portugal, and Spain).

The CPUCH has entered into force on 2 January 2009 and is today binding only on 60 states. Sadly enough, it appears that the sensible message coming from the CPUCH has not yet been fully appreciated.

The Agreements Relating to Specific Wrecks

Art. 303 of the UNCLOS does not prejudice "other international agreements and rules of international law regarding the protection of objects of an archaeological and historical nature" (Art. 303, para. 4). In fact, some specific agreements

have so far been concluded by states interested to protect wrecks of particular importance for their national historical and cultural heritage. These agreements provide for forms of cooperation between the coastal and the flag state.

Reference can be made to the 1972 agreement between Australia and the Netherlands concerning old Dutch shipwrecks, namely, the *Batavia*, the *Vergulde Draeck*, the *Zuytdorp*, and the *Zeewijk* which sank, respectively, in 1629, 1656, 1712, and 1727; the 1989 exchange of notes between South Africa and the United Kingdom on the wreck of the British warship *Birkenhead* (sunk in 1852); the 1989 agreement between France and the United States on the wreck of the *Alabama*, belonging to the Confederate States of America and lost in battle in 1864; the 1997 memorandum of understanding between Canada and the United Kingdom on the exploration, recovery, and disposition of the *HMS Erebus* and *HMS Terror*, two wrecks lost during the attempt made in 1846 by Sir John Franklin to search for the Northwest Passage; the 2001 agreement between France and the United States on the French wreck of *La Belle*, which sank in 1686 off the coast of Texas; and the 2000 agreement (not yet in force) between Canada, France, the United Kingdom, and the United States concerning the shipwreck of the British liner *Titanic*, sunk in 1912.

Cross-References

► Underwater Sites in Archaeological Conservation and Preservation

References

Camarda, G., and T. Scovazzi, eds. 2002. *The protection of the underwater cultural heritage – Legal aspects*. Milan: Giuffre.

Dromgoole, S., ed. 2006. *The protection of the underwater cultural heritage – National perspectives in light of the UNESCO convention 2001*. Leiden: Brill.

Dromgoole, S. 2014. *Underwater cultural heritage and international law*. Cambridge, MA: Cambridge University Press.

Garabello, R., and T. Scovazzi, eds. 2003. *The protection of the underwater cultural heritage – Before and after the 2001 UNESCO convention*. Leiden: Brill.

O'Keefe, P. 2002. *Shipwrecked heritage: A commentary on the UNESCO Convention on Underwater Cultural Heritage*. Leicester: Institute of Art and Law.

Strati, A. 1995. *The protection of the underwater cultural heritage: An emerging objective of the contemporary law of the sea*. The Hague: Springer.

Underwater Sites in Archaeological Conservation and Preservation

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Introduction

Exceptional preservation is one of the reasons why underwater cultural heritage stands out (Fig. 1). This applies both to sites occurring at the water bottom's surface and to those that are buried deeply in underwater sediments. The waterlogged, anaerobic, and often anoxic conditions warrant that not just stone, ceramics, and other durable materials are preserved but all kinds of organic materials – artifacts and ecofacts – as well. This applies to sites of all periods, including early prehistory (Fig. 2). It is one of the aspects that define the high resolution of archaeological information contained in submerged wetland sites and in sites issuing from wreck.

Exceptional preservation, however, does not mean that the issues involved in archaeological conservation and preservation are any less complicated. Quite to the contrary. Paradoxically, exceptional preservation translates into a high level of vulnerability of sites, contexts, assemblages, and individual objects. All interference disturbs the chemical and physical equilibrium between archaeological material and its environment. That is true on land but is even more pointedly the case for underwater environments. As a consequence of growing attention for underwater

Underwater Sites in Archaeological Conservation and Preservation, Fig. 1 The remains of a seventeenth-century shipwreck and the sculptures adorning its deck equipment are a telling example of how exceptional submerged conservation conditions can be. The Dutch cargo vessel, commonly denoted as "The Ghost Ship" (Eriksson and Rönnby 2012), sits upright at a depth of 130 m in the Baltic. © Deep Sea Productions

Underwater Sites in Archaeological Conservation and Preservation, Fig. 2 A Mesolithic antler ax with wooden shaft illustrates the level of conservation of submerged prehistoric sites, in this case at Gamborg Fjord, Denmark, where the unconsolidated site is subject to erosion. © H. Dal

sites – both in research and heritage management – the conservation and preservation of archaeological objects from maritime or waterlogged environments has developed into a specific branch of conservation science (e.g., Pearson 1987; Björdal 2000; Memet 2008). At the start it built heavily on experience with conservation for purposes of display, but research into in situ conservation and preservation of objects and sites in an underwater environment has developed in tandem. It intensified over the last decade (Björdal et al. 2012; Gregory and Matthiesen 2012).

Metals are a special case. Unlike organic materials, the preservation of metals is not exponentially better in an underwater environment. Corrosion and degradation tend to be aggressive, especially in salt water. Iron of different qualities and composition is particularly prone to react strongly. Depending on the material in its vicinity, such as sand and calcareous organic debris, a hard, irregular, and brittle shell tends to form around it. The resulting lumps are called concretions; their significance is unrecognizable and not just to the untrained eye. Despite their ugly appearance, they may be significant information carriers, even if the object which caused their formation has completely dissolved (Fig. 3). For other metals, with the exception of most inert ones, it is as true as for iron that corrosion and degradation processes will slow down and come to a near standstill once a protective cover has formed. These processes will set in with renewed vigor if the equilibrium with the environment is disturbed, even a little.

Providing for as stable an environment as possible is therefore the key to the archaeological conservation and preservation of underwater sites.

Underwater Sites in Archaeological Conservation and Preservation, Fig. 3 Underwater iron objects will transform into so-called concretions, ugly lumps of which the significance eludes the casual observer. Yet, such concretions can hold significant artifacts or significant archaeological information, even if the object which caused their formation has completely dissolved. The lower image graphically explains that concretions can form relatively quickly and that it is a bad idea to hammer away on them, and not just for archaeological reasons. (Photo: Jens Auer) © SDU-MAP

Definition

Underwater sites have a special place in archaeological conservation and preservation. Underwater environments have warranted exceptional preservation of archaeological traces and remains. Moreover, underwater environments often preserve archaeological remains that dry land environments do not. Objects retrieved from underwater sites have stimulated fundamental conservation science research. The ongoing exploration of the underwater world and the intensified use of underwater and offshore environments have a profound impact on ongoing preservation and degradation as well as on our knowledge about them. Although underwater sites can be extremely vulnerable, they provide abundant information and stimuli for conservation research. Research relating to in situ preservation is rapidly developing, and so are monitoring techniques. Archaeological conservation and preservation of underwater sites is therefore not necessarily more difficult than conservation and preservation on land, but special challenges remain. Just like on land, the central issues to be resolved are not of a technical nature. Rather, they relate to responsible management and to the compatibility of preservation with access, use, and enjoyment of the cultural heritage that underwater sites entail.

Key Issues/Current Debates/Future Directions/Examples

Conservation research and common sense have come together in the deployment of simple but very effective measures of conservation and preservation of underwater archaeological sites. Sandbags and cheap polypropylene netting are not expensive and can be used effectively to isolate vulnerable deposits from mechanical damage, the influence of currents, and biochemical degradation (see examples in Grenier et al. 2006a) (Fig. 4). Gravel has been used in other circumstances (Fig. 5). Underwater ruins have been consolidated with stones, mortar, and various covers.

A key issue in archaeological conservation and preservation of sites is, however, that all efforts depend on their management. General management policies are an important part of it, but specific measures targeted at the archaeological conservation and preservation of a specific site depend on a site management plan, however rudimentary this may be. Management depends on authority and responsibility, and these are only assumed if there is jurisdiction and control. Successful examples of specific in situ measures, whether they are in inland waters, the North Sea, the Baltic, the Mediterranean, the Indian Ocean, the Atlantic, the Caribbean, or the Pacific

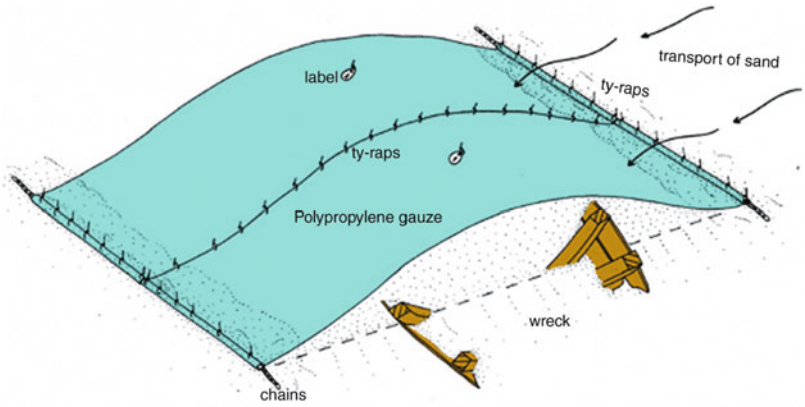

Underwater Sites in Archaeological Conservation and Preservation, Fig. 4 The principle of using cheap polypropylene netting to catch sediment in transport in order to cover or backfill exposed remains that are vulnerable to mechanical, chemical, and biological degradation has been well proven in many places of the world. © Martijn Manders – RCE

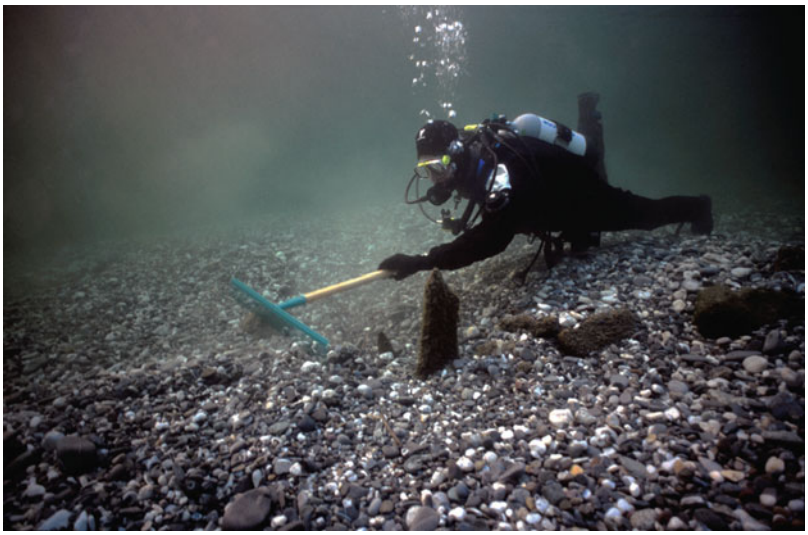

Underwater Sites in Archaeological Conservation and Preservation, Fig. 5 Gravel is applied as the top layer in the archaeological conservation and preservation of prehistoric sites in Lake Konstanz, Germany. Circum-Alpine pile dwelling sites in Switzerland, Austria, France, Germany, Italy, and Slovenia were inscribed on the UNESCO World Heritage Site list in 2011. (Photo: Joachim Köninger). © Landesamt für Denkmalpflege Baden-Württemberg

(all seven have their examples), are limited to situations where a "competent authority" takes responsibility and almost all examples are in relatively shallow water and close to the shore. Admittedly, these are also the situations where most attention of archaeologists and laypersons has been, but there are many areas where one could wish that developments had taken off as well.

Obviously, zones without any preservation strategies include areas with deficient cultural heritage management. This may be due to the absence of a competent authority, although most countries nowadays have one. It can also happen in cases where heritage management is organized at the local or regional level of government for which the sea is beyond the horizon. Under such circumstances, conservation of underwater sites remains limited or absent altogether. It is remarkable that it can also lead to complete overshadowing of conservation policies at sea. A coastal state has some measure of authority over marine scientific research and an

environmental responsibility in maritime zones such as the Continental Shelf and Exclusive Economic Zone, even though these are international waters (Dromgoole 2013). If heritage is generally organized at a lower government level, it can happen that economic, maritime, fisheries, or defense authorities are completely unaware of heritage conservation principles. As a result they may not notice any need or may take badly informed decisions that directly destroy underwater sites for uninformed reasons, profiting the treasure-hunting industry in sheer contravention of what the same country finds acceptable on land. Examples from Europe, the Americas, and Asia illustrate the point and emphasize the importance of further promotion of the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001. That such blank zones continue to exist is the more surprising since very remote sites, such as that of the famous *Titanic*, are now subject to protection (Varmer and Aznar 2012).

On a site-specific level, sandbags and other types of cover may be cheap and effective, but they share the dilemma of many measures of archaeological conservation and preservation in that they make in situ remains inaccessible. The purpose is to make sites inaccessible for destructive agents, but it makes them inaccessible for enjoyment as well. The context determines whether that is a problem or not. In the context of the sturdy submerged classical harbor works of Caesarea Maritima, archaeological conservation only enhances visitor experience (Raban 2009). In the context of the exceptional Grotte Cosquer (Clottes and Courtin 1996), underwater conservation follows the logic of conservation of Paleolithic cave art elsewhere, jointly with making the stunning imagery available (Clottes et al. 2005). Conservation and management are not targeted at visitors at all, and visiting through a long siphon with its entrance at 37 m below sea level is complicated anyway. But the simple covering of wreck sites in the Netherlands, Australia, or Sri Lanka does not add to any visitor enjoyment either (Maarleveld 2009; Firth 2011). Other ways to involve and satisfy visitors and other stakeholders are then essential, as no archaeological conservation and preservation can do without them (Carver 2011). The Internet is an obvious medium (Manders et al. 2009). Despite the understandable focus on shallow sites and inshore locations, attention is gradually extending to deeper, and more remote, locations where environmental parameters are nevertheless subject to change after intervention (Leino et al. 2011; Mann 2012).

Yet again metals are a special case. In order to temporarily delay degradation, sacrificial anodes have occasionally been used in archaeological conservation and preservation (MacLeod et al. 1986; Gregory 1999). The technique is well proven in the protection of contemporary metal structures in seawater and especially on ships with rotating bronze propellers. In the absence of sacrificial anodes, electrochemical reactions will quickly consume their steel axles. Despite the efficiency of the technique, it begs the question whether the more general and long-term application in archaeological conservation would be sustainable, given that maritime industries are hard pressed to find alternatives for sacrificial paints and anodes in view of environmental concerns. Nevertheless, the monitoring and management of electrochemical circumstances on underwater sites featuring substantial iron or light metal wreck are important aspects in managing their long-term preservation and enjoyment (Macleod 2006).

This touches on a subject that has been the cause for some confusion. Although archaeological sites include artifacts that become "movable antiquities" on removal, the site as such is immovable. This is as true for archaeological sites resulting from wreck as it is for prehistoric kitchen middens. In discussing relatively recent wreck sites that occur at the surface of the (sea) bottom, it is relatively common to refer to the name of the original craft (Fig. 6). Management of electrochemical processes consists in conservation measures that are specifically targeted at protecting the "object." Nevertheless, such efforts are specifically oriented to preservation in situ and are thus part of conservation and management of the site as a whole. In that sense the efforts are fundamentally different from conservation efforts addressing operating watercraft and other movable items, despite similarity in techniques. It is

Underwater Sites in Archaeological Conservation and Preservation, Fig. 6 Wing of a Japanese "Emily" bomber plane on the World War II heritage trail, Saipan Lagoon, Commonwealth of the Northern Mariana Islands. © Ships of Discovery

important to keep this difference in mind because of the legal differences relating to "immovable sites" and "movable objects" and their consequences for protection, salvage, and treasure hunting. Archaeological conservation and preservation of underwater sites, including those wreck sites that for historical reasons are considered significant, are supported by, find their legal basis in, and should elaborate on spatial protection. Salvage practice, rulings, and contracts derive their meaning from the thing, not from the place. Like any other activity, however, salvage activities are subject to spatial policies, regulations, and permits. They are therefore subordinate to heritage protection policies, which is important to keep in mind.

Although a management plan for a specific site is the obvious context for specific measures of conservation and preservation, more general management plans or policies can include very relevant measures that contribute to long-term preservation. Such measures generally need to be integrated with general management schemes such as spatial planning or policies addressing specific activities, be they offshore exploration or fishing. Integration of specific measures in such general policies or in agreements with industry can add enormously to the archaeological conservation and preservation of underwater sites, both directly and indirectly. Yet again, as so often in these pages, reference can be made to treasure hunting in maritime archaeology. Treasure hunters have started to justify their destructive activities by referring to the impact of deep-sea fisheries. Undoubtedly, it is true that fishing impacts archaeological sites. But that is no reason to replace impact with willful destruction. Both the dredging and fishing industries have shown their willingness to consider responsible policies of impact mitigation. It is not in their interest to do otherwise. Moreover, most deep-sea fishing techniques do not impact the bottom at all (Maarleveld et al. 2013, chapter 10).

In preference of discussing general trends, relatively little has been said on archaeological reserves, parks, and memorials. Obviously, however, they are the perfect examples where site management plans are in place, where at least some of the techniques of archaeological conservation and preservation have been developed and where the experience with managing the compatibility of preservation with access, use, and enjoyment of the cultural heritage is greatest. On the other hand, their number is relatively few and therefore hardly representative for global practices. But a few can be mentioned and add to the discussion. The USS Arizona Memorial in Pearl Harbor is an exceptional case. Although not established for predominantly archaeological reasons, it is certainly the site that attracts more visitors each year than any other underwater site. The wreck site of the French fourth rate navy vessel Célèbre that sank in 1758 in the entrance to Louisbourg fortress in Canada is an example where management and monitoring started in 1961 and intensified through archaeological documentation and improving accessibility to the

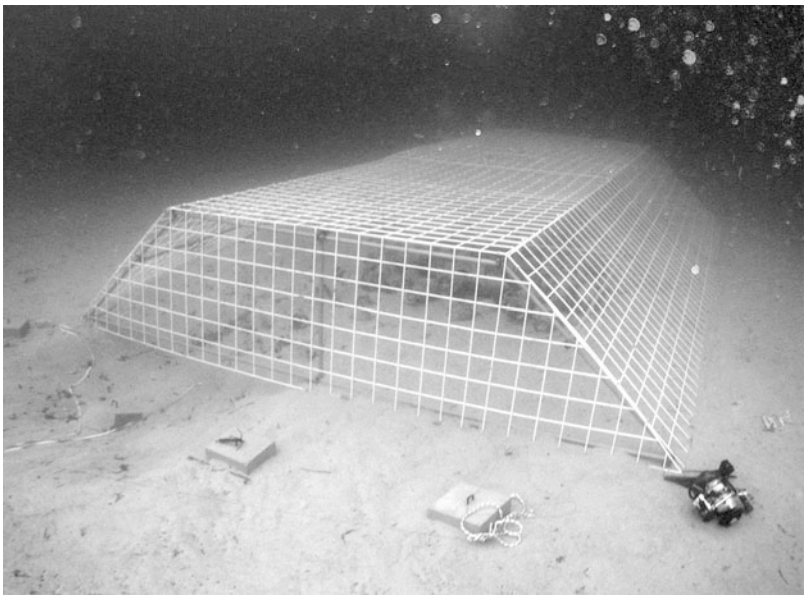

Underwater Sites in Archaeological Conservation and Preservation, Fig. 7 A trapezoidal cage protects a classical shipwreck deposit at Rab Rt Sorinj, the north cape of the island Rab, Croatia, from interference by visiting divers. Amphoras have been looted from wrecks all over the Mediterranean. © I. Radić Rossi

vulnerable site for visiting recreational divers in the 1980s (Grenier 1994). The Louisbourg wrecks are managed in conjunction with the Fortress of Louisbourg National Historic Site of Canada. A third example is Florida's Underwater Archaeological Preserves. These reserves have been established in response to extensive looting and take public archaeology and education as their motto (Jameson and Scott-Ireton 2007). Finally, the protective cages that the Croatian Conservation Institute has mounted over classical shipwreck sites should be mentioned (Fig. 7). They protect sites against visitor interference while allowing them a see-through in much the same way as visitors watch wild animals in a classical zoo.

Although one can expect creative developments to continue, underwater sites have begun to play a significant role in archaeological conservation and preservation. This is quite different from a couple of decades ago.

Cross-References

- ▶ Avocational Archaeology
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Heritage: Public Perceptions
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Stakeholders and Community Participation

References

Björdal, C.G. 2000. *Waterlogged archaeological wood: Biodegradation and its implications for conservation*. Uppsala: Swedish University of Agricultural Sciences.

Björdal, C.G., D. Gregory, and A. Trakadas, eds. 2012. *WreckProtect: Decay and protection of archaeological wooden shipwrecks*. Oxford: Archaeopress.

Carver, M. 2011. *Making archaeology happen: Design versus dogma*. Walnut Creek: Left Coast Press.

Clottes, J.J.E., and J. Courtin. 1996. *The cave beneath the sea: Paleolithic images at Cosquer*. New York: Abrams.

Clottes, J., J. Courtin, and L. Vanrell. 2005. *Cosquer redécouvert*. Paris: Seuil.

Dromgoole, S. 2013. *Underwater cultural heritage and international law*. Cambridge: Cambridge University Press.

Eriksson, N., and J. Rönnby. 2012. 'The ghost ship'. An intact fluyt from c.1650 in the middle of the Baltic Sea. *The International Journal of Nautical Archaeology* 41: 350–361. https://doi.org/10.1111/j.1095-9270.2012.00342.x.

Firth, A. 2011. A scent of plaice? In *Local heritage, global context. Cultural perspectives on sense of*

place, ed. J. Schofield and R. Szymanski, 143–156. Farnham: Ashgate.

Gregory, D. 1999. Monitoring the effect of sacrificial anodes on the large iron artefacts on the Duart Point wreck, 1997. *The International Journal of Nautical Archaeology* 28: 164–173.

Gregory, D., and H. Matthiesen, eds. 2012. Preserving archaeological remains *in situ* (Paris4). *Conservation and Management of Archaeological Sites* 14: 1–4.

Grenier, R. 1994. The concept of the Louisbourg Underwater Museum. *The Northern Mariner/Le Marin du nord* IV(2): 3–10. Available at: http://www.cnrs-scrn.org/northern_mariner/vol04/tnm_4_2_3-10.pdf. Accessed 14 Aug 2017.

Grenier, R., D. Nutley, and I. Cochran, eds. 2006a. *Underwater cultural heritage at risk: Managing natural and human impacts*. Paris: ICOMOS. Available at: http://www.international.icomos.org/risk/2006/fulldocan.pdf (accessed 14 August 2017).

Jameson, J.H., and D.A. Scott-Ireton, eds. 2007. *Out of the blue: Public interpretation of maritime cultural resources*. New York: Springer.

Leino, M., A.T. Ruuskanen, J. Flinkman, J. Kaasinen, U.E. Klemelä, R. Hietala, and N. Nappu. 2011. The natural environment of the shipwreck Vrouw Maria (1771) in the northern Baltic Sea: An assessment of her state of preservation. *International Journal of Nautical Archaeology* 40: 133–150. Available at: https://doi.org/10.1111/j.1095-9270.2010.00273.x.

Maarleveld, T.J. 2009. Drama, place and verifiable link. Underwater cultural heritage, present experience and contention. In *Spirit of place: Between tangible and intangible heritage / L'esprit du lieu: entre le patrimoine matériel et immaterial*, ed. L. Turgeon, 97–108. Québec: Les Presses de L'Université Laval.

MacLeod, I.D. 2006. In-situ corrosion studies on wrecked aircraft of the imperial Japanese navy in Chuuk Lagoon, Federated States of Micronesia. *The International Journal of Nautical Archaeology* 35: 128–136. https://doi.org/10.1111/j.1095-9270.2006.00093.x.

MacLeod, I.D., N.A. North, and C.J. Beegle. 1986. The excavation, analysis and conservation of shipwreck sites. *ICCROM Conference, Ghent* 1985: 113–32.

Manders, M., R. Oosting, and W. Brouwers. 2009. *MACHU final report*. Rotterdam: Educom Publishers BV. Available at: http://www.machuproject.eu/documenten/MACHU_report_3.pdf. Accessed 14 Aug 2017.

Mann, H. 2012. The appearance of new bacteria (Titanic Bacterium) and metal corrosion. In *Colloquium proceedings. UNESCO Scientific Colloquium on the Factors impacting the underwater cultural heritage,* 44–51. Available at: http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/images/uch_Brussels_papers.pdf. Accessed 14 Aug 2017.

Memet, J.B. 2008. Conservation of underwater cultural heritage: Characteristics and new technologies in underwater cultural heritage. *Museum International* 240: 42–49.

Pearson, C., ed. 1987. *Conservation of marine archaeological objects*. London: Butterworths.

Raban, A. 2009. *The harbour of Sebastos (Caesarea Maritima) in its Roman Mediterranean context*. Oxford: Archaeopress.

Varmer, O., and M.J. Aznar. 2012. The centenary of Titanic and the treaty giving legal protection. In *Colloquium proceedings. UNESCO Scientific Colloquium on the Factors impacting the underwater cultural heritage,* 18–23. Available at: http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/images/uch_Brussels_papers.pdf. Accessed 14 Aug 2017.

Further Readings

Bailey, G.N., J. Harff, and D. Sakellariou, eds. 2017. *Under the sea: Archaeology and palaeolandscapes of the continental shelf*. Cham: Springer.

Benjamin, J., C. Bonsall, C. Pickard, and A. Fischer, eds. 2011. *Submerged prehistory*. Oxford: Oxbow.

Grenier, R., D. Nutley, and I. Cochran, eds. 2006b. *Underwater cultural heritage at risk: Managing natural and human impacts*. Paris: ICOMOS. Available at: http://www.international.icomos.org/risk/2006/fulldocan.pdf. Accessed 14 Aug 2017.

Leshikar-Denton, M.E., and P. Luna Erreguerena, eds. 2008. *Underwater and maritime archaeology in Latin America and the Caribbean*. Walnut Creek: Left Coast Press.

Maarleveld, T.J., U. Guérin, and B. Egger, eds. 2013. *Manual for activities directed at underwater cultural heritage. A guide on the rules annexed to the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage*. Paris: UNESCO.

Satchell, J., and P. Palma, eds. 2007. *Managing the marine cultural heritage: Defining, accessing and managing the resource*. York: CBA.

UNESCO (1970) and UNIDROIT (1995) Conventions

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Introduction

The growth in the international market in art works and other cultural objects following the Second World War prompted the United Nations Educational, Scientific and Cultural Organization (UNESCO) to begin in the 1960s drafting an

international convention to control this trade. In addition, the newly independent, former colonized States sought a means of recovering cultural heritage objects that had been removed during colonialism. The 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property ("the 1970 UNESCO Convention") was adopted in November 1970; as of mid-2018, there are 137 States Parties.

When a State ratifies an international convention (or treaty), it may view the convention as either self-executing, in which case the provisions of the convention are automatically adopted into national domestic law, or as non-self-executing (or executory), in which case the provisions of the convention must be adopted into national domestic law usually through implementing legislation, although other mechanisms such as administrative measures may be sufficient (O'Keefe 2017: 193–197). Larger, multilateral conventions are typically viewed as non-self-executing. Most market States that have ratified the 1970 UNESCO Convention, with some exceptions, such as the United Kingdom, have enacted implementing legislation. However, variation in the methods of implementation adopted by the different ratifying States, particularly the market States, has resulted in significantly different responses and degrees of effectiveness of the Convention in regulating the international trade.

Recognizing that there were impediments to acceptance of the 1970 UNESCO Convention particularly by European States that follow the civil law, UNESCO asked the International Institute for the Unification of Private Law (UNIDROIT) to draft a new convention to respond to these concerns. The UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects was finalized in 1995. In contrast to the 1970 UNESCO Convention, which is a matter of public international law and operates purely on a State-to-State basis, the UNIDROIT Convention focuses on the creation of private rights of action through adoption of uniform national legislation. The UNIDROIT Convention requires ratifying States to adopt domestic law that implements the convention and, for the most part, does not allow States to opt out of sections of the convention. There are currently 44 States Parties.

Background

The 1970 UNESCO Convention

The UNESCO Convention, in Article 1, defines cultural property as "property which, on religious or secular grounds, is specifically designated by each State as being of importance for archaeology, prehistory, history, literature, art or science" and which belongs to an enumerated list of categories, including paintings, drawings, original works of sculpture, rare manuscripts, coins more than 100 years old, ethnological objects, products of archaeological excavations, and elements of artistic or historical monuments that have been dismembered. Archaeological artifacts that are looted from the ground and sold directly onto the international art market are unknown and therefore undocumented before they appear on the market. Therefore, the requirement of "specific designation" raises particular problems as applied to archaeological objects whose original archaeological context is crucial to developing knowledge and understanding of the past but which is destroyed through looting of archaeological sites. Therefore, one key question is how the various market States respond to the specific designation requirement in their implementing legislation in order to regulate or prevent trade in undocumented archaeological artifacts.

To some States, Article 3 contains the key obligation of the convention, stating: "The import, export or transfer of ownership of cultural property effected contrary to the provisions adopted under this convention by the States Parties thereto, shall be illicit." According to O'Keefe, this provision means that States Parties shall not permit the import of cultural objects whose export from another State Party was illegal (O'Keefe 2017: 136). However, the United States took the position that Article 3 is "a mysterious provision that will not be operative in the United States" (Bator 1982: 377). Rather, the United States views Articles 7(b)(1) and 9 as embodying the core obligations of the convention.

The convention imposes obligations on both market States and countries from which cultural objects originate. Countries of origin have an obligation to protect their own sites and museums, to police their borders, and to educate their people about the values in conserving their cultural heritage. These obligations more specifically include establishing a government agency or service to assist in the preparation of laws for the regulation of cultural objects, establish a national inventory of protected property, promote scientific and technical institutions, and supervise archaeological excavations (Article 5); establishing a licensing system for the export of cultural objects (Article 6); and requiring dealers to maintain registers with information on the origin, supplier, description, and price of items sold (Article 10).

One of the motivating reasons for adoption of the 1970 UNESCO Convention was to provide a means of obtaining restitution to formerly colonized States of cultural artifacts removed during colonialism (Prott 2012: 2). However, this goal was not realized because of objection from the former colonist States and the general principle that international agreements do not have retroactive effect (UNESCO 2015: 22). However, Article 15 provides that States Parties may continue to fulfill obligations under any other international agreement and may enter into additional agreements for the purpose of restituting cultural property removed before the UNESCO Convention's entry into force. In addition, UNESCO established the Intergovernmental Committee for Promoting the Return of Cultural Property to its Countries of Origin as a forum to hear and help negotiate resolution of cultural heritage disputes (Bator 1982: 363–364), although the process has rarely been utilized (Prott 2012: 5).

In order to increase understanding and effectiveness of the convention and, to some extent, out of frustration with the limited implementation of the convention by market States, the States Parties established a Subsidiary Committee in 2013 that would meet on a regular basis. To strengthen understanding and resolve problems of interpretation, the Subsidiary Committee submitted Operational Guidelines to the Meeting of the States Parties in 2015 (UNESCO 2015; Scovazzi and Ferri 2015). The Guidelines note, in particular, the special challenges posed by the categories of products of archaeological and paleontological clandestine excavations, elements of dismembered artistic or historical monuments and archaeological sites, and ethnological and indigenous cultural items, particularly human remains, which are not specifically covered by the convention (UNESCO 2015: 6–7).

The 1995 UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects

For the first two decades, the 1970 UNESCO Convention proved to be fairly unpopular with most of the European market States and received few ratifications. One of the primary reasons for this was that the continental European countries follow the good faith purchaser doctrine by which a purchaser who acts in good faith can obtain title to stolen property after the passage of a relatively short period of time, which varies among different countries. UNESCO therefore asked Unidroit to draft a convention that would pertain to private international law and, among other provisions, would provide a compensation mechanism for the good faith purchaser (Prott 1997).

The Unidroit Convention utilizes the same definition of cultural property as that in Article 1 of the UNESCO Convention. The Unidroit Convention provides that stolen objects should, in most circumstances, be returned to the original owner and illegally exported objects to the country of origin. Fair and reasonable compensation must be paid to a good faith purchaser of stolen or illegally exported cultural objects. The convention also provides a definitive statute of limitations of 3 years from the time the claimant knows the location of the object and the identity of the possessor and, in any case, 50 years from the time of the theft or illegal export. However, a claim for a cultural object that is an integral part of an identified monument or archaeological site or part of a public collection or that is a sacred or communally owned object is subject only to the 3-year actual discovery rule. A significant provision equates illegal excavation with theft when this is consistent with local law. Article 3(2) states, "a cultural object which has been unlawfully

excavated or lawfully excavated but unlawfully retained shall be considered stolen, when consistent with the law of the State where the excavation took place." Characterizing such objects as stolen implicates the domestic law of market States against trading in stolen property. This provision offers a suitable response to the problem of looted and therefore previously unknown and undocumented archaeological artifacts.

To be eligible for compensation, the possessor must have "neither [known] nor ought reasonably to have known that the object was stolen and can prove that it exercised due diligence when acquiring the object" (Article 4(1)). Article 4(4) provides:

> In determining whether the possessor exercised due diligence, regard shall be had to all the circumstances of the acquisition, including the character of the parties, the price paid, whether the possessor consulted any reasonably accessible register of stolen cultural objects, and any other relevant information and documentation which it could reasonably have obtained, and whether the possessor consulted accessible agencies or took any other step that a reasonable person would have taken in the circumstances.

Due diligence thus refers to the conduct of the purchaser in investigating an object's provenance at the time of purchase. Particularly in the realm of antiquities, certain additional factors should be taken as indicating likelihood of theft or illegal export. These include origin in areas with recent large-scale looting, such as Iraq, Syria, and Afghanistan.

Unlike the 1970 UNESCO Convention, which allows States Parties to determine their method of implementation of the convention into domestic law, the UNIDROIT Convention requires that all States Parties adopt the uniform legislation provided in the convention. For that reason and despite the fact that it was drafted to appeal to the European continental States, relatively few market States have ratified it. In fact, several European States, such as Switzerland and Germany, examined the UNIDROIT Convention and then subsequently chose to ratify the 1970 UNESCO Convention because of the latter's greater flexibility. Nonetheless, as will be discussed below, the UNIDROIT Convention has had a significant influence even on States that chose not to ratify it.

Current Debates: Models of Implementation

The United States Senate gave its unanimous consent to ratification of the 1970 UNESCO Convention in 1972, but it specified that the convention would not come into effect until domestic implementing legislation was enacted, which did not occur until 1983. At that point, few market States had ratified the convention. While it took close to 30 years before other major market countries demonstrated interest in the 1970 UNESCO Convention, that situation began to change significantly in the late 1990s and early 2000s. In 1997, France joined the Convention, followed by the United Kingdom and Japan (2002); Sweden, Denmark, and Switzerland (2003); Germany (2007); Belgium and the Netherlands (2009); and Luxembourg and Austria (2015).

Several of these countries decided to ratify the Convention in response to the looting of archaeological sites and museums that occurred during and after the US-led invasion of Iraq in 2003. Switzerland was motivated, at least in part, by the discovery of large quantities of looted antiquities that had been stored in the free transit zone of the Geneva airport by the Italian dealer Giacomo Medici (Watson and Todeschini 2005). Finally, some countries joined in response to their analysis of the 1995 UNIDROIT Convention on Stolen and Illegally Exported Cultural Property. While examining this latter convention, which was drafted to appeal to the European continental countries, these countries realized that its more onerous requirements were not acceptable, whereas the less precise requirements and latitude granted to method of implementation of the 1970 UNESCO Convention made it more attractive. The relative effectiveness of the different models of implementation used by market States may be analyzed, particularly with respect to two issues: the problem of specific designation in the Article 1 definition of cultural property and the ability of a market State to take proactive steps in the case of

emergency situations, such as we have seen in Iraq and Syria.

"Across-the-Board" or Reciprocal Import Restrictions: Implementation of Article 3

Most States Parties grant reciprocal recognition to the export restrictions of other nations when those export restrictions are promulgated as part of their implementation of the 1970 UNESCO Convention. This broad approach to the recognition of other States Parties' export controls implements Article 3 of the Convention. Article 6(b), which states that States Parties "undertake . . . to prohibit the exportation of cultural property from their territory unless accompanied by the . . . export certificate" described in Article 6(a), is an integral part of a trade regulatory scheme. Because export controls operate based on categories of types of objects whose export is restricted, reciprocal import controls similarly apply to categories of types of objects, rather than only to specific, identified objects. This means that an object does not have to have been documented in order to be subject to export and import control, thereby providing an effective approach to the problem of looted and therefore previously undocumented archaeological objects. The implementation schemes of three nations, Australia, Canada, and Germany, are examined as examples of "across-the-board" or reciprocal import restrictions.

Australia. Australia enacted its implementing legislation, The Protection of Movable Cultural Heritage Act, in 1986 before becoming a State Party in 1989 and amended it in 2011. It is perhaps unique among States that have ratified the 1970 Convention in that its import controls apply to all illegally exported cultural objects, regardless of whether the State of origin is a Party to the 1970 Convention. The export control that was violated only needs to be a "law of that country relating to cultural property" (Section 14(1)). In addition, it does not matter when the object was illegally exported from its country of origin, so long as the import into Australia occurred after the effective date of the legislation. Such an object is subject to forfeiture. A person who knowingly violates the import prohibition commits an offense punishable by a fine not exceeding $100,000 or imprisonment not exceeding 5 years or both (Section 14(2)). Australia is reported to be considering strengthening its legislation in the wake of the scandals involving Australian museums that acquired sculptural pieces stolen from Hindu temples from the dealer Subhash Kapoor (Crennan 2016).

Canada. In 1978, Canada enacted broad import and export regulations, pursuant to Articles 3 and 6(b) of the Convention, when it adopted the Cultural Property Export and Import Act ("CPEIA"), R.S.C. 1985, c. C-51 ff. The CPEIA establishes a system of controls on the export of cultural materials from Canada and serves an important function in preserving Canada's cultural heritage (Nafziger et al. 2010: 302–305). This legislation allows the establishment of a list of cultural materials whose export is subject to control through an export permit requirement.

With respect to import controls, the CPEIA applies to "foreign cultural property," defined as "any object that is specifically designated by [a reciprocating State] as being of importance for archaeology, prehistory, history, literature, art or science" R.S.C. 1985, c. C-51, § 37(1). The definition is thus similar to the 1970 UNESCO Convention's definition of cultural property. A "reciprocating State" is a "foreign State that is a party to a cultural property agreement." The Act envisages the possibility that Canada will enter into bilateral and multilateral agreements "relating to the prevention of illicit international traffic in cultural property." While the Act does not specifically refer to the 1970 UNESCO Convention as one such agreement, it is clear that the Convention fits this definition and that the Act's provisions therefore apply to any nation that is a State Party. The operative provisions of the Act are relatively straightforward, stating, "it is illegal to import into Canada any foreign cultural property that has been illegally exported from that reciprocating State" R.S.C. 1985, c. C-51, § 37(2). The import restrictions apply only to foreign cultural property illegally exported after the date on which a cultural property agreement comes into force in both Canada and the reciprocating State. The relevant date for Canada with respect to the 1970 Convention is 1978.

One recurring theme in the implementing legislation of several market States is the question of how the "specific designation" requirement of the UNESCO Convention's definition of cultural property is interpreted. One court in Canada answered this question with respect to Canada's import controls, in R. v Yorke, by holding that a Bolivian Decree restricting the export of textiles sufficiently designated the category of textiles and therefore fit the CPEIA's definition of "foreign cultural property." The court understood the difficulty posed by a specific designation requirement, particularly as applied to the types of archaeological and ethnographic objects that are frequently undocumented before their illegal removal, stating:

> [T]he appellant's submission that, to "specifically designate" cultural property something more was required of Bolivia than what was specified in the Decree, is not tenable. It would not be possible for a nation to create an itemized list of every piece of property to be protected. The categories have been made clear in the Decree . . ., and they apply to the items seized from the appellant. Likewise, the suggestion that the term "weavings" is somehow overly broad and fails to distinguish those "weavings" which are of cultural significance from those which are not, is not persuasive. The term "weavings" is one of common usage and the Decree distinguishes them from property of other types of manufacture. Ms. Bubba-Zamora testified about the weaving tradition in Bolivia. Textiles that are cultural property reveal valuable information regarding ethnic groups and their religious practices. (R. v Yorke (1998), 166 N.S.R. (2d) at 150)

This may be the only judicial interpretation of the specific designation requirement and how it can be satisfied.

Two examples of attempted recoveries of cultural materials under the Canadian Act occurred relatively early in its history, and, in both attempts, it could not be established that the cultural materials had left their country of origin after the date on which the CPEIA went into effect. One involved a shipment of antiquities from Egypt that was seized at Mirabel Airport near Montreal in 1989 (Walden 1995: 208–210). The Egyptian authorities presented evidence that the artifacts had been illegally excavated and smuggled out of Egypt but ultimately were not able to present proof that they had been taken out of Egypt after 1978. A similar episode occurred in the prosecution of a dealer for importing artifacts smuggled out of Nigeria (R. v Heller (1984), 30 A.L.R. (2d) 130 (Q.B.)). This case involved the attempted prosecution of a New York dealer who imported a Nok terracotta sculpture into Canada that had been illegally exported from Nigeria (Shyllon 2000: 221).

Between 1978 and 2000, Canada received 11 requests for returns, 7 of which were successful. Between 2000 and 2007, there were five returns, one each to Peru, Bolivia, and Egypt and two to Colombia (O'Keefe 2007: 149). According to Canada's 2010 report to UNESCO on its implementation of the 1970 Convention, between 2007 and 2010, Canada returned 350 cultural objects to Bulgaria, China, Egypt, Mali, and Nigeria (Canada 2011: 3). According to Canada's 2015 report to UNESCO, between 2011 and 2015, it returned over 21,000 objects to four States: Bulgaria, China, India, and Lebanon (Canada 2015: 5; UNESCO n.d.). The largest seizure and return of cultural artifacts by Canada was the 2011 restitution to Bulgaria of 21,000 cultural objects, including 18,000 ancient coins and other objects such as jewelry, Byzantine crosses, amulets, belt buckles, and bronze eagles (Crawford 2011).

It is a criminal offense to import or attempt to import cultural property in violation of the CPEIA (R.S.C. 1985, c. C-51, §§ 43 and 45). The maximum penalty is a fine in the amount of $25,000 and imprisonment for up to 5 years (R.S.C. 1985, c. C-51 § 45). The only reported conviction under this provision occurred in R. v Yorke, discussed above, involving a dealer who imported textiles from Bolivia (R. v Yorke, 166 N.S.R. (2d) 130 (1998)) (O'Keefe 2017: 240–242).

Germany. Germany enacted implementing legislation for the 1970 UNESCO Convention in 2007. Under this legislation, Germany prohibited the import of any illegally exported cultural objects that had been individually classified in an accessible inventory by the country of origin (termed the "list" or "inventory" principle). (Act implementing the UNESCO Convention of 14 November 1970 on the means of prohibiting and preventing the illicit import, export and

transfer of ownership of cultural property (Act Implementing the Cultural Property Convention) 23.5.2007, BGBl 1 2007, s 6(2) sentences 1–3)). It is widely recognized that this approach is not effective for confronting the problems of the looting of archaeological sites and undocumented artifacts.

In recognition of this limitation and as a response, at least in part, to the widespread looting that is occurring in Middle Eastern countries, in 2016 Germany amended its legislation to deal more effectively with this problem, Act on the Protection of Cultural Property (Cultural Property Protection Act) 8.6.2016, BGBl 1 p 1914 (Peters 2016: 96–97). In so doing, Germany adopted the category principle. This legislation fulfills Germany's obligations under United Nations Security Council Resolution 2199 (2015) to restrict the import of cultural materials illegally removed from Syria after 2011.

The amended legislation creates new provisions for the import of archaeological objects into Germany. The import restrictions no longer require that objects have been inventoried but rather focus on whether a State Party subjects the category of objects to export restriction. Under this legislation, an importer must present documentation that the cultural property was legally exported if it left another State Party to the 1970 UNESCO Convention after 2007, the date of Germany's ratification of the Convention. This shifts the burden to the importer to present such documentation; in the absence of such documentation, the law creates a presumption that the cultural property was unlawfully exported from the relevant State Party after 2007 (Federal Government Commissioner for Culture and the Media 2016: 7). This requirement recognizes that most States require licenses for the export of cultural property and that this provision, moving from a list principle to a category principle, particularly helps to protect archaeological objects.

States that adopt reciprocal import restrictions based on legal export from another State Party have resolved the two key issues in implementation of the 1970 UNESCO Convention. First, they have resolved the question of specific designation by considering that the process of establishing export controls on categories of cultural objects constitutes specific designation. Second, they have provided a proactive response that obviates the need for enactment of special legislation or other steps to respond quickly to crisis situations. As Canada noted in its 2015 Report to UNESCO, "Canada has not required any additional measures to implement UNSCR 2199 for the protection of Syrian and Iraqi cultural heritage. The *Cultural Property Export and Import Act* already prohibits the import into Canada of cultural property illicitly trafficked from these states" (Canada 2015: 9).

Bilateral Agreements

The United States and Switzerland are the only States Parties that require other States Parties to enter into supplementary agreements (termed bilateral agreements or Memoranda of Understanding) in order to implement the 1970 UNESCO Convention. Despite this superficial resemblance, the Swiss legislation differs from that of the United States in several important respects. The Swiss legislation implements Article 3 rather than, as in the case of the United States, Article 9. For this reason, the Swiss agreements are not limited to the categories of archaeological and ethnological materials but, rather, may apply to all types of cultural property.

Switzerland. The Swiss implementing legislation, the Cultural Property Transfer Act ("CPTA"), took effect in June 2005 (Loi fédéral du 20 juin 2003 sur le transfert international des biens culturels). The Swiss legislation permits the Swiss Federal Council to enter into agreements with other States that are Party to the 1970 Convention to protect "cultural and foreign affairs interests and to secure cultural heritage." (CPTA, Article 7). The Swiss legislation defines "cultural property" as "significant property from a religious or universal standpoint for archaeology, prehistory, history, literature, arts or sciences belonging to the categories under Article 1 of the UNESCO Convention of 1970" (CPTA, Article 2(1)).

The Swiss definition does not mention "specific designation" found in Article 1 of the Convention. The agreements include a list of designated artifact types of cultural property by category. This allows the import of objects to be

restricted even if they have not been documented before their illegal removal. While the Swiss agreements are not restricted to archaeological and ethnological materials, they primarily relate to categories of archaeological objects recognized as being of significant importance for the cultural heritage of a State. The Swiss agreements are of potentially unlimited duration and do not need to be renewed. Most of the Swiss agreements are truly mutual in nature in that they call for recognition of Swiss regulations on the export of cultural property, and each agreement has two designated lists of protected cultural properties – one list of Swiss cultural property and the second list for the cultural property of the State with which Switzerland has the agreement.

Officials of the Swiss Ministry of Culture negotiate the agreements directly with their foreign counterparts. The agreements last for an indefinite amount of time, thereby providing a disincentive to trade in the affected cultural objects. The Federal Council can also take additional measures when a "State's cultural heritage [is] jeopardized by exceptional events" (CPTA, Article 8). Unlike the bilateral agreements under the CPTA that implement Article 3, emergency actions taken under Article 8 of the CPTA implement Article 9 of the Convention and may last for only a limited amount of time.

As of 2018, Switzerland has agreements in force with Italy (2008), Greece (2011), Colombia (2011), Egypt (2011), Cyprus (2014), China (2014), Peru (2016), and Mexico (2017) (Switzerland 2016a). Artifacts have been returned to their countries of origin, including Greece, Italy, Egypt, Turkey, Chile, Peru, and Lebanon, although some of these actions do not seem to have been taken pursuant to a bilateral agreement. Switzerland returned a group of 32 artifacts to Egypt in June 2015 pursuant to the bilateral agreement and in conjunction with a celebration to mark the 10th anniversary of the Swiss legislation (n.a. 2015). In 2016, it returned five archaeological artifacts to Italy (Switzerland 2016b).

The CPTA adds criminal provisions for the intentional or negligent illicit import of cultural property or incorrect declaration of cultural property during import or transit. The maximum penalty under the CPTA for intentional violation is a fine of 100,000 Swiss francs or imprisonment of up to 1 year; for negligent violation, the maximum fine is 20,000 Swiss Francs. If the offender acts on a professional basis, the sanction is a fine of up to 200,000 Swiss Francs or jail for up to 2 years (CPTA, Article 24). The CPTA adopts higher duties of diligence for "persons active in the art trade and auctioning business" (CPTA, Article 16).

The Swiss legislation that implemented the 1970 UNESCO Convention also made other changes in Swiss law regulating the art market. Perhaps prime among these were changes in the good faith purchaser doctrine, which permits a seller to transfer title to stolen property to a good faith purchaser and made Switzerland, in the past, a place where title to stolen and looted antiquities could be laundered. These changes have altered the applicability of the doctrine to acquisitions of art and cultural objects making Switzerland less desirable as an intermediate market country. While other countries now serve the function of transit point, Switzerland still seems to host a robust art trade.

United States. Although the United States signed the UNESCO Convention in 1970 and the Senate gave its unanimous consent to ratification in 1972, the Senate also required the adoption of implementing legislation before the convention would have domestic legal effect. This implementing legislation, the Convention on Cultural Property Implementation Act ("CPIA"), was signed into law in early 1983 (19 U.S.C. §§ 2601–13). The United States implemented as substantive provisions only Articles 7(b)(1) and 9 but also refers to other articles of the convention. It adopted the convention's Article 1 definition of cultural property but explicitly eliminates the specific designation requirement.

Article 7(b)(i) states that States Parties should "prohibit the import of cultural property stolen from a museum or a religious or secular public monument or similar institution in another State Party to this Convention after the entry into force of this Convention for the States concerned, provided that such property is documented as appertaining to the inventory of that institution."

Because this provision refers to traditional theft from documented collections, its implementation has not been problematic.

Article 9 of the UNESCO Convention states:

> Any State Party to this Convention whose cultural patrimony is in jeopardy from pillage of archaeological or ethnological materials may call upon other States Parties who are affected. The States Parties . . . undertake, in these circumstances, to participate in a concerted international effort to determine and to carry out the necessary concrete measures, including the control of exports and imports and international commerce in the specific materials concerned. Pending agreement each State concerned shall take provisional measures to the extent feasible to prevent irremediable injury to the cultural heritage of the requesting State.

The first difficulty with the implementation of Article 9 is that several key terms, including "cultural patrimony," "jeopardy," and "pillage," are left undefined. "Jeopardy" would seem to involve some sense of futurity – that is, it encompasses a situation in which there is a threat or danger of pillage, as well as contemporaneous, ongoing pillage of the cultural patrimony. O'Keefe focuses more on the question of the extent to which these terms imply a requirement of a crisis or emergency situation and concludes that this is not necessary:

> [P]illage and jeopardy of a cultural heritage occur where the remains of a particular civilization are threatened with destruction or extensive movement abroad or when the sale of certain archaeological objects on the international market sets off a broad campaign of clandestine excavations leading to the destruction of important archaeological sites.... [I]t should not be considered open to a State Party to refuse to act on the ground that, in its opinion, the pillage complained of was not in fact putting the cultural heritage of the requesting State in danger.... Article [9] was against illicit traffic in cultural objects, and . . . the requesting State should not, therefore, be required to produce evidence as to the degree of damage or size of the illicit trade in these objects. (O'Keefe (2017: 168))

The last section of Article 9 includes the concept of "irremediable injury" in considering a State Party's obligation to act quickly to avoid such harm. "Irremediable injury" should include the destruction of the stratigraphy of a site, despite the availability of what appear to be substantially similar objects on the market. O'Keefe comments, "[a] general trade in unprovenanced objects from various sites in a country or countries of the same region may destroy any efforts to properly survey, date, and verify the development of national culture" (O'Keefe 2017: 169).

Implementation of Article 9 has proven to be controversial. The relevant CPIA provisions allow the President of the United States to impose import restrictions, following a request by another State Party, upon designated categories of archaeological and ethnological materials pursuant to either an emergency action (19 U.S.C. § 2603) or a bilateral agreement (or memorandum of understanding (MOU)) between the United States and the requesting State (19 U.S.C. § 2602).

These import restrictions apply to designated categories of archaeological or ethnological materials rather than to specific documented artifacts. The CPIA defines an archaeological object, in part, as an object of cultural significance that is at least 250 years old and is "normally discovered as a result of scientific excavation, clandestine or accidental digging, or exploration on land or under water" (19 U.S.C. § 2601(2)). An ethnological object is defined as "the product of a tribal or preindustrial society" that is "important to the cultural heritage of a people because of its distinctive characteristics, comparative rarity, or its contribution to the knowledge of the origins, development, or history of that people" (19 U.S.C. § 2601(2)).

The process for achieving a bilateral agreement is onerous and cumbersome. A State Party initiates the process by submitting a formal request to the United States through diplomatic channels with documentation that the four statutory criteria mandated by the CPIA for entering into a bilateral agreement are satisfied. The four statutory criteria (paraphrased) are that the cultural patrimony of the requesting State Party is in jeopardy due to looting; the requesting State Party has taken measures consistent with the 1970 UNESCO Convention to protect its cultural patrimony; other States are taking similar measures to restrict the import of those archaeological objects whose import the US would restrict; and the imposition of import restrictions "is consistent with the general interest

of the international community in the interchange of cultural property among nations for scientific, cultural, and educational purposes" (19 USC §2602 (a)(1)).

The request is reviewed by the Cultural Property Advisory Committee, which consists of members appointed by the President. The members represent the interests of museums and the public, are experts in the international trade, or are archaeologists or anthropologists. The Committee makes a recommendation to an Assistant Secretary in the State Department, who then determines whether the statutory criteria are satisfied and, if they are, negotiates the agreement. Agreements last for 5 years and must then be renewed, although they may be renewed an unlimited number of times. Even though there are statutory provisions for emergency actions, which obviate the need to negotiate an agreement, any State wishing to have import restrictions imposed on an emergency basis must first request a bilateral agreement and submit the necessary supporting documentation (19 USC §2603). Import restrictions imposed in emergency situations can last a maximum of 8 years (an initial period of 5 years with one renewal period for 3 years), 19 U.S.C. § 2603(c)(3). As of mid-2018, the United States has bilateral agreements with 17 States: Belize, Bolivia, Bulgaria, Cambodia, China, Colombia, Cyprus, Egypt, El Salvador, Greece, Guatemala, Honduras, Italy, Libya, Mali, Nicaragua, and Peru. It also has emergency restrictions on the import of cultural materials from Iraq and Syria, pursuant to special legislation that implemented United Nations Security Council Resolutions 1483 (Iraq) and 2199 (Syria). This special legislation allows the emergency restrictions to last for an indefinite period of time.

The method of implementation used by both Switzerland and the United States has the drawback of not automatically applying to illegally exported cultural materials in the absence of a bilateral agreement. This means that in case of crisis situations, such as in Syria, both countries needed to take additional steps to prohibit import of illegally removed cultural materials. In the case of Switzerland, however, because the Swiss legislation allows the Federal Council to respond to crisis situations without need for a request from the affected State or negotiation of an agreement, import restrictions can be imposed on an emergency basis under the Swiss implementation of Article 9 of the 1970 UNESCO Convention. In the case of Syria, this is the route that was adopted when the Swiss Federal Council acted in late 2014 to restrict the import of cultural materials illegally exported from Syria after the beginning of the conflict in March of 2011 through its Order 946.231.172.7 (Switzerland 2014; Neuhaus 2015).

In contrast, it took an act of Congress to allow import restrictions to be imposed on the import of cultural materials from Iraq and Syria. In the case of Iraq, these import restrictions did not go into effect until 2008, although pre-existing trade sanctions prohibited import of cultural materials as well. Import restrictions on cultural materials from Syria went into effect in 2016, over a year after adoption of UNSCR 2199, which required all United Nations member States to enact such restrictions. This demonstrates the inefficiency of the United States' method of implementation of the 1970 UNESCO Convention and the necessity of revision to its legislation. In addition, the fact that the United States has bilateral agreements with only 17 States after 35 years as a State Party indicates that the process required by the CPIA is too onerous for both a requesting State and the United States to enter into and continuously renew agreements. While the agreements have been effective in limiting import of illegally exported archaeological objects from those 17 States, these represent only about 15% of all the States Parties to the 1970 UNESCO Convention. The US implementation of the 1970 UNESCO Convention is of limited effect with respect to the remaining 120 States Parties.

"Specific Designation": Japan

Japan has likely taken the most minimal approach to implementation of the 1970 UNESCO Convention among State Parties in that it restricts the import only of object that have been recorded or inventoried before theft or illegal export. This requirement is particularly problematic for regulating the trade in previously undocumented

objects, specifically, archaeological artifacts and ethnological materials. It is likely that Japan adopted this approach because Japan itself maintains inventories of cultural objects and otherwise allows free trade in objects that are not inventoried.

Japan became a party to the Convention in 2002 and enacted the Law concerning Controls on the Illicit Export and Import of Cultural Property (O'Keefe 2017: 204). Despite its name, it implements exclusively Article 7(b) of the Convention. Article 2 defines as cultural property what each State Party designates in accordance with Article 1 of the 1970 UNESCO Convention and thus seems to give the Convention a broad interpretation (O'Keefe 2017: 204–205). This is negated, however, in that Articles 3 and 4 apply only to "specified foreign cultural property" defined as "cultural property that has been stolen from an institution stipulated in Article 7(b)(i) of the Convention." Japan's implementation therefore seems entirely inadequate to deal with the problem of looted and therefore undocumented archaeological and ethnographic objects, as well as with the realities of difficulties in providing lists of objects stolen from museums and other public collections. (O'Keefe 2017: 205; Lee 2004: 12–13). While inventorying is a desirable goal as it reduces the incentive for theft and increases the likelihood of recovery, it is often not feasible to fully inventory all cultural objects.

Influence of the 1995 Unidroit Convention: Hybrid Approaches

Several market States have ratified both the 1970 UNESCO Convention and the 1995 Unidroit Convention. These States typically adopt comprehensive implementing legislation pursuant to both conventions. These measures emphasize compliance with the Unidroit Convention, which is mandatory in its requirements for implementation.

An example of a nation ratifying both conventions is New Zealand, which joined the 1995 Unidroit Convention in late 2006 and the 1970 UNESCO Convention in early 2007. Its comprehensive legislation, the Protected Objects Act, as revised 2007 (Public Act 1975 No 41), incorporates elements of both conventions into its domestic law. In addition to regulating the export of protected cultural objects from New Zealand, the legislation reflects Article 3 of the 1970 Convention in prohibiting the import into New Zealand of unlawfully exported protected foreign objects (Section 10A). The definition of "protected foreign object" tracks the definition of cultural property used in both conventions (Section 2(1)). This legislation also allows reciprocating States to bring actions to recover stolen or illegally exported protected objects (Section 10B).

It should be noted that those States Parties that are also members of the European Union must enact legislation implementing the European Union provisions regulating the movement of cultural objects: Directive 2014/60/EU on the return of cultural objects unlawfully removed from the territory of a Member State (OJ L 159, 28.05.2014) and Regulation on the export of cultural goods, Council Regulation (EC) 116/2009 of 18 December 2008 on the export of cultural goods (OJ L 39 of 10.02.2009). Italy's Code of the Cultural and Landscape Heritage enacted in 2004 (Legislative Decree no. 42 of 22 January 2004, GU Suppl. to No. 45 of 24 February 2004) is an example of legislation implementing these European Union provisions, as well as both the 1970 UNESCO and the 1995 Unidroit Convention.

Some States have ratified only the 1970 UNESCO Convention but have incorporated some particular principle or measure from the Unidroit Convention in a hybrid approach. The provision most typically incorporated pertains to the status of illegally excavated or legally excavated but illegally withheld archaeological artifacts. The Netherlands and the United Kingdom are examples of this approach.

The Netherlands. The Netherlands took an explicit hybrid approach in its implementing legislation. The Explanatory Memorandum that accompanied enactment of the Netherlands' legislation makes clear that it was influenced by various aspects of the 1995 UNIDROIT Convention, including its emphasis on a private law approach (Netherlands 2007/2008: 2–3). The Netherlands implementation follows the reciprocal model in that it prohibits the import of any

cultural property which has been removed from the territory of a State Party and is in breach of the provisions adopted by that State Party, in accordance with the objectives of the 1970 UNESCO Convention in respect of the export of cultural property from that State Party or the transfer of ownership of cultural property (Act of 9 December 2015, Relating to the Combining and Amendment of Rules Regarding Cultural Heritage (Heritage Act) section 6.3.1.)

However, the legislation goes a step further in also prohibiting the import of cultural property that "has been unlawfully appropriated in a State Party" (Section 6.3.2). The Explanatory Memorandum clarifies that unlawful appropriation includes "unlawful excavation at archaeological sites" and explicitly references the 1995 UNIDROIT Convention's equation of unlawful excavation with theft (Netherlands 2007/2008: 16). Furthermore, this provision applies even without establishing that an export control has been violated.

United Kingdom. One can suggest that the United Kingdom has taken something of a hybrid approach as well, incorporating the misappropriation definition from the UNIDROIT Convention. When the United Kingdom ratified the 1970 UNESCO Convention, it originally took the position that it did not need to enact implementing legislation. However, in 2003, it enacted new criminal legislation, the Dealing in Cultural Objects (Offences) Act 2003, although this was not characterized as a direct means of implementing the 1970 UNESCO Convention. This Act created a new offense for dealing in "tainted cultural objects" (chapter 27). One commits this offense if he or she "dishonestly deals in a cultural object that is tainted, knowing or believing that the object is tainted" (Section 1, Subsection 1). The statute defines a "tainted object" under the following circumstances: "(2) A cultural object is tainted if, after the commencement of this Act- (a) a person removes the object in a case falling within subsection (4) or he excavates the object, and (b) the removal or excavation constitutes an offence" (Section 2, Subsection 2). Subsection 4 refers to objects removed from "a building or structure of historical, architectural or archaeological interest" or from an excavation. For purposes of the statute, it does not matter whether the excavation or removal took place in the United Kingdom or in another country or whether the law violated is a domestic or foreign law (Section 2, Subsection 3). These provisions are clearly influenced by Article 3(2) of the 1995 UNIDROIT Convention, and, to that extent, the UK legislation bears a similarity to the Dutch legislation implementing the 1970 UNESCO Convention. Although it was not enacted as a means of restricting the importation of cultural objects, the UK legislation has been used as a means of seizing "tainted objects" upon entry (Vigneron 2008: 262, 292–93, 295; Steel 2012).

Future Directions

It remains to be seen whether the UNIDROIT Convention will ultimately garner the same relatively widespread acceptance that the 1970 UNESCO Convention has. At the same time, the salient question is whether nations that have ratified the 1970 UNESCO Convention will take their obligations seriously enough so that the convention will have its intended impact on the incentives to trade in looted, stolen, or undocumented cultural objects. While most State Parties have resolved the problem of the "specific designation" designation requirement, with the exception of Japan, the problem of a reactive rather than proactive plagues the method of implementation adopted by the United States and, to a lesser extent, Switzerland. Given that the United States is generally considered home to the largest art market, its inability to respond quickly and effectively to crises of looting caused by armed conflict and natural disaster is a serious detriment to our ability to protect and preserve the world's cultural heritage. The experiences of the past 15 years, since the 2003 Gulf War, demonstrate that the United States needs to devise a more effective method of implementation of the 1970 UNESCO Convention. Not only does the number of ratifying States need to increase, but the ratifying States must continue to seek better methods for implementing and enforcing the convention so that it becomes a more effective tool in the preservation of the world's archaeological heritage.

Cross-References

- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Bator, P.M. 1982. An essay on the International Trade in Art. *Stanford Law Review* 34: 275–384.

Canada. 2011. Report by Canada [to UNESCO] on implementation of the 1970 convention on the means of prohibiting and preventing the illicit import, export and transfer of ownership of cultural property. http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/pdf/canada_2010-11natrep_1970_en.pdf. Accessed 20 June 2018.

Canada. 2015. Report by Canada [to UNESCO] on implementation of the 1970 convention on the means of prohibiting and preventing the illicit import, export and transfer of ownership of cultural property. http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/pdf/CANADA_REPORT_EN.pdf. Accessed 22 June 2018.

Crawford, A. 2011. Canada returns Bulgarian stolen artefacts. *CBC News*, June 10. http://www.cbc.ca/news/canada/story/2011/06/10/bulgaria-artifacts.html.

Crennan, S.M. 2016. Review: Ancient art provenance project. National Gallery of Australia, 17 February.

Federal Government Commissioner for Culture and the Media. 2016. *Key aspects of the new act on the protection of cultural property in Germany*, 7. September. https://www.bundesregierung.de/Content/DE/_Anlagen/BKM/2016/2016-09-23-kulturgutschutz-informationen-englisch.pdf?__blob=publicationFile&v=2. Accessed 22 June 2018.

Lee, K-G. 2004. An overview of the implementation of the 1970 Convention in Asia. http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/pdf/Lee_en.pdf. Accessed 22 June 2018.

n.a. 2015. Egypt to retrieve 32 artifacts from Switzerland in June. *Egypt Independent*, May 7. http://www.egyptindependent.com/news/egypt-retrieve-32-artifacts-switzerland-june. Accessed 22 June 2018.

Nafziger, J.A.R., R.K. Paterson, and A.D. Renteln. 2010. *Cultural law: International, comparative, and indigenous*. Cambridge: Cambridge University Press.

Netherlands. 2007/2008. Explanatory memorandum to the implementing Act 1970 UNESCO convention, parliamentary documents II 2007/08, 31 255, No. 3.

Neuhaus, N. M. 2015. Switzerland limits trade in Syrian cultural property. Institute of Art and Law Blog. http://www.ial.uk.com/news/switzerland-limits-trade-in-syrian-cultural-property/. Accessed 22 June 2018.

O'Keefe, P.J. 2007. *Commentary on the 1970 UNESCO convention*. Builth Wells: Institute of Art and Law.

O'Keefe, P.J. 2017. *Protecting cultural objects: Before and after 1970*. Builth Wells: Institute of Art and Law.

Peters, R. 2016. The protection of cultural property: Recent developments in Germany in the context of new EU law and the 1970 UNESCO Convention 2. *Santander Art and Culture Law Review* 85.

Prott, L.V. 1997. *Commentary on the Unidroit convention*. Leicester: Institute of Art and Law.

Prott, L.V. 2012. Strengths and weaknesses of the 1970 convention: An evaluation 40 years after its adoption. http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/pdf/Prott_2_en.pdf. Accessed 22 June 2018.

Scovazzi, T., and P.G. Ferri. 2015. Recent developments in the fight against the illicit export of archaeological objects: The operational guidelines to the 1970 UNESCO convention. *Art, Antiquity and Law* 20: 195–228.

Shyllon, F. 2000. The recovery of cultural objects by African States through the UNESCO and UNIDROIT conventions and the role of arbitration. http://www.UNIDROIT.org/English/publications/review/articles/2000-2-shyllon-e.pdf.

Steel, P. 2012. Hundreds of stolen items returned to Kabul. *Museums Journal* 112/09 (Sept. 1). Available at: http://www.museumsassociation.org/museums-journal/news/01092012-stolen-items-returned-to-kabul.

Switzerland. 2014. Verordnung über Massnahmen gegenüber Syrien (17 Dezember, revised 22 April 2015). https://www.admin.ch/opc/de/classified-compilation/20121374/index.html. Accessed 22 June 2018.

Switzerland. 2016a. Bilateral agreements. https://www.bak.admin.ch/bak/en/home/cultural-heritage/transfer-of-cultural-property/bilateral-agreements.html. Accessed 22 June 2018.

Switzerland. 2016b. Fünf antike Kulturgüter an Italien zurückgeben. https://www.admin.ch/gov/de/start/dokumentation/medienmitteilungen.msg-id-62591.html. Accessed 22 June 2018.

UNESCO. 2015. Operational guidelines for the implementation of the convention on the means of prohibiting and preventing the illicit import, export and transfer of ownership of cultural property (UNESCO, Paris, 1970). http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/pdf/OPERATIONAL_GUIDELINES_EN_FINAL_FINAL.pdf. Accessed 20 June 2018.

UNESCO. n.d. Recent restitution cases of cultural objects using the 1970 convention. http://www.unesco.org/new/en/culture/themes/illicit-trafficking-of-cultural-

property/recent-restitution-cases-of-cultural-objects-using-the-1970-convention/. Accessed 22 June 2018.
Vigneron, S. 2008. Trafic illicite et restitution des biens culturels, Royaume Uni. In *Protection de la propriété culturelle et circulation des biens culturels. Étude de droit comparé Europe /Asie*, ed. M. Cornu and J. Fromageau. 2008_Études+sur+la++Protection+-de+a+propriété+culturelle+et+circulation+des+biens+-culturels.pdf. Centre d'etudes sur la cooperation juridique internationale. Accessed 22 June 2018.
Walden, D.A. 1995. Canada's cultural property export and import act: The experience of protecting cultural property (Special issue). U.B.C.L. *Rev.* 203–216.
Watson, P., and C. Todeschini. 2005. *The Medici conspiracy: The illicit journey of looted antiquities from Italy's tomb raiders to the world's greatest museums*. New York: PublicAffairs.

Further Readings

Gerstenblith, P. 2017. Implementation of the 1970 UNESCO convention by the United States and other market nations. In *The Routledge companion to cultural property*, ed. Jane Anderson and Haidy Geismar, 70–88. London: Routledge.
O'Keefe, P.J., and L.V. Prott. 2011. *Cultural heritage conventions and other instruments: A compendium with commentary*. Builth Wells: Institute of Art and Law.
UNESCO n.d.. *Conventions*. http://portal.unesco.org/en/ev.php-URL_ID=13039&URL_DO=DO_TOPIC&URL_SECTION=201.html. Accessed 22 June 2018.
Unidroit. 1995. Convention on stolen or illegally exported cultural objects. http://unidroit.org/english/conventions/1995culturalproperty/main.htm. Accessed 22 June 2018.

UNESCO (1972) and Malta (1992) Conventions

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Brief Definition of the Topic

In 1972, UNESCO adopted the *Convention Concerning the Protectionof the World Culturaland Natural Heritage*, a treaty that has become UNESCO's most widely accepted international instrument and was ratified by nearly all its member states. Its purpose is to encourage the identification, protection, and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity. The Convention (http://whc.unesco.org/) is administered by the World Heritage Committee which consists of 21 elected nations that are party to the Convention.

The Convention names formal advisory bodies to the WH Committee, of which ICOMOS, the International Council on Monuments and Sites, advises on cultural properties and advisor on natural sites is the World Conservation Union. ICOMOS is responsible for the evaluation of nominations of cultural properties made by States Parties against the criteria laid down by the WH Committee. In addition to the basic criterion of "outstanding universal value," as specified in the Convention, these relate to aspects of authenticity, management, and conservation.

World Heritage has become a source of prestige for states and cultural properties on the list are rather strongly biased toward architectural heritage. The list also has an imbalance in that most non-western countries are rather poorly represented. In recent years, attempts are made to remedy such issues. Apart from that, archaeological sites benefit most from a nation's participation in the WH Convention not because some archaeological sites may actually make it to the list, but because the vast majority of such sites, that will never make it to the list, may benefit from the obligations imposed by the treaty, especially article 5 that requests proper management of archaeological heritage.

The Malta Convention (http://conventions.coe.int/Treaty/en/Treaties/Html/143.htm) dates from 1992, when the Council of Europe adopted *European Convention on the Protection of the Archaeological Heritage* (*Revised*). The treaty has been ratified by almost all European countries and has become an important international standard.

The convention revises the Convention of London and was drafted as a result of the economic development in Europe in the 1960s and 1970s that caused massive destruction of archaeological resources (Willems 2007). The rescue archaeology in those days was unable to cope with the consequences of rapid spatial development and it was clear that to accomplish a better survival of archaeological resources, archaeology should become part of the planning process. After all, the expensive rescue operations were a direct result of a failure to do so. In addition, it was considered desirable that in the future some of those resources could be preserved in situ because their importance was recognized at an early stage. This changed rescue archaeology into preventive archaeology. Further, it had become an accepted principle to charge the developer with the cost of archaeological work resulting from the development. And finally, it was realized that the public needed to benefit more from the results of archaeological research that was conducted mostly in an academic setting. These are the central principles enshrined in the Convention.

Cross-References

- ▶ European Convention on the Protection of Archaeological Heritage (1992)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO World Heritage Convention (1972)

References

Willems, W.J.H. 2007. The work of making Malta: The Council of Europe's archaeology and planning committee 1988–1996. *European Journal of Archaeology* 10: 57–71.

UNESCO Declaration Concerning the Intentional Destruction of Cultural Heritage (2003)

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Introduction

International law regulates the rights and obligations of subjects of international law, such as States, international organizations, and individuals. Cultural heritage is protected under international law by different treaties, such as the Convention for the Protection of Cultural Property in the Event of Armed Conflict (see Schipper's entry ▶ "Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)"), the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (see O'Keefe's entry ▶ "Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)"), the Convention concerning the Protection of the World Cultural and Natural Heritage (see Labadi's entry ▶ "UNESCO World Heritage Convention (1972)"), or the Convention for the Safeguarding of the Intangible Cultural Heritage (see Blake's entry ▶ "Convention for the Safeguarding of Intangible Cultural Heritage (2003)"), among many others. These are all binding instruments that establish international rights and obligations (mainly directed to States) related to tangible and intangible cultural heritage.

Declarations have also been adopted on the same field. Some examples are the United Nations Declaration on the Rights of Indigenous Peoples (see Nichols' entry ▶ "United Nations Declaration on the Rights of Indigenous Peoples (2007)"),

the UNESCO Universal Declaration on Cultural Diversity and the instrument under study, the Declaration concerning the Intentional Destruction of Cultural Heritage (the "UNESCO Declaration 2003"), adopted on October 17, 2003 by consensus of the General Conference of the United Nations Educational, Scientific, and Cultural Organization ("UNESCO").

Definition

Declarations in international law are instruments that are designed not to be enforceable and are considered "soft law" (Murphy and Damrosch 2014). However, resolutions adopted by organs representative of the international community "may sometimes have normative value. They can, in certain circumstances, provide evidence important for establishing the existence of a rule or the emergence of an *opinio juris*. To establish whether this is true. . ., it is necessary to look at its content and the conditions of its adoption; it is also necessary to see whether an *opinio juris* exists as to its normative character" (International Court of Justice 1996). In other words, instruments like the Declaration are susceptible of providing evidence of a belief that its content must be carried out as a legal obligation (or the emergence of such belief) and, hence, to provide evidence of the existence of an international customary law rule.

The Declaration was originally conceived as a reaction to the destruction of the Buddhas of Bamiyan, in Afghanistan (see Bartsch's entry ▶ "Bamiyan Buddhas"). In that context, UNESCO's General Conference intended to send a strong message indicating that intentional destruction of cultural heritage is not to be tolerated. Although it is not clear whether this goal was actually achieved (see below "Key Issues/Current Debates"), the draft of the Declaration had three main purposes: to support existing international legal obligations of States and individuals toward cultural heritage, to prevent new acts of intentional destruction of cultural heritage through State cooperation and the adoption of domestic appropriate measures, and to invite States to join applicable international treaties (O'Keefe and Prott 2011). In this line, the Declaration as finally adopted presents a preamble where the General Conference, among other things, recalled the "tragic destruction of the Buddhas of Bamiyan that affected the international community as a whole" (see below "Historical Background"); expressed concern "about the growing number of acts of intentional destruction of cultural heritage"; made reference to international treaties applicable to cases of destruction of cultural heritage – such as the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict-; and referred to the development of customary international law "as also affirmed by the relevant case-law, related to the protection of cultural heritage in peacetime as well as in the event of armed conflict."

The scope of the Declaration is expressly limited to "intentional destruction" of cultural heritage (Article II.2). Although in principle it does not cover the protection of natural heritage (in contrast with the Convention concerning the Protection of the World Cultural and Natural Heritage), it expressly includes cases of destruction of "cultural heritage linked to a natural site" (Article II.1). This has been considered an improvement, since it suggests that culture and nature are intertwined (Bandeira Galindo 2008; Hladik 2004). Further, its scope expressly covers intentional destruction during peacetime (Article IV) and wartime (Article V), avoiding the so-called dichotomy between international humanitarian law and peacetime instruments (Hladik 2012). In this vein, the Declaration suggests different measures that States should adopt to combat intentional destruction of cultural heritage (Article III).

The Declaration addresses the conduct of both individuals and States. The Declaration makes it clear in its Article VI that an act of intentional destruction of cultural heritage conducted by a State or the omission by a State to "prohibit, prevent, stop, and punish any intentional destruction" would give place to international responsibility

(in which case, the international law of State responsibility for internationally wrongful acts would apply). It also reminds that "States should take all appropriate measures" to criminalize individuals who "commit, or order to be committed, acts of intentional destruction of cultural heritage of great importance for humanity" (Article VII). It is remarkable that both articles make it clear that it does not matter whether or not the intentionally destroyed piece of cultural heritage is inscribed on a list maintained by UNESCO or another international organization. This means that the relevant factor is that the piece must be of "great importance for humanity" (Articles VI and VII).

Further, the Declaration recognizes that States should cooperate among themselves and with UNESCO to achieve the protection of cultural heritage within their territories (Article VIII.1), while it also encourages States to cooperate with each other in criminal matters related to the intentional destruction of cultural heritage (Article VIII.2). It also declares that it is necessary to respect the international rules that criminalize the breaches of international human rights law and international humanitarian law – or laws of war – when related to intentional destruction of cultural heritage (Article IX). Finally, it provides that States should ensure the widest publication as possible of the Declaration (Article X).

Historical Background

The Buddhas of Bamiyan were destroyed by the Taliban regime in Afghanistan in 2001. The figures were not only unique monumental pieces of cultural and religious significance, they were artistically remarkable, since they presented an exceptional mixture of Central Asian, Indian, and Hellenistic influences (Wangkeo 2003). After the destruction, it has been suggested that the international community was incensed and wanted to mark its deep contempt against such acts of destruction (O'Keefe and Prott 2011). In December 2002, UNESCO organized an ad hoc meeting of experts that gave place to a first draft of the Declaration, which was submitted to UNESCO where it was subject to negotiations between its member States (Lenzerini 2003).

The destruction of the Buddhas was completely unprecedented. Scholars pointed out that its uniqueness stem from several rare circumstances: the destroyed pieces were located in Afghan territory and were considered part of that country's cultural heritage; the Taliban regime had decreed the destruction of any figure different from those allowed by that group; the destruction was planned and publicly announced; before the detonation of the statues, different sanctions had been adopted by the United Nations and the international community. The destruction was considered also a way of protesting against the pressure exercised by UNESCO's officials and the United Nations Secretary-General (Francioni and Lenzerini 2003; Goy 2005; Bandeira Galindo 2008).

These unique circumstances proved to be legally challenging for the international community. On March 2001, 2 years before the adoption of the Declaration, the United Nations General Assembly debate regarding the situation in Afghanistan showed that, although every delegation rejected the Taliban decree that ordered the destruction of the statues, virtually no State considered the destruction of the Buddhas a violation of international law. The Ukrainian delegation was the only one that, during that session, condemned the destruction of non-Islamic historic monuments as "a flagrant violation of international law" (United Nations General Assembly 2001a). In May of that year, the United Nations General Assembly adopted Resolution 55/243, "strongly call[ing] upon the Taliban to abide by their previous commitments to protect the cultural heritage" (United Nations General Assembly 2001b). In this line, it has been suggested that sanctions adopted against the Taliban at the time were essentially moral (Goy 2005).

Another challenge arose regarding the international legal rules that would potentially apply to that situation: international humanitarian law or international law applicable in peacetime. The former applies only during armed conflict and, consequently, a breach of international humanitarian law could not, in principle, take place during peacetime. Certain scholars argued that, since Afghanistan was going through a civil war, international humanitarian law applied (Francioni and Lenzerini 2003). However, others were of the

view that the destruction of the Buddhas was not related, in any way, to the armed conflict and, hence, would not have been governed by international humanitarian law (O'Keefe 2006).

In any case, the most significant conclusion about the aftermath of such a monumental destruction and the reactions that followed is that the international community universally condemned intentional destruction of cultural heritage and expressed unanimous concern (Wangkeo 2003; Lenzerini 2003). In this context, the Declaration played a paramount role giving normative form to the condemnation by the international community.

Key Issues/Current Debates

It could be argued that the Declaration had certain aspiration to support the existence or the emergence of a customary international law rule. Actually, its preamble expressly states that the General Conference was "[m]indful of the development of rules of customary international law as also affirmed by the relevant case-law, related to the protection of cultural heritage in peacetime as well as in the event of armed conflict." It does not seem that the Declaration lived up to such purpose (Lenzerini 2003; Green Martínez 2012). Despite the Declaration itself constitutes a non-enforceable instrument, the drafters of the Declaration apparently emphasized such character through the word "should." Provisions that required action by States under the Declaration are seemingly mere suggestions: during peacetime "States **should** take all appropriate measures. . ." (Article IV); during armed conflicts "States **should** take all appropriate measures. . ." (Article V); further, "States **should** take all appropriate measures. . ." to combat intentional destruction of cultural heritage (Article III.1–III.4). As a commentator pointed out, the term "should" "is totally unnecessary in a declaration of principles, since by its soft-law nature this kind of instrument is not capable of creating international obligations of binding character, and the frequency of its use in the Declaration on the intentional destruction of cultural heritage clearly demonstrates that the main preoccupation of most of the negotiators was to preserve their domestic interests rather than to produce an instrument having the effective scope of safeguarding a value belonging to the international community as a whole" (Lenzerini 2003). In this regard, it has been considered that "[t]he Declaration does not itself impose obligations on Member States of UNESCO. Its hortatory and thus not fundamentally norm-creating language is incapable of doing so, and the *travaux préparatoires* show that this was not the intention" (O'Keefe 2006). Otherwise, States would renounce to the possibility of destroying or even affecting cultural heritage within their territories.

Nevertheless, the Declaration portrays a clear and unanimous contempt toward intentional destruction of cultural heritage and that, by itself, might constitute a step forward toward the emergence of a customary rule of international law. This is particularly relevant if we take into consideration that, although international actors expect that host states will in principle protect their cultural property, it has been suggested that no customary norm has developed against destroying cultural heritage in peacetime (Wangkeo 2003). This can be evinced from the United Nations General Assembly's debate, in which only one State claimed that the destruction of the Buddhas entailed a breach of international law and United Nations General Assembly Resolution 55/243, which did not refer to an existing customary rule applicable to the Buddhas. The prohibition of intentional destruction of cultural heritage was subject to intense debate during the drafting of the Declaration (Vrdoljak 2007; Francioni and Lenzerini 2003), and, in that context, the Declaration can be conceived as a step forward (Lenzerini 2003; Green Martínez 2012). It is worth mentioning that in the years that followed, positive developments took place in the international legal arena (particularly in the field of human rights law) suggesting that a customary rule may have emerged.

International Perspectives

States seem to be reluctant to give up their sovereignty when it comes to the administration of cultural heritage within their territories. In other

words, States have preferred to retain the power to physically affect cultural heritage, if necessary. However, the Declaration is evidence of the unanimous consensus in the international community against intentional destruction of cultural heritage, regardless of who carries it out and where it happens. Although the document is not binding, it reaches a universal agreement on the standards that mankind aspires to regarding the protection of cultural heritage.

Future Directions

Since its adoption in 2003, the values behind the declaration have been consistently applied. In 2013 the International Court of Justice rendered a judgment in the case regarding the *interpretation of the 1962 Judgment in the Temple of Preah Vihear case.* There, the Court referred to the World Heritage Convention and affirmed that both parties to the dispute (Cambodia and Thailand) must cooperate with each other and with the international community to protect a world heritage site. Furthermore, the Court affirmed that under the World Heritage Convention, both States have the obligation not to take any intentional measures which might directly or indirectly damage world heritage (International Court of Justice 2013). Although no express reference is made to the Declaration, the judgment rendered by the Court clearly displays how the values recognized in the Declaration are interpreted and enforced through the application – in this case – of the World Heritage Convention.

Moreover, the interest of local communities and the international community as a whole in cultural heritage as expressed in the Declaration has also been considered a step forward. While commenting the case referred to, a scholar affirmed that the Declaration strengthened the idea that safeguarding cultural and spiritual heritage concerns both local communities and the humanity as whole (Chechi 2015).

Finally, the criminal dimension of the Declaration is also relevant today. The Declaration provides for individual and State responsibility, while it also calls on States to assume jurisdiction over crimes involving the intentional destruction of cultural heritage, making a relevant reference point in the field of cooperation and criminalization (Vrdoljak 2016). In this context, it is worth underscoring that, when the Declaration was adopted, the International Criminal Court (the "ICC") was giving its first steps. Currently, the Rome Statute of the ICC – which counts with 123 States parties – criminalizes international destruction of cultural heritage. Under Article 7, intentional destruction of cultural heritage can be considered a crime against humanity of persecution during both peacetime and wartime (Ehlert 2014), and, further, under Article 8 of the Statute, it is considered a war crime to "intentionally [direct] attacks against buildings dedicated to religion, education, art, science or charitable purposes, historic monuments, hospitals [...] provided they are not military objectives." On 27 September 2016, in the case *Prosecutor v. Ahmad Al Faqi Al Mahdi* – the first case in which a defendant pleaded guilty before the ICC – Mr. Al Mahdi was convicted to 9 years of imprisonment for the intentional destruction of Timbuktu in Northern Mali. The Declaration called on the international community to criminalize the intentional destruction of cultural heritage, and, in this context, the Rome Statute of the ICC means an enormous improvement toward the criminalization of intentional destruction of cultural heritage worldwide.

Cross-References

- ▶ Bamiyan Buddhas
- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)
- ▶ UNESCO World Heritage Convention (1972)
- ▶ United Nations Declaration on the Rights of Indigenous Peoples (2007)

References

Bandeira Galindo, G. 2008. The UNESCO Declaration concerning the intentional destruction of cultural heritage. In *The cultural heritage of mankind*, ed. Nafziger and Scovazzi, 1st ed., 399–453. Leiden: Martinus Nijhoff Publishers.

Chechi, A. 2015. The 2013 judgment of the ICJ in the temple of Preah Vihear case and the protection of world cultural heritage sites in wartime. *Asian Journal of International Law* 6: 353–378.

Ehlert, C. 2014. *Prosecuting the destruction of cultural property in international criminal law*. Leiden/Boston: Martinus Nijhoff Publishers.

Francioni, F., and F. Lenzerini. 2003. The destruction of the Buddhas of Bamiyan and international law. *European Journal of International Law* 14 (4): 619–651.

Goy, R. 2005. La destruction intentionnelle du patrimoine culturel en droit international. *Revue générale de droit international public* 109: 273–304.

Green Martínez, S. 2012. Serpientes y Escaleras: La Declaración de la UNESCO Relativa a la Destrucción Intencional de Patrimonio Cultural y su Impacto en la Norma Consuetudinaria Preexistente. In *Víctimas, Perpetradores y el Respeto del Derecho Internacional Humanitario: entre responsabilidad y protección*, ed. Buis and Giosa, 24–31. Azul: UNICEN.

Hladik, J. 2004. The UNESCO declaration concerning the intentional destruction of cultural heritage: A new instrument to protect cultural heritage. *Art, Antiquity and Law* 9: 215–236.

Hladik, J. 2012. Different legal issues related to the protection of cultural property in peacetime and wartime. *Proceedings of the Annual Meeting (American Society of International Law)* 106: 453–462.

International Court of Justice. 1996. Legality of the threat or use of nuclear weapons, Advisory Opinion of 8 July 1996, I.C.J. Reports 1996, 226.

Lenzerini, F. 2003. UNESCO declaration concerning the international destruction of cultural heritage: One step forward and two steps back. *Italian Yearbook of International Law* 13: 131–145.

Murphy, S., and L. Damrosch. 2014. *International law – Cases and materials*. 6th ed. St. Paul: West Academic Publishing.

O'Keefe, P., and L. Prott. 2011. *Cultural heritage conventions and other instruments – a compendium with commentaries. Institute of art and law*. Builth Wells: Crickadarn.

O'Keefe, R. 2006. *The protection of cultural property in armed conflict*. Cambridge, UK: Cambridge University Press.

UNESCO. 2003. Draft declaration concerning the intentional Destruction of Cultural Heritage, 17 July 2003, UNESCO Doc. 32 C/25.

United Nations General Assembly. 2001a. 94th plenary meeting, 9 March 2001, UN Doc. A/55/PV.94.

United Nations General Assembly. 2001b. Resolution 55/243, 1 May 2001, UN Doc. A/RES/55/243.

Vrdoljak, A. 2007. Intentional destruction of cultural heritage and international law. In *Multiculturalism and international law – 2004 international law session*, ed. Koufa, 378–396. Athens/Thessaloniki: Sakkoulas Publications.

Vrdoljak, A. 2016. The criminalisation of the intentional destruction of cultural heritage. In *Forging a socio-legal approach to environmental harms*, ed. Bergin and Orlando. Abingdon: Routledge.

Wangkeo, K. 2003. Monumental challenges: The lawfulness of destroying cultural heritage during peacetime. *Yale Journal of International Law* 28 (1): 183–274.

Further Readings

Blake, J. 2015. *International cultural heritage law*. Oxford: Oxford University Press.

Dupuy, P. 2007. The impact of legal instruments adopted by UNESCO on general international law. In *Standard-setting in UNESCO, volume I: Normative action in education, science and culture, essays in commemoration of the sixtieth anniversary of UNESCO*, ed. Yusuf. Boston/Leiden: Martinus Nijhoff Publishers.

Francioni, F. 2009. La Protección del Patrimonio Cultural a la Luz de los Principios de Derecho Internacional Público. In *La Protección Jurídico Internacional del Patrimonio Cultural: Especial Referencia a España*, ed. Fernandez and Prieto de Pedro. Madrid: Colex.

Forrest, C. 2010. *International law and the protection of cultural heritage*. Abingdon: Routledge.

Green Martínez, S. 2015. Destruction of cultural heritage in northern Mali: A crime against humanity? *Journal of International Criminal Justice* 13 (5): 1073–1097.

Hill, C. 2017. Killing a culture: The intentional destruction of cultural heritage in Iraq and Syria under international law. *Georgia Journal of International and Comparative Law* 45: 191–220.

Lostal, M. 2017. *International cultural heritage law in armed conflict case-studies of Syria, Libya, Mali, the invasion of Iraq, and the Buddhas of Bamiyan*. Cambridge, UK: Cambridge University Press.

Lostal, M. 2012. La Protección de Bienes Culturales en el Tribunal Penal Internacional para la Ex Yugoslavia. *Revista Electrónica de Estudios Internacionales* 24: 1–25.

Schabas, W. 2017. Al Mahdi has been convicted of a crime he did not commit. *Case Western Reserve Journal of International Law* 49 (1): 75–102.

UNESCO World Heritage Convention (1972)

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The Convention concerning the Protection of the World Cultural and Natural Heritage (better known as the World Heritage Convention) was adopted by UNESCO (the United Nations Educational, Scientific, and Cultural Organization) in November 1972. Its key feature, the World Heritage List, has become one of the most popular global programs on conservation, with 1073 sites on the List in 167 countries (as of October 2017). Despite its popularity, this legal instrument is still badly understood. This entry aims to explain the mechanisms to inscribe sites on the World Heritage List. It will then present the key issues facing this legal instrument. A final section will present the way forward for the full implementation of the World Heritage Convention.

The World Heritage Convention: Basics Mechanisms

Since the creation of UNESCO in 1945, a number of international campaigns had been organized for the conservation of iconic sites, the first of which was launched in 1959 on the Nubian monuments of Egypt, threatened by the construction of the Aswan Dam (Bandarin and Labadi 2007: 28). The Convention concerning the Protection of the World Cultural and Natural Heritage (henceforth World Heritage Convention or The Convention), adopted on 16 November 1972 by the General Conference of UNESCO, was conceived as a more permanent mechanism that could protect cultural and natural heritage sites deemed to be of "outstanding universal value." This text was also adopted, because uncontrolled development was becoming one of the most significant threats affecting heritage sites. This is clearly highlighted in the preamble of this convention which stresses:

> The cultural heritage and natural heritage are increasingly threatened with destruction not only by the traditional causes of decay, but also by changing social and economic conditions which aggravate the situation with even more formidable phenomena of damage and destruction. (UNESCO 1972)

The Convention is a legal intergovernmental instrument and aims to set up a system of collective protection of natural and cultural properties of outstanding universal value for present and future generations. It needs to be ratified by countries which subsequently become States Parties to the Convention. This instrument came into force in December 1975 when 20 nations had ratified it. States Parties are the key actor of this international system. While it is often wrongly believed that UNESCO decides which sites should be on the World Heritage List, in reality only States Parties have the power to nominate sites located on their territory for inscription on the List. Those that extend beyond national borders can be nominated as joint transboundary or transnational nominations by more than one country (Bandarin and Labadi 2007: 37). To be able to do so, States Parties first need to submit to UNESCO a tentative list, which can be compared to a "wish list" of sites they plan to nominate in the next 5–10 years. For instance, the tentative list of Iraq includes some of the key archaeological sites illustrating its place as the cradle of civilization, including Babylon, Nimrud, or the ancient city of Nineveh.

To nominate a site for inclusion on the World Heritage List, States Parties need to prepare and submit to UNESCO a nomination dossier. The Operational Guidelines for the Implementation of the World Heritage Convention provide information of the format and content of these dossiers, which should clearly identify the boundaries of the site, describe it, and justify its outstanding universal value, using one or more of the official criteria, also detailed in the Operational Guidelines (UNESCO 2015; see Table 1 for the list of criteria). Nomination dossiers should also detail the authenticity of the property according to the

UNESCO World Heritage Convention (1972), Table 1 Criteria for the assessment of outstanding universal value

(i) Represent a masterpiece of human creative genius
(ii) Exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town planning, or landscape design
(iii) Bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared
(iv) Be an outstanding example of a type of building, architectural or technological ensemble, or landscape which illustrates (a) significant stage(s) in human history
(v) Be an outstanding example of a traditional human settlement, land use, or sea use which is representative of a culture (or cultures) or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change
(vi) Be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance (The Committee considers that this criterion should preferably be used in conjunction with other criteria.)
(vii) Contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance
(viii) Be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features
(ix) Be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal, and marine ecosystems and communities of plants and animals
(x) Contain the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation

values of the site and the cultural context, as well as the conditions of integrity which measures the "wholeness and intactness of the heritage and its attributes" (UNESCO 2015, paragraph 88). Despite this condition, some sites have been able to be inscribed on the List after having been destroyed, as is the case with the now famous Buddhas of Bamiyan, inscribed in 2003. Nomination dossiers should also detail the different management and conservation principles in place to ensure that the outstanding universal value of the site will be preserved in the long term. In the early years of the implementation of the Convention, dossiers were only a few pages long. In the past 15 years, these dossiers have increased in complexity and length.

Once nomination dossiers have been drafted by States Parties, they need to be submitted to UNESCO World Heritage Centre, which acts as the Secretariat to the Committee. These dossiers are subsequently evaluated by one of the advisory bodies to the Committee: ICOMOS (International Council on Monuments and Sites) for cultural heritage sites and IUCN (International Union for the Conservation of Nature) for natural heritage sites. The so-called mixed sites that are sites with cultural and natural heritage values and some cultural landscapes are jointly evaluated by ICOMOS and IUCN. These two organizations prepare an evaluation for each site, based on the nomination, consultation with relevant experts, and on-site visit. Each evaluation contains a recommendation on whether the site should be inscribed on the World Heritage site, referred back to the State Party for additional information, or deferred, which means that a completely new nomination will need to be submitted. The hardest recommendation is "not to inscribe," as this nomination cannot be presented again, except in exceptional circumstances.

These evaluations are presented orally during the World Heritage Committee meeting, which takes place annually and is retransmitted live (past Committee meetings can still be watched on YouTube). The World Heritage Committee is composed of 21 elected States Parties, in respect of Article 8(1) of the World Heritage Convention. The Committee takes the final decisions on whether a site should be inscribed on the World Heritage List, referred back for additional information, deferred, or not inscribed. The discussions on the nominations are the highlight of the committee meeting and are well attended by the different delegations and national media, which report back on the national sites that have been inscribed. The other key functions of the Committee are to examine the state of conservation of World Heritage sites, to decide the properties to inscribe or remove from the List of World

Heritage in Danger, and to determine the uses of the World Heritage Fund. The Committee also decides which sites should be deleted from the World Heritage List. So far, only two sites have been deleted from the World Heritage List. The first is the Arabian Oryx Sanctuary, deleted from the List in 2007 because of Oman's decision to reduce the size of the protected area by 90%, with plans to proceed with hydrocarbon prospection which would have destroyed the value and integrity of the property. The second property deleted was the Dresden Elbe Valley in 2009 because of a four-lane bridge construction project within the boundaries of the property.

Current Debates and Continuing Issues

Continued Unbalances of the List

One of the major recurring problems of the World Heritage List is its geographical unbalance, despite programs, primarily the 1994 Global Strategy, that have aimed to address this issue. As of 2017, the List is still dominated by the Europe region, with 434 cultural sites, 62 natural sites, and 10 mixed sites, representing almost 50% of the whole List. In contrast, sites located in Africa and the Arab states combined do not even reach 20% [51 cultural sites, 37 natural sites, and 5 mixed sites (9%) are located in Africa and 74 cultural sites, 5 natural sites, and 3 mixed sites (8%) are located in the Arab states]. The European domination of the List has not really changed over the past 23 years. As of 1994 and 2004, 55% of all sites were located in Europe (Labadi 2005: 92). It is quite fair to conclude, considering these figures and lack of evolution, that one of the key aims of the Global Strategy, "to correct the imbalances of the list between regions of the world," has failed (UNESCO 1994), despite different measures set in place. It is true that the Latin American and Asia-Pacific regions have been able to adopt successfully, to a certain degree, the principles of the Convention. Yet, the system remains Eurocentric. This situation can be explained by the lack of adequate tools to monitor the implementation of the Global Strategy. While major efforts have been given to training in underrepresented regions, with programs such as AFRICA 2009, their results have been limited due to lack of stability of trained staff or stability of structures (Office of the External Auditor for UNESCO 2011: 35). In addition, it seems that the preparatory assistance from the World Heritage Fund has not been as effective as could have been expected. Only 28% of all the sites that have benefited from preparatory assistance since the adoption of the Global Strategy with a view to nomination were inscribed on the List. Most importantly, there has been no will on the part of European States Parties to reduce the number of nominations that they wanted to nominate or to assist parties with less resources or experience.

Despite this failure, other unbalances noted in the Global Strategy report have been redressed, to some extent. This is the case, for instance, for a better representation of types of monuments and periods. For instance, "The Architectural Work of Le Corbusier, an Outstanding Contribution to the Modern Movement" comprising 17 sites located in Argentina, Belgium, France, Germany, India, Japan, and Switzerland was inscribed on the List in 2016. A number of transboundary routes, reflecting the cooperative nature of the Convention, have also been inscribed, including the Qhapaq Ñan, Andean Road System, an extensive Inca communication, trade, and defense network of roads covering 30,000 km, located in Argentina, Bolivia, Chile, Columbia, Ecuador, and Peru. Despite this relative success, the additional following issues remain.

Intrinsic Values and Consequences

"Outstanding universal value," the central notion of the Convention, has also led to issues, as it is still too often considered as being intrinsic to sites, instead of being considered as extrinsic (Labadi 2013). Such an understanding of significance means that World Heritage sites are considered as having inherent values that reside in the physical fabric of their structures, features that do not change in time and that can thus be appreciated by all mankind equally, regardless of individuals' backgrounds or their geographical location. Considering values as intrinsic in this manner also means that values are detached from their own

changing history, the wider social and cultural environments that shape them, as well as the shifting and conflicting significance that can be given to them by different individuals. This excludes, de facto, the possibility of drawing a comprehensive statement of significance that would take into account wider sociocultural values and considerations – in particular, values attributed by the local communities associated with the property. This is a way of giving a veneer of objectivity to the process of selecting sites for World Heritage Listing, by insisting that sites can be valued the same way by everybody everywhere. However, this veneer of objectivity and this understanding of intrinsic values are slowly being chipped away, as reflected, for instance, in the comments made by the delegate of Lebanon during the discussions on the nomination of the Historic City of Yazd (Iran) for inscription on the World Heritage List, at the 2017 World Heritage Committee meeting. This delegate criticized ICOMOS for having provided conflicting views on this site in its evaluation. He further stated that "inscribing a site on the List is not a mathematical formula" and that ICOMOS could make the Committee be aware of its diverging opinions among its panel.

One of the unfortunate consequences of this situation of attempting to consider values as intrinsic is the exclusion of local communities from the nomination, inscription, and management of sites. The major efforts to recognize the essential role of local communities should not be underestimated, as exemplified, for instance, by the 2002 Budapest Declaration, the 2007 5th C added to the strategic objectives, or the different events organized as part of the celebrations of the 40th anniversary of the Convention. Yet, a number of official documents are rather ambivalent concerning community participation, confirming the exclusionary trend of a framework that considers values as inherent to heritage sites**.** This ambivalence can be noted in the official format of the nomination dossier that States Parties need to fill out when proposing sites for inclusion on the List. Since 1997, one of the direct references to the local population is made under a section entitled "Factors Affecting the Site," reflecting the fact that communities are still sometimes considered a threat to sites. These exclusionary trends can also be explained by the use made by governments of the World Heritage List, as a tool to communicate about national narratives and national identities. In this nationalist endeavor, narratives focus on the great men of history and their great and impressive deeds. These narratives, termed by Laurajane Smith the "authorised heritage discourse," contribute to disengaging local populations whose values do not fit within this narrative (2006).

These exclusionary trends already appeared during the early days of the international heritage conservation movement, as illustrated, for instance, by the Abu Simbel Temples in Egypt. These temples were moved in 1968 onto an artificial hill to protect them from being submerged after the construction of the Aswan High Dam. These monuments were subsequently inscribed on the World Heritage List in 1979, but only the physical remains have been preserved; the intangible links with the Nubians have been lost. Since then, examples abound of sites inscribed on the World Heritage List that excludes communities, from Petra in Jordan to the Mahabodhi Temple Complex at Bodh Gaya in India, which has been documented as having been "cleaned" of its street vendors, with some areas close to the temple made into fee-paying attractions targeted at wealthy visitors (Geary 2015: 51–52).

Gender Unbalance

Gender equality is a top priority of the United Nations and its specialized agencies. Gender equality concerns all aspects of the World Heritage Convention, as gender relations are infused throughout the implementation of this legal instrument, from the identification of heritage to its conservation and management and its interpretation. Research on the representation of gender in official nomination dossiers has revealed a clear marginalization of the references to women and a strong bias toward androcentric representations of the past and a focus on the great men of history (Labadi 2013; 78ff; Labadi in press). This strongly positions women at the margin of the text, history, and heritage and makes them

invisible, secondary, and forgettable. Worse, some references tend to be a vehicle for stereotypical personal characteristics of women, describing them as sentimental, hysterical, prone to making decisions based on emotion, and incapable of rational action. It could have been thought that this focus on the great men of history could have changed in recent years, especially since gender equality issues have been given major prominence at UN level. Yet, on the contrary, the focus on the great men of history has increased in the recent nomination dossiers. There are now entire dossiers focusing on great men and their deeds, as is the case with the serial nomination of "The Architectural Work of Le Corbusier" (France, Argentina, Belgium, Germany, India, Japan, and Switzerland), inscribed on the World Heritage List in 2016. This invisibility of women was reflected, until recently, in the experts from both ICOMOS and IUCN who undertook evaluation missions of nominated sites for inclusion on the World Heritage List. From 2006 to 2008, 70% of ICOMOS experts were men (Tabet 2010: 25); 33 men out of a total of 34 acted as IUCN evaluators for the period 2001–2004 (Cameron 2005: 8). No precise information has yet been published on how these unbalances have been rectified.

Unsustainable Development

An increasing number of World Heritage sites suffer from unsustainable growth, which have taken many forms, from major infrastructure or housing projects to problematic tourism development (Labadi 2015: 137–150; Labadi and Logan 2015: 1–20; Labadi Forthcoming). These unsustainable projects, in a number of cases, threaten the very values for which the site was inscribed on the World Heritage List in the first place. Luang Prabang in Laos is but one example. The town of Luang Prabang was inscribed on the World Heritage List in 1995 under criteria (ii), (iv), and (v) for the exceptional fusion of Lao traditional architecture and nineteenth- and twentieth-century European colonial style buildings; its diversity of religious buildings, vernacular constructions, and colonial buildings; and because it is remarkably well preserved. In the past few years, the Greater Mekong Subregion (GMS), made of Cambodia, China, Laos, Myanmar, Thailand, and Viet Nam, has increasingly affected the heritage-led development of Luang Prabang (Labadi 2017: 45–60). For more than two decades, this subregion has worked toward an integrated economic cooperation program, with assistance from the Asian Development Bank. Tourism has been identified as one of the flagship sectors for development by the GMS Economic Cooperation Program and infrastructure development recognized as the means to achieve tourism growth. This has led to the construction of a high-speed railway link to China, an improvement of the road from Luang Prabang to the Thai Border, as well as the upgrading and expansion of the city's current airport facilities, to ensure an increase in regional tourism, with the expectation that the number of arrivals by air to Luang Prabang will increase by 400% over the next 20 years. These major infrastructural developments have raised concerns that the heritage of Luang Prabang will get overexploited.

However, it is not only the built environment that gets exploited. Local communities and cultures are also too often negatively impacted by these unsustainable trends. When communities have been able to draw some economic benefits from World Heritage sites, primarily through tourism, unfortunately, their well-being has often been impacted, particularly in developing countries. It seems in particular that the spatiotemporal dislocations between the developed and developing world have been aggravated by the World Heritage label. This is what was recently referred by Italian writer Marco d'Eramo as UNESCO-cide (2014). This means that tourists are attracted by the prospect of seeing something different from what they have at home and, when in the developing world, are interested by an authentic experience, a space of difference, distant from modernity. The result is that these tourists, most of them originating from the Western world, behave as if they were in a zoo, taking pictures of local inhabitants or trying to visit their homes uninvited. The presentation of World Heritage sites as being authentic has tended to exacerbate

further these issues, especially since authenticity has been defined as an original and unchanged state of things. This understanding of authenticity reinforces this dichotomy between the developed and developing world and stereotypes associated with these categories, in particular the fact that developing countries have remained authentic, in other words that they are unchanged and backward and have not yet entered modernity.

The Way Forward: Policy on World Heritage and Sustainable Development

The unsustainable trends highlighted in the previous section are rather surprising, considering that a number of key ideas related to sustainability were reflected in the very text of the World Heritage Convention from 1972 (Labadi 2017: 47). This is particularly the case with the idea of intergenerational equality, presented in Article 4 of the Convention, which recognizes that heritage should be identified, protected, as well as transmitted to future generations. This idea echoes the definition from the Brundtland report that sustainable development is "Development that meets the needs of current generations without compromising the ability of future generations to meet their own needs" (WCED 1987: 45). However, these continuous unsustainable trends might reflect the lack of clear policies on the integration of sustainable development approaches into the convention mechanisms. Indeed, up until 2012, only declarations (e.g., the 2002 Budapest Declaration, the 2012 Kyoto Vision) or events (e.g., 40th Anniversary of the Convention in 2012 on the theme of "World Heritage and Sustainable Development: the Role of Local Communities") aimed to deal with the concept of sustainable development. At its 2012 session, the World Heritage Committee made a historic request for a "proposal for a policy on the integration of sustainable development into the processes of the World Heritage Convention" (UNESCO 2012). This is historic as it is the first time that the Committee asked to define tools and ways to ensure that sustainable development principles were integrated within the implementation of the Convention. This "Policy for the Integration of a Sustainable Development Perspective into the Processes of the World Heritage Convention," fully adopted by UNESCO in November 2015, can become a powerful tool to align the convention mechanisms with sustainable development principles.

This policy is structured on the four core pillars of sustainable development from the document "Realizing the Future We Want for All," adopted at the Rio + 20 Conference (UNCSD 2012: 1). This document focuses on four core dimensions of sustainable development: (1) inclusive social development (including respecting, protecting, and promoting human rights and indigenous people as well as achieving gender equality), (2) inclusive economic development, (3) environmental sustainability (including resilience to disasters and climate change), and (4) peace and security. The first pillar on "inclusive social development" calls States Parties to ensure that the nomination, conservation, and management of properties are based on the recognition of the principles of inclusion and equity, through the provision of opportunities for all and the reduction of social and economic inequalities. This is further detailed through recognizing the potential of World Heritage properties to enhance the quality of life and well-being of all stakeholders, particularly local communities. The section on "respecting, consulting, and involving indigenous people and local communities" requests the free, prior, and informed consent and effective participation of indigenous people, whenever relevant. The section on gender equality requests equal representation of both men and women within activities for the nomination, conservation, and management of World Heritage properties. It also requests that women and men benefit equally from economic opportunities at World Heritage sites.

The second pillar on "inclusive economic development" is also strongly oriented toward social responsibility through encouraging inclusive and equitable economic development that generates decent employment and income for local communities. In addition, this pillar encourages local

initiatives and entrepreneurship through the strengthening of educational programs and capacity building. While the policy encourages economic growth, employment, and poverty-reduction initiatives within World Heritage properties, it also establishes some limits as parameters for sustainability. It does so by reiterating decision 37COM7 of the World Heritage Committee which urges States Parties and leading industry stakeholders "to respect the "No-go" commitment by not permitting extractive activities within World Heritage properties and by making every effort to ensure that extractive companies located in their territory cause no damage to World Heritage properties, in line with Article 6 of the Convention" (UNESCO 2013). This no-go commitment has so far been signed by 22 of the world's leading mining companies, Shell and Total, as well as a number of financial companies, including Paribas, HSBC, and JP Morgan. This restriction and reference to the no-go commitment helps the section on economic dimension to be linked to and respect environmental protection.

The third pillar on "environmental sustainability" aims to protect biological and cultural diversity, and the ecosystem benefits through integrating their preservation within the conservation and management of World Heritage sites. This pillar also aims to promote the potential of World Heritage properties for reducing disaster risks and adaptation to climate change. Finally, this section aims to enhance preparedness for effective response and building-back-better in post-disaster recovery and reconstruction strategies within management systems and conservation practice for World Heritage properties.

A fourth pillar focuses on the potential of World Heritage properties to contribute to peace and security. This includes the potential of heritage properties to prevent conflicts through celebrating cultural diversity, difference, or shared histories as well as contributing to post-conflict reconstruction through its inclusion in appropriate programs and policies involving multiple stakeholders. This section also relates to the protection of heritage during conflicts by complying with existing international heritage instruments (e.g., 1954 Hague Convention).

Conclusion

The World Heritage Convention is the most popular legal text and program on the conservation and management of cultural and natural heritage sites. This chapter has detailed the basic principles for inscribing sites on the World Heritage List, particularly the key role played by States Parties, responsible for identifying and nominating properties. This first section has also clarified the role played by the World Heritage Committee and the advisory bodies. A second section has detailed the recurring issues with the implementation of this convention, including the geographical unbalance of the List, problematic since it gives the impression that sites of outstanding universal value are mostly located in Europe, perpetuating the false idea that Europe is culturally superior to the rest of the world. Another issue concerns the association of outstanding universal value with intrinsic value. Far from a semantic debate, this consideration has some grave consequences, primarily the exclusion of local communities from the identification of values as well as from the conservation and management of World Heritage sites. This text has also detailed the issues with the continuous gender unbalances within the implementation of the Convention, despite gender equality being the top priority of UNESCO. Finally, this entry has explained the increasing unsustainable development trends affecting World Heritage sites, e.g., infrastructure development, tourism, or housing projects.

The "Policy for the Integration of a Sustainable Development Perspective into the Processes of the World Heritage Convention," fully adopted by UNESCO in November 2015, has then been presented, as it can become a powerful tool to align the convention mechanisms with sustainable development principles and solve the issues highlighted. However, many challenges lay ahead for its full implementation. The first step will need to be the inclusion of its key principles in the Operational Guidelines; the second step will be for the Committee to adopt a number of programs on key issues covered in this policy. The final step will be, of course, to raise awareness of

the principles contained in this policy and of its implementation mechanisms.

References

Bandarin, F., and S. Labadi, eds. 2007. *World heritage: Challenges for the millennium*. Paris: World Heritage Centre.

Cameron, C. 2005. *Evaluation of IUCN's work in World Heritage Nominations*. Gland: IUCN.

D'Eramo, M. 2014. UNESCO-cide. *New Left Review*. 88, July–August 2014. Available from https://newleftreview.org/II/88/marco-d-eramo-unescocide. Accessed on 31 Oct 2017.

Geary, D. 2015. Buddhist circuits and worlding practices in North India. In *The making of heritage. Seduction and disenchantment*, ed. C. Del Marmol, M. Morell, and J. Chalcraft, 44–58. London: Routledge.

Labadi, S. 2005. A review of the global strategy for a balanced, representative and credible world heritage list 1994–2004. *Conserv Manage Archaeol Sites* 7 (2): 89–102.

Labadi, S. 2013. *UNESCO, cultural heritage, and outstanding universal value*. Plymouth: AltaMira.

Labadi, S. 2015. The impacts of culture and heritage-led development programmes: The cases of Liverpool (UK) and Lille (France). In *Urban heritage, development and sustainability*, ed. S. Labadi and W. Logan, 137–150. London: Routledge.

Labadi, S. 2017. UNESCO, heritage and sustainable development: International discourses and local impacts. In *Promise and peril: Archaeology engaging with economic development*, ed. P. Gould and A. Pyburn. New York: Springer.

Labadi, S. Forthcoming. Re-examining World Heritage and sustainable development. In *Routledge companion of global heritage conservation*, ed. V. Bharne. London: Routledge.

Labadi, S. in press. World heritage and gender equality. In *World Heritage and sustainable development: New directions in World Heritage Management*, ed. P. Larsen and W. Logan. London: Routledge.

Labadi, S., and W. Logan. 2015. Approaches to urban heritage, development and sustainability. In *Urban heritage, development and sustainability*, ed. S. Labadi and W. Logan, 1–21. London: Routledge.

Office of the External Auditor for UNESCO. 2011. *Independent evaluation by the UNESCO external auditor volume 1 implementation of the global strategy for the credible, balanced and representative world heritage list*. 35th session of the World heritage committee. Available from: http://whc.unesco.org/archive/2011/whc11-35com-INF9Ae.pdf. Accessed on 27 Oct 2017.

Smith, L. 2006. *Uses of heritage*. London: Routledge.

Tabet, J. 2010. *Review of ICOMOS working methods and procedures for the evaluation of cultural and mixed properties*. Paris: ICOMOS.

UNCSD. 2012. *The future we want*. Rio de Janeiro: United Nations. Available at: https://sustainabledevelopment.un.org/futurewewant.html. Accessed on 31 Oct 2017.

UNESCO. 1972. *Convention concerning the protection of the world cultural and natural heritage*. Paris: UNESCO.

UNESCO. 1994. *Expert meeting on the 'Global strategy' and thematic studies for a representative world heritage list (20–22 June 1994)*. World Heritage Committee – 18th Session (12–17 December 1994). Paris: UNESCO WHC94/CONF.003/INF.6. URL (consulted January 2004): http://whc.unesco.org/archive/global94.htm.

UNESCO. 2012. *Decisions adopted by the world heritage committee at its 36th Session (Saint Petersburg)*. Paris: UNESCO.

UNESCO. 2013. Decisions adopted by the world heritage committee at its 37th session (Phnom Penh). In *Convention concerning the protection of the World Cultural and Natural Heritage – World Heritage Committee – Thirty Seven session (16–27 June)*, WHC-13/37.COM/20. Paris: UNESCO. Available at: http://whc.unesco.org/en/documents/123631.

UNESCO. 2015. *Operational guidelines for the implementation of the world heritage convention*. Paris: UNESCO.

WCED. 1987. *Our common future: From one earth to one world. Report of the World Commission on Environment and Development*. New York: United Nations.

UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective

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Introduction

Many countries throughout the world possess rich diverse heritage resources; these are either cultural – humanity's construction and acquisition over millennia – or natural heritage. In many cases, the cultural heritage and natural heritage are intertwined, thus adding value to the heritage properties (Posey 1999). On realizing that both "the cultural heritage and the natural heritage are increasingly threatened with destruction not only by the traditional causes of decay, but also by

changing social and economic conditions which aggravate the situation with even more formidable phenomena of damage or destruction," the General Conference of the United Nations Educational, Scientific, and Cultural Organization meeting in Paris from 17 October to 21 November 1972, at its seventeenth session, decided and adopted that UNESCO and the international community would collaborate with every state party to safeguard the heritage from destruction (UNESCO World Heritage Convention 1972). In spite of the great strides made by some countries since declaration of the UNESCO World Heritage Convention and other conventions that followed thereafter, by 2005, almost 50 countries did not have any properties inscribed in the World Heritage List. According to current records, by 2010, 48 countries do not have properties inscribed in the World Heritage List (whc.unesco.org/uploads/activities/documents/activity). By implication, these countries' heritage might be increasingly endangered unless the respective state parties have taken drastic measures to safeguard them from complete destruction. This entry highlights the wide disparities on the UNESCO World Heritage List graphically demonstrating that Africa has the least number of properties; it also explores the causes behind this huge void and suggests ways which Africa could claim a major stake on the World Heritage List.

Definition

Article 4 of the World Heritage Convention clearly states that "Each State Party to this Convention recognizes that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage referred to in Articles 1 and 2 and situated on its territory, belongs primarily to that State. It will do all it can to this end, to the utmost of its own resources and, where appropriate, with any international assistance and co-operation, in particular, financial, artistic, scientific and technical, which it may be able to obtain" (UNESCO World Heritage Convention 1972). In 2001, UNESCO adopted the Universal Declaration of Universal Cultural Diversity after members realized that the 1972 Convention was basically dealing with Western heritage that seemed to favor European and North American state parties (Leask 2006: 11–14). But even before 1994, the committee had established new criteria such as traditional knowledge systems, trade routes, (itineraries), and traditional industrial complexes. Principally this was a move toward more representivity in the listing of World Heritage properties, resultant to which many African and other Third World state parties had their heritage properties inscribed to the World Heritage List.

By 2005, UNESCO had identified World Heritage properties through geographical regions, namely, Africa, Arab States, Asia and the Pacific, Europe, and North America. The total number of properties inscribed in the World Heritage List that year was 836. The Africa region (sub-Saharan Africa excluding the Arab countries) had 65 properties, accounting for 7.78%. The Arab States (including the North African States of Morocco, Algeria, Libya, Tunisia, and Egypt) had a total of 64 properties constituting 7.66%, while Asia and the Pacific boasted of 165 properties comprising 19.74%; collectively Europe and North America had the highest number at 430 properties that accounted for 51.44%, and finally, Latin America and the Caribbean had a total of 112 properties inscribed in the World Heritage List. This accounted for 13.40%.

Key Issues/Current Debates

From the foregoing statistics, Europe and North America ranked the highest, followed by Asia and the Pacific, Latin America, Africa, and the Arab States in that order. But even within Europe and North America region, wide disparities were observed; of the 430 properties, Italy topped the bar with 40 properties, followed closely by Spain with 38 properties and France and Germany with 29 properties each. The United Kingdom and Northern Ireland had 26 properties each, the Russian Federation had 20, and the United States of America had 19. Greece had 16, Sweden and

Portugal had 13 properties apiece, while the Czech Republic and Canada had 12 properties each. The rest of the European countries had less than 10 properties; the least was Malta 3 and Ireland 2, and the Holy See, Ireland, and Iceland had 1 property each.

Out of the 165 properties that the Asia and Pacific region had, China ranked the highest with 31, India 26, Australia 16, and Japan 13 properties; Indonesia, Sri Lanka, Iran, and Republic of Korea had 7 properties each, while the rest had less than six properties. State parties like Afghanistan, Malaysia, Mongolia, Turkmenistan, and the Laos People's Republic had 2 properties each. The Solomon Islands and Cambodia were at the bottom of the bar with 1 property each.

In Latin America and the Caribbean, of the 112 properties, Belize, Paraguay, Haiti, El Salvador Nicaragua, Saint Kitts and Nevis, Saint Lucia, and Uruguay were at the bottom of the pool with a paltry 1 property each; Costa Rica, Honduras, and Dominica had 2 properties apiece. On the hand, Mexico topped the region with 24 properties, followed closely by Brazil with 17 properties, Peru 10, Cuba 8, and Argentina 7; the remaining State parties had between 6 and 3 properties.

Of the Africa region, Ethiopia and South Africa topped the bar with 7 properties apiece, Tanzania 6, Democratic Republic of the Congo (DRC) and Zimbabwe 5 each, and Senegal and Mali 4 each, while Kenya had 3; the rest had between 2 and 1 properties. It follows however that, in 2006, the World Heritage List included 830 properties with only 82 sites from Africa (an increase of 17 properties within a year), accounting to roughly 10% of the total World Heritage properties. The statistics were not very different in the two successive years, 2007 (851 properties: 660 cultural, 166 natural, and 25 mixed) and 2008 (878 properties: 679 cultural, 174 natural, and 25 mixed parties).

Out of the 29 properties inscribed during 2008 32nd session in Quebec, Canada, only 2 properties were from Africa – the Le Morne Cultural Landscape (Mauritius) and the Sacred Mijikenda Kayas which include 11 sites that were given one serial number (these were Kayas Mtswakara in Kauma, Gandini in Duruma, Fungo in Giriama; Kambe, Ribe, Jibana, and Kauma; Mudzimuvya, Bomu/Fimboni in Rabai). During the 33rd session held in Seville, Spain, in 2009, the World Heritage Convention added 13 new properties to the World Heritage List and lost one property; thus, the 2009 World Heritage List includes a total of 890 properties, out of which 689 are cultural, 176 natural, and 25 properties in 148 state parties. In the same year, the Ruins of Loropeni in Burkina Faso were the only property listed from Africa. We have observed a few exceptions in the above analysis; for instance, in sub-Saharan Africa, both Ethiopia and South Africa still rank high with 8 properties each, according to the 2010 World Heritage List. They are followed by Tanzania with 7 properties; the majority of state parties in this vast region have less than 5 properties. In fact, the majority of the Africa state parties fall with the 1–4 property brackets.

In Asia and the Pacific region, China, India, Australia, and Japan had 31, 26, 16, and 13, respectively; Indonesia, Sri Lanka, Iran, and Republic of Korea had 7 properties each, while the rest had less than six properties. Five years later, in 2010, the scenario was not very different: China had 36 properties, India 28, Australia 18, Japan 14, Republic of Korea 10, Sri Lanka 8, and Indonesia 7. The rest of the region's state parties have less than 5 properties.

As for Europe and North America, the high figures are still increasingly predominant. According to the 2010 records which consist of 911 properties, Italy still leads with 43(4.7%), followed by Spain 41(4.5%), France 35 (3.8%), Germany 33(3.6%), and the United Kingdom 28(3.0). The United States of America has 19 properties; Greece boasts of 17 (1.8%); and Canada, Poland, Portugal, and Sweden at 13 each (1.4%), while the Czech Republic prides itself of 12(1.3%). Both Belgium and Switzerland have 10 each (1.0%), Turkey 9, and Austria 8, while the remaining state parties within this region had between 7 and 1 properties as of July 2010 (Table 1).

The above statistics lead us to three big questions: Why do the Africa region, the Arab States, Asia and the Pacific, as well as the Latin America and the Caribbean regions have very few heritage

UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective, Table 1 The number of World Heritage properties by region 2012. (Source: UNESCO)

Regions	Cultural	Natural	Mixed	Total	(%)	States parties with inscribed properties
Africa	47	35	4	86	9	32
Arab States	67	4	2	73	8	17
Asia and the Pacific	148	55	10	213[a]	22	32
Europe and North America	393	59	10	462[a]	48	50
Latin America and the Caribbean	90	35	3	128	13	26
Total	745	188	29	962	100	157

[a]The property "Uvs Nuur Basin" (Mongolia, Russian Federation) is a trans-regional property located in Europe and Asia and the Pacific region. It is counted here in the Asia and the Pacific region

properties inscribed to the prestigious World Heritage List? Indeed, why do China, India, Japan, and Australia (and to some extent, the Republic of Korea (Asia and Pacific region)); Mexico, Brazil, Argentina, and Cuba (Latin America and Caribbean region); and Iran, Egypt, and Morocco (Arab States region) have relatively more properties inscribed in the UNESCO World Heritage List than any other state parties in their respective regions? More interestingly – specific European and North American countries – notably, Italy, Spain, France, Germany, and the United Kingdom; the United States of America, Greece, Canada, Poland, and Portugal; and Sweden, the Czech Republic, Belgium, and Switzerland top the World Heritage List. Why is there such a discrepancy?

It should be understood that many countries have the will and commitment to safeguard their heritage for posterity but are hindered by lack of infrastructure especially the technical capacity and financial resources. Developed countries like those in the European and North American region not only have the political will and commitment but also the financial resources and abundant qualified professionals in the heritage sector with well-established networks. Their heritage legislation is always reviewed to be in tandem with global systems and developments.

On the contrary other regions, especially majority of the Third World countries, there are innumerable, glaring, and varied contributing factors key of which are listed herein below:

- The existence of outdated colonial legislation that is mostly biased toward tangible heritage associated with the aspects of archaeological, paleontological, aesthetic, scientific, and artistic values (Negri 2008: 7–10).
- Many African countries have not recognized the importance of intangible heritage properties at global levels, except for a few like Malawi and South Africa. The tangible heritage and intangible heritage are intertwined; the latter refers to heritage resources associated with a place and which are not expressed in fabric but in languages, songs, activities like music making and dancing, storytelling, memory, and routine; places of symbolic meanings; etc. (http://www.unesco.org/culture/ich/index.php?lg=en&pg=0ng0002). Thus, UNESCO adopted the Masterpieces of Oral and Intangible Heritage of Humanity following which this criterion was proclaimed in 2003. Hence, the *Gule Wamkulu* (the Great Dance) masquerade performances of Malawi were inscribed according to this criterion (http://www.unesco.org/culture/ich/RL/00142).
- Most African governments have different priorities like healthcare, education programs, poverty alleviation programs, and provision of clean water; hence, they give little or no concern to their country's heritage sector. "This lack of recognition and political goodwill to include culture in the mainstream developmental agenda has resulted in the culture not being included even the development cooperation programmes. This has of course resulted in

lost opportunities by not using cultural knowledge, to address serious national issues and projects on HIV/AIDS, and other health concerns, Education, Environment, Rural Development, etc. In addition many countries are losing large numbers of cultural heritage and property in terms of indigenous knowledge, sites, monuments, antiquities and cultural landscapes among others" (Abungu 2006: vi).

- Conservation policies are not integrated into sustainable government policy frameworks encompassing heritage management.
- Poor planning and management of heritage resources where sometimes heritage managers condone the destruction of the heritage they are obliged to protect.
- Heritage management very difficult owing to insufficient and professionally qualified human resources.
- Inadequate financial and infrastructure resources for effective management of heritage properties.
- Incomplete or nonexistent national heritage resource inventories (databases) from which the state party nomination dossier to the World Heritage List originates.
- Lack of networking among heritage professionals – no sharing of information, knowledge, and best practice.
- Traditional heritage conservation methods have not been fully acknowledged in Africa.
- Lack of community participatory mechanisms for involvement of local communities especially the youth in conservation and management planning processes.
- Lack of awareness: politicians, decision makers, and communities unaware of their roles in heritage conservation and management.
- Civil strife, terrorism, and political sabotage (e.g., Rwanda, DRC, Iraq, and Somalia; the recent burning of Kasubi Tombs in Uganda) (Eboreime 2008: 1–5).

As remedies to the African heritage problems, the converse of the above should suffice. Moreover, the Third World countries should produce heritage practitioners with local and global views, who appreciate the diversity and dynamism of heritage and are equipped with the tools to manage their resources. They must be professionals who appreciate that some heritage resources are nonrenewable by ingraining indigenous perceptions of heritage in the legislations, professionals who appreciate and contribute to the democratization of heritage in relation to access, ownership, management of institutions, and knowledge production. To manage the heritage holistically, the legislation must be inclusive of the communities who produced, used, and conserved those heritage resources.

Heritage management is a collective obligation including the corporate sector and not only the preserve for governments, national parks, or communities. The disadvantaged regions should also document and patent their indigenous knowledge systems as security against foreign appropriation: The Kenyan kiondo, a bag made from sisal or bark, and khanga (women's wrapper) which were appropriated by Japanese and British companies, respectively, are examples of African ineptitude. Like the Japanese and Koreans, Third World countries must appreciate and inscribe her griots (storytellers), poets, musicians, craftspeople, and prophets.

Recent and Ongoing Programs

There are notable developments in the Africa region that underscore the essence of training in the methodologies of heritage management. From 2000 to 2009, the AFRICA 2009 program ran the course on the Conservation of Immovable Cultural Heritage in Sub-Saharan Africa that alternated yearly between the Centre for Heritage Development in Africa (CHDA) in Mombasa, Kenya, for the Anglophone- and Lucophone-speaking countries and Benin for the Francophone speakers. However, the course succeeded in equipping participants with among others, tools for writing of Conservation Management Plans. There was therefore pertinent need to equip heritage practitioners on tools for nominating heritage properties. African professional soon realized that in spite of Africa's rich and diverse heritage resources, the Africa region has continuously been able to have the least number of properties (about 9%) on the prestigious World Heritage

List. Thus, in 2006, the UNESCO World Heritage Centre launched the African World Heritage Fund (AWHF) based in Johannesburg, South Africa.

Future Directions

The African World Heritage Fund (AWHF) was launched in 2006 to support African state parties to implement the UNESCO Convention on the protection of the World Cultural and Natural Heritage. Following its strategic plan 2008–2010 and in collaboration with World Heritage institutions and African state parties, the AWHF initiated a training course in 2010, on the development of nomination dossiers for World Heritage listing by African countries. As part of its objectives, AWHF put in place the training program to build up competence of African heritage professionals in the development of nomination dossiers and management plans required by the World Heritage Committee when considering sites for listing on the World Heritage List.

The objectives of the course were threefold:

1. To give competence to African natural and cultural heritage professionals thereby improving the quality of African nomination dossiers submitted to the World Heritage Committee
2. To increase the number and diversity of African heritage properties on the World Heritage List
3. To reinforce the network of heritage professionals working on African World Heritage sites

Since the inception of the African World Heritage Fund, several training sessions have been conducted in various parts of the African continent with encouraging results.

Conclusion

We have seen that since 1972, regional imbalances have existed in the inscription of heritage properties in the World Heritage List. This entry has raised some poignant issues pertaining to the "imbalanced" scenario where some regions have tens of properties inscribed while other regions are tottering on the margins. This entry pinpoints the challenges affecting the inscription, sustainability, and opportunities in their use, in a fast globalizing period. This entry analyzes some recent landmark developments which have seen more African properties inscribed as World Heritage properties. Despite this improvement, Africa must rise up to the challenges outlined here and fight not only to inscribe its rich heritage resources to the world map but also to maintain them professionally.

Cross-References

- ▶ African World Heritage Fund (AWHF)
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Abungu, G.O. 2006. *Keynote address during the National Museums of Kenya scientific proceedings 2006 on "science for heritage conservation: Our heritage our wealth", held on 15th–17th November 2006*. Nairobi: National Museums of Kenya.

Activities. n.d. Available at: whc.unesco.org/uploads/activities/documents/activity. Accessed 14 Apr 2011.

Eboreime, J. 2008. Challenges of heritage management in Africa. In *Cultural heritage and the law: Protecting immovable cultural heritage in English-speaking countries of Sub-Saharan Africa*. ICCROM conservation studies 8, ed. W. Ndoro, A. Mumma, and G. Abungu, 1–5. Rome: ICCROM.

Gule Wamkulu. n.d. Available at: http://www.unesco.org/culture/ich/RL/00142. Accessed 15 Nov 2012.

Leask, A. 2006. World heritage site designation. In *Managing world heritage sites*, ed. A. Leask and A. Fyall. Amsterdam: Butterworth – Heinemann.

Negri, V. 2008. Introduction to heritage management in Africa. In *Cultural heritage and the law: Protecting immovable cultural heritage in English-speaking countries of Sub-Saharan Africa*. ICCROM conservation studies 8, ed. W. Ndoro, A. Mumma, and G. Abungu, 7–10. Rome: ICCROM.

Posey, D.A. 1999. *Culture and nature – The inextricable link. Cultural and spiritual values of biodiversity: A complimentary contribution to the global biodiversity assessment*. Nairobi: UNEP.

UNESCO World Heritage Convention 1972. n.d. Available at: http://whc.unesco.org/en/convention/
What Is Intangible Cultural Heritage? n.d. Available at: http://www.unesco.org/culture/ich/index.php?lg=en&pg=00002. Accessed 15 Nov 2012.

UNESCO's World Heritage List Process

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Introduction

A number of international charters and conventions have been influential in shaping heritage legislation and policy. The leader in these is the United Nations Educational, Scientific and Cultural Organization, known as UNESCO, whose members work to protect and conserve cultural and natural heritage. This entry provides a brief historical background to the creation of the World Heritage list, discusses the nomination process for cultural heritage properties on the List, and describes the roles of the World Heritage Committee, the World Heritage Centre and the functions of the two of the three advisory bodies, the International Council on Monuments and sites (ICOMOS) and the International Union for the Conservation of Nature (IUCN), that are mandated through the Convention to provide evaluations to the World Heritage Committee. The International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), which advises the Committee on the conservation of cultural sites, is not discussed.

Key Issues/Current Debates/Future Directions/Examples

Background

International awareness about conservation issues can be traced to the Athens Charter for the Restoration of Historic Monuments, more commonly known as the Athens Charter. In 1931, the First International Congress of Architects and Technicians of Historic Monuments, under the patronage of the League of Nations, adopted the Athens Charter to provide measures to protect monuments, establish international organizational and advisory bodies, and develop legislation to protect historic sites. Although the Athens Charter would be revised, its influence continues by providing a model that shapes conservation and preservation policies in Western countries (Smith 2006).

The period after World War II was characterized by large-scale restorations of war-damaged cities and monuments and a concern for the protection of cultural property. These concerns were central to the Hague Convention of 1954, which resulted in the Convention for the Protection of Cultural Property in the Event of Armed Conflict in 1956. The preamble to the Hague Convention recognized that "cultural property has suffered grave damage during recent armed conflicts and that, by reason of the developments in the technique of warfare, it is in increasing danger of destruction" and required that State Parties work to reduce impacts of armed conflict on cultural heritage properties and prohibit vandalism, misappropriation, or theft (Article 4).

In 1964, the Second International Congress of Architects and Technicians of Historic Monuments met in Venice to rework the Athens Charter. The Congress, made up largely of European representatives, developed guidelines and policies to assist professionals in heritage conservation to "safeguard [monuments] for future generations" (Preamble). The central aim of what would be known as the Venice Charter was to conserve and restore these monuments "no less as works of art than as historical evidence" (Article 3). The Charter reflected the shared and real concern of lost and damaged cultural patrimony and adopted measures to protect monuments. The ideas and values related to memory, identity, authenticity, and aesthetics became central to the ideology of how monuments were understood within the Charter.

The Venice Charter was part of a larger heritage preservation movement in Western countries

(the USA, Australia, countries in Western Europe) and became a guiding text to heritage practitioners (Smith 2006: 93). This conservation ethic, as well as an emphasis on materiality, physicality, universality, and aesthetics, would be readopted and refashioned in subsequent heritage legislation. The Charter also established a "fellowship" of practitioners and provided guidance on what was important to conserve (Smith 2006: 93). For example, ICOMOS, a nongovernmental organization of heritage practitioners founded in 1965 as a result of the Venice Charter, used the Charter to help guide decisions and train experts to undertake heritage work and site missions. ICOMOS will be further described in the next section.

Origins

The impetus for the World Heritage Convention can be traced back to the Athens and Venice charters and to UNESCO's attempt to protect heritage sites, the World Conservation Union (now known as IUCN) and ICOMOS lobbying, and US representatives pushing for an international natural and heritage convention. In the 1960s, UNESCO undertook large-scale projects to protect threatened heritage sites, such as the rescue campaign at Abu Simbel in Egypt, the ancient Nubian site that would be destroyed with the creation of the Aswan Dam. UNESCO also sponsored projects such as renovations at Mohenjo-Daro in Pakistan and Borobudur in Indonesia, and it was these types of interventions that led to discussions on guidelines and protection for international heritage sites (Turtinen 2000: 9). During this time, IUCN representatives were developing a global initiative to protect natural heritage sites and ICOMOS representatives were active in campaigns to protect cultural heritage sites. At this same time, US representatives were lobbying to create a World Heritage trust to preserve the most important cultural and natural sites in the world. Together, these international heritage bodies helped shepherd the creation of one convention to protect both cultural and natural heritage sites.

During its 17th session in 1972, the General Conference of UNESCO adopted the Convention Concerning the Protection of the World Cultural and Natural Heritage, also known as the World Heritage Convention. The Convention aimed to safeguard natural and cultural heritage and was developed by ICOMOS and IUCN, two of the three advisory bodies to the World Heritage Committee. The Convention, administered by the World Heritage Centre at UNESCO, is a "key legal instrument in heritage conservation" and has far-reaching influence and authority (Rössler 2006: 334). The Convention provides the legal framework and the administrative and financial support for the World Heritage list, an inventory of cultural and natural sites deemed of "universal" significance. As of May 2013 962 properties are listed; these include 745 cultural, 188 natural, and 29 mixed properties. Of these, 82 are designated as cultural landscapes, a category created in 1992.

The Convention also established the Intergovernmental Committee for the Protection of the Cultural and Natural Heritage of Outstanding Universal Value within UNESCO, called the World Heritage Committee. The Committee is composed of 21 States Parties to the Convention, elected at the annual General Conference. States Parties are responsible for nominating properties, providing a site management plan, and once a property is inscribed on the List, protecting the "World Heritage values" of the sites (Articles 4 and 6.2). Representatives for the States Parties work directly with members of the Secretariat at the World Heritage Centre in Paris, who provide feedback, oversee the preparation, format, and content of nominations, and ensure adherence to the rules and guidelines set in the *Operational Guidelines for the Implementation of the World Heritage Convention*, also known as the *Operational Guidelines*. The *Operational Guidelines* provide procedures for inscribing properties on the World Heritage list and List of World Heritage in Danger, protecting World Heritage properties, granting assistance under the World Heritage Fund, and mobilizing national and international support. The *Operational Guidelines* is an evolving document that reflects changes in scholarship and trends in heritage conservation and preservation, and the World Heritage Committee updates these frequently, based on recommendations from their advisory bodies.

Article 4 of the Convention requires that State Parties must ensure the "identification, protection, conservation, presentation, and transmission to future generations of the cultural and natural heritage referred to in Articles 1 and 2" (UNESCO World Heritage Convention). Cultural heritage, broadly defined, includes monuments, buildings, and sites, whereas natural heritage includes natural features or sites, and geological formations. The Convention emphasizes that properties must have "outstanding universal value" (Article 11.2) and meet conditions of "integrity and/or authenticity." Originally, the Convention presented two separate lists of criteria for nominated cultural and natural heritage sites. In 2004, members of the Sixth extraordinary session of the World Heritage Committee merged the two lists to require that properties meet at the minimum one of their ten selection criteria, which range from representations of "creative genius" to "containing. . .exceptional natural beauty and aesthetic importance."

Nominations to the World Heritage List

Countries who have signed the World Heritage Convention can submit nomination proposals to be considered for inclusion to the World Heritage list, and as of June 2010, 187 States Parties have signed. Figure 1 provides a model of the nomination process. As a first step, a State Party inventories their natural and cultural heritage sites, which are then included on the Tentative List and forwarded to the World Heritage Committee. To nominate a site to the List, the State Party selects a site from the Tentative List and prepares a nomination file to submit to the World Heritage Centre for review (Fig. 1). Once the nomination file has been completed and evaluated by the Secretariat, the nomination dossier is forwarded to the advisory bodies that are mandated by the World Heritage Convention to evaluate properties. The advisory bodies play a central role in how cultural patrimony is understood and represented. ICOMOS evaluates cultural and mixed sites and IUCN evaluates natural sites. Located in Paris, ICOMOS is an international, nongovernmental organization and network of heritage and conservation practitioners that advise on cultural properties and cultural landscape designations. IUCN comprises a large network of experts who evaluate and report on the conservation, protection, and management of natural heritage properties, and

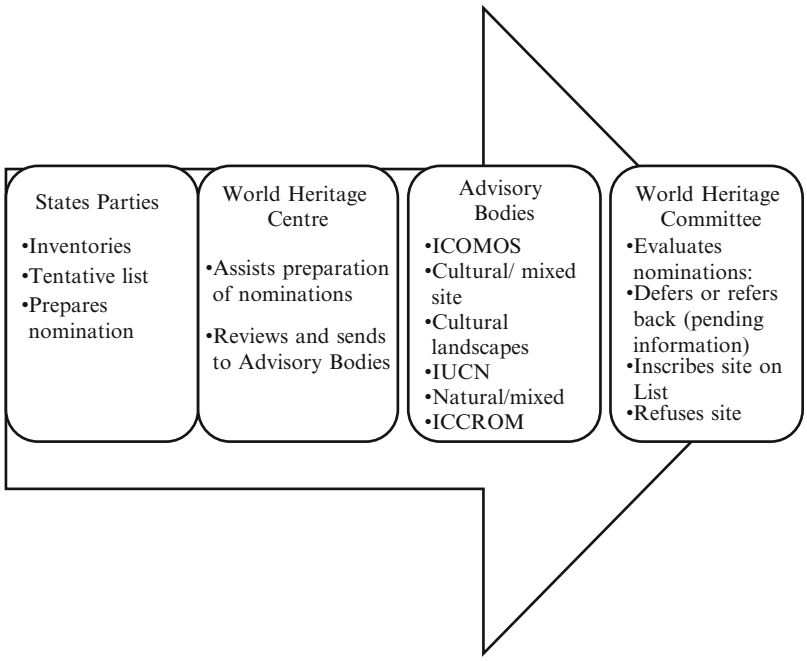

UNESCO's World Heritage List Process, Fig. 1 The nomination process

develop strategies to conserve and protect the world's natural heritage and resources. IUCN plays a critical role in the World Heritage process and its members provide advisory services to the World Heritage Committee on nominations of properties with natural heritage values, provide evaluations of state of conservation of World Heritage properties, and train States Parties to identify potential properties. IUCN also advises ICOMOS on nominations for cultural landscapes.

Cultural heritage nomination evaluations involve a range of experts, including National and International committees, World Heritage advisory bodies, ICOMOS internal members, and in cases lacking adequate specialists, non-ICOMOS members. Once the "outstanding universal value" of the nominated sites is determined by ICOMOS, the advisory body calls on internal expert members to conduct a site mission (Fig. 2).

Members are also involved in national and international scientific committees established to provide guidance on cultural heritage issues. Today, 27 International Scientific Committees provide feedback to UNESCO on World Heritage Issues. ICOMOS committees serve as "technical bodies" and "undertake research, develop conservation theory, guidelines, and charters, and foster training for better heritage conservation, promote international exchange of scientific information and carry out common projects" (ICOMOS website). Members of the International Scientific Committee for Cultural Landscapes (IFLA), a joint committee between ICOMOS and the International Federation of Landscape Architects (IFLA), for example, advise ICOMOS on issues related to the cultural landscapes, including nominations of World Heritage sites.

Key Issues and Current Debates

Some of the key issues surrounding the World Heritage List are that it overrepresents western European properties, underrepresents the heritage of indigenous peoples, and disproportionately represents cultural and natural heritage properties (see Cleere 2001; Fowler 2004; Smith 2006). In 2000, former ICOMOS Director Henry Cleere found that over 55% of World Heritage properties

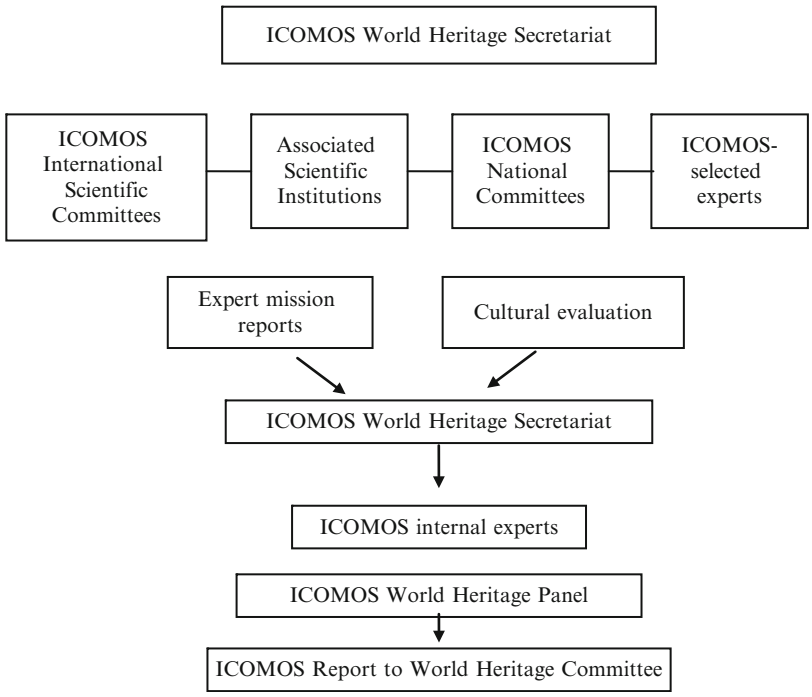

UNESCO's World Heritage List Process, Fig. 2 Overview of the ICOMOS evaluation process

were located in Western Europe (Cleere 2001: 25). In a study of representations and cultural diversity discourses related to World Heritage, Sophia Labadi (2007) argued that the World Heritage List lacked a diverse representation of minority groups and their values with little or no participation of local communities in the nomination process. Labadi (2007: 161) found that experts involved in these nominations stressed a very linear and conservative notion of history, as related to World Heritage sites, and that these narratives are flawed because they limit the perspectives and disallow competing claims and histories. The cultural landscape designation was created, in part, to address some of these imbalances; it was seen as a way to include non-Western landscapes and other cultural heritage properties that had been overlooked. Still, the majority of nominations to the World Heritage Committee are submitted by European countries and Europeans act as experts, work on World Heritage scientific advisory bodies, and provide recommendations to the Committee.

The criteria for nomination to the List, as defined, emphasize the universal values of a site. The concept of universality has been critiqued as creating a value system that promotes a specific and largely western and European cultural view of heritage (Cleere 2001; Smith 2006). More importantly, the notion that certain cultural properties are more valuable sets up a hierarchy and value system. Those monuments or sites from grand Western contexts are perceived to be inherently valuable, while those things from more modest contexts, presumably non-Western cultural contexts or less grand Western social contexts can, in certain circumstances, acquire or be acknowledged as valuable (Smith 2006: 90). It also creates a system that encourages a shared view of heritage, and emphasizes the scientific, aesthetic, material, and physical nature of heritage. Cleere (2001) argued that the criteria are purposely vague to allow for flexibility and inclusiveness, though Smith (2006: 97) disagreed and argued that the vagueness of the criteria in effect creates a set of assumptions about what constitutes "universal value" or "heritage."

In 2005, Christina Cameron, formerly a Chairperson of the World Heritage Committee, evaluated IUCN's World Heritage nominations and was critical of the process of developing and evaluating nominations, due to the lack of transparency. The sociopolitical contexts of heritage were explored by Baird (2009) in her study of World Heritage nominations (see also Bianchi and Bonicace 2002). She argued that World Heritage experts influenced and guided heritage outcomes and practices, and in some cases, adopted a possessive posture in heritage negotiations that excluded third party review and alternative interpretations. This critique of heritage experts had been argued before, and Smith (2006: 88) noted that many of the leading experts in conservation, preservation, and heritage fields give "political legitimacy" and influence policy-making decisions (Smith 2006: 88). As Smith (2006) reminds us, in addition to assessing World Heritage nomination dossiers, members write, edit, and lobby for national and international charters and conventions.

Numerous critiques of the impacts of tourism and development have emerged in the last decade (see, e.g., Harrison and Hitchcock 2005; Rakic and Chambers 2008). Much of the ideas of heritage are open to interpretation and often engage competing claims and negotiations. More importantly, as the former director of the World Heritage Centre, Francesco Bandarin (2005), noted the relationship between World Heritage sites and tourism is fraught with tensions. These tensions include issues of representation, authenticity, financial benefits, ideas of universal heritage, and competing claims, among others. One must recognize that World Heritage status increases international attention to the natural and cultural heritage resources within a property that can bring a suite of challenges, especially when these come into conflict with traditional owners' ideas of conservation and preservation or access to sacred lands. The distribution of local knowledge in international contexts must be addressed. The designation of a World Heritage status, whether explicit or not, assigns values and creates hierarchies of meaning.

Cross-References

- ▶ Authenticity and the Manufacture of Heritage
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

References

Baird, M. 2009. The politics of place: Heritage, identity, and the epistemologies of cultural landscapes. Unpublished PhD dissertation, Oregon University.

Bianchi, R., and P. Bonicace. 2002. Editorial: The politics of world heritage. *International Journal of Heritage Studies* 8: 79–80.

Cameron, C. 2005. Evaluation of IUCN's work in world heritage nominations. Available at: http://cmsdata.iucn.org/downloads/christina_cameron_review.pdf. Accessed Oct 2009.

Cleere, H. 2001. The uneasy bedfellows: Universality and cultural heritage. In *Destruction and conservation of cultural property*, ed. R. Layton, J. Thomas, and P.G. Stone, 22–29. London: Routledge.

Fowler, P. 2004. *Landscapes for the world: Conserving a global heritage*. Macclesfield: Windgather Press.

Harrison, D., and M. Hitchcock, eds. 2005. *The politics of world heritage: Negotiating tourism and conservation*. Clevedon: Channel View Publications.

Labadi, S. 2007. Representations of the nation and cultural diversity in discourses on world heritage. *Journal of Social Archaeology* 7: 147–170.

Rakic, T., and P. Chambers. 2008. World heritage: Exploring the tension between national and universal. *Journal of Heritage Tourism* 2: 145–155.

Rössler, M. 2006. World heritage cultural landscapes: A UNESCO flagship programme 1992–1996. *Landscape Research* 31: 333–353.

Smith, L. 2006. *Uses of heritage*. London: Routledge.

Turtinen, J. 2000. *Globalising heritage: On UNESCO and the transnational construction of world heritage*. Stockholm: Stockholm Center for Organization Research.

UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (1995)

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Introduction

The UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects 1995 came into force on 1 July 1998. As at 30 August 2019, it had 47 States Parties.

In 1983, a meeting of experts at UNESCO in Paris had recommended that UNESCO consult with another organization specializing in the harmonization of what are called "private law" issues, i.e., issues arising from dealings between private citizens. UNESCO already had the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property 1970 but this was a "public law" Convention which dealt with matters at an inter-State level. The experts in 1983 saw there were developing problems with matters such as time limitations (when would a claim for return of an object be barred because too much time had elapsed since the wrongdoing) and the status of the "bona fide" purchaser (a claim to an object could not succeed because the person who possessed it had bought it not knowing of any defect in the title).

UNESCO then asked UNIDROIT (International Institute for the Unification of Private Law) in Rome to take up the matter, providing seed money. Two studies were commissioned by UNIDROIT and meetings of experts invited in their individual capacities were held in Rome in 1988 and 1989. These were followed by four meetings of experts nominated by governments and, finally, a diplomatic conference in 1995. This history shows the length of time and the complexities involved in producing a convention dealing with cultural heritage when the rights of citizens are affected. That needs to be taken into account

when proposing new conventions or amendment of an existing one.

UNESCO was represented at all stages of negotiation of the UNIDROIT Convention. The two organizations collaborated closely and regard the 1970 Convention and the UNIDROIT Convention as compatible – as do others. For example, the Swiss Working Group on the International Transfer of Cultural Objects stated:

> The two conventions function independently but supplement each other by achieving a common purpose with different means. Therefore they are complementary. (Swiss Working Group 1999)

Definition

The UNIDROIT Convention deals with "cultural objects" (Article 2). This phrase was a conscious choice to avoid what some saw as the emotional content of "cultural heritage" and others the legal implications inherent in "cultural property." The objects are those which, "on religious or secular grounds, are of importance to archaeology, prehistory, history, literature, art or science," and they must belong to one of the categories set out in Annex A to the Convention. These include products of archaeological excavations whether regular or clandestine; elements of dismembered historical monuments or archaeological sites and antiquities more than 100 years old. The categories are the same as those for the 1970 Convention (O'Keefe 2017: 121).

Under Article 1, the Convention applies to claims of an "international character." This is not defined but clearly means that an international element must be involved. What precisely is needed to bring a situation within the definition would depend on the relevant facts. The claim must be for restitution or return of either stolen or illegally exported cultural objects.

The Convention does not apply to objects exported during the lifetime of the person who created it and for 50 years after the death of that person (Article 7(1)(b)). This ties in with the period of copyright as it existed at the time the Convention was drafted. It was felt that the creator of a cultural object had the right to export it if he or she so desired and thus earn a living from the work. The free sale of a person's creative work acts as an encouragement for future work. The lifetime exception does not apply to objects made by a member of a tribe or indigenous community for traditional or ritual use by that community.

Key Issues: Theft

Theft of cultural objects is the first issue raised by the Convention. The rule is blunt – if objects are stolen the possessor must return them (Article 3). States Parties are bound to implement this rule in their local legislation. It can then be relied on by private parties to claim back stolen objects.

The meaning of "stolen" is a matter for the law of the State where the claim is made. This can sometimes be difficult to establish. For example, in the case *United States v. Schultz* (178 F. Supp. 2d 45 (2002); 333 F.3d 393 (2003), at issue was whether the United States National Stolen Property Act applied. An English conservator – Tokeley-Parry – had arranged for some 2000 antiquities to be smuggled out of Egypt. A portion of these had been sent to Schultz – a prominent New York dealer – for sale through his network of contacts. Schultz was charged with conspiring to receive stolen antiquities that had been transported in foreign commerce in violation of the Act. The question was whether the antiquities were stolen and Schultz knew of this. The courts found against Schultz on both issues. The Federal judge at sentencing said that Schultz knew he was stealing "in every sense of the word" and was no different from "an ordinary thief" (Lufkin 2002: 5). Egypt had passed legislation declaring all antiquities were the property of the Government. This was actively enforced with the result that their removal from the country without permission meant they were stolen in terms of the United States Act (Gerstenblith 2003: 5).

Other States have claimed ownership of undiscovered antiquities with the objective of being able to claim them if they are clandestinely excavated and removed. The Convention supports this. Under Article 3(2), where a State has claimed

ownership, "a cultural object which has been unlawfully excavated or lawfully excavated but unlawfully retained shall be considered stolen." While the Convention provision has full legal force only among the 47 States Parties, it is also influential in arguments whether the ownership claims of other States should be enforced.

There are qualifications on the rule that stolen objects must be returned. Firstly, the abovementioned time limitations. The idea behind these is to have certainty of ownership. A person who claims to own an object should not be liable to have that claim disputed after a certain period of time has elapsed. This principle, in force in a number of legal systems, was hotly disputed during negotiation of the Convention. The compromise reached is quite complex, taking into account strongly held legal and political positions.

With time limitations, there are two factors to be considered – when does the time start to run and for how long. Under Article 3(3), the period begins "when the claimant knew the location of the cultural object and the identity of its possessor." This may be difficult to establish. Suppose the claimant is a State and one of its officials finds out where the object is held. Does that knowledge start the period running? What level within the administrative structure has to be reached before it does? Once the time starts running, the period is 3 years, but there is an overall period of 50 years from the time of the theft.

Fifty years is a relatively short time when the special character of cultural objects is taken into account. Consequently, a specific regime was created for objects "forming an integral part of an identified monument, or belonging to a public collection" (Article 3(4)). The limitation period is 3 years from the time the claimant knew the location of the objects and the identity of the possessor. There is no overall period unless a State, at the time of becoming party, makes a special provision in its law for 75 years or longer. It is not stated when this period should start but, considering the position of the rule in the text, this would seem to be from the time the claimant knew the location of the cultural object and the identity of its possessor. Where a State implements such an extended period for claims and an object from one of its monuments or public collections is found in another State Party, any claim to the material will be subject to a 75 year limitation period. Consequently, a State needs to carefully consider what it is doing if it opts to impose the 75 year limitation period.

The Convention specifically defines what is meant by a "public collection." This is a group of "inventoried or otherwise identified" objects. It has implications for those collections which do not have accurate inventories. A group implies that there must be more than one object, but there is no requirement of a unifying theme. The Collection must be owned by one of four types of organizations specified in Article 3(7)), including religious institutions in a Member State. Why these are specially singled out is not clear. It raises difficult practical questions. For example, many collections held by religious institutions are not inventoried; often they are not open to the public; sometimes part of the collection is owned by a religious body and part not. Can a person establish his or her own religion for the purpose of bringing the collection under this protection? (O'Keefe 2009: 398).

Singled out for specific treatment are sacred or communally important cultural objects belonging to or used by a tribal or indigenous community (Article 3(8)). Provided these are used traditionally or ritually, any claim for restitution is subject to the same time limitations that apply to public collections.

In returning a stolen cultural object, its possessor will, in many cases, suffer a loss, not only of the object but also what he or she paid for it. Should the successful claimant be required to pay compensation? This was, and still is, a controversial topic. However, the Convention makes provision for "fair and reasonable compensation" (Article 4). This will be decided by the courts where the claim is made. What is required to be taken into account is still debatable. For example, if the possessor has undertaken conservation, should the compensation include its cost and what of any increased value brought about by conservation?

There are two conditions that have to be met before compensation has to be paid. Firstly, the possessor must not have actually known that the object was stolen at the time of its acquisition nor can he or she have turned a blind eye to the circumstances surrounding the acquisition. In other words, if it can be shown that the possessor should have known from the facts at the time of acquisition that the object was stolen then no compensation will be payable.

Secondly, the possessor must prove that he or she exercised due diligence when acquiring the object. This is also a very controversial issue. In English law, the basic rule is that no-one can acquire a good title from a thief so there is no question of paying compensation to recover stolen property. However, if the object has been bought by a person who does not know it is stolen, a good title of ownership is obtained 6 years after the acquisition if no successful claim is made. The rule in the Convention is closer to that in what is known as the Civil Law, i.e., a system of law found in countries such as France. In those countries, a person obtains a good title if they bought the stolen object not knowing this and have kept it for a set period (e.g., 0–5 years depending on the jurisdiction) with no claim being made.

Requiring that due diligence be performed is one thing – establishing if it were adequate is another. For example, four Byzantine mosaics had been stolen from a church in Northern Cyprus and illegally taken out of the country. An art dealer called Goldberg bought them from a dealer called Dikman in the free port area of Geneva airport and took them to Indiana in the United States. They were claimed back by the Autocephalous Greek Orthodox Church of Cyprus. Goldberg testified in the American courts that, in an attempt to enquire into the right of Dikman to sell the mosaics, she had contacted the UNESCO office in Geneva (the main office is in Paris); the International Foundation for Art Research in New York (there was no record of her telephone call) and Customs offices in the United States, Switzerland, Germany, and Turkey (she could not remember the names of any person she spoke to and the Customs services had no documentation of any enquiries). On the other hand, she did not contact the Greek Orthodox Church nor either of the two administrations in Cyprus even though she knew that was where the mosaics originated. Her efforts were judged to be insufficient (*Autocephalous Greek Orthodox Church of Cyprus v. Goldberg* 717 F.Supp. 1374 (1989); 917 F.2d 278 (1990)).

In Article 4(4), the Convention provides guidance to a person intending to acquire a cultural object. For example, was the price too low compared to what a knowledgeable dealer or collector would expect? Were any databases of stolen objects accessed, e.g., the Art Loss Register in London or the list maintained by Interpol. Regard must be had to all the circumstances of the acquisition. In an American case, certain pre-Columbian artifacts were presented to a supposed purchaser (actually an FBI agent) "caked with mud and straw" (*United States v. McClain* 593 F.2d 658 (1979) at 663) – surely something to raise suspicions.

Key Issues: Illegal Export

There are some who argue that there is a qualitative difference between theft and illegal export of cultural objects. Others argue that both are morally reprehensible. These points of view were both represented in negotiations for the UNIDROIT Convention when the issue came up as to whether it should include provisions on illegal export as well as theft. Those who supported inclusion believed that there should be a more efficient method of obtaining return of an illegally exported object than that under the 1970 Convention. Eventually, there was agreement for inclusion of provisions on illegal export but the number of objects covered should be limited (Prott 1997: 52).

Article 5 commences with a general rule that a State Party may request the court of another State Party "to order the return of a cultural object illegally exported from the territory of the requesting State." This procedure simplifies return. Under the 1970 Convention, the request for return has to be dealt with on a State to State basis which is cumbersome. The requesting State, if it is the owner of the object, can also sue in the courts of the other

State for theft or try to have any export prohibition enforced. In either case, it has no special standing.

Under Article 5(3), the State can make its request to the court and the court must order its return if the requesting State proves that the removal of the object from its territory significantly impaired one or more of the following interests:

a. The physical preservation of the object or of its context
b. The integrity of a complex object
c. The preservation of information of, for example, a scientific or historical character
d. The traditional or ritual use of the object by a tribal or indigenous community

Then there is a much more general interest, namely, that "the object is of significant cultural importance for the requesting State."

Article 5(3) provoked a virulent reaction from some dealer, collector, and museum groups. Allegations were made that courts would be obliged to order the return of what a State demanded (Lalive 1999) and that museums would be emptied. Such persons did not credit the courts with the power and integrity to make decisions based on the facts. The procedure is streamlined but the State still has to prove that the removal impairs the interests listed and produce evidence to this effect. It is then for the courts to decide whether that is indeed the case.

Limitation periods apply. These are 3 years from the time the location of the object and the identity of its possessor was known. There is a maximum period of 50 years from the date of export.

The requesting State is required to pay compensation provided there is lack of knowledge of the illegal export on the part of the possessor of the same nature as for stolen objects. However, compensation is not required if the requesting State comes to an agreement with the possessor that he or she will retain ownership of the object (Article 6(3)). For example, the owner may find it desirable to lend the object to a museum in the requesting State. This could be acceptable to that State in that it avoids having to pay compensation and yet has the object available for public access. If the object was made by a member of a tribal or indigenous group for traditional or ritual use by that community, then it must be returned to that community (Article 7(2)).

It is common for objects to be sent from one State to another for perfectly legitimate reasons such as display in an exhibition. Often these are accompanied by an export permit which imposes penalties for failure to observe conditions. The Convention states that where there has been a temporary export, and the object is not returned within any time limit imposed, then it is deemed to have been illegally exported (Article 5(2)). This can be very significant where political changes have raised issues of ownership and the person to whom the object should be returned is unclear.

Finally, States that have rules, or introduce rules, more favorable than those in the Convention for the return of stolen or illegally exported cultural objects are not prevented from relying on them by the UNIDROIT Convention (Article 9). This was inserted to make clear that States already giving greater protection to cultural objects should not have to cut down existing protection.

Future Directions

There are no proposals for amendment of this Convention.

References

Gerstenblith, P. 2003. The *McClain/Schultz* doctrine: Another step against trade in stolen antiquities. *Culture Without Context: The Newsletter of the Illicit Antiquities Research Centre* 13: 5–8.

Lalive, P. 1999. Une Convention internationale qui dèrange: La Convention UNIDROIT sur les biens culturels. Extracts published in English in Prott, L.V. (2009). In *Witnesses to history: A compendium of documents and writings on the return of cultural objects*, 322–325. Paris: UNESCO.

Lufkin, M. 2002. Frederick Schultz is Sentenced to 33 Months in Prison. *The Art Newspaper*, July–August 2002, p. 5.

O'Keefe, P.J. 2009. Using UNIDROIT to avoid cultural heritage disputes: Limitation periods. In *Cultural heritage issues: The legacy of conquest,*

colonization, and commerce, ed. J.A.R. Nafziger and A.M. Nicgorski, 389–402. Leiden: Martinus Nijhoff Publishers.
Prott, L.V. 1997. *Commentary on the UNIDROIT convention on stolen and illegally exported cultural objects 1995*. Builth Wells: Institute of Art and Law. (new edition pending).
Swiss Working Group. 1999. *International transfer of cultural objects: UNESCO convention of 1970 and UNIDROIT convention of 1995*. Berne: Federal Office of Culture.

Further Readings

O'Keefe, P.J. 2017. *Protecting cultural objects: Before and after 1970*. Builth Wells: Institute of Art and Law.

Unilinear Evolution and Lineal Time: A Critique

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Introduction

Nineteenth century evolutionism brought about the crystallization of a set of ideas in various fields of the natural and social sciences. That was a time of many conceptual changes that not only placed humans in a higher position in the Universe – defying the preeminent Christian order and history – but also gave an explanation of this new order. Evolution became a principle used to understand the origins and changes through time of many realms of life, from the Universe to the history of Humankind, in steady and lineal processes of transformation from the simplest to the most complex. This established the idea of progress as improvement and as a general goal of existence on Earth, as well. Its impact is so evident that even today, original concepts of those times, such as "progress," "development," "change," or even "primitive," are commonly used. Several evolutionary concepts are still commonly integrated in the way many people understand and explain the world such as gradualism, complexity, adaptation, and natural selection. The concept of time is, particularly, one of most prevalent.

In archaeology, despite criticism and the apparent long abandonment of the objective and lineal idea of time, a similar temporal model underlies many current proposals, at different scales. Ontological assumptions about time, such as its irreversibility and flowing character, seems to be in line with the nineteenth century evolutionism.

Definition

The idea of time according to the classic concept of evolution was a natural and universal phenomenon, external to humans, homogeneous, linear, directional, and quantifiable. As a given dimension, as in all space and to all entities of the universe, time inexorably progressed steadily in a continuous flow. Over time, a more complex ways of living unfolded at different points in different parts of the world, which could be sequentially ordered (according to their increased complexity) in successive periods along a common past. This in turn was a demonstration of human progress. As they moved toward the present, progress became more rapid, as if time were accelerated.

The natural sciences as well as the anthropology and archaeology of the nineteenth century provided the empirical evidence for this. The material, biological, and cultural remains of other life forms found in the same areas inhabited or conquered by Europeans, in conjunction with the same (and strange) customs and other objects found from non-European peoples around the world, were considered as definite evolutionary proof. Material things were the fossilized evidence of the past and its progressive and accumulative changes, while customs were their living testimony. The European and recent North American history were both evidence of the acceleration of time.

For evolutionism, time was not a special concern and did not propose an original idea about it beyond the prevalent one of that era. It did, however, contribute to its consolidation as a concept. The prevailing traditional view was that of a

single linear progression: past, present, and future. Thus, a long-held conception of time and history as a long cumulative process was reaffirmed, where progressive complexity led humanity toward better and more complex forms. This was supposed to be a kind of natural fate, showing a single universal time (i.e., "natural" time) in a linear fashion from past to future.

In that process of change, the key resided in the formal differences and similarities, both in the tangible and intangible aspects of societies. With difference comes change (a basic principle of the sensory experience of how we perceive the passage of time). Since change can only occur in time and with time, differences are evidence of its passing, as well the actions of evolution, understood primarily as cumulative change. Similarities among different societies were used as indicators of the rate of evolution, as long as they highlighted "survivals" – such was the evolutionary term – the continuity in time of some ancient traits, at the same time they showed parallelism between societies far away in space and time. Thus, evolutionism established and fully enforced one of the underlying principles of archaeological thought: Material things contain time.

Evolutionism sought to unravel the laws of culture and humanity, as biology does with nature. The quintessential method to achieve this goal was through the use of comparison. Classification and management became its primary tools. Two more theoretical and methodological ideas brought about a basic foundation: uniformitarianism and analogy. The principle of uniformitarianism, where the laws of nature are valid for all times and places, is perhaps the clearest and most explicit expression – if not the only one – on the theory of the evolution of time in the classical writings. The present time as a key to understanding the past – the famous sentence by the nineteenth century geologist Charles Lyell – is the most accurate summary on the evolutionary procedure, together with its concept of temporality.

The classification of the diversity of human life in time and space, combined with the sorting criterion that says that everything evolves from the simplest form to the most complex, helped organize humanity and its history. Humankind came to be perceived as a single, abstract, and ecumenical entity; while its history, was understood as occurring in a single universal development. Humanity and its history reached its highest manifestation only in the lifestyle of the then prevalent Western industrial society. On a more specific level, each culture – past and present – represented some of the conditions or lifestyles known by humankind, from the simplest life forms – those in the wild – to the most complex – those found in civilized societies. Nevertheless, all of them were subject to the same possibilities of progress – although not necessarily following the same orderly progression at every stage – given the unity of origin of humankind and the universality of the laws of evolution.

In this regard, the nineteenth century evolutionism was always considered as unilinear: There is only one course for human history following a natural order for certain types of life, from the least to the most complex, developed in a homogeneously flowing time.

Current Debates

Since the early twentieth century, much criticism has been directed toward this evolutionary perspective. Franz Boas' anthropological criticism and his followers, as well as the criticism coming from the functionalism movement of the first half of the twentieth century, contributed to dismiss several of the evolutionary principles. This criticism had perhaps a bigger impact on cultural and social anthropology rather than on archaeology. Critics not only denied the unilinearity of a single human history, but also the use of the comparative and social typologies that geared toward a more generalizing and homogenizing perspective.

However, the linear concept of time was not the primary target of criticism. The development of new archaeological analytical techniques to recover past time and order cultures chronologically held basically the same concept of time as a linear homogeneous and quantifiable phenomenon. The traditional diffusionism, the cultural-historical school of thought (important in South

America in the first half of the twentieth century), and the North American cultural history also held a similar concept of time. These lines of thought deepened a practical and theoretical consequence not explicitly expressed as a principle in unilinear evolutionism: the spatialization of time (Fabian 1983). While for evolutionists formal differences were mainly time, both post- and anti-evolutionist archaeologists held a similar view in which similarities and differences in space became time. Physical horizontal space, or distance, was regarded as another form in the materialization of time. Greater formal differences and less complexity (compared with the European vision of the world) meant a greater temporal difference. Also, the higher the spatial distance, the greater is the elapse or temporary "difference" (such as in deep geological stratigraphy). Thus, the physical attributes of objects and their spatial relationships were endowed with a significant dimension that defined and indicated time. Objects and distances were understood as material clocks.

From anthropological practice, the conceptualization of spatial distance as time difference led to the denial of the contemporary of the Western world with other different life forms; though coetaneous, they were considered as living in another epoch. This is what Fabian (1983: 31, 32) very well characterized as allochronism of anthropology: "a persistent and systematic tendency to place the referent(s) of anthropology in a Time other than the present of the producer of the anthropological discourse."

With the same concept of time, but conceptually distinct in relation to the causes of change, it was no surprise that those theoretical lines grouped cultures in relative chronological schemes following a linear order. There, time was a uniform and objective, divided into equivalent units, but historically and culturally differentiated. The oldest life forms physically evolved further away from more developed centers. Although these life forms usually continue to live together, they eventually disappear from the chronological schemes and are replaced by other forms of life in the next unit of time, usually in another space. The societies from the oldest time periods – usually corresponding to hunter-gatherers –are located in areas very far from the most modern times – that of people with agriculture and pottery – without actually coexisting in the archaeological narrative, even though that was the case. The coexistence of more complex and late societies with those perceived as less developed is also denied in archaeology.

The revival of evolutionary thinking in the mid-twentieth century in the United States tried to reverse these forms of chrono-spatial schematization. Two scales of action for the evolution of a multilinear concept of time were proposed: synchronic and diachronic, where the uniform and linear passage of time would allow the cumulative change of societies. On the one hand, a general trend, that of humanity or culture as a human phenomenon, with the emergence of forms of increasingly complex organization, from stage to stage. On the other, specific developments of particular cultures in local areas, with variations in different adaptive forms, with high to low in a setting that could be contemporaneous (Sahlins and Service 1960).

The introduction of radiocarbon dating in the mid-twentieth century as a form of absolute dating helped reinforce previous linear conceptions of time. This dating method validated concepts of time that were already generally held both in evolution, and diffusionism and cultural history. This method was functionally consistent with their views on cultural change, as long as the assumptions of the radiocarbon method are based on the same temporal ontology: time as a natural and homogeneous flow. The notion of time was essentially the same. The difference was that now it was possible to know the *amount* of time separating the events (O'Brien and Lyman 2002). The *when* in the chronologies became a *how much* in absolute chronologies. But, in addition, this was also the most tangible and objective evidence that objects contain time and that it will depend on our technical abilities and theoretical techniques to recover it.

Multilinear evolutionism was criticized for bringing into play many pre-understandings that were subject to be debated by non-positivist perspectives. Criticism on this concept of time was very similar to that directed toward the unilinear

notion of evolution: its general cultural types, variability reduction, the direct use of ethnographic analogy, and its principles and explanation of change. But this new line in evolutionism started to hold a multiple and contextual view of time. While equally smooth and linear, and part of the same general process, time was not regarded anymore as a single entity, but as two (or more) simultaneous or superposed times entangled as branches stemming from a common tree of general evolution. There is a relative time, that of the specific evolution of the species (i.e., cultures), relative to their particular environmental and cultural contexts (Sahlins and Service 1960: 2–6). At the same time, there is an absolute time, general, usually sequential, a-historical, in which successive levels of increasing complexity and organizational integration progressively emerged at different stages. Time was starting to be better understood in terms of its length from a dual approach: that of human temporality and that of ecological temporality.

The first theoretical approach in which environmental time is introduced as another time intertwined with the human one originates from what is known as the French Annales school (a periodical journal in which the main articles written by a leading group of French historians were published after 1929). It was not until many years later that these articles were incorporated in archaeological thinking. Maurice Braudel (1966), the main mentor of this school, distinguished, within the constant flow of time, the overlapping of different rates or speeds, understood as layers and fragmentations of history. The main, or the longest rate of time, is the one that involves a slower processing and transformative evolution. It is the time of long-lived structures, continuous and steady over generations and with a long balance with nature, the one that has an almost imperceptible effect on the lives of humans.

This duration of a parsimonious flow is fragmented and changes pace in short-term time. On the one hand, there are those of an intermediate time, of dozens of years, a quarter or half a century long. Intermediate time is the duration of social, political, and economic conjectures. It is the structural history of groups and clusters. On the other hand, there is a short-term time, that of individuals, of everyday life, of events. These short durations are neither perceived nor subjective or social times. Although Braudel referred to them as temporalities, they are only paces of time, the speed of historical phenomena depending on the magnitude of the processes. This time is superimposed and, at the same time, develops simultaneously. It is a multiple time.

The multiple time and the relationship between different temporal scales and the material record were proposed as temporary perspectivism (see Bailey 2007). Time is a process and representation, in terms of its links to the present. This notion basically proposed an archaeological ontology of time: a form of objectification in which the time of phenomena (of varying and relative durations or periods) materializes differentially under different resolutions, in particular concrete forms. Objects and the archaeological record form a temporary and material palimpsest (an aggregate of materials, objects, and meanings accumulated, of different ages and differential duration, subject to transformation and partial preservation). The ways of relating to the times of phenomena define four temporary perspectives, which enable or constrain different questions, requiring different explanations and methodologies.

Two important aspects are hereby added: the multiplicity of times and its differential materiality. In addition, the fourth perspective of time introduces the subjective time: a socially situated perspective, from the observer as well as from the people of the past. This perspective is conditioned by symbolic representations and cognitive categories about time, specific to each social group. This is the elapsed time that is differentially sensed. It is not just a matter of time, but also a conceptual issue. Time is not only multiple but can also acquire meaningful cultural forms.

A different perspective on lived time and its materiality can be found in the New Archaeology (Processual Archaeology). Time was not, according to this school of thought, a problematic issue and did not contribute substantially to theoretical discussions. Due to its concerns about understanding how the world worked, and how

processes and systems functioned, in its beginnings, it gave priority to the reconstruction of the mechanisms of interaction over time trajectories. However, various processual archaeologies indirectly began to deal with time and its relationship to the different issues of change, such as the mechanisms of evolution, adaptation, training processes, behavior chains, etc. These were concerns that involved time as an intrinsic factor in the development of these changes.

In other cases, time was considered a variable and came into play at the individual level. For instance, the proposals about artifact design in relation to conservative or expedient technological strategies (Nelson 1991) involve individuals thinking and considering time. Whatever it is the case, either in conservation strategies where tools are prepared in advance to their use or in expediency where there is availability of raw material and time to manufacture tools at the place of use, both involve a rational individual that takes into account the use and allocation of time. Equally, the analyses of procurement areas, optimal foraging models, or of cost-benefit, for example, put into play other notions of time. In spite of being a lived and perceived time, it is not freed from a Western-European concept of time. Time is seen as homogeneous, chronometric, and capitalist: It is a valuable resource (a form of capital) and decisions are taken based on its administration. Anyhow, it is important that here other time scales were introduced: that of individuals and that of short-term processes, and even of events (such as those of the knapping of a lithic artifact or its use). Although evolution operates inexorably as time itself, at a smaller scale, there are possibilities for the human in handling time. Individuals are active against time, even if this lies outside the individual.

This conception of time is also implied in the idea of surplus production and in current models of domestication – the management of time of others, animals, and plants – as well as in the considerations on the use of deferred resources or the intensification of production, for example. Also in the proposals of social differentiation and forms of social reciprocity, redistribution of resources, construction and maintenance of power, or the exchange of gifts, an active management of short-term time is at stake as it involves the appropriation of time by a few other individuals.

In these cases, it is not always a materialized time that is locked in things, but a relational time. Things are not containers of time. They do not contain the flow of time and they are not material clocks. Time is not the frame for the development of activities. It is, actually, a superimposed time which comes into play in the interactions between people and things. Neither is necessarily a linear time, conventionally flowing (though it well may have a past and a future, as is the case with redistribution, for example).

The possibility of a relational time can also be found in other postprocessual theoretical proposals. This is not the same relational positivist time subject to manipulation, but a time that arises from the practices and the active involvement of individuals with the material and the world (Gosden 1994). It is the short time of individual practices in its active dimension, along with the subjective time of individuals and their practices, putting at stake in these acts a whole series of socially acquired and incorporated dispositions, social memories, more ways of perceiving and experiencing the duration. In short, as maintained by Elias (1984), it is a relational effect, or what he calls the effect of the put-in-relation. It is a multiplicity of times, overlapping, of various lengths. A time that can acquire multiple shapes, socially and historically situated. Social practices produce and structure time, and there will always be as many forms of time as types of practices (Gosden 1994: 122–126).

Thus, life is composed of many times: The time that it takes to produce a lithic artifact has implicitly several temporalities, such as the time of other future practices (immediate or delayed), in other chains of coordinated actions in networks, leading at the same time to previous longer lengths of time, such as the socialization of the craftsman, or the short period of his training, and the long duration of the social structures of society where that practice takes place. The subsequent movement of that artifact and its participation in other

practices, from its first use to its ending on the shelf of a museum, require other multiple times that need to be considered. Without losing its fluid quality and overall linearity, the time of practice links things, people, and time, and from there, it branches out throughout its development into a multitude of other forms of different times and varied additional temporalities. The biographical perspective of objects (Gosden and Marshall 1999), for example, is one of the ways in which the realization of time in objects acquires these multiple dimensions, following a linear accumulation of history.

There is another social dimension of the temporality of the practices that has to do with the construction of social identities and life cycles. Whether it is over the small scales of daily and personal habits, or through the broader ones of sacred times, social rituals, and other public times, meanings are created and reproduced (Gosden 1994: 136). Among them, meanings related to gender, age, and lifestyle (Gilchrist 1999: 80). These are practices that not only deal directly with gender, but also with other practices that may be embodied – such as certain work or food habits, or sacrifices. Undoubtedly, there is a linear time, that of the flow of life which is marked biologically in bodies, but also bodies materialize overlapping stories of various durations.

Other ways of understanding the relational temporalities between objects and people have recently been deepened by some authors. Bearing in mind the timing of things and people, both would find themselves trapped in complex entanglements of moving relations of mutual dependence of human with things, things with things, and objects with humans (Hodder 2012). These entanglements have an important temporal dimension, as the mutual dependence keeps people busy, caring, arranging, and interacting with things. Since humans and things live in different temporalities – the life of things can be much longer or shorter than that of humans – there is no direct linearity in the flow of time.

The past is also involved in these entanglements, in a nonlinear, discontinuous, and fragmented way. This can occur either via the materiality of historical things that persist, which appear and have incidence in the present, or well as long-duration processes, or as other entanglements at a given point in time which guides where actions can be directed in the future (Hodder 2012: 100). The mess of things and people covers multiple times, past and present, short and long term, and, in turn, mutually intertwined, in a combination of different temporalities. Time lies in things, in people, and in relationships. It is constantly flowing in a linear manner, although at different time frames.

Overall, nonlinear perspectives of time, although still trying to break with linearity, take the past as ubiquitous, almost homogeneous in its effect on the present. While they recognize the different forms of temporality, it is as if history acted as a rather fuzzy or blurry whole. Questions like "the past is here, now" or "practices update the past through present actions," reinforce an almost causal linearity between past and present. The prospect of a historical materiality acting in the present, as suggested by Hodder, integrating with the present, is a nonlinear dimension of the past. The past presents a heterogeneous continuity (Lucas 2005). Our conscience can only perceive time as a flow, thanks to the memory that holds what happened, the past, and relates it to the present, as when we hear a tune or watch a movie. These retentions may have different depths, that is, age, or duration. When they manifest in the present, they work as "echoes" of the past (Lucas 2005: 26). There is then not such a thing as a linearity of the past (or with the past), but fragments and discontinuities that differentially arrive in the present time.

The past, rather than a linear succession of events, can be understood as a network of connected events, unequally distant from each other and the present. Each past period of time is extremely heterogeneous, made of fragments of different pasts (Olivier 2004). In fact, we do not recover events from a linear past, but connections that developed over time and are embodied in objects as memories in the present and not as representations of past events. It is a way of thinking about the different presents that shaped the past, in multiform times, in another kind of actualism.

In short, we can say that the different conceptions of time managed to link different elements, creating different ways of understanding it. Many of the elements are different, with different results. Due to the diversity of analytical units and ontological assumptions, it is difficult to make a critical comparison, although the acceptance of a certain kind of linearity and its materiality in objects emerge as elements in common. This issue is therefore theoretically complex. Even in different kinds of time and temporalities, including even the nonlinear, the idea of flow remains constant. Perhaps mental structures limit the ways in which they can express the passage of time and archaeologists fail at separating their own experiences when analyzing time, in a sort of familiarity that naturalizes certain aspects of common sense. It may also happen that archaeology is still subject to a long duration of the linear conception of time, a vision materialized with modernity.

The materialization of time on objects is a strong assumption common to all archaeologies from even the start of unilinear evolutionism until today. It has, in fact, been effective for the building of knowledge and the recovery of time. Today it is enriched and complex due to the relational perspective, where not only materials carry time, but relationships build it and make it happen.

International Perspectives

The concepts of time in South American archaeology, in a broad and spatial temporal perspective, have followed the successive unilinear international intellectual traditions of from the nineteenth century evolutionism to the present time.

In the nineteenth century (in the academic world at least), a kind of generalized allochrony denied the coetaneity of the "other," ignoring the continuity of the archaeological past with the societies of the present. Time was linear, but local history was interrupted and discontinued by another linearity, that of the Western world since the Spanish conquest. In the formation of nation-states from the nineteenth century, this view was used to justify the territorial expansion into indigenous lands and to define sovereignty, justifying so-called civilization and its development (Piazzini Suárez 2006). Once more consolidated states and archaeology as a discipline, this kind of allochronic thinking facilitated the creation and ownership of the pre-colonial past as heritage and, later on, the definition of the subject of study of a universal archaeology concerned with the study of cultural diversity. This situation began to change after the 1970s with the development of a Latin American social archaeology. In recent decades, other theoretical positions have begun to accept that continuity and respect or incorporate other voices in professional practice. New critical positions also incorporate self-reflection on professional practice and on its relationship to other people, their pasts and their voices (Gnecco 1999).

Future Directions

The recent concepts of multitemporality and on the relational perspectives of time, coupled with new approaches in the social sciences, seem to open new directions in terms of thinking about time and its linearity. In general, there is an increasing concern in archaeology about the short time, almost eventful time, depending also on a more general interest in individuals and subjectivities. Although this archaeology will need other methodological tools in order to define absolute short time lapses. The accuracy of the current absolute chronology is inadequate for an archaeology of short duration or of subjective temporalities. Neither its theoretical assumptions are in accordance with the particularities of relatively short phenomena such as some events and practices.

Also the concerns with the recent past (or more appropriately contemporary past due to its relevance today) are opening new lines of inquiry and expansion of archaeology (González Ruibal et al. 2010), working with the archaeology of warfare, state terrorism, and the disappearance of persons, in continuity with the present.

Inquiries into other ontologies (Henare et al. 2007) are now being considered in the archaeological discipline. Though, in general, this is

done from the perspective of the material culture or from human and nonhuman relations, time acts as an ontological category and, from a multi-relational stand, is part of a larger whole. The inquiries relating to other ontologies may venture into other temporalities not yet considered.

The nonrepresentational perspectives in human geography are challenging the conceptions of events and the flow, discussing the performative efficacy of the former and debating how to think about change in a world that is constantly being formed on its social aspect. The events make permanent differences, constituting the present, but in a temporality exceeding it, that includes past and future, not as memory but as anticipation, experience, and synthesis of a temporal subject (Rose 2010: 346–347) To think about archaeological time in a nonrepresentational form may enable some further analysis on small scales of events and individuals.

Despite these perspectives more focused on the subjects and their temporalities, and their multiple relationships with things and with nonhumans in general, as well as in their mutual agency, however, they have not yet developed further the analyses of the agency of time in itself. This lack of consideration implies the idea of time as a frame or scene and of an external flow. Time could be another agent in the network of interactions or the entanglements of things and people, and not an emerging entity. To some extent, unilinear evolutionism and the idea of progressive change and the widespread conception of time as a flow that acts on things – making them look older, accumulating time, modifying the archaeological record – imbues certain power of action to time, although closer to the idea of cause. But it is different to think of time with a capacity of agency, as it is the current thinking from posthumanism in relation to things, nature or other humans, as coactors interacting in concrete socio-material relationships (Bastian 2009). The multiplicity of simultaneous times and durations may have their different kinds of agency, as well as relational time. Perhaps a perspective from agency may lead us to rethink its linearity or, on the contrary, help to search for an agency capacity in its inevitable flow and linearity.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Age Estimation
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology as Anthropology
- ▶ Archaeology: The World at 1800–1850
- ▶ Archaeometry Laboratory at the University of Missouri Research Reactor (MURR)
- ▶ Archaeometry: Definition
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Chronological Systems, Establishment of
- ▶ Chronopolitics and Archaeology
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Methods in Historical Archaeology
- ▶ Dating Techniques in Archaeological Science
- ▶ Electron Spin Resonance (ESR) Dating in Archaeology
- ▶ New Archaeology, Development of
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Radiocarbon Dating in Archaeology
- ▶ Thomsen, Christian Jürgensen

References

Bailey, G. 2007. Time perspectives, palimpsests and the archaeology of time. *Journal of Anthropological Archaeology* 26: 198–223.

Bastian, M. 2009. Inventing nature: Re-writing time and agency in a more-than-human world. *Ecological Humanities Corner: Australian Humanities Review* 47: 99–116.

Braudel, M. 1966. (segunda edición en español 1976). *El Mediterráneo y el mundo mediterráneo en la época de Felipe II*. México: Fondo de Cultura Económica.

Elias, N. 1984. (primera edición en español 1989). *Sobre el tiempo*. México: Fondo de Cultura Económica.

Fabian, J. 1983. *Time and the other. How anthropology makes its object*. New York: Columbia University Press.

Gilchrist, R. 1999. *Gender and archaeology: Contesting the past*. London: Routledge.

Gnecco, C. 1999. *Multivocalidad histórica. Hacia una cartografía postcolonial de la arqueología*. Bogotá: Departamento de Antropología, Universidad de Los Andes.
González Ruibal, A., V.M. Fernández Martínez, Á. Falquina Aparicio, X. Ayán Vila, and A. Rodríguez Paz. 2010. Arqueología del fascismo en Etiopía (1936–1941). *Ebre* 38 (4): 233–254.
Gosden, C. 1994. *Social being and time*. Oxford: Blackwell Publiserhs.
Gosden, C., and I. Marshall. 1999. The cultural biography of objects. *World Archaeology* 31 (2): 169–178.
Henare, A., M. Holbraad, and S. Wastell, eds. 2007. *Thinking through things. Theorising artefacts ethnographically*. London: Routledge.
Hodder, I. 2012. *Entangled. An archaeology of the relationships between humans and things*. Oxford: Wiley-Blackwell.
Lucas, G. 2005. *The archaeology of time*. Abingdon: Routledge.
Nelson, M. 1991. The study of technological organization. In *Archaelogical method and theory*, ed. M.B. Schiffer, vol. 3, 57–100. Tucson: Arizona Press.
O'Brien, M.J., and R.L. Lyman. 2002. *Seriation, stratigraphy, and index fossils. The backbone of archaeological dating*. New York: Kluwer Academic Publishers.
Olivier, L. 2004. The past of the present. Archaeological memory and time. *Archaeological Dialogues* 10 (2): 204–213.
Piazzini Suarez, E. 2006. Arqueología, espacio y tiempo: una mirada desde Latinoamérica. *Arqueología Sudamericana* 2 (1): 3–25.
Rose, M. 2010. Envisioning the future: Ontology, time and the politics of non-representation. In *Taking-place: Non-representational theories and geography*, ed. B. Anderson and P. Harrison, 341–361. Surrey: Ashgate Publishing Limited.
Sahlins, M.D., and E.R. Service, eds. 1960. *Evolution and culture*. Ann Arbor: University of Michigan Press.

Further Reading

Barad, K. 2007. *Meeting the universe halfway*. London: Duke University Press.
Bayley, G. 1983. Concepts of time in quaternary prehistory. *Annual Review of Anthropology* 12: 165–192.
Bintliff, J. 1991. *The Annales School and archaeology*. Leicester: Leicester University Press.
Gell, A. 1992. *The anthropology of time*. Oxford: Berg.
Harding, J. 2005. Rethinking the great divide: Long-term structural history and the temporality of event. *Norwegian Archaeological Review* 38 (2): 88–101.
Knapp, A.B.. 1992. *Archaeology, Annales, and ethnohistory*. Cambridge: Cambridge University Press.
McGlade, J. 1999. Arqueología, dinámica no lineal y discurso histórico. *Trabajos de Prehistoria* 56 (2): 5–l8.
Mora, S. 2007. El pasado como problema antropológico. *Revista Colombiana de Antropología* 43: 157–196.

United Kingdom: Archaeological Museums

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Introduction

Museums containing archaeological material in the United Kingdom are many and varied. They constitute the principal means by which people can gain direct experience of the past, and in terms of *global* footfall, they continue to rival football matches as a favorite venue for leisure activity. However, some museums are significantly more successful than others in attracting visitors, with figures for 2012 showing that the British Museum remains far away the most popular visitor attraction in the UK, with over 5.57 million visitors. Many of the smaller museums would count themselves fortunate to attract 10,000 visitors a year.

While there are many fine examples of UK archaeological museums that have been refurbished, or relocated to new premises, in the last decade as a result of funding by central or local Government and/or the Heritage Lottery Fund (e.g., Shetland Museum, Lerwick), many archaeological museums in the UK face serious problems, principally relating to shortage of funds. This crisis in the museum sector means that some museums are being forced to close or to reduce staffing and services. This issue is not limited to the UK but is widespread around the world, and the way in which it is handled relates to broader debates regarding the role and utility of culture in society.

Definition

An archaeological museum can be defined as an institution that possesses a collection of archaeological material – be it obtained locally,

regionally, nationally, or internationally – which it curates, displays, and makes accessible for the benefit of present and future generations. Many museums, especially the larger examples, also regard the undertaking of research into the collections (either by their own staff or by others, or both) and dissemination of information about the collections as a core responsibility. In many museums, archaeological material is just one of a range of collections that are held. In the UK, an Accreditation Scheme exists to uphold national standards of museum practice. It is administered by Arts Council England in partnership with CyMAL: Museum, Archives, Libraries Wales; Museums Galleries Scotland; and the Northern Ireland Museum Council. The benefits of achieving accredited status include the eligibility to bid for large grants. Various other recognition schemes exist, including the designation of certain collections as being of national importance; once again, these can assist a museum in securing grants.

The distinction between a museum and a heritage centre is a moot point. Heritage centres generally aim to present the history and archaeology of a particular location and need not necessarily achieve this using real archaeological objects; however, many heritage centres do include such material, and some have collections that are in store as well as being on display. For this reason, the text below will include some consideration of visitor centres. The absence of a legally binding definition of a museum means that some visitor attractions call themselves museums even if they do not possess the kind of material that is normally found in a museum.

Historical Background

There is a long history of collecting and displaying archaeological material in the United Kingdom, extending back at least as far as the seventeenth century. The Ashmolean Museum in Oxford grew out of an early seventeenth-century Cabinet of Curiosities; the British Museum was founded in 1753 and was initially based on the collections of Sir Hans Sloane; the archaeological collections of what is now called National Museums Scotland started to be amassed in 1781, by the Society of Antiquaries of Scotland; and the Hunterian Museum in the University of Glasgow was founded in 1807 and is Scotland's oldest public museum. There are now well over 200 museums, scattered across the United Kingdom, whose collections include archaeological material, whether it be from the UK or from further afield. These museums range in size from the massive (British Museum) to the tiny (e.g., the Findhorn Heritage Centre and Ice House, Moray), and the scope of their collections ranges from the worldwide (e.g., the British Museum and Victoria and Albert Museum) to the individual site or object (e.g., the Mary Rose Museum, Portsmouth). Some, including the university-based museums such as the formerly-named Marischal Museum in Aberdeen, are funded – directly or indirectly and wholly or partly – by central Government; some (e.g., the Royal Albert Memorial Museum & Art Gallery, Exeter) are funded by City Councils or Local Authorities; and many (such as Bute Museum) are independently resourced, and of those, some have virtually no source of income, depending on volunteers to remain open.

Regarding archaeological material found in the UK, the principal collections reside in the national museums of the constituent countries in London, Edinburgh, Belfast, and (until the displays are relocated to St Fagans National History Museum) Cardiff, although there is no National Museum of England as such; the British Museum, which fulfils that role, presents material from the whole of the UK. Certain regional and local museums contain significant collections. In southern England, these include the Wiltshire Heritage Museum in Devizes, the Salisbury and South Wiltshire Museum in Salisbury, and the Dorchester Museum in Dorset, which house important collections of prehistoric material from Wessex; the Royal Albert Memorial Museum, Exeter and the Royal Cornwall Museum, Truro, whose collections cover much of the southwest; and the Museum of London which, as its name suggests, focuses on material from London and environs. In northern England, the Hull and East Riding

Museum in Yorkshire houses the nationally significant Mortimer Collection of prehistoric and later finds from Mortimer's barrow diggings in the East Riding of Yorkshire, while the Weston Park Museum in Sheffield houses the similarly important Bateman Collection, from that antiquary's barrow diggings mostly in the Peak District. The Great North Museum in Newcastle upon Tyne houses the collections amassed by the Society of Antiquaries of Newcastle upon Tyne, principally from Northumberland and Durham, while the York Museum contains a fine collection of Roman material from the city, and Tullie House Museum in Carlisle holds some important finds from northwest England. In Scotland, the museum formerly known as Marischal Museum in Aberdeen possesses sizeable collection of human and artifactual remains from Aberdeenshire and surrounding areas; Kelvingrove Museum and the Hunterian Museum in Glasgow are strong on the archaeology of the west of Scotland; Orkney Museum in Kirkwall possesses a large amount of material from excavations in Orkney; and Shetland Museum in Lerwick has a fine collection of Shetland archaeological material. And in Sutherland, the private museum belonging to Lord Strathnaver at Dunrobin Castle contains, among other material, a good collection of Pictish stones. In Northern Ireland, the Armagh County Museum (which is a branch of National Museums Northern Ireland) holds some significant finds from the county.

Individual treasures are to be found in some of the smaller museums. For example, the Rotunda Museum in Scarborough has, since 1834, displayed Gristhorpe Man, a 1.78-m-tall Early Bronze Age man, along with the lid of his tree-trunk coffin and the grave goods that accompanied him; while the Roman Army Museum at Vindolanda on Hadrian's Wall, Northumberland, houses the best collection of Roman writing tablets from Britain; Dover Museum houses the magnificent Bronze Age Dover Boat; and the Lynn Museum in King's Lynn displays the enigmatic Early Bronze Age "Seahenge" monument, with its central upturned tree base. Not all archaeological collections are housed in museums, however. The Duke of Northumberland's collection at Alnwick Castle, for instance, includes local and non-local (including Irish) prehistoric material, while the Duke of Argyll's collection at Inveraray Castle includes a rare Late Bronze Age flesh hook, an Iron Age massive armlet, a Neolithic Alpine jadeitite axehead, and a jet spacer plate necklace. Small displays are also to be found in some libraries, as at Todmorden Library, West Yorkshire, where most finds from an Early Bronze Age cemetery at Blackheath Cross ended up. Sadly, many archaeological objects remain in private hands and are never, or only seldom, seen by the public. The Crosby Garrett Roman parade helmet, a metal detector find which Tullie House Museum was unable to secure when it was bought at auction for £2 million in 2010, was displayed in the Royal Academy's *Bronze* exhibition in 2012 but otherwise remains with its anonymous owner. Finds that pass through the Portable Antiquities Scheme in England and Wales and are returned to finders may be made available electronically by means of the Scheme's database, http://finds.org.uk/database, although physical access to these finds (e.g., for research) is dependent on the goodwill of the possessor. Finally, considerable amounts of archaeological material currently reside with their excavators, awaiting a permanent home. The issue of storage is covered below.

Key Issues/Current Debates

The UK's archaeological material culture is therefore dispersed widely and in a dizzying array of institutions, facilities, and private hands. Leaving aside the issues relating to privately held material, what are the principal issues that relate to its curation, research, and accessibility?

By far the most serious problem is that of the shortage of resources which, as detailed below, has caused the closure of many museums and heritage centres, has led to cuts in staff and services, and has jeopardized the ability of many museums to acquire new material, to store adequately the material that they hold, and to make that material available for research. Added to this is an alarming managerial trend, in some quarters, towards regarding curators and conservators as an

expensive and anachronistic luxury that can be dispensed with.

The current crisis in museum funding is nothing new: museums have come and gone in large numbers over the last 150 years. However, the current economic climate is particularly harsh, especially for Local Authority-run museums where the culture budget was cut by 7.8% in 2011–2012. According to a recent report in the *Museums Journal*, 42 museums, galleries and heritage sites (including some containing archaeological material) have closed during the decade 2002–2012, with 30 of these closures occurring in the 2 years between 2010 and 2012 (Steel 2012). Financial cuts and the generally tough financial climate also mean a diminution in the staffing of museums and, in particular, in curatorial and conservation posts; for example, the trustees of Salisbury and South Wiltshire Museum were forced to take the decision to delete the Collections Manager/Curator of Archaeology post in 2012, while Museums Sheffield announced the loss of 45 jobs across its organization in February 2012 following the loss of £1.4 millions' support from Arts Council England and is facing another round of cuts in 2013. (Museums Sheffield advertised for a Curator of Archaeology in November 2012, but this post was to run only until the end of March 2015.) National museums are not immune from financial cuts, with all the UK national museums suffering significant reductions in their grant-in-aid. National Museum Wales has recently (February 2013) announced that 35 posts will be axed in the current round of restructuring, while others are downgraded (*Museums Journal* February 2013), and National Museums Northern Ireland still lack archaeological curators for their nationally significant collections held at the Ulster Museum.

The problems surrounding the acquisition and storage of archaeological material have been highlighted in the Society of Museum Archaeologists' report, *Archaeological Archives and Museums 2012* (http://www.socmusarch.org.uk/docs/Archaeological-archives-and-museums-2012.pdf), where it is pointed out that many museums have been forced to close their doors to new acquisitions and some 9,000 archaeological archives in England remain "undepositable." A similar situation (albeit smaller in scale) exists in Scotland, where an increasing amount of material that passes through the Treasure Trove system for allocation has no bidders. While the potential solutions to such a problem include the building of regional repositories, such a move would require collaboration between cash-strapped Local Authorities, or else private sponsorship, which is currently hard to secure. Nationalization of the national archaeological archive, which is the case in the Republic of Ireland, is most unlikely to occur.

The impact of the financial crisis on research into archaeological material in UK museums is becoming increasingly severe. Some museums (including Museums Sheffield: Weston Park) have closed their archaeological collections to researchers, while others limit the time that researchers can spend (e.g., at Hull & East Riding Museum) and/or charge them for access (e.g., Dorchester Museum and Salisbury & South Wiltshire Museum). While these measures may be understandable in terms of the need to budget staff time, they are having a significantly deleterious effect on archaeological research, particularly as undertaken by students. Research on large assemblages, which takes a considerable amount of time, is simply being rendered impossible in some museums. Furthermore, the fact that only a small percentage of those who care for archaeological collections are trained archaeologists and, of the latter, only a few are actively engaged in research means that much of the potential of the collections is not currently being realized. Just as research is adversely affected, so is the dissemination of information about the archaeological holdings, despite worthy initiatives such as Culture24 (formerly "the 24-hour museum," http://www.culture24.org.uk/home) and the proliferation of digitized catalogues, such as the online catalogues of the Hunterian Museum (http://www.huntsearch.gla.ac.uk/) and Wiltshire Heritage Museum (http://www.wiltshireheritage.org.uk/collections/).

This focus on the problems facing archaeological museums and other institutions holding archaeological collections in the UK is not intended to detract from the excellent work that continues to be undertaken by some museums. The phenomenal success of the British Museum's initiatives such as *The History of the World in 100 Objects* (http://www.bbc.co.uk/ahistoryoftheworld/) and of its *Ice Age Art* exhibition (7 February to 26 May 2013, http://www.britishmuseum.org/whats_on/exhibitions/ice_age_art.aspx) shows what can be achieved through tapping into the public's insatiable desire for archaeology. Similarly, the key role played by National Museums Scotland archaeological curators in the success of the Scottish Archaeological Research Framework (ScARF: http://www.scottishheritagehub.com/content/welcome) is widely acknowledged, and archaeological museum curators and conservators are playing an increasing role in the mass media dissemination of archaeological information, as shown for instance in the BBC series *A History of Ancient Britain* (http://www.bbc.co.uk/programmes/b010bg26) and in various web-based initiatives. Publications (both for the specialist audience and for the wider public) by archaeological museum curators and conservators continue to demonstrate that some museums – mainly, but not exclusively, the national museums in England, Wales, and Scotland – remain centres of excellence for archaeological research. This is because the individuals in question are uniquely placed to provide an overview and a depth and breadth of knowledge about archaeological material culture that cannot be matched by full-time excavators or by most university-based academics, who generally lack the in-depth knowledge of museum collections afforded to their museum-based colleagues. Finally, there are many splendid examples of recently refurbished museums (such as the Royal Albert Memorial Museum & Art Gallery, Exeter and The Collection in Lincoln).

As far as current debate within UK archaeological museums is concerned, most centres on the problems mentioned above. These problems eclipse concerns about ownership and repatriation – a topic which had previously set local museums against national museums and, increasingly, had involved local versus local museums and regional vs. regional museums in arguments over ownership. However, initiatives such as shared ownership and of proactive loan program (e.g., by the British Museum) have gone a long way to calming the debate, even though the politics of envy (directed against larger and better-resourced institutions) and competing claims for ownership or right of possession will probably always exist. One debate that tends to remain suppressed, due to fear over consequences, is that concerning the downward transformation in the status and power of curators in some museums over the past two to three decades, as museum management regimes that privilege other areas such as education, marketing, and collections management have tended to come to the fore.

International Perspectives

The problems and issues outlined above are by no means limited to the UK. Problems of resourcing face archaeological museums around the world, and the change in museum management philosophy that privileges other areas over curation and conservation has led to widespread cuts in the number of professionally trained curators and conservators in several continents. That said, there are still many excellent archaeological museums, and much world-class research is still carried out by museum curators and conservators. The funding model for archaeological museums may vary around the world, but – with a few notable exceptions – a general decline in public funding and a concomitant need to rely increasingly on charitable grants and commercially generated income can be discerned.

Future Directions

What of the future? The public's fascination with archaeology continues unabated, as is demonstrated by the crowds who have flocked to see parts of the (fairly) recently discovered

Staffordshire Hoard of Anglo-Saxon artifacts which are on display in Birmingham Museum & Art Gallery (until December 2014) and in the Potteries Museum, Stoke on Trent (until September 2013). Museums must continue to engage the public and maximize the accessibility of the collections while safeguarding their physical well-being for future generations. Advances in electronic technology mean that it is possible to deliver more, and more varied, information than hitherto, both within museum displays (e.g., through the use of applications for electronic media) and on the Internet. Much effort is currently being expended on developing increasingly sophisticated electronic means of access to collections and to the information about them; the challenge remains to ensure that the information that is disseminated by these media is correct, authoritative, and accessible but not dumbed down. There is also useful current research into haptic technology, to address issues surrounding the physical experience of museum objects. Such initiatives will benefit not only the visually impaired but all who wish to gain a sensation of touching an object that is protected in its glass case. Community engagement, through incorporating features such as Twitter, Facebook, and Flickr within a museum's range of communication media, is a rapidly growing area that is likely to continue to expand. By allowing the broader public to register their feelings and share ideas, reactions, and information, this constitutes a democratization of knowledge and an ethos of sharing that is in tune with the Zeitgeist (This should not, however, take the place of scholarship or of hard-won specialist knowledge.).

In UK archaeological museums, issues of storage and physical access to collections will require more creative and "joined-up, bigger picture" thinking than has been the case; the establishment of regional repositories, with facilities for research as well as for storage, would seem to be a sensible way to proceed. Inevitably, more museums will close and some may be forced into partnerships, and it is likely that, for their funding, many museums will have to rely increasingly on the Heritage Lottery Fund (and other charitable institutions) and on private and commercial sources. But the success of past initiatives such as *Renaissance in the Regions* – whereby nearly £300 million was spent on revitalizing certain museums in England between 2002 and 2011 and further monies were subsequently disbursed by Arts Council England under the Renaissance Major Grants Programme – shows just what can be achieved when the political will exists (http://webarchive.nationalarchives.gov.uk/*/http://www.mla.gov.uk/what/programmes/renaissance/renaissance_review_launch). UK archaeological museums find themselves at a time of particular stress and hardship and under increasing pressure to compete with other tourist attractions to deliver a crowd-pleasing "offer." Pulling off that particular trick while not losing sight of their core responsibilities to care for the collections in perpetuity, to research them and facilitate research by others, and to maximize accessibility is the challenge faced by museum directors throughout the UK.

Cross-References

- ► British Museum
- ► Ethics of Collecting Cultural Heritage
- ► Heritage Museums and the Public
- ► International Council of Museums (ICOM)
- ► Ireland: Archaeological Museums

Disclaimer The contents of this entry should not be taken to represent the official view of National Museums Scotland.

References

Steel, P. 2012. Closures hit museums across UK. *Museums Journal* 112 (11): 5.

Further Reading

There is a huge literature on UK museums in general; for an up-to-date review of issues, the *Museums Journal* is a useful starting point. See also the *Public Archaeology* journal for a critical review of current developments and the *Journal of the History of Collecting* for an historical perspective on museum collecting in general, including archaeological collecting. The Society of Museum Archaeologists also publishes, as in its 2012 Report on Archaeological Archives and Museums.

United Kingdom: Cultural Heritage Management Education

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Introduction

Cultural heritage management depends on public goodwill as it is funded out of taxpayers' money or out of developers' money at the behest of government. Without education in heritage and archaeology there will be less awareness of the need to manage cultural heritage, and heritage organizations will struggle to gain public funding. Cultural heritage in the UK is managed by various organizations. There have long been museums, which originally were intended to be educational. There are national agencies in different parts of the Kingdom: English Heritage, Historic Scotland, Cadw (in Wales), and the Northern Ireland Environment Agency. These have ancient sites and remains in their care, and education about these sites is part of their work. In Scotland and Wales, there are also Royal Commissions on Ancient and Historic Monuments which also investigate cultural heritage. There is the National Trust, and the National Trust for Scotland, both independent of government and holding many landscapes and historic houses. Local government officials also record and conserve the local historic environment. There are charitable trusts and companies who carry out fieldwork. All these organizations carry out education, either through training or as public outreach programs. There are also some organizations and sites which have education as their main purpose. These include living history or experimental reconstruction centers, the Young Archaeologists' Club, and the education sections of museums which form a distinct professional sector. Of great importance in the UK is the role of the voluntary sector. They run independent museums of all kinds, and also heritage assets such as steam railways. These often work with schools.

It is important to understand the mind-set of the cultural heritage management profession. The remains of the past are seen as a resource for investigating the past. They are thought to be fragile, being eroded and destroyed every year, and so a precious resource that has to be conserved for future generations. The idea that remains of the past have to be conserved is dominant. Encouraging public access to these remains can be seen as a threat to their long-term survival. People erode sites by walking on them and damage artifacts by handling them. Recording and conserving remains is also the main objective of most heritage management organizations. Senior management in most organizations has come from a research, recording, and conservation background. Education is, therefore, not always welcome, and is often seen as a peripheral part of a service, poorly resourced, lacking trained staff, and the first to be cut when budgets are tight. The problems faced by education within museums were highlighted by David Anderson in his report *Common Wealth* in 1997 which argued for a higher profile and more resources for museum education. Much of what he said is applicable still within the wider cultural heritage sector, even if museums have made great strides in implementing Anderson's views.

Key Issues

Work with schools tends to be with primary schools and children aged 5–11. Schools and colleges do not usually offer courses in archaeology or in heritage, and neither is a subject in the various national curricula in the UK. Each of the four nations in the UK has its own education system with different curricula. England, Wales, and Northern Ireland share similar qualifications, while those of Scotland are rather different. There are formally laid down curriculum expectations, detailing the subject content to be taught up to the age of 14 or beyond. At 14–16, students will study for named qualifications in specific subjects: GCSEs in most of the UK and Standard Grade in

Scotland. At 16–18, they will study for AS and A Levels in specific subjects or Highers and Advanced Highers in Scotland. In school curricula, the subject most usually linked with cultural heritage in teaching is history.

However, archaeology does appear at AS and A Level, the qualifications taken at ages 17 and 18 upward. There used to be an Archaeology GCSE, taken at age 16, but this was abolished by its awarding body as being expensive to run for the number of students it attracted. There is both a shortage of teachers with a background in archaeology and a lack of awareness that archaeology is a very good academic subject with high standards of teaching and learning. Heritage can also be taught in a few vocational qualifications as part of leisure and tourism, but this is far from common. This is especially unfortunate when most of the history taught in the UK schools at the ages of 13 and over is modern history, modern being the twentieth century and its world wars. Pupils think that the past only consists of Hitler and Stalin, taught over and over again from the age of 13–18. There is one GCSE in history that explicitly includes heritage management and marketing alongside archaeology as options. This was created specifically to counter the modern history bias, but is not available to all the schools as it is restricted to only around 100 schools.

There are various barriers to good education work in the cultural heritage management sector. These are partly educational, partly archaeological. Among teachers, there is a lack of understanding about archaeology and its links with historic sites. Archaeology is seen simply as excavation, while historic sites are seen in the same light as museums – places that reflect a historical narrative. At best, they offer a story to be read and passively absorbed by pupils. Most teachers lack training in how to use historic sites and rely heavily on the education staff at such sites for ideas and expertise. They also often lack the detailed historical knowledge that would involve the site into its context. Curriculum content also acts to constrain which heritage sites will be used. If the site represents a period that is not taught in the curriculum, then it has to work harder to attract teachers' interest. The amount of curriculum time available for subjects like history is being squeezed by other subjects in secondary schools, where only one third of pupils study the subject at age 14+, and an increasing number are allowed to drop it at age 13. Issues of cost, health and safety, and curriculum time can make it hard for schools to organize trips to heritage sites.

Cultural heritage organizations usually need to subsidize their education work. It is not usually possible to cover all the costs by charging schools. Some organizations are unwilling to spend scarce money on education. In times of recession or spending cuts, education is often among the first casualties. Within the heritage profession, there are few employees with specialized training in heritage education. Some organizations like to employ former schoolteachers, yet the skills of a classroom teacher are different from those of a heritage educator. There are as yet few postgraduate courses in the UK that teach these skills. Within the cultural heritage sector, there can be a dominance of people with a research and conservation background, for whom education is at best a peripheral concern, and at worst an active distraction from the "real" business of cultural heritage management. Some organizations, therefore, choose not to carry out any education work.

In spite of these educational and archaeological barriers, there are also causes for optimism. Many archaeologists have a zeal for education and a commitment to help the public engage in cultural heritage. The Council for British Archaeology has done much to secure the place of heritage nationally within education. Many organizations that receive public funding realize that it is their duty to serve the people in return for this, and education is one of the key services. The nature of archaeology and heritage is ideal for engaging students. Its physicality is ideal for learners who find classroom learning to be less than inspiring. Students with kinesthetic learning styles or with conditions which have an impact on traditional academic learning, such as dyslexia, will flourish on a visit to a heritage site. It is quite common to see the teachers amazed that the troublemaker or the most disaffected student of their class is taking an interest and engaging in learning when handling artifacts or visiting sites. The fact that we have to

tease out the meanings of heritage through analysis makes it ideal as a tool for learning investigative skills. The prevailing kind of education used by good teachers in schools uses constructivist education theory, which is ideally suited to working with heritage where meanings have to be constructed from mute evidence. Teachers have long known this, and there are national initiatives in England that are designed to get teachers out of the classroom and using built resources in the environment: *Learning Outside the Classroom and Engaging Places*.

The state of cultural heritage education in further education (for ages 16+) and continuing education (part-time adults) is somewhat parlous. Changes to stage funding of these sectors of education have been made in recent years as governments seek to allocate scarce resources to more targeted segments of the population. In particular, they have prioritized funding subsidy for teaching courses leading to vocational qualifications. Subjects like history, archaeology, and history of art or architecture are not deemed vocational, lose subsidy, and have become uneconomic to run. A few colleges and universities still feel that it is important to offer opportunities for a rounded education and are willing to put on courses relating to cultural heritage, but these are now few and far between. Up until the 1990s, part-time courses for adults were the major means by which the adult voluntary sector in history and archaeology gained their up-to-date training in methods, skills, and ideas. Continuing education was the way the professional sector of archaeology supported the large voluntary sector. This is now done massively through project-funded community archaeology.

Future Directions

The future for education about heritage or archaeology is mixed. It will never be a mainstream part of school curricula, where history dominates the study of the past. Good teachers will, however, always value the educational benefits of direct physical engagement with the past. Heritage education will also be marginal to the concerns of field research and heritage conservation. On the other hand, the vitality of the voluntary sector demands a response from professional archaeologists and heritage managers. There will be a demand for training and education of adult volunteers that cannot be ignored. Indeed, this demand represents a great opportunity. Professional researchers can extend the reach of archaeology into areas not represented in mainstream archaeology, for example twentieth-century defense structure or the rural medieval economy, through the work of adequately trained and involved volunteers. The audience for heritage education is there and waiting, it only needs archaeologists to realize it and find the will to go and meet it.

Cross-References

- ▶ Avocational Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Formal Education Up to Age 18, Archaeology in
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ United States: Cultural Heritage Management Education
- ▶ Volunteers in Archaeology
- ▶ World Heritage Education, Training, and Capacity Building

Further Reading

Anderson, D. 1999. *A common wealth: museums in the learning age, a report to the department of culture, media and sport.* Revised edition. London: Stationary Office.

AQA Archaeology. Available at www.aqa.org.uk (the awarding body for GCE AS and A Level archaeology).
Campaign for Learning in Museums and Galleries. Available at www.cultureunlimited.org (think tank for the cultural sector that grew out of the Campaign for Learning in Museums and Galleries).
Engaging Places. Available at www.engagingplaces.org.uk (supports learning through architecture, heritage and archaeology).
Group for Education in Museums. Available at www.gem.org.uk (publish the Journal of Education in Museums).
Inspiring Learning for All. Available at www.inspringlearningforall.gov.uk (developed the influential Generic Learning Objectives as a way of measuring the effectiveness of learning in museums).
Learning Outside the Classroom. Available at www.lotc.org.uk (covers cultural and natural heritage, and offers the quality badge for sites working with schools and guidance on out of classroom education).
OCR History Pilot. Available at www.ocr.org.uk (the awarding body for the GCSE History Pilot).

United Nations Convention on the Law of the Sea and Underwater Cultural Heritage

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State of Knowledge and Current Debates

Introduction

Following the Second World War, as a part of the global realignment of power and wealth, states decided to expand their maritime jurisdiction; however, these manoeuvres had ramifications for both the development of national maritime boundaries and international recognition of state control over the seabed's associated resources. The state driven reshaping of maritime boundaries, in conjunction with growing concerns over economic development and national security and an increased accessibility of resources, resulted in State Parties requesting increased international certainty in maritime jurisdictional boundaries. This in part, in 1957, directed the United Nations (UN) General Assembly to adopt Resolution 1105 (XI) (International Conference of Plenipotentiaries to Examine the Law of the Sea), which led to the first Conference on the Law of the Sea in Geneva, Switzerland in 1958.

The aim of the 1958 Conference was to examine the legislative boundaries of the sea, addressing not just the legal boundaries but also the biological, economic, technical, and political aspects across open bodies of water. Discussions culminated in the first United Nations *Convention on the Law of the Sea* (1958) and comprised four independent conventions and an optional protocol: *Convention on the Territorial Sea and the Contiguous Zone* (CTSCZ); *Convention on the High Seas*; *Convention on Fishing and Conservation of the Living Resources of the High Seas*; *Convention on the Continental Shelf;* and *Optional Protocol of Signature concerning the Compulsory Settlement of Disputes*. The 1958 Convention replaced the older "freedom of the seas" perspective, dating to the seventeenth century (Grotius 1633). However, despite the introduction of provisional maritime zones, the defined breadth of each boundary was ambiguously worded. Unfortunately, although discussions leading up to the adoption of the 1958 Convention included "wrecked ships and their cargoes (including bullion) lying on the seabed or covered by the sand or the subsoil" as an area of interest, the concept of cultural heritage was omitted from the text (YILC 1957: 298).

While each of the 1958 UN Conventions identified provisional maritime zones, wording within the individual Conventions relating to jurisdictional boundaries and associated rights to resources remained controversial. Prolonged discussions regarding dissatisfaction with the terms relating to maritime zones followed the Convention, which in 1960, led to a second Conference on the Law of the Sea. However, this conference failed to fulfil the objective of establishing a specific breadth for the territorial sea, as again, Committees could not agree upon any one of the specific proposals put forward (Treves 2008; White 1969). The Conference resulted in the 1960 United Nations *Convention on the Law of the Sea*, but the text did not yield any new agreements, and jurisdictional boundaries remained

ambiguously worded. Once again, underwater cultural heritage remained omitted from the Convention.

As controversial issues regarding jurisdictional boundaries and the continued state of ambiguity concerning the ownership of both living (e.g., molluscs and fish) and non-living (e.g., solid, liquid, or gaseous mineral resources; oil; gravel; or nodules) natural resources remained unresolved, discontent with the Convention continued to grow. By 1974, it was clear that a third Conference on the Law of the Sea was necessary to reconsider a coastal State's jurisdiction over maritime zones and introduce new concepts relating to equitable exploitation of resources within the Area (DOALOS n.d.: 'Economic Exclusive Zone'; UN Convention 1982, Art. 133 [a]; Walker 2012).

This third Conference convened in New York in 1973. Eleven sessions were held between 1973 and 1982, and during this time, 160 sovereign States met to discuss legislative control across the seas, including defining economic, biological, technical, navigational, and political boundaries across open bodies of water and the passage of ships through narrow straits. Many State Parties also felt it was the correct political environment to readdress the safeguarding and management of underwater cultural heritage beyond the contiguous zone (Strati 1995). It was, however, effectively determined that cultural heritage held a low status within the context of the *Law of the Sea,* as it fell short in comparison to the economic potential for the exploitation of natural raw materials and seabed development; this resulted in minimal discussions regarding underwater cultural heritage within the Third Conference (Carducci 2002; Strati 1995).

The final draft of the third United Nations *Convention on the Law of the Sea* (UNCLOS III) was adopted and opened for signature on December 10, 1982, coming into force on November 16, 1994 after the required 60th State Party (Guyana) ratified. The Convention was adopted with the provision that it is to be accepted as a whole – ratification of, or accession to the Convention establishes that the State consents to be bound by all of its provisions. By July 2016, 168 State Parties had agreed to ratification, formal confirmation or accession of the Convention. This is the third *Law of the Sea* Convention adopted by the United Nations, and the first to recognize underwater cultural heritage.

The 1982 Convention

The 1982 Convention comprises 320 articles, set out in 17 parts and 9 annexes, and provides more comprehensive definitions for the 6 identified maritime zones: Internal waters, Territorial Sea, Contiguous Zone, Exclusive Economic Zone, Continental Shelf, and the Area. There are also articles addressing trade, fishing rights, control over natural resources, and the protection of the marine environment within each zone.

Internal waters encompass any waters landward of the baseline of the territorial sea, except in archipelagic states, and include navigable waterways such as lakes, rivers, canals, and bays (Art. 8). The Territorial Sea extends beyond a State's terrestrial territory, which is measured from the low-waterline, and its internal waters, to a belt of sea adjacent to its coast (Art. 2). A State's territory also includes the airspace over the territorial sea and the seabed and subsoil. Every State has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles, measured from baselines determined in accordance with the 1982 Convention (Art. 3). The Contiguous Zone is a zone contiguous to the State's territorial sea and may not extend beyond 24 nautical miles from the baselines from which the breadth of the territorial sea is measured (Art. 33). The Exclusive Economic Zone (EEZ) is an area beyond and adjacent to the territorial sea, subject to the rights and jurisdiction of the coastal State and the rights of the freedoms of other States as governed by UNCLOS III (Art. 55). The Continental Shelf includes the continental shelf of a coastal State, the associated seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baseline from which the breadth of the territorial sea is measured where the outer edge of the continental margin

does not extend up to that distance (Art. 76). The Area, or High Seas, includes the seabed and ocean floor and the subsoil thereof, beyond the limits of national jurisdiction within the high seas, and all parts of the sea that are not included in the EEZ, the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State (Art. 86).

The 1982 Convention also provides for the establishment of four institutions – the International Seabed Authority, the International Tribunal for the Law of the Sea, the Commission on the Limits of the Continental Shelf, and the Meeting of the States Parties to the Convention. The International Seabed Authority organizes and controls activities pertaining to natural resources in the Area beyond national jurisdiction. The International Tribunal for the Law of the Sea facilitates an international legal framework for settling disputes related to activities on the sea and the uses of its resources. The Commission on the Limits of the Continental Shelf provides recommendations on the establishment of a coastal State's continental shelf outer limit, where it extends beyond 200 nautical miles. The Meeting of the States Parties to the Convention convenes when a Review Conference has been called upon to deal with provisions on natural resource mining in the Area, for amending the Convention, addressing issues of a general nature relating to the Convention, and to elect members of the Commission on the Limits of the Continental Shelf.

Current Debates

After 40 years of discontent regarding the ill-defined maritime zones, the 1982 Convention finally codified agreed upon definitions for jurisdictional maritime boundaries, including a newly introduced Exclusive Economic Zone. The United Nations would like to achieve universal ratification; however, some State Parties remain discontent with Part XI of UNCLOS III, which deals with the mining of natural resources found in the Area, and have identified it as a reason to forgo ratification (de Soto 1983; Malone 1983). In order to rectify the issue, the Secretary-General initiated a series of informal consultations amongst States, which led to the establishment of an *Agreement Related to the Implementation of Part XI of the Convention* in July 1998, but to date, universal ratification has not been achieved. As underwater cultural heritage is not a contentious issue for many States, it was not referenced within the 1998 Agreement.

Of the 320 articles articulated within UNCLOS III, only two address underwater cultural heritage – Article 149 and Article 303. Article 149 *Archaeological and historical objects* specifies that all objects of an archaeological and historical nature found in the Area shall be preserved or disposed of for the benefit of mankind as a whole, with particular regard being paid to the preferential rights of the State or country of origin, or the State of cultural origin, or the State of historical and archaeological origin. No blanket date range or age has been assigned to identify archaeological or historical objects, nor does the text differentiate between archaeological and historical. It is understood that the Article does not apply to modern objects.

Article 303 *Archaeological and historical objects found at sea* similarly remains ambiguous regarding what constitutes archaeological and historical objects. The text establishes that States have a duty to protect these objects and shall cooperate for this purpose (Art. 303 [1]) and that nothing in this article shall affect the rights of identifiable owners, the law of salvage or other rules of Admiralty, or laws and practices with respect to cultural exchanges (Art. 303 [3]). In order to control traffic, the coastal State may, in applying Article 33, presume that the removal of objects from the seabed in the contiguous zone without its approval would result in an infringement within its territory of the laws and regulations referred to in that article (Art. 303 [2]). Article 303 [4] is without prejudice to other international agreements and rules of international law regarding the protection of objects of an archaeological and historical nature; thus enabling future cultural heritage conventions, such as the 2001 United Nations Educational, Scientific, and Cultural Organization's (UNESCO) *Convention on*

the Protection of the Underwater Cultural Heritage, to work in conjunction with UNCLOS III rather than to conflict with it.

While the 1982 Convention addresses underwater cultural heritage, its inclusion in Article 149 and Article 303 do not afford substantive definitions establishing what constitutes archaeological and historical objects. Moreover, the Convention refrains from outlining managerial responsibility or legislative protection for these objects beyond the maximum breadth of the contiguous zone. These ambiguities have an impact on what drives a signatory's domestic policy on underwater cultural heritage legislation. Provisions of international and domestic heritage law only apply to cultural-identifiers or materials identified as needing protection and require legislatively presented definitions of the subject matter in order to afford strong legal protection (Prott and O'Keefe 1984). Without specific reference to what constitutes underwater cultural heritage, or in the case of the 1984 Convention, *archaeological and historical objects*, State Parties can subjectively choose to establish or omit underwater cultural heritage based on the ambiguously presented Articles.

Despite the 1982 Convention recognizing that other international treaties may come into force regarding underwater cultural heritage, such as the 2001 Convention, no other international convention related to navigable bodies of water compares in terms of its international impact. The United Nations comprises of 193 member States; of these, 165 have signed or ratified the 1982 *Convention on the Law of the Sea*. Comparably, UNESCO comprises of 195 member States, but to date, only 57 have accepted or ratified the 2001 *Convention on the Protection of the Underwater Cultural Heritage*. As such, UNCLOS III has a larger global impact regarding underwater cultural heritage management than the 2001 Convention, despite the fact that its inclusion does not afford a robust level of detail regarding appropriate management or identification of archaeological or historical objects. Within the scope of the 1982 Convention, further clarification regarding the ambiguously presented terms is required to effectively manage underwater culture heritage within UNCLOS III and its identified maritime zones.

Cross-References

- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Maritime Archaeological Organizations
- ▶ Underwater Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime

References

Carducci, G. 2002. The expanding protection of underwater cultural heritage: The new UNESCO Convention versus existing international law. In *The protection of the underwater cultural heritage: Legal aspects*, ed. G. Camarda and T. Scovazzi, 135–216. Milan: Dott. A. Giuffre Editore, S.p.A.

de Soto, A. 1983. Reflections on UNCLOS III: Critical Junctures. In *Law and contemporary problems*, ed. R.C. Maxwell and H.B. Robertson, vol. 46, no. 2, 65–69. Duke University School of Law, in Durham, North Carolina.

DOALOS. n.d. *The United Nations Convention on the Law of the Sea: A historical perspective*. Division of Ocean Affairs and the Law of the Sea. Available at: http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm#Historical%20Perspective. Accessed 21 Sept 2011.

Grotius, H. 1633. The Freedom of the Seas or the right which belongs to the Dutch to take part in the East Indian Trade, Batoche Books Limited, Kitchener, Reprinted 2000.

Malone, J.L. 1983. The United States and the Law of the Sea after UNCLOS III. In *Law and contemporary problems*, ed. R.C. Maxwell and H.B. Robertson, vol. 46, no. 2, 29–36. Duke University School of Law, in Durham, North Carolina.

Prott, L., and P. O'Keefe. 1984. *Law and the Cultural Heritage: volume 1. Discovery and excavation*. Oxon: Professional Books Limited.

Strati, A. 1995. *The protection of the underwater cultural heritage: An emerging objective of the contemporary law of the sea*. The Hague: Kluwer Law International.

Treves, T. 2008. United Nations Convention on the Law of the Sea. United Nations Audiovisual Library of International Law. Available at: http://www.un.org/law/avl. Accessed 21 July 2011.
United Nations (UN) 1982, Convention on the Law of the Sea (UNCLOS III).
Walker, G., ed. 2012. *Definitions for the Law of the Sea: Terms not defined by the 1982 Convention*. Leiden: Martinus Nijhoff Publishers.
White, I.L. 1969. A Framework for Analyzing International Law-in-Action: A Preliminary Proposal. *International Studies Quarterly* 13 (1): 46–49.
Yearbook of the International Law Commission (YILC). 1957. *Yearbook of the International Law Commission: 1956, Volume II: Documents of the eight session including the report of the Commission to the General Assembly*. New York: United Nations.

Further Reading

Archer, A.A., and P.B. Beazley. 1975. The Geographical Implications of the Law of the Sea Conference. *The Geographical Journal* 141 (1): 1–13.
Carducci, G. 2002. New developments in the Law of the Sea: The UNESCO Convention on the Protection of the Underwater Cultural Heritage. *The American Journal of International Law* 96 (2): 419–434.
Dean, A.H. 1958. The Geneva Conference on the Law of the Sea: What was Accomplished. *The American Journal of International Law* 52 (4): 607–628.
Oceans and Law of the Sea (OLOS). 1998. The United Nations Law of the Sea: A historic perspective. Accessed 11 Oct 2011. http://www.un.org.
Rau, M. 2002. The UNESCO Convention on underwater cultural heritage and the International Law of the Sea. In *Max Planck Yearbook of United Nations Law*, ed. J.A. Frowein and R. Wolfrum, vol. 6, 387–472. The Hague: Kluwer Law International.

United Nations Declaration on the Rights of Indigenous Peoples (2007)

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Introduction

The UN Declaration on the Rights of Indigenous Peoples (UNDRIP) was formally adopted by General Resolution 61/295 on September 13, 2007, with 144 votes in favor, 4 votes against, and 11 abstentions (Wessendorf 2008). This declaration is the first explicit, international document that lays out the rights particular to Indigenous peoples. However, it is an aspirational document and is not legally binding. This declaration draws upon concurrent movements in the work of the UN Permanent Forum on Indigenous Issues, established in 2000, and efforts during the Second International Decade of the World's Indigenous People (2005–2014) (Schnuttgen et al. 2007). It also builds upon the framework of the earlier Universal Declaration of Human Rights, adopted and proclaimed on December 10, 1948, and the two International Covenants of 1966 (focusing on Economic, Social, and Cultural Rights and then Civil and Political Rights) (Bowen 2000; Silverman and Ruggles 2007). The 2007 UN Declaration and the International Labour Organization's Number 169 "Indigenous and Tribal Peoples Convention," commonly written as ILO 169, form the two most important international legal texts addressing the status of Indigenous peoples and have important repercussions for national and local policies (Jepsen et al. 2017). ILO 169, in comparison to UNDRIP, is a legally binding treaty once a nation has ratified it (Barelli 2012).

Definition

The UN Declaration on the Rights of Indigenous Peoples (UNDRIP) establishes Indigenous peoples as possessing equal rights but also the right to consider themselves different and to be respected as different. It is composed of 46 articles and covers such diverse topics as their right to be free from discrimination and forced assimilation, to practice and revitalize their culture, to establish and control their own institutions, to occupy and access traditional territories, and to self-determination and decision-making. Other issues addressed include labor rights, violence against Indigenous women and children, Indigenous Intellectual property rights, media access and use, relationships to the state, and the commitments of the United Nations to upholding Indigenous rights. The final article, however, includes

the provision that the integrity and the unity of the sovereign nation-state and international human rights obligations take first priority (United Nations Declaration on the Rights of Indigenous Peoples of 2007, see United Nations 2008). A hallmark of UNDRIP is its emphasis on free, prior, and informed consent (FPIC).

Key Issues

After more than 20 years of preparation, the vote for the passage of this document was close, mainly due to the strong political pressure of the CANZUS group (Canada, Australia, New Zealand, and the United States) who dissented (Wessendorf 2008). A major problem for the four dissenting states was related to land claims, addressed most explicitly in Articles 25–29. For instance, although several nations already have systems in place for dealing with Indigenous land claims, most of these do not meet the full measure of intent presented in these articles. Archaeologists have played a role in establishing chronologies of occupation and land use, and these national systems have sometimes used or misused archaeological research in deciding the rights of Indigenous groups to land.

The term "traditional ownership" appears several times, both in the text of the Declaration itself and in the statements of the initially dissenting nations. Without a clear definition in the document itself, what constitutes this "traditional ownership" is left to each nation to decide. How this is conceptualized and turned into policy is critical for Indigenous land rights, and archaeology is often an important line of evidence. Establishing the duration of occupation in an area and the territorial range of these peoples can be important in corroborating a treaty or other forms of recognition. Moreover, there is a tendency to view prehistoric groups as "traditional" and separate from contemporary Indigenous groups, who often do not meet the defining characteristics based on the spread of past material cultures. Demonstrating traditional cultural uses of territory after being removed for long periods of time is difficult especially as cultures easily change, even without the forced assimilation policies common in colonizing societies.

Where the peoples themselves have often been marginalized in the colonial written record, archaeology may allow for more direct links by using material evidence of past societies. Both prehistoric archaeology and contact archaeology have provided important information, even though the use of archaeology in land claims depends greatly on the legal system of the nation and should not outweigh all other lines of evidence or traditional knowledge. New Zealand and Australia have national infrastructures specifically for addressing land claims, while the United States and Canada rely on more general legal processes for dealing with Indigenous rights concerns (Nettheim et al. 2002).

Land and resource-based self-determination as laid out in UNDRIP, as opposed to merely cultural self-determination, further raised concerns over the unity of the nation-state. The Declaration is written in such a way as to support internal self-determination, with territorial integrity (Errico 2007). Article 46 was added at a later stage in the process to ensure this was clearly stated, in an effort to address these criticisms. The original statements in opposition to the Declaration from Canada, Australia, New Zealand, and the United States reflect these concerns. Though Australia in April 2009, New Zealand in April 2010, Canada in November 2010, and the United States in December 2010 formally endorsed the Declaration, it is important to note their original oppositions and reasons.

The Declaration is also significant in that nowhere does it include a definition of the term "Indigenous," preferring that such peoples self-identify. The inability to recognize Indigenous peoples has historically crippled legislation on Indigenous rights. The term arises comfortably as a more neutral one in nations like the United States, Canada, Australia, and New Zealand, where there is a clearly defined separation between earlier occupants and settler colonizers. However, Indigenous peoples throughout Africa, the Americas, Asia, the Pacific, and Europe have all played a part in calling for international legislation such as UNDRIP and are currently engaged

in activism for its implementation in their countries and regions.

There is an ongoing tension in how peoples are recognized by international development organizations or their national governments as either "Indigenous" or an "ethnic minority group," and anthropologists have played a role in shaping this international legal category through "expert testimony, research, and participation in treaty bodies and international legal commissions" (Goodale 2017: 141). Anthropologists are one of many stakeholders in the human rights process, and it is important for anthropologists and archaeologists to reflexively engage with their ethical and professional obligations when working on or with Indigenous peoples. The rise of Indigenous archaeologies especially calls on professionals to rethink the "Us" and "Them" dichotomy that seems inherent in traditional anthropological scholarship and to explicitly recognize the political nature of all heritage studies (Hillerdal et al. 2017).

Future Directions

The Declaration celebrated its 10th anniversary in 2017. As noted above, even though UNDRIP is not legally binding, not all nations initially voted in favor of its passage as an aspirational document. Furthermore, its framing continues to encourage each nation-state to individually consider the Indigenous peoples they recognize within their territories as a special category of ethnic group and as citizens subject to national infrastructures, limiting explicit recognition of Indigenous peoples' self-government and claims to territory (Champagne 2013). Given the delayed endorsement of UNDRIP by the CANZUS group, there is concern that this "selective endorsement" already signaled that some nations were not willing to substantially change their policies and practices to implement the Declaration (Lightfoot 2012). While some countries, most notably Bolivia, wrote aspects of the Declaration into their national law, UNDRIP still remains as more of a benchmark than an international baseline of policy (Jepsen et al. 2017).

Article 32, Section 2 of UNDRIP established that:

> States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free, prior, and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources.

FPIC is now widely recognized by international and national organizations and their policies, and the Inter-American Court of Human Rights has upheld the approach that "when a development project is likely to have a serious (negative) impact on their cultures and lives of indigenous peoples, States must obtain their consent before implementing it" (Barelli 2012: 32). However, exploration and exploitation of natural resources as well as renewable energy projects and tourism are continuing to have significant, negative impacts on Indigenous peoples as both states and industries do not uphold the principle of FPIC and vary in their processes of consultation (Jepsen et al. 2017). It can be argued that there is no incentive within UNDRIP itself to encourage nation-states to recognize the rights of Indigenous peoples within their own forms of social and cultural organizations and collective orientations to land (Champagne 2013).

Engaging with Indigenous peoples prior to the start of development or archaeological projects and respecting their right to consent, not merely to be consulted, is an ongoing issue that has yet to become standard practice around the world. The political constructions of Indigenous identities and the reclamations of heritage continue to move the work of archaeologists beyond academic scholarship into the realm of present-day events and economic, cultural, and political repercussions. As Niezen reflects, "law has a uniquely powerful capacity to create entities out of abstractions," and archaeologists should be cognizant of human rights frameworks in the places they live and work (Niezen 2017: 30).

Cross-References

- ▶ Indigenous Archaeologies
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Peoples, Working with and for
- ▶ Latin America: Indigenous Peoples' Rights

References

Barelli, Mauro. 2012. Free, prior and informed consent in the aftermath of the UN declaration on the rights of indigenous peoples: Developments and challenges ahead. *International Journal of Human Rights* 16 (1): 1–24.

Bowen, John R. 2000. Should we have a universal concept of 'indigenous peoples' rights'? Ethnicity and essentialism in the twenty-first century. *Anthropology Today* 16 (4): 12–16.

Champagne, Duane. 2013. UNDRIP (United Nations declaration on the rights of indigenous peoples): Human, civil, and indigenous rights. *Wicazo Sa Review* 28 (1): 9–22.

Errico, Stefania. 2007. The draft UN declaration on the rights of indigenous peoples: An overview. *Human Rights Law Review* 7 (4): 741–755.

Goodale, Mark. 2017. *Anthropology and law: A critical introduction*. New York: New York University Press.

Hillerdal, Charlotta, Anna Karlström, and Carl-Gösta Ojala, eds. 2017. *Archaeologies of "us" and "them": Debating history, heritage and indigeneity*. New York: Routledge.

Jepsen, Käthe, Pamela Leiva Jacquelin, and Katrine Broch Hansen, eds. 2017. *The indigenous world 2017*. Copenhagen: IWGIA.

Lightfoot, Sheryl R. 2012. Selective endorsement without intent to implement: Indigenous rights and the Anglosphere. *The International Journal of Human Rights* 16 (1): 100–122.

Nettheim, Garth, Gary D. Meyers, and Donna Craig. 2002. *Indigenous Peoples and Governance Structures: a comparative analysis of land and resource management rights*. Canberra: Aboriginal Studies Press, Australian Institute of Aboriginal and Torres Strait Islander Studies.

Niezen, Ronald. 2017. Collective rights and the construction of heritage. In *Archaeologies of "us" and "them": Debating history, heritage and indigeneity*, ed. Charlotta Hillerdal, Anna Karlström, and Carl-Gösta Ojala, 19–32. New York: Routledge.

Schnuttgen, Susanne, Frédéric Vacheron, and Montserrat Martell. 2007. *UNESCO and indigenous peoples: Partnership to promote cultural diversity*. Paris: UNESCO.

Silverman, Helaine, and D. Fairchild Ruggles. 2007. *Cultural heritage and human rights*. New York: Springer.

Wessendorf, Kathrin, ed. 2008. *The indigenous world 2008*. Copenhagen: IWGIA.

United States: Cultural Heritage Management

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Introduction

The protection and management of cultural heritage in the United States comprises a complex mosaic of government, local, and indigenous stakeholders interacting within a federal political system with a strong tradition of private and entrepreneurial involvement (McManamon 2000; Murtaugh 2006). In the United States, the protection afforded to cultural resources depends on where the resources are located and who owns them. One-third of the US landmass, concentrated disproportionately in Alaska and the westernmost states, is federal property, and there are heritage sites effectively owned and managed by the national authorities. The remaining two-thirds is owned by state, municipal, and private entities; the ability to manage heritage sites in this area varies considerably. Properties on state lands may enjoy the full protection of preservation laws, while cultural heritage protection on privately owned lands is generally negligible given the strong influence of private property rights in the American legal tradition. In addition to its 50 states and several territories, the United States is home to 565 federally recognized Indian tribes as well as numerous other tribes recognized at the state level and a host of ethnic and minority populations, all of which have a stake in cultural heritage preservation.

Key Issues/Current Debates/Future Directions/Examples

The preservation movement in the United States began in the nineteenth century when groups of private individuals initiated efforts to preserve buildings and sites associated with important personages in the nation's early history (e.g., George Washington's Mount Vernon Estate and Andrew Jackson's Hermitage). Patriotism and moral instruction were the chief motivating factors driving preservation until the twentieth century, when aesthetic interests relating to the preservation of buildings, furniture, and other cultural objects assumed prominence (Murtaugh 2006: 11–23). Little attention as yet was paid to archaeological sites, but historic houses, house museums, historic villages (e.g., Colonial Williamsburg in Virginia and Greenfield Village in Dearborn, Michigan), and historic battlefields (often originally acquired by the military for instructional purposes) were common by the middle of the twentieth century. In 1949, the congressionally chartered National Trust for Historic Preservation was created to promote preservation of nationally significant "sites, buildings, objects, and antiquities" and to facilitate public participation in the same (Murtaugh 2006: 172). The National Trust is a private, nonprofit organization that owns a small group of historic properties and continues to serve as a focal point for education, advocacy, and information about preservation in the United States.

The federal government's role in cultural heritage preservation began haltingly in the late nineteenth/early twentieth century but has grown steadily in importance and influence since that time. Today federal involvement dominates the preservation field in terms of legislation, policy, and funding. In 1892, the ruin of a deteriorating prehistoric pueblo at Casa Grande, New Mexico, was rescued by a presidential executive order following a lobbying campaign led by concerned citizens (McGimsey and Davis 1984: 116–117). Later, a 6-year advocacy effort by scientific and archaeological organizations to deter rampant commercial exploitation and vandalism of other prehistoric sites in the American Southwest resulted in passage of the first federal preservation legislation, the Antiquities Act of 1906 (Harmon et al. 2006). The Antiquities Act outlawed unauthorized excavation, damage, or removals from archaeological and historical sites, monuments, and objects on federal lands and authorized the president to preserve sites, structures, and objects of archaeological and scientific interest by declaring them national monuments. Cultural and natural sites were steadily reserved as national monuments and parks in the years following passage of the Antiquities Act. In 1916, this activity received additional stimulus by the creation of the National Park Service, which assumed responsibility for management of the national parks. Today the National Park Service manages almost 400 national parks in 50 states, comprising 84,000,000 acres of land containing more than 68,000 archaeological sites and 27,000 historic structures (National Park Service n.d.).

Preservation of cultural heritage became the official policy of the United States in the 1935 Historic Sites Act, which declared that "it is a national policy to preserve for public use historic sites, buildings and objects of national significance for the inspiration and benefit of the people of the United States" (quoted in Murtaugh 2006: 172). This often-overlooked law is significant for the way for its encouragement of public-private partnerships dedicated to preserving cultural heritage; in that sense, it foreshadows some of the provisions of the later National Historic Preservation Act of 1966, which adopt a similar approach. The Historic Sites Act encouraged the collection of data regarding heritage sites, including "a survey of historic and archaeologic sites, buildings, and objects," regardless of whether the sites were publicly or privately owned. The Secretary of the Interior was also empowered to make cooperative agreements – again, with both public and private entities – to protect cultural heritage of significance to the nation and to acquire, restore, and operate the same. The Historic Sites Act became the basis for the creation of the National Historic Landmarks program (McGimsey and Davis 1984: 118; Murtaugh 2006: 43–44).

The federal government's ability to manage archaeological heritage was greatly strengthened

by the passage of the Archaeological Resources Protection Act (ARPA) in 1979. This law makes the excavation of archaeological sites on federal and Indian lands without a permit illegal; establishes criminal penalties for looting, vandalism, and destruction of sites; and prohibits the sale, purchase, exchange, transport, export, and receipt of archaeological resources obtained illegally. The 1988 amendments to ARPA require federal agencies to survey their lands for archaeological resources and to promote public awareness of the importance of heritage preservation. During the 1990s, a series of high-profile prosecutions and legal cases confirmed ARPA's status as an effective anti-looting tool, applicable in certain situations even to activities on private land (Hutt et al. 1999: 188–232).

Management of cultural heritage on both public and private lands received a dramatic boost with the passage of the National Historic Preservation Act (NHPA) of 1966. Later amendments, executive orders, and regulations, as well as complementary environmental legislation, have turned the NHPA into an effective tool for protecting and managing historical sites, landscapes, and archaeological resources at not only the federal level but in the state, local, and private spheres as well. The NHPA established an inventory of significant cultural properties, called the National Register of Historic Places (King 2008: 87–107), and encouraged states to create State Historic Preservation Offices (SHPO) in order to develop plans for the identification and management of cultural resources, administer grant programs for local preservation projects, and review projects for compliance with federal law. The NHPA also created a federal agency called the Advisory Council on Historic Preservation to provide comment and advice on proposed federal actions affecting cultural heritage. The 1992 amendments to the NHPA allow federally recognized Indian tribes to develop Tribal Historic Preservation Offices to carry out the same preservation functions as the SHPO on the state level and created a research unit of the National Park Service called the National Center for Preservation Training and Technology.

One of the most significant features of the NHPA is its "Section 106" provision that requires federal agencies to "take into account" the effect of their actions on significant cultural sites (King 2008: 109–206). This requirement applies not only to direct actions by federal agencies (e.g., construction of a new road in a national forest) but also to federally assisted actions, many of which take place on, or affect, private property. For example, because proposed construction of an interstate natural gas pipeline requires a permit from the Federal Energy Regulatory Commission and is therefore a "federally assisted action," Section 106 of the NHPA would trigger surveys for archaeological sites and historic properties of the areas affected by the construction even if the "impact areas" were all located on private property. The approach adopted in Section 106 is noteworthy and perfectly suited to the US situation. First, it requires every federal agency, not a single authority (the United States, unlike many nations, has no ministry of culture), to assume responsibility for preservation. This diffusion of legal responsibilities for preservation makes sense because multiple federal agencies have direct control over cultural heritage on lands they manage. Overtime preservation planning has become an established, integrated component of US federal agency activities, and most US land-managing or land-developing agencies now have professional staffs including archaeologists, architectural historians, and preservation planners. Second, Section 106 requires preservation on affected private lands without challenging the traditional primacy of private property rights; it does this by imposing regulatory requirements for preservation to ensure that significant cultural heritage is not destroyed through the activities of federally funded or federally assisted projects carried out on private lands. Thus, the NHPA affords welcome, albeit limited, opportunities to identify and protect cultural heritage located on private property, where cultural heritage found on or beneath the soil generally belongs to the private landowner and is otherwise subject to little, if any, regulation.

The NHPA dramatically transformed the US system of cultural heritage management and is largely, though not solely, responsible for shaping

the modern discipline of cultural resource management in the country. It enhanced the responsibilities of the National Park Service beyond its park-management functions within the U.-S. Department of Interior to the point that the agency has become the premier preservation agency for the country. Home to the National Register of Historic Places, National Historic Landmark Program, Heritage Documentation Programs, and National Center of Preservation Technology and Training, the Park Service provides vital advice and consultation for the numerous federal agencies that have responsibilities for preservation and management under the NHPA, ARPA, and other legislation. The NHPA also is responsible for the creation of the Advisory Council on Historic Preservation, a federal agency, and for state and tribal preservation offices (SHPO, THPO). Today every state and territory has a SHPO; they serve as highly visible centers for the coordination of preservation efforts in their areas. Many states have enacted legislation to protect and manage cultural heritage on state lands or affected by state-funded or state-assisted projects, much as NHPA does on the federal level. There are also currently 118 THPOs performing heritage-related and compliance functions for Native American tribes in 28 states (National Association of Tribal Historic Preservation Officers n.d.).

By requiring review of projects for their effects on cultural sites, the NHPA also stimulated the emergence of a veritable cultural resource management industry that employs thousands of private consultants, entrepreneurs, and government specialists who are either involved in conducting archaeological and historic preservation studies or reviewing them in accordance with government laws and regulations (McManamon 2000). The growth of non-academic professional archaeology in particular was affected by this development; the new field of "contract archaeology" not only provided a welcome source of professional employment but also in turn influenced the more traditional, academic field of archaeology as new engagement with public and private stakeholders engendered a rethinking of professional ethics and practice, which has come to be known as "public archaeology."

For most of the twentieth century, federal legislation and policy equated cultural heritage protection with the national interest, that is, a unitary, shared public interest that all Americans might embrace. Two important laws late in the century reflect a more fragmented view of cultural heritage rights. First, the 1987 Abandoned Shipwreck Act removed abandoned shipwrecks in the 3-mile US territorial waters from the jurisdiction of federal admiralty courts, where they had been regularly seized by treasure hunters intent on mining them for commercial profit and assigned their title to the states. Unfortunately many of the states still have regressive laws that encourage commercial salvage of historic shipwrecks while imposing some level of archaeological oversight. The Abandoned Shipwreck Act also recognizes treasure hunters as valid stakeholders, in contrast to the situation on federal lands, where looters of archaeological sites are subject to criminal prosecution (Elia 2000: 46–47).

Second, the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 gives two groups – Native Americans and Native Hawaiians – special rights to recover and own affiliated cultural heritage (Hutt et al. 1999: 232–248; King 2008: 260–270). This law establishes a mechanism for the repatriation of certain human remains, funerary objects, sacred objects, and objects of cultural patrimony both from federal lands and from museums and other curatorial institutions. In addition to helping to redress historical inequities in the often-troubled relationship between these indigenous groups and mainstream Euro-American culture, NAGPRA also requires consultation among archaeologists, federal agencies, museums, and the native groups. This obligation to consult has proven to be one of the most salutary effects of NAGPRA and has helped to promote the active involvement of indigenous populations in the US preservation system as well as a greater understanding among the various stakeholders.

The federal government's role in cultural heritage management has been decisive domestically since the 1960s, as has the constructive

involvement of the states through their SHPOs and, to a lesser extent, the municipalities through encouragement of preservation through zoning and other local regulations. Even so, the importance of the private sector should not be overlooked. More historic buildings and house museums are certainly owned by private individuals and groups than by government, and the same is true for museums and other cultural attractions. Public ownership of archaeological sites is the only exception to this pattern, in the sense of recorded sites that have been brought under effective control for management purposes, although even in the case of archaeology some private organizations (e.g., the Archaeological Conservancy) are acquiring sites for the purpose of preservation.

At the international level, the United States has a mixed record of participation in conventions relating to cultural heritage. It signed the 1954 Hague *Convention for the Protection of Cultural Property in the Event of Armed Conflict* in 1954 but only ratified the treaty in 2009 after a difficult and controversial experience following the invasion of Iraq in 2003 that witnessed the looting of the Iraq Museum and the pillaging of numerous archaeological sites. The United States ratified the 1970 UNESCO cultural property convention in 1983 but has not ratified the 1995 UNIDROIT *Convention on Stolen or Illegally Exported Cultural Objects* and shows no signs of moving in that direction. It did ratify the 1972 World Heritage Convention and currently has eight cultural properties, twelve natural properties, and one mixed property listed on the convention, with several nominations pending. Finally, the United States has not taken steps to ratify either the 2001 UNESCO *Convention on the Protection of the Underwater Cultural Heritage* or the 2003 UNESCO *Convention for the Safeguarding of the Intangible Heritage*.

In sum, the US system of cultural heritage management is a thriving, dynamic, and imperfect enterprise involving specialists, entrepreneurs, government and private actors, and a host of interested parties working to protect and preserve historic buildings, landscapes, districts, archaeological sites, national landmarks, national heritage areas, and cultural objects. Although serious problems continue to affect the field, including the challenge of protecting cultural heritage on private property, chronic underfunding for heritage projects, and periodic legal challenges to preservation legislation, cultural heritage management is a well-established fact of American life and public awareness of the value of preservation is at an all-time high.

Cross-References

- ▶ Cultural Heritage Management and Armed Conflict
- ▶ International Conventions Pertaining to Heritage Policy: Introduction

References

Elia, R.J. 2000. US protection of underwater cultural heritage beyond the territorial sea: Problems and prospects. *International Journal of Nautical Archaeology* 29 (1): 43–56.

Harmon, D., F.P. McManamon, and D.T. Pitcaithley, eds. 2006. *The Antiquities Act: A century of American archaeology, historic preservation, and nature conservation*. Tucson: University of Arizona Press.

Hutt, S., C.M. Blanco, and O. Varmer, eds. 1999. *Heritage resources law: Protecting the archeological and cultural environment*. New York: Wiley.

King, T.F. 2008. *Cultural resource laws and practice*. 3rd ed. Lanham: AltaMira Press.

McGimsey, C.I.I.I., and H.A. Davis. 1984. United States of America. In *Approaches to the archaeological heritage: A comparative study of world cultural resource management systems*, ed. H. Cleere. Cambridge: Cambridge University Press.

McManamon, F.P. 2000. The protection of archaeological resources in the United States: Reconciling preservation with contemporary society. In *Cultural resource management in contemporary society: Perspectives on managing and presenting the past*, ed. F.-P. McManamon and A. Hatton, 40–54. London: Routledge.

Murtaugh, W.J. 2006. *Keeping time: The history and theory of preservation in America.* Hoboken: Wiley.

National Association of Tribal Historic Preservation Officers. n.d. Available at: www.nathpo.org/map.html. Accessed 15 Nov 2011.

National Park Service. n.d. Available at: http://www.nps.gov/aboutus/index.htm. Accessed 15 Nov 2011.

Further Reading

Hutt, S., E.W. Jones, and M.E. McCallister. 1992. *Archeological resource protection*. Washington, DC: The Preservation Press.

Neumann, T.W., and R.M. Sanford. 2001. *Cultural resources archaeology: An introduction*. Walnut Creek: AltaMira Press.

United States: Cultural Heritage Management Education

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Introduction

Since the Society for American Archaeology issued its turn-of-the-century call for a renewed vision for archaeology education (Bender and Smith 2000), a profound change has taken root in this endeavor. Contributors to the 2000 SAA volume noted that the conceptual structure of archaeology's curricula had changed little since the mid-twentieth century, despite significant advances in method, theory, data accumulation, and the contexts in which archaeological research was conducted. Major advances in scientific data acquisition techniques, analytical methods, and theoretical modeling had kept academic archaeologists' vision of the discipline centered on its historiographic research aspects, yet at the same time the introduction of historic preservation law in the USA introduced a specifically public context for the discipline's practice. In 2000, the call was for those who teach archaeology to acknowledge its public dimensions and begin to train students to understand and function effectively in the latter contexts as well as in traditional research dimensions. Those scholars who adjured their colleagues to take heed of the need for such revision emphasized the notion that archaeological practice extended beyond pure research, but they still conceptualized the archaeological record traditionally: as a finite, material resource to be understood through the methods of science.

In response to those early efforts, which were heavily influenced by the contemporary articulation of the Society for American Archaeology's standards for archaeological ethics (Lynott and Wylie 2000), a new paradigm for archaeological education began to emerge through such initiatives as the MATRIX project (http://www.indiana.edu/~arch/saa/matrix/homepage.html). The conversations engendered by this work encouraged archaeologists to explore the many public dimensions of archaeological practice and their consequences for archaeology curricula. Soon traditional concepts such as "The Past" and its material manifestations, "Archaeological Resources," became subsumed in the more broadly conceived and socially contextualized concept of "Heritage," broadly defined as "the full range of inherited traditions, monuments, objects, and living environments, and [extending to] the range of contemporary activities, meanings, and behaviours that are drawn from them" (Chilton and Mason 2010). As this conversation unfolded, notions of the archaeological practices of historic preservation and cultural resource management became more broadly situated in the attendant domains of heritage studies or heritage management.

Definition

In all their manifestations, heritage studies programs are highly interdisciplinary and require that students develop an understanding of archaeology practice as it is inflected by the theoretical and methodological perspectives of such disciplines as history, sociology, sociocultural anthropology, architecture, environmental biology, communications, historic preservation, literature, and urban and rural planning. Under this rubric, students of archaeology develop a concept of a past that is recorded not only through tangible heritage, commonly thought of as archaeological resources, but also through the intangible, defined as "The

practices, representations, expressions, knowledge, skills. . .that communities, groups, and in some cases, individuals recognize as part of their cultural heritage" (Ahmad 2006: 298). Managing a heritage thus defined not only requires knowledge and skills developed through scientific approaches to the past but also those rooted in the humanities.

Heritage studies and management programs are also focused on archaeological practice, as were their predecessors, cultural resource management programs, and, like their predecessors, heritage programs regularly emphasize the applied dimensions of their courses of study – specifically, teaching students to become effective professionals in heritage planning and management (cf. University of Maryland, Graduate Studies; University of Massachusetts, Center for Heritage Studies; Texas Tech University, Heritage Management Program). Beyond this shared concern with professional practice, Heritage Studies and Management programs differ markedly from their forebears in their notions of what is entailed in such practice. Programs moving to a heritage focus are generally heavily centered on developing expertise in arenas originally mapped out by British and European scholars, including such elements as developing an understanding of the effects of collective memory on historical narratives and learning how to engage processes that can articulate the many meanings and values associated with the material fabric of the past (e.g., Lowenthal 1985; Stone and Molyneaux 1994; Stone and Planel 1999; and Zerubavel 1996). Students in programs with a heritage focus are encouraged to think critically about how best to administer and conserve heritage and landscape in lieu of resources and sites.

Formal degrees awarded through Heritage Studies and Management programs are usually confined to the master's, although a few also offer a doctoral program. In the latter instance, the emphasis on practice is coupled with an emphasis on original research (cf. University of Maryland, Graduate Studies; Indiana University, Center for Archaeology in the Public Interest).

Key Issues

Heritage Studies and Management programs are a relatively new phenomenon in United States academic institutions. The first programs to use this nomenclature emerged at the turn of the twenty-first century, and a number are currently under development or recently announced. This nascent status brings with it several challenges as well opportunities.

The challenges to these programs center on the definition of heritage studies academic structure and, in particular, the role of archaeology within such a highly interdisciplinary undertaking. The student who is interested in pursuing a heritage studies program has to search under many different program umbrellas to find the desired course of study. Some programs reside in independent centers (e.g., University of Massachusetts, Center for Heritage and Society; Montclair State University, Center for Heritage and Archaeological Studies; Texas Tech University, Center for Advanced Study of Museum Science and Heritage Management), although only the latter offers a degree program. Others are imbedded in historic preservation programs (e.g., University of Pennsylvania; University of Florida; Georgia State University), while still others are offered as specialized tracks – frequently applied – within anthropology programs (e.g., Indiana University; University of Maryland; University of Minnesota). In keeping with this variety of disciplinary homes, there is only minimal agreement among proscribed curricula, beyond the requirement of practical training in the form of an internship, practicum, or fieldwork. Method requirements range widely from standard archaeological and/or archival methods through qualitative and quantitative methods to innovative video and digital applications. Only a few core courses in heritage studies or heritage management can be found listed within these programs, and at least some seem to be only marginally altered from earlier historic preservation or cultural resource management programs. It is to be hoped that academic institutions in the United States might

move toward a greater uniformity in the institutional placement of heritage studies. Such alignment might go far toward resolving the issues surrounding heritage studies curricula.

Since the theoretical underpinnings of heritage studies rest as much in history and sociology as in anthropology, the relationship between heritage studies and traditional archaeological curricula is particularly unclear. The most interdisciplinary of the Heritage Studies and Management programs decenter the study of archaeology and include it as yet another, sometimes optional, component in the course of study. Such programs emphasize the social dialogue around the interpretation, preservation, and administration of heritage and seek to make archaeological concerns a component in a set of overlapping and equally legitimate perspectives on the academic and social dimensions of heritage. In contrast, programs that imbed heritage management in anthropology curricula tend to proscribe programs of study that emphasize the links between archaeology and sociocultural anthropology through required courses in field and analytical methods, theory, and in some cases ethics. Where the Heritage Management Program is offered as a degree in applied anthropology, the course of study often mimics earlier cultural resource management programs with its emphasis on gaining professional archaeological skill sets – including working knowledge of the preservation law that surrounds archaeological practice. Indeed, as heritage management programs continue to replace cultural resource programs in the academy, it will be critical to resolve the issue of how to integrate a robust study of core heritage theory and practice with traditional training in archaeological practice. Here a key question is "how much can traditional archaeological training be attenuated to allow for training in allied disciplines that claim the past as their subject of inquiry, as well?" Clarity around the differences between cultural resource and heritage management study is essential, along with a definition of the knowledge and skills that a heritage manager with archaeological expertise should possess. The resolution of these issues might then inform the development of Heritage Management Programs, many of which have been inaugurated without benefit of such clarity.

The opportunities presented by the new Heritage Programs are, at the same time, striking. As students in these programs develop the knowledge and skills involved with practicing archaeology in a broad sociocultural and academic context, professional archaeologists will become engaged in a multivocal conversation about the meanings of the past and the most effective ways of preserving and interpreting it – especially in the service of larger social programs that may seek to develop national or local identities or economic opportunity through heritage tourism. Such a dialogue will inevitably require that archaeologists articulate the meaning and importance of the discipline to a broad and diverse audience. Successful engagement in this exchange should strengthen disciplinary practice as well as recruitment of a diverse group of young professionals. Moreover, since the conversation about heritage is at its foundation international (Ahmad 2006), US archaeologists will need to reflect on their practice in a broader arena, one that includes indigenous voices as well as professional perspectives from around the world and that demands reference to the ethical parameters of studying the past. The professional self reflection required by such developments can only lead to an engaged practice with wider credibility and viability in the United States.

Cross-References

- ▶ Australia: Cultural Heritage Management Education
- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Brazil: Cultural Heritage Management Education
- ▶ Canada: Cultural Heritage Management Education
- ▶ China: Cultural Heritage Management Education
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in the Digital Age
- ▶ Ethics in Archaeology
- ▶ Heritage and Archaeology

▶ Heritage and Higher Education
▶ Heritage Theory
▶ Heritage Values, Communication of
▶ Intangible Cultural Heritage
▶ Japan: Cultural Heritage Management Education
▶ Peru: Cultural Heritage Management and Education
▶ Society for American Archaeology (SAA): Committee on Ethics
▶ United Kingdom: Cultural Heritage Management Education

References

Ahmad, Y. 2006. The scope and definitions of heritage: From tangible to intangible. *International Journal of Heritage Studies* 12: 292–300.

Bender, S.J., and G.S. Smith, eds. 2000. *Teaching archaeology in the twenty-first century*. Washington, DC: Society for American Archaeology.

Chilton, E., and R. Mason. 2010. *Social science of the past*. National Science Foundation White Paper. Available at: http://www.nsf.gov/sbe/sbe_2020/all.cfm

Georgia State University, Historic Preservation. n.d. Available at: http://www2.gsu.edu/~wwwher/index.html. Accessed 14 Sept 2011.

Indiana University, Center for Archaeology in the Public Interest. n.d. Available at: http://www.indiana.edu/~capi/. Accessed 9 Sept 2011.

Lowenthal, D. 1985. *The past is a foreign country*. Cambridge: Cambridge University Press.

Lynott, M. J., and A. Wylie, eds. 2000. *Ethics in American archaeology*. 2nd rev. ed. Washington, DC: Society for American Archaeology.

M.A.T.R.I.X. n.d. Available at: http://www.indiana.edu/~arch/saa/matrix/homepage.html. Accessed 21 Sept 2011.

Stone, P.G., and B.L. Molyneaux. 1994. *The presented past: Heritage, museums and education*. London: Routledge.

Stone, P.G., and Ph.G. Planel. 1999. *The constructed past: Experimental archaeology, education and the public*. London: Routledge.

Texas Tech University, Heritage Management Program. 2011. Available at: http://www.depts.ttu.edu/museumttu/hmpdegSum.html. Accessed 9 Sept 2011.

University of Florida, Historic Preservation. n.d. Available at: http://www.dcp.ufl.edu/historic-preservation. Accessed 14 Sept 2011.

University of Maryland, Graduate Studies. n.d. Available at: http://www.bsos.umd.edu/anth/Programs/Graduate/index.html#introphil. Accessed 9 Sept 2011.

University of Massachusetts, Center for Heritage Studies. n.d. Available at: http://www.umass.edu/chs/about/ourgoals.html. Accessed 9 Sept 2011.

University of Minnesota, Anthropology. n.d. Available at: http://anthropology.umn.edu/graduate/ma.html. Accessed 14 Sept 2011.

University of Pennsylvania, Historic Preservation. n.d. Available at: http://www.design.upenn.edu/historic-preservation. Accessed 14 Sept 2011.

Zerubavel, E. 1996. Social memories: Steps to sociology of the past. *Qualitative Sociology* 19: 283–299.

Urals: Paleolithic

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Introduction

The Ural Mountains, forming a natural physiographic boundary between Europe and Asia, was a key loci of the Paleolithic and Mesolithic occupation. The mountain regions with the adjoining areas of the East European Plains and the West Siberian Lowland have principal significance for documenting the processes and natural contexts of the Pleistocene human expansion from the SE parts of the European continent into West Siberia and the northern Russian Arctic. Past climate change and the regional topographic modeling by orogenesis and the Pleistocene glaciations, reflected by the marked environmental transformations of past landscapes and biota, attest to the complexity of the Urals' Quaternary development ultimately determining timing and the extent of the earliest hominid inhabitation of this territory. The initial peopling of the western (Fore-Ural) area is linked to the Paleolithic dispersal into the marginal East European Plain probably during the climatically favorable Middle Pleistocene interglacials. The southern and central river valleys, transecting the mountain ranges, were the main geographic corridors of the later (Middle and Upper Paleolithic) migrations into the eastern (Trans-Ural) regions of

West Siberia. A progressing evolution during the Late Pleistocene reflected a behavioral adjustment resulting in formation of specific regional cultural complexes in the mountain areas and the foothills based on exploitation of reindeer and the "mammoth fauna" in the northern periglacial tundra-steppe, respectively. Geoarchaeology records from diverse settings provide insights into the timing and ecology conditions of the Pleistocene colonization of the north-central Eurasia and evidence on the trajectories of the Quaternary environmental development in the broader Urals.

Definition

The Urals and the adjoining regions of the East European Plain (*Priuralye* – the Fore-Urals) and the West Siberian Lowland (*Zauralye* – the Trans-Urals) (Fig. 1) are of a major relevance for the Paleolithic studies in respect to the particular geographical location along the border zone between Europe and North Asia. Except for documenting the cultural development and adaptation strategies in the context of Pleistocene climate and environmental change, the broader territory of the Urals has a principal bearing for mapping timing and natural conditions of the initial human migrations into the subpolar and polar regions of Eurasia. The paleoenvironmental proxy data related to early peopling of this territory originate from the river-eroded subaerial deposits (loess-paleosol sections) in the Kama Basin, the karstic cave sites in the Chusovaya River valley transecting SE-NW the Central Urals, and from genetically diverse (aeolian, colluvial, and alluvial) Quaternary formations along the eastern slopes of the Ural mountain range and the valleys draining the western margin of the West Siberian Plain. The broad variety of the cultural data provides witness to several stages of early inhabitation of the Ural region ecosystems, likely encompassing a time span over 0.5 Ma. The earliest (Middle Pleistocene) finds are represented by the typical "pebble tool"

Urals: Paleolithic, Fig. 1 A geographic map of the Urals with the main continental drainages of the Fore-Urals (the Kama and the Pechora Basins) and the Trans-Urals (the Ob River Basin). The principal Paleolithic research relates to the southern, central, and the NW region of the Ural territory

industries, followed by the Middle Paleolithic traditions including the Levallois prepared-core stone-flaking technology, and the Upper/Final Paleolithic blade complexes eventually replaced by a variety of the Mesolithic cultural facies illustrating the major regional ecological shifts during the Pleistocene/Holocene transition (12,000–10,000 years ago) of the Ural region ecosystems. The Ural is also World-known for the Paleolithic cave art (Kotov 2009).

At present, there are several hundred of Pleistocene sites mapped over the investigated Ural territory. The long-term interdisciplinary research focus is on geology and paleoecology contexts of single localities, taphonomy, and chronostratigraphy. Apart of the spatially confined cultural locations, especially the large-scale fluvial erosions cutting the loess plateau of the Fore-Urals (the Upper Kama Basin) and the floodplain deposits of the Trans-Ural river valleys provide a major source of paleontological and paleobotanic records in the framework of the Pleistocene regional climate change reconstructions. Evolutionary pathways and processes in natural environments, the specific behavioral Paleolithic adaptation patterns and material-technological conditions, as well as documentation of sequenced climatic events stored in the geological records are the principal objectives of the current multidisciplinary Quaternary geology, paleoecology, and geoarchaeology studies.

Historical Background

Natural transformations in the Urals and the adjacent foothill/plain areas are evidenced by the stratified geological, biotic (floral and faunal), as well as rich early cultural records. Interactions of the Quaternary climatic variations with the regional topographic modeling by the northern Arctic glaciations and the interglacial transgressions, the Pleistocene neotectonics triggering landscape erosion, and stages of surface stability with pedogenic weathering indicate the complex environmental development of the Ural area. The continental orogenic activity in conjunction with the glacial dynamics and fluvial erosion shaped the regional relief. During the cold Pleistocene periods, the vast extra-glacial areas of the adjoining West Siberian Lowland south of the Arctic ice sheet were periodically transformed into large periglacial zones – major sedimentation catchment areas of aeolian as well as glaciofluvial and lacustrine deposits transported from the continental NE European and NW Siberian Arctic ice-margin ablation surfaces. The cyclic nature of the glacial and interglacial periods led to a restructuring of the past landscapes and generation of specific ecosystems adjusted to particular topographic settings and responding to ongoing climatic variations, contributing to formation of biotically productive river valleys particularly along the Ural foothills.

The paleoenvironmental transformations promoted the western and northern geographic expansion of early humans into the subpolar regions of central Eurasia as well as the progressive cultural adaptation to extreme natural conditions. The mapped occupation sites in the Polar Urals and North Siberia (Mochanov and Fedoseeva 2002; Svendsen and Pavlov 2003; Pitulko et al. 2004) provide proof that people reached the (sub-) Arctic including the northernmost coastal areas already well before the Last Glacial (>24,000 years ago), likely >40,000 years ago (Svendsen et al. 2010; Pitulko et al. 2016, 2017). All these discoveries lead to revision of the traditional perceptions on a late peopling of northern Asia as well as the obsolete "postglacial" chronology models of the initial human migrations across the exposed landbridge of the Pleistocene Beringia into the North American continent (Chlachula 1996, 2003). Geoarchaeology studies, particularly in the poorly explored geographic regions – the Polar Urals and the NW West Siberia – are of utmost importance for reconstruction of Quaternary climate change as well as the early human prehistory in north Eurasia. The present status of the geo- and environmental archaeology research in some of the marginally mapped geographical areas of the Northern Urals reflects a limited accessibility of these territories, visibility, and/or the preservation potential of the Paleolithic records comparing to the better-investigated central and especially the Southern Ural regions.

Key Issues/Current Debates

The Urals with the bordering plains of Eastern Europe and West Siberia are of key importance for multidisciplinary Quaternary investigations focusing on the initial peopling of north-central Eurasia because of the strategic geographical position of this mountain chain, forming the natural borderline between Europe and Asia. Apart from mapping the Pleistocene and Holocene climate evolution and the associated landscape ecology transformations, the territory of the Urals has a major relevance for reconstruction of the time intervals of dispersal of the Pleistocene hominids/early humans into the high latitudes of Eurasia and documentation of cultural adaptation strategies to past climate variations. The current scientific debates primarily focus on the regional chronologies' improvement and interpretations of Paleolithic environmental adaptation strategies.

Natural Context, Paleogeography, and Climate History

The Ural Mountains extend as a major geographic landmark between Europe and Asia for over 2,000 km from the Arctic coast to the arid steppes of western Kazakhstan (Fig. 1). The five physiogeographic zones, connecting the Southern Urals with the Northern, Subpolar, and Polar Urals, are characterized by a marked latitudinal vegetation zonation with polar tundra-forest, taiga, and open steppe being the dominant biotopes. Most of the regional relief (700–1,895 m asl.) is transected by mountain valleys with the E-W oriented fluvial drainage following the continental topographic gradient (Fig. 2). The adjoining geographical area in the West (Fore-Urals) includes the loess plateaus of the Upper Kama and Pechora River Basins. The eastern (Trans-Urals) area is delimited by the Tobol and Ob River Basins with the tributary valleys (Severnaya Sosva, Sosva, Tura, Tagil, Neiva, Pyshma) cutting the foothills. Small hills (300–400 m asl.) between shallow river valleys, lakes, and bogs extend further east into the West Siberian Lowland. The present climate over the Ural Mountains is controlled by the NW Atlantic atmospheric circulation. The soil cover is characterized by well-developed parkland-steppe chernozems, mixed/coniferous taiga forest brunisols/gleysols, and forest-tundra regosols. The topographically and biotically diverse territory attests to a complex paleogeography and paleoecology history reflecting large-scale regional landscape restructurings affected by the Cenozoic orogenesis, periodic sea transgressions and regressions, and the Arctic and mountain glaciations (Velichko 1993; Astakhov 1997, 2001; Mangerud et al. 2002). The Fore- and Trans-Ural plains constitute a continuation of the Eurasian loess

Urals: Paleolithic, Fig. 2 The Urals, modeled by tectonics and Pleistocene glaciations, create a natural boundary between Europe and North Asia. View of the eastern slopes of the subpolar Ural Mountains / the northern Transurals descending into the West Siberian Lowland (the lower Ob Riber basin) with alpine tundra vegetation. The Khanti-Mansiysk Autonomous Region.

belt connecting the European and Siberian loess regions. The regional Quaternary stratigraphy is based on geological, paleontological, biostratigraphic, and paleomagnetic records of the continental basin transgressions and regressions and stages of loess deposition.

The pre-Quaternary (Miocene-Pliocene) history of the Urals is connected with the formation of the initial hydrological systems in the Fore-Urals (the Pechora, the Volga-Kama, and the Caspian Basins) as well as the Trans-Urals (the Irtysh-Ob Basin) triggered by the contact orogenesis of the Eurasian Plate in conjunction with long-term climate variations. During warm climatic stages, the continental basins were filled by seashore marine, fluvial, and lake deposits superimposed by periglacial alluvial formations (Yakhimovich et al. 1987; Stefanovskiy 2006). The Early Pleistocene interglacial biotic records document a forest-steppe habitat with arboreal taxa absent in the area today (*Fagus*, *Acer*, *Fraxinus*, *Ulmus*, *Tilia*, *Castanea*) and brackish settings inhabited by large faunal species such as *Archidiskodon meridionalis*, *Hipparion* sp., and *Coelodonta* sp. Climatic cooling at the end of the Early Pleistocene (740 ka BP/thousands of years ago) is manifested by glacial deposits distributed in the Pechora and the Upper Kama Basins, with the continental coastline expansion due to the regressions of the Caspian Sea and the Arctic Ocean.

The reactivated tectonics at the beginning of the Middle Pleistocene in the Urals-Caucasus area accelerated a restructuring of the former regional drainage systems. Increased aridity put up to an intensified weathering in the mountain areas. A reduced riverine activity in the adjacent West Siberian Lowland contributed to genesis of closed-lake and boggy basins. Floral and faunal communities indicate dry steppe environments replacing the former Mediterranean-type woodlands with *Pterocarya fraxinifolia*, *Rhododendron* sp., *Taxus baccata*, and *Castanea sativa* (Stefanovskiy 2006). The new hydrological network of the Tobol (MIS 9) Interglacial (390–270 ka BP) corresponds to the 60 m terrace with the Tiraspol Fauna Complex including herbivorous megafauna (*Paleoloxodont* sp., *Mammuthus primigenius* Blum., *Bison priscus gigas*, *Alces alces*, *Megaloceros giganteus*, *Cervus elaphus*, *Equus hemionus*, *Equus caballus*, *Camelus* sp., and *Ovis ammon* sp.) indicative of warm semiarid parklands. The following Samarovo (MIS 8) Glacial (270–244 ka BP) correlates with the maximum expansion of the Arctic ice blocking the northern Ob/Irtysh River drainage of the West Siberian glacial waters diverted south into the Aral-Caspian Basin. Temperate parklands characterized the following Shirta (MIS 7) Interglacial (244–170 ka BP). A geographic recession of ice masses is assumed for the Tazov (MIS 6) Glacial (170–130 ka BP) with mountain glaciers confined to the Northern and Polar Urals. The late Middle Pleistocene in the south-central basins is associated with fossil fauna of the Khozarian Complex (*Mammuthus primigenius*, *Coelodonta antiquitatis*, *Bison priscus longicornis*, *Megaloceros giganteus*, and *Equus caballus chosaricus*) found in alluvial formations indicative of moderately cold environments. A final Middle Pleistocene neotectonic stage accentuated the regional geomorphological relief restructuring due to continuing uplifts of the Central and Southern Ural mountain ranges.

A reduced regional topographic differentiation during the early Late Pleistocene is associated with planation processes in the Trans-Ural area and the Last Interglacial (MIS 5e, 130–120 ka BP) transgression. The Ural foothills were covered by a mixed spruce and pine-dominated taiga; open parklands occupied the lowlands hosting the "Mammoth Fauna Complex" (Bolikhovskaya and Molodkov 2006). The regional stratigraphy and glacial geomorphology reflect reducing geographical limits of the continental ice masses during the early/Zyriansk (MIS 4) and the late/Sartan (MIS 2) Last Glacial stages. Large ice-dammed lake between the northern Arctic ice sheet and the southern continental water divides inundated most of the West Siberian Lowland during the early Last Glacial (c. 80–60 ka BP). Moraines in the Pechora Basin on the NE European Plains point to the expanding Arctic glaciations from the Kara – Barents Sea ice lobes presumably reaching their maximum Late Pleistocene extent similarly as in West Siberia (Astakhov 1997,

2001). Dynamic climatic fluctuations during the second half of the glacial stage caused a gradual recession of the continental ice limits in the Northern Urals and activation of intensive periglacial gravity-slope processes contributing to massive accumulations of polygenic colluvia in the Trans-Ural foothills. Deposition of up to 20 m of loess sediments on the Fore-Ural plateaus, overlying periglacial alluvia of the Upper Kama, reflects the prevailing dry and cold climatic conditions within the Late Pleistocene periglacial tundra-steppe.

The subsequent mid-Last Glacial (MIS 3) interstadial (59–24 ka BP) correlates with global warming that promoted expansion of the spruce- and pine-dominated taiga. The new glacial advance during the late Last Glacial/Sartan stage (MIS 2), confined to the Polar and Northern Urals with localized ice caps, led to the formation of tundra-steppe and tundra-forests in the southern lowland and the mountain areas, respectively (Velichko 1993). The geographic distribution of glacial landforms and glacigenic deposits provides evidence of the Arctic ice expanding from the Kara Sea Basin along the western slopes of the Urals and possibly merging with some mountain piedmont glaciers (Mangerud et al. 2002, 2008). The eastern slopes of the Urals likely hosted an ice-free environment in view to an increased regional atmospheric aridity. Accelerated loess accumulation in the Fore-Ural area marks the onset of the full Last Glacial conditions with incorporating remains of large Pleistocene animals (*Mammuthus primigenius*, *Coelodonta antiquitatis*, *Equus* sp., *Bison priscus*) and small species typical of periglacial tundra-steppe (Yakhimovich et al. 1987). Fluvial formations on both sides of the Urals illustrate rich Late Pleistocene ecosystems with faunal communities of periglacial tundra-steppe (mammoth, woolly rhinoceros, horse, bison, reindeer, elk, saiga) with smaller open-steppe and semidesert taxa such as wolf, fox, hare, marmot, as well as rodents and other mammals indicative of mixed polar tundra-steppe biotopes. Permafrost limits at the end of the Pleistocene (the Allerød Warming) were still located at 55°N in the Trans-Urals/West Siberia (Velichko et al. 2002). Precipitation values during the late Last Glacial and the early Holocene (15–10 ka BP) amounted to c. 60–65% on the East European Plains and 80% in West Siberia comparing to the present-day values. The modern geographic distribution of particular biotopes in the broader territory of the Urals reflects the Holocene climate development.

Pleistocene Environments and Early Human Occupation

Interaction of the Pleistocene climatic variations with the regional relief modeling by the northern Arctic glaciations, interglacial sea transgressions, and stages of river erosion and sediment weathering attest to the complexity of the Quaternary history of the broader Ural area. During most of the Pleistocene, the North and Central Trans-Urals, sloping east from the central mountain range, were ice free. The bordering foothills and plains of West Siberia constituted parts of the periglacial super zone (Arkhipov 1999) and the place of mass accumulation of aeolian deposits transported from the ablation zone of the NE European-West Siberian ice sheets. The geographic and topographic configuration of the Urals, forming a natural gateway for the early human infiltration further east into the vast parklands and forest lowlands of Western Siberia, predisposed a long occupation history. The initial human inhabitation of the Ural territory, presumably from the northern Caucasus region and East European Plain, was a complex process governed by changing paleoecology conditions in response to the Pleistocene climate variations. Warm Middle Pleistocene interglacial conditions providing rich biotic resources of forest-parklands undoubtedly facilitated early human migrations further north and east along the Ural range via the major river systems (Volga, Kama, Pechora) draining the East European Plains. Mixed coniferous and broad-leaved forests with pine, birch, lime, elm, and beech formed a mosaic vegetation cover during the late Middle Pleistocene (MIS 9 and MIS 7) interglacials.

Presently the oldest-recorded (the Lower and Middle Paleolithic) sites are exposed along the Kama River banks along the western Ural foothills due to erosion of subaerial sediments

overlying relics of the Middle Pleistocene (35–60 m) fluvial terraces. The cultural material is represented by archaic core-and-flake stone industries (cores, retouched flakes, scrapers, and other tools) produced on cobbles from the gravelly alluvia (Fig. 3a). Fragmented animal bones with anthropogenic working and use attributes (flaking, splitting, retouching) indicate productive riverine valley occupation habitats and complex behavioral activities (Fig. 3b). The formal technological uniformity of these finds and their patterned geological contexts indicate a gradual and intensified peopling across the midlatitudes of Eurasia prior to the Last Interglacial (>130 ka BP) (Matyushin 1994; Chlachula 2010, 2017). Periglacial subarctic tundra-steppe and forest-tundra expanded during the late Middle Pleistocene (MIS 8 and MIS 6) glacial stages in the northeastern part of Europe (the Pechora Urals)

Urals: Paleolithic, Fig. 3 Illinsk Site (the Upper Kama Basin): (**a**) Stone tools from the Middle Pleistocene alluvia buried by 10 m of loess deposits. (**b**) Humanly flaked bones of fossil fauna (mammoth, woolly rhinoceros, Cervidae) found in association with the Paleolithic industry provide evidence of favorable interglacial natural environments in the parkland zone of the central Fore-Urals

over most of the extra-glacial territories hosting periglacial fauna (*Mammuthus primigenius*, *Coelodonta antiquitatis* Blum., *Rangifer tarandus*, *Bison* sp.). These prominent cold periods brought presumably a significant reduction of the former early human occupation areas.

The major climatic warming at the beginning of the Last Interglacial/MIS 5 (130 ka), recorded in the loess-paleosol sections from the East European Plain to southern Siberia, caused inundations and ground saturation of the formerly glaciated areas and thus temporarily impeded free movements of early humans. Increased continentality and MAT led to expansion of parkland steppe facilitating new migrations of the Middle Paleolithic (Neanderthal/early *Homo sapiens*) people (Fig. 4). High summer temperature (increased by c. 4–5 °C in respect to present values) and mean annual precipitation (by c. 100 mm) contributed to the northward distribution of southern taiga along both sides of the Urals by 500–700 km beyond the present limits (Velichko 1993). Pine-spruce-birch forests with oak, hornbeam, lime, hazel, and elm characterized the prevailing warm interglacial mosaic vegetation (MIS 5e, MIS 5c). Recession of human occupation is linked with the onset of the early Last Glacial stage (MIS 4, 74–59 ka BP) reducing the formerly inhabited areas of the periglacial steppe zone around the Southern Urals and repeatedly during the late Last Glacial stage (MIS 2, 24–12 ka BP). The most intensive late Middle/early Upper Paleolithic geographic expansion occurred during the mid-Last Glacial interstadial interval (MIS 3, 59–24 ka BP) reaching the northernmost regions of the Urals and the adjacent territories of Northern Europe and NW Siberia (Pavlov 1996; Pavlov et al. 2001). The progressive biological and cultural adaptation enabled to retain the new lands prior and shortly after the LGM. The Central Urals forming the free geographic passage connecting the East European Plain with the vast West Siberian territories most likely played a key role in this historical evolutionary process.

The Upper Paleolithic occupation of the Urals is principally associated with open-air sites in the western foothills and the cave complexes in the

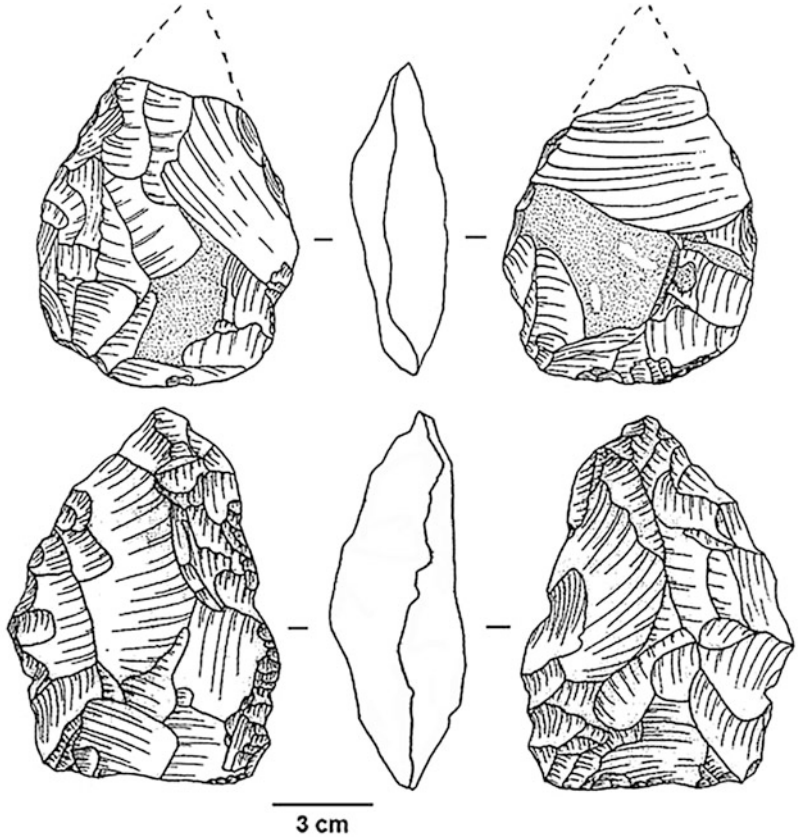

Urals: Paleolithic, Fig. 4 Galyanskaya Site. Bifacial Middle (?) Paleolithic stone tools from an open-air site in the Tura River valley, a tributary of the Chusovaya valley, may represent the earliest cultural records found in the Central Ural region, including the "Neanderthal" Levallois stone-flaking technique. (Courtesy Yu. B. Serikov)

Urals: Paleolithic, Fig. 5 The Chusovaya River valley, Central Urals, with karstic limestone formations incorporating Late Pleistocene cultural records. The valley served as one of the main Paleolithic and Mesolithic migration corridors connecting the East European Plains and the West Siberian Lowland

Chusovaya River valley cutting E-W through the main Ural mountain range (Fig. 5). The multilayer sites (Bezymyannaya Cave, Kotel Cave, Kamen Dyrovatyy, Bolshoy Glukhoy) distributed in the karstic formation over a 200 km distance encompass a long record spanning from the Late Pleistocene (Middle Paleolithic) till the Iron Age (Fig. 6). Periglacial biotic niches possibly existed

Urals: Paleolithic, Fig. 6 Geographic distribution of the investigated Paleolithic cave sites in the Chusovaya River valley (central Urals): *1* Grot Dozhdevoy, *2* Grot Dyrovatyy (Cave 4), *3* Grot Dyrovatyy (Cave 5), *4* Grot Kirpichnyy, *5* Grot Kotel, *6* Grot Dyrovatye Rebra, *7* Grot Bolshoy Glukhoy

in the Chusovaya River tributaries (Koiva, Sylvitsa, Serebryanka) that may have allowed continuity of the local occupation throughout the Last Glacial Maximum (20–18 ka BP). A unique cultural (Late Pleistocene to Holocene) cultic place with >18,000 arrowheads made of various materials (stone, bone, and metal) originates from Kamen Dyrovatyy Cave, with the Upper Paleolithic level dated to 13,800 year BP. Other Central Ural cave sites interpreted as cultic in view to recorded archaeological cultural inventories (Kumyshanskaya Cave, Ignatievskaya Cave, Grot Zotinskyy, Kotel Cave) as well as those in the Southern Urals (Kapova Cave) (Matyushin 1994) suggest a high sociocultural and behavioral complexity (Fig. 12). In the latter mountain zone, spruce and pine taiga forests persisted until the onset of the Last Glacial (c. 22–21 ka BP). A certain regional cultural nonuniformity across the Ural territory manifested in the lithic industry composition may indicate differences in the regional environmental adaptations. The

taxonomic diversity of hunted fauna is particularly evident at the Final Paleolithic/Mesolithic sites, specializing on hunting reindeer and mammoth in the montane areas and the eastern lowlands, respectively (Serikov 1999, 2000; Kosintsev and Plasteeva 2015). A multifunctional character and a variety of particular activities are indicated by the broad repertoire of stone and bone tools, including "hacking" instruments, barbed harpoons, and arrowheads (Fig. 7). A microlithization and stone tool polishing in the Mesolithic complexes distributed across the Urals and West Siberia point to an adaptive adjustment and a diversification of exploitation of the Final Pleistocene/early Holocene environments.

In contrast to the forest settings of the central montane valleys, the eastern Ural foothills passing into the West Siberian Lowland hosted a variety of natural settings related to seasonally water-saturated taiga forests with braided river streams, lakes, and bogs. This vast and biotically very rich and diverse territory underwent a paleogeographical and paleoecological evolution reflecting large-scale environmental shifts, partly affected by the Arctic as well as the mountain Pleistocene glaciations. The stratigraphic positions of the mapped Pleistocene sites are determined by past geomorphic processes and biotic shifts in both the lowland and foothill areas with an absence of thick loess deposits that are present on the eastern slopes of the Urals. The Paleolithic in the Trans-Ural regions, predating the mid-Last Glacial, is poorly known contrary to the western regions of the Urals associated with open sites in the NE European periglacial belt (Pavlov 1996). The archaic character of the documented local (Paleolithic as well as Mesolithic) stone industries may reflect their expedient, time-transgressive character predetermined by raw material sources (Serikov 2000).

The easternmost limits of the Trans-Urals provide multiple lines of evidence of Paleolithic peopling of this geographically marginal and still poorly explored territory of West Siberia following the mid-Last Glacial warming (35–24 ka BP). A specific cultural entity represents the Upper Paleolithic complex of open-air sites in the Sosva River Basin on the periphery of the West Siberian Lowland (Fig. 8) contextually associated with massive concentrations of large Pleistocene fauna remains, previously interpreted as natural "mammoth cemeteries" known since the nineteenth century. Other fossil fauna with woolly rhinoceros, bison, horse, reindeer, and other animals characteristic of periglacial tundra-steppe together with small (bird and fish)

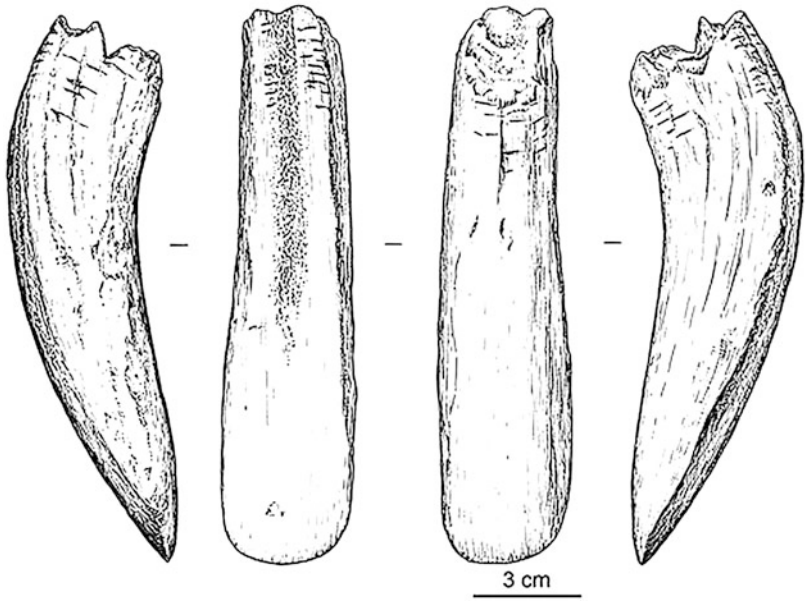

Urals: Paleolithic, Fig. 7 Dyrovatye Rebra Cave (the Chusovaya valley). Final Paleolithic "hacking" tools made of elk antlers

Urals: Paleolithic, Fig. 8 Erosion of the former Sosva River floodplain in the north-central Trans-Ural area delivers rich and partly humanly worked fossil faunal records attesting to biotically very productive Late/Final Pleistocene periglacial tundra-forest and tundra-steppe environments

species indicates a diversity of exploitation of the local Late Pleistocene natural resources and adaptation to subpolar periglacial environments (Chlachula and Serikov 2011). The skeletal remains from the occupation localities suggest both active hunting and anthropogenic scavenging practices during the Last Glacial (with radiocarbon dates of c. 25–12 ka BP). Human behavioral activities at the key site Gari I are also documented by circular concentrations of mammoth and rhinoceros bones (including complete sculls, large bones, and tusk fragments), some of them artificially modified, reminding primitive dwelling structures known in the Upper Paleolithic from the East European Plains. The geological context of the well-preserved fossil records, sealed in cryogenically distorted alluvial deposits of the former meandering Sosva River, indicates complex taphonomic histories of the occupation sites buried in cold periglacial swampy-riverine settings (Figs. 9 and 10). The paleontological records show an extraordinary biotic potential of the Pleistocene periglacial West Siberian steppe marginally interspersed by the eastern Ural foothill ecosystems. The dominant exploitation of mammoth (98.5%) corroborates the faunal compositions from other Upper Paleolithic sites on both sides of the Urals (Byzovaya Cave, Mamontova Kurya in the Pechora Basin; Volchiya Griva in West Siberia)

Urals: Paleolithic, Fig. 9 Rychkova Site (the Sosva River Basin). A mammoth tusk buried in the Late Pleistocene overbank clay deposits. *Mammuthus primigenius* is the most-represented species in the Late Pleistocene fossil fauna assemblages of the Trans-Ural area

(Pavlov 1996; Petrin 1986; Savel'eva 1997; Svendsen and Pavlov 2003; Zenin 2002).

The adjacent West Siberian Lowland is assumed to have been colonized after the Last Glacial Maximum at c. 17–15 ka BP in view of the extreme environmental conditions (a high climate continentality and natural water/stream barriers). The north Trans-Ural and probably the Siberian Arctic regions remained largely ice free even during the LGM, and except for surface-saturated and frozen boggy lowlands, there were no major natural obstacles for free movement of Paleolithic groups further east into NW Siberia

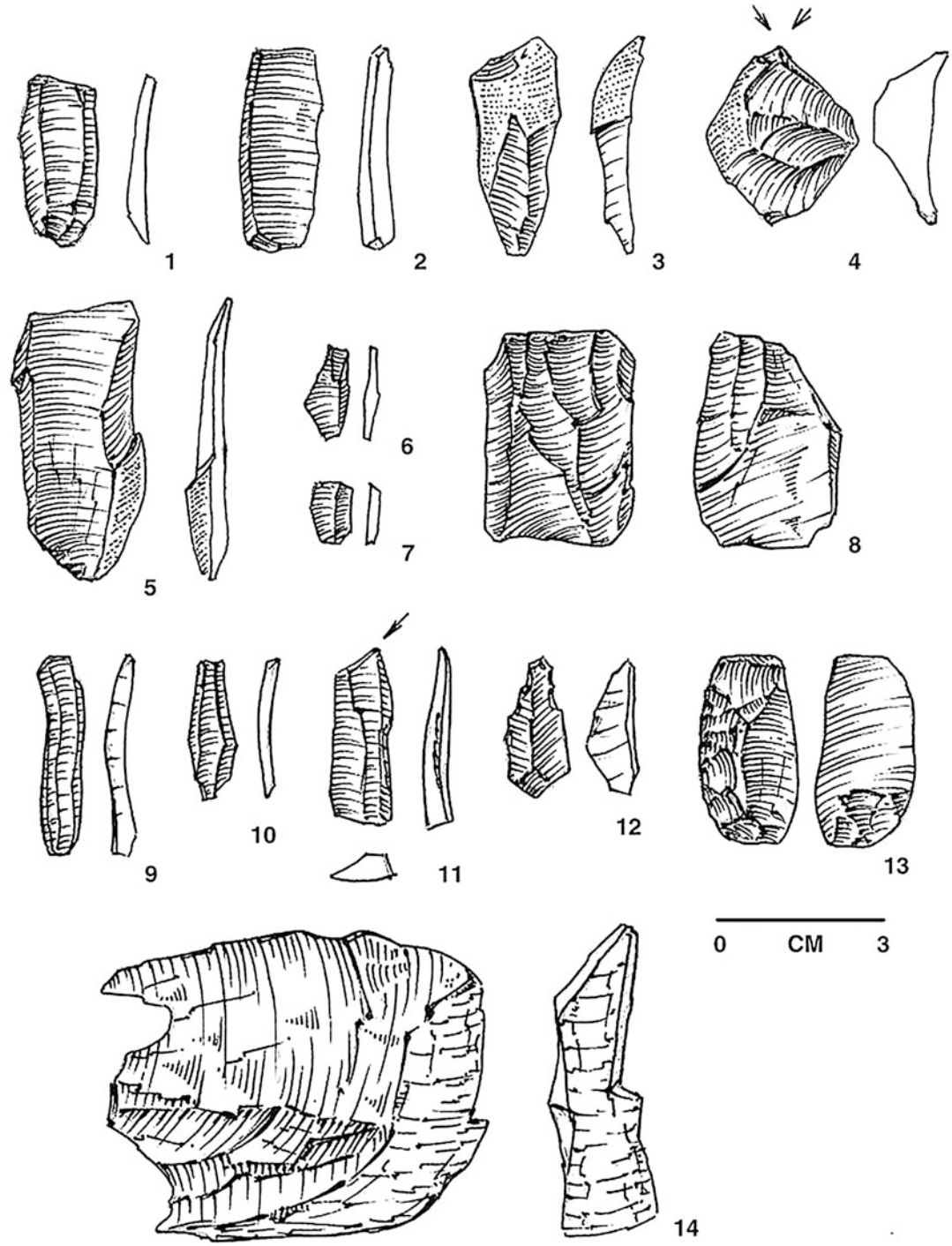

Urals: Paleolithic, Fig. 10 Gari Site I (the Sosva River Basin). The Upper Paleolithic stone industry (nuclei, scrapers, burins, retouched blades, and flakes made from local alluvial gravels) together with utilization of skeletal megafauna remains (10 – a mammoth tusk flake) indicates a successful human adaptation to the Last Glacial ecosystems of the Trans-Urals and the adjacent West Siberia

prior and after that time interval. Fossil fauna finds display a major biotic potential of these territories. The latitudinal zonal differentiation of the Last Glacial ecosystems of the Urals from the Arctic coast to the Black/Caspian Sea was likely more uniform, largely covered by periglacial tundra-steppe in contrast to the more mosaic interglacial parkland landscapes facilitating a free migration of fauna as well as the Upper Paleolithic groups particularly within the foothill corridors. Regional paleoenvironmental deviations, differing from the overall territorial biogeographic and climatic pattern, may have played a significant role in the process of early prehistoric peopling of the northern regions.

International Perspectives

The present state of the Paleolithic research in the Urals provides evidence of an active process of the early peopling in this strategic geographical territory on the crossroads of Europe and North Asia. The contextual geology and paleoecology records from the investigated archaeological sites and stratified geological sections point to pronounced environmental dynamics and landscape transformations triggered by past climate change as well as geomorphic processes over the mountain as well as foothill areas. The Pleistocene climatic cycles regulated spatial and temporal movements of early humans from the southeastern regions of the European continent as well as the subsequent expansion onto the bordering North and West Siberia.

The first well-manifested occupation, particularly in the western Fore-Ural foothill areas adjacent to the East European Plains, occurred during the Middle Pleistocene interglacials, presumably the Likhvin Interglacial complex (450–360 ka BP) being the warmest and most favorable climatic interval for the last 0.5 Ma years (MAT by c. 4–5 °C above the present values). Abundant expedient core-and-flake stone industries together with anthropogenically worked fossil fauna osteological materials indicate productive riverine valley habitats of the Kama River Basin with mixed (spruce-fir and oak-linden-elm-hornbeam) parklands. Except for the Southern Ural regions, persistence of inhabitation in glacial stages within extremely cold polar tundra-steppe environments predetermines use of fire, but this is unlikely at the time of the most extensive continental Pleistocene glaciations of northern Eurasia reaching the Central Ural limits.

The next stage of the Pleistocene peopling of the Urals is linked to the Middle Paleolithic (Neanderthal) expansion during the Last Interglacial/MIS 5 (130–74 ka BP). The climatic optimum (with MAT 1–3 °C above the present values) promoted mosaic vegetation in the particular geographical zones and topographic settings with mixed pine-spruce-birch forests enriched by broad-leaf taxa (oak, hornbeam, lime, hazel, and elm) in the montane areas, and open-parkland steppe in the lowlands. During the cold Last Interglacial stages (MIS 5d, 5b), these ecosystems were replaced by tundra-forest and periglacial tundra-steppe, respectively. The main river valleys cutting the mountain range with rich rocky material for stone tool production as well as diverse biotic resources were likely occupied repeatedly at various Last Interglacial intervals. Cultural finds are absent from the climatically harsh early Last Glacial (MIS 4).

The following Late Paleolithic dispersal represents a most distinctive cultural marker recorded throughout the Ural territory associated with the climatic amelioration during the mid-Last Glacial stage/MIS 3 (59–24 ka BP). This environmentally favorable time interval with a climatic optimum at c. 31 ka BP correlates with the progressive spatial expansion further north along the western as well as the eastern Ural slopes reaching the ice-free subpolar limits as witnessed by the cultural records from the Upper Pechora Basin and the Siberian Arctic in the biotically productive periglacial tundra-steppe environments. Geographical shifts of the early Late Paleolithic milieu into the marginal mountain areas across the Central Urals into the adjoining West Siberian Lowland are likely to have occurred still during the warmer interstadials prior to the LGM. The Chusovaya River valley transecting the central mountain range was one of the main corridors for Pleistocene fauna migrations from the East European

Plain into West Siberia (Fig. 11). The formal diversity of blade-dominated lithic industries suggests regionally specific cultural environmental adaptations.

Probably only isolated human populations occupied the Central Urals around the Last Glacial Maximum/LGM (24–19 ka BP) contrary to the biologically more productive periglacial tundra-steppe in the southern Fore- and the Trans-Ural regions. Yet, the radiocarbon dates (23–19 cal ka) from the archaeological strata of the Medvezhia Cave provide evidence that humans were present along the Northern Urals close to the LGM (Svendsen et al. 2010). Milder microclimate conditions in the foothills with a higher diversity of biotic resources of the transient montane-taiga and steppe fauna communities predisposed the periodic occupation recorded in the Central and Southern Ural karstic areas during the Last Glacial (24–12 ka BP).(Danukalova and Yakovlev 2006). The dominance of woolly mammoth in the lowland parkland (tundra-)steppes and horse/reindeer in the mountain areas illustrates the pattern of animal resource exploitation (Fig. 12). The later

Urals: Paleolithic, Fig. 11 Lugovskoye Palaeolithic Site, West Siberia (dated to 15–13 ka BP). A perforated mammoth vertebra with an inserted fragment of a broken flint-made arrowhead. (Photo courtesy of A. Rezvyy)

Urals: Paleolithic, Fig. 12 Shulgan-Tash (Kapova) Cave (Southern Urals). The Upper/Final Paleolithic rock art in the Gallery of Paintings discovered in 1959 illustrating the Urals Last Glacial fauna. (Photo courtesy of V. Kotov)

progressive regional cultural development is manifested by the appearance of locally heterogeneous Mesolithic complexes in response to climate warming and associated environmental transformations at the end of the Pleistocene.

The Trans-Ural Upper Paleolithic complex, best documented in the Sosva-Tavda River Basins, represents a specific cultural entity based on utilization of the Pleistocene fauna attesting to a particular behavioral adjustment to the Last Glacial tundra-steppe/tundra-forest environments with active hunting as well as anthropogenic "scavenging" of naturally deceased animals (particularly of mammoth). The multifunctional use of skeletal remains for dwelling structures, tools, and artwork also encountered in the contemporaneous cultures of the Upper Kama and the Upper Pechora Basins along the NW Urals correlates with the climax of the Paleolithic evolution in the periglacial zone of the mid- and high-latitude Eurasia. Overall, the Last Glacial climate fluctuations and the associated shifts in natural habitats preconditioned the intensity and timing of the Paleolithic settlement of these marginal and geographically rather extensive areas. The initial human colonizations along the Ural Mountains into the Arctic clearly took place at the latest in the climatically moderate mid-Last Glacial (MIS 3) interstadial stage (55–24 ka BP) when only small glaciers covered the nearby mountain ranges. The southern and central Ural regions were inhabited much earlier.

Future Directions

The scientific importance of the Ural Paleolithic studies lies in the documentation of the earliest prehistoric migration processes, the adaptation strategies, and the cultural exchanges between Eastern Europe and West Siberia. Complex paleoenvironmental and climatic multiproxy data from the stratified geological sections coupled with cultural archives of the presently investigated as well as perspective archaeological localities will contribute significantly to a more comprehensive understanding on the overall trajectories of the Paleolithic and Mesolithic occupation of north-central Eurasia. Detailing the single-site chronologies and geological and paleoecology contexts should be in the focus of the following geoarchaeological studies. Systematic field reconnaissance in the upper reaches of the Chusovaya River and its tributaries (Koiva, Sylvitsa, Serebryanka) together with the foothill areas of the Northern Urals may provide new evidence on the earliest human settlement from these still poorly studied geographical regions. Application of the integrated Quaternary geology and geoarchaeology field research approach and laboratory analytical methods should constitute a working framework of the future Paleolithic investigations particularly in the marginally mapped formerly glaciated areas of the Northern and Polar Urals, the Fore-Urals loess formations, as well as of cave sites in the central and southern regions. The new results will complete the present culture-historical mosaic of the early human inhabitation, particularly in the largely unexplored northern territories.

Cross-References

- ► Environmental Reconstruction in Archaeological Science
- ► Hominin Paleoecology and Environmental Archaeology
- ► Lithic Technology, Paleolithic
- ► Siberia: Paleolithic

References

Arkhipov, S.A. 1999. Natural habitat of early man in Siberia. *Quaternary of Siberia. Anthropozoikum* 23: 133–140.

Astakhov, V. 1997. Late glacial events in the central Russian Arctic. *Quaternary International* 41–42: 17–25.

Astakhov, V. 2001. The stratigraphic framework for the Upper Pleistocene of the glaciated Russian Arctic: Changing paradigms. *Global and Planetary Change* 31: 283–295.

Bolikhovskaya, N.S., and A.N. Molodkov. 2006. East European loess-palaeosol sequence: Palynology,

stratigraphy and correlation. *Quaternary International* 149: 24–36.

Cheprasov, M.Yu., J. Chlachula, T.F.Obada, S.E. Grigoriev amd G.P. Novgorodov 2017. New records on the Paleolithic of the Central Kolyma Basin, Yakutia. Man and the North – Antropology, Archaeology and Ecology", Apríl 2-6, 2018, Institute of Northern Development RAS, Tyumen 4: 273–267.

Chlachula, J. 1996. Geology and quaternary environments of the first preglacial Palaeolithic sites found in Alberta, Canada. *Quaternary Science Reviews* 15: 283–313.

Chlachula, J. 2003. Controverse sur l'age des premiers Américains. *La Recherche (Paris)* 370: 42–46.

Chlachula, J. 2010. Environmental context and human adaptation of Palaeolithic peopling of the Central Urals. *Quaternary International* 220: 47–63.

Chlachula, J., 2017. Chronology and Environments of the Pleistocene Peopling in North Asia. Archaeological Research in Asia 12: 33–53.

Chlachula, J., and Yu.B. Serikov. 2011. Last glacial ecology and geoarchaeology of the Trans-Ural area: The Sosva River Upper Palaeolithic complex, West Siberia. *Boreas* 40 (1): 146–160.

Danukalova, G., and A. Yakovlev. 2006. A review of biostratigraphical investigations of Palaeolithic localities in the Southern Ural region. *Quaternary International* 149: 37–43.

Kosintsev, A.P., and N. Plasteeva. 2015. Paleolithic hunting in the Urals (Russia). In *Forgotten times and spaces: New perspectives in paleoanthropological, paleoetnological and archeological studies*, ed. Sandra Sázelová, Martin Novák, and Alena Mizerová, 1st ed., 91–97. Brno: Institute of Archaeology of the Czech Academy of Sciences/Masaryk University.

Kotov, V.G. 2009. *Historical Bashkiriya in the Stone Age – Palaeolithic. History of the Bashkir nation*. Vol. 1, 23–53. Moskva: Nauka. (in Russian).

Mangerud, J., V.I. Astakhov, and J.I. Svedsen. 2002. The extent of the Barents-Kara ice sheet during the Last Glacial Maximum. *Quaternary Science Reviews* 21: 111–119.

Mangerud, J., J. Gosse, A. Matiouchkov, and T. Dolvik. 2008. Glaciers in the Polar Urals, Russia, were not much larger during the Last Global Glacial Maximum than today. *Quaternary Science Reviews* 27: 1047–1057.

Matyushin, G.N. 1994. *Stone Age of the Southern Urals*. Moskva: Nauka. (in Russian).

Mochanov, Y.A., and S.A. Fedoseeva. 2002. *Archaeology of the Palaeolithic of North-East Asia, ex-tropical homeland of humankind and early human occupation stages of America*. Yakutsk: Polyrnyj Krug. (in Russian).

Pavlov, P.Y. 1996. *Palaeolithic monuments of the north-eastern European part of Russia*. Syktyvkar: Ural Branch RAS. (in Russian).

Pavlov, P., J.I. Svendsen, and S. Indrelid. 2001. Human presence in the European Arctic nearly 40,000 years ago. *Nature* 413: 64–67.

Petrin, V.T. 1986. *Palaeolithic sites of the west Siberian lowland*. Novosibirsk: Siberian Branch RAS. (in Russian).

Pitulko, V.V., P.A. Nikolsky, E.Yu. Girya, A.E. Basilyan, V.E. Tumskoy, S.A. Koulakov, S.N. Astakhov, E-Yu. Pavlova and M.A. Anisimov. 2004. The Yana RHS Site: Humans in the Arctic before the Last Glacial Maximum. *Science* 303: 52–56.

Pitulko, V.V., A.N. Tikhonov, E.Y. Pavlova, P.A. Nikolskiy, K.E. Kuper, and R.N. Polozhiv. 2016. Early human presence in the Arctic: Evidence from 45,000-year-old mammoth remains. *Science* 351 (6270): 260–263.

Pitulko, V.V., E.Y. Pavlova and P.A. Nikolskiy. 2017. Revising the archaeological record of the Upper Pleistocene Arctic Siberia: Human dispersal and adaptations in MIS 3 and 2. *Quaternary Science Reviews* 165: 127–148.

Savel'eva, E.A., ed. 1997. *Archaeology of the Komi Republic*. Moskva: DIK. (in Russian).

Serikov, Y.B. 1999. *Palaeolithic of the Central Urals*. Nizhniy Tagil: NT University Press. (in Russian).

Serikov, Y.B. 2000. *Palaeolithic and mesolithic of the Central Trans-Urals*. Nizhniy Tagil: NT University Press. (in Russian).

Stefanovskiy, V.V. 2006. *Pliocene and quaternary of the eastern slope of the Urals and Trans-Urals*. Ekaterinburg: Ural Branch RAS. (in Russian).

Svendsen, I.G., and P.Y. Pavlov. 2003. Mammontova Kurya: An enigmatic, nearly 40 000 year-old Paleolithic site in the Russian Arctic. In *Chronology of the Aurignacian and the transitional technologies, dating stratigraphies, cultural implications*, Trabalhos de Arquelogia 33, ed. J. Zilhao and F. d'Errico, 109–120. Lisboa: Institut Portuguese Archaeologia.

Svendsen, I.G., H.P. Heggen, A.K. Hufthammer, J. Mangerud, P. Pavlov, and W. Roebroeks. 2010. Geo-archaeological investigations of Palaeolithic sites along the Ural Mountains – On the northern presence of humans during the last Ice Age. *Quaternary Science Reviews* 29 (23–24): 3138–3156.

Velichko, A.A., ed. 1993. *Evolution of landscapes and climates of northern Eurasia. Late Pleistocene – Holocene. Elements of prognosis, 1. Regional palaeogeography.* Moskva: Nauka-RAN/Institute of Geography.

Velichko, A.A., N. Catto, A.N. Drenova, V.A. Klimaov, K.V. Kremenetski, and V.P. Nechaev. 2002. Climate changes in East Europe and Siberia at the Late glacial-Holocene transition. *Quaternary International* 90: 75–99.

Yakhimovich, V.L., V.K. Nemkova, and A.V. Sidnev. 1987. *Pleistocene of the Fore-Urals*. Moskva: Nauka. (in Russian).

Zenin, V.N. 2002. Principal stages of peopling of the West-Siberian Plain by Palaeolithic man. *Archaeology, Ethnography and Anthropology of Eurasia* 12: 22–44.

Further Readings

Serikov, Y.B. 2007. *The Palaeolithic occupation site Gari and some problems of the Ural Palaeolithic*. Nizhniy Tagil: NT University Press.

Urartu, Archaeology of

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Introduction

Urartu was an Iron Age kingdom that flourished between the ninth and the seventh centuries BCE in the northern regions of the Ancient Near East, stretching across portions of the modern nations of Turkey, Armenia, Iran, and a small part of northeastern Iraq (Dan 2010).

Celebrated as one of Assyria's uttermost rivals (and for a time the most powerful state in the Ancient Near East), this political entity has been the object of numerous studies in the past 15 decades (Piotrovsky 1969; Barnett 1982; Lindsay and Smith 2006). Over this time, the Urartian material culture assemblage has proven to be very characteristic and distinguishable within the archaeological record in the Ancient Near East (Zimansky 1995a). This entry provides a general historical overview of the Kingdom of Urartu while focusing on the development of Urartian studies and Urartian archaeology as well as on Urartian material cultural assemblage.

Definition

Urartu, Bianili, and Nairi

The name Urartu (which is the same as Ararat present in modern bible or the word "*rrt*" in original Hebrew) comes from the Assyrian language and was employed by the Assyrians to refer both to a specific region lying northeast from Assyria (and also written as "Uruatri") and to a particular political entity (comprised across sections of modern-day Turkey, Armenia, northern Iraq, and northeastern Iran) that was conformed around 830 BCE and disappeared in the seventh century. A wide array of the information we currently possess on Urartu comes from Assyrian texts and inscriptions, and scholars often employ the term "Urartian" in order to denominate both the language and the culture of the kingdom in question. However it is important to notice that Urartian kings did not refer to their land as Urartu but as Bianili. Currently, scholars often refer to this latter as Urartu/Bianili. Therefore, in order to avoid confusions, it is necessary to set this distinction straight. In addition to this, Assyrian sources also mention the term "Nairi" which also is geographical in nature and refers to several minor kingdoms subdued by the Assyrian King Tiglath-Pileser I at the end of the eleventh century BCE. Nairi is also an important term since King Sarduri I left an inscription (which is actually the first inscription that can be attributed to a king of Urartu/Bianili) calling his kingdom "Nairi" (Zimansky and Sagona 2009).

Key Issues

A Historical Overview of Urartu and Urartu/Bianili

Although the region in which the Kingdom of Urartu/Bianili was comprised has a long history, this section focuses mostly on the history of the political entity that was conformed between the ninth and the seventh century BCE.

There is agreement among scholars that the region was already inhabited by the sixth millennium BCE, and the presence of third millennium occupations has been reported in the Lake Urmia area (Zimansky and Sagona 2009). The first written records that mention the region in question were written by the Hittites in the second millennium. In them, Hittite kings mention the presence of two different kingdoms named Azzi and Khayasha. Later on, the area fell under the influence of the Mittani, yet by the thirteenth century BCE, the region slipped out of Mittanian control and was incorporated into the Assyrian sphere of influence as multiple campaigns were launched by

different Assyrian kings who sought to dominate and excerpt tribute from this area (Barnett 1982). These campaigns were amply recorded in Assyrian texts and in them are not only clues to the type of relationships Assyrians held with those societies living in the area of Urartu but also the first traces for building the political history of Urartu/Bianili (Barnett 1982; Radner 2011). For example, the Assyrian King Shalmaneser I refers to these lands as "Uruatri" and mentions the presence of at least eight different kingdoms (Piotrovsky 1969; Barnett 1982; Zimansky and Sagona 2009). As for the Kingdom of Urartu/Bianili, its political history begins in the latter part of the first millennium. Smith (1999) subdivides it into three periods that he denotes as formative, imperial, and reconstruction, and this division is based upon historical records and the physical landscapes produced by state authorities. The formative period (c. 1300–850) is not well understood and the archaeological evidence is scarce especially in the eastern Anatolian region.

In the mid-ninth century BCE, Urartian kings began conquering rival polities in an area that ranges from the area of Lake Urmia in the southeast to the headwaters of the Euphrates in the northwest, as well as the incorporation of the Sevan Basin in the Shirak Plain. This program of military campaigns represents the imperial period. Another important characteristic of this period includes a program for the construction of massive fortresses in the Ararat area under the auspices of Urartian King Argishti I. This period of imperial expansion was brought to an end in the late eight century when Assyrian armies under the King Sargon II advanced north while at the same time Cimmerians irrupted in Urartu/Bianili's northern border. Urartian King Rusa I was able to overcome the critical situation. He inflicted a defeat to the Cimmerians and Assyrian armies eventually withdrew to their homeland (Piotrovsky 1969; Barnett 1982; Smith 1999; Zimansky and Sagona 2009). In addition upheavals and challenges to the Urartian dynastic power arose. In the aftermath of this situation, the Kingdom of Urartu/Bianili managed to survive, and Rusa I was able to regain the political control of the kingdom and suffocated the rebellions. However Urartu/Bianili was never able to experience another expansionist era.

The reconstruction period follows immediately after the imperial period. This is not as rich as the previous period in historical records, yet the archaeological evidence is quite substantial. Among other things, this evidence permits scholars to suggest that the Urartian state authority was fully reestablished and that Urartu/Bianili once again challenged Assyrian power in the highlands. Further, Urartian kings were able to recover control over much of the territories lost during the end of the imperial period (Smith 1999). The reign of King Rusa II represents the zenith of this period, and thanks to a series of foundational inscriptions, the construction of a series of massive fortresses can be directly attributed to him (Zimansky 1995a; Smith 1999). The information regarding the successors of Rusa II is unclear, and by the early sixth century BCE, the Kingdom of Urartu/Bianili was once again immersed in a series of crises. As a matter of fact, it has been suggested that Rusa II's intensive program of massive fortress building was a direct result of the overwhelming pressure nomads such as Cimmerians and Scythians were exercising on Urartu/Bianili at the time, and this fact has also been signaled as a probable cause of both the Urartian and Assyrian collapses (Çilingiroğlu and Salvini 2001). As for the exact time of when Urartu/Bianili collapsed, Piotrovsky (1969) dated it as happening either in 585 or 580 BCE based upon biblical dates. However, Sebastian Kroll (1984), as well as other scholars, thinks this date is uncertain and disagrees with such a long chronology. In any case by the late sixth century BCE, references to the Kingdom of Urartu/Bianili disappear completely from written records.

Urartian Material Culture Assemblage

Urartian material culture assemblage is important because it allows scholars to trace the spread of the Kingdom of Urartu/Bianili through the presence of distinctive styles of architecture, art, and pottery. This is unmistakably distinguishable to the degree as Zimansky (1995a, 103) states that "these are defined with such precision that things are not Urartian by degrees or with qualifications –

they either are so, or are not." However, despite its condition of uniqueness and uniformity, the same author points out that it is important to remember that the Urartian material culture studied by archaeologists and linguists is mostly a governmental production representing the elites rather than a broad segment of the population (Zimansky 1995a). For instance, most of the Urartian archaeological efforts have been oriented toward the excavation of fortresses (Piotrovsky 1969), waterworks (Burney 1972; Garbrecht 1980), and royal tombs (Barnett 1963). Only recently archaeologists have started investigating residential areas nearby the fortresses as is the case of Ayanis (Stone and Zymansky 2001) and Bastam (Kleiss 1980). Since Urartian material culture assemblage is displayed in a wide array of categories, this section will deal only with the most general of them. One focus is architecture and another is pottery and metalwork.

Urartian architecture is represented by diverse levels ranging from domestic to state sponsored. When it comes to the latter, architecture is both massive and impressive. This entry focuses on the best examples of state-sponsored architecture which are fortresses and waterworks.

Urartian architects excelled at constructing fortresses and often choose strategic locations at natural eminences where fertile ground, agriculturally productive land, and communication routes could be overlooked. Fortresses were emplaced in carefully selected locations allowing defensibility but avoiding isolation from the rest of the countryside (Zimansky 1995a). Urartian fortresses were completely surrounded by walls, and these conformed a perimeter whose function was to protect multiple storage magazines, arsenals, and administrative facilities. Perhaps the most outstanding characteristic of Urartian defensive architecture is the outer walls. These walls were buttressed, and sometimes, at the places when angles changed, major towers were built. Urartian fortress walls were so massive that more than often exceed 4 m of thickness, and based upon some art depictions, it has been suggested that they were several meters tall and topped with crenellations (Zimansky and Sagona 2009).

These types of structures belong both to the Imperial and to the reconstruction period. King Argishti I built several fortresses in the Sevan area, while King Rusa II built what are considered the most impressive examples of fortresses during the reconstruction period. Toprakkale (or Rusahinili as it was originally known to Urartians) is a fortress in the outskirts of the modern city of Van. Its importance lies in the fact that its citadel rock was the political center of the empire. This last is located 5 km away from Toprakkale and was placed next to the ancient city of Tuspa which was the capital city of Urartu/Bianili. Most of the artifacts found at Toprakkale are dated to the seventh century BCE, and only very few items belong to the eight century BCE (Zimansky 1995b). In Turkey in the shore of Lake Van, the fortress of Ayanis is found. Archaeological work at the site began in the late 1980s, and as a result of the discovery of some inscriptions in a temple, scholars now know this fortress was named Rusahinili Eidurukai or the city of Rusa in front of Mount Eiduru setting a distinction from Toprakkale (Çilingiroğlu and Salvini 2001).

Another site, Karmir Blur (or the ancient city of Teisheba), lies next to modern Erevan in the Republic of Armenia. Karmir Blur is rich in well-preserved archaeological remains since it was violently destroyed resulting in an outstanding preservation of the archaeological contexts. Archaeologists have excavated the complete ground plan of the citadel, and the function of all rooms found within the citadel has been determined due to the fortuitous finding of the inventories (Zimansky 1995b).

Another fortress built by Rusa II that has been extensively studied by archaeologists is Bastam (Rusai-URU.TUR or Rusa's small city). Discovered in the 1960s by a German archaeological team, it remains as one of Urartu/Bianili's largest fortresses built. In this case the fortifications extend from the plain level to the summit of the hill, and just as in Karmir Blur, multiple magazines for storage have been found. Along with the architectural remains of the wall's stone foundations, archaeologists have uncovered evidence for royal administrative practices such as bullae with imprints of Rusa II's seal and tablets (Kleiss 1980; Zimansky 1995b).

Urartian architects excelled at projects other than fortresses. Reservoirs, terracing, and irrigation works are found through the entire Urartian region (Burney 1972), and as hydrotechnical installations, they are remarkable, elaborate, and well-planned water supply systems (Garbrecht 1980). Perhaps the finest example is the water supply system that provided Tuspa with freshwater, both for daily consumption and for irrigation activities. This 56 km massive waterwork built by King Menua initially brought freshwater to the royal capital at the citadel of Van (Van Kale), and later it was extended by either King Rusa I or Rusa II to supply Toprakkale from a spring located in the neighboring valley of Engil Cayi river (Garbrecht 1980). Besides its importance as a massive construction, the Menua Canal (which is first of several sections of the hydrotechnical system) has been securely dated to the reign of this king (805–785 BCE) due to a series of inscriptions that are found along the aqueduct. This is not only a rare but a fortunate finding for archaeologists since waterworks often lack of archaeological evidence – such as pottery or coins – which allows secure and precise dating (Garbrecht 1980).

Ceramic traditions that precede the presence of Urartu/Bianili as a state are just as difficult to identify as those traditions that immediately follow the kingdom's temporality. As an exception, the ribbed buff ware bowl has been described as an Early Iron Age tradition that continues well into time of Urartu/Bianili's development in the first half of the first millennium BCE. On the other hand, Urartu/Bianili's pottery is very distinctive, especially the kind that is associated with state activities. Kroll (1976) argues that ceramics at 95% of Urartian sites consist of simple, undecorated brown and buff wares. In the case of this simple ceramics, the boundaries of the state cannot be correlated with its distribution (Zimansky and Sagona 2009). Instead, wares associated to the state are much clearer to identify and constitute the core of the Urartian pottery (Zimansky 1995b). "Toprakkale Ware" and pithoi represent examples to illustrate this point. The "Toprakkale Ware" was originally labeled as such by Charles Burney (1957) and can be considered a diagnostic type since it is distinguishable both by color and finishing being red and highly burnished. Zimansky and Sagona (2009) mention that as a result of neutron activation analysis, scholars now know that this pottery was locally made even though it looks the same throughout the extension of Urartu/Bianili and that its essential function was wine and food serving since trefoil-shaped jugs and slightly incurving rimmed plates are the most common forms associated with this type.

The previous section indicated that fortresses included storage facilities. Within these, rows of enormous jars or *pithoi* have been found buried up to their shoulders in the contexts of every major citadel. Because of its shape and size, it has been long argued that liquids were stored in them (Zimansky and Sagona 2009). At Toprakkale, Piotrovsky (1969) calculated the total storage volume at a little over 34,000 l (9,000 gal). However, Wartke (1993) has argued that the storing capacity was quite more substantial estimating 400,000 l. In the opinion of Zimansky and Sagona (2009), this last figure looks more correct.

Finally, metalwork is also an important component of the cultural assemblage of Urartu/Bianili. Metalwork in Urartu is mostly characterized by the production of bronze artifacts such as cauldrons, figurines, shields, helmets, horse trappings, belts, bowls, and plaques. According to Zimansky (1995a), metalwork production is closely associated with the Urartian state since many of these artifacts bear inscriptions that mention Urartian kings. Despite the importance of Urartian metalwork as a component of the Urartian material culture, heavy criticizing has been raised around the way metal artifacts have been studied archaeologically. Muscarela (2006) argues that several problems arise when archaeologists are unaware of crucial details approach the material. Among them he points to the fact that most of the metal artifacts are the product of looting and plunder carried out for many decades, thus resulting in unprovenienced material, and he adds that this is problematic since omitting this fact may lead to subjective conclusions. One of

the publications discussed by the same author is *Urartian Art and Artifacts* (Azarpay 1968) which according to the author focuses mostly on excavated material although fails to discuss the full corpus. Another important publication brought up in Muscarela's discussion is *Urartu: A Metalworking Center* (Merhav 1991) which shows wonderful illustrations of the full repertory of metal artifacts and compiles excellent scholarly essays written by authorities in Urartian archaeology. The work contains only a handful of the hundreds of pieces displayed, and only some come from actual excavations, while the vast majority lacks from provenience and comes from private collections.

Future Directions

There are many things unknown about Urartu/Bianili and research along specific lines is necessary. In the first place as Zimansky (1995b) points out, Urartian archaeology has been oriented toward fortified sites under state direct control leaving out of the map wider sectors of the Urartian population leading to a subjective homogeneity of the Urartian society. Some efforts have been done in this sense (Stone and Zymansky 2001), yet there is so much more that we need to know about the Urartian society that did not belong to the upper strata. On the other hand, Urartian elites cannot be completely ruled out of the question, and important research lines have been pursued in terms of how they exercised the power and contemplated themselves. Smith's work on political landscapes represents a thriving effort to understand how Urartian elites constructed spaces to exercise their power. In a similar line, Tanyeri-Erdemir (2006) has analyzed Urartian imperial art and architecture focusing on how material culture may have been used by King Rusa II as an active component in the modification, renewal, and reproduction of his rule. In sum, Urartian archaeology offers young scholars not only an open invitation to pursue research careers but a wide variety of subjects that still need to be explored.

Cross-References

- ▶ Empire in the Ancient Near East, Archaeology of
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Fortifications, Archaeology of
- ▶ Landscape Archaeology
- ▶ Late Antique Anatolia, Archaeology of
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic

References

Azarpay, G. 1968. *Urartian art and artifacts: A chronological study*. Berkeley: University of California Press.

Barnett, R.D. 1963. The Urartian cemetery at Igdyr. *Anatolian Studies* 13: 153–198.

Barnett, R.D. 1982. Urartu. In *Cambridge ancient history III/1: the prehistory of the Balkans; the middle east and the Aegean World, tenth to eighth centuries*, ed. J. Boardman, I.E.S. Edwards, N.G.L. Hammond, and E. Sollberger, 314–371. Cambridge: Cambridge University Press.

Burney, C.A. 1957. Urartian fortresses and towns in the Van region. *Anatolian Studies* 7: 37–53.

Burney, C. 1972. Urartian irrigation works. *Anatolian Studies* 22: 179–186.

Çilingiroğlu, A., and M. Salvini, eds. 2001. *The historical background of Ayanis. Ayanis I. Ten years' excavations at Rusahinili Eiduru-kai: 15–24*. Roma: Istituto Per Gli Studi Micenei Ed Egeo-Anatolici.

Dan, R. 2010. The archaeological and geographical landscape of Urartu. In *Proceedings of the 6th International Congress on the Archaeology of the Ancient Near East, Islamic session*, ed. P. Matthiae, F. Pinnock, L. Nigro, and N. Marchetti, vol. 3, 331–340. Wiesbaden: Harrassowitz Verlag.

Garbrecht, G. 1980. The water supply system at Tuspa (Urartu). *World Archaeology* 11 (3): 306–312.

Kleiss, W. 1980. Bastam, an Urartian citadel complex of the seventh century B. C. *American Journal of Archaeology* 84 (3): 299–304.

Kroll, S. 1976. *Keramik urartäischer Festungen in Iran*. Berlin: Dietrich Reimer Verlag.

Kroll, S. 1984. Urartus Untergang in anderer Sicht. *Istanbuler Mitteilungen* 34: 151–170.

Lindsay, I., and A.T. Smith. 2006. A history of archaeology in the Republic of Armenia. *Journal of Field Archaeology* 31: 165–184.

Merhav, R., ed. 1991. *Urartu a metalworking center in the first millennium BCE*. Jerusalem: The Israel Museum.

Muscarela, O.W. 2006. Urartian metal artifacts: An archaeological review. *Ancient Civilizations* 12 (1–2): 147–177.
Piotrovsky, B.B. 1969. *Urartu* (trans: Hogarth, J.). New York: Cowles Book Co., Inc.
Radner, K. 2011. Assyrians and Urartians. In *The Oxford handbook of ancient Anatolia*, ed. S.R. Steadman and G. McMahon, 734–745. Oxford: Oxford University Press.
Smith, A.T. 1999. The making of an Urartian landscape in southern Transcaucasia: A study of political architectonics. *American Journal of Archaeology* 103 (1): 45–71.
Stone, E.C., and P. Zymansky. 2001. *Survey and soundings in the outer town of Ayanis 1996–1998, in a. Çilingiroğlu & M. Salvini (ed.) Ayanis I. Ten years' excavations at Rusahinili Eiduru-kai: 355–375*. Roma: Istituto Per Gli Studi Micenei Ed Egeo-Anatolici.
Tanyeri-Erdemir, T. 2006. Innovation, change, continuity: Considering the agency of Rusa II in the production of the imperial art and architecture of Urartu in the 7th century B.C. In *Beyond the steppe and the sown*, ed. D.-L. Peterson, L.M. Popova, and A.T. Smith, 264–281. Leiden: Brill.
Wartke, R.-B. 1993. *Urartu: Das Reich am Ararat*. Mainz: Philipp von Zabern.
Zimansky, P. 1995a. Urartian material culture as state assemblage: An anomaly in the archaeology of empire. *Bulletin of the American Schools of Oriental Research* 299/300: 103–115.
Zimansky, P. 1995b. An Urartian ozymandias. *Biblical Archaeologist* 58 (2): 94–100.
Zimansky, P., and A. Sagona. 2009. *Ancient Turkey*. London: Routledge.

Urban Archaeology

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Brief Definition of the Topic

The phrase urban archaeology is used to refer to the study of archaeology *in* towns or cities or *of* towns or cities. The former, which is a rather narrow definition, describes the practice of archaeology in urban places, particularly "living" urban places (as distinct from towns and cities which were abandoned in the past and are ruinous). Distinguishing it from other branches of the discipline are the particular challenges posed by working in such contexts: excavation is usually in response to development – or redevelopment, more frequently – rather than research-driven, so the locations of sites for excavation and the areal sizes of those sites are determined by the agencies of development; the timetables are often restricted; the stratigraphies are usually very deep, even in cities of modern origin; and preservation is generally by record only. Urban archaeology thus defined is most commonly practiced in countries where legislation protects potential archaeological heritage from destruction by infrastructural development without prior investigation and where the archaeological profession is large enough to accommodate teams who specialize in working in these environments. Such legislation varies from country to country. So too does the view of what constitutes an urban-archaeological heritage worthy of physical protection (in the case of standing buildings) or preservation by record (in the case of buried structures and deposits): the importance of archaeology of pre-1800 date is uncontested everywhere, but the protection afforded to nineteenth- and (especially) twentieth-century archaeologies is rather more hit and miss, although the development of archaeological research into the contemporary world is currently changing attitudes to the most recent past. There is now a body of literature dedicated to the nature of urban-archaeological practice and, closely related to it, a corpus of publications and "grey literature" pertaining to urban-archaeological strategies and policies. This archaeology-as-praxis definition is a development of recent decades, reflecting on the one hand the great explosion of infrastructural development in urban places in the second half of the twentieth century, particularly post-WWII in certain parts of the world, and on the other the fact that research into the medieval and early modern pasts – the period of foundation of so many "living" towns and cities – was itself sporadic and poorly coordinated until the 1960s.

The second, broader definition presents urban archaeology as the archaeological understanding of urban spaces and urban lives, regardless of their location or date. It is, in other words, the

archaeology of *urbanism* as a phenomenon. It draws quite disparate studies – from, say, the study of prehistoric agricultural nucleations in Mesopotamia to the study of nineteenth-century slums and red-light districts in Australia and North America, for example – into the same net, although it has long been the case that histories of urbanism through time tend to be written by geographers and "urban historians" rather than by archaeologists. Most of the research on urbanism in our discipline is focused on understanding the patterns and processes of urban development in shorter time periods and in specific places: thus, for example, there is a voluminous literature pertaining to, for example, urbanism and ancient state formation, colonial towns in the Americas, and Viking-age towns in Europe, while there is an even greater volume concerned with the archaeologies of individual cities.

The distinction between the two definitions of urban archaeology is a fine one, since the purpose of all archaeological intervention in towns and cities, even in rescue-archaeology situations, is to inform our understanding of them. Indeed, published studies of individual urban places not only make central use of data from development-instigated archaeological excavations but are usually precipitated by such excavations. In any case, whatever the specific motivations for archaeological research, studies of individual cities – London, Annapolis, and Melbourne, to name three obvious ones – have been profoundly influential in the side-by-side development of archaeological praxis and archaeological thought.

The meaning or meanings of the term "urban" have, of course, long exercised scholarly minds, not only in archaeology but also in both closely cognate and distantly cognate disciplines too (e.g., geography and sociology, respectively). While debates about terminology often seem peripheral to the serious business of research, terminology is important because the words we use reflect and shape how we think. As an adjective, it is generally agreed across disciplines that "urban" possesses spatial, functional, and social meanings and that these meanings are bound up in each other.

In terms of space, first of all, urban connotes a place of densely concentrated population relative to its surrounding "countryside," with, *critically*, one being defined in contradistinction to the other in every particular instance. The terms "town" and "city" have historical resonances, but the adjective "urban" usefully bypasses the problems raised by the inconsistencies in their usage from one country (even region) to another; "village," however, is universally taken to connote a settlement too small to be regarded as "urban." The measurement of scale appropriate to the definition is not merely areal – the size of a settlement, in other words. Spatial connectivity is critical too: urban places are not merely central places in particular localities but connect to other urban places, allowing greater flows of people, goods, and ideas than are possible in places of dispersed settlement.

Such networks of connectivity bring us to the second definition. Urban places differ from rural places in their functions, and archaeology has contributed hugely to our understanding of those differences. Towns and cities are places of secondary (manufacturing) and tertiary (trade and service) industries and are capable of such specialization not simply because they are relatively large and populous. Rather, it is because they possess symbiotic relationships with rural places and their primary (food-generating) industries *and* are connected to other, similarly specializing, urban places. Archaeology, uniquely, locates the sites and products of such specialization in individual urban settings, illuminates the networks of connectivity which help to explain those products, and, perhaps most critically, reveals the social matrices in which the activities and patterns of production and service provision are located.

This brings us to the third understanding of "urban": its role as a descriptor of society, or more accurately of social relations, in places where the density of population in itself creates for all inhabitants very particular challenges of socio-spatial negotiation. Town and cities, particularly the latter insofar as that word describes very large settlements, are places where power structures are often overtly expressed in planning, architecture, and commerce and where space is contested according to wealth, class, ethnicity, and other forms of identity. Archaeological research on urban places has moved away in recent years from the mere

documentation of the physical heritage to sophisticated social analyses of urban spaces and materialities, a development spearheaded by work on modern (eighteenth-century and later) rather than medieval and more ancient cities.

Looking to the future, urban archaeology continues to face three particular challenges. First, the decades of growth that preceded the recent global economic crash generated in many parts of the world a huge corpus of material from urban sites. Much of this still needs processing. How do we achieve a balance between the storage and recording of data, both of which are time-consuming and expensive, and the generation of meaningful narratives about urban life? Second, given the speed with which urban places change character, even in a global recession, what constitutes urban heritage and what should be protected from alteration? Whose opinions should be solicited in making such decisions? To what extent should the emphasis shift from individual structures in cities to areas in cities and to the landscapes of parts of cities? Third, as archaeological interpretation becomes more sophisticated, there is a need for the discipline to engage more directly with other disciplines with research interests in urbanism. Thirty years ago, Clack and Haselgrove observed that "archaeologists still have no clear idea of what they are trying to contribute to urban studies." While much has changed, the discipline remains more marginal within the larger urban-studies research cluster than it should be given its data-collecting potential and its rich intellectual tradition.

Cross-References

- ▶ Charter for the Conservation of Historic Towns and Urban Areas (Washington 1987)
- ▶ Medieval Urbanism
- ▶ Organization of World Heritage Cities (OWHC)
- ▶ Urban Archaeology at Five Points
- ▶ Urban Archaeology in Twenty-First Century Perspective
- ▶ Urban Heritage
- ▶ Urban Landscapes: Environmental Archaeology
- ▶ Urbanism in the Ancient Near East

Further Reading

Clack, P., and C. Haselgrove. 1981. *Approaches to the urban past*, Occasional paper. Vol. 2. Durham: Department of Archaeology.

Council of Europe. 1999. *Report on the situation of urban archaeology in Europe*. Strasbourg: Council of Europe Publications.

Green, A. 2006. Introduction: Urban historical archaeology – Challenging ambivalence. In *Cities of the world 1500–2000*, ed. A. Green and R. Leech, 1–14. Leeds: Maney.

Leone, M. 2005. *The archaeology of liberty in an American capital: Excavations in Annapolis*. Berkeley: University of California Press.

Mayne, A., and T. Murray, eds. 2001. *The archaeology of urban landscapes: Explorations in slumland*. Cambridge: Cambridge University Press.

Museum of London. 2010. *Tracks through time: Archaeology and history from the East London Line Project*. London: MOLA.

O'Keeffe, T., and R. Yamin. 2006. Urban historical archaeology. In *The Cambridge companion to historical archaeology*, ed. D. Hicks and M. Beaudry, 87–103. Cambridge: Cambridge University Press.

Rothschild, N., and D. Di Zeraga Wall. 2007. Urban archaeology. In *Encyclopedia of archaeology*, ed. D. Pearsall, 2164–2171. San Diego: Elsevier.

Sinclair, P.J., G. Nordquist, F. Herschend, and C. Isendahl, eds. 2010. *The urban mind: cultural and environmental dynamics*, Studies in global archaeology. Vol. 15. Uppsala: Uppsala University.

Urban Archaeology at Five Points

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Introduction

The construction of a new federal courthouse at Foley Square in Lower Manhattan, New York City, by the General Services Administration (GSA) required a cultural resources investigation as stipulated in Section 106 of the National Historic Preservation Act (amended). The

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proposed location of the courthouse was on a block that was once part of the infamous Five Points, a neighborhood known as New York City's most notorious, nineteenth-century slum. Historical research conducted by Historic Conservation and Interpretation (HCI), Inc., a New Jersey firm headed by the late Ed Rutsch, recommended archaeological testing and excavation before construction of the building began. HCI's report, which was done under contract to Edwards and Kelsey, the engineers for the project, made it clear that any intact remains of the Five Points had the potential to provide a less biased picture of life in the neighborhood than the picture drawn by the yellow journalism of the day.

Key Issues/Current Debates/Future Directions/Examples

Before the project began, the site was being used as a parking lot. As is often the case in large cities in the United States, the only open land available for new development is open because buildings that once stood there have been taken down in order to create space for parking. The Courthouse Block was once lined with tenements that faced four streets: Pearl, Park, Chatham, and Baxter. The name, Five Points, derived from the intersection of two of those streets – Baxter and Park – with Worth Street, thus creating five points that emptied into an open area. A lithograph of that open area, dating to 1855, has become the iconic image of Five Points (Fig. 1) and was, in great part, the basis for the set of Martin Scorsese's *Gangs of New York* (2002), a movie based on a book of the same name, published in 1927.

A *project design* provided the program for the documentary research, survey, and excavation of the site, and its analysis and publication. When the tenements were taken down in the 1960s, their foundations including basements were left in place and covered with about 10 ft of fill. The site area included 14 historic lots, and excavation began with the mechanical removal of the fill that covered the basement walls and former

Urban Archaeology at Five Points, Fig. 1 Lithograph of Five Points in 1855 (New York State census). (Image: Valentine's Manual, 1855)

backyard areas on those lots. Once exposed, the building outlines were compared to a series of fire insurance maps that showed the changing configuration of each lot over time. In addition to the configuration of the structures, the maps, in this case by William Perris, include information on building material, use, and condition. The exposed walls were cleaned by hand (with shovels and trowels), and former backyard areas were cleared in order to locate structural features.

A total of 54 *features* were exposed including privies, cesspools, water closets, sumps, trash pits, at least one cistern, a possible ice pit, and a single bake oven. All were measured and mapped (Fig. 2), but only 22 were excavated. The sample included backyard features on lots facing all four street fronts. Features were generally bisected, one-half excavated *stratigraphically*, a profile drawn, and then the second-half was excavated. Catalog (context) numbers were assigned arbitrarily to each provenience (findspot, layer, or *context*) that was removed separately, and all artifacts were bagged by context. With a few exceptions, features were photographed and tied into one of 23 vertical datum points that were located throughout the site area. A few additional excavation units were used to sample the fill that had been deposited before the block was developed for residential use in the late eighteenth–early nineteenth century and to examine underlying strata that were believed to relate to the tanyards that were present on the block before that development.

Stratification diagrams were used to model the sequence of contexts and features and deduce phases of occupation – analytical units

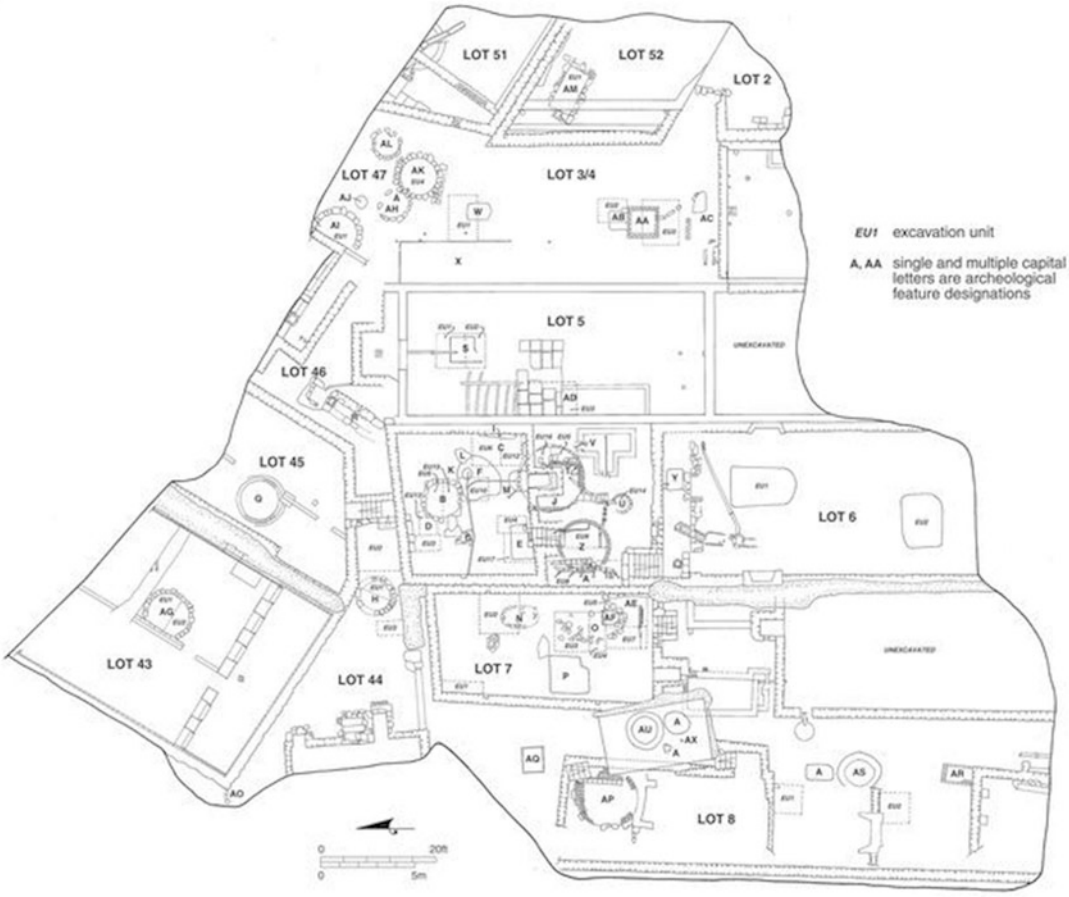

Urban Archaeology at Five Points, Fig. 2 Plan of excavated area

or AU. Specialists in ceramics, glass, clay pipes, and other objects – together with architectural and faunal remains – used these tentative AUs as an initial guide to grouping artifacts. An effort was made to have all analysts working on, or at least beginning, features at the same time in order to maximize communication. AUs were refined based on cross-mending data, especially from the ceramics, and shared with other analysts. Terminus post quem dates (TPQs) were determined from each artifact category and compared to census and directory data which was being collected by a team of historians at the same time. Artifact and primary historical information were entered into a computerized database, which was available to everyone working on the project. Conservation of fragile materials was conducted in the same laboratory with the artifact analysis. Floral and parasitological analyses were conducted by consultants located elsewhere.

The collaborative approach to analysis provided a stimulating environment in which to consider the research questions posed in the research design and to generate new ones. Artifact analysts used their data, sometimes alone and sometimes in combination with other data, to address predefined general research areas: e.g., family and neighborhood life, work and industry, health and hygiene, the construction of the "slum," and working-class life. In addition to the resulting technical papers, the six-volume report includes a narrative history along with vignettes based on the archaeology, the primary documentary data, an illustrated compendium of smoking pipes, an artifact inventory, and a volume covering conservation (Yamin 2000).

The artifacts found in the features provided new insights into everyday life at Five Points. Feature B on Lot 6, for instance, included two sets of everyday dishes, a cut glass decanter and wine glasses, olive oil bottle seals, and lead seals with Hebrew letters on them that had belonged to a Jewish family named Goldberg who lived on the Pearl Street lot in the 1830s. Their food remains suggested they kept kosher and a book on New York City's early Jewish community listed a synagogue at that address, Harris Goldberg, sexton. A large cesspool on the same lot (Feature J) included artifacts associated with a tenement built in 1848 to house newly arrived Irish immigrants. The artifacts revealed evidence of people striving for respectability. They were not well-off, but they ate better than they had at home in Ireland and had dinner and tea wares imported from Staffordshire. A privy belonging to a brothel was found on the other side of the site (Lot 43 on the figure) that included two classes of artifacts – some that probably related to entertaining clients (a porcelain tea and coffee set, many wine bottles, lighting fixtures, fancily decorated smoking pipes, the remains of seafood snacks) and others relating to the private lives of prostitutes (the contents of a sewing box, female urinals, bird cage watering devices, children's toys, and china). The brothel was in the center of what was New York City's first garment district, and privies associated with the German and Polish tailors and second-hand clothing dealers who worked there were also excavated. There were thousands of straight pins – some still tucked in paper, fasteners, twill tape, buttons, and thimbles, some personalized and some specially made for tailors without tops. The picture that emerges of Five Points from the archaeology is not a generic picture of a slum. It was a vibrant, multiethnic neighborhood where various immigrant groups got their start-up in the economic ladder in their new homes.

Cross-References

- ▶ Archaeology as Anthropology
- ▶ Archival Research and Historical Archaeology
- ▶ Urban Archaeology in Twenty-First Century Perspective

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References

Yamin, R., ed. 2000. *Tales of Five Points: Working- class life in nineteenth- century New York*. Vols. I–VI. (Edwards and Kelcey Engineers, Inc. and General Services Administration, Region 2). West Chester: John Milner Associates.

Urban Archaeology in Twenty-First Century Perspective

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Introduction and Definition

Cities are among humankind's most complex creations. To do archaeology in a city is to probe into a complicated past that leaves a complicated record. The mere act of excavation is no small challenge, and the analysis of the wealth of data recovered is an even greater one. An entire city may be thought of as an individual site or it may be broken down into a multitude of sites – individual properties that have changed hands, and possibly shape, many times and been used for many different purposes.

Although the archaeology of cities is not new and, in fact, is one of the oldest fields of endeavor – think, for instance, of Rome, Ur, or Teotihuacan where some of the discipline's pioneers concentrated their energies – doing archaeology in younger cities is different and is the focus of this entry.

This kind of urban archaeology is in great part the result of historic preservation laws which require the investigation of places within cities that are slated for redevelopment, places where new construction will destroy remnants of what was there before. This is not always the case though. St. Mary's City, the sixteenth-century capital of Maryland in the United States, is an abandoned city that has been made visible by a long-term archaeological program that, among other things, has revealed its baroque plan, based on the plans that were fashionable in Europe when St. Mary's City was founded (Leone and Hurry 1998: 35). More common in the United States and elsewhere, however, are excavations undertaken ahead of new construction within the constraints of time and money (Fig. 1). These kinds of projects have made all sorts of unexpected discoveries, from the creation of new land to forgotten burial grounds, from the recovery of Staffordshire tea sets in neighborhoods known as slums to alcohol bottles in the homes of teetotalers.

Urban Archaeology in Twenty-First Century Perspective, Fig. 1 Excavation of a block in New York City, once part of the notorious Five Points neighborhood, where the Patrick Moynihan Federal Courthouse now stands

Any urban project begins with the detailed study of maps which graphically show the growth and change in cities over time. In the USA, nineteenth-century fire insurance maps are particularly valuable when planning an urban excavation as they delineate lot boundaries and the configuration of major structures, and even some minor ones, within those boundaries (Fig. 2). To know who lived in those structures, urban archaeologists consult city directories, tax records, census records, and deeds. If they are lucky, there will be other pertinent documents like diaries, legal case records, or even secondary sources that

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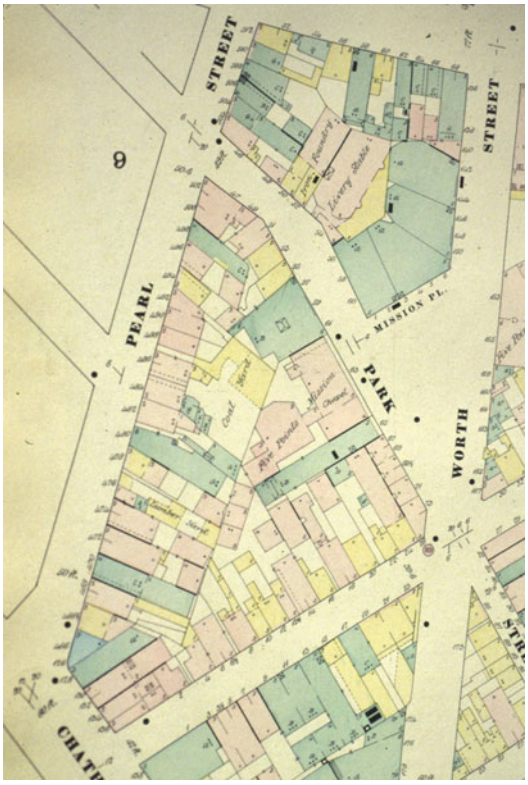

Urban Archaeology in Twenty-First Century Perspective, Fig. 2 1853 Perris Insurance Atlas map of the New York City block shown in Fig. 1

involve people who lived on the site at one time or another. Such documents are rare, though, since urban projects are more often than not in places where ordinary people lived and worked, people who did not keep diaries and are not mentioned in history books. Historical research is part and parcel of doing urban archaeology, and building a historical context is essential for both investigating the site and especially for interpreting the finds. Urban archaeologists have also adopted scientific techniques developed in other disciplines to squeeze as much information out of the recovered data as possible. Faunal specialists analyze animal bones to reconstruct diet and butchering patterns, archaeobotanists use microscopic plant remains to reconstruct environmental conditions as well as to provide information on diet and medicine, and palynologists identify pollen relating to historic plant communities. The microscopic eggs found in night-soil deposits are identified by parasitologists to speculate about diseases in historic populations, soil chemistry is sometimes used to define activity areas, and the identification of bugs (entomology) may be used to define environmental features and household products.

Historical Background

Some of the most dramatic finds in cities relate to the manipulation of landforms. Maps show the changing configuration of New York's shoreline beginning in the seventeenth century, but archaeological excavations have also revealed the depths and contents of the fills used to create new land (Cantwell and Wall 2001: Chapter 13). A project in the 1980s at 175 Water Street in Lower Manhattan encountered a 92-foot-long, 25-foot-wide merchant ship that had been used to contain fill at the eastern end of four water lots stretching out into the East River. At another site in Lower Manhattan (the ASSAY site), a series of late eighteenth-century timber wharves that had been filled and built upon in the nineteenth century was uncovered (Fig. 3). Wharves have also been found under made land in Philadelphia, Boston, Baltimore, Albany, and San Francisco in the United States, and in a variety of European cities including London, Dublin, Amsterdam, Dordrecht, Bergen (Norway), and some sites in Denmark (McDonald 2011). Besides the research value of comparing wharf construction and interpreting waterfront activity, these filled structures reveal the premium put on urban land and the effort that went into creating it before machines were available to do the earth moving.

Wharves are not the only made land in cities where land was at a premium. A whole harbor was covered over in Istanbul leaving at least 22 shipwrecks in situ. The site, known as Yenikapi and discovered during construction of a transportation hub in the early twenty-first century, covered an area about the size of ten city blocks and was dug completely by hand, sometimes down to a depth of 25 ft. (Rose and Aydingün 2007). Besides boats, the excavation uncovered a limestone breakwater that protected the city's first harbor, a

Urban Archaeology in Twenty-First Century Perspective, Fig. 3 Timber wharves uncovered on the assay site in Lower Manhattan, New York City

possible length of Constantinople's original wall, the walls of a charnel house later converted to a tannery, and all the things expected in a harbor – anchors, ships' fittings, and hundreds of amphorae. Less common were well-preserved objects made of leather and wood, preserved because of the waterlogged anaerobic conditions. Extraordinary finds were immediately conserved, removed from the field, and placed on display in the Archaeological Museum of Istanbul, an ideal practice rarely possible while an excavation is still underway.

Most modern cities are built on many layers of fill, and figuring out the stratigraphy in the fill (or fills) is a major task of urban archaeology. This is as true in Istanbul as it is in New York. The strata, or layers, may cover evidence of sequential occupations, often alternating between old living surfaces and material used to cover the surfaces and support new ones. As with the filled wharves that supported made land, fill was also used to fill up ponds, abandoned foundations, and backyard features, such as privies, wells, and cisterns. These features frequently served as repositories for all sorts of household and/or workshop trash which becomes the data urban archaeologists use to learn about peoples' daily lives, their work, their tools, their tastes, and their economic wherewithal. Broken dishes, for instance, are mended to define their functions, and matching ones are identified as sets. The decorations on clay pipes are used as clues to group membership (e.g., Masonic order, Irish Fenians), and butchering marks on bones may indicate ethnicity. A basic difference between urban archaeology in the United States and elsewhere is this emphasis on artifacts.

In the USA, artifact assemblages, used as keys to everyday life, provide the major focus of analysis, whereas in England, for instance, it is the organization of space – the way urban places are configured – that receives the most attention. At the Hungate site in York, UK, a broad horizontal approach to excavation was used to expose the complex pattern of foundations present in this nineteenth-century, working-class neighborhood (Fig. 4). Likewise, at the Rocks in Sydney, Australia, cottage foundations were exposed over a large area revealing the tight crowding in that working-class neighborhood. This difference in emphasis probably has more to do with the nature of the sites and cities where they were found than with choice on the part of the investigators. In general, large urban archaeological projects in the USA are in areas where deep nineteenth-century basements destroyed most of the earlier land surfaces and any remnants of structures built upon them. All that is left are the nineteenth-century basement foundations. To find backyard privies, wells, cisterns, and trash pits

Urban Archaeology in Twenty-First Century Perspective, Fig. 4 Densely packed foundations exposed at the Rocks in Sydney, Australia

that predated the nineteenth-century buildings, it is necessary to lift up the basement floors and look beneath them.

There are exceptions though. Remnants of an eighteenth-century African Burial Ground were found in Manhattan beneath nineteen feet of fill (Fig. 5). The land where the burial ground was built originally sloped steeply down to a freshwater pond that was filled at the beginning of the nineteenth century and the land around it was raised and leveled. When buildings were built on top of that land, their foundations did not reach the old ground surface at the bottom of the slope. Over 300 burials were excavated from this surface in the early 1990s, contributing invaluable data on the physical condition of Africans (many enslaved) in eighteenth-century New York and on the origins of the population that had made the Middle Passage (Cantwell and Wall 2001: Chapter 16). Other historic burial grounds have also been excavated on urban sites in the USA including two cemeteries belonging to the First African Baptist Church in Philadelphia, Freedman's Cemetery in Dallas, Texas, Voegtly Cemetery in Pittsburgh, and the UAME Cemetery in Wilmington, Delaware. The covering over of these burial grounds within cities and the reuse of the land are another indication of the premium put on urban land. Rather than treated as sacred space

Urban Archaeology in Twenty-First Century Perspective, Fig. 5 Remains of the African Burial Ground exposed at 19 ft. below grade on a site in Lower Manhattan where the General Services Administration was building an office building

not to be disturbed, they were covered with fill, forgotten, and incorporated into the secular city.

Key Issues/Current Debates

Although the subjects of analysis on urban projects depend to a great degree on the finds, certain subjects recurrently emerge. Class is one of the most important, and urban projects have provided rare access to working-class neighborhoods in several major cities. The Cumberland/Gloucester Street site, investigated in the early 1990s in Sydney, Australia, occupied what had been two half-city blocks where 42 homes had stood. The neighborhood, known as "The Rocks," was cleared in the early twentieth century, but beneath a thick layer of fill, the archaeologists found evidence going back to the earliest occupation of the area. Convict men and women first settled the sloped ground across the harbor from the center of Sydney in the late eighteenth century. Row houses gradually replaced the early terrace ones, and by the middle of the nineteenth century, the neighborhood was regarded by outsiders and historians as "a classic slum" (Karskens 2001: 69). The excavation complicated the picture, producing evidence of refined dining (dinner, breakfast, and tea sets), moralizing china that would have inculcated proper values in children, and wash sets and combs and brushes that indicated an emphasis on cleanliness, all qualities assumed to be lacking in "slum" dwellers (Fig. 6). Even what was left of the houses showed a care for interior decoration and a willingness to spend money on decorative items like china figurines, rugs, and lamps. While there was no question that the inhabitants were workers – many artifacts relating to sewing suggested that women worked as seamstresses and dressmakers – and the neighborhood was overcrowded and unsanitary, it appeared to the investigators that residents' values were not so different than middle-class values of the time. Seen from the outside, the neighborhood looked dangerous, but from the inside – from the archaeological evidence – it looked very different.

The Five Points project in New York City produced much the same result (e.g., Yamin 2001b). Also excavated in the early 1990s, the site was located on a block that was once part of the Five Points neighborhood, known as New York City's most notorious nineteenth-century slum. One side of the project area was inhabited by Eastern European, mostly Jewish, immigrants, and the other by newly arrived Irish immigrants. While the Eastern European residents, many of whom were in the tailoring or used clothing business, may have been economically better off, artifacts recovered from a large cesspool associated with an Irish tenement

Urban Archaeology in Twenty-First Century Perspective, Fig. 6 Moralizing China recovered at the Rocks, Sydney, Australia

indicated that the Irish ate more expensive cuts of meat and owned the same kinds of Staffordshire teawares they would have had at home in Ireland. Their tenement households were overcrowded and households often included borders, but families were more comfortable than they had been in Ireland and did not fit the stereotypes portrayed in the yellow journalism of the day. These two projects in working-class neighborhoods demonstrate the power of urban archaeology to get inside neighborhoods that have previously been portrayed negatively by outsiders through prejudice and fear of "the other."

Another strength of urban archaeology is its ability to bring people close to the past and reveal the connections between past and present. A long-term project in Annapolis, Maryland, invited visitors to view ongoing excavations and talk to the archaeologists who were doing work (Potter 1994). Using critical theory as a framework for interpretation, the archaeologists connected the finds in the ground to the context of the living city. This kind of archaeology has the capacity to demythologize places where excavations are conducted and the people who do them. In Cape Town, South Africa, excavations in District Six, a multiethnic neighborhood that was leveled in the 1970s, revealed the reality of living conditions in yet another neighborhood portrayed as a slum, and the investigators worked with peoples' memories to capture the "complexity, contradictions, and ambiguity" of life in the district (Malan and Van Heyningen 2001: 53). In a different way, the extensive archaeological work done in Quebec City in anticipation of the city's 400th anniversary has made the city's past – its heritage – visible (Moss 2009). Excavations uncovered Jacques Cartier's sixteenth-century fort, the seventeenth-century Chateau Saint Louis including Champlain's house, and the Intendant's Palace which, before it was a palace, was a shipyard and before that, a brewery. Careful attention was paid on this project to botanical and entomological data which revealed changes in the landscape. Recovered artifacts included French-made wares that were being used by Samuel D. Champlain and his retainers as well as assemblages relating to the earliest interactions with native peoples. What is perhaps most extraordinary about the work in Quebec is the support it received from national, provincial, and local agencies, setting an ideal, though probably unreachable, standard for other cities.

While these large excavations done in public view attract a good deal of attention from the press and from visitors, the written reports, weighed down with exhaustive artifact lists and methodological descriptions, have generally been less accessible. A number of urban archaeologists, however, have experimented with using a variety of narrative styles to bring urban data to life (Praetzellis and Praetzellis 1998). In some instances, the narratives serve to clarify the analysis by bringing the many strands of data – artifact, environmental, historical, etc. – together into one interpretation as well as to make the results readable (Yamin 2001a). In the UK, archaeologists working in industrial cities have brought the past in those places to life by paying particularly close attention to context. The interweaving of still standing architectural remnants with archaeological finds is enormously evocative and a powerful way to make sense of cities that have changed so dramatically over time (Belford 2006; Symonds 2006, 2011). This work is yet another example of archaeology revealing a past that is irreparably intertwined with the present.

Urban archaeology is many things. It can be as intimate as the portrait of a lady that begins with her bodkin, the implement she used to lace up her bodice (Beaudry 2011), or as impersonal as the symbolic meaning of changes in orientations of public buildings (Leone and Hurry 1998). Above all, urban archaeology combines data derived from excavation and the analysis of material culture with information drawn from primary documents as well as secondary historical sources to interpret the growth of cities and the experience of urban life.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Agency in Archaeological Theory
- ▶ Annapolis: Historical Archaeology

▶ Capitalism: Historical Archaeology
▶ Clay Pipes in Historical Archaeology
▶ Historic St. Mary's City
▶ History and Archaeology: Relationship Over Time (US Perspective)
▶ Southern Africa: Historical Archaeology
▶ Teotihuacan: Geography and Culture
▶ Topography of Rome
▶ Urban Archaeology
▶ Urban Archaeology at Five Points
▶ Zooarchaeology

References

Beaudry, M.C. 2011. Stitching women's lives: Interpreting the artifacts of sewing and needlework. In *Interpreting the early modern world, transatlantic perspectives*, ed. M.C. Beaudry and J. Symonds, 143–158. New York: Springer.

Belford, P. 2006. The world of the workshop: Archaeologies of urban industrialisation. In *Cities in the world, 1500–2000*, ed. A. Green and R. Leech, 133–149. Leeds: Maney Publishing.

Cantwell, A.-M., and D. diZerega Wall. 2001. *Unearthing Gotham, the archaeology of New York City*. New Haven: Yale University Press.

Karskens, G. 2001. Small things, big pictures: New perspectives from the archaeology of Sydney's Rocks neighborhood. In *The archaeology of urban landscapes, explorations in Slumland*, ed. A. Mayne and T. Murray, 69–85. Cambridge: Cambridge University Press.

Leone, M.P., and S.D. Hurry. 1998. Seeing: The power of town planning in the Chesapeake. *Historical Archaeology* 32: 34–62.

Malan, A., and E. Van Heyningen. 2001. Twice removed: Horstley Street in Cape Town's District Six, 1865–1082. In *The archaeology of urban landscapes, explorations in Slumland*, ed. A. Mayne and T. Murray, 39–56. Cambridge: Cambridge University Press.

McDonald, M.R. 2011. Wharves and waterfront retaining structures as vernacular architecture. *Historical Archaeology* 45: 42–67.

Moss, W., ed. 2009. The recent archaeology of the early modern period in Quebec City. *The Journal of the Society for Post-Medieval Archaeology* 43 (1).

Potter, P.B., Jr. 1994. *Public archaeology in Annapolis. a critical approach to history in Maryland's ancient city.* Washington: Smithsonian Institution Press.

Praetzellis, M., and A. Praetzellis, ed. 1998. Archaeologists as storytellers. *Historical Archaeology* 32 (1).

Rose, M., and S. Aydingün. 2007. Under Istanbul. *Archaeology* 60: 34–40.

Symonds, J. 2006. Tales from the city: Brownfield archaeology-a worthwhile challenge? In *Cities in the world*, ed. A. Green and R. Leech, 235–248. Leeds: Maney Publishing.

Symonds, J. 2011. Stooping to pick up stones: A reflection on urban archaeology. In *Interpreting the early modern world, transatlantic perspectives*, ed. M.C. Beaudry and J. Symonds, 63–84. New York: Springer.

Yamin, R. 2001a. Alternative narratives: Respectability at New York's Five Points. In *The archaeology of urban landscapes, explorations in Slumland*, ed. A. Mayne and T. Murray, 154–170. Cambridge: Cambridge University Press.

Yamin, R., ed. 2001b. Becoming New York: The Five Points neighborhood. *Historical Archaeology* 35 (3): 1–5.

Further Reading

Bain, A. 1998. A seventeenth century beetle fauna from colonial Boston. *Historical Archaeology* 32: 38–48.

Henry, S.L. 1987. A chicken in every pot: The urban subsistence pattern in turn-of-the century Phoenix, Arizona. In *Living in cities, current research in urban archaeology*, Society for historical archaeology special publication series, ed. E. Staski, vol. 5, 19–28. Pleasant Hill: Society for Historical Archaeology.

Kelso, G.K. 1998. Pollen analysis of the feature 4 privy at the Cross Street Back Lot Site, Boston, MA. *Historical Archaeology* 32: 49–62.

Mrozowski, S. 1987. Exploring New England's evolving urban landscape. In *Living in cities: current research in urban archaeology*, Society for historical archaeology special publication series, ed. E. Staski, vol. 5, 1–9. Pleasant Hill: Society for Historical Archaeology.

Urban Dark Earth

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Introduction

Dark Earth is a term used in European urban archaeology to designate thick, dark-colored, homogeneous deposits covering large surfaces generally ascribed to the post-Roman period. Dark Earth constitutes an important part of urban stratigraphy. Taking into account that these deposits

lack any recognizable internal stratigraphy and that they often formed over several centuries, their study requires an adapted research protocol and case-by-case investigation. The systematic study of Dark Earths from an environmental perspective enhances our knowledge of the array of human and natural events that shaped European cities.

Definition

The term Dark Earth does not correspond to a soil classification name (e.g., in soil taxonomy, FAO/WRB, etc.) nor should it imply a univocal archaeological interpretation. The term is used in substitution for other terms present in older literature such as "dark layers," "black layers," "black earth," "made earth," or "dark made earth" (see Macphail et al. 2003; Brogiolo 2011). In Eastern Europe and Scandinavia, the expression "cultural layer" is often used (Krupski et al. 2017). In this chapter the adjective "urban" is employed in order to avoid confusion with "Amazonian Dark Earths." Urban Dark Earth indicates dark-colored, humic, and poorly stratified units, often formed over several centuries, frequently rich in anthropogenic remains (brick, mortar, tile, charcoal, bone, pottery, slag, etc.) occurring over large surfaces in urban contexts. More specifically, urban Dark Earth *stricto* sensu is applied to indicate units situated in between stratified deposits of antique cities (between the first and the third to fifth century CE) and medieval ones (from the eleventh to twelfth century CE onward). More detailed discussions on the definition of "urban Dark Earth" are offered by Macphail et al. (2003), Galinié (2004), Fondrillon (2009), and Devos et al. (2009, 2011).

Historical Background

Interest in urban Dark Earth has developed since the late 1970s as part of the study of the transformations of urban space after the collapse of the Roman Empire in the United Kingdom, Italy, and France (Nicosia et al. 2013). The homogeneous nature of Dark Earth, together with its thickness, has often led scholars to interpret it as the result of a single process, natural or anthropic, to explain its origin. Such interpretations explain urban Dark Earths as alluvial deposits, as simple accumulations of urban dumps, as massive backfill units for ground-rising purposes, as gardens, or as urban horticultural plots. However, the application of analytical methods of geosciences to Dark Earths (especially soil physicochemical analyses and soil micromorphology) has revealed that they result from a complex interplay of many diverse anthropic activities and natural processes. The first examples of the use of these analytical techniques date to the early 1980s at urban sites in the United Kingdom (Macphail 1981). In Italy, a geoarchaeological approach involving the use of soil micromorphology was applied to the study of Dark Earths initially by Cremaschi (1992) in the city of Ferrara. In France, the use of an interdisciplinary protocol for the analysis of Dark Earth involving historians, archaeologists, and geoscientists was advocated in 1995 by Cammas et al. (1995). In Belgium, a pioneering multidisciplinary study was made in the historical center of Ghent in the 1990s (Nicosia et al. 2017).

At the break of the new millennium, an expansion of research on urban Dark Earth can be noticed. This entails a geographical diffusion to Scandinavia and Central and Eastern Europe (see, e.g., Heimdahl 2005), as well as the development of a more solid framework:

- Several research protocols are proposed, involving the integration of different disciplines (e.g., archaeology, geoarchaeology, archaeobotany, archaeozoology, etc.) (see, e.g.: David et al. 2000; Laurent and Fondrillon 2010; Devos et al. 2011).
- A sampling rationale for Dark Earth has been developed (Laurent and Fondrillon 2010; Nicosia et al. 2017).
- Besides the application of traditional archaeological and geoarchaeological approaches, a series of new methods are applied: geophysics (David 2004), macrobotanical studies (Heimdahl 2005), micro-artifact studies and analysis of the coarse content (Sidell 2000), 3D mapping of Dark Earth (Borderie et al.

2014), and phytolith studies on thin sections (Devos et al. 2013).

Key Issues/Current Debates

A key issue in Dark Earth studies concerns the understanding of the formation processes hidden behind the apparent homogeneity of these units. Soil micromorphological, physicochemical, and archaeobotanical analyses have demonstrated that they involve several syn- and post-depositional processes. Accretion derives from the input of a vast range of materials, such as kitchen refuse, hearth rake-out, cereal-processing waste, cess, manure, construction materials (stone, brick, mortar, plaster, tiles, wood, earth-based materials, etc.), industrial and artisanal waste, and backfill. Accretion can also result from flooding (see Figs. 1 and 2) and colluvial and eolian processes. Successive phases of human reworking (plowing, digging, robbing, etc.), bioturbation (rodents, earthworms, enchytraeids, roots), and weathering of earth-based materials and organic remains have been reported to cause the obliteration of any original stratification or sedimentary structure and the ultimate homogenization of Dark Earth. Under the microscope it is possible to observe that charcoal, ceramics, bone, and even coprolites become heavily fragmented and may develop a random and unoriented distribution throughout Dark Earth (Fig. 3). Besides bioturbation, other soil-forming processes are also involved in the genesis of Dark Earth. These correspond mainly to humification of the organic material, decalcification, alkalinization, and oxidoreduction. Part of the sequence can be lost due to erosion by wind and water and/or truncation by successive human activities. Taking into account the complex formation history, several models have been proposed, emphasizing the necessity of investigation of the Dark Earth on a case-by-case basis (see, e.g., Macphail 1994; Heimdahl 2005; Devos et al. 2011) (see Fig. 5).

For historians and archaeologists studying urban history, identifying the palimpsest of activities hidden within Dark Earth and their spatial distribution is of crucial importance. The geoarchaeological approach allows to disentangle such superimpositions. The activities consist, for example, of repeated dumping of waste, cultivation and manuring (see Fig. 4), herding (see Fig. 4), stabling of animals, leather and metal working, decay of insubstantial buildings, and market activities. Several attempts have been undertaken to develop maps showing the distribution of activity zones identified within Dark Earth (Devos et al. 2011; Borderie et al. 2014), thus contributing to understanding the organization of the urban fabric. Dark Earth *stricto* sensu often witnesses the introduction in the post-Roman city of activities typical of the rural world (agriculture, horticulture, herding, soil extraction, etc.). From a historical perspective, they appear in a moment of profound transformation of European cities. Further, according to Galinié (2004) and Brogiolo (2011), Dark Earths *stricto* sensu do not seem to accompany a moment of de-urbanization, abandonment, and impoverishment, but rather a phase in which agricultural activities possibly acquired a particularly important role in the urban economy. It is important to note that, besides natural sedimentary processes, the parent material for Dark Earths *stricto* sensu is primarily provided by anthropic sedimentation, which implies the presence of humans and their activities inside the post-Roman city.

A second issue concerns the chronology of the events during which urban Dark Earth formed. Although micromorphological investigations can often reveal their relative chronology, absolute dating remains an issue. As Dark Earths often formed over several centuries and were subjected to heavy reworking, part of the artifacts and of the datable materials (e.g., charcoal and seeds) were mixed within the deposit, thereby hampering the dating process (see, e.g., the radiocarbon dating of a seventh- to eleventh-century CE Dark Earth sequence from Florence in Nicosia et al. 2012).

A third key topic is the potential of Dark Earth to provide proxies to understand the evolution of the urban environment. As such, the integration of soil micromorphology and the study of phytoliths in thin sections provides a wealth of data on the cultivation of crops within the (pre-)urban area in Brussels and Flanders (see, e.g., Devos et al. 2011).

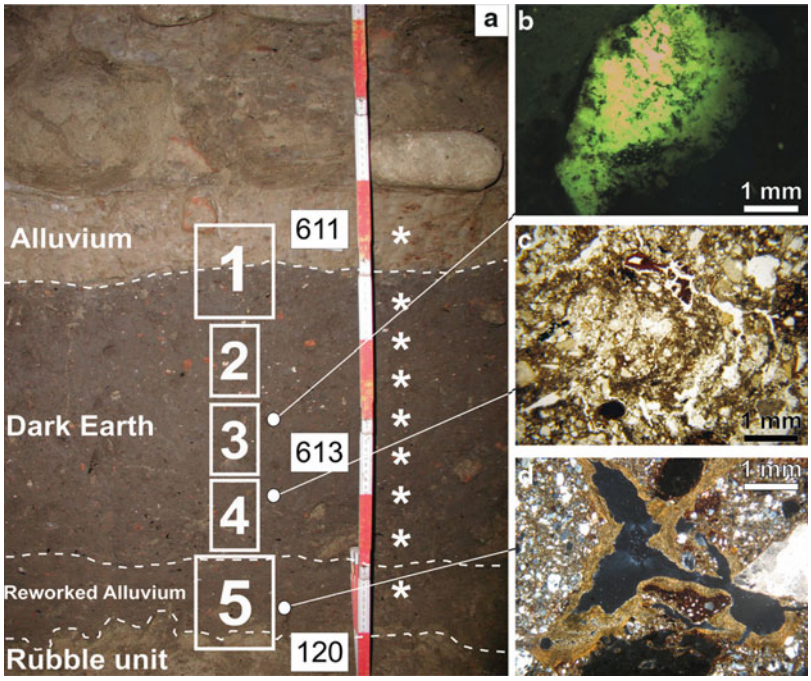

Urban Dark Earth, Fig. 1 Firenze, Uffizi gallery complex (see Nicosia et al. 2012), an example of Dark Earth in an active alluvial setting. (**a**) The stratigraphic sequence, composed from bottom to top by a construction rubble unit (Unit 120); a layer of clay-loamy alluvium reworked by bioturbation and weathering into Dark Earth; a 40-cm-thick Dark Earth unit deriving from night soiling, domestic waste discard, and episodic input of alluvium (Unit 613); alluvial silty clay loam layer from the Arno river (Unit 611; possibly the large magnitude flood of 1177 CE). Note the sampling strategy: a continuous set of thin sections (rectangles), intercepting both the basal and top interfaces of Dark Earth, accompanied by a continuous series of samples for physicochemical analyses (asterisks), in close association with the undisturbed samples for thin sections. (**b**) Carnivore-omnivore excrement fragment fluorescent under blue light. This type of illumination can be used as an aid to identify organic components in thin section. Additional SEM/EDS analyses highlighted a calcium-phosphate composition, confirming the interpretation as fecal material: 58.1% Ca; 35.8% P; other elements (<3%) Na, Mg, Si, and Al (atom%, without oxygen) (blue light fluorescence, 20×). (**c**) Passage feature deriving from the burrowing action of soil fauna (earthworms, beetles, ants, small rodents, etc.). The occurrence of these features is typical in Dark Earth thin sections and testifies to the strong homogenizing effect of bioturbation. At higher magnifications (100×–400×), many finely comminuted charcoal and charred vegetal particles can be seen within such passage features (plane polarized light, 20×). (**d**) Layered silts and clays filling a pore, as the result of flooding and runoff on the soil surface. This type of features forms at depth in seasonally flooded soils, indicating the periodic input of alluvial material during Dark Earth formation. The alluvium brought in was then reworked by bioturbation and human activities into Dark Earth (crossed polarizers, 20×)

Combined archaeobotanical, archaeozoological, and geoarchaeological studies also permit the reconstruction of local and supralocal landscapes (Devos et al. 2017a).

International Perspectives

The frequent discovery of Dark Earth in towns all over Europe led scholars from different geographic contexts to share ideas and experiences in the analysis and interpretation of Dark Earths with new focus. This resulted in the organization of a series of international meetings. In 2001 a round table on Dark Earth is organized in Louvain-la-Neuve (Belgium) (Verslype and Brulet 2004). During the World Archaeological Conference in Dublin (Ireland) in 2008, a session titled "Geoarchaeology and Dark Earths" treated the European urban and the Amazonian Dark

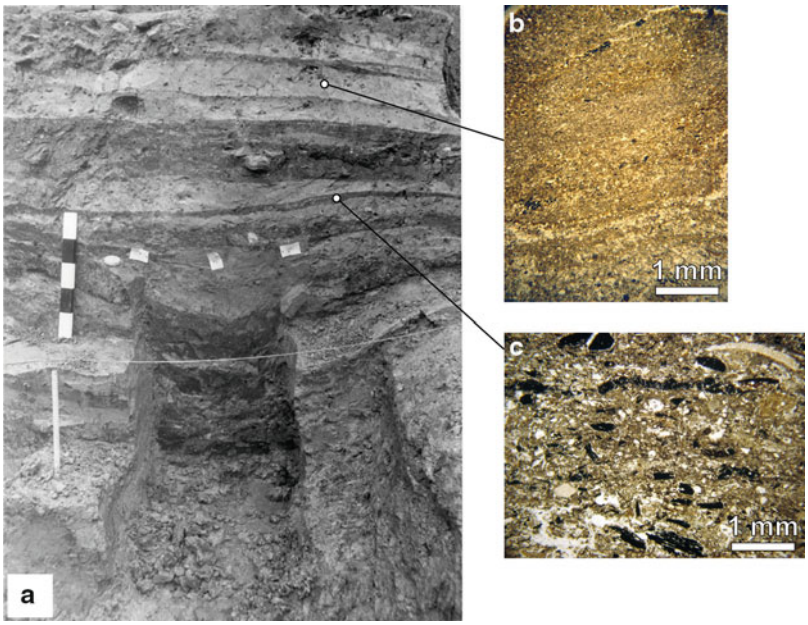

Urban Dark Earth, Fig. 2 Ferrara, Corso Porta Reno site (see Cremaschi and Nicosia 2010), an example of a fast-accreting urban sequence due to the repeated input of alluvium by the nearby Po river. Dark Earths *stricto* sensu did not form at this site because accretion was too fast for soil-forming processes, especially bioturbation, to completely homogenize the deposit. (**a**) The stratigraphic sequence of the site, with occupation deposits (dark-colored layers), dating to the eighth to thirteenth centuries CE, intercalated to alluvial layers (light-colored layers). (**b**) View in thin section of alluvial fine sands and silts. Note the presence of laminations (plane polarized light, 20×). (**c**) Occupation deposit in thin section: the strong parallel horizontal orientation of the coarser components (mostly charcoal and charred matter) and the massive microstructure are linked to trampling and compaction (plane polarized light, 20×)

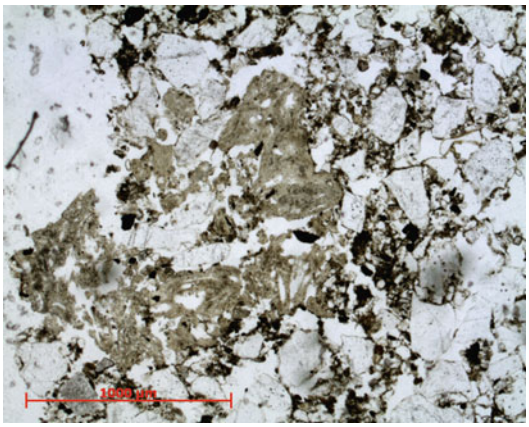

Urban Dark Earth, Fig. 3 Brussels, Court of Hoogstraeten site (see Devos et al. 2013). Microphotograph showing the fragmentation of coprolithic material (plain polarized light, 20×)

Earth. Dark Earths were also a key issue during the "Journée d'étude: Géoarchéologie de l'urbain" in Paris in 2009 (Borderie 2011) and the "Conference on the Environmental Archaeology of European Cities in Brussels" (2015) (Devos et al. 2017b). During all these meetings, the problematic of Dark Earth, its definition, and the perspectives for further research were thoroughly discussed. This also resulted in an exponential rise in the amount of publications and communications on the subject involving collaboration of scholars from different countries (e.g., Nicosia et al. 2013, 2017; Borderie et al. 2014) and attempts to standardize research procedures (see, e.g., Nicosia et al. 2017).

The research protocols developed for the study of urban Dark Earth are increasingly used to study the so-called rural Dark Earth: thick, humic,

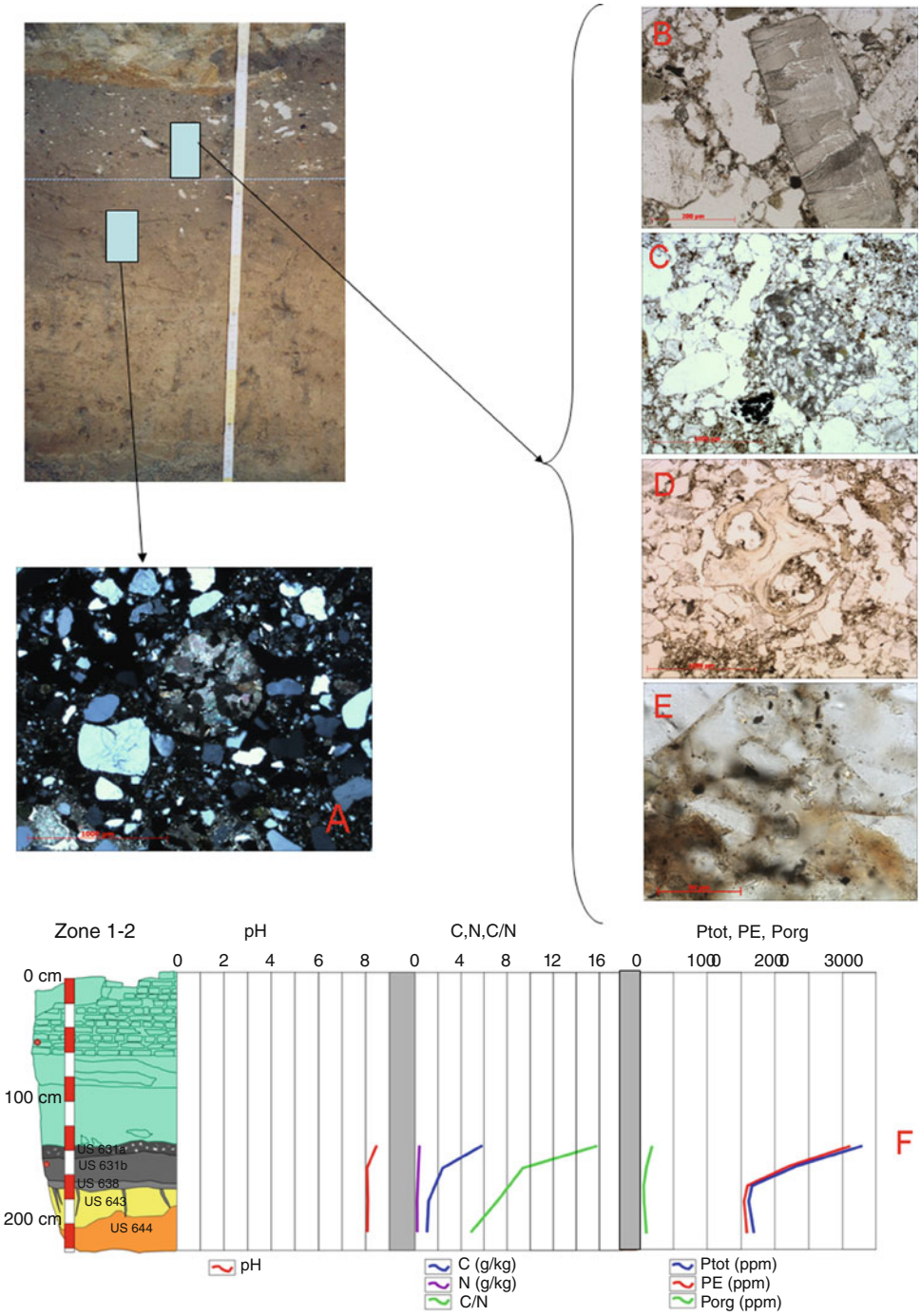

Urban Dark Earth, Fig. 4 Brussels, rue de Dinant (modified from Devos et al. 2009), an example of Dark Earth formation due to a succession of human activity and natural processes. The lower part witnesses grassland. Evidence is the open microstructure with abundant earthworm granules (biocalcite) (**a**) and a phytolith spectrum typical for grassland (see Devos et al. 2009). The upper part of the Dark Earth results from reworking of the soil and the growing of crop fields. Among the evidence the combined presence of ploughmarks, eggshell (**b**), mortar (**c**), bone (**d**), phytolith markers for cereals (**e**), and enhanced concentrations of phosphorus and bases revealing enhanced chemical fertility (**f**) (see Devos et al. 2009)

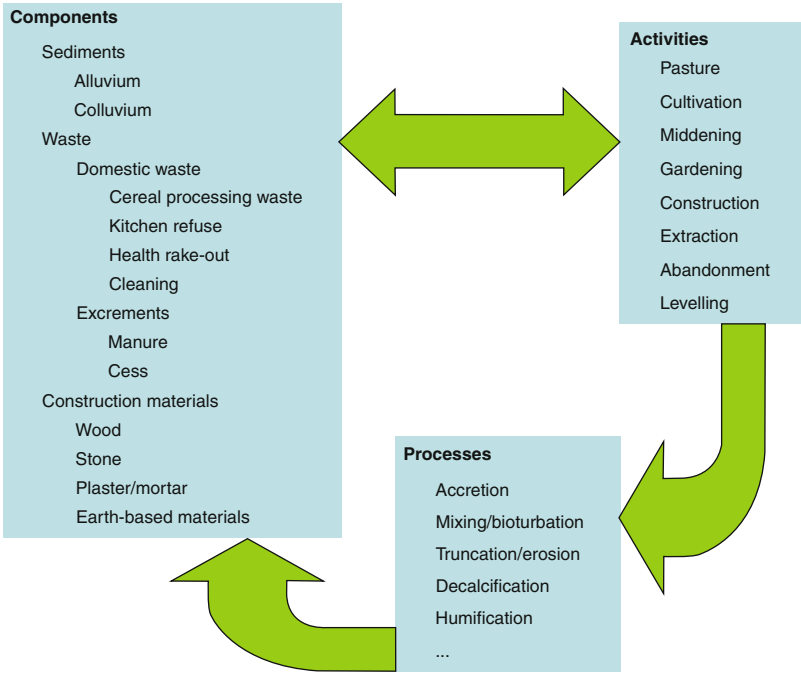

Urban Dark Earth, Fig. 5 Simplified model showing the main components, activities, and processes involved in the formation of Dark Earth (Based upon Macphail 1994; Goldberg and Macphail 2006; Devos et al. 2011)

homogeneous, dark-colored layers that are found on rural sites (Goldberg and Macphail 2006).

Future Directions

The lack of internal stratification of urban Dark Earth deposits at the macroscale is particularly problematic for urban archaeologists as it runs contrary to the concept that "one stratigraphic unit equals one action" (Harris 1989). However, many interdisciplinary studies have proven that, in many cases, Dark Earth represents a palimpsest of different activities and natural processes subjected to thorough homogenization and to weathering (Fig. 5). The resulting ostensible homogeneity of a deposit belies its complexity. Although soil micromorphology has proven a powerful tool in elucidating the use of space and the cultural activities associated with Dark Earth formation, further integration of other analytical methods is advocated. Specifically, thin section study can be integrated with soil physicochemical analyses, instrumental analyses (e.g., electron microprobe, SEM/EDS), phytolith and parasite analysis, micro-archaeology, and spatial analysis of artifact distribution.

Future study should include research on the origin and evolution of the organic matter in Dark Earth, especially of pyrogenic organic matter, and the collaboration between soil micromorphologists and pedo-anthracologists.

Taking into account the complexity of Dark Earth, its study requires a systematic analytical approach. Beginning with appropriate research questions, this includes quality sampling, knowledge of natural processes acting in specific contexts, and the application of solid interpretive models drawn from archaeological excavations.

Systematic recording and study of all Dark Earth within towns should not only improve our knowledge on the spatial organization of the different neighborhoods and their evolution but will also contribute to our understanding of the evolution of the urban landscape and its vegetation.

One final caveat must be issued regarding the expression "Dark Earth." As mentioned above, the term does not indicate a specific soil type according to one of the systems of soil classification. Archaeological features (burials, walls, hearths, etc.) often appear to "float" in these deposits, and it is often very difficult to identify negative features during excavation. Also, Dark Earths are encountered in

both urban and rural contexts and not necessarily where a previous Roman-age occupation exists. The term "Dark Earth" is useful for identifying these diverse deposits on account of their common features but should be employed as archaeological jargon instead of scientific soil classification. Indeed, as its presence in the *Encyclopedia of Global Archaeology* suggests, the term has been well established in archaeological literature for many decades. This chapter has attempted to emphasize the importance and commonalities of urban Dark Earths while at the same time demonstrating that characterizations and interpretations of Dark Earth must be made on the basis of context. Moreover, only through multi- and interdisciplinary approaches like those described here will further light be shed on the centuries of history "hiding" in the dark of Dark Earth.

Cross-References

- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Chemistry: Definition
- ▶ Archaeological Soil Micromorphology Working Group
- ▶ Archaeological Soil Micromorphology
- ▶ Ash: Geoarchaeology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ France: Medieval Archaeology
- ▶ Geoarchaeology
- ▶ Italy: Medieval Archaeology
- ▶ Macphail, Richard I.
- ▶ Medieval Archaeology
- ▶ Medieval Urbanism
- ▶ Phytolith Analysis on Soil and Ceramic Thin Sections
- ▶ Scanning Electron Microscopy (SEM): Applications in Archaeology
- ▶ Stratigraphy in Archaeology: A Brief History
- ▶ Taphonomy: Definition
- ▶ Urban Archaeology
- ▶ Urban Landscapes: Environmental Archaeology

References

Borderie, Q. 2011. Géoarchéologie de l'urbain. Retour sur la journée d'étude du 29 octobre 2009. *Les Nouvelles de l'archéologie* 123: 61–64.

Borderie, Q., M. Fondrillon, C. Nicosia, Y. Devos, and R. Macphail. 2014. Bilan des recherches et nouveaux éclairages sur les terres noires: des processus complexes de stratification aux modalités d'occupation des espaces urbains. In *Archéologie de l'espace urbain*, ed. E. Lorans and X. Rodier, 235–250. Tours: Presses Universitaires Université François Rabelais.

Brogiolo, G.P. 2011. *Le origini della città medievale*. Mantova: SAP Società Archeologica.

Cammas, C., F. Champagne, C. David, B. Desachy, and L. Guyard. 1995. Le problème des "terres noires" sur les sites urbains tardo-antiques et médiévaux: réflexions et propositions méthodologiques à partir de l'exemple du Collège de France à Paris. *Les Nouvelles de l'Archéologie* 61: 22–29.

Cremaschi, M. 1992. Caratteristiche geoarcheologiche della successione stratigrafica posta in luce nello scavo archeologico di Piazzetta Castello. In *Ferrara prima e dopo il castello. Testimonianze archeologiche per la storia della città*, ed. S. Gelichi, 58–65. Ferrara: Spazio Libri Editori.

David, C. 2004. Reconnaissances géophysiques par la méthode électrique à mailles ultra fines: perspectives pour la connaissance de la structuration interne des "terres noires". L'exemple des "remblais médiévaux" du Palais de Justice de Besançon. In *Terres noires – dark earth. Actes de la table ronde internationale tenue à Louvain-la-Neuve, les 09 et 10 novembre 2001*, ed. L. Verslype and R. Brulet, 75–85. Louvain-la-Neuve: Université Catholique de Louvain.

David, C., C. Cammas, V. Durey-Blary, C. Féchant, S. Jesset, D. Josset, and F. Naizet. 2000. Problématique archéologique. Méthodes et techniques appliquées à l'étude des terres noires: état de la recherché. In *Terres Noires -1*, 15–38. Tours: Maison des Sciences de la Ville, de l'Urbanisme et des Paysages.

Devos, Y., L. Vrydaghs, A. Degraeve, and K. Fechner. 2009. An archaeopedological and phytolitarian study of the "Dark Earth" on the site of Rue de Dinant (Brussels, Belgium). *Catena* 78: 270–284.

Devos, Y., L. Vrydaghs, A. Degraeve, and S. Modrie. 2011. Unravelling urban stratigraphy. The study of Brussels' (Belgium) Dark Earth. An archaeopedological perspective. *Medieval and Modern Matters* 2: 51–76.

Devos, Y., C. Nicosia, L. Vrydaghs, and S. Modrie. 2013. Studying urban stratigraphy: Dark Earth and a microstratified sequence on the site of the Court of Hoogstraeten (Brussels, Belgium). Integrating archaeopedology and phytolith analysis. *Quaternary International* 315: 147–166.

Devos, Y., C. Nicosia, L. Vrydaghs, L. Speleers, J. van der Valk, E. Marinova, B. Claes, R.M. Albert, I. Esteban, T.B. Ball, M. Court-Picon, and A. Degraeve. 2017a. An integrated study of Dark Earth from the alluvial valley

of the Senne river (Brussels, Belgium). *Quaternary International* 460: 175–197.

Devos, Y., E. Marinova, A. Degraeve, and W. Van Neer. 2017b. Editorial: Proceedings of the Conference on the Environmental Archaeology of European Cities (CEAEC). *Quaternary International* 460: 1–2.

Fondrillon, M. 2009. À propos des recherches sur les terres noires urbaines: dépasser le concept d'attente. *Archéologie Médiévale* 39: 1–16.

Galinié, H. 2004. L'expression "terres noires", un concept d'attente. In *Terres noires – dark earth. Actes de la table ronde internationale tenue à Louvain-la-Neuve, les 09 et 10 novembre 2001*, ed. L. Verslype and R. Brulet, 43–55. Louvain-la-Neuve: Université Catholique de Louvain.

Goldberg, P., and R.I. Macphail. 2006. *Practical and theoretical geoarchaeology*. Oxford: Blackwell Publishing.

Harris, E.C. 1989. *Principles of archaeological stratigraphy*. London/New York: Academic Press.

Heimdahl, J. 2005. *Urbanised Nature in the Past. Site formation and environmental development in two Swedish towns, AD 1200–1800*. PhD. Thesis, University Stockholm (=Avhandeling i kvartärgeologi, 5). www.diva-portal.org/diva/getDocument?urn_nbn_se_su_diva-705-2__fulltext.pdf.

Krupski, M., C. Kabala, A. Sady, R. Glinski, and J. Wojcieszak. 2017. Double- and triple-depth digging and Anthrosol formation in a medieval and modern-era city (Wroclaw, SW Poland). Geoarchaeological research on past horticultural practices. *Catena* 153: 9–20.

Laurent, A., and M. Fondrillon. 2010. Mesurer la ville par l'évaluation et la caractérisation du sol urbain: l'exemple de Tours. *Revue archéologique du centre de la France* 49: 307–343.

Macphail, R.I. 1981. Soil and botanical studies of the "Dark Earth". In *The environment of man: The Iron Age to the Anglo-Saxon period*, British archaeological reports, British series 87, ed. M. Jones and G.W. Dimbleby, 309–331. Oxford: Archaeopress.

Macphail, R.I. 1994. The reworking of urban stratigraphy by human and natural processes. In *Urban-rural connexions: Perspectives from environmental archaeology*, Symposia of the Association for Environmental Archaeology 12, Oxbow Monograph 47, ed. A.R. Hall and H.K. Kenward, 13–43. Oxford: Oxbow.

Macphail, R.I., H. Galinié, and F. Verhaeghe. 2003. A future for Dark Earth? *Antiquity* 77: 349–358.

Nicosia, C., R. Langohr, F. Mees, A. Arnoldus-Huyzendvel, J. Bruttini, and F. Cantini. 2012. Medieval dark earth in an active alluvial setting from the Uffizi gallery complex in Florence, Italy. *Geoarchaeology* 27: 105–122.

Nicosia, C., Y. Devos, and Q. Borderie. 2013. The contribution of geosciences to the study of European Dark Earths: A review. *Post-Classical Archaeologies* 3: 145–170.

Nicosia, C., Y. Devos, and R.I. Macphail. 2017. European "Dark Earth". In *Archaeological soil and sediments micromorphology*, ed. C. Nicosia and G. Stoops. Chichester: Wiley.

Sidell, E.J. 2000. Dark earth and obscured stratigraphy. In *Taphonomy and interpretation*, ed. J.P. Huntley and S. Stallibrass, 35–42. Oxford: Oxbow Books.

Verslype, L., and R. Brulet, eds. 2004. *Terres noires – dark earth. Actes de la table ronde internationale tenue à Louvain-la-Neuve, les 09 et 10 novembre 2001*. Louvain-la-Neuve: Université Catholique de Louvain.

Urban Heritage

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Introduction

As a concept, urban heritage is global and has a worldwide scope, but at the same time it harbors a number of notions and must be seen in relation to the different and specific contexts with which it deals. Urban heritage issues engage not only heritage managers and archaeologists but also geographers, landscape and urban planners, engineers, architects, anthropologists, and historians, among others. As cultural heritage issues in general, those concerning the urban heritage are interdisciplinary and multifaceted. The urban heritage often has a position "in between." On one hand, it is constantly changing and under the threat of being destroyed due to the nature of urban development, and on the other hand, it is protected and conserved because of its historical values. Heritage structures are often regarded as a passive setting to the broader scope of the growing modern city. The ultimate goal is to strive for integration so that historic qualities and modern urban conditions can develop side by side.

Definition

Commonly, urban heritage is defined as the layers of historical, physical remains that constitute contemporary urban areas, that is, the built heritage with architectural and historical value or the "monuments" of a city (churches and other religious buildings, castles, city walls, palaces, and institutional buildings). In addition to this, urban heritage includes the urban plan (sites, streets, plots, and block plans of the buildings) and building and land utilization. However, the research complex of cultural heritage in the context of contemporary urban development operates with an expanded concept of heritage, not only including the physical remains and historic preservation and urban development policies, but also considering the political and sociological constitution of the city in regard to its capacity for social integration and local democracy. Urban heritage is both tangible and intangible, that is, including people that live in and are connected with urban areas and places, customs, and beliefs that are of less tangible character but important for the articulation of space and the built environment.

Legislation

Urban heritage is managed differently in different countries and depends ultimately on national legislation. Yet, international key organizations that are dealing with general heritage issues are of considerable importance to urban heritage planning and to how urban heritage is defined and managed on international as well as national, regional, and local levels. Various of UNESCO's charters, for example, concern urban heritage issues. From being focused on the protection and conservation of built heritage in urban areas, more recent conferences, papers, and adopted charters about cultural diversity and intangible heritage have expanded UNESCO's scope to reflect on the involvement of local communities. Other organizations influential for the definition and managing of urban heritage are ICOMOS (International Council on Monuments and Sites) and ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property). Their conferences, papers, and charters have also moved from being focused on how to protect physical remains toward social aspects of and holistic approaches to urban heritage. In addition to international organizations, there are non-governmental groups, groups representing developer interests, and research groups that support urban heritage management and protection, such as National Trust, historical associations, local action groups, and universities.

The scale and the scope of urban heritage management and protection vary from World Heritage Cities that ascribe to universal values embraced by existing legislation, through National Heritage Areas and Conservation Areas (entire districts or towns) and individual Listed Buildings that ascribe to more specific and local values but also embraced by existing legislation, to Urban Heritage Parks with specific and local values but no official status.

Historical Background

Most likely, people in the urban centers that existed around the world thousands of years ago were involved in different kinds of management of their milieu, although never defined as urban heritage protection.

The earliest concerted efforts to protect urban heritage, as a response to the processes of industrialization and urbanization that were part of the wider modernization process, started in the eighteenth and nineteenth centuries (see Jokilehto 1999, for an overview of the history of European urban conservation). Focus was exclusively on the protection of monuments and grand architecture, albeit with various approaches, as, for example, "aesthetic restoration" aiming at stylistic unity as an illustration of the ideal, followed by the "antirestoration movement" that wanted (inspired by Romanticism) to preserve the remains even if damaged, and modern conservation that recommended "careful restoration." Another approach was to focus on the building's "historicity," that is, to recognize the different layers of the building.

In the 1960s and 1970s, the approach shifted from individual buildings and their conservation toward a wider interest in areas, streetscapes, and environments and from monuments toward vernacular buildings. By the 1980s and 1990s, aesthetic values had been expanded to include social values, and the "spirit of place" was recognized as being important and valuable to the general community and to local groups within these places. The tendency within urban heritage management pointed toward a holistic approach.

Today, urban heritage and urban areas are being transformed by globalization, industrialization or deindustrialization, by growth of tourism industries, and through developments of national and postcolonial identities and population growth, and the holistic approach is now de facto on the agenda, although not always prioritized.

Current Debates

As a consequence of this contemporary complex situation, the challenges within the urban heritage field have increased. Ongoing debates evoked by these challenges can be divided into the following themes.

Legislation

The main critique against existing legislation is that laws and international guidelines and policies promoting sustainable urban heritage conservation and development have very little influence in contexts outside the Western world (Birabi 2007: 39). The reason is that these laws, guidelines, and policies, rooted in Europe and directed toward and applicable primarily to situations in the Western world, are not adapted to *non-Western contexts* and are therefore to a large extent neglected in these areas (Zetter and Watson 2006).

Conservation Versus Change and Tangible Versus Intangible Urban Heritage

Another challenging issue concerns UNESCO's World Heritage Cities or Urban World Heritage Sites. There are obvious difficulties of translating traditional conservation concepts, centered around *authenticity* and *preservation*, to the multifaceted and changing contexts urban World Heritage Sites represent (Pendlebury et al. 2009: 349). The result is that the urban experience is ignored and that we get urbanity without urbanness. This debate does not only concern urban World Heritage Sites but rather urban areas and urban heritage in general (Nasser 2003: 467). It is also connected to the debate on tangible and intangible heritage. Even though existing approaches to urban heritage aim at being holistic and have grown wider to embrace both tangible and intangible aspects, there are obvious difficulties to include the intangible, because the basis within urban heritage management is still to protect and to preserve (Tweed and Sutherland 2007: 62), which contradicts the nature of the intangible.

Global and Local

The concept of globalization is a phenomenon with long history, even though the terminology is modern. Its definitions are manifold, depending on the context, but in general we speak about the removal of barriers between (national) borders. Within cultural globalization, this results in a homogenization of culture. Common assumptions about cities throughout the world are that they are essentially homogeneous in both form and definition, that they are based on Western models, and that they are a result of globalization – furthermore, that economic globalization inevitably leads to cultural globalization and that this is connected to the emergence of the urban "explosion," which started with the economic boom in the 1960s and is still proceeding rapidly. These developments result in a growth of a homogeneous "urbanness" and a loss of national and local characteristics and distinctiveness. In this view, globalization presents a major threat to the maintenance of the cultural heritage of urban areas. A reaction against this perspective, evolving from the idea that the situation is more complex, has resulted in the common view that economic globalization instead leads to cultural localism, with increased local resistance to cultural globalization, resulting in an even stronger protection of the local cultural identity as an essential component of sustainable urban development. In other words, globalization and localization occur side by side, and the balance between

these forces is ultimately what urbanism is about (Karlström 2010: 554; Logan 2002: xii). The complex connections between the global and the local processes can also be seen as a resource for local economic and social development within the urban heritage tourism field (Green 2001: 191). The global and local must not be regarded as dichotomies but rather as inextricably bound together and acknowledged as a powerful resource harboring and offering something of its own, something uniquely urban.

Urbanism and Identity

In close connection to the debates about urban heritage and globalization/localization are debates concerning urban heritage and identity. The core question is whether there is a particular urban identity that is created in the intersection of and in the space between the global and the local, and what characterizes this identity, or identities. Parts of the debate also concern the challenge of identifying and maintaining these identities, of including them as an important and necessary part of the urban heritage (Evans et al. 2011), and of looking at the relationships between how the urban area is seen, its identities, and how it wants to be seen. Much of the input to these debates draws on involvements in community work and research in the politics of urban space and contemporary urban sociology. Through a better understanding of the multicultural and ethnic heritage places in urban areas, they can be used as a tool to promote stability and sustainability rather than seeing them as separated enclaves (Lin 2011). The dynamics of cultural diversity, differentiation, and fragmentation must be seen as positive forces counterbalancing homogenization and integration.

Future Directions

Regardless of whether urbanism is a result of, or results in, globalization and localization, and whether the study of urbanism involves individual and specific perspectives and/or collective and universal perspectives, it forces us who deal with past and present urban heritage to consider this new set of multi-scalar engagements. Debates concerning globalization within the urban heritage field have recently paved the way for debates about urban heritage in relation to cosmopolitanism. Globalization is seen as something happening out there, whereas cosmopolitanism happens from within. Cosmopolitanism, which has an overarching framework of global politics but also very specific concerns about the individual and the community, "is not a circle created by culture diffused from a centre, but instead [. . .] centres are everywhere and circumferences nowhere" (Meskell 2009: 5). This and the fact that the majority of the world's population now lives in cities result in that urban areas and urban heritage become a source of both growing cultural conflicts and growing cultural dialogues (Keith 2005). These new forms of cultural hybridity need to be acknowledged and further debated. With the growing pressure from the outside on urban areas and on the urban heritage, questions about sustainable development and urban heritage tourism are also highly important to develop further.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Cultural Heritage and Communities
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Intangible Cultural Heritage
- ▶ Tangible Heritage in Archaeology

References

Birabi, A.K. 2007. International urban conservation charters: Catalytic or passive tools of urban conservation practices among developing countries? *City & Time* 3: 39–53.

Evans, B., F. McDonald, and D. Rudlin, eds. 2011. *Urban identity. Learning from place*. London: Routledge.

Green, M. 2001. Urban heritage tourism: Globalization and localization. In *Cultural attractions and european tourism*, ed. G. Richards, 173–197. Oxford: CABI Publishing.

Jokilehto, J. 1999. *History of architectural conservation*. Oxford: Butterworth-Heinemann.

Karlström, A. 2010. Southeast Asian urban minds. An example from Laos. In *The urban mind. Cultural and environmental dynamics*, ed. P.J.J. Sinclair et al.,

553–571. Uppsala: African and Comparative Archaeology, Department of Archaeology and Ancient History, Uppsala University.
Keith, M. 2005. *After the cosmopolitan? Multicultural cities and the future of racism*. London: Routledge.
Lin, J. 2011. *The power of urban ethnic places. Cultural heritage and community life*. London: Routledge.
Logan, W.S., ed. 2002. *The disappearing 'Asian' city. Protecting Asia's urban heritage in a globalizing world*. Oxford: Oxford University Press.
Meskell, L., ed. 2009. *Cosmopolitan archaeologies*. Durham/London: Duke University Press.
Nasser, N. 2003. Planning for urban heritage places: Reconciling conservation, tourism, and sustainable development. *Journal of Planning Literature* 17: 467–479.
Pendlebury, J., M. Short, and A. While. 2009. Urban world heritage sites and the problem of authenticity. *Cities* 26: 349–358.
Tweed, C., and M. Sutherland. 2007. Built cultural heritage and sustainable urban development. *Landscape and Urban Planning* 83: 62–69.
Zetter, R., and G.B. Watson, eds. 2006. *Designing sustainable cities in the developing world*. Aldershot: Ashgate.

Further Reading

Armstrong, W., T.G. Mcgee, A.D. King, and J. Rex, eds. 2007. *Cities in the developing world*, Routledge Library Editions: The City. London: Routledge.
Clark, D. 1996. *Urban world/global city.* London: Routledge.
Shaw, B.J., and R. Jones, eds. *Contested urban heritage. Voices from the periphery.* Aldershot: Ashgate.
Sinclair, P.J.J., G. Nordquist, F. Herschend, and C. Isendahl, eds. 2010. *The urban mind*, Cultural and environmental dynamics. Uppsala: African and Comparative Archaeology, Department of Archaeology and Ancient History, Uppsala University.

Urban Landscapes: Environmental Archaeology

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Introduction

Archaeological deposits formed within settlements large, long lasting, and complex enough to be called towns pose interesting challenges for the environmental archaeologist. They are places where large concentrations of organic materials are always likely to have been amassed, used, and discarded. Consequently, in some cases organics – including delicate plant and animal fossils – form a large part of the archaeological record, as in the early medieval towns of Northern and Northwestern Europe (e.g., Carver's (2009: 11) "organic crescent"). By contrast, many urban deposits, particularly if they are well-drained sedimentary contexts, are almost devoid of the remains of animals and plants other than the most decay-resistant charred plant material, bone, and shell. Stratigraphy may be very complicated, however, with repeated reworking of deposits over time.

Definition

Urban dwellers live under conditions very different from those in the surrounding countryside, but nevertheless the town has a landscape of a sort, created primarily by human activity. The substratum was largely the detritus of former occupation, but it supported a mosaic of habitats for plants and animals. This patchy environment was what the human occupants experienced, and it varied greatly with geography and time. This landscape can be considered at scales from that exploited by a minute insect right through to the various zones into which towns inevitably became divided socially and functionally.

Key Issues/Current Debates/Future Directions/Examples

For those times and places where there is a record, the historical approach to past urban landscapes is often extremely evocative (Cockayne 2007). However, the sources for such accounts must inevitably be biased towards the outrageous, emphasizing behavior and environments which by the general standards of the time were considered unacceptable and even requiring civil action. Comments that towns were clean do exist, but

are very rare! Archaeology provides a way of reconstructing past environments, living conditions, and human activities where there is no documentation and of countering the bias of documents.

Remains of almost any organism which found its way into the town may be preserved under one set of circumstances or another. The range of surviving evidence reflects what went into the ground, modified by inground preservation during the life of the deposits, including any recent decay. For the purposes of discussion, potential biological remains can usefully be divided into labile (those organisms or tissues which almost inevitably decay very rapidly and are rarely encountered), delicate (those which require special conditions, such as anoxic waterlogging, dehydration, charring, mineral replacement, or the presence of toxic mineral salts), and robust (those, such as bone and shell and also of course charred or mineral-replaced material, which survive in a wide range of deposit types). Some deposits contain almost all kinds of material, presenting what is almost an embarrassment of riches. At the other extreme, an acidic well-aerated deposit may preserve almost nothing, even bone and shell having dissolved. Taking urban archaeological deposits as a whole in time and space, the majority have limited preservation, yielding robust materials (mostly bone), charred plant remains, and (less often) mineral-replaced fossils. Such remains are usually primarily of value in economic reconstruction and give rather little indication of urban landscapes beyond perhaps certain local craft activities.

What is the nature of the "environmental" evidence? Firstly, there is the sedimentary matrix in which fossils are preserved, itself often composed of both organic and inorganic material. The deposits formed in towns are almost always *not* soils in the sense of surface-forming, biologically stratified, and long-lived systems (so that to call them "soils" is a misnomer; "sediments" is more correct). Nevertheless, many of the techniques of soil science can be applied to elucidating the environments in which deposits formed (e.g., Davidson et al. 2006). Studies of the very fine organics have barely started, but available techniques include various investigations of biomolecules, such as coprosterols and DNA (e.g., King et al. 2009; Bull and Evershed 2012).

Most attempts to reconstruct the environments of ancient towns have been based on the recognizable remains of organisms. These may be microscopic, with pollen perhaps the most familiar, but also phytoliths, diatoms, fungal spores, eggs of intestinal parasites, and rarely even diatoms. At the other extreme are the sorts of large remains which are obvious during the excavation process – larger bones and shells, timbers, nutshell, and fruitstones. In between these lie what are conventionally called "macrofossils" (though they generally require a microscope for analysis): most remains of plants and macro-fungi, the exoskeletons of crustaceans, insects and other arthropods, the smaller molluscs, and small bones. Not all of these have received the attention they deserve; fungal spores and mites have been particularly neglected but probably have considerable potential, the latter for detecting livestock in towns (Schelvis 1994) – the bones of domestic animals obviously cannot be used as evidence that they were *kept* in urban areas, but evidence for large quantities of their dung is usually more convincing. Remains of small vertebrates, on the other hand, may contribute substantially to painting a picture of the urban environment (Boucher 2000; O'Connor 2000).

What is *recovered* from the buried resource depends on the archaeological strategy (the sampling program) and support for post-excavation work, which may be largely a function of political expediency. Research excavations inevitably produce more information about single locations, but the sort of brief assessment preceding development which is *de rigueur* through many areas of the world can be argued to produce a broader picture (Hall and Kenward 2006).

The reconstruction of the past urban environment depends on numerous "point" reconstructions. Towns are (and were) far too heterogeneous for one or a few "sites" to be representative of urban complexity. Unfortunately, almost no towns have been studied to the extent that this complexity can be reconstructed to produce a picture of urban zonation for any period,

let alone for their whole history. Even York and London, probably the towns most intensively and extensively studied by environmental archaeologists, have not reached this point. There is certainly considerable potential, however, as shown by some work on insects (Kenward and Carrott 2006), a synthesis of biological evidence from Viking-Age York, England (Hall and Kenward 2004), and studies spanning the Iron Age through to the medieval periods in Novgorod, Russia, and Uppsala, Sweden (Hellqvist 1999).

We can look at the landscape of a town from a number of aspects, notably the evidence for seminatural environments, for the appearance of streets and yards (as perceived by all the senses), for accumulations of waste, for the presence of open water and its quality, for the nature of buildings (a major determinant of the appearance of towns), for urban "wildlife" (including pests, parasites, and commensals), and for the various activities of the occupants both in and outside of the built environment.

In some cases, we can surmise – on the basis of evidence from plants and insects – that areas were invaded by vegetation and probably took on a seminatural appearance, much like a modern urban wasteland area. In others, the same kind of evidence, as well as the nature of the deposits themselves, points to extremely intensive disturbance, to the extent that only a few hardy weeds were able to establish a roothold (Hall and Kenward 2004). Not surprisingly, in view of this, evidence for urban trees is vanishingly small in older periods, while pollen analyses have provided details on nineteenth century backyards in Lowell, Massachusetts, USA (Kelso 1993). In many cases, where there is preservation of delicate remains in deposits formed on external surfaces (usually in yards), the insect remains suggest for European sites fairly unclean conditions, not at all enhanced by the abundant open cesspits present in many cases.

On the other hand, multiple environmental techniques applied on various urban sites in the region around Boston (USA), probably the most studied urban landscape in North America (e.g., Mrozowski 2006), indicate a different type of yard landscape. These studies suggest that early residential backyards were also mainly composed of disturbed sediment but that these were dry and included gardens of exotic and edible as well as weedy plants. However, with the growth of cities, household gardens tend to disappear from yards.

The visual appearance of structures is fundamental to the urban landscape. While excavation evidence is generally, and quite rightly, seen as the primary source of information concerning the nature of buildings, biological remains have the potential to contribute detail. Many buildings were entirely "biological" in that they were constructed of organic materials: timbers, small wood, plant thatch, stripped bark, and moss for packing crevices. Obviously, archaeobotanical analysis is required to identify such materials before it is reasonable to reconstruct buildings conceptually above the foundations revealed by excavation. The greatest unknown in most such cases is the nature of roofing, for which there is surprisingly little bioarchaeological evidence (however, see Letts et al. 2000).

The insides of buildings were as much part of the urban landscape to the occupants as were outdoor areas. Substantial progress has been made in reconstructing indoor environments at some sites, notably in Europe in the Viking Age/early medieval period. The most substantial study of living floors was that for Anglo-Scandinavian Coppergate, York, where deposits undoubtedly formed during occupation attested to substantial accumulation of filth and to conditions (probably below the surface) moist enough for the invasion of insects more often found in waterside litter (Fig. 1). There was also abundant evidence for drier conditions, presumably both in the surface levels on which people stood and in the structure of the buildings (Kenward and Hall 1995). At Coppergate, there was a contrast between floors which seem to have been domestic and those which were more probably workshops. This kind of differentiation can sometimes be seen elsewhere, for example, at the eleventh-century workshop at Viborg, Denmark (Iversen et al. 2005).

Interpretation of the very "mixed" assemblages of biological remains found in urban deposits can be, to say the least, challenging (Figs. 2 and 3).

Urban Landscapes: Environmental Archaeology, Fig. 1 A twelfth-century cesspit at 16–22 Coppergate, York, complete with seat, during excavation; the fills of pits like this may be rich in evidence for food waste (Figs. 2 and 3) and the remains of parasites (Fig. 3). (Photograph: York Archaeological Trust)

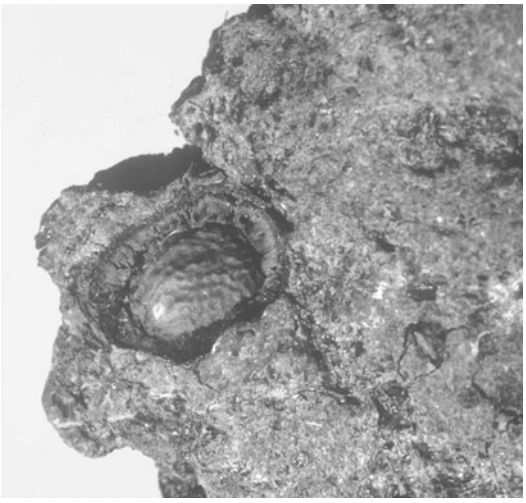

Urban Landscapes: Environmental Archaeology, Fig. 2 Concretion of human fecal material of the kind typically found in pits like that shown in Fig. 1; the fruitstone embedded in the concretion is from a blackthorn fruit (sloe, *Prunus spinosa* L.), a well-collected species

Two approaches to disentangling such complex mixtures have been taken: the use of species association analysis (Carrott and Kenward 2001; Smith 2012) and identification of activities and materials through "indicator groups" and "packages" (Kenward and Hall 1997; Hall and Kenward 2003). The application of species association analysis to Roman sites in Carlisle, NW England, has given pointers to contrasting conditions across the town (Kenward and Carrott 2006). Indicator groups – based on as wide a range of biological remains as possible – lead us to better understanding of the kinds of materials and activities in particular areas of towns, with obvious implications for local environments. If we establish that slaughtering, skin cleaning, tanning (for skins), or retting or dyeing (for textile manufacture) took place, for example, it is very likely that the locality was blighted by accumulations of foul matter, bad smells, and polluted water (Fig. 4).

Researchers in bioarchaeology tend to emphasize those periods with good organic preservation (itself probably primarily the results of large-scale accumulation of organic matter incidental to human activity) when discussing conditions in past towns (Fig. 5). Thus, in Northwest Europe the emphasis is on the earlier Roman period of Britain and on the Viking Age to the end of the medieval period. Preservation in surface-lain deposits is rare in Roman stone-built towns and becomes less common in deposits formed in the later in the medieval and into the postmedieval periods. On North American urban sites, studies tend to focus on specific contexts offering better chances of preservation. Within settlements, there is a clear bias towards the less salubrious areas, where organic matter accumulated and self-preserved, with preservation in the more affluent areas often restricted to deep cuts (cesspits,

Urban Landscapes: Environmental Archaeology, Fig. 3 An example of extremely delicate plant material preserved in waterlogged urban deposits – leaf epidermis of leek, *Allium porrum* L. Also present (in one of the marginal teeth of the leaf fragment) is an egg of the intestinal parasitic worm, *Trichuris*, probably *T. trichiura* (Linnaeus)

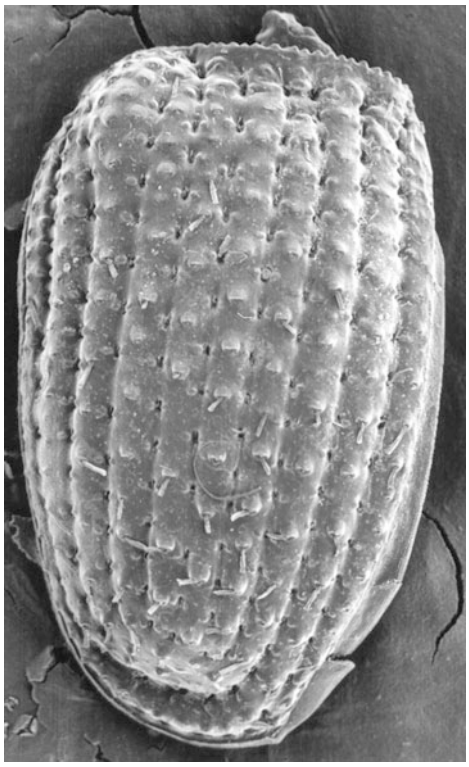

Urban Landscapes: Environmental Archaeology, Fig. 4 An elytron of the heathland weevil *Micrelus ericae* (Gyll.). Found in tenth-century deposits in the center of York, it is part of a group of organisms representing imported material (heather and/or turves from heathland)

Urban Landscapes: Environmental Archaeology, Fig. 5 Taking a sample column for environmental analyses at the Intendant's Palace Site (CeEt-30) in Quebec City, Canada. (Photograph courtesy of Université Laval)

latrines, and wells). Though biased, these areas may provide interesting information on the evolving urban landscape, for example, in privies in Colonial Boston (Bain 1998; Bain and King 2011).

Thus, preservation determines the richness of the information we can recover from biological remains, with the greatest amount of evidence in what are conventionally called "anoxic waterlogged" deposits (Kenward and Hall 2004), but this resource seems to be threatened by recent inground decay. Fortunately, in many periods and places, the abundance of documentary evidence for environments is inversely proportional to that from the ground.

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Urban Archaeology

References

Bain, A. 1998. Seventeenth-century beetle fauna from Colonial Boston. *Historical Archaeology* 32: 38–48.

Bain, A., and G. King. 2011. Asylum for wayward immigrants: Historic ports and colonial settlements in Northeast North America. *Journal of the North Atlantic* 1: 109–124.

Boucher, G. 2000. *Les habitudes alimentaires des habitants de l'îlot Hunt (CeEt-110) de 1850 à 1900: étude archéozoologique*. Cahiers d'archéologie du CELAT 8. Québec: Université Laval.

Bull, I., and R. Evershed. 2012. Organic geochemical signatures of ancient manure use. In *Manure matters. Historical, archaeological and ethnographic perspectives*, ed. R. Jones, 61–77. Farnham: Ashgate.

Carrott, J., and H. Kenward. 2001. Species associations among insect remains from urban archaeological deposits and their significance in reconstructing the past human environment. *Journal of Archaeological Science* 28: 887–905.

Carver, M. 2009. *Archaeological investigation*. London and New York: Routledge.

Cockayne, E. 2007. *Hubbub. Filth, noise and stench in England 1600–1770*. Yale: Yale University Press.

Davidson, D.A., G. Dercon, M. Stewart, and F. Watson. 2006. The legacy of past urban waste disposal on local soils. *Journal of Archaeological Science* 33: 778–783.

Hall, A., and H. Kenward. 2003. Can we identify biological indicator groups for craft, industry and other activities? In *The environmental archaeology of industry.* Symposia of the Association for Environmental Archaeology 20, eds. P. Murphy, and P.E.J. Wiltshire, 114–30. Oxford: Oxbow.

Hall, A.R., and H.K. Kenward. 2004. Setting people in their environment: Plant and animal remains from Anglo-Scandinavian York. In *Aspects of Anglo-Scandinavian York.* The Archaeology of York 8, eds. R.A. Hall, D.W. Rollason, M. Blackburn, D.N. Parsons, G. Fellows-Jensen, A.R. Hall, H.K. Kenward, T.P. O'Connor, D. Tweddle, A.J. Mainman, and N.S.H. Rogers, 372–426 + references 507–21. York: Council for British Archaeology and York Archaeological Trust.

Hall, A.R., and H.K. Kenward. 2006. Development-driven archaeology: bane or boon for bioarchaeology? *Oxford Journal of Archaeology* 25: 213–224.

Hellqvist, M. 1999. Urban and rural environments from iron age to medieval time in northern Europe: Evidence from fossil insect remains from south-eastern Sweden and Novgorod, Russia. In *Published PhD dissertation, Teknisk-naturvetenskapliga vetenskapsområdet*. Uppsala: Uppsala Universitet.

Iversen, M., D. Robinson, J. Hjermind, and C. Christensen, eds. 2005. *Viborg Søndersø 1018–1030. Arkæologi og naturvidenskab i et værkstedsområde fra vikingetid (Jysk Arkæologisk Selskabs Skrifter)*. Højbjerg: Viborg Stiftsmuseum/ Jysk Arkæologisk Selskab.

Kelso, G. 1993. Pollen-record formation processes, interdisciplinary archaeology, and land use by mill workers and managers: The Boott Mills Corporation, Lowell, Massachusetts, 1836–1942. *Historical Archaeology* 27: 70–94.

Kenward, H., and J. Carrott. 2006. Insect species associations characterise past occupation sites. *Journal of Archaeological Science* 33: 1452–1473.

Kenward, H., and A. Hall. 1995. *Biological evidence from Anglo-Scandinavian deposits at 16–22 Coppergate*. The Archaeology of York 14, 435–797. York: Council for British Archaeology.

Kenward, H., and A. Hall. 1997. Enhancing bioarchaeological interpretation using indicator groups: Stable manure as a paradigm. *Journal of Archaeological Science* 24: 663–673.

Kenward, H., and A. Hall. 2004. Beyond the foundations: Decay of organic remains in archaeological deposits associated with timber buildings at Bryggen. In *Safeguarding historic waterfront sites. Bryggen in Bergen as a case*, ed. A. Christensson, Z. Paszkowski, J. Spriggs, and L. Verhoef, 138–141. Szczecin: Stiftelsen Bryggen.

King, G.A., M. Thomas, P. Gilbert, E. Willerslev, M.J. Collins, and H. Kenward. 2009. Recovery of DNA from archaeological insect remains: First results, problems and potential. *Journal of Archaeological Science* 36: 1179–1183.

Letts, J.B., J. Moir, D. Smith, and D. de Moulins. 2000. *Smoke blackened thatch: A unique source of late medieval plant remains from southern England*. London: English Heritage.
Mrozowski, S.A. 2006. *The archaeology of class in urban America*. Cambridge: Cambridge University Press.
O'Connor, T.P. 2000. Human refuse as a major ecological factor in medieval urban vertebrate communities. In *Human ecodynamics*, ed. G. Bailey, R. Charles, and N. Winder, 15–20. Oxford: Oxbow Books.
Schelvis, J. 1994. Predatory mites (Acari: Gamasida) in excrements of five domestic animal species. *Pedobiologia* 38: 72–80.
Smith, D.N. 2012. Defining an indicator package to allow identification of 'cesspits' in the archaeological record. *Journal of Archaeological Science* [online publication stage; issue number pending].

Further Reading

Brothwell, D.R., and A.M. Pollard. 2005. *Handbook of archaeological sciences*. Chichester: Wiley.
Deagan, K.A. 2008. Environmental archaeology and historical archaeology. In *Case studies in environmental archaeology*, ed. E.J. Reitz, S.J. Scudder, and C.M. Scarry, 21–42. New York: Springer.
O'Connor, T., and J.G. Evans. 2005. *Environmental archaeology. Principles and methods*. 2nd ed. Thrupp: Sutton Publishing.
Thiébault, S. 2010. *L'archéologie environnementale de la France*. Paris: La Découverte.
Wilkinson, K., and C. Stevens. 2003. *Environmental archaeology: Approaches, techniques & applications*. Stroud: Tempus.

Urban Planning in the Greek World

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Introduction

Urbanism is one characteristic that binds the ancient cities of Greece to earlier developments in Mesopotamia and the Near East. Cities in east and west shared a number of features in common, including an urban center, a tutelary deity worshipped at a central sanctuary, and dependence on a rural hinterland for sustenance. But monarchs ruled in the east, and Greek cities evolved along a different, complex, and varied path, experimenting with new social and political institutions and an ideology of citizenship. It is therefore remarkable that urbanism first emerges in ancient Greece at the end of the sixth century BCE, at the very same time when increasing contact with the Persian Empire becomes a catalyst for experiments with empire in Greece (Morris 2006: 26–51).

Ancient Greeks were first and foremost agriculturalists; so urbanism, when it appeared, was made possible by stable environmental conditions and an abundant and diverse supply of food, such as grain, olives, grapes, and fish. Geography was also of consequence. The earliest Greek cities were located on or near the coast, and this reflects the importance of maritime trade as a factor for urbanism. The sea also provided natural defenses for civilization to grow and develop with protection from the outside. Peculiar to ancient Greece, the many isolated valleys that formed natural barriers between cities encouraged attitudes about control of resources that ultimately enabled urbanism.

Definition

Urbanism, a state of existence, is quite distinct from the process of urbanization, state formation, and questions about the emergence of civilization. Ancient Greek cities are distinguished by settlement size, density and structure, as well as by topographical organization, occupational pattern, and architecture as an expression of power, identity, and culture. But which of these factors are markers of urbanism? Urbanism is not merely about the size of a city or its population. Nor is the relationship between nucleated settlements and urbanism interdependent: A nucleated settlement was not a prerequisite for an urban center. Urbanism in ancient Greece is found where one also finds mobility, surplus wealth, domination, consumption and exchange of resources and territory, and an administration to manage it all. Any definition more specific would limit the varied and complex nature of the literary and archaeological evidence for ancient Greek cities.

It is also important to distinguish between urbanism as it relates to the physical appearance of cities and the phenomenon of the rise of the polis, or city-state, whose emergence and growth at a remarkable pace in Greece in the eighth century BCE. was accompanied by substantial social and political transformations. As it turns out, urbanism and polis ideology were different, since urbanism required mobility of people and goods beyond a city, and a polis required belonging and obligation to the idea of a community (Whitley 2001: 165–168). Thus, an accurate definition of urbanism for any city must take into account degrees of interaction with the territory and resources around it. This is of some consequence for orthogonal town-plans as a factor for urbanism, especially because by design, they reveal interest in the Greek principle of *isonomia*, which nurtured belonging by granting all citizens equal access to resources.

Political independence appears to have been a prerequisite for urbanism in ancient Greece, but a complete definition of urbanism involves much more than the ideology of independence and citizenship. In ancient Greek cities, only in politically independent units does one find diverse functionality of urban space for politics, religion, commerce, and entertainment. Such activities played out in the standard suite of public buildings for a Greek city, including sacred architecture, the theater, prytaneion, bouleuterion, and gymnasium, among others. Beyond the city center, extramural sanctuaries enforced a city's claims to territorial control. One challenge to using population size as a factor for urbanism is illuminated by demes in Attica, where one does not find such facilities for diverse function of urban space in demes politically dependent on Athens, even though some of them had populations that exceeded politically independent cities elsewhere in Greece.

At a level somewhat harder to measure, urbanism also concerns the character and personality of a city and its cultural sophistication. Here one must also consider the challenge of escaping the corruption of our perspective by Medieval and early modern urbanism.

Historical Background

Homer and Hesiod, our best sources for early Greek society down to the seventh century BCE in Greece, convey little, if anything at all, about urbanism. Archaeological evidence shows that, in the eighth and seventh centuries BCE, discreet villages coalesced into larger communities for political and economic reasons, especially in southern Greece. Some cities may have had as many as 10,000 inhabitants. Still, few today would argue with the conclusion that "whatever factors made possible the achievement of Archaic Greece, an advanced urban culture was not one of them" (Snodgrass 1981: 157–158). But even in this period, one can perceive a harbinger of forces for urbanism developing in sanctuaries, which dominated city centers, enforced territorial claims on the periphery of communities, encouraged mobility, and were adorned with sacred architecture increasing in monumentality.

It is not until the eve of the Classical period in the late sixth century BCE. when increased diversification of the function of space in a very small number of cities, like Athens and Syracuse, allows for discussion of urbanism. From this point on, urbanism was propelled forward by the rise of imperial administrative centers whose populations estimated at 40,000 exacted wealth and resources from territories far beyond their immediate hinterland (Morris 2006: 27, 36–46). In the fourth century BCE., these trends were imported to Macedonia, whence aspects of Greek urbanism were spread to Egypt and the Near East by the campaigns of Alexander the Great. Here and in the ensuing Hellenistic period, urbanism was concentrated in fewer, larger cities by monarchs who employed synoecism to control subjects and resources. In Asia Minor, especially, the impact of Hellenistic urbanism on Roman cities is clear (Parrish 2001).

Key Issues/Current Debates

Indicators of Urbanism

Were ancient Greek cities "urban"? This enduring question about ancient Greek urbanism is rooted in debate about indicators for it. Osborne and Morris revived discussion over 30 years ago,

reacting to M.I. Finley's use of categories devised by Max Weber in 1921. For Finley (1977: 325), "The Graeco-Roman world was more urbanized than any other society before the modern era". On the other hand, Osborne (1987: 194), echoing Snodgrass quoted above, has claimed, "urbanization was unknown in Greece." Morris (2006: 27–32, 1991: 37–38) allows that urbanism does not define cities in Greece prior to the late sixth century BCE, but makes a compelling case for the emergence of urbanism with the rise of imperial administrative centers like Athens and Syracuse shortly after 500 BCE. Instances of such opposing interpretations can usually be traced to sources open to multiple interpretation, and the question of ancient Greek urbanism presents no exception. Still, scholarship over the past three and a half decades has landed on a handful of reasonable indicators for urbanism in ancient Greece and excluded an equal number of others.

Substantial discussion has been devoted to the idea that a city was shaped by its countryside, and that urbanism only occurred when a city grew beyond dependence on its hinterland (Osborne 1987: 16, 194–195). A city's ability to grow beyond the carrying capacity of its hinterland was a mark of urbanism brought on by imperial expansion and control, which, in the formula proposed by Morris, did not emerge in Greece until after contact with the Persian Empire (2006: 27–32). According to this argument, indicators for urbanism include the evolution of a city beyond the needs of its hinterland for sustenance and an administration of imperial magnitude. The imperial ambitions of Athens were behind the best, and perhaps singular, example of forces for urbanism in the fifth century BCE. With the exception of Syracuse, they are not reflected in other Greek cities, which did not develop beyond means their countryside allowed them. Such interdependent movement of people and resources between cities makes a case for mobility as a reasonable indicator of urbanism, to the degree that mobility can be distinguished from forces at work in imperial administrations and exchange between city and country (Whitley 2001: 167).

Writing can be another important indicator of urbanism (Sweet 1997: 35–49). Writing transformed communities into urban centers because of its impact on social organization. City administrations, especially those dependent on agriculture, needed a way to keep track of things. Writing allowed for recording and organizing information, managing complex relationships between resources and labor, and controlling a community's mobility and security. All of these are ingredients in the recipe for urbanism. But if, with a few exceptions among prehistoric cities of the Near East, writing and urbanism appear at the same time across the ancient world, what are we to make of Archaic Greece, where writing appears in the eighth century BCE., long before the first cases of urbanism? For Greece in the eighth century BCE., the earliest writing served poetry for a seafaring aristocracy in the unique physical landscape and transformative social and political conditions described above (Powell 2007: 45–53, 59–64). Only about two centuries after its invention in Greece does writing become linked to the economic interests of Greek cities and take on value as an indicator of urbanism.

Other components of ancient Greek cities are harder to justify as indicators of urbanism. Substantial discussion has been devoted to trade in specialized crafts, especially pottery, as an indicator of urbanism. When centers of craft production engage in interdependent trade networks, they begin to resemble forces in a market economy. But the scale of this industrial enterprise was probably never sufficient enough to encourage urbanism in cities (Morris 1991: 38–40; Whitley 2001: 174–179). Town-planning is certainly a component of urbanism, but not a requirement for it. Population size seems to be more a consequence of urbanism than an explanation for it. Nor are walls for city defenses indicators of urbanism for ancient Greece, for not only do they appear around settlements of different sizes in most periods of Greek antiquity, they also tend to appear long after the emergence of politically independent cities (Snodgrass 1981: 157–158, 2006: 274–276; Whitley 2001: 313). In addition to the above, Morris (1991: 38–40) also excludes the presence of an agora as a meaningful index for urbanism in an ancient Greek city. Nonetheless, worthy of mention as a hallmark of the Greek

agora is the stoa, a long, narrow rectangular building with a roof spanning a rear wall and a colonnade on the façade. Its original function was to aid the operation of sanctuaries, where it provided for storage and lodging at these important markers of territorial control. But it was borrowed for civic architecture in classical times, most notably to flank the agora, where it provided civic space for law courts, commerce, and ad hoc political meetings. The functional evolution of the stoa mirrors the social and political transformations that accompanied the rise of urbanism in Greek cities.

Hippodamus of Miletus

If town-planning per se is not an indicator of urbanism, then this raises questions about the impact on urbanism of Hippodamus of Miletus (498–408 BCE), the architect, urban planner, and namesake of the Hippodamian city plan. First off, city plans of Smyrna in Ionia and Greek colonial foundations in south Italy and Sicily like Megara Hyblaia, which all belong to the seventh century BCE, show that Hippodamus theorized and perhaps refined the orthogonal city plan rather than create it. Such plans had broad, straight streets with neat intersections at right angles and an open area in the center of the city reserved for public and sacred architecture in the service of community, spectacle, commerce, politics, and cultural identity. Much of Hippodamus's fame is due to Aristotle's criticism of his ideas, which have not been directly linked to cities with types of plans attributed to him (Wycherley 1962: 17–18; Owens 1991: 4–6; Cahill 2002: 3–5). Aristotle (*Politics* 2.8) called him the inventor of the art of planning cities, whose ideal city had 10,000 citizens divided into three classes (artisans, farmers, and soldiers), with loosely corresponding divisions of land: sacred, for worship of the gods, public, to support the soldiers, and private, as property for the farmers. Aristotle called this system impossible and confused, and the actual impact of Hippodamus on Greek city planning must be examined within the context of the polemic in which it is conveyed.

Hippodamian style cities of the Classical period are not hard to find (Owens 1991: 51–73; Hoepfner and Schwandner 1994: 17–67). The only city plan Aristotle attributed to Hippodamus was the Peiraeus, laid out sometime after 478 BCE, with an agora named for its planner (Gill 2006: 1–15). Estimated to have a population of about 25,000, archaeological evidence has revealed an orthogonal plan complete with insulae (city blocks) and courtyard houses of the prostas type also found at Priene a century later (Hoepfner and Schwandner 1994: 22–50).

Without naming the planner, Strabo (14.2.9) implies that Hippodamus laid out the city of Rhodes in 408/7 BCE. There is little agreement about ambiguous evidence for Hippodamus's involvement in city planning at his home town of Miletus in c. 479 BCE and at the Athenian panhellenic foundation of Thurii in southern Italy in 443 BCE (Burns 1976: 414–428; Cahill 2002: 301–302 note 6; Gill 2006: 1–15).

The career and impact of Hippodamus on urbanism are both elusive (Whitley 2001: 315–319). City plans on orthogonal principles predating the career of Hippodamus are found in pre-classical cities like Megara Hyblaia on Sicily, Vroulia on Rhodes, and Marzabotto in Etruria. Cities not attributed to Hippodamus or his influence, but which were laid out with perpendicular streets and regular city blocks, are also known from many other sites in Greece and Asia Minor from the Classical and Hellenistic periods, such as Abdera, Halicarnassus, Ilion, Olynthus, Pergamon, and Priene (Hoepfner and Schwandner 1994; Parrish 2001). It turns out that Hippodamian plans have less to do with a single moment of invention and more to do with circumstances in which Greek cities were formed. Cities that grew out of long established villages, like Athens, were unlikely to have orthogonal plans, whereas new foundations, like the Peiraeus, were more likely to have regular orthogonal plans.

Future Directions

Future study of ancient Greek urbanism is tied to new discoveries in archaeology, especially those with potential to inform on the indices for urbanism described above. At the same time, a substantial challenge to archaeologists and readers of

their work, and one far too often neglected by studies that appeal to town plans, is the reproduction of restored plans and conceptual reconstruction drawings by artists. These provide false impressions of completeness and consistently neglect to compare what has been found to what might still lie beneath the surface. Beyond archaeology, research questions will also continue to evolve in new directions. A case in point is a recent Social Darwinist theoretical exercise which, despite controversy over the extent to which genes control behavior, aims to link ancient Greek urbanism to the success of eusocial communities by transplanting genetic models for insect communities to human societies (Bintliff 2010: 15–41).

Cross-References

- ▶ Polis
- ▶ Urban Archaeology
- ▶ Urban Planning, Roman
- ▶ Urbanism in the Ancient Near East

References

Bintliff, J. 2010. Classical Greek urbanism. In *Valuing others in classical antiquity*, ed. R.M. Rosen and I. Sluiter, 15–41. Leiden: Brill.

Burns, A. 1976. Hippodamus and the planned city. *Historia: Zeitschrift für Alte Geschichte* 25: 414–428.

Cahill, N. 2002. *Household and city organization at Olynthus*. New Haven: Yale University Press.

Finley, M.I. 1977. The ancient city: From Fustel de Coulanges to Max Weber and beyond. *Comparative Studies in Society and History* 19 (3): 305–327.

Gill, D.W.J. 2006. Hippodamus and the Peiraeus. *Historia: Zeitschrift für Alte Geschichte* 55: 1–15.

Hoepfner, W., and E.-L. Schwandner. 1994. *Haus und Stadt im klassischen Griechenland*. Munich: Deutscher Kunstverlag.

Morris, I. 1991. The early polis as city and state. In *City and country in the ancient world*, ed. J. Rich and A. Wallace-Hadrill, 24–57. London: Routledge.

Morris, I. 2006. The growth of Greek cities in the first millennium B.C. In *Urbanism in the preindustrial world: Cross-cultural approaches*, ed. G.R. Storey, 27–51. Tuscaloosa: University of Alabama Press.

Osborne, R., Jr. 1987. *Classical landscape with figures: The ancient Greek city and its countryside*. London: G. Philip.

Owens, E.J. 1991. *The city in the Greek and Roman world*. London: Routledge.

Parrish, D., ed. 2001. *Urbanism in western Asia Minor: New studies on Aphrodisias, Ephesos, Hierapolis, Pergamon, Perge and Xanthos*, Journal of Roman Archaeology Suppl. 45. Portsmouth: Journal of Roman Archaeology.

Powell, B.B. 2007. *Homer*. Malden: Blackwell.

Snodgrass, A.M. 1981. *Archaic Greece: The age of experiment*. Berkeley: University of California Press.

Snodgrass, A.M. 2006. *Archaeology and the emergence of Greece*. Ithaca: Cornell University Press.

Sweet, R.F.G. 1997. Writing as a factor in the rise of urbanism. In *Urbanism in antiquity: From Mesopotamia to Crete*, ed. W.E. Aufrecht, N.A. Mirau, and S.W. Gauley, 35–49. Sheffield: Sheffield Academic Press.

Whitley, J. 2001. *The archaeology of ancient Greece*. Cambridge: Cambridge University Press.

Wycherley, R.E. 1962. *How the Greeks built cities*. London: Macmillan.

Further Reading

Adams, R.M. 1966. *The evolution of urban society*. Chicago: Aldine.

Branigan, K. 2001. *Urbanism in the aegean bronze age*, Sheffield studies in aegean archaeology 4. London/New York: Sheffield Academic Press.

Finley, M.I. 1981. *Economy and society in ancient Greece*. London: Chatto & Windus.

Marcus, J., and J.A. Sabloff, eds. 2008. *The ancient city: New perspectives on urbanism in the old and new world*. Santa Fe: School for Advanced Research.

Murray, O., and S. Price. 1990. *The Greek city: From Homer to Alexander*. Oxford: Clarendon Press.

Owen, S., and L. Preston, eds. 2009. *Inside the city in the Greek world*. Oxford: Oxbow Books.

Thompson, H.A., and R.E. Wycherley. 1972. *The Agora of Athens: The history, shape, and uses of an ancient city center*, Athenian agora 14. Princeton: American School of Classical Studies at Athens.

Urban Planning, Roman

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Introduction

Hundreds of towns were founded, expanded, and redeveloped across the breadth of the Roman Empire, many of which still survive as cities

today. Since the standing remains of the Romans' towns in Europe and the Mediterranean region are one of the strongest reminders of their urban-focused culture, the Roman town-building tradition has been a subject of scholarly interest for centuries. Urban planning involved incising the basic layout of a future town into the landscape, creating parameters for its physical development, although other processes are also associated with it. Since the designs of many such towns have survived in the archaeological record, scholars utilize this resource for interpreting the purpose and development of Rome's concept of the city.

Definition

Roman urban planning is the principles and practice employed in the founding, construction, expansion, and infrastructural maintenance of Roman nucleated settlements.

The physical definition and subdivision of a new urban space was to prepare it for construction: its fortifications, paved streets, or buildings. Thus, the study of Roman urban planning and the study of Roman urban architecture are partly intertwined. Traditionally, urban planning's strongest association is with an orthogonal grid of streets, possessed by many Roman towns. Regular street systems are the most obvious aspect of urban planning to have survived. Yet the founding of a new settlement also involved less archaeologically tangible processes, such as the establishment of a new urban population. After the initial founding, a town's physical development over time usually involved the periodical replanning of areas within it. The methods employed for planning towns were also used to design some nonurban or periurban settlements.

Historical Background

Ascertaining when the Roman practice of town planning began is hampered by the imprecision of the textual and archaeological sources. Although Rome itself grew to a great size, it never possessed an orthogonal grid of streets (Liv. 5.55). Particular areas of the city were replanned during its history, such as the major new fora projects initiated by Caesar, Augustus, and Trajan, yet an overarching unitary plan was lacking – a fact admitted by Roman authors. For the beginnings of Roman urban planning, one has to look instead to the settlements created in the wake of Roman territorial expansion. The first reference to Rome's involvement in the founding of a colony is for the late sixth century BCE. As many as 16 of the so-called Latin colonies are reported to have been created before the mid-fourth century BCE, but they were seemingly founded with the involvement of other Latin city-states. From an archaeological perspective, the sites associated with these early colonies demonstrate settlement histories stretching further back in time than the colonial foundation dates furnished by the written sources. In this sense, the founding of a colony by Rome before the second half of the fourth century BCE appears not to have involved the creation of a new settlement, but rather the sending of colonists to an existing one. Archaeological evidence does not currently support a systematic redevelopment of these settlements' urban centers immediately after, and as a consequence of, becoming colonies.

There is insufficient archaeological data to determine confidently which Roman settlement was the first to be constructed from scratch (*ex novo*). A small coastal fort at Ostia may have been the first (see below), but the first colonial town known to be founded by Rome alone on a site with no known pre-Roman settlement is Fregellae (328 BCE). It was orthogonally planned and placed on the banks of the river Liri to counteract the contemporary Samnite threat. At least by the second half of the fourth century BCE, then, Rome was employing surveyors to plan her new settlements.

Scholars have long debated the source of Roman urban planning practices. Some Bronze Age settlements of the *terramare* cultures on the Po plain were laid out orthogonally, and this prompted a theory, no longer upheld, that this represented the origins of formal town planning on the Italian peninsula. In the 1950s, F. Castagnoli proposed that the orthogonality of Rome's colonies (and that of Etruscan

settlements) was derived from the advances made by Hippodamos of Miletus (Castagnoli trans. 1971). This Greek urban planner is known to have been involved in the redevelopment of Piraeus, Athens' harbor town, during the fifth century BCE (Arist. *Pol*. 1267b 24–1269a 29). Although the term, "the Hippodamian plan," is still synonymous with the orthogonal street systems of classical antiquity, it is misleading. Orthogonality was employed in Greek urban contexts before Hippodamos was born, as seen in the Archaic Greek colonies of southern Italy and Sicily. The Etruscans seem to have adapted these ideas, reflected in the early fifth-century-BCE street plan of Marzabotto (Bentz and Reusser 2008). Most recently, the ancient Latin town of Gabii has been discovered to have had a regularized street plan (Becker et al. 2009). The close proximity of Gabii to Rome suggests that the Romans could have learned these methods considerably earlier than previously thought. Yet what is lacking is a proven, planned Roman settlement predating the later fourth century BCE.

Early Roman town planning has much in common with contemporary Hellenistic practices, suggesting that concurrent developments in the broader Mediterranean and in Italy were influential (Sewell 2010). Regularized settlements were being founded on the Italian peninsula in Bruttium and Lucania in the late fourth century BCE (Osanna 2009). The old Etruscan centers and perhaps some in Latium were founding small fortified centers in their territories. On a macro-level, this was the most dynamic period for urbanism in the eastern half of the Mediterranean, with the founding of hundreds of cities by Alexander the Great and his successors. A corresponding increase in the quantity of itinerant experts in urban planning must have resulted. This situation probably contributed to the dissemination of contemporary, town planning practices among the urban cultures of the Mediterranean at this time, including the Romans. Although some Greek concepts are manifest in the earliest examples of Roman urban planning after 338 BCE, others are not. Some older Italic conventions were also adopted. Additionally, the Romans were also innovative from the beginning, employing conventions not seen in the settlement forms of other urban cultures.

Many new towns were founded by Rome on an already highly urbanized Italian peninsula during the republic and under Augustus (Gros and Torelli 2007), and many annexed, existing settlements were subsequently replanned. In the wake of Rome's dramatic territorial expansion across the Mediterranean and Europe between the later third century BCE and the first century CE, in many cases, a settlement model was created with which Rome had most experience: a network of urban centers administering territorial units. Consequentially, the areas of the empire which are closely associated with Roman urban planning are those provinces to which Rome brought the concept of the city for the first time.

Key Issues/Current Debates

Sources

Urban archaeology provides scholars with most of the available evidence on Roman urban planning. Archaeological evidence from the majority of Roman towns is derived from the excavation of only a small percentage of their total surface areas. Many have modern settlements situated above them, prohibiting extensive archaeological investigation in the long term. Thus, the plans of Roman towns created by archaeologists often involve extensive hypothetical reconstruction. When conditions are favorable, modern remote sensing techniques can reveal an abandoned town's plan (Fig. 1), but to establish how the plan developed over time without accompanying excavation is an interpretational challenge.

Few ancient textual sources relate to Roman town planning. An overview is provided by Vitruvius (1.4–7; Rowland and Howe 1999) writing in the Augustan period, who discusses how to choose the site of a new town, the planning and construction of the city wall, the laying out of the streets, and the allocation of public spaces. He also describes some of the technical procedures for the laying out of a city. A surviving collection of surveying manuals, the *Corpus Agrimensorum Romanorum*, was probably compiled in the fifth

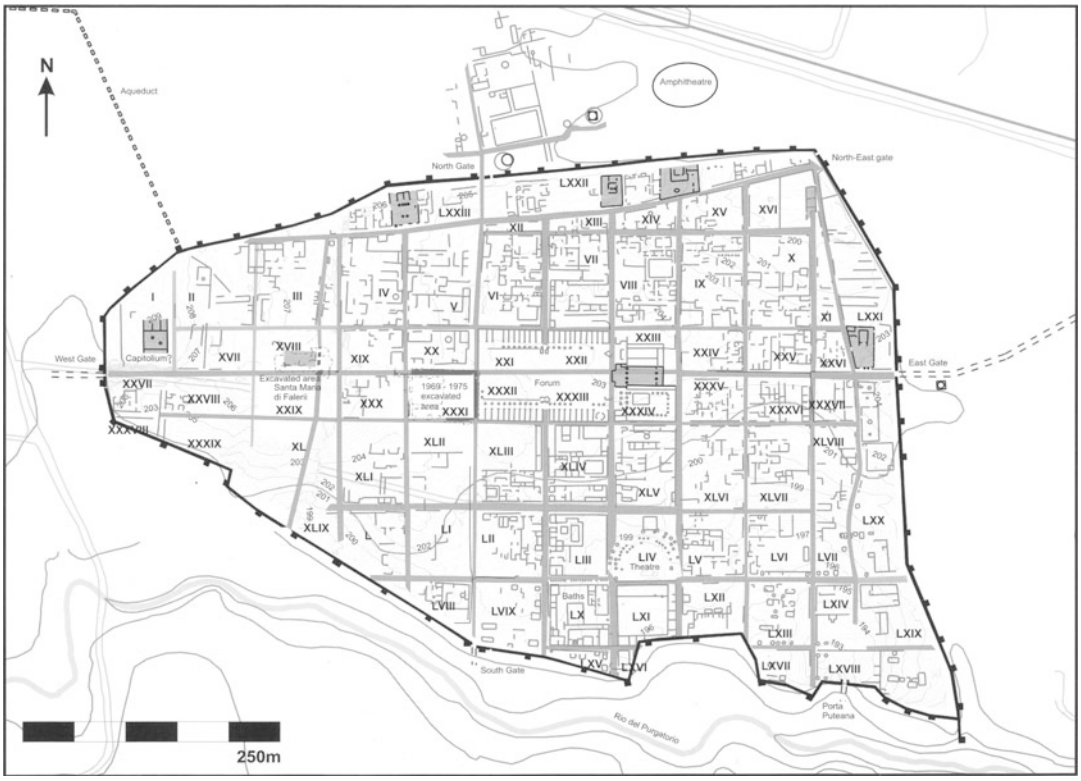

Urban Planning, Roman, Fig. 1 Falerii Novi. Reconstructed town plan based on the interpretation of a magnetometry survey (Millett 2007: 72, Fig. 1. Reproduced with permission from M. Millett and the Journal of Roman Archaeology)

century CE (Campbell 2000). Although it deals primarily with the procedures and issues related to the division and marking of land outside cities, similar techniques were employed by those engaged in planning urban space. An important testimony from the sixth century CE is provided by the treatise of Julian of Ascalon who set down regulations governing the design and replanning of houses to ensure the continued urban vitality of existing cities (Hakim 2001). Many surviving inscriptions refer to building projects that contributed to the physical development of towns over time.

The Process of Urban Planning

During the Roman Republic, the founding of colonies was overseen by three commissioners (*tresviri coloniae deducendae*), often high-ranking politicians who were responsible to the senate and the people of Rome (Gargola 1995). Some written sources refer to the commissioners being present at the site of the new settlement. The great military leaders of the Late Republic founded many colonies for the veteran soldiers of their wars, although this could involve settling them in an existing town and elevating its status to that of a colony. During the Imperial Period, emperors and their agents founded new colonies. Provincial governors might also have encouraged urbanization. Yet there were other forms of Roman town than just colonies, and for many of them, it is unclear who instigated and oversaw their foundation.

A number of interdependent factors influenced the choice of a new urban site. Curiously, our chief contemporary literary source, Vitruvius, discusses only one consideration: how healthy a site was in terms of its soils, winds, and nearby bodies of water, the qualities of which, in his view, could either be salubrious

or lead to illness. Today, it is believed that many other factors were influential. Colonies were frequently founded in newly conquered territory, and, during the republic, defensible positions were often favored to protect the urban population from potentially hostile neighbors or invaders. When no high ground was available, natural water courses could be exploited to provide protection to a town's perimeter. During the imperial period, low-lying sites were chosen even when elevated terrain was available. This is not only a sign of more peaceable times but could also be due to the benefits brought by easy access to long-distance communications routes. With the Romans' habit of building public roads and their utilization of navigable rivers and natural harbors, towns became nodes in the empire's transport network. New Roman foundations were often situated directly within or nearby to existing native settlements, effectively replacing them – true during both the republic and the empire. The Latin word *colonia*, although it came to be more closely associated with a particular legal status during the imperial period, originally signified a "settlement of cultivators," indicating that the presence of adjacent land suitable for tilling was often a prerequisite. Towns could also be sited in relation to the commercial exploitation of other natural resources such as metals or building materials. Freshwater was a basic requirement for a new town, and securing its supply would have influenced the decision of where to locate it.

Little is known about those who were involved in the planning of the new settlement. In reference to a colonizing project, Cicero (*On the agrarian law* 2.32; Freese 1930) mentions surveyors, architects, clerks, secretaries, and criers. Surveyors who were responsible for establishing the holdings in a town's territory probably also created the street system. Hyginus Gromaticus (*Constitutio limitum* T 144; Campbell 2000) advises setting up the central right-angled intersection of a new system of land division for a colony either in or as close to the town as possible, so that the orientation of the street system and the boundaries of the agricultural land is the same. This method was apparently applied for the planning of Ammaedara (Haïdra) in Africa. During the imperial period, experts from the Roman army could also be involved in urban planning.

The founding of a town could be initiated by the sacred act of taking the auspices (interpreting the flight of birds) and the *sulcus primigenius* (a ritual pulling of a plow) to demarcate the limit of the future town. A monumental definition of this perimeter could be created with the construction of a city wall, an essential element of Roman towns during the republic. Many new towns of the imperial period were originally not given fortifications. Walls were expensive to construct due to their manpower requirements and the time they took to build. It was the army's role to provide security on the empire's borders. In the peaceful inner areas, there is some suggestion that city walls were a privilege conferred by imperial favor.

Some of the tools used for surveying are known (Adam trans. 1994), such as the *groma*, a pole driven into the ground, on top of which was attached the center of a horizontal cross of four perpendicular arms of the same length. Right angles were established with this instrument. An example was recovered at Pompeii in the House of Verus. Measuring rods ten Roman feet in length, the *pertica* or *decempeda*, were also used, and the lines thus created must have been marked on the ground in some way until construction began.

In descriptions of Roman town plans by archaeologists, the terms *decumanus maximus* (main east-west street) and *cardo maximus* (main north-south street) are often employed. This terminology is taken from the writings of the Roman surveyors and was applied to the main intersecting straight axes of land division. It was long assumed that these terms were also applicable to urban streets, and an actual example of an urban *decumanus* is known from two inscriptions from the Latin colony of Aquileia (*Insc. Aq.* 842 and 3495) in Italy. This town's plan is known not to be orientated according to the cardinal points (Fig. 2), indicating that these terms were applied even when the streets were not so aligned. Roman urban street systems could be strictly aligned east-west and north-south, but the majority were not. What factors determined the orientation of a street

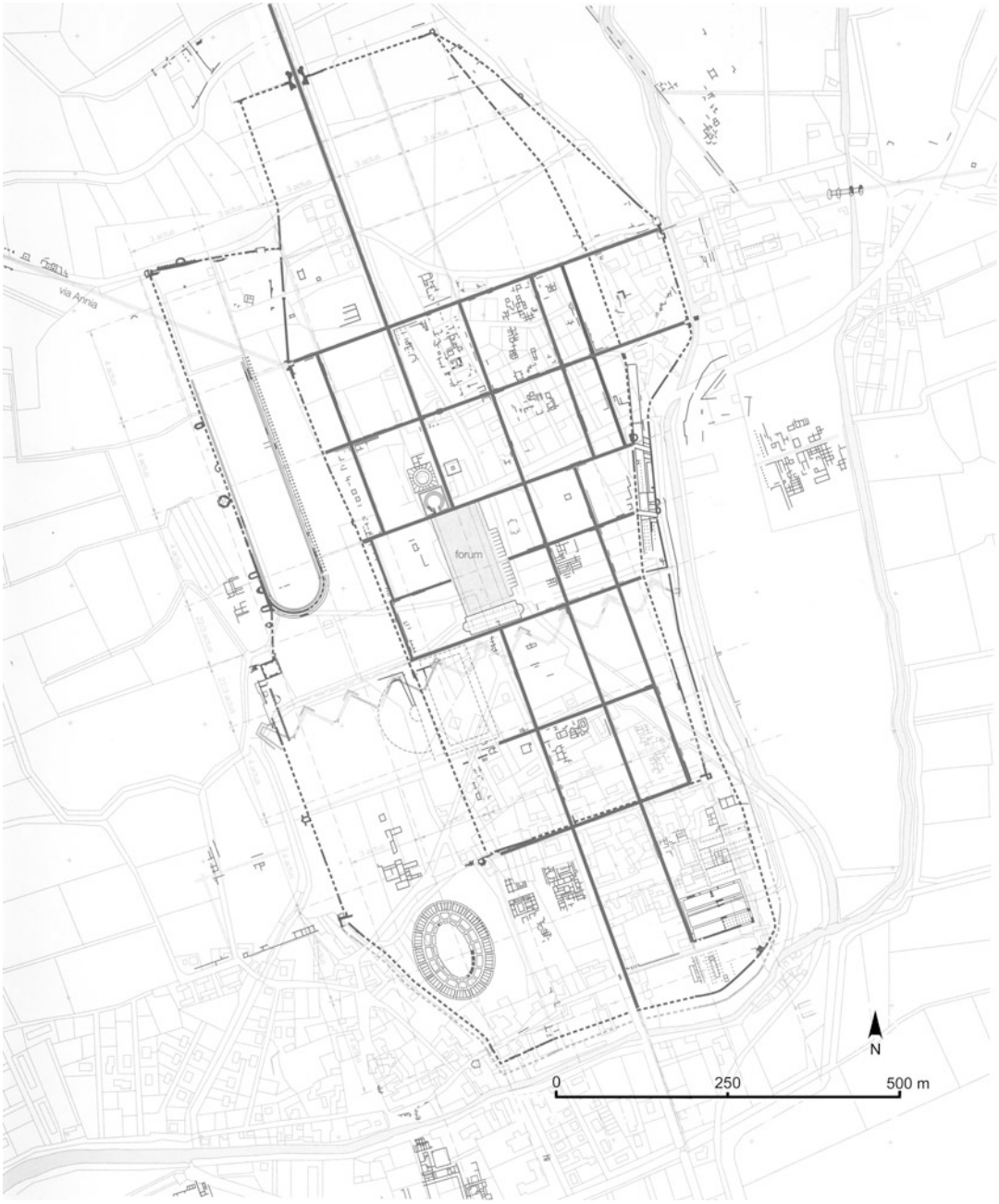

Urban Planning, Roman, Fig. 2 Aquileia. Partially reconstructed town plan. (Adapted from Lackner 2008: 335)

grid is often difficult to establish. Vitruvius recommends orientating the grid obliquely to the prevailing winds to avoid ill health among the urban inhabitants. Practical considerations such as the site's natural topography could play a role. Some towns were founded along the routes of public roads, the axis of which could influence that of the urban street system.

Archaeologists normally apply the Latin term *insula* (island) to describe the rectilinear blocks framed by streets that made up the town. In antiquity this term was specifically used to denote large apartment buildings, common in Rome from the Augustan period, well-preserved examples of which may be still seen at Ostia. The primary Roman units of measurement used in surveying were the *pes* (Roman foot) and the *actus* (120 ft). Other forms of unit from specific regions of the empire were employed locally. It is often difficult for archaeologists to reconstruct the units employed on a specific site due to inaccuracies in the original surveying. Although the reproduced plans of Roman towns often make them appear to be regular, on the ground there are nearly always discrepancies in the dimensions of each city block.

Very little is known about other aspects of the planning process which were probably much more challenging for the founders than marking straight lines on the terrain. Above all, urban planning was about giving structure to a built environment for a new population, usually comprising thousands of individuals. Founders of Roman colonies and their agents were responsible for establishing the new population at the site, distributing land to farm, and probably also allocating plots destined for houses in the town. This must have been a huge organizational challenge and a stressful process for the colonists who would have needed temporary shelter until their homes were built and food supplies until their first harvest. Founding towns was also a costly business. Finance needed to be managed, and labor and building materials needed to be procured. At least by the Late Republic, public building was often undertaken by contract with complex, legally binding clauses. Time pressure was also an issue. During the republic, the tenure of colonial commissioners is known to have been three years, although they probably remained as patrons of the new town in the long term. Thus, archaeologically speaking, most of the processes involved in urban planning are virtually invisible, resulting in a disproportionate modern emphasis on the physical layout of Roman settlements in publications concerned with urban planning.

Planning Characteristics of Roman Towns

As discussed below, the form of Roman towns differed according to region. No two were the same, and they varied greatly in size, yet certain planning conventions were used repeatedly. Orthogonality is a characteristic of most *ex novo* towns and was usually applied to major extensions of existing cities, such as Pergamon in Asia Minor. Annexed settlements could be replanned with regularized grids, but some continued to develop with no major change to their original, unordered layout, such as Glanum in Gallia Narbonensis, Thuburbo Majus in Africa (Fig. 3), or indeed Athens. Square *insulae* (city blocks) have a strong Roman association (Fig. 4), but this should not be over emphasized. Perhaps the Latin colonies of Placentia and Cremona (founded originally in 218 BCE) were the first to have square city blocks, but rectangular *insulae* continued to be common in Roman planning. A walled town did not always have a street system filling its entire intramural space, but when it did, normally a street ran around the entire inner face of the wall (Figs. 3, 4, and 5).

Orthogonally planned cities usually had the forum placed so that the main streets running from the main gates would converge on it (Figs. 1, 4, 5, and 6), but this did not always correlate with the town's geometric center. During the republic, elongated rectangular fora were the norm (e.g., Falerii Novi and Aquileia: Figs. 1 and 2), with more variation seen in the imperial period, including near-square examples (e.g., Thuburbo Majus and Timgad: Figs. 3 and 4). On sites with pronounced terrain, the forum was usually placed on level ground, and an elevated position was often favored (in stark contrast to Greek practice). Multiple fora are known to have existed in some towns, although additional fora were usually created some time after the initial foundation. During the republic, there is some sign that towns were planned with areas reserved for houses of its ruling class situated near the forum.

Fora developed over time to have buildings related to commerce and local government lining their borders, usually with some religious foci (Gros 1996). During republican times, some

Urban Planning, Roman, Fig. 3 Thuburbo Majus: plan of the Roman city. Example of an irregular town plan. (Adapted Alexander et al. 1980: Plate 34)

towns had uniquely sized *insulae* placed along the edges of the forum intended for its future public architecture. Often *tabernae* (shops) were built along a forum's flanks, and, from the Late Republic onward, a *macellum* (market) could be found nearby. The political function of the forum is reflected in the fact that it frequently possessed some form of political assembly place, such as a *curia* (senate house), and it has been argued for several Roman towns that voting took place on their fora. Thus, the presence of a forum is taken to reflect the ability of a community to run its own affairs.

In a town situated on particularly pronounced terrain, often the highest points were reserved for its most important sanctuaries and sacral architecture. If founded on more level ground, major temples could be placed near or on the forum instead. A forum dominated by a large axially placed temple at one end started to become a feature of some Roman foundations from the second century BCE in Italy and Spain. Under the emperors, starting at Rome with the Forum of Caesar, this convention took on a new impetus. The character of the forum changed by becoming pedestrianized and a location for emperor veneration. An axially arranged forum with a temple at one end became common in many of the Western Provinces. More common still on western fora from the Augustan period onward was a basilica, a multifunctional hall with architectural origins in the second century BCE, associated particularly with the dispensing of justice, commerce, and local government. It was sometimes situated

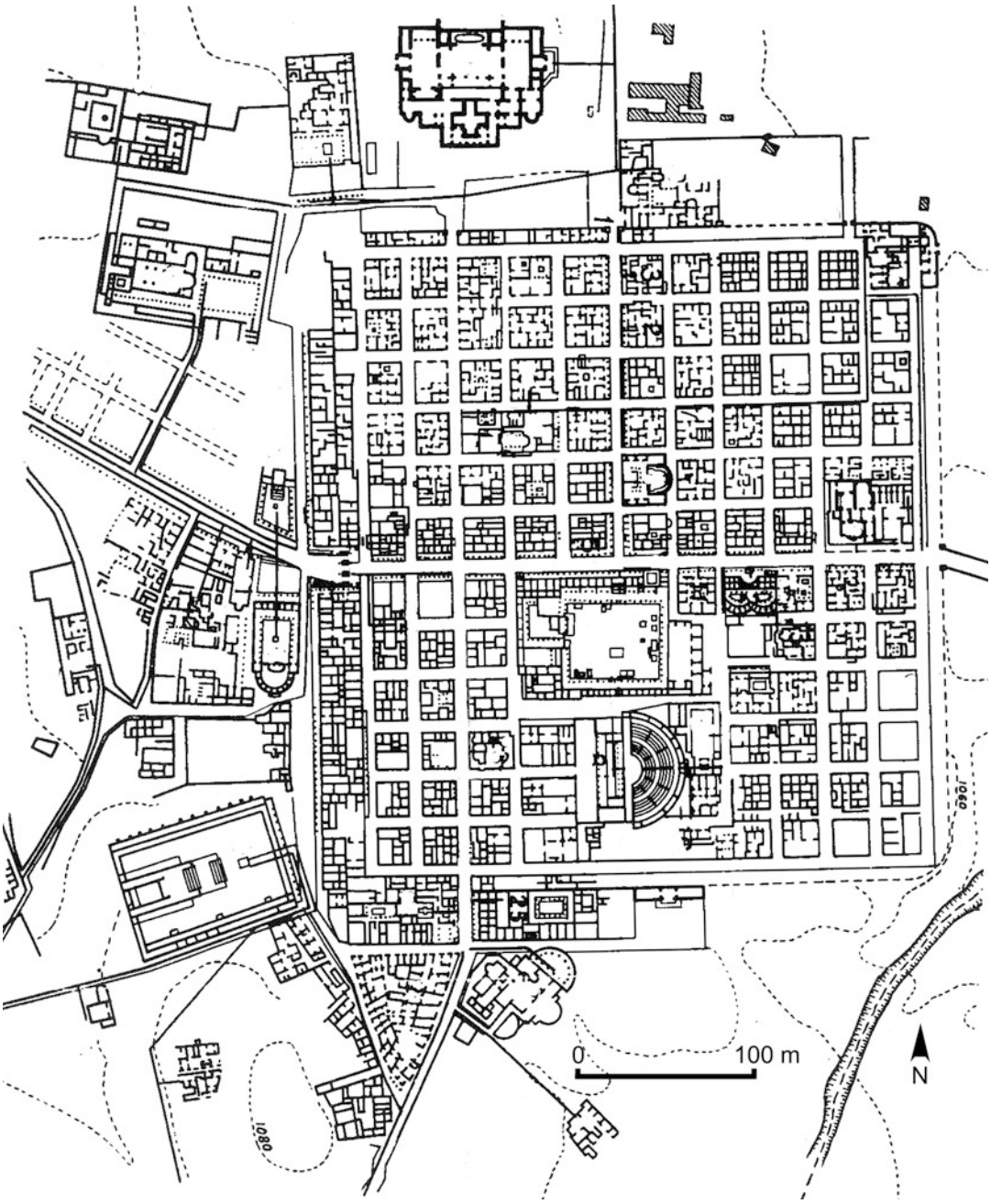

Urban Planning, Roman, Fig. 4 Timgad (Thamugadi): actual state of remains. (Adapted Gros and Torelli 2007: 370, Fig. 223)

axially opposite the main forum temple, as at Bavay, Trier, and Amiens. Axiality in architectural compositions is generally a trait with strong Roman associations.

Similar to Greek planning practices, some basic urban zoning was created by town planners. The largest fraction of a city's surface area was intended for domestic architecture. Communal

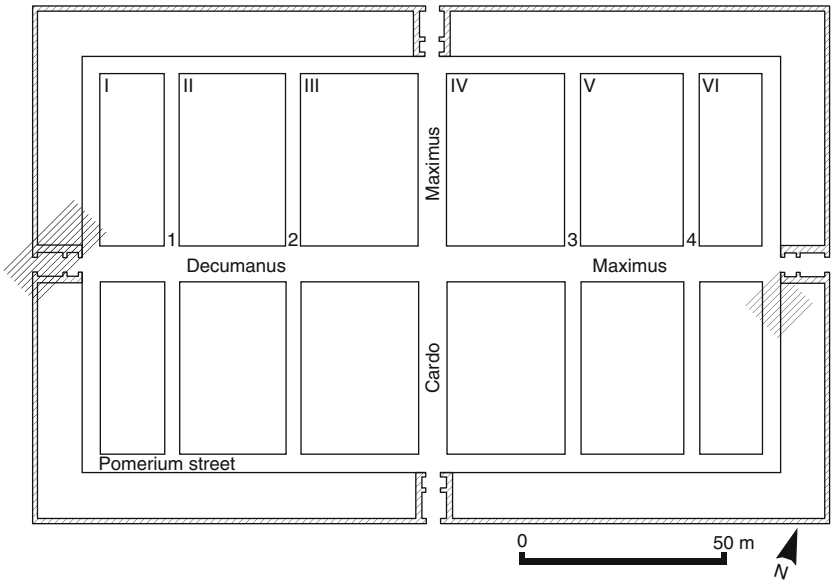

Urban Planning, Roman, Fig. 5 Ostia. Hypothetical reconstruction of the original *castrum*. (Adapted from Brandt 1985: 43, Fig. 4)

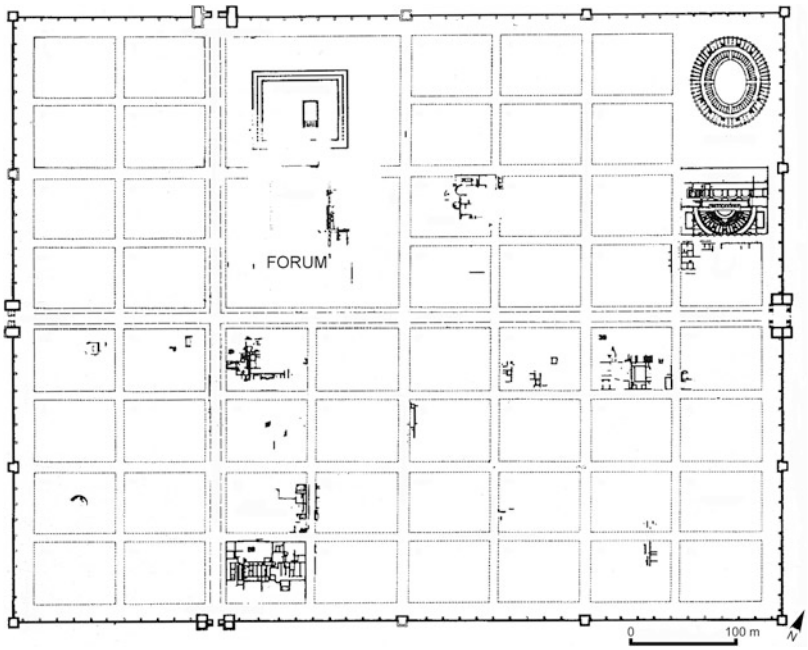

Urban Planning, Roman, Fig. 6 Aosta: Reconstructed town plan. (Adapted from Gros and Torelli 2007: 244, Fig. 133)

spaces were defined from the start, such as streets, the forum, and sanctuaries. Areas outside the city were reserved for necropolises, but it is unclear whether they were assigned during the initial planning. Cities could develop to have areas dominated by facilities for industrial production, but there is little sign such zones were set aside from the start. Although commerce is strongly associated with the forum, anyone who has visited Pompeii is aware that shops and bars are found in

many areas of the town, and they tended to develop along the busiest streets over time.

Urban Planning and Military Installations

It is unlikely that the Romans learned how to plan towns from their experience in creating temporary military camps because their first planned towns predate the tradition of the planned camp. Most Roman military installations have rectilinear forms for the same reason some Roman towns do: it is an expedient solution to building on level terrain. Yet the situation may be more complex, since among the candidates for the first *ex novo* planned settlement built by the Romans is Ostia, a rectilinear, permanent coastal fort (Fig. 5). It may be described as a fort due to its small size (2.44 ha), its defenses, and a lack of a forum. Most scholars believe it dates to the mid-fourth century BCE or later, and it was a colony of Roman citizens, placed to defend the coast near Rome. As many as ten similar citizen colonies were subsequently built on coastal stretches of the *ager Romanus* (Roman public land) before the end of the third century BCE. From the early second century BCE onward, the character of the citizen colony changed. New examples were much larger and had a forum, making them small towns. An example is Potentia (184 BCE) in *Picenum*. Although nearly 18 ha in size, just like its smaller predecessors it was rectangular in shape, probably with a gate on each wall and a central intersection of the streets leading from them. This design continued to be used, as manifested in the Augustan colonies of Aosta (Fig. 6), Barcino (Barcelona), and Turin. In turn, this form of planned settlement has similar design characteristics to the "playing-card" design of auxiliary forts and legionary fortresses. Timgad, a second-century-CE colony founded for military veterans and planned by the *Legio III Augusta*, has a design seemingly influenced by that of a military base (Fig. 4).

Similarly, planned forts and fortresses could themselves become the basis for towns in the Western Provinces when the army vacated them. In Britain, for example, the street system of the legionary fortress at Colchester became the core of a colony for veterans in the first century CE (Fig. 7). After the army had withdrawn from the legionary base at Wroxeter and demolished it, its street system was incorporated into a civilian settlement which became the *civitas* capital (see below) of the *Cornovii*.

Urban Planning Outside Towns

Periurban settlement is known to exist around many Roman towns (Goodman 2007), but it usually developed with little respect to the alignment of the urban street system (Fig. 3). Some orthogonally planned extramural settlement is known, however, such as that in front of the south gate of the *Oppidum Ubiorum* (which later became Roman Cologne), laid out soon after the town's foundation. Similarly, many secondary settlements in the territories of administrative urban centers developed without regularized street systems. A few were planned orthogonally, such as *Epomanduorum* (Mandeure) in Gaul (Fig. 8), which may have been founded through private initiative. It eventually covered an area of 120 ha and possessed monumental public buildings.

The Three-Dimensional Development of Urban Plans

The physical evidence for urban planning is provided by the archaeological remains of structures and streets subsequently built in conformity to the surveyors' lines. After the initial surveying was complete, filling an urban plan with buildings could be a prolonged process. At the Latin colony of Cosa, for example, founded in 273 BCE, no house yet found predates the second century BCE! Public buildings were expensive to erect and depended upon available funds, meaning that they were usually constructed individually over time. From the second century BCE onward, urbanization occurred at a more rapid pace. Although towns could use their public finance for building projects, the process was boosted by a new and rapidly growing convention among the elite to donate their wealth for the good of the public. Euergetism (public benefaction), as it is known, became a driving force for the creation of public buildings, streets, aqueducts, and other amenities in towns across the empire.

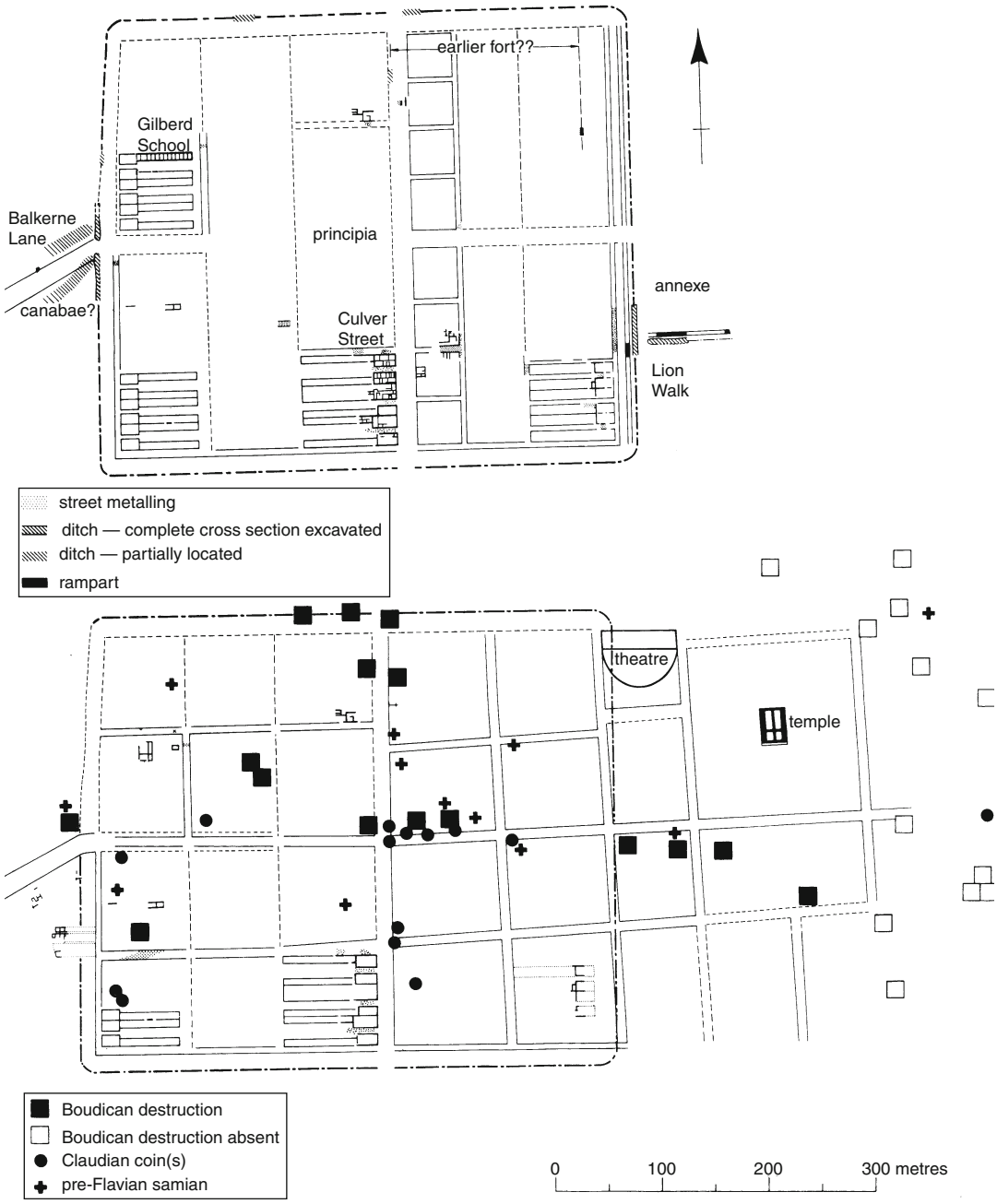

Urban Planning, Roman, Fig. 7 Colchester: plan of the fortress (above) and its development into the first colony (below) (Crummy 1993: 36, Fig. 3. Reproduced with permission of P. Crummy and the Council of British Archaeology)

Large building projects could transform a town's plan over time. Once all the available empty spaces of the original plan had been filled, new houses and public buildings could be constructed outside the town, as demonstrated at Timgad (Fig. 4). A lack of vacant urban space is one of the explanations why many large structures, such as amphitheaters, were located on the

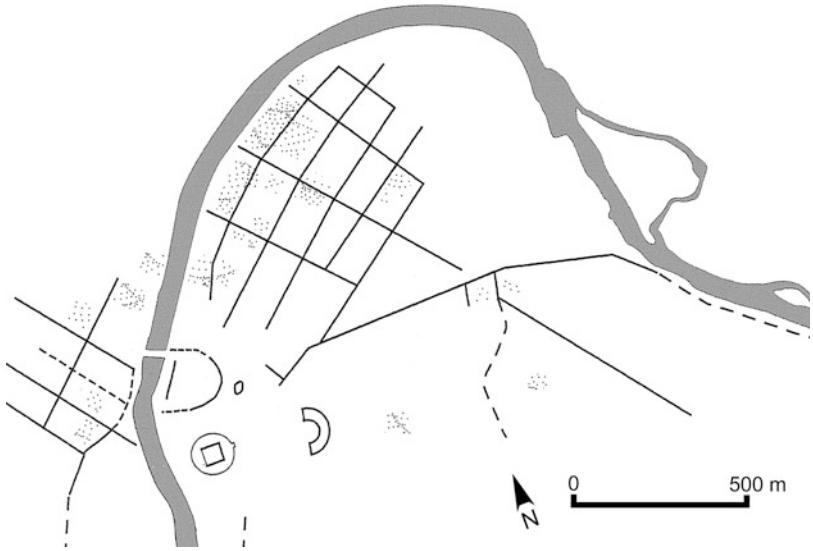

Urban Planning, Roman, Fig. 8 Mandeure: reconstructed plan of a "secondary agglomeration." (Adapted from Petit et al. 1994: 91, Fig. 3)

edge of, or just outside, a town's limits. The continued growth of a town was usually not limited by the constraints of its original planning unless it was situated on mountainous terrain. At *Augusta Treverorum* (Trier), a new wall circuit was built toward the end of the second century CE which increased its original surface area from 80 to 285 ha. There are also many instances of intramural areas being replanned to make way for new building complexes. This is most dramatically illustrated at Rome through the building projects of the emperors. The baths of Trajan, for example, created after 104 CE, had a perimeter enclosing an area of more than 10 ha, built directly on top of the *Domus Aurea* (the palace of Nero). Smaller scale projects reshaped urban centers in Italy and the provinces, mutating their original plans. The dynamism of Roman towns is reflected in these patterns of abandonment, replanning, changing property boundaries, and new construction. Towns could also contract, a phenomenon particularly well documented in Gaul and Greece in late antiquity, where many new defenses were thrown up, encompassing a severely reduced urban area.

Efforts to control cycles of abandonment and reconstruction already start to become apparent by the first century BCE. In the *Lex Tarantina* (Crawford 1996: 304, 307), it states that no building should be demolished unless a promise is made to the town's chief magistrate to rebuild it. Provincial governors could order owners to repair buildings, and especially appointed officials (*curatores*) could be allocated to cities in the west for up to 10 years with the task of restoring their urban vitality (Laurence et al. 2011). The recycling of urban structures became widespread in late antiquity, particularly apparent in the dismantling of pagan sanctuaries and the reuse of their building materials in new churches. A surviving treatise by Julian of Ascalon from the sixth century CE is a compilation of guidelines for the construction of houses (Hakim 2001). He focuses on the general upkeep of the built environment and conflict avoidance among neighbors, dealing with issues such as fire prevention and height restrictions during new construction.

International Perspectives

Although some generalizations may be made about Roman urban planning, pronounced regional variations are apparent in the form, size, and development of towns across the empire. Local traditions clearly had an influence, but establishing why particular differences manifest themselves in distinct regions is often challenging. Due to the size of the Roman Empire and its urban diversity, publications relevant to urban planning tend to focus on individual sites, provinces, or regions.

Roman town planning is more strongly associated with Italy and the Western Provinces because more settlements were founded there than in the Roman east, much of which was already urbanized when incorporated into the empire. In Greece, large-scale Roman interventions there were few: Caesar refounded Corinth as a Roman colony in 44 BCE; Patras became veteran colony under Augustus, who also founded a new city, Nikopolis in Epirus, after the battle of Actium, necessitating the citizens of nearby *poleis* to abandon their ancestral homes to resettle in the new city. Colonies were also founded in Macedonia, Asia, Syria, and Pisidia by Augustus. Towns continued to be founded, sporadically, such as Antinopolis in Egypt by Hadrian, and the new Roman capital Constantinople begun in 324 CE on the site of former Byzantion. Many existing eastern cities were transformed through planned urban expansions and smaller replanning projects associated with large-scale building programs. At some sites, such as Gerasa in Jordan and Aphrodisias in Caria (Turkey), the physical remains of the Roman period dominate the archaeological record. The character of the public spaces and domestic and monumental architecture of the east under Roman rule was often strongly influenced by local traditions, and the resulting conceptual fusion is a major theme in scholarly literature. Many new planned towns in the previously un-urbanized Danubian provinces were founded on or near bases of the Roman army.

In the Roman west, great numbers of colonies and other forms of urban centers were founded as a consequence of Roman conquest. Some areas, such as North Africa, southern Gaul, and the Iberian coastal areas had already been partly urbanized by the Greeks and the Phoenicio-Punic cultures. The earliest western Roman foundations were in these regions, such as *Italica* (206/205 BCE) and *Narbo* (118 BCE), although little is known about their early development. From the Augustan period onward, towns were founded in previously un-urbanized areas, such as Britain, Spain, and *Gallia Comata*. Territorial units called *civitates peregrinae* (denoting that their inhabitants were not Roman citizens) are most strongly associated with the previously un-urbanized areas of the empire, and those in the west have been well studied. They were loosely based on pre-Roman ethnic boundaries and were often administered by urban centers, the creation of which often involved some form of urban planning. Yet these towns, the *civitas* capitals, were not founded systematically by the Romans but came into existence over time through a variety of processes.

Future Directions

With the increasing use of remote sensing techniques to record the plans of abandoned towns, going forward, the body of evidence for urban planning is sure to increase, encouraging comparative studies; a good example of which is the analysis of the plans of *Falerii Novi*/*Falerii Veteres* (Millett 2007). The developmental trajectory of Roman urban planning practices and the reasons behind regional variations might thus be elucidated as a consequence. It should also be possible to explore further the relationship Roman towns enjoyed with the territories they administered. For example, a recent study has suggested that the replanning of towns in northern Campania was accompanied by changes in the settlement patterns of the territories associated with them (Rescigno and Senatore 2009).

Cross-References

- ▶ Architecture, Roman
- ▶ Centuriation and Roman Land Surveying (Republic Through Empire)
- ▶ Urban Planning in the Greek World

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References

Adam, J.P. 1984 (trans. 1994). *Roman building: Materials and techniques*. Trans. A. Mathews. London: B.T. Batsford.

Alexander, M.A., A.B.. Abed-Ben Khader, S. Besrour, B. Mansour, and D. Soren. 1980. *Corpus des mosaïques de Tunisie. 2.1. Thuburbo Majus, Les mosaïques de la région du forum*. Tunis: Institut National d'Archéologie et d'Art.

Becker, J.A., M. Mogetta, and N. Terrenato. 2009. A new plan for an ancient Italian city: Gabii revealed. *American Journal of Archaeology* 113: 629–642.

Bentz, M., and C. Reusser. 2008. *Marzabotto: Planstadt der Etrusker*. Mainz am Rhein: von Zabern.

Brandt, J.R. 1985. Ostia, Minturno, Pyrgi: The planning of three Roman colonies. *Acta ad archaeologiam et artium historiam pertinentia* 2 (5): 25–87.

Campbell, B. 2000. *The writings of the Roman land surveyors: Introduction, text, translation and commentary*. London: Society for the Promotion of Roman Studies.

Castagnoli, F. 1956 (trans. 1971). *Orthogonal town planning in antiquity*. Trans. V. Caliandro. Cambridge, MA: MIT Press.

Crawford, M. 1996. *Roman statutes. volume 1*. London: Institute of Classical Studies.

Crummy, P. 1993. The development of Roman Colchester. In *Roman towns: The Wheeler inheritance*, ed. S.-J. Greep, 34–45. York: CBA.

Freese, J.H. 1930. *Pro Quinctio. Pro Roscio Amerino. Pro Roscio Comoedo. On the Agrarian Law*, Loeb Classical Library. Cambridge, MA: Harvard University Press.

Gargola, D.J. 1995. *Land, laws and gods: Magistrates and ceremony in the regulation of public lands in Republican Rome*. Chapel Hill: University of North Carolina Press.

Goodman, P.J. 2007. *The Roman city and its periphery: From Rome to Gaul*. London: Routledge.

Gros, P. 1996. *L'architecture romaine: Du début du IIIe siècle av. J.-C. à la fin du Haut-Empire. volume 1: les monuments publics*. Paris: Picard.

Gros, P., and M. Torelli. 2007. *Storia dell'urbanistica. Il mondo romano*. 2nd ed. Rome: Laterza.

Hakim, B.S. 2001. Julian of Ascalon's treatise of construction and design rules from sixth-century Palestine. *Journal of the Society of Architectural Historians* 60 (1): 4–25.

Lackner, E.-M. 2008. *Republikanische Fora*. Munich: Biering & Brinkmann.

Laurence, R., S. Esmonde Cleary, and G. Sears. 2011. *The city in the Roman west, c.250 BC-c.AD 250*. Cambridge: Cambridge University Press.

Millett, M. 2007. Urban topography and social identity in the Tiber Valley. In *Roman by integration: Dimensions of group identity in material culture and text*, Journal of Roman Archaeology. Supplementary series 66, ed. R. Roth and J. Keller, 61–72. Portsmouth: Journal of Roman Archaeology.

Osanna, M., ed. 2009. *Verso la città. Forme insediative in Lucania e nel mondo italico fra IV e III sec. a.C. Atti delle giornate di studio, Venosa 2006*. Venosa: Osanna.

Petit, J.-P., M. Mangin, and P. Brunella. 1994. *Altas des agglomérations secondaires de la Gaule Belgique et des Germanies*. Paris: Editions Errance.

Rescigno, C., and F. Senatore. 2009. Le città della piana campana tra IV e III sec. a.C. Dati storici e topgrafici. In *Verso la città. Forme insediative in Lucania e nel mondo italico fra IV e III sec. a.C. Atti delle giornate di studio, Venosa 2006*, ed. M. Osanna, 415–462. Venosa: Osanna.

Rowland, I.D., and T.N. Howe. 1999. *Vitruvius: Ten books on architecture*. Cambridge: Cambridge University Press.

Sewell, J. 2010. *The formation of Roman urbanism, 338–200 BC: Between contemporary foreign influence and Roman tradition*, Journal of Roman Archaeology. Supplementary series 79. Portsmouth: Journal of Roman Archaeology.

Further Reading

Conventi, M. 2004. *Città romane di fondazione*. Rome: "L'Erma" di Bretschneider.

Haverfield, F. 1913. *Ancient town-planning*. Oxford: Clarendon Press.

Lavan, L., ed. 2001. *Recent research in late-antique urbanism*, Journal of Roman Archaeology. Supplementary series 42. Portsmouth: Journal of Roman Archaeology.

Lorenz, T. 1987. *Römische Städte*. Darmstadt: WBG.

Sommella, P. 1988. *Italia antica. L'urbanistica romana*. Rome: Jouvence.

Ward-Perkins, J.B. 1974. *Cities of ancient Greece and Italy: Planning in classical antiquity*. New York: Braziller.

Urbanism in the Ancient Near East

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Introduction

The earliest urbanization on the globe occurred in the Near East in the context of a broader cultural transformation that led to the emergence of the first complex societies. The historical significance of these developments, which included the appearance of class societies and the advent of writing, cannot be overstated. Despite their historical importance, cities in Mesopotamia and the wider Near East remain relatively poorly understood. The reasons for this situation are first, conceptual; second, methodological; and third, political. In recent years, however, remarkable steps forward have been achieved in the study of urbanism in the ancient Near East. This brief essay

will summarize the current situation in the archaeology of urbanism in the Near East and will discuss possible ways forward.

Definition

Defining urbanism is a complex issue. Diverse answers are possible (Smith 2003) to the following simple question: What is a city? First, in some cases "city" is a legal status defining a particular form of administration within a state. Second, cities can be political institutions, as, for example, in the Greek *polis*. Third, a sociological characterization of cities focuses on the structure of social interactions: city dwellers interact as strangers with little solidarity. Fourth, a geographical definition is one in which cities are central nodes that can only exist in relation to a hinterland of smaller villages that supply it with goods and food in exchange for urban services. In addition, the urban settlement harbors full-time specialists of various types, has particular urban facilities, and is marked by zoning of activities.

In the study of urbanism in the ancient Near East, both the sociological and the geographical perspectives on urbanism are important, whereas legal and political characterizations have been less influential (Smith 2003; Marcus and Sabloff 2008; Emberling 2015). The famous ten-point list of urbanism proposed by Vere Gordon Childe (2004: 112–115) is in fact a geographical definition of cities put together on the basis of his knowledge of the ancient Near East. Given the diversity of urban settlements, scholars working on the issue in recent years do not typically offer this type of trait list definition anymore, but they do adhere to a qualitative differentiation between cities and their hinterland (e.g., Emberling 2015).

Key Issues/Current Debates/Future Directions/Examples

Classifying settlements as urban is not a neutral act. The word "city" is etymologically linked to "civilization," and when archaeologists claim urban status for an archaeological site, civilization is often implied (Childe 2004: 108). Many archaeologists have argued that cities and civilizations first emerged in the Neolithic, at sites such as Jericho and Çatalhöyük, which where substantial settlements encompassing several thousands of people (Gates 2003: 18–28). These interpretations are problematic, however, given the nature of settlements such as Jericho, Çatalhöyük, and other large Neolithic settlements such as Abu Hureyra and 'Ain Ghazal. None of these large sites are surrounded by associated subsidiary settlements, and none of them have evidence for full-time specialists, central facilities, or zoning of activities, and it is for this reason that Hole (2000) argued that size is not an index of complexity in the Neolithic.

It is only in the fourth millennium BC, during the so-called Uruk period in Mesopotamia, that we can document the rise of the first truly urban settlements in the Near East. In the course of the Uruk period, the size of the largest settlements increases by a factor 20, from about 10 ha to 200 ha, and we see the rise of settlement systems consisting of large centers with associated smaller villages (Pollock 2001), and the emergence of monumental architecture within the urban centers, most spectacularly at the eponymous site of Uruk (Nissen 2015). The most popular explanation for the urbanization processes and the accompanying demographic changes focuses on the idea that in the Uruk period, the southern alluvium was at an ecological optimum during which very high agricultural yields could be obtained with relatively little effort and which could be supplemented with aquatic resources from nearby marshes (Algaze 2008).

Despite the importance of the Uruk period in the history of the Near East, we know relatively little about the urban settlements concerned. Our knowledge of the period derives from three sources: Robert McC. Adams' large-scale surveys in the 1950s–1970s (Adams and Nissen 1972), German surveys of the city of Uruk in the 1980s (Finkbeiner 1991), and early excavations at sites such as Uruk, which focused heavily on the monumental buildings (Eichmann 1989). Political

developments within Iraq have precluded further survey work and excavations of early urban centers, with the result that we know very little about issues such as the density of occupation, the presence of workshops, and whether there was zoning of activities in these settlements. In short, we know little about the nature of the urban economy and society in this period.

In recent decades it has become clear that in northern Mesopotamia urbanization also occurred that was at least as early as that in the southern alluvium. This is best documented at site such as Tell Brak, Tell Hamoukar, and Arslantepe (Oates et al. 2007; Al Quntar et al. 2011). Survey data suggest that these sites reached considerable sizes, 130 ha (Tell Brak) and 300 ha (Tell Hamoukar), and excavations have produced evidence for monumental buildings and long-distance trade. It should be noted, however, that monumental buildings and long-distance trade are well documented at earlier sites, such as Ubaid period Gawra (Rothman 2002), and that we do not really know what the large spreads of surface material at Hamoukar and Brak represent. The research projects investigating this issue were cut short by the Syrian civil war. Thus, unfortunately, we know relatively little about the spatial layout and activities that took place within these cities, and thus our understanding is limited, as it is in the south. Interestingly, the ecological optimum argument that has been used to explain the rise of urban communities in the south is less evident for the north, and there appear to be only a few large urban settlements in northern Mesopotamia. Further, the urban communities in the north disappear toward the end of the fourth millennium BC and only reappear around 2600 BC, whereas those in the south continue and flourish (Ur 2010).

The Early and Middle Bronze Age (3000–1600 BC) data for urban settlements are much richer than those available for the Uruk period. A large number of urban settlements have been investigated across Mesopotamia and in the Levant, including famous sites such as Ebla, Mari, Qatna, Eshnunna, and Ur. At the latter two sites, large-scale excavations undertaken in the early twentieth century AD have opened considerable exposures of residential and workshop areas, providing important data on the texture of urban life in Mesopotamia. Houses of various scales are found intermixed in dense neighborhoods, and there are small workshops, shops, and shrines mixed in between houses. A similar spatial subdivision in more or less equivalent neighborhoods consists of residences, shops, and workshops, and a central monumental area has been postulated for Mashkan-shapir, where an exemplary city survey was undertaken (Stone and Zimansky 2004). It has been argued that the mixed neighborhoods were occupied by kin groups in which client relations played an important role and that this type of agglomeration is comparable to that seen in traditional premodern Near Eastern cities (Stone 2007), although the latter are highly specific to a particular period in history and should not be construed as the timeless oriental city. These studies suggest that cities in the ancient Near East differed substantially from early modern cities of the west in social terms and that neighborhoods operated in ways not dissimilar to villages in the countryside. This point is also made by Steinkeller (2007) who argues that cities and villages differed relatively little in terms of economy and society.

In the Late Bronze and Iron Ages (1600–333 BC), the general understanding of urban cities in the Near East as composed of mixed neighborhoods with a central monumental complex surrounded by a city wall does not change much, although the size of temple and palace complexes depended on the power of the particular urban community. A Mesopotamian map of the city of Nippur dating to around 1500 BC depicts a city that meets these criteria in remarkably accurate proportions (Fig. 1). Archaeologically the best known example from this period is that of Ras Shamra (Ugarit), excavated on a large scale in the mid-twentieth century AD, for which Schloen (2001) argues that client systems along patriarchal lines were central to neighborhood communities.

In the Late Bronze and Iron Age, imperial capitals become prominent in the archaeological record. In cities such as Hattuša, Nimrud, Dur-Sharrukin, Nineveh, Babylon, and Persepolis, very monumental capitals were created with large palaces and temple complexes meant to inspire awe and act as testimony to the power of

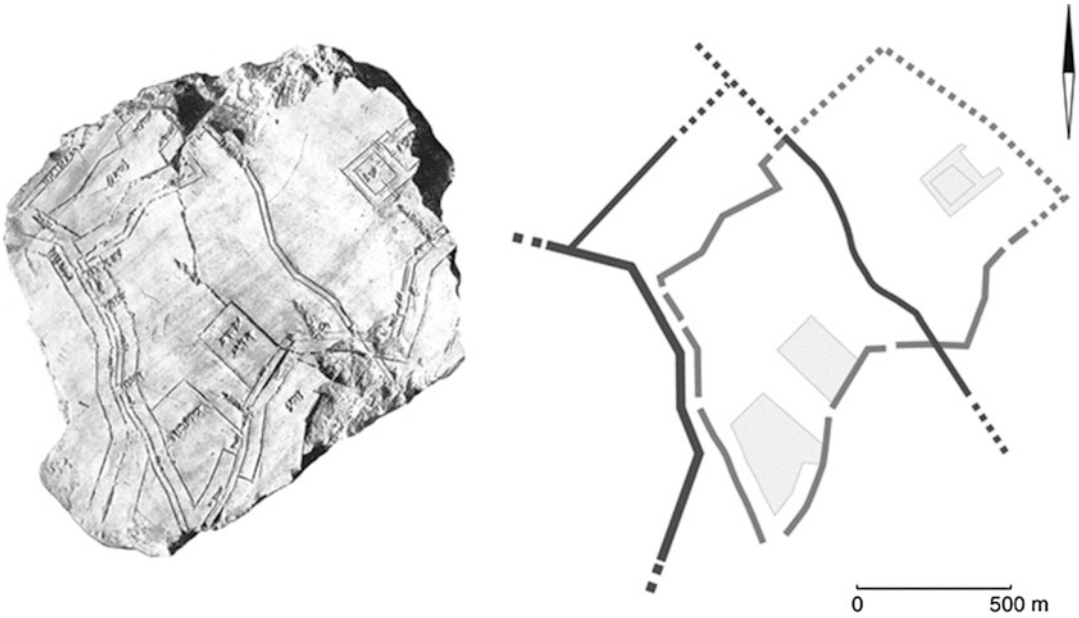

Urbanism in the Ancient Near East, Fig. 1 The Nippur map on a clay tablet juxtaposed to a map produced of the city in the excavations (after Fisher 1905, plate 1 and Pedersén et al. 2010, Fig. 7). Redrawn by Joanne Porck

the empire (Harmansah 2012; Otto 2015). These cities were either new foundations or existing cities reengineered on a massive scale. On the whole these cities remain poorly understood as economic or social entities, despite very extensive research at, for example, Hattuša for over a century, because research has focused almost exclusively on the monumental elements of these cities.

The archaeological study of cities in the ancient Near East remains lopsided in that we know much more about palaces, temples, and ramparts than we do about cities as economic and social systems. This bias results from the entrenched notion in Near Eastern archaeology that monumental architecture is more worthy of investigation than residential and workshop areas. There are also methodological problems: it is no longer ethical to excavate at the scale and pace in which archaeologists uncovered entire neighborhoods and large monumental complexes in the early twentieth century AD. Finally, political developments have effectively closed of many parts of the Near East, including much of Iraq, Syria, and Iran, for archaeological research.

What, then, is the archaeological way forward for advancing our understanding or urbanism in the Near East? Obviously we need to balance the need for understanding urban settlements in their entirety and in their landscapes with the limited resources available, instead of focusing all our efforts on the monumental components of cities. Various projects have already shown what can be achieved with techniques such as systematic surface survey in combination with small test excavations, geophysical research, and remote sensing, and excellent results have been obtained at sites such as al-Rawda (Castel and Peltenburg 2007), Mashkan-Shapir (Stone and Zimansky 2004), Abu Salabikh (Postgate 1983), and Tell Taya (Reade 1973). Moreover, we need to know more about what happens in these cities, houses, workshops, industrial areas, etc. (Fisher and Creekmore 2014). Detailed studies mapping out artifact assemblages in excavated segments of urban settlements in combination with remote sensing technologies have a great potential to finally inform us about what happened in cities (Stone 2008; Fisher 2014; Nishimura 2014). Thus a powerful toolkit for better mapping the characteristics of ancient cities has developed over the past decades. Projects applying this toolkit have added a considerable amount to our understanding of urbanism with relatively limited resources. Now that various parts of the Near

East are once more accessible for archaeological research, such as southern and eastern Iraq, much of the Levant, Turkey, and Iran, it is to be hoped that more work along these lines will be executed in the years ahead and throw new light on ancient cities.

Cross-References

- ▶ Empire in the Ancient Near East, Archaeology of
- ▶ Households in the Ancient Near East, Archaeology of
- ▶ Prospection Methods in Archaeology
- ▶ Urban Archaeology
- ▶ Urban Landscapes: Environmental Archaeology

References

Adams, R.M., and H.J. Nissen. 1972. *The Uruk countryside, the natural setting of urban societies*. Chicago: University of Chicago Press.

Al Quntar, S., L. Khalidi, and Jason A. Ur. 2011. Proto-urbanism in the late 5th millennium BC: Survey and excavations at Khirbat al-Fakhar (Hamoukar), Northeast Syria. *Paléorient* 37: 151–175.

Algaze, G. 2008. *Ancient Mesopotamia at the Dawn of civilization: The evolution of an urban landscape*. Chicago: University of Chicago Press.

Castel, C., and E. Peltenburg. 2007. Urbanism on the margin: Third millennium BC al-Rawda in the arid zone of Syria. *Antiquity* 81: 601–616.

Childe, V.G. 2004. The urban revolution. In *Foundations of social archaeology, selected writings of V. Gordon Childe*, ed. T.C. Patterson and C.E. Orser, 107–116. Walnut Creek: Altamira.

Eichmann, R. 1989. *Uruk : die Stratigraphie : Grabungen 1912–1977 in den Bereichen 'Eanna' und 'Anu-Ziqqurrat'*. Mainz am Rhein: Philipp von Zabern.

Emberling, G. 2015. Mesopotamian cities and urban process, 3500–1600BCE. In *The Cambridge world history: volume 3: Early cities in comparative perspective, 4000 BCE–1200 CE*, ed. N. Yoffee, 253–278. Cambridge: Cambridge University Press.

Finkbeiner, U. 1991. *Uruk: Kampagne 35–37 1982–84. Die archäologische Oberflachen-Untersuchung Survey*. Mainz am Rhein: Philipp von Zabern.

Fisher, K.D. 2014. Making the first cities on Cyprus: Urbanism and social change in the late bronze age. In *Making ancient cities: Space and place in early urban societies*, ed. A.T. Creekmore and K.D. Fisher, 181–219. Cambridge: Cambridge University Press.

Fisher, K.D., and A.T. Creekmore. 2014. Making ancient cities: New perspectives on the production of urban places. In *Making ancient cities: Space and place in early urban societies*, ed. A.T. Creekmore and K.D. Fisher, 1–31. Cambridge: Cambridge University Press.

Gates, C. 2003. *Ancient cities, the archaeology of urban life in the ancient near east and Egypt, Greece, and Rome*. London: Routledge.

Harmansah, Ö. 2012. Beyond Assur: New cities and the Assyrian politics of landscape. *Bulletin of the American Schools of Oriental Research* 365: 53–77.

Hole, F. 2000. Is size important?, function and hierarchy in Neolithic settlements. In *Life in Neolithic farming communities, social organization, identity, and differentiation*, ed. I. Kuijt, 191–209. New York: Kluwer Academic.

Marcus, J., and J.A. Sabloff. 2008. Introduction. In *The Ancient City. New perspectives on Urbanism in the old and new world*, ed. J. Marcus and J.A. Sabloff, 3–25. Santa Fe: School for Advanced Research.

Nishimura, Y. 2014. North Mesopotamian urban neighborhoods at Titriş Höyük in the third millennium BC. In *Making ancient cities: Space and place in early urban societies*, ed. A.T. Creekmore and K.D. Fisher, 74–110. Cambridge: Cambridge University Press.

Nissen, H.J. 2015. Urbanization and the techniques of communication: The Mesopotamian City of Uruk during the fourth millennium BCE. In *The Cambridge world history: volume 3: Early cities in comparative perspective, 4000 BCE–1200 CE*, ed. N. Yoffee, 113–130. Cambridge: Cambridge University Press.

Oates, J., A. McMahon, P. Karsgaard, S. al Quntar, and J. Ur. 2007. Early Mesopotamian urbanism, a new view from the north. *Antiquity* 81: 585–600.

Otto, A. 2015. Neo-Assyrian capital cities: From Imperial Headquarters to cosmopolitan cities. In *The Cambridge world history: volume 3: Early cities in comparative perspective, 4000 BCE– 1200 CE*, ed. N. Yoffee, 469–490. Cambridge: Cambridge University Press.

Pedersén, O., P.J.J. Sinclair, I. Hein, and J. Andersson. (2010). Cities and urban landscapes in the Ancient Near East and Egypt with special focus on the city of Babylon. The Urban Mind, Cultural and Environmental Dynamics. G. N. P.J.J. Sinclair, F. Herschend and C. Isendahl. Uppsala, Uppsala University Press: 113–147.

Pollock, S. 2001. The Uruk period in southern Mesopotamia. In *Uruk Mesopotamia and its Neighbours: Cross-cultural interactions in the era of state formation*, ed. M.S. Rothman, 181–231. Santa Fe: School of American Research.

Postgate, J.N. 1983. *The west mound surface clearance, Abu Salabikh excavations I*. London: British School of Archaeology in Iraq.

Reade, J. 1973. Tell Taya (1972–3): Summary report. *Iraq* 35: 155–187.

Rothman, M.S. 2002. *Tepe Gawra, the evolution of a small prehistoric center in northern Iraq*. Philadelphia: University of Pennsylvania.

Schloen, D.J. 2001. *The house of the father as fact and symbol, patrimonialism in Ugarit and the ancient near east*. Winona Lake: Eisenbrauns.

Smith, M.L. 2003. Introduction, the social construction of ancient cities. In *The social construction of ancient cities*, ed. M.L. Smith, 1–36. Washington/London: Smithsonian Books.
Steinkeller, P. 2007. City and countryside in third-millennium southern Babylonia. In *Settlement and society: Essays dedicated to Robert McCormick Adams*, ed. E.C. Stone, 185–212. Los Angeles: Cotsen Institute of Archaeology.
Stone, E.C. 2007. The Mesopotamian urban experience. In *Settlement and society: Essays dedicated to Robert McCormick Adams*, ed. E.C. Stone, 213–234. Los Angeles: Cotsen Institute of Archaeology.
Stone, E.C. 2008. A tale of two cities: Lowland Mesopotamia and highland Anatolia. In *The Ancient City. New perspectives on Urbanism in the old and new world*, ed. J. Marcus and J.A. Sabloff, 141–164. Santa Fe: School for Advanced Research.
Stone, E.C., and P. Zimansky, eds. 2004. *The anatomy of a Mesopotamian City. Survey and sounding at Mashkan-Shapir*. Winona Lake: Eisenbrauns.
Ur, J. 2010. Cycles of civilization in northern Mesopotamia, 4400-2000 BC. *Journal of Archaeological Research* 18: 387–431.

Further Readings

Algaze, G. 2008. *Ancient Mesopotamia at the dawn of civilization: The evolution of an urban landscape*. Chicago: University of Chicago Press.
Mieroop, M.V.D. 1999. *The ancient Mesopotamian City.* Oxford: Oxford University Press.

US Domestic Archaeological Heritage Law

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Introduction

To understand United States (US) law as it relates to archaeological resources, it is necessary to appreciate two facts.

First: The USA is a capitalist democracy made up of 50 more or less self-governing states (plus several territories and other jurisdictions) – each of which contains multiple semi-independent local governments. Besides these entities, there are over 500 American Indian tribes within the borders of the country, each of which is regarded in the law as a sovereign nation and many of which exercise control over land bases of varying scales.

Second: The US legal system circumscribes the rights of the federal government vis-à-vis those of the states, local governments, Indian tribes, and individual citizens (the last category strangely defined to include corporations). The rights of private property owners, though not absolute, are given considerable deference.

One result of these facts is that there is no generally applicable US law protecting archaeological resources or any other part of the environment. Instead, there are:

1. *Prohibition laws* designed to regulate access to archaeological resources on lands controlled by the federal government (and those held in trust by government for Indian tribes)
2. *Impact assessment and control laws* that more or less control the impacts of federal agency actions (and, less directly, the actions of other change agents under certain circumstances) on archaeological resources and other aspects of the environment
3. *Registration and documentation laws* that authorize and structure programs for the inclusion of archaeological sites and other places held to have heritage value on official lists and encourage documentation of their characteristics, but do not afford much if any protection for such places
4. *A complex mosaic of state*, *tribal*, *and local laws* designed to achieve similar purposes

In addition, there are government *programs* at various levels – generally grounded in some sort of law – designed to encourage and facilitate management of archaeological resources, among other environmental values.

Definition

Archaeological heritage law in the USA includes the law per se – that is, statutes enacted by the US Congress, state legislatures, tribal councils, and local governments – as well as regulations, standards, and guidelines issued by official bodies in accordance with those laws and executive orders

issued by the president, state governors, and the chief executives of tribes and local jurisdictions. Federal laws are codified in the United States Code (USC), where they are grouped into titles and sections. The Archaeological Resources Protection Act, for instance, is cited as 16 USC 470aa-mm, meaning Title 16 of the Code, Section 470, subsections aa through mm. Regulations are published in the Code of Federal Regulations (CFR), referenced by title and "part." For example, the regulations for implementing the Native American Graves Protection and Repatriation Act are cited as 43 CFR 10, that is, Title 43, Part 10 of the CFR.

Archaeology practiced under and in response to US cultural heritage law is widely and colloquially referred to as an aspect of "cultural resource management" (CRM) or even (very misleadingly) as identical with CRM in its entirety (see King 2005: 83–89, 2011: 1–3 for discussion).

The federal heritage laws – the focus of this discussion – have created, and are interpreted and administered by, several governmental bodies. These bodies structure the conduct of archaeology within the US government, so their roles need to be described at the outset.

Archaeology in the US Government

Unlike many other nations, the USA has no overall ministry or bureau that is responsible for the nation's archaeological resources or more broadly for its historic or cultural heritage. To some extent the National Park Service fills this role by managing many protected areas (units of the national park system) established in whole or in part to protect and interpret archaeological and historic sites. The National Park Service also manages "external" programs like the National Register of Historic Places, a list of formally evaluated significant archaeological, architectural, and historic sites, buildings, structures, landscapes, and other pieces of real estate throughout the country. It provides grants to help support the network of State Historic Preservation Officers (SHPOs) who administer historic preservation programs (including archaeology) in their states. Another general coordinative agency is the Advisory Council on Historic Preservation, a small independent agency that advises the president and congress on historic preservation (including archaeological) matters, oversees project review under Section 106 of the National Historic Preservation Act (NHPA; see below), and advises other federal agencies about their responsibilities under the same statute.

Each agency of the federal government in theory has its own program to implement NHPA and sometimes other cultural heritage laws, and those that manage substantial amounts of land usually emphasize archaeology – sometimes, unfortunately, to the exclusion of other aspects of heritage. The Smithsonian Institution and a few research bodies in other federal agencies conduct archaeological research for its own sake, but most agencies manage archaeological and other heritage resources as an adjunct to their core missions.

Under the NHPA, many of the functions involved in administering federal requirements pertinent to archaeology are carried out by State Historic Preservation Officers (SHPOs) and, on the lands of some Indian tribes, by Tribal Historic Preservation Officers (THPOs). Key functions carried out by SHPOs and THPOs include maintaining lists of identified historic properties (including archaeological sites), establishing plans intended to guide the identification and evaluation of such properties, and consulting with federal agencies and other change agents about actions that may affect such properties.

The Laws

As noted above, US laws relating to archaeology can be conveniently divided into three classes: prohibition laws, impact assessment and control laws, and registration and documentation laws.

Prohibition laws. The oldest of US archaeological laws is the Antiquities Act of 1906 (54 USC 32001-303), which forbade the excavation or removal of "antiquities" from federal and Indian tribal land without a permit from the relevant federal land managing agency. The law also

authorizes the president to withdraw federal lands from general use to form national monuments. After suffering a successful court challenge in the 1970s, the Antiquities Act was augmented by enactment of the Archaeological Resources Protection Act of 1979 (16 USC 470aa-mm; ARPA). This law does essentially the same thing as the Antiquities Act, but with reference to "archaeological resources," defined as things of "archaeological interest" that are over 100 years old. Section 3(d) of the 1990 Native American Graves Protection and Repatriation Act (25 USC 3001-13; 18 USC 1170; NAGPRA) similarly prohibits the disturbance of Native American (i.e., American Indian, Inuit, Aleut, and Native Hawaiian) human remains and cultural items on federal and tribal lands; NAGPRA goes on to establish a complex system for repatriating such remains and items, and those held by federal government agencies and federally assisted museums, to culturally affiliated tribes and groups.

Another prohibition law – though it does not directly prohibit anything – is the Abandoned Shipwreck Act (43 USC 2101–2106; ASA). The ASA establishes that the federal government owns abandoned shipwrecks in US waters, but also transfers title to them to the several states, which are expected to regulate access to them by archaeologists, sport divers, and commercial interests. Under the Sunken Military Craft Act (10 USC 113), however, the wrecks of military vessels remain US government property, and access to them is theoretically controlled by the various military services.

All the prohibition laws are aimed at controlling the individual (including corporate) citizen or noncitizen who might for some reason (e.g., research, wealth acquisition, recreation) intentionally disturb something of putative archaeological interest (or interest to the government). All directly or indirectly prohibit such disturbance by unlicensed persons, and some (like ARPA) prescribe standards and procedures for the issuance of licenses. Most only incidentally affect the operations of government agencies, if they affect such operations at all. In other words, under most prohibition laws relating to archaeology, the government prohibits *others* from disturbing archaeological resources but implicitly or explicitly allows *itself* to do so.

To the extent the prohibition laws are enforced – a difficult matter, given the scale of public lands in the USA to which most of them apply – they are enforced by land management agencies like the Bureau of Land Management, Forest Service, and National Park Service, as well as by agencies that manage lands incidental to their missions, such as the military services.

As a signatory to the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property, the USA makes efforts to control trafficking in antiquities across its borders, and ARPA includes a provision prohibiting interstate commerce in artifacts obtained in violation of its terms or those of other laws.

Impact assessment and control laws. With the expansion of government involvement in land use and industry that accompanied the Great Depression and World War II, citizens began to impress upon lawmakers the fact that government itself could do damage to the environment, including archaeological sites. The result, which continues to this day, has been a proliferation of laws, regulations, and guidelines, as well as international instruments, designed to assess and to some extent control the impacts of government actions.

In the USA, the general-purpose federal impact assessment law is the National Environmental Policy Act (42 USC 4321 and other sections; NEPA). Although the national policy promised by the law's title and articulated in its Section 101 is generally ignored, extensive regulations (40 CFR Parts 1500–1508) have been developed by the Council on Environmental Quality (in the Executive Office of the President) for implementing NEPA's procedural requirement. These feature preparation of a "detailed statement" of the environmental impacts of "major federal actions significantly affecting the quality of the human environment." Among the impacts to be assessed are impacts on "historic or cultural resources" (40 CFR 1508.27(b)(3)), which are widely understood to include (but not be limited to) archaeological sites. Importantly, NEPA requires consideration of the effects of

projects not only on federal and tribal land but wherever they occur in the USA (and to some extent elsewhere) – provided there is some federal involvement in them (via, for instance, federal grants, loans, loan guarantees, and licenses).

Interacting with NEPA compliance, Section 106 of the National Historic Preservation Act (54 USC 306108; (NHPA)) and regulations of the Advisory Council on Historic Preservation (ACHP) for implementing it (36 CFR Part 800) require federal agencies specifically to consider the effects of their actions on "historic properties," defined as places included in or eligible for the National Register of Historic Places. As discussed below, the register is a list of recorded and evaluated historic and prehistoric places that is maintained by the National Park Service. Any significant archaeological site can be eligible for the National Register (as may many other types of property), so compliance with Section 106 provides the rationale for funding thousands of archaeological surveys throughout the USA every year. The scope of Section 106 is similar to that of NEPA – it applies to potentially damaging projects wherever they are planned, regardless of land ownership, provided the federal government is somehow involved. Neither NEPA nor NHPA covers projects in which the federal government has no involvement.

Other sections of the NHPA prescribe additional federal agency responsibilities, authorize maintenance of the National Register, and provide for federal assistance to, and oversight of, SHPOs and THPOs.

Another federal law, known variously as the Archaeological and Historic Preservation Act and the Archaeological Data Preservation Act (54 USC 312501-08), requires that federal agencies finance the recovery of archaeological, historical, and scientific data threatened by projects they propose to conduct, assist, or license. NAGPRA also includes a "discovery" provision whose implementing regulations (43 CFR Part 10) effectively require that federal agencies assess the likely effects of their actions on Native American graves and cultural items on federal and tribal land, in consultation with Indian tribes and Native Hawaiian groups.

The collective effect of all these laws and regulations on the practice of archaeology has been considerable. In essence (though not explicitly), they require federal agencies – and through them, the many state, local, and private parties that benefit from federal financial assistance, contracts, licenses, and permits – to sponsor archaeological surveys wherever their projects may result in ground-disturbing activities. Such surveys are in theory conducted as parts of interdisciplinary studies to identify all kinds of environmental impacts under NEPA and as parts of "historic preservation" or "cultural resource management" (CRM) studies under Section 106 of NHPA. In practice, unfortunately, archaeological surveys are sometimes the only things done to identify "cultural resources" subject to effect by projects, ignoring resources that are not archaeological but may be of considerable cultural importance, such as culturally valued plants and animals, landscapes, and a wide range of more intangible aspects of the environment (King 2013: 3–6, 22–23, 126–128).

The assessment of impacts on archaeological sites and other aspects of the environment usually results in efforts to avoid, reduce, or otherwise mitigate effects that are adverse. Such efforts may be specified in documents prepared and adopted under NEPA and are routinely provided for in "memoranda of agreement" (MOAs) executed under Section 106 of NHPA. MOAs are based on consultation among the responsible federal agency, the SHPO and/or THPO, Indian tribes and Native Hawaiian groups, sometimes the ACHP, and other interested parties.

For archaeological sites, impact mitigation often involves "data recovery" – that is, rescue excavation or other forms of information retrieval, followed by analysis, reportage, and management of collections ("curation").

Registration and documentation laws. In the Historic Sites Act of 1935 (320101-0616 USC 461–467), congress authorized the National Park Service to identify and make records of historic places of significance in interpreting and commemorating the nation's history. Today such places are referred to as National Historic Landmarks; they are nominated through an exhaustive,

multilevel process of review and are said to be "nationally significant." When the NHPA was enacted in 1966, it created a more expansive National Register of Historic Places, including places of importance at the state and local levels. The National Park Service continues to maintain both the National Historic Landmarks list and the National Register, both of which include archaeological sites as well as historic buildings, structures, landscapes, and groups of properties referred to as "districts." The 1935 law also allowed the National Park Service to make permanent a Depression-era program that employed architects and draftspeople to prepare meticulous records of historic buildings. The Historic American Buildings Survey (HABS) survives to this day in the National Park Service and has cloned itself to create the Historic American Engineering Record (HAER) and the Historic American Landscapes Survey (HALS). All three programs (especially HAER) sometimes document archaeological sites.

State, *tribal*, *and local laws*. Many Indian tribes, states, and local governments have prohibition laws, some applying only to lands directly controlled by government (e.g., public parks and recreation areas) and some (including many Indian tribal laws) applying more broadly. Some jurisdictions have laws expressly prohibiting the exhumation of interred human remains, marked or unmarked, on all lands within their borders.

Most US states have their own environmental impact assessment and management laws, sometimes referred to colloquially as "state environmental policy acts" or SEPAs. Some have their own state equivalents of the National Register and provisions somewhat like those of NHPA Section 106 for addressing the effects of state-sponsored and state-regulated projects on historic places. Some tribal governments have enacted similar laws, as have a few local governments. Some tribes and local governments have set up their own archaeological, historic preservation, or "CRM" programs that conduct surveys, proactive preservation, and data recovery. Each state's, tribe's, and local government's laws and programs are unique to their promulgating jurisdiction; there is no consistency among sub-federal governments across the USA.

All the states and some tribes and local governments participate in the National Park Service's registration program by nominating properties, including archaeological sites, to the National Register. Some states, tribes, and local governments maintain their own registers as well, and some conduct documentation programs, often in cooperation with the HABS–HAER–HALS program of the National Park Service.

Generalizations. Generally speaking, the following can be said about US law relating to archaeology and archaeological resources:

1. There is no central government organization responsible for archaeology, though both the National Park Service and the Advisory Council on Historic Preservation fulfill some of the functions carried out by central cultural ministries in other countries. Federal land management agencies tend to have their own archaeologically oriented heritage programs, and State Historic Preservation Officers perform coordinative functions with respect to archaeological resource management in their respective states.
2. Excavating or otherwise disturbing an archaeological site on federal or tribal land for purposes other than the conduct of a federal, federally assisted, or federally licensed land-use project requires a permit from the responsible federal agency and/or tribe. Such permits are issued only to technically qualified archaeologists and require that work be done in accordance with research designs, adhere to established fieldwork standards, and produce reports. Recovered artifacts either remain the property of the federal government or are returned to tribes (or Native Hawaiian groups in Hawaii). These requirements are imposed under ARPA and NAGPRA. Similar requirements are often but not universally imposed by state and local governments on lands under their control, under their own laws; some Indian tribal governments impose similar and sometimes more restrictive requirements on tribal lands. Excavation and other disturbance

of sites on private land are mostly unregulated, but it is illegal to disturb graves in many jurisdictions, and excavations on private land that are carried out with federal assistance (for instance, under a research grant from the National Science Foundation) are regulated (in theory at least) under NEPA and NHPA.

3. Construction and other land-use projects (mining, forestry, road construction, energy production, etc.) on federal land, or on any other land with federal assistance or permits, must be subjected to impact analysis of some kind under NEPA and must be the subject of review and consultation under Section 106 of NHPA. Archaeological surveys are often done as part of the impact assessment process, along with studies to identify and evaluate historic buildings, structures, neighborhoods, landscapes, and other resources. Multiparty consultation on the effects of such projects usually leads to agreements about how adverse effects will be mitigated; this often involves archaeological excavation. Surveys and data recovery operations, like other kinds of environmental impact assessment and mitigation, are usually financed by project proponents.
4. Archaeological sites are routinely included in the National Register of Historic Places, although the cost of preparing nominations and the fact that nomination does not give a place any particular protection tend to discourage this practice. Under Section 106 of NHPA, the same consideration is given to a place that simply meets the criteria for inclusion in the register as to one that is actually included. Some state and many local laws, however, require that attention be given only to impacts on places actually included in the National Register or a state or local equivalent.
5. Artifacts and data recovered from federal and tribal land remain the property of the federal government or the tribe from whose land they came and for the most part must be cared for in accordance with government-wide curatorial policies issued by the National Park Service (36 CFR Part 79). An exception is made under NAGPRA for Native American human remains and cultural items, which are repatriated to culturally affiliated tribes or groups, who may manage them as they think best. Ownership and control of artifacts found on nonfederal, non-tribal land are determined in accordance with whatever state and local laws apply. As a general rule, and with the general but not invariable exception of human skeletal remains, archaeological material found on private land remains the property of the private property owner.

Key Issues/Current Debates

Most of the laws under which archaeological sites are managed in the USA were drafted and promoted by environmentalists, historic preservationists, and other non-archaeologists, but over the decades archaeologists have adapted to the laws and sometimes become dominant in their interpretation, particularly in the federal land management agencies. This has generated concern about whether implementation of the impact assessment and control laws has come to be biased in favor of archaeology at the expense of other types of historic properties and more broadly defined cultural or heritage values. Indian tribes and Native Hawaiian groups are particularly vocal in their opposition to an overly archaeological approach to management of their heritage.

A widespread, rather mindlessly accepted equation of "cultural resource management" (CRM) with archaeology – particularly by academic institutions where the latter is taught – has led to confusion about just what the laws are intended to protect (see King 2005, 2009, 2011: 534–549; Sebastian and Lipe 2011).

Implementation of the impact assessment and control laws has created a multibillion dollar cultural resource management industry dominated by for-profit consulting firms that perform archaeological, historical, and architectural surveys, studies, and impact mitigation work like rescue archaeology under contract. The quality of this work, its value as research, its usefulness to the public, and its cost-effectiveness are sometimes questioned by a range of interests, including members of congress, development firms,

nongovernmental organizations, Indian tribes, and archaeologists themselves. The fact that most impact assessment and mitigation work is done by contractors for the proponents of the very projects that threaten or destroy archaeological sites and other aspects of cultural heritage raises questions about whether and how much archaeologists have become shills for development interests (see King 2009).

The boom in archaeological fieldwork under the heritage laws has greatly exacerbated the problem of what to do with fieldwork's products – particularly recovered artifacts and other materials. The poor fit between burgeoning collections and limited curatorial facilities – for which the term "curation crisis" was coined in the 1990s (see Childs 1995) – remains unresolved, although the US Army Corps of Engineers and others are working hard to address it.

In the 1980s and 1990s, there was considerable conflict between archaeologists and indigenous groups, including Indian tribes and Native Hawaiians, over the treatment of ancestral human remains and associated cultural items. Although the enactment and more or less systematic if often highly bureaucratized implementation of NAGPRA has ameliorated this conflict, treatment of the dead and their belongings, and of ancestral artifacts in general, remains a prickly subject (see Thomas and Deloria 2001; Watkins et al. 2008). At the same time, NAGPRA has forced the development of relationships between archaeologists and tribes that would doubtless never have evolved otherwise. The late Hester Davis (2010: 191) asserted that NAGPRA "has changed the world of American archaeology . . . forever," by altering the power relationships between archaeologists and indigenous communities and requiring the former, at least, to adapt to new realities. Meanwhile, conflicts continue to arise from time to time not only between archaeologists and Native Americans but between archaeologists and groups whose ancestors are not embraced by the protections of NAGPRA, such as the descendants of enslaved Africans (c.f. Hansen and McGowan 1998).

Offshore, the treatment of shipwrecks and other submerged archaeological resources continues to be a contentious issue. US archaeologists, like their compatriots in the United Kingdom and elsewhere, tend toward reflexive revulsion at the damage ostensibly done to such resources by "treasure hunters," even when such damage is controlled through application of high-quality archaeological methods. As Sean Kingsley (2010, 2011: 223–244) has detailed, the same archaeological communities seem less concerned with the far more extensive destruction of wrecks wrought by modern deepwater fishing.

Academic archaeology in the USA tends to ignore CRM or to treat it as an uninteresting low-grade specialization in which its second- and third-rate students can find employment. This tends to be a self-fulfilling prophecy; academic institutions pump poorly trained, badly motivated, and uncreative archaeologists into the CRM industry, leading to intellectual stultification and ethical lassitude that justify academics in their attitudes toward the field. There are ongoing arguments over who is "qualified" to conduct archaeological work under the heritage laws. Agencies like the National Park Service and organizations like the Register of Professional Archaeologists (http://rpanet.org/) promulgate and apply professional standards to resolve such arguments, but these are of little use as long as the academic community fails to produce graduates who appreciate and engage with CRM's intellectual challenges.

International Perspectives

It is probably safe to say that archaeologists in other countries – to the extent they consider the matter – view the US system with a degree of mild bemusement. Just as US archaeology differs from much of the world's archaeological practice by being mostly embedded in anthropology, so its legal management regime for archaeology differs from those of many nations by being integrated (sometimes uncomfortably) into the US environmental impact assessment and historic preservation systems. The non-centralized nature of these systems and the respect they accord (albeit

grudging) to private property rights also contrast with the legal systems of many other countries.

Because the USA has since World War II been a major player in the arena of international heritage preservation – usually represented by the federal agencies who dominate official US practice and are guided by US policy – there is some tendency to think of the US system as a model for other nations, but this may be ill-advised. The US laws governing archaeological resource management are the products of their own unique evolutionary trajectories and are not necessary relevant to the experiences, political structure, resources, or needs of other nations (c.f. King 2009, 2010).

Future Directions

Predicting the future is always a chancy affair, and doing so in a year like 2017 in the USA is particularly problematical. The political forces into whose control the 2016 general election delivered the US executive and legislative branches are openly hostile to the "administrative state" of which archaeology, as a part of CRM and environmental protection, has been a part since at least the late 1960s. The extent to which these forces will succeed in dismantling the administrative state remains to be seen, but it is virtually certain that they will cause the government officials responsible for CRM and environmental regulation to minimize their profiles. At the same time, their vigorous support for, and indeed identity with, extreme capitalism is likely to make the CRM and environmental impact assessment industries even more subservient than they have been to the forces of development. And the triumphal anti-intellectualism of the people now in control does not bode well for archaeology or any other thought-based pursuit.

However, it is arguable that the administrative state, including its environmental and CRM subunits, was overdue for reform. The very scale and complexity of the regulatory infrastructure – its laws, regulations, policies, programs, operating standards, and standard operations – are daunting to the citizen who tries to engage them, either to protect an important bit of the environment like an archaeological site or to advance what the citizen thinks to be a worthwhile project. It would have been nice to undertake this reform in an orderly, civilized manner, but even a devastating forest fire clears out the brush and allows new growth to shoot up. Some in the historic preservation community have begun thinking about new ways to do business (cf. Page and Miller 2016). It is just possible that when the current crisis has run its course – if we survive – it will be possible to build a new system that is more democratic, sustainable, and responsible to the broad public interest in archaeology, the environment, and human culture.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Ethics of Commercial Archaeology: USA
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)

References

Childs, S.T. 1995. The curation crisis. Common ground online. U.S. National Park Service. http://www.nps.gov/archeology/cg/fd_vol7_num4/crisis.htm. Accessed 21 Dec 2011.

Davis, H. 2010. Heritage resource management in the United States. In *Cultural heritage management: A global perspective*, ed. P.M. Messenger and G.S. Smith. Gainesville: University Press of Florida.

Hansen, J., and G. McGowan. 1998. *Breaking ground, breaking silence: The story of New York's African burial ground*. New York: Henry Holt & Co..

King, T.F. 2005. *Doing archaeology: A cultural resource management perspective*. Walnut Creek: Left Coast Press.

King, T.F. 2008–2009. *Ilhéus-Bahia*. Brazil: Universidade Estadual de Santa Cruz.

King, T.F. 2009. *Our unprotected heritage: Whitewashing destruction of our natural and cultural environment*. Walnut Creek: Left Coast Press.
King, T.F. 2010. Estudo de impacto ambiental, gestao de patrimônio cultural e bens históricos. Aprendendo com os erros dos Estados Unidos da América. Trans. R. Brandi. Cadernos de Ciências Humanas 11–12(20–21).
King, T.F., ed. 2011. *A companion to cultural resource management*. Oxford: Wiley-Blackwell.
King, T.F. 2013. *Cultural resource laws & practice*. 4th ed. Lanham: AltaMira Press.
Kingsley, S. 2010. Deep-sea fishing impacts on the shipwrecks of the English Channel and western approaches. In *Oceans odyssey: Deep-sea shipwrecks in the English Channel and Atlantic Ocean*, ed. G. Stemm and S. Kingsley. Oxford: Oxbow Books.
Kingsley, S. 2011. Challenges of maritime archaeology: In too deep. In *A companion to cultural resource management*, ed. T.F. King. Oxford: Wiley-Blackwell.
Page, Max, and Marla R. Miller, eds. 2016. *Bending the future: 50 Ideas for the next 50 years of historic preservation in the United States*. University of Massachusetts Press: Boston.
Sebastian, L., and W.D. Lipe. 2011. *Archaeology and cultural resource management: Visions for the future*. Santa Fe: School for Advanced Research Press.
Thomas, D.H., and V. Deloria Jr. 2001. *Skull wars: Kennewick Man, archaeology, and the battle for native American identity*. New York: Basic Books.
Watkins, J., L. Zimmerman, H. Burke, and C. Smith. 2008. *Kennewick Man: perspectives on the Ancient One*. Walnut Creek: Left Coast Press.

Further Readings

36 CFR Part 800, protection of historic properties, Advisory Council on Historic Preservation. 2018
36 CFR Part 79, curation of federally owned and administered archaeological collections. 2018
40 CFR Parts 1500–1508, regulations for implementing the procedural provisions of the National Environmental Policy Act, Council on Environmental Quality. 2018
43 CFR Part 10, Native American Graves Protection and Repatriation Act Regulations, National Park Service. Historic Sites Act. 16 USC 461–467. 2018
Abandoned Shipwrecks Act, 43 USC 2101–2106. 2018
Antiquities Act, 54 USC 32001-303 (previously 16 USC 431–433). 2018
Archaeological and Historic Preservation Act, 54 USC 312501-08 (previously16 USC 469-469c-2). 2018
Archaeological Resources Protection Act, 16 USC 470aa-mm. 2018
King, T.F. 2005. *Doing archaeology: a cultural resource management perspective*. Walnut Creek (CA): Left Coast Press.
King, T.F. 2007. *Saving places that matter: A citizen's guide to the National Historic Preservation Act*. Walnut Creek: Left Coast Press.
National Environmental Policy Act, 42 USC 4321 et seq. National Historic Preservation Act, 16 USC 470. 2018
Native American Graves Protection and Repatriation Act, 25 USC 3001–3013 and 18 USC 1170. 2018
Neumann, T.W., R.M. Sanford, and K.G. Harry. 2010. *Cultural resources archaeology*. 2nd ed. Lanham: AltaMira Press.
Sunken Military Craft Act, 10 USC 113. 2018

US National Park Service and World Heritage

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State of Knowledge and Current Debates

Introduction

In the United States, the Assistant Secretary of the Interior for Fish and Wildlife and Parks has responsibility for directing and coordinating participation in the World Heritage Convention. The National Park Service's Office of International Affairs provides technical staff support to the Assistant Secretary in this regard (Public Law 96–515; 54 U.S.C. 307,101; 36CFR73). This work includes coordinating preparation of US nominations to the World Heritage List (which are submitted through the US Department of State); maintaining and updating the US World Heritage Tentative List; submitting periodic reports on the condition of World Heritage sites in the United States to the World Heritage Centre of the United Nations Educational, Scientific and Cultural Organization (UNESCO); providing information and assistance to the public and to site representatives; and contributing to the US' positions on matters of World Heritage policy, in coordination with the State Department. The Office of International Affairs also forms part of the official US delegations to the annual meetings of the World Heritage Committee and other policy and technical meetings.

As of 2017, there are 23 World Heritage sites in the United States, 18 of which are also units of the

National Park System. Of the listed sites, several have significant archaeological components, including Cahokia Mounds State Historic Site in Illinois (inscribed on the World Heritage List in 1982), Chaco Culture in New Mexico (inscribed 1987), Mesa Verde National Park in Colorado (inscribed 1978), Papahānaumokuākea in Hawaii (inscribed 2010), and the Monumental Earthworks of Poverty Point (inscribed 2014).

The global significance for these sites is summarized by the UNESCO World Heritage Centre (http://whc.unesco.org/en/list/):

Cahokia Mounds State Historic Site: Cahokia Mounds, some 13 km north-east of St Louis, Missouri, is the largest pre-Columbian settlement north of Mexico. It was occupied primarily during the Mississippian period (800–1400), when it covered nearly 1600 ha and included some 120 mounds. It is a striking example of a complex chiefdom society, with many satellite mound centers and numerous outlying hamlets and villages. This agricultural society may have had a population of 10–20,000 at its peak between 1050 and 1150. Primary features at the site include Monks Mound, the largest prehistoric earthwork in the Americas, covering over 5 ha and standing 30 m high.

Chaco Culture: For over 2,000 years, Pueblo peoples occupied a vast region of the southwestern United States. Chaco Canyon, a major center of ancestral Pueblo culture between 850 and 1250, was a focus for ceremonials, trade, and political activity for the prehistoric Four Corners area. Chaco is remarkable for its monumental public and ceremonial buildings and its distinctive architecture – it has an ancient urban ceremonial center that is unlike anything constructed before or since. In addition to the Chaco Culture National Historical Park, the World Heritage property includes the Aztec Ruins National Monument and several smaller Chaco sites managed by the Bureau of Land Management.

Mesa Verde National Park: A great concentration of ancestral Pueblo Indian dwellings, built from the sixth to the twelfth century, can be found on the Mesa Verde plateau in southwest Colorado at an altitude of more than 2,600 m. Some 4,400 sites have been recorded, including villages built on the Mesa top. There are also imposing cliff dwellings, built of stone and comprising more than 100 rooms.

Papahānaumokuākea: Papahānaumokuākea is a vast and isolated linear cluster of small, low-lying islands and atolls, with their surrounding ocean, roughly 250 km to the northwest of the main Hawaiian Archipelago and extending over some 1931 km. The area has deep cosmological and traditional significance for living Native Hawaiian culture, as an ancestral environment, as an embodiment of the Hawaiian concept of kinship between people and the natural world, and as the place where it is believed that life originates and to where the spirits return after death. On two of the islands, Nihoa and Mokumanamana, there are archaeological remains relating to pre-European settlement and use. Much of the monument is made up of pelagic and deepwater habitats, with notable features such as seamounts and submerged banks, extensive coral reefs, and lagoons. It is one of the largest marine protected areas (MPAs) in the world.

Poverty Point: Monumental Earthworks of Poverty Point owes its name to a nineteenth-century plantation close to the site, which is in the Lower Mississippi Valley on a slightly elevated and narrow landform. The complex comprises five mounds, six concentric semielliptical ridges separated by shallow depressions, and a central plaza. It was created and used for residential and ceremonial purposes by a society of hunter fisher-gatherers between 3700 and 3100 BP. It is a remarkable achievement in earthen construction in North America that was unsurpassed for at least 2,000 years.

How US Nominations to the World Heritage List Are Made

US nominations to the World Heritage List are subject to certain prerequisites in the National Historic Preservation Act 1980 Amendments (Public Law 96–515; 54 U.S.C. 307,101). These require that any property nominated must have been previously determined to be of national significance to the United States, that there must be legal protections in place to ensure preservation of the property and its environment, and that the

owners of any non-Federal property must agree to the nomination. The requirement for owner consent has limited the types of properties that the United States can nominate: it is unlikely that large districts with many property owners, particularly in urban areas, could meet this requirement. Many such areas in other countries have been inscribed as World Heritage sites.

Archaeological properties are also included on the US World Heritage Tentative List. A Tentative List is a national list of properties that appear to meet the eligibility criteria for nomination to the World Heritage List. The World Heritage Committee's *Operational Guidelines* ask signatory nations to provide Tentative Lists to help evaluate properties for inscription. These annotated lists describe the sites that countries are likely to nominate in the next several years. In order to be nominated to the World Heritage List, a property must have been on its country's Tentative List for at least 1 year. Inclusion on the Tentative List does not confer any official status on a site; it means only that the site appears to meet the World Heritage criteria and may be nominated by the United States in the future.

The US Tentative List was most recently updated in 2016. It includes two sites that are primarily archaeological in nature: Hopewell Ceremonial Earthworks in Ohio, comprising Hopewell Culture National Historical Park, Newark Earthworks State Memorial and Fort Ancient State Memorial, and Serpent Mound in Ohio, an effigy mound. The Tentative List information on these properties can be found at http://whc.unesco.org/en/tentativelists/state=us.

The process for developing and submitting World Heritage nominations in the United States is established in Federal regulations (36CFR73). The regulations established the Federal Interagency Panel for World Heritage, which consists of eight Federal agencies that advise the Assistant Secretary on World Heritage matters, specifically the inclusion of sites on the Tentative List, the selection of sites for nomination from the Tentative List, and the evaluation of draft nomination dossiers for final submission. The Assistant Secretary is the chair of the Panel. In addition to the Assistant Secretary's office, the Panel comprises the Department of State, the National Park Service, the Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, the Advisory Council on Historic Preservation, the President's Council on Environmental Quality, and the Smithsonian Institution. The regulations also establish requirements for public and official notification and public participation in the process.

The Office of International Affairs plays the primary technical role in shepherding potential nominations through this process. The staff provide representatives of sites on the Tentative List with information on the national and UNESCO program requirements and review draft materials based on a knowledge of how the World Heritage Committee and its technical Advisory Bodies have evaluated similar nominations. The preparation of the nomination dossier itself is the responsibility of the property owner. The Office of International Affairs draws on the expertise in natural and cultural resources of the rest of the National Park Service in this work, consulting with staff of the National Historic Landmarks Program, the Archeology Program, and other experts working throughout the country.

Historical Background

The United States was the first country to ratify the World Heritage Convention, in 1973. It also played a significant role in shaping the Convention as a vehicle to preserve both natural and cultural properties, as the National Park Service does in the United States. In promoting and entering into the Convention, the United States sought to apply these conservation ideals on a global scale, to benefit the most important places around the world. When the World Heritage Committee met in Washington, D.C. in 1978, the Committee included Yellowstone and Mesa Verde National Parks among the first World Heritage inscriptions.

The United States continued to make World Heritage nominations with regularity through the mid-1990s. Concern over the increasing size of the World Heritage List, which had become dominated by sites in Western and developed countries, as well as domestic controversy related to the inclusion of Yellowstone National Park on the

List of World Heritage in Danger in 1995, resulted in reduced activity related to World Heritage in the United States, and no nominations were made between 1994 and 2009. Following the creation of the 2008 US World Heritage Tentative List, the United States began to make nominations from it, successfully inscribing three additional sites, including Papahānaumokuākea and the Monumental Earthworks of Poverty Point.

The United States has served four terms on the 21-member World Heritage Committee, including a term as one of the original members. As part of the renewed World Heritage activity that resulted in the revised US Tentative List, the United States successfully ran for election to the Committee in 2005; that term concluded in 2009.

Current Issues

In 2008, the World Heritage Committee requested comments from countries signatory to the World Heritage Convention on the future of the Convention, in relation to its upcoming 40th anniversary in 2012. Comments submitted from a number of stakeholders expressed a desire to put more emphasis on the conservation of inscribed sites rather than the inscription of additional sites and noted a rapid increase in the number of World Heritage sites that taxes the capacity of the World Heritage Centre and the Committee. The politicization of many of the Committee's decisions has also been noted. However, the trends noted at that time have continued with little change to the present.

A significant issue for the US World Heritage program arises from the fact that the United States has been legally prohibited from paying dues to either UNESCO or the World Heritage Fund since 2011, when the member states that make up the General Assembly of UNESCO voted to include Palestine as a member of UNESCO. These laws (Pub. L. 101–246, title IV, Sec. 414, Feb. 16, 1990, 104 Stat. 70; and Pub. L. 103–236, title IV, Sec. 410, Apr. 30, 1994, 108 Stat. 454), dating from the 1990s, prohibit the United States from providing funds to any UN body that accepts Palestine as a member under the current circumstances. As a result, the United States has lost its vote in the UNESCO General Assembly and is disqualified from election to the World Heritage Committee. There is no current prohibition on making World Heritage nominations under these circumstances, but it is an unprecedented situation.

Cross-References

► Cultural Heritage Management: International Practice and Regional Applications

References

National Historic Preservation Act. 1980. Public Law 96–515; 54 U.S.C. 307101.

United Nations Educational, Scientific and Cultural Organisation, Intergovernmental Committee for the Protection of the World Cultural and Natural Heritage. 2016. Operational guidelines for the implementation of the World Heritage Convention. http://whc.unesco.org/en/guidelines. Accessed 29 Aug 2017.

United States Code of Federal Regulations, Title 36, volume 1, Part 73, World Heritage Convention (July 1, 2004).

World Heritage List (2017) UNESCO World Heritage Centre. http://whc.unesco.org/en/list/. Accessed 29 Aug 2017.

USA and Mexico (1970): Bilateral Treaties and Patrimonial Property Restitution

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Introduction

Increases in looting and illegal trafficking of ancient objects or monuments from countries with an important cultural heritage and a great compulsion for achieving pre-Columbian art

from Latin American countries with the objective of increasing private and museums' collections made specialists in cultural heritage, United Nations Educational, Scientific and Cultural Organization (UNESCO), and many countries to propose and establish rules for protect and preserve ancient cultural heritage.

Definition

In the last years of decade of 1960s, United Mexican States and the United States of America were working through diplomatic relations for considering establishing a compromise to protect each other's cultural heritage from trafficking with the goal to decrease illegal activities as looting and/or archaeological sites' destruction. In 1970, both countries signed a bilateral treaty for recovering and restitution of patrimonial properties.

Key Issues

Since 1930s, protection and conservation of cultural patrimony was focused by specialists and many countries which originally participate in *Athens Conference* (1931). Up to 1960s many steps on the way for protecting national heritage were done. By 1964, the General Conference of UNESCO, in its thirteenth session, adopts the *Recommendation on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property* (Olivé Negrete and Cotton 2003: 106–110) asking the Member States to work with these statements on the way to adopt as soon as possible a Convention. It occurs at the General Conference in its sixteenth session on November 1970 (*Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property*) (UNESCO 1970).

Based on *Declaration of Principles of International Cultural Co-operation* adopted by the General Conference of UNESCO on 1966, the IV Regional Conference of National Committees for UNESCO from West Hemisphere, on June 1967, in Mexico City, established the *Tlatelolco Resolution*. In this entry, the Conference suggested to Member States several measures should be taken to protect and promote cultural Latin American patrimony. Fifth suggestion is supported on the knowledge of increment on illicit trade of cultural items, and each state should ask UNESCO to promote an International Convention focused on prohibiting and avoiding illegal traffic and trade of art, movable objects, books, and documents (Olivé Negrete and Cotton 2003: 19–23).

As it happens in the entire world, looting and trafficking always are attached with other illegal activities and it is quite difficult to stop it by itself, especially because the free market for antiques from countries and extinct cultures with a great ancient heritage is not prohibited or ruled with laws based on respect, research, conservation, and diffusion of scientific and humanistic knowledge.

During the decades of 1960s, particularly in archaeological sites in West Coast, Maya lands, and Central Mexico (Teotihuacan), looters' activity and illegal trafficking increased due interest for achieving pre-Columbian art, historical objects, and documents. Many of them were stolen from archaeological sites, churches, and public files and libraries.

On the last years of this decade, diplomatic relations between Mexico and the USA were working on establishing bilateral rules to protect each other's cultural patrimony. In July 17, 1970, the *Treaty of Cooperation between the United Mexican States and the United States of America Providing for the Recovery and Return of Stolen Archaeological, Historical, and Cultural Properties* was signed.

In Mexico, this treaty, first, was approved by the Senate and ratified by presidency on November 1970 and then the exchange of ratifying legal instruments of both countries takes place on March 24, 1971, in Washington, D.C. Presidency wrote an ordinance on May 3, 1971, and then it was published to enter into force on *Official Journal of the Federation* on June 9, 1971 (Olivé Negrete and Cotton 2003: 175–178).

The main intention was based on a close cooperation and the desire for stimulating protection, study, and appreciation of goods with archaeological, historical, and cultural importance, and the resolution for promoting recovery and return of such properties.

Through several articles, both countries accorded to define the concepts, meanings, and the period in which properties were produce since pre-Columbian, historical, and modern times and including archives up to 1920.

They also took a compromise for stimulating research, to avoid illegal excavations in archaeological sites and stealing of archaeological, historical, or cultural properties. In the same sense, both parts will give facilities for movements and exhibitions on both countries of archaeological, historical, and cultural items with the intention of having mutual understanding and comprehension of artistic and cultural heritage of both parts.

Another important issue is the permission for legal international trade of art items, in accordance with legal statements that regards conservation of archaeological, historical, cultural, and national goods.

In this treaty, recovery and return will start with a request from one part, while the other accepts the compromise to apply all legal resources to recover and return goods that had been taken out from its original country after the date of the treaty's operative. Through diplomatic channels, the application part will give all documentation to establish the request. If it is not possible to recover and return by diplomatic media goods founded in its territory, authorities will promote a legal procedure to achieve this. In both countries, justice procurators are authorized to promote a legal procedure in its respective courts.

When the archaeological, historical, or cultural items will have the legal authorization for the return, all expenses will take charge by the requesting part. In this process, any person or part has the right for asking any reimbursement from the part which is returning the item. Finally, items will not cause any charge or penalty as a result of applying trade laws.

This is basically what the treaty is about and had been functioning since then for the benefit and protection of Mexico and US cultural heritage.

On November 1970, the *Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property* was adopted by UNESCO and enters into force in 1972. Mexico accepted in the same year and USA until 1983 (UNESCO 1970).

Cross-References

- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Heritage Legislation, The Introduction of: Disciplining Through Law
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Repatriation: Overview
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions
- ▶ Vandalism and Looting (Ethics)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Olivé Negrete, J.C., and B. Cotton, eds. 2003. *INAH, una historia, Volumen III: leyes, reglamentos, circulares y acuerdos*. México: INAH.

UNESCO. 1964. Recommendation on the means of prohibiting and preventing the illicit export, import and transfer of ownership of cultural property. Paris. http://portal.unesco.org/en/ev.php-URL_ID=13083&URL_DO=DO_TOPIC&URL_SECTION=201.html. Accessed 31 Mar 2012.

UNESCO. 1966. Declaration of principles of international cultural co-operation. Paris. http://portal.unesco.org/en/ev.php-URL_ID=13147&URL_DO=DO_TOPIC&URL_SECTION=201.html. Accessed 31 Mar 2012.

UNESCO. 1970. Convention on the means of prohibiting and preventing the illicit import, export and transfer of ownership of cultural property. Paris. http://portal.

unesco.org/en/ev.php-URL_ID=13039%26URL_DO=DO_TOPIC%26URL_SECTION=201.html. Accessed 31 Mar 2012.

Further Reading

INAH. 1963. *Leyes y reglamentos*. México: Instituto Nacional de Antropología e Historia.

Seligman, T. 1988. An unexpected bequest and an ethical dilemma. In *Feathered serpents and flowering trees, reconstructing the murals of Teotihuacan*, ed. K. Berrin, 15–23. Hong Kong: The Fine Arts Museums of San Francisco.

Treaty of Cooperation between the United States of America and the United Mexican States providing for the recovery and return of stolen archaeological, historical and cultural properties. n.d. http://exchanges.state.gov/heritage/culprop/laws/pdfs/treaty01.pdf. Accessed 31 Mar 2012.

Use of Cultural Heritage to Enhance Older People's Wellbeing

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Introduction

As life expectancy increases, many societies move towards a future in which a higher percentage of the population than ever before is older than 60 years. In the case of European Union countries, the number of older people in the population will almost double, rising from 85 million in 2008 to 151 million in 2060. The number of very old people (aged 80 years and above) is projected to increase by even more, almost tripling from 22 million in 2008 to 61 million in 2060 (European Commission 2009: 20–21 and 40). Moreover, senior lifestyles reflect a tendency towards a "long youth" rather than prolonged old age. The "Third Age" of active and healthy citizens age 60+ is being extended continuously, postponing the "Fourth Age" of older citizens in need of care, treatment, and rehabilitation. These trends, coupled with economic downturns and the likelihood of reduced future welfare benefits, will increase a relativization of retirement. This involves a departure from the existing life-course model of distinct, consecutive phases of education, work, and retirement/leisure to a more integrated model where education, work, and leisure increasingly take place throughout life (Walker and Maltby 2012).

Cultural heritage-based interactions can be utilized to stimulate life-long learning and to provide a focal point for older persons' reflections upon their lives and, and the meaning of cultural heritage for their wellbeing. The use of cultural heritage as a tool for supporting wellbeing, improved health, and quality of life among older people can benefit society as a whole, e.g., in relation to increased social cohesion, regional development, an enriched cultural environment, and intergenerational learning, while concurrently extending the knowledge base about the importance and roll of cultural heritage in supporting health. Around the world, the cultural heritage sector is embracing opportunities to support wellbeing, health and the quality of life for older people in an aging society and many older people already benefit from taking part in heritage activities (e.g., museum visits, genealogy, and local history research).

Definition

Wellbeing is a multifaceted and dynamic concept. It is described as a sense of how one's life is going, through the interaction between their circumstances, activities, and psychological resources. When achieving wellbeing, people gain a sense of individual vitality. This in turn facilitates undertaking activities that are meaningful, engaging, and which make them feel competent and autonomous. Wellbeing entails inner resources helping people to cope and be resilient. In a state of wellbeing, people feel a sense of relatedness to other people. In addition to personal, internally focused elements of wellbeing, social experiences, supportive relationships, and a sense of

connection with others is also enhanced (Michaelson et al. 2009: 8–9, 21). The use of cultural heritage as a tool for supporting wellbeing among older people draws in particular on active and creative engagements with the historic environment, folk traditions, archives, and archaeological/historical museums and collections.

Key Issues/Current Debates/Future Directions/Examples

Western societies are faced with the situation of increased life expectancy together with increasing numbers of older people outside the labor market. At the same time there is the decreasing number of young people contributing to the support of the older population. This relationship reflects profound challenges in modern population demographics, e.g., how to support high quality of life, processes of personal improvement and adaptation to change for older people. Another challenge is to obtain social cohesion, given that 40% of citizens age 65+ live alone and in risk of isolation. The changing demographic landscape also means increasing costs related to care. Thus, there is an economic interest for older people to belong to the Third Age group for a longer time and to the Fourth Age for a relatively shorter time. This entails developing methods and activities by which older people can maintain life quality and experience wellbeing. Therefore, in sync with the emerging trend of an aging population, there is an urgent interest to understand life quality, health, and wellbeing of older persons (Walker and Maltby 2012).

Cultural heritage can support people's health and wellbeing through stimulating memory and imagination, and experiences of beauty (Zipsane 2011; Ander et al. 2012). Cultural heritage can contribute to active aging and to development of novel care, treatment, and rehabilitation programs. Arts and craft activities had indicated positive therapeutic and medical outcomes, including reduction of stress, anxiety, depression, and blood pressure for the treatment and rehabilitation of all kinds of patients including older patients (Stuckey and Nobel 2010).

Cultural heritage activities aimed to support older people's wellbeing are based on varying approaches. One approach is activities based on life-long learning, for example, reminiscence activities that aim to trigger memories in participants experiencing and handling objects. Reminiscence sessions are also useful for older people who are socially isolated, allowing for social engagement with other participants (Osborn 1993). Participating older people report feeling happy and proud that both their personal memories are taken into social consideration and that others consider their professional and personal competences and skills as valuable.

In the case of older people in the Fourth Age or those suffering from dementia, their participation in museums and heritage programs that are focused on sensorially experiencing smells, sounds, touch, and sights influences changes in their emotions and leading to more positive mood, mental harmony, and lessened aggression (Zipsane 2011: 98). One example of this is an EU funded Erasmus+ project, "AHA-Active aging and heritage in adult learning" (Hansen 2017). Conducted at open air museums in five countries in Europe, the project is based on memory training visits by older people in the early stages of memory loss or dementia to venues recreating the atmosphere of the early 1940s. This project resulted in positive outcomes of these visits, for example, in stimulating memories and emotions, and increased wellbeing. Here it is understood that stimulating positive emotions facilitates the ability to think, plan, pursue training, and solve problems (Goleman 1995: 80, 85). Life-long learning is also supported by activities based on the idea that active aging enhances wellbeing. The Nordic Center of Heritage Learning (NCK) launched the Senior Citizens Heritage Learning Initiative that includes activities such as older people volunteering at museums and archives and participating in workshops, lectures, and special cultural heritage visits (Zipsane 2011).

A second approach focuses on non-pharmacological support to enhance wellbeing in older people receiving healthcare. The relation between handling museum objects and the promotion of health and wellbeing among hospital

inpatients and older people in residential care homes has been studied in the University College of London's "Heritage in Hospitals" project (Ander et al. 2012). Furthermore, handling museum collection objects has been shown to promote positive emotions, motivation, and interest in learning; relieve anxiety; and initiating personal memories in hospital patients. This results in bringing out a sense of vitality and energy overriding depressive feelings, providing renewed sense of identity (vs. institutionalization), stimulating social interaction, and enabling patients to find positive meaning in their current condition and lives. The outcomes of these museum-in-health interventions are statistically significant improvements on measures of wellbeing and happiness (Ander et al. 2012: 6–7; see also Chatterjee and Noble 2013). Following these results, the UCL team has developed both a protocol for museum objects handling sessions (Ander et al. 2012), and a museum's wellbeing measures toolkit (Thompson and Chatterjee 2014). Essentially, the "Heritage in Hospitals" studies are part of a general public health strategy in seeking to understand the value of nonpharmacological approaches such as heritage-based activities for health and wellbeing. This reflects the long-standing interest among cultural heritage professionals for making museums and galleries more responsive to the society they serve, beyond the already ongoing education and social cohesion programs.

The inclusion of wellbeing perspectives into museums', galleries', and heritage places' planning and goals could not only foster increased quality of life for older people (and possibly lower public costs for caretaking) but could also have the outcome of creating a win-win situation for the cultural heritage sector in general. Reminiscence activities in heritage places and museums, listening to patients' stories and experiences while handling collection objects, and open curatorial participative practices are defining museum's venues and objects with new meaning and value. For example, the "Re-Active" project in open air museums reported that reminiscence activities were found to be especially valuable and that engaging in cultural heritage activities fosters community's involvement (see Hansen 2014). Furthermore, museum object-handling interventions in hospitals and loaning out memory boxes for care homes and day centers give museum's collections further uses extending beyond storage, exhibition, and programs for school children.

In conclusion, it is interesting to recall that politicians and policy makers have been promoting cultural access for all citizens, signifying that culture and cultural heritage play a role in enhancing older peoples' wellbeing, and that museums and other heritage institutions should provide learning activities particularly for older people. Indeed, more national and international funding is being granted to projects aimed to stimulate research and programs focusing on supporting wellbeing among older people (e.g., EU's Framework Program for Research and Innovation Horizon 2020). There are also a growing number of researchers who argue that politicians and public officers should stop viewing culture as a low productivity branch of the economy mainly absorbing resources, and realize that the cultural sector is actually saving public investments through increasing social cohesion and inclusion through programs in the areas of migration, public healthcare and general welfare (e.g., Sacco 2013). Guided by the current demographic scenario, policy insights, and market context, Hansen and Zipsane (2014) suggest also that the heritage sector should acknowledge older people as a potential market for cultural heritage institutions, offering activities and experiences that are designed in collaboration with older people to be specifically interesting and appealing to this group.

Future Directions

Supporting wellbeing among older people opens new curatorial and management opportunities and challenges in applied cultural heritage. Wellbeing can provide a broad conceptual framework for evaluating the role of cultural heritage in the lives of older people, both on individual and community levels. Prospective outcomes of heritage activities can also benefit society as a whole, e.g.,

in relation to social cohesion, regional development, intergenerational learning, and provide a rich cultural environment while extending our knowledge base about older peoples' experiences and desires concerning heritage. Last but not least, there is the potential of reduced costs of care and rehabilitation if wellbeing and life quality are supported in the older population.

As seen in the short review above, current research on connections between cultural heritage, aging, and wellbeing among older people indicates that cultural heritage has an important role in supporting wellbeing among older people. But much remains to be investigated in this innovative research area. For example, research is needed in the currently very relevant area of migration that focuses on older people with migrant backgrounds, i.e., with "different" personal memories from those collected and represented in national, regional, and local museums. Many migrant populations are large and diverse in composition in Western societies after WWII. These new citizens are growing older and reaching retirement age in their countries of adoption. In the resulting multicultural scenario, immigrant identity is a combination of memories and experiences from both their cultural landscape of origin and from the host country, a mix of everything that has relevance in creating a particular bi-cultural sense of belonging (Colomer 2013). Therefore, activities and approaches such as reminiscence, museum loan boxes, object handling, and various activities designed specifically for the wellbeing of "native" older citizens would need to be studied and re-evaluated to be properly adapted to include older citizens with migrant backgrounds.

In summary, this innovative area of supporting older people's wellbeing at the interface of cultural heritage, museums, and health and social services is exciting, expanding, and highly topical. Future research is needed that focuses specifically on the opportunities and risks of cultural heritage as a tool for improved wellbeing and quality of life among older people, drawing in particular on active and creative engagements with the historic environment, folk traditions, archives, and archaeological/historical museums and collections. This will also extend pedagogical and didactic knowledge by focusing on how older people reflect upon lifelong learning.

Cross-References

- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Cultural Heritage Outreach
- ▶ Experiencing Cultural Heritage
- ▶ Heritage and Public Policy
- ▶ Heritage and Society
- ▶ Heritage Museums and the Public
- ▶ Heritage Research and Visitor Planning
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values and Education
- ▶ Heritage: Public Perceptions
- ▶ Marketing Heritage
- ▶ Narrative and Storytelling for Archaeological Education
- ▶ Sweden: Cultural Heritage Management
- ▶ Volunteers in Archaeology

References

Ander, E.E., L.J. Thomson, A. Lanceley, U. Menon, G. Noble, and H.J. Chatterjee. 2012. Heritage, health and wellbeing: Assessing the impact of a heritage focused intervention on health and wellbeing. *International Journal of Heritage Studies* 19 (3): 229–242. https://doi.org/10.1080/13527258.2011.6851740.

Chatterjee, H., and G. Noble. 2013. *Museums, health and well-being*. Farnham: Routledge.

Colomer, L. 2013. Managing the heritage of immigrants. Elderly refugees, homesickness, and cultural identities. *TEA Newsletter of the EAA* 39: 17–23.

European Commission. 2009. *The 2009 ageing report: Economic and budgetary projections for the EU-27 Member States (2008–2060)*. Luxembourg: Office for Official Publications of the European Communities. Available at: http://ec.europa.eu/economy_finance/

publications/publication14992_en.pdf. Accessed 19 Aug 2016.
Goleman, D. 1995. *Emotional intelligence: Why it can matter more than IQ for character, health and lifelong achievement*. New York: Bantam Books.
Hansen, A., ed. 2014. *Report on the Re-Active project, 2012–2014*. Östersund: Jamtli.
Hansen, A., ed. 2017. *Reminiscence in open air museums – Results from the Erasmus+ project Active Ageing and Heritage in Adult Learning*. Östersund: Jamtli förlag. http://www.beamish.org.uk/content/uploads/2016/10/aha_project_report.pdf
Hansen, A., and H. Zipsane. 2014. Older people as a developing market for cultural heritage sites. *Journal of Adult and Continuing Education* 20 (1): 137–143. https://doi.org/10.7227/JACE.20.1.9.
Michaelson, J., S. Abdallah, N. Steuer, S. Thompson, and N. Marks. 2009. *National accounts of wellbeing: Bringing real wealth onto the balance sheet*. New Economics Foundation (NEF). Available at: http://www.nationalaccountsofwellbeing.org/public-data/files/national-accounts-of-well-being-report.pdf. Accessed 19 Aug 2016.
Osborn, C. 1993. *The reminiscence handbook. Ideas for creative activities with older people*. London: Age Exchange.
Sacco, P.L. 2013. *Culture 3.0: Art, participation, and development* (This is the translation of the title in Swedish, *Kultur 3.0: Konst, delaktighet, utveckling*). Göteborg: Nätverkstan (in Swedish).
Stuckey, H.L., and J. Nobel. 2010. The connection between art, healing, and public health: A review of current literature. *American Journal of Public Health* 100 (2): 254–263.
Thompson, L.J., and H. Chatterjee. 2014. Assessing wellbeing outcomes for arts and heritage activities: Development of a museum wellbeing measures toolkit. *Journal of Applied Arts & Health* 5 (1): 29–50. https://doi.org/10.1386/jaah.5.1.29_1.
Walker, A., and T. Maltby. 2012. Active ageing: A strategic policy solution to demographic ageing in the European Union. *International Journal of Social Welfare* 21: 117–130. https://doi.org/10.1111/j.1468-2397.2012.00871.x.
Zipsane, H. 2011. Heritage learning in service for the memories and life quality of senior citizens. *International Journal of Continuing Education and Lifelong Learning* 3 (2): 91–103.

Further Reading

Touch and Wellbeing, UCL (UK): https://www.ucl.ac.uk/museums/research/touch. Accessed 19 Aug 2016.
Zipsane, H., and S. Grut. 2013. Museums and the ageing population. In *Report 2. Heritage and the ageing population. The learning museum network project*, ed. A. Nicholls, M. Pereira, and M. Sani. Östersund: Nordic Centre of Heritage Learning and Creativity.

Uses of Heritage

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Introduction

Published in 2006 by Routledge, the book *Uses of Heritage* offers a re-theorization of heritage that de-privileges the idea of heritage as a "thing," place, or site. It develops two interlinked arguments, the first of which is that heritage is a performance of meaning making and second these performances are framed by different discourses about heritage. The most conspicuous discourse is what the book terms the "Authorized Heritage Discourse," or AHD. In de-privileging the idea of heritage as material, as a "thing," the book draws on the work of the historian Raphael Samuel (1994), and explores the idea that heritage "things" are "theaters of memory," where the past and present are negotiated through the performances of heritage management, preservation, and visiting. Heritage is a process of remembering and meaning making, in which understandings of both the past and present are continually negotiated by the performance of identifying, managing, and visiting heritage places or participating in heritage events which are social and therefore intangible. All heritage is thus intangible, because heritage is what happens at and around heritage places or events – perhaps organized around a place, artifact, or site, though it may be an intangible event such as a ceremony or artistic performance; it is a moment of action, not a thing or place itself. While the sites, artifacts, and places may be important, they are important only in terms of how they facilitate or are used as cultural tools in the cultural and social "work" that heritage does in society.

Key Issues

The book finds synergy with the arguments by Dicks (2000, 2007), Harvey (2001), and Kirshenblatt-Gimblett (1998) that respectively stress heritage is a form of communicative practice, a verb, and a practice of cultural production. It also has synergy with Sharon Macdonald's (2013) arguments about "past-presenting." Debates from within the social sciences about memory and remembering, sense of place, emotion and affect, dissonance, identity, and performance are drawn on to develop a nuanced picture of heritage as a process ultimately concerned with the regulation of social and cultural change and conflict. It challenges the idea that heritage is ultimately "good," "comfortable," monolithic, and universally valuable and argues that ultimately all heritage is fundamentally dissonant and contested.

The contested nature of heritage and the role it plays in the arbitration and regulation of social and political conflict are often obscured by the AHD. This dominant discourse is embedded in the policies and legal frameworks utilized to manage and conserve heritage (or cultural resources), which were developed in many Western countries during the nineteenth and twentieth centuries, and is embedded in intergovernmental agencies such as UNESCO and ICOMOS. This is not to say that there is a single AHD or that such discourses are immutable or beyond challenge; however, within many Western countries and intergovernmental agencies, there is a core of shared understandings about the nature of heritage. These commonalities of understanding have their origin in Western Europe in the nineteenth century and the lobbying of archaeologists and architects for the protection of the material culture that they deemed to be of innate and inheritable value (see chapters 1–3).

Critical discourse analysis (CDA) underpins the conceptualization of the AHD. As such, discourse is defined as being both reflective of and constitutive of social practices, as it is "a practice not just of representing the world, but of signifying the world, constituting and constructing the world in meaning" (Fairclough 1992: 64). This means that discourse not only helps define and frame the way we may think, talk, and write about the world but that a particular discourse will also arbitrate and frame our practices.

The AHD defines heritage as "fragile, finite, and nonrenewable" and as something that must be preserved for future generations. Under the AHD, heritage tends to be defined as aesthetically pleasing and nationally significant material objects, sites, places, or landscapes that represent all that is "good" or worthy of celebration from the past. The value of material culture is assumed to be innate rather than associative or attributed. As something fragile and finite, those possessing appropriate expertise are privileged within this discourse over other stakeholders (such as economic interests, local or other communities, or social or political interest groups), and experts are defined as the "stewards for the past," who have a professional "duty" to safeguard heritage and to communicate the value of heritage to nonexperts.

The AHD also stresses the idea of inheritance; heritage, under the guidance of experts, must be passed onto the future, if not untouched, at least unchanged. Thus, people in the present are dissuaded from actively rewriting the meaning of the past or reconsidering its role in the present. These basic tenets derive from European architectural conservation debates, particularly John Ruskin and William Morris' idea of "conserve as found." Heritage is thus defined as something that is "found" rather than made or conceptualized, and its fabric is understood as inherently meaningful and historically and culturally valuable. The idea that the meaning and value of heritage sites may change, that it may be disputed both over time and within particular contexts, and that ultimately a site is simply a collection of bits and pieces that someone or various groups have attached meaning and value to becomes an uncomfortable perception. My assertion in the book, for instance, that Stonehenge is merely "a collection of rocks in a field" (p. 3), has met with some disbelief and ire (for instance, Soli 2011) from those with an emotional and intellectual investment in the framework of the AHD. However, Stonehenge, like other heritage sites, has acquired new and disparate meanings over time.

Its "finding" relates to the way it is conceived, and it has been refound over the centuries and redefined as an archaeological site, tourist attraction, site of druidic worship, and observatory, among other understandings – and at one time (by the then owner of the land it is on) as an inconvenient collection of rocks in a field.

The degree of importance that is placed on the materiality in Western culture, alongside assumptions about the aesthetic worth of certain objects or sites made within the AHD, means that the material artifact or site has often come to be seen as embodying the social or cultural values that have been attached to it. Thus, a monument or heritage site tends to become confused with the cultural and social values that are used to interpret it and give it meaning. For instance, Stonehenge becomes something that "just is" of significance. This process tends to obscure the possibility that heritage may not only have multiple meanings or values for different people or social groups but that some of these values may conflict or contradict each other. Further, it disavows the possibility that some groups may not value a site or place at all. The AHD places emphasis on the national and universal value of heritage and tends to de-privilege local value, community value, or other values that a place of heritage may have to subnational groups or interests. Certainly, a hierarchy of value is defined and maintained within the AHD.

Assumptions about the innate value of heritage also work to reinforce the idea that heritage represents all that is good and important about the past. This assumption also links to a key construction within the AHD that heritage and identity are irrevocably linked. Not only do heritage sites come to stand in for the values used to give them meaning, they also tend to be seen as standing in for "identity," particularly national identity. Exactly how heritage and identity (and the concept of identity tends to be seen as self-evident within the discourse) are linked is never articulated or defined – again it is a given that "just is."

The AHD constructs not only a particular definition of heritage but also an authorized mentality and framework that guides and regulates heritage preservation practices and public policy developments in many Western countries. While the specifics of the AHD will vary across time and space, these core concepts have currency and consequences not only for heritage experts but also for all those communities, individuals, and other interests or groups who engage with and regard heritage (however they may define it) as important. The consequences of the AHD are that it tends to regulate and confine professional and academic debate about the nature and meaning of heritage and the way it can be managed, preserved, and interpreted. This means that it also tends to validate the bodies of knowledge and values that contributed to it – it is by definition self-referential. It also excludes those understandings of heritage that may sit outside of the framework defined by the AHD. The AHD tends to be embedded in Western and more particularly international policy, an occurrence that gives authority or authorization and legitimacy to the discourse and the assumptions embedded within it within the West. Although the AHD has been challenged to some degree by increasing international interest in intangible heritage, there is much within the Western AHD that escapes criticism in this development (see chapter 3 and Smith and Waterton 2009a; Smith 2015; Smith and Campbell 2017).

In developing my arguments about the AHD, and the idea of heritage as a cultural performance rather than a "thing," the book presents several case studies, drawn primarily from England and Australia, which illustrate the performative nature of heritage and the social and cultural negotiations that are undertaken as part of this performance. These case studies in the first instance look at how the AHD influences engagements with heritage sites. Interviews with visitors to English country houses and an ethnographic study of the Riversleigh World Heritage site in Australia are used to explore the way the AHD constructs certain social and cultural meanings and the consequences this has for underpinning power relations between different social and cultural groups. Three case studies also examine definitions of heritage that sit outside of, or in opposition to, the AHD. Visitor interviews with people at museums of working-class life; an ethnographic analysis of the development of a community

heritage organization in the deindustrialized town of Castleford, West Yorkshire; and a review of Australian and US Indigenous debates and conflicts over heritage provide examples of heritage discourses that seek to challenge the AHD. The challenges documented in these case studies illustrate the degree to which heritage becomes an important resource in the politics of identity. To understand this process, the work of Nancy Fraser on the "politics of recognition" is drawn on, to illustrate that heritage is not only ultimately political but how it may be actively taken up in political struggles. Fraser (1995) argues that in the latter twentieth century, "identity politics" became an important form of political struggle for those seeking social justice. The recognition of the special and specific claims that particular groups made for the redistribution of resources of power (such as welfare, education, housing, and so forth) was often underpinned by appeals or reference to particular understandings of history and culture (Fraser 2001). The recognition of difference has thus become an important aspect of political conflicts, and heritage is often used to legitimize claims to identity, and as such it has become a key resource in these struggles. These insights, which began to be developed in the last sections of *Uses of Heritage*, have since been developed further (see Smith 2007, 2010, 2017; Smith and Waterton 2009b, 2011).

Uses of Heritage has largely met with positive critical attention. For Ian Baxter (2007: 130), the book was identified as being "seminal" in the emerging debates within heritage studies about "power, accord, and dissonance." Others have noted that, while the AHD may be an "annoying acronym" or sounds like a disease, it provides a useful and compelling heuristic devise for exploring the consequences of heritage practices (Feintuch 2007; Warren-Findley 2007: 149). The book has also been praised for, unlike all too much writing on heritage, offering detailed analysis of interview and other ethnographic data to support its arguments (Feintuch 2007; Warren-Findley 2007; Dicks 2007; Day 2009). Others, particularly those heavily invested in the AHD, have been less convinced and note that I "failed to consider the scientific issues entailed in managing resources" (James 2007: 788). The de-privileging of expertise (or science) in the hopes of developing more democratic heritage practices and understandings has been a long-term issue underlying my work with heritage (see Smith 1994), and while this has and continues to receive criticism (for instance, Soli 2011; Carman 2011), it is not a position I back away from. Indeed, engaging with how different communities connect with heritage, and understanding that scientific expertise is simply one of many communities of interest in heritage (Smith and Waterton 2009b: 19), is vital if academic and professional debate is to grow and develop. As Baxter (2007: 128) notes, heritage studies is an emerging field of enquiry that will only reach maturity with the development of debates that aim to question and reexplore the established canon. I actually think that the sort of ultra-defensive claims made by James (2007) goes some way to demonstrating the validity of my arguments.

A common mischaracterization of my work is that it is based on a social constructivist epistemology (see, e.g., Albert 2013: 11; Harrison 2015: 27) and that I thus adopt a relativist ontology. This mischaracterization tends to be linked to a discomfort with my de-privileging of materiality (see, e.g., Harrison 2013). Rather than taking a relativist or constructivist position, my work is firmly based within critical realism, an ontological philosophical position that also underpins CDA (2006: 13–16). *Uses of Heritage* does not dismiss the importance of "things"; indeed I argue they are useful and important cultural tools for the processes and performances of heritage making. Rather the book points to the overprivileging of materiality in dominant discourses and practices and argues that we need to broaden our conceptualization of heritage to engage with a wider range of experiences of heritage and heritage making than have been traditionally acknowledged and authorized.

Some have taken issue with my reading of critical realism, arguing that the ideas that heritage is a performative process (that all heritage is intangible) are an epistemic fallacy within

critical realism (Skrede and Hølleland 2018: 83). This critique simply misunderstands that critical realism does not discount that the social and social structures are "real" and have material consequences in people's lives. Skrede and Hølleland (2018) are also concerned that I have not done a detailed critical discourse analysis to demonstrate the AHD, and they are correct in this; a detailed analysis is not done within *Uses of Heritage,* but this was not the aim of the book. I drew on the broad ideas of critical discourse studies that underline CDA to acknowledge the existence of a dominant discourse so that it may be challenged. My mistake was referring only to CDA, which is a methodology, rather than more clearly pulling out the basic ideas underpinning a critical approach to the idea of discourse on which my arguments were based. Contra to the assumption made by Skrede and Hølleland (2018: 86) that establishing the AHD was the central concern of the book and that examining alternative discourses was not, my aim was rather to open the conceptual space for alternative discourses, and, indeed, the second half of the book illustrates the range of alternative and competing discourses to the AHD.

The arguments in *Uses of Heritage* have, as Iain Robertson points out (2012), been widely taken up within the heritage literature (see, for instance, essays in Graham and Howard 2008; Gibson and Pendlebury 2009; Harrison 2010; West 2010; Benton 2010; Skrede and Hølleland 2018). While I have developed aspects of the work further, particularly in a 4-year research project funded by the Australian Research Council, which has allowed me to extend the research on visitor responses to heritage to Australia and the USA, others have started to extend the debate. Emma Waterton (2010), for instance, has documented in more detail the nature of the AHD in England and within UNESCO and the way it has responded to policy attempts focusing on "social inclusion." The concept of the AHD has begun to take on a life of its own and not only within academic and professional debate. A Google search for the term revealed it being used in a mountain bike discussion list based in the UK. The discussion was about finding new places to go bike riding in, and someone suggested that the group should contact the Scottish National Trust to find places, with the reply from a member of the group that national trusts were:

> . . .organisations for people that need their heritage spoon fed. Not real heritage either, heritage chosen by white, middle class, self-appointed experts, presenting their own values and narratives of the great and good as though they are appropriate to us all and form what we all view as the national treasures. It's called the AHD, the authorised heritage discourse. (Trailmonkey 2010)

As an author, I find it very gratifying that the book has made an impact in academic discussions of heritage. However, many practitioners and policymakers have told me that the book, and the concept of the AHD in particular, speaks very directly to their experiences of the heritage sector. To actually find a trail bike discussion list citing the AHD shows that the concept works for some people, and a glance through Google also shows that beyond academic use there is also a growing take-up of the ideas and terminology of the book in heritage policy documents, which is very encouraging.

I would like to finish however by highlighting an element of the work that has not been explored as much as I would like. That is the emphasis the book places on resistance to hegemonic discourses and in particular the sections on working-class heritage. What these sections show (and see Smith, Shackel and Campbell 2011 and the *International Journal of Heritage Studies* 17(4) for further developments of these arguments) is that we do not need to go to non-Western locations to find alternative or oppositional heritage narratives or experiences. What the sections of the book on working-class heritage show is that the country house style of heritage experience, though dominating many people's sense of what heritage is or may be, does not sit well with everyone's understanding of heritage. The emphasis on performance, intangible manifestations of heritage, dissonance, and community found in many non-Western contexts can also be

found in the backyard, so to speak, of Western heritage researchers and policymakers. Hopefully, this will change, and more people will explore this aspect of the book.

Cross-References

- ▶ Heritage Theory
- ▶ Heritage: History and Context
- ▶ Intangible Cultural Heritage

References

Albert, M.-T. 2013. Heritage studies – Paradigmatic reflections. In *Understanding heritage: Perspectives in heritage studies*, ed. T. Albert, R. Bernecker, and B. Rudolff, 9–17. Berlin: Walter de Gruyter.

Baxter, I. 2007. Book review. *Journal of Heritage Tourism* 2: 128–130.

Benton, T. 2010. *Understanding heritage and memory*. Manchester: MUP.

Carman, J. 2011. Stories we tell: Myths at the heart of 'community archaeology'. *Archaeologies*. https://doi.org/10.1007/s11759-011-9180-x.

Day, M. 2009. Book review. *Social History in Museums* 33: 39–40.

Dicks, B. 2000. *Heritage, place and community*. Cardiff: University of Wales Press.

Dicks, B. 2007. Book review. *Museum and Society* 5: 58–59.

Fairclough, N. 1992. *Discourse and social change*. Cambridge, MA: Polity Press.

Feintuch, B. 2007. Book review. *Museum Anthropology Review*. Available at: http://museumanthropology.net/2007/11/15/mar-2007-2-34/. Accessed 23 Jan 2012.

Fraser, N. 1995. From redistribution to recognition? Dilemmas of justice in a 'post-socialist' age. *New Left Review* 212: 68–93.

Fraser, N. 2001. Recognition without ethics? *Theory, Culture and Society* 18: 21–42.

Gibson, L., and J.R. Pendlebury, eds. 2009. *Valuing historic environments*. Farnham: Ashgate.

Graham, B., and P. Howard, eds. 2008. *Ashgate research companion to heritage and identity*. Farnham: Ashgate.

Harrison, R. 2010. *Understanding the politics of heritage*. Manchester: MUP.

Harrison, R. 2013. *Heritage: Critical approaches*. London: Routledge.

Harrison, R. 2015. Beyond "natural" and "cultural" heritage: Toward an ontological politics of heritage in the age of Anthropocene. *Heritage & Society* 8 (1): 24–42.

Harvey, D.C. 2001. Heritage pasts and heritage presents: Temporality, meaning and the scope of heritage studies. *International Journal of Heritage Studies* 7: 319–338.

James, N. 2007. Book review. *Antiquity* 81: 787–790.

Kirshenblatt-Gimblett, B. 1998. *Destination culture: Tourism, museums and heritage*. Berkeley: University of California Press.

Macdonald, S. 2013. *Memorylands: Heritage and identity in Europe today*. London: Routledge.

Robertson, I. 2012. *Heritage from below*. Farnham: Ashgate.

Samuel, R. 1994. *Theatres of memory, volume 1: Past and present in contemporary culture*. London: Verso.

Skrede, J., and H. Hølleland. 2018. Uses of Heritage and beyond: Heritage Studies viewed through the lens of Critical Discourse analysis and Critical Realism. *Journal of Social Archaeology* 18 (1): 77–96.

Smith, L. 1994. Heritage as postprocessual archaeology? *Antiquity* 68: 300–309.

Smith, L. 2006. *Uses of heritage*. London: Routledge.

Smith, L. 2007. Empty gestures? Heritage and the politics of recognition. In *Cultural heritage and human rights*, ed. H. Silverman and D.R. Fairchild, 159–171. New York: Springer.

Smith, L. 2010. Ethics or social justice? Heritage and the politics of recognition. *Australian Aboriginal Studies* 2010: 60–68.

Smith, L. 2015. Intangible heritage: A challenge to the authorised heritage discourse? *Revista d'etnologia de Catalunya* 40: 133–142.

Smith, L. 2017. "We are … we are everything": The politics of recognition and misrecognition at immigration museums. *Museum and Society* 15 (1): 69–86.

Smith, L., and G. Campbell. 2017. The tautology of "intangible values" and the misrecognition of intangible cultural heritage. *Heritage & Society* 10 (1): 26–44.

Smith, L., and E. Waterton. 2009a. 'The envy of the world?': Intangible heritage in England. In *Intangible heritage*, ed. L. Smith and N. Akagawa, 289–302. London: Routledge.

Smith, L., and E. Waterton. 2009b. *Heritage, communities and archaeology*. London: Duckworth.

Smith, L., and E. Waterton. 2011. Heritage and the politics of exclusion. *Current Swedish Archaeology* 19: 51–57.

Smith, L., P.A. Shackel, and G. Campbell, eds. 2011. *Heritage, labour and the working class*. London: Routledge.

Soli, B. 2011. Some reflection on heritage and archaeology in the Anthropocene. *Norwegian Archaeological Review* 44: 40–54.

Trailmonkey. 2010. Singletrack, mountain bike magazine, chat forum: National Trust, English Heritage or RHS? Available at: http://singletrackworld.com/forum/topic/national-trust-english-heritage-or-rhs. Accessed 24 Jan 2012.

Warren-Findley, J. 2007. Book review. *Public History Review* 14: 148–149.

Waterton, E. 2010. *Politics, policy and the discourses of heritage in Britain*. Basingstoke: Palgrave Macmillan.

West, S. 2010. *Understanding heritage in practice*. Manchester: MUP.

Utopian Communities, Archaeology of

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Introduction

The study of utopian communities is a research field that has been mainly the endeavor of historians and anthropologists. However, archaeologists have focused their attention to the research of these peculiar kinds of settlements and their material culture. Utopian communities are found in many geographical regions that include Europe and the American continent. These social experiments emerged as a response to the Industrial Revolution and capitalism and were inspired by the ideas of French, English, and American thinkers. A large number of utopian communities were founded in the United States, and towards 1860, around 130 secular- and religious-oriented communities existed that included Fourierist, Mormon, Shaker, Icarian, and Perfectionist ones, Hutterites, Rappites, and Zoarites, and Saint Simonians (Hayden 1981; Holloway 1966). There exist a variety of examples of archaeological research and theoretical approaches on these types of settlements (Kozakavich 2017) and range from eighteenth-century colonization projects in Patagonia, Argentina (Senatore 2007) to nineteenth and twentieth-century religious and secular communities in North America and in Mexico (Velasquez 2012). Moreover, research on utopias from Historical Archaeology has shed light on burial practices amongst the Quakers in Alexandria (Bromberg and Shephard 2006), the relationship between the ideological realm and the practice of everyday life (see Van Bueren 2006), gender (Spencer-Wood 1991, 2006), consumption patterns, and material culture that reveal the lifestyles and values of particular societies (see Kozakavich 2006; Starbuck 2004; Van Wormer and Timothy Gross 2006; Van Wormer 2006), and architectural projects (see Preucel and Pendery 2006; Tarlow 2002; Tomaso et al. 2006).

Definition

The archaeology of utopia can be defined as a field that studies counter-cultural communities. That is, communities that live at the margins of a dominant ideological and economic system like capitalism, and set forth a series the practices that include alternative modes of production and the organization of religious and social life. These communities were created following two basic principles that are: dissatisfaction with aspects of the dominant culture and the belief that a better way of life is possible (Van Bueren and Tarlow 2006). Thomas More coined the term *utopia* in 1516 to refer to a place that does not exist; the term *utopia*, on the other hand, has been employed to encompass the projects of real visionaries who seek alternative lifestyles (Kozakavich 2017; Van Bueren and Tarlow 2006). It is also a secular heaven, a model society in America created by those who flew from the industrial problems in Europe. These model societies or social experiments aimed to provide examples which they hoped the world would follow (Holloway 1966). Not all groups of people who chose to separate themselves from the broader society were utopian; to be considered as such, the group must act according to the Western utopian literary and philosophical tradition and can be rather radical in their goals and ideals. Therefore, the term utopia applies better to some groups more than others and can be best understood as an *intention* and an activating impulse that informs and inspires people to create or achieve an ideal society (Kozakavich 2017). These can also be defined as intentional communities, a concept that encompasses groups with a variety of philosophical principles and religious beliefs, family structures, and economic forms. Intentional communities have planned residential groupings, shared economic, religious, and social values, and the intention to live alternative life-styles (Kozakavich 2017).

The members of utopia aimed to construct a perfect society according with their religious, or political ideals, and their leaders sought to set an example for the rest of the world. These communitarian experiments followed particular religious or secular philosophies, and could congregate a dozen or hundreds of persons through which ideal societies were established. The members of utopia have made a conscious decision to live differently and separately from the rest of society. The communities are visionary and missionary and believe to represent the best future for humanity. They are highly designed and communally organized (Tarlow 2002). Utopian settlements are relatively small in size and located at a certain distance from major population centers, are self-contained, and in some cases, religion constitutes the main element in their conformation (Orser 2002: 556–557).

Key Issues/Current Debates/Future Directions/Examples

Gender

Archaeological research on gender has the potential to inform on the accuracy of the idealistic drawings of utopian settlements and features that were predominantly used by women. These include degree of cooperative housekeeping, the transformation of culture and of women's roles, and the adoption and/or refusal of artifacts invented by the communards (Spencer-Wood 2006). Research on the materialistic domestic reforms that took place during the nineteenth century in the Boston area, for example, suggests changes in the construction of gender (Spencer-Wood 1991). Materialistic domestic reformers sought to make women dominant in the domestic sphere, transform gender ideology, and improve women's status, lives, and work. Their purpose was to professionalize women's occupations and empower them by applying scientific, industrial, and business principles and introducing innovations in the material culture used in housework. These included the latest scientific technology, which could provide efficient house designs and housekeeping machinery that would decrease the amount of work required by housework. These innovations were controlled, and sometimes even developed, by women, and sympathetic men. The reformers believed that women's work should have the same status as men's skilled work and used technological innovation to transform housework into a public profession; housework was extended and professionalized into the public realm. This resulted in cooperatives where women from different families participated in large-scale production processes in the public sphere. Cooperatives transformed unpaid housework into remunerative skilled labor in the public sphere, such as kitchens, laundries, and day cares. These drew on the beliefs of the community as a family and the scientific efficiency of collective labor developed by communitarian socialists like Fourier and Owen, amongst others. Some of these cooperative housekeeping facilities and equipment were incorporated into utopian communities, such as the Shakers, Rappite Harmony Society Towns, Owenite communes, Fourierist Associations, Brook Farm, Oneida Perfectionists, Amana Inspirationist communes, and Hutterites. Despite their varying religious backgrounds, utopian communities often developed similar public cooperative housekeeping organizations that included cooperative laundries, kitchens, and schools. Because in the nineteenth century most communes subscribed to the egalitarianism philosophical principles of the Enlightenment, they considered all work equal, although women continued to perform cooperative domestic work. Members of utopias made housework the equivalent of other kinds of public labor and sought improvements in facilities and furniture that would increase the efficiency of domestic work, such as large spaces for communal food preparation, laundry, cleaning, and childcare. Also, improvements to sanitary and lighting facilities, such as those used by the Oneida Community, sought to maximize members' health and decrease domestic labor. Shaker domestic innovations included a washing machine, a cheese press, and a flat broom, amongst others. The Oneida Perfectionists developed methods for fruit preservation and created an improved mop wringer and an institutional potato peeler (Spencer-Wood

1991). Overall, the research on these communities and the materialistic domestic reforms yield information on the construction of gender ideology and roles through the innovation and use of material culture. They professionalized housework and changed women's status and labor, empowering women by redefining the domestic sphere as overlapping with the public one, as women worked outside their home and the public space was domesticated. Moreover, the research on these communities shows women's resistance to male dominance in both the private and public spheres and how notions of gender changed in these cultural systems (Spencer-Wood 1991).

Architecture

The modification and reinterpretation of the landscape, and the design of architectural projects were central to utopian communities. While many of these were actually constructed, and are valuable sources for archaeological interpretation on the life inside utopia, others were never materialized. This has been explored at sites like Floridablanca and Brook Farm, and in the Crédit Foncier Company, where the ideal city of Peace remained as a future project (see below). Most utopian thinkers envisioned themselves as social architects and thought that they could transform society through architectural designs, and some embodied eccentric ideas. Many intended to re-structure a complete city and country. Some projects emerged as a response to the Industrial Revolution and adopted symbols linked with gardens and agriculture, or with the machinery and industry, and incorporated them to the physical layout. The physical plan intended to fuse their ideals on nature, family, and society. Behind every utopia, there is a complex and well-structured plan on the physical layout of the communities because the physical spaces condition social behavior. Even when the designs vary from one utopia to another, in general terms they have areas for communal activities and others intended for private or family living. The architectural layout is crucial to the study of utopia because by analyzing it, it is possible to understand the social and ideological mechanisms that operated inside the community (Hayden 1981). These culturally built landscapes had the intention of molding its inhabitants' behavior to suit ideological and religious goals, as observed in Shaker communities, and these landscapes were not static; they moved and were modified in response to internal changes and the community's needs (Kozakavich 2017).

Llano del Rio Cooperative, was established by Job Harriman near Los Angeles in the mid-1910s, as an alternative to the dehumanizing forces of industrial capitalism. Harriman created plans for a model city that was intended to create a self-sufficient, egalitarian, and secular community. Spaces within this socialist cooperative were influenced by progressive agendas, domestic reforms, and women. These spaces highlighted the ideals held by members of the utopia stressing beauty, solidarity, and equality of opportunities as well the importance of labor-saving devices that would liberate women from domestic tasks (Van Bueren 2006).

In Feltville, New Jersey, a small-scale industrial village dedicated to paper-making, bookbinding, and printing was designed and operated by David Felt, a liberal Unitarian printer and stationer, from 1845 to 1860. Data drawn from historical geography and archaeological finds suggest that the values built in Feltville were those of a secular but Christian, capitalist, and classist community, and that the daily segregation and prevailing social order and hierarchies were inscribed into the village's landscape (Tomaso et al. 2006).

Floridablanca was created as part of the Spanish peopling project of the Patagonia coast, Argentina, and was a small colony that was inhabited between 1780 and 1784. Located near the port of Saint Julian in the province of Santa Cruz this colonization project was inspired by the ideas derived from the Enlightenment. It was part of a defensive strategy to protect this geographical region from English colonizers and that involved the peopling of this territory with Spanish families. The social project was innovative for that time in that it selected impoverished families and bachelors dedicated to agriculture and that knew useful crafts and domestic activities. Neither foreigners nor people with illnesses were generally

admitted. A contract was signed between the Crown and the colonists that obliged them to settle in Patagonia and could not abandon the region without prior authorization. The research project aimed to understand the creation, reproduction, and transformation of the discourses derived from the Spanish Enlightenment underlying the colonization project, as well as the social practices of the settlers. An interesting result of the archaeological project conducted at Floridablanca was obtained from the analysis of the architectural layout of the site. The households of the colonizers were found to be homogenous in size and design and other buildings did not adjust to the official architectural project. The first was interpreted as the material representation of the ideal of equality of the Enlightenment, but the others that were constructed by the settlers were not mentioned in the official representations and narratives of the settlement, as they did not adjust to the ideal layout (Senatore 2007).

Brook Farm was one of the most famous utopian communities in North America. Located in Roxbury, Massachusetts, it was founded during the nineteenth century by George and Sophia Ripley and functioned from 1841 to 1847. Despite the fact that the occupation of the site ranges from the pre-Historic period to the twentieth century, it is best known for its utopian component. The archaeological research at this site focused on the materiality of the cultural landscape, on the built environment of the utopian community. It aimed to understand the social practices by which philosophies such as Transcendentalism and Fourierism were successfully inscribed in the architecture and settlement patterns of the community (Preucel and Pendery 2006). This allowed insights to the daily lives of the community members and explore the reasons behind the adoption of Fourierism. The results obtained from the research at Brook Farm suggested that Transcendentalism was a philosophy that promoted egalitarianism and this view was embedded in the landscape through the moral elevation of agriculture. Moreover, an egalitarian program inside the community of volunteer labor was observed in the unplanned expansion of the settlement and the use of eclectic architecture that emphasized individualism. In contrast, the adoption of Fourierism promoted a more authoritarian system that aimed to control every aspect of social life and that included sexual behavior. This philosophy was materialized in the form of a phalanstery, and the centralization of activities in that building, an expansion of the industry, and the standardization of communal architecture (Preucel and Pendery 2006).

Consumption of Material Culture

Utopian communities are alternative projects to capitalism. Therefore, the analysis of consumption of material culture recovered at these sites allows to explore the relationship between communal ideals and the material world, the interaction with the dominant culture and economic system to which they oppose (Orser 2002; Tarlow 2002). In this regard, resistance actions within utopian settlements can be translated into technological innovations that are typical of this kind of communities (Leone 1999). Also, a higher consumption of locally manufactured goods in contrast to others produced by the dominant system is expected. But, the analysis of the material culture from utopia often reveals contradictions between the social and religious ideals and everyday practice and consumption.

The research done at the religious Shaker community of Canterbury, New Hampshire, that functioned from 1783 until 1992 included an assessment of the built environment and the mapping of the surface of the village. It combined a mixed approach that included archaeological work, documentary research, interviews, cataloguing, and the elaboration of inventories. The results of the excavations revealed material culture like clay tobacco pipes and items manufactured in the outside world like alcohol and perfume bottles, ceramics, and little material culture that was actually manufactured by members of the community (Starbuck 2004).

Another example of how Archaeology can unveil contradictions underlying utopia is provided by the research done on Russian *doukhobors*. These groups fled from the tsarist regime to

Canada during the late nineteenth century in search of new territories. The community originated as a reform movement against the Russian Orthodox Church during the eighteenth century. It was characterized by a belief in a divine ray that inhabited every living being and thus, believed in the equality of life. The members of this society practiced communalism, pacifism, and vegetarianism. Smoking and drinking was prohibited. The material culture recovered comprised bottles of wine, whiskey, gin, and beer. Also, remains of beef, poultry, rabbit, and fish were identified. Regarding communalism, the ceramic sample suggested that rather than communal dining there existed inequality in the patterns of consumption of material culture between one dwelling and another (Little 2007). The research undertaken by Kozakavich (2006) at the site of the former *doukhobor* village of Kirilovka, located on the south bank of the North Saskatchewan River valley, near the town of Langham, started as a cultural resource management project. The excavations at the village site and the artifacts recovered, particularly liquor bottles, further support the idea that drinking was practiced in village life. The analyses of a variety of faunal remains suggest an abandonment of vegetarianism, finding evidence of the consumption of beef, poultry, rabbit, and fish, and possible pork and sheep. Moreover, the material culture found at Kirilovka does not support the maintenance of true communalism at a village level. Also, the identification of a variety of ceramic vessels with different decorative patterns, indicative of individual purchases of pieces instead of whole table sets, suggests that family dining behavior incorporated purchased mass-produced tableware. Differences found in the artifacts recovered from the eastern and the western sides of the village, such as purchased toys, watches, glass, and improvements to the household, are suggestive of differential consumer patterns and activities that were probably motivated by different interpretations and practice of Doukhoborism on the part of the residents. The research shows that Doukhobor identity was dynamic and subject to change through time and that their material choices expressed how ethnicity, ideology, and economics shaped people's practices and daily life (Kozakavich 2006).

The Crédit Foncier Company was established in 1866 in the valley of El Fuerte in Sinaloa, Mexico. Its founder, Albert K. Owen, was inspired by Quaker ideas and utopian thinkers like Robert Owen and Charles Fourier. He envisioned the bay of Topolobampo as the place where to construct Pacific City. Like most utopias, Owen carefully selected its members, whom were mainly devoted to agricultural activities, architects, shoemakers, horticulturists, editors, and topographers, amongst others. The rules inside the colony were strict and discouraged the consumption of alcohol and tobacco. Although it was never constructed, the layout of the city and buildings suggest a physical separation between the community and the outside world, and promoted communal interaction. Followers of Owen migrated to Mexico from Europe and the United States to join the project and settled along the valley, where they lived in nuclear families, constructed houses, and devoted to agricultural activities. Owen published a periodical pamphlet with images of the colony in order to promote it and attract new adepts. These photographs provide insights to the mechanisms of ethnogenesis and self-presentation of the colony, as a heaven on earth surrounded by gardens, livestock, abundant resources, communal activities, and family houses. This would probably provide the outside world with an image of being self-sufficient. However, this was contradicted by the material culture recovered at the sites and the documentary sources in the form of personal letters of members of the community that narrate a life of stress, poverty, and illness (Velasquez 2012). Although there was evidence of technological innovation in the shape of a sugar mill and chimney, the finding of imported ceramics and bottles suggests that the colonists were barely self-sufficient and relied upon the envoys from abroad. Moreover, alcohol bottles were also identified in the analyzed samples (Velasquez 2012).

The archaeological research of utopia enables to explore the social dynamics inside the

communities. Also, how its members constructed a self-image and their interpretation of the world they inhabit. It provides insights to the contradictions underlying the relationship between the ideological realm and the materiality of everyday life. The contradictions found in the patterns of consumption for example, illustrate the strategies set forth by members of utopia in order to survive. It could be argued that in every utopia, there existed an imaginary or ideal one, and the material one that left traces in the archaeological record. And, it is the job of archaeologists to explore how these conciliated with one another and what can they say about the transformation of the world and the construction of alternative narratives. It is important to understand that the incongruities found inside utopian communities involve a continuous praxis of reinvention, construction, deconstruction, and reconstruction of an ideal world. Utopia is not static but rather dynamic and constantly changing and adapting to new output. This contradicts the utopian ideal of constructing a perfect, permanent, and static community. As it has been observed in the cases presented above, utopia seldom stays at the margins of the world they oppose. Future directions should focus on the experience of manhood and womanhood to assess notions on equality. Also, it is important to address the attitudes towards the body in terms of architectural designs, clothing, hygiene, sexual and food abstinence as the embodiment of particular ideologies. Because most studies have focused on nineteenth-century settlements in North America, and utopia arises as a counter-culture that opposes the dominant social, economic, and ideological system, it is necessary to broaden the field to other periods and geographical areas. These could comprise from medieval communities, to runaway slave settlements, and millenarist and new age projects that put into practice resistance, alternative ways of life, redemption, and salvation. One of the most substantial contributions made by Archaeology to the study of utopia is to provide an alternative narrative to the official one. Through the study of material culture, that is seldom documented, it is possible to venture to the life within these communities and explore the social dynamics inside them.

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Contemporary Past, Archaeology of the
- ▶ Historical Archaeology
- ▶ Historical Archaeology in Latin America
- ▶ Leone, Mark P.
- ▶ Modern World: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Tarlow, Sarah

References

Bromberg, F.W., and Steven J. Shephard. 2006. The Quaker burying ground in Alexandria, Virginia: A study of burial practices of the religious society of friends. *Historical Archaeology* 40 (1): 57–88.

Hayden, D. 1981. *Seven American utopias*. Cambridge, MA/London: MIT Press Classic.

Holloway, M. 1966. *Heavens on earth*. New York: Dover Publications.

Kozakavich, S.C. 2006. Doukhobor identity and communalism at Kirilovka village site. *Historical Archaeology* 40 (1): 119–132.

Kozakavich, S.C. 2017. *The archaeology of utopian and intentional communities*. Florida: University Press of Florida.

Leone, M. 1999. Setting some terms for historical archaeologies of capitalism. In *Historical archaeologies of capitalism*, ed. M. Leone and P. Potter Jr., 1–22. New York: Kluwer Academic/Plenum Press.

Little, B.J. 2007. *Historical archaeology. Why the past matters*. Walnut Creek: Left Coast Press.

Orser, Ch.J. 2002. *Encyclopedia of historical archaeology*. London: Routledge.

Preucel, R.W., and S.R. Pendery. 2006. Envisioning utopia: Transcendentalist and Fourierist landscapes at Brook Farm, West Roxbury, Massachusetts. *Historical Archaeology* 40 (1): 6–19.

Senatore, M.X. 2007. *Arqueología e historia en la colonia española de Floridablanca, Patagonia-siglo XVIII*. Vol. 5. Buenos Aires: Editorial Teseo.

Spencer-Wood, S. 1991. Toward an archaeology of materialistic domestic reform. In *The archaeology of inequality*, ed. R. McGuire and R. Paynter, 231–286. Oxford, UK/Cambridge, MA: Blackwell.

Spencer-Wood, S. 2006. A feminist theoretical approach to the historical archaeology of utopian communities. *Historical Archaeology* 40 (1): 152–185.

Starbuck, D.R. 2004. *Neither plain nor simple*. Hanover/London: University Press of New England.

Tarlow, S. 2002. Excavating utopia: Why archaeologists should study "ideal" communities of the nineteenth century. *International Journal of Historical Archaeology* 6 (4): 299–323.

Tomaso, M., R.F. Veit, C.A. DeRooy, and S.L. Walling. 2006. Social status and landscape in a nineteenth -century planned industrial alternative community: Archaeology and geography of Feltville, New Jersey. *Historical Archaeology* 40 (1): 133–151.

Van Bueren, T.M. 2006. Between vision and practice: Archaeological perspectives on the Llano del Rio Cooperative. *Historical Archaeology* 40 (1): 133–151.

Van Bueren, T.M., and Sarah A. Tarlow. 2006. The interpretive potential of utopian settlements. *Historical Archaeology* 40 (1): 1–5.

Van Wormer, S. 2006. The ties that bind: Ideology, material culture and the utopian ideal. *Historical Archaeology* 40 (1): 37–56.

Van Wormer, S., and G. Timothy Gross. 2006. Archaeological identification of an idiosyncratic lifestyle: Excavation and analysis of the Theosophical Society Dump, San Diego California. *Historical Archaeology* 40 (1): 100–118.

Velasquez, S.H.V. 2012. *Lugar de maravillas: Arqueología en Pacific City*. México: Colofón/Axial.

V

Valcamonica Rock Art

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Introduction

The 75-km-long Valcamonica (Camonica Valley) in the Italian Alps includes over 300,000 rock engravings spanning 10,000 years, from the Epipaleolithic period to the Middle Ages. The valley is at the crossing of the Alps from Italy to Central Europe where both ideas and people passed through. Since 1956 this area has been studied for 60 years by the same team, enabling scholars to explore the meaning of stylistic and thematic changes from period to period. After defining the essential archeological elements of chronology, economy, and cultural identities, the main efforts were oriented toward the conceptual analysis of behavioral patterns, religious beliefs, and the meaning of the rock art depictions. Changes in the way of thinking, in the economy, and in the social organization contribute to our understanding of the formative period of the European society.

Thanks to the research results, Valcamonica was declared by UNESCO as "World Cultural Heritage" in 1979. It was the first rock art site in the world to obtain such nomination and the first Italian site to become part of the World Heritage list. Valcamonica is also renowned for the new research approach applied, focusing on the use of rock art as a means of historical reconstruction, producing history for periods considered as prehistoric.

The succession of different styles of rock art allows the definition of a sequence of Camunian periods illustrating 10,000 years of events and human adventures. The numerous cases of superimpositions, the depictions of datable weapons, tools, and objects and the presence of extinct animals in the earliest phases and of datable inscriptions in the later ones make this sequence a chronological pillar of post-Paleolithic rock art in Europe.

The proto-Camunian period dates back to the end of the Pleistocene and the first phases of the Holocene, 12,000–7500 years ago. The final post-Camunian period documents the "historic" phases: Roman, Medieval, and recent.

In each period, rock art reflects the interests and concerns of its time, the economy, the beliefs and the cult, the social organization, the political trends, and the international relations. In certain periods, tools and weapons illustrate foreign objects or foreign influence. The introduction of

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new technology such as the wheel or metalworking or weaving is meaningful for defining the way of life. Changes in the economic activities; in religious and worship habits; in the architecture of huts, of shrines, and of other buildings depicted in the rock art; in different funerary practices; and in other descriptions of habits provide the historical background of the various periods, each having its specific stylistic, typological, and thematic character.

Key Issues/Current Debates/Future Directions/Examples

Proto-Camunian Period (12,000–5500 BCE)

In the pre-Boreal and Boreal climatic stages, this rock art relates to pre-Neolithic culture. Pollen analysis from geological logging in Valcamonica shows this period's tall trees were pine trees and birches. Material culture is characterized by a lithic industry of blades and abundant microliths. The iconographic style is defined as a simplified naturalism with figures schematized just by a contour line. Main themes are large animals represented in large, almost natural size. Sometimes their images are shown to be hit by spears. Elk figures are exclusive to this period and are not found in later periods. In this area this animal became extinct during the early Holocene. Human figures are absent. Weapons and tools are limited to spears or darts. The essential economic activities are hunting and fishing.

There are stylistic and thematic similarities with the rock art of the Arctic region and archaic hunter phases in the Near East and North Africa. Analogous expressions are known elsewhere in Italy in Levanzo (Egadi) and the cave of Addaura, Monte Pellegrino (Sicily). There are similarities with the archaic rock art of Austria and Portugal and, with some instances, of rock paintings in Levantine Spain.

In Europe, this style developed in the late phases of the Upper Paleolithic earlier than 10,000 years ago. Such rock art is typical of hunter-gatherers of the terminal Paleolithic and the Epipaleolithic periods.

Camunian Periods I–II (5500–3300 BCE)

In this period, style changes drastically, and the repertory reveals a social revolution. The main subject matter is stylized anthropomorphic figures mostly with upraised hands. The sharp changes in subject matter and style reveal a new population in Valcamonica practicing a complex economy, which included agriculture and animal rearing. Large groups of human figures illustrate assembly and socializing. The previous artists were dependent on their prey which was the focus of their interest and likely of their cognitive concepts. In the new economy, man becomes the focus, and there is awareness in society and socialization reflecting the importance of team cooperation and the need of conviviality. People were organized in larger social units requiring coordination and planning. Hunter-gatherers became food producers, and the social structure was more complex, more sophisticated, and also more problematic. In the late phases of Period II, large ghostlike anthropomorphic figures appear, some of them being over 2 m high. This suggests an ideology concerning humanlike supernatural beings. Figures of anthropomorphic spirits are present in Central and Eastern Europe since the beginning of the sixth millennium BCE.

The Camunian Periods I and II correspond to the Neolithic of the fertile plains. During the Climatic Optimum, Valcamonica was a rocky land but had forests of firs, alders, oaks, and some grassland that fostered animal grazing.

The material culture is Neolithic with pottery which is characteristic of cultures generally present in Northern Italy, the so-called Bocca Quadrata (square mouth pots) and that of the Lagozza Culture. This rock art represents figures of axes and other tools used in the same period. It includes also the earliest figures of plows.

Period I includes adoration symbols, such as the solar disc or the axe. In the subsequent period (Period II), there are also representations of rituals and social and economic gatherings. Some scenes represent ceremonial occasions. Cult activities appear to have been diversified and probably occupied a relevant place in daily life.

Period I and II weapons and tools are spears, boomerangs, bows and arrows, paddles, and hoes and plows. The first domesticated animals appear (dogs, oxen, and then goats). Sun worshipping and worshipping the dead are added to at the end of Period II with the evidence of animal (especially dog) worshipping.

Neolithic objects excavated from the shelter Riparo Gaban are decorated with repeated ideograms and an anthropomorphic figure similar to the "spirits" of Valcamonica.

The Late Neolithic of Central Europe was a period of international contacts, trade gradually developed, and ethnic entities were aware of the deeds and customs of other human groups. While the Camunian tribes were producing rock engravings, the first urban civilizations were emerging in the Near East.

Toward the end of Period II, the first anthropomorphic images on standing stones or menhir-statues appear. Such images will then occupy a dominant role in the rock art of Valcamonica in the successive Period III-A. These monuments consist in engraved or painted anthropomorphic stones. Often they are boulders, reaching up to over two meters in length, selected by man for their peculiar, vaguely anthropomorphic, natural shape. These stone monuments reflect a new element in the iconography and thus in the ideology at Valcamonica from around 3350 BCE. Similar monuments appear earlier in various parts of Europe and Asia throughout the Neolithic period. They reveal the presence of a widespread religious movement that interested various areas of Eurasia. It reached the Alpine area with some delay, in respect to other regions. Here it acquired specific local patterns reflecting new ideological trends.

Camunian Period III-A (3,350–2500 BCE)

Period III has been divided into two sizable stages, III-A and III-B-C-D. Their art illustrates an interesting conceptual development in cultures, beliefs, and social organizations. Period III-A corresponds to the Chalcolithic period, in the early sub-Boreal climatic stage, and marks the beginning of metallurgy in the area.

Several monumental compositions and menhir-statues represent a tripartite concept of the world. Solar and/or lunar images are the head of an anthropomorphized world; the central part of the body includes the breast and necklaces for feminine figures or weapons for masculine figures; the lower part is either a pubic triangle, a snake, or two weapons positioned as the legs of vaguely anthropomorphic beings. The concept of a tripartite universe appears in the menhir-statues of the fourth millennium BCE in the Alps, in Valcamonica, and in Valtellina.

The meaning of these cosmological images that can be male, female, or having an undefined gender still requires an explanation. What is the ideology behind the images? How does the idea developed? The concept of a tripartite universe and of a tripartite human society will later become a main core of Indo-European ideology.

The tripartite menhir-statues appear at the same time as the earliest depictions of wheels, daggers, and other metal weapons. Metallurgy was not invented but imported and probably arrived with a new ideology, which was assimilated and reshaped.

Depictions of weapons and tools are numerous and represent metal daggers, axes, spears, and halberds of the same typology as archeological findings in Northern Italy and Central Europe in this period. Wheeled wagons indicate a new age for communication and transportation.

Domesticated animals include dogs, oxen, goats, and now pigs. The technological and cultural innovations are illustrated by the rock art. The plow, the wheeled vehicles, weapons and tools made of metal reveal the essential economic activities, including animal breeding, agriculture and hunting, complementing metalwork, organized trade, and professional craftsmanship.

The rock art compositions of this period are among the most elegant, best-planned, and suggestive works of the whole Camunian cycle. Engraved rock surfaces and menhir-statues are concentrated in cult sites, open-air sanctuaries where tens of such monuments are found in single areas, and the presence of fireplaces near the menhir-statues, heaps of stones, and other stone structures indicate a wide range of performances

and cult activities. The sanctuaries are likely to have occupied an important role of gathering, socialization, and ritualization of events.

As the places of worship grow in number, priesthood is arguably acquiring a dominant role, a privileged class in a regime that looks like an oligarchic-theocratic system.

Toward the end of the Chalcolithic period and the beginning of the Bronze Age, around 2500 BCE, a new change takes place in the style of rock art. The symbols represented on monumental compositions spread to the entire rock. The daggers and the axes change typology: they are no longer Chalcolithic; they are Early Bronze Age. The focus of interest is no more the tripartite entity. Single figures that were part of the monumental composition and of the iconography of the menhir-statues in the Chalcolithic period are now represented and probably worshipped individually. An iconographic development is illustrated by strange compositions of weapons, which together make a sort of anthropomorphic being. The tripartite universal giant is replaced by mythical beings having weapons and tools as limbs. A new age introduces new idols.

Camunian Periods III-B-C-D (2,500–1200 BCE)

In Period III-B-C-D, changes in the themes and style herald changes in the social system. Modes of depiction change, and in each phase, figures of tools and weapons contribute to establish a well-documented chronology. The standard Bronze Age chronology of the region lasts from 2500 to 1200 BCE. Period III-B belongs to the Early Bronze Age; Period III-C relates to the end of the Early and the beginning of the Middle Bronze Age, while Period III-D covers the later phases of the Middle and the beginning of the Late Bronze Age. The transition between the Bronze Age and the Iron Age is tentatively dated in this Alpine area to c. 800 BCE.

From phase to phase, the rock art is changing the focus on themes, changing its typology (grammar), and the kind of compositions and association of signs and figures (syntax). Changes in grammar and syntax reflect changes in the concerns and the way of thinking of the makers and reveal the conceptual dynamics of a restless Bronze Age.

Besides the wealth of weapons and other objects, the iconography includes compositions considered to represent fields and other territorial features. In the second millennium BCE, they are among the earliest known "topographic maps."

Toward the end of this period, mythological scenes and anthropomorphic figures in action bring a new stylistic approach to the rock art. The change is drastic and anticipates the character of the rock art in the Iron Age. The most common weapons are subtriangular daggers, battle-axes, spears, and shields. The chronological definition of the numerous depictions of metal weapons and tools is supported by comparable finds in datable archaeological excavations.

Dogs, oxen, goats, and pigs continue to be present among the domesticated animals with the additional appearance of the horse, which soon occupies an important place in the iconography of the Iron Age. Technological and cultural innovations represented in rock art suggest an increase in metalwork and weaving. Hunting, fishing, agriculture, and animal breeding continue, but new economic dynamics develop as a consequence of trade and the accumulation of surplus. The growth in the region of hillforts or "castellieri" indicates the political and social context of the changes recorded by the rock art typology.

Another change is recorded after the described evolution of beliefs and religion. The rock art shows that the trinity vision of the universe, the cosmological religion of the Chalcolithic, gradually turned into a cult of objects and weapons. Apparently the conceptual emphasis moved from the cult of the "Purusha-like" universal creator to the cult and worship of weapons and to the magic power of metal tools.

Period III, at different moments, shows parallels with the rock art of Mount Bego (France), with that of Southern Scandinavia, and of the Iberian Peninsula. Some areas of Europe have rock art styles and themes evolving in similar orientations, indicating the presence of similar trends over rather vast regions.

Camunian Period IV (1200–16 BCE)

The end of the Bronze Age and the transition to the Iron Age brought new cultural winds. In the Mediterranean regions, dynamic political structures developed with thriving city-states. Seafaring promoted trades. The hillforts in Valcamonica and other neighbor valleys illustrate the development of local chiefdoms. In the Alpine regions, introverted tribes gradually opened up to international relations. The trade of amber and precious metals used transalpine tracks, and the mountain regions acquired benefits from these exchanges. Metal ores were exploited and metal tools were traded. Wagons and weapons of Mycenaean type are represented in the rock art of Valcamonica. Figures of wheeled wagons are figured in the rock art, funerary structures, and other monuments through Germany, all the way north to Scandinavia.

The Camunian Period IV coincides with the later phases of the Bronze Age, the Final Bronze Age, and the Iron Age. Five main typological phases are recognized, the first two in the Bronze Age and the three other in the Iron Age. Climatically, it starts with a relatively hot climate that gradually becomes colder and more humid; this is the end of the sub-Boreal stage and most of the sub-Atlantic.

The character of the iconographic style has become realistic, narrative with descriptive and anecdotal scenes of daily life, of magic, and of mythological nature. Figures of isolated tools and weapons are typical of the Bronze Age and tend to become rare in the Iron Age. The magic power of the mythic tools is transmitted to the magic power of mythic heroes. In the Iron Age, weapons and tools are mostly represented, held by people. They include shields, helmets, swords, lances, and axes. Many agricultural instruments are represented in scenes showing people using them: plows, hoes, sickles, and picks. There are numerous figures of structures, huts, barns, shrines, and temples. Representations of handicraft activities include plowing of agricultural land, metalwork, and the construction of wheels and the making of wheeled wagons and of architectural building.

Domesticated animals are more diversified than in the Bronze Age: dogs, oxen, horses, donkeys, goats, ducks, chickens, and geese. The breeding of rabbits appears at later stages. During this period, writing begins using a local language in the Northern Etruscan alphabet. Essential economic activities are trading, mineral extraction, metalwork, animal breeding, agriculture, and hunting. The categories of professional warriors and priests emerge. In the initial phases, the sociopolitical structure is based on the lordships of the hillforts (castellieri). Later, the depictions of groups of warriors and the growing number of fighting scenes present the image of an unstable and warlike society.

Beliefs and religion are drastically changed toward the end of the Bronze Age. When compared to previous periods, conceptual innovations are considerable. Rock figures often represent epical and heroic events likely to have similar inspirations to those of the Germanic mythology.

In the Final Bronze Age, thematic and stylistic analogies with bronze and pottery decorations of the Urnfield and proto-Villanovan cultures are evident. In the Early Iron Age, the middle phases of Period IV, there are strong Villanovan and Etruscan influences. In the late phases, Celtic, Rhaetian, and Venetian influences alternate each other in less than three centuries. International relations and cultural influences appear to move dynamically. Something happened with the traditional beliefs. New ideas were colonizing the Alpine Camunians. Images of imported gods gradually replaced those of ancestors and mythic heroes.

The last phases of rock art, preceding the arrival of the Roman legions in 16 BCE, display a decadent style. The low quality of the shapes of the rock engravings is in apparent contrast with the introduction of secondary details in the representation of objects like shields, hats, or musical instruments. Figures acquire signs of new stylistic trends due to external influence. The Camunians were conquered by the culture of Rome even before the arrival of the Roman Legions.

The custom of producing rock art as a pattern of culture came to its conclusion with the Roman occupation. In the last 2000 years, since the full introduction of theistic religions, sporadic rock

engravings were made, in Roman, Medieval, and recent times, but the rock art was no longer a cultural and ritual necessity.

Conclusions

The rock art of Valcamonica is an archive of 10,000 years of European history. Over 300,000 pictures mirror the events that shaped the evolution of European society, from hunter-gatherers to a more modern way of life. This immense art body has been documented, recorded, and described. It must now be understood. The ancient Camunians did not produce their pictorial "database" just to embellish the rock surfaces. Rock art was used as a means of communicating messages, commemorating events, teaching the candidates to initiation, operating magic, and other purposes. They tell stories that we have to understand. Research is progressing toward decoding the pictures engraved on the rock surfaces. This is the present challenge of research: producing history out of an archive of depictions left behind by prehistoric peoples.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Europe: Prehistoric Rock Art
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ UNESCO World Heritage Convention (1972)

References

Anati, E. 1961. *Camonica valley*. New York: Alfred Knopf.

Anati, E. 1982. *La prehistoire des Alpes*. Paris: Jaca Book.

Anati, E. 2008. *The civilization of rocks*. Capo di Ponte: Edizioni del Centro.

Anati, E. 2015a. *World rock art*. Capo di Ponte: Atelier Research Center for Conceptual Anthropology.

Anati, E. 2015b. *Decoding prehistoric art and the origins of writing*. Capo di Ponte: Atelier Research Center for Conceptual Anthropology.

Anati, E. 2015c. *The rock art of valcamonica*. Capo di Ponte: Atelier Research Center for Conceptual Anthropology.

van der Merwe, Nikolaas J.

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Basic Biographical Information

Nikolaas Johannes van der Merwe was born in South Africa in 1940. In 1958, he won a scholarship (offered by a Trans Atlantic shipping line) to attend Yale University, from which he graduated in 1962 with a B.S. in Physics. Yale was then very active in the development of archaeological sciences, and under the joint supervision of the archaeologist Kwang-chi Chang, the radiocarbon scientist Minze Stuiver, and the geochemist Karl Turekian, he investigated for his doctoral dissertation the feasibility of dating iron-carbon alloys (steel and cast iron) by radiocarbon. He received his Ph.D. in Anthropology from Yale in 1966. He was an Assistant, then Associate Professor in the Department of Anthropology of the State University of New York at Binghamton from 1966 to 1974. In 1974, he was appointed as the first Professor of Archaeology at the University of Cape Town in South Africa. In 1988, he returned to the USA as the first Landon T. Clay Professor of Archaeological Sciences at Harvard University, a position he held until 2001, when he was appointed as University Professor of Natural Sciences at the University of Cape Town. He retired in 2005 to Kalk Bay, near Cape Town. Among the honors bestowed upon him are the 1994 John F. Herschel Medal for Interdisciplinary Research (Royal Society of South Africa) and the 1998 Pomerance Medal for Scientific Contributions to Archaeology (Archaeological Institute of America).

Major Accomplishments

Nik van der Merwe is best known for pioneering the use of stable carbon isotopes to infer past diet from the analysis of body tissues. This has been hailed as "one of the great triumphs of scientific archaeology" (Pollard et al. 2007: 183). It is

probably the only scientific approach developed within archaeology that has been widely adopted in other fields of science and now provides an extremely important set of tools for biogeochemistry, zoology, ecology, nutrition, and food sciences. By 1970, van der Merwe was aware that radiocarbon laboratories had identified systematic offsets between radiocarbon dates on wood charcoal and on some types of carbonized annual plants. The latter were almost all tropical grasses, a group that includes the major cultigens maize, sorghum, and African millets. He realized that this provided the means to track the spread of maize agriculture through North America. Working in South Africa with the radiocarbon scientist John Vogel, he measured and plotted the stable carbon isotope ratios of human bone collagen in samples spanning the first millennium CE in eastern North America and showed that maize did not become a major cultigen until after 800 CE. Publication of these results was delayed for several years by negative reviews from archaeologists, who insisted that this date was far too late, but their eventual appearance (Vogel and van der Merwe 1977; van der Merwe and Vogel 1978) forced a major reevaluation of the later prehistory of eastern North America. He subsequently tracked the spread of maize into highland Peru and the South American rain forest (e.g., van der Merwe et al. 1981) and with his student Julia Lee-Thorp pioneered the isotopic investigation of early hominid diets from the carbon in tooth enamel (van der Merwe et al. 2003). He has published many studies outside archaeology and is hailed as one of the founders of the field of isotopic ecology.

Although his doctoral dissertation research (van der Merwe 1969) had shown that iron-carbon alloys could be directly dated, the technique was little used because of the large sample size required. The development of AMS radiocarbon dating from the late 1980s allowed the dating of much smaller samples, a development of great potential value for archaeometallurgy (e.g., Cook et al. 2003). His doctoral work also required technical proficiency in archaeometallurgy. He directed a major archaeological survey and excavation project between 1970 and 1974 on prehistoric copper- and ironworking around Phalaborwa in north-eastern South Africa, undertook ethnoarchaeological studies of ironworking in Malawi, and contributed several important syntheses of research on the origins and spread of metallurgy through Africa (e.g., Miller and van der Merwe 1994).

He was largely responsible for introducing African archaeologists to archaeological science, and the doctoral students that he trained at the University of Cape Town have greatly expanded the range of the research that he initiated. These include Julia Lee-Thorp (Oxford) and Francis Thackeray (South African Museums) on isotopes and human evolution, Judy Sealy (Cape Town) on hunter-gatherer and pastoralist diets in southern Africa, David Killick (Arizona) on archaeometallurgy, and Anne Cohen (Woods Hole Oceanographic Institute) on marine isotope ecology. The isotope laboratory that he founded at the University of Cape Town remains at the forefront of research in light stable isotope ecology.

He also played an important role behind the scenes in advising the post-apartheid government of South Africa on the restructuring of universities and particularly on the continuing importance of university-based research. It is probably no coincidence that funding for archaeological research has been maintained at a high level in South Africa, in marked contrast to the woeful state of funding for archaeology in most other nations in sub-Saharan Africa.

Cross-References

- ▶ Bone: Chemical Analysis
- ▶ Chang, Kwang-chih
- ▶ Isotope Geochemistry in Archaeology
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
- ▶ Radiocarbon Dating in Archaeology

V

References

Cook, A.C., J. Wadsworth, J.R. Southon, and N.J. van der Merwe. 2003. AMS radiocarbon dating of rusty iron. *Journal of Archaeological Science* 30: 95–101.

Miller, D.E., and N.J. van der Merwe. 1994. Early metal working in Sub-Saharan Africa: A review of recent research. *The Journal of African History* 35: 1–36.
Pollard, A.M., C. Batt, B. Stern, and S.M.M. Young. 2007. *Analytical chemistry in archaeology*. Cambridge: Cambridge University Press.
van der Merwe, N.J. 1969. *The carbon-14 dating of iron*. Chicago: University of Chicago Press.
van der Merwe, N.J., and J.C. Vogel. 1978. ^{13}C content of human collagen as a measure of prehistoric diet in Woodland North America. *Nature* 276: 815–816.
van der Merwe, N.J., A.C. Roosevelt, and J.C. Vogel. 1981. Isotopic evidence for prehistoric subsistence change at Parmana, Venezuela. *Nature* 292: 536–538.
van der Merwe, N.J., J.F. Thackeray, and J.A. Lee-Thorp. 2003. The carbon isotope ecology and diet of *Australopithecus africanus* at Sterkfontein, South Africa. *Journal of Human Evolution* 44: 581–597.
Vogel, J.C., and N.J. van der Merwe. 1977. Isotopic evidence for early maize cultivation in New York State. *American Antiquity* 42: 238–242.

Further Reading

van der Merwe, N.J., and H. Tschauner. 1992. C_4 plants and the development of human societies. In *C_4plant biology*, ed. R. Sage and R.K. Monson, 509–549. New York: Academic.

Van Project

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Introduction

In July 2006, a team led by Cassie Newland and John Schofield excavated a 1991 Mk 3 Ford Transit van and posed the critical question: what does it mean to do archaeology? One of the seminal projects in an archaeology of the contemporary and recent past, the Van Project followed orthodox archaeological methodology, recording, analysis, and interpretation and challenged core assumptions about the discipline, its objects of study, and the role of archaeology within contemporary society.

Key Issues/Current Debates/Future Directions/Examples

The Ironbridge Museum (Telford, UK) had used the van from 1991 to 2005, first for the museum's archaeological unit and then for its works and maintenance teams. Van excavation strategy was standard, followed the Museum of London's Archaeological Site Manual, and started with library, archive, and oral research. Next, the interior of the van was gridded in 20 cm units, and a first layer of the site was divided into two contexts: the carpets and mats in the front of the van (context 1,059) and the carpets and wooden floor in the back (1,001). Details of importance were drawn to scale and photographed; elevations were drawn at a scale of 1:10 and plans at 1:10 or 1:20. Once these contexts had been recorded and artifacts photographed in situ, objects were collected. A second layer (the metal floor of the van) was then identified and defined by three more contexts: the offside of the cab (1,037), the nearside of the cab (1,039), and the back of the van (1,024). These contexts were recorded and artifacts collected. The five contexts yielded 352 cultural artifacts that were bagged and tagged with context numbers. In addition, each context was sampled for forensic, chemical, environmental, and entomological analyses. Features of the van's chassis were given context numbers, were photographed or drawn, and were examined for evidence of usewear. Following surface recording and artifact collection, the van chassis and engine were dismantled; individual components were assessed, measured, photographed, and planned on site. Finds and records were archived at Ironbridge; the carcass of the van was recycled at a scrapyard.

Based on Adrian Myer's finds analysis, the majority of artifacts were associated with the archaeological or the maintenance phase of van use. Analysis identified two main artifact categories: mass-produced vehicle components and van parts and deposited artifacts. The latter included historic materials (i.e., ceramics) from the van's use by the Ironbridge archaeologists, objects associated with electricians and their work, and miscellaneous or misplaced objects unassociated with

either of the vehicle's two formal use-phases. Further analysis included a detailed typology for screws (and a cache of 36 brass, slotted-drive, flat-head screws) and the standard attributions of categories of use (e.g., wood working, electrics). Further subclassification of electrical artifacts was based on frequency: domestic maintenance artifacts were most common, followed by fuse and bulbs, followed by high voltage and industrial materials. Examination of material associated with Ironbridge archaeological activity identified and dated a ceramic pipe stem, ceramic sherds dating from 120 CE through the nineteenth century, early twentieth-century glass fragments, building daub, and slag from a blast furnace. Other finds were less easily categorized: liquids were classified as multi-stratified and were handled as deposit samples. A final category of objects, nonwork artifacts, included plastic and foil candy wrappers, plastic coffee stirrers, cigarette butts, a fruit stone (*Prunus domestica* ssp. Domestica), an adhesive sticker from an apple, the detritus from tobacco consumption, metallic confetti, decorations and miscellanea from holiday celebrations, and other ephemeral activities not connected to orally documented uses of the vehicle.

Post-excavation analysis included mapping the spatial distributions of artifacts across van strata and contexts, as well as sourcing materials used in the construction of the van and in the artifacts excavated from it. Analysis of environmental samples (by Steve Davis) revealed 60 taxa of beetles (represented by 119 individuals) including woodworm (*Anobium punctatum*) and other woodland taxa and synanthropic taxa (e.g., *Oryzaephilus surinamensis*) which are common in urban contexts associated with stored cereals and seeds, and beetles of the Lathridiidae family which are commonly found in mold or plant debris. This environmental assemblage represents an infestation of the van itself and is not related directly to the vehicle's use.

Forensic analysis (carried out by Anna Nilsson) included fingerprinting (to establish patterns in van use) and hair analysis (to characterize van occupants). The unequal location and concentration of fingerprints suggest frequent driving of the van by a series of different individuals often traveling without a front seat passenger. Human and animal hair was recovered: the latter from a cat (*Felis catus*) and a dog (*Canis domesticus*) and the former long and bleached or dyed, perhaps identifying a woman's presence.

Identification of vehicle function suggests a use for transportation of tools and archaeological finds but also of the supplies and detritus of maintenance crews, as well as for other unexpected, non-sanctioned uses: traveling to celebrations and parties, transport of a personal pet (the museum did not utilize guard dogs), or other mundane activities (snacking and smoking).

Analysis of use-wear on the body of the van suggested a history of misuse and multiauthored reworkings of the vehicle which created a vehicle significantly displaced from its original design and which may best be understood in unique terms of the van's own particular biography. The excavators concluded that the "van-envion emerged through dwelling and eating, resting and sheltering; as lunch-table and lunch; workplace and playground, being site, situation and folk-memory" and thus should be understood in terms of a dwelling perspective (*sensu* Ingold).

At an epistemological level, the Van Project made important contributions to a modern, critical archaeology, to its practice, its objects of study, and its relevance to contemporary society. For the practice of archaeology, the project demonstrated that not every artifact fits easily into the documented phases or functions determined for a site (e.g., the celebratory artifacts, such as the confetti, which oral testimony suggested were deposited during non-sanctioned use of the van). Also, the project showed clearly how a single artifact will have many different uses and users, meanings, and interpretations, each of which must be acknowledged as equally authoritative in any interpretation. Furthermore, the project provided clear evidence of how the condition of one component of an artifact or site (e.g., the van's engine) may have been affected by (re)workings that another component (the van's body) may not have experienced; thus, sites and artifacts can be disjoint and internally heterogeneous. Finally,

artifact analysis demonstrated that some artifacts and traces of past activity will not fit into regular categorization (e.g., the liquids from the van engine, the confetti, the dog hair) and will provide vital unexpected information about otherwise unrecorded, ephemeral behavior and activity.

At a more reflexive level, the project demonstrated that meaning derives not only from an artifact's uses and positions in the past but also from the archaeological actions practiced upon it. Excavation (as well as preservation or interpretation) informs on the people and activities of a site's life history, on the perceptual biases of traditional archaeology, and on the explanatory breadth and refinement of thought that accompanies a study of modern material culture. Thus, the archaeological record that was created as the van excavation proceeded was continuously turned back into the process of excavation, layering new factual strata onto the metal, wood, and artifactual sedimentations of the site.

In addition, the project demonstrated that the most insightful archaeological investigations are multivocal and give equal attention to the opinions and commentary of popular sources as to academic experts. Van Project output ranged from traditional academic articles in *Cambridge Journal of Archaeology* (Bailey et al. 2009) and the *International Journal of Historical Archaeology* (Myers 2011) to more ephemeral, public output: interactive blogs, daily progress reports on the excavation, audio and video diaries, Internet message boards, short films, news reports, public discussions, and opinion gathering. Wide, public debate was enabled and provoked; a "collision of responses" was anticipated and accommodated. Output was live, dynamic, and open, inviting response and critique that were fed into ongoing excavation and interpretation.

On a more general level, the project illustrated the detail and breadth of information that can be obtained from a study of the common and the mundane. It showed how an archaeology of the contemporary or recent past can transform familiar objects into unfamiliar ones and, in doing so, provide original perspectives that open new understandings of what is taken for granted in the modern industrialized world. Critically, the project opened the horizons of archaeology to a world of experience and material far beyond the limits of the ancient past and thus destroyed the traditional boundaries that separate archaeology from modern material culture studies and popular history.

The project showed that the study of modern material culture requires a direct and targeted approach that interrogates the complexities and multiple nuances of a single object. As well as provoking these discussions of discipline, methodology, and epistemology, the Van Project retained its own scientific currency; it was more than mere provocation or intellectual exercise. The project was an independent and self-contained research study of the material culture of mass production in late twentieth century. The archaeological interrogation of contemporary material culture is a powerful means for studying patterns of human behavior and perceptions. Projects such as the van excavation are particularly valuable when practiced in an industrialized modern world of objects that is so vast and plentiful that overarching syntheses are, if not impossible to carry out, of little value beyond their over generalizing conclusions.

While the project can be viewed as a completed, self-contained work, the impact of the van lives on. After the remains of the completely excavated van were sent to a recycling facility, the stripped down ferrous metals were exported to Turkey to be made into construction materials that now form parts of modern buildings. Other metals, such as aluminum, were sent to East Asia; brass, bronze, and lead went to China; and plastic, foam, and fabric went into local UK landfills, continuing a never-ending material and archaeological voyage. The archaeology of the van (just like the materials of the van and the knowledge and debate created by it) continues beyond the limit of the project; comment, teaching, inspiration, and clone projects roll on.

Cross-References

► Contemporary Past, Archaeology of the
► Ethnoarchaeology
► Ironbridge Gorge Museum Trust (IGMT)

▶ Ironbridge Institute
▶ Material Culture and Education in Archaeology
▶ Modern Material Culture, Archaeology of
▶ Modern World: Historical Archaeology

Further Reading

Bailey, G., C. Newland, A. Nilsson, and J. Schofield. 2009. Transit, transition: Excavating J641 VUJ. *Cambridge Archaeological Journal* 19 (1): 1–27.

Myers, A. 2011. Contemporary archaeology in transit: The material culture of the Van. *International Journal of Historical Archaeology* 15: 138–161.

Vandalism and Looting (Ethics)

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Introduction

In the examination of "vandalism" and "looting," emphasis is placed upon the agency and – by implication – the ethical standpoint from which these terms are asserted, used, theorized, and, as phenomena, treated. This entry begins therefore with the professionalized archaeological standpoint, which dominantly views looting as a form of destruction that is instigated and maintained by the demand of the antiquities' market and the vast availability of economically motivated nonprofessional diggers unearthing cultural objects on a global scale. The impact of war/conflict upon vandalism and looting is a topic examined later, as it draws special attention upon the underlying ideological factors which maintain and encourage these phenomena, besides the economic crisis entailed. It also creates unique ramifications in terms of the extent and nature of the looting/vandalism phenomena. A brief account follows on the legal discourse that is adopted, as well as the technology that is used in the attempt to intercept the development of vandalism/looting. In the end, alternative approaches are presented, as they encourage a unique conceptualization and deconstruction of the vandalism/looting phenomena while they illustrate their historical and sociopolitical contexts and throw light upon the looters' motives and perspectives.

Definition

Vandalism and looting are dominantly defined as two interconnected phenomena that entail a wide spectrum of practices, ranging from the unscientific extraction of antiquities out of undisturbed ground to the formation of unprovenanced antiquities' collections. Divergence in the discourse surrounding these terms lies not so much in the account of the actions or processes involved but in the ethical and ideological standpoint from which they are approached, theorized, and labeled. Professionalized archaeological views that espouse preservationist values discuss the vandalism and looting of cultural heritage in connection with their assumed self-interested and/or profit-related motives, the violation of archaeological ethics, the consequent physical damage, as well as the discursive impairment regarding the insight into the past. Concurrently, post-processual archaeological and anthropological approaches that advocate multi-stakeholder values regard these phenomena as diverse acts of nonprofessional disturbance of the material past and throw light upon the historical, social, economic, and ideological contexts that surround them, as well as encourage the consideration of their unique forms, motivations, purposes, and implications developing on the ground.

Looting in Archaeological Contexts

Unregulated disturbance of the material past is as old as the awareness of the past (Schnapp 1996). The urgency to define, distinguish, and establish the appropriate and authorized behavior toward ancient remains arose with the rendering of their significance and the notion of their protection in the context of rising nationalisms in Europe, in light of the implications that ancient remains had in the formation and preservation of national

identities (Anderson 1991; Hamilakis 2007). As archaeological discourse was developing in its own terms, it was also being defined on the basis of its contrast from long-held practices that, from that point onward, started to be conceived as unscientific, unethical, unprofessional, or illegal. Across the scope of physical interactions with the past, the ideology and practice of a professionalized archaeology distinguished itself from categories such as collecting and antiquarianism. By implication, antiquities' looting – namely, the undocumented, self-interested, and profit-related removal of antiquities – stood at the opposite end. Meanwhile, definitions and guidelines, national legislations, and international conventions regarding the scientific, ethical, and professional treatments of ancient materiality were and continue to be established (*see* AIA 2018; CIfA n.d.; EAA 2009; SAA 1996).

To grasp the magnitude of the problem that looting causes for archaeologists, one needs to understand the centrality of context to archaeological research. Context is "where an artefact is found and what is found with it [. . .] the set of relationships among artefacts and between artefacts and their surrounding structures" (Brodie 2006: 52). Archaeologists maintain that coherent historical information comes about only through the systematic study of context. It is thought that objects, in their context of discovery, can provide insight into past cultures; objects which seem insignificant on their own may acquire great informational value if found next to other objects or far removed from their usual area of distribution. Accordingly, when there is undocumented digging and removal of antiquities, archaeological context is believed to be destroyed and historical information lost.

Researchers of the global traffic in looted cultural objects assert that the problems arising from looting extend beyond the destruction of context, as unprovenanced antiquities, despite their unlicensed excavation or illegal export, are sold and owned in a country other than that of their origin (Trafficking Culture 2018a). In the context of state judicial systems, binary distinctions such as criminal vs. non-criminal may conceal cases that are considered suspicious when seen from an archaeologist's point of view, and end up falling into the legal category, evading conviction. Due to the lack of efficient national patrimony laws or due to incompatibilities between different state laws regarding the protection of cultural heritage, it is common for an illegally excavated antiquity when transferred across territorial boundaries to be recognized as legal outside its country of origin. Objects are granted a legal status, provided there is appropriate paperwork that proves a "legitimate" title to the object "that the assumed owner is the owner and has full rights of ownership" (Carman 2005: 19). Another route into legitimacy is when objects are "published in an academic paper or exhibition catalogue" and their suspicious origins are "quietly forgotten" (Brodie 2002: 2). As such, the antiquities' trade is dominantly viewed as a trade that converts a "looted artefact into legal art" (Elia 1995: 245).

In an attempt to acknowledge this dubiety in academic analytical terms, it is common for researchers to use the notion "illicit" in order to "convey the perceived suspect origins of artefacts which cannot be, or have yet to be, proven illegal" (Mackenzie 2014). In effect, dominant references to looting across the archaeological literature presuppose Colin Renfrew's (2000: 15) definition, which describes it as "the illicit, unrecorded and unpublished excavation of ancient sites to provide antiquities for commercial profit." This conceptualization applies to a wide range of undocumented excavations discussed in archaeology, mainly emphasizing their illicit context and commercial intent.

Economically driven motives concern a wide social network comprising the multilevel economic system of the antiquities market (Brodie 2012; Campbell 2013). The term "subsistence-diggers" (Hollowell 2006; Matsuda 1998) is commonly used in order to denote those who first engage in the illicit excavation of archaeological sites and initial transaction of cultural objects. The real commercial profiteering, however, is claimed to implicate those who comprise the further levels of the social network, bringing significant amounts of economic profit to traffickers, as well as cultural capital to collectors and auction houses. It was in this context that Elia asserted that "collectors are the real looters" (Elia 1993: 17).

Vandalism and Looting in War Contexts

Although there is indication to support that looting exists in all countries (for a recent survey see Proulx 2013), the phenomenon of vandalism, aside from the forcible removal and misappropriation of goods, has been particularly associated with contexts of war or conflict. There, the deliberate destruction of sites and monuments is denoted as a series of acts whose purpose is to intentionally eliminate or exploit the cultural heritage of the conquered, while causing the impairment of their identity. Such implication is rooted in the dominantly Western discourse that regards culture as a bounded entity and links identity formation to material culture and claims of ownership.

Surges of vandalism and looting are claimed to be observable today in the wars of the Islamic State network (*aka* ISIL, ISIS, ISI, Aqi) and their claimed pursuit to eliminate the pre-Islamic past. Following the wars in Syria and Iraq, the term "cultural genocide" (Stanton 2015) was once again brought to the fore of analysis (*c.f.* Lemkin 1973: 79), reflecting the resurgence of the matter and impact of looting/vandalism phenomena since World War II and indicating the upgrade of their status from geographically bound cultural problems to globally pervasive security issues. It is in light of these developments that the policy toward these matters is claimed to have become more preemptive than reactive (Nemeth 2016), and it concerns national as much as international agencies, the private as much as the public sector, and, in some cases, cultural heritage specialists as much as counterterrorism officials and cultural institutions as much as security departments (*see* Bogdanos 2005).

In this context, discussion goes beyond practices of "subsistence-digging" as it makes mention of "militant" diggers, who execute the looting of antiquities and use the profits either from their trade (Baker and Anjar 2012; Osborn 2015) or from selling digging permits and charging transit fees (Heissner et al. 2017), in order to fund for their arms procurement. As for the form and purpose of the vandalism involved, these are regularly ascribed to categories such as shelling, gunfire, and army occupation (Cunliffe 2012).

The proclaimed link between war and cultural damage in the form of vandalism and looting, led to developments in the field of law. The international legal framework responsible for the protection of cultural heritage has its roots in the "Lieber Code" of the American Civil War, which instructed soldier conduct in the context of war, one that concerned – among many things – behavior toward buildings and objects of cultural value. The *Hague Conventions* of 1899 and 1907 addressed further the conduct toward cultural heritage during warfare, setting the groundwork for the eventual adoption of the *Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict* in 1954, focusing exclusively on the protection of cultural property. Ever since, the international response has been variously complemented, with the 1970 *UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property* setting a turning point in the international field of cultural protection. A recent UN development that is projected as a strengthening and enforcing strategy to the existing regime is the cultural peacekeeping initiative, where troops are deployed to protect cultural heritage from destruction (*aka* Blue Helmets for Culture). It is a resolution that aims to include "a cultural component in the mandates of peacekeeping interventions where cultural heritage is at risk" and to create "a task force of experts in the protection of cultural heritage" (Foradori 2017).

The role of national and international law enforcement in the effort to curtail the phenomena of vandalism and looting is generally acknowledged; however the question of its effectiveness remains open. The tangible impact of laws is sometimes conditioned by certain factors that are impossible to detect, predict, or calculate. In any case, the publicity and the implicated pressure developed by the legal discourse on these issues are claimed to have had some positive results, echoed in indications of the reduction of the market for certain antiquity categories and the

recovery of lost and stolen artworks (see Art Recovery International 2016).

Raising public awareness about the implications of looting (see SAFE 2018) goes in hand with the effort to document and monitor the ongoing damage. A field of technology that archaeologists use and has improved exponentially is in the area of high-resolution satellite imagery, using sources such as Google Earth (*for a list of references, see* Trafficking Culture 2018b) and NASA (Coleman and Quijada 2010). This method permits research across vast regions, even in places that are unsafe or difficult to access. Lists of sites (*see* Looted Heritage n.d.; UNESCO World Heritage Centre 2018) and objects (*see* ICOM 2018), as well as maps of areas affected by vandalism and looting, are constantly being created and updated (*see* APAAME 2017; EAMENA 2016; The Antiquities Coalition 2018). One of the latest developments is the creation of an online platform that allows satellite imagery access to a global network of citizen explorers (crowdsourcing) in order to record new archaeological sites and map looting activity (*see* GlobalXplorer 2017).

Alternative Approaches to Vandalism and Looting

Alternative approaches to acts of looting arise from the fields of anthropology, post-processual, indigenous, ethnographic, or public archaeology, throwing light upon the social, cultural, and political circumstances that underlie their contexts. Critical in this respect was the conception and emergence of the term "subsistence-digging." It represented the first break with the negative outlooks toward looting as it described the undocumented excavation and sale of cultural objects that supports the traditional subsistence lifestyle of certain local communities (Heath 1973; Staley 1993). As a notion, it is claimed to echo the idea of "subsistence farming and implies that the person engaging in the activity has few other economic opportunities; that they are looting for survival, not profit" (Yates and Brodie 2012).

Since then, scholarly work has focused the attention upon the sociopolitical circumstances that surround nonprofessional diggers in both Western and non-Western contexts. They depart from the idea that undocumented digging is legal or is treated as socially acceptable and justified (Hollowell 2006) and it responds to various on-the-ground conditions that extend from government corruption (Stark and Griffin 2004) to grassroots resistance (Kersel 2007). They concentrate on diverse motivations and interests, which, besides subsistence, in many cases concern connection to place (Antoniadou 2014; Colwell-Chanthaphonh 2004; Trodden van Delzen 1996).

The sympathetic turn toward the discussion on looting extends to and characterizes the larger discourse on conceptions of destruction. While criticizing Western ideas about heritage preservationism and questioning their universality, some scholarly accounts recognize vandalism's affordance of cultural significance (Merrill 2011) or accept destruction as a natural and inevitable dimension of heritage in the context of a non-hegemonic theorization (Holtorf 2006).

Cross-References

- ▶ Aerial Archaeology
- ▶ Archaeological Institute of America (AIA)
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Post-Processualism, Development of

References

Anderson, B. 1991. *Imagined communities*. London: Verso.

Antoniadou, I. 2014. *Looting deconstructed: A study of non-professional engagements with the material past in Kozani, Greece.* Thesis (PhD), University of Southampton.

APAAME. 2017. *Aerial photographic archive for archaeology in the Middle East.* Retrieved from http://www.apaame.org

Archaeological institute of America. 2018. *Policies and documents.* Retrieved from https://www.archaeological.org/about/policies

Art Recovery International. 2016. *Art recovery international.* https://artrecovery.com

Baker, A., and Anjar, M. 2012. Syria's looted past: How ancient artefacts are being traded for guns. *Time,*

September 12. Retrieved from http://world.time.com/2012/09/12/syrias-looted-past-how-ancient-artifacts-are-being-traded-for-guns/

Bogdanos, M. 2005. *Thieves of Baghdad*. New York: Bloomsbury Publishing.

Brodie, N. 2002. Introduction. In *Illicit antiquities: The theft of culture and the extinction of archaeology*, ed. N. Brodie and K.W. Tubb, 1–22. London: Routledge.

Brodie, N. 2006. An archaeologist's view of the trade in unprovenanced antiquities. In *Art and cultural heritage. Law, policy and practice*, ed. B.T. Hoffman, 52–63. Cambridge: Cambridge University Press.

Brodie, N. 2012. Uncovering the antiquities market. Chapter 12. In *The Oxford handbook of public archaeology*, ed. R. Skeates, C. McDavid, and J. Carman. New York: Oxford University Press.

Campbell, P.B. 2013. The illicit antiquities trade as a transnational criminal network: Characterising and anticipating trafficking of cultural heritage. *International Journal of Cultural Property* 20 (2): 113–153.

Carman, J. 2005. *Against cultural property. Archaeology, heritage and ownership*. London: Duckworth.

Chartered Institute for Archaeologists (CIfA). n.d. *CIfA regulations, standards and guidelines*. Retrieved from https://www.archaeologists.net/codes/cifa

Coleman, C., and Quijada, M. 2010. *NASA Earth scientists advance space archaeology.* Retrieved from https://www.nasa.gov/topics/earth/features/space-archaeology.html

Colwell-Chanthaphonh, C. 2004. Those objects of desire. Collecting cultures and the archaeological landscape in the San Pedro Valley of Arizona. *Journal of Contemporary Ethnography* 33 (5): 571–601.

Cunliffe, E. 2012. Damage to the soul: Syria's cultural heritage in conflict. Global heritage fund. Retrieved from http://ghn.globalheritagefund.com/uploads/documents/document_2107.pdf

EAMENA. 2016. *Endangered archaeology in the Middle East and North Africa.* Retrieved from http://eamena.arch.ox.ac.uk

Elia, R. 1993. A seductive and troubling work. *Archaeology*, 46(1):64–69.

Elia, R.J. 1995. Conservators and unprovenanced objects: Preserving the cultural heritage or servicing the antiquities trade? In *Antiquities: Trade or betrayed? Legal, ethical and conservation issues*, ed. K.W. Tubb, 244–255. London: Archetype-UKIC.

European Association of Archaeologists. 2009. *EAA code of practice.* Retrieved from https://www.e-a-a.org/EAA/About/EAA_Codes/EAA/Navigation_About/EAA_Codes.aspx?hkey=714e8747-495c-4298-ad5d-4c60c2bcbda9#practice

Foradori, P. 2017. *Blue helmets for culture*. Retrieved from https://sustainablesecurity.org/2017/05/16/blue-helmets-for-culture/

GlobalXplorer. 2017. About GlobalXplorer. Saving the past, for our future. Retrieved from https://www.globalxplorer.org/about

Hamilakis, Y. 2007. *The nation and its ruins: Antiquity, archaeology and National Imagination in Greece*. Oxford: Oxford University Press.

Heath, D.B. 1973. Economic aspects of commercial archaeology in Costa Rica. *American Antiquity* 38: 259–265.

Heissner, S., Neumann, P.R., Holland-MacCowan, J., and Basra, R. 2017. *Caliphate in decline. An estimate of Islamic State's financial fortunes.* Retrieved from http://icsr.info/wp-content/uploads/2017/02/ICSR-Report-Caliphate-in-Decline-An-Estimate-of-Islamic-States-Financial-Fortunes.pdf

Hollowell, J. 2006. Moral arguments on subsistence digging. In *The ethics of archaeology: Philosophical perspectives on the practice of archaeology*, ed. C. Scarre and G. Scarre, 69–93. Cambridge: Cambridge University Press.

Holtorf, C. 2006. Can less be more? Heritage in the age of terrorism. *Public Archaeology* 5 (2): 101–105.

ICOM. 2018. *Red List.* Retrieved from http://icom.museum/programmes/fighting-illicit-traffic/red-list/

Kersel, M. 2007. Transcending borders: Objects on the move. *Archaeologist* 3 (2): 81–98.

Lemkin, R. 1973. *Axis rule in occupied Europe: Laws of occupation analysis of government proposals for redress*. New York: Howard Fertig.

Looted Heritage. n.d. *Looted heritage.* Monitoring the illicit antiquities trade. Retrieved from https://heritage.crowdmap.com/main

Mackenzie, S. 2014. *Illicit antiquities.* Retrieved from http://traffickingculture.org/encyclopedia/terminology/illicit-antiquities/

Matsuda, D. 1998. The ethics of archaeology, subsistence digging, and artifact looting in Latin America: Point and muted counterpoint. *International Journal of Cultural Property* 7 (1): 87–97.

Merrill, S.O. 2011. Graffiti at heritage places: Vandalism as cultural significance or conservation sacrilege? *Time and Mind* 4 (1): 59–75.

Nemeth, E. 2016. *Strategic shift: Reactive to preemptive policy.* Retrieved from http://culturalsecurity.net/cs/models.htm#reactivetopreemptive

Osborn, A. 2015. *Islamic state looting Syrian, Iraqi sites on an industrial scale – UNESCO.* Retrieved from https://uk.reuters.com/article/uk-mideast-crisis-unesco/islamic-state-looting-syrian-iraqi-sites-on-industrial-scale-unesco-idUKKCN0PC1OS20150702

Proulx, B.B. 2013. Archaeological Site Looting in "Glocal" Perspective: Nature, Scope, and Frequency. *American Journal of Archaeology*, 117:111–25.

Renfrew, C. 2000. *Loot, legitimacy and ownership: The ethical crisis in archaeology.* London: Duckworth.

Saving Antiquities For Everyone (SAFE). 2018. *Our principles.* Retrieved from http://savingantiquities.org/about/#X-CONTENT-BAND-6

Schnapp, A. 1996. *The discovery of the past*. London: British Museum Press.

Society for American Archaeology. 1996. *Principles of archaeological ethics.* Retrieved from http://www.saa.

org/AbouttheSociety/PrinciplesofArchaeologicalEthics/tabid/203/Default.aspx
Staley, D.P. 1993. St Lawrence Island's subsistence diggers: A new perspective on human effects on archaeological sites. *Journal of Field Archaeology* 20: 347–355.
Stanton, G. 2015. *ISIS is committing genocide*. Retrieved from http://genocidewatch.net/2015/10/15/isis-is-committing-genocide-2/
Stark, M., and P.B. Griffin. 2004. Archaeological research and cultural heritage management in Cambodia's Mekong Delta: The search for the 'Cradle of Khmer Civilisation'. In *Marketing heritage: Archaeology and the construction of the past*, ed. Y. Rowan and U. Baram, 117–142. Walnut Creek: Altamira Press.
The Antiquities Coalition. 2018. *#Culture under threat smart app.* Retrieved from https://theantiquitiescoalition.org/cultureunderthreat-smart-m-app/
Trafficking Culture. 2018a. *Trafficking culture. Researching the global traffic in looted cultural objects*. Retrieved from http://traffickingculture.org
Trafficking Culture. 2018b. *Using Google Earth to identify and quantify the looting of archaeological sites: Bibliography.* Retrieved from http://traffickingculture.org/data/using-google-earth-to-identify-and-quantify-the-looting-of-archaeological-sites-bibliography/
Trodden van Delzen, D. 1996. The world of Tuscan tombrobbers: Living with the local community and the ancestors. *International Journal of Cultural Property* 5 (1): 111–126.
UNESCO World Heritage Centre. 2018. *List of world heritage in danger.* Retrieved from http://whc.unesco.org/en/danger/
Yates, D., and Brodie, N. 2012. *Subsistence digging.* Retrieved from http://traffickingculture.org/encyclopedia/terminology/subsistence-digging/

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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Introduction

The llama is an animal from the highlands of the Andes mountain range. The recent identification (Goepfert 2011) of massive sacrifices of these beasts in Moche sites suggests the existence of herds along the semidesert coast of northern Peru. This may be explained by human intervention, which encouragingly testifies our ingenuity for the idea of sustainable development, or, and this is less likely, by subtle changes in climate, which are just as important to our concerns about climate change. There are just as many clues obtained from detailed archaeological research as there are testimonies that may have been destroyed once and for all through looting in a search only for the rich funerary mask, or the beautiful object that can return a substantial profit. The looter and its corollary, the buyer collector, who may even be his sponsor, thus commit theft of information, which is harmful to the common good.

Large parts of the past are gone forever. Regarding ideofacts, tastes, beliefs, and rituals, the loss is immeasurable. Regarding ecofacts and artifacts, even at sites that are well known and identified, it is at the cost of a slow and painstaking work, spread over many years that archaeologists are able to draw relevant information from the preserved relics in order to reconstruct the social life of objects. Conversely, the search for the beautiful object, which is illicit and, consequently, clandestine, can only be undertaken by a brutal, and hence, destructive intervention.

Whereas the archaeologist's task is to ensure the protection of the past and the common interest, by contrast, the collector's task is only motivated by a search for private benefit in a speculative perspective. According to Interpol, after drugs, arms, and human trafficking, the looting of artworks ranks fourth in organized crime. However, it needs to be taken into account that the traffic of works of art is often used in laundering drug money, and that looting is a source of potential revenue for criminal organizations to buy weapons.

Admittedly, these are extreme cases. Collectors and art dealers are quick to reply that what motivates their action is the fact that they will ensure the conservation of works from the past, and in doing so, they contribute to a common struggle against their destruction. It is a fact that many major or minor works, since time immemorial, have suffered from multiple causes of destruction. The first cause is clearly natural destruction, including from slow to rapid disintegration of organic matters

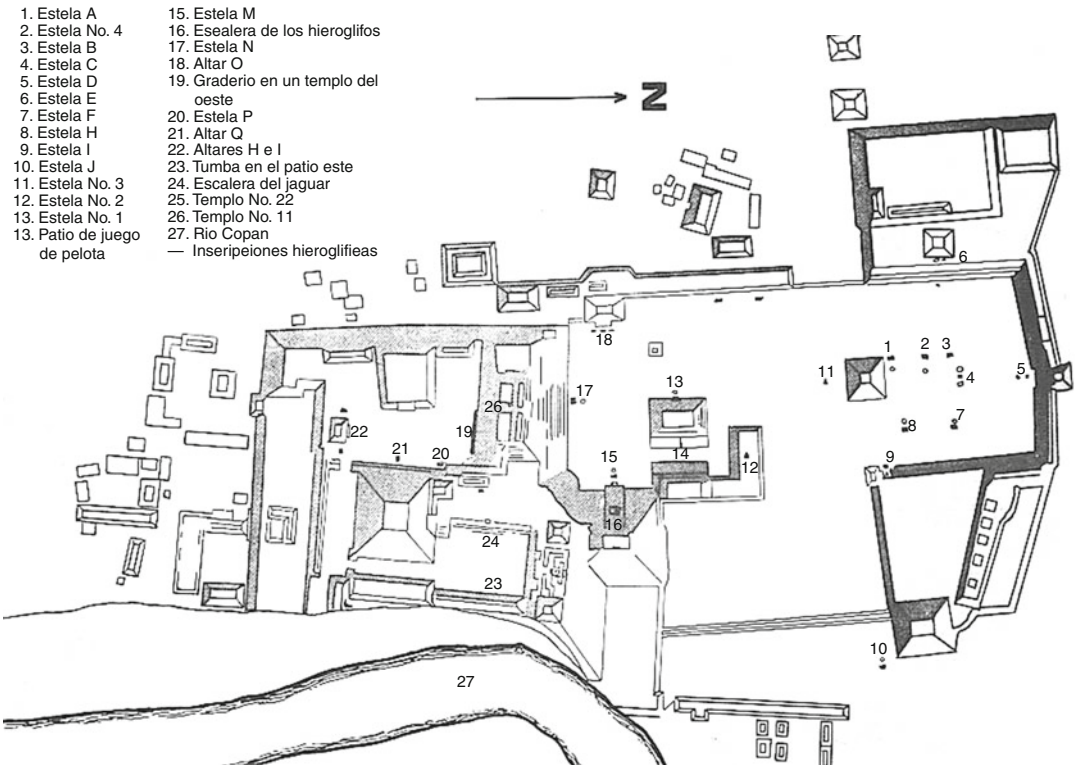

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 1 Map of Copan site (Honduras), showing the erosion of the Acropolis by the river

to full catastrophes (mudslides, earthquakes, etc.) (Fig. 1). Superimposed over this natural degradation is mass destruction by people: plundering and looting punctuate the history of humanity, whether in Rome, Egypt, right to the recent world wars and the holocausts of books by the Nazis. More recently, and despite the efforts of preventive archaeology (Martínez Muriel 1988), increasing urbanization and the ravages of modernity have amplified these destructive phenomena. Again it should be stressed that the destruction is the work of a collective action whose objective is rarely the obliteration of the past. It is essential to clearly differentiate plunder from destruction, plunder being akin to theft for personal interest.

Definition

Closer to our concern is vandalism, which, in an effort to differentiate itself from plunder, still shares a few similarities with it. Less massive, less destructive, it however contributes to inevitable erosion. The visitor who traces graffiti on a monument contributes, through stupidity or ignorance, to its degradation. The unaware tourist, who, happy with his discovery, removes a sherd or an arrowhead on a site, is equally objectionable. Yet these are isolated actions, which simply through their repetition, can have serious side effects. Of greater concern is the use of prestigious sites for staging artistic "events." Concerts with light and sound organized in Egypt, Jordan, and Mexico lead to an uncontrollable influx of spectators who stamp on the remains, and mill around monuments outside demarcated areas. Even more destructive are informal New Age events like those which occur at Stonehenge or Chichen Itza (Fig. 2), whose followers' last concern is to respect the ruins. These vandals' ignorance and contempt finally overlap with fanaticism, such as the Taliban in Bamiyan. This may called damage,

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 2 The celebration of the Spring Equinox at Chichen Itza (Mexico). (Photographed by the author)

vandalism, or even looting, as some Bamiyan objects have allegedly found their way to antique shops.

If vandalism sometimes leads to looting, the latter is more akin to opportunistic or circumstantial looting whose origins date back to Antiquity. Looting is indeed an ancient activity. In Egypt, rich burials had to be protected against grave robbers. Similarly, in Central Asia, evidence of ancient looting has multiplied in recent excavations (Bendezu-Sarmiento and Grizeaud 2011). These ancient lootings are not always intended to recover beautiful objects or wealth. In the tombs of Central Asia, it is sometimes minor parts or bones that were collected rather than offerings. It is possible to also draw a parallel with contemporary examples from sub-Saharan Africa where retrieving objects from burials for other uses than their original indented use is current practice. The same situation has been observed in Guatemala where thieves use the Mayan ceramics and grinding stones for personal use (Hansen 1997). Is that looting? Vandalism?

Examples

It is not intended here to give an historical outline of archaeological looting; however, the case of the New World where the Spaniards seized upon the riches of the Aztec and Inca Empires, in their systematic search for gold should be mentioned. This has resulted in the looting of tombs, or other such excessive depredations, such as in Peru, with the diversion of a stream to cause the collapse of an adobe pyramid (Fig. 3). In parallel, a vast campaign of vandalism is ongoing, with the systematic destruction of the remains of a pagan past that the Spaniards wanted to eradicate (Chamussy et al. 2011). The destruction of the Templo Mayor in Mexico or the burning of Mayan codices by Diego de Landa belongs to the same mind set. These two approaches are "justified" on grounds that are more akin to vandalism or destruction than looting.

During the Renaissance and up to the early twentieth century, we enter the field of antique cabinets of curiosity and museums. Organized collection of archaeological objects, and of natural history by nineteenth-century explorers whose aim was to enrich the collections of European museums, unquestionably comes under the concept of pillage. Some antique dealers, such as Boban (Riviale 2001) in the nineteenth century, played a pioneering role in this questionable area. Whether we are talking about the Elgin Marbles, the sack of the Summer Palace in Beijing, or the removal of Yaxchilan lintels, the topic is controversial (Merryman 2006). There is, however, little doubt that if the victims can rightfully call these

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 3 Overview of the Huaca Cortada, Mochica civilization (Peru). (Photographed by N. Goepfert)

acts organized looting, the goal is to enrich public collections, and, in rare cases only, achieve personal enrichment. It differs from artwork thefts that grew from the first half of the last century, with the discovery of American Indian, African, and Pacific Arts (*Mexico en el Mundo de las colecciones de Arte* 1994).

A significant shift occurred in the middle of the twentieth century with the development of archaeological speculation. Looting acquired the dimensions of a systematic, global phenomenon, with gangs and complex laundering circuits. All archaeologists agree on a definition of looting in three broad categories. Whether we call them opportunistic or occasional, seasoned amateurs or professionals, these terms cover the same reality, even if the boundaries between them are tenuous and permeable (*Arqueología Mexicana* 1996). At the base level, is opportunistic looting, which may follow the fortuitous discovery of an object, or a burial site. Many of the objects discovered in these circumstances constitute, for the discoverer, an exceptional boon. The sale of the object, even well below its market value, may represent for the discoverer the equivalent of several months' income. Under these circumstances, how can one be indignant or make a complaint about them? If the looters limit themselves to selling the fruit of their discovery, they generally escape any conviction. Often, they simply recover or destroy the discovered relics. Here, we find again the notion of vandalism: Many farmers from Petén, for example, recover containers for their personal use (Hansen 1997). Also, think about those communities who prospect, dig, and loot to defend, like in Africa, their territorial claims (Polet 2011). Some Eskimos communities from Alaska assert their right to search and sell their archaeological heritage, thereby denying any justification of archaeological intervention that would deprive them of what is theirs (Meunier 2011).

Whether it involves individuals or communities, there is the temptation to pass from the hazardous discovery to intensive looting, without going beyond a local scale. People steal in their region; they systematically look for objects, but more often than not, without method. In the Valley of Ocosingo (Chiapas, Mexico), looters who became aware of the archaeological interest in mounds near which they had lived for a long time, gutted a minor site in two or three nights, destroying a burial site, but also any objects they found within (Taladoire 2011) (Fig. 4). More seasoned researchers of burial sites in Western Mexico, like some *tombaroli* Italians, know how to identify them and wreak real devastation, even though for the most part, they do not carry out their activities a fair distance away from their village. It takes skill and organization, but they are not looting gangs, acting for sponsors, even though their destruction can reach staggering proportions. In Western Mexico, hundreds of tombs were violated in this way, while the number of examples of scientific digs amounts to only a few dozen. Of the 550 recorded graves in Cerveteri, in Puglia, we evaluate the number of looted graves at 400.

Alongside professional looting, there is organized crime (Meyer 1973; Valdiosera Bermán

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 4 Occasional looting site of Joaquin Rancho Millares, Ocosingo Valley (Chiapas, Mexico). (Photographed by the author)

1985). These are organized groups searching for specific objects, who do not recoil from violence. In 1997, A. Anaya, from the National Institute of Anthropology and History in Mexico, accompanied by epigraphist P. Mathews and some workers, sought to transport the Number 4 altar from the El Cayo site all the way to Tenosique (Mexico), in order to keep it secure. Before they could act, they were surrounded by about thirty armed men, who threatened to kill them. At night, they escaped in a makeshift raft down the Usumacinta River (*Mexicon* XIX: 6, 1997). An opponent of looting, Carlos Catalan, a Guatemalan, was murdered in cold blood. As Richard Hansen writes (1997),

> collecting Pre-Columbian art is often viewed as a justifiable means of preserving the past. It is in fact, a destructive and somewhat violent business, as attested by the recent assassination in Carmelia of Carlos Catalan, a local chiclero who had become a staunch opponent of looting in the Petén.

The same year, the watchman at Tziquin Tzakan in Guatemala was assassinated by looters, and a few days later, the same fate happened to one of the two watchmen at Yaxhá (*Mexicon* XIX: 5, 1997). This violence also manifests itself elsewhere. In 1990, armed men burst on the site of Herculaneum and managed to steal 223 objects from the warehouse. The individuals involved in this violence show no more regard for the pyramids they empty (Figs. 5 and 6), the graves they ransack, than for human life. In their search for valuable objects, they destroy without qualms all that they deem unsalable. Nor do they hesitate to break through protection systems installed to protect excavations.

Looting is not limited to single sites. It also involves institutions. In 1999, a jadeite object from Copán was stolen from the National Museum of Anthropology in Mexico (*Mexicon*, XXI: 6, 1999). Another jade figurine from Copan was stolen from the Museum of Tegucigalpa in 2004 (*Mexicon* XXVI: 5, 2004). Thefts are increasing whether they are at the Louvre, The Museum of Cluny (Paris), of Cairo, or elsewhere. Even if this phenomenon remains relatively rare, it is wholly at odds with the argument that implies that these objects be saved to preserve heritage for all humanity, since these objects were heritage listed as such and therefore cannot be sold, at least not publicly.

One borderline case was the massive looting of the Baghdad Museum in April 2003 during the second Gulf War. The museum suffered three robberies, firstly around 40 sculptures were stolen in the galleries; the second one consisted of 3,100 objects from excavations, which were stored in the reserves; and the third one occurred in the cellars, where more than 10,000 small objects were removed. Of these, approximately 5,500

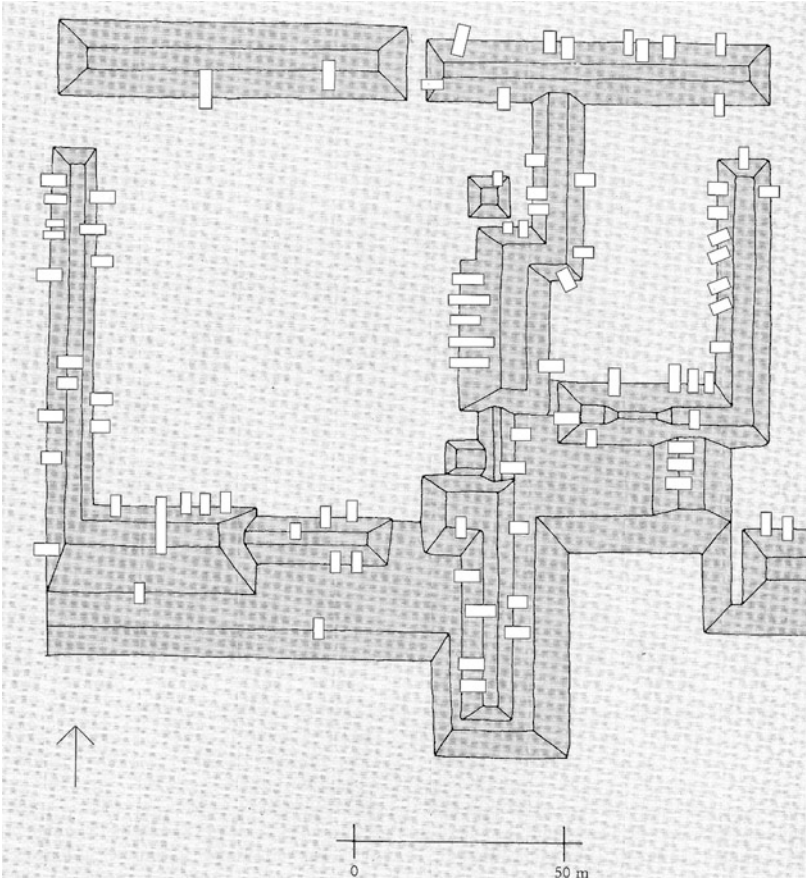

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 5 Looting trenches recorded on La Muralla site (Guatemala). (After Quintana and Wurster 2001)

items were recovered, including more than 700 seized by US customs. There are still about 8,000 pieces missing, some of which have reappeared on the art markets in Jordan, Lebanon, Japan, and Switzerland. In 1996, the Swiss police discovered more than 10,000 Italian artifacts in four warehouses, with an estimated value of 35 million francs.

It is not only the magnitude, which horrifies, but also the extent of the destruction that it entails. To transport objects easily, and without risks, looters look primarily for medium-sized objects of high value. Small pieces do not always have a sufficient market value and are often destroyed at the site. Major pieces like stelae and sculptures, however, are highly sought. But what to do with a stela measuring 3 m in height, and weighing more than a ton? That is no problem when it is sawn into fragments to be transported by a mule. The case of the stelae of Machaquila, cut into 14 pieces, is far from unique (*Arqueología Mexicana* 1996; Graham 1997) (Fig. 7).

The circulation of stolen or looted pieces in commercial circuits is only possible after a slow process of "money laundering," except when it comes to financed looting, which can be delivered immediately. One must wait years before an object reappears, which complicates the task for those who fight against looting. The objects are sometimes stored in secret places, thus freezing invested funds. Others use complex circuits in order to baffle searchers. In 1998, French customs seized several stolen statues from the San Agustin site in Colombia. They were called "garden gnomes" by their owner. Missing since 1989, they had, before arriving in Nantes, followed a complicated route, via the USA, St. Martin, and Spain to cover their tracks. The major objects are not traded openly, but in what Clemency Coggins calls a black market

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 6 Professional looting trench in the Group II of the Río Bec site (Campeche, Mexico). (Photographed by the author)

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 7 Calakmul Stela (Campeche, Mexico). Is heritage better preserved when it is cut into pieces? (Photographed by the author)

(*Arqueología Mexicana*1996). The Internet plays an increasing role, but the majority of major transactions take place in total obscurity. This apparent discretion may give the impression of little activity, largely contradicted by the amount of funds invested. There are in fact only a few quantifiable data on the illicit trade in cultural property, and there is a fast acceleration, parallel to the increase in looting. Traffickers only have their own interests at heart, duping both sellers and buyers. The occasional looter will only receive a handful of dollars; the professional, on the other hand, is able to demand much more. But the difference between the investment cost and the price demanded of the buyer can be very steep.

The discretion of the market leads to the inevitable consequence of the doubtful authenticity of the objects. The fake market has had a growing success and is attested by catalogs, where the descriptions vary between approximate stylistic attributes and absurdities, such as a piece called "Mexico, Inca period." A code of silence among players in this market does not help collectors. The fake market concerns mostly small objects with little value. Big merchants usually cannot afford to deceive their clients, provided they can avoid falling into their own traps. The experts are far from immune to error in authenticity and within domains that are infinitely better documented; there abound fake Dufy and Modigliani paintings. So, imagine in archaeology! This "industry" of fakes is growing even faster as it meets the tastes of collectors as well as merchants. Selective collecting reflects the owner's tastes and fads, as tastes change and fashion evolves. In the area of Zapotec urns, fake styles have been identified, each one responding to specific years. In this way, we have a fake from 1925, with hair

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 8 Figurine Mezcala (Private collection)

"like a boy," a fake from 1930, and so on (Mongne 1992). While privileging his tastes, the collector, instead of discovering unknown arts, merely reflects his own image. An example of this blindness, which profoundly separates the collector from the archaeologist, is Olmec art. Among some 400 identified Olmec monuments, only the monumental heads, about 20 objects, that is 5 % of the body, experience popularity out of proportion. Could the reason be that apart from their real beauty, these objects refer to a "classic" art with which we are all familiar? The same applies to Mezcala or Inuit art, whose sleek appearance speaks to our fantasies of abstract art. Mezcala culture, appreciated by collectors for its sobriety and the geometry of its forms, is very popular since a collector argued, without proof, that they were dated Preclassic (Fig. 8). Since then, archaeologists have made progress in the identification of this culture and its dating, but so-called experts continue to authenticate based on obsolete typologies without verification or correction. Rectifying the error would cause major disruptions in the market.

In other words, in using their aesthetic approach, founded on subjective criteria and financial objectives, collectors and dealers show their ignorance of the cultures they revel in, and their indifference to this universal heritage, which they so claim to defend. One of the arguments of dealers and collectors can indeed be found in the following statement: In recovering these objects, the governments of countries, which have suffered from looting, have seemingly been unable to protect – they work for the protection of aesthetic heritage worldwide (Hoog and Hoog 1991). Traffickers and some collectors deny then the notion of national heritage, which is the very foundation for the identity of a number of countries. They consider themselves above this "narrow nationalism," thus demonstrating their contempt, or even their racism.

The notion of heritage is not considered in a uniform way (Devisse 1994), and, depending on the countries, it can simply cover the domain of colonial art, or in others extend to all vestiges of the past, or even include the ethnological field. In this context, contradictory notions crop up of national heritage, state-level responsibility, and world heritage, which imply the existence of transnational institutions, in particular UNESCO, ICOM, or INTERPOL (Graham 1997). Faced with this institutional framework, the notion of globalization "entitles" some to believe in an individual responsibility invested in the preservation of works of art. We also mentioned the concept of community heritage, which led some groups to claim ownership of their relics, and, in keeping with the same logic, to prohibit archaeologists to access the sites.

In this complicated environment, the fight against looting is a daunting task, despite the progress already made. Overall, national and international laws have been strengthened or improved (Litvak King et al. 1980). The implementation in many countries of ministries or agencies responsible for cultural affairs, with large budgets, changes the conditions for protecting

and preserving sites. The fight against looting has intensified, and the number of international agencies who dedicate an important part of their activities to this repression has increased. Here and there, this fight achieves satisfying results. The signature by many countries of the Conventions on Illicit Traffic of Cultural Property facilitates negotiations and returns. Several museums or large institutions, like Harvard, have begun a policy of return to the country of origin. Conversely, others, in contradiction with the rules of the ICOM, do not hesitate to buy stolen goods, even when they were reported to the authorities, or even included in the databases readily available. In this way, a museum in Florida acquired a fragment of a sculpture of Seibal, known since 1965, and stolen a few years later (*Mexicon* XXV: 4, 2003). This is far from being the only example. In short, we cannot deny the progress that has already been made, but the art market has in parallel become more structured and more complex. And the monies exchanged far exceed the capacity of law enforcement agencies.

Against the lack of legislative frameworks and their application, the best weapon is through the awareness of the importance of heritage within the population concerned, education, and development. This information is crucial against the disinformation practices by looters, dealers, and even museums where laws are haughtily ignored, objects are decontextualized, and confusion between collecting and archaeology is carefully nurtured. That collectors and dealers are treated as archaeologists is insulting to the professionals who fight against the devastation of sites in order to preserve the past and give it meaning.

A newspaper, which recounts the theft of a Corot from the Louvre in 1998, reported an official response that summarizes the current opinion among specialists in France: "The *less said, the better*." In other words, discretion and the law of silence prevail. This attitude may be justified: Any publicity given to artistic and archaeological looting is likely to encourage more and amplify the problem. Investigations designed to locate stolen objects can only benefit from this silence. However, this position is not satisfactory, because it obscures a recurring phenomenon that affects all countries. The fight against the illicit trafficking of cultural heritage is a global phenomenon. Only large-scale publicity recovered a large proportion of the Iraqi objects that had disappeared. Similarly, it is through training and information that *huaqueros* from Sipan (Peru) have become transformed into vigilant guardians of their heritage, thus benefiting from the upsurge in tourism, an investment of longer duration than plunder (Aimi et al. 2008).

Cross-References

- ▶ Bamiyan Buddhas
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Iraq: Archaeological Heritage
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Parthenon (Elgin) Marbles: Case Study
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (1995)

References

Arqueología Mexicana. 1996. Saqueo y destrucción. Un futuro sin pasado. In *Arqueología Mexicana*, Vol. 4, No. 21. Mexico: Ed Raíces.

Bendezu-Sarmiento, J., and J.J. Grizeaud. 2011. Le pillage des tombes en Asie centrale méridionale et steppique. In *Halte au Pillage!* ed. G. Compaganon, 31–50. Paris: Ed. Errance.

Devisse, J. 1994. Patrimoine, pillages, vols. In *Cent objets disparus. Pillage en Afrique*. Paris: ICOM.

Goepfert, N. 2011. *Frayer la route d'un monde inversé. Sacrifice et offrandes animales dans la culture Mochica (100–800 apr. J.-C.), côte nord du Pérou*. British archaeological reports; Monographs in American Archaeology, Vol. 28. Oxford: Archaeopress.

Graham, I. 1997. *Cent objets disparus. One hundred missing objects. Saqueo en America Latina*. Paris: ICOM.

Hansen, R.D. 1997. Plundering the Petén. *Archaeology* 50 (5): 48–49.

Hoog, M., and E. Hoog. 1991. *Le marché de l'art*. Que-sais-je ? Paris: P.U.F.

Litvak King, J., R. Luis González, and M. del Refugio González. 1980. *Arqueología y derecho en México*. Serie antropológica 23. México: Instituto de Investigaciones Antropológicas e Instituto de Investigaciones Jurídicas, UNAM.
Martínez Muriel, A. 1988. El salvamento arqueológico. La antropología en México. Panorama Histórico, Vol. 6. In *El desarollo* técnico, ed. C.G. Mora, 395–410. México: INAH.
Merryman, J.H. 2006. *Imperialism, art and restitution*. Cambridge: Cambridge University Press.
Meunier, Y. 2011. L'invention d'un pillage en Alaska. In *Halte au pillage!* ed. G. Compagnon, 301–314. Paris: Ed. Errance.
Mexico en el Mundo de las colecciones de Arte. 1994. *México en el mundo de las colecciones de arte. Mesoamérica*, tomos 1 y 2. México: Secretaría de Relaciones Exteriores, CONACULTA, Universidad Nacional Autónoma de México.
Mexicon, *Journal of Mesoamerican Studies*. 1997, 1999, 2003, 2004, 2005. Markt Schwaben: Verlag.
Meyer, K. 1973. *Main basse sur le passé*. Paris: Le Seuil.
Mongne, P. 1992. Muséologie et contrefaçon: les urnes zapotèques du Museum für Völkerkunde de Berlin. *Journal de la Société des Américanistes* 78: 1.
Polet, J. 2011. Deux sociétés ouest africaines, deux visions du legs de l'histoire, deux pratiques patrimoniales divergentes: les Eotilés de Côte d'Ivoire et les habitants du Méma au Mali. In *Halte au pillage!* ed. G. Compagnon, 415–426. Paris: Ed. Errance.
Quintana, O., and W. Wurster. 2001. *Ciudades mayas del noreste del Petén, Guatemala. Un estudio urbanístico comparativo*. Allgemeine und Vergleichende Archäologie Materialen Band 59. Mainz am Rhein: Verlag Phillip von Zabern.
Riviale, P. 2001. Eugène Boban ou les aventures d'un antiquaire au pays des américanistes. *Journal de la Société des Américanistes* 87 (1): 351–362.
Taladoire, E. 2011. Le pillage archéologique en Mésoamérique et le marché de l'art précolombien. In *Halte au Pillage!* ed. G. Compagnon, 339–358. Paris: Ed. Errance.
Valdiosera Bermán, R. 1985. *Contrabando arqueológico*. México: Editorial Universo.

Further Reading

Antonio, A., W. Alva, and E. Perassi, eds. 2008. *Sipán. El tesoro de las tumbas reales*. Firenze: Fondo Italo-Peruano. Giunti Arte Mostre Musei. Giunti Industrie Grafiche S. p.A, Prato.
Compagnon, G., ed. 2011. *Halte au Pillage!* Paris: Ed. Errance.
Dorfman, J., and A.L. Slayman. 1997. Maverick Mayanist. *Archaeology* 50 (5): 50–60.
Investigaciones Antropológicas e Instituto de Investigaciones Jurídicas, UNAM. México.
Sánchez Nava, P.F., and L.A. López Wario. 2010. *Coleccionismo, saqueo y peritajes arqueológicos*. Textos Básicos y Manuales. México: INAH.

Vandals in Search of the Past

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Introduction

Whether they relate to the random collection of small relics by unaware tourists or to graffiti on monuments, occasional acts of vandalism are destructive and open to criticism. The intentional destruction of archaeological monuments, whether it involves large works or the ideological eradication of the past for religious, political, or economic motives, is clearly of graver concern. A less serious aspect of vandalism goes more often unnoticed, even when it is not publicized to great fanfare. It essentially concerns sites that are threatened when they are used for private purposes, such as cultural events.

Key Issues/Current Debates/Future Directions/Examples

For about 30 years, it has become a popular trend to use major prestigious sites for public concerts and artistic events, which bring together a large concentration of spectators. If, in Greece, the opening of sites at night has been authorized for a very long time to allow for romantic walks, the phenomenon worsened in 2009 with free access given to 81 sites within the "Greece by Moonlight" program, authorized by the Ministry of Culture. Other events include the Pink Floyd concert in Pompeii in 1971, the show organized by Jean-Michel Jarre on the Giza Plateau (1999), the recital of Placido Domingo "The Concert of a Thousand Columns" at Chichen Itza (2008), which was a follow-up to Luciano Pavarotti (1997), and other artists. If such events use the sites only as a prestigious setting, which for that matter indirectly showcases them, they raise

various problems. Despite relatively strict controls, the mere presence of thousands of spectators (17,000 people at Chichen Itza), as well as the required technical support (lighting, sound, construction of platforms) inevitably leads to the damage and trampling of buried remains. It is symptomatic that responsible institutions like the National Institute of Anthropology and History of Mexico, openly express their reluctance to use sites in this way. One can question the consequences if such concerts were to take place in sites as fragile as Çatalhöyük.

Professionals are not entirely exempt from accepting responsibility for such destruction in pursuit of the development of their own work. The recent controversy in Mexico concerning the installation of a sound and light show at Teotihuacan (2008) is a striking illustration of this. The setup of the necessary infrastructure resulted in significant damage that later required intensive work and expensive restoration. In other cases, site managers, anxious to give their research wide publicity, or even convinced of the emotional value of the sites, do not hesitate to organize cultural events that go well beyond the traditional scientific discourse. In other words, this development corresponds to a passionate approach, which has become popular among some archaeologists and can cause dramatic consequences.

This use of sites for personal or private means can indeed, for a number of reasons, lead to real appropriation by particular groups, such as members of New Age cults, some of whom claim a link to the past, which may be in part, simply imagined. Some of the most well known are those organized at Stonehenge, Chichen Itza, or Teotihuacan. At Stonehenge, since the site reopened in 2000 (after its closure in 1985, following the Battle of Beanfield), thousands of curious people, Druids, and followers of esoteric cults converge on the site each summer solstice. In 2010, there were no fewer than 36,500 people (6,500 vehicles) that occupied the site. While some show relative respect to the site, others, such as the self-styled King Arthur Pendragon come to feast: Their supporters do not hesitate to climb the monoliths, light bonfires, fight against their detractors, and finally transform the site into a nightclub. The sheer mass of participants is already a factor of destruction, in addition to other damage. Similarly, at Teotihuacan, every year, there are thousands of sun worshipers who climb the main pyramid to receive the positive vibrations of the universe. At Chichen Itza, thousands of other sun worshipers attend each year the descent of the serpent of light along the Castillo pyramid. Whether it matters to them or not, this phenomenon is more likely the result of the secondary effects of restoration, and was not intentionally created by ancient Mayas.

While some famous sites are relatively well protected, many others such as Catal Höyük, Carnac (France), El Tajin (Mexico), or the prehistoric temples in Malta, are threatened with the same problems, and many other problems remain unknown. A few years ago, in Chaco Canyon National Historical Park, intruders sought to practice their form worship in spite of the local traditions, and desecrated a kiva in this way. There are many other examples from around the world.

It is not our primary concern to analyze these beliefs, nor the fragility of their archaeological basis, whether it be the eclectic reclamation of ancient cults, questionable interpretations of the past (like the end of the world in 2012), or even pure nonsense, such as the story of crystal skulls (Walsh 2008). Our concern is simply their multiple consequences for archaeology and anthropology. Of primary concern is the unintentional damage caused to monuments and the destructive trampling of relics, resulting in the potential obliteration of the past. More serious is the appropriation of these relics for private use such as the removal of fragments of buildings for spiritual purposes. Sometimes the rituals themselves are accompanied by voluntary and involuntary damages, such as those that recently occurred at Villa Hermosa (Tabasco, Mexico) with the spill of toxic liquids on about twenty Olmec sculptures. The cost of the clean up was $25,000! These practices involve a form of neo-colonialist behavior, which excludes not only the common tourist, but also archaeologists and others who are responsible for

the preservation of the past, as well as the descendants of the cultures who built these sites. The desecration of sites, to the detriment of communities is another major issue. We have seen above that the desecration of the kiva shocked the Navajos, and required long purification rites. The Shoshone-Paiute and other groups have also criticized these intrusions that question their cultural identity. This phenomenon occurs elsewhere including, for example, the site of Çatalhöyük. This defiance of local traditions and interests has serious consequences for communities. It can lead to the outright closure of sites to archaeologists and visitors alike. This happened with the Quiches of Guatemala. It can also stir up tensions based on bitter memories of colonization and its atrocities. In other words, the dissemination of these beliefs and the multiplication of these rituals raise the crucial issue of whether the past belongs to humanity, or to a specific group. For archaeological research, there are some essential ethical implications. If humanity no longer shares a common heritage, both its collective understanding and its specificities must be questioned.

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Chaco Canyon, Archaeology of
- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mexico's Heritage and Management
- ▶ Olmec: Geography and Culture
- ▶ Teotihuacan: Geography and Culture
- ▶ UNESCO World Heritage Convention (1972)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

References

Walsh, J. McL. 2008. Legend of the crystal skulls. *Archaeology* 61 (3): 36–41.

Vargas, Iraida

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Basic Biographical Information

Iraida Vargas Arenas is the most influential archaeologists in contemporary Venezuelan archaeology, due to her groundbreaking contributions to research and teaching. She was born in Maracay, Aragua State, on August 7, 1942. She graduated from the School of Sociology and Anthropology of the Central University of Venezuela in 1964.

Iraida Vargas Arenas studied Paleobotany in the Laboratory of Palynology of the Faculty of Sciences of the Sorbonne and the University of Leyden, the Netherlands, under the direction of Thomas Van der Hammen. Upon Van der Hammen's return to Venezuela in 1965, she entered the University of Los Andes where he founded the Laboratory of Palynology, initiating archaeobotanical studies in Venezuela. With fellow archaeologist and life partner Mario Sanoja Obediente, Iraida Vargas Arenas carried out regional archaeological investigations in the Cordillera de Mérida, the Maracaibo Lake basin, and the Quíbor Valley. Their work initiated a change of era in Venezuelan archaeology which was then empiricist, normative, and diffusionist.

In 1967, Iraida Vargas Arenas joined the Central University of Venezuela-Caracas as a teacher. This initiated a path that would lead her to investigate the ways of life and work of the Indigenous peoples that occupied the territories of present Venezuelans and gave rise to a series of monographs and scientific articles, some of which were co-authored by Mario Sanoja.

In 1976, Iraida Vargas Arenas obtained her PhD from the Complutense University of Madrid. She participated in the XL International Congress of Americanists held in Lima in 1970, where Latin American Social Archaeology was initiated. In 1974, she published with Mario Sanoja *Venezuelan*

Vargas, Iraida, Fig. 1 Iraida Vargas Arenas

Ancient Formations and Modes of Production. Notes for the study of the integration processes of Venezuelan society (12,000 BC–1900 A.D.) which interpreted the history of Venezuela from a Marxist perspective (Fig. 1).

Major Accomplishments

In the 1980s, Iraida Vargas Arenas organized and participated in the meetings that consolidated the theoretical basis of Latin American Social Archaeology. She was the only woman who participated in these first debates and contributed decisively in the development of the theoretical position of historical materialism. During this decade, Vargas, together with a group of Venezuelan archaeologists, including Mario Sanoja, founded the Venezuelan Society of Archaeologists (SOVAR) in Caracas. They created and edited the GENS journal to spread the works to society.

Archaeology, Science and Society (1990) became Iraida Vargas' top publication. In this book, she postulates a three-category system: economic-social formation (ESF), way of life, and culture. The first category, the ESF, which includes the mode of production and reproduction, is the category that expresses the concrete totality that is nothing more than the society we study. The second category, the way of life, allows us to access the expressions of the particularities that exist in each ESF (Vargas 1990). It represents the historical-social response of a determined human group to the objective natural and social conditions which it must confront and resolve. With this category, it is possible to explain the concrete forms that the ESF acquires in both the totality that it represents, its contradictions, transformations, and specific forms of structuring in a certain place; therefore, with this category we would explain the particular forms society expresses itself in a given territory. The third category, culture, expresses the phenomenal representations of the ways of life (Vargas 1990).

From an ethical-political point of view, Vargas studied and elaborated proposals on the relations between archaeological research, education, and history teaching. With Mario Sanoja, she began to apply Social Archaeology, making it a useful science in the sense of directing archaeological practice toward the search of solutions to the problems that our communities suffer. From this viewpoint, they published *History, Identity and Power* (Vargas and Sanoja 1993), where they discuss the origin of the Venezuelan nation, cultural heritage, historical-cultural heritage, the problems of teaching history in Venezuela, and the role of museums as educational tools, all articulated with the question of cultural identity as a strategic element for the defense of national sovereignty.

By the end of the twentieth century and the first decade of the twenty-first century, Iraida Vargas and Mario Sanoja published a series of highly influential books. The first of these books was *Canoe People. Political Economy of the former Appropriation Society of north-eastern Venezuela* (Sanoja and Vargas 1995). In this book, the empirical evidence obtained in the Venezuelan northeast incorporates, for the first time, discussion of the role of women in the Appropriating Social Formation. In addition, it reveals the gatherers' ways of life of the

Appropriator Social Formation that settled around the year 8000 BC on the Caribbean and Atlantic facade of Venezuela. Sanoja and Vargas' second and third books were *Water and Power: Caracas and the Formation of Caracas Colonial State: 1567–1700* (Sanoja and Vargas 2002) and *Guayana's Ages. Archaeology of a Chimera. Santo Tomé and the Catalan Capuchin Missions 1595–1817* (Sanoja and Vargas 2005). In these books, they study the colonial conditions that were implanted into the Venezuelan territories with European conquest of these lands, that is, the origin of Venezuelan colonial way of life as a particular form of the totality of the capitalist social formation. Iraida Vargas developed her ideas in a fourth book, which she sole-authored, *Woman, Women. Origin and Historical Development of Social Exclusion in Venezuela, the Case of Women Collectives* (Vargas 2006). In this book, she addresses the contributions of women in social production and reproduction in the Social, Appropriating, Tribal and Colonial Formations to understand the role of women's collectives in the contemporary history of Venezuela.

Through the works described here, and through her teaching, Iraida Vargas Arenas had a profound influence on the development of in contemporary Venezuelan archaeology. She is a pioneer whose work has fundamentally shaped the discipline of archaeology in her country.

Cross-References

- ► Latin American social archaeology
- ► Sanoja, Mario
- ► The Decolonization of Venezuelan Archaeology

References

Sanoja, M., and I. Vargas. 1974. *Antiguas formaciones y modos de producción venezolanos*. Caracas: Monte Ávila Editores.

Sanoja, M., and Vargas. 1995. *Gente de la canoa. Economía política de la antigua sociedad apropiadora del noreste de Venezuela.*

Sanoja, M., and I. Vargas. 2002. *El agua y el poder: Caracas y la Formación del Estado colonial Caraqueño:1567–1700*. Caracas: Banco Central de Venezuela.

Sanoja, M., and I. Vargas. 2005. *La edades de Guayana. Arqueología de una quimera. Santo Tomé y las misiones capuchinas catalanas. 1595–1817*. Caracas: Monte Ávila Editores Latinamericana.

Vargas, I. 1990. *Arqueología Ciencia y Sociedad*. Editorial Abre Brecha.

Vargas, I. 2006. *Historia, Mujer, Mujeres. Origen y desarrollo histórico de la exclusión social en Venezuela, el caso de los colectivos femeninos*. Caracas: MINEP.

Vargas, I., and M. Sanoja. 1993. *Historia Identidad y Poder*. Caracas: Fondo Editorial Tropykos.

Vasiliev, Igor B.

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Vasiliev Igor Borisovich (15.09.1948–08.08.2004). A famous scientist, a lecturer, and an outstanding leader of the archeological science in the Volga – Ural Region of Russia. He graduated the Bashkir State University (Ufa city). In 1970 he was invited by Matveeva G.I. to the Kuibyshev University as a laboratory assistant of archeology study. At the same time, he organized an archeology club at the Kuibyshev Palace of the Pioneers, which started the school archeology in the city. Since 1974 and till the end, all the scientific work of Vasiliev I. B. was connected with Kuibyshev State University and Kuybyshev Pedagogical Institute, where he had a career from a laboratory assistant position to the head of the archeology and ancient civilization chair position. He organized an archeological club for students and then research-and-development archeological laboratory. In 1979 he defended a dissertation in the Board of Studies of the Archeology Institute at the Academy of Science USSR (Moscow). At the same time, working in Samara, in 1988–1994, he took place in the History and Archeology Institute RAS USSR as a science deputy director (Sverdlovsk). In 1994 he headed in Samara Institute of History and Archeology of the Volga Region. He organized archeological expedition and headed active field works in Samara, Orenburg,

Saratov, Voronezh, Kurgan, Tyumen Regions, Bashkiria, and poor North Caspian Sea Regions. He is the author of the famous archeological artifacts diggings, such as Vilovatoe Settlement, Old Elshanka, Kair-Shak, Tenteksor (Neolithic), I and II Khwalyn barrows, Gundorov settlement (Eneolithic), Ytevsky Kurgan barrow (the Early Bronze Age), and others. Due to active expeditions and museum artifacts exploration, he discovered unknown earlier archeological cultures as Middle Volga Region, Elshanskaya (Neolithic), Samarskaya and Khvalynskaya cultures (Eneolithic), and also Potapovsky, Alekseevsky, and Volsko-Lbishensky culture type (the Bronze Age). Academic interest topics are Eastern Europe neolithization, Indo-Iranian and Indo-European nations protohistory, and the Neolithic, Eneolithic, Volga Region, and Ural Bronze Age periodization and culture classification. Vasiliev I. B. was one of the first archeologists who participated complex researches together with agrologists, anthropologists, and paleozoologists. He cooperated intensively with Russian and foreign archeologists. More than 10 all Soviet Union and International Conferences were organized due to his initiative in Samara city. Vasiliev Igor Borisovich is the author of more than 170 research articles and monographs. He actively replenished his findings with the collections of the regional museum. Due to his and his colleagues efforts, there has been established one of the most famous museums in Samara city – educational museum of archeology of the Volga region.

References

Ivanov, I.V., and I.B. Vasiliev. 1995. A man, nature and soils of the Ryn-sands and Volgo-Ural interstream area in the Holocenic system, M.

Vasiliev, I.B. 1971. Barrow diggings near the Samara river. Archeological discoveries – 1970. M.

Vasiliev, I.B. 1981. The Eneolith of the Volga region (heath and woodland grass). Kuibyshev.

Vasiliev, I.B. 1990. The North Caspian Sea Region in the Neolithic, Mesolithic and Eneolitic Age (the main results of the researches). The North Caspian Sea Region history issues, Kuibyshev.

Vasiliev, I.B. 2003. Khvalynskaya eneolithic culture of the Volga-Ural heath and woodland grass (some of the researches' results). Issues of the Volga Region archeology. Ed. 3. Samara.

Vasiliev, I.B., and G.I. Matveeva. 1979. A barrow near the village of Syezzheye, the Samara river. The Soviet archeology, №4.

Vasiliev, I.B., and G.I. Matveeva. 1986. By the beginning of the Samara Volga region history. Kuibyshev.

Vasiliev, I.B., and A.A. Vuibornov. 1988. The Neolith of the Volga region (heath and woodland grass). Kuibyshev.

Vasiliev, I.B., S.A. Agapov, I.B. Vasiliev, V.I. Pestricoava. 1990. Khvalynsky. The Eneolithic barrow. Saratov city.

Vasiliev, I.B., P.F. Kuznetsov, A.P. Semenova. 1994. Potapovsky kurgan barrow of the Indo-iranian people in the Volga Region of the Samara.

Vegeculture: General Principles

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Introduction and Definition

Vegetative propagation, or the asexual reproduction of plants, is commonly associated with traditional forms of cultivation in wet, tropical environments of Africa, the Americas, Southeast Asia (mainland and island), New Guinea, and the Pacific. It occurs to some degree in most agricultural systems. Vegetative propagation is implicated in the emergence of agriculture and early plant domestication in the wet tropical rainforests of South America (Piperno and Pearsall 1998) and New Guinea (Denham et al. 2003), as well as potentially in other parts of the world (Weiss et al. 2006).

The term vegeculture connotes forms of plant exploitation, ordinarily agriculture, that are heavily reliant upon the vegetative propagation of plants (Sauer 1952; Hather 1996; Shuji and Matthews 2002). Vegeculture is usually used to refer to a subcategory of agriculture, horticulture, or food production. However, in addition to its economic (food production) meaning, usage of

the term is now being expanded to encapsulate the cultural and social associations of vegetative forms of cultivation.

Key Issues

Vegetative (Asexual, Clonal) Propagation

> Most perennial plants possess two modes of regeneration: sexual reproduction through seed and clonal reproduction through some form of vegetative propagation. . .. The relative importance of sexual vs. clonal recruitment may vary widely among plant species as well as among populations within species. For example, there are many anecdotal reports in the literature of species having abandoned sexual reproduction for some form of clonal reproduction, at least in some habitats or parts of their geographic range. . .. (Eckert 2002: 279).

The defining feature of vegecultural practices is that planting involves some aspect of the "body" of the parent plant, such as a piece of root, tuber, stem cutting, or sucker that is removed and set into the ground (Sauer 1952: 25; Nakao 1966; Hather 1996). Planting a portion of the plant body involves asexual propagation, perpetuating a genetic clone that is selected for based on desirable phenotypic traits. Although commonly associated with root crops, a range of food plants may be cultivated vegetatively. Plant families commonly incorporated into vegecultural practices are generally derived from the clade of monocotyledons that includes a range of staple food plants, such as true yams (Dioscoreaceae), taros (Araceae), sugarcanes (Poaceae), bananas (Musaceae), and palms (Arecaceae), as well as various supplementary and ritual food plants, for example, gingers (Zingiberaceae).

There are various practices through which vegetative propagation is affected. In the case of subterranean storage organs, a whole or substantial portion of a rhizome, corm, or tuber can be dug up, moved, and reburied for propagation, for example, gingers (*Zingiber* spp.), taro (*Colocasia esculenta*), and some yams (*Dioscorea* spp.) (Hather 1996). For vines, a cutting or slip may be taken and partially buried, for example, sweet potato (*Ipomoea batatas*). Similarly, for a variety of other plants, a portion of the stem can be cut and planted, partially or completely, in the ground, for example, manioc/cassava (*Manihot esculenta*) and sugarcane (*Saccharum officinarum*). For other plants, new suckers that grow around the base of the parent are dug up and replanted, for example, sago (*Metroxylon sagu*) and bananas (*Musa* cvs). A few plants can also be propagated by planting sections of aerial roots, for example, marita pandans (*Pandanus conoideus*).

Through asexual reproduction people are able to establish a high degree of control over the gene pool of cultivated plants. Namely, people select for desired phenotypic traits and are able to establish genetic isolation of the cultivated stock through vegetative propagation. Hereby, people establish greater control of phenotypic traits within the natural range of the plant than is possible under sexual reproduction (which entails continual reproduction with wild populations and other cultivated varieties). The clonally reproduced stock is subject to somatic mutation and, as with all plants, genes may be variably expressed in different growth environments (Gremillion and Piperno 2009).

Vegetative (Asexual) and Seed (Sexual) Forms of Plant Cultivation

Arguably, vegeculture represents a different orientation to plants than in seed-based systems of plant exploitation and cultivation. Vegeculture is based on the exploitation of perennials and the faculty of reproduction from plant parts, whereas seed-based reproduction exploits the sexual reproductive capacity of plants, often annuals (including cereals, legumes, and a range of vegetables) as well as a range of perennials (including some fruit and nut trees).

To exemplify using New Guinea as an example, a whole range of plant types are traditionally cultivated using vegetative propagation, including the following: trees (*Pandanus conoideus*), palms (*Metroxylon sagu*), grasses (*Saccharum officinarum*, *Setaria* spp.), fruiting herbaceous plants (*Musa* spp.), leafy herbaceous plants (*Abelmoschus manihot*, *Rungia klossii*), and root crops (*Colocasia esculenta*, *Dioscorea* spp.). These plants are cultivated for various edible plant parts, including efflorescences/flowers,

leaves, buds, fruits, nuts, stem pith, and a variety of subterranean storage organs (roots, rhizomes, tubers, corms). Indeed, agricultural practices in the highlands of New Guinea were formerly almost exclusively, and still are predominantly, vegetative.

Furthermore, *Casuarina* tree fallowing, a fallow system involving the planting of nitrogen-fixing trees in the highlands, is undertaken by the transplanting of self-sown seedlings. Similar arboricultural practices occur throughout the lowlands of New Guinea, where tree crops have formed a much larger contribution to diets. Trees are usually transplanted through the digging up, movement, and planting of germinated seedlings and saplings, rather than reproduced from the planting of seed.

A vegetative orientation to cultivation has aided the widespread adoption of several food plants introduced to New Guinea over the last few hundred years, such as sweet potato (*Ipomoea batatas*), and manioc/cassava (*Manihot esculenta*) and taro konkon (*Xanthasoma sagittifolium*). Seed-propagated plants are also being widely adopted, including maize (*Zea mays*) and rice (*Oryza* sp.).

Agricultural or horticultural systems based on vegecultural practices have been contrasted with those based upon sexual reproduction using seeds, not only in terms of the mechanics of planting but also in terms of other agronomic, cultural, demographic, developmental, environmental, and social aspects (Harris 1969; Diamond 1997; Hildbebrand 2007). However, rather than being seen as strictly demarcated alternatives, these strategies usually co-occur. Vegetative propagation is often practiced by agricultural societies reliant on the seed-based cultivation of cereals, legumes, and trees. Although this is readily apparent to anyone who is a gardener in the western world – where people continually reproduce perennials as ornamentals in their gardens – this probably also occurred in the distant past. The vegetative propagation of figs (*Ficus carica*) in the Lower Jordan Valley has been interpreted to have preceded, or accompanied, the earliest cultivation of plants there (Kislev et al. 2006), despite uncertainties regarding the timing and significance of the earliest finds (Denham 2007). Similarly, most groups reliant on vegecultural practices may also reproduce plants from seed.

Vegecultural Orientations in Foraging/Hunting-Gathering Societies

Although commonly associated with types of cultivation in different parts of the world, there is increasing evidence that vegecultural orientations existed within some foraging, or hunting-gathering societies. This orientation was manifest as an awareness of a plant's vegetative reproductive capacity in the way people exploited plants, as opposed to directly cultivating them. The current understanding of these practices is limited by a lack of the relevant archaeobotanical, ethnobotanical, and genetic data.

Multiple accounts of Australian Aborigines record people replanting a viable portion of a plant when digging for and collecting tubers (Berndt and Berndt 1993). People may have dug up and collected the majority of tubers, but they were sufficiently aware of the vegetative reproductive capacity of plants to know that new tubers would grow if a viable portion of the plant was reburied. In northern Australia there is circumstantial evidence for forms of vegecultural manipulation involving various plants, potentially including taro (*Colocasia esculenta*) and yams (*Dioscorea* spp.), in the distant past (Jones and Meehan 1989; Denham et al. 2009). In more temperate and desert regions, the distributions of some species of yam (e.g. *Dioscorea hastifolia*; Hallam 1989), *Typha* (Gott 1999), and other tuberous plants such as *murnong*, or daisy yam (*Microseris scapigera*; Gott 1983), are suggestive of sustained human management along vegecultural principles, including potential movement, in the past.

The Social Context of Vegecultural Systems

People practicing vegeculture often transpose elements of the vegetative reproductive capacity of plants onto their social relations and even onto human anatomy (Barton and Denham 2011). Recurrent elements include cloning the "body" or parts of the plant and the trans-generational life histories of many vegecultural staples.

The Kawelka at Kuk Swamp in New Guinea articulate their kinship relationships with

reference to vegetative propagation. The original people, or principal landowners, are "ground-root-men" (*mae pukl wua* in Melpa) (Ketan and Muke 2001) and people who "hold onto the ground bone" (*mae ombil amborom*) (Strathern and Stewart 1998: 87–88). The root binds the people to the ground like plants. New generations, lineages, and subclans emerge from the original clan through time, as stems, shoots, and cuttings emerge from the root; like transplants, people are adopted by or married into other groups (Muke and Mangi 2006: 42–62; John Muke, *pers. comm.* to Tim Denham 2007).

These types of insight on the social implications of vegeculture are being applied to processes in the distant past that currently have low archaeological visibility. An example is the way domesticated rice (a sexually reproduced crop) was adopted by farmers inhabiting Island Southeast Asia around 4,000–3,000 years ago (Barton and Denham 2011). How was the planting of rice from seed grafted onto preexisting vegetative cultivation practices, and what were the social implications for people inhabiting that vegecultural world? Rather than a model of rapid, widespread adoption for food production, recent interpretations focus on the gradual incorporation of rice as a status crop (e.g., Barton 2012).

Cross-References

- ▶ Bananas: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Manioc: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Sugarcane: Origins and Development
- ▶ Taro: Origins and Development
- ▶ Yams: Origins and Development

References

Barton, H. 2012. The reversed fortunes of sago and rice, *Oryza sativa*, in the rainforests of Sarawak, Borneo. *Quaternary International* 249: 96–104.

Barton, H., and T.P. Denham. 2011. Prehistoric vegeculture and social life in Island Southeast Asia and Melanesia. In *Why cultivate? Anthropological and archaeological approaches to foraging-farming transitions in Southeast Asia*, ed. G. Barker and M. Janowski, 17–26. Cambridge: McDonald Institute for Archaeological Research.

Berndt, R.M., and C.H. Berndt. 1993. *A world that was: The Yaraldi of the Murray River and the lakes, South Australia*. Melbourne: Melbourne University Press.

Denham, T.P. 2007. Early fig domestication, or gathering of wild parthenocarpic figs? *Antiquity* 81: 457–461.

Denham, T.P., M. Donohue, and S. Booth. 2009. Revisiting an old hypothesis: Horticultural experimentation in northern Australia. *Antiquity* 83: 634–648.

Denham, T.P., S.G. Haberle, C. Lentfer, R. Fullagar, J. Field, M. Therin, N. Porch, and B. Winsborough. 2003. Origins of agriculture at Kuk Swamp in the Highlands of New Guinea. *Science* 301: 189–193.

Diamond, J. 1997. *Guns, germs and steel*. London: Jonathan Cape.

Eckert, C.G. 2002. The loss of sex in clonal plants. *Evolutionary Ecology* 15: 501–520.

Gott, B. 1983. Murnong—Microseris scapigera: A study of a staple food of Victorian Aborigines. *Australian Aboriginal Studies* 1983: 2–17.

Gott, B. 1999. *Cumbungi*, Typha species: A staple Aboriginal food in southern Australia. *Australian Aboriginal Studies* 1999: 33–50.

Gremillion, K.J., and D. Piperno. 2009. Human behavioral ecology, phenotypic (developmental) plasticity, and agricultural origins: Insights from the emerging evolutionary synthesis. *Current Anthropology* 50: 615–619.

Hallam, S.J. 1989. Plant usage and management in Southwest Australian Aboriginal societies. In *Foraging and farming: The evolution of plant exploitation*, ed. D.R. Harris and G.C. Hillman, 136–151. London: Unwin Hyman.

Harris, D.R. 1969. Agricultural systems, ecosystems and the origins of agriculture. In *The domestication and exploitation of plants and animals*, ed. P.J. Ucko and G.W. Dimbleby, 3–15. London: Duckworth.

Hather, J.G. 1996. The origins of tropical vegeculture: Zingiberaceae, Araceae and Dioscoreaceae in Southeast Asia. In *The origins and spread of agriculture and pastoralism in Eurasia*, ed. D.R. Harris, 538–550. London: UCL Press.

Hildebrand, E.A. 2007. A tale of two tuber crops: How attributes of Enset and Yams may have shaped prehistoric human-plant interactions in Southwest Ethiopia. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T.P. Denham, J. Iriarte, and L. Vrydaghs, 273–298. Walnut Creek: Left Coast Press.

Jones, R., and B. Meehan. 1989. Plant foods of the Gidjingal: Ethnographic and archaeological perspectives from northern Australia on tuber and seed exploitation. In *Foraging and farming: The evolution of plant exploitation*, ed. D.R. Harris and G.C. Hillman, 120–135. London: Unwin Hyman.

Ketan, J., and J. Muke. 2001. *National heritage management: A site management plan for the Kuk World Heritage Project in Papua New Guinea*. Port Moresby: PNG National Commission for UNESCO and The

Anthropology and Sociology Strand, School of Humanities and Social Sciences, University of Papua New Guinea.
Kislev, M.E., A. Hartmann, and O. Bar-Yosef. 2006. Early domesticated fig in the Jordan Valley. *Science* 312: 1372–1374.
Muke, J., and J. Mangi. 2006. *Community management issues of the Kuk World Heritage Site, western Highlands province, Papua New Guinea*. Port Moresby: Social Research Institute.
Nakao, S. 1966. *Saibaishokubutsu to Noko no Kigen (Origins of agriculture and crops)*. Tokyo: Iwanami Shoten. (In Japanese).
Piperno, D.R., and D.M. Pearsall. 1998. *The origins of agriculture in the Lowland Neotropics*. San Diego: Academic Press.
Sauer, C.O. 1952. *Agricultural origins and dispersals: The domestication of animals and foodstuffs*. Cambridge, MA: M.I.T. Press.
Shuji, Y., and P. Matthews, eds. 2002. *Vegeculture in Eastern Asia and Oceania*. JCAS Symposium series 16. Osaka: National Museum of Ethnology.
Strathern, A., and P.J. Stewart, eds. 1998. *Kuk heritage: Issues and debates in Papua New Guinea*. Port Moresby/Townsville/Pittsburgh: PNG National Museum/Centre for Pacific Studies/Okari Research Group, Department of Anthropology, University of Pittsburgh.
Weiss, E., M.E. Kislev, and A. Hartmann. 2006. Autonomous cultivation before domestication. *Science* 312: 1608–1610.

Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)

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Introduction

The Vermillion Accord is a set of six clauses adopted by the World Archaeological Congress (WAC) which concerns science and the treatment of the dead. It is of high significance to the archaeological profession and Indigenous groups, and its development and adoption is a key moment in the history of the reburial movement. Created in 1989, and adopted by WAC in 1990, the Vermillion Accord was the first document developed *together* by archaeologists and Indigenous people to provide a set of principles for behavior, decision making, and mutually agreed ethical approaches to the question of archaeological (and other scientific) interest in the mortal remains of the dead. At a time of high concern around issues raised by the reburial movement, when tensions could run exceptionally high and the media represented the debate as intractably polarized, the Vermillion Accord stands out as a demonstration that "mutual understanding and respect were possible between Indigenous people and archaeologists" (Zimmerman 2002: 91). Indeed, *respect* is the key word throughout the Accord, and forms the fundamental basis for agreement and decision making. Additional important aspects of the Accord are that it includes fossil hominids and, although developed out of the reburial debate, is not designed to be exclusively concerned with the Indigenous dead.

Definition

The Vermillion Accord reads as follows:

1. Respect for the mortal remains of the dead shall be accorded to all irrespective of origin, race, religion, nationality, custom and tradition.
2. Respect for the wishes of the dead concerning disposition shall be accorded whenever possible, reasonable and lawful, when they are known or can be reasonably inferred.
3. Respect for the wishes of the local community and of the relatives or guardians of the dead shall be accorded whenever possible, reasonable and lawful.
4. Respect for the scientific research value of skeletal, mummified and other human remains (including fossil hominids) shall be accorded when such value is demonstrated to exist.
5. Agreement on the disposition of fossil, skeletal, mummified and other remains shall be reached by negotiation on the basis of mutual respect for the legitimate concerns of communities for the proper disposition of their

ancestors, as well as the legitimate concerns of science and education.

6. The express recognition that the concerns of various ethnic groups, as well as those of science, are legitimate and to be respected will permit acceptable agreements to be reached and honored.

Key Issues

The Accord was developed by participants at the first Inter-Congress of the World Archaeological Congress, which was held in Vermillion, South Dakota, USA in 1989. Entitled "Archaeological Ethics and the Treatment of the Dead," the Inter-Congress brought together more than 200 people from 20 countries, many of them Indigenous – including 50 Native Americans from 27 different nations and Indigenous delegates from Australia, Scandinavia, New Zealand, and Africa (Zimmerman 2002: 91). They had come together to discuss a matter of great (and continuing) concern to Indigenous groups – that the mortal remains of their dead were held in museums without the permission of their communities of origin and against their wishes, and that requests for their return were being met with refusal, at that time, from almost all holding institutions.

Many of these remains (and by far the majority that were housed in European institutions) had been acquired in the nineteenth century for the purposes of racial science. Others, most notably in the previous "colonies," had also been gathered in more recent years for modern archaeological and physical anthropological study. Although little information was widely available in the 1980s, subsequent historical research driven by Indigenous concerns, revealed that collections were extensive, both in number and in terms of geographical region, and were to be located in museums (national, regional, and local), universities and private holdings both in their country of origin and internationally.

While history indicates that Indigenous groups had always been concerned at the removal of remains, opposed it when they could and had in a few known instances requested returns (Gunson 1974: 1, 84; Turnbull 2002; Fforde 2004: 61–75), the reburial issue came to the fore in the mid-1980s. A small number of significant returns had occurred prior to this date, but it was only in the 1980s that Indigenous concerns were made loud and clear to the archaeological, anthropological, and museum professions (Hubert 1989; Mulk 2009). By the time of the Inter-Congress, the reburial issue could be considered the single most important point of debate for these stakeholders: for Indigenous groups it raised deep concerns about the treatment of their dead, and for scientists and museum professionals it raised questions of profound significance about ethics, the future of research, and the role of museums (Layton 1989; Weatherall 1989; Watkins 2003; Turnbull and Pickering 2010).

As noted by US archaeologist Larry Zimmerman, who hosted and helped to organize the Inter-Congress, the Vermillion meeting was not the first cooperation between Native Americans and archaeologists on the issue of human remains (2002: 91). Nor was it the first time that the issue had been debated at an international level – this had occurred at the first meeting of WAC in Southampton, UK in 1986. Indeed, the decision to hold the Inter-Congress had been taken by the organizing committee at the 1986 meeting due to the presentations, discussion and debate about the issue brought to the Congress by its Indigenous participants (e.g., Hammil and Cruz 1989; Hubert 1989; Richardson 1989 and see Turner 1989). However, the Vermillion Inter-Congress was the first time that archaeologists and Indigenous people were "able to come to agreement on working toward real solutions" (Zimmerman 2002: 91), and the result was the Vermillion Accord.

Initial reaction to the Accord from the archaeological community was varied. The Society of American Archaeology disagreed with its contents, whereas the Canadian Archaeological Association and the Australian Archaeological Association adopted the Accord with some changes to reflect local circumstances (Zimmerman 2006: 89 and see Watkins et al. 1995 for a review of policies). Shortly after the Accord was adopted, and following two decades of lobbying by Native American groups, *The National Museum of the American*

Indian Act (1989) followed by *The Native American Graves Protection and Repatriation Act* (1990) were made law in the USA. While these significant pieces of repatriation legislation should not be seen as a result of the Vermillion Accord, its adoption demonstrates clear awareness of the need to provide real solutions to the repatriation issue at that time, and it is legitimate to argue that it contributed to the passing of this legislation. WAC continued to develop policy in this area, adopting its Code of Ethics on Members Obligations to Indigenous Peoples in 1990, and the Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects in 2006.

The Vermillion Accord was adopted at the end of a decade which had witnessed considerable efforts by Indigenous communities to seek the return of their dead, had resulted in a small number of returns to communities, and demonstrated that some archaeologists had begun to change their stance around retention. Throughout the 1990s, countries with Indigenous claimants moved to develop pro-repatriation policies, but in Europe only a small number of museums agreed to return remains, and these were almost all from the UK. Changes gathered pace in the 2000s, with more remains returned to Australia and some to New Zealand and North America, including from many UK institutions that had steadfastly refused requests in previous decades.

While the reburial debate was (and in some areas continues to be) deeply divisive (see Hubert 1992; Jones and Harris 1998; Mulk 2009), both within the scientific profession and between scientists and Indigenous groups, the Vermillion Accord was an early signal not only that scientists and Indigenous groups could come to agreement, but also that polarized arguments suggesting that, for example, Indigenous groups were "anti-science" or that all scientists shared the same views, were not the reality. Fundamentally, the Accord may be seen as an early signal of the opening up of dialogue between Indigenous groups and those professions which seek to study their past, the beginning of the ceding of exclusive control by the latter and the emergence of the development of collaborative partnerships around cultural heritage (Zimmerman et al. 2003; Phillips and Allen 2010; Turnbull 2010). It can also be viewed as an example of the significant role that the World Archaeological Congress has played in this shift.

Cross-References

- ▶ Australia: Indigenous Cultural Property Return
- ▶ Australia: Repatriation Acts
- ▶ Ethics and Human Remains
- ▶ Human Remains in Museums
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Peoples, Working with and for
- ▶ Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues
- ▶ Media and Archaeology
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Sacred Site Conservation and Preservation
- ▶ Society for American Archaeology (SAA)
- ▶ Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC): First Code of Ethics
- ▶ Zimmerman, Larry J.

References

Fforde, C. 2004. *Collecting the dead: Archaeology and the reburial issue*. London: Duckworth.

Gunson, N., ed. 1974. *Australian reminiscences and papers of L.E. Threlkeld, missionary to the Aborigines 1824–1859*, Australian Aboriginal Studies. Vol. 40. Canberra: Aboriginal Studies Press, Australian Institute of Aboriginal Studies.

Hammil, J., and R. Cruz. 1989. Statement of American Indians against desecration before the world archaeological congress. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 195–201. London: Routledge.

Hubert, J. 1989. A proper place for the dead: A critical review of the 'reburial' issue. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 131–166. London: Routledge.

Hubert, J. 1992. Dry bones or living ancestors? Conflicting perceptions of life, death and the universe. *International Journal of Cultural Property* 1: 105–127.
Jones, D.G., and R.J. Harris. 1998. Archaeological human remains: Scientific, cultural, and ethical considerations. *Current Anthropology* 30: 253–264.
Layton, R. 1989. *Conflict in the archaeology of living traditions*. London: Routledge.
Mulk, I. 2009. Conflicts over the repatriation of Sami cultural heritage in Sweden. *Acta Borealia: A Nordic Journal of Circumpolar Societies* 26: 194–195.
Phillips, C., and H. Allen. 2010. *Bridging the divide: Indigenous communities and archaeology into the 21st century.* Walnut Creek: Left Coast Press.
Richardson, L. 1989. The acquisition, storage and handling of Aboriginal skeletal remains in museums: An indigenous perspective. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 185–199. London: Routledge.
Turnbull, P. 2002. Indigenous Australian people, their defence of the dead and native title. In *The dead and their possessions: Repatriation in principle, policy and practice*, ed. C. Fforde, J. Hubert, and P. Turnbull, 63–86. London: Routledge.
Turnbull, P. 2010. The Vermillion Accord and the significance of the history of the scientific procurement and use of indigenous Australian bodily remains. In *The long way home: The meaning and values of repatriation*, ed. P. Turnbull and M. Pickering, 117–134. New York: Berghahn Books.
Turnbull, P., and M. Pickering, eds. 2010. *The long way home: The meaning and values of repatriation*. New York: Berghahn Books.
Turner, E. 1989. The souls of my dead brothers. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 189–194. London: Routledge.
Watkins, J. 2003. Archaeological ethics and American Indians. In *Ethical issues in archaeology*, ed. L. Zimmerman, K.D. Vitelli, and J. Hollowell-Zimmer, 129–142. Plymouth: AltaMira Press.
Watkins, J., L. Goldstein, K. Vitelli, and L. Jenkins. 1995. Accountability: Responsibilities of archaeologists to other interest groups. In *Ethics in American archaeology: Challenges for the 1990s*, ed. M. Lynott and A. Wylie, 33–37. Washington, DC: Society of American Archaeology.
Weatherall, R. 1989. *Aborigines, archaeologists and the rights of the dead*. Paper presented at the 1989 WAC Inter-Congress, Vermillion.
Zimmerman, L. 2002. A decade after the Vermillion Accord: What has changed and what has not? In *The dead and their possessions: Repatriation in principle, policy and practice*, ed. C. Fforde, J. Hubert, and P. Turnbull, 91–98. London: Routledge.
Zimmerman, L. 2006. Liberating archaeology, liberation archaeologies, and WAC. *Archaeologies* 2: 85–95.
Zimmerman, L., K.D. Vitelli, and J. Hollowell-Zimmer. 2003. *Ethical issues in archaeology.* Plymouth: AltaMira Press.

Vermillion Accord on Human Remains (1989) (Legislation)

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Introduction

The World Archaeological Congress (WAC) adopted the Vermillion Accord on Human Remains at its first Inter-Congress, held at Vermillion, South Dakota, in September 1989. The Accord comprises six principles that have since greatly influenced debates and the formulation of ethical policies in respect of scientific use of human remains by archaeologists and researchers in cognate disciplines.

Definition

The first four principles of the Accord commit WAC members to observe and advocate the following:

1. Respect for the mortal remains of the dead shall be accorded to all, irrespective of origin, race, religion, nationality, custom, and tradition.
2. Respect for the wishes of the dead concerning disposition shall be accorded whenever possible, reasonable, and lawful, when they are known or can be reasonably inferred.
3. Respect for the wishes of the local community and of relatives or guardians of the dead shall be accorded whenever possible, reasonable, and lawful.

4. Respect for the scientific research value of skeletal, mummified, and other human remains (including fossil hominids) shall be accorded when such value is demonstrated to exist.

The Accord further specifies that:

5. Agreement on the disposition of fossil, skeletal, mummified, and other remains shall be reached by negotiation on the basis of mutual respect for the legitimate concerns of communities for the proper disposition of their ancestors as well as the legitimate concerns of science and education.
6. The express recognition that the concerns of various ethnic groups as well as those of science are legitimate and to be respected will permit acceptable agreements to be reached and honored.

Key Issues

The Accord was drafted by members of WAC and representatives of indigenous communities wanting to find common ground after a decade of organized, vigorous campaigning – notably by North American Indians and Australian Aboriginal people – to put an end to the unrestricted exhumation, study, and keeping by museums, universities, and other scientific institutions of indigenous skeletal remains and grave goods. Discussions at Vermillion further brought to light evidence that North American, Australian, and European museums and medical school collections included bones and soft tissue structures from the bodies of indigenous people killed during the nineteenth century in frontier clashes with settlers, police, or military personnel.

In adopting the Accord, WAC committed its members to respect the rights of the dead to burial in accordance with ancestral or contemporary religious beliefs and practices and to recognize the rights of those with familial, communal, or cultural obligations to care for the dead to do so without hindrance or constraint. At the same time, by the Accord, WAC formally declared its commitment to promoting the scientific study of human remains for the benefit of all humanity.

What was most significant about the adoption of the Accord was that it affirmed the importance of recognizing the value of research on human remains but did so after emphasizing the need to respect the wishes of those with not just familial but obligations of "guardianship" to the dead. WAC members unanimously agreed that only by scientists respecting the continuing rights of indigenous people to treat remains in accordance with their religious or cultural beliefs, would they gain sufficient moral standing to try and convince those with affinities to the dead to permit remains to be used for research.

This was a major step beyond how archaeological and other research communities had previously responded to increasingly determined campaigning by indigenous people for ownership and control of the fate of remains. Up until this time, researchers and museum curators were in general ready to agree to surrender for reburial the remains of known individuals, but publically affirmed their opposition to the reburial or cremation of all other remains on the grounds that this would deny science evidence of potentially great value in producing new knowledge of our species' evolutionary development.

On the face of it, the principles set out in the Accord appear to stand at odds on the fundamental issue of recognizing that both researchers and indigenous people have legitimate concerns in respect of the dead. Indigenous intellectuals and postcolonial scholars have argued that justifying preservation and unrestricted research on remains on the grounds of potentially producing new knowledge of benefit to all humankind, or people sharing a common genetic ancestry, risks promoting the interests and ambitions of scientific practitioners over the religious beliefs and cultural traditions of peoples who, in many instances, continue to struggle to overcome the ingrained psychic and material legacies of colonialism. Researchers with interests in human remains have countered that recognizing culturally based claims of rights to determine the fate of human remains risks losing our means of gaining new insights into our evolutionary history or possibly understanding the causes of disease in specific populations. The most strident opposition to returning remains to the care of

indigenous communities came from scientists who believed that they were defending the heritage of humankind against "indigenous creationists."

In practice, however, the Accord has contributed greatly to the development of new and mutually beneficial relations between indigenous communities with affinities to remains, research communities, and museums. Its principles have been adopted by or greatly influenced thinking about the ethics of research on human remains within government circles, international and national scientific societies, and the museum sector. The Accord was used in the early 1990s by several Australian State Governments as the basis for developing new policies in regard to Aboriginal and Torres Strait Islander human remains. In 1991 the Council of Australian Museum Directors (CAMD) drafted a new national policy for museums and Aboriginal Australian people. In regard to human remains, CAMD endorsed the Vermillion principles, reasoning that they would permit acceptable agreements to be reached and honored. Since then, the Accord has informed discussions among museum professionals in many countries worldwide, similarly resulting in the adoption of new policies and practices governing the keeping, or surrender to community claimants' ownership and control, of human remains and cultural property of profound significance.

The Vermillion principles were incorporated within WAC's 1990 Code of Ethics and used in 2006 in developing the Tamaki Makau-rau Accord, which addresses the sensitive issue of displaying human remains and sacred objects in museums and by other media. Moreover, the Code and Tamaki Makau-rau reflect an expansion of the Vermillion principles to recognize that communities with legitimate claims to remains held in scientific collections may include, but are not limited to, ethnic, racial, religious, traditional, or indigenous groups of people.

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Ethics and Human Remains
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation: Overview
- ▶ World Archaeological Congress (WAC): First Code of Ethics

Further Reading

Turnbull, P., and M. Pickering, eds. 2010. *The long way home: The meaning and values of repatriation*. Oxford: Berghahn.

Zimmerman, L. 1992. A decade after the Vermillion Accord: What has changed and what has not? In *The dead and their possessions: Repatriation in principle, policy and practice*, ed. J. Hubert, C. Fforde, and P. Turnbull, 91–99. London: Routledge.

Vertebrate Taphonomy in Archaeological Research

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Introduction

Broadly applied, taphonomy is the study of what happens to objects after they leave the biosphere (living contexts), enter the lithosphere (buried contexts), and are subsequently recovered and studied. Taphonomy is of interest to any scientific discipline that investigates the buried record, including archaeology, paleobiology, paleontology, and soil sciences. Although the methodological framework of taphonomy can be applied to the study of practically any kind of material that was once buried, including ceramics and lithics, its archaeological application usually involves the study of preserved organic residues. Vertebrate taphonomy is further restricted to the study of preserved skeletal specimens that originate from a subphylum of animals who share a number of characteristics but importantly possess a living endoskeleton of cartilage and bone. These consist of specimens

from zoological classes of living jawed vertebrates that are often recovered through archaeological excavation, including Chondrichthyes (cartilaginous fishes), Osteichthyes (bony fishes), Amphibia (amphibians), Reptilia (reptiles), Aves (birds), and Mammalia (mammals).

Definition

Taphonomy has been described as "the study of natural processes of preservation and destruction" (Behrensmeyer 1984: 558). Vertebrate taphonomists are interested in studying all of those processes that contributed to the preservation and/or destruction of bone specimens as they progress through successive, often nonlinear and recursive, stages from death through decomposition, burial, recovery, analysis, and curation. The recovered sample can display preserved evidence of these processes in the form of a taphonomic overprint. Taphonomists attempt to (1) identify the specific agents (physical cause of modification) that have contributed to preservation and destruction based on surviving clues (taphonomic effect, trace, or signature) in the archaeological record, (2) recognize how the recovered samples differ from the originally accumulated and deposited assemblages and evaluate the significance of differential preservation to subsequent interpretation, and (3) infer a relative chronology (taphonomic history) of taphonomic processes (dynamic actions of taphonomic agents) that have affected the assemblage (Behrensmeyer 1984; Lyman 1994).

Historical Background

Taphonomy is a neologism that was first introduced into the literature by Russian paleontologist Ivan A. Efremov. Derived from the Greek *taphos* (burial) and *nomos* (law), taphonomy concerned "the study of the transition (in all its details) of organic remains from the biosphere into the lithosphere" (Efremov 1940). Although its name is of recent derivation, interest in the processes that form the buried record has a long history in archaeology, one which originates at least with the early nineteenth century curiosity surrounding the relationship between human artifacts and extinct Pleistocene mammals (Grayson 1986). In archaeology, taphonomic studies generated increasing attention during the latter half of the twentieth century and gained more recent momentum due to controversial interpretations about early hominid behavior that were inferred from associated bone assemblages (Binford 1981; Brain 1981). Today, vertebrate taphonomy has become such an essential tool in the analysis and interpretation of archaeofaunal assemblages that it is difficult to consider it as a separate aspect of study and anything other than a standard component of practice which is necessarily basic to all analyses of archaeological bone specimens.

Key Issues/Current Debates

Analysis of vertebrate specimens recovered from excavated archaeological contexts is generally used to establish inferences about past subsistence and ecological contexts. Preserved archaeofaunal assemblages are usually composed of two related subsets of bone specimens that were originally accumulated at the site of deposition: (1) intentionally by humans as by-products of subsistence and (2) by any number of agents that were either incidental to human activities or not. Both subsets can be used in paleoecological inference; however, subsistence inferences tend to emphasize the analysis of specimens that were intentionally accumulated and deposited by humans for subsistence purposes. Although intuitively obvious, it is important to emphasize that both subsets of archaeofaunal specimens in the recovered sample differ quantitatively and qualitatively from the target population of interest, the living organisms that were associated with any area or time of archaeological attention (Fig. 1). Specimens that were recovered from the context of archaeological interest were selectively accumulated and deposited by various human and nonhuman mechanisms. After their deposition, specimens were further affected by a potentially wide range of taphonomic processes that could have subsequently modified their spatial arrangement and/or qualitative and quantitative attributes before and after burial and prior to eventual

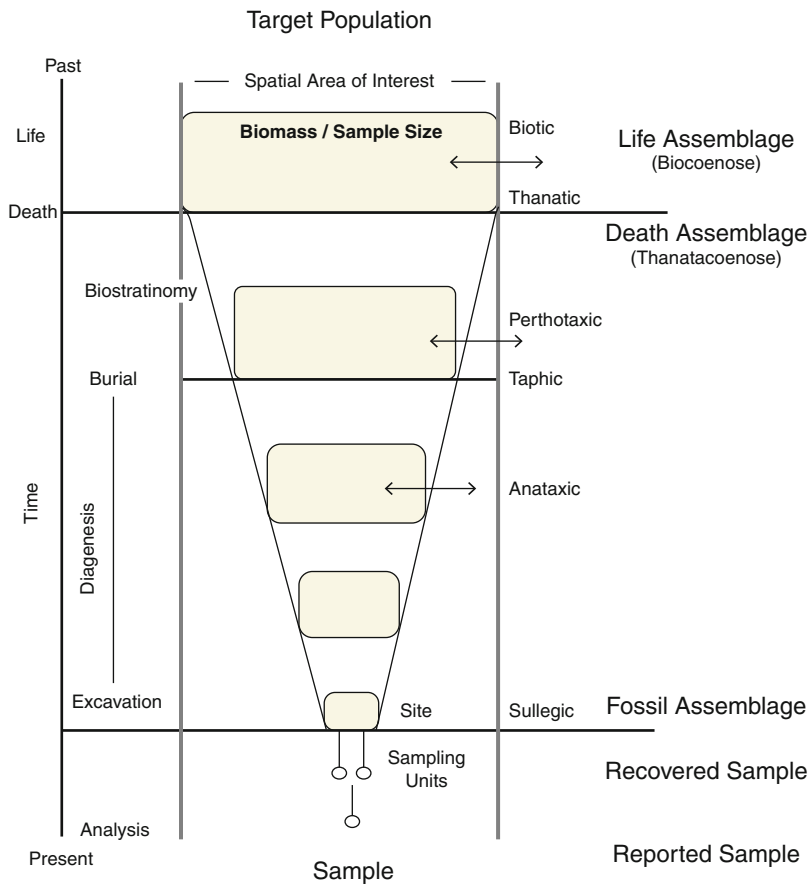

Vertebrate Taphonomy in Archaeological Research, Fig. 1 Schematic taphonomic framework emphasizing the relationship between a recovered and analyzed archaeological sample and the archaeologist's target population of interest

recovery in archaeological excavation (Clarke and Kietzke 1967; Grayson 1981; Lyman 1987; Wilson 1988). Both subsets are important to archaeological interpretation; however, it is crucial to consider their relationship to the original target of interest and their relevance and reliability in terms of the questions that we ask and the answers that we seek. It is important to consider the potentially different taphonomic histories that formed the sample. Taphonomic evidence is potentially accessible through the study of traces or signatures that might have preserved in the recovered specimens and their associated depositional contexts. The recognition of signatures and their use in interpretation is established through middle range research which experientially examines and evaluates causes and their effects (Binford 1981).

Factors that contributed to these histories can include various processes involved in the perimortem and postmortem accumulation, deposition, dispersal, and destruction of the archaeofaunal assemblage, in addition to technical and methodological aspects involved in its archaeological recovery, analysis, identification, and curation. Although taphonomists search for clues in the study sample and associated archaeological contexts, they must remain ever mindful of pervasive equifinality (similar outcome produced by different events). Multiple effects may be produced by one process, similar effects may be produced by different processes, or observable effects may be obscured through subsequent assemblage formation.

Perimortem Assemblage Accumulation and Deposition

Most vertebrate archaeofaunal assemblages were originally accumulated and deposited through varying processes, and because of the different questions asked by archaeologists, it is important to distinguish between the different taphonomic

histories represented in the sample. Specimens of animals that were selectively accumulated by humans for subsistence purposes can contribute to paleoecological inferences; however, these are relevant to conditions in areas from which they were selectively procured and subsequently transported. Specimens whose accumulation was incidental to human consumption can provide information about ecological conditions in and around the immediate area of deposition. They may represent the preserved specimens of animals that were deposited at the time of human occupation, or they may embody evidence of later intrusion into site contexts. These specimens often consist of bones from smaller anthropic (associated with humans) taxa, like rodents that are generally treated as nuisance rather than prey items. While alive, they thrive in the conditions that are created in and around human activity, and after death their skeletons can be subsequently incorporated into the immediate sedimentary record through accidental entrapment, fire, flood, or natural death in underground burrows. Relevant signatures can be identified in preserved specimens and their associated contexts. High concentrations of anatomically complete skeletons with relatively, little perimortem damage, and relatively intact anatomical articulation can suggest accidental in situ death and subsequent decay. Pale surface coloration of preserved bone specimens that contrasts with otherwise soil-stained assemblages might suggest intrusion. Associated contextual information as visible krotovinas (soil-filled burrows) or vertical/spatial association with features that inhibit escape can be crucial for establishing the mechanism of accumulation, as can the ecological and biological characteristics of the identified taxa (Stahl 1996). Bone specimens can be accumulated, modified, and subsequently deposited as prey items by human and nonhuman predators. Prey taxa can be identified through digested bone specimens deposited in scats and pellets, whereas predators can be identified through modifications that occurred during capture, consumption, and digestion. Signature criteria are established through actualistic study and consist of corroborating evidence like tooth marks, acid etching, patterned bone fragmentation, skeletal element representation, adhering scat material, archaeological context, and ecological information (Andrews 1990; Stahl 1996). Regardless of which predator accumulated and deposited them, preserved prey specimens can provide information on ecological conditions. Carnivores, and especially domestic dogs when present, can accumulate, modify, spatially rearrange, and deposit bones that can subsequently be incorporated into the archaeological record. In particular, tooth mark morphology, frequency, orientation, and patterning on preserved bone specimens are compared to results from actualistic studies and used to establish their involvement in assemblage formation (Binford 1981; Brain 1981).

Bones that were accumulated, modified, and deposited by humans for subsistence purposes are often identified by similar criteria, including patterned bone breakage, tooth marks, and carcass disarticulation; however, a wider range of potential data are implicated primarily because of the highly varied nature of cultural consumption. Butchery scars produced by tools are noted for their location, orientation, and morphology, yet these are often rare. Interpretations based solely on patterned breakage and disarticulation are especially prone to equifinality as these forms of alteration are often guided by anatomical rather than predator-specific variables (Hill 1979; Lyman 1987b). Archaeologists record the extent and anatomical location of discoloration on bone surfaces that have been exposed to heat as important evidence for human consumption. Bone discoloration can be compared with results from actualistically derived studies that associate color with temperature in order to assess the degree of exposure to heat (Shipman et al. 1984). However, bone discoloration is not necessarily a product of cooking, as many cooking techniques leave no trace of direct heat modification. Discoloration of bone is more often than not the result of intentional disposal or use as fuel. Sometimes bones used as tools can substantiate human use, as can archaeological context. In any case, the strength of the inference is increased through using multiple lines of evidence.

Postmortem Accumulation, Dispersal, and Destruction

A wide variety of processes can affect the quantitative and qualitative structure of the deposited assemblage prior to burial. Water movement can alternately modify, spatially arrange, winnow, and accumulate bone assemblages. Different velocities and sediment substrates are implicated in the size, shape, and density sorting of bone specimens, particularly those from smaller skeletons which are prone to movement at even low hydrodynamic velocity. Evidence for water movement can be found in patterned spatial orientation of bone specimens, surface modifications, and analysis of sediment matrix (Voorhies 1969; Behrensmeyer 1975). Deposited bone specimens can be subsequently modified or completely removed by animals for mineral consumption and dental maintenance, sometimes leaving visible clues that can lead to the identification of the modifier. Exposed bone that is trampled can produce breakage, surface modification, and size-sorted horizontal and vertical spatial movement. Exposed bone can become weathered over time, and the extent of bleaching, cracking, exfoliation, and disintegration can be used to assess the duration of exposure, ambient pre-burial environments, sequential burial and reexposure, and attritional and catastrophic accumulation (Behrensmeyer 1975). Bone assemblages continue to be altered after burial and during diagenesis through chemical dissolution as the physical properties of the buried bone complexly interact with ambient matrix conditions. Burial environments can also substitute or add to buried bone materials and contribute to breakage or vertical and spatial movement through mechanical pressure. Diagenetic modifications are inferred from comparisons with actualistic studies by means of chemical assays, fracture morphology, coloration, surface changes, conjoinability, and archaeological context (Hedges 2002).

Archaeological Recovery, Analysis, Identification, and Curation

Prior to excavation and recovery of archaeofaunal assemblages, the factors that contributed to the unique taphonomic histories of preserved specimens are outside of the archaeologist's purview. However, the different techniques and screen aperture sizes used in field recovery can strongly affect the qualitative and quantitative characteristics of the studied sample. This can, in turn, affect counting statistics and estimations of assemblage diversity. Increasingly meticulous recovery using fine aperture mesh or water flotation augments the recovery of smaller items which can skew assemblage composition toward domination by smaller specimens. The latter can affect assemblage characteristics by increasing the proportion of smaller animals or indeterminately identified specimens that cannot be reliably identified because they are too small. These factors also implicate the differential fragmentation of specimens, a process which can continue during recovery, and subsequent processing and handling. Fragmentation is relevant to analysis and interpretation only if it preceded recovery and can be accordingly identified by coloration of recent fracture surfaces. Correction factors, comparison of retrieved samples with known recovery results, and actualistically derived affects of differing screen apertures (Schaffer and Sanchez 1994) can be used to assess recovery-related influences. Other evidence for understanding assemblage accumulation and deposition is observed in archaeological contexts during field excavation, including skeletal articulation, intrusion, and spatial/vertical association in feature contexts. Specimen identification is also affected by taphonomic history as denser elements, or portions thereof, are differentially resistant to fragmentation and often preserve with enhanced diagnostic potential. Conversely, differential fragmentation can also obscure identification, as when preserved specimens are too small to be reliably identified. Often, preserved specimens of small-bodied animals may be large enough for identification, whereas large-bodied animals can yield larger indeterminate fragments (Watson 1979). The qualitative and quantitative structure of the sample, how representative it is of the target of interest, and its overall utility for answering research questions are direct outcomes of identification.

Equifinality

Equifinality often confounds interpretations of taphonomic histories and evaluations of the relationship between sample and target assemblages using criteria derived from actualistic studies in middle range research. One taphonomic process may produce different preserved effects. Different taphonomic processes may produce the same preserved effect. Taphonomic processes may produce no preserved effect, or preserved evidence that was available at one point in a taphonomic history may have been subsequently obscured by a later process. Bone destruction and preservation, as defining features of taphonomy, are strongly mediated by the differential structural density of osseous tissue within skeletal elements. Relatively fragile portions of elements are more prone to destruction; relatively harder portions are more prone to preservation. Many different taphonomic processes are implicated as ultimate causal factors that can contribute to differential bone destruction, whereas the proximate causal factor is bone structural density. Taphonomists compare differential bone preservation to experimentally derived structural density values from different portions of the vertebrate skeleton in order to assess whether or not survivorship was influenced by attritional forces whose effects were mediated by differential bone structural density. The procedure can be used as a first-order approximation for exploring assemblage survivorship; however, observations from the recovered specimens and their archaeological context are used to uncover evidence for the ultimate causes behind assemblage preservation. The likelihood that the assessment is a correct one is strengthened through the use of multiple, corroborating lines of evidence (Brain 1981; Lyman 1994).

Subsistence Interpretation

Interpretations pertaining to human subsistence are more reliably derived from the analysis of bones that were originally accumulated and deposited by humans for their consumption. However, the quantitative and qualitative structure of the recovered sample is never isomorphic with the target assemblage. Fluctuations in the basic counting statistic (NISP or Number of Identified Specimens) are affected by various taphonomic processes involved in differential fragmentation, preservation, and recovery (Grayson 1981). Archaeological data are used to identify the kinds of animals that were exploited in the past, which sexes or ages were preferred, and when, where, and how they were procured, processed, and consumed. However, because the exact quantitative relationship between sample and target assemblages can never be known, it is usually difficult to establish anything more than a rough estimate of relative contribution to human subsistence.

Paleoecological Interpretation

Inferential logic in paleoecological study relies on contemporary observations of living organisms. It links existing ecological relationships among analogous living organism with animals identified in the recovered sample that were accumulated and deposited at some earlier period and place of archaeological interest. Findley (1964) previously identified four important problems that are immediately relevant to paleoecological inference building: (1) although the ability to identify animals varies between different elements in different skeletons and can be obscured by taphonomic processes, paleoecological inferences require high-resolution identifications; (2) even where high-resolution identifications are possible, available ecological data may be poorly known; (3) many animals are widely distributed and broadly tolerant of a wide range of ecological conditions; thus, greater emphasis is placed on specific animals that tolerate only a narrow range of conditions; and (4) the relationship between an animal and its not static and can change through time. The quantitative relationship between sample and target assemblages is never isomorphic, and the exact significance of taxonomic abundances in the sample is difficult to determine. Therefore, interpretations that are based on treating identified taxa as variables have a higher likelihood of being incorrect. Treating identified taxa as attributes is the only currently acceptable

approach to paleoenvironmental analysis. Interpretation based on presence and absence, with asymmetrical emphasis on the former over the latter, greatly reduces the chances of inappropriate conclusions. Attribute-level treatment is still vulnerable to problems associated with analogical reasoning and to obstacles created during taphonomic history; however, these problems can be mitigated through reconstructing communities of associated vertebrates. Multiple concordance within an identified suite of taxa overcomes problems associated with archaeological resolution and long-distance transport and strengthens the analogy because the niche of the entire community is narrower than that of any individual component. The possibility that all members of the entire community were affected in the same direction and to the same magnitude is far less than the same possibility affecting only one member of the community (Grayson 1981). The validity of inferences based on the recovered vertebrate sample can be further corroborated with other associated archaeological data.

Cross-References

- ▶ Bone Density Studies in Environmental Archaeology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Experimental Maritime Archaeology
- ▶ Middle-Range Theory in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Site Formation Processes
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy: Definition
- ▶ Zooarchaeology

References

Andrews, P. 1990. *Owls, caves and fossils*. Chicago: University of Chicago Press.

Behrensmeyer, A.K. 1975. The taphonomy and paleoecology of Plio-pleistocene vertebrate assemblages east of Lake Rudolf, Kenya. *Bulletin of the Museum of Comparative Zoology* 146: 473–578.

Behrensmeyer, A.K. 1984. Taphonomy and the fossil record. *American Scientist* 72: 558–566.

Binford, L.R. 1981. *Bones: Ancient men and modern myths*. Orlando: Academic Press.

Brain, C.K. 1981. *The hunters or the hunted? An introduction to African cave taphonomy*. Chicago: University of Chicago Press.

Clarke, J., and K.K. Kietzke. 1967. Paleoecology of the lower nodule zone, Brule formation in the big badlands of South Dakota. *Fieldiana: Geology Memoirs* 5: 111–129.

Efremov, I.A. 1940. Taphonomy: A new branch of paleontology. *Pan-American Geology* 74: 81–93.

Findley, J.S. 1964. Paleoecological reconstructions: Vertebrate limitations. In *Proceedings of the Fort Burgwin conference on paleoecology*: 1962 (Number 3), ed. J.J. Hester and J. Schoenwetter, 23–25. Fort Burgwin: Fort Burgwin Research Center.

Grayson, D.K. 1981. A critical view of the use of vertebrates in paleoenvironmental reconstruction. *Journal of Ethnobiology* 1: 28–38.

Grayson, D.K. 1986. Eoliths, archaeological ambiguity, and the generation of "middle-range" research. In *American archaeology past and future*, ed. D.J. Meltzer, D.D. Fowler, and J.A. Sabloff, 77–133. Washington (DC): Smithsonian Institution Press.

Hedges, R.E.M. 2002. Bone diagenesis: An overview of processes. *Archaeometry* 44: 319–328.

Hill, A.P. 1979. Butchery and natural disarticulation: An investigatory technique. *American Antiquity* 44: 739–744.

Lyman, R.L. 1987a. Zooarchaeology and taphonomy: A general consideration. *Journal of Ethnobiology* 7: 93–117.

Lyman, R.L. 1987b. Archaeofaunas and butchery studies: A taphonomic perspective. In *Advances in archaeological method and theory, volume 10*, ed. M.B. Schiffer, 249–337. San Diego: Academic Press.

Lyman, R.L. 1994. *Vertebrate taphonomy*. Cambridge: Cambridge University Press.

Schaffer, B.S., and J.L.J. Sanchez. 1994. Comparison of 1/8″ and ¼"-mesh recovery of controlled samples of small-to-medium-sized mammals. *American Antiquity* 59: 525–530.

Shipman, P., G. Foster, and M. Schoeninger. 1984. Burnt bones and teeth: An experimental study of color, morphology, crystal structure and shrinkage. *Journal of Archaeological Science* 11: 307–325.

Stahl, P.W. 1996. The recovery and interpretation of microvertebrate bone assemblages from archaeological contexts. *Journal of Archaeological Method and Theory* 3: 31–75.

Voorhies, M. 1969. *Taphonomy and population dynamics of an early Pliocene vertebrate fauna, Knox County, Nebraska,* Contributions to Geology Special Paper 1. Laramie: University of Wyoming.

Watson, J.P.N. 1979. The estimation of the relative frequencies of mammalian species: Khirokitia, 1972. *Journal of Archaeological Science* 6: 127–137.

Wilson, M.V.H. 1988. Taphonomic processes: Information loss and information gain. *Geoscience Canada* 15: 131–148.

Further Reading

Behrensmeyer, A.K., and A.P. Hill, eds. 1980. *Fossils in the making: Vertebrate taphonomy and paleoecology.* Chicago: University of Chicago Press.

Shipman, P. 1981. *Life history of a fossil. An introduction to taphonomy and paleoecology.* Cambridge: Harvard University Press.

Vestígios, Revista Latino-Americana de Arqueologia Histórica

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Basic Information

Latin-American historical archaeology has been established as a field of study in the last few decades. Although the scope of research among its scholars is diverse, there are some specific issues that have attracted special attention. Among these, theoretical production and the formulation and development of alternative approaches to those produced in the centers of power can be highlighted.

Unfortunately, despite the growth and the variety of research being carried out in Latin-American historical archaeology, it still lacks the adequate amount of channels of exchange among scholars from different countries. In this sense, investigations have been restricted to the boundaries of researchers' own countries. These artificial constraints have resulted in the creation of difficulties in the search for commonalities that would allow the consolidation of a Latin-American historical archaeology.

Major Impact

It is possible to state that the establishment of connections between the archaeologies of different countries has become one of the greatest challenges being faced at the contemporary setting. The presence of pluralistic spaces of discussion is essential in approaching issues such as the genesis of modern society in Latin America and the historical connections that help to reconstruct regional social practices, in the contexts in which they occurred, through the study of material culture.

Vestígios, *Latin-American Historical Archaeology Journal*, intends to create this space of exchange and interaction among scholars of the discipline. The journal was implemented in 2007 with a solid criterion of excellence – through peer reviews – and an international board of archaeologists such as Mary Beaudry, Randall McGuire, Stanley South, Matthew Johnson, Kathleen Deagan, Pedro Funari, and Tania Andrade, among others. The journal is particularly interested in method and theory as well as in different case studies from Latin-American historical archaeology.

The journal presents two annual issues, with original papers, and the translation of a classic article (either in English or other languages) to Spanish or Portuguese (the official languages of the journal).

The journal is published by the Laboratório de Arqueologia da Faculdade de Filosofia e Ciências Humanas da Universidade Federal de Minas Gerais (Archaeological Lab of the Philosophy and Human Sciences College from the Federal University of Minas Gerais), and it has been funded by different agencies such as CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico), FAPEMIG (Fundação de Amparo à Pesquisa do Estado de Minas Gerais), and CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior).

Vestígios is available online (http://www.fafich.ufmg.br/vestigios/), free to read and download.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Funari, Pedro Paulo A. (Indigenous Archaeology)
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historical Archaeology
- ▶ Indigenous Archaeologies
- ▶ Lima, Tania Andrade
- ▶ Orser, Jr., Charles E.

References

Vestígios. n.d.. Available at: http://www.vestigios.org. Accessed 3 Sept 2013.

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Basic Biographical Information

For over 30 years, the research and works of Peter Veth (Fig. 1) have become synonymous with the prehistory of the Western Desert of Australia. Along with researchers such as Prof. Mike Smith and Prof. Peter Hiscock, Peter has been at the forefront of Australian archaeological debate since the 1980s. He is probably best known for his conceptual model, *Islands in the Interior*, which explored prehistoric hunter-gatherer colonization models, the response of people to climatic fluctuations such as during the Last Glacial Maximum, and more broadly the innate dynamism and resilience of desert hunter-gatherers (see below). More recently, Peter's interests have included global models for the emergence of desert societies, colonization timing and mechanisms in Australia, exploration and analysis of rock art across the arid zone, Native Title processes and investigations, and theoretical and methodological innovations in maritime archaeology. Peter has carried out major research programs in Maluku Province (eastern Indonesia), in East Timor, and in the remote Pacific. Peter has also been heavily involved in consulting archaeology in Western Australia and other parts of Australia; he remains one of the longest serving presidents of the Australian Association of Consulting Archaeologists Inc.

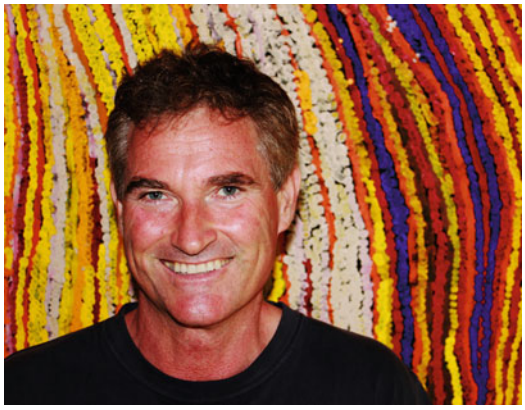

Veth, Peter M., Fig. 1 Photo of Peter Veth

Peter gained an interest in the Western Desert early in his career following a 6-week survey of Sturt Creek and Lake Gregory with Charles Amsden (a Doctoral graduand of Lewis Binford). In 1982, he completed his B.A. (Hons) thesis at the University of Western Australia (UWA) focussing on quarry and open sites on the Burrup Peninsula (Murujuga). Peter's Ph.D. (and subsequent work) undertook the first systematic investigation of the Little and Great Sandy Deserts of the Western Desert. His Ph.D. thesis used both surface analysis and excavation of key sites (Yulpul, Karlamilya, Winakurinjuna, Jalpiyari) around the Durba Hills and Rudall River to explore arid zone behavior and ultimately develop the *Islands in the Interior* model. He works closely with the *Martu* peoples – the last hunter-gatherers in the world to come in to contact with Europeans as late as 1963 and 1976.

The *Islands in the Interior* model emphasized the importance of persistent water sources and the abundance of economic plant resources in piedmont/montane uplands and riverine/gorge systems as refugia in periods of climatic extremes, the three major sand-ridge deserts as barriers, and the rest of the continent as temporary barriers to occupation during the height of the Last Glacial Maximum (see Fig. 4 in the entry on "▶ Australian Deserts: Extreme Environments in Archaeology"). Despite being based on the first archaeological data retrieved from this area, this model has proved to be robust since its inception and still forms the framework for prehistoric arid zone behavior through climatic extremes today. Peter's doctoral work incorporating this model was the first Australian archaeology thesis to be published internationally (University of Michigan Ann Arbor International Monograph Series) in 1993.

Following his postdoctoral research Peter obtained a position at James Cook University (JCU) as a lecturer in 1992. Peter remained at JCU for the next 11 years, being promoted to associate professor in 1997. During this time, he implemented Australia's first maritime archaeology undergraduate stream with Flinders University (and supervised the first doctoral candidates in that discipline); shifted his research focus toward the islands of the Indonesian archipelago with Prof. Matthew Spriggs and Prof. Sue O'Connor, including the first scientific investigation of the Aru Islands and East Timor and the discovery of Pleistocene-dated shell fish hooks at Lene Hara Cave, East Timor, with Sue O'Connor; and had increasing interest across the Torres Strait Islands with Dr. Melissa Carter who discovered and dated the first prehistoric pottery in Torres Strait. Peter's interest and research, however, continued in the arid zone, and he undertook several important investigations and discoveries during this time, including his excavations (with O'Connor) at Serpent's Glen rockshelter in the Carnarvon Ranges, which still represents the earliest evidence of human occupation (>23,500 BP) in the Western Deserts; the excavations (with Mike Smith and Michael Hadley) of Kaalpi rockshelter in the Calvert Ranges allowing further investigation of late-Holocene populations in the heart of the Great Sandy Desert; and the characterization of arid coastal occupation and exploitation across the Montebello Islands off the Pilbara coastline. Here occupation has been dated to at least 30,000 years ago.

Between 2005 and 2010 Peter co-discovered the earliest occupation in the Kimberley (between 45,000 and 50,000 BP) at *Parnkupirti* on the shores of Lake Gregory and codirected the first systematic survey and investigation of the rock art, archaeology, and dreaming narratives of the 1800-km-long Canning Stock Route with Professor Jo McDonald and colleagues. He has carried out the first dating of pigment art from the arid zone of Australia with Jo McDonald and colleagues in the US.

In 2011, Peter moved back to UWA and continues to excel. He has recently been awarded the Inaugural Kimberley Foundation Ian Potter Chair in Rock Art, a Winthrop Chair; received the Australian Research Council (ARC) Discovery Outstanding Researcher Award (Professorial Level 3) – one of the first archaeologists to do so; obtained the largest ARC Discovery Project grant in Australia for the archaeological investigation of Barrow Island off the Pilbara coastline; and is the series consultant on the upcoming ABC Television series on archaeology and indigenous heritage, *First Footprints*. He is currently also the lead chief investigator of the ARC Linkage Grant *The Australian Historic Shipwreck Protection Project* focusing on the archaeological study and in situ reburial of the colonial trader Clarence (1841–1850).

Major Accomplishments

Peter's pioneering and collaborative research has addressed a number of themes in archaeology, including (a) the first global review of the archaeology of desert hunter-gatherers; (b) theorizing information exchange in the archaeology of the deserts; (c) analyzing the role of art and aggregation cycles; (d) articulating mobility models for the Pleistocene and late Holocene; (e) examining the archaeology of desert-coastal occupations; (f) critiquing Neo-Marxist and ecological models

for change in desert societies; (g) examining the adaptive role of specialized technologies in the deserts, such as the tula adze; (h) modeling for mobility and assemblage variation in the deserts; (i) progressing studies of linguistic stratigraphy and archaeology; (j) establishing early occupation of the Western Desert; (k) examining the relationship between language boundaries and art style provinces; (l) the first direct dating of pigment art in the arid zone; (m) use of ArcGIS web-enabled DBs for the management of complex and remote sites in the Western Desert; (n) the archaeology of Pleistocene hunter-gatherers on islands within the arid zone; and (o) a paradigm shift in the accepted dynamism of Australian desert hunter-gatherer societies both through time and in space. His distinguished contributions were recognized in his election as a fellow of the Australian Academy of the Humanities in 2005 and five other fellowships and major awards for research excellence since 1992.

Cross-References

- ▶ Australia: Maritime Archaeology
- ▶ Australian Association of Consulting Archaeologists Inc. (AACAI)
- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Australian Rock Art
- ▶ Burrup Peninsula
- ▶ McDonald, Josephine J.
- ▶ Smith, Mike

Further Reading

Harrison, R., P. Veth, and J. McDonald, eds. 2005. Native title and archaeology. *Australian Aboriginal Studies* 2005/1. Canberra: AIATSIS.

McDonald, J., and P. Veth. 2012. *Companion to rock art*. Oxford: Wiley-Blackwell.

O'Connor, S., and P. Veth, eds. 2000. *East of Wallace's Line: studies of past and present maritime cultures in the Indo-Pacific region*, Modern Quaternary Research in South East Asia 16, V–VI. Rotterdam: A.A. Balkema.

O'Connor, S., M. Spriggs, and P. Veth, eds. 2005. *The archaeology of the Aru Islands, Maluku Province. Terra Australis*. Canberra: The Research School of Pacific and Asian Studies, The Australian National University.

Taylor, L., and P. Veth, eds. 2008. *Art and identity*, Australian Aboriginal Studies. Canberra: AIATSIS.

Veth, P.M. 1993. *Islands in the interior: the dynamics of prehistoric adaptations within the arid zone of Australia*, International Monographs in Prehistory, Archaeological series 3. Ann Arbor: Oxbow.

Veth, P.M., and G. Hamm. 1989. *The archaeological significance of the Lower Cooper Creek*, Monograph for the Lake Eyre Basin Project. Adelaide: South Australian Museum.

Veth, P., and P. Hiscock, eds. 1996. *Archaeology of northern Australia: Regional perspectives*, Tempus Archaeology and Material Culture Studies in Anthropology 4. St Lucia: Anthropology Museum, The University of Queensland.

Veth, P., M. Smith, and P. Hiscock. 2005. *Desert peoples: Archaeological perspectives*. Oxford: Blackwell Publishing.

Veth, P., K. Aplin, L. Wallis, T. Manne, T. Pulsford, and A. Chappell. 2007. *Late Quaternary foragers on arid coastlines: Archaeology of the Montebello Islands, Northwest Australia*, British Archaeological Reviews International series. Oxford: Archaeopress.

Veth, P., P. Sutton, and M. Neale. 2008. *Strangers on the shore: Early coastal contacts in Australia*. Canberra: National Museum of Australia.

Veth, P., M. Smith, J. Bowler, K. Fitzsimmons, A.N. Williams, and P. Hiscock. 2009. Excavations at Parnkupirti, Lake Gregory, Great Sandy Desert: OSL ages for occupation before the Last Glacial maximum. *Australian Archaeology* 69: 1–10.

Veth, P., N. Stern, J. McDonald, J. Balme, and I. Davidson. 2011. The role of information exchange in the colonisation of Sahul. In *The role of information in hunter-gatherer band adaptations*, ed. R. Whallon, W.A. Lovis, and R.K. Hitchcock, 203–220. Los Angeles: The Costen Institute of Archaeology Press of UCLA.

Vicus

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Introduction

The study of the Roman *vicus* involves a wide-ranging consideration of local neighborhoods in both urban and rural contexts. The *vicus* defined the political, administrative, and religious subdivision of Roman settlements. At the same time, such an investigation reveals the framework, articulation, and character of local, everyday life.

Vici were the basic building blocks of the Roman community.

Definition

Vicus (plural *vici*) is a Latin term that refers to a variety of small settlements, whether in town or in the countryside, in Rome or in Roman territory, or elsewhere. It has been related to the Greek *oikos* (house), but its meaning is closer to *amphodon* (street), *kome* (village), or to the Oscan *eituns* (neighborhood). Like many Latin words, this (seemingly technical) designation has a variety of overlapping and contrasting uses. Much controversy among scholars has resulted, with the debate recently becoming more polarized. Evoking both "house" and "street," *vicus* basically refers to a group of residential buildings around a street, which can be termed a "neighborhood" or "ward" inside a city or a "village" in the countryside. The street itself is seen as a unifier of the local inhabitants and a place for their shared life.

Historical Background

In Rome, *vicus* is the most commonly used name for "street" or "lane," the alternative being *clivus*, which refers specifically to a road on a hillside ("incline"). There were only two roads called via inside the city of Rome (*Sacra* and *Nova*). We are not informed of the size of the various *vici* in Rome (although some in the countryside were certainly very modest groups of houses: Tarpin 2008). As a result, the *vicus* has often been classified as the smallest urban unit recognized by Roman administrators. The landscape of the city changed radically through time so that the number of *vici* was constantly evolving (e.g., after the great fires of 64, 69, and 80 CE).

The names of the *vici* are varied and are commonly taken from a local ethnicity (*Vicus Tuscus* "Etruscan street"), a geographical feature (*Vicus Jugarius* "Yoke street"), a locally practiced trade (*Vicus Argentarius* "Street of the Bankers"), or a local deity (*Vicus Dianae* "Diana's street"). Steinby (1993–2000) has entries for each named *vicus* we know of in Rome. The term *vicus* can often (but need not) have an administrative or judicial meaning, as is explained in a famous definition of Festus (502, 508 L with Todisco 2006), who noted the wide range of competencies enjoyed by different *vici*, especially outside town.

Vicus is a term that is related to other geographical units, notably the *pagus* ("country district"), the *mons* ("hill"), and the *regio* ("region"). However, *vici* also existed in relation to the urban fabric as a whole (*urbs*, *municipium*, *colonia*), as well as to the city's ritual boundary (*pomerium*). In some cases, such as in Imperial Rome, the *vicus* was clearly an official subdivision of a designated larger urban district (*regio*). Some information about *vici* also comes from the fragments of the early third-century CE Severan Marble Plan of Rome (http://formaurbis.stanford.edu/). During the republican period, the *vici* of Rome apparently overlapped and competed with *pagi* and *montes* in town, while their relationship to the four republican city *regiones* is not directly attested. The republican *vici* also had relationships with the voting tribes. It is notable that extant indications of addresses given in ancient texts and inscriptions nearly all cite only a *vicus* (Castrén 2000). Once you were in the neighborhood, you could easily ask for the particular house or shop you were seeking.

The *vici* were administered by officials called *vici magistri* (or *vicomagistri*), locally elected each year, who were assisted by *ministri*. These local magistrates organized the annual festival of *Compitalia*, which was the main local holiday, a movable neighborhood feast in late December or early January (eventually fixed at third to fifth of January). The *Compitalia* was celebrated with an animal sacrifice, a banquet for all, and games (*ludi*) that could include theatrical productions. On this occasion (and perhaps for other official functions), the *vicomagistri* wore the purple-bordered toga of a magistrate of the Roman people and were accompanied by a *lictor* (attendant with rods and axes). The *vicomagistri* we know of were

of humble origin, most of them being freedmen. The *ministri* were nearly all slaves.

The life of the *vici* centered around local shrines (*compita*), most often located at crossroads where two or three roads converged (Varro *de lingua latina* 6.25). These shrines, in honor of the local deities called *lares compitales*, could be simple altars or small sanctuaries according to the size and resources of the *vicus* (Marcattili 2005; Steinby 1993–2000: the few named examples bear the names of local families, unlike the *vici*). The land the shrines stood on was consecrated and marked off from its surroundings. Other gods could be added to the cult of the *lares* and would share with them in protecting the neighborhood. Meanwhile, the nature of the *lares* as deities has been hotly disputed for over a century. Their shrines received private cult on a regular (perhaps daily) basis and public recognition on the local festival of *Compitalia*. Augustus added two more public holidays for the local *lares* (Suetonius *Divus Augustus* 31).

Most scholars tend simply to equate the compital shrine with the *vicus*, thus assuming one designated shrine in each neighborhood. Such an exact equivalency is not, however, directly indicated by ancient writers, many of whom still speak of the compital shrines separately without mentioning *vici* even in the Imperial period (e.g., Pliny *HN*3.66 re. 73 CE). There has been debate about whether an official neighborhood shrine should typically have been located at the middle or on the boundary of the individual *vicus*. Some annual rituals (*lustratio*) were designed to mark off the boundaries of the *vicus* (although these boundaries are now lost to us). A *vicus* could also contain other street shrines, but these are much less amply documented than the compital shrines of the *lares*. Compital cult, practiced by Italian merchants and their households, is attested on Delos in the second century BCE, when the island was administered by Athens and, therefore, had no *vici* (Hasenohr 2003). It should be noted that the *vicus* is consistently represented as much in terms of local shrines and festivals as in terms of administration or judicial competency. At the same time, the many aspects of the *vicus* (political, religious, social, economic) were designed to affirm identity and local community, whether more or less in connection to other geographical and administrative entities.

Vici and their associated shrines could also be found in diverse patterns across Italy and in the provinces of the Western Empire (Capogrossi Colognesi 2002; Tarpin 2002). Some cities in Italy had *vici* during the republican period, presumably in imitation of Rome (e.g., Capua, Minturnae). A *vicus* outside Rome could, however, indicate either a new settlement or a local village that had been appropriated by the Roman administration or even an indigenous settlement that chose voluntarily to represent itself in Roman terms. The traditional notion that *vici* were always subdivisions of *pagi* in the countryside has recently been challenged by Stek (2009). He has argued that there was no regular hierarchical connection between these two types of administrative units and that *vici* and *pagi* were unevenly distributed across Italy during the republican period. Stek's main proposition is that the Romans spread their culture in Italy through local cults and administrative units, which were often superimposed onto older patterns of settlement and existing rural shrines.

The *vici* of Rome had a long and evolving history, as the city grew over the centuries from a handful of very modest settlements to become the dominant metropolis of the Mediterranean, with a population of over a million people (Tarpin 2002, 2008). It is possible that *vici* existed as/in the villages that predated the foundation of the city (traditional date 753 BCE). On the other hand, Dionysius of Halicarnassus (4.14.3-4, 5.2.2; writing in the early years of Augustus' principate) records a tradition that assigns the creation of *vici* and the neighborhood cult of the *lares* to (legendary) King Servius Tullius, in the context of a systematic urban reform (sixth century BCE, Pliny *HN* 36.204). While the origins of the *vici* remain obscure, they contained elements that were increasingly formalized side by side with patterns of local life that evolved organically at a grassroots level.

Key Issues/Current Debates

There has been a lively debate over more than 20 years concerning the role of the *vici* during the republican period. It has been argued that the *vici* had very little in the way of any formal administrative function before the time of Augustus (Wallace-Hadrill 2003; Fraschetti 2005). According to this argument, the subdivisions of the larger *regiones* (4 before Augustus' reform) were mainly *pagi* (with their annual festival of the *Paganalia*) and *montes* (with their annual festival of the *Septimontium*). Alternatively, the 27 shrines of the Argei may have marked the local areas of this traditional republican city (Rodríguez Almeida 2002). On this view, Augustus would appear as a truly radical reformer, who gave obscure local entities a completely new and central role in his reorganization of the city.

There is, however, ample evidence of the existence of *vici* and of their compital cults in Rome before Augustus from a variety of sources beginning in the third century BCE. Accordingly, the competing view would see republican *vici* as vital political units as early as the later third century, when local distributions of wine and oil are already attested during the war against Hannibal (Tarpin 2002; Lott 2004). The existence of the ancient Latin term *vicatim* ("by vicus" Sisenna fr. 47) provides further evidence for communication from the political center expressed explicitly in terms of *vici*. Such *vici* are thought already to have been administered by freedmen *vicomagistri* for centuries before Augustus. In other words, Augustus may merely have been systematizing a network of *vici* that had played an essential role in city administration for centuries.

The turbulent history of the *vici* in the last decades of republican government has been adduced by each side of this debate in favor of their own very distinct position. As more formal republican politics disintegrated, the *vici* emerged, both as tools of powerful popular politicians like Marius Gratidianus or Publius Clodius and as vehicles for the expression of local political sentiments, often of anger and frustration (Flambard 1977, 1981). The violence of armed groups (sometimes referred to in English as "gangs"), which drew on recruits through local networks, had become a feature of city life by the year 100 BCE. The increasingly politicized celebration of *Compitalia* grew violent and was banned in 64 BCE, then revived and banned again in the 50s BCE by the senate, and banned yet again in the 40s by Julius Caesar as dictator. Scholars have interpreted all this political ferment either as a sign that the *vici* were already official urban districts with influential local magistrates or as evidence that politics had no official role to play in the republican *vici* and was essentially subversive and unsanctioned.

The long history of *vici* in Rome was decisively shaped by the Emperor Augustus' urban reforms, which were completed in 7 BCE (Lott 2004). Augustus reorganized the city of Rome, which had outgrown the old four *regiones* of the republican city, into 14 *regiones*, of which the official subdivisions were the *vici* (Suetonius *Divus Augustus* 30). He (re)established a pattern of four annually elected *vicomagistri* and four *ministri* for each *vicus*. These neighborhood magistrates were to be (almost all) freedmen and only very few attested names are of former slaves of the Imperial household. Augustus entrusted these local magistrates with new statues of the *lares*, now called *lares Augusti* ("Augustan *lares* = August/holy *lares*"). The significance of these religious reforms has been much debated, since the nature of the *lares* themselves was under discussion by ancient writers and no ancient source gives any detailed interpretation of Augustus' innovations (Flower 2017). There is no consensus as to whether the *lares Augusti* were the same deities with new names, or quite different from the earlier *lares compitales*. Moreover, there is no evidence for *lares Augusti* outside Rome before Augustus. Regardless of precise theological definitions, Augustus clearly undertook a major initiative to restore compital shrines, renew their cults, connect them with local *vici*, and ultimately to use the resulting network to communicate directly between himself and the most humble new citizens in the local neighborhoods of Rome. Many altars and inscriptions survive as evidence for this Augustan reform (Lott 2004 has an appendix). It is not clear whether Augustus

initiated similar reforms in any other Roman city; many scholars have simply assumed this to be the case.

The *vici* marked the beginning of a new era on the first day of the new month named for the Emperor (August) in the year 7 BCE, which was to be the day when their magistrates took up their annual office. There is also evidence of Augustus giving gifts of statues of other divinities to individual *vici* from 10 BCE onward. Residents of *vici* gave small monetary offerings as gifts to the Emperor every first of January to mark the calendar New Year. The Emperor, in turn, would use this money to pay for gifts to local *vici* throughout the year. Augustus set the pattern for relationships of future Emperors with the *vici* in Rome, as is attested by the great base dedicated to the Emperor Hadrian by the *vici* of Rome in 136 CE (Tarpin 2002, R2 = *CIL* 6.31218). This inscription lists the largest number of names of *vici* known to us from any source.

In the present state of our knowledge, archaeology has only afforded glimpses of *vici*, most notably in Rome and in Pompeii (Van Andringa 2000). Meanwhile, there are real risks in combining ancient evidence from different places and time periods into any kind of general synthesis; the search for a single definition of an ideal *vicus* has tended to hamper progress.

We are on firmer ground in discussing the functions of the *vici* in Rome. The *vici* were traditionally connected to a variety of lists of inhabitants, which were kept quite separately from the official census taken by the republican censors. From early times, the *Compitalia* celebration had included the hanging of woolen dolls and balls at the crossroads, with each doll representing a free inhabitant and each ball a slave (Festus 273 L; Macrobius *Saturnalia* 1.7.34). In other words, everyone was counted. This early form of inventory was supplemented by the lists of local inhabitants kept by owners of buildings, which may also have been posted. Such lists of local people were used as the basis of *vicatim* distributions of goods. The distribution of grain, whether free or at subsidized prices, was initiated by Gaius Gracchus in 121 BCE and evolved over time into a regular system. Julius Caesar initiated a new type of census based on the local *vici* (Lo Cascio 2008). This network of local knowledge was used to constitute what became a privileged class, known as the *plebs frumentaria* ("the people entitled to the grain dole"). In this way, the *vici* served as the basis for the grain dole, even as the list of recipients came to be identified as the true Roman people (Virlouvet 2009).

Similarly, the provision of drinking water at public fountains, protection against fires, and local law and order in the streets were all delegated, at their lowest level, to responsible parties in the *vici*. Augustus continued to draw on this local expertise and manpower, even as he introduced greater systemization into each of these administrative areas. In 6 CE, the *vigiles*, a large professional fire brigade composed of freedmen, was established in separate barracks throughout the city (Sablayrolles 1996). In a Mediterranean urban landscape in which shops and businesses tended to congregate by type in the same geographical area, the local *vicus* will often have had its own economic character. At the same time, each area of the city contained small businesses that catered to local daily needs.

Housing in Rome (as in Pompeii and elsewhere) seems to have been very mixed. There were exclusive neighborhoods, as well as poor ones, but most city streets will have had a wide variety of inhabitants who lived locally and who could be seen walking around on the streets, since vehicular traffic was generally prohibited in town during daylight hours. Many inhabitants of Rome were slaves, at least for some part of their lives. Many others had connections or property in the countryside and were only in town for a few years or at certain seasons of each year. Rome also attracted many foreigners. A study of the *vici* involves the demography of the local population, which was constantly in flux because of high rates of mortality, movement, and the manumission of slaves.

The rhythms of daily life, at the water fountain, the small bakery, the neighborhood shrine, and the local workshop, could be found in each *vicus*. It was here that news or views were exchanged and violence or self-defense could be planned. Consequently, the political élites sought out the locals in

their neighborhoods, to influence or patronize their humblest neighbors, even as the *vici* could generate an expression of local political opinion. In a huge city without a formal police force, the *vici* were the basic units that made urban life possible. Even after the Emperor Tiberius built a barracks for the Praetorian Guard in Rome, everyday security still depended on local oversight. Augustus used a network of renewed *vici* to establish himself as Rome's leader in relation to ordinary people. He did this not for merely administrative reasons but because the *vicus* signified "home" for poorer Romans.

International Perspectives

Since the precise definition of a Roman *vicus* is still hotly debated, comparisons with urban patterns in other cultures have proved elusive. The question of size is clearly of central importance. Scholars who see the *vici* of Rome as large are, therefore, more likely to compare them to substantial urban units, such as the ward or district. By contrast, the smaller *vicus* suggests a localized neighborhood on an individual street. In the latter case, a comparison with the traditional Chinese *hu-tong*, especially in Beijing, is suggestive but has not been explored in any detail so far. A *hu-tong* is a narrow road lined with traditional courtyard houses, local shops, and bathing establishments (Meyer 2008). Such small streets are still to be found in Beijing but have mostly lost their local shrines and traditional religious culture as a result of more than 60 years of communist rule.

Future Directions

The best way to move forward with the study of *vici* would be through systematic and scientifically sophisticated archaeological excavation. The exploration of an unexcavated streetscape in Pompeii would provide the most promising opportunity. In Rome, a renewed focus on streets and neighborhoods would also be desirable, although much more difficult in practice. In the country, rural *vici* will emerge through more general surveys of larger areas of settlement and religious centers of local importance.

Cross-References

- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Topography of Rome
- ▶ Urban Planning, Roman

References

Capogrossi Colognesi, L. 2002. *Persistenza e innovazione nelle strutture territoriali dell'Italia Romana. L'ambiguità di una interpretazione storiografica e dei suoi modelli*. Naples: Jovene.

Castrén, P. 2000. *Vici* and *Insulae*: The houses and addresses of the Romans. *Arctos* 34: 7–21.

Flambard, J.-M. 1977. Clodius, les collèges, la plèbe et les esclaves. *Mélanges de l'École française de Rome* 89: 115–156.

Flambard, J.-M. 1981. *Collegia compitalicia*: phénomène associatif, cadres territoriaux et cadres civiques dans le monde romain à l'époque républicaine. *Ktèma* 6: 143–166.

Flower, H. I. 2017. The Dancing Lares and the Serpent in the Garden: Religion at the Roman Street Corner. Princeton: Princeton University Press.

Fraschetti, A. 2005. *Roma e il Principe*. 2nd ed. Rome/Bari: Laterza.

Hasenohr, C. 2003. Les *Compitalia* à Délos. *Bulletin de Correspondence Hellénique* 127: 167–249.

Lo Cascio, E. 2008. Vici, regiones *e forme di interazione sociale nella Roma imperiale*. In *Rome des Quartiers: des vici aux rioni Cadres institutionnels, pratiques sociales, et requalifications entre Antiquité et époque modern*, ed. M. Royo, E. Hubert, and A. Bérenger, 65–76. Paris: DeBoccard.

Lott, J.B. 2004. *The neighbourhoods of Augustan Rome*. Cambridge: Cambridge University Press.

Marcattili, F. 2005. Compitum. In *Thesaurus Cultus et Rituum Antiquorum*, vol. 4. Basel/Los Angeles: LIMC/Getty Publications.

Meyer, M. 2008. *The last days of old Beijing: Life in the vanishing backstreets of a city transformed*. New York: Walker & Company.

Rodríguez Almeida, E. 2002. *Forma Urbis Antiquae: le mappe marmoree di Roma tra la Repubblica e Settimio Severo* (Collection de l'École française de *Rome* 305). Rome: CEFR.

Sablayrolles, R. 1996. *Libertinus miles: les cohorts des vigiles*. Rome: École française de Rome.

Steinby, E.M. (ed.) 1993–2000. *Lexicon Topographicum Urbis Romae*, 6 vols. Rome: Quasar.

Stek, T. 2009. *Cult places and cultural change in Republican Italy*. Amsterdam: Amsterdam University Press.
Tarpin, M. 2002. *Vici et pagi dans l'Occident romain*. Rome: École française de Rome.
Tarpin, M. 2008. Les *vici* de Rome, entre sociabilité de voisinage et organization administrative. In *Rome des Quartiers: des vici aux rioni. Cadres institutionnels, pratiques sociales, et requalifications entre Antiquité et époque moderne*, ed. M. Royo, E. Hubert, and A. Bérenger, 35–64. Paris: De Boccard.
Todisco, E. 2006. Sulla glossa <vici> nel De verborum significatu di Festo. La struttura del testo. In *Gli Statuti Municipali*, ed. L. Capogrossi Colognesi and E. Gabba, 605–614. Pavia: IUSS Press.
Van Andringa, W. 2000. Autels de carrefour, organization vicinale et rapports de voisinage à Pompéi. *Rivista di Studi Pompeiani* 11: 47–86.
Virlouvet, C. 2009. *La plèbe frumentaire dans les témoinages épigraphiques: essai d'histoire sociale et administrative du people de Rome antique*. Rome: École française de Rome.
Wallace-Hadrill, A. 2003. The streets of Rome as a representation of imperial power. In *The representation and perception of Roman imperial power*, ed. L. De Blois, P. Erdkamp, O. Hekster, et al. Amsterdam: Gieben.

Vietnam's Archaeological World Heritage Sites

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Introduction

Archaeological research in Vietnam has a long and rich history, formally commencing during the French colonial period and continuing through today, and the country's archaeological record extends into the Paleolithic (Higham 2002). Today, archaeological projects in the country are executed through the Institute of Archaeology, which is part of the Vietnam Academy of Social Sciences. It is generally a nationally sponsored research enterprise. Much of the field research in recent decades has served to broaden our understanding of various historically significant sites in Vietnam, which has in turn had an impact on their designation as UNESCO World Heritage sites.

Stewardship of many archaeological sites, especially those with a high international profile, involves a mixture of national and local involvement. The Socialist Republic of Vietnam ("Vietnam") ratified the World Heritage Convention in 1987. Currently, Vietnam has seven properties inscribed as World Heritage sites, consisting of two natural heritage and five cultural heritage sites. Vietnam's "Law on Heritage," formulated in 2001, covers all elements of heritage classification, controls archaeological excavation, outlines preservation activities, and also addresses sustainable tourism. Management of each site is largely under the direction of the government, specifically the Ministry of Culture, Sports and Tourism (founded in 2007), with the involvement of various national and local administrative units and offices. The new ministry is the merger of former committees and ministries, including the former National Sports Committee, the National Administration of Tourism, and the former Ministry of Culture and Information. Prior to the merger, all of Vietnam's World Heritage activities were overseen by the Ministry of Culture and Information (Di Giovine 2009: 216). While the headquarters are located in Hanoi, satellite offices are located in most cities and at every World Heritage site (Di Giovine 2009: 216). Between 1995 and 2005, the number of tourist visits to Vietnam and its World Heritage sites increased from 1,351,000 to 2,972,000 at an annual rate of 9.2% (Di Giovine 2009: 4).

Key Issues/Current Debates/Future Directions/Examples

World Heritage Natural Sites

Hạ Long Bay
Property: 150,000 ha

Ha Long Bay ("Descending Dragon Bay"; Vietnamese: *Vinh Ha Long*) is situated in the Gulf of Tonkin and features a remarkable seascape of islands and limestone pillars. Most of the islands

are uninhabited, though archaeological sites such as Cai Beo on the island of Cat Ba have been found (Higham 2002: 36). It is a popular domestic and international tourist destination, located in the Quang Ninh province. The Hạ Long Bay site is overseen and managed by the Hạ Long Bay Management Board of Quảng Ninh People's Committee. Administratively, the bay belongs to Hạ Long City, Cam Pha town, and is part of the Van Don District. Featuring thousands of limestone karsts and isles in various sizes and shapes, Hạ Long Bay is the center of a larger zone which includes Bai Tu Long Bay to the northeast, and the Cat Ba islands to the southwest.

The bay's geomorphology is known as a drowned karst landscape due to the unusual combination of its limestone karst features. One distinctive feature of Ha Long Bay is an abundance of lakes within the larger limestone islands. Additionally, extensive limestone caves represent another important feature. In all, Ha Long Bay possesses a tremendous diversity of caves and other landforms.

The property's extent includes 1,960 islets, most of which are limestone, and the bay is home to 14 endemic floral species and 60 endemic faunal species. The core zone of Ha Long Bay was listed by UNESCO as a World Heritage site in 1994, with an extension granted in 2000.

Phong Nha–Ke Bang National Park

Property: 85,754 ha

The Phong Nha–Ke Bang National Park (Vietnamese: *Vuon quoc gia Phong Nha – Ke Bang*) is in the Bo Trach and Minh Hoa districts of central Quang Bình Province, in north-central Vietnam, about 500 km south of Hanoi. The Phong Nha Nature Reserve is situated on the edge of the Phong Nha/Ke Bang Karst plateau, and the plateau extends into Laos.

The park derives its name from both Phong Nha cave and the Ke Bang forest. The park was created to protect one of the world's two largest karsts regions with 300 caves and grottoes. Noted for its spectacular and extensive cave and grotto systems, the area is comprised of 300 caves and grottoes, of which only 20 have been surveyed by Vietnamese and British scientists. In April 2009, the total length of the caves and grottoes was extended to 126 km after the discovery of the Son Doong Cave.

Some of the caves have yielded archaeological evidence for early Holocene occupation, while other caves and grottoes show signs of use within the past millennium.

This national park was inscribed as a World Heritage site in 2003. The park is overseen and managed by the National Park Management Phong Nha–Ke Bang of People's Committee of Quang Bình Province.

World Heritage Culture Sites

Complex of Hue Monuments

The complex is located in the Thua Thien Province of central Vietnam. Hue represents a past Vietnamese feudal empire at its apogee during the early nineteenth century. Hue served as the administrative center of southern Vietnam in the seventeenth and eighteenth centuries. The Nguyen dynasty made it the national capital of a united Vietnam in 1802, a position held by the site until 1945. The Perfume River divides the capital in two. A total of four citadels or defended enclosures made up the city: Kinh Thanh (Capital City), for official administrative buildings; Hoang Thanh (Imperial City), for royal palaces and shrines; Tu Cam Thanh (Forbidden Purple City), for the royal residences; Dai Noi (or Inner City); and Tran Binh Dai, an additional defensive work in the northeast corner of the Capital City, designed to control movement on the river. A fifth fortress, Tran Hai Thanh, was constructed a little later to protect the capital against assault from the sea. At the heart of the complex was the Forbidden Purple City, enclosed by brick walls. Originally, there were over 40 buildings within the enclosed area, but most are now in disrepair.

The complex suffered considerable damage due to military conflict in 1885, 1947, and 1968. Due to its historical significance, Huee was inscribed as a cultural heritage site by UNESCO in 1993, and is managed by the Hue Monuments Conservation Center (HMCC) and the Hue People's Committee.

Hoi An (Ancient Town)
Property: 30 ha
Buffer zone: 280 ha

Hoi An is an ancient town located in the lower section of Thu Bon River, the coastal plain of Quang Nam in Central Vietnam. It is an exceptionally well-preserved example of a traditional Asian trading port and maritime commercial center. Most of the buildings are in the traditional architectural styles of the seventeenth to nineteenth centuries, and they include religious buildings such as pagodas and temples. The town is considered to be something of a living museum of architecture and urban lifestyle. Many festivals occur at Hoi An annually, preserving traditional lifestyles, religious ceremonies, customs, and culinary practices. Due to its geographic position, Hoi An was an active international trading port for traffic of merchant ships from Japan, China, and the Western world during the seventeenth and eighteenth centuries.

The current architecture of Hoi An, almost exclusively in wood, combines traditional Vietnamese designs and techniques with those from other countries, such as China and Japan. Reminiscent of Japanese examples, there is a wooden bridge with a pagoda atop it. An inscription indicates it has existed from at least the early eighteenth century. There are also numerous ancient tombs in Vietnamese, Japanese, and Chinese styles.

Archaeological finds and excavations have shown this area to have been an active port and trading center since the Iron Age Sa Huynh people lived in the area, along the Thu Bon River as early as the second century BCE. The ancient town is situated on the north bank of Thu Bon River, and continued to operate as an important port of Champa civilization. At the epicenter of ancient Champa civilization, Hoi An became one of the most important port cities, a designation that would last for several centuries (Di Giovine 2009: 262).

Starting in the 1980s, the architecture and culture of the Hoi An ancient town gained increasing scholarly and tourist recognition and interest, making it one of the major tourist attractions of Vietnam. Today, most if not all of the homes within the historic center of Hoi An have been restored according to international preservation standards, and most of its residents are actively engaged in the tourist industry (Di Giovine 2009: 265).

The site is managed by the Conservation Management Center for the Relics of Hoi An and the People's Committee of the Quang Nam Province. In 1999, the property was inscribed as a World Heritage site.

My Son Sanctuary
Property: 142 ha
Buffer zone: 920 ha.

Located in the Duy Xuyen district of the Quang Nam Province of central Vietnam, the My Son sanctuary is 45 km west of Hoi An and 70 km south of Da Nang. This sanctuary area is known as the most significant Champa architectural and sculptural monuments in the country.

A valley surrounded by mountains, My Son was the site for a religious center for the capital of the Champa Kingdom. The site is an important example of ancient and historical cultural exchange, with the introduction of the Hindu architecture of the Indian subcontinent into southeast Asia. At the start of the first millennium, the Champa civilization increasingly came under the influence of Hinduism, and many Hindu temples were subsequently built. Successive kings in the sixth to eighth centuries continued to construct temples and monuments. Warfare during the medieval period affected the site, leading to the decline of Champa civilization and its eventual absorption into the Dai Viet state in the fifteenth century.

My Son consists of eight groups of tower temples cover a period from the tenth to the thirteenth centuries, and this chronology is reflected in different architectural styles. The temples are constructed in fired brick with stone pillars and decorated with sandstone bas-reliefs depicting scenes from Hindu mythology. The major style of architecture and sculptural motifs derives directly from Indian civilization.

Conflict in the twentieth century also damaged many of the structures at My Son. During the

1960s, My Son periodically functioned as a military base and mines were set on the hillsides and the mountain slopes. Devastation occurred due to heavy bombing by the USA in August 1969, during which many of the temple-towers were severely damaged. Only approximately 20 temple-towers still remain intact. However, most of the surviving inscriptions and archaeological materials are preserved and held in My Son and in various museums.

My Son was inscribed as a UNESCO World Heritage site in 1999, along with Hoi An. It is home to hundreds of thousands of tourists and researchers annually, and the site is managed by the Conservation Management Center for the Relics of My Son and the People's Committee of the Quang Nam Province.

Central Sector of the Imperial Citadel of Thang Long

Property: 18 ha
Buffer zone: 108 ha

Thang Long – Hanoi Imperial Citadel (Vietnamese: *Hoang thanh Thang Long*) refers to a cultural complex located in the heart of modern-day Hanoi, and its traces were recently uncovered during construction of new buildings in 2002. The site at 18 Hoang Dieu Street was chosen for the construction of the National Assembly, but development stopped when traces of the Imperial Citadel were uncovered.

Originally, the Imperial Citadel was first built in the eleventh century by the Ly Dynasty, marking the independence of the Dai Viet kingdom after a millennium of Chinese colonial rule. It was constructed on the remains of a Chinese fortress on drained land reclaimed from the Red River Delta in Hanoi. The site would remain the center of uninterrupted regional political power for the next several centuries. The Citadel enclosed the Forbidden City, constructed in brick in the eleventh century, and was itself enclosed by a defensive wall.

The Citadel reached its apogee in size in the sixteenth to seventeenth centuries. French colonial control of Vietnam began in the 1880s, and Thang Long functioned as the colonial headquarters for French administration of Indochina (modern Vietnam, Laos, and Cambodia). The royal palaces and many structures were destroyed in the late nineteenth century. Several palaces and historic buildings were rebuilt according to a French architectural style. After the First War of Independence (1954) and the division of Vietnam into two entities, the ancient Forbidden City became the military headquarters for North Vietnam. The Ministry of Defense gradually abandoned its use of the property between 1994 and 2004, designating it for cultural and historic purposes.

Due to its historical significance and location within the modern capital of Vietnam, the management of the site is quite complex and has increasingly involved multinational participation. The site is directly managed by the Conservation Center for the Co Loa and Hanoi Citadels (also known as the Hanoi Ancient Wall–Co Loa Vestiges Preservation Center). The Center was established in 2007, and has approximately 100 staff members. In addition to overseeing the Thang Long Citadel (also known as the Hanoi Citadel), the Center also manages the nearby Co Loa site. The Center is overseen and funded by the Hanoi People's Committee, the Ministry of Culture, Sports and Tourism, as well as the Vietnam National Commission for UNESCO. The Center cooperates with the Vietnam Institute of Archaeology (which is part of the Vietnam Academy of Social Sciences).

The central sector of the Imperial Citadel of Thang Long was inscribed as a World Heritage site in June 2010. In October 2010, UNESCO Director-General Irina Bokova made her first official visit to the country and, coinciding with Hanoi's Millennial Anniversary Celebrations, handed over the World Heritage certificate to government officials. Following a request from the Vietnamese government, UNESCO is supporting the Vietnam National Commission and the Hanoi People's Committee to ensure Thang Long's long-term conservation. With technical support from the Tokyo-based National Research Institute for Cultural Properties, the Vietnamese Ministry of Culture, Sports and Tourism, the Conservation Center for the Co Loa and Hanoi Citadels, the

Vietnamese Academy of Social Sciences (VASS), the Institute of Vietnamese Studies and Development Sciences (IVIDES), and the Institute of Monument Conservation, a comprehensive site management plan for the complex is being developed and implemented to ensure the long-term conservation and sustainable development of the site (Regional Committee of Tourism Paris Ile-de-France 2008). As part of this effort, a focus will be placed on local capacities for site managers, planners, and research scientists.

Citadel of the Ho Dynasty

Property: 156 ha
Buffer zone: 5,079 ha

The Ho Citadel (Vietnamese: *Thanh nha Ho*) (Fig. 1) is located in the Thanh Hoa Province in Vietnam's north-central coast region, approximately 150 km south of Hanoi. It was the capital of Vietnam from 1397 to 1407 during the short-lived Ho Dynasty.

Measuring 877 × 889 m, the citadel is marked by an enclosing wall of stone, which still remains standing. The enclosure has a diameter of over 3,500 m, with a wall height of 5–6 m. Unlike other citadels in the country that were constructed with brick, construction of the Ho Citadel employed massive stone slabs sourced from nearby mountains. The stone materials used for construction were carefully hewn into slabs with uniform dimensions, and the citadel was marked by four arched gates (south, north, east, and west). Researchers are currently exploring how the stone walls were constructed. According to historical texts, construction was

South gate

North gate

Vietnam's Archaeological World Heritage Sites, Fig. 1 (continued)

East gate

West gate

Vietnam's Archaeological World Heritage Sites, Fig. 1 The gates of the Ho Citadel (Source: Vietnam Institute of Archaeology)

completed in 3 months, seeing the transport and erection of over 25,000 cu m of rock, averaging 10–20 tons per slab (Tong Trung Tin, *pers. comm.*).

The Citadel was inscribed as Vietnam's seventh World Heritage site in June 2011. Approximately 1 month after inscription, a quarry was identified 2 km northwest of the site that may be the source of the stone materials. Researchers from the Ho Dynasty Citadel's Heritage Preservation Center have discovered 21 flagstones scattered across a wide area. Based on clues such as cutting marks on the surface of the stones and comparisons with slabs from the citadel, the

researchers speculate that the stones were intended for use at the Citadel but were discarded due to faults. A multiyear excavation project is planned at the quarry site.

The site is managed by the Ho Dynasty Citadel's Heritage Preservation Center in conjunction with the People's Committee of Thanh Hoa and the Ministry of Culture, Sports and Tourism.

Future Directions

The state-sponsored Institute of Archaeology, headquartered in Hanoi, employs hundreds of archaeologists working throughout the country on projects ranging from the Paleolithic to protohistoric and historic eras. Given the volume of archaeological fieldwork, the pace of research, and the number of sites within the country, it is likely that Vietnam's list of World Heritage properties will continue to grow in the coming years. To illustrate, as of this writing, there are currently seven additional properties being considered on the UNESCO Tentative List.

Cross-References

- ▶ Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
- ▶ UNESCO World Heritage Convention (1972)
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management

References

Di Giovine, M. 2009. *The heritage-scape: UNESCO, world heritage, and tourism*. Lanham: Lexington Books.

Higham, C. 2002. *Early cultures of mainland southeast Asia*. Bangkok: River Books.

Regional Committee of Tourism of Paris Ile-de-France. 2008. The central sector of the imperial citadel of Thang Long – Hanoi: Management plan. Available at: http://whc.unesco.org/document/105317 (no access date).

Further Reading

Tran, K.P. 2006. *Cultural resource and heritage issues of historic Champa states in Vietnam: Champa origins, reconfirmed nomenclatures, and preservation of sites*. Working Paper series 75. Singapore: Asia Research Institute, National University of Singapore.

United Nations Education, Scientific and Cultural Organization. UNESCO World Heritage Center. Available at: http://whc.unesco.org/ (no access date).

Villas and Farms in the Mediterranean World

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Introduction

Farms and villas were ubiquitous in the regions of the ancient Mediterranean. Ancient villas were mansions located outside urban agglomerations including residential quarters displaying a complex architectural and decorative vocabulary and facilities for the processing and storing of agricultural crops. They are usually discussed mostly in the context of the history of architecture, of agricultural exploitation, or of type of management and labor of ancient Classical Greece and Rome, but farms and the so-called proto-villas actually predated the Classical Greek period and are attested in the Etruscan and Punic worlds as well. However, the Greek Classical period and, to a greater extent, the Hellenistic period were defining moments in terms of the delineation of clearer architectural typologies and a more regular diffusion of these dispersed settlements in the countryside. In the Hellenistic period, the number of villas and farms populating the countryside of areas such as mainland Greece, peninsular Italy, and Sicily greatly increased. Both in Rome and in ancient Greece, where the social and political structures were based on census, landed wealth was the criterion determining the belonging to one class or the other. Minimum landownership was therefore what qualified one as a citizen soldier, and for this reason,

landownership, i.e., farms and villas, is indissolubly linked with ancient states' social and political history.

Definition

Villas are categorized into three types, using Latin terminology: (1) *villae suburbanae* (suburban villas), located in close proximity of towns and cities; (2) *villae rusticae* (rural villas), located in the countryside, which could be the management center of large agricultural estates (*latifundia*); and (3) *villae maritimae* (maritime villas), located on the seacoast or also on lakeshores. Some scholars make a further distinction between maritime villas (with structures built right on the shore, such as fishponds and bath complexes) and coastal villas, located on the coastline but not having a direct relationship between their architecture and the sea (Lafon 2001).

Villas usually featured a single compact structure with a central courtyard, which functioned as a connecting element between the different parts. A villa would, in general, consist of (a) *pars urbana*, the part where the owner and his family would live; (b) *pars rustica*, the place where the productive activities of the villa took place, including also the living quarters of the staff and slaves, as well as the farm animals; and (c) *pars fructuaria*, where the products were stored. The villa of Settefinestre near ancient Cosa, Italy, exemplifies this organization of space well.

Ancient literary sources stress that maritime villas, unlike their rural counterparts, were unproductive, a manifestation of elite conspicuous consumption. When maritime villas have been more extensively excavated, however, the presence of a *pars rustica* or of other production activities have often been found. Indeed, all natural resources of the villa estate may have been exploited, e.g., clay beds, quarries, and lagoons (for fishing, fowling, etc.). Maritime villas were often the seat of a particular type of production, *pastio villatica*, i.e., the production of quality foods for the urban market which comprised such things as honey, fish, and game.

For the Romans, the term "villa" could convey a variety of meanings; it was commonly used to refer either to farms or to the opulent country mansions of the elite. A key defining factor, however, was the location outside the urban context, as legal sources make clear. Reading the ancient texts, it is also clear that "villa" indicated different things to different authors at different times. Significantly, Varro, the first-century BCE author of a treatise on agriculture in the form of dialogue addressed to the Roman upper class, starts his work with a discussion over the meaning of "villa" which shows the range of meanings covered by the term in his time. By the late fourth century CE, "villa" no longer indicated the landed estate but the settlement and the land held by several owners, in other words a village (Bowes and Gutteridge 2005).

The elements marking the distinction between farm and villa are size and degree of refinement of the décor. As a very general rule, in a farm the ratio between residential rooms and service spaces is no more than 1:3 of the total area, whereas in villas, the residential part was much larger and more richly decorated. Also in the case of farms, a central courtyard was the main architectural feature; the number of rooms varied depending on the size of the farm. Villa Regina (Boscoreale, Italy) is a good example of a large farm featuring a wine press, threshing floor, and moderate architectural décor. Often, though, the building technique employed in farms was wattle and daub on stone foundations, and the building would consist of a few rooms only. Since excavations have mostly focused on large and, architecturally, more visible buildings, excavated farm buildings are small in number. Therefore, the knowledge about the presence of farms and the chronology in a given territory comes largely from field survey.

Historical Background

Villas and farms were the characterizing elements of the landscape of the Hellenistic and Roman Mediterranean. Considered to be the indication of a particular type of exploitation of the land,

featuring on the whole polyculture but with pre-eminence given to cultivation of vines, olive trees, and fruit trees essentially aiming at the production of surplus for the market, the diffusion of villas and farms can be traced in certain geographic areas alongside states' territorial expansion. In northern Greece, the growth of the Macedonian kingdom in the Hellenistic period facilitated in some areas the creation of large estates which appear to have promoted the introduction of new technologies in order to process crops more efficiently, as in the case of the olive rotary crusher (Foxhall 2007). In Italy, during the third century BCE, farms started appearing in greater densities in the territories conquered by Rome. The South Etruria Survey has recorded thousands of rural settlements comprising farmsteads, farms, and villas. While the exact chronology of occupation of these sites can only be partially determined in field survey, for one is dependent on only the artifacts visible on the ground and on their quality as chronological markers, it was nonetheless possible to define a broad chronological development which indicated increased number of sites in the archaic period and in the second to first century BCE, a massive peak in the first and second century CE, with decrease in number of sites starting in the late second/third century CE (Di Giuseppe 2005).

The "standard history" of the evolution of farms and villas in Roman Italy put forward by the historiography of the 1970s and 1980s has been characterized by an evolutionist model (Terrenato 2001): small farms appeared in the third century BCE as the result of the Roman conquest; during the second century BCE in the aftermath of the Hannibalic war, which opened the way to Rome's conquests in the East, some developed into villas. The availability of manpower (slaves) and riches that the conquering wars brought about allowed the elite to create slave-staffed villas producing cash crops. The landed estates of the wealthy grew in size, incorporating former small- and medium-sized properties and large tracts of *ager publicus*. The displaced small farmers ended up swelling the ranks of the urban *plebs* in Rome, starting the Gracchan movement for land reforms, the subsequent profound transformation of the army, and the crisis of republican institutions. In fact, data from field surveys carried out across different regions of the Italian peninsula indicate that there was no exclusive relationship between farms and villas. Rather than seeing the former decrease when the latter increase in number, the two seemed to have increased or decreased together (Launaro 2011).

Since the appearance of farms and villas in the territories conquered by Rome is considered a typical Roman way of exploitation of the land, an issue that has interested scholars has been to determine what the origins of the "villa," both in its architectural typology and types of production, were. Farms and villas engaged mostly in producing wine and olive oil were present in the Greek Classical and Hellenistic world, and some have linked the appearance of villas in the Roman world in the third century BCE to the contacts with the southern part of the Italian peninsula and its Greek colonies (Lafon 2001). Others have preferred to stress a link with the Punic world of North Africa. Carthage, before its destruction by Rome in 146 BCE, was surrounded by many farms and villas. The wealth of the city came as much from her agricultural hinterland as from the extensive Mediterranean commercial networks. Although archaeological excavations of Hellenistic Punic farms around Carthage are scant (Brun 2004), it is known that courtyard villas fortified by corner towers were in use both in Sicily and in North Africa as early as the third century BCE. Roman authors, such as Appian (*Pun*. 101; 107), normally refer to Punic farms as *turres* (towers) or *castella* (fortified buildings), stressing their fortified nature. Recent discoveries on the island of Jerba, off the cost of Tunisia, have highlighted the great diffusion in the Hellenistic period of villas producing sweet wine which was widely exported around the Mediterranean (Fentress 2001). In addition, arboriculture and certain cultivations that later characterized the production of Roman villas seem to have been developed to a greater extent in the farms of Carthage. The agricultural treatise by the

Carthaginian Mago was judged by the Roman senate in 146 BCE to be the only noteworthy work deserving to be translated into Latin. Agricultural manuals written later by Latin authors, in particular Varro's and Columella's (first century CE), often quote Mago's work as a source.

Fortification of rural dwellings was a feature not limited to the Punic world of North Africa and Sicily. Mainland and insular Greece offer several examples of rural stone towers dating to the Classical and Hellenistic period, at times part of farms and at times more isolated. These structures, for a long time seen exclusively as serving defensive needs, have recently been connected to the productive exploitation of the Greek landscape and to the dependent labor that enabled these activities, since they might have confined unfree labor engaged in agriculture and mining activities on estates of absentee wealthy owners or tenants (Morris and Papadopoulos 2005).

The two alternative models for the origin of the villa, the Greek or the Punic worlds, have been questioned after the important archaeological discovery of the Auditorium Villa in Rome in the late 1990s. Here, a substantial villa existed already in the years 500–300 BCE; further enlargement of the complex occurred in 300–225 BCE. The name "villa" for this archaic and early republican complex is justified primarily by its size, so far unparalleled for the same period; by the décor (see the figurative architectural terra-cottas of the second phase, similar to those known from Etruscan religious buildings); by the type of plan, featuring a central open court; and by the presence of an oil press (Carandini 2006). The complex had a long occupation history, going out of use after the mid-second century CE. This discovery has led to the reconsideration of finds at other later villa sites, where the recovery of archaic architectural terra-cottas had been explained with abandoned archaic rural sanctuaries which later had been obliterated by the construction of farms and villas. Instead, it has been proposed that these might constitute similar cases as that of the Auditorium Villa: palatial rural structures typical of the Etruscan world, from which the Roman villa evolved (Terrenato 2001). Indeed, one does not need to wait until Rome's territorial expansion in the third century BCE to see indications of the intensification of agricultural exploitation in its environs, especially in the case of viticulture. At various sites in the southeastern *Suburbium* near modern Centocelle, wherein the late republic and empire luxurious villas were built, archaeological investigations have revealed numerous trenches dug in the tufa plateau in order to plant vines, dated on the basis of associated ceramic material to the fifth century BCE. The intensification of settlements in the countryside for agricultural purposes resulted in at times massive interventions to make the land suitable to cultivation. In order to develop the marshy Fondi plain for viticulture in the second century BCE, thousands of amphorae were laid head to toe in order to drain the land. In this area, several farms and villas were built starting in this period.

Architectural Typology

From an architectural point of view, it is possible to identify changes in villa architectural typology that mark specific chronological periods. The second century BCE marked a transition in villa architecture in Italy, with the incorporation of elements typical of the townhouse into the plan of typical villas, such as the atrium and the peristyle garden. These architectural elements had no direct practical function in relation to agriculture but added monumentality to the residential quarters. Together with the degree of lavishness in furnishings – statuary, mosaics, and wall paintings – these architectural elements became the indicators of the wealth and social status of the owner and, at the same time, a "must-have" feature if one had aspirations to become part of a socially higher group. Generally speaking, the republican villa was built on imposing substructures housing cisterns (the *basis villae*), creating at least two artificial terraces. On the upper one was the villa building; on the lower were gardens and orchards. The Villa Prato near Sperlonga is a good example of the use of two terraces and of the simple division between residential quarters on one side and service area with two presses on the other (Broise and Lafon 2001). Although the bath quarter excavated at this villa is unusual in typology and early chronology, small bath suites

appear regularly in residential quarters of villas up to the early first century CE. These facilities are always located in proximity to the kitchen, a practical planning solution which facilitated the heating of the water for the baths and rationalized the drainage and water supply lines, grouping together the rooms (kitchen, baths, latrine) that needed them. In late republican and early imperial villas, the atrium and peristyle court were often enlarged, while one or more rooms opening onto the peristyle, used for dining and other reception activities, were added. Other changes notable in the period regarded not only the architecture but also the décor. For flooring, earlier examples of *opus signinum* floor with a decorative pattern made with the insertion of pebbles give the way to mosaics and marble tile floors (*opus sectile*).

In maritime villas, also built on various levels and in very scenic positions, the residential quarter was placed on the seaward side, while the service quarters were on the mainland side. Architectural elements that were exploited to great extent in Roman villa architecture starting from the Augustan period were the portico and the cryptoportico. The use of the colonnaded portico in particular represents the assimilation in the private sphere of an element typical of Hellenistic and Roman public architecture. Portico and cryptoportico were used by villa designers as key elements in determining the circulation space and in providing socially distinct access to the villa's parts (Zarmakoupi 2011, 2014).

The late first century CE and early to mid-second century CE mark a change in villa typology. Residential quarters become larger and more elaborated; peristyle courts and gardens are replicated, as are dining rooms and reception areas. In the second century, bath quarters featuring the canonical sequence and layout of rooms (*frigidarium*, *tepidarium*, *caldarium*) observable in the large urban baths appear, often as independent pavilions rather than as part of the central body of the villa. Other architectural features that characterize second-century large villas are large gardens framed by colonnaded porticoes, often with decorative water features, monumental *nymphaea*, and the so-called garden-stadia, i.e., walled gardens in the shape of an ancient stadium.

The suburban villas around Rome continued to flourish and to become more opulent until the late antique period. In other regions, different trends are observable; for instance, luxury villas around Ravenna and in the lake region in northern Italy appeared only when the imperial seat was moved to Milan first (286–402 CE) and to Ravenna later (402–476 CE). Late antique villas present at least one large reception hall and larger dining rooms no longer accommodating the typical set of three couches, each able to accommodate three diners, which were placed to form a U along three sides of a rectangular room, but the *stibadium* is found instead. The *stibadium* was a semicircular dining couch; one or more could be accommodated in a late antique dining hall, which normally featured at least one apse along one wall but could have up to three apses (*trichonch*). The apse is indeed the defining element of late antique architecture. The ultimate example of a late antique villa is the Villa Casale at Piazza Armerina in central Sicily. The scale and opulence of this complex are such that it is still debated whether it was in fact an imperial palace, the palace of a governor, or "simply" the villa of some powerful member of the elite.

Another element that characterizes architecturally the late antique villa is the presence of mausolea or of monumental tombs within the villa building. Whereas in previous periods, monumental tombs were built on the villa estate, in isolated prominent positions visible from a major road that passed nearby, in late antiquity, the mausolea appear as part of the villa architecture. It has been suggested that such cases reflect the diffusion of Christianity and martyr cults. Augustine in the *De Civitate Dei* (22.8) lists many miracles, which took place at villa martyr shrines. In fact, tying a Christian ritual space to a functioning villa is problematic. Even when early churches are often built near or on top ruins of abandoned villas, to what extent the villa acted as a point of memory for the development of Christian worship and to what extent location was simply determined by the fact that the villa offered readily available building material are not clear.

The development of architecturally magnificent villas was a phenomenon not limited to Italy and the environs of Rome. Provinces where

the local and the senatorial aristocracy of Rome established estates at a significant level, such as Epirus, Dalmatia, Hispania, and North Africa, all have examples of monumental villas. These structures developed alongside the occupation of marginal lands by farms. Especially in North Africa, the Roman period is characterized by farms and complex irrigation systems bringing under cultivation marginal lands which in earlier and later epochs were not cultivated.

A region which displays particularly fine examples of villa complexes built in the imperial period on a monumental scale is Istria (Croatia). During the first century CE, particularly on the western coast, several grand villas were built; epigraphic evidence indicates that much of this area was under ownership of Rome's senatorial elite (Tassaux 2003). These estates produced wine, olive oil, and also purple dye. The most impressive example of Istrian villas is the Verige Bay villa, on the island of Veli Brijun in the Adriatic Sea. At the height of its development, it featured three templelike structures linked by a semicircular portico, an outdoor apsidal dining area at the end of a ca. 150-m long colonnaded area, a bath complex and an adjacent garden, and a major residential quarter unfolding around a peristyle in the main block. One sector of this huge complex was devoted to the processing of olive oil, revealing what type of cultivation was prevalent on this estate (Schrunk and Begović 2000).

Key Issues/Current Debates

Four main issues can be identified in the context of current debates on villas and farms:

1. Recent archaeological and historical studies have been reconsidering the traditional view that Rome's social crisis, centered around issues of land distribution which occurred from the second century BCE onward, was due to the growth of large slave-staffed villas which displaced small- and medium-sized farmers. Field surveys accompanying the excavation at the villa of Settefinestre had indicated that in this area there were few farms when this villa flourished, thus seemingly confirming ancient texts referring, for south Etruria, to a countryside depopulated of free farmers, instead occupied only by large slave-staffed estates. More recent work has on the contrary observed that this phenomenon cannot be generalized, since in many areas of Roman Italy, small- and medium-sized farms continued to exist well into the imperial period. Whether these farms were part of larger estates belonging to the wealthy and were rented out under a sharecropping system or whether they were owned by small proprietors cannot be determined from a purely archaeological point of view. The fact that small farmers were able to be competitive on the market in terms of production has also been pointed out (Kron 2008).
2. After the Roman conquest of Gaul and the Spanish provinces, land distributions and the foundation of colonies occurred in several areas of these provinces in the late first century BCE and early first century CE. On the land plots, the colonists built farms and planted vines. Until then, these regions had been large importers of wine from Italy, but soon, the production of these farms started to replace Italic wine both on regional and transmarine markets. By the Flavian period (69–96 CE), the farms were enlarged into villas, equipped with a well-appointed residential part and service areas, indicating that the successful wine business allowed now the owners to spend on the beautification of their residences (Brun 2005). In Italy, at several villa sites in the second century CE, the subdivision of rooms into smaller units, poor-quality repairs, and even burials placed within the former residential part of the villa were observed. These two phenomena were linked, positing that estates that had been producing wine for export had been affected by the new provincial production and that owners had, in effect, abandoned them; the poor repairs and the burials were, in this scenario, the signs of squatters. When all the available evidence is considered, however, it appears that signs of demise at villa sites do not coincide also with the abandonment of cultivation. The concentration of land in the

hands of fewer proprietors led some owners to keep fewer villas equipped with adequate residential quarters for their sojourns, leaving the others to the use of their tenants (Marzano 2007).

3. Despite the apparently straightforward nature of defining what a farm is, from the point of view of archaeological classification, what constitutes a farm is, partly, debated. When looking at excavated structures, it is disputed whether a temporary residence should be called a farm or only a permanent one and whether a distinction should be made between farming and herding (we might think of structures related to transhumance, occupied only seasonally, for instance). In the context of field survey, scholars have been asking whether a sherd scatter in a field necessarily constitutes a farm or whether it only attests to the ancient agricultural practice of manuring. If a sherd scatter always defines a farm, what scatter size indicates this type of dwellings, and what scatter size indicates a "villa?" It is known that, over time, especially in fields subject to regular deep plowing, the size of a scatter and the quality of the finds recovered can change drastically in only a few years.
4. The popularity of field survey and its rapid methodological developments have not been accompanied by parallel developments in theoretical and interpretative frameworks. While scholars have been asking how to recognize settlement hierarchy from survey data and how to make these data comparable (Alcock and Cherry 2004), more recent work has shifted attention away from methodology and the limited range of historical and "processual" questions field survey had been used to answer. Focus is now on the wider archaeological developments in relation to the interpretation of material culture and theories of landscape (Witcher 2006).

International Perspectives

The term villa in modern studies is the cause of some debate, since scholars working on different regions of the ancient world use it differently. In studies focusing on areas such as Roman Italy, villa always refers to mansions of a certain size, displaying notable signs of elaborate décor in the residential quarters, such as mosaic and marble floors and wall paintings. Outside of Italy, in the case of studies on the northern European provinces of the Roman Empire, "villa" is used to label also smaller establishments with little indication of elegant décor, what in effect in the Mediterranean regions is called "farm." The reason for this discrepancy is that these territories annexed by Rome had a very different architectural tradition from the one used in the Mediterranean. Rather than building farms with rectangular plans, Celtic populations built round houses; rather than using masonry and roof tiles, they built in timber. Therefore, when a building in these northern European regions displays a rectangular plan and certain building techniques, scholars see it as sign of either direct Roman presence or of clear Roman influence on local population. In other words, they see in these buildings indicators of Romanization. For this reason, the term "villa," which carries with it a baggage of "Romanness," is used. Differences in modern usage are not limited to these two distinctions. In the context of studies on the eastern provinces of the empire, "villa" is commonly used to indicate particularly grand townhouses, which in size and décor outdid the normal scale found in upper-class urban dwellings. The correct nomenclature for such buildings in the Roman context is *domus*.

Future Directions

In future years, the regular application in excavations of a range of scientific techniques which have become more affordable (e.g., paleobotanical analyses, isotope analysis of bones and teeth, DNA) will yield a wealth of new information on the production of farms and villas, the standards of living of their inhabitants, and the environmental changes caused by the establishment of farms and villas in the countryside (deforestation, reclamation of marshes, and the like) or natural environmental changes which affected these human

settlements. As an example of the new insights gained from DNA studies, one can cite the Vagnari/S. Felice project in southern Italy, focusing on a Roman village and villa which in the imperial period belonged to the emperor. Analyses conducted on the human bones from the many burials excavated in the necropolis have revealed that most of the workforce on this estate was born locally, whereas ca. 25% came from other parts of the empire (http://www.ed.ac.uk/history-classics-archaeology/classics/research/research-projects-ii/vagnari).

Scientific analyses coupled with powerful computing tools, such as geographic information system, are offering effective ways to model and analyze ancient landscapes, allowing to grasp issues about degree of connectivity between sites, location of natural resources, and settlement hierarchy, among other issues.

After decades of attention devoted to villas, both in archaeology and ancient history, attention is now shifting to properly studying the lower stratum of rural dwellings, the farms and farmsteads. Questions about the spatial and material qualities of this lower rural domestic architecture, the rural exchange systems, and the type of interaction between humans and the surrounding environment can be properly answered only through excavation. Despite the fact that thousands and thousands of farms and farmsteads have been located in field surveys, new understandings will come in the future as some investigators are leaving the "allure" of excavating rich villas and turning to understand how the majority of the ancient population lived. The Roman Peasant Project (http://www.sas.upenn.edu/romanpeasants/), for instance, which aimed at investigating the "lived experience of lower-class rural dwellers" (Bowes et al. 2017, p. 172) has identified the first archaeological data for convertible agriculture for the late Republican/early imperial period. These data are very important, since they show intensive use and careful management of the land also at sites at the lower end of the rural settlement spectrum. In addition, the project's results challenge the idea that intensive/extensive land use relates in a straightforward manner to dense/sparse rural settlement patterns, and this has implications for the interpretation of field survey data (Bowes et al. 2017).

Cross-References

- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Demography of the Ancient Roman World
- ▶ Domestic Archeology: Textiles of Northern Mediterranean
- ▶ Economy, Roman
- ▶ Romanization
- ▶ Terracotta Architectural Sculpture in Classical Archaeology
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ Vicus

References

Alcock, S.E., and J.F. Cherry, eds. 2004. *Side-by-side survey: Comparative regional studies in the Mediterranean world*. Oxford: Oxbow Books.

Bowes, K., and A. Gutteridge. 2005. Rethinking the later Roman landscape. *Journal of Roman Studies* 18: 405–413.

Bowes, K., A.M. Mercuri, E. Rattigheri, R. Rinalsi, A. Arnoldus-Huyzendveld, M. Ghisleni, C. Grey, M. MacKinnon, and E. Vaccaro. 2017. Peasant agricultural strategies in southern Tuscany: Convertible agriculture and the importance of pasture. In *The economic integration of Roman Italy. Rural communities in a globalizing world*, ed. T.C.A. De Haas and G.W. Tol, 170–199. Leiden: Brill.

Broise, H., and X. Lafon. 2001. *La villa Prato di Sperlonga*. Rome: École Française de Rome.

Brun, J.-P. 2004. *Archéologie du vin et de l'huile. De la Préhistoire à l'époque hellénistique*. Paris: Errance.

Brun, J.-P. 2005. *Archéologie du vin et de l'huile en Gaule Romaine*. Paris: Errance.

Carandini, A. (ed.) with M.T. D'Alessio, and H. Di Giuseppe. 2006. *La fattoria e la villa dell'Auditorium nel quartiere Flaminio di Roma*. Rome: "L'Erma" di Bretschneider.

Di Giuseppe, H. 2005. Villae, villulae e fattorie nella Media Valle del Tevere. In *Roman villas around the Urbs. Interaction with landscape and environment*, ed. B. Santillo Frizell and A. Klynne, 1–19. Rome: The Swedish Institute in Rome.

Fentress, E. 2001. Villas, wine and kilns: The landscape of Jerba in the late Hellenistic period. *Journal of Roman Archaeology* 14: 249–268.

Foxhall, L. 2007. *Olive cultivation in ancient Greece. Seeking the ancient economy*. Oxford: Oxford University Press.
Kron, G. 2008. The much maligned peasant. Comparative perspectives on the productivity of the small farmer in classical antiquity. In *People, land, and politics*, ed. L. De Ligt and S.J. Northwood, 71–119. Brill: Leiden.
Lafon, X. 2001. *Villa Maritima. Recherches sur les villas littorales de l'Italie romaine: IIIe siècle av. J.C.-IIIe siècle ap. J.-C*. Rome: École Française de Rome.
Launaro, A. 2011. *Peasants and slaves. The rural population of Roman Italy (200 BC to AD 100)*. Cambridge, MA: Cambridge University Press.
Marzano, A. 2007. *Roman villas in Central Italy. A social and economic history*, Columbia studies in the classical tradition 30. Leiden: Brill.
Morris, S.P., and J.K. Papadopoulos. 2005. Greek towers and slaves: An archaeology of exploitation. *American Journal of Archaeology* 109: 155–225.
Schrunk, I., and V. Begović. 2000. Roman estates on the island of Brioni, Istria. *Journal of Roman Archaeology* 13: 252–276.
Tassaux, F. 2003. Élites locales, élites centrales. Approche économique et sociale des grands propriétaires au nord de l'Italie romaine (Brescia et Istrie). *Histoire et sociétés rurales* 19: 91–120.
Terrenato, N. 2001. The auditorium site in Rome and the origins of the villa. *Journal of Roman Archaeology* 14: 5–32.
Witcher, R. 2006. Broken pots and meaningless dots? Surveying the rural landscapes of Roman Italy. *Papers of the British School at Rome* 74: 39–72.
Zarmakoupi, M. 2011. Porticus and cryptoporticus in luxury villa architecture. In *Pompeii: Art, industry and infrastructure*, ed. E. Poehler, M. Flohr, and K. Cole, 50–61. Oxford: Oxbow Books.
Zarmakoupi, M. 2014. *Designing for luxury on the Bay of Naples. Villas and landscapes (c. 100 BCE – 79 CE)*. Oxford: Oxford University Press.

Further Readings

Bowes, K. 2008. *Private worship, public values and religious change in late antiquity*. Cambridge, MA: Cambridge University Press.
De Franceschini, M. 2005. *Ville dell'agro romano*. Rome: "L'Erma" di Bretschneider.
Francovich, R., and R. Hodges. 2003. *Villa to village: The transformation of the Roman countryside in Italy, c. 400–1000*. London: Duckworth.
Lewitt, T. 2003. 'Vanishing villas'. What happened to elite rural habitation in the west in the 5th and 6th centuries A.D.? *Journal of Roman Archaeology* 16: 260–275.
Lo Cascio, E., and A. Storchi Marino, eds. 2001. *Modalità insediative e strutture agrarie nell'Italia meridionale in età romana*. Bari: Edipuglia.
Mielsch, H. 1987. *Die römische Villa. Architektur und Lebensform*. Munich: C. H. Beck.
Purcell, N. 1995. The Roman *villa* and the landscape of production. In *Urban society in Roman Italy*, ed. T.J. Cornell and K. Lomas, 151–179. London/New York: Routledge.
Smith, J.T. 1997. *Roman villas. A study in social structure*. London: Routledge.

Visualizing Mediterranean Archaeology

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Introduction

Mediterranean archaeology has been a territory of intensive methodological experimentation, simulation, and scientific visualization for digital applications in archaeology over the past 30 years. New archaeological discoveries, broader and more intensive archaeological surveys, and multi-stratified sites in need of interpretation and dissemination all demonstrate the need to embrace different and innovative methodological approaches for the reconstruction of the past. The Neolithic site of Çatalhöyük in Turkey, the Paleolithic caves of Lascaux in France, the megalithic temples of Malta in the 1980s and 1990s, and the Acropolis in Athens, for example, turned on a more focused attention to the difficult relation between archaeological evidence, the site, and its perception in present and past societies, through visualization and reconstruction processes. The potential to see and study sites not just through their archaeological evidence, the material culture, but also by their hypothetical original aspect generates new questions and interpretation issues. Debates on representation, multivocality, processualism, and post-processualism (Hodder 1982, 2001) created an important methodological premise to the most advanced use of digital representation and visualization in archaeology. Those debates questioned the authenticity of the digital workflow and its ability to produce virtual models without always having the ability to validate them. Sites were no more considered as

frozen snapshots of the past, but diachronic models, digital interactive environments, and dynamic processes. A specific focus of digital representation on Mediterranean archaeology at the dawn of the computing "big bang" is explainable by the concentration of international multidisciplinary research projects in this area with a more specific emphasis on methodologies of representation and communication, beyond the traditional archaeological report. The use of virtual technologies for visualization opened new and unexplored gates in archaeology, creating a strong connection between interpretation and communication processes.

Definition

Scientific visualization in archaeology includes all the digital processes of computer graphic rendering and simulation involving data, models, and spatial information produced by different integrated technologies of data capturing, virtual reconstruction, and visual communication. Data capturing concerns the digital documentation of objects, sites, and landscapes; virtual reconstruction and visual communication regard the final digital output of archaeological models and data and their social interaction with the public and the community of scholars. The final goal of visualization is the performance of digital data at different levels of analysis, interpretation, and modeling. For example, visualization and data processing in the archaeological fieldwork can come from different technologies such as remote sensing, laser scanning, digital photogrammetry, or computer vision. But visualization can be also generated by computer graphics, animation, or real-time renderings such as virtual reality systems, Web, or cyberspaces online (e.g., virtual communities such as Second Life). A first level of visualization is identifiable during the observation and documentation of the archaeological evidence: for example, in an excavation area or in landscape survey. A second level comes from the virtual reconstruction of archaeological models according to their hypothetical colors, materials, textures, contexts, and shapes. It is important to note that the major part of the visualization projects at the beginning was addressed to digital reconstruction and not on the documentation (Forte and Siliotti 1997; Forte 2000). The reason is that it was much easier in that phase to produce models without very analytical studies on site documentation and on validation of archaeological data.

Historical Background

In the field of digital applications and visualization technologies in archaeology, it is possible to distinguish three main categories: digital documentation, virtual archaeology, and cyber-archaeology. Digital documentation regards all the technologies of data capturing (i.e., laser scanners, remote sensing, photogrammetry, computer visions) and the related visualization of these data. It is the bottom-up phase of archaeological research and it is focused on archaeological evidence: artifacts, ecofacts, sites, and landscapes.

Virtual archaeology was born at the beginning of the 1990s (Forte and Siliotti 1997; Barceló et al. 2000; Forte 2000) with the purpose of virtually reconstructing the past by means of digital (static) graphic renderings. 3D Models were produced with a high level of photorealism, including textures, colors, and geometrical details (Forte and Siliotti 1997). Cyber-archaeology characterizes more specifically this millennium with a focus on interactive models, virtual reality, serious games, and simulation environments.

The first important experiment of digital visualization in archaeology was the reconstruction of the Paleolithic caves of Lascaux in southern France, carried out by Benjamin Britton in the 1990s (Britton 2001). A head-mounted display (HMD) connected with two personal workstations comprised the system: the users dressing the HMD were able to make a virtual imaginary trip into the Paleolithic caves. Another digital experiment simulation was "Virtual Petra" at Brown University (Shape Lab). The scope of this simulation was the reconstruction of the Great Temple at Petra in relation to both archaeological artifacts and stratigraphy (Vote et al. 2002).

Later, the use of visualizing technologies substantially increased, thanks to wider use of personal computers. This technological phase was more oriented to the theatralization of the digital content in virtual environments, virtual theaters, virtual rooms, and immersive visualization systems. In this category, projects like NUME (CINECA, Bologna) and Rome Reborn (UCLA, Los Angeles, and University of Virginia; Frischer 2008) were developed in the late 1990s. NUME (New Electronic Museum of the city of Bologna; Bocchi et al. 2000) was aimed at the historical reconstruction of Bologna, in different phases starting with the twelfth century. Rome Reborn focused on a detailed urban and architectural reconstruction of Rome in 320 CE with a strong emphasis on the monumental and topographical aspects of the reconstruction (Frischer 2008).

At the beginning of the twenty-first century, major attention was paid to applications able to involve users simultaneously and to increase the degree of immersivity. One of the most advanced systems in this category was the AVIE (Advanced Visualization and Interaction Environment), an omni-spatial visualization device for the collaborative interaction of large-scale heterogeneous cultural datasets using 360° stereoscopic visualization environment (Kenderdine et al. 2010). This specific system was used for the immersive simulation of the Mnajdra Megalithic temples of Malta (Flynn and Liritiz 2005) during the exhibit of Spaces of Mnajdra, in Sydney in 2010.

Other projects, such as VITA (Visual Interaction Tool for Archaeology), were wholly oriented towards the development of collaborative systems integrating different types of 3D data (Benko et al. 2004). In the case of VITA, two users wearing see-through, head-mounted displays and tracked gloves were able to explore a portion of the virtual dig site using tangible interfaces and devices. Lu et al. (2007) designed a computer-aided and collaborative system for the reconstruction of archaeological artifacts, which allowed several archaeologists to remotely reassemble artifacts at the same time. Their research work mainly focused on algorithms assisting the reconstruction and support of multiple users rather than the immersive experience of the collaboration. Hall et al. (2001) explored a mixed-reality system SHAPE which allowed for exploration of archaeological artifacts through augmented reality in the public setting of the museum using head-mounted displays.

One of the first virtual collaborative interaction and visualization for archaeological museums was "The Ancient Via Flaminia Project (Forte 2008)" hosted at the National Roman Museum in Rome (Forte 2008; Pietroni et al. 2007) involving the virtual reconstruction of the Roman landscape along the Via Flaminia (a consular road connecting Rome to *Ariminum* in North Italy). The main focus of this application was the Villa of Livia (Figs. 1, 2, and 3), spouse of the Emperor Augustus, a monument virtually reconstructed integrating digital documentation by 3D laser scanning (Fig. 4) and architectural modeling. In this case, the users are able to explore collaboratively the virtual monument using 3D avatars.

Lately, the most advanced use of visualization system in archaeology is tele-immersion (Forte and Kurillo 2010): multiple users from different locations, as human avatars, can share the same cyberspace and operate in that environment almost as a real space. The primary goal of such collaborative frameworks is to facilitate immersive real-time interaction among distributed users. Collaborative applications must provide a communication channel to allow users to verbally communicate and interact with the data. One of the most interesting experiments in this system concerns the reconstruction of the excavation process, and the first case study was the Neolithic site of Çatalhöyük, Turkey (Forte et al. 2012). In this case, all the layers recorded by laser scanner, artifacts, GIS layers, and databases are shared in the 3D space (Figs. 5 and 6).

Key Issues/Current Debates

In the digital era, interpretation, reconstruction, and communication of the past are based on methods and technologies of visualization. This new era of visualization raises new research questions and concerns in relation to the representation of archaeological data in situ, during data

Visualizing Mediterranean Archaeology, Fig. 1 3D virtual reconstruction of the south part of the imperial Villa of Livia

Visualizing Mediterranean Archaeology, Fig. 2 The virtual Villa of Livia: archaeological evidence recorded by laser scanning and in transparency reconstruction of the atrium (first–second century CE)

collection, and in the interpretation phase. A big difference between what happens today in the domain of cyber-archaeology and the past archaeologies is that nowadays almost the entire workflow of data collection and visualization is digital, while in the past, it was mostly analog (Forte 2010a, b). The outcome of this phenomenon is that enormous quantities of archaeological data are born digital and they continue to evolve in digital environments, computers, labs, networks,

Visualizing Mediterranean Archaeology, Fig. 3 The avatar of Livia in the cyberspace of the virtual villa

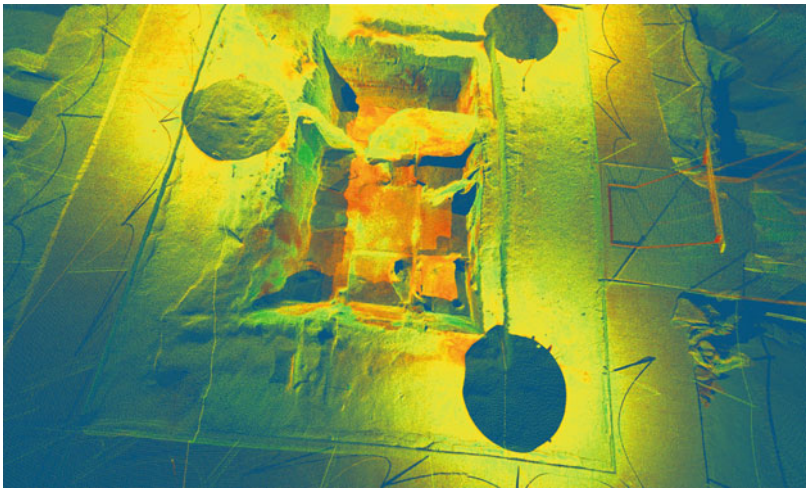

Visualizing Mediterranean Archaeology, Fig. 4 Laser scanning model of the building 77 at Çatalhöyük (a Neolithic house)

and the Web. In fact, there is a substantial difference between digitizing analog information (e.g., scanning a photograph from a book or a printed map) and capturing data in digital format (i.e., by means of a 3D laser scanner). In the first case, there is a mediation analog-digital since the data are translated by two very different ontologies; in the second case, data are digitally generated directly on site.

Digital visualization and empirical data can have a dichotomous relationship if the methodological process is unclear and not transparent. In other words, a virtual reconstruction of a Neolithic house, for example, could be spectacular and photorealistic but also totally fake if not integrated within a consistent and scientific workflow of transparent data (maps, on-site documentation, databases, etc.). Therefore, authenticity,

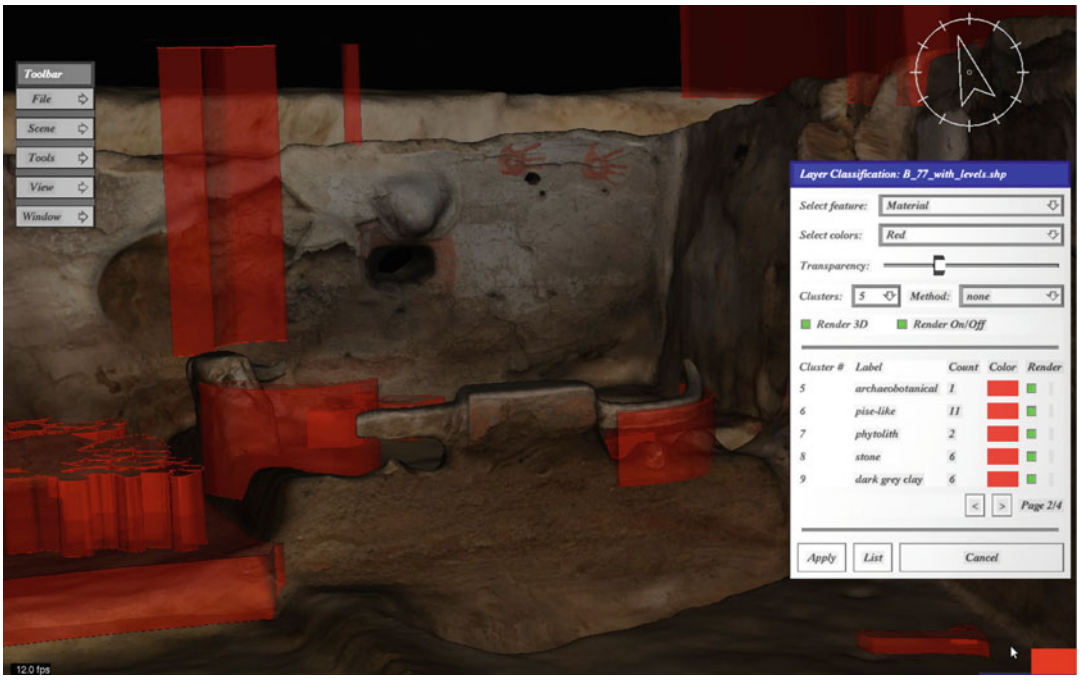

Visualizing Mediterranean Archaeology, Fig. 5 3D visualization of the archaeological informative system of Çatalhöyük (B77) – 3D Digging Project

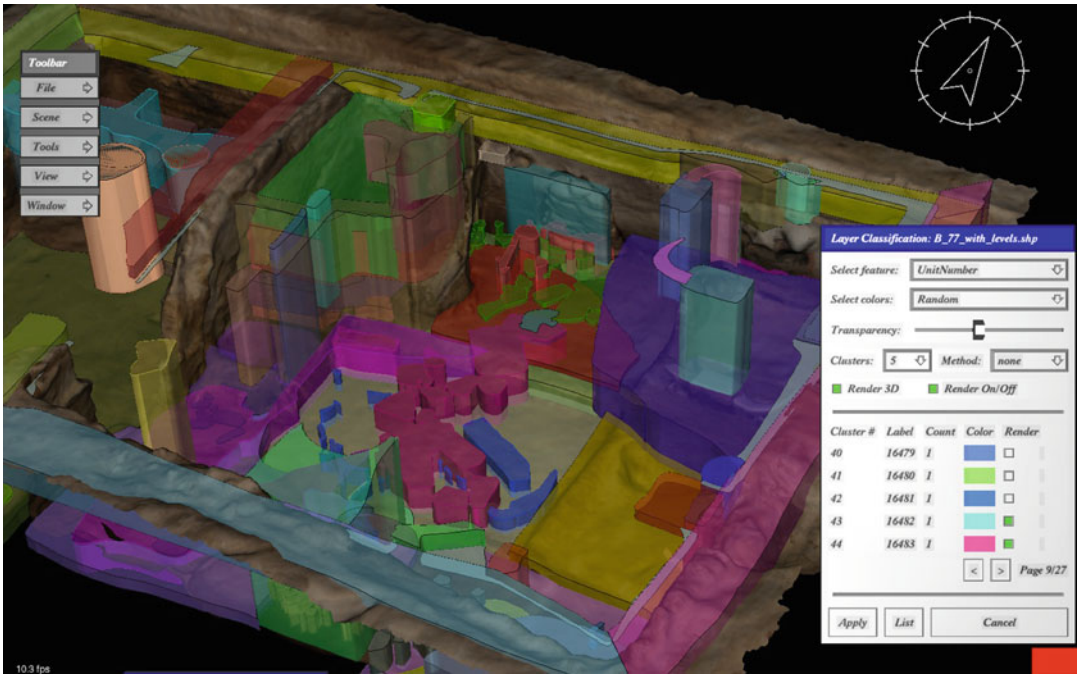

Visualizing Mediterranean Archaeology, Fig. 6 3D visualization of a Neolithic house at Çatalhöyük integrated with the GIS database

representation, validation, transparency, and other related factors pushed the community of archaeologists to discuss about standardization, guidelines, and best practice in the realization of digital archaeological models (Ryan 2001).

One of the first initiatives in this debate was the ICOMOS Ename Charter for the Interpretation and Presentation of Cultural Sites (http://www.enamecharter.org/initiative_0.html; Callebaut et al. 2002), aimed at analyzing problems of representation and communication of archaeological sites. Article 2.4 of the Charter reports that "Visual reconstructions, whether by artists, architects, or computer modelers, should be based upon detailed and systematic analysis of environmental, archaeological, architectural, and historical data, including analysis of written, oral and iconographic sources, and photography. The information sources, on which such visual renderings are based, should be clearly documented and alternative reconstructions based on the same evidence, when available, should be provided for comparison." Another initiative, CVRO (Cultural Virtual Reality Organization) was launched in 2001 (Frischer et al. 2002) with the scope to standardize and validate 3D models in virtual archaeology (Frischer et al. 2002: 9). Even if this initiative was unsuccessful, it pointed out some important methodological issues in digital visualization and representation. A more consistent and international initiative was the London Charter (Beacham et al. 2006; Bentkowska-Kafel and Denard 2012). The introduction to the Charter states: "The London Charter for the use of 3-dimensional visualization in the research and communication of cultural heritage seeks to establish what is required for 3D visualization to be, and to be seen to be, as intellectually rigorous and robust as any other research method. The initiative has to be seen in the context of what has become a constant burning issue in 3D visualization applications to cultural heritage: "transparency" (http://www.londoncharter.org/introduction.html)". The last initiative, named the Seville Principles, has tried to reconnect and update the former initiatives: "The spectacular growth of cultural tourism and the amazing technological advances in recent years have led to the development and implementation of a myriad of projects to investigate, preserve, interpret and present various elements of archaeological heritage using computer-based visualization. These projects have demonstrated not only the extraordinary potential of computer-based visualization but also its many weaknesses and inconsistencies. Therefore, there is a clear need for a theoretical debate with practical implications to enable heritage managers use the best that new technology can offer them in this area while minimizing its most controversial applications. In short, some basic principles must be established to govern practices in this growing field" (http://cipa.icomos.org/fileadmin/template/doc/PRAGUE/096.pdf). Good selection and standardization of these basic principles is very difficult to achieve. All of these initiatives recalled the core of the debate: the scientific validation of the workflow of data producing any process of visualization, representation, and reconstruction. There is no visualization without reconstruction and data integration. In addition, this workflow has to be transparent, accessible, and shareable in order to comprehend the complexity of the digital hermeneutics. Transparency is an important factor in relation to the peremptoriness of virtual reconstruction: once a model is made by digital rendering, one does not offer alternative views to its interpretation. For this reason, it is important to keep track of all the steps undertaken for its production.

International Perspectives

The biggest change in archaeological visualization in the last decade was determined by the evolution of digital technologies and more advanced methods of data capturing and simulation. If the 1990s were characterized by a great development of virtual archaeology (VA), high-resolution static models made in computer graphics, the third millennium is characterized by cyber-archaeology (CA), whereas the models are dynamic and the interpretation is based on the interaction between users and virtual environments.

In cyber-archaeology, data are digitally captured in the field by different 3D technologies

(e.g., laser scanners or photogrammetry), immediately visualized by tablet PCs or mobile computers, post-processed in laboratories for further analyses, and finally shared and again visualized on the Web or in virtual reality systems (Forte 2010a). This new and fast hermeneutic cycle generates new research questions and simulations and increases quality and quantity of information. The visualization speed in this new digital hermeneutic cycle is impressive: data are born visual and grow and spread out visually. In CA the entire simulation process is interactive and, in 3D, can process data individually or by a collaborative network or through virtual communities.

Going back to the historical background on the main topic of visualization and Mediterranean archaeology, it is interesting to note that there is a link between the great discoveries of the nineteenth century and the first experiments of visualization and representation. In fact, the first most important excavations in the Mediterranean region (e.g., Egypt, Greece, Italy, Middle East) made several archaeological sites very famous worldwide. Consequently, when the new potential of digital visualization emerged, these sites were the first to be virtually reconstructed and represented in their original hypothetical context (Forte and Siliotti 1997).

Future Directions

The involvement of digital visualization technologies in archaeology is consistently growing; it is possible to estimate that in the near future, most part of the archaeological fieldwork, survey, and on-site research will be based on real-time visualization. Real-time visualization means that all the data are processed simultaneously and the results are immediately available, visible, and interactive on-site and by different communities of users. This approach involves a strong interdisciplinary effort in the integration of different technologies but also in the methods of survey and excavation. This encompasses a deep transformation of archaeological theory and method and generates a new digital hermeneutics for archaeology. If the ontology of data, format, dimension, quality, and quantity changes, the interpretation process is different as well as the reconstruction and communication of the past. The next possible revolution in this domain is in the collaborative systems: in the virtual communities and in the co-participation of many different stakeholders and content managers. The former research in visualizing archaeological data was mainly focused on specific applications and not so much on revolutionary methods for studying and communicating archaeological data. In the future, stronger and distributed interdisciplinary efforts will be concentrated on new and different ontologies of data and on the systematic use of "mediated" digital documentation (laser scanners, remote sensing, and so on). Mediated and remote tools of investigation operate almost in real time: it means that when a laser scanner records millions of point clouds (Fig. 4), or a stratigraphy (Fig. 7) is generated by computer vision in a tablet PC, the operator/the archaeologist is still there, comparing digital data on a screen and "real" data on-site. In other words, this is the domain of cyber-archaeology, whereas visualization is a performing activity and generates non-predetermined simulations.

A good example is the Çatalhöyük Research Project at the Neolithic site of Çatalhöyük, Turkey (Forte et al. 2012). The site, dating from 7400–6000 BCE is made up of two settlement mounds: Çatalhöyük East and Çatalhöyük West. Çatalhöyük East consists of 21 m of Neolithic deposits. Çatalhöyük West is 6 m high and is almost exclusively Chalcolithic (6000–5500 BCE). Furthermore, the two mounds span 2000 years and indicate a high degree of continuity though time: the house is the social-cultural pattern of the system, ritual space, and domestic and symbolic space. The site was inscribed in the UNESCO World Heritage list in 2012.

An experimental project of 3D archaeology and real-time visualization is ongoing since 2009 with the collaboration of different international teams. The main scope the project is the three-dimensional digital reproduction of the entire archaeological excavation visualizing and interpreting structures, artifacts, and stratigraphic

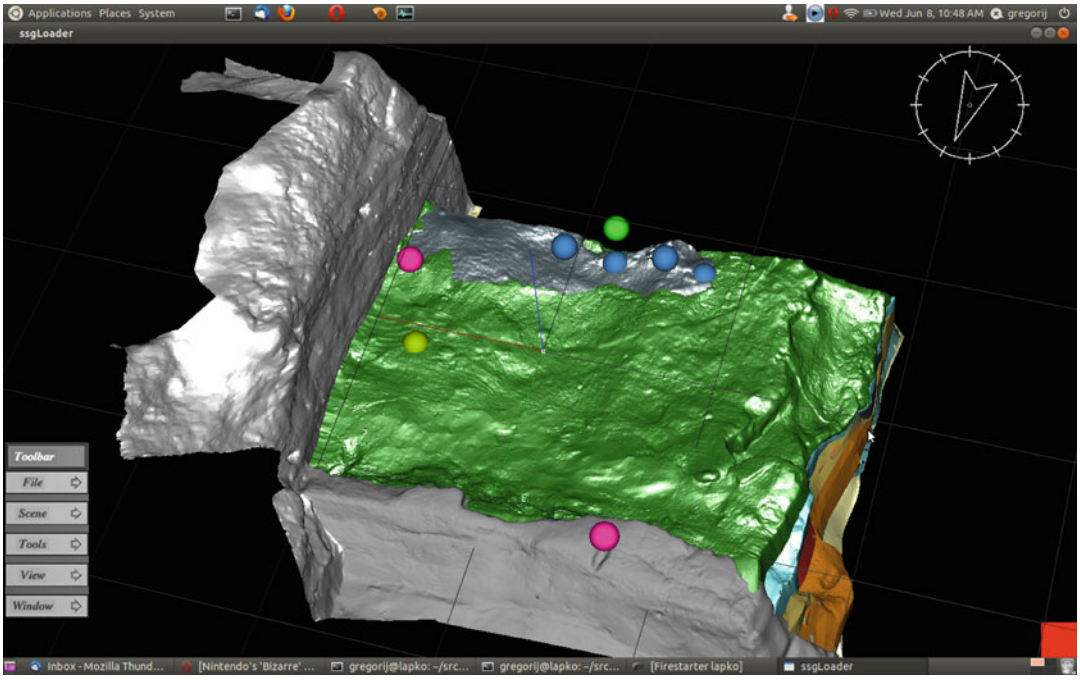

Visualizing Mediterranean Archaeology, Fig. 7 3D visualization of a micro-stratigraphy at Çatalhöyük with a selection of archaeological objects

layers. All fieldwork activities are based on 3D data recording by 3D laser scanning, digital photogrammetry, GIS, and remote sensing. This workflow involves the following stages: 3D learning, 3D digging-data recording, and 3D communication and reconstruction. The creation of an innovative digital workflow entirely three dimensional (from the field to the virtual reality) represents a revolutionary process for archaeological interpretation. This approach makes the excavation process, which removes physically all the spatial relations between layers and artifacts virtually "reversible." This work allows the complex stratigraphy of the site to be explored, analyzed, and interpreted, thus promoting new questions about site processes.

After the fieldwork, all the data are post-processed by TeleArch (Fig. 8), a 3D virtual collaborative system (see an example here: http://tele-immersion.citris-uc.org/sites/ti6.citris-uc.org/files/ti_archeology.wmv) developed by the University of California, Merced, and by the University of California, Berkeley. The visualization and integration with TeleArch represents the final step of the digital workflow, starting from the archaeological fieldwork (data capturing), post-processing of models (meshing of point clouds), and digitalization of drawings and outlines to a GIS format. Once all the datasets are in TeleArch, it is possible to elaborate the 3D data in a collaborative way. At this stage, the simulation stimulates new feedback from the operator who can interact with models and data identifying new features not identifiable otherwise. The regeneration and simulation of 3D models in a cross-data platform can stimulate new interpretations and assist the research in the validation of the previous ones. In archaeology, this stage of data collection is crucial since during the excavation, a relevant amount of information is removed or destroyed during the digging procedures.

In conclusion, the future for digital visualization in archaeology is very challenging and not easily predictable, given the revolutionary speed at which digital technologies develop. Visualizing will mean interacting in real time with models, data, virtual reality systems, and simulation environments; visualizing will be a digital interactive

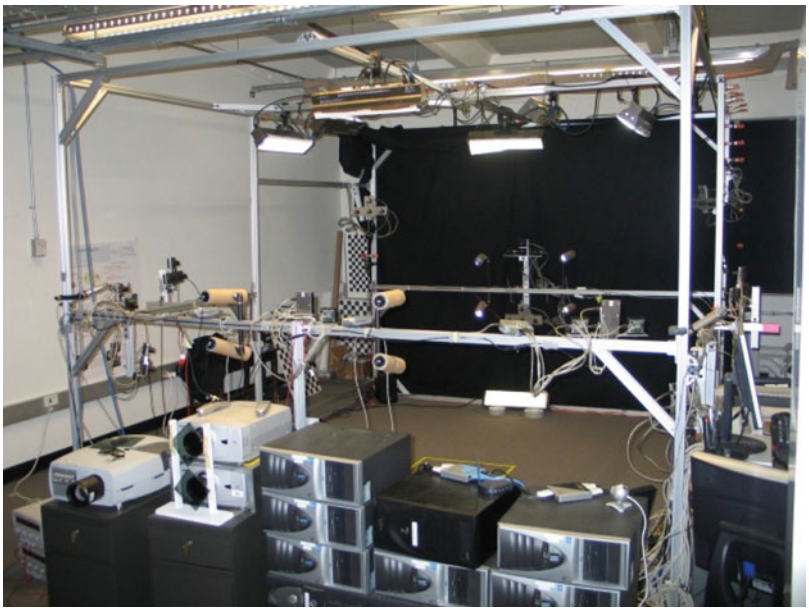

Visualizing Mediterranean Archaeology, Fig. 8 TeleArch: Teleimmersive Archaeology system installed at the University of California, Berkeley

performance with a high degree of embodiment for all the users and communities involved. The concept itself of digital visualization in archaeology has changed enormously in the past 30 years: originally involving the graphic rendering of static pictures and then the re-elaboration of dynamic models and environments created by user's avatars. It now includes a digital hermeneutics cycle generating new knowledge not in the reconstruction of a single past but in the simulation of possible pasts.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Aerial Archaeology
- ▶ Archaeological Informatics
- ▶ Archaeological Record
- ▶ Çatalhöyük Archaeological Site
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management Technology and Training
- ▶ Europe: Paleolithic Art
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Internet, Archaeology of the
- ▶ Landscape Archaeology
- ▶ Media and Archaeology
- ▶ Topography of Rome
- ▶ Visualizing Mediterranean Archaeology

References

Barceló, J. A., M. Forte, and D. H. Sanders, eds. 2000. *Virtual reality in archaeology*. BAR International series 843. Oxford: Archaeopress.

Beacham, R., H. Denard, and F. Niccolucci. 2006. An introduction to the London Charter. In *The e-volution of information communication and technology in cultural heritage*. Proceedings of VAST 2006, ed. M. Ioannides et al., 263–269. Budapest: Archaeolingua.

Benko, H., E. W. Ishak and S. Feiner. 2004. Collaborative mixed reality visualization of an archaeological excavation. In *The International Symposium on Mixed and Augmented Reality (ISMAR 2004)*, November 2004, 132–140.

Bentkowska-Kafel, A., and H. Denard, eds. 2012. *Paradata and transparency in virtual heritage*. Farnham/Burlington: Ashgate.

Bocchi, F., M.E. Bonfigli, L. Calori, and A. Guidazzoli. 2000. Virtual reality and cultural heritage: Some

applications. In *Proceedings of EVA 2000*, ed. V. Cappellini and J. Hemsley, 162–165. Florence: Pitagora Editrice Bologna.

Britton B. 2001. The boundaries of scientific culture in virtual heritage. In *Seventh International Conference on Virtual Systems and Multimedia (VSMM'01) 2001*, 21–27. Berkeley: IEEE Computer Society.

Callebaut, D., D. Pletinckx, and N.A. Silberman. 2002. Why multimedia matter in cultural heritage: The use of new technologies in the Ename 974 Project. In *Multimedia communication for cultural heritage*, ed. F. Niccolucci and S. Hermon, 65–72. Budapest: Archaeolingua.

Flynn, B., and I. Liritiz. 2005. *Exploration of Maltese prehistoric temples through the application of multimedia technologies*. Rhodes: University of the Aegean, Department of Mediterranean Studies.

Forte, M. 2000. About virtual archaeology: Disorders, cognitive interactions and virtuality. In *Virtual reality in archaeology*. BAR International series S 843, ed. J. Barcelo, M. Forte, and D. Sanders, 247–263. Oxford: Archaeopress.

Forte, M. 2010a. Introduction to cyber archaeology. In *Cyber archaeology*. BAR International series 2177, ed. M. Forte. Oxford: Archaeopress.

Forte, M. 2010b. *CyberArchaeology*. BAR International series 2177. Oxford: Archaeopress.

Forte, M., ed. 2008. *La Villa di Livia. Un percorso di ricerca di archeologia Virtuale*. Rome: "L'Erma" di Bretschneider.

Forte, M. and G. Kurillo. 2010. Cyberarchaeology experimenting teleimmersive archaeology. In *16th International Conference on Virtual Systems and Multimedia (VSMM 2010)*, 20–23 October 2010, Seoul.

Forte, M., and A. Siliotti, eds. 1997. *Virtual archaeology: Great discoveries brought to life through virtual reality*. London: Thames and Hudson.

Forte, M., N. Dell'Unto, J. Issavi, N. Lercari, and L. Onsurez. 2012. 3D archaeology at Çatalhöyük. *International Journal of Heritage in the Digital Era* 1 (3): 351–377.

Frischer, B. 2008. The Rome Reborn Project. How technology is helping us to study history. *OpEd* November 10, 2008.

Frischer, B., F. Niccolucci, N. Ryan and J. Barcelò. 2002. From CVR to CVRO. The past, present, and future of cultural virtual reality. In *Proceedings of VAST 2000*. British Archaeological Reports 834, ed. F. Niccolucci, 7–18. Oxford: Archaeopress. Available at http://www.iath.virginia.edu/~bf3e/revision/pdf/CVRtoCVRO.pdf

Hall, T., C. Luigina, L. Bannon et al. 2001 The visitor as virtual archaeologist: Explorations in mixed reality technology to enhance educational and social interaction in the museum. In *Proceedings of Virtual Reality, Archaeology, and Cultural Heritage (VAST 2001)*, 91–96. New York: ACM SIGGRAPH.

Hodder, I. 1982. *Symbolic and structural archaeology*. Cambridge: Cambridge University Press.

Hodder, I. 2001. *Archaeological theory today*. Cambridge: Cambridge University Press.

ICOMOS. 2008. Charter for the interpretation and presentation of cultural heritage sites, October 2008. Available at http://www.international.icomos.org/charters/interpretation_e.pdf

Kenderdine, S., A.M. Duguet, J. Fritz, J. Gollings, L. Manovich, G. Michelle, and J. Shaw. 2010. *Place-Hampi, the panoramic imaginary of Vijayanagara*. Heidelberg: Heidelberg Neckar.

Joukowsky, M. 2002. Technologies in use at the Brown University excavations of the Petra Great Temple. In *International Conference on Science and Technology in Archaeology and Conservation, Abstracts of the Hashemite University (Zarqa, Jordan)*. Zarqa: Hashemite University.

London Charter for the computer-based visualization of cultural heritage. 2009. Available at: http://www.londoncharter.org

Pietroni, E., M. Forte and S. Pescarin. 2007. Multiuser virtual reality museum application for cultural heritage: The ancient Via Flaminia project. In *Proceedings 8th International Symposium on Virtual Reality, Archaeology and Cultural Heritage-VAST 2007*.

Ryan, N. 2001. Documenting and validating virtual archaeology. *Archeologia e Calcolatori* 12: 245–273.

Vote, E., D. Acevedo, D. Laidla, and M. Joukowsky. 2002. Discovering Petra: Archaeological analysis. *IEEE Computer Graphics and Applications* 22 (5): 38–49.

Further Reading

Acevedo, D., E. Vote, D. H. Laidlaw and M. Joukowsky. 2001. Archaeological data visualization in VR: Analysis of lamp finds at the Great Temple of Petra, a case study. In *Proceedings of the Conference on Visualization '01*, San Diego, 493–496.

Forte, M. 2009. Participatory research in cyber-archaeology. In *CAA 2009. Proceedings of the 37th Annual Computer Applications and Quantitative Methods in Archaeology Conference*, 22–26 March, Williamsburg, 76–85.

Forte, M., and E. Bonini. 2010. Embodiment and enaction: A theoretical overview for cybercommunities. In *Heritage in the digital era*, ed. M. Ioannides, A. Addison, A. Georgopoulos, L. Kalisperis, A. Brown, and D. Pitzalis, 45–56. Multi-Science Publishing.

Forte, M., and N. Dell'Unto. 2010. Embodied communities, Second Life and cyber archaeology. In *Heritage in the digital era*, ed. M. Ioannides, A. Addison, A. Georgopoulos, L. Kalisperis, A. Brown, and D. Pitzalis, 181–194. Ltd.: Multi-Science Publishing.

Forte, M., and S. Pescarin. 2012. Behaviours, interactions and affordance in virtual archaeology. In *Paradata and transparency in virtual heritage*, ed. A. Bentkowska-Kafel and H. Denard, 2–13. Farnham: Ashgate.

Forte, M., and E. Pietroni. 2009. 3D collaborative environments in archaeology: Experiencing the reconstruction of the past. *International Journal of Architectural Computing* 7 (1): 57–75.

Volcanic Activity

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Introduction

When measured on the timescale of a human lifetime, volcanic eruptions are – in most regions of the world – relatively rare phenomena. However, over historical, archaeological, and evolutionary timescales, volcanic eruptions occur frequently, and they do so often in areas populated by humans. Nearly 10,000 volcanic eruptions are known from the Holocene alone (Siebert et al. 2010), and more than 2000 such events are known from the late Quaternary. Most volcanologists consider these numbers to be severe underestimates of the actual number of eruptions that have taken place. Volcanic activity has thus been a facet of human life from even before the evolution of the lineage *Homo* in the tectonically and volcanically turbulent landscapes of Eastern Africa (King and Bailey 2006). This entry considers the breadth of these interactions illustrated by a series of case studies, which together highlight the salient features of the relationships between humans and volcanism (see also Grattan 2006; Cashman and Giordano 2008; Riede 2016).

Considerations of volcanic activity in archaeological contexts can broadly be divided into two categories: (1) volcanic eruptions and their fallout as temporal markers and (2) volcanic eruptions as causes or catalysts for bio-cultural change. It is the latter aspect that has generated most controversy, but this entry suggests that the two can, should, and are increasingly being combined under a framework that takes account of past human vulnerability in a way that is sensitive both to the physical and the political, social, ecological, and historical constellations of the affected species and/or societies.

Definition

Volcanic activity ensues when molten rock (magma) is extruded onto the surface of the Earth; lava, pyroclastic materials, and/or volcanic gases erupt through an opening in the crustal surface termed a vent, and each of these types of ejecta constitutes a hazard to people living nearby (e.g., lava and pyroclastic flows, mud avalanches) as well as at some distance (gases and ash fallout). Volcanic activity is chiefly the result of plate tectonic activity (Fig. 1). Consequently, the vast

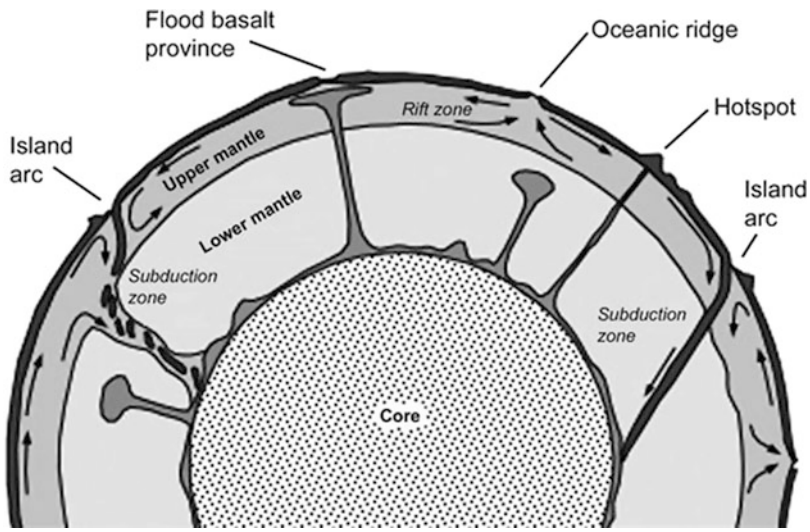

Volcanic Activity, Fig. 1 A model of the Earth's mantle and the different volcanic systems

majority of subaerial as well as submarine volcanoes are located along plate boundaries, for instance, along the so-called Ring of Fire that frames the Pacific Ocean. Here, continental plates either converge (subduction zones) or spread (rift zones) from each other, and both processes can lead to volcanic activity. Volcanoes can also be fed by so-called mantle plumes, which are accumulations of magma at unusually shallow depths in the Earth's mantle. These features create volcanic "hot spots" (e.g., Iceland, Hawaii, the Eifel region), which often persist over very long times and can rapidly build up critical masses of magma. These subterranean blowtorches burn through the mantle and are responsible for some of the world's largest volcanic provinces (e.g., flood basalts) and most massive eruptions.

Volcanic activity has a plethora of faces, ranging from the gentle and barely noticeable extrusion of gas bubbles in picturesque water-filled craters to cataclysmic super-eruptions that affect climate on a global scale. The products of volcanic activity – for instance, the light and bubble-rich pumice and the durable basalt – have been used in many periods of prehistory and history to fashion tools and as building material. The focus of this entry is the volcanic eruptions themselves, which are commonly rated using the Volcanic Explosivity Index (Fig. 2; Newhall and Self 1982). This semiquantitative scale is similar to the better-known Richter scale for earthquakes in that it is logarithmic and it amalgamates several eruption parameters (volume ejected, plume height, eruption duration, and impact on weather systems and climate).

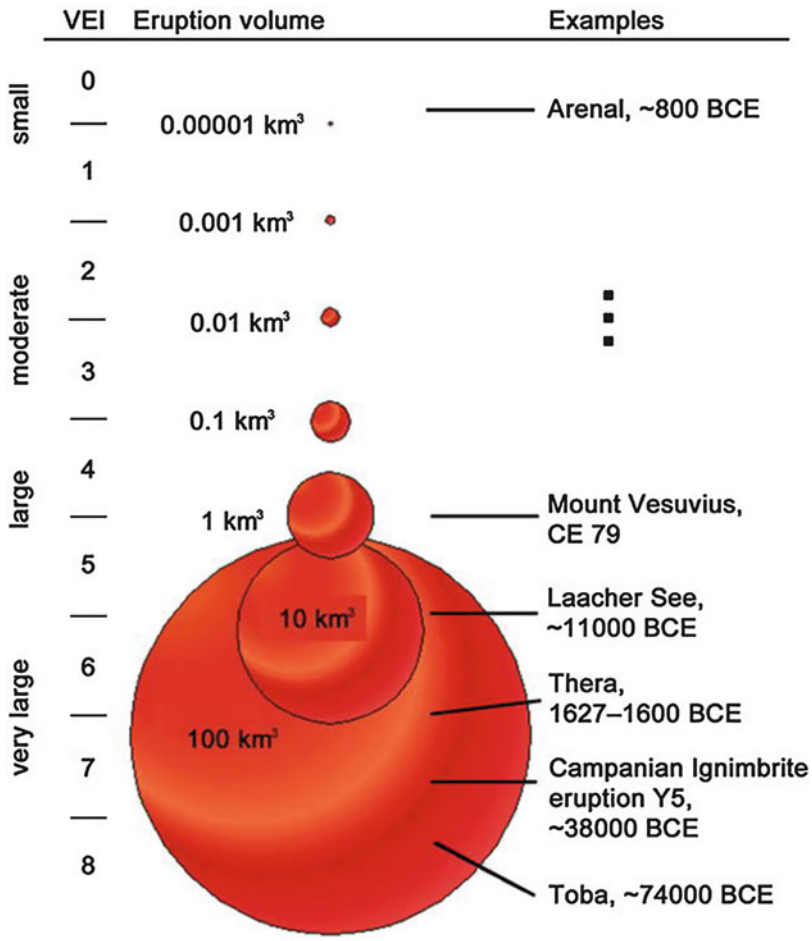

Volcanic Activity, Fig. 2 Schematic of the Volcanic Explosivity Index (VEI) with examples of past eruptions that have impacted human societies mentioned in the text

Alternative schemes of classification employ more rigorously quantitative measures of eruption magnitude and intensity. Just like volcanism takes many forms, so do the interactions of volcanic activity with human societies vary along a multitude of intersecting axes – volcanic, topographic, technological, economic, religious, and communication-related (Blong 1984; Riede 2015).

Historical Background

Volcanoes as destructive and productive geological agents have long fascinated scholars of natural history. Volcanic eruptions also hold a special place in the history of archaeology. The eighteenth-century rediscovery and subsequent excavation of the ancient Roman towns of Pompeii and Herculaneum in the shadow of the still active Vesuvius and the vivid description of their destruction in AD 79 by Pliny the Younger have captured the attention and imagination of antiquarians, archaeologists, and the public alike (Sigurdsson 1999). Pompeii's morbid allure – a par excellence example of dark geo-cultural heritage – has made it one of today's most visited archaeological sites in the world. Although tragic for the inhabitants of these places, the preservative effect of the ashfall has been a boon to archaeology, allowing for reconstructions of Roman life with unprecedented detail. Similarly spectacular and at times macabre finds of buried settlements and their inhabitants are rare elsewhere in the world and from other periods, but by no means unknown. Indeed, recent work around Mount Vesuvius has revealed evidence of similar or even larger eruptions that buried earlier prehistoric hamlets and fields in the area. Likewise, the Bronze Age settlement of Akrotiri on Santorini in the Aegean Sea – buried by the cataclysmic Thera eruption (1600–1627 BCE) – also ranks among the most comprehensively researched archaeological sites in the world. In the Americas, the buried village of Cerén in El Salvador and Tetimpa in Mexico, for instance, have also provided incredibly detailed snapshots of past life. Much further back in time, the occasional Paleolithic site covered by ash fallout has also been discovered, and key episodes in deep prehistory were likely affected in direct or indirect ways by volcanic activity: The first dispersals of hominins out of Africa was, at the almost two million-year-old locale of Dmanisi in Georgia, stopped short by a volcanic eruption; early *Homo sapiens* may have experienced a severe genetic bottleneck following the Toba super-eruption; the fate of Neanderthals and early European modern humans may have been affected by a paroxysmal eruption at the Phlegraean Fields in Italy whose fallout ash is found as far afield as Russia (e.g., at the site of Kostenki); the recolonization of Northern Europe at the end of the Pleistocene was punctuated by the eruption of the Laacher See volcano in Western Germany; the colonization of Oceania was both delayed by volcanic eruptions, but may at times also have been accelerated by them as their eruption columns may have served as navigational markers for new islands otherwise hidden far below the horizon.

The remarkable discoveries of devastated settlements close to volcanoes do remain exceptional and also illuminate merely one facet of past volcanic activity and its impact on human societies. The sheer destructive forces unleashed in the immediate vicinity of volcanic edifices render it unsurprising that towns and villages were occasionally annihilated and people killed. If, however, recent eruptions and their consequences serve as a useful analogue, then the indirect effects of volcanic events, often at some geographic remove from the eruptive center and articulated through migration and other socioeconomic and sociocultural effects, are much more significant (Table 1). In this vein, several scholars have put forward volcanic eruptions as prime movers or catalysts for cultural

Volcanic Activity, Table 1 The human impacts of recent (twentieth-century) eruptions. Most eruptions entail several forms of response

Impact/response type	N, events recorded	N, people affected
Killed	~250	~90,000
Injured	~150	~16,000
Homeless/ infrastructure damage	~100	~300,000
Evacuated/migration	~250	~5,000,000

changes observed in the archaeological record. Various settlement crises, collapses, and similarly dramatic episodes have been attributed wholly or in part to volcanic activity. Yet, many scholars have pointed out that the precise dating required to distinguish correlation from causation is often not in place and also that volcanic events can stimulate creative and adaptive culture change rather than only lead to collapse.

Key Issues

Establishing whether and how volcanic activity has affected a given human society requires extensive empirical and interdisciplinary efforts. To date, a substantial number of well-research case studies from all parts of the world are available (Grattan and Torrence 2007; Riede 2015; Sheets and Grayson 1979; Torrence and Grattan 2002). What is lacking, however, is a comparative framework within which these case studies reasonably can be evaluated in relation to each other and from which general patterns of vulnerability, response, and impact can be extracted. Volcanic eruptions and their attendant ash (=tephra) fallout are in principle ideally suited to such comparative analyses: Unlike more general arguments about the effects of climate change or most other extreme geological events on human societies, the tephra layers produced by any given eruption act as an archaeologically synchronous time marker that allows for unique event-stratigraphic dating precision. Such so-called isochron layers can then be used to link proximal and distal fallout areas, facilitating the comparative investigation of the dynamics of impact anchored at a common point in time and along a given geographic transect. In this way, the changing impact dynamics among different (but most likely linked) groups are thrown into relief; eruptions and their fallout can serve to bring past communities together through migration, but also separate them via their ecological effects. What is more, the proximal-to-distal dynamics of volcanic hazards also change dramatically, and detailed empirical studies can make solid arguments for the importance of these hazards. To this end, volcanological and disaster scientific studies from present and recent eruptions can serve as a road map to formulating specific and testable hypotheses about how a given eruption in the past may have impacted societies in directly affected areas as well as further afield.

Past Volcanism and Tephrochronology

Temporal control is essential to investigations of volcanic activity and its impact on human communities in the past. The use of tephra in chronological studies is rapidly maturing, and several regions of the world now benefit from robust tephrochronological lattices that link lacustrine, marine, terrestrial, and ice-core records (Lane et al. 2014). Tephra analysis (especially the analysis of non-visible crypto-tephras) is rapidly becoming part of archaeologists' standard analytical toolkit, and linking archaeological sequences directly to the environmental archives that most often contain traces of volcanic fallout is now increasingly feasible. Efforts at collating large datasets of known tephra find localities of particular eruptions require the sifting of literature from a large number of disparate disciplines: geology, volcanology, soil science, palynology, and archaeology. Despite these difficulties, the ever-expanding regional tephrochronological lattices are now beginning to link more and more volcanic provinces together by eruption events detectible in different stratigraphic sequences and often across very large areas. This increasing linkage holds the promise of also being able to better synchronize regional archaeological sequences with each other and with relevant environmental archives (lakes, ice cores, marine sediments, etc.). Yet, methodological problems persist. The geochemical fingerprinting using laser ablation inductively coupled plasma mass spectrometry as a gold standard remains costly, and not all tephras can be readily distinguished even via such high-powered methods. Miscorrelations and erroneous age transfers are possible pitfalls. Furthermore, tephra layers – while themselves not organic – preserve best in stable environmental archives, i.e., many archaeological sites do not offer ideal preservation conditions for tephra. In addition, reworking can lead to the dissolution of

initially discrete tephra layers, creating tephra "zones" of diffuse spread less useful for precise and accurate dating. Yet, tephrochronology is still a young discipline undergoing rapid methodological development and empirical expansion.

Past Volcanism, Vulnerability, and Resilience

Although an ever-increasing number of well-investigated case studies now exist, the potential of volcano and tephra studies in relation to past human vulnerability and resilience is far from exhausted. One issue arising out of the great precision with which tephrochronology can date, in particular, early prehistoric cultural sequences lies in the incompatibility of this event-stratigraphic framework with the usually less precise dating obtained by other means. So, while a given eruption (even a very large one) may have been catastrophic for particular *communities* of early hominids or humans, they may not have left a lasting impact on these as a *species*. Given the generally poor chronological and geographic resolution of Paleolithic cultural sequences, a seemingly unchanging archaeological record can thus mask even significant impacts of a given eruption at a local scale and over short- or medium-term timescales. This problem is further amplified by important differences between proximal and distal impacts and by the difficulty of disentangling the temporalities of effects and impacts. The controversy surrounding case studies such as the impact of the very large Toba super-eruption (~74.000 years ago, Indonesia) with its claimed impact on human genetic diversity and the somewhat smaller but still cataclysmic Campanian Ignimbrite (Y5) eruption (~38.000 years ago, Italy) and its alleged influence on late Neanderthals and early anatomically modern humans in Europe exemplifies these difficulties. It is arguably first from the very late Pleistocene Late Glacial onward that the temporal resolution of the archaeological record begins to be such that the effects on communities rather than species can meaningfully be addressed: In the Late Glacial of Northern Europe, for instance, hunter-gatherer groups living at low population densities were affected by a low-frequency/high-magnitude eruption of the Laacher See volcano located in present-day westernmost Germany. This volcano erupted after a long period of quiescence just after a cold spell that punctuated the otherwise mild and stable Allerød interstadial. The eruption devastated an area of over 1400 km^2 in extent around the eruption site and so preserved archaeological and paleoenvironmental features of that time. This includes some of the richest sites known from this period (e.g., Gönnersdorf) as well as animal tracks, burned woodlands, and a plethora of macrobotanical remains. The nearby River Rhine was dammed up, and when this dam broke, flood waves transported vast amounts of rafting pumice and tephra along the Rhine drainage. Flooding features can be traced as far downstream as the English Channel. The eruption is dated to just under 13,000 years BP, and the tephra fallout from this weeks-to-months-long event is found over large parts of Europe. Yet, no sites in the near-vent region exist that attest to the presence of people in the area immediately prior to the eruption. Indeed, there is one site just north of the area of complete devastation, which may be as little as 200 years younger than the eruption itself. Evidently, people did move back after the event, although their presence in the centuries following the eruption seems to have been ephemeral at best. In contrast to the near-vent area, some regions of medial and distal fallout appear to have been fully or at least largely deserted by people following the eruption. Several sites directly covered by airfall tephra from the Laacher See volcano – after nearly 13,000 years of compression still up to 40 cm thick some 230 km and 10 cm thick some 350 km northeast of the eruptive center – attest to this. The ash fallout likely affected plant and animal populations negatively due to the very low grain size of the tephra particles posing a respiratory health hazard, due to the hardness of the tephra particles dramatically increasing tooth wear and because the tephra was highly loaded with poisonous substances such as fluoride. The seasonal timing of the eruption in late spring/early summer almost certainly further aggravated the effects on animals and plants as seedlings and young animals were less able to withstand the stress generated by the tephra fallout. Although the resolution of paleoenvironmental archives is

rarely good enough to demonstrate such effects as far back in time as the Late Glacial, observations of the effect of tephra fallout on fertility and soil balance in recent times suggest that fallout deeper than 15 cm effectively sterilizes the soil, requiring a lengthy process of regeneration. In addition to these mechanisms, the eruption also affected climate and weather patterns for some time. It likely led to unusual optical phenomena, and extremely loud sounds as well as pressure waves were probably also generated. The eruption column alone would, on a fine day, have been visible over large parts of Europe. The very tangible environmental effects of the eruption combined with its extreme multisensory aftermath for a substantial impact on those groups living at the periphery of the contemporaneous late Paleolithic world. Groups may already have been stressed by the cold phase immediately preceding the eruption, and the abandonment of the affected landscape disrupted important travel, trade, and communication routes leading, in turn, to the isolation of groups in Southern Scandinavia. This demographic isolation appears then to have precipitated notable consequences such as the loss of bow-and-arrow technology, a general reduction of material culture complexity (as measured by the lithic chaine opératoire), and a (perhaps willing) geographic separation from more central continental groups. This separation takes archaeological form in the so-called Bromme culture, the only autochthonous Late Glacial culture in Northern Europe (Riede 2017). As so often in discussions of volcanic impacts on human society, this argument is not uncontested, with issues of chronology and material culture interpretation being central to such counterclaims. Such debate notwithstanding, the brief discussion of this case study serves here to highlight that any arguments about the impact of past eruptions should be sensitive to the kind of indirect (often network- or migration-mediated) "domino effects" of volcanic eruptions. It is as seemingly paradoxical as it is interesting that the strongest cultural effects of past volcanism are often most clearly seen in areas not themselves directly affected by a given eruption and its fallout.

International Perspectives

Volcanic activity does not respect current national border, and, as such, the study of past volcanism almost automatically is given an international dimension, although regional research biases can distort the known distribution of tephra fallout. Even if a given volcano and its fallout affected only one country, it is likely that the indirect effects of this event can be seen and explored in the archaeology of another. It is interesting to note that recent years have seen an increasing interest in past volcanic events specifically in regions that are not volcanically very active today (e.g., Europe north of the Alps). Recent eruptions there and their impact, coupled with the evident impact of other extreme geological events (e.g., tsunamis and earthquakes), as well as advances in Quaternary science and volcanology, have contributed to setting past volcanic activity high on research and funding agendas. The combined power of tephrochronology and of past disaster science in addressing past vulnerability and resilience duly justifies this attention.

Future Directions

Why study past volcanism and its interaction with human societies, and what are the challenges for future research? Volcanism is a relatively rare phenomenon over short timescales, and the number of historical fatalities low. Thus, the data available for evaluating the ecological, economic, and social impact of eruptions in the present and future remain scarce. If, however, we want to better understand the long-term impact of such events on societies, and if there is a causal relationship between long-term patterns of (pre-eruption) vulnerability and (post-eruption) responses and impacts, only archaeology really has access to the necessary temporal perspective (Fig. 3). In addition, the many case studies of the impacts of volcanic eruptions on societies at different levels of economic and political complexity can be used to reflect on and retrospectively analyze the specific constellations of vulnerability that existed among those affected groups (Sheets

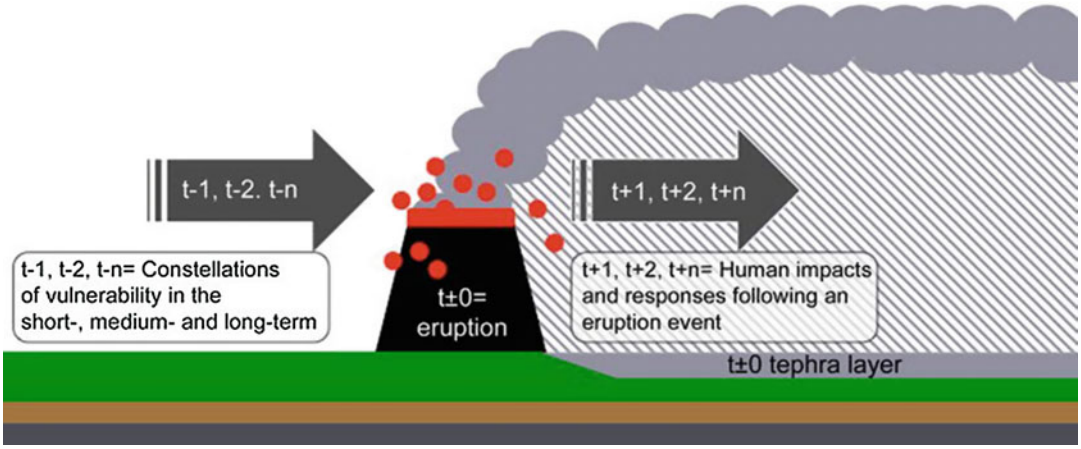

Volcanic Activity, Fig. 3 Volcanic eruptions as temporal and analytical markers, especially for investigating long-term patterns of (pre-eruption) vulnerability and (post-eruption) responses. Disciplines such as anthropology, sociology, and history provide insights into the short and medium term, whereas archaeology provides insights into the long term

2012; Riede et al. 2017). Using eruptions and their fallout layer as a chronostratigraphic marker in a dual analytical sense, i.e., as an actual chronological as well as a cultural "time zero," it is possible and imperative to look at the societies before *and* after the event. Given that disaster scientists have long argued that any research into vulnerability and post-disaster recovery must be sensitive to the affected groups' history, such increased systematic attention to past eruptions may be useful for both better understanding the course of prehistory and history (cf. van Bavel and Curtis 2016) and for better understanding volcanic eruptions in general: Disasters, in this perspective, are "revealers" of resilience and vulnerability (García-Acosta 2002: 50). Vulnerability in turn is a composite of economic, ecological, political, and network factors that require broad knowledge of the societies in questions. Ecological and social vulnerability are intimately linked, and simplistic scenarios of the human impact of volcanic events are no longer tenable. Indeed, recent eruptions such as the 2011 Eyjafjallajökull event highlight that eruption size always underdetermines the extent of impact and the particular responses chosen. This eruption was small and the volcano located far away from major centers of human occupation. Yet, many people experienced it as a catastrophe (Lund and Benediktsson 2011). Rather than the geophysical parameters alone, the ways in which an eruption intersects with the economy, mobility patterns, and political and religious structures of the affected groups are vital. It has also been shown that, from contemporary to prehistoric societies, religious worldviews have an important role to play in shaping disaster responses. Vice versa, some theologians argue that volcanic events have played some role in shaping the foundations of major religions either through what has been termed "geo-mythology" or, if loss of life and property are involved, via issues of theodicy (the justification of suffering in light of divine benevolence). Yet, archaeologists generally look first or indeed exclusively toward the climatic or ecological impact of eruption for explaining the cultural changes (or lack thereof) documented in the archaeological record. But can we identify, for instance, the religious repercussions and responses to volcanic activity in the archaeological record, and can we use these as explanatory elements for long-term culture changes? Although contested, some murals at Çatalhöyük in present-day Turkey depict volcanic disasters (Fig. 4). Intriguingly, sites such as Asiklihöyük may be representative of earlier aceramic Neolithic villages affected by ashfall, and the refugees from this or other yet undiscovered sites may be the founders of

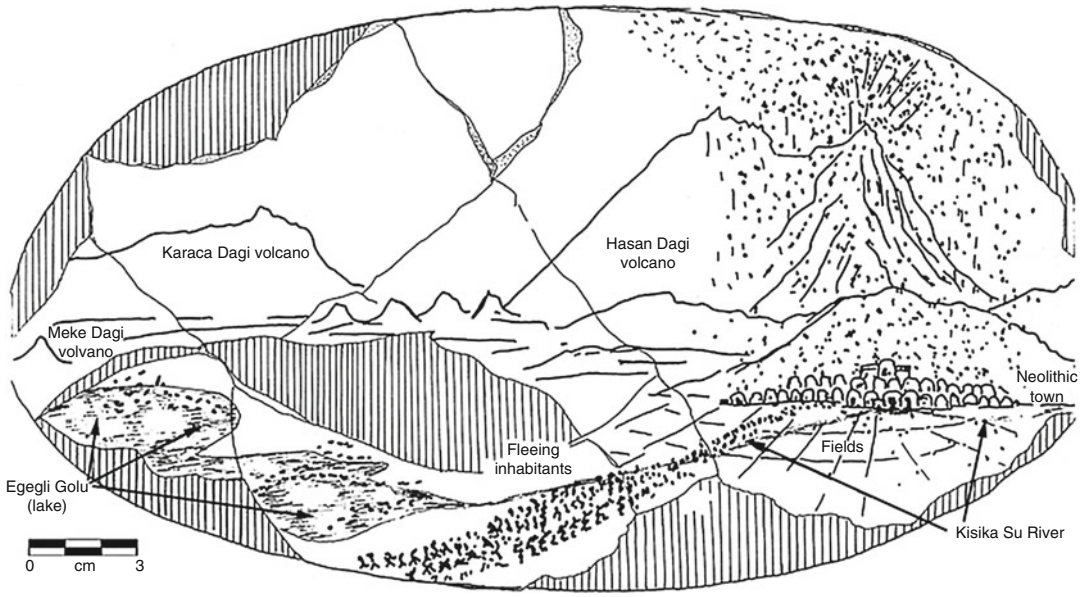

Volcanic Activity, Fig. 4 A mural from the famous early Neolithic settlement of Çatalhöyük (Turkey) arguably showing an erupting volcano, possibly Hasan Dagi, and fleeing villagers. The areas marked with vertical stripes are not preserved

Çatalhöyük. Such destruction events may thus have formed an integral part of the early religious systems evident at that site. Similarly, at Arenal in Costa Rica, it has been demonstrated that religiously motivated mobility – pilgrimages – rather than economic or other concerns drew people back to areas devastated by eruptions (Sheets 2011). It seems clear that religious sensemaking structured and continues to structure responses to volcanic hazards, and the climatic and ecological effects of even minor volcanic activity can be greatly amplified by such worldviews (Chester 2005). Much like disaster scientists have called for more attention to history, they have also urged for individual agency to be considered more fully. While at times limited by their data resolution, archaeologists are theoretically well equipped to follow this call. Viewing past societies as internally heterogeneous allows for a more nuanced understanding of past disasters and their impact: Any given volcanic event can be detrimental to some, beneficial to others. Religious movements, for instance, often use such events to drive or suppress social change.

Investigations of contemporaneous disasters, and here especially of volcanic eruptions, have long been the resort of geoscientists. Over the last decades, however, the so-called "radical" approach emerged in partial opposition to the former "dominant" way of studying catastrophes and their consequences (Alexander 2000). The radical school attempts to give more room to human individual and collective agency, history, and politics in assessing the impact of a given event on the impacted societies. In this way, the agenda of radical disasters science matches very well that of many post-processual archaeological approaches, albeit without fully jettisoning the notion of human ecology. If approached from this angle, past disasters hold the potential of bridging the theoretical divide between classic functionalist-ecological and interpretative approaches in archaeology – clearly, no single perspective can amply address issues of vulnerability, impact, and response. Finally, future work could benefit from an ethno-archaeology of volcanic activity and from thinking volcanism through as a form of geo-cultural heritage. While past eruptions are already routinely used as information sources for future eruption scenarios, volcanological, sociological, and anthropological studies of contemporary volcanic events rarely if ever

include considerations of the material aspects of vulnerability and impact beyond basic infrastructural concerns. On a broader scale, interdisciplinary approaches that investigate the twin aspects of vulnerability and impact from the present into the deep past will no doubt yield important insights into the diversity, patterns, and determinants of individual and group responses to volcanic activity and may suggest ways to survive and handle such events in the future (Cooper and Sheets 2012; Riede 2015). If nothing else, past eruptions help us think about potential future calamities in ways that remain constrained by our historical and archaeological evidence base (Donovan and Oppenheimer in press).

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Dmanisi Hominins and Archaeology
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Gönnersdorf (Magdalenian): Geography and Culture
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Kostenki: Geography and Culture

References

Alexander, D. 2000. *Confronting catastrophe*. Oxford: Oxford University Press.

Blong, R.J. 1984. *Volcanic hazards. A sourcebook on the effects of eruptions*. Sydney: Academic.

Cashman, K.V., and G. Giordano. 2008. Volcanoes and human history. *Journal of Volcanology and Geothermal Research* 176: 325–329.

Chester, D.K. 2005. Volcanoes, society, and culture. In *Volcanoes and the environment*, ed. J. Martí and G.G.J. Ernst, 404–439. Cambridge, MA: Cambridge University Press.

Cooper, J., and P.D. Sheets, eds. 2012. *Surviving sudden environmental change*. Boulder: University of Colorado Press.

Donovan, A., and C. Oppenheimer. in press. Imagining the unimaginable: Communicating extreme volcanic risk. In *Advances in volcanology*, ed. K. Nemeth, 1–15. Berlin/Heidelberg: Springer.

García-Acosta, V. 2002. Historical disaster research. In *Catastrophe & culture: The anthropology of disaster*, ed. S.M. Hoffman and A. Oliver-Smith, 49–66. Santa Fe: School of American Research Press.

Grattan, J. 2006. Aspects of Armageddon: An exploration of the role of volcanic eruptions in human history and civilization. *Quaternary International* 151: 10–18.

Grattan, J., and R. Torrence, eds. 2007. *Living under the shadow. Cultural impacts of volcanic eruptions*. Walnut Creek: Left Coast Press.

King, G., and G.N. Bailey. 2006. Tectonics and human evolution. *Antiquity* 60: 265–285.

Lane, C.S., V.L. Cullen, D. White, C. Bramham-Law, and V.C. Smith. 2014. Cryptotephra as a dating and correlation tool in archaeology. *Journal of Archaeological Science* 42: 42–50.

Lund, K.A., and K. Benediktsson. 2011. Inhabiting a risky earth: The Eyjafjallajökull eruption in 2010 and its impacts. *Anthropology Today* 27: 6–9.

Newhall, C.G., and S. Self. 1982. The Volcanic Explosivity Index (VEI): An estimate of explosive magnitude for historical volcanism. *Journal of Geophysical Research* 87: 1231–1238.

Riede, F. 2014. Towards a science of past disasters. *Natural Hazards* 71 (1): 335–362.

Riede, F., ed. 2015. *Past vulnerability. Volcanic eruptions and human vulnerability in traditional societies past and present*. Aarhus: Aarhus University Press.

Riede, F. 2016. Volcanic activity and human society. *Quaternary International* 394: 1–5.

Riede, F. 2017. *Splendid isolation. The eruption of the Laacher see volcano and southern Scandinavian late glacial hunter-gatherers*. Aarhus: Aarhus University Press.

Riede, F., G.A. Oetelaar, and R. VanderHoek. 2017. From crisis to collapse in hunter-gatherer societies. A comparative investigation of the cultural impacts of three large volcanic eruptions on past hunter-gatherers. In *Crisis to collapse. The archaeology of social breakdown*, ed. T. Cunningham and J. Driessen, 23–39. Louvain-la-Neuve: UCL Presses Universitaires de Louvain.

Sheets, P. 2011. Pilgrimages and persistent social memory in spite of volcanic disasters in the Arenal area, Costa Rica. *Ancient Mesoamerica* 22: 425–435.

Sheets, P.D. 2012. Responses to explosive volcanic eruptions by small to complex societies in ancient Mexico and Central America. In *Surviving sudden environmental change*, ed. J. Cooper and P.D. Sheets, 43–63. Boulder: University of Colorado Press.

Sheets, P.D., and D.K. Grayson, eds. 1979. *Volcanic activity and human ecology*. London: Academic.

Siebert, L., T. Simkin, and P. Kimberly. 2010. *Volcanoes of the world*. Washington, DC: Smithsonian Institution.

Sigurdsson, H. 1999. *Melting the Earth. The history of ideas on volcanic eruptions*. Oxford: Oxford University Press.

Torrence, R., and J. Grattan, eds. 2002. *Natural disasters and cultural change*. London: Routledge.

van Bavel, B., and D.R. Curtis. 2016. Better understanding disasters by better using history: Systematically using the historical record as one way to advance research into disasters. *International Journal of Mass Emergencies and Disasters* 34 (1): 143–169.

Further Reading

Chester, D.K. 1993. *Volcanoes and society*. London: Edward Arnold.
De Boer, J.Z., and D.T. Sanders. 2002. *Volcanoes in human history. The far-reaching effects of major eruptions*. Princeton: Princeton University Press.
Friedrich, W.L. 2000. *Fire in the sea: Natural history and the legend of Atlantis*. Cambridge, MA: Cambridge University Press.
Hoffman, S.M., and A. Oliver-Smith, eds. 1999. *The angry earth. Disaster in anthropological perspective*. London: Routledge.
Hoffman, S.M., and A. Oliver-Smith, eds. 2002. *Catastrophe & culture: The anthropology of disaster*. Santa Fe: School of American Research Press.
Martí, J., and G.G.J. Ernst, eds. 2005. *Volcanoes and the environment*. Cambridge, MA: Cambridge University Press.
Oppenheimer, C. 2011. *Eruptions that shook the world*. Cambridge, MA: Cambridge University Press.
Sigurdsson, H., ed. 2000. *Encyclopedia of volcanoes*. San Diego: Academic.

Online Resources

http://www.arch.ox.ac.uk/intav
http://www.tephrabase.org
http://www.volcano.si.edu

Volunteers in Archaeology

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Introduction

Archaeology's beginnings in antiquarianism were largely the result of the enthusiasm of amateurs, investigating archaeological sites outside the boundaries of their usual professions. While not true volunteering in a sense, this approach led to many early archaeological studies being conducted in this way and often entirely funded by wealthy benefactors. The development of academic archaeology in the first half of the twentieth century and then commercial archaeology in the second moved archaeology into the realms of a profession and changed the way volunteers were able to be involved. However, archaeology still includes significant contributions from volunteers. The development of these more professional approaches to archaeology has not been without their problems. Indeed it has been suggested that low median wages within the profession are the result of the development of archaeology from what were essentially volunteer roots. For example, Aitchison (2004) has argued that the view still exists that archaeology is something that is conducted for the love of it, rather than for remuneration. Archaeology as a discipline still struggles today to reconcile these ethical issues of successfully combining professional standards and volunteer labor.

Definition

The United Nations (2001) defines volunteering as any activity that is undertaken by an individual of their own free will, for the benefit of others (and themselves) and without expectation of financial remuneration. The use of volunteer labor is generally considered to be ethically acceptable only when it is used for a not-for-profit motive. It is within this broad definition that we discuss volunteering in archaeology.

Key Issues/Current Debates/Future Directions/Examples

Many opportunities for volunteering exist within archaeology and related heritage fields. While the most obvious involve excavations, these opportunities are often rare, places are competitive, and on occasion travel costs have to be met by the volunteer. When excavations for the purposes of research do occur, they are generally undertaken by archaeologists associated with universities or other similar research institutions. Volunteer places are often more readily available with state and local government departments, museums, and historical societies or as part of professional archaeological organizations. Such positions can involve a wide range of tasks not always directly

related to archaeology but can include curating artifact assemblages, undertaking research, or working as guides at heritage places. Institutions like those mentioned are commonly not for profit or rely on grant funding for their research. In such situations, volunteers are essential as budgets rarely extend to pay salaries. In best practice use of volunteer labor, volunteers are considered as unpaid employees, with the same rights and responsibilities as paid workers. Within this paradigm, employers provide training and insurance and cover the out-of-pocket costs for volunteers engaged in archaeological work. However, a study of volunteering within the museum sector (Holmes 2006) suggested that only about half of the institutions who use volunteer labor provide these forms of support.

Archaeological volunteering can be undertaken by people with varying levels of experience, and volunteers can be broken into one of three broad groups. "Students" are those people enrolled in and working towards the attainment of a university degree in archaeology. "Qualified archaeologists" are volunteers with a recognized qualification (usually university level) who may or may not also be working as professional archaeologists. So-called enthusiastic amateurs are people with an interest, but without any specific qualifications, in archaeology.

For students hoping to work in archaeology after graduation, volunteering is a way to gain or refine essential practical skills. Practical training can be rare within structured university classes, and as a result such experience is frequently acquired through volunteer work. Hands-on training is important for teaching both necessary archaeological techniques such as survey and excavation but also essential fieldwork etiquette including not standing too close to the edge of a trench and pitching in with the washing up. A student with a wide range of field experience and a demonstrated ability to work in tough conditions will easily impress future employers over other less experienced candidates.

Often what defines the boundaries of a "volunteer" in archaeology are blurred. While students are encouraged to gain volunteer field experience, in some countries a fieldwork component is a compulsory part of an archaeology degree. In this case what students are primarily engaged in is a program of work experience rather than true volunteering, particularly where they are required to pay to attend field schools or similar. Most students cease volunteering once they receive their archaeological qualification and take up jobs within the profession.

Qualified archaeologists also frequently volunteer their time or expertise. Numerous professional bodies are available for archaeologists to join, and many of these are run by professional archaeologists often in a voluntary capacity. For example, the *World Archaeological Congress* (WAC), formed in 1986, is an international organization run by archaeologists on a voluntary basis to create a global network of researchers and advocate on the behalf of archaeology (World Archaeological Congress 2010). WAC is also responsible for the Archaeologists Without Borders program, which supports disadvantaged countries by funding professional archaeologists working on a voluntary basis to visit and share their expertise (World Archaeological Congress 2009).

Enthusiastic amateurs are members of the public who are interested in archaeology, heritage, or looking for new experiences. There are a number of ethical considerations with using enthusiastic amateurs to conduct archaeological fieldwork. Based on the concept of excavation as destruction, some practitioners question whether it is ethically acceptable to have volunteers with limited experience engaged in processes which effectively destroy the resource being investigated, suggesting that unqualified volunteers may miss vital data due to a lack of appropriate training. However this argument has been countered on a number of grounds, including that no archaeological project is capable of recording all data and that all members of the community have a right to engage with heritage. This argument suggests that so-called amateurs are not simple passive consumers of heritage, but instead have an intrinsic interest in the process and outputs of archaeology. It is within this paradigm that community or public archaeological projects include non-professional volunteers as a standard approach. An example is ongoing excavations at Sedgeford in the UK since 1996. This project is entirely

staffed by volunteers at all levels and is designed to be an ongoing, multidisciplinary, inclusive community archaeological project (Faulkner 2000). All participants, whether qualified archaeologists or local enthusiasts, work on the project as volunteers, towards a common goal, and between 50 and 75 volunteers work at the site each year. The inclusion of enthusiastic amateurs in archaeological fieldwork also provides a labor force that allows large-scale projects that may otherwise be impossible. For example, large-scale field-walking over a wide area can be achieved using volunteer labor. Likewise the inclusion of metal detectorist volunteers in archaeological projects is becoming more commonplace. Volunteers are also employed in an ongoing capacity to help create essential records of at risk archaeological sites. Shorewatch, a UK project started in 1997, relies on the efforts of local communities to manage exposed archaeological sites on Scotland's coast which are under threat from environmental pressures (Dawson et al. 2011). As part of this project, local groups are trained in recording methodology and are provided with recording forms and equipment; this allows groups to record sites as well as monitor their ongoing preservation.

The involvement of local community as has been discussed above can provide both essential labor and a strong support base for archaeology and related heritage fields. In this and other documented capacities, volunteers will continue to play an essential role in archaeology both for the successful completion of individual projects and for the ongoing interpretation and care of archaeological sites and collections.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Field Schools, Archaeological
- ▶ Stakeholders and Community Participation
- ▶ World Archaeological Congress (WAC)

References

Aitchison, K. 2004. Supply, demand and a failure of understanding: Addressing the culture clash between archaeologists' expectations for training and employment in 'academia' versus 'practice'. *World Archaeology* 36: 203–219.

Dawson, T., O. Lelong, and I. Shearer. 2011. Local community groups and Aeolian archaeology: Shorewatch and the experience of the Shetland Community Archaeology Project. In *Aeolian archaeology: The archaeology of sand landscapes in Scotland*, Scottish archaeological Internet report, ed. D. Griffiths and P. Ashmore, vol. 48, 87–99. Edinburgh: Society of Antiquaries of Scotland.

Faulkner, N. 2000. Archaeology from below. *Public Archaeology* 1: 22–33.

Holmes, K. 2006. Experiential learning or exploitation? Volunteering for work experience in the UK museums sector. *Museum Management and Curatorship* 21: 240–253.

United Nations. 2001. United Nations volunteers report. Unpublished report prepared for the UN General Assembly Special Session on Social Development, Geneva, Feb 2001.

World Archaeological Congress. 2009. Archaeologists without borders. Available at: http://www.worldarchaeologicalcongress.org/activities/archaeologists-without-borders. Accessed 19 Nov 2012.

World Archaeological Congress. 2010. About WAC. Available at: http://www.worldarchaeologicalcongress.org/about-wac/about-wac. Accessed 19 Nov 2012.

von den Driesch, Angela

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Basic Biographical Information

Angela von den Driesch (Fig. 1), née Karpf, was a German veterinarian, archaeozoologist, and university professor. Born in Dresden (Saxony) on

von den Driesch, Angela, Fig. 1 Angela von den Driesch, 1934–2012

July 11, 1934, she grew up in Tegernsee (Bavaria). After graduating from secondary school and attending a language school, she studied veterinary medicine in Munich and Zurich from 1957 to 1962. Two years after obtaining her license to practice veterinary medicine, she received her doctorate in veterinary medicine. When in 1965 Joachim Boessneck (1925–1991) became the first chair of the newly founded Institut für Paläoanatomie, Domestikationsforschung und Geschichte der Tiermedizin (Institute of Palaeoanatomy, Domestication Research and the History of Veterinary Medicine) at the veterinary faculty of the Ludwig-Maximilians-Universität München, he appointed Angela von den Driesch as his assistant. In 1970, she passed her habilitation (German postdoctoral lecture qualification) and was appointed to a professorship at the institute in 1978. After the early death of Joachim Boessneck in 1991, she succeeded him as chair of the institute until her retirement in 1999. She was an active researcher until her death on January 4, 2012.

Major Accomplishments

Angela von den Driesch started her career at a time when the importance of the natural sciences in archaeology and in prehistoric archaeology in particular increased rapidly. Archaeologists realized that archaeozoology among other disciplines could offer valuable data relative to subsistence and ritual practices in prehistoric societies as well as to the local environmental conditions prevailing during site occupation. Through their cooperation in international teams, Angela von den Driesch and Joachim Boessneck essentially influenced the development of archaeozoology as a discipline in Europe and the Near East, which is reflected in their impressive common publication record (Publikationsliste n.d.). Angela von den Driesch participated in excavations in Europe (mainly Germany, Spain, and Greece), the Middle East, Central and Southeast Asia, and Northern and South Africa. As a dedicated teacher, she not only trained young scientists in the lecture hall and the lab of the institute but offered them the opportunity to gain experience abroad in the field.

Since archaeozoology was and sometimes still is considered an auxiliary discipline to archaeology, it certainly was an advantage that von den Driesch was trained as a veterinarian and therefore advocated for archaeozoology as an independent research discipline with study materials and questions as well as methods of its own. In 1976, she published "A guide to the measurement of animal bones from archaeological sites" – a key reference for documenting bone dimensions in mammals and birds, which soon thereafter became the international standard for archaeozoologists worldwide. Her own research centered on the human-animal relationship in the past, but aspects like animal palaeopathology, ichthyoarchaeology (von den Driesch 1994), or ungulate domestication received particular attention (e.g., Peters et al. 1999; von den Driesch et al. 2008).

Her second field of expertise was the history of veterinary medicine (von den Driesch and Peters 2003). Her studies covered pictorial evidence and texts dealing with animal pathologies, the usage

or treatment of domestic animals as passed down by Mesopotamian, Egyptian, Greek, Latin, Arabic, Chinese, and Tibetan artists and authors from early historic to modern times as well as the traditions in veterinarian folk medicine of various peoples – in collaboration with philologists of the respective languages (Maurer and von den Driesch 2006). She was one of only few researchers that combined profound veterinary knowledge with that of the history of veterinary medicine including the diseases of animals evidenced in archaeological sites (e.g., von den Driesch et al. 2004).

When founded, the Munich institute could only rely on a small collection of skeletons so that Boessneck and von den Driesch had to build up a collection for professional archaeozoological use. With their focus on animal remains from prehistoric contexts from Europe, Asia, and Africa, many exotic and meanwhile rare species were needed and could be obtained with the help of zoological gardens and donors or while in the field. First interested in and later a specialist in ichthyoarchaeology, Angela von den Driesch put much effort into the fish reference collection, preparing herself specimens obtained in fish markets from, e.g., the Mediterranean region, Central Europe, North and South Africa, and East and South Arabia. Totaling c. 20,000 skeletons of more than 2,700 vertebrate taxa, the Munich collection today is an extremely valuable and most comprehensive archaeozoological reference.

As many of the so-called small subjects at universities, archaeozoology often has to face the shortage of resources, even to the point of closing down institutions. After Boessneck's unexpected death, this threat became real for the Institut für Paläoanatomie, but von den Driesch could avert it for the time until her retirement. Owing to Angela von den Driesch's farsightedness, the reference collection of the Munich institute was merged with the already-existing Bayerische Staatssammlung für Anthropologie to the new Staatssammlung für Anthropologie und Paläoanatomie München, hence securing beyond her tenure the future of the collections as well as that of the institute. The chair of the Munich institute is now codirector of the state collection.

She was a founding member of the International Council for Archaeozoology (ICAZ) and visiting professor at Pretoria, Cape Town, Phnom Penh, and Madrid, at the *Ecole nationale véterinaire de Toulouse* and Harvard University, Boston. Her merits are also reflected in the honors she received: silver medal *bene merenti* of the Bavarian Academy of Sciences; corresponding member of the German Archaeological Institute, Berlin, and the Austrian Archaeological Institute, Vienna; professor *honoris causa* in the Faculty of Philosophy at the University of Granada; and the Sarton Chair of the History of Science at the State University of Ghent.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Animal Paleopathology
- ▶ Camels: Domestication
- ▶ Göbekli Tepe: Agriculture and Domestication
- ▶ Ichthyoarchaeology
- ▶ International Council for Archaeozoology (ICAZ)
- ▶ Zooarchaeology

References

Maurer, P., and A. von den Driesch. 2006. Tibetan ‹horse books› from the High Himalayas. In *Horses and humans: The evolution of human-equine relationships*, BAR international series, ed. S.L. Olsen, S. Grant, A.M. Choyke, and L. Bartosiewicz, vol. 1560, 355–361. Oxford: Archaeopress Publishers.

Peters, J., D. Helmer, A. von den Driesch, and M. Sana Segui. 1999. Early animal husbandry in the northern Levant. *Paléorient* 25: 27–48.

Publikationsliste. n.d.. Available at: http://www.palaeo.vetmed.uni-muenchen.de/download/publ_pal.pdf. Accessed 31 May 2012.

von den Driesch, A. 1976. *A guide to the measurements of animal bones from archaeological sites*, Peabody museum bulletin. Vol. 1. Cambridge, MA: Peabody Museum.

von den Driesch, A. 1994. Hyperostosis in fish. In *Fish exploitation in the past. Proceedings of the 7th meeting of the ICAZ fish remains working group*, Annales du Musée Royal de l'Afrique Centrale, Sciences

Zoologiques, ed. W. Van Neer, vol. 274, 37–45. Tervuren: Musée Royal de l'Afrique Centrale.

von den Driesch, A., and J. Peters. 2003. *Geschichte der Tiermedizin. 5000 Jahre Tierheilkunde*, 2nd rev and enl edn. Stuttgart: Schattauer.

von den Driesch, A., D. Kessler, and J. Peters. 2004. Mummified baboons and other primates from the saitic-ptolemaic animal necropolis of Tuna el-Gebel, Middle Egypt. In *Conservation policy and current research*, Documenta Archaeobiologiae, ed. G. Grupe and J. Peters, vol. 2, 231–278. Rahden/Westf: Verlag Marie Leidorf.

von den Driesch, A., H. Brückner, H. Obermaier, and A. Zander. 2008. The hunt for wild dromedaries at the United Arab Emirates coast during the 3rd and 2nd millennia BC. Camel bones from the excavations at Al Sufouh 2, Dubai, UAE. In *Archaeozoology of the Near East VIII. Proceedings of the 8th International Symposium on the Archaeozoology of Southwestern Asia and Adjacent Areas*, Travaux de la Maison de l'Orient et de la Méditerranée, ed. E. Vila, L. Gourichon, A.M. Choyke, and H. Buitenhuis, vol. 49(2), 487–497. Lyon: Maison de l'Orient et de la Méditerranée.

Further Reading

Becker, C., H. Manhart, J. Peters, and J. Schibler, eds. 1999. *Historia Animalium ex Ossibus: Beiträge auf Paläoanatomie, Archäologie, Ägyptologie, Ethnologie und Geschichte der Tiermedizin. Festschrift für Angela von den Driesch [including a laudation by F. Poplin]*. Rahden/Westf.: Verlag Marie Leidorf.

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Walsh, Grahame Leslie

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Biographical Information

Grahame Leslie Walsh was born on the 20th of September 1944 in Roma, Queensland, Australia, and he died on the 18th of August 2007, in Brisbane, Queensland, Australia. Walsh's early years were spent on a Queensland sheep and cattle station where at 13 he was introduced to rock art, an interest he pursued for the rest of his life. After 4 years of high school, he worked as an assistant to a newspaper photographer where he began to develop his photographic skills. In 1977 he became an Aboriginal Site Recorder and later Historic Sites Officer with the Queensland National Parks and Wildlife Service (QNPWS). In this role Walsh undertook systematic recording of cultural heritage sites across Queensland using his own detailed recording system.

In the same year, he began annual visits to the Kimberley area of Western Australia and the Victoria River Downs area in the Northern Territory studying, comparing, and recording the rock art of these two regions.

Walsh established the Takarakka Rock Art Research Centre at Carnarvon Gorge, Queensland in 1984 and began to collate and organize his collection. Supported by the Australian Bicentennial Authority's National Aboriginal and Torres Strait Islander Program, he produced a book on Australia's rock art for the 1988 Bicentenary. In 1989 he took a position as a cultural consultant (specializing in rock art) with the Dreamtime Cultural Centre in Rockhampton, run by Traditional Owners. From thereon Walsh became a full-time independent rock art researcher, and his annual field trip to the Kimberley was extended to 3–4 months.

Between then and his death he focused increasingly on Kimberley rock art, publishing and presenting at numerous conferences, workshops, and private lectures in Australia, Europe, and the USA. He initiated multi-disciplinary rock art research projects and amassed a huge database of sites and associated information. He attracted private funding and a large number of committed volunteers because of his dedication, his mastery of his subject, and his ability to engage others in the possibilities of rock art research, to explain the past.

He was awarded a D.Litt. from the University of Melbourne in 2004. The citation in part read "His contribution to the field of rock art research, management and conservation has been immense,

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and of international as well as national significance." He was awarded a Ph.D. from Griffith University in 2007 for his *Development of Australian Rock Art Recording Methodologies for the Recording and Interpretation of Cultural and Environmental Histories*.

Major Accomplishments

Grahame Leslie Walsh made a significant contribution to the understanding, protection, and documentation of Australian rock art. He accumulated a vast database of Australian rock art over a period of more than 35 years and developed a sophisticated and detailed recording methodology. He collected many traditional stories and myths from Aboriginal informants across the country. He produced several significant publications on Australian rock art.

In the 1970s, Walsh conducted research throughout the Central Queensland Sandstone Belt (CQSB). He worked on cultural site management and developed the first plans to manage visitor access in the Carnarvon Gorge and Mt. Moffatt National Parks by designing and constructing boardwalks and interpretive signage as well as allocating areas for restricted access.

Walsh's documentation of cultural heritage included many other rock art regions in Queensland, and he undertook pioneering recording work in the Mitchell and Palmer Rivers of far North Queensland (1984), the Flinders Island Group of Islands and Princess Charlotte Bay (1983–1986), Lawn Hill National Park (1982–1984), Hook Island, White Mountains (1983), and the Jane Table Hill area of Lakefield National Park (1986).

Walsh's role in the QNPWS encouraged the organization to recognize the importance of protecting cultural heritage sites on lands under its control, changing from its sole focus on natural heritage. Project Duwardi at Lawn Hill (1982–1984) saw Walsh working with Traditional Owners to document the rock art of this area and the development of a management plan for the National Park's cultural sites.

His documenting and photographing of significant rock art across the country culminated in the publication of the highly acclaimed *Australia's Greatest Rock Art*.

Walsh's best-known research was in the Kimberley region of Western Australia. He was the first to recognize and draw attention to the extent, quality, diversity, and significance of Kimberley rock art. His unpublished *Terminology of Australian Rock Art* includes over 900 identifiable elements for Kimberley rock art (Fig. 1). His understanding of these recurring motifs and styles enabled Walsh to develop a relative chronology of Kimberley rock art (Fig. 2). He developed innovative, and sometimes controversial, theories about cultural and environmental changes of the region's past. He produced two major publications: *Bradshaws: Ancient Rock Paintings of North-West Australia* and *Bradshaw Art of the Kimberley*. He also researched widely the most recent Wandjina Period of art (Fig. 3). Through 30 years of research in the Kimberley, he documented thousands of sites, producing an archive and database including over 1.6 million images.

Walsh's Kimberley work included collaborations with traditional elders, anthropologists, archaeologists, paleoclimatologists, geologists, paleobotanists, geomorphologists, and dating experts. Current research in the Kimberley owes much to Grahame Walsh. His work showed the potential for Kimberley rock art to tell the story of Australia's early history and continues to provide a foundation for research in the region.

Awards received include:

- 1985 JP Thomson Medal from the Royal Geographical Society of Australia
- 1990 Joint recipient of the Australian Heritage Award for *Australia's Greatest Rock Art*
- 2001 Winner of the Australian Award for Excellence in Educational Publishing (Scholarly Section) for *Bradshaw Art of the Kimberley*
- Life Member of the Royal Geographical Society of Australia
- 2009 Member (AM) in the General Division of the Order of Australia "for service to the research and preservation of Indigenous art and cultural heritage"

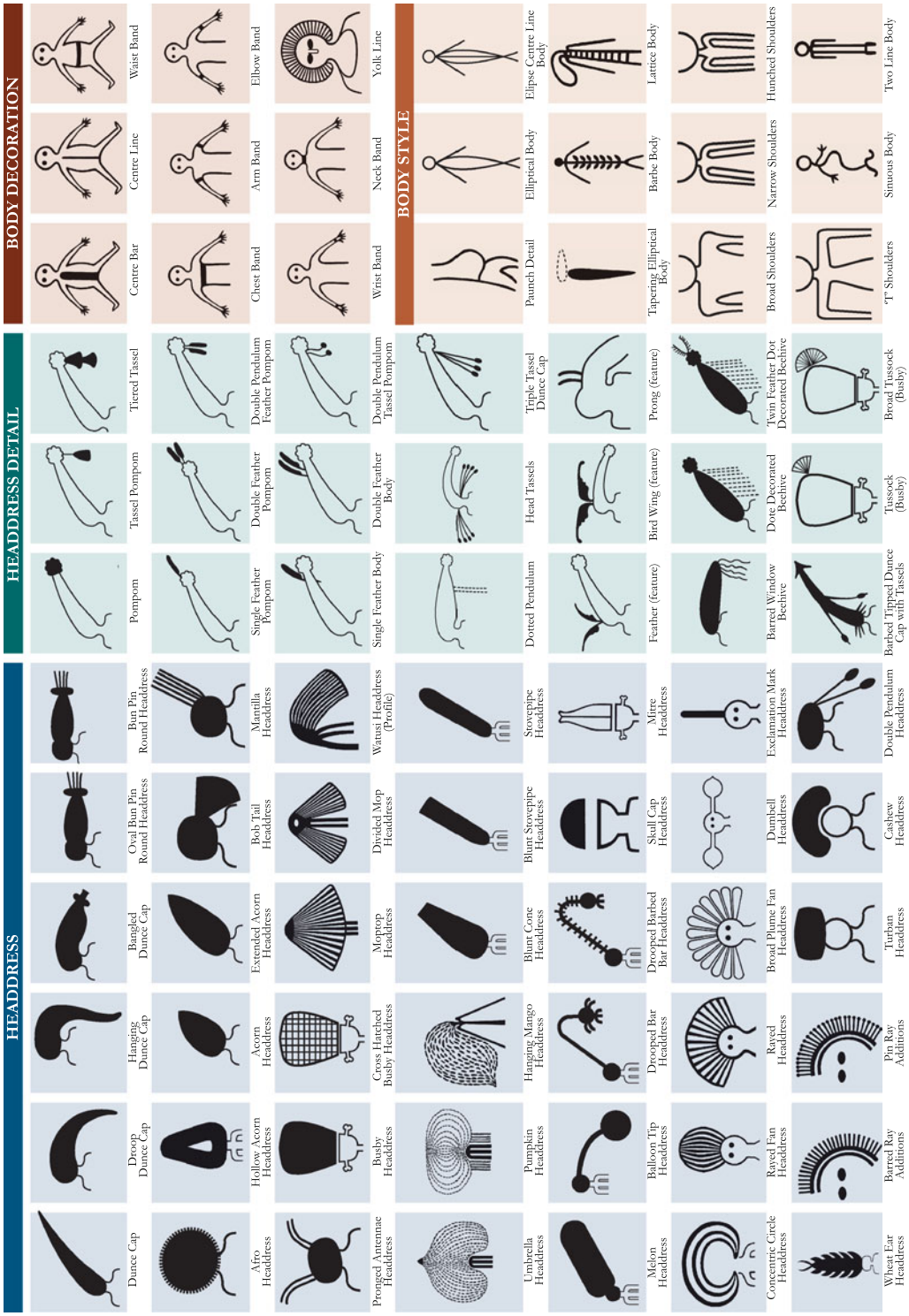

Walsh, Grahame Leslie, Fig. 1 Examples of headdress detail, body decoration, and body style identified within the Kimberley rock art sequence. (After Walsh 2000: 95)

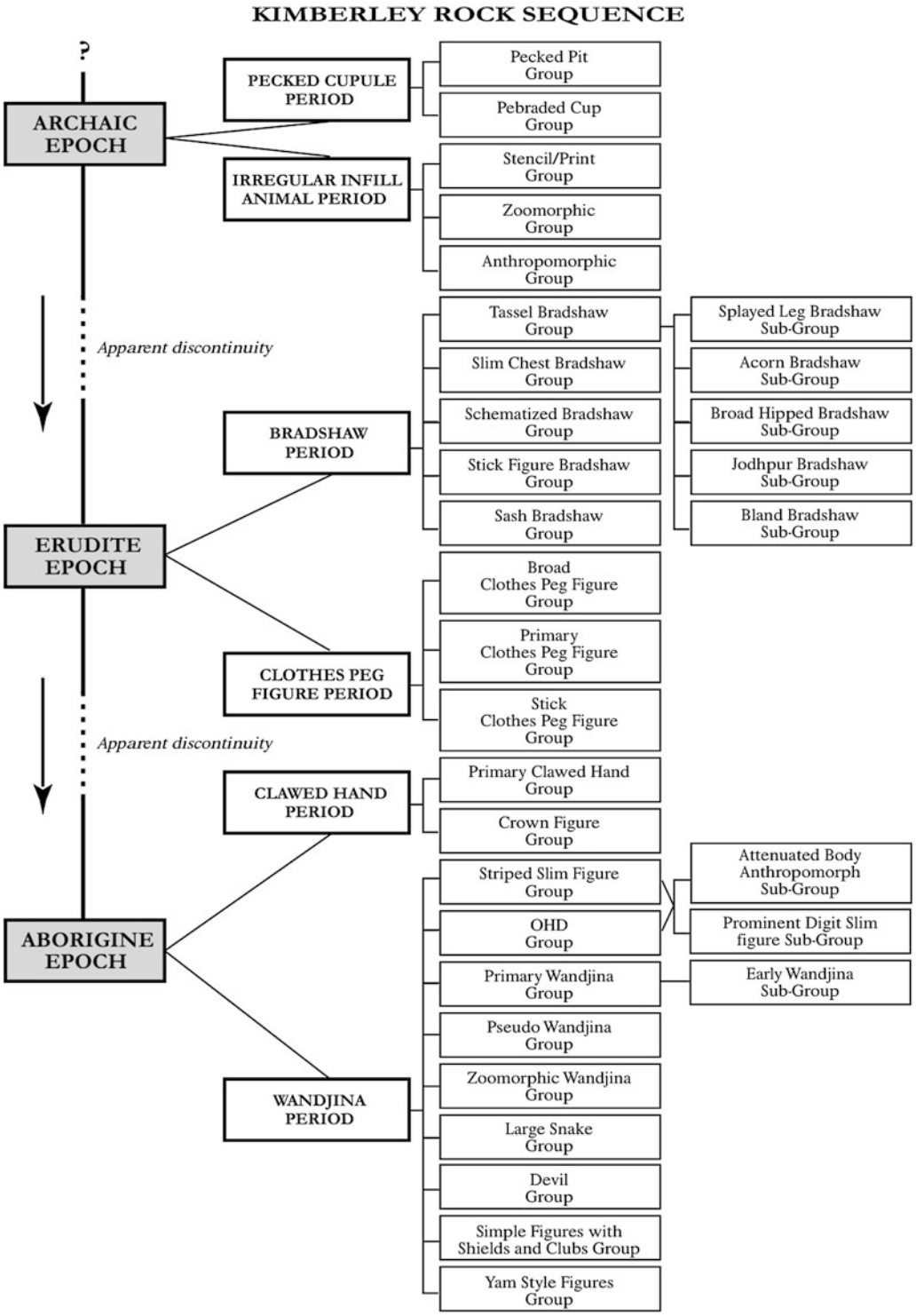

Walsh, Grahame Leslie, Fig. 2 Walsh's Kimberley rock art sequence showing division of the art into major epochs, periods, groups, and subgroups based on style and relative age

Walsh, Grahame Leslie, Fig. 3 G.L. Walsh with Traditional Owner, Dicky Udmarra, recording Ungud mythology, Kimberley, 1989

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Australian Paleoart
- ▶ Australian Rock Art
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Techniques in Archaeological Science
- ▶ First Australians: Origins
- ▶ Gwion Gwion
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art, Forms of

Further Reading

Morwood, M.J., G.L. Walsh, and A. Watchmann. 1994. The dating potential of rock art in the Kimberley, NW Australia. *Rock Art Research* 11 (2): 79–87.

Morwood, M.J., G.L. Walsh, and A. Watchmann. 2010. AMS radiocarbon ages for beeswax and charcoal pigments in north Kimberley rock art. *Rock Art Research* 27 (1): 3–8.

Roberts, R., G.L. Walsh, A. Murray, J. Olley, R. Jones, M. Morwood, C. Tuniz, E. Lawson, M. Macphail, D. Bowdery, and I. Naumann. 1997. Luminescence dating of rock art and past environments using mud-wasp nests in northern Australia. *Nature* 387: 696–699.

Roberts, R.G., G.L. Walsh, J.M. Olley, A.S. Murray, M.K. Macphail, I.D. Naumann, R. Jones, and M.J. Morwood. 2000. Rock picture chronologies and palaeoenvironmental records from fossil mud wasp nests: Preliminary investigations using optical dating. In *Advances in dating Australian rock markings,* Occasional AURA Publication 10, ed. G.K. Ward and C. Tuniz. Melbourne: Archaeological Publications.

Walsh, G.L. 1979. Mutilated hands or signal stencils? A consideration of irregular hand stencils from central Queensland. *Australian Archaeology* 9: 33–41.

Walsh, G.L. 1984. Composite stencil art: Elemental or specialized? *Australian Aboriginal Studies* 9: 34–44.

Walsh, G.L. 1988. *Australia's greatest rock art*. Bathurst: E.J. Brill-Robert Brown and Associates.

Walsh, G.L. 1992. Rock art retouch: Can a claim of Aboriginal descent establish curation rights over humanity's cultural heritage?. In *Rock art and ethnography,* Occasional Aura Publication 5, ed. M.J. Morwood and D.R. Hobbs, 47–59, Melbourne: Archaeological Publications.

Walsh, G.L. 1994. *Bradshaws: Ancient rock paintings of north-west Australia*. Somerset: Castle Carey Press.

Walsh, G.L. 1997a. Ancient rock art of the Kimberley. In *Proceedings of Kimberley Society,* Occasional Paper 1, ed. K. Kenneally, M.R. Lewis, M. Donaldson, and C. Clement, 39–46.

Walsh, G.L. 1997b. Wandjinas and recent rock art of the Kimberley. In *Proceedings of Kimberley Society,* Occasional Paper 1, ed. K. Kenneally, M.R. Lewis, M. Donaldson, and C. Clement, 65–70.
Walsh, G.L. 2000. *Bradshaw art of the Kimberley. Carnarvon Gorge*. Takarakka: Nowan Kas Publications.
Walsh, G.L. 2007. Development of Australian rock art recording methodologies: For the interpretation of cultural and environmental histories. Unpublished Ph.D. dissertation, Griffith University.
Walsh, G.L., and M.J. Morwood. 1999. Spear and spearthrower evolution in the Kimberley region, NW Australia: Evidence from rock art. *Archaeology in Oceania* 34: 45–58.
Watchmann, A.L., G.L. Walsh, M.J. Morwood, and C. Tuniz. 1997. AMS radiocarbon age estimates for early rock paintings in the Kimberley, NW Australia: Preliminary results. *Rock Art Research* 14 (1): 18–26.

Wang Ningsheng

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Wang Ningsheng (1930–2014) was a Chinese archaeologist, who worked in the most southwesterly regions of China since the 1960s (Wang 2014). He is regarded as an important figure in Cultural Anthropology and as a pioneer of China's Ethnoarchaeology (Kong and Li 2014; Gu 2014).

Biographical Information

Wang Ningsheng was born in Nanking (known as "Nanjing" after 1979), the capital city of the Republic of China, in 1930. His childhood was spent in the turmoil of the Second Sino-Japanese War (1937–1945), but his parents still managed to make sure that he was educated, especially in Chinese classics and English literature. In 1954, he began his undergraduate studies in archaeology at Peking University 北京大學, supervised by a number of renowned scholars, including Tang Lan 唐蘭 (1901–1979), Su Bingqi 蘇秉琦 (1909–1997), Xia Nai 夏鼐 (1910–1985), and Zhang Zhenglang 張正烺 (1912–2005). In 1960, Wang was transferred to the Central Institute for Nationalities 中央民族學院 (known as the "Minzu University of China 中央民族大學" after 2008) and was sent to Sichuan and Yunnan provinces to carry out archaeological and ethnographic surveys.

Wang Ningsheng's interest in ethnoarchaeology was largely inspired by Gu Jiegang 顧頡剛 (1893–1980), who used the customs of ethnic groups to approach ancient historical and archaeological issues (Gu 1963). Along these lines of thinking, Wang started to write a number of papers based on his surveys in China's southwestern regions. After being transferred to the Institute of History of Yunnan Province in 1964, he decided to turn ethnoarchaeology into his career for the rest of his life.

Just 1 year later, Wang Ningsheng met an important landmark in his career. In 1965, he discovered a large number of human-made markings placed on cliff faces in Cangyuan 滄源 County, Yunnan Province, roughly dated to the late Neolithic period. Together with 2 later discoveries in 1978 and 1982, there are in total 11 locations of "Cangyuan Rock Paintings 滄源崖畫" distributed within a range of 20 km east-west in Cangyuan County (Wang 1985). Most of the rock paintings depict hunter-gatherers and their ritual and production activities. It is notable that, some of the activities, or parts of them, can still be seen in local practice in the present day, which offers a great deal of material for Wang's study of ethnoarchaeology (Yu 2009).

During the 1970s, Wang worked first for the Museum of Yunnan Province and then for the Yunnan College of Nationalities 雲南民族學院 (known as the "Yunnan Minzu University 雲南民族大學" after 2003). Starting from 1983, as a visiting professor, Wang was invited to visit a number of universities in Europe and America, including the University of Pennsylvania and the University of Washington in the USA, the University of Oslo and the University of Troms in Norway, and Heidelberg University in Germany. In addition, he was awarded the title of Honorary Research Fellow by the Institute of the Study of Human Issues in Philadelphia.

Starting from 1990, Wang began writing freelance articles – *Gushi Xinyan* 古史新研 – in the form of columns for newspapers in China mainland and Hong Kong. His final book – *Wang Ningsheng Ji* 汪寧生集 – published in 2014, is a portrait of his life of ethnoarchaeology.

Cross-References

► Ethnoarchaeology

References

Gu, C. 谷叢 2014. Wang Ningsheng 汪寧生. In *Zhongguo Kaoguxue Dacidian* 中國考古學大辭典, ed. W. Wang, 89. Shanghai: Shanghai cishu chubanshe 上海辭書出版社.

Gu, J. 顧頡剛 1963. *Shilin Zashi* 史林雜識. Shanghai: Zhonghua shuju 中華書局.

Kong, L. 孔令遠 and Y. Li 李艷華 2014. Wang Ningsheng zhongguo minzu kaoguxue de chuanjianzhe 汪寧生中國民族考古學的創建者. *China Cultural Heritage* 中國文化遺產 2014 (2): 87–91.

Wang, N. 汪寧生 1985. *Yunnan Cangyuan Yahua de Faxian yu Yanjiu* 雲南滄源崖畫的發現與研究. Beijing: Wenwu chubanshe 文物出版社.

Yu, F. 于帆 2009. *Cangyuan rock art – its artistic features and modern representation* 滄源岩畫的藝術特性及其現代呈現. Masters dissertation. Fudan University, Shanghai.

Further Readings

Wang, N. 汪寧生 2014. *Wang Ningsheng Ji* 汪寧生集. Beijing: Xueyuan chubanshe 學苑出版社.

War at Sea Archaeology

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Introduction and Definition

"War at sea" today is recognized as armed naval conflict waged by or between sovereign nations or states. Nation-states, like the United States with the world's largest Navy, invest tremendous resources in acquiring, equipping, and manning a dedicated naval fleet for the purpose of carrying out force projection. The modern Navy has a multipurposed mission including display of power by showing the flag, conducting humanitarian efforts, and implementing government policies through blockade of ports, combat, or invasion. From the earliest times, the impetus for development of sea power has been to support maritime trade through protection of the merchant fleet, maintaining access to overseas trade and navigation routes, and even restriction of competitors' trade.

Archaeology addresses the details of naval war as revealed by the artifacts and the global provenance of the archaeological sites. The questions commonly addressed by data recovery from naval archaeological sites concern the specifics of ship construction, weapons, provisioning, and life on board. Frequently finding naval wrecks answers questions specific to a ship's loss and location, which is exceptionally important for ships whose loss is referenced in historic records but the location and cause of sinking are a mystery. Archaeology can address tactical questions regarding how a sea battle would have been fought. Ships lost together in the same naval battle or invasion are interpreted as an underwater battlefield, thus facilitating the study of naval tactics and strategy. It will be possible to answer more theoretical questions regarding the development of navies and the concept of war at sea when a comparative collection of naval sites is acquired through professional underwater archaeological excavation and publication.

Historical Background

Earliest Evidence of War at Sea

Tribal warfare occurred in prehistoric societies, although more governed by ritual than the wars waged by later complex societies. The technological development of basic weapons such as the spear, sword, and bow increased humanity's early warfare capabilities. Maritime cultures used primitive watercraft types including reed craft, dugouts, and skin boats to deploy warriors

and transport captives and booty taken in raids. The earliest evidence of warfare fought at sea comes from Late Bronze Age textual and iconographic materials dating from the late thirteenth to early twelfth centuries BCE. The Tanis stele of Ramses II, texts of the last Hittite King Suppiluliuma II, and texts from Ugarit describe battles with sea raiders who are known to history as the "Sea Peoples." The earliest iconographic image of a naval battle is Ramses III's relief at Medinet Habu, depicting the Egyptian victory over the Sea Peoples. This naval battle and other examples from antiquity illustrate ships engaged in combat with weapons like those used on land – throwing spears, maces, bows, and slings. The Egyptian naval force used one nautical innovation – a grapple and line that was thrown into the enemy ship's rigging and heaved to overturn that enemy ship (Johnstone 1980; Wachsman 1998). Late Bronze Age shipwrecks such as those found at Uluburun and Cape Gelidonya in Turkey substantiate that the swords, knives, and axes carried on ships were similar to those weapons used on land.

One of the first innovations specific to naval warfare was the technique of ramming using a heavy bronze ram to batter the hulls of enemy ships. Evidence for the use of rams comes from iconographic images, war memorials, and naval inventories (Casson and Steffy 1991; Morrison 1995a: 63). The second-century BCE bronze Athlit ram, which contained bow timbers, was found on the Israel coast in 1980, thus providing important archaeological evidence (Casson and Steffy 1991). Another ram came from the Marsala wreck found in Western Sicily. This ram dated to the Punic War of 264–241 BCE and was associated with galley hull timbers marked with Phoenician letters, which the shipbuilders used in the construction process (Frost 1997).

Mediterranean naval warfare was a progressive arms race of ever stronger rams and larger galleys and fleets. Tactical developments in naval maneuvers included the *diekplous* or defensive circle and the *periplous* flanking maneuver. Greeks, Phoenicians, Persians, and Egyptians competed for control of the Mediterranean with their naval fleets. Athens, a city-state, relied on sea power in order to safeguard its essential grain route from the Black Sea and in one summer launched a fleet of 250 oared ships. The Persian King Xerxes attempted to invade Greece with a fleet of 957 triremes, which was opposed by 306 Greek ships. Building and maintaining large fleets required vast economic resources, political and naval organization, and the training of disciplined naval personnel. Battle at sea involved ramming and some naval tactics but continued to be fought like land battles where courage and strength achieved more than tactical skill (Morrison 1995a). Javelins and spears were found on the merchant Kyrenia shipwreck sunk off Cyprus about 300 BCE. These were carried for ship defense or alternatively might represent evidence of an assault on the ship. Land siege weapons such as catapults were deployed on ships in the third century BCE although this has not been confirmed by archaeology (Morrison 1995b). Naval shipbuilders built larger hulls that allowed an increase in the banks of rowers. Rome ultimately built oared ships containing five and seven rower levels. Rome's victory at the battle of Actium, however, curtailed the need for fleets of large naval ships and subsequent fleets consisted of smaller ships used mostly for suppression of piracy and guarding the frontier (Hocker 1995). As Rome expanded into Gaul and Britain, local watercraft were adapted as river lighters, transports, and ferries. Archaeological discoveries from inland rivers and lakes have produced watercraft finds from sites in Germany, Switzerland, France, and the Netherlands. Except for two boats found in Mainz, Germany, that exhibit some Mediterranean influence, none of these inland examples appear to be specifically modified for naval warfare other than being sturdy platforms with an expanded capacity for transport (Arnold 1992; Höckmann 1993; Neyland 1995). As Rome declined, Vandal fleets raided undefended coastal areas. The earliest use of Greek fire in a naval battle occurs from this time and was used by Emperor Anastasius against Ostrogoths in Italy (Hocker 1995).

Chinese naval warfare is mentioned in the Warring States Period from the fifth to third centuries BCE. Although not confirmed by

archaeological finds, documents report the use of grapples, ramming, and halberds. In the third century BCE, the Han Dynasty is credited with development of the stern rudder, the junk-building tradition, and the use of fire to destroy a naval fleet. The Han Dynasty is credited with the use of chemical warfare that was used on land but would also have been available to its navy. Chinese naval fleets continued in use during the later Sui and Tang Dynasties, a period from CE 581 to 907 (Ebrey et al. 2006; Sawyer 2011). India developed strong naval capabilities during the Chola Dynasty from CE 985 to 1042 (Sasaki 2011). Historical accounts describe episodes of piracy and naval conflict between the Arabian Peninsula and Indus region throughout late antiquity and the early medieval period. Alexander the Great built a large fleet to conquer the Indus region during fourth century BCE. His expedition occupied Indus ports and established shipyards in strategic locations (Kervran 1999: 77–83).

Medieval Naval Warfare

Arabs and Byzantines competed for control of the Eastern Mediterranean. In CE 655, at the "Battle of the Masts," Arabs successfully defeated the Byzantine fleet by chaining their ships together to form an unbreakable line. In CE 679, a Byzantine fleet used Greek fire to burn an Arab fleet, and by CE 840, Arab fleets had mastered the use of Greek fire and utilized it to defeat the Byzantine navy. Arab fleets, organized by city rather than kingdom, operated independently but by the tenth century CE employed standing navies with arsenals, officer corps, and state-owned ships (Hocker 1995). Galleys were relatively light and swift and only rarely survive in the archaeological record. Recent excavations in Istanbul discovered four light war galleys, dating from the late tenth to early eleventh centuries CE. The similarities in construction indicate that the state organized and controlled the galley design (Delgado 2011: 188–191).

In Northern Europe warships from archaeological contexts include the seventh-century CE Saxon ship burial at Sutton Hoo in Suffolk, England, and the Norwegian Viking Oseberg, Gokstad, and Tune ships dating from CE 800 to 900. These ship burials contained elegant hulls of overlapped strakes fastened with iron rivets and roves. The royal ships transported warriors for raiding and displayed the prestige of their chiefs. Norse raiders attacked undefended coastal settlements but at times fought sea battles such as the Battle of Svolder in which ships were lashed together as fighting platforms (Christensen 1972; Evans 1986). The recent reinterpretation of a Viking warrior's skeleton from a mid-tenth-century grave in Birka, Sweden, is intriguing for the new analysis found that the previously assumed male is in fact that of a female warrior, which indicated gender roles in Viking warfare were not entirely male dominated (Strickland 2017). Custom in land combat likely applied to the sea.

China's Song Dynasty of the twelfth to thirteenth centuries CE established the first standing navy that at its zenith possessed 20 squadron's totally 52,000 marines. This fleet was equipped with the magnetic compass, paddle wheel watercraft, and gunpowder bombs thrown by trebuchets. The Song Dynasty was seceded by the Mongol Yuan Dynasty of Kublai Khan. The Khan attempted to invade Japan on two occasions using fleets of Chinese- and Korean-built vessels armed with cannon and transporting soldiers and cavalry (Sawyer 2011). Archaeological finds from this invasion reveal the hurried Chinese ship construction; incorporation of Chinese soldiers under Mongol command, weaponry, and supplies for invasion; and the fleet's inability to secure a beach head resulting in its destruction when struck by typhoons (Delgado 2008; Shadbolt 2011). Chinese naval prowess culminated during the Ming Dynasty in the fifteenth century CE when Admiral Zheng He's exploratory fleet was sent out to the southern Pacific and Indian Oceans. Naval shipwrecks have not been discovered, but Chinese merchant ships have been salvaged, including the thirteenth-century CE Quanzhou, fourteenth-century CE Shinan, and sixteenth- to early seventeenth-century CE Ko Si Chang wrecks. Although not naval ships, their construction illustrates that China was constructing sturdy ocean-going

ships (Sawyer 2011; Green 1987a, b). The salvage of the fourteenth-century CE *Maranei* wreck claims to have discovered a hand cannon that predates by 300 years other examples of such weapons (Kaylan 2001). As professional archaeology in Asia expands, more discoveries will be made that will document war at sea in Asia.

The Italian towns of Pisa, Venice, and Genoa built Mediterranean navies to defend their commerce. Sea battles were fought initially against the Arabs, then the invading Normans, and finally with each other. The Genoese and Venetians fought four naval wars, in CE 1253–1284, 1293–1299, 1350–1355, and 1378–1381. Venice was victorious and ultimately dominated the Mediterranean (Lane 1973). During the same period, England and France engaged in constant warfare raiding and fighting for control of sea lanes. The CE 1217 Battle of Dover fought between an English fleet of 40 ships and a French fleet of 80 is credited as the first recorded use of sailing ship tactics. In CE 1340, the Battle of Sluys saw the destruction of the French fleet in a decisive action that gave the English control of the sea during the Hundred Years' War (Lewis and Runyan 1990).

Cogs, caravels, hulks, and carracks were principal types developed for the North Atlantic voyages in the late medieval period. Innovations in the development of fore and stern castles on ships allowed defenders to rain weapons down on attacking galleys. These ships incorporated innovations including the stern rudder, square sailing rig, and navigation with astrolabe, charts, and compass. These ships were built principally for trade but had to also be able defend against pirates and serve a naval function when pressed into service (Rose 2011). The most notable example of a cog is that found in Bremen, Germany; although not a naval ship, it possessed the fore and after castles features necessary for defense during this period. Other cogs have been found in Northern Europe particularly in the Netherlands and Scandinavia (Hocker and Vlierman 1996; Unger 1997). Artillery on ships would play an increasing role and for the first time allow naval ships to battle with one another at a distance.

Exploration and Conquest: Sixteenth-Century Naval Warfare

Archaeological examples from the Mediterranean include the fifteenth-century CE Cavoli ship wrecked on the Sardinian coast while carrying artillery from the Spanish Levant and the Lomellina wreck dating to 1516 (Bueno 1998; Guérout and Rieth 1998). These guns were in part on board as cargo; however, the shape and form of naval guns were not necessarily different than those designed for armies (Martin 2011b). A well-known example of an early English sixteenth-century CE warship is the 700 t burthen "Great Ship" rated *Mary Rose*, built in 1509–1510 period and wrecked in 1545 while engaging the French in the Solent. She carried artillery that included both bronze and iron breech-loading cannon, wrought iron swivel guns located in her fore and stern castles, and a large quantity of shot consisting of stone, iron, lead, and composites of lead and iron, as well as canister shot packed with flint flakes (Hildred 2011). Ships of exploration found in the Americas always carried a complement of wrought iron guns. These voyages were commercial rather than naval, but the distinction between commercial and naval was not clear during much of the late medieval and early modern eras. Japan also used gunpowder and muskets in the late sixteenth century to augment boarding of ships during an invasion of Korea. The Koreans, led by Admiral Yi Sun-sin, defeated the Japanese with superior nautical tactics and the innovative "turtle ship" design (Swope 2005).

How to finance naval fleets and wars was a struggle for the rising states of Northern Europe and the Mediterranean. One method was to defray the fleet cost through regulated piracy. Castile and Aragon hired out their galleys to corsairs in order to defray their ship's maintenance costs. Corsairs were required to leave a deposit with the government in order to compensate damages to friendly parties. State-sanctioned piracy carried the risk of reprisal and war (Mott 2003).

The Ottoman Empire built a powerful navy that dominated the trade and maritime affairs of the Eastern Mediterranean Sea. The Ottoman Navy rivaled that of the city-state of Venice and resulted in the Ottoman-Venetian Wars

(CE 1499–1503). In CE 1571, the Ottomans suffered a severe defeat at the Battle of Lepanto by the Holy League but rebuilt their navy to adequately defend the island of Cyprus as their possession. A late sixteenth-century Ottoman wreck was excavated at Yassiada, Turkey, and provides a comparison of Ottoman ship construction with that of European shipwrights during this time (Pulak 2005). A number of cannonballs found near the wreck might indicate part of a cargo. European maritime nations eventually bypassed the Ottoman control of the land-based trade routes by exploiting maritime routes around Africa to Asia (Scandurra 1972). In the sixteenth century, the North African Barbary states dominated the Mediterranean Sea. Ships were seized and captives taken from the coasts of Italy, Spain, and Portugal, as well as in Northern Europe and even North America. Barbary pirates might have made advances in windward sailing technology that enabled these successes (Godfrey 1974).

Spain, with ships in the Mediterranean Sea and Atlantic and Pacific Oceans, became the first two-ocean navy. It had to arm both ships and forts, thus relied on wheeled guns that could serve in either location. Spain implemented the convoy system to protect its merchant fleet and thus maintain the flow of specie and goods. Galleon construction was government subsidized and regulated. Galleons were designed to be multifunctional serving as warship, transporting troop and supply, and shipping cargo to and from the colonies. England and France's naval strategy was to build smaller and swifter ships that could be used as privateers or for piracy, which were less expensive to construct and maintain (Mott 2003). There are a number of archaeological examples of galleons, several of which are relatively complete such as the Basque whaling ship *San Juan* sunk in CE 1565 and the Swedish warship *Vasa* sunk CE 1628. Galleons were also built in the colony shipyards in the Caribbean and the Philippines. The Philippine-built merchant galleon *San Diego* sunk in CE 1600 after ramming a Dutch ship during battle was discovered and salvaged (Goddio 1994).

Naval fleet actions were fought for control of trade in CE 1508 when a Gujarati/Egyptian force destroyed a Portuguese squadron at Chaul, and the following year CE 1509, the Portuguese destroyed that allied fleet at the Battle of Diu resulting in Portuguese domination of the Indian Ocean. In CE 1582, the Spanish fleet defeated the combined Portuguese, French, and English fleets at the Battle of Ponta Delgada in the Azores. In CE 1588, Philip II of Spain assembled a large Spanish Armada to conquer England. Queen Elizabeth I sent Admiral Sir Charles Howard to counter the Spanish naval force. The Spanish fleet was scattered resulting in a number of Spanish galleys wrecked along the Atlantic Coast of Ireland. This resulted in a number of archaeological sites. One of the largest of Spanish Armada ships was the nave *Trinidad Valencera*. Heavily armed with cannon and small arms, she was both a warship and a transport. The excavation of her remains off the coast of County Donegal, Ireland, revealed numbers of both land and sea guns and weapons such as firepots and a wooden fire trunk for flame throwing. These show how she functioned as an artillery transport but also was designed to fight at sea with cannon and utilize her superior crew size when boarding and hand-to-hand fighting was necessary (Martin 2011a).

Sovereign Navies and Global Empires

From the seventeenth to the eighteenth centuries, increasingly only sovereign states can afford the great expense of a navy. Navies are used by their respective nations to implement global political and commercial objectives. Territorial expansion through colonization was also supported by sovereign navies. Ships were lost in these risky and expensive ventures. Archaeological examples discovered in the United States include the French explorer La Salle ship *LaBelle* sunk in Matagorda Bay, Texas, and the Ribault fleet discovered near Cape Canaveral, Florida (Bruseth 2017; Soergel 2016). Discovery of these sheds light on France's strategies for expansion in North America and the many facets of armament, weapons of conquest, and colonization. Sovereigns of maritime nations were sometimes referred to as the "Master of the Sea," which inferred prestige but also implied the potential to use warfare to establish and protect their maritime realm (Sicking 2003). Competition

between the English and Dutch commercial fleets led to the Anglo-Dutch naval wars in the seventeenth century. The Dutch fleet under Admiral Michiel de Ruyter came up the Thames River and destroyed the British fleet, thus establishing Dutch naval supremacy during the seventeenth century. Naval battles during this period resulted in more ships captured than sunk. Naval guns lacked the power to pierce ships below the waterline, and most of the tactics involved destroying sails, rigging, and men. Tactics still relied heavily on boarding and hand-to-hand combat, but by late century the line of battle strategy was in use. The line of battle was an orchestrated fleet movement along a line that utilizes the advantage of the cannon broadside while not accidentally hitting ships of its own fleet. In order to fight with this tactic, ships of the line were built large enough to withstand the punishing artillery fire during the battle. Naval warfare utilizing line of battle tactics required more disciplined and professional naval officers and crews and strong centralized governments that regulated the design of warships. The stimulus for these conflicts and maintaining expensive navies was commercial competition (Mahan 1918).

The maritime powers of Europe, during the eighteenth century, were continually at war over global politics. Britain, France, and Spain battled over control of trade and the colonies in the Americas. The United States rose out the American Revolution with naval support from Spain and France. Numerous shipwrecks have been excavated from this time period. The 74-gun French-built HMS *Invincible* lost off the Solent in 1758 is an example of a large ship of the line (Bingeman 2011). Other examples include the 26-gun frigate *Machault* and *Bienfaisant* lost in 1760 during the Battle of Restigouche in Canada, as well as the French flagship *L' Orient* destroyed by ADM Nelson during the Battle of the Nile in 1798. Shipwrecks excavated from the American Revolution provide details on the construction, provisioning, and weaponry used during this conflict. Vessels in the United States waters include the British transport *Betsy*, privateer *Defense*, and gunboat *Philadelphia*, all of which were scuttled in separate events (Johnston 1997; Switzer 2005; Broadwater 2005).

The Napoleonic Wars led to a long series of naval battles, the culmination of which occurred in 1805 at the Battle of Trafalgar in which Admiral Horatio Nelson defeated the combined French and Spanish fleets with his naval tactics. The massive 112-gun Spanish Navy ship *Nuestra Senora de la Santisima Trinidad* lost during the battle may have recently been discovered by the Spanish Hydrographic Service (Bilton 2010). After Trafalgar, the British Royal Navy ruled the world's oceans during the nineteenth century. The nascent United States Navy successfully fought ship-to-ship engagements with the Royal Navy during the War of 1812 but lacked sufficient sea power to keep the British Navy from blockading United States ports and raiding the east coast and shores of the Chesapeake Bay. Both British and American navies engaged in riverine warfare in the United States inland waterways. Well-preserved examples include the United States War of 1812 sloops *Hamilton* and *Scourge* sunk in Lake Ontario and gunboats such as the USS *Scorpion* from the Chesapeake Bay region and Lake Champlain (Cassavoy and Crisman 1988; Crisman 2014). The war established the importance to the United States of a blue water navy of sufficient size and quality to defend its shores and commerce and to influence global politics.

The nineteenth century exhibited many advances in ship design, sail and steam power, and weapons. Steam power was used to power paddle wheels as early as the 1810s. It became increasingly reliable, and the steam-powered screw propeller became a more efficient means of propulsion than sail. Riveted iron hulls reduced reliance on timber and permitted construction of stronger and more durable hulls, allowing ships to increase in size. Naval ships by late century developed armored hulls that carried large, accurate guns with rifled chambers that could fire explosive fused shells. USS *Monitor* effectively showed the advantage of the rotating gun turret. *Monitor's* turret and guns have been archaeologically recovered and are under conservation and study. The duel between ironclads CSS *Virginia* and USS *Monitor* marks the change from wooden to iron hulled ships. Innovations were not adopted overnight, wooden ships continued to be used

alongside iron built hulls, and steam-powered ships also carried masts and sails. The American Civil War is a period that saw the first successful use of mine and submarine warfare. Recovery of the Confederate submarine *Hunley* brought the latter nineteenth-century submarine experiments into archaeological focus, showing that many of the twentieth-century submarine innovations had earlier precursors. *Hunley* was an extension of mine warfare, a means of keeping enemy warships off the coast and breaking the blockade (Neyland 2007). Ramming, although a tactic of bygone navies, was successfully used in riverine warfare during the American Civil War. CSS *Virginia* successfully sunk USS *Cumberland* by ramming after pummeling her with cannon shot (Watts 1988). The ironclad ships of Austria and Italy engaged in the first fleet battle of ironclads at the Battle of Lissa in 1866, and interest was renewed in ramming after the Austrian flagship sank the Italian flagship. The last naval ship equipped with a ram was the German ship *Emden* launched in 1908. China's naval battles during the nineteenth century amounted to a series of losses against European steam-powered ships during the Opium Wars of the 1840s and from the Japanese in the Sino-Japanese War in 1894 and 1895.

The subjugation of native peoples by European nations is usually thought of in terms of land battles and armies, but naval power also played its role. Ships were used to transport the armies of colonization and support them with supplies. Ships also engaged in riverine and amphibious operations against native peoples overawing and overwhelming them with the technology and weaponry of ships. Ship guns could shell bands of Native Americans both onshore and in the water as occurred in the Black Hawk War of 1832 and the Seminole Wars fought throughout the first half of the nineteenth century (Trask 2013: 280, 287; Belko 2011).

Key Issues/Current Debates

War at Sea Today

The US Navy's Great White Fleet of 1907 demonstrated United States naval power to the world. These early twentieth-century battleships were steam-powered, steel-armored armed, and mounted large ship-sinking guns in rotating turrets along the centerline of the deck. Steam power made it possible to build these large Dreadnought-class battleships. Twentieth-century navies were pivotal in the global warfare of World War 1, World War II, and the undeclared Cold War. Naval aviation and submarine warfare were the air and undersea innovations that impacted tactics, strategies, and rules of engagement. In 1916, during the Battle of Jutland, seaplanes were launched from seaplane carrier HMS *Engadine*, and in the Black Sea, Russian seaplanes harassed Turkish maritime routes. Aircraft successfully eliminated Zeppelins, engaged in antisubmarine patrols sinking German U-boats, and carried out the first successful torpedo attack on a ship. In 1918, the Royal Navy converted an Italian passenger liner to be the first aircraft carrier (Allward 1993).

The conclusion of World War I resulted in the scrapping of ships under the terms of the Washington Naval Treaty, but by the 1930s nations had resumed rebuilding ships in advance of World War II. The Japanese built the largest ship, the 72,000 t *Yamato*. Battleships would prove to be vulnerable to air power as occurred with the sinking of HMS *Prince of Wales* and *Repulse* and the Japanese attack on the ships at Pearl Harbor. Naval aircraft launched from aircraft carriers protected by a fleet of supporting ships became the effective strategy for naval combat in World War II and thereafter. Aircraft carriers played key roles in the Battles of the Coral Sea, Midway, and Leyte Gulf. There have been numerous archaeological projects to locate and document World War II ship and aircraft losses. Examples of such projects are the United States National Park Service mapping of USS *Arizona*, Naval History and Heritage Command's survey of US Navy shipwrecks lost during the D-Day Normandy Invasion, and NOAA's survey of German U-boats, merchant, and Navy vessels lost during the Battle of the Atlantic off North Carolina coast (Lenihan 1989; Neyland 2009; Battle of the Atlantic 2011). Aviation crash sites, particularly those in the water, have resulted in a specialization in aviation archaeology. Research into twentieth-century ship and

aircraft wrecks focuses on wreck identification, location, loss, and memorials.

Naval aviation after World War II continued to expand with development of jet aircraft, larger nuclear-powered aircraft carriers, and the advent of the use of guided missiles. Ship-to-ship combat has become infrequent since battles occur at greater distances due to naval aviation and missiles. Submarines were used effectively during both World Wars against enemy naval ships but principally took their toll on merchant shipping. These were first diesel powered but during the Cold War were nuclear powered, thus enabling them to stay underwater for weeks or months. Torpedoes were their main weapon of attack during the World Wars, but during the Cold War and today, submarines are equipped to launch dozens of ballistic missiles armed with nuclear warheads. There are ship and aircraft wrecks from the Cold War, but only a few such as those sunk at the Bikini Atoll atomic bomb tests have been archaeologically documented (Delgado 1991; Neyland 2011).

The only major naval conflict that took place after World War II was the 1982 Falklands War. A Royal Navy fleet of 100 ships was dispatched over 7000 miles from Britain to the South Atlantic to protect the Falkland Islands from a takeover by Argentina. British operations were based primarily at sea, which is an element of modern warfare where major sea power nations use their navies as force projection platforms. The Falklands War showed the continued importance of the aircraft carrier but also the vulnerability of modern ships to sea-skimming missiles. Nuclear submarines are an important element for protecting the battle fleet. Twenty-first-century naval operations today are joint land, sea, and air operations. The United States continues to dominate, maintaining a navy with more ship tonnage than that of the next 17 largest navies.

Future Directions

Predictions for future war at sea indicate battles will be fought at great distances using unmanned systems above, on, and below the water. These autonomous systems will both operate independently and be integrated into manned counterparts. War at sea is far more technologically advanced, but many of the casual elements are similar to those of earlier periods – maintaining coastal and national defense, preserving maritime commerce and freedom of the seas and support of military land deployments. These systems have pushed the exploration of the deep sea and are having an impact on the archaeological study of naval vessels, especially those sunk during World War II and the Cold War. Recent deep-sea explorations have found shipwrecks that were previously beyond human reach. The discovery and mapping of USS *Indianapolis* at a depth of 18,000 ft. within an undersea mountain range is a prime example.

The militarization of space by nations for the purposes of surveillance, global positioning, and communications has become an integral part of war at sea. Space operations are as important today as naval aviation was to winning World War II at sea. Synthesis of sea, air, and space warfare will continue as exemplified by annual Navy League's Sea-Air-Space Exposition, which is touted as "the largest maritime exposition in the U.S." (Navy League's Sea-Air-Space 2017). The world's oceans already contain many space artifacts that have fallen out of orbit.

Advances in deep-sea technology are having an emerging impact on the archaeological study of those naval vessels sunk in deep waters; most examples of discoveries are those sunk during World War II and the Cold War. A recent exploration, funded and led by Microsoft co-founder Paul Allen, found and extensively surveyed USS *Indianapolis* at a depth exceeding 5.5 kl (Navy News Service 2017; PBS 2017).

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Caribbean Maritime Archaeology
- ▶ Cold War

▶ Freshwater Archaeology
▶ Global Archaeology
▶ Hanse Archaeology
▶ Indian Ocean: Maritime Archaeology
▶ Modern Vessel Archaeology (Iron and Steel Wrecks)
▶ Society of the Ship

References

Allward, M. 1993. *An illustrated history of seaplanes and flying boats*. New York: Barnes & Noble Books.

Arnold, B. 1992. *Batellerie Gallo-Romaine sur le Lac de Neuchâtel Tome 1 & 2*. Saint-Blaise: Editions du Ruau.

Battle of the Atlantic. 2011. Available at http://sanctuaries.noaa.gov/missions/2011battleoftheatlantic/welcome.html. Accessed 12 Nov 2011.

Belko, W.S. 2011. *America's hundred years' war: U.S. expansion to the Gulf coast and the fate of the Seminole, 1763–1858*. Gainesville: University Press of Florida.

Bilton, P. 2010. Shipwrecks of glory: The Nuestra Senora de la Santisima Trinidad of 1796. *Factoidz*. Available at http://factoidz.com/shipwrecks-of-glory-thenuestra-seora-de-la-santisima-trinidad-of-1796/. Accessed 15 Nov 2011.

Bingeman, J.M. 2011. *The First HMS Invincible (1747–58): Her excavations (1980–1991)*. Oxford: Oxbow Books.

Broadwater, J.D. 2005. From collier to troop transport: The *Betsy*, Yorktown, Virginia. In *Beneath the seven seas: Adventures with the Institute of Nautical Archaeology*, ed. G. Bass, 200–205. London: Thames and Hudson.

Bruseth, J.E., A.A. Borgens, B.M. Jones, and E.D. Ray. 2017. *The archaeology of a seventeenth-century ship of new world colonization*. College Station: Texas A&M University Press.

Bueno, M.M. 1998. Cavoli: A 15th century shipwreck off Sardinia. In *Excavating ships of war*, ed. M. Bound, 31–37. Oxford: University of Oxford.

Cassavoy, K.A., and K.J. Crisman. 1988. The war of 1812: Battle for the Great Lakes. In *Ships and shipwrecks of the Americas: A history based on underwater archaeology*, ed. G. Bass, 169–188. London: Thames and Hudson.

Casson, L., and J.R. Steffy. 1991. *The Athlit Ram*. College Station: Texas A&M University Press.

Christensen, A.E. 1972. Scandinavian ships from earliest times to the Vikings. In *A history of seafaring based on underwater archaeology*, ed. G. Bass, 159–180. New York: Walker and Company.

Crisman, K. 2014. *Coffins of the brave: Lake shipwrecks of the war of 1812*. College Station: Texas A&M University Press.

Delgado, J.P. 1991. *The archaeology of the atomic bomb: A submerged cultural resources assessment of the sunken fleet of Operation Crossroads at Bikini and Kwajalein Atoll Lagoons*, Southwest cultural resources center professional papers 37. Santa Fe: Southwest Cultural Resources Center.

Delgado, J.P. 2008. *Kublai Khan's lost fleet: In search of a legendary armada*. Berkeley: University of California Press.

Delgado, J.P. 2011. Ships on land. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 182–201. Oxford: Oxford University Press.

Ebrey, P.B., A. Walthall, and J.B. Palias. 2006. *Pre-modern East Asia: A cultural, social, and political history*. Boston: Houghton-Mifflin Company.

Evans, A.C. 1986. *The Sutton Hoo ship burial*. Bath: The Bath Press.

Frost, H. 1997. Marsala Punic warship. In *Encyclopedia of underwater and maritime archaeology*, ed. J.P. Delgado, 260–262. London: British Museum Press.

Goddio, F. 1994. San Diego. *National Geographic* 186 (1): 35–57.

Godfrey, F. 1974. *Barbary legend. War, trade and piracy in North Africa 1415–1830*. Westport: Greenwood Press.

Green, J. 1987a. Introduction. In *The sea remembers: Shipwrecks and archaeology from Homer's Greece to the rediscovery of the Titanic*, ed. P. Throckmorton, 152–154. New York: Smithmark Publishers.

Green, J. 1987b. Chinese ocean-going ships. In *The sea remembers: Shipwrecks and archaeology from Homer's Greece to the rediscovery of the Titanic*, ed. P. Throckmorton, 152–154. New York: Smithmark Publishers.

Guérout, M., and E. Rieth. 1998. The wreck of the *Lomellina* at Villefranche sur Mer. In *Excavating ships of war*, ed. M. Bound, 38–50. Oxford: University of Oxford.

Hildred, A. 2011. *Weapons of war: The armaments of the Mary Rose*. Portsmouth: The Mary Rose Trust Ltd.

Hocker, F.M. 1995. Late Roman, Byzantine, and Islamic galleys and fleets. In *The age of the galley: Mediterranean oared vessels since pre-classical times*, 86–100. Annapolis: Naval Institute Press.

Hocker, F.M., and K. Vlierman. 1996. *A small cog wrecked on the Zuiderzee in the early fifteenth century*. Lelystad: Nederlands Instituut voor Scheeps- en onderwaterArcheologie.

Höckmann, O. 1993. Late Roman Rhine vessels from Mainz, Germany. *International Journal of Nautical Archaeology* 22: 125–135.

Johnston, P.F. 1997. Philadelphia. In *Encyclopedia of underwater and maritime archaeology*, ed. J.P. Delgado, 308–309. London: British Museum Press.

Johnstone, P. 1980. *The sea-craft of prehistory*. Cambridge, UK: Harvard University Press.

Kaylan, M. 2001. Chinese shipwreck treasures revealed. *Forbes Magazine*. Available at http://www.forbes.com/2001/04/04/0404hot.html. Accessed 11 Nov 2011.

Kervran, M. 1999. Multiple ports at the mouth of the river Indus: Barbarike, Deb, Daybul, Lahori Bandar, Diul Sinde. In *Archaeology of seafaring: The Indian Ocean in the ancient period*, ed. H.P. Ray. New Delhi: Pragati Publications.

Lane, F.C. 1973. *Venice a maritime republic*. Baltimore: John Hopkins University Press.

Lenihan, D.J. 1989. *USS Arizona memorial and Pearl Harbor national historic landmark*, Southwest cultural resources center professional papers 23. Santa Fe: Southwest Cultural Resources Center.

Lewis, A.R., and T.J. Runyan. 1990. *European naval and maritime history, 300–1500*. Bloomington: Indiana University Press.

Mahan, A.T. 1918. *The influence of sea power upon history, 1660–1783*. Boston: Little Brown.

Martin, C. 2011a. Stowed or mounted: The Spanish Armada of 1588 and the strategic logistics of guns at sea. In *Ships & guns: The sea ordnance in Venice and Europe between the 15th and 17th centuries*, ed. C. Beltrame and R.G. Ridella, 85–97. Oxford: Oxbow Books.

Martin, J.L. 2011b. Did naval artillery really exist during the modern period? A brief note on cannon designs. In *Ships & guns: The sea ordnance in Venice and Europe between the 15th and 17th centuries*, ed. C. Beltrame and R.G. Ridella, 73–84. Oxford: Oxbow Books.

Morrison, J. 1995a. The trireme. In *The age of the galley: Mediterranean oared vessels since pre-classical times*, ed. R. Gardiner, 49–65. Annapolis: Naval Institute Press.

Morrison, J. 1995b. Hellenistic oared warships 399-31 BC. In *The age of the galley: Mediterranean oared vessels since pre-classical times*, ed. R. Gardiner, 66–77. Annapolis: Naval Institute Press.

Mott, L.V. 2003. Iberian naval power, 1000–1650. In *War at sea in the Middle Ages and Renaissance*, ed. J.B. Hattendorf and R. Unger, 105–118. Suffolk: The Boydell Press.

Navy League's Sea-Air-Space Exposition. 2017. Available at http://www.seaairspace.org/. Accessed 15 Sept 2017.

Navy News Service. 2017. Researchers announce wreckage from USS Indianapolis Located. Story Number: NNS170819-02Release Date: 8/19/2017 12:53:00 PM. Available at: www.navy.mil/submit/display.asp?story_id=102031. Accessed 15 Sept 2017.

Neyland, R.S. 1995. *Technological continuity and change: a study of cultural adaptation in pram-class boatbuilding in the Netherlands*. Unpublished PhD dissertation, Texas A&M University.

Neyland, R.S. 2007. Submarine and ironclad: American Civil War wrecks. In *Discovery: Unearthing the new treasures of archaeology*, ed. B.M. Fagan, 221–223. London: Thames & Hudson.

Neyland, R.S. 2009. The underwater navy at Normandy. *Naval History* 23 (3): 37–40.

Neyland, R.S. 2011. Underwater archaeology of the world wars. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 708–732. Oxford: Oxford University Press.

PBS. 2017. USS Indianapolis LIVE from the Deep. Available at http://www.pbs.org/uss-indianapolis/home/utm_source=promourl&utm_medium=direct&utm_campaign=indianapolis_2017. Accessed 15 Sept 2017.

Pulak, C. 2005. A rare Ottoman wreck: Yassiada, Turkey. In *Beneath the seven seas: Adventures with the Institute of Nautical Archaeology*, ed. G. Bass, 138–141. London: Thames and Hudson.

Rose, S. 2011. Medieval ships and seafaring. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 426–444. Oxford: Oxford University Press.

Sasaki, R.J. 2011. A survey of East Asian shipbuilding traditions during the era of Chinese maritime expansion. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 535–560. Oxford: Oxford University Press.

Sawyer, R.D. 2011. *Ancient Chinese warfare*. Philadelphia: Basic Books.

Scandurra, E. 1972. The maritime republics: Medieval and renaissance ships in Italy. In *A history of seafaring based on underwater archaeology*, ed. G. Bass, 206–224. London: Thames and Hudson Ltd.

Shadbolt, P. 2011. Shipwreck may be part of Kublai Khan's lost fleet. *CNN* Available at: http://www.cnn.com/2011/10/25/world/asia/japan-archaeology-shipwreck/index.html?iref=allsearch. Accessed 12 Nov 2011.

Sicking, L. 2003. The Netherlands before the Dutch revolt. In *War at sea in the Middle Ages and Renaissance*, ed. J.B. Hattendorf and R.W. Unger, 199–216. Suffolk: The Boydell Press.

Soergel, M. 2016. Wreckage found off Cape Canaveral linked to lost French colony of Fort Caroline. *The Florida Times-Union Jacksonville.com* Available at http://jacksonville.com/news/metro/2016-08-17/story/wreckage-found-cape-canaveral-linked-lost-french-colony-fort-caroline. Accessed 18 Sept 2017.

Strickland, A. 2017. Iconic viking grave belonged to a female warrior. *CNN* Available at http://www.cnn.com/2017/09/14/health/female-viking-warrior-grave/index.html. Accessed 20 Sept 2017.

Switzer, D. 2005. Excavating the colonial privateer *Defence*: Penobscot Bay, Maine. In *Beneath the seven seas: Adventures with the Institute of Nautical Archaeology*, ed. G. Bass, 194–199. London: Thames and Hudson.

Swope, K.M. 2005. Crouching tigers, secret weapons: Military technology employed during the Sino-Japanese-Korean war, 1592–1598. *The Journal of Military History* 69: 11–42.

Trask, K,.A. 2013. *Black hawk: The battle for the heart of America*. New York: Henry Holt and Co.

Unger, R.W. 1997. Bremen cog. In *Encyclopedia of underwater and maritime archaeology*, ed. J.P. Delgado, 72–73. London: British Museum Press.

Wachsman, S. 1998. *Seagoing ships & seamanship in the Bronze Age Levant*. College Station: Texas A&M University Press.
Watts, G.P. 1988. The Civil War at sea: Dawn of an age of iron and engineering. In *Ships and shipwrecks of the Americas: A history based on underwater archaeology*, ed. G. Bass, 207–230. London: Thames and Hudson.

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Basic Biographical Information

Born in Auckland in 1943, Graeme Ward completed his secondary schooling in Auckland and Wellington. His university studies at the University of Otago included a range of science and arts subjects; he graduated in 1969 with a Bachelor of Arts with a double major in anthropology and psychology. He undertook papers in Prehistoric Archaeology and wrote a thesis in 1970–1971, under the supervision of B. F. Leach, entitled "Obsidian and New Zealand Archaeology: A paradigm for sourcing artifact assemblages using X-ray fluorescence spectrography," and graduated with a Master of Arts (First Class Honors). As an undergraduate and master's student, he was involved in fieldwork throughout New Zealand and in Fiji and in advocating national legislation to protect archaeological heritage.

After employment as an assistant lecturer in archaeology, Ward won a doctoral scholarship in the Research School of Pacific Studies at the Australian National University. He conducted fieldwork in the New Hebrides 1973–1975 toward his doctoral dissertation, *Prehistoric Settlement and Economy in a Tropical Small Island Environment: The Banks Islands, Insular Melanesia* (1979). At ANU, making further use of his training in basic sciences, he collaborated with colleagues to explore aspects of raw material sourcing (e.g., Smith et al. 1977) and in clarifying approaches to the use and interpretation of radiocarbon age estimates and of the intellectual arguments behind sourcing studies (e.g., Ward and Wilson 1978).

In 1972, Ward researched places associated with the chert industries of the eastern Solomon Islands as part of the project organized by R. C. Green and D. Yen. In 1979–1980, he assisted Leach with excavations on Kapingamarangi, a Polynesian outlier in Micronesia, and the following year took leave from his Australian employment to act in the role of Director of the Micronesian Archaeological Survey for the (US) Trust Territory of the Pacific Islands. Subsequently, he was involved in contract research in the Mariana Islands. During his work with the Archaeological Survey, he edited and published several MAS Reports for the Historic Preservation Office.

Since 1978, Ward has been employed at the Australian Institute of Aboriginal Studies (later AIATSIS), initially as Registrar of Sites, being responsible for the National Sites Register and assisting in the administration of the Institute's National Site Recording Program, then as Research Fellow (from 1997). He administered the Institute's national Rock Art Protection Program, acted for an extended period as Director of Research, began a series of field researches in Northern Australia, and continued to be involved with writing and editing in both Indigenous Australian and Pacific Island fields.

Ward's current research focusses on the ever-changing connection of Indigenous Australians to various landscapes. During research with Traditional Owners, in various parts of Australia, he came to view cultural heritage places, especially rock-art sites as central to Indigenous Australians' concerns. The range of related research topics extended from detailed recording and condition reporting through protection of physical fabric and the intellectual property of cultural places to matters relating to management and protection legislation (e.g., Ward 1985), the ethics of research (e.g., Cole and Ward 2000), and Indigenous Australian interests in research process and results and particularly in promoting an

Indigenous Australian voice in the discourses around rights to manage heritage places and the direction of research (Mowaljarlai et al. 1988; Ward 1992).

Over the last decade or so, Ward has continued to research Indigenous interests in cultural heritage places as they relate to perceptions of ownership and the values of tourism, aiming to establish consciousness, and evaluation, of tourism's impact on heritage places, especially rock markings, in the region centered on Wadeye (Point Keats) in the Northern Territory. Fieldwork with Traditional Owners (TOs) and staff of the Kanamkek-Yile Ngala Museum involves comprehensive recording of heritage places that are, or are intended to be, the subject of tourism and acknowledges the important role of systematic dating of sites in the perception of their cultural significances. Research aims include developing sustainable site management and educational opportunities by investigating and enhancing local control of access and impact on the sites (e.g., Ward and Crocombe 2010). With TOs and their representatives, he has made numerous presentations at conferences and symposia. Recently, his research interests have extended into aspects of visual representations beyond that of rock markings to explore similarities, symbolism, and changes in cultural significances over time (Ward and Crocombe 2008).

Major Accomplishments

In the various phases of his career, from technical studies of raw materials sourcing and the use and significances of radiocarbon dating, through field archaeology and related ethnographic studies in Australia and the Pacific, to studies of the perception of values held by, and uses made of, Indigenous Australian rock markings, Ward has worked with archaeological and other colleagues and with TOs of various heritage places. Their advocacy of protection for archaeological heritage in New Zealand contributed to the development of national legislation here. Their critical analyses of the bases of sourcing studies have been republished, and their papers evaluating analyses of radiocarbon age estimates are much quoted and provide the bases for techniques in use today. Ward's collaborations with TOs in researching into and supporting their research and conservation interests at conferences and through publications have furthered Indigenous Australians' interests in their cultural heritage places.

Ward has been a member of various professional organizations, ranging from national and state archaeological associations and committees through to areas of specific focus, such as the Australian Rock Art Research Association, serving on the executive of several associations and on the editorial boards of various journals. He has edited, or co-edited, numerous reports, collections of papers, and conference proceedings, encouraging the writing of young scholars and providing opportunities for Indigenous voices. He served as editor of the Institute's journal for several years.

In recent years, his work has focussed on the preservation and appreciation of Indigenous rock art, on educating the public as to its importance and fragility, while also assisting Indigenous communities to participate in the care and management of their cultural heritage resources.

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Australian Rock Art
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Ethnoarchaeology
- ▶ Heritage and Public Policy
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Rock Art Sites: Management and Conservation

References

Cole, N., and G.K. Ward. 2000. Response to the Cairns Declaration: A code of ethics for AURA. *Rock Art Research* 17 (1): 72–75.

Mowaljarlai, D., P. Vinnicombe, G.K. Ward, and C. Chippendale. 1988. Repainting of images on rock in Australia and the maintenance of Aboriginal culture. *Antiquity* 64 (237): 690–696.

Smith, I.E.M., G.K. Ward, and W.R. Ambrose. 1977. Geographic distribution and the characterization of volcanic glasses in Oceania. *Archaeology and Physical Anthropology in Oceania* XII (3): 173–201.

Ward, G.K. 1985. The Federal Aboriginal Heritage Act and archaeology. *Australian Aboriginal Studies* 2: 47–52.

Ward, G.K. 1992. Ochre and acrylic: Conflicting ideology and divergent discourses in the issue of repainting of Aboriginal imagery. In *Retouch: Maintenance and conservation of Aboriginal rock imagery*, Occasional AURA publication, ed. G.K. Ward, vol. 5, 31–38. Melbourne: Archaeological Publications.

Ward, G.K., and M. Crocombe. 2008. Port Keats painting – Revolution and continuity. *Australian Aboriginal Studies* 1: 39–55. Available at: http://lryb.aiatsis.gov.au/PDFs/aasj08.01_wardcrocombe.pdf.

Ward, G.K., and M. Crocombe. 2010. Rock paintings near Wadeye, Northern Territory: Site management and educational aspects of research and tourism. *Rock Art Research* 27 (2): 229–237.

Ward, G.K., and S.R. Wilson. 1978. Procedures for comparing and combining radiocarbon age determinations: A critique. *Archaeometry* 20 (1): 19–31.

Further Reading

Smith, C.E. & G.K. Ward. (ed.) 2000/2007. *Indigenous cultures in an interconnected world*. St Leonards: Allen & Unwin. Available at: http://www.ebooks.com/ebooks/book_display.asp?IID = 293705.

Smyth, D., and G.K. Ward, ed. 2008. Protecting country. *Indigenous governance and management of protected areas*. Research Program, AIATSIS. Available at: http://www.aiatsis.gov.au/research/protectingcountry.html.

Ward, G.K., ed. 1985. *Archaeology at ANZAAS, Canberra: A collection of papers presented at Section 25A of the 54th Congress of the Australian & New Zealand Association for the Advancement of Science, May, 1984*. Canberra: Canberra Archaeological Society.

Ward, G.K., ed. 1992. *Retouch: Maintenance and conservation of Aboriginal rock imagery. Proceedings of Symposium O – Retouch, First Congress of the Australian Rock Art Research Association, Darwin 1988*, Occasional AURA publication. Vol. 5. Melbourne: Archaeological Publications.

Ward, G.K., ed. 2011. The role of AIATSIS in research and protection of Australian rock art. *Rock Art Research* 28 (1): 7–16.

Ward, G.K., and C. Tuniz, eds. 2000. *Advances in dating Australian rock-markings: Papers from the first Australian rock-picture dating workshop*, Occasional AURA publication. Vol. 10. Melbourne: Archaeological Publications.

Wari, Geography and Culture of

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State of Knowledge and Current Debates

Wari was an expansive state that emerged in the Ayacucho Valley of Peru in the sixth century AD. At its height in the eighth and ninth centuries, it held influence over 1300 km of the Andean sierra from Cajamarca in the north to Moquegua in the south. For the first half of the twentieth century, Wari was only recognized as a northern and "coastal" variant of the Tiwanaku (Tiahuanaco) culture. The publication and discovery of the city of Huari changed that perspective, and scholars now recognize Wari and Tiwanaku as two unique and distinct contemporary, expansive polities (Tello 1970 [1931]).

Because Wari was not recognized as the center of empire until later in archaeological scholarship, researchers have both sometimes overplayed its territorial control or conversely downplayed its significance among its contemporaries. These perspectives in some cases were driven by nationalist agendas, as Wari is the Peruvian counterpart to Bolivia's Tiwanaku. In other cases, detractors of Wari's imperial role point out that its imposition of material culture on the populace is incomplete and some populations may not show overt signs of direct transformation by imperial culture.

What these detractors are forgetting, however, is that empire is the incorporation of distinct states and ethnic groups into a larger polity. Those ethnic states retain (often at imperial behest) their customs, clothing, and way of life. In most

empires, a great proportion of the populace continues living as their parents and grandparents did, though with greater exposure to both materials and ideas from other parts of the imperial realm. Wari represents an excellent case of the transformation of imperial agendas over 400 years and the changing relationships with local populations in different areas of imperial influence.

There is also a tendency to compare Wari to the later Inca empire. Many Wari scholars see the roots of Inca state institutions in Wari statecraft. Other scholars, particularly those focused on the Inca, argue that cultural borrowing and temporal transmission were not that significant in the rise of the Inca state. This relationship between ancestral nations and later states and empires is one that can be of great importance in understanding the cultural diversity in both statecraft and values in today's world. The role Wari and Tiwanaku played in the rise of Inca imperialism is undeniable, but whether earlier Wari state institutions were transformed by the Inca or Inca state institutions emerged *sui generis* is still hotly debated.

Wari scholarship is growing rapidly as the archaeological dataset that underpins our knowledge of Wari is being expanded exponentially through new excavations and new analyses on museum collections. In fact, the amount of data available from Wari settlements and collections has probably doubled in the past decade, replicating in 10 years what had taken half a century to accumulate before. And yet, there is still a great deal to explore in understanding the Wari phenomenon, which will propel our understanding of the first Andean empire in the next decades. The gaps in our knowledge and areas of growth in Wari studies are evident when we examine the antecedents and geographic extents of Wari settlement in the Andes.

Antecedents

The Ayacucho Basin was occupied in pre-Huari times by a culture known as Huarpa. Between the second and sixth centuries AD, Huarpa peoples established small villages clustered around larger towns along the 45 km length of the Ayacucho valley. They were agriculturists who used ceramics painted with black and red geometric designs on white slip. From these humble beginnings, the Wari state emerged (Lumbreras 1974). It was during the latter phases of Huarpa development that influences from the Nazca culture began to appear in the ceramic iconography, representing a cross-fertilization of ideas from the adjacent Nazca region into the highland Huarpa society.

Nazca culture flourished in the western valleys of the Andes in the drainages of the Ica, Nazca, and Acari rivers on Peru's central coast. Their towns and ceremonial centers lie just over the continental divide from the Huarpa homeland, a few days walk away. Nazca art was graphically vivid and naturalistic, with brilliantly earth tone-colored polychrome vessels. In the Nazca valley, these polychrome ceramics were produced at the civic ceremonial center of Cahuachi and distributed to the surrounding towns. The Nazca were the master craftsmen of southern Peru in the pre-Wari period, and their religious centers were likely famous throughout southern Peru, perhaps even drawing Huarpa pilgrims.

By late Huarpa times, Nazca designs and pigments began to infiltrate Huarpa iconography. This cross-fertilization formed the basis for the vibrant polychrome pottery styles that would characterize Wari state pottery production in the following centuries. In particular, Nazca designs edged with fine black outlined circles and a four-direction recurving ray icon appear in late Huarpa and early Wari styles, like Chakipampa and Ocros (Knobloch 2012).

These Huarpa innovations are accompanied by an increasingly complex settlement pattern. Huarpa communities grow in density toward the end of the sixth century AD, especially on the plateau that would become the site of Huari, capital of the regional state and later empire that bears the same name. This growth in demography is accompanied by a rapidly increasing social complexity as Wari engages with and incorporates many of the regional polities as it explodes outside its heartland and spreads across the Andes. The developments in the Wari heartland are extremely important in understanding this transition.

The Wari Heartland

The capital of the Wari polity is the site of Wari itself. Covering several square kilometers, the city housed as many as 40,000 people at its height. Major thoroughfares crisscrossed the urban center and provided access to the large rectangular compounds that formed most of the site structured the city. However, the city did grow organically unlike many of the provincial centers that were rigidly centrally planned. Irregular architecture that still conforms to the Wari courtyard house form filled in spaces in between major compounds. Elite households and administrative buildings were likely housed in the majority of these compounds within the city.

The western side of the city seems to have had a more ceremonial function according to Enrique Gonzalez Carre and Enrique Bragayrac. The D-shaped structures at Vegachayoq Moqo and Monjachayoq were likely the principle religious structures at the site, and the largest of them, set in a U-shaped mound, has been called the Templo Mayor. Moving south into Monjachayoq, subterranean cut stone galleries, some four to five stories deep, may represent the tombs of Wari's kings. And further to the southeast, William Isbell's (1991) excavations at Moraduchayoq revealed evidence for an early semisubterranean cut stone sunken court that was built over by the burgeoning urban expansion. Finally, the Cheqo Wasi sector with its stone slab tombs may have been the resting place of Wari lords.

The entire capital city was a humming metropolis with canals running through the city to supply water to the urban population and remove waste from the urban area. While the major thoroughfares provided access to the high-walled neighborhood compounds, access to areas within these districts was provided by a complex maze of passageways designed so that only the residents who lived there would be able to navigate them. The city did not contain two hallmarks of building style seen in some of the provincial centers, namely, niched halls and the blocks of geometrically organized conjoined rooms, though the latter is found at the site of Azangaro in the nearby Huanta valley north of the capital.

Azangaro, a rectangular enclosure of approximately 150 m by 400 m, is composed of three sectors. The north sector contains large Wari patio compounds, typical of administrative architecture at the capital and in many provinces. The central sector is a block of rows of conjoined rooms that may have served a storage function or perhaps housed corvee laborers. The south sector is a large enclosed space with irregular architecture within. The site, located in a lower and warmer part of the Ayacucho basin, represents a possible agricultural production center that was also tied in to Wari ritual, according to excavator Martha Anders.

Agricultural production to feed the capital city may also have been the function of the small Wari administrative site of Jargampata, located to the east of the capital (Isbell and McEwan 1991). A single patio compound, Jargampata represents a small-scale Wari administrative presence for the extraction of an important resource. Sites like Jargampata are found throughout the empire, though often they are related to larger provincial sites.

A review of Wari's heartland would not be complete without mentioning Wari's second city, Conchopata, located near the airport in the modern city of Ayacucho. Originally identified as a ceramic production center by Denise Pozzi-Escot, excavations in the late 1990s by Jose Ochatoma and Martha Cabrera (2007) revealed a dense urban settlement replete with D-shaped temples that contained the severed skulls of people from foreign lands. Located south of the capital city, Conchopata was a thriving community that produced some of the most stunning pottery in the Wari realm. Through the iconography on these pots, we see military elites, lords with chevron headbands and facial decorations, and women of noble standing as members of the community.

Wari Provinces

From its capital in the Ayacucho sierra of Peru, Wari spread its influence from Cajamarca in the north to Cuzco and Moquegua in the south. It was bounded on its southern border by colonies of the

Tiwanaku state and by local groups interacting with Tiwanaku and Wari state institutions. In the north, Wari interfaced with the Moche kingdoms vis-a-vis the highland polities with whom they had more intensive interaction and, in some instances, direct control. Such is the nature of empires, that their power and influence over vast regions are always the subject of negotiation, and that local powers weigh the benefits and deficits of affiliating with the imperial force before deciding how they will integrate or not.

The geography of Wari provincialism can be divided into northern and southern realms, which are quite distinctive in their relationships with the center. Each realm may have contained several provinces, of which four will be introduced in each the north and south. Each of the eight regions is centered on a pre-existing polity or groups of polities that had their own distinctive relationships with the Wari capital. To the north, these regions were arranged linearly along the Andean cordillera, with Cajamarca, Huaylas, Junin, and Huanca constituting the central axis. To the southeast lies the region of Cusco, and to the south were linearly arranged the regions of Parinacocha, Condesuyo, and Puquina.

In the far north, the Cajamarca region incorporates the existing polities of Cajamarca and Huamachuco that inhabited this region since pre-Wari times (Topic 1991). Peoples of these areas spoke the same language in the post-Wari era at the time of the Inca conquest (Rowe 1946). The great, unfinished administrative center of Viracochapampa lies in the geographic center of this region within the Huamachuco polity. Other Wari settlements like Huaquerones and El Palacio de Miraflores (Watanabe 2002) were located within the Cajamarca polity territory. To the west, the region interfaces with the northern Moche kingdoms in the valleys of Lambayeque, Jequetepeque, Chicama, and Moche as evidenced at such locales as San Jose de Moro (Castillo 2012). The Cajamarca region of influence is likely marked by a Wari alliance with this polity, as an interface with the northern Moche states and as a venue for extraction of resources from further north, including the rich spondylus trade-off the coast of Ecuador.

Huaylas, the second most distant of the northern regions from Wari, incorporates the headwaters of the Santa valley (the Callejon de Huaylas) and the adjacent Callejon de Conchucos. This region was inhabited by Recuay peoples in pre-Wari times and was also the heart of the earlier Chavin civilization. The Wari settlement of Honco Pampa lies at the geographic center of this region. Wari may have allied with or incorporated a Recuay polity into the imperial realm as an interface with the southern Moche state. Wari influence on the coast is most notable at Castillo de Huarmey, where a mass tomb of elite female women was discovered in recent years (Giersz and Pardo 2014), and at Chimu Capac in the Pativilca valley.

Junin, the second closest region to the north of Wari, is probably the least investigated and least known of the Wari regions in the mountainous interior that marked the heart of Wari territory to the north. But it was also the region that interfaced most closely with the pre-existing coastal Lima polities, for which recent discoveries are revealing new and exciting interactions with the Wari state. These include the discoveries of Wari elite female burials at Huaca Pucllana but also include the city of Cajamarquilla (Segura 2001) and the long known Wari contexts at Ancon and Pachacamac (Uhle 1903). The Chancay, Rimac, and Lurin valleys form the coastal zone of this region and are the source of the Wari-influenced Nievería ceramic style. The highland settlement purportedly associated with the Wari influence in this region is the site of Yanahuanca.

Huanca, the closest region to the north of Wari, is also relatively little known given its proximity to the Wari capital. Like Junin, its highland centers are on the Marañon and on the east side of the continental divide, thus not adjacent to the coastal polities. Wari Willka was perhaps its most important Wari center and shrine (Shea 1969). The coastal valleys of Mala, Cañete, Chincha, and Pisco include the settlements of Huaca Malena and Cerro del Oro, attesting to a Wari coastal presence in this region.

To the southeast lies the region of Cusco, which marks the Wari territory that interfaces with the Amazonian foothills to the east and the

high plains of the Titicaca Basin to the south. The second largest administrative center in the empire, Pikillacta, lies at the geographic center of this region (McEwan 2005). On its southern frontier, the recently identified Wari labor settlement at Raqchi marks the boundary with the Titicaca basin (Sillar 2013). The northeastern component of this region is marked by the recent finds of a Wari settlement at Espiritu Pampa (Fonseca Santa Cruz 2011), the first Wari center to be identified in the high jungle. This Wari region would become the first region of consolidation of the expanding Inca state in the early fourteenth century AD. During Wari times, local ceramic styles like Araway coexist with imperial Wari styles and mark a region of cultural ceramic production as we see in other southern Wari zones.

To the south, the region of Parinacocha marks a broad area that inhabited the highlands adjacent to the pre-Wari Nazca polities. The Wari administrative center of Jincamocco lies at the geographic center of this region (Schreiber 1992). Other rural Wari settlements in adjacent valleys such as those in Chicha-Soras (Meddens 1991) and the upper Nazca settlement of Pataraya (Edwards 2010) document an intensive occupation of the region in Wari times. As the primary interface to Nazca settlements in the Ica, Nazca, and Acari valleys, this region was likely one of the earliest areas of proto-imperial cultural development.

The second region to the south is Condesuyo, consisting of the valleys of Ocoña, Majes, Sihuas, Vitor, and their tributaries. Post-Wari peoples present here at the time of the Inca conquest included the Cabana Conde, Collagua, Alca, and Arones ethnic groups (Rowe 1946). During late Wari times, the Qosqopa style became a prevalent regional ceramic variant that linked this region together in a common material culture. The use of certain mortuary traditions, like the painted slabs that adorned Middle Horizon and later tombs, also unites the peoples of this region in a common cultural tradition. Strong Wari influence is pronounced in places like Corral Redondo in Ocoña, La Real and Beringa in Majes, Chuquibamba, and the site of Millo in Vitor.

The third and southernmost region is Puquina, named after a tributary of the Tambo valley in the region and a linguistic group that was ethnohistorically documented to inhabit the valleys of Tambo, Moquegua, Locumba, and Sama in the sixteenth century before the language disappeared a few decades later. The Puquina region has its geographic center at the Wari administrative center of Cerro Baúl. In Inca times, this region constituted the Inca province of Colesuyo. This is the only region in which Wari settlement also interfaces with Tiwanaku colonies.

Arts and Architecture

Wari provincial centers were architectural masterpieces that replicated canons found in the Wari capital and also introduced new patterns of grid planning in the distant reaches of the Wari realm. While not all Wari constructions were laid out in large blocks ahead of time, the most notable walled cities like Pikillacta and Viracochapampa followed this pattern. In both cases, urban planning of new large areas had been laid out in rectilinear districts, but the internal compounds had never been completed. This demonstrates that Wari had designs to continue to grow its provincial centers at the end of its reign that never came to fruition.

The basic building block of Wari construction is the patio group, a roughly square walled compound that enclosed a central open space (Isbell and McEwan 1991). Rooms of standardized width encircled the open patios in many cases, forming a kind of courtyard house that housed both residential and craft production activities. Walls were often plastered and painted in brilliant white colors, and floors were often plastered as well. These courtyard houses often stand two to three stories tall. Roofing was made of a thatch of ichu grass suspended on a wooden structure. While grand boulevards bisect sites like Pikillacta, small passageways connected houses within neighborhoods in the provincial centers.

In addition to the courtyard constructions, large monumental structures called niched halls graced some of the largest courtyard compounds. Present only in the administrative centers at Pikillacta and Viracochapampa, niched halls ranged in size from small 3.5 by 4 m structures

to 15 m by 42 m buildings. They are so named for the trapezoidal-based niches that are built into the walls. The rounded corners of these halls are also a deviation from the Wari norm of rectilinear architecture. John Topic suggests this architectural form may have been derived from Huamachuco constructions in the north highlands. Based on excavations in these halls, it appears they retained a religious function.

The other forms of religious architecture associated with Wari state settlements are the D-shaped temples (Cook 2001). These buildings in the form of the letter D range in size from 5 m in diameter to 20 m wide. They also contain niches in both the curved walls and along the straight-sided wall through which a door provided access to the structure. The largest D-shaped temples are located at the Wari capital, but they are present at several other important Wari centers, like Conchopata, Honco Pampa, and Cerro Baúl. D-shaped temples have yielded evidence of human trophy heads extracted from subject populations, as well as feasting vessels representing an intersection between political, military, and religious power. The feasting vessels, highly decorated ceramic forms, represent another of Wari's great artistic achievements.

Ceramic Arts

Wari innovated ceramic arts drawing on Huarpa and Nazca antecedents. They also created a culinary assemblage that introduced new forms focused on feasting and drinking. Oversized face neck jars are prevalent in both offering caches and in feasting contexts, standing over 1 m in height and capable of storing 150 or more liters of liquid. They are often highly decorated and depict a Wari lord wearing an elaborate woven tunic with facial decoration. Oversized urns are also noteworthy, especially in the assemblages at Conchopata, Pacheco, and Maymi. The Conchopata iconographic style found on some of these urns depicts the front-facing deity, a principal Wari figure, often with disembodied heads of mythical attendants. Other depictions in this style include military campaigns with warriors in their garb or symbols of plants and agricultural fecundity. Both face neck jars and oversized urns served ceremonial functions, and many were ritually smashed after limited use in feasting ceremonies (Knobloch 2012; Fig. 1).

Other serving vessels associated with the Wari drinking and feasting assemblage include keros (large beer mugs), smaller cups, and figurative vessels. Some of the keros could hold more than 2 l of liquid, though smaller cups held half a liter and were more frequent in the Wari assemblage. Bowls and serving plates are also part of the Wari decorated ceramic assemblage and come in many iconographic styles, like the Nazca-influenced Chakipampa style, the orange-slipped Ocros style, the Robles Moqo style, and the Vinaque style, all probably innovated in the Wari heartland. Other styles infused Wari ideas and icons with other ceramic traditions, like the brilliantly colored Atarco style and the coastal Nievería style. The innovation in Wari ceramics was matched or exceeded in technological sophistication by their work in textiles.

Textile Arts

Wari textiles were masterpieces of artistry and were developed in three major techniques: tapestry, tie-dye, and featherworks. Among the most exquisite of woven objects were tapestry weaves, including mantles, headbands, four cornered hats, and, most importantly, tunics. Wari tapestry is created by passing the multicolored horizontal wefts back and forth through the undyed vertical warps and packing them tightly so they conceal the warp threads underneath. The tunics were large garments worn by elite men depicting supernatural deities (the sacrificer and attendants), face frets, and less commonly anthropomorphic animals, weapons, plants, and skulls (Bergh 2012). Tunics were also created in a distinct process through tie-dye of components of woven cloth that were stitched together to form a whole. The tie-dye weaves were created by tying cloth in bundles before dying to create patterns on the fabric, often circles, diamonds, and square blocks, that were then stitched together to create patchwork patterns of brilliantly colored cloth.

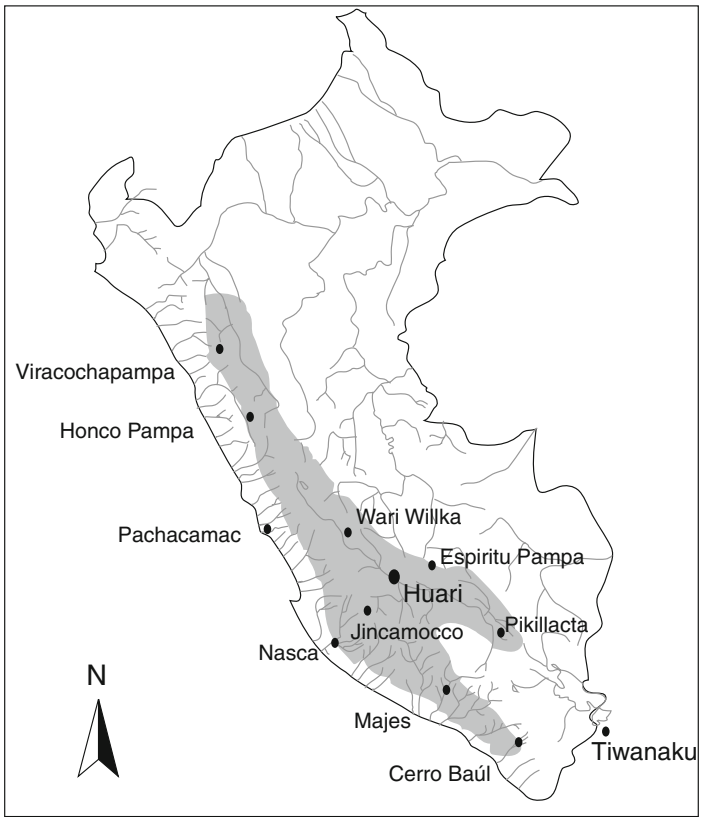

Wari, Geography and Culture of, Fig.1 Extents of Wari influence and important Wari and contemporary sites in Peru

The third major area of textile artisanry was in featherwork, created from the brilliantly colored feathers of rainforest birds. The most impressive pieces are large panels or tabards, probably used as wall hangings and in some cases as interment offerings. One spectacular find in the Churunga valley of southern Peru contained 8 sets of 12 yellow- and blue-feathered panels stuffed in oversized face neck urns interred in an offering (King 2012). Feathered weaves also were used in headgear, and feathers often could adorn mummy bundles or even figures interred with them. These figurines, often made of semiprecious stone or metal, represent another area of Wari craftsmanship: a cultural fluorescence in bronze.

Metalworks and Lithic Technologies

Wari metal craftsmanship was focused on gold, silver, and copper, the latter of which was often smelted in a copper-arsenic bronze (Lechtman 2003). Wari metalwork was often focused on flashy ornaments, like large plumes that protruded from clothing or headdresses, elaborate tupus or shawl pins worn by elite women, ear ornaments, and neck ornaments like the sheet hammered silver pectorals discovered in some Wari burials. Metal masks and gold and silver plaques were also part of the decorative metals assemblage used for both adornment and offerings in Wari sites. Rare examples of metalwork include smelted copper and silver figurines found in offerings or graves at Wari sites. And while there are some examples of metal tools, like the tumi knife or metal drills, most tools were crafted of stone, the most valued of which was obsidian, or volcanic glass, mined from the volcanoes around the Wari realm.

Wari flaked stone tools and lapidary craftsmanship were also extraordinary. Obsidian, lapis lazuli, and semiprecious stones were the most valued, though local lithic material was often the

primary source for utilitarian tools. Obsidian cutting implements included laurel leaf-shaped bifaces and smaller projectile points, the most common obsidian forms found at Wari sites (Williams et al. 2012). Lapis, onyx, chrysocolla, and other semiprecious stone was shaped into beads for necklaces and bracelets as well as crafted into figurines, in some cases of mythical personages who represented founding ancestors of important lineages in the empire (Cook 1992).

The Wari arts were instrumental in tying the empire together, both through gifts to local elites as a means of purchasing their loyalty and gifts to the gods to ensure the continued productivity of the agricultural fields that supported Wari state expansion. Delivering these products around the empire required an economic infrastructure in the form of productions centers and roads. And supporting the growing state required the transformation of the landscape into more and more productive agricultural land. Thus, economic infrastructure was also a key component of Wari expansionism.

Economy and Subsistence Infrastructure

Tying together such a substantial reign required both communication networks and recording systems. The Wari developed expansive roads on which both information and goods traveled around the empire. While many of these were new trails, they also built upon existing paths that connected settlements together. Along these road systems, settlements grew up and the Wari state assisted in developing high elevation irrigation infrastructure that developed the subsistence production in regions around the empire. Finally, Wari administrative centers contained storage facilities embedded within administrative state architecture that served to maintain some of these products for state use. The Wari also invented an early form of the quipu, a set of woven cords on which numerical and categorical information could be recorded. The Wari quipu likely is the primary record keeping device of state administration.

Roads

Roads were critical to linking Wari settlements to each other and to the Wari heartland. The primary Wari roads are longitudinal networks linking similar ecological zones in the Andean valleys. As Schreiber (1992) notes, a primary ecological component of this settlement system is the location of Wari sites at the juncture between the maize-and potato-growing zones along the western flank and in the intermontane valleys of the Andes. The vast majority of major Wari sites fall within this ecological framework. Thus, Wari roads pass through this *quichua* zone (2000–3000 masl) of the Andean sierra. Wari centers also likely serve as nodes, connecting higher and lower elevation sites in the same valley to the Wari southern road network.

Wari road ecology was focused on recreating a staple reproduction strategy in each node along the network. Settlements were meant to be relatively self-sufficient in creating the means to reproduce a Wari lifestyle in these centers. Wari strived to link similar ecological niches via a road system that facilitated the movement of ideas and prestige goods. In addition to a distinctive ecological strategy of network connections, Wari invested in the infrastructure of facilities along the thoroughfares that connected capital to colony.

In many places, Wari roadways are marked with petroglyphs, indicating the trails of movement between sites in the settlement clusters. Wari investment in road infrastructure includes formal administrative centers approximately every 50–100 km along its southern trunk road, each of which is accompanied by less formal towns and villages surrounding these centers.

Trade and Exchange

Access to exotic goods acquired through long-distance exchange was an important part of social life for the Wari. Excavations indicate that Wari access to these goods was more concentrated in elite status households. Wari colonists had access

to a restricted set of luxury goods, reflecting a centralized distribution system. Obsidian is a prime example of a resource that traveled long distances to arrive in Wari sites. It is ubiquitous in Wari sites, and obsidian tools are found in greater concentrations in Wari elite residential contexts than in non-elite contexts.

Metalworks traveled long distances to arrive in Wari colonies. Within the Wari sphere in the Moquegua valley, there are copper-arsenic bronzes, copper-tin bronzes, and copper-arsenic-nickel (ternary) bronzes. These alloys represent distinct regional sources of ores from the altiplano, to the circum-altiplano, to the western cordillera of the Andes (Lechtman 2003). Moquegua is somewhat unique in that access to the ternary bronze and the tin bronze by Wari settlers is present. Other Wari colonies, like Pikillacta in the Cuzco area, are represented by a single dominant bronze source: arsenic bronzes from the western Andean cordillera (Lechtman 2003). Arsenic bronze was one of the goods that likely traveled as an interregional commodity of exchange along the Wari road system. In the provincial contexts, metal goods were widely accessible to colonial populations, especially to elite households. Exotic goods procured via long-distance exchange indicate that Wari utilized a limited number of sources but had a centralized distribution network that favored their accumulation in elite settings.

Wari focused on the long-distance movement of wealth goods, items of prestige that were easily transported but not easily replicated. Metal objects and obsidian bifaces were some of the principal commodities exchanged in this manner. Textiles were also likely a wealth medium of exchange. Meanwhile, bulk goods primarily were exchanged within regions, drawing on the area within 50–100 km of a regional center. The Wari constructed provincial nodes of production to create a more far-reaching and complex integrative system than anything before. Yet, it would not have been possible without the antecedents that Wari, Tiwanaku, and their contemporaries and predecessors developed in terms of road networks.

Agriculture

The Wari were master landscape engineers and transformed the highland Andean landscapes by constructing extensive canal systems and creating terraced irrigation agriculture. Their waterworks were especially well developed in the regions surrounding the most important provincial centers. While highland irrigation agriculture had been practiced for centuries by preceding cultures, the Wari established it on a scale not previously seen and introduced these extensive agrarian production regimes to areas where it had not previously been used (Williams 2006).

The quichua ecological zone is the primary locale of agricultural works and of Wari settlement, the staple products of which were fundamental to Wari social reproduction. These include agrarian items for local consumption in each of the Wari centers along the route. Cultigens such as maize, aji, beans, cucurbits, various cacti, and the Peruvian pepper berry, *Schinus molle*, are all grown in this zone. These same goods have been discovered in abundance in archaeological contexts at Wari sites such as Cerro Baúl.

Storage

Wari storage systems have been heavily sought and rarely extensively and definitively documented. Work in certain provincial centers has shown them to be embedded within administrative architecture, while proposals that whole sectors of sites were dedicated as storage, such as at Pikillacta and Azangaro, have been critiqued that these areas likely served as housing for corvee laborers or for other needs (i.e., McEwan 2005). At the provincial center at Cerro Baúl, storage facilities have been identified as specialized rooms within Wari patio groups (Williams 2001), in a string of square structures that formed the façade of the principal palatial residence, and in large structures flanking agricultural terracing on the slopes of the great mountain. These diverse types of storage, often embedded within other

infrastructure instead of standing alone as Inca storage structures did, have made it more difficult to identify Wari storage systems without extensive excavation in various types of architecture. As more Wari sites are subjected to intensive investigations over decades, we will likely identify more varied types of Wari state storage. Concomitant with storage, a hallmark of state administration is record keeping, a feat the Wari achieved through a relatively recently discovered class of knotted cord predecessors to the Inca quipu.

Record Keeping

Wari knotted cord records differ from their Inca corollaries in several ways. First, they often utilize wrapped pendant cords as a principal element in their construction. The wrappings around the head of each pendant cord, often decorated with geometric designs, may signal categorical information in a more explicit symbolism than the binary choices presented in Inca quipu construction. Secondly, while they do likely encode numerical information on knots in the pendant cords, the exact coding system used by Inca quipu specialists is not replicated in Wari knots, though there are some striking similarities. Knots are composed of a series of turns as they are in Inca quipus, and they seem to be organized along the cords in groups that may represent a hierarchical ordering of numbers. However, they may not use the same base ten numerical system the Inca quipu did and likely have other ways of organizing information distinct from the better studies Inca counterparts. Nevertheless, the Wari quipu demonstrates a sophisticated recording technology that laid the basis for later corded recording systems and likely worked to store and transmit information throughout the Wari realm (Conklin 1982). The transmission of information was a key facet in maintaining political network cohesion over a vast territory. It was accompanied by investment in infrastructure for the hosting of commensal events and for creating group cohesion through religious architecture that articulated a cosmological vision for the peoples of the empire.

Breweries and Commensal Politics

One way in which Wari leaders cemented relationships with each other and with local lords was through feasting events at state centers (Nash 2010). By hosting these fetes, replete with large quantities of *chicha de molle*, an alcoholic beverage made by the Wari, they were able to reinforce a common identity. In fact, recent discoveries of the Andes' oldest large-scale brewery at Cerro Baúl and the dregs of molle beer from other administrative sites indicate that brewing infrastructure was key to Wari expansion. At Cerro Baúl, a compound measuring over 400 m^2 in area contained specialized rooms for grinding grains, boiling mash, and fermenting the liquid, as well as the remains of the elaborate drinking vessels used in feasts that had been smashed on the floor of the burning buildings at the time of abandonment (Moseley et al. 2005).

The addition of *molle* berries to the corn brew is documented by the thousands of spent seeds found in pits in the floor, each with evidence that the sugary resins on the pits had been dissolved in liquid (Sayre et al. 2012). Furthermore, researchers suggest that the brewmasters were elite women based on the finds of the largest concentration at the site of elite womens' shawl pins in the brewery (Moseley et al. 2005). The beer was thus granted a special character, having been produced in specialized facilities by groups of elite women and drunk out of elaborate cups up 2 l in volume. Consumption of beer in ritual events was an important avenue of building relations among Wari subjects. But beer was not the only means of consolidating a shared identity. The Wari also established a state religion and constructed temples and religious architecture to incorporate their subjects into the empire through faith.

Religion

Wari religion, especially in later years, revolved around a figure known as the staff god or the front-facing deity. This was a creator deity,

depicted in both male and female forms and holding a staff in each hand. Attendant figures in profile accompany the central figure in some depictions, and ritually important plants and animals, like the condor, llama, puma, and maize, appear in the deity's accouterments. Wari religious iconography appeared primarily on textiles and ceramics and was likely used in ceremonies in both the public and private sphere. In many areas, Wari actors usurped preexisting shrines to make them their own. In others, they built temples in the styles of the regions they conquered to incorporate local peoples into state religion (Williams and Nash 2016). These platform and sunken court complexes in Wari's southern realm, which mimicked religious architectural forms found in the region prior to Wari expansion, were accompanied in the same sites by imperial religious architecture like D-shaped temples and niched halls. The Wari incorporated religious doctrine from the societies they encountered into their own ritual pantheon in order to make allying with Wari more attractive to competing polities. However, there is also evidence of the use of force in subjugating groups and bringing them into the Wari realm through a strong and organized military.

Military

Evidence for Wari military prowess comes primarily from iconographic representations on Wari ceramic vessels and miniature sculpture in stone and metal as well as from the skeletal remains of the victims of warfare and violence in Wari lands. Some of the most notable iconography of Wari militarism comes from an oversized ceramic urn from the site of Conchopata. Images of Wari warriors, mounted on reed boats and carrying bow and arrows or porting an axe and shield, depict the soldiers on their way to battle. Metal figurines discovered at the site of Pikillacta include warriors brandishing a sling, along with spears and a shield and a figure wielding a club over a fallen human body.

At the site of Beringa in the Majes valley, Tung (2012) documents an increase in violent trauma on human remains at the site with the incursion of the Wari state. Likewise, the trophy heads from the D-shaped temple at Conchopata have geochemical markers that indicate they were taken from peoples foreign to the Wari heartland, probably the result of conquest warfare. However, some Wari areas do not show any evidence of violence. On the Wari southern frontier, the large Tiwanaku cemeteries containing thousands of graves in the Moquegua valley have low incidences of violent trauma on the skeletal remains, and extensive implements of warfare have not been recovered in the excavations at Wari or Tiwanaku sites. Warfare was not a ubiquitous means of incorporation in Wari politics, but it is apparent that an organized military did play a role in Wari expansion and the maintenance of Wari imperialism for over 400 years. A pending question is how did the very successful system Wari established and maintained come to its end.

The End of Wari

The demise of the Wari state is still a topic that has not been extensively investigated. Some have argued the end of the Middle Horizon states was driven by climatic stress (Ortloff and Kolata 1993). Others have argued internal factionalism and contestation over hydrological resources may have been a principal factor in state collapse (Williams 2002). What we do know is that Wari administrative centers across the Andes were widely abandoned around 1000–1050 CE. In some places, ceremonial closure of state architecture, including the burning and ritual destruction of state monuments, accompanied settlement abandonment (Moseley et al. 2005).

If increasing factionalism played a role in Wari's demise, it may have been encouraged by increasing bureaucracy that impeded local leaders within the Wari realm to respond effectively to the needs of their communities and constituents. Bureaucracy is hard to measure in a society without written regulations

decipherable to today's scholars. But in some Wari centers, a vast expansion of administrative architecture appears in the latter half of Wari's existence. It is likely this expansion represents the emergence of many more state institutions, which may have been vying for more and more control over the lives of tributary communities. Disagreements over the role of community autonomy and which state institutions had authority over which communities may have created regulations which did not serve the common good but overburdened the peoples who lived in Wari towns. Eventually, this may have led to people abandoning the government and Wari way of life.

Cross-References

- ▶ Andean Petroglyphs
- ▶ Andes: Prehistoric Art
- ▶ Central Andes: Prehispanic Hunter-Gatherers
- ▶ Inca State and Empire Formation
- ▶ Moche, Geography and Culture of
- ▶ South American Geography and Chronology
- ▶ Tiwanaku, Geography and Culture of

References

Bergh, Susan. ed. 2012. Tapestry woven tunics. In *Wari: Lords of the ancient Andes*, 159–192. New York: Thames and Hudson.

Castillo, L.J. ed. 2012. Looking at the Wari empire from the outside in. In *Wari: Lords of the ancient Andes*, 47–63. New York: Thames and Hudson.

Conklin, W. 1982. The information system of middle horizon quipus. In *Ethnoastronomy and archaeoastronomy in the American tropics*, ed. A.F. Aveni and G. Urton, vol. 385, 261–281. New York: Annals of the New York Academy of Sciences.

Cook, Anita. 1992. The stone ancestors: Idioms of imperial attire and rank among Huari figurines. *Latin American Antiquity* 3 (4): 341–364.

Cook, A. 2001. Huari D-shaped structures, sacrificial offerings and divine kingship. In *Ritual sacrifice in ancient Peru*, ed. E. Benson and A. Cook, 137–163. Austin: University of Texas Press.

Edwards, M. 2010. Archaeological investigations at Pataraya: A Wari outpost in the Nasca Valley of Southern Peru. Unpublished Ph. D. dissertation, University of California, Santa Barbara.

Fonseca Santa Cruz, J. 2011. El Rostro Oculto de Espiritu Pampa, Vilcabamba, Cusco. *Arqueologia Iberoamericana* 10: 5–7.

Giersz, M., and C. Pardo. 2014. *Castillo de Huarmey. El Mausoleo Imperial Wari*, 348. Lima: Museo de Arte de Lima.

Isbell, William Harris, and Gordon Francis McEwan. 1991. *Huari administrative structure*: prehistoric monumental architecture and state government. Dumbarton Oaks.

King, H. 2012. Featherwork. In *Wari: Lords of the ancient Andes*, 207–216. New York: Thames and Hudson.

Knobloch, P. 2012. Archives in clay: The styles and stories of Wari ceramic artists. In *Wari: Lords of the ancient Andes*, 122–143. New York: Thames and Hudson.

Lechtman, H. 2003. Middle Horizon bronze: centers and outliers. In *Patterns and process: A Festchrift in honor of Edward V. Sayre*, ed. Lambertus van Zelst. Suitland: Smithsonian Center for Materials Research and Education.

Lumbreras. 1974. *The peoples and cultures of ancient Peru*. Washington, DC: Smithsonian Institution Press.

McEwan, G. 2005. *Pikillacta: The Wari Empire in Cuzco*. Iowa City: University of Iowa Press.

Meddens, F. 1991. A provincial perspective of Huari organization viewed from the Chicha/Soras Valley. In *Huari administrative structure: Prehistoric monumental architecture and state government*, ed. W. Isbell and McEwan, 215–232. Washington, DC: Dumbarton Oaks.

Moseley, M., D. Nash, P. Williams, S. DeFrance, A. Miranda, and M. Ruales. 2005. Burning down the brewery: Excavation and evacuation of an ancient imperial colony at Cerro Baúl, Perú. *Proceedings of the National Academy of Sciences* 102 (48): 17264–17271.

Nash, Donna J. 2010. Fine dining and fabulous atmosphere: Feasting facilities and political interaction in the Wari realm. In *Inside ancient kitchens: New directions in the study of daily meals and feasts*, ed. E. Klarich, 83–109. Boulder: University Press of Colorado.

Ochatoma Paravicino, José 2007. Alfareros del imperio Huari: vida cotidiana y áreas de actividad en Conchopata. Universidad Nacional de San Cristóbal de Huamanga, Facultad de Ciencias Sociales.

Ortloff, Charles R., and Alan L. Kolata. 1993. Climate and collapse: agro-ecological perspectives on the decline of the Tiwanaku state. *Journal of Archaeological Science* 20 (2): 195–221.

Rowe, J. 1946. Inca culture at the time of the Spanish conquest. In *The Andean civilization, vol. 2 of Handbook of South American Indians*, Bureau of American Ethnology Bulletin 143, ed. J.H. Steward, 183–330. Washington, DC: Smithsonian Institution.

Sayre, Matthew, David Goldstein, William Whitehead, and P.R. Williams. 2012. A marked preference: Chicha de

Molle and Wari state consumption practices. *Ñawpa Pacha* 32 (2): 231–258.
Schreiber, K. 1992. *Wari imperialism in middle Horizon Peru*, Anthropological Papers 87. Ann Arbor: Museum of Anthropology, University of Michigan.
Segura, R. 2001. *Rito y Economia en Cajamarquilla*, 203. Lima: Fundo Editorial PUCP.
Shea, D. 1969. Wari Willka: A central Andean oracle site. PhD Dissertation, Department of Anthropology, University of Wisconsin – Madison.
Sillar, W. 2013. My state or yours? Wari "Labor Camps" and the Inka cult of Viracocha at Raqchi, Cuzco, Peru. *Latin American Antiquity* 24 (1): 21–46.
Tello, Julio C. 1970 [1931]. Las ruinas de Huari. In *100 años de arqueología en el Perú*, ed. R. Ravines, 519–526. Fuentes e Investigaciones para la Historia del Perú 3. Lima: Instituto de Estudios Peruanos. 1970. Originally published in *El Perú, Diario de la mañana* (Lima), 27 August 1931.
Topic, J. 1991. Huari and Huamachucho. In *Huari administrative structure: Prehistoric monumental architecture and state government*, ed. W. Isbell and McEwan, 141–164. Washington, DC: Dumbarton Oaks.
Tung, Tiffiny A. 2012. *Violence, ritual, and the Wari empire: A social bioarchaeology of imperialism in the ancient Andes*. Gainesville: University Press of Florida.
Uhle, Max. 1903. *Pachacamac. Report of the William Pepper, M.D., LL.D., Peruvian expedition of 1896*. Philadelphia: University of Pennsylvania.
Watanabe, Shinya 2002. Wari y Cajamarca. Kaulicke, W. Isbell, Huari y Tiwanaku: Modelos y Evidencias. Primera parte. Boletín de Arqueología PUCP 4. Lima: Fondo Editorial de la Ponticia Universidad Católica del Perú, 531–541.
Williams, Patrick Ryan 2002. Rethinking disaster-induced collapse in the demise of the Andean highland states: Wari and Tiwanaku. *World Archaeology* 33 (3): 361–374.
Williams, P.R. 2001. Cerro Baúl: A Wari center on the Tiwanaku frontier. *Latin American Antiquity* 12 (1): 67–83.
Williams, P.R. 2006. Agricultural innovation, intensification, and sociopolitical development: The case of highland irrigation agriculture on the Pacific Andean watersheds. In *Agricultural Strategies*, ed. J. Marcus and C. Stanish, 309–333. Los Angeles: Cotsen Institute of Archaeology, UCLA.
Williams, P.R., and Donna Nash. 2016. Religious Ritual and Wari State Expansion. In *Ritual and Archaic States*, edited by Joanne M. A. Murphy. Gainesville: University Press of Florida. 131–156.
Williams, P.R., Laure Dussubieux, and J. Nash Donna. 2012. Provenance of Peruvian Wari obsidian: Comparing INAA, LA-ICP-MS, and portable XRF. In *Obsidian and ancient manufactured glasses*, ed. Ioannis Liritzis and Chris Stevenson, 75–96. Albuquerque: University of New Mexico Press.

Warwasi: Geography and Culture

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Introduction

The Warwasi rockshelter is situated in the Tang-i Knisht valley near Baktharan in western Iran. In the 1950s, the site was excavated by R. Braidwood (Braidwood and Howe 1960) who made a trench of 8 × 2 m to a depth of 5.60 m, and distinguished 30 layers. The finds from these excavations are stored in the Philadelphia University Museum, and were published only in the end of twentieth century (Fig. 1).

Key Issues/Current Debates/Future Directions/Examples

The sequence of layers from Warwasi comprised Middle and Early Upper Paleolithic layers: the Middle Paleolithic layers (ZZ-JJ) represented the Zagros Mousterian (Dibble and Holdaway 1990), whereas the Upper Paleolithic layers were typical for the Baradostian, described also as the "Zagros Aurignacian" (Olszewski 1999). The review of the materials carried out by M. Otte and J.K. Kozłowski allowed to put forward a hypothesis about the continuity of the Middle and the Upper Paleolithic layers at Warwasi – since layers LL-Y display transitional features in between the Mousterian and the Baradostian (Otte and Kozłowski 2007) (Figs. 2 and 3).

The layers ascribed to the Zagros type Mousterian are characterized by Levallois technique, besides bladelet production which increase in the sequence, a stable index of side-scrapers – also shaped using the Quina retouch – increasing proportion of Upper Paleolithic tool, and a low index of denticulated-notched tools. These features are typical of other Mousterian sites in the Zagros

Warwasi: Geography and Culture,
Fig. 1 Stratigraphic sequence of the Warwasi rockshelter

	Layer	Middle Palaeolithic (H.Dibble)	Upper Palaeolithic (D.Olszewski)	M. Otte & J.K Kozłowski
1	ZZ	Unit A		Zagros Mousterian
2	VV			
3	UU			
4	TT			
5	SS	Unit B		
6	QQ			
7	OO			
8	NN	Unit C		
9	LL			
10	KK			
11	JJ	Unit D		
12	II		Early Zagros Aurignacian	Transitional layers
13	HH			
14	GG			
15	FF			
16	EE			
17	DD			
18	CC			
19	AA			
20	Z		Late Zagros Aurignacian	
21	Y			
22	X			Baradostian "*sensu stricto*"
23	W			
24	V			
25	U			
26	T			
27	S			
28	R			
29	Q			
30	P			

Mountains such as Kundji, Shanidar, Hazaar Merd, and Bisitun; also in the publications of these sites, some differences may occur that result from the subjective classification by different authors.

Layers LL-Y show the co-occurrence of Middle and Upper Paleolithic components which indicates to their transitional nature. These layers correspond to the "Early Zagros Aurignacian" (layers LL-AA) according to D. Olszewski (Olszewski and Dibble 2006). The Middle Paleolithic elements in these layers are represented mainly by side-scrapers, Mousterian points, truncated-faceted pieces, and notched-denticulated tools, also by decreasing frequency of Levalloisian technique (up to layer FF) and the presence of discoidal core technique. The Upper Paleolithic features are, first of all, bladelet production, mainly from carenoidal cores/end-scrapers. These bladelets are,

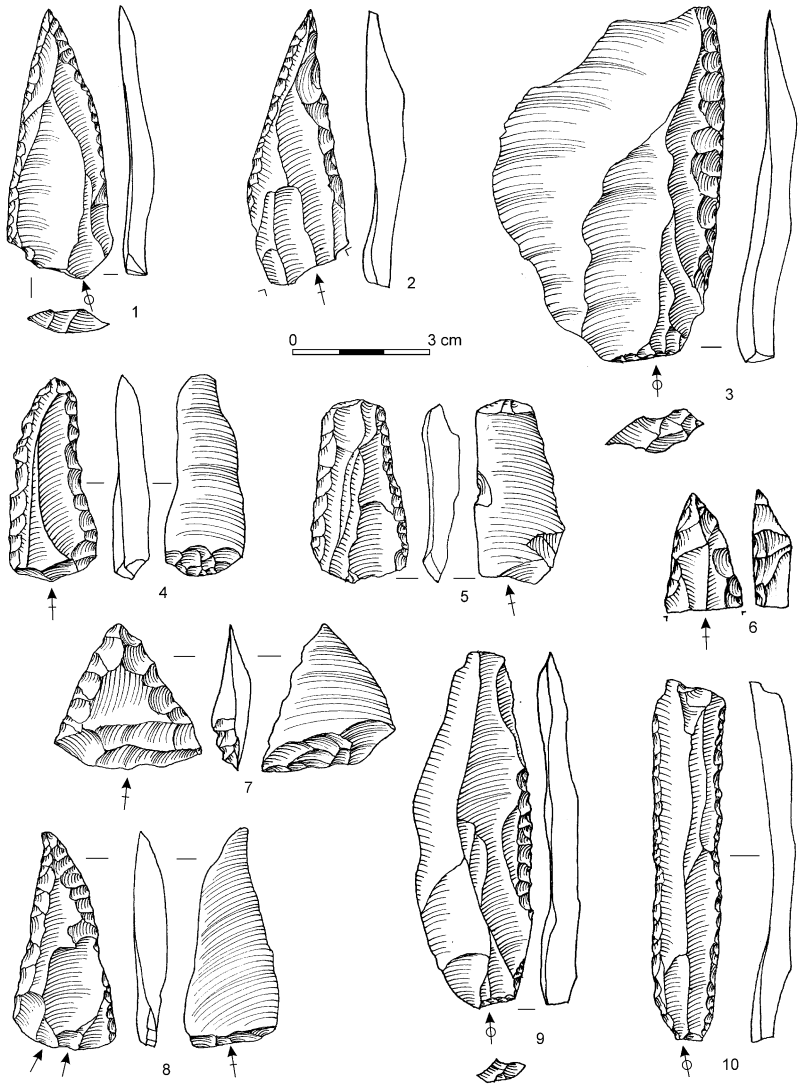

Warwasi: Geography and Culture, Fig. 2 Middle Paleolithic from Warwasi rockshelter, layer QQ: *1*, *2*, *4*, *6–8* – Mousterian points, *3* – side-scraper, *5* – truncated-faceted piece, *9*, *10* – retouched blades

frequently, with marginal retouches resembling lamelles Dufour or Arjenah points (Fig. 4).

In layers X-P the Middle Paleolithic elements vanish while blade and bladelet techniques remain. Bladelets with marginal retouches (Dufour, Krems, or Arjenah types), obtained from cores/polyhedral burins or carinated/nosed cores/end-scrapers, co-occur with blade end-scrapers and typical burins. These assemblages are typical for the Baradostian, described by D. Olszewski as the "Late Zagros Aurignacian."

The discussion around the sequence from Warwasi is related to the question of the origins of the Upper Paleolithic in southwestern Eurasia and the appearance of Modern Humans in this territory. The hypothesis about the continuity between the Zagros Mousterian and the Baradostian is either assumed to be an argument in support of the Central Asian origins of the Aurignacian (e.g., Otte 2004), or was criticized because the transitional layers in Warwasi could be nonhomogeneous. However, the recent investigations in the Yafteh Cave in Western Iran

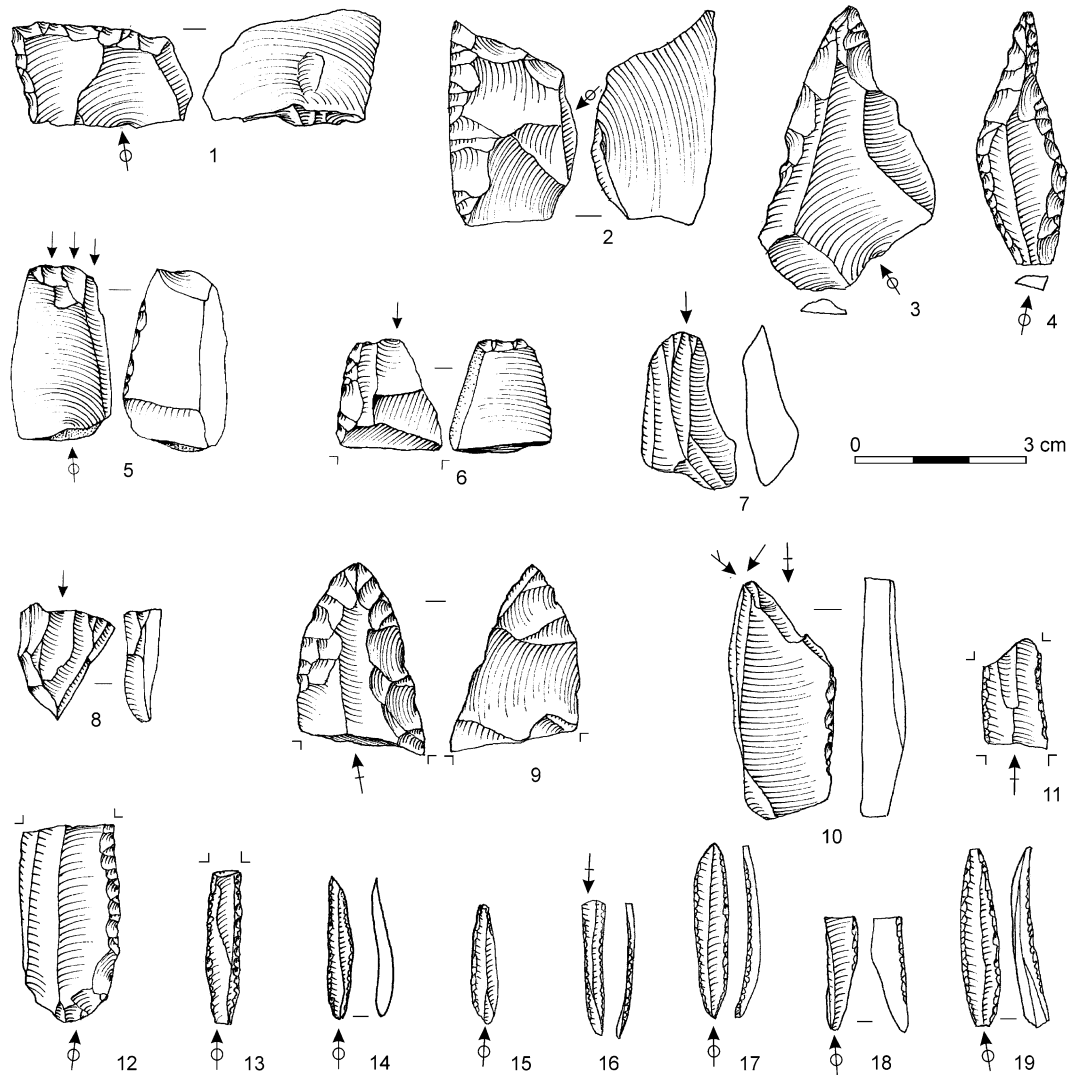

Warwasi: Geography and Culture, Fig. 3 Transitional Middle/Upper Paleolithic from Warwasi rockshelter, layer DD: *1*, *2* – side-scrapers, *3*, *4* – Mousterian points, *5*, *6* – truncated-faceted pieces, *7* – carinated core, *8* – single platform core for bladelets, *9* – carenoidal end-scraper, *10* – dihedral burin, *11*, *12* – retouched blades, *13–19* – retouched bladelets

(Otte et al. 2007) have provided arguments in favor of continuity of the Zagros type Mousterian and the Baradostian. An argument against the post-depositional mixing up of Middle and Upper Paleolithic occupations is the considerable thickness of the "transitional layers" at Warwasi (l.5–1.8 m) and the horizontal position of these layers which makes the mixing of finds at the interface of layers fairly unlikely.

Simultaneously, the fact that Aurignacian forms occur in the Baradostian, even fairly early (in the Yafteh Cave 40–29.4 Kyr BP and in Shanidar Cave 35.4–24.5 Kyr BP), does not necessarily point to the dominating role of the Baradostian in the origins of the Aurignacian in Western Eurasia – because equally early centers – Proto-Aurignacian in nature – are registered in the Near East (Kozłowski 2010). Also

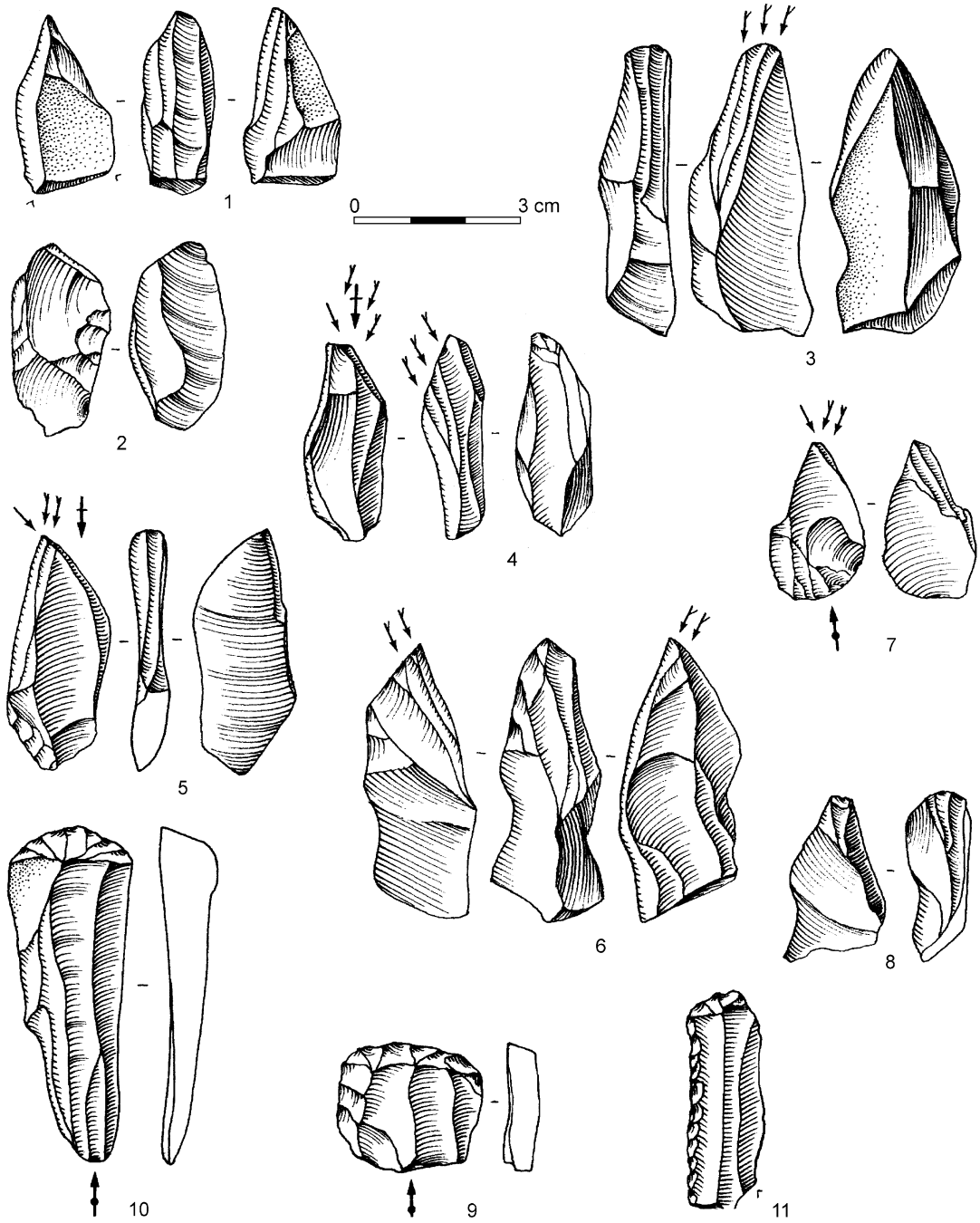

Warwasi: Geography and Culture, Fig. 4 Baradostian from Warwasi rockshelter, layer R: *1–8* – polyhedral burins/cores, *9*, *10* – end-scrapers on blades, *11* – retouched-truncated blade

questionable is the spread of the Aurignacian from Central Asia to Europe along a route that is alternative to the route via Anatolia and the Balkans, namely, to the north of the Caspian Sea, directly to the Russian Lowland (Dolukhanov 2008).

Cross-References

- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ European Middle Paleolithic: Geography and Culture
- ▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ *Homo sapiens*
- ▶ Kostenki: Geography and Culture
- ▶ Lithic Technology, Paleolithic
- ▶ Middle East Middle to Upper Paleolithic Transitional Industries

References

Braidwood, R.J., and R. Howe. 1960. *Prehistoric investigations in Iraqi Kurdistan*. Oriental Institute studies 31. Chicago: University of Chicago Press.

Dibble, H., and S.J. Holdaway. 1990. Le Paléolithique moyen de l'abri sous roche de Warwasi et ses relations avec le Moustérien de Zagros et du Levant. *L'Anthropologie* 94: 619–642.

Dolukhanov, P.M. 2008. Modern human's expansion in Eurasia: One flew east. *The Open Anthropology Journal* 1: 26–32.

Kozłowski, J.K. 2010. Biological vs. cultural differenciation at the Middle to Upper Palaeolithic transition. *Origini, New Series* 32: 27–52.

Olszewski, D.I. 1999. The Early Upper Palaeolithic in the Zagros mountains. In *Dorothy Garrod and the progress in the Palaeolithic*, ed. W. Davies and R. Charles, 167–180. Oxford: Oxbow Books.

Olszewski, D.I., and H. Dibble. 2006. To be or not to be Aurignacian: Zagros Upper Palaeolithic. In *Towards a definition of the Aurignacian*. Trabalhos de Arquelogia 45, ed. O. Bar-Yosef, and J. Zilhao, 355–73. Lisbon: American School of Prehistoric Research/Instituto Português de Arqueologia.

Otte, M. 2004. The Aurignacian in Asia. In *The early Upper Palaeolithic beyond western Europe*, ed. P.J. Brantingham, S.L. Kuhn, and K.W. Kerry, 144–150. Berkeley: University of California Press.

Otte, M., and J.K. Kozłowski. 2007. *L'Aurignacien du Zagros*. ERAUL 118. Liege: Université de Liège.

Otte, M., F. Biglari, D. Flas, S. Shidrang, N. Zwyns, M. Mashkour, R. Naderi, A. Mohaseb, N. Hashemi, J. Darvish, and V. Radu. 2007. The Aurignacian in the Zagros region: new research in the Yafteh Cave, Lorestan, Iran. *Antiquity* 81: 82–96.

Water Buffalo: Domestication

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Basic Species Information

The genus *Bubalus* was widely distributed in Europe and Southern Asia in the Pleistocene, but later was restricted to the Indian subcontinent and Southeast Asia (Mason 1974). In historical times, the wild Asian buffalo (*Bubalus arnee*, Kerr 1792) ranged across South and Southeast Asia from Mesopotamia to Indochina. It is currently listed as endangered, with a world population fewer than 4000, potentially fewer than 200, and it is even possible that no purebred wild animals exist (http://www.iucnredlist.org/apps/redlist/details/3129/0). Domestic water buffalo (*B. bubalis*) have been classified on morphological and behavioral criteria into two types: river and swamp (MacGregor 1941). Some have referred to these as separate subspecies, naming river buffalo *B. bubalis bubalis* and swamp buffalo *B. bubalis carabanesis*. Morphologically, the swamp buffalo (Fig. 1) is gray with white chevron (one or two white stripes on the throat), socks and tip of tail, and relatively straight pale-colored horns, while the river buffalo (Fig. 2) has a black body without white markings and generally curved horns. The two types are now well known to be genetically distinct, based on chromosome number (swamp $2n = 48$, river $2n = 50$) and allozyme and microsatellite genotype frequencies (Zhang et al. 2011). Swamp buffaloes are mostly phenotypically homogenous throughout their distribution. There are no recognized breeds and they are used for draught and meat. There are a number of specialized breeds of river buffalo, however, which are primarily used for milk production. Traditional (true) mozzarella cheese, originating in Italy, is made only from river buffalo milk, and its flavor is highly prized.

Water Buffalo: Domestication, Fig. 1 Swamp buffalo (©FAO/K. Pratt)

Water Buffalo: Domestication, Fig. 2 River buffalo. (Image provided by Dr. Rakesh Kumar Pundir. (From http://www.fao.org/dadis/))

One exception to the morphological distinction of the two types is the native buffalo of Sri Lanka. Although phenotypically resembling the swamp type, they have a chromosome number of $2n = 50$ and phylogenetically cluster strongly with river-type populations (Barker et al. 1997). They likely represent the type of buffalo from which the present breeds of river buffalo were derived.

The world population in 2014 was reported (http://faostat.fao.org) as 218 million in 44 countries, although this did not distinguish between numbers of the two types. More people in the world depend on this species than on any other domestic animal species (FAO 2000). The river type is native to the Indian subcontinent, but has spread west to the Balkans, Greece, Italy, and Egypt within historical times, while the swamp type occurs throughout Southeast Asia, from Nepal, Assam, and Bangladesh in the west to the Yangtze valley of China. The geographical ranges of the two types

overlap in Eastern India (Assam) and Bangladesh and possibly also in Myanmar. The two types will hybridize, but natural mating is more successful when the animals have been raised together. First-generation hybrids ($2n = 49$) are fertile, and limited data indicate normal chromosome segregation in backcrosses and F2 animals (Cooper 1991). However, $2n = 49$ bulls in all generations show increased sperm abnormalities as compared with purebred river or swamp, suggesting reduced fertility. Some swamp buffalo populations in Australia, China, and the Philippines are being upgraded for milk production by backcrossing to river buffalo bulls.

Archaeological, anatomical, and historical evidence supports the contention that both river and swamp buffalo are descended from *B. arnee*, although the swamp type is morphologically more similar to *B. arnee* than is the river type. Recent mtDNA analysis of one *B. arnee* animal from Thailand showed ancestry to both river and swamp types, but a much closer relationship to the latter (Sarataphan et al. 2017). The time of divergence of the two types (i.e., origin of the $2n = 48$ karyotype from the putative $2n = 50$ karyotype of *B. arnee*) has been estimated in various studies as from at least 10,000 years ago to 1.7 Mya, but probably around 128,000–270,000 years ago. Even given this uncertainty, divergence occurred well before domestication (Zhang et al. 2011).

Genetic evidence clearly points to independent domestication of the two types. Cockrill (1981) stated that the river buffalo was first domesticated about 4000–5000 years ago in the riverine civilizations of the Euphrates and Tigris, and the Indus, but recent studies have concluded that the most likely area where this took place is the western region of the Indian subcontinent (Kumar et al. 2007). In contrast, the time and place of domestication of the swamp type is uncertain and subject to debate. Cockrill (1981) suggested that the swamp buffalo was domesticated in the Yangtze valley, also about 4000–5000 years ago. However, there is no evidence that the endemic distribution of *B. arnee* included Central China, and archaeological and genetic studies of Chinese buffalo do not support domestication in China. Groves (2006) noted that the oldest putative domestic buffaloes come from Neolithic sites (4500–6000 BCE) in Southern China, and archaeological findings at Ban Chiang, northeastern Thailand, show that water buffalo were already domesticated there by around 600 years BCE. Molecular genetic data (Zhang et al. 2016) indicate that the domestication center for swamp buffalo was in the China/Indochina border region. Following domestication in this region, it spread south through peninsular Malaysia to the islands of Indonesia (Sumatra, Java, and Sulawesi), north/northeast into Central China, and then through an eastern island route via Taiwan to the Philippines and Borneo.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-environmental Contexts
- ▶ Cattle: Domestication and Development
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Yak: Domestication

References

Barker, J.S.F., S.S. Moore, D.J.S. Hetzel, D. Evans, S.G. Tan, and K. Byrne. 1997. Genetic diversity of Asian water buffalo (*Bubalus bubalis*): Microsatellite variation and a comparison with protein-coding loci. *Animal Genetics* 28: 103–115.

Cockrill, W.R. 1981. The water buffalo: A review. *British Veterinary Journal* 137: 8–16.

Cooper, D.W. 1991. Cytogenetic aspects of crossbreeding river and swamp buffalo. In *Buffalo and goats in Asia: Genetic diversity and its application*, ACIAR proceedings 34, ed. N.M. Tulloh, 48–52. Proceedings of a workshop, Kuala Lumpur, Australian Centre for International Agricultural Research. Canberra, A.C.T. 2601, Australia. 10–14 Feb 1991.

FAO. 2000. *World watch list for domestic animal diversity.* 3rd ed. Rome: Food and Agriculture Organization of the United Nations.

Groves, C.P. 2006. Domesticated and commensal mammals of Austronesia and their histories. In *The Austronesians historical and comparative perspectives*, ed. P. Bellwood, J.J. Fox, and D. Tryon, 161–173. Canberra: ANU EPress. Available at http://www.epress.anu.edu.au?p=69411.

Kerr, R. 1792. Class I. Mammalia: containing a complete Systematic Description, Arrangement, and Nomenclature, of all the known Species and Varieties of the Mammalia, or Animals which give suck to their young. Anim. Kingdom. A. Strahan and T. Cadell, London; and W. Creech, Edinburgh, (Feb) 1792: 27 unno. pp. [33]–400.

Kumar, S., M. Nagarajan, J.S. Sandhu, N. Kumar, and V. Behl. 2007. Phylogeography and domestication of Indian river buffalo. *BMC Evolutionary Biology* 7: 186.
MacGregor, R. 1941. The domestic buffalo. *Veterinary Record* 53: 443–450.
Mason, I.L. 1974. Species, types and breeds. In *The husbandry and health of the domestic buffalo*, ed. W.R. Cockrill, 1–47. Rome: Food and Agriculture Organization of the United Nations.
Sarataphan, N., W. Narongwanichgarn and S. Maneerat. 2017. Phylogenetic analysis of a Thai wild water buffalo (Bubalus arnee) through mitochondrial control region. International Journal of Conservation Science 8: 105–112.
Zhang, Y., D. Vankan, Y. Zhang and J.S.F. Barker. 2011. Genetic differentiation of water buffalo (*Bubalus bubalis*) populations in China, Nepal and south-east Asia: Inferences on the region of domestication of the swamp buffalo. *Animal Genetics* 42: 366–377.
Zhang, Y., Y. Lu, M. Yindee, K.-Y. Li, H.-Y. Kuo, Y.-T. Ju, S. Ye, O. Faruque, Q. Li, Y. Wang, V.C. Cuong, L.D. Pham, B. Bouahom, B. Yang, X. Liang, Z. Cai, D. Vankan, W. Manatchaiworakul, N. Kowlim, S. Duangchantrasiri, W. Wajjwalku, B. Colenbrander, Y. Zhang, P. Beerli, J.A. Lenstra, and J.S.F. Barker. 2016. Strong and stable geographic differentiation of swamp buffalo maternal and paternal lineages indicates domestication in the China/Indochina border region. *Molecular Ecology* 25: 1530–1550.

Further Reading

Cockrill, W.R., ed. 1974. *The husbandry and health of the domestic buffalo*. Rome: Food and Agriculture Organization of the United Nations.
Cockrill, W.R. 1976. *The buffaloes of China*. Rome: Food and Agriculture Organization of the United Nations.
NRC. 1981. *The water buffalo: New prospects for an underutilized animal*. Washington, DC: National Academy Press.

Waterlogged Finds: Conservation

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Introduction

Archaeological conservation is an ever-evolving discipline, which traditionally developed to preserve finds removed from their burial environment. Methods used have their roots in the nineteenth century. Today, possible conservation strategies are conservation ex situ, reburial, active conservation in situ, and passive conservation in situ. The purpose of this section is to introduce concepts, challenges, and changes in relation to conservation of waterlogged finds.

Definition

The conservation of waterlogged finds is defined as activity intended to prolong the existence of water-saturated physical remains that are archaeologically significant and undertaken with respect for the integrity of the remains.

Finds

Finds are physical remains of the past that archaeologists investigate to understand our ancestors. A find may be made of organic, inorganic, or metal materials. Organic materials are carbon based. They include animal-derived materials, for example, as leather, wool, and bone, and materials derived from plants, for example, wood and fibers. Inorganic finds are silica-based materials such as ceramics, glass, and lithics. Metals are conductive and usually highly oxidative, for example, iron, copper and tin, lead, silver and gold, and their various alloys. Finds can range from buildings and shipwrecks to grave goods, to human remains, to pieces of rubbish.

Waterlogged

Webster's dictionary defines waterlogged as "excessively saturated with. . .water." Finds in a waterlogged environment, on land or underwater, may or may not be waterlogged. The degree to which a find is waterlogged depends primarily on its porosity and hygroscopicity, which in turn can depend on its degree of degradation. Waterlogged wood is defined as having the entire pore spaces filled with water (Jordan 2001: 47; Jensen and Gregory 2006). On land, a find in a context below the water table is likely to be waterlogged. Such contexts may be in places that are natural (e.g., wetlands) or man-made (e.g., waterfronts, wells, ditches, storage pits, or graves). Underwater (as at the bottom of rivers, lakes, or the sea) a

find may be in the water column and/or buried under sediment (Gregory et al. 2012).

The effect of a particular environment on a find depends on varied and complex interactions between the material and its physical and biogeochemical environment. Characteristics defining depositional environments include water and oxygen content, hydrogen-ion concentration (pH), redox potential (Eh), presence of ion species, macro- and microbial activity, temperature, and salinity. Levels of water and oxygen are key factors determining the decay or preservation of a find. If either is limited then finds, particularly organic ones, may be well preserved. In an anoxic waterlogged environment, finds, particularly organic materials, may survive thousands of years. The presence of water, however, leads to dissolution, hydrolysis, or electrochemical corrosion depending on the material. A find may reach a state of equilibrium with the environment such that its rate of decay is minimal. Finds recovered from waterlogged burial environments may appear to be in a good condition but they may not be physically, chemically, or structurally sound (Cronyn 1990; Jordan 2001; Björdal 2012).

Conservation

Webster's dictionary defines conservation as the "act of conserving, preventing injury, decay, waste or loss" and also the "official supervision of [natural] resources in order to preserve and protect them through prudent management." Conservation of finds traditionally developed to preserve objects removed from their burial environment and to "discover the true nature of the original artifact," thereby contributing to present and future archaeological process (Cronyn 1990: 4). Conservation of finds has been described as "An operation aiming above all to prolong the life of an object by preventing, for a more or less long period of time, its natural or accidental deterioration" (Berducou 1990). Fundamental to conservation is preservation of the *integrity*, or true nature, of the object through the application of science (Clavir 1998). The integrity of a find can be cultural, scientific, aesthetic, religious, historic, and material (Kapelouzou 2012: 180).

Conservation activities, including examination, analysis, cleaning, stabilizing, repair, restoration, recording, documenting, and dissemination of information, are variously applied to gain information from finds while preventing decay and damage. International and national shared guidelines for practice and codes of ethics guide the conservation of finds as a professional discipline. Conservation is rooted in foundations of respect and uniqueness from which arise principles of minimum intervention and treatment reversibility (Kapelouzou 2012: 172–182).

Waterlogged organic finds and metals pose great challenges for conservation, organics because of their susceptibility to biodegradation and structural change, and metals to corrosion. Inorganics are, in comparison, relatively stable materials (Cronyn 1990). Challenges to conserving waterlogged finds ex situ (i.e., removed from a waterlogged environment) are deterioration due to a change in the environment, biodeterioration during wet storage, distortion due to water removal, discovery of "true identity," and long-term stability.

Historical Background

In the nineteenth century, scientific conservation of waterlogged finds began with the need to treat finds from land-based archaeology. In Denmark, from the 1830s, it was recognized that organic and metal finds recovered from waterlogged sites needed treatment to prevent their loss following recovery. Staff at the National Museum in Copenhagen quickly realized that waterlogged organic finds must be kept wet even before treatment began and that water with which wood was permeated needed to be replaced with a different material, a consolidant, in order to prevent disintegration of the find (Christensen 1970: 12–14). In 1859, it was found that boiling wood objects in alum (aluminum potassium sulfate) produced good results (Madsen et al. 2001: 37). Until 1958, alum was used at the National Museum in Denmark to conserve some 100,000 finds (Unger et al. 2001: 373). The use of alum to conserve waterlogged wood was quickly adopted in other

countries to treat large and small objects. In Norway it was used to treat parts the *Oseberg* ship, in the early 1900s (Unger et al. 2001: 374).

By the end of the nineteenth century, German and Norwegian chemists had identified the need to remove soluble chlorides from iron objects to prevent corrosion post excavation. Various treatments were developed to remove chlorides from iron by electrochemical and electrolytic reduction and heat treatments (Mardikian et al. 2010). The problems that soluble salts cause for inorganic finds, particularly ceramics, were also realized as huge numbers of finds began arriving at National Museums in Germany and Britain, from excavations of salt-rich land sites in Mediterranean and Middle Eastern countries (Watkins and Scott 2001). In the 1880s, at the Berlin Royal Museums, a chemical laboratory to research conservation treatments including desalination of ceramics, electrolytic reduction treatments for metals, and consolidation of organics was established under Friedrich Rathgen, the "Father of Archaeological Conservation" (Gilberg 1987). By the early 1920s, a research laboratory under Alexander Scott was established at the British Museum to understand deterioration and develop treatments for objects in the museum's collection. Scott was succeeded by Harold Plenderleith whose book, written with A.E.A Werner, *The Conservation of Antiquities and Works of Art: Treatment, Repair and Restoration*, published in 1956, and revised 1971, was for a long time the standard reference for treatments, including those of waterlogged finds.

From the 1950s, technological developments enabled, and increasingly expanded, access to finds underwater, including those in marine environments (Pearson 1987; Jones 2003). For these finds, conservation challenges include the removal or deactivation of soluble salts, particularly chlorides, from all materials; consolidation and drying of large organic finds, such as ships, as well as their contents; and extraction of finds from concretions. In some environments, finds are encased in concretions of calcium carbonate, shells, sand, and corrosion, within which iron finds may have completely corroded leaving voids. Discovery, excavation, and recovery of large finds, particularly ships such as *Vasa* (Sweden), *Mary Rose* (UK), the Bremen Cog (Germany), *Batavia*, and *Xantho* (Australia), during the 1960s through 1980s, led to further refinement, adaptation, and development of conservation treatments for waterlogged finds from marine environments (Pearson 1987; Jones 2003).

By the 1930s, it was already apparent that alum was not ideal (Unger et al. 2001: 382). Polyethylene glycol (PEG) as a consolidant for wood was introduced in Sweden in the early 1950s and taken up by the National Museum in Denmark following experiments in the late 1950s and early 1960s to find a treatment for five Viking-period ships (Christensen 1970). PEG has been used since to conserve most waterlogged wood finds, including *Vasa*, *Mary Rose*, and Bremen Cog. Other consolidants (e.g., ethylene glycol, glycerol, sugars, resins, silicone oils, and Kauramin), application methods (e.g., immersion, spraying), mediums (e.g., water and organic solvents), and drying methods (e.g., air-drying, freeze-drying, solvent drying) have been tried and tested (Unger et al. 2001: 363–496). The efficacy of these treatments is generally compared to that of PEG.

Mitigating the corrosion by chlorides of waterlogged metals has been a continuing quest since the nineteenth century. The problem of stabilizing copper alloys was essentially resolved in the mid-1960s with the use of benzotriazole (BTA) (Madsen 1967). No universal chloride-removal treatment, however, has yet been found for iron (Mardikian et al. 2010: 92). Early methods involved stripping off corrosion products to bare metal. Since, however, the original surface of an iron or copper alloy find is likely within the corrosion layer, following the principle of integrity requires that corrosion products as well any remaining underlying metal must be stabilized (Cronyn 1990). Research continues to characterize and understand corrosion mechanisms in order to optimize treatment methods. Treatment methods generally seek to stabilize metals by either removing, deactivating, or inhibiting the effects of chlorides. Some methods to remove chlorides involve reduction (by electrolytic,

electrochemical, or thermal means) of corrosion products to facilitate release of chloride ions. Other methods aim to inhibit their effects through control of the ambient environment to remove water and/or oxygen (Mardikian et al. 2010: 89–95).

Recovery and treatment of spectacular finds in the 1960s and 1970s led to the development of ex situ conservation methods. Through the 1990s, however, it became apparent that only a small fraction of finds in waterlogged environments, on land or underwater, could ever be excavated, let alone recovered, and treated with resources available. Instead preservation in situ – by reburial or leaving in place – has become the first, for some the preferred, conservation option rather than recovery and treatment ex situ. This approach is embodied in UNESCO's 2001 *Convention for the Protection of Underwater Cultural Heritage* (Manders 2008). With increasing pressure to leave archaeological remains in situ, conservation research and practice has expanded to include better understanding of physical and chemical aspects of burial environments as well as their effects on archaeological materials, how to monitor environments without changing them, and to determine if preservation in situ can be a reality as well as an aspiration (Corfield et al. 1997; Holden et al. 2006; Caple 2008).

Postwar urban development, in Europe and Scandinavia in the 1960s and 1970s, increasingly threatened archaeological contexts below the water table on land sites. Archaeological conservation labs were established in universities, museums, and archaeology units to treat the influx of archaeological materials, especially organic finds of wood and leather, from "rescue archaeology" preceding development in cities, including London and York in Britain and Trondheim in Norway. Since 1970, archaeological conservation has evolved as an increasingly specialized profession. Courses and programs, including B.S., M.S., and Ph.D. programs, have been established, for example, in the UK, Denmark, Canada, and the USA (Sease 1996). Unifying professional codes of practice and ethics have been agreed (Kapelouzou 2012). The development of conservation of waterlogged finds can be followed in professional journals and conference proceedings, particularly the International Institute of Conservation (IIC) journal *Studies in Conservation* (since the 1950s), journals such as *Journal of Archaeological Science* and *Journal of Cultural Heritage*, and the triennial conference proceedings of the International Council of Museums Conservation Committee (ICOM-CC) working groups for wet organic archaeological materials and for metals (since the late 1970s).

Key Issues and Current Debates

Current interests include pre- and post-conservation storage and display, effectiveness of treatment methods, retreatment, reburial, in situ preservation, and the scope of archaeological conservation (Caple 2008; Williams and Peachey 2010; Mardikian et al. 2011; Straetkvern and Williams 2012). The goal of conservation is minimal or no change to the find. This requires attaining and maintaining the find in equilibrium with its environment. Conserving a waterlogged find involves suiting the condition of the find to fit the environment or suit the environmental conditions to the find. Conservation options are conservation ex situ, reburial, active conservation in situ, or passive conservation in situ.

Conservation ex situ involves treating the find removed from its archaeological context.

Conservation can be a decades-long process, requiring researching appropriate methods and materials, gathering resources (e.g., funding, staff, facilities, materials, and equipment), and treating the finds. Finds must be kept wet until treated and dried, thus presenting problems of biodegradation of organics and corrosion of metals. Options for preventing biodegradation of organics include use of biocides, filtration, ultraviolet radiation, chilling, anoxic conditions, and high humidity (rather than immersion) (Jones 2003; Straetkvern and Williams 2012: 181–183). For metals, particularly iron, conservation options include electrolytic and/or storage in alkaline solutions (Pearson 1987; Mardikian et al. 2010: 89–95). Recently, display aquariums are being investigated to keep finds accessible and visible

for archaeologists and the public during wet storage and treatment (Björdal et al. 2009).

The ideal consolidant for the conservation of organics would be long lasting, give dimensional stability, not alter appearance, not cause shrinkage or swelling, be compatible with preservatives, allow post treatment repairs, penetrate the structure, be nontoxic, be nonflammable, resist insects and fungi, and be reversible (Unger et al. 2001: 363–364). For some projects (e.g., *Vasa*), PEG remains the best option in terms of reliability, repeatability, ease of use and economy (Hocker et al. 2012). Even so alternative consolidants are being sought that are specific to the find, either previously treated (e.g., Oseberg ship) or recently recovered (e.g., Roman ships in Italy) (Giachi et al. 2011; Christensen et al. 2012).

Conservation of iron remains an intractable problem. Research is focusing on characterizing iron corrosion post excavation to determine and clarify the role of chlorides, as well as how best to remove or deactivate them (Rimmer et al. 2012). Some projects continue with refinements of traditional treatments (e.g., electrolytic reduction and desalination via soaking in alkaline solutions). Others are experimenting with new methods, for example, the use of subcritical fluids (e.g., Mardikian et al. 2011: 39–49). Instead of removing chlorides, other projects are relying on removal of another of the agents of corrosion – water – through storage or display in very dry relative humidity to prevent corrosion (Williams and Peachey 2010: 187–200).

Reburial – following excavation, recovery and recording ex situ – allows finds to be kept in the same or similar waterlogged environment.

In an early (1985) reburial, timbers from sixteenth century Basque whaling ships were placed within a cofferdam constructed at the excavation site in Red Bay, Canada. The timbers were buried beneath sand, rock, and silt bags. Monitoring of the site in 1986, 1988, and 1992 found that an anaerobic reducing environment had been achieved; thus, preservation was presumed (Waddell 2007: 149–153).

In 2002, approximately 9,000 finds from *Fredericus* (1719) were reburied in Marstrand Harbor, Sweden, in trenches and covered by at least 50 cm of sand and clay (Gregory et al. 2012). Findings from the RAAR (Reburial and Analyses of Archaeological Remains) project, started in 2001, indicate that reburial of materials in Marstrand Harbor may be a long-term option only for large wood timbers. From examination of materials after 7 years, reburial is not recommended at all for iron, low-fired earthenware, glass, plant fiber, or horn; and up to 7 years might be considered for tanned leather, animal bone, and antler. The feasibility of longer reburial for copper alloy (bronze), medium- to high-fired ceramics, and wood is an ongoing study. Long-term survival of packing materials and labeling materials is also being tested. Polyethylene-based packing materials, graphite pencils, and permanent marker ink have survived well so far. Optimal burial depth is location specific with many contributing factors including sediment type, porosity, and organic content (Straetkvern and Williams 2012: 23–48). Continuous monitoring needs to be part of reburial strategy in line with curation of archaeological archives in repositories ex situ. Reburial removes finds from their original contexts hence the importance of cataloguing, recording, and labeling pieces.

Active conservation in situ – following excavation or survey and recording – keeps the find in its archaeological context, under active control of its condition and/or the environment to maintain equilibrium between the find and its environment.

Underwater finds, such as shipwrecks, may be physically covered, with or without their contents to provide physical protection and an anoxic environment through covering with sufficient layers of, for example, sandbags, rock, and/or devices, such as artificial sea grasses or netting, to promote sedimentation at the site (Gregory et al. 2012). In addition, rates of corrosion may be reduced through attachment of sacrificial anodes to an iron find in situ. The success of conservation in situ of large iron finds, such as vessels, cannon, and anchors, depends on monitoring through in situ corrosion measurements (MacCleod 2002: 697–714; 2005: 310–316).

On land, re-covering waterlogged finds may also involve physical covering with soil, clay,

aggregates, concrete, and/or geotextiles, to mitigate the effects of development, particularly construction work in urban sites, where finds are below the water table. Provision for continued monitoring should also be part of the mitigation strategy (Caple 2008: 216; Gregory et al. 2012). Physical protection to isolate a find does not necessarily prevent its decay – for example, the materials used may change the local chemistry at the site and/or change the hydrological conditions, with consequent deterioration of finds (Davies 2009: 56–57). Characterization of the burial environment, determination of threats (physical, chemical, biological, and/or sociological) to the find and of the condition of the find, should be made to determine measures needed to mitigate decay of the find.

Passive conservation in situ – the find may or may not be excavated, surveyed, or recorded but is left in its archaeological context – involves the natural burial environment and natural processes being relied on to maintain waterlogged conditions and to continue to preserve the find.

Relative to the number of finds that remain in waterlogged environments on land and underwater, resources are so insufficient that it is inevitable that most finds will be left, unattended or modified, in situ, where, it is hoped, the environment remains unchanged and will not present a physical, chemical, or biological threat to them (Manders 2008). Unfortunately, as more investigation and monitoring are done, it is clear that no change to a burial environment or the archaeological remains within can be guaranteed.

Research in Scandinavia and England suggests that the corrosion rate of iron and copper alloys still in the ground is increasing due to air pollution, climate, and hydrological changes. In England, all ancient monuments in 1945 contained an estimated four billion iron and copper objects. Over 50 years to 1995, an estimated 14 million were lost per year due to site loss or damage, with an additional 5 million lost due to corrosion. (Caple 2008: 215). For waterlogged land sites, not only is maintenance of groundwater levels crucial but also its level of contamination and degree of oxygenation. Hydrological changes at a site may be a consequence of changes in land use, climate change, and sea-level change occurring many miles from the site (Davies 2009: 15–16). For effective preservation in situ, monitoring of a site within its environment, not just of the environment of the site, is essential (Holden et al. 2006: 61).

Underwater, environments presumed to provide preservation of finds are also changing with consequent acceleration of decay of finds. For example, wood-destroying shipworms are appearing in the deep cold waters of the Baltic Sea (Straetkvern and Williams 2012: 9–14). "Preservation in situ" is potentially misleading since research indicates that while finds remain buried, not all are being preserved – the rate of decay may simply be slower than it might be if they were at the surface (Caple 2008: 215). Continuing corrosion and decay of large iron shipwrecks, such as USS *Arizona*, may lead to collapse of hulls, loss of remains, disturbance of grave sites, and pollution (e.g., release of fuel) (Mardikian et al. 2011: 400–408).

Changing the Scope and Concept of Archaeological Conservation?

Archaeological conservation traditionally developed to preserve finds removed from their burial environment. To prolong the integrity of finds, conservators sought to attain a situation of minimal or no change (Cronyn 1990; Kapelouzou 2012). Since the 1990s, preservation in situ and reburial have increasingly become alternative conservation options to recovery and treatment ex situ. Research and observation, however, indicate that neither leaving nor reburying finds in a waterlogged environment prevents change in condition.

Most training courses for archaeological conservators focus on treatment of individual objects and care of museum collections. Should the remit and scope of archaeological conservators now be extended to include preservation of finds in situ? Should conservation education and training expand to include additional knowledge and associated skills (e.g., in hydrology, geological sciences, engineering, land management) with

understanding and awareness of moral judgments concerning economic impacts of changing land use, the effects of natural habitats on wildlife, and ethical implications of taking actions to preserve objects which cannot be seen (Caple 2008: 216).

Such an expansion of scope also raises the question of reexamining concepts that have defined archaeological conservation since the 1970s, including to what extent can principles developed for conservation of finds ex situ be applicable for finds in situ? To what degree is it possible, or reasonable, to control change of the environment and or the find if it is left in situ? Does prolonging the existence of an object necessarily mean no change? For how long is a find's existence to be prolonged? Does the definition of archaeological conservation need to be altered to embrace the inevitability of change? For example, English Heritage's definition of conservation of the historic environment; "the process of managing change to a significant place in its setting in ways that will best sustain its heritage values, while recognizing opportunities to reveal or reinforce those values for present and future generations" (English Heritage 2008: 7).

International Perspectives

Since the establishment of the ICOM-CC working groups for wet organic archaeological materials and metals in the mid-1970s, conservation of waterlogged finds has become an international practice. For example, by the mid-1980s, over 450 papers and reports from 30 countries on waterlogged wood had been published (Jones 2003: 6). The published proceedings include transcripts of discussions that provide additional insight into issues, debate, and controversy over the years. The evolution of conservation research and practice can be followed, in which projects increasingly involve collaborators from different countries. Current international perspectives on conservation of waterlogged finds appear in the 2010 conference proceedings for ICOM-CC WOAM and are summarized below (Straetkvern and Williams 2012) and for ICOM-CC Metals (Mardikian et al. 2011).

Researchers in various countries collaborate to undertake and contribute to the conservation of waterlogged finds from land and underwater sites, including research into new conservation materials and methods, assessing effectiveness of traditional treatments, and contributing expertise and experience gained to other nation's projects. For example, conservators from Norway, Sweden, and Denmark are investigating retreatment of alum-consolidated wood, including the *Oseberg* ship. Investigations and research to understand and improve the condition of *Vasa*, in Sweden, include researchers from Denmark (National Museum), the United Kingdom (Mary Rose Trust), the USA (Texas A&M), and Australia (Western Australian Museum). Relatively new projects started since the 1990s may include advisory panels drawing on international expertise – for example, the Newport Ship (Wales), in the USA *Hunley* and *Monitor* conservation projects, and the Yenikapi ships in Turkey.

The search for the ideal consolidant for waterlogged wood continues at centers in several countries; for example, in France (Arc-Nucleart in Grenoble) and Australia (Western Australian Museum, WAM), testing use of azelaic acid; in Japan (Toyo Feather Industry Co. Ltd., and Kyoto University) and Australia (WAM), use of feather-derived keratin; and in Canada (Canadian Conservation Institute, CCI), different types of PEG, and in the USA, Texas A&M has pioneered the use of alkoxysilanes or silicone oils. The presence of sulfur and/or of iron in wood affects the penetration of consolidants and their long-term stability. Researchers in Australia (WAM) and Sweden are seeking to improve wood consolidation by researching methods to remove iron from wood. Extraction of sulfur from wood is being investigated in France (Arc-Nucleart). In England, the Mary Rose Trust and University of Canterbury as a treatment method for Mary Rose timbers are researching sulfur deacidification with nanoparticles of strontium carbonate (Straetkvern and Williams 2012: 419–424).

Removal or deactivation of chlorides in iron finds continues as a research focus in the UK and

the USA. At Cardiff University, Wales, conservators and scientists have been researching and evaluating methods of chloride extraction for over 30 years. Collaborative research projects now include conservators at the British Museum and English Heritage. In the USA, conservators and scientists at the Warren Lasch Conservation Lab and Clemson University are investigating stabilization options for *Hunley* submarine hull, including use of subcritical drying fluids.

International collaborative projects are investigating aspects of preservation in situ –including characterizing burial environments, understanding the decay of materials, and mitigation strategies to inhibit change, in waterlogged environments on land and underwater. The RAAR project, based in Sweden, includes researchers from Denmark (National Museum) and Australia (WAM). Scientists and conservators at WAM pioneered in situ corrosion monitoring and use of sacrificial anodes, for conservation management of iron ships and artifacts still underwater, and provided advice and expertise to projects worldwide (MacCleod 2002: 697–714; 2005: 310–316).

Future Directions

Conservation is an ever-evolving discipline. As examination techniques and available expertise improve, particularly in understanding the evidence that may be preserved and retrievable, conservators are better able to understand the short- and long-term effects of treatments. Feedback from dissemination of findings and constant review, particularly as conservation research deepens understanding of how materials deteriorate in different environments and effects and effectiveness of treatments, should lead to continuous evaluation and reassessment of methods and treatments used.

Conservation of archaeological finds traditionally developed to preserve finds removed from their burial environment. Research needs to continue to improve old methods and develop new methods for treatment of finds ex situ. Since the 1990s, preservation in situ and reburial have become alternative options to treatment ex situ. Preservation in situ is still a nascent discipline; more work is needed to ensure this option combines understanding of the environment, the find and processes of deteriorations, with a commitment to continuous monitoring (Gregory et al. 2012). With increasing single-site data and multi-site data synthesis, prediction modeling may help inform decisions as to the best conservation option for a particular find, whether to conserve ex situ or in situ. Technological advances for imaging sites and finds are not only providing opportunity to better record and share information about finds and their condition but may also provide another conservation option – that of virtual conservation. A find may or may not be recovered, but it is recorded such that it continues to have a "virtual" existence, even if its remains are abandoned, discarded, and lost. In deciding future options for conserving waterlogged finds, it needs to be determined whether maintaining constant condition or managing change is the ultimate goal. If the definition of archaeological conservation is altered, underlying principles including those of reversibility and minimum intervention may also need to be reframed.

Conservation has become a profession guided by unifying codes of practice and ethics (Kapelouzou 2012). Conservation of waterlogged finds, however, is not an activity that can be done in isolation – conservators are part of the archaeological process and have a key role in the archaeological team. Understanding and mitigating the effects of environments on finds – whether in the burial or museum environment – is increasingly a multidisciplinary exercise, including expertise from, for example, the geological, biological, and social sciences. The decision to conserve a waterlogged find requires not only an archaeological commitment but also social and political ones. Commitment of resources in the present and long term will be needed. Whichever conservation option is chosen to prolong the existence of finds *for* present and future generations, its achievement will require commitment *by* present and future generations.

Cross-References

- ▶ Authentication and Conservation in Archaeological Science
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Underwater Sites in Archaeological Conservation and Preservation
- ▶ Wood: Conservation and Preservation

References

Berducou, M. 1990. Introduction to archaeological conservation. In *Historical and philosophical issues in the conservation of cultural heritage*, ed. N.S. Price, M.K. Talley Jr., and A.M. Vaccaro, 248–259. Los Angeles: Getty Conservation Institute.

Björdal, C.G. 2012. Microbial degradation of waterlogged archaeological wood. *Journal of Cultural Heritage* 13 (3): 118–122. https://doi.org/10.1016/j.culher.2012.02.003.

Björdal, C.G., T. Nilsson, and R. Petterson. 2009. Preservation, storage and display of waterlogged wood and wrecks in an aquarium: 'Project Aquarius'. *Journal of Archaeological Science* 34: 1169–1177.

Caple, C. 2008. Preservation in situ: The future for archaeological conservators? In *Contributions to 2008 IIC Congress*, 214–217. London. Available at: http://www.iiconservation.org/node1412 (accessed 4 September 2012).

Christensen, B.B. 1970. *The conservation of waterlogged wood in the National Museum of Denmark*. Copenhagen: National Museum.

Christensen, M., F.K. Hansen, and H. Kutzke. 2012. New materials used for the consolidation of archaeological wood-past attempts, present struggles, and future requirements. *Journal of Cultural Heritage* 13 (3): 183–190. https://doi.org/10.1016/j.culher.2012.02.013.

Clavir, M. 1998. The social and historic construction of professional values in conservation. *Studies in Conservation* 43 (1): 1–8.

Corfield, M., P. Hinton, T. Nixon, and M. Pollard, eds. 1997. *Preserving archaeological remains in situ*. London: Museum of London.

Cronyn, J.M. 1990. *The elements of archaeological conservation*. London: Routledge.

Davies, G. 2009. *Planning mitigation and archaeological conservation. Resource assessment*. Research Department Report series 65–2009. London: English Heritage.

English Heritage. 2008. *Conservation principles, policies & guidance for the sustainable management of the historic environment*. London: English Heritage.

Giachi, G., C. Capretti, I.D. Donato, N. Macchioni, and B. Pizzo. 2011. New trials in the consolidation of waterlogged archaeological wood with different acetone-carried products. *Journal of Archaeological Science* 38: 2957–2967.

Gilberg, M. 1987. Friedrich Rathgen: The father of modern archaeological conservation. *Journal of the American Institute for Conservation* 26 (2): 105–120.

Gregory, D., P. Jensen, and K. Straetkvern. 2012. Conservation and in situ preservation of wooden shipwrecks from marine environments. *Journal of Cultural Heritage* 13 (3): 139–148. https://doi.org/10.1016/j.culher.2012.03.005.

Hocker, E., G. Almkvist, and M. Sahlstedt. 2012. The Vasa experience with polyethylene glycol: A conservator's perspective. *Journal of Cultural Heritage* 13 (3): 175–182. https://doi.org/10.1016/j.culher.2012.01.017.

Holden, J., L.J. West, A.J. Howard, E. Maxfield, I. Panter, and J. Oxley. 2006. Hydrological controls of in situ preservation of waterlogged archaeological deposits. *Earth-Science Reviews* 78: 59–83.

Jensen, P., and D.J. Gregory. 2006. Selected physical parameters to characterize the state of preservation of waterlogged archaeological wood: A practical guide for their determination. *Journal of Archaeological Science* 33 (4): 551–559.

Jones, M., ed. 2003. *For future generations: Conservation of a Tudor maritime collection*. Portsmouth: Mary Rose Trust.

Jordan, B.A. 2001. Site characteristics impacting the survival of historic waterlogged wood: A review. *International Biodeterioration & Biodegradation* 47 (1): 47–54.

Kapelouzou, I. 2012. The inherent sharing of conservation decisions. *Studies in Conservation* 57 (3): 172–182.

MacCleod, I. 2002. In situ corrosion measurements and management of shipwreck sites. In *International handbook of underwater archaeology*, ed. C.V. Ruppe and J. Scott, 697–714. New York: Plenum.

MacCleod, I. 2005. A new corrosion mechanism for iron shipwrecks in seawater: A study of the Fujikawa Maru (1944) in Chuuk Lagoon, Federated States of Micronesia. In *14th triennial meeting, The Hague, 12–16 September 2005: Preprints (ICOM Committee for Conservation)*, ed. I. Verger, 310–316. London: Earthscan.

Madsen, H.B. 1967. A preliminary note on the use of benzotriazole for stabilizing bronze objects. *Studies in Conservation* 12 (4): 163–167.

Madsen, H.B., I. Meyer, and T.B. Jakobsen. 2001. Conservation of waterlogged wood: An obsolete method. In *Past practice – Future prospects*. British Museum Occasional Paper 145, ed. A. Oddy and S. Smith, 33–38. London: British Museum.

Manders, M. 2008. In situ preservation: 'The preferred option'. *Museum International* 60 (4): 31–41.

Mardikian, P., N.G. González, M.J. Drews, and P. de Vries. 2010. New perspectives regarding the stabilization of terrestrial and marine archaeological iron. In *The conservation of archaeological materials: Current trends and future directions*. British Archaeological Reports International series 2116, ed. E. Williams and C. Peachey, 89–95. Oxford: Archaeopress.

Mardikian, P., C. Chemello, C. Waters, and P. Hull. 2011. *Metal 2010 Proceedings of the Interim Meeting of the ICOM-CC Metal Working Group*. Charleston: ICOM-CC.

Pearson, C., ed. 1987. *Conservation of marine archaeological objects*. London: Butterworths.

Rimmer, M., D. Watkinson, and Q. Wang. 2012. The efficiency of chloride extraction from archaeological iron objects using deoxygenated alkaline solutions. *Studies in Conservation* 57 (1): 29–41.

Sease, C. 1996. A short history of archaeological conservation. In *Archaeological conservation and its consequences*, ed. A. Roy and P. Smith, 157–161. London: International Institute for Conservation.

Straetkvern, K., and E. Williams. 2012. *Proceedings of the 11th ICOM-CC Group on Wet Organic Archaeological Materials Conference*. Greenville: ICOM-CC.

Unger, A., A.P. Schniewind, and W. Unger. 2001. *Conservation of wood artifacts*. Berlin: Springer.

Waddell, P.J.A. 2007. Timber reburial. In *The underwater archaeology of Red Bay*, ed. R. Grenier, M. Bernier, and W. Stevens, I-149–153. Ottawa: Parks Canada.

Watkins, S. 1997. Science and conservation at the British Museum: A nineteenth century legacy. In *The interface between science and conservation*. British Museum Occasional Paper 116, ed. S. Bradley, 211–220. London: British Museum Press.

Watkins, S.C., and R. Scott. 2001. Timeless problems: Reflections on the conservation of archaeological ceramics. In *Past practice, future prospect*. British Museum Occasional Paper 145, ed. A. Oddy and S. Smith, 195–200. London: British Museum Press.

Williams, E., and C. Peachey, ed. 2010. *The conservation of archaeological materials: Current trends and future directions*. British Archaeological Reports International series 2116, ed. A. Oddy and S. Smith, 89–95. Oxford: Archaeopress.

Further Reading

Appelbaum, B. 2007. *Conservation treatment methodology*. Oxford: Butterworth-Heinemann.

Barkman, L. 1978. Conservation of rusty iron objects by hydrogen reduction. In *Corrosion and metal artifacts – A dialogue between conservators and archaeologists and corrosion scientists*. Special Publication 479, ed. F.B. Brown, H.C. Burnett, W.T. Chase, M. Goodway, J. Kruger, and M. Pourbaix, 156–166. Washington, DC: U.S. Department of Commerce/National Bureau of Standards.

Daniels, V., ed. 1988. *Early advances in conservation*. British Museum Occasional Paper 6. London: British Museum Press.

Hamilton, D.L. 1996. *Basic methods of conserving underwater archaeological material culture*. Washington, DC: U.S. Department of Defense.

Nixon, T.J.P., ed. 2004. *Preserving archaeological remains in situ?* London: Museum of London Archaeology Service.

Oddy, A., and S. Carroll, eds. 1999. *Reversibility – Does it exist?* Occasional Paper 135. London: British Museum Publications.

Richards, V., and J. McKinnon, eds. 2009. *In situ conservation of cultural heritage: Public, professionals and preservations*. Columbus: Past Foundation.

Robinson, W. 1998. *First aid for underwater finds*. London: Archetype & Nautical Archaeology Society.

Rodgers, B.A. 2004. *The archaeologist's manual for conservation*. New York: Kluwer Academic/Plenum.

Selwyn, L. 2004. *Metals and corrosion. A handbook for the conservation professional*. Ottawa: Canadian Conservation Institute.

Singley, K. 1988. *The conservation of archaeological artifacts from freshwater environments*. Lake Michigan: Maritime Museum.

Smith, W.C. 2003. *Archaeological conservation using polymers: Practical applications for organic artifact stabilization*. College Station: Texas A&M University Press.

Wills, B., ed. 2001. *Leather wet and dry. Current treatments in the conservation of waterlogged and desiccated archaeological leather*. London: Archetype.

Watkins, Joe (Indigenous Archaeology)

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Basic Biographical Information

Joe Watkins (1951–), a member of the Choctaw Nation of Oklahoma, is a tireless worker in the development of indigenous archaeology, who, for three decades, has broken new ground in conducting collaborative work with indigenous communities, in encouraging indigenous persons to enter the field of archaeology and in promoting self-reflexivity within the discipline toward its relationships with descendant communities.

Joe E. Watkins was born February 18 at Talihina Indian Hospital to Irving and Thelma

Watkins. He is a nephew of Joseph Oklahombi, a Choctaw Code Talker and World War I hero. Growing up, Joe learned Choctaw traditional philosophy and culture during stays with his Choctaw-speaking grandparents in southeastern Oklahoma and was encouraged by them to respect and preserve indigenous history. He received a B.A. in anthropology from the University of Oklahoma in 1973, cultivating an interest in material culture. The same year, Joe went to France to study morphological typology and flintknapping with Francois Bordes. Soon he developed a tremendous artistic talent, not only in flintknapping but also in carving, beadwork, and featherwork. In 1977, Watkins received an M.A. in anthropology with an archaeology specialization from Southern Methodist University (SMU). He then completed fieldwork in experimental archaeology for a doctoral dissertation, only to have it rejected before defense.

During the turbulence between Native Americans and archaeologists in the 1970s, Joe found himself in occasional internal conflict, but also in a unique position for understanding both groups' viewpoints. In the late 1970s and 1980s, he drew upon this perspective to serve as a representative to the American Indian Religious Freedom Act Task Force, as an archaeologist/Native American specialist for the Department of the Interior, and as an archaeologist for the Oklahoma Archaeological Survey, where he completed more than 300 projects. Joe and his (then) wife Isabella Peralta-Romas were blessed with two children, Ethan in 1991 and Sydney in 1992. In 1993, he participated in a workshop sponsored jointly by the Society for American Archaeology (SAA) and the National Science Foundation, which led to the formation of the Principles of Archaeological Ethics. Joe conducted a second dissertation project at SMU, analyzing archaeologists' responses to questions about interaction with Native Americans, and, in 1994, became one of the first Native American archaeologists to attain a Ph.D. His dissertation (Watkins 2001), one of the seminal works in indigenous archaeology, closes with the insight: "That is what indigenous archaeology can bring to the discipline: a viewpoint that refuses to be 'objective' and embraces the emotional, one that pursues not "truth" but understanding, and one that includes all facets of what it is to be human on the brink of an exciting adventure" (Watkins 2001: 181).

Dr. Watkins worked as an archaeologist for the Bureau of Indian Affairs Anadarko Agency from 1993 to 2003, concurrently serving as an instructor at the University of Oklahoma, Indiana University, the University of Nevada-Reno, and Flinders University, Australia, teaching courses on archaeological ethnics and Native American consultation. He also began serving as a consulting archaeologist for the Choctaw Nation. He received the SAA Presidential Award in 1997 and again in 1999 and the Oklahoma State Historic Preservation Officer's Citation of Merit in 1999. During this period, Dr. Watkins chaired the Committee on Native American Issues for the Register of Professional Archaeologists and the Committee on Ethics for the American Anthropological Association, as well as the Committee on Native American Relations and the Native American Scholarships Committee for the SAA. In 2001, he co-organized a conference at Dartmouth College that explored the relationship between Native Americans and archaeologists; out of this came the "Closet Chickens," a networking and support group for Indigenous archaeologists. From 2003 to 2007, Dr. Watkins served as an Associate Professor in the Department of Anthropology at the University of New Mexico. In March 2006, Joe Watkins married Carol Ellick: archaeologist and illustrator. In 2007, he accepted directorship of the Native American Studies (NAS) Program at the University of Oklahoma, where he was instrumental in setting up both a NAS masters program and a program to train Tribal Historic Preservation Officers. An indefatigable worker, Watkins has authored 3 books, 55 articles, 30 book chapters, and 20 scholarly reviews, over the last 17 years, principally concerning Indigenous archaeology and archaeological ethics. He has also given nearly 200 professional presentations and has served on nearly 3 dozen boards and committees. Currently, he serves on the Choctaw Nation NAGPRA Advisory Board, is a member of the Indigenous

Advisory Committee of the World Archaeological Congress, and chairs the SAA Committee on Ethics in Archaeology. Recent research involves collaboration with Ainu communities in Japan and the Beswick and Barunga communities of the Northern Territory in Australia.

Major Accomplishments

Joe Watkins' professional work and personality contributed to the formulation of Indigenous archaeology and continue to influence its development to this day. Through the turbulent 1970s to 1990s, he maintained a humanistic approach, advocating respect, communication, and understanding between the Native American and archaeological communities. As Indigenous archaeology has matured, he has helped to shift the dialogue from a focus on repatriation to broader issues of maintaining cultural continuance and communication and making long-term commitments for increasing the relevance of archaeology (e.g., Watkins 2010a, b). Through his prolific writing and presentations, his work on many boards and panels, and his university teaching, he has a broad and lasting influence on upcoming generations of archaeologists, indigenous and nonindigenous alike (e.g., Watkins and Ellick 2011).

Cross-References

- ▶ Closet Chickens
- ▶ Indigenous Archaeologies
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Watkins, Joe (Theory)

References

Watkins, J. 2001. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: AltaMira Press.

Watkins, J. 2010a. Wake up! Repatriation is not the only indigenous issue in archaeology! In *Bridging the divide: Indigenous communities and archaeology into the 21st century*, ed. C. Phillips and H. Allen, 49–60. Walnut Creek: Left Coast Press.

Watkins, J. 2010b. Becoming one of them. In *Being and becoming indigenous archaeologists*, ed. G. Nicholas, 321–326. Walnut Creek: Left Coast Press.

Watkins, J., and C. Ellick. 2011. *The anthropology graduate's guide: From student to a career*. Walnut Creek: Left Coast Press.

Watkins, Joe (Theory)

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Basic Biographical Information

Joe Edward Watkins (Fig. 1) is an American archaeologist and anthropologist and a member of the Choctaw Nation of Oklahoma. In 2013 he was supervisory cultural anthropologist and chief, Tribal Relations and American Cultures program for the National Park Service (NPS), an opportunity that allows him to develop more effective and satisfying relationships between this organization and communities. In 2014 he took on the role of American Indian Liaison for the NPS. He served in all three positions until his retirement from the NPS in 2018.

Watkins received his B.A. in anthropology from the University of Oklahoma and both his M.A. (1977) and Ph.D. (1994) from Southern

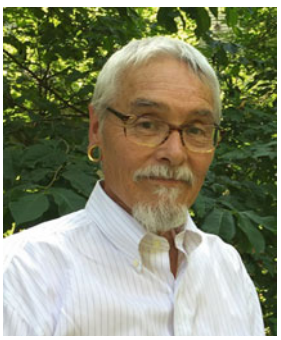

Watkins, Joe (Theory), Fig. 1 Joe Watkins. (Photo by Carol J. Ellick)

Methodist University. After completing his M.A. degree, he held the position of archaeologist/Native American specialist for the Heritage Conservation and Recreation Service of the US Department of the Interior, in Atlanta (1978–1980). This led to several years running his own CRM company, American Indian Cultural Consultants, Inc, in Oklahoma. Following that, he served as archaeologist/environmental coordinator for the Branch of Land Operations, US Department of the Interior, Bureau of Indian Affairs, in Anadarko, Oklahoma (1993–2003). Watkins was also assistant director of the Oklahoma Indian Legal Services (1982–1984); business manager of the Millicent Rogers Museum in Taos, New Mexico (1984–1987); and archaeologist for the Oklahoma Archaeological Survey (1990–1993). He was associate professor of Anthropology at the University of New Mexico from 2003 to 2007. He was then director of Native American studies at the University of Oklahoma, Norman (2007–2013), where he taught courses on indigenous archaeology, tribal historic preservation, and contemporary issues in Native American studies.

Watkins' interest in archaeology developed when, as a 10-year-old, he discovered a projectile point near his grandmother's homestead, which led to an early lesson in the complexities of cultural heritage from his grandmother who told him that the artifact related to someone else's past, not his, since the Choctaw had been relocated to Oklahoma from Mississippi in the 1830s. Addressing challenges relating to the legacy of colonialism would become an underlying theme dominating Watkins' career. During the early part of his academic life, inspired by the archaic point, his interests focused on material culture, lithic analysis, and experimental archaeology. In 1972, he spent time in France working with Francois Bordes at the site of Pech de L'Aze IV, where he learned flintknapping and Bordes' classification system from the master himself and also worked with Jacques Tixier and Bruce Bradley. In 1975, he built a full-sized late prehistoric-style, subterranean, earth-covered pit house at the Fort Burgwin Research Center near Taos, New Mexico, which he lived in throughout the winter and engaged in a variety of traditional activities – from corn grinding and food preparation to pottery and basket manufacture to flintknapping, arrow making, and hide-working – to gain insight into the lifeways of ancient Southwesterners.

As a young Native American scholar, Watkins found himself increasingly questioned by archaeologists as to his objectivity and by indigenous community members as to his "Indianness." Such encounters contributed to his interest in European and later sub-Saharan African archaeology, which afforded the opportunity to avoid having his credibility and integrity questioned. However, Watkins' reentry into North American archaeology came about through his post-M.A. foray into the legislative side of archaeological heritage through a position he held with the Heritage Conservation and Recreation Service of the US Department of the Interior. He participated in a series of national consultations on the American Indian Religious Freedom Act of 1978 and the impact of the federal policies on tribal communities that sought input from community members. These consultations brought forward many perspectives on the effects of archaeological and heritage management practices upon sacred sites, access to sacred objects, and human remains and cemeteries. Deeply affected by the testimonials he witnessed, his interests subsequently shifted to the ethical practice of anthropology and the study of anthropology's relationships with descendant communities and aboriginal populations, topics that have dominated his career ever since.

Major Accomplishments

Over the course of more than 50 years, Watkins' research and writing have spanned the realm of archaeology, from culture history to processual and postprocessual archaeologies, with significant contributions to each, in addition to more than 25 years' involvement in cultural resource management. His interests include the history and application of heritage legislation in the United States and elsewhere; CRM policy and practice; archaeological ethics; plains archaeology; public archaeology; lithic technology, experimental

archaeology, and material culture studies; Native American studies; indigenous archaeology; education; identity and nationalism; and intellectual property.

Watkins' most recognized and valued work is focused on the dynamic and multifaceted relations between indigenous communities and the discipline of archaeology. His dissertation – Ethics and Value Conflicts: Analysis of Archeologists' Responses to Questionnaire Scenarios Concerning the Relationship between American Indians and Archeologists (1994) – provided a critical review of the controversies surrounding the Kennewick Man/Ancient One, the Wenatchee Clovis Cache, and other cases. This work was later revised and published as *Indigenous Archaeology: American Indian Values and Scientific Practice* (Watkins 2000), which is today the most widely cited title in the realm of indigenous archaeology.

In 1993, Watkins participated in the joint Society for American Archaeology/National Science Foundation-sponsored workshop that led to the formulation of the Society for American Archaeology's Principles of Archaeological Ethics (and he continues to press for review and revision). He has also been very active in the American Anthropological Association; in addition to other AAA roles, he was a member of their "Darkness in El Dorado" Task Force in 2002, charged with the difficult task of assessing charges brought against James Neel and Napoleon Chagnon by journalist James Tierney. He was an advisor to the MATRIXX (Making Archaeology Teaching Relevant in the XXI Century) project, sponsored by the SAA Task Force on Curriculum. Since 2009, Watkins has been a member of Time Team America, an archaeology/reality television program produced by the (US) Public Broadcasting System. He was also a steering committee member of the Intellectual Property Issues in Cultural Heritage (IPinCH) Project (20108–2016).

Watkins is an accomplished educator and administrator, with an outstanding record of advisory board, committee chair or member, and executive service for such state, national, and international organizations as the Alfonso Ortiz Center for Intercultural Studies, American Anthropological Association, National Museum of Natural History, Oklahoma Council for Archaeological Preservation, Plains Anthropological Society, Register of Professional Archaeologists, Society for American Archaeology, Society of Professional Archaeologists, University of Oklahoma, Wenner-Gren Foundation, and World Archaeological Congress. He has been a Fulbright scholar and a Ford Foundation fellow, has received a Citation of Merit from the Oklahoma State Historic Preservation Office, and has been twice awarded a Presidential Recognition Award by the Society for American Archaeology. Watkins was elected to serve President-elect of the Society for American Archaeology (2018–2019) and President (2019–2021).

Watkins' contributions to archaeology and anthropology have been substantial, as they have also been to indigenous communities in North America and beyond. His integration of indigenous, anthropological, and historical perspectives reveals similarities and differences in the experiences of Native Americans and other colonized, marginalized, and underrepresented populations. Such efforts have also provided important insights into the impacts archaeology has had on indigenous peoples and vice versa. He has also worked with aboriginal groups in Australia and is currently involved with indigenous Ainu communities in Japan to compare their struggle with that of American Indians in historical, political, social, cultural, and economic spheres.

As an archaeologist and a Choctaw, Watkins straddles two different worlds and ways of knowing – one based on Western scientific tradition and the other on traditional knowledge – each with often very different needs, goals, values, and demands. At the intersection, he has worked to promote ethically sound and mutually satisfying archaeological practices, a desire likely instilled by that lesson on heritage provided to him by his Choctaw-speaking grandmother when he was young. As a Native American scholar who has experienced formidable challenges in his career, and whose work has always promoted relevance and responsibility in archaeological practice, Joe Watkins serves as an important role model not only for aboriginal

youth but also for established scholars of any background.

Cross-References

- ▶ American Anthropological Association (AAA) and Ethics
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Intellectual Property Issues in Cultural Heritage (IPinCH) Project
- ▶ Kennewick Man Case: Tribal Consultation, Scientific Studies, and Legal Issues
- ▶ Media and Archaeology
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Watkins, Joe (Indigenous Archaeology)

References

Watkins, J.E. 2000. *Indigenous archaeology: American Indian values and scientific practice*. Walnut Creek: AltaMira Press.

Further Readings

Ellick, C.J., and J.E. Watkins. 2011. *The anthropology graduate's guide: From student to a career*. Walnut Creek: Left Coast Press.

Watkins, J.E. 2003. Beyond the margin: American Indians, first nations, and archaeology in North America. *American Antiquity* 68 (2): 273–285.

Watkins, J.E. 2004. Becoming American or becoming Indian? NAGPRA, Kennewick, and cultural affiliation. *Journal of Social Archaeology* 4 (1): 60–80.

Watkins, J.E. 2005a. The politics of American archaeology: Cultural resources, cultural affiliation and Kennewick. In *Indigenous peoples and archaeology: Decolonizing theory and practice*, ed. C. Smith and M. Wobst, 189–203. London: Routledge Press.

Watkins, J.E. 2005b. Through wary eyes: Indigenous perspectives on archaeology. *Annual Review of Anthropology* 34: 429–449.

Watkins, J.E. 2006. Writing unwritten history. In *Archaeological ethics*, ed. K.D. Vitelli and C. Colwell-Chanthaphonh, 2nd ed., 225–234. Lanham: AltaMira Press.

Watkins, J.E. 2010a. Wake up! Repatriation is not the only indigenous issue in archaeology! In *Bridging the divide: Indigenous communities and archaeology into the 21st century*, ed. C. Phillips and H. Allen, 49–60. Walnut Creek: Left Coast Press.

Watkins, J.E. 2010b. Becoming one of "them". In *Being and becoming indigenous archaeologists*, ed. G.-P. Nicholas, 321–326. Walnut Creek: Left Coast Press.

Watkins, J.E., and T.J. Ferguson. 2005. Working with and working for indigenous communities. In *Handbook of archaeological methods*, ed. H.D.G. Maschner and C. Chippendale, 1371–1405. Walnut Creek: AltaMira Press.

Watson, Patty Jo

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Basic Biographical Information

Patty Jo Watson (Fig. 1) is an American archaeologist whose theoretical writing was instrumental in the development of an explicitly scientific archaeology. Her research interest focused on agricultural origins in western Asia and eastern North America. Born in 1932 in Superior, Nebraska, she grew up in rural Nebraska and Iowa before attending the University of Chicago in the 1950s. She received an M.A. in anthropology in 1956 and a Ph.D. in 1959 working under the direction of Robert Braidwood, a pioneer of modern archaeology.

Watson, Patty Jo, Fig. 1 Patty Jo Watson

Watson's first field training was at the University of Arizona Point of Pines Field School in 1953. In 1954–1955, she was a field assistant on Braidwood's Iraq-Jarmo Project, an important multidisciplinary project to investigate the origins of agriculture in the Hilly Flanks of the Zagros Mountains, northern Iraq. This model of problem-oriented, interdisciplinary research was championed by Watson throughout her career. In addition to research in Iraq and Iran, Watson conducted major fieldwork in Turkey, New Mexico, and Kentucky in collaboration with colleagues and students, including her husband, Richard Watson, a philosopher of science and a geologist.

In the 1960s, Watson taught at Los Angeles State College, University of Southern California, University of California–Los Angeles, and University of Michigan, before being appointed assistant professor at Washington University in St. Louis in 1969. Watson spent the remainder of her career at Washington University, retiring in 2004.

Watson was appointed Edward Mallinckrodt Distinguished University Professor of Anthropology at Washington University in 1993, a title she continues to hold as professor emerita. Throughout her long and distinguished career, Watson has held office in many professional organizations, received numerous awards for her achievements, and elected to several prestigious scholarly organizations, including the National Academy of Sciences (1988), American Academy of Arts and Sciences (1997), and American Philosophical Society (2000).

Major Accomplishments

Watson's dissertation research and early postdoctoral work in contemporary Iranian villages pioneered the use of ethnographical data as an analog to aid in the interpretation of past remains, a subspecialty now known as ethnoarchaeology. This work was published much later (Watson 1979) when archaeological ethnography became a subspecialty in its own right.

In the 1960s, Watson maintained her affiliation with the Oriental Institute of the University of Chicago, shifting her research focus to a Halafian site in the Diyarbakir region of southeastern Turkey (Watson and LeBlanc 1990), while Braidwood and his Turkish colleague Halet Çambel were conducting excavations a the nearby site of Çayönü. During this period, Watson formed important collaborations with Steven Leblanc, her first Ph.D. student, and Charles Redman, a student at the University of Chicago. LeBlanc and Redman's research interests in the Southwestern USA briefly drew her into field research in New Mexico (Cibola Archaeological Research Project); however, it was the publication of a short treatise on the philosophical underpinnings of archaeological inquiry for which they are best known.

In 1971, publication of *Explanation in Archeology: An Explicitly Scientific Approach* (Watson et al. 1971) was the first comprehensive statement of the "New Archaeology" or what came to be known as "processual archaeology." The book

helped foment a new approach to archaeology that emphasized the nature of scientific explanation, the scientific method, systems theory, and an ecological view of culture. This was followed by a second volume, published in 1984, that updated and extended their original arguments (Watson et al. 1984). By the late 1980s, advocates of post-processualism – the backlash against scientific archaeology – rejected the scientific method and processualism because of its overreliance on deterministic models and scientific objectivity, had become prominent. Watson spent the next two decades countering the critics of processual archaeology and a general antiscience bias among post-processualists (e.g., Watson 1991).

Watson remained ensconced in theoretical debates on the origins of agriculture and the philosophy of archaeological inference; however, in the late 1960s, her fieldwork began shifting to eastern North America. This happened somewhat by default because of her involvement with the newly organized Cave Research Foundation, of which her husband was a founding member. Unable to interest any North Americanists in the rich, well-preserved archaeological remains in caves of the Central Kentucky Karst, Watson began systematic documentation of prehistoric remains in Salts Cave, one of the large caves within the boundaries of Mammoth Cave National Park (Watson 1969). Salts and Mammoth caves had been extensively mined for mineral resources between 2,000 and 3,000 years ago. Among the perishable remains preserved in these caves were thousands of desiccated human paleofeces. In collaboration with the paleoethnobotanist Richard Yarnell, analysis of the paleofeces revealed a suite of indigenous plants in the early stages of domestication, known as the Eastern Agricultural Complex (Watson 1974). At the time, it was still thought that agricultural development in eastern North America was secondary to and dependent on developments that first occurred in Mesoamerica.

Armed with the exceptional data on early plant domestication from Salts Cave, Watson, in collaboration with her second Ph.D. student, William Marquardt, initiated the Shell Mound Archaeological Project to investigate prehistoric plant use just prior to the time period represented at Salts Cave. The middle Green River valley, just downstream from Mammoth Cave, was well known for large, freshwater shell middens dating 5,000–3,000 years ago. Marquardt and Watson employed the systematic use of water flotation recovery techniques to obtain carbonized plant remains from these sites. Their discovery, in 1976, of carbonized fragments of squash rind from 5,000-year-old midden deposits was the oldest record for a domesticated plant in eastern North America at the time. It has since been shown that not only does squash appear even earlier in the archaeobotanical record but that it was also independently domesticated in the Eastern USA (Marquardt and Watson 2005).

Watson's cave research and the Shell Mound Archaeological Project are still active, carried on by her students and a new generation of their students. The science wars have largely receded, replaced by a variety of interpretive archaeologies that emerged from the post-processual critique. However, as a model for archaeological inference, the scientific method, as advocated by Watson, is still the dominant model for selecting among competing knowledge claims and advancing archaeological knowledge.

Cross-References

- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Braidwood, Robert John
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Hypothesis Testing in Archaeological Theory
- ▶ Near East (including Anatolia): Origins and Development of Agriculture
- ▶ Processualism in Archaeological Theory

References

Marquardt, W.H., and P.J. Watson, ed. 2005. *Archaeology of the Middle Green River Region, Kentucky.* Institute of Archaeology and Paleoenvironmental Studies Monograph 5. Gainesville: Florida Museum of Natural History.

Watson, P.J. 1969. *The prehistory of Salts Cave, Kentucky*. Reports of Investigations 16. Springfield: Illinois State Museum.

Watson, P.J., ed. 1974. *Archeology of the Mammoth Cave Area*. New York: Academic. (Reprinted with a new foreword. 1997. St. Louis: Cave Books).

Watson, P.J. 1979. *Archaeological ethnography in Western Iran*. Viking Fund Publications in Anthropology 57, Wenner-Gren Foundation. Tucson: University of Arizona Press.

Watson, P.J. 1991. A parochial primer: The new dissonance as seen from the Midcontinental USA. In *Processual and postprocessual archaeologies: Multiple ways of knowing the past*. Center for Archaeological Investigations Occasional Paper 10, ed. R. Preucel, 265–274. Carbondale: Southern Illinois University Press.

Watson, P.J., and S.A. LeBlanc. 1990. *Girikihaciyan: A Halafian site in southeastern Turkey*. Los Angeles: UCLA Institute of Archaeology.

Watson, P.J., S.A. LeBlanc, and C.L. Redman. 1971. *Explanation in archeology: An explicitly scientific approach*. New York: Columbia University Press.

Watson, P.J., S.A. LeBlanc, and C.L. Redman. 1984. *Archeological explanation: The scientific method in archeology*. New York: Columbia University Press.

Further Reading

Watson, P.J. 1999. From the Hilly Flanks of the fertile crescent to the Eastern Woodlands of North America. In *Grit tempered: Early women archaeologists in the Southeastern United States*, ed. N.M. White, L.P. Sullivan, and R.A. Marrinan, 286–297. Gainesville: University Press of Florida.

Watson, P.J. 2009. Archaeology and anthropology: A personal overview of the past half-century. *Annual Review of Anthropology* 38: 1–15.

Watson, P.J. 2013. Patty Jo Watson. In *Archaeology in the making: Conversations through a discipline*, ed. W.L. Rathje, M. Shanks, and C. Witmore, 47–67. London/New York: Routledge.

Waynuna: Agriculture and Domestication

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Basic Site Overview

Waynuna (15° 16′ 01″ S, 72° 44′ 55″ W) is a multicomponent, open-air site located at 3,625 m above sea level (masl) on the eastern side of the Cotahuasi valley in southern Peru. The earliest component dates to the Late Preceramic (or Late Archaic) Period between 4,000 and 3,600 cal year BP based on the presence of diagnostic lithic artifacts and 10 radiocarbon dates (Perry et al. 2006). This component is significant for evidence of early highland plant domestication and interregional interaction (Perry et al. 2006, 2007). Later components are ceramic bearing and date to the last ~3,000 years (Jennings 2002).

Waynuna lies on a flat agricultural terrace in the shadow of Cerro Aycano (4,443 masl), about 400 m above and south of the modern village of Huillac or Huilla. Overlooking the Cotahuasi river (~2,700 masl), the site receives sunlight during most of the day. The ecotone between maize (*Zea mays*) and potato (*Solanum* spp.) cultivation zones today is at about 3,600 masl, where the site is located. Today, vegetation around Waynuna is dominated by thorny scrub growth (Figs. 1 and 2).

Justin Jennings (2002) discovered Waynuna (site CO-38 in his survey) in the late 1990s. He noted extensive terracing and four circular enclosures 8–10 m in diameter interpreted as animal corrals. In the center of the site were three 7-m diameter circular subterranean structures containing sub-chambers, niches, stone doorways, and beehive-shaped domed roofs, which perhaps served a special or religious function. Jennings found other surface architecture that he believed dated to the "Inchoate Period" (c. 2,850–1,200 cal year B.P.), and he recovered three diagnostic obsidian points that suggested an origin for the site in the Archaic Period, but he did not find evidence for a substantial domestic settlement on the site.

Subsequent test excavations by Sandweiss in 2004 found Middle Horizon (1,200–950 cal year BP) potsherds in the terrace fill. Underlying the terrace fill was a midden deposit lacking pottery and surrounding a circular stone house foundation approximately 2.1 m in diameter. It was these preceramic deposits that dated to 4,000–3,600 cal year B.P. The most abundant artifactual remains were fragments of obsidian, most of which were

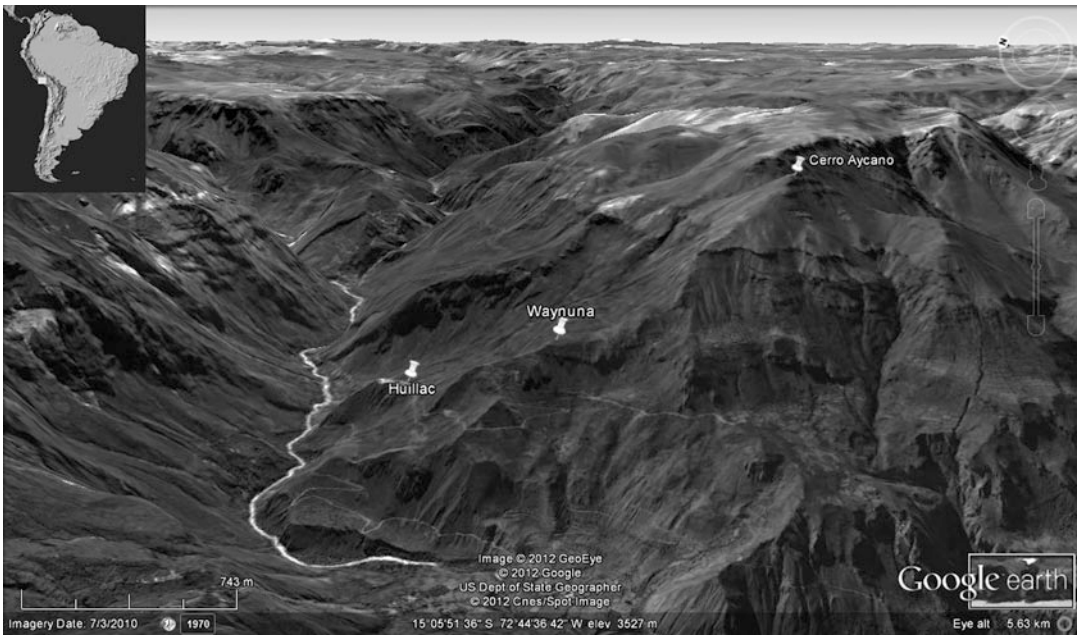

Waynuna: Agriculture and Domestication, Fig. 1 Google Earth oblique view of Waynuna, Huillac, and Cerro Aycano in the Cotahuasi valley, Peru; *inset* map of South America shows location of Waynuna as a *white rectangle*. The Cotahuasi river and valley run through the *center left* of the image

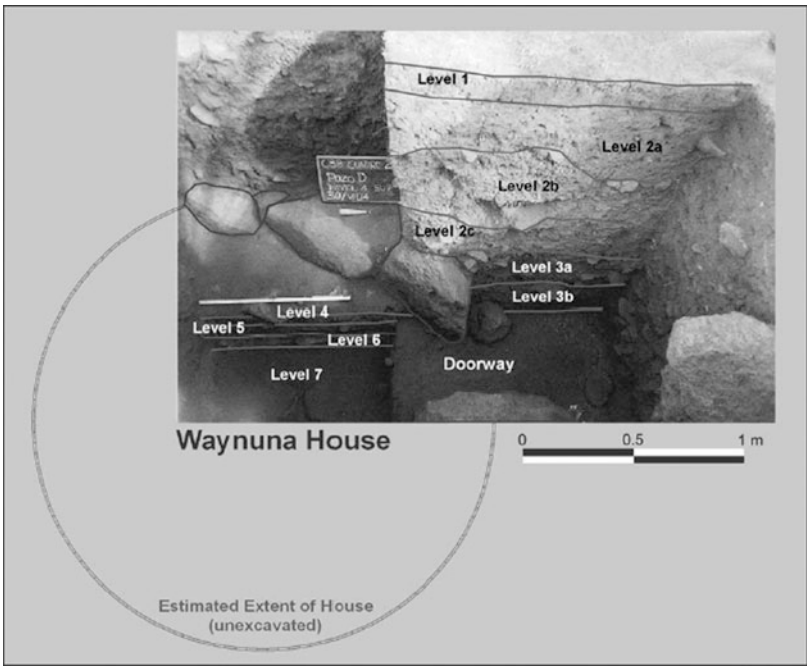

Waynuna: Agriculture and Domestication, Fig. 2 Photograph of the west wall profile at Waynuna showing 2004 stratigraphic excavation. *Outlined arc* of stones in the photo is part of the Preceramic house, and the additional extent of the house is estimated

chemically sourced by Rademaker (2006, subsequent research) to the Cerro Condorsayana Alca-1 outcrops some 4.5 km distance at 4,700 masl; a few fragments came from Alca-5 outcrops, located 30 km away in the Pucuncho Basin at 4,400 masl.

Evidence of Early Agriculture

Linda Perry and Dolores Piperno (Perry et al. 2006, 2007) analyzed starch grains and phytoliths from the preceramic house floor, and they found evidence for domesticated maize, potato, chili pepper, and arrowroot. These data add to our understanding of early plant domestication in Peru. Early Holocene squash (*Cucurbita* spp.) macro- and microfossils have been recovered from northern Peru at Nanchoc sites on the western slopes of the Andes (Dillehay et al. 2007) and at the Siches site near the coast (Piperno 2011); Nanchoc also has early peanut (*Arachis* sp.) and cotton (*Gossypium barbadense*). The earliest known domesticated gourd in Peru comes from Early Holocene contexts at Quebrada Jaguay (Erickson et al. 2005), on the Pacific coast, some 150 km south of Waynuna. The microfossils from Waynuna constitute the earliest evidence for domesticated plants in the southern highlands of Peru.

Starch grains from maize, potato, arrowroot, and chili pepper were found adhering to grinding stones, suggesting that food was processed at the site. Patterns of damage on the maize starch grains indicate grinding, possibly to make *chicha* or corn beer, later a staple of the Andean diet (Perry et al. 2006). The chili pepper starch grains were identified as probably *Capsicum pubescens*, a species that includes *rocoto*. Today, *rocoto* is the signature pepper for Arequipa Department where Waynuna is located. Added to the suite of domesticates that are all still cultivated in the area today, the possible *chicha*-making, and the ecotonal site location, this specific identification supports the other indications that Waynuna stands at or near the beginning of a tradition in lifeways that continues to the present.

Maize and potato affirm the strategic ecotonal position of Wayuna. Arrowroot (*Maranta* sp.) only grows below 1,000 masl on the humid eastern side of the Andes, and the presence of this species in the arid, western Andes at Waynuna demonstrates long-distance (>300 km), interzonal interaction with the eastern lowlands. The obsidian sourcing data show regional interaction with higher-elevation zones at near and medium distances. Despite its location high on a mountain side above a remote Andean valley, these data show that Waynuna was not isolated but rather participated in an extensive trade or resource acquisition network, possibly on a camelid caravan route (see, for instance, Lynch 1983).

In summary, Waynuna was first occupied about 4,000 years ago by farmers who grew and processed potatoes, maize, and chili peppers. These first inhabitants maintained widespread relations with regions as near as the adjacent puna (high altitude grasslands) and as far as the eastern slopes of the Andes leading down to the Amazonian jungle. Later occupants of the site built terraces and other structures but apparently resided elsewhere. In modern times, although the agricultural terraces surrounding Waynuna are still farmed, the local people inhabit the village of Huillac, situated on the same ridge crest at slightly lower elevation north of the site.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Andes: Prehistoric Period
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Potato: Origins and Development
- ▶ Sweet Potato: Origins and Development

References

Dillehay, T.D., J. Rossen, T.C. Andres, and D.E. Williams. 2007. Preceramic adoption of peanut, squash, and cotton in northern Peru. *Science* 316: 1890–1893.

Erickson, D.L., B.D. Smith, A.C. Clark, D.H. Sandweiss, and N. Tuross. 2005. An Asian origin for a 10,000-year-old domesticated plant in the Americas. *Proceedings of the National Academy of Sciences* 102: 18,315–18,320.

Jennings, J.M. 2002. Prehistoric imperialism and cultural development in the Cotahuasi Valley, Peru. Unpublished PhD dissertation, University of California-Santa Barbara.

Lynch, T.F. 1983. Camelid pastoralism and the emergence of Tiwanaku civilization in the South-Central Andes. *World Archaeology* 15: 1–14.
Perry, L., D.H. Sandweiss, D. Piperno, K. Rademaker, M.-A. Malpass, A. Umire, and P. de la Vera. 2006. Early maize agriculture and interzonal interaction in southern Peru. *Nature* 440: 76–79.
Perry, L., R. Dickau, S. Zarrillo, I. Holst, D.M. Pearsall, D.R. Piperno, M.J. Berman, R.G. Cooke, K. Rademaker, A.J. Ranere, J.S. Raymond, D.H. Sandweiss, F. Scaramelli, K. Tarble, and J.A. Zeidler. 2007. Starch fossils and the domestication and dispersal of chili peppers (*Capsicum* spp. L.) in the Americas. *Science* 315: 986–988.
Piperno, D.R. 2011. The origins of plant cultivation and domestication in the New World tropics: Patterns, process, and new developments. *Current Anthropology* 52 (S4): S453–S470.
Rademaker, K. 2006. Geoarchaeological investigations of the Wayñuna site and the Alca obsidian source, Peru. Unpublished MS dissertation, University of Maine.

WCCWiki

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Basic Information

#WCCWiki is an initiative run by the Women's Classical Committee UK (WCC UK) that seeks to achieve comprehensive representation on Wikipedia of women within all classical disciplines and has a strong focus on classical archaeologists. The project is run by volunteers from the WCC UK and the wider Wikipedia editorial community and is open to people of all genders who share the project's ethos.

The catalyst for the project was a growing concern within the classical community about the biases that exist within English language Wikipedia, including a systemic lack of representation of women as editors and as subjects. Wikipedia's purpose was set out by its founder, Jimmy Wales, to provide free access to the sum of all human knowledge (Wales 2016). However, demographic biases within the population of editors mean that systemic biases are written into the encyclopedia's content. Research into the gender of Wikipedia editors shows there to be a large gender gap, with women being underrepresented (Bayer 2015). A lack of recognition of the achievements of women is the result. Wikipedia consistently ranks within the top ten of the world's most visited websites, and its content is routinely reproduced on Google and embedded elsewhere. This means its biases are perpetuated far beyond the encyclopedia itself. #WCCWiki works to eliminate the gender skew and ensure the fair representation of women in the encyclopedia from the full range of classics disciplines, including classical archaeologists.

The project builds on the Wikipedia "editathons" held by the Trowelblazers, and by Dr. Debbie Challis, then at the Petrie Museum, that aimed to foreground women within archaeology, geology, and paleontology. It also takes inspiration from the impulse to find classical foremothers arising from the "Women as Classical Scholars" conference held in 2013 by the University of Notre Dame and King's College London. Following the foundation of the WCC UK in 2015, and with the support of trainers from Wikimedia UK, the #WCCWiki project was designed to replicate this success.

Major Impact

The core activities of #WCCWiki are to train women with knowledge of classics and archaeology to edit Wikipedia and to support people of all genders working to improve Wikipedia's coverage of women in classical disciplines. Wikipedia's systems of categorization mean that comparison of changes over time is not straightforward (Nevell 2018). However, figures provided by Wikimedia UK suggest that in January 2017 there were over 200 biographies of classicists on Wikipedia, but only around 10% of these were of women. Similar research in December 2018 found there were 2088 biographies of classicists on the English language Wikipedia, of which 268 were

of women (12.88%), and 193 biographies of classical archaeologists, of which 37 were of women (19.17%) (Nevell 2018).

WCCWiki is managed entirely by volunteers. The project is run from its project pages on Wikipedia, which includes a list of entries that need creating or improving, as well as bibliographical resources, details of forthcoming events, and a calendrical list showing pages that project editors have created or improved. By categorizing the pages in need of creation or improvement according to work required, participants can more quickly find editorial tasks, such as checking pages for updates, that require little time or energy.

Drop-in editing sessions are held online on a monthly basis, using an open chat channel to discuss the project's work and to provide support to editors. Periodic in-person meetups and training events are held at varying locations, including at the University of Kent, the University of Manchester, the University of Birmingham, the Institute of Classical Studies in London, the Institute of Archaeology (UCL), and the University of Oxford. However, the project functions mainly in an online environment, which minimizes the time and cost to participants who are often early career researchers and may not be in the UK.

Ongoing discussions of the project also take place on the project's "talk page," via the hashtag #WCCWiki on Twitter and on the Women's Classical Committee Facebook page. Other hashtags such as #NoPageRage, #Foremothers, and #VisibleWikiWomen connect the project on Twitter with wider discussions about the lack of female representation on #Wikipedia. Particular strands of work are to improve visibility of women by obtaining images of article subjects and to improve the coverage of women from ethnic minorities and women of color, such as Helen Maria Chesnutt. Article translation between mainly European languages is also undertaken by project editors. The project engages with similar women-focused groups, including Women in Red, who highlight the missing women in Wikipedia by inserting redlinks for absent pages, and the Classical Association of Canada's Graduate Student Caucus.

WCCWiki, Fig. 1 #WCCWiki project banner image. (Katherine McDonald, CC BY-SA 4.0)

#WCCWiki has been well supported by Wikimedia UK, the charitable organization that runs Wikipedia in the UK (Fig. 1).

Cross-References

- ▶ Engendered Archaeologies
- ▶ Engendering Historical Archaeology
- ▶ Internet Use for Archaeological Education
- ▶ Scholarly Publishing of Archaeology

References

Bayer, T. 2015. How many women edit Wikipedia? In *Wikimedia Blog*. www.blog.wikimedia.org/2015/04/30/how-many-women-edit-wikipedia. Accessed 18 Dec 2018.

Nevell, R. 2018. How many biographies of classicists does Wikipedia have? In *Richard the Castellan*. www.richardthecastellan.wordpress.com/2018/12/14/how-many-biographies-of-classicists-does-wikipedia-have. Accessed 18 Dec 2018.

Wales, J. 2016. The sum of all knowledge. www.onbeing.org/programs/jimmy-wales-the-sum-of-all-human-knowledge-2/. Accessed 12 Dec 2018.

Further Reading

Bridges, E., V. Leonard, and C. Millington. Editing a fairer Wikipedia: The Women's Classical Committee editathon. *Classics and Social Justice* blog. www.classicssocialjustice.wordpress.com/2017/02/01/editing-a-fairer-wikipedia-the-womens-classical-committee-editathon. Accessed 18 Dec 2018.

Hassett, B.R., S. Pilaar Birch, B. Wragg Sykes, and T. Herridge. *Trowelblazers*. www.trowelblazers.com. Accessed 12 Dec 2018.

Leonard, V. 11 June 2017. How we doubled the representation of female classical scholars on Wikipedia. *Times Higher Education*. www.timeshighereducation.com/blog/how-we-doubled-representation-female-classical-scholars-wikipedia. Accessed 18 Dec 2018.

Leonard, V. 12 Dec 2018. Female scholars are marginalised on Wikipedia because it's written by men. *Guardian*. www.theguardian.com/education/2018/dec/12/female-scholars-are-marginalised-on-wikipedia-because-its-written-by-men. Accessed 18 Dec 2018.

The Women's Classical Committee Wikipedia Project. www.en.wikipedia.org/wiki/Wikipedia:Women%27s_Classical_Committee. Accessed 12 Dec 2018.

Wegener, Corine

Corine Wegener
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Basic Biographical Information

Corine Wegener received her Bachelor of General Studies degree in political science from the University of Nebraska-Omaha and Master of Arts degrees in both political science and art history from the University of Kansas. She is the Cultural Heritage Preservation Officer in the Office of the Under Secretary for History, Art, and Culture at the Smithsonian Institution in Washington, DC.

Major Accomplishments

As a major in the U.S. Army Reserve, Corine Wegener served as the Arts, Monuments, and Archives Officer for the 352nd Civil Affairs Command in Baghdad, Iraq. Her duties included assisting the staff of the Iraq National Museum with the recovery and preservation of their collections after the looting during the US invasion of 2003. As a result of that experience, she founded the U.S. Committee of the Blue Shield in 2006, a nonprofit organization dedicated to US ratification and implementation of the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict. She continues to serve as President. In 2007, Wegener developed a Blue Shield training program for US military personnel, designed to familiarize them with the 1954 Hague Convention. Over the past 3 years, she has organized nine military training sessions for approximately 570 US military personnel, working closely with partner organizations, the Archaeological Institute of America (AIA), the American Institute for the Conservation of Historic and Artistic Works (AIC), and the Smithsonian Institution, all of which provide volunteers, travel funds, and/or facilities. Wegener helped establish the Smithsonian Haiti Cultural Recovery Project after the 2010 Haiti earthquake. As the International Project Coordinator, she helped launch and equip the Cultural Recovery Center in Port-au-Prince and led the first teams of conservation volunteers to arrive in Haiti. Volunteer conservators and Haitian colleagues and trainees recovered, restored, and treated over 30,000 works of art, works on paper, books, and historical documents over the course of 18 months. She has written and lectured widely about her experiences with cultural property

protection and the Blue Shield. She serves on the board of the U.S. Committee of the International Council of Museums (ICOM), the ICOM Disaster Relief Task Force; is secretary of the Association of National Committees of the Blue Shield; and vice president of the U.S. Military Civil Affairs Association.

Cross-References

- ▶ Blue Shield
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ International Council of Museums (ICOM)
- ▶ Iraq: Archaeological Heritage
- ▶ Military Personnel Training in Archaeology
- ▶ Repatriation: Overview
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

Further Reading

Atwood, R. 2004. *Stealing history. Tomb raiders, smugglers, and the looting of the ancient world*. New York: St Martin's Press.

Bernhardsson, M.T. 2005. *Reclaiming a plundered past. Archaeology and nation building in modern Iraq*. Austin: University of Texas Press.

Carman, J. 2005. *Against cultural property. Archaeology, heritage and ownership*. London: Duckworth.

Renfrew, C. 2000. *Loot, legitimacy and ownership*. London: Duckworth.

Waxman, S. 2008. *Loot. The battle over the stolen treasures of the ancient world*. New York: Times Books.

Weidenreich, Franz

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Basic Biographical Information

Franz Weidenreich was born on 7 June 1873 in Edenkoben, Germany, and died in his New York City home on 11 July 1948. Gregory (1949: 85) described Weidenreich as "the flower of German science and true culture" with an "indefatigable energy and constructive intellect." He graduated from the Humanist Gymnasium in Landau, later spending some 6 years studying medicine and general sciences from a number of German universities in Berlin, Kiel, and Munich. He eventually received an M.D. from the University of Strasbourg in 1899. His research interest was the anatomical structure of the mammalian cerebellar central nucleus, and after his graduation in 1901, he worked under the direction of Gustav Schwalbe in the Department of Anatomy at Strasbourg. Upon expanding his research into blood and lymphatic systems, which took him briefly to the University of Frankfurt, he returned to Schwalbe's lab in 1902 where he was appointed Professor of Anatomy two years later. By 1914, Weidenreich had published 55 research papers, primarily on the topic of hematology. But in his early writings were found a scientific curiosity of human evolution, where he published a couple of papers on the origins of the human chin and its relationship to speech, and a comparison of human and ape pelvic and lower limb anatomy to locomotion. In 1926, he published his first "official" paper on Anthropology, an anatomical description of the Weimar-Ehringsdorf fossil human skull.

Between 1914 and 1921, he wrote few scientific discourses and instead focussed his energies as a member of the Municipal Council of Strasbourg, and President of the Democratic Party of the disputed territory of Alsace-Lorraine. With the French takeover in 1918, Weidenreich lost his Strasbourg academic position, but by 1921, he was established in the Department of Anatomy at the University of Heidelberg. Seven years later he took the position of Professor of Anthropology at the University of Frankfurt, where he stayed until 1934 when a visiting professorship in Anatomy at the University of Chicago became available. In the fall of that year, Weidenreich was considered for a teaching position at the Peking Union Medical College with the death of Davidson Black, in Beijing, China. This consideration was confidently recommended by one

of Black's closest friends, (Sir) Grafton Elliot Smith.

Weidenreich's appointment as Visiting Professor of Anatomy at the PUMC and Honorary Director of the Cenozoic Research Laboratory, a collaborative facility (between the PUMC and the Geological Survey of China) that focussed on the analysis of fossil and cultural materials from the Zhoukoudian (Peking Man) site began on January 1, 1935. With intense fighting between various Chinese factions and the Japanese, Weidenreich eventually left for the United States in 1941, where he took his last research position, this time at the American Museum of Natural History in New York City.

Major Accomplishments

During Weidenreich's tenure at the Peking Union Medical College, he took on similar responsibilities to Davidson Black: describing and publishing on the *Sinanthropus* fossil material from Zhoukoudian, collaborating with Chinese and other foreign scientists, and working with the Rockefeller Foundation to continue funding the excavations and the Cenozoic Research Laboratory work.

However, he added new dimensions to the Zhoukoudian scientific program. First, he recognized an anatomical similarity between the Chinese *Homo erectus* (*Sinanthropus*) and Indonesian *Homo erectus* (or *Pithecanthropus* originally found by Dubois in the 1890s), developed in collaboration with G.H.R. von Koenigswald whom he visited in Java in 1937. Together, they "sank" *Sinanthropus* into the older *Pithecanthropus* label, eventually leading to the combining of the Chinese and Indonesian fossils into a single genus (originally speculated by Black) known as *Homo erectus*. The following year, these two scientists announced a new fossil skull from Java (*Pithecanthropus robustus*).

Second, he took a unique taphonomic perspective to the stratigraphic levels at Zhoukoudian, suggesting that some of the scattered fossil remains were the result of activities by carnivores. In one publication, he even suggested that some human skulls (only represented by the skullcap) were victims of murder, claiming that lengthy cracks and deep punctures in the bony structure were the result of violent blows to the head!

Third, he examined the more modern human skeletal remains from Zhoukoudian's Upper Cave as possibly representing different racial origins, including Mongoloid, Melanesian, and possibly Inuit, creating a hypothesis of interracial heterogeneity for the upper reaches of the Peking Man site.

Fourth, and most significantly, with continued military incursions around Zhoukoudian and infiltration into Beijing, Weidenreich and his Chinese colleagues (in particular Pei Wenzhong) arranged for the manufacture of a series of replica casts of the original *Sinanthropus* fossils, which would eventually be housed at the American Museum of Natural History. In addition, the originals of the most significant of the *Sinanthropus* fossils would be transported out of Beijing, and out of China. Sadly, the original fossils became lost, but the replicas (and further discoveries) of *Sinanthropus* are still available for scientific study.

Cross-References

- ▶ Black, Davidson
- ▶ Java Man
- ▶ Peking Man
- ▶ Zhoukoudian, Archaeology of
- ▶ Zhoukoudian: Geography and Culture

References

Gregory, W.K. 1949. Franz Weidenreich, 1873–1948. *American Anthropologist* 51: 85–90.

Further Reading

Jia, L., and W. Huang. 1990. *The story of Peking Man. From archaeology to mystery*. Beijing: Foreign Languages Press.

McCort, J.J. 1957. Franz Weidenreich 1873–1948. *New England Journal of Medicine* 257 (14): 670–671.

Wells, E. Christian

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Basic Biographical Information

Christian Wells received his B.A. from Oberlin College and his M.A. and Ph.D. in Anthropology from Arizona State University. He was trained in economic and environmental anthropology and archaeology. He is currently Professor of Anthropology at the University of South Florida, where he holds affiliate appointments with the College of Global Sustainability, the Water Institute, and the Institute for the Study of Latin America and the Caribbean. He is a member of the editorial boards for *American Anthropologist* (American Anthropological Association), *Archaeological and Anthropological Sciences* (Springer–Earth Sciences), and the *Journal of Agriculture, Food Systems, and Community Development* (New Leaf Associates).

Major Accomplishments

Dr. Wells is the Professor of Anthropology and Director of the Center for Brownfields Research at the University of South Florida, where he has served previously as Founding Director of the Office of Sustainability and Deputy Director of the Patel School of Global Sustainability. His research focuses on understanding how cultural and natural resources are increasingly impacted by global tourism. Over the past 20 years, he has undertaken social and environmental science research throughout the United States, Mexico, Central America, and the Caribbean.

He is especially known for developing methods to extract and characterize inorganic anthropogenic residues from soils and sediments associated with archaeological sites (Wells and Terry 2007). He has lectured and published widely on human impacts to the physical and chemical properties of soils over time and developed the theoretical concept of "cultural soilscapes" to characterize these impacts (Wells 2006).

His current research examines the effects of mass tourism on sustainable development, critical infrastructures, and human and environmental health (especially soil and water systems). His latest book (Lyon and Wells 2012), *Global Tourism: Cultural Heritage and Economic Encounters*, brings together ethnographers and archaeologists to explore the various ways in which hosts, guests, cultural patrimony, and natural resources intersect in the global economy of tourism.

Cross-References

▶ Community Archaeology
▶ Cultural Heritage and Communities
▶ Stakeholders and Community Participation
▶ Sustainable Cultural Tourism Policies: Overview

References

Lyon, S., and E.C. Wells, eds. 2012. *Global tourism: Cultural heritage and economic encounters*. Lanham: AltaMira Press.

Wells, E.C. 2006. Cultural soilscapes. In *Function of soils for human societies and the environment*, ed. E. Frossard, W.E.H. Blum, and B.P. Warkentin, 125–132. London: Geological Society.

Wells, E.C., and R.E. Terry. 2007. Advances in geoarchaeological approaches to anthrosol chemistry, part I: Agriculture, Part II: Activity area analysis. *Special issues of Geoarchaeology* 22(3–4).

Further Readings

McAnany, P.A., and E.C. Wells, eds. 2008. *Dimensions of ritual economy*. Bingley: Emerald Group Publishing.

Wells, E.C., and K.L. Davis-Salazar, eds. 2007. *Mesoamerican ritual economy: Archaeological and ethnological perspectives*. Boulder: University Press of Colorado.

West Africa: Islamic Archaeology

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Introduction

Unquestionably, West Africa is presently on the periphery of the discipline of Islamic archaeology, even more so than other "peripheral" areas such as the East African coast. This position within the discipline relates principally to Islamic archaeology's origins in the study of Middle Eastern material culture and its emphasis on art and architectural models that are simply not present in West Africa. West Africa, though, has been home to Islam for over 1,000 years and like elsewhere in the Islamic world has seen the development of wide-ranging cultural networks, powerful Muslim dynasties, and varied architectural and material-culture traditions. It represents perhaps one of the greatest untapped zones of Islamic archaeology, with major settlements never touched and material traditions of whole dynasties poorly understood. For an increasingly global Islamic archaeology, West Africa's "difference" actually becomes a strength (Whitcomb 2004) as we seek to diversify ideas of the cultures and material remains of Islam. Additionally, increasing prominence of West Africa within the contemporary landscape of Islam will almost certainly lead to growing interest in its past cultures and remains.

Definition

The most commonly accepted definition of Islamic archaeology is that it represents the study of all material remains in areas where the ruling elite was Muslim (Milwright 2010: 6–8). This certainly poses major problems in West Africa where Islam seemingly moved into territories not with rulers but with small enclaves of traders, and in some areas centuries passed before ruling elites adopted Islam. Based upon experiences in West Africa, Insoll (1999) has sought an alternative definition, maintaining that there are a range of Muslim behaviors that consistently create distinctive material-culture signatures and that this knowledge can be the basis for studying past Muslim societies regardless of the presence or not of a ruling Muslim elite. Within the West African context, Islamic archaeology is perhaps most usefully approached in a very open way as the research of remains relating to all past Muslim communities and their cultural networks, as well as of non-Muslim groups controlled by Muslim elites.

The material evidence defined as Islamic archaeology in West Africa has tended to be either material remains which are *excavated* from the earth or standing *ruins* of past settlements. Standing buildings which still function and ethnographically documented material-culture traditions have generally been the domain of art historians or anthropologists (e.g., Prussin 1986). Arabic inscriptions on rocks and tombstones have been the preserve of epigraphy (Moraes Farias 2003).

There is in fact really no such recognized discipline as "Islamic archaeology" in West Africa, and very few people actively seek Islamic remains or position themselves as an "Islamic archaeologist." Therefore, even though remains related to Islamic societies are recovered, they are often not properly investigated for the insights they can provide into the Islamic past. Going further, Islamic elements of past West African societies have often been actively sidelined, due to negative associations with the colonial-era belief in the importance of "Arab stimulus" for past cultural developments in West Africa. Related to this, the archaeology of Islamic societies is often approached as just one element of a wider concern with "precolonial" societies (i.e., those preceding the presence of European colonialism). The archaeology of the Islamic period is also often described using the terms "medieval" or

"postmedieval," terms which have been heavily criticized as having little relevance to West Africa's past.

There does seem to be a relatively broad consensus concerning the definition of periods in the history of West African Islam, despite the process of Islamization having been a long and complex one from around the eighth or ninth century until the nineteenth when Muslim presence first roughly approximated today's landscape (see "Historical Background" section). This picture broadly corresponds to the "early Islamic," "later Islamic," and "modern" periods discussed in the Central Islamic lands. While it would be inappropriate to apply this periodization or these labels too strictly, this does provide some means of relating Islamic history in West Africa to movements elsewhere.

Within the context of this entry, "West Africa" should not be too simplistically understood as all the territory occupied by modern West African states, as these territories are relatively arbitrary creations of the colonial and postcolonial era and provide a weak basis for discussing the Islamic past. For instance, the West African state of Mauritania extends c. 1,000 km further north of the southern extremity of the North African state of Algeria. This said, contemporary West Africa broadly approximates to a clearly defined zone within the *Bilād al-Sūdān*, or "land of the blacks," defined by early Arabic authors in Central Islamic lands. The area south of the Sahara from the Atlantic to Lake Chad was understood as an extremely rich zone of gold and slaves (as well as ivory and the mild stimulant the kola nut), becoming known particularly as "the land of gold" throughout the Islamic world. This area also had a rich tradition of states and empires, from Islam's arrival up to the colonial era. While West Africa represents a useful geographical category for thinking about Islamic archaeology, the diversity of this region must be recognized. This includes the gradual shift from the nomadic semi-desert in the north to the dense agriculturalist-occupied forest zone in the south, and a broadly related shift from a Berber (principally Tuareg) population in the north to a black population in the south.

Today, West Africa is a mosaic of Islamic, Christian, and animist groups. Arabic has historically not been the dominant language throughout Muslim West Africa, though it certainly has scholarly status, and in Mauritania is the official language.

Historical Background

External Arabic historical sources first describe Islam in West Africa around the eighth century CE, associated with traders seeking the wealth of gold, slaves, and ivory to be found there (Levtzion and Hopkins 2000). These traders used camel caravans to cross the Sahara (see Fig. 1), in an era before sea transport along the Atlantic coast (only commencing with Europeans in the fifteenth century) and prior to east–west routes connecting with the Horn of Africa (likely commencing *c.* fourteenth century). For several centuries Islam was largely restricted to traders, albeit converted indigenous traders as well as immigrants. Islamic settlement was also largely restricted to the southern Sahara and the zone immediately below the Sahara known as the "Sahel" (in Arabic, "shore"), at places such as Audaghust, Tadmekka and Kawar (see Fig. 1). This arid, sparsely populated area was the first habitable zone after the Saharan crossing and therefore was an ideal point to serve as a trading base supplying Saharan caravans with products collected from throughout West Africa. From the eleventh century, Islam began to spread further south, a process which in the western regions was significantly aided by the militant Almoravids, who waged holy war, including converting the ruler of the most powerful early kingdom, Ghana (not to be confused with the modern state of Ghana). The other most important early kingdoms, Gao and Kanem, also now appeared to experience increased Islamization. The start of the "Golden Age" of West African Islam however came in the thirteenth/fourteenth centuries and is particularly associated with the growth and expansion of power of the Empire of Mali (not to be confused with the modern Republic of Mali) and its most famous ruler, Mansa Musa, known throughout the early Muslim

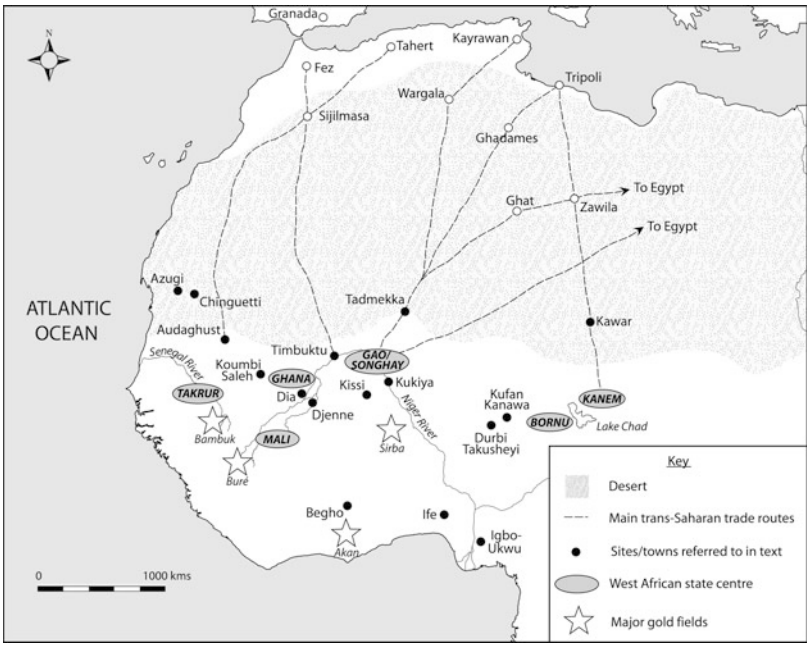

West Africa: Islamic Archaeology, Fig. 1 Map of West Africa showing key locations referred to in the text and trans-Saharan trade routes

West Africa: Islamic Archaeology, Fig. 2 View across modern Timbuktu, Mali, with the Djinguereber Mosque shown in the foreground. (Image courtesy UNESCO Serge Negre)

world for his wealth in gold. The first significant records of West African rulers' *hajj* journeys also occur now (both of Mali and Kanem), as does the development of Timbuktu (Fig. 2), West Africa's most famous city, which became a celebrated center of Islam noted for its libraries and mosques.

During the fifteenth and sixteenth centuries, Songhay, the last of the great premodern empires (developing from the ancient state center of Gao to inherit Mali's power), helped push Islam beyond its traditional heartlands deeper into the savanna and forest regions. Songhay's expansion even encroached on the kingdom of Bornu, now the successor state of Kanem in the east. The Moroccan invasion of West Africa in the late sixteenth century destabilized Songhay, and it was not until the nineteenth-century jihadist movements that Islam truly became a religion of the common people and the village. Despite a European coastal trading presence from the fifteenth century, it was not until the colonial era that Christianity developed significantly.

West African archaeology began in the mid-nineteenth century, a process intertwined with the European exploration of the African "interior" (Timbuktu itself was only finally visited and returned from by a European in 1822). Explorers pursued living cities but also the remains of past civilizations which the growing study of external Arabic records and local Arabic *tarikh*s was helping to reveal (Es-Sa'di 1900; Cooley 1841). Mainly, however, there was a focus on understanding the "traditional" or indigenous African past and this was often contrasted with Islam, despite Islam's very long history here. Already though, it could be seen that Islamic ruins in West Africa were of a very different character to those found in much of the Islamic world, including an apparent lack of monumental tiled and Arabic-inscribed architecture. While the vast majority of scholars were not fundamentally interested in Islamic remains, certain important studies were done, including the groundbreaking work of De Gironcourt (1920) who recorded the relatively extensive presence of funerary and non-funerary Arabic inscriptions (found mainly in the modern Republic of Mali, dating from the eleventh to fifteenth centuries CE). One crucial idea put in place at this time was the belief that cultural advances among West African populations had been due in large part to the "stimulus" of Arab contact.

Huge progress came in the 1950s and 1960s, largely through the work of Mauny who systematically charted "medieval" sites throughout West Africa (Mauny 1961). Focused studies also took place at such important sites as Gao, Koumbi Saleh, and Tegdaoust (associated with Audaghust). The latter in particular saw commencement of systematic investigations lasting decades (Devisse 1983). These investigations uncovered compelling evidence for sophisticated early Islamic architecture and trade imports. Certain broader reflections also started to be made concerning West African Islamic material culture, including observation and discussion of the distinct absence of locally produced Islamic coinage. Within this same era archaeology continued to uncover new evidence for the richness of West African cultures not documented by Arab sources, such as Ife and Benin, and this perhaps attracted more research interest than sites seemingly already well documented by Arabic sources.

The 1970s and 1980s began to turn up evidence that enabled scholars to begin to overturn the "Arab stimulus" hypothesis for complex society development in West Africa. A key discovery was made close to the important later Islamic town of Djenne, namely, a pre-Islamic urban site with evidence of significant long-distance trade contacts (McIntosh 1995). Further east, in the zone of Kanem-Bornu, similar evidence also emerged at Daima and Kursakata (see Gronenborn 2001).

While the preference for investigating "indigenous" pasts in contrast to Islamic pasts has been dominant, certain important studies of Islamic remains have occurred. Since the 1980s the epigrapher Paulo de Moraes Farias has illuminated the corpus of Arabic inscriptions, demonstrating their ability to provide detailed and fascinating accounts of early Islamic cultural processes (2003). Timothy Insoll's excavations, most notably at Gao (see 2003), but also at Timbuktu, provided further evidence of archaeology's potential to investigate trade and architectural history. Among other works, Cressier addressed the study of Sufi archaeology in the Sahel (Bernus et al. 1999). More recently, work at Tadmekka by the author (Nixon 2009) reconsidered how archaeology can provide insights into trans-Saharan trade. As archaeology of the last two millennia in West Africa continues apace, other projects not specifically concerned with Islam continue to turn up

West Africa: Islamic Archaeology, Fig. 3 Excavation of Islamic stone towns in the West African Sahel: left, excavation of a continuous, superimposed sequence of houses at Tadmekka, Mali (Image Sam Nixon); right, excavation beginning to undercover the stone, pillared congregational mosque at Koumbi Saleh, Mauritania, rebuilt successively between *c*. eleventh and fifteenth centuries CE. (Image copyright Bernard Nantet)

Islamic remains, including work within the Kanem-Bornu region at sites such as Garumele or Birni Gazargamo.

Key Issues/Current Debates

Most investigation of Islamic archaeology in West Africa has taken place within the context of wider investigations of West African culture of the past two millennia, with little reference to developing debates elsewhere within Islamic archaeology. Often, investigations have related to agendas created by historians grounded in the study of the Arabic records of the region. Despite this, a clear and distinct body of debates has developed which recovery of Islamic remains feeds into.

The Chronology, Geography, and Culture of Early Islamic Contact

Arabic sources clearly indicate how Islam's arrival in West Africa occurred within the context of trading ventures across the Sahara for gold, slaves, and ivory. A core ongoing debate has been attempting to understand the early chronology and geography of this trade. Although it is clear from Arabic sources that by the tenth century CE, significant trade contacts were in place across all Saharan routes, the question of whether historically undocumented trade occurred before this, and if so where, has long divided opinion. Archaeological excavations associated with the main trading town on the westernmost route, Audaghust, have not recovered clear evidence of pre-tenth-century contacts (Devisse 1983), but recent excavations at Tadmekka further east provided compelling evidence of trade at least back to the ninth century (Fig. 3; Nixon 2009; Nixon et al. 2011). The major oasis center of the Central Saharan route, Kawar (Lange and Berthoud 1977), has never been excavated, and therefore suggestions of pre-tenth-century trade here have been impossible to verify. It is in fact increasingly believed that early Islamic trade was built on strong pre-Islamic commerce in gold and slaves across the Sahara. The most compelling argument for this comes from the site of Kissi (Burkina Faso) where evidence for trans - Saharan imports can be traced from the first to the twelfth century CE (Magnavita et al. 2009).

Clarification of when trade developed is paramount, as it is central to debates over the extent to which external contact contributed to West African development. Likewise, understanding the geography of early Islamic connections is obviously important for a basic understanding of Islamic networks, but also relates to understanding the development of the states with which early Muslims traded. While Ghana in the far west has long been seen as the preeminent early West African power, evidence of early trade further east asks us to consider whether other early West

African states such as Gao or Kanem were equally important.

The identity of the first Islamic traders has been strongly debated by historians. The most prominent traders were long seen to be North African Zenata Berbers. Other historians have pointed to documentary evidence also indicating the important trading role of the Ibadi, a splinter sect of Islam who dispersed into the Sahara soon after Islam's arrival in North Africa. There is some documentary basis for suggesting that the Zenata were mainly concentrated on the westernmost route, with the Ibadi on routes further east. Excavated material culture from Tegdaoust and Tadmekka shows distinct differences between the western and eastern routes, but there is little comparative "Zenata" or "Ibadi" material from North Africa to test this against. Surface remains of mosques and cemeteries at Tadmekka and Kawar (see Insoll 2003: 206–262) are however suggestive of the early Ibadi. Clarification of this issue is important in order to understand the ethnic and religious nature of the first populations who communicated Islam to West Africa.

The Landscape of Settlement

There has been considerable interest in understanding how Islamic settlements developed throughout the landscape. Unsurprisingly, focus has been on the first settlements created at the southern edge of the Sahara. The excavations at Tegdaoust and Tadmekka suggest a lack of pre-Islamic urban phases but the existence of permanent architecture from *c*. ninth century CE. These towns appeared to continue as central places right up to the thirteenth/fourteenth century, despite the development of competing regional centers. While their vicinities are not systematically surveyed, it appears they were largely isolated in a wider nomadic environment, which accords with historical descriptions.

Away from the desert's edge, the model for initial Islamic settlement has long been one of small enclaves of traders developing close-knit communities in proximity to, but clearly separate from, capitals of local states. Archaeology has provided solid evidence of this at Gao, where a trading settlement appears to have developed 2 km from the royal settlement (Insoll 2003), and epigraphy (e.g., Fig. 4) has provided great insight into this process. While a similar "dual town" scenario is described by Arab records for Ghana, its capital has never been clearly located, although Koumbi Saleh has contentiously variously been seen as either Ghana's capital or its traders' town (see Insoll 2003). Further east, the earliest capital of Kanem has also not been found. Examples of similar "dual towns" have been proposed for other locations, including for Kukiya, downriver of Gao. While the Sahel/savanna zone

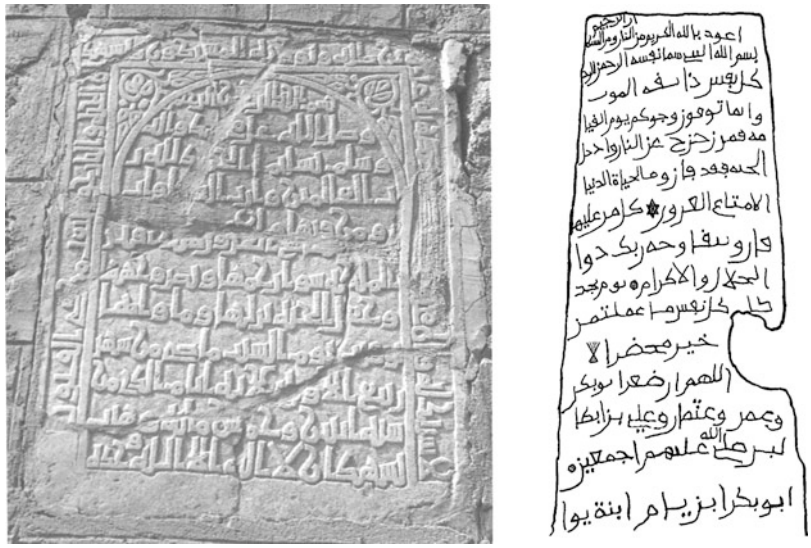

West Africa: Islamic Archaeology, Fig. 4 Arabic inscriptions from the Republic of Mali: left, imported early twelfth-century gravestone from Gao; right, drawing of locally made gravestone from Kukiya (© The British Academy 2003)

would become the heartland of West African Islam through the twelfth to fourteenth centuries CE, we have little idea of the growth of fully fledged Islamic towns. While some evidence exists from Gao, not only have we not found the capitals of Ghana and early Kanem, whose rulers supposedly converted to Islam, the capital of Mali remains undiscovered. Supreme Islamic towns such as Timbuktu and Djenne have also yet to be properly investigated. Excavations have taken place at Dia (Bedaux et al. 2005), seen as a regionally significant early Islamic center, but so far there is no clear idea of how this relates to the larger picture of Islamic settlement.

At some point during the fourteenth to sixteenth centuries, there was a further spread of Islamic traders and settlements southward to the forest fringes. The Arabic historical sources however provide limited insight into this, and therefore archaeology takes on even greater importance. One significant settlement which has been excavated and shows Muslim presence at the forest fringe from this era is Begho in modern Ghana (Stahl 1994). The whole question of settlement in this zone is, though, poorly understood. Accounts of later phases of settlement, including the nineteenth-century *jihad*s, are almost entirely based on historical records and oral tradition.

Islamic Architecture

Traditional Muslim building in West Africa is most associated with mud architecture and particularly with the Western Sudanese style, most synonymous with the legacy of Mali and Songhay (i.e., Fig. 2). This architectural style is most commonly linked to mosques, with characteristic features including flat roofs, vertical buttresses, and pyramidal minarets, with protruding wooden beams/branches acting as both structural support and decoration (Prussin 1986). While structures are mainly composed of mud-brick, wet mud is periodically added during renovation like plaster. Architecture in a broadly similar style is found right across the Sahel and savanna belt of West Africa. The Western Sudanese style has long been linked with the influence of the fourteenth-century immigrant Andalusian architect al-Saheli, but modern commentators, seeing this story as mythical, point out strong relationships with early Ibadi architecture or claim it as an entirely indigenous building style (Aradeon 1989). The oldest standing structures in this style supposedly date back to the fourteenth century but have clearly undergone extensive renovation. There are no clear excavated examples of the Western Sudanese style, or pre-fourteenth-century documentary evidence, to help us understand its origins.

Mud-brick architecture in West Africa is a highly developed tradition, linked to specialist "masons," but it is still unclear whether this "technology" is associated with Islamic influence. Archaeology has shown broad zones of difference in mud-brick form, most importantly a difference between a rectangular mud-brick tradition in the Mali/Songhay zone and the cone-shaped *tubali* bricks of northern Nigeria. Fired brick has also been found in significant quantities, especially in the Kanem-Bornu zone (e.g., Garu Kime). Fired brick is also present at Gao, in the form of a fired-brick *mihrab* and portions of what appears to be a *caravanserai*. There is no evidence of tiling, though such a tiled structure might still be found, especially given Arabic records' apparent indication of an elaborate audience hall at the still undiscovered Malian capital of Niani. Plaster and paint are both evidenced in early excavated contexts, including abstract painted designs at Koumbi Saleh and thick ochre plaster at Tadmekka, tying in with ethnographic examples (Prussin 1986).

Stone architecture, while little present today (e.g., Chinguetti, Mauritania), was clearly more common in the past. The early sites of Tegdaoust and Tadmekka (Fig. 3) are defined by stone ruins. The trading town of Ghana was also supposed to have been of stone in the eleventh century. Other stone ruins include Koumbi Saleh (Mauretania) and the Almoravid settlement of Azugi (Mauritania). That the majority of these stone towns are in the northern Sahel certainly relates to the distribution of available stone but also to the greater presence of Berber populations here who have stronger traditions of stone architecture.

A core formal division is made in West African archaeology between Muslim and non-Muslim

architecture based, respectively, upon the presence of rectilinear or circular forms. This does not always apply though, as observed by Insoll (2003: 325). Again, it would be important to recover building forms from significant early towns such as Timbuktu to progress this debate. Studies of individual building form, functional types, and decorative design in Islamic architecture in West Africa are a lively tradition in art-historical studies (Prussin 1986), but this has so far not translated into archaeology. Most strikingly, there has been a relative inattention to mosque design. There is, however, already a relatively useful collection of archaeologically occurring evidence, including the fired-brick mosque in Gao, the stone mosque of Koumbi Saleh (Fig. 3), surface evidence of mosques at Birni Gazargamo and at Tadmekka (including a *musalla*), and excavated examples of Sufi mosques from Niger (Bernus et al. 1999).

Beyond building materials and basic formal distinctions, there has been an interest in certain other additional elements in building design. Wooden doors are known from historic-era towns of the Sahel, and the recovery of keys and locks from early northern Sahelian ruins indicates the long history of this (Berthier 1997; Nixon 2009). While the presence of window glass is open to debate, we do have evidence of ceramic window grills (Fig. 5) and wooden windows from museum collections.

Another strain of research briefly to note concerns town walls. We see these particularly in both the Malian zone, in northern Nigeria, and in Niger. Not only are walled towns well documented from recent historic periods, they have also been evidenced at older abandoned sites, including one of the ancestral Hausa sites, Kufan Kanawa (Haour 2003).

West Africa: Islamic Archaeology, Fig. 5 Ceramic window grill from Djenne, Mali. (Image B. Grishaver, Collection National Museum of Ethnology Leiden, nr. 5591–1)

West Africa: Islamic Archaeology, Fig. 6 Reconstructed early Islamic glass vessel excavated at Tegdaoust, Mauritania. (Image copyright Bernard Nantet)

Trade

Since the start of excavations in West Africa, there has been research into Islamic trade goods from across the Sahara. The most common goods evidenced are glass beads, vessel glass (often merely fragments, but also some reconstructable vessels: e.g., Fig. 6), and glazed ceramics. Core commodities that also travelled and are found in relative abundance are brass ingots, most strikingly at the abandoned Saharan caravan site of Ma'aden Ijafen in Mauritania (2085 brass bars). Other obvious but less common durable markers of trade include ornately inscribed brass bowls (e.g., Gronenborn et al. 2012) and tombstones

from Spain (Fig. 4). While many sites do not feature these goods, this likely indicates not lack of trade but rather movement of other goods more difficult to detect archaeologically. A core item which has largely eluded us are textiles (see however Nixon 2009), suggested by historical sources as perhaps the most important early trade good. We are now also starting to think more critically about the trade goods which are present. Restriction of vessel glass and glazed ceramics largely to the Sahelian towns suggests perhaps that these were commodities mainly for consumption by traders themselves. The wider distribution of glass beads is more complex, especially as their greatest concentrated occurrence has been in non-Islamic graves far to the south (Igbo-Ukwu, Nigeria) in very early contexts (radiocarbon dated eighth to twelfth century CE; see Insoll 2003: 347–8).

The core commodities which the central Islamic world desired from West Africa are all items which are of poor archaeological visibility: gold, slaves, ivory, and kola nuts. Despite this, the crucial gold trade at least has seen some good archaeological insights. A mainstay of the study of the gold trade has been analysis of North African dinars, the majority being made of West African gold (dinars have also been recovered in West Africa at Tegdaoust and Gao). Increasing evidence of locally worked gold has been found, at Tegdaoust (ingots), Djenne (earring), Gao (bead), Durbi Takusheyi (jewelry), and Tadmekka (coin-blank moulds). The Tadmekka evidence demonstrated that West African gold attained an extremely high purity (98–99%), further explaining the Muslim world's fascination with it. While early Arabic sources refer mainly to the gold mines of Bambuk and Buré (Fig. 1), wider distribution of gold finds requires us to consider other important sources, including the Sirba gold fields (Niger and Burkina Faso). Archaeological finds of ivory exist (e.g., the hippo ivory cache at Gao), and slave-trade archaeology is developing, but the kola trade has so far seen little input from archaeologists.

The Tadmekka moulds have provided the only concrete evidence to date of locally produced coinage in West Africa, being proof of the "bald" (i.e., unstamped or blank) "coinage" described by early Arabic sources here (Nixon et al. 2011). While there may have been a range of such unstamped "coinages," the only documentary records of inscribed coinages are a fourteenth-century reference to Kanem silver coinage and a fifteenth-century description of West African silver coinage in Egypt (see Nixon et al. 2011). We do however have clear evidence for the adoption of the Islamic weight system, in the form of not only Fatimid glass weights (Tegdaoust) but also rudimentary, locally produced ceramic disc weights, and locally produced metal weights. Archaeology also provides extensive evidence of cowrie shells, a major import from the Indian Ocean to serve as money.

Technology and Local Material Culture

Since early in West African archaeology, much discussion has concerned whether certain technologies present in West Africa should or should not be attributed to Islam's arrival. Metalworking technology is the most contentious topic. The basic starting point for discussion is certainly that indigenous metalworking was highly proficient before Islam's arrival, particularly iron and copper. One specific technology that has led to an extensive but unresolved debate is the highly complex "lost wax" casting process, present in West Africa seemingly as early as the tenth century CE. In addition to evidence for imported brass, there is also evidence now for local brass working (Stahl 1994). Recent metallurgy studies at Tadmekka also indicate the presence of highly technical crucible steel working. Another important area of debate is textile production. Arabic sources strongly indicate the prevalence of skins for clothing prior to Islam's arrival, but it is unclear whether this was allied with an indigenous textile tradition. Certainly, restrictions on exposing the body would have led to an increased need for clothing, and all archaeobotanical evidence of cotton and spindle-whorl finds indeed postdate Islam's arrival.

Among glazed ceramics recovered, none appear to be locally produced. Likewise, analysis of vessel glass suggests that this was all imported. Glass-bead production is not totally absent from

West Africa: Islamic Archaeology, Fig. 7 Muslim male potters in Niger placing pots in preparation for a firing. (Image courtesy Olivier Gosselain)

West Africa, there being evidence for both primary glass and glass-bead production at Ife in Nigeria (*c*. twelfth century CE) and also evidence for powder glass beads from Mauritania in historic times. Suggestions of a more widespread and early tradition of glass-bead making are rather questionable, being based mainly on the presence of malformed beads or bead wasters, actually commonly included in large bead exports. We have already spoken about the apparent absence of inscribed coinage. The lack then of West African examples of these material-culture types has certainly gone a considerable way to placing West Africa outside familiar territory for many in Islamic archaeology.

Art historians and anthropologists have been highly engaged in demonstrating the wide range of material-culture forms of the historic and contemporary Muslim world in West Africa (Bravmann 1983; Prussin 1986). Archaeologists have been less successful, leading perhaps to a perception of early material-culture poverty of Islam in West Africa. Certainly, archaeology has not been well aided by the perishability of the materials which ethnographic collections suggest much early Islamic material culture in West Africa would have been created in, such as leather, wood, and textiles. Locally produced Islamic material culture is certainly not absent, however. Ubiquitous pottery naturally comes to mind, and while traditions of pottery associated with Islamic groups in West Africa are perhaps better defined in the anthropological literature (Fig. 7), the implications of this for archaeologists appear promising. Survey also shows various other distinctive types of durable, archaeologically recoverable material culture, including ceramic fabricated items, such as spindle whorls, jewelry, and functional metal objects of everyday use (e.g., Fig. 8).

West Africa: Islamic Archaeology, Fig. 8 Padlock and key produced by Hausa metalworkers (Nigeria) and traded to Ashanti (Ghana) – collected in Kumasi (Ghana) in 1818. (© The Trustees of the British Museum)

International Perspectives

West African Islamic archaeology has involved a wide range of non-West African national research

teams but principally French, English, German, Dutch, and American, as well as a recent Japanese collaboration in Mali (Gao). West African national researchers are largely associated with government heritage and research agencies (see particularly Mamadou Cisse's work at Gao).

To date, West African Islamic archaeology has mainly been researched in Mali, Mauritania, Nigeria, and Niger. Contemporary politics in these countries linked to recent Islamic fundamentalist movements have obviously problematized this focus. The broad shift of international projects to other countries will likely see more results relevant to Islamic archaeology from countries such as Senegal, Ghana, and Benin. Changing patterns of relations between Islam and the West presents a more nuanced situation for West African national agencies. Certainly though radical Islam sees all archaeological practice as problematic. However, more moderate development of a stronger Islamic consciousness might lead to more investment in the study of Islamic remains than the emphasis so far on prehistoric or "indigenous" archaeology.

While practical and political problems currently dominate the international outlook for Islamic archaeology in West Africa, we should highlight the need also for new impetus to link West African research more into the international scene. Certainly, there should be renewed efforts at establishing broad theoretical connections, but also this might be aided by comparative approaches with other more peripheral areas of the Islamic world. Most obviously, there is the East African coast, but also perhaps Silk Road archaeology, which is allied to a similar long-distance trade network in a region expanding beyond the Arabized Islamic heartlands.

Future Directions

Other than progressing the key issues and debates outlined above, there are a number of core research areas that would improve understanding of the West African Islamic past in itself and insert West African Islamic archaeology into wider global debates.

1. *The archaeology of religion*. Research on this core area of Islamic archaeology has been relatively poor. Firstly, a more systematic assessment of evidence for mosque architecture is required, including analysis of style and space, but also *qibla* orientation, and site location. In addition, it is necessary to use the available evidence, particularly from epigraphy, to communicate early conceptions of Islam among West African populations, the epigraphic corpus in itself containing numerous Koranic passages and other Islamic lore and local renderings of these. Surface remains from burial grounds also offer a fascinating resource, including funerary stelae, enclosures, and monuments. Existing excavated burial evidence is also important (e.g., Gronenborn et al. 2012; Paris 1996), particularly for what this shows about crossovers between animism and Islam.
2. *Secular architecture and settlement planning*. So far a synthetic and analytical understanding of the secular built environment of Islam in West Africa is less developed even than understanding of religious architecture. There is in fact a relatively wide range of evidence, particularly from the northern Sahelian stone towns, not only from excavated data but also from aerial photographs. This aerial photography also represents an ideal resource for thinking about settlement planning of Muslim towns. This certainly requires engagement with the extensive work done by art historians and anthropologists.
3. *Locally produced material culture*. It has already been stated how little archaeologists have generated insights into locally produced Islamic material culture in comparison to their insights into imports. Anthropology has begun to gain certain detailed insights into how pottery making and technical style, as well as form, changes with Islam (O. Gosselain personal communication), and therefore this represents a potentially ideal point for archaeologists to commence.
4. *Diet*. While archaeology is well equipped to deal with this crucial topic due to the widespread preservation of bones and botanical

material, as yet a systematic treatment has not been attempted. Recovery of evidence at Tadmekka provided positive signs of the potential of investigation, including unexpected evidence of dog and wheat consumption (Nixon 2009).

5. *Cross–Saharan connections*. Throughout the majority of its history, West African Islam has been closely linked to other distant parts of the world and in particular had a strong history of interchange with North Africa. Given this, it is somewhat surprising that there is an almost total lack of archaeological exchange across the Sahara. This is not only an issue for studies of trade goods and immigrant communities as there were important episodes within African Islamic history which involved both North and West Africa. Most obviously, the Almoravid movement came from Mauritania to conquer Morocco and Spain. Also, early Ibadi culture spanned the Sahara, and the Fatimids had major involvements with West African trading towns. Lastly, in the late sixteenth century, it is impossible to consider West African history without the Moroccan conquest, and likewise this movement left impacts and archaeological remains in Morocco.

In addition to new research themes, there are innumerable important Islamic sites that have never been investigated, from Chinguetti in Mauritania, referred to locally as "the seventh city of Islam," to the early Songhay capital town of Kukiya, to the Kawar oases in Niger where some of the first Islamic populations in West Africa settled. Also, there is the rarely discussed and underexplored Senegal river zone (see McIntosh et al. in press). This is not withstanding the as yet undiscovered capital cities of the states of Ghana and Mali whose kings were some of the most important converts to Islam. The archaeology of Islam in West Africa has already provided many insights, but in some ways the surface has hardly yet been scratched. When and how this is explored further certainly though relates to larger patterns of international politics and currents of Islam in West Africa.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic Archaeology
- ▶ Islamic Archaeology and Art History
- ▶ Islamic Industry, Archaeology of
- ▶ Medieval Archaeology
- ▶ Orientalism: Islamic Archaeology and its Colonial Context
- ▶ Religion in Islamic Archaeology
- ▶ Spain and North Africa: Islamic Archaeology
- ▶ Swahili Archaeology
- ▶ West Africa: Museums
- ▶ West and Central Africa: Historical Archaeology

References

Aradeon, S. 1989. Al-Saheli. The historian's myth of architectural technology transfer from West Africa. *Journal des Africanistes* 59: 99–131.

Bedaux, R., J. Polet, K. Sanogo, and A. Schmidt. 2005. *Recherches archéologiques à Dia dans le Delta intérieur du Niger, Mali: bilan des saisons de fouilles 1998–2002*. Leiden: CNWS.

Bernus, E., P. Cressier, A. Durand, F. Paris & J.-F. Saliège. 1999. Vallée de l'Azawagh. Sahara du Niger. Études Nigériennes 57. Saint-Maur: Sepia.

Berthier, S. 1997. Recherches archéologiques sur la capitale de l'empire de Ghana: étude d'un secteur d'habitat à Koumbi Saleh, Mauritanie. Campagnes II-III-IV-V (1975–1976)–(1980–1981). Cambridge Monographs in African Archaeology 41/BAR International series 680. Oxford: Archaeopress.

Bravmann, R. 1983. *African Islam*. Washington, DC: Smithsonian Institution Press.

Cooley, W.D. 1841. *The Negroland of the Arabs examined and explained: or, An inquiry into the early history and geography of Central Africa*. London: J. Arrowsmith.

De Gironcourt, G. 1920. *Missions De Gironcourt en Afrique Occidentale 1908-1909 – 1911-12. Documents scientifiques*. Paris: Société de Géographie.

de Moraes Farias, P.F. 2003. *Arabic medieval inscriptions from the Republic of Mali. Epigraphy, chronicles and Songhay-Tuareg history*. Oxford: Oxford University Press.

Devisse, J., ed. 1983. *Tegdaoust III. Recherches sur Aoudaghost (Campagnes 1960–1965, Enquêtes*

générales). Paris: Éditions Recherche sur les Civilisations (ADPF).
Es-Sa'di, A 1900. *Tarikh es-Soudan*. Translated by O. Houdas. Paris: Ernest Leroux.
Gronenborn, D. 2001. Kanem-Borno: A brief summary of the history and archaeology of an Empire of the Central Sudan. In *West Africa during the Atlantic slave trade: Archaeological perspectives*, ed. C.R. DeCorse, 101–130. London: Leicester University Press.
Gronenborn, D., P. Adderley, J. Ameje, A. Banerjee, T. Fenn, G. Liesegang, C-P. Haase, Y. Abdallah Usman & S. Patscher. 2012. Durbi Takusheyi: A high-status burial site in the western Central *bilād al-sūdān*. Azania: Archaeological Research in Africa 47 (3): 256–271.
Haour, A. 2003. *Ethnoarchaeology in the Zinder region, Republic of Niger: the site of Kufan Kanawa*. Cambridge Monographs in African Archaeology 56. Oxford: Archaeopress.
Insoll, T. 1999. *The archaeology of Islam*. Oxford: Blackwell.
Insoll, T. 2003. *The archaeology of Islam in Sub-Saharan Africa*. Cambridge: Cambridge University Press.
Lange, D., and S. Berthoud. 1977. Al-Qasaba et d'autres villes de la route centrale du Sahara. *Paideuma* 23: 19–40.
Levtzion, N., and J.F.P. Hopkins, eds. 2000. *Corpus of early Arabic sources for West African history.* Princeton: Markus Wiener Publishers.
Magnavita, S., L. Koté, P. Breunig, and O.A. Idé, eds. 2009. *Crossroads/Carrefour Sahel. Cultural and technological developments in first millennium BC/AD West Africa*. Frankfurt: Africa Magna Verlag.
Mauny, R. 1961. *Tableau géographique de l'Ouest africain au Moyen Âge d'après les sources écrites, la tradition et l'archéologie*. Dakar: IFAN.
McIntosh, S. 1995. *Excavations at Jenne-Jeno, Hambarketolo and Kaniana (Inland Niger Delta, Mali), the 1981 season*. Berkeley/Los Angeles: University of California Press.
McIntosh, R., S. McIntosh, and H. Bocoum. In press. *Seeking the origins of Takrur: archaeological excavations and survey in the Middle Senegal River Valley.* New Haven: Yale University Publications in Anthropology.
Milwright, M. 2010. *An introduction to Islamic archaeology.* Edinburgh: Edinburgh University Press.
Nixon, S. 2009. Excavating Essouk-Tadmakka (Mali): new archaeological investigations of early Islamic trans-Saharan trade. *Azania: Archaeological Research in Africa* 44: 217–255.
Nixon, S., T. Rehren, and M. Filomena Guerra. 2011. New light on the early Islamic West African gold trade: Coin moulds from Tadmekka, Mali. *Antiquity* 85: 1353–1368.
Paris, F. 1996. *Les sépultures du Sahara nigérien, du néolithique à l'islamisation*. Paris: Orstom Editions.
Prussin, L. 1986. *Hatumere: Islamic design in West Africa*. Berkeley: University of California Press.
Stahl, A. 1994. Innovation, diffusion, and culture contact: The Holocene archaeology of Ghana. *Journal of World Prehistory* 8: 51–112.
Whitcomb, D. (ed.) 2004. Changing social identity with the spread of Islam. Archaeological perspectives. (The Oriental Institute of the University of Chicago, Oriental Institute Seminars 1. Chicago: University of Chicago Press.

Further Reading

Devisse, J. 1988. Trade and trade routes in West Africa. In *General history of Africa, Volume III: Africa from the seventh to the eleventh century*, ed. M. el Fasi, 367–435. Berkeley: University of California Press.
Devisse, J., ed. 1993. *Vallées du Niger*. Paris: Editions de la Réunion des Musées Nationaux.
Insoll, T. 1996. *Islam, archaeology and history. Gao region (Mali) ca. AD 900–1250.* Cambridge Monographs in African Archaeology 39/BAR International series 647. Oxford: Tempvs Reparatvm.
Lange, D. 2004. *Ancient kingdoms of West Africa. Africa-centred and Canaanite-Israelite perspectives*. Dettelbach: Roll.
Levtzion, N. 1985. The early states of the western Sudan. In *History of West Africa*, ed. J.F. Ade Ajayi and M. Crowder, vol. 1, 3rd ed., 129–166. Harlow: Longman Group Ltd.
Maas, P., and G. Mommersteeg. 1992. *Djenné: Chef d'Oeuvre Architectural*. Bamako: ISH/Amsterdam: Institut Royal des Tropiques.
Masonen, P. 2000. *The Negroland revisited: Discovery and invention of the Sudanese Middle Ages*. The Finnish Academy of Science and Letters: Helsinki.
Palmer, H. 1967. *Sudanese memoirs. Being mainly translations of a number of Arabic manuscripts relating to the Central and western Sudan*. London: Frank Cass & Co.

West Africa: Museums

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Introduction

West African museums are as diverse as West African cultures. They include history museums, research institutes, open-air museums, privately owned museums, and religious sites. Major influences on the type, size, and constitution of the

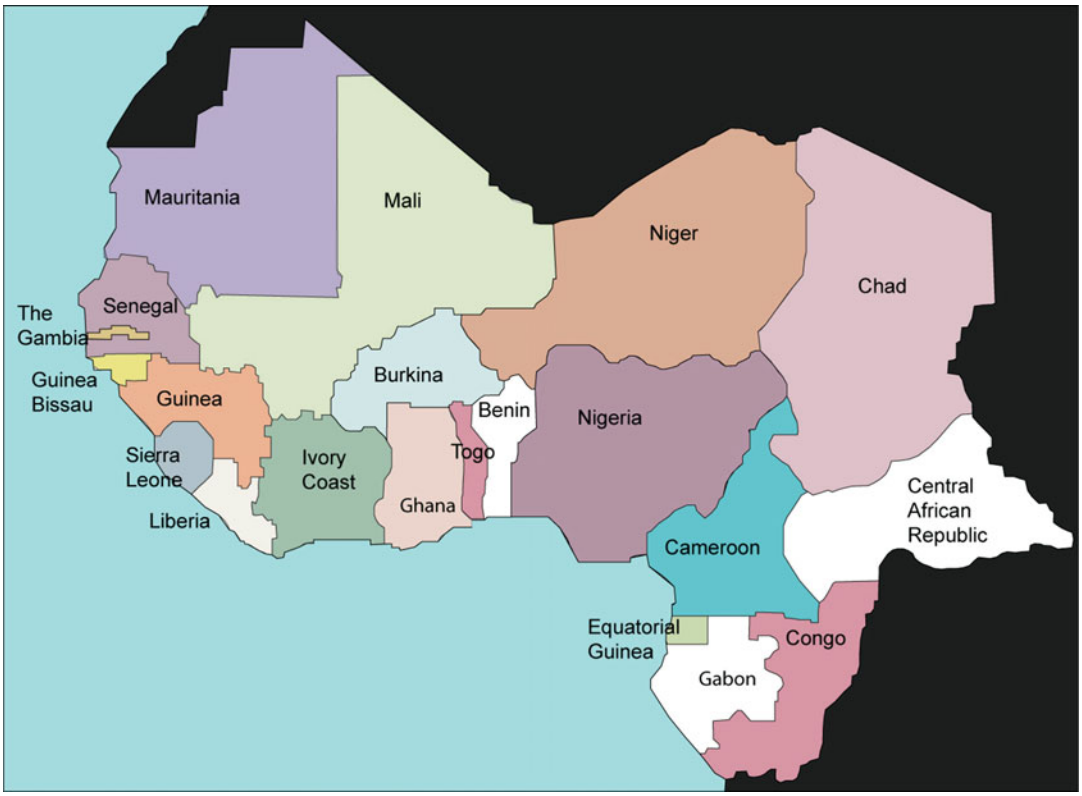

West Africa: Museums, Fig. 1 Map of West Africa (Map drawn by Kylie Lower). (Source: United Nations 2005)

museums include factors such as remnant or sourced artifacts and collections, religious prominence (Islam, Christianity, and African traditional religions), and the availability of financial support. A common thread is the display of vibrant and dynamic cultures.

While the treasures and artifacts of West Africa are routinely displayed in the museums of former colonial powers, such as the British Museum in the United Kingdom and the Ethnologisches Museum in Germany, support is needed to protect, conserve, and display the collections held by museums in West Africa itself.

Definition

The Sahara Desert to the north borders the region of West Africa while the Atlantic Ocean borders the western and southern areas of the region. The region of West Africa includes Benin, Burkina Faso, Cameroon, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo (Fig. 1). The region's natural cultural and linguistic diversity was reinforced by varied influences from European colonization by the British, French, German, and Portuguese. Accordingly, there is great variety in both the content and form of museums in West Africa.

Key Issues and Current Debates

The key issues for museums in West Africa concern the professional training of staff to curate artifacts and prepare exhibitions, obtaining

sufficient funding to conserve and protect materials and dealing with the legacies of colonialism, including the repatriation of materials from former colonizing countries.

While some people had accompanied archaeologists on fieldwork or were employed as cleaners or attendants at museums, until recently, few curators in West African museum had undergone professional training in museum management skills. The lack of trained staff and dedicated funding to manage and analyze collections, and undertake training and educational programs led to many museums failing to develop a vision or mission consistent with national goals (Ardouin and Arinze 2000).

The Bendrologie Museum of Manega in Burkina Faso provides an example of a private museum that has successfully integrated local cultural traditions into museum displays. This museum has three functions: collection, conservation, and the study of art objects. Several buildings are used for exhibitions, while others are administrative. In addition, the museum houses dwellings built using traditional techniques, including Bobo, Senufo, and Fulbe houses. The museum's collections include masks, musical instruments, weapons, tombstones, books, paintings, currency, jewelry, and over a hundred stuffed animals (Ardouin and Arinze 2000: 65–66). One of the interesting places in the Museum is "The Pavilion of Death," which houses objects and displays relating to death. When visiting this space, visitors must enter and exit backward, and remove their shoes and hats, in deference to Mossi cultural customs regarding death, death being the opposite of life (Bendrologie Museum of Manega 2013).

Though funding is a major issue for museums throughout Western Africa, the establishment of the African World Heritage Fund in 2006 provided an additional source of revenue for protecting and conserving those museums that are located on World Heritage sites in West Africa.

Two of the 32 places from West African countries inscribed on the World Heritage List in 2013 are museums. These are the Royal Palace of Abomey in Benin and Old Towne of Djenné in Mali. The Royal Palace of Abomey is the remnants of a vanished kingdom, which ruled from 1625 to 1900 (Fig. 2). The world heritage area is inclusive of 10 palaces, which are no longer inhabited. Two of the palaces were restored to house a collection of royal objects. The Historical Museum of Abomey illustrates the history of the kingdom and its desire for independence against colonial occupation. The collection is used in exhibitions and educational programs and includes murals, sculptures, and a series of intricate earthen bas-reliefs (Ardouin and Arinze 2000: 164; UNESCO 2013b). The Old Towne of Djenné is one of the oldest towns of sub-Saharan Africa, being inhabited since 250 BCE. Around 2000 traditional houses have survived. The houses are built on hillocks to protect them from seasonal floods (Fig. 3). This place is an open-air museum that includes public buildings and family dwellings. Excavations have discovered remains of traditional brick structures (djénné ferey), funerary jars, millstones, and various terra cotta artifacts. The buildings are earthen construction and include several monumental houses, the reconstructed Great Mosque, Koranic schools, and the Tombs of the Saints (Ardouin and Arinze 2000: 24; UNESCO 2013a). Though families normally have a duty to maintain their architectural heritage, at Djenné family dwellings are in a poor state due to internal conflicts and disputed successions.

The West African Museums Programme (WAMP) started in 1982. WAMP is an African nongovernment organization dedicated to the development of private, community, specialized, and public museums in West Africa. Its mission is to improve the capabilities of museum professionals and organizations and increase attendance at museums in West Africa, regardless of language and geographical barriers. WAMP organizes various training opportunities, such as workshops, courses, symposiums, and regional programs. WAMP has individual and institutional membership (WAMP 2007). WAMP has hosted several major workshops focusing on different

West Africa: Museums, Fig. 2 Old Towne of Djenné. (Source: Stephen Davies)

West Africa: Museums, Fig. 3 Royal Palace of Abomey. (Source: Stephen Davies)

themes. The first workshop in 1985 in Lomé, Togo was on "Museums and the Community in West Africa." This was followed by "Museums and Archaeology in West Africa" in Abidjan, Côte d'Ivoire, in 1993, "Museums and History in West Africa" in Ouidah, Benin, in 1995 and "Museums and Urban Culture in West Africa" in Accra, Ghana, in 1996. WAMP has a website (WAMP 2007) and various publications such as a regular Bulletin, books, videos, and audios. In 2000, WAMP published a *Directory of Museums in West Africa*, listing the museums by country and type. The proceedings of the above major workshops have also been published. Arinze (1988: 37) advises that WAMP has played a positive role for stimulating more representative collections and the establishment of more local museums. The Small Grants Programs run by WAMP has also been successful in stimulating practical activities in museums.

Future Directions

The establishment of many museums during the colonial era in West Africa served the colonial agendas of the time, particularly that of articulating the devolution of political authority with building more modest reforms through progress in education (Hargreaves 1996: 107). From the 1950s, museums were used as a mechanism to rewrite history and in fostering national consciousness. Efforts were made to train Africans to work in museums. Governments started to take responsibility for museum funding. In 1963, UNESCO established a training center in Jos, Nigeria, which trained many museum professionals (Arinze 1988: 32).

The repatriation of cultural objects has long been a matter of concern for museums in West Africa. Throughout West Africa, objects of movable heritage have been plundered from archaeological sites, due to a lack of local awareness and unregulated tourism. Indeed, Basu (2012: 163) argues that one of their primary flows of antiquities is into European and North American museums and art markets. The most renowned repatriations in more recent times include the repatriation of the Benin Bronzes to Nigeria (O'Neill 2004).

Dealing with the legacies of colonialism is a challenge for museums throughout West Africa. In the postcolonial era, one response has been to neglect the parapets of colonialism, including museums. In Sierra Leone, for example, Basu (2012: 146) argues that the neglect of the National Museum in the postcolonial era can be regarded as intentional, as a "tacit act of resistance against the hegemonic forces of colonialism, against even the memory of colonialism."

Throughout West Africa, museums are adopting different models to present interesting and new experiences. Various mechanisms have been set up to tackle issues surrounding museum management. For instance, at Djenné, surveillance teams were set up to fight unauthorized excavations of archaeological sites and an information and awareness center was established to educate visitors to the city (Ardouin and Arinze 2000: 27). Although they may share similar goals of social inclusion and righting historical wrongs, the approach taken to museums in other countries that portray African heritage and culture is a contrast to the approach taken within African museums, the latter which is more empowering to Africans (Oldfield 2012).

One critical issue facing West African countries today is that of reclaiming and curating their pasts. For some museums, the priority is to undertake further research into identified or unattributed objects in their collections, while for others, there is a need to prepare interpretative materials for visitors or conserve their collections. Irrespective of the issues faced by each individual museum, it is clear that museums in West Africa have an important role to play for international visitors, visitors from different parts of Africa, and nationals of the particular country.

Cross-References

- ▶ African World Heritage Fund (AWHF)
- ▶ British Museum
- ▶ Buildings Archaeology
- ▶ East Africa: Museums
- ▶ Heritage Museums and the Public
- ▶ Museums and Memory Experiences
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective

References

Ardouin, C.D., and E.N. Arinze, eds. 2000. *Museums & history in West Africa*. Washington: Smithsonian Institution Press.

Arinze, E.N. 1988. African museums: The challenge of change. *Museum International* 50 (1): 31–37.

Basu, P. 2012. A museum for Sierra Leone? Amateur enthusiasms and colonial museum policy in British West Africa. In *Curating empire: Museums and the British imperial experience*, ed. S. Longair and J. McAleer, 145–167. Manchester: Manchester University Press.

Bendrologie Museum of Manega. 2013. *Bendrologie Museum*. Available at: http://www.musee-manega.bf/ang/index.htm (accessed 4 April 2013).

Hargreaves, J. 1996. *Decolonization in Africa*. London: Longman.

O'Neill, M. 2004. Enlightenment museums: Universal or merely global? *Museum and Society* 2 (3): 190–202.

Oldfield, J.R. 2012. Repairing historical wrongs: Public history and transatlantic slavery. *Social and Legal Studies* 21 (2): 243–255.

UNESCO. 2013a. *Old Towne of Djenné*. Available at: http://whc.unesco.org/en/list/116 (accessed 3 April 2013).

UNESCO. 2013b. *Royal palace of Abomey*. Available at: http://whc.unesco.org/en/list/323 (accessed 3 April 2013).

United Nations. 2005. *Map of West Africa*. Available at: http://www.un.org/depts/Cartographic/map/profile/westafrica.pdf (accessed 3 April 2013).

WAMP. 2007. *West African Museums Programme*. Available at: http://www.wamponline.org/en/index.php (accessed 3 April 2013).

Further Reading

Ardouin, C.D., ed. 1997. *Museums & archaeology in West Africa*. Washington: Smithsonian Institution Press.

Ardouin, C.D., and E.N. Arinze, eds. 1995. *Museums & the community in West Africa*. Washington: Smithsonian Institution Press.

Ardouin, C.D., and E.N. Arinze. 2002. *Museums & urban culture in West Africa*. Washington: Smithsonian Institution Press.

West and Central Africa: Historical Archaeology

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Introduction

The region of West Africa – extending from Senegambia in the west to Cameroon in the east and bordered by the Atlantic Ocean in the south and the Sahel to the north – is ripe for archaeological research focused on early global interactions. In the mid-fifteenth century CE, notable European figures, such as Christopher Columbus, navigated along the West African coast and exchanged ideas and goods with speakers of the Niger-Congo language, who dominated local political relations (DeCorse 2001: 3). Likewise, the region of Central Africa – encompassing the area in, and between, the states of Cameroon, Chad, and the Democratic Republic of the Congo – offers a prime setting in which to investigate the emerging relations between fifteenth-century CE Portuguese traders and Bakongo. Researchers who engage in historical archaeology in West and Central Africa use methods and theories aimed at elucidating the intense interconnectedness that defines modern life. Yet, absolute definitions of the term are impossible and debates rage over the moment marking the start of the historic era and the relative agency exerted by African groups and outside ones.

Definition

In early programmatic statements, historical archaeology was defined by the expansion of Western European people across the globe and attendant social, economic, and political changes experienced by the non-European groups they encountered. Americanist researchers set the pace for such theorizations and looked to the mid to late fifteenth century as the period when

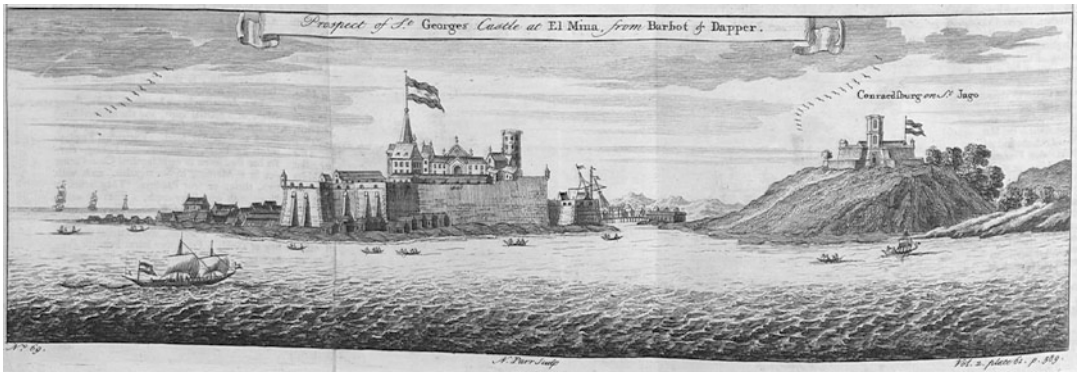

West and Central Africa: Historical Archaeology, Fig. 1 View of Elmina Castle from the sea in 1745–1747 (Astley 1745–1747: vol. 2, plate 61, facing p. 589)

explorers connected continental Europe to the broader Atlantic World. In turn, they distinguished historical sites as ones where archaeologists could intermingle European lines of evidence such as artifacts, settlement patterns, aesthetic qualities, and documentary sources to measure the frequency and amplitude of local changes. Early historical archaeological efforts in West and Central Africa followed Americanist research paradigms and focused on European monumental architecture and political prominence (Posnansky and DeCorse 1986). Thus, stone trading forts along the Ghanaian coast and colonial buildings in Angola served as benchmarks for European dominance in local political arenas (Fig. 1). Researchers used a similar investigative frame to interpret archaeological sites associated with Arab traders, who were in the Sahel of West Africa by the end of the first millennium CE. In both cases, sites associated with outside groups were associated with literacy and urbanism, while sites associated with local groups were interpreted as nonliterate, prehistoric, and village or town dwellers.

More recently, researchers have critiqued definitions of historical archaeology underpinned with Eurocentric notions of cultural exchange and the omission of African oral testimonies as a valid line of comparative evidence (Andah and Okpoko 1979). The subdiscipline has been further broadened by questioning the assumption that European/African power dynamics associated with colonialism were analogous to those in the deeper historical past (Cusick 1998; Lane 2005). Rather than a focus on the impact of Europeans, these more holistic efforts now theorize Europeans as intrusive and part of a broader historical process through which outside traders and diplomats were seamlessly integrated into local negotiations of power and authority. Research paradigms accordingly shifted to understand the long-term historical processes impacting local political economies and the ways that Europeans were latecomers to such interactions (Stahl 2001). Africanist researchers are still at pains to define the "historical" element of historical archaeology. Rather than attempting to define fixed moments in the past where history begins and prehistory ends, Africanist archaeologists argue that interpretations of the past are constructed in the present. Thus, the past and timelines dividing it are products of modern political negotiations and the agendas of individual researchers (Reid and Lane 2004). Despite its arbitrary and political nature, historical archaeology provides a means of drawing West and Central Africa into debates over modernity, cosmopolitanism, and globalization. While the earliest examples of historical archaeology in West and Central Africa highlighted the presumed political sea change caused by European interlopers, more recent projects focus on placing events associated with European contact and colonialism along a much longer historical arc.

Key Issues

Current longitudinal studies do not assume that West and Central Africa are on an evolutionary trajectory toward a Western prototype. The investigation of African urban forms nicely illustrates this point. McIntosh and McIntosh (1995) convincingly argue that cities emerged in the Middle Niger Delta region in the late first millennium CE. The urban forms, at sites such as Jenne-jeno, predate the entrance of European and Arab traders into the area and exhibit unique kinds of settlement types and political arrangements. Rather than a palatial citadel surrounded by an urban warren, Jenne-jeno exhibits a massive town wall surrounding individual urban clusters, each of which contains house compounds similar in size and appointment to one another. This heterarchial arrangement of structures does not fit standard models of urbanism in other parts of the globe where cities are often found nested within hierarchical settlement systems and contained within state-like political systems. Roderick McIntosh uses the Jenne-jeno example, alongside ethnographic and linguistic research in the surrounding region, to explore the deep symbolic reservoirs contained within the modern oral histories. He argues that these accounts hold the key for understanding how archaeological actors actively manipulated their local environments and then passed along detailed knowledge of landscapes to future generations. Moreover, he questions whether or not it is necessary for a city to be supported by a state-like political structure. Indeed, it appears that dense arrangements of people – urban centers surrounded by related rural countryside – were possible in the Sahel without the support of broad state-like political interactions.

While the McIntoshes focused on recreating the dynamic relationships connecting Jenne-jeno to its nearby hinterland, Timothy Insoll (1997, 1998) has documented the trans-regional networks that connect Timbuktu and Gao. Through archaeological survey and detailed mining of local Arabic archives, Insoll has traced the vibrant trade networks that moved gold, salt, ivory, and war captives between the Sahel, North Africa, and the broader Mediterranean region (see also Haour 2011). Attempts to connect local political economies to trans-regional ones is a classic research agenda in the historiography of historical archaeology, as is creating social biographies of trade goods. David et al. (1991) used a detailed ethnoarchaeological investigation of local handbuilt earthenware ceramic vessels to reveal the ways that material culture frames ethnicity and identity in present-day Cameroun. Analogous decorative styles and depositional patterns in the archaeological record suggest that similar dynamics were at play in the deeper archaeological past. In a similar vein, Akin Ogundiran (2002) has investigated the shifting regimes of value associated with cowry shell "currency" used across West Africa. This study traced cowries from the Maldives Islands and into shrines, ancestral offerings, and ritual regalia.

Whereas documentary sources, such as ship's manifests and diarist's accounts, discuss cowries in economic terms, Ogundiran demonstrated that Yoruba oral sources and modern ethnoarchaeological observations can broaden the interpretation of cowries into social and political realms as well. Furthermore, his study illustrates the utility of addressing issues of the Atlantic World at both local and global scales of interaction. Gouda and English pipe makers, who created the iconic white clay pipes ubiquitous on Atlantic era sites, never intended for their wares to be included in Bight of Benin ancestral shrines (Norman 2009). Granular histories, which work from the specific domestic contexts up to instrumental transnational ones, hold the potential to challenge conventional interpretations underpinned by Western European notions of materiality. The interpretation of cowries and pipes in West Africa has been modeled on the work of Ann Stahl (2001), who suggests working "upstream" from the present to the deeper archaeological past. Stahl's longitudinal research project began with intensive ethnohistorical and archaeological research conducted with people living in and around the site under investigation. These oral sources were then carefully compared, and contrasted, with archaeological material sequenced from the present to the Iron Age. Through identifying tensions between oral,

documentary, and archaeological sources, Stahl elucidated the changes in aesthetic preferences and daily practices as the Banda region of Ghana was drawn into regional urban networks and Atlantic spheres of exchange.

As the above examples illustrate, archaeologists in West and Central Africa regularly push the bounds of the "historic" into what once was considered the deeper "prehistoric" past. Yet for this broad region, historical archaeology remains synonymous with the investigation of the emerging Atlantic World and the dislocations associated with colonialism. Attempts to understand the African Atlantic or colonialism must address the forced removal of approximately 12 million people from West and Central Africa to slave societies in the Americas. In return, tons of mass-manufactured trade items from Europe, tobacco from the Americas, and cowries from the Maldives poured into the area. Due to the global reach of trade associated with war captives on the African coast, there is a long-standing research agenda of integrating West and Central Africa alongside related locales of the African diaspora as one unit of analysis (Agorsah 2011). Merrick Posnansky was one of the first researchers to initiate research on the coastal West African states that profited from the Atlantic slave trade. Kings and elites associated with the polities of Allada, Dahomey, and Hueda (Fig. 2) controlled coastal outlets into the Atlantic and in turn taxed traders and used the surplus to lavish gifts on political followers (Norman 2009). Amassing such "wealth in people" fits within local understanding of power and authority, which involves mobilizing people, rather than specie. Although each of these polities experienced population expansion and settlement nucleation inward toward their central palace complexes, archaeological research reveals that political structures, economic networks, and social processes were expanded rather than radically altered during the Atlantic era. The investigation of interregional and intraregional relationships between West African states has brought into clearer focus the massive movement of people and things away from the Sahel in the fifteenth and sixteenth century and toward the coast. It has also provided poignant vignettes of people in smaller-scale sites and border regions, who were caught between larger warring states and buffeted by demands for war captives (Usman et al. 2005).

As with the emergence of urbanism and transregional trade, researchers vigorously debate the origins of slavery (see Lane and MacDonald 2011). Questions emerge over whether enslavement – as a political designation where one person, or group of people, forcibly claims ownership of others – represents an internal or external phenomenon. As discussed above, heterarchy appears to be a common political arrangement in at least some areas of West and Central Africa. At the same time, hierarchial political arrangements where political leaders collect wards, concubines, political captives, and pawns appear to have a deep history throughout the region as well (e.g., Swanepoel 2011). Researchers are thus faced with the problem of how to identify enslavement in the archaeological record. At the level of the domestic unit – house or palace compounds – identifying enslavement appears problematic. The houses of "free" rural agricultural and enslaved laborers might present very similar archaeological signatures. Given that West and Central African leaders often circulated material wealth, rather than amassing it themselves, identifying the residences of elite African "slave owners" presents problems as well. Most researchers turn to broader landscapes as a means of identifying regional level warfare and intensive agriculture that may represent the results of slaving as a political strategy.

Increasingly, historical archaeologies of West and Central Africa draw on landscape studies in an attempt to highlight the active role that monuments, spaces, and places play in the human experience (Monroe and Ogundiran 2012). Such studies have been particularly successful in engaging the interests of local stakeholders through research efforts focused on local concerns (Apoh and Gavua 2010). Landscape studies also work to disrupt conventional narratives focused on European agency associated with the built landscape. Brempong Osei-Tutu (2007) demonstrates that, while massive, European forts can be fonts of memories documenting the dislocations associated with European trade and colonialism.

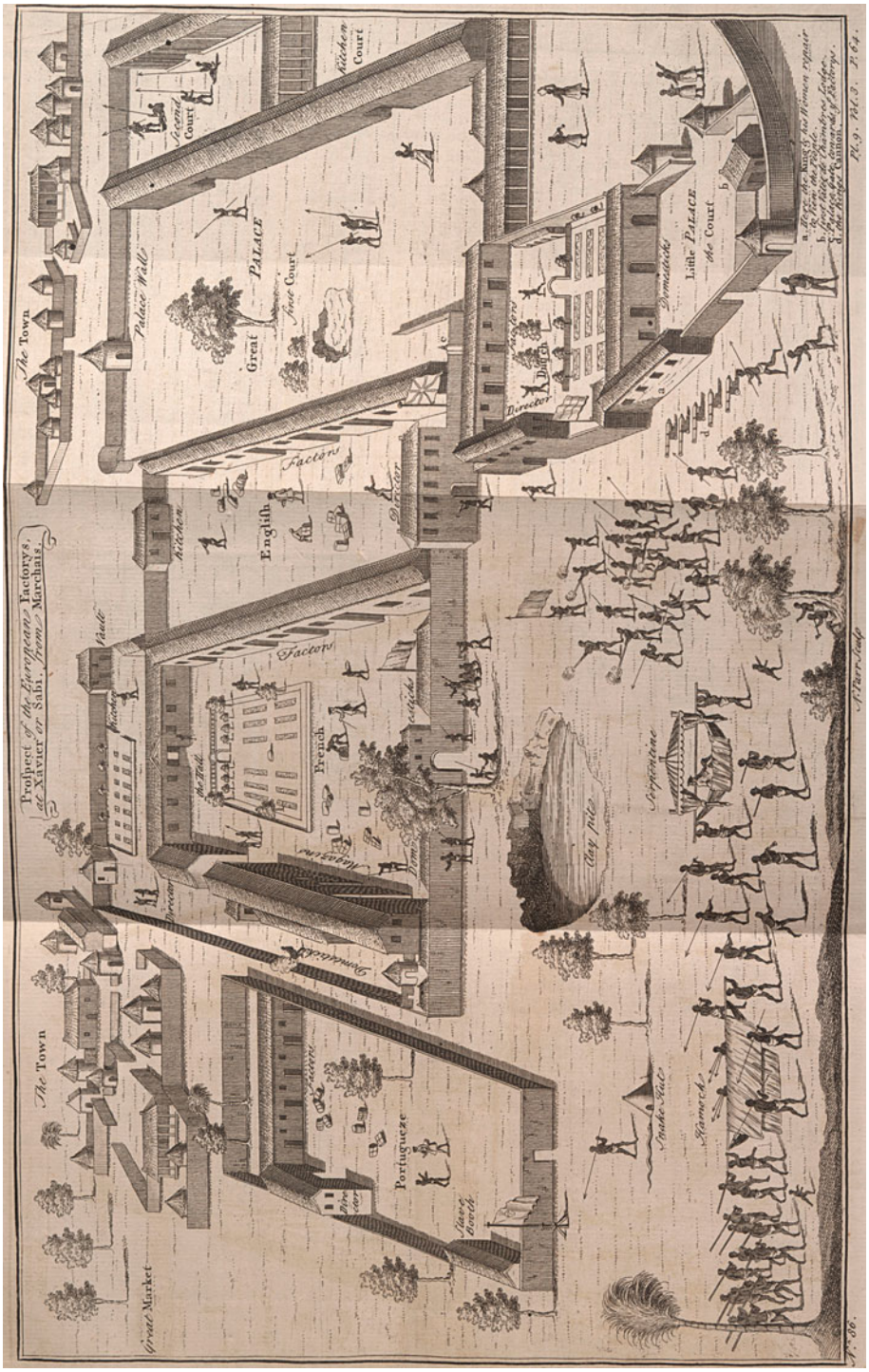

West and Central Africa: Historical Archaeology, Fig. 2 View of the Huedan palace complex at Savi in 1745–1747 (Astley 1745–1747: vol. 3, plate 9, facing p. 64)

Future Directions

It should be noted again here that no unifying theoretical, methodological, or chronological definition for historical archaeology exists for West and Central Africa. Yet, researchers working on sites from c. 1000 CE to the twentieth century commonly focus on the ways that relentlessly interconnected lives impact people at local and global scales of interaction. The robust interplay of landscape, material culture, documents, oral sources, and archaeological material is a common – but not universal – research design for such projects. In terms of theory, many recent historical archaeology studies of West and Central Africa embrace a critical stance where researchers acknowledge their own place in global politics; the history of colonialism, enslavement, and racism; and the scarcity of African researchers. Indeed it is surprising that the amount of research by African diaspora researchers in the Americas (e.g., Fennell 2007) on the Bakongo region dwarfs that generated by Africanist researchers. Moving forward, it seems necessary for greater direct collaboration between researchers in the Americas, Caribbean, and Africa. These research strategies should include multisited projects that document the forced removal of specific groups, or individuals, into the Atlantic World as well as the ways that they reconstituted life in diasporic places. Nonetheless, historical archaeological projects in West and Central Africa need not recreate the dynamics of colonialism, where research designs and project funds are controlled by outside groups. If historical archaeology is to embrace calls to decolonize the discipline, it is clear that African researchers require an interpretive space to put forward their own narratives of the past, funding to make projects possible, and universities from which to foster local dialogs. Perhaps (re)awakening local interests is the key for historical archaeology to thrive in West and Central Africa and archaeologists should, as Robertshaw (2004) suggests, adopt storytelling to fit with the regional aesthetic for passing along important knowledge about one's past.

Cross-References

- ▶ Adandé, Alexis B. A.
- ▶ African Diaspora Archaeology
- ▶ Andah, Bassey Wai
- ▶ Clay Pipes in Historical Archaeology
- ▶ Crossland, Leonard Brighton
- ▶ DeCorse, Christopher
- ▶ Deetz, James (Historical Archaeology)
- ▶ Eyo, Ekpo Okpo
- ▶ Fortifications, Archaeology of
- ▶ Jenne-Jeno, Archaeology of
- ▶ Modern World: Historical Archaeology
- ▶ Ogundiran, Akinwumi
- ▶ Posnansky, Merrick
- ▶ Postcolonial Archaeologies
- ▶ Schmidt, Peter R.
- ▶ Sowunmi, Margaret Adebisi
- ▶ Togola, Térába
- ▶ West Africa: Islamic Archaeology
- ▶ West Africa: Museums

References

Agorsah, E. K. 2011. Archaeological perspectives on colonial slavery: Placing Africa in African diaspora studies in the Caribbean. In *Slavery in Africa: Archaeology and memory.* Proceedings of the British Academy 168, ed. P.J. Lane and K.C. McDonald, 199–224. Oxford: Oxford University Press.

Andah, B.W., and A. Okpoko. 1979. Oral traditions and west African cultural history: A new direction. *West African Journal of Archaeology* 21: 104–124.

Apoh, W., and K. Gavua. 2010. Material culture and indigenous spiritism at the Katamansu archaeological "Otutu" (Shrine). *African Archaeological Review* 27: 211–235.

Astley, T., ed. 1745–1747. *A new general collection of voyages and travels*. London.

Cusick, J., ed. 1998. *Studies in culture contact: interaction, culture change and archaeology.* Center for Archaeological Investigations, occasional paper 25. Carbondale: Southern Illinois University.

David, N., K.B. Gavua, S. MacEachern, and J.A. Sterner. 1991. Ethnicity and material culture in North Cameroon. *Canadian Journal of Archaeology* 15: 171–177.

DeCorse, C.R. 2001. *An archaeology of Elmina: Africans and Europeans on the Gold Coast, 1400–1900*. Washington, DC: Smithsonian Press.

Fennell, C. 2007. *Crossroads and cosmologies: diasporas and ethnogenesis in the New World*. Gainesville: University of Florida Press.

Haour, A. H. 2011. The early medieval slave trade of Central Sahel. In *Slavery in Africa: archaeology and memory*. Proceedings of the British Academy 168, ed. P.J. Lane and K.C. McDonald, 61–78. Oxford: Oxford University Press.

Insoll, T. 1997. Archaeological research in Timbuktu Mali. *Antiquity* 72: 413–417.

Insoll, T. 1998. Iron age Gao: An archaeological contribution. *Journal of African History* 38: 1–30.

Lane, P.J. 2005. Barbarous tribes and unrewarding gyrations? The changing role of ethnographic imagination in African archaeology. In *African archaeology. A critical introduction*, ed. A.B.. Stahl, 24–54. Oxford: Blackwell.

Lane, P.J., and K.C. McDonald. 2011. Introduction: Slavery, social revolutions and enduring memories. In *Slavery in Africa: archaeology and memory*. Proceedings of the British Academy 168, ed. P.J. Lane and K.C. McDonald, 61–78. Oxford: Oxford University Press.

McIntosh, S.K., and R.J. McIntosh. 1995. Cities without citadels: Understanding urban origins along the middle Niger. In *The archaeology of Africa: Food, metals, and towns*, ed. T. Shaw, P.J. Sinclair, B. Andah, and A. Okpoko, 622–641. New York: Routledge.

Monroe, J.C., and A. Ogundiran. 2012. *Power and landscape in Atlantic West Africa*. Cambridge: Cambridge University Press.

Norman, N.L. 2009. Hueda (Whydah) country and town: Archaeological perspectives on the rise and collapse of an African Atlantic kingdom. *International Journal of African Historical Studies* 43: 387–410.

Ogundiran, A. 2002. Of small things remembered: Beads, cowries, and cultural translations of the Atlantic experience in Yorubaland. *International Journal of African Historical Studies* 35: 427–457.

Osei-Tutu, B. 2007. Ghana's "slave castles", tourism, and social memory of the slave trade. In *Archaeology of Atlantic Africa and the African diaspora*, ed. A. Ogundiran and T. Falola, 185–198. Bloomington: University of Indiana Press.

Posnansky, M., and C.R. DeCorse. 1986. Historical archaeology in sub-Saharan Africa – A review. *Historical Archaeology* 20: 1–14.

Reid, A.M., and P.J. Lane. 2004. African historical archaeologies: An introductory consideration of the scope and potential. In *African historical archaeologies*, ed. A. Reid and P. Lane, 1–32. New York: Kleuwer/Plenum.

Robertshaw, P. 2004. African historical archaeology(ies): Past, present, and a possible future. In *African historical archaeologies*, ed. A. Reid and P. Lane, 375–391. New York: Kleuwer/Plenum.

Stahl, A. 2001. *Making history in Banda: Anthropological visions of Africa's past*. Cambridge: Cambridge University Press.

Swanepoel, N. 2011. Different conversations about the same thing? Source materials in the recreation of a nineteenth-century, slave-raiding landscape, northern Ghana. In *Slavery in Africa: archaeology and memory*. Proceedings of the British Academy 168, ed. P. Lane and K. McDonald, 167–198. Oxford: Oxford University Press.

Usman, A., J. Aleru, and R. Alabi. 2005. Sociopolitical formation on the Yoruba northern frontier: A report of recent work at Ila-Iyara, North Central Nigeria. *Journal of African Archaeology* 3: 139–154.

Further Reading

Cusick, J., ed. 1998. *Studies in culture contact: interaction, culture change and archaeology*. Center for Archaeological Investigations, occasional paper 25. Carbondale: Southern Illinois University.

Deagan, K. 1991. Historical archaeology's contributions to our understanding of early America. In *Historical archaeology in global perspective*, ed. L. Falk, 97–112. Washington, DC: Smithsonian Institution Press.

DeCorse, C.R., and G.L. Chouin. 2004. Trouble with siblings: Archaeological and historical interpretation of the West African past. In *Sources and methods in African history: Spoken, written, unearthed*, ed. T. Falola and C. Jennings, 7–15. Rochester: University of Rochester Press.

Deetz, J. 1977. *In small things forgotten: An archaeology of early American life*. New York: Anchor Books.

Guyer, J. 1993. Wealth in people and self-realization in equatorial Africa. *Man* 28: 243–265.

Holl, A.F.C. 2000. *The Diwan revisited: Literacy, state formation and the rise of kanuri domination (AD 1200–1600)*. London: Kegan Paul International.

Kelly, K.G. 2001. Change and continuity in coastal Bénin. In *West Africa during the Atlantic slave trade: Archaeological perspectives*, ed. C.R. DeCorse, 81–100. London: Leicester University Press.

Lawrence, A.W. 1963. *Trade castles and forts in West Africa*. London: Jonathon Cape.

McIntosh, R.J. 2005. *Ancient middle Niger and the self-organizing landscape*. Cambridge: Cambridge University Press.

Monroe, J.C. 2007. Continuity, revolution or evolution on the Slave Coast of West Africa? Royal architecture and political order in precolonial Dahomey. *Journal of African History* 48: 349–373.

Ogundiran, A., and T. Falola. 2007. Pathways in the archaeology of TransAtlantic Africa. In *Archaeology of Atlantic Africa and the African diaspora*, ed. A. Ogundiran and T. Falola, 3–48. Bloomington: University of Indiana Press.

Richard, F. 2009. Historical and dialectical perspectives on the archaeology of complexity in the Siin-Saalum (Senegal): Back to the future? *African Archaeological Review* 26: 75–135.

Schmidt, P. 1983. An alternative to a strictly materialist perspective: A review of historical archaeology, ethnoarchaeology, and symbolic approaches in African archaeology. *American Antiquity* 48: 62–79.

Thiaw, I. 2003. Archaeology and the public in Senegal: Reflections on doing fieldwork at home. *Journal of African Archaeology* 1: 215–225.
Vogt, J. 1979. *Portuguese rule on the Gold Coast 1469–1682*. Athens: University of Georgia Press.

West and Central African Neolithic: Geography and Overview

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State of Knowledge and Current Debates

Introduction: Sub-Saharan Africa and the Elusive Notion of the Neolithic

The very concept of the Neolithic on the African continent is the subject of considerable debate, as is highlighted in the introduction of the collective work *The Archaeology of Africa*: *Food*, *Metals and Towns* (Sinclair et al. 1993). The definition of the Neolithic, originally designating the presence of polished stone tools, has rapidly been enriched by association with the presence of ceramics and especially the concept of a transition from predation to production, thus resulting in a very broad definition used at once to define chronological stages and cultural entities (Sinclair et al. 1993). The classic concept of the Neolithic is in fact articulated around the appearance of economies of production (livestock, farming), involving the settlement of populations and the development of some technical innovations (grinding equipment, ceramics). While, broadly speaking, this schema corresponds particularly well to the situation known in Europe, it is not at all applicable under the same form to the African continent, where ceramics, agriculture, livestock, and settlement appears independently, with more or less important differences in time and space according to the region. In addition, the economic systems that have developed throughout the Holocene in sub-Saharan Africa are extremely varied, making it even more difficult to define a concept better suited to the continent.

This situation is reflected in the archaeological literature by considerable terminological diversity. Although the term "Neolithic" was quite widely used by Africanist researchers until the early 1980s and its use continues today, the terms "food production," "Late Stone Age," "Ceramic Stone Age," and "Later Stone Age" have gradually become more frequently used (Sinclair et al. 1993).

Several definitions of the Neolithic have been proposed by researchers working in West Africa. R. Vernet and G. Aumassip have argued that if the Neolithic is indeed a "new attitude of man toward nature," we may use criteria other than direct evidence of agriculture and livestock and that "any new evidence of a change in thinking can be considered: new attitudes vis-à-vis the tool itself, new types of behavior, habitat structure" (Vernet and Aumassip 1994: 255, editor's transl.). As a major technical innovation, the appearance of pottery constitutes a real change in the relationship between man and his environment, and some authors consider its presence as a sufficient criterion for discussing the Neolithic. The definition of an "African Neolithic" has also been suggested out of archaeological and ethno-archaeological reflections based on West African actualistic examples (Huysecom 2012). Within this definition, the term Neolithic is applicable to societies possessing a control of the environment through transformation and presenting at least one of the particularities often associated with Neolithization, whether livestock, agriculture, ceramics, or settlement. The precise establishment of a group's lifestyle from the archaeological material being often the problem, the author recommends the use of the term African Neolithic to design all cultural groups associated with the presence of ceramics and before the onset of metallurgy. S.K. McIntosh (2001) defined a "West African Neolithic" as characterized by the transition to economies of production (agriculture and livestock), succeeding the

"West African Late Stone Age" and preceding the "West African Iron Age." The presence of ceramics is thus not taken into account in these definitions. S.K. McIntosh, however, states that the sites attributed to the "Late Stone Age" with a production economy and Neolithic sites with the presence of livestock can be contemporary, just as sites with a production economy with or without the presence of metal can coexist in the same chronological range. The terms Neolithic and Iron Age, generally considered to be directly successive in time, thus do not imply a chronological independence in West Africa (McIntosh 2001: 323).

The term Neolithic is also used in Central Africa. In Gabon, an "Early Neolithic" beginning in the late 3rd millennium BCE and a "Late Neolithic" between the end of the 2nd millennium and the middle of the 1st millennium BCE have been described in this way (Clist 2005; Oslisly and White 2007). The criteria defining a Neolithic village in Gabon are notably the presence of polished stone tools, ceramics, grinding equipment, and pit dumps ranging chronologically between the Late Stone Age and the Early Iron Age (Clist 2005). In Central Africa, we should also note the use of the "Stone to Metal Age" concept (or SMA), corresponding to a transition period between "Late Stone Age" occupations and the appearance of metallurgy (de Maret 1995), which could be considered as another appellation of the regional Neolithic (Oslisly and White 2007). The Neolithic/SMA in Central Africa refers to a period corresponding to the appearance of ceramics and the development of new subsistence strategies, which varies from a chronological perspective in terms of the geographic zones considered, but is mainly included between the end of the 3rd and the beginning of the 1st millennium BCE.

We therefore note considerable variability in the concepts, which essentially can be explained by geographic, environmental and chronological factors. When it is used, the term Neolithic, however, often refers to the appearance of economies of production, either the presence of livestock or agriculture. Some cultures characterized by the early presence of ceramics or the exploitation of wild grasses were also considered as representatives of an Early Neolithic, appearing on the current borders of the Sahara and the Sahel at the beginning of the Holocene around 10,000 BCE, (Huysecom et al. 2009; Huysecom 2012) (Fig. 1). In Africa, the production of pottery is indeed a phenomenon appearing independently from the domestication of plants and animals. The development of ceramics was probably facilitated by the exploitation of new resources, becoming available at the beginning of the Holocene with the extension of tropical grasslands rich in edible grasses over previously barren areas (Huysecom et al. 2009). Although the appearance of ceramics thus seems connected to a type of open environment, we observe its early and occasional presence several times during the mid-Holocene in southern areas of West or Central Africa, at least partly in relation with some northern cultural groups. Pottery remains from the SMA 1 dated from the 7th/6th millennium BCE at Shum Laka (Cameroon) could thus reflect the southern displacement of populations used to exploiting savannah environments or savannah-forest mosaics following the climatic deterioration occurring toward the end of the seventh millennium BCE (de Maret 1995; Lavachery 2001) (Fig. 1). Ceramics dated to the 6th millennium BCE in Konduga (Nigeria) indicate the occupation of savannah woodland environment or forest on the old southwest banks of Lake Chad, presumably by populations originating from eastern central Sahara in search of a more favorable environment (Breunig and Neumann 2002) (Fig. 1). Although the early appearance of ceramics at Shum Laka seems to be linked to the beginnings of the exploitation of some oil-producing fruit trees (Lavachery 2001), the phenomena described above are attached neither to the appearance of domestic species nor to real settlement phenomena and do not constitute in any way a Neolithic in the classical sense of the term.

Livestock and especially agriculture involved only very late, and sometimes only temporarily, forest areas (Mbida et al. 2000; Neumann et al. 2012a). It is thus logical that the term Neolithic is used less frequently by researchers working in southern zones of West Africa as well as Central Africa. Nevertheless, it is crucial to highlight the

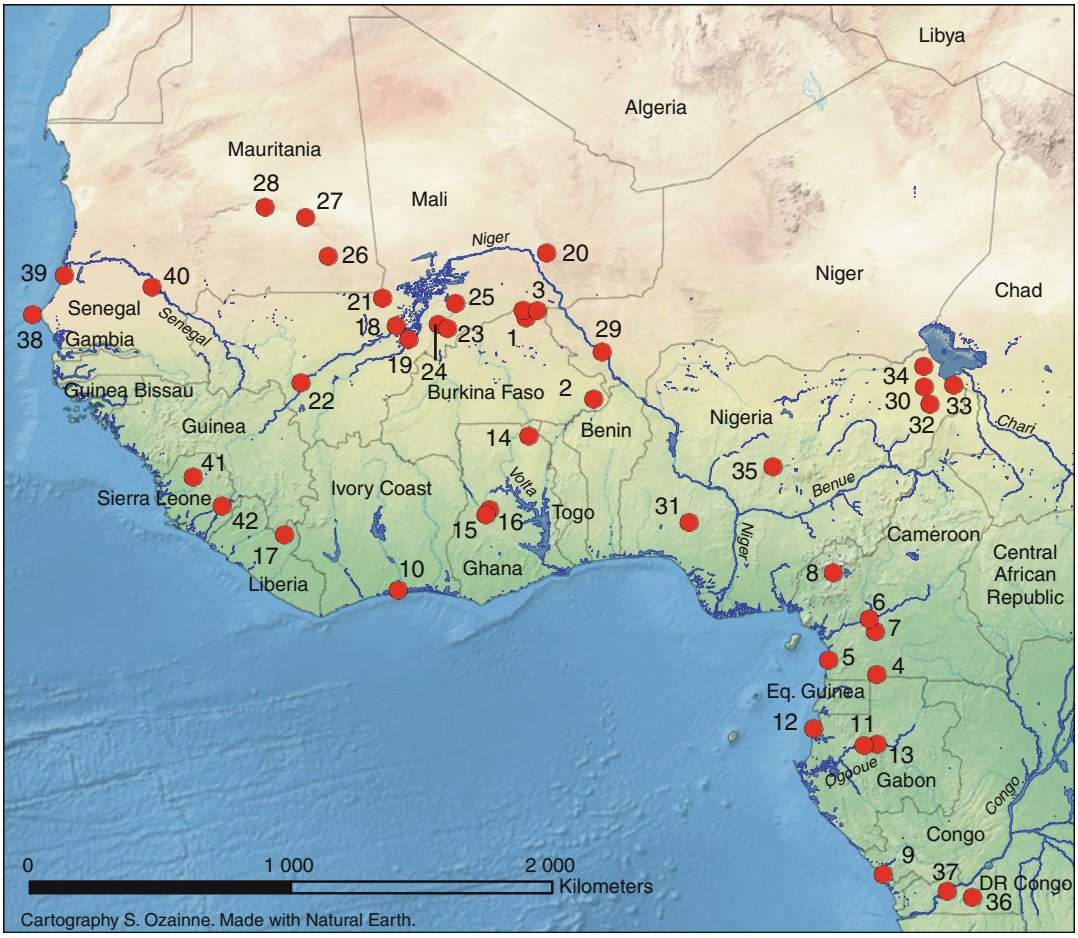

West and Central African Neolithic: Geography and Overview, Fig. 1 Sites mentioned in the text. Burkina-Faso: *1*. Oursi. *2*. Pentenga. *3*. Tin-Akof. Cameroon: *4*. Abang Minko'o. *5*. Bwambé-Sommet. *6*. Nkang. *7*. Obobogo. *8*. Shum Laka. Congo: *9*. Tchissanga. Ivory Coast *10*. Tiebiessou. Gabon: *11*. Epona, Otoumbi. *12*. Okala. *13*. Okanda. Ghana: *14*. Birimi. *15*. Boase. *16*. Kintampo. Liberia: *17*. Sopie. Mali: *18*. Dia-Shoma. *19*. Djenné-Jeno. *20*. Karkarichinkat. *21*. Kobadi. *22*. Kourounkorokale. *23*. Nin-Bèrè 3. *24*. Ounjougou. *25*. Windé Koroji Ouest. Mauritania: *26*. Dhar Nema. *27*. Dhar Oualata. *28*. Dhar Tichitt. Niger: *29*. Kirkissoy. Nigeria: *30*. Gajiganna. *31*. Iwo Eleru. *32*. Konduga. *33*. Daima, Kursakata, Mege. *34*. Zilum. *35*. Ungwar Kura. DR Congo: *36*. Ngovo. *37*. Sakuzi. Senegal: *38*. Cap-Vert. *39*. Khant. *40*. Walalde. Sierra Leone: *41*. Kamabai. *42*. Yengema

existence of an important common point in the history of subsistence modes in both regions. In these variable environmental, cultural, and chronological conditions, we observe the development throughout the Holocene of economic strategies based on the more or less intensive exploitation of nondomestic resources; these systems continued after the introduction of agriculture, and most of them are still operating today (Kahlheber and Neumann 2007). During the Late Holocene, between 2500 and 500 BCE, agriculture, moreover, occupied a secondary place in the mosaic of subsistence strategies, and we thus find ourselves in a general context of a "low-level food production" economy (Smith 2001), the first large, truly sedentary farming communities appearing only during the Iron Age, from the 1st millennium BCE but mainly during the first millenium AD (Kahlheber and Neumann 2007). This economic particularity is no doubt one of the main factors

explaining the problems linked to the use of the term "Neolithic" in Africa.

Although the classic concept of Neolithic consequently seems inadequate to describe the history of Holocene economic systems in sub-Saharan Africa, important changes in terms of the relationship between nature and societies occurring since the Early/Middle Holocene have motivated some authors to define an Early Neolithic beginning around 10,000 BCE. From around 2500 BCE, the Late Holocene is then characterized by the rapid expansion of pastoralism and agriculture south of the Sahara, and thus the development of real strategies for production, motivating the use of the term Neolithic by a large number of authors. In recent decades, the suffix "Stone Age" is, however, often used to refer to all cultures before the onset of metallurgy. Finally, although there is no concept to synthesize the economic and technical diversity observed for the Holocene in West and Central Africa, the majority of regional definitions, whether or not they use the term Neolithic, refer to the existence of a more or less extended period before the beginning of the Iron Age characterized by the development of new subsistence strategies involving increased use of wild resources and/or the presence of domestic animals.

Environments and Subsistence of the Late Holocene in West and Central Africa

The Appearance of Livestock South of the Sahara

Livestock was introduced in West Africa from the central Sahara through migrations influenced by the end of the climatic optimum of the Early/Middle Holocene and the establishment of more arid conditions. The movement may have begun between 5300 and 3500 BCE with the progressive abandonment of the eastern Sahara in favor of safe havens and the beginning of seasonal transhumance of pastoralists (Jousse 2004; Kuper and Kröpelin 2006). This first wave of introduction of domestic species in West Africa, with the arrival of beef, caprines, and also certainly dog, occurred between the 3rd and 2nd millennium BCE. Men and animals thus migrated together (Linseele 2007). The impact on the environment of more arid conditions from the Late Holocene, in fact, made previously unfavorable areas progressively more accessible for pastoralism. Until about 2000 BCE, the conditions favorable to the presence of the tsetse fly, transmitting trypanosomiasis (sleep disease), would have been maintained in the Sahel region which was therefore unsuitable for livestock keeping (Smith 2005). Southern regions and more particularly forested zones consequently remained adverse to farmers. The first evidence of domestic fauna in Central Africa occurs in fact very late, the oldest known dating to the 1st millennium BCE (Mbida et al. 2000).

It is possible that, during their southward migrations, nomadic pastoralists who came from the Sahara were able to move by adapting their transhumance strategies to minor ecological changes, albeit moving quickly over long distances in case of severe drought (Linseele 2007). Clearings, leading to a gradual consolidation of areas on the boundary of the endemic tsetse area, also probably accompanied the spread of pastoralism southward. The colonization of the Sahelo-sudanian zone by livestock farmers may have also assisted the rapid appearance of breeds of cows tolerant to trypanosomiasis, contributing in turn to boost the expansion of livestock. In central Ghana, bones of small size cows dated to the beginning of the 2nd millennium BCE have indeed been interpreted as representative of possible ancestors of the current N'dama cow, capable of living and reproducing in environments where the tsetse fly is found (Gautier and Van Neer 2005) (Fig. 2). This hypothesis considers that bovines of Saharan origin were able to rapidly acquire a smaller size by adapting to the more humid southern regions. The forested zones logically remain unfavorable to the presence of livestock farmers, and the remains of domestic fauna from the 1st millennium BCE are associated with a period of high climatic and environment disruptions resulting in the opening of the landscapes in forested areas (Mbida et al. 2000; Neumann et al. 2012a, b).

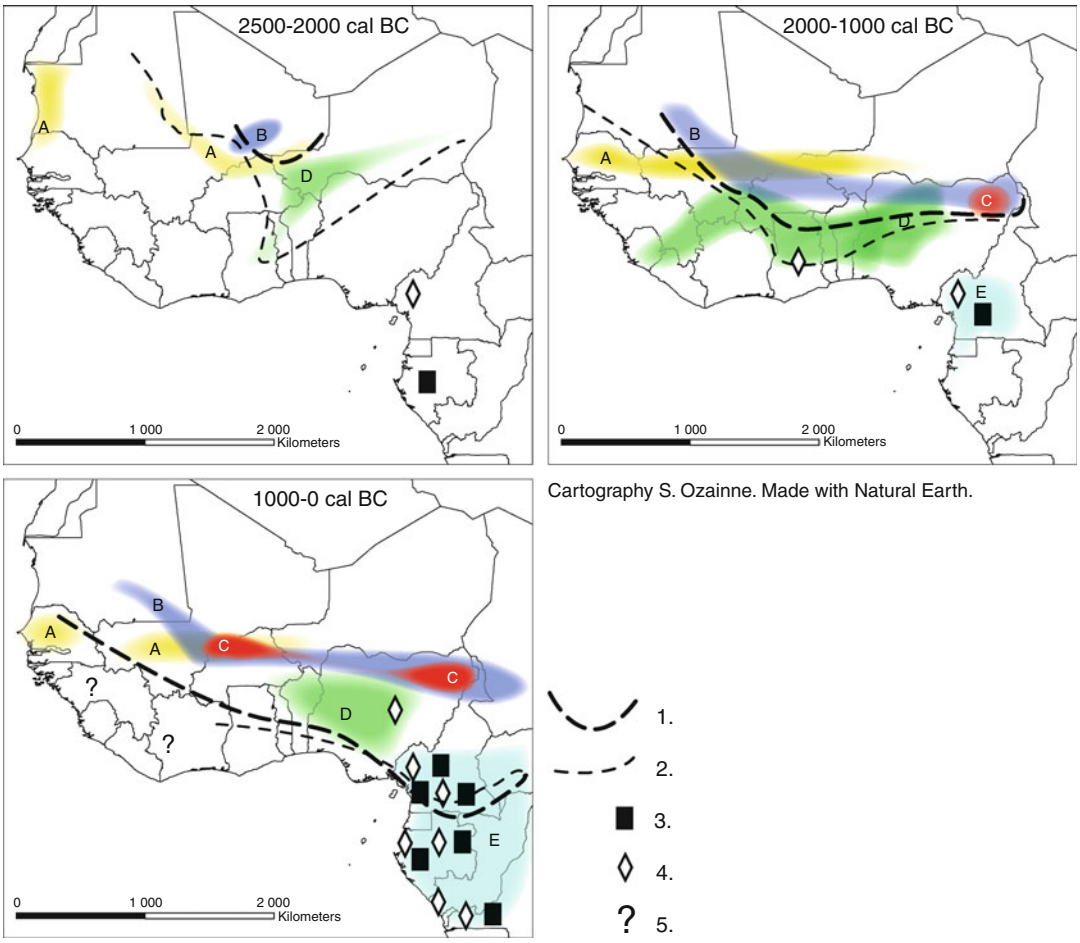

Cartography S. Ozainne. Made with Natural Earth.

West and Central African Neolithic: Geography and Overview, Fig. 2 Cartographic representations of the principal cultural and economic phenomena during the Late Holocene in West Africa and Central Africa. *1* Southern limit of agriculture (pearl millet). *2* Southern limit of herding. *3* Pit sites in Central Africa. *4* Exploitation of oily fruit trees. *5* Zones with little or no documentation. *A* Saharan cultural influences. *B* West–east Sahelian cultural current. *C* East–west Sahelian cultural current. *D* Sudanian cultures. *E* Cultures of the Late Neolithic in Central Africa. Chronology in calendar years BCE

The Emergence of Agriculture in Sub-Saharan Africa

The emergence of agriculture in sub-Saharan Africa corresponds to the beginnings of pearl millet cultivation. Belonging to the Poaceae (grass) family and to the Panicoideae subfamily, pearl millet is ecologically and physiologically adapted to dry conditions in the semiarid zones of sub-Saharan Africa and is characterized by a rapidly growing cycle and a capacity to grow with annual precipitations of only 250 mm. The quantity but above all the seasonal distribution of precipitations characterizing the climate of savannahs are thus ideal for its cultivation (Kahlheber and Neumann 2007).

The oldest known remains of domestic pearl millet were discovered in the northeast of Mali, in the low valley of Tilemsi, and dated between 2500 and 2000 BCE (Manning et al. 2011). The presence of pearl millet at the Sahara-Sahel limits around 2500 BCE implies that the zone of its domestication was certainly situated further away in time and space. Hypothetic centers of millet and sorghum domestication have been

placed by J.R. Harlan (1971) to the east of Lake Chad and in the West African Sahel, based on the current distribution of their wild ancestors, but this certainly extended further north during the humid phases of the Holocene. The appearance of agriculture in sub-Saharan Africa is thus unlikely to be due to local domestication of wild plants by hunter-gatherer societies, and millet culture was probably developed by groups of Saharan pastoralists who adapted to the new environmental and economic constraints around the end of the Middle Holocene (Neumann 2003, 2005; Ozainne 2013). It is certainly a desire for the predictability of the availability of resources and thus for greater security in the supply of food which was the main generator for the domestication of plants (Marshall and Hildebrand 2002).

After its appearance in the south of the Sahara in the 3rd millennium BCE, agriculture rapidly spread through the whole of the Sahelo-sudanian zone in West Africa (Fig. 2). Pearl millet has thus been well documented since the beginning of the 2nd millennium BCE in southeast Mauritania, in eastern Mali, and northern Burkina Faso but equally more southerly in northern Ghana (Kahlheber and Neumann 2007). The culture of millet is then documented in northeast Nigeria, in the Lake Chad Basin since the final centuries of the 2nd millennium BCE, and then in central Nigeria since the beginning of the 1st millennium BCE. Westward, in the Middle Senegal Valley the first known remains of pearl millet also date back to the middle of the 1st millennium BCE (Kahlheber and Neumann 2007).

Remains of pearl millet dated to the second half of the 1st millennium BCE have also been identified in southern Cameroon (Eggert et al. 2006). In the same region and during the same period, the discovery of Bambara groundnut remnants (*Vigna subterranea*) has also been documented (Kahlheber and Neumann 2007). The presence in forested zones of these two species characteristic to the Sudano-Sahelian zone constitutes a special event in the history of African agriculture, contemporaneous with a period of disturbance of the tropical rainforest, due to increasing aridity and/or stronger seasonnality (Neumann et al. 2012b). In southern Cameroon, the establishment of a more pronounced dry season after 400 BCE indeed resulted in a significant disruption in the balance of the rainforest and the appearance of vegetation that could be cleared more easily, all of these conditions offering a suitable context for pearl millet cultivation. However, the presence in forested zones of this agricultural system adapted to the northern savannahs corresponds only to a single episode of about 200–400 years in the history of Central African settlement, with the forest beginning to regenerate and other types of subsistence being established during the first centuries CE (Neumann et al. 2012a, b).

Agriculture thus appears very late in sub-Saharan Africa, at least 6000 years after its beginning in the Middle East. This particular situation could in part be explained by the environmental context peculiar to the savannahs, which offers ideal conditions for the exploitation of wild plants as well as for pastoralism. The group of savannah landscapes, broadly speaking (semiarid to grassy landscapes and scrubland), is in fact an environment that abounds with animal and vegetable resources and constitutes more than 80% of the vegetation in sub-Saharan Africa, thus covering a much wider surface than other ecosystems (Neumann 2003). By offering pastoralists an ideal ground for their nomadic lifestyle that was dependent on the seasonal availability of wild plant resources, the savannahs may have been paradoxically responsible for the delay of the onset of agriculture (Neumann 2003; Smith 2005).

Pearl millet cultivation in all likelihood remained in the first instance a secondary strategy of subsistence (Kahlheber and Neumann 2007). Based on current archeobotanical knowledge, many late Neolithic groups cannot indeed be considered as being made up of real farmers, but rather as populations cultivating certain plants within a diversified subsistence strategy, including the intensive exploitation of wild plants, probably inherited from the Early Holocene, as an important component (Kahlheber and Neumann 2007; Huysecom 2012). We also observe in West Africa a mosaic of economic systems during the 2nd millennium BCE. The appearance of genuine

settlement agriculture in West Africa would only come with the Iron Age, probably from the first centuries AD (Kahlheber and Neumann 2007).

Economic Systems in Forest or Forest-Savannah mosaic zones

The impression of economic diversity in the Late Holocene is amplified by the distinct strategies that developed in the forest and forest-savannah mosaic zones, where the resources were different and where some mixed systems appeared. Central Africa and more generally the more humid zones of sub-Saharan Africa are thus more typically characterized by the development of agroforestry systems, as pastoralism was not adapted to these regions, mainly because of the presence of the tsetse fly. During the 2nd millennium BCE, we note the progressive development of the exploitation of oil palm (*Elaeis guineensis*) in the center and south of Ghana (Logan and D'Andrea 2012). Oil palm does not grow in dense tropical forest, favoring open areas and climates with a less pronounced dry season as well as high rainfall, and is currently found in the forest and savannah boundary areas but also in areas of secondary forest and zones cleared for agriculture. Sometimes interpreted as a marker for the anthropization of landscapes, the presence of this pioneer species in the archaeological record seems to have a particular climatic significance. In central Ghana, the charred macrofossils coming from the archaeological levels of sites of the Kintampo tradition represent, nonetheless, a robust indicator of relationships between populations and oil palm (Logan and D'Andrea 2012).

In Central Africa, the importance of oil palm is also demonstrated during the opening of landscapes occurring in the 1st millennium BCE (Neumann et al. 2012a) (Fig. 2). The incense tree (*Canarium Schweinfurthii*) is another oil-producing fruit tree species which was also found in Central and West Africa. Its presence is signaled in low quantities in central Ghana in the 2nd millennium BCE (Logan and D'Andrea 2012). In western Cameroon, this species has been visible since the end of the 7th millennium BCE, and its presence increased significantly between 2500 and 400 BCE (Lavachery 2001). We also find traces of it during the 1st millennium BCE at sites in southern Cameroon as well as in the southern forest zone in the Democratic Republic of Congo (de Maret 1990; Mbida et al. 2000). The hypothesis of the development of arboriculture during the Holocene in West and Central Africa has thus been put forward by several authors (Lavachery 2001; Oslisly and White 2007; Logan and D'Andrea 2012), but the presence and increase of fruit trees in archaeological records could also result from the intensification of wild tree exploitation in a degraded and semi-open environment (Neumann et al. 2012a).

In forest-savannah mosaic zones, mixed systems also appeared during the Late Holocene, with the example of the joint production of pearl millet and legumes like the *Vigna unguiculata* (cowpea) combined with the exploitation of oil-producing fruit trees (oil palm, incense tree). This type of mixed economy is demonstrated at the beginning of the Iron Age during the 1st millennium BCE in the Lake Chad Basin and in central Nigeria but could have been established since the 2nd millennium BC in central Ghana (Kahlheber et al. 2009; Watson 2010; Logan and D'Andrea 2012).

Finally, the hypothesis of the early cultivation of bananas in Central Africa remains controversial. In fact, banana phytolites (*Musa* sp.) were identified in southern Cameroon at the Nkang site, dated to the 1st millennium BCE, in an economic context of production with the presence of domestic animals (Mbida et al. 2000). Originating from South and Southeast Asia, the banana was introduced by humans in Africa in an already domesticated form, and its presence at Nkang has been interpreted as proof of the early existence of agricultural systems in forested zones, which could be the cause for the increase of villages that was documented for the same period (Mbida et al. 2000). However, the attribution of phytolites in Nkang to *Musa* and not to *Ensete*, a genre of the banana family which appeared independently in Africa, does not take into account recent criteria for morphological differentiation, and the chronological and environmental context of the site could additionally indicate the unfavorable conditions for the farming of *Musa* (Neumann and

Hildebrand 2009). The issue remains unresolved and requires the acquisition of more data.

Emergence of Food Production and Population: A General Scenario

Climatic Changes and Migrations in the Sahara-Sahel in the Third Millennium BCE

Between 4000 and 3000 BCE, the end of the humid period of the Early/Middle Holocene marked the beginning of a long-term trend of aridity. Between 3000 and 2500 BCE, pastoral populations reached the Sahel in West Africa from the east and central Sahara (Jousse 2004; Kuper and Kröpelin 2006). The opening of the landscapes in the Sahelian belt indicates a southward shift toward the vegetation zones during the same period. Pastoralist groups who progressively settled in the south of the Sahara seem to originate from several distinct cultural contexts but share common origins in the central Sahara; some among them may be linked to the origins of agriculture (Fig. 2). Pastoralists thus reached the Niger Bend from the large massifs of the Sahara, probably from the north of Mali and Niger as well as the south of Algeria. It is possible that some populations originating from the Sahara reached the Sahel zone much earlier, without in this case propagating livestock (Ozainne 2013).

The second half of the third century BCE was characterized by important environmental changes south of the Sahara, where general climatic degradation resulted in a gradual desiccation of the landscapes. The Sahelo-sudanian belt strip is thus affected by the arrival of cultural traits clearly indicating Saharan origins, including wide-mouthed pottery, often hemispherical, as well as decorations made with single or pivoting comb impressions. In Dogon Country (Mali), the Ounjougou site complex also shows the presence of ceramics between 2600 and 2200 BCE, indicating links with northeast Mali, southwest Niger, and central Sahara in general (Figs. 1 and 2). It is likely that, from this period, the Dogon Country was occasionally visited by groups of pastoralists during seasonal transhumance or in the context of reconnaissance of new territories (Ozainne 2013). Generally, in Sahelo-Sudanian West Africa, we find several examples of cultural traits of the Sahara on Late Holocene sites. This is the case, for example, for some pottery at the site of Pentenga in southwest Burkina Faso (Frank et al. 2001), as well as the lithic industry (geometric microliths and chisels) and ceramics (wavy decorations or pivoting impressions) in the Neolithic of the Cap-Vert peninsula in Senegal (Huysecom 1990; Thiam 2010). The phenomenon of shell middens, which mainly concerns the Mauritanian coast during the Middle and Late Holocene, appears on the Senegal River delta at the Khant sites, from the 4th millennium BCE (Thiam 2010). On the coast of the Guinea Gulf, in Ivory Coast, shell middens would more likely appear around the 2nd millennium BCE (Chenorkian 1983) (Figs. 1 and 2).

Between 2500 and 2000 BCE, pastoralists arrived in Mauritania, whereas the Inner Niger Delta in Mali, still too humid, certainly remained adverse to the presence of livestock. The expansion of livestock in the Sudanian zone was rapid, and pastoralists already reached the center of Ghana around 2000 BCE (Gautier and Van Neer 2005). This early southern penetration of pastoralism could explain the presence within the Kintampo tradition (Ghana) of cultural traits of Saharan origin since the end of the 3rd millennium BCE, particularly bifacial armatures or pivoted comb decorations on ceramics (Stahl 1994; Watson 2010). This Saharan heritage is, however, included within the development of a cultural ambiance which seems proper to the Sudanian and Sudano-guinean zone, asserting itself from the end of the 3rd millennium BCE (Figs. 1 and 2).

Pearl millet cultivation, which had been known from 2500 BCE at Karkarichinkat in the Lower Tilemsi Valley (Mali) (Manning et al. 2011), expanded rapidly in the Sahelo-sudanian belt from around 2000 BCE. The spread of agriculture seems linked to the development of a new "Sahelian" cultural trend, essentially characterized by the presence of pottery with a reduced opening, with simple or everted rims, and decorations of fibre roulette impressions (Ozainne 2013) (Fig. 2).

In the grasslands of western Cameroon, the "Stone to Metal Age 2" of the Shum Laka site, which ends between 2400 and 2000 BCE, is

characterized by an economy founded on hunting but also by the growing use of *Canarium schweinfurthii* seeds. Pottery associated with the SMA 2 of Shum Laka includes some Saharan attributes, particularly with decorations of pivoting impressions which were interpreted to reflect a progressive southward movement of ceramic technology from the Middle Holocene (Lavachery 2001) (Fig. 2).

Expansion of Agriculture and Cultural Diffusions in the Second Millennium BCE

During the 2nd millennium BCE, sub-Saharan West Africa was characterized by a gradual trend toward aridification, which coincides with the beginning of the impact of agropastoral activities in the Sahelian and Sudanian environments (Ballouche and Neumann 1995). Between 2000 and 1500 BCE, agriculture progressed very quickly indeed in areas favorable to the presence of pearl millet, essentially along the Sudano-Sahelian belt as well as in some specific environments of the southern fringe of the Sahara. The appearance of millet cultivators is then documented in southeastern Mauritania (Dhar Tichitt and Oualata, characterized by the occurrence of large resurgences of water), in eastern Mali (Ounjougou, Winde Koroji West), in northern Burkina Faso (Oursi Tin-Akof) but also further south at Birimi in northern Ghana (Kahlheber and Neumann 2007) (Figs. 1 and 2). In forest and forest-savannah mosaic environments of West Africa, other types of economies seem to have appeared in the same period, with notably the exploitation of oil palm (Logan and D'Andrea 2012). In Central Africa, the "Early Neolithic" in Gabon, dated between 2100 and 1700 BCE at the site of Okanda in the Ogooue valley, is characterized by the presence of pit dumps containing ceramics, but no precise data on the modes of subsistence are associated with them (Oslisly 1998) (Figs. 1 and 2). In the majority of sites of the 2nd millennium BCE, we additionally almost systematically find polished stone axes, which can be either imported or manufactured at sites relatively close to habitats, such as in central Ghana (Watson 2010).

By contrast, there are not necessarily systematic and exclusive associations between environmental contexts, types of economy, and cultural groups. The geographic distribution of the Kintampo tradition, principally represented in Ghana, is an excellent example as we find it in the savannah zone, the forest-savannah mosaic but also in the semi-deciduous forest during the entire first half of the 2nd millennium BCE (Stahl 1994; Watson 2010). In the north of Ghana, the Kintampo tradition is clearly associated with pearl millet cultivation at the site of Birimi (Figs. 1 and 2). At the central and southern sites of the country, we more often observe economies based on herding and the exploitation of non-domestic plant resources, including oil palm, with only one isolated case of pearl millet known at Boase (Gautier and Van Neer 2005; Watson 2010; Logan and D'Andrea 2012). These economic variants within the same cultural tradition could be explained either by the adoption of agriculture by a local culture or, in contrast, by the adaptation to the ecological potential of the forest of populations which have migrated from the Sahel (Watson 2010). Additionally, in central Ghana, the Kintampo tradition overlaps partially in time and space with another cultural entity named "Punpun," associated with a different material culture and type of economy. The overlapping at the same sites of these two cultures, differentiated by very distinct technical and stylistic characteristics of ceramics, was first interpreted as the succession of two populations, then as a local change in lifestyle, the Kintampo culture marking a local economic and cultural evolution with the transition to an economy of production (Stahl 1994). It was also explained as a social frontier between two contemporary groups, one of hunter-gatherers (Punpun) and the other of agro-pastoralists originating from the Sahel (Watson 2010). More generally, we observe a cultural ambiance proper to the Sudano-Guinean zone during the first half of the 2nd millennium BCE, for instance represented at the Kintampo sites in Ghana or Iwo Eleru in Nigeria (Shaw and Daniels 1984; Stahl 1994; Watson 2010) (Figs. 1 and 2).

During the first half of the second century BCE, a coherent cultural tradition seems to have also developed between Sierra Leone (Yengema, Kamabai)

and Liberia (Sopie), concerning in all likelihood Guinea and southwest Mali (Kourounkorokale) and corresponding partially with the "Guinea Neolithic" described in the literature before 1970 (Ozainne 2013).

Between 1500 and 1000 BCE, agriculture continued its progression toward the east and southeast along the Sahelo-sudanian belt and appeared in the southern Lake Chad basin (Gajiganna culture) from 1200 BCE (Figs. 1 and 2). Archaeological data attributed to the same chronological interval suggests the establishment of an important Sahelo-sudanian cultural current between Mauritania and the basin of Lake Chad. This phenomenon is well recorded at the sites southeast of Mauritania (Dhar Tichitt and Oualata), Méma (Kobadi), Gourma (Windé Koroji), and Dogon Country (Ounjougou) in Mali, southwest Niger (Kirkissoy), and northeast Nigeria (Kursakata). It is characterized notably by the rapid eastward progression of ceramic traditions with fibre roulette decorations (Figs. 1 and 2). This axis to be related to migrations and/or cultural diffusion developing along the Sahelo-sudanian belt during the 2nd millennium BCE and also in all likelihood to the rapid expansion of agriculture in the savannah environments (Ozainne 2013). The rapidity of this phenomenon was certainly enhanced by mobile seasonal lifestyles based on animal husbandry, in which pearl millet cultivation was probably first integrated as a secondary livelihood (Kahlheber and Neumann 2007). This schema thus implies a border effect more or less in line with forest environments, where other resources were exploited. The existence of mixed economic systems at the forest-savannah boundaries, but also of homogenous cultural traditions occupying several climatic zones, is nonetheless not excluded, as is demonstrated by the specificities of the Kintampo tradition in Ghana.

In Central Africa, the end of the 2nd millennium BCE corresponds with the beginning of the Late Neolithic (or the last period of the SMA, the Stone to Metal Age) which developed especially during the 1st millennium BCE with the progressive expansion of village communities in forestry zones. These Late Neolihtic sites are characterized above all by the presence of numerous pit dumps (Clist 2005; Oslisly and White 2007) (Figs. 1 and 2).

Climatic Changes and Socio- Economic Transitions of the First Millennium BCE

During the 1st millennium BCE, drier climatic conditions were recorded in sub-Saharan Africa, and several regions in the Sahel faced decreasing occupations from 800 BCE, possibly reflecting an increase in the mobility of populations (Breunig and Neumann 2002). Between 800 and 400 BCE, the opening of landscapes following climatic changes enabled agriculture to spread in more southern zones. Previously flooded areas southeast of Lake Chad (Kursakata, Mege) were occupied by pearl millet cultivators from the beginning of the 1st millennium BCE (Kahlheber and Neumann 2007). In central Nigeria, sites from the beginning of the Iron Age (Ungwar Kura) are associated between 800 and 400 BCE with a mixed economic system combining pearl millet and "cowpea" and the exploitation of wild oily fruit trees in mosaic forest/savannah woodlands (Kahlheber et al. 2009) (Figs. 1 and 2). Westward, the appearance of pearl millet occured later from around 800 BCE in the Middle Senegal Valley (Walalde) in an Iron Age context (Deme and McIntosh 2006).

During this period we observe the persistence of cultural currents on an east–west axis along the Sahelo-sudanian belt, and roulette decorated ceramics appeared from the end of the 2nd millennium BCE in southeast of Lake Chad Basin and in northern Cameroon (Livingstone Smith 2007). On this same axis, an inverse phenomenon could also be involved, with the appearance in southwest Niger (Kirkissoy) and in Dogon Country in eastern Mali (Nin-Bèrè 3) of some ceramic features (carinated containers, decorative geometric motifs) previously documented in northeast Nigeria (Gajiganna) between the end of the 2nd millennium and the middle of the 1st millennium BCE (Vernet 1996; Breunig and Neumann 2002; Ozainne 2013) (Figs. 1 and 2). This cultural countercurrent in the Sudano-Sahelian zone, however, is documented only by a small number of archaeological sites and needs to be confirmed. A new wave of migration from eastern central Sahara

may also have occured at the beginning of the first millennium BCE (Ozainne 2013).

In West Africa, the 1st millennium BCE is also generally regarded as a period of transition between the Neolithic and Iron Age, often characterized by the emergence of new cultural and technical specifications within contexts that are still essentially Neolithic. The final centuries before our era, however, are often marked by an important cultural and economic disruption, some Neolithic heritage being likely to survive within the early traditions of the Iron Age. Contemporary to the beginning of rice cultivation and the presages of urbanization in the Inner Niger Delta in Mali (Dia and Djenné-Jeno), the Faïta ceramic tradition is linked, for example, with the Neolithic of Dhar Tichitt, Oualata and Nema (Bedaux et al. 2005; McIntosh and McIntosh 1980; MacDonald 2011) (Figs. 1 and 2). Sahelian cultures from the Neolithic to Iron Age transition also appear to be characterized by rarer and more rudimentary lithic industries (Vernet 1996).

In Central Africa, we observe during the second half of the 1st millennium BCE an important rainforest disturbance, that can be attributed to increasing aridity and/or stronger seasonality (Neumann et al. 2012b). It is in this context that the presence of domestic millet is attested at the sites of Bwambé-Sommet and Abang Minko'o in southern Cameroon (Eggert et al. 2006; Neumann et al. 2012a). The opening of the forest landscape also promoted the use of oil palm and/or incense tree in the same region; the exploitation of nut trees is also attested in many other locations in Central Africa in the same period, e.g. in Gabon (Otoumbi) but also in the southwestern Congo (Tchissanga) and the Democratic Republic of Congo (Sakuzi, Ngovo) (Figs. 1 and 2).

From the end of the 2nd millennium BCE, the opening of landscapes also facilitated the dissemination of village communities southward through the forest areas of Central Africa, where many sites of the 1st millennium BCE are characterized by habitats often associated with sets of pit dumps containing charred remains and ceramics (Abang Minko'o, Obobogo, Okala). Comparable sites are also known in the south of humid forests in the southwest Democratic Republic of Congo (Sakuzi) (de Maret 1990; Clist 2005; Eggert et al. 2006; Oslisly and White 2007) (Figs. 1 and 2). During the first half of the 1st millennium BCE, the presence in Gabon (Okala, Epona) of one or many ceramic traditions characterized particularly by bilobed vases and incised or pivoting comb decorations illustrating the advance of neolithic groups through the forest, along the coast and the valley of the Ogowe but perhaps also following the ridge lines from southern Cameroon (Clist 2005; Oslisly and White 2007) (Figs. 1 and 2). The sites dated from the second half of the 1st millennium BCE then demonstrate a rapid transition between the Neolithic and the Iron Age in Central Africa. As in West Africa, this period seems to be also characterized by a decrease or loss of lithic industries, perhaps associated with the beginnings of iron tools, whose arrival, however, did not eradicate the polished stone axes (Clist 2005).

Generally speaking, it seems that the ceramic traditions at the end of the Neolithic and the beginning of the Iron Age in Central Africa integrate multiple sources including at once elements from Saharan traditions, such as pivoting imprint decorations, but also cultural groups that develop south of Lake Chad from the 2nd millennium BCE, particularly characterized by geometric designs, incisions, and carinated containers. Rouletted decorations appeared in northern Cameroon around the beginning of the 1st millennium BCE within the context of major savannah cultural trends initiated during the 2nd millennium BCE. This decoration technique however affected only marginally forest areas of Central Africa and spread to the east and the Great Lakes region along the forest boundaries (Livingstone Smith 2007).

More arid climatic conditions and the opening of landscapes in the 1st millennium BCE thus appear to have resulted in a coherent sequence of cultural and economic events. In the Sahelo-sudanian belt, we observe an increased mobility of populations in some environments but also an intensification of occupations in other environments, with notably the appearance of large settlement mounds and even fortified sites in areas previously flooded such as in the Inner Niger Delta in Mali (Dia and Jenne-Jeno) or the southern

Lake Chad Basin (Daima, Zilum) (McIntosh and McIntosh 1980; Connah 1981; Breunig and Neumann 2002; Bedaux et al. 2005; Magnavita et al. 2006) (Figs. 1 and 2). In the savannah environments, the first millennium BCE appears thus to be a period of social and economic transition, after which agricultural practices have become more extensive. After 500 BCE, the disturbance of forest areas in Central Africa coincides chronologically with the establishment of populations practicing millet cultivation as well as breeding small livestock and exploiting oil palm or incense tree. Finally, the appearance of iron is documented in most parts of West and Central Africa during the same period.

Conclusion

We may retain a general definition of the major cultural and economic changes in the Holocene in West and Central Africa according to a schema divided into three main stages. Firstly, from the Early Holocene, populations developed techniques of ceramic production within the confines of the Saharan and Sahelian zones, in the context of a rational exploitation of wild plants including the use of ground material, thus constituting a "proto-producer" period, sometimes called "Early Neolithic." The presence of ceramic and incense tree remains has moreover been signaled since the Middle Holocene in southern Cameroon. Secondly, during the Late Holocene, we observe the development of a "Low-level production Neolithic," characterized by a still partially mobile lifestyle, in which herding was very important and agriculture played mainly a complementary role, as well as the exploitation of wild plant resources. This sub-Saharan Neolithic (called "Later Stone Age," "Final Stone Age," or even "Stone to Metal Age" according to the region and the researchers) begins around the middle of the 3rd millennium BCE with the arrival of the first farmers and then the rapid development of pearl millet cultivation in the Sahelo-sudanian zone. From the end of the 3rd millennium to the beginning of the 1st millennium BCE, West and Central Africa thus present a mosaic of economic systems within which agriculture remains a secondary component. Thirdly, the 1st millennium BCE was characterized by the appearance of new domestic species and the development of large and more sedentary communities at the beginning of the Iron Age in the savannah zones. From this period of socio-economic transition, agricultural practices changed and became gradually more extensive during the first half of the 1st millennium CE.

The arrival of pastoralists south of the Sahara and then the emergence and diffusion of agriculture thus constitutes a set of events which are articulated in a consistent manner over time and space, and seem to be attached to a number of demographic and cultural phenomena, all suggestive of a "Neolithization-like" process. We first observe a general dynamic of north–south migrations coinciding with climatic and environmental changes at the beginning of the Late Neolithic. In the 3rd millennium BCE, the arrival of pastoralism in the Sahel is in fact linked to Saharan ceramic traditions, although the first cultivators seem to have initiated new cultural currents proper to the Sahel, clearly drawing their origin from the Saharan world. The period of the 2nd millennium BCE is characterized rather by a process of migrations and acculturations on a general east–west bidirectional axis, coinciding at least in part with the expansion of agriculture along the savannah zones and accentuated by partially mobile lifestyles still strongly influenced by pastoralism. To the south, forest environments probably induced an economic and cultural border effect likely to support the emergence of intermediary systems in the savannha-forest transition zones, either by the adaptation of cultivators or by the adoption of pearl millet cultivation by local populations. From the 2nd millennium BCE, the agriculture frontline progressively shifted south. Then, around the middle of the 1st millennium BCE, an important climatic threshold caused new migration from the Sahara to the Sahel as well as an opening of the rainforest of Central Africa. This latter event temporarily allowed the cultivation of pearl millet at very low latitudes and enhanced the growth of village communities in forest environments.

It remains difficult to identify possible cultural interactions between early farmers and hunter-

gatherer societies having already acquired pottery, since ceramic remains prior to the 2nd millennium BCE are very rare south of the Sahara. It is likely that populations living in more closed environments in southern zones during the Middle Holocene implemented economic systems requiring a lesser use of pottery than those developed by groups exploiting wild grasses in the Sahelo-sudanian belt, thus leaving behind only a small archaeological footprint. The rare examples of pottery in the sub-Saharan area during the Middle Holocene, moreover, often evoke the Saharan world and could represent the reconnaissance and gradual occupation of the southern regions by northern populations, occurring in parallel with the contemporary environmental changes.

Cross-References

- ► Jenne-Jeno, Archaeology of
- ► Nkang: Early Evidence for Banana Cultivation on the African Continent
- ► Ounjougou Site Complex, Archaeology of the

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References

Ballouche, A., and K. Neumann. 1995. A new contribution to the Holocene vegetation history of the West African Sahel: Pollen from Oursi/Burkina Faso and charcoal from three sites in NE Nigeria. *Vegetation History and Archeobotany* IV (1): 31–39.

Bedaux, R.M.A., J. Polet, K. Sanogo, and A. Schmidt, eds. 2005. *Recherches archéologiques à Dia dans le Delta intérieur du Niger (Mali): Bilan des saisons de fouilles 1998–2003*. Leiden: CNWS Publishers.

Breunig, P., and K. Neumann. 2002. From hunters and gatherers to food producers: New archaeological and archaeobotanical evidence from West African Sahel. In *Droughts, food and culture: Ecological change and food security in Africa's later prehistory*, ed. F. Hassan, 123–155. New York: Kluwer Academic Plenum.

Chenorkian, R. 1983. Ivory Coast prehistory: Recent developments. *African Archaeological Review* 1: 127–142.

Clist, B. 2005. Des premiers villages aux premiers européens autour de l'estuaire du Gabon: Quatre millénaires d'interactions entre l'homme et son milieu. Unpublished Ph.D. dissertation, Université Libre de Bruxelles.

Connah, G. 1981. *Three thousand years in Africa: Man and his environment in the Lake Chad region of Nigeria*. Cambridge: Cambridge University Press.

de Maret, P. 1990. Le "néolithique" et l'Âge du Fer Ancien dans le sud-ouest de l'Afrique Centrale. In *Paysages quaternaires de l'Afrique centrale atlantique*, ed. R. Lanfranchi and D. Schwartz, 447–457. Paris: ORSTOM.

de Maret, P. 1995. Pits, pots and the far west stream. *Azania* 29–30: 318–323.

Eggert, M.K.H., A. Höhn, S. Kahlheber, C. Meister, K. Neumann, and A. Schweizer. 2006. Pits, graves and grains: Archaeological and archaeobotanical research in southern Cameroon. *Journal of African Archaeology* 4 (2): 273–298.

Frank, T., P. Breunig, P. Müller-Haude, K. Neumann, W. Van Neer, R. Vogelsang, and H.-P. Wotzka. 2001. The Chaîne de Gobnangou, SE Burkina Faso: Archaeological, archaeobotanical, archaeozoological and geomorphological studies. *Beiträge zur Allgemeinen und Vergleichenden Archäologie* 21: 127–190.

Gautier, A., and W. Van Neer. 2005. The continuous exploitation of wild animal resources in the archaeozoological record of Ghana. *Journal of African archaeology* 3 (2): 195–212.

Harlan, J.R. 1971. Agricultural origins: Centers and non-centers. *Science* 174: 468–474.

Huysecom, E. 1990. *Fanfannyégèné I: un abri-sous-roche à occupation néolithique au Mali: la fouille, le matériel archéologique, l'art rupestre*. Sonderschriften des Frobenius-Institut 8. Wiesbaden: F. Steiner.

Huysecom, E. 2012. Un Néolithique "très" ancien en Afrique de l'Ouest? *Dossier Pour la Science* 76: 86–91.

Jousse, H. 2004. A new contribution to the history of pastoralism in West Africa. *Journal of African Archaeology* 2 (2): 187–201.

Kahlheber, S., and K. Neumann. 2007. The development of plant cultivation in semi-arid West Africa. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T.P. Denham, J. Iriarte, and L. Vrydaghs, 320–346. London: One World Archaeology/UCL Press.

Kahlheber, S., A. Höhn, and N. Rupp. 2009. Archaeobotanical studies at Nok sites: An interim report. *Nyame Akuma* 71: 2–17.

Kuper, R., and S. Kröpelin. 2006. Climate controlled Holocene occupation in the Sahara: Motor of Africa's evolution. *Science* 313: 803–807.

Lavachery, P. 2001. The Holocene archaeological sequence of Shum Laka rock shelter (Grassfields, western Cameroon). *The African Archaeological Review* 18 (4): 213–247.

Linseele, V. 2007. *Archaeofaunal remains from the past 4000 years in Sahelian West Africa: Domestic livestock, subsistence strategies and environmental changes*. Oxford: Archeopress.

Livingstone Smith, A. 2007. Histoire du décor à la roulette en Afrique subsaharienne. *Journal of African Archaeology* 5 (2): 189–216.

Logan, A.L., and A.C. D'Andrea. 2012. Oil palm, arboriculture, and changing subsistence practices during Kintampo times, 3900–3600 bp. *Quaternary International* 249: 63–71.

MacDonald, K.C. 2011. Betwixt Tichitt and the IND: The pottery of the Faïta Facies, Tichitt tradition. *Azania* 46 (1): 49–69.

Magnavita, C., P. Breunig, J. Ameje, and M. Posselt. 2006. Zilum: A mid-first millennium BC fortified settlement near Lake Chad. *Journal of African Archaeology* 4 (1): 153–169.

Manning, K., R. Pelling, T. Higham, J.-L. Schwenniger, and D.Q. Fuller. 2011. 4500-year old domesticated pearl millet (*Pennisetum glaucum*) from the Tilemsi Valley, Mali: New insights into an alternative cereal domestication pathway. *Journal of Archaeological Science* 38 (2): 312–322.

Marshall, F., and E. Hildebrand. 2002. Cattle before crops: The beginning of food production in Africa. *Journal of World Prehistory* 16 (2): 99–143.

Mbida, C.M., W. Van Neer, H. Doutrelepont, and L. Vrydaghs. 2000. Evidence for banana cultivation and animal husbandry during the 1st millennium BC in the forest of southern Cameroon. *Journal of Archaeological Science* 27: 151–162.

McIntosh, S.K. 2001. West African Neolithic. In *Encyclopedia of prehistory, volume 1: Africa*, ed. P. Peregrine and M. Ember, 323–338. New York: Plenum/Kluwer/Academic.

McIntosh, S.K., and R.J. McIntosh. 1980. *Prehistoric investigations at Jenne, Mali*. Cambridge Monographs in African Archaeology 2. Oxford: British Archaeological Reports.

Neumann, K. 2003. The late emergence of agriculture in Sub-Saharan Africa: Archaeological evidence and ecological considerations. In *Food, fuel and fields. Progress in African archaeobotany.* Africa Praehistorica 15, ed. K. Neumann, A. Butler, and S. Kahlheber, 71–92. Köln: Heinrich-Barth-Institut.

Neumann, K., and E. Hildebrand. 2009. Early bananas in Africa: The state of the art. *Ethnobotany Research and Applications* 7: 353–362.

Neumann, K., K. Bostoen, A. Höhn, S. Kahlheber, A. Ngomanda, and B. Tchiengué. 2012a. First farmers in the Central African rainforest: A view from southern Cameroon. *Quaternary International* 249: 53–62.

Neumann, K., M.K.H. Eggert, R. Oslisly, B. Clist, T. Denham, P. de Maret, S. Ozainne, E. Hildebrand, K. Bostoen, U. Salzmann, D. Schwartz, B. Eichhorn, B. Tchiengué, and A. Höhn. 2012b. Comment on "Intensifying weathering and land use in iron age Central Africa". *Science* 337 (6098): 1040.

Oslisly, R., and L. White. 2007. Human impact and environmental exploitation in Gabon during the Holocene. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T. Denham, J. Iriarte, and L. Vrydaghs, 347–360. Walnut Creek: Left Coast Press.

Ozainne, S. 2013. Un Néolithique ouest-africain. *Cadre chrono-culturel, économique et environnemental de l'Holocène récent en pays dogon (Mali)*. Journal of African Archaeology monograph series 8; Peuplement humain et paléoenvironnement en Afrique de l'Ouest 3. Frankfurt am Main: Africa Magna Verlag.

Shaw, T., and S.G. Daniels. 1984. *Excavations at Iwo Eleru, Ondo State, Nigeria*. West African Journal of Archaeology 14. Ibadan: West African Journal of Archaeology.

Sinclair, P., T. Shaw, and B.W. Andah. 1993. Introduction. In *The archaeology of Africa: Food, metals and towns*. One World Archaeology 20, ed. T. Shaw, P. Sinclair, B.W. Andah, and A. Okpoko, 1–31. New York/London: Routledge.

Smith, A.B.. 2005. *African herders: Emergence of pastoral traditions*. African Archaeology Series 8. Walnut Creek: Alta Mira Press.

Smith, B.D. 2001. Low-level food production. *Journal of Archaeological Research* 9 (1): 1–43.

Stahl, A.B.. 1994. Innovation, diffusion, and culture contact: The Holocene archaeology of Ghana. *Journal of World Prehistory* 8 (1): 51–112.

Thiam, M. 2010. *La céramique dans l'espace sénégambien: un patrimoine méconnu.* Paris: L'Harmattan.

Vernet, R. 1996. *Le Sud-Ouest du Niger de la préhistoire au début de l'histoire*. Etudes nigériennes 56. Niamey/Paris: IRSH, Sépia.

Vernet, R., and G. Aumassip. 1994. Quelques problèmes sémantiques du Sahara préhistorique. In *Milieux, hommes et techniques du Sahara préhistorique: problèmes actuels*, 247–268. Paris: L'Harmattan.

Watson, D.J. 2010. Within savanna and forest: A review of the late Stone Age Kintampo tradition, Ghana. *Azania* 45: 141–174.

Further Reading

Amblard-Pison, S. 2006. *Communautés villageoises néolithiques des Dhars Tichitt et Oualata (Mauritanie)*. BAR International series 1546. Oxford: J. & E. Hedges.

Blench, R.M., and K.C. MacDonald. 2000. *The origins and development of African livestock*. London: UCL Press.

Clist, B. 1990. Des derniers chasseurs aux premiers métallurgistes: sédentarisation et débuts de la métallurgie du fer (Cameroun, Gabon, Guinée équatoriale). In *Paysages quaternaires de l'Afrique centrale atlantique*, ed. R. Lanfranchi and D. Schwartz, 458–478. Paris: ORSTOM.

Coon, C.S. 1968. *Yengema Cave report*. Philadelphia: University Museum of Pennsylvania.

D'Andrea, A.C., M. Klee, and J. Casey. 2001. Archaeobotanical evidence for pearl millet (*Pennisetum glaucum*) in sub-Saharan West Africa. *Antiquity* 75 (288): 341–348.

de Maret, P. 1996. Shum Laka (Cameroon): general perspectives. In *Aspects of African archaeology: Papers*

from the 10th Congress of the Panafrican Association for Prehistory and Related Studies, ed. G. Pwiti and R. Soper, 275–280. Harare: University of Zimbabwe.

Denham, T., J. Iriarte, and L. Vrydaghs. 2007. *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*. One World Archaeology 51. Walnut Creek: Left Coast Press.

Gallin, A. 2011. *Les styles céramiques de Kobadi: analyse comparative et implications chronoculturelles au Néolithique récent du Sahel malien*. Frankfurt am Main: Africa Magna.

Grébénart, D. 1985. *La région d'In-Gall-Tegidda-n-Tesemt (Niger): programme archéologique d'urgence 1977–1981, 2: le Néolithique final et les débuts de la métallurgie.* Etudes nigériennes 49. Niamey: Institut de recherches en sciences humaines.

Hassan, F. 2002. *Droughts, food and culture. Ecological change and food security in Africa's later prehistory.* New York: Kluwer Academic Plenum Publishers.

Huysecom, E., S. Ozainne, F. Raeli, A. Ballouche, M. Rasse, and S. Stokes. 2004. Ounjougou (Mali): A history of Holocene settlement at the southern edge of the Sahara. *Antiquity* 78 (301): 579–593.

Huysecom, E., M. Rasse, L. Lespez, K. Neumann, A. Fahmy, A. Ballouche, S. Ozainne, M. Maggetti, C. Tribolo, and S. Soriano. 2009. The emergence of pottery in Africa during the 10th millennium calBC: New evidence from Ounjougou (Mali). *Antiquity* 83 (322): 905–917.

Kahlheber, S., K. Bostoen, and K. Neumann. 2009. Early plant cultivation in the Central African rain forest: First millennium BC pearl millet from South Cameroon. *Journal of African Archaeology* 7 (2): 253–272.

Langlois, O. 2004. Distributions ancienne et actuelle des décors imprimés au Diamaré (Nord-Cameroun) et à ses marges. In *Actes de la deuxième table ronde "La céramique imprimée du Sahara et de ses marges"*. Préhistoire Anthropologie méditerranéennes 13, ed. A. Gallin and D. Commelin, 109–126. Aix-en-Provence: ESEP.

MacDonald, K.C. 1996a. The Windé Koroji Complex: Evidence for the peopling of the eastern Inner Niger Delta (2100–500 BC). *Préhistoire, anthropologie méditerranéennes* 5: 157–165.

MacDonald, K.C. 1996b. Tichitt-Walata and the Middle-Niger: Evidence for cultural contact in the second millennium BC. In *Aspects of African archaeology: Papers from the 10th Congress of the Panafrican Association for Prehistory and Related Studies*, ed. G. Pwiti and R. Soper, 429–440. Harare: University of Zimbabwe.

MacDonald, K.C. 1997. Kourounkorokale revisited: the pays Mande and the West African microlithic technocomplex. *African Archaeology Review* 14 (3): 161–200.

Maley, J. 2010. Climate and palaeoenvironment evolution in north tropical Africa from the end of the Tertiary to the Upper Quaternary. *Palaeoecology of Africa* 30: 227–278.

Neumann, K. 2005. The romance of farming – plant cultivation and domestication in Africa. In *African Archaeology. A critical introduction*, ed. A.B.. Stahl, 249–275. Malden: Blackwell.

Ngomanda, A., K. Neumann, A. Schweizer, and J. Maley. 2009. Seasonality change and the third millennium BP rainforest crisis in southern Cameroon (Central Africa). *Quaternary Research* 71 (3): 307–318.

Oslisly, R. 1998. Hommes et milieux à l'Holocène dans la moyenne vallée de l'Ogooué (Gabon). *Bulletin de la société préhistorique française* 95 (1): 93–105.

Person, A., S. Amblard-Pison, H. Jousse, T. Vallette, C. Albaret, M. Raimbault, A.-F. Maurer, and J. Suire. 2012. Influence de l'environnement sur la gestion des ressources au Néolithique dans la zone refuge du Dhar Néma (Mauritanie sud-orientale). *Journal of African Archaeology* 10 (2): 133–164.

Raimbault, M. 1996. L'impact de la dégradation climatique holocène sur les Néolithiques du Sahara malien et les données du faciès sahélien de Kobadi. *Préhistoire, anthropologie méditerranéennes* 5: 135–146.

Shaw, T., P. Sinclair, B.W. Andah, and A. Okpoko. *The archaeology of Africa: Food, metals and towns*. One World Archaeology 20. New York/London: Routledge.

Stahl, A.B.. 2005. *African archaeology: A critical introduction*. Malden: Blackwell.

West and Central Asia: Early Homo Fossil Records

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West and Central Asia is an enormous territory that extends from the Mediterranean to the Hindu Kush and Pamir Mountains, and from the Indian Ocean to the southern edge of Siberia (Fig. 1). West Asia comprises the Arabian Peninsula, the Levant (Israel, Lebanon, western Jordan, and western Syria), Turkey, Iraq, and Iran. Some but not all researchers would also include the countries of the Caucasus – Armenia, Azerbaijan, and Georgia. Central Asia consists of the "Five Stans" of Kazakstan, Kryrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, and also northern Afghanistan. West and Central Asia vary enormously in their climate and relief. Climatically, they lie west of the Indian summer monsoon (apart from the Yemeni Mountains)

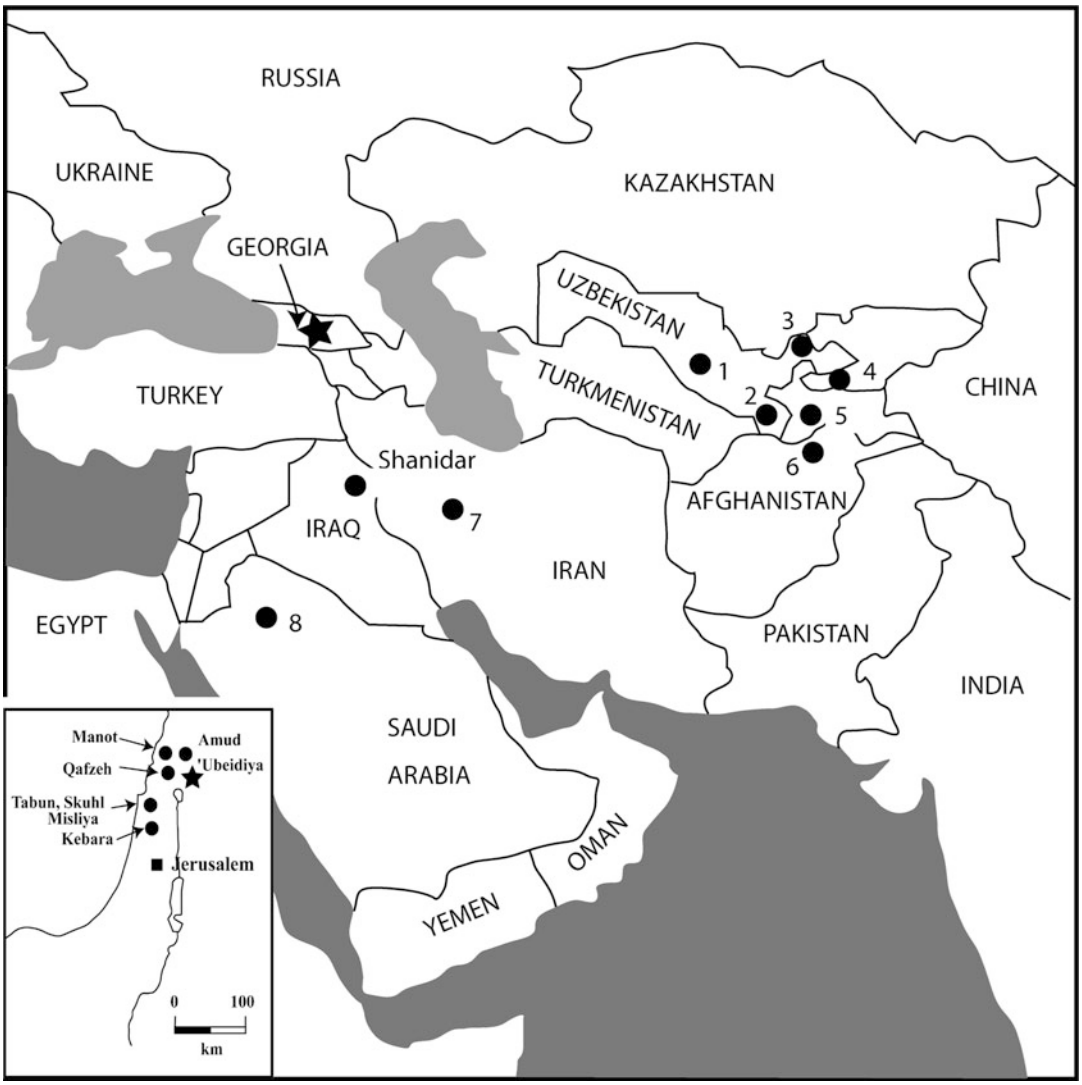

West and Central Asia: Early Homo Fossil Records, Fig. 1 Principal sites with hominin remains in West and Central Asia. ★ Key on main map: Dmanisi, Georgia. Central Asian sites: 1 Anghilak; 2 Teschik Tasch; 3 Obi Rakhmat; 4 Sul-ungir, Kyrgyzstan; 5 Khudji, Tajikistan; 6 Darra-i-Kur, Afghanistan; 7 Wezmeh, Iran; 8 Wusta, Saudi Arabia

and are thus areas of winter/spring rainfall, most of which is delivered by westerly winds from the Mediterranean. The Mediterranean coast and hinterland of the Levant and Turkey has the highest rainfall and mildest winters. Most of the Arabian Peninsula, the interior of West Asia (Jordan, eastern Syria, Iraq, and the Iranian Plateau), and much of Central Asia is now desert, and aridity is the key climatic variable. Rainfall varies from ca. 600 mm along parts of the Levantine coast to annual averages (over 30–40 years) of <100 mm in the deserts of the Negev, southern Israel, much of Arabia, the Iranian Plateau, and Central Asia. Consequently, it is likely that the core areas of hominin residence would have been in those areas such as the Levant, western Turkey, and the Caucasus where rainfall was highest.

Rainfall can vary enormously from year to year, so that annual averages are not particularly useful climatic indicators, particularly in desert regions, even when evaporation rates are also taken into account. Annual temperatures vary enormously, with some areas such as Arabia and Iran routinely experiencing daytime summer temperatures of >40 °C but cool (and generally frost-free) winters. Other areas, notably eastern Turkey, the Caucasus, parts of the Zagros Mountains, and Central Asia have slightly cooler (but nevertheless still hot) summers but very cold winters, with temperatures sometimes below −20 °C and deep snow.

In terms of relief, West Asia contains the Dead Sea Valley (400 m below sea level), and mountains (mainly extinct volcanoes) over 5,000 m high in eastern Turkey (Mt. Ararat, 5,165 m), the Caucasus (El'brus, 5,642 m), and northern Iran (Mt. Demavend, 5,604 m). The Zagros Mountains are a major mountain chain over 1,500 km long along western Iran with peaks over 4,000 m that divides the lowlands of Mesopotamia from the Iranian Plateau, which has an average altitude of 1,000 m. Apart from the Tigris-Euphrates river system of Iraq, Syria, and Turkey, the Orontes in Syria, and the Oxus in Central Asia, Southwest and Central Asia have few large perennial rivers. This is especially true of Arabia, which now has none, and Iran, which has only one, the Qara Su, which flows through the Zagros Mountains into the Euphrates. Availability of perennial water would thus have been a major constraint on early hominins throughout West and Central Asia. In areas away from major rivers, the main water supplies would have been lakes and springs, especially along some mountain ranges. Most of the evidence for Early Pleistocene hominins in Southwest Asia comes from the edges of extinct lakes and streams.

Climatic History

The Pleistocene climate of West and Central Asia experienced numerous small-scale fluctuations in the Early Pleistocene (2.4–0.8 Ma) between warm, moist periods and cooler, drier ones, with an average duration of 30–40 ka. Around a million years ago, there was a shift to more severe fluctuations on an average cycle of ca. 100,000 years, with longer and much cooler periods (=glaciations) punctuated by shorter warm and moist (=interglacial) periods. Since 600 ka, there have been four particularly long and severe periods when temperatures and rainfall were considerably lower than today. Throughout the Pleistocene, hominin settlement was likely centered in areas with higher rainfall and dependable supplies of water (notably the Levant) such as perennial rivers, lakes, and springs, and the most arid parts were probably uninhabited or only sparsely settled. In cold and dry periods, much of inland western and central Asia was probably uninhabited.

Role as a Cross-Roads and Corridor

Neither West nor Central Asia was a closed system that had no links to neighboring regions. The Levant in particular is often envisaged as a corridor that linked – when conditions were favorable –West Asia with Africa, Europe, and continental Asia. Western Turkey was likely the main corridor between Europe and Asia. The Arabian Peninsula was probably also a major corridor between Africa and Asia via the Sinai Peninsula at the head of the Red Sea, the 1000-mile (1600 km) coastline of the Red Sea, and the Bab al Mandab strait at its southern end. Central Asia is another open system, with potential links with North China to the east, and India and Pakistan to the southeast via Afghanistan.

Historical Background

Paleoanthropological research in West and Central Asia has been very piecemeal and low-key for the most part, and many parts remain very poorly known. The longest and heaviest concentration of research has been in Israel. The British were very active before 1939 in what was then the British Mandate of Palestine, and Dorothy Garrod from Cambridge, UK, undertook a major series of

excavations of caves such as Tabun and Skuhl. Since 1948, Israeli archaeologists have been extremely active, as have American teams, and the literature on the Paleolithic of West Asia is dominated by that on evidence from Israel. Much less research has taken place in the rest of West Asia: state-sponsored research is often overshadowed by the need to invest scarce resources on later historic sites and monuments, and major Paleolithic sites have often been excavated by foreign-teams operating under license – Ralph Solecki's excavation over several seasons at Shanidar Cave, Iraq, is one obvious example. In Central Asia, some paleoanthropological research occurred in Soviet times, such as Okladinov's excavation of the Neanderthal child's skeleton at Teschik Tasch. This tradition continued after 1989, and the late Andrei Dondonov and Vadim Ranov jointly conducted outstanding investigations of the Paleolithic and climatic record of Tajikistan. Paleoanthropological research in other countries formerly within the Soviet Union has prospered since 1989. Georgia is an outstanding example, with the 1.77–1.85 Ma evidence from Dmanisi – fortuitously found beneath a medieval castle – one of the most important discoveries in paleoanthropology from the past 100 years. At present, there are outstanding prospects for Paleolithic and paleoanthropological research across most of West and Central Asia: when so little is known, there is so much still to learn.

The Fossil Evidence for Homo in West and Central Asia

West Asia has an exceptional fossil record for our genus for the Early Pleistocene, 1.8 Ma ago (see Dennell 2009), and for Neanderthals and our species in the last 250,000 years. Sadly, there is a major gap in the fossil record between these two time-lines. Central Asia has very little fossil evidence for our genus, and only from the last 100,000 years. The earliest and most informative evidence for our genus outside Africa comes from Dmanisi, Georgia. There is also a hominin right lower incisor (UB 335) from the lake-side site of "Ubediya," Israel, that is ca. 1.0–1.4 Ma-old and attributed to *Homo* sp. indet. (Belmaker et al. 2002).

Dmanisi

The paleontological site of Dmanisi lies directly underneath a medieval castle, and over a basalt laid down ca. 1.8 Ma, during the Olduvai Subchron of normal magnetic polarity. The lowest deposits (Unit A) over the basalt contain artifacts, fossils, and stone artifacts. Paleomagnetism analysis shows that this unit has a normal polarity and was formed during the Olduvai Subchron, ca. 1.77–1.95 Ma. Shortly after 1.77 Ma, the top of Unit A was eroded and a series of cavities developed inside it. The sediments inside these cavities have a reversed polarity, and were thus formed after 1.77 Ma. These cavities contain most of the non-hominin fossils and artifacts, and two hominin crania (D2280 and D2282) that came from the same level as the mandible D211 that was found in 1991. Overlying Unit A and the cavities, there is an abrupt erosional layer along the base of some stream channels that cut into Unit A and then filled with sands and gravels (Unit B1). These channels contain artifacts, a toothless hominin cranium (D3444) (Lordkipanidze et al. 2006) and a mandible (D3900). Unit B1 is covered by an archaeologically sterile layer of sand (Unit B2) with reversed polarity, i.e., <1.77 Ma. The entire fossil hominin and associated stone tools date from and shortly after the Olduvai Subchron and are thus ca. 1.77–1.85 Ma.

The hominin remains found so far comprise five published crania, three mandibles, the partial skeleton of an adolescent associated with skull D2700/D2735, and the post-cranial remains of one large and two small adults. The crania are very small-brained: 775 cc^3 for D2880, 650 cc^3 for D2282, c. 625 cc^3 for D3444, and only 600 cc^3 for D2700, which was associated with mandible D2735 in layer B1, and 546 cc^3 for D4500. D2700 was from a sub-adult, probably male, whose head was likely at or near its fully adult size. The classification of these remains has proved problematic. There is general agreement that

they represent a very early form of our genus, with affinities to the East African *H. habilis* and *H. rudolfensis* that dispersed out of Africa between 2 and 1.8 Ma (Gabunia et al. 2000). The crania have been classified as the earliest form yet found of *H. erectus*, including those from Africa (a.k.a. *H. ergaster*). Indeed, some researchers have suggested that they may even be ancestral to *H. erectus* in Africa – in other words, some of their descendants dispersed southwards into Africa (Rightmire et al. 2006). The mandibles, however, tell a different story. Following the discovery of a robust mandible D2600, a new taxon, *H. georgicus*, was proposed (Lumley and Lordkipanidze 2006). More evidence is needed before we can choose between *H. georgicus* or a primitive form of *H. erectus*, or determine whether two populations are present. A more recent and plausible assessment is that the Dmanisi population and its contemporaries in East Africa (*H. habilis* and *H. rudolfensis*) are part of a single evolving lineage of early *Homo* (Lordkipanidze et al. 2013).

The postcranial evidence offers some fascinating insights into the anatomy of the earliest-known Asians (Lordkipanidze et al. 2007). It shows that these individuals were small, with an estimated height of only 144.9–166.2 cm, and a weight of 40–50 kg. These figures overlap with those for australopithecines (110.0–151.00 cm; 29–49 kg), earliest *Homo* (125.0–157.0 cm; 32–52 kg), and the 1.53 Ma skeleton of *H. ergaster* from Nariokotome (KNM WT15000) (150.5–169.1 cm; 45.5–70.6 kg) but are generally intermediate between australopithecines and early *Homo* on the one hand, and KNM WT 15000 and later hominins on the other. Their encephalization quotient (or EQ, the ratio of brain to body size) of 2.57–3.13 was also intermediate between early *Homo* (3.1) and KNM WT15000 (2.71–3.78). Additionally, there was an absence of humeral torsion, meaning that their hands would have faced forward instead of hanging sideways, as with modern humans, and the foot was orientated more medially than in modern humans, despite its modern arched appearance.

As might be expected for such an early form of our genus, the stone tools are very simple, and show no evidence of standardization or core preparation, as the main objective of flaking appears to have been the production of a sharp-edged flake (de Lumley et al. 2005; Mgeladze et al. 2011). The tools are most like Oldowan ones from East Africa that date back to 2.6 Ma, but because so few were retouched, they have been classified as "pre-Oldowan" to emphasize their technological simplicity. Nothing is yet known about their subsistence, although the fact that the individual D3444 survived without teeth implies either that soft foods were available or that he was fed altruistically by others who softened food for him by chewing it first.

The Big Gap in the Fossil Record: 1.8 Ma–200 ka

West Asia has been described as a "black hole of paleoanthropology" (Dennell 2009: 192) because of its lack of hominin fossil between the time of Dmanisi and the appearance of *Homo sapiens* ca. 200 ka ago, despite the excellence of its archaeological record, particularly for the Levant. Recent finds of cranial fragments from Koçabas, Turkey, and el Khown, Syria, have been identified as *H. erectus*, but in the absence of facial and mandibulary evidence, this identification is tenuous. At around 800 ka, new types of Acheulean handaxes and cleavers similar to ones in Africa were used at the site of Gesher Benot Ya'aqov in Israel, and may indicate an influx of new groups from Africa, but their identity and morphology are unknown. After ca. 400 ka, the Acheulean is followed by a very different type of tool assemblage known as the Jabrudrian (makers unknown), and this in turn was replaced by Mousterian assemblages after ca. 250 ka. In Central Asia, the earliest tool assemblages date from ca. 900 ka; these were not Acheulean, but very small flakes and were used with little change throughout the middle Pleistocene. The identity of these earliest inhabitants of Central Asia is currently unknown.

Because almost nothing is known about the type of hominins that inhabited West Asia between the time of Dmanisi and ca. 200 ka, or about Central Asia between 900 ka and the last

West and Central Asia: Early Homo Fossil Records, Table 1 Hominin remains from West and Central Asia 1.0 Ma–200 ka

Site	Age	Hominin remains	Classification
Azych, Azerbaijan	Mid-Middle Pleistocene	Mandible	*H. heidelbergensis*
Sel'ungur, Kyrgzstan	Late Middle Pleistocene	10 teeth, humeral fragment	Neanderthal/non-hominin?
Kara'in III.2, Turkey	ca. 200–250 ka	3 1st phalanges, 1 3rd phalange, left mandible fragment, cuboid, radius fragment	Neanderthal?
Kara'in, III.3	ca. 300–350 ka	Two vertebrae, femoral diaphysis	*Homo* sp. indet
Zuttiyeh, Israel	ca. 300 ka	Cranial	Various
Tabun E, Israel	ca. 400 ka	Molar, femoral fragment	*Homo* sp. indet.
Qesem, Israel	ca. 300 ka	8 teeth	*Homo* sp. indet
Koçabas¸ Turkey	Middle Pleistocene	Two cranial fragments	*H. erectus*
El Khowm, Syria	Middle Pleistocene	Cranial fragment	*H. erectus*

Sources: Dennell 2009, 2014; Glantz et al. (2008) (doubts over the Sel'ungir teeth); Kappelman et al. 2007 (Koçabas); Le Tensorer et al. 2006 (El Khowm); Hershkovitz et al. (2011) for Qesem

glaciation (see Table 1), many major issues of human evolution are difficult to resolve, particularly the relationships the inhabitants of West and Central Asia may have had with Europe, Africa, and the rest of Asia. For example, the earliest European fossil evidence for our genus is a mandible from Atapuerca, Spain, that is classified as *Homo* of indeterminate species, and dated to ca. 1.2 Ma (Carbonell et al. 2008); its source population in West Asia is unknown. According to Krause et al. (2010), the ancestors of the Denisovans – a population currently known only from analysis of the ancient DNA of a 30–48 ka human bone from Denisova Cave, Siberia – may have entered Southwest Asia from Africa ca. 1 Ma ago; an alternative view is that they originated in Asia (Martinón-Torres et al. 2010). Either way, there is no relevant skeletal evidence from West Asia. Around 800,000 years ago, Atapuerca was inhabited by *H. antecessor* (Carbonell et al. 1995). Both these populations were probably immigrants from West Asia and descendants of the Dmanisi hominins, but there is no equivalent to *H. antecessor* in West Asia. After 600 ka, the resident hominin in Europe was *H. heidelbergensis*, which some researchers believe also inhabited sub-Saharan Africa and perhaps even China. The only relevant finding from West Asia is a mandible from Azych Cave, Azerbaijan, that dates from the mid-Middle Pleistocene and was identified as *H. heidelbergensis*. In Europe, the descendants of *H. heidelbergensis* evolved into Neanderthals, and several examples are known from before the Upper Pleistocene (125–10 ka), but not for certain in West Asia (see Dennell 2009). The cranial specimen from Zuttiyeh Cave, Israel, is probably ca. 300 ka old, but there is no consensus over its identification (Sohn and Wolpoff 1993). Like, eight teeth from Qesem Cave, Israel, ca. 300-ks-old, are indeterminate. Although West Asia was likely a major corridor for hominins migrating into Europe and eastwards to South and East Asia between 1 Ma and 200 ka there is sadly almost no evidence of the hominin traffic that used it during this time.

Neanderthals and *H. sapiens*

The fossil hominin record of West Asia improves enormously for the last 150 ka. The evidence from the Levant is especially important for the large number of Neanderthal remains and also the earliest examples of *H. sapiens* outside Africa (see Table 2).

West and Central Asia: Early Homo Fossil Records, Table 2 The fossil hominin evidence from the Levant and Arabia, 250–40 ka. Principal source: Dennell 2014

Country	Locality	Specimen	Context	Age (ka)	Identification	Comments
Israel	Mislaya	1 adult maxilla	Upper Terrace Unit 6	177–194 ka	*H. sapiens*	Hershkovitz et al. 2018
	Tabun	Tabun I: almost complete skeleton Tabun II: mandible Molar and femur fragments	Layer C but probably intrusive from layer B Layer C Layer E	122 ± 16 ka if layer B 165 ± 16 ca. 300 ka	Neandertal Neandertal, (*H. sapiens*: Howell 1999); neither (Harvati and Lopez 2017)	Indicates presence of Neanderthal in MIS 6 in the Levant Indeterminate
	Skhul B	7 adults, 3 juveniles		119 ± 18 (TL)	*H. sapiens*	
	Qafzeh L Qafzeh XV-XXII	4 adults, 2 juveniles 2 adults, 5 juveniles, several isolated teeth		92 ± 5 (TL) 96 ± 13 (ESR EU) 115 ± 15 (ESR LU)	*H. sapiens* *H. sapiens*	
	Kebara F Kebara VII-XII	1 juvenile skeleton 1 partial adult skeleton, numerous isolated bones and teeth	Layer F Layers VII-XII	51.9 ± 3.5 to 59.9 ± 3.5 for layer XII by TL	All Neandertal	
	Amud B Amud B	2 adults, 2 juveniles 2 juveniles, numerous fragmentary remains	Layer B Layer B	(B1) 57.6 ± 3.7 (B2) 65.5 ± 3.5 (B4) 68.5 ± 3.4	Neandertal	
	'Ein Qashish[a]	Skull fragment, right M^3; leg bones and vertebra		60–70 ka	Neandertal	Been et al. 2017; Ekshtain et al. 2019
	Manot	Partial cranium		54.7–65.5	*H. sapiens*	Hershkovitz et al. 2015
Syria	Dederiyeh	3 infant burials various adult remains	Layers 3, 11 and 13 Layers 4 and 5		Neandertal	Akazawa et al. 1999
Lebanon	Ksar Akil KS1	"Egbert," a skull and some post-cranial; now lost	Layer XXVII or XVIII	47 ± 9 43.7 ± 1.5 (^{14}C) 40.8–39.2 ka cal BP (Douka et al. 2013)	*H. sapiens*	Bergman et al. 2017
Lebanon	Ksar Akil KS2	"Ethelruda," a partial maxilla	Layer XXV	42.4–41.7 ka cal BP	*H. sapiens*	
Arabia	Al-Wusta	Manual phalange		85 ka	*H. sapiens*	Groucutt et al. 2018

[a]'Ein Qashish is the first open-air site in the Levant where Neandertal remains have been recovered

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Early *Homo sapiens*

The earliest skeletal evidence for our species comes from Jebel Irhoud, Morocco (ca. 300 ka-old) and Ethiopia, ca. 190–160 ka. Recent evidence indicates that our species had already entered the Levant before the last interglacial (ca. 125–115 ka). An important recent discovery is that of a maxilla from Misliya Cave, Israel, that is dated to between 177,000 and 194,000 years old and is identified as that of *Homo sapiens.* It was found associated with Tabun-D type Middle Paleolithic assemblages (Hershkovitz et al. 2018). This discovery implies that our species may already have started to exit Africa before 170,000 years ago. Two other cave sites in Israel have produced unambiguous evidence of *H. sapiens* that is older than 70 ka (Shea 2003). The cave of Skuhl in Mount Carmel contained the remains of 16 individuals in levels B1 and B2 which have been dated by ESR and TL to between ca. 80 and 100 ka. The cave of Qafzeh has also produced evidence of 16 individuals, both on the terrace in front of the cave and from levels XVI to XXI inside. These are dated from between 80 and 120 ka by ESR and TL techniques. There is also some potentially important but ambiguous evidence from the cave of Tabun, Israel, which lies immediately adjacent to Skuhl, and has the most important and best-dated sequence of Middle Paleolithic stone tool assemblages in Southwest Asia. Two hominin finds are particularly important. The first (Tabun I) is a skeleton that was initially thought to have come from layer C, but more likely was an intrusive burial from layer B, dated by ESR to 122 ± 16 ka, and the second (Tabun II) is a mandible from layer C, which has been dated to 140 ± 21 ka (ESR) and 165 ± 16 (TL, on burnt flint). Both the mandible and skeleton have been identified as Neanderthal, but the mandible is unfortunately taxonomically ambiguous as some have identified it as *H. sapiens,* and others as Neanderthal. The Tabun II specimen is thus either an early Neanderthal or the earliest example of *H. sapiens* from outside Africa (or perhaps a hybrid, or a descendant of an indigenous, and currently undocumented, population). If the Tabun II mandible is regarded as that of a Neanderthal, it implies that Neanderthals were resident in the Levant before the last interglacial and also made the Mousterian assemblages before the appearance of *H. sapiens.* If on the other hand, the mandible is that of *H. sapiens*, it implies that it left Africa before the last interglacial and used Mousterian assemblages.

Neanderthals

If we exclude for the moment the Tabun II mandible, all Neanderthal finds from the Levant are younger than 70 ka (see Table 2). Many of these were deliberate burials. In level B of Amud Cave, Israel, a Neanderthal skeleton and other remains have been dated by TL and U-series to ca. 60–70 ka old, and at Kebara Cave, Israel, parts of a juvenile (Kebara I) were found in level F (later subdivided into units VI-XIII), and in later excavations, most of the postcranial skeleton of an adult male (Kebara II). These remains are dated to between 55 and 65 ka by ESR and TL. On current evidence, Neanderthals persisted in the Levant until 40–50 ka, when they are replaced, this time permanently, by *H. sapiens*.

Neanderthals are also widely distributed across west and Central Asia in the Upper Pleistocene in Marine Isotope Stages 3 and 4, ca. 70–40 ka. One of the best-known Neanderthal sites in West Asia is the cave of Shanidar, northern Iraq, where numerous remains were found from ca. 10 individuals in layer D. The youngest of these (Shanidar 1 and 5) lay above a charcoal sample that was radiocarbon dated to 46,990 ± 1500 and 50,600 ± −3000 BP. The oldest lie at depths beyond the range of radiocarbon carbon dating, and may date from shortly after, or even before, the last interglacial. The Shanidar finds include a partial skeleton, Shanidar 1, which exhibited multiple traumas even more severe than that routinely seen in many Neanderthal skeletons (Trinkaus and Zimmerman 1982). In Central Asia, the most important Neanderthal find is a child's skeleton from Teschik Tasch in Uzbekistan that was found in a late Mousterian context. For a long time, this was believed to be

the most easterly example of a Neanderthal, but recently some examples have been found in the Lake Baikal area of Siberia, 1500 km to the east, so Neanderthals had a very wide distribution during the last glaciation. Other evidence for Neanderthals in Central Asia has recently come to light. At Obi Rakhmat Grotto, Uzbekistan, six permanent maxillary teeth and 121 cranial fragments (all probably from the same 9–12-year-old individual) have been found in level 16 associated with a Middle Paleolithic assemblage; the age of the hominin remains is ca. 60–90 ka. At Anghilak Cave, also in Uzbekistan, a fragment of an adult fifth metatarsal (AH-1) was found in stratum IV, for which there are radiocarbon dates of 43,900 ± 2000 and 38,100 ± 2100 uncalibrated years BP (Glantz et al. 2008). There is also a recent find of a second deciduous incisor from the open-air site of Khudji, Tajikistan. This was found in horizon 8 in a late Middle Paleolithic context, dated by radiocarbon to ca. 40 ka uncalibrated years BP (Trinkaus et al. 2000). There is also a late Pleistocene upper third premolar (P^3) from Wezmeh, Iran, that has been identified as Neandertal (Zanolli et al. 2019) – the first positive indication of Neandertals in the Zagros Mountains. The only pertinent evidence from Afghanistan was a right temporal bone that was found in 1966 in a late Middle Paleolithic context at Darri-i-Kur, dated by radiocarbon to 30,000 BP., and identified as Neanderthal but this has been recently re-dated to only 4,500 BP (Douka et al. 2017) and is thus now irrelevant to discussions of human evolution in Central Asia. In the Caucasus, there are numerous caves with Middle Palaeolithic, Mousterian, assemblages, and Neanderthal remains have been found at the caves of Mezmaiskaya, Barakaevskaya, and Monasheskaya (Golovanova and Doronichev 2003). The first of these contained the remains of an infant Neanderthal from layer 3, dated at ≥36 ka. Analysis of the ancient DNA from one of its ribs showed that Neanderthals were genetically different from ourselves (Ovchinnikov et al. 2000).

A prevalent interpretation of this evidence is that Neanderthals greatly expanded their range eastwards and southwards in the last glaciation. Their appearance in the Levant after 70 ka has been attributed to worsening conditions at higher latitudes that forced them further south. As conditions improved, so they were able to expand eastwards to the Zagros Mountains and thence into Central Asia. We should bear in mind, however, the virtual absence of fossil evidence from Central Asia before 70 ka, so their apparent expansion eastwards may reflect our ignorance of what happened before this time.

Later *H. sapiens* in West and Central Asia

The earliest indication of post-Neandertal *H. sapiens* in West Asia is a partial cranium that was found in the cave of Manot, Israel, on a limestone ledge in a side chamber – unfortunately not associated with any archaeological material. As a result of sampling, 11 points of the calcite patina around the skull, an average uranium-thorium age of 54.7–65.5 ka was obtained. It is described as *H. sapiens* but with a mixture of modern and archaic features and may represent an immigrant population of *H. sapiens* that arrived in the Levant from Africa after ca. 60,000 years ago (Hershkovitz et al. 2015). Otherwise, there is disappointingly very little evidence for the earliest populations of *H. sapiens* that succeeded Neanderthals in West and Central Asia. The earliest skeletal evidence for our species in West Asia is the skull of an adolescent (a.k.a. "Egbert") and a maxilla (a.k.a. "Ethelruda") from the base of a long Aurignacian sequence at the cave site of Ksar Akil, Lebanon, dated to ca. 40–45 ka (Douka et al. 2013). Several isolated teeth attributed to *H. sapiens* were also recovered from the cave of Üçağızlı in Southwest Turkey and dated by ^{14}C as from 41.4 ± 1.1 to 29.1–0.4 uncalibrated ka BP (Güleç et al. 2007) but at least one is more Neandertal-like (Kuhn et al. 2009: 108). The changeover from Neanderthal to *H. sapiens* is likely to have been a complex process given the archaeological evidence for the replacement of Middle Paleolithic, Mousterian assemblages to Upper Paleolithic ones between 45 and 30 ka.

Future Directions

There are several obvious directions in which future research into human evolution in West and Central Asia could proceed. The most obvious need is to increase greatly the number of hominin specimens (particularly cranial and mandibular ones) for Central Asia before 30 ka, and for West Asia between 1.75 Ma (the age of the Dmanisi specimens) and 150 ka (the age of the Tabun II mandible). At present, the fossil record for *Homo* in West and Central Asia is relevant to two separate themes: the earliest appearance of our genus ca. 1.85 Ma ago outside Africa (as evidenced by the Dmanisi finds), and the earliest examples of *H. sapiens* outside Africa and their Neanderthal contemporaries in the last 200,000 years. These themes need to be linked to provide a record of what happened between these two events.

Five gaps are especially important to fill in West Asia: (i) the identification of the source population that first colonized Europe (on current evidence) ca. 1.3–1.4 Ma; (ii) the identification of the source population of *H. antecessor*, ca. 1 Ma–800 ka; (iii) the identification of the African immigrants that introduced African types of cleavers and handaxes to the Levant ca. 800 ka (as evidenced at Gesher Benot Ya'aqov); (iv) the identification of the source population of *H. heidelbergensis* that entered Europe after 600 ka; (v) to determine whether Neanderthals in West Asia developed indigenously, or were immigrants; and (vi) to determine more precisely than at present when *H. sapiens* first entered the Levant.

Another direction for future research is to establish the climatic context of hominin settlement. At present, very little of the archaeological and fossil hominin record of West Asia can be confidently linked to a specific type of climate. A useful beginning would be to establish whether hominins were present in warm, moist (interglacial) periods, or cool, drier periods (=glaciations). One of the best examples in Asia of this type of linkage is from Tajikistan, where Paleolithic sites are consistently found in interglacial paleosols and not in glacial loess deposits (Ranov 1995): hominins were thus present in Tajikistan in warm periods, but not cold ones. As mentioned above, aridity was one of the key variables affecting Pleistocene human settlement in West and Central Asia, and the core, or long-term resident, populations were likely restricted to areas with dependable, year-round water, as these were the ones most likely to persist throughout cold, dry periods as well as moist, warm ones. Until we can establish the climatic context of hominin settlement, it is not possible to investigate how hominins responded to climatic and environmental changes, expanded or contracted their distribution, or colonized neighboring regions.

Future directions need also to include conceptual developments. One particularly relevant to investigations of Neanderthals and early *H. sapiens* in Asia is to move away from a rigid, dichotomized framework in which the Neanderthals and *H. sapiens* are mutually exclusive terms. One major justification for doing so is that one might expect a variable fossil record in areas such as the Levant if populations repeatedly, under the changing conditions of the Pleistocene, expanded and contracted their distribution, overlapped and interacted with others, fused with others, or fragmented. Another justification is the recent evidence that Neanderthals and early *H. sapiens* interbred, with the result that all Eurasians contain some Neanderthal genes (Green et al. 2010). There is also, particularly in Central Asia, the currently unseen presence of the Denisovans (see above). If they were a sister species of Neanderthals, they will also need to be accommodated in assessments of fossil hominin specimens. Assuming that the Denisovans will be confirmed as a genetic reality, we may find that a simple binary choice between Neanderthals and *H. sapiens* is insufficient for correctly identifying Upper Pleistocene specimens and populations.

Finally, the expansion of *H. sapiens* into West and Central Asia needs to be envisaged as a process that involved several dispersal events, some of which may have been short-term and thus failures. The early presence of *H. sapiens* in the Levant before 170 ka may be an example of a failed dispersal event (Shea 2008), and its

eventual expansion into Central Asia may well have involved several dispersal events, as well as occasional contractions and extinctions. Likewise, Neanderthal population demography is also likely to have been complex under the highly variable conditions of MIS 6–3, 160–40 ka.

References

Akazawa, T., S. Muhesen, Ishida Hajime, Kondo Osamu, and C. Griggo. 1999. New discovery of a Neanderthal child burial from the Dederiyeh Cave in Syria. *Paléorient* 25 (2): 129–142. https://doi.org/10.3406/paleo.1999.4691.

Been, E., E. Hovers, R. Ekshtain, A. Malinski-Buller, N. Agha, et al. 2017. The first Neanderthal remains from an open-air Middle Palaeolithic site in the Levant. *Scientific Reports* 7 (1): 2958.

Belmaker, M., E. Tchernov, S. Condemi, and O. Bar-Yosef. 2002. New evidence for hominid presence in the lower Pleistocene of the southern Levant. *Journal of Human Evolution* 43: 43–56.

Bergman, C., J. Williams, K. Douka, and D. Schyle. 2017. The palaeolithic sequence of Ksar 'Akil, Lebanon. In *Quaternary of the Levant: Environments, climate change, and humans*, ed. Y. Enzel and O. Bar-Yosef, 267–276. Cambridge: Cambridge University Press.

Carbonell, E., J.M. Bermúdez de Castro, J.L. Arsuaga, J.C. Díez, A. Rosas, G. Cuenca-Bescós, R. Sala, M. Mosquera, and X.P. Rodríguez. 1995. Lower Pleistocene hominids and artifacts from Atapuerca-TD6 (Spain). *Science* 269: 826–829.

Carbonell, E., J.M. Bermúdez de Castro, J.M. Parés, A. Pérez-González, G. Cuenca-Bescós, A. Ollé, M. Mosquera, R. Huguet, J. van der Made, A. Rosas, R. Sala, J. Vallverdú, N. García, D.E. Granger, M. Martinón-Torres, X.P. Rodríguez, G.M. Stock, J.M. Vergès, E. Allué, F. Burjachs, I. Cáceres, A. Canals, A. Benito, C. Díez, M. Lozano, A. Mateos, M. Navazo, J. Rodríguez, J. Rosell, and J.L. Arsuaga. 2008. The first hominin of Europe. *Nature* 452: 465–469.

de Lumley, H., M. Nioradzé, D. Barsky, D. Cauche, V. Celiberti, G. Nioradzé, O. Notter, D. Zvania, and D. Lordkipanidze. 2005. Les industries lithiques préoldowayennes du début du Pléistocène inférieur du site de Dmanissi en Géorgie. *L'Anthropologie* 109 (1): 1–182.

Dennell, R.W. 2009. *The palaeolithic settlement of Asia*. Cambridge: Cambridge University Press.

Dennell, R.W. 2014. Smoke and mirrors: The fossil record for *Homo sapiens* between Arabia and Australia. In *Southern Asia, Australia and the search for human origins*, ed. R.W. Dennell and M. Porr, 33–50. Cambridge: Cambridge University Press.

Douka, K., C.A. Bergman, R.E.M. Hedges, F.P. Wesselingh, and T.F.G. Higham. 2013. Chronology of Ksar Akil (Lebanon) and implications for the colonization of Europe by anatomically modern humans. *PLoS One* 8 (9): e72931. https://doi.org/10.1371/journal.pone.0072931.

Douka, K., V. Slon, C. Stringer, R. Potts, A. Hübner, et al. 2017. Direct radiocarbon dating and DNA analysis of the Darra-i-Kur (Afghanistan) human temporal bone. *Journal of Human Evolution* 107: 86–93.

Ekshtain, R., A. Malinsky-Buller, N. Greenbaum, N. Mitki, M.C. Stahlschmidt, et al. 2019. Persistent Neanderthal occupation of the open-air site of 'Ein Qashish, Israel. *PLoS One* 14 (6): e0215668.

Gabunia, L., A. Vekua, D. Lordkipanidze, C.C. Swisher, R. Ferring, A. Justus, M. Nioradze, M. Tvalcherlidze, S.C. Antón, G. Bosinski, O. Jöris, M.-A. de Lumley, G. Majsuradze, and A. Mouskhelishvili. 2000. Earliest Pleistocene hominid cranial remains from Dmanisi, Republic of Georgia: Taxonomy, geological setting, and age. *Science* 288: 1019–1025.

Glantz, M., B. Viola, P. Wrinn, T. Chikisheva, A. Derevianko, A. Krivoshapkin, U. Islamov, R. Suleimanov, and T. Ritzman. 2008. New hominin remains from Uzbekistan. *Journal of Human Evolution* 55: 223–237.

Golovanova, L.V., and V.B. Doronichev. 2003. The Middle Palaeolithic of the Caucasus. *Journal of World Prehistory* 17: 71–140.

Green, R.E., J. Krause, A.W. Briggs, T. Maricic, U. Stenzel, M. Kircher, N. Patterson, H. Li, W. Zhai, M.H.-Y. Fritz, N.F. Hansen, E.Y. Durand, A.-S. Malaspinas, J.D. Jensen, T. Marques-Bonet, C. Alkan, K. Prüfer, M. Meyer, H.A. Burbano, J.M. Good, R. Schultz, A. Aximu-Petri, A. Butthof, B. Höber, B. Höffner, M. Siegemund, A. Weihmann, C. Nusbaum, E.S. Lander, C. Russ, N. Novod, J. Affourtit, M. Egholm, C. Verna, P. Rudan, D. Brajkovic, Z. Kucan, I. Gušic, V.B. Doronichev, L.V. Golovanova, C. Lalueza-Fox, M. de la Rasilla, J. Fortea, A. Rosas, R.W. Schmitz, P.L.F. Johnson, E.E. Eichler, D. Falush, E. Birney, J.C. Mullikin, M. Slatkin, R. Nielsen, J. Kelso, M. Lachmann, D. Reich, and S. Pääbo. 2010. A draft sequence of neandertal genome. *Science* 328: 710–722.

Groucutt, H., R. Grün, I.S.A. Zalmout, N.A. Drake, S.J. Armitage, et al. 2018. *Homo sapiens* in Arabia by 85,000 years ago. *Nature Ecology and Evolution* 2: 800–809. https://doi.org/10.1038/s41559-018-0518-2.

Güleç, E., I. Özer, M. Sağir, and S. Kuhn. 2007. Early Upper Paleolithic human dental remains from Ucagizli Cave (Hatay, Turkey). *American Journal of Physical Anthropology* 132 (S44): 122.

Harvati, K., and E.N. Lopez. 2017. A 3-D look at the Tabun C2 jaw. In *Human paleontology and prehistory: Contributions in honor of Yoel Rak*, ed. A. Marom and E. Hovers, 203–213. Springer.

Hershkovitz, I., P. Smith, R. Sarig, R. Quam, L. Rodríguez, et al. 2011. Middle Pleistocene dental remains from

Qesem Cave (Israel). *American Journal of Physical Anthropology* 144: 575–592.
Hershkovitz, I., O. Marder, A. Ayalon, M. Bar-Matthews, G. Yasur, et al. 2015. Levantine cranium from Manot Cave (Israel) foreshadows the first European modern humans. *Nature* 520: 216–219.
Hershkovitz, I., G.W. Weber, R. Quam, M. Duval, and R. Grün. 2018. The earliest modern humans outside Africa. *Science* 359: 456–459.
Howell, F.C. 1999. Paleo-demes, species clades, and extinctions in the Pleistocene hominin record. *Journal of Anthropological Research* 55: 191–243.
Kappelman, J., M.C. Alçiçek, N. Kazanci, M. Schultz, M. Ozkul, and S. Sen. 2007. First *Homo erectus* from Turkey and implications for migrations into temperate Eurasia. *American Journal of Physical Anthropology* 135: 110–116.
Krause, J., Q. Fu, J.M. Good, B. Viola, M.V. Shunkov, A.P. Derevianko, and S. Pääbo. 2010. The complete mitochondrial DNA genome of an unknown hominin from southern Siberia. *Nature*. https://doi.org/10.1038/nature08976.
Kuhn, S.L., M.C. Stiner, E. Güleç, I. Özer, H. Yilmaz, I. Baykara, A. Açikkol, P. Goldberg, K.M. Molina, E. Ünay, and F. Suata-Alpaslan. 2009. The early Upper Paleolithic occupations at Üçağızlı Cave (Hatay, Turkey). *Journal of Human Evolution* 56: 87–113.
Le Tensorer, J.-M., S. Muhusen, and P. Schmid 2006. *Research on the Paleolithic of the El Kowm Area (Syria)*. Project of the Institute for Prehistory and Archaeological Science, Basel, Switzerland: University of Basel.
Lordkipanidze, D., A. Vekua, R. Ferring, G.P. Rightmire, C.P.E. Zollikofer, M. Ponce de León, J. Agusti, G. Kiladze, A. Mouskhelishvili, M. Nioradze, and M. Tappen. 2006. A fourth hominin skull from Dmanisi, Georgia. *The Anatomical Record* 288A (11): 1146–1157.
Lordkipanidze, D., T. Jashashvili, A. Vekua, M.S. Ponce de León, C.P.E. Zollikofer, G.P. Rightmire, H. Pontzer, R. Ferring, O. Oms, M. Tappen, M. Bukhsianidze, J. Agusti, R. Kahlke, G. Kiladze, B. Martínez-Navarro, A. Mouskhelishvili, M. Nioradze, and L. Rook. 2007. Postcranial evidence from early *Homo* from Dmanisi, Georgia. *Nature* 449: 305–310.
Lordkipanidze, D., M.S. Ponce de León, A. Mouskhelishvili, y. RAk, G.P. Rightmire, A. Vekua, and C.P.e. Zollikofer. 2013. A complete skull from Dmanisi, Georgia, and the evolutionary biology of early Homo. *Science* 342: 326–331.
Lumley, M.-A., and D. Lordkipanidze. 2006. L'homme de Dmanissi (*Homo georgicus*), il y a 1,810,000 ans. *Comptes Rendues Palévolution* 5: 273–281.
Martinón-Torres, M., R.W. Dennell, and J.M. Bermúdez de Castro. 2010. The Denisova hominin need not be an out of Africa story. *Journal of Human Evolution* 60: 251–255.
Mgeladze, A., D. Lordkipanidze, M.-H. Moncel, J. Despriee, R. Chagelishvili, M. Nioradze, and G. Nioradze. 2011. Hominin occupations at the Dmanisi site, Georgia, Southern Caucasus: Raw materials and technical behaviours of Europe's first hominins. *Journal of Human Evolution* 60: 571–596.
Ovchinnikov, I.V., A. Götherström, G.P. Romanova, V.M. Kharitonov, K. Lidén, and W. Goodwin. 2000. Molecular analysis of Neanderthal DNA from the northern Caucasus. *Nature* 404: 490–493.
Ranov, V.A. 1995. The 'Loessic Palaeolithic' in South Tadjikistan, Central Asia: Its industries, chronology and correlation. *Quaternary Science Reviews* 14: 731–745.
Rightmire, G.P., D. Lordkipanidze, and A. Vekua. 2006. Anatomical descriptions, comparative studies and evolutionary significance of the hominin skulls from Dmanisi, Republic of Georgia. *Journal of Human Evolution* 50 (2): 115–141.
Shea, J. 2003. The Middle Palaeolithic of the East Mediterranean Levant. *Journal of World Prehistory* 17: 313–394.
Shea, J. 2008. Transitions or turnovers? Climatically-forced extinctions of *Homo sapiens* and Neanderthals in the East Mediterranean Levant. *Quaternary Science Reviews* 27: 2253–2270.
Sohn, S., and M.H. Wolpoff. 1993. Zuttiyeh face: A view from the east. *American Journal of Physical Anthropology* 91: 325–347.
Trinkaus, E., and M.R. Zimmerman. 1982. Trauma among the Shanidar Neanderthals. *American Journal of Physical Anthropology* 57: 61–76.
Trinkaus, E., V.A. Ranov, and S. Lauklin. 2000. Middle Paleolithic human deciduous incisor from Khudji, Tajikstan. *Journal of Human Evolution* 38: 75–583.
Zanolli, C., F. Biglari, M. Mashkour, K. Abdi, H. Monchot, et al. 2019. A Neanderthal from the Central Western Zagros, Iran. Structural reassessment of the Wezmeh 1 maxillary premolar. *Journal of Human Evolution* 135: 102643.

West Asia: Paleolithic

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Introduction

West Asia is a key locale for the investigation of Paleolithic human migration and adaptation because of the area's location at the crossroads between Africa and Eurasia as well as its diverse environmental settings. Geographic units in west

Asia comprise the Levant, the Zagros and Taurus Mountains, Anatolia, the Caucasus, and the Arabian Peninsula. In the Levant, east Mediterranean coastal plains and the rift valley extending between the Red Sea and the Afrin Basin provided significant habitats and migration routes for early humans during the Paleolithic. To its east, inland areas of the Syrian Desert and the Jordanian Badia are presently under arid environments, but the inland basins, often associated with oases, such as el-Kowm, Palmyra, Azraq, and Jafr, used to hold Pleistocene lakes, around which prehistoric sites are clustered. The rugged terrains and cave systems in the Zagros–Taurus and the Caucasus Mountains have also been important fields for the study of early human habitations. In the Arabian Peninsula, a number of Paleolithic sites have been located in various environmental settings, including coastal plains, foothills of the Asir and Hadhramaut Mountains, as well as near wadis and lakeshores in interior plains.

Geographic connections between west Asia and surrounding regions are structured by water mass and mountain ridges (Fig. 1). One of the routes to Africa is through the northern Sinai between the Southern Levant and the Upper Nile area. Another is Bab el-Mandab between the Lower Awash River and the southwestern corner of the Arabian Peninsula. Land routes to northern areas are bounded by the Mediterranean Sea, Black Sea, and Caspian Sea, and the one between the latter two is truncated by the Caucasus Mountains. The landmass to South and Central Asia is the Iranian plateau flanked by rugged terrains of the southern Zagros Mountains along the Persian Gulf and the Alburz Mountains at the southern Caspian shore.

Definition

Early, Middle, and Late Pleistocene

In 2009, the International Union of Geological Sciences lowered the base of the Pleistocene epoch to include the Gelasian Stage that began c. 2.6 Ma. Thus, the former "Late Pliocene" corresponds to the current "Early Pleistocene." However, the stages for the Middle and Upper Pleistocene are unchanged with their beginnings at the Brunhes–Matuyama reversal and the last interglacial, respectively.

Hominin

The term "hominin" is used to denote human ancestors instead of the old term "hominid," which is currently used to mean ancestors of humans, chimpanzees, gorillas, and orangutans.

Historical Background

Investigations of some key Paleolithic sites in west Asia were initiated in the 1920s and 1930s, as exemplified by the excavations by Dorothy A.E. Garrod at Mt. Carmel and Southern Kurdistan, René Neuville at the Judean Desert, and Turville-Petre at the Galilee area and Kebara Cave. These early systematic excavations provided fundamental archaeological records for the definition of Paleolithic cultures and their chronological sequences. Initial influence from European prehistory on cultural names (e.g., Aurignacian, Levalloiso–Mousterian, and Tayacian) was subsequently modified into or replaced with locally defined cultural entities (e.g., Levantine Aurignacian, Ahmarian, Levantine Mousterian, and Yabrudian). While early investigators tended to focus on deep cultural deposits at caves in an effort to establish Paleolithic cultural sequences, subsequent surveys, and excavations of open-air sites in the inland areas, such as Negev, Sinai, Badia, and Syrian Desert, led to the recognition of greater diversity of Paleolithic entities as well as dynamic adaptation of prehistoric populations to various environments.

The progress and intensity of Paleolithic research in west Asia varies depending on geographic areas. The Levant has been most intensively studied since the 1920s, providing fundamental data sets for studying Paleolithic populations in west Asia. Although the Zagros region received early investigations from the

West Asia: Paleolithic, Fig. 1 Map of west Asia showing sites mentioned in the text. The following site names are in alphabetical order and associated numbers correspond to those in the map: Abu Hureyra (63), Abu Noshra (70), Abu Sif (34), Ain al-Buhayra (48), Ain Difla (47), Ain Mallaha (10), Ain Qasiyya (36), Ain Rahub (18), Amud (15), Antelias (6), Azariq (42), Azraq (36), Azykh (56), Beidha (49), Berekhat Ram (9), Bezez (8), Bisitun (75), Boker (44), Boker Tachtit (44), C-Spring (36), Dawādmi (83), Dederiyeh (60), Dhofar (82), Dmanisi (55), Douara (66), Dursunlu (58), Ein Aqev (44), Ein Gev (16), el-Kowm (64), el-Wad (24), Emireh (15), Erq el-Ahmar (33), Eshkaft-e Gavi (79), Evron (11), Far'ah II (40), FAY-NE 1 (81), Fazael (31), Gar Arjeneh (78), Gesher Benot Ya'aqov (13), Gharmachi 1b (65), Hatoula (29), Hayonim (12), Holon (27), Humian (77), Hummal (64), Jayroud (5), Jerf Ajla (66), Jilat (39), Karain (59), Kebara (25), Keoue (1), Khallat Azana (35), Kharaheh IV (38), Ksar Akil (6), Kudaro I (53), Kunji (78), Lagama (67), Latamne (65), Lion Spring (36), Mar Gurgalan Sarab (76), Mureybet (62), Mushabi (68), Naamé (7), Nachcharini (3), Nadaouiyeh (64), Nahal Aqev (44), Nahal Ein Gev I (16), Nahal Oren (23), Nizzana (43), Ohalo II (17), Öküzini (59), Ortvala Klde (54), Palegawra (73), Pa Sangar (78), Qafzeh (21), Qesem (26), Quneitra (14), Ramat Matred (45), Raqefet (22), Ras el-Kelb (6), Rasfa (20), Revadim (30), Rosh Ein Mor (44), Rosh Horesha (46), Rosh Zin (44), Saaide (2), Saflulim (46), Salibiyah (32), Shanidar (71), Shekaft-i Ghad-i Barm-i Shur (80), Shukba (28), Shunera (41), Skhul (24), Tabaqa (48), Tabun (24), Tor Faraj (52), Tor Fawaz (52), Tor Hamar (69), Tor Sabiha (51), Tor Sadaf (48), Tor Sageer (48), 'Ubeidiya (17), Üçağizli (61), Umm el-Tlel (64), Umm Qatafa (33), Uwaynid (37), 'Uyun al-Hammam (19), Wadi Aghar (52), Wadi Fatimah (84), Wadi Hammeh (19), Wadi Judayid (51), Wadi Mataha (50), Warwasi (74), Yabrud (4), Yafteh (78), Yarimburgaz (57), Yutil al-Hasa (48), Zarzi (72), Zuttiyeh (15)

1920s to 1950s, subsequent fieldwork has been prevented by geopolitical instability. Renewed investigations of Paleolithic sites have recently increased in Anatolia, the Caucasus, southern Iran, and the Arabian Peninsula in relation to the study of early *Homo* species and *Homo sapiens* dispersals out of Africa.

Key Issues/Current Debates

Lower Paleolithic

Earliest Hominin Occupation in West Asia

Currently, the earliest evidence for human occupation in west Asia is known at Dmanisi,

Georgia, in the southern Caucasus (e.g., Gabunia et al. 2001). Archaeological deposits at Dmanisi overlie the Masavera basalt that was dated to c. 1.8–2.0 Ma by $^{40}K/^{40}Ar$ and $^{40}Ar/^{39}Ar$ dating. This basalt and the lower archaeological layers (units A1 and A2) show normal polarity directions (the Olduvai Subchron), while the upper ones (units B1 and B2) have a reversed polarity (the Matuyama Chron). Well-preserved bone remains include four hominin crania, three mandibles, and a number of postcranial specimens. These hominin remains have been identified as the primitive form of *Homo erectus/ergaster* or placed in a new taxon named *Homo georgicus*. Rich faunal remains at Dmanisi include Early Pleistocene types mostly of Eurasian species and indicate grassland with some forest as the local environment. Chipped stone artifacts from the site primarily consist of unmodified flakes and chopping tools, and this lithic industry is called "Pre-Oldowan." These observations let researchers to consider that the first colonization of west Asia took place at the early stage in the evolution of genus *Homo* before the appearance of the handaxe technology or the Acheulian tradition. Some researchers also propose the possibility that *Homo erectus* originated in Asia and that some of them migrated into Africa.

Acheulian Tradition

Much of the Lower Paleolithic records in west Asia comprise Acheulian assemblages with a varying amount of bifaces, i.e., hand axes and cleavers (Fig. 2). A large number of Acheulian finds are reported in west Asia, and their accounts accumulated in the last decade particularly in Anatolia, the Caucasus (e.g., Azykh and Kudaro I), and the Arabian Peninsula (e.g., Wadi Fatimah and Dawādmi) in addition to the Levant. However, the number of sites with clear contexts and dates is limited. The dates are estimated by several different methods, including radiometric dating, paleomagnetic analysis, paleontological comparison, and the paleoenvironmental examination of marine and fluvial deposits. Researchers proposed several chrono-cultural entities within the Acheulian tradition, such as Early, Middle, Late, Late evolved, and Final Acheulian on the basis of techno-typological attributes of bifaces (Bar-Yosef 1994).

The earliest assemblages with bifaces in west Asia are currently known from the Early Pleistocene lake deposits at 'Ubeidiya, Israel, located 3 km south to the Sea of Galilee. The site has numerous publications on the geological and sedimentological studies as well as lithic and faunal analyses. The comparison of fauna with those dated in the African and European sequences

West Asia: Paleolithic, Fig. 2 Hand axes from the middle Euphrates region

provided a date estimate (c. 1.4 Ma) of the site. Only a small portion of animal bones show cut marks, and recent sedimentological and faunal analyses suggest that archaeological remains at ‘Ubeidiya were deposited as a result of low energy fluvial processes rather than “living floors” at the lakeshore. The industry of chipped stone artifacts from ‘Ubeidiya has been identified as Early Acheulian or Developed Oldowan, characterized by core choppers, polyhedrons, spheroids, and crude bifaces that occur in varying frequencies in different layers. These tool types tend to differ from each other in the selection of raw materials: bifaces are often made from basalt, chopping tools, and polyhedrons from flint, and most spheroids from limestone.

The water-logged site of Gesher Benot Ya‘aqov (GBY), also located in the Jordan Valley, is dated to c. 0.7–0.8 Ma by paleomagnetic analyses, which show that lacustrine deposits with archaeological remains deposited over the Brunhes–Matuyama boundary. Lithic industry of GBY, designated as Acheulian, is characterized by the preferential use of basalt for bifaces, i.e., hand axes and cleavers, the blanks of which are frequently provided by the Kombewa technique. These technological features have been interpreted as evidence for a hominin dispersal from Africa. Both African and Levantine taxa constitute micromammalian remains. Notable is the recovery of an elephant skull from an archaeological horizon at level 1 in layer II-6. Whether this skull resulted from hunting, scavenging, or natural mechanisms has been investigated through a series of taphonomic studies. Well-preserved plant remains include fruit, seeds, bark, and wood, and the excavators suggest that numerous pitted stones from the site were used for cracking nuts. In addition, the use of fire at GBY has been suggested through taphonomic examination of burnt remains (Alperson-Afil and Goren-Inbar 2010).

The accounts of Latamne in the Orontes Valley and Joub Jannine II in the Beqqa Valleys often classify their lithic assemblages as Middle Acheulian or estimate their age to the Middle Pleistocene. In contrast to these Middle Acheulian sites that are clustered in the Mediterranean environmental zones, the Late Acheulian or late Lower Paleolithic sites are more widely distributed both in the Mediterranean areas (e.g., Holon, Tabun, Umm Qatafa, and Garmachi 1b) and at inland areas (e.g., Lion Spring, C-Spring, and the sites in the el-Kowm basin), suggesting the adaptation to drier settings or climatic amelioration during the Late Acheulian period.

The date of Berekhat Ram in the northern Golan Heights is broadly estimated as c. 230–780 ka, and its lithic assemblage is characterized by the high proportion of Levallois products and Upper Paleolithic tool types, i.e., end scrapers and burins, with few bifaces. The site is well known for the stone “figurine,” which has been accepted as an artificially modified object after rigorous examination by microscopes and experimental production.

Hominin fossils associated with Acheulian artifacts are very limited. A right lower incisor from ‘Ubeidiya has been broadly assigned to the genus *Homo*. At the site of Nadaouiyeh Aïn Askar in the el-Kowm basin, a fragment of left parietal bone was found in an Acheulian level that is characterized by oval hand axes and estimated as 450 ka. The bone was classed as *Homo erectus*.

Technological Variability: Flake Assemblages and the Yabrudian Complex

Some Lower Paleolithic assemblages lack bifaces. Such examples include the sites of Evron Quarry, Bizat Ruhama, Tabun layer G, Hummal level 13–14, and some sites in the Orontes and Euphrates Valleys. These occurrences have been explained in several different ways. The first one regards them as representing separate cultural entities, naming them the Tayacian or the Khattabian. Another position is to see them as a response to limited availability of raw materials. In addition, insufficient sample size has been pointed out as a reason for the absence of bifaces at some sites.

A more numerously documented example of the Lower Paleolithic technological variability is the Yabrudian complex (also called the Acheulo-Yabrudian or the Mugharan) (Ronen and Weinstein-Evron 2000). The complex comprises flake-based industries with heavily retouched

scrapers and a varying amount of bifaces (i.e., the Yabrudian and the Acheulo-Yabrudian) and blade-based industries with higher proportions of Upper Paleolithic tool types (i.e., the Amudian and the Pre-Aurignacian). The distribution of this complex is currently known in the central and northern Levant. The southern end is at Qesem Cave, the northern limit is at Dederiyeh Cave (Fig. 3), and the easternmost site is in the el-Kowm basin. This complex always occurs stratigraphically above the Late Acheulian and below the Tabun D type of the Levantine Mousterian tradition as seen at Tabun, Yabrud I, el-Kowm, and Dederiyeh. Along with this stratigraphic evidence, radiometric dates obtained from Qesem, Yabrud I, and Tabun layer E suggest the age of the Yabrudian between 200 and 400 ka at the end of the Lower Paleolithic. The Acheulian tradition, however, may have continued during this period in the Southern Levant, where the Yabrudian complex is not distributed. Zuttiyeh Cave has yielded hominin fossil associated with

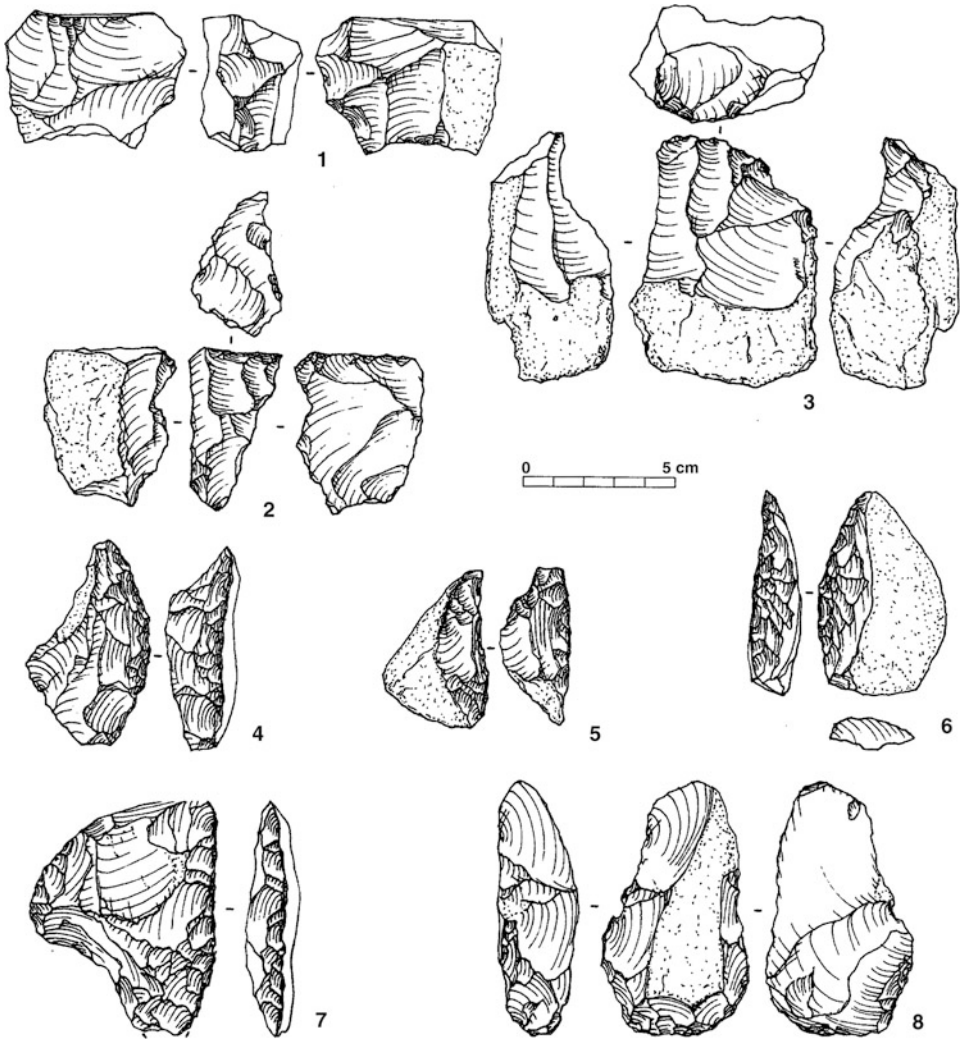

West Asia: Paleolithic, Fig. 3 Yabrudian stone artifacts from Dederiyeh Cave (layer F in K22 and K23). (After Nishiaki et al. 2011a)

this complex. The skull from this cave has been placed in several different taxons, including archaic *Homo sapiens*. More recently, human teeth from Qesem Cave have been suggested to represent a new, locally developed, post *Homo erectus* lineage.

In Anatolia, the cave of Karain E yielded flake-based assemblages in the first two phases of the archaeological sequence (called Clactonian and Charentian), followed by the Mousterian in phase 3. Another flake-dominated assemblage without bifaces or the Levallois technique has been documented from Yarimburgaz Cave, whose estimated age is mid-Middle Pleistocene on the basis of the faunal remains. The apparent contemporaneity of these industries with the Yabrudian complex in the Levant may have implications for some of their common technological aspects.

Middle Paleolithic Period

Cultural Variations and Their Chronology

The account of the Middle Paleolithic cultural variability usually refers to three lithic industries, the Tabun B-, C-, and D-types (or phases 1, 2, and 3: Shea 2003), which have been defined by the techno-typological attributes of lithic assemblages from layers B, C, and D of Tabun Cave. The three industries are grouped under the Levantine Mousterian tradition (Fig. 4), and their common use of the Levallois technique distinguishes themselves from the preceding Yabrudian complex. The Tabun D-type is characterized by the production of blades and elongated points both with the Levallois method and the "laminar system." A significant number of Upper Paleolithic tool types occur in the D-type assemblages. In contrast, unilateral sidescrapers are representative

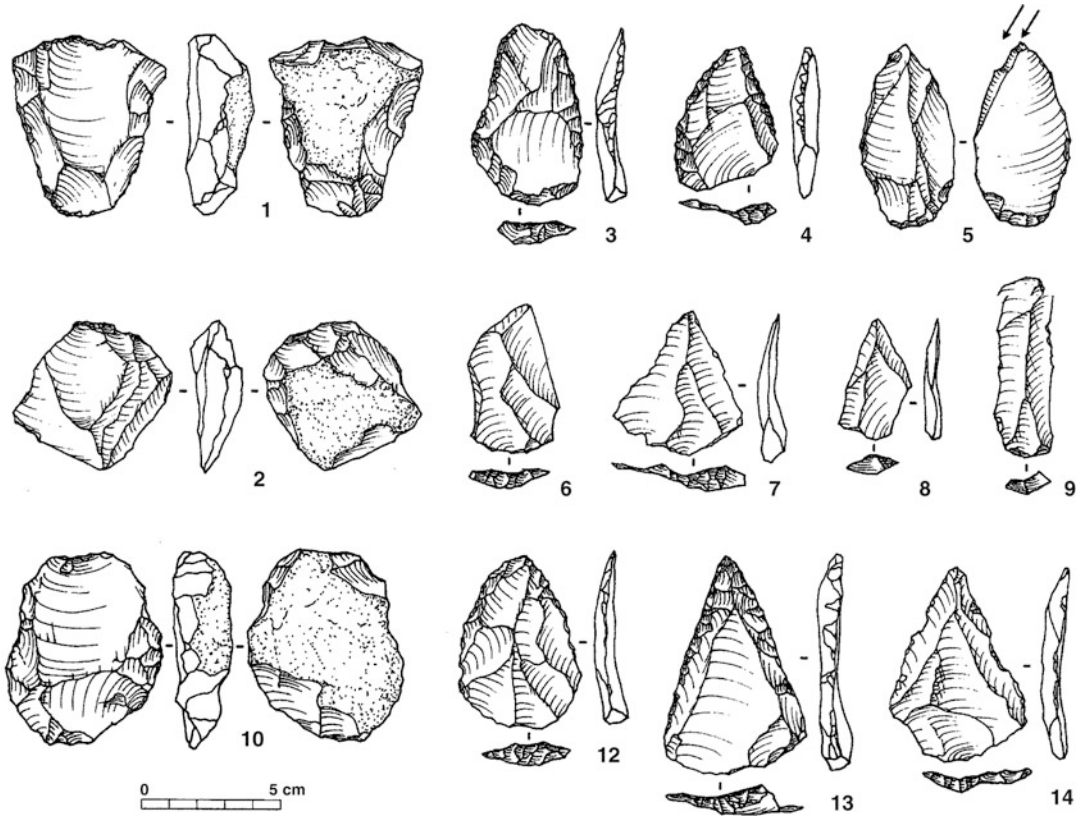

West Asia: Paleolithic, Fig. 4 Mousterian stone artifacts from Dederiyeh Cave (layer E in K22). (After Nishiaki et al. 2011a)

in the Tabun C-type industry, which often produces oval flakes with some points and blades from centripetally and/or bidirectionally prepared Levallois cores. The Levallois cores of the Tabun B-type are frequently prepared by unidirectional convergent flaking that produces broad-based points with some blades. Sidescrapers are dominant in retouched tools with few Upper Paleolithic types. The attribution of some lithic assemblages to these industries is shown in Table 1.

Besides Tabun Cave, the stratigraphic sequence of the Tabun B-, C-, and D-type industries is observable at only a few sites, such as Hayonim Cave (the D-type in layers F and lower E followed by the C-type in upper layer E), and probably Douara Cave (the D-type in unit IV followed by the C-type in unit III). As such, the current scheme of the Levantine Mousterian chronology primarily draws upon radiometric dating methods, e.g., TL, ESR, U-series, and amino acid racemization, which have been applied to the sites including Tabun, Hayonim, 'Ain Difla, Rosh Ein Mor, Qafzeh, Skhul, Naamé, Kebara, Amud, Tor Faraj, Tor Sabiha, Quneitra, Ksar Akil, and Far'ah II. These radiometric dates overall indicate that the three industries occurred in a general order from the Tabun D- through C- to B-type between 250 and 47 ka.

There are several dating results that could suggest the temporal overlap between different industries. For example, the dates proposed for 'Ain Difla (c. 100 ka) and Nahal Aqev (c. 70–90 ka) indicate that the Tabun D-type industry lasted longer in the southern arid areas, while it was replaced by the Tabun C-type in the north. In addition, revised ESR dates (c. 100–120 ka) for Tabun layer B is closer to the dates of the Tabun C-type assemblages at Qafzeh and Skhul than those of Tabun B sites, such as Kebara and Amud. However, these anomalous dating results remain to be verified by additional samples with more secure contexts.

The faunal sequence has also contributed to the establishment of the Middle Paleolithic chronology. For example, faunal assemblages, particularly micromammals, from layers XV to XXV of Qafzeh, associated with the Tabun C-type assemblages, are characterized by the increase of Afro-Arabian elements adapted to savanna conditions. This is interpreted to represent the northward expansion of Afro-Arabian species with anatomically modern humans during MIS 5. In contrast, almost all the Afro-Arabian elements are eliminated in the faunal assemblages at Tabun B sites, such as Kebara and Amud, where Palearctic–European elements are dominant as a result of their southward dispersal with Neanderthals during the cold and dry climate of MIS 4. The faunal assemblages of both Hayonim lower and upper E, associated with Tabun D-type and C-type industries, respectively, are characterized by the presence of earlier Pleistocene elements and the dominance of Palearctic mammals, indicating their chronological precedence to Qafzeh. These accounts for bio-cultural chronology generally fit the radiometric dates of Qafzeh, Kebara, Amud, and Hayonim E, although the suggested correlation of the fauna from Tabun layer B to MIS 4 does not fit the ESR dates mentioned above.

Middle Paleolithic assemblages are profuse also in other areas in west Asia. Those in the Zagros–Taurus regions are classed as the Zagros Mousterian, which is characterized by the frequent application of retouch that produces various forms of scrapers. Recent studies suggest that core reduction technology involves Levallois methods that tend to produce elongated blanks by linear flaking directions. Similar technological characteristic is noted at Ortvala Klde in the southern Caucasus. Revised TL dates for the earliest Mousterian assemblage (F) at Karain E are c. 200–250 kya, indicating that the Mousterian tradition in this region started before the last interglacial like the Levantine Mousterian. In addition, recent finds in southern Iran and southern Arabia report the association of bifacial foliates or Nubian Levallois products, indicating greater variability of Middle Paleolithic assemblages in west Asia.

The Timing of Neanderthal and Modern Human Occurrences

The Neanderthal occupation in west Asia is attested by the fossil evidence from Kebara, Amud, Tabun, Dederiyeh, Shukhba, Shanidar, and Bisitun Caves. The contexts of Neanderthal fossils are mostly dated to the late Middle

West Asia: Paleolithic, Table 1 List of Paleolithic entities in west Asia and their principal information

	Archaeological entities		MIS[a]	Dates (Ka)[b]	Sites with hominin remains[c]	Some of other excavated or systematically surveyed sites[d]
Epipaleolithic	Zarzian		2			Mar Gurgalan Sarab (B–C), Palegawra, Pa Sangar, Shanidar (B2), Warwasi (A–O), Zarzi
	Late Epipaleolithic	Late Natufian	2	13–11/10	Abu Hureyra (1), Ain Mallaha, Hayonim, Nahal Oren, Saaide II, Shukba	Abou Sif, Ain Rahub, Jayroud, Khallat Azana, Mureybet, Raqefet, Rosh Horesha, Rosh Zin, Saflulim, Salibiyah I, Wadi Humeima
		Early Natufian			Ain Mallaha, Ain Saratan, Azraq 18, El-Wad (B), Erq el-Ahmar, Hayonim (B), Kebara (B), Wadi Hammeh 27, Wadi Metaha	Beidha, Dederiyeh (B), Fazael VI, Salibiyah XII, Tabaqa, Wadi Judayid, Yutil Hasa (D)
	Middle Epipaleolithic	Mushabian-Ramonian		16/15–13		Azariq XII, Ein Qadis II, Har Harif K V, Mushabi V, Mushabi XIV/1, Nahal Sekher 23, Ramat Matred II, Shunera XXI
		Geometric Kebaran			Neve David and ‘Uyn al-Hammamm	Azariq II, Douara II (A&B), Ein Gev III, Fazael III & VIII, Hamifgash I, Haon II, Hayonim Terrace, Hefzibah, Kharaneh IV (D), Lagama North VIII, Mushabi XIV/2, Nadaouiyeh, Nahal Oren, Palmyra Site 50 (Spots B, C, F), Raqefet, Umm el-Tlel
	Early Epipaleolithic	Nizzanan		22/20–16/15		Azariq IX, Azraq 17 (Trench 1), Hamifgash IV, Jilat 6 (A)
		Nebekian-Qalkhan				Ain Qasiyya (Area D), Tor Hamar (E), Uwaynid 14 & 18, Jilat 6 (C), Yabrud III (6–7), Yutil Hasa (C, E)
		Kebaran			Ain Qasiyya (Area A&B), Ein Gev I, Kebara (C), Kharaneh IV (B)	Fazael III, Hayonim (Ca-Ce), Nahal Oren (9), Raqefet (I), Urkan el-Rubb II
Upper Paleolithic	Baradostian (Zagros Aurignacian)		3–2			Eshkaft-e Gavi, Gar Arjeneh, Mar Gurgalan Sarab (D–E), Pa Sangar, Shanidar (C), Shekaft-i Ghad-i Barm-i Shur, Warwasi, Yafteh

	Levantine Aurignacian (a former grouping)	Arqov/ Divshon		30/26–17		Boker BE (I), Boker C, Ein Aqev, Har Horesha I, Tor Fawaz?
		Atlitian		27–26	Nahal Ein Gev I	Antelias (I & II), el-Wad (C), Ksar Akil (6)
		Classic Levantine Aurignacian		32–26	el-Wad (D)	Antelias (III & IV), Hayonim (D), Kebara (1 & 2) Ksar Akil (8–7), Raqefet (III)
		Levantine Aurignacian A?		36–32		Ksar Akil (11–13), Umm el-Tlel
	Ahmarian	Late (including Masraqan)		25–16	Ohalo II	Ain al-Buhayra (Unit C, F, and H-I), Ein Aqev East, Fazael X, Lagama X, Yutil al-Hasa (Areas A and B)
		Early		43–25	Ksal Akil (14–20) and Qafzeh (D)	Abu Noshra I, Boker A, Boker BE, Erq el-Ahmar (E–F), Jebel Humeima, Kebara (III-IV), Lagama VII, Thalab al-Buhayla, Tor Aeid, Tor Hamar (F–G), Yabrud II (5–6)
Initial Upper Paleolithic (Emiran)		3	47/ 42–38/ 33	Üçağızlı Mughara?[e]	Boker Tachtit, Ksar Akil (21–25), Tor Sadaf (A & B), Umm el-Tlel (IIBase & III2A), Wadi Aghar	
Middle Paleolithic	Zagros Mousterian		7?–3	200/250 (Karain E, Layer III.2). 148 (Humian)	Neanderthals from Bisitun, Karain E (III.2)[e], Shanidar (D)	Humian, Kunji, Warwasi
	Levantine Mousterian	Tabun B	5/4–3	75–47	Neanderthals from Amud (B1 & B2), Dederiyeh (3, 11, & 13), Kebara (VII–XII), Shukba (D), Tabun (C1)?[e]	Bezez (B), Erq el-Ahmar (H), Far'ah II, Keoue, Quneitra, Sefunim, Tor Faraj, Tor Sabiha
		Tabun C	6–5	160–75	Qafzeh (XV–XXII), Skhul (B), Tabun (C2)?[e]	Dederiyeh (D), Douara (III), Hayonim (upper E), Naamé, Nahr Ibrahim, Ras el-Kelb
		Tabun D	8/7–6	250/200–160		Abu Sif, Ain Difla, Dederiyeh (E), Douara (IV), Hayonim (lower E and F), Hummal (II), Jerf Ajla, Nahal Aqev, Rosh Ein Mor, Tabun (D), Yabrud I

(continued)

West Asia: Paleolithic, Table 1 (continued)

	Archaeological entities	MIS[a]	Dates (Ka)[b]	Sites with hominin remains[c]	Some of other excavated or systematically surveyed sites[d]
Lower Paleolithic	Yabrudian/Acheulo-Yabrudian/Amudian/Pre-Aurignacian/Hummalian	11–7	c. 400–200	Qesem (post *Homo erectus* lineage), Zuttiyeh (variously identified, including Archaic *Homo sapiens*)	Adlun, Dederiyeh (F), el-Kowm, Masloukh, Tabun (E), Yabrud I (11–25)
	Flake-dominant assemblages with no or few bifaces	–	c. 750–200		Bizat Ruhama, Evron-Quarry, Hummal (14–13), Karain E (Phases 1&2), Tabun (G), Yarimburgaz
	Acheulian (including assemblages that have been classed as Middle or Late/Upper Acheulian)	19–7	c. 800–200	Nadaouiyeh Aïn Askar (*Homo erectus*)	Azych, Berekhat Ram, C-Spring, Dawādmi, Gesher Benot Ya'aqov, Gharmachi 1b, Holon, Joub Jannine II, Kurdaro I, Latamne, Lion Spring, Revadim, Tabun (F), Umm Qatafa (D & E), Wadi Fatimah
	Early Acheulian or developed Oldowan	–	c. 1400 ('Ubeidiya)		'Ubeidiya
	Assemblages dominated by cobbles/pebbles and unmodified flakes	–	c. 1750 (Dmanisi)	Dmanisi (*Homo georgicus*)	Dursunlu, Hummal

[a]MIS correlation is uncertain for most Lower Palaeolithic sites
[b]Dates for Upper and Epipaleolithic entities are uncalibrated radiocarbon years, and those for Middle and Lower Paleolithic are other radiometric dates including TL, ESR, U-series, AAR, and OSL, as well as age estimates from faunal spectra
[c]*Homo sapiens* unless indicated
[d]Layer numbers/alphabets are shown in parentheses
[e]Either identification of hominin types or association with lithic industries is unclear

Paleolithic between 47 and 75 ka during MIS 4 on the basis of radiometric dates, stratigraphic positions, faunal spectra, and/or lithic-technological attributes. In contrast, early modern humans recovered in the Middle Paleolithic strata of Qafzeh and Skhul have been given earlier dates (c. 75–130 ka) corresponding to MIS 5 by a series of radiometric dates and the analyses of faunal assemblages.

There are some fossil records that indicate the earlier occurrence of Neanderthals in west Asia, but these cases need further supporting data to be accepted. For example, layer III.2 of Karain E, associated with human remains with some Neanderthal traits, has been dated around 200–250 kya by TL. Another case is the Tabun C1 skeleton, which is broadly recognized as representing Neanderthal features, but some researchers, including excavators, consider that the specimen may have infiltrated down from layer B on the basis of the field observation as well as the more recent analysis of U/Th ratios. Although this makes the fossil stratigraphically later, the revised ESR date for Tabun layer B (c. 100–120 ka) is significantly older than the dates of other sites with Neanderthal fossils, such as Amud and Kebara, and closer to those of Qafzeh and Skhul with early modern humans. In addition, the stratigraphic affinity of the Tabun C2 specimen to layer C is unequivocal, but its biological affinity has been controversial, representing both Neanderthal and modern human attributes. If the Neanderthal affinity is accepted, the TL and ESR dates of Tabun layer C (120–180 ka) suggest that Neanderthals appeared in the Levant before modern humans at Qafzeh and Skhul. In contrast to these possibilities of the early appearance of Neanderthals, there is currently no evidence for the existence of *Homo sapience* during the age between 47 and 75 ka in west Asia.

Hunting, Residential, and Symbolic Behavior

Faunal remains deposited as human refuse in the Middle Paleolithic include various ungulates (e.g., gazelle, fallow deer, red deer, roe deer, aurochs, and onager) and large reptiles that are easy to capture (e.g., tortoise and legless lizards). The seasonality of site use and mobility appears to have been variable. For example, the analyses of cementum increment of gazelle teeth suggest multi-seasonal occupation of the sites with Neanderthal fossils, such as Tabun layer B and Kebara, in contrast to shorter-term occupation at sites associated with *Homo sapiens* fossils, such as Tabun layer C and Qafzeh XVI–XXIII (Lieberman 1993). The relatively high residential stability at Kebara, indicated by dense accumulation of refuse and the prolonged use and maintenance of hearths, contrasts to the ephemeral occupation at Hayonim layer E (Meignen et al. 2006). At the rockshelter of Tor Faraj, associated with the Tabun B-type assemblage, the structured use of living space has been documented through the examination of the arrangement of hearths and the distribution of artifacts and phytoliths (Henry 2004). The evidence for symbolic objects is limited, but the use of ochre in burials and ochre-stained ground stones at Qafzeh is well known (Hovers et al. 2003). In addition, perforated sea shells from Qafzeh and Skhul may have been used as beads.

Upper Paleolithic Period

Origin: Initial Upper Paleolithic

The beginning of the Upper Paleolithic period is marked by the Initial Upper Paleolithic (IUP or Emiran) industry that is technologically characterized by the introduction of prismatic cores and the production of pointed blades with relatively large, sometimes facetted, striking platforms. The IUP is also typologically defined by the high occurrences of Upper Paleolithic tools, i.e., burins and end scrapers, with some fossil indices, such as Emireh points and chamfered pieces. A series of ^{14}C and TL dates from IUP sites range between 47 and 33 ka, within which Boker Tachtit is dated older than northern IUP sites at Üçağızlı Mughara, Umm el-Tlel, and Jerf Ajla. Despite the recent accumulation of IUP assemblages, the debate over their origin continues (Bar-Yosef and Belfer-Cohen 2010) with a view of this industry as representing a transitional phase from the Middle to Upper Paleolithic period and the other position maintaining that the IUP culture was brought by *Homo sapiens* dispersing from Africa.

West Asia: Paleolithic, Fig. 5 Upper Paleolithic chipped stones from the middle Euphrates region

Upper Paleolithic Cultural Variations

Accounts for the techno-typological variability of Upper Paleolithic chipped stones after the IUP often refer to two cultural traditions, i.e., the Ahmarian (Fig. 5) and the Levantine Aurignacian. The former appeared earlier at c. 43/38 ka, following the IUP, and it features dominant production of blades/bladelets that are modified into pointed or backed forms. In contrast, the beginning of the Levantine Aurignacian is dated to at least a few millennia later around 35 ka, and it is characterized by numerous flakes created into burins and scrapers, and high occurrences of twisted bladelets detached from carinated tools/cores.

The variations within the Levantine Aurignacian tradition have been traditionally grouped into phases A, B, and C on the basis of stratified assemblages from Ksar Akil layers VI–XIII. Among the three phases, part of the Levantine Aurignacian B and C (i.e., layers VII and VIII) shows "classic" Aurignacian elements, such as flat frontally carinated and nosed scrapers along with bone and antler artifacts, such as split-based points, similar to the European Aurignacian. The origins of the Levantine Aurignacian tradition are usually assumed outside the Levant, such as southeastern Europe and the Zagros region (Olszewski and Dibble 2006). Relevance of flake-based assemblages mainly distributed in the arid marginal zone to the Aurignacian tradition has been debated, and they have recently been classed as a separate industry called the Arqov/Divshon (Goring-Morris and Belfer-Cohen 2006).

The Ahmarian tradition is often subdivided into the early and late phases. The Late Ahmarian is characterized by the increase of Ouchtata bladelets replacing el-Wad points, as well as the employment of multiple core-reduction strategies for bladelet production. In addition, some of the Late Ahmarian assemblages, such as Ohallo II, include microlith types that are hallmarks of the Kebaran, one of the early Epipaleolithic entities. As such, the Late Ahmarian has been renamed by some scholars as Masraqan (Goring-Morris 1995). In either way, Late Ahmarian/Masraqan lithic assemblages are likely to represent a transitional phase from the Upper to Epipaleolithic period. Their continuous transition is also indicated by the overlapping range of ^{14}C dates between the Late Ahmarian and the Early Epipaleolithic, particularly the Nebekian sites in Wadi el-Hasa.

Settlement, Subsistence, and Symbolic Behaviors

The extensive distributions of Upper Paleolithic settlements, particularly those of the Ahmarian and the Arqov/Divshon, in the steppe/arid zone have been documented in the Negev, northern Sinai, and southern Jordan. In contrast, the sites

of the "classic" Levantine Aurignacian and the Atlitian tend to occur in the Levantine core areas. In both regions, the sites are small with relatively thin deposits containing several hearths at most, indicating their ephemeral nature and the high residential mobility, which are consistent with the circular settlement pattern proposed for the Upper Paleolithic inhabitants in the central Negev. A similar view on Upper Paleolithic occupation has been presented by the seasonality study of gazelle hunting (Lieberman 1993) and the decreasing trend in the proportions of commensal species (e.g., house mice) from the Middle to Upper Paleolithic layers at Qafzeh, Sefnim, and Kebara caves.

Large mammal bones from Upper Paleolithic sites mostly consist of ungulates including gazelle, fallow deer, red deer, aurochs, wild goat, boar, and equid with greater focus on smaller species (i.e., gazelle) than that of the Middle Paleolithic. In addition, intentional exploitation of small prey (e.g., hares, birds, and small turtles) is suggested at sites like Ksar Akil, Hayonim, Kebara, and Ohalo II. At the latter site, evidence for fishing is also present. Although botanical remains from Upper Paleolithic sites are scarce in west Asia, they are exceptionally well preserved at a waterlogged, Late Ahmarian/Masraqan site of Ohalo II at the lakeshore of Galilee. The record suggests the exploitation of a wide range of grass species, including wild barley and emmer wheat, which were probably processed on ground stones, as suggested starch grain analysis (Piperno et al. 2004).

Art objects rarely occur in the west Asian Upper Paleolithic, but animal teeth pendants and incised limestone slabs from Hayonim Cave offer common features between the Levantine and European Aurignacian. In addition, numerous sites of both the Ahmarian and Levantine Aurignacian traditions yielded ochre fragments, ochre-stained stones, or marine shells, the latter of which are sometimes perforated, as reported at Üçağızlı and Yabrud II. Rare human burials have been discovered at Nahal Ein Gev I and Ohallo II, while isolated human bones have been recovered from Ksar Akil, Antelias, Qafzeh, Kebara, and el-Wad. The paucity of burials may be related to the ephemeral nature of Upper Paleolithic settlements.

Epipaleolithic Period

Cultural Chronology

Like preceding Paleolithic periods, Epipaleolithic material cultures are primarily defined by lithic evidence but classed into much greater numbers of categories. This is mainly related to the variability in the morphology and production technique of Epipaleolithic microliths, on which researchers draw to define cultural entities (Goring-Morris 1995; Olszewski 2008). In the Levant, Epipaleolithic cultures are often grouped into the early, middle, and late phases (Table 1). In general, non-geometric forms of microliths are dominant in the early phase, while geometric microliths mark the middle (e.g., trapeze/rectangle and triangle) and late phase (e.g., lunate) (Fig. 6). Furthermore, the presence/absence of microburin technique, a specific method for segmenting bladelets, shows temporal and geographic patterns, providing a criterion to distinguish between the Kebaran (absent) and the Nebekian (present) in the early phase, and between the Geometric Kebaran (absent) and the Mushabian (present) in the middle phase. The microburin technique is more widespread in the Late Epipaleolithic, or the Natufian cultural complex, which is divided into the early, late, and sometimes final phases. Recent recovery of some Early Natufian sites in steppe areas in Jordan indicate that a range of environment inhabited by Early Natufian foragers was wider than previously envisioned.

Microlithic assemblages in the Zagros region are classified as the Zarzian, although their chronological data are limited. Numerous Epipaleolithic cave sites have also been discovered in the Antalya area, Turkey, including Öküzini Cave, where stratified assemblages show a diachronic trend from non-geometric to geometric microliths as in the Levant and the Zarzian. Another microlithic industry with geometric microliths, the Trialetian, has been proposed for the assemblages in the Caucasus, eastern Anatolia, and the Iranian plateau.

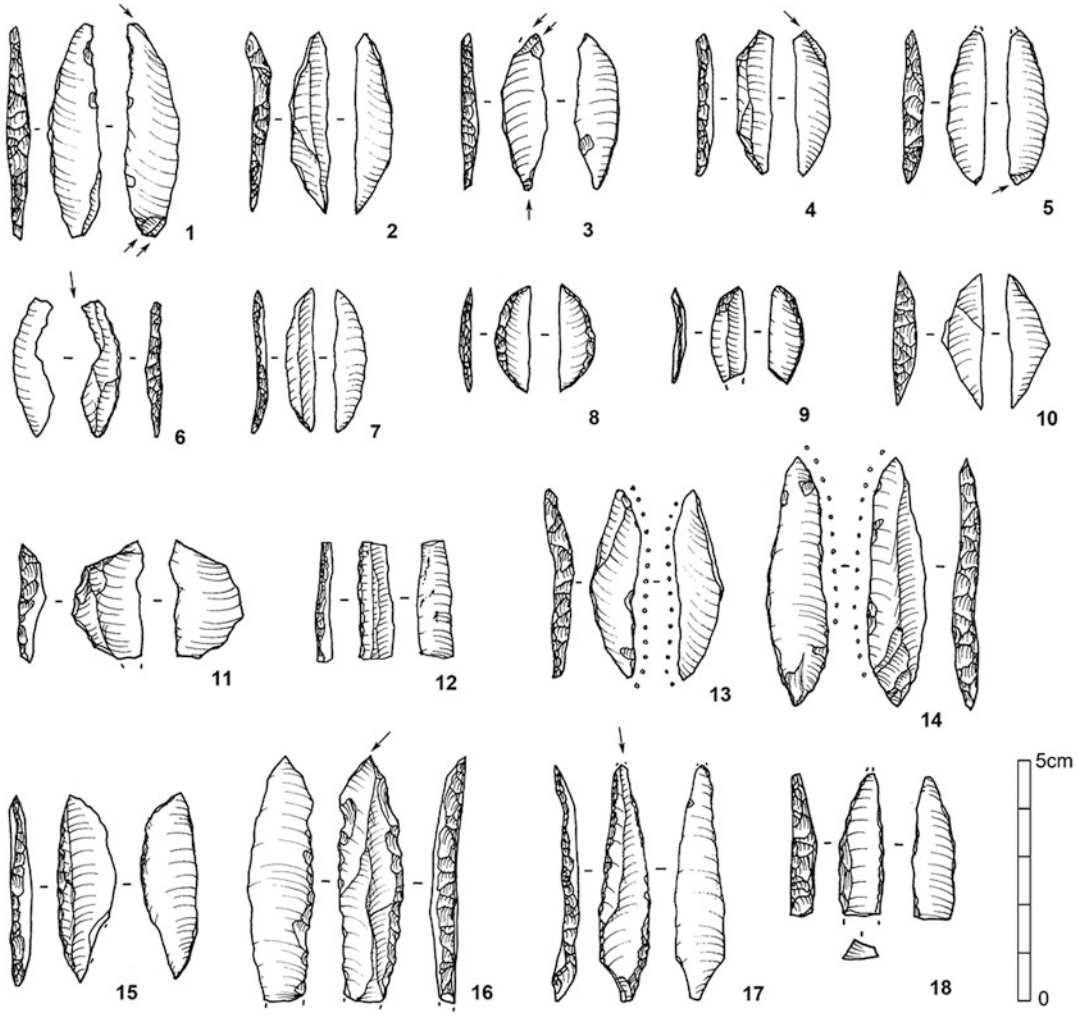

West Asia: Paleolithic, Fig. 6 Late Epipaleolithic chipped stones from Dederiyeh Cave. (After Nishiaki et al. 2011b)

While some researchers suggest that morphological variability of microliths can be caused by their re-modification for prolonged use rather than by intentional stylistic differences, others consider that both functional and stylistic variability recognized for distinguishing between different entities is likely to represent social groups with different technological traditions, adaptive strategies and/or territories. In the case of the Natufian complex, its regional and temporal variability is also manifested in groundstone artifacts, architecture, ornamental objects, decoration motifs, and burials.

Mobility Pattern, Subsistence, and Society

Early and Middle Epipaleolithic sites are generally small and have thin occupational deposits, indicating that inhabitants have continued high residential mobility since the Upper Paleolithic period. The seasonality analysis of gazelle hunting also suggests that Kebaran and Geometric Kebaran occupations were seasonal in contrast to multi-seasonal occupations during the Natufian and Mousterian periods (Lieberman 1993). However, a few Early and Middle Epipaleolithic sites are quite large, even allowing for the effect of deflation and sheetwash (e.g., Jilat 6), associated

with hut structures (e.g., Ein Gev III, Kharaneh IV, and Umm el-Tlel), and/or human burials (e.g., Neve David, Kharaneh IV, and 'Uyun al-Hammam). These sites point to a long-term change rather than a sudden shift in settlement system towards the Natufian culture. The increased sedentism of Natufian foragers is illustrated by many lines of evidence, including stone-walled structures, storage facilities, numerous human burials, large site size, dense archaeological remains, and the increase in human commensals, such as house mice (Valla 1995). Multi-seasonal occupation is also indicated by seasonally available faunal and botanical species and the analysis of cementum increment of gazelle teeth.

Game species during the Epipaleolithic period include gazelle, equids, aurochs, cervids, caprines, hare, tortoise, and birds. While similar range of species was exploited in the Natufian, gazelle hunting was more intensified. Direct evidence for plant diet during the Epipaleolithic is rare, but botanical remains from a few Natufian sites, such as Abu Hureyra, Dederiyeh Cave, Wadi Hammeh 27, and Hayonim Cave, attest the use of wild cereals (e.g., barley, einkorn, and rye), wild legumes (e.g., lentils and vetches), wild nuts (e.g., almonds and pistachios), and wild fruits. Intensive exploitation of cereals during the Natufian is also suggested by indirect evidence, such as glossed blades and numerous food processing tools, particularly mortars and pestles.

Long-distance distribution of marine shells continued, and possibly was enhanced, from the Upper to Epipaleolithic period. Their occurrences at inland sites and patterned associations with particular lithic industries are interpreted as representing social interactions through the exchange of shells that are often pierced (Ritcher et al. 2011). Some Early Natufian sites (e.g., el-Wad) yielded numerous shell/bone beads as grave goods, such as a necklaces and a headdress, but their social significance remains controversial. The increase of human burials also distinguishes the Epipaleolithic from the Upper Paleolithic culture. In early Natufian villages, burials are often placed in and near residential space.

In sum, the generally increasing trend in sedentism and cereal use, as well as the development of burial customs and exchange of exotic materials during the Epipaleolithic, is widely considered precursors of sedentary villages, food production, and social practices in the following Neolithic period, although the transitional process was complex and variable at different parts in west Asia.

International Perspectives

Although Paleolithic research in southern Arabia and southern Iran has been underdeveloped in comparison to those in the Levant, recent fieldwork in the former areas discovered Middle Paleolithic stone assemblages that are techno-typologically distinct from the Levantine Mousterian or the Zagros Mousterian. More specifically, bifacial foliates associated in the FAY-NE 1 assemblage C and Nubian Levallois products in the Dhofar region show affinities with Middle Stone Age assemblages in eastern and northeastern Africa. OSL dates indicate that these recent finds in southern Arabia represent the southern dispersal of early *Homo sapiens* out of Africa during MIS 5 in addition to the northern route to the Levant at Qafzeh and Skhul (Armitage et al. 2010; Rose et al. 2011). Although the southern route hypothesis still needs to be verified with fossil remains in the future, the investigation of the southern and eastern parts of west Asia can contribute greatly to archaeological testing of the southern dispersal route of *Homo sapiens*, linking the population history in west Asia to those in southern and eastern Asia.

Future Directions

Although Paleolithic records in west Asia are well organized on the basis of numerous cultural entities and their chronological sequences, as a result of almost a century of research history, increasing number of new assemblages indicate greater material variability, as exemplified by various non-bifacial Lower Paleolithic assemblages from the Levant and Turkey, Middle Paleolithic assemblages with bifacial foliates in southern Iran and

Arabia, and variable flake-based assemblages of the Levantine Upper Paleolithic. On the other hand, the validity of numerous cultural labels assigned for local Epipaleolithic assemblages is becoming under reexamination. Regardless of the theoretical orientations in the interpretation of cultural entities, their definition and chronological placement continue to be significant issues, particularly along with the progress of radiometric dating methods that allow researchers to make chronological correlations among archaeological assemblages both at the local and regional scales.

Explaining the variability, both synchronic and diachronic, of archaeological entities is a challenging task. Recent accumulation of radiometric dates and paleoenvironmental records led some researchers to reexamine temporal correlations between the occurrences of archaeological entities (Epipaleolithic and Neolithic) and climatic events (Maher et al. 2011), although such examinations would be more difficult for earlier time periods due to greater range of estimated dates. Functional interpretation of material variability has been pursued by several regional studies in Negev, southern Jordan, Azraq, and Wadi Hasa in relation to raw material availability and proximity to water sources, i.e., factors that vary according to daily and seasonal mobility patterns. The continuation of these regional studies should accumulate data regarding the ecological aspects of material variability. On the other hand, the interpretation of lithic industries as representing social groups can add evidence from other material records, such as the association of specific types of bone/antler objects in the Classic Levantine Aurignacian and the composition of imported shells in the Epipaleolithic industries, although the preservation of organic materials can vary under different environmental settings.

In depth studies of particular Paleolithic behaviors include the use of fire, the use of space, hunting behaviors, diets, hunting weapon technology, land-use patterns, burial practices, and creation of symbolic objects. While the synchronic variability of these behaviors can provide insights into the repertoire of adaptive strategy and cultural variability, their diachronic examination can contribute to such issues as the behavioral evolution of early *Homo* populations, the socioeconomic and cognitive aspects of the so-called Upper Paleolithic Revolution and the increasing complexity of subsistence/settlement systems and social structures in the Epipaleolithic period.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Acheulean Industrial Complex
- ▶ African Stone Age
- ▶ ‘Ain Difla Rockshelter
- ▶ Archaic *Homo sapiens*
- ▶ Dmanisi Hominins and Archaeology
- ▶ East Asia: Paleolithic
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Fossil Records of Early Modern Humans
- ▶ Handaxes and Biface Technology
- ▶ *Homo erectus*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Human Evolution: Theory and Progress
- ▶ Human Evolution: Use of Fire
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Lithic Technology, Paleolithic
- ▶ Material Culture and Education in Archaeology
- ▶ Middle East Middle to Upper Paleolithic Transitional Industries
- ▶ Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic
- ▶ Middle East: Epipaleolithic
- ▶ Mousterian Industry Tradition
- ▶ Neanderthals and Their Contemporaries
- ▶ Oldowan Industrial Complex
- ▶ Out-of-Africa Origins
- ▶ Radiocarbon Dating in Archaeology
- ▶ South Asia: Paleolithic
- ▶ West and Central Asia: Early Homo Fossil Records
- ▶ Zooarchaeology

References

Alperson-Afil, N., and N. Goren-Inbar. 2010. *The Acheulian site of Gesher Benot Ya'aqov, Volume II: Ancient flames and controlled use of fire*. New York: Springer.

Armitage, S.J., S.A. Jasim, A.E. Marks, A.G. Parker, V.I. Usik, and H.-P. Uerpmann. 2010. The southern route "out of Africa": Evidence for an early expansion of modern humans into Arabia. *Science* 331: 453–456.

Bar-Yosef, O. 1994. The Lower Paleolithic of the Near East. *Journal of World Prehistory* 8 (3): 211–265.

Bar-Yosef, O., and A. Belfer-Cohen. 2010. The Middle to Upper Palaeolithic transition in western Asia. In *The Upper Palaeolithic revolution in global perspective: Papers in honour of Sir Paul Mellars*, ed. K.V. Boyle, C. Gamble, and O. Bar-Yosef, 85–101. Cambridge: McDonald Institute for Archaeological Research.

Gabunia, L., S.C. Anton, D. Lordkipanidze, A. Vekua, A. Justus, and C.C. Swisher III. 2001. Dmanisi and dispersal. *Evolutionary Anthropology* 10: 158–170.

Goring-Morris, N. 1995. Complex hunter/gatherers at the end of the Paleolithic (20,000-10,000 BP). In *The archaeology of society in the Holy Land*, ed. T. Levy, 141–167. London: Leicester University Press.

Goring-Morris, N., and A. Belfer-Cohen. 2006. A hard look at the "Levantine Aurignacian": How real is the taxon? In *Towards a definition of the Aurignacian*, ed. O. Bar-Yosef and J. Zilhão, 297–316. Lisbon: Instituto Português de Arqueologia.

Henry, D.O., ed. 2004. *Neanderthal in the Levant: Behavioral organization and the beginnings of human modernity*. London: Continuum.

Hovers, E., S. Ilani, O. Bar-Yosef, and B. Vandermeersch. 2003. An early case of color symbolism: Ochre use by modern humans in Qafzeh Cave. *Current Anthropology* 44 (4): 491–522.

Lieberman, D. 1993. The rise and fall of seasonal mobility among hunter-gatherers: The case of the Southern Levant. *Current Anthropology* 34 (5): 599–631.

Maher, L.A., E.B. Banning, and M. Chazan. 2011. Oasis or mirage? Assessing the role of abrupt climate change in the prehistory of the Southern Levant. *Cambridge Archaeological Journal* 21 (1): 1–30.

Meignen, L., O. Bar-Yosef, J.D. Speth, and M.C. Stiner. 2006. Middle Paleolithic settlement patterns in the Levant. In *Transitions before the transition*, ed. E. Hovers and S.L. Kuhn, 149–169. New York: Springer.

Olszewski, D. 2008. The Palaeolithic period, including the Epipalaeolithic. In *Jordan: An archaeological reader*, ed. R.B. Adams, 35–69. London: Equinox.

Olszewski, D., and H. Dibble. 2006. To be or not to be Aurignacian: The Zagros Upper Paleolithic. In *Towards a definition of the Aurignacian*, ed. O. Bar-Yosef and J. Zilhão, 355–371. Lisbon: Instituto Português de Arqueologia.

Piperno, D.R., E. Weiss, I. Holst, and D. Nadel. 2004. Processing of wild cereal grains in the Upper Palaeolithic revealed by starch grain analysis. *Nature* 430: 670–673.

Ronen, A., and M. Weinstein-Evron, eds. 2000. Toward modern humans: The Yabrudian and Micoquian 400-50 k-years ago (BAR International series 850). Oxford: Archaeopress.

Rose, J.I., V.I. Usik, A.E. Marks, Y.H. Hilbert, C.S. Galletti, A. Parton, J.M. Geiling, V. Černý, M.W. Morley, and R.G. Roberts. 2011. The Nubian complex of Dhofar, Oman: An African Middle Stone Age industry in southern Arabia. *PLoS One* 6 (11): e28239. https://doi.org/10.1371/journal.pone.0028239.

Richter, T., A.N. Garrard, S. Allock, and L.A. Maher. 2011. Interaction before agriculture: Exchanging material and sharing knowledge in the final Pleistocene Levant. *Cambridge Archaeological Journal* 21 (1): 95–114.

Shea, J.J. 2003. The Middle Paleolithic of the East Mediterranean Levant. *Journal of World Prehistory* 17 (4): 313–394.

Valla, F. 1995. The first settled societies – Natufian (12,500-10,200 BP). In *The archaeology of society in the Holy Land*, ed. T. Levy, 169–185. London: Leicester University Press.

Further Reading

Akazawa, T., K. Aoki, and O. Bar-Yosef, eds. 1998. *Neanderthals and modern humans in western Asia*. New York: Plenum Press.

Akazawa, T., and S. Muhesen, eds. 2003. *Neanderthal burials: Excavations of the Dederiyeh Cave, Afrin, Syria*. Auckland: KW Publications Ltd.

Balter, M. 2010. The tangled roots of agriculture. *Science* 327: 404–406.

Bar-Yosef, O., and L. Meignen, eds. 2007. *Kebara Cave, Mt. Carmel, Israel: The Middle and Upper Paleolithic archaeology, Part I*. Cambridge, MA: Peabody Museum of Archaeology and Ethnology, Harvard University.

Bar-Yosef, O., and D. Pilbeam, eds. 2000. *The Middle and early Upper Paleolithic in southwest Asia and neighboring regions*. Cambridge: Harvard University.

Bar-Yosef, O., and F. R. Valla,0 eds. 1991. *The Natufian culture in the Levant* (International Monographs in Prehistory, Archaeological series 1). Ann Arbor: International Monographs in Prehistory.

Chazan, M., and L.K. Horwitz, eds. 2007. *Holon: A Lower Paleolithic site in Israel*. Cambridge, MA: Peabody Museum of Archaeology and Ethnology, Harvard University.

Dennell, R. 2009. *The Palaeolithic settlement of Asia* (Cambridge World Archaeology). Cambridge: Cambridge University Press.

Garrod, D.A.E., and D.M.A. Bate. 1937. *The Stone Age of Mount Carmel: Excavations at the Wady el-Mughara*. Vol. 1. New York: AMS Press.

Gilead, I. 1991. The Upper Paleolithic period in the Levant. *Journal of World Prehistory* 5 (2): 105–154.

Gilead, I. 1995. The foragers of the Upper Paleolithic period. In *The archaeology of society in the Holy Land*, ed. T. Levy, 124–137. London: Leicester University Press.
Goring-Morris, A.N. 1987. *At the edge: Terminal Pleistocene hunter-gatherers in the Negev and Sinai* (BAR International series 361). Oxford: Archaeopress.
Goring-Morris, A.N., and A. Belfer-Cohen, eds. 2003. *More than meets the eye: Studies on Upper Palaeolithic diversity in the Near East*. Oxford: Oxbow Books.
Henry, D.O., ed. 1995. *Prehistoric cultural ecology and evolution*. New York: Plenum Press.
Henry, D.O. 1998. *The prehistoric archaeology of Jordan* (BAR International series 705). Oxford: Archaeopress.
Hovers, E. 2009. *The lithic assemblages of Qafzeh Cave*. Oxford: Oxford University Press.
Kuhn, S.L. 2002. Paleolithic archeology in Turkey. *Evolutionary Anthropology* 11: 198–210.
Le Tensorer, J.-M., R. Jagher, and M. Otte, eds. 2011. *The Lower and Middle Palaeolithic in the Middle East and neighbouring regions* (ERAUL 126). Liège: ERAUL.
Neuville, R. 1951. *Le Paléolithique et le Mésolithique du Désert de Judée*. Paris: Archives l'Institut de Paléontologie Humaine.
Nishiaki, Y., Y. Kanjo, S. Muhesen, and T. Akazawa. 2011a. Recent progress in Lower and Middle Palaeolithic research at Dederiyeh Cave, Northwest Syria. In *The Lower and Middle Palaeolithic in the Middle East and neighbouring regions (ERAUL 126)*, ed. J.-M. Le Tensorer, R. Jagher, and M. Otte, 67–76. Liège: Université de Liège.
Nishiaki, Y., Y. Kanjo, S. Muhesen, and T. Akazawa. 2011b. Newly discovered Late Epipalaeolithic lithic assemblages from Dederiyeh Cave, the Northern Levant. In *The state of the stone: Terminologies, continuities and contexts in Near Eastern lithics*, ed. E. Healey, S. Campbell, and O. Maeda, 79–87. Berlin: Ex oriente.
Olszewski, D., and H. Dibble, eds. 1993. *The Paleolithic prehistory of the Zagros-Taurus*. Philadelphia: The University Museum, University of Pennsylvania.
Otte, M., F. Biblari, and J. Jaubert, eds. 2009. *Iran Palaeolithic/Le Paléolithique d'Iran* (BAR International series 1968). Oxford: Archaeopress.
Petraglia, M.D., and J.I. Rose, eds. 2009. *The evolution of human populations in Arabia: Paleoenvironments, prehistory and genetics*. Dordrecht: Springer.
Shea, J.J. 2007. Behavioral differences between Middle and Upper Paleolithic *Homo sapiens* in the East Mediterranean Levant: The roles of intraspecific competition and dispersal from Africa. *Journal of Anthropological Research* 63 (4): 449–488.
Stiner, M. 2005. *The faunas of Hayonim Cave, Israel: A 200,000 year record of Paleolithic diet, demography and society.* Cambridge, MA: Peabody Museum of Archaeology and Ethnology, Harvard University.
Wendorf, F., and A.E. Marks, eds. 1975. *Problems in prehistory: North Africa and the Levant*. Dallas: Southern Methodist University Press.

Western Europe: Historical Archaeology

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Introduction

Academic archaeology has its roots in the "Great Tradition" of European scholarship (Renfrew 1980: 289; for critical discussion of the "Great Tradition" see Ferguson 2013) of European scholarship (Renfrew 1980: 289). Archaeologists of the eighteenth and particularly the nineteenth century followed that tradition and focused their interests on antiquity for primarily two reasons: The Enlightenment freed antiquity of its biblical and theological context so it became the subject of intellectual scrutiny; antiquity offered spectacular and visible on the surface evidence of the glorious past of the Mediterranean region. Shrouded in mystery to raise interest of the educated and wealthy, research of the ruins of the past guaranteed results, a significant circumstance for privately funded and goal-oriented endeavors. Thus, scholars attempted to describe early civilizations of the classical world such as the Sumerian Empire, the kingdoms of Egypt, Greek city-states, and the Roman Empire. The prevailing at that time concept of archaeology was to accept all evidence of the human past as historic, and such understanding influenced the practice of archaeology in many European countries. Hence the long-lasting relationship between history and archaeology in Europe.

The German archaeologist Carl Schuchhardt (1908: 944 ff. expanded the concept of *Altertumswissenschaft* (science of antiquity) and suggested that also "excavated prehistory," which provides evidence of the past hidden underground, is a part of "real" history. Consequently, prehistoric archaeology became a part of the "Great Tradition." Furthermore, the acceptance of geography and ethnology as professional academic disciplines in

Germany, and later in other European countries, prompted a more systematic and broader scholarly interest in the studies of the past societies. Subsequently, in addition to writing sources, spectacular art objects, and architecture, scholars also accepted less impressive remains of material cultures from the past as historical records recovered by the means of archaeological methods.

Today researchers divide archaeology into two major subdisciplines: prehistoric and historic archaeology. Prehistoric archaeology unravels the story of humanity of at least 2.5 million years and focuses on all aspects of human social life, whereas historic archaeology might seem as an ambiguous subdiscipline, being neither history nor prehistory (Deagan 1988; Small 2011), or prahistory or protohistory, as it is called in some European countries, for instance, in Great Britain, Germany, Poland, and Russia. It is the subject of this essay.

Definition

Historical archaeologists argue about the parameters that define the discipline. The term historical archaeology has several meanings, but it generally relates to researching societies living at times for which we have written records. Thus, it concerns peoples who recorded themselves, and also those who did not have access to script, in writing.

There are generally two understandings of historical archaeology: broader, favored by many European archaeologists, and narrower, followed by some European and American archaeologists. Such duality reminds of Karl Polanyi's 1944:76 44–49 discussion on the two meanings of economics: substantivist and formalist. I shall use this distinction here to explain the two meanings of historical archaeology. The broader "substantivist" understanding refers to the methodology of research. It identifies historical archaeology as a discipline to study all societies who recorded themselves and historical events they either caused, or to which they related, through the use of script supported by archaeological records. According to this view, the range of historical archaeology incorporates all the literate societies from the origins of script until modern times. Therefore, it includes the archaeology of Mesopotamia and Egypt, the Indus River Valley, and southern China, archaeology of the Maya and the Aztecs, classical archaeology of Greece and the Roman Period, medieval and post-medieval archaeology, archaeology of European colonies, urban archaeology, industrial archaeology, etc.

The narrower, "formalist" understanding is strictly about the timeline of processes and events in a specific historical context. In this view, historical archaeology becomes interdisciplinary (bridging disciplinary divides to create new knowledge) and transdisciplinary (use of different sources of knowledge by engaging various stakeholders) field of research that includes a variety of methodologies to examine the world's history since about 1500 CE. For clarity, interdisciplinary approach is to synthesize several disciplines in an attempt to answer research questions or explain a phenomenon; it is not about adding new methodologies to the practice of archaeology. Transdisciplinary research (see also Mode 2 thinking) is about using various sources of knowledge by engaging the interested parties in order to produce new knowledge. On the difference between interdisciplinary and transdisciplinary approach see brief but informative article by Toomey et al. 2015. The definiens here is not just the use of script but the historical context of modernity and the expanding role of Western European countries worldwide and their cultural, primarily economic and political, domination. I follow the chronology of modernity proposed by Marshall Berman (1982: 16–17), who divided modernity into three periods: early (1500–1789), classical (1789–1900 [1914]), and late modernity (1900–1989). According to this narrower meaning, the discipline concerns the post-Columbian (post-Quincentennial) era and emphasizes Eurocentricity and the period of European domination in the world at times of geographic discoveries, the beginnings of mercantilism and the origin of capitalism related to colonialism, and European political domination worldwide. In this respect, scholars agree that historical archaeology relates to primarily the times around and after 1500 CE. I subscribe to such understanding in this article.

The strict definition of historical archaeology is usually explored according to such factors as purpose of research and chronology (American approach) and methodology (European concept), drawing a distinction between the American tradition that defines the subject as "post-Columbian" and the European approach that establishes broader connections with what has been called the "documentary archaeology" of all literate societies. The American definition points out to a specific historical event (1492) as the apical point of the timeline and context, while European colleagues pay attention to the type of sources and methodology. Thus, traditional definitions enlarge the scope of historical archaeology to include all "documentary archaeology" (more on this in Gilchrist 2005), whereas recent definitions focus on specific chronological periods and foci.

Briefly defined, historical archaeology is about studying the evidence and consequences of European cultural (socioeconomic and political) domination from around 1500 CE until recent times. It is chiefly about studying the evidence of broadly understood modernity and its consequences including internal (intracontinental) and external (intercontinental) colonialism of the British, Spanish, Portuguese, French, Dutch, German, and Italian nations. Their interactions and consequences of economic and political domination over regions and peoples worldwide, dated from the end of the fifteenth century (the end of the Middle Ages) to modern times, examined through the use of archaeological and historical methods define the core interests of the discipline. Viewed in such a way, historical archaeology is interdisciplinary and its methodology involves the use of methods to recover and process data on material culture, past ecosystems (historical ecology), language (historical linguistics), and geography (historical geography), but it also dwells on methodologies and theories offered by cultural anthropology (ethnology), sociology, political science, economics, demography, etc. It also becomes transdisciplinary by engaging various stakeholders and their views to inspire conscientization.

In sum, based on the preferred view, the organizing concept for the discipline is either a history of the literate world (broader substantive view) or a history of European political and economic domination and the cultural context of modernity that produced suitable socioeconomic conditions for the origin of capitalism (narrower formalist view). Either way, the unique position of historical archaeology as a research field is the intersection of archaeological data and written records, which allows simultaneous access to variety of sources. Modern Western European historical archaeology crosses the artificial boundaries between classical (Mesopotamia, Egypt, Greece, Rome), biblical, medieval, post-medieval, urban, industrial, underwater, etc., archaeologies. It utilizes common data, methods, methodology, and theory. Historical archaeology also provides the means to study societies who for various reasons have not produced written records of themselves but were impacted by literate cultures.

Historical Background

Historical archaeology emerged in Europe and was exclusively related to researching the classical periods, especially histories of ancient Mesopotamia, Egypt, Greece, and the Roman Empire. Interests in medieval archaeology originated in the last decades of the nineteenth century and intensified, along with post-medieval research, throughout the twentieth century. Medieval archaeology is now well established in Western Europe, but post-medieval and industrial archaeologies are relatively new subdisciplines; both originated and developed within the last 50 years. Significant increase of post-medieval research focusing on the times after 1500 CE occurred in Europe during the 1970s and 1980s and is growing (Fig. 1). Much of post-medieval archaeology sprung out from urban rescue archaeology and studies on material culture. Industrial archaeology developed as "the social history of the working class" and is presently practiced in many Western European countries to address the material evidence for industrialization of the modern world. It deals with still largely intact industrial buildings, factories, and machines of the last two centuries.

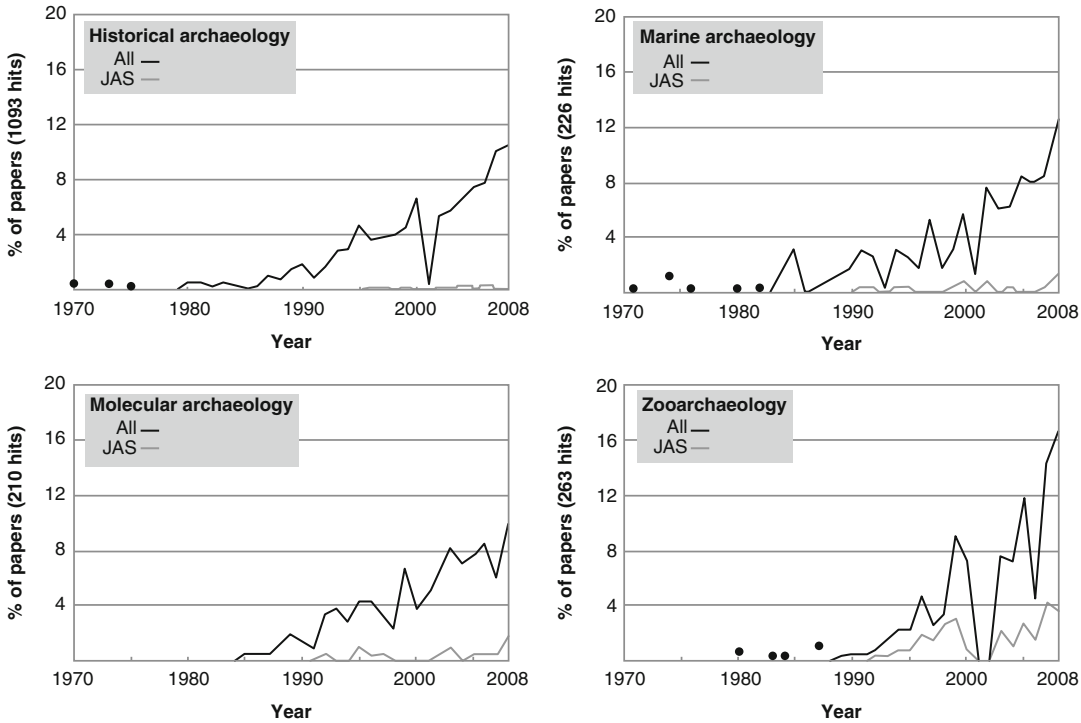

Western Europe: Historical Archaeology, Fig. 1 Change in the number of publications regarding historical archaeology, marine archaeology, molecular archaeology, and zooarchaeology, between 1970 and 2008 (After Marriner 2009, Fig. 2)

Thus, if one considers the wider meaning of historical archaeology related to the definition based on methodological aspects, historical archaeology originated in the nineteenth century, whereas the narrower meaning related to the chronological and contextual definition suggests that historical archaeology, although rooted in the tradition of the late nineteenth century archaeology, is a young discipline which matured in the second half of the twentieth century but is still developing and searching for identity. Thus far, Western European historical archaeology has been dominated by the British, German, Dutch, French, Scandinavian, and to some extent American research, and to date there has been little comparative work across the European continent (Gilchrist 2005; Mehler 2013). *Post-Medieval Archaeology* remains the principal society and a journal in Britain that focuses exclusively on the period after 1500 CE.

North American vs European Historical Archaeology

Traditionally, European archaeologists consider archaeology as an auxiliary subfield of history (part of the humanities), whereas in the United States it mostly operates under the umbrella of anthropology (part of the social sciences). Understandably then, European- and American-trained archaeologists view historical archaeology differently (for brief discussion, see, for instance, Mehler 2013). Such distinction is expressed in the definition of the discipline and rooted in its key interests limited by the available sources. Because in North America literate period originated with European colonialism, historical archaeologists study the colonial and postcolonial times, battlefields, slavery, urbanization, mercantilism, industrialization, etc., whereas European archaeologists have a wider range of sources available and thus focus on ancient literate

societies; medieval and post-medieval, industrial, urban, or military archaeology; etc.

Presently, archaeologists view historic archaeology not as an auxiliary subfield of history regarded as a method of obtaining historic facts undocumented in script. They emphasize the claim that it stands on its own. Current developments strongly suggest that the field refocused from studying sheer historical events and from following traditional historical methodology rooted in empirical (logical) positivism to researching historical processes with anthropological methodology that includes evolutionary and comparative outlooks (see Thurman (1998) conversations with Lewis Binford). This trend is common in the United States and is gaining popularity in Europe, although many topics studied by European scholars remain oriented on histories of events rather than processes.

Generally, whether viewed as part of anthropology or history, historical archaeology operates in two distinctive scales: diachronic scale to observe changes over time and synchronic that employs comparative analysis of cultures from the same period. Current historical archaeology, whether European or American, is interested in addressing large-scale processes, visible in global scale. It also dominates the practice of professional or contract archaeology across the globe, as urban development and historic buildings conservation yield massive archaeological data from last centuries. Therefore, even if historical archaeology is viewed as a history with spade, it must not be seen as simply a method of providing data to illustrate historical events. It becomes interdisciplinary and transdisciplinary and not just multidisciplinary. Linked to anthropology and history, it seeks to understand the nature of modern life (cf. Orser and Fagan, 1995: 14) in a larger, global scale. Although it is mostly practiced in Europe and the United States, archaeologists in other regions develop strong interests in this discipline (see Curet 2011; Ikawa-Smith 2011; Politis and Curtoni 2011; Thomas 2011; Sandelowsky 2011; Shimada and Vega-Centeno 2011; Shocoongdej 2011; Small 2011; Thomas 2011; Juwayeyi 2011).

Key Issues and Current Debates

Although traditional Western European historical archaeology focuses on, for instance, acculturation such as the Romanization of Western Europe (Fig. 2), research topics related to Romanization are phrased in terms of imperialism, colonialism, and military expansions. Among new subjects that gain popularity are globalism, cultural domination and resistance, rise of capitalism (commodification), industrialization, economic exploitation, ethnicity, gender, social conflict, identity, etc. Presently, even if topics concern historical events, they are frequently examined in the context of historical process. Such processual outlooks relate to archaeology of colonialism, migrations and culture contacts, archaeology of atrocities, archaeology of power, archaeology of capitalism, archaeology of identity, archaeology of conflict and warfare, industrial archaeology, etc.

One of the most significant among currently discussed topics is the research of societies who otherwise did not record themselves in writing. It relates to studying former colonies in North America, South America, Africa, and South Asia. One of the understudied area is the Hispanic military frontier (Williams 1992: 7) in the New World and its economic and political role. From current studies we learn a great deal about the relationship between the colonizers and the colonized. For instance, Spanish military installations (presidios) were initially economically self-sufficient but after 1830 data reveal greater dependence on European-made products (Williams 1992: 7). It might suggest an increase in local political hostility but certainly point out to changes in economic relationships between the New and Old Worlds. Such research also examines the dependency relations between European early industrial economies and undeveloped colonial peripheries.

The archaeology of African diaspora and the history of slavery very much concerns Europe, Africa, and the Americas. There is also an emerging interest in the British imperial diaspora that unites the historical archaeology of Britain, Ireland, Canada, the United States, India, the

Western Europe: Historical Archaeology, Fig. 2 Mountmaurin, southern France. Gallo-Roman villa. Photo by Ludomir Lozny

Caribbean, Australia, and New Zealand by exploring the legacy of involuntary transportation from Ireland to Australia and contrasting historical and contemporary perceptions of British penal transportation in the two countries. Historical archaeology must not be, however, understood as just the history of European colonial and post-colonial times that dominates the American version of historical archaeology (Fig. 3).

The focus of French historical archaeology (see Bellan and Journot 2011 for a review of recent projects) is on local monographs and long-lasting craft traditions, castles, villas, monasteries, and fields, using the themes of symbolism, knowledge, constraint, power, and conflict. Urban archaeology is emerging and studies of architectural monuments (chateau) are common (Fig. 4). Industrial archaeology and military archaeology (battlefields) increased in popularity throughout Europe (Figs. 5 and 6). Such topics are discussed in relationship to political and economic systems and social arrangements and walls surrounding towns, fields, etc. The social history of walls is not common. It reflects a range of social relations beyond the usually assumed defensive functions, and a conceptualization of walls needs to be readdressed in scholarship. It must include an approach to investigate the social arrangements of space where walls become a part of the landscape as much as buildings, monuments, streets, etc. Some of the European non-city walls include the approx. 150 miles-long Offa's wall (dyke) that separates England and Wales, and Danevirke, a system of ca. 20 miles-long fortifications in the present-day Schleswig-Holstein that originated around 500 CE, has been rebuilt several times and last used in 1864. Such either fortification or boundary markers and certainly noticeable landmarks also exist in other parts of Europe (Samson 1992).

Historical archaeology is, understandably, gaining momentum in Italy, especially its urban fraction and the study of the Renaissance but new trends such as landscape studies become popular. Post-medieval, urban archaeology is also popular in Scandinavia and recently focused on researching post-medieval farmsteads. Studies on cities, countryside, and the relationship

Western Europe: Historical Archaeology, Fig. 3 St. Augustine, Florida, USA. The oldest continuously occupied Spanish colonial village in North America. Photo by Ludomir Lozny

Western Europe: Historical Archaeology, Fig. 4 Carcassonne, southern France. Photo by Ludomir Lozny

Western Europe: Historical Archaeology, Fig. 5 Aerial view of World War I trenches recovered in eastern France. Daily Mail, 10 February, 2012

between towns and countryside form the core of historical archaeology in the Netherlands and other Low Countries (Figs. 7 and 8). Archaeology of the great medieval cultural expansions in Western Europe that laid out the foundation for modern Western Europe, especially related to the Franks and Charlemagne and the Norse, are drawing attention of archaeologists and historians.

Theory and Methodology

The epistemology of historical archaeology, as all other archaeologies, is framed within modernity. Historical archaeology, as any other archaeology, has no theory of its own. Whether European or American, until late 1980s - early 1990s it was inherently theory-free. Atheoretical particularism characteristic of the culture history approach was typical for European archaeology and historical archaeology. This is currently changing to incorporate a range of new interpretations and theoretical views. As in history, interpretive approaches prevail over empirically driven explanations and are often mixed with Marxism, especially

Western Europe: Historical Archaeology, Fig. 6 Industrial archaeological park of Rhineland Industrial Museum, Germany. Photo by Ludomir Lozny

Western Europe: Historical Archaeology, Fig. 7 Lauriergracht, Amsterdam, the Netherlands. Photo by Ludomir Lozny

Western Europe: Historical Archaeology, Fig. 8 Zuiderzeemuseum – Enkhuizen near Amsterdam, the Netherlands. Photo by Ludomir Lozny

dialectical materialism as a popular approach, and structuralism and their epigones such as agency, etc., and other social theories borrowed from sociology, political science, economics, etc. Theories of material culture, and materiality in general, are common to both prehistoric and historic archaeology. Processual, evolutionary-inspired approaches are not very common in Europe while postprocessualism has influenced scholars in several European countries to replace traditional empiricism and positivism. Postprocessual thought gained popularity in Britain and also

Scandinavia has become influenced by postmodern theories. Paul Courtney has recently (2009) reviewed the state of theory in post-medieval archaeology in Europe and concluded that: "...post-medieval archaeology is still largely entwined with medieval archaeology. The main driving force for post-medieval archaeology has tended to be from urban archaeology (...). Rural archaeology has been relatively undeveloped (...). The intellectual roots of post-medieval archaeology across Europe (...) clearly lie in history, though anthropological influences have grown (...)." Fragmentation of practice and theory has become another problem, however. One area in which historical archaeology has begun to realize its unique potentials is that of basic research in archaeology, or the development of middle-range theory to link our observations of the archaeological record to a reasonable approximation of the past events that formed that record (Deagan 1988: 10).

In order to better understand the interest and key issues researched by historical archaeologists and also appreciate the current debates, the following two questions need to be address: How can studying archaeology and history together contribute to better understanding of the human condition, past and present? How can archaeology and history enrich each other? A combination of these two disciplines offers a new and unique methodological perspective to study human culture and in effect produces results that neither one can achieve separately, simply because texts present views on very selective historical events while archaeological data cover a much wider range of events and processes which are better understood and assessed chronologically when supported with written records.

Generally, topics of study within historical archaeology concern both, processes and events. All are concerned about timelines and chronology supported by written sources. Methods to date processes and events are easier in historical archaeology than in prehistoric archaeology because in historical contexts either written sources or specific artifacts, such as coins, produce relatively accurate dates. The problem is to link such finds with the archaeological context in which they occur because coins often date not the time of their circulation but the event of deposition into the archaeological context and therefore suggest a date ex post, but this problem relates to methodology of research and not dating techniques.

There are issues related to the development of new means of production, accumulation of wealth and power, distribution of goods and services, and human sociopolitical organization that can only be understood through the use of methodology that makes reference to both documentary and material accounts of the past conditions. Slavery, imperialism, class formation, cultural syncretism, the manifestation of economic inequality among classes, consumer choice behavior, and accelerated environmental degradation are a few of the related topics that can be accurately described and understood only by a historical archaeological approach, that is, through the use of written records in combination with material evidence (see Deagan 1988: 8 for discussion). Because of its unique methodology to utilize archaeological evidence supported by written sources, historical archaeology also contributes to examining interconnections among various social groups and culture change in a multiethnic context of modern nation-states.

Historical archaeology is diversified in respect to methodology. The practitioners mostly follow the methodology of history but some also engage in studying various topics by employing the anthropological perspective. Because one of the key problems in historical archaeology is to investigate the concurrence of texts and artifacts (see Andren 1998 for discussion), historical archaeology might seem as not fitting in the traditional anthropological framework of American archaeology, but on the contrary, it inevitably establishes links with history and other related disciplines, such as linguistics and art history but also political science and economics. While the availability of documents has sometimes led to a particularistic brand of historical archaeology, in which theory may be underdeveloped, the rich combination of sources has frequently promoted wide-ranging methodological and theoretical innovation. The French contribution to the methodology and

theory of historical archaeology has been the approach identified as *le longue durée*, the history of long-term processes (changes) introduced by Fernand Braudel. It is appropriate to emphasize that due to its unique methodology, historical archeology may contribute to the advancement of theory in archaeology in general.

There is growing use of archaeometry and scientific analysis of artifacts, especially ceramic (composition of paste) or metal objects (physical attributes of metals are used in addition to stylistic analysis to trace the origin of certain objects), but in historic archaeology, certain dating techniques are more useful than others. For instance, absolute dating techniques such as carbon dating is not always recommended in historic contexts because the range it offers (25, 50, or 100 years) might cover a significant portion of the studied period. Dendrochronology seems more appropriate, for it offers a calendric date, but its use is limited by the existence of local tree-ring sequences and the fact that wood is not always present in archaeological sites or does not always date the event but, like coins, suggest ex post dates (the "old wood" syndrome must be kept in mind when using this method). On the other hand, written sources do not document all historical events but selected ones. Therefore, the application of archaeological methods to research traditional historical events and processes for which there is simply inadequate documentation constitutes a valid and important focus in the field and one that boasts the most successful contributions of historical archaeology to date.

Future Directions

Fragmentation of practice and theory has become a significant problem for historical archaeologists during the twentieth century. Modern historical archaeology offers a different outlook and it frequently crosses the interdisciplinary boundaries to utilize various methods, methodology, and theory. As observed by Deagan (1988: 7), in current approaches to the past there is often little difference among studies in historical archaeology, cultural anthropology, and social history.

New methodology of historical archaeology incorporates the use of all kinds of written records, not just narratives but also census data, personal accounts, diaries, etc. The study of material culture has been expanded to also examine the material evidence of space and place which are often manifested in the cultural landscape symbolically. The focus is also on intangible aspect of human culture such as memories, symbolic meanings, etc. All these allow the use of a range of new methods to record and manipulate the data. Therefore, twenty-first century historical archaeology is not just about written records and material archaeological data but it presently relates to oral histories and memories, archaeology of place and space, and indigenous narratives of places. A combination of sources, such as written sources and oral histories (local knowledge), including myths and local legends, are used in designing specific research approaches (Lozny 2006). Significant changes are expected in the use of new theories as a range of theoretical views both processual and post-processual in origin is replacing the atheoretical particularism characteristic of the culture history approach. Historical archaeology must continue to be interdisciplinary and transdisciplinary.

Historical archeology provides good training to critically examine written sources and evaluate how they relate to the archaeological record. In this sense historical archaeology requires very specific methodology in the use of resources which might be or simply are biased. Because it deals with written records, knowledge of various languages, including those presently not in use such as Latin or ancient Greek, is essential (if we accept the broader view of historical archaeology). Landscape archaeology although not exclusive to it became a significant new nondestructive approach to study histories of space (Lozny 2012; and Fig. 9).

There has recently been an attempt to claim a universal character to historical archaeology. The most comprehensive and articulate argument for a global historical archaeology has been formulated by Charles E. Orser (1996), pledging for the definition of the discipline as the study of the modern world, characterized by a single economy that is

Western Europe: Historical Archaeology, Fig. 9 The author and students conducting landscape archaeology project in the Labas Valley, Central Pyrenees. Photo by Ludomir Lozny

colonial, international, and expanding. There are four key concepts defining this new reality: global colonialism, eurocentrism, capitalism, and modernity. The call for a global "modern-world archaeology" addresses the "grand historical narratives" of the last 500 years and specifically such phenomena as capitalism, economic improvement, and consumerism. This approach may, however, channel archaeological thinking into certain more general directions seeking explanations at the global scale and may in effect hamper intellectual advancement in so many other subjects needing research on local scales. Nevertheless, the larger point here is that some consensus between European post-medieval and American historical archaeology is necessary in order to break free from the parochial approach to study the past, as it happened throughout the twentieth century.

Historical archaeology has been, and in some cases still is, politicized and often used for political gains to promote a range of nationalistic agendas (Arnold 1990; Galaty and Watkinson 2004; Lozny 2017), and such use to justify political claims has been common (ample examples from around the world are discussed by various authors in Lozny 2011). Regrettably, such practice will probably continue as the research offered by the social sciences and the humanities is often used for political gains.

Historical archaeologists must also be concerned with ethical practice what constitutes the right conduct and, in this instance, disagreement arises over exactly where ethical responsibilities lie. Historical archaeologists, as all other scientists, must not cross the line that separates scholars from activists; they must honestly report on their findings following the code of scientific conduct and not their personal political agendas. The ethical responsibility here is to the public who are not just the consumers of archaeological knowledge but also our sponsors and any violation of such ethical conduct must be pointed out and censured. The very fact that historical archaeologists engage in an open exchange of ideas about how they affect the people whose heritages they study is an optimistic sign. As discussed by Beaudry (2009), because historical archaeology deals with issues still remaining within memory of many individuals and groups, scholars must follow a specific ethical code. The ethical issues

are relevant to all studies and will continue to be applied to the traditional interests of historical archaeology such as urban archaeology, archaeology of rural areas, archaeology of power, domination and resistance, or material studies. Ethical issues might become particularly significant in the European theater, should the interest grow in studies of phenomena related to the recent history such as forced migration and displacement of large groups in Europe; diasporas; ethnic cleansing and violence; the historical significance of the two most potent and vicious social systems of the twentieth century – fascism and communism; war atrocities, social movements; and also larger social phenomena such as colonialism and post-colonial environment evidenced in multicultural societies in Europe and elsewhere, the significance of cultural heritage in multiethnic societies and its relation to sustainable development, etc. These are the most pressing issues to be studied by historical archaeologists in the twenty-first century.

Historical Archaeology in the Academia

Historical archaeology is taught at several European universities in Great Britain, Germany, France, Italy, Spain, the Netherlands, and Belgium, and many aspects are also covered in classes related to medieval archaeology or art history. The academic aspect of historical archaeology would require a separate study and thus is not the concern in this essay.

Historical Archaeology and Preservation (Conservation)

Historical archaeology forms a core of many culture managements and preservation (conservation) institutions and services in western Europe, such as English Heritage (Historic Building and Monuments Commission for England), French *Institut National de Recherches Archéologiques Préventives* (INRAP), German *Denkmalschutzämter* and *Stadt-und Kreisarchäologien*, Dutch *Rijksdients voor het Oudheidkunding Bodenmonderzoek* (ROB), Swedish *Riksantikvarieämbetet*, and offices of the Italian *Ministero per i Beni e le Attività Culturali* and Spanish *Instituto del Patrimonio Cultural de Espana* to name a few. These are the strongholds of Western European historical archaeology as places of research and employment.

References

Andren, A. 1998. *Between artefacts and texts: Historical archaeology in global perspective*. New York: Plenum.

Arnold, B. 1990. The past as propaganda: Totalitarian archaeology in Nazi Germany. *Antiquity* 64: 464–478.

Beaudry, M.C. 2009. Ethical issues in historical archaeology. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster. New York: Springer.

Bellan, G., and F. Journot, eds. 2011. *Archéologie de la France moderne et contemporaine*. Paris: La Decouverte.

Berman, M. 1982. *All that is solid melts into air: The experience of modernity*. New York: Simon and Schuster.

Courtney, P. 2009. The current state and future prospects of theory in European post-medieval archaeology. In *International handbook of historical archaeology*, ed. T. Majewski and D. Gaimster. New York: Springer.

Curet, A. 2011. Archaeology in Cuba and the Caribbean Islands. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 641–672. New York: Springer.

Deagan, K.A. 1988. Neither history nor prehistory: The questions that count in historic archaeology. *Historical Archaeology* 22 (1): 7–12.

Ferguson, James R. 2013. Great traditions and grand narratives. *Culture Mandala: Bulletin of the Centre for East-West Cultural and Economic Studies* 10 (2): 15–40.

Galaty, M.L., and Ch. Watkinson, eds. 2004. *Archaeology under dictatorship*. New York: Kluwer Academic/Plenum Press.

Gilchrist, R. 2005. Introduction: Scales and voices in world historical archaeology. *World Archaeology* 37 (3): 329–336.

Ikawa-Smith, F. 2011. Archaeology in contemporary Japan. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 675–706. New York: Springer.

Juwayeyi, Yusuf. 2011. Excavating the history of archaeology in Malawi. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 785–806. New York: Springer.

Lozny, L.R. 2006. Place, historical ecology and cultural landscape: New directions for culture resource management. In *Landscapes under pressure. Theory and practice of cultural heritage research and preservation*, ed. R. Ludomir and L.R. Lozny, 15–26. New York: Springer.

Lozny, L.R., ed. 2011. *Comparative archaeologies: A sociological view of the science of the past*. New York: Springer.

Lozny, L.R. 2012. Landscape archaeology of the Labas Valley, Central Pyrenees. In *Continuity and change in cultural mountain adaptations: From prehistory to contemporary threats*, ed. L.R. Lozny, 123–206. New York: Springer.

Lozny, L.R., ed. 2017. *Archaeology of the communist era. A political history of archaeology of the twentieth century*. New York: Springer.

Mehler, N. 2013. Globalization, immigration, and transformation: Thoughts from a European perspective. *Historical Archaeology* 47 (1): 38–49.

Marriner, N. 2009. Currents and trends in the archaeological sciences. *Journal of Archaeological Science* 36 (12): 2811–2815.

Orser, C.E. 1996. *A historical archaeology of the modern world*. New York: Plenum.

Orser, C.E., and B.M. Fagan. 1995. *Historical archaeology*. New York: HarperCollins.

Podgorny, I. 2011. "Silent and alone". How the ruins of an ancient city found close to Palenque were taught to talk the language of archaeology (Mesoamerica). In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 520–554. New York Springer.

Polanyi, K. 1944. *The great transformation*. New York: Farrar & Rinehart.

Politis, G.G., and R.P. Curtoni. 2011. Archaeology and politics in Argentina: The last fifty years. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 495–526. New York: Springer.

Renfrew, C. 1980. The great tradition versus the great divide: Archaeology as anthropology? *American Journal of Archaeology* 84 (3): 287–298.

Samson, R. 1992. Knowledge, constraint, and power in inaction: The defenseless medieval wall. *Historical Archaeology* 26 (3): 26–44.

Sandelowsky, Beatrice. 2011. The status of archaeology and anthropology in Southern Africa today: Namibia as example. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 769–784. New York: Springer.

Schuchhardt, C. 1908. Ein Stück trojanischer Forschung. *Zeitschrift für Ethnologie* 40: 943–950.

Shimada, Izumi, and Rafael Vega-Centeno. 2011. Peruvian archaeology: Its growth, characteristics, practice and challenges. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 569–612. New York: Springer.

Shocoongdej, Rasmi. 2011. Contemporary archaeology as a global dialogue: Reflections from Southeast Asia archaeology in Southeastern Asia. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 707–730. New York: Springer.

Small, D.B. 2011. The archeology of Israel and Palestine. In *Comparative Archaeologies: A Sociological View of the Science of the Past*, ed. L.R. Lozny, pp. 463–492. New York: Springer.

Thomas, Frank. 2011. Pacific Islands Archaeology. In *Comparative archaeologies: A sociological view of the science of the past*, ed. L.R. Lozny, 731–767. New York: Springer.

Thurman, Melburn D. 1998. Conversations with Lewis R. Binford on historical archaeology. *Historical Archaeology* 32 (2): 28–55.

Toomey, A. H., N. Markusson, E. Adams, and B. Brockett. 2015. Inter- and transdisciplinary research: A critical perspective. Submitted to global sustainable development Report Chapter 7 Policy Brief. Retrieved from: https://sustainabledevelopment.un.org/content/documents/612558-Inter-%20and%20Trans-disciplinary%20Research%20-%20A%20Critical%20Perspective.pdf

Williams, Jack S. 1992. The archaeology of underdevelopment and the military frontier of Northern New Spain. *Historical Archaeology* 26 (1): 7–21.

Further Readings

Falk, L., ed. 1991. *Historical archaeology in global perspective*. Washington, DC: Smithsonian Institution Press.

Funari, P.P.A., M. Hall, and S. Jones, eds. 1999. *Historical archaeology: Back from the edge*. London: Routledge.

Hall, M., and S.W. Silliman, eds. 2006. *Historical archaeology*. Oxford: Blackwell.

Hicks, D., and M.C. Beaudry, eds. 2006. *The Cambridge companion of historical archaeology*. Cambridge: Cambridge University Press.

Majewski, T., and D. Gaimster, eds. 2009. *International handbook of historical archaeology*. New York: Springer.

Noel-Hume, I. 1967. *Historical archaeology*. New York: Alfred Knopf.

Orser, C.E., Jr., ed. 2002. *Encyclopedia of historical archaeology*. London/New York: Routlage.

Schuyler, R. ed. 1979. Historical archaeology: A guide to substantive and theoretical contributions. Farmingdale: Baywood Publishing Company.

South, S. 1977. *Method and theory in historical archaeology*. New York: Academic Press.

Western Roman Provinces, Archaeology of the

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Introduction

By the end of the first century CE, all of the modern countries of Western Europe up to the Rhine river, including Spain, Portugal, France, Belgium, the Netherlands, Germany, Switzerland, and much of Britain, had been incorporated into the Roman Empire. They eventually became the Roman provinces of Hispania Baetica, Hispania Lusitania, Hispania Tarraconensis, Gallia Narbonensis, Gallia Aquitania, Gallia Lugdunensis, Gallia Belgica, Raetia, Noricum, Germania Superior, Germania Inferior, and Britannia (Fig. 1).

Greco-Roman goods had been flowing into most of these areas before their formal incorporation into the empire, and after the conquest and the establishment of the provinces, some areas accepted Roman and/or Mediterranean traditions more than others. This is particularly true in the provinces of Gallia Narbonensis and the eastern and southern parts of the provinces of the Iberian Peninsula, particularly because of the presence of Greek and, in the case of Spain, Phoenician colonies that predated incorporation into the empire. Even so, it is clear that Mediterranean goods were circulating in the entire region, even in Britannia, prior to their official conquests.

Key Issues

Urbanism

It was in the provincial towns and cities where much of the cultural interaction between the indigenous populations, merchants, soldiers, and Roman officials took place. Here patrons could expect more people to witness their benefactions, and so most acts of euergetism occurred in these locales. It was also in urban locations that members of the indigenous population became familiar with Greco-Roman traditions.

The Roman-period towns of the western provinces can be divided into four categories, *coloniae*, *municipia*, *civitas* centers, and *vici*, of roughly descending importance. In most instances, *coloniae* consisted of settlements of Roman veterans, but some cities, such as *Eburacum* (York) in Britannia or *Vesontio* (Besançon) in Germania Superior, were promoted to this status. Some towns of considerable size fell into none of these categories, for example, *Aquae Sulis* (Bath), which seems to have been more of a resort town (Dark 1993). Moreover, these designations did not always reflect the importance of a town. *Mogontiacum* (Mainz), for instance, an important legionary base, the capital of Germania Superior, and an important economic center along the Rhine was only a *vicus* until its promotion to a *municipium* in the fourth century CE. The large urban centers, primarily the provincial capitals and the colonies, have received the greatest level of archaeological scrutiny, but particularly since 1960s and 1970s, attention has increasingly turned to small towns and other types of nucleated settlements (Burnham and Wacher 1990).

The provincial capitals had a particularly important role to play in the diffusion of Roman traditions. The capitals of the Iberian provinces were *Emerita Augusta* (Mérida) in Hispania Lusitania, *Corduba* (Córdoba) in Hispania Baetica, and *Tarraco* (Tarragona) in Hispania Tarraconensis. Those of the Gallic provinces were *Burdigala* (Bordeaux) in Gallia Aquitania, *Durocortorum Remorum* (Reims) in Gallia Belgica, *Lugdunum* (Lyon) in Gallia Lugdunensis, and *Narbo Martius* (Narbonne) in Gallia Narbonensis. The capital of Germania Inferior was *Colonia Claudia Ara Agrippinensium* (Cologne), and the capital of Germania Superior was *Mogontiacum* (Mainz). Although the capital of Britannia was originally *Camulodunum* (Colchester), eventually *Londinium* (London) became the home of the provincial governor. The capital of Noricum was *Virinum*, which was not even officially founded until 50 CE. Lastly, while it does not appear to have been the original

Western Roman Provinces, Archaeology of the, Fig. 1 Map of the western provinces. Public domain

provincial capital of Raetia, by the second century CE, *Augusta Vindelicum* (Augsburg) had assumed this role.

In addition to the provincial capitals, other *coloniae* and *municipia* functioned as important urban centers. The Iberian provinces had 27 *coloniae* and as many as 37 *municipia* altogether (Curchin 1991: 103–22; Fear 1996: 63–104). Many more *coloniae* were founded in western Spain because this part of the region was not as urbanized from the start. In the south and east, the important cities of *Gades* (Cádiz), *Carthago Nova* (Cartagena), and *Emporiae* (Empúries) predate formal Roman activity in the

region by centuries. *Gades* (Cádiz), founded by the Phoenicians perhaps as early as c. 1100 BCE, was the oldest city in Spain. *Carthago Nova* (Cartagena), established by the Carthaginians in 223 BCE, was described centuries later by Livy as *opulentissima omnium in Hispania* – the richest of all the cities in Spain (Liv. 26.48). *Emporiae* (Empúries) was founded in the middle of the sixth century BCE by Greeks from the colony of *Massilia* (Marseille). Despite these examples, Spain was not particularly urbanized prior to incorporation into the Roman Empire.

On the other side of the Pyrenees, the earliest of the colonies were founded in the southern part of the region. By the end of the Augustan period (27 BCE to 14 CE), veteran colonies had been established at *Narbo Martius* (Narbonne), *Arelate* (Arles), *Baeterrae* (Béziers), *Arausio* (Orange), *Forum Julii* (Fréjus), most likely *Noviodunum* (Nyon), *Augusta Raurica* (Augst), *Carpentoracte Meminorum* (Carpentras), and *Lugdunum* (Lyon), and possibly even *Valentia Julia* (Valence) and *Vienne* (Vienna). It was not until the middle of the first century CE and beyond that colonies were founded in the north, with veteran colonies at *Colonia Claudia Ara Agrippinensium* (Cologne) founded under Claudius (r. 41–54 CE), possibly at *Aventicum Helvetiorum* (Avenches) under Vespasian (r. 69–79 CE), and *Vetera* (Xanten) under Trajan (r. 98–117 CE).

In order to determine the size and importance of the urban centers in the Gallic provinces, Goudineau ranked them on a set of 35 different criteria, including size of territory, number and scale of monumental structures, degree of urban planning, level of industry, and legal status, among others (Goudineau 1980). Based on his analysis, he identified the 18 largest towns in the region and divided them into four groups: first, *Lugdunum* (Lyon), *Narbo Martius* (Narbonne), *Nemausus* (Nîmes), *Augusta Treverorum* (Trier), and *Vienne* (Vienna); second, *Arelate* (Arles), *Burdigala* (Bordeaux), *Augustodunum Aeduorum* (Autun), and *Durocortorum Remorum* (Reims); third, *Vasio Vocontiorum* (Vaison), *Mediolanum Santorum* (Saintes), *Aventicum* (Avenches), *Baeterrae* (Beziers), and *Arausio* (Orange); and finally *Forum Julii* (Fréjus), *Aquae Sextiae* (Aix-en-Provence), *Divodurum* (Metz), and *Tolosa* (Toulouse). Although not part of Goudineau's study in the two Germanies, *Colonia Claudia Ara Agrippinensium* (Cologne) developed into the most successful commercial center and was perhaps second only to *Lugdunum* (Lyon) in the continental provinces (Drinkwater 1983: 130).

Unfortunately, no such study has been undertaken in Britain, but it is evident that the island had fewer large urban centers than the continental provinces (Mattingly 2006: 260–3, 289). There were only four *coloniae*, *Camulodunum* (Colchester), *Glevum* (Gloucester), *Lindum* (Lincoln), and *Eburacum* (York), and the only known *municipium* was *Verulamium* (St. Albans). *Londinium* (London) demonstrates, however, that this system was not rigid because, although the capital and the most important city in Britannia, no firm evidence has survived to indicate that it ever became a *colonia*.

Noricum had only one colony, *Ovilava* (Wels), a town that was elevated to this status and did not have any veterans (Alföldy 1974: 86–96). This lack of *coloniae* seems to indicate that not many Roman citizens ever immigrated to the province. In addition to this colony, the province had eight *municipia*, a particularly large number of towns given that much of the province consisted of mountainous and uninhabited areas.

Very few towns of status are known in Raetia. Its capital, *Aelium Augustum* (Augsburg), is the only confirmed *municipium*. Although Tacitus does mention a *splendissima Raetiae provinciae colonia*, a most splendid colony of the province of Raetia, unfortunately he does not give the name of the town (*Germania* 41). It seems, however, that the two most important towns in Raetia were *Curia* (Chur) and *Tridentum* (Trent).

Although all of the western provinces had such urban centers, they were unevenly distributed. Some areas, such as Normandy and Brittany in France, Wales, and southwestern England, showed hardly any urbanization. Likewise, these regions had little in the way of Roman-style development, with, for example, few Roman-style architectural features, inscriptions, or sculpted

monuments (Mattingly 2006: 296, 509; King 1990: 106, 120).

The Countryside

Despite the urban development that took place after the incorporation of the region into the Roman Empire, the rural population in all parts of the region always exceeded the urban one. In Britannia, for example, the urban population has been estimated to have been no more than 200,000 compared to a rural population of 1.6 million (Mattingly 2006: 256). The types of settlements in the countryside varied widely, and the ways in which they are defined alter our understanding of their development distributions. Moreover, these areas have not often been subjected to the same level of archaeological scrutiny as the urban centers.

The most outstanding archaeological feature of the countryside is the villa. The term villa is complicated. Here the term indicates a rural structure with some Roman-style features, such as rectilinear architecture, stone or ceramic building materials, mosaics, and public baths, that may also have had productive elements including grape and olive presses or grain dryers.

The placement of rural residences was not unrelated to the placement of the urban centers, largely because of the economic opportunities they provided to agricultural producers but also the importance of landholding to the urban elites. Clusters of villas are known around, for example, many of the towns of Noricum, including *Virunum*, but especially *Juvavum* (Salzburg). Such patterns are not entirely straightforward because, for example, very few villas are located near *Londinium* (London), the largest city in Britannia, while many appear around *Cunetio* (Mildenhall, Suffolk), a relatively small settlement.

The heyday of the villa in most parts of the region was in the early fourth century CE, but their number and size varied temporally. For instance, in Britannia the villas of the first century, such as the large and extravagantly decorated villa at Fishbourne (West Sussex), averaged more than 2,000 m^2 in built area (Cunliffe 1971). Such villas were located almost exclusively in the southern part of the province. Over the course of the following three centuries, villas spread across a wider area of the south, but while they were increasing in number, they were at the same time decreasing in size. Villas are essentially absent in some parts of Britannia, particularly Wales and the military zone in the north near Hadrian's Wall, particularly in the modern counties of Cumbria, Durham, Northumberland, and Lancashire. While it seems possible that the heavy military presence in these areas stifled economic development, it is equally if not more likely that in these areas the segment of the population wealthy enough to construct villas felt no need to display their wealth in this way.

Villas are abundant in the Gallic provinces, especially in the area from across Gallia Belgica southwest across Gallia Lugdunensis to Gallia Aquitania (King 1990: 92–7). The regions of Picardy and southern Aquitaine have been particularly well studied thanks to aerial photography undertaken in the 1960s and 1970s CE. Although many different arrangements existed for the villas in this area, one of the most popular types consisted of a main residence building with a forecourt adjacent to a large rectangular courtyard, sometimes as large as two hectares, which was surrounded by subsidiary buildings. Such villas are known in Picardy, for example, at Warfusée-Abancourt, but also in Aquitaine at Montmaurin and Chiragan and further afield at Anthée, Echternach, Otrang, Oberentfelden, Seeb, Levet, and Noyers-sur-Serein. Despite the widespread nature of this style of villa, certain regions had their own preferred arrangements. An example is the "hall villa," peculiar to the Germanies and northern Gallia Belgica, which had larger open rooms instead of clusters of smaller ones, while the villas of Gallia Narbonensis were much more like their Italian counterparts, with a residence wing and often an area with facilities for the production and storage of both olive oil and wine.

Architecture

Although most of Spain, and particularly the south of France, was incorporated into the Roman Empire by the late second century BCE,

in both areas the development of monumental architecture did not occur until the Augustan period (Ward-Perkins 1981: 219). After the Augustan period, towns throughout the region contained Roman-style structures, including fora, aqueducts, baths, and entertainment facilities.

The forum complex at *Augusta Raurica* (Augst), dating from the mid-second century, is typical of city centers and public architecture throughout the western provinces (Ward-Perkins 1981: 220–1). The monumental core of the town occupied three entire blocks of the city's grid and consisted of a basilica, forum, and a temple, which together formed a single unit, unified by a series of porticos. As is typical in the western provinces, the basilica ran transversely across one end of the space of the forum, while the temple faced it at the opposite end. Similar complexes can be found at *Lutetia* (Paris), *Lugdunum Convenarum* (Bertrand-de-Comminges), and *Virinum*, just to name a few in the continental provinces. In Britain, the pattern was altered somewhat, often with the omission of the temple, as at *Venta Silurum* (Caerwent), Caistor, *Calleva Atrebatum* (Silchester), and *Viriconium Cornoviorum* (Wroxeter).

Some of the finest Roman-period architectural elements to survive in the western provinces revolved around water (Sear 1998: 210–3, 217; Ward-Perkins 1981: 214–8, 224–5). In fact, perhaps the most impressive architectural elements in Spain were the aqueducts and bridges, including the bridge over the Tagus river (Tajo) in Alcantara, the highest in the Roman world, as well as the aqueduct bridges at Segovia and *Tarraco* (Tarragona). The most famous of the aqueduct bridges in the western provinces is, however, the Pont du Gard (Fig. 2), which was part of the channel that provided water to *Nemausus* (Nîmes). Most aqueducts were underground and lacked these dramatic aqueduct bridges. On the continent, *Augusta Raurica* (Augst) had an aqueduct, and *Colonia Claudia Ara Agrippinensium* (Cologne) had two, while *Aventicum* (Avenches) had at least six (Carroll 2001: 50–1). With the exception of a timberlined channel in *Cambodunum* (Kempten), no aqueducts

Western Roman Provinces, Archaeology of the, Fig. 2 The Pont du Gard (©S. McGowen)

have survived in Raetia (Herrling 1943: 119). In Britain, the nature of the terrain as well as the availability of water also made aboveground channels largely unnecessary (de la Bédoyère 2001: 213–4).

The water from these aqueducts was used for many purposes, one of which was baths (Ward-Perkins 1981: 233–6; Carroll 2001: 49–50; de la Bédoyère 2001: 38–9, 104–8). Towns of any significance had public baths, sometimes several sets. Some bathing establishments in the western provinces, for example, those at *Glanum* (St.-Rémy), have an arrangement of the traditional bathing rooms (*frigidarium*, *tepidarium*, *caldarium*) along the edge of *palaestra* as found in Pompeii, for example. An alternative design seems to have developed in the Gallic provinces. In this case, the bathing rooms were arranged linearly, as in the Great Southern Baths at *Conimbriga* (Condeixa-a-Velha) in Hispania

Lusitania (Ward-Perkins 1981: 217–8). Interestingly, these baths replaced an Augustan-period complex of the traditional Pompeian type. Baths fed by springs were also common architectural features in the western provinces. These types of baths often included numerous plunge pools. Such baths are known at *Ivaonum* (Évaux) and *Rubiacum* (Royat) in Gallia Aquitania, Badenweiler in Germania Superior, Les Fontaines Salées in Gallia Lugdunensis, and Amélie-les-Bains in Gallia Narbonensis, but perhaps the best surviving set is found at *Aquae Sulis* (Bath) in Britannia.

Structures used for entertainment – theaters, amphitheaters, and circuses – were also particularly important to the development of Roman-style architecture in the region. The western provinces and Gaul in particular are home to some of the earliest known theaters outside of Italy (Sear 2006: 97–102, 196–254, and 258; Ward-Perkins 1981: 230–2). Several theaters are known in the Gallic provinces, including those at *Arelate* (Arles), *Lugdunum* (Lyon), and one at *Arausio* (Orange), the latter of which is preserved almost entirely. The largest of the Gallic theaters, with a capacity of c. 7,000 people, was in *Augustodunum Aeduorum* (Autun). The Iberian provinces had at least 15 theaters, including those at *Italica* (Santiponce), *Emerita Augusta* (Mérida), *Tarraco* (Tarragona), *Saguntum* (Sagunto), and *Acinipo* (Ronda la Vieja), most of which were constructed in the first and second centuries CE (Keay 1988: 125). In the Germanic provinces, theaters have been discovered at *Augusta Raurica* (Augst), *Aventicum* (Avenches), *Mogontiacum* (Mainz), *Nida* (Heddernheim), *Lopodunum* (Ladenburg), *Epomanduodurum* (Mandeure), and Lenzburg, all of which were built of stone with the exception of the one at Heddernheim (Carroll 2001: 51–2). In contrast, only three theaters have been identified in Britannia; those at *Durovernum Cantiacorum* (Canterbury), *Camulodunum* (Colchester), Gosbecks, and *Verulamium* (St. Albans) have been identified (de la Bédoyère 2001: 102–4). It is likely, however, that *Londinium* (London) and the other *coloniae* also had theaters. In Noricum, theaters are known at *Virunum* as well as at *Carnuntum* (Pfaffenberg). So far no theaters have been identified in Raetia.

Although not as numerous as theaters, several amphitheaters existed in the western provinces. Many were made of wood, as at *Aventicum* (Venches) or *Xanten* (Vetera); in Britannia, most consisted of earthen embankments with timber or stone revetments (de la Bédoyère 2001: 99–102). Although most were located in the larger towns, an amphitheater has been identified using aerial photography at *Venta Icenorum* (Caistor St. Edmund), one of the smallest *civitas* centers in Britain. In the western provinces, circuses were the rarest of the entertainment structures (Keay 1988: 120–3; King 1990: 80–82). The Gallic provinces had only five, and the only known example in Britannia is at *Camulodunum* (Colchester) (Crummy 2005).

With a few important exceptions, imperial benefaction was rare in the western provinces. Euergetism by provincials led to the construction of public buildings, but in the western provinces, competitive building by members of the elite was comparatively rare. In Britannia, most public benefactions were actually made by outsiders (Mattingly 2008). For example, a certain Lucius Viducius Placidus built an arch and a gateway in York, although he appears to have originated from the area around Rouen (*AE* 1977.512; *AE* 1983.643).

Infrastructure

As true of most of the Roman Empire, the western provinces had well-developed infrastructure. These regions had pre-Roman roads, as, for example, the Venetic road linking *Julium Carnicum* (Zuglio) with a settlement on the Gurnia River in Noricum. After the conquest of each region, however, extensive road networks developed throughout the provinces. Although originally constructed for the military, once in place they were used for civilian purposes, speeding communication and facilitating the transportation of goods. These roads were also powerful symbolically, as they marked a territory as unquestionably Roman.

In the Iberian provinces, many of the roads followed the major rivers such as the Ebro,

Tagus, and the Duero and divided the tribal territories. The so-called *Camino de la Plata* started as just such a road and eventually became a major artery between *Asturica Augusta* (Astorga) and *Emerita Augusta* (Mérida) (Keay 1988: 49). The Via Heraclea (later the Via Augusta), one of the most important roads in Spain, ran along the coast and linked Spain with both Gaul and Italy. The earliest roads in the central European provinces were constructed in the south. In the late second century BCE, an important road linking the Pyrenees and the Rhône was established (King 1990: 39). Then, in the later first century BCE, the road network was extended northward: initially from *Lugdunum* (Lyon) to the Moselle, then to *Colonia Claudia Ara Agrippinensium* (Cologne) and the Atlantic, as well as east-west through *Bagacum* (Bavay) to the Atlantic coast (King 1990: 55–6; Carroll 2001: 32–3; Drinkwater 1983: 124). An important route eventually developed along the west bank of the Rhine to the North Sea, passing through *Mogontiacum* (Mainz).

Similar roads, which undoubtedly began as military supply routes, also crisscrossed Britannia. The three most important roads in Britannia were Watling Street, which extended from London to Chester and points north, the Fosse way, running from Exeter to the colony at Lincoln, and Ermine Street, which went from the south through London and on to Lincoln and then on to York (Mattingly 2006: 134, 142–3). In Noricum, the most important Roman road connected Aquileia with the Tagliamento valley. This thoroughfare crossed the Alps from Italy at the Sella di Camporosso (Saifnitzer Sattel) to *Virinum* where it turned north to *Ovilava* (Wels) and on to the Danube River (Alföldy 1974: 11–3). In Raetia, the southern part of the province was not as well equipped with roads as the north, and certainly this reflects the military origin of the road network (Herrling 1943: 100–16). Numerous roads also fed into the capital at *Augusta Vindelicum* (Augsburg) from all directions.

Although these networks were extensive, travel by road was slow and expensive, and so wherever possible travel by water was preferred. In the Iberian provinces, grain, olive oil, and minerals were transported along the Guadalquivir River from *Corduba* (Córdoba) to points downstream and onto seafaring vessels. Likewise, one of the reasons for the success of *Londinium* (London) was its placement not only at the hub of the road network but also at the navigable end of the Thames. *Lugdunum* (Lyon), too, was a hub in the road network as well as a point where riverboats could travel north up to the Saône to *Cabillonum* (Chalon-sur-Saône). *Arelate* (Arles) also gained importance from its location at the mouth of the Rhône, where seagoing vessels could transfer goods onto riverboats. Additionally, the Rhine and the Danube were navigable and served as major trade routes in the Germanic provinces, Noricum, and Raetia.

Art

Pottery, jewelry, metalwork, and other smaller-scale objects could certainly qualify as art objects. Gaulish Samian ware, with its major production center at La Graufesenque near Millau, was exported throughout the western provinces (Bémont and Jacob 1986). The major artistic outlets were, however, wall painting, mosaic, and sculpture.

Before the Roman period, no tradition of wall painting or plasterwork existed in the area that would become the western provinces. In the Roman period, wall painting was almost ubiquitous in the homes, temples, and public buildings, but unfortunately it has not survived well. What has survived has often been removed from its context and, perhaps more detrimentally, divided between different museums and collections. No doubt the spread of this type of wall decoration was uneven, but the limited remains make a thorough analysis of the pattern of diffusion difficult.

All of the four Pompeian Styles appear in the western provinces (Ling 1991: 168–74; Henig 1995: 118–20). The Pompeian Second Style decoration appears in four houses in *Glanum* (St.-Remy), including the so-called House of Sulla, which dates to the 40s BCE. Architectural illusionism and trompe-l'œil, hallmarks of the Second Style, also appear in wall painting from the Dover Painted House, a second-century building at Southwark in Britannia. The Third Style was especially popular in the western provinces. An

example dating to the mid- to late Augustan period from Magdalensberg shows Dionysus and several Greek heroines on red backgrounds, and the mature Third Style appears at a villa in Commugny in Switzerland, with similar examples at both *Vesunna* (Périgueux) in Gallia Aquitania and *Aventicum* (Avenches) in Gallia Belgica. The Fourth Style, though often simplified with less fantastical architecture, is particularly popular in Gaul, the Germanies, and the Iberian provinces. Some instances contain extra detail not usually found in Italy. For example, in the baths at *Virinum*, foliage consisting of flowers and fruit containing birds and other objects took the place of the typical candelabras, and at *Asturica Augusta* (Astorga) in Hispania Tarraconensis, attributes of various gods and goddesses, such as the winged hat of Mercury or the lyre of Apollo, were introduced. Although only two, these cases demonstrate the type of excess detail and creative use of motifs that could be found in provincial wall painting.

After the destruction of Pompeii, wall painting continued in Italy as well as in the provinces. At a house at Leicester appears a trompe-l'œil podium together with fine and delicate architectural decoration typical of the Pompeian Fourth Style. Such eclecticism is fairly typical of wall painting in the second and third centuries. At this same time, mythological iconography became increasingly rare. Two fine exceptions, both dated to the Antonine period (mid-second century CE), survive in Germany. At *Augusta Treverorum* (Trier), Jason and Medea appear in the central panel of the so-called green wall, and at a frontier fort in Echzell, a panel containing an image of Fortuna handing over a cornucopia to Hercules is flanked by a pair of Cretan scenes: Daedalus making the wings of Icarus and Theseus killing the Minotaur. It also appears that particular patterns were preferred in certain contexts. For example, curvilinear motifs were favored on ceilings, as, for example, at Hölstein and Bösingen in Switzerland. Dating to late second or early third century CE, both ceilings are decorated with intersecting circular garlands, similar to ceiling paintings in the Neronian *Domus Aurea* in Rome. Paintings from *Augusta Treverorum* (Trier), capital of the prefecture of Gaul under the tetrarchy, demonstrate the fine quality possible in provincial painting. One room in particular, perhaps part of an imperial residence, has an elegant ceiling decorated with portrait busts and cupids. Though the identity of the portraits is debated, the execution of the paintings is highly naturalistic, with bodies well proportioned and drapery fully plastic. Such features were, however, short lived. With the increasing Byzantine influence, illusionistic architecture was replaced by patterning in bright, contrasting colors as, for example, at Lullingstone and *Venta Silurum* (Caerwent) in Britannia. Moreover, pagan iconography gradually diminished in favor of Christian subjects, such as the *orantes* from the villa at Lullingstone.

As with painting, no native tradition of decorated pavements existed (Ling 1998: 61–76; Dunbabin 1999: 73–87, 144–59). Fragments of pebble mosaics perhaps dating to the fifth and fourth centuries BCE have survived at *Cástulo* (Cazlona) in southern Spain, but otherwise the tradition is largely nonexistent. Early mosaics are closely tied to Italian prototypes, but as local mosaicists trained others, regional workshops developed with their own localized and distinctive styles. For example, a school of mosaicists operated in the Rhône valley and had production centers at *Lugdunum* (Lyon) and *Vienna* (Vienne); the development of regional workshops is particularly well documented for Britannia (Smith 1965).

Early examples of decorated floor coverings come in the form of *opus signinum* pavements from *Emprion* (Ampurias), *Glanum* (St.-Rémy), and *Massalia* (Marseille). Black and white mosaics, which were predominant in Italy during the early Imperial period, have been found throughout the region, with some fine early examples known at *Emporiae* (Ampurias) and *Forum Julii* (Fréjus) on the continent, and also at the large early villa at Fishbourne in Britannia.

In addition to the black and white mosaics, figured mosaics, primarily mythological in nature, also appeared. Literary or academic themes were particularly popular in the area of the Mosel Valley and the Rhineland, coming from workshops centered on *Augusta Treverorum* (Trier) and *Colonia Claudia Ara Agrippinensium* (Cologne).

Such mosaics often represent the Muses or important artists and authors. For example, a mosaic from *Augusta Treverorum* (Trier), known by the name of its artist, Monnus, depicts the Muses with literary figures such as Homer and Aratus as well as a gallery of the greatest Greek and Latin authors including Hesiod, Menander, Cicero, and Vergil (Fig. 3). One example of such a literary mosaic has been found at Low Ham in Britain. This mosaic depicts episodes from book four of the *Aeneid* in a narrative sequence. On the whole, however, depictions of Roman legends are rare. Scenes from daily life, such as chariot racing, gladiatorial combat (Fig. 4), and hunting also appear, although they too are relatively uncommon.

Little tradition of sculpting in stone existed in the western provinces before incorporation into

Western Roman Provinces, Archaeology of the, Fig. 3 Vergil panel from the Monnus mosaic at *Augusta Treverorum* (Trier) (©S. McGowen)

Western Roman Provinces, Archaeology of the, Fig. 4 Gladiator mosaic from *Arelate* (Arles) (©S. McGowen)

the empire. It is possible, however, that wood could have been the preferred medium and that it simply does not survive. Nevertheless, after formal incorporation, use of stone for sculpture increased dramatically. In addition to sculpture in stone, bronze sculpted monuments did exist throughout the region, for example, the head of Hadrian (r. 117–138 CE) from the river Thames in *Londinium* (London) and the head of Minerva from the sanctuary of Sulis Minerva in *Aquae Sulis* (Bath) (Fig. 5). Because of the inherent value of bronze, which can be easily melted down and recast, they have not survived well.

Stone sculpture appeared in four main contexts in the western provinces – private, civic, funerary, and sacred. Sculpture adorned some homes and villas throughout the region (Stirling 2005: 29–90, 190–5). For example, at the villa in modern-day Lullingstone in Britannia, two portrait busts made of Greek marble were discovered, and in a private home in *Limonum Pictonum* (Poitiers) in Gallia Aquitania was found a statue of Minerva in a Greek archaic style. An astounding collection of sculptures was also found at the villa in Chirgan in the province of Gallia Aquitania about 60 km from *Tolosa* (Toulouse).

Western Roman Provinces, Archaeology of the, Fig. 5 Bronze head of Minerva from *Aquae Sulis* (Bath) (©S. McGowen)

Sculptures such as these certainly said much about the wealth and status of their owners. Sculpture was, however, more prevalent in public contexts. Funerary monuments, from monumental structures such as the Mausoleum of the Julii at *Glanum* to smaller stelai such as the tombstones of M. Favonius Facilis from *Camulodunum* (Colchester) and L. Cantius Secundus from near St. Leonhard in Noricum, were erected with varying density throughout the region. Public places, such as the fora at *Lugdunum* (Lyon) or *Tarraco* (Tarragona); the theaters at *Arausio* (Orange), *Tarraco* (Tarragona), and *Italica* (Santiponce); or the baths at *Virinum*, were decorated with sculpture. Finally, architectural sculpture and sculpted votives appear at numerous sacred sites, including the sanctuary of Sulis Minerva at *Aquae Sulis* (Bath), decorated with a sculpted pediment depicting a fierce, mustached male gorgon, or the sanctuary of Hercules at Deneuvre, where more than 50 reliefs and freestanding statues of the god have been discovered (Fig. 6).

Much sculpture from the western provinces is of high quality and naturalistic, in keeping with the Greco-Roman traditions. Most works from Lyon (*Lugdunum*) and *Vienne* (Vienna), catalogued in the *Nouvel Esperandieu* series, are naturalistic and entirely Greco-Roman in style (Darblade-Audoin 2006; Terrer 2003). Moreover, the sculpted heads of Jupiter Ammon from the forum at *Tarraco* (Tarragona) seem directly inspired by the Forum of Augustus at Rome and are executed with a high level of skill. Much of the Roman-period sculpture from the western provinces is not of such high quality. Instead, in contrast to Greco-Roman naturalism, it tends to be highly schematic, displaying a so-called Celtic style, hallmarks of which are flowing hair, oversized heads and eyes, and fondness for patterning. (Green 1998) has even suggested that such stylistic features may be "...conscious attempts by indigenous populations...to make a positive and independent statement..." In contrast, (Johns 2003) has presented a strong counterargument advocating that the skill of the artists and the nature of the material highly influenced style, often regardless of the desires of the patrons or even the intentions of the artists.

Western Roman Provinces, Archaeology of the, Fig. 6 Relief of Hercules from the spring sanctuary at Deneuvre (©S. McGowen)

Western Roman Provinces, Archaeology of the, Fig. 7 Statue group of the Capitoline Triad from *Augusta Treverorum* (Trier) (©S. McGowen)

Religion

Not much is known of religious traditions in the area of the western provinces prior to incorporation of the region into the empire. That it was polytheistic is clear, but almost nothing is known about the names of the deities, and those that are known come from Roman-period sources. Pre-Roman religious practice does not seem to have involved temples generally. It does seem to have been concentrated around natural features such as rivers, springs, and groves, as, for example, described by Lucan in his account of Caesar's campaigns in Gaul (Lucan, 3.394-452). Based on the quantity of objects discovered in sacred contexts, it is apparent that the practice of making dedications to the gods was widespread.

The invasion and the subsequent incorporation of these regions led to an influx of new people who brought with them the gods of the official Roman state religion, including the Capitoline Triad of Jupiter, Juno, and Minerva (Fig. 7), and it was effectively a requirement that each *colonia* has a temple for these gods. The most important part of official religion in the provinces was, however, the imperial cult. Each province had its own provincial temple, where representatives of the population gathered every year to make offerings and take part in ceremonies. Such temples existed at *Tarraco* (Tarragona), *Emerita Augusta* (Mérida), *Narbo Martius* (Narbonne), *Lugdunum* (Lyon), and *Camulodunum* (Colchester) (Fishwick 1987: 82–8, 235–46). Early phases of the provincial cult in the west usually consisted of an altar provided for the worship of living emperors, while temples were reserved for the cult of the deified, deceased emperors. Although the precise form of these temples is not always known, it does appear that the types of temples used for these official cults were very much Roman in form. The introduction of these official cults into the provinces illustrates how the Romans used religion for political ends: official religion and the imperial cult in particular served to unify the diverse populations of the empire (Allason-Jones 2008: 120–1).

Not all gods were, however, new. Pre-Roman gods were incorporated into Roman religious

life in three main ways. In some instances, a Roman deity took over completely. For example, while pre-Roman religious activity occurred at Uley in Britannia, in the Roman period, Mercury became the chief deity of the sanctuary. Here the Roman messenger god took on a martial capacity, as demonstrated by the dedication of model spears to alongside caducei. In some instances, a deity from the Roman pantheon was paired with a pre-Roman one. For example, the Celtic deity Sulis was paired with Roman Minerva at *Aquae Sulis* (Bath) in Britannia, and in *Aquae Granni* (Aachen) in Germania Inferior, the Roman god Apollo was paired with the Celtic Grannus. In some instances, however, the pre-Roman deity remained and was sometimes venerated with inscribed and sculpted dedications, a Roman religious tradition. Generally, such deities are referred to local deities. Coventina, for instance, had a center of worship at *Brocolitia* (Carrawburgh) on Hadrian's Wall, and for a long time, she was considered a local deity. Altars dedicated to this goddess have also been found in northern Spain. It is not entirely clear whether her worship traveled from Britain to Spain or Spain to Britain, and adding to the complication, all of the devotees whose ethnic origin is known are Germanic (Allason-Jones 2008: 118–9). Thus, the identification of deities with non-Roman names as local is more complicated than it may first appear.

This same sort of blending is also apparent in religious architecture. A distinctive type of temple existed in the western provinces, particularly northern Gaul and Britannia. Though some variation of shape did occur, they consisted primarily of a square central cella surrounded by a concentric ambulatory or passageway. Such temples are largely confined to civilian areas. In Britannia, for example, most of the more than 50 temples of this type have been discovered in the southern and eastern parts of the province away from the military areas in the north. Worship in the military area, by contrast, was marked by the erection of inscribed stone altars, which are largely absent in the rest of Britain.

The Military and the Borders

The military also left an enduring archaeological mark on the western provinces, particularly the frontier regions of the Germanies, Britannia, Noricum, and Raetia but also northwestern Spain (Hanel 2007). Throughout these areas, permanent bases were constructed for both the legionary and auxiliary forces. Camps of the early empire were often polygonal in plan and constructed of less durable materials, particularly turf and timber. By the middle of the first century CE, however, permanent fortresses of the typical playing-card shape were the standard, as, for example, the stone fort at Hofheim. Stone as a building material became predominant in the late first and second centuries, especially following the civil wars of 69 CE. During the process of consolidating the empire under Hadrian, permanent boundaries were constructed, the most famous of which is Hadrian's Wall, which extends the entire width of Britannia at its narrowest point between the Solway in the west and the Tyne in the east (Fig. 8). These borders brought with them the development of new forts and other types of military structures such as milecastles and watchtowers.

In proximity to the camps often developed civilian settlements called *canabae* for legionary bases or *vici* for auxiliary forts. The best understood of the *canabae* in the western provinces are *Isca Silurum* (Caerleon), *Noviomagus* (Nijmegen), and *Bonna* (Bonn), and the *vicus* at

Western Roman Provinces, Archaeology of the, Fig. 8 Hadrian's Wall (©S. McGowen)

Vindolanda has been well excavated. Though it is not clear whether these settlements served agricultural purposes, certainly various types of manufacturing, such as bronze working and terracotta production for both pottery and tile, occurred in most. Some even had features resembling fora, the precise function of which is uncertain.

Current Archaeological Trends

Along with numerous subsidiary regional journals, there are four main academic journals for archaeological material from Western Europe. *Britannia*, sponsored by the Society for the Promotion of Roman Studies, is the primary publication for the province of Britannia. *La Revue Archeologique*, published by the Société Archéologique d'Alep, is the main venue for archaeological material from the French provinces, although its purview extends to material from much of the Mediterranean and even into Central Asia. *Bonner Jahrbücher*, published through the Rheinisches Landesmuseum Bonn and the LVR-Amt für Bodendenkmalpflege im Rheinland, has as its focus primarily material from the Rhineland areas, but it also includes articles on all aspects of archaeology in Europe. Finally, the primary resource for archaeological activity in Spain is Archivo Español de Arqueologia, which is sponsored by Archivo Español de Arte y Arqueología.

Many interdisciplinary and international conferences have either been instituted or have developed dramatically on particular topics relevant to the western provinces. For example, the International Congress of Roman Frontier Studies, also known as Limeskongress, which was first held in 1949, will conduct the twenty-first meeting in September 2012 in Ruse, Bulgaria. Similarly, the International Colloquium on Roman Provincial Art is held biennially. This conference series, which began in the 1980s, had as its original focus the countries of Western Europe, but in 2007 it was opened to the eastern provinces as well. In addition to the papers presented at these conferences, they have also generated monographs important to the study of this region.

The archaeology of the western provinces has also seen dramatic growth in the availability of online resources. For instance, an international research project conducted from 2004 to 2007 and funded by the European Commission, General Directorate for Education and Culture within the framework of the sponsorship program, "Culture 2000," has produced a website detailing the archaeology of all the western Roman provinces (http://www2.rgzm.de/transformation). Pottery from the region is well catalogued and analyzed as part of the Potsherd: Atlas of Roman Pottery project (http://potsherd.net). Similarly, much of the Gallo-Roman sculpture has been digitized and catalogued by the Centre Camille Jullian (http://nesp.mmsh.univ-aix.fr/). This project is part of a larger effort to update the printed catalogues of Gallo-Roman sculpture, compiled in the late nineteenth and early twentieth centuries by Émile Espérandieu. Three volumes in this new series, under the title *Nouvel Espérandieu*, have already been published with more volumes currently under production.

Cross-References

- ► Architecture, Roman
- ► Baths and Bathing, Roman
- ► Ethnicity and Identity in the Ancient Mediterranean World
- ► Imperial Cult, Roman
- ► Infrastructure in the Roman World: Roads and Aqueducts
- ► Romanization
- ► Urban Planning, Roman
- ► Villas and Farms in the Mediterranean World

References

Alföldy, G. 1974. *Noricum*. London/Boston: Routledge & Kegan Paul.

Allason-Jones, L. 2008. *Daily life in Roman Britain*. Oxford/Westport: Greenwood Press.

Bémont, C., and J.-P. Jacob, eds. 1986. *La terre sigillée gallo-romaine. Lieux de production du Haut Empire. Implantations, produits, relations*. Paris: Editions de la Maison des sciences de l'homme.

Burnham, B.C., and J. Wacher. 1990. *The small towns of Roman Britain*. Berkley/Los Angeles: University of California Press.

Carroll, M. 2001. *Romans, Celts, and Germans: The German provinces of Rome*. Stroud: Tempus.

Crummy, P. 2005. The circus at Colchester (*Colonia Vîctricensis*). *Journal of Roman Archaeology* 18: 267–277.

Cunliffe, B.W. 1971. *Fishbourne: A Roman palace and its garden*. Baltimore: Johns Hopkins Press.

Curchin, L.A. 1991. *Roman Spain: Conquest and assimilation*. London: Routledge.

Darblade-Audoin, M.-P., ed. 2006. *Nouvel Espérandieu: recueil généraldes sculptures sur pierrede la Gaule*. Paris: Académie des inscriptions et belles-lettres.

Dark, K.R. 1993. Town or '*temenos*'? A reinterpretation of the walled area of '*Aquae Sulis*'. *Britannia* 24: 254–255.

de la Bédoyère, G. 2001. *The buildings of Roman Britain*. Stroud: Tempus.

Drinkwater, J.F. 1983. *Roman Gaul: The three provinces, 58 B.C.-A.D. 260*. London: Croom Helm.

Dunbabin, K.M.D. 1999. *Mosaics of the Greek and Roman world*. Cambridge: Cambridge University Press.

Fear, A.T. 1996. *Rome and Baetica: Urbanizationin southern Spain c.50B.C.-A.D. 150*. Oxford: Clarendon Press.

Fishwick, D. 1987. *The imperial cult in the Latin West: Studies in the ruler cult of the western provinces of the Roman Empire*. Leiden: Brill.

Goudineau, C. 1980. Les villes de la paix romaine. In *Histoire de la france urbaine*, ed. G. Duby. Paris: Seuil.

Green, M.J. 1998. God in man's Image: Thoughts on the genesis and affiliations of some Romano-British cult-imagery. *Britannia* 29: 17–30.

Hanel, N. 2007. Military camps, *canabae*, and *vici*: The archaeological evidence. In *A companion to the Roman army*, ed. P. Erdkamp. Oxford: Blackwell Publishing, Ltd.

Henig, M. 1995. *The art of Roman Britain*. London: Batsford.

Herrling, W.G.L. 1943. *The romanization of Raetia*. Chicago: University of Chicago.

Johns, C. 2003. Art, romanisation, and competence. In *Roman imperialism and provincialart*, ed. S. Scott and J. Webster. Cambridge: Cambridge University Press.

Keay, S.J. 1988. *Roman Spain*. London: British Museum Publications.

King, A. 1990. *Roman Gaul and Germany*. London: British Museum.

Ling, R. 1991. *Roman painting*. Cambridge, UK/New York: Cambridge University Press.

Ling, R. 1998. *Ancient mosaics*. London: British Museum Press.

Mattingly, D.J. 2006. *An imperial possession: Britain in the Roman Empire, 54 B.C.-A.D. 409*. London: Allen Lane.

Mattingly, D.J. 2008. Urbanism, epigraphy, and identity in the towns of Britain under Roman rule. In *A Roman miscellany. Essays in honour of Anthony R. Birley on his seventieth birthday*, ed. H.M. Schellenberg, V.E. Hirschmann, and A. Krieckhaus. Gdansk: Akanthina.

Sear, F. 1998. *Roman architecture*. London: Routledge.

Sear, F. 2006. *Roman theatres: An architectural study*. Oxford: Oxford University Press.

Smith, D.J. 1965. Three fourth-century schools of mosaic in Roman Britain. In *La mosaïque gréco-romaine. Paris29 août – 3septembre 1963*, ed. M.H. Stern and M.G. Picard. Paris: Éditions du centre national de la recherche scientifique.

Stirling, L.M. 2005. *The learned collector: Mythological statuettes and classical taste in late antique Gaul*. Ann Arbor: University of Michigan Press.

Terrer, D., ed. 2003. *Nouvel Espérandieu: Recueil général des sculptures sur pierre de la Gaule*. Paris: Académie des inscriptions et belles-lettres.

Ward-Perkins, J.B. 1981. *Roman imperial architecture*. New Haven/London: Yale University Press.

Further Reading

Abad Casal, L. 1982. *La pintura romana en España*. Cadiz: Universidades de Alicante y Sevilla.

Alarcão, J.D. 1988. *Roman Portugal*. Warminster: Aris and Phillips.

Baatz, D., F.-R. Herrmann, and B. Beckmann. 1982. *Die Römer in Hessen*. Stuttgart: Theiss.

Bedon, R., R. Chevallier, and P. Pinon. 1988. *Architecture et urbanisme en Gaule romaine*. Paris: Editions Errance.

Birley, A.R. 1979. *The people of Roman Britain*. London: Batsford.

Blagg, T.F.C., and M. Millett, eds. 1990. *The early Roman Empire in the West*. Oxford: Oxbow Books.

Blázquez, J.M. 1993. *Mosaicos romanos de España*. Madrid: Cátedra.

Bromwich, J. 1996. *The Roman remains of southern France: A guidebook*. London/New York: Routledge.

Bromwich, J. 2003. *The remains of northern and eastern France: A guidebook*. London/New York: Routledge.

Cleere, H. 2001. *Southern France: An oxford archaeological guide*. Oxford: Oxford University Press.

Collins, R. 1998. *Spain: An oxford archaeological guide*. Oxford: Oxford University Press.

Creighton, J. 2006. *Britannia: The creation of a Roman province*. London/New York: Routledge.

Corpus Signorum Imperii Romani(CSIR) = Corpus der Skulpturen derrömischen Welt = Corpusof the Sculpture ofthe Roman World =Corpus des Sculptures duMonde Romain 1967-. [Arranged by country].

Cüppers, H., ed. 1990. *Die Römer in Rheinland-Pfalz*. Stuttgart: Theiss.

Czysz, W. 1995. *Die Römer in Bayern*. Stuttgart: Theiss.

Drack, W., and R. Fellmann. 1988. *Die Römer in derSchweiz*. Stuttgart: Theiss.

Esmonde-Cleary, S. 2008. *Rome in the Pyrenees*. Abingdon: Routledge.

Espérandieu, É.J. 1907-1966. *Recueil général des bas-reliefs de la Gaule romaine*. Paris: Imprimerie nationale.
Espérandieu, É.J. 1931. *Recueil général des bas-reliefs, statues et bustes de la Germanie romaine*. Paris/Bruxelles: G. van Oest.
Fauduet, I. 1993. *Les temples de tradition celtique en Gaule romaine*. Paris: Editions Errance.
Fishwick, D. 1987. *The imperial cult in the Latin West: Studies in the ruler cult of the western provinces of the Roman Empire*. Leiden: Brill.
García y Bellido, A. 1949. *Esculturas romanas de España y Portugal*. Madrid: Consejo Superior de Investigaciones Científicas.
Grenier, A. 1931–1960. *Manuel d'archéologie gallo-romaine*. Paris: Picard.
Goodman, P.J. 2007. *The Roman city and its periphery: From Rometo Gaul*. London: Routledge.
Henig, M. 1984. *Religion in Roman Britain*. London: Batsford.
Horn, H.G.N., and T. Bechert. 1987. *Die Römer in Nordrhein-Westfalen*. Stuttgart: Theiss.
Johnson, P. 1995. *Romano-British mosaics*. Princes Risborough: Shire.
Laurence, R., A.S. Esmonde Cleary, and G. Sears. 2011. *The city in the Roman West, c. 250 B.C.-c. A.D. 250*. Cambridge: Cambridge University Press.
Ling, R. 1985. *Romano-British wall painting*. Aylesbury: Shire.
Mierse, W.E. 1999. *Temples and towns in Roman Iberia: The social and architectural dynamics of sanctuary designs from the third century B.C. to the third century A.D*. Berkeley: University of California Press.
Millett, M. 1992. *The Romanization of Britain: An essay in archaeological interpretation*. Cambridge: Cambridge University Press.
Nerzic, C. 1989. *La sculpture en Gaulero maine*. Paris: Editions Errance.
Osland, D. 2006. *The early Roman cities of Lusitania*. Oxford: Archaeopress.
Potter, D.S. 2006. *A companion to the Roman Empire*. Oxford: Blackwell.
Recueil Général des Mosaïquesde la Gaule 1957-. Paris: Centre national de la recherche scientifique.
Todd, M. 2004. *A companion to Roman Britain*. Oxford: Blackwell.
Toynbee, J.M.C. 1964. *Art in Britain under the Romans*. Oxford: Clarendon Press.
Von Elbe, J. 1977. *Roman Germany: A guide to sites and museums*. Mainz: P. von Zabern.
Von Elbe, J. 1995. *The Romans in Cologne and lower Germany: A guide to Roman sites and museums*. Düsseldorf: U. Preis.
Von Schnurbein, S. 1979. *Die Römer in Haltern*. Münster: Westfälisches Landesmuseum für Vor- und Frühgeschichte, Landschaftsverband Westfalen-Lippe.
Wightman, E.M. 1970. *Roman Trier and the Treveri*. London: Hart-Davis.
Wightman, E.M. 1985. *Gallia Belgica*. London: Batsford.
Wilson, R.J.A. 2002. *A guide to the Roman remains in Britain*. London: Constable.
Winkler, G. 1975. *Die Römer in Oberösterreich*. Linz: Oberösterr. Landesverl.
Woolf, G. 1998. *Becoming Roman: The origins of provincial civilization inGaul*. Cambridge: Cambridge University Press.

Wheats: Origins and Development

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Basic Species Information

Wheat is one of the world's most widely grown crops today. Together with its typical companion cereal and barley, wheat was the staple cereal crop of several early civilizations extending from the Indus, to Mesopotamia, to ancient Egypt, and throughout the Mediterranean. However, the term, wheat, is to some degree a misnomer, as it is not a single crop species but a complex of several related crop species that belong to the genus *Triticum* (i.e., *Triticum* spp.). The various species within this genus derive from hybridizations and multiple domestications, including the hybridization of wheat and the closely related goat-faced grasses (*Aegilops* spp.), and from post-domestication evolutionary advances, such as the evolution of free-threshing spikelets.

The first major spectrum of variation in the wheats is at the ploidy level (i.e., variation in the number of sets of chromosomes). Figure 1 illustrates the approximate maximal extent of crops of each ploidy level based on traditional agriculture and archaeobotanical data. In current taxonomy, each ploidy level is recognized as a separate species, with traditional cultivar groups and both wild and domesticated forms grouped as subspecies. In this system, there are three main biological species, *Triticum monococcum* (diploid), *T. turgidum* (all tetraploids), and *T. aestivum* (all hexaploids). For example, wild emmer

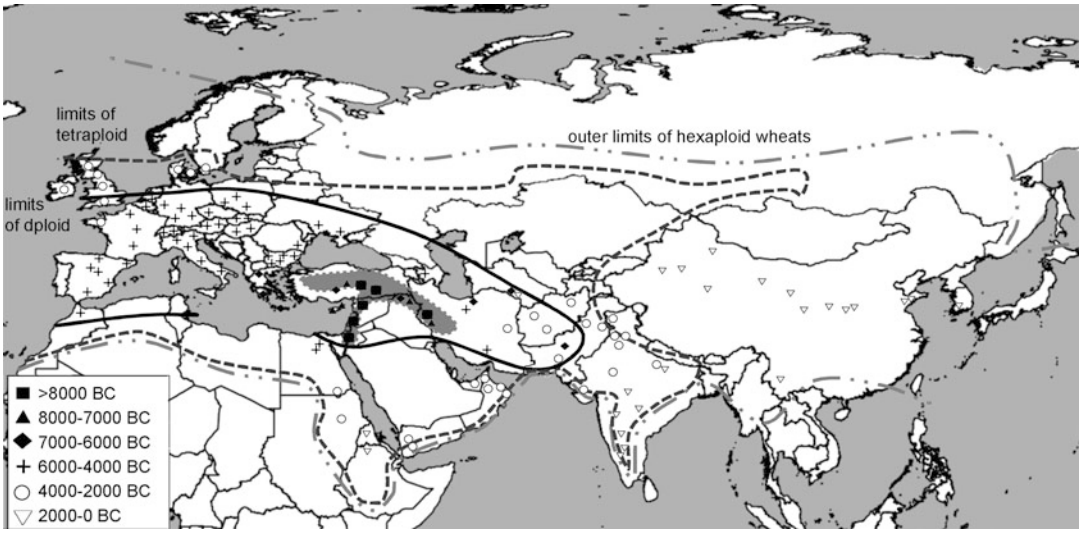

Wheats: Origins and Development, Fig. 1 Geographical distributions of wild wheats (*Triticum* spp.), with different lines representing the approximate limits of the spread of wheats of different ploidy level. Representative archaeological evidence for the earliest wave of wheat dispersals is indicated by broad time horizons

wheat should be *T. turgidum* ssp. *dicoccoides;* domesticated emmer wheat, *T. turgidum* ssp. *dicoccum*; and free-threshing hard wheat, *T. turgidum* ssp. *durum*. However, in practice most archaeobotanists continue to use a somewhat more traditional binomial system in which hulled (e.g., *Triticum dicoccum*) and free-threshing varieties (e.g., *T. durum*) and wild varieties (e.g., *Triticum dicoccoides* and *T. boeticum* instead of *T. monococcum* ssp. *boeticum*) are considered distinct species (see Zohary et al. 2012, for a comparison of these systems). This classification system makes more explicit the communication of archaeological findings and makes available valuable data-table space. These variations in wheats are culturally significant, as each species has a different potential in terms of agricultural ecology and food use. Further, this classification scheme distinguishes between the wheats based on the archaeological implications, including evidence suggestive of agricultural and food processing practices, specifically whether the grains are from a wild or domesticated and hulled or free-threshing variety.

Major Domestication Traits

The domesticated varieties can be separated based on their response to threshing, specifically, whether the product of threshing is spikelets or grains. In hulled varieties, including *T. monococcum*, *T. turgidum* ssp. *dicoccum*, and *T. aestivum* ssp. *spelta* (spelt wheat), the grains are tightly encased in the glumes that do not release the grains during threshing. This is in opposition to the free-threshing varieties, including tetraploid durum-type (i.e., *T. turgidum* ssp. *durum*) and hexaploid bread wheats, which are not enclosed tightly and release easily during threshing with the result a naked kernel. The archaeological implication is related to the end product of threshing (i.e., spikelet or grains) and how the crop is stored and distributed thereafter. The hulled varieties can be stored for longer periods because they are protected by the glumes. They are distributed as spikelets and will need to be freed from the glume before further processing, unlike the free-threshing varieties which are ready to be milled after winnowing and sieving (Zohary et al. 2012).

Timing and Tracking Domestication

Although all of the wild wheat varieties have a restricted distribution in southwest Asia, mainly in the "Fertile Crescent" and Anatolia (Fig. 1), wheats are likely to derive from several domestication events across this geographical range. This issue has been the focus of debate in recent years between scholars who favor a single focus of all Near Eastern agricultural origins in a restricted part of southeastern Turkey (e.g., Abbo et al. 2010, 2013), where wild wheats, barley, lentil, and pea overlap with wild chickpea, and those who favor the archaeobotanical evidence for a gradual domestication process of diverse sets of crops over a very wide geographical range of the Fertile Crescent (e.g., Fuller et al. 2012; Asouti and Fuller 2012).

While there are debates on the pace and geographic distributions of domestication, all scholars accept that there were at least three domestications of wild wheats, from wild einkorn (*T. boeticum*), wild emmer (*T. dicoccoides*), and wild Timopheev's wheat (*T. araraticum*). However, archaeobotanical evidence is suggestive of additional domesticated forms of wheat that indicate additional domestications, such as two-grained einkorn and a recently recognized "emmer" type, or striate emmeroid. The former may have been domesticated from *T. urartu* and the latter an early Timopheev's wheat (*T. timopheevii* domesticated from *T. araraticum*), although confirmation supported by genetic evidence is not yet available. In addition to these four or five morphologically distinct domestication events, growing genetic data suggest that there were multiple regions of early cultivation, certainly for emmer wheat (Fuller et al. 2012).

The existence of now extinct domesticated morphotypes highlights the incompleteness of the presence of modern landraces for representing the original genetic diversity of early cultivars. Figure 2 represents the current understanding of domestication processes of wheat, specifically the selection for non-shattering rachises, which results in domesticated glume wheats. In each case, this was also accompanied by a gradual

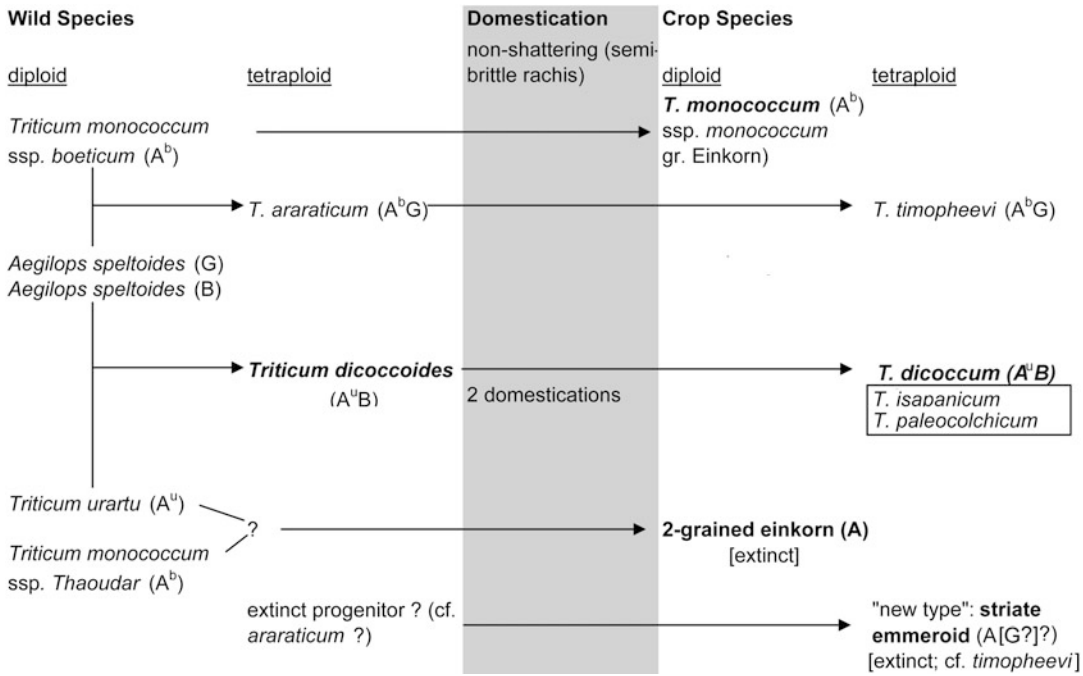

Wheats: Origins and Development, Fig. 2 Diagram representing the current understanding of the selection for non-shattering rachises that resulted in the glume wheats of *Triticum* spp.

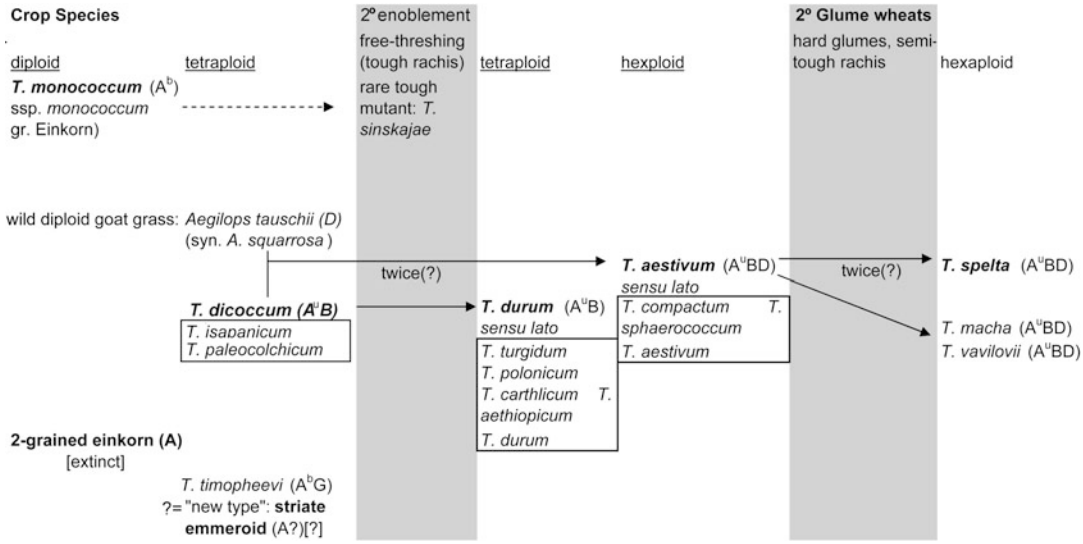

Wheats: Origins and Development, Fig. 3 Diagram representing the post-domestication improvement of wheat through the evolution of free-threshing forms and retro-evolution of hexaploid glume wheats

increase in grain size over the course of the Pre-Pottery Neolithic in southwest Asia, i.e., between c. 9500 BCE and 6000 BCE, after which changes in grain sizes in glume wheats were negligible. In the case of two-grained einkorn (probably from wild *T. urartu* but plausibly *T. boeticum* ssp. *thauodar*), domestication appears to have been focused on the upper Euphrates region in Syria (Willcox et al. 2008) and it quickly spread to Cyprus shortly after the first signs of domestication in this region (Lucas et al. 2012). In the case of one-grained einkorn (*T. monococcum*), an early focus might have been further to the northwest in Syria and/or in southeastern Turkey. In the case of emmer wheat, the current evidence suggests two foci, one in southeastern Turkey and the other in the southern Levant (Jordan Valley and/or Damascus basin). In the case of striate emmeroid (Possibly form *T. araraticum*), a wheat which was to become an important Neolithic crop at Anatolian sites, such as Çatalhöyük, and in Neolithic and Bronze Age Europe (Kohler-Schneider 2003), as well as spread to Turkmenistan, a domestication somewhere in eastern Anatolia seems most likely. Free-threshing (or naked) wheat evolved early in the history of wheat cultivation, as a form of secondary ennoblement. This took place at least once from tetraploid emmer and at least once by hybridization to produce hexaploid bread wheats (Fig. 3). These free-threshing wheats have the advantage of requiring less crop-processing stages and labor, although they may be more prone to spoilage in storage. Forms of hexaploid glume wheat, such as spelt (*T. spelta*), evolved from free-threshing hexaploid wheats (Fig. 3), presumably in part as better adaptation to primitive storage conditions and cooler climates. Spelt wheat became widespread in Europe from the Middle or Late Bronze Age.

Wheats were an essential part of the founder crop package that dispersed from the "Fertile Crescent" (Fig. 1) westwards through Neolithic Europe, starting about 7000 BCE and reaching the British Isles just after 4000 BCE. It similarly spread rapidly eastward to the Indus Valley and Turkmenistan, where there is evidence of wheat by 6000 BCE. The dispersal into Egypt and up the Nile is later, while the spread of wheat in monsoonal India or to southern Arabia took place after 3000 BCE. The first wheats in southern India appear to date more recently than 2000 BCE. In China, the earliest directly dated wheat is around 2400 BCE and a fair number of sites have evidence of wheats at c. 2000 BCE (Flad et al. 2010). Different species of wheats, or sets of wheats, spread along these different trajectories; each

was suited to varied ecologies and different culinary traditions. In general, it was glume wheats that were most important early on, e.g., emmer wheat in ancient Egypt or Yemen and einkorn wheats in Neolithic central Europe (Colledge and Conolly 2007). In the eastward spread of free-threshing wheats, mainly hexaploids were prominent in the case of the Indus Valley. Based on the current evidence, hexaploid free-threshing wheat was the only species that was adopted in eastern Asia (Boivin et al. 2012).

Identification of the different domesticated varieties of wheats in the archaeological record can be distinguished by comparison of grain morphology and size, spikelet fork morphology, and with the free-threshing wheats, the rachis segments (for additional criteria on identification, refer to Jacomet 2006; Zohary et al. 2012). For einkorn wheat, the two domesticated varieties can be distinguished by grain morphology. Grains of the one-grained variety are "spindle-shaped," whereas the grains of the two-grained variety are straight and flat, as opposed to curved when viewed ventrally. The spikelet forks of einkorn wheat can be distinguished in abaxial view as the angle between the lower parts of the two primary keels (glumes) is relatively small and measures less than 90°, as opposed to the angle observed in emmer wheat which is larger than einkorn and measures greater than 90°. When viewed in cross section, the shape of the lower part of the glume base is rounded and almost rectangular as opposed to clearly rectangular as in the glume bases of emmer wheat. When viewed laterally, the internode is broad in relation to the width of the spikelet. The grains of emmer wheat are generally more rounded at the apical end when viewed dorsally and are tapered at the embryo ends. In lateral view, the grains have a flat or slightly concave ventral surface with the highest point above the embryo on the rounded dorsal side. There is considerable overlap in the morphology of the free-threshing wheat grain varieties, but generally the grains of naked wheat, when viewed dorsally, are slender to round, with the apical and embryo ends bluntly rounded. The morphology in cross section is generally symmetrically rounded as is the dorsal ridge when viewed laterally. The rachis remains of the free-threshing wheats (tetraploid versus hexaploid) can be distinguished based on the glume base remnants and cross section. For the tetraploid durum-types, the glume remnants persist with two protrusions on the top of the rachis segment. In cross-section the segment tends to be rounded and thick. In hexaploid wheats the glumes bases are entirely torn off leaving concave scars. In cross-section the hexaploid rachis is thin with sharp edges.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Barley: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Near East (including Anatolia): Origins and Development of Agriculture
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

References

Abbo, S., S. Lev-Yadun, and A. Gopher. 2010. Agricultural origins: Centers and noncenters; a Near Eastern reappraisal. *Critical Review in Plant Sciences* 29 (5): 317–328.

Abbo, S., S. Lev-Yadun, M. Heun, and A. Gopher. 2013. On the 'lost' crops of the Neolithic Near East. *Journal of Experimental Botany* 64 (4): 815–822.

Asouti, E., and D.Q. Fuller. 2012. From foraging to farming in the southern Levant: The development of Epipalaeolithic and pre-pottery Neolithic plant management strategies. *Vegetation History and Archaeobotany* 21 (2): 149–162.

Boivin, N., D.Q. Fuller, and A. Crowther. 2012. Old World globalization and the Columbian exchange: Comparison and contrast. *World Archaeology* 44 (3): 452–469.

Colledge, S., and J. Conolly, eds. 2007. *The origins and spread of domestic plants in Southwest Asia and Europe*. Walnut Creek: Left Coast Press.

Flad, R., L. Shuicheng, W. Xiaohong, and Z. Zhijun. 2010. Early wheat in China: Results from new studies at

Donghuishan in the Hexi Corridor. *The Holocene* 20 (6): 955–965.
Fuller, D.Q., G. Willcox, and R.G. Allaby. 2012. Early agricultural pathways: Moving outside the 'core area' hypothesis in Southwest Asia. *Journal of Experimental Botany* 63 (2): 617–633.
Jacomet, S. 2006. *Identification of cereal remains from archaeological sites*. Basel: IPAS Basel University.
Kohler-Schneider, M. 2003. Contents of a storage pit from late Bronze Age Stillfried, Austria: Another record of the "new" glume wheat. *Vegetation History and Archaeobotany* 12 (2): 105–111.
Lucas, L., S. Colledge, A. Simmons, and D.Q. Fuller. 2012. Crop introduction and accelerated island evolution: Archaeobotanical evidence from 'Ais Yiorkis and pre-pottery Neolithic Cyprus. *Vegetation History and Archaeobotany* 21: 117–129.
Willcox, G., S. Fornite, and L. Herveux. 2008. Early Holocene cultivation before domestication in northern Syria. *Vegetation History and Archaeobotany* 17: 313–325.
Zohary, D., M. Hopf, and E. Weiss. 2012. *Domestication of plants in the Old World*. 4th ed. Oxford: Oxford University Press.

Wheeler, Mortimer

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Basic Biographical Information

Sir Robert Eric Mortimer Wheeler, commonly known as Mortimer, was born in Scotland in 1890, to a father who was a journalist (Piggott 1977: 623). He attended Bradford Grammar School, and went on to complete a degree in archaeology at University College in London. In 1913, Mortimer Wheeler began the studies that led to his postwar doctoral research on Roman pottery in the Rhineland (Piggott 1977: 624). After completing a Masters degree at the University of London in 1912, Wheeler was awarded a Franks Archaeological Studentship, which allowed him to undertake doctoral research in the Rhineland (Wheeler 1958: 31–32). However, this was temporarily delayed by the First World War, in which he served, and from which he emerged as a Major with a Military Cross. After serving in World War I, he conducted excavations of Roman sites in Essex. Mortimer Wheeler was awarded a Ph.D. from the University of London in 1920. The identity of his doctoral supervisor is unknown, and the topic of his thesis seemed to hold little importance to him, especially in later years, when he stated in his autobiography that "nothing need be said" of the trip (Wheeler 1958: 32).

From 1920 to 1926, Mortimer Wheeler held the joint positions of Keepership of Archaeology in the National Museum of Wales and Lecturer in Archaeology at the University of Cardiff (Piggott 1977: 626). In 1924, he became Director of the National Museum of Wales (Wheeler 1958: 58). In 1926, he moved to London, where he obtained the post of Keeper of the London Museum, which he held until 1946 (Piggott 1977: 628). From 1948 to 1955, Mortimer Wheeler was Chair of the Archaeology of the Roman Provinces at the University of London (Piggott 1977: 638).

Mortimer Wheeler's primary research interest was Roman archaeology. He undertook excavations of Roman sites in Wales, from 1920 to 1926, and in Hertfordshire, from 1930 to 1933, where he unearthed a pre-Roman settlement (Wheeler 1958: 56, 88). Wheeler undertook a second period of military service during the Second World War and rose to the rank of Brigadier (Piggott 1977: 635). During this war, he took advantage of the discipline of his fellow soldiers to enlist their help in recording potential sites.

In 1941, Mortimer Wheeler was elected as a Fellow of the British Academy (Piggott 1977: 638). Two years later, he was appointed Director-General of Archaeology in India (Wheeler 1958: 162), and in 1950, he was also appointed as the Archaeological Adviser to Pakistan (Piggott 1977: 637). He was the elected President of the Society of Antiquaries in London from 1954 to 1959 (Piggott 1977: 640). In 1952, he received a knighthood from Queen Elizabeth II in recognition of his contributions to archaeology. He was a steadfast and active archaeologist up to his death in July 1976.

Major Accomplishments

The majority of Wheeler's work centered around Roman sites in Wales, forming the subject of his

first seven published works, but his later work was in India, subsequent to him being appointed the head of a museum in Pakistan. However, his major contribution to archaeology lies in contributing to significant improvements in archaeological methods, especially through the stratigraphic trenching method that developed with Kathleen Kenyon (Davis 2008); in his publications for the general public (Wheeler 1958, 1961); and in his role as the public face of archaeology in the early years of television during the 1950s.

Wheeler was strongly influenced by the work of his contemporaries, General Pitt-Rivers and Flinders Petrie, who were also committed to rigorous excavation and recording methods. Wheeler was deeply concerned with the practice of excavation, and in ensuring that this was done correctly and methodically, as opposed to the rather ad hoc and frequently destructive excavation methods employed up to that time. The accurate and careful study of different cultures was important in his work, especially in terms of the significance of stratigraphy. Wheeler believed that the true value of excavation lay in the recovery of primary information from sources that were not documents (Piggott 1977: 625).

Wheeler made a significant contribution to the development of archaeological excavation methods. His respect for each site, and desire to keep excavation damage to a minimum, is a consistent theme throughout his publications. He was also one of the first archaeologists to recognize the importance of stratigraphy, and to use it to date sites and determine the number of cultures in a particular area (Wheeler 1961: 56–59). He argued vigorously that careful excavation and analysis, and continuous use of stratigraphical references, were key to determining information about early cultures.

Mortimer Wheeler's final research project culminated in his book *Civilizations of the Indus Valley and Beyond*, written in 1961 and revised in 1966. By this time, his focus on methodical excavation had led him to develop the grid method of excavation, in collaboration with Kathleen Kenyon, based upon the premise that the easiest and most systematic method to survey a site is by using squares (Wheeler 1961: 83). Throughout his book *The Indus Civilization*, Wheeler reiterated the importance of correctly observing the location of artifacts and the systematic and recorded excavation of sites to allow for meaningful re-excavation (Wheeler 1962).

Sir Mortimer Wheeler made a major contribution to public education in archaeology in Britain. During the 1950s, he became one of the main public faces of archaeology when he made regular appearances in the BBC series *Animal, Vegetable or Mineral* (Brass 1955) in an effort to place archaeology in the public psyche. As a result, Wheeler was voted Television Personality of the Year for 1955 (Brass 1955). During this period, Wheeler continued to publish work about his excavations, in particular focusing on the importance of stratigraphy, and the influential grid method of excavation that he developed in collaboration with Kathleen Kenyon (Wheeler 1961: 83).

Throughout his life, Sir Mortimer Wheeler worked assiduously to achieve better standards in archaeological method and analysis, and to create greater public awareness of the discipline. He accomplished both aims. His methods of excavation became the standard and the public developed a growing interest in archaeology. He published a plethora of books and papers over his lifetime and left a far-reaching legacy that revolutionized the archaeology of his era and which still has impact today.

Cross-References

- ▶ British Pioneers and Fieldwork Traditions
- ▶ Excavation Methods in Archaeology
- ▶ Petrie, William Matthew Flinders
- ▶ Stratigraphy in Archaeology: A Brief History

References

Brass, D. 1955. Shirley and Matilda stole T.V. first night. *The Argus* 24 Sept, p. 3. Available at: http://trove.nla.gov.au/ndp/del/article/71697532?searchTerm=Mortimer%20Wheeler%20on%20television&searchLimits. Accessed 24 Mar 2013.

Davis, M. 2008. *Dame Kathleen Kenyon. Digging up the Holy Land*. Walnut Creek: Left Coast Press.

Piggott, S. 1977. Robert Eric Mortimer Wheeler. *Biographical Memoirs of Fellows of the Royal Society* 23: 623–642.
Wheeler, M. 1958. *Still digging: adventures in archaeology*. London: Pan Books Limited.
Wheeler, M. 1961. *Archaeology from the earth*. Middlesex: Penguin Books.
Wheeler, M. 1962. *The Indus civilization*. Cambridge: Cambridge University Press.
Wheeler, M. 1966. *Civilizations of the Indus Valley and beyond*. New York: McGraw-Hill Book Company.

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Basic Biographical Information

John Peter White is an Australian archaeologist and editor. He was born in New Zealand (1937), raised in Australia, and educated at the University of Melbourne (BA 1961, History), University of Cambridge (BA 1963, MA 1967, Archaeology and Anthropology), and the Australian National University (PhD 1968, Prehistory). He was awarded British Commonwealth Undergraduate and Graduate Fellowships (1956–1959, 1961–1963, 1964–1967) and a postdoctoral Harkness Fellowship (1970–1971). He held appointments at Melbourne (Tutor, 1960–1961), the Australian Museum (Assistant Curator, 1967–1970), and the University of California at Berkeley (Postdoctoral Fellow, 1970–1971) before joining the Department of Anthropology at the University of Sydney in 1971, where he remained until 1992 (Lecturer 1971–1974, Senior Lecturer 1974–1978, Reader 1978–1992). Successive University reorganizations shifted his appointment as Reader to the School of Archaeology, Classics and Ancient History (1992–2000), the School of Philosophy, Gender, History and Ancient World Studies (2000–2002), and the School of Philosophical and Historical Inquiry (2002), the post from which he retired in 2003. While employed at Sydney, he held visiting appointments at UC Berkeley (1976), ANU (1977, 1979, 1997–1999), and the Universities of Arizona (1979), Auckland (1981), and Papua New Guinea (1984). Since 2003, he has been Adjunct Professor of Archaeology at the University of New England (Armidale). He served as Editor of the journals *Mankind* (1974–1978) and *Archaeology in Oceania* (1980–present [2012]). He has been appointed to numerous editorial boards and advisory panels and has been honored by election to the Australian Academy of the Humanities (1985) and by collected papers in a special issue of *Australian Archaeology* (Specht et al. 2003).

Major Accomplishments

White has published or edited more than 130 books, journal articles, book chapters, and notes on a wide range of topics, within Australia and beyond, including regional prehistory, ethnoarchaeology, lithic, ceramic, faunal and raw material source analysis, economic change, artifact "style" and society, radiocarbon dating, rock art, and the history and politics of archaeology. He pioneered new approaches to lithic analysis through direct observation of stone tool manufacture, use, and discard in the New Guinea Highlands, forcing a shift away from standard culture historical taxonomies based on overall artifact form toward the definition of functional tool categories based on working edge attributes as units of analysis (White 1969). His comparative analysis of Australian versus European lithics drew attention to the limits of conventional inferences about connections between tool form and makers' cognitive and behavioral capabilities (White 1977). His archaeological fieldwork produced the first evidence for Pleistocene human occupation of the New Guinea Highlands (White et al. 1970) and (in collaboration with other members of the Lapita Homelands Project) yielded similarly early dates for colonization of the Bismarck Archipelago (Allen et al. 1988). His several syntheses and edited volumes on the prehistory of Sahul (Pleistocene Australia-New Guinea) have

drawn global scholarly attention to the similarities and differences that distinguish this region from other parts of the world, particularly with respect to time of arrival, the identities of founding populations, and their impact on regional biota, including megafaunal extinctions and the development of agriculture (e.g., Denham and White 2007; White with O'Connell 1982). As a public intellectual, he advocated scientific rigor in opposition to unsupported speculation about the human past (White 1975). As editor, he made *Archaeology in Oceania* for three decades the key outlet for regional research on the human material record.

Cross-References

▶ First Australians: Origins
▶ Hunter-Gatherers, Archaeology of

References

Allen, J., C. Gosden, R. Jones, and J.P. White. 1988. Pleistocene dates for the human occupation of New Ireland, Northern Melanesia. *Nature* 331: 707–709.

Denham, T., and J.P. White, eds. 2007. *The emergence of agriculture: A global view*, Reader in one world archaeology. London: Routledge.

Specht, J., V. Attenbrow, and R. Torrence. 2003. Shaping the future pasts: Papers in Honour of J. Peter White. *Australian Archaeology* 57.

White, J.P. 1969. Typologies for some prehistoric flaked stone artefacts in the Australian New Guinea Highlands. *Archaeology and Physical Anthropology in Oceania* 4: 18–46.

White, J.P. 1975. *The past is human*. Sydney: Angus & Robertson.

White, J.P. 1977. Crude, colorless and unenterprising? Prehistorians and their views on the stone age of Sunda and Sahul. In *Sunda and Sahul: Prehistoric studies in Southeast Asia, Melanesia and Australia*, ed. J. Allen, J. Golson, and R. Jones, 13–30. London: Academic Press.

White, J.P., K.A.W. Crook, and B.P. Ruxton. 1970. Kosipe: A late Pleistocene site in the Papuan Highlands. *Proceedings of the Prehistoric Society* 36: 152–170.

White, J.P., and J.F. O'Connell. 1982. *A Prehistory of Australia, New Guinea and Sahul*. Sydney: Academic Press.

Wilkinson, Tony James

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Tony Wilkinson is the foremost authority in geoarchaeologically grounded landscape archaeology in the Near East. I first met Tony at Francis Pryor's major excavations at Fengate, Peterborough, England, in June 1975 (Fig. 1). Tony was a great digger with an eye for stratigraphic detail, setting him apart from most of the Fengate crew, and an easy ability to impart his skills in stratigraphic reckoning to those for whom it was more challenging. This talent remained with him and enabled his students and field assistants to learn quickly under his guidance. Also at this time Tony introduced me to the delights of various 1960s and 1970s Motown and blues artists through second-hand record stalls in Peterborough market. This love of music was his second and unsung talent that he much enjoyed, especially when he was living in Lincoln and Chicago. Indeed, Tony played a mean harmonica.

Tony was born in August, 1948, and grew up in Essex before going to London read Geography at Birkbeck College (1966–1969). He then crossed "the pond" to McMaster University in Hamilton, Canada, where he continued his training as geographer (1970–1972). Here his research focused upon the hydrology of overland flow in the Canadian High Arctic. He then returned to England and started working as a circuit digger. After Fengate, Tony was taken on by the Central Unit, essentially a "flying squad" of hard drinking excavators working for the Chief Inspector of Ancient Monuments for England and Wales, Geoff Wainwright. He survived some very severe winters working with the Central Unit at sites such as Shaugh Moor on Dartmoor, before taking on his own English Heritage funded project with Peter Murphy: The Hullbridge Survey (1982–1988). This involved intensive survey of the coastal and river estuarine landscapes of the Rivers Stour, Colne, Blackwater, Crouch, and Roach as well

Wilkinson, Tony James, Fig. 1 Tony Wilkinson at the Iron Age and Romano-British settlement site of Cat's Water Fengate, Peterborough, Cambridgeshire, in July 1975

as the north shore of the Thames estuary in Essex (Wilkinson and Murphy 1995) and excavations of the drowned Neolithic site at The Stumble (Wilkinson et al. 2012). This is where Tony developed his particular combination of archaeological survey and geomorphological skills that he has employed to great effect in all his subsequent work in the much drier climates of the Near East, in countries such as Iraq, Oman, Yemen, Saudi Arabia, Syria, Turkey, and Iran over a period of more than 30 years.

By the time that Tony became a Research Associate and Associate Professor at the Oriental Institute in Chicago (1992–2004), he had already undertaken extensive fieldwork in the Near East and had been the Assistant Director of the British Archaeological Expedition to Iraq in Baghdad between 1989 and 1992. I again worked with Tony in the Dhamar region of the highlands of Yemen in the late 1990s where new field survey revealed hundreds of new prehistoric sites, many of which were buried by substantial hillwash eroded deposits. This research led him to suggest that the combined influences of human impact and underlying climate change acted as the twin drivers of major landscape change in semi-arid landscapes such as these (Wilkinson 2003a, 2005a).

This extensive and ground-breaking survey work in the Near East and southern Arabia was brought together in the publication of his book on the *Archaeological Landscapes of the Near East* (Wilkinson 2003b). For this Tony received the prestigious Book Prize from the Society for American Archaeology in 2004 and also the Wiseman Book Award of the Archaeological Institute of America in 2005. This book establishes a new framework for understanding the settlement structure and evolving landscape of the ancient Near East set against the backdrop of contemporary environmental, social, and economic conditions.

At this same time Tony used his unique combination of geomorphology and settlement distribution type of field survey work to inform modeling approaches to investigating the organization of irrigated landscapes and site territories in southern Arabia and Syria (Wilkinson 2005b; Wilkinson et al. 2007). This brought his geographer's background to bear on archaeological site distribution data and led to the award of a large National Science Foundation grant (2002–2005) for "Settlement systems within a dynamic environment and economy: contrasting northern and southern Mesopotamian city regions."

Tony then re-emigrated back across the Atlantic with his wife Eleonor to take up a Lectureship in the Department of Archaeology at the University of Edinburgh, briefly in 2004–2006, before moving on to a new Professorship position at the University of Durham in 2006. There his most

recent research project is the Fragile Crescent Project (2008–2012) funded by the Arts and Humanities Research Council, which aimed to advance our understanding of the settlement landscapes of Upper Mesopotamia and the northern Levant (Galiatsatos et al. 2009). This project has brought together data drawn from archaeological surveys and satellite imagery into one analytical framework to provide a data source to rival that available for southern Mesopotamia. Projects such as this must be seen a significant culmination to most of a lifetime of archaeological and geoarchaeological survey work in the Mesopotamian region and beyond. In the current troubled times, this study is even more valuable and his colleagues are currently in discussion with UNESCO regarding ways in which the project's database may contribute to the protection and management of Syria's endangered heritage.

In honor of Tony's lifetime achievements to archaeological landscape survey, he was aptly made a Fellow of the British Academy in 2008 and awarded the John Coles Medal for Landscape Archaeology in 2009, also by the British Academy.

On Christmas day 2014 Tony passed away after a lengthy battle with cancer. In typical style, he had continued working on his AHRC Fragile Crescent publication to the very last (Bradbury and Philips 2011; Cunliffe 2012). His final send-off in the parish church in his home village of Brancepeth in County Durham on January 26, 2015, was a fine celebration of a life very well lived. Tony was a fine man, friend, and scholar.

References

Bradbury, J., and G. Philip. 2011. The world beyond tells: Pre-classical activity in the basalt landscape of the Homs region, Syria. In *Pierres levées, stèles anthropomorphes et dolmens. Standing stones, anthropomorphic stelae and dolmens*, ed. T. Steimer-Herbert and J. Pouilloux, 169–180. Oxford: Archaeopress.

Cunliffe, E. 2012. Modernity, monumentality and the moment: A Syrian case study. In *As time goes by? Monumentality, landscapes and the temporal perspective. Proceedings of the International Workshop Socio-Environmental Dynamics over the Last 12,000 Years: The Creation of Landscapes II (14th–18th March 2011, Kiel)*, Human development in landscapes, ed. M. Furholt, M. Hinz, and D. Mischka, vol. 2, 61–72. Bonn: Graduate School at the Christian-Albrechts Universität, University of Kiel/Habelt.

Galiatsatos, N., T.J. Wilkinson, D.N.M. Donoghue and G. Philip. 2009. The Fragile Crescent Project (FCP): Analysis of Settlement Landscapes Using Satellite Imagery. CAA 2009: Making History Interactive, Williamsburg.

Wilkinson, T.J. 2003a. The organization of settlement in highland Yemen during the Bronze and Iron Ages. *Proceedings of the Seminar for Arabian Studies* 33: 157–168.

Wilkinson, T.J. 2003b. *Archaeological Landscapes of the Near East*. Tuscon: University of Arizona Press.

Wilkinson, T.J. 2005a. Soil erosion and valley fills in the Yemen highlands and southern Turkey: Integrating settlement, geoarchaeology and climate change. *Geoarchaeology* 20 (2): 23–56.

Wilkinson, T.J. 2005b. Approaches to modelling archaeological site territories in the Near East. In *Non-linear models for archaeology and anthropology*, ed. C.S. Beekman and W.W. Baden, 123–138. Aldershot: Ashgate Press.

Wilkinson, T.J., and P.L. Murphy. 1995. *The archaeology of the Essex Coast*, The Hullbridge Survey. Vol. I, 71. Chelmsford: East Anglian Archaeology.

Wilkinson, T.J., J.H. Chrisiansen, J.A. Ur, M. Widell, and M. Altaweel. 2007. Urbanization within a dynamic environment: Modeling Bronze Age communities in Upper Mesopotamia. *American Anthropologist* 109 (1): 52–68.

Wilkinson, T.J., P.L. Murphy, N. Brown, and E.M. Heppell. 2012. *The archaeology of the Essex Coast*, Excavations at the prehistoric site of the Stumble. Chelmsford: East Anglian Archaeology. Vol. II, 144. Chelmsford: East Anglian Archaeology.

Willems, Willem J.H.

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Basic Biographical Information

Professor Dr. Willem J.H. Willems (1950–2014) was one of the most prominent Dutch archaeologists. He steered three main national organizations and played a major role in the restructuring of the archaeological heritage management system in

the Netherlands. He was also very active in the international arena of heritage management and produced an impressive list of academic publications. Without doubt, Willems also took the lead in committee and board participations, in presidencies, in academic professorships, in network size, and in air miles. During his long and impressive career of nearly 40 years, his professional passion was threefold: Roman archaeology, archaeological heritage management, and international collaboration.

After his academic training in Roman archaeology and anthropology at the University of Amsterdam and in anthropology at the University of Michigan (USA), he started his professional career in 1979 as the provincial archaeologist of Limburg, the province in the southern part of the Netherlands where he was born. He continued in Roman archaeology with a PhD dissertation (1986, cum *laude*) entitled *Romans and Batavians* and with numerous articles and monographs. Both in the Netherlands and internationally, he was considered as one of the leading Roman specialists. In 1985, he became project manager for the Roman period at the State Service for Archaeology (ROB, now *Rijksdienst Cultureel Erfgoed*, www.cultureelerfgoed.nl) in Amersfoort, and 2 years later, he also became professor of Roman archaeology at the University of Leiden.

Major Accomplishments

Inspired by the CRM developments he had witnessed in the USA, he not only developed his taste for excavating Roman sites but also grabbed the challenges to preserve them, as well as some of the other types of sites. Heritage management even became his main concern when in 1989 he became the director of the ROB. As such, he also developed an interest in the social role of archaeology, especially the relation between science and society. He could also bring these interests into practice on an international scale, when in the early 1990s he was part of a committee of experts from the Council of Europe that drafted the Convention for the Protection of the Archaeological Heritage (also known as the Malta convention). His approach and view on heritage management and academic quality was probably ultimately challenged when he was asked (in 1999) to become the director quality management for archaeology at the Ministry of Education, Culture and Science. His main task was to direct the adaptation of the Dutch archaeological heritage management system to the implementation of the principles of the Malta Convention, a complex and delicate process. He however accomplished that the future commercially based heritage management system would be accompanied by quality assurance measures. Subsequently, he vigorously chaired the committee that successfully developed the Dutch Quality Standard. After its completion, he was appointed as Inspector General for Archaeology (2001) and could start to mold the State Inspectorate for Archaeology (now Heritage Inspectorate, www.erfgoedinspectie.nl). It had to monitor in practice the quality of the archaeological work that was undertaken under the new regime and in a commercial setting. In 2006, he exchanged this position for one in Leiden, where he got a second professorship at the university, for the chair of archaeological heritage management. At the same time, he became the Dean of the Faculty of Archaeology (till 2013). He established a heritage management research group with PhD candidates from all over the world and started the first master's degree specialization in heritage management with a global orientation. He has also published extensively on this subject (Fig. 1).

His wide horizons and endless affiliation with archaeological matters are reflected in the huge number of Dutch committees, executive boards, and editorial boards he participated in (such as the Dutch Archaeology Foundation, the RAAP Foundation, RING Foundation, Central Committee of Experts for Archaeology – CCvD, the Van Es Award Committee, ICOMOS Netherlands, the Centre for International Heritage Activities (CIE)). On the international level, the list is even longer. Ever since his studies in the USA, he remained intensely involved in the international arena, for instance, through his membership of the Society for American Archaeology and of the Register of Professional Archaeologists. In Europe, he was the vice president for Europe of

Willems, Willem J.H., Fig. 1 Willems opening a seminar of the Inspectorate, March 2003. (Photo: State Inspectorate for Cultural Heritage)

the ICOMOS Committee for Archaeological Heritage Management, the founding president of the Europae Archaeologiae Consilium, and the president of the European Association of Archaeologists (1998–2003). After that, he chaired the latter's Archaeological Heritage Prize Committee. In 2009, he was elected copresident (with Douglas C. Comer) of ICAHM and in 2010 Willems was elected as 1 of the 12 members of the European Union's academic committee Joint Programming Initiative on Cultural Heritage and Global Change. On top of this all, he occasionally evaluated nominations for World Heritage Sites (Fig. 2).

For many of his achievements, Willems was honored with prizes and honorary memberships. To mention just three of the most prestigious ones, in 2004, he was the Recipient of the Rheinlandtaler, which is awarded by the Landschaftsverband Nordrhein-Westfalen in Bonn, and in 2010, he received the Special Achievement Award of the Register of Professional Archaeologist's for his efforts in the Malta Convention and in heritage management in Europe and internationally. In April 2015, he received posthumously the Presidential Recognition Award of the Society of American Archaeologists.

Willems' achievements are celebrated by 40 of his friends and colleagues in Fernweh – Crossing borders and connecting people in archaeological heritage management. Essays in honour of prof. Willem J.H. Willems (2015).

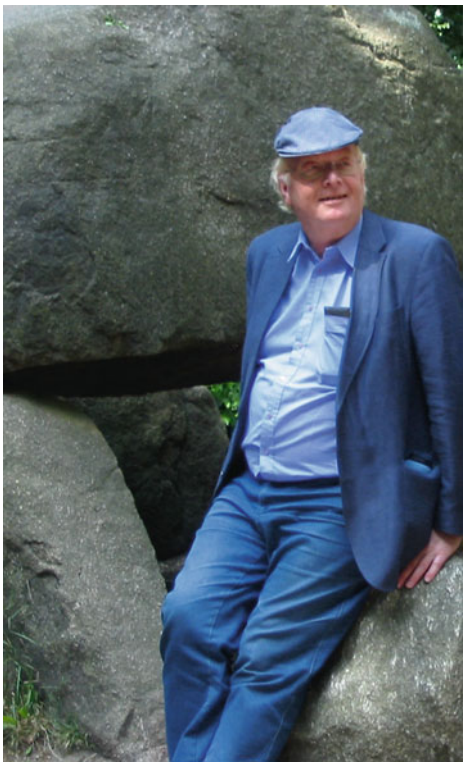

Willems, Willem J.H., Fig. 2 Willems on excursion with PhD candidates on heritage management subjects, July 2009. (Photo: M. van den Dries)

Cross-References

► Netherlands: Cultural Heritage Management
► UNESCO (1972) and Malta (1992) Conventions

References

An extensive bibliography is available at www.willemwillems.com

Fernweh – Crossing borders and connecting people in archaeological heritage management. Essays in honour of prof. Willem J.H. Willems. 2015. Edited by Monique H. van den Dries, Sjoerd J. van der Linde and Amy Strecker. Leiden: Sidestone Press.

Malta Convention. n.d. Available at: http://conventions.coe.int/Treaty/en/Treaties/html/143.htm

Willendorf II: Geography and Culture

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Introduction and Definition

Willendorf II, a site originally excavated about a century ago, is one of the more important European Upper Paleolithic sites in part for the discovery of the famous Venus I figurine but also for the data it can provide on the earliest Aurignacian. Excavations at Willendorf II have yielded a long loess-paleosol succession with a rather high paleoclimatic resolution. Embedded in this sequence are ten archaeological horizons separated by sterile loess deposits. The archaeological horizons are attributed to an unspecified Early Upper Paleolithic, the Aurignacian, and the Gravettian. Radiocarbon dates on abundant high-quality conifer charcoal provides a reliable chronological framework. Willendorf II is one of the rare sites to offer a good chronostratigraphic framework for the period between 45,000 and 25,000 ^{14}C BP in Central Europe.

The site Willendorf II is located about 80 km west of Vienna, Austria, in the Danube valley. This part of the Danube valley is called Wachau, which belongs to the geological unit of the Paleozoic Bohemian Massif. The Danube valley cuts deep into this massif and is characterized by rather steep and sometimes cliffy slopes. In this narrow part of the valley on the loess covered left/west bank of the Danube, a cluster of 8 Paleolithic sites is known consisting of Willendorf I, Willendorf I-Nord, and Willendorf II to VII. The deposits of the site Willendorf II lie on top of a lower terrace of the Danube. The archaeological horizons are found in the upper half of about 20-m-thick loess, loess-like, and loamy deposits.

Key Issues/Current Debates/Future Directions/Examples

Excavation History

The first mention of Willendorf II as a Paleolithic site goes back to the second half of the nineteenth century. Later, in 1907, during more extensive work at the nearby site of Willendorf I, M. Much excavated for a few days at Willendorf II. Also in 1907 the construction of the railroad in the Danube valley started. The associated earthworks resulted in a whole series of new sites in the Danube valley, among them Willendorf I-Nord and Willendorf III to VII. From May to July 1908, H. Obermaier and J. Bayer (Naturhistorisches Museum, Vienna) visited the railway construction sites on a daily basis and documented the archaeological occurrences. On 29 July 1908 the first scientific excavation at Willendorf II was started. J. Szombathy (Naturhistorisches Museum, Vienna) directed the excavation, while Obermaier and Bayer directed the work in Szobathy's absence. During that first excavation most of the sequence was exposed. Archaeological horizons (AH) 3–9 were identified. The most important and obviously most famous object ever found at Willendorf II is the *Venus I* figurine, which was found on the 7th of August 1908. The work in the course of this first excavation campaign at the site lasted until September 1908 (Felgenahuer 1959).

Szombathy directed a second excavation from 19 April to 5 July 1909; Bayer was responsible for site supervision. During this excavation, the lower part of the sequence containing AHs 1 and 2 was exposed. Also, more surface in AH 4–9 was excavated.

In 1912, Szombathy conducted fieldwork east of the railway tracks in the area of the old brickyard to explore the potential for future excavations in this area of the site. From 1913 onward, Bayer continued the fieldwork on a small scale. After a break of some years, Bayer continued his excavations in 1926 and 1927. During these excavation campaigns the *Venus II* and *Venus III* figurines were discovered.

In 1955, Willendorf II was re-excavated by F. Felgenhauer (1959). Besides a 25-m-long test

trench, Felgenhauer's team excavated a surface of approximately 10 × 20 m in the north of the earlier excavations. During this work, geological work was conducted by F. Brandtner (Felgenhauer 1959). After Felgenhauer's excavation finished, severe destruction was done to the site through different agents.

In 1981, P. Haesaerts (Royal Belgian Institute of Natural Sciences, Brussels, Belgium) started his work in Willendorf II. His team cleaned a small section and took a number of samples for radiocarbon dating, sedimentological analysis, and paleoclimatic/paleoenvironmental reconstruction (Haesaerts 1990). About 10 years later, in 1993, P. Haesaerts, F. Damblon (both Royal Belgian Institute of Natural Sciences), and G. Trnka (University of Vienna) started a collaborative research program on Willendorf II to enlarge the 1981 section and to collect more well-provenienced samples for dating and reconstruction of the paleoenvironment. The results of this work form the basic description of the sequence up to now (Haesaerts et al. 1996; see also Nigst and Haesaerts 2012).

Since 2006, an interdisciplinary team is conducting new fieldwork at the site (Nigst et al. 2008a, b). The goals of this work are to get a better understanding of the site formation processes, to establish a more reliable chronostratigraphic framework for the archaeology at Willendorf II, and to reconstruct the paleoenvironment and climate. Archaeologically, the fieldwork focuses on the Aurignacian archaeological horizons three to four.

Chronostratigraphy

The stratigraphic sequence consists of six loessic and loamy bodies lying on top of a low terrace of the Danube. For the lower half of the sequence (stratigraphic units (SU) H to E), we have only limited information from the fieldwork and geological studies during the early excavations (Brandtner, in Felgenhauer 1959). For the upper part of the sequence (SU D to A), much more information is available based on the work of Haesaerts (Haesaerts 1990; Haesaerts et al. 1996; Nigst and Haesaerts 2012).

The base of the sequence (see Fig. 1) is formed by Danube gravels (SU H), followed by a pale yellowish loess (SU G), a reddish brown partly reworked paleosol (SU F), and a unit of pale yellowish loess (SU E). No information is available on the age and chronostratigraphic correlation of these lower units.

SUs D and C represent the Middle Pleniglacial. SU D is described as a 2.5–3.0-m-thick stony heterogeneous brownish loam (Haesaerts et al. 1996; Nigst and Haesaerts 2012). The rich mollusk assemblage preserved in SU D1 is indicative of a rather mild climatic environment with some wooded patches near the site (Frank and Rabeder 1994), and pedosedimentary characteristics evoke a rather humid climate with drier conditions at the end. This well-expressed climatic episode, probably centered around 41,500 ^{14}C BP and also recorded in a similar position at the nearby site of Schwallenbach, was named the Willendorf Interstadial (Haesaerts et al. 1996). During the 1909 excavations AH 2 was described within the SU D. Later fieldwork attempted unsuccessfully to relocate AH 2.

SU C, about 1.5–2 m thick, consists of a complex set of stratified pale yellowish sandy loesses, bleached light gray horizons, and three humiferous horizons (Haesaerts et al. 1996; Nigst and Haesaerts 2012). The lowest of the three humiferous horizons, SU C8, occurs in parts as brownish gray lenses stretched by solifluction and contains ash stripes with concentrations of charcoal. The lithic assemblage of AH 3 is reported in the old fieldwork to be associated with SU C8 (Felgenhauer 1959). This observation was verified during the 1993 fieldwork (Haesaerts et al. 1996) and the excavation since 2006 (Nigst et al. 2008a). The ^{14}C-dates from charcoal of the humiferous horizon SU C8 give an age estimation for the AH 3 of about 39,000/38,000 ^{14}C BP (Haesaerts et al. 1996; Nigst and Haesaerts 2012). This age estimation is based on the two ^{14}C dates GrA-896 and GrN-17805. The ^{14}C date GrN-11192 provided an age of about 34,100 ^{14}C BP. This charcoal sample was not subject to the same detailed sample cleaning and identification processes (for details see, e.g., Damblon et al. 1996) prior to submission to the dating laboratory

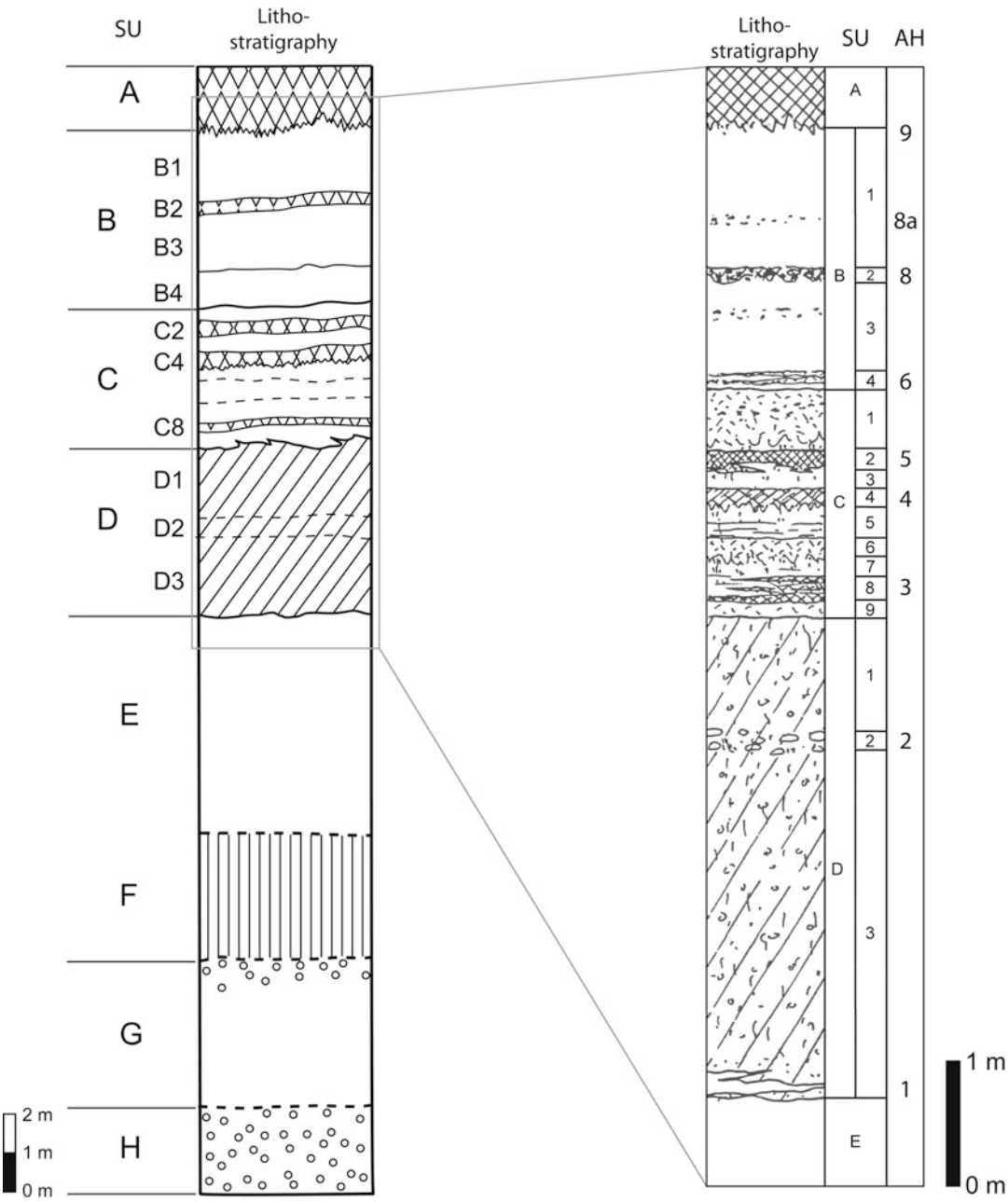

Willendorf II: Geography and Culture, Fig. 1 Willendorf II: sequence. *Left*: schematic section of the entire deposits exposed between 1908 and 1993. *Right*: stratigraphic log of the upper part of the sequence, documented in 1993 fieldwork. Abbreviations: *SU* stratigraphic unit, *AH* archaeological horizon. (Graphic: P. Haesaerts and P.R. Nigst)

as the later dates samples, and it was at the minimal carbon weight limit for conventional ^{14}C dates (Haesaerts et al. 1996). Therefore, it has to be considered as a minimum age, and the best age estimation for SU C8 (and AH 3) is about 39,000/38,000 ^{14}C BP. The second humiferous horizon (SU C4) is less developed but almost in situ. AH 4 is located in SU C4. It has been described as an

Aurignacian with numerous carinated and nosed end scrapers (e.g., Hahn 1977). The associated ^{14}C-dates on charcoal (natural origin) date the SU C4 to 32,000/31,000 ^{14}C BP. The upper one of the three humiferous horizons, SU C2, is best expressed and occurs as a decimetric, dark brown layer slightly stretched by solifluction. The AH 5, assigned to the Gravellian, is located in this SU. The correlation of the AHs 3, 4, and 5 and these three distinct, dark-colored humiferous horizons has been observed by all excavators at the site (Felgenhauer 1959; Haesaerts 1990; Haesaerts et al. 1996; Nigst and Haesaerts 2012; Nigst et al. 2008a, b).

Altogether, SU C represents the upper part of the Middle Pleniglacial (between 39,000 and 26,000 ^{14}C BP) and records a complex succession of climatic episodes. While the sandy loess layers (SUs C7, C5, C3, and C1 pro parte) represent cold episodes, the bleached horizons (SUs C9, C6, and C1 pro parte) show characteristics of tundra gley indicating very cold conditions (deep frost or permafrost). The tundra gley of sub-SU C1 pro parte is most developed and occurs as a marker at the boundary between the Middle and the Late Pleniglacial (Haesaerts 1990; Haesaerts et al. 1996). Moreover, the three humiferous horizons (SUs C8, C4, and C2) containing AHs 3, 4, and 5 are related to interstadial episodes, such an interpretation being in good agreement with the pedological characteristics (Haesaerts et al. 1996) and the malacological content (Frank and Rabeder 1994). Taking into consideration the section of Schwallenbach – located roughly 4 km downstream on the left bank of the Danube – where three well-developed humiferous soils are preserved within a similar stratigraphic and chronological background, these three interstadial episodes were named Schwallenbach I (between 39,000 and 37,400 ^{14}C BP), Schwallenbach II (around 32,000 ^{14}C BP), and Schwallenbach III (around 30,500 ^{14}C BP) (Haesaerts et al. 1996).

SU B represents the Late Pleniglacial loess cover, which shows evidence of a progressive trend towards a cold and dry climate based on pedological characteristics and the malacological content (Haesaerts et al. 1996; Frank and Rabeder 1994). SU B comprises pale yellowish homogeneous loess layers (SUs B1 and B3), thin lenses of pale gray loess (SU B4), and a light brownish horizon (SU B2). The loess of SU B caps the thick tundra gley of SU C1 posterior to 28,560 ^{14}C BP overlain by Gravettian AH 6, reworked by solifluction, and dated to 26,500 and 26,100 ^{14}C BP. Gravettian AH 8 occurs in the middle part of SU B in association with an incipient humiferous horizon (SU B2). Charcoal from this horizon provided consistent ages between 25,800 and 25,230 ^{14}C BP. The in 2006 newly discovered Gravettian AH 8a is located in the middle part of SU B1. No excavations after 1955 were able to observe AH 9. SU A is formed by the thick humic horizon on top of the section and represents the recent soil.

A similar stratigraphic sequence was documented at the nearby site Schwallenbach (Haesaerts et al. 1996). Figure 2 shows the correlation of the two sites. This shows a similar stratigraphic sequence and the reproducibility of the record documented at Willendorf II at another site, a few kilometers downstream.

Archaeological Sequence

The archaeological sequence comprises ten AHs including six Gravettian (AH 5–9), two Aurignacian (AH 3 and 4), and two archaeological horizons which cultural attribution is unclear, but which in general are considered as Early Upper Paleolithic (e.g., Felgenhauer 1959; Hahn 1977; Otte 1981; Haesaerts et al. 1996; Nigst 2006; Nigst et al. 2008a; Nigst and Haesaerts 2012).

For both AH 1 and AH 2 the cultural attribution is unsecure and the exact stratigraphic position unclear. Both have been observed only during the 1909 excavation. Several authors have described AH 2's lithics as undiagnostic and attributed them to the Early Upper Paleolithic in general (Hahn 1977; Teyssandier 2003; Nigst 2006).

AH 3 is the lower of the two Aurignacian horizons and was excavated for the first time during the 1908 and 1909 fieldwork (Fig. 3). Further excavation is documented for 1955, but only in a test trench. Since 2006, the AH 3 has been excavated on a limited surface (Nigst et al. 2008a). Based on the lithic artifacts including carinated/nosed end scraper-cores, AH 3 is attributed by most scholars

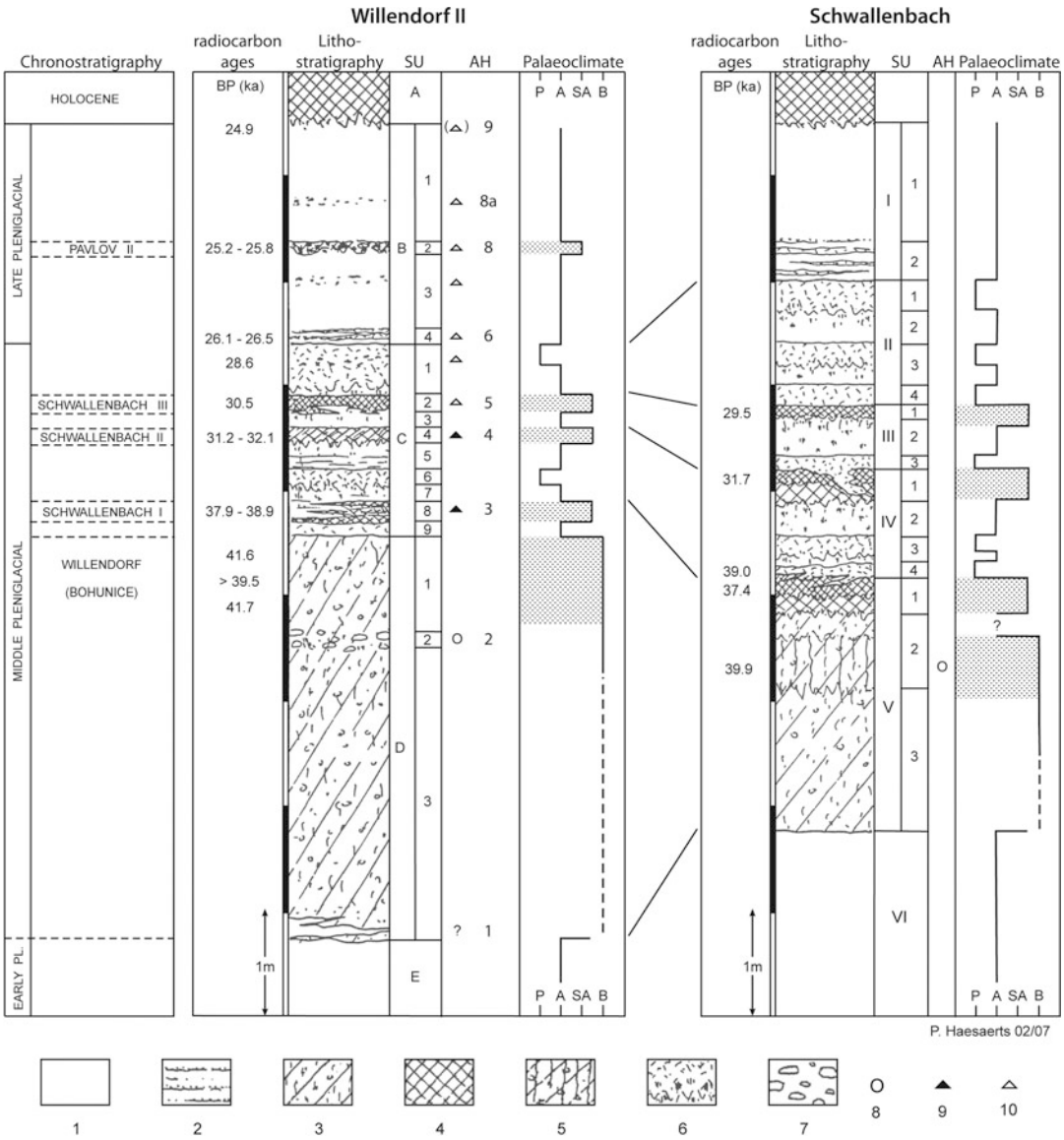

Willendorf II: Geography and Culture, Fig. 2 Willendorf II and Schwallenbach: comparative sequences. Graphic symbols. *1*. loess; *2*. sandy loess; *3*. loam; *4*. humiferous horizon; *5*. B horizon; *6*. light gray horizon (tundra gley); *7*. stones; *8*. Early Upper Paleolithic; *9*. Aurignacian; *10*. Gravettian. Abbreviations: *SU* stratigraphic unit, *AH* archaeological horizon, *P* periglacial, with deep frost or permafrost, *A* arctic, *SA* subarctic, *B* boreal. (Graphic: P. Haesaerts)

to the Early Aurignacian technocomplex (e.g., Hahn 1977; Teyssandier 2003; Nigst 2006; Nigst and Haesaerts 2012).

The upper of the two Aurignacian horizons, AH 4, was first identified in 1908 and excavated in all fieldwork seasons since then. It is located in SU C4, a paleosol rich in charcoals dating to 32,000/31,000 ^{14}C BP. The assemblage consists of abundant lithics, bone/antler tools (Fig. 4), and a mollusk shell. Based on the lithics (Fig. 5) – including abundant evidence of the production of small bladelets from carinated/nosed end scraper-cores – AH 4 is attributed to the Early Aurignacian or Late Aurignacian.

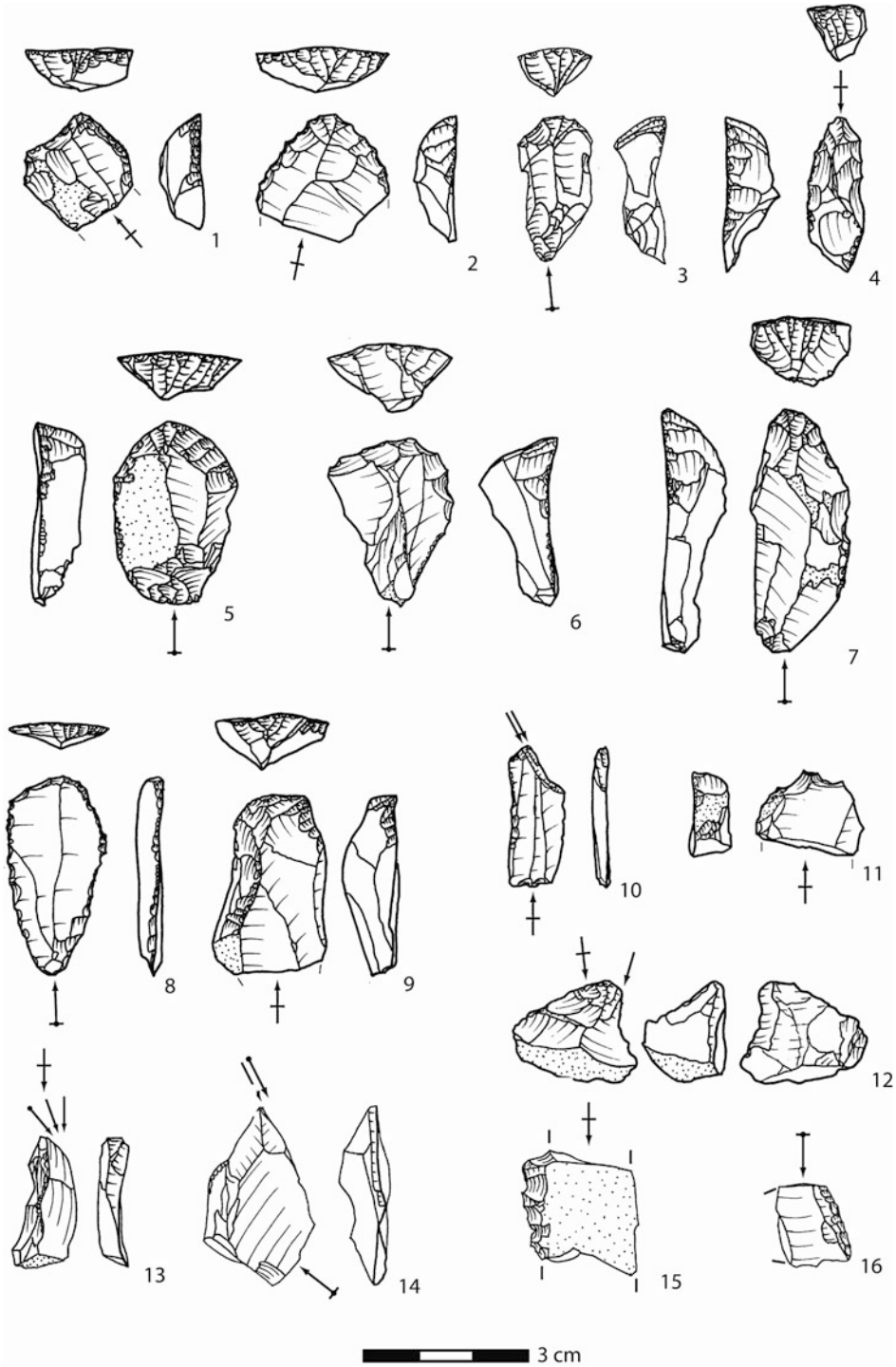

Willendorf II: Geography and Culture, Fig. 3 Willendorf II-AH 3. Selected lithics. *1*. nosed end scraper; *2*, *5*, *6*, *8*, *9* single end scrapers; *3*, *4*, *7* carinated end scrapers; *10*, *12*, *13*, *14* burin; *11*. borer/bec; *15*, *16* unilaterally retouched piece. (Graphic: Ph.R. Nigst)

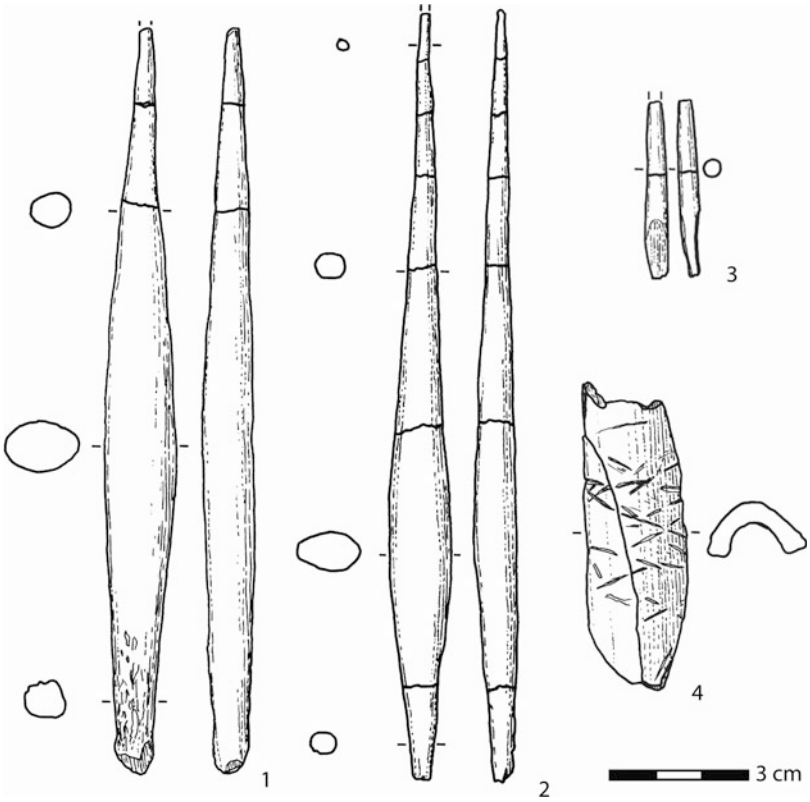

Willendorf II: Geography and Culture,
Fig. 4 Willendorf II-AH 4. Selected bone/antler/ivory tools. *1*, *2* bone point; *3*. fragment of an ivory stick; *4*. bone fragment with crossing lines. (Redrawn after Hahn (1977) by P.R. Nigst)

AH 5 is documented in SU C2, which is a dark brownish humiferous horizons with charcoal concentrations and partly reworked by solifluction (Haesaerts et al. 1996). The archaeological assemblage includes – besides abundant lithics – worked bone/antler/ivory remains. The lithic assemblage includes pointed blades, end scrapers, Microgravette points, Gravette points, backed pieces, fléchettes, and burins and attributed to the Early Gravettian (Moreau 2009) or Early Pavlovian (Svoboda 1994).

The Gravettian AH 6 is located in SU B4, consisting of several thin lenses of pale gray loess. AH 6 is – like AH 8 and 7 – attributed to the Middle Gravettian or Evolved Pavlovian. AH 7 is attributed to the Middle Gravettian or Evolved Pavlovian as well. It was documented only in the early fieldwork and not observed in the very limited excavation in upper SUs during the most recent fieldwork.

The Gravettian AH 8 has been excavated since 1908 during several fieldwork opportunities (e.g., Felgenhauer 1959; Haesaerts et al. 1996; Nigst et al. 2008b). This AH in located in the SU B2, an approximately 5 cm thick continuous light brownish horizon, underlined by abundant traces of rootlets. AH 8 is either attributed to the Middle Gravettian or to the Evolved Pavlovian (e.g., Svoboda 1994).

In the course of section cleaning and stabilization of the western section in 2006, the new Gravettian AH 8a was discovered about 30 cm above SU B2 in SU B1 (Nigst et al. 2008b). In the same stratigraphic position Haesaerts et al. (1996) describe a horizon of charcoals, but only in 2006 also archaeological remains could be observed.

The Gravettian AH 9 is by far the richest of the archaeological horizons. It is attributed to the late (Upper) Gravettian or Willendorf-Kostenkian (Svoboda 1994). None of the fieldwork since 1955 could locate AH 9, as its richest parts were in the eastern part of the site partly destroyed by the railway construction and the remaining parts excavated in the early excavations. Lithic raw

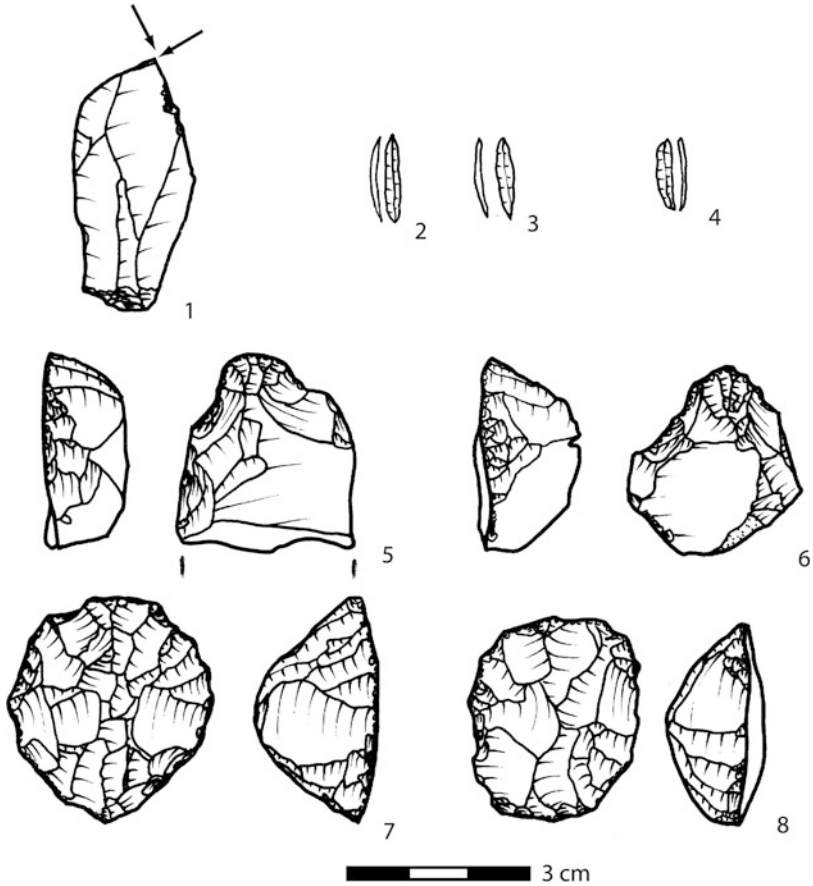

Willendorf II: Geography and Culture,
Fig. 5 Willendorf II-AH 4. Selected lithics. *1*. burin; *2–4* bladelets; *5*, *6* nosedend scrapers; *7*, *8* carinated end scraper. (Redrawn after Hahn (1977) by P.R. Nigst)

materials are dominated by various cherts occurring in the close Danube gravels but also contain far-distance transported flint most probably originating from northern Moravia or southern Poland (Antl-Weiser 2008b). Among the retouched lithics are shouldered points, hence the attribution to the Willendorf-Kostenkian (e.g., Sovobda 1994). The Venus II and Venus III figurines originate from AH 9, while the famous Venus I figurine was found about 25 cm below AH 9 (see below).

The Venus Figurines of Willendorf II

In total three so-called Venus figurines have been discovered at Willendorf II. The most famous one is the Venus I figurine that was found on 7th of August 1908. The anthropomorphic figurine is about 11 cm tall and depicts an obese woman. The head does not show a face, the arms are resting on the breasts, and the feet are not shown. Originally the figurine was covered with red ochre, most of which was accidentally removed when it was washed. The raw material of the figurine is oolithic limestone that most probably originates from the Stránksá skála outcrops in southern Moravia (Antl-Weiser 2008a). Traditionally the Venus I figurine is attributed to AH 9, but reanalysis of the original documentation shows that its correct stratigraphic position is actually about 25 cm below AH 9 and associated with a horizon of charcoal (Haesaerts et al. 1996; Antl-Weiser 2008a, b). On the contrary, the Venus II and III figurines originate from AH 9.

The Venus II figurine, discovered in 1926, is made from ivory and in a very bad state of preservation, as preservation of organic finds at Willendorf II in general is not good. It was found together with mammoth bones in a pit that was dug from AH 9 down into the loess and some of the underlying AHs. The so-called Venus III is

a piece of ivory showing some traces of working; its interpretation as a Venus figurine was often questioned (Antl-Weiser 2008a, b).

Cross-References

- ▶ Art, Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Europe: Paleolithic Art
- ▶ Lithic Technology, Paleolithic
- ▶ Mobiliary Art, Paleolithic

References

Antl-Weiser, W. 2008a. The anthropomorphic figurines from Willendorf. *Wissenschaftliche Mitteilungen aus dem Niederösterreichischen Landesmuseum* 19: 19–30.

Antl-Weiser, W. 2008b. Die Venus von Willendorf – 100 Jahre danach. *Mitteilungen der Anthropologischen Gesellschaft in Wien* 138: 1–21.

Damblon, F., P. Haesaerts, and J. van der Plicht. 1996. New datings and considerations on the chronology of Upper Palaeolithic sites in the Great Eurasiatic Plain. *Préhistoire Européenne* 9: 177–231.

Felgenhauer, F. 1959. Willendorf in der Wachau. In *Monographie der Paläolith-Fundstellen I-VII*. Mitteilungen der Prähistorischen Kommission der Österreichischen Akademie der Wissenschaften VIII–IX. Vienna: Verlag R.M. Rohrer.

Frank, C., and G. Rabeder. 1994. Neue ökologische Daten aus dem Lößprofil von Willendorf in der Wachau. *Archäologie Österreichs* 5 (2): 59–64.

Haesaerts, P. 1990. Nouvelles recherches au gisement de Willendorf (Basse Autriche). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique: Sciences de la Terre* 60: 203–218.

Haesaerts, P., F. Damblon, M. Bachner, and G. Trnka. 1996. Revised stratigraphy and chronology of the Willendorf II sequence, Lower Austria. *Archaeologia Austriaca* 80: 25–42.

Hahn, J. 1977. *Aurignacien: Das ältere Jungpaläolithikum in Mittel- und Osteuropa*. Fundamenta A/9. Cologne: Böhlau Verlag.

Moreau, L. 2009. *Geißenklöstle: Das Gravettien der Schwäbischen Alb im europäischen Kontext*. Tübingen: Kerns Verlag.

Nigst, P.R. 2006. The first modern humans in the Middle Danube area? New evidence from Willendorf II (eastern Austria). In *When Neanderthals and modern humans met*, ed. N.J. Conard, 269–304. Tübingen: Kerns Verlag.

Nigst, P.R., and P. Haesaerts. 2012. L'Aurignacien en Basse Autriche: résultats préliminaires de l'analyse technologique de la couche culturelle 3 de Willendorf II et ses implications pour la chronologie du Paléolithique supérieur ancien en Europe centrale. *L'Anthropologie* 116 (4): 575–608. https://doi.org/10.1016/j.anthro.2011.10.004.

Nigst, P.R., T.B. Viola, P. Haesaerts, S. Blockley, F. Damblon, C. Frank, M. Fuchs, M. Götzinger, U. Hambach, C. Mallol, L. Moreau, L. Niven, M. Richards, D. Richter, L. Zöller, G. Trnka, and J.-J. Hublin. 2008a. New research on the Aurignacian of central Europe: A first note on the 2006 fieldwork at Willendorf II. *Quartär* 55: 9–15.

Nigst, P.R., T.B. Viola, P. Haesaerts, and G. Trnka. 2008b. Willendorf II. *Wissenschaftliche Mitteilungen aus dem Niederösterreichischen Landesmuseum* 19: 31–58.

Otte, M. 1981. *Le Gravettien en Europe centrale*. Dissertationes Archaeologicae Gandenses 20. Brugge: De Temple.

Svoboda, J. 1994. *Pavlov I – Excavations 1952–1953*. ERAUL 66. Liège: University of Liège.

Teyssandier, N. 2003. Les débuts de l'Aurignacien en Europe: Discussion à partir des sites de Geissenklösterle, Willendorf II, Krems-Hundssteig et Bacho-Kiro. Unpublished PhD dissertation, Université de Paris X-Nanterre.

Willey, Gordon Randolph

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Basic Biographical Information

Gordon Randolph Willey is widely regarded as the preeminent Americanist. He was born in 1913 in Chariton, Iowa, but grew up in Long Beach, California. He studied at the University of Arizona under Byron Cummings where he received his bachelors and masters degrees. He pursued doctoral work at Columbia University with Duncan Strong and completed his dissertation on the Chancay Valley, Peru, in 1942. The following year, he joined the Bureau of American Ethnology at the Smithsonian Institute to work for Julian Steward in editing the *Handbook of South American Indians*. In 1950, he accepted the Bowditch Professorship in Central American Archaeology

and Ethnology at Harvard University, a position he held until 1987. Willey participated in or directed major fieldwork projects in eight different countries. In the United States, he has worked in Arizona, Georgia, Louisiana, and Florida. Outside of the United States, he has worked in Belize, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Peru. He died on April 28, 2002.

Willey was honored with numerous professional awards and prizes. Among the most prestigious of these are the Viking Fund Medal for Archaeology (1953), the Order of the Quetzal of Guatemala (1968), the American Institute of Archaeology's Gold Medal (1973), the American Anthropological Association's A. V. Kidder Medal (1974), the Royal Anthropological Institute's Huxley Medal (1979), the Society for American Archaeology's Distinguished Service Award (1980), and the University of Pennsylvania Museum's Lucy Wharton Drexel prize (1981). He held honorary degrees from Cambridge University, the University of Arizona, and the University of New Mexico. He was a member of the National Academy of Sciences, the American Academy of the Arts and Sciences, the American Philosophical Society, the British Academy (corresponding member), and the Sociedad Mexicana de Antropología. He was a fellow of the Society of Antiquaries, the Royal Anthropological Institute of Great Britain and Ireland, the American Anthropological Association (President, 1961), and the Society for American Archaeology (President, 1968).

Major Accomplishments

Willey is perhaps best known for creating the field of "settlement pattern" archaeology. In the first half of the twentieth century, most archaeological research was concentrated upon excavating a few big urban centers with relatively little attention paid to the more numerous, smaller villages and hamlets. Willey's settlement pattern approach was a significant departure from this standard. He regarded the distribution of human settlements provided a natural starting point for the functional interpretation of archaeological cultures (Willey 1953). Different sites were best understood not in isolation, but rather as part of complex economic, social, and political landscapes. Because this approach required the study of the common people as well as rulers, it marked a shift to a more democratic orientation that recognized the dynamic interplay between elites and commoners. The widespread popularity of Willey's approach is due in part to the fact that it provided a workable methodology for addressing questions of social structure, demography, and subsistence patterning.

Willey devised his settlement pattern approach as part of the Virú Valley project, one of the first multidisciplinary research programs in the New World involving archaeologists, anthropologists, and human geographers. The goal of the Virú project was the reconstruction of the archaeology and ethnology of a small coastal valley in Peru. Willey's role was to record the forms, settings, and spatial relationships of the sites within the valley and to make inferences about the societies that created and inhabited them during successive cultural periods. Willey always attributed the idea of a settlement pattern approach to Julian Steward and downplayed his own contributions. But, in fact, his implementation of and modifications to this idea went far beyond what Steward had previously accomplished in his Southwestern studies. For example, Willey developed a more sophisticated community-based approach that allowed him to make inferences about changes in population size and sociopolitical organization over a period of 1,500 years.

Willey has often been characterized as the "grand synthesizer." There are good reasons for this. Willey provided the definitive synthesis of the archaeology of the Americas for his time (Willey 1966, 1971). He also synthesized the history of American anthropological archaeology from the speculative to the modern periods (Willey and Philips 1958; Willey 1968, 1988; Willey and Sabloff 1974, 1993). However, Willey also synthesized different kinds of archaeological theory. Throughout his career, he sought to bridge the "great divide" between humanist and scientific traditions. For him, the goals of archaeology are twofold, namely, to narrate the process of the human past and to explain and understand the events that comprise that past. Willey was a strong advocate of a comparative generalizing approach,

but not at the expense of a specific particularizing one. He argued that it is impossible to make meaningful comparisons unless the specifics of at least two contexts are well controlled.

Willey's influence on archaeological method and theory is considerable (Sabloff and Fash 2007). His work on settlement archaeology established a new field that is regarded as the starting point for all investigations of culture process and social change. His syntheses of New World prehistory and the history of American archaeology are major achievements and are commonly used as textbooks. His work has anticipated many of the recent trends in the last 30 years. For example, his functionalist and processualist approach was reinterpreted to become the centerpiece of the New Archaeology (Willey and Philips 1958). His writing style exhibits a critical self-consciousness favored by some post-processual archaeologists. His interest in ideology and the Mesoamerican worldview resonates strongly with new developments in cognitive archaeology. Willey consistently took theoretical stances that were not dogmatic or rigid, but rather flexible and pragmatic.

Cross-References

- ▶ Landscape Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Sabloff, Jeremy Arac

References

Sabloff, J.A., and W.L. Fash, eds. 2007. *Gordon R. Willey and American archaeology: Contemporary perspectives*. Norman: University of Oklahoma Press.

Willey, G.R. 1953. *Prehistoric settlement patterns in the Virú Valley, Peru.* Bureau of American Ethnology Bulletin 155. Washington, DC: Smithsonian Institution.

Willey, G.R. 1966. *An introduction to American archaeology, Volume I: North and Middle America*. Englewood Cliffs: Prentice Hall.

Willey, G.R. 1968. One hundred years of American archaeology. In *One hundred years of anthropology*, ed. J.O. Brew, 29–53. Cambridge: Harvard University Press.

Willey, G.R. 1971. *An introduction to American archaeology, Volume II: South America*. Englewood Cliffs: Prentice Hall.

Willey, G.R. 1988. *Portraits in American archaeology: Remembrances of some distinguished Americanists*. Albuquerque: University of New Mexico Press.

Willey, G.R., and P. Philips. 1958. *Method and theory in archaeology*. Chicago: University of Chicago Press.

Willey, G.R., and J.A. Sabloff. 1974. *A history of American archaeology*. London: Thames and Hudson.

Willey, G.R., and J.A. Sabloff. 1993. *A history of American archaeology*. 3rd ed. London: Thames and Hudson.

Further Reading

Preucel, R.W. 1999. Gordon Willey. In *The great archaeologists. Encyclopedia of archaeology*, ed. T. Murray, 701–712. Santa Barbara: ABC-CLIO.

Preucel, R.W. 2001. Gordon Willey. In *The great archaeologists. History and discoveries*, ed. T. Murray, 1322–1323. Santa Barbara: ABC-CLIO.

Sabloff, J.A., and G.R. Willey. 1967. The collapse of Maya civilization in the southern lowlands: A consideration of history and process. *Southwestern Journal of Anthropology* 23: 311–336.

Vogt, E.Z., and R.M. Leventhal, eds. 1983. *Prehistoric settlement patterns: Essays in honor of Gordon R. Willey*. Albuquerque: University of New Mexico Press.

Willey, G.R. ed. 1956. *Prehistoric settlement patterns in the New World*. Viking Fund Publications in Anthropology 23. New York: Wenner-Gren Foundation.

Willey, G.R., ed. 1987. *Essays in Maya archaeology*. Albuquerque: University of New Mexico Press.

Willey, G.R., ed. 1990. *New World archaeology and culture history: Collected essays and articles*. Albuquerque: University of New Mexico Press.

Willey, G.R., and P. Phillips. 1995. Method and theory in American archaeology II: Historical-developmental interpretations. *American Anthropologist* 57: 723–819.

Winckelmann, Johann Joachim

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Basic Biographical Information

Johann Joachim Winckelmann (1717–1768) is among the most influential founders of the modern disciplines of art history and classical archaeology. Born in poverty at Stendal, in Prussia, his abilities allowed him to obtain a gymnasium

education, followed by unsatisfying university studies in subjects such as theology and natural sciences before he became a reluctant schoolteacher. In 1748, he seized the opportunity to become librarian to Count Heinrich von Bünau at his estate near Dresden, a post that brought him into contact with the lively culture of the city, including the royal collections of fine and decorative arts. He began to study and write on art, and, encouraged by the Papal Nuncio to the Saxon court, Count Alberigo Archinto, he converted to Catholicism and in 1755 went to Rome. There his reputation grew among artistic and papal circles. In 1763, he won the important posts of Commissario delle Antichità della Camera Apostolica (papal antiquary) and Scriptor Linguae Teutonicae (responsible for German-language manuscripts in the Vatican Library). His writings won him international fame that extended far beyond the scholarly audience. While returning to Rome from Vienna in June 1768, he was murdered at Trieste.

Major Accomplishments

Winckelmann's importance derives primarily from his publications on ancient, especially classical, art. His first publication, *Gedancken über die Nachahmung der griechischen Wercke in der Mahlerey und Bildhauer-Kunst* (*Reflections on the Imitation of Greek Works in Painting and Sculpture*), was produced in Dresden in 1755; although he had then seen scarcely any examples of ancient Greek art in person, his essay called for no less than a complete renewal of contemporary artistic and social values through adopting the superior ones of the Greeks. Residence in Italy enabled him to study original works in the collections in Rome and other cities, and in an era when the corpus of ancient monuments was not yet comprehensively organized or available, his publications helped disseminate information about both already-known works and new archaeological discoveries. While he continually insisted on the importance of first-hand examination, often criticizing the work of previous scholars on the basis of his own observations, his own reliance on the textual tradition of the ancient Greek and Roman writers for both documentation and interpretation is clear. His most famous work, the *Geschichte der Kunst des Altertums* (*History of the Art of Antiquity*) of 1764, is built on the chronological and developmental framework established in antiquity and used by the post-antique writers whom he also read, one that valued Greek art over Roman and High Classical works over those of earlier and later periods. Always passionate, frequently polemical, and perpetually an outsider no matter how celebrated, Winckelmann made crucial contributions not only to the academic study of the material remains of classical antiquity but also to the Western classical tradition in the art and culture of his own and subsequent times.

Cross-References

► Classical (Greek) Archaeology

References

Akademie der Wissenschaften und der Literatur, Mainz. 1996–. *Johann Joachim Winckelmann. Schriften und Nachlass*. Mainz-am-Rhein: Verlag Philipp von Zabern.

Décultot, E. 2000. *Johann Joachim Winckelmann. Enquête sur la genèse de l'histoire de l'art*. Paris: Presses Universitaires de France.

Donohue, A.A. 1995. Winckelmann's History of Art and Polyclitus. In *Polykleitos, the Doryphoros, and tradition*, ed. W.G. Moon, 327–353. Madison: University of Wisconsin Press.

Justi, C. 1923. *Winckelmann und seine Zeitgenossen*. 3rd ed. Leipzig: F.C.W. Vogel.

Leppmann, L. 1971. *Winckelmann*. London: Victor Gollancz Ltd.

Mallgrave, H.F. (tr.). 2006. *Johann Joachim Winckelmann. History of the art of antiquity*. Los Angeles: Getty Research Institute.

Mattusch, C.C. (tr.). 2011. *Johann Joachim Winckelmann. Letter and report on the antiquities at Herculaneum*. Los Angeles: J. Paul Getty Museum.

Wobst, H. Martin

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Basic Biographical Information

H. Martin Wobst (Fig. 1) was born on December 12, 1943, in Eickelborn, Germany, and received a classical education at the Kaiser-Whilhelms-Gymnasium in Hannover, Germany. He arrived in the United States in May 1963 to study classical archaeology at the University of Michigan. After one classical archaeology class in his freshman year, he decided to switch to Anthropology. At Michigan, he earned his B.A. in 1966, his M.A. in 1968, and his Ph.D. in 1971. Wobst's dissertation, entitled *Boundary Conditions for Paleolithic Cultural Systems: A Simulation Approach*, was directed by Robert Whallon, a student of Lewis Binford. He became a member of the faculty of the Department of Anthropology of the University of Massachusetts Amherst in 1971. Wobst retired from full-time teaching in the fall of 2010 after a remarkable career as an internationally recognized scholar, a superb teacher, and an effective administrator.

Wobst was a member of the faculty at the University of Massachusetts Amherst who ushered the anthropology department onto the national and international stage, developing its reputation for European Studies, for biocultural anthropology, and for its theoretically informed archaeology. He served as department chair from 1978 to 1984, and again in 1988. He nurtured generations of graduate students as the long-term Graduate Program Director of the department's committee-based student-centric program, in his seminars on Theory and Method in Archaeology, Professional Anthropology, and Indigenous Archaeology, and in his hours of one-on-one advising. He chaired more than 25 completed Ph.Ds and 30 completed M.As, and was a member of approximately 100 committees.

Wobst, H. Martin, Fig. 1 H. Martin Wobst

Wobst is best-known as an archaeological theorist and a strong advocate for indigenous rights and participation in higher education. He has worked with indigenous students, young professionals, and community members in their efforts to transform archaeology, including by raising travel funds for attendance at the World Archaeological Congress (1999) and the American Anthropological Association (2000), as Chair of the Funding Committee of the World Archaeological Congress (2004), as a Founding Member of the Doctoral Program in Indigenous Archaeology at the University of Catamarca, Argentina, and as a Research Team Member of the Intellectual Property Issues in Cultural Heritage Project (IPinCH) of Simon Fraser University (2009-present).

Major Accomplishments

Wobst has made and continues to make major intellectual contributions to the theory of materiality, exploring its implications for all forms of human culture. His often cited "Stylistic Behavior and Information Exchange" (Wobst 1977) developed a

general theory of style as information exchange, analyzing Yugoslavian folk costume by way of example. It is one of the foundational papers in archaeology's move away from the New Archaeology's focus on energetics and toward a more holistic understanding of culture process.

He incorporated agency in this theory by conceiving of material culture as "product of and precedent for" cultural action, and has most recently pursued this line by considering material culture as an "intervention" in ongoing social and ideological processes (Wobst 1999, 2006). Published for his professional colleagues, these concepts also formed the basis for his very popular undergraduate course on the "Archaeology of US," that taught students how to question our culture's taken-for-granted ways conveyed, for instance, in the arrangement of seating in classrooms, the location of sidewalks and informal paths on the campus, and the furnishings found in women's, men's and gender-free bathrooms (Wobst 2007). The study of how humans manufacture, use, and think about material culture was for him the encompassing and distinctive definition of the field of archaeology.

His second major area of contribution was to broaden the discipline's understandings of hunter-gatherer/band/egalitarian ways of life. He challenged the field, through intricate computer simulations and abstract thought experiments, to move beyond tacit culture-bound preconceptions that ancient hunter-gatherer life was small scale, repetitive, and dull, instead offering on the basis of reasonable scientific assumptions that this way of life was and is constituted by lives filled with considerable variety, enmeshed in complex social processes, full of action and imagination. A major foil to illustrate these points was the European Paleolithic, of which his working knowledge of 13 languages gave him unusual scholarly command. Surveying the portable artifacts, rock art, and settlement systems of the Paleolithic, his articles pointed to heretofore underanalyzed dimensions of material variability that could only be accounted for by imagining dynamic and diverse ways of life (Wobst 1974a, b, 1976).

To these areas Wobst has added theoretical and institutional contributions furthering indigenous archaeology. He has coedited two foundational volumes on the topic, one of original papers with Claire Smith (Smith and Wobst 2005) and another that compiles key articles and excerpts in the development of indigenous archaeology with Margaret Bruchac and Siobhan Hart (Bruchac et al. 2010). In these volumes, and in other venues, his contributions point out how and why archaeology is better archaeology when it engages indigenous peoples, be they in the Australian desert, the Arctic tundra, the former Soviet Union, or his community of Leverett, Massachusetts (Wobst 2005, 2010).

Wobst is widely known for his razor-sharp and often amusing analyses, qualities that make him one of his generation's commentators par excellence. His articles, afterwords, professional presentations, and discussant's comments capture archaeology's historical trends and contemporary interests, dissect their internal contradictions, comment on their unexplicated frames of reference, and show that human culture is capable of extraordinary variability. For Wobst, the future of the discipline lies not in establishing new orthodoxies, but in continually pushing at the boundaries of how archaeology understands the breadth of the human experience through the distinctive lens of our creative materiality.

Cross-References

- ▶ Decolonization in Archaeological Theory
- ▶ Ethnic Identity and Archaeology
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Materiality in Archaeological Theory
- ▶ Style: Its Role in the Archaeology of Art

References

Bruchac, M.M., S. Hart, and H.M. Wobst, eds. 2010. *Indigenous archaeologies: A reader in decolonization*. Walnut Creek: Left Coast Press.

Smith, C., and H.M. Wobst, eds. 2005. *Indigenous archaeologies: Decolonising theory and practice*. London: Routledge.

Wobst, H.M. 1974a. The archaeology of band society – Some unanswered questions. In *A model of band society*. Memoirs of the Society for American Archaeology 29, ed. B.J. Williams, v–xiii. Washington, DC: Society for American Archaeology.

Wobst, H.M. 1974b. Boundary conditions for Paleolithic social systems. *American Antiquity* 39: 147–178.

Wobst, H.M. 1976. Locational relationships in Paleolithic society. *Journal of Human Evolution* 5: 49–58.

Wobst, H.M. 1977. Stylistic behavior and information exchange. In *For the director: Research essays in honor of James B. Griffin*. Museum of Anthropology, University of Michigan, Anthropological Papers 61, ed. C. Cleland, 317–342. Ann Arbor: University of Michigan.

Wobst, H.M. 1999. Style in archaeology or archaeologists in style. In *Critical approaches to the interpretation of material culture*, ed. E.S. Chilton, 118–132. Salt Lake City: University of Utah Press.

Wobst, H.M. 2005. Power to the (indigenous) past and present! Or: The theory and method behind archaeological theory and method. In *Indigenous archaeologies: Decolonizing theory and practice*, ed. C. Smith and H.M. Wobst, 17–32. New York: Routledge.

Wobst, H.M. 2006. Artifacts as social interference: The politics of spatial scale. In *Confronting scale in archaeology: Issues of theory and practice*, ed. G. Lock and B. Molyneaux, 55–64. New York: Springer Verlag.

Wobst, H.M. 2007. Toilets as tools for teaching. In *Archeology to delight and instruct*, ed. H. Burke and C. Smith. London: University College London Press.

Wobst, H.M. 2010. Indigneous archaeologies: A worldwide perspective on human materialities and human rights. In *Indigenous archaeologies: A reader on decolonization*, ed. M.M. Bruchac, S.M. Hart, and H.M. Wobst, 17–27. Walnut Creek: Left Coast Press.

Further Reading

Wobst, H.M. 1990. Minitime and megaspace in the Paleolithic at 18 K and otherwise. In *In the world at 18,000*, ed. O. Soffer and C. Gamble, 322–334. London: Unwyn and Hyman.

Wobst, H.M. 1993. Mobility and gene flow: Some biological and social thoughts on the Paleolithic. In *Ela' Qua: Essays in honor of Richard B. Woodbury.* Research Report 28, ed. D.S. Krass, R.B. Thomas, and J.W. Cole, 283–291. Amherst: Department of Anthropology, University of Massachusetts Amherst.

Wobst, H.M. 2000. Regions and late Pleistocene hunter-gatherers. In *Regional approaches to adaptation in late Pleistocene Western Europe*. BAR International series 896, ed. G.L. Peterkin and H.A. Price, 221–229. Oxford: Archaeopress.

Wobst, H.M. 2001. Matter over mind: Perishables and the glorification of materiality in archaeology. In *Fleeting identities: Perishable material culture in archaeological research*. Occasional Paper 28, ed. B. Drooker, 43–57. Carbondale: Center for Archaeological Investigations.

Wobst, H.M. 2011. Foraging for information among foragers – An afterword. In *Information and its role in hunter-gatherer bands.* Ideas, Debates and Perspectives 5, ed. R. Whallon, W.A. Lovis, and R.K. Hitchcock, 43–57. Los Angeles: Costen Institute of Archaeology Press.

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Basic Biographical Information

American anthropologist Milford H. Wolpoff was born in 1942 to Ruth (Silver) and Ben Wolpoff in Chicago, Illinois. He was educated at the University of Illinois in the field of physical anthropology, evolutionary biology, and ecology and was a student of Eugene Giles. He was awarded a bachelor degree from the University of Illinois, Urbana, in 1964. In 1969 the University of Illinois awarded him a Ph.D. on the basis of his dissertation, Metric Trends in Hominid Dental Evolution. He has been at the University of Michigan, Ann Arbor, since 1971. Since 1977 he has held the position as Professor of Anthropology at the University of Illinois.

Milford H. Wolpoff is an Honorary Life Member of the Honor Society of Phi Kappa Phi and a Fellow of the American Association for the Advancement of Science. In 2011 he won the Darwin Lifetime Achievement Award of the American Association of Physical Anthropologists as well as the Honorary Member of the Golden Key International Honour Society.

Major Accomplishments

Milford H. Wolpoff has made major contributions to both the research and teaching of

paleoanthropology. He is the author of *Paleoanthropology*, which has been the leading textbook for undergraduate and graduate courses in human evolution since it was first published in 1980. He is the coauthor, with Rachel Caspari, of R*ace and Human Evolution: A Fatal Attraction*, which reviews the scientific evidence and conflicting theories of human evolution and how these interpretations are related to views about race.

Much of Professor Wolpoff's research focuses on the evolution of European Neanderthals (e.g., Wolpoff 2009), the role of culture in early hominid evolution, the nature and explanation of allometry, robust australopithecine evolution, the distribution and explanation of sexual dimorphism, hominid origins (Wolpoff 2002), the pattern and explanation of Australasian hominid evolution, the contributions and role of genetics in paleoanthropological research, and the taxonomy of the genus Homo.

Milford H. Wolpoff's major contribution to paleoanthropology is the development of one of the two most recognizable theories in human evolution – the multiregional model. His basis for advancing the multiregional interpretation of human evolution derives from his disbelief in punctuated equilibrium, the idea that changes occur when new species are formed and only rarely are slowly and gradually accumulated during the stable periods between species, as an accurate model for Pleistocene humanity, noting that speciation played a role earlier in human evolution.

The multiregional theory is a scientific model that provides an explanation for human evolution. In his vision, multiregional evolution describes evolution within a widespread species by normal evolutionary mechanisms (Wolpoff 2004). This differentiates from the replacement theories that he believes describe evolution between species, within changes at the time of speciation, as one species replaces the other.

The theory suggests that humans first arose near the beginning of the Pleistocene, about two million years ago, and successive human evolution has been within a single, continuous human species. This continuous human species includes archaic humans including *Homo erectus* and Neanderthals and evolved worldwide to the diverse populations of modern *Homo sapiens sapiens*. This theory suggests that humans evolved through a combination of adaptation within various regions of the world and gene flow between those regions. Supporters of the multiregional origin find supporting evidence in the fossil record, genetics evidence, and the continuity of archaeological cultures as support for this theory. Wolpoff and his colleagues first published the multiregional evolution in 1981 (Thorne and Wolpoff 1981), before the current understanding of mitochondrial DNA and nuclear sequencing in place. Finally it should be noted that Wolpoff's studies of migrations and gene flow out of Africa in human evolution prefigured the out-of-Africa theory of human evolution.

Cross-References

- ▶ Human Evolution: Multiregional Origins
- ▶ Human Evolution: Theory and Progress
- ▶ Out-of-Africa Origins

References

Thorne, A.G., and M.H. Wolpoff. 1981. Regional continuity in Australasian Pleistocene hominid evolution. *American Journal of Physical Anthropology* 55: 337–349.

Wolpoff, M.H. 1980. *Paleoanthropology*. New York: Alfred A. Knopf.

Wolpoff, M.H. 2002. Sahelanthropus or 'Sahelpithecus'? *Nature* 419: 581–582.

Wolpoff, M.H. 2004. Multiregional evolution. In *Archaeology: The key concepts*, ed. C. Renfrew and P. Bahn, 176–181. London: Routledge.

Wolpoff, M.H. 2009. How Neanderthals inform human variation. *American Journal of Physical Anthropology* 139: 91–102.

Further Reading

Wolpoff, M.H., and R. Caspari. 1998. *Race and human evolution: Fatal attraction*. New York: Simon and Schuster.

Wolpoff, M.H., J. Hawks, and R. Caspari. 2000. Multiregional, not multiple origins. *American Journal of Physical Anthropology* 112: 129–136.

Wood: Conservation and Preservation

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Introduction

Archaeological wood is a wood with a recognized archaeological value (UNI 11205: 2007). The archaeological value is due to a recognized cultural value. Being strictly related to cultural heritage, the material itself is somehow connected to artefacts partly or completely made of wood. Ancient trunks or stem portions (or even roots or branches), not in strict relation with an ancient artefact, however, must be considered as archaeobotany.

Wood is a biodegradable material because it can be destroyed by some categories of living organisms, such as insects, fungi, marine borers, and bacteria (from the most to the less aggressive). Nevertheless, archaeological artefacts made of wood, preserved in the world' museums, are not rare and the wood itself must be conserved in order to preserve the artefact.

Archaeological wood artefacts fall under two different categories: dry archaeological wood and waterlogged archaeological wood. The first comes not from underground or underwater typical excavations but from aerial dry environments (Fig. 1a): an important example is the desert areas for ancient Egyptian objects; in these situations, wood is protected by dry conditions against fungal attacks. More frequently found, however, are the artefacts of the latter category, waterlogged archaeological wood, coming from underwater or terrestrial, but below the water table, excavations (Fig. 1b). In this peculiar environment, wood is protected against insect and fungal attacks by the waterlogged conditions; moreover, the frequent low oxygen availability slows down even the rather slow bacterial attack (Florian 1990).

Wood: Conservation and Preservation, Fig. 1 (**a**) A coffin of dry archaeological wood from the cliff tombs in Longhushan (China, VII – IV cen. B.C.); (**b**) one of the three Roman ships found in an excavation in the center of Naples (Italy, I cen. B.C.)

In the other excavation environments, it is very rare to find wooden archaeological objects because the conditions are aggressive toward the material that is then transformed into humic substances within decades.

Wooden artefacts can be found even as charcoal artefacts. But in those cases, wood has been already transformed into a different material and the conservation of charcoal will not be discussed here.

Definition

Wood conservation is defined as the guaranteed operations on wooden cultural heritage through a coherent, coordinated, and planned activity of study, prevention, maintenance, and restoration applied to archaeological wood constituting in total or partially archaeological artefacts (UNI 11205: 2007). The preservation is aimed to extend the life of the conserved artefacts as much long as possible. From the methodological point of view, the whole conservation of ancient objects previews three different phases: analyses, conservation, and preservation.

Key Issues/Current Debates/Future Directions/Examples

The key issues and current debates within this discussion are strictly linked to the three aforementioned phases of conservation. But, before that, wood protection and conservation starts within the excavation site.

According to the ICOMOS Charter on the Protection and Management of Underwater Cultural Heritage (1996), once the presence of wood has been identified, if it is not absolutely necessary, retrieval must only be carried out if suitable conditions for safeguarding the wood can be ensured beforehand. In advance, the real economic and technical possibilities for carrying out the following operations in a given time frame must be verified: characterization of the site where the wood is found, storage in suitable and controlled microclimatic conditions, and the characterization of the wood, restoration, possible showcasing in temporary exhibitions, and/or museum use. Where resources are deemed insufficient, retrieval must be postponed and only the documentation and implementation of the suitable measures for protection and temporary conservation must be undertaken.

Wood needs specific care during the retrieval. Before carrying out retrieval operations, measures to protect it from direct radiation and high temperatures (with screens, roofs, and constant spraying in the case of waterlogged wood) must be put in place, and the level of water, if present, must be regulated (with suction pumps etc.) so as to operate in controlled environmental conditions.

If wood comes from confined subaerial sites and underground sites of environments characterized by a dry climate, an apparently unaltered appearance of the wood must not lead to underestimating the importance of caution in the retrieval phase. The general rule applies also in these cases, that is, to prevent the wood from being exposed to sudden variations of relative humidity in order to avoid drastic shrinkages or swelling that can lead to deformations and breakages. Therefore, there is a basic importance to thermo-hygrometrical control the site and the environment in which the artefact is placed after it has been retrieved, so as to put in place systems to enable wood to gradually reach equilibrium in the new conditions, without undergoing damage. It is also necessary to implement measures to guarantee the preservation of wood from biotic attacks. The addition of a suitable biocide must be subject to the evaluation by expert sectorial technical-scientific personnel.

The retrieval of waterlogged wood must be carried out avoiding the evaporation of water from the wood. It is preferable that small size wood be placed in hermetic containers, possibly incorporating sediment and a quantity of water adequate to maintain the waterlogged conditions. For large size wood requiring more time for retrieval, it must be constantly wet to avoid irreversible damage. Since the presence of water in wood in conditions in which it is exposed to environmental contaminants constitutes a factor of high risk for biological colonization, particular attention must be paid to preserving wood.

Then, a characterization is necessary in order to define in qualitative and quantitative terms the degradation undergone by wood and the mechanisms and agents that caused it. This operation has crucial diagnostic value in the preparatory, fact-finding stage, in order to design a project that aims to make suitable choices for the conservation of wood.

Wood characterization cannot operate in isolation from knowledge of the peculiarities of the site

where it lies and the environmental parameters during excavation to be identified (an example can be found in UNI 11206: 2007 "Cultural heritage – Archaeological and archaeo-botanic wood – Guide lines for recovery and first conservation").

Keeping in mind that when possible, while characterizing wood noninvasive enquiries take precedence, sampling must be carried out so as to gather significant data with the least removal of material. The sample must be conserved in containers that are suitably sealed and closed so as to maintain the original humidity of the wood. In the case of waterlogged wood, the sample must be conserved in water that is microbiologically pure. The sample must be maintained in conditions that are unfavorable to biological growth ($T < 4$ °C, no light). The sample must preferably be taken, insofar as possible, from preexisting fractures or surfaces that are not visible. When sampling during excavation, the sample must be taken in the context of the recovery of the wood. The size of the sample depends on the type and number of enquiries laid down. In sampling operations, the environmental parameters of the site in which the wood was found must be noted.

Wood characterization supplies data for the definition of its state of conservation and for carrying out technological evaluations. These characterizations must include at least (Macchioni et al. 2012):

- Wood species identification, through macroscopic and/or microscopic observations.
- Macroscopic description, to define the morphometric characteristics of wood, of some technological characteristics (presence of sapwood and defects, such as, e.g., knots), of the presence of carbonization, traces of workmanship, etc.
- Micromorphological characterization of the anatomical features that define the state of wood such as the effects of abiotic and biotic degradation. In the case of biodegradation, the entity of degradation of wood must be evaluated, and the typology of attacks by organisms (insects, molluscs, crustaceans) and microorganisms (bacteria, fungus) must be distinguished.
- Chemical analysis aimed at determining chemical components of wood residue apparent in quantitative and qualitative results. Quantitative results define the amount of residue of both organic (in particular, cellulose, hemicellulose, holocellulose; lignin, organic extractives; some aqueous extractives) and inorganic nature (in particular, some aqueous extractives, ashes). Qualitative results identify chemical alterations undergone by the constituents of wood. Chemical characterization of mineral contents enables defining the diagnostic framework. Each evaluation must be carried out on the basis of comparison with analytical results obtained from the same unaltered species of wood recently.
- Physical analysis in which humidity and density values of wood are determined. In the particular case of waterlogged wood, the volume mass must be determined as basic density and residual basic density; moreover, the maximum content of water and equilibrium humidity must be determined.

On the basis of the obtained results, it will be possible to produce a diagnostic report, aimed to take any decision on conservation of archaeological wood.

The suitable choices to conserve wood could then be divided into three branches:

1. The general state of preservation of wood is good/very good, and the future preservation environment is quite similar to the previous one, that is, before retrieval. The decision must be that deep consolidation treatments are not necessary, eventually just a surface makeup.
2. The general state of preservation of wood from the anatomical, physical, and chemical point of view is not good, and the future preservation environment of the artefact is completely different from the previous one. A consolidation treatment can be necessary. The artefact

typology, the diagnostic report, and the future preservation of environment will suggest the most suitable treatment, in terms of materials and methods.

3. The general management of the excavation site, the financial constraints, the lack of scientific support to perform a consolidation treatment, the lack of decision chain in terms of future preservation/exhibition of the artefacts are all elements that could support the decision of an in situ preservation activity for wooden objects. The excavation site and the relevant wooden artefacts are recorded and then reburied, both in terrestrial and underwater sites.

More in depth:

1. Deep impregnation treatments on a porous material, and particularly on wood, can never be considered really reversible. The only achievable results are a reduction of the concentration of the consolidant or the retreatability of the new composite made of wood and the consolidant. The future behavior of the new composite during time (at least decades or centuries), its physical and chemical stability, is never completely foreseeable; thus, the consolidation of a wooden artefact through a deep impregnation must be planned only when it is absolutely necessary.
2. In waterlogged archaeological wood, when the anatomical, physical, and chemical decay is high, the reduction in thickness and in strength of the wood cell walls is high, and the pressure of water ensures the maintenance of the shape of the cells, and in last analysis of the whole artefact. The loss of water during an eventual air drying frequently causes partial or total collapsing of cells and the partial or total loss of the original shape of the artefact (Fig. 2).

Consequently, the conservation of waterlogged archaeological wood involves the removal of water by means of treatments whose goals, as suggested by Grattan and Clarke (1986), can be summarized in the ability of the treatment to stabilize shape and dimensions of the artefact and the ability of the artefact (by means of the treatment) to withstand the future preservation environment. Moreover, the approach to conservation must also ensure the safeguarding of physical integrity of wood and, as much as possible, of its mechanical properties, when the wooden findings consist of large-sized structures with a

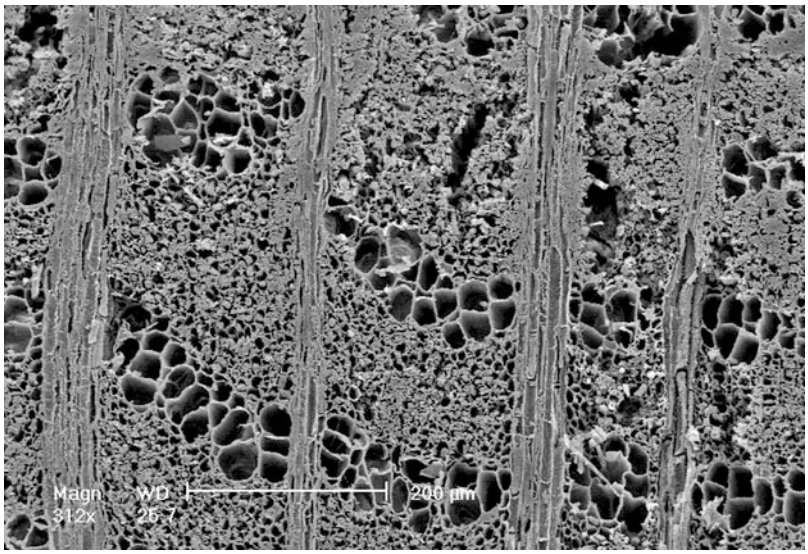

Wood: Conservation and Preservation, Fig. 2 Transverse section of elm (*Ulmus* sp.) wood by SEM. The fiber cell walls have been destroyed by bacterial attacks

complex architecture, made of several wood species differently decayed. Various methods have been tested and used so far for the conservation of degraded waterlogged wood (Giachi et al. 2010, 2011). Recently, Hoffmann (2009) compared some of the treatments currently most used and found that whereas the success of a stabilizing intervention depends on several factors, each method presents advantages and disadvantages. Generally, a compromise between contingent conservation exigencies, maintenance requirements, costs, safety, and easiness of procedures is chosen. At present, the most used techniques to conserve waterlogged archaeological wood are based on the impregnation of artefacts by natural or synthetic products, which penetrate into the objects through the diffusion and permeation processes (Grattan and Clarke 1987). Treatments using PEGs [polyethylene glycols of various molecular weights (Fig. 3)] are by far the most diffused, although methods using sucrose and other sugars (Cott and Strigazzi 1999) and more recently sugar alcohols (Zhang et al. 2009) and Kauramin®, a melamine resin (Wittköpper 1998), are also used. A new methodology through a "gentle" controlled drying in vacuum chambers is taking off (so far there have been no scientific studies published on this methodology).

3. Reburial in terrestrial environments and covering with natural or artificial sediments in underwater excavations must be designed with particular accuracy because the goal must be the obtaining of the same conditions that ensured the conservation of the artefacts before the excavations. Particular care must be paid to the oxygen availability and the risk of quick and highly destroying fungal attacks in terrestrial excavations, while, in underwater marine excavations the risk of quick destroying attacks is from marine borers, especially from shipworms (*Teredo* sp.). The presence of a thick (at least 50 cm) layer of sediment reduces the oxygen availability and protects from the shipworms attacks (Björdal and Gregory 2011).

The artefacts, treated or not, reburied or not, will need continued maintenance that must be designed together with the treatment methodology.

Wood is a hygroscopic and anistropic material and it maintains these features through time. Its treatment with different chemical consolidant can vary, but not block, the eventual and

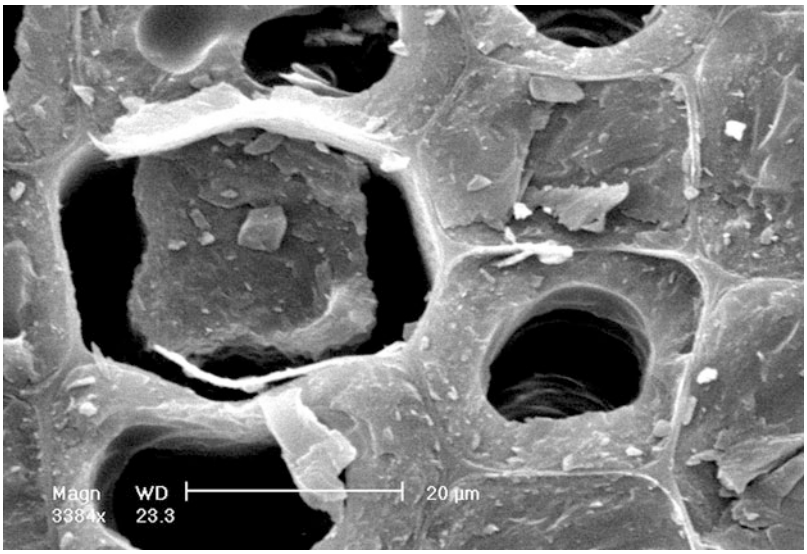

Wood: Conservation and Preservation, Fig. 3 Transverse section of a fir (*Abies* sp.) archaeological samples treated with PEG 400 and 4000. The treatment both consolidates degraded cell walls and fills some cell lumens

differentiated movements of wood due to thermohygrometric variations of the environmental conditions. As such, the chemical stability of untreated and mostly of treated artefacts needs continuous monitoring because the real behavior of a new composite made of decayed wood and consolidant cannot be completely foreseeable. Such was the case of the warship Vasa, which is well known and has been scientifically described in several Ph.D. thesis, papers, and books (e.g., Sandström et al. 2002). Additionally, wood is a biodegradable material and the component of the cell walls can be severely degraded by new attacks on already degraded cells of archaeological wood. The new eventual components added to wood for preserving artefacts could avoid new attacks, but also cause new ones. In the end, the stability of the treated artefacts must be controlled through time and the design of the preservation treatment should precisely describe the analyses to be made and their timing.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Museums
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Ship Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime
- ▶ Waterlogged Finds: Conservation

References

Björdal, C., and D. Gregory, eds. 2011. *Wreck protect, decay and protection of archaeological wooden shipwrecks*. Oxford: Archaeopress.

Cott, J., and G. Strigazzi. 1999. Verschiedene Saccharide für die Nassholzkonservierung [Various saccharids for water-logged wood conservation]. *Arbeitsblätter für Restauratoren* 32: 291–294.

Florian, M.L.E. 1990. Scope and history of archaeological wood. In *Archaeological wood, properties, chemistry and preservation.* Advances in Chemistry series 225, ed. R.M. Rowell and R.J. Barbour, 3–32. Washington, DC: American Chemical Society.

Giachi, G., C. Capretti, N. Macchioni, B. Pizzo, and I.D. Donato. 2010. A methodological approach in the evaluation of the efficacy of treatments for the dimensional stabilisation of waterlogged archaeological wood. *Journal of Cultural Heritage* 11: 91–101.

Giachi, G., C. Capretti, I.D. Donato, N. Macchioni, and B. Pizzo B. 2011. New trials in the consolidation of waterlogged archaeological wood with different acetone-carried products. *Journal of Archaeological Science* 38: 2957–2967.

Grattan, D.W., and R.W. Clarke. 1987. Conservation of waterlogged wood. In *Conservation of marine archaeological objects*, ed. C. Pearson, 164–206. London: Butterworth.

Hoffmann, P. 2009. On the efficiency of stabilisation methods for large waterlogged wooden objects, and how to choose a method. In *Proceedings of the 10th ICOM Group on Wet Organic Archaeological Materials Conference, Amsterdam 2007*. Nederlandse Archeologische Rapporten 37, ed. K. Strætkvern and D.J. Huisman, 323–348. Amersfoort: Drukkerij Stampij.

ICOMOS. 1996. Charter on the protection and management of underwater cultural heritage. Ratified by the 11th ICOMOS General Assembly, held in Sofia, Bulgaria, from 5–9 October 1996.

Macchioni, N., B. Pizzo, C. Capretti, and G. Giachi. 2012. How an integrated diagnostic approach can help in a correct evaluation of the state of preservation of waterlogged archaeological wooden artefacts. *Journal of Archaeological Science* 39: 3255–3263.

Sandström, M., E. Jaliehvand, I. Persson, U. Gelius, P. Frank, and I. Hall-Roth I. 2002. Deterioration of the seventeenth-century warship Vasa by internal formation of sulfuric acid. *Nature* 415: 893–897.

UNI 11205. 2007. *Cultural heritage – Archaeological and archaeo-botanic wood – Guidelines to the characterization*. Italian Technical Standard.

UNI 11206. 2007. *Cultural heritage – Archaeological and archaeo-botanic wood – Guide lines for recovery and first conservation*. Italian Technical Standard.

Wittköpper, M. 1998. Der aktuelle Stand der Konservierung archäeologischer Naßhölzer mit Melamin/Aminoharzen am Römisch-Germanischen Zentralmuseum. *Archäeologisches Korrespondenzblatt* 28: 637–647.

Zhang, J.P., S. Imazu, and A. Morgós. 2009. Lactitol conservation of the 1st c. BC extremely degraded warterlogged archaeological wooden figures and objects excavated at the tomb of one of the king of the ancient Sishui Kingdom in China. In *Proceedings of the 10th ICOM Group on Wet Organic Archaeological Materials Conference, Amsterdam 2007*. Nederlandse Archeologische Rapporten 37, ed. K. Strætkvern and D.J. Huisman, 253–269. Amersfoort: Drukkerij Stampij.

Woodland and Mississippian Cultures of the North American Heartland

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State of Knowledge and Current Debates

Introduction

Since the early days of North American archaeology, one area of particular interest has been the North American heartland, which is found in the Midwest and Midsouth of the continent, stretching from the eastern margins of the Great Plains to the Appalachian Mountains (Fig. 1). The first Europeans venturing west of the Appalachians encountered thousands of mounds, enclosures, and other earthworks in this area, which stood as testaments to the ancient people who lived in these regions. At first these constructions, many of which were laid out with startling geometric precision, were attributed by some European Americans to a lost race of mound builders, who perhaps had been eradicated by the indigenous people then inhabiting the area. Although some of the earliest students of archaeology in North America, including Thomas Jefferson, concluded that these constructions were built by the ancestors of American Indians, it

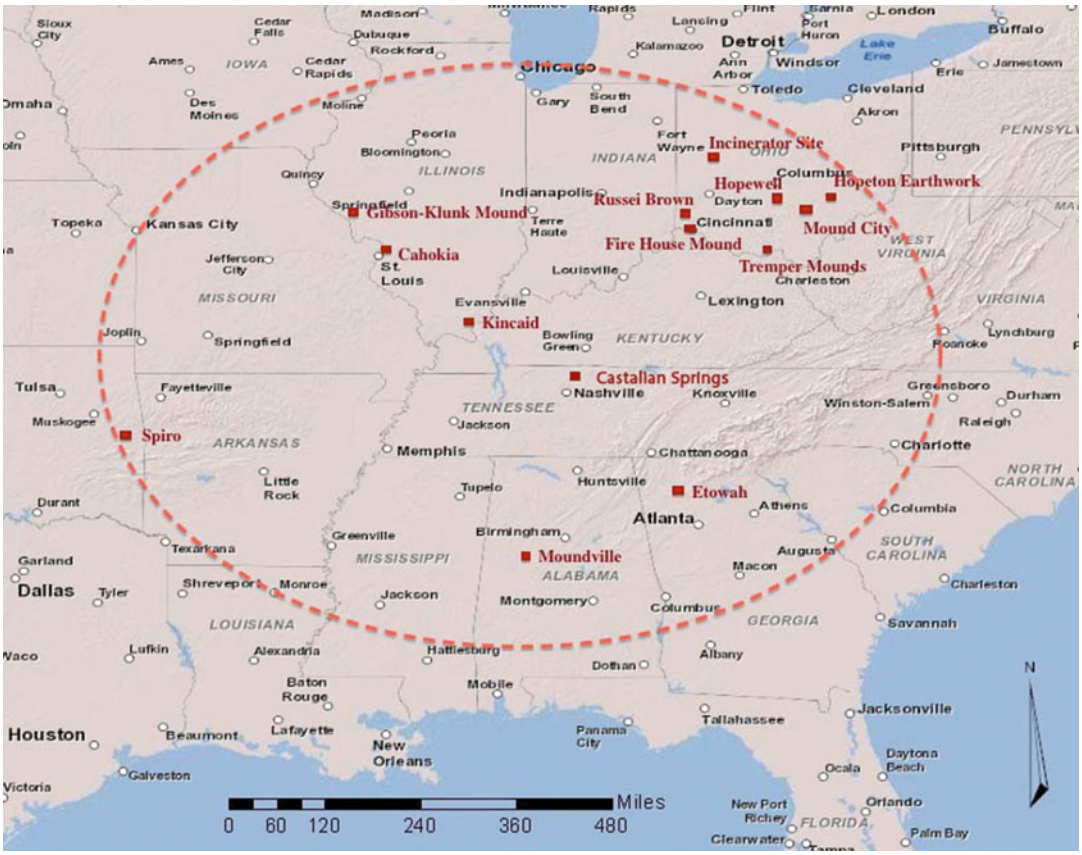

Woodland and Mississippian Cultures of the North American Heartland, Fig. 1 The heartland region showing the location of key sites

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was not until the end of the nineteenth century that the debate about who the mound builders were was settled, and these mounds were understood to have been built by Indians. Deprived of popular fantasies about lost races and ancient wonders, the public became much less interested in the mounds and earthworks of the heartlands. Progressively, many of the tumuli were destroyed for the fill dirt they contained or in order to make farming of the land easier during the nineteenth and twentieth centuries.

Today, most Americans know very little of the mounds and earthworks of the heartland, and the preservation of those remaining is threatened. Even those who do know of a particular mound group have little understanding of the cultural context in which mounds and earthworks were built. Instead, superficial and stereotypical ideas about "primitive" or "ecological" Indian tribes of the heartland are common.

Nevertheless, at first stimulated by early debates about mound builders and their origins, but then carried on by the universities and museums of the area as well as under government auspices and through contemporary CRM projects, the archaeology of the heartland has been an important focus for American archaeologists since the late nineteenth century. Not only have archaeologists learned about mounds, earthworks, and their constructions, but the cultural sequence for the area now is well understood. The lifeways of people inhabiting this area in the pre-Columbian past have been partially delineated. Archaeologists working in the heartland also contribute significantly to theoretical and methodological debates within American archaeology. Between 1000 BCE and European contact, two broad periods generally are recognized for the heartland. These periods, the Woodland and the Mississippian, which encompass much of the time when significant mound and earthwork construction took place, are the focus of this entry.

History of Concepts

By the 1930s, North American archaeologists generally agreed that there were two broad pre-Columbian Eastern Woodland pottery making patterns both of which were associated with more sedentary lifeways and possibly horticulture. These were called the Woodland pattern and the Mississippian pattern by McKern (1939: 309) and distinguished on the basis of trait lists. A further attempt to define the Woodland pattern was made at an archaeological conference held in Chicago in 1941 when a more detailed list of Woodland traits was constructed that was linked to semi-sedentary lifeways; grit-tempered, cord-marked pottery of subconoidal form; and stemmed or notched projectile points. In contrast the Mississippian pattern was believed to be distinguished by sedentary lifestyles; shell-tempered, incised, or modeled pottery in various shapes; and small triangular projectile points.

As archaeologists grew more interested in human adaptations and adopted more explicitly evolutionary models of the past, the concepts of the Woodland and Mississippian patterns were reformulated. Archaeologists came to recognize a Woodland period, extending from approximately 3,000–1,000 years ago, and a Mississippian period beginning around 1,000 years ago each with different lifeways. The Woodland period was associated with the appearance of pottery and burial mounds as well as with the first evidence of horticulture. It was also generally subdivided into Early, Middle, and Late subperiods with the Early Woodland marked by the initial appearance of pottery and burial mounds and the Middle Woodland distinguishing the era of Hopewell cultural developments and interaction (see below). In heartland taxonomic sequences, the Late Woodland usually was described as an interlude between Hopewell and Mississippian fluorescences. Outside the heartland, where Mississippian culture did not develop, the Late Woodland period, more often than not, was understood to continue until contact with Europeans. The Mississippian period distinguished societies that were dependent on agriculture and, thus, fully sedentary. It was also characterized by population growth and aggregation, social ranking, specialization of labor, and elaborate religious ceremonies.

The seminal formulation of Willey and Phillips (1958) placed the Woodland and the Mississippian into an evolutionary scheme by insisting that these patterns were stages of cultural development rather

than periods. While these authors viewed the Early Woodland as at an "Archaic level" of development, Middle Woodland and later cultures of the Eastern Woodlands including the Mississippian were presented as examples of the Formative Stage. This stage had two central defining characteristics: agricultural economies and settled village life.

Today North American archaeologists use the concepts of Woodland and Mississippian periods and stages more or less interchangeably, overtly ignoring the evolutionary implications of these designations even while implicitly accepting many aspects of the formulation. There is a general understanding that the peoples of the heartland after roughly 3,000 years ago used pottery, built mounds, and engaged in elaborate mortuary ceremonialism while living in more or less sedentary villages and growing both native and tropical cultigens as parts of mixed economies that also incorporated many wild resources. These people are also understood to have participated in regional trade networks that moved raw materials, foodstuffs, and finished goods to great distances. Significant population growth and aggregation are believed to have characterized the Woodland and the Mississippian. Although data now indicate both considerable variability in Woodland and Mississippian societies and economies and the presence of "Woodland traits" during the preceding Archaic period, Woodland and Mississippian remain important general concepts for heartland archaeologists.

Woodland and Mississippian Cultures of the North American Heartland, Table 1 Temporal breakdown of the Woodland and Mississippian periods in the North American heartland

Cultural period	Subperiod	Approximate dates
Mississippian	Late Mississippian	AD 1400–1550
	Middle Mississippian	AD 1200–1400
	Early Mississippian	AD 1000–1200
Woodland	Late Woodland	AD 500–AD 1000
	Middle Woodland	200 BC–AD 500
	Early Woodland	1000 BC–200 BC

The Woodland

As mentioned above, the Woodland period in the heartland of North America is typically broken down into Early, Middle, and Late periods (Table 1). The Early Woodland period is usually dated from approximately 1000 BCE to 200 BCE, while the Middle Woodland period includes the interval between approximately 200 BCE and CE 500. There is some variation within the heartland in dating with some authorities starting the Middle Woodland closer to 100 BCE and some not ending it until CE 600. The Late Woodland period follows the Middle Woodland interval and extends until around CE 1000 in the heartland, although in adjacent nonheartland areas Late Woodland persists to contact with Europeans in the sixteenth century.

Early Woodland

Early Woodland people in the heartland have sometimes been characterized as having Archaic adaptations with pottery, but this is an oversimplification of complex, time-transgressive, and variable changes. The first pottery in the Eastern Woodlands was produced along the Atlantic Coast in parts of the Carolinas, Georgia, and Florida during the Archaic period. However, this innovation did not quickly diffuse over the heartland. Instead, the adoption of ceramic technologies was a slower time-transgressive process that could have been influenced by the production, exchange, and use of steatite (soapstone) bowls (Sassaman 2002). Alternately, steatite bowls could have had a specialized purpose, possibly processing certain mast (nuts) for consumption (Truncer 2004). Vessels, bowls, and bottles made out of gourds, wood, and basketry also might have contributed to the slow adoption of pottery. Some peoples in the heartland did adopt pottery earlier than others, which may reflect lower mobility, new land tenure systems, and/or the incorporation of new subsistence strategies. Notably by approximately 1500 BCE, Late Archaic people living along the middle Tennessee River were making pottery. By the beginning of the Early Woodland period, most groups in the heartland were

probably aware of how to produce pottery. Yet it is unclear how much pottery some Early Woodland people made and whether it was central to their lifeways.

While many Early Woodland people were mobile hunter-gatherers, who probably did not construct permanent structures, some sites suggest a greater degree of permanence. Similarly, some groups supplemented earlier subsistence practices with various indigenous domesticates such as goosefoot (*Chenopodium berlandieri*), knotweed (*Polygonum erectum*), sumpweed (*Iva annua*), sunflower (*Helianthus annuus*), and squash (*Cucurbita pepo*). Several cave sites in northwest Arkansas and eastern Kentucky contained caches of these domesticated seeds (Fritz 1993). Nuts were also important foodstuffs because they could be gathered by the bushel in a good year and placed in storage pits to be eaten during lean seasons. People hunted white-tailed deer (*Odocoileus virginianus*), rabbit (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), squirrel (Sciurus spp.), and wild turkey (*Meleagris gallopavo*). Many Early Woodland groups also fished, hunted waterfowl, and collected freshwater mussels and other aquatic fauna.

Many aspects of Early Woodland life were remarkably similar to earlier lifeways. Yet Crothers (2012: 525) has argued that "new forms of social and economic relations emerged panregionally with the development of the first horticultural economies." It appears that many Early Woodland peoples placed an emphasis on establishing and conducting complex ritual regimes, which may have included masculine initiation ceremonies in certain caves (Crothers 2012) and rituals associated with menstrual retreats in rock shelters (Claassen 2011) as well as the elaborate treatment of the dead at specific regional centers that archaeologists have long recognized. The interactions at these regional centers presented opportunities to "work out" competing claims on the social persona of the living and dead, as well as opportunities to feast, negotiate alliances, smoke pipes, exchange goods, play games, and possibly acquire brides/grooms from other social groups.

Early Woodland mortuary regimes had considerable continuity with earlier practices from the Terminal Archaic period, c. 2000–1000 BCE. For example, the Glacial Kame and Red Ocher mortuary complexes straddle the transition between the Late Archaic and Early Woodland periods. The Glacial Kame mortuary complex, of Illinois, Indiana, Ohio, and further north around the Great Lakes, derived its name from the practice of placing the dead in gravel ridges or kames left by glaciation. These burials usually were tightly flexed inhumations in circular pits that were covered with red ocher and sometimes included elaborate ceremonial objects, such as sandal-sole shell gorgets, circular shell gorgets, bar gorgets, birdstones, tubular pipes, wolf and bear masks, and copper and shell beads. The Red Ocher mortuary complex refers to burials in Indiana, Ohio, and Michigan that were covered in red ocher and associated with diagnostic turkey tail points. These bodies were sometimes covered by low artificial mounds and interred with cache blades and tubular pipes. The deposition of large caches of ceremonial objects, such as turkey tail points and cache blades, is a notable development associated with the Red Ocher complex because it portends some later Early/Middle Woodland rituals. While historically these two "types" of sites have been considered distinct, it is probably more apt to refer to Red Ocher and Glacial Kame as similar regional interaction spheres.

After 500 BCE, the construction of burial mounds and associated earthen enclosures accelerated, especially in portions of Ohio, Kentucky, and West Virginia. Many of these mounds and enclosures are associated with the Adena taxon. This association is unfortunate because the Adena mound, located near Chillicothe Ohio, is a poor type site. It is composed of a primary and a secondary mound and there are significant differences between the artifacts interred in these components. New AMS dates from Burial 20, a log crypt dug into the primary mound, place the earlier component at the Adena-type site, circa 100 BCE to 100 CE (Lepper et al. 2014). These dates from Adena indicate that the primary mound was contemporaneous with the early Middle Woodland (Hopewell) Tremper Mound, located

further south in the Scioto River Valley. The secondary mound (Adena type-site) is therefore coeval with later Middle Woodland components. Heartland archaeologists therefore need to reassess the Adena taxon and perhaps even adopt new approaches to variable mortuary programs throughout this part of the Woodland (Clay 2014).

Mounds associated with the Adena taxon typically date after 500 BCE and extend into the Middle Woodland period. Adena burial mounds are notoriously complex and variable. These mortuary regimes often begun with some sort of charnel structure, crypt, or screened area; whose use was discontinued when the facility was mounded over. Circular "paired post" structures were a common feature at the base of Adena mounds. Some of these paired post structures were quite large and it appears unlikely that they were roofed, given the absence of central support posts. Circular earthen enclosures, colloquially dubbed "sacred circles," are also often associated with Adena. These earthen enclosures generally have a moat-like outer ring that was bridged by a narrow gateway and an interior earthen embankment. A mound was sometimes constructed inside these earthen rings, and in particular cases, it grew so large that the underlying circular embankment was no longer visible.

Adena burial mounds were sometimes accretional tumuli with log tombs or crypts dug into the primary mound. Deceased individuals were interred in these log tombs and then the mound was capped with additional soil. Some Adena mounds became quite large due to the addition of many accretional burials and soil mantles. There is also considerable diversity in Adena interment styles, since extended burials, cremations, and bundle burials can occur in the same mound. Some of these burials were interred with various objects, including stone axes, gorgets, pendants, celts, mica crescents, copper beads, shell beads, pearl beads, tubular pipes, animalistic headdresses, and copper bracelets and rings.

Elaborately carved stone and clay tablets are considered diagnostic of Adena, but it is notable that four serpentine examples were found in Mound 1 at the Middle Woodland, Hopewell type-site located near Chillicothe, Ohio. A close examination of the primary evidence reveals that most of these tablets derived from poorly dated contexts so assigning them to a particular period is problematic. Nevertheless, these small rectangular, engraved tablets portray a rich assortment of iconographic imagery, including raptorial birds, human–bird hybrid beings, and other types of images. These tablets were often interred with bone awls and/or various pigments. The bone awls seem to correspond to the grooves found on the back of many of these tablets, which suggests they were used to sharpen the awls. Archaeologists have suggested that these tablets could have been used in two ways. First, these tablets may have been used to stamp the illustrations they bear onto clothing or other objects. Second, they may have been part of tattooing kits, which posits that the bone awls were sharpened on the tablets and dipped into the pigments. The bone awls were then used to impregnate different areas of the body with tattoos.

Middle Woodland

Archaeologists date the beginning of the subsequent Middle Woodland period earlier in some parts of the heartland than in others. This is because many of the diagnostic traits used to mark the Early–Middle Woodland transition are time-transgressive traits that occur earlier in particular areas and later in others. For example, the Early Woodland (Tchefuncte/Tchula) people of the Lower Mississippi River Valley produced ceramic vessels with curvilinear incising and rocker stamping: two attributes that are often used to differentiate Middle Woodland, Hopewell assemblages. Some of the most characteristic motifs are incised depictions of raptors and ducks on ceramic vessels (Fig. 2). Middle Woodland, Hopewell people in Illinois also produced similar pottery styles by around 200 BCE. These decorative techniques were only later adopted by peoples in southern Ohio, as well as in other parts of the heartland. In many areas of the central Ohio River Valley, Middle Woodland groups simply continued to make pots very similar to those they traditionally used, a pattern often associated with the continuation of the Adena complex.

Woodland and Mississippian Cultures of the North American Heartland, Fig. 2 Unusual double Hopewell ceramic vessel with raptorial and diving bird imagery from Mound City near Chillicothe, Ohio

While an early perspective was that Middle Woodland, Hopewell people lived in hierarchical societies that had corn-based agricultural economies and permanent villages, subsequent archaeological work has revised our understanding of their lifeways. Settlement surveys have found little evidence of domestic dwellings among Ohio Hopewell earthworks. Instead they have documented the presence of small, dispersed occupations that served as sedentary farmsteads or nodes in more itinerant hunter-gatherer lifeways. Middle Woodland settlement patterns were oriented differently in the Illinois River Valley, since Illinois Hopewell occupations are more regularly spaced and located at the base of bluffs below clusters of burial mounds. Other regions also seem to have dispersed settlements.

Analyses of Middle Woodland subsistence practices generally show continuity with earlier food ways. Nevertheless, increased utilization of indigenous seeds is evident in the Illinois and central Ohio River Valleys. This pre-maize horticulture emphasized the cultivation of oily seeds, sunflower, and sumpweed, as well as small grains like chenopodium, knotweed, maygrass, and little barley. All of these seeds had been cultivated for several millennia, but in Middle Woodland times, they became even more important to some groups (Scarry and Yarnell 2011). The diets of other Middle Woodland peoples do not reflect an increasing use of indigenous domesticates. There are also regions, such as the central Mississippi River Valley, where the diet of Middle Woodland people remains to be delineated.

Middle Woodland mortuary practices also varied considerably, but many Adena/Hopewell funerary regimes involved secondary burial rites. It was during these staged secondary burial rites that Middle Woodland mounds were constructed to cover their charnel precincts. Two important centers of mound building in the heartland region are the Illinois and Ohio Hopewell archaeological complexes, although a number of other regional expressions exist.

Illinois Hopewell is known primarily from the Illinois River Valley, where many burial mounds have been found on bluffs and in the floodplain. The Gibson–Klunk mounds, located along the western bluff line of the Illinois River Valley at Kampsville, Illinois, have been particularly well studied. These mounds had central vaults, often lined with logs, in which the dead were placed and allowed to decompose. Many of these bones were collected and then interred as secondary burials in the corner of the tomb or in a pit along the side of the primary mound (Brown 1979). Some of the dead were interred as primary burials in these crypts. Grave goods were frequently buried with both types of burials. At the end of the ritual cycle, Illinois Hopewell people covered these crypts with mounds. Some status differentiation is evident in the burials, but sex and age rather than heredity seem to be the primary determinants of burial treatment.

Ohio Hopewell people, in contrast, constructed charnel houses to store the dead before they were cremated. These Ohio Hopewell charnel houses were roofed, sometimes two storied, rectangular structures that had rectangular fired clay basins on their floors (Brown 1979). The fired clay basins were constructed from puddled clay and the dead could have been cremated in some of the larger

examples, but they probably also served as multipurpose hearths. Burials along with rich grave goods were placed on the floors of these charnel houses. Large ritual caches, a distinctive feature of Ohio Hopewell rituals, sometimes were deposited in these structures in (or adjacent to) the fired clay basins. Large ritual caches often contained more elaborate objects and ritual paraphernalia than the burials. Ohio Hopewell people razed these charnel structures and constructed a mound over them, which terminated their use. Moreover, on floodplains or alluvial terraces, these mounds often were enclosed within large earthen embankments that were constructed in a variety of geometric shapes and included circular woodhenge structures within them as well as mounds. Ohio Hopewell hilltop enclosures were constructed to conform to the natural topography of hills and summits.

The elaborate paraphernalia found with burials and in ritual caches in Hopewell mounds indicate that increased interaction, exchange, and possibly long-distance forays occurred during the Middle Woodland period. The term "Hopewell Interaction Sphere" has been used to describe this interaction and exchange (Carr and Case 2005; Charles and Buikstra 2006). The movement of specific types of objects and raw materials, including copper, marine shell, and exotic cherts, points to continuity with previous exchange networks. The copper came primarily from northern Michigan and southern Ontario, although a smaller amount was derived from the Appalachian Mountains and other sources. The marine shell likely came from the Gulf and Atlantic Coasts. Various types of chert also moved through Hopewell exchange networks, sometimes in huge quantities, given the large numbers of exotic bifaces found in particular ritual caches. For example, there were caches of over 8000 bifaces made of nonlocal blue-gray chert, found under Mound 2 at the Hopewell type-site.

Other materials were acquired in unprecedented quantities by Middle Woodland people, such as obsidian from the Rockies and mica from the Appalachians. For example, 300 lbs. of obsidian was interred under Hopewell Mound 11 and it appears to have been directly procured from outcroppings at Yellowstone National Park in Wyoming. The direct acquisition of this obsidian is supported by depictions of bighorn rams in Hopewell iconography. Bighorn rams are not local to Eastern North America, but live in the Rocky Mountains near the obsidian sources indicated by recent chemical analyses. Similarly large quantities of mica were acquired by Ohio Hopewell people probably from Middle Woodland groups who lived in the Carolinas. This mica was cut into various forms, such as circles, human hands, and decapitated/dismembered human bodies.

Certain finished objects were exchanged during the Hopewell horizon, such as copper panpipes, copper "reel-shaped" gorgets, Hopewell series pots, and plain and effigy platform pipes. For example, large caches of exquisitely carved Hopewell animal effigy platform pipes were deposited under Mound 8 at Mound City and the Tremper mound, which are located along the Scioto River in central Ohio (Fig. 3). Smaller quantities of animal effigy platform pipes also occur with burials in various other Ohio and Illinois Hopewell mounds. These animal effigy pipes depict a veritable menagerie of different mammals, reptiles, and birds. They represent these animals in a naturalistic style, although some stylized motifs occur. Compositional analyses indicate that these pipes were produced from various sources. Three important sources are Sterling pipestone from

Woodland and Mississippian Cultures of the North American Heartland, Fig. 3 Falcon effigy pipe from the Tremper Mound in Southern Ohio

northern Illinois, Feurt Hill pipestone from central Ohio, and red catlinite from Minnesota and southern Ontario (Emerson et al. 2013).

Recent research also indicates that specific iconographic themes emerged during the Middle Woodland, Hopewell period. For example, Giles (2013) has illustrated that Burial 11 in Hopewell Mound 25 was interred wearing a double-headed raptor headdress that parallels other representations from the central Ohio River Valley, including certain Adena tablets (e.g., the Low Tablet). Some Hopewell iconographic themes and objects also suggest a measure of continuity with Late Woodland and Mississippian symbols, including, (Hopewell) copper earspools, quadriconcave plates, cross-in-circle motifs, human-bird hybrid imagery, and copper falcon repoussé plates (Fig. 4).

Hopewell exchange objects have been found in sites outside the heartland. For example, burial pits excavated at the Mandeville site, a Deptford/Swift Creek tradition site located on the Chattahoochee River in Georgia, contained copper panpipes and earspools, clay platform pipes, prismatic blades, ceramic figurines, mica, and greenstone celts suggesting Hopewell ceremonialism. After approximately 50 BCE, sites in the vicinity of Kansas City to the west of the heartland contain ceramics similar to those from Illinois Hopewell sites as well as other Hopewell objects. The Abbott Farm site, located near Trenton, New Jersey, also contained pottery suggestive of Hopewell in association with mica sheets, argillite and jasper bifaces, conch shell fragments, and platform pipes. Hopewell ideas therefore seem to have influenced many groups outside the heartland during Middle Woodland times (Carr and Case 2005).

Woodland and Mississippian Cultures of the North American Heartland, Fig. 4 Hopewell falcon copper repoussé plate from Mound City, Mound 7 near Chillicothe, Ohio

The Late Woodland

The Late Woodland begins at approximately CE 500, when Hopewell mounds and earthwork complexes were no longer being built. There are a number of places at which terminal Middle Woodland or early Late Woodland people continued to build mounds, such as the Firehouse mound near Cincinnati, Ohio, and the Russell Brown Mound near Chillicothe, Ohio. There also was some rebuilding or repair of Hopewell earthworks during the Late Woodland. Similarly the Hopewell Interaction Sphere appears to have broken down around CE 400–500. However, a more limited interaction sphere continued in the Ohio River Valley that had a more northerly centered distribution in which materials such as mica, shell, and possibly slate were still exchanged (Seeman and Dancey 2000). There are also certain artifacts that seem to indicate continuities with Middle Woodland, Hopewell traditions, such as early Late Woodland Fairfield shell gorgets. The end of the Middle Woodland usually was not abrupt even in Hopewell core regions, and the archaeological taxonomic units associated with this Middle to Late Woodland transition can vary considerably across the heartland. The Late Woodland period ends around CE 1000 when a number of societies in the heartland have characteristics associated with the Mississippian pattern.

Traditionally, archaeologists have considered the Late Woodland period as the time of the "good gray cultures." This designation reflects the idea that the Late Woodland was a drab period of decline, sandwiched between the Hopewell and Mississippian cultural climaxes. More recently archaeologists have viewed the Late Woodland as a pivotal period with considerable variability that was marked by several important transitions.

Late Woodland ceramics were most often plainer than those made during the Middle

Woodland, with cord marking a common surface treatment. The Late Woodland stone tool industry also is characterized by the disappearance of various exotic stone types as well as a reliance on utilized or minimally worked flakes rather than more formal tools. With respect to settlement and subsistence, there was considerable diversity during the Late Woodland period. For example, some Late Woodland peoples had subsistence and settlement strategies that emphasized logistical mobility that was consistent with earlier periods. Other Late Woodland groups began to settle in nucleated communities. In general, groups were probably more mobile during the early Late Woodland interval, but became increasingly sedentary through time. The increasingly sedentary lifeways associated with Late Woodland people may have been a response to overall population growth.

Archaeologists have found strong evidence for nucleated settlements in the Ohio Valley above the Falls of the Ohio. In contrast, settlements decrease in size as the Late Woodland begins in the lower Ohio and along the Illinois drainage. Stonewalled enclosures often called "stone forts" first were made in southern Illinois and Kentucky at this time. The nucleated settlements in Ohio that have moats and fortifications, as well as the "stone forts," may indicate defensive concerns. At the end of the Late Woodland, towns with mounds appear in the central Mississippi Valley, northern Georgia, and other parts of the heartland. Other traits associated with Mississippian societies also emerge at the end of this period. They include the use of shell to temper ceramics, wall trench construction for houses, and intensive maize agriculture (Anderson and Mainfort 2002). Rock art at Gottschall Rockshelter and Picture Cave also indicates the appearance of He-Who-Wears-Human-Heads-As-Earrings and Birdman imagery during the terminal Late Woodland period, iconographic themes that become important during the Mississippian period.

Another Late Woodland development was the widespread adoption of the bow and arrow around CE 700, marked by the predominance of small notched and unnotched triangular projectile points. These points often were made from flakes instead of directly from bifacial cores. Although the bow and arrow may have been known earlier, people now were making predominantly small points that were probably arrow points. This shift to the bow and arrow is significant due to its presumed efficiency as a hunting implement and as a weapon. Archaeologists also debate whether the rise of the bow and arrow was associated with intensified deer hunting or conflict and warfare. Some archaeologists suggest that higher population levels in the Late Woodland caused resource stress and the adoption of second-line resources like small mammals and shellfish.

One response to this competition over resources was to intensify the agricultural production of native seed plants and later tropical cultigens like maize. However, Late Woodland people did not uniformly intensify agricultural production. Within the major Midwestern river valleys, archaeologists have documented intensification of the plant cultivation as evidenced by the widespread presence and large quantities of native seeds. People also used some corn and tobacco, as well as many aquatic resources, including fish species that spawn in river backwaters. However, proportionately lower use of seed plants and greater reliance on white-tailed deer are evident in upland sites.

The end of the Late Woodland period also is marked by the shift to maize agriculture beginning around CE 900–1000. This shift is evident both in the greater amount of maize found in sites and in changes in the C^{12}:C^{13}ratio found in human bone. Minor use of maize has been presumed starting in Middle Woodland times based on recovery of a few macro plant remains, and maize pollen has been dated to the third century BCE further north and east, but re-dating of maize macro-remains from Middle Woodland contexts suggests a much more complicated and variable history of the adoption of maize in the heartland (Simon 2017; Hart and Lovis 2013). Eastern Eight Row or Northern Flint corn, which developed out of existing maize demes in the Northeast, is associated with the spread of maize agriculture, but this too was more variable than archaeologists once thought. Much more detailed archaeobotanical, palynological, and isotopic study will be

necessary to sort out the timing and process of the shift to maize agriculture.

Moreover, beans (*Phaseolus vulgaris*) were not yet present at the end of the Late Woodland. AMS dating of beans from Eastern Woodland contexts indicates that beans did not arrive until approximately CE 1200 at the earliest. Thus, the maize, bean, and squash polyculture that is iconic for American Indians was not yet practiced, and each of these crops has its own history of spread and adoption (Hart et al. 2002).

Mississippian Period

Given the amount of diversity in Late Woodland adaptations, the development of Mississippian cultural phenomena cannot be attributed to the same factors everywhere. However, around CE 1000, a number of groups in the heartland rapidly developed traits that characterize Mississippian societies, including a growing reliance on maize agriculture, shell-tempered pottery, wall trench structures, and aggregated village settlements. Many Mississippian societies became complex political polities or chiefdoms with hierarchical social structures. These polities often were centered on large towns that had public plazas, platform mounds, and residential spaces. Ceremonial structures, possibly the residences of chiefs or elites, were sometimes constructed at the top of Mississippian platform mounds. Mississippian chiefdoms generally first developed in the American Bottom and central Mississippi River Valley and then spread further east until these complex polities extended throughout most of the heartland. There are also some cultural traditions in the heartland that, despite certain distinctions, have been considered regional variants of Mississippian. The most notable are the Fort Ancient societies of the central Ohio River Valley.

The Mississippian period is divided into the Early Mississippian from CE 1000–1200, the Middle Mississippian from CE 1200–1400, and the Late Mississippian from CE 1400–1550 (Table 1). During the Early Mississippian period, the traits associated with Mississippian societies, such as maize agriculture, shell-tempered pots, wall trench structures, and a site layout that included both platform mounds and raised earthen plazas, spread to many regions of the heartland. It was also during the Early Mississippian period that hierarchical chiefdoms emerged. The largest political polity of the period was Cahokia, located east of modern-day St. Louis. Mississippian polities were not particularly stable and their power rose and fell. The Middle Mississippian period marks the height of these polities. In contrast, the Late Mississippian was a time of increased warfare, population aggregation, and political turmoil, as well as decreased mound building.

In some areas, Mississippian societies persisted into the Protohistoric era and certain polities have been linked with the indigenous groups De Soto's expedition encountered between 1539 and 1543 (Cobb 2003). The accounts of the De Soto expedition and other ethnohistoric records are often used as a baseline for the social organization and practices of Mississippian societies (Urban and Jackson 2004). Nevertheless, the arrival of Europeans did create a volatile period with increased violence and epidemic diseases that led to a massive depopulation of indigenous communities. During this turbulent period, the social and political landscape was dramatically transformed as particular peoples were essentially eliminated, while sometimes new ethnicities were created from their remnants. The ethnohistoric evidence also establishes that a number of different languages were spoken. It is therefore clear that Mississippian societies were not one people, but rather different cultural groups that had similar lifeways.

Mississippian people were some of the first easterners to settle in large permanent towns that contained central plazas, public buildings, platform mounds, and encircling stockades. These towns served as centers for political polities that included some outlying farmsteads and hamlets. The size and scale of Mississippian polities varied a great deal, but some of the largest were comprised of multiple towns that were politically aligned together. Some polities probably had one central "power" or chief. Migrations also appear to have been common and some areas experienced quite rapid population increases and decreases. For example, there was an influx of people right before the emergence of Cahokia in the American

Bottom around CE 950. In contrast, the lower Ohio Valley and adjacent areas of southern Illinois and northern Kentucky, as well as western and central Tennessee, were largely abandoned by CE 1450–1500. This area has been dubbed the Vacant Quarter (Cobb and Butler 2002).

Mississippian people were maize agriculturalists who also cultivated native plants and exploited deer, fish, waterfowl, and wild plants. After the Early Mississippian, native cultigens became less important in most of the heartland, and the maize–bean–squash polyculture began to be developed. It has been argued that Mississippian populations were adapted to a specific meander belt habitat in the major river valleys of the Midwest and Southeast, but more recent investigations indicate that Mississippian adaptations were more varied, both geographically and temporally.

On the basis of ethnohistorical accounts, there were probably fairly distinct social roles for men and women in Mississippian communities. Mississippian women were responsible for agricultural production, although men probably helped clear the fields of large stones and trees prior to planting. Mississippian women used stone hoes that were often made out of Mill Creek or Dover chert to till the land. At some sites, like Ocmulgee in Georgia, ridges and furrows associated with prehistoric agriculture have been found. Mississippian men actively engaged in hunting, warfare, and politics. Men in these societies likely earned prestige through hunting, military accomplishments, and/or their skill at negotiating treaties and keeping the peace.

There has been considerable discussion about prehistoric Mississippian politics and social organization. Archaeologists have sometimes classified Mississippian societies into types such as simple, complex, and paramount chiefdoms, but contemporary archaeologists are more interested in understanding these societies' historical trajectories and political economies (Cobb 2003). Some archaeologists believe that long-standing Eastern Woodland beliefs associated with membership in communities and lineages were replaced during Mississippian times with ideologies that elevated particular individuals to hierarchical positions of power. More recently archaeologists have discussed the potential importance of heterarchical or lateral political positions, possibly linked to moieties, clans, age grades, and/or other sodalities (Blitz 2010).

During the Historic period, most heartland societies were organized into dualistic moieties, although there were some specific differences between them (Urban and Jackson 2004). For example, some tribes in the heartland, such as the Creek, were divided into red and white organizations. The red organization dealt with warfare and external relations, while the white organization was more inward-directed and devoted to peace and municipal order. Certain towns were considered as either red or white, although these associations could shift through time as a result of wars and ball game competitions.

Another important subject is the way that different material symbols were linked to particular social positions in Mississippian polities. For example, it appears that Mississippian elites commissioned an array of symbolically charged icons, which asserted their (possibly ancestral) connections to important deities and religious beliefs. These symbols and icons have been referred to as the Southeastern Ceremonial Complex (SECC). SECC objects include elaborate repousse´ copper plates, ornate (sometimes effigy) pots, human and animal effigy pipes, human figurines, "chunkey" stones, chipped stone "swords," stone maces, monolithic axes, and engraved shell gorgets and cups. Many of these Mississippian icons were differentially interred with burials or in ritual caches. The largest quantities of ceremonial paraphernalia were deposited at important Mississippian mound centers, such as Moundville, Etowah, Spiro, and Cahokia. However, the distributions of other symbols, including Mississippian maces, illustrate more varied depositional patterns that included some smaller centers.

In recent years, researchers have focused on understanding Mississippian iconography and linking it to the ethnohistoric beliefs of Native American people. This work has also refined the chronological sequence for SECC representations based on the large elaborate imagery found at four Mississippian mound sites: Cahokia, Etowah,

Moundville, and Spiro. These Mississippian symbols seem to focus on a number of iconographic themes, including warfare, fertility/renewal, eschatology, and cosmology, although there is considerable variation in the subjects represented by these depictions. Abstracted representations of cosmos, such as cross, cross-in-circle, and triskele motifs, are some of the most common SECC symbols (Reilly and Garber 2007). These cosmograms occur in various material media, but most notably on Mississippian shell gorgets that were often pierced for attachment and worn as adornments. Other SECC representations include avian, anthropomorphic, and animalistic "subjects" that probably were associated with the upper and lower worlds in a three-tiered cosmos.

For example, one of the copper Rogan plates from Etowah, Georgia, portrays a now famous representation of a falconoid birdman holding a mace in one hand and a decapitated head in the other (Fig. 5). Similar representations have been found in the Craig Mound in Spiro, Oklahoma, the Castalian Springs site in central Tennessee, and various other Mississippian sites throughout the heartland (Fig. 6). This image almost certainly depicts a warfare-related theme, although it could have as its justification a mythic narrative about the Siouan god-hero: Red Horn or Morning Star (Reilly and Garber 2007).

Utilitarian objects were also produced and exchanged by Mississippian people. For example, Mill Creek chert hoes were made in southern Illinois and then widely exchanged throughout the heartland. There are also several Mississippian sites associated with salt production. Other raw materials, such as copper and marine shell, were widely exchanged by Mississippian people. However, it is not clear how much elite control was exercised over the movement and exchange of these different objects and materials.

Some of the large important Mississippian polities were centered at Cahokia in Illinois, Moundville in Alabama, Kincaid in Illinois, Etowah in Georgia, and Spiro in Oklahoma. Cahokia and Moundville were two of the largest Mississippian sites and usually these are

Woodland and Mississippian Cultures of the North American Heartland, Fig. 5 One of the Braden style copper Rogan plates from the Etowah site showing a birdman holding a mace and a decapitated head (Courtesy Smithsonian Institution)

Woodland and Mississippian Cultures of the North American Heartland, Fig. 6 Braden style birdman holding a mace and a decapitated head on a Mississippian shell gorget from the Castalian Springs Site in Central Tennessee (From Thruston 1890)

interpreted as paramount chiefdoms. Nevertheless, there are important scalar differences between them, suggesting the uniqueness of the larger Cahokian polity (Wilson et al. 2006).

Located across the Mississippi from modern-day St. Louis, Cahokia was the center of one of the earliest and largest Mississippian chiefdoms. Cahokia consisted of at least 104 mounds, a series of large plazas, palisades, and woodhenges, as well as several residential areas. Plazas were large raised public spaces that were periodically cleaned, while the woodhenges were circular wooden structures resembling Stonehenge that may have tracked astronomical events. The mounds at Cahokia were used for a variety of different purposes that included the designation of elite residences, charnel precincts, and other ceremonially charged areas. These mounds included Monks Mound, the largest earthen tumulus in Eastern North America, which is about 30 m (100 ft) high, 291 m (955 ft) long, and 236 m (775 ft) wide with an access ramp on its southern side. Monks Mound is such a large feature of the landscape that you might mistake it for a hill if it were not in the middle of the floodplain.

The Cahokian polity was unique in a number of ways. For example, it encompassed a number of other large Mississippian towns, such as the St. Louis Mound Center, the East St. Louis Mound Center, Pulcher, Mitchell, and Lohmann, and several other small mound centers. Notably, the East St. Louis Mound Group was the second largest Mississippian mound center, while the St. Louis Mound Group was the fourth largest (Wilson et al. 2006). Consequently, the Cahokian polity was larger by a scale of magnitude than any other Mississippian polity. This Cahokian polity actually encompassed an area over 17 times larger than Moundville located in Alabama, which was the largest Mississippian center outside of the American Bottom region. At its height the Cahokia polity probably had a population that was 6–14 times larger than Moundville's. There are also indications that the residential population surrounding Cahokia, especially the upland Richland complex of communities, was probably multiethnic. The pluralistic nature of the population at Cahokia appears to be different from most other Mississippian polities in the heartland, a characteristic that distinguishes it from most chiefdoms. Elaborate mortuary rituals often considered to indicate social hierarchy also have been documented at Cahokia within Mound 72, a small ridge-topped mound that contained numerous staged internments, mass burials, and caches of grave goods (Fowler et al. 1999).

The Cahokian polity was closely associated with the Braden art style, which was likely the foundation for later Mississippian iconographic styles, such as the Hightower (Etowah), Hemphill (Moundville), and Craig (Spiro) styles. Moreover, iconographically charged objects may have perpetuated an ideology that promoted Cahokians as important mediators with cosmos. Such mediators would have been essential in enacting ritual renewal through green corn ceremonialism and renewing the new fire. For example, Pauketat and Emerson (1991) have argued that Ramey Incised pots served to legitimate chiefly authority in which comestibles were "redistributed" and elite ideas were diffused to regional nonelite (often) peripheral populations.

The Moundville site was the center of another large Mississippian political polity, probably a paramount chiefdom. It is located on a high terrace on the Black Warrior River in western Alabama. The site is composed of 32 mounds and a rectangular plaza. The mounds positioned around the plaza seem to have been paired. Knight (1998) has suggested that the spatial arrangement of the mound and plaza complexes at Moundville mirrored its social organization. Correspondingly, he has argued that these mounds were built and controlled by a number of politically and ceremonially integrated groups, possibly with a dualistic social system. There were also dense occupations at Moundville, especially soon after it was founded, but later the site was used primarily as a necropolis to bury the dead. In the broader region, there are also four smaller mound sites that are probably associated with Moundville. However, there is relatively little domestic debris around the mounds at these sites so they may not have been aggregated villages (Wilson et al. 2006).

There are, of course, other large important Mississippian mound centers, including Etowah in Georgia, Spiro in Oklahoma, and Kincaid in Illinois among others, as well as numerous smaller mound sites. In general, many of these Mississippian polities followed a similar developmental trajectory marked by an initial period of political consolidation and population aggregation. Later, when these Mississippian polities were declining, the population living at these mound centers dropped, and they were used increasingly as ceremonial centers. In certain cases, this ceremonial use focused on burying important deceased individuals with elaborate ritual objects, and these sites became essentially necropolises.

The influence of Mississippians extended out of the heartland into Florida and the Upper Midwest where cultural groups with many Mississippian traits and possibly ethnic connections have been identified, such as the Oneota groups of northern Illinois, Wisconsin, and Iowa, and the Fort Walton culture of northern Florida.

Within the heartland itself the Fort Ancient tradition was an important regional variation during the Late Prehistoric period. The Fort Ancient tradition developed in the central Ohio River drainage after around CE 1000. On the basis of highly similar ceramics, greater interaction occurred between Fort Ancient populations after CE 1450, but breakdown of the tradition occurred after approximately CE 1700 (Drooker and Cowan 2001). Fort Ancient groups produced shell-tempered ceramics that have some Mississippian stylistic elements and similarities. Their subsistence economy centered on maize and native cultigens but also included wild plants and animals. Fort Ancient settlements are primarily found in the floodplains, and they included nucleated villages after approximately CE 1100. Central plazas, large (possibly communal) structures, and stockades have been observed at Fort Ancient sites after CE 1200. Late Fort Ancient settlements of the Madisonville horizon sometimes became quite large villages. There are a number of SECC shell gorgets and other icons found at Fort Ancient sites that point toward interaction with Mississippian groups further south. Other artifacts, such as some Iroquoian-style pipes, point to relationships between Fort Ancient groups and communities further north (Drooker and Cowan 2001). Studies of grave goods suggest that there was little ascribed ranking among Fort Ancient populations, and archaeologists believe these people may have been organized into a tribal confederacy rather than a hierarchical chiefdom (Drooker and Cowan 2001).

Issues and Debates

Given the rich archaeological record for Woodland and Mississippian peoples of the heartland, it is not surprising that there are many substantive and theoretical debates among contemporary archaeologists studying these cultures. We have space to introduce only some of these issues in this entry. We briefly introduce some topics of debate in this section and organize these subjects into three broad areas of interest: (1) ecology and economics, (2) sociopolitical organization and interaction, and (3) ceremonialism, religion, and mortuary behavior. Each of these broad areas of interest has been stimulated by changing theoretical perspectives as heartland archaeologists moved from an initial focus on culture history to a processualist emphasis on adaptation and cultural evolution, and then incorporated aspects of the post-processualist critique by variously focusing on human agency, gender, material culture, and symbols.

Ecology and Economics

Interest in human–environment interactions has been significant since the beginning of North American archaeology. Initially debates often centered on the degree to which the environment shaped culture. For example, an issue was whether particular social forms including the presumably more sociopolitically complex societies of the heartland developed because of the relative richness of regional resources or as a result of historical forces and diffusion. Since the 1960s and 1970s, this debate has become less generalized, and more evidence for human use of environmental resources has made it possible to explore detailed patterning in subsistence and economy over time and across the heartland. Critiques of the processualist and adaptationist

perspective have not reduced interest in the variable ways in which humans have interacted with the environment. Instead, attention has been refocused on the complex social and ideological factors that affect human choices about resource use as well as on how humans, intentionally or unintentionally, shaped the landscapes in which they lived.

One key area of debate and research surrounds the development of indigenous agriculture. As previously discussed, several seed-bearing plants native to the Eastern Woodlands and adjacent areas that were first grown in the Archaic period also were cultivated by Woodland and Mississippian people in the heartland. Although the use of these plants became widespread, their role in local economies does appear to have varied. New dating evidence also calls into question the previous consensus that maize was gradually incorporated into heartland economies (Simon 2017). While intensification of maize agriculture does not occur before the Late Woodland or the Mississippian periods, variability in the timing and nature of its adoption and in the role of the hardier Northern flint variety seems evident, but is poorly understood.

A second, related topic of debate has to do with how the iconic Native American maize–bean–squash polyculture came into being. Maize and beans, the two principal tropical cultigens eventually adopted by heartland societies, have different histories with beans arriving only between CE 1200 and 1300 (Hart et al. 2002). Though well-known from ethnohistorical and ethnographic accounts, this polyculture was not developed in the heartland and other parts of the Eastern Woodlands until after this time. Thus, the diversity of agricultural systems developed by both Woodland and Mississippian societies has become clearer, as more data have been accumulated. Environmental, historical, economic, demographic, and ideological factors all may have influenced the specific nature of Woodland and Mississippian agricultural production and political economies.

Other questions have to do with the ways in which Woodland and Mississippian people enhanced the natural environment in order to acquire more food and raw materials. There has been debate about whether human agents intentionally disturbed particular environmental niches to promote the growth of certain oily and starchy seeds (Smith 2011). Certainly many actions of heartland peoples promoted the kinds of early successional habitat types that contain more food for humans. In the mature forests of the heartland, most of the biomass is trapped in forms such as cellulose that humans cannot digest. Disturbed habitats, old fields, and natural forest clearings and edges contain many more edible fruits, seeds, and shoots. These niches also attract important game species like the white-tailed deer, rabbits, and many birds. Garden hunting for these animals likely was practiced by Mississippian peoples. Some Woodland and Mississippian peoples likely cleared and burned the forest to create fields and gardens, but it also was accomplished as groups established and moved their villages. Thus, the growth and aggregation of Woodland and Mississippian populations disturbed more forest, and these actions favored mast-bearing trees like oak and hickory. These people probably also transplanted fruit-bearing trees to open areas within the forest and broadcast some native seed plants on river banks. Archaeologists are just beginning to realize the many ways that heartland peoples managed and structured the environments in which they lived.

Sociopolitical Organization and Interaction

Neoevolutionary ideas have had a major influence on archaeological conceptualizations of the Woodland and the Mississippian periods in the heartland. Early archaeologists tended to see both the Hopewell and Mississippian patterns as representing sociopolitically complex, ranked societies made possible by agricultural economies. Archaeologists started to recognize that the sociopolitical organization and economy of these societies varied more extensively as knowledge about their subsistence and settlement strategies accumulated. Today, Woodland peoples including the Hopewell usually are understood as tribal people, whose elaborate ceremonial life symbolized and reinforced kin groups, social identity, and cosmological beliefs. In contrast, Mississippians

have continued to be understood as internally differentiated chiefdom societies, and key debate centers on how power was distributed, how resources were controlled, and how ceremonial life symbolized religious belief.

One key debate of this type has been about the nature and size of Hopewell communities (e.g., Carr and Case 2005; Charles and Buikstra 2006; Byers and Wymer 2010). Although large Hopewell mound centers have long been known in Ohio, Illinois, and elsewhere, settlements often seem small and ephemeral in comparison, and domestic structures have not been well documented. Hopewell mound centers certainly do not contain large numbers of domestic structures, but instead were centers for ritual events that often involved the disposal of the dead. If Hopewell people did not live at these sites, where did they reside? While the settlements of the Illinois Hopewell may or may not have included large residential villages, as well as mound complexes and small hamlets, it does appear that residential sites were grouped into spatially integrated communities that probably linked related lineages and utilized distinct mound complexes (Carr and Case 2005). In Ohio, some researchers propose a dispersed sedentary community model in which single or sometimes multiple household units were dispersed across the landscape although they shared a corporate ritual space at mound centers that were periodically visited. Mound ceremonialism thus reinforced kinship-based identity and community that may not have been linked to spatial proximity. Other archaeologists question the duration of occupation or sedentary nature of Hopewell hamlets (Charles and Buikstra 2006). There also is related debate about how territorial Hopewell people were.

The nature and significance of exchange and interaction among Hopewell and other Middle Woodland people is a subject of active debate and research as well. As we have noted, there is considerable evidence for the exchange of Hopewell material culture and raw materials across the heartland and beyond during the Middle Woodland. This phenomenon was coined the Hopewell Interaction Sphere (and linked to both economic and religious interaction). Mound centers may have been nodes in elaborate regional trading networks as well as sacred places. However, interaction implies some level of cultural pluralism and the diversity in many ceramics or other aspects of material culture indicate the ethnic diversity of the people who participated in Hopewell ceremonialism. As data have accumulated, some researchers have even questioned the utility of terms like Adena and Hopewell that suggest cultural uniformity across the heartland (Clay 2014).

Another area of considerable debate is over the nature of Mississippian polities. Neoevolutionary concepts, especially Service's concept of a chiefdom characterized by hierarchical ranking, have been important concepts in modeling the nature of Mississippian societies even though these concepts were originally formulated for Polynesian societies (Peebles and Kus 1977). While not denying the sociopolitically complex nature of Mississippian societies, contemporary archaeologists have suggested that there was much more variability in how hierarchical and centralized power was in Mississippian polities (see Cobb 2003; Beck 2003). Pauketat (2007) has even suggested that the chiefdom model has limited our archaeological understanding of Mississippian culture by preventing an appreciation of cultural variability and human agency. Today, archaeologists debate the nature of leadership and power and also may view Mississippian societies as culturally plural (Blitz 2010).

Another topic of recent debate related to sociopolitical organization focuses on the nature and causes of conflict and warfare in Mississippian times. Despite popular characterizations of American Indians as peaceful, "noble savages," conflict and warfare have long histories in North America. Nevertheless in the heartland, warfare does not appear to have been more than periodic raiding and trophy taking until the Mississippian period (Milner 2007). The establishment of chiefdoms at this time can be linked to a shift from small-scale conflicts to large-scale internecine warfare between polities or within pluralistic polities, like the one centered at Cahokia. The widespread construction of stockades both within the heartland and elsewhere in the Eastern Woodlands is suggestive of intergroup conflict as well. However, there is debate about whether these conflicts

result mainly from resource stress resulting from larger and more aggregated human populations or from elites jockeying for power and legitimization of their authority (Dye 2009).

Ceremonialism, Religion, and Mortuary Behavior

A third area of recent debate is heartland ceremonialism, religion, and mortuary practices. The historical trajectory of research on these issues is quite different. Early work on these subjects sought to connect moundbuilding, burial practices, and certain objects to specific Native American communities and their beliefs. It included research on green corn ceremonialism, moundbuilding, ball games, and the Southeastern Ceremonial Complex (SECC). A few scholars explored these associations even when archaeological theories and thought shifted to more cross-cultural, scientific (processual) approaches.

Conversely, mortuary analyses became a privileged way of investigating the organization of heartland societies because distinctions among burials (e.g., grave goods and furniture) were believed to reflect their status. Thus, the internment of elaborate funerary objects and indeed elaborate mortuary programs themselves were viewed as indicating the deceased's high status (Saxe 1970). These approaches were applied throughout the heartland to analyze Woodland and Mississippian cemeteries. Archaeologists concluded that most Woodland cemeteries reflected status achieved through the lifetime of individuals. In contrast, differences among Mississippian burials were believed to reflect these societies' hierarchical organization.

Noteworthy studies include Peebles and Kus's (1977) analysis of burials from Moundville and Fowler et al. (1999) interpretation of the charnel facilities (including mass graves, caches, and elaborate internments) under Mound 72 at Cahokia. Both of these studies argued that Mississippian mortuary regimes reflected stratified chiefdoms. New analyses raise questions about these interpretations. For instance, the burials at Moundville are not contemporaneous and temporally significant patterns exist regarding how the dead were treated. Similarly, Emerson et al. (2016) have shown that the burials and charnel facilities under Mound 72 are not all contemporaneous, that some of the burials were not accurately aged and sexed, and that the funerary furniture associated with the (central) beaded burial was probably misinterpreted. Contemporary Mississippian scholars have also questioned a simplistic association between burial treatment and social organization, since mortuary ritual and spectacle can reinforce the structure of the larger community, enhance the power of leaders, and make connections with ancestors and cosmic forces (Sullivan and Mainfort 2012).

Another important issue is the construction of different mounds, enclosures, and other architectural features that correspond with astronomical events. It is clear that beginning in, at least, the Early and Middle Woodland periods, certain mounds and enclosures were constructed that aligned with solar, lunar, and/or other celestial events. In particular, the large Ohio Hopewell geometric enclosures and ritual architecture indicate a complex understanding of plane geometry, measurement, arithmetic, and observational astronomy closely tied to ritual practices. Mississippian people also constructed mounds and other architectural features that correspond to different astronomical alignments. While these astronomical alignments certainly were intertwined with the rituals and beliefs of Woodland and Mississippian peoples, the importance different celestial cycles and events played in their calendric systems has probably been underestimated. For example, it would make sense for dispersed Ohio Hopewell groups to time their rituals to correspond with different celestial events because these occurrences would have been visible in the day/night sky.

Finally, there has been a great deal of recent interest in Mississippian and Hopewell iconography. Iconographic approaches have addressed various issues through the formal analysis of heartland imagery, including the existence of different styles and workshops, as well as the patterning of specific motifs and themes and their referents. Yet linking pre-Columbian imagery with historically documented Native American religious beliefs, rituals, and cosmologies is challenging. Accordingly, debates exist about how feasible it is to trace the meaning of heartland

imagery through time and across cultural boundaries (e.g., disjunction).

Nevertheless, the objects associated with the Southeastern Ceremonial Complex have long fascinated archaeologists. They were once understood to represent a pan-Mississippian phenomenon, a religious cult, or prestige goods that circulated widely among the various groups. More recent iconographic studies have demonstrated the existence of regional styles. Specific studies of art styles and the meaning of specific motifs and themes are now being undertaken, which has led to increased discussion about Mississippian beliefs and cosmology (Reilly and Garber 2007).

Conclusion

The study of the Woodland and Mississippian peoples of the heartland in Eastern North America has been a major focus for North American archaeologists since the mid-nineteenth century. Today the Woodland period is considered to have encompassed the period from approximately 1000 BCE to CE 1000. The Woodland period is commonly broken into Early, Middle, and Late subperiods. The (Early to Middle Woodland) Adena and the Hopewell complexes stand out as particularly important cultural phenomena. After CE 1000, Mississippian polities of varying organization and complexity came into existence in the heartland with Early, Middle, and Late Missisisipipan subperiods also being recognized. Archaeologists have accumulated a great deal of evidence about Woodland and Mississippian people, which makes possible the discussion and debate of many significant methodological and theoretical topics. Nonetheless, a tremendous potential for future research on Woodland and Mississippian cultures in the heartland remains.

References

Anderson, D. G. R. C. Mainfort, Jr. 2002. An introduction to woodland archaeology in the southeast, in D. G. Anderson and R. C. Mainfort, Jr. (ed.) *The Woodland Southeast*:1–19. Tuscaloosa: The University of Alabama Press.

Beck, R.A., Jr. 2003. Consolidation and hierarchy: Chiefdom variability in the Mississippian southeast. *American Antiquity* 68: 641–661.

Blitz, J. 2010. New perspectives in Mississippian archaeology. *Journal of Archaeological Research* 18: 1–39.

Brown, J.A. 1979. Charnel houses and mortuary crypts: Disposal of the dead in the Middle Woodland period. In *Hopewell archaeology: The Chillicothe conference*, ed. D.S. Brose and N. Greber, 211–219. Kent: Kent State University Press.

Byers, A.M., and D. Wymer, eds. 2010. *Hopewell settlement patterns, subsistence, and symbolic landscapes*. Gainesville: University of Florida Press.

Carr, C., and D.T. Case, eds. 2005. *Gathering Hopewell: Society, ritual, and ritual interaction*. New York: Kluwer Academic/Plenum Publishers.

Charles, D.K., and J.E. Buikstra, eds. 2006. *Recreating Hopewell*. Gainesville: University of Florida Press.

Claassen, C. 2011. Rock shelters as women's retreats: Understanding Newt Kash. *American Antiquity* 76: 628–641.

Clay, R.B. 2014. What does mortuary variability in the Ohio Valley Middle Woodland mean? Agency, its projects, and interpretive ambiguity. *Southeastern Archaeology* 33: 143–152.

Cobb, C.R. 2003. Mississippian chiefdoms: How complex? *Annual Review of Anthropology* 32: 63–84.

Cobb, C.R., and B.M. Butler. 2002. The vacant quarter revisited: Late Mississippian abandonment of the lower Ohio River valley. *American Antiquity* 67: 625–641.

Crothers, G.M. 2012. Early Woodland ritual use of caves in eastern North America. *American Antiquity* 77: 524–541.

Dye, D. 2009. *War paths, peace paths: An archaeology of cooperation and conflict in Native eastern North America*. Lanham: AltaMira Press.

Emerson, T.E., K.B. Farnsworth, S.U. Wisseman, and R.E. Hughes. 2013. The allure of the exotic: Reexamining the use of local and distant pipestone quarries in Ohio Hopewell pipe caches. *American Antiquity* 78 (1): 48–67.

Emerson, T.E., K.M. Hedman, E.A. Hargrave, D.E. Cobb, and A.R. Thompson. 2016. Paradigms lost: Reconfiguring Cahokia's Mound 72 beaded burial. *American Antiquity* 81 (3): 405–425.

Fowler, M.L., J. Rose, B. Vander Leest, and S. R. Ahler. 1999. *The Mound 72 area: Dedicated and sacred space in early Cahokia*. Illinois State Museum Reports of Investigations, 54.

Fritz, G.J. 1993. Early and Middle Woodland period paleoethnobotany. In *Foraging and farming in the eastern woodlands*, ed. C.M. Scarry, 39–56. Gainesville: University Press of Florida.

Giles, B.T. 2013. A contextual and iconographic reassessment of the headdress on burial 11 from Hopewell mound 25. *American Antiquity* 78: 502–519.

Hart, J.P., and W.A. Lovis. 2013. Reevaluating what we know about the histories of maize in northeastern North America: A review of current evidence. *Journal of Archaeological Research* 21: 175–216.

Hart, J.P., D.L. Asch, M.C. Scarry, and G.W. Crawford. 2002. The age of common bean (*Phaseolus vulgaris* L.) in the northern Eastern Woodlands of North America. *American Antiquity* 76: 377–386.

Knight, V.J. 1998. Moundville as a diagrammatic ceremonial center. In *Archaeology of the Moundville chiefdom*, ed. V.J. Knight and V.P. Steponaitis, 44–62. Washington, DC: Smithsonian Institution Press.

Lepper, B.T., K.L. Leone, K.A. JAKES, L.L. Pansing, and W.H. Pickard. 2014. Radiocarbon dates on textile and bark samples from the central grave of the Adena Mound (33Ro1), Chillicothe, Ohio. *Midcontinental Journal of Archaeology* 39 (3): 201–221.

Mckern, W.C. 1939. The Midwestern taxonomic method as an aid to archaeological culture study. *American Antiquity* 4: 301–313.

Milner, G.R. 2007. Warfare, population, and food production in prehistoric eastern North America. In *Warfare and violence among the indigenous peoples of North America*, ed. R.J. Chacon and R.G. Mendoza, 182–201. Tucson: University of Arizona Press.

Pauketat, T.R. 2007. *Chiefdoms and other archaeological delusions*. Lanham: Altamira Press.

Pauketat, T.R., and T.E. Emerson. 1991. The ideology and authority of the pot. *American Anthropologist* 93: 919–941.

Peebles, C.S., and S.M. Kus. 1977. Some archaeological correlates of ranked societies. *American Antiquity* 42 (3): 421–448.

Reilly, F.K., and J.F. Garber, eds. 2007. *Ancient objects and sacred realms: Interpretations of Mississippian iconography.* Austin: University of Texas Press.

Sassaman, K.E. 2002. Woodland ceramic beginnings. In *The Woodland Southeast*, ed. D.G. Anderson and R.C. Mainfort Jr., 298–420. Tuscaloosa: University of Alabama Press.

Saxe, A.A. 1970. *Social dimension of mortuary practices*. Unpublished PhD dissertation, University of Michigan.

Scarry, C.M., and R.A. Yarnell. 2011. Native American domestication and husbandry of plants in eastern North America. In *The subsistence economies of indigenous north American societies*, ed. B.D. Smith, 483–501. Washington, DC: Smithsonian Institution Scholarly Press.

Seeman, M.F., and W.S. Dancey. 2000. The Late Woodland period in Ohio: Basic issues and prospects. In *Late woodland societies: Tradition and transformation across the midcontinent*, ed. T.E. Emerson, D. McElrath, and A. Fortier, 583–611. Lincoln: University of Nebraska Press.

Simon, M.L. 2017. Reevaluating the evidence for Middle Woodland maize from the Holding site. *American Antiquity* 82 (1): 140–150.

Smith, B.D., ed. 2011. *The subsistence economies of indigenous North American societies: A handbook*. Washington, DC: Smithsonian Institution Scholarly Press.

Sullivan, L.P., and R.C. Mainfort, eds. 2012. *Mississippian mortuary practices: Beyond hierarchy and the representationalist perspective*. Gainesville: University of Florida Press.

Thruston, G.P. 1890. *The antiquities of Tennessee and adjacent states and the state of aboriginal society in the scale of civilization represented by them. A series of historical and ethnological studies*. Cincinnati: Robert Clarke and Company.

Truncer, J. 2004. Steatite vessel age and occurrence in temperate eastern North America. *American Antiquity* 69: 487–513.

Urban, G., and J.B. Jackson. 2004. Social organization. In *Handbook of the North American Indians: volume 14 Southeast*, ed. R.D. Fogelson, 697–706. Washington, DC: Smithsonian Institution Press.

Willey, G.R., and P. Phillips. 1958. *Method and theory in American archaeology.* Chicago: University of Chicago Press.

Wilson, G., J. Marcoux, and B. Koldahoff. 2006. Square pegs in round holes: Organizational diversity between early Moundville and Cahokia. In *Leadership and polity in Mississippian society*, Center for Archaeological Investigations, occasional paper, ed. B.M. Butler and P.D. Welch, vol. 33, 43–71. Carbondale: University of Southern Illinois Press.

Drooker, P.B., and C.W. Cowan. 2001. Transformation of the fort ancient cultures of the Central Ohio Valley. In *Societies in eclipse: Archaeology of the Eastern Woodlands Indians, A.D. 1400–1700*, ed. D.S. Brose, C.W. Cowan, and R.C. Mainford Jr., 83–106. Washington, DC: Smithsonian Institution Press.

World Archaeological Congress (WAC)

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Introduction

What eventually became the World Archaeological Congress emerged from what was initially planned as the 11th Congress of the International Union of Pre- and Protohistoric Sciences (IUPPS) to be held in Southampton, England, in September of 1986. The Southampton organizing committee had hoped to make the 11th Congress a more inclusionary meeting than previous Congresses. Mostly the IUPPS was organized by and for

Western European archaeologists, and while not specifically excluded from membership, archaeologists from non-Western nations had virtually no role in the organization. In response, several other organizations such as the Pan-African Congress and the International Congress of Americanists sought to alleviate the IUPPS's geographic biases. As well, Indigenous people, particularly from North America and Australia, had accelerated their demands for repatriation of the skeletal remains of their ancestors stored in archaeology laboratories and museums as well for a say in how their pasts were studied and represented. In response to these pressures, the 11th Congress organizers, particularly Peter J. Ucko, Chair of the Archaeology Department at Southampton University, made plans to assure the presence and participation of Indigenous people and archaeologists from a much wider range of countries than those usually at IUPPS World Congresses.

At the same time, growing violence associated with South Africa's apartheid policies had prompted organizations including the African National Congress, the National Union of Students, the Association of University Teachers, and several others to call for a ban of participation by South African and Namibian scholars in academic meetings. When the labor-dominated city government of Southampton announced that it would withhold financial support from the meeting unless IUPPS respected the ban, the local organizers agreed. However, the IUPPS and other archaeological organizations such as the Society for American Archaeology objected on the grounds of academic freedom for research and the free exchange of ideas. In early 1986, the IUPPS Secretary-General and International Executive Committee disavowed the Southampton meeting, which led to the withdrawal of many scholars from the meeting, but archaeologists from Eastern Europe, South America, Africa, and India supported the ban. The Southampton organizers agreed to proceed with the meeting as the World Archaeological Congress. The reasons that many either boycotted or chose to attend the meeting were complex (see Ucko 1987 and Gero 1999 for a detailed discussion of both events and attitudes), but what emerged was a very successful and exciting academic meeting, one that considered the usual scientific aspects of archaeology as well as openly exploring its political nature.

Approximately 850 people attended WAC-1 from 71 countries (more than twice the number present at the 10th IUPPS Congress in Mexico City). At the closing plenary of WAC-1, attendees resoundingly agreed that the World Congresses should continue, and the World Archaeological Congress emerged from that consensus. More than a quarter century has passed since the Southampton meeting. Since then WAC has become a vibrant organization, and given its origins in the shadow of apartheid, it is significant that WAC 4 was held in Cape Town, South Africa, with Nelson Mandela as its patron. Relationships with the IUPPS and the Society for American Archaeology have been mended, and while WAC is not the largest archaeological organization in the world, it certainly can lay claim to being the most active organization of archaeologists in terms of international influence.

Definition

WAC is both a quadrennial meeting and an organization. As a nongovernmental organization, the World Archaeological Congress is the only fully international and representative organization of practicing archaeologists (WAC 2010). WAC works to promote interest in the past in all areas of the world, exploring both the scientific and humanistic aspects of archaeology. As well, WAC has a specific mission to (1) promote professional training for disadvantaged nations and communities; (2) broaden public education, involving national and international communities in archaeological research; (3) develop archaeological practice so that it empowers Indigenous and minority stakeholders; (4) contribute to the conservation of archaeological sites threatened by looting, urban growth, tourism, development, or war; and (5) redress global inequities among archaeologists. WAC openly recognizes and explores the political role archaeology plays in

the construction of accounts of the past and the uses to which the accounts are put.

Governed by statutes that are regularly examined and revised (WAC 2009), WAC has 14 Regional Electoral Colleges designed to reflect geography and meant to foster development of regional networks that can facilitate study of the cultural heritage of each region. Members living in each region elect both a Senior and a Junior Representative to serve on the WAC Council. WAC also has an elected Executive with four officers (President, Vice-President, Secretary, and Treasurer) and those they appoint, usually the editor(s) of *Archaeologies*, the WAC journal, a Membership Secretary, a Student Representative, and the Coordinator of the major Congress meeting. Executive members communicate as needed by e-mail and often meet at WAC Inter-Congresses. Eight Indigenous Representatives, appointed by various Indigenous organizations, also serve as Council Members. The full Council tries to meet every 2 years but always meets as an Assembly during the quadrennial WAC Congress. The Assembly is WAC's principal policy-making body, elects officers, and determines the organization and location of future Congress meetings.

WAC Congresses generally have met every 4 years, but occasionally political or organizational issues at the selected venue have caused shifts in locations or slight delays. The initial Congress took place in England in 1986, followed by Venezuela (1990), India (1994), South Africa (1999), United States (2003), Ireland (2008), a 2013 Congress scheduled for Jordan, and WAC has offers to host the meeting well beyond 2013. Each Congress has produced about 10 published volumes of proceedings that comprise the One World Archaeology series. Historically, each Congress has at least partially supported the attendance of a large number of participants from traditionally underrepresented areas and groups, exactly those people who contribute to the essential diversity of WAC's purpose and who enhance the international scope of the conference.

Subject to approval by the Executive, WAC also sanctions Inter-Congresses, which are organized by members of the regional colleges, usually around a primary topic. Inter-Congresses have focused on topics as diverse as Heritage Management in East and South East Asia (Beijing, China 2011), Overcoming Structural Violence (Ramallah, West Bank 2009), and Kyosei-no-koukogaku: Coexistence in the Past – Dialogues in the Present (Osaka, Japan 2006). Since the first Inter-Congress on Archaeological Ethics and the Treatment of the Dead in 1989 (Vermillion, South Dakota USA), WAC has approved nearly 20 Inter-Congresses. WAC also sponsors Workshops and Symposia, usually in association with other national and international meetings.

WAC operates a Global Libraries Program, which provides publications to add to the archaeological literary collections of disadvantaged institutions. WAC publishers provide copies of all WAC publications, but many other print and digital materials come from members and philanthropic organizations. Archaeologists Without Borders supports archaeology education and training in countries where the development of archaeology has been economically difficult. Invited by host institutions, WAC members from different parts of the world provide advice, lectures and workshops, and other educational opportunities. WAC also operates an active listserv, accessible by both members and nonmembers, to foster exchange of information and opinion.

When WAC began it published *The World Archaeological Bulletin*, which ran through 2004. In 2005 WAC began publication of *Archaeologies: The Journal of the World Archaeological Congress*, now published in print and electronic versions by Springer. WAC also publishes the *Newsletter of the World Archaeological Congress*, now distributed only in electronic form. WAC also supports publication of two other peer-reviewed journals, *Arqueología Suramericana/Arqueologia Sul-Americana*, which is intended to promote and spread the production of archaeology and related disciplines in South America and the *Journal of Environment and Culture*, which provides a forum for debates on how culture and environment can be mutually complementary in Africa.

WAC has developed an active book publishing program, working with some of the world's finest archaeological publishers. The organization continues to produce its One World Archaeology series, numbering more than 60 volumes, growing by 10 or more volumes after each Congress. Most are edited volumes usually derived from Congress themes and sessions, but sometimes with additional papers solicited later. The Worlds of Archaeology series presents the global diversity of archaeology, foregrounding many different voices, particularly those silenced by colonial processes. The Archaeology and Indigenous Peoples series examines the current relationship and possibilities for collaboration between archaeologists and Indigenous peoples. The Research Handbooks in Archaeology provide comprehensive coverage and state of the art articles on key topics in the field. The Global Cultural Heritage Manuals seek to provide information for researchers planning archaeological or other heritage projects in a particular region, considering everything from environmental conditions to law. All royalties from all series publications go to support travel for disadvantaged scholars, students, and Indigenous people to attend WAC meetings.

The growth of the World Archaeological Congress has rarely been smooth. WAC makes a determined effort to keep membership fees very low and has a variable fee structure to support membership for Indigenous people, archaeologists from disadvantaged nations, retired and jobless archaeologists, and students. Although WAC receives substantial royalties from publications, those funds are directed toward travel support for the major Congresses. This has meant that WAC has always been dependent on volunteers, funds from host institutions, and gifts to support most operating costs. WAC has no professional administrative staff, and with the exception of occasional paid consultants and short-term, paid administrative support for meetings, it operates entirely with volunteers who serve roles in governance, editing and most translating, and on a variety of Task Forces and Standing Committees.

Because WAC has openly acknowledged and embraced the political side of archaeology, some archaeologists still tend to think of WAC as a political, rather than a scientific or scholarly, organization. For members, especially in Eurocentric countries, it is not uncommon to hear the charge that "WAC does politics, not archaeology." This has been especially the situation in the United States where archaeology has been epistemologically science-centered for decades. WAC certainly "does science" but maintains that all archaeology is political, yet such perceptions have worked to keep membership lower than it might be, usually about 1,200 members. Membership, however, has steadily grown as the journal has improved, as high-quality book series have appeared and as more archaeologists recognize that diversity serves the discipline well.

Key Issues/Current Debates/Future Directions

The core issues related to diversity within archaeology that led to the origin of WAC are still something of a problem. For example, WAC has worked very hard to select venues for its quadrennial Congresses and Inter-Congresses, which has rarely been easy. Some archaeologists argue that there is still a Eurocentric, economically advantaged country bias in venue selection, as well as a Northern Hemisphere bias (Shepherd and Haber 2011). Hosting a major international conference or even a smaller Inter-Congress is no simple undertaking financially or logistically. Given WAC's meager financial resources, the organization can be of little help with funding, although with several Congresses and nearly 20 Inter-Congresses, WAC can provide a lot of advice and logistical support. Financial and logistical issues for the host countries are one matter, but their archaeological, international, and internal political situations at the time also can cause problems. WAC 2 (1990), for example, was to have been in Colombia, but drug-based terrorist activities in the host city forced a shift to nearby Venezuela. WAC 3 (1994) in India proved difficult due to the destruction of the Ayodhya temple, which divided the Indian public and even the archaeological community, so much so that fights

broke out at the closing plenary. WAC 5 (2003) in Washington, DC, took place 2 years after the 9/11 terrorist acts, and the resulting security in the United States proved to be so paranoid and strict that many delegates could not get visas to enter the country. WAC 6 (2008) was initially planned for Jamaica, but last-minute economic issues forced a shift to Ireland where a national dispute over possible damage from highway construction to the important cultural landscape surrounding Tara spilled over into the meetings. In spite of these difficulties, all the meetings proved to be intellectually successful and very rewarding for attendees, so much so that many attendees to WAC meetings remark that they are "life-changing" experiences.

Even though WAC may sometimes be criticized for economic or geographic biases, other concerns actually stem from the substantial diversity that WAC does have. As might be expected, in an organization that embraces the political nature of archaeology, there are diverse opinions about how archaeology should be done and what policies and actions are ethical. Most such issues relate to WAC's interaction with non-archaeological entities such as the military or multinational corporations (Shepherd and Haber 2011; Smith 2011). At the simplest level the WAC Executive has been asked to intercede on behalf of particular issues within countries, usually on behalf of protection of important sites endangered by development activities, looting and sales of antiquities or human remains, allegations of ethical violations, or pending laws or policies regarding heritage. The Executive has sometimes done so but occasionally receives criticisms for engaging with the problem before it has adequate data or because it is seen as an extra-national entity without a right to be involved. Often the matters are international in scope. Shepherd and Haber (2011) have raised concerns about how WAC engages with multinational corporations that cause environmental and heritage damage as well as impinge on Indigenous lands, cultures, and rights. Before and at WAC 6 in Ireland, several WAC members challenged WAC's engagement with any military personnel or military-related activities, urging that no members of the military or archaeologists working with the military be allowed to present papers at the Congress. The WAC Executive has certainly struggled with many of these issues and has relied on the WAC Ethics Committee for advice about policies of engagement. Many questions get explored at sessions during the major Congresses and at some Inter-Congresses. Resolutions generated during the closing plenary sessions may be discussed and voted on, and if they are affirmed, they are passed along to the Executive for consideration and possible enactment as WAC policy, statute, or ethics codes.

WAC's diversity actually presents something of a structural contradiction. Diversity brings a wide range of opinion on almost every issue, and the need for fairness demands that those opinions be openly discussed. That makes decision-making slow and to some makes the organization seem cumbersome and conservative, perhaps even cowardly. Many members want WAC to be political and progressive, but were it to act decisively, it would risk being unfair or biased toward particular viewpoints. In spite of this conundrum, most archaeologists now recognize that archaeology is indeed political and the politics must be discussed openly; heritage issues of concern to Indigenous people and other descendant communities are now a regular part of archaeological consideration; archaeologists from economically disadvantaged and previously colonized nations are partners in the development of the discipline. Certainly issues and concerns remain, but WAC truly must be seen as a resounding success having moved well beyond the vision of Peter Ucko and the Southampton organizing committee.

Cross-References

- ▶ Archaeology and Politics
- ▶ Postcolonial Archaeologies
- ▶ Repatriation: Overview
- ▶ Ucko, Peter (Indigenous Archaeology)
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ World Archaeological Congress (WAC): First Code of Ethics

References

Gero, J. 1999. The history of World Archaeological Congress. Available at: http://worldarchaeologicalcongress.org/about-wac/history/146-history-wac. Accessed 30 Mar 2012.

Shepherd, N., and A. Haber. 2011. What's up with WAC? Archaeology and 'engagement' in a globalized world. *Public Archaeology* 10 (2): 96–115.

Smith, C. 2011. Errors of fact and errors of representation: Response to Shepherd and Haber's critique of the World Archaeological Congress. *Public Archaeology* 10 (4): 223–234.

Ucko, P. 1987. *Academic freedom & apartheid: The story of the World Archaeological Congress*. London: Duckworth. Available at: http://worldarchaeologicalcongress.org/about-wac/history/513-the-story-of-the-world-archaeological-congress-by-peter-ucko. Accessed 30 Mar 2012.

World Archaeological Congress (WAC). 2009. Statutes of the World Archaeological Congress. Available at: http://worldarchaeologicalcongress.org/about-wac/statutes. Accessed 30 Mar 2012.

World Archaeological Congress (WAC). 2010. About WAC. Available at: http://worldarchaeologicalcongress.org/about-wac. Accessed 30 Mar 2012.

Further Reading

Day, M. 2006. Peter Ucko and the World Archeological Congress (WAC). In *A future for archaeology*, ed. R. Layton, S. Shennan, and P. Stone, 41–46. London: University College London Institute of Archaeology.

Golson, J. 2006. Peter Ucko's 'human archaeology'. In *A future for archaeology*, ed. R. Layton, S. Shennan, and P. Stone, 7–16. London: University College London Institute of Archaeology.

Zimmerman, L. 2006. Liberating archaeology, liberation archaeologies and WAC. *Archaeologies* 2 (1): 85–95.

World Archaeological Congress (WAC) and Cultural Heritage Management

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Basic Information

> "The World Archaeological Congress is a non-governmental, not-for-profit organization and is the only representative world-wide body of practising archaeologists" (http://www.worldarchaeologicalcongress.org/about-wac).

The World Archaeological Congress (WAC) is dedicated to protecting, promoting, and preserving the cultural heritage of all cultures. WAC plays an active role in cultural heritage management by providing an international platform for researchers and Indigenous groups to unite, share knowledge, and enhance the protection of global cultural heritage.

Every 4 years, WAC hosts an international congress; archaeologists, members of First Nation groups, and Indigenous peoples from across the globe attend these congresses. Cultural heritage is a focus of all of these major conferences. Some 1,800 archaeologists attended the WAC-6 Congress in Dublin in 2008 and over 1,000 people attended WAC-7 at the Dead Sea in Jordan in 2013 (http://www.worldarchaeologicalcongress.org/events/congresses). WAC supported the attendance of over 230 participants from Indigenous and economically disadvantaged countries at WAC-6 and 440 people at WAC-7. This is part of a process of democratizing knowledge dissemination by scholars from around the world. WAC Congresses allow for the inception, intensification, and transferral of new ideas between participants and create an ever-strengthening, interconnected network of knowledge as a resource that can be used by current and future generations of researchers and stakeholders in cultural heritage.

WAC also holds smaller, themed inter-congresses in the area of cultural heritage. These have included *Indigenous People and Museums* (Indianapolis, USA, June 2011), *Archaeological Invisibility & Forgotten Knowledge: Ethnoarchaeology, Hunter-Gatherers, Ephemeral Cultural Aspects* (Lodz, Poland, September 2007), and *Threats to Archaeology: Its Importance, Its Values and Its Development* (Kingston, Jamaica, May 2007). The inter-congresses serve a similar purpose to the international congresses but focus on specialist discussions of a specific theme. Inter-congresses are held at shorter intervals than full Congresses, and there can be multiple inter-congresses in 1 year. These conferences, along with the many WAC publications, illustrate WAC's commitment to facilitating global dialogue on cultural heritage matters.

WAC's publications that focus on cultural heritage include the refereed journal, *Archaeologies*, which is published three times a year. The aim of *Archaeologies* is to make research and relevant issues accessible to a wider audience in a timely manner. WAC publishes several book series, including *One World Archaeology*, *Indigenous Archaeologies*, and the *Global Cultural Heritage Manual Series*. Contributors to these publications come from many backgrounds and countries. These WAC publications accelerate expansion of the archaeological literature and knowledge in cultural heritage.

Major Impact

WAC plays a proactive role in the cultural heritage management of Indigenous and First Nations peoples and indeed members from economically disadvantaged nations. WAC's Archaeologists without Borders and the Global Libraries Programs aim to overcome economic disparity in education and training and provide some necessary tools for archaeologists in economically disadvantaged nations as well as sharing knowledge from, and within, these nations. These initiatives, together with subsidized membership, further WAC's goal to make participation in global archaeology and cultural heritage management accessible to all peoples, to lessen economic and geographic barriers to the growth of knowledge in archaeology and cultural heritage.

WAC congresses, publications, and workshops facilitate Indigenous voice when such groups need international support and an avenue into mainstream media. Part of WAC's remit is to empower Indigenous and First Nation peoples' involvement in the heritage management of their culture. WAC does this by providing sponsorship for Indigenous people to attend its events and by providing support for members from economically disadvantaged countries. WAC's discussion list server supplies members with a direct line of communication to heritage experts seeking to undertake ethical best practice procedures in heritage research and management when working with Indigenous groups.

WAC provides a means to protect culturally sensitive heritage through its codes of ethics: the First Code of Ethics (1990), The Vermillion Accord on Human Remains (1989), and The Tamaki Makau-rau Accord on the Display of Human Remains and Sacred Objects (2006) (http://www.worldarchaeologicalcongress.org/about-wac/codes-of-ethics). According to these codes, consultation with relevant communities must be sought, and respect must be taken when working with sensitive cultural matters. While the codes are not legally binding, WAC members have a professional and ethical obligation to abide by them.

WAC produces an informal newsletter several times a year that updates members about issues in global heritage and instigates dialogue between the executive and members to deal with the issues effectively. The importance of this dialogue surfaced in early 2011, which was a tumultuous period for heritage protection. The April newsletter outlined the threats to Ugandan, Bangladeshi, Egyptian, and Libyan cultural heritage due to development and military action and declared WAC's opposition to these events (http://www.worldarchaeologicalcongress.org/images/pdfs/enews_37.pdf). As outlined in the newsletter, WAC continues to monitor these events and lobby the relevant governing bodies to protect their sites.

WAC plays an integral role in expanding the archaeological discipline and ensuring that all of its global, interconnected members undertake cultural heritage management ethically and that the cultural heritage of all peoples and all nations can be protected equally.

Cross-References

- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC): First Code of Ethics

Further Reading

World Archaeological Congress. n.d. Available at: http://www.worldarchaeologicalcongress.org/.

World Archaeological Congress (WAC): First Code of Ethics

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Introduction

Following on the success of the 1986 World Archaeological Congress (WAC) in Southampton (UK) in 1989, the organization held its first Inter-Congress on the topic Archaeological Ethics and the Treatment of the Dead in Vermillion, South Dakota (USA). Attendees at that meeting passed the Vermillion Accord, a six-clause statement recognizing the rights, obligations, and concerns of Indigenous people and scientists relating to ethical treatment of the dead. Several Indigenous people who attended that meeting went to the WAC II meeting in Barquesimeto, Venezuela, the following year. A Maori representative, Hirini Matunga, organized a small session of other Indigenous attendees and one archaeological advisor to discuss a possible code of ethics that would move beyond repatriation issues into broader concerns about the rights of Indigenous people to have a voice in how their own heritage is studied or represented.

Matunga presented a draft document to the group asking their concerns about what they wanted from their interaction with archaeologists and other heritage scholars, how they could best assure that this might happen, and what behaviors they expected from archaeologists. The two sections of the code reflect many of their concerns. The section entitled "Principles to Abide By" primarily focuses on acknowledgment by WAC members that Indigenous people have primacy over all aspects of their heritage and that members should seek to collaborate with those whose heritage they study, including them in everything from setting research agendas to funding. The second section, "Rules to Adhere To," is a more precise set of expected behaviors of members that recognize the need for fully informed consent, clearly stated boundaries for research, obligations related to reporting of findings, and long-term treatment and protection of Indigenous heritage.

Committee members expressed concern about whether the language of the draft code would be too strong for the WAC Executive and Council to accept, but when the Indigenous Representatives to the Council offered it the next day, Executive and Council easily adopted the *First Code of Ethics: Members' Obligations to Indigenous Peoples* (Zimmerman and Bruguier 1994).

Definition

Although it is usually just called the WAC Code of Ethics, the official name of the document is *The World Archaeological Congress First Code of Ethics: Members' Obligations to Indigenous Peoples*. The title recognizes that this listing of principles and behaviors specifically addresses only concerns about Indigenous heritage and that it is not a full set of ethical obligations of archaeologists to all aspects of heritage. The idea that it is a *first* code recognizes that ethics are constantly changing and will eventually need alteration as conditions shift. The code is as follows (World Archaeological Congress (WAC) n.d.-a):

Principles to Abide By

Members agree that they have obligations to indigenous peoples and that they shall abide by the following principles:

1. To acknowledge the importance of indigenous cultural heritage, including sites, places, objects, artefacts, human remains, to the survival of indigenous cultures.
2. To acknowledge the importance of protecting indigenous cultural heritage to the well-being of indigenous peoples.

3. To acknowledge the special importance of indigenous ancestral human remains, and sites containing and/or associated with such remains, to indigenous peoples.
4. To acknowledge that the important relationship between indigenous peoples and their cultural heritage exists irrespective of legal ownership.
5. To acknowledge that the indigenous cultural heritage rightfully belongs to the indigenous descendants of that heritage.
6. To acknowledge and recognise indigenous methodologies for interpreting, curating, managing, and protecting indigenous cultural heritage.
7. To establish equitable partnerships and relationships between Members and indigenous peoples whose cultural heritage is being investigated.
8. To seek, whenever possible, representation of indigenous peoples in agencies funding or authorising research to be certain their view is considered as critically important in setting research standards, questions, priorities, and goals.

Rules to Adhere to

Members agree that they will adhere to the following rules prior to, during and after their investigations:

1. Prior to conducting any investigation and/or examination, Members shall with rigorous endeavor seek to define the indigenous peoples whose cultural heritage is the subject of investigation.
2. Members shall negotiate with and obtain the informed consent of representatives authorised by the indigenous peoples whose cultural heritage is the subject of investigation.
3. Members shall ensure that the authorised representatives of the indigenous peoples whose culture is being investigated are kept informed during all stages of the investigation.
4. Members shall ensure that the results of their work are presented with deference and respect to the identified indigenous peoples.
5. Members shall not interfere with and/or remove human remains of indigenous peoples with the express consent of those concerned.
6. Members shall not interfere with and/or remove artefacts or objects of special cultural significance, as defined by associated indigenous peoples, without their express consent.
7. Members shall recognise their obligation to employ and/or train indigenous peoples in proper techniques as part of their projects, and utilise indigenous peoples to monitor the projects.

Key Issues/Current Debates/Future Directions/Examples

Soon after the WAC Executive and Council passed the code, several other organizations including the Australian Archaeological Association and the Canadian Archaeological Association adopted similar codes, using the WAC code as a model. To date the code has remained unaltered, but was extended when the WAC Council adopted The Tamaki Makau-rau Accord on the Display of Human Remains and Sacred Objects (World Archaeological Congress (WAC) n.d.-b). The WAC Standing Committee on Ethics is charged with monitoring WAC ethics and has begun development of a general code of ethics as well as an international code of ethics. In a 2007 meeting, the committee agreed to a set of core values and processes to be used to evaluate future consideration of WAC ethics. They also prepared a draft general ethics code that will remain under discussion for the foreseeable future (World Archaeological Congress (WAC) n.d.-c).

Cross-References

► Australia: Repatriation Acts
► Ethics and Human Remains

- ▶ French Guiana: Archaeology and Minority Communities
- ▶ Indigenous Archaeologies
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Stakeholders and Community Participation
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ Vermillion Accord on Human Remains (1989) (Legislation)
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management

References

World Archaeological Congress (WAC). n.d.-a. World archaeological congress codes of ethics. Available at: http://www.worldarchaeologicalcongress.org/site/about_ethi.php (accessed 16 March 2012).

World Archaeological Congress (WAC). n.d.-b. The Tamaki Makau-rau Accord. Available at: http://worldarchaeologicalcongress.org/about-wac/codes-of-ethics/169-tamaki-makau-rau-accord (accessed 23 March 2012).

World Archaeological Congress (WAC). n.d.-c WAC ethics. Available at: http://humanitieslab.stanford.edu/WACEthics/Home (accessed 23 March 2012).

Zimmerman, L., and L. Bruguier. 1994. Indigenous peoples and the World Archaeological Congress Code of Ethics. *Public Archaeology Review* 2: 5–8.

Further Reading

Phillips, C., and H. Allen, eds. 2010. *Bridging the divide: Indigenous communities and archaeology into the 21st century*. Walnut Creek: Left Coast Press.

Rosenswig, R. 1997. Ethics in Canadian archaeology: An international, comparative analysis. *Canadian Journal of Archaeology/Journal Canadien d'Archéologie* 21: 99–114.

Williams, E., and D. Johnston. 1991. The World Archaeological Congress (WAC) and the WAC first code of ethics. *Australian Archaeology* 32: 64–67.

Zimmerman, L. 2006. Liberating archaeology, liberation archaeologies and WAC. *Archaeologies* 2: 85–95.

World Heritage and Human Rights

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Introduction

In a new book series called "Critical Perspectives on Cultural Heritage," editor Beverly Butler describes an intellectual program whose goal is to disrupt Eurocentric cultural heritage theory and practice, propose "alternative intellectual, moral-ethical, and also grounded concerns," and center "cultural heritage discourse within a wider concern for the preservation of human dignity and human justice and to use these alternative discourses as a resource for future action in terms of creating a proactive (rather than reactive), responsive and just future for a new critical cultural heritage studies" (Butler 2007). Critical heritage scholars are deeply concerned about social, economic, and political inequities worldwide. It is not surprising, then, that human rights have become an important focus in this domain of the cultural heritage field as well as among progressive archaeologists. Nor is this interest new, although interest in it has lagged until recently. In 1968 – on the twentieth anniversary of UNESCO's "Universal Declaration of Human Rights" – UNESCO held a meeting on "Cultural Rights as Human Rights" in which experts discussed community or group rights (Aoyagi 1970), the notion of universal culture and its engagement with national culture (N'Daw 1970), elite and majority culture (Debesa 1970), and other topics now current (such as the role of mass media and access to science and technology) (UNESCO 1970). Unfortunately, UNESCO's 1970 monograph on this subject went largely unnoticed, although the field of heritage studies was exploding onto the scene in the 1980s and 1990s, resulting in the twenty-first century bounty we see today.

Definition

Defining human rights is the crux of the issue. They are a particular category of rights whose definition has varied widely over time. The philosophical framework for the contemporary notion of human rights emerged out of the Enlightenment. As currently conceived, at least in the West, they are best defined by the United Nations 1948 Universal Declaration of Human Rights. Since promulgation of that charter, there have been further declarations. The human rights we speak about today are those recognized in international law rather than (or more than) being predicated upon earlier moral or philosophical premises. The reader is directed to the various international documents.

Key Issues

Cowan et al.'s (2001) *Culture and Rights* and UNESCO's promulgation of the 2001 "Universal Declaration on Cultural Diversity" and 2003 "Convention for the Safeguarding of the Intangible Cultural Heritage" revived interest in the topic of human rights. In March 2006, *American Anthropologist* published a themed set of papers dealing with human rights (Goodale 2006). Independently and at the same moment, the Collaborative for Cultural Heritage Management and Policy (CHAMP) at the University of Illinois (called at that time Collaborative for Cultural Heritage and Museum Practices) hosted its first annual international conference and chose "cultural heritage and human rights" as the topic for discussion (Silverman and Ruggles 2007). In 2007, ICOMOS-Australia, Deakin University, and the University of Ulster held two important research workshops at which multiple rights were debated (Langfield et al. 2010). In 2010, the Princess Maha Chakri Sirindhorn Anthropology Centre in Bangkok launched a national culture and rights project in Thailand. In February 2011, the Office of the United Nations High Commissioner on Human Rights (in UNESCO's Geneva office) convened a dozen cultural heritage experts to consider the issue of access to cultural heritage as a human right. A few weeks later, ICOMOS-Norway held a meeting to promote a rights-based approach to cultural heritage (see Ekern et al. 2012).

Clearly, we are witnessing the emergence of an important new paradigm within the field of critical heritage studies. But its consensual form remains to be worked out. What do we actually mean by human rights applied to cultural heritage? This is a temporally shifting definitional terrain as some cultural rights once defended have come to be criticized and vice versa. Indeed, what is "culture" now that it has been unmoored from its antiquated conceptualization of bounded entity?

Fundamentally, the linkage of cultural rights and human rights must signify social, political, and economic equity in the vibrantly creative embodied lives of actors at the local level of stakeholders and communities. Therefore, can and should cultural rights and human rights be universalized as encompassed by UNESCO's various declarations – beyond the idealistic notion of all of humankind being enriched by the enjoyment of everyone's cultural heritage ("outstanding universal value")? Cowan (2006) worries appropriately about a hegemonic rights framework. William Logan, who holds the UNESCO Chair at Deakin University, cogently identifies "the clash between universalism and cultural relativism" and sanguinely recognizes the pragmatic need to negotiate between absolutism in human rights and "broader community, regional and national interests, and, indeed, between various interests within the same local community" (2007: 50). Elazar Barkan is pessimistic about the ability of human rights scholars to elaborate a theory of "group rights" that can withstand the reality of "people everywhere [who] hold to cultural and political beliefs that they see essential to their own identity and culture, yet that are at the same time offensive, at times violently so, to others, both members of the groups themselves, and outsiders" (2007: 199). My position is that we must be very careful not to diminish the concept and advocacy of vital human rights by uncritically and automatically placing cultural rights on the

same plane. Human rights such as: life itself without fear of intimidation or physical abuse by the state or its agents; adequate food and health care; freedom of religious practice (or not to practice religion); group expression of cultural traditions (and the right to leave that tradition); freedom of political expression; unfettered mobility; gender equality. Not all cultural rights rise to the level of these human rights. Indeed, some cultural rights as locally practiced might be argued to abrogate human rights. The challenge is to defend those cultural rights that are human rights – but who decides? and how? – without provoking disastrous resistance by oppositional forces. Much work remains to be done on cultural rights, human rights, and heritage. The issue should not be abandoned because of its complexities. The field can advance by interrogating the concepts and improving the methods used to investigate these problems and, especially, by deploying ethnographically grounded studies of culture and rights that are "undertaken in a theoretically informed, reflexive and critical way" (Cowan 2006: 21).

Kirshenblatt-Gimblett has recognized the fraught issue of proprietary rights and cultural rights (1998: 65), a topic which has grown in importance. Concerning some sites already on the prestigious World Heritage List and others awaiting consideration by UNESCO's World Heritage Committee, there is a recurring problem of property rights for those who reside (especially if there is legal title) on land that lies within the officially delimited borders of the site. Some governments, such as Indonesia and Thailand, have removed settlements in their process of implementing a site management plan and opening of a site to increased tourism through the World Heritage Site moniker. Is residential tenancy a human right? Other interesting cases involve what a national heritage organization considers to be appropriate and inappropriate use of a site by local people. Do they have free (no entry fee required) access (availability at any time) to a site with which they have coexisted for generations? Are local stakeholders allowed to perform ceremonies on sites that they regard as important? Are these cultural rights or human rights?

A particular contribution of the international lawyer Rosemary Coombe is her recognition of the importance of governmentality in cultural heritage and her explanation of its object and instrument nature. Just as anthropologists comfortably speak of social constructivism, which was a paradigm shift only a generation ago, so now we must understand legal constructivism: "Identities do not exist before the law but are forged in relation to law" (Coombe 2010). The legal, social, and other technologies by which law is deployed generate and constrain opportunity, bringing this perspective into alignment with anthropologists' and archaeologists' greater familiarity with theories of agency, practice, and materiality.

The work of another international lawyer, Yvonne Donders (2008, 2009, 2010), in the field of social and cultural rights, human rights and cultural diversity, and human rights and development relates to the elaboration of the content, nature of obligations, state of implementation, indicators, and justiciability of economic, social, and cultural rights (see also Vrdoljak 2009, 2010). Lawyer Jane Anderson (2009) is especially concerned with philosophical and practical problems for intellectual property law and the protection of indigenous/traditional knowledge and cultural heritage.

Rights are becoming a major concern in the critical heritage field: rights *to, in*, and *as* heritage (Smith et al. in preparation). Here there is a great and necessary opportunity for heritage scholars to analyze, theorize, and recommend policy. The problem of a "universal validity of the language of rights" (Nussbaum 1998: 77) is readily translatable to debates about World Heritage under today's conditions of globalization, frequent inter-ethnic conflict, internal political unrest, and the tension between local/national identity and the constitution of world citizenship.

Also related to the issue of rights is the issue of peace. Logan (2010) eloquently propounds the use of heritage conservation to strengthen the defenses of peace, following the Preamble to UNESCO's 1945 Constitution and arguing against the politicization of the World Heritage List program (see also *The Economist* 2010;

Silverman 2011). Logan (2010) and Silverman (2011) share a belief in the value of transnational or transborder/transboundary inscriptions for mitigating conflict.

Human rights and cultural rights are complicated by UNESCO's World Heritage framework. Barbara Kirshenblatt-Gimblett precisely recognizes the "fundamental contradiction... between [UNESCO's] celebration of diversity, on the one hand, and [its] application of a universal standard" (2006: 187). Clearly, human rights will remain an important topic in heritage studies and heritage practice.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Gender
- ▶ Cultural Heritage Management and Poverty
- ▶ Culture in Archaeology
- ▶ Engendered Archaeologies
- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies
- ▶ UNESCO's World Heritage List Process

References

Anderson, J. 2009. *Law, knowledge, culture: The production of indigenous knowledge in intellectual property law*. Cheltenhem: Edward Elgar Press.

Aoyagi, K. 1970. Community or group rights. In *Cultural rights as human rights*, 25–27. Paris: UNESCO.

Barkan, E. 2007. Genes and burkas: Predicaments of human rights and cultural property. In *Cultural heritage and human rights*, ed. H. Silverman and D.F. Ruggles, 184–200. New York: Springer.

Butler, B. 2007. Series editor's foreword. In *Reclaiming heritage. Alternative imaginaries of memory in West Africa*, ed. F. de Jong and M. Rowlands, 9–10. Walnut Creek: Left Coast Press.

Coombe, R. 2010. Honing a critical cultural study of human rights (Special issue on human rights). *Communication and Critical/Cultural Studies* 7: 230–246.

Cowan, J. 2006. Culture and rights after culture and rights. *American Anthropologist* 108: 9–24.

Cowan, J., M.-B. Dembour, and R.A. Wilson, eds. 2001. *Culture and rights: Anthropological perspectives*. Cambridge: Cambridge University Press.

Debesa, F. 1970. Culture of elite and culture of majorities. In *Cultural rights as human rights*, 31–33. Paris: UNESCO.

Donders, Y. 2008. The UN declaration on the rights of indigenous peoples: A victory for cultural autonomy? In *Changing perceptions of sovereignty and human rights: Essays in honour of Cees Flinterman*, ed. I. Boerefijn and J. Goldschmidt, 99–122. Antwerp: Intersentia.

Donders, Y. 2009. Culture and human rights. In *Encyclopedia of human rights*, ed. D. Forsythe, 441–450. Oxford: Oxford University Press.

Donders, Y. 2010. Do cultural diversity and human rights make a good match? *International Social Science Journal* 61: 15–35.

Ekern, S., W. Logan, B. Sauge, and A. Sindig-Larsen, eds. 2012. Special issue: World heritage and human rights: Preserving our common dignitity through rights based approaches. *International Journal of Heritage Studies* 18: 213–225.

Goodale, M., ed. 2006. In focus: Anthropology and human rights in a New Key. Themed section. *American Anthropologist* 108: 1–84.

Kirshenblatt-Gimblett, B. 1998. *Destination culture. Tourism, museums and heritage*. Berkeley: University of California Press.

Kirshenblatt-Gimblett, B. 2006. World heritage and cultural economics. In *Museum friction. Public cultures/global transformations*, ed. I. Karp, C.A. Kratz, L. Szwaja, and T. Ybarra-Frausto, 161–202. Durham: Duke University Press.

Langfield, M., W. Logan, and M.N. Craith. 2010. *Cultural diversity, heritage and human rights. Intersections in theory and practice*. London: Routledge.

Logan, W.S. 2007. Closing Pandora's box: Human rights conundrums in cultural heritage protection. In *Cultural heritage and human rights*, ed. H. Silverman and D.F. Ruggles, 184–200. New York: Springer.

Logan, W.S. 2010. Heritage and dialogue: Using heritage conservation to strengthen the defences of peace. In *Proceedings II*, 1440–1448. Çanakkale: World Universities Congress, Çanakkale Onsekiz Mart University.

N'Daw, A. 1970. Universal culture and national cultures. In *Cultural rights as human rights*, 28–30. Paris: UNESCO.

Nussbaum, M.C. 1998. *Cultivating humanity: A classical defense of reform in liberal education*. Cambridge: Harvard University Press.

Silverman, H. 2011. Border wars: The ongoing temple dispute between Thailand and Cambodia and UNESCO's World Heritage List. *International Journal of Heritage Studies* 17: 1–21.

Silverman, H., and D.F. Ruggles, eds. 2007. *Cultural heritage and human rights*. New York: Springer.

Smith, L., W.S. Logan, and H. Silverman, eds. in preparation. *Theorizing heritage*. London: Routledge.

The Economist. A danger list in danger, 28 August 2010, 49–50.

UNESCO. 1970. *Cultural rights as human rights*. Paris: UNESCO.

Vrdoljak, A.F. 2009. Cultural heritage in human rights and humanitarian law. In *Human rights and international humanitarian law*, ed. O. Ben-Naftali, 250–302. Oxford: Oxford University Press.
Vrdoljak, A.F. 2010. Human rights and illicit trade in cultural objects. In *The selected works of Ana Filipa Vrdoljak*. Berkeley Electronic Press. Available at: http://works.bepress.com/ana_filipa_vrdoljak/20 (no access date).

Further Reading

Donnelly, J. 2003. *Universal human rights in theory and practice*. Ithaca: Cornell University Press.
Goodhart, M. 2009. *Human rights. Politics and practice*. New York: Oxford University Press.
Griffin, J. 2008. *On human rights*. Oxford: Oxford University Press.
Hunt, L. 2007. *Inventing human rights. A history*. New York: W.W. Norton.
Lauren, P.G. 2011. *The evolution of international human rights*. Philadelphia: University of Pennsylvania Press.
Moyn, S. 2010. *The last utopia. Human rights in history*. Cambridge: Belknap Press/Harvard University Press.

World Heritage Education, Training, and Capacity Building

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Introduction

Since the 1990s, many universities have launched Heritage studies programs, seven being listed on the UNESCO web site as having specialized in the study of World Heritage issues (UNESCO n.d.-a). Other universities include World Heritage alongside studies that are more focused on heritage at the national and local levels. UNESCO, the World Heritage Committee, and its secretariat, the World Heritage Center, have taken a number of initiatives to encourage universities to support its World Heritage mission, including recently encouraging the development of a new set of Category Two Centers (C2Cs).

Definition

At the heart of the ongoing debates about the role of universities and particularly about the C2Cs is the important distinction between "education" and "training." In simple terms, university education has breadth and depth of teaching based on research and analysis. Training, by contrast, is narrower in focus, shorter in program length, and more directed at meeting the specific needs of employer or special interest groups. A third term – capacity building – is commonly used which also focuses on the needs of heritage protection agencies. It embraces education and training but goes beyond both to strengthen institutions, communities, and networks in other ways (UNESCO and Kingdom of Bahrain Ministry of Culture 2011: 3).

Historical Background

The UNESCO World Heritage Convention 1972 was radical in its time in envisaging heritage as both natural and cultural and bringing the two together into a single normative statement and protective system. In the ensuing 40 years, both the community and professional views of what constitutes cultural heritage have broadened in many countries around the world. Educational programs have responded to this broadening conception of heritage and its value for contemporary society. Several important shifts can be discerned.

Moving from a mid-twentieth century focus on iconic monuments and archaeological sites, the criteria adopted for evaluating cultural nominations to the World Heritage List encompassed values that enabled the inscription of a wider range of places, such as vernacular building ensembles, historic towns and villages, and designed parks and gardens. In 1993, cultural landscapes and their associative values were added, while the last decade has seen a greater emphasis on the intangible values of places and debate about the addition of historic urban landscapes.

Another major trend has seen heritage discourse and practice move from a narrowly

technical focus to a more ethics-based approach. The World Heritage system has moved to a values-based approach to managing heritage places, and there has been an increased weight put on associative values, especially of indigenous communities. Questions about "Whose heritage?" and "In whose interest is a place being inscribed?" have been given higher priority, as, too, is the development of more inclusive heritage registers.

The global debates have led to the recognition that wide variations exist in the way heritage is understood from one world region to another and from one culture to another and that variation is part of the world's rich and creative cultural diversity. The Nara Conference on Authenticity in November 1994 had a major impact on heritage conservation theory and practice, concluding as it did that the ways of conserving heritage should be in accord with local ways of understanding heritage. This widening is seen in the debates about philosophy and practice in the key global organizations – UNESCO, ICOMOS, ICOM, ICCROM, and IUCN – and is reflected in the programs taught and the research undertaken in educational and training institutions at the national and global levels.

Educational Responses

Initially education and training providers responded to the global conservation effort spearheaded by UNESCO by creating a series of specialist courses, some dealing with the conservation of monuments and sites and drawing heavily on the disciplines of archaeology and architecture, others focusing on science- and laboratory-based materials conservation, and yet others on museology or public history (Logan 2010). In the 1970s and 1980s, ICCROM in Rome and the University of York in England were key training institutions. During the 1980s and 1990s, other universities moved into the heritage field, and courses were developed that, in relation to heritage places, shifted from technical restoration to focus on broader planning and management issues, often connected to economic development through tourism.

Within the last 15 years, the increasingly holistic conception of heritage has led to new batch of courses drawing together at least heritage places and museum studies and beginning to focus on intangible heritage and traditional knowledge systems. In some countries such as the United Kingdom, Australia, and, more recently, the United States, "heritage studies" has emerged as a new interdisciplinary area in its own right bringing together history and geography, architecture and archaeology, economics and town planning, anthropology, ethnology and folklore studies, art history, and museum studies and with strong emphases on the interconnections between philosophy, theory, and practice.

UNESCO Engagement with Education and Training

Article 5 of the World Heritage Convention 1972 calls on States Parties to "foster the establishment or development of national or regional centres for training in the protection, conservation and presentation of the cultural and natural heritage and to encourage scientific research in this field." Despite this unambiguous statement, little was initially done within the UNESCO system to link heritage and education. Since the 1990s, there has been a more concerted effort by the World Heritage Center to influence curricula and bring students and teaching staff in schools and universities into actively supporting UNESCO's World Heritage program. For a discussion of initiatives taken at the school level, see Logan (2012a).

UNESCO's connection with universities has a long and honorable history, dating back to the appointment of former Oxford scholar, Julian Huxley, as its first director in 1946 and continuing with the regular commissioning of university scholars such as Claude Lévi-Strauss to write key reports. In 1991 UNESCO's General Conference decided to create and set up a network with the UNITWIN program under which universities agreed to collaborate, usually across the North/South divide, and the appointment of UNESCO Chairs (UNESCO n.d.-b). The aim of both components is to facilitate knowledge and skills transfer and institutional capacity building through

training, research, information sharing, and outreach activities in UNESCO's major program areas of education, natural sciences, social and human sciences, culture, and communication and information. As of 31 May 2011, there were 715 UNESCO Chairs. Of these, 23 are designated to the field of cultural heritage, although several of the earlier ones created in the 1990s appear to now be defunct (UNESCO n.d.-c). There are no Chairs in the natural sciences focusing on natural heritage.

Apart from a 10th anniversary meeting held at UNESCO Paris headquarters in November 2002, there has been little linkage between the various UNITWIN programs or the UNESCO Chairs. A number of other networks have tried to fill this gap but have also been less successful than hoped. The Forum UNESCO: University and Heritage (FUUH) network was established by UNESCO in 1995, initially under the management of the Valencia Polytechnic University in Spain but now jointly managed by that university and the World Heritage Center. The FUUH mission is broad and emphasizes supporting UNESCO action in favor of cultural and natural heritage protection, enhancement, and conservation. FUUH is an informal network whose main collaborative activity has been the annual, now biennial international conferences, and it has run in 13 university locations across the world (FUUH n.d.).

Other networks have been established at a regional level. For instance, in 2001, ICCROM joined forces with UNESCO's Office of the Regional Advisor for Culture in Asia and the Pacific based in Bangkok to form the Asian Academy of Heritage Management (AAHM). This is a network of institutions, mostly universities, that offers professional training in the field of cultural heritage management (UNESCO Bangkok, AAHM n.d.). Such training is seen to be critically important given the Asia-Pacific context of rapid environmental degradation, urban infrastructure development, and mass tourism. Since 2008, the network has become more self-governing, and its principal activity has been a major regional conference held every 18 months or 2 years.

Key Issues/Current Debates

While reference is conventionally made now to the conservation of cultural heritage as being a multidisciplinary activity requiring a holistic approach, both in management and education, in reality many obstacles make this difficult to achieve. It is regrettable that the definition and management of heritage is divided between UNESCO conventions and programs and in administrative arrangements at the global level and commonly, too, at the national level. Faculty divisions within universities continue to make it difficult to educate students across the range of disciplines needed to practice heritage conservation in a more holistic way, even to deal with natural and cultural values under the World Heritage Convention let alone working with intangible values, cultural expressions, and heritage representation in museums or to deal with growing concerns about heritage sustainability, environmental degradation, and the potential impacts of climate change.

Increasingly, however, heritage is seen not simply as a reflection of the world's rich and creative diversity but as the very underpinning of the cultural identity of people, and its maintenance is considered a basic human right. In other words, heritage conservation can no longer be seen just as a technical issue; it always involves fundamental philosophical and ethical questions, and these must be incorporated into heritage courses in universities: Why are we doing it? Who for? Who said? Are the local people whose heritage is being "protected" involved? How does it fit with other human rights? How does it fit with sustainability?

This shift has also been reflected in teaching and research in a number of university courses where heritage is understood as being produced through sociopolitical processes reflecting society's power structures. The close link between heritage and identity is recognized, as is the link between official heritage definitions and nation building and the misuse of "heritage" in some countries to reinforce the power of political elites and dominant ethnic groups. This means that while there remains a very clear need to produce graduates with practical architectural and

archaeological conservation expertise and heritage planning and management skills, the social sciences can add skills for analyzing the social, political, and economic context and for negotiating heritage conservation outcomes in situations where the identification, evaluation, and interpretation of heritage items is contested between various groups within the community.

This shift toward a more critical approach to heritage practice encourages scholars and practitioners to consider the human rights implications of conservation interventions and to devise ways in which local people, including indigenous peoples and ethnic minorities in particular, can be empowered to play a meaningful role in determining how their heritage is identified and managed. This ties in closely with the work being done by Ms. Farida Shaheed, Independent Expert at the UN Human Rights Commission in Geneva, who focused in 2011 on access to and enjoyment of cultural heritage as a cultural right (UNHRC 2011). It also resonates with efforts by the Advisory Bodies, notably the IUCN and ICOMOS, to move the World Heritage system toward a rights-based approach to site management. This new approach has already encouraged a rich stream of research in universities, and a number of books are now available that deal with the links between cultural diversity, heritage, and human rights (see, for instance, Silverman and Ruggles 2007; Langfield et al. 2010; Ekern et al. 2012).

International Perspectives

World Heritage education appears to have started moving in two directions – toward Critical Heritage Studies on the one hand, but toward a greater emphasis on skills training designed to meet the World Heritage system's specific needs on the other hand. In a carefully managed education system, both of these approaches should coexist so that students and researchers are able to ground theory in an understanding of practice. The signs are, however, that we are moving toward a dual system based on conflicting rather than complementary approaches.

In a sense, the division is occurring as a result of wider problems in the World Heritage system, especially the proliferation of inscribed places with severe management and sustainability issues. There are now 35 properties on the World Heritage in Danger List, and a further 135 were subject to close scrutiny in 2011 by the World Heritage Committee (UNESCO World Heritage Committee 2011). The World Heritage Committee's attempt to contain the problem through its "state of conservation" and periodic reporting mechanisms is not sufficient. There is a sense among some in UNESCO's cultural sector that there is a need for training that is more focused on meeting the specific demands of World Heritage sites.

Reemphasizing Skills Training

The World Heritage Committee called on the advisory bodies to revise its 2001 training strategy. Moving beyond training to cover institutional capacity building more widely, this new strategy was presented to the Committee at its 35th session in 2011. There had been some small representation of the UNESCO Chairs in the drafting sessions as well as an increasingly large participation by the Category 2 Centers. These centers, while not legally part of UNESCO, are associated with it by way of formal arrangements approved by UNESCO's General Conference. There are now 20 such culture-related centers of which six focus on World Heritage. Many States Parties are keen to establish a C2C, which is in line with their responsibilities under the Convention, but they must guarantee funding, possess staff with sufficient experience, and, perhaps most importantly, have a genuine commitment to making the C2C function effectively.

The majority of strongest universities in the heritage field will be outside the "Category 2 family" that is being created. There is a concern that the C2Cs will be perceived as having UNESCO's imprimatur but may not attain the same standards of teaching and research. The situation is exacerbated by confusion between the notions of education and training (Logan 2010). These are two different processes and can involve different agencies, universities focusing more on the

former although also providing training while professional bodies, government departments, and other agencies focus on training. University education is broad, questioning, liberating, and improving. With regard to World Heritage, university teachers are not trainers seeking merely to serve the needs of the World Heritage system. Of course there is a necessity to provide such technical expertise, but they have also to engage students in the larger philosophical concerns, to inculcate in them an appreciation of ethical responsibility, and to encourage critical analysis and debate.

Critical Heritage Studies

Critical Heritage Studies also takes the stance that heritage is not simply a reflection of the world's rich and creative diversity but is the very foundation of the cultural identity of people, and hence, its maintenance is basic human right. Again this means that heritage conservation can no longer be seen merely as a technical issue but needs to be seen in an ethical context; indeed, when talking of World Heritage, conservation should be seen more clearly as a tool for attaining the ethical mission set by UNESCO in its Constitution and other statements. An Association of Critical Heritage Studies has been established, and an inaugural conference was held in June 2012 at the University of Gothenburg, Sweden.

Future Directions

It is quite clear that growth of World Heritage system requires new responses, probably including a realignment away from serving the political and economic interests of the States Parties and toward the original UNESCO mission (Logan 2012b: 125–7). It is perhaps unfortunate that, given the increasingly difficult situation in which UNESCO's flagship World Heritage program finds itself, World Heritage education and training seems to be moving toward a dual system comprising C2Cs and the rest. It also be seen as running against the advice of the Independent External Evaluation of UNESCO when it recommended five strategic directions, the fifth being to develop a partnership strategy that included renewing, not scaling down, links with and between institutes, programs, universities, and centers of excellence that can improve UNESCO's performance (UNESCO Executive Board 2010: 11).

There is currently a sense of dismay in some universities. It is likely that Critical Heritage Studies will expand in the non-C2C universities and possibly assume a more questioning stance toward UNESCO and its World Heritage program. Other institutions may also be affected. The AAHM, for example, will no longer be in line with UNESCO's approach. ICCROM has already begun adjusting. The UNESCO Chairs in the cultural heritage field are likely to be brought under the direct control of the World Heritage Center, if they survive at all. The encouragement of a new batch of C2Cs may in some parts of the world draw students away from existing university courses, making them unviable. This is a risky experiment. It is too soon to know the consequences, but the collateral damage could be high.

Cross-References

- ▶ Heritage and Higher Education
- ▶ Heritage Values and Education
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

References

Ekern, S., W. Logan, B. Sauge, and A. Sinding-Larsen. 2012. Human rights and world heritage: Preserving our common dignity through rights-based approaches to site management. *International Journal of Heritage Studies* 18: 213–225.

Langfield, M., W. Logan, and M.N. Craith. 2010. *Cultural diversity, heritage and human rights: Intersections in theory and practice*. London: Routledge.

Logan, W. 2010. Development of world heritage studies in university education. In *World heritage and cultural diversity*, ed. D. Offenhauser, W.C. Zimmerli, and M.-T. Albert, 38–43. Cottbus/Frankfurt am Main: IKO – Verlag für Interkulturelle Kommunikation/Brandenburg Technical University.

Logan, W. 2012a. Patrimonito leads the way: UNESCO, cultural heritage, children and youth. In *Children,*

childhood and cultural heritage, ed. K. Darian-Smith and C. Pascoe, 21–39. London: Routledge.
Logan, W. 2012b. States, governance and the politics of culture: World heritage in Asia. In *The Routledge handbook of heritage in Asia*, ed. P. Daly and T. Winter, 113–128. London: Routledge.
Silverman, H., and D.F. Ruggles, eds. 2007. *Cultural heritage and human rights*. New York: Springer.
UNESCO. 1972. *Convention concerning the protection of the world cultural and natural heritage (the world heritage convention)*. UNESCO.
UNESCO. n.d.-a. World heritage convention. Frequently asked questions. Available at: http://whc.unesco.org/en/faq. Accessed 7 Oct 2011.
UNESCO. n.d.-b. UNITWIN/UNESCO Chairs program. Available at: http://portal.unesco.org/en/ev.php-URL_ID=22017&URL_DO=DO_TOPIC&URL_SECTION=201.html. Accessed 1 Oct 2011.
UNESCO. n.d.-c. List of UNESCO chairs and UNITWIN networks in the field of cultural heritage by country. Available at: http://www.unesco.org/en/university-twinning-and-networking/access-by-domain/culture/cultural-heritage/. Accessed 1 Oct 2011.
UNESCO Bangkok AAHM. n.d. Asian academy of heritage management. Available at: http://www.unescobkk.org/culture/world-heritage-and-immovable-heritage/asian-academy-for-heritage-management/. Accessed 1 Oct 2011.
UNESCO Executive Board. 2010. *Report on the independent external evaluation of UNESCO*. Paris: Document 185 EX/18, UNESCO.
UNESCO Fuuh. n.d. Forum UNESCO: University and Heritage.net. Available at: http://universidadypatrimonio.net/eng/red_forum_unesco/porque.html. Accessed 1 Oct 2011.
UNESCO, and Kingdom of Bahrain Ministry of Culture. 2011. The 'Bahrain Report'. First annual meeting of World Heritage related category 2 centres and of relevant UNESCO chairs and higher education and research institutions, Manama, 19–20 December 2010. Available at: http://whc.unesco.org/uploads/events/documents/event-756-1.pdf. Accessed 7 Nov 2011.
UNESCO World Heritage Committee. 2011. State of conservation of World Heritage properties inscribed on the World Heritage List. Available at: http://whc.unesco.org/archive/2011/whc11-35com-7Be-pdf. Accessed 7 Oct 2011.
United Nations Human Rights Council (UNHRC). 2011. Report of the independent expert in the field of cultural rights, Farida Shaheed. Human Rights Council Seventeenth Session Agenda Item 3: (A/HRC/17/38). Available at: http://daccess-dds-ny.un.org/doc/UNDOC/GEN/G11/122/04/PDF/G1112204.pdf?OpenElement. Accessed 7 Nov 2011.

Further Reading

Smith, L. 2006. *Uses of heritage*. London: Routledge.

World Heritage Journals

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Brief Definition of the Topic

Given the interdisciplinary and global reach of "heritage" in academic, professional, and community contexts, it should come as little surprise that journals that deal with the topic represent a great variety of subject matters and perspectives. Indeed, journals that include "heritage" in their title may just as likely be focused on conservation science as tourism, subjects that seem at first quite distant but are connected by their shared concerns with authenticity and preservation. As attention to heritage has grown over the past half century, in large part intertwined with the founding and expanded reach of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and other international bodies such as ICOMOS, so the number of journals devoted to heritage issues has increased. What follows is a summary of these publications, both those which are exclusively devoted to heritage (along its various dimensions) as well as those whose primary focus is elsewhere but nevertheless publishes a good deal of material important to the study of heritage.

Early Journals

Any review of the history of world heritage journals must begin by acknowledging the important role played by a more traditional "archaeology" journal, the *Journal of Field Archaeology*, founded in 1974 largely by faculty at Boston University's Department of Archaeology. Long before any other journals were focused on heritage issues, the *JFA* included from its outset a regular section called "The Antiquities Trade," whose aim was to "provide a forum for commentary on the illicit traffic in antiquities" (Wiseman 1974: 1). This feature remained an important part of *JFA* until 1993 and was revived in 2005 under the editorship of Morag Kersel and Christina Luke. In 1977, the *JFA*

established a second section entitled "Preservation and Rescue," under the editorship of Thomas F. King, which was a regular feature until 1982.

Several national and international organizations also published journals that included content on heritage preservation and policy. Upon their founding in 1948, UNESCO published *Museum International* and ICOM published *ICOM News*, magazines that regularly include articles on heritage issues. In 1978, the U.S. National Park Service began publishing its *CRM Bulletin*, which then became the more broadly construed *CRM Journal* in 2003.

It was not until the early 1990s, however, that journals devoted entirely to heritage issues were founded. In 1991, the *International Journal of Cultural Property* began publication, aimed at being an interdisciplinary law and policy journal on cultural property and heritage disputes. In 1994, the *International Journal of Heritage Studies* began publication, mainly on issues of heritage preservation and tourism. These were followed by *Art, Antiquity, and the Law* (1996); *Culture without Context* (1997–2006); and the *IFAR Journal* (1998), all focused on art and antiquities trade issues.

Recent Expansion of Heritage Journals

Since 2000, the number of journals focused on world heritage has greatly expanded to deal with the many different dimensions of the subject. There are now journals that focus on problems of conservation (*Journal of Cultural Heritage* [2000], *Conservation Science in Cultural Heritage* [2001]), tourism (*PASOS: Journal of Tourism and Cultural Heritage* [2003, e-journal], *Journal of Heritage Tourism* [2006]), intangible heritage (*International Journal of Intangible Heritage* [2006]), architecture and the built environment (*International Journal of Architectural Heritage* [2007]), and digital heritage (*ACM Journal on Computing and Cultural Heritage* [2008], *International Journal of Heritage in the Digital Era* [2012]). Finally, two recent journals have been founded that focus on the larger context of heritage in contemporary social life, *Heritage and Society* (founded in 2008 as *Heritage Management*) and the *Journal of Cultural Heritage Management and Sustainable Development* (2011).

In addition, several more general archaeology journals regularly include content on heritage issues. Aside from the revived "Antiquities Trade" feature in *JFA*, the *Journal of Social Archaeology* (2001) and the journal of the World Archaeological Congress, *Archaeologies* (2006), both seek to examine the social and political context of archaeological practice and thus often include articles on conflicts and policies dealing with heritage worldwide.

Cross-References

- ▶ Heritage and Society
- ▶ International Council of Museums (ICOM)
- ▶ International Journal of Cultural Property
- ▶ International Journal of Heritage Studies
- ▶ Journal of Cultural Heritage Management and Sustainable Development
- ▶ Journal of Heritage Tourism
- ▶ Journal of Social Archaeology
- ▶ King, Thomas F.
- ▶ UNESCO World Heritage Convention (1972)
- ▶ US National Park Service and World Heritage
- ▶ World Archaeological Congress (WAC)

References

Wiseman, J. 1974. Editorial. *Journal of Field Archaeology* 1: 1–2.

World Heritage List: Criteria, Inscription, and Representation

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Introduction

It has been said that World Heritage is a category and the World Heritage List is its instrument

(Hafstein 2009: 108). While categories themselves are mechanisms for organizing information and making meaning of them (cf. Evans-Prichard 1976: 222–225; Lévi-Strauss 1966), a list "brings greater visibility" to them, rendering them bounded and defined yet at the same time abstracted (Goody 1977: 81). The category of "world heritage" is not universally comprehended but rather must be effectively constructed, communicated, and standardized in meaning to meet the world's varied understandings of culture, heritage, and patrimony and to convey UNESCO's principle objectives. The World Heritage List accomplishes this; it converts places primarily of local import into sites publically recognized as possessing universal value through a complex, ritual process that engages actors from local, regional, national, and transnational realms. This entry will outline the major turns of thought in the development of the List, process of inscription, criteria used to define the sites, and key issues and current debates surrounding the List's representative quality.

Definition

The World Heritage List is the primary instrument that constructs the universalized category of "World Heritage" by cataloguing the diverse worldwide sites that are determined to possess "outstanding universal value." Because the individual sites are so disparate and the criteria for their inscription so conceptual, the List's construction of world heritage exists through its inherent juxtapositionality. That is, the List allows each site to be seen in juxtaposition to all of the other World Heritage sites, and therefore, what constitutes world heritage is complexified, conceptually deepened, and expanded as more sites are inscribed on the List over time (Di Giovine 2010). It is a "mechanism of display" akin to a public speech (Hafstein 2009: 97) or a map, which lends conceptual coherence to what Di Giovine (2009) calls UNESCO's heritage-scape, an alternative geographical rendering of the world in which World Heritage sites, rather than political capitals, are the focus. Critics have argued that, over time, the List has changed from a measure aimed at preservation to a branding mechanism for touristic consumption (Ryan and Silvanto 2009).

Although the List strives to be inclusive enough to construct the World Heritage Convention's metanarrative of "unity in diversity," like all lists, it innately indexes a particular structural order and value-based hierarchy (Schuster 2002), which often creates a high level of competition at numerous levels. On the one hand, since the List is organized primarily by state-party, it is often implicitly believed that the more sites a state possesses, the higher the value and legitimacy of that nation. On the other hand, the List maintains a level of exclusivity and competition within a nation-state by including only sites that are deemed to meet its criteria of "universal value." UNESCO itself has asserted that not all sites "of local or natural interest, which are quite justifiably a source of natural pride," possess universal value (cf. UNESCO 2005b: 4). Competition therefore may occur when one community, group, or nation succeeds in designating its site while another fails in its effort to designate a similar property.

Key Issues

The World Heritage Criteria

The World Heritage Criteria consists of a set of ten typologies, or idealized categories, which are used to evaluate, and offer the conditions for, a site's inscription on the World Heritage List. They are concerned with identifying a site's "outstanding universal value," which, in turn, would guide state-parties in constructing management and conservation plans for their World Heritage properties (UNESCO 2005b: 12). The *Revised Operational Guidelines* defines "outstanding universal value" as:

> cultural and/or natural significance, which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage is of the highest importance to the international community as a whole. The Committee defines the criteria for the inscription of properties on the World Heritage List. (2005a: 24)

The typologies were established in the World Heritage Convention (UNESCO 1972) and identified in the first *Operational Guidelines*, passed in 1978. At this time, cultural and natural sites were evaluated separately, based on "two sets of criteria" (1978: 1), but 25 years later, the two criteria were merged into one set of ten typologies, with the first six being the "cultural" criteria and the last four being the formal "natural" criteria (see UNESCO 2003b). This went into effect in the 2005 *Revised Operational Guidelines*, which stated that a property is recognized as possessing "outstanding universal value" if one or more of the following criteria are met:

1. Represent a masterpiece of human creative genius.
2. Exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town planning, or landscape design.
3. Bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared.
4. An outstanding example of a type of building, architectural or technological ensemble, or landscape which illustrates (a) significant stage(s) in human history.
5. Be an outstanding example of a traditional human settlement, land use, or sea use which is representative of a culture (or cultures) or human interaction with the environment, especially when it has become vulnerable under the impact of irreversible change.
6. Be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance (The Committee considers that this criterion should preferably be used in conjunction with other criteria).
7. Contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.
8. Be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features.
9. Be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal, and marine ecosystems and communities of plants and animals.
10. Contain the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

The criteria's wording is extremely important for assimilating disparate sites into a cohesive List and for crafting the universalizing narrative individual sites possess. Instead of indicating concrete categories, the typologies are purposefully vague, so as to be applicable to a wide variety of places across the globe. Rather than *being* something definite, these sites are intended to *represent*, *exhibit*, *bear testimony to*, *exemplify*, or be *tangibly associated with* generalized forms, cultural traditions, ideas, and human abilities that are loosely defined and easily interpreted in multiple ways. They are, in a way, empty signs whose values and meanings can be filled in by different parties throughout time. It is a testament to the universal applicability of the criteria that, while the *Operational Guidelines* have progressively modified the conceptions of what constitutes "outstanding universal heritage," the actual typologies have remained the same as they were outlined in the Convention.

Authenticity and Integrity

Furthermore, the World Heritage Convention stipulates that a site must also meet a standard of "authenticity" (for cultural sites) or "integrity" (for natural sites). Like the typologies, these were originally separate categories but were merged in the 2005 *Revised Operational Guidelines*.

Stemming from the Venice Charter (ICOMOS 1964) and reconceptualized most significantly in

the Nara Document on Authenticity (UNESCO 1994b), UNESCO's understanding of authenticity rests on the notion that a property's outstanding universal value is "truthfully and credibly expressed" through the form, design, materials, and functionality. This includes "subsequent modifications or additions" (1978: 4). Following the "Cairns Decision" (UNESCO 2000), intangible heritage, spirit, and sense of place were also added in an attempt to better accommodate non-Western value systems (2005a: 21).

The *Revised Operational Guidelines* expanded "integrity" to encompass all sites under consideration, and state-parties are now required to submit a statement of integrity for each property nominated. By integrity, UNESCO means "the measure of the wholeness and intactness of the natural and/or cultural heritage and its attributes" (2005a: 22). The typologies for integrity are both conceptual and concrete: On the one hand, a site must include "all elements necessary to express its outstanding universal value"; on the other hand, the designated site itself must be of an adequate size to appropriately represent such values. Furthermore, the statement must include a thorough assessment of the site's state of conservation as well as ongoing development projects that may threaten the integrity of the proposed World Heritage site (such as its geographic boundaries and buffer zones, its cultural or natural resources, or its aesthetic qualities and vistas). Threats to a site's integrity are most often invoked when protesting subsequent government interventions in and around a World Heritage site.

The Process of Inscription

The process of inscription has changed little since it was originally outlined in the 1972 World Heritage Convention, despite substantial changes in UNESCO's conceptualization of what constitutes "heritage."

Because UNESCO is an intergovernmental body, the inscription process begins with a participating state-party, which must offer up its cultural property for inscription; the few exceptions to this rule include Cambodia's Angkor Archaeological Park and Afghanistan's Bamiyan Buddhas, which were both designated while the countries were under United Nations-led transitional governments. To nominate a site, the state-party must be a signatory to the World Heritage Convention, paid its annual dues to the World Heritage Fund, and included the site on its Tentative List. Each signatory has its own Tentative List, an inventory or wish list of properties it intends to nominate. It can be as extensive or as brief as the nation deems appropriate and can be indefinitely modified as the state-party adds or withdraws a property from the nomination process.

Once a property is added to the state-party's Tentative List, a Nomination File is opened at the World Heritage Centre in Paris, which will contain all of the appropriate documentation concerning the site: maps, figures, images, precise coordinates of the area to be considered (including proposed buffer zones), relevant historical records, letters of endorsement by important figures, previous academic studies on the site, current and future management and preservation plans, as well as an official description of the site attesting to its universal value, authenticity, and integrity that is based on the World Heritage Criteria.

These data will then be analyzed by UNESCO-approved Advisory Bodies, nongovernmental organizations specializing in historic preservation or nature conservation. Cultural sites are assessed by the International Council of Monuments and Sites (ICOMOS) and natural sites by the International Union for Conservation of Nature (IUCN); both also conduct on-site research to evaluate the proposed monument and its management. A third Advisory Body, the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), will be contacted should the site require an assessment of past or proposed restoration work. In their written report, the Advisory Bodies assess how the proposed property meets or falls short of the criteria outlined in the World Heritage Convention. This is less an act of evaluation as it is of idealization, for it effectively changes the property into an idealized material form of UNESCO's metanarrative of "unity in diversity" (Di Giovine 2009: 199).

Once the File is complete, it can be presented at the annual meeting of the World Heritage Committee, which is composed of 21 representatives of state-parties who are elected from the General Assembly. The Committee examines each nomination based on the technical evaluations and votes to inscribe or reject a site. They may also vote to defer judgment on a site, requesting additional information from the state-party. Along with a site's inscription, the Committee confirms the textual wording of the site's designation; often it is a slight modification of the Advisory Body's statement of the site's "outstanding universal value." However, the importance of this act should not be underestimated; it is often subject to politicking as other parties struggle to determine the site's specific narrative, which will translate to the ways in which the site is conserved and packaged for touristic consumption (Di Giovine 2009, 2010). Finally, the World Heritage Committee inscribes the new World Heritage site's name and geographic location on the List, along with other similarly valorized places.

The List of World Heritage in Danger

At its annual meeting, the World Heritage Committee also reviews the state of conservation and management of World Heritage sites. If they find threats to a site's integrity or other characteristics that determined its inscription on the World Heritage List, the Committee may vote to inscribe the property onto the List of World Heritage in Danger, a separate List designed to alert the international community to elements threatening a World Heritage site. These can be "ascertained" dangers – "specific and proven" threats such as warfare, pollution, destruction, or other risks to the site's integrity – or "potential" dangers that may threaten the characteristics for which the site was designated (UNESCO 2005a: 47–49). The List is perceived differently by state-parties; some see it as an instrument to raise awareness of their site and to generate international support (monetary and technical) to help protect it; others see it as a dishonorable sanction. Nevertheless, upon inscription on the List of World Heritage in Danger, a state-party must take corrective action.

Delisting

The *Operational Guidelines* also provides the possibility that a site can be delisted if a state-party does not comply with the corrective measures required when the property was inscribed on the List of World Heritage in Danger. Informed by Article 4 of the Convention – "Each state party to this Convention recognizes that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage referred to in Articles 1 and 2 and situated on its territory, belongs primarily to that State" – this rare action has, to date, been exercised when the state has failed to adequately protect a site's integrity. For example, Oman's Oryx Sanctuary was delisted in 2007 after the nation-state reduced the boundaries of the natural park by 90%, began fossil fuel extraction within the sanctuary, and did not enforce animal poaching laws, which resulted in nearly eradicating the Oryx population (when the site was delisted, only four breeding pairs remained). While national policies affected Oman's World Heritage site, Germany's Dresden Elbe Valley was delisted in 2009 after the federal government was legally unable to halt the Saxony region's construction of a bridge over the Danube, which UNESCO deemed would threaten the integrity of the panorama for which the site had been inscribed. While it is incumbent for a state-party to be a member in good standing before designating a site, UNESCO has indicated that a site cannot be delisted if the state-party's status changes, as occurred in 2011 when Thailand announced its withdrawal from the World Heritage Convention over Cambodia's contested designation of Preah Vihear.

Representation and the Transformation of the World Heritage List

The World Heritage List is very much a process and must be seen in its ongoing sociohistorical context (cf. Francioni 2008: 5). Since its inception in 1972, the List has changed from including predominantly Western religious monuments to living cultural landscapes, transboundary itineraries, and contemporary constructions. Indeed, these marked changes best illustrate the criteria's

effectiveness to adapt to changing conceptions of heritage while maintaining the same wording of the typologies.

The Nature/Culture Dichotomy and the Creation of "Cultural Landscapes"

Article I of the 1972 World Heritage Convention lists three general forms of cultural heritage that were to be considered for listing:

- *Monuments*: architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings, and combinations of features, which are of outstanding universal value from the point of view of history, art, or science
- *Groups of buildings*: groups of separate or connected buildings which, because of their architecture, their homogeneity, or their place in the landscape, are of outstanding universal value from the point of view of history, art, or science
- *Sites*: works of man or the combined works of nature and man, and areas including archaeological sites, which are of outstanding universal value from the historical, aesthetic, ethnological, or anthropological point of view

These are built structures ("architectural" and "archaeological" are the main terms used) and are valued predominantly for their aesthetic qualities, scientific import, and historical longevity. Indeed, they are all considered monumental, in that they are specifically meant to be devices to trigger one's memory and can be keys to scientifically understanding past peoples and their cultures. Preservation of their authentic, material forms is therefore a primary concern. As UNESCO wrote in a treatise that predated the Convention, "Historic monuments are the adornments with which Man has decked the earth; they are the common heritage of mankind and remind us that civilization is made up of contributions from all peoples, and that technique has ever gone hand in hand with the cult of the beautiful, and the taste for the new with the search for the imperishable" (1970: 9). Such conceptualization of material culture as monumental, valued for its imagined existence in the past, has been subject to critiques that argue that the List artifactualizes or museumifies otherwise living cultural properties (cf. Lowenthal 1998).

Just as Article I of the World Heritage Convention identified "cultural" sites in terms of their aesthetic or scientific value, so too did Article II define "natural" sites:

- *Natural features* consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view
- *Geological and physiographical formations* and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation
- *Natural sites* or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation, or natural beauty

Natural sites, then, were conceptualized as "exceptional natural sites and national parks without people" (Rössler 2006: 334). Just as it is incumbent to preserve cultural monuments from the natural transience of time, so too is it imperative to conserve natural sites from human intervention (Fowler 2003: 15). Such oppositional definitions, therefore, not only created a problematic distinction but also antagonism between the two categories. Indeed, although the Convention allows for sites to be designated as "mixed" – an almost one-to-one "combination" of natural and cultural elements – there are comparatively very few, and experts have found it not only ineffective but "intellectually flaccid" (Fowler 2003: 18).

This Enlightenment-era division between nature and culture has been critiqued by social scientists, who point out that these two categories are rarely, if ever, mutually exclusive. Humans are a part of nature (cf. Papayannis and Howard 2007), and places, by their very demarcations (which are necessary for the nomination File), are cultural (Pearson and Richards 1997: 5). Furthermore, since these "parks without people"

often did have human communities living within their boundaries, a "natural" designation seems to implicitly consider them as *naturvölk*, primitives lagging behind the world's civilizational trajectory (cf. Morgan 1877; Herder [1891]1966). Particularly when such indigenous communities espouse different views of material culture and monumentality, this frequently causes an undervaluation of indigenes' culture, leading to their marginalization; under the guise of conservation, these minorities are considered a nuisance to be educated, modernized, or removed (cf. Smith 2006; Di Giovine 2009: 234–259).

In response to social scientists' critiques of this dichotomy, a third category of "cultural landscapes" was added to the *Operational Guidelines* in 1992 after many years of debate within UNESCO. Coined by human geographer Carl Sauer (1925) and subsequently retheorized a number of times since (see Wagner and Mikesell 1962; Birks et al. 1988), the term focuses on the interactions between humankind and the natural environment. Its justification rests on Article 1 of the Convention text, which points out that World Heritage broadly consists of the "combined works of nature and man" (UNESCO 1994c: 13–14). As with natural and cultural sites, UNESCO specifies three forms of cultural landscapes:

1. *Clearly defined landscapes* designed and created intentionally by humans, such as many gardens and parks. Such landscapes had been already included on the World Heritage List in the early years such as Versailles in France, but the concept opened the List for sites such as Kew Gardens in the United Kingdom or the large-scale extended designed area of the Lednice-Valtice Cultural Landscape in the Czech Republic.
2. *Organically evolved landscapes*, which can be either relict landscapes or continuing landscapes. This results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features. These include a number of agricultural landscapes ranging from the tobacco landscape of Vinales Valley in Cuba, the Rice Terraces of the Philippine Cordilleras, or the Puszta pastoral landscape of Hortobagy National Park in Hungary.
3. *Associative cultural landscapes*. The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic, or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent. This type is exemplified by Uluru-Kata Tjuta in Australia, Sukur in Nigeria, and Tongariro National Park in New Zealand (Rössler 2006: 335–336).

Rather than eliminating the nature-culture divisions, the category therefore was meant as a bridge between the two, to provide a category where human interaction upon the natural environment was clearly evident. In particular, "associative cultural landscapes" were meant to accommodate alternative forms of heritage by minority groups whose cultural production is primarily immaterial; examples of such sites are Uluru in Australia, Sukur in Nigeria, and Tongariro in New Zealand. In addition to nominating properties as "cultural landscapes" outright, "mixed" sites can be recategorized as cultural landscapes, as Uluru, Sukur, and Tongariro were. Cultural landscapes are marked as "cultural sites" on the World Heritage List and its associated map (http://whc.unesco.org/en/list).

Thana Sites and "Negative World Heritage Sites"

While the List is intended to reveal the unity of humanity in the diversity of its creations (Di Giovine 2009, 2011), a few sites have been inscribed which are neither valued for their aesthetics nor reveal their physical endurance throughout time. These are places of warfare, genocide, and destruction, "dark" or thana sites that are of interest to the newly increasing trend of "dark tourism" or "thanatourism" (see Seaton 2009; Sharpley and Stone 2009). Rather than revealing "unity in diversity" as traditional

World Heritage sites do, they can be considered "negative World Heritage sites" (Di Giovine 2009: 124–132; cf. Meskell 2002) for they were designated as exemplars of the destructive nature of war and cultural intolerance, as were the Nazi concentration camp of Auschwitz (designated in 1979, the 2nd year of World Heritage inscriptions), Hiroshima's "A-Bomb" Dome, or the empty spaces in Afghanistan's Bamiyan Valley where the immense Silk Road-era Buddhas stood before they were destroyed by the Taliban in 2001. Although each of these examples viscerally reveals the more destructive side of humanity, UNESCO puts a unifying spin on the narrative by downplaying specific geopolitics in favor of generalities concerning humankind and the need to create world peace, issuing a warning of future strife should diversity be universally undervalued.

Disproportionate Representation and the 1994 Global Strategy

From the mid-1980s onward, it was generally perceived inside and outside of UNESCO that its definition of "cultural heritage" as solely aesthetic and monumental was outdated (Pressouyre 1993; UNESCO 1994a: 2–3). In response, UNESCO commissioned a sweeping study of the List. The study found certain "overrepresentations" of Western categories of what was considered of universal value, including monuments, historic towns, religious buildings, and "elitist" architecture; these sites came mostly from "historical periods" rather than from prehistoric ages or the twentieth century. It also found that Christianity and Europe were overrepresented compared to other religions and other parts of the world. The ensuing *Global Strategy for a Balanced*, *Representative and Credible World Heritage List* (1994a) addressed these issues by broadening the definitions of cultural and natural heritage, paying particular attention to alternative forms of cultural heritage found in underrepresented parts of the world. A primary goal of the *Global Strategy* was to encourage nation-states in underrepresented regions – such as Africa and the Pacific Islands – to join the Convention by providing incentives and sending Advisory Bodies to work closely with these countries to nominate their properties. In the "Cairns Decision" (UNESCO 2000), the World Heritage Committee definitively established a quota system whereby each nation could only nominate one new property per year; this was an attempt to lessen the ever-increasing gap between underrepresented nations and Western European countries such as Italy who would consistently inscribe several sites per year. The "Budapest Declaration" of 2002 reaffirmed UNESCO's commitment to encourage developing nations to join the Convention by pledging to help ensure sustainable development and more community involvement.

The Cairns Decision also allowed an important exception to this rule: In addition to requesting an unlimited amount of extensions (increasing the geographic size of a preexistent World Heritage site), countries could nominate an unlimited amount of transboundary or multisited World Heritage properties. While originally conceived as sites that straddle the borders of multiple countries (i.e., large natural parks in Africa or the Americas), they also include networks of individual properties that are thematically linked, such as the archaeological remains of the "Frontiers of the Roman Empire," the Jesuit missions of Guaranis in Argentina and Brazil, or the colonial Mountain Railways of India. The network paradigm is becoming increasingly popular within nation-states themselves; the "Longobards in Italy, Places of Power" network consists of seven locations across Italy in which the Lombard invaders established power centers. "Itineraries" that trace pilgrimage or trade routes have also become popular, although the medieval European pilgrimage route to Santiago de Compostela is listed separately under France and Spain instead of as one transboundary site. To inscribe more "contemporary" properties, the Global Strategy has also reconceptualized the importance of aesthetics. While "industrial heritage sites," such as the UK's perfectly planned workmen's city of Saltaire or Delhi's Victoria Station, have a classic aesthetic quality to them, others such as the abandoned salt and coalmines northeastern Europe do not. And although "underwater cultural heritage" is regulated by a different, less-binding Convention (UNESCO 2001), it is conceivable that the

World Heritage List may include these sunken remains of human interaction (such as shipwrecks or the submerged city of Alexandria, Egypt) in the future.

If the goal of the Global Strategy was to engage more nation-states and to distribute World Heritage designations more evenly throughout the world, it has proven to be fairly effective. When the Strategy was enacted in 1994, only 135 nations had ratified the Convention; in the span of a decade, nearly all became signatories. While Western Europe still counts the highest density of World Heritage sites, the List is indeed becoming more evenly distributed. Most importantly, the Global Strategy has helped complexify the very notion of heritage, allowing more flexibility and greater anthropological understanding of the ways in which "heritage" is conceived of, manifested, and valued (see Di Giovine 2015).

Future Directions

The Representative List of Intangible Cultural Heritage

While explicitly attempting to address alternative notions of heritage, the creation of "associative cultural landscapes" and the *Global Strategy* did little to alleviate tensions among developing nations and aboriginal groups whose cultures were predicated more on immaterial practices than the creation of monumental material cultural forms. UNESCO responded by taking progressive steps toward defining, valorizing, and safeguarding intangible cultural heritage. Building on a failed 1989 *Recommendation for the Safeguarding of Folklore and Traditional Culture*, a Korean proposal to create a "World Living Human Treasures List, similar to the World Heritage List" (UNESCO 1993: 2), and a sweeping study of intangible heritage (UNESCO 1996), in 1997 UNESCO adopted a resolution creating the *Proclamation of Masterpieces of the Oral and Intangible Heritage of Humanity*, a type of List that was not, however, subject to a Convention and had no financial resources at its disposal (Hafstein 2009: 95). Though it was intended to "proclaim" the top forms of immaterial heritage, it went largely unnoticed in comparison to the World Heritage List; it was also criticized by many of the same indigenous groups as being too hierarchical and elitist and without adequate reliance on the participation of the communities producing such masterpieces. While all groups pushed for a Convention that would provide legal instruments similar to that of the World Heritage Convention, they were divided in their desire for a List; one faction felt that a selective List would be the only adequate way of raising the necessary awareness for safeguarding these practices, while the smaller nations wished to eschew lists altogether (or at least a selection process), which they perceived as unconditionally elitist. The final product, *The Representative List of the Intangible Cultural Heritage of Humanity*, and its associated *List of Intangible Heritage in Danger* (2003a), represents a compromise between the two: While still selective in its process of inscription, it eschews "universal value" as its primary criterion in favor of "representivity" (Hafstein 2009: 108); each signatory draws up a complete inventory of its cultural practices and is encouraged to submit one for inscription during the Intangible Heritage Committee's biennial meeting. It thus builds on the basic structure of the World Heritage List yet purports to be more democratizing and even less determinate in its standards of selection – thus attempting to preclude a situation of unbalanced representationality that the Global Strategy was forced to correct.

The Representative List of Oral and Intangible Cultural Heritage seems to be a key development for the evolution and survival of the World Heritage List. While separate, both lists are inexorably linked historically, conceptually, and, to a certain extent, even procedurally. One was born from the other so that the other could remain relevant amid changing conceptions of heritage. Indeed, the World Heritage List has progressively moved from including sites primarily conceived of as artifactual and monumental to those that espouse more holistic, living notions of heritage. Importantly, intangible heritage designations have quickly been met with similar celebrations at the local level in many societies across the world, and in its early years, locals often conflated the Intangible Heritage List with that of the World Heritage List.

Particularly following the Yamato Declaration, in which participants agreed to create a more integrated approach toward safeguarding both tangible and intangible heritage (UNESCO 2004), it is conceivable that the Intangible Heritage list, while remaining separate and decidedly less place-oriented, will implicitly inform future nominations by state-parties, as well as future actions by the World Heritage Convention.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Intangible Cultural Heritage
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage Objectives and Outcomes

References

Birks, H.H., H.J.B. Birks, P.E. Kaland, and D. Moe. 1988. *The cultural landscape: Past, present and future*. Cambridge: Cambridge University Press.

Di Giovine, M.A. 2009. *The heritage-scape: UNESCO, world heritage, and tourism*. Lanham: Lexington Books.

Di Giovine, M.A. 2010. World heritage tourism: UNESCO's vehicle for peace? *Anthropology Newsletter* 51: 8–9.

Di Giovine, M.A. 2011. UNESCO's heritage-scape: A global endeavour to produce 'peace in the minds of men' through tourism and preservation. In *Heritagescapes and cultural landscapes*, ed. R.P.-B. Singh, 57–86. Delhi: Shubhi Publications.

Di Giovine, M.A. 2015. UNESCO's world heritage program: The challenges and ethics of community participation. In *Between imagined communities and communities of practice*, ed. N. Adell, R. Bendix, C. Bortolotto, and M. Tauschek. Göttingen: Universitätsverlag Göttingen.

Evans-Prichard, E.E. 1976. *Witchcraft, oracles, and magic among the Azande*. Oxford: Clarendon Press.

Fowler, P. 2003. *World heritage cultural landscapes. 1992–2002*, World Heritage Paper 6. Paris: World Heritage Centre.

Francioni, F. 2008. The 1972 World Heritage Convention: An introduction. In *The 1972 World Heritage Convention. A commentary*, ed. F. Francioni and F. Lenzerini, 3–7. New York: Oxford University Press.

Goody, J. 1977. *The domestication of the savage mind*. Cambridge: Cambridge University Press.

Hafstein, V.T. 2009. Intangible heritage as a list: From masterpieces to representation. In *Intangible heritage*, ed. L. Smith and N. Akagawa, 93–111. London: Routledge.

Herder, J. G. 1891 (trans.1966). On the origin of language. In *On the origin of language: Two essays*, ed. J. J. Rousseau, and J. G. Herder, 85–176. Trans. J. H. Moran and A. Gode. Chicago: University of Chicago Press.

ICOMOS. 1964. The Venice Charter. Second international congress of architects and technicians of historic monuments, Venice.

Lévi-Strauss, C. 1966. *The savage mind*. Chicago: University of Chicago Press.

Lowenthal, D. 1998. *The heritage crusade and the spoils of history*. Cambridge: Cambridge University Press.

Meskell, L. 2002. Negative heritage and past mastering in archaeology. *Anthropological Quarterly* 75 (3): 557–574.

Morgan, L.H. 1877. *Ancient society: Or researches in the line of human progress from savagery through barbarism to civilization*. Chicago: C.H. Kerr.

Papayannis, T., and P. Howard. 2007. Editorial: Nature as heritage. *International Journal of Heritage Studies* 13 (4–5): 298–307.

Pearson, M.P., and C. Richards. 1997. *Architecture and order: Approaches to social space*. New York: Routledge.

Pressouyre, L. 1993. *La convention du patrimoine mondial, vingt ans après*. Paris: Editions UNESCO.

Rössler, M. 2006. World heritage cultural landscapes: A UNESCO flagship programme 1992–2006. *Landscape Research* 31 (4): 333–353.

Ryan, J., and S. Silvanto. 2009. The world heritage list: The making and management of a brand. *Place Branding and Public Diplomacy* 5 (4): 290–300.

Sauer, C.O. 1925. The morphology of landscape. *University of California Publications in Geography* 2: 19–53.

Schuster, J.M. 2002. *Making a list and checking it twice: The list as a tool of historic preservation*, Working Paper 14. Chicago: The Cultural Policy Center at the University of Chicago.

Seaton, T. 2009. Thanatourism and its discontents: An appraisal of a decade's work with some future issues and directions. In *The sage handbook of tourism studies*, ed. T. Jamal and M. Robinson. London: Sage.

Sharpley, R., and P.R. Stone, eds. 2009. *The darker side of travel: Theory and practice of dark tourism*. Bristol: Channel View Publications.

Smith, L. 2006. *Uses of heritage*. London: Routledge.

UNESCO. 1970. *Protection of mankind's cultural heritage. Sites and monuments*. Paris: UNESCO.

UNESCO. 1972. *Convention concerning the protection of the world cultural and natural heritage. November 16, 1945*. Paris: UNESCO.
UNESCO. 1978. *Operational guidelines for the implementation of the World Heritage Convention (adopted by the committee at its first session and amended at its second session)*. Paris: UNESCO.
UNESCO. 1993. *Establishment of a system of 'living cultural properties' (living human treasures) at UNESCO*, (142 EX/18), UNESCO Executive Board meeting, 142 nd session. Paris: UNESCO.
UNESCO. 1994a. *Expert meeting on the 'global strategy' and thematic studies for a representative World Heritage List (WHC-94/CONF.003/INF.6). 20–22 June 1994.* Paris: UNESCO.
UNESCO. 1994b. *Nara document on authenticity. Report of the experts meeting (WHC-94/CONF.003/INF.008). November 1–6, 2004*. Japan: Nara.
UNESCO. 1994c. *Operational guidelines for the implementation of the World Heritage Convention (WHC/2/Revised. February 1994)*. Paris: World Heritage Centre.
UNESCO. 1996. *Our creative diversity. Report of the world commission on culture and development. Summary version*. Paris: UNESCO.
UNESCO. 1997. The oral heritage of humanity, in Records of the General Conference, volume 1: resolutions: 53–54. 29 th session, October 21–November 12, 1997. Paris: UNESCO.
UNESCO. 2000. Cairns Decision. 24th World Heritage Committee meeting: 7–8. November 27–December 2, 2000. Cairns
UNESCO. 2001. *Convention on the protection of the underwater cultural heritage. November 2, 2001*. Paris: UNESCO.
UNESCO. 2002. Budapest Declaration. (WHC-02/CONF.202/25). 26th World Heritage Committee meeting, 24–29 June 2002. Budapest, Hungary.
UNESCO. 2003a. *Convention for the safeguarding of the intangible cultural heritage. October 17, 2003*. Paris: UNESCO.
UNESCO. 2003b. Decision 6 EXT.Com 5.1, in Decisions adopted by the World Heritage Committee at its 6th extraordinary session, May 17–23, 2003. Paris: UNESCO.
UNESCO. 2004. *The Yamato declaration for the integrated approach towards safeguarding tangible and intangible cultural heritage (WHC-04/7 EXT.COM/INF.9)*, 7th extraordinary session of the 28th World Heritage Committee meeting, December 6–11, 2004. Paris: UNESCO.
UNESCO. 2005a. *Revised operational guidelines for the implementation of the World Heritage Convention (WHC. 05/2 2 February 2005)*. Paris: World Heritage Centre.
UNESCO. 2005b. *World heritage information kit*. Paris: World Heritage Centre.
Wagner, P.L., and M.W. Mikesell, eds. 1962. *Readings in cultural geography.* Chicago: University of Chicago Press.

World Heritage Objectives and Outcomes

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Introduction

UNESCO's (1972) World Heritage Convention describes its purpose primarily in terms of preserving "natural" sites and built "cultural" structures, such as unique landforms, monuments, and archaeological remains. Yet by the 40th anniversary of the Convention's ratification, Irina Bokova, UNESCO's then-director general, reacted to the destruction of World Heritage-listed properties in Timbuktu, Mali, in these words: "Let's be clear. We are not just talking about stones and building. This is about values, identities and belonging. . . . [W]e must start seeing cultural heritage as an international security issue" (Bokova 2012). While her statement may at first signal a shift in the World Heritage Convention's goals – from preservation to peacemaking – a closer analysis of UNESCO's major documents, pronouncements, and practices reveals multiple, complex, and intersecting objectives, which are met with varying degrees of success and produce often unexpected outcomes. This entry will examine the World Heritage Convention's objectives in the short term, medium term, and long term, arguing that they nested and are interdependent; it will also show how these interrelated goals ultimately factor into UNESCO's broader, global peacemaking objectives.

Definition

Founded in 1945 as a specialized arm of the United Nations, UNESCO was born in the wake of the tragedies of World War II. UNESCO's role as the United Nations Educational, Scientific and Cultural Organization

was to delve beyond traditional diplomacy and economically oriented programs and engage directly with publics at more intangible levels for the ultimate goal of building "peace in the minds of men" (UNESCO 2003b: 1). This tactic of public diplomacy is predicated on the idea, espoused in the Preamble to UNESCO's Constitution, that "the wide diffusion of culture, and the education of humanity for justice and liberty and peace are indispensable to the dignity of man and constitute a sacred duty which all the nations must fulfil in a spirit of mutual assistance and concern" and that "a peace based exclusively upon the political and economic arrangements of governments" is insufficient and "must therefore be founded, if it is not to fail, upon the intellectual and moral solidarity of mankind" (UNESCO 1945: 1). While this statement does not mention heritage sites per se, it provides the foundation for the World Heritage Convention's emphasis on the collective responsibility toward promoting "the wide diffusion of culture" and education concerning "each other's ways and lives" (1945: 1) – for which World Heritage sites would become metonyms.

Historical Background

Abu Simbel: A Precursor to the World Heritage Convention

In the mid-1950s, Egyptian president Gamal Nasser announced plans to construct the Aswan High Dam at the first cataract of the Nile to regularize the river's flooding, improve the region's agricultural landscape, and symbolically modernize the country in the eyes of the world. The plan called for the construction of a reservoir which would completely submerge a temple complex constructed by Pharaoh Ramses II (1303–1213 BCE). At the behest of Egypt and the Sudan, in 1960 UNESCO launched an unprecedented international campaign to move the temples to higher ground through a technologically ambitious plan (see *Time Magazine* 1963; UNESCO 1980). Over 40 member states raised $80 million – nearly double the planned cost – and sent teams of archaeologists to excavate the "practically virgin land" together (UNESCO 1982: 30), while international engineers succeeded in saving the temples. Abu Simbel had a profound effect on the future of World Heritage, and UNESCO proclaimed it "a triumph of international solidarity" (UNESCO 1982). It revealed the strong emotional relationship that such heritage properties – and the prospect of their transience – could exert on the international community, irrespective of national origins, and brought nations and experts together for the common goal of researching, and preserving, these monuments.

The World Heritage Trust and Creation of the World Heritage Convention

It was in the glow of the Abu Simbel success that, in 1965, a White House conference called for the creation of a "World Heritage Trust" to engage the international community in the preservation of exemplary sites "for the present and future of the entire world citizenry" (quoted in UNESCO 2008b: 7). A plan of conservation was adopted which was similar to that of the US National Parks service. The idea of a World Heritage Trust undoubtedly gained international traction when, the following year, UNESCO launched the immensely successful "Save Venice" campaign in response to the devastating floods that rocked the northern part of Italy. In 1968, the International Union for the Conservation of Nature (IUCN) followed suit in adopting a similar framework for its membership. These proposals were combined in 1972, when delegates to the United Nations Conference on the Human Environment in Stockholm called for a new Convention that could better ensure the safeguarding and management of cultural and natural properties. Later that year, it became the World Heritage Convention (*Convention Concerning the Protection of the World Cultural and Natural Heritage*) spearheaded by UNESCO, which created a World Heritage Committee that oversees the general body of state-party delegates to the Convention, and a small World Heritage Fund comprised of mandatory donations by each member state. Implicit in the Convention text, and in subsequent publications sponsored by UNESCO and the World Heritage Centre, are a number of

interlinked short-term, medium-term, and long-term objectives.

Key Issues

Short-Term Objectives: Knowledge Creation and Dissemination

While the World Heritage Convention is explicitly concerned with preserving tangible natural and cultural heritage, interestingly, the Convention grants the World Heritage Committee only limited power to affect such ambitious goals as cultural preservation, sustainable development, and peacemaking. Rather, the Committee is only invested with the short-term ability to create and diffuse alternative narratives concerning the universal value of heritage sites by evaluating and inscribing a property onto the World Heritage and World Heritage in Danger lists and by disseminating these lists through diverse channels and global networks. These are fundamentally acts of knowledge creation and dissemination. Furthermore, moneys can be disbursed from the relatively small World Heritage Fund primarily for use in needs assessments and Advisory Body evaluations (necessary for the nomination of a site), publicity campaigns by state ministries to raise awareness of a site's World Heritage designation, and capacity-building and technical assistance programs, such as exchanges between site managers in developing countries with those in Europe (Di Giovine 2009a: 315–319; UNESCO 1972: 12–13). While it is believed that these awareness-raising campaigns will inspire international conservation and tourism efforts in the medium term, they are also directed toward locals, "to strengthen appreciation and respect. . .of the cultural and natural heritage as defined in Article 1 and 2 of the Convention" (1972: 13).

Although UNESCO has some control over the knowledge they produce and diffuse, they have little control over the way it is interpreted, used, and reproduced by state parties and other actors. In particular, while each site is meant to reveal UNESCO's claim of "unity in diversity," actors may emphasize a particular aspect of the place's history to valorize certain groups and marginalize others, as frequently occurs to minority or indigenous populations living on or near the designated site and who may attribute alternative use values to it. Designations, however, are intended to increase the "prestige factor" of a site (cf. Dure 1974) – important for the generation of preservation and tourism campaigns – but often lead to emotionally charged competition between nation-states who quantify their value based on the number of sites they have on the list. In some cases, this may even exacerbate geopolitical tensions, leading to civil strife – such as periodic riots between Cambodians and Thais over Angkor Wat or the political and military actions taken by these same countries upon the designation of Preah Vihear as a Cambodian World Heritage site in 2008.

Medium-Term Objectives: Preservation and Tourism Development

Safeguarding Cultural and National Properties

Although it is not invested in the direct ability to conduct historic preservation and natural conservation projects, UNESCO's *Convention for the Protection of the Cultural and Natural Heritage* is first and foremost aimed at safeguarding cultural and natural resources deemed to be of "universal value," the "heritage of mankind" (1972: 1). UNESCO attempts to fulfill this objective first through *normative actions* and second through *coercive actions*.

Normative actions involve the institution of norms, procedures, and requirements a state party must satisfy before nominating their site for World Heritage status. These include thorough research concerning the proposed site's history, topography, universally valorized qualities, authenticity, and integrity, the intervention of expert "Advisory Bodies" who assess the site's integrity and level of authenticity on behalf of UNESCO, and the drafting of conservation and management plans. State parties in good standing to the World Heritage Convention may receive some funding for these endeavors, although the Operational Guidelines specify that the fund should ultimately "be used to mobilize additional funds for International Assistance

from other sources" (UNESCO 2008a: 60). Such actions contribute to UNESCO's goal of knowledge creation while, at the same time, also induce the nation-state to ensure the site's preservation by cooperating with the international community (cf. UNESCO 1972: 3). Furthermore, once a site is inscribed on the World Heritage List, state parties are required to submit periodic assessments both on the site ("reactive monitoring") and on the implementation of the World Heritage Convention in its territory ("periodic reporting") and to make any modifications to the management of its site (2008a: 45–47, 54–56).

Should these norms not be fulfilled, UNESCO may take *coercive action* by inscribing the property on the List of World Heritage in Danger and calling for specific, time-sensitive responses on the part of the state party in question. Noncompliance may result in the site's delisting (UNESCO 2008a: 28, 52–53). However, coercive actions should not simply be understood as a means of compelling nation-states and groups to act through negative reinforcement and threats of sanction, but also through the prospect of raising a group's symbolic capital in the international community. In its *World Heritage Information Kit*, UNESCO makes clear its belief that such claims to prestige directly foster conservation projects (2008b: 9).

While inscription on the World Heritage List in Danger is sometimes perceived by a state as a penalty, it also is intended to serve as an extra awareness-raising mechanism directed toward international communities, one that creates a sense of urgency for sites that are in particular danger, as the cases of Abu Simbel and Venice successfully revealed. Further underscoring the believed link between knowledge dissemination and preservation, in 2002 the World Heritage Committee adopted *the Budapest Declaration on World Heritage*, which invited "all partners to support World Heritage conservation through key strategic objectives known as the 'Four Cs': strengthen Credibility of the World Heritage List; ensure effective Conservation of World Heritage properties; promote the development of effective Capacity-building measures; increase public awareness and support through Communication" (2008b: 8, see 2002a).

Although grounded in egalitarianism, UNESCO's emphasis on preservation, as well as its tactics, has drawn criticism. On the one hand, while a World Heritage site is "supposed to be protected by the world community, under normal circumstances it is directly managed by the nation in whose political boundaries it is located" and who may not share in UNESCO's ideological interests (Di Giovine 2009a: 7); a site's conservation is ultimately carried out at the country's discretion and is subject to national law (UNESCO 1972: 3–4). Should UNESCO's coercive power fail, it has little recourse but to delist a site, which does nothing to directly protect it from further destruction. On the other hand, scholars have pointed out that conservation often denies a monument's total life history, taking the site back to an idealized and historicized state that "tempts us to ignore our own influence on them" (Lowenthal 1998: 114), conserving only one of many possible narratives embodied in the structure through time and destroying or erasing others (Di Giovine 2009a: 359). In the name of conservation, site managers often prevent alternative uses by indigenous populations while at the same time paradoxically prohibiting those same populations to "modernize" their technologies or living practices in the name of preserving authenticity (see Di Giovine 2009b; Smith 2006). There also runs the risk of privileging the needs of international tourists, rather than those of local communities. Indeed, it was only in 2007 that the World Heritage Committee officially recognized "the fact that conservation, capacity building, credibility and communication are all intrinsically linked to the role of community" (UNESCO 2008b: 8, cf. 2007).

Heritage Tourism and Development: An Uneasy Alliance

UNESCO has historically expressed ambivalence toward tourism development, even while conducting limited normative actions (requiring management plans to account for tourism impacts), and promoting *inspired actions* among tourists by supporting publicity campaigns by

governmental ministries and industries involved in tourism. "Tourism" is not mentioned in the World Heritage Convention, and the phrase "tourist development projects" appears only among a list of possible threats to World Heritage sites that could provide the basis for inscription on the World Heritage List in Danger (see UNESCO 1972: 6). Interestingly, though, a majority of the early World Heritage sites were already well known to, if not also well visited by, international audiences.

UNESCO's ambivalence toward tourism seems to stem from the early failures by the UN and other intergovernmental organizations in tourism development. The World Heritage Convention was ratified when expectations of tourism as a means of peaceful economic development were at their height. The United Nations granted the nascent International Union of Tourism Officers (IUOTO) consultative status in 1954; the UN held its first conference on international tourism in Rome in 1963, where it outlined a framework for tourism development, it declared 1967 International Tourism Year (ITY) with the slogan "Tourism: Passport to Peace," and it finally absorbed IUOTO into the newly created United Nations' World Tourism Organization in 1970 (UNWTO 1974, 1975; Jafari 1975). More concretely, in 1969 the World Bank had created a dedicated Tourism Projects Department which lent over $525 million between 1970 and 1979 to "support tourism as an economic growth tool" for 18 countries that met specific criteria (Hawkins and Mann 2007:354; Di Giovine 2009a: 216). It is important to note that UNESCO stayed on the sidelines. Indeed, a study commissioned by UNESCO – which was published as the monograph, *Tourism: Passport to Development?* (de Kadt 1979) – found that the predicted "multiplier effect" of direct and indirect employment that could revitalize developing countries did not materialize (UNESCO 1976: 81); rather, the industry's proclivity to vertical and horizontal integration created foreign monopolies that largely relegated locals to the sidelines and allowed for notable "leakages" – the proportion of monies invested or earned in the tourism sector that ended up overseas (Markandya et al. 2005: 231), mostly in the hands of the tourists' countries of origin (Bryden 1973). Furthermore, it did not stave off a "flight from the land" by farmers who continued to move to cosmopolitan urban centers in search of work (UNESCO 1976: 81). In 1979, the World Bank followed suit, issuing its own study, which acknowledged drawbacks to tourism development in the absence of adequate planning on the part of the developing nation (Norohona 1979), and by the mid-1980s, it ceased taking on tourism-related projects (Hawkins and Mann 2007: 356); responsibility was ceded to multilateral corporations and NGOs. Meanwhile, some academics argued that tourism creates inauthenticity, museumification, "stress," and sociocultural imbalance akin to imperialism (cf. MacCannell 1976; Nash 1977; Murphy 1985: 1, 3).

While the UN's top-down, economics-heavy focus on tourism was problematic to the peace-making and safeguarding rhetoric of the World Heritage Convention, the Convention found resonances in the UN's Millennium Development Project and the "sustainable tourism" turn of the mid-1990s, which focused on preserving a destination's structural and contextual integrity, facilitating a closer engagements with local stakeholders, fostering a better understanding of the multiplicity of meanings and values attributed to a tourist destination, and ensuring a more equitable distribution of economic and social benefits from tourism development initiatives (Smith and Eadington 1994; Stronza 2001; Telfer 2002; Mbaiwa and Stronza 2009). Revealing a *rapprochement* with the tourism industry, in 1999 UNESCO hosted its first workshop at the International Tourism Exchange (ITB), one of the tourism industry's largest trade fairs, and in 2001 the World Heritage Committee in Helsinki founded what would become the World Heritage Sustainable Tourism Programme, whose aims would be to "engage in dialogue and actions with the tourism industry to determine how the industry may contribute to help safeguard these precious resources" (UNESCO n.d., see 2001: 63). Reflecting the program's mission of "using tourism as a positive force to retain WH site values and to help mitigate site threats," it pursues a threefold strategy of raising awareness, developing partnerships, and providing technical

support to aid the World Heritage Committee, UNESCO field offices, and site managers in assessing and managing tourism-related issues at World Heritage sites. In particular, the World Heritage Centre offers a seven-point "framework for utilizing tourism to benefit site protection" (UNESCO n.d.: 1):

1. Building the capacity of the site management to deal with tourism
2. Training local community members in tourism-related activities so that they can participate and receive tourism's benefits
3. Helping to market these products through their promotion at the local, regional, country, and international levels
4. Raising public awareness and building pride in the World Heritage site with local communities and visitors through a conservation education campaign using a symbolic specie upon which to base a social marketing and public awareness campaign (e.g., a Manta Ray in Komodo National Park, a Toucan in Sian Ka'an Reserve)
5. Using tourism-generated funds to supplement unmet conservation and protection costs at the sites
6. Spreading the lesson learned to other sites and other protected areas
7. Building an increased awareness of World Heritage and its activities and policies in the tourism industry and to the clients of the industry

These statements also reveal an articulated shift from considering tourism as a threat to socio-economic stability to embracing tourism's perceived communicative and awareness-raising abilities. Indeed, in UNESCO's action plan of sustainable tourism development for poverty alleviation in the Sahara Desert – which draws on the cooperation between nation-states, international organizations, travelers, the tourism industry, and local populations (2003a: 5) – UNESCO pointedly reveals its change in position: "There is no contradiction between an economically efficient tourism and an ethical and qualitative tourism, respectful of societies, cultural diversity and environment" (2003a: 2). This sentiment of cooperation with the tourism industry translated into more direct engagement with the UN's World Tourism Organization (UNWTO), whose work on promoting "universally accessible" tourism (UNWTO 2018) had traditionally been considered antithetical to UNESCO's preservation endeavors; in 2015 representatives from the two organizations met in Siem Reap, Cambodia, to discuss a "policy and governance framework necessary to foster a new collaboration model between tourism and culture" (UNWTO 2016: 12). This culminated in the joint issue of the *Siem Reap Declaration on Tourism and Culture* (UNESCO/UNWTO 2015) and a second joint meeting of the two organizations in Oman during the United Nation's Year of Sustainable Tourism for Development in 2017.

Long-Term Objective: Peacemaking

"UNESCO's mission is to contribute to the building of a culture of peace, the eradication of poverty, sustainable development and intercultural dialogue through education, the sciences, culture, communication and information" (UNESCO 2010: 2). To satisfy this peacemaking objective, its World Heritage Convention relies on the prospect of what can be considered *inspired action* – long-term, often subtle changes in the ways in which individuals and groups perceive the meaning and value of not only World Heritage sites but the universality of cultural diversity for which these monuments illustratively stand. In line with some globalization theories' emphasis on individuality over that of collectivities, in which one's imagination negotiates between individuals and "globally defined fields of possibility" (Appadurai 1996: 31; cf. Robertson 1992: 8), UNESCO seems to posit that "peace in the minds of men" can emerge through the reordering of individuals' sense of place; rather than identifying exclusively with sites of local or national interest, individuals may also entertain a "common recognition and identification with the world's shared cultural heritage" as exemplified in these monuments (Di Giovine 2009a: 34) and enacted through collective participation in their preservation and touristic visitation.

While acts of violence include both ethnic cleansing and the destruction of a group's cultural property (UNESCO 1996), activities linking "peace and cooperation" (cf. Sandwith et al. 2001), which are marked by "mutual understanding [and] a plural approach to history," can create a global "culture of peace" (UNESCO 2008a: 90). This notion is made most explicit in UNESCO's (2001) *Universal Declaration of Cultural Diversity*, which, defining culture as the "distinctive spiritual, material, intellectual, and emotional features of a society or group," argued that "respect for the diversity of cultures. . .[and] an awareness of the unity of humankind, and of the development of intercultural exchanges. . .are among the best guarantees of international peace and security" (UNESCO 2002b: 1). Ratified shortly after the September 11 terrorist attacks on New York and Washington, D.C., the Declaration further acknowledges that UNESCO's "specific mandate" within the UN system was to "ensure the preservation and promotion of the fruitful diversity of cultures" (2002b: 1), "as necessary for humankind as biodiversity is for nature" (2002b: 2). Acknowledging that "diversity is the essence of identity" (Matsuura 2002a: 3), UNESCO's then-director general, Koïchiro Matsuura, comments that the Declaration "makes it clear that each individual must acknowledge not only otherness in all its forms but also the plurality of his or her own identity, within societies that are themselves plural" (Matsuura 2002b: i). By simultaneously celebrating the differences that mark human life and yet positing some unanimously recognizable (and valued) universal culture, UNESCO proposes a peaceful world system based on the structural unity of difference – a "culture of cultures" (Sahlins 2000: 488) that Di Giovine terms a world "heritage-scape" (2009a, 2010, 2011). "If a heritage object temporally connects individuals with the socio-spatial milieu from which they came, UNESCO's World Heritage objects are intended to transcend the temporal and spatial situatedness of one culture's heritage claims, ensuring that everyone equally possesses each World Heritage site; rather than basing identities on collective antagonism toward difference, tourists consuming the World Heritage narrative can celebrate and internalize diversity" (Di Giovine 2010: 9).

This ultimate objective is clearly utopian, and while UNESCO and its representatives talk of peacemaking in some of their documents and decrees, it is clear that such a lofty goal is largely implicit and contingent on the successful outcomes of multiple medium-term objectives that are themselves difficult to fulfill. While only time will tell if such a broad plan can work, UNESCO's major challenge – other than ensuring success in the equally idealistic aims of creating sustainable and inclusive preservation and tourism development initiatives – is ensuring that the list remain current and representative of the heritage-scape's audience, which is ever expanding as new populations enjoy greater mobility, global communication, and connectivity. Through the *1994 Global Strategy for a Balanced, Representative and Credible World Heritage List* (UNESCO 1994), the periodic updates to its Operational Guidelines, the passing of associated Conventions and networks protecting other forms of tangible and intangible heritage while increasingly embracing more popular methods of promoting and accessing heritage through tourism, and attempting to expand and diversify the communities it reaches by innovating new organizations such as the Creative Cities Network (see Di Giovine 2015), UNESCO has demonstrated that it is capable of, and willing to make, changes in the forms and meanings of "world heritage" while maintaining its metanarrative of "unity in diversity" (cf. Rössler 2010).

Future Directions

The objectives of UNESCO's World Heritage Convention are ambitious and far-reaching: to ensure the protection of endangered cultural and natural resources, to enhance sustainable development primarily through heritage tourism, and, ultimately, to fulfill UNESCO's "unique mandate," (2001: 1, cf. 2011), established in the Preamble of UNESCO's Constitution, of fostering "peace in the minds of men" (1945: 1). Yet

because UNESCO is an intergovernmental organization that derives its legitimacy from nation-states and its World Heritage program is based on an international convention to which state parties voluntarily adhere, UNESCO has limited ability to affect real policy change in these areas; direct action is limited to creating and disseminating information concerning World Heritage sites in the short term. Instead, UNESCO depends on normative and coercive actions to contribute to safeguarding cultural and natural resources in the medium term, which are believed to lead to inspired action toward tourism development and, ultimately, to peacemaking among global publics in the long term. But since UNESCO relies on the interpretation of its Convention by individual state parties, who have different needs, goals, and understandings of "heritage," unintended consequences often arise. This entry has traced the historical context of UNESCO's logic, examined its various and contingent objectives, and described the major outcomes of each.

"The World Heritage Convention is a noble, vital force in the world, fostering peaceful coexistence and honoring our past in equal measure with our future," remarked Koïchiro Matsuura at UNESCO's celebration in Venice honoring the 30th anniversary of the Convention's ratification (UN News Service 2002). Paying particular attention to the Convention's historical and cultural context, this entry has argued that UNESCO's primary objectives are linked in a complex chain of logic that is contingent upon the successful fulfillment of each short- and medium-term goal: UNESCO's direct act of designating World Heritage sites can increase prestige, thereby fostering preservation and tourism development, which, if implemented correctly, can create a peacemaking understanding of "unity in diversity" in the myriad "minds of men" who interact with, or otherwise consume, these sites and their representations. It is "inevitable" that tourism, preservation, and peacemaking are interlinked, writes Francesco Bandarin, the longtime director of UNESCO's World Heritage Centre in Paris:

> It is an inevitable destiny: the very reasons why a property is chosen for inscription on the World Heritage List are also the reasons why millions of tourists flock to those sites year after year. In fact, the belief that World Heritage sites belong to everyone and should be preserved for future generations is the very principle on which the World Heritage Convention is based. (Pedersen 2002: 3)

Bandarin's quote is telling, for it equates tourism and preservation with the mutual identification with cultures that are not immediately one's own. UNESCO believes it is this celebration, internalization, and preservation of cultural diversity that can ultimately create peace, at least in the minds of men. This is arguably a slow process, one akin to acculturation and which is constantly complicated by inter- and intrastate politics, but only time may tell of its ultimate success.

Cross-References

- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Heritage Outreach
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Heritage Tourism and the Marketplace
- ▶ Stakeholders and Community Participation
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ UNESCO World Heritage Convention (1972)
- ▶ US National Park Service and World Heritage
- ▶ World Heritage and Human Rights
- ▶ World Heritage List: Criteria, Inscription, and Representation

References

Appadurai, A. 1996. *Modernity at large*. Minneapolis: University of Minnesota Press.

Bokova, I. 2012. Culture in the cross hairs. *The New York Times*. Opinion section. Available at: www.nytimes.com/2012/12/03/opinion/03iht-edbokova03.html. Accessed on 4 Dec 2012.

Bryden, J. 1973. *Tourism and development: A case study of the commonwealth Caribbean*. Cambridge, UK: Cambridge University Press.

De Kadt, E. 1979. *Tourism: Passport to development? A joint World Bank-UNESCO study*. Oxford: Oxford University Press.

Di Giovine, M.A. 2009a. *The heritage-scape: UNESCO, world heritage, and tourism*. Lanham: Lexington Books.

Di Giovine, M.A. 2009b. Revitalization and counter-revitalization: Tourism, heritage, and the Lantern Festival as catalysts for regeneration in Hoi An, Viet Nam. *Journal of Policy Research in Tourism, Leisure and Events* 1: 208–230.

Di Giovine, M.A. 2010. World heritage tourism: UNESCO's vehicle for peace? *Anthropology News* 8–9, November 2010.

Di Giovine, M.A. 2011. UNESCO's heritage-scape: A global endeavor to produce 'peace in the minds of men' through tourism and preservation. In *Heritagescapes and cultural landscapes*, ed. R.P.B. Singh, 57–86. Delhi: Shubhi Publications.

Di Giovine, M.A. 2015. UNESCO's world heritage program: The challenges and ethics of community participation. In *Between imagined communities and communities of practice*, ed. N. Adell, R. Bendix, C. Bortolotto, and M. Tauschek. Göttingen: Universitätsverlag Göttingen.

Dure, R.P. 1974. *The prestige factor in international affairs: Proceedings from the 23rd Stevenson lecture*. London: London School of Economics.

Hawkins, D.E., and S. Mann. 2007. The World Bank's role in tourism development. *Annals of Tourism Research* 34: 348–363.

Jafari, J. 1975. Creation of the inter-governmental World Tourism Organization. *Annals of Tourism Research* 11: 237–244.

Lowenthal, D. 1998. *The heritage crusade and the spoils of history.* Cambridge, UK: Cambridge University Press.

MacCannell, D. 1976. *The tourist: A new theory of the leisure class*. Berkeley: University of California Press.

Markandya, A., T. Taylor, and S. Pedroso. 2005. Tourism and sustainable development: Lessons from recent World Bank experience. In *The economics of tourism and sustainable development*, ed. A. Lanza, A. Markandya, and F. Pigliaru, 225–251. Cheltenham: Edward Elgar.

Matsuura, K. 2002a. The cultural wealth of the world is its diversity in dialogue. In *UNESCO, universal declaration of cultural diversity: I*. Paris: UNESCO.

Matsuura, K. 2002b. Preface. In *UNESCO, cultural diversity: Common heritage, plural identities,* 1–5. Paris: UNESCO.

Mbaiwa, J., and A. Stronza. 2009. The challenges and prospects for sustainable tourism and ecotourism in developing countries. In *The Sage handbook of tourism studies*, ed. T. Jamal and M. Robinson, 333–353. London: Sage Publications, Ltd.

Murphy, P.E. 1985. *Tourism: A community approach*. New York: Methuen.

Nash, D. 1977. Tourism as a form of imperialism. In *Hosts and guests: The anthropology of tourism*, ed. V. Smith. Pennsylvania: University of Pennsylvania Press.

Norohona, R. 1979. *Social and cultural dimensions of tourism*, Staff Working Paper 326. Washington, DC: World Bank.

Pedersen, A. 2002. *Managing tourism at world heritage sites: A practical manual for world heritage site managers*. Paris: UNESCO World Heritage Centre.

Robertson, R. 1992. *Globalization: Social theory and global culture*. London: Sage.

Rössler, M. 2010. World heritage and cultural heritage management: New conservation challenges. Paper presented at the 15th International Summer University at ISES, Köszeg, July 2, 2010.

Sahlins, M. 2000. Goodbye to tristes tropes. In *Culture and practice: Selected essays*, ed. M. Sahlins, 471–500. New York: Zone Books.

Sandwith, T., C. Shine, L. Hamilton, and D. Sheppard. 2001. *Transboundary protected areas for peace and cooperation. World Commission on Protected Areas (WCPA)*, Best Practice Protected Area Guideline series 7. Gland: World Conservation Union (IUCN).

Smith, L. 2006. *Uses of heritage*. London: Routledge.

Smith, V., and W.R. Eadington, eds. 1994. *Tourism alternatives: Potentials and problems in the development of tourism*. New York: Wiley.

Stronza, A. 2001. The anthropology of tourism: Forging new ground for ecotourism and other alternatives. *Annual Review of Anthropology* 30: 261–283.

Telfer, D. 2002. The evolution of tourism and development theory. In *Tourism and development: Concepts and issues*, ed. R. Sharpely and D. Telfer, 35–78. Clevedon: Channel View Publications.

Time Magazine. 1963. The pharaoh and the flood. *Time Magazine online*, April 12, 1963. Available at: http://www.time.com/time/magazine/article/0,9171,828111-1,00.html. Accessed 4 Sept 2011.

UN News Service. 2002. Experts examine 30 years of UN efforts to preserve world-renowned cultural sites. November 23, 2002. Available at: http://www.un.org/apps/news/printnewsAr.asp?nid=5362. Accessed 4 Sept 2011.

UNESCO. 1945. *Constitution of the United Nations Educational, scientific and cultural organization*. London, November 16, 1945. Paris: UNESCO.

UNESCO. 1972. *Convention concerning the protection of the world cultural and natural heritage*. Paris, November 23, 1972. Paris: UNESCO.

UNESCO. 1975. Why a world tourism organization? *Annals of Tourism Research* 11: 246–249.

UNESCO. 1976. A UNESCO report: The effects of tourism on socio-cultural values. *Annals of Tourism Research* 4: 74–105.

UNESCO. 1980. *The UNESCO international campaign to save the monuments of Nubia*, UNESCO document code UNESCO/Nubia/Gen/Inf.1. Paris: World Heritage Centre.

UNESCO. 1982. *Nubia: A triumph of international solidarity.* Paris: UNESCO.

UNESCO. 1994. *Expert meeting on the 'global strategy' and thematic studies for a representative world*

heritage list. 20–22 June 1994, WHC-94/CONF.003/INF.6. Paris: UNESCO.
UNESCO. 1996. *Our creative diversity. Report of the world commission on culture and development*. Paris: UNESCO.
UNESCO. 2001. *Report of the 25th session of the world heritage committee meeting, Helsinki, Finland 11–16 December 2001*. Paris: UNESCO.
UNESCO. 2002a. Budapest declaration. (WHC-02/CONF.202/25). Records of the 26th World Heritage Committee meeting, Budapest, Hungary 24–29 June 2002.
UNESCO. 2002b. *Universal declaration of cultural diversity*. Paris: UNESCO.
UNESCO. 2003a. *The Sahara of cultures and men. Towards a strategy for the sustainable development of tourism in the Sahara, in the context of combating poverty*. Paris: UNESCO.
UNESCO. 2003b. *UNESCO: What it is, what it does. Brochure*. Paris: UNESCO.
UNESCO. 2007. WHC-07/31.COM/13B. In *UNESCO, records of the World Heritage Committee meeting, 31st session, Christchurch, NZ, May 23, 2007*. Paris: World Heritage Centre.
UNESCO. 2008a. *Operational guidelines for the implementation of the World Heritage Convention*. Paris: World Heritage Centre.
UNESCO. 2008b. *World heritage information kit*. Paris: World Heritage Centre.
UNESCO. 2010. *UNESCO: What is it? What does it do? Brochure*. Paris: UNESCO.
UNESCO. 2011. *65 ways UNESCO benefits countries all over the world. Brochure*. Paris: UNESCO.
UNESCO. n.d.. *A proposed framework for the development of joint cooperation on nature conservation and sustainable tourism at world heritage natural sites between the tourism industry and the UNESCO World Heritage Centre*. Paris: World Heritage Centre.
UNESCO/UNWTO. 2015. Siem Reap Declaration on tourism and culture—building a new partnership. Siem Reap, 5 February 2015. Available at: https://www.icomos.org/images/DOCUMENTS/18_April/2017/Siem_Reap_Declaration_2015.pdf. Accessed 16 Jan 2018.
United Nations World Tourism Organization (UNWTO). 1974. Establishment of the World Tourism Organization. *Annals of Tourism Research* 2: 83–88.
UNWTO 2016. *UNWTO/UNESCO world conference on tourism and culture: Building a new partnership. Siem Reap, Cambodia, 4–6 February 2015*. Madrid: UNWTO. Available at: www.e-unwto.org/doi/pdf/10.18111/9789284417360. Accessed 16 Jan 2018.
UNWTO (2018). *Who We Are*. Madrid: United Nations World Tourism Association. Available at: www2.unwto.org/content/who-we-are-0. Accessed 16 January 2018.

World Heritage Sites and Education: UNESCO's World Heritage Education Programme

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Introduction

Article 27 Paragraph 1 of UNESCO's 1972 Convention *Concerning the Protection of the World Cultural and Natural Heritage* states that

> The States Parties to this Convention shall endeavour by all appropriate means, and in particular by educational and information programmes, to strengthen appreciation and respect by their peoples of the cultural and natural heritage defined in Articles 1 and 2 of the Convention.

Given this emphasis, UNESCO has developed the World Heritage Education Programme (WHEP) which has the following objectives:

- To encourage young people to become involved in heritage conservation on a local as well as on a global level
- To promote awareness among young people of the importance of the UNESCO 1972 World Heritage Convention and a better understanding of the interdependence of cultures among young people
- To develop new and effective educational approaches, methods, and materials to introduce/reinforce World Heritage Education in the curricula in the vast majority of UNESCO Member States
- To create a new synergy among educators, heritage experts, environmental specialists, States Parties, development actors, and other stakeholders in the promotion of World Heritage Education on a national and international level

The WHEP, which is regarded by UNESCO as one of its most successful flagship programs for

young people, comprises a number of interrelated projects:

- Development and publication of innovative educational and informational materials, notably the *World Heritage in Young Hands* kit
- Development initiatives for multimedia educational resource material production, including the production of episodes of a cartoon series starring *Patrimonito*, the young World Heritage helper
- Youth Forums and summer camps
- National subregional and regional training seminars for teachers and educators
- Skills development and training courses for young people

For further information concerning the WHEP please see: http://whc.unesco.org/en/wheducation

Definition

The *UNESCO Young People's World Heritage Education Programme* seeks to encourage and enable tomorrow's decision makers to participate in heritage conservation and to respond to the continuing threats facing our heritage.

Key Issues/Current Debates/Future Directions/Examples

Background

Despite education being emphasized in the World Heritage Convention, it was not until 1994 that UNESCO itself began to address this aspect of the Convention in a joint project between the UNESCO World Heritage Centre (WHC) and the UNESCO Associated Schools (ASPnet) in a project entitled *Young People's Participation in World Heritage Preservation and Promotion*.

The idea of an education program relating to World Heritage fitted UNESCO's broader agenda perfectly as it was the lead agency for the United Nations 1988–1997 *World Decade for Cultural Development*. UNESCO had convened a *World Commission on Culture and Development* and documents emphasizing the importance of educational projects, and in particular those stressing cultural diversity, had been circulated to all UNESCO's National Commissions. The Canadian Commission suggested the development of an educational program relating to World Heritage.

Initially, staff from the WHC and ASPnet produced a very simple pack of information outlining the functions of the 1972 Convention and detailing conservation efforts at World Heritage sites that were sent out to any Schools asking for information. Within the year, with this information, projects were produced by schools from 16 Member States and it was clear that there was a real interest in World Heritage education.

In June 1995, a *World Heritage Youth Forum* (WHYF) was organized in Bergen by the Norwegian National Commission for UNESCO in conjunction with the WHC and ASPnet. Young people and their teachers from 25 Member States were present. To raise the profile of the event, the WHYF was timed to coincide with the General Assembly of the *Organisation for World Heritage Cities* (OWHC) and the Director General of UNESCO and city mayors, who were attending the OWHC, were invited to address, and attend parts of, the WHYF.

While the WHYF discussed a wide range of issues relating to World Heritage, two stood out as being particularly urgent: first, the potentially negative impact of tourism and second, the impact of conflict on World Heritage, and other, sites. Tourism pressure on sites was a particular worry for the mayors of some of the cities participating in the OWHC meeting and the issue of conflict had been brought into close focus, given the war in the former Yugoslavia, where the World Heritage city of Dubrovnik had been specifically targeted. An offer by the Mayor of Dubrovnik to host a second WHYF was immediately accepted by those attending the WHYF (ASP net 1995: 23). Participants from other countries also brought examples of their work relating World Heritage to Identity (Egypt), Conservation (Greece), Peace (Senegal), and Nature (New Zealand). A key issue to emerge was that if World Heritage education was to be successful, it needed to be practical:

> Teachers agreed that teaching about the past often remains too theoretical. It has to come alive for young people and be made interesting for them. New approaches in the classroom are needed as well as field visits, excursions and extra-curricular activities. (ASP net 1995: 15)

It was also noted, however, that while such a practical approach was regarded as essential for any WHEP to be successful, that relatively few teachers internationally were comfortable with such an approach to the curriculum.

Following the success of the Bergen WHYF, the WHEP was adopted as a medium-term "Special Project" (1996–2001) by the UNESCO General Conference in November 1995. Work focused on the production and piloting of a WHE kit for teachers and holding of regional youth fora.

As agreed in Bergen, the First European World Heritage Youth Forum was held in Dubrovnik in 1995. Following from the Bergen WHYF, teachers and students from 21 European States Party worked in small groups on draft materials based on six topics:

- The 1972 Convention
- Educational approaches
- World Heritage and the Environment
- World Heritage and Tourism
- World Heritage and a Culture of Peace
- World Heritage and Identity

These draft materials were further refined by a small international advisory group and retested at two more WHYF, in Zimbabwe and China, before a final "experimental" version of the WHE kit was produced in 1998 for testing by ASPnet Schools. In total, 4,000 copies of this experimental version of the kit were produced, 2,500 in English and 1,500 in French. Copies were circulated to all Associated Schools declaring an interest and teachers were asked to complete an enclosed evaluation form. An external evaluation of Young Hands was undertaken in 2000 by the English Heritage Education Service and the information contained in these forms was drawn on in the evaluation. The evaluation was generally positive and, after minor modification, the kit went into full production.

The *World Heritage in Young Hands* kit, aimed primarily at secondary school teachers, has been published in over 30 national language versions. An estimated 57,000 copies have been printed and distributed. The kit has been tested and adapted to national needs and introduced in over 130 Member States of UNESCO through close to 1,000 UNESCO ASPnet Schools. Through the WHC website, the different versions of the kit are gradually being made available free of charge online. UNESCO claims that "at a very conservative estimate, at least a million young students will be reached by all Kit versions" (http://whc.unesco.org/en/wheducation/).

World Heritage Youth Fora

Since the first WHYF in Bergen, some 27 international and regional youth fora have been held with an estimated 1,560 young people participating. Numerous national fora have also been held. These fora provide young people and their teachers with an opportunity to exchange experiences and ideas on how to become involved in heritage conservation and presentation. The fora serve as an inspiration to develop World Heritage educational and participatory activities and help to establish networks for further cooperation at the regional and international level (Fig. 1).

An important development has been the organization of a WHYF in conjunction with the annual World Heritage Committee meeting. One of the exciting highlights of the Forum is meeting members of the World Heritage Committee and its advisory bodies to discuss the Convention and its implementation. A Youth delegation also presents the result of the Youth Forum to the Committee.

Patrimonito: The Young Heritage Guardian

Patrimonito was created in 1995 by a group of Spanish-speaking students during the first WHEF in Bergen. The young students designed Patrimonito on the basis of the World Heritage Emblem which symbolizes the interdependence of cultural and natural sites: The central square is a form created by people and the circle represents nature, the two being intimately linked; the emblem is round like the world and at the same time a symbol of protection. Patrimonito means

World Heritage Sites and Education: UNESCO's World Heritage Education Programme, Fig. 1 Students at the Newcastle World Heritage Education Forum working with a local TV crew on heritage and tourism at Hadrian's Wall. (Credit: Newcastle University)

"small heritage" in Spanish, and the character represents a young heritage guardian and has been widely adopted as the international mascot of the WHEP.

In 2002, a cartoon series entitled *Patrimonito's World Heritage Adventures* was launched where Patrimonito introduces World Heritage sites, the threats they are facing, and proposes solutions to preserve them. Storyboards were chosen following a competition among secondary school pupils to raise their awareness of the importance of World Heritage and their role in preserving it. The competition was organized by UNESCO on the occasion of the celebration of the thirtieth Anniversary of the World Heritage Convention in 2002. The selected storyboards are professionally animated and produced in CD-ROM format for global diffusion to schools and at World Heritage Youth events.

The World Heritage Volunteers Campaign

The World Heritage Volunteers campaign is coordinated by the WHC in cooperation with the Coordinating Committee for International Voluntary Service CCIVS and mobilizes youth NGOs operating in the nonformal sector for World Heritage promotion and preservation through involvement in international voluntary work. Projects are organized by local youth organizations or NGOs which determine the project goals and activities in collaboration with a range of partners (local community, site management, local authorities, and other stakeholders), train work camp leaders, and host international volunteers. Activities themselves are undertaken by young volunteers, aged 18–30 years, coming from different countries. Youth camps generally last between 2 to 4 weeks and accommodate between ten to thirty volunteer participants encouraging young people to play an active role in the promotion and preservation of World Heritage.

Skills Development Training Courses

Skills development training courses relating to the WHEP have trained nearly 1,250 teachers and educators have been trained through nearly 40 seminars and workshops at national, subregional, regional, and international level. Skills development training courses have been provided to over 200 young people.

The Future

The WHEP has now moved into its second phase, seeking to reinforce the involvement of young people in World Heritage preservation, pursuing efforts to integrate World Heritage Education in school curricula, and encouraging communities and States Parties to participate in and promote heritage preservation and intercultural learning.

The WHEP has been funded by a number of extra-budgetary sources including the Norwegian Agency for Development Cooperation (NORAD), the Royal Norwegian Ministry of Foreign Affairs, Rhône-Poulenc, the Dutch Government, the Italian Government, and the World Heritage Fund.

Cross-References

▶ Formal Education up to Age 18, Archaeology in
▶ Heritage Values and Education
▶ UNESCO World Heritage Convention (1972)
▶ World Heritage Education, Training, and Capacity Building

References

ASP Net. 1995. *First world heritage youth forum, Bergen, Norway 24–28 June 1995*. Bergen: UNESCO.

World Heritage Syria

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Acronyms

AAAS	Les Annales Archéologiques Arabes Syriennes. Revue d'archéologie et d'histoire, DGAM, Damascus
DGAM	Directorate-General of Antiquities and Museums in Syria
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
UNESCO	United Nations Educational, Scientific and Cultural Organization

Historical Overview of Syria

Syria is located in the center of the Middle East, which has provided the most ancient civilizations to human history. It is an area with ancient civilizations dating back thousands of years.

Stable human settlements began to appear in the Syrian region in the prehistoric ages. Through the period of historical ages that began in the late fourth millennium BC, Syria was home to many civilizations. It was a zone of conflict for the power and domination of the empires that stabilized and flourished in Mesopotamia, Egypt, Anatolia, and Persia. Syria was the seat of some civilizations such as Ebla, Mari, and others (the end of the third millennium and the beginning of the second millennium BC) and was the seat of civilizations and kingdoms of Amorites, Aramaic, Syriac and others. It was also a home of the Phoenician civilization that spread throughout the Mediterranean coasts and other parts of the coast of the Atlantic Ocean. Additionally, it founded commercial stations that were the beginning of the establishment of civilizations in many areas.

Syria was not the center of empires in the ancient ages, so it was a part of many civilizations through its long ancient history such as Acadians, Babylonians, Assyrians, Chaldeans, Hittites, Hauris, Ancient Egyptians, Hellenistic, and Roman civilizations. In the beginning of the growth of Islamic empire, Damascus became the capital of the Umayyad Caliphate, which was the largest empire in the Islamic history that expanded from middle Asia to the Iberian Peninsula. However, Syria returned to be controlled as a part of successive Islamic kingdoms and caliphate in the Medieval Age, and it was ruled by the Abbasids, Fatimid, Mongols, Tartars, Seljuks, Crusaders, Mamluks, and finally Ottomans. Moreover it was the seat of some kingdoms like Hamadani, Zengid, and Ayyubids. In the first half of the twentieth century, it was dominated by French colonialists who defined its current geographical boundaries. The name of Syria was launched on areas much larger than what is currently known as the "Syrian Arab Republic" (Errico 2013, p. 127). Since 2011 when the war began in Syria, those sites have been listed as World Heritage Sites in Danger.

These sites are (UNESCO):

1. Ancient City of Damascus (1979)
2. Ancient City of Bosra (1980)
3. Site of Palmyra (1980)
4. Ancient City of Aleppo (1986)
5. Crac des Chevaliers and Qal'at Salah El-Din (2006)
6. Ancient Villages of northern Syria (2011)

UNESCO nominates sites in the Tentative World Heritage List, which is an inventory of those properties that each State Party intends to consider for nomination. From Syria there are 12 sites on the tentative list (UNESCO):

7. Norias of Hama (1999)
8. Ugarit (Tell Shamra) (1999)
9. Ebla (Tell Mardikh) (1999)
10. Mari (Tell Hariri) (1999)
11. Dura Europos (1999)
12. Apamea (Afamia) (1999)
13. A desert castle: Qasr Al-Hayr al-Sharqi (1999)
14. Maaloula (1999)
15. Tartus: The Citadel City of the Crusaders (1999)
16. Raqqa-Ràfiqa: The Abbasid city (1999)
17. Arwad Island (1999)
18. Mari and Europos-Dura sites of Euphrates Valley (2011)

The Ancient City of Damascus

It was nominated and listed in 1979 after having achieved five of the ten UNESCO Criterions: I, II, III, IV, and VI.

Damascus is one of the oldest inhabited cities in the world. The archaeological excavations in Tell Al-Ramad on the outskirts of the city show that the area of Damascus has been inhabited before the seventh millennium BC (De Contenson 1985). Damascus as a city with continuous human activity emerged with the presence of the Aramaeans in the third and second millennium BC. It was one of the Decapolis cities in the Hellenistic period. Roman and Hellenistic periods as well as the Byzantine period were very important, and they gave Damascus road plans, which are still visible now. It is known that most of its ancient buildings date back to the Islamic period, especially the period of Ottoman control, which was from the sixteenth century to the beginning of twentieth century.

The city of Damascus has fortifications and fences and seven doors dating back to the Roman period. The doors were renovated and modified, and other doors have been added during later times. The seven Roman doors are Bab Sharki, Bab El Jabia, Bab Touma, Bab Al Jenain, Bab Al-Faradis, Bab Al Sagheer, and Bab Kesan, and the castle in the northwestern corner of the old city, which it may have been constructed in the Seljuk period in the eleventh century AD (OMRAN 2001). It was completed and renovated significantly in the Ayyubid and Mamluk periods after the thirteenth century AD.

The city of Damascus includes many important historical monuments such as:

The Umayyad Mosque that dated back to the beginning of Umayyad period in the eighth century AD. Damascus was the capital of the Umayyad Caliphate, one of the greatest ones in all Islamic history. The Mosque has a large influence coming from Byzantine Basilica shape, like the Basilica of John Batiste where the Mosque built on its ruins.

The city has many ancient *souqs* (markets) and *khanat* (ancient trading complex), now the most of them are important commercial areas, such as Hamidiya Souq, Medhat Pasha Souq, Khan Asaad Pasha (Rihaoui 1975), Souk El Bazouria, Souk El Asrounieh, Souq El Harika, and others.

Old Damascus has many historical residential neighborhoods that are still continuously inhabited. It is noted that some neighborhoods of Damascus were characterized by a specific religious majority and other neighborhoods were inhabited by residents of different faiths. Inside the city walls during its long history the city was multiethnic. Despite some incidents throughout history that led to tragedies and fights as a result of some strife, Damascenes maintained for long historical stages a coexistence of peace, cooperation, and integration among the people in order to

keep their city beautiful and prosperous. Some of the most important neighborhoods inside the city walls of Old Damascus are Bab Sharki, Bab Touma, Al-Qamariyah, Al-Amara, Al-Shaghour, Yahud Quarter (Jewish Quarter) and Al-Amin neighborhood and others outside the city walls such as Al-Salihiya neighborhood, Al-Qanawat neighborhood, etc.

Damascus has many palaces and houses. These houses have a specific type that is called the "Damascene house" or the "Arab house." These types of attached houses have no windows opened on the narrow streets, so it opens onto a courtyard in the middle of the house. Most of them have three levels, which are mainly subterranean basements, ground floors, and first floors and rarely a second floor or more (Burford 1841). The ancient urban fabric of Damascus does not have a European style, which started to appear around the end of the Ottoman period and during French colonization at the beginning of the twentieth century. One of the most beautiful palaces in Damascus is the Al-Azm Palace, built in the eighteenth century by Ottoman ruler As'ad Pasha Al-Azm. It is a beautiful example of Islamic architecture. It was restored and converted to a museum of folk traditions. The palace was built in the style of Al-Ablaq, which uses different colored stones of white, black, yellow, and red. The colors of the stone rows alternate in horizontal lines; this style was developed in the Mamluk and Ottoman periods. Marble, wood, and clay were also used in the construction and decoration. The palace contains many suites and lounges that open onto several inner courtyards rich with trees, water fountains and tiled floors. The Palace is considered one of the most visited historical monuments in the old city of Damascus. The city of Damascus includes many Damascene houses and palaces. We also find many other historical monuments, the most important of which are Beit Al-Akkad, Farhi house, Beit Jabri, Anbar house (one of the beautiful Damascene houses built in the nineteenth century), Bimaristan Nouri (historical hospital), and many more.

The old city of Damascus suffered many damages during the war, according to the official DGAM site in Syria; there are 31 monuments or archaeological sites that have suffered small, medium or large damage. The most important were in the Umayyad Mosque, which had cracks in the southern wall of the mosque and the mosaic overlooking the courtyard, damage in the (southwest) side of the courtyard, fragmentation effects scattered on the columns near the "Al khazneh Dome," and minor damage to the roof in the inner courtyard (DGAM).

In addition, many important historical monuments have had various damages such as As'ad Pasha Azem Palace, Qal'at Damascus (Damascus citadel), the Eliyahu Hanavi Synagogue in Jobar, Yalbugha Mosque, Al-Qabbani Building, Al-Hejaz Railway Station, Al-Qadam Mosque, Essali Shrine, and others (DGAM).

Finally after the Syrian government has regained control on the Old Damascus, it started maintenance and restoration works like the mosaic in the Umayyad Mosque. In October 2018, DGAM reopened the national museum of Damascus for public visits, after having saved more than 300,000 archaeological finds. These finds were brought from the provincial museums of many Syrian cities (Matthiae 2018).

The Ancient City of Bosra

It was first listed as a World Heritage Site in 1980 after having achieved three of the ten UNESCO Criterions: I, III, and VI (UNESCO).

In the Italian encyclopedia *Treccani*, one of its names was "Nova Traiana Alexandrina"; in Turkish it was called "EskiŞam" meaning "Old Damascus" or "Old Sham." The name in Arabic is "Bosra al-Sham," and it is an important historical city located in the south of Syria near the Jordan border and is a part of the Hauran region and near the Arab Mountain. The city has a history dating back to the fourteenth century B.C. Its name occurs in the precious Tell el-Amarna tablets in Egypt, which represent royal correspondence between the Pharaohs and the Phoenician and Amorite kings. But its golden age was in the Roman era when it was the capital of the Roman's Arab Province.

Bosra was an important station on the "Via Nova Traiana" road, which connects Damascus to the Red Sea, passing through the city of Bosra and Philadelphia (Amman) to Aqaba. The city became very important during the reign of Roman Emperor Philip the Arab (Latin: Philippus Arabus, 244–249 AD), who was from the city of Shahba near Bosra, when he declared it a metropolis. We find the city on Philippe's coins in the middle of the third century AD (Mukdad 2007) (Fig. 1). In the Christian period, Bosra remained an important center, when it later became a bishopric and then an archbishopric. During the ascent period of Ghassanid in the sixth century, Bosra formed one of the main Ghassanid centers (Warwick 2000).

Bosra has a special importance in Islamic history, in which the Prophet Muhammad met the Christian monk Bahira in one of his commercial trips in Syria. It was one of the first Byzantine cities to be conquered in the initial phase of Islamic expansion, which became a station on the pilgrimage road to Mecca. It had more importance in Ayyubid and Mamluk periods when it was located near the borderline of the conflict with the Crusaders, and then it declined significantly in the Ottoman period, where very few of its Christian and Muslim populations remained (Fig. 2).

The city is characterized with its archaeological remains dating back to the Roman, Byzantine, and Nabataean periods such as a Roman theater dating back to the reign of Emperor Trajan, the Basilica of the Monk Bahira, the cathedral built in Ghassanid period which was one of the greatest of the East (Warwick 2000), the Church of St. Sergius, several Roman baths, Decumanus Maximus, Triumphal Arch, Tetrapylon, Nabataean arch, and many residential buildings.

World Heritage Syria, Fig. 1 Philippe's coin (Mukdad 2007)

Bosra has many Islamic monuments, which dates back to different periods such as the Ayyubid Citadel that surrounds the Roman theater, which is the most important Islamic monument reserved in the site and was completed in the thirteenth century; the Omari mosque which is one of the oldest mosques in Islamic history; the Mosque of Mabrak el-Naqa (Naqa is the female camel, the place where the camel of the prophet Muhammad had kneeled); Mosque of Fatima; the Gumushtakin Mosque; Hammam Manjak which is a Mamluk bath complex in Damascene style built about 1372 by Manjak, the governor of Damascus (Burns 2009), Birket al-Hajj; and other buildings.

The Site of Palmyra

It was first listed as a World Heritage Site in 1980 after having achieved three of the ten UNESCO Criterions: I, II, and IV (UNESCO).

In Arabic, the city of Palmyra is called "Tadmur"; in Aramaic it is called Tadmur or Tadmurta (meaning marvel) and in Latin called Palmyra. It is an oasis in the Syrian Desert between the Euphrates River and the coastlands of Syria. It contains huge ruins of a great city that was one of the most important cultural centers in the ancient world between the first and third centuries AD. Tadmur was mentioned in the archives of Mary and in Assyrian texts dating back to the beginning of second millennium BC (Seyrig 1951). It became a part of the Roman Empire in the middle of the first century AD as a part of the Roman province of Syria. As a city on the caravan route connecting Persia, India, and China with the Roman Empire, Palmyra has more power and richness. Thus, the art and architecture of Palmyra combines Roman and Greek traditions with local and Persian traditions. It is a special and

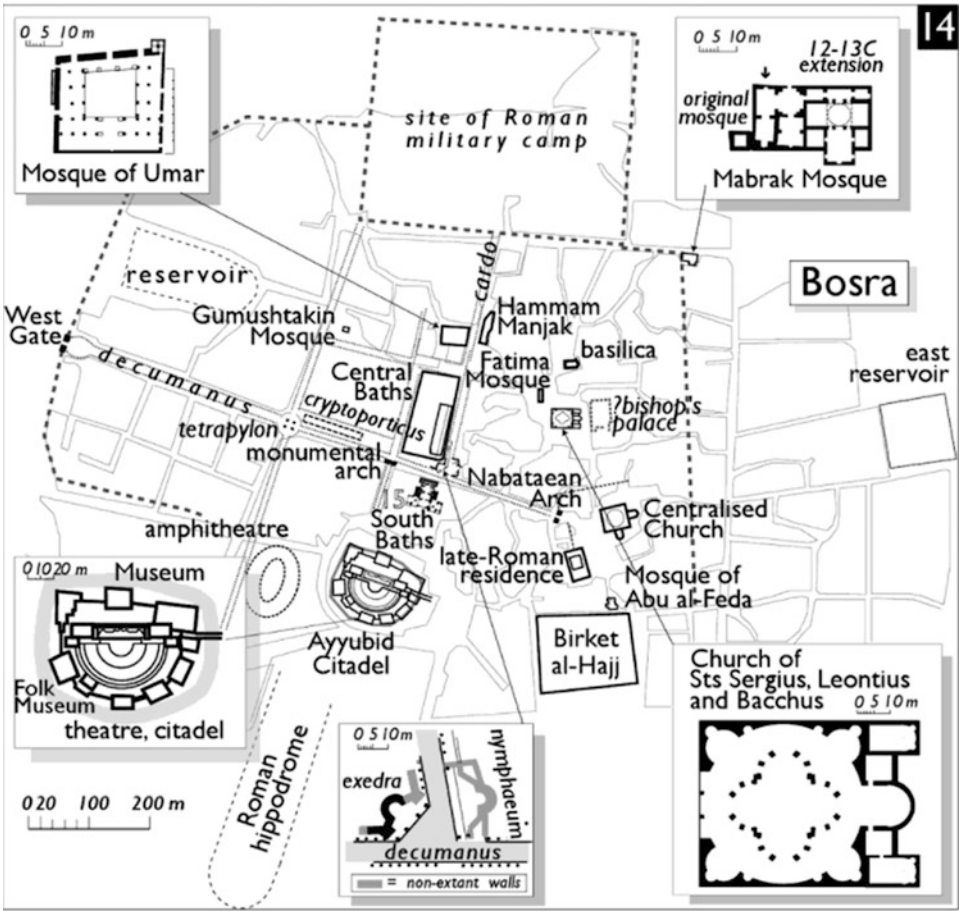

World Heritage Syria, Fig. 2 Map of Bosra archaeological site (Burns 2009)

distinctive case of Hellenistic and Roman art (Balty 1996).

The city of Palmyra has 6 km semioval defensive walls, surrounding all of the city's buildings such as official, religious, cultural, market, and residential neighborhoods. The Palmyrenes were mixed from Amorites and then Aramaic and Arab tribes, the most famous of which were Komare, Mattabol, and Ma'zin. The city also had a Jewish community. The inhabitants of the city spoke Palmyrene, a dialect of Aramaic, used for writing the Palmyrene alphabet. They also used less Greek language in commercial and diplomatic communications.

Odaenathus and Zenobia: Odaenathus was one of the most famous kings of Palmyra; he defeated the Persian king Sabor I, so he got the title "Imperator Totius Orientis" from Roman Emperor Galianos and became the Governor of the East.

In the Byzantine Era, it became a Christian city, and it was reduced to a small town in the Islamic period. Palmyra in its Arabic name Tadmur was mentioned in the books of Arabic historians and travelers such as Yaqoot al-Hamwi in the thirteenth century AD, Ibn Alshehneh in the fifteenth century AD (Al-Bounni 1972), Al-Bakri, and others; they described it as an existing city with a great history and monuments. It was re-illuminated by the European travelers in the seventeenth and eighteenth centuries. In the twentieth century, the excavations revealed many

of its archaeological treasures and are still hiding more.

The most important of Palmyra monuments are Great Colonnade of Palmyra, Tetrapylon, Triumphal Arch, Roman theater, Agora, and Diocletian Camp.

The city had many temples for its various inhabitants who worshiped local Semitic deities and Mesopotamian and Arab gods. The most important temples are the Temple of Bel and Temple of Baalshamin (Collart 1957). Outside the city walls extends the large Valley of Tombs that is about 1 km long and includes a big number of various types of tombs. The more monumental one is tower tombs; the more important one is the Tower of Elahbel (Al-Bounni et al. 1979).

The Great Colonnade is the main axe of the ancient city, about 1100 m long and built in the second and third centuries AD (Segal 1997).

The Temple of Bel: As a pantheon of the Palmyrene gods, it was the most important religious building dedicated to Bel (the Akkadian Babylonian god). At the same time, Palmyrenes worship other gods in this temple such as Yarhibol (the sun god) and Aglibol (the lunar god) (Teixidor 1979).

The Roman Theater: It has a small stadium consisting of about 13 rows, a semicircular building with limestone, built in the first half of the second century AD. It has been buried under sand, and then it was found in the excavations carried out in 1952.

In 2015 during the Syrian civil war, ISIS was conquest to the city of Palmyra, when they destroyed the most important monuments of Palmyra, such as Temple of Bel, Temple of Baalshamin, Triumphal Arch, Tower Tombs of Elahbel, Tetrapylon, and others. In addition, the site was damaged from the battles that carried out there. In August 18, 2015, in the city of Palmyra, ISIS have killed in a savage way the archaeologist Khaled al-Asaad, who was the curator of the site and museums of Palmira for a long time, and he spent his life in work, exploration, and research at the Palmyra site. In 2017 the Syrian Army has liberated the city from ISIS.

Ancient City of Aleppo

It was first listed as a World Heritage Site in 1986 after having achieved two of the ten UNESCO Criterions: III and IV (UNESCO).

Aleppo is located in northern Syria, between the Mediterranean coast and the Euphrates. It grew up on a calcareous plateau that gave Aleppo the stone as a main building material in the city, which preserved many historical monuments in good condition.

The city of Aleppo is one of the oldest cities in the world, which has been an important center without interruption for at least 4500 years; it was mentioned with the name (Khalab) in Ebla texts from the late third millennium BC (Archi 1999). Archaeological excavations at Aleppo Citadel revealed the Temple of Hadad (the Storm God), which date back to the second half of the second millennium BC (Burns 2016). Through a long history, many civilizations settled in Aleppo: the Akkadian and Eblaite were the first; then the Amorites had established the kingdom of Yamhad in Aleppo and its region; then the Hittite, Mitanni, Assyrian, Chaldean, Achaemenid, and the obvious presence of the Hellenistic Era where Seleucus Nicator established the Hellenic city of Beroea in the site in the third century BC; and then the Roman and Byzantine civilizations (Bryce 2014); the city contains few architectural and archaeological remains that belong to those civilizations. After, it began the Islamic period, starting with Rashidun Caliphate, Umayyad Caliphate, Abbasids Caliphate, Hamdanids, Seljuq, Zengids, Ayyubids, Mongols, Timurid, Mamluk, and Ottomans (Gaube 2007). Finally, the French mandate was in the first half of twentieth century.

The urban fabric of the Ancient City of Aleppo (Fig. 3) covers an area of about 4 km^2; it has a rich ethnic variety, so it has many important religious buildings belonging to Islam, Christianity, Judaism, and others. But mostly ancient Aleppo demonstrates the urban structure of the Islamic city, where the main part of it dates back to Ottoman period from 1517 to 1918. Hellenistic

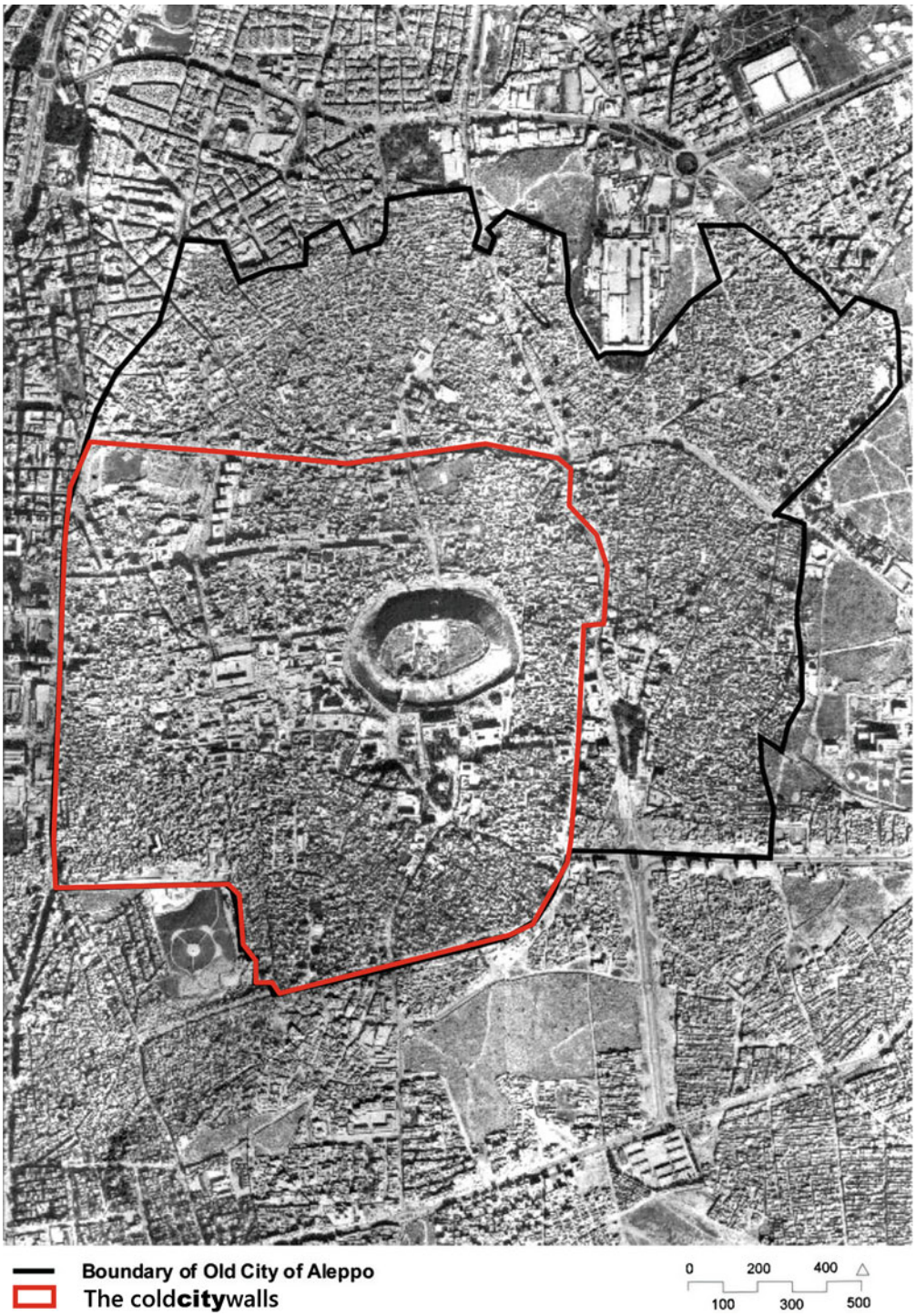

World Heritage Syria, Fig. 3 The Ancient City of Aleppo inside and outside walls (Windelberg 2001)

and Roman urban style is presented clearly in the area of Jallum neighborhood that contains the Al-Madina Souq (the old markets) and caravanserais, the Great Mosque; this area extends from the west side of the Citadel to Bab Antakeya (the Door of Antioch) (Gaube 2007). In the heart of the walled city, we see the formidable citadel; it is located on a high artificial hill that has been grown through a long history. Many historical neighborhoods grew out of the city walls between sixteenth and twentieth centuries (Watenpaugh 2004). The Old City of Aleppo houses more than 106,000 residents in many ancient quarters (Windelberg 2001), which are located inside and outside the city walls. Each one was characterized by the religious and ethnic characteristics of its inhabitants (Raymond 1985), and some others are ethnically mixed. The most important quarters and urban elements of old city are:

The doors: There have been known 12 doors in the walls of the city, 5 of which are still existent: Bab al-Hadid, Bab al-Maqam, Bab Qinnasrin, Bab Antakeya, and Bab al-Nasr; the other doors are ruined: Bab al-Ahmar, Bab al-Nairab, Bab al-Jinan, Bab al-Faraj (Gaube 2007), Bab Al-Hayyat, Bab Al-Faradis, and Bab Al-Salama (Hadjar 2005).

The quarters: Inside and outside the city walls – Aqabeh, Bayadah, Farafira, Jalloum, Al-Qasileh, Aghyol, Almaji, Fardos, Hazzazeh, Kallaseh, Qadi Askar, Qarleq, Al Jdaideh, etc. (Hadjar 2005).

The most significant historic buildings of the Ancient City of Aleppo: Aleppo Citadel, Bimaristan Arghun al-Kamili, Al-Shibani Church-School, Khanqah al-Farafira, and others.

Places of worship: Great Mosque, Mar Assia al-Hakim Church Syrian Catholic, the Central Synagogue of Aleppo or al-Bandara synagogue, Forty Martyrs Armenian Cathedral, Al-Shuaibiyah Mosque, etc.

Madrasas: Al-Muqaddamiyah, Al-Halawiyah, Al-Firdaws, Al-Zahiriyah, Al-Kamiliyah, etc.

Traditional houses: Junblatt Palace, Beit Ghazaleh, Beit Basile, Beit Marrash, Beit Achiqbash, Beit Dallal, etc.

Traditional bathes (Hammam): Hammam Yalbugha, Hammam al-Sultan, Hammam al-Nahhasin, Hammam al-Bayadah, Hammam al-Jawhary, Hammam Bahram Pasha, Hammam Bab al-Ahmar, etc. (Hadjar 2005).

Since 2012 when the disaster in Aleppo actually started, many associations and organizations started ideas and projects aiming to the conservation and restoration of Syrian cities, mainly the city of Aleppo and its ancient center.

Crac Des Chevaliers and Qal'At Salah El-Din

It was first listed as a World Heritage Site in 2006 after having achieved two of the ten UNESCO Criterions: II and IV (UNESCO).

These two citadels are the most important example of Byzantine, Crusader, Ayyubid, and Mamluk military buildings in the Levant, illustrating the exchange of influences and the documentation of the development of fortified architecture in the Near East during these periods (UNESCO). The distance between them is approximately 95 km. The two were built out of cities on the heights of the Syrian coastal mountains. There were points of conflict and wars between the Ayyubids and then the Mamluks with the Crusader kingdoms that are established in the Levant coast during approximately all twelfth and thirteenth centuries. Most of their architectural elements date back to the Crusader and Byzantine periods, and quite a few elements were added in later periods during the reign of the Ayyubids and Mamluks.

Crac Des Chevaliers

In early eleventh century AD when the site of the citadel was a camp of Kurdish garrison established by the ruler of Homs, the citadel had been named "Hisn Al-Akrad" (the castle of the Kurds) (Kennedy 1994). It was built on the top of a mountain rising approximately 660 m above sea level and overlooking an area called "Fathet Homs" (gap of Homs) that is a relatively low area of the coast mountains of Levant, which

provides easy connection between the city of Homs in Syrian inland and the cities of Tripoli and Tartous on the coast. It has a strategic location that monitors traffic communication between the inland and coast areas (Kennedy 1994). The Crusaders captured the citadel in 1110 AD (Kenneth 1977). It was granted by the Count of Tripoli Raymond II to the Hospitallers. It was built by the Hospitallers Order of Saint John of Jerusalem from 1142 to 1271, with further construction by the Mamluks in the late thirteenth century (UNESCO).

In 1271 the Mamluk Sultan Baybars captured the castle after a siege lasted more than a month. After the castle was damaged as a result of its bombardment, it was restored and improved in the thirteenth and early fourteenth centuries by the Mamluks who used it as a base for their military operations (Kenneth 1977). After the conflict with Crusaders ended, the castle lost its strategic importance and was abandoned. In the nineteenth century, the villagers occupied the site and lived inside it until the French mandate. The castle is located on a Trapezoidal basaltic plain separated from the mountain on the southern side by an industrial trench. The castle is divided into two integrated defensive zones. The upper castle, built on a rocky hill in the center of the site, is organized around a central patio space and has a double trapezoidal wall. It includes the religious architectural complex containing a small chapel, and the fortified building on the south side was the residence for Hospitallers (DGAM).

Qal'at Salah El-Din

It is located near the city of Al-Hafah and about 30 km east of Lattakia on the coastal mountain at a height of 440 m above sea level, built on a narrow ridge that has a triangular shape whose head at the west direction. At the north and south, there are two deep valleys (Fig. 4). The site was separated from the east by a deep trench dug in the Byzantine period, the architect left a pillar in its center to support a movable bridge. The citadel was called the "Saone Citadel" in Arabic "Sahyun Citadel," which was replaced with the name of "Salah El-Din Citadel" in 1957. Arab historians such as Yahya al-Antaki and Ibn al-Qalanisi mentioned that it was affiliated to the Hamdani and its ruler was "Raqtash the Turkish" in 975 AD, but no traces of that period were found (Saada 1967). When Byzantine Emperor John Tzimiskes conquered Syria, he took the site in 975 AD. It continued under Byzantine domination until the Crusaders captured it in 1108, when they conquered all Lattakia area (Kennedy 1994).

The Byzantine buildings were concentrated in the upper courtyard, which is located in the

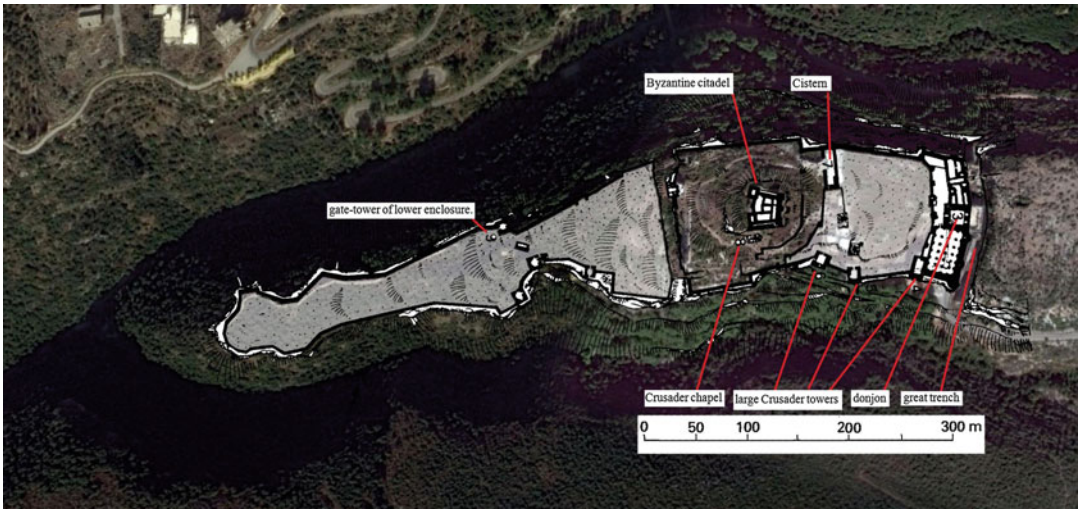

World Heritage Syria, Fig. 4 The map of Qal'at Salah El-Din

eastern part of the plateau, which includes the largest number of buildings of military, civil, and religious use. This area is the most difficult to understand in terms of architectural organization and construction stages due to overlapping works and similarities in the techniques and the problem of repeated reuse.

The western part of the ridge is separated from the upper courtyard by the beginning of a ditch. Its walls are equipped with four rectangular towers and a circular tower which were built during the Crusader period.

After the siege of several days and being bombarded with catapults, in 1188 Saladin conquered the citadel (Saada 1967).

Because of the Syrian conflict, the Salah El-Din Citadel had a few damages, but Crac Des Chevaliers have had more: damage to the tower due to clashes, the southern towers, the Knights Tower, the mosque, the entrance tower, the external façades of the northern side, the stable overlooking the moat, King Al-Zahir Baybars Tower, the Knights Hall, the pathway leading to the kitchen, and the eastern tower opposite the Knights Tower (DGAM). Since March 2014, the Syrian government has regained control on the site and began emergency maintenance and documentation (UNESCO).

Ancient Villages of Northern Syria

It was first listed as a World Heritage Site in 2011 after having achieved three of the ten UNESCO Criterions: III, IV, and V (UNESCO).

They are also called the "Dead Cities" or the "Forgotten Cities." There are around 40 villages that were grouped into 8 archaeological parks (Fig. 5), located on the calcareous plateau in northern Syria within the governorates of Aleppo and Idleb. They date back to the Roman period and most of them to the Byzantine period. These sites were built between the first and seventh century AD. Their development ceased and declined at the end of the third century AD to flourish again between the end of the fourth century and the end of the sixth century, and then they were abandoned between the eighth and tenth

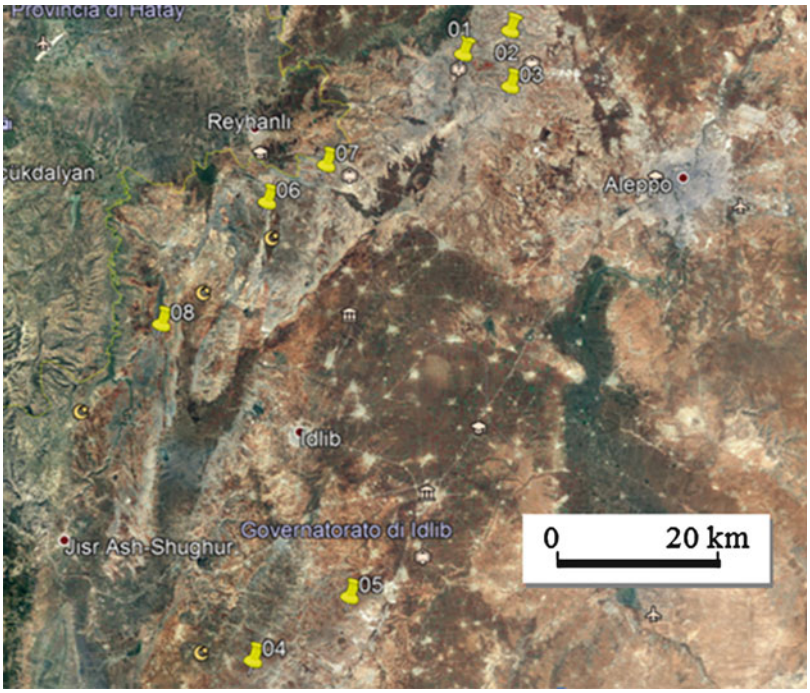

World Heritage Syria, Fig. 5 Map showing the eight groups of old villages north of Syria

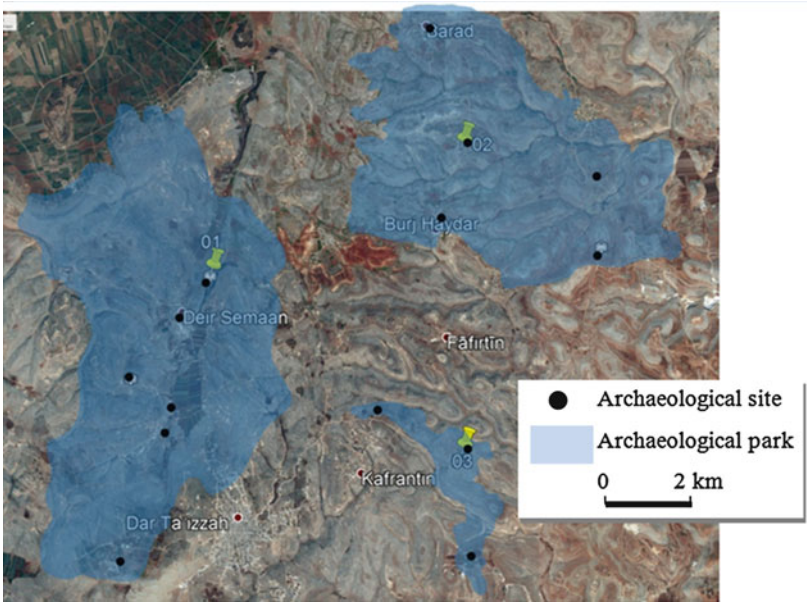

World Heritage Syria, Fig. 6 Map showing the first, second, and third groups of old villages north of Syria

centuries when the farmers gradually left their villages toward the nearby plains (Tatt 1990). There are many well-preserved historical remains including pagan temples, churches, Christian sanctuaries, funerary monuments, baths, public buildings, and economic buildings. These ruins integrated in their natural environment form a series of unique and exceptional cultural landscapes.

They provide an example of rural life in the Byzantine period and give us knowledge of the development of Christianity in the East. They include ruins of many monuments and important Byzantine churches such as the Church of Saint Simeon Stylites; in the archaeological site of Brad, there is the tomb of St. Maron; he was the founder of the Maronite Church, Churches of Sheikh Suleiman village, Mushabbak Basilica, Qalb Loze Basilica, Serjilla ruins, the pyramid tomb in Bara, and others (DGAM 2010).

There are some damages of the sites of Ancient Villages since the start of Syrian conflict in 2011. These damages come from illegal excavations, destruction, and damage due to the armed conflict, damage of historic buildings due to the use of ancient stones as building material, illegal constructions, use of the sites by internally displaced persons and armed groups, and finally quarrying (UNESCO).

The first group of villages is area of 3700 ha the Archaeological Park "Jebel Sem'an 1" contains six sites: Qal'atSem'an, Deir Sem'an, Refadé, Sittar-Roum, Qatura, and Sheikh Barakat (Fig. 6).

The second group of villages is area of 2760 ha; the Archaeological Park "Jebel Sem'an 2" contains five sites: KafrNabo, Kalota, Kharab Shams, BorjHaydar, and Brad (Fig. 6).

The third group of villages is area of 380 ha; the Archaeological Park "Jebel Sem'an 3" contains three sites: Batouta, Sinkhar, and Sheikh Suleiman (Fig. 6).

The fourth group of villages is area of 3200 ha; the Archaeological Park "Jebel Zawiyé 1" contains ten sites: al-Bara, Wadi Martaoun, Mujleya, Btirsa, Bshilla, Ba'uda, Dallozé, Serjilla, Shinshara, and Rabi'a (Fig. 7).

The fifth group of villages is area of 530 ha; the Archaeological Park "Jebel Zawiyé 2" contains two sites: Ruweiha and Jeradé (Fig. 7).

The sixth group of villages is area of 460 ha; the Archaeological Park "Jebel al-A'la" contains three sites: QalbLozé, Kfeir, and Qirqbizé (Fig. 8).

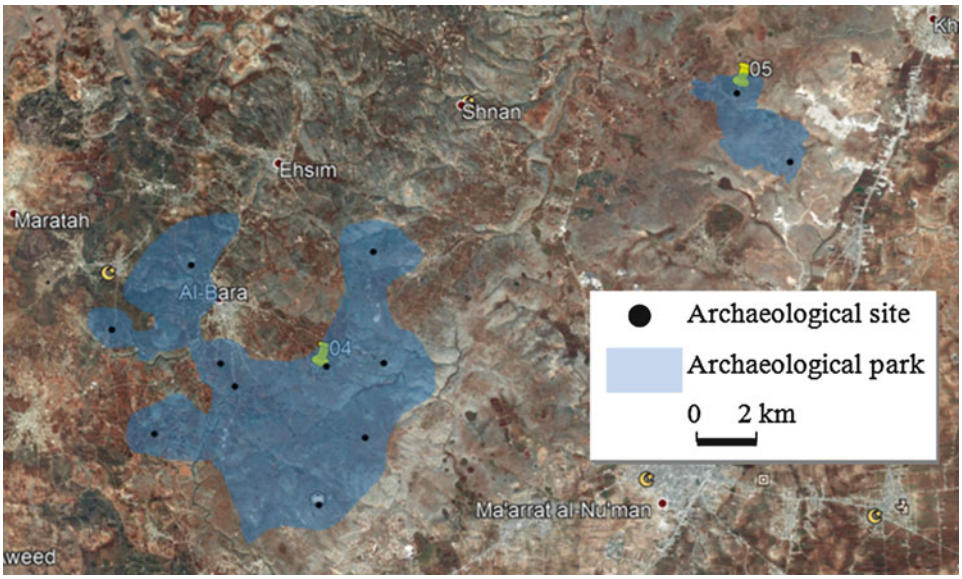

World Heritage Syria, Fig. 7 Map showing the fourth and fifth groups of old villages north of Syria

World Heritage Syria, Fig. 8 Map showing the sixth and seventh groups of old villages north of Syria

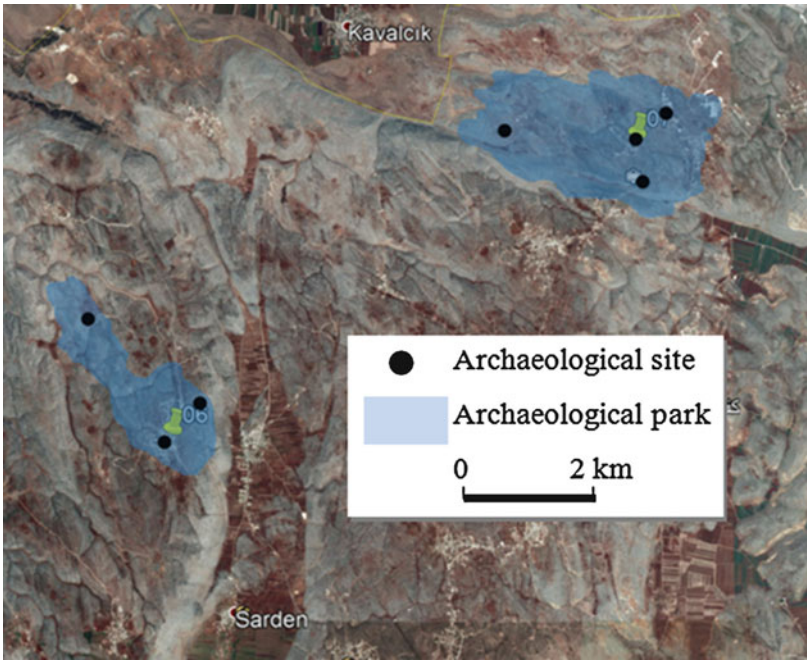

The seventh group of villages is area of 580 ha; the Archaeological Park "Jebel Barisha" contains four sites: DarQita, Deirouné, Kherbetal-Khatib, and Baqirha (Fig. 8).

The eighth group is area of 680 ha. Archaeological Park "Jebel Wastani" contains three sites: Benasra, al-Fassouq, KafrAqareb (Fig. 9).

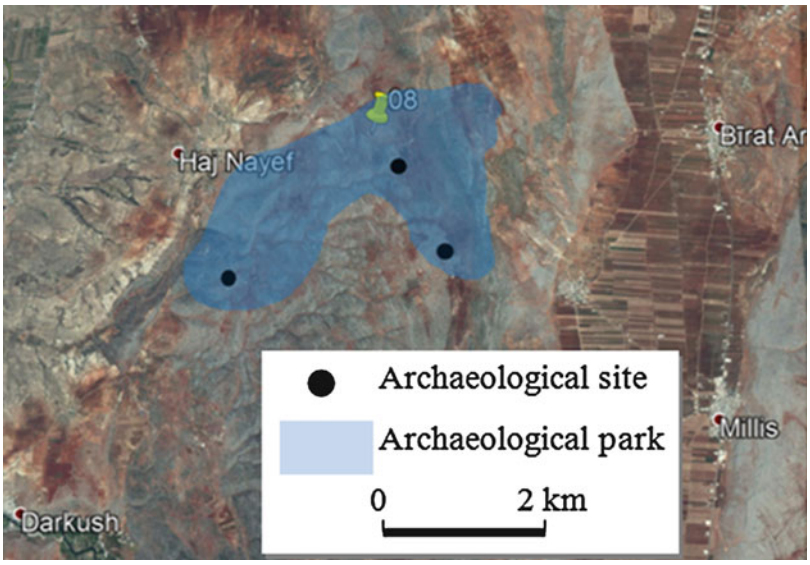

World Heritage Syria, Fig. 9 Map showing the eighth group of old villages north of Syria

References

Al-Bounni, Adnan. 1972. Some of Palmyrene antiquities in an Arabic Text from the Middle Ages. *Annales Archéologiques Arabes Syriennes* 22: 73–79. Arabic text, Damascus.

Archi, Alfonso. 1999. Aleppo in the Ebla Age. *Annales Archéologiques Arabes Syriennes* 43: 131–136. DGAM, Damascus.

Balty, Jean-Charles. 1996. Palmyre entre orient et occident. Acculturation et resistances. *Annales Archéologiques Arabes Syriennes* 42: 319–322. English and Arabic text, Damascus.

Bryce, Trevor. 2014. *Ancient Syria: A three thousand year history*. New York: Oxford University Press.

Burford, Robert. 1841. Description view city Damascus, now exhibiting Panorama, Leicester square, painted R. Burford, London.

Burns, Ross. 2009. *Monuments of Syria: An historical guide*. London: Tauris.

Burns, Ross. 2016. *Aleppo a history: Cities of the ancient world*. New York: Routledge.

Collart, Paul. 1957. Baalshameen Temple in Palmyra. *Annales Archéologiques Arabes Syriennes* 7: 227–236. English and Arabic text, Damascus.

De Contenson, H. 1985. La region de Damas au néo-lithique. *Annales Archéologiques Arabes Syriennes* 35: 101–110. English and Arabic text, Damascus.

DGAM. 2010. LesVillages Antiques du Nord de la Syrie, RésuméAnalytique: Dossier de présentation en vue de l'inscriptionsurla listeduPatrimoineMondial de l'UNESCO, Damas.

Errico, Silvana. 2013. CIL X,5182: Scritto nella pietra, Tricase: Youcanprint, Borè.

Gaube, Heinz. 2007. *Ahistory of the City of Aleppo, "Syria: medieval citadels between East and West/ edited by Stefano Bianca"*, 73–102. Torino: Allemandi for the Aga Khan trust for culture.

Hadjar, Abdallah. 2005. *Historical monuments of Aleppo*. Aleppo: Automobile and Touring Club of Syria.

Kennedy, Hugh. 1994. *Crusader castles*. Cambridge, UK: Cambridge university press.

Kenneth, M. Setton. 1977. *A history of the crusades: Volume IV the art and architecture of the crusader states/volume IV edited by Harry, W. Hazard*. London: the Uni. Of Wisconsin Press.

Matthiae, Paolo. 2018. The daily newspaper La Repubblica, Italy.

Mukdad, Anas. 2007. *Bosra. Aux portes de l'Arabie*. Beyrouth: Institutfrancais du Proche-Orient.

Omran, Hazar. 2001. The Citadel of Damascus in the end of the 5th/11th century. *Annales Archéologiques Arabes Syriennes* 44: 91–103. DGAM, Arabic text, Damascus.

Raymond, André. 1985. *Grandes villesarabesál'époqueit y*. Paris: Sindbad.

Rihaoui, A.K. 1975. *Khanat in Damascus*' (The caravansaray in old Damascus). *Annales Archéologiques Arabes Syriennes* 25: 47–82, it y text, Damascus.

Saada, Gabriel. 1967. History of Salahuddin Castle. *Annales Archéologiques Arabes Syriennes* 17: 59–78, it y text, Damascus.

Segal, Arthur. 1997. *From function to monument : Urban landscapes of Roman Palestine, Syria and Provincia Arabia*. Oxford: Oxbow Books.

Seyrig, Henri. 1951. Palmyra and the East. *Annales Archéologiques Arabes Syriennes* 1: 58–70, in Arabic by George Haddad, Damascus.

Tatt, George. 1990. Results of research carried out in the calcareous plateau, French Archaeological Mission French Institute for the Near East working in North

Syria. *Annales Archéologiques Arabes Syriennes* 40: 183–195, in Arabic by MamoudHraitani, Damascus.
Teixidor, Javier. 1979. *The pantheon of Palmyra*. Leiden: E.J. Brill.
Warwick, Ball. 2000. *Rome in the East : The transformation of an empire*. London: Routledge
Watenpaugh, Heghnar Zeitlian. 2004. *The image of an Ottoman city: Imperial architecture and urban experience in Aleppo in the 16. And 17. Centuries*. Leiden: Brill.
Windelberg, Jens. 1998–2001. Development plan, project for the rehabilitation of the Old City of Aleppo, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), Old it y Directorate, Aleppo.

Websites

http://dgam.gov.sy
http://whc.unesco.org/en/criteria/
http://whc.unesco.org/en/statesparties/sy

Further Reading

Abdul-Hak, Sélim. 1964. The theatre and the Citadel of Bosra. *Annales Archéologiques Arabes Syriennes* 14: 5–22. DGAM, Arabic text, Damascus.
Abel, Armand. 1956. La citadelleeyyubite de BosraEski-Cham. *Annales Archéologiques Arabes Syriennes* 6: 99–125. Damascus.
Al-Bounni, Adnan, and Al-Asʿad. 1979. Palmyra: Archaeological. Historically. Tourism, Arabic text, Damascus.
Ball, Warwick. 2000. *Rome in the East : The transformation of an empire*. London: Routledge.
Burns, Ross. 2017. *Origins of the colonnaded streets in the cities of the Roman East*. Oxford: Oxford University Press.
Claire, Smith, et al. 2018. *The manipulation of social, cultural and religious values in socially mediated terrorism, religions 9, 168*. Basel: MDPI.
Flood, Finbarr Barry. 2001. The great mosque of Damascus: STudies on the making of an it y visual culture, Leiden.
Frezouls, Edmond. 1952. Les it yromains de Syrie. *Annales Archéologiques Arabes Syriennes* 2. DGAM, Damascus.
Meinecke, Michael. 1996. *Patterns of stylistic changes in Islamic architecture: Local traditions versus migrating artists*. New York: New York University Press.
Moughdad, S., S. Cerulli, and G. Gualandi. 1975. *Bosra: Ricerche siriane*. Faenza: Fratelli Lega.
Nicolle, David. 2004. *Crusader castles in the Holy Land 1097–1192*. Osceola: Oxford.
Smith, Andrew Michael. 2013. *Roman Palmyra: Identity, community, and state formation*. New York: Oxford University Press.
Sommer, Michael. 2017. *Palmyra: A history: Cities of the ancient world*. New York: Routledge.
Southern, Pat. 2008. *Empress Zenobia :Palmyra's rebel queen*. London: Continuum.
Stoneman, Richard. 1994. *Palmyra and its empire: Zenobia's revolt against Rome*. USA: University of Michigan Press.
Wilkins, Charles L. 2010. *Forging urban solidarities: Ottoman Aleppo 1640–1700*. Leiden: Brill.

World Monuments Fund (WMF)

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Introduction

World Monuments Fund (WMF), with headquarters in New York, is the leading independent organization devoted to saving important cultural heritage sites around the world. For over 45 years, working in more than 100 countries, WMF's highly skilled experts have applied proven and effective techniques to the preservation of important architectural and cultural heritage sites. Through partnerships with local communities, funders, and governments, the organization inspires an enduring commitment to stewardship for future generations. WMF projects span the history of human civilization, from the earliest known cultures to the recent past.

Key Issues/Current Debates/Future Directions/Examples

WMF's Program Areas

The organization's work encompasses five core program areas.

Cultural Legacy: WMF has a long history of protecting monuments that represent a cultural era or a particular period of artistic expression, such

as the moai of Easter Island (Charola 1994); sites in Venice, Italy (Kaley 1980); the Taj Mahal, in Agra, India; or the Qianlong Garden, in Beijing's fabled Forbidden City. These are sites of universal importance, for which the organization raises funds, brings together support, and works toward long-term, sustainable preservation. WMF's conservation work in the Qianlong Garden is undertaken in full cooperation with the Palace Museum. The project is notable not only for the fine craftsmanship of the conservators, but the program has resulted in a great flowering of opportunities strengthening the ability of conservation in the Qianlong Garden to serve as a springboard for international exchange of ideas through colloquia; specialized conservation training for specific materials; publications; and the development of an exhibition, *The Emperor's Private Paradise*, which allowed the public to understand the context of the objects created for this extraordinary imperial retreat (Berliner 2010).

Capacity Building: In addition to working on physical restoration, WMF helps local communities build the governmental, financial, and technical infrastructures needed to preserve and sustain their heritage. One of WMF's most successful capacity-building programs is at the vast temple complex of Angkor, in Cambodia, where the organization has been working for 20 years. Conservation and capacity building activities have resulted in several important publications. Most notably a monograph on Preah Khan Monastic Complex (see Coe and Stubbs 2011). For Phnom Bakheng, the oldest temple at Angkor, publications have resulted that provide site management plans, environment surveys, and artistic and historical interpretations (Chermayeff et al. 2006). Another capacity-building program is its Iraq's Cultural heritage Program, which has the aim to assist the State Board of Antiquities and Heritage in rebuilding its capacities as steward of Iraq's rich archaeological and historic heritage. This program has included several courses on site documentation, condition assessment, and site management planning organized with the Getty Conservation Institute, and continues today with the development of a web-GIS of Iraq's known cultural heritage sites (Palumbo et al. 2009). In Central and South America, WMF has promoted various capacity-building programs, centered on national conservation policies (Horton et al. 2010) or specific groups of monuments (Charola and Magadán 2009).

Advocacy: Through its advocacy programs, WMF speaks out in support of architectural and cultural heritage around the globe (Giurescu 1989; Conference Abstracts 2002; Chusid 2011; Haney et al. 2011). Its signature advocacy tool is the World Monuments Watch, a biennial list of endangered sites. Launched in 1996, the World Monuments Watch is a powerful call to global action on behalf of sites needing immediate help. Hundreds of Watch sites have been preserved or are now out of danger. Special advocacy themes have emerged from the Watch through which WMF has focused on areas that deserve increased public attention. Modernism at Risk became the vehicle through which WMF communicated to the public the increasing alarm by many that icons of twentieth century architectural and design heritage were being lost. Sustainable Tourism is another vehicle for WMF to deliver a message emphasizing the fragility of sites and the need for sensible approaches to assist the public in enjoying a wide range of cultural sites. Too often, visitors are not provided with sufficient information to understand that there can be many historic places to visit and not only the most famous sites. Sustainable Tourism encourages greater exploration of the cultural riches to be encountered around the world and ways that the visitor experience can be improved and travelers can become engaged in the preservation process.

Education and Training: WMF takes a multi-layered approach to education, promoting the exchange of information among professionals, educating the public, and training craftspeople in both lost arts and modern standards. Through site interpretation, international symposia, and field schools, such as the ones held in New Orleans in the aftermath of Hurricane Katrina, WMF helps to ensure that heritage preservation remains a vital

field. WMF has provided opportunities for high school students in Newburgh, New York, to work on a historic structure through summer field schools, but the project also became a portal to learn about the history of Newburgh, a city once famed for its role in the American Revolution. WMF facilitates graduate and postgraduate research projects, which have allowed emerging preservation professionals to work on sites as varied as the landscape connecting Lednice and Valtice estates in the Czech Republic, Horace Walpole's Strawberry Hill in the UK, the Gertrude Vanderbilt Whitney Studio in New York City, and the historic urban centers and colonial churches of the Colca Valley in Peru.

Disaster Recovery: WMF's work in disaster recovery has ranged from its response to the Venice flood over 40 years ago to its recent work in Iraq and Haiti. While it cannot plan in advance for damage wrought by natural or man-made disasters, WMF is nonetheless ready to step in wherever possible, providing rapid-response experts, damage assessments, and assistance in conservation planning and implementation. Notable among WMF's projects are the complete restoration of the Abbey of San Clemente a Casauria after the 2009 earthquake in Abruzzo, Italy; a series of missions to Haiti in 2010, following the earthquake, which led to the publication on the Gingerbread Houses of Port-au-Prince to assist homeowners and policymakers in developing alternatives to demolition (Langenbach et al. 2010); and participation in the Lower Manhattan Emergency Preservation Fund after the destruction of the World Trade Center.

WMF and Archaeology

WMF's activities span the full breadth of human artistic achievement from the earliest settlements of antiquity through the twentieth century. WMF's concern is to conserve sites of cultural merit and increase public awareness of the significance of these sites that embody cultural traditions giving special character to historic places cherished by local residents and international visitors. While WMF does not have a formal program in archaeology, nor does the organization engage in active archaeological exploration, archaeological investigation can be an essential element in the conservation process. Additionally, the presentation of archaeological sites and interpretation for the public has figured prominently in many WMF projects. These activities have ranged from the implementation of complex documentation and assessment projects to the design and installation of protective shelters, and from the development of site management plans to the creation of visitor itineraries and interpretive materials. Of special note is WMF's work at Babylon in Iraq, where WMF is working closely with the State Board of Antiquities and Heritage to complete a site management plan and conserve key architectural structures on the site. WMF is also working in Bulla Regia, Tunisia, in a complex project that involves surveys, documentation, management planning, interpretation and site presentation, conservation, and sheltering, all conducted in cooperation with the Institut National du Patrimoine of Tunisia, providing training opportunities for its staff. Documentation is an essential component of all WMF projects, which benefit from a vast array of tools and technology available in the field today.

When appropriate and feasible, 3D laser scanning has been employed as part of the documentation process at WMF project sites. At Lalibela, in Ethiopia, WMF and University of Cape Town have completed one of the largest laser scanning projects conducted on a cultural heritage site, with the resulting data now used by the architects and conservators to map conditions and develop their conservation plans. WMF has employed laser scanning at numerous sites around the world and continues to employ the technology in coordination with other documentation efforts to assure the most accurate data possible at project sites.

At the temple of Amenhotep III in Luxor, Egypt, WMF assists the mission directed by Hourig Sourouzian in an ambitious project that sees archaeological excavation and conservation proceed hand in hand to reveal and eventually reerect parts of the largest Egyptian temple known, including the colossi of the second and third pylons of the temple.

Conclusions

WMF is committed to disseminating information to professional colleagues and the interested public. WMF staff members and consultants regularly present information on projects at professional workshops, conferences, and colloquia. All WMF's publications have been digitized and made freely available on its website, www.wmf.org. Further, information on more than 300 projects and all past World Monuments Watch sites can be found on www.wmf.org.

Cross-References

- ▶ Ackerman, Lisa
- ▶ Cambodia: Cultural Heritage Management
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Outreach
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage and Archaeology
- ▶ Heritage and Higher Education
- ▶ Heritage Landscapes
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ Heritage: History and Context
- ▶ Site Visitation and Interpretation: Management
- ▶ Sustainability and Cultural Heritage

References

Berliner, N. 2010. *The emperor's private paradise: Treasures from the Forbidden City*. New Haven: Yale University Press.

Charola, A.E. 1994. *Easter Island: The heritage and its conservation*. New York: World Monuments Fund.

Charola, A.E., and M.L. Magadán, eds. 2009. *Manual básico de conservación para las Misiones Jesuíticas Guaraníes*. New York: World Monuments Fund.

Chermayeff, J.C., J. Rousakis, and J. Gilmartin, eds. 2006. *Phnom Bakheng: Workshop on public interpretation*. New York: World Monuments Fund.

Chusid, J. 2011. *Preserving the textile block at Florida Southern College*. New York: World Monuments Fund.

Coe, M.D., and J.H. Stubbs, eds. 2011. *Preah Khan monastic complex: Angkor, Cambodia*. London: Scala Publishers.

Conference Abstracts. 2002. *Heritage conservation in South America: Challenges and solutions*. New York: World Monuments Fund.

Giurescu, D. 1989. *The razing of Romania's past*. New York: World Monuments Fund.

Haney, G., J. Allen, E. Avrami, and W. Raynolds. 2011. *New Gourna village: Conservation and community*. New York: World Monuments Fund.

Horton, B.N., et al. 2010. *Lineamientos para la conservación de monumentos y sitios en Guatemala*. Guatemala: Mayab'Ja Editoras.

Kaley, D.E. 1980. *The church of the Pietà*. New York: International Fund for Monuments.

Langenbach, R., et al. 2010. *Preserving Haiti's gingerbread houses: 2010 earthquake mission report*. New York: World Monuments Fund.

Palumbo, G., N. Agnew, and D. Myers. 2009. The GCI-WMF Iraq cultural heritage conservation initiative: Building professional capacity for cultural heritage conservation and management. *Conservation and Management of Archaeological Sites* 11: 340–350.

World-Systems Analysis

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Introduction

From its beginnings, archaeology has discussed the pervasive role of regional and interregional interaction in accounting for local records of prehistoric society. Because field archaeologists are generally confined to local excavation sites, their various understandings of the nature of such supra-local connections and influences have been contested and often speculative. Postulations of migration, diffusion, and long-distance

exchange as explanations of widespread similarities in the material record have thus generated voluminous debate. Concepts such as "interaction spheres" have been resorted to as a way of acknowledging extensive areas united by exchange in prehistory but often without suggesting a specific sociocultural or institutional framework that may have generated this exchange and without identifying its consequences for the populations involved. The recognition that much prehistoric social organization was regional or even interregional in scope has prompted archaeologists to turn to social sciences such as sociology, anthropology, political science, and economic history for models of long-distance societal interaction. Following Wallerstein's (1974) proposal for a "world-system" analysis of sixteenth-century exchange in early capitalist Europe, several researchers from different disciplines have suggested that a similar model should be used to interpret archaeological indications of long-distance exchange in precapitalist societies. Wallerstein's and other such early "global" models (e.g., Ekholm and Friedman 1979) emerged from a yet earlier "dependency theory" originally articulated by Andre Gunder Frank to account for the polarization of developed and "underdeveloped" nations in the modern world. Much of the discussion regarding the use of world-system analysis in archaeology has thus predictably concerned the extent to which assumptions about social processes in the modern world can be applied to prehistoric societies.

Definition

The central argument of the world-systems approach is that the specific trajectories of local, territorially bounded, or culturally homogeneous societies will largely be the result of much wider and less easily mapped fields of interaction. In Wallerstein's (1974) study, the economic development of individual nations in sixteenth-century Europe is explained in terms of an international division of labor within and beyond Europe. For Wallerstein, this sixteenth-century world-system comprised a "core," a "periphery," and an intermediate buffer zone or "semi-periphery." The core is the main locus of capital accumulation, based on an "unequal exchange" of its manufactured products for raw materials from its impoverished periphery. This model clearly draws on Frank's use of the concepts of "metropole" and "satellite" in dependency theory. Wallerstein emphasized the trade in bulk goods such as food and fuel (with low value-to-weight ratio) in generating core-periphery polarities and suggested that trade-in "preciosities" (prestige goods or luxuries) would not in itself have such systemic effects. For this and other reasons, Wallerstein has discouraged the application of world-system models to precapitalist contexts, except when dealing with politically unified "world empires." Others, such as Schneider (1977), while seeking to promote the world-systems approach to precapitalist societies, including its emphasis on regional inequalities, argue that precapitalist "world economies" were often based precisely on the exchange of preciosities.

The exchange of exotic prestige goods controlled by social elites is indeed a familiar theme in archaeological research and often appears to be geared to regional asymmetries. Several edited collections (Rowlands et al. 1987; Champion 1989; Chase-Dunn and Hall 1991) focus on relations between "centers" and "peripheries" in ancient societies, discussing the extent to which economic, political, or cultural asymmetries can be detected in the archaeological record. Chase-Dunn and Hall distinguish between core-periphery "differentiation" and core-periphery "hierarchy," observing that not all seemingly asymmetric relations in precapitalist world-systems entail exploitation or political domination. They also propose that a world-system perspective can be applied to different kinds of supra-local interaction networks with different geographical extent, ranging from far-reaching exchanges of information and prestige goods through a more restricted zone of regular military interaction to a spatially even more circumscribed domain of bulk-goods exchange. The boundaries of such networks are conceptualized as thresholds, where the density of interactions sharply decreases. Such a wider definition of "world-

systems" would accommodate a variety of modes of long-distance interaction in prehistory, and several prominent archaeologists have adopted the term in their analyses of such interaction, both in the ancient Old World and in the pre-Columbian New World. Edited collections have appeared which discuss the relations between the "world-system" terminology and similar concepts such as "civilizations" (Sanderson 1995) and "interregional interaction" (Schortman and Urban 1992). The objection has been raised, however, that a looser, more inclusive definition of "world-system" risks making the category amorphous and analytically useless.

Key Issues

The usefulness of applying the concept of "world-system" to non-capitalist societies has been the subject of much discussion. For several of its advocates, a criterion by which a "world-system" can be identified is the occurrence of correlations between cycles of growth and decline in widely separate areas. Frank thus based his proposal of a singular Bronze Age world system spanning much of Afro-Eurasia on what he and Gills perceived as largely calibrated cycles of expansion and contraction in different parts of the Old World between 1700 BCE and CE 1700 (cf. Frank and Gills 1993). Although the details of this argument have been contested, there appears to be some agreement that several early Old World civilizations were to some extent interconnected and their trajectories sometimes calibrated (cf. Chase-Dunn and Hall 1997; Hornborg and Crumley 2007).

Several archaeologists have proposed significant modifications of the Wallersteinian "world-system" concept in order to make it applicable to prehistoric societies. Most of the advantages and problems of applying world-system analysis to archaeology are addressed in a collection edited by Kardulias (1999). Particularly problematic are questions regarding how world-systems are to be delineated in geographical space and whether long-distance interdependencies also imply interregional inequalities, hegemony, and underdevelopment. The inclusion of prestige-goods exchange networks in the category "world-systems" suggests that, in these systems, interregional polarizations of power, while often manifest, are not immediately implied by the nature of the interaction itself. Other regularities, such as the tendency of new centers of accumulation to develop on the frontiers or margins of earlier systems, contributing to their decline, appear to recur in both modern and premodern contexts. A fundamental constraint of most world-systems is the tendency of a core's capacity to control its hinterland to diminish with distance. Much as von Thünen showed already in 1826, for instance, the reason why prestige-goods exchange reaches farther than bulk-goods exchange in traditional societies is a matter of logistics and transport costs. Such dynamics have undoubtedly limited the interregional exercise of power, particularly in premodern settings (cf. Stein 1999). With various modifications and criticisms taken into account, the world-systems approach nevertheless continues to generate important transdisciplinary discussions on the prospects of writing world history over the very long term (cf. Denemark et al. 2000).

Current Debates

In recent years, the world-systems perspective has been criticized for reproducing a Eurocentric perception of people in the "periphery" as passive victims of expansion rather than as active agents negotiating their relation to the "core" in their own terms (cf. Stein 2002). While it is certainly justified to acknowledge the agency of the periphery in contributing to the particularities of core-periphery relations, it would be unfortunate if such a concession to "bottom-up" perspectives should obscure the historical incentives of colonial and imperial power centers. The world-system perspective is fundamentally materialist in that central concepts such as "unequal exchange" and "exploitation" are understood as objective, material phenomena. To be sure, cultural processes of ethnogenesis and identity formation in world-systems are as important and worthy of study as their material metabolism, but

the inequalities which polarize "cores" and "peripheries" cannot be reduced entirely to cultural or ideological constructions. The world-system approach as developed by Frank and Wallerstein is ultimately concerned with the structures of long-distance exchange which contribute to capital accumulation in the core and impoverishment in the periphery. If this model is to maintain its relevance in both modern and premodern contexts, the sense in which exchange is "unequal," "asymmetric," and "exploitative" needs to be specified. Otherwise, the model will be reducible to a tautological definition of "core" as the locus of accumulation and "accumulation" as what occurs in the core. In the modern world economy, the exchange of manufactures from the core for raw materials from the periphery implies a recursive, net transfer of productive potential (negative entropy) from the periphery and a continuous gain in purchasing power in the core. Thus defined, unequal exchange is a process of social reproduction that systematically reinforces capital accumulation in the core and relative impoverishment in the periphery. Although similar structures of exchange may have characterized a number of premodern world-systems, this should be investigated empirically for each case. There are obviously many cases where no such systematic exchange of manufactures for raw materials can be identified.

Against this background, the most urgent challenge for world-systems research is to develop analytically rigorous definitions of the processes of "capital accumulation" and "unequal exchange," which are so frequently referred to but remain conspicuously under-theorized in the world-system literature. Wallerstein's explicit references to Arghiri Emmanuel's calculations of the unequal exchange of embodied labor time suggest that labor is the metric he would resort to in a definition, but this basically Marxian framework needs to be complemented with calculations of the unequal exchange of embodied natural space, i.e., land. Although generally more or less impossible to estimate in prehistoric contexts, the flows of labor time and natural space embodied in goods and services can occasionally be reconstructed from historical and archaeological data on the metabolism of empires such as Rome or the Inca. In widening the concept of "world-system" to accommodate premodern societies, it will thus be necessary to also widen the concepts of "unequal exchange" and "capital accumulation." If the monumental architecture of imperial Rome and the agricultural terraces of the Inca can be recognized as "capital" that was as productive in their respective contexts as were textile factories in nineteenth-century Britain, it should be relevant to approximately estimate the net quantities of labor time and natural resources that were invested in their production. Such calculations would make it reasonable to posit the occurrence of "unequal exchange" and "capital accumulation" in ancient world-systems.

While perhaps feasible in the case of modern world economies and some premodern world empires, calculations of the unequal exchange of embodied labor and land would be unlikely to illuminate core-periphery asymmetries in prestige-good systems, where elites exchange exotic products that are strategically used to mobilize their local followers. An alternative approach would be to estimate discrepancies between the "catalytic" potential of different prestige goods circulated in such separate but interacting local economies, measured in terms of the labor time that they are able to mobilize, relative to the input of labor time invested in their production and transport. Such discrepancies, when related to the rates at which the different kinds of prestige goods are exchanged, should increase our understanding of the systemic logic of core-periphery asymmetries in premodern societies.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Capitalism in Archaeological Theory
- ▶ Global Archaeology
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Trade and Transport in the Ancient Mediterranean

References

Champion, T.C., ed. 1989. *Centre and periphery: Comparative studies in archaeology*. London: Routledge.

Chase-Dunn, C., and T.D. Hall, eds. 1991. *Core/periphery relations in precapitalist worlds*. Boulder: Westview Press.

Chase-Dunn, C., and T.D. Hall, eds. 1997. *Rise and demise: Comparing world-systems*. Boulder: Westview.

Denemark, R.A., J. Friedman, B.K. Gills, and G. Modelski, eds. 2000. *World system history: The social science of long-term change*. London: Routledge.

Ekholm, K., and J. Friedman. 1979. 'Capital', imperialism and exploitation in ancient world systems. In *Power and propaganda*, ed. M. Larsen, 41–58. Copenhagen: Akademisk verlag.

Frank, A.G., and B.K. Gills, eds. 1993. *The world system: Five hundred years or five thousand?* London: Routledge.

Hornborg, A., and C.L. Crumley, eds. 2007. *The world system and the earth system: Global socio-environmental change and sustainability since the Neolithic*. Walnut Creek: Left Coast Press.

Kardulias, P.N., ed. 1999. *World-systems theory in practice: Leadership, production, and exchange*. Lanham: Rowman & Littlefield.

Rowlands, M., M. Larsen, and K. Kristiansen, eds. 1987. *Centre and periphery in the ancient world*. Cambridge: Cambridge University Press.

Sanderson, S.K., ed. 1995. *Civilizations and world systems: Studying world-historical change*. Walnut Creek: AltaMira.

Schneider, J. 1977. Was there a pre-capitalist world system? *Peasant Studies* 6 (1): 20–29.

Schortman, E.M., and P.A. Urban, eds. 1992. *Resources, power, and interregional interaction*. New York: Plenum.

Stein, G.J. 1999. *Rethinking world-systems: Diasporas, colonies, and interaction in Uruk Mesopotamia*. Tucson: University of Arizona Press.

Stein, G.J. 2002. From passive periphery to active agents: Emerging perspectives in the archaeology of interregional interaction. *American Anthropologist* 104 (3): 903–916.

Wallerstein, I. 1974. *The modern world-system I: Capitalist agriculture and the origins of European world-economy in the sixteenth century*. New York: Academic.

Further Reading

Alcock, S.E., T.E. D'Altroy, K.D. Morrison, and C.M. Sinopoli, eds. 2001. *Empires: Perspectives from archaeology and history*. Cambridge: Cambridge University Press.

Blanton, R., and G. Feinman. 1984. The Mesoamerican world system. *American Anthropologist* 86: 673–682.

Chase-Dunn, C., and E.N. Anderson, eds. 2005. *The historical evolution of world-systems*. New York: Palgrave Macmillan.

Edens, C.M., and P.L. Kohl. 1993. Trade and world systems in early Bronze Age western Asia. In *Trade and exchange in prehistoric Europe*, ed. C. Scarre and F. Healy, 17–34. Oxford: Oxbow Books.

Frank, A.G. 1993. Bronze Age world system cycles. *Current Anthropology* 34 (4): 383–429.

Gosden, C. 2004. *Archaeology and colonialism: Culture contact from 5000 BC to the present*. Cambridge: Cambridge University Press.

Hall, T.D., and C. Chase-Dunn. 1993. The world-systems perspective and archaeology: Forward into the past. *Journal of Archaeological Research* 1 (2): 121–143.

Hall, T.D., P.N. Kardulias, and C. Chase-Dunn. 2011. World-systems analysis and archaeology: Continuing the dialogue. *Journal of Archaeological Research* 19 (3): 233–279.

Hornborg, A. 2011. *Global ecology and unequal exchange: Fetishism in a zero-sum world*. London: Routledge.

Kohl, P. 1987. The use and abuse of world systems theory: The case of the 'pristine' West Asian state. In *Advances in archaeological method and theory, volume 11*, ed. M. Schiffer, 1–35. New York: Academic.

Kristiansen, K. 1999. *Europe before history*. Cambridge: Cambridge University Press.

Peregrine, P.N., and G.M. Feinman, eds. 1996. *Pre-Columbian world systems*. Madison: Prehistory Press.

Shannon, T.R. 1989. *An introduction to the world-system perspective*. Boulder: Westview Press.

Sherratt, A. 1997. *Economy and society in prehistoric Europe: Changing perspectives*. Edinburgh: Edinburg University Press.

Smith, M.E., and F.F. Berdan, eds. 2003. *The postclassic Mesoamerican world*. Salt Lake City: University of Utah Press.

Worsaae, Jens Jacob Asmussen

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Basic Biographical Information

Jens Jacob Asmussen Worsaae (1821–1885) (Fig. 1) was a Danish archaeologist and museum director, who created the basis for the development of prehistoric archaeology as a scientific

Worsaae, Jens Jacob Asmussen, Fig. 1 J.J.A. Worsaae (1821–1885). (After a drawing by August Jerndorff)

discipline in the mid-nineteenth century. He was born in Vejle, Jutland, as son of the County Steward. In 1836 he came to Copenhagen and worked until 1843 as a volunteer at the Royal Museum for Nordic Antiquities under the leadership of Christian Jürgensen Thomsen. He studied law and theology at the University of Copenhagen but did not graduate. Instead he became occupied with archaeology and in 1843 came under the patronage of the Danish king Christian VIII, who urged him to write a survey of Danish prehistory. The King also contributed financially to Worsaae's travels and studies in Norway, Sweden, and Germany (1842–1845) and in the British Isles (1846–1847). In 1847 he was appointed Inspector for the Conservation of Antiquarian Monuments. He obtained the title of professor in 1855 and was the first to give lectures on prehistoric archaeology at the University of Copenhagen. In 1858 he became Inspector, from 1865 Director, of The Danish Royal Collections at Rosenborg Castle. Also in 1865, after the death of C.J. Thomsen, he became Director of the Royal Museum for Nordic Antiquities, and in 1866 Director of the Ethnographic Museum, while still being Inspector for the Conservation of Antiquarian Monuments. From 1874 to 1875, he was briefly Minister for Education and Ecclesiastical Affairs. Worsaae became a member of the Royal Danish Academy of Sciences and Letters in 1852, and he was in 1865 elected vice-president of the Royal Society of Northern Antiquaries.

Major Accomplishments

Worsaae developed early an interest in archaeology and began collecting antiquities as a schoolboy. As a young student he undertook archaeological excavations and published the results in *Antikvariske Annaler* 1838–1839 and 1840–1841. Still during his early career, he was engaged in disputes with established scholars, opposing their misinterpretations of archaeological finds as evidence of historical myths. Worsaae based his research on the work by C.J. Thomsen, who introduced the Three-Age System, dividing the time before the beginning of history in a Stone Age, a Bronze Age, and an Iron Age. He dissociated himself from the traditional antiquarian practice of collecting, emphasizing the importance to document archaeological finds in their context as well as recording the association of archaeological finds, thus introducing modern archaeological methods. In 1843 he published a survey of Danish prehistory according to the Three-Age System and with explanation of archaeological practice: *The Primeval Antiquities of Denmark*. It attracted international attention, when translated into German (1846) and English (1849). After a journey to England, Scotland, and Ireland in 1846–1847 (Jensen 2007), Worsaae in 1851 issued a book on the remains of the Danes and Norwegians in England, Scotland, and Ireland (English edition: Worsaae 1852). He continued the work by Thomsen and succeeded in subdividing the three main periods of Danish prehistory. In 1848 he was attached to the "Lejre Commission" together with the botanist J. Steenstrup and the geologist J.G. Forchammer with the purpose of investigating the shell-mounds along the ancient coastlines. The Danish word for shell-mound, *kjøkkenmødding*, has since become a loanword in many languages. Inspecting the shell-mound at Mejlgaard in Jutland in 1851, Worsaae found

simple stone artifacts different from those found in megalithic tombs. He concluded that they were older than the Neolithic and thus suggested a division of the Stone Age into an earlier and later period. Worsaae also divided the Bronze Age in an early period with inhumation and a late period with cremation burials, a division supported by stratigraphic observations during the excavations of grave mounds. His datings of the finds became known, when he published an illustrated catalogue of prehistoric artifacts in chronological order in 1854, with an updated edition in 1859 (English edition: Worsaae 1882). In 1865 he divided the Iron Age in three periods. The first one contained weapons found in bogs, like the finds from Torsbjerg in Schleswig, which he interpreted as weapon sacrifices. To the second period of the Iron Age, he referred the gold finds of the Migration Period and to the third objects from the Viking Age. He also interpreted male or female equipment from the Bronze Age such as weapons or ornaments found in bogs as votive depositions. The work by Worsaae was not only fundamental to Danish archaeology but had an impact on the development of archaeological method in general, especially in Scandinavia. Outside Scandinavia the Three-Age System became gradually accepted towards the end of the nineteenth century.

As Inspector for the Conservation of Antiquarian Monuments, Worsaae was assigned by the Danish King Frederik VII to conduct the excavations of the royal grave mounds at Jelling in 1861. His main accomplishment as responsible for the ancient monuments, however, was the implementation of a national survey. In 1873, on Worsaae's application, the Danish parliament gave an annual appropriation for a systematic inspection and documentation of prehistoric monuments in Denmark. It was carried on until 1932 by the National Museum, and the resulting register has formed the basis for later heritage administration as well as for research in ancient monuments in the country ever since.

Cross-References

▶ Thomsen, Christian Jürgensen

References

Jensen, J. 2007. *Et Archæologisk Vikingetog. J.J.A. Worsaaes rejse til England, Skotland og Irland 1846–47*. Copenhagen: The National Museum.

Worsaae, J.J.A. 1849. *The primeval antiquities of Denmark*. London: John Henry Parker.

Worsaae, J.J.A. 1852. *An account of the Danes and Norwegians in England, Scotland, and Ireland*. London: Murray.

Worsaae, J.J.A. 1882. *The industrial arts of Denmark from the earliest times to the Danish conquest of England*. South Kensington Museum art handbooks. London: Chapman and Hall.

Further Reading

Gräslund, B. 1987. *The birth of prehistoric chronology. Dating methods and dating systems in nineteenth-century Scandinavian archaeology*. Cambridge: Cambridge University Press.

Klindt-Jensen, O. 1975. *A history of Scandinavian archaeology*. London: Thames and Hudson.

Rowley-Conwy, P. 2007. From genesis to prehistory. In *The archaeological three age system and its contested reception in Denmark, Britain, and Ireland*. Oxford: Oxford University Press.

Trigger, B. 1989. *A history of archaeological thought*. Cambridge: Cambridge University Press.

Wreck Site Formation Processes

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Introduction

All terrestrial archaeological sites are, by definition, places where human agency has modified a natural environment by rearrangement (digging, building, removing, or bringing in material) and by the processes of life and death (food

production, processing, and consumption; waste disposal; making, using, and disposing of artifacts; acquiring goods from elsewhere; cultural and belief-related activities; and burial). These transforming inputs, which directly reflect human behavior and activity, are known as *cultural formation processes* or C-transforms. The environment is also constantly modified by *natural formation processes* or N-transforms. These may be cataclysmic and terminal, such as sudden burial in volcanic ash. More usually they are gradual and progressive and include the natural processes of decay and erosion, the deposition or removal of soil, the buildup of vegetation, fire, and the activities of burrowing animals.

Definition

These transforms induce changes whereby a once-functioning focus of organized human activity metamorphoses into the archaeological signatures encountered today. If the processes which brought about the changes are understood, it is possible, in theory at least, to work backwards from the observed remains and their associations to establish an understanding of the site when it was a functioning entity. Although this ideal is rarely achieved in totality, the study of a site's formation processes – how it reached the state it is in today – is the key to interpreting archaeological features of every kind (Schiffer 1987; Renfrew and Bahn 1991: 44–47).

Key Issues/Current Debates/Future Directions/Examples

Shipwrecks

Cataclysmic events which bury a site quickly, such as the entombment of Pompeii or the engulfment by sand drifts of the Neolithic village at Skara Brae in Orkney, are often the easiest formation processes to interpret, since they seal the archaeology in a tight context at a single moment, and limit subsequent re-ordering and decay. A shipwreck too is a cataclysmic deposition, but the factors which affect its formation as an archaeological site differ in several important respects from a site created by a terrestrial disaster.

In the first place a ship is a highly organized and completely mobile entity, so the location of its wreck is usually fortuitous. From the time its keel is laid, and especially from the start of its final

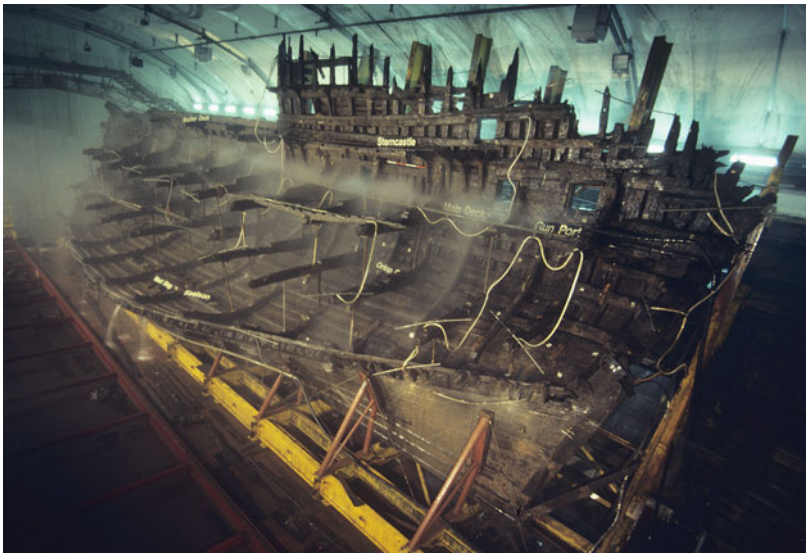

Wreck Site Formation Processes, Fig. 1 *Mary Rose* – a partially intact wreck (Colin Martin)

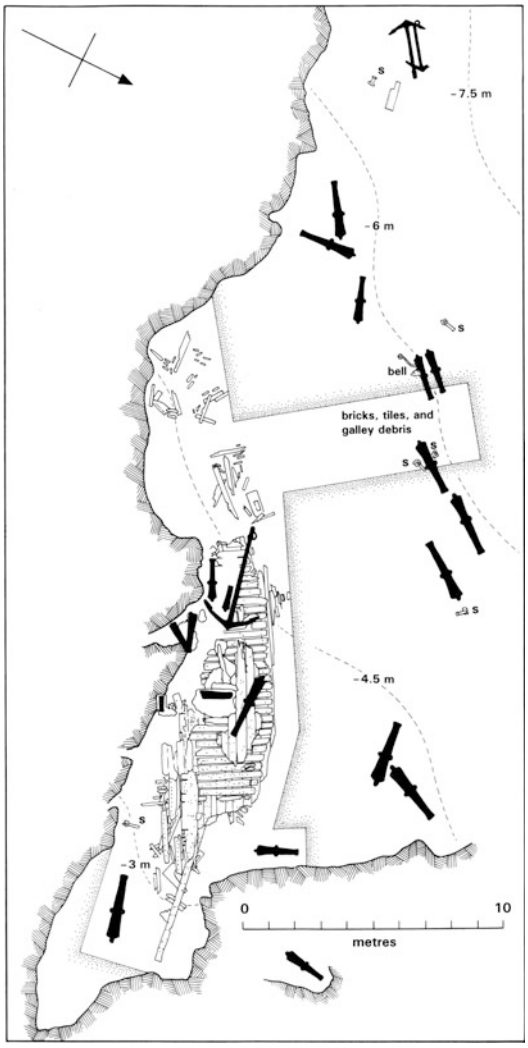

Wreck Site Formation Processes, Fig. 2 The *Dartmouth* (1690) – a continuous wreck site with discernible patterning (Colin Martin)

voyage, its ultimate fate is conditioned by C-transformation factors – how it was designed and built, how it was operated and managed, and particularly how attempts were made to avoid or mitigate the wrecking when the final disaster loomed. All these factors are the products of human input and behavior, but they are affected and modified by N-transforms, particularly the weather, currents, and the location of hazards such as lee shores or reefs.

A wrecking event can be characterized as the moment at which the organized entity represented by a vessel's structure, contents, and crew, together with its systems of propulsion, control, and management, begins an irreversible process of change in which it leaves the world of human artifice (the C-world) and reverts to nature (the N-world). This transformation is often extremely dynamic, as when a ship strikes a reef in heavy seas and disintegrates in seconds. But it may, as in the case of a hull that settles into a benign environment of soft sediments, be a gentle and gradual process. In both cases, however, the wreck will represent a massive environmental anomaly which is unstable, lacks integration with its surroundings, and is prone to further disintegration, decay, and dispersal by N-transforms. These may extract some material. Buoyant items, unless trapped, will simply float away, while other losses will accrue more slowly to abrasion, corrosion, and biological attack. Much of the surviving material will be redistributed by tides, surges, currents, and wave action that may result in the breakup of structures and the transport elsewhere of their fabric and contents. These effects are influenced by the topography, geology, and sediment regimes of the sea bed on which the wreck lies.

Once the dynamic phase of a wreck's integration with the sea bed is complete, a static or stabilized state will normally follow as the remains settle into a state of balance with their environment. This can happen quickly and perhaps with little change to the ship's original form, as when a vessel sinks into and is encapsulated in semifluid mud. On the other hand, the dynamic phase may be short-lived but so violent that much of the vessel's substance and most of its coherence is lost by the time stability is achieved. Such a formation will almost invariably be fragmentary, jumbled, and perhaps spread over a wide area. The situation may be further complicated if the wrecked ship, or parts of it, is transported by wind or current while breaking up. This can create a linear scatter of objects and sub-formations, each perhaps further dispersed by secondary

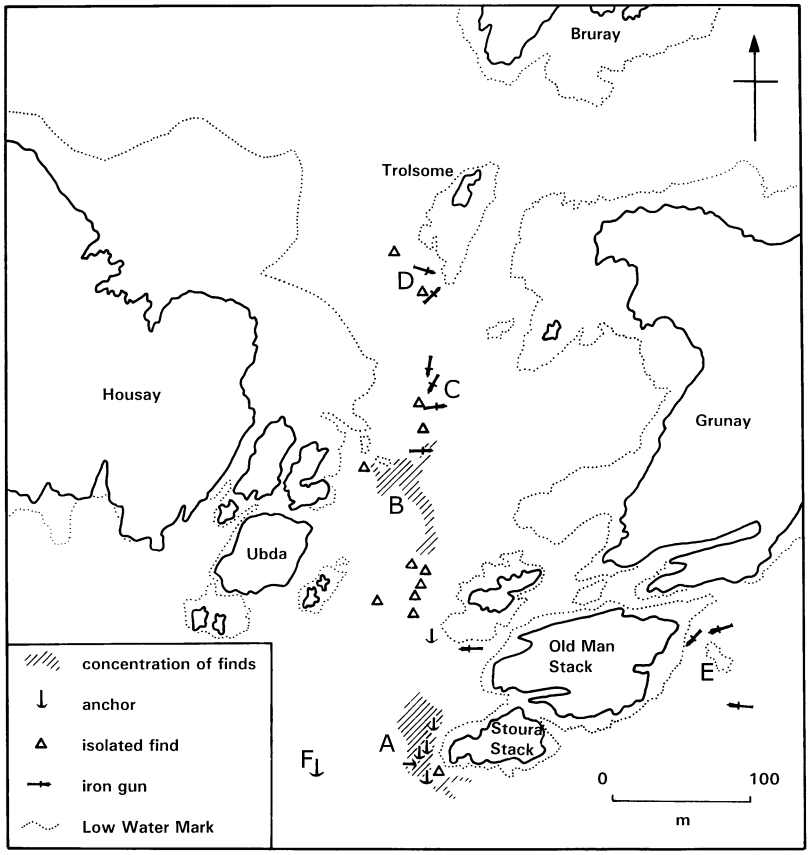

Wreck Site Formation Processes, Fig. 3 The *Kennemerland* (1664) – a discontinuous wreck with little discernible patterning. (Colin Martin, adapted from Muckelroy 1978: 173)

actions, spread along the axis of the wreck's trail of destruction.

The circumstances of a shipwreck and the attendant environmental inputs determine its eventual characteristics as an archaeological site formation. At one end of the scale, a vessel may survive almost intact, with its contents more or less complete and in situ, as, for example, the *Mary Rose*, which sank near Portsmouth, England, during an engagement with the French in 1545. At the other extreme a ship may be so broken up and dispersed, and its component parts so reduced by mechanical, chemical, and biological degradation, that it effectively ceases to exist (Figs. 1, 2, 3, and 4).

No two wreck formations are the same, since the complex and interacting variables that constitute the environmental setting, the nature of the ship, and the circumstances of its loss will combine to create a set of attributes unique to each site. Levels of archaeological survival can therefore range from almost intact to virtually extinct. Most wrecks, however, lie between these two extremes and may be categorized either as "continuous" (sufficiently coherent to allow a degree of reconstruction to be attempted) or "discontinuous" (too scrambled for meaningful conclusions to be drawn) (Muckelroy 1978: 182–214). But a fuller understanding of formation processes will reduce the size of the latter category, for there is an

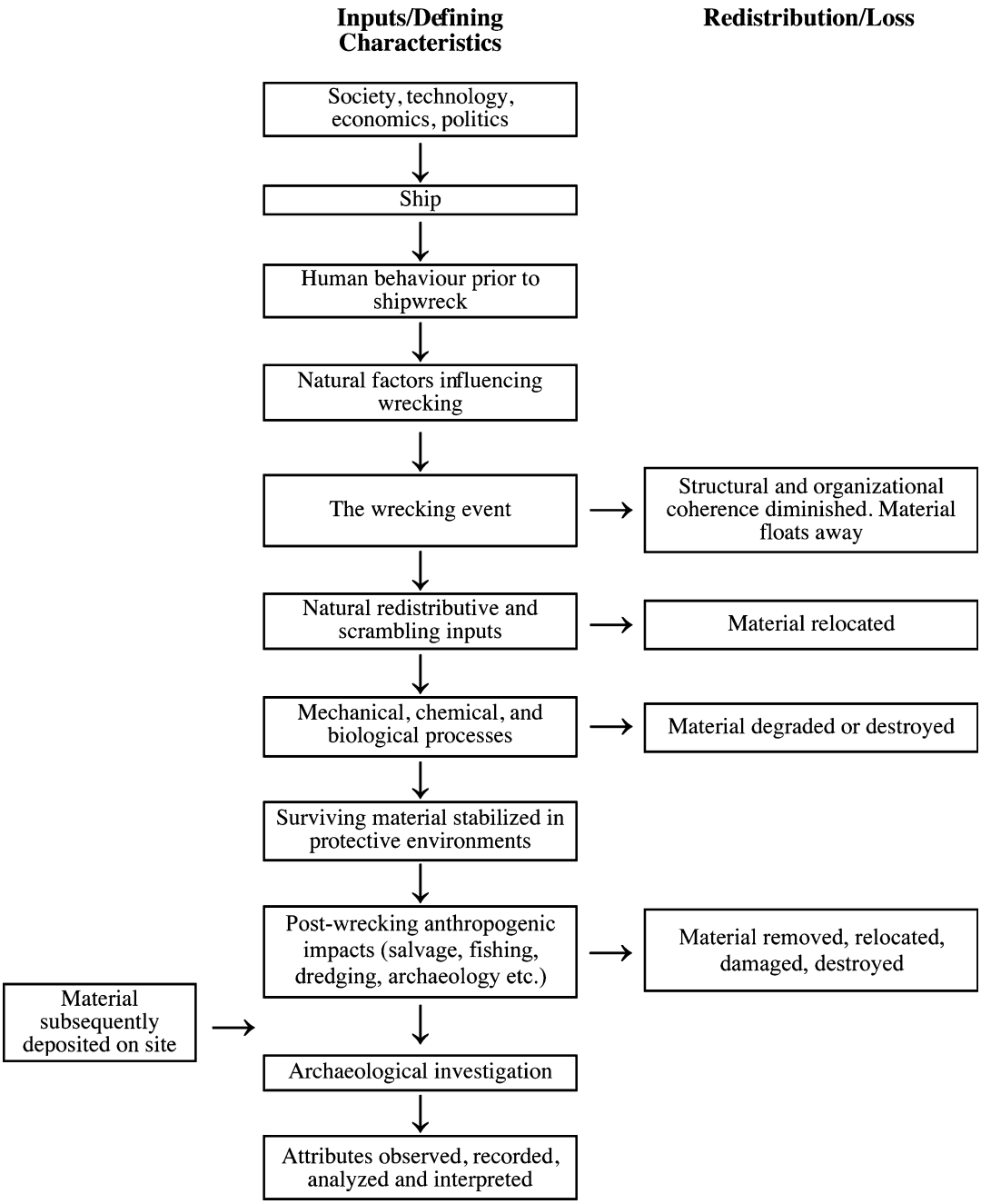

Wreck Site Formation Processes, Fig. 4 Flow diagram of wreck site formation processes. (Colin Martin, adapted from Muckelroy 1978: 158)

ultimate logic to the dispersal patterns of every wreck.

Cross-References

- ▶ Muckelroy, Keith (Underwater and Maritime Archaeology)
- ▶ Site Formation Processes
- ▶ Underwater Archaeology

References

Gibbs, M. 2006. Cultural site formation processes in maritime archaeology. *International Journal of Nautical Archaeology* 35 (1): 4–19.

Martin, C. 2011. Wreck site formation processes. In *The Oxford handbook of maritime archaeology*, ed. A. Catsambis, B. Ford, and D.L. Hamilton, 47–67. Oxford/New York: Oxford University Press.

Muckelroy, K. 1978. *Maritime archaeology*. Cambridge: Cambridge University Press.

Renfrew, C., and P. Bahn. 1991. *Archaeology: Theories, methods, and practice*. London: Thames and Hudson.

Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Albuquerque: University of New Mexico Press.

Writing Archaeological Fiction

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Introduction and Definition

The archaeologist has become a mainstay of popular fiction, indeed almost a cliché. The learned professor, aspiring student, hard-bitten field professional, and "bookish" laboratory technician have all become stereotypes, easily incorporated into a narrative whose ultimate goal, at least in film, is generally light entertainment. More serious treatments are typically literary, but both reflect the degree to which archaeology has assumed a role in the public consciousness as a glamor profession. For the diligent writer of archaeological fiction, the challenge is to bring integrity to a field easily trivialized.

Key Issues/Examples

No inventory of archaeological fiction could ever be complete, and such a survey is beyond the purview of this essay, but some examples deserve emphasis. The reader of classic fiction is well-served, and though the field has not been extensively explored, some seminal examples are readily accessible. Thomas (1976) surveyed high points in the British creative literature (1880s–mid-1970s) and asked how well the reader was really served by writers' understanding, attention to detail, or indeed respect for the field – generally not well. Similarly, Holtorf (2014) examined the public face of archaeology and the popular tropes to which the field has been welded – adventurer, detective, revealer, and caretaker.

Early writers cared little for the practical realities of the work, often a single individual would be cited as carrying out extensive excavation unassisted (Thomas 1976: 310), while the niceties of meticulous recording to place discoveries in usable context are also glossed over or ignored. Such an approach plays to the drama of the moment, in which the archaeology is background only, and this mechanism remains in force today: science is subservient to storytelling, obliging the writer to manage affairs skillfully if he or she is to both create marketable fiction and do the science justice.

Literature

In the twentieth century, archaeology blossomed in the public consciousness, both as an individual field and as the informative underpinning for creative endeavors such as the historical novel. That it has almost become its own genre can easily be judged by market research: at time of writing, the online book market Goodreads lists 79 titles under "Best Archaeology Thriller Books," and 133 as

"Popular Archaeological Fiction Books." Best-selling names like Dan Brown, Jack McDevitt, and Clive Cussler are high in the mix – though only the latter is recognized as having particularly relevant experience in the form of his creation of the real-life NUMA organization (based on his fictional equivalent, for the preservation of US maritime history through underwater archaeology) and his featuring of real scientific figures in fictional contexts. That archaeological fiction now carries the expectation of credibility may be seen in the review of fiction alongside technical and academic volumes by some journals (e.g., *Public Archaeology*).

To discuss just a few highly contrasting examples, one might consider Wilbur Smith's remarkable, experimental 1972 novel *The Sunbird*, actually two novels in one. The ancient land of Ophir is believed to have existed – as witnessed by its mention in ancient texts and exemplified by the 1946 Tel Qasile (Tel Aviv) pottery shard (e.g., Berlyn 2006; Kitchen 1989) on which is inscribed in Paleo-Hebrew script assigned to the eight century BC a receipt, to someone named Beth-Horon, for 30 shekels' worth of gold imported from Ophir. Its location remains unknown to science, though best guesses place it anywhere between southern Arabia and India. Smith placed it on the Atlantic coast of Africa, north of the Namib Desert (Phoenician fleets journeyed as far west as Spain and are thought to have explored the Atlantic margins of Iberia and Morocco (e.g., Harden 1948; Pearce 1980), so continuing southward for gold is not beyond reasonable artistic license). The first novel describes the archaeologists finding the lost kingdom and excavating evidence of what seemed to be the last stand of its people before its final destruction, while the second dramatized the ancient events based on the modern interpretation. The scientists discovered themselves the reincarnation of the ancient king and high priest too, always a good literary method of tying timeframes together. The visual metaphors of the cover of the 1984 Pan edition could not be more explicit; machine guns go so well with treasure and ancient ruins: it seems most popular archaeologists, especially on film, are usually heavily armed.

A second example might be *The First Americans* by Kathleen O'Neal Gear and W. Michael Gear, archaeologists of note, whose multivolume saga of the indigenous peoples of North America from the Stone Age to immediate pre-Columbian times are bestsellers. They have another series set among the Anasazi culture, combining the mystery genre. At time of writing, they have co-written 37 novels, with more on the way, including those individually authored. A sharp distinction may be made between such work and the traditional historical genre because history is defined as that which derives from documentary sources passed down from earlier times, while the first Americans northward from Mexico were largely (though not universally) nonliterate peoples whose antiquity has, to significant extent, become apparent through archaeology. In this sense, Romano-Celtic narratives *might* be regarded as near historical because Roman documentation is ever the starting point, but when putting flesh on the bones of nonliterate cultures, revealed in part or entirety through contemporary science, the definition of historical must, perforce, be shed. It becomes its own subgenre – the term "archaeo-historical" would seem appropriate.

Finally, straddling the line between historical and archaeo-historical, one might consider novels of Ancient Egypt, a popular genre in its own right, from Pauline Gedge's *Child of the Morning* and *The Oasis* to the works of Paul Doherty and Michael Asher. Elizabeth Peters' long-running *Amelia Peabody* series combines sleuthing with science in Agatha Christie's Egypt – a winning combination of genres. Christian Jacq's extensive writings, including the mutlimillion copy best-selling *Ramses* pentalogy, have captured public imagination, which is unfortunate in the sense that Jacq, despite being a Sorbonne-trained Egyptologist, chose to write romantic fiction rather than historical. That he knew the audience he was writing to is demonstrated by his success, however, it quickly becomes apparent that his Ancient Egypt is almost painfully "sanitized" for appeal to modern sensibilities.

A strong case can be made for archaeology being an invaluable tool for writers of "speculative fiction" – science fiction and fantasy. Thomas

(1976: 316) appreciated this. That the field informs fantasy – provides scenarios, fleshes out details, and generates and supports the great model of human descent from earlier ages so richly used by many fantasists – is undeniable. The "golden age" fantasists of the 1920s and 1930s – Robert E. Howard, H. P. Lovecraft, Clarke Ashton Smith, August Derlith, and others – developed worlds made at least metaphorically real by the discoveries taking place in Egypt, Mesopotamia, Mesoamerica, and elsewhere, filled with cyclopean ruins and unknown or legendary peoples given reality through the implicit notion that their scientific provenance had simply not yet occurred. In this sense, the products of archaeology, both artefactual and theoretical, underpin even the wildest speculations and excursions into the supernatural. Unfortunately, few writers are able to bring to bare the technical knowledge to flesh out their worlds with scientifically consistent and compelling detail. Though this is artistically unnecessary, real compulsion to the discerning reader may well lie in the details. Reiss (2015) points out: "Getting things wrong doesn't necessarily matter. But getting things *right*, even just one or two small things right, can convey an authenticity that will carry the weight of any number of wrong assumptions."

However profoundly archaeology informs fantasy, the science itself can be seen as a subgenre – of adventure or romantic fiction – while inviting the reader educationally into its own inner workings. Adrien Praetzellis has penned novels which neatly bridge the gap between fact and fiction; the 2003 *Death by Theory* and its 2011 sequel *Dug to Death* constitute useful beginners' guides to theory and method in the form of an engaging fictional narrative. Likewise, Sarah Milledge Nelson's novels of ancient Asia (e.g., *Spirit Bird Journey* and *Jade Dragon*, both published in 2009) are extrapolations of little-known epochs based on the evidence to hand. In the former, her protagonist visits the era in question in dream, allowing the reader to encounter as a living culture the society investigated scientifically in the balance of the text. Such works are distinct from the Gears' historico-archaeological approach and Jacq's romanticism by archaeology itself being a functional component of the narrative.

Film and Television

The popularity of archaeology as a storytelling medium in the last 40 years may with some confidence be laid at the feet of Hollywood. Paramount's 1981 release Raiders of the Lost Ark in one stroke defined and condemned a genre, for science was subserviated to adventure from the outset and the supernatural was thematically emphasized. The archaeologist as an archetype became a heavily armed man of action, the irony in this being that Indiana Jones is acknowledged as being based, not on any member of the archaeological profession but on the great American paleontologist Roy Chapman Andrews who led pioneering expeditions to Mongolia in the 1930s. "The man in the hat" has become a cliché of modern entertainment yet, contradictorily, remains the only figure of the genre to state explicitly what the field is or is not and to cite proper research procedure and theory (Kobialka 2017: 214). Gladstone (2014) defends Dr. Jones as being, far from a *bad archaeologist* by modern standards, a *good adventurer* by the traditional expectations of the era in which he was trained.

The Mummy films hung glamor and supernatural horror on a historico-archaeological context, something both the *Tomb Raider* games, films, and comics and the *Relic Hunter* TV series embody in modern times. To offer a polarized example, BBC's 20-season nonfiction *Time Team* did much to popularize the science, and while its appeal has been to the benefit of the field overall, many archaeologists wince at the haste and sometimes unavoidably destructive methods (e.g., mechanical excavation) employed.

Comics

The field of graphic narrative offers a unique balance between written and filmic media, and comics have exploited archaeological knowledge to depict a variety of narratives in historical and

fantasy contexts. Eric Shanower's *Age of Bronze* is a highly regarded example, telling the story of the Trojan War in a classic, un-sensationalized style of black and white line art. Frank Miller's *300* began life as a comic before being filmed, and here archaeological detail of fifth-century BC Greece was idealized into a fantasy context, though the depiction of Sparta and the daily life of the period was commendable. *Heros the Spartan* is the highly acclaimed comic strip penned by Tom Tully and illustrated by Frank Bellamy, for the British comic *Eagle* from 1962 onward, and remains remarkable for its graphic detail. In the UK, Pat Mills' *Slaine* has run nearly 40 years in the weekly *2000 AD* and, while telling Celtic adventures in high fantasy mode, is perhaps unique in the degree to which archaeological relics are depicted. Mr. Mills, whom this writer had the pleasure of interviewing in 1999, would often direct his artists concerning the antiquities he wished to appear, supplying them with pages from textbooks to guide the art.

The Writer's Approach

To write archaeologically one must perforce know the field. Journals and textbooks are the province of the specialist with adequate time. Fagan (2006) provides an entertaining framework for the aspiring writer of nonfiction to suit the voracious public appetite for engaging narratives, both about practical scientific work and the projected pasts based thereon. Praetzellis and Praetzellis (2015), however, approach the fictional sphere in their enacted narratives, seeking reconstructed humanistic meaning from raw data as a culmination of the interpretive phase. This process transposes information from fact to fiction to illuminate it for layman and specialist alike. This is as close to a formalized approach as one might find yet is likely too restrictive for most casual writers.

The writer who seeks to use archaeology as a background for drama must first ask for what market the work is intended. On the evidence of many financially successful book, film, or television series, if the goal is to tell an adventure, romance, or fantasy, then the quality of the archaeological detail is unlikely to be a factor in an editor's decision. Story, characterization, pacing, and engagement are the paramount qualities, and only when they have been satisfied will the nature of the scientific background apply.

On the other hand, if the marketplace is literary drama, more diligence may be required (though, it must be acknowledged, not necessarily). If the ambition is to produce a work of dignity and credibility, the quality of research then becomes a hallmark and selling point. As the traditional historical novel is expected to accurately reflect the current state of research into any given period, and the literary crime novel should properly relate police and legal procedure, the archaeological work may be expected to do appropriate justice to its field. Even so, all the rules of fiction apply, be they pacing, characterization, narrative/dialogue balance, expositional limitations, etc.; the technical background cannot swamp the characters and events which actually comprise stories.

Among the dos and don'ts are some obvious ones – don't rehash clichés, stereotypes, and classics; they come dangerously near to "fan fiction" and will not impress editors. As the number of would-be fantasy writers who to this day can only repackage Tolkien is legion, so would editors be disinclined to look favorably on adventure writers locked too firmly into the Indiana Jones or Lara Croft tropes and much less so the writer of literary fiction. Likewise, mapping the present day too literally onto the past in terms of familiar behaviors, attitudes, and imperatives, to facilitate reader comfort, is both a scientific sin and counter-educational in terms of the substance of any work.

The most important *do* any working archaeologist would cite can only be research accuracy. Presenting the reader with properly reported facts, reasonably interpreted, opens the field to drama on a solid basis of credibility, and this may be assigned to the practice of due diligence. In reference to the act of recreating past times as experiential entertainment, Holtorf (2017: 6) said: "The past does not have to be genuine in the sense that it once 'really' happened, but it needs to be credible as an authentic experience about a past that *could* have happened."

Reasonable speculation is also a prime ingredient of creativity. For instance, the supernatural may be a theme in any context, but the supernatural *as tangible reality* belongs in the adventure and fantasy fields, while academic analysis of past cultures' taboos, spirituality, and cultic practices, embracing the supernatural, is legitimate fodder for the most dignified of tracts. The difference is in the treatment – the pulp writer may have the long-dead spirit rise to object in person to its tomb being violated; the literary author derives drama from perhaps a black market trade in the antiquities in question.

Purpose and Meaning

From an epistemological standpoint, archaeology is complicated by its own nature – secondary observation and deduction, rather than primary observation. Doubt may always be encountered in the constructions placed upon the material remains of other times, and interpretive philosophies (epistemological idealism, positivism, and realism) have been constructed to make sense of data (Trigger 1998). Petersson and Holtorf (2017) cast the very practice of projecting our thoughts upon other times in a fresh light. Their model offers the possibility that every writer engages in a fundamental projection of potential alternate reality when they create fiction – that all stories have an independent existence which carries its own credibility and integrity. They posit that absolute historical accuracy – divorced from modern context and perceptions – is impossible and for the purpose of entertainment unnecessary: any story is a melange of elements which speak to the viewer and carry meaning in the viewer's present lived reality. In different words and context, Praetzellis and Praetzellis (2015: 125) acknowledge the same difficulties and possibilities.

If this is the case, a narrative expressing an internally consistent world view, and which is constructed with integrity, taking into account a range of factors (economic, social, spiritual, geographic, technological) may take on compelling realism and "live" in the mind of the reader. If this world serves not only to entertain and divert but to challenge the reader to think at greater depth or indeed about our conceptions of past times revealed by science, it may be deemed a success.

The public's fascination with archaeology seems perennial. It may be the identification with glamor (which many a field worker would roundly reject), the remote regions to which the profession takes its workers (though camp conditions are rarely up to tourist standard), or perhaps a fundamental fascination with being able to, literally, dig up anything from secrets to treasure. The fact that this is not what archaeology is actually about is beside the point – as Holtorf (2007, *cited in* Kobialka 2017: 213) pointed out, a recent survey found the best-known archaeologists in the world are Indiana Jones and Lara Croft. The potential frustration for professionals inherent in this cannot be underestimated; thus it is perhaps the duty of the writer of archaeological fiction to repay something of that debt – do the field justice, with respect, while preserving at least a hint of the wide-eyed delight with which students encounter the larger world of their dreams.

This is more or less Thomas's (1976: 318) position that the field is still waiting for the great archaeological novel, but it *may* have to write it itself. His closing remark offers a delicious irony; he said that unless archaeology brought forth a novelist capable of doing the field the justice it deserves *from within*, who knows what "travesties" would come from without. In the 40 plus years since this remark was penned, archaeologists have indeed accepted the challenge – the abovementioned Nelson, Praetzellis, and Gear and Gear among them – though whether any have fulfilled the dream quite as Thomas meant it remains open to debate. The irony, however, is that *Raiders of the Lost Ark* was released just 5 years after Thomas' comment. Hollywood may be depended upon to fill *any* void.

Cross-References

- ▶ Film, Archaeology In
- ▶ Media and Archaeology
- ▶ Popular Culture and Archaeology
- ▶ Television and Archaeology: Views from the UK and Beyond

References

Berlyn, P. 2006. The biblical view of Tyre. *Jewish Bible Quarterly* 34 (2): 73–82.
Fagan, B. 2006. *Writing archaeology: Telling stories about the past.* Walnut Creek: Left Coast Press.
Gladstone, M. 2014 In Defence of Indiana Jones, archaeologist Tor.com, https://www.tor.com/2014/11/17/in-defense-of-indiana-jones-archaeology/
Goodreads. https://www.goodreads.com/shelf/show/archaeological-fiction
Harden, D.B. 1948. The Phoenicians on the west coast of Africa. *Antiquity* 22 (87): 141–150.
Holtorf, C. 2014. *Archaeology is a brand! The meaning of archaeology in contemporary popular culture*. Abingdon: Taylor and Francis.
Holtorf, C. 2017. Introduction, the meaning of time travel. In *The archaeology of time-travel*, ed. B. Petersson and C. Holtorf, 1–22. Oxford: Archaeopress.
Kitchen, K.A. 1989. Where did Solomon's gold go? *BAR* 15 (3): 30–31 34.
Kobialka, D. 2017. A cup of decaf past, an archaeology of time travel, cinema and consumption. In *The archaeology of time-travel*, ed. B. Petersson and C. Holtorf, 213–228. Oxford: Archaeopress.
Pearce, A.F. 1980. Early observations and historical notes on the Aghulas current circulation. *Transactions of the Royal Society of South Africa* 44 (2): 205–212.
Petersson, B., and C. Holtorf. 2017. Introduction, the meaning of time travel. In *The Archaeology of time-travel*. Oxford: Archaeopress.
Praetzellis, M., and A. Praetzellis. 2015. Archaeologists as storytellers: The docudrama. In *Subjects and narratives in archaeology*, ed. R.M. Van Dyke and R. Burnbeck, 123–144. Boulder: University Press of Collorado.
Reiss, A.S. 2015. Getting the archaeology right in fantasy fiction. Tor.com https://www.tor.com/2015/09/23/getting-the-archaeology-right-in-fantasy-fiction/
Thomas, C. 1976. The archaeologist in creative fiction. In *To illustrate the monuments, essays on archaeology presented to Stuart Piggott on the occasion of his sixty-fifth birthday*, ed. J.V.S. Megaw, 309–319. London: Thames and Hudson.
Trigger, B.G. 1998. Archaeology and epistemology: Dialoguing across the Darwinian chasm. *American Journal of Archaeology* 102 (1): 1–34.

Further Reading

Archaeology in Cinema

Ascherson, N. 2004. Archaeology and the British media. In *Public archaeology*, ed. N. Merriman, 145–158. London: Routledge.
Fagan, G. 2006. Diagnosing pseudoarchaeology. In *Archaeological fantasies: How pseudoarchaeology misrepresents the past and misleads the public*, ed. G. Fagan, 23–46. London: Routledge.
Fowler, P. 2007. Not archaeology and the media. In *Archaeology and the media*, ed. T. Clark and M. Brittain, 89–107. Walnut Creek: Left Coast Press.
Jordan, P. 1981. Archaeology and television. In *Antiquity and man. Essays in honour of Glyn Daniel*, ed. I. Evans, B. Cunliffe, and C. Renfrew, 207–213. London: Thames and Hudson.
Schablitsky, M., ed. 2007. *Box office archaeology: Refining Hollywood's portrayals of the past*. Walnut Creek: Left Coast Press.
Van Dyke, R.M., and R. Burnbeck, eds. 2015. *Subjects and narratives in archaeology*. Boulder: University Press of Colorado.

Wu, Rukang

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Basic Biographical Information

Born in Wujin County, Changzhou Municipality, Jiangsu Province, eastern China, Rukang Wu (also known as Woo Ju-Kang before 1967) received a B.A. from the National Central University (then at Chongqing) in 1940. After graduation, he worked with Dingliang Wu (1894–1969) (also known as Woo Ting-Lian before 1967) in the section of Anthropology of the National Research Institute of History and Philology, Academia Sinica (then at Kunming, Yunnan Province), where they conducted studies on extant human skeleton and a number of field survey on different ethnic groups in Guizhou Province. In 1941, he published his first scientific article in a journal of Academia Sinica, the study of axes and the atlas of modern Chinese. Near the end of 1946, Rukang Wu left for the United States where he earned a doctoral degree under the supervision of Mildred Trotter at the Washington University Medical School in St. Louis, Missouri. He spent the summer of 1948 studying paleoanthropology under the direction of T. Dale Stewart at the National Museum of Natural History, Smithsonian

Institution, Washington, DC. In the autumn of 1949, Wu returned to China and began to work at the Dalian Medical College as the head of the Department of Anatomy. In 1956, he moved to the Laboratory of Vertebrate Paleontology (now the Institute of Vertebrate Paleontology and Paleoanthropology), Chinese Academy of Sciences, where he has made the first study of nearly all human fossils found in China between 1949 and 1966.

Major Accomplishments

During Rukang Wu's tenure at the Institute of Vertebrate Paleontology and Paleoanthropology, he studied human fossils of Middle Pleistocene origin, including Zhoukoudian, Maba, Chenjiawo, Gongwangling, Yunxian, Xichuan, Hexian, and Jinniushan, and of Late Pleistocene origin, including Ziyang, Dingcun, Salawusu, Liujiang, and Jianping.

Rukang Wu also studied *Gigantopithecus* from Daxing and Liucheng in detail, as well as *Dryopithecus* teeth from Kaiyuan. In the late 1970s, he organized a comprehensive study of the Zhoukoudian site. The result of this work provided a series of chronometric data for the different strata of the deposits in the cave and showed that *Homo erectus* had probably occupied the site for at least 200 kiloyear.

During the 1980s, he and colleagues excavated at Shihuiba, Lufeng, Yunnan Province, and found a lot of hominoid fossils. Initially, they divided the assemblage into two genera: *Sivapithecus and Ramapithecus*. In 1987, he proposed a new genus, *Lufengpithecus*, to represent all hominoid fossils from this site. This new genus is generally accepted by the international community.

During the 1960s, Rukang Wu proposed that the unique characters of true humans are not formed altogether in a short period. Instead, these characters appeared at different times in a long transition period from ancient apes toward humans. Erect bipedal walking and the ability of manufacturing tools marked the beginning and termination of this transition period, respectively. The enlarging of the brain and the development of language and consciousness and society were forming gradually during this transition period. He introduced the term "neoanthropology" to embrace all of the subfields studying the variation and changes of physical characteristics of modern humans as a whole.

In 1982, he founded the journal, Acta Anthropologica Sinica, which is the only journal dealing with paleoanthropology and physical anthropology in China. He is a member of the Chinese Academy of Sciences and was the honorary president of the Chinese Association of Anatomical Sciences.

Cross-References

▶ East Asia: Early *Homo* Fossil Records
▶ *Homo erectus*
▶ Zhoukoudian, Archaeology of

Further Reading

Li, L. 2004. *Biography of Wu Rukang*. Shanghai: Shanghai Scientific and Technological Education Publishing House.

Wu, X. 2010. Wu Rukang. In *Outstanding persons of Chinese Academy of Sciences*, ed. W. Qianjin and H. Yanhong, 546–549. Beijing: Science Press.

Wylie, Alison

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Basic Biographical Information

Alison Wylie (Fig. 1) is an internationally known feminist philosopher of science and a leader in the philosophy of archaeology. A Canadian by birth, Wylie became acquainted with field archaeology during early childhood. Both of her parents were long-time avocational archaeologists who worked

Wylie, Alison, Fig. 1 Alison Wylie

as volunteers for projects in England as well as in Canada.

Wylie received a B.A. Honours (with Distinction in Philosophy and Sociology) from Mount Allison College in 1976. As an undergraduate, she gained fieldwork experience at Fort Walsh, a nineteenth-century Northwest Mounted Police post, and the Fortress of Louisbourg. She also took a history and philosophy of science course where she encountered the work of Merrilee Salmon and used it in a term paper on the possibility of a Kuhnian revolution in contemporary archaeology. In the fall of 1976, Wylie enrolled in the graduate program in the History and Philosophy of the Social and Behavioral Sciences at the State University of New York at Binghamton. She met and worked with several young archaeologists in the Department of Anthropology, notably Charles Redman, Margaret Conkey, and John Fritz, who were enthusiastic advocates of the New (or Processualist) Archaeology. She spent the summer of 1977 at Grasshopper, the University of Arizona's field school. Wylie completed her M.A. in Anthropology (1979) and a Ph.D. in Philosophy (1982). Her dissertation, focusing on positivism and the New Archaeology, was written under the direction of the realist philosopher Rom Haré and advised by Redman.

Wylie was hired as an Assistant Professor at the University of Western Ontario in 1985, where she was promoted to Associate Professor (1989–1993) and then Professor (1993–1998). In 1998, she moved to Washington University at St. Louis to take the position in Philosophy and the Program for Social Thought and Analysis. In 2003, she joined the faculties of the Department of Women's Studies at Columbia University and the Department of Philosophy at Barnard College. She is curre ntly Professor of Philosophy at the University of Washington in Seattle (2005–). She is the founder and coordinator of the Science Studies Network at the University of Washington and director of Biological Futures in a Globalized World, a project designed to foster the development of an integrated research ethics curriculum. She has held numerous visiting appointments including those at the Center for Advanced Study in the Behavioral Sciences (1995–1996) and the Clayman Institute for Gender Research (2005–2006) at Stanford; the University of Denver (1995); the University of California, Berkeley (1990–1992), Columbia University, and New York University (2001–2002); the École des hautes études en sciences sociales in Paris (2003), Reading University (2010), and Durham University (2012–2013).

Major Accomplishments

Wylie's primary research focus in archaeology is on archaeological inference; that is, how archaeologists derive interpretations of past times and places from limited knowledge of an intrinsically highly incomplete body of evidence – the archaeological record – and how they support their claims to knowledge of those times and places. One of Wylie's earliest contributions was her essay in Ian Hodder's book *Symbolic and Structural Archaeology* (Wylie 1982a), which provided epistemological support for structural archaeology. She showed that the most promising of the new structural perspectives exploited methodological approaches that were scientific and testable.

Wylie has made major contributions to the application of analogical reasoning in archaeology. She intervened in the debate between Patty Jo Watson and Richard Gould concluding that Gould's arguments against analogy were

themselves analogical (Wylie 1982b). She reviewed the arguments against analogy offered by some New Archaeologists concluding that analogy is not categorically flawed, but it can be misused (Wylie 1985, 1988). The key is to work on both the source side and subject side of the analogy in order to secure it more strongly. She has also proposed an influential model of interpretation that involves a dialectical tacking between experience-near concepts and experience-distant concepts (Wylie 1989). This latter model was inspired by Clifford Geertz and his interpretive anthropology.

Wylie was an early exponent of the archaeology of gender. She participated in the famous conference organized by Joan Gero and Margaret Conkey at the University of South Carolina's Wedge Plantation. Her contribution was to review the delay of an archaeology of gender (given its significance in the other social sciences) and evaluate its prospects for the future (Wylie 1991). She concluded that archaeology can benefit from the established traditions of gender research and that gender studies can benefit from archaeology because only archaeology can begin to answer questions about long-term evolution and diversity of the sex/gender system. She followed this with a series of influential publications arguing that feminist approaches, among other critical perspectives, may well enhance the conceptual integrity and empirical adequacy of archaeological knowledge claims (e.g., Wylie 1992).

Wylie has also interrogated the idea of objectivity in science and its implications for both feminism and feminist archaeology. She argues that the thesis that theories are culturally constructed does not necessarily entail epistemic relativism, where anything goes. Rather, she advocates a perspective she calls "mitigated objectivity." In this case, multiple lines of evidence drawn from the natural and social sciences are mutually constrained when they converge, or alternatively fail to converge, upon a particular interpretive account (Wylie 2000). This perspective is broadly consistent with standpoint theory in feminist science. Knowledge is understood to be situated with respect to particular experiences and social values. Wylie (2003: 40) explains that the question of what standpoints make a difference cannot be settled in the abstract, but instead requires an investigation of problem-specific practices of knowledge production.

She is equally concerned with the sociopolitical contexts of archaeology as a discipline and of individual archaeologists working in diverse economic, political, and social settings internationally. She is frequently consulted on ethical issues in contemporary archaeology (Lynott and Wylie 2000; Wylie 2003). Her recent book, *Thinking from Things* (Wylie 2002), is a set of essays describing and discussing her philosophical engagement with archaeological theory and practice from the 1970s to the 2000s, a period of great change for global archaeology. Hence, it is a significant contribution to the intellectual history of archaeology in the late twentieth century.

During the past 30 years, several philosophers of science have displayed passing interest in archaeology, but Alison Wylie is the only one with substantial experience not only in field archaeology but also in writing archaeological reports. She is familiar with documentation of archaeological finds during excavation and with the inferential processes employed by archaeologists as they describe, analyze, and interpret their finds. She is widely known because of her publications in archaeological journals and her vigorous participation in professional gatherings of archaeologists. Her publications provide well-informed analyses of archaeological procedures in the field, in the lab, and in the ensuing reports by a long-term participant observer who is a professional philosopher of science. She is often asked to serve as consultant to archaeological projects and to help form policy for archaeological groups in various parts of the world. For all these reasons, Wylie occupies a well-deserved position as intellectual guide and counselor to the global archaeological community.

Cross-References

- ► American Anthropological Association (AAA) and Ethics
- ► Communicating Archaeology: Education, Ethics, and Community Outreach in North America

▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
▶ Post-Processualism, Development of
▶ Processualism in Archaeological Theory
▶ Structural Archaeology

References

Lynott, M., and A. Wylie. ed. 2000. *Ethics in American archaeology*. 2nd rev. ed. Washington, DC: Society for American Archaeology.

Wylie, A. 1982a. Epistemological issues raised by a structuralist archaeology. In *Symbolic and structural archaeology*, ed. I. Hodder, 39–46. Cambridge: Cambridge University Press.

Wylie, A. 1982b. An analogy by any other name is just as analogical: A commentary on the Gould-Watson dialogue. *Journal of Anthropological Archaeology* 1: 382–401.

Wylie, A. 1985. The reaction against analogy. *Advances in Archaeological Method and Theory* 8: 63–111.

Wylie, A. 1988. "Simple" analogy and the role of relevance relations: Implications of archaeological practice. *International Studies in the Philosophy of Science* 2: 134–150.

Wylie, A. 1989. Archaeological cables and tacking: The implications of practice for Bernstein's 'Options beyond objectivism and relativism'. *Philosophy of Social Science* 19: 1–18.

Wylie, A. 1991. Gender theory and the archaeological record: Why is there no archaeology of gender? In *Engendering archaeology: Women and prehistory*, ed. J.M. Gero and M.W. Conkey, 31–54. Oxford: Blackwell.

Wylie, A. 1992. The interplay of evidential constraints and political interests: Recent archaeological work on gender. *American Antiquity* 57: 15–34.

Wylie, A. 2000. Standpoint matters, in archaeology for example. In *Primate encounters: Models of science, gender, and society*, ed. S. Strum and L. Fedigan, 243–260. Chicago: University of Chicago Press.

Wylie, A. 2002. *Thinking from things: Essays in the philosophy of archaeology*. Berkeley: University of California Press.

Wylie, A. 2003. On ethics. In *Handbook on ethical issues in archaeology*, ed. L. Zimmerman, K.D. Vitelli, and J. Hallowell-Zimmer, 3–16. Walnut Creek: Altamira Press.

Further Reading

Denning, K. 2000. Philosophy from the ground up: an interview with Alison Wylie. Available at: http://www.assemblage.group.shef.ac.uk/5/wylie.html

Kincaid, H., A. Wylie, and J. Dupre, eds. 2007. *Value-free science? Ideals and illusions*. Oxford: Oxford University Press.

Wylie, A. 2003. Why standpoint matters. In *Science and other cultures: Issues in philosophies of science and technology*, ed. R. Figueroa and S. Harding, 26–48. London: Routledge.

Wylie, A. 2005. The promise and perils of an ethic of stewardship. In *Beyond ethics: Anthropological moralities on the boundaries of the public and the professional*, ed. L. Meskell and P. Pels, 47–68. London: Berg.

Wylie, A. 2007. Doing archaeology as a feminist. *Journal of Archaeological Method and Theory* 14 (3): 209–216.

Wylie, A. 2011a. Standpoint (still) matters: Research on women, work, and the academy. In *Feminist epistemology and philosophy of science: Power in knowledge*, ed. H. Grasswick, 157–179. New York: Springer.

Wylie, A. 2011b. Critical distance: Stabilizing evidential claims in archaeology. In *Evidence, inference and enquiry*. British Academy Publications, ed. P. Dawid, W. Twining, and M. Vasilaki, 371–394. Oxford: Oxford University Press.

Wylie, A. 2013. Interdisciplinary practice: Archaeology and philosophy. In *Archaeology in the making: Conversations through a discipline*, ed. W. Rathje, M. Shanks, and C. Witmore, 93–121. London: Routledge.

X

Xia Nai

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Basic Biographical Information

Xia Nai (1910–1985) was a major pioneer of post-1949 modern Chinese archaeology. Born in Wenzhou, Southern Zhejiang province, Xia became an archaeologist only after he received his Bachelor's degree in modern economic history from Tsinghua University in 1934. Upon graduation, he received the Boxer Indemnity Scholarship to study archaeology abroad. One of the requirements for the scholarship recipient was field experience. Accordingly, Li Ji, the director of archaeology department of Academia Sinica, and Fu Sinian, the director of Academia Sinica, provided an opportunity for Xia to excavate at the late Shang Dynasty (1350–1046 B.C.E) site of Xibeigang Royal Cemetery in Anyang city, Henan province. After his first archaeological field experience in 1935, Xia began his academic career in archaeology at the University College London (UCL). He initially studied classical archaeology with Perceval Yetts and later continued to pursue his PhD in Egyptology with Stephen Glanville, who was then the chair of Egyptian Archaeology and Philology at UCL.

The outbreak of the Second World War did not end Xia's academic pursuit offshore. Instead, Xia obtained the Douglas Murray Scholarship to conduct fieldwork in Egypt in 1939 at the Cairo Museum. In 1941, Xia returned to China and obtained a position at the Preparatory Office at the Central Museum (now Nanjing Museum). In 1943, he joined the Department of Archaeology of the Institute of History and Philology, Academia Sinica, first as an Associate Research Fellow, then as a Research Fellow, and finally was promoted as Acting Director in 1947. By the end of the Chinese Civil War in 1948, Academia Sinica was to be relocated to Taiwan. While Li Ji and Fu Sinian moved to Taiwan, Xia Nai remained in China and taught at Zhejiang University for a year. Since the departure of his major predecessors, Xia held the key to the success of the development of the field of Chinese archaeology in New China. In 1950, Xia was appointed Second Deputy Director of the newly established Institute of Archaeology. He then became the Director of the Institute between 1962 and 1982 and was elected President of the new Archaeological Society of China in 1979. Through his influence until his passing, he has left his avant-garde and scrupulous philosophy in almost every domain in the first chapter of post-1949 Chinese archaeology.

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Major Accomplishments

While often acclaimed for his contributions to modern Chinese archaeology, Xia Nai is seldom recognized as the first Egyptologist in China. At UCL, Xia examined Flinders Petrie's Egyptian beads collection for his dissertation. His dissertation, *Ancient Egyptian Beads* (2014), was completed in 1943 but was not published until 2014. His painstaking effort in cataloging and analyzing of the beads was also reflected in the 1760 index cards he meticulously inked with descriptions, analyses, and drawings. The cards are now digitized in the UCL museum online catalogue (Fig. 1). As a graduate student, Xia also participated in several international excavations. He excavated at Maiden Castle in Britain, Armant in Egypt, and Tell el-Duweir in Palestine. Guided by his mentors, Xia was equipped with solid analytical and field techniques and was inspired to develop his life-long academic interest in the historical connections between the East and the West as reflected in his subsequent research. An example of such is his first collection of essays published in Xia (1961), which covers topics related to ancient China and its economic and cultural relationships with Rome and Persia through the study of silk, silver, and currencies.

In his postgraduate career back in China, Xia led multiple field projects and made discoveries that revolutionized the field. For example, he discovered features related to the Shang culture at Huixian in Henan province, providing the first archaeological evidence of Shang influence outside of Anyang. In a survey conducted in Hunan province, he accurately identified Mawangdui as a Western Han site (206 B.C.–A.D. 9), which led to the subsequent excavation of the site thus the

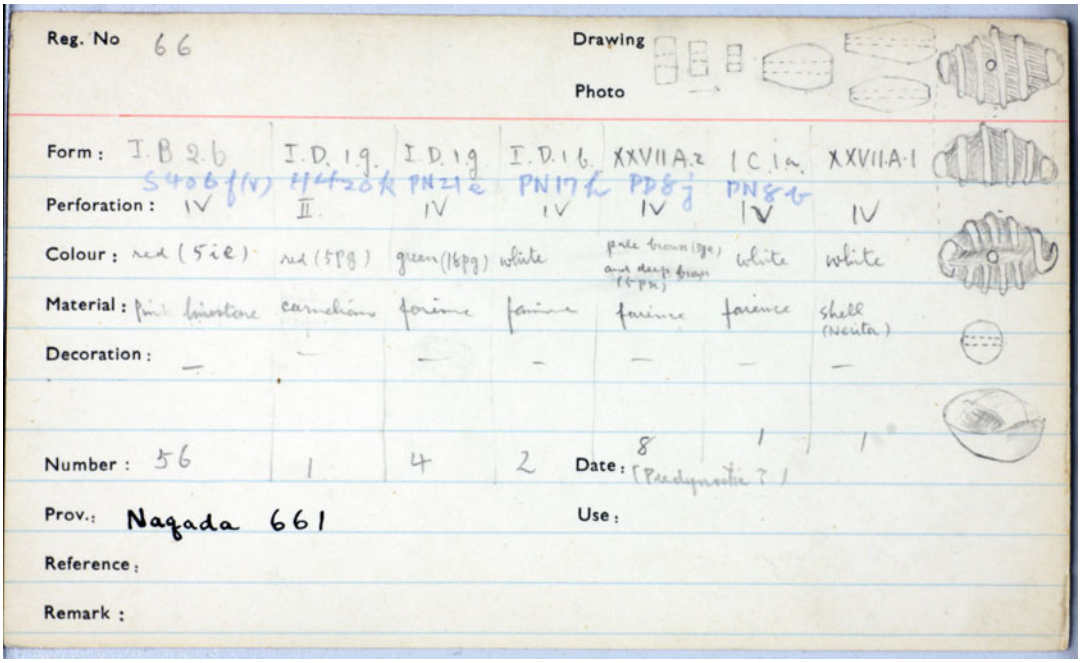

Xia Nai, Fig. 1 Card 66 – 1 of the 1760 index cards Xia Nai recorded of Flinders Petrie's Egyptian beads collection. (Taken from The Xia Nai Index of Egyptian Beads in The Petrie Museum of Egyptian Archaeology 2014. Courtesy of the Petrie Museum of Egyptian Archaeology, UCL)

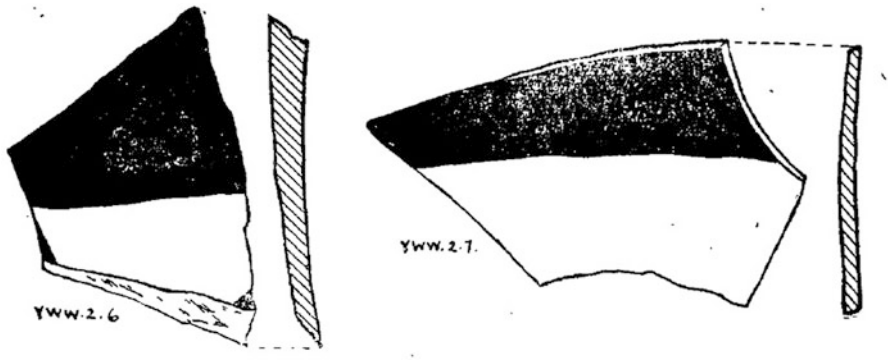

Xia Nai, Fig. 2 The two Gansu Yangshao (Majiayao) style painted pottery sherds excavated from Tomb No. 2 at Yangwawan, Gansu province. (Taken from Xia 1948: Fig. 5)

understanding of the Han burial systems. Of all the projects Xia headed, he is most famous for the 1945 excavation at the site of Yangwawan in Gansu province. While excavating Tomb No. 2 of the Qijia culture (ca. 2200–1600 B.C.), Xia discovered two Gansu Yangshao culture (ca. 3300–2000 B.C.) (later on renamed by him as Majiayao culture) painted pottery sherds (Fig. 2) from the fill of the tomb. In his article "New Discovery of a Ch'i Chia (Qijia) Culture Cemetery" (1948), Xia discusses the taphonomy of the site and concludes that the Yangshao sherds were discarded prior to the burial of the Qijia deceased. The stratigraphic evidence rectifies Swedish geologist-turned-archaeologist J.G. Andersson's initial proposal that Qijia predated Yangshao. The subsequent projects in the Northwest that Xia headed provided additional evidence to revise the chronological system of prehistoric cultures in China. His work was also the basis for overturning the hypothesis that the early Chinese civilization originated in the west and entered China through the Silk Road into Gansu and then spread into the Central Plains. In every excavation that Xia headed, he employed the systematic scientific field methods adopted from one of his mentors Mortimer Wheeler, most famous for his excavation at Mohenjo-daro in Pakistan and his advanced systematic field excavation methods. These methods later on became the basis for the field excavation methods in China.

Xia's training and experience contributed to his strong advocacy of Marxist materialism and archaeological science. Xia's (1959) article, "Regarding the Naming of Archaeological Cultures," stresses the importance of anthropological and sociological considerations to the designation and study of archaeological cultures. Yet, Xia recognized the limitations of traditional archaeology in accurately reconstructing the cultural development of such cultures. Consequently, throughout his career, he encouraged interdisciplinary collaboration, particularly with natural sciences, taking a great leap forward toward the development of archaeological science. For example, after the development of the radiocarbon dating method by Willard Libby in the late 1940s, Xia immediately encouraged and supported the installation of a radiocarbon laboratory in China. When the lab was set up in the early 1960s, Xia provided a comprehensive chronology of the prehistoric cultures in China based on the absolute dates obtained from the lab in his 1977 article "Carbon14 Dating and Prehistoric Archaeology in China" (Fig. 3). Moreover, Xia collaborated with multiple metal physicists and utilized different analytical methods to understand metallurgical development in ancient China at Gaocheng in Hebei province that dated to the Shang Dynasty.

Apart from his own academic achievements, Xia also dedicated his postgraduate career to the

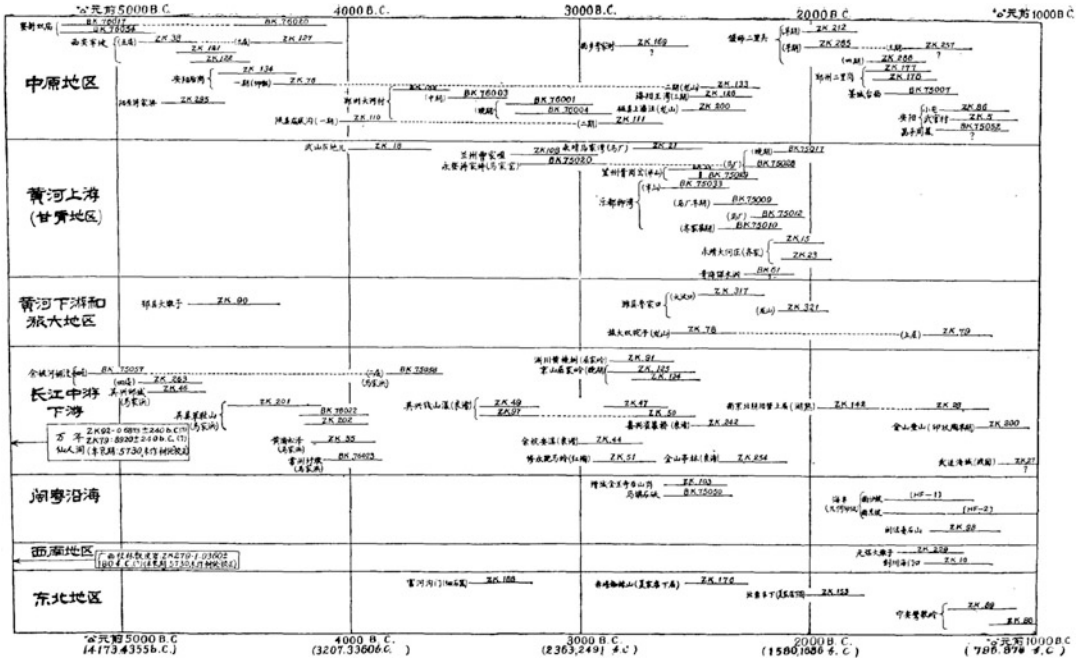

Xia Nai, Fig. 3 The chronological sequence of prehistoric cultures in China based on the absolute C14 dates produced by the first radiocarbon laboratory in China at the Archaeological Institute of the Chinese Academy of Social Sciences. The chart is divided into seven regions including the Central Plains region, the Upper Yellow River Valley (Gansu-Qinghai region), the Lower Yellow River Valley, the Middle Yangtze River Valley, the Fujian and Guangdong coastal region, the Southwest region, and the Northeast region. (Taken from Xia 1977: Fig. 1)

nurturing of a young generation of archaeologists and to promote Chinese archaeology to a wider audience. The collaborative effort of Xia and his colleagues such as Su Bingqi and Pei Wenzhong resulted in the unprecedented founding of archaeology as a specialized field under the History Department at Peking University in 1952. Moreover, beginning 1956, four short-term archaeological training programs took place under the leadership of Xia, during which he and the leading archaeologists at that time instructed survey and excavation methods to the participants. While Xia continued to actively contribute at the academic level, he also composed popular narratives such as *The Memoirs of a Traveler in Dunhuang* (2002). On the other hand, he took on editorial work for major journals including *Acta Archaeologica Sinica* and *Archaeology*. In 1985, Xia was appointed as the Editor-in-Chief of *The Encyclopedia of China – Archaeology Volume* and passed away in the same year in Beijing after suffering from a stroke.

Cross-References

- ▶ Andersson, Johan Gunnar
- ▶ Li Ji [Li Chi]
- ▶ Marxism and Archaeology in the Soviet Union and China
- ▶ Petrie, William Matthew Flinders
- ▶ Su Bingqi
- ▶ Wheeler, Mortimer

References

The Xia Nai Index of Egyptian Beads in The Petrie Museum of Egyptian Archaeology. 2014. UCL Museums and collections, University of College London. www.ucl.ac.uk/library/digital-collections/collections/xianai. Accessed 1 Dec 2017.

Xia, Nai. 1948. 齐家墓葬的新发现及其年代的改订 (New discovery of a Ch'i Chia (Qijia) culture cemetery). 考古学报 *(Acta Archaeologica Sinica)* 1948(3): 101–117.
Xia, Nai. 1959. 关于考古学上文化的定名问题(Regarding the naming of archaeological cultures). 考古 *(Archaeology)* 1959(8): 169–172.
Xia, Nai. 1961. 考古学论文集 *(Collection of archaeological essays)*. 北京:科学出版社. Beijing: Science Press.
Xia, Nai. 1977. 碳14測定年代和中國史前考古學(Carbon14 dating and prehistoric archaeology in China). 考古 *(Archaeology)* 1977(4): 217–232.
Xia, Nai. 2002. 敦煌考古漫记 *(The memoires of a traveler in Dunhuang)*. 天津:百花文艺出版社. Tianjin: Baihua Literature and Art Publishing House.
Xia, Nai. 2014. *Ancient Egyptian beads*. Berlin/Heidelberg: Springer.

Further Reading

Andersson, Johan Gunnar. 1925. Preliminary report on archaeological research in Kansu. In *Memoirs of the Chinese geological survey*, ed. Zhongyang dizhi diaochasuo (China), Series A, vol. 5. Peking: The Geological Survey of China.
Chang, K.C. 1986. Xia Nai (1910–1985). *American Anthropologist* 1986(88): 442–444.
Hebei Provincial Museum Administration of Cultural Relics. 1973. 河北藁城台西村的商代遗址 (The Shang site at Hebei Gaocheng Taixi Village). 考古 *(Archaeology)* 1973(5): 266–271, 329–331.
Hsia (Xia), Nai. 1983. *Jade and silk of Han China (The Franklin D. Murphy Lectures III)*. Trans. Li Chu-tsing. Kansas: Helen Foresman Spencer Museum of Art, the University of Kansas.
Liu, Wensuo, and Clayton D. Brown. 2009. 夏鼐与李济 (Xia Nai and Li Ji). 古今论衡*(Disquisitions on the Past and Present)* 2009(20): 61–74.
Tong, Enzheng. 1995. Thirty years of Chinese archaeology (1949–1979). In *Nationalism, politics, and the practice of archaeology*, ed. Philip L. Kohl and Clare Fawcett, 177–197. Cambridge, UK: Cambridge University Press.
Wang, Zhongshu. 1985. 夏鼐先生传略 (A brief history of Xia Nai). 考古 *(Archaeology)* 1985(8): 678–685.
Xia, Nai. 1955. 放射性同位素在考古学上的应用-放射性炭素或炭14的断定年代法(The application of radioisotope in archaeology: Reconstructing chronology with radiocarbon or carbon14). 考古 *(Archaeology)* 1955(4): 73–78.
Xia, Nai. 1979. 考古学与科技史 *(Archaeology and the history of science and technology)*. 北京:科学出版社. Beijing: Science Press.
Xia, Nai. 1984. 什么是考古学 (What is archaeology). 考古 *(Archaeology)* 1984(10): 931–935.
Xia, Nai. 1985. 中国文明的起源 *(The origins of the Chinese civilization)*. 北京:文物出版社. Beijing: Cultural Relics Press.
Xia, Nai. 2000. 夏鼐文集 *(Collection of Xia Nai's works)*. 北京:社会科学文献出版社. Beijing: Social Sciences Academic Press.
Xia, Nai. 2011. 夏鼐日记 *(共十册) (Xia Nai diary (volumes one to ten))*. 上海:华东师范大学出版社. Shanghai: East China Normal University Press.

Xiaochangliang: Geography and Culture

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Introduction

The Nihewan Basin, located in the valley formed by Sanggan River and its tributary, the Huliu River, which covers an area of about 9,000 km^2 with an average elevation of 1,000 m, in northwest Hebei province and northern Shanxi province, 50 km west of Beijing, is a key region for studying Chinese or even global Quaternary geology, paleontology, and Paleolithic archaeology. Research in the Nihewan Basin can be traced back to the 1920s, when French scholars E. Licent and P. Teilhard de Chardin and others found and studied mammalian fossils contained in Late Cenozoic fluvio-lacustrine strata near Nihewan village, which eventually corresponded to the Villafranchian fauna in Europe (Barbour et al. 1927). The lacustrine sediments in the ancient Nihewan lake basin were called the "Nihewan Formation" (Barbour 1924). In 1960s (Gai and Wei 1974) and 1970s (Jia and Wei 1976), the Hutouliang and Xujiayao sites were discovered. Paleolithic archaeology then became an important part of research here. In 1978, with the discovery of Xiaochanglaing (You et al. 1979), scholars began to study the Lower Paleolithic. This was the first time that Lower Paleolithic archaeology was studied systematically in the area, although the age of Xiaochangliang was

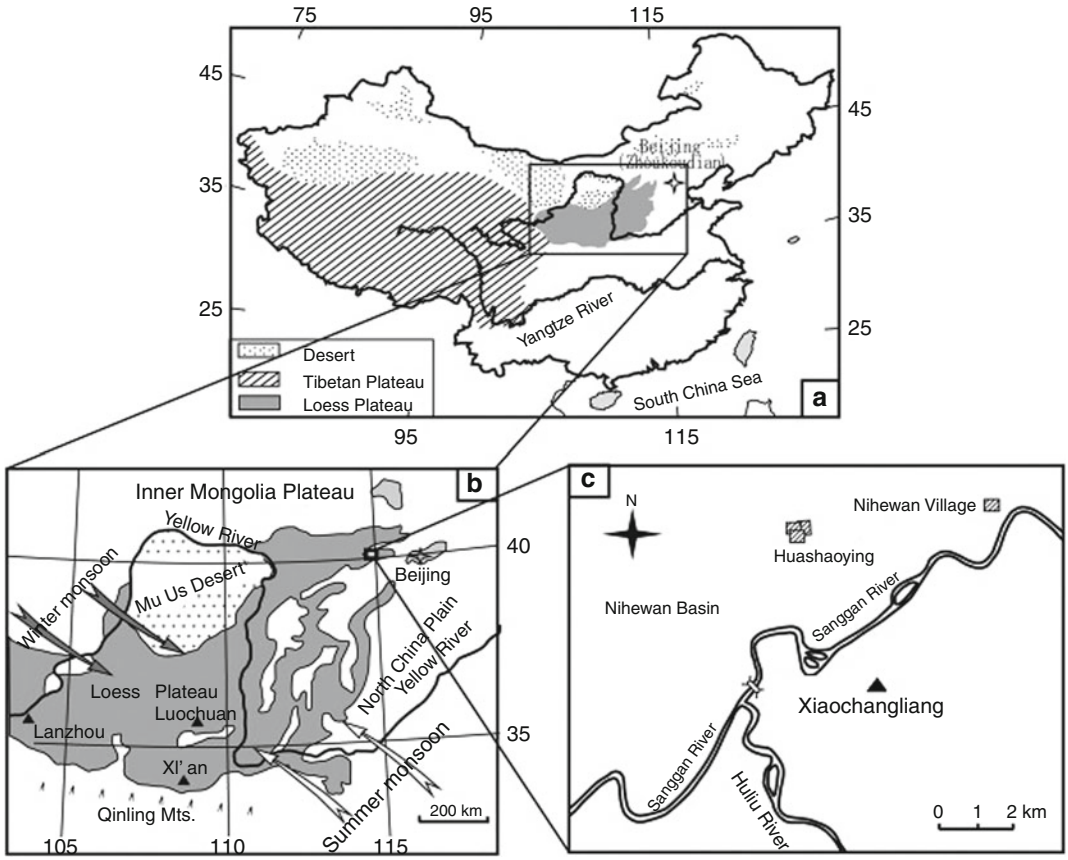

Xiaochangliang: Geography and Culture, Fig. 1 A map showing the position of the Xiaochangliang site. (After Ao et al. 2010)

controversial at that time. At present the Lower Paleolithic sites in the Nihewan Basin are known as one of the richest areas in North China, or even all of China. Over 20 Lower Paleolithic sites have been discovered, including 14 Early Pleistocene ones. They are located in the eastern part of the Nihewan Basin, around the Donggutuo Village and Cengjiawan Platform (Fig. 1).

Definition

The Xiaochangliang site (40°13′10″N, 114°3′944″E, altitude 916.52 m), whose name has been carved on the first bronze broad at China Millennium Monument's historical corridor in Beijing, is one of the most extensively excavated and prolific sites yet studied in the Nihewan Basin. It is located on the edge of Cenjiawan platform of the Nihewan cliff, Yangyuan, Hebei province. It was found by You Yuzhu, Tang Yingjun, and Li Yi, members of the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP) in 1978. By now the site has been excavated several times, and the area has been excavated about 200 m^2.

The Xiaochangliang strata, belonging to the Nihewan Formation, are normal faults located at the boot wall of a Brown fault. The section of the strata is as follows:

1. Light-brown, silty, loosen loess. Thickness (Th.) 12.07 m
2. Light-red, loess with calcium tuberculosis, gradual transition from the underlying strata. Th.1.83 m

3. Gray-green, clayey silt with calcium TB. Th. 0.70 m
4. Brown-yellow, slightly viscous, silty sand, with calcium tuberculosis, gradual transition from the underlying strata. Th.1.16 m
5. Gray, viscous, clayey silt. Th. 0.92 m
6. Gray, calcareous cement layer and with 8-cm-thick gray silt. Th. 0.21 m
7. Gray, silt and clay. Th. 0.59 m
8. Brown-yellow silt, with thin bedding. Th. 0.95 m
9. Light-red, clayey silt. Th. 1.14 m
10. Brown-yellow, silty sand. Th. 1.38 m
11. Gray-green, sandy silt. Th. 1.01 m
12. Sallow, silty sand. Th. 0.49 m
13. Sienna brown, clayey silt, with calcium TB. Th.1.84 m
14. Brown-yellow, fine sand. Th. 0.18 m
15. Brown-red, clayey silt. Th. 0.21 m
16. Brown-yellow, silt. Th. 0.40 m
17. Brown-red, clayey silt. Th. 0.68 m
18. Yellow-green, clayey silt. Th. 0.49 m
19. Brown-red, silt, the bottom 30-cm-thick gravel layer. Th. 2.47 m
20. Gray, silty sand, with small gravel and fine gravel. Th. 2.42 m
21. Maliang (site name, about 0.78 Ma) layer, brown-yellow, fine sand, the lower part of the gray-green or light-gray silt layer of calcium TB. Th. 0.78 m
22. (22)TBS layer, thick layer of brown sand. Th. 19.13 m
23. Yellow-green, sandy silt. Th. 2.03 m
24. Light-red, clayey silt. Th. 2.80 m
25. Gray, clayey silt. Th. 0.50 m
26. Light-red, sandy silt. Th. 0.40 m
27. Yellow-green, silty sand. Th. 0.45 m
28. Brown-yellow, silty sand, below the bottom of a small gravel. Th. 0.19 m
29. Brown-yellow, sandy silt, the upper with a yellow-green clip gravel. Th. 0.66 m
30. Light-red, sandy silt. Th. 0.92 m
31. Gray-green, clayey silt, similar to Donggutuo (site name, about 1.1 Ma) layer A. Th. 0.13 m
32. Light-red, sandy silt. Th. 2.05 m
33. Gray-green, clayey silt, with bedding. Th. 2.20 m
34. Light-red, silty sand. Th. 0.38 m
35. Gray-green, silty sand. Th. 0.33 m
36. Brown-yellow, medium and fine sand. Th. 0.22 m
37. Light-red, sandy silt. Th. 1.32 m
38. Brown-yellow, Shanshenmiaozui (site name, about 1.33 Ma) layer, fine sand. Th. 0.09 m
39. Brown-yellow, sandy silt. Th. 0.99 m
40. Gray-green, silty clay, with horizontal bedding. Th. 1.29–1.86 m
41. Xiaochangliang layer: fine gray sandy silt. Th. 0.80 m
42. Light-red, clayey silt. Th. 0.21 m
43. Gray, silty clay, viscous. Th. 0.58 m
44. Brown-yellow, silty sand, with small gravel. Th. 1.37 m
45. Brick-red, silty sand. Th. 11.15 m
46. Gravel layer especially boulders. Th. 0.31 m
47. Purple, volcanic breccias, bared more than 10 m

The archaeological layer of Xiaochangliang site lies approximately 70 m below the Late Pleistocene Malan loess (e.g., You et al. 1978). Vertebrate fossils and artifacts were found associated within a fine gray sandy silt layer reaching 0.80-m thickness (You et al. 1978). A small investigation in 1990 found no discernible pattern of orientation of either artifacts or fossils, and the majority of artifacts appeared in fresh condition. That means it is an *in situ* buried site.

From the perspective of the 1816 stone artifacts assemblage (Fig. 2), the overwhelming majority of the artifact assemblage consists of flakes and flake fragments, along with some cores and clearly identifiable tools (You et al. 1980; You 1983; Chen et al. 1999). There are 96 cores, 342 flakes, 35 tools, and 1,343 blocks or debris. The stone artifacts are made predominantly of volcanic breccias, including cherts, chalcedonies, and agates, and cherts are the main raw material. An abundant source of raw materials can be found from the exposed bedrock, Jurassic volcanics, sediments, and Precambrian quartzite with cherty streaks which extremely fissured, at the vicinity of the Xiaochangliang site. Hard-hammer direct percussion is the main technology used to produce flakes. Most of the tools are semifinished products, and only few are refined products including

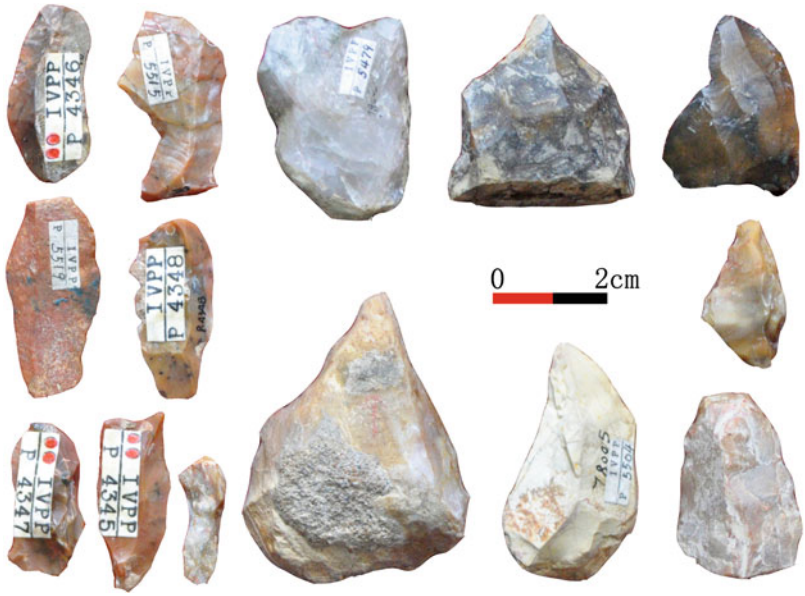

Xiaochangliang: Geography and Culture, Fig. 2 The stone artifacts from Xiaochangliang

various scrapers, points, borers, small chopping tools, and burins.

Except for the lithic products, there are also many mammal fossils, including *Allophaiomys cf. A. Pliocaenicus*, *Martes* sp., *Hyaena licenti*, *Palaeoloxodon* sp., *Hipparion sinense*, *Equus sanmeniensis*, *Coelodonta antiquitatis*, *Cervus* sp., *Gazella* sp., and *Bovids*.

The age of Xiaochangliang site, according to Zhu Rixiang and other studies, is 1.36 Ma (Zhu et al. 2001).

Key Issues/Current Debates/Future Directions/Examples

The hot topics in research at the Xiaochangliang site are as follows.

First is the culture development: primitive or progressive. Some researchers consider that it is characterized by random flake knapping, lacking tool retouch, and instability of shape (Chen et al. 2002), meaning that the lithic technology is original (Schick et al. 1991), but for other researchers (Huang 1985), it has many advanced traits, for example, some smaller blades and flake fragment with faceted platform were observed, and the types of stone tools are diverse, including various scrapers, points, borers, small chopping tools, and burins.

Second is the age. Since its discovery in 1978, given its importance, the Xiaochangliang site has attracted the attention of geologists and chronologists. However, its age had long been debated because of the unavailability of an accurate chronostratigraphic framework. Age determinations by electron spin resonance, thermoluminescence, and radiometric isotopic methods could not be satisfactorily applied to these artifact-containing strata because of the absence of required materials. Paleomagnetic dating indicates that the site lies below the Jaramillo subchron (Schick and Dong 1993), placing them at or shortly before 1 Ma, while Zhu et al. (2001) report an age 1.36 Ma (between the Oldovai and Jaramillo events) for the artifact-bearing lacustrine deposits at Xiaochangliang. However, by stratigraphic correlation (Wei et al. 2011), the age of Xiaochangliang site is considered to be over 1.50 Ma.

Third is the paleoenvironment. At present, the climatic context of Xiaochangliang site is unclear, and it is not yet known whether the occupation occurred during an interglacial or glacial period. The faunal remains include *Cervus* and *Gazella*, which do not imply cold conditions. Given the

evidence from Gongwangling as well as Central Asia (Wang et al. 1997), the occupation at Xiaochangliang 1.36 Ma ago was probably during a warm episode.

Cross-References

► Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic

References

Ao, H., C.L. Deng, M.J. Dekkers, Y.B. Sun, Q.S. Liu, and R.X. Zhu. 2010. Pleistocene environmental evolution in the Nihewan Basin and implication for early human colonization of North China. *Quaternary International* 223–224: 472–478.

Barbour, G.B. 1924. Preliminary observation in Kalgan area. *Bulletin of the Geological Society of China* 3: 167–168.

Barbour, G.B., E. Licent, and P. Teilhard de Chardin. 1927. Geological study of the deposits of the Sangkanho Basin. *Bulletin of the Geological Society of China* 6: 263–278.

Chen, C., C. Shen, W.Y. Chen, and Y.J. Tang. 1999. 1998 excavation of the Xiaochangliang site at Yangyuan, Hebei. *Acta Anthropologica Sinica* 18: 225–239.

Chen, C., C. Shen, W.Y. Chen, and Y.J. Tang. 2002. Lithic analysis of the Xiaochangliang industry. *Acta Anthropologica Sinica* 21: 23–40.

Gai, P., and Q. Wei. 1974. Discovery of early Pleistocene stone artifacts in Nihewan. *Vertebrata PalAsiatica* 12: 67–74.

Huang, W.W. 1985. On the stone industry of Xiaochangliang. *Acta Anthropologica Sinica* 4: 301–307.

Jia, L.P., and Q. Wei. 1976. A Palaeolithic site at Xujiayao in Yangkao County, Shanxi Province. *Acta Archaeology Sinica* 2: 97–114.

Schick, K., and Z.A. Dong. 1993. Early Paleolithic of China and eastern Asia. *Evolutionary Anthropology* 2: 22–35.

Schick, K., N. Toth, Q. Wei, J.D. Clark, and D. Etler. 1991. Archaeological perspectives in the Nihewan Basin, China. *Journal of Human Evolution* 21: 13–26.

Wang, H.Q., S.H. Ambrose, C.L. Liu, and L.R. Follmer. 1997. Paleosol stable isotope evidence for early hominid occupation of east Asian temperate environments. *Quaternary Research* 48: 228–238.

Wei, Q., J. Li, and S.W. Pei. 2011. Paleolithic site and its information about ancient human activity. In *The Nihewan Rift basinand early man*, ed. B.Y. Yuan, Z.K. Xia, and P.S. Niu, 132–207. Beijing: Geological Publishing House.

You, Y.Z. 1983. The new materials and the age of Xiaochangliang site, Heibei. *Prehistorical Research* 1: 92–98.

You, Y., Y. Tang, and Y. Li. 1978. Paleolithic discoveries in the Nihewan formation. *Chinese Quaternary Research* 1: 1–13.

You, Y.Z., Y.J. Tang, and Y. Li. 1979. The discovery of Xiaochangliang site and its significance. *Chinese Science Bulletin* 24: 365–367.

You, Y.Z., Y.J. Tang, and Y. Li. 1980. Discovery of the Paleolithics from the Nihewan formation. *Quaternary Sciences* 5: 1–11.

Zhu, R.X., K. Hoffmen, R. Potts, C.L. Deng, Y. Pan, B. Guo, Z.T. Guo, B.Y. Yuan, Y.M. Hou, and W.W. Huang. 2001. Earliest presence of humans in northeast Asia. *Nature* 413: 413–417.

X-Ray Diffraction (XRD): Applications in Archaeology

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Introduction and Definition

X-ray diffraction (XRD) is an analytical technique in which a prepared sample is bombarded with an X-ray beam at varying angles. The diffractometer measures the size of the "unit cell" – space between adjacent crystal planes – by virtue of the "d-spacing" (Fig. 1). Most archaeological samples are typically soil or sediments such as clays. Stoney materials can be analyzed and the only requirement of a material for XRD analysis is that it be crystalline. In the case of soil or sediments, the sample to be analyzed is in powder form. This allows the sample to present all of the possible crystal orientations in the minerals comprising the sample.

Key Issues/Current Debates/Future Directions/Examples

To prepare a sample, the material must be ground into a uniform consistency. This step randomizes the minerals in the sample. Samples are generally

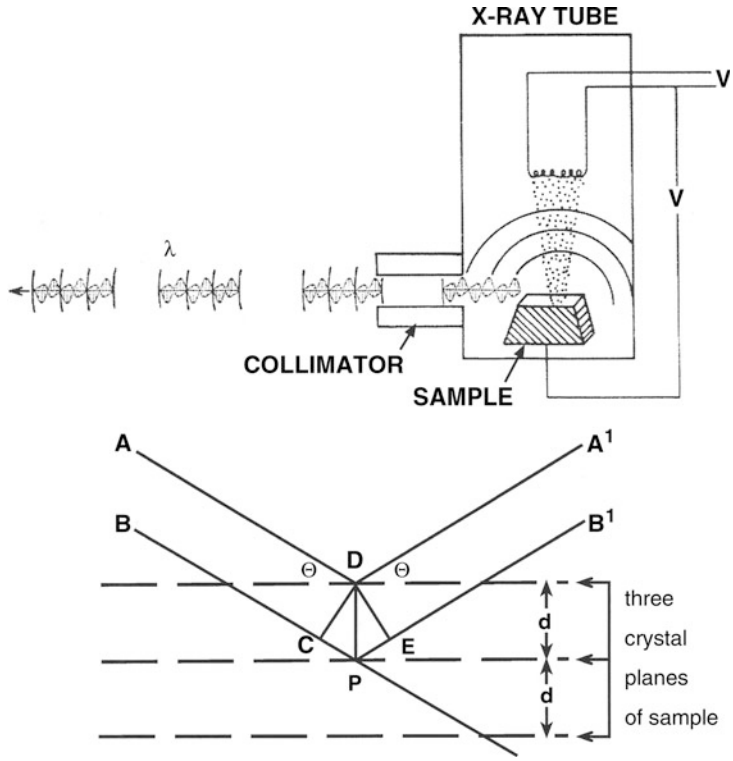

X-Ray Diffraction (XRD): Applications in Archaeology, Fig. 1 Schematic of X-ray diffraction. The diffractometer measures the "d-spacing" between the crystal planes following Bragg's Law ($n \cdot \lambda = 2 \cdot d \cdot \sin(\theta)$), where n is the integer representing the peak of interest, d is the lattice spacing of the specific crystallized mineral or element, θ is the angle between the scattered X-ray and the incident radiation, and λ is the wavelength of the incident light

placed into an oven at a low temperature for 15–20 min to dry them out. The dry samples are then pounded with a mortar and pestle to a uniform powder. The powder is then pressed into a tablet using an aluminum disc frame, onto which 200 psi (pounds per square inch) is applied for 1 min. Pressing the powder prevents the incident X-rays from penetrating the sample too deeply, thereby creating some problems with the analysis, such as absorption, refraction, and reradiation of X-rays.

Then, samples are placed, one at a time, in the XRD diffractometer, and data are collected from 2 to 50 2θ at a step increment of 0.01° and scan speed of 0.1 s per stop. XRD data can be collected and saved using DIFFRACplus XRD Commander software by Bruker AXS, although other software is available.

Prior to interpretation, the raw diffractograms from the XRD machine have to be processed. Using the DIFFRAC*plus* EVA software by Bruker AXS, the Kα2 peaks and background noise are stripped, and the threshold sensitivity is adjusted

X-Ray Diffraction (XRD): Applications in Archaeology, Fig. 2 Soil profiles at Whitehall Forest showing the profile of "horizon 3" paleosol as the deeper, darker brown horizon in contact with the mid-level orange-red horizon

ALLEGED PALEOSOL FINE FRACTION DATA						HORIZON 3 FINE FRACTION DATA					
Angle	d value	Intensity	Intensity %	Caption	Mineral(s)	Angle	d value	Intensity	Intensity %	Caption	Mineral(s)
2-Theta °	Angstrom	Count	%			2-Theta °	Angstrom	Count	%		
14.307	7.1829	136	100	d=7.1829	Kaolinite	7.341	13.9727	202	100	d=13.9727	HIV
10.254	10.0094	104	76.6	d=10.0094	Biotite & Muscovite	14.3	7.1865	166	81.8	d=7.1865	Kaolinite
7.366	13.9248	102	74.9	d=13.9248	HIV	10.262	10.0014	160	79	d=10.0014	Biotite & Muscovite
28.973	3.5758	90.3	66.3	d=3.5758	Kaolinite	28.944	3.5793	109	53.8	d=3.5793	Kaolinite
31.061	3.3408	67.5	49.6	d=3.3408		31.174	3.329	90.3	44.6	d=3.3290	
						20.714	4.9753	78.3	38.7	d=4.9753	
						31.965	3.2486	77.7	38.4	d=3.2486	
ALLEGED PALEOSOL COARSE FRACTION DATA						**HORIZON 3 COARSE FRACTION DATA**					
Angle	d value	Intensity	Intensity %	Caption		Angle	d value	Intensity	Intensity %	Caption	
2-Theta °	Angstrom	Count	%			2-Theta °	Angstrom	Count	%		
31.028	3.3442	5299	100	d=3.3442	Quartz	31.014	3.3457	3756	100	d=3.3457	Quartz
24.26	4.2568	996	18.8	d=4.2568	Potassium feldspar	24.245	4.2595	737	19.6	d=4.2595	Potassium feldspar
42.695	2.4572	326	6.2	d=2.4572		31.976	3.2476	309	8.2	d=3.2476	
46.158	2.2818	270	5.1	d=2.2818		42.684	2.4578	249	6.6	d=2.4578	
49.708	2.1282	244	4.6	d=2.1282		46.15	2.2822	215	5.7	d=2.2822	
31.978	3.2473	223	4.2	d=3.2473		49.71	2.1281	189	5	d=2.1281	
47.145	2.2367	181	3.4	d=2.2367		32.565	3.1903	150	4	d=3.1903	
10.243	10.0204	118	2.2	d=10.0204		10.266	9.9982	126	3.3	d=9.9982	
32.563	3.1905	94.5	1.8	d=3.1905		47.128	2.2375	116	3.1	d=2.2375	
31.559	3.2893	58.3	1.1	d=3.2893		12.184	8.4289	94.7	2.5	d=8.4289	
29.754	3.484	56.8	1.1	d=3.4840		29.733	3.4863	56.6	1.5	d=3.4863	
41.031	2.5523	47	0.9	d=2.5523		33.293	3.1225	50.9	1.4	d=3.1225	
48.932	2.1598	37.4	0.7	d=2.1598		25.61	4.0358	48.9	1.3	d=4.0358	
20.632	4.995	37	0.7	d=4.9950		27.456	3.7693	48.9	1.3	d=3.7693	
						41.05	2.5512	47.2	1.3	d=2.5512	
						48.933	2.1598	48.7	1.3	d=2.1598	

X-Ray Diffraction (XRD): Applications in Archaeology, Fig. 3 2-Theta, d-spacing, percent intensity peak data from XRD diffractograms and mineral interpretations for fine and coarse fractions of the alleged paleosol and horizon 3. Data are listed from greatest to least percent intensity and mineral interpretations are identified only for major components (>50% intensity in the fine fraction and >10% intensity in the coarse fraction)

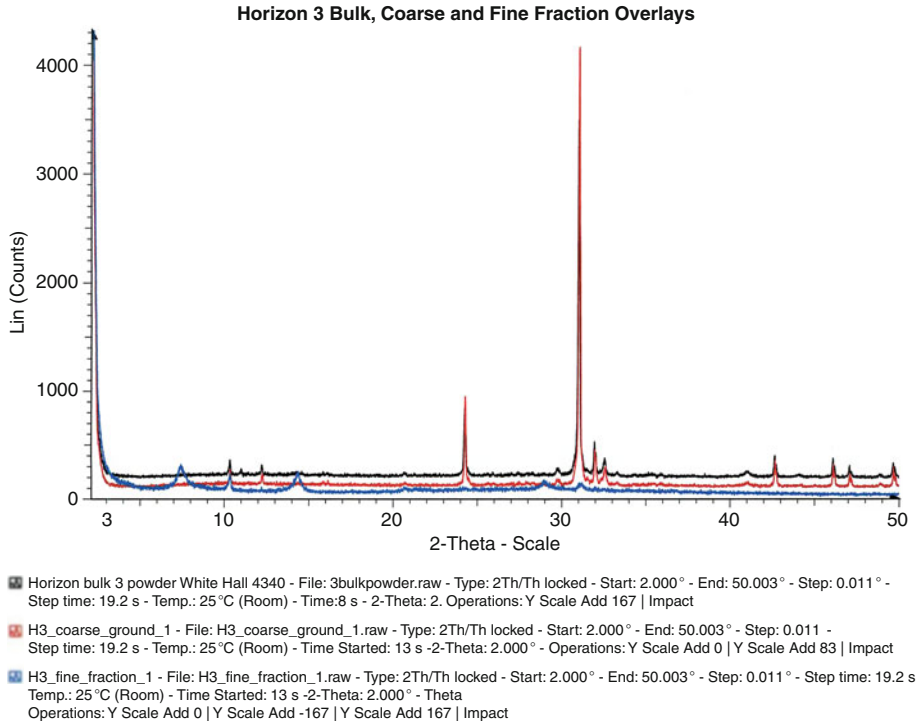

X-Ray Diffraction (XRD): Applications in Archaeology, Fig. 4 Diffractogram of the coarse, bulk, and fine fractions of a suspected paleosol sediment. The larger peak is that of the quartz soil fraction. The second peak located at 24° is identified as feldspar

prior to performing a peak search to identify the major peaks in the diffractogram. Any significant peaks missed by the automated peak search are manually selected and added to the diffractogram record. Finally, potential mineral matches for each peak are identified using the general search option within the EVA software. Suspected minerals not included by the automated search are checked by conducting manual EVA searches for individual minerals. Peak intensity, 2θ, and d-spacing are used to identify the most likely mineral(s) responsible for each peak. The 2θ and d-spacing of suspected mineral matches are then compared to known index values and thereby verified or disqualified as a match using a Powder Diffraction Database Search software by Scintag, Inc.

An Example of XRD Identification of Paleosols

In the diffractograms shown below, one sees the mineralogic makeup of a puted paleosol collected within a soil profile exposed in a test pit located in the Georgia Piedmont near Athens, Georgia. The pit was located on a natural levee of the Middle Oconee River; thus, the parent material for the soils exposed in the walls of the pit is alluvial. One horizon is alleged to be a paleosol and is referred to hereafter as the "paleosol." The depth from which this horizon was originally sampled was not noted. The other horizon, referred to hereafter as "Horizon 3," was sampled from a depth of 134 cm. Figure 2 shows the soil profile in the field.

As expected, quartz created the most intense peak for the bulk and coarse fraction from both horizons. Figure 3 shows the tabulated XRD data shown graphically in the following diffractograms (Fig. 4). Potassium feldspar created the second most intense peak in the bulk and coarse fraction diffractograms for both horizons. Greater variability in terms of peak intensity was evident in the

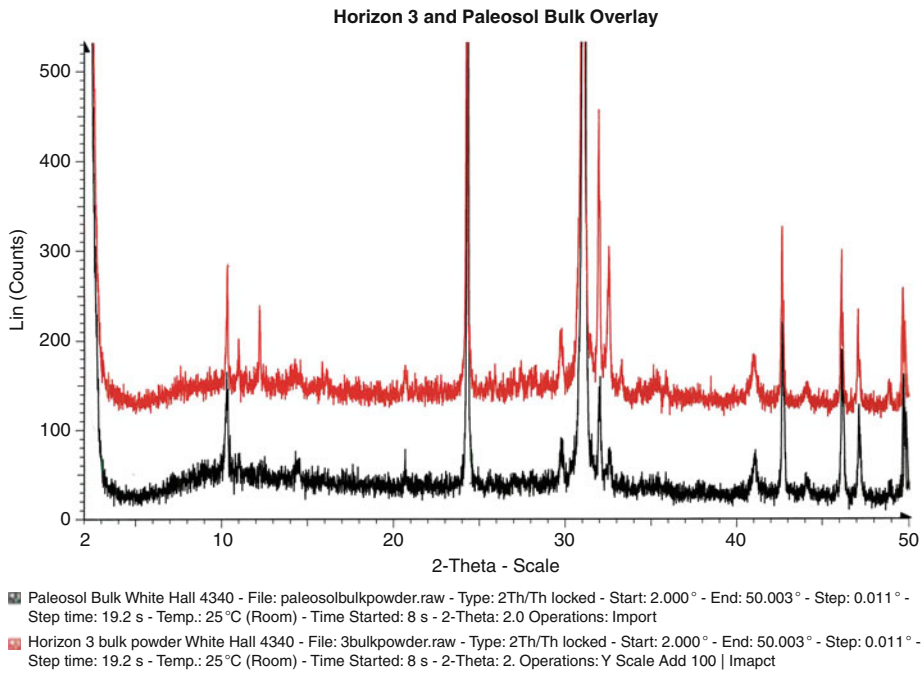

X-Ray Diffraction (XRD): Applications in Archaeology, Fig. 5 Diffractogram of the paleosol bulk fraction and Horizon 3 sediment

fine fraction diffractograms for the two horizons (Fig. 5), although both possessed the same major minerals. Kaolinite, hydroxy-interlayered vermiculite (HIV), biotite, and muscovite created the largest peaks in both horizons. However, kaolinite created the most intense peak in the alleged paleosol fine fraction, whereas HIV was responsible for the most intense peak in the Horizon 3 fine fraction. Ultimately, XRD analysis successfully pinpointed differences between the fine fractions of the two horizons and confirmed their identities as Inceptisols.

Cross-References

- ▶ Archaeological Soil Micromorphology
- ▶ Archaeometry: Definition
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

Further Reading

Garrison, E. 2003. *Techniques in archaeological geology.* Berlin: Springer.

X-Ray Fluorescence (XRF): Applications in Archaeology

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Introduction

Edward Hall's abstract for his 1960 paper entitled "X-ray fluorescent analysis applied to archaeology" in the journal *Archaeometry* is just as appropriate one-half century later. X-ray fluorescence spectrometry (XRF) may be more "well

established" and is still "not suitable for some projects" even though they might seem so, and archaeologists might very much want XRF to be so. This chapter is dedicated to a brief discussion of the applicability of XRF analysis in archaeology.

How does XRF work, and more importantly when and where is it appropriate? There are a number of recent published works on the subject that delve into the subject in great depth and are highly recommended for further edification (i.e., Beckhoff et al. 2006; Potts and West 2008; Shackley 2011a; and the important Jenkins 1999).

Today the market is being flooded with, it seems, hundreds of portable x-ray fluorescent instruments (pXRF), but do they really do all that the marketing suggests (see Shackley 2011b; Speakman et al. 2011)? The recent edited volume by Potts and West (2008) is devoted to the portable instrument for a variety of applications in science and engineering, including archaeological stone and museum works of art, and more recently Ioannis Liritzis and Nikolaos Zacharias provide a critical evaluation of pXRF in obsidian studies as well as other archaeological materials (Liritzis and Zacharias 2011). Is there a need anymore for the desktop laboratory EDXRF? Can we as archaeologists get away with only a much less expensive pXRF? As an academic in a major university, I saw the upcoming students increasing interest in pXRF as a solution to a problem – is it a solution looking for a problem or a very real need to be able to carry great analytical power into remote field conditions? It may, indeed, be too soon to definitively answer these questions, but very recent newer versions of pXRF instruments and software may be resolving some of these issues.

The vast majority of archaeological XRF worldwide is applied to inorganic materials, mainly volcanic rocks, and there are very good technical reasons (for that see Davis et al. 2011; Lundblad et al., 2008). This does not mean, of course, that there aren't perfectly good reasons for analyzing ceramics or organics (Speakman et al. 2011). While pottery is "not a rock," it is composed of rocks and clay sediments that lend themselves to XRF analysis (Hall 2001; Neff 1992; Pollard 1996). The very real difference is that unlike volcanic rocks as an example, ceramics are not formed at very high temperatures in the mantle or crust and are not necessarily a reflection of human production.

What is very different from Edward Hall's XRF world is that archaeology as a discipline has changed markedly both theoretically and methodologically, due in large part to the tools and technology that are offered in the twenty-first century. Issues of social identity, equality, gender, national character, and native rights are all current and important issues in archaeology today and are being addressed with these new tools – XRF certainly among them (see Joyce 2011; Mills et al. 2013; Pollard and Bray 2007; Sillar and Tite 2000). Scholars have argued elsewhere that without our twenty-first-century archaeological tools, a twenty-first-century archaeology would be not much more than the New Archaeology of the 1960s or Culture Historical in nature (Shackley 2005; see also Joyce 2011). X-ray fluorescence spectrometry will play an important role as a "well established method" for illuminating our ever-changing problems in archaeology well into this century. What XRF will look like in another 50 years is impossible to imagine. The portables are probably a peep into that future.

History of XRF in Archaeology

X-rays were first discovered by the German physicist Wilhelm K. Röntgen (1845–1923) for which he won the Nobel Prize in 1901 (Röntgen 1898). Charles G. Barkla in 1909 found a connection between x-rays radiating from a sample and the atomic weight of the sample. In 1913, Henry G. J. Moseley helped number the elements with the use of x-rays, by observing that the K line transitions in an x-ray spectrum moved the same amount each time the atomic number increased by one, a primary theoretical precept in XRF physics (Moseley 1913/14; see Fig. 1 here). He is credited with revising the periodic tables which were based

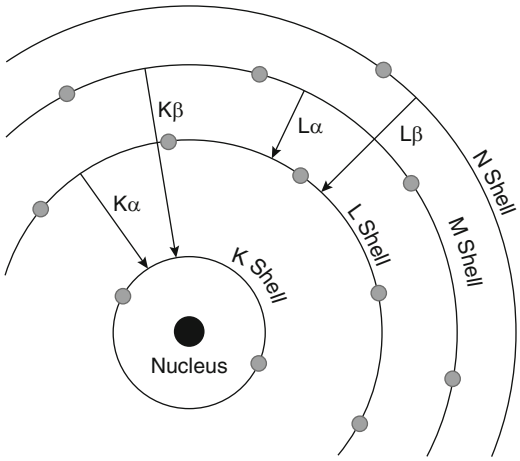

X-Ray Fluorescence (XRF): Applications in Archaeology, Fig. 1 Schematic view of orbital transitions due to x-ray fluorescence (from Shackley 2011b: Fig. 2-1)

on increasing atomic weight, to periodic tables based on atomic number. He later laid the foundation for identifying elements in x-ray spectroscopy by establishing a relationship between frequency (energy) and the atomic number, a basis of x-ray spectrometry. The potential of the technique was quickly realized, with half of the Nobel Prizes in physics awarded to developments in x-rays from 1914 to 1924.

A Brief Discussion of the Principles of XRF

In EDXRF analysis, samples are irradiated with photons, usually from an x-ray tube or radioisotopic source. The primary x-ray beam excites electrons in the sample, causing it to emit secondary x-rays, i.e., to *fluoresce*. The emitted x-rays occur at energies specific to elements in the sample, appearing as peaks over a given energy spectrum (Fig. 1). The height or *intensity* of a given peak reflects, in part, the concentration of that element in the sample and may be converted to units of concentration, usually by comparison to a regression line or quadratic algorithm based on well-characterized standards (Jenkins 1999; McCarthy and Schamber 1981).

Traditional destructive XRF analysis of geologic samples requires rigorous and time-consuming sample preparation. Samples are ground to a fine powder and pressed into briquettes or, for analysis of major elements, prepared as fused glass disks, particularly for wavelength XRF (WXRF) where the relationship between the angle of the instrument and the object analyzed is crucial. However, with energy-dispersive XRF (EDXRF) where the emitted energy is captured by the detector for all elements simultaneously, and through a detector and multichannel analyzer convert that energy to pulses and ultimately through software to elemental data, the surface of the object is not as critical (Davis et al. 2011). While early EDXRF instruments did not yield the instrumental precision of WXRF, and certainly neutron activation analysis (NAA), advances in detector electronics and software have decreased the difference between these instruments and with miniaturization have heralded the portable XRF emerging technology (see Liritzis and Zacharias 2011). A number of experiments (summarized in Davis et al. 2011) have shown that EDXRF is the best technique in the analysis of volcanic rocks when sample destruction is not possible (see also Lundblad et al. 2008) (Fig. 2).

The overarching assumption seems to be that XRF, particularly energy-dispersive x-ray fluorescence spectrometry (EDXRF), solves so many of our problems in the archaeological sciences. Glascock (2011) most recently addressed this issue by directly comparing the results of NAA versus EDXRF for obsidian sources in Central Mexico. I refer you to that study for an in-depth discussion on this subject.

What's Good About XRF

The appeal of x-ray analysis of archeological specimens lies in its remarkable combination of practical and economic advantages:

- *Nondestructive*

  In the vast majority of cases, analyzed samples are not destroyed or changed by exposure to x-rays. They can thus be saved for future

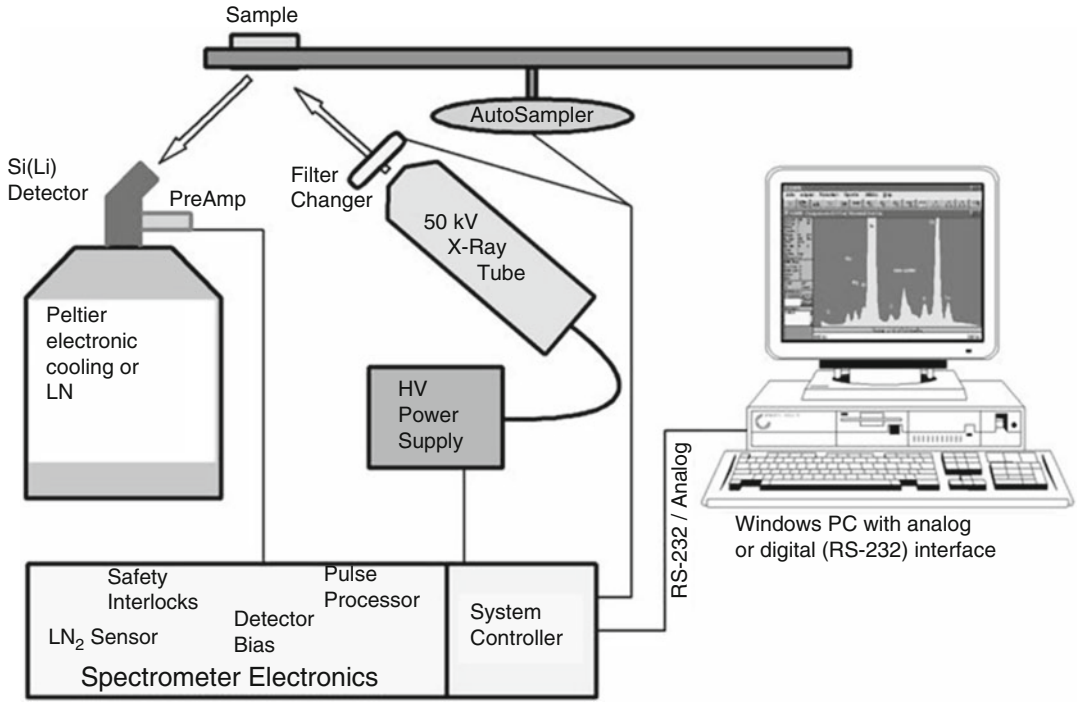

X-Ray Fluorescence (XRF): Applications in Archaeology, Fig. 2 Schematic drawing of a typical EDXRF instrument. Cooling can be either electronic Peltier or liquid nitrogen (LN). From Shackley (2011b: Fig. 2-9)

reference or used for other types of testing that may be destructive, such as obsidian hydration analysis.

- *Minimal Preparation*

  Many samples can be examined with little or no pretreatment, including almost all obsidian artifacts. While it is best to wash any sediments off archaeological specimens, it has been shown that if the dirt is minimal, and the artifact has not been subjected to heat so high as to melt some sediment matrix onto the sample, vigorous cleaning is not necessary (Shackley and Dillian 2002). This is mainly due to the penetration of x-rays in the mid-Z x-ray region beyond the surface, and while it does incorporate any contamination on the surface, it is generally not an issue if some soil remains in the flake scars. The analyzed volume is very large compared to any surface contamination. This is not the case with most metals, where patination and chemical weathering can radically change the composition at the surface and yield erroneous results (Hall 1960).

- *Fast*

  X-ray spectrometry enables chemical compositions to be determined in seconds. For an analysis of the elements Ti-Nb on the Berkeley Thermo desktop instrument, at 100 live seconds per sample, it takes about 3 to 5 minutes per sample depending on mass.

- *Easy to Use*

  Modern instruments run under graphical interfacing software that easily handles measurement setup and results calculation. Tasks that once required the constant attention of a trained analyst can now be handled by skilled students and are fully automated after, of course, effective calibration and method compilation.

- *Cost-Effective*

  Without the more involved sample preparation necessary in most WXRF and all

destructive analyses, the cost is significantly lowered per sample.

While this suggests that XRF will solve all our problems, it is not the all-knowing black box we would like it to be, however (Speakman et al. 2010).

What Nondestructive EDXRF Will Not Do

- Sample size limits. Samples >10 mm in smallest dimension and >2 mm thick are optimal for desktop EDXRF analyses (see Davis et al. 2011; Lundblad et al. 2008). Why is this important? Shackley (1989) and more recently (Eerkens et al. 2007) noted that for hunter-gatherers in the North American West, high residential mobility often requires that stone sources, including obsidian, be conserved for long periods of time. As an example, an Archaic hunter will attempt to rejuvenate a dart point rather than make a new one whenever possible as he or she moves through the landscape. The rejuvenation of that point creates debitage that is quite small, often smaller than 10 mm. With modern recovery techniques, these small debitage are recovered much more often than they were in the past, and to make a long story short, Eerkens et al. (2007) found that indeed these small obsidian flakes in North American Great Basin sites indicated not only greater distance to the original tool raw material but a greater diversity of sources than visible with an analysis of the larger flakes with EDXRF. So, while EDXRF can analyze much of the stone material left in prehistory, it may not solve all problems of interest to twenty-first-century archaeologists. To be fair, however, the procurement ranges that could be reconstructed were relatively accurate with samples above the 10 mm threshold in the Eerkens et al.'s (2007) study, and NAA had to be used on the smaller flakes which is essentially a destructive technique. Recently, however, with the newer digital EDXRF instrumentation and tube collimation, we have been able to reach sizes down to 2 mm with the ThermoScientific Quant'X EDXRF at Berkeley, and the "spot" sizes on many portable instruments are much smaller enabling the analysis of small debitage.
- Restricted elemental acquisition: As discussed below, nondestructive XRF is restricted generally to a subset of the mid-Z x-ray region; the best portion including Ti-Nb contains excellent incompatible elements for volcanic rocks (Shackley 2005). While some rare earth elements and those with low atomic numbers or with very low concentrations can be useful in discriminating sources, in most cases, XRF cannot solve that problem. This is discussed in detail in Glascock's comparison between XRF and NAA (2011).
- XRF cannot characterize small components – XRF like NAA is a mass analysis – every component in the irradiated substance is included in the analysis. It is possible to collimate the incoming x-rays from the tube and/or into the detector to focus on small components such as various minerals, but environmental scanning electron microscopy (ESEM), electron microprobe, or laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) is much better suited to this kind of analysis. However, the bulk analysis of volcanic rocks has shown to be quite effective.

It is true that XRF will not solve all our problems in archaeological provenance studies; it is simply the best nondestructive analytical tool at our disposal at this time (see Shackley et al. 2017).

Is pXRF a Revolution or Just the Latest Development in XRF?

While portable XRF has both become very popular and highly criticized, this is expectable in a discipline that borrows much of its analytical technology (Liritzis and Zacharias 2011; McAlister 2011; Shackley 2011a, b; Sheppard et al. 2011; Speakman and Shackley 2013). What seems to be most problematic is that these portable instruments were originally designed for mining and industrial applications seeking only qualitative results. These methods and calibration

are not necessary and sufficient to address archaeological problems where relatively precise quantitative data are required. Tied to this, most of the instruments, unlike lab/desktop EDXRF, did not allow the user to generate their own calibrations, indeed most relied solely on fundamental parameter routines that are often standardless and could not be modified beyond factory settings. The criticisms have had their effect, and many of the manufacturers are generating software that allows the user to employ linear calibrations by ratioing peaks/counts to the Compton scatter and thus eliminate the problem of differing sample sizes as earlier discussed by Davis et al. (2011) and Lundblad et al. (2008) for lab EDXRF instruments. Given these important shifts in the ability of pXRF, it will be possible to take a sensitive instrument to the field or museum settings and nondestructively analyze at least volcanic rocks with similar instrumental precision and accuracy of lab XRF instruments. Most of the pXRF systems now available do not acquire the range of elements that laboratory systems do (i.e., Na through U), but the mid-Z (i.e., $Z = 19–41$) sensitivity seems to be very good. There may come a time in the near future when portable systems will acquire the typical sodium through uranium elements that laboratory instruments can today, but they are not here yet (c.f. Liebmann 2017). This is likely the future of XRF in archaeology. Hopefully, archaeologists will evaluate it with the same skepticism that is healthy for the discipline.

Cross-References

- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Proton-Induced X-Ray Emission Spectroscopy (PIXE): Applications in Archaeology

References

Beckhoff, B., B. Kanngießer, N. Langhoff, R. Wedell, and H. Wolff, eds. 2006. *Handbook of practical X-ray fluorescence analysis*. New York: Springer.

Davis, M.K., T.L. Jackson, M.S. Shackley, T. Teague, and J. Hampel. 2011. Factors affecting the energy dispersive X-ray fluorescence (EDXRF) analysis of archaeological obsidian. In *X-ray fluorescence spectrometry (XRF) in Geoarchaeology*, ed. M.S. Shackley, 59–80. New York: Springer.

Eerkens, J.W., J.R. Ferguson, M.D. Glascock, C.E. Skinner, and S.A. Waechter. 2007. Reduction strategies and geochemical characterization of lithic assemblages: A comparison of three case studies from western North America. *American Antiquity* 72: 585–597.

Glascock, M.D. 2011. Comparison and contrast between XRF and NAA: Used for characterization of obsidian sources in Central Mexico. In *X-ray fluorescence spectrometry (XRF) in Geoarchaeology*, ed. M.S. Shackley, 161–192. New York: Springer.

Hall, E.T. 1960. X-ray fluorescent analysis applied to archaeology. *Archaeometry* 3: 29–37.

Hall, M.E. 2001. Pottery styles during the early Jomon period: Geochemical perspectives on the Moroiso and Ukishima pottery styles. *Archaeometry* 43: 59–75.

Jenkins, R. 1999. *X-ray fluorescence spectrometry*. 2nd ed. New York: Wiley.

Joyce, R.A. 2011. Is there a future for XRF in twenty-first century archaeology? In *X-ray fluorescence spectrometry (XRF) in Geoarchaeology*, ed. M.S. Shackley, 193–202. New York: Springer.

Liebmann, M.J. 2017. From landscapes of meaning to landscapes of signification in the American southwest. *American Antiquity* 82: 642–661.

Liritzis, I., and N. Zacharias. 2011. Portable XRF of archaeological artefacts: Current research, protocols and limitations. In *X-ray fluorescence spectrometry (XRF) in Geoarchaeology*, ed. M.S. Shackley, 109–142. New York: Plenum Press.

Lundblad, S.P., P.R. Mills, and K. Hon. 2008. Analysing archaeological basalt using non-destructive energy-dispersive X-ray fluorescence (EDXRF): Effects of post-depositional chemical weathering and sample size on analytical precision. *Archaeometry* 50: 1–11.

McAlister, A.J. 2011. Methodological issues in the geochemical characterization and morphological analysis of stone tools: Q case study from Nuku Hiva, Marquesas Islands, East Polynesia. Unpublished Ph.D. dissertation, University of Auckland.

McCarthy, J.J., and F.H. Schamber. 1981. Least-squares fit with digital filter: A status report. In *Energy dispersive X-ray spectrometry*, ed. K.F.J. Heinrich, D.E. Newbury, R.L. Myklebust, and C.E. Fiori, 273–296. Washington, D.C.: National Bureau of Standards Special Publication 604.

Mills, B.J., J.J. Clark, M.A. Peeples, W.R. Haas Jr., J.M. Roberts Jr., J.B. Hill, D.L. Huntley, L. Borck, R.L. Breiger, A. Clauset, and M.S. Shackley. 2013. Transformation of social networks in the late pre-Hispanic US southwest. *PNAS* 110: 5785–5790.

Moseley, H.G.J. 1913/1914. High frequency spectra of elements. *The Philosopher's Magazine* 26: 1024–1034 and 27: 703–713.

Neff, H. ed. 1992. Chemical characterization of ceramic pastes in archaeology. *Monographs in World Archaeology* 7. Madison: Prehistory Press.

Pollard, A.M. 1996. The geochemistry of clays and provenance of ceramics. In *Archaeological chemistry*, ed. A.M. Pollard and C. Heron, 104–1e47. Cambridge: Royal Society of Chemistry.

Pollard, A.M., and P. Bray. 2007. A bicycle made for two? The integration of scientific techniques and archaeological interpretation. *Annual Review of Anthropology* 36: 245–259.

Potts, P.J., and M. West, eds. 2008. *Portable X-ray fluorescence spectrometry: Capabilities for in situ analysis*. Cambridge: The Royal Society of Chemistry.

Röntgen, W.K. 1898. On a new kind of rays: Second communication. *Annals of Physical Chemistry* 64: 1–11.

Shackley, M.S. 1989. Early hunter-gatherer procurement ranges in the Southwest: evidence from obsidian geochemistry and lithic technology. Unpublished PhD dissertation, Tempe: Arizona State University.

Shackley, M.S. 2005. *Obsidian: Geology and archaeology in the north American southwest*. Tucson: University of Arizona Press.

Shackley, M.S., ed. 2011a. *X-ray fluorescence spectrometry (XRF) in Geoarchaeology*. New York: Springer.

Shackley, M.S. 2011b. An introduction to x-ray fluorescence (XRF) analysis in archaeology. In *X-ray fluorescence spectrometry (XRF) in Geoarchaeology*, ed. M.S. Shackley, 7–44. New York: Springer.

Shackley, M.S., and C. Dillian. 2002. Thermal and environmental effects on obsidian geochemistry: Experimental and archaeological evidence. In *The effects of fire and heat on obsidian*, ed. J.M. Loyd, T.M. Origer, and D.A. Fredrickson, 117–134. Sacramento: Cultural Resources Publication, Anthropology-fire History, U.S. Bureau of Land Management.

Shackley, M.S., L. Morgan, and D. Pyle. 2017. Elemental, isotopic, and geochronological variability in Mogollon-Datil volcanic province archaeological obsidian, southwestern USA: Solving issues of intersource discrimination. *Geoarchaeology*. https://doi.org/10.1002/gea.21672.

Sheppard, P.J., G.J. Irwin, S.C. Lin, and C.P. McCaffrey. 2011. Characterization of New Zealand obsidian using PXRF. *Journal of Archaeological Science* 38: 45–56.

Sillar, B., and M.S. Tite. 2000. The challenge of "technological choices" for materials science approaches in archaeology. *Archaeometry* 42: 2–20.

Speakman, R.J., and M.S. Shackley. 2013. Silo science and portable XRF in archaeology: A reply to Frahm. *Journal of Archaeological Science* 40: 1435–1443.

Speakman, R.J., S.C. Phillips, V. Florey, N. Little, and J.G. Iñañez. 2010. Approaches to micro-xrf analysis of obsidian. Paper presented at the 38th International Symposium on Archaeometry, Tampa Bay, Florida.

Speakman, R.J., N.C. Little, D. Creel, M.R. Miller, and J.G. Iñañez. 2011. Sourcing ceramics with portable XRF spectrometers? A comparison with INAA using Mimbres potter from the American Southwest. *Journal of Archaeological Science* 38: 3483–3496.

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Yafteh Cave

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Introduction

The site of Yafteh is a well-shaped Karstic cave that had been used as a base camp by the Upper Paleolithic hunter-gatherers of Khorramabad valley of Central Zagros between 29,000 and 39,500 years ago. The Yafteh cave is one of the main reference sites of Iranian Upper Paleolithic which has yielded a well-dated archaeological sequence and several large assemblages of lithic artifacts, faunal remains, and considerable number of symbolic objects (Otte et al. 2007, 2012; Shidrang 2015, 2018; Mashkour et al. 2009). The lithic industries of this site are relatively well defined from both typological and technological points of view and may be considered as the best representative of Baradostian/Zagros Aurignacian culture in the region. Yafteh cave is located at about 13 km to the West of Khorramabad (33^0 33'30"N, $48^0$12'41"E) in Lurestan province, western part of the central Zagros (Fig. 1).

Definition

Yafteh cave is a part of the karstic system in Mesozoic and Cenozoic limestone formations of the folded zone in the central Zagros and located on the piedmonts of a mountain ridge with the same name which is a part of the higher Sefid Kuh mountain range (Hole 2012; Otte et al. 2007, 2011). Yafteh is located at an elevation of 1278 m above sea level and is a south facing cave with a good panoramic overview of an alluvial plain or in fact a part of Khorramabad valley (Hole 2012).

The interior of the cave is an elongated chamber with maximum dimensions of 22 × 9 m, and its entrance measures about 10 m wide and 4 m high which opens toward southwest and connect to the valley floor with a gentle slope (Fig. 2). In addition to its perfect topographic location, several excavations at Yafteh cave revealed a wealth of Paleolithic archaeological remains, specifically from Upper Paleolithic period, that led the researchers to consider the cave as an Upper Paleolithic base camp (Hole and Flannery 1967; Hole 2012).

Key Issues and Current Debates

The Yafteh cave excavated for the first time by Frank Hole in 1965 as a part of a Prehistoric survey project he conducted with Kent Flannery in Khorramabad valley, southwestern Iran. The

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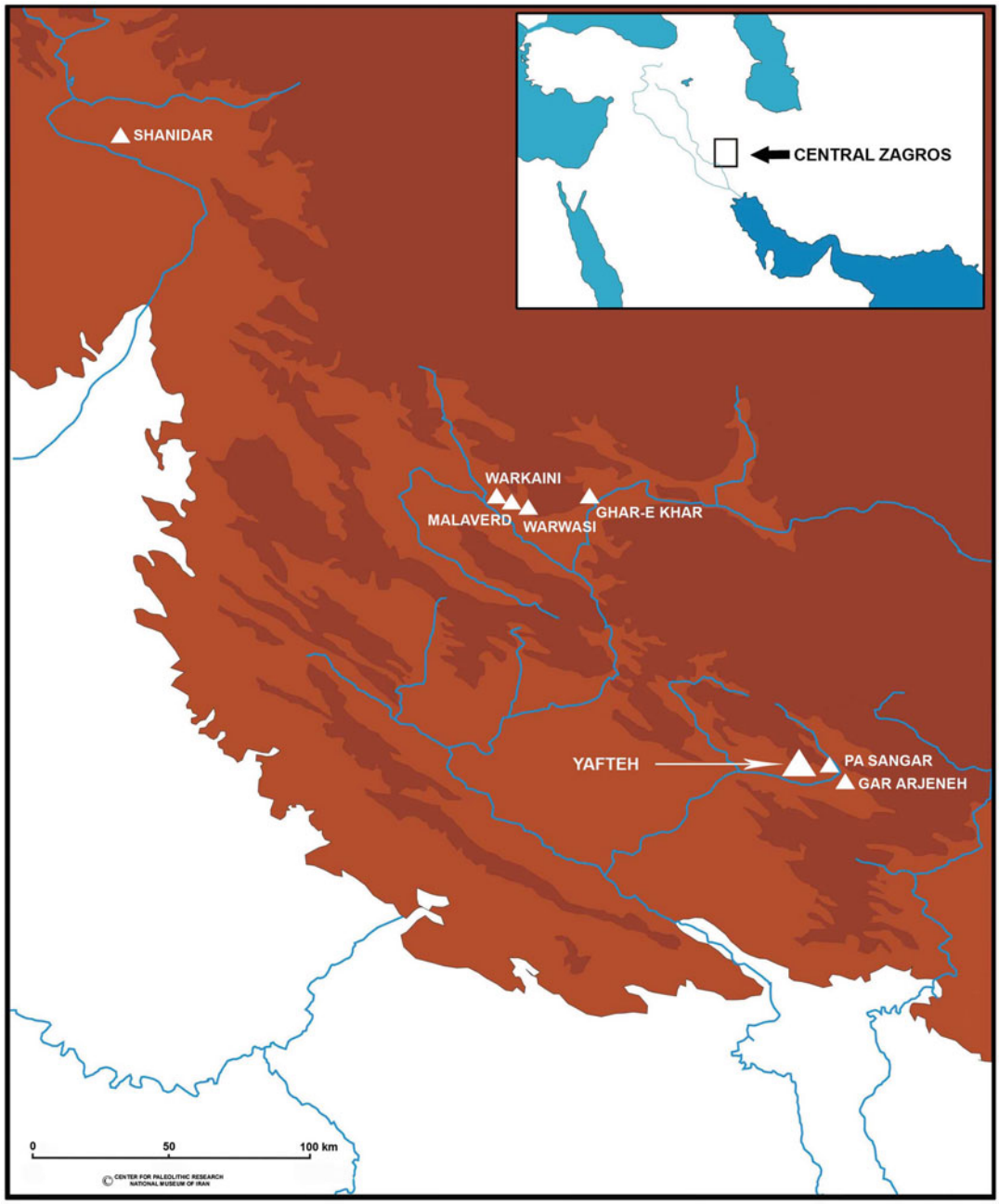

Yafteh Cave, Fig. 1 Map showing the location of Yafteh cave in the central Zagros. (After Otte et al. 2007)

excavation revealed two meters of Pleistocene deposits containing mainly the archaeological evidence of Upper Paleolithic period. Eleven radiocarbon dates obtained from 1965 excavation in Yafteh cave and most of the samples failed between 29,000 and 38,000 BP with an early date of 40,000 BP which attracted many attentions to the site (Hole and Flannery 1967).

Yafteh Cave, Fig. 2 Yafteh cave opens at the top of a gentle slope and offers a panoramic view of the alluvial plain of Khorramabad. (Photo: S. Shidrang)

The richness of archaeological materials discovered from the Khorramabad excavations permitted Hole and Flannery to detect the diachronic changes in the lithic artifacts found from the Late Mousterian to the Zarzian layers. Based on these investigations, they defined two subdivisions for the Upper Paleolithic lithic industries or Baradostian and also proposed the hypothesis of gradual development of the Late Mousterian industry into Baradostian in this region. According to these studies, the Baradostian lithic industry of the Yafteh cave displayed an increase in tool types and blade production, but the subsistence pattern did not show a great difference between the two periods (Hole and Flannery 1967).

During last four decades the lithic assemblages of Yafteh cave examined by several researchers, among them the reexaminations of the Yale University collection by Minzoni-Déroche, Otte, Kozlowski, and the National Museum of Iran's collection by J-G. Bordes and S. Shidrang, led to the better understanding of the typo-technological characteristics of these industries and highlighted their resemblance to the Aurignacian industries of Europe and Levant (Minzoni-Deroche 1993; Otte and Kozlowski 2004; Bordes and Shidrang 2004, 2009).

In 2005, a new test excavation at Yafteh cave by Otte and Biglari and then by Otte and Shidrang in 2008 provided new AMS dates for the Baradostian sequence of Yafteh cave (Otte et al. 2007, 2011, 2012; Shidrang 2007b). New chronological data lunched the possibility of intermediate chronological position of the Baradostian or Zagros Aurignacian (the term coined by Olszewski and Dibble in Olszewski and Dibble 1994) in southwest Asian Early Upper Paleolithic sequence which may overlap with the Early phase of Ahmarian and predate most of the dates of Levantine Aurignacian. These dates suggested the attribution of the sequence to an age between 24,500 and 36,000 14C BP and launched the probability of a single chronological signal of approximately 33,500 14 C BP for the major part of the Yafteh sequence (Fig. 3) (Otte et al. 2011).

Besides chronological investigations, the study of the 1965s Yafteh Collection by Bordes and Shidrang in 2004 updated the state of knowledge on the techno-typological evolution of the Baradostian industry and its place in the debate of Aurignacian technocomplexes (e.g., Bordes and Shidrang 2009). Bordes and Shidrang's work was inspired by the late 1990s ongoing

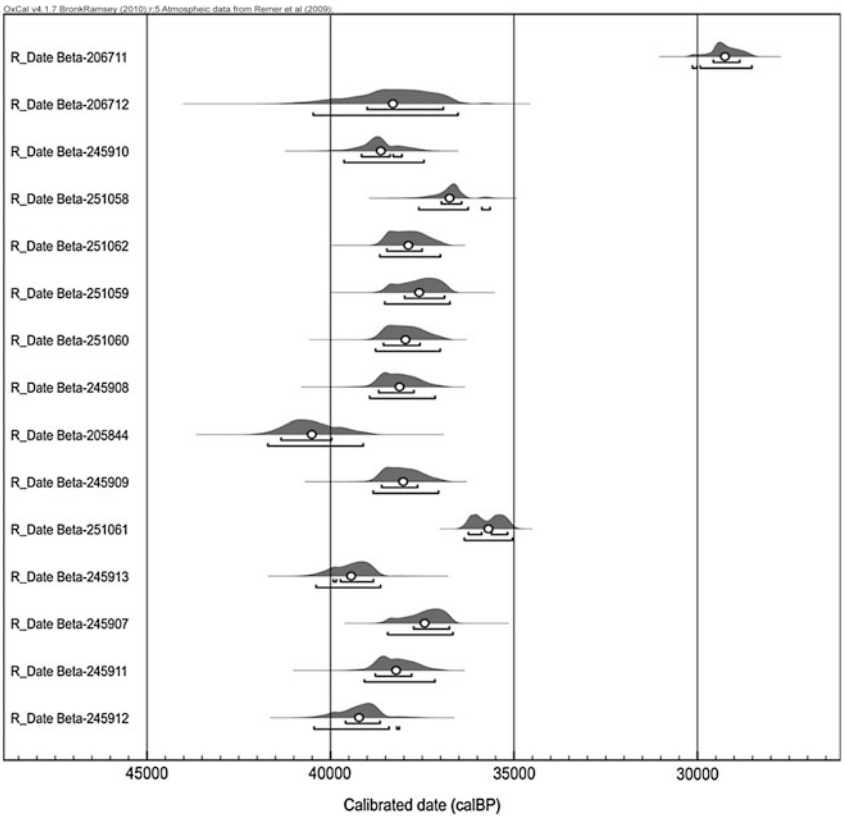

Depth (from ground level)	Collected	Age	cal BP ± 1 σ	Lab. Number	$^{13}C/^{12}C$	A
125	**2005**	**24470 ± 280**	**29252 ± 374**	**Beta-206711**	**−24.8 o/oo**	**89.7**
150	**2005**	**33400 ± 840**	**38300 ± 1049**	**Beta-206712**	**−24.4 o/oo**	**103.1**
200	1965	34800 + 2900/-4500		GX-711		
201	1965	32500 + 2400/-3400		GX-710		
201	1965	29410 ± 1150		SI-332		
210.5	**2008**	**33800 ± 330**	**38629 ± 528**	**Beta-245910**	**−23.7 o/oo**	**100.8**
212	1965	30860 ± 3000		SI-333		
213	**2008**	**32190 ± 290**	**36755 ± 384**	**Beta-251058**	**−22.5 o/oo**	**100**
213.5	**2008**	**33160 ± 240**	**37879 ± 450**	**Beta-251062**	**−25.3 o/oo**	**100**
226.5	**2008**	**32900 ± 290**	**37584 ± 501**	**Beta-251059**	**−24.0 o/oo**	**100**
234	**2008**	**33260 ± 300**	**37957 ± 473**	**Beta-251060**	**−23.4 o/oo**	**100**
236	**2008**	**33430 ± 310**	**38118 ± 471**	**Beta-245908**	**−24.7 o/oo**	**100**
240	**2005**	**35450 ± 600**	**40510 ± 672**	**Beta-205844**	**−24.9 o/oo**	**80.8**
245	**2008**	**33330 ± 310**	**38020 ± 474**	**Beta-245909**	**−25.2 o/oo**	**100**
250	1965	21000 ± 800		SI-336		
251	**2008**	**31120 ± 240**	**35696 ± 388**	**Beta-251061**	**−23.3 o/oo**	**100**
258.5	**2008**	**34360 ± 340**	**39437 ± 479**	**Beta-245913**	**−24.7 o/oo**	**103.9**
260	**2008**	**32770 ± 290**	**37435 ± 491**	**Beta-245907**	**−24.7 o/oo**	**100**
260	1965	38000 ± 3400/-7500		GX-709		
266.5	**2008**	**33520 ± 330**	**38212 ± 495**	**Beta-245911**	**−23.2 o/oo**	**100.1**
273	**2008**	**34160 ± 360**	**39220 ± 518**	**Beta-245912**	**−27.4 o/oo**	**103.4**
278	1965	31760 ± 3000		SI-334		
280	1965	>36000		GX-708		
280	1965	34300 ± 2100/-3500		GX-707		
285	1965	>40000		SI-335		
290	1965	>35600		GX-706		

Yafteh Cave, Fig. 3 Table summarizing 14C ages and calibrated results (Otte et al. 2011)

research on the appearance of the Aurignacian culture and the dispersal of Anatomically Modern Humans in Europe through the tracing of the two earlier industries of the Aurignacian classification (e.g., Bon 2002, 2006; Bordes 2002, 2006; Bazile and Sicard 1999). The 2004 study established a

new comparative framework for the Baradostian with other similar industries and increasingly put the emphasis on its resemblance to the Proto-Aurignacian of Europe and in part to the early Ahmarian of the Levant.

In the Baradostian sequence of the Yafteh cave, the lower part of the sequence is associated with an assemblage mainly oriented toward the production of Arjeneh points and relatively large, straight, or slightly curved Dufour bladelets. The bladelets or blanks of these tools were removed from prismatic cores or sometimes from narrow flake ridges. There are also a number of end-scrapers on blades which in some cases have Aurignacian retouch on their lateral edges (Fig. 4). The later phase of the Baradostian sequence in the Yafteh cave is characterized by the production of small twisted bladelets produced from carinated burins and nosed scrapers made mostly on cherty nodules and having fine and semi abrupt inverse or alternate retouch (Roc-de-Combe sub-type Dufour bladelets) (Fig. 5), which resemble the later phases of Aurignacian or the recent Aurignacian (Bordes and Shidrang 2009; Shidrang 2015, 2018).

A recent analysis of 2005–2008 Yafteh lithic assemblages combined with stratigraphical interpretations and information derived from other archaeological materials, suggested a three cultural phases model for the Yafteh sequence (Shidrang 2015, 2018). The oldest phase contains a lower frequency of artifacts, and the main technological characteristic of the assemblage is a few number of standard flat prismatic cores that their negatives of removals correspond to bladelets with a very straight profile and most probably moderate size blades from the initial stage of the reduction sequence. The toolkit is relatively simple including Baradostian bladelets type A (Dufour bladelets of Dufour subtype), Arjeneh points and retouched bladelets with a few retouched blades. Despite the limited number of artifacts in this phase, the tools percentage ratio to debitage is fairly high which may suggest the earliest phase of the sequence corresponds to short-term visits of EUP hunter-gatherers to the site rather than a long seasonal occupation (Shidrang 2015, 2018). The central phase of the Yafteh sequence is the main and probably the longest occupation of the site. This rich layer contains significant amount of archaeological materials, and it has an ashy texture with charcoal, visible fire place, and frequent traces of ocher. In the middle phase, blades increase (a separate line of blade production?) and frequently used as blank for end scrapers, notches, or typical Aurignacian retouched blades. There is a diversity of bladelet cores which display some degree of specialization for production of different bladelet types. Carinated burins that are an important characteristic of the upper phase or the last EUP occupation of the cave appear in the upper part of the middle phase. Among other elements, a considerable number of Arjeneh points as well as end scrapers on blades might indicate a base camp occupation specialized in hide working and piercing hides and ornaments in the middle phase of the sequence. While having many Proto-Aurignacian similarities in the earliest phase, the middle phase of the Baradostian in the Yafteh cave has been transformed into a more complicated industry with more diverse and intense specialization of tools (Shidrang 2015, 2018).

The small bladelets with twisted profile which were usually produced from carinated burins appear from the middle phase but increase in the upper part of the sequence. The small twisted bladelets mainly had no retouch, but some were retouched into Type "B" Baradostian bladelets or Dufour bladelets "Roc de Combe" subtype (Fig. 5). Contrary to bladelets which are frequent in the late phase, blades are less standard and lose their importance as the primary choice for end scrapers, being replaced by flakes. All these characteristics resemble the late Aurignacian of Europe which has received less attention compared to Early Aurignacian (Shidrang 2015, 2018). The Yafteh cave excavations yielded considerable evidence of personal ornaments, bone tools, and frequent use of ocher and other minerals throughout the sequence of Baradostian (Otte et al. 2007; Shidrang 2007a, 2015). Such evidence is completely absent in the Middle Paleolithic of the Zagros, and their presence in the early Baradostian may point to a considerable cultural differences between the behavioral patterns of the Middle and Upper Paleolithic hunter-gatherers in the Zagros (Shidrang 2015, 2018).

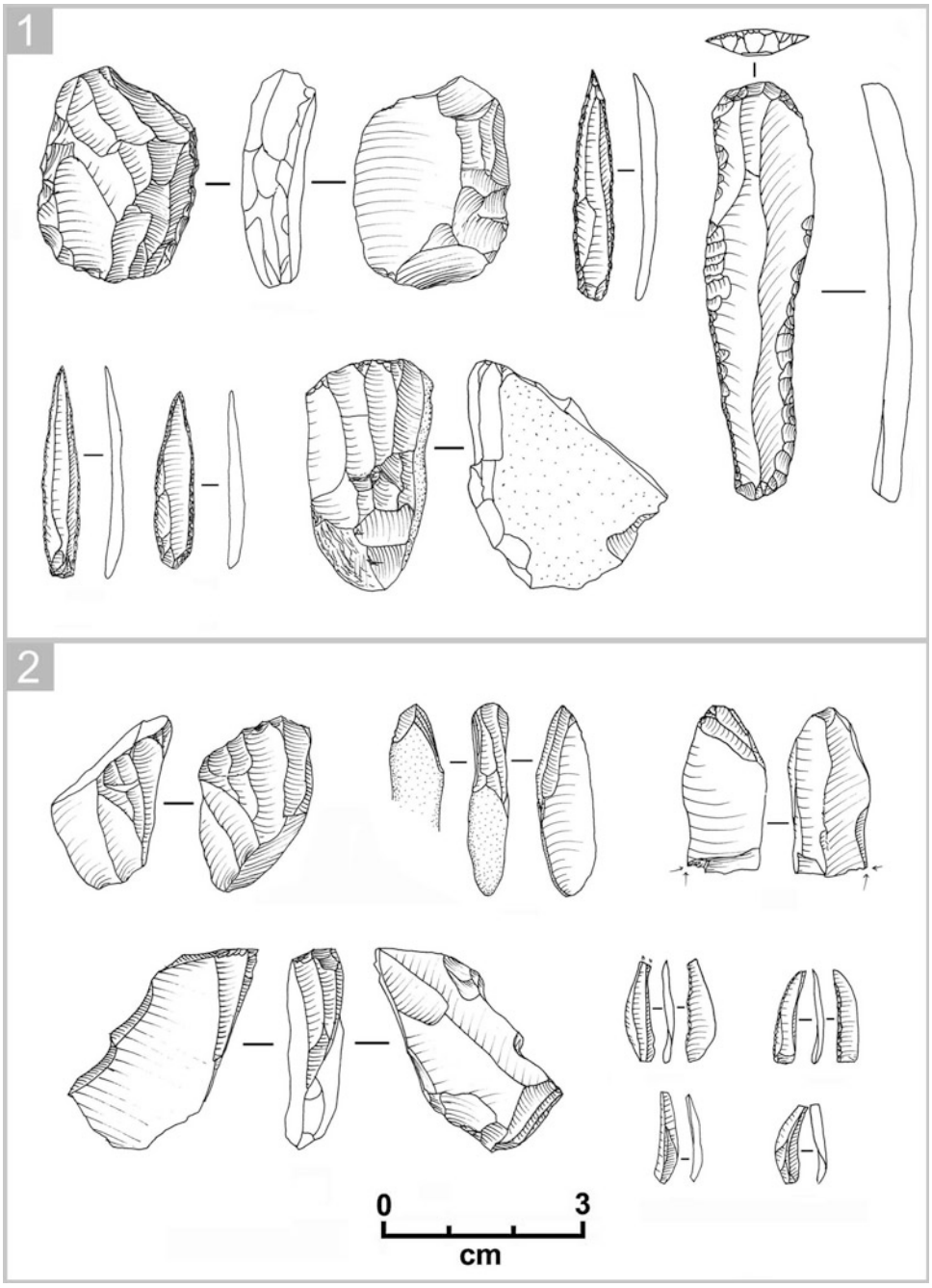

Yafteh Cave, Fig. 4 (**a**) Example of lithic artifacts from the middle phase of the Baradostian (**b**) Example of the lithic artifacts from the late phase of Baradostian at Yafteh cave (Shidrang 2018)

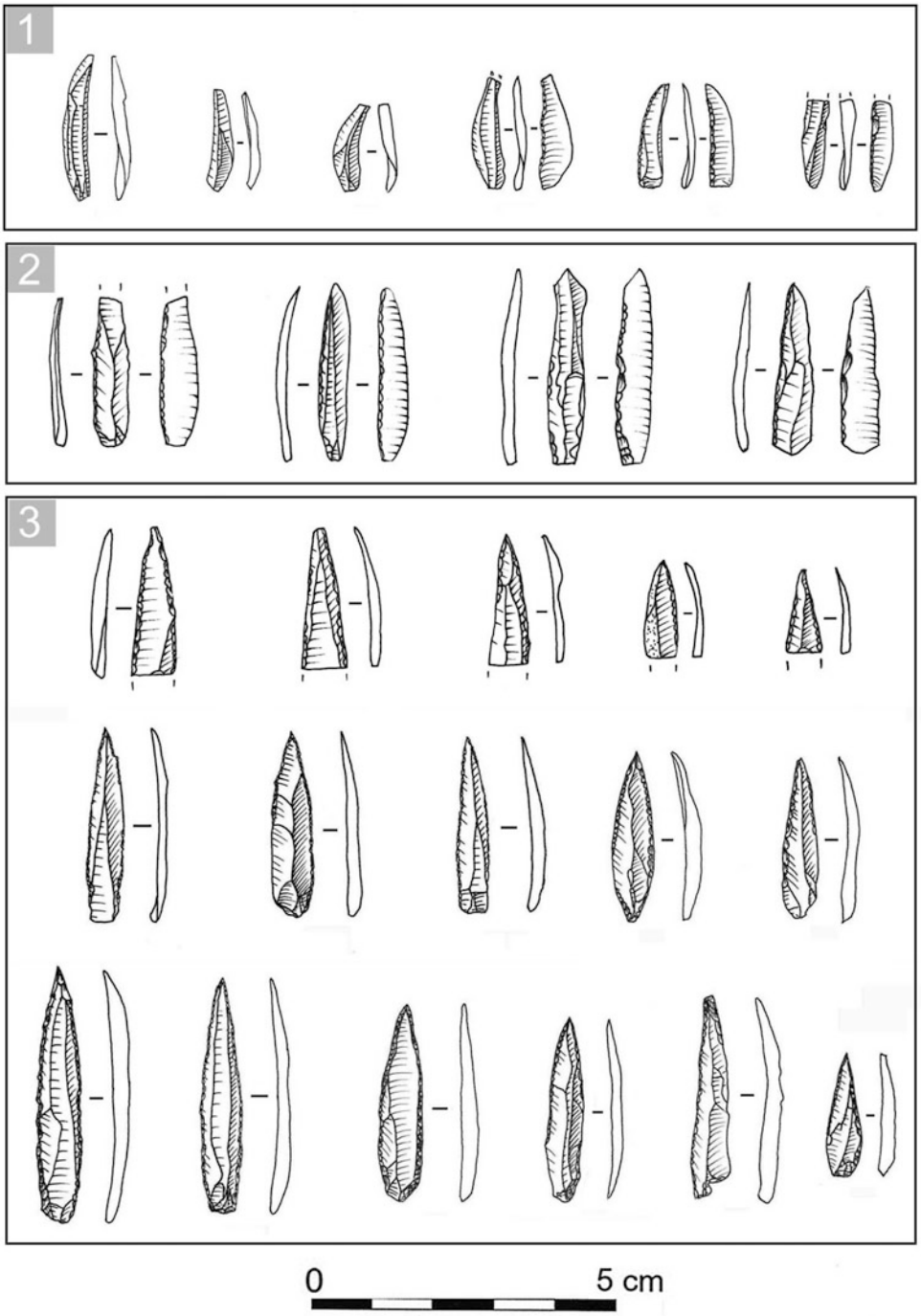

Yafteh Cave, Fig. 5 (**a**) Baradostian bladelets (Type B); (**b**) Baradostian bladelets (Type A); (**c**) Arjeneh points (Shidrang 2015, 2018)

Cross-References

- ▶ Europe: Early Upper Paleolithic
- ▶ Middle East Middle to Upper Paleolithic Transitional industries
- ▶ Warwasi: Geography and Culture

References

Bazile, F., and S. Sicard. 1999. Le premier Aurignacien du Languedoc oriental dans son contexte méditerranéen. In *Les faciès leptolithiques du nord-ouest méditerranéen: Milieux naturels et culturels*, ed. D. Sacchi, 117–125. Paris: Société Préhistorique Française.

Bon, F. 2002. *L'Aurignacien entre Mer et Océan. Réflexion sur l'unité des phases anciennes de l'Aurignacien dans le sud de la France*, Mémoire de la Société Préhistorique Française; 29. Paris: Société Préhistorique Française.

Bon, F. 2006. A brief overview of Aurignacian cultures in the context of middle-to upper transitional industries. In *Towards a definition of the Aurignacian*, ed. O. Bar-Yosef and J. Zilhão, 133–144. Lisboa: American School of Prehistoric Research/Instituto Português de Arqueologia.

Bordes, J.G. 2002. Les interstratifications Châtelperronien/Aurignacien du Roc-de-Combe et du Piage (Lot, France). Analyse taphonomique des industries lithiques, implications archéologiques. Thèse de doctorat de Préhistoire et Géologie du Quaternaire de l'Université Bordeaux.

Bordes, J.G. 2006. News from the west: A reevaluation of the classical Aurignacian sequence of the Perigord. In *Towards a definition of the Aurignacian*, ed. O. Bar-Yosef and J. Zilhão, 147–171. Lisboa: Instituto Português de Arqueologia.

Bordes, J.G., and S. Shidrang 2004. Les premières manifestations de la modernité culturelle au Moyen Orient: une première analyse des industries lithiques de Yafteh (Khorramabad, prvince de Lorestan). In *Le Paléolithique d'Iran, Rapport de la mission archéologique française en Iran (période paléolithique), exemplaire multigraphié remis au Ministère des Affaires Etrangères*, eds. J. Jaubert and F. Biglari, 110–124.

Bordes, J.G., and S. Shidrang. 2009. La Sequence Baradostienne de Yafteh (Khorramabad, Lorestaan, Iran). In *Iran Palaeolithic. Proceedings of the XV World Congress UISPP, Lisbonne, BAR International Series, 28*, ed. M. Otte, F. Biglari, and J. Jaubert, 85–100.

Hole, F. 2012. The 1960s excavations at Yafteh cave. In *L'Aurignacien de la grotte Yafteh (fouilles 2005–08) et son contexte/the Aurignacian of Yafteh Cave (2005–08 excavations) and its context*, ed. M. Otte, S. Shidrang, and D. Flas, 11–25. Liège: ERAUL 132.

Hole, F., and K.V. Flannery. 1967. The prehistory of southwestern Iran: A preliminary report. *Proceedings of the Prehistoric Society* 33: 146–206.

Mashkour, M., V. Radu, A. Mohaseb, N. Hashemi, M. Otte, and S. Shidrang. 2009. The upper Paleolithic faunal remains from Yafteh cave (central Zagros) 2005 campaign. A preliminary study. In *Le Paleolithique D'Iran*, ed. M. Otte, F. Biglari, and J. Jaubert, 73–85. Oxford: Archaeopress.

Minzoni-Deroche, A. 1993. Middle and upper paleolithic of the Taurus-Zagros region. In *The paleolithic prehistory of the Zagros-Taurus, University Museum symposium series, 5*, ed. D.I. Olszewski and H.L. Dibble, 147–158. University of Pennsylvania.

Olszewski, D.I., and H.L. Dibble. 1994. The Zagros Aurignacian. *Current Anthropology* 35 (1): 68–75.

Otte, M., and J. Kozlowski. 2004. La Place du Baradostien dans l'origine du Paléolithique Supérieur d'Eurasie. *L'anthropologie* 108: 395–406. ELSEVIER.

Otte, M., F. Biglari, D. Flas, S. Shidrang, N. Zwyns, M. Mashkour, R. Naderi, A. Mohaseb, N. Hashemi, J. Darvish, and V. Radu. 2007. The Aurignacian in the Zagros region: New research at Yafteh Cave, Lorestan, Iran. *Antiquity* 81: 82–96.

Otte, M., S. Shidrang, N. Zwyns, and D. Flas. 2011. New radiocarbon dates for the Zagros Aurignacian from Yafteh Cave, Iran. *Journal of Human Evolution* 61: 340–346.

Otte, M., S. Shidrang, and D. Flas, eds. 2012. *L'Aurignacien de la grotte Yafteh (fouilles 2005–08) et son contexte/the Aurignacian of Yafteh Cave (2005–08 excavations) and its context*, 165. Liège: ERAUL 132.

Shidrang, S. 2007a. The Early Upper Paleolithic Ornamental objects from Yafteh Cave and Pa Sangar Rockshelter, Lurestan. *Iranian Journal of Archaeology and History* 41: 38–44 (In Farsi, with an English abstract.).

Shidrang, S. 2007b. The Early Upper Paleolithic lithic assemblages from F15 test pit (2005), Yafteh Cave, Iran: A typo-technological study, Master thesis, Universita degli studi di Ferrara, Italy.

Shidrang, S. 2015. The Early Upper Paleolithic of Zagros: Techno- typological assessment of three Baradostian lithic assemblages from Khar Cave (Ghar-e Khar), Yafteh Cave and Pa-Sangar rockshelter in the Central Zagros, Iran. Ph.D. dissertation, Bordeaux University.

Shidrang, S. 2018. The Middle to Upper Paleolithic Transition in Zagros: The appearance and evolution of Baradostian. In *The Middle and Upper Paleolithic Archeology of the Levant and Beyond, Replacement of Neanderthals by Modern Humans Series*, ed. Y. Nishiaki and T. Akazawa. Springer Nature Singapore Pte Ltd.

Yak: Domestication

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Basic Species Information

The domesticated yak (*Bos grunniens* Linnaeus, 1766) is a bovine species with unique long hairy skirts on its chest, flanks, and rump as well as a fully haired and horse-like tail. There are ~14 million domestic yak distributed at high altitudes from 2,000 to 5,000 m accompanied by hypoxia and low temperatures throughout the Qinghai-Tibetan Plateau, Himalayan and Altai regions in Asia. Yak is the most important livestock species for the nomads, mainly the Tibetans, in the region given their importance in producing meat, milk, fiber, hide, dung fuel as well as pack energy (Olsen 1990; Wiener et al. 2003; Leslie and Schaller 2009). The wild yak (*Bos mutus* Przewalski, 1883) survives in remote northern Qinghai-Tibetan Plateau at elevations from 3,000 to 5,500 m. The number of wild yak has shrunk from millions to less than 15,000 in the last century due to poaching and competition with livestock. This led to isolated and fragmented habitats with major populations present in northern Tibet and western Qinghai provinces, China. Yak are recognized as vulnerable among the IUCN Red List of Threatened Species (Olsen 1990; Wiener et al. 2003; Leslie and Schaller 2009).

The extant wild yak is thought to be the direct ancestor of the domestic yak. The domestication process may have begun ~10,000 years ago by the ancient nomadic Qiang people. The establishment of a primary yak industry and culture in China started at least 4,500 years ago. However, the taxonomic classifications and scientific names of both domestic and wild yak have gone through various changes under the genera of *Bos*, *Poephagus*, and *Bison*, mostly based on limited morphological and anatomical descriptions.

Apart from the hairy skirts, yak has 14 dorsal vertebrae and 14 pairs of ribs which are one and one pair more than other bovine species but five lumbar and 12–16 coccygeal vertebrae which are one and four to zero less than other bovids, respectively (Olsen 1990; Wiener et al. 2003; Leslie and Schaller 2009). Although the yak shares the basic vertebral column structure with American bison and European wisent following their probable common and recent past ancestry in central Asia (Leslie and Schaller 2009), Olsen (1990) found some anatomical difference in their skulls. There have been some reports on bovid fossil related to ancestral yak, but Olsen (1990) challenged their taxonomic assignments based on fragmented specimens excavated from Pleistocene locations in Alaska of USA, China, India, Nepal, and Russia. In the documentation of most but limited archaeological and recent historical evidence in China, Olsen (1990) concluded that the fundamentals of when and how yak domestication began remain obscure.

Guo et al. (2006) and Qi et al. (2008) investigated the genetic origin of domestic yak using variations in mitochondrial DNA (mtDNA). In two separate datasets, the former with only Chinese yak samples and the latter with a complete sampling across all eight yak keeping countries in Asia, two or three deeply divergent (>100,000 years before present) and diversified phylogenetic mtDNA lineages were observed. The major lineages were shared by domestic and wild yak while there was no clear geographic structure in terms of the distribution patterns of the major mtDNA lineages among domestic yak populations, supporting a single and recent origin of domestic yak from wild yak gene pool. Molecule dating of the major lineage (mt-I) from Qi et al. (2008) suggested an expansion of domestic yak population ~5000 years ago, which largely agrees with available archaeological evidence for yak domestication (Wiener et al. 2003). Different refuge wild yak populations harboring the

mtDNA lineages were thought to have survived over the most recent glacial period when the Qinghai-Tibetan Plateau was not completely covered by ice. Such populations intermixed before domestication and thus contributed to the unique mtDNA diversity reservoir in today's domestic yak.

The highest mtDNA diversity and a significantly expanded major lineage (mt-I) identified in the eastern Qinghai-Tibetan Plateau area advocated it to be considered as the primary center for a single domestication event for yak. Two separate dispersal routes were testified following the significant but gradient reduction in mtDNA diversity in domestic yak populations distributed along a westward route via the "Pamir Knot" across the Himalayan and Kunlun mountains and a northward route across the South Gobi and Gobi Altai mountains (Qi et al. 2008). An extended Chinese yak mtDNA D-loop dataset and complete mtDNA sequences confirmed the previous findings and revealed a unique haplogroup present in wild yak (Wang et al. 2010).

The hybridization of female yak crossing with local male taurine (*B. taurus*) or indicine (*B. indicus*) cattle has been practiced since 1100 BCE and this practice intensified in the mid-1900s in order to explore the heterosis in milk and meat performance. The F1 yak-cattle hybrids are called Pien Niu by the Chinese, of which the females are fertile but males remain sterile until the third generation of backcrossing (Wiener et al. 2003; Qi et al. 2010). Molecular marker–based analyses revealed cattle introgression in most of domestic yak populations in Asia and a higher cattle admixture was detected among the Chinese and Mongolian yak populations than those kept in the Himalayan region and Pamir Plateau area (Qi et al. 2010). Wild and domestic yak can interbreed to produce fertile offspring of both sexes, and semen collected from the tamed wild yak bulls has been successfully applied to improve domestic yak genetics since 1990s in China (Wiener et al. 2003).

Recently, the draft genome assembly of a female domestic yak was published based on a whole-genome shotgun sequencing strategy at 65-fold coverage with a total length of 2,657 Mb base pairs. Comparative analyses between the yak and cattle genomes revealed that yak carried expanded gene families responsible for sensory perception and energy metabolism as well as enriched protein domains related to sensing extracellular environments and hypoxic stress, which were found to be under positive selection in evolution (Qiu et al. 2012). These findings are important to understand the unique adaptability of the yak to high altitudes. Such genome resources would certainly facilitate the identification of genes and alleles for genetic and genomic selection to improve the productivity of yak.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Cattle: Domestication and Development
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Water Buffalo: Domestication

References

Guo, S.C., P. Savolainen, and J.P. Su. 2006. Origin of mitochondrial DNA diversity of domestic yaks. *BMC Evolutionary Biology* 6: 73.

Leslie, D.M., Jr., and G.B. Schaller. 2009. Bos grunniens and *Bos mutus* (Artiodactyla: Bovidae). *Mammalian Species* 836: 1–17.

Olsen, S.J. 1990. Fossil ancestry of the yak, its cultural significance and domestication in Tibet. *Proceedings of the Academy of Natural Sciences of Philadelphia* 142: 73–100.

Qi, X.B., J.L. Han, and R. Blench. 2008. Understanding the yak pastoralism in Central Asian Highlands: Genetic evidence for origin, domestication and dispersion of domestic yak. In *Past human migrations in East Asia: Matching archaeology, linguistics and genetics*, ed. A. Sanchez-Mazas, R. Blench, M.D. Ross, I. Peiros, and M. Lin, 427–442. London/New York: Routledge/Taylor & Francis Group.

Qi, X.B., J.L. Han, and G. Wang. 2010. Assessment of cattle genetic introgression into domestic yak populations using mitochondrial and microsatellite DNA markers. *Animal Genetics* 41: 242–252.

Qiu, Q., G. Zhang, and T. Ma. 2012. The yak genome and adaptation to life at high altitude. *Nature Genetics* 44: 946–949. https://doi.org/10.1038/ng.2343.

Wang, Z.F., X. Shen, and B. Liu. 2010. Phylogeographical analyses of domestic and wild yaks based on mitochondrial DNA: New data and reappraisal. *Journal of Biogeography* 37: 2332–2344.

Wiener, G., J.L. Han, and R.J. Long. 2003. *The yak*. 2nd ed. Bangkok: The Regional Office for Asia and the Pacific. Food and Agriculture Organization of the United Nations.

Yamanouchi, Sugao

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Basic Biographical Information

Sugao Yamanouchi (1902–1970) was a Japanese archaeologist, often called the "Father of Jomon studies". Jomon is the name of the Japanese hunter-gatherer period/culture with pottery. Yamanouchi was born in Tokyo in 1902, the son of the teacher of Japanese literature. In 1914, he entered Waseda Junior High School (in the old system of education, almost equal to the high school in the present educational system). During his school days, he was interested in evolution and Marxism/anarchism and read *On the Origin of Species* by Charles Darwin and *Das Kapital* by Karl Marx, in their original languages. He also had fun collecting artifacts on some archaeological sites, including Jomon shell middens, and sometimes had a chance to talk with the famous anthropologist, Ryuzo Torii in the University of Tokyo, who was a lecturer at that time.

In 1919, following Dr. Torii's advice, Sugao Yamanouchi chose to enter not high school but the college course of the Department of Anthropology at the University of Tokyo (in the old system of education, almost equal to the half stage of an undergraduate degree in the present educational system). As an undergraduate, he had a great interest in genetics, and his bachelor thesis was based on the subject. In 1922 he graduated from the college course. He worked at Tohoku University, located in the northeast part of Japan, as a junior assistant of the Department of Anatomy from 1924 to 1933. Over the period of a decade, he excavated a large number of shell middens – including those at Daigi-gakoi, Obora, and Satohama – in order to accumulate data for the sequential stratification of Jomon pottery. His ambition was to construct a chronological framework for Japanese prehistoric pottery, in order to establish the sequence of human skeletons of prehistoric Japan. However, Yamanouchi gradually came to dislike his job in the department because of its hierarchic nature, and because he held a sharply divided opinion on genetics, which was against that of the department professor, Kotondo Hasebe, he resigned his post in 1933. Yamanouchi decided to remain as an archaeologist with no formal institutional affiliation. After returning to Tokyo, he began to hold study meetings on prehistory, and these produced a journal, *Senshi Koko-gaku* (*Prehistoric Archaeology*), which continued for several years.

In 1946 Yamanouchi was appointed as a lecturer with the Department of Anthropology at the University of Tokyo, probably because of a collapse of imperialism due to the defeat of World War II. Yamanouchi served as a member of a number of committees of the Japanese Archaeological Association, which was the first nationwide organization of archaeology, from the time of its inception in 1948. In 1962, he received a doctorate from Kyoto University, and on the very same day, he left the University of Tokyo upon reaching retirement age. After that, Yamanouchi joined the Department of Arts and Literature of Seijo University as a professor of culture history. In the summer of 1970, he died by pneumonia.

Major Accomplishments

Sugao Yamanouchi's major accomplishments include identification of the impression of cord mark – which is meant by the Japanese word, "*Jomon*" – on pottery in Japanese hunter-gatherer culture. Consistent with its literal sense, Jomon pottery mostly has cord impressions. The wide range of variation in cord impressions in Jomon pottery serves as a key to determine the local pottery type or to subdivide the chronological sequence of a local pottery tradition. Prior to

Dr. Yamanouchi's work, this decorative technique had long been unsolved. Dr. Yamanouchi solved the riddle no later than 1929 (Saito and Sakadume 1998), by showing that, in most cases, the cord mark was produced not by the mere impression of cords but by rolling either a cord or a wound strand around a shaft.

Dr. Yamanouchi was the first scholar to attempt to construct the chronological chart of Jomon pottery sequences in type and to apply this throughout the Japanese mainlands. When he excavated the Ogawa shell midden in Fukushima in 1924, he fully recognized the importance in the stratigraphical evidence which he had already known from Dr. Matsumoto's work on typological sequence of Jomon pottery based on the stratigraphical data from the two shell middens – Satohama and Usozawa – excavated in late 1910s (Matsumoto 1919). Then, Yamanouchi gradually devoted himself to research in Jomon pottery sequence. It is true that he did not come back to anatomical analysis which would rely upon the time measure proposed by him of pottery sequences, while every scholar of Jomon culture has relied basically upon his framework of the sequence since his work. In 1930s, his chronological investigation clarified the almost simultaneous introduction of rice farming throughout the main parts of Japanese Archipelago. In Japanese prehistoric studies, since then, the argument for rivalry ceased to be operative between the western Japan as earlier rice cultivation areas and the eastern Japan as delayed cultivation areas deeply based on fishing, hunting, and gathering.

Dr. Yamanouchi's detailed research shed new light on the question of subsistence in Japanese prehistory. In 1925, he identified a rice impression on stone-age pottery (Yamanouchi 1925), which he typologically dated to the beginning of Yayoi period. His work demonstrated that rice cultivation was introduced in the Japanese Archipelago during the Yayoi period. This interpretation was put forward at a time when most archaeologists believed that rice cultivation did not start until the introduction of metal. Later, Dr. Yamanouchi hypothesized that salmon and nuts had served as staple food in the diet of the Jomon period in the eastern Japan and that this enabled people to achieve prosperity, in contrast to western Japan where salmon hardly existed. Dr. Yamanouchi's hypothesis derived from ethnographic analogies with salmon exploitation by Indigenous groups in California, USA. This is an example of his broad knowledge of world prehistory and ethnography. It is an irony, however, that his understanding of Russian prehistory prevented him from accepting radiocarbon dates for Jomon pottery. He had rejected the idea that the early Jomon pottery dated back to earlier than 5000 BP, since this was not supported by his typological studies of stone implements in Japanese Archipelago and the Russian continent. He did not accept radiocarbon dating unless it was supported by comparison between artifacts themselves.

Dr. Yamanouchi placed much importance on academic freedom throughout his academic career and paid keen attention to the priority of scholars as to who proposed a new theory. He often fiercely criticized other scholars who he thought encroached on his intellectual territory. His frankness led to a number of scholars having difficulties with him. However, there are many archaeologists who are proud to be known as his follower. Sugao Yamanouchi's eventful life with its outstanding and varied accomplishments in archaeology has become almost a legend within the history of prehistoric studies in Japan.

Cross-References

- ▶ Japan: Indigenous Occupation
- ▶ Periodization in Japanese Prehistoric Archaeology
- ▶ Torii, Ryūzō

References

Matsumoto, H. 1919. Miyato-jima Satohama oyobi Kesennuma Usozawa Kaiduka no doki, hu toku-ni dokimoyou-ron. [Pottery recovered from Satohama shell-midden in Miyato Island and Usozawa shell-midden in Kesen County, with discussion on its motif.] *Gendai-no-kagaku [The Scientific Gazette]* 7(5–6): 10–42 (in no.5) and 20-48 (in no.6). (in Japanese).

Saito, T., and H. Sakadume. 1998. Taidan: Saito koko-gaku wo megutte. [An interview: Archaeology and Professor Saito]. In *Saito Tadashi Chosaku Senshu [A selection of Tadashi Saito's works, Volumes 6.],* ed. T. Saito, 233–260. Tokyo: Yuzan-kaku (in Japanese).

Yamanouchi, S. 1925. Sekki jidai nimo ine ari. [There existed rice in Stone Age.] Jinruigaku-zasshi. *The Journal of the Anthropological Society of Tokyo* 40 (5): 181–184. (in Japanese).

Further Reading

Habu, J. 2004. *Ancient Jomon of Japan*. Cambridge: Cambridge University Press.

Kenrick, D.M. 1995. *Jomon of Japan*. London: Kegan Paul International.

Kobayashi, T. 2004. *Jomon reflections*. Oxford: Oxbow Books.

Publication Committee for Twenty-five Years Memorial Essays After the Late Professor Sugao Yamanouchi's Death. ed. 1996. *Garyo tensei*. [*The finishing strokes*.] Aizu Wakamatsu: Tosho-Insatsu (in Japanese).

Sahara, M. 1984. Yamanouchi Sugao ron. [On Sugao Yamanouchi.]. In *Jomon bunka no Kenkyu [Studies on the Jomon culture] volume 10*, ed. S. Kato, T. Kobayashi, and T. Fujimoto, 232–240. Yuzankaku: Tokyo (in Japanese).

Sato, T. 1974. Nihon Kokogaku Senshu. [A series of selected papers of distinguished Japanese archaeologists.] Yamanouchi Sugao. Tokyo: Tsukiji-Shokan (in Japanese).

Terada, K. 1975. Nihon no jinrui-gaku. [Anthropology in Japan.] Tokyo: Shisaku-Sha (in Japanese).

Yamanouchi, S. 1967–72. *Senshi koko-gaku ronbun-shu*. [*Collections of papers on prehistoric archaeology.*] Tokyo: Senshi-Koko-gaku-Kai (in Japanese).

Yamanouchi, S. 1979. Nihon sensi-doki no Jomon. [Cord marks on Japanese prehistoric pottery.] Tokyo: Senshi-Koko-gaku-Kai (in Japanese).

Yams: Origins and Development

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Basic Species Information

Yams are flowering plants of the family Dioscoreaceae, consisting of more than 800 species of climbing vines and woody shrubs. Many members of the yam family produce subterranean tubers or tuberous stems, and have heart-shaped leaves, small green or white flowers, and a fruit that is a winged capsule or berry. Yams are distributed widely throughout the tropical and warm temperate regions of the world, though current geographic distribution has almost certainly been influenced by human translocations. Today yams are widely used as an important food staple and as a fallback food in Africa, Asia, the Caribbean, Pacific islands, and South America.

In 2007, worldwide yam production totaled 52 million t, of which Africa produced 96%, most of which derived from West Africa, with Nigeria alone producing 71% of that total (IITA 2009). Yams are a good source of dietary fiber and are rich in carbohydrates, vitamin C, and essential minerals. Yams may be stored for up to six months after harvest, making them ideal for transport, and can be consumed by boiling, roasting, baking, frying, mashing, and even processing into flour, which will keep for prolonged periods. Spanish and Portuguese mariners added Southeast Asian yams to their ship stores transporting several species of Dioscoreas to the New World. The word yam is thought to derive from West African languages, from the Mande, *niam* or the Temne, *enyame*, later adopted into Portuguese as *ynhame* and Spanish as ~ *tame*, French, *igname*, and English as, *yam* (Burkill 1938). While the term "yam" is now used loosely to refer to many different genera that produce edible roots, true yams are only those of the family Dioscoreaceae.

Harvesting wild yams is a relatively simple procedure; several groups employ the use of a digging stick, such as the Sakai of Malaysia, Baka of Cameroon, and the Aborigines of Australia. Collection of tubers from a wild plant will disturb the soil, aiding in the growth of new tubers and larger tubers, and as long as the growth head of some tubers is left behind, the plant will continue to produce fresh tubers, providing foragers with a perennial resource. The Baka also fill the hole left behind with organic matter to facilitate new yam growth. This simple vegetative mode of propagation also allows for in situ management of yam plants by foragers. Transport of yams from their place of collection to campsites, or settlements, will have inadvertently spread

useful yams along with the dispersals of people. In some parts of the Pacific, deliberate translocations of yams to "seed" new islands may have been an important element of human colonization of these and other landscapes.

Human Evolution

Several hypotheses have been proposed where yams and other plants producing edible starchy roots (collectively described as Underground Storage Organs, USOs) are key to the spread of hominins outside Africa and of important changes in social organization. Wrangham et al. (1999) have suggested that access to USOs and cooking them, which dramatically increasing digestibility and energy returns, was a key evolutionary factor in the reduction of molar and gut size of *Homo erectus*, and helped facilitate dispersal of that species.

The "grandmother hypothesis" forwarded by O'Connell et al. (1999) suggests that instead of males provisioning the group with meat (a high-risk strategy of potentially high energetic returns, but with low rates of success), women and daughters supplied the group with USOs (a low-risk resource with high energetic returns). In doing so, this engendered mother-infant food sharing, combined with assistance from grandmothers, reinforcing co-residence among related females. As a result, it is suggested that matrilocality may have been the dominant model of hominid social organization throughout most of the Lower and early Middle Pleistocene (1.8– < 0.5 myr) (O'Connell et al. 1999).

The oldest remains of yam tissues in an archaeological context come from the West Mouth of Niah Cave in the lowland rainforests of Sarawak, Malaysia. From several deposits dating to 20,000 years ago, fragments of the yam *Dioscorea hispida*, and other unidentified tuberous remains were recovered by flotation (Barton and Paz 2007). *Dioscorea hispida* is still an important food source in Island Southeast Asia today among forager groups on the Malay Peninsula, and as a fallback food across island Southeast Asia. What is so interesting about this plant though is its toxicity. Without treatment, usually soaking, boiling, and/or roasting, the tubers are extremely toxic and cases of accidental death or hospitalization are known. Access to toxic yams could have provided important evolutionary advantages to humans, providing them with a relatively rewarding food source, isolated from other competitors, such as pigs and large ungulates.

Fire Management

Aboriginal Australians used fire as a tool to encourage the distribution of yams and manage productivity. The Kuku-Yalanji people of Cape York, Queensland, exploited two species of yam, *Dioscorea bulbifera*, and *Dioscorea transversa*, burning rainforest margins to encourage growth (Hill and Baird 2003). In Western Australia, *Dioscorea hastifolia*, was also managed by the use of fire, increasing the density of this plant in specific areas (Hallam 1989). In eastern Australia in 1841, Governor Sir George Grey noted large tracts of land studded with holes where people had been extracting yams (possibly *Dioscorea transversa*). Continuous digging around some species acts to aerate the soil, thin and encourage better growth, and burning provides disturbed habitats that favor certain species (Gott 2005).

Domestication

Some groups of West African farmers engage in a process of yam management, rather loosely referred to as a process of "domestication" (Dumont and Vernier 2000; Scarcelli et al. 2006). Farmers select yam tubers from the forest that present desirable phenotypic attributes such as size, color, and taste and transplant the yam head, from which new tubers grow, into their cultivated plots. Over a period of 3–4 years, farmers can induce favorable change in the tubers (Hildebrandt 2003) by various methods including through applying stress by increasing the harvesting cycle; exposure of plants to sunshine, tillage, and mound heaping (Chikwendu and

Okezie 1989; Scarcelli et al. 2006); and, also by the introduction of an obstacle, such as a stone or piece of pottery, that physically interfere with the orientation of tuber growth (Vernier et al. 2003: 39). Simply harvesting the plant repeatedly changes the soil conditions around newly forming tubers, allowing the growth of larger tubers in more loosely packed soils (Hildebrandt 2007: 290). If the phenotypic changes are of interest to the farmers, these plants are then introduced into the main crop, often alongside tubers with similar phenotypes (Scarcelli et al. 2006: 122).

The entire process is managed entirely via vegetative propagation though the exact biological process allowing this plasticity of tuber form is unknown (Scarcelli et al. 2006: 122). In order to better understand this process, Scarcelli et al. (2006) undertook a genetic analysis of "wild" (in their terms) "predomesticated" plants (*D. abyssinica* and *Dioscorea praehensilis*) that reproduced sexually from the forest with cultivated varieties (*D. cayenensis*, *D. rotundata*) that were vegetatively propagated. They found that nearly half the samples (47%) considered to be "wild" contained genes from cultivated "domesticated" yams and that 14 samples could be considered genetically intermediate between the "wild" and "domesticated" plants. Sexual reproduction maintains genetic variation that is gradually incorporated into cultivated plots where propagation is continued via asexual methods. The mixture of genes from "wild" and "domesticated" varieties suggests ongoing hybridization, probably from feral plants abandoned in old fallows that have since returned to forest (Mignouna and Dansi 2003: 524). Farmers select from a mixture of heterogeneous genetic stock consisting of wild species, a diversity of hybrids, and feral landraces from old farms (Mignouna and Dansi 2003: 527).

Genetic studies of African yams show that there are no clear genetic and phenotypic correspondences between yams classified as "wild" and "domesticated." The processes employed by people in the selection and propagation of yams can lead to useful phenotypic change, but with little corresponding genetic change (Mignouna and Dansi 2003; Zohary 2004; Scarcelli et al. 2006).

Toxins and Medicinals

The active compounds within the family of Dioscorea yams fall into three main categories: the alkaloids, tannins, and saponins (Coursey 1967). The tannins and saponins are the least likely to present a problem for human consumption, though they do affect the taste of the tuber. Tannins are thought to give tubers an acrid taste (Coursey 1967: 208) and the saponins cause bitterness (Coursey 1967: 210). Saponins have also been identified as the active component in many fish poisons (acting to deoxygenate the water) and are readily detectable in tubers, characteristically forming a soapy lather when agitated in water (Coursey 1967: 209). At least one of the alkaloids, dioscorine, which has been identified in *Dioscorea hispida*, is extremely toxic and causes paralysis of the nervous system and – if taken in sufficient quantities – death (Burkill 1966: 833). While some of the chemicals and cellular crystals in tubers and rhizomes cause discomfort, the toxins and other physiological effects are usually destroyed or alleviated by heat, applied either through boiling or roasting.

Many groups exploit yams for their medicinal properties. In China's Yunan Province, the root of *Dioscorea althenoides* is taken orally as a cure for chronic rheumatism, indigestion, and for injuries from falls (Huang et al. 2004). Among the Lahu of Southwest China, the leaves of *Dioscorea bulbifera* are used as an antiseptic for puncture wounds and a decoction from the mature fruits to alleviate gastric bleeding (Huai and Pei 2004). In India, *Dioscorea bulbifera* is used as contraceptive by some tribal groups. *Dioscorea pentaphylla* is used as a medicine for ailments of the digestive tract and for problems with respiration. *Dioscorea prazeri* may be used as a soap and shampoo to kill lice. The pounded leaves of *Dioscorea hispida* may be used to treat skin conditions in Malaysia. Among the Sakai of Peninsular Malaysia, mucilage from the tubers of *Dioscorea laurifolia* and unidentified *Dioscorea* species is used to treat warts. The boiled tubers of *Dioscorea membranacea* are used to treat asthma and fever (Maneenoon et al. 2008).

Social Contexts of Yams

The Baka of Cameroon apply the metaphor of the human body to describe the anatomy of yams; it is the only plant treated in this way (Dounias 1996). The spiny roots at the head of the tuber are referred to as "hair," the oblong tuber as "body," and the terminal point as "bottom." Other tuberous forms are associated with male reproductive organs and leaf hairs are recognized as human "body hair" (Dounias 1996: 624). Ownership of newly discovered plants is marked by snapping vegetation surrounding the plant. Underground cavities left by the extraction of yams, which may last for years, are recognized by a name which translates as "edible yam ancestor" (Dounias 1996: 629).

Amongst the Avatime of Southeastern Ghana, yam rituals involve feeding the "forebears" before any living member of the clan may eat the yam flesh (Brydon 1981). These yam rituals are not held for the entire village but are reserved for kinship groups: "It is the elders of the clans who are the representatives of the living Avatime and who must make sure that the spirits of the clan forebears are well looked after before they eat yams themselves" (Brydon 1981: 666).

On the island of Pohnpei in Micronesia, yams are also revered and cultivated as a high prestige food. The islanders cultivate at least 133 varieties of *Dioscorea* species, though total agrodiversity is thought to have increased dramatically over the last 150 years with introductions by whalers, traders, missionaries, and colonial administrators, as well as Pohnpeians returning from overseas (Raynor et al. 1992). Traveling with your yam was clearly the thing to do. Consumption of yams on Pohnpei is a strongly ritualized activity where humans may not eat yams until they have been presented to the island chiefs, and through them, to the various traditional gods.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Niah Cave (The West Mouth)
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Vegeculture: General Principles

References

Barton, H., and V. Paz. 2007. Subterranean diets in the tropical rain forests of Sarawak, Malaysia. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T.P. Denham, J. Iriarte, and L. Vrydaghs, 50–77. Walnut Creek: Left Coast Press.

Brydon, L. 1981. Yams and chiefs in Avatime: Speculations on the development of a social order. *Journal of the International African Institute* 51: 659–677.

Burkill, I.H. 1938. The contact of the Portuguese with African food plants which gave words such as "yam" to European languages. *Proceedings of the Linnean Society of London* 150: 84–95.

Burkill, I.H. 1966. *A dictionary of the economic products of the Malay Peninsula*. Kuala Lumpur: Government of Malaysia and Singapore, Ministry of Agriculture and Cooperatives, Malaysia.

Chikwendu, V.E., and C.E.A. Okezie. 1989. Factors responsible for the enoblement of African yams: Inferences from experiments in yam domestication. In *Foraging and farming: The evolution of plant exploitation*, ed. D.R. Harris and G.C. Hillman, 344–357. London: Unwin Hyman.

Coursey, D.G. 1967. *Yam: An account of the nature, origins, cultivation and utilisation of the useful members of the dioscoreaceae*. London: Longmans.

Dounias, E. 1996. Perception and use of wild yams by the Baka hunter-gatherers in south Cameroon. In *Tropical forests people and food*, ed. C.M. Hladik, A. Hladick, O.F. Linares, H. Pagezy, A. Semple, and M. Hadley, 621–932. Paris: UNESCO.

Dumont, R., and P. Vernier. 2000. Domestication of yams (*Dioscorea cayenensis-rotundata*) within the Bariba ethnic group in Benin. *Outlook on Agriculture* 29: 137–142.

Gott, B. 2005. Aboriginal fire management in southeastern Australia: Aims and frequency. *Journal of Biogeography* 32: 1203–1208.

Hallam, S.J. 1989. Plant usage and management in southwest Australian societies. In *Foraging and farming: The evolution of plant exploitation*, ed. D.R. Harris and G.C. Hillman, 136–151. London: Unwin Hyman.

Hildebrandt, E. 2003. Motives and opportunities for domestication: An ethnoarchaeological study in Southwest Ethiopias. *Journal of Anthropological Archaeology* 22: 358–375.
Hildebrandt, E.A. 2007. A tale of two tuber crops: How attributes of enset and yams may have shaped prehistoric human-plant interactions in southwest Ethiopia. In *Rethinking agriculture: Archaeological and ethnoarchaeological perspectives*, ed. T. Denham, J. Iriarte, and L. Vrydaghs, 273–298. Walnut Creek: Left Coast Press.
Hill, R., and A. Baird. 2003. Kuku-Yalanji rainforest Aboriginal people and carbohydrate resource management in the wet tropics of Queensland, Australia. *Human Ecology* 31: 27–52.
Huai, H.-Y., and S.-J. Pei. 2004. Plants used medicinally by folk healers of the Lahu people from the autonomous county of Jinping Miao, Yao, and Dai in southwestern China. *Economic Botany* 58: S265–S273.
Huang, J., S. Pei, and C. Long. 2004. An ethnobotanical study of medicinal plants used by the Lisu people in Nujiang Northwest Yunnan, China. *Economic Botany* 58: S253–S264.
International Institute of Tropical Agriculture (IITA). 2009. Yam. http://www.iita.org/yam. Accessed 1 Mar 2013.
Maneenoon, K., P. Sirirugsa, and K. Sridith. 2008. L. (Dioscoreaceae), a major food plant of the Sakai tribe at Banthad Range, Peninsular Thailand. *Ethnobotany Research and Applications* 6: 385–394.
Mignouna, H.D., and A. Dansi. 2003. Yam (Dioscorea spp.) domestication by the Nago and Fon ethnic groups in Benin. *Genetic Resources and Crop Evolution* 50: 519–528.
O'Connell, J.F., K. Hawkes, and N.G. Blurton-Jones. 1999. Grandmothering and the evolution of Homo erectus. *Journal of Human Evolution* 36: 461–485.
Raynor, B., A. Lorens, and J. Phillip. 1992. Traditional yam cultivation on Pohnpei, eastern Caroline Islands, Micronesia. *Economic Botany* 46: 25–33.
Scarcelli, N., S. Tostain, C. Mariac, C. Abangla, O. Da, J. Berthaud, and J. Pham. 2006. Genetic nature of yams (Dioscorea sp.) domesticated by farmers in Benin (West Africa). *Genetic Resources and Crop Evolution* 53: 121–130.
Vernier, P., G.C. Orkwor, and A.R. Dossou. 2003. Studies on yam domestication and farmers' practices in Benin and Nigeria. *Outlook on Agriculture* 32: 35–41.
Wrangham, R.W., J.H. Jones, G. Laden, D. Pilbeam, and N. Conklin-Brittain. 1999. The raw and the stolen: Cooking and the ecology of human origins. *Current Anthropology* 40: 567–594.
Zohary, D. 2004. Unconscious selection and the evolution of domesticated plants. *Economic Botany* 58: 5–10.

Further Reading

Huai, H.-Y., and S.-J. Pei. 2004. Plants used medicinally by folk healers of the Lahu people from the autonomous county of Jinping Miao, Yao, and Dai in southwestern China. *Economic Botany* 58: S265–S273.
Semple, A., and M. Hadley, eds. *Tropical forests people and food*, 621–932. Paris: UNESCO.

Yellowhorn, Eldon

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Basic Biographical Information

Eldon Yellowhorn is a past president of the Canadian Archaeological Association (2010–2012) and the first Aboriginal person to hold this title. It is the latest milestone he has reached during his career in archaeology.

Dr. Yellowhorn grew up on a farm on the Peigan Indian Reserve in southern Alberta, and his boyhood years were full of rural adventures. There is a direct path from the family farmstead to his interest in the earth sciences that inspired his professional development. His undergraduate degrees in physical geography (1983) and archaeology (1986) from the University of Calgary brought him insights about the prairie landscape of his childhood that added more fuel to his curiosity. Gaining a better understanding of the ancient history of his Piikani ancestors compelled him to take on graduate studies in archaeology.

Dr. Yellowhorn discovered his enthusiasm for archaeological fieldwork through the surveys and excavations he conducted as part of his training. After several field seasons and a curator internship, he decided to pursue advanced degrees in archaeology. Attending graduate school at Simon Fraser University in Burnaby, British Columbia, in 1989, gave him the opportunity to mature as a researcher and to study the antiquity of his home community and the culture he inherited from his ancestors. His survey of the Piikani First Nation identified many new sites but more importantly opened up a discussion on a subject that had received no prior attention. His thesis explored the legal status of heritage protection on Indian reserve lands in Canada and interrogated existing legislation for this purpose.

After he completed his M.A. degree in archaeology (1993), Dr. Yellowhorn began working in the heritage consulting industry, conducting impact assessments in advance of terrain-altering activities. This experience brought him an

insider's view of applied archaeology that differed from the research-oriented mode that was standard for graduate school. Although his clients included a variety of stakeholders, he had a special interest in first nations that needed his archaeological expertise.

By 1995 he had decided to pursue an academic career, so began his days as a student at McGill University. He specifically chose that school in order to work with Bruce Trigger. While studying archaeological theory was crucial for elucidating the archaeological record of the northern plains, Dr. Yellowhorn could not ignore the oral narratives that formed part of Piikani culture. His dissertation research directed him back to the old stories he heard in his youth to ascertain whether they could explain archaeological manifestations. One puzzle that caught his attention was the one that mystified researchers concerning the origins of large-scale communal hunting of bison using "buffalo jumps." Examining this question in light of Piikani mythology led him to construct his scheduling breakthrough hypothesis that accounted for the sudden appearance of this type of bison hunting strategy.

Major Accomplishments

Throughout his career, Dr. Yellowhorn has been an advocate of the right of Aboriginal people to be active participants in examining the past through their internal dialogue on the nature of antiquity. His internalist approach brings a self-reflexive quality to field research that enhances this perspective by appropriating the methods of archaeology to pursue internally defined objectives. Given his faculty appointment at Simon Fraser University, where he is an associate professor in Archaeology and Chair of the First Nations Studies Department, he welcomes the opportunity to train Aboriginal students to become competent researchers of their own antiquity and to be well-informed interpreters of archaeological discourse.

Cross-References

► Canadian Archaeological Association (CAA)
► Indigenous Archaeologies

York Archaeological Trust

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Basic Information

The York Archaeological Trust for Excavation and Research Ltd. is one of the largest archaeological units in the UK, with 100 members, 12 trustees, and 198 staff. The Trust's headquarters is at 47 Aldwark, York, North Yorkshire YO1 7BX, UK.

The Trust was founded in 1972, in response to proposals to construct an inner ring road in York. The road was intended to remove through traffic from the ancient walled city in line with government advice on conservation in historic towns (Esher 1968). However, local archaeologists estimated that the road would have a devastating impact on below ground archaeology, cutting through six major Roman cemeteries, two Roman suburbs, areas of Anglo-Saxon and Viking occupation, three medieval suburbs, the site of a priory, and several churches, ancient hospitals, and almshouses (Addyman 1974: 156). The inner relief road was never built, but regeneration within the city in the Aldwark area, and elsewhere, did proceed. This prompted a series of major archaeological rescue excavations on Roman and later sites by the newly constituted York Archaeological Trust (Jones 1984: 132–143).

Major Impact

In the late 1970s the Trust gained international acclaim for its work on deeply stratified urban deposits. York's location between two rivers has led to the accumulation of moist anaerobic layers, which frequently contain well-preserved organic residues such as fragments of wood, thatch, coprolites, beetles, seeds, and pollen. The excavation of such richly organic deposits enabled the Trust

to undertake pioneering research in environmental archaeology, analyzing the sediments from variety of sites, including a Roman sewer system, in partnership with the Department of the Environment-funded Environmental Archaeology Unit at the University of York (Buckland 1976).

The Trust is perhaps best known for its 5-year-long "Viking Dig" at Coppergate, which revealed tenth-century Viking houses and craft workshops (Hall 1984). The popularity of this dig led to the creation of the Jorvik Viking Centre, which opened in 1984, with its famous time-capsule ride through a reconstruction of the Viking town. In the last 5 years, the Trust has gained prominence by excavating the remains of nineteenth-century working-class terraced houses and shared toilet facilities in the former "slum" area of Hungate. In response to the growth of contract archaeology in Britain, the Trust now operates at a national level, with offices in Glasgow, Sheffield, and Nottingham. The educational activities of the Trust have also grown, and in addition to the Jorvik Viking Centre, the Trust now runs three other attractions in York: Jorvik DIG, an archaeological education and discovery center; Barley Hall, a reconstructed medieval town house; and Micklegate Bar, a medieval gateway containing exhibitions on the city walls (York Archaeological Trust website n.d.).

Cross-References

- ▶ Jorvik Viking Centre
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Urban Archaeology

References

Addyman, P. 1974. York, the anatomy of a crisis in urban archaeology. In *Rescue archaeology*, ed. P.A. Rahtz, 153–162. London: Pelican.

Buckland, P.C. 1976. *The environmental evidence from the Church Street Roman sewer system*, The archaeology of York: The past environment of York. Vol. 14/1. London: Council for British Archaeology (for the York Archaeological Trust).

Esher, L. 1968. *York: A study in conservation*: Report to the Ministry of Housing and Local Government and York City Council. London: HMSO.

Hall, R.A. 1984. *The Viking dig: Excavations at York*. London: The Bodley Head Ltd.

Jones, B. 1984. *Past imperfect: The story of rescue archaeology*. London: Heinemann.

York Archaeological Trust. n.d.. Available at: http://www.yorkarchaeology.co.uk/. Accessed 29 Oct 2012.

Yuanmou

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Introduction

Yuanmou is located in the northern Yunnan Province, near the southeastern margin of the Tibetan Plateau, 110 km away from Kunming, the capital of Yunnan Province, southwestern China. The Yuanmou Basin is a north–south elongated basin ~30 km in length and ~7 km wide on average. It is the lowest basin of the central Yunnan Plateau with an elevation of 1,050–1,150 m. The Longchuan River, the first tributary of the Jinsha River (upper reaches of Yangtze River), runs from south to north and joins the Jinsha River at Longjie town, in the northern part of Yuanmou. The Yuanmou Basin is a faulted basin. The western mountain is comprised of Precambrian metamorphic and granite rocks with an average elevation of 1,400 m, and the eastern mountain is composed of Jurassic and Cretaceous red layered sandstone rocks with an average elevation of 2,500 m; together they comprise the basement rocks of the Yuanmou Basin. The Plio-Pleistocene hominid-bearing fluviolacustrine deposits are best developed in the southern part of the basin and are ~850 m thick and date to between 4.9 and 1.4 Ma (Zhu et al. 2008a). The Late Miocene hominoid-bearing fluvial deposits can be found in the northwestern part of the basin, are ~70 m thick, and date to between 8.5 and 7.1 Ma (Zhang and Yue

2006). The discoveries of hominids and hominoids in the Yuanmou Basin caused great attention from the fields of paleoanthropology and paleontology since 1965.

Definition

In this entry, Yuanmou refers to the Early Pleistocene hominid and cultural remains in Yuanmou Basin, Yunnan Province, Southwestern China.

Key Issues/Current Debates/Future Directions/Examples

Two hominid upper medial incisors were discovered by geologists from the Chinese Academy of Geosciences in May 1965 at a location northwest of Shangnabang village, southeastern Yuanmou Basin. Here, the Plio-Pleistocene deposits are well developed and are designated to the Yuanmou formation geologically. The teeth were unearthed from layer 25, member 4 of the Yuanmou formation (there are 28 layers in total). After comparisons with the hominid material from Zhoukoudian, the original researcher found that the Yuanmou fossils were different from *Homo erectus pekinensis*, and gave it a new subspecies name *Homo erectus yuanmouensis*, represented by a young male individual (Hu 1973, Fig. 1). Subsequently, further study has been carried out and summarized the features as follows: The crown is robust and the outline is triangular fan-shaped, widely expanded to incisive margin; most of the labial side of crown is flat, except the basal part is more convex; and there are Tome's line, labial grooves, and shallow depressions. The basal tubercle and fingerlike projections were developed, the lingual surface shows a distinct shovel fossa which is divided by the median ridge into two halves, numerous enamel furrows are visible in the lingual fossa, and the transverse section at the neck art of the root is nearly elliptical, thinner in labiolingual diameter of root. Generally, it indicates more primitive features than *Homo erectus pekinensis* and shows transitional features between slender *Australopithecus* and *Homo erectus* (Zhou and Hu 1979; Zhou 1998).

A field team from the Beijing Natural History Museum surveyed at the southern slope of Guojiabao site, some 250 m away from the original place where the Yuanmou incisors were found. In December, 1984, a human left tibia shaft was unearthed from fluvial deposits that overlie layer 25, member 4, Yuanmou formation (Zhou et al. 1991; Fig. 2). The tibia should be from layers between 25 and 28, member 4. According to the latest paleomagnetic results (Zhu et al. 2008b), the age of the tibia should be at least 1.4 Ma or between 1.7 Ma and 1.4 Ma. The features of the tibia were summarized by the original researcher as follows: The tibia probably represents a young female and belongs to the platycnemic type. The anterior border of the shaft is obviously round and obtuse, and the

Yuanmou, Fig. 1 Upper medial incisors of *Homo erectus yuanmouensis*. (From Zhou 2009 with permission)

Yuanmou, Fig. 2 Tibia of *Homo erectus yuanmouensis*. (From Zhou 2009 with permission)

S-shape curve is weakly developed. There is a shallow interosseous crest. A marked flexor longus swells behind the shaft, a popliteal line shapes well, and a vertical ridge bulges, dividing the back of shaft into two halves. The wall of shaft is thick and the marrow cavity is relatively small. In general, although from younger layers, the tibia could still be attributed to *Homo erectus yuanmouensis*, the traits approximate *Homo habilis* (Zhou et al. 1991; Zhou 1998).

A formal excavation was launched by the Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, at a small hill where the human teeth were unearthed in October–December, 1973; no more hominid fossil have been discovered, but six artifacts were sorted from in situ strata and another ten artifacts were collected from the surface nearby (Yuan et al. 1984). The artifacts were made from quartz and quartzite cobbles and pebbles from rivers. The flaking technique and secondary work of the implements are nearly all undertaken by direct hammering. A few implements were made by bipolar technique, but there are no prepared platforms. All artifacts are small types, and core scrapers are common. In general, those artifacts show features of the early stage of the Early Paleolithic period (Wen 1978; Huang et al. 1985; Zhou 1998), matched with the primitive features of hominid fossil from the same site.

The features of the Yuanmou hominid have not been debated much; however, age determination has been controversial over the past decades. The paleomagnetic dating for hominid incisor-bearing layer gave the following results: 1.7 Ma (Li et al. 1976), 0.7 Ma (Hyodo et al. 2002), and 1.7 Ma (Zhu et al. 2008); the ESR dating result is 1.1–1.6 Ma (Huang and Grün 1998); the analysis of comprehensive lithostratigraphy, biostratigraphy, magnetostratigraphy result and support age of middle Pleistocene is probably 0.5–0.6 Ma (Liu and Ding 1983). An early Pleistocene age (1.7 Ma) is widely accepted.

Homo erectus yuanmouensis is the earliest hominid fossil to date in China; however, the incisors and tibia could not provide much morphological traits for such species. Southern Yuanmou Basin has thick Plio-Pleistocene fluviolacustrine deposits, which have great potential for finding more hominid and culture remains. Unfortunately, just two excavations have been conducted in the past half century. Further field survey and excavation is necessary for future projects.

Cross-References

- ▶ Central Asia: Paleolithic
- ▶ Dmanisi Hominins and Archaeology
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ East Asia: Paleolithic
- ▶ *Homo erectus*
- ▶ *Homo habilis*
- ▶ Insular Southeast Asia in the Lower Paleolithic
- ▶ Java Man
- ▶ Movius Line
- ▶ Zhoukoudian, Archaeology of
- ▶ Zhoukoudian: Geography and Culture

References

Hu, C. 1973. Ape-man teeth from Yuanmou, Yunnan. *Acta Geoscientia Sinica* 1: 75–71.

Huang, P., and R. Grün. 1998. Study on burying ages of fossil teeth from Yuanmou Man site, Yunnan Province, China. *Acta Anthropologica Sinica* 3: 165–170.

Huang, W., Q. Wie, and X. Zhang. 1985. The Paleolithic artifacts in Yuanmou Basin. *Prehistoric Studies* 4: 19–22.

Hyodo, M., H. Nakaya, A. Urabe, H. Saegusa, S.H. Xue, J. Yin, and X. Ji. 2002. Paleomagnetic dates of hominid remain from Yuanmou, China, and other Asian sites. *Journal of Human Evolution* 43: 27–41.

Li, P., F. Qian, X. Ma, Q. Pu, L. Xing, and S.H. Ju. 1976. A preliminary study of the age of Yuanmou Man by paleomagnetic techniques. *Scientia Sinica* 6: 579–591.

Liu, T., and M. Ding. 1983. Discussion on the age of "Yuanmou Man". *Acta Anthropologica Sinica* 1: 40–48.

Wen, B. 1978. Paleolithic artifacts found in Yuanmou Basin, Yunnan. *Collected papers on paleoanthropology IVPP Beijing*, 126–135.

Zhang, Y., and L. Yue. 2006. Paleomagnetic dating of Lufengpithecus hudiensis localities. In *Lufengpithecus hudiensis site*, ed. G. Qi and W. Dong, 245–251. Beijing: Science Press.

Zhou, G. 1998. A study of fossil hominoid and cultural remains in Yuanmou Basin, in *Collected works for the 30thanniversary of Yuanmou Man discovery and the International Conference on Paleoanthropology studies*, 203–227. Yunnan Science and Technology Press.

Zhou, G. 2009. *All about Yuanmou man – The paths of 30 years paleoanthropological researches in Yuanmou Basin*. Kunming: Yunnan Science and Technology Press.

Zhou, G., and C. Hu. 1979. Supplementary notes on the teeth Yuanmou Man with a discussion on the morphological evolution of the mesial upper incisors in hominoids. *Vertebrata Palasiatica* 17: 149–162.

Zhou, G., B. Wang, and H. Zhai. 1991. New material of Yuanmou Man. *Kaogu Yu Wenwu* 1: 56–61.

Zhu, R., R. Potts, Y. Pan, H. Yao, L. Lü, X. Zhao, X. Gao, L. Chen, F. Gao, and C. Deng. 2008a. Early evidence of genus *Homo* in East Asia. *Journal of Human Evolution* 55: 1075–1085.

Zhu, R., R. Potts, Y. Pan, L. Lü, H. Yao, C. Deng, and H. Qin. 2008b. Paleomagnetism of the Yuanmou Basin near the southeastern margin of the Tibetan Plateau and its constraints on late Neogene sedimentation and tectonic rotation. *Earth and Planetary Science Letters* 272: 97–104.

Further Reading

Qian, F., and G. Zhou. 1991. *Quaternary geology and paleoanthropology of Yuanmou, Yunnan, China*. Beijing: Science Press.

Qian, F., Q. Pu, Z.H. Yuan, and X. Zhang. 1977. The division of quaternary glacier and stratigraphy of Yuanmou Basin, in *Collected papers on Quaternary glacier and geology of China*. Beijing: Geological Press.

Wu, X., and F. Poirier. 1995. *Human evolution in China: A metric description of the fossils and review of the sites*. New York: Oxford University Press.

Zhou, G., and X. Zhang. 1984. *Yuanmou man*. Kunming: Yunnan People's Press.

Z

Zbyszewski, Georges

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Basic Biographical Information

Georges Zbyszewski (1909–1999) (Fig. 1) was born in Russia, son of a Russian countess and a Polish military officer. During the Russian Revolution, he moved with his family to Paris, where several years later he adopted French nationality and graduated in Natural Sciences at Sorbonne University, becoming an assistant of Jacques Boucart (1891–1965). In France, he met several Portuguese researchers such as the geologist Carlos Teixeira (1910–1982) and the geographers António de Medeiros Gouveia (1900–1972) and Orlando Ribeiro (1911–1997).

In 1935, Georges Zbyszewski moved to Portugal, advised by Jacques Boucart, in order to study the Quaternary lands from the Portuguese coast, with the idea of elaborating his Ph.D. dissertation. The aim of Zbyszewski's studies was to compare the Portuguese Quaternary formations with those from the north of Morocco, which had been studied before by Boucart. George Zbyszewski worked then with António de Medeiros Gouveia, which was preparing his Ph.D. dissertation about the Algarve region. Zbyszewski finally established in Portugal in 1940 invited by António Viana, Chief of Serviços Geológicos de Portugal (Geological Services of Portugal), to work in that institution. He crossed the country, elaborating studies and making important discoveries regarding paleontology (Fig. 3), geology, and archaeology, publishing several scientific articles regarding these disciplines.

In 1973, he started to teach in the Faculty of Sciences of Lisbon University.

Georges Zbyszewski also contributed to the elaboration of geological charts, working in Serviços Geológicos de Portugal till 1979, when he retired.

Major Accomplishments

Georges Zbyszewski was a great contributor to the advancement of Portuguese geology, paleontology, and archaeology. In terms of his scientific achievements, Georges Zbyszewski was the author of 281 publications, 54 of which were about paleontology. He published 105 studies on the Portuguese Quaternary (research about

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C. Smith (ed.), *Encyclopedia of Global Archaeology*,
https://doi.org/10.1007/978-3-030-30018-0

Zbyszewski, Georges, Fig. 1 Georges Zbyszewski. (Photo at the Geological Museum (Lisbon))

prehistoric fauna and lithic industries), covering the entire Portuguese territory. Concerning geology, he published 96 works and also 26 articles about other several subjects. He was the author or co-author of 45 geological charts of Portugal, in the scale of 1/50,000 and the respective explicative information.

Zbyszewski's studies about the Quaternary led him to publish, besides particular notes, valuable synthetic works on this subject, such as *Le Quaternaire du Portugal* (Fig. 2) and *A classificação do Paleolítico antigo e a cronologia do Quaternário de Portugal* (1942). The studies carried out in the region of Alpiarça (1946) were a decisive contribute for the knowledge of the Quaternary lands, in which he studied not only the characteristics of the terraces of the Tagus in this region but also the Paleolithic industries related with these deposits.

The presence of Henri Breuil in Portugal during World War II allowed a close collaboration with Zbyszewski. Several publications came out from this partnership such as "Contribuição para o estudo das indústrias paleolíticas de Portugal e sua relação com a Geologia do Quaternário" (1942), whose first volume constituted the *XXIII Comunicações dos Serviços Geológicos*, dedicated to the study of the main quarries from both sides of the ancient Tagus estuary, and the second volume, published on *XXVI Comunicações dos Serviços Geológicos*, dedicated to the quaternary

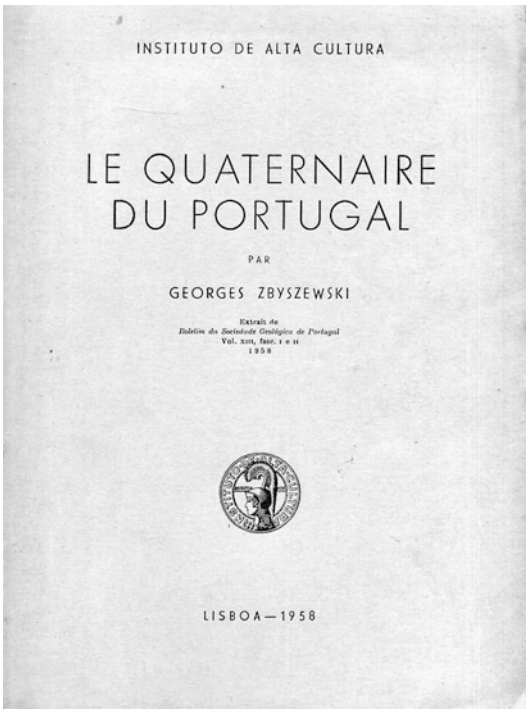

INSTITUTO DE ALTA CULTURA

LE QUATERNAIRE DU PORTUGAL

PAR

GEORGES ZBYSZEWSKI

Extrait de
Bulletin de Société Géologique de Portugal
Vol. XIII, fasc. I e II
1958

LISBOA—1958

Zbyszewski, Georges, Fig. 2 The cover of "Le Quaternaire du Portugal"

beaches in the Estremadura coastline and the fluvial terraces of the Low Tagus Valley (1945).

Still regarding prehistoric archaeology, Zbyszewski studied the remains found in caves and rock-shelters that he surveyed or in which survey he collaborated. Some examples are the Almonda's caves (1941 and 1947); Lapa da Bugalheira (1941); Lapa da Maceira, Vimeiro (1949); and the caves of Ponte da Lage (Oeiras) (1957), of Salemas (Ponte de Lousa) (1962), of Columbeira (Bombarral) (1963), and of Alcobertas (1971) and Lapa do Bugio in the same year. He was dedicated also to the study of Late Prehistory in Portugal, conducting research about the hypogea of Casal do Pardo (Palmela), the Tholoi of Praia das Maçãs (1961) and of Calhariz (Sesimbra), and the dolmen of Casal do Penedo (1951), of Casainhos, and of Várzea de Sintra (1977).

Zbyszewski participated in countless conferences and scientific meetings, being since 1956 the permanent representative of Geological

Zbyszewski, Georges, Fig. 3 Bones (femur and tibia) of ancient Paleoloxodon found by Zbyzewsky associated with lithic artifacts

Services of Portugal in the Stratigraphy Commission of the International Conference of Geology. He was a member of several scientific societies from Portugal and other countries, for example, the French Geological Society, French Prehistoric Society, and Portuguese Association of Archaeologists, among others (Mota, n. d.).

The recognition of his work granted him the title of *Chevalier des Palmes Académiques* (Knight of the Academic Palms) (1959) and *Chevalier de l'Ordre National du Mérite* (Knight of the National Order of Merit) (1969), both attributed by the French State.

In 2005, the name of Georges Zbyszewski was given to one of the streets from Lisbon.

Cross-References

► Europe: Prehistoric Rock Art
► Lithic Technology, Paleolithic

References

Breuil, H., and G. Zbyszewski. 1942. *Contribution à l'étude des industries Paléolithiques du Portugal et de leurs rapports avec la géologie du Quaternaire*, Comunicações dos Serviços Geológicos de Portugal, Tomo: XXIII, 1–394. Lisboa: Serviços Geológicos de Portugal.

Breuil, H., and G. Zbyszewski. 1945. *Contribution à l'étude des industries Paléolithiques du Portugal et de leurs rapports avec la géologie du Quaternaire*, Comunicações dos Serviços Geológicos de Portugal, Tomo: XXIV, 1–678. Lisboa: Serviços Geológicos de Portugal.

Mota, T.S. n.d.. Georges Zbyszewski (1909–1999). http://cvc.instituto-camoes.pt/ciencia/p55.html.

Further Readings

Zbyszewski, G. 1954. *L'Aquitanien supérieur de Lisbonne et du Ribatejo*, Separata do Tomo XXXV das Comunicações dos Serviços Geológicos de Portugal. Lisboa: Serviços Geológicos de Portugal.

Zbyszewski, G. 1958. Le Quaternaire du Portugal. *Boletim da Sociedade Geológica de Portugal* 13 (1 & 2): 3–227.

Zbyszewski, G. 1964. Nova Contribuição para o conhecimento da Jazida Quaternária da Mealhada. *Memórias e Notícias. Museu L. M. G. Uni. Coimbra* 84: 1–37.

Zbyszewski, G., and F. de Lapparent. 1957. *Les Dinosauriens du Portugal*. Lisboa: Serviços Geológicos de Portugal.

Zbyszewski, G., C. Leitão, M. Penalva, and O.V. Ferreira. 1980/81. Paléoanthropologie du Würm au Portugal. *Setúbal Arqueológica* VI/VII: 7–23.

Zeuner, Frederick Everard

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Basic Biographical Information

Frederick Zeuner (Fig. 1) was an intellectually brilliant and innovative natural scientist who founded the subdiscipline of environmental archaeology.

Born in Berlin in 1905, Zeuner was educated at the universities of Berlin, Tübingen, and Breslau (now Wroclaw in Poland) where he studied

Zeuner, Frederick Everard, Fig. 1 Frederick Zeuner, *c.* 1955. (Reproduced by permission of the Institute of Archaeology, University College London)

paleontology and geology with mineralogy, geography, zoology, and botany as minor subjects. At Breslau he studied under Walther Soergal, whose research on Quaternary glaciations and mammalian faunas influenced Zeuner and who supervised his Ph.D. (1927) on uplifted river terraces southwest of Breslau. At age 20, he was appointed *Assistent* and later *Privatdozent* in the Breslau Institute of Geology and Palaeontology. He qualified as a university teacher in 1931 with a thesis on Tertiary insects and was appointed to a lectureship at the University of Freiburg-im-Breisgau.

By 1934 Zeuner had already published over 30 scientific papers and monographs, but his career was then disrupted by the political turmoil in Germany where the Nazis had gained power in 1933. His Jewish wife was classified as a "non-Aryan" and Zeuner was dismissed from his university post. The couple left Germany for London in 1934 where, as an academic refugee, Zeuner was supported by the Academic Assistance Council (later the Council for Assisting Refugee Academics or CARA) which Sir William Beveridge, Director of the London School of Economics, and other prominent academics had established in May 1933. Already known for his many publications on fossil insects, Zeuner became a Research Associate in Palaeontology at the British Museum (Natural History) and in 1939 published a major monograph, *Fossil Orthoptera Ensifera*, for which he was awarded a London University D.Sc. degree. Although formally classified as an enemy alien, he succeeded in becoming a naturalized British citizen, and during the Second World War he joined the Anti-Locust Research Centre at the Museum. At this time he completed his first two books (see below) and began publishing papers on prehistoric archaeology and Pleistocene mammals.

Soon after his arrival in London, circumstances arose that changed the direction of Zeuner's scientific career. Through the determined efforts of Mortimer Wheeler, the then Director of the London Museum, and his wife Tessa, the Institute of Archaeology was founded, without premises in 1934 and formally in 1937 in a refurbished mansion, St. John's Lodge in Regent's Park (Evans 1987: 1–18). Wheeler's vision of archaeology included training in natural sciences, and, with further support from CARA, Zeuner joined the Institute as an Honorary Lecturer in Geochronology in 1936 – an event that marks the beginning of what was to become the subdiscipline of environmental archaeology. Teaching at the Institute was suspended during the Second World War, but although his fieldwork was curtailed, Zeuner continued to publish paleontological, geological, and archaeological papers. In 1944 the University of London agreed, in light of his exceptional qualifications, that he should be promoted to a (part-time) professorship, and in 1946, the same year that Gordon Childe became Director of the Institute (Fig. 2), he became the world's first Professor of Environmental Archaeology (Harris 2009: 130). His appointment later became full time and he continued to teach at the Institute and undertook fieldwork throughout the world until his premature death at the age of 58 in November 1963.

Zeuner, Frederick Everard, Fig. 2 Zeuner (*left*) with Professor Gordon Childe, date and location not recorded, possibly in Regent's Park. (Reproduced by permission of the Institute of Archaeology, University College London)

Major Accomplishments

The defining achievement of Zeuner's career was his ability to master evidence from across the natural sciences to examine, on a world scale, the sequence of environmental changes that occurred in the Quaternary and relate them to prehistoric archaeology and mammalian faunas. His talent for comparative field observation, his command of the multilingual European scientific literature, and his ability to synthesize a wide array of data were reflected in his first book, *The Pleistocene Period* (1945). In it he sought to establish an absolute chronology by relating changes in climate and sea level to evidence from fluctuations in solar radiation (following the Serbian mathematician Milutin Milankovitch's astronomical calculations, Gribbin 2002: 476–80), glacial moraines, loess (wind-blown silt from glacial sediments), river terraces, ancient shore lines, cave deposits, and changes in fauna. Then, in a companion volume *Dating the Past* (1946), which drew on lectures Zeuner gave at the Institute of Archaeology, he introduced the new subject of geochronology, described its techniques, comprehensively examined the relationship of Pleistocene (ice age) and Holocene (postglacial) environmental changes worldwide to archaeological periods, principally the Paleolithic, and concluded with a section on dating the prehuman past of the Earth.

These two publications established Zeuner's international reputation as a leading environmental scientist, but preceded the demonstration in 1950 by Willard Libby and his colleagues at Chicago that organic materials could be directly dated by the radiocarbon technique. Zeuner responded to this breakthrough by immediately setting up his own radiocarbon dating project in London and produced a series of results, including dating the Neolithic occupation of Jericho excavated by Kathleen Kenyon (Harris 2009: 130–31, 139: Notes 5 and 6).

Through the 1950s and early 1960s, Zeuner undertook field projects in many parts of the world and published a multitude of archaeological, geological, and faunal papers. In his last decade he worked increasingly on animal domestication. This culminated, just before his premature death, in the publication of his magnum opus, *A History of Domesticated Animals* (1963), in which he presented domestication in its widest sense as more a biological than a cultural process. Zeuner was a lucid and fluent lecturer and at the

Institute of Archaeology, he inspired and trained a succession of research students, many of whom went on to develop the subdiscipline of environmental archaeology that he created.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Childe, Vere Gordon (Theory)
- ▶ Radiocarbon Dating in Archaeology
- ▶ Wheeler, Mortimer

References

Evans, J.D. 1987. The first half century and after. *University of London Institute of Archaeology Bulletin, University College London* 24: 1–25.

Gribbin, J. 2002. *Science: A history 1543–2001*. London: Allen Lane, The Penguin Press.

Harris, D.R. 2009. 'A new professor of a somewhat obscure subject': V. Gordon Childe at the London Institute of Archaeology, 1946–1956. *European Journal of Archaeology* 12 (1–3): 123–144.

Zeuner, F.E. 1945. *The Pleistocene period, its climate, chronology and faunal successions*. London: The Ray Society, 2nd ed. 1959, London: Hutchinson.

Zeuner, F.E. 1946. *Dating the past: An introduction to geochronology*. London: Hutchinson, 2nd, 3rd, 4th ed. 1950, 1952, 1958. London: Metheun.

Zeuner, F.E. 1963. *A history of domesticated animals*. London: Hutchinson.

Further Reading

Sheldon, J. 2001/2002. Environmental archaeology at the Institute: The early years. *Archaeology International* 2001 (2002): 9–11.

Zhan, Guo

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Basic Biographical Information

Dr. Zhan received his M.A. in Mongolian History and Yuan Dynasty History from the Chinese Academy of Social Sciences and studied at the Archaeology Department of Peking University. Guo Zhan is the director of the World Heritage Expert Committee of China, a nongovernmental professional consultant institution designated by the State Administration of Cultural Heritage (SACH) as well as a senior researcher on history and archaeology and concurrent professor at the Chinese Academy of Governance. Dr. Zhan is the ICOMOS vice president and was first elected by the 15th General Assembly in 2005. He also is the vice-chairman and secretary-general of ICOMOS-China as well as director of IICC-Xi'an.

Major Accomplishments

Dr. Zhan took part in the deliberations and research with regard to the Nara Document on Authenticity in Nara, Japan, in 1994 and 2004.

He has worked within the State Administration of Cultural Heritage on the protection, management, and research of ancient architecture, historic cities, and archaeological sites, successively acting as project manager, deputy division chief, director of the General Office, director of the Cultural Relics Division, director of the Division of World Heritage, and commissioner of the Department of Cultural Heritage Protection until his retirement.

Most recently, Zhan has organized the ICOMOS Asia-Pacific Group meetings in China, worked with the international and national post-disaster heritage rescue and protection measures in the wake of Wenchuan earthquake in 2008, and presented at various symposia on the protection and management of cultural landscapes, industrial heritage, and the Grand Canal of China.

He is engaged in the conservation and monitoring of heritage sites in China and serves as chair of the International Symposium on the Concepts and Practices of Conservation and Restoration of Historic Buildings in East Asia. He participated in the revision of the *Principles for the Conservation of Heritage Sites in China* and organized the translation into Chinese of *History of Architectural Conservation* written by Jukka Jokilehto, the *ICOMOS Charter on the Interpretation and*

Presentation of Cultural Heritage Sites (ICIP), *Preparing World Heritage Nominations* (World Heritage Centre, ICOMOS, IUCN), and of some interesting discussion papers of ICOMOS International Scientific Committee on the Theory and Philosophy of Conservation and Restoration.

Cross-References

- ▶ China: Cultural Heritage Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ China: Managing Cultural Heritage and the World Heritage List

Further Reading

Cao, N. 2008. *China. World heritage sites*. London: Compendium.

Gao, J., ed. 2008. *Atlas of world heritage. China*. New York: Better Link Press.

Murphy, J.D. 1995. *Plunder and preservation. Cultural property law and practice in the People's Republic of China*. Hong Kong: Oxford University Press.

Zheng Dekun

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Basic Biographical Information

Cheng Te-K'un 鄭德坤 (Zheng Dekun) (1907–2001) was born in Xiamen, Fujian Province, China, in 1907 (Cheng 1981; An interview with Professor Cheng Te-K'un 1985; Cheng 1994b; Cheng Te-K'un jiaoshou jianli 1994a; Deng 2000 and 2017). He attended the Yenching University in Beijing in 1926. Though beginning university as a premedical student, he completed a bachelor's and a master's degree in Chinese literature. Upon graduation, Cheng joined the Harvard–Yenching Institute as a research fellow and conducted research on the Chinese classics *Classic of Mountains and Seas* (Shanhaijing 山海經) and *Commentary on the Water Classic* (Shuijingzhu 水經注). He visited historical sites across China with Professor Gu Jiegang 顧頡剛 (1893–1980). His monograph, *A Brief History of the Chinese Mortuary Objects* (Zhongguo mingqi 中國明器), and coauthored with Shen Weijun 沈維鈞, was published in the first volume of the *Harvard–Yenching Institute Monograph Series* and used as a teaching material at Waseda University in Japan.

In 1933, Cheng became a professor at Amoy University (modern Xiamen University) in Fujian. He established the university's Museum of Chinese Cultures, which has now developed into the Museum of Anthropology. He also led the first excavation in the province, bringing to light four Tang dynasty tombs at Quanzhou. At the request of the Harvard–Yenching Institute, he started teaching Chinese history at the West China Union University (now Sichuan University) in Chengdu, Sichuan, in 1936, where he also served as curator of the university's museum. In 1938, Cheng embarked upon a doctorate in archaeology at Harvard University and completed a thesis on the prehistory of Sichuan. Upon graduation, he returned to his position at the West China Union University where he reorganized the museum collection and advocated for the use of "native materials" in teaching. He also became editor for *Journal of the West China Border Research Society* (Hauxi bianjiang yanjiu xuehui zazhi 華西邊疆研究學會雜誌).

Cheng's work brought his name to the attention of the British Council. He was invited to give lectures at the universities of Oxford, Cambridge, and London and elected a fellow of the Royal Anthropological Institute of Great Britain and Ireland in 1947. After staying in Hong Kong for 3 years, Cheng was invited back to Cambridge as the lecturer in Far Eastern Art and Archaeology in 1951. During his time in Cambridge, he published his monograph *Archaeological Studies in Szechwan* and devoted himself to the writing of the series *Archaeology in China*. Cheng was invited to lecture at Princeton University in America, the

University of Malaya in Malaysia, and Nanyang University (now National University of Singapore). He organized excavations in Malaysia, resulting in the publication of *Archaeology in Sarawak*. Cheng was awarded an honorific plaque by the board of the Museum of Far Eastern Antiquities in Stockholm in 1963 and honored as emeritus reader in Chinese archaeology and emeritus fellow of Wolfson College, Cambridge, when he retired in 1974.

Cheng was soon invited to join the Chinese University of Hong Kong. He was appointed the dean of the faculty of arts and pro-vice-chancellor in academic affairs. He retired in 1979 but continued to serve as emeritus professor of the department of fine arts, as well as honorary director of the Center for Chinese Archaeology and Art and the Institute of Chinese Studies. He was awarded an honorary degree in literature by the Chinese University in 1981 and elected as a corresponding fellow of the British Academy in 1985.

Major Accomplishments

Cheng's work on Sichuanese archaeology has earned him the title of "Father of Sichuanese Archaeology," granted to him by Japanese archaeologist Seiichi Mizuno (1905–1971) (An interview with Professor Cheng Te-K'un 1985). His monograph on Sichuan was the first publication in a Western language that provided an overall survey of materials from the province, and, thus, drew attention to a long-overlooked area. In particular, the chronological framework proposed for prehistoric Sichuan is considered by scholars to be most valuable. The three-volume *Archaeology in China* drew on newly discovered archaeological materials and provided a comprehensive survey of China in prehistory, Shang, and Zhou periods. The series, later translated into Japanese, has been praised for linking Chinese archaeological activity to world knowledge, at a time when English references on Chinese archaeology was limited. Cheng also published extensively on Chinese jades, ceramics, and paintings.

Cheng is also known for having laid a foundation for the development of archaeology in Hong Kong. He founded, and became director of, the Centre for Chinese Archaeology and Art under the Institute of Chinese Studies at the Chinese University. He invited archaeologist Lin Shouchin 林壽晉 (1929–1988) to join the history department, who was one of the first few scholars from the Chinese Academy of Sciences to teach in Hong Kong (Deng 2000). To this day, the Chinese University remains at the forefront of the study of Chinese art and archaeology in the region. Professor Cheng also served as member of the Antiquities Advisory Board of Hong Kong and a consultant of the ancient book publishing planning team under the People's Republic of China's State Council.

References

An interview with Professor Cheng Te-K'un. 1985. *Chinese University Bulletin* (5):21–24.

Cheng, Te-k'un. 1981. Zixu 自序 (Preface). *Zhongguo lishi dili lunwenji* 中國歷史地理論文集 (*Studies in Chinese historical geography*), 1–5. Hong Kong: Chinese University Press.

Cheng, Te-k'un. 1994a. jiaoshou jianli 鄭德坤教授簡歷 (Biographical notes of Professor Cheng Te-k'un). *Nan Zhongguo ji linjin diqu guwenhua yanjiu: Qingzhu Cheng Te-k'un jiaoshou congshi xueshu huodong liushi zhounian lunwenji* 南中國及鄰近地區古文化研究: 慶祝鄭德坤教授從事學術活動六十週年論文集 (*Ancient cultures of south China and neighbouring regions: Essays in honor of Professor Cheng Te-k'un on the occasion of the sixtieth anniversary of his academic career*), ed. Deng Cong, vii. Hong Kong: Centre for Chinese Archaeology and Art, Institute of Chinese Studies, The Chinese University of Hong Kong.

Cheng, Kwang-chih. 1994b. Xu 序 (Preface). *Nan Zhongguo ji linjin diqu guwenhua yanjiu: Qingzhu Cheng Te-k'un jiaoshou congshi xueshu huodong liushi zhounian lunwenji* 南中國及鄰近地區古文化研究: 慶祝鄭德坤教授從事學術活動六十週年論文集 (*Ancient cultures of south China and neighbouring regions: Essays in honor of Professor Cheng Te-k'un on the occasion of the sixtieth anniversary of his academic career*), ed. Deng Cong, xxxix–xl. Hong Kong: Centre for Chinese Archaeology and Art, Institute of Chinese Studies, The Chinese University of Hong Kong.

Deng, Cong. 2000. Kaoguxue de yidai zongshi Cheng Te-k'un jiaoshou 考古學的一代宗師鄭德坤教授

(Professor Cheng Te-k'un: A grandmaster in Chinese archaeology). *Yu Zhongda yiqi chengzhang – Xianggang Zhongwen Daxue yu Zhongguo Wenhua Yanjiusuo tushi 1949–1997* 與中大一起成長——香港中文大學與中國文化研究所圖史 1949–1997 (*Growing up with The Chinese University of Hong Kong–CUHK and ICS: A photo history 1949–1997*), ed. Chen Fangzheng 陳方正, 221–223. Hong Kong: Institute of Chinese Studies, The Chinese University of Hong Kong.

Deng, Cong, ed. 2017. *Xugu hengjin: Zheng Dekun jiaoshou baishi danchen jinian* 盱古衡今:鄭德坤教授百十誕辰紀念 *(Celebrating the 110th birthday of professor Zheng Dekun)*. Hong Kong: Centre for Chinese Archaeology and Art.

Further Readings

Cheng, Te-K'un. 1957. *Archaeological studies in Szechwan*. Cambridge, UK: Cambridge University Press.

Cheng, Te-K'un. 1959–1963. *Archaeology in China*, vol 3. Cambridge, UK: W. Heffer.

Cheng, Te-K'un. 1969. *Archaeology in Sarawak*. Cambridge, UK: W. Heffer.

Cheng, Te-K'un. 1980. *The world of Chinese – a struggle for human Unity*. Hong Kong: Chinese University Press.

Cheng, Te-K'un, and Weijun Shen. 1933. *Zhongguo mingqi* 中國明器 *(A brief history of Chinese mortuary objects)*. Beijing: Hafo yanjingshe.

Zhoukoudian, Archaeology of

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Introduction

Zhoukoudian is located in the Fangshan District, 55 km southwest of downtown Beijing. A hill called Longgushan "Dragon Bone Hill" was known by local farmers in the early twentieth century for Ordovician limestone quarrying. Zhoukoudian was first visited by the Swedish geologist Johan Gunnar Andersson as a potential location of quaternary mammalian fossils in 1918. The American paleontologist Walter Granger later identified fossils at the Dragon Bone Hill in 1921. Austrian paleontologist Otto Zdansky then discovered two *Homo erectus* teeth from the Locality 1 cave in 1926, the same year Canadian anthropologist Davidson Black named the hominid teeth as a new species *Sinanthropus pekinensis* (Black 1927). Black secured funding from the Rockefeller Foundation and started the official international collaboration with the Cenozoic Research Laboratory (today's Institute of Vertebrate Palaeontology and Palaeoanthropology, Chinese Academy of Sciences) in 1927. Both Davidson Black and Chinese paleontologist Yang Zhongjian led excavations at the site, where the first skull of Peking man was recovered by Chinese anthropologist Pei Wenzhong in 1929. Since 1930, Zhoukoudian has become one of the most important paleoanthropology sites for the study of human evolution in the world.

Definition

Zhoukoudian (aka Choukoutien in early publications) is a UNESCO world heritage site in China. It refers to a village whose landscape includes 27 localities of hominids, fauna, and cultural remains. Four of these localities yielded significant hominid fossils of different species. Locality 1 cave (Peking man site) unearthed 203*Homo* fossil fragments of *Homo erectus*, belonging to more than 40 individuals (Fig. 1). These included six nearly complete skulls, five of which were lost during WWII. The Peking man skulls are the most important study subjects for Asian *Homo erectus* and have been published extensively. A human premolar unearthed from Locality 4 in 1973 was unknown to the world, which probably belongs to Asian Archaic *Homo sapiens*. Locality 26 (aka the Upper Cave) yielded 10 individual fossil remains belonging to modern human *Homo sapiens sapiens*, which are also well-studied specimens in paleoanthropology. The latest discovery of human fossils at Zhoukoudian was from the

Zhoukoudian, Archaeology of, Fig. 1 The only surviving Peking man skull, examined by one of the authors (Dr. Chen Shen) at the Institute of Vertebrate and Paleontology and Paleoanthropology in 2010. (Photo credit, author (ZXL))

Tianyuan Cave where 34 fragments were found, including a mandible, teeth, and postcranial bones, which present a nearly complete individual (Shang and Trinkaus 2010). Direct AMS 14 C dating from a limb fragment produced the most reliable and earliest date for China's Homo sapiens sapiens at Zhoukoudian, ranging from 42,000 to 38,500 years ago. In addition, six localities (Locality 1, 4, 13, 15, 22, and 26) yielded a large assemblage of lithic artifacts and other cultural relics such as fire remains and ornaments.

Key Issues/Current Debates/Future Directions/Examples

Locality 1 (Peking Man Site)

The most focused studies at Zhoukoudian have been dating, climatic context, lithic technology, and hominid and carnivore remains of the cave. Recent dating studies have changed the old perspectives about when Peking man lived, suggesting the hominid appeared at Zhoukoudian as early as 780,000 years ago (Shen et al. 2009), when the world was in extreme cold and dry climate. With cultural material deposits measuring 40 m deep, it is possible to show the occupation of early hominids may have lasted half a million years at Zhoukoudian. Lithic artifacts were recovered from deposits of three cultural phases (early layers 8–10, middle layers 6–7 and QII, and late layers 3–5), accounting for more than 17,000. These were catalogued into ten classes with 40 types of stone tools, which suggest a gradual transition from simple use to a more complicated tool manufacturing process at the site.

Locality 15

The lithic artifacts from Locality 15 (dated to the late Middle Pleistocene and early Late Pleistocene Periods) reveal evidence suggesting that lithic technology at the site was more developed than that of their predecessors at the Locality 1 (Gao 2000). The Zhoukoudian Locality 15 hominid (most likely East Asian *Homo heidelbergensis* although no fossil found yet) effectively mastered sophisticated core reduction modes, represented by multi-directional flaking and alternate flaking, which were not evident at the Locality 1.

Fire Use

One of the issues debated about Zhoukoudian's cultural contents is the use of fire. Although there is no structurally defined hearth at the Locality 1 site, burnt ashes, charcoals, burnt bones, and even stone tools were often identified in situ. Whether or not these fire-related activities were the result of intentional human control and manipulation or of natural causes and hydratic force is the subject of further studies. Since 2009, full-

Zhoukoudian, Archaeology of, Fig. 2 Ongoing excavation at Zhoukoudian Locality 1 by scientists from Chinese Academy of Sciences since 2009. (Photo credit: the author (SC))

scale excavations at the Locality 1 have been carried out by Chinese scientists and have revealed possible fire floors at the layer 4 (Fig. 2). An interdisciplinary research team is taking samples for all relevant scientific laboratory testings, and hopefully the results will advance our knowledge about the human use of fire in the Middle Pleistocene at Zhoukoudian.

Hunters or Hunted

Since 1980s, a number of studies related to Peking man behaviors have challenged old thoughts suggesting that Locality 1 was primarily a den of the giant hyena. Lewis Binford argued the deposition of fossil remains were likely the results of carnivores' activities (Binford and Ho 1985). Later Steve Weiner (Weiner et al. 1998) and Paul Goldberg (Goldberg et al. 2001) cautioned early reported evidences of fire use and proposed the fire-ash and burned bones at the cave probably were natural process of the formations. A study by Noel Boaz (Boaz et al. 2004) on spatial distribution of hominid fossils further dismissed the idea that the Zhoukoudian Locality 1 cave was a home base for Peking man. Instead, the cave was more likely used by carnivores scavenging the Peking man. The 20 years of studies in favor of carnivore activities over hominids were all based on analyses of limited samples of fauna and sediment.

Concerning all the discoveries and debates, new systematic excavations and multi-disciplinary research will bring the solutions. The comprehensive study of lithics including both technology and function will reveal the behavioral capability. Further taphonomic and zoo-archaeological research, physical anthropology, chronology dating, and paleoenvironmental study should be all involved.

Cross-References

- ▶ Archaic *Homo sapiens*
- ▶ Black, Davidson
- ▶ *Homo erectus*

References

Binford, L.R., and K.C. Ho. 1985. Taphonomy at a distance: Zhoukoudian, "The home of Beijing Man?". *Current Anthropology* 26 (4): 413–442.

Black, D. 1927. On a lower molar hominid tooth from the Chou Kou Tien deposit. *Palaeontology Sinic, series D* 7 (1): 1–29.

Boaz, N.T., R.L. Ciochon, Q.Q. Xu, and J.Y. Liu. 2004. Mapping and taphonomic analysis of the Homo erectus loci at Locality 1 Zhoukoudian, China. *Journal of Human Evolution* 46 (5): 519–549.

Gao, X. 2000. Interpretations of typological variability within paleolithic remains from Zhoukoudian Locality 15, China. Unpublished PhD dissertation, University of Arizona.

Goldberg, P., S. Weiner, O. Bar-Yosef, Q.Q. Xu, and J.Y. Liu. 2001. Site formation at Zhoukoudian, China. *Journal of Human Evolution* 41: 483–530.

Shang, H., and E. Trinkaus. 2010. *The early modern human from Tianyuan Cave, China*. College Station: Texas A&M University Press.

Shen, G., X. Gao, B. Gao, and D.E. Granger. 2009. Age of Zhoukoudian Homo erectus determined with $^{26}Al/^{10}Be$ burial dating. *Nature* 458: 198–200.

Weiner, S., Q.Q. Xu, P. Goldberg, J.Y. Liu, and O. Bar-Yosef. 1998. Evidence for the use of fire at Zhoukoudian, China. *Science* 281: 251–253.

Zhoukoudian: Geography and Culture

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Introduction

The Zhoukoudian site (39°41′N, 115°51′E) is a series of cavities on the Dragon Hill, which is located at Zhoukoudian, Fangshan District, about 50 km southwest of Beijing at an elevation of about 128 m above sea level (Fig. 1). So far at least 27 fossil localities have been systematically studied and numbered. These are known not only for the discoveries of human remains but also for the long sequence of lithic and animal bone assemblages produced through several excavations in the various localities. Among all the localities, the Locality 1, situated on the northern slope of Dragon Bone Hill, including the "Peking Man Cave" and the Pigeon Hall, in which several human skeletal remains were first discovered in 1929 and named collectively as "Peking Man", is the most important one. At the time, the impact of finding the human fossils, originally called *Sinanthropus*, was immense. Continued excavations at Locality 1 uncovered an additional series of human fossils derived from a thick, well-stratified sequence.

Definition

The fossiliferous potential of the Zhoukoudian area was first investigated by geologist J. Gunnar Andersson in 1919 (Andersson 1919) at Chicken Bone Hill which now termed Zhoukoudian Locality 6. The main cave infilling, a hill of Ordovician limestone named Dragon Bone Hill, was discovered by J. Gunnar Andersson, Otto Zdansky, and Walter Granger in 1921 (Andersson 1922). Long-term fieldwork was undertaken from 1921 to 1937, and many important discoveries were recovered in the Dragon Bone Hill, especially at Locality 1. The first excavation was undertaken by Zdansky in 1921 and 1923, and three isolated hominid teeth were recovered (Black 1926; Zdansky 1927; Weidenreich 1937). Five complete *Homo erectus* skulls and a number of mandibular and dental remains were discovered from 1929 to 1936. The first identified and also the well-preserved recovery skull (skulls E), discovered in 1929 by Pei Wenzhong (Pei 1930; Black 1931; Black et al. 1933), was a turning point in the investigation of the site and helped to ensure continued funding (Cormack 2000). Hominid discoveries were made each field season, but the excavation of skulls LI, LII, and LIII during 11 days in November 1936 by Jia Lanpo was particularly noteworthy (Jia 1999). The sixth complete skull was discovered during fieldwork from the 1950s to 1970s. The inventory of all of the Peking Man fossils from Locality 1 is as follows: 6 complete or nearly complete skulls, 12 large skull fragments, 15 incomplete mandibles, 157 teeth, 3 humerus fragments, 1 clavicle, 7 femur fragments, 1 tibia fragment, and a lunate

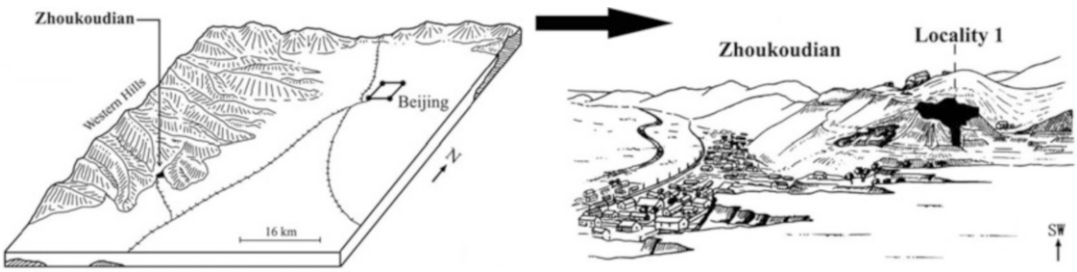

Zhoukoudian: Geography and Culture, Fig. 1 A map showing the position of the Zhoukoudian site (After Andersson 1943)

bone. The specimens represent materials from more than 40 male and female individuals of different ages. The Peking Man cave is the richest *Homo erectus* site in the world and marked a new era in our understanding of the history of human evolution.

Zhoukoudian is known not only for the discoveries of human remains but also for the long sequence of lithic and animal bone assemblages obtained at several excavations in the various localities (Jia and Huang 1990). Over 100,000 pieces of stone artifacts have been unearthed from Locality 1 alone (Fig. 2). The variety of raw materials used to make the stone artifacts include quartz, flint, sandstone, etc.; local quartz is dominant and outcrops exposed by weathering processes from such places as the riverbed and the hill slopes in the vicinity of the cave. The most striking feature of the Peking Man industry lies in use of the direct bipolar percussion technique, which was created by Peking Man himself principally because of the scarcity of better quality material in the region. The stone tools include scrapers, points, choppers, burins, borers, and so on, using different production techniques. Changes in tool size, raw materials used and the flake-producing techniques over time demonstrate that the lithic technology of Peking Man progressively evolved.

Nearly 100 species of mammalian fossils have been found in Locality 1, including thick-jaw deer (*Megaloceros pachyosteus*), sika deer (*Cervus grayi*), gazelle (*Gazella*), saber-toothed tiger (*Machairodus*), striped hyena (*Pachycrocuta sinensis*), and cave bear (*Ursus spelaeus*), among others. Some of these were clearly part of the diet of Peking Man.

Several ash layers are interspersed relatively widely within the 40 m of deposits. More strikingly, ash residue in the fourth layer was quite thick, and the thickest part is over 6 m. In these ash layers, there were large quantities of burnt stones, charred bones, and burnt seeds of hackberries. The analysis of black layer samples and associated charred bone fragments confirms the existence of remains of fire use by Peking Man.

The Peking Man cave sediments, more than 40 m thick, have been divided from bottom to

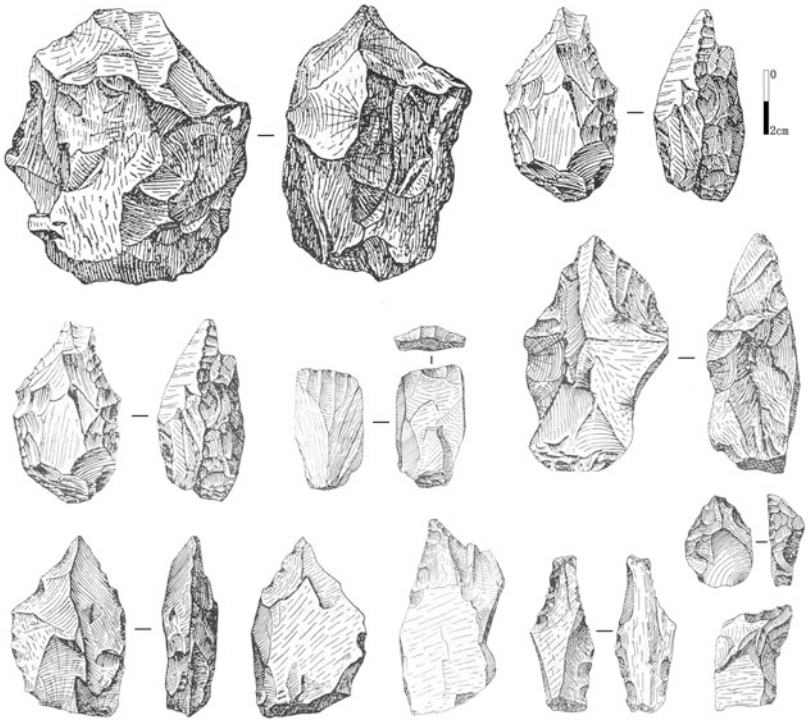

Zhoukoudian: Geography and Culture, Fig. 2 The stone artifacts from Zhoukoudian, Locality 1 (After Pei and Zhang 1985)

top into 17 layers (Fig. 3). Human remains were found in nearly all layers (1–10) (Pei and Zhang 1985). The lithic assemblages were concentrated in several horizons (layers 1, 3, 4, top of 8 and 10), and some artifacts were found scattered throughout the thick brecciated layers (layers 5–9). The sediments also record much information regarding paleoclimatic change (Yang et al. 1985). They are characterized by breccias layers interbedded with non-breccia layers. The breccia layers imply a cold climate and the non-breccia layers imply a warm climate. There are many sedimentary cycles composed of subdivided beds in each layer, which may reflect paleoclimatic variations of different scales (Liu 1985).

The geological age of the deposits of Locality 1 is Middle Pleistocene based on the mammalian assemblages from the cave. A series of detailed geological, palynological, and paleontological studies, as well as dating, has contributed significantly to our understanding of the complex stratigraphy and the dates of the Peking Man site. Early attempts to date Locality 1 may be traced to 230Th/234 U ages measured on two fossil bones by Cherdyntsev (1971). In the late 1970s, numerical dating was carried out at several Chinese institutions using different techniques, including U-series disequilibrium (Zhao et al. 1985a), fission track (Liu et al. 1985), paleomagnetism (Qian et al. 1985), thermoluminescence (Pei 1985), and amino acid racemization (Zhou 1989). As a result, the following chronological sequence has been proposed (Zhao et al. 1985b): c. 700 ka for the lowest fossiliferous horizon (layer 13), based mainly on paleomagnetic stratigraphy; c. 500 ka for the lowest stone artifact-containing layer (layer 10), based on fission track dating of sphene grains extracted from ash deposits; and c. 230 ka for the uppermost strata (layers 1–3) based on 230Th/234 U dating of fossils. Alongside technical advances in dating methods, chronological studies of Locality 1 have continued, but the newer age results do not significantly alter the generally accepted temporal framework, which places the age of the hominid remains in the range of about 230–500 ka. At present, a new result which was made by a new radiometric method indicates that the date of the oldest human fossils is about 770,000 years ago and that *H. erectus* at Zhoukoudian lived during a relatively mild glacial period (Shen et al. 2009).

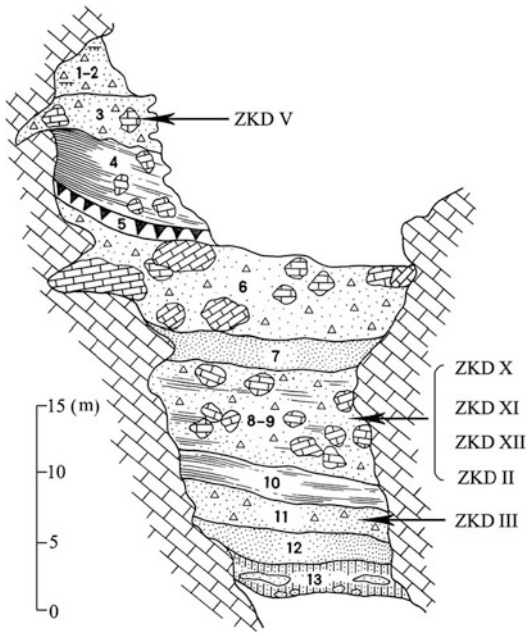

Zhoukoudian: Geography and Culture, Fig. 3 A sketch showing the deposits (West Profile) of ZKD Locality 1 and the stratigraphic positions of the cranial discoveries (From Wu et al. 2011)

Key Issues/Current Debates/Future Directions/Examples

There are some hot topics on which many subsequent studies have focused. The first is dating. Although many dating methods have been used to determine the age of Locality 1 and a general temporal framework has been obtained, the validity of the assumptions used in the dating and the accuracy of the derived ages remain problematic. Even the latest result which was made by Shen et al. (2009) has been subject to debate. The second is the use of fire. There is no doubt that the ash layers existed; even the ash residue in the fourth layer was quite thick. Furthermore, abundant burnt stones, charred bones, and burnt seeds of hackberries were found. Some

of these samples have been analyzed and confirm the existence of remains of fire used by Peking Man (Wu 1999), but also there are some contradictions (Weiner et al., 1998). The third concerns the function of the cave: whether or not the cave was Peking Man's home. Because of the long sequence of the sediments, as well as other evidence, Peking Man was considered to have lived long term in the cave. But Binford (Binford and Ho 1985) thought the cave was a trap. The fourth focuses on the lithic industry. From the view of geology, the Zhoukoudian industry is old, but the small elongated flakes produced by the bipolar method are even Upper Paleolithic products in the West (Teilhard and Pei 1932). Finally, the issue of whether this hominid species was a direct ancestor of later eastern Asian populations or a side branch in human evolution impacts on the two principal current hypotheses about the origin of modern *H. sapiens* (e.g., Wolpoff et al. 1984).

Cross-References

- ▶ Andersson, Johan Gunnar
- ▶ *Homo erectus*
- ▶ Human Evolution: Use of Fire

References

Andersson, J.G. 1919. Preliminary description of a bone deposit at Chou-Kou-Tien in Fang-Shan-Hsien Chihli Province. *Geografiska Annaler* 1: 265–268.

Andersson, J.G. 1922. Current palaeontological research in China. *Bulletin of the American Museum of Natural History* 46: 727–737.

Andersson, J.G. 1943. Researches into the prehistory of the Chinese. *The Museum of Far Eastern Antiquities (Ostasiatiska Samlingarna) Stockholm* 15: 1–304.

Binford, L., and Chuan Kun Ho. 1985. Taphonomy at a distance: Zhoukoudian, 'The cave home of Beijing Man'? *Current Anthropology* 26: 413–442.

Black, D. 1926. Tertiary man in Asia: The Choukoutien discovery. *Nature* 118: 733–734.

Black, D. 1931. On an adolescent skull of Sinanthropus pekinensis in comparison with an adult skull of the same species and with other hominid skulls, recent and fossil. *Paleontologia Sinica Series D* 7: 1–144.

Black, D., P. Teilhard de Chardin, C.C. Young, and W.C. Pei. 1933. Fossil man in China. The Choukoutien Cave deposits with a synopsis of our present knowledge of the late Cenozoic of China. *Memoirs of the Geological Survey of China Series A* 11: 1–158.

Cherdyntsev, V.V. 1971. *Uranium-234*. Jerusalem: Israel Program for Scientific Translation.

Cormack, J.L. 2000. The scientific influence that Dr. Davidson Black (Bu Dasheng) had on Chinese prehistory. *Acta Anthropologica Sinica* 19 (Suppl): 292–298.

Jia, L.P., ed. 1999. *Chronicle of Zhoukoudian, 1927–1937*. Shanghai: Shanghai Scientific and Technical Publishers.

Jia, L.P., and W.W. Huang. 1990. *The story of Peking man, from archaeology to mystery*. Hongkong: Oxford University Press.

Liu, Z. 1985. Sequence of sediments at locality 1 in Zhoukoudian and correlation with loess stratigraphy in northern China and with the chronology of deep-sea cores. *Quaternary Research* 23: 139–153.

Liu, S., F. Zhang, R. Hu, J. Liu, S. Guo, and S. Zhou. 1985. Dating Peking Man site by fission track method. In *Multi-disciplinary study of the Peking Man site at Zhoukoudia*, ed. R. Wu, 241–245. Beijing: Science Press.

Pei, W.C. 1930. An account of the discovery of an adult Sinanthropus skull in the Chou Kou Tien deposit. *Bulletin of the Geological Society of China* 8: 203–205.

Pei, J.X. 1985. Thermoluminescence dating of the Peking Man site and other caves. In *Multi-disciplinary study of the Peking Man site at Zhoukoudian*, ed. R.K. Wu, M.E. Ren, X.M. Zhu, Z.G. Yang, C.K. Hu, Z.C. Kong, Y.Y. Xie, and S.S. Zhao, 256–260. Beijing: Science Press.

Pei, W.Z., and S.S. Zhang. 1985. A study on the lithic artifacts of Sinanthropus. *Palaeontologica Sinica New Series D* 12: 1–277.

Qian, F., J.X. Zhang, and W.D. Yin. 1985. Magnetic stratigraphy from the sediment of West Wall and test pit of locality 1 at Zhoukoudian. In *Multi-disciplinary study of the Peking Man site at Zhoukoudian*, ed. R. Wu, 251–254. Beijing: Science Press.

Shen, G.J., X. Gao, B. Gao, and D.E. Granger. 2009. Age of Zhoukoudian Homo erectus determined with 26Al/10 Be burial dating. *Nature* 458: 198–200.

Teilhard de Chardin, F., and W.C. Pei. 1932. The lithic industry of the Sinanthropus deposits in Choukoutien. *Bulletin of the Geological Society of China* 11: 317–358.

Weidenreich, F. 1937. The dentition of Sinanthropus pekinensis: A comparative odontography of the hominids. *Palaeontologica Sinica, New Series D* 1: 1–181. (text); 1–121 (atlas).

Weiner, S., Q.Q. Xu, G. Pau, J.Y. Liu, and B. Ofer. 1998. Evidence for the use of fire at Zhoukoudian, China. *Science* 281: 251–253.

Wolpoff, M., X.Z. Wu, and A. Thorne. 1984. Modern Homo sapiens: A general theory of hominid evolution involving the fossil evidence from east Asia. In *The origins of modernhumans*, ed. F. Smith and F. Spencer, 411–483. New York: Alan R. Liss.

Wu, X.Z. 1999. Investigating the possible use of fire at Zhoukoudian, China. *Science* 283: 299a.
Wu, X.J., L.A. Schepartz, and C.J. Norton. 2011. Morphological and morphometric analysis of variation in the Zhoukoudian Homo erectus brain endocasts. *Quaternary International* 211: 4–13.
Yang, Z., Y. Mou, F. Qian, X. Wang, P. Niu, H. Chen, W. Yin, and X. Wei. 1985. Study of the late Cenozoic strata at Zhoukoudian. In *Multi-disciplinary study of the Peking Man site at Zhoukoudian*, ed. R. Wu, 1–86. Beijing: Science Press.
Zdansky, O. 1927. Preliminary notice on two teeth of a hominid from a cave in Chihli (China). *Bulletin of the Geological Society of China* 5: 281–284.
Zhao, S.S., M. Xia, C.H. Zhang, M.L. Liu, S.X. Wang, Q.F. Wu, and Z.B. Ma. 1985a. Uranium series dating of Peking Man site. In *Multi-disciplinary study of the Peking Man site at Zhoukoudian*, ed. R.K. Wu, M.E. Ren, X.M. Zhu, Z.G. Yang, C.K. Hu, Z.C. Kong, Y.Y. Xie, and S.S. Zhao, 246–250. Beijing: Science Press.
Zhao, S.S., J.X. Pei, S.L. Guo, S.S. Liu, F. Qian, S.H. Chou, and X.G. Li. 1985b. Study of chronology of Peking Man site. In *Multi-disciplinary study of the Peking Man site at Zhoukoudian*, ed. R.K. Wu, M.E. Ren, X.M. Zhu, Z.G. Yang, C.K. Hu, Z.C. Kong, Y.Y. Xie, and S.S. Zhao, 239–240. Beijing: Science Press.
Zhou, Y.H. 1989. Amino acid dating of Peking Man and Dingcun Man. *Acta Anthropologica Sinica* 8: 177–181.

Zimbabwe: Cultural Heritage Management

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Introduction

Zimbabwe has a history of formal cultural heritage management which dates back to the colonial period. The country was a British colony from 1890 and named Rhodesia after Cecil John Rhodes. It won independence in 1980 after a war of liberation. The management of cultural heritage has remained conservative, lagging behind modern management practices. In Zimbabwe, cultural heritage is defined by law and includes some of the following: any historical building, ruin, statue, grave, cave, rockshelter, and area of archaeological or historical interest. This entry discusses the history of cultural heritage management in Zimbabwe and the challenges that have often been encountered when managing it. Finally, it looks at some of the concerns that have been raised about cultural heritage in Zimbabwe and how its management should be improved.

Historical Background

When the colonial government introduced formal cultural heritage management in Zimbabwe, it had assumed that there was no cultural heritage protection in the country. Prior to that time, however, cultural heritage was protected by traditional methods and laws, which were upheld by the local communities and enforced by traditional leaders. These traditional laws were not written down, and they constituted what is now known as customary laws (Chiwaura 2005). The introduction of formal laws to manage cultural heritage was part of efforts to protect the dry-stone ruins of Great Zimbabwe, Khami, Dhlodhlo (Danang'ombe), Zinjanja (Regina), Nalatale, and others (Fig. 1), which early European settlers had incorrectly believed were storage rooms for gold and other precious minerals for King Solomon and the Queen of Sheba (Mahachi and Ndoro 1997).

To protect these sites from pillaging and destruction, the Legislative Assembly enacted the Ancient Monuments Protection Ordinance in 1902. This was followed by the 1912 Bushman and Relics Ordinance aimed at protecting rock art. The promulgation of this ordinance emanated from the concern that the rampant pillaging of rock art by early European settlers in South Africa would spread into Rhodesia (Ndoro 2001). Both the 1902 and the 1912 ordinances were later repealed and replaced by the comprehensive Natural Historical Monuments and Relics Act of 1936. A wide range of cultural and natural heritage sites were for the first time protected and managed under this act. Following its enactment, the Commission for the Preservation of Natural

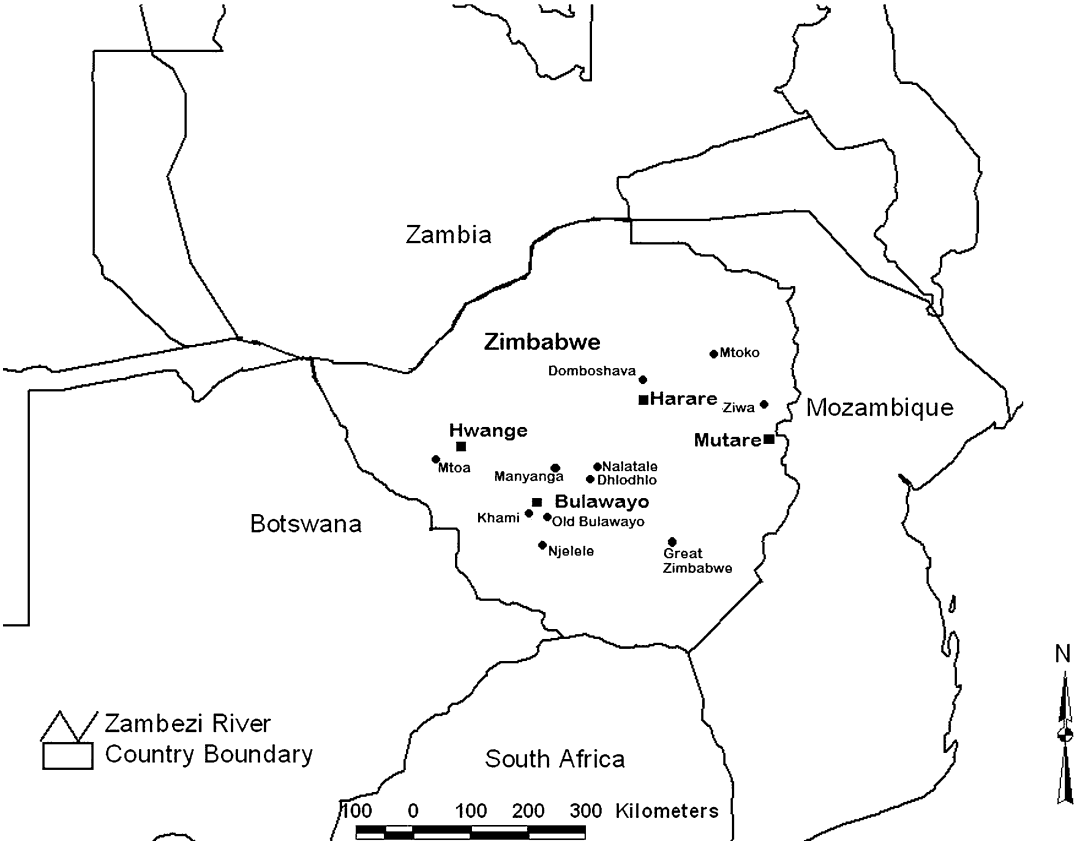

Zimbabwe: Cultural Heritage Management, Fig. 1 Part of Southern Africa showing some of the archaeological cultural heritage sites in Zimbabwe

and Historical Monuments and Relics, commonly known as the Commission, was established to implement the protective legislation. Its objective was to coordinate activities related to the preservation of ancient, historical, and natural monuments, relics, and other objects of aesthetic, historical, archaeological, or scientific interest. The Act was later repealed and replaced with a new Act, CAP 313, after the Commission and the National Museums of Rhodesia were amalgamated in 1972 to establish the National Museums and Monuments of Rhodesia. Ndoro (2001) viewed this amalgamation as a positive development as it ensured that all cultural heritage property had to come under a single administration. However, Chipunza (2005) saw the merger differently, contending that the activities of the Commission to protect cultural heritage sites became limited as the inspection of monuments was no longer recognized as a profession. The new organization was divided into five administrative regions and headquartered first in Harare, then Salisbury, and placed under the ministry of Internal Affairs. Open-ended contracts for White regional and executive directors were established, probably to safeguard the interests of the White community. The problem of open-ended contracts is that cultural heritage continues to be administered with the same management style without any chance for change or improvement. At independence, the heritage agency's name was changed to the National Museums and Monuments of Zimbabwe (NMMZ) and administered under the ministry of Home Affairs. Although there are opposing views regarding the joining of the two organizations, the objective of the new

body did not differ much from that of the Commission, except in few instances where it provides for the establishment of museums and the board of trustees. The protection of cultural heritage remained under this law and administration until independence, when it was adopted wholesale by the NMMZ.

Key Issues/Current Debates

Management Prior to Independence

Soon after its establishment, the Commission began to compile a list of rock paintings, ruins, and places of scenic beauty. A monuments register was created, with 2,400 sites initially entered. By 1954, the Commission had proclaimed 79 of these sites as national monuments (Summers and Cooke 1959). A number of sites declared as national monuments were related to colonialism, perhaps as part of legitimizing this cultural heritage in a country where Black people were the majority. Activities such as archaeological excavations, alteration, defacing or removal, and export of an ancient monument or relic were not permitted without the written consent of the Commission. Separate registers for historical buildings were also subsequently prepared in each of the country's major cities, and although they were protected by law, not many were declared as national monuments. Historical Buildings Advisory Committees were also established to provide advice on how they were to be protected and managed.

A major challenge during the formative years of the Commission was the lack of staff and equipment to carry out maintenance work on proclaimed monuments and other sites. Following an agreement with the National Parks Advisory Board in 1951, Victoria Falls and the Zimbabwe Ruins (Great Zimbabwe) were temporarily transferred to the Parks Board for management. Additional monuments were transferred to the Parks authorities after a further agreement was made in 1961. Table 1 shows a list of monuments that were transferred and were to be managed by the Parks Board, while Table 2 shows monuments that were to be co-managed by the two organizations.

Zimbabwe: Cultural Heritage Management, Table 1 Monuments handed over to the Parks Board in 1951 for management

Registered number	Name of monument
1	Victoria Falls Reserve
4	World's View Hill-Matopos
9	Sinoa (Chinhoyi) Caves
10	Rhodes-Inyanga Estate
12	Pungwe Falls
29	World's View Farm-Nyanga
35	Chirinda Forest
42	Mtoa Ruins-Hwange
44	Mjelele Valley Road Cave
46	Ewanrigg Aloe Garden
51	Rupisi Hot Springs

Zimbabwe: Cultural Heritage Management, Table 2 Monuments that were to be co-managed by the Commission and the Parks Board

Registered number	Name of monument
2	Zimbabwe Ruins
7	Bambata Cave
8	Nswatugi Cave
19	Silozwane Cave
20	Gulubahwe Cave

The hope of the Commission was that these monuments were to be transferred back in future when adequate staff members were employed and equipment acquired. Only Great Zimbabwe and a few other sites were returned in 1975, but the rest including the Victoria Falls remained under the current Zimbabwe Parks and Wildlife Management Authority. Attempts to take over the management of Victoria Falls by the NMMZ in recent years from the Parks authorities have caused a considerable dispute between the two organizations (Makuvaza 2010).

Many sites that were proclaimed as national monuments were then fenced, and brass plaques were erected to advise the public that they were now government property and protected by law, and breaking the law was by order liable to prosecution (Fig. 2). Proclamation of sites as national monuments, fencing and phraseology on the plaques instantaneously sidelined local communities from managing their cultural heritage in fear of being prosecuted.

Zimbabwe: Cultural Heritage Management, Fig. 2 Plaques erected at cultural heritage sites proclaimed as national monuments to warn the public that they were protected by law

Zimbabwe: Cultural Heritage Management, Fig. 3 Brass plaques erected at cultural heritage sites after the enactment of the Act, CAP 313

Local communities had also begun to be isolated from managing cultural heritage as they were evicted from their original areas to create European settlements through the 1930 Land Apportionment Act and later by the 1949 Forestry Act, 1951 Land Husbandry Act, and the 1975 Parks and Wildlife Management Act. The result was that people were physically and spiritually separated and settled in new areas with cultural heritage sites they were not directly associated with (Pwiti and Ndoro 1999; Ndoro 2001). The problem of isolating people from their cultural heritage appears to have been realized and addressed when the old plaques were replaced with appropriately rephrased ones, showing the new Act, CAP 313 (Fig. 3).

These brass plaques are still erected at many cultural heritage sites proclaimed as national monuments in Zimbabwe today. The problem of isolating the local communities from their cultural heritage appears to have been in principal addressed but in practice remained, even well after the independence of the country.

During its early formation, the Commission had felt that the enactment of the legislation was not adequate for the full protection of sites in the country. Physical intervention was therefore required in cases where sites would collapse or vandalized. An inspection program was established, and the work included carrying out regular inspection of all monuments, which included maintenance and repair (Fothergill 1953). Inspection reports, which outlined the conservation requirements of cultural heritage sites, were also introduced as part of the program. However, much of the early conservation work was technical and unsystematic and involved seasonal clearing of vegetation, restoration, and provision of access to the visiting public (Pwiti 1997; Ndoro 2001). At some sites such as Khami and Nalatale, concrete or cement mixed with earth (dhaka) was applied to stabilize the collapsing walls. This approach, however, focused more on the protection of physical aspects of cultural heritage sites, while the protection of intangible elements was not of major concern. Also, regular conservation work was biased towards bigger and popular sites such as Great Zimbabwe, Khami, Dhlodhlo, Nalatale, Tsindi, and Mtoko ruins. Smaller, less popular, and other type of cultural heritage sites were managed through a monuments inspection program. Some sites located in private farms such as Manyanga (Ntaba zi ka mambo) located in the former Meikles farm in the Bubi district were in part administered by the farmers themselves. Although there were attempts to manage some of the religious sites such as Njelele in the Matobo hills and Tere ruins in Mtoko, these sites remained under the custodianship of traditional authorities and community protection (Pwiti and Ndoro 1999; Ranger 1999; Makuvaza 2008).

Archaeological research at some of the sites led to the realization that they could be developed as major tourist attractions in the country. Consequently, site museums were developed during the colonial period and others after independence at or near sites such as Great Zimbabwe, Khami, Dhlodhlo, Nalatale, Mtoko, and Ziwa in Nyanga and in Matopos (Fig. 4). Exhibitions in these site

Zimbabwe: Cultural Heritage Management, Fig. 4 A museum at Khami developed as part of a visitor attraction at the site

museums, however, were largely targeted at foreign tourists and less at domestic visitors.

Many of these sites were, however, later abandoned at the height of the liberation struggle during the latter half of the 1970s for security reasons (Ndoro 2001). During this period, no conservation work was carried out, and vegetation, which had previously been regularly cleared, grew back threatening their structural stability.

Post-Independence Period

After independence, the approach to the management of cultural heritage in the country did not, however, differ much from that which was established during the colonial period. The legislation was amended in 1984, in 1990, and in 2001 during which year it was renamed CAP 25/11. Regardless of these amendments, the legislation remained to a very large extend identical to the predecessor Acts, especially in sections and parts that relate to the definition and the actual protection and management of cultural heritage in the country. After independence, the management of cultural heritage continued under the same conservative management structures, established during the colonial era.

Although there was not a marked difference between the management of cultural heritage during the colonial and independence periods, the new Zimbabwean government began to support its management throughout the country. More attention, however, was given to Great Zimbabwe which was viewed as a source of national pride and from which a new identity could be advanced (Pwiti 1997). Several international consultants were sent to Great Zimbabwe and other sites by UNESCO, UNDP, and by other European countries such as United Kingdom, Sweden, and Norway to provide advice on how they should be managed (cf. Ndoro 1997, 2001). This eventually resulted in the acknowledgement by UNESCO of the significances and values of Great Zimbabwe and Khami as universally outstanding, leading to their proclamation in 1986 as World Heritage sites. This was followed later by the proclamation of Matobo Hills in 2003, while Ziwa has been under consideration for World Heritage listing since 1997. Other monuments and sites continued to be managed through a revived monuments inspection program as was the case before independence.

In 1991, the NMMZ developed a Master Plan for Cultural Resource Conservation and Development, which was aimed at providing a national conservation strategy and development of some of the monuments as tourist attractions so as to generate revenue for the organization (Collett 1991). The master plan was also aimed at changing museum displays and at addressing local communities concerns. After independence, presentations of major monuments had remained targeted at foreign tourists, and the local communities had

also remained alienated from the management of these sites (Pwiti 1997). To address some of these concerns, a number of sites were selected for development, including Khami, Dhlodhlo, Domboshava – a rock art site situated 35 km north east of Harare and Old Bulawayo – a nineteenth-century Ndebele settlement located about 25 km south of Bulawayo.

While efforts were made to improve the management and development of important archaeological sites in the country, cultural heritage related to colonialism did not receive similar attention. Upon independence, the new government thought to be responsive to Black people's sensitivities could not allow cultural heritage related to colonialism to continue to survive (Turnbridge 1984). In Harare, this resulted in the removal of the statue of Cecil John Rhodes from Africa Unity Square and from the city center in Bulawayo (Fig. 5). The statue was viewed as symbolizing colonialism and oppression.

Keeping the statue in public places would have been interpreted as glorifying the colonial past and reminding Zimbabweans of the bitter colonial era under the British settler government rule. In Bulawayo, the statue was placed behind the premises of the Natural History Museum in the Centenary Park, away from public view. Plans are now at an advanced stage by the NMMZ to erect the statue of Joshua Nkomo at the position where Rhodes' statue once stood. Nkomo was one of the Zimbabwean nationalist who helped lead the war of independence against White minority rule in the country. About a decade ago, demands were also made by Sangano Munhumutapa, a pressure group, to exhume Cecil John Rhodes' grave in Matopos and repatriate the bones to Britain (cf. Muringaniza 2004). The NMMZ, however, intervened and saved the grave from this planned action, arguing that the monument is an integral part of the country's history.

On attainment of independence, many historical buildings have been threatened by modern development alleged to have been hindered by colonialism. Some of the buildings which had symbolized the settler government and oppression were owned by people of European origin, and Black Zimbabweans who could not own them did not have an interest in their protection. Instead, they were increasingly disturbed by the colonial repression the buildings symbolized and actively questioned the cultural heritage which was being protected in those structures (Turnbridge 1984). The interest in the protection of historical buildings appears to have been gradually lost due to the collapse of the Advisory Committees, as the few interested Whites left the country at the beginning of the land reform program in 2000. From 2000, the Zimbabwean government embarked on a compulsory "fast track" acquisition of White-owned farms and redistributed them to "landless" Black Zimbabweans. The legislation has also remained passive on the protection of historic buildings as a result of the increased demand for modernization of old buildings to accommodate present economic and public needs.

Zimbabwe: Cultural Heritage Management, Fig. 5 The statue of Cecil John Rhodes erected during the colonial period, between Main Street and 8th Avenue in Bulawayo

Few cultural heritage sites were proclaimed as national monuments in the country after independence. In the recent past, Mataga and Chabata (2008) examined the current NMMZ monument register, and they found out that the majority of sites were declared before independence and the rate at which these sites were listed dramatically declined after 1980. They noted that by 2006, of the 171 sites on the list, only seven were declared after independence, a surprising development given the change from the minority to the majority government. This is also notwithstanding the fact that a lot of sites have been found through archaeological research following the introduction of the archaeology program at the University of Zimbabwe early after independence.

The acquisition of White farms resulted in unemployment, reduced gross domestic product, deteriorating race relations, political and economic instability, and skills emigration. Subsequently, European states and the USA imposed "targeted" or "smart" sanctions on the country as a punitive measure of forcing the government to impede what they regarded as unwarranted land reform program and human rights abuse during elections. The worsening economic situation resulted in the departure of experienced archaeologists and cultural heritage managers to work in neighboring countries. The official household redistribution of land and the informal resettlements must have seriously impacted negatively on the protection of cultural heritage in the country. The hustle with which the land acquisition program was carried out meant that there was no time to protect cultural heritage during the land reform program.

The high unemployment rate resulted in the widespread of illegal mining named *Chikorokoza* of diamond known locally as *Ngoda* and gold in previously protected farms and along the country's Great Dyke. Cultural heritage sites could be destroyed through this illegal mining, probably taking advantage of the fact that mining legislation overrides the protection of cultural heritage in Zimbabwe. The Great Dyke is a linear intrusion of mafic and ultramafic rocks which cut across the Archaean granites and greenstones of the Zimbabwe craton in a SW-NNE direction. It is between 520 and 550 km in length and 4–11 km wide and is rich in ore deposits, including gold, silver, chromium, platinum, nickel, and asbestos (Wilson and Prendergast 2001). The impact that the land redistribution program and these mining activities had on cultural heritage is at present unknown as no impact studies have been carried out.

Strained international relations also led to either the withdrawal, cancellation, or drying up of donor funds for the management of cultural heritage in the country. Previously, cultural heritage management in Zimbabwe depended much on donor funding. The major problem of the withdrawal or cancellation of donor funding is that it placed the entire cultural heritage management into an uncertain future (Murimbika and Moyo 2008). The prevailing harsh economic environment also resulted in continued business depression leading to the withdrawal of local aid support for cultural heritage management. Consequently, cultural heritage management has been greatly underfunded in the country.

Future Directions

Way Forward and Conclusion

There have been expectations that cultural heritage management in Zimbabwe should be improved. These hopes have been based on the knowledge that cultural heritage has not been efficiently managed during both the colonial and postcolonial periods. The expectations have also been that the improvement should be in line with the shifting meaning of cultural heritage and the best international management practices. The failure to improve the management of cultural heritage in Zimbabwe has been regarded by Pwiti and Ndoro (1999) as the perpetuation of the colonial legacy.

To improve the management of cultural heritage, it has thus been argued that the legislation governing cultural heritage management should be revised. This would address the problem, according to Chipunza (2005) of its entrenchment in colonial principle, which considers that cultural heritage sites should be protected rather than used.

This would also address the problem of the isolation of the local communities from managing their cultural heritage and the protection of its intangible aspects. The overlap of duties that were created between the NMMZ and the Park authorities since from the 1950s would as well be addressed through the revision of the legislation. The rampant destruction of cultural heritage through mining ventures could be avoided if reference is made to its protection under the mining legislation. Contracts for the NMMZ administrators require to be shortened to avoid the pursuance of self-interests and style of management, which can negatively affect the proper management of cultural heritage. This would end the current conservative approach to the management of cultural heritage in Zimbabwe.

Cross-References

- ▶ Cambodia: Cultural Heritage Management
- ▶ Canada: Cultural Heritage Management
- ▶ China: Cultural Heritage Management
- ▶ Cyprus: Cultural Heritage Management
- ▶ Greece: Cultural Heritage Management
- ▶ Singapore: Cultural Heritage Management

References

Chipunza, K. 2005. Protection of immovable cultural heritage in Zimbabwe: An evaluation. In *Legal frameworks for the protection of immovable cultural heritage in Africa*, ICCROM Conservation Studies, ed. W. Ndoro and G. Pwiti, vol. 5, 42–45. Rome: ICCROM.

Chiwaura, H. 2005. The development of formal legislation and the recognition of traditional customary law in Zimbabwe's heritage management. In *Legal frameworks for the protection of immovable cultural heritage in Africa*, ICCROM Conservation Studies, ed. W. Ndoro and G. Pwiti, vol. 5, 18–21. Rome: ICCROM.

Collett, D.P. 1991. *The master plan for the conservation and resource development of the archaeological heritage*. Harare: The National Museums and Monuments of Zimbabwe.

Fothergill, R.J. 1953. *The monuments of southern Rhodesia*. Bulawayo: The Commission for the Preservation of Natural and Historical Monuments and Relics.

Mahachi, G., and W. Ndoro. 1997. The socio-political context of southern African Iron Age studies with special reference to Great Zimbabwe. In *Caves, monuments and texts: Zimbabwean archaeology today*, Studies in African Archaeology, ed. G. Pwiti, vol. 14, 89–104. Uppsala: Department of Archaeology & Ancient History, Uppsala University.

Makuvaza, S. 2008. Why, Njelele a rain-making shrine in the Matobo world heritage area, Zimbabwe, has not been proclaimed a national monument. *Heritage Management* 1: 163–180.

Makuvaza, S. 2010. *Managing the Victoria Falls world heritage site; problems, stakeholders views and possible solutions*. Unpublished M.Sc. dissertation, School of Biology & Environmental Science, University College Dublin, Ireland.

Mataga, J., and F. Chabata. 2008. Preservation of spiritual heritage in Zimbabwe: The case of Gomba/Mazowe landscape. *Journal of the Prehistory Society of Zimbabwe* 28: 50–58.

Murimbika, M., and B. Moyo. 2008. Archaeology and donor aid in the 'developing world': The case for local heritage in Zimbabwe. In *Managing archaeological resources: Global context, national programs, local actions*, One World Archaeology, ed. F.-P. McManamon, A. Stout, and J.A. Barnes, vol. 58, 87–106. Walnut Creek: Left Coast Press.

Muringaniza, S.J. 2004. Heritage that hurts: The case of the grave of Cecil John Rhodes in the Matopos national park, Zimbabwe. In *The dead and their possessions: Repatriation in principle, policy and practice*, One World Archaeology, ed. C. Fforde, J. Hubert, and P. Turnbull, vol. 43, 317–328. London: Routledge.

Ndoro, W. 1997. The evolution of a management policy at Great Zimbabwe. In *Caves, monuments and texts: Zimbabwean archaeology today*, Studies in African Archaeology, ed. G. Pwiti, vol. 14, 109–124. Uppsala: Department of Archaeology & Ancient History, Uppsala University.

Ndoro, W. 2001. *Your monument our shrine: The preservation of Great Zimbabwe*, Studies in African Archaeology. Vol. 19. Uppsala: Department of Archaeology & Ancient History, Uppsala University.

Pwiti, G. 1997. Taking African cultural heritage management into the twenty-first century: Zimbabwe's master plan for cultural heritage management. *African Archaeological Review* 14: 81–83.

Pwiti, G., and W. Ndoro. 1999. The legacy of colonialism: Perceptions of the cultural heritage in southern Africa with special reference to Zimbabwe. *African Archaeological Review* 16: 143–153.

Ranger, T. 1999. *Voices from the rocks: Nature culture and history in the Matopos Hills of Zimbabwe*. Harare: Baobab.

Summers, R., and C.K. Cooke. 1959. *An archaeological survey of southern Rhodesia*, Supplement 1. Supplement to the annual report of the Commission for the Preservation of Natural and Historical Monuments and Relics.

Turnbridge, J.E. 1984. Whose heritage to conserve? Cross-cultural reflections on political dominance and urban heritage conservation. *Canadian Geographer* 28: 171–180.

Wilson, A.H., and M.D. Prendergast. 2001. Platinum-group element mineralization in the Great Dyke, Zimbabwe, and its relationship to magma evolution and magma chamber structure. *South African Journal of Geology* 104: 31–342.

Zimbabwe's World Heritage Sites

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Introduction

Zimbabwe has five World Heritage sites, which are Great Zimbabwe, Khami, Matobo Hills, Victoria Falls, and Mana Pools. The Nyanga Terraces are on the Tentative List (Fig. 1). Great Zimbabwe, Khami, and the Nyanga Terraces are managed by the National Museums and Monuments of Zimbabwe (NMMZ), while the Victoria Falls and Mana Pools are run by the Zimbabwe Parks and Wildlife Management Authority (ZPWMA). The Matobo Hills are managed by both the NMMZ and the ZPWMA. These sites have a long history of research, conservation, and development well before they were accorded World Heritage status.

Key Issues/Current Debates/Future Directions/Examples

Great Zimbabwe

Declared the second national monument in 1937 after Victoria Falls, Great Zimbabwe (CE 1290–1450) is located near the city of Masvingo in south central Zimbabwe. It is one of the best-known archaeological sites in sub-Saharan Africa (Fig. 2). The site was established following the demise of Mapungubwe (CE 1220–1290), a precolonial site, situated at the confluence of Shashe and Limpopo rivers in the south. It consists of dry-stone walls and several Dhaka (earthen) structures of different sizes. Great Zimbabwe is divided into three main areas: the Hill Complex, the Valley Ruins, and the Great Enclosure. Two perimeter walls separate the inside and external confines of the settlement (Ndoro 2001).

At its peak, between the fourth and fifteenth centuries, its population probably numbered 18,000 people, settled over an area of more than 720 ha (Huffman and Vogel 1991). The site was perhaps the largest settlement in sub-Saharan Africa before European colonization of the region (Ndoro 2001).

The decline of Great Zimbabwe as a center of a powerful prehistoric state between CE 1450 and 1550 remains an unresolved archaeological problem. According to Pikirayi (2001), this is largely due to unsystematic investigations of the late nineteenth century European antiquarians and prospectors, who destroyed its stratigraphy and looted the site in search of Near Eastern artifacts and gold. The site was abandoned by the middle of the fifteenth century. Causes for the abandonment have been suggested to be the decline of trade, which had shifted to the north of the country, political instability, famine, and water shortages caused by climatic change (Garlake 1982). However, the demise of Great Zimbabwe led to the rise of two major polities; the Mutapa state in the north and the Torwa state in the west.

During the late nineteenth and early twentieth centuries, Europeans who encountered Great Zimbabwe caused great controversy among the archaeological world. They contended that the site was not built by the indigenous people because of its advanced architecture. They thus attributed its construction to the Phoenicians, Arabians, or Egyptians (Mahachi and Ndoro 1997).

According to Huffman and Vogel (1991), this hypothesis was based on superficial similarity

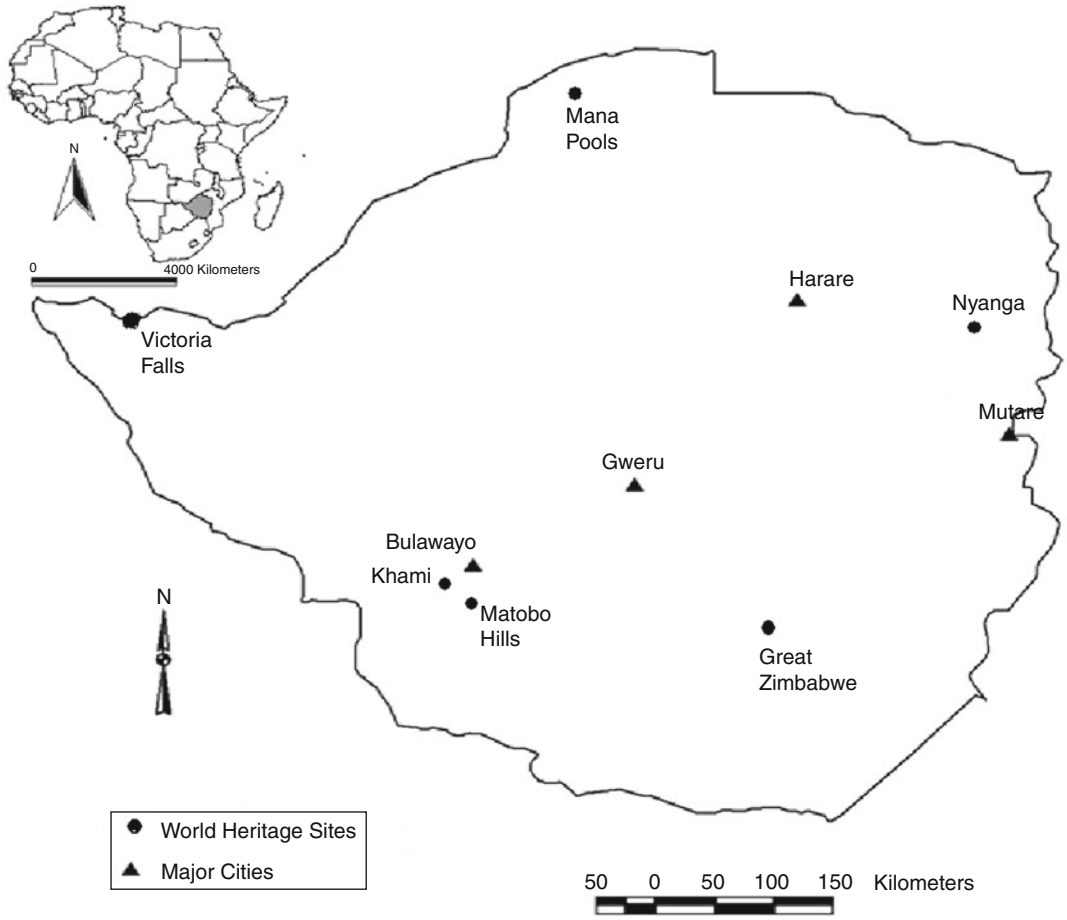

Zimbabwe's World Heritage Sites, Fig. 1 Map showing the location of world heritage sites in Zimbabwe

Zimbabwe's World Heritage Sites, Fig. 2 Conical Tower in the Great Enclosure

between the site and the ruins in southern Arabia and false resemblance in names such as Ophir and Fura (also called Mount Darwin). The Rhodesian government also mounted political pressure on archaeologists to deny the authorship of the site by the indigenous people to justify its colonization of the country (cf. Mahachi and Ndoro 1997). This view, however, changed with the arrival of the first systematic archaeologists from the 1920s onwards. Evidence which demonstrated that the site was constructed by the indigenous people was largely based on the stratigraphical evidence at the site and comparative research carried out at Khami and Dhlodhlo (Danan'ombe) (cf. Caton-Thompson 1931; Robinson 1959). From this archaeological research, it was ultimately concluded that the indigenous people of Zimbabwe were responsible for the construction of the settlement.

Since from the late nineteenth century, archaeological research was carried out alongside conservation of the site, which began as far back as 1914 (Ndoro 1994). Much of it was, however, technical and unsystematic (Pwiti 1997; Ndoro 2001). Major restorations of collapsed stone walls were carried out on different parts of the site and approached from misinformed interpretation of the site. This is because the site was viewed as a product of exotic populations rather than of the indigenous people (Pwiti 1997). At independence from the British settler government in 1980, the country was named Zimbabwe after this archaeological site. Once the authorship of the site was resolved, not much archaeological research has been carried out at the site, and the focus shifted to its conservation and management. Accordingly, the government began to support the management of the site as it was viewed as a source of national pride and from which a new identity could be forged (Pwiti 1997). Several international consultants were sent to Great Zimbabwe by UNESCO and UNDP and by many European countries to provide advice on how it should be managed (cf. Ndoro 2001). This eventually resulted in the acknowledgement by UNESCO of its significance and values as universally outstanding leading to its proclamation in 1986 as a UNESCO cultural World Heritage site.

Khami

This archaeological site is a complex of dry-stone walls that cover approximately 35 ha of land and is located 22.5 km west of Bulawayo. Khami was established as a Torwa state in around 1640 after the collapse of Great Zimbabwe. The distinct development of Khami state was a modified style of dry-stone wall architecture, which was inherited from the Great Zimbabwe architecture. Its structures are terrace or retaining walls that are constructed around and over granite hill tops. The top surfaces of the hill tops were leveled to create platforms at which residential houses were built (Robinson 1959). The platforms are also decorated with check and cords patterns, and the general layout of Khami is a clear testimony of the continuity from the preceding site of Great Zimbabwe (Fig. 3). The site has seven built-up areas believed to have been occupied by the royal family, with open areas in the valley occupied by the commoners.

The wealth of the Torwa state in cattle and involvement in long distance trade was envied by other ethnic groups. This eventually led to the invasion of the site in around 1683 by a powerful Rozvi people. This led to the burning and abandonment of the Torwa capital and the shift of the state to Dhlodhlo (Danan'ombe), located approximately 100 km in the east.

The archaeological footprint, which was protected as it was the royal reserve for Lobengula, the Ndebele King, was not badly disturbed by rampant prospecting by treasure hunters of the Rhodesia Ancient Ruins Company Limited. The site was examined by Randall-MacIver (1906), by Gertrude Caton-Thompson (1931), and by Robinson (1959), with the major aim of resolving the authorship of Great Zimbabwe. However, this work also provided comprehensive knowledge about the site's history. Since then, like at Great Zimbabwe, not much archaeological research has been carried out at the site as attention shifted to its conservation and protection. In 1937, Khami was proclaimed as a national monument in recognition of its importance in the prehistory of the country. Its significance was, however, eventually acknowledged as universally outstanding leading to its proclamation as

Zimbabwe's World Heritage Sites, Fig. 3 The restored Hill Complex at Khami

Zimbabwe's World Heritage Sites, Fig. 4 The Matobo Hills cultural world heritage landscape

a UNESCO cultural World Heritage site in 1986, the same year Great Zimbabwe was also accorded with the same status. Even though there are efforts which are being made to protect the property, the site is threatened by the constant flow of sewage into Khami River and dam due to the expansion of the Bulawayo high density suburbs towards this World Heritage site.

Matobo Hills

The Matobo Hills are located in Matabeleland South Province, about 35 km south of Bulawayo. They measure about 3,100 sq. km, extending from almost to the Botswana border in the west, while to the east they merge with the Mbalambala granite pluton (Fig. 4). The local people also refer to this cultural landscape as Matonjeni.

The natural landscape comprises of scenic geological formations, which provides a wide range of niches that support a variety of flora and fauna. The geomorphology of the hills gives rise to microclimates and soil conditions which change markedly over short distances. The resultant landscape comprises of extensive open grasslands with groups of kopjes (rock outcrops) which are interspersed with wetlands (marshes and streams). The combination and diversity of flora and fauna and its long history of interaction with humankind has made this cultural landscape worthy of attention and preservation (Walker 1996).

Archaeological evidence has shown that the hills have been inhabited from the Stone Age period right up to the present times (Walker 1996). The hills have probably the highest concentration of rock art in southern Africa. This testimony, which when combined, contributes to the understanding of the precolonial history of the region. Matobo is the abode of the oracular cult of the High God (Mwari/Mwali) whose voice is believed to have been heard from the rocks (Ranger 1999). This oracle links the local communities with the hills. The hills also contain important historical sites from the colonial and postcolonial periods. Archaeological research in the Matobo has been more focused on the Stone Age period and the historical period as well as its biodiversity (see Grobler 1974; Walker 1996). However, not much research has been carried out on the Iron Age period of the hills. Although this is the case, the hills were accorded World Heritage status in 2003, making the area the first cultural landscape to be honored with this importance in the country.

The management of the hills has a long history, dating back to a period before the arrival of Europeans in the area in the late nineteenth century. Before this period, the hills have been managed by traditional methods and laws (cf. Ranger 1999). With the coming of Europeans, new laws based on European notions of management were introduced. Today, the management of this cultural landscape is based on the combination of traditional practices and modern legislations.

Victoria Falls

The Victoria Falls were inscribed on the World Heritage list in 1989 as a transboundary property shared between Zambia and Zimbabwe. This site is located in southwestern Zambia and northwestern Zimbabwe.

At Victoria Falls, the Zambezi River course is interrupted by the falls at approximately 1,300 km from the river's source in the northwest province of Zambia (Fig. 5). Below, the river traverses for another 1,500 km to its delta on the Indian Ocean

Zimbabwe's World Heritage Sites, Fig. 5 The Victoria Falls world heritage site main falls

in Mozambique. In 1855, the Victoria Falls was named by a Scottish missionary-explorer, David Livingstone, in honor of the British Queen Victoria. The falls are also known by their local Kololo name, Mosi-oa-Tunya, meaning the "smoke that thunders" because of the water's roar and clouds of rising mist.

The management and development of Victoria Falls as a tourist resort began from 1900 soon after the eviction of the local communities from the area (see McGregor 2003). On the Zambian side, the management of the Victoria Falls began in 1934 when an Executive Committee was set up under the Victoria Falls Reserve Preservation Ordinance. Its objectives were to promote tourism by managing visitor rondavels previously located at the now defunct Rainbow Lodge as well as managing the Zambia hydropower station and the customs post. Subsequently in 1948, the Preservation of Natural and Historical Monuments and Relics, which is now the National Heritage Conservation Commission, set up a Conservancy Committee. In the following year, the committee enacted bylaws and extended the protected area to the Songwe Gorge, which is just below the falls. On the Zimbabwean side, the Victoria Falls Reserve Preservation Act was enacted in 1928, specifically to protect the Victoria Falls Reserve, known as the Special Area (Fig. 6). A new legislation called the Monuments and Relics Act was enacted in 1936. This followed the establishment of the Commission for the Preservation of Natural and Historical Monuments and Relics, popularly known as the Commission, which is now the NMMZ. A year after, in 1937, the Victoria Falls Reserve was proclaimed the country's first national monument. In the same

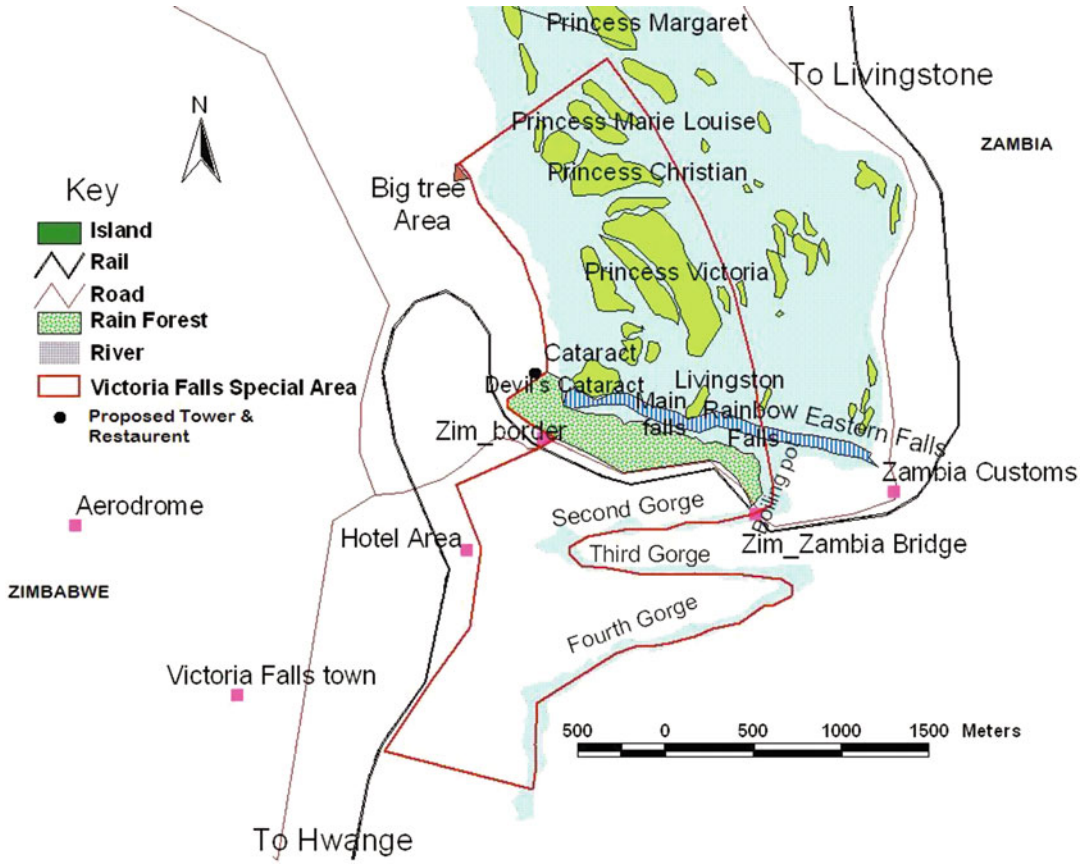

Zimbabwe's World Heritage Sites, Fig. 6 The Victoria Falls special area proclaimed as Zimbabwe's first national monument in 1937

year, bylaws were put in place to protect the area (Joint Technical Committee 2007). At present, there are numerous related legislations being implemented at the site.

With the growth of heritage tourism, which is a special interest travel, which ranges from the examination of physical remains of the past and natural landscapes to the experiencing of local cultural traditions, the Victoria Falls have become a popular tourism area. Visitors to the site are motivated by unique experience, exclusivity, differentiation, personal experiences, and nostalgia for the past and the desire to experience diverse landscapes and forms. Until a few decades ago, the only important tourism activities at the site were to walk and view the falls and gorges from a few selected points. In recent years, however, a broad range of activities have been offered within the World Heritage area to cater for the different needs of visitors. In view of that, the site is currently being threatened by the expansion of tourism facilities (Joint Technical Committee 2007).

Also in recent years, the NMMZ and the ZPWMA have been involved in an ownership dispute of the Special Area. The NMMZ argues that the Special Area is the country's first national monument under the then Commission and should be returned, while the ZPWMA counter argues that the area is now part of the Victoria Falls National Park, which was established in 1952 and it now falls under its administration. Although this conflict is yet to be resolved, it has caused considerable management problems of this celebrated World Heritage site (cf. Makuvaza 2010).

Mana Pools

The Mana Pools were the first to be proclaimed in 1984 as a UNESCO natural World Heritage site in Zimbabwe. The site is located in the Hurungwe district in Mashonaland Province. It is composed of three adjoining protected areas, namely, the Mana Pools National Park, Sapi, and Chewore Safari Areas.

This World Heritage site is part of the Miombo woodland/savannah biogeographic territory. The area includes large areas of the rugged Zambezi escarpment and also contains the last remaining natural stretch of the middle Zambezi River. Well-grassed Brachystegia communities dominate the mountainous escarpment and higher Chewore areas with small but significant riparian communities along the numerous streams. The valley is dominated by the mopane (*Colophospermum* spp.) woodlands. There is also a wide range of large mammals, over 350 bird species and aquatic wildlife in this World Heritage site.

The property has a well-defined and buffered boundary. Each of the three areas has functional park management plans. However, the site does not have an integrated site management plan to ensure the effective management of the property.

Conservation problems affecting this World Heritage site, which are pollution and uncontrolled exploitation of its resources, have not been fully addressed since from early 1990s when an environmental impact study for the proposed Mupata hydroelectric power generation was carried out (see du Toit 1982). For engineering reasons, the Mupata project was shelved and a new feasibility study was carried out at Batoka Gorge. However, both projects appear to have been shelved as well given the economic and political problems experienced in the country in recent years. The site has also continued to be threatened by poaching, sport hunting, boating, and fishing. It is also regularly threatened by the regulating effect of the Kariba Dam and continued development of tourism facilities.

Nyanga Terraces

This cultural landscape, which is located in the Nyanga area in northeastern Zimbabwe, has been on the UNESCO World Heritage Tentative List since 1997. The cultural landscape has stone-faced terraces, which cover every hill and valley sides, while hundreds of hectares of soils have been worked into wide cultivation ridges. Associated with these are stone-built homesteads of the builders. Old water furrows reveal the exploitation of available water resources, and traces of iron-working show testimony of manufacturing activities. The cultural landscape covers a total of approximately 5,000 sq. km. The whole complex represents an agricultural society of industrious farmers and livestock herders whose culture developed from about CE 1300 to sometime in the

nineteenth century (Soper 2006). The terraces have evidence of human occupation for all the major archaeological periods identified in the country's archaeological sequence, beginning from the Stone Age to the historical period.

Since the placement of the terraces on the Tentative List, no effort has been made to ultimately inscribe them on the World Heritage List. Recently, however, the potential World Heritage status of the site has been noted (Willems and Comer 2011). If properly nominated, there is no doubt that the terraces can be Zimbabwe's next cultural World Heritage landscape.

Discussion and the Future

Although there is sufficient knowledge about sites such as Great Zimbabwe, Khami, and the Matobo Hills, a knowledge gap on how people moved from their old settlement to new established ones still exists. For instance, it is not clear if the movement of populations from Mapungubwe to Great Zimbabwe and from Great Zimbabwe to Mutapa in the north and to Khami in the west was rapid or gradual. If the movement was steady, settlements which are associated with this gradual process of movement require searching and further investigation. In Matobo, the transformation from the hunter-gatherer to the Iron Age period also requires further archaeological enquiry. Although a lot of archaeological research has been carried out on the Nyanga Terraces, there still exist areas that are not very apparent. The purpose for which the terraces have been constructed, and the recent discovery of gold mining by Kritzinger (2008) are still very highly controversial issues. At Victoria Falls, archaeological research was only active during the 1970s (see Phillipson 1975), while there is virtually no archaeological research carried out in the Mana Pools World Heritage area. As a result, not much is known about the prehistoric people who once settled in these natural World Heritage sites.

However, while this is the case, on the administrative side, there is also little or no effort made to fully involve the local communities in the management of these World Heritage sites. This explains why the integrity of some of them is constantly threatened. The friction between the NMMZ and the ZPWMA over the ownership of the Special Area needs to be resolved, while coordination with the Zambian authorities is vital to curb further development of tourist facilities in this World Heritage area. Lastly, efforts have to be made to nominate the Nyanga Terraces so that it can be added to Zimbabwe's rich and diverse natural and cultural World Heritage properties.

Cross-References

- ▶ Canada: World Heritage
- ▶ Chile's World Archaeological Heritage and its Management
- ▶ Cuba: Archaeological Heritage Rescue and Management
- ▶ Indonesia's World Heritage
- ▶ Israel: World Heritage Sites
- ▶ Japan: World Heritage
- ▶ Pacific Islands: World Heritage
- ▶ Vietnam's Archaeological World Heritage Sites
- ▶ Zimbabwe: Cultural Heritage Management

References

Caton-Thompson, G. 1931. *The Zimbabwe culture: Ruins and reactions*. Oxford: Clarendon Press.

Du Toit, R.F. 1982. *A preliminary assessment of the environmental implications of the proposed Mupata and Batoka hydro-electric schemes: Zambezi River, Zimbabwe*. Harare: Zimbabwe Natural Resources Board.

Garlake, P. 1982. *Great Zimbabwe described and explained*. Harare: Zimbabwe Publishing House.

Grobler, J.H. 1974. *Aspects of the biology, population ecology, and behaviour of the Sable Hippotragus niger niger (Harris, 1838) in the Rhodes Matopos National Park, Rhodesia*. Salisbury: National Museums and Monuments of Rhodesia.

Huffman, T.N., and J.C. Vogel. 1991. The chronology of great Zimbabwe. *South African Archaeological Bulletin* 46: 61–70.

Joint Technical Committee. 2007. *Draft joint Victoria Falls/Mosi-oa-Tunya site management plan. The National Museums and Monuments of Zimbabwe*. Harare: Causeway.

Kritzinger, A. 2008. Gold not grain-pre-colonial harvest in the terraced hills of Zimbabwe's eastern highlands. *Cookeia Journal* 13: 1–44.

Mahachi, G., and W. Ndoro. 1997. The socio-political context of southern African Iron age studies with special reference to great Zimbabwe. In *Caves, monuments*

and texts: Zimbabwean archaeology today. Studies in African archaeology, Vol. 14, ed. G. Pwiti, 89–104. Uppsala: Department of Archaeology & Ancient History, Uppsala University.
Makuvaza, S. 2010. Managing the Victoria Falls world heritage site; problems, stakeholders views and possible solutions. Unpublished Msc. dissertation. Dublin: School of Biology & Environmental Science, University College Dublin.
McGregor, J. 2003. The Victoria Falls 1900–1940: Landscape tourism and the geographical imagination. *Journal of Southern African Studies* 29: 717–737.
Ndoro, W. 1994. The preservation and presentation of Great Zimbabwe. *Antiquity* 260: 616–629.
Ndoro, W. 2001. *Your monument our shrine: The preservation of Great Zimbabwe*. Studies in African archaeology, Vol. 19. Uppsala: Department of Archaeology & Ancient History, Uppsala University.
Phillipson, D.W., ed. 1975. *Mosi-oa-Tunya: A handbook to the Victoria Falls region*. Rhodesia: Longman.
Pikirayi, I. 2001. *The Zimbabwe culture: Origins and decline of southern Zambezian states*. Lanham: AltaMira Press.
Pwiti, G. 1997. Taking African cultural heritage management into the twenty-first century: Zimbabwe's master plan for cultural heritage management. *African Archaeological Review* 14: 81–83.
Randall-MacIver, D. 1906. *Medieval Rhodesia*. London: McMillan.
Ranger, T. 1999. *Voices from the rocks: Nature culture and history in the Matopos Hills of Zimbabwe*. Harare: Baobab.
Robinson, K.R. 1959. *Khami ruins*. Cambridge: Cambridge University Press.
Soper, R. 2006. *The terrace builders of Nyanga*. Harare: Weaver Press.
Walker, N. 1996. *The painted hills: Rock art of the Matopos*. Gweru: Mambo Press.
Willems, J.H.W., and D. Comer. 2011. Africa, archaeology, and world heritage. *Conservation of Archaeological Sites* 13: 160–173.

Zimmerman, Larry J.

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Basic Biographical Information

Larry J. Zimmerman is a North American archaeologist who is known for his work in social justice as it relates to the practice of archaeology. Zimmerman received a Ph.D. from the University of Kansas in 1976 and taught at the University of South Dakota from 1974 to 1996, where he was Distinguished Regents Professor. He was Chair of the American Indian and Native Studies at the University of Iowa from 1998 to 2001 and was Head of the Archaeology Department at the Minnesota Historical Society from 2002 to 2004. Since 2004, he has served as Professor of Anthropology and Museum Studies and Public Scholar of Native American Representation at Indiana University-Purdue University, Indianapolis, and the Eiteljorg Museum of American Indians and Western Art in Indianapolis, Indiana.

Major Accomplishments

Zimmerman is highly regarded for his commitment to Native American and Indigenous issues as they relate to archaeology. In 1978, Zimmerman excavated the Crow Creek Massacre site in central South Dakota. His ability and willingness to listen to Lakota and Arikara Indian nations about their concerns over the project led him to insist on reburying the human remains that had been uncovered at the site. Three years of negotiations took place between the tribes, the Bureau of Indian Affairs, and the US Army Corps of Engineers before the remains were finally reburied. This project led to Zimmerman being trusted by many Native American activists but also put him in the middle of the controversy over whether repatriation and reburial could be a legitimate activity for a US archaeologist. Zimmerman's decision to speak with the descendants of the individuals buried at this archaeological site and ultimately to accede to their wishes with regard to treatment of the human remains resulted in hardships for him within the profession. Rather than hiding these challenges, he chose to publish accounts of them, such as the 1989 essay, "Made Radical by My Own," which were received as beacons by young Native scholars.

Zimmerman's publications revealed deficiencies in what was then standard American archaeology. The theoretical voids in American

archaeology that Zimmerman highlighted are what many archaeologists now stand proudly behind: the need for archaeology to be socially relevant and respectful. By assigning his support to the "radical" side, Zimmerman exposed himself to the potential of ridicule and derision by his peers. Zimmerman (1989b: 66) stated that, "I think being yelled at by colleagues and Indians is good for the soul," standing bravely behind his belief that being yelled at is a small price to pay for doing the right thing.

In 1988, Zimmerman served as Organizing Secretary of the World Archaeological Congress' First Inter-Congress in Vermillion, South Dakota. This meeting is important in that it resulted in one of the first archaeological codes of ethics to note the importance of treating human remains as inextricable from their cultural contexts, the Vermillion Accords. These set forth provisions for the ethical treatment of the dead by archaeologists and rest on the principle that human skeletons mean much more than archaeological objects. This was a watershed moment, representing the first time an international community of archaeologists listened to and reflected on the concerns of Indigenous peoples in an archaeological code of ethics. The fact that professional archaeologists from all over the world chose to travel to a remote area of South Dakota reflects the importance of the meeting. The Vermillion Accords have influenced generations of archaeologists and have meant that Native Americans have been able to see that a segment of the archaeological population really does understand deeply held tribal concerns about human remains and burial sites.

More recently, Zimmerman has been involved in a project of archaeology of the homeless, conducting research in downtown Indianapolis, Indiana, USA. The homeless archaeology project provides useful information for city governments and social workers who may have lacked an understanding of what life is really like for the homeless. Similar to Zimmerman's work with Native American communities, this research takes place alongside members of homeless communities. It is a collaborative research and also a form of social justice. These themes pervade most of Zimmerman's work.

Zimmerman's professional service includes work for the Society for American Archaeology, for which he served as a member of the Nominating Committee (1994) and as the chair of the Native American Scholarships Committee (1995–1997). He has also served the American Anthropological Association as elected Chair of the Committee on Ethics (2002–2005). Much of Zimmerman's professional service has been for the World Archaeological Congress, for which he has served as Executive Secretary from 1990 to 1994 and as Vice President from 2005 to 2008.

In addition to the Vermillion Inter-Congress held in 1988, Zimmerman organized the World Archaeological Congress' 2009 Inter-Congress on Indigenous Peoples and Museums, held in Indianapolis, Indiana, USA. This conference provided space for ongoing dialogue about topics such as repatriation, the differing national ethics of museum exhibits, and ways that Indigenous knowledge can enhance archaeological research. It is certain that Zimmerman's reputation was one of the big draws for the meeting. In the 23 years since the Vermillion Inter-Congress, American archaeology has undergone a shift. Today, there are more than 17 Native Americans who hold doctorates in archaeology and many more with Master's degrees. In addition, the attitude and spirit of the Vermillion Inter-Congress is expressed in mainstream archaeology through the practice of what is called "Indigenous archaeology." If Zimmerman had not set the groundwork back in 1989, there certainly would never have been a 2009 conference of this nature. And, many of the subjects that were discussed might never have been raised.

Zimmerman has been honored by many organizations, including the Indiana University-Purdue University, Indianapolis, where he was named Outstanding Distinguished Resident Faculty, School of Liberal Arts in 2009. He was awarded the Mariko Mizuhara Award for Cross-Cultural Understanding in 2000 from the University of Iowa. Notably, in 2008, he received the inaugural Peter J. Ucko Memorial Award for Contributions to World Archaeology from the World Archaeological Congress at the sixth Congress in Dublin, Ireland. In a reflection of how his work

has affected North American archaeology, Zimmerman was nominated for this award by four Native American archaeologists who hold doctorates. Each nominator was able to reflect on how Zimmerman's work had allowed them to progress within the discipline of archaeology.

Larry Zimmerman's commitment is not to archaeology of the dead, but to archaeology for the living. In his work with Native Americans, he sees us as inextricably linked to our ancestors and does not conduct work without acknowledging this bond. In his work with the homeless, he sees the path between the data he accumulates and the process of changing the lives of the people who live on the street. His archaeology is not conducted in an academic vacuum. He realizes that archaeology is a science that can be a powerful force for good.

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Ethics in Archaeology
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Peoples, Working with and for
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation: Overview
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ World Archaeological Congress (WAC)

References

Zimmerman, L.J. 1989a. Human bones as symbols of power: Native American views of 'grave-robbing' archaeologists. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 211–216. London: Unwin Hyman.

Zimmerman, L.J. 1989b. Made radical by my own: An archaeologist learns to understand reburial. In *Conflict in the archaeology of living traditions*, ed. R. Layton, 60–67. London: Unwin Hyman.

Further Reading

Zimmerman, L.J. 1997. Remythologizing the relationship between archaeologists and Indians. In *Native Americans and archaeologists: Stepping stones to common ground*, ed. N. Swidler, K. Dongoske, R. Anyon, and A. Downer, 44–56. Walnut Creek: AltaMira Press.

Zimmerman, L.J., and R. Alex. 1981. Digging ancient burials: The Crow Creek experience. *Early Man* 3 (3): 3–10.

Zimmerman, L.J., and T. Biolsi, eds. 1997. *Indians and anthropologists: Vine Deloria, Jr. and the critique of anthropology*. Tucson: University of Arizona Press.

Zimmerman, L.J., and L.E. Bradley. 1993. The Crow Creek massacre, initial coalescent warfare and speculations about the genesis of extended coalescent. *Plains Anthropologist, Memoir. Essays in Memory of Robert Alex* 38 (145): 215–226.

Zimmerman, L.J., and J. Hammil. 1986. Comment on the SAA plenary session on reburial. *Bulletin of the Society for American Archaeology* 4 (2).

Zimmerman, L.J., K.D. Vitelli, and J. Hollowell-Zimmer, eds. 2003. *Ethical issues in archaeology*. Walnut Creek: AltaMira Press.

Zimmerman, L.J., H. Burke, and C. Smith. 2008a. *The archaeologist's field handbook, North American edition*. Lanham: AltaMira Press.

Zimmerman, L.J., H. Burke, C. Smith, J. Watkins, and D. Lippert, eds. 2008b. *The ancient one: Perspectives on Kennewick Man*. Walnut Creek: Left Coast Press.

Zimmerman, L.J., C. Colwell-Chanthaphonh, T.J. Ferguson, D. Lippert, R.H. McGuire, G.P. Nicholas, and J. Watkins. 2010a. The premise and promise of Indigenous archaeology. *American Antiquity* 75 (2): 228–238.

Zimmerman, L.J., C. Singleton, and J. Welch. 2010b. Activism and creating a translational archaeology of homelessness. *World Archaeology* 42 (3): 443–454.

Zoning: Boundary Areas and Buffer Zones

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Introduction

In the sense that time, as a quote widely attributed to Woody Allen would have it, is nature's way of keeping everything from happening at once, so

zoning is a scheme devised by humans to prevent everything from happening at the same place. On any landscape, some areas are more amenable to particular uses than are others, and uses in some areas can be complementary or incompatible. When the landscape contains archaeological sites and materials that can be damaged by certain forms of human activities, preservation of them depends upon allocating, or zoning, uses appropriately. Effective conservation and preservation at archaeological sites must draw upon the knowledge of where vulnerable archaeological resources are located. Zones can then be delineated in ways that can be easily used by site managers.

Definition

Zoning is a basic land management tool, one commonly employed by local and regional governments in developed countries around the world. Zoning as practiced in settings from urban to rural addresses a variety of issues associated with use: activities (residential, commercial, industrial, agricultural), density of use or development, height of buildings, limitations on built space per unit of landscape, limitations on area of impervious surface, construction of roads and parking lots, preservation of green space, and rules governing both architectural and landscape design.

Key Issues/Current Debates/Future Directions/Examples

Many organizations that play a role in the conservation and preservation of archaeological sites have been slow to apply the concept and protocols of zoning. The idea of a buffer zone around World Heritage Sites was not introduced into the *Operational Guidelines for the Implementation of the World Heritage Convention* until 1977. In the 2005 version of these guidelines, a buffer zone was strongly recommended, but not mandatory. In 2008, an International Expert Meeting on World Heritage and Buffer Zones was held in Davos, Switzerland, which introduced less equivocal language into the Operational Guidelines (UNESCO 2012: Paragraphs 103–107). It defined a buffer zone as an area surrounding a property necessary to the proper conservation (used in this sense to include preservation) that has been established by means of legal or customary restrictions. It should constitute an added layer of protection around the property. The buffer zone is described as (including), "the immediate setting of the nominated property, important views and other areas or attributes that are functionally important as a support to the property and its protection" (UNESCO 2012: Paragraph 104). Sites nominated to the World Heritage List, according to this version of the guidelines, must include a map of the buffer zone and a clear description of the size, characteristics, and uses authorized in the buffer zone. The guidelines also state that the buffer zone be determined through "appropriate mechanisms" and that the purposes served by the buffer zone be described.

In the publication resulting from the experts meeting (UNESCO 2009), it is emphasized that a buffer zone be defined in legal terms, "not just in the World Heritage nomination dossier" (UNESCO 2009: 29), thus emphasizing that such a zone should exist as more than a name alone. The document also suggests that the zone be devised in mind of all forms of intrusion to the site, including acoustic and visual, as well as those which arise from construction, roads, vibration, and natural disasters. It also notes that the buffer zone should be part of the management plan or system for the protected area, that is, the buffer zone itself must be managed and management should be integrated with that of the site itself.

The Xi'an Declaration (UNESCO 2005) also addresses the subject of buffer zones, here in the context of the preservation of setting. The need for monitoring change is expressly presented: "Monitoring should define approaches and actions to appreciate and measure as well as prevent or remedy decay, loss of significance or trivialization and propose improvement in conservation, management and interpretation Practices" (UNESCO 2005: 3). It sets out the need for the development

of qualitative and quantitative indicators for this purpose. This is consistent with protocols for monitoring as they are used in many other fields, including ecology and medicine, which stipulate that instruments, indicators, and standards be identified in a monitoring plan (Comer 2006). Instruments are the means by which change is measured (e.g., a series of photographs or samples taken over time, periodic surveys of visitors to the site and residents of local communities). Indicators are things to be measured, which should be selected because they are most relevant to the condition of the system of which they are a part (e.g., indicator species in ecology, cholesterol or blood pressure in medicine). Finally, standards are thresholds that when crossed produce damage to the system in question.

Clearly, a buffer zone can be considered just the first step in establishing zoning adequate for effective management of an archaeological site or, indeed, any protected area. Other organizations with stewardship responsibilities for areas containing vulnerable natural and cultural resources have extended zoning in ways similar to those used by local governments in developed countries. For example, the Visitor Experience and Resource Protection Framework that has been used by the United States National Park Service since 1997 relies heavily on the concept of zoning (United States National Park Service 1997). Zones are determined by an analysis of the distribution of cultural and natural resources, the environmental context in which they are found, the degree to which they are sensitive to damage or destruction by human use, and existing infrastructure. This analysis is conducted after extensive research, which includes review of scientific literature and interviews with subject matter experts and all parties with a legitimate interest in the protected area. Of particular importance to achieving the goals of the framework is consultation with local communities and any indigenous peoples associated with the area in question. For each zone, the desired use and the desired condition are established. These can vary widely. Areas that provide essential visitor amenities, for example, should not be located in zones that contain sensitive resources. Some sections of archaeological sites can best be appreciated and understood in relative solitude; others, for example, the bustling city centers of the ancient world, can be experienced best in the presence of others. The VERP approach also emphasizes the need to monitor both resource conditions and the satisfaction of visitors and residents alike.

The effective management of an archaeological site benefits greatly from zoning, and at large archaeological sites, it is likely that this cannot be achieved without zoning. As time goes one, zoning similar to that done by developed countries in urban and suburban environments should become standard practice.

Cross-References

- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Site Visitation and Interpretation: Management

References

Comer, D.C. 2006. Monitoring of landscape change at world heritage sites: Prologue to proactive management. In *Of the past, for the future: Integrating archaeology and conservation*, ed. N. Agnew and J. Bridgland, 163–172. Los Angeles: Getty Conservation Institute.

UNESCO. 2005. *The Xian declaration on the conservation of the setting of heritage structures, sites, and areas*. Paris: UNESCO.

UNESCO. 2009. *World heritage and buffer zones*. Paris: UNESCO.

UNESCO. 2012. *Operational guidelines for the implementation of the World Heritage Convention*. Paris: UNESCO.

United States National Park Service. 1997. *VERP: The Visitor Experience and Resource Protection (VERP) framework: A handbook for planners and managers*. Washington, DC: National Park Service.

Zooarchaeology

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Introduction

Animals have played key roles in society, evolving alongside people from the Paleolithic right up until today. First they served as a source of food: animals were killed or scavenged for their meat, fat, and marrow as well as their skins and bones for manufacturing. Since domestication, renewable secondary products such as milk, wool, or labor have also been provided by animals. Alongside practical innovation, perceptions of animals also evolved into a range of often subtle varieties. Human-animal interactions are therefore of utmost interest in reconstructing ancient cultures. Moreover, animals are often used as media conveying messages that reflect relationships between people: they have formed an integral part of our mentality. Animal remains are usually brought to light in substantial quantities during archaeological excavations. As such, they potentially offer statistically reliable information on how humans interacted with their environments and with one another.

Definition

Zooarchaeology, originally called archaeozoology in the Old World, considers relationships between humans and animals using animal remains from archaeological sites. Although rooted in paleontology, the study of fossils from extinct natural fauna, zooarchaeological research deals exclusively with evidence from archaeological contexts. It is a multidisciplinary subject: it may involve the analysis of related objects (e.g., hunting gear or harnessing) and integrate the evaluation of excavated materials with pictorial and written records. Zooarchaeology thus addresses diverse problems, from the biological and environmental aspects of past cultures to the social and cognitive side of human-animal relationships.

Historical Background

In his review of zooarchaeology in eastern North America, Neil D. Robison (1987) outlined three periods also applicable to Europe. Developments after the 1980s form the fourth, most recent phase.

The Formative Period (1850s–1951)

Archaeozoology emerged in mid-nineteenth-century Europe. It first developed in areas where spectacular architecture, hoards, and written sources did not distract attention from gathering complementary information in the form of biological remains. In 1851, Japetus Steenstrup began studying massive "shell banks" in coastal Denmark. Recovering archaeological artifacts and animal bones, he realized that these masses of shell were food refuse and coined the term "kitchen midden" (*køkkenmødding;* Forchammer et al. 1851–1856). Soon similar formations were studied along the Atlantic coasts of Europe and North America (Wyman 1868).

Archaeology in the nineteenth century was also inspired by romantic nationalism. Communal identities were asserted by claiming ancestral lineages. Celts, Etruscans, and other putative ancestors were studied across Europe. Help by Ludwig Rütimeyer was enlisted in a quest for Celtic Helvetii at Swiss lakeshore settlements. Although many of the pile dwellings turned out to have been much earlier (Neolithic and Early Bronze Age), Rütimeyer (1861) came up with a scholarly analysis of animal remains which, according to Darwin, represented "the most important contribution on domestic races ever published."

In 1865, Rudolf Carl Virchow – pathologist, politician, and polymath – had high hopes of having discovered yet another prehistoric pile dwelling in central Berlin which turned out to be an early eighteenth-century urban deposit. Among others, he identified evidence for seafood consumption which predated the first eighteenth-

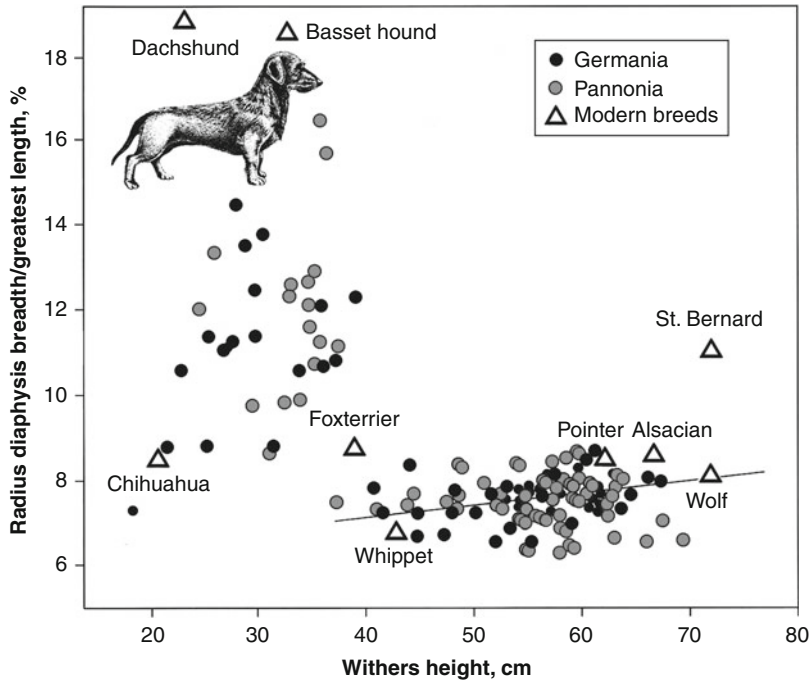

Zooarchaeology, Fig. 1 The distribution of first–third century Roman provincial dogs by estimated withers height and forearm shape (relative breadth of radius) from Pannonia and Germania in comparison with modern breeds. Propagating an inherited, nonpathological deformation through breeding created a range of short-legged forms toward the upper left corner of the graph (after Bökönyi 1984; Peters 1997)

century Hamburg postal regulation concerning oyster barrels shipped to Berlin (Virchow 1872: 124). In this earliest example of postmedieval archaeozoology, Virchow struck the delicate balance between naturalists and culture historians, identifying lowly kitchen garbage of no interest to historians as "luxury artifacts" carrying historical meaning. In 1874 Virchow began working with Heinrich Schliemann at Troy.

Darwin's 1868 book on the variability of domesticates directed attention to an important point central to zooarchaeology: domestic animals are material culture since they are shaped by human needs, beliefs, and aspirations. Human influence on their genetic makeup was not always conscious but is characteristic of the social niche the animals occupy – driven by cultural forces that can be detected in the shape and size of bones (Fig. 1). Ulrich Duerst (1926) adopted Rudolf Martin's standardized human bone measurement system for a wide range of mammals.

Systematization Period (1951–1969)

Following World War II, the first generation of full-time zooarchaeologists emerged, including Jesús Altuna, Joachim Boessneck, Sándor Bökönyi, Vera Issacovna Gromova, John E. Guilday, Johannes Lepiksaar, Stanley J. Olsen, Elisabeth Schmid, Rudolf Stampfli, to name just a few.

By this time, domestication was recognized by archaeologists as a benchmark in the development of civilization. The origins of most Old World domesticates have been traced back to the Neolithic of the "Fertile Crescent" (including the Levant as well as the Taurus and Zagros mountains ranging between Anatolia and Iran). The formation and distribution of domestic animals across Europe dominated the agenda, reinforcing the misconception that zooarchaeology was a "prehistoric" discipline. Under the influence of ethnographic research, the need to quantify animal remains arose. Theodore E. White (1953) came up with the concept of Minimum Number of Individuals (MNI). Much of the work at the time was aimed at reconstructing animal keeping rather than consumption. The mentality that focused on individuals and resulting herds populating catchment areas of sites leads to the development of a "herd management" jargon including harvest profiles and herding strategies. This language, however, although pervasive, remained

largely allegoric in the face of typically sporadic archaeological evidence. Little critical attention was paid to the impact of site formation processes on the reliability of data.

Integration Period (1969–1980s)

The invention of MNI already indicated the intellectual need to understand zooarchaeological data in more exact, economic terms, pushing interpretation beyond the physical descriptions of ancient animals. The archeological aspects of animals began to be treated at a new scientific level (Brothwell & Higgs 1969).

Radiocarbon dating at stratified settlements helped to clarify the pace of domestication in the Near East (Braidwood 1963). Scientific expectations culminated in "New Archaeology" aimed at treating archaeology as a natural science. With their positivist agenda, archaeologists discovered the wealth of information represented by animal bones, treating them from a primarily archaeological point of view. Previously archaeozoology was largely practiced by natural scientists; zooarchaeology represents the same discipline, but the emphasis is on archaeology.

Environmental thought on the rise during the 1960s soon inspired archaeological interpretation. Animal remains were tentatively included among ecofacts as materials not directly altered or modified by humans but associated with human exploitation (Schiffer 1987: 290–291). However, zooarchaeological finds by definition (i.e., in their connection to human cultural contexts) incorporate an artifactual dimension just like properly manufactured, even artistic bone objects or the genetic makeup of domesticates. Anthropogenic influences can create considerable bias in the environmental interpretation of animal remains from archaeological deposits.

New Archaeology (subsequently morphing into processual archaeology) set very high standards to present archaeology as a natural science. The processual paradigm includes the use of quantitative data in deductive models, the scientific method of observation, and hypothesis testing. Zooarchaeology has greatly benefited from this ambition: quantitative methods had long been around, but the novelty was that in addition to taxonomic composition or reconstruction of animal size, the degrees of fragmentation and dispersal were recognized as characteristic of ancient cultural behavior. Proponents of New Archaeology applied concepts from a variety of fields such as middle-range theory, adopted from sociology by Lewis Roberts Binford. Middle-range theory proceeds from an empirical phenomenon toward general statements to be tested using data. Binford carried out ethnoarchaeological fieldwork among the Nunamiut and Navajo in North America, as well as in Australia, applying archaeological ideas and methodology to the analysis of contemporary animal bone refuse. By describing how modern people handle similar objects, he linked their use to archaeological interpretation (Binford 1981). In the case of direct ethnographic analogy, continuity in ancient practices can be documented. In the absence of cultural continuity, analogies remain indirect: in addition to morphological similarity between the archaeological and modern artifact, a reconstruction of technological/cultural contexts is necessary (Fig. 2).

Worked bones, traditionally treated as "real" artifacts, were studied by archaeologists from a purely stylistic point of view, rarely falling into the purview of zooarchaeologists. The 1957 book *Prehistoric Technology* by Sergei Aristarkhovich Semenov (1964) was translated into English and became very influential during this period. Zooarchaeologists became more directly involved with analyzing worked osseous materials in the late 1970s thanks to the application of new models, integrating archaeological, zoological, and technical information.

Opponents to the processual approach have emphasized that archaeological data are not reproducible and usually of too poor quality to meet the criteria set by the logical positivism of "hard" science. By the late 1980s, postprocessual archaeology, a variegated rebound effect to failed scientific methodology was largely united only in its rejection of such methods. This trend took a toll on the demand for zooarchaeology that had been so appreciated by the processualist school. Animal bone reports became mere appendices to archaeological analyses (with little effort to integrate their conclusions), or published as case

Zooarchaeology, Fig. 2 Late fifteenth-century Inka Period llama metapodium bone point from Paria, Oruro Province, Bolivia (left), and its modern counterpart (right) being used by a local villager. In the absence of direct cultural continuity, aside from morphological similarities, the raw material, use wear, and functional context need to be carefully considered

studies in specialist journals, separated from mainstream archaeological discourse. Rarely, zooarchaeological monographs were dedicated to the fauna of prominent archaeological sites, especially in the German language literature where the processualist/postprocessualist divide was far less dramatic.

Diversification Period (1980s–present)

A revival came through advances in both archaeology and natural sciences on the one hand and in the international spread of zooarchaeology on the other. Due to immense diversification, only brief summaries of this on-going phase can be outlined here.

Ground-breaking research in stable isotopes (carbon, nitrogen, strontium, oxygen, sulfur, etc.) may be considered a spin-off from radiocarbon dating (van der Merwe 1982). Carbon and nitrogen isotopes became instrumental in assessing the type and proportion of plant to animal products in human and animal diets, refining reconstructions based on the traditional, morphological identification of animal remains. Radiogenic isotopes of strontium built into the mineral phase of the skeleton (Price et al. 2002) are of help in mapping regions where drinking water was consumed at various periods through an individual's life. Long-distance movements before or after death can thus be detected.

Complementary to the osteological evidence of meat consumption is the analysis of food residue preserved on ceramic sherds developed by Evershed et al. (1997).

The advent of ancient DNA studies has exposed the key relationship between heredity and environment, often treated superficially in conventional zooarchaeology. Wilhelm Johannsen introduced the term phenotype in 1911 to distinguish between an organism's inherited genotype and the effect of environment on its manifestation. In the absence of genetic information, however, zooarchaeologists attributed skeletal variability either to "superior breeding skills" (e.g., in Roman provinces) or to "environmental strain." While all experts *knew* that size and shape were a composite of heredity and environment, the emphasis shifted with the archaeological narrative. Ancient DNA was first recovered from a nineteenth-century museum specimen of the *quagga*, a South African wild horse extinct in 1883 (Higuchi et al. 1984). While DNA fragments are not always well preserved and expensive to extract, recently the analysis of mineralized residual collagen in archaeological bone using soft-ionization mass spectrometry (ZooMS: Zooarchaeology by Mass Spectrometry) has offered an affordable alternative in molecular species identification (Collins et al. 2010).

In response to postprocessual criticism, traditional zooarchaeology also started addressing new, culturally informed questions. Previously neglected aspects of social identity, gender, and agency began to be studied. Focus from production shifted to the more tangible aspects of consumption (household archaeology and feasting). These approaches gave a special inspiration to studies of bone manufacturing. While in the 1980s bone tools and ornaments began to be integrated with ordinary animal remains within the framework of raw material studies, the focus did not extend much beyond technological reconstruction and function. Recent discussions, however, incorporate key theoretical issues, re-connecting the study of manufactured animal remains with archaeology.

Zooarchaeological Data and Interpretations

Traditionally, hand-collected bones of large mammals have been studied. However, dry or wet-sieving is needed for the recovery of small vertebrates (e.g., rodents, birds, fish) and for unbiased anatomical recovery even of larger species. Especially fine methods are required in the study of minute insect and endoparasite remains.

The use of reference collections is advisable during identification. However, comparative materials are not always at hand in the case of extremely variable taxa (e.g., song birds) or are unavailable on-site in countries where exporting archaeological finds is illegal. In such cases osteological atlases (e.g., Schmid 1972) have been indispensable. Recently a number of on-line resources, including 3D imaging, have significantly broadened the range of comparisons.

In addition to taxonomic information, the skeletal part, as well as the age and sex of the animal need to be recorded whenever possible. Fragmentation and human modifications such as cut marks, traces of burning, or evidence of manufacturing should also be documented. All available standard measurements must be taken on each bone. Finally, precise stratigraphic information is required as no bone can be considered a "find" without proper archaeological context.

Once a database of individual finds is compiled, analysis begins with cross-tabulating the numbers of identifiable specimens (NISP) by animal species and skeletal part. These counts are, however, invariably biased by preservation. When bone weights are recorded, a similar summary will reveal the degree of fragmentation. In order to offset fragmentation bias, the minimum numbers of individuals may be estimated.

MNI is based on the most commonly found skeletal element of each species at a site. Simply put, finding three left boar tusks among ten pig bones would mean that at least three individuals were slaughtered. The use of MNI values has been hotly contested for decades as the way various authors calculate them strongly differ. Problems of interpretation also arise as minimum numbers vary depending on the way stratigraphic units are grouped for the calculation (aggregation effects; Grayson 1984). Moreover, MNI estimates are often taken at face value as "herds," forgetting that the calculation shows theoretical minima and some deposits characterized by these usually meager numbers had spanned centuries (NB the method developed by White in 1953 was aimed at calculating the dietary contribution of animals). Various refinements and redefinitions of MNI in zooarchaeology have not yet been successful in properly addressing these key problems.

Since the nineteenth-century biometry has been an essential tool used in taxonomic investigations in zoology. The comprehensive bone measurement manual by Jan Ulrich Duerst (1926) was simplified for zooarchaeological use by Angela von den Driesch (1976). Distinctions between the domestic form and its wild ancestor as well as secondary sexual dimorphism are often studied using measurements. A similar protocol for fish bones was published by Morales and Rosenlund (1979). Recently the development of geometric morphometrics (GMM; Bookstein 1991), a multivariate method of analyzing shape, has become important. This method can be profitably used in combination with ancient DNA information in recognizing genotype, the inherited component behind the external appearance of bones (phenotype).

Age and sex are manifested in some bones such as horn cores, teeth (e.g., boar tusks) and cock spurs. Measurements can also be used in sexing animal remains. Age data are often scrutinized in the wider context of hunting strategies and exploitation for secondary products in domesticates. Secondary exploitation means the extended use of live animals for renewable resources such as milk, wool, labor, manure, companionship, and prestige. While meat can be acquired by hunting, secondary exploitation relies on animal keeping. Ground-breaking ethnographic observations by Sebastian Payne (1973) have been widely used in establishing demographic curves demonstrating longevity in herds, usually associated with secondary products such as wool. The effect of culling young animals is often interpreted as a sign of dairy exploitation, although this phenomenon may be far more complex.

In zooarchaeology, reconstructions of kill-off patterns and putative herd structures are implicitly based on precarious MNI estimations, however, often disregarding distinctions between sheep and goat and the sex of the animal that cannot be recognized on the morphology of juvenile bone. This scarcity of detail, exacerbated by problems of bone preservation, makes the application of Payne's inventive method laden with cumulative bias beyond the control of zooarchaeologists. Spurious interpretations regarding "herd management strategies" abound when in fact one is dealing with humble food refuse reflecting the dietary contribution of animals in a certain time and place, and only indirectly related to herding. However, current discussion concerning the critical re-evaluation of the method (Vigne & Helmer 2007; Brochier 2012) and its integration with independent evidence from, for example, milk residue and dietary isotope analyses have opened new perspectives.

Current Issues

Given its increasing diversity, zooarchaeology contributes to several strands of ground-breaking archaeological research. The following examples illustrate only some of the developments in zooarchaeology 170 years after the first archaeozoological treatise by Steenstrup.

Domestication

As detailed in numerous additional entries in this volume, problems of domestication have traditionally dominated debate as a technological development of utmost importance. The first ever international conference on archaeozoology was devoted to domestication research and the history of domestic animals (Matolcsi 1973). Questions concerning the places and times of first domestication remain to be resolved.

Just as large series of accelerator mass spectrometry (AMS) dating have become instrumental in fine-tuning conventional radiocarbon chronologies (frequently using animal remains), studies of ancient DNA, food residue, and dietary stable isotopes have revolutionized domestication research. Put in a proper chronological framework, genetic studies began to offer reliable data for mapping domestication trends for the first time (Harris 1996). By the beginning of the new millennium, complex ancestral lineages have been outlined for most domesticates (e.g., Larson et al. 2007; Pedrosa et al. 2007).

Evidence of Early Neolithic dairy exploitation of Bovids in Europe was found through residue analyses (e.g., Craig et al. 2005). Remains of mare's milk at the Chalcolithic site of Botai in Kazakhstan furnished long-awaited key evidence that the numerous horses killed at the settlement were already domesticated, as milking wild horses would have been unlikely (Outram et al. 2009).

Fauna history

Although prone to increasing "noise" created by past human activity, zooarchaeological finds can contribute to studying fauna history and zoogeography. For example, a trend of the northwest to southeast extinction of European lions may be traced across the Balkans between the Early Neolithic (ca. sixth millennium BC) and the Early Iron Age (ca. first millennium BC) in the Pontic region. Considering that all lion remains marked in Fig. 3

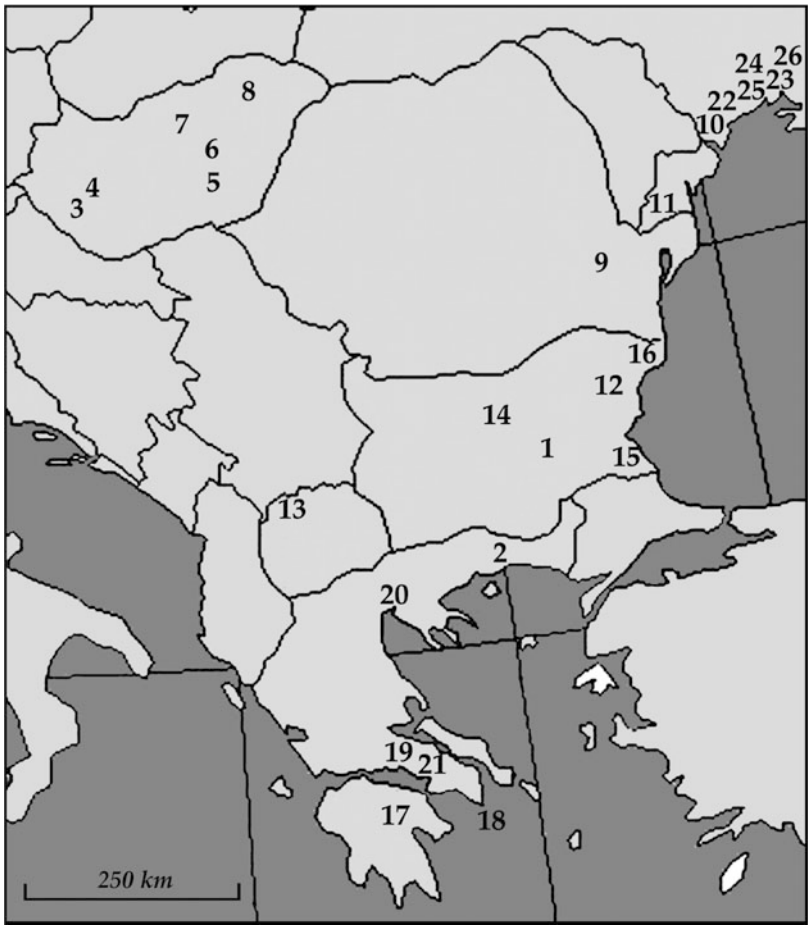

Zooarchaeology, Fig. 3 The extinction of European lions in the Balkans in estimated chronological order. Legend: 1 Karanovo II, Early Neolithic, Bulgaria; 2 Dikili Tash, Neolithic, Greece; 3 Zengővárkony, Late Neolithic, Hungary; 4 Tolna–Mözs, Copper Age/ Furchenstich culture, Hungary; 5 Hódmezővásárhely–Kopáncs-Olasz tanya I.; 6 Tiszaföldvár–Téglagyár, Copper Age, Hungary; 7 Gyöngyöshalász–Encspuszta, Copper Age, Hungary; 8 Tiszalúc–Sarkad, Copper Age, Hungary; 9 Hârșova, Late Copper Age/ Cernavoda level, Romania; 10 Mayaki, Copper Age, Ukraine; 11 Bolgrad, Copper Age, Ukraine; 12 Goljamo Delčevo, Copper Age, Bulgaria; 13 Slatino, Copper Age, Macedonia; 14 Devetashka Cave, Copper Age, Bulgaria; 15 Sozopol, Copper Age, Bulgaria; 16 Durankulak, Copper Age and Late Bronze Age, Bulgaria; 17 Tiryns, Late Bronze Age, Greece;18 Keos, Late Bronze Age, Greece; 19 Delphi, Late Bronze Age-Iron Age, Greece; 20 Kastanas, Late Bronze Age-Iron Age, Greece; 21 Kalapodi, Iron Age, Greece; 22 Tira, Early Iron Age, Ukraine; 23 Ol'biya, Early Iron Age, Ukraine; 24 Berezan, Early Iron Age, Ukraine; 25 Chernomorka I, Early Iron Age, Ukraine; 26 Chernovaty, Early Iron Age, Ukraine

were deposited by humans, the zoogeographical reliability of individual finds can be critically appraised on the basis of skeletal part distributions: teeth may have been widely circulated prestige goods/amulets, while bones of the feet could be left in high status imported lion skins. However, numbers of ordinary bones representing lion carcasses rather than these prestigious parts were also recovered to substantiate the main zoogeographical tendency outlined in Fig. 3. A concentration of Early Iron Age finds from the Western Pontic Coast may represent live imports to Hellenistic colonies from outside Europe, although this hypothesis (based on

subsequent Roman and Byzantine analogies) remains to be supported by DNA and/or strontium isotope analyses.

Events in fauna history are inseparable from environmental change. Bones of large game of diagnostic value, however, are found relatively rarely. Small organisms with faster reproduction rates have been particularly useful in reconstructing environmental history. Masses of marine fish remains from Danish coastal sites representing the warm Atlantic period (7th–4th millennium BC) could be profitably used to model future changes in combination with modern fisheries records (Enghoff et al. 2007). The authors conclude that major changes to fish stocks will be inevitable. Although economically important cod populations can potentially be maintained in waters near Denmark, the vulnerability to increasing water temperatures will increase fish mortalities.

Taphonomy

Taphonomy is the critical appraisal of postmortem processes that turn animal carcasses into "finds." This important concept adopted by zooarchaeologists by some 40 years ago had developed in paleontology (Efremov 1940). Until the 1960s, most archaeozoologists had typically explained assemblage variation by ancient human behavior, often disregarding effects of differential preservation and methods of recovery. From an archaeological point of view, predepositional (biostratinomic) modifications to animal remains are of special interest. In contrast to paleontology, ancient human activity had a key role to play in shaping zooarchaeological assemblages. Culturally characteristic ancient modes of butchering and cooking expose bones to further deterioration by natural agents in the deposit. Moreover, studies of animal pathology can be most reliably carried out on animals that were interred largely intact as unfit for human nutrition. Frequently buried alongside humans, horses and dogs may be viewed in a broader cultural context (e.g., in relation to the gender, age, and status of the deceased human) in addition to their anatomical integrity preserved under favorable taphonomic circumstances (Fig. 4).

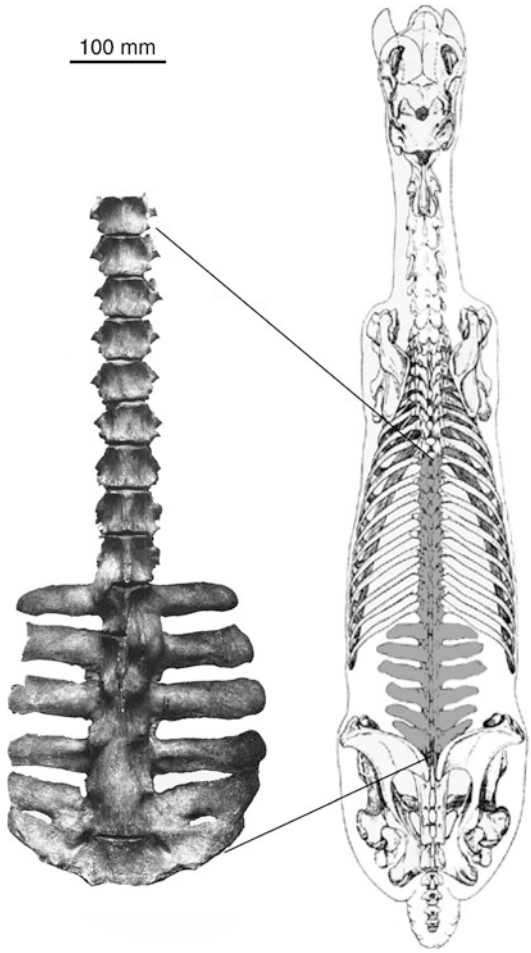

Zooarchaeology, Fig. 4 Fifteen pathologically fused thoracic and lumbar vertebrae from a ca. 14 years old stallion from the Late Avar Period (eighth–ninth century) cemetery of Tiszafüred–Majoros, Hungary. For years this animal must have been decapacitated and unfit for riding, but it had evidently been taken care of and was finally interred within a human cemetery

Complex Cultural Interpretations

It has been recognized that beyond food production, patterning in bone assemblages may be related to subtle aspects of animal use in social self-representation, exchange, and communal consumption (Marciniak 2005; Russell 2012). Taphonomically informed analyses of animal remains have gained new momentum within another trend of investigating the "biography" of artifacts in archaeology. High prestige items in particular, such as the canine teeth preserved in

the carefully sawn-off skull fragment of a medieval leopard found in Hungary (Fig. 5), embody inseparable overlaying aspects of zoological, taphonomic, technical, and culture historical information. Large predators especially can be exploited in a number of ways depending on their availability, perceived value, and symbolic meaning. Each of these forms is expressed in different degrees of skeletal representation ranging from complete through scattered to carefully selected, the latter cases usually standing for the complete beast symbolically. The biography of such objects parallels their taphonomic history, composed of decisions made from hunting through the degrees of carcass partitioning prior to selecting special parts depending on intended use. For high status items, careful, decorative manufacturing adds to the value of the objects. Finally, such artifacts may be deposited under special circumstances further improving their state of preservation and chances of recovery (Fig. 6). Prestige goods made from rare animals may end up in burials or in well-investigated high status proveniences.

Zooarchaeology, Fig. 5 Sawn-off muzzle region of a large leopard skull with upper canine teeth worked into a high status decorative item from the fourteenth century town of Segesd–Pékóföld, Hungary. The object may have belonged to an exotic leopard skin such as those once worn by members of the Teutonic order

International Perspectives

Even though archaeological cultures cross-cut national borders, their geographical and chronological extent is limited. Thanks to the universal use of animals and the fact that the animal skeleton is far more standardized than most archaeological objects, zooarchaeology is an

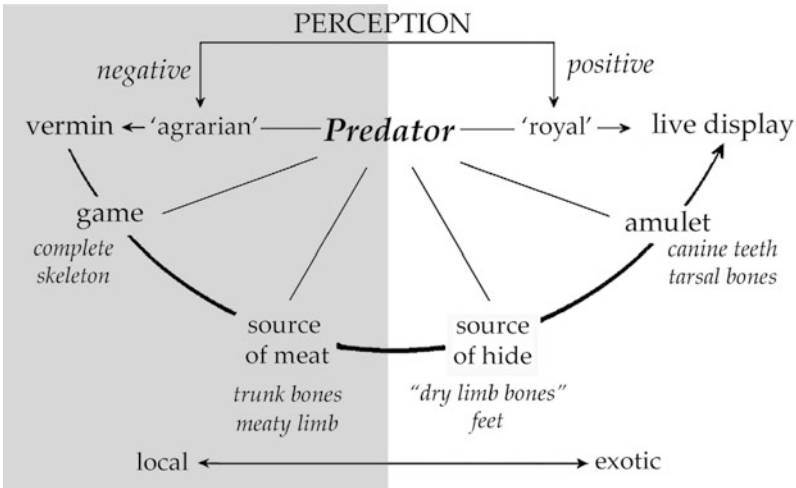

Zooarchaeology, Fig. 6 Taphonomic aspects determining the biography of large predator remains in archaeological contexts. Perceptions and values of animals vary depending on their availability and uses in various cultural settings as reflected in zooarchaeological finds

emphatically international discipline. Its principles and main methods are globally applicable with little or no variation between archaeological periods. The "integration period" in zooarchaeology not only meant increasing integration with archaeology and other disciplines, it also brought about the recognition that zooarchaeologists worldwide had shared academic interests. In 1971, the International Council for Archaeozoology (ICAZ) was created in order to foster communication between practitioners in this narrow field. Europe was politically divided at the time, but this important channel of communication between East and West functioned very well, also involving scholars from North America. By the twenty-first century ICAZ musters a global membership.

While developing countries served as areas to be explored by archaeological expeditions from the "Western World" for over a century, increasing numbers of local archaeozoologists began working in these areas on behalf of their own heritage management. Zooarchaeology has a long tradition in Russia and other republics of the former Soviet Union. The discipline is also important in China, but little has been known abroad about work in these countries, largely due the limited international dissemination of results rooted in linguistic isolation. From this point of view, Latin America has been in a more advantageous position as respectable research traditions in countries such as Argentina and Mexico have been more directly linked to both Europe and North America, providing channels of publicity beyond the region.

Future Directions

Since its rise in the mid-nineteenth century, zooarchaeology has reflected shifts in the broader ideological environment, largely mediated through developments in archaeology itself. The evolution of both political and scientific thought contributed to the diversification of this subject in its academic scope, geographical focus, and interdisciplinary integration. Traditional methods of identifying and inventorying animal remains from archaeological sites form a basic part of any respectable policy in heritage management. Additional locally available analytical methods and the redistribution of scientific capacity in leading research institutions through the international network of zooarchaeologists will determine the new directions and pace of development in our discipline. Targeted use of increasingly available chemical identification (such as ZooMS; Buckley et al. 2010), complementing traditional morphometric analysis, already began to have an impact on how zooarchaeology is done in the twenty-first century.

Cross-References

- ▶ Biometry in Zooarchaeology
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone Tools, Paleolithic
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Hunting and Hunting Landscapes
- ▶ Ichthyoarchaeology
- ▶ International Council for Archaeozoology (ICAZ)
- ▶ Isotopic Studies of Husbandry Practices
- ▶ North American Megafauna Extinction: Climate or Overhunting?
- ▶ Secondary Products and the "Secondary Products Revolution"
- ▶ Social Zooarchaeology
- ▶ Vertebrate Taphonomy in Archaeological Research
- ▶ Zooarchaeology by Mass Spectrometry (ZooMS)
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

References

Binford, L.R. 1981. *Bones. Ancient men and modern myths*. New York: Academic Press.

Bökönyi, S. 1984. *Animal husbandry and hunting in Tác - Gorsium. The vertebrate fauna of a Roman town in Pannonia*. Budapest: Akadémiai Kiadó.

Bookstein, F. 1991. *Morphometric tools for landmark data: Geometry and biology*. Cambridge: Cambridge University Press.

Braidwood, R.J. 1963. *Prehistoric man*. Chicago: University of Chicago Press.

Brochier, J.É. 2012. The use and abuse of culling profiles in recent zooarchaeological studies: Some methodological comments on "frequency correction" and its consequences. *Journal of Archaeological Science* 40/2: 1416–1420.

Brothwell, D., and E. Higgs, eds. 1969. *Science in archaeology*. New York: Thames and Hudson.

Buckley, M., S.W. Kansa, S. Howard, S. Campbell, J. Thomas-Oates, and M. Collins. 2010. Distinguishing between archaeological sheep and goat bones using a single collagen peptide. *Journal of Archaeological Science* 37: 13–20.

Collins, M., M. Buckley, H.H. Grundy, J. Thomas-Oates, J. Wilson, and N. van Doorn. 2010. ZooMS: The collagen barcode and fingerprints. *Spectroscopy Europe* 22: 2–2.

Craig, O.E., J. Chapman, C. Heron, L.H. Willis, L. Bartosiewicz, G. Taylor, A. Whittle, and M. Collins. 2005. Did the first farmers of central and eastern Europe produce dairy foods? *Antiquity* 79: 882–894.

Driesch, A. von den 1976. *Das Vermessen von Tierknochen aus vor- und frühgeschichtliche Siedlungen.* Institut für Paläoanatomie, Domestikationsforschung und Geschichte der Tiermedizin der Universität München. Dissertation.

Duerst, J.U. 1926. Vergleichende Untersuchungsmethoden am Skelett bei Säugern. In *Handbuch der biologischen Arbeitsmethoden 7/2*, ed. O. Abderhalden, 125–530. Bern–Wien–Berlin: Urban und Schwarzenberg.

Efremov, I.A. 1940. Taphonomy: New branch of paleontology. *Pan-American Geologist* 74: 81–93.

Enghoff, I.B., B.R. MacKenzie, and E.E. Nielsen. 2007. The Danish fish fauna during the warm Atlantic period (ca. 7,000-3,900 BC): Forerunner of future changes? *Fisheries Research* 87: 167–180.

Evershed, R.P., H.R. Mottram, S.N. Dudd, S. Charters, A.W. Stott, G.J. Lawrence, A.M. Gibson, A. Conner, P. Blinkhorn, and V. Reeves. 1997. New criteria for the identification of animal fats in archaeological pottery. *Naturwissenschaften* 84: 402–406.

Forchhammer, G., J.C.H.R. Steenstrup, and J. Worsaae. 1851–1856. *Undersøgelser i geologisk-antikvarisk retning*. København: Kongliga Hofbogtrykker Bianco Luno.

Grayson, D.K. 1984. *Quantitative Zooarchaeology*, Studies in archaeological science. New York: Academic Press.

Harris, D.R., ed. 1996. *The origins and spread of agriculture and pastoralism in Eurasia*. Washington DC: Smithsonian Institution Press.

Higuchi, R., B. Bowman, M. Freiberger, O.A. Ryder, and A.C. Wilson. 1984. DNA sequences from the quagga, an extinct member of the horse family. *Nature* 312: 282–284. https://doi.org/10.1038/312282a0.

Larson, G., U. Albarella, K. Dobney, P. Rowley-Conwy, J. Schibler, A. Tresset, J.-D. Vigne, C.J. Edwards, A. Schlumbaum, A. Dinu, A. Bălăşescu, G. Gaynor Dolman, A. Tagliacozzo, N. Manaseryan, P. Miracle, L. Van Wijngaarden-Bakker, M. Masseti, D.G. Bradley, and A. Cooper. 2007. Ancient DNA, pig domestication, and the spread of the Neolithic into Europe. *PNAS* 104 (/39): 15276–15281.

Marciniak, A. 2005. *Placing animals in the Neolithic. Social zooarchaeology of prehistoric farming communities*. London: University College of London Press.

Morales, A., and K. Rosenlund. 1979. *Fish bone measurements. An attempt to standardize the measuring of fish bones from archaeological sites*. Copenhagen: Steenstrupia.

Outram, A.K., N.A. Stear, R. Bendrey, S. Olsen, A. Kasparov, V. Zaibert, N. Thorpe, and R.P. Evershed. 2009. The earliest horse harnessing and milking. *Science* 323: 1332–1335.

Payne, S. 1973. Kill-off patterns in sheep and goats: The mandibles from Aşvan kale. *Anatolian Studies* 23: 281–303.

Pedrosa, S., M. Uzun, J.-J. Arranz, B. Gutiérrez-Gil, F. San Primitivo, and Y. Bayón. 2007. Evidence of three maternal lineages in near eastern sheep supporting multiple domestication events. *Proceedings of the Royal Society B* (2005) 272: 2211–2217. https://doi.org/10.1098/rspb.2005.3204.

Peters, J. 1997. *Der Hund in der Antike aus archäozoologischer Sicht. Anthropozoologica* 25–26: 511–523.

Price, T.D., J. Burton, and R.A. Bentley. 2002. The characterization of biologically available strontium isotope ratios for the study of prehistoric migration. *Archaeometry* 44: 117–135.

Robison, N.D. 1987. Zooarchaeology: Its history and development. In *The Zooarchaeology of eastern North America: History, method and theory, and bibliography*, Miscellaneous paper no. 12, ed. A.E. Bogan and N.D. Robison, 1–26. Knoxville (TN): Tennessee Anthropological Association.

Russell, N. 2012. *Social Zooarchaeology: Humans and animals in prehistory.* New York: Cambridge University Press.

Rütimeyer, L. 1861. *Die Fauna der Pfahlbauten der Schweiz. Untersuchungen über die Geschichte der wilden und der Haus-Säugetiere von Mittel-Europa.* Allgemeine schweizerische Gesellschaft für die gesammten Naturwissenschaften/Société Helvétique des Sciences Naturelles 19.

Schiffer, M.B. 1987. *Formation processes of the archaeological record*. Salt Lake City (UT): University of Utah Press.

Semenov, S.A. 1964. *Prehistoric technology: An experimental study of the oldest tools and artefacts from traces of manufacture and wear.* London: Cory, Adams & Mackay.

Schmid, E. 1972. *Atlas of animal bones/Knochenatlas*. Amsterdam/London/New York: Elsevier Publishing Co.

van der Merwe, N.J. 1982. Carbon isotopes, photosynthesis, and archaeology. *American Scientist* 70: 596–606.

Vigne, J.-D., and D. Helmer. 2007. Was milk a 'secondary product' in the old world neolithisation process? Its role

in the domestication of cattle, sheep and goats. *Anthropozoologica* 42: 9–40.
Virchow, R. C. 1872. Über moderne Pfahlanlagen und Küchenabfälle in Berlin. *Verhandlungen der Berliner Gesellschaft für Anthropologie, Ethnologie und Urgeschichte* October 1871–November 1872: 123–124.
White, T.E. 1953. A method of calculating the dietary percentage of various food animals used by aboriginal peoples. *American Antiquity* 18: 396–398.
Wyman, J. 1868. An account of some kjoekkenmoeddings, or shell-heaps, in Maine and Massachusetts. *American Naturalist* 1 (11): 561–584.

Further Readings

Bökönyi, S. 1974. *History of domestic mammals in Central and Eastern Europe*. Budapest: Akadémiai Kiadó.
Higgs, E.S., ed. 1972. *Papers in economic prehistory*. Cambridge: Cambridge University Press.
Matolcsi, J., ed. 1973. *Domestikationsforschung und Geschichte der Haustiere: Internationales Symposion in Budapest 1971*. Budapest: Akadémiai Kiadó.
Reitz, E.J., and E.S. Wing. 1999. *Zooarchaeology*, Cambridge manuals in archaeology. Cambridge: Cambridge University Press.
VanDerwarker, A.M., and T.M. Peres, eds. 2010. *Integrating Zooarchaeology and Paleoethnobotany. A consideration of issues, methods, and cases*. New York/Dordrecht/Heidelberg/London: Springer.

Zooarchaeology by Mass Spectrometry (ZooMS)

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Brief Definition of the Topic

Zooarchaeology by mass spectrometry (usually abbreviated as ZooMS) is a minimally destructive method to determine animal origin by peptide fingerprinting for (mineralized) collagenous materials.

Mass spectrometry (MS) of proteins has been made possible due to the introduction of "soft" ionization methods, most notably MALDI (matrix-assisted laser desorption/ionization) and ESI (electrospray ionization) MS. MALDI achieves ionization of peptides through proton transfer via a solid matrix, where electrospray ionization can be attained directly from the liquid phase. These ionization methods allow molecules to not be degenerated during measurement. Where "harder" ionization would break down a protein in random fragments that are difficult to predict, proteins are instead digested by enzymes into peptides. Restrictive enzymes cut at specific sites (lysine and arginine for trypsin, the most common enzyme used for this purpose), creating consistent and predictable fragments. The resulting peptides can therefore be compared to theoretical fragments based on in silico digestions of known protein sequences.

ZooMS uses MALDI ionization to investigate materials such as bone extracts as these are relatively simple aqueous solutions, containing almost exclusively collagen type I. Collagen type I, the main organic constituent of bone, teeth, antler, and skin (leather and parchment), has a helical structure and consists of three fibrils: two α1 chains and one α2. Some fish collagens also contain a subunit α3 in lieu of one α1 chain. Although collagen is highly conserved through closely related taxa, especially within COLI-α1, there are minor – though significant – changes in primary sequence between genera and in some cases species. The changes in primary sequence cause differences in mass, ultimately producing a fingerprint of masses that may be (partially) characteristic for the animal of origin. Therefore, identification is dependent on the extent of evolutionary divergence (typically to the level of genera). For example, using ZooMS, sheep and goat can be distinguished primarily through a single peptide showing a mass difference between the two species (Buckley et al. 2010). Fingerprints are matched to either theoretical data based on in silico digestions of sequences obtained through cDNA libraries or comparison to practical data obtained through ZooMS analysis of known standards. In-house collagen databases are currently expanded to animal species other than mammals, including fish (Richter et al. 2011) and birds. Alternatively, indexed peptides of thoroughly investigated taxa can be used to determine animal origin.

Current generations of (MALDI) spectrometers can measure peptides at levels of a

femtomole. Although this risks detecting contaminating substances (such as cellular keratins or autocleavage products of trypsin), the source material does not require amplification, and the extract is measured "as it is obtained." Common contaminants are well documented and do not necessarily interfere with a fingerprint obtained from collagen.

With this high sensitivity, a partial extraction in a mild buffer is often sufficient to obtain reliable and repeatable results, both for animal origin identification and thermal age estimations (see below), especially for samples that are well preserved and have been protected from water flux or modern material such as bone particles in meat and bone meal. In some situations, samples are decalcified prior to buffer extraction. This overall yields a higher concentration of collagen; however, it is permanently destructive to the sampled material. A buffer-only extraction will not significantly damage well-preserved mineralized artifacts.

Peptide fingerprinting (and by extension ZooMS) is a fast- and low-cost method: hundreds of samples can be processed in a day at a cost of <15! per sample.

Deamidation (the loss of an amino group, e.g., glutamine, is transformed to glutamic acid) is a very common nonenzymatic posttranslational modification in proteins and is commonly associated with ageing of tissues. This process continues postmortem and can therefore indicate the amount of damage proteinaceous substances have been exposed to. Without altering the method as described above, the amount of overall deamidation between several glutamine sites in bone collagen can be estimated (Wilson et al. 2012), and this has been shown to correlate well with thermal age but poorly with common diagenetic parameters. ZooMS can therefore not only yield animal origin but also give an indication of (thermal) damage without necessarily damaging the originating material. A definite link between ZooMS success and degree of deamidation and DNA amplification has not been clearly established. However, a buffer-only extraction does not prevent successful DNA extraction from the exact same samples.

ZooMS is applicable to any venture that involves minimal sampling of collagen-containing material. Applications of ZooMS include investigation of animal feeds or detecting counterfeit leathers. In an archaeological context, advantages of ZooMS range from investigating rare or precious artifacts, morphologically indistinct bones, or very small (<250 μm) fragments that are otherwise problematic to identify. The high-throughput setup of ZooMS allows for cost-effective screening of samples prior to more expensive or destructive analyses, including aDNA. Buffer-only extraction only leaches partial collagen and has been shown to be nondestructive even to microscopic features, such as toolmarks, and allow for repeat or follow-up analyses on the same material. The estimation of thermal age through glutamine deamidation may aid discrimination of bone samples from multilayered sites.

New applications and optimization of both method and database are continuously in development, making ZooMS, along with its currently established advantages, an important tool for zooarchaeologists to consider more routinely in the future.

Cross-References

- ▶ Archaeology: Definition
- ▶ Biomolecular Archaeology: Definition
- ▶ Bone: Chemical Analysis
- ▶ Dating Techniques in Archaeological Science
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Vertebrate Taphonomy in Archaeological Research
- ▶ Zooarchaeology

References

Buckley, M., S.W. Kansa, S. Howard, S. Campbell, J. Thomas-Oates, and M.J. Collins. 2010. Distinguishing between archaeological sheep and goat bones using a single collagen peptide. *Journal of Archaeological Science* 37: 13–20.

Richter, K.K., J. Wilson, A.K.G. Jones, M. Buckley, N.L. Van Doorn, and M.J. Collins. 2011. Fish 'n

chips: ZooMS peptide mass fingerprinting in a 96 well plate format to identify fish bone fragments. *Journal of Archaeological Science* 38: 1502–1510.

Wilson, J., N.L. Van Doorn, and M.J. Collins. 2012. Assessing the extent of bone degradation using glutamine deamidation in collagen. *Analytical Chemistry.* https://doi.org/10.1021/ac301333t.

Further Reading

Collins, M., M. Buckley, H.H. Grundy, J. Thomas-Oates, J. Wilson, and N. Van Doorn. 2010. ZooMS: The collagen barcode and fingerprints. *Spectroscopy Europe* 22: 6–10.

El-Aneed, A., A. Cohen, and J. Banoub. 2009. Mass spectrometry, review of the basics: Electrospray, MALDI, and commonly used mass analyzers. *Applied Spectroscopy Reviews* 44: 210–230.

Robinson, N.E., and A.B.. Robinson. 2004. *Molecular clocks: Deamidation of asparaginyl and glutaminyl residues in peptides and proteins*. Cave Junction: Althouse Press.

Zooarchaeology: Methods of Collecting Age and Sex Data

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Introduction and Definition

Zooarchaeology has taken great strides since the early 1900s when a zoologist or veterinarian might occasionally have been consulted to examine animal bones recovered from archaeological excavations, if the context in question was believed to be especially important. Faunal reports from that era were often simply lists of species present: specific elements may or may not have been listed, and the age and sex of individuals represented were certainly not included. Having consulted the zoologist at all was a big enough step in archaeological scientific inquiry at the time. Most excavations before 1960 did not even bother collecting animal remains, and it was not until the 1970s when the processualist movement took hold in archaeology that excavators began consistently to consider bones a valuable source of environmental and anthropological information. However, in order to obtain that information, more data was needed from the animal remains themselves.

Understanding past lifeways through faunal remains is contingent on the amount of information one can extract from those remains. Determining the age and/or sex of animals slaughtered for daily food requirements or ritual purposes can aid in the reconstruction of herding strategies or ceremonial procedures, respectively. For example, identifying a predominantly older female population among sheep remains can suggest a secondary product strategy. In this instance, ageing and sexing information from animal remains is crucial to the interpretation of culturally deposited bone.

The evolution of the study of animal bones was facilitated by adopting methodologies pioneered originally for the study of human bones. Thus, systematic studies of dental eruption and attrition, and epiphyseal fusion of postcranial bones using modern specimens enabled the definition of stages of growth and development which could then be applied to archaeological specimens. These techniques were proven to be effective for the study of archaeological human remains and were then applied to common domesticates. As more techniques developed in the study of humans, so too did the application of similar methods to animal bones. Metrical and morphological studies proliferated, especially for dental analyses. More recently, technological innovations in morphometric and microscopic analyses have been used to age and sex animal bones, as have genetic and histological methods. These techniques are outlined below in simple terms, from the most basic to the most advanced available today. This entry is not meant to present a summary of every study produced on ageing and sexing – such a feat would require a volume unto itself. Rather, it describes many of the more common methods available for distinguishing age and sex.

To date, there are three major volumes that compile methods for ageing and sexing of archaeological animal bones. These are Ruscillo

(2006a), Pike-Tay (2001), and Wilson et al. (1982). Countless articles in journals and edited volumes have also been written, each presenting its own unique application of known methods of ageing and/or sexing or presenting new methods for applicability to animal bones.

Key Issues and Current Debates

Ageing Methods

Cortical Bone Texture

Perhaps the most basic method of determining age is to inspect the texture of cortical bone. Fetal and juvenile specimens exhibit rough developing cortex which becomes smoother with age. This texture difference is due to extracellular modifications of collagen as well as other developmental processes involving the mineralization of bone. Histological studies show microscopic differences in the structure of juvenile and adult bone tissue, but more useful to the bone analyst are the visual and tactile differences of the bone cortex which will immediately distinguish younger from older individuals. Although not always useful for suggesting precise ages, this method can be used in a bone assemblage to establish the presence of juvenile and immature specimens. Figure 1 shows the cortical differences between juvenile, immature, and adult long bones.

The juvenile bone (Fig. 1a) has a rough cortex, similar in texture to fine sandpaper. The younger the juvenile individual is, the finer the granularity. Fetal bones are smaller and less developed and have a very fine granular texture. Fetal specimens are often difficult to distinguish from neonatal individuals and can be described as "perinatal" i.e., having died close to the date of birth, either before (prenatal) or after (postnatal).

The immature specimen (Fig. 1b) has residual rough cortex around the epiphyseal joint, especially towards the ends of the bone diaphysis (shaft). This roughness decreases with age as the cartilage between the epiphysis and diaphysis ossifies. By maturity (Fig. 1c), the cortex is smooth with well-defined muscle attachments.

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 1 Differences in cortical bone texture in (**a**) juvenile bone, (**b**) immature bone, and (**c**) adult bone. (Image by the author, with thanks to Lucretia Kelly for the specimens)

A good synopsis for identifying fetal bones in archaeological contexts is Prummel (1987). For a useful reference work on the ageing of fetal bones, see Habermehl (1975).

Epiphyseal Fusion

Analysis of epiphyseal fusion is the most common age determination technique used for postcranial bones. The fusion of bone epiphyses to the adjoining diaphysis occurs in regular stages during development and is fairly predictable with age, thus representing a good age indicator.

Silver's reference work *The Ageing of Domestic Animals* (1969) greatly aided faunal analysts when zooarchaeology was still in its infancy. Not only did Silver gather information from older veterinary and zoological studies on tooth eruption from nine major domesticates (horse, ass, cattle, sheep, goat, pig, dog, cat, and camel), but he also recorded the ages of epiphyseal fusion for almost all postcranial elements. Despite some problems, this work is still consulted for good estimates of age based on the state of epiphyseal fusion of specific bone ends and also for dental eruption timings (see below).

Many studies following Silver have attempted further to define ages from epiphyseal states while also considering influences such as castration, breeding, and environmental factors (e.g., see

Davis 2000 for the delayed epiphyseal fusion of bones due to castration in a population of Shetland sheep). Problems with this method arise when trying to determine ages over four years for ungulates and over a year for smaller mammals such as canids and felids. After the complete fusion of long bones, ageing individuals is impossible without incorporating some other method, such as dental attrition which continues throughout life.

Since the fusion states of individual specimens typically only provide age estimates of the form "younger than *x*" or "older than *y*," moving from this to an estimate of population structure or kill-off pattern is not straightforward. The usual approach is to combine elements into a number of groups, from the earliest-fusing to the latest-fusing (e.g., Zeder 2006), and to calculate the percent of specimens that are fused within each of these. One naturally expects to see a drop-off in "percentage fused" as one moves towards the later-fusing groups, but the rate and position of this drop-off can indicate kill-off structure (Fig. 2).

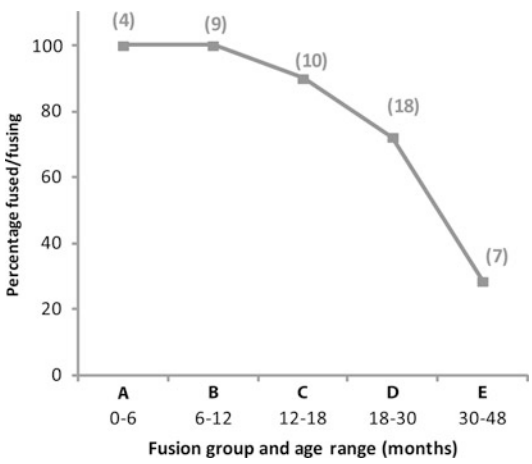

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 2 Epiphyseal fusion drop-off curve for sheep at Halaf period Fıstıklı Höyük, Turkey. Data points represent the percentage of specimens fused or fusing in each of five sequential fusion groups (as defined by Zeder 2006). Numbers in brackets are the sample sizes for each group. (Image from David Orton, used with permission)

Tooth Eruption

The most commonly used age determination methods involve some form of dental analysis, partly due to the high preservation rate of teeth and mandibles. As with humans, other mammals have fairly predictable ages of tooth eruption and development. Mandible and maxilla fragments with teeth still intact can thus often offer fairly accurate estimates of age-at-death, especially for complete mandibles or maxillae and for individuals under 48 months of age, the time when most medium-large mammals have completed eruption of all teeth.

If the permanent dentition is fully erupted, other methods of ageing teeth can be adopted, such as measurements of dental attrition or cementum annuli counts (see below). Studies such as Deniz and Payne (1982) on goats and Jones (2006) on sheep have developed methods of ageing which consider both eruption stages and tooth wear to produce a complete mortality profile of a population. Zeder (2006) considered both tooth eruption and wear along with long bone fusion to further refine age determination accuracy in caprids. Similar work has been performed with wild and domesticated pigs by Bull and Payne (1982).

Tooth Wear and Dental Attrition

Much work has been performed on recording the rate at which dentition wears for different species. Theoretically, dental attrition progresses at a predictable rate so that wear can be measured within an accuracy of months to determine the age at death of an individual. Factors which affect the rate at which attrition occurs include feed, captivity, and environmental conditions for grazing. Sex and side of dentition do not generally seem to significantly affect attrition.

Methods usually involve observing and recording the wear on the occlusal surfaces of a row of teeth. Diagrams using standardized coding, such as those shown in Fig. 3, can be drawn to show patterns by indicating the level of wear of the occlusal enamel, cementum, and dentine of a specimen (after Grant 1982; see also Payne 1973). Theoretically, individual permanent teeth can be aged in this

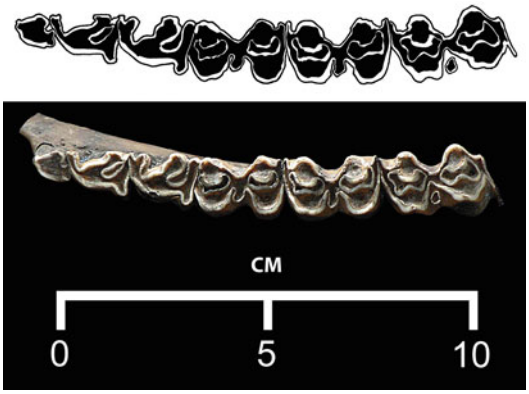

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 3 Dental attrition on a cattle mandible from Vindolanda (V07 69A 18174) with corresponding diagram of tooth wear patterns. (Images by Deb Bennett, used with permission of the Vindolanda Trust)

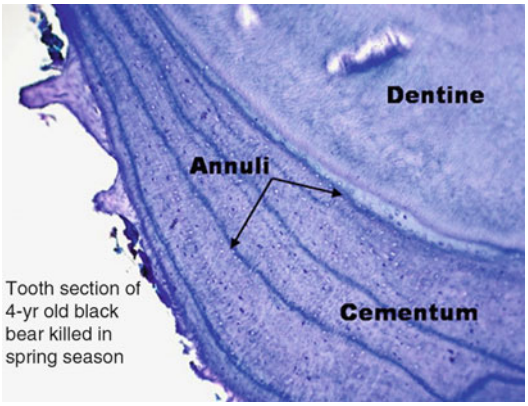

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 4 Cementum annuli as seen under a microscope with dye for contrast (Image copyright Gary Matson/Matson's Lab, used with permission)

manner if given a dataset from known age/wear individuals, but usually this method is performed on complete or partially complete mandibles.

Tooth Crown Heights

Examining tooth crown heights is another method for gauging attrition. Typically, the distance between the occlusal surface and the line separating the enamel of the crown from the dentine of the root is measured for each relevant tooth on the buccal side (outlined in Klein and Cruz-Uribe 1984: 46–47). These measurements can then be analyzed in various ways, including Klein's and Cruz-Uribe's own Quadratic Crown Height Method (QCHM) which predicts age based on eruption age, unworn height, and an estimate of the age at which the crown would be completely worn down. Alternatively, linear and quadratic regressions have been performed using measurements on specimens of known age. This technique has been applied to cervids, bovids, and equids.

Cementum Annuli Counts

Tooth cementum is laid down continuously, but seasonal differences in deposition rate result in growth banding analogous to tree rings. When a tooth is thin-sectioned and stained for greater visibility, the rings (annuli) can be counted under a microscope and used to estimate age. Figure 4 shows dark annuli that have been deposited in the winter months, while the larger lighter-stained cementum represents the growth period in the spring and summer. Most wild animals can be aged this way, especially those from northerly latitudes where seasonal temperatures are more distinct. Domesticated animals and species in less seasonal climates may exhibit less characteristic seasonal growth patterns in dental cementum because there are less distinct differential feeding and growth periods.

Not only can this method be used to age animals at death, but the season in which the animal died can also be postulated.

Sexing Methods

The number of diagnostic features in a skeleton that indicate the sex of an individual differs from species to species. The predominant difference between male and female individuals is size dimorphism; males tend to be larger than females. Some species like pigs and deer are highly dimorphic, while many smaller species, such as hare, are less so. Thus, osteometric data can be used to estimate sex ratios for many species if the sample size is large enough. More reliable for identifying males from females, however, is the recognition

of primary, secondary, and tertiary sexual characteristics. These are outlined below.

Primary Sexual Characteristics

Primary sexual characteristics are, of course, the reproductive organs. These features are useful for sexing individuals while they are alive, but after death reproductive organs generally do not survive in the archaeological record. The baculum or penis bone, however, can preserve in certain conditions. Carnivores such as procyonids, mustelids, canids, felids, ursids, and pinnipeds have bacula. Occasionally, some of these species may have a female equivalent bone in their clitoris, the *os clitoridis* or baubellum, but this element is often absent or cartilaginous and cannot be predictably found in female individuals archaeologically.

The presence of a baculum in an archaeological sample or in a burial of a complete skeleton signifies a male individual, but not finding a baculum does not necessarily mean that males are absent. Some bacula are small and fragile and do not preserve well. Alternately, finding a baculum does not mean that females do not exist in a sample. The presence of a baculum is most useful for sexing when excavating whole skeletons. Canids, in particular, are sexed in this manner because many cultures bury companion animals purposefully.

Secondary Sexual Characteristics

Secondary sexual characteristics include features that males possess which females do not. These commonly include horns, antlers, tusks, large canines, and spurs. The identification of sex based on these secondary features is not a relative value like ageing data. Instead, it is based on a present or absent classification as with bacula. For example, if large canines from a wild boar are present, the identification of the individual as male is certain. A secondary trait that is relative is body size; mature males are larger than females in most mammals. A comparison of size data within a faunal sample can often distinguish size dimorphism.

Headgear Horns and especially antlers are good indicators of male individuals. If a frontal bone is found with pedicles from antlers, identifying the individual as male is certain (with the exception of caribou/reindeer). Caution must be used when interpreting sex based on pieces of antler – finding antler is not always evidence that male deer was hunted. Male deer molt their antlers after the annual rut in the late autumn or early winter, and these may be collected by humans. Both sexes of caribou produce antlers. The males, like most cervids, will shed their antlers after the rut, while females will shed theirs during the winter months unless they are pregnant, in which case they will retain their antlers until the spring.

Horns differ from antlers in that the horncores actually form part of the cranium; they are made of bone and are not shed. Many species exhibit horns on male individuals only, but some bovids have produced breeds where both males and females have horns. Work on distinguishing between the sexes by identifying horncore morphology has been performed so that the horns themselves can be sex indicators (Armitage and Clutton-Brock 1976, although see Sykes and Symmons 2007). Studies have shown that castrating male individuals early in life will affect the development of the horn cores. Thus, horncore morphology may also be useful in identifying castrates in a bone sample (Fig. 5).

Canine Morphology Another potentially diagnostic difference between male and female animals

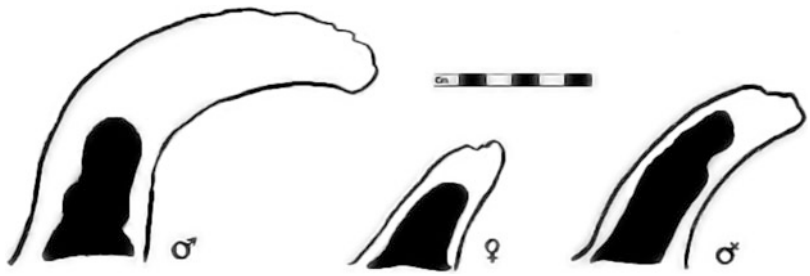

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 5 Horn-core differences in male, female, and wether sheep individuals as determined from radiographs. (After Clutton-Brock et al. 1990)

is canine size. This is true of many species, including suids, equids, moschids, hippopotamids, and elephantids, among others. With the exception of equids and moschids, male tusks grow perpetually throughout life; an old adult wild boar can have tusks of a considerable size. In equids and moschids, canine teeth are much more prominent in the male individuals. Only 25% of female horses produce canines, and these are usually small in size. For felids and canids, canines seem to be proportionate with size. Females, being diminutive in stature, will naturally have smaller canines. It is difficult, however, with domesticated dogs and cats to use canines as sex indicators because manipulated breeding has produced great size variety which plays a large role in determining the overall stature of male and female individuals and their sexually dimorphic characters.

Size Dimorphism or Trimorphism Size dimorphism is the most inclusive of all the sexually dimorphic differences in animals. Almost all mammals with the exception of the spotted hyena and the blue whale exhibit larger male stature and/or female gracility. This size dimorphism is measurable using standardized bone measurements, the collection and manipulation of which is known as biometry or more specifically *osteometrics*.

If the bone sample size is large enough, one can plot bone sizes (e.g., length versus width of any complete bone) to reveal size dimorphism in a population. Usually, there will be great overlap between the sexes, especially if there are wild and domestic populations or multiple domestic breeds present at the site but also because adult females and immature males are often similar in size. The challenge when interpreting osteometric data is that male animals are often culled from the population before maturity is reached, while females are often kept until they are too old to produce offspring or secondary products like milk. Males that are kept for meat, wool, or labor will often be castrated, further complicating the interpretation of the data. Castrated mature males are still larger than females, but their economic contribution to the herd has been altered: males can be used as studs or for sport (e.g., bullfighting), while castrates are kept either for meat (as in pigs and bovids), for wool (e.g., sheep), or for labor (as in cattle or equids). One cannot usually tell if the larger individuals in a site population are male or castrated individuals from size alone without also examining morphological differences using morphometrics, discussed below.

Bones that preserve well in the archaeological record and for which osteometrics have proven particularly useful for distinguishing between males/castrates and females include the metapodials, especially among bovids.

Birds Birds also exhibit secondary sexual characteristics in the form of spurs (males) and calcium deposits in the medullary cavity (females). Plumage is also a secondary trait, males often displaying more flamboyant colors and longer tail feathers, but these features rarely survive in the archaeological record.

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 6 Sexual dimorphic characters of *Gallus*, (**a**) medullary bone from a hen, and (**b**) a spur on a tarsometatarsus of a cock. (Image copyright Lena Strid, used with permission)

Medullary bone is deposited commonly in the leg bones of female birds (femur, tibiotarsus, and/or tarsometatarsus) during egg production. Figure 6a shows a layer of mineral deposits in a tarsometatarsus of a hen. The medullary bone acts as a repository for the storage of calcium required for eggshell development. The medullary cavity can have a significant amount of mineral deposition, or the mineral stores can be represented by a fine bony web within the cavity. The extent to which the medullary bone is laid down is dependent on the species of bird, its age, its egg productivity, the mineral content in its diet, and other environmental factors. In order to examine this trait, however, one would need either to break the bones open or to use radiographs (O'Connor and O'Connor 2005). Medullary bone can also be considered a tertiary sexual character, for it arises after the sexual maturity of the animal and not during puberty.

Male spurs are more obvious on the tarsometatarsus on most adult galliform birds (Fig. 6b). This family includes turkeys, chickens, quails, pheasants, and peacocks. These spurs are used in mate and territory competitions and are useful indicators of sex.

Tertiary Sexual Characteristics

Tertiary sexual characters differ from secondary traits in that they arise during maturity and not as a direct result of sex hormones during puberty. Tertiary traits develop as a result of sex-specific behaviors (i.e., pelvic changes due to pregnancy and birth) or in support of secondary traits (i.e., atlas changes due to muscle development for headgear support). These affected bones are found in different places in the body but mainly involve the neck, the pelvis, and the lower extremities.

Pelvic Morphology The easiest and most common method for identifying sex through skeletal morphology is by examining the shape of the pubis. For ruminants, if the pubis is oval or round in section, it is a male individual. If the pubis is thin and slightly twisted, it is female (Fig. 7). Caution should be taken when examining female pubes – a male castrated within the first few days of life will develop a thinner pubis as well; the pubis of the castrated individual will resemble that of a female who has not yet reproduced. The absence of androgens during the early development of males will default the female morphology.

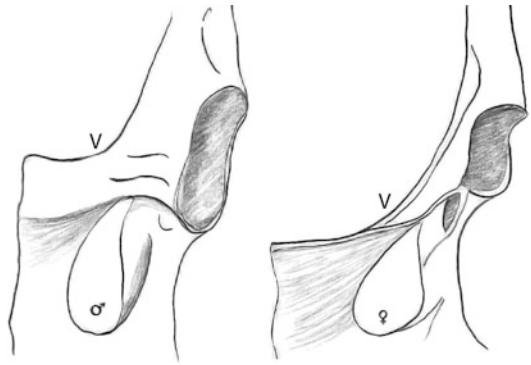

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 7 Bovid pubes of a male and female

The shape of the obturator foramen, the space between the acetabulum, ischium, and ilium, can also be diagnostic of sex for ruminants. The female foramen is symmetrical and when traced resembles the shape of an avocado pit. The male foramen when traced is less symmetrical, bulging on one side compared to the other (see images in Ruscillo 2003). The foramen of a castrated individual interestingly resembles that of a male, probably due to its equitable size. Therefore, if one finds a complete innominate of a ruminant that has the pubis resembling that of a female and an obturator foramen of a male, then the identification of a castrated individual is likely.

A method for distinguishing sex in suids specifically is by measuring the height of the medial border of the acetabulum. Males have a higher medial wall than females – the female pubis is thin and the medial wall by association is also gracile (Greenfield 2006).

Mean Shape Method *Morphometrics* is a branch of mathematics which examines the metrical and statistical properties of shapes and shape changes of objects. Using techniques such as elliptic Fourier analysis (EFA) or eigenshape analysis, for example, bone morphology can be compared between the sexes in quantifiable terms. These techniques are particularly useful for

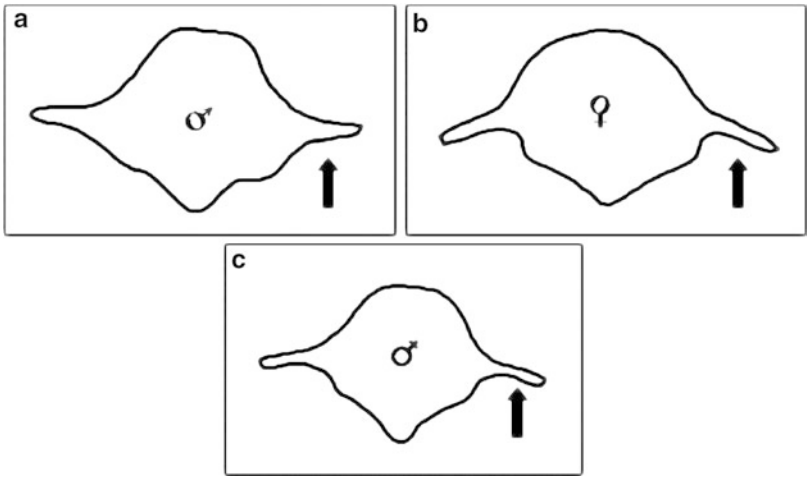

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 8 Mean shapes of sheep atlases for (**a**) male, (**b**) female, and (**c**) wether. (From Ruscillo 2003)

examining tertiary sexual characteristics which are not immediately visible to the eye.

Ruscillo (2003) explores tertiary sexual characteristics using what she has called the "Mean Shape Method." By digitally outlining profiles of selected bone elements using a statistically sound number of specimens of known sex, eigenshape analysis can produce an average shape for each element by sex. Profiles were obtained by the use of profile gauges. These mean shapes can then be compared to the shapes of the archaeological specimens to determine the sex of the individual. The method was fruitful for cervids and bovids and indicated several bones that were sexually dimorphic. The transverse processes of the atlas were significantly dimorphic for both families of animals. Figure 8 shows the mean shapes of sheep atlases produced after scanning over 30 individuals of each sex including males, females, and wethers (castrated males).

Male and female bovids and cervids showed significant differences between shapes of the glenoid process (the articular part of the scapula) and the astragalus. For sheep, the transverse processes of the atlas, the astragalus, and the obturator foramen each showed a third shape corresponding to wethers. In general, the mean wether bone shapes are characterized as having the morphology of females with the size of males. Presumably, similar shapes would be expected of castrated goats, cattle, and cervids.

Table Test Sexing canid remains can be difficult unless a whole skeleton is present with a baculum. Isolated bones of canids can be problematical to sex because millennia of breeding the species have produced highly variable sizes and even bone shapes. However, a complete mature canid humerus can help suggest the sex of the animal with 85% accuracy. The "Table Test" is described by Ruscillo (2006b) and is fairly simple. The complete humerus is placed on its anteroventral side on a level surface. If the humerus falls over to one side, then it is likely a male individual; if it rests stably on its anteroventral side, then it is more likely to be a female specimen, though several male humeri were stable as well in individuals which were lap animals and did not exercise "normal" male behaviors. These individuals may have been castrated as well. The morphological difference being measured by this simple test is the size of the deltoid tuberosity which is significantly more developed in most male individuals because of the more robust deltoid muscle.

Future Directions

Much work has been done in the past 60 years to identify useful methods of ageing and sexing animal bones in the field and in the laboratory. There is still much to do, however. With advancements in technology, future work in ageing and sexing will no doubt involve more microscopic, chemical, and molecular analytical methods, as these become more accessible and affordable.

Osteohistology

Osteohistology is defined as the study of the microscopic structure, chemical composition, and function of bone. The stage of structural development of bone can be observed and recorded by viewing cross sections of bone under the microscope. The patterns of lamellar bone, osteons, resorption lacunae, and Haversian canals correspond to different ages. There are six primary stages of long bone structure in cross section (shown in Dammers 2006: 23; Fig. 8). With a detailed study of the bone structure of each taxon, age profiles can be recorded and used to age archaeological specimens. Many of these studies have yet to be done for specific taxa, but an overview of how this method can be applied to different species is explained in Dammers (2006). The development stages and patterns of bone structure are also distinctive of sex. Future work in this area is likely to prove invaluable.

Imaging

Medical imaging and 3D modeling technologies may be used to refine morphometric analysis for distinguishing between the sexes. Magnetic resonance imaging (MRI) technologies have, as yet, seen limited use with archaeological animal bone. Although radiography is currently preferred for inquiries related to bone, the image produced by MRI is superior for reproducing any object accurately in three dimensions, recording morphological and even histological information. With further refinement, minute histological details of bone structure may be more readily identified and accurate ageing assessed from bone samples.

There are many programs which have enabled the 3D imaging of objects. These programs replicate the specimen under examination by plotting coordinates on three planes. By comparing the location of a specific point or group of points plotted on the surfaces of an object, the principle components of shape can be measured and contrasted. Eigenshape analysis has already been used in comparing the eigensurface on paleontological species (MacLeod and Krieger 2007). This kind of technology will be especially useful for comparing sexual dimorphic differences in any species.

DNA and Molecular Studies

Every year strides in genetic technology are made, and improvements in cost and reliability are starting to make molecular sexing a viable option in archaeology. Genetic studies based on polymerase chain reaction (PCR) are already being implemented in projects involving various aspects of the origins of domesticated species.

In a study by Telldahl et al. (2012), for example, sex classifications based on measurements of cattle metapodia are corroborated by molecular studies. A sample of archaeological individuals was sexed using both conventional morphometric criteria and genetic analysis, and the results compared to establish the accuracy of the former. No doubt as DNA analysis becomes more mainstream and affordable, sex determination from bone remains will become easier and more accurate.

The future of ageing and sexing methods in zooarchaeology will likely be imaging and biomolecule based. New techniques will give rise to more accurate and more frequent identifications of age and sex, permitting creation of mortality profiles for animal populations from communities in the past. This should in turn give rise to a clearer picture of economics, trade, ritual, and daily lifeways of ancient peoples.

Cross-References

- ▶ Biometry in Zooarchaeology
- ▶ Geometric Morphometrics and Environmental Archaeology
- ▶ Secondary Products and the "Secondary Products Revolution"
- ▶ Zooarchaeology

References

Armitage, P.L., and J. Clutton-Brock. 1976. A system for classification and description of the horn cores of cattle from archaeological sites. *Journal of Archaeological Science* 3 (4): 329–348.

Bull, G., and S. Payne. 1982. Tooth eruption and epiphyseal fusion in pigs and wild boar. In *Ageing and sexing animal bones from archaeological sites*, BAR British

series 109, ed. B. Wilson, C. Grigson, and S. Payne, 55–72. Oxford: Archaeopress.

Clutton-Brock, J., A. Valbonesi, D. Castillo-Fernandez, and E. Dahl. 1990. *The osteology of soay sheep*. London: British Museum (Natural History).

Dammers, K. 2006. Using osteohistology for ageing and sexing. In *Recent advances in ageing and sexing animal bones*, ed. D. Ruscillo, 9–39. Oxford: Oxbow Books.

Davis, S.J.M. 2000. The effect of castration and age on the development of the Shetland sheep skeleton and a metric comparison between bones of males, females and castrates. *Journal of Archaeological Science* 27 (5): 373–390.

Deniz, E., and S. Payne. 1982. Eruption and wear in the mandibular dentition as a guide to ageing Turkish Angora goats. In *Ageing and sexing animal bones from archaeological sites*, BAR British series 109, ed. B. Wilson, C. Grigson, and S. Payne, 155–206. Oxford: Archaeopress.

Grant, A. 1982. The use of tooth wear as a guide to the age of domestic ungulates. In *Ageing and sexing animal bones from archaeological sites*, BAR British series 109, ed. B. Wilson, C. Grigson, and S. Payne, 91–108. Oxford: Archaeopress.

Greenfield, H.J. 2006. Sexing fragmentary ungulate acetabulae. In *Recent advances in ageing and sexing animal bones*, ed. D. Ruscillo, 68–86. Oxford: Oxbow Books.

Habermehl, K.H. 1975. *Die Altersbestimmung bei Haus- und Labortieren*. Berlin/Hamburg: Verlag Paul Paray.

Jones, G.G. 2006. Tooth eruption and wear observed in live sheep from Butser Hill, the Cotswold Farm Park and five farms in the Pentland Hills, UK. In *Recent advances in ageing and sexing animal bones*, ed. D. Ruscillo, 155–178. Oxford: Oxbow Books.

Klein, R.G., and K. Cruz-Uribe. 1984. *The analysis of animal bones from archaeological sites*. Chicago: University of Chicago Press.

MacLeod, N., and J. Krieger. 2007. Eigensurface analysis: A new method of modeling and analyzing 3d morphological data. In *Computer-aided visualization in palaeontology*, ed. M. Sutton, 8–9. London: Department of Earth Science & Engineering, Imperial College.

O'Connor, T.P., and S. O'Connor. 2005. Digitising and image-processing radiographs to enhance interpretation in avian palaeopathology. In *Feathers, grit and symbolism. Birds and humans in the ancient Old and New Worlds*, ed. G. Grupe and J. Peters, 69–82. Rahden: Marie Leidorf.

Payne, S. 1973. Kill-off patterns in sheep and goats: The mandibles from Asvan Kale. *Anatolian Studies* 23: 281–303.

Pike-Tay, A. 2001. Innovations in assessing season of capture, age and sex of archaeofaunas. *Archaeozoologia* 11 (1.2).

Prummel, W. 1987. Atlas for identification of foetal skeletal elements of cattle, horse, sheep and pig, Part 1 *Archaeozoologia* 87(1.1): 23–30; Part 2 *Archaeozoologia* 87(1.2): 11–41.

Ruscillo, D. 2003. Alternative methods for identifying sex from archaeological animal bones. In *Zooarchaeology in Greece: Recent advances*, British School at Athens 9, ed. E. Kotjabopoulou, Y. Hamilakis, P. Halstead, C. Gamble, and P. Elefanti, 37–44. London: The British School at Athens.

Ruscillo, D., ed. 2006a. *Recent advances in ageing and sexing animal bones*. Oxford: Oxbow Books.

Ruscillo, D. 2006b. The table test: A simple technique for sexing canid humeri. In *Recent advances in ageing and sexing animal bones*, ed. D. Ruscillo, 62–67. Oxford: Oxbow Books.

Silver, I.A. 1969. The ageing of domestic animals. In *Science in archaeology*, ed. D.R. Brothwell and E.S. Higgs, 284–302. London: Thames.

Sykes, N., and R.H. Symmons. 2007. Sexing cattle horncores: Problems and progress. *International Journal of Osteoarchaeology* 17 (5): 514–523.

Telldahl, Y., E.M. Svensson, A. Götherström, and J. StorÅ. 2012. Osteometric and molecular sexing of cattle metapodia. *Journal of Archaeological Science* 39 (1): 121–127.

Wilson, B., C. Grigson, and S. Payne, eds. 1982. *Ageing and sexing animal bones from archaeological sites*, BAR British series 109. Oxford: Archaeopress.

Zeder, M.A. 2006. Reconciling rates of long bone fusion and tooth eruption and wear in sheep (Ovis) and goat (Capra). In *Recent advances in ageing and sexing animal bones*, ed. D. Ruscillo, 87–118. Oxford: Oxbow Books.

Further Reading

Crabtree, P.J. 1990. Zooarchaeology and complex societies: Some uses of faunal analysis for the study of trade, social status, and ethnicity. In *Archaeological method and theory*, ed. M.B. Schiffer, vol. 2, 155–205. Tucson: University of Arizona Press.

Ducos, P. 2001. Construction of age profiles in artiodactyls. In *Innovations in assessing season of capture, age and sex of archaeofaunas*, ed. A. Pike-Tay. Oxford: Oxbow Books.

Hillson, S. 2005. *Teeth*. 2nd ed. Cambridge: Cambridge University Press.

McGrory, S., E. Svensson, A. Götherström, J. Mulville, A.J. Powell, M.J. Collins, and T.P. O'Connor. 2012. A novel method for integrated age and sex determination from archaeological cattle mandibles. *Journal of Archaeological Science*. https://doi.org/10.1016/j.jas.2012.05.021.

O'Connor, T.P. 2006. Vertebrate demography by numbers: Age, sex, and zooarchaeological practice. In *Recent advances in ageing and sexing animal bones*, ed. D. Ruscillo, 1–8. Oxford: Oxbow Books.

Uerpmann, H.-P. 1973. Animal bone finds and economic archaeology: A critical study of 'osteo-archaeological' method. *World Archaeology* 4 (3): 307–322.

Zvelebil, Marek

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Basic Biographical Information

Marek Zvelebil (1952–2011) was born in Prague, capital of the then-communist country of Czechoslovakia. He relocated to the west in his teens with the rest of his family and studied at Sheffield and Cambridge. He spent 30 years as part of the faculty in Sheffield until his death in 2011.

Marek's interests were highly diverse. His mastery of eastern European languages enabled him to study shamanism among Siberian hunter-gatherers; he collaborated with his father, the eminent linguist Professor Kamil Zvelebil of Leiden University, in disputing the Early Neolithic origins of the Indo-European language group; he collaborated in fieldwork projects in Ireland and the Outer Hebrides; and after the fall of communism, he started to work in the Czech Republic. But Marek is mainly known for his work on the hunter-gatherers of the Baltic region and their part in the transition to agriculture. His Ph.D. was on this topic. His study visits to Finland were always via ferry and car – not by air – for fear that a flight approaching a fog-bound Helsinki

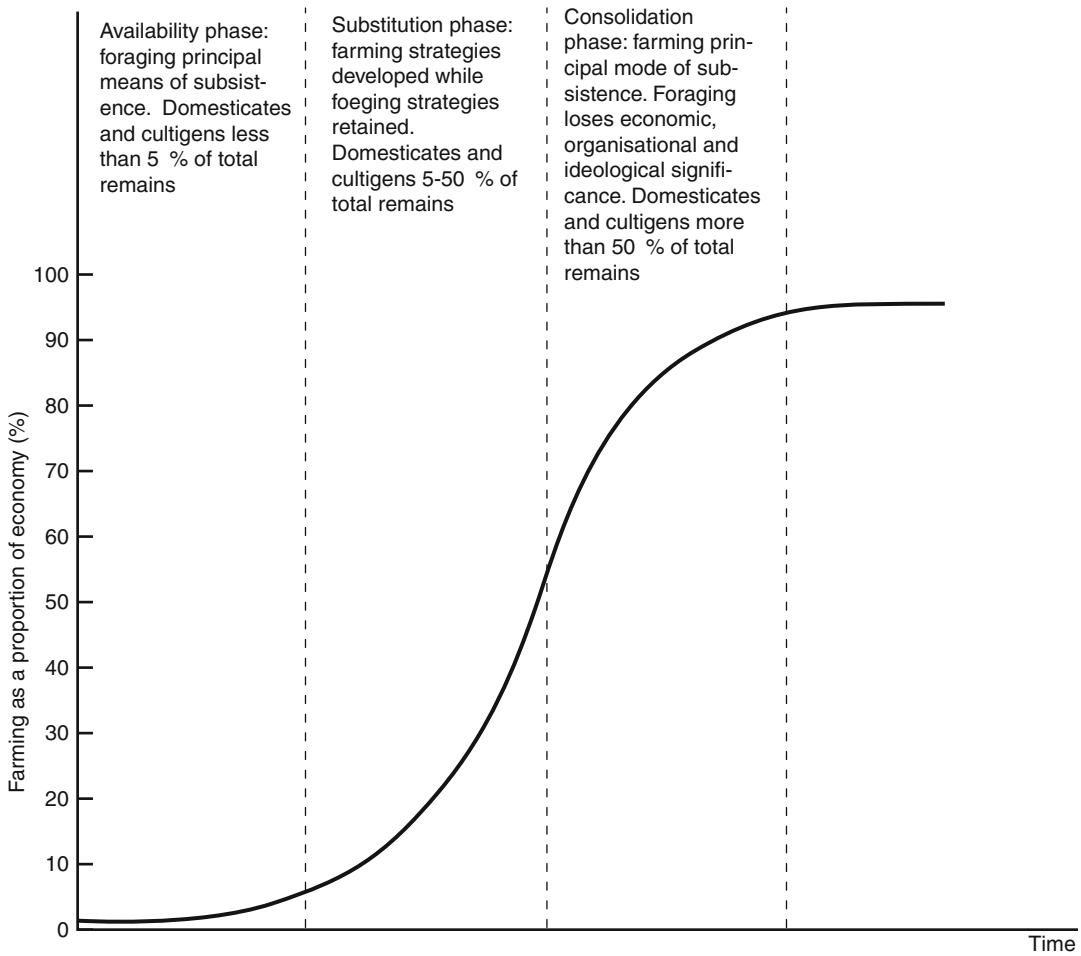

Zvelebil, Marek, Fig. 1 Chart showing the "availability model". (Reproduced from Zvelebil 1986, Fig. 3)

might be diverted to nearby Leningrad (now St. Petersburg), potentially resulting in his enforced return to Communist Czechoslovakia.

Major Accomplishments

Marek was part of the small group of scholars who argued that hunter-gatherer lives did not have to be "nasty, brutish, and short," and that in favorable areas like the Baltic coasts, hunter-gatherer populations might be as dense and society as hierarchical as those of early farmers. The "availability model" for the origins of agriculture in the Baltic made the hunter-gatherers active players in the transition to agriculture by defining three phases in the process (Zvelebil and Rowley-Conwy 1984):

- The availability phase: hunter-gatherers are aware of agriculture practiced by neighboring farmers but adopt little or none of it; agriculture produces <5% of food.
- The substitution phase: farming is being adopted and the two ways of life are in competition due to scheduling clashes between farming and foraging; agriculture produces 5–50% of food.
- The consolidation phase: farming matures and spreads into suboptimal parts of the region; agriculture provides >50% of food.

Marek further developed this model 2 years later, in a paper (Zvelebil 1986) from which Fig. 1 is taken. This model was in direct opposition to immigration or "wave of advance" models of the spread of agriculture into Europe, in which the hunter-gatherer population did not even feature. In immigration models, the first appearance of any domesticated species constituted the "Neolithic Revolution," but in the availability model,

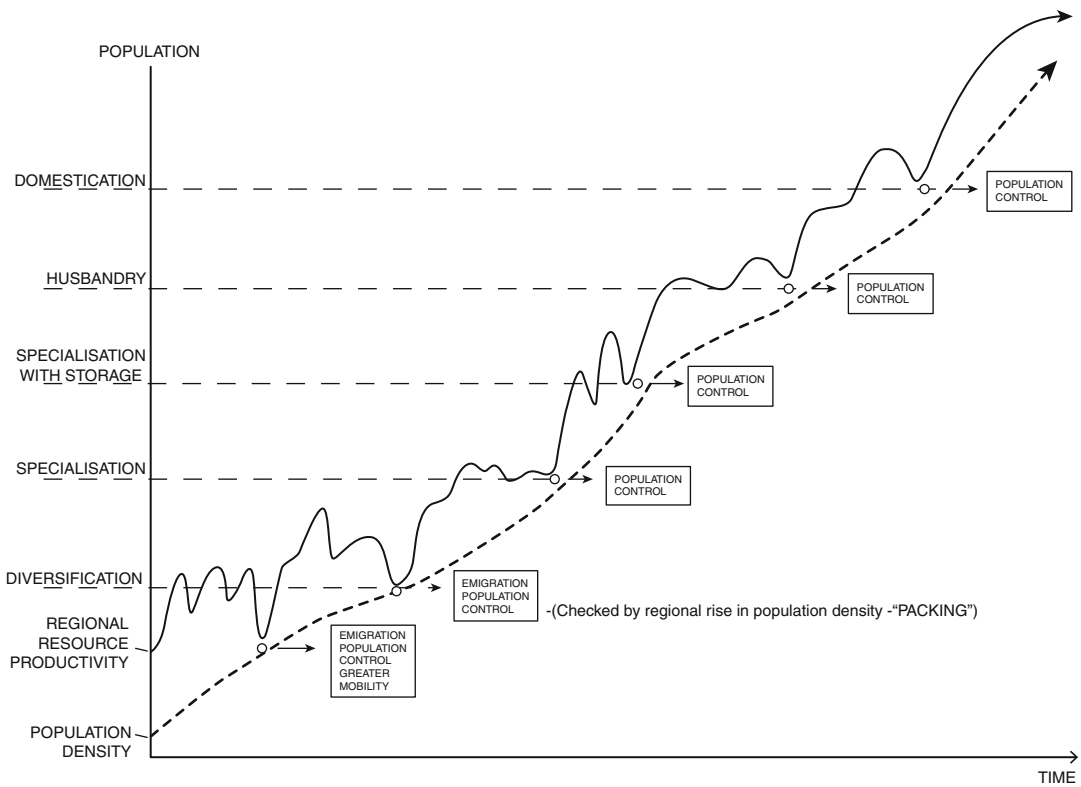

Zvelebil, Marek, Fig. 2 Chart of increasing hunter-gatherer population density and its economic outcomes. (Reproduced from Zvelebil 1995, Fig. 2)

revolutionary change occurred only towards the end of the substitution phase and the transition to the consolidation phase.

The existence of lengthy availability phases of a millennium or more in various parts of the Baltic, when the agricultural spread halted, suggested that dense local populations of hunter-gatherers saw no reason to adopt farming. These dense populations were based on their sophisticated use of abundant but highly seasonal resources, which allowed long-term demographic expansion and economic intensification. The way Marek viewed this is shown in Fig. 2 (from Zvelebil 1995): population density (the dotted line) increases inexorably; each time it impacts the regional resource productivity ceiling (the solid line), a new solution is found (the practices on the vertical axis), allowing population density to increase once more. His major reviews of the exploitation of native plant and animal species suggested a degree of local domestication by hunter-gatherers before the advent of Neolithic farming (Zvelebil 1994, 1995).

Marek focused attention on the zone where hunter-gatherers and farmers met. He stressed the importance of connections across the boundary: ceramics, stone axes, and perhaps some agricultural items were documented moving north from the farmers to the hunter-gatherers. Commodities moving south were less easily visible in the archaeological record but might have included forest products such as furs and honey, seal fat, and also amber from the Baltic (Zvelebil 1996, 2006). For a long period this interaction would have been stable and balanced, as shown in Fig. 3 (left). But the longer the frontier lasted, the more disruptive its effects would be on hunter-gatherer society. Prestige items imported from the farmers would lead to competition between hunter-gatherers, disrupting the social fabric. This would lead to the "commercialization" of some hunter-gatherer procurement activities, to obtain

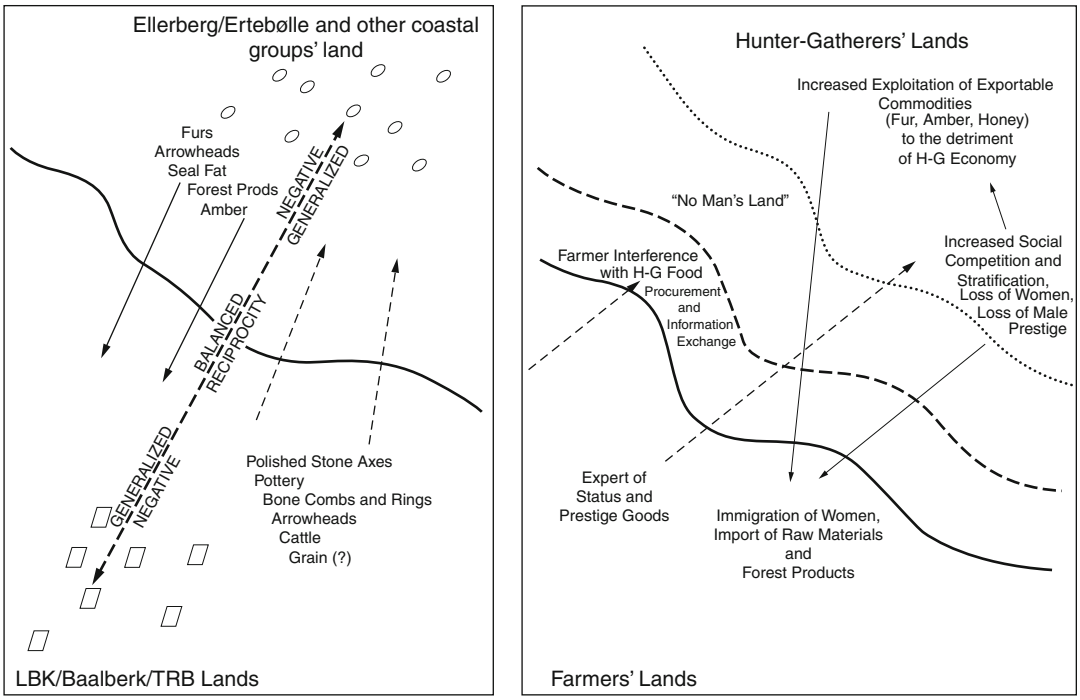

Zvelebil, Marek, Fig. 3 *Left*: model of balanced system of exchange between Ellerbek/Ertebølle hunter-gatherers and LBK/Baalberg/TRB farmers. (Reproduced from Zvelebil 1996, Fig. 18.5. Marek's spellings of place-names were sometimes idiosyncratic!). *Right*: model of a destabilized hunter-gatherer/farmer frontier zone. (Reproduced from Zvelebil 1996, Fig. 18.8)

exportable commodities for exchange with the farmers. Hypergyny – the outmarriage of hunter-gatherer women to farmers and the consequent lack of mates for some male hunter-gatherers – would further destabilize things. Both competition and hypergyny would cause disruption to the hunter-gatherer society and might lead to farmers encroaching upon hunter-gatherer lands, initially to obtain their own forest products but subsequently to settle areas suitable for agriculture (Fig. 3 right).

This is probably the most in-depth consideration of any hunter-gatherer/farmer interaction in Europe. Needless to say, modifications have been suggested to some aspects of the intensification/population growth model (e.g., Rowley-Conwy 2004), but Marek's treatment remains the core study for the Baltic area, standing as something of a model of its kind. It should not be assumed that the Baltic pattern will be replicated everywhere: one attempt to apply it to the Adriatic (Zvelebil and Lillie 2000) has drawn criticism because of the lack of forager-farmer continuity in the region (Biagi and Spataro 2002). But the availability model can be employed as a useful search tool in any area.

Cross-References

- ▶ Complex Hunter-Gatherers
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ European Mesolithic: Geography and Culture
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunting and Hunting Landscapes
- ▶ Pig: Domestication

References

Biagi, P., and M. Spataro. 2002. The Mesolithic/Neolithic transition in north eastern Italy and the Adriatic Basin. *Saguntum-Extra* 5: 167–178.

Rowley-Conwy, P. 2004. How the West was lost. A reconsideration of agricultural origins in Britain, Ireland and southern Scandinavia. *Current Anthropology* 45 (supplement): S83–S113.

Zvelebil, M. 1986. Mesolithic prelude and Neolithic revolution. In *Hunters in transition. Mesolithic societies of temperate Eurasia and their transition to farming*, ed. M. Zvelebil, 5–15. Cambridge: Cambridge University Press.

Zvelebil, M. 1994. Plant use in the Mesolithic and its role in the transition to farming. *Proceedings of the Prehistoric Society* 60: 35–74.

Zvelebil, M. 1995. Hunting, gathering, or husbandry? Management of food resources by the late Mesolithic communities of temperate Europe. *MASCA Research Papers in Science and Archaeology* 12 (Supplement): 79–104.

Zvelebil, M. 1996. The agricultural frontier and the transition to farming in the circum-Baltic region. In *The origins and spread of agriculture and pastoralism in Eurasia*, ed. D.R. Harris, 323–345. London: UCL Press.

Zvelebil, M. 2006. Mobility, contact, and exchange in the Baltic Sea basin, 6000–2000 BC. *Journal of Anthropological Archaeology* 25: 178–192.

Zvelebil, M., and M. Lillie. 2000. Transition to agriculture in eastern Europe. In *Europe's first farmers*, ed. T.-D. Price, 57–92. Cambridge: Cambridge University Press.

Zvelebil, M., and P. Rowley-Conwy. 1984. Transition to farming in northern Europe: A hunter-gatherer perspective. *Norwegian Archaeological Review* 17: 104–128.